

RF/MICROWAVE COMPONENTS & SUBSYSTEMS

PRODUCT CATALOG

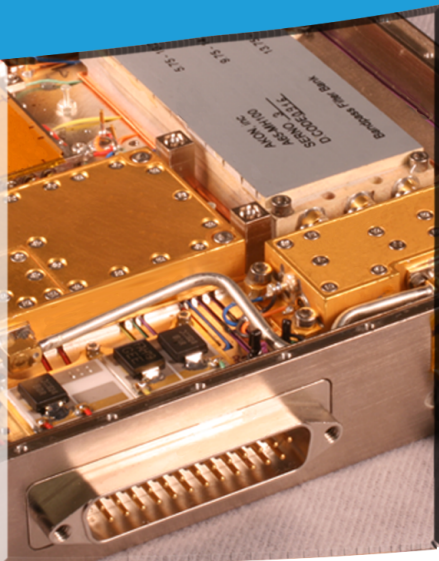


Table of Contents

General

Mission Statement	I
Our Team	I
Our Commitment	I
Facilities	II
Engineering	II
Manufacturing	III
Quality Assurance	IV
Environmental Stress Screening (ESS)	V
High Rel and Space Rel Screening Options	V
Major Programs Supplied by AKON	VI

Components

Power Dividers/Equalizers	1
Datasheet 115: Miniature Power Dividers & Power Combiners	2
Datasheet 116: Miniature Fixed Gain Equalizers (Negative Slope)	4
Datasheet 301: Wideband Equalizer 0.5 - 18.0 GHz	5
Digitally Controlled Phase Shifters	6
Datasheet 300: X-Band Phase Shifter 8.0 - 8.4 GHz	7
Digitally Controlled Attenuators	9
Datasheet 242A: Digitally Controlled Attenuator 1.0 - 18.0 GHz	10
Log Components	12
Datasheet 121C: Fast Rise & Fall Time SDLA 2.0 - 18.0 GHz; 60 dB	13
Datasheet 124A: Detector Log Video Amplifiers 46 dB Dynamic Range	15
Datasheet 136: High Speed SDLAs with Limited RF Output	17
Datasheet 161A: Log IF Amplifiers	20
Datasheet 165: Log IF Amplifiers with Limited RF Output	22
Datasheet 253: SDLVA 18 - 40 GHz	24
Datasheet 303: High Speed SDLAs	26
Datasheet 339: Broadband DLVA 1.4 - 21.5 GHz; 40 dB	28
Datasheet 340: Fast Rise & Fall Time ERDLVAs 0.5 - 18.0 GHz; 75 dB	30

Table of Contents Cont'd

Switches

Datasheet 252: RF Switch SP5T	34
Datasheet 258: RF Switch Assembly SP3T-SP2T	37
Datasheet 259: RF Switch SP2T (with silent arm)	40
Datasheet 337: RF Switch SP5T	43

Band Pass Filters

Datasheet 326: Combine Filters	47
--------------------------------------	----

Integrated Microwave Assemblies

Fast Stepping LO Assemblies 50

Datasheet 238: LO Assembly with BITE Source	52
Datasheet 275: LO Assembly	54
Datasheet 316: 9.5 - 18.5 GHz Fast Stepping LO/ High Speed Synthesizer	56

RF Sources 58

Datasheet 231: High Speed RF Source 6.0 - 18.0 GHz	59
--	----

Switch Matrices 61

Datasheet 236: Switching Matrix 6.0 - 18.0 GHz	62
Datasheet 237: Switching Matrix 2.0 - 18.0 GHz	65
Datasheet 318: 16 x 12 Switch Matrix 0.5 - 18 GHz	68

Filter Banks & Switch Filter Banks 71

Datasheet 151: Switch Filter Bank 6.0 - 18.0 GHz	72
Datasheet 317: 6.0 - 18.0 GHz Switch Filter Bank	74

Integrated Microwave Subsystems

Tuners 76

Datasheet 146: 0.4 - 18.0 GHz Pre-Channelized Single Conversion, IF B.W. 2.0 - 6.0 GHz Miniature Tuner	79
Datasheet 203: Microwave Assembly 1.0 - 18.0 GHz	82
Datasheet 239: Wideband Microwave Tuner 1 - 18.0 GHz	85
Datasheet 285: Tuner/ Downconverter 2.0 - 6.0 GHz to 1.0 - 2.0 GHz Baseband	88
Datasheet 302: Tuner/Downconverter 6.0 - 18.0 GHz to 2.0 - 6.0 GHz Baseband	90
Datasheet 320: Four Channel 0.5 - 18.0 GHz ESM System Converter	92
Datasheet 338: 0.8 - 20.0 GHz Pre-Channelized Dual Conversion Selectable IF Bandwidth Miniature Tuner	95

Table of Contents Cont'd

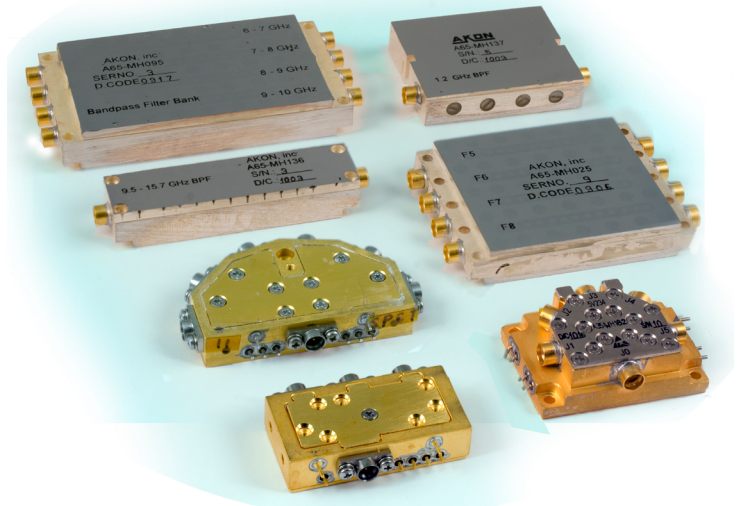
Receiver Subsystems	98
Datasheet 173: Phase Matched Receiver for Interferometer DF Systems 2.0 - 8.0 GHz and 8.0 - 18.0 GHz	99
Datasheet 174: Integrated ECM Receiver 6.0 - 18.0 GHz	101
Datasheet 310: 5-Channel Channelized Receiver Front-End 1.0 - 18.0 GHz	103
Datasheet 319: 0.5 - 40 GHz Front End Amplifier/ Front End Receiver	105
Digital Frequency Discriminators	108
Datasheet 251: Digital Frequency Discriminator 4.3 - 5.3 GHz	109
Datasheet 295: Digital Frequency Discriminator 239 - 386 MHz	111
Datasheet 297: Digital Frequency Discriminator 2.0 - 6.0 GHz	113
Datasheet 298: Digital Frequency Discriminator 6.0 - 18.0 GHz	116
Datasheet 314: Digital Frequency Discriminator 2.0 - 18.0 GHz	119
Matched EW/ECM Subsystems	121
Datasheet 308: Matched EW/ECM Subsystems 6 - 18 GHz	122
Datasheet 309: Matched EW/ECM Subsystems 2 - 18 GHz	128
Glossary of Terms	
Glossary of Terms - Logging Products	G-1
Glossary of Terms - Tuner, Converter, Receiver Products	G-8
Model Numbers	
Model Number Index	MI-1

Mission Statement

AKON's mission is to fulfill our customers' requirements for the highest quality RF/Microwave components and subsystems by focusing on all aspects of product performance, reliability, delivery and competitive price.

Our Team

AKON is composed of highly skilled individuals dedicated to working in unison to produce a "built-in quality" product and to provide the best customer service possible. Akon encourages creativity, growth, and improvement from every member of its team.



Our Commitment

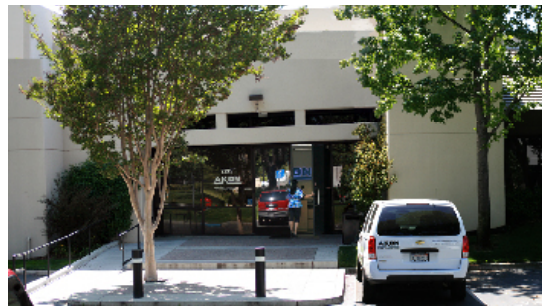
Excellence:	We are committed to providing the highest levels of customer service and satisfaction through continuous improvement of our facilities, personnel and products.
Integrity:	We are committed to the highest standards of ethics, integrity and professionalism.
Teamwork:	We value teamwork and effective communications by and between our company, our customers, our employees and our suppliers.
Responsibility:	We act responsibly toward our community and our environment.



Facilities

AKON, Inc. is located in San Jose, California, in the heart of Silicon Valley and less than ten minutes by car from San Jose International Airport (SJC). It is comprised of approximately 45,000 square feet of state-of-the-art manufacturing, engineering design, and general office space.

The manufacturing and testing area is designed and maintained to simulate an advanced development laboratory-type environment. It is an enclosed area that is environmentally controlled with respect to airborne particles, temperature, humidity, air flow patterns, air motion, and lighting. We have built an ESD-protected raised floor underneath and overhead an air-filtration system keeps air circulating to a better than Class 100,000 level. All employees must be properly gowned with protective hair and shoe coverings to prevent unnecessary contamination of the area.



Being a U.S. government cleared facility, AKON's facility as a whole is a tight security area with badge access only. Security cameras are placed throughout the building to protect us and our customers. All departments are themselves independent security areas - with card access given only to department employees.



Engineering

In its 28 years in business, AKON has built up a reputation of engineering design excellence that is evident in every unit that is shipped. For more than a quarter century, AKON's engineering team has focused solely on designing, developing, and maintaining the highest quality RF/microwave subsystems and components for the electronic warfare community. AKON designs and fabricates hardware for airborne, seaboard and space applications ranging from log components to major subsystems.

In support of its design activities, AKON has established separately managed in-house laboratories



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for the design and development of components such as, for example, miniature switches and filters. These laboratories design components specific to customer requirements and significantly reduce prototype development times by eliminating long lead-times associated with procurement from outside vendors and allows for real-time feedback on component performance and modifications, when necessary.



AKON engineers have the knowledge, tools and experience to design, manage and deliver even the most technically challenging projects. Their experience includes all aspects of the product design and development life cycle: research and development design and analysis, fabrication and manufacturing and maintenance and diagnostics.

Design analysis using computer-based simulation and modeling programs provide an assessment of each design's reliability, reproducibility, testability, and maintainability.

Simulation software reduces the time and costs required to perform circuit analyses while modeling allows identification and correction of design problems before the circuit is prototyped.

All engineering work is subject to AKON's 100% Quality Assurance Procedures and a dedicated document control department to ensure full project documentation with complete traceability available to the customer.

Manufacturing

AKON's considerable manufacturing capability is the result of combining state of the art facilities and equipment with multi-talented personnel at all levels with a procurement and manufacturing strategy that maximizes value to our customers.

All AKON units are assembled, tuned and tested by experienced and highly skilled individuals. Each employee plays an important role in the continuous improvement and quality enhancement of our products and our manufacturing lines are structured in a way that reduces set-up times and maximizes first-time quality.



Close relationships between all employees- from line-level personnel to management- is encouraged to facilitate communication and to guarantee real-time and unified action by the organization.

Our procurement strategy is similarly focused on maximizing value to our customers by bringing in-house the manufacture of key components- filters, switches, digitally controlled attenuators, amplifiers, etc. - which traditionally are procured from outside vendors. This minimizes the impacts caused by late supplier delivery, component quality issues and unexpectedly high material cost. For items we do procure, our close relationships with suppliers contribute to lower costs and higher quality as suppliers deliver parts as they are needed. Procured components are subjected to rigorous inspection and testing prior to sending to manufacturing floor.



Quality Assurance

AKON considers quality a major element of product and management performance. Its quality system conforms to MIL-I-45208. Requirements beyond this, including elements of MIL-STD-883 and MIL-I-38510, are common but are applied to specific customer contracts. Receiving Inspection of all incoming material conformance to the purchase order and Akon drawings and specifications is performed. In-process quality inspections are performed at

the completion of housing assembly, pre-tune, pre-cap, and final assembly and testing stages. To further ensure the best possible quality, in-process monitoring of the manufacturing process is conducted on an ongoing random basis.

Environmental Stress Screening (ESS)

AKON has a fully instrumented environmental testing laboratory. MIL-STD-167, MIL-STD-202, MIL-STD-750, MIL-STD-810, and MIL-STD-883 are the basis of most tests. Following is list of commonly performed testing at Akon.

Stabilization Bake	Microprocessor Controlled +125°C.
Thermal Shock	Air to Air. Microprocessor Controlled. Temperatures: -54°C or -65°C to +125°C (typ). Soak Times: 30-60 mins.
Mechanical Shock	Drop Machine: 50 G, 11 ms, 1/2 sine wave. 100 G, 6 ms, 1/2 sine wave. 1500 G, 1/2 ms, 1/2 sine wave. Shaker Shock
Vibration	Random, Sine, and combined Random/Sine. 2,200 force pounds.
Thermovac	Microprocessor controlled. Thermal platform temperature range:-54°C to +95°C.
Temperature-Humidity	Microprocessor controlled. Temperatures to +95°C. Relative humidity of 5% to 95%.
Temperature Cycling	Microprocessor controlled. DC power application at any point within the program. RF power application.
DC Burn-In	Microprocessor controlled. Temperatures to +95°C.
RF Burn-In	Microprocessor controlled. Temperatures to +95°C.
Leak Rate Testing	Hermetic Packages: Helium Fine Leak Rate Testing to 1 x 10 ⁻¹⁰ ATM cm ³ /s. Gross Leak Testing. Non-Hermetic Packages: Bubble Leak Testing.

High Rel and Space Rel Screening Options

AKON's design and construction techniques set the standard for rugged construction and long operating life. It has developed a high-reliability capability to serve its customers' growing needs for space qualified high reliability microwave products and the necessary controls and processes to supply this demanding customer segment have been put in place to insure the highest quality product. Many space level screening and qualification testing procedures can be performed in-house, along with the necessary documentation control, program management, and process tracking to keep any high reliability project on track. Data is kept on file for vibration, mechanical shock, temperature cycling, life tests and electrical tests over temperature. Additional test data is also available for package related tests such as water vapor content and hermeticity. Test methods used are from MIL-STD-883, MIL-STD-810, and MIL-STD-202.



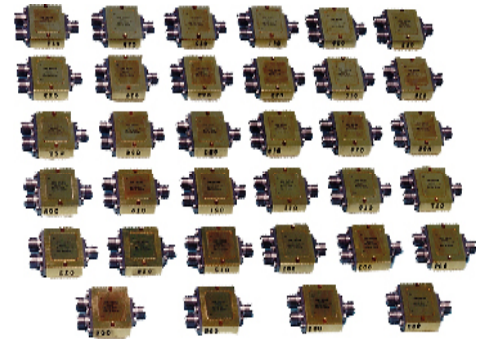
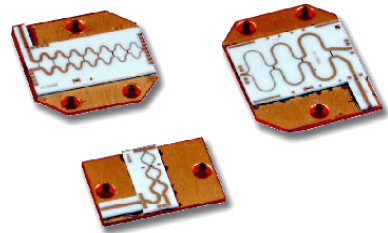
Major Programs Supplied by AKON

Alenia (Italy) - EFA
AEG -Germany FL-1800
Anaren - Canadian Fighter
CSIST - Shipboard Radar Update
Ford - Harm Seeker
India Govt. - Aircraft Radar
ITT - IDECM Advanced ECM
Japan - FSX, Several RWR Programs
JPL-MLS (complex Converter Assy.)
JPL-MIRO (complex IMA)
Litton - A12 Carrier Stealth Aircraft
Loral - ALQ-131
Loral - ALR-56C (F-15 Fighter)
Loral - ALR-56M (F-16 Fighter)
Marconi (UK) - Airborne Programs
Raytheon - ALQ-142
Raytheon - SLQ-32
Raytheon-ULQ-18
Sanders-USM-406C
Sanders-USM-464
USN PMR -Range Radar
BAE/MiKES - SPEWS II F-16 RWR
NRL- HGHS
Westinghouse - ASPJ Multi-Platform
U.S. Navy - SLQ-32
Raytheon/Envisioneering - SeaRAM Program

Akon Inc. has delivered in excess of 75,000 units for these programs.

Power Dividers/Equalizers

AKON offers miniature power dividers and gain (slope) equalizers covering the frequency range of 1.0 to 18.0 GHz. These units can be provided in connectorized or drop-in packages.



FEATURES:

- **COMPACT SIZE**
- **COAXIAL AND DROP-IN CONFIGURATIONS**
- **2.0 - 18.0 GHz FREQUENCY RANGE**
- **HERMETIC PACKAGE OPTIONS**
- **LOW INSERTION LOSS**
- **EXCELLENT PHASE AND AMPLITUDE TRACKING**
- **SIZE: 0.68" x 1.18" x 0.22"**



AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications.

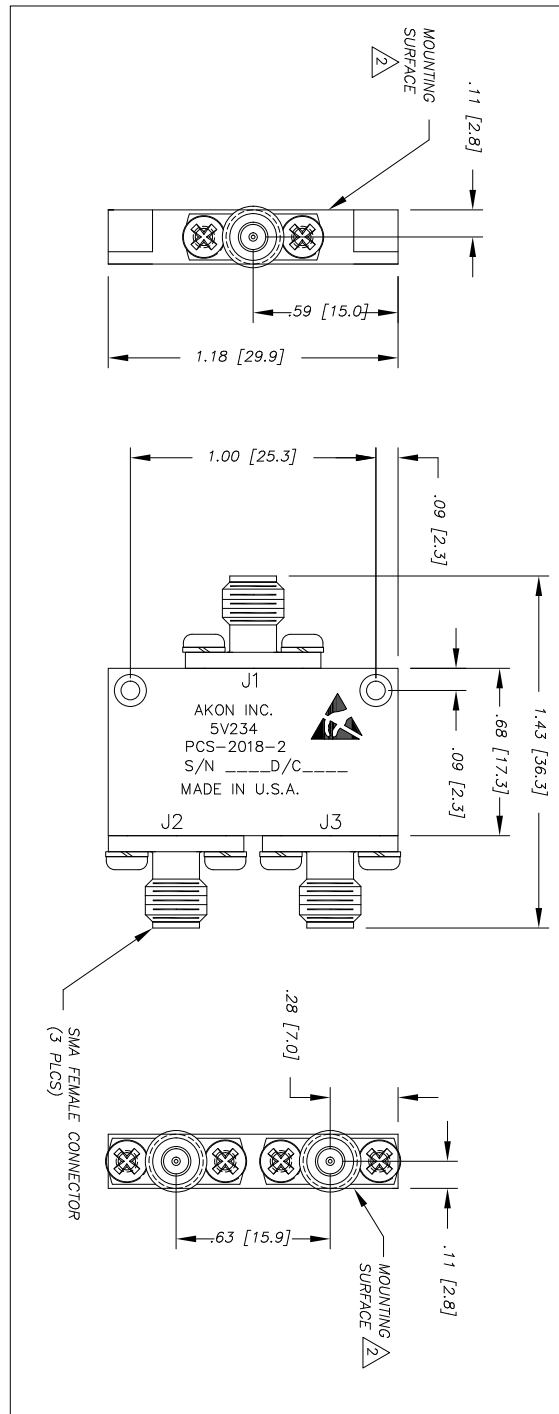
AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, phase shifters, miniature RF filters and switches, and microwave amplifiers covering the 0.5 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.

AKON's product line of power dividers and power combiners operate over the 0.5 - 18.0 GHz frequency band with inherent thin film reliability. Models are available with optimized performance over 2.0 - 6.0 GHz and 6.0 - 18.0 GHz bands in either coaxial or drop-in packages. Optional hermetic packaging is also available. SMA connectors are field replaceable and removable. Units exhibit excellent optional phase and amplitude tracking.

SPECIFICATIONS:

Model Number	PCS-2060	PCS-6018	PCS-2018
Frequency Range (GHz)	2.0 - 6.0	6.0 - 18.0	2.0 - 18.0
Insertion Loss (dB)	1.0	1.2	1.8
Frequency Flatness (dB)	+/- 0.30 (max)	+/- 0.50 (max)	+/- 1.00 (max)
Isolation (dB)	15 (min)	15 (min)	15 (min)
VSWR	1.8:1 (max)	1.8:1 (max)	2.0:1 (max)
Amplitude Balance (dB)	+/- 0.2 (nom)	+/- 0.3 (nom)	+/- 0.4 (nom)
Phase Balance (°)	+/- 4.0 (nom)	+/- 7.0 (nom)	+/- 10.0 (nom)

OUTLINE DRAWING:



FEATURES:

- **SMALL SIZE**
- **2.0 - 18.0 GHz FREQUENCY RANGE**
- **LOW VSWR AND LOSS**
- **THIN FILM RELIABILITY**
- **WIDE SELECTION OF ATTENUATION SLOPES**
- **SIZE: 1.095" x 0.67" x 0.22"**



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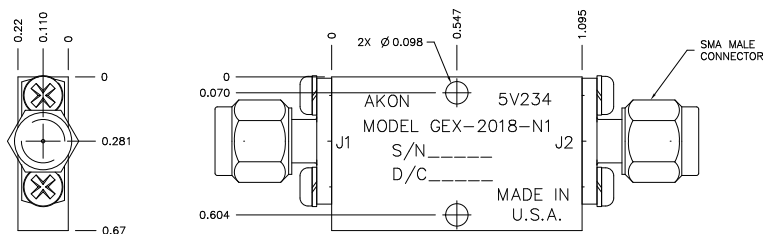
AKON's product line includes high reliability custom integrated microwave assemblies, DIFM receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 0.5 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the US Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.

AKON's miniature fixed slope gain equalizers cover the full 0.5 - 18.0 GHz frequency range with a wide variety of attenuation slopes. Units are of thin film construction and utilize proven passive and absorptive designs resulting in excellent reliability. Units are available in drop-in configurations. Coaxial models feature SMA field replaceable connectors which can be removed for stripline applications. Optional in-house screening to MIL-STD-883 is available at an additional cost.

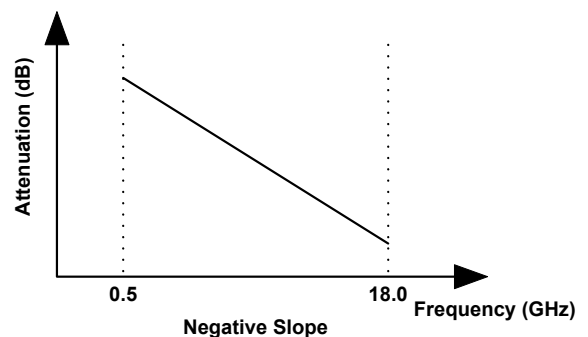
SPECIFICATIONS:

Model Number	GEX-2018-N1	GEX-2018-N2	GEX-2018-N3	GEX-2018-N4	GEX-2018-N5	GEX-2018-N6	GEX-2018-N7
Frequency Range (GHz)	2.0 - 18.0	2.0 - 18.0	2.0 - 18.0	2.0 - 18.0	2.0 - 18.0	2.0 - 18.0	2.0 - 18.0
Insertion Loss (dB)	7.0 @ 2.0 GHz 3.0 @ 18.0 GHz	6.5 @ 2.0 GHz 3.0 @ 18.0 GHz	6.0 @ 2.0 GHz 3.0 @ 18.0 GHz	5.5 @ 2.0 GHz 2.5 @ 18.0 GHz	5.0 @ 2.0 GHz 2.5 @ 18.0 GHz	4.5 @ 2.0 GHz 2.0 @ 18.0 GHz	12.0 @ 2.0 GHz 2.0 @ 18.0 GHz
Ripple (dB)	+/- 0.75 (max)	+/- 0.75 (max)	+/- 0.75 (max)	+/- 0.50 (max)	+/- 0.50 (max)	+/- 0.50 (max)	+/- 0.50 (max)
Slope (dB/GHz)	0.25 (nom)	0.22 (nom)	0.19 (nom)	0.19 (nom)	0.16 (nom)	0.16 (nom)	0.625 (nom)
VSWR	2.0:1	2.0:1	2.0:1	2.0:1	2.0:1	2.0:1	2.0:1

OUTLINE DRAWING:



PERFORMANCE CHARACTERISTICS:



FEATURES:

- 0.5 - 18.0 GHz FREQUENCY RANGE
- QUALIFIED TO MIL-STD-810F
- EXTENDED TEMPERATURE RANGE
- EXCELLENT GAIN FLATNESS
- LOW RIPPLE
- 2.0:1 VSWR
- SIZE: 1.09" x 0.67" x 0.22"



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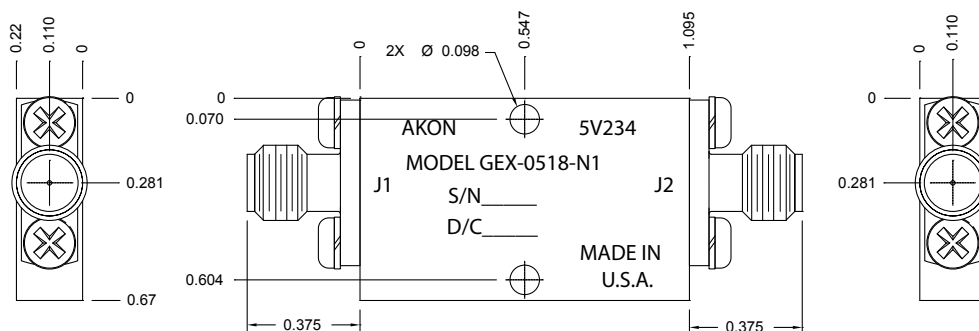
AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, phase shifters, miniature RF filters and switches, and microwave amplifiers covering the 0.5 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.

AKON's wideband equalizers are of thin film construction and utilize proven passive and absorptive designs resulting in excellent reliability. Units are available in drop-in configurations. Coaxial models feature SMA field replaceable connectors which can be removed for stripline applications. Optional in-house screening to MIL-STD-883 is available.

SPECIFICATIONS:

Model Number	GEX-0518-N1
Frequency Range (GHz)	0.5 - 18.0
Insertion loss (dB)	13.0 @ 0.5 GHz (max) 2.0 @ 18 GHz (max)
Ripple (dB)	+/- 0.5 (max)
VSWR	2.0:1 (max)
Slope (dB/GHz)	0.625 (nom)
Temperature Range (°C)	-40 to +71

OUTLINE DRAWING:



Digitally Controlled Phase Shifters

AKON offers a line of digitally controlled RF phase shifters that operate over the band of 2.0 to 18.0 GHz, providing up to 360° of phase shift relative to insertion phase. Phase adjustment resolution can be as high as 6 bits. Phase shift speeds are on the order of 500 nS. Possible applications include phased arrays, solid-state frequency serrodyning, phase and vector modulators and amplifier feedback linearizers.



FEATURES:

- 8.0 - 8.4 GHz FREQUENCY RANGE
- HIGH RELIABILITY
- 20 dB POWER GAIN
- EXCELLENT GAIN FLATNESS
- LOW INSERTION LOSS
- 4 DEGREES PHASE ACCURACY
- SIZE: 3.0" x 2.5" x 0.79"



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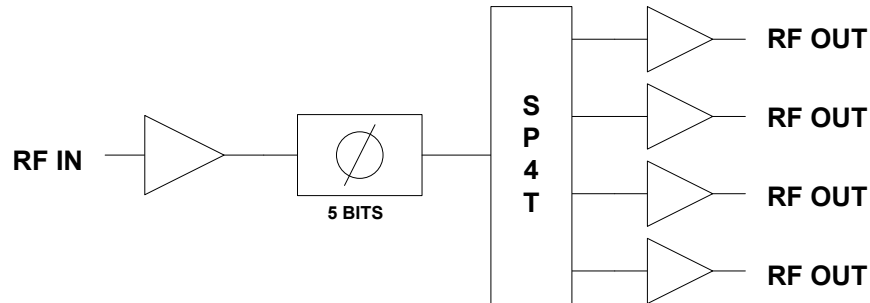
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AKON's X-Band Band Phase Shifter, Model Number A50-8X003 can be offered as a total hermetic unit. The design approach used in this unit is field proven and uses a series of amplifiers, a 5 bit phase shifter, a four throw switch (SP4T) and four medium power amplifiers.

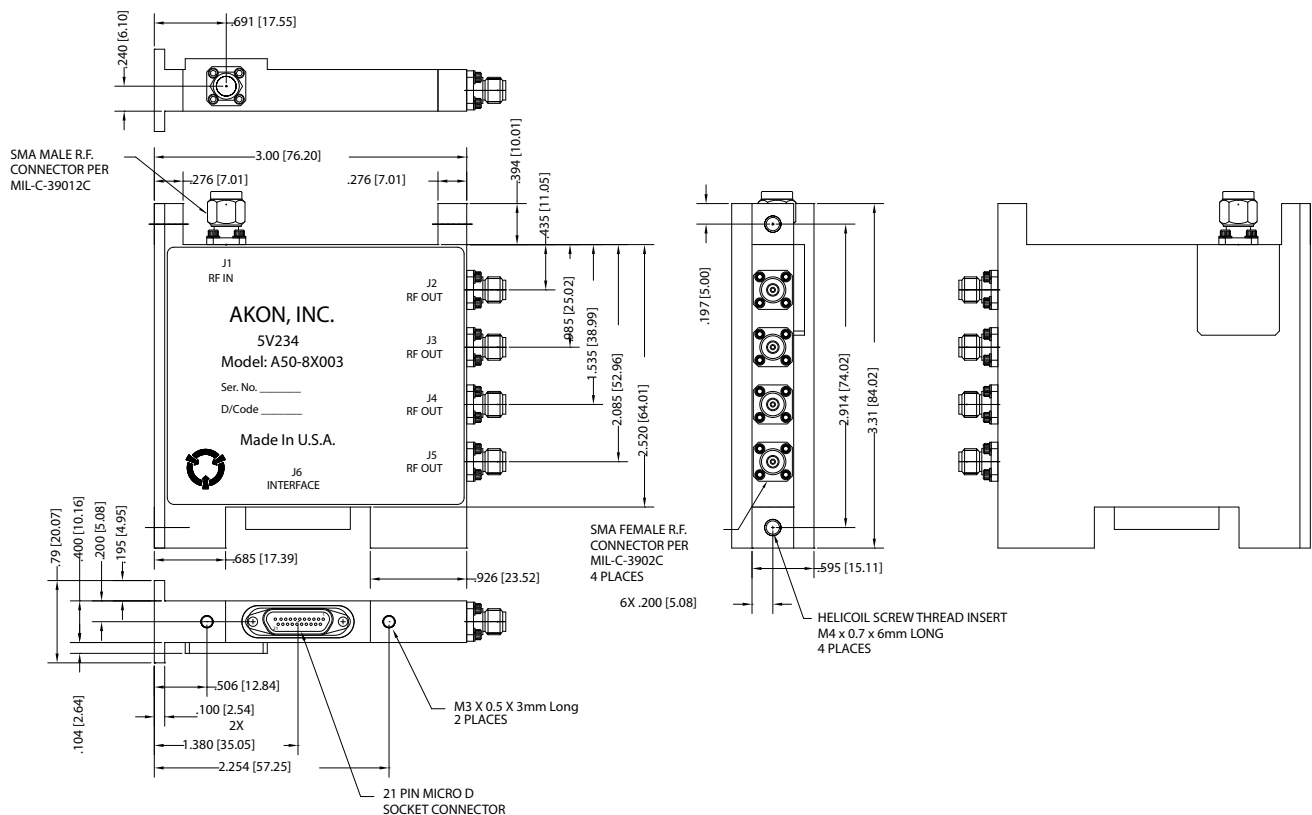
SPECIFICATIONS:

Model Number	A50-8X003
Frequency Range (GHz)	8.0 - 8.4
Output Power (dBm)	+20 @ 1 dB compression for all conditions
Power Gain (dB)	20 (typical)
Gain Flatness (dB)	+/- 0.5
Gain Variation (dB)	+/- 0.5 (max)(over frequency/operating temp)
IM product level (dB)	20 down (min) (@ 1 dB compression)
VSWR	1.5:1 (typical)
Phase Shift Range (°)	360
Phase Shift Control (bits)	5
Phase Linearity	Linear over 8.0 to 8.4 GHz
Phase Accuracy (° RMS)	4
Harmonics(dBc)	-20 (typical)
Spurious (dBc)	-50
Power Supply (VDC)	+6.5 @ 660 mA -6.5 @ 75 mA
Package	Hermetic
Temperature Range (°C)	-15 to +60
Size (Inches)	3.0" x 2.5" x 0.79"

BLOCK DIAGRAM:



OUTLINE DRAWING:



Digitally Controlled Attenuators

AKON offers a line of digitally controlled RF attenuators that operate over the range of 1.0 to 20.0 GHz and can provide attenuation up to 60 dB. Attenuation is flat over the entire band with no suck-outs and remains relatively flat regardless of attenuation setting. Control is single-ended TTL with up to 8 bits of resolution. Response time is typically under 100 nS.



FEATURES:

- 0.5 - 18.0 GHz FREQUENCY RANGE
- TTL COMPATIBLE LOGIC
- HIGH SPEED SWITCHING
- LOW DC POWER CONSUMPTION
- STABLE ATTENUATION
- HIGH RF POWER HANDLING
- SIZE: 2.0" x 2.0" x 0.45"



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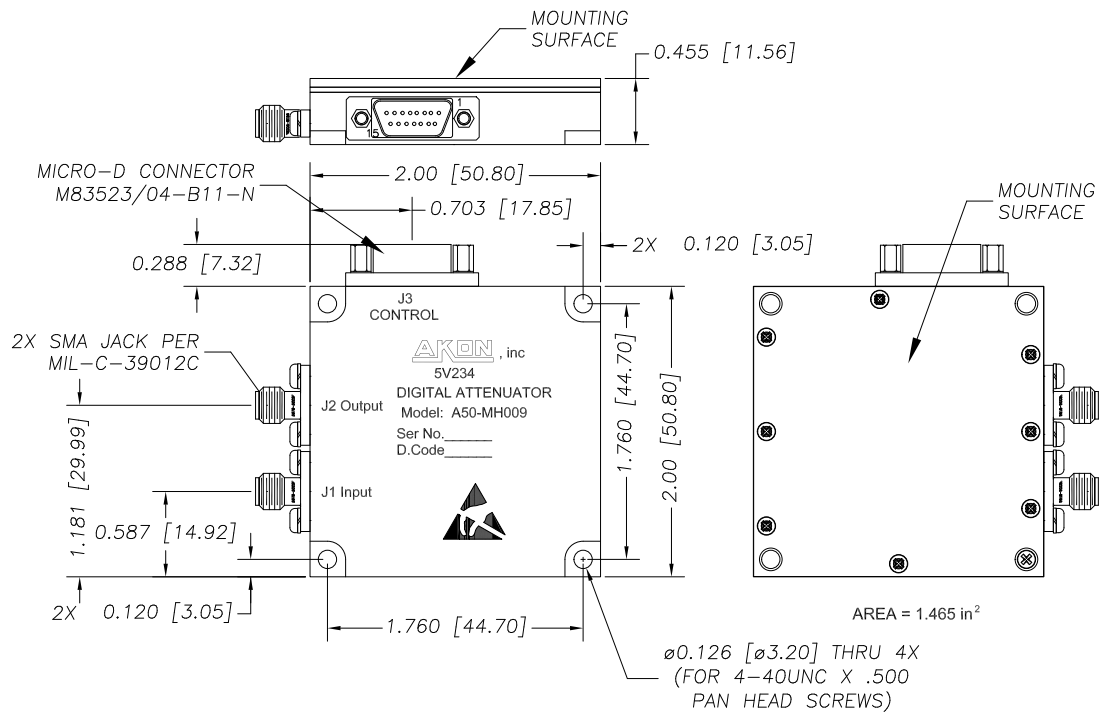
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Model No. A50-MH009 is a high performance 8-bit digitally controlled attenuator with extremely flat frequency response.

SPECIFICATIONS:

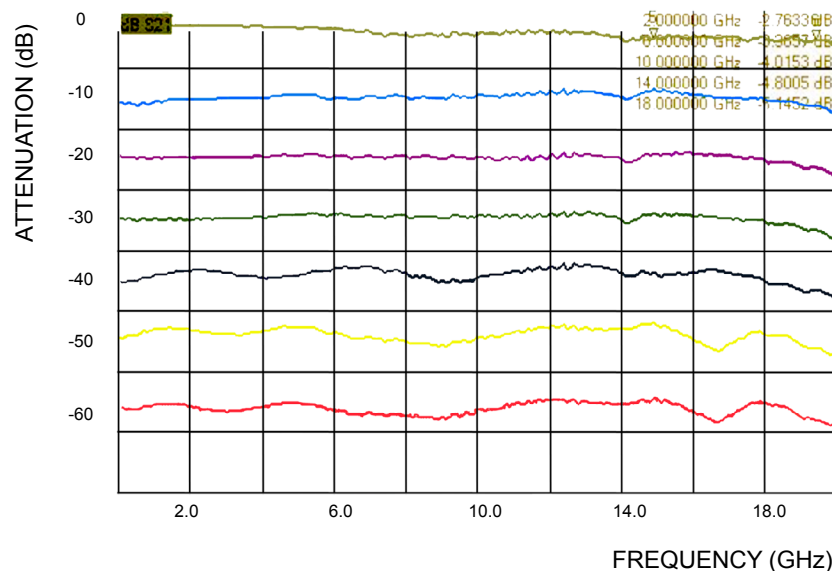
Model Number	A50-MH009
Frequency Range (GHz)	0.5 - 18.0
Attenuation Range (dB)	64
Attenuation Step Size (dB)	0.25
Digital Control	TTL Logic Control; 8 bit
Insertion Loss (dB)	4.5 (max)
Attenuation Linearity (dB)*see note	+/- 1.0 (nom)
Attenuation Flatness (dB)	+/- 2.0 (max)
Power Handling (dBm)	+20 (max)
Switching Speed (nS)	650 (max)
VSWR	2.2:1 (max)
Impedance (Ohms)	50
RF Connectors	SMA-F
Control and Power Supply Connector	D-Type
Power Supply (VDC)	+12V
Size (Inches)	2.0" x 2.0" x 0.455"
Operating Temperature (°C)	-40 to +71
Note:	Linearity with best fit straight line is +/- 1.5 dB (nom), +/- 1.75 dB (max) from 0.5 to 1.0 GHz.

OUTLINE DRAWING:



TYPICAL PERFORMANCE:

ATTENUATION RESPONSE @25°C

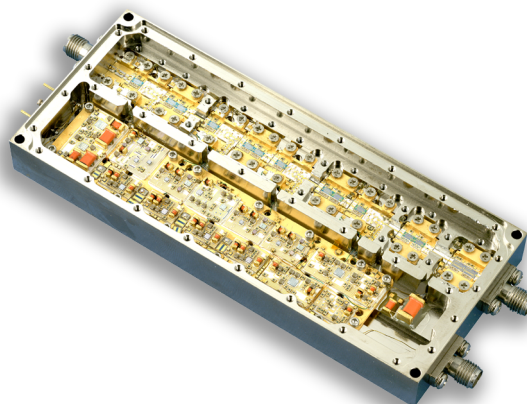


Log Components

SDLAs

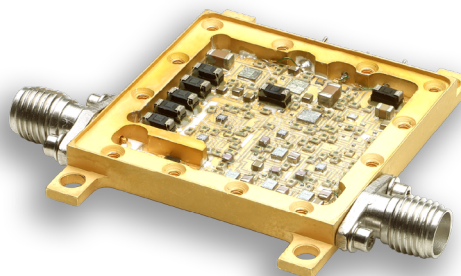
AKON offers standard SDLA's covering the 2.0 - 6.0, 6.0 - 18.0, and 2.0-18.0 GHz frequency ranges. Rise times down to 10 nano seconds are available. Fall times in the order of 60 nanoseconds for 60 dB drop from 90 % of the trailing edge are also available. Unlike most SDLVA's available in the market, our units maintain a fairly constant slope as a function of frequency and temperature. If required, units can also include limited RF output with excellent second and third harmonic performance.

Our SDLAs are completely fabricated using a "chip and wire" technique. We have shipped units using this cableless method with up to 90+ dB RF gain.



DLVAs

The basic single detector DLVA is available in 0.5 - 2.0, 2.0 - 6.0, and 2.0 - 18.0 GHz ranges as connectorized or drop-in units. A built-in limiter or attenuator can be incorporated for improved input VSWR. Units with external analog or digital control for C.W. or noise cancellation are available.



FEATURES:

- FAST RISE AND FALL TIMES
- EXCELLENT LINEARITY
- COMPUTER TUNED AND TESTED
- PRODUCTION READY
- SIZE: 3.20" x 1.85" x 0.40"



AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications.

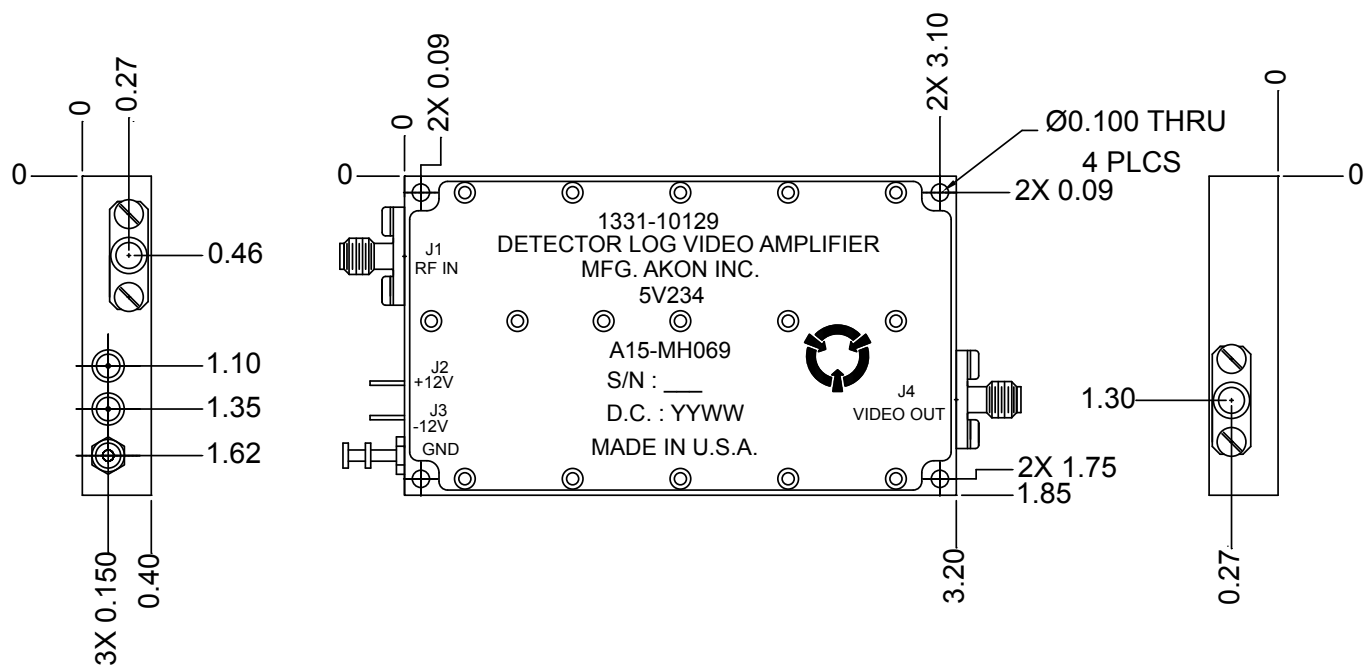
AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 0.5 - 18.0 GHz frequency range (up to 40.0 GHz for some applications).

Model A15-MH069 is an ultra-fast miniature SDLA. In slightly over 2.0 cubic inches, the unit features 60 dB dynamic range and exceptionally fast 40 nanosecond fall time.

SPECIFICATIONS:

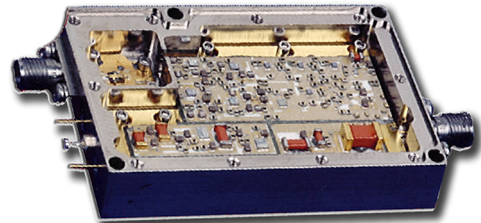
Model Number	A15-MH069
Frequency Range (GHz)	2.0 - 18.0
Dynamic Range (dBm)	60
T.S.S. (dBm)	-66
Logging Range (dBm)	-60 to 0
Frequency Flatness (dB)	+/- 2.0 (max); +/- 1.75 (typ)
Log Linearity (dB)	+/- 1.5 (max); +/- 1.0 (typ)
Log Slope (mV/dB)	15
Rise Time (nS)	10
Fall Time (nS)	40
Propagation Delay (nS) (50% RF to 10% Video)	10
Recovery Time (nS) (90% to +/- 1.0 dB of baseline)	125 (typ); 200 (max)
Power Supply (VDC)	+12 @ 500mA; -12 @ 125mA
Coupling	DC
Operating Temperature (°C)	-20 to +71
VSWR	2.0:1 (max)

OUTLINE DRAWING:



FEATURES:

- VERY LOW DC POWER CONSUMPTION
- MINIATURE SIZE
- DROP-IN & COAXIAL CONFIGURATIONS
- FAST RISE AND FALL TIMES
- EXCELLENT ABSOLUTE ACCURACY
- SMALL LOG SLOPE VARIATION
- PERFORMANCE OVER TEMPERATURE



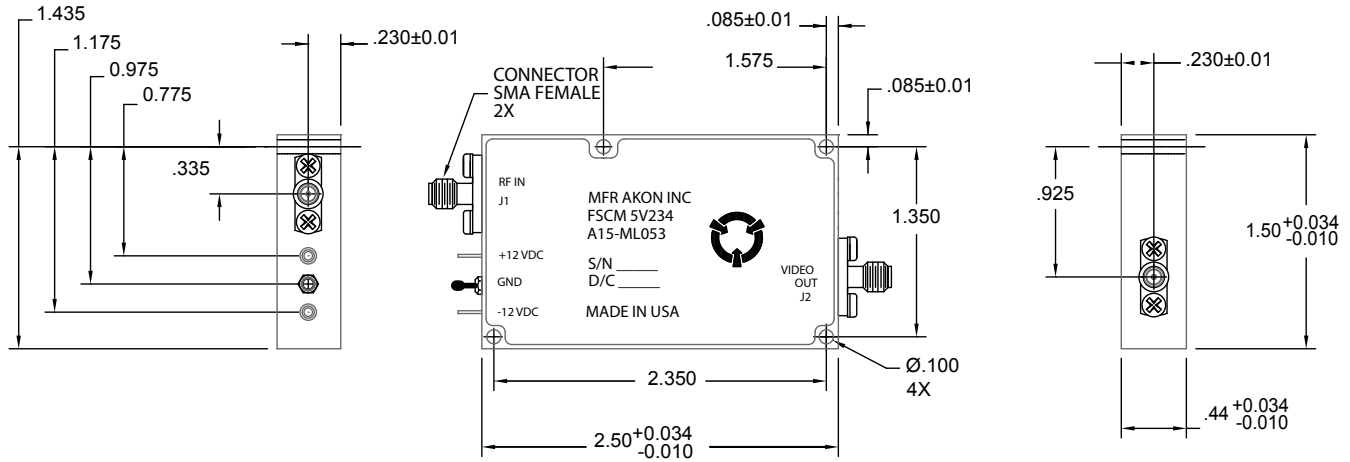
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SPECIFICATIONS:

Model Number	A15-ML053	A15-ML054	A15-ML055	A15-ML089
Frequency Range (GHz)	0.5 - 2.0	2.0 - 6.0	2.0 - 18.0	2.0 - 18.0
T.S.S. (dBm)	-44	-43	-42	-42
Logging Range (dBm)	-40 to +4	-40 to +4	-40 to +4	-40 to +4
Frequency Flatness (dB)	+/- 0.75 (nom)	+/- 1.0 (nom)	+/- 1.5 (nom)	+/- 1.5 (nom)
Log Linearity (dB)	+/- 0.5 (-40 to 0 dBm) +0.5 to -1.2 (0 to +4 dBm)	+/- 0.5 (-40 to 0 dBm) +0.5 to -1.2 (0 to +4 dBm)	+/- 0.5 (-40 to 0 dBm) +0.5 to -1.2 (0 to +4 dBm)	+/- 0.5 (-40 to 0 dBm) +0.5 to -1.2 (0 to +4 dBm)
Log Linearity (dB) (-40° C to +85° C)	+/- 1.00 (-40 to 0 dBm) +0.65 to -1.40 (0 to +4 dBm)	+/- 1.00 (-40 to 0 dBm) +0.65 to -1.40 (0 to +4 dBm)	+/- 1.00 (-40 to 0 dBm) +0.65 to -1.40 (0 to +4 dBm)	+/- 1.00 (-40 to 0 dBm) +0.65 to -1.40 (0 to +4 dBm)
Log Slope (mV/dB)	50 +/- 1	50 +/- 1	50 +/- 1	70 +/- 1
Rise Time (nS)	20 (nom)	20 (nom)	20 (nom)	20 (nom)
Fall Time (nS)	150 (nom)	150 (nom)	150 (nom)	150 (nom)
Recovery Time (nS) (90% to +/- 1.0 dB of Baseline)	300	300	300	300
Propagation Delay (nS) (50% RF to 10% Video)	20 (nom)	20 (nom)	20 (nom)	20 (nom)
Power Supply (VDC)	+/- 12	+/- 12	+/- 12	+/- 12
Current (mA)	20 (max)	20 (max)	20 (max)	20 (max)
Coupling	DC	DC	DC	DC
VSWR	2.2:1	2.7:1	3.2:1	3.2:1
Size (Inches)	2.5" x 1.5" x 0.44"	2.5" x 1.5" x 0.44"	2.5" x 1.5" x 0.44"	2.5" x 1.5" x 0.44"
Operating Temperature (°C)	-40 to +85	-40 to +85	-40 to +85	-40 to +85

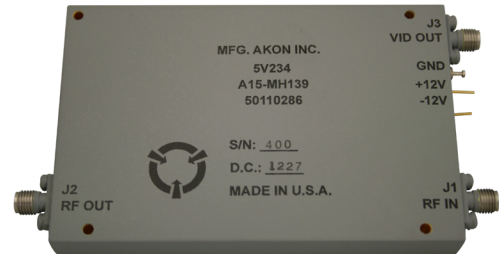
OUTLINE DRAWING:



FEATURES:

- LIMITED RF OUTPUT
- FLAT FREQUENCY RESPONSE
- EXCELLENT LOG LINEARITY
- EXCELLENT TEMPERATURE PERFORMANCE
- DC COUPLED

AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications. AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 0.5 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.

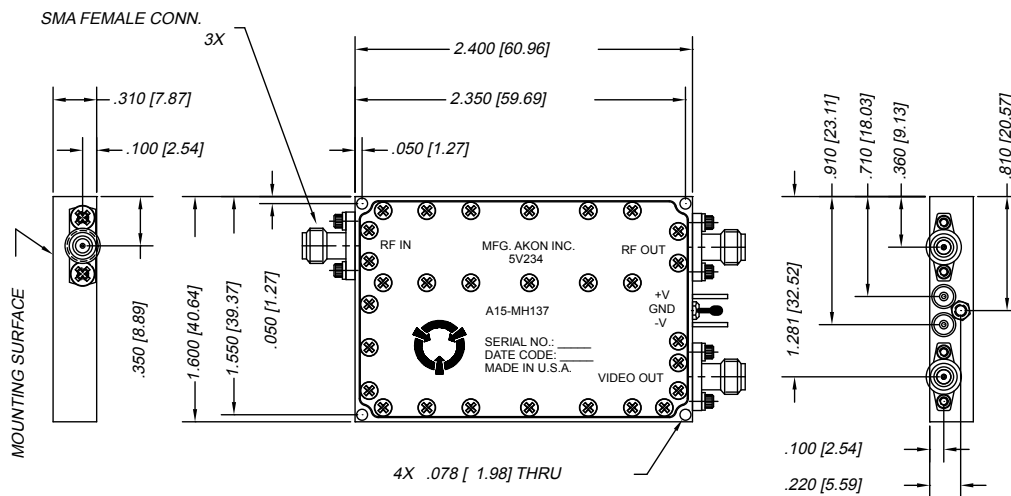
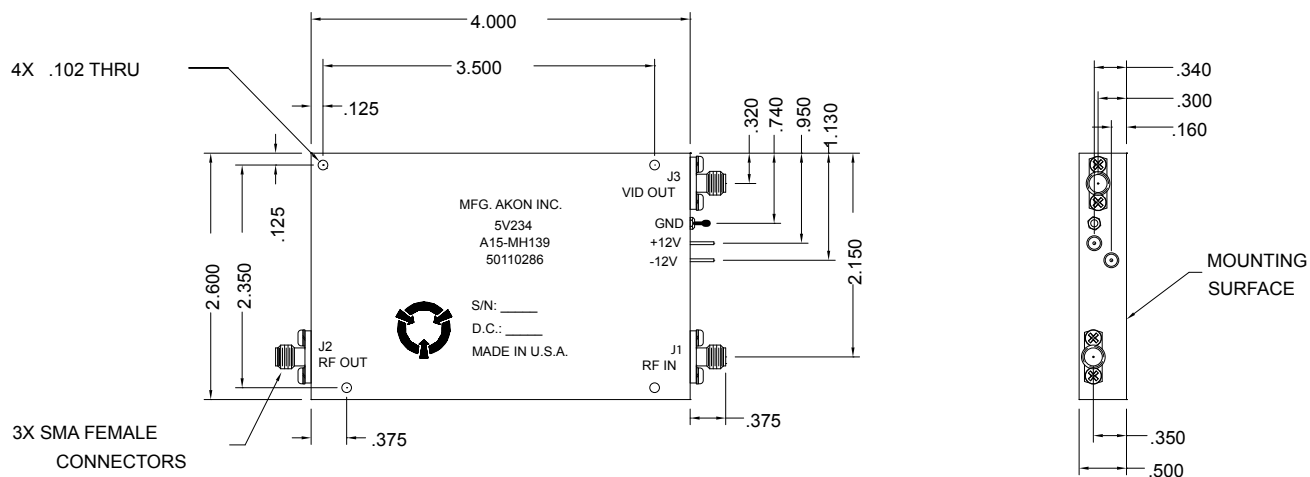


This series of log components offer SDLA performance with ERDLVA accuracy. Absolute accuracies of ± 3.0 dB over frequency, temperature and power can be offered over an extended range of 2 - 18GHz, while resulting in 10 ns of propagation delay, 10 ns rise time and 60 ns recovery time.

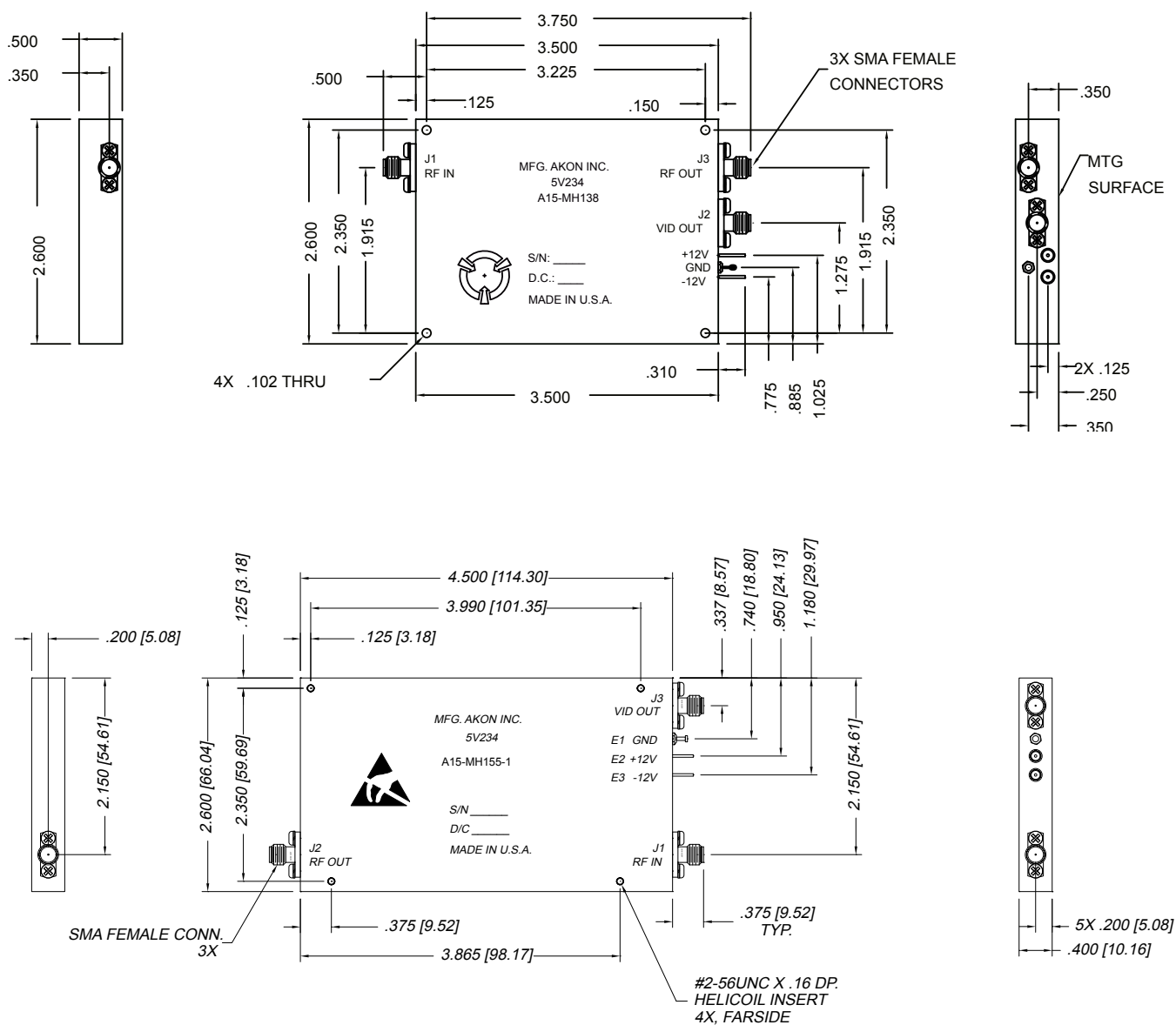
SPECIFICATIONS:

Model Number	A15-MH139	A15-MH137	A15-MH138	A15-MH155-1
Frequency Range (GHz)	2.0 - 6.0	6.0 - 18.0	0.5 - 2.0	2.0 - 18.0
T.S.S. (dBm)	-73	-73	-73	-73
Logging Range (dBm)	-70 to 0	-70 to 0	-70 to 0	-70 to 0
Frequency Flatness (dB)	± 1.5	± 2.0	± 1.5	± 3.0
Limited Output (dB)	+13 ± 2.0	15 ± 3.0	+13 ± 2.0	13 ± 3.0
Harmonics (dBc)	8	8	8	8
VSWR	2.0:1	2.0:1	2.0:1	2.0:1
Log Linearity (dB)	± 1.0	± 1.0	± 1.0	± 1.0
Log Accuracy (dB) (over temperature at a given frequency)	± 2.5	± 3.0	± 2.5	± 3.0
Rise Time (nS)	10	10	10	10
Recovery Time (nS) (60 dB drop)	60	60	60	60
Propagation Delay (nS) (50% RF to 10% Video)	10	10	10	10
Log Slope (mV/dB)	25	25	25	25
Operating Temperature (°C)	-20 to +85	-20 to +85	-20 to +85	-20 to +85
Power Supply (VDC)	± 12 +650mA/ -150mA	± 12 +750mA/ -150mA	± 12 +650 mA/ -150 mA	± 12 +750mA/ -150mA
DC Offset (mV)	25 ± 25	25 ± 25	25 ± 25	25 ± 25
Size	4.0" x 2.6" x 0.5"	2.4" x 1.6" x 0.310"	3.5" x 2.6" x 0.5"	4.5" x 2.6" x 0.5"

OUTLINE DRAWINGS:

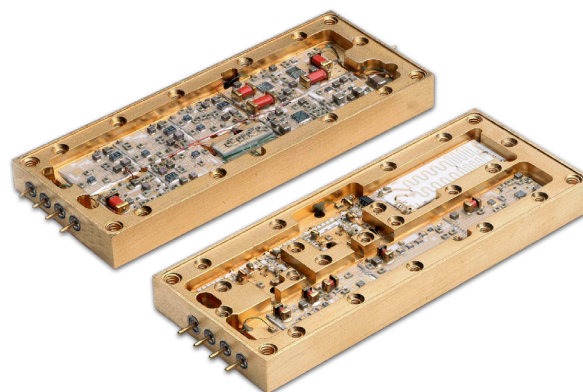


OUTLINE DRAWINGS:



FEATURES:

- LOW DC POWER CONSUMPTION
- MINIATURE SIZE
- DROP-IN & COAXIAL CONFIGURATIONS
- FAST RISE AND FALL TIMES
- EXCELLENT ABSOLUTE ACCURACY
- SMALL LOG SLOPE VARIATION



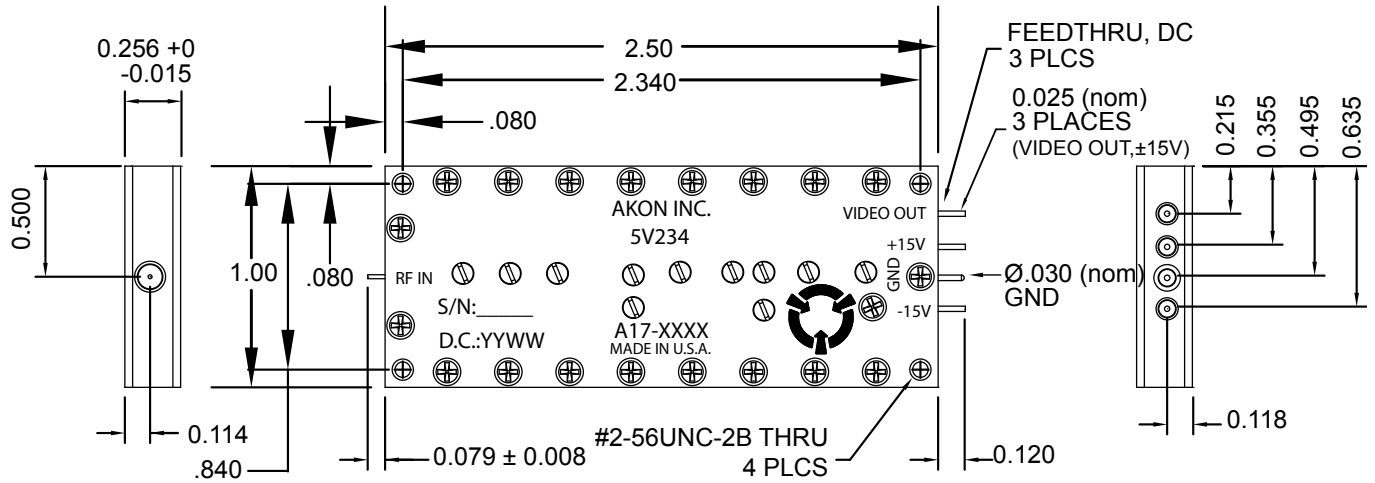
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SPECIFICATIONS:

Model Number	A17-OH010	A17-1H011	A17-MH012
Frequency Range (GHz)	0.5 - 10	1.0 - 2.0	0.5 - 2.0
T.S.S. (dBm)	-72	-72	-72
Logging Range (dBm)	-65 to 0	-65 to 0	-65 to 0
Frequency Flatness (dB)	+/- 1.0	+/- 1.0	+/- 1.25
Log Linearity (dB)	+/- 1.0	+/- 1.0	+/- 1.0
Temperature Variation (dB)	+/- 1.0	+/- 1.0	+/- 1.0
Rise Time (nS)	10	10	10
Recovery Time (nS) (90% to +/-1.0 dB of baseline)	60	60	60
Propagation Delay (nS) (50% RF to 10% Video)	10	10	10
Log Slope (mV/dB)	15	15	15
Power Supply (VDC)	+/- 15	+/- 15	+/- 15
Coupling	DC	DC	DC
Operating Temperature (°C)	-40 to +85	-40 to +85	-40 to +85
VSWR	2.0:1	2.0:1	2.0:1
Current (mA)	-300 -115 (nom)	-300 -115 (nom)	-300 -115 (nom)
Size	OUTLINE A	OUTLINE A	OUTLINE A

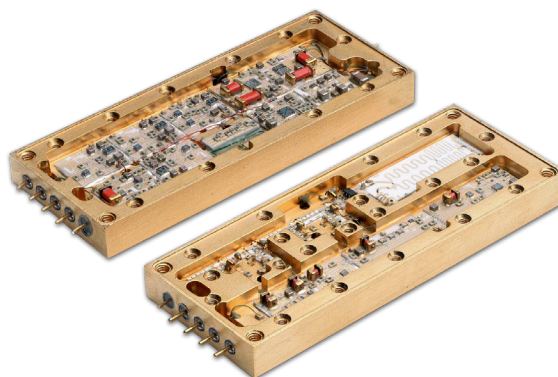
OUTLINE DRAWING:

OUTLINE A



FEATURES:

- LIMITED RF OUTPUT
- WIDE DYNAMIC RANGE
- FLAT FREQUENCY RESPONSE OVER 0.5 - 2.0 GHz
- EXCELLENT LOG LINEARITY
- LOW LOG SLOPE VARIATION
- EXCELLENT VSWR



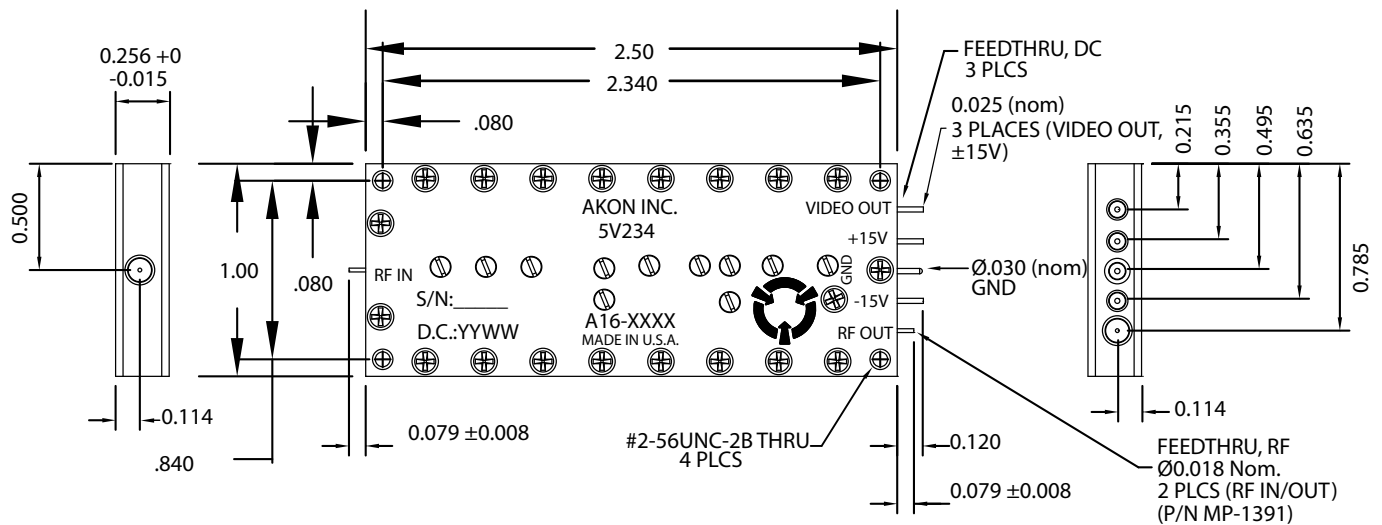
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SPECIFICATIONS:

Model Number	A16-OH003	A16-1H004	A16-MH005
Frequency Range (GHz)	0.5 - 1.0	1.0 - 2.0	0.5 - 2.0
T.S.S. (dBm)	-72	-72	-72
Logging Range (dBm)	-65 to 0	-65 to 0	-65 to 0
Frequency Flatness (dB)	+/- 1.0	+/- 1.0	+/- 1.25
Limited Output (dB)	+5 +/- 2.0	+5 +/- 2.0	+5 +/- 3.0
Harmonics (dBc)	8 (nom)	8 (nom)	8 (nom)
Log Linearity (dB)	+/- 1.0	+/- 1.0	+/- 1.0
Temperature Variation (dB)	+/- 1.0	+/- 1.0	+/- 1.0
Rise Time (nS)	10	10	10
Propagation Delay (nS) (50% RF to 10% Video)	10	10	10
Recovery Time (nS)	60	60	60
Log Slope (mV/dB)	15	15	15
Power Supply (VDC)	+/- 15	+/- 15	+/- 15
Coupling	DC	DC	DC
Operating Temperature (°C)	-40 to +85	-40 to +85	-40 to +85
VSWR	2.0:1	2.0:1	2.0:1
Current (mA)	+340 (nom) -125 (nom)	+340 (nom) -125 (nom)	+340 (nom) -125 (nom)
Size	OUTLINE A	OUTLINE A	OUTLINE A

OUTLINE DRAWING:

OUTLINE A



FEATURES:

- 18.0 - 40.0 GHz
- -63 TO +2 dBm VIDEO LOG RANGE
- 15 NS RISE TIME MAX
- +/- 1.5 dB VIDEO LOG LINERITY
- 40 NS FALL TIME (TYP)
- 10 NS DELAY TIME
- OPTIONAL LIMITED RF OUTPUT



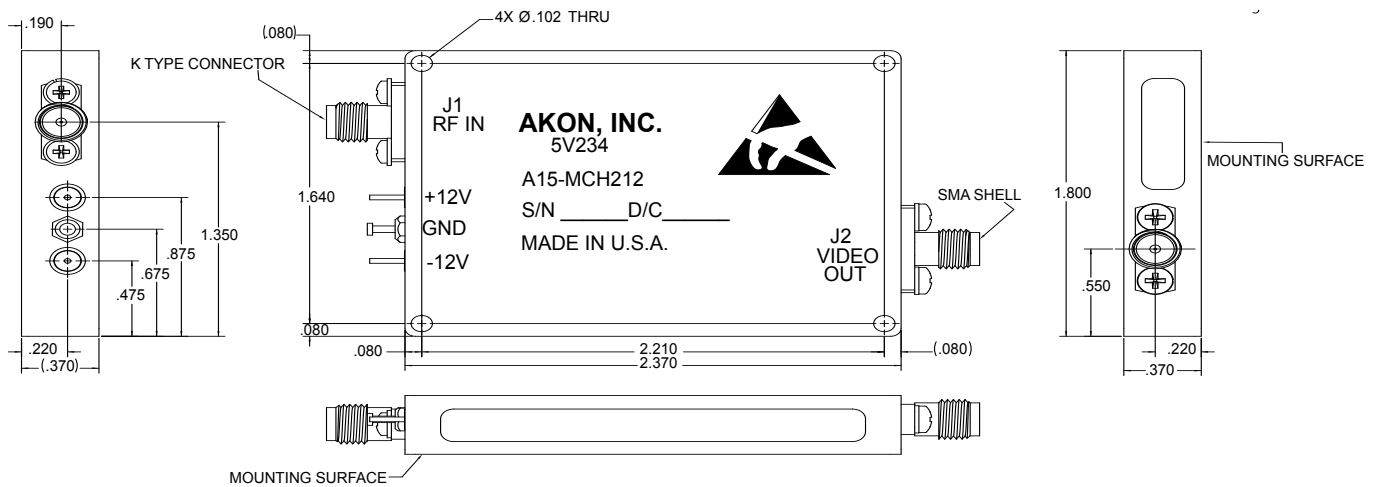
AKON is a leading manufacturer of RF, Microwave and Millimeter-Wave components and subsystems for military, space and commercial applications. AKON's line of products includes high reliability custom Integrated Microwave Assemblies, DIFM Receivers, Microwave Receiver Front-Ends, RF Switching Matrices, Frequency Synthesizers, custom LO Assemblies, Frequency Converters, RF Switches, RF Attenuators and Microwave Amplifiers covering 2 - 40 GHz frequency range (up to 26.5 GHz for some applications).

AKON is qualified to MIL-I-45208 Quality System requirements by agencies of the US Department of Defense as well as US and International space agencies. Screening to requirements of MIL-STD-883 are available at an additional cost. All specifications described below are over the full operating temperature

SPECIFICATIONS:

Model Number	A15-MCH212
Frequency Range (GHz)	18 GHz - 40 GHz
T.S.S (dBm)	-67 (nom)
Power Handling (dBm)	15 (max)
Logging Range (dB)	-63 to +2
Log Linearity (dB)	Deviation from Best Fit Straight Line: +/- 1.5 (max) @ 25 +/- 1.0 (80% band) Over temperature: +/- 2.0 (max) +/- 1.5 (80% band)
Log Accuracy (Window @ 25mV/dB At A Given Frequency Over Temperature Range)	+/- 2.0 (nom) (80% band) +/- 2.5 (max)
Slope (dB/GHz)	For Linearity: 25 +/- 1.0 mV/dB For Log Accuracy: 25 mV/dB
Frequency Flatness (dB)	+/- 2.5 (max) @ 25°C +/- 3.0 (max) over temp
Rise Time (ns)	15 (max) 10 (typ)
Fall Time (1.0 dB Below Peak to 60 dB Below Peak) (ns)	60 (max) 40 (typ)
Delay Time (50% RF to 10% Video) (ns)	10
Power Supply (VDC)	+12 VDC @ 550 mA (w/out load) -12 VDC @ 150 mA (w/out load)
Operating Temperature (°C)	-20 to +71 (Extended Temperature Range Available)

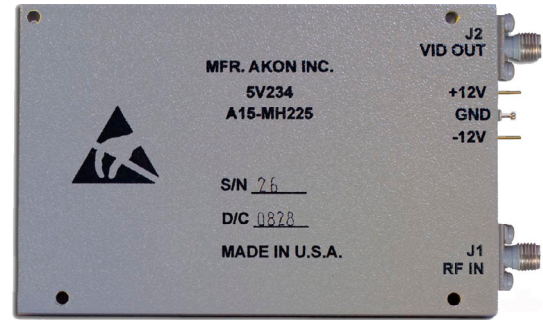
OUTLINE DRAWING



FEATURES:

- 0.5 - 18.0 GHz FREQUENCY COVERAGE
- 10 NS RISE TIME
- 60 NS RECOVERY TIME
- EXCELLENT LOG LINEARITY
- FLAT FREQUENCY RESPONSE

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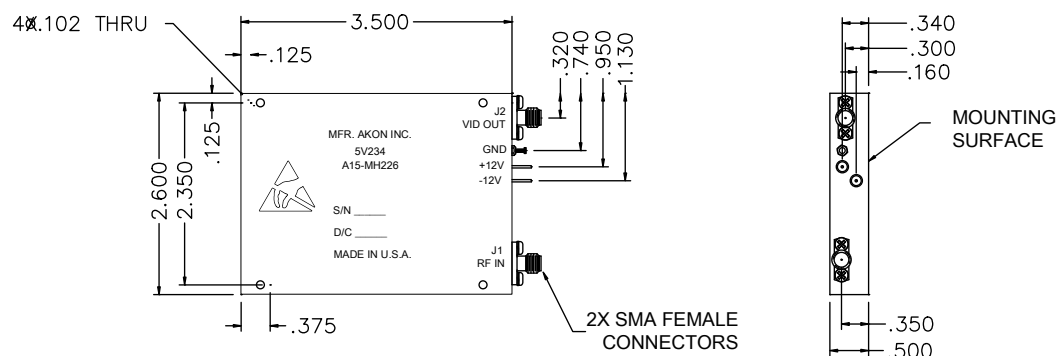


This series of log components offer SDLA performance with ERDLVA accuracy. Absolute accuracies of ± 3.0 dB over frequency, temperature and power can be offered over an extended range of 0.5 - 18.0 GHz, while resulting in 10 ns of propagation delay, 10 ns rise time and 60 ns recovery time.

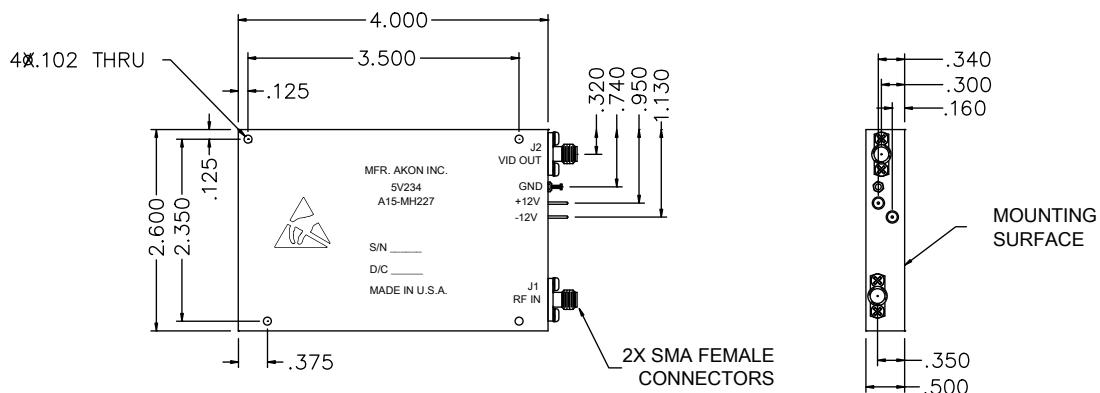
SPECIFICATIONS:

Model Number	A15-MH226	A15-MH227	A15-MH228	A15-MH225
Frequency Range (GHz)	0.5 - 2.0	2.0 - 6.0	6.0 - 18.0	2.0 - 18.0
T.S.S. (dBm)	-73	-73	-73	-73
Logging Range (dBm)	-70 to 0	-70 to 0	-70 to 0	-70 to 0
Frequency Flatness (dB)	± 1.5	± 1.5	± 2.0	± 3.0
VSWR	2.0:1	2.0:1	2.0:1	2.0:1
Log Linearity (dB)	± 1.0	± 1.0	± 1.0	± 1.0
Log Accuracy (dB) (over temperature at a given frequency)	± 2.5	± 2.5	± 3.0	± 3.0
Rise Time (nS)	10	10	10	10
Recovery Time (nS) (60 dB drop)	60	60	60	60
Propagation Delay (nS) (50% RF to 10% Video)	10	10	10	10
Log Slope (mV/dB)	25	25	25	25
Operating Temperature (°C)	-20 to +85	-20 to +85	-20 to +85	-20 to +85
Power Supply (VDC)	± 12 +500 mA -150 mA	± 12 +500mA -150mA	± 12 +600mA -150mA	± 12 +600mA -150mA
DC Offset (mV)	25 $\pm$ 25	25 $\pm$ 25	25 $\pm$ 25	25 $\pm$ 25
Size	3.5" x 2.6" x 0.5"	4.0" x 2.6" x 0.5"	4.5" x 2.6" x 0.4"	4.5" x 2.6" x 0.4"
Outline	A	B	C	C

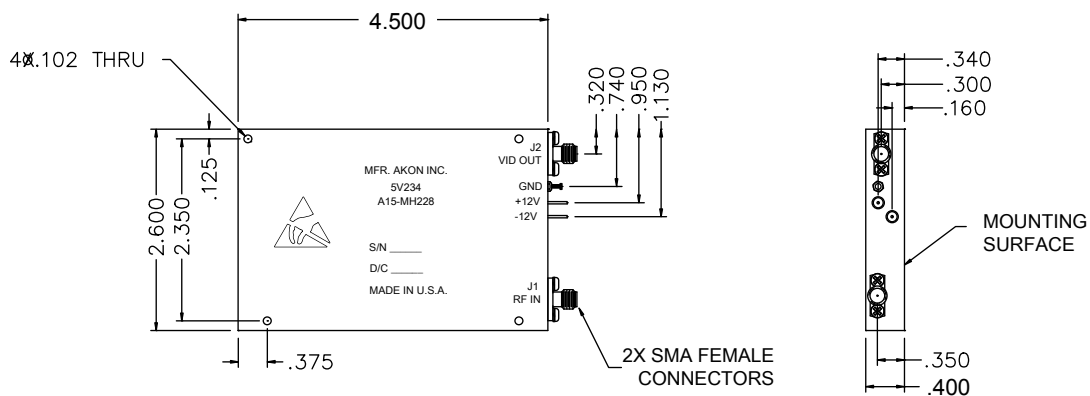
OUTLINE A



OUTLINE B



OUTLINE C



FEATURES:

- WIDE FREQUENCY RANGE
- EXCELLENT LOG LINEARITY
- LOW DC POWER
- MIL SCREENED & HERMETICALLY SEALED
- COMPUTER TUNED AND TESTED
- SIZE: 2.2" x 1.5" x 0.4"



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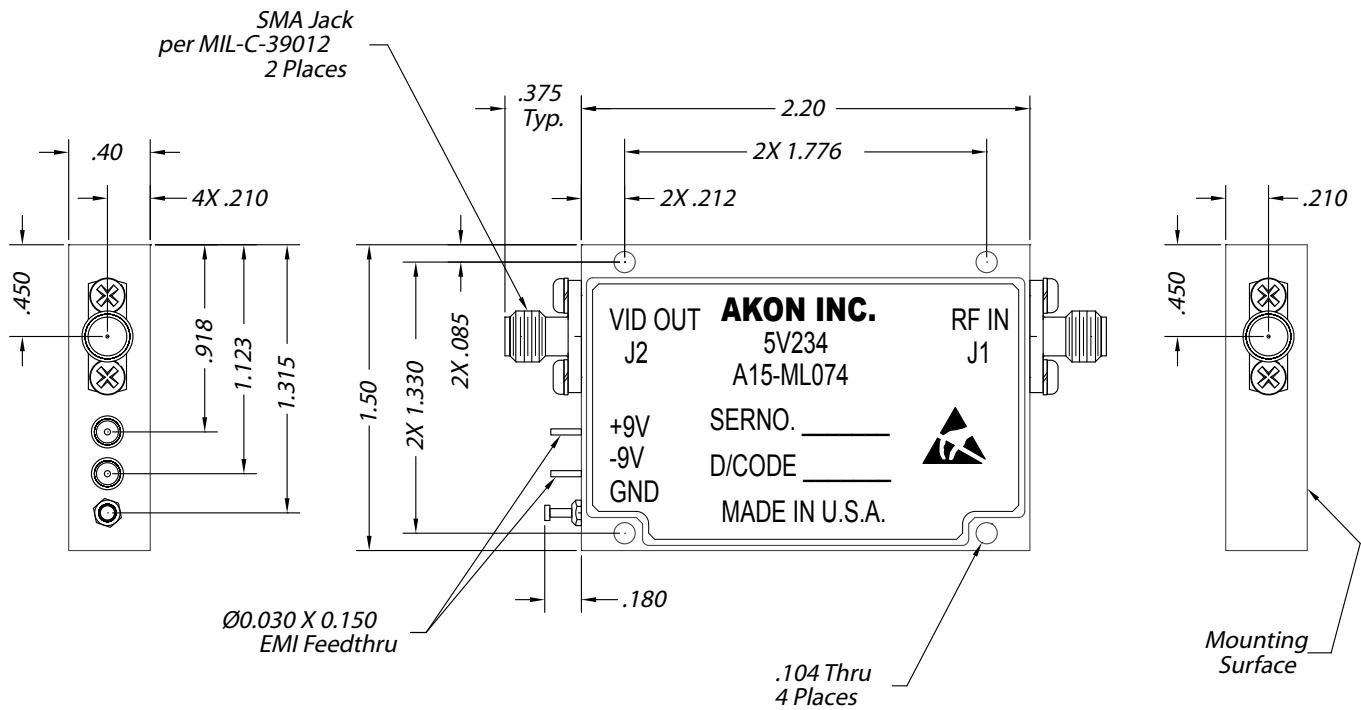
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Model A15-ML074 is a miniuature DLVA over a wide frequency range. In slightly over 1.0 cubic inches, the unit features 40 dB dynamic range and is available in hermetic packaging with Mil screening.

SPECIFICATIONS:

Model Number	A15-ML074
Frequency Range (GHz)	1.4 - 21.5
Dynamic Range (dB)	40
T.S.S. (dBm)	-52
Logging Range (dBm)	-40 to 0
Frequency Flatness (dB)	+/- 1.5 dB 80% Band +/- 1.75 dB 90% Band +/- 2.0 dB (max)
Log Linearity (dB)	+/- 0.75 dB (typ); +/- 1.0 dB (max)
Log Slope (mV/dB)	50
Rise Time (nS)	30ns (max) any pulse width
Fall Time (nS)	500ns For up to 100 microsecond pulse width
Propagation Delay (nS) (50% RF to 10% Video)	60ns (max)
Recovery Time (nS) (90% to +/- 1.0 dB of baseline)	1 microsecond (max)
Power Supply (VDC)	+9V @ 120mA; -9 @ 45mA
Coupling	DC
Operating Temperature (°C)	-40 to +85
VSWR	3.0:1
Video Impedance (Ohms)	93

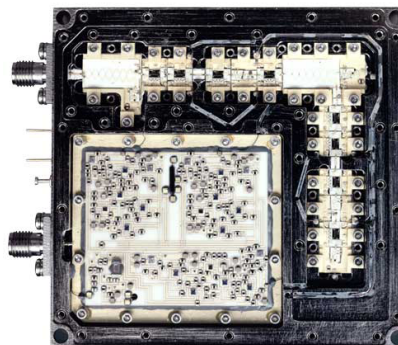
OUTLINE DRAWING:



FEATURES:

- FAST RISE AND FALL TIMES
- EXCELLENT LINEARITY
- COMPUTER TUNED AND TESTED
- PRODUCTION READY

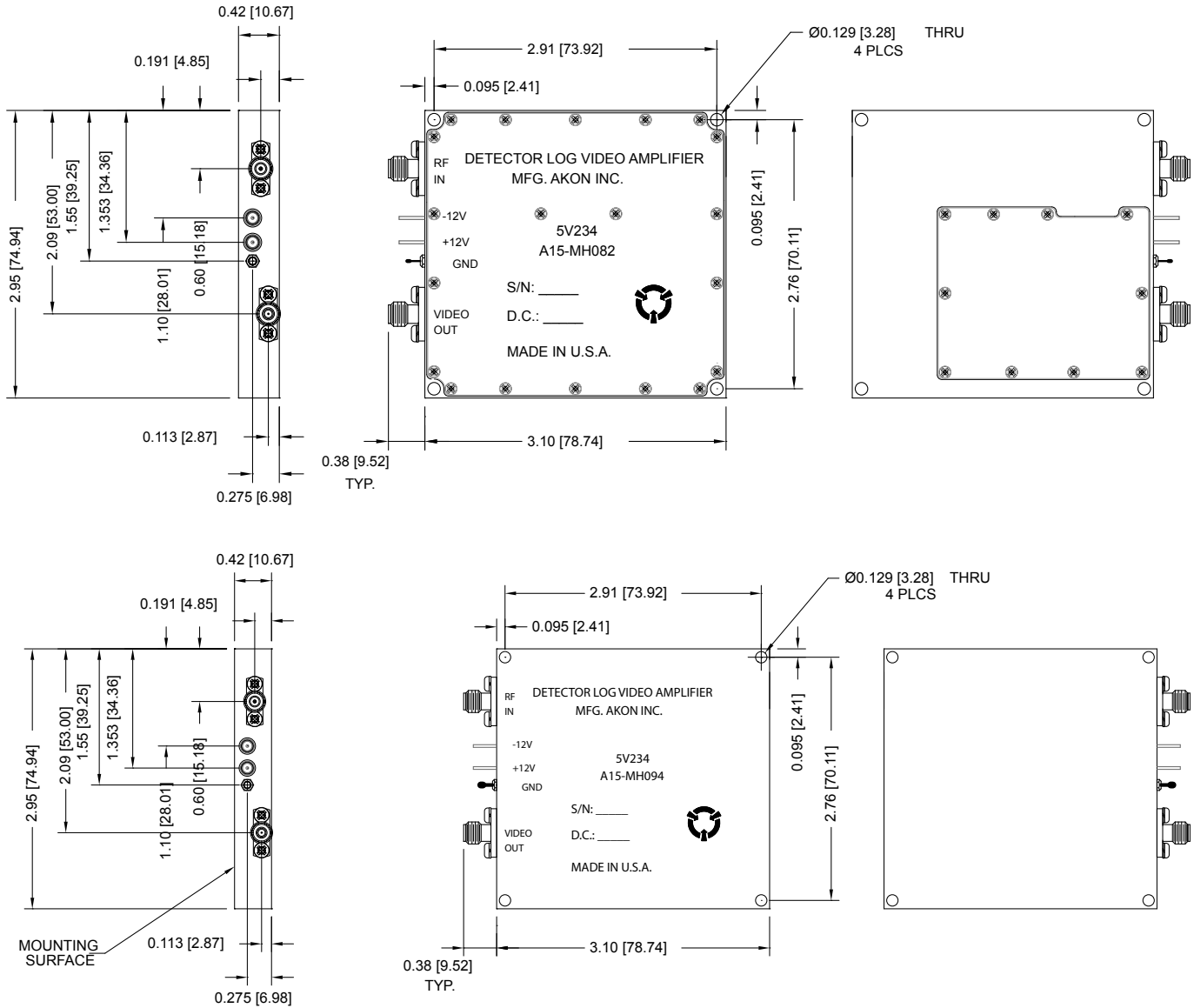
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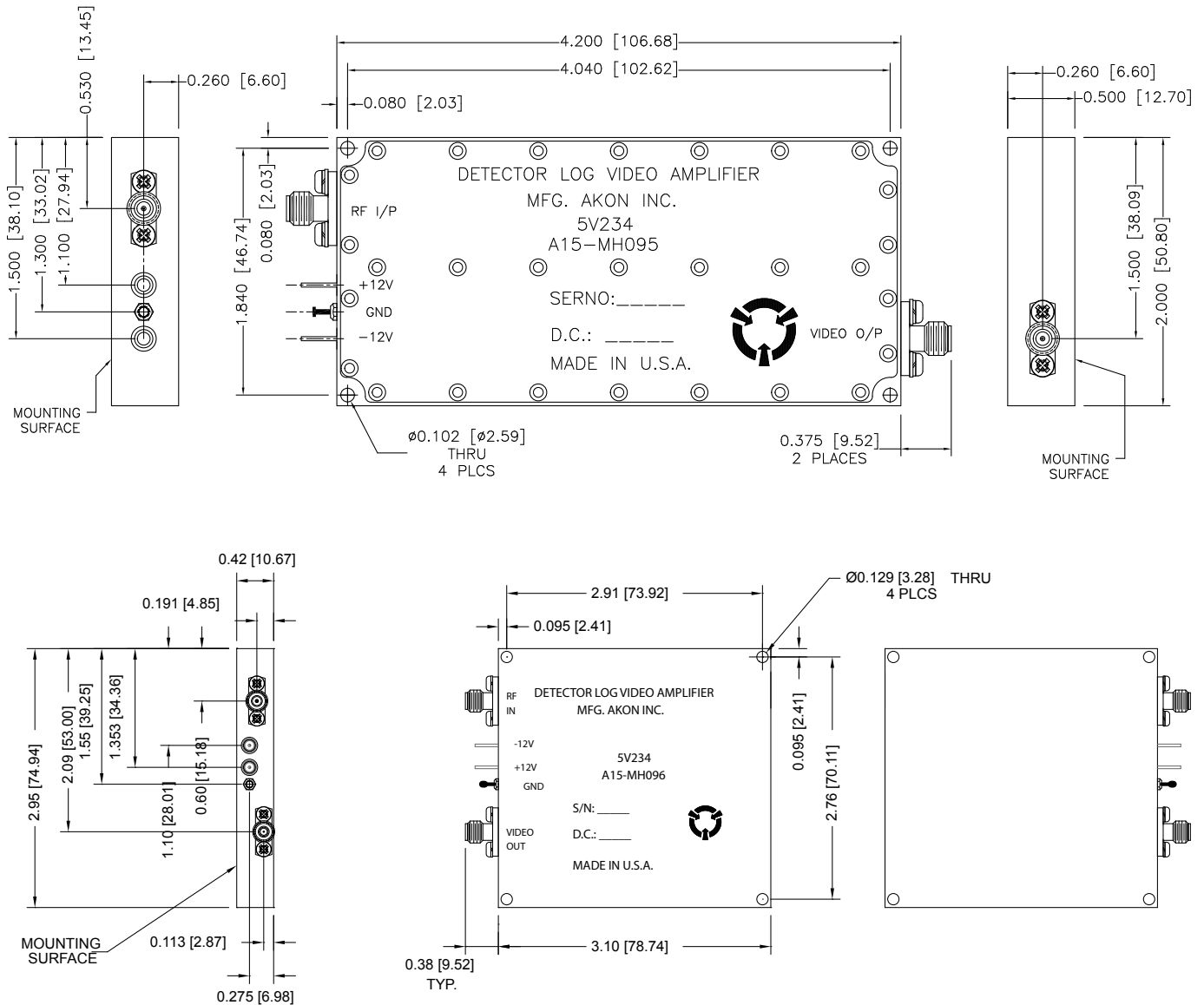
SPECIFICATIONS:

Model Number	A15-MH082	A15-MH094	A15-MH095	A15-MH096
Frequency Range (GHz)	0.5 - 2.0	2.0 - 6.0	6.0 - 18.0	2.0 - 18.0
Dynamic Range (dB) (T.S.S. to end of logging)	77	77	75	74
T.S.S. (dBm)	-73	-73	-70	-69
Logging Range (dBm)	-70 to +4	-71 to +4	-68 to +5	-67 to +5
Log Slope (mV/dB)	50	50	50	50
Frequency Flatness (dB)	+/- 1.7 (max) +/- 1.0 (typ)	+/- 1.5 (max) +/- 1.0 (80% of band)	+/- 2.0 (max) +/- 1.4 (80% of band)	+/- 2.75 (max) +/- 1.75 (80% of band)
Log Linearity (dB)	+/- 1.3 (max) +/- 1.0 (typ)	+/- 1.0 (max) +/- 1.0 (80% of band)	+/- 1.2 (max) +/- 1.0 (80% of band)	+/- 1.35 (max) +/- 1.0 (80% of band)
Temperature Variation (dB)	+/- 1.0 (max)	+/- 1.0 (max)	+/- 1.25 (max)	+/- 1.25 (max)
Rise Time (nS)	20 (max) 15 (typ)	20 (max) 15 (typ)	20 (max) 15 (typ)	20 (max) 15 (typ)
Fall Time (nS)	150	150	150	150
Recovery Time (nS)	200 250 (max)	200 250 (max)	200 250 (max)	200 250 (max)
Propagation Delay (nS) (50% RF to 10% Video)	20(max) 15 (typ)	18 (max) 15 (typ)	18 (max) 15 (typ)	18 (max) 15 (typ)
Power Supply (VDC)	+/- 12	+/- 12	+/- 12	+/- 12
Current (mA)	+500 -150	+550 -150	+550 -150	+550 -150
VSWR	2.0:1 (max)	2.0:1	2.0:1	2.0:1
Coupling	DC	DC	DC	DC
Operating Temperature (°C)	-20 to +85	-20 to +85	-20 to +85	-20 to +85

OUTLINE DRAWINGS

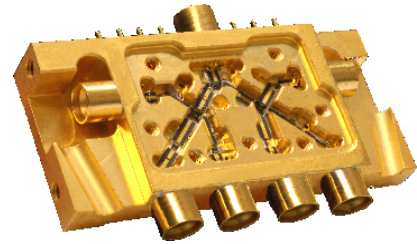


OUTLINE DRAWINGS CONT'D



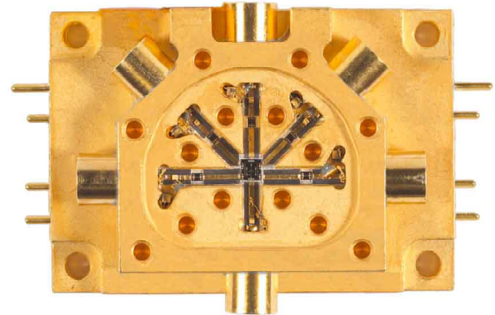
Switches

AKON offers a line of high performance, high speed and high isolation RF switches. These switches are available in standard configurations such as SPST through SP8T, as well as in nearly any custom configuration the customer can imagine. Switching speeds are typically on the order of 100 nanoseconds, but higher speed units, to under 10 nanoseconds are also optionally available. Switch off state isolation can be 60 db or greater, or a standard 30 to 35 dB. Both reflective and absorptive configurations are available. Frequency band coverage is model dependent but ranges from 500 MHz to 40 GHz. Connector options include SMA, GPO, TNC, type N or an extended pin for drop-in. Standard control logic is single ended TTL. Industry standard housings are available or custom packaging and integrated switching assemblies as well.



FEATURES:

- 2.0 - 18.0 GHz FREQUENCY RANGE
- LOW INSERTION LOSS
- HIGH ISOLATION
- FAST SWITCHING TIME
- SMA OR GPO CONNECTORS



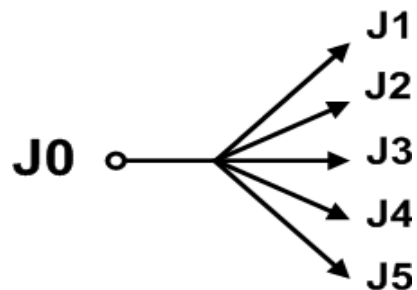
AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications. AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 0.5 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs.

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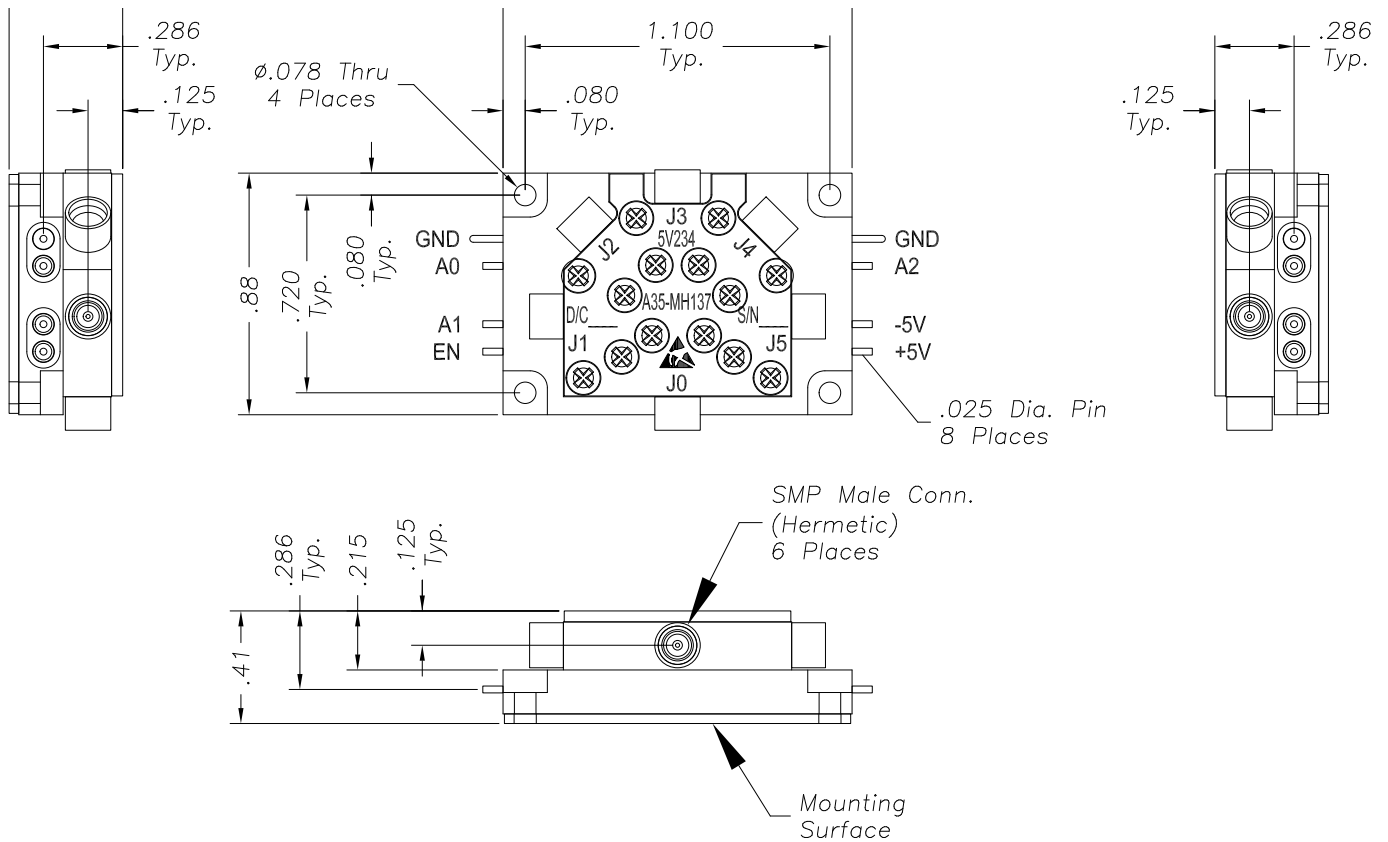
SPECIFICATIONS:

Model Number	A35-MH137
Frequency Range (GHz)	2.0 - 18.0
Switching Speed (nS)	50 (typ)
Isolation (dB)	60 (typ)
Insertion Loss (dB)	3 (max)
VSWR	2.0:1 (max)
Type	Reflective
Power Supply (VDC)	+/- 5V (other voltage options are available)
Power Handling (dBm)	+24

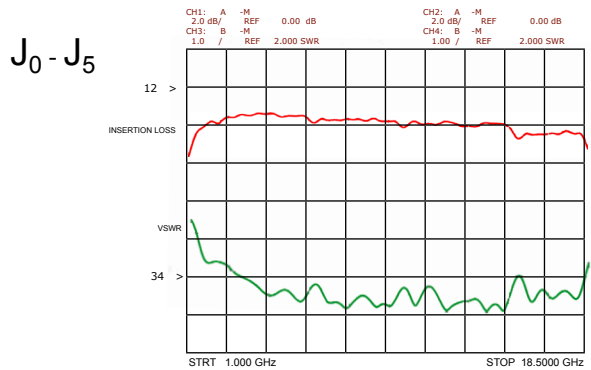
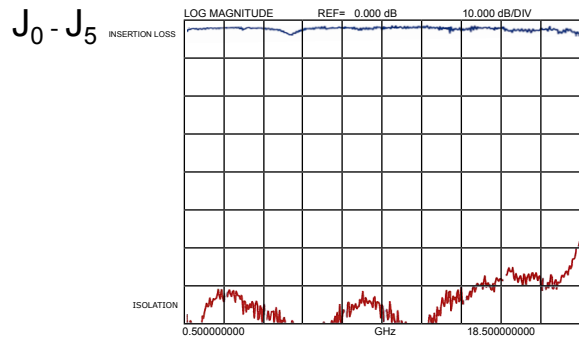
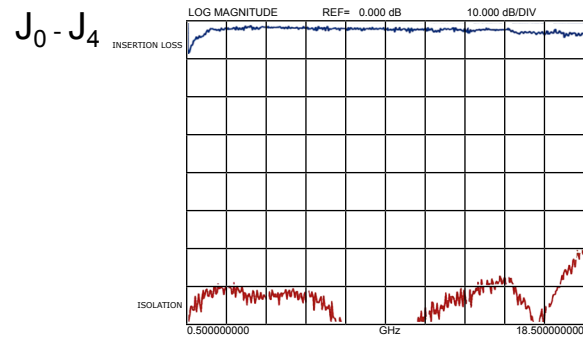
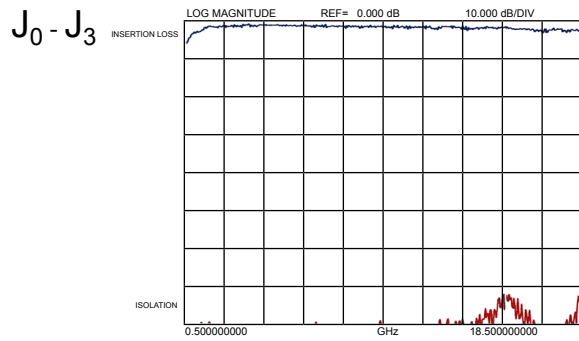
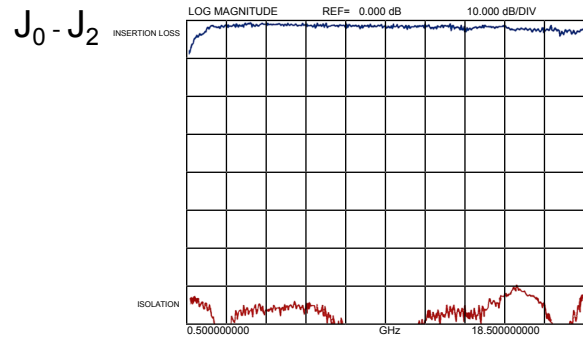
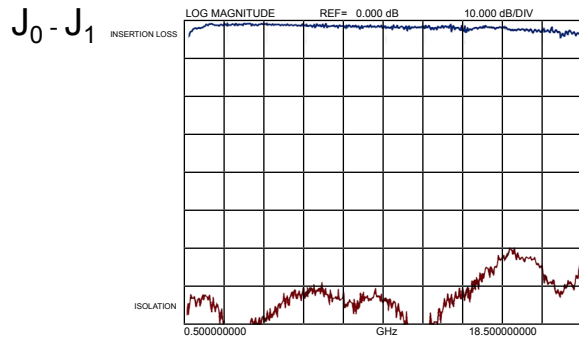
BLOCK DIAGRAM:



OUTLINE DRAWING:



TYPICAL PERFORMANCE:

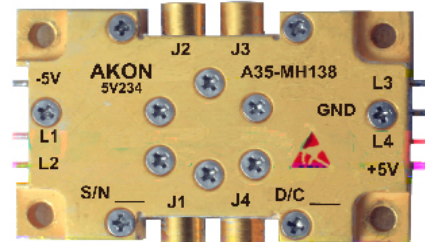


FEATURES:

- 2.0 - 18.0 GHz FREQUENCY RANGE
- LOW INSERTION LOSS
- HIGH ISOLATION
- FAST SWITCHING TIMES
- SMA OR GPO CONNECTORS

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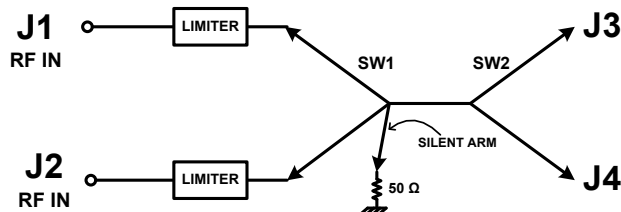
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SPECIFICATIONS:

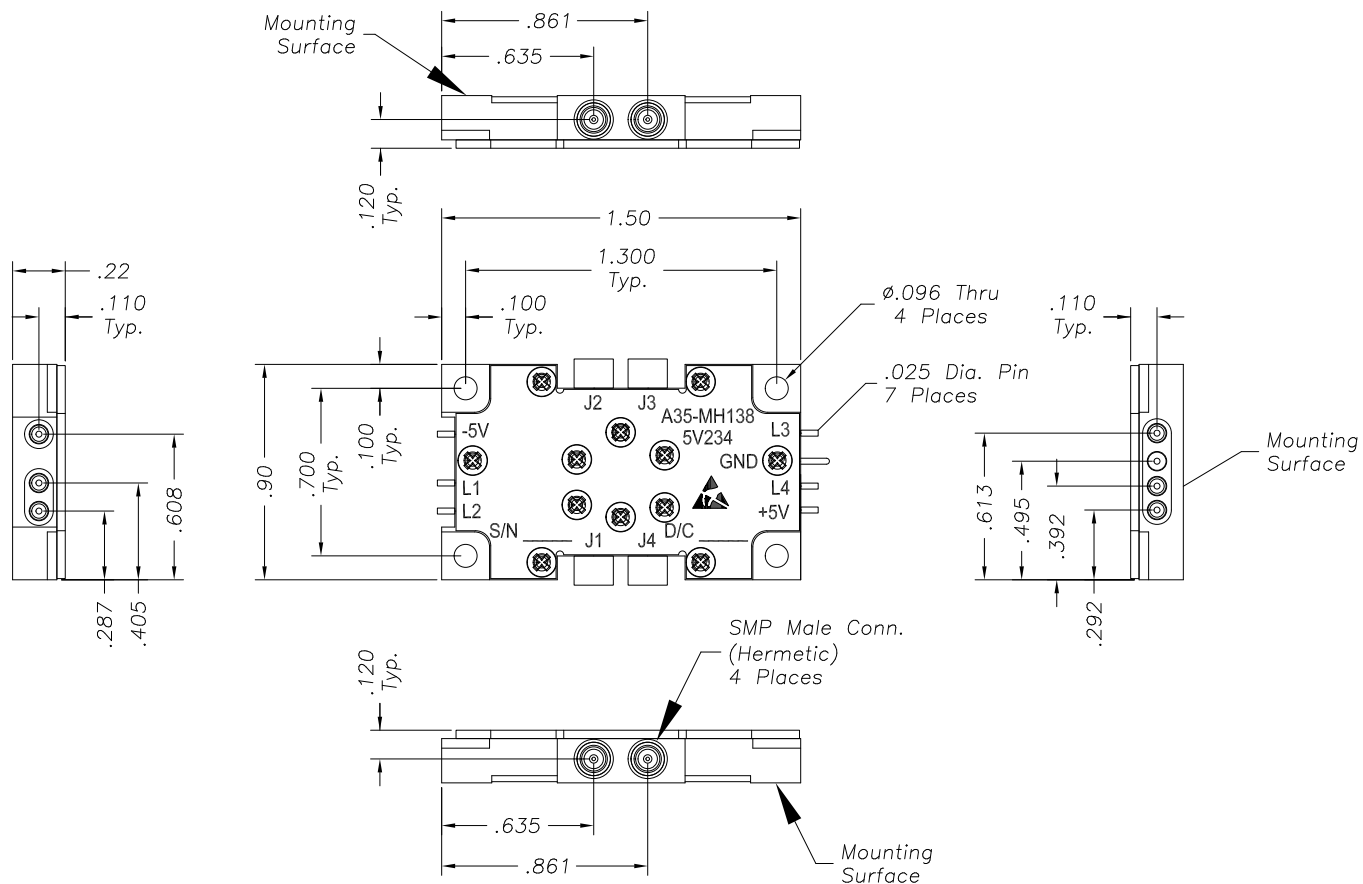
Model Number	A35-MH138
Frequency Range (GHz)	2.0 - 18.0
Switching Speed (nS)	50 (typ)
Isolation (dB)	60 (typ)
Insertion Loss (dB)	3 (max)
VSWR	2.0:1 (max)
Type	Reflective
Power Supply (VDC)	+/- 5V (other voltage options are available)
Limiters	1 watt CW; 100W Peak; 1 us, 0.01% Duty Cycle

BLOCK DIAGRAM:



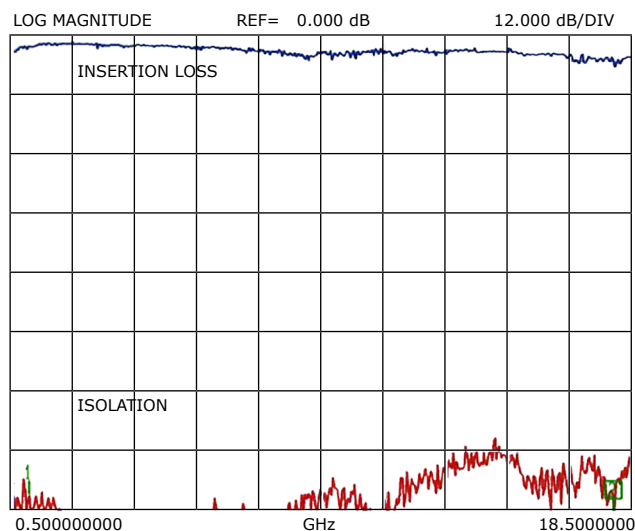
DISCRETE COMBINATIONS
LIMITER: 1.8 dB
SW1: 3.0 dB
SW2: 3.0 dB
8.0 dB

OUTLINE DRAWING:

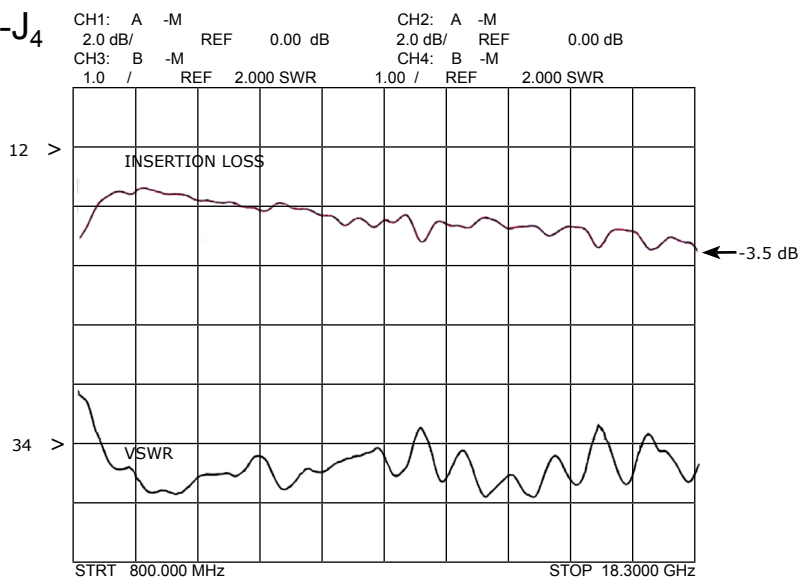


TYPICAL PERFORMANCE:

TYPICAL "ON" J_1 - J_4
"OFF" J_1 - J_3

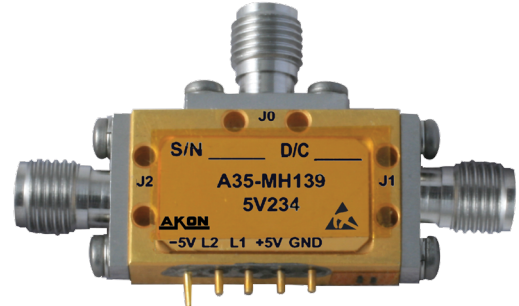


TYPICAL J_1 - J_4



FEATURES:

- 2.0 - 18.0 GHz FREQUENCY RANGE
- LOW INSERTION LOSS
- HIGH ISOLATION
- FAST SWITCHING TIMES
- SMA OR GPO CONNECTORS



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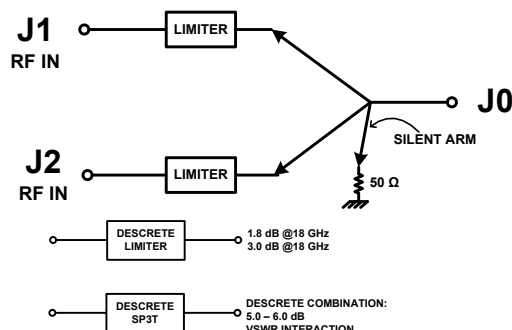
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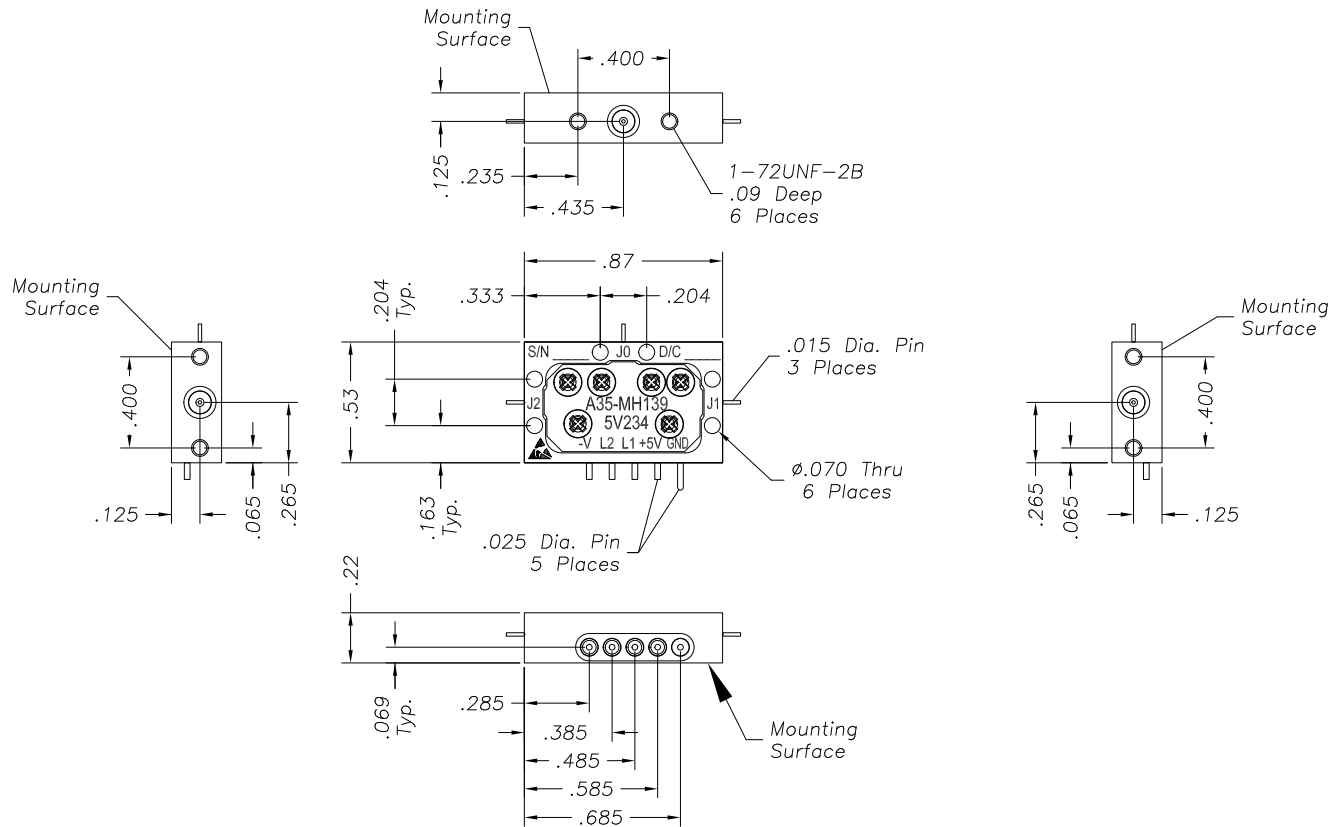
SPECIFICATIONS:

Model Number	A35-MH139
Frequency Range (GHz)	2.0 - 18.0
Switching Speed (nS)	100 (typ)
Isolation (dB)	60 (typ)
Insertion Loss (dB)	3 (max)
VSWR	2.0:1 (max)
Type	Reflective
Limiters	1 watt CW; 100W Peak; 1 us, 0.01% Duty Cycle
Power Supply (VDC)	+/- 5V (other voltage options are available)

BLOCK DIAGRAM:

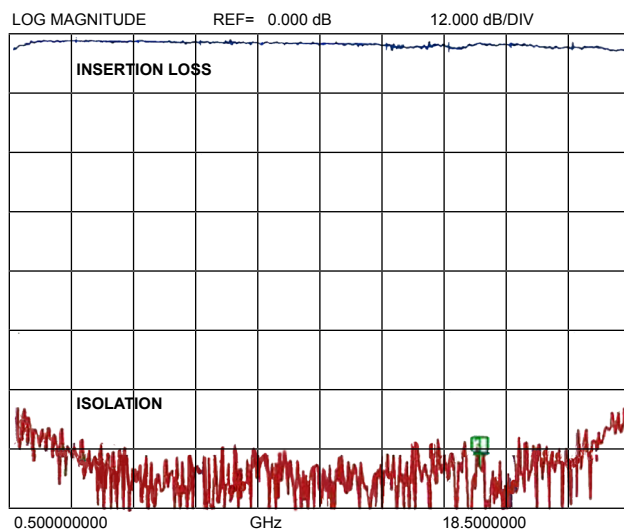


OUTLINE DRAWING:

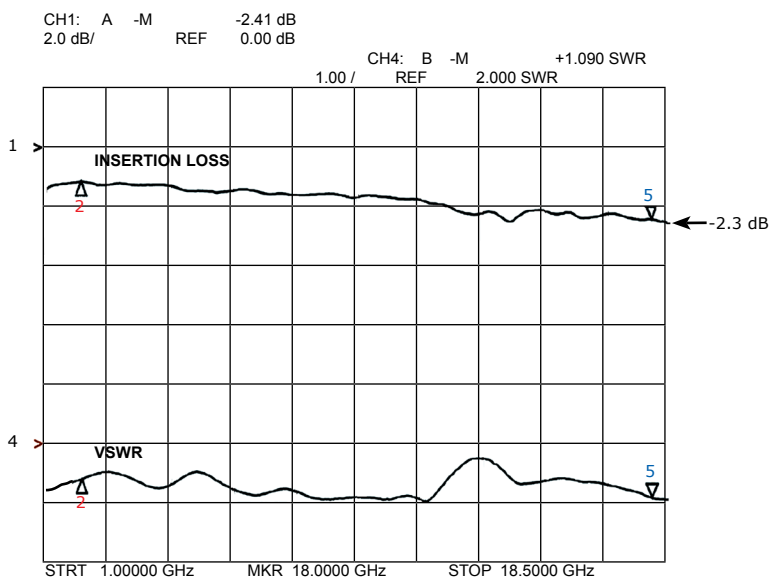


TYPICAL PERFORMANCE:

$J_0 - J_1$



$J_0 - J_2$

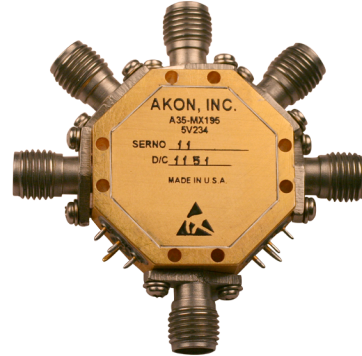


FEATURES:

- 2.0 - 18.0 GHz FREQUENCY RANGE
- LOW INSERTION LOSS
- HIGH ISOLATION
- FAST SWITCHING TIME
- SMA OR GPO CONNECTORS

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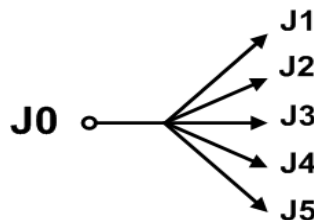
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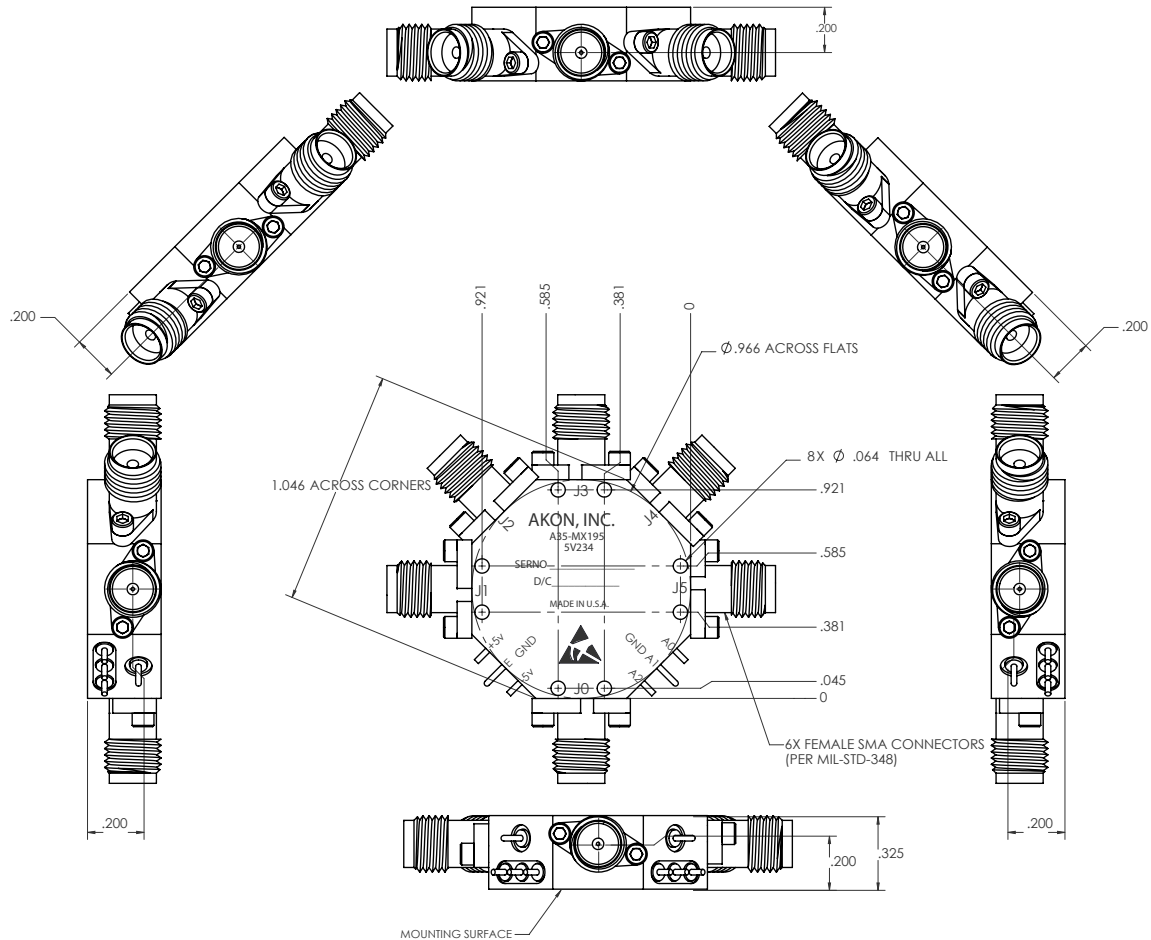
SPECIFICATIONS:

Model Number	A35-MX195
Frequency Range (GHz)	2.0 - 18.0
Switching Speed (nS)	50 (typ)
Isolation (dB)	70 (typ)
Insertion Loss (dB)	3 (max)
VSWR	2.0:1 (max)
Type	Reflective
Power Supply (VDC)	+/- 5V (other voltage options are available)
Power Handling (dBm)	+24

BLOCK DIAGRAM:



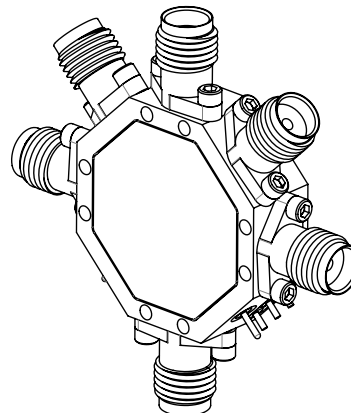
OUTLINE DRAWING:



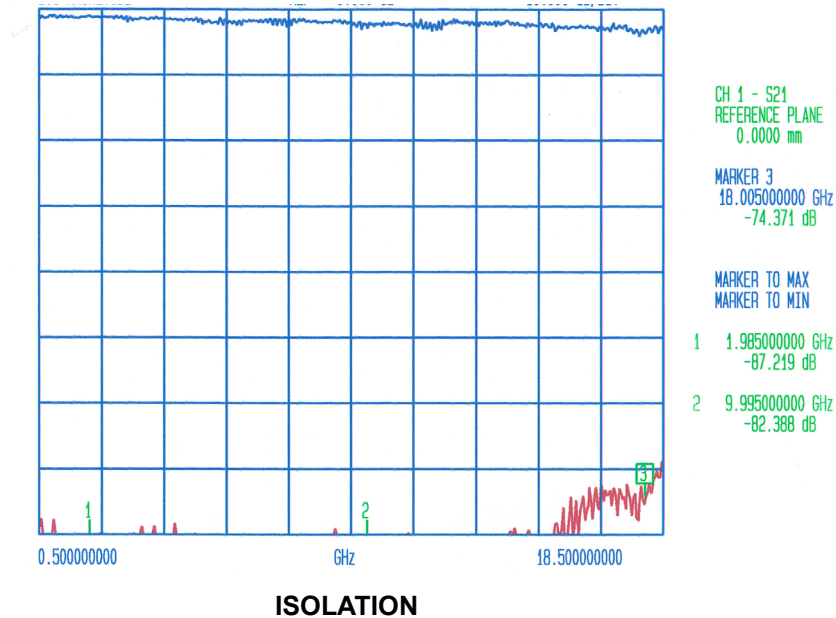
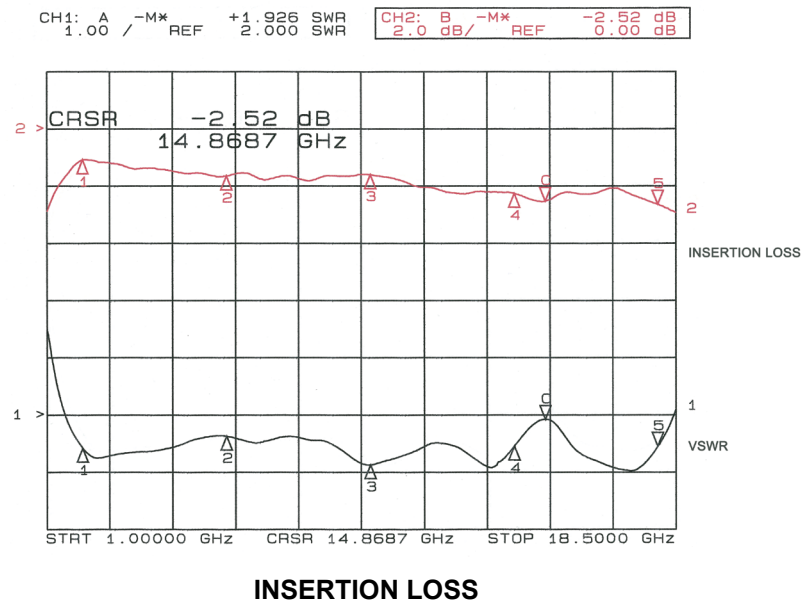
TRUTH TABLE				
A2	A1	A0	E	POSITION
0	0	1	1	J0 - J1
0	1	0	1	J0 - J2
0	1	1	1	J0 - J3
1	0	0	1	J0 - J4
1	0	1	1	J0 - J5
X	X	X	0	ALL OFF

NOTES (UNLESS OTHERWISE SPECIFIES):

- FINISH: NICKEL STRIKE: 50-150 MICROINCHES PER QQ-N-290, GRADE G.
SULFAMATE NICKEL: 100-200 MICROINCHES, PER MIL-P-27418.
GOLD PLATING PER MIL-G-45204, TYPE II, CLASS 1, GRADE C.



TYPICAL PERFORMANCE:



Band Pass Filters

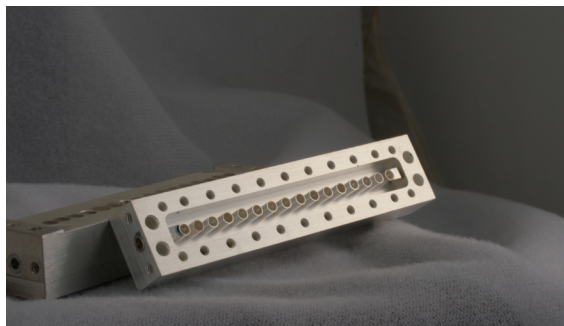
AKON is a worldwide leader in the design and manufacture of custom band pass filters. Low cost, custom filters are available in prototypes to production quantities with high performance, low loss designs. A full range of technologies is available for a wide variety of commercial and military applications.



FEATURES:

- EXCELLENT REJECTION AND SPURIOUS
- LOW PASS BAND INSERTION LOSS
- LIGHTWEIGHT, COMPACT AND ECONOMICAL
- ROBUST CONSTRUCTION

AKON's comblne filter designs incorporate high “Q” structures enabling the realization of high skirt selectivity and very low pass-band insertion loss making them ideally suited for critical receiver front-end or transmitter applications. Increased selectivity is accomplished by the addition of more resonators to the design. The filter housing is generally made from lightweight aluminum and may be silver-plated for improved electrical characteristics.



AKON comblne filters are available from 2 to 16 resonator sections with bandwidths up to 50% and operating frequencies from 1 GHz to 20 GHz. Standard connectors are SMA-F, drop-in configuration also available. Typical electrical specifications that can be enhanced include insertion loss, VSWR, power handling, and spurious response suppression. Call us regarding non-standard parameters. Please consult our sales department for further details.

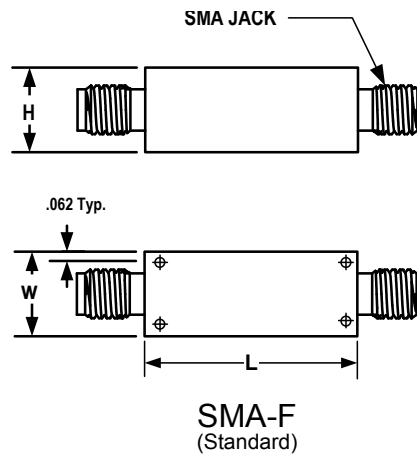
BAND PASS:

Model	Passband (GHz)	Insertion Loss (dB)	Lower Stopband (GHz)	Upper Stopband (GHz)	VSWR	Size (Inches) (L x H x W)
A65-MH002	6.0 - 10.0	1.0	75 dB (DC to 5.1)	75 dB (11.5 to 18.0)	1.8:1	2.9 x 0.6 x 0.5
A65-MH003	10.0 - 14.0	1.0	75 dB (DC to 8.5)	75 dB (16.1 to 26.0)	1.8:1	2.9 x 0.7 x 0.5
A65-MH004	14.0 - 18.0	1.0	75 dB (DC to 11.9)	75 dB (20.7 to 30.0)	1.8:1	2.9 x 0.6 x 0.5
A65-MH005	2.0 - 6.0	2.5	65 dB (DC to 1.7)	45 dB (6.9 to 18.0)	2.0:1	2.9 x 0.7 x 0.5
A65-MH011	11.9 - 12.1	2.5	60 dB (DC to 11.5)	60 dB (12.5 to 24.0)	1.5:1	2.3 x 0.6 x 0.5
A65-MH012	10.0 - 11.0	1.0	65 dB (DC to 8.5)	65 dB (12.65 to 22.0)	1.5:1	2.25 x 0.6 x 0.38
A65-MH044	5.7 - 8.3	1.2	60 dB (DC to 5.0)	60 dB (8.7 to 18.0)	1.8:1	2.5 x 0.4 x 0.5
A65-MH045	8.7 - 11.3	1.3	60 dB (DC to 7.9)	60 dB (11.85 to 18.0)	1.8:1	2.8 x 0.4 x 0.5
A65-MH046	10.7 - 13.3	1.0	60 dB (DC to 8.5)	60 dB (14.6 to 24.0)	1.8:1	1.9 x 0.4 x 0.5
A65-MH047	12.7 - 15.3	1.0	60 dB (DC to 10.4)	60 dB (16.7 to 24.0)	1.8:1	1.9 x 0.35 x 0.5
A65-MH048	14.7 - 16.3	1.0	60 dB (DC to 12.7)	60 dB (17.7 to 30.0)	1.8:1	1.9 x 0.4 x 0.5
A65-MH049	15.7 - 18.3	1.0	60 dB (DC to 13.6)	60 dB (19.8 to 24.0)	1.8:1	1.9 x 0.4 x 0.5
A65-MH050	0.99 - 1.010	2.0	60 dB (DC to 0.9)	60 dB (1.1 to 5.9)	1.5:1	1.5 x 0.4 x 1.2
A65-MH051	3.5 - 6.6	1.0	50 dB (DC to 0.5)	60 dB (7.6 to 18.0)	2.0:1	1.8 x 0.4 x 0.5
A65-MH052	5.4 - 10.0	1.0	50 dB (DC to 1.0)	60 dB (11.5 to 18.0)	2.0:1	1.8 x 0.4 x 0.5
A65-MH053	7.65 - 15.0	1.0	50 dB (DC to 1.0)	60 dB (17.0 to 24.0)	2.0:1	1.8 x 0.4 x 0.5
A65-MH054	11.5 - 20.0	1.0	50 dB (DC to 1.0)	60 dB (23.0 to 30.0)	2.0:1	1.8 x 0.4 x 0.5
A65-MH055	9.0 - 21.0	2.0	50 dB (DC to 2.4)	60 dB (23.5 to 30.0)	2.0:1	1.6 x 0.3 x 0.5
A65-MH056	6.0 - 7.1	1.0	60 dB (DC to 4.9)	60 dB (7.9 to 18.0)	1.5:1	2.0 x 0.4 x 0.5
A65-MH057	7.2 - 8.3	1.0	60 dB (DC to 5.7)	60 dB (9.4 to 18.0)	1.8:1	2.0 x 0.4 x 0.5
A65-MH058	8.4 - 15.6	1.0	50 dB (DC to 2.5)	60 dB (17.8 to 24.0)	2.0:1	1.6 x 0.3 x 0.5
A65-MH059	8.4 - 9.5	1.0	60 dB (DC to 6.9)	60 dB (10.6 to 18.0)	1.5:1	2.0 x 0.4 x 0.5
A65-MH060	10.8 - 12.0	1.0	60 dB (DC to 9.3)	60 dB (13.2 to 22.0)	1.8:1	2.0 x 0.4 x 0.5

BAND PASS (CONT'D):

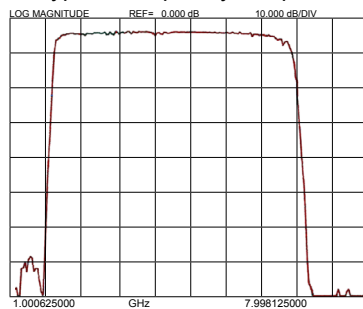
Model	Passband (GHz)	Insertion Loss (dB)	Lower Stopband (GHz)	Upper Stopband (GHz)	VSWR	Size (Inches) (L x H x W)
A65-MH061	9.6 - 10.8	1.0	60 dB (DC to 8.8)	60 dB (11.5 to 22.0)	1.5:1	2.4 x 0.4 x 0.5
A65-MH062	12.0 - 13.2	1.0	60 dB (DC to 11.0)	60 dB (14.2 to 24.0)	1.5:1	2.4 x 0.4 x 0.5
A65-MH063	13.2 - 14.4	1.5	60 dB (DC to 12.2)	60 dB (15.4 to 24.0)	1.5:1	2.2 x 0.4 x 0.5
A65-MH064	14.5 - 15.6	1.5	60 dB (DC to 13.5)	60 dB (16.5 to 24.0)	1.5:1	2.2 x 0.4 x 0.5
A65-MH065	15.7 - 16.8	1.5	60 dB (DC to 14.8)	60 dB (17.7 to 24.0)	1.5:1	2.2 x 0.4 x 0.5
A65-MH066	16.9 - 18.0	1.5	60 dB (DC to 16.0)	60 dB (18.9 to 24.0)	1.5:1	2.2 x 0.4 x 0.5
A65-MH067	8.3 - 8.5	1.0	60 dB (DC to 7.2)	60 dB (9.6 to 18.0)	1.5:1	1.7 x 0.4 x 0.5
A65-MH068	9.5 - 9.7	1.0	60 dB (DC to 8.4)	60 dB (10.8 to 18.0)	1.5:1	1.6 x 0.4 x 0.5
A65-MH076	9.5 - 11.0	1.0	60 dB (DC to 8.0)	60 dB (15.6 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH077	11.5 - 12.5	1.0	60 dB (DC to 14.4)	60 dB (12.6 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH078	13.0 - 14.5	1.0	60 dB (DC to 9.7)	60 dB (14.4 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH079	15.0 - 16.5	1.0	60 dB (DC to 12.7)	60 dB (18.28 to 24.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH080	17.0 - 18.5	1.0	60 dB (DC to 14.4)	60 dB (21.0 - 24.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH081	9.5 - 13.5	1.0	60 dB (DC to 6.6)	60 dB (17.5 to 24.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH082	14.0 - 18.5	1.0	60 dB (DC to 9.8)	60 dB (24.0 to 26.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH083	6.0 - 7.0	1.0	50 dB (DC to 5.5)	50 dB (7.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH084	7.0 - 8.0	1.0	50 dB (DC to 6.5)	50 dB (8.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH085	8.0 - 9.0	1.0	50 dB (DC to 7.5)	50 dB (9.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH086	9.0 - 10.0	1.0	50 dB (DC to 8.5)	50 dB (10.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH087	10.0 - 11.0	1.0	50 dB (DC to 9.5)	50 dB (11.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH088	11.0 - 12.0	1.0	50 dB (DC to 10.5)	50 dB (12.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH089	12.0 - 13.0	1.0	50 dB (DC to 11.5)	50 dB (13.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH090	13.0 - 14.0	1.0	50 dB (DC to 12.5)	50 dB (14.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH091	14.0 - 15.0	1.0	50 dB (DC to 13.5)	50 dB (15.5 to 18.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH092	15.0 - 16.0	1.0	50 dB (DC to 14.5)	50 dB (16.5 to 24.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH093	16.0 - 17.0	1.0	50 dB (DC to 15.5)	50 dB (17.5 to 24.0)	1.5:1	1.8 x 0.4 x 0.5
A65-MH094	17.0 - 18.0	1.0	50 dB (DC to 16.5)	50 dB (18.5 to 24.0)	1.5:1	1.8 x 0.3 x 0.5

CONFIGURATION:

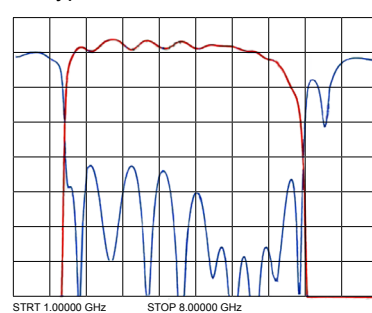


TYPICAL PERFORMANCE:

Typical Frequency Response



Typical Return/Insertion Loss



Fast Stepping LO Assemblies

AKON offers an expanding line of supercomponents which now includes custom LO Assemblies. Akon's LO Assemblies use a crystal oscillator (TCXO or OCXO) as a reference. Active multiplication with filtering is used to achieve frequencies up to 20.0 GHz.



FAST STEPPING LO ASSEMBLIES - OVERVIEW

- **Complimentary Product to AKON's Tuner Line**
- **Provide variable (stepped) and fixed frequency outputs**
- **Step size 10 MHz to 500 MHz depending on Tuner requirements**
- **Tuning Speed < 100 nanoseconds**
- **External Reference Input**
- **High stability OCXO**
- **Frequencies generated by direct multiplication, mixing, filtering, switching**
- **Multiple outputs can drive multiple tuners**



2135 Ringwood Ave. San Jose, CA 95131 Tel. (408) 432-8039 Fax (408) 432-1089
www.akoninc.com sales@akoninc.com

FEATURES:

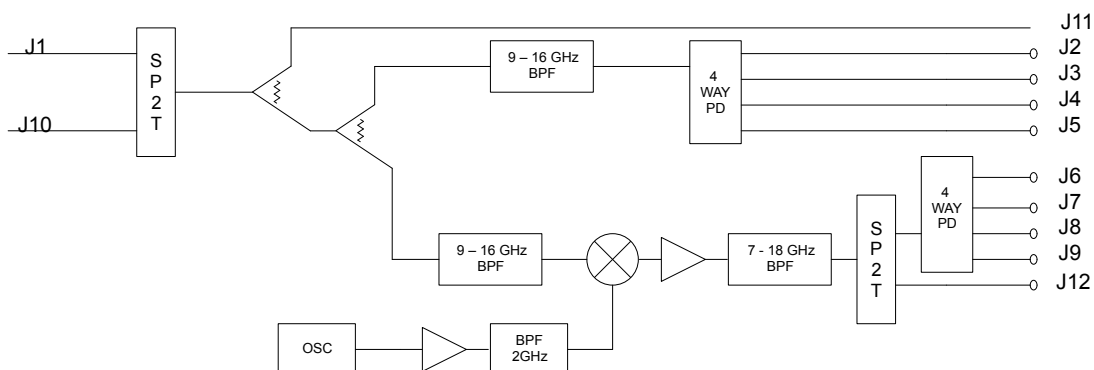
- **FREQUENCY RANGE: 7.0 – 18.0 GHZ**
- **AMPLITUDE MATCHING: < 0.4 DB**
- **PHASE MATCHING: < 7°**
- **TTL CONTROL: 1 BIT**
- **INTERNAL OSCILLATOR: 1.0 GHZ**

AKON is a leading manufacturer of RF/ microwave components and subsystems for military, space and commercial applications. AKON's line of products includes high reliability custom integrated microwave assemblies, DIFM receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO Assemblies, frequency converters, RF Switches, RF attenuators and microwave amplifiers covering 2 - 18 GHz frequency range (up to 26.5 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the US Department of Defense as well as several governmental space agencies. Screening to requirements of MIL-STD-883 are available at additional cost. All specifications described below are over the full operating temperature.

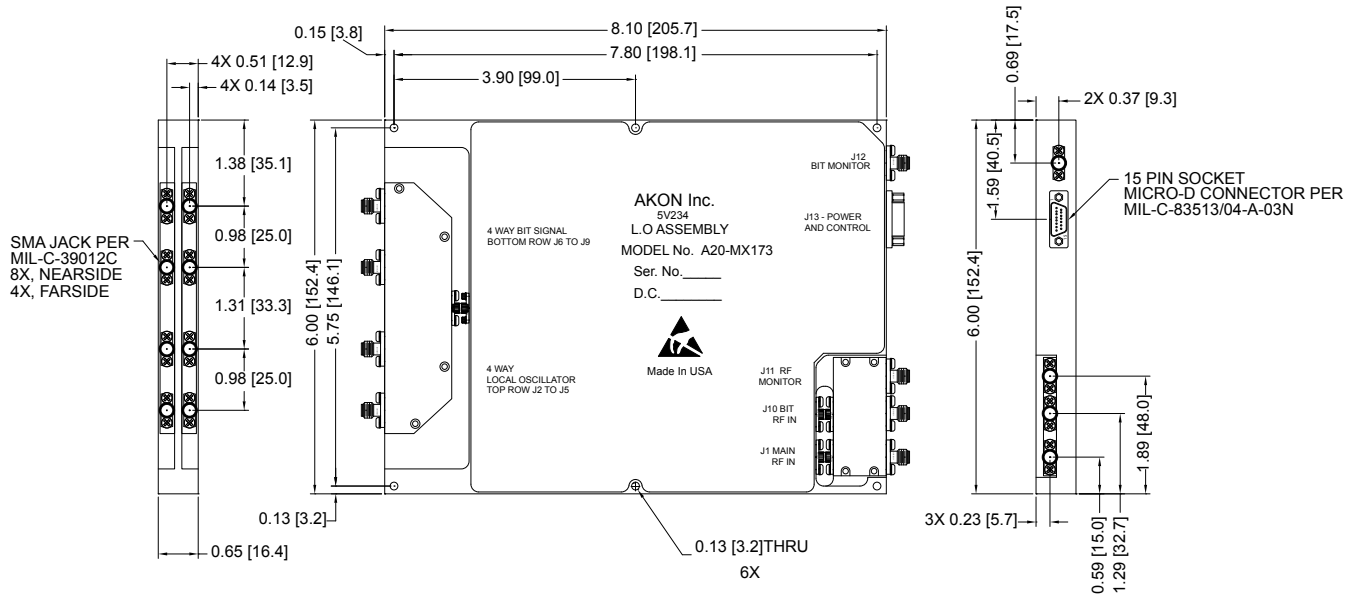
SPECIFICATIONS:

Model Number	A20-MX173
J1/ J10 (GHz) RF/BITE IN (dBm)	9 - 16 (+10 (min))
J11 (GHz) RF Monitor (dBm)	9 - 16 (+6 (nom))
J12 (GHz) BITE Monitor (dBm)	7 - 18 (-6 (nom))
J2, J3, J4, J5 (GHz) LO (GHz)	9 to 16
Amplitude Matching (dB)	0.4
Phase Match (°)	7 (nom)
J6, J7, J8, J9 (GHz) BITE (dBm)	7 -18 (-13 (nom))
SP2T Control (dB)	60 (min)
TTL control (bits)	1
Internal Oscillator (GHz)	@ 1.0
Power(VDC)	+8 @ 350 mA -8 @ 100 mA; 3.6 Watts

BLOCK DIAGRAM:



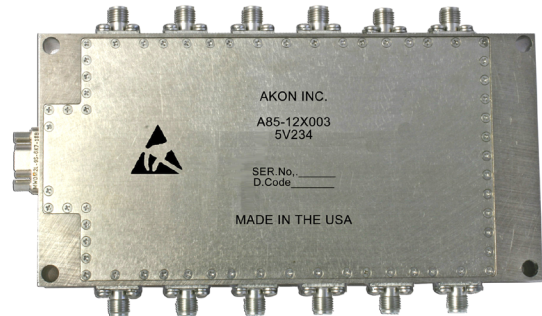
OUTLINE DRAWING:



FEATURES:

- 4, 5 and 6 GHz FREQUENCY RANGES
- < 200 KHz FREQUENCY ACCURACY
- -9 dBm MIN OUTPUT POWER LEVEL
- 2 Bit TTL CONTROL
- -30 dBc MAX SPURIOUS LEVELS

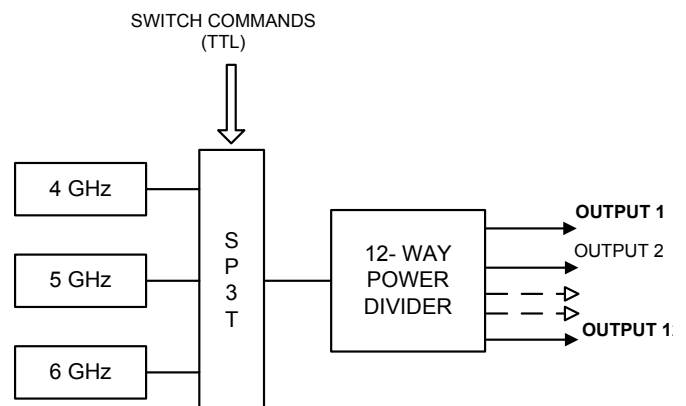
AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications. AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 0.5 - 18.0 GHz frequency range (up to 40 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.



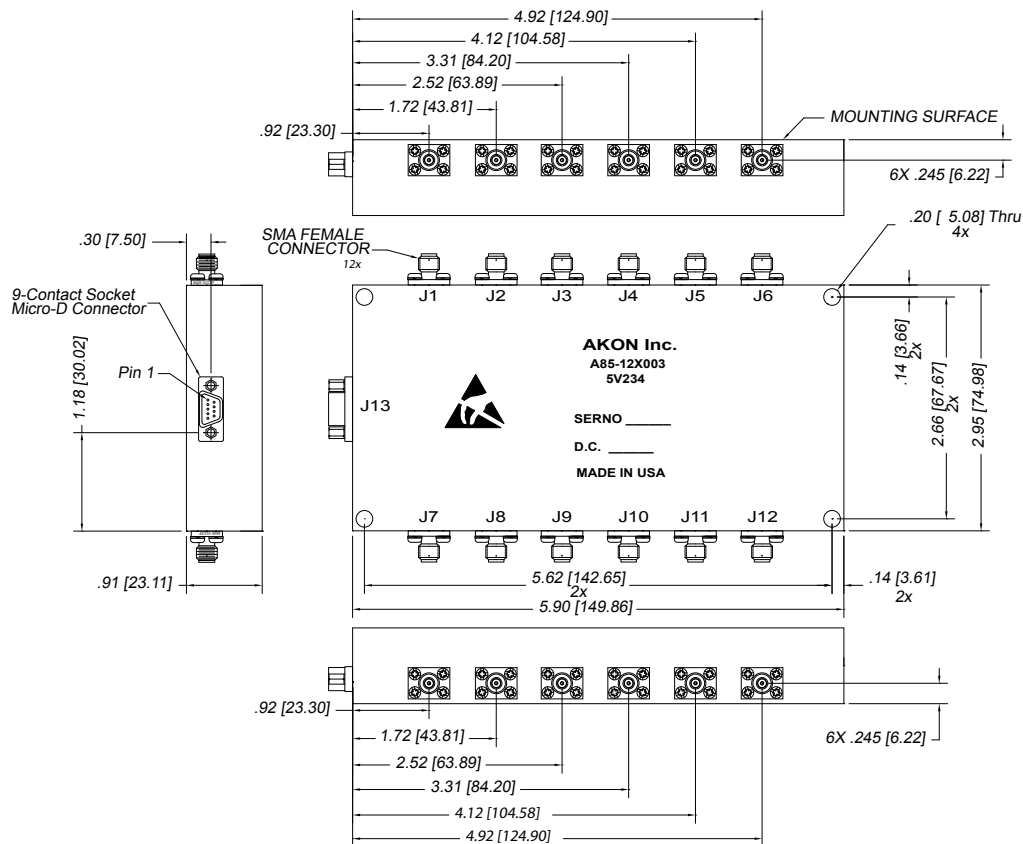
SPECIFICATIONS:

Model Number	A85-12X003
LO Phase Noise (dBc/Hz)	-55@ 1 KHz away from Fc (min)
LO 1 Frequency (GHz)	4
LO 2 Frequency (GHz)	5
LO 3 Frequency (GHz)	6
Switching Time (uS)	< 1
Output Power Level (dBm)	-9 (min) at each LO output
Frequency Accuracy (KHz)	< 200
# LO Output Ports	12
LO Radiation (dBc)	-90 (max)
Power Supply (V)	+/- 8.5
Frequency Selection	2 bit TTL
Spurious levels (dBc)	-30 (max)

BLOCK DIAGRAM:



OUTLINE DRAWING:



9-PIN MICRO-D CONNECTOR	
PIN NO.	DESCRIPTION
1	+8.5V
2	+8.5V RTN
3	-8.5V
4	-8.5V RTN
5	SPARE
6	LOGIC BIT A1
7	LOGIC BIT A0
8	LOGIC BIT RTN
9	SPARE

J1-J12	LO Output
J13	POWER SUPPLY and CONTROL

FEATURES:

- **EXTREMELY HIGH SPEED: 70 ns**
- **500 MHz STEP SIZE VARIABLE OUTPUT**
- **FIXED 5.5 GHz OUTPUT**
- **5 BITS SINGLE ENDED TTL CONTROL**
- **+/- 8V POWER SUPPLY**
- **EXTERNAL REFERENCE INPUT OPTION**
- **HIGH STABILITY OCXO**
- **FREQUENCIES GENERATED BY DIRECT MULTIPLICATION, MIXING, FILTERING AND SWITCHING**
- **MULTIPLE OUTPUTS CAN DRIVE MULTIPLE TUNERS**



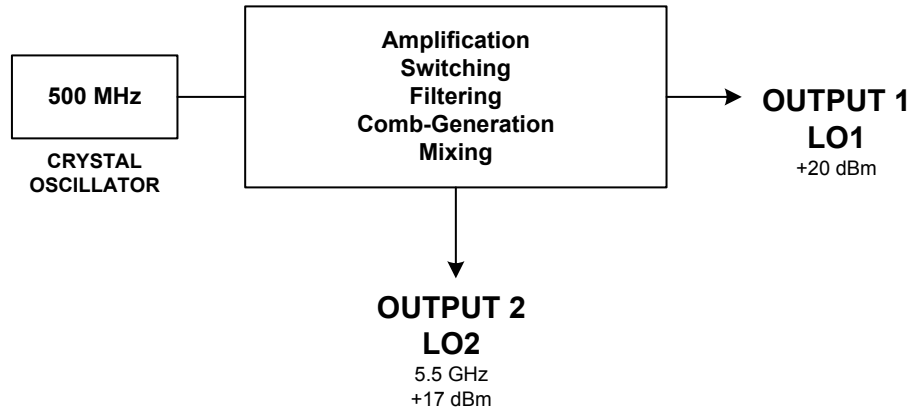
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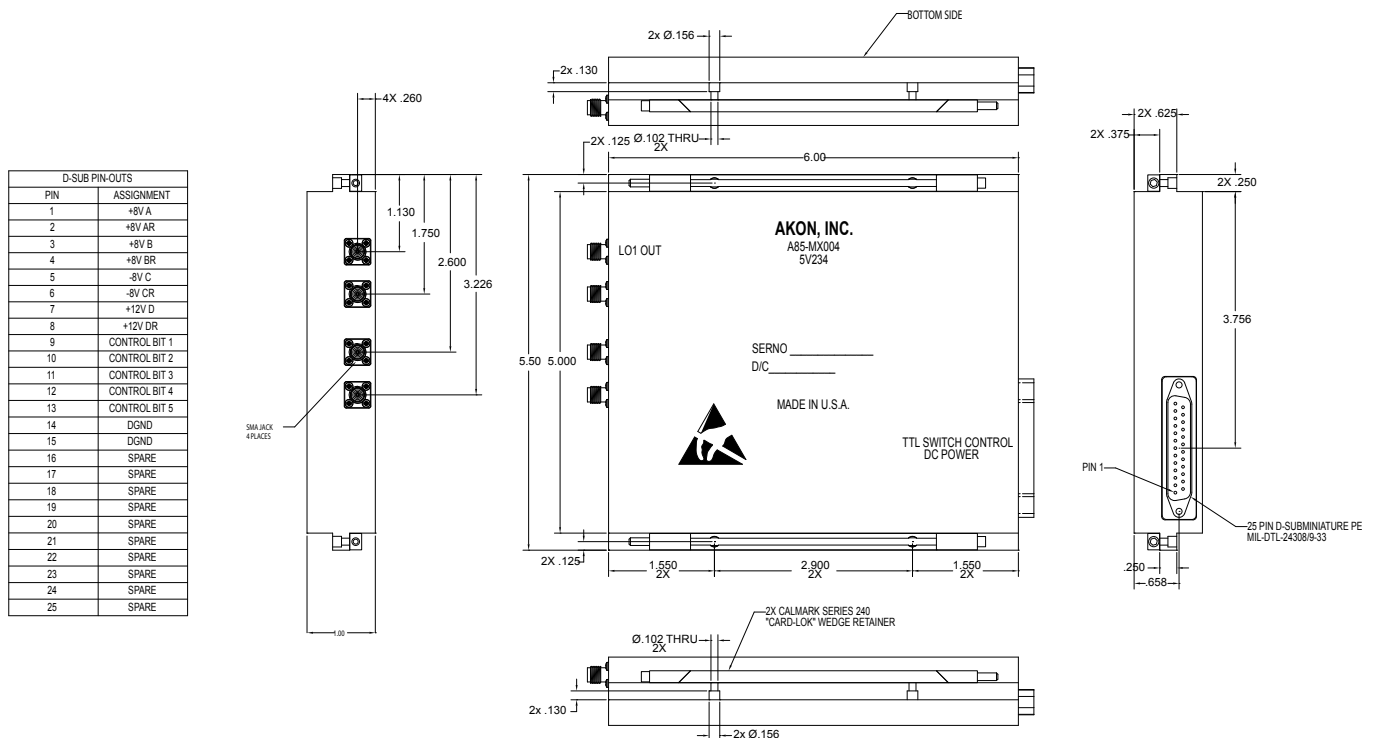
SPECIFICATIONS:

Model Number	A85-MX004
Frequency Range (GHz)	9.5 - 18.5
Step Size (MHz)	500
# of LO Ports per each output	2
Output 1	Variable- 500 MHz Step
Output 2	Fixed 5.5 GHz
Output 1 (dBm)	+20 (nom)
Output 2 (dBm)	+17 (nom)
Control (Bits)	5 (single ended TTL)
Speed (nS)	70 (max)
Harmonics (dBc)	-50 (nom)
Frequency Accuracy (ppm)	+/- 30 (max)
Spurious (dBc)	-50 (nom)
Power Supply	+8V / -8V DC
WedgeLock	On 6.0" x 1.0" side

BLOCK DIAGRAM:



OUTLINE DRAWING:



RF Sources

AKON now offers a comprehensive line of frequency synthesizer products, available in two basic varieties. For general purpose applications, we offer a VCO based solution which can provide tuning speeds in the order of 110 microseconds. For high performance applications, we offer units utilizing Direct Digital Synthesis (DDS). VCO based units feature 1.0 MHz step size while DDS units feature 10 MHz step size. Both types are available with optional output pulse modulators and digitally controlled attenuators.



FEATURES:

- 6.0 - 18.0 GHz FREQUENCY RANGE
- 100 nS RESPONSE TIME
- TTL INTERFACE
- AMPLITUDE CONTROL OVER 60 dB
- HARMONICS -20 dBc (-60 dBc WITH SFB)
- LOW PHASE NOISE
- 100 MHz STEP SIZE
- CRYSTAL REFERENCE

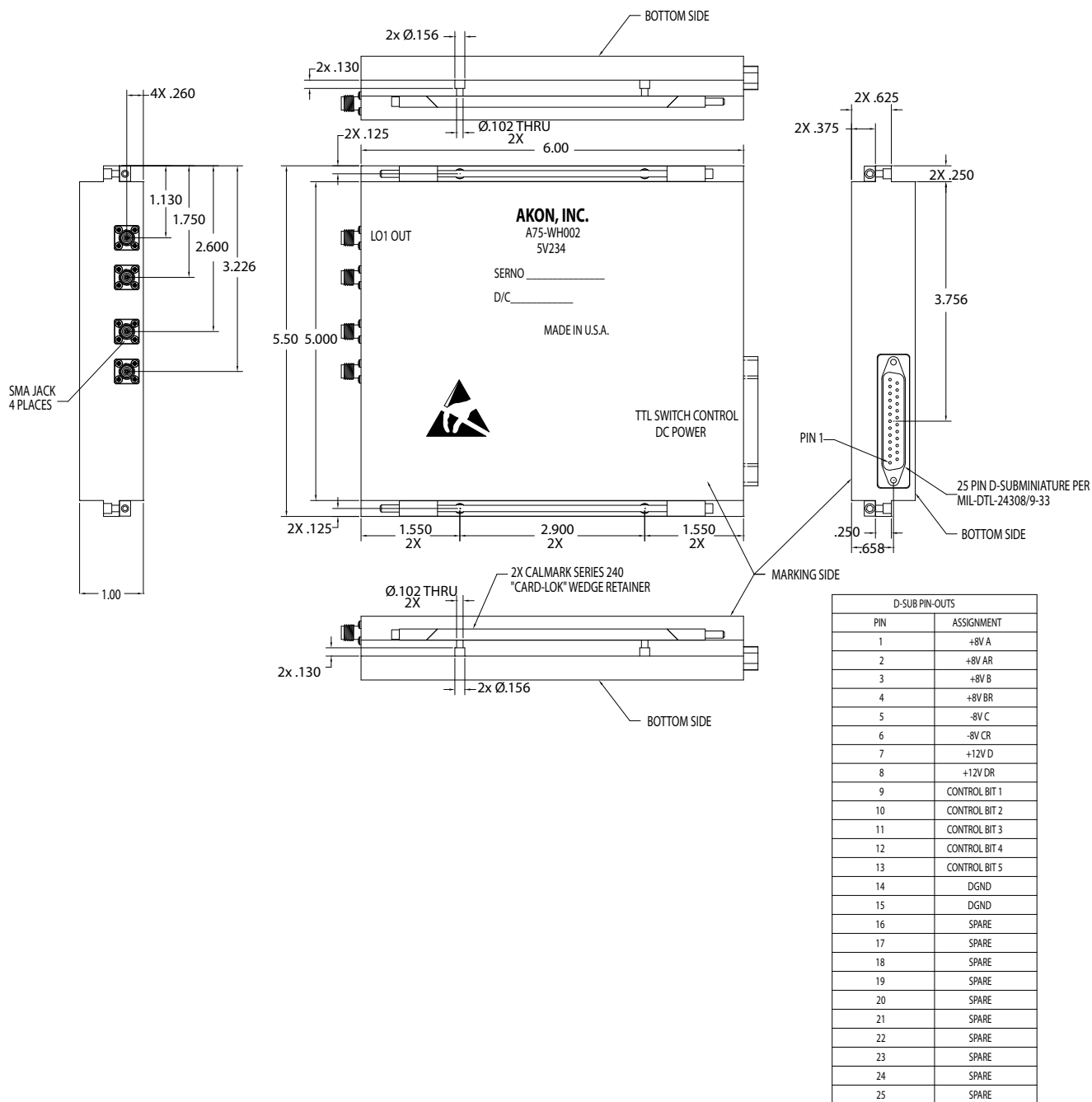


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SPECIFICATIONS:

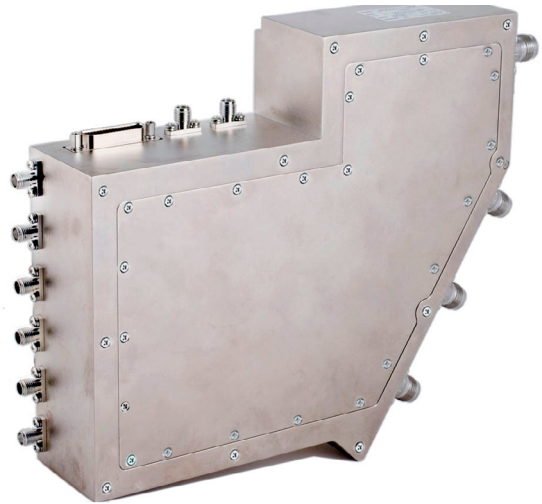
Model Number	A75-WH002
RF Output Port 1 (GHz)	5.5 (Fixed)
RF Output Port 2 (GHz)	6.0 - 18.0 (Tunable)
Step Size (MHz) * (see options)	100
Setting Accuracy (ppm)	+/- 30
Setting Time (nS)	100 (max)
Output Power Level (dBm)	10 (min)
Spurious (dBc)	-50
Harmonics (dBc)	-60
Phase Noise (dBc/Hz)	-90 @ 1 KHz -110 @ 10 KHz -115 @ 100 KHz
Power Supply (VDC)	+/- 8 or +/- 15
Synthesizer Control Discrete Lines	Digital Tuning (TTL Logic)
Operating Temperature (°C)	-40 to +71
Options:	
1. Frequency Range (GHz)	0.5 to 30.0
2. Step Size (MHz)	10, 100 or 500

OUTLINE DRAWING:



Switch Matrices

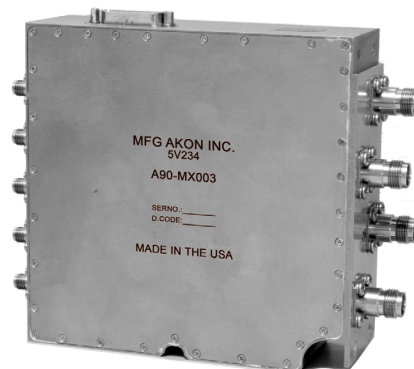
AKON is one of the leading suppliers of switch matrix products. All switch matrices are custom built to customer specifications. These matrices are used on variety of test platforms, simulator systems etc.



FEATURES:

- 3 x 6 MATRIX
- HIGH SPEED ABSORPTIVE SWITCHES
- MULTIPLE CROSSOVERS
- 6 dB NOISE FIGURE
- 20 nS RECOVERY TIME
- 70 dB ISOLATION

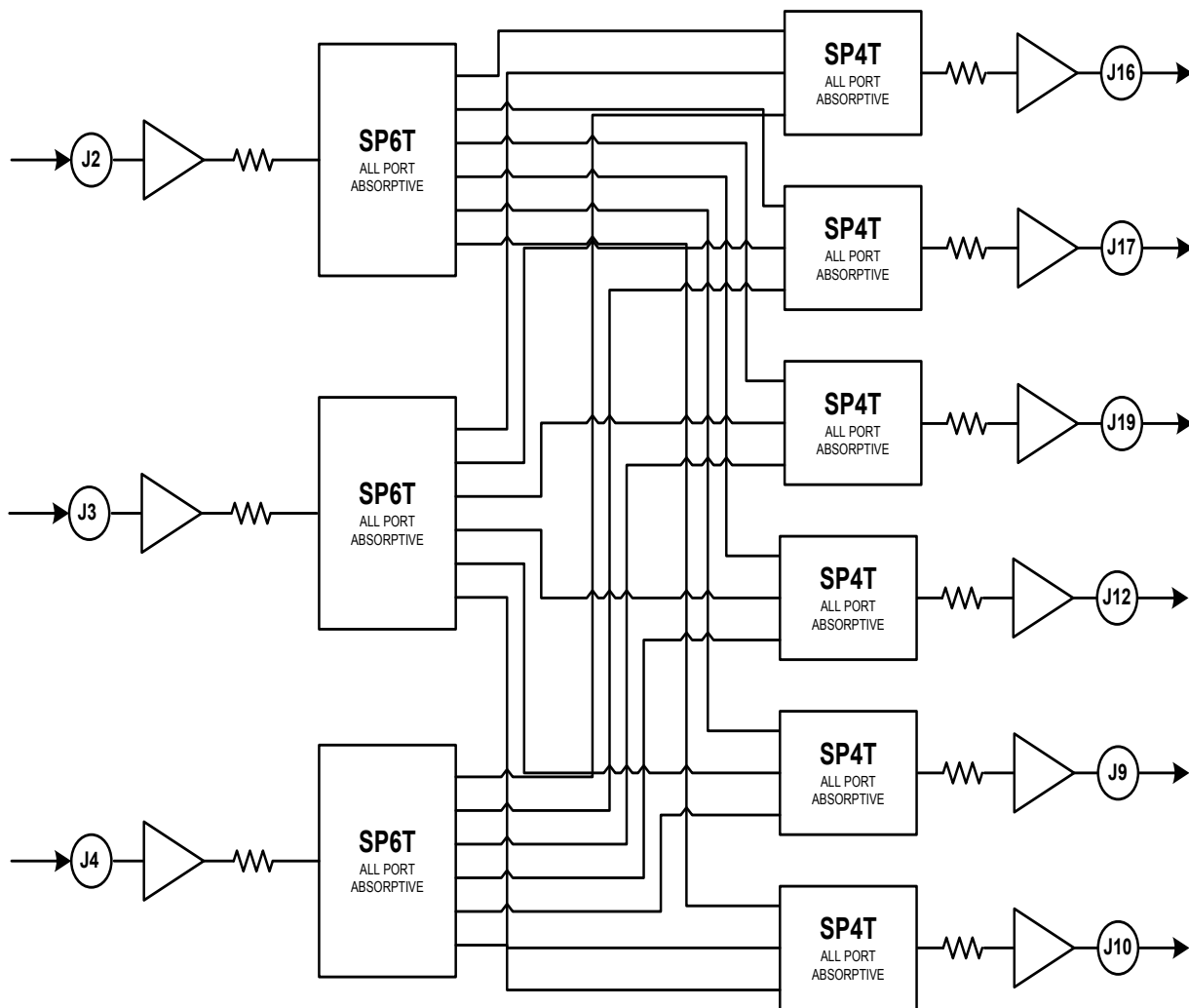
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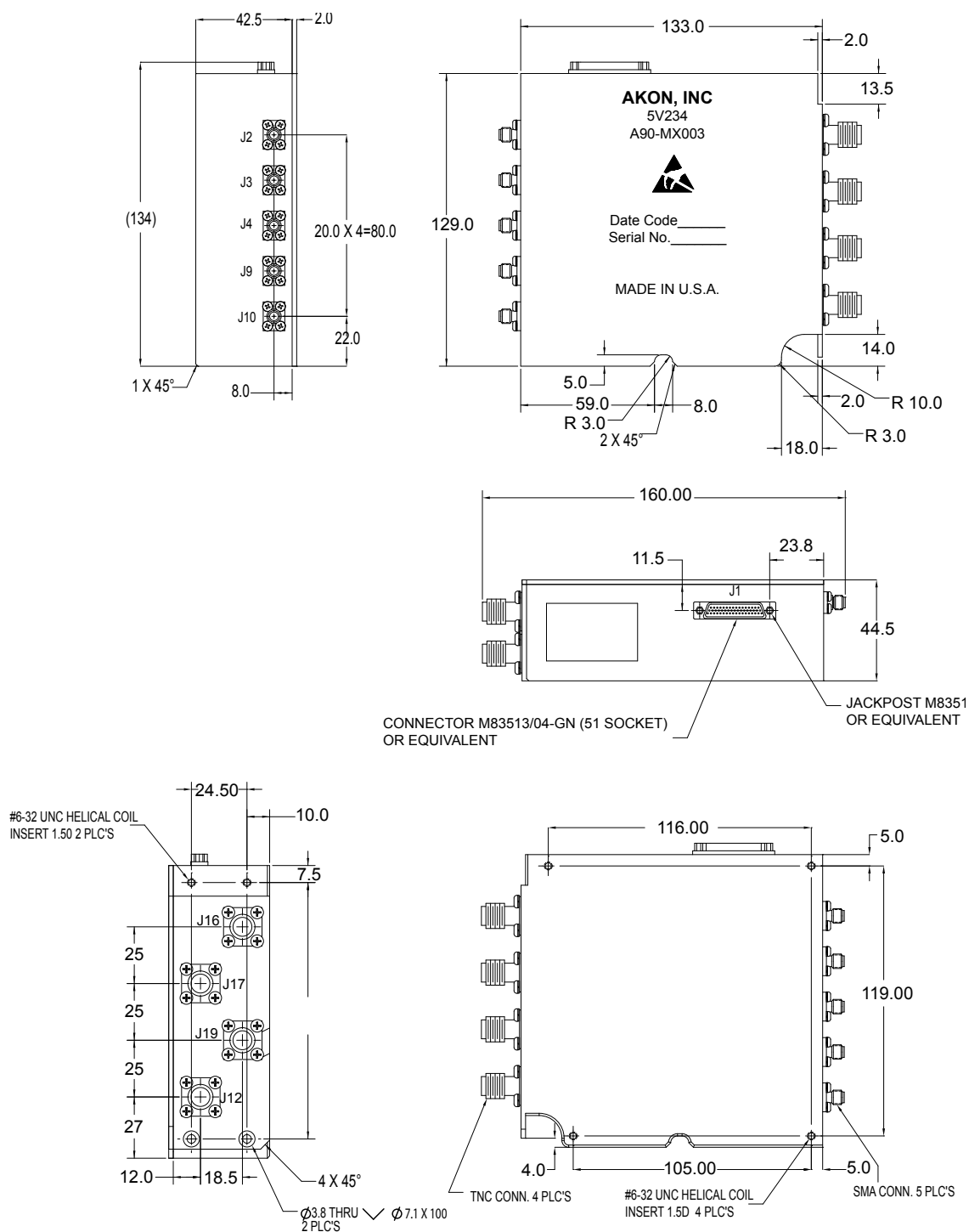
SPECIFICATIONS:

Model Number	A90-MX003
Frequency Range (GHz)	6.0 - 18.0
Power Handling (dBm)	-50 to + 8 (min)
Small Signal Gain (dB)	9 to 11
Frequency Flatness (dB)	< 2
Noise Figure (dB)	6 (max)
Output Power (dBm) (for 1dB gain compression)	+16 to +14 (min)
Output Power (dBm)	20.0 (max)
Harmonics (dBc)	-20.0 (2nd Level) -30.0 (3rd Level)
Isolation (dB)	70 (min)
Recovery Time (nS)	20 (max)
VSWR	2.0:1 (max)
Impedance (ohms)	50
RF Input Power (dBm)	+23 (max) (for CW mode) +27 (max) (for pulse mode)
Switching Speed (nS) (50% TTL Control to 90% RF Output)	50 (max)
Power Supply (VDC)	+12.0 @ 1.2A +5.0 @ 1.0A -12.0 @ 0.75A

BLOCK DIAGRAM:



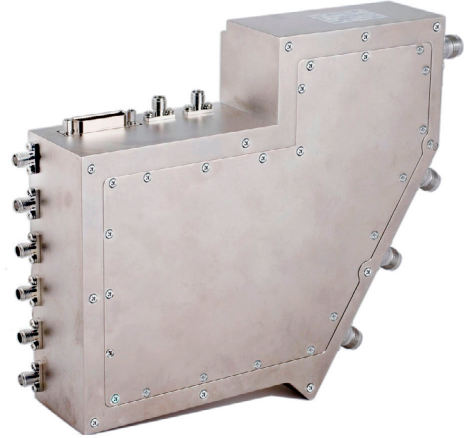
OUTLINE DRAWING:



FEATURES:

- 10 x 6 MATRIX
- HIGH SPEED ABSORPTIVE SWITCHES
- MULTIPLE AMPLIFIERS, SWITCHES, POWER DIVIDERS
- 20 nS RECOVERY TIME
- 65 dB ISOLATION BETWEEN ANY TWO PORTS

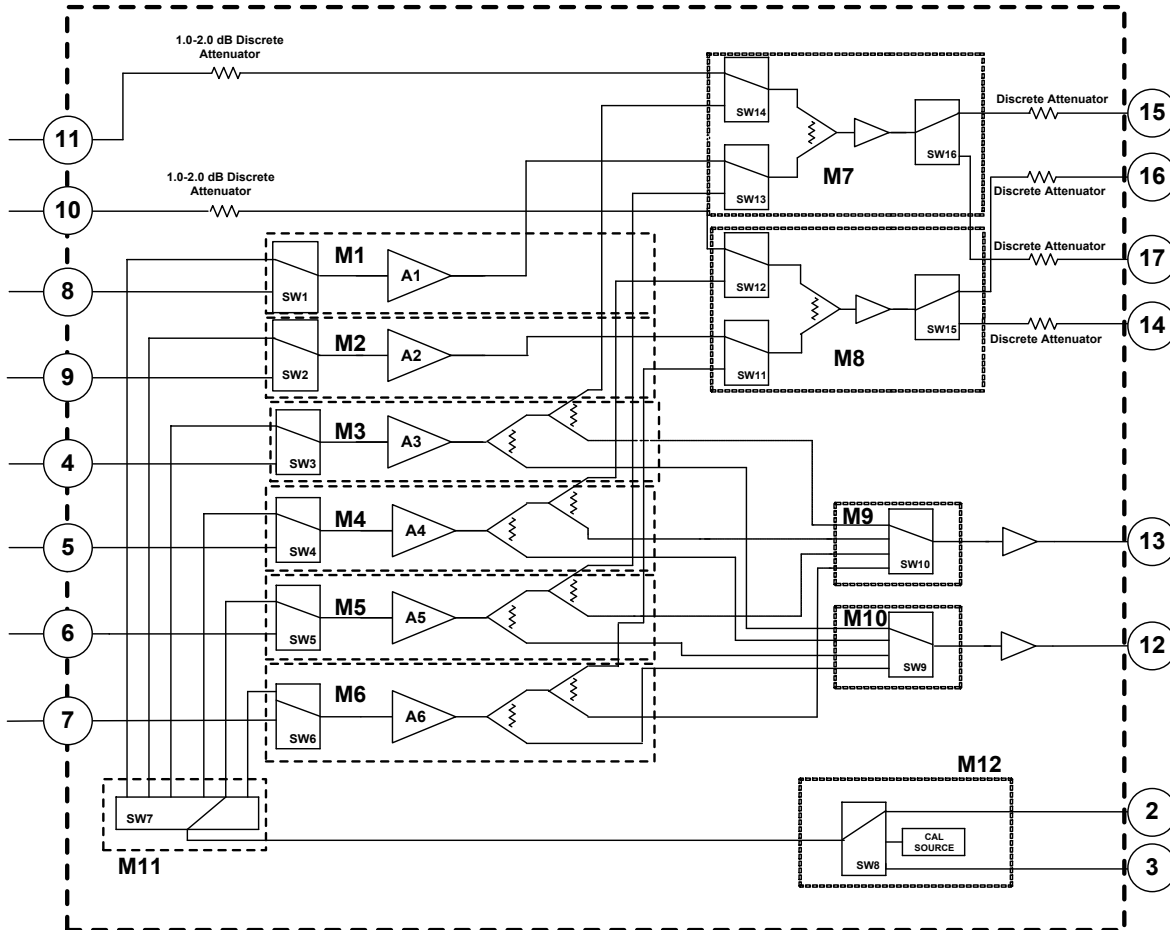
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SPECIFICATIONS:

Model Number	A90-MX004
Frequency Range (GHz)	2.0 - 18.0
Power Handling (dBm)	-70 to +13 (P4 - P7) -65 to +22 (P11- P10) -15 to +15 (P2 - P3)
Frequency Flatness (dB)	+/- 2
Noise Figure (dB)	8 (max)
Output Power (dBm)	< +23 (max)
Harmonics (dBc)	-20.0 (2nd harmonic) (min) -30.0 (3rd harmonic) (min)
Isolation (dB)	70 (min)
Recovery Time (nS)	20 (max)
Propagation Delay (nS)	2.0 (max)
VSWR	2.0:1 (max)
RF input Power (dBm)	+23.0 (for CW mode) +27.0 (for pulse mode)
Switching Speed (nS)	50 (max)
Power Supply (VDC)	+12.0 @ 2A +5.0 @ 1A -12.0 @ 0.6A
Size	7.4" x 6.8" 1.8"

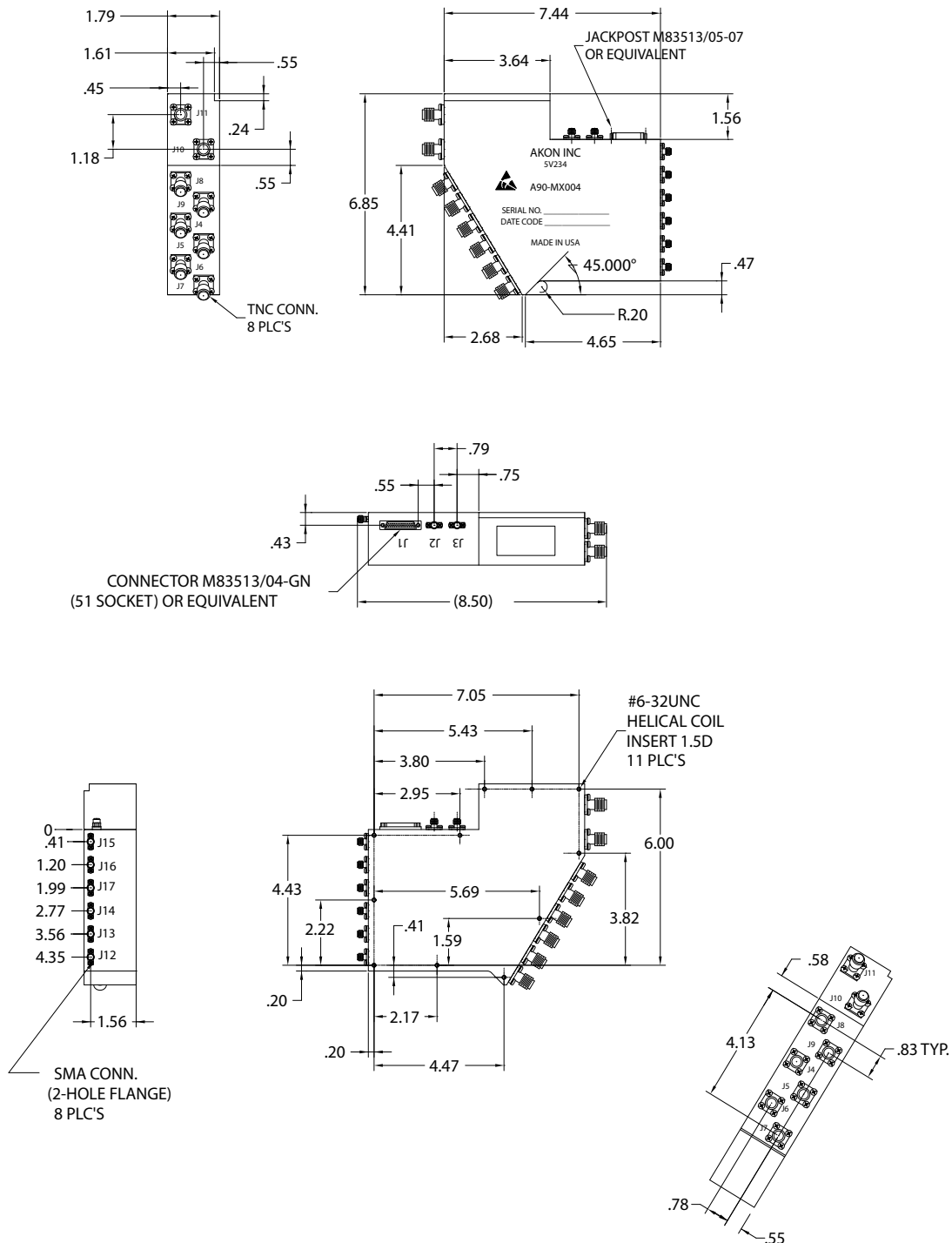
BLOCK DIAGRAM:



Small Signal Gain / Loss (Gain window)

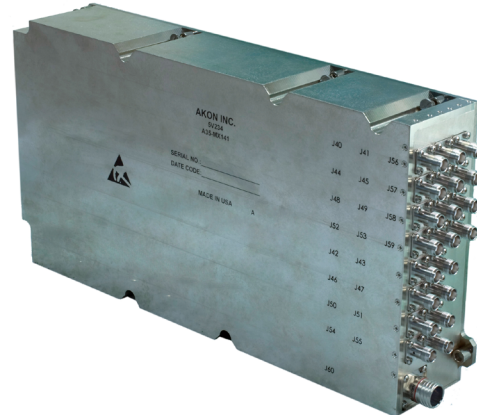
Port 10, 11 to 14, 15, 16, 17	-4.5 to -11.5 dB (± 3.5 dB)
Port 8, 9 to 14, 15, 16, 17	+1.0 to +8.0 dB (± 3.5 dB)
Port 4, 5 to 14, 15, 16, 17	+2.5 to -5.5 dB (± 4.0 dB)
Port 6, 7 to 14, 15, 16, 17	+13.5 to +5.5 dB (± 4.0 dB)
Port 4, 5 to 12, 13	+0.5 to +7.5 dB (± 3.5 dB)
Port 6, 7 to 12, 13	+11.5 to +18.5 dB (± 3.5 dB)
Port 2, 3 to 14, 15, 16, 17	-7.0 to +1.0 dB (± 4.0 dB)
Port 2, 3 to 14, 15, 16, 17	-4.0 to -14.5 dB (± 5.25 dB)
Port 2, 3 to 14, 15, 16, 17	+7.0 to -3.5 dB (± 5.25 dB)
Port 2, 3 to 12, 13	-0.5 to -8.0 dB (± 3.75 dB)
Port 2, 3 to 12, 13	+3.0 to +10.5 dB (± 3.75 dB)

OUTLINE DRAWING:



FEATURES:

- 0.5 - 18.0 GHz FREQUENCY RANGE
- +/- 8° DEGREES PHASE TRACKING
- 15 dBm OPERATING INPUT POWER
- 50 NS SWITCHING SPEED (10/90% RF)
- -40 °C to +71 °C OPERATING TEMPERATURE

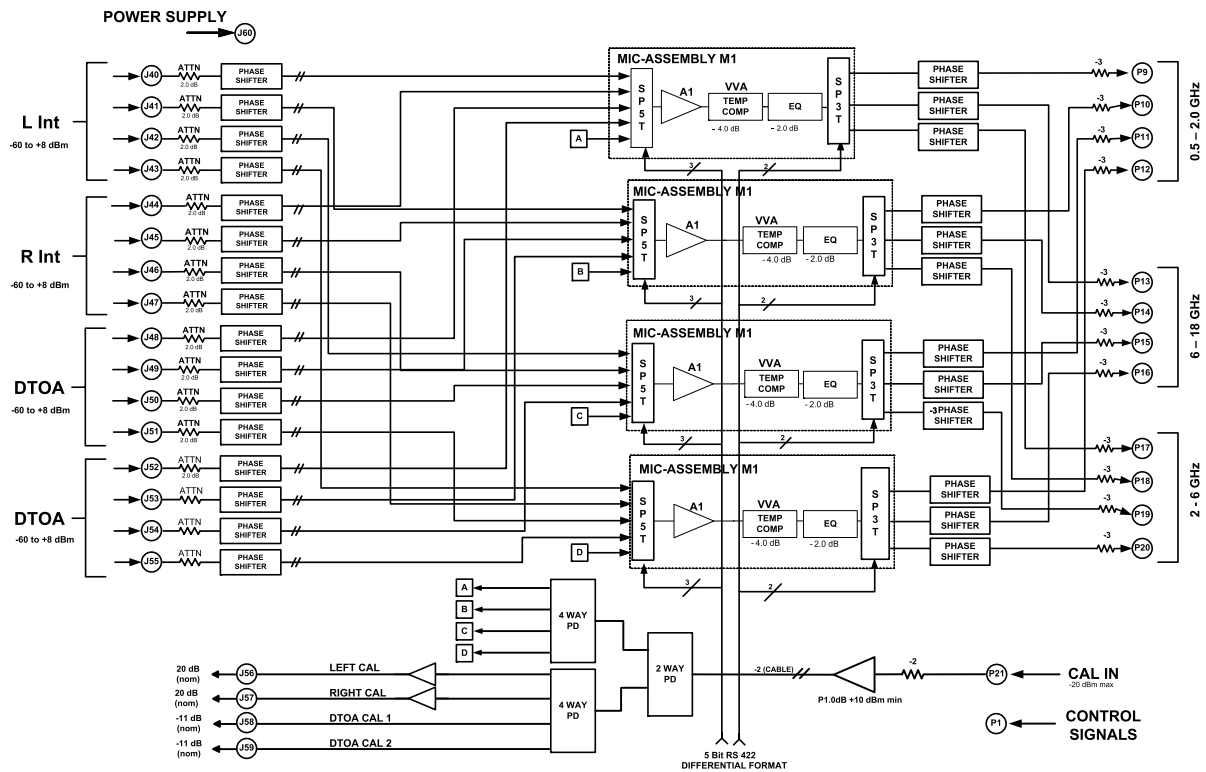


AKON's Model No. A35-MX141 is an absorptive switch matrix consisting of 36 RF input/output connectors with two SP18T absorptive RF switches as the basic building blocks. Using a single RF connector, it allows either a transmitter or receiver to connect to 36 different array elements. Phase matching of +/- 8° is from any of the 16 input ports to any of the 12 output ports. The input signals are launched through a precision, high performance 2.0 dB attenuator and a mechanical adjustable phase shifter. The unit is fed using a phase matched cable to an Integrated Microwave Assembly (IMA). Microwave Assembly consists of SP5T (70 dB isolation), a medium power, low noise amplifier, a VVA for temperature compensation of amplifier and switch circuits.

SPECIFICATIONS:

Model Number	A35-MX141
Operating Frequency Range (GHz)	0.5 - 18 (J21, J40 to J55, J56 to 59); 0.5 - 2.0 (P9 to P12); 6.0 - 18.0 (P13 to P16); 2.0 - 6.0 (P17 to P20)
Operating Input power (dBm)	-60 to +8; -40 to -20 (max) (P21 CAL Input)
Small Signal Gain/Loss (dB)	-5 (nom) (J40 to J55 to P9 to P20); -12 (nom) (P21 to P9 to P20); -11 (max) (P21 to J58 to J59); +20 (min) (P21 to J56 to J57)
Noise Figure (dB)	11 (J4 to J55 to P9 to P20); 16 (P21 to P9 to P20); 12 (P21 to J58, J59); 13.5 (P21 to J56, J57)
Gain/Loss Flatness (dB)	+/- 2.0 (Ripple)
Gain Window (dB)	+/- 3.5
1dB Compression point (J40 to J55) (dBm)	+8 (min); +9 (nom)
Phase Matching between Ports (°C)	+/- 8 over frequency and temperature
Input Signal Type	CW/ Pulsed
Pulse Width Range (nS)	0.1 µSec - 250 µSec
Input PRI Range (µS)	1 - 5000
Maximum Input Level (dBm)	+15.0 CW
Isolation (SP5T and SP3T) (dB)	70 (min)
Switching Speed (nS)	< 50
VSWR (at all RF ports)	2.0:1 (max)
Power Supply (VDC)	+28 V +/- 5% @ 1.2 Amps
Operating Temperature (°C)	-40 to +71

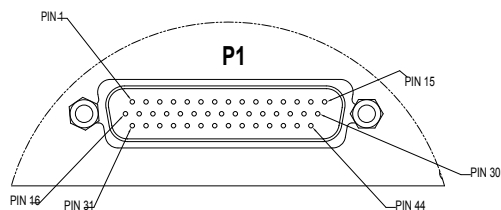
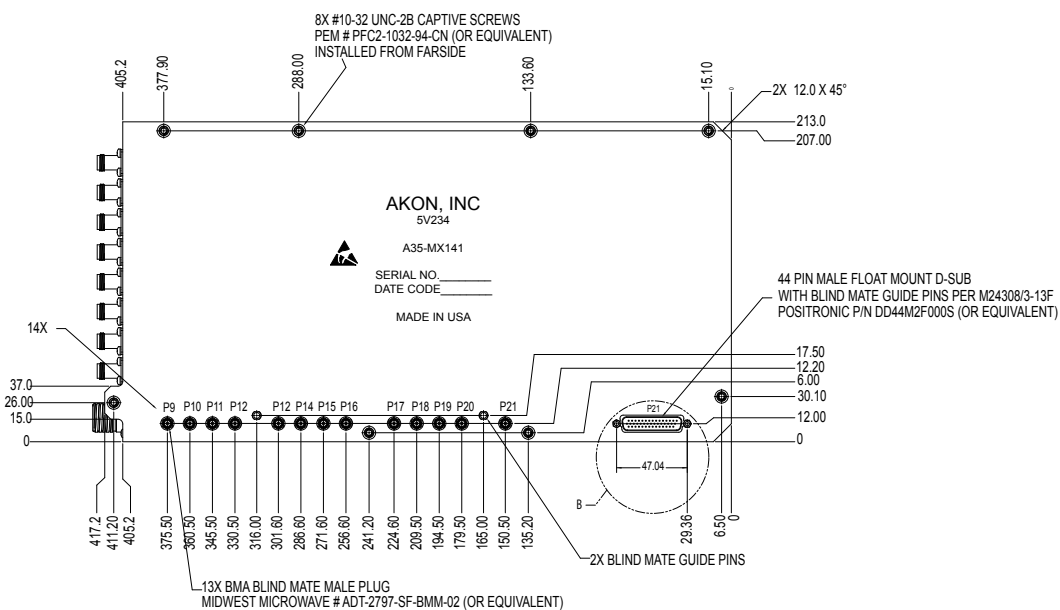
BLOCK DIAGRAM:



OUTLINE DRAWING:

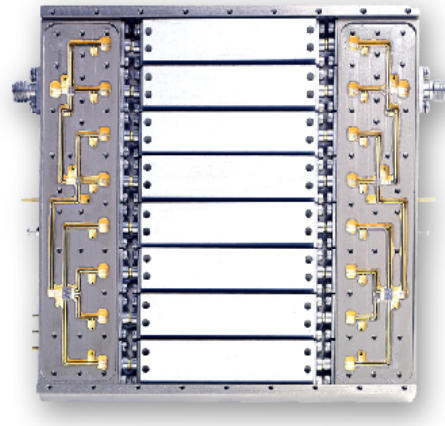
P1 PIN OUT TABLE	
PIN	FUNCTION
1-3	NOT CONNECTED
4	A0 IN
5	A0 IN
6	A1 IN
7	A1 IN
8	A2 IN
9	A2 IN
10	A3 IN
11	A3 IN
12	A4 IN
13	A4 IN
14	NOT CONNECTED
15	GND
16-29	NOT CONNECTED
30	GND
31-42	NOT CONNECTED
43-44	GND

J60 PIN OUT TABLE	
PIN	FUNCTION
A	+28V
B	GND
C	NOT CONNECTED
D	NOT CONNECTED
E	NOT CONNECTED
F	NOT CONNECTED
G	NOT CONNECTED



Filter Banks & Switch Filter Banks

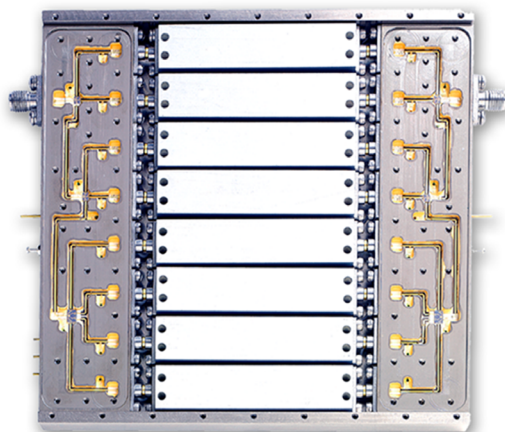
AKON produces miniature filter banks and switch filter banks in the 2.0 - 18.0 GHz range. Filters, amplifiers, attenuators, and equalizers are put together using MIC techniques. Filter designs vary from lumped element to cavity or suspended substrate type, depending upon the requirements. The units can be tailored for specific customer requirements.



FEATURES:

- **8 CHANNELS**
- **MMIC SWITCH DESIGN**
- **SHARP FILTER REJECTION:**
60 dBc; 15% FROM BAND EDGES
- **HIGH SWITCH ISOLATION: 62 dB**

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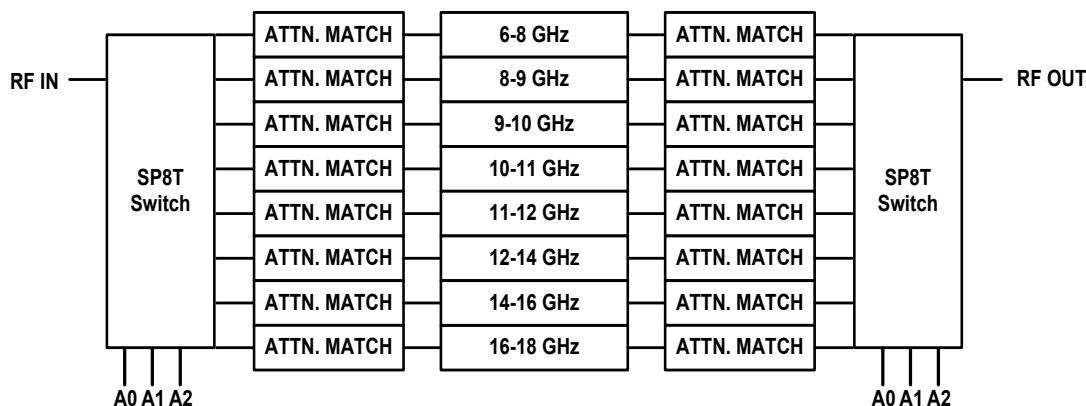


AKON's modular design approach to its switch filter banks results in multichannel configurations, from 2 to 36 and up, which feature low profile packaging, high channel to channel isolation. AKON can design a custom switch filter bank to meet the most demanding electrical, mechanical, and environmental specifications.

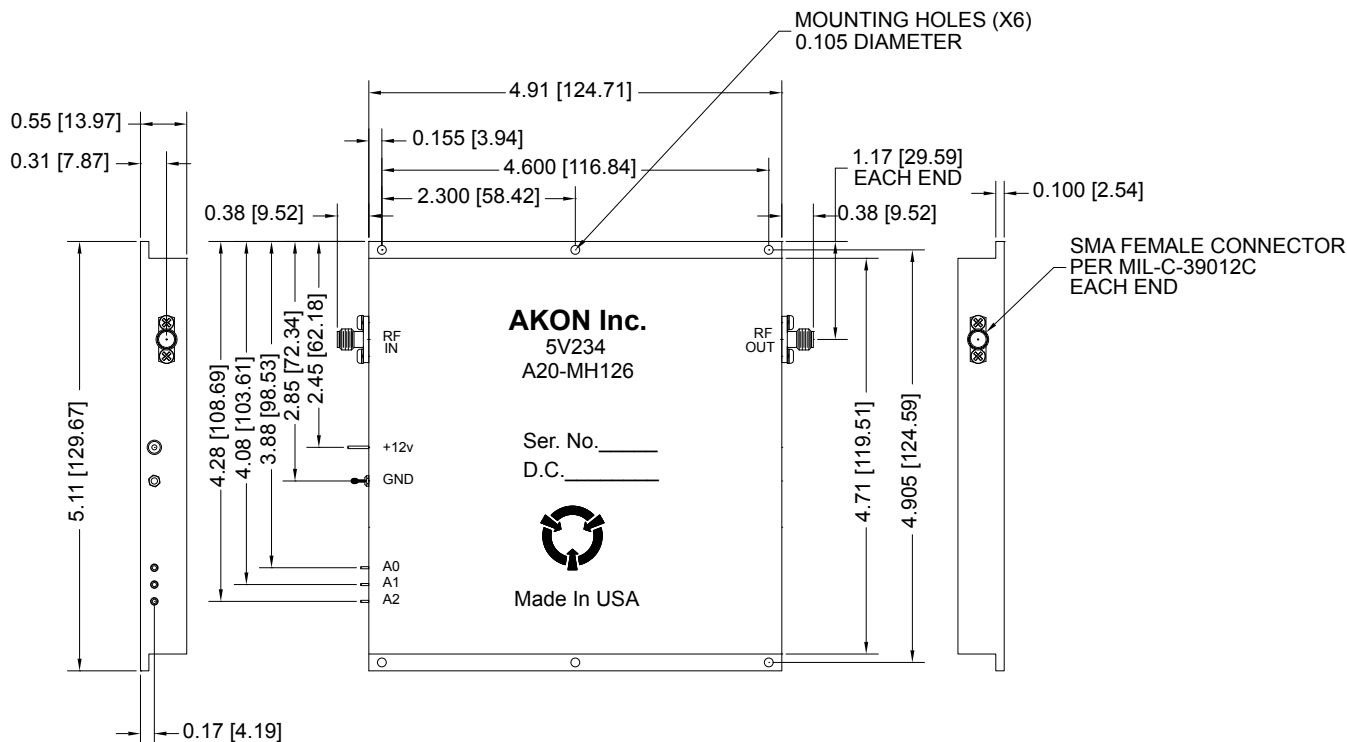
SPECIFICATIONS:

Model Number	A20-MH126
Frequency Range (GHz)	6.0 - 18.0
Channels (GHz)	6.0 - 8.0 8.0 - 9.0 9.0 - 10.0 10.0 - 11.0 11.0 - 12.0 12.0 - 14.0 14.0 - 16.0 16.0 - 18.0
Isolation (dB)	60
Filter Rejection (dBc)	-60 (15% from band edges)
Insertion Loss (dB)	8.0 (nom) 9.0 (max)
Power Handling (dBm)	Up to +15
Switching Speed (nS)	100 (max)
Power Supply (VDC)	+/- 12 or +/- 15
Size	3.91" x 3.71 x 0.55"
Channel Selection Control	3 TTL Lines

BLOCK DIAGRAM:



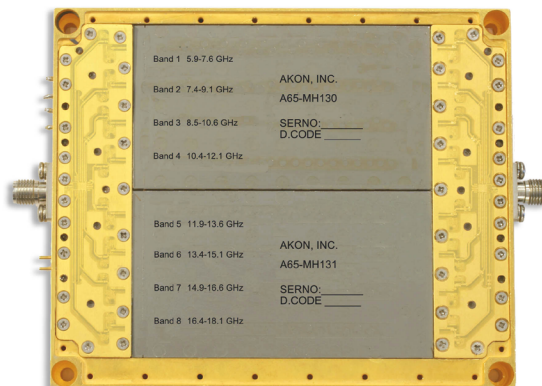
OUTLINE DRAWING:



FEATURES:

- EXTREMELY COMPACT SIZE
- 6 - 18 GHZ FREQUENCY RANGE
- 8 CHANNELS
- MMIC SWITCH DESIGN
- SHARP FILTER REJECTION
- HIGH ISOLATION
- 100 NS (NOM) SWITCHING SPEED

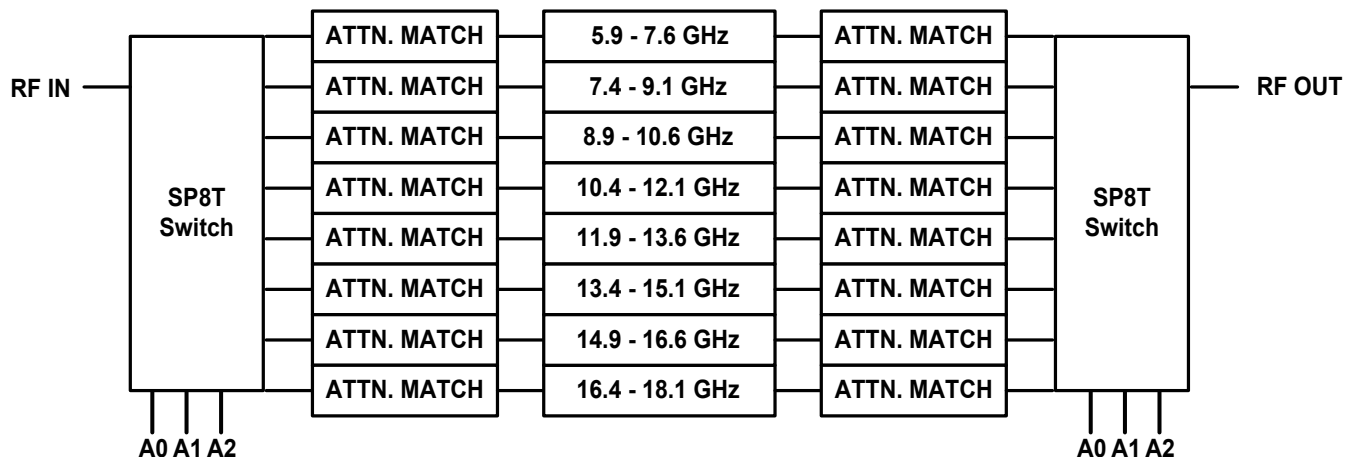
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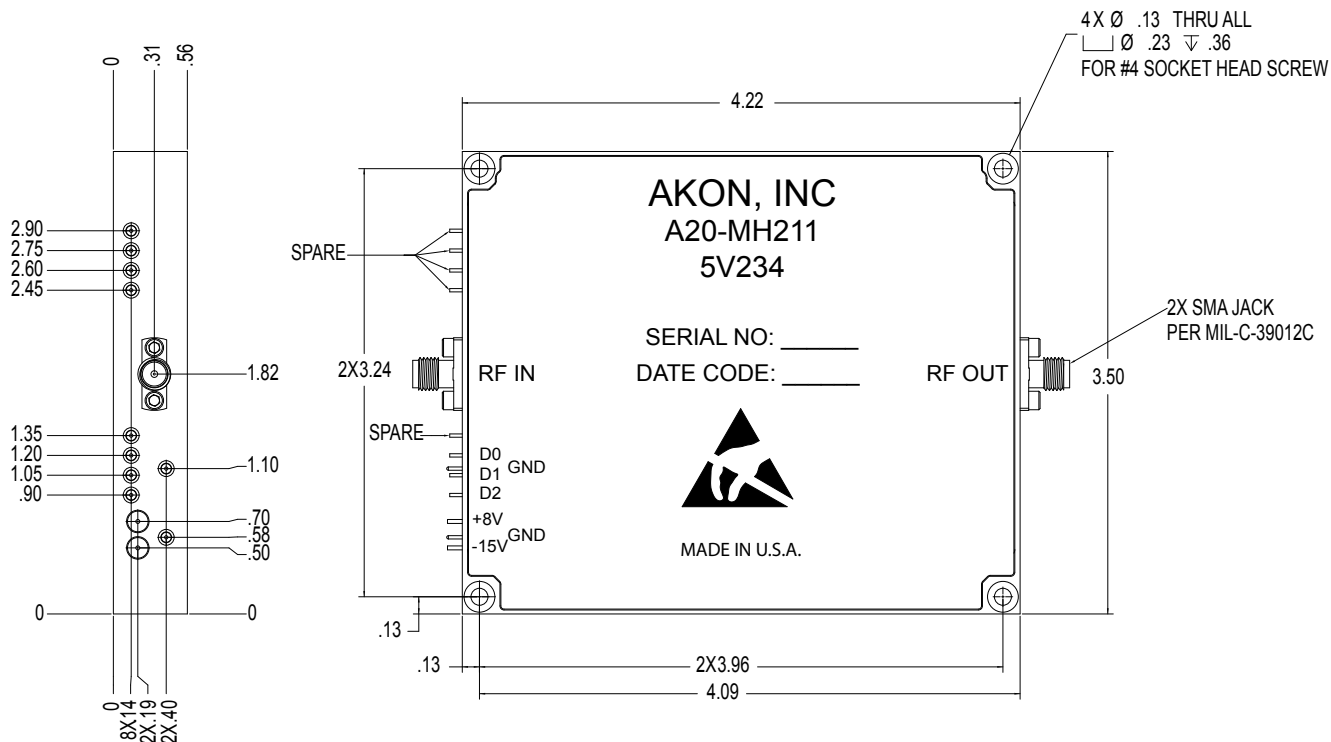
SPECIFICATIONS:

Model Number	A20-MH211
Frequency Range (GHz)	5.9 to 18.1
Channels (GHz)	8 Total: CH1: 5.9 - 7.6 CH2: 7.4 - 9.1 CH3: 8.9 - 10.6 CH4: 10.4 - 12.1 CH5: 11.9 - 13.6 CH6: 13.4 - 15.1 CH7: 14.9 - 16.6 CH8: 16.4 - 18.1
Power Supply (VDC)	+8 and -15
Frequency Flatness (dB)	+/- 1.0 (typ) +/- 1.25 (max)
Insertion Loss (dB)	9.0 over 95% of band, 9.7 (max)
Switching Speed (nS)	100
Stop Band (dB)	-80
Isolation (dB)	-80
Input Level (dBm)	+20 (max)
Spurious (dBc)	-60 (max)
Harmonics (dBc)	-60 (max)
VSWR	2.0:1 95 % of band, 2.5:1 (max)
Channel Selection Control	3 TTL Compatible Lines

BLOCK DIAGRAM:

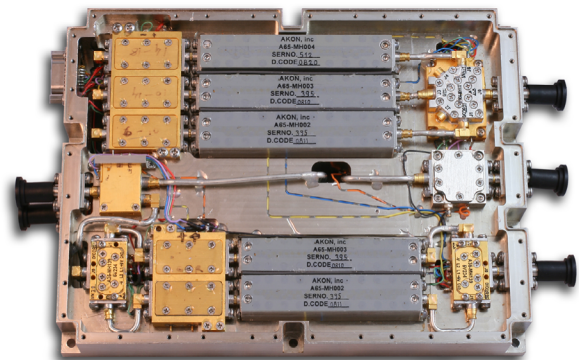


OUTLINE DRAWING:



Tuners

AKON manufactures Microwave Tuners in several configurations which address multiple system level requirements for the downconversion of signals in wide bandwidths from 0.5 to 18 GHz, and providing a 1 GHz IF output to customer's signal processor. There are a number of existing designs, and Akon additionally provides custom product design and development capability for newer system requirements, different IF output frequencies and bandwidths, different RF input frequency ranges, etc. Akon tuners provide high dynamic range, excellent spurious response, good noise figure and sensitivity. Local Oscillator sources can be either Akon or customer supplied. Typical applications include ESM, ELINT, ECM and RWR systems. Akon tuners are built to the highest quality standards associated with military airborne and ship board applications.



AKON MICROWAVE TUNERS - OVERVIEW

Wideband Input: 0.5-18 GHz typical.

- **1 GHz output at 500 MHz bandwidth, or selectable IF bandwidth**
- **Single or Dual Conversion.**
- **Multichannel Input Preselector.**
- **Two Architectures:**

Type 1: LNA prior to preselector filters

Type 2-A: LNA after preselector filters

Type 2-B: LNAs in each preselector channel

- **Input Limiter, Input BITE Switch Frequently Included.**
- **Input Dynamic Range Extender included as required.**
- **Main Attributes:**

Type 1: Best Sensitivity and Noise Figure.

Typically -70 dBm

Good Spurious Free Dynamic Range 40 to 45 dB

Type 2-A: Best Spurious Free Dynamic Range 60 to 65 dB

Type 2-B: Good Sensitivity and Noise Figure

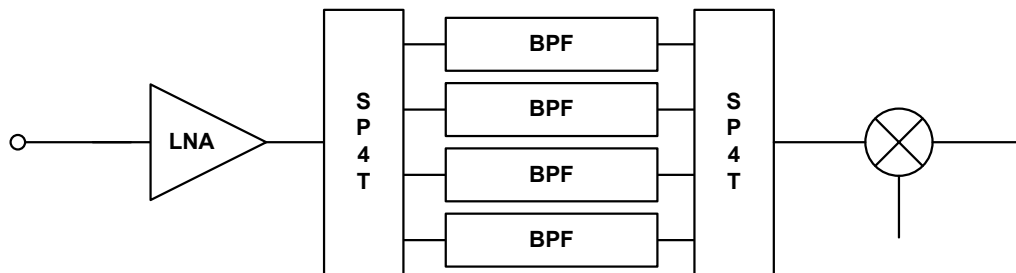
Typically -65 dBm

Spurious Free Dynamic Range of 65 dB (typical).

Tunes the Bands in Steps of 10 MHz to 500 MHz

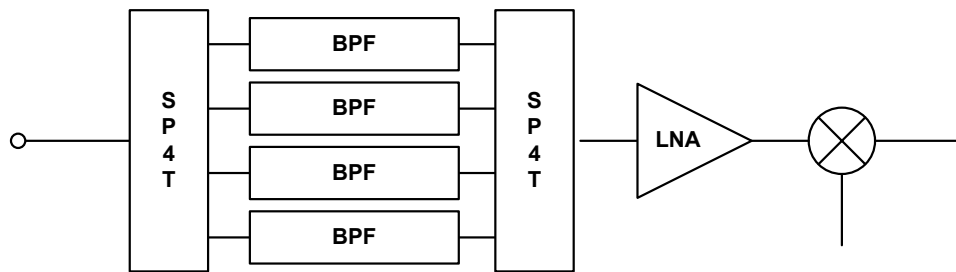
TYPE 1 TUNER:

- BEST NOISE FIGURE
- LIMITED SFDR



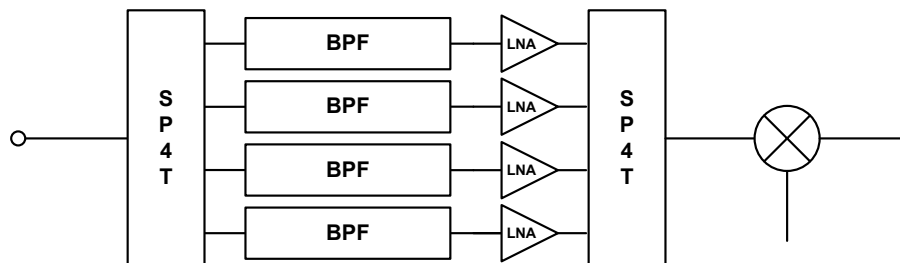
TYPE 2A TUNER:

- BEST SFDR
- ACCEPTABLE NOISE FIGURE



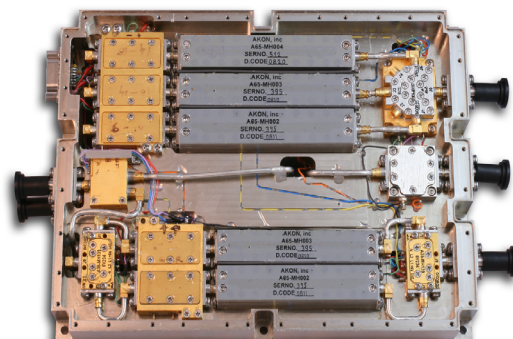
TYPE 2B TUNER:

- BEST SFDR
- GOOD NOISE FIGURE



FEATURES:

- TYPE 2 TUNER
- 0.4 - 18.0 GHz INPUT FREQUENCY RANGE
- PRE-FILTERED TO AVOID HARMONICS
- 2.0 - 6.0 GHz OUTPUT
- 21 dB TOTAL GAIN
- OUTPUT AMPLIFIER WITH +20 dBm OUTPUT POWER
- SIZE: 6.8" x 5.1" x 1.0"

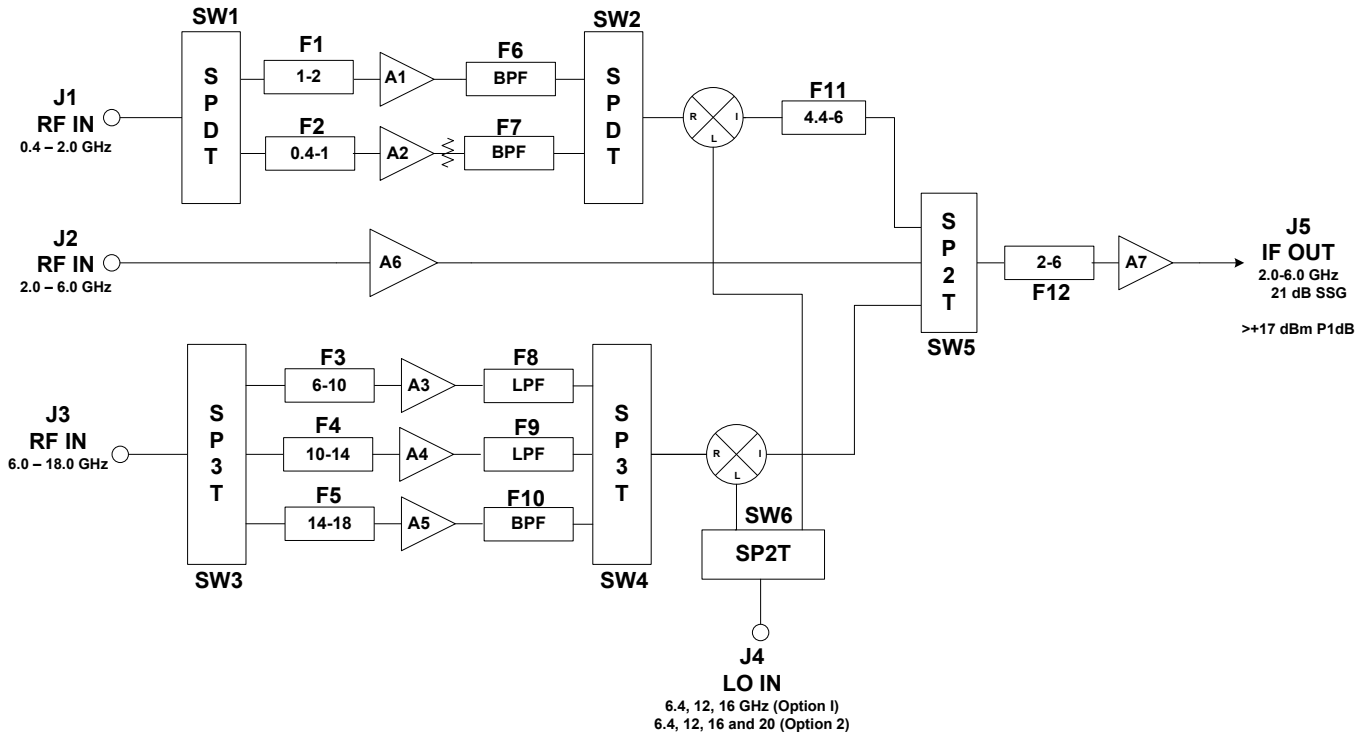


AKON's A20-MX084 is an ultra wideband, three input 0.4 - 18 GHz combination up and down converter. Signals in the 0.4 to 2.0 band pass through a two channel filter preselector, and these channels are individually upconverted into the 2 to 6 GHz band. Signals in the 2 to 6 GHz band pass through the unit without frequency conversion, only amplification. Signals in the 6 to 18 GHz band pass through a three channel filter preselector and are then individually downconverted to the 2 to 6 GHz band. Input NF is band dependent and varies from 8.5 to 12 db. Conversion gain is 21 dB typical, and deselected channel isolation is typically 60 dB.

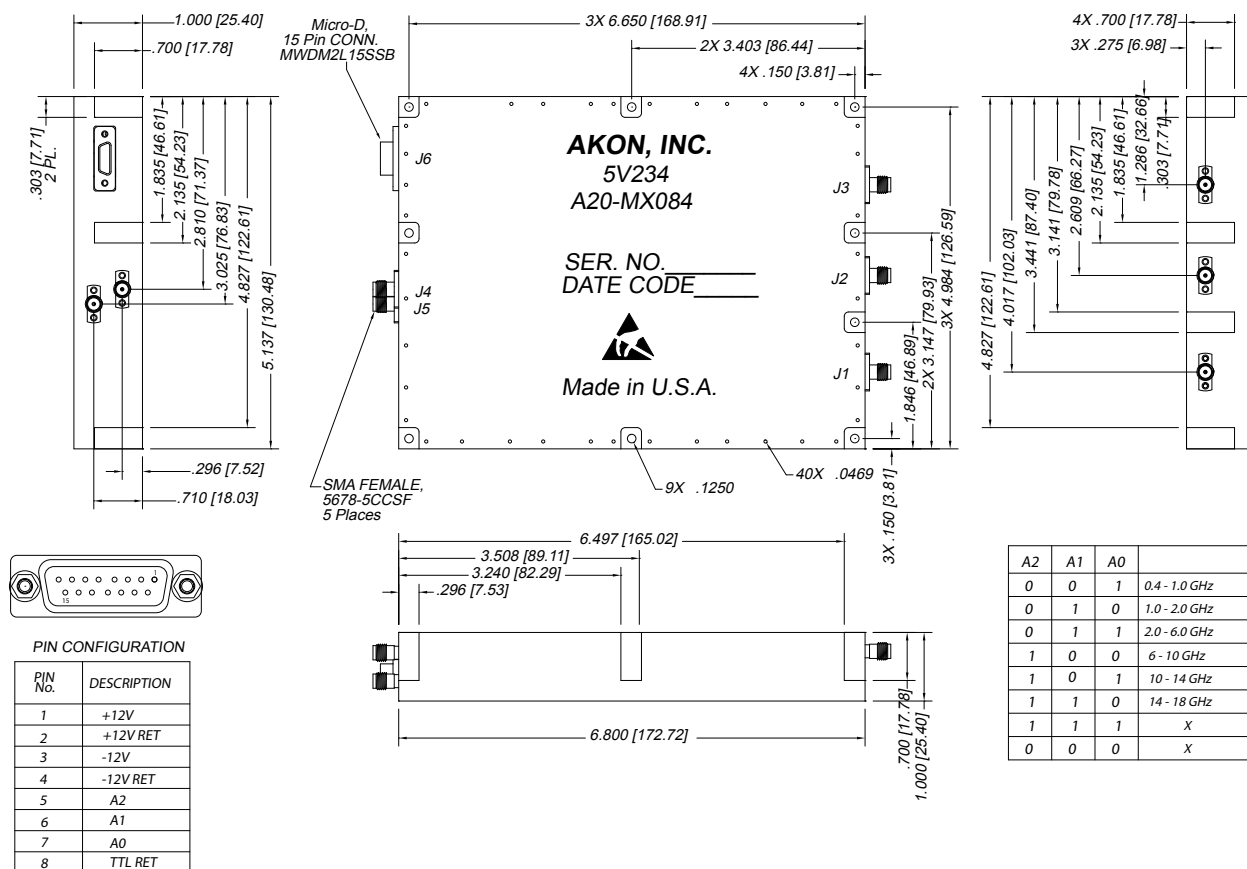
SPECIFICATIONS:

Model Number	A20-MX084	
Frequency Range (GHz)	J1: 0.4 - 2.0 J2: 2.0 - 6.0 J3: 6.0 - 18.0	
LO Input (dBm)	J5: +20 (typ) Harmonics: -40 dBc (max) Spurious: -60 dBc (max)	
RF Frequencies and Corresponding LO Frequencies (GHz)	RF	LO
	0.4 - 1.0	6.4
	1.0 - 2.0	6.4
	6.0 - 10.0	12.0
	10.0 - 14.0	16.0
	14.0 - 18.0	12.0
Gain, Gain Flatness (dB)	21 (nom), (+/- 3 (max) , +/- 2 (85% BW))	
VSWR	2.0:1 (nom); < 3.0:1 (95% BW)	
Harmonics (dBc)	Pre-mixing > 60; Post-mixing -35 (nom)	
Image Rejection/Spurious (dBc)	RF Band	dBc
	0.4 - 2.0	-40
	2.0 - 6.0	-40
	6.0 - 10.0	-38
	10.0 - 14.0	-40
	14.0 - 18.0	-40
Input 1 dB Compression (dBm)	J1: -2 (typ) J2: -3 (typ) J3: -4 (typ)	
Power Supply (VDC)	+12 @ 1.7A (max) -12 @ 0.4A (max)	
Noise Figure (dB)	J1: 10.5 (max) J2: 8.5 (max) J3: 12.0 (max)	
Isolation (dBm)	60 (min)	
Filter Rejection (dBc)	-60 @ 15% From Band Edges	

BLOCK DIAGRAM:



OUTLINE DRAWING:



FEATURES:

- TYPE 1 TUNER
- 65 dB INSTANTANEOUS DYNAMIC RANGE
- -65 dBm CHANNEL SENSITIVITY
- PRECONVERSION CHANNELS: 8 EACH;
- -65 dBc; 15% FROM BAND EDGES
- -60 dB CHANNEL TO CHANNEL ISOLATION
- BUILT-IN 65 dB LOG VIDEO OUT @ 1.0GHz

AKON is a leading manufacturer of high quality converter assemblies. Model A20-MX152 covers the 1.0 - 18.0 GHz input range. Using 8 pre-mixer channels and dual conversion, the input frequency is translated to 1.0 GHz with IF bandwidths of +/- 250, +/- 125, +/- 25 and extremely narrow +/-10MHz. Log Video (SDLA's) at 1.0 GHz and 1.0 - 18.0GHz is built-in. Capability exists for the unit to receive an external signal of 750-1250 MHz and upconvert it to 1 - 18 GHz using unique architecture. AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U,S, Department of Defense and well as by leading foreign and domestic military OEMs. Screening to requirements of MIL-STD-883 is available. All specifications described below are over the full operating temperature.

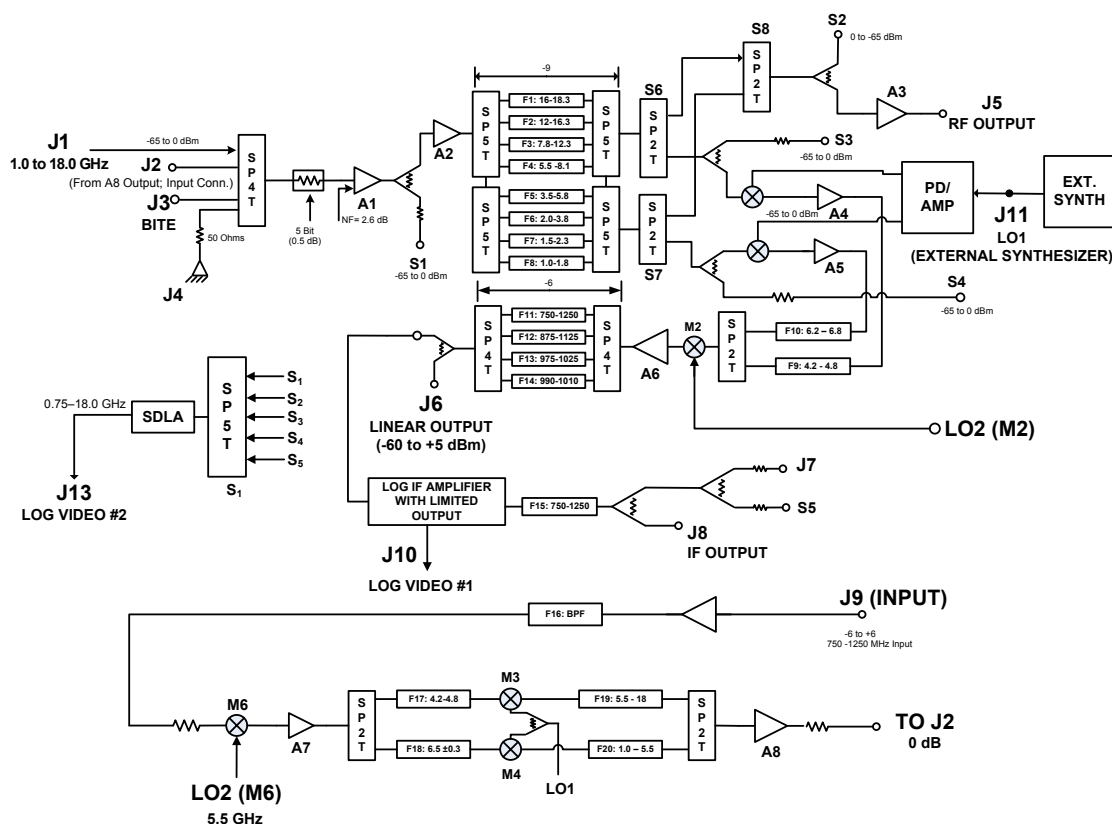
SPECIFICATIONS:

Model Number	A20-MX152	
INPUT PORTS		
Frequency Range (GHz)	Port J1 (Antenna) 1.0 - 18.0 Port J2 (Internal Connection) 1.0 - 18.0 Port J3 (BITE) 1.0 - 18.0 Port J9 (External Input) 0.75 - 1.250; -6 to +6 dBm Port J11 (LO-1)..... 7.5 - 16.8; 0 dBm (max) Port J12 (LO-2) 5.5; 0 dBm (max)	
Noise Figure (dB)	17 (max); 16 (nom)	
Dynamic Range (dBm)	-65 to 0 (1.0 dB compression)	
Input Pre-Selection	Channel Frequency Stop-Band (-60 dBc) CH:1 1.0 - 1.8 GHz DC - 850 GHz; 2.07 to 18.0 GHz CH:2 1.5 - 2.3 GHz DC - 1.3 GHz; 2.64 to 18.0 GHz CH:3 2.0 - 3.8 GHz DC - 1.73 GHz; 4.37 to 18.0 GHz CH:4 3.5 - 5.8 GHz DC - 3.0 GHz; 6.3 to 18.0 GHz CH:5 5.5 - 8.1 GHz DC - 4.7 GHz; 9.315 to 18.0 GHz CH:6 7.8 - 12.3 GHz DC - 6.8 GHz; 14.14 to 18.0 GHz CH:7 12.0 - 16.3 GHz DC - 10.4 GHz; 18.745 to 24.0 GHz CH:8 16.0 - 18.0 GHz DC - 13.9 GHz	
OUTPUT PORTS		
Port J5	Frequency Range: 1 - 18 GHz; +19 dBm (max); +13 dBm (min)	
Port J6	Linear Receiver Gain: 5.0 dB Nom. Output: -60 to +5 dBm Frequency Ripple: +/- 2.0 dB Frequency Flatness: +/- 3.0 dB (Including Temp.)	
Port J7 (Band Limited)	Output: -2 dBm +/- 2.0dB @750 - 1250MHz Harmonics: -50 dBc	
Port J8 (Band limited)	Output: +7dBm +/- 2dB @750 - 1250 MHz Harmonics: -50 dBc	
Port J10 (Log Video Output)	Frequency: 0.75 - 1.25 GHz Dynamic Range: -65 to 0 dBm Rise Time: 10 nS Fall Time: 75 nS Log Linearity: +/- 1.0 dB Localized DLVA Flatness: +/- 1.0 dB (nom)	

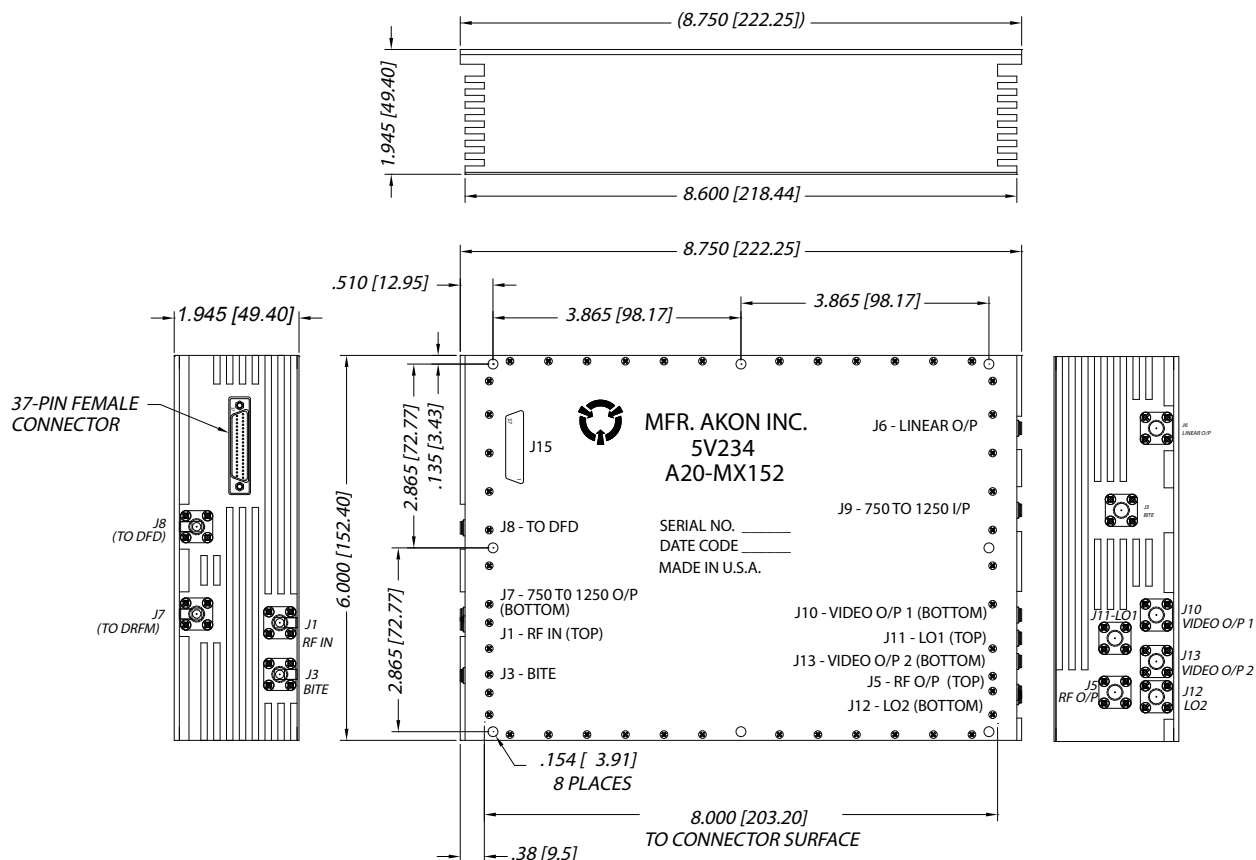
SPECIFICATIONS CONT'D:

Model Number	A20-MX152
Port J13 (SDLA)	Frequency Range: 750 MHz-18.0 GHz Dynamic Range: -65 to 0 dBm Log Linearity : +/- 1.0 dB (nom); +/- 2.0 (max) Localized Flatness: +/- 2.5 (dB) Rise Time: 10 nS Recovery Time: 100 nS Log Slope: 25 mV/dB
IF Bandwidth	Center Frequency: 1.0 GHz BW1: +/- 10 MHz BW2: +/- 25 MHz BW3: +/- 125 MHz BW4: +/- 250 MHz
Digital Attenuator	Frequency Range (GHz): 1.0 - 18.0 +/- 1.0 (nom) Response Time: 100 nS Dynamic Range: 15.5 dBm Accuracy: +/- 1.0 dB Step Size: 0.5 dB
Power Supply (VDC)	+8 @ 2800 mA; -8 @ 700 mA
Power Consumption (W)	28

BLOCK DIAGRAM:



OUTLINE DRAWING:

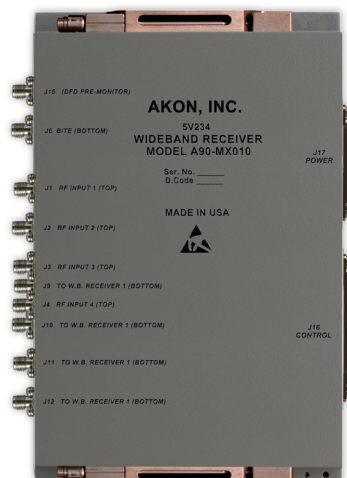


J15 - 37 PIN "D" CONNECTOR			
PIN#	DESCR.	PIN#	DESCR.
1	ATT CTRL (5 dB)	20	B1
2	ATT CTRL (1 dB)	21	RF BAND SELECT (5.5 TO 18.3 GHz)
3	ATT CTRL (2 dB)	22	RF BAND SELECT (1 TO 5.8 GHz)
4	ATT CTRL (4 dB)	23	RF BAND SELECT (5.5 TO 18.6 GHz)
5	ATT CTRL (8 dB)	24	SPARE
6	SPARE	25	A1
7	C2	26	A0
8	C1	27	SPARE
9	C0	28	A2
10	SPARE	29	A1
11	+8V	30	A0
12	GND	31	SPARE
13	SPARE	32	SPARE
14	-8V	33	SPARE
15	GND	34	SPARE
16	SPARE	35	SPARE
17	+10V	36	SPARE
18	GND	37	SPARE
19	B0		

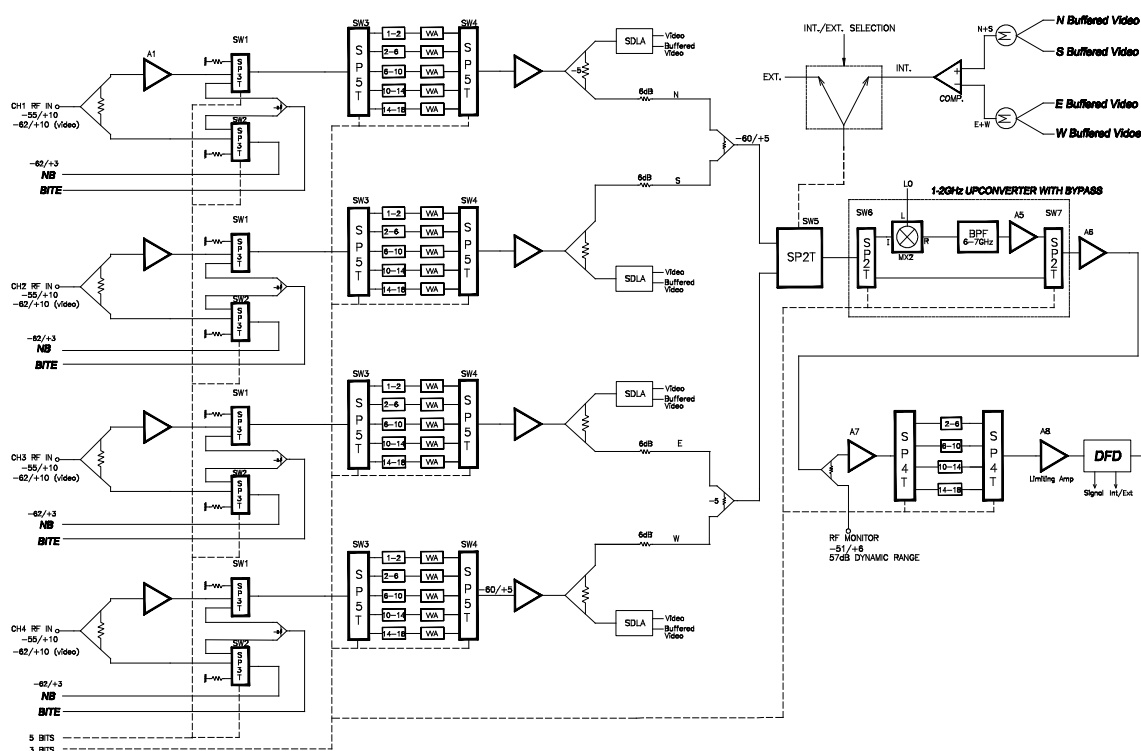
FEATURES:

- TYPE 1 TUNER
- 1 - 18 GHz INPUT FREQUENCY
- 65 dB INPUT DYNAMIC RANGE
- 4 INPUT CHANNELS
- 77.6 WATTS POWER CONSUMPTION
- SIZE: 9.2" x 5.9" x 1.7"
- WEIGHT 3.0 KG

AKON's 1 to 18 GHz Wideband Microwave Tuner A90-MX010 is preceded by a front-end low noise amplifier (limiter - low noise amplifier - 10 meter cable - equalizer - bias tee on both sides of the RF cable). (FEA is separately specified). The net front-end FEA gain is 20 dB with 5 dB maximum (4.0 dB nominal) noise figure and +23 dBm minimum output power. The 10 meter cable with equalizer and bias tee has 8.0 dB loss. Thus the input dynamic range of -65 to 0 dBm is translated to -55 dBm to +10 dBm at the input of the tuner. AKON is qualified to MIL-I-45208 Quality System requirements by agencies of the U.S. D.O.D. and leading military OEMs. Screening to requirements of MIL-STD-883 is available. All specifications described below are over the full operating temperature.



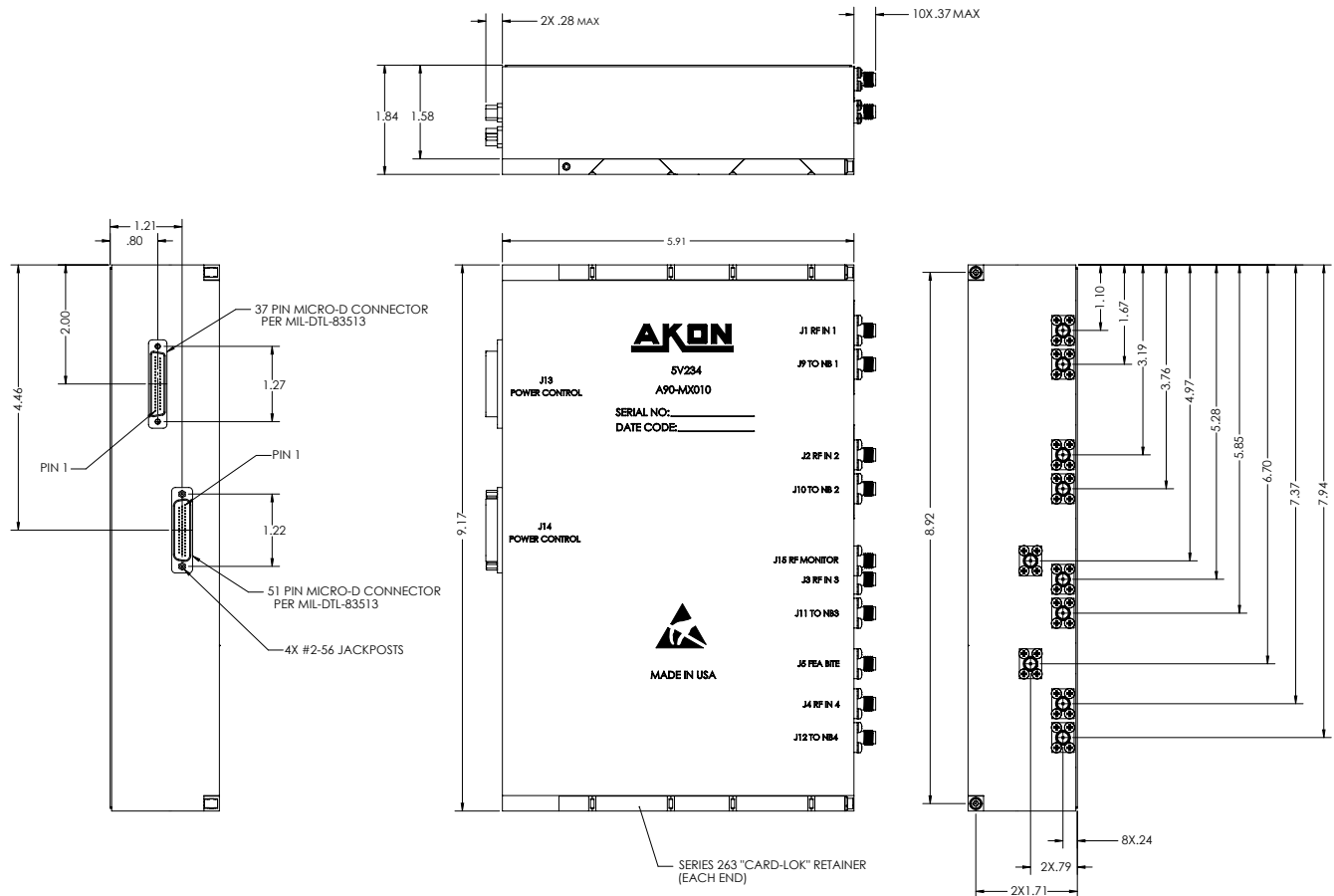
BLOCK DIAGRAM:



SPECIFICATIONS:

Model Number	A90-MX010
Number of Input Channels	4 Total (J1, J2, J3, J4)
Number of Output Channels	12 Total: 4 - To Narrow Band Receiver; 4 - To Bite Input; 4 - To Vid 1,2,3,4
Output Frequency Data	14 bits + 1 bit (Signal Present)
Output : Monitor Prior to DFD (dBm)	-51 to +6
Isolation (dB)	60 (min); 65 (nom)
Harmonics (dBc)	-8 (min)
Spurious (dBc)	-50 (min)
Input Frequency (GHz)	1 to 18
Processing Bands (GHz)	1 – 2, 2 – 6, 6 – 10, 10 – 14, 14 – 18
Filter Rejection 15% from band edges (dBc)	-65
Input RF Processing Range (dBm)	-53 to +12
Input Equivalent Dynamic Range at FEA Input (dBm)	-65 to 0
T.S.S. @ FEA Input (dBm)	-72 (nom)
Input Log Dynamic Range (@FEA Input)(dBm)	-72 to 0
Log Slope (mV/dB)	25
Absolute accuracy of power measurement (dB)	+/- 2.0 (typ); +/- 3.0 (max)
Channel to Channel isolation (dB)	65
Input V.S.W.R	2.0:1
Log Linearity over frequency and temperature (dB)	+/- 1.5
Pulse Rise Time (10% - 90%) (nS)	25
Pulse Settling Time (nS)	40
Recovery Time (nS)	75
Input Control Bits	Total 7 Bits: 3 Band Select 2 Input SW Control 1 INT/EXT SW Control Select 1 DFD INT/EXT Trigger
Power Supply (VDC)	+12 @1.0A; +8 @ 6.2A; -8 @ 2.0A

OUTLINE DRAWING:



J14 (POWER/CONTROL)	
PIN	FUNCTION
1	DATA BIT 1-
2	DATA BIT 1+
3	DATA BIT 2-
4	DATA BIT 2+
5	DATA BIT 3-
6	DATA BIT 3+
7	DATA BIT 4-
8	DATA BIT 4+
9	DATA BIT 5-
10	DATA BIT 5+
11	DATA BIT 6-
12	DATA BIT 6+
13	DATA BIT 7-
14	DATA BIT 7+
15	DATA BIT 8-
16	DATA BIT 8+
17	DATA BIT 9-
18	DATA BIT 9+
19	DATA BIT 10-
20	DATA BIT 10+
21	DATA BIT 11-
22	DATA BIT 11+
23	DATA BIT 12-
24	DATA BIT 12+
25	DATA BIT 13-
26	DATA BIT 13+

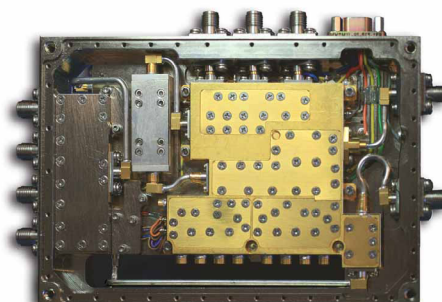
J14 (POWER/CONTROL CONT'D)	
PIN	FUNCTION
27	DATA BIT 14-
28	DATA BIT 14+
29	CLK IN -
30	CLK IN +
31	BAD DATA -
32	BAD DATA +
33	+8VC
34	+8VD
35	-8VB
36	+8VC RETURN
37	+8VD RETURN
38	-8VB RETURN
39	SPARE
40	SPARE
41	SPARE
42	SPARE
43	SPARE
44	SPARE
45	SPARE
46	SPARE
47	SPARE
48	SPARE
49	SPARE
50	SPARE
51	SPARE

J13 (POWER/CONTROL)	
PIN	FUNCTION
1	A0, RF BAND SELECT
2	A1, RF BAND SELECT
3	A2, RF BAND SELECT
4	B0, BITE BAND SELECT
5	B1, BITE BAND SELECT
6	B2, BITE BAND SELECT
7	BIT 1, RF/BITE SELECT
8	BIT 2, CH1 SHUTDOWN
9	BIT 3, CH2 SHUTDOWN
10	BIT 4, CH3 SHUTDOWN
11	BIT 5, CH4 SHUTDOWN
12	MASS CONTROL 1, INT/EXT
13	MASS CONTROL 2, NS/EW
14	ATTENUATION
15	MODULATION
16	BITE INT/EXT
17	DIGITAL GND 1
18	DIGITAL GND 2
19	+12VA
20	+12VB
21	+8VA
22	+8VB
23	-8VA
24	+12VA RETURN
25	+12VB RETURN
26	+8VA RETURN

J13 (POWER/CONTROL CONT'D)	
PIN	FUNCTION
27	+8VB RETURN
28	-8VA RETURN
29	VIDEO OUT, CH1
30	VIDEO OUT, CH1 RETURN
31	VIDEO OUT, CH2
32	VIDEO OUT, CH2 RETURN
33	VIDEO OUT, CH3
34	VIDEO OUT, CH3 RETURN
35	VIDEO OUT, CH4
36	VIDEO OUT, CH4 RETURN
37	SPARE

FEATURES:

- TYPE 1 TUNER
- 2.0 - 6.0 GHz INPUT FREQUENCY
- 1.0 - 2.0 GHz IF OUTPUT
- 25 dB IF OUT NET GAIN
- HERMETIC PACKAGE OPTIONS AVAILABLE
- EXCELLENT TEMPERATURE STABILITY
- SIZE: 4.98" x 3.42" x 0.89"

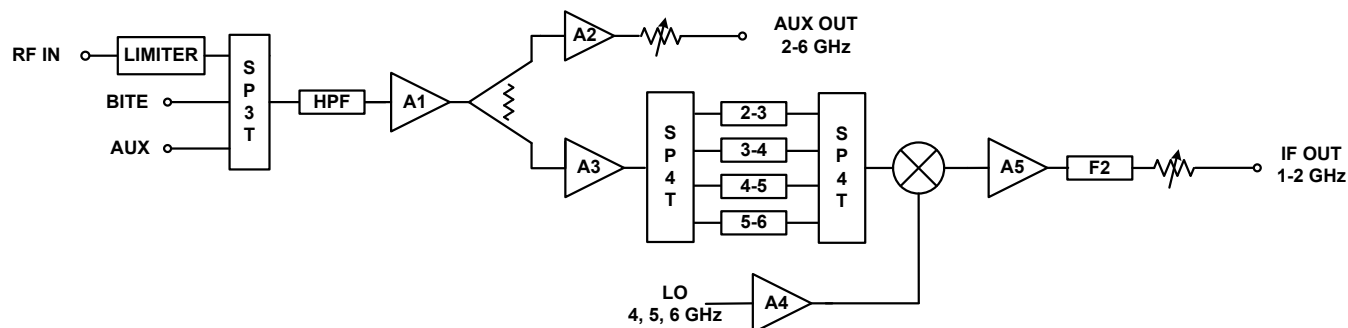


AKON's A60-ML008 is a high gain downconverter which accepts inputs in the 2.0 to 6.0 GHz frequency band, incorporates a 4-channel preselector filter, each channel being 1 GHz wide, and individually down converts those channels to a 1.0 to 2.0 GHz IF output. Conversion gain is approximately 25 dB, and dynamic range is 52 dB. 0 dB SNR threshold is -72 dBm. Deselected channel isolation is over 60 dB and switching time is less than 200 nS typical.

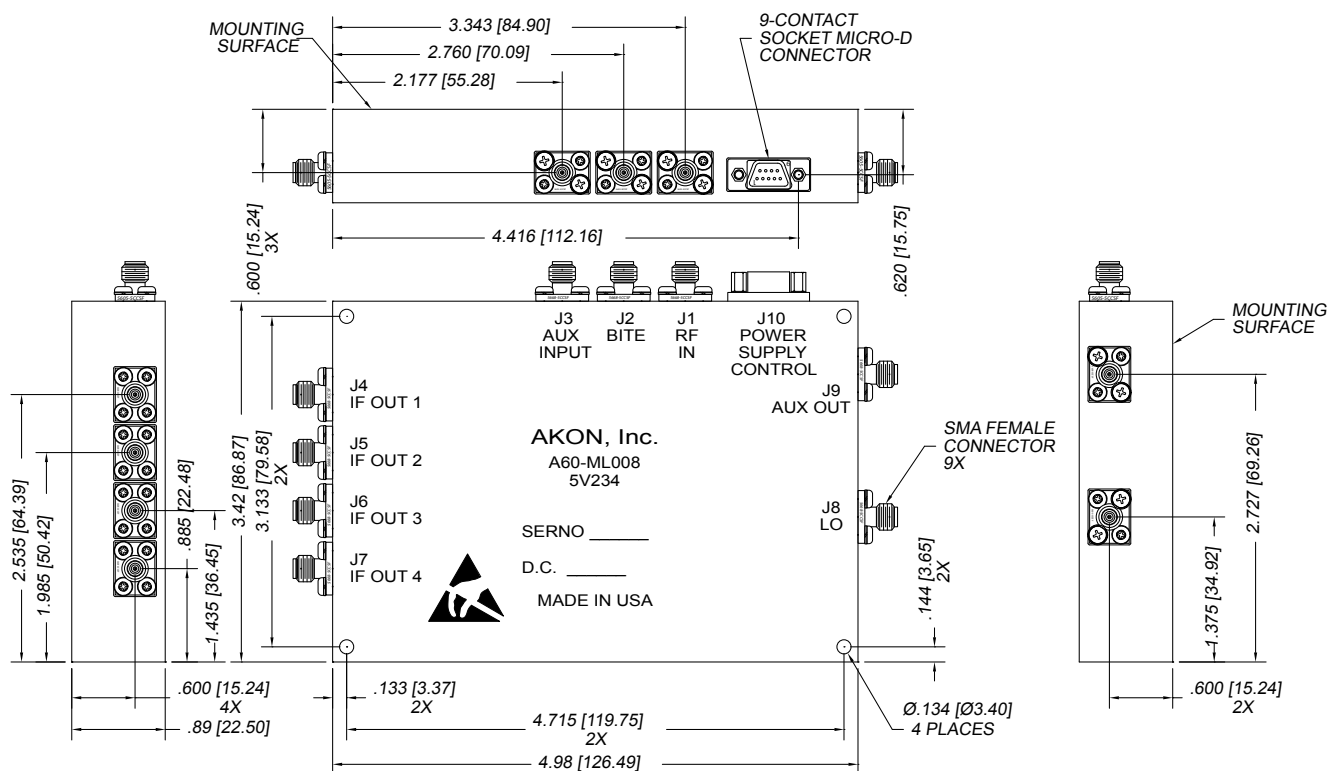
SPECIFICATIONS:

Model Number	A60-ML008
Frequency Range (GHz)	2.0 - 6.0
IF Output (GHz)	1.0 - 2.0
Noise Figure (dB)	10
Switching Time (nS)	200 (for switch filter bank)
Survival Power (W)	2 (max) CW or 200 W 1% duty ratio
SP3T Switch Isolation (dB)	50 (min)
SP4T Switch Isolation (dB)	30 (min)
SP3T Controls (TTL)	2 bit
SP4T Controls (TTL)	2 bit ganged
VSWR	2.5:1 (max) for all RF and IF ports
LO Input (dBm)	-10 (min) (amplifier is used to meet the LO drive requirement)
LO Radiation (dBc)	-90 (max)
Output Frequency Bandwidth (GHz)	2.0 - 6.0
Aux RF Out Net Gain (dB)	12 +/- 1
1dB Compression Point (dBm)	+12 at output
Rejection For Input Less Than 1.7 GHz (dBc)	-50 (min)
IF OUT Frequency Bandwidth (GHz)	1.0 - 2.0
IF OUT Net Gain (dB)	25 +/- 2
Rejection at IF Output of 1.0 - 2.0 GHz (dBc)	<-30 (max) -60 <850 MHz
In Band Spurious (dBc)	<-30 (max)
In Band Harmonics (dBc)	<-30 (max)
IF Linear Dynamic Range (dB)	52 (min) (-72 to -20 dBm)
Input RF Power for 0dB SNR at IF Output (dBm)	-72
Power Supply (VDC)	+12V / +8.5V @ 1.5A, -12V / -8.5V @ 300mA (max)
Operating Temperature (°C)	-10 to + 60

BLOCK DIAGRAM:

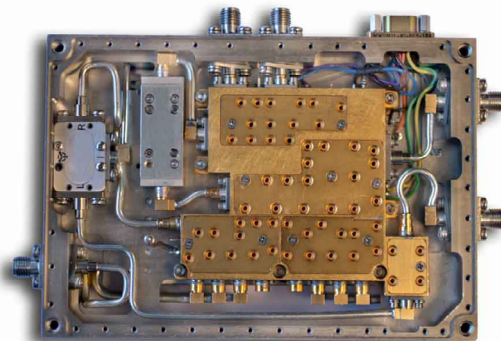


OUTLINE DRAWING:



FEATURES:

- TYPE 1 TUNER
- 6.0 - 18.0 GHz INPUT FREQUENCY
- 2.0 - 6.0 GHz IF OUTPUT
- -10 dBm LO INPUT
- 200 NS SWITCHING SPEED
- 6.0 - 18.0 GHz AUXILIARY OUTPUT
- -30 dBc INBAND SPURIOUS

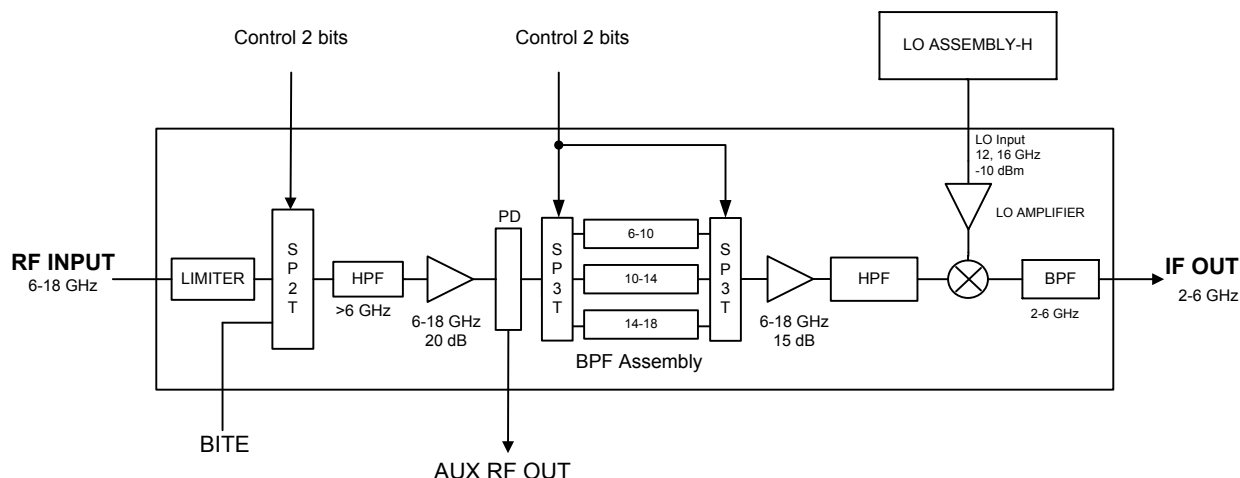


AKON's A60-ML006 is a medium-gain downconverter which accepts inputs in the 6.0 to 18.0 GHz band, incorporates a 3-channel preselector filter, each channel being 4 GHz wide, and individually down converts those channels to a 2.0 to 6.0 GHz IF output. Conversion gain is roughly 12 dB, and dynamic range is 48 dB. 0 dB SNR threshold is -68 dBm. Deselected channel isolation is over 60 dB and switching time is less than 200 ns typical.

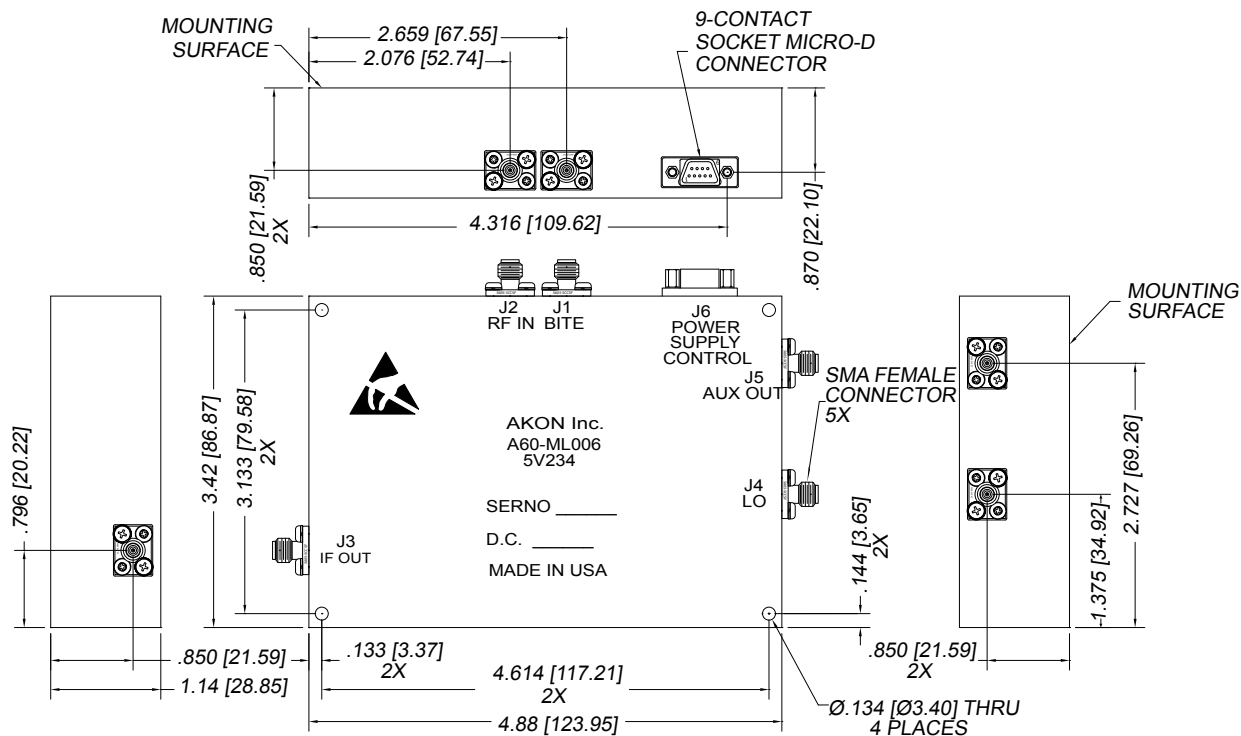
SPECIFICATIONS:

Model Number	A60-ML006
Frequency Range (GHz)	6.0 - 18.0
IF Output (GHz)	2.0 - 6.0
Noise Figure (dB)	10 (max)
Switching Speed (ns)	200
Survival Power (W)	2 (max)
SP2T Switch Isolation (dB)	50 (min)
SP3T Switch Isolation (dB)	30 (min)
SP2T Controls (TTL)	2 bit
SP3T Controls (TTL)	2 bit ganged
LO Input (dBm)	-10 (min)
VSWR	2.5:1 (max)
LO Radiation (dBc)	-90 (max)
Aux RF Out Net Gain (dB)	12 +/- 1 dB in 6.0 - 14.0 GHz 12 +/- 2 dB in 14.0 - 18.0 GHz
IF Output Frequency Bandwidth (GHz)	2.0 - 6.0
IF Out Net Gain (dB)	3 +/- 2 dB (6.0 - 14.0 GHz RF input) 3 +/- 3 dB (14.0 - 18.0 GHz RF input)
In Band Harmonics (dBc)	<-30 (max)
In Band Spurious (dBc)	<-30 (max)
IF Linear Dynamic Range (dB)	48 (min) (-68 dBm to -20 dBm)
Power Supply (VDC)	+8.5, -8.5
Power Consumption (W)	8 (max)

BLOCK DIAGRAM:



OUTLINE DRAWING:



FEATURES:

- 0.5 - 18.0 GHz FREQUENCY RANGE
- FOUR CHANNELS
- 1.0 GHz IF CENTER FREQUENCY
- 100 ns SWITCHING TIME
- EXTERNAL VARIABLE LO
- BUILT-IN LO1 PROCESSING
- BUILT-IN LO2
- INTEGRATED DC-DC CONVERTER/
POWER SUPPLY
- LO PRESENCE MONITOR
- CHANNEL TEMPERATURE MONITORING
- MODULAR DESIGN

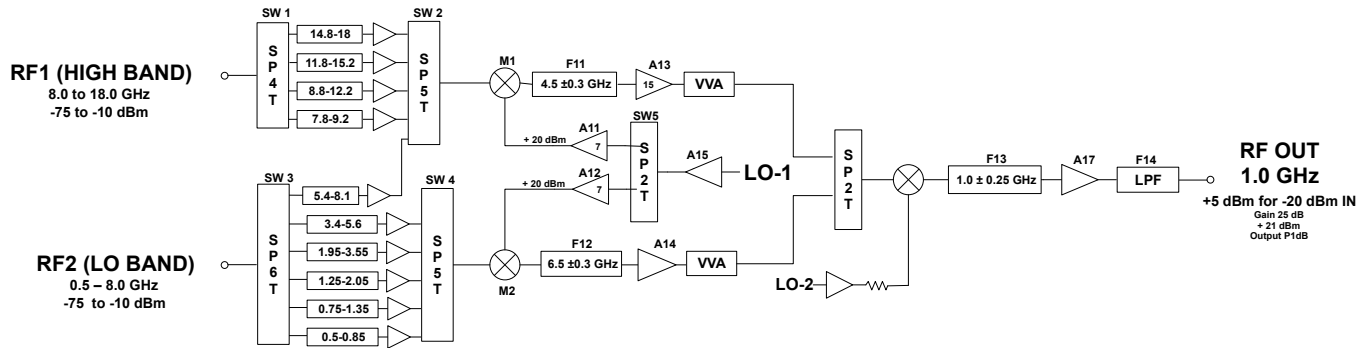


AKON's A20-MX209 is a compact four channel tuner system that provides RF to IF conversion, pre-selection, and gain equalization. The modular design consists of 4 tuners, which each tuner handling 2 input bands from 0.5 - 18.0 GHz and 1 IF output at 1 GHz (single RF input from 0.5 - 18.0 also available) and features built-in LO1 amplification, filtering and multiplication using "high side" LOs. The unit also features an integrated DC-DC converter and LO presence and channel temperature monitoring.

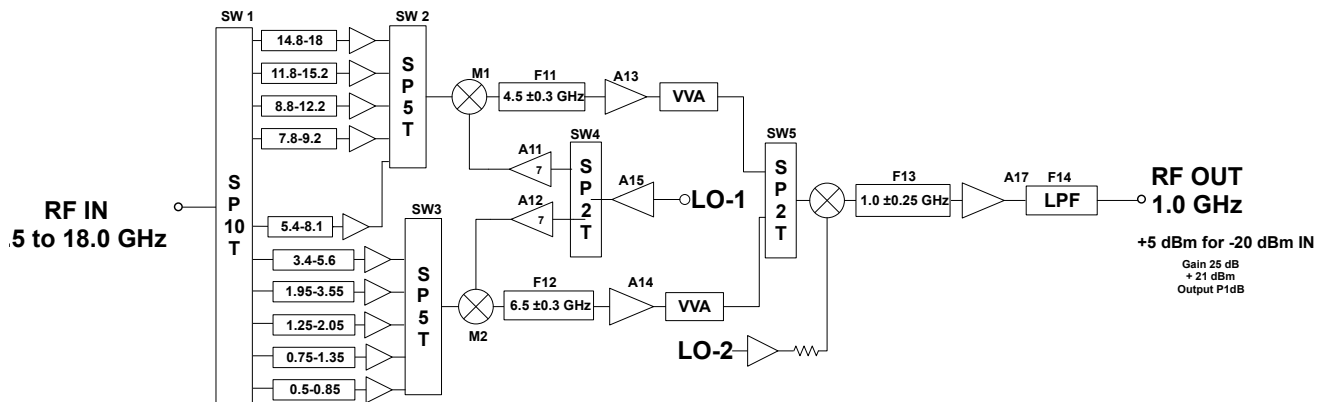
SPECIFICATIONS:

Model Number	A20-MX209
Frequency Range (GHz)	0.5 to 18.0
Number of Input Channels	2 (0.5 - 8.0, 8.0 - 18.0 GHz)
Input Impedance (Ohms)	50 (nom)
Power Levels (dBm)	-75 to -10
Recovery Time (μ S)	1 (max)
IF Output Channels	4
IF Center Frequency (GHz)	1
IF Bandwidth (MHz)	500 +/- 250 @ 1 GHz Fc
Preselector Filter Rejection (dBc)	-60 +/- 15% Fc
IF Output Power (dBm)	+28 (max)
1 dB Compression point (dBm)	+21 (min)
Third-Order Intercept (dBm)	+30 (min)
Output VSWR	1.5:1 (max)
Channel to Channel Isolation (dB)	60 (min)
Gain (dB)	+25 (nom)
Noise Figure (dB)	10 (nom); 11 (max) (below 8 GHz) 11 (nom); 12 (max) (above 8 GHz)
Spurious Levels (dBc)	-60 (max)
Switching Time (ns)	100 (max)
Power Supply (VDC)	+12 +/- 3%
Power Consumption (W)	70
Size (Inches)	9.95 x 4.74 x 3.55

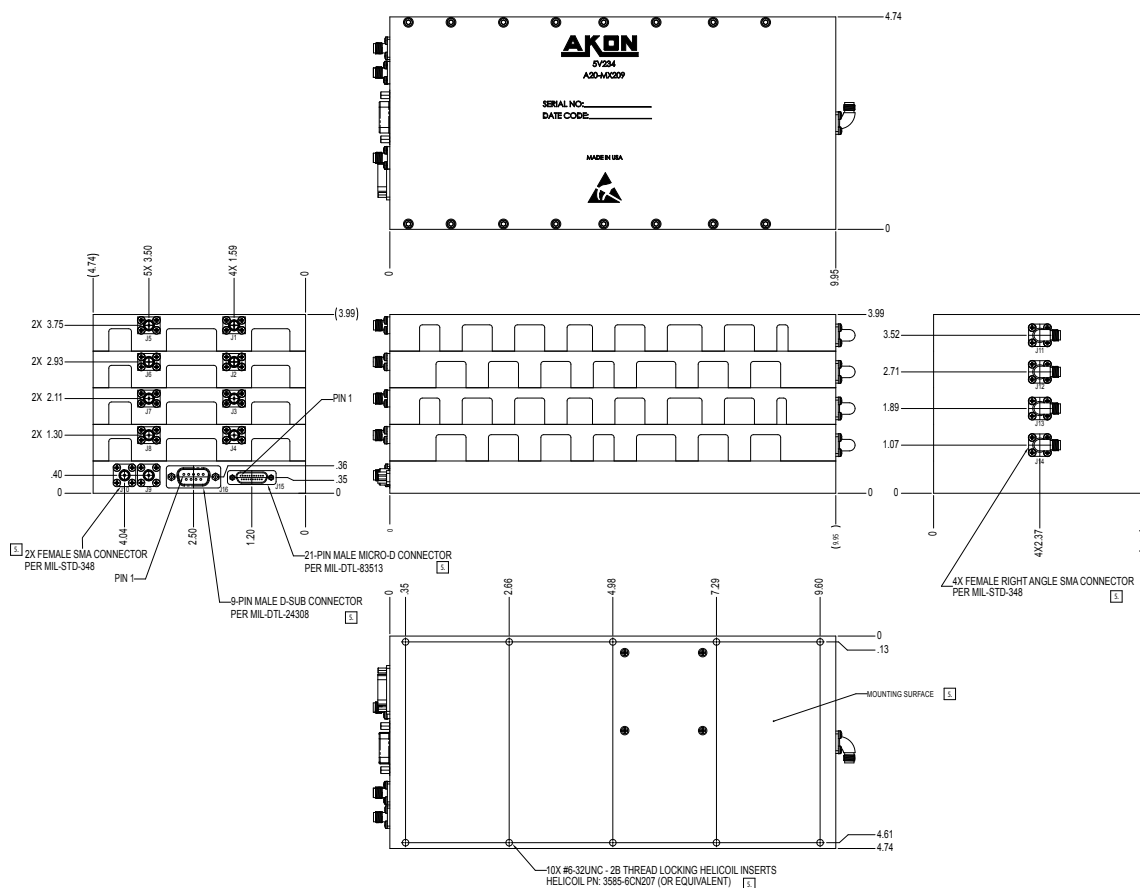
TUNER BLOCK DIAGRAM:



OPTIONAL CONFIGURATION (SINGLE 0.5 - 18 GHz INPUT):



OUTLINE DRAWING:



CONNECTOR DESIGNATIONS	
CONNECTOR	FUNCTION
J1	RF IN (0.5-8 GHz) TUNER 1
J2	RF IN (0.5-8 GHz) TUNER 2
J3	RF IN (0.5-8 GHz) TUNER 3
J4	RF IN (0.5-8 GHz) TUNER 4
J5	RF IN (8-18 GHz) TUNER 1
J6	RF IN (8-18 GHz) TUNER 2
J7	RF IN (8-18 GHz) TUNER 3
J8	RF IN (8-18 GHz) TUNER 4
J9	10 MHz REF
J10	LO 1 (7-18.7 GHz)
J11	IF OUT TUNER 1
J12	IF OUT TUNER 2
J13	IF OUT TUNER 3
J14	IF OUT TUNER 4
J15	21-PIN MICRO-D
J16	9-PIN D-SUB

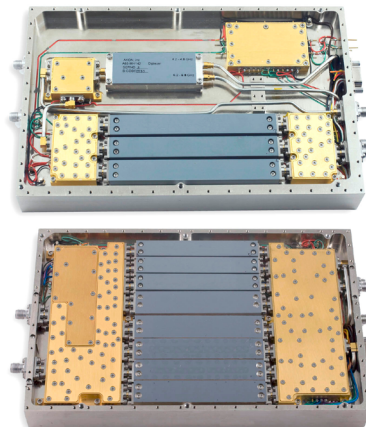
RF-BAND SELECTION					
BAND SELECT 4	BAND SELECT 3	BAND SELECT 2	BAND SELECT 1	BAND SELECTED	
0	0	0	0	14.8 - 18 GHz	
0	0	0	1	11.8 - 15.2 GHz	
0	0	1	0	8.8 - 12.2 GHz	
0	0	1	1	7.8 - 9.2 GHz	
0	1	0	0	5.4 - 8.1 GHz	
0	1	0	1	3.4 - 5.6 GHz	
0	1	1	0	1.95 - 3.55 GHz	
0	1	1	1	1.25 - 2.05 GHz	
1	0	0	0	0.75 - 1.35 GHz	
1	0	0	1	0.5 - 0.85 GHz	
1	0	1	0	N/A	
1	0	1	1	N/A	
1	1	0	0	N/A	
1	1	0	1	N/A	
1	1	1	0	N/A	
1	1	1	1	N/A	

J16 D-SUB CONNECTOR PIN-OUTS	
PIN NO.	FUNCTION
1	+12VDC (A)
2	+12VDC (B)
3	+12VDC (A) RTN
4	+12VDC (B) RTN
5	SPARE
6	SPARE
7	SPARE
8	SPARE
9	SPARE

J15 MICRO-D CONNECTOR PIN-OUTS	
PIN	FUNCTION
1	BAND SELECT 1
2	BAND SELECT 2
3	BAND SELECT 3
4	BAND SELECT 4
5	DIGITAL GND
6	SPARE
7	TEMP MONITOR TUNER 1
8	TEMP MONITOR TUNER 2
9	TEMP MONITOR TUNER 3
10	TEMP MONITOR TUNER 4
11	TEMP MONITOR LO 1
12	TEMP MONITOR LO 2
13	SPARE
14	EXTERNAL REFERENCE (10MHz) MONITOR
15	LO LOCK DETECT WITH EXTERNAL REFERENCE
16	EXTERNAL LO PRESENCE
17	SPARE
18	SPARE
19	SPARE
20	SPARE
21	SPARE

FEATURES:

- TYPE 1 TUNER
- 70 dB DYNAMIC RANGE
- 8 PRECONVERSION CHANNELS
- 50 dB SPURIOUS FREE RANGE
- 5 dB CONVERSION GAIN
- 60 dB CHANNEL TO CHANNEL ISOLATION
- 1 GHz IF OUTPUT
- +/- 25MHz, +/- 125MHz, +/- 250MHz INSTANTANEOUS BW



AKON's A20-MH260 is a 0.8 to 20.0 GHz microwave tuner of the classical type. It features a 60 dB dynamic range expander, an integrated input switch/limiter and launches through the LNA. The unit features an 8-channel filter bank preselector which eliminates received image frequencies. The unit features dual conversion steps to a final IF output frequency of 1 GHz. Output bandwidth is also selectable between 500 and 50 MHz. Conversion gain is 5 dB, Dynamic range extends to -70 dBm, of which the first 50 dB is spurious-free. LO sources are externally applied.

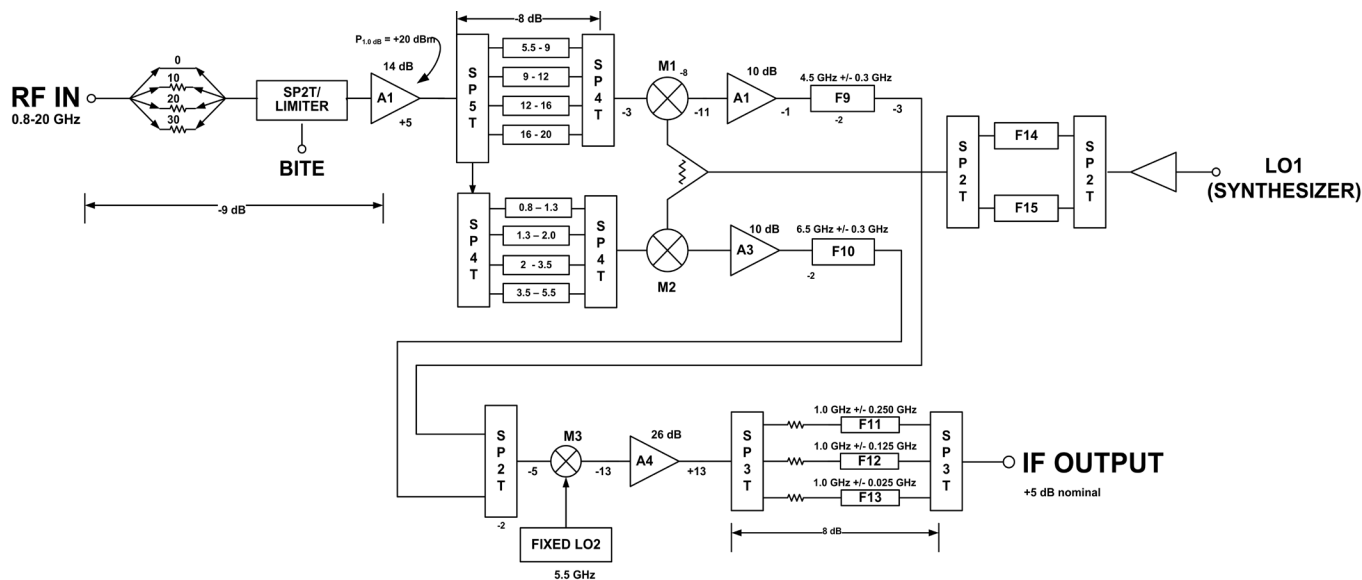
SPECIFICATIONS:

S/N	Model Number			A20-MH260
1.0	Frequency Range (GHz)			1 to 20 (min)
2.0	IF Output (GHz)			1
3.0	IF 1 dB Bandwidth (MHz)			500, 250, 50
4.0	Conversion Gain (dB)			5 (nom)
5.0	Input 1 dB Compression Point (dBm)			-10 (min)
6.0	Input Instantaneous Dynamic Range(dB)			60 (-70 to -10 dBm)
7.0	Input Power for 0 dB SNR in 500 MHz BW(dBm)			-70
8.0	Spurious @ -24 dBm Input (dBc)			-50 (min)
9.0	Number of Pre-select Bands			8
9.1	Bands	Pre-select Tuning Bands (GHz)	Pre-select Filters 1.0 dB BW (GHz)	Overlap
9.1	I.	0.8 - 1.3	0.775 - 1.325	+/- 25 MHz
9.1	II.	1.3 - 2.0	1.275 - 2.025	+/- 25 MHz
9.1	III.	2.0 - 3.5	1.875 - 3.625	+/- 125 MHz
9.1	IV.	3.5 - 5.5	3.375 - 5.625	+/- 125 MHz
9.1	V.	5.5 - 9.0	5.25 - 9.25	+/- 250 MHz
9.1	VI.	9.0 - 12.0	8.75 - 12.25	+/- 250 MHz
9.1	VII.	12.0 - 16.0	11.75 - 16.25	+/- 250 MHz
9.1	VIII.	16.0 - 20.0	15.75 - 20.0	+0/-250 MHz
10.0	Pre-select Band Switching Speed			100 ns (max)
11.0	Window Over Frequency @ 25°C			+/- 2.5 dB (max.)
12.0	Noise Figure (dB)			16 (max.)
13.0	Gain Variation vs. Temperature (dB)			+/- 2.0 (max.)
14.0	Dynamic Range Extender (dB)			10, 20, 30 (selectable)
15.0	LO1 Input(SMA-F Connector)			Variable; (not included)

SPECIFICATIONS CONT'D:

S/N	Model Number	A20-MH260
16.0	LO2 Input(SMA-F Connector)	Fixed; (not included)
17.0	Power Input	+15V(<1.5A), -15V (<-0.4A)
18.0	Operating Temperature (°C)	0 to 50
19.0	Control Signals	TTL
19.0	Dimensions	7.6"×4.9"×1.3" (max.)

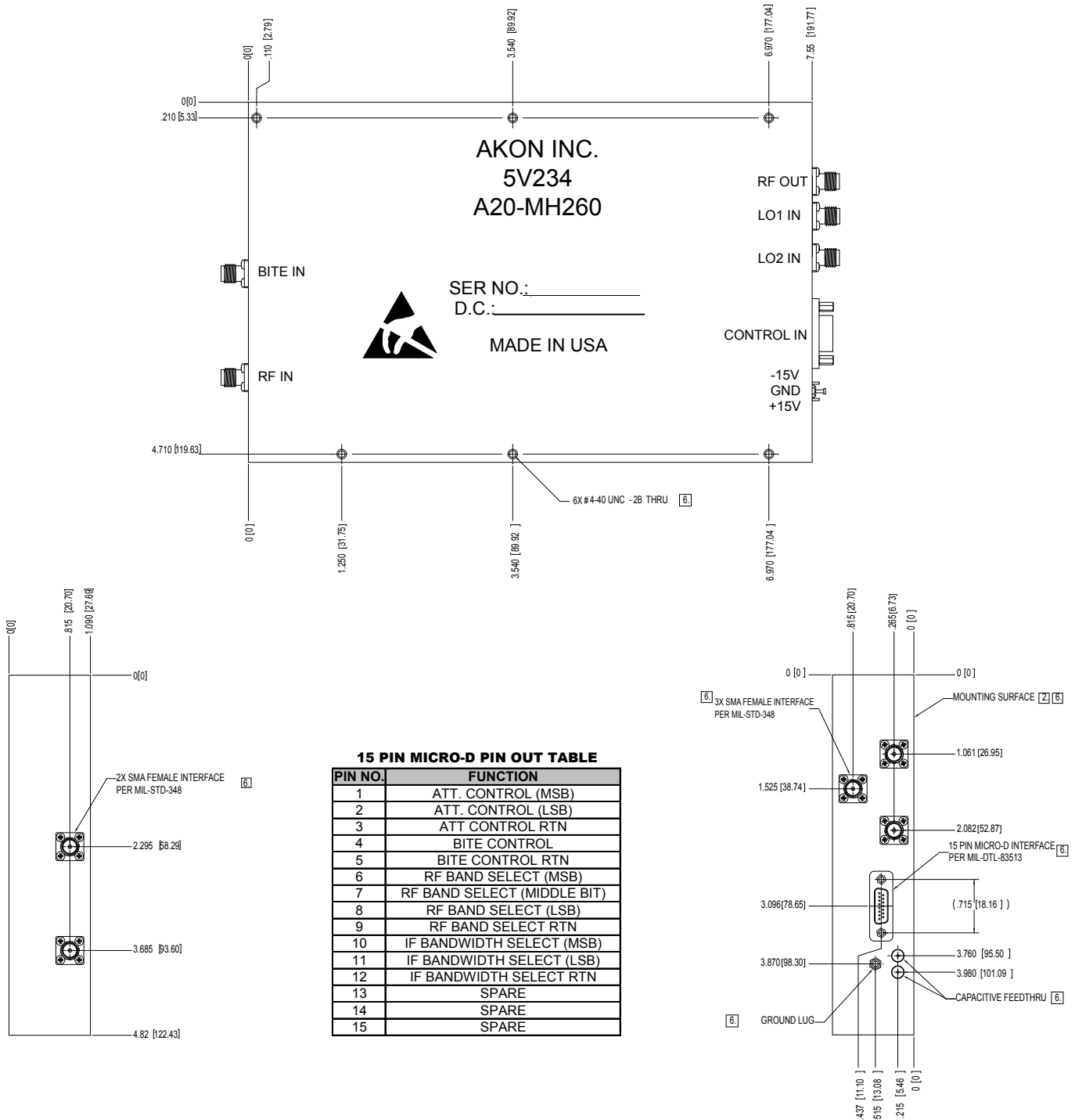
Block Diagram



0.8 - 20.0 GHz Pre-Channelized Dual Conversion Selectable IF Bandwidth Miniature Tuner

Datasheet 338

OUTLINE DRAWING:

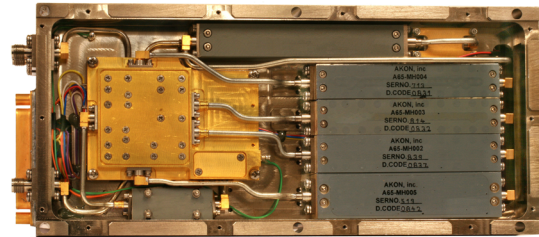


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DS338 REVA

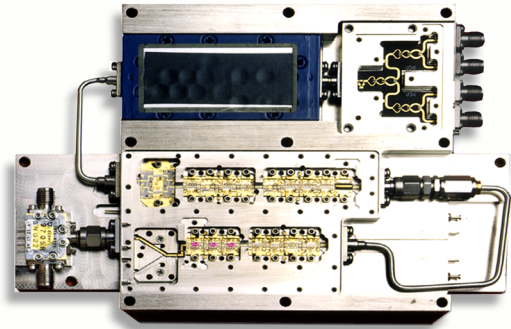
Receiver Subsystems

AKON offers a broad capability in the design and manufacture of custom high performance receiver front-ends for use in ESM receivers and other EW applications. These supercomponents can incorporate channelization filters, downconverters, LNAs and switching functions. Phase matching of channels is available for interferometer and monopulse applications.



FEATURES:

- MULTI-OCTAVE FREQUENCY COVERAGE
- 90 dB TEMPERATURE COMPENSATED AND
- PHASE MATCHED GAIN FOR LIMITED RF OUTPUT
- BUILT-IN LIMITER AND BITE SWITCH
- $\pm 15^\circ$ PHASE MATCH AT 18 GHz



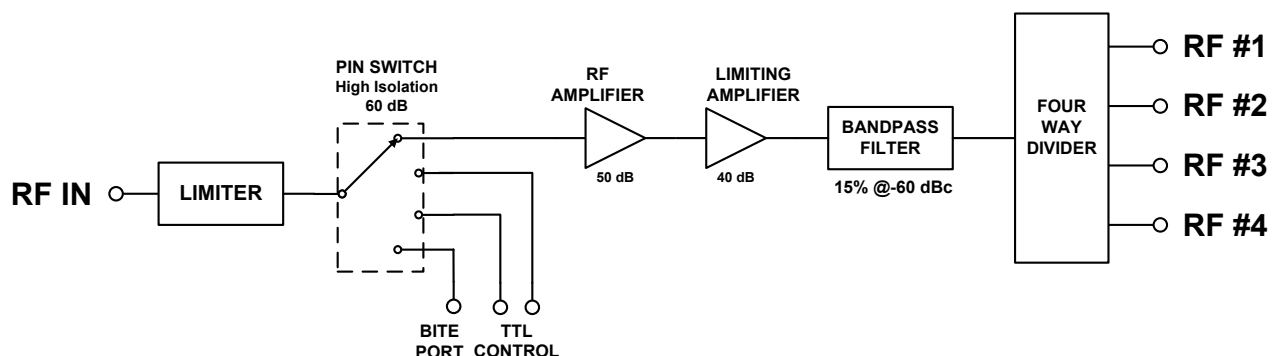
AKON's line of products includes high reliability custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, RF attenuators and microwave amplifiers covering 0.5 - 18.0 GHz frequency range (up to 26.5 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense as well as various leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.

This subsystem consists of a limiter, SP2T BITE switch, 90 to 95 dB phase matched receiver, highly flat RF amplifiers feeding a band Pass filter, and a four-way divider. In sum, the output feeds to the interferometer DF receiver processor. The unit results in a minimum +10 dBm output over -60 dBm to 0 dBm input while maintaining a phase match of ± 15 degrees at 18.0 GHz and ± 10 degrees at 8 GHz. This receiver covers 2.0 - 8.0 and 8.0 - 18.0 GHz, but units can be designed over 2.0 - 18.0 GHz bandwidth with similar performance. Please contact us directly to discuss specific applications to define a unit exactly tailored to your needs.

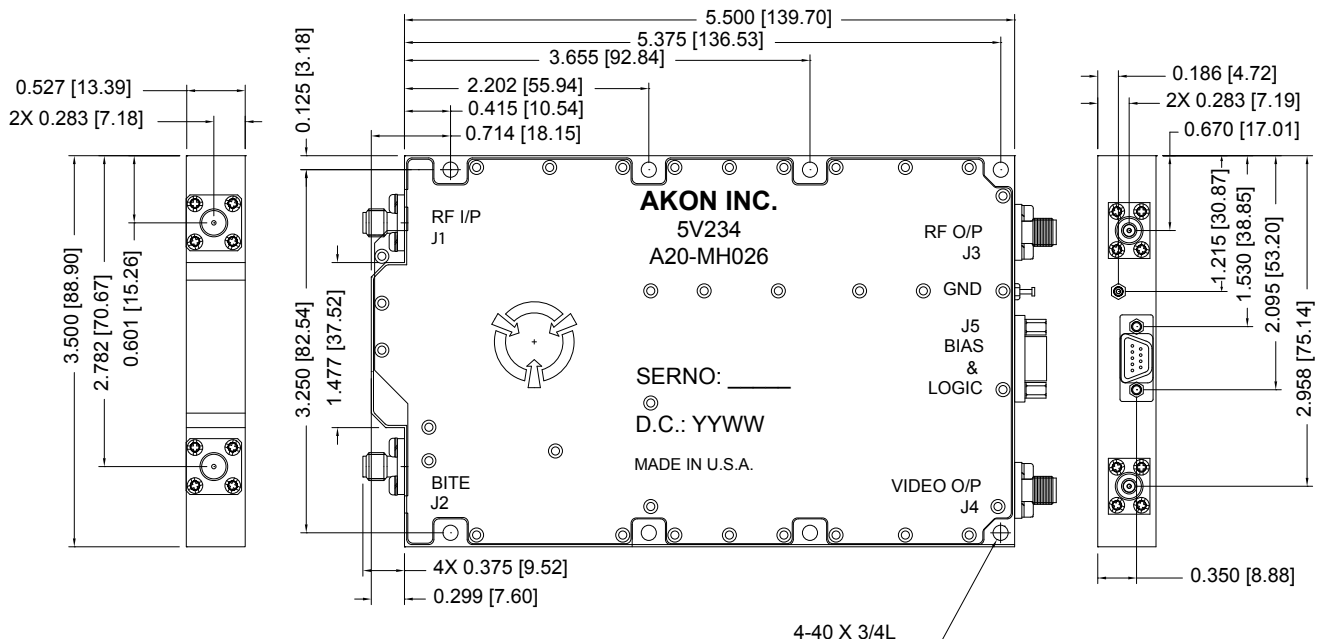
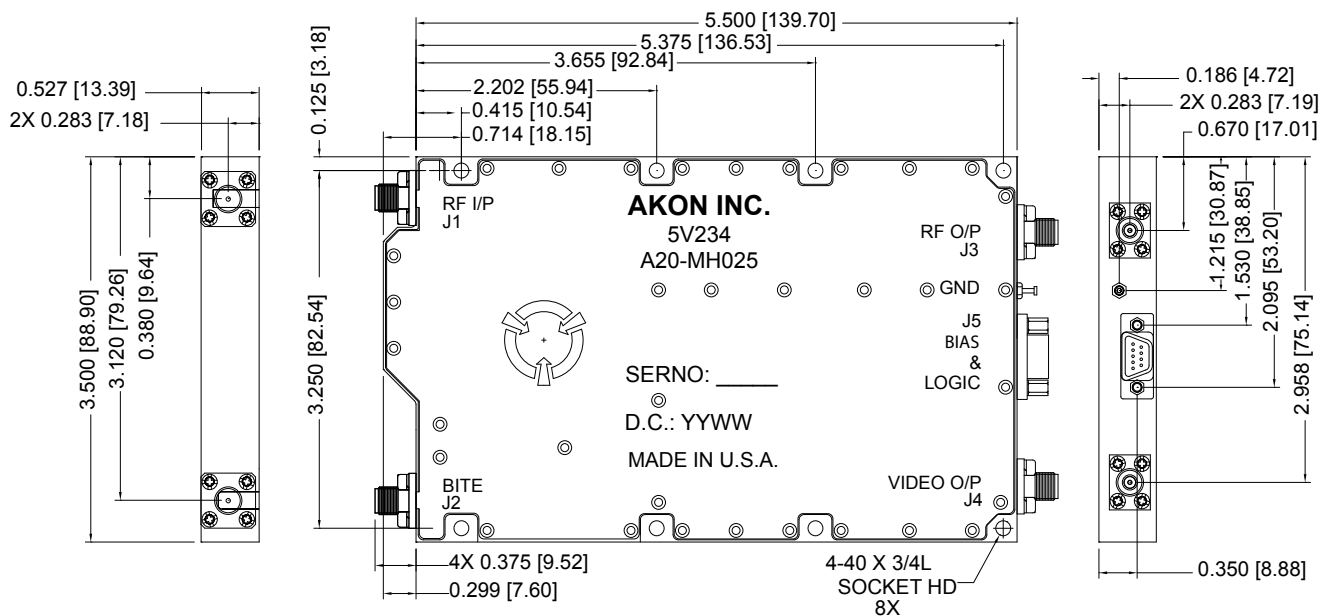
SPECIFICATIONS:

Model Number	A20-MH025	A20-MH026
Frequency Range (GHz)	2.0 - 8.0	8.0 - 18.0
Dynamic Range (dBm)	-65 to 0	-64 to 0
Noise Figure (dB)	9	10
Gain (dB)	90 (min), 95 (typ)	90 (min), 95 (typ)
Frequency Flatness (dB)	± 3.0	± 3.0
Phase Matched Flatness ($^\circ$ C)	± 12	± 15
Output Port/Port ($^\circ$ C)	± 5	± 6

BLOCK DIAGRAM:



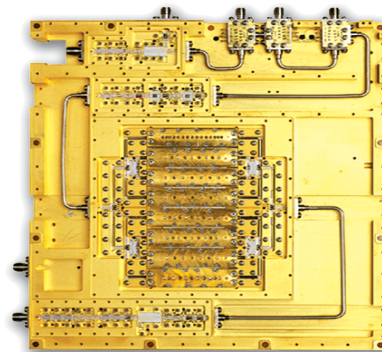
OUTLINE DRAWINGS:



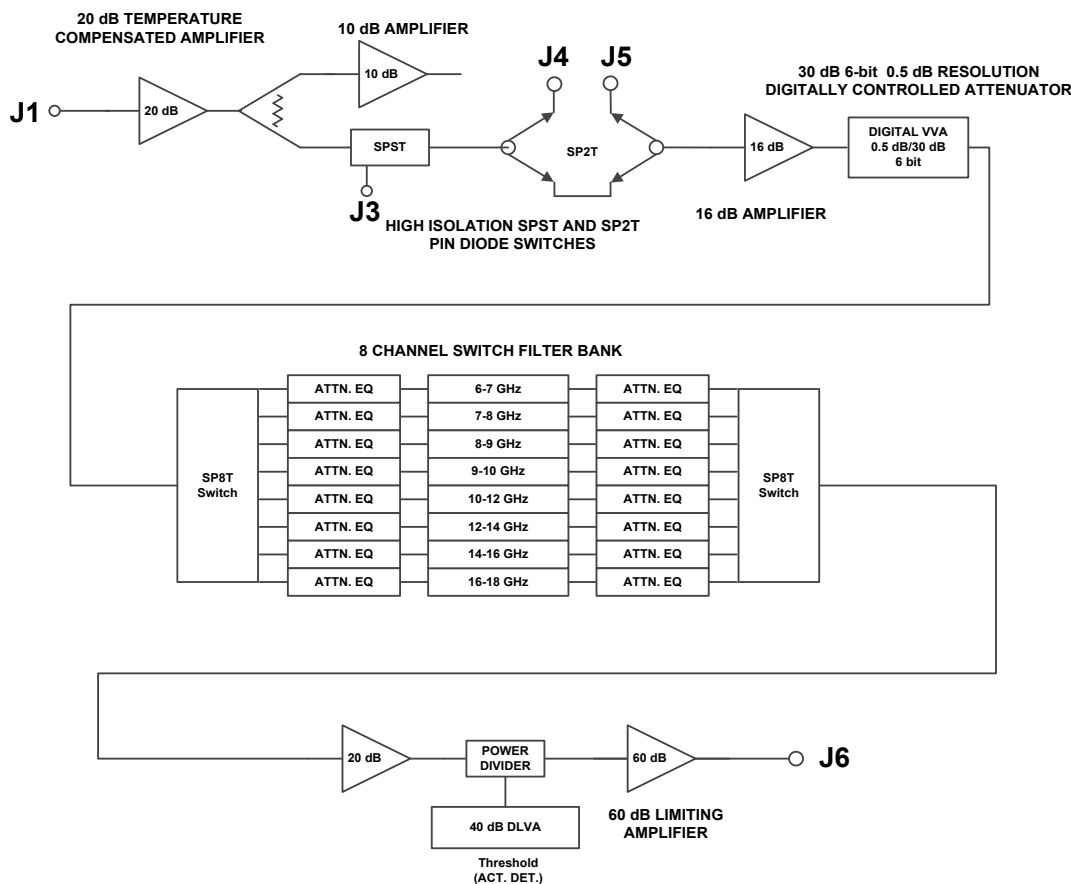
FEATURES:

- ULTRA BROAD FREQUENCY RANGE
- BUILT-IN HIGH POWER PROTECTION
- BUILT-IN BITE CIRCUIT
- BUILT-IN DLVA
- RF OUTPUT FOR FREQUENCY MEASUREMENT
- EXCELLENT LINEARITY

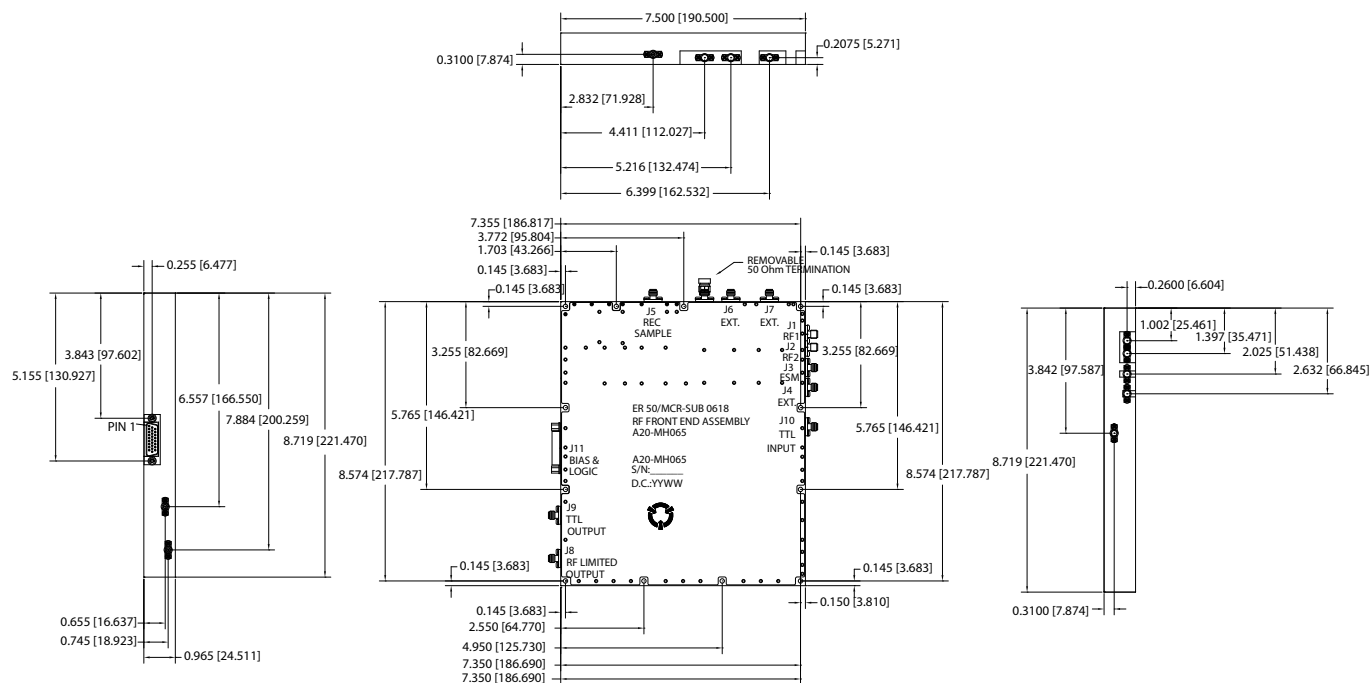
AKON's model **A20-MH065** is a critical part of our line of products which include high reliability custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, RF attenuators and microwave amplifiers covering 2.0 - 18.0 GHz frequency range (up to 26.5 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense as well as various leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.



BLOCK DIAGRAM:



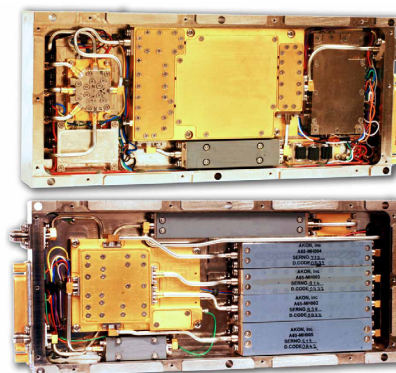
OUTLINE DRAWING:



26 PIN CONNECTOR		26 PIN CONNECTOR CONT'D	
Pin Number	Description	Pin Number	Description
1	+15VA	14	L2, SP8T
2	+15VB	15	L3, SP8T
3	+15VC	16	L1, VVA
4	+15VA Return	17	L2, VVA
5	+15VB Return	18	L3, VVA
6	+15VC Return	19	L4, VVA
7	-15V	20	L5, VVA
8	-15V Return	21	L6, VVA
9	L1, SP4T	22	SP2T (B)
10	L2, SP4T	23	SPARE
11	L3, SP4T	24	0-+5V
12	SPARE	25	0-+5V Return
13	L1, SP8T	26	SPARE

FEATURES:

- 1.0 - 18.0 GHz COVERED IN 5 BANDS
- RF OUTPUT FOR FREQUENCY MEASUREMENT
- 65 dB CHANNEL TO CHANNEL ISOLATION
- FILTER SKIRT -60 dBc; 15%
- 70 dB DLVA FOR AMPLITUDE MEASUREMENT
- T.S.S.: -75 dBm
- -72 dBm TO 0 dBm LOG RANGE
- ABSOLUTE ACCURACY PER CHANNEL: +/- 2.0 dB
- MATCHING BETWEEN CHANNELS: 2.0 dB P-P

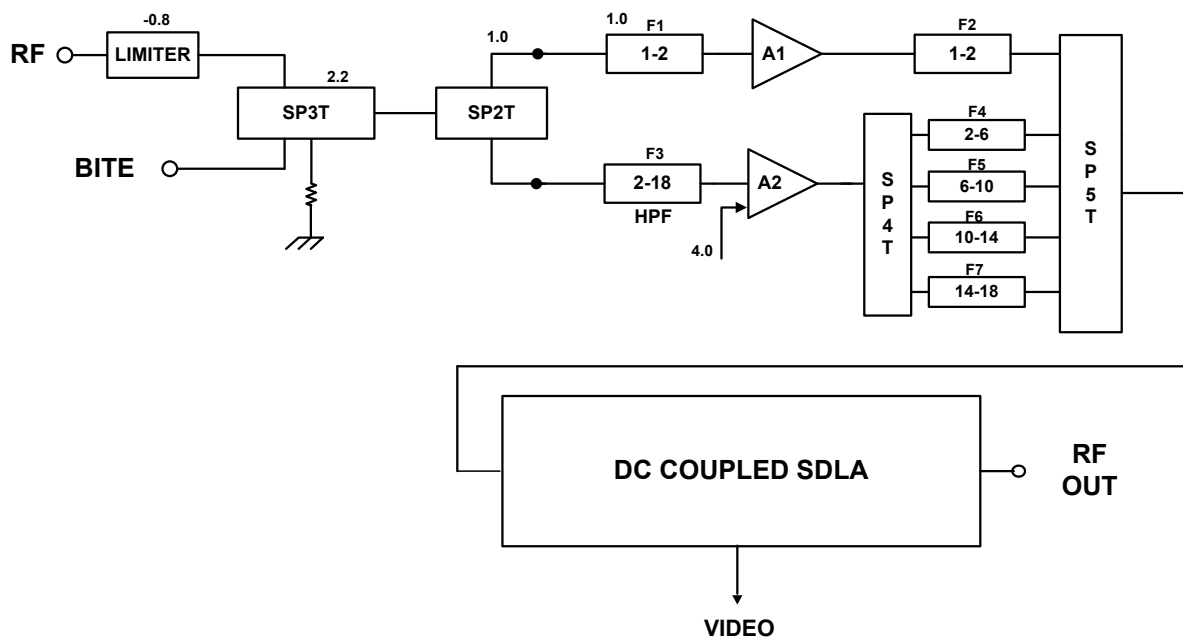


AKON is a leading manufacturer of a broad range of microwave components and integrated subassemblies in 0.5 to 20.0 GHz range. We specialize in concept through hardware realization of “custom” microwave components and integrated subassemblies (MIC and MMIC). The A20-MH166 is a 5-band RF amplifier and filter-preselector, which channelizes the 1.0 to 18 GHz band into 5 sub-bands of 1.0 to 2.0, 2.0 to 6.0, 6.0 to 10.0, 10.0 to 14.0 and 14.0 to 18.0 GHz. There are two inputs, one for the RF source and the other for a test signal input. the unit provides 35 dB of low noise gain. There is additionally included a DC coupled SDLA with TSS of -75 dBm which provides high speed detected video out. Applications include front-end preselection and video recovery for EW RWR and ELINT receivers. AKON can customize this product to the individual customer’s specific requirements.

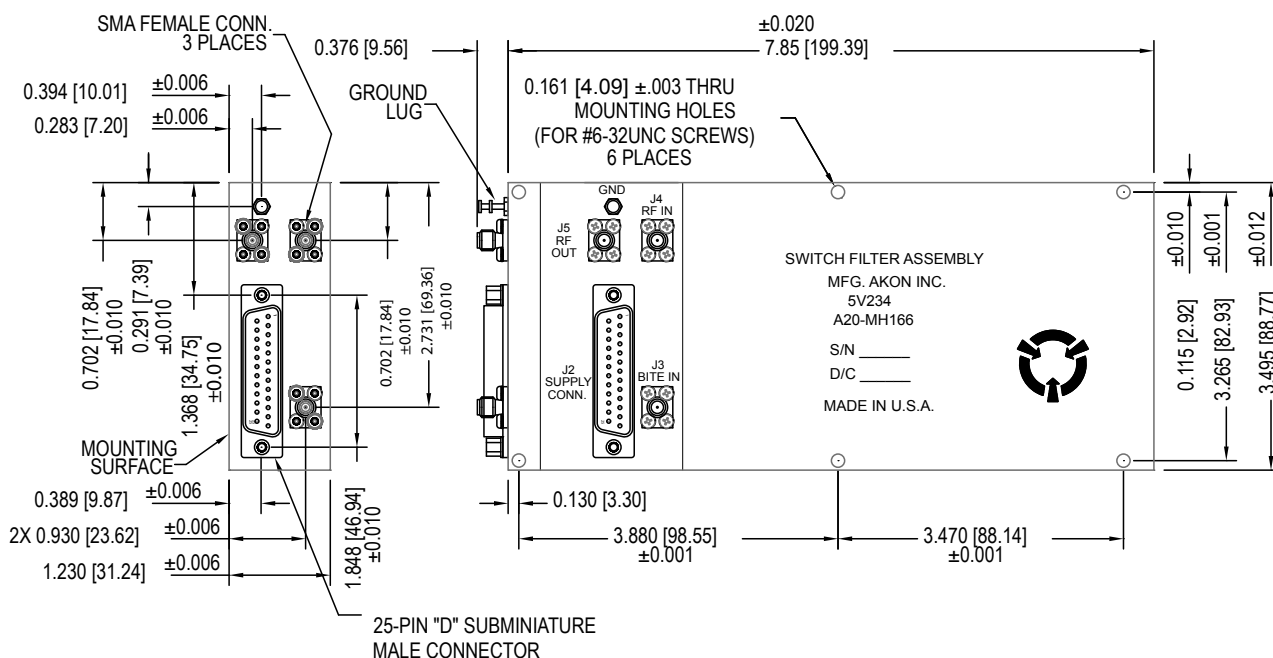
SPECIFICATIONS:

Model Number	A20-MH166
Frequency Range (GHz)	1.0 - 18.0 (5 Bands: 1 - 2, 2 - 6, 6 - 10, 10 - 14, 14 - 18)
Band Overlap (MHz)	5 (min) from the band edge
Filter Rejection (dBc)	-65 (min)
T.S.S. (dBm)	-75 (min)
Dynamic Range (dBm)	-72 to 0
Absolute Accuracy (dB)	+/- 2.0 (nom); +/- 3.0 (max)
Channel to Channel Isolation (dB)	65
Maximum Input Level (dBm)	+30 (CW) +50 (Peak 1.0 μ S PW @1000 us PRF)
VSWR	3.0:1 (max); 2.5:1 (nom)
Gain (dB)	35 +/- 3.0
Output Power (dBm)	+13
Harmonics (dBc) (In band)	-8 (at saturation); -30 (in linear range)
Band Switching Time (nS) (Input TTL to 90% of band)	300 (max)
Rise Time (nS) (10% to 90%)	25
Settling Time (nS) (10 % to 0.5 dB of final value)	40
Recovery Time (nS)	75 (0 dB to -72 dB below peak)
Power Supply (VDC)	+12 @ 540 mA; -12 @ 325 mA +8 @ 825 mA

BLOCK DIAGRAM:

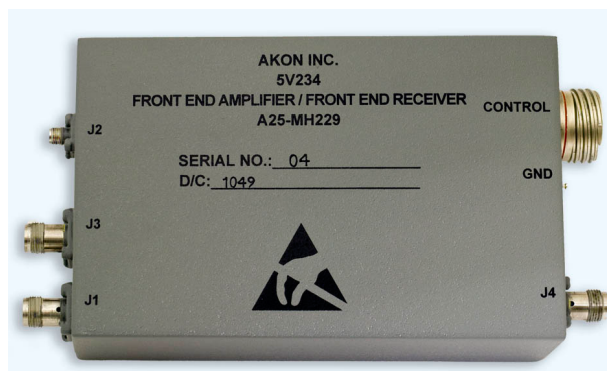


OUTLINE DRAWING:



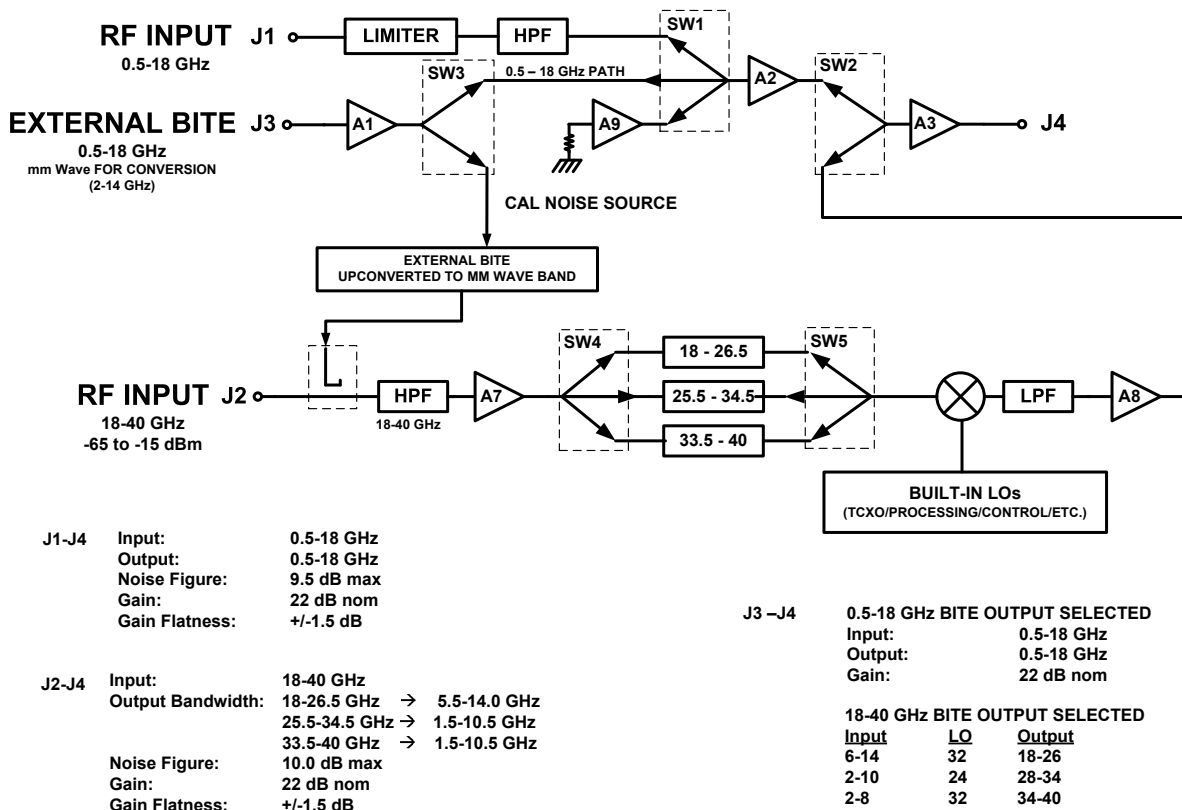
FEATURES:

- 0.5 - 40.0 GHz INPUT FREQUENCY
- 0.5 - 18.0 GHz OUTPUT FREQUENCY
- 22 dB GAIN
- +/- 2.5 dB GAIN FLATNESS
- UP TO 50 dBm MAX INPUT POWER (DAMAGE)
- TOTAL WEIGHT: 1.74 Kg
- 6.5 x 4.0 x 1.85 INCHES
- LO's BUILT-IN



AKON's model **A25-MH229** is a front-end down converter for 18.0 - 40.0 GHz and 0.5 - 18.0 GHz front-end amplifier with switch filter bank and medium power amplifiers. Nominal gain of 0.5 - 18.0 GHz channel is 22 dB, with +21 dBm as minimum output power at 1.0 dB compression. The unit features built-in LO's for 18.0 - 40.0 GHz front-end and built-in BITE signals for 0.5 - 18.0 GHz (1.0 GHz, 16.0 GHz) and 18.0 - 40.0 GHz (20.0, 28.0 and 36 GHz) block converter.

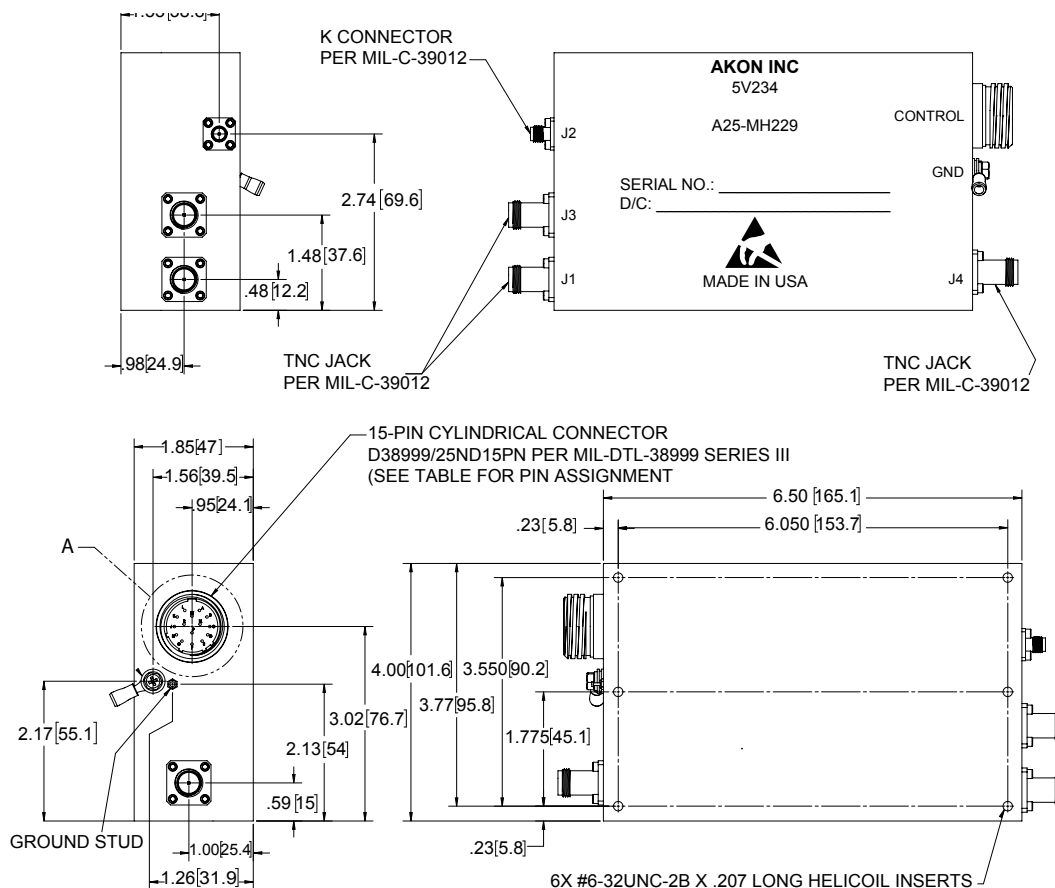
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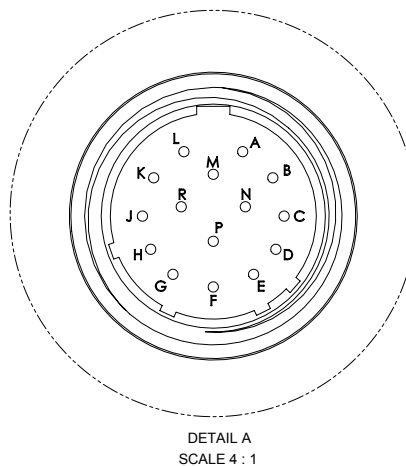
SPECIFICATIONS:

Model Number	A25-MH229
Input Frequency Range (GHz)	Input J1 (Low Band): 0.5 -18.0 Input J2 (High Band): 18.0 - 40.0
Input J3 (BITE) (GHz)	0.5 to 18.0
Output Frequency Range (J4) (GHz)	0.5 to 18.0
Input Signal Type	CW/Pulsed
Maximum Input Power For Damage (dBm)	J1: For CW mode: +30.0; For Pulse mode: +50.0; PW:1 uSec and 1KHz PRF; J2: For CW mode: +20.0
Gain over Frequency (dB)	J1-J4: 22.0 (nom), 20.5 (min) J2-J4: 22.0 (nom), 20.5 (min)
Gain Flatness over Frequency (dB)	+/- 2.5
Input 1 dB Compression (dBm)	J1: 0 J2: -15
Noise Figure (dB)	J2-J4: 9.0 (nom); 9.5 (max) J1-J4: 10.0 (max)
VSWR	2.2:1 (max)
Switch Isolation b/w Ports (SP2T) (dB)	70 (min)
Switching Speed (SP2T) (nS)	< 50
Image Rejection (dBc)	-60
Harmonics (in-band) at J4	2nd Harmonic: -22 dBc (min) 3rd Harmonic -26 dBm (min)
Spurious (dBc)	-50 (nom) -40 (min)
High Pass Filter Rejection (dBc)	J1 (0.5 GHz - 18.0 GHz): -50 @ 375.0 MHz -60 > 340 MHz J2 (18 GHz - 40 GHz): -50 -> DC to 15.3 GHz
Local Oscillator Phase Noise (LO signal provided inside the unit for 18 GHz-40 GHz band)	-60 dBc/ Hz 1 kHz -80 dBc/ Hz 10 kHz -90 dBc/ Hz 100 kHz
Impedance at all Ports (Ohms)	50
Connectors	Input RF Port J1: ETNC-F RF Input J2: 2.9 mm K type External BITE J3: ETNC-F Output Port J4: ETNC-F Supply and Contro Connector: Circular per MIL DTL 38999, Series III
TTL Control (Bits)	RS 422 differential format (for Band Selection, Switch Filter Bank and BITE Selection and BITE Enable)
Power Supply with Built-In EMI Filter	+28 V +/- 10%
Operating Temperature (°C)	-40 to +71
Storage Temperature (°C)	-55 to 85
Size (inches)	6.5" x 4.0" x 1.85"
Weight (Kg)	1.74 (max)

OUTLINE DRAWING:



CONTROL PIN-OUTS	
PIN	ASSIGNMENT
A	BIT 0
B	BIT 0
C	BIT 1
D	BIT 1
E	BIT 2
F	BIT 2
G	BIT 3
H	BIT 3
J	+28V
K	+28V RETURN
L	DIGITAL GROUND
M	SPARE
N	SPARE
P	SPARE
R	SPARE



Digital Frequency Discriminators

AKON's Digital Frequency Discriminators (DFD) are key components in many modern ESM and surveillance systems and can be designed to operate from 0.5 to 40.0 GHz. Measurement resolution can be as fine as 16 bits. These units can operate in the presence of simultaneous signals, including CW, and with input SNR as low as 0 dB. Optional output flags include CW, out of band, simultaneous signals and data valid. The units can be either of the triggered sampling type, or the continuous sampling type. Input sensitivity is typically -65 dBm. Response times are typically in the order of 200 nS.



FEATURES:

- 4.3 - 5.3 GHz FREQUENCY RANGE
- HIGH SENSITIVITY
- MULTIPLE SIGNAL HANDLING
- TTL COMPATIBLE
- 300 nS PROCESSING TIME
- 0.25 MHz FREQUENCY ACCURACY

AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications. AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 2.0 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.

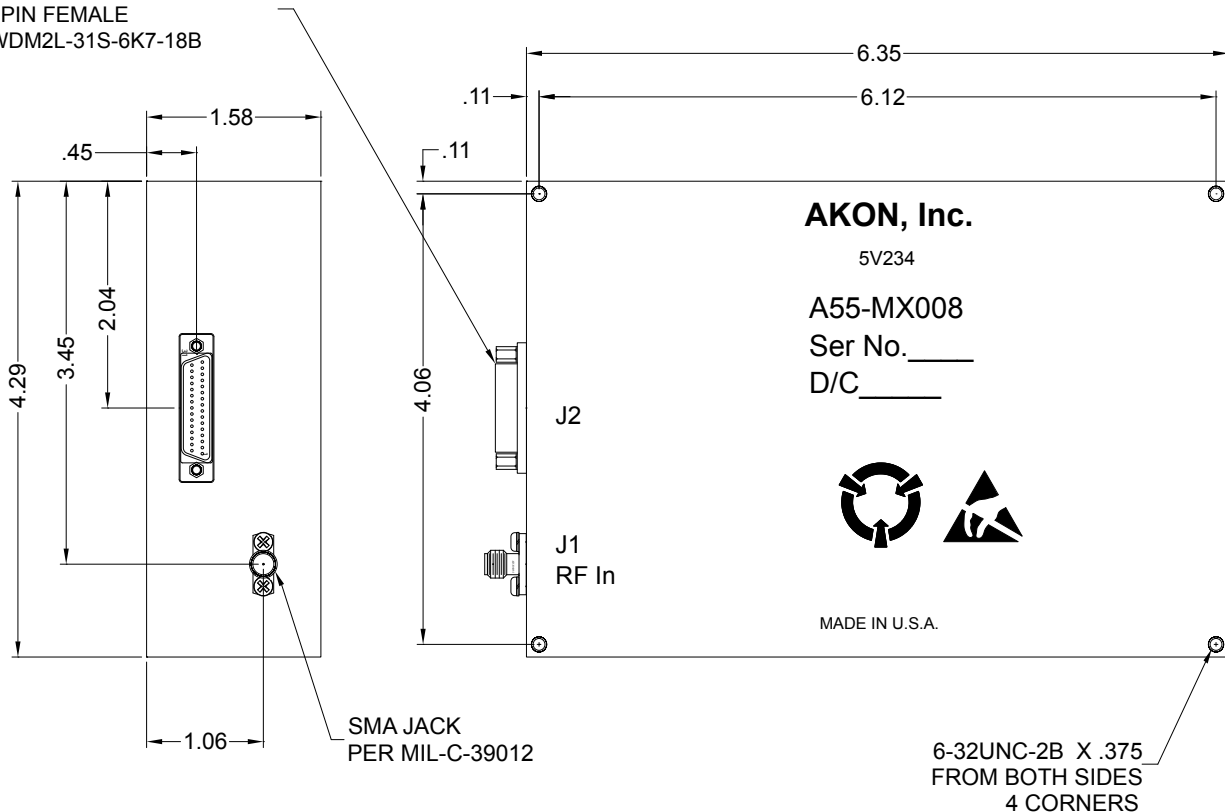


SPECIFICATIONS:

Model Number	A55-MX008
Frequency Range (GHz)	4.3 - 5.3
Unambiguous Frequency Range (GHz)	3.9 - 5.8
Frequency Resolution (MHz)	0.125 (14 bits)
Frequency Accuracy (MHz RMS)	0.25
Trigger	Internal & External
Sensitivity (dBm)	-55
Dynamic Range (dB)	50
Processing Time (ns)	300 (from RF leading edge)
Pulse Width Range (ns)	100 to CW
Binary Zero (MHz)	3776
Frequency Value	3776 + output data(decimal equivalent)* 0.125 MHz
Data for input frequency < 4290 MHz	3FFF (hex)
Data for input frequency > 5310 MHz	3FFF (hex)
Input RF SNR (dB)	25
External Trigger	TTL pulse 100 nS
Flags	1) CW Flag: TTL High if CW signal is detected 2) Signal Present: 100 nS pulse output with 100 nS delay
Power Supply (VDC)	+15V, -15V and +5V
Operating Temperature (°C)	10 to 40

OUTLINE DRAWING:

MICRO-D CONNECTOR
31 PIN FEMALE
MWDM2L-31S-6K7-18B



PIN #	FUNCTION
1	F0 (LSB)
2	F1
3	F2
4	F3
5	F4
6	F5
7	F6
8	F7
9	F8
10	F9
11	F10
12	F11
13	+5V
14	EXT. TRIGGER
15	DATA READY
16	DATAACK INPIUT

PIN #	FUNCTION
17	SIG. PRESENT
18	N/C
19	+15V
20	-15V
21	+15V RTN
22	N/C
23	-15V RTN
24	EXT TRIG RTN
25	+5V RTN
26	C.W. FLAG
27	F13 (MSB)
28	F12
29	READ SELECT
30	SPARE
31	SPARE

FEATURES:

- 239 - 386 MHz FREQUENCY RANGE
- HIGH SENSITIVITY
- MULTIPLE SIGNAL HANDLING
- TTL COMPATIBLE
- 300 nS PROCESSING TIME
- 1 MHz FREQUENCY ACCURACY
- BUILT-IN SDLA

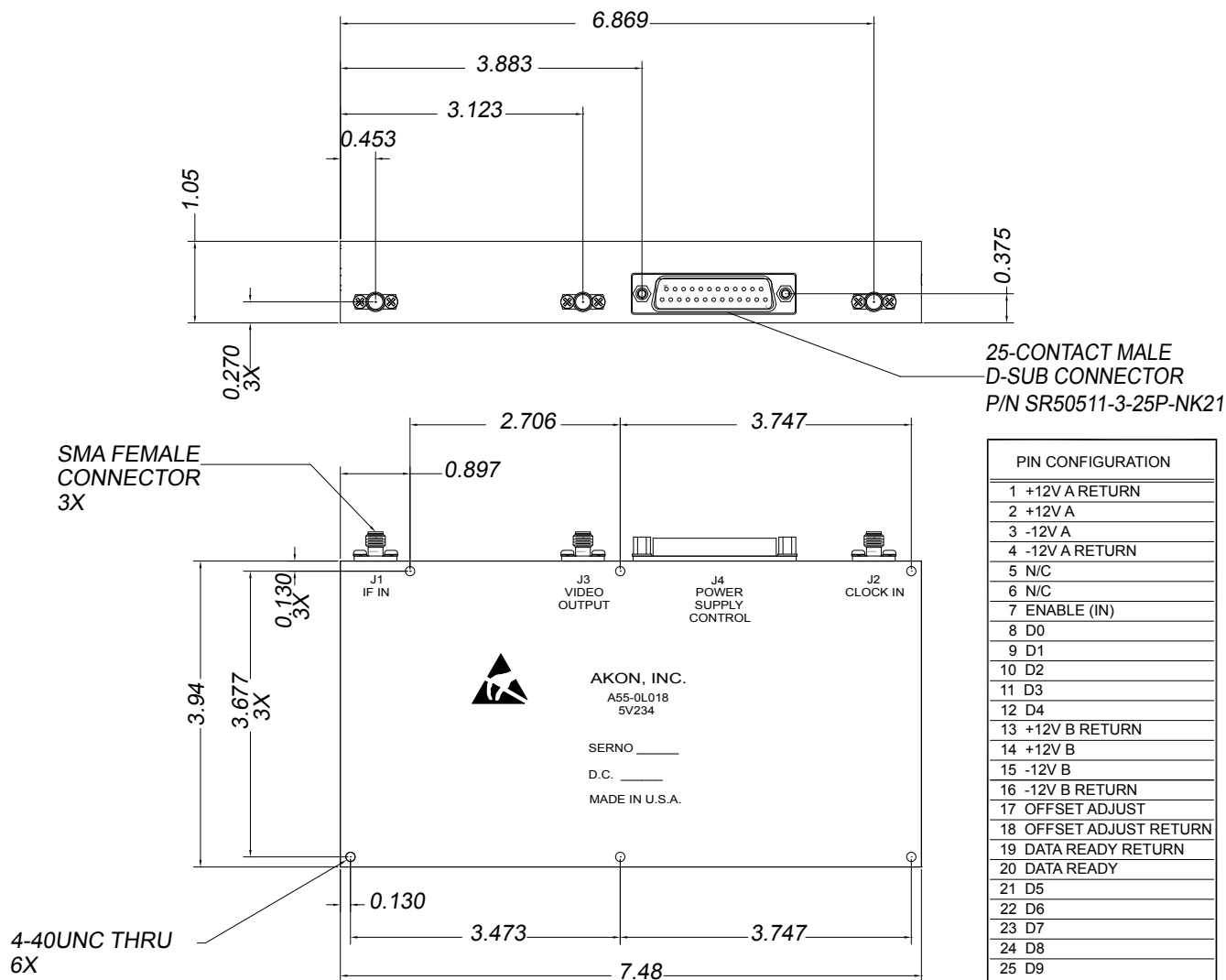


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SPECIFICATIONS:

Model Number	A55-OL018	
Frequency Range (MHz)	239 - 386	
Dynamic Range (dBm)	-65 to -5	
Operating Bandwidth (MHz)	147	
Input Signal to Noise Ratio (dB)	5	
Pulse Width (nS)	50 (min) (up to CW)	
Frequency Resolution (MHz)	0.14 (10 bits)	
Frequency Accuracy (MHz)	< 1 (RMS)	
Digital Controls	TTL compatible	
Processing Time (nS)	300 (max) (from external enable input to valid data ready)	
Video Output (Logarithmic)	Logarithmic Slope (mV/dB) 30 +/- 10% Logging Range -65 to -5 dBm (min) Log Linearity +/- 1 dB Log Accuracy +/- 1.5 dB Log Accuracy +/- 2.0 dB (max) Log Linearity +/- 1.5 dB (max) Rise Time (Pulse Input) 15.0 nS Fall Time (90% to 10% output) 25 nS DC Offset (RF input terminated to 50Ω) 50 mV +/- 20.0 mV Video Output Noise Level 10 mV p - p (nom) Video Output Flatness +/- 0.75 dB	
Power Supply (VDC)	+12 +/- 10% @ 1000 mA (max) -12 +/- 10% @ 400 mA (max) +5 +/- 10% @ 200 mA (max)	

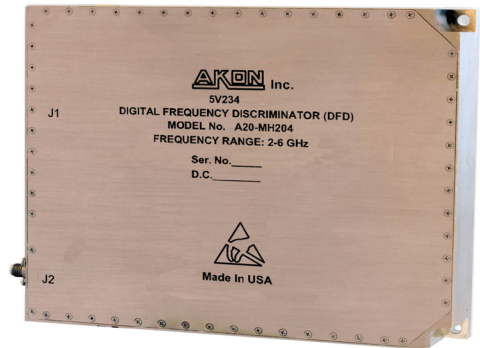
OUTLINE DRAWING:



FEATURES:

- 2.0 - 6.0 GHz FREQUENCY RANGE
- 100 nS to CW INPUT RF PULSE WIDTH
- EXTERNALLY TRIGGERED
- 14 BITS FREQUENCY RESOLUTION
- 100 nS RECOVERY TIME
- SIZE: 5.9" x 4.69" x 1.5"

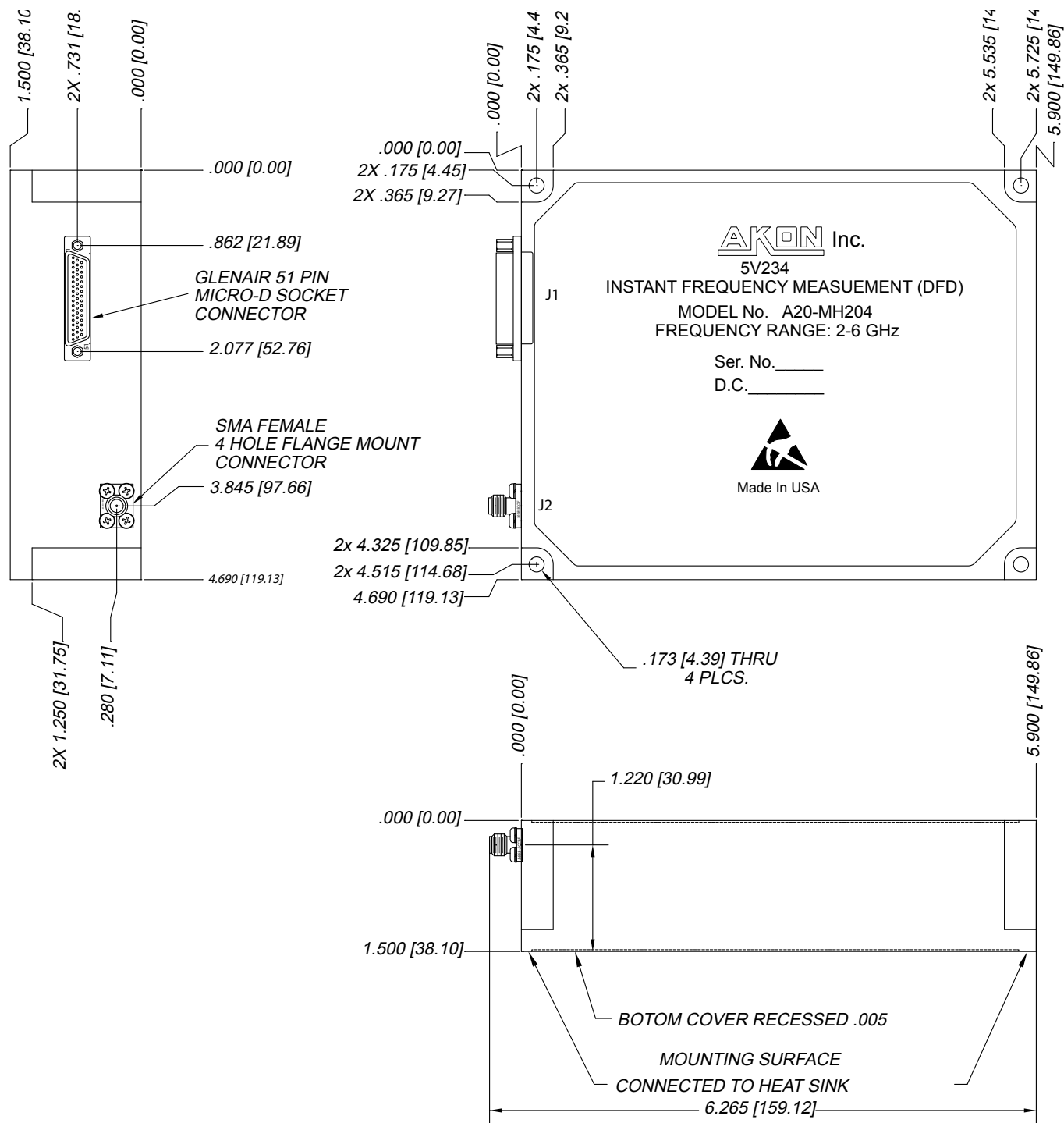
AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications. AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 2.0 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.



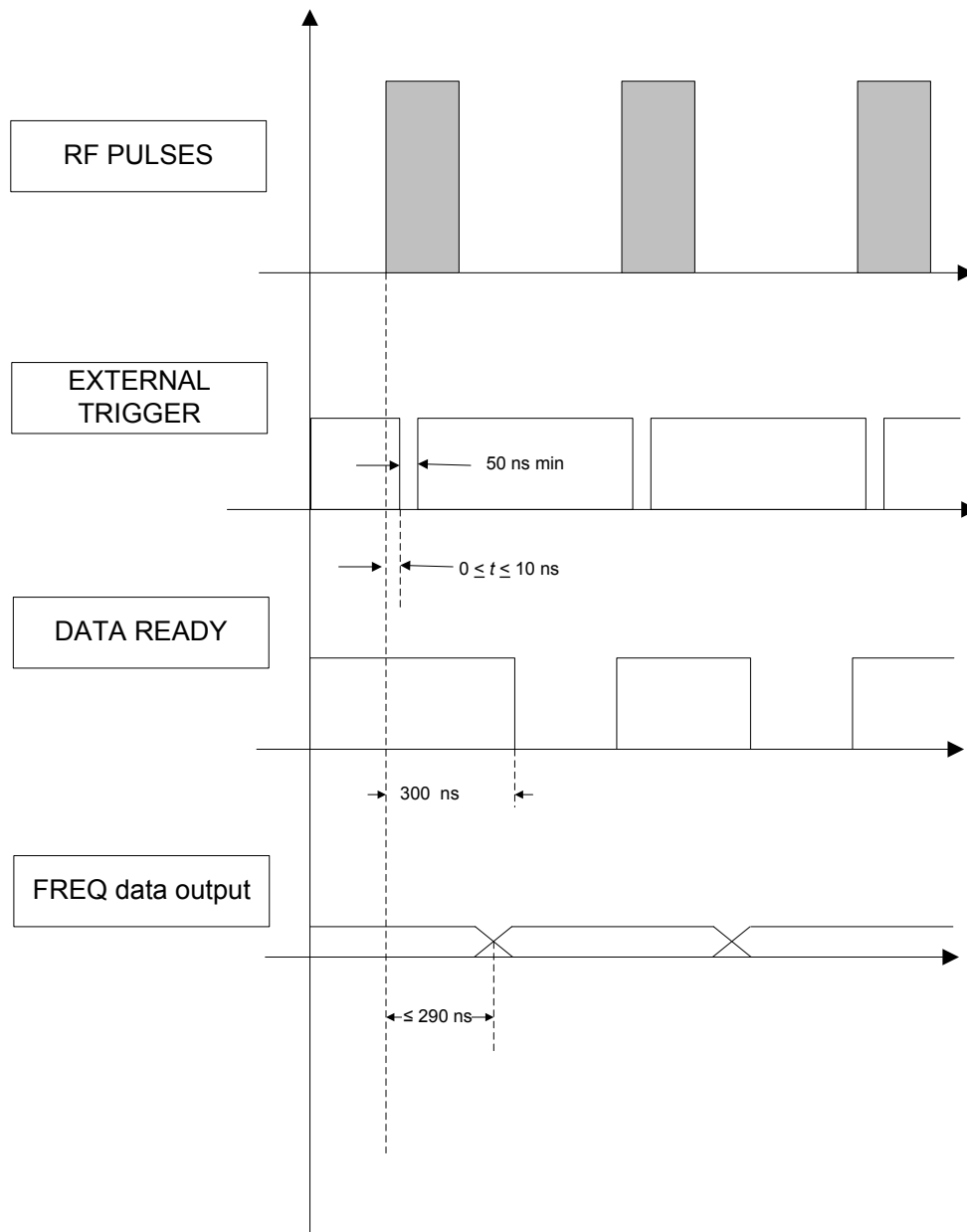
SPECIFICATIONS:

Model Number	A20-MH204
Frequency Range (GHz)	2 - 6
Unambiguous BW (MHz)	4800
Frequency Accuracy (MHz) RMS	1.5 (max)
Frequency Resolution (MHz)	0.3
Mean Cell Width (MHz)	0.3 (nom)
Dynamic Range (dBm)	-65 to +5
Sensitivity (dBm)	-65
Signal Processing Capability	Pulse (100 nS to CW)
Input VSWR	2:1 (max)
Input Impedance (Ohms)	50
Survival Power (dBm)	+20
Operating Mode	External Clock Mode
Recovery Time (nS)	100 (max)
Processing Shadow Time (nS)	200 (max)
Throughput Time (nS)	300 from external trigger
Data Ready	The Data Ready output shall be inactive (TTL high)
Output Frequency Data Word	The frequency data word shall be: Frequency = (decimal word x 0.3 MHz) +1800 MHz 14 bit
Data Ready Output	TTL high initially. TTL low when the frequency data of input RF signal has settled. Nominal pulse width 100 nS. After 100 nS, TTL releases to high.
Power Supply (VDC) (Unit is protected from reverse polarity, transients, and turn-on sequence)	+12 @ 200 mA +8V @ 1.3 A -8V @ 250 mA
Operating Temperature Range (°C)	-20 to +71 (higher temperatures available)
Size (Inches)	5.9 x 4.69 x 1.5

OUTLINE DRAWING:



TIMING DIAGRAM:



FEATURES:

- 6.0 - 18.0 GHz FREQUENCY RANGE
- 100 nS to CW INPUT RF PULSE WIDTH
- EXTERNALLY TRIGGERED
- 14 BITS FREQUENCY RESOLUTION
- 100 nS RECOVERY TIME
- SIZE: 5.9" x 4.69" x 1.5"

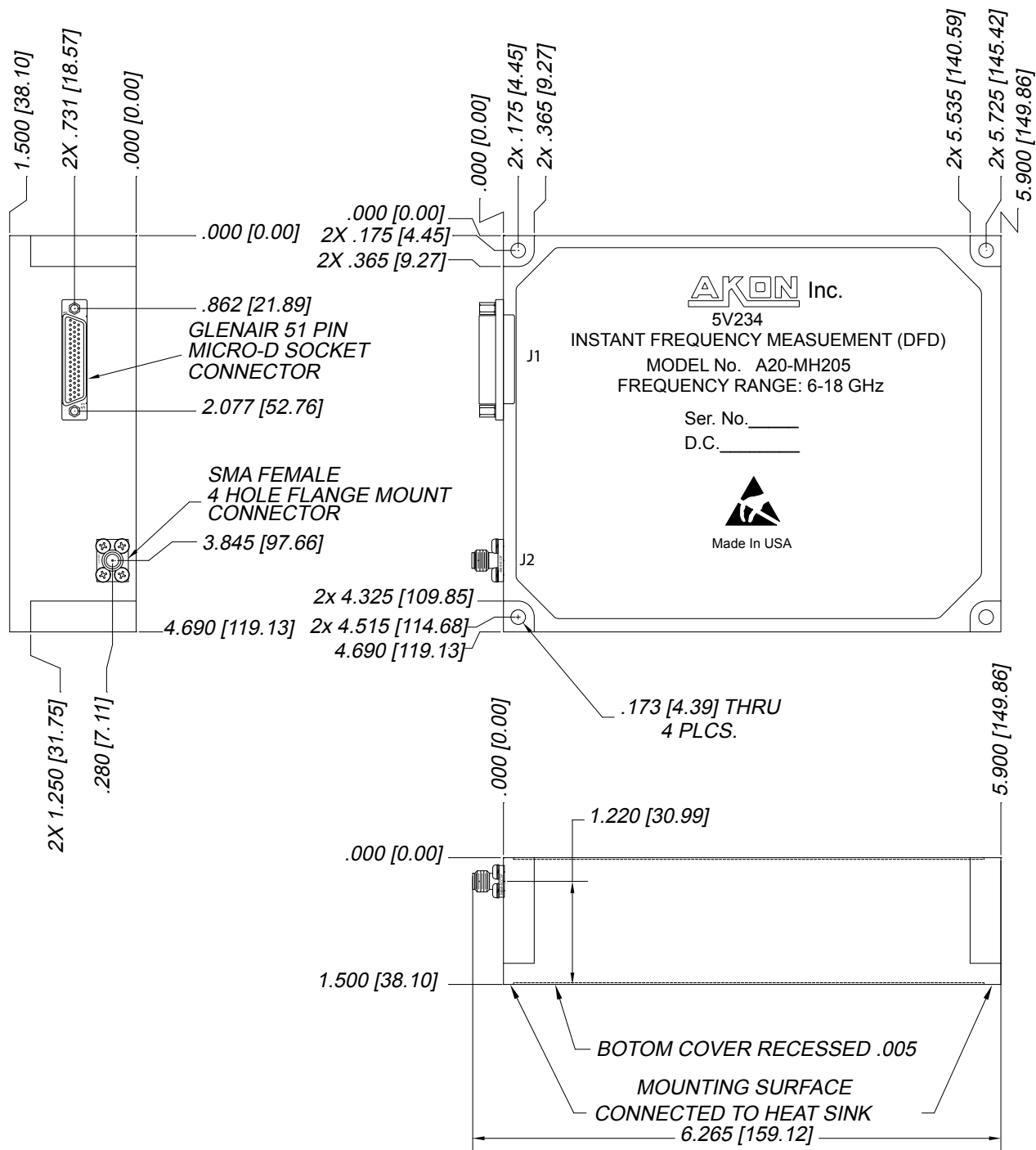
AKON is a leading manufacturer of RF/microwave components and subsystems for military, space and commercial applications. AKON's product line includes high reliability, custom integrated microwave assemblies, DFD receivers, microwave receiver front-ends, RF switching matrices, frequency synthesizers, custom LO assemblies, frequency converters, RF switches, digitally controlled attenuators, miniature RF filters and switches, and microwave amplifiers covering 2.0 - 18.0 GHz frequency range (up to 40.0 GHz for some applications). AKON is qualified to MIL-I-45208 Quality System Requirements by agencies of the U.S. Department of Defense and by leading foreign and domestic military OEMs. All specifications are valid over the full operating temperature unless otherwise indicated.



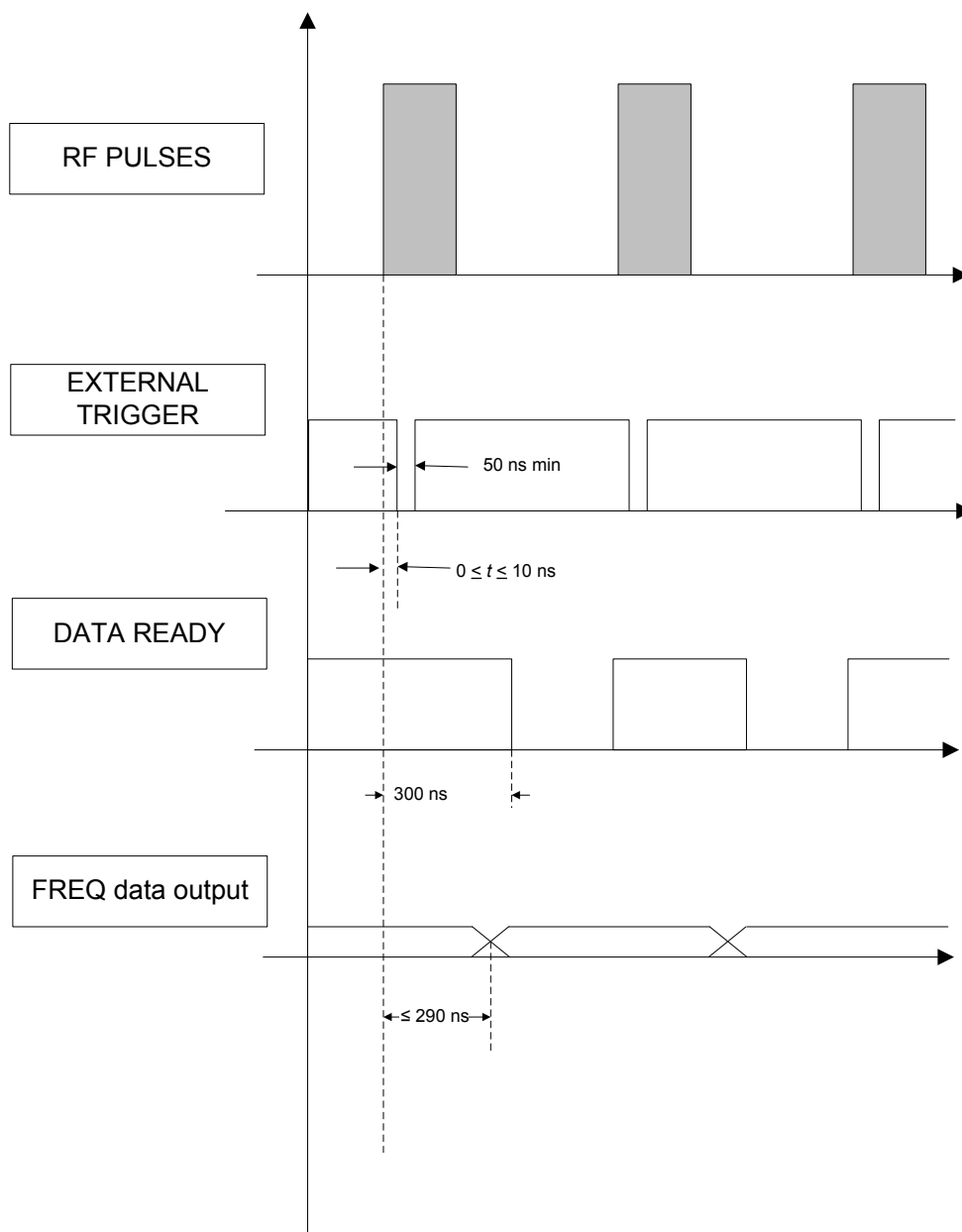
SPECIFICATIONS:

Model Number	A20-MH205
Frequency Range (GHz)	6 - 18
Unambiguous BW (MHz)	12900
Frequency Accuracy (MHz) RMS	3 (max)
Frequency Resolution (MHz)	0.8
Mean Cell Width (MHz)	0.8 (nom)
Dynamic Range (dBm)	Shall be -63 to +7
Sensitivity (dBm)	-63
Signal Processing Capability	Pulse (100 ns to CW)
Input VSWR	2:1 (max)
Input Impedance (Ohms)	50
Survival Power (dBm)	+20
Operating Mode	External Clock Mode
Recovery Time (ns)	100 (max)
Processing Shadow Time (ns)	200 (max)
Throughput Time (nS)	300 from external trigger
Data Ready	The Data Ready output shall be inactive (TTL high)
Output Frequency Data Word	The frequency data word shall be: Frequency = (decimal word x 0.8MHz) +5800 MHz 14 bit
Data Ready Output	TTL high initially. TTL low when the frequency data of input RF signal has settled. Nominal pulse width 100 nS. After 100 nS, TTL releases to high.
Power Supply (VDC) (Unit is protected from reverse polarity, transients, and turn-on sequence)	+12 @ 200 mA +8V @ 1.3 A -8V @ 250 mA
Operating Temperature Range (°C)	-20 to +71 (higher temperatures available)
Size (Inches)	5.9 x 4.69 x 1.5

OUTLINE DRAWING:



TIMING DIAGRAM:



FEATURES:

- 2.0 - 18.0 GHz FREQUENCY RANGE
- HIGH SENSITIVITY -60 dBm
- MULTIPLE SIGNAL HANDLING
- TTL COMPATIBLE 14 BIT OUTPUT
- 300 nS PROCESSING TIME
- 5.0 MHz FREQUENCY ACCURACY
- 1.0 MHz FREQUENCY RESOLUTION

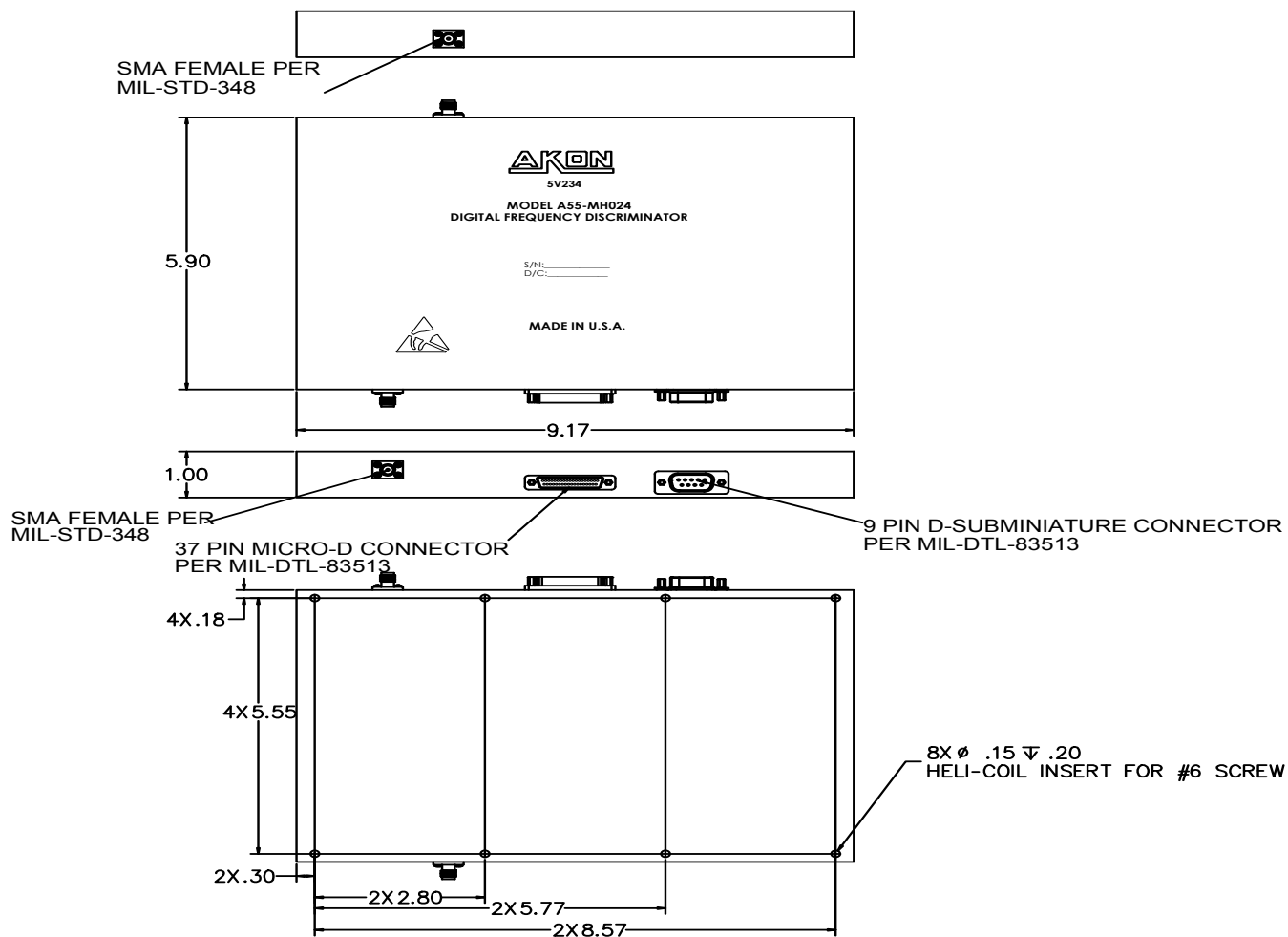


AKON is a leading manufacturer of RF, Microwave and Millimeter-Wave components and subsystems, including Digital Frequency Discriminator (D-IFM) subsystems. AKON's DFDs are highly integrated microwave assemblies using the latest digital and microwave technologies to provide a highly accurate unit in a small volume, and also be of robust reliability for long service life in full Military environments. The AKON DFD is housed in a compact 233 x 150 x 25.4 mm package. Package is environmentally sealed against dust and moisture. The DFD provides 14 bits of digital output corresponding to the measured frequency, along with flag outputs to indicate presence of signal, valid data output and other requirements. The unit is capable of processing simultaneous signals (pulse on pulse, pulse on CW), and will provide accurate results of the stronger of the two signals if the power difference is 6 dB or more. This particular model features both internal as well as external signal triggering modes, which are user selectable. In the internal trigger mode, the unit will automatically sense the presence of an incoming pulse which is above the threshold level and make a frequency measurement. In the external trigger mode, the unit will attempt to make a frequency measurement every time it receives an externally applied trigger pulse. Maximum external trigger frequency is 40 MHz. AKON has other models of DFDs which cover narrower frequency bands and therefore provide increased frequency accuracy. Please contact your local AKON representative or AKON directly for more information.

SPECIFICATIONS:

Model Number	A55-MH024
Frequency Range (GHz)	2.0 to 18.0 GHz
Input Pulse Width Range	50 nS to CW
Operating Input Dynamic Range (dBm)	-60 to +10
Triggering Modes	
External Triggering (MHz)	External trigger clock up to 40
Internal Triggering	Pulse, Pulse on CW, Pulse on Pulse
For Pulse on Pulse/CW (nS)	Input Power Level Difference: 6.0 dB (min) Pulse Width: 100 (min) Pulse PRI: 300 (min)
VSWR	2.0:1 (typ)
Output	14 bits SE-TTL (LVDS or Differential available)
Frequency Resolution (MHz)	1.0 (typ)
RMS Accuracy (MHz)	5.0
Throughput Time (nS)	200
Processing Shadow Time (Internal Trigger Mode) (nS)	250
DC Power (VDC)	+12 @ 1.0 A; -12 @ 250 mA
Output Flags	Signal present; Data ready; Invalid Data
Dimensions (Inches)	9.17 x 5.9 x 1.0

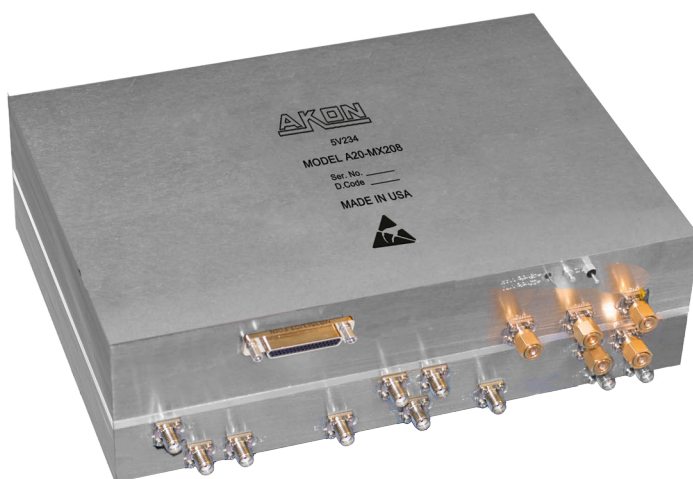
OUTLINE DRAWING



Matched EW/ECM Subsystems

AKON has developed a line of matching receiver/tuners, fast stepping LO synthesizers, and transmit up converters for use in modern highly integrated EW/ECM systems. These subsystems are designed to work with customer-supplied DRFM and receiver/signal processor subsystems, leveraging the customer's internal digital processor, software and DSP capability.

The Tuner (downconverter), Fast Stepping LO and Up Converter work as an integrated subsystem to accept the broadband RF inputs, down convert to a 1 GHz IF for use by the RF Processor and DRFM, and then re-convert the DRFM output back up to the original RF frequency. This is done synchronously by using the same LO source for both up and down conversion processes, and the same IF frequencies in both converters. Both converters incorporate digitally controlled attenuators to compress the input RF dynamic range down to 40 dB for use by the DRFM, and then to proportionally re-expand that range back in the up-converter. Both converters also incorporate high speed SDLAs so the customer has real time information on instantaneous Rx and Tx levels. The up-converter has sufficient output power to drive most HPAs be they either solid state or TWT.



FEATURES:

- 6 - 18 GHz FREQUENCY RANGE
- COMPLEMENTARY MATCHED Rx & Tx MODULE
- RF PROCESSOR & DRFM DIRECT INTERFACE
- HIGH SENSITIVITY
- HIGH DYNAMIC RANGE
- FOR MILITARY TACTICAL ENVIRONMENT

GENERAL:

AKON's model A20-MH251 is a critical part of our line of products which include matching receiver/tuners, fast stepping LO synthesizers, and transmit up converters for use in modern highly integrated EW/ECM systems. These subsystems are designed so that the customer can supply his own DRFM and receiver/signal processor subsystems, leveraging the customer's internal digital processor, software and DSP capability, and allowing the simple purchase of the required microwave components to complete the ECM system.

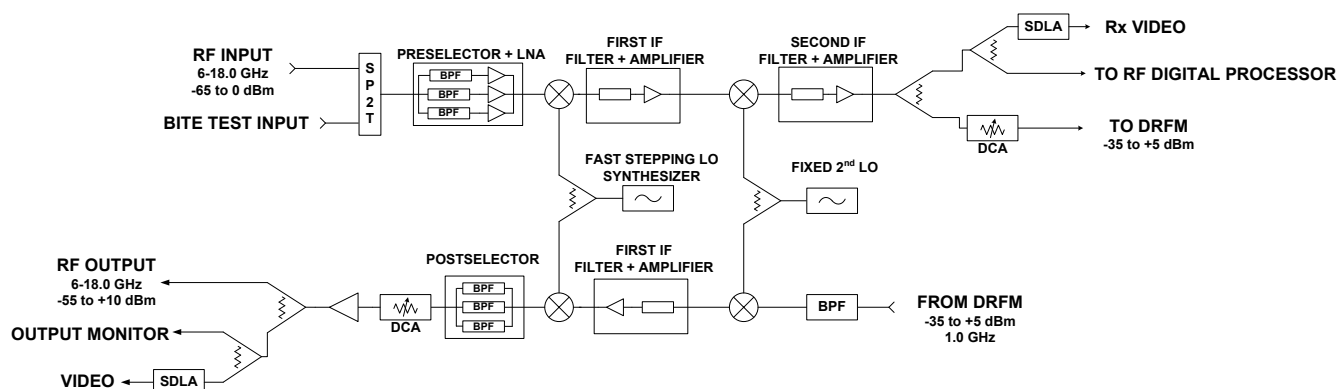
It has been AKON's observation that the majority of receiver/processors and DRFMs operate with RF inputs in the range of 750 MHz to 1250 MHz, 500 MHz instantaneous bandwidth. AKON has designed a line of complementary microwave subsystems to directly interface with these customer designed items.



INTEGRATED ECM CONVERTER SUBSYSTEM

The Tuner (down converter), Fast Stepping LO and Up Converter work as an integrated subsystem to accept the broadband RF inputs, down convert to a 1 GHz IF for use by the RF Processor and DRFM, and then re-convert the DRFM output back up to the original RF frequency. This is done synchronously by using the same LO source for both up and down conversion processes, and the same IF frequencies in both converters. Both converters incorporate digitally controlled attenuators to compress the input RF dynamic range down to 40 dB for use by the DRFM, and then to proportionally re-expand that range back in the up-converter. Both converters also incorporate high speed SDLAs so the customer has real time information on instantaneous Rx and Tx levels. The up-converter has sufficient output power to drive most HPAs be either solid state or TWT. See sections below

AKON Integrated ECM Converter Subsystem with Synchronous Up/Down Frequency Conversion



for more detailed descriptions of the individual modules.

TECHNICAL CONSIDERATIONS:

Tuner/Receiver

This microwave subsystem accepts broadband RF input typically in the band from 6 to 18 GHz. The Type 1 tuner has the input LNA ahead of the switched filter preselector, which minimizes passive losses ahead of the LNA, providing best NF and sensitivity.

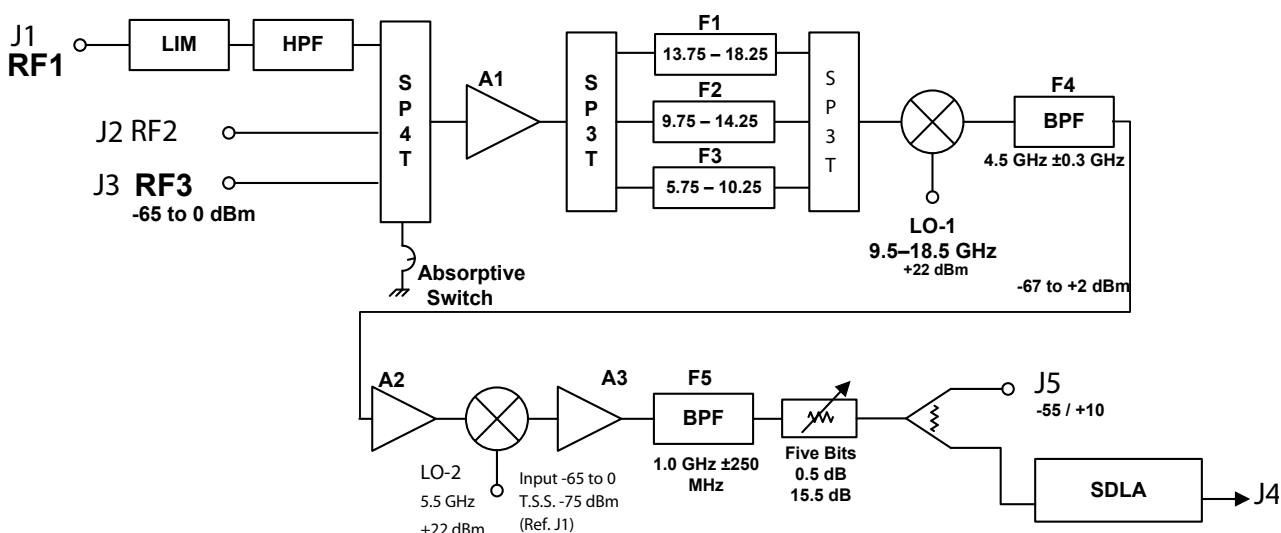
This particular tuner is of the Type 1 configuration. Main RF enters the unit through a limiter to prevent accidental damage from strong local emitters, and then through a high pass filter which removes all interfering signals below 6 GHz. There is an SP4T switch which selects either the main RF input or one of two auxiliary inputs or terminates the input into 50 ohms. Following this switch is the tuner input LNA.

The LNA feeds an amplified broadband 6-18 GHz signal to the input preselector filter bank. This bank consists of three overlapping bandpass filters which divide the 6-18 band into three sub-harmonic sub bands. This is to help eliminate mixer spurious as well as images. The selected sub-band then is fed to the first conversion mixer. Here it is mixed

6-18 GHZ TUNER SPECIFICATIONS

Input Frequency Range (GHz)	6.0 to 18.0
Input Dynamic Range (dBm)	-65 to 0
Max RF input, no damage (dBm)	+20 CW, +50 peak, 1 μ s
RF Channels (GHz)	5.75 to 10.25 9.75 to 14.25 13.75 to 18.25
First IF Frequency (GHz)	4.5, 600 MHz 1 dB BW
Second IF Frequency (GHz)	1.0, 500 MHz 1 dB BW
Second IF Bandwidth (MHz)	500 (1.0 dB)
Conversion Gain (dB)	10
Conversion Gain Adjustment (dB)	15, 0.5 dB resolution
J1 - J2 Conversion Gain (dB)	10 nom
Noise Figure (dB)	12 typ, 13 max
LO1 (GHz)	9.5 to 18.5, +22 dBm
LO2 (GHz)	5.5, +22 dBm
Harmonics from LNA	With 6 to 9 GHz input 40 to 45 dB with input > 9 GHz
Input Switch	Absorptive
Image Rejection (dB)	60
Spurious (dBc)	-60 Except 8.7 to 9.3 GHz, -45 dBc, and 14.0 to 14.2 GHz, -50 dBc
DC Power (V)	+/- 8 preferred

6-18 GHz Tuner Block Diagram



with a stepped frequency LO so as to convert the desired 500 MHz wide segment down to the first IF frequency.

The first IF stage is centered at 4.5 GHz with a 600 MHz bandwidth. The signal from the mixer passes through a 1 GHz bandpass filter and is then further amplified to obtain optimum drive level for the second conversion mixer. The amplifier feeds the second mixer, where the 4.5 GHz first IF is mixed with a 5.5 GHz fixed LO to obtain a second IF frequency of 1.0 GHz. This second IF frequency signal is amplified and then passes through a 1 GHz bandpass filter having a 500 MHz bandwidth. This second IF filter sets the tuner's instantaneous bandwidth to 500 MHz.

Following the second IF filter is a DCA which can be used to adjust conversion gain of the tuner so as to compress the wide input dynamic range down to the 40 dB or so that is usable by the system DRFM. After the DCA is a power splitter which provides main IF output, as well as signal to a high speed SDLA which provides log video of the signal

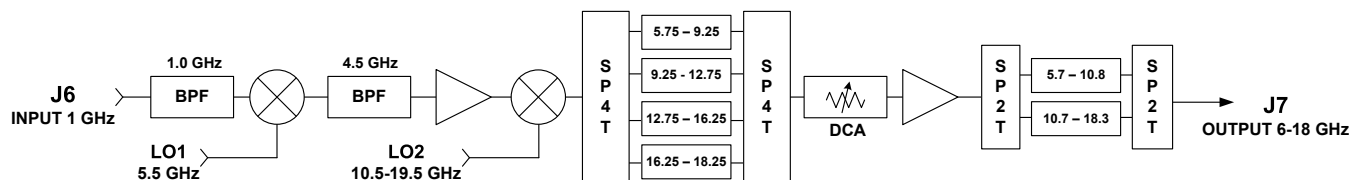
being output by the tuner.

Transmit Up Converter

This assembly is basically a mirror image of the receiver/tuner, wherein the up converter accepts an input IF signal centered at 1.0 GHz and with an instantaneous bandwidth of up to 500 MHz, and using the same LO sources, conversion steps and filter banks, linearly up-converts the DRFM signal back to the original RF frequency. The up-converter can provide output 1 dB compression point up to +20 dBm, variable conversion gain, and low spurious outputs. Again, digitally controlled attenuators are incorporated into the RF path to provide variable RF conversion gain, so that the customer can take the 40 db dynamic range from the DRFM and expand that up to 65 or more dB at the up converter output. SDLAs are included post variable gain so the customer again can monitor real time transmitted signal amplitude.

The DRFM signal enters the upconverter and passed through a 1 GHz anti-aliasing filter and then goes to the first up conversion mixer. The LO is the same 5.5 GHz as was used in the tuner, and this gives an IF frequency of 4.5 GHz. This IF signal is filtered then amplified to again obtain optimum mixer drive level. After the IF amplifier the

Transmit Upconverter Block Diagram



signal is fed to the second up conversion mixer, where the signal is mixed with the same stepped LO signal as in the tuner, for conversion to the final RF frequency. The up converted signal then passes through the post selector filter bank which uses the same bandpass filters as in the tuner. The filter bank removes mixer spurious, LO bleedthrough and images.

Following the postselector filter bank is a DCA which is used to change the conversion gain so as to be able to expand the signal dynamic range by some 15 dB. After the DCA is the final RF amplifier, which puts out the signal with sufficient power to drive the transmit HPA subsystem.

FAST STEPPING SYNTHESIZED LO

Tuning of both the Tuner and Up Converter is accomplished by the third item in the set, the Fast Stepping LO. This assembly generates all necessary fixed and variable LO signals as required by both the Tuner and Up Converter. The LO Source incorporates a very stable and low phase noise TCXO as the key frequency generating element. There are then comb generators, switches, filters, mixers and amplifiers arranged so that both fixed and variable frequency outputs are available for both conversion steps in both the Tuner and Up Converter. Tuning step size can be 500 MHz (or 100 MHz) per customer requirements, and tuning speed is on the order of 70 ns. This LO puts out the fixed 5.5 GHz signal as well as the 500 MHz stepped tuning signal from 9.5 to 18.5 GHz. The LO has dual outputs for all LO frequencies to simultaneously drive one Tuner and one Up-Converter. Reference inputs can optionally be provided for phase locking the LO to an external source. An optional reference output can also be provided for

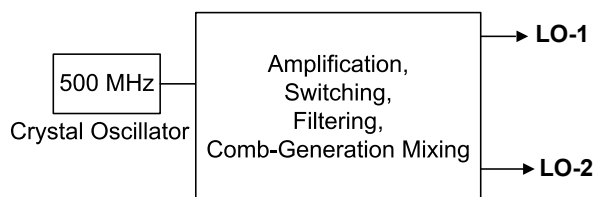
TRANSMIT UPCONVERTER SPECIFICATIONS

Input Frequency (GHz)	1.0
Input Bandwidth (MHz)	500
Maximum IF Input (dBm)	0
Conversion Gain (max)	10
Conversion Gain Adjustment Range (dB)	15.5, in 0.5 dB steps
Second IF Frequency (GHz)	4.5 +/- 0.3
RF Channels (GHz)	5.75 to 10.25 9.75 to 14.25 13.75 to 18.25
LO1 (GHz)	5.5
LO2 (GHz)	9.5 to 18.5
Spurious (dBc)	-50 typ
Output P-1 (dBm)	>0

LO SPECIFICATIONS

Tuning Range - LO1 (GHz)	9.5 to 18.5
Fixed Output - LO2 (GHz)	5.5
Output Power (dBm)	+20
Tuning Step Size (LO1)(MHz)	500
Tuning Command	TTL, 5 bits
Overall Accuracy (ppm)	+/- 30
Setting Time (ns)	70
Spurious (dBc)	-50
Harmonics (dBc)	-50

LO Block Diagram



phase locking the DRFM.

PACKAGING

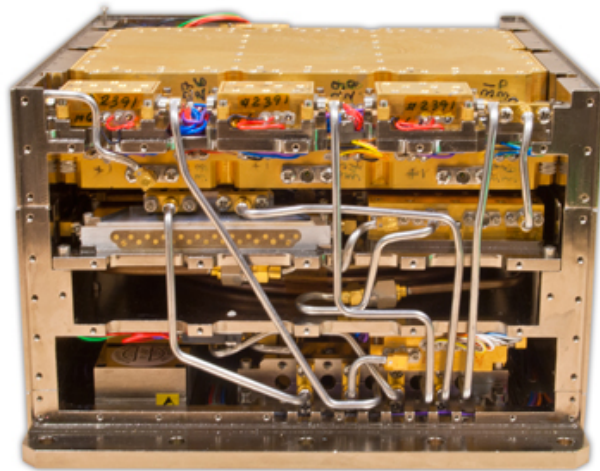
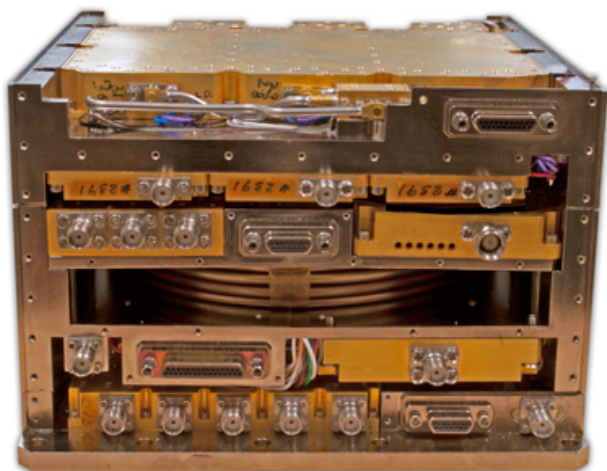
All three assemblies are similarly packaged in MIL grade environment-proof aluminum enclosures. RF interconnections are via SMA connectors, DC and control signals are brought in on micro-D connectors. Units are powered from +/- 15 VDC.

OPTIONS

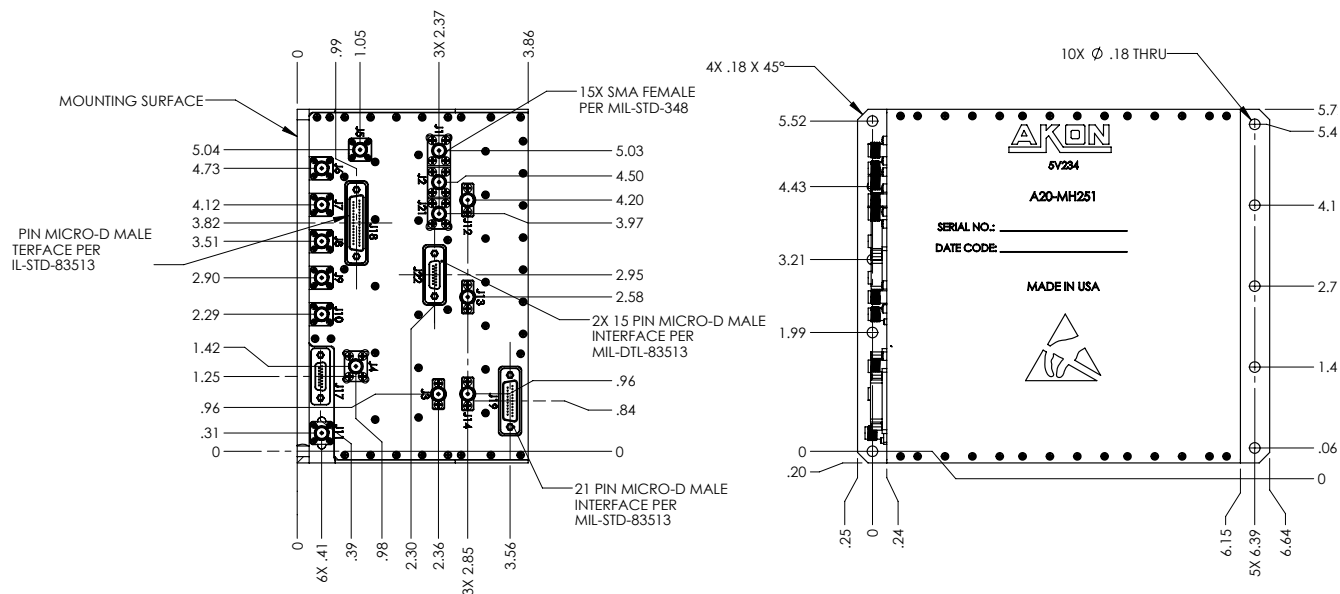
Customized versions of these assemblies are available on a special-order basis, which can have different RF input frequency ranges (including millimeter bands), different conversion gains, different IF (to/from DRFM, RF processor) center frequencies and bandwidths. AKON

additionally provides other associated microwave EW assemblies such as Digital Frequency Discriminators, Extended Range High Speed DLVAs, Switch Matrices, Switched Filter Banks, Front End Amplifiers, and ECM. Please contact AKON directly with your specific needs and discuss the options with one of AKON's EW experts to determine the best solution for your microwave requirements. AKON is DOD cleared to SECRET level.

TUNER, SYNTHESIZER, UPCONVERTER MODULE INTERCONNECT PLAN



OUTLINE DRAWING:



J18-31 PIN MICRO-D INTERFACE	
PIN	FUNCTION
1	+15 V
2	+15V RTN/GND
3	+15 V
4	+15 V RTN/GND
5	-15 V
6	-15 V RTN/GND
7	SPARE
8	SPARE
9	SPARE
10	SPARE
11	SPARE
12	SPARE
13	SPARE
14	SPARE
15	SPARE
16	SPARE
17	SPARE
18	B14
19	B15
20	B16
21	B17
22	B18
23	B19
24	GND
25	B20
26	B21
27	B22
28	B23
29	B24
30	B25
31	GND

J17-15 PIN MICRO-D INTERFACE	
PIN	FUNCTION
1	+15 V
2	+15 V RTN/GND
3	+15V
4	+15 V RTN/GND
5	-15 V
6	-15V RTN/GND
7	GND
8	B0
9	B1
10	B2
11	B3
12	B4
13	B5
14	B6
15	SPARE

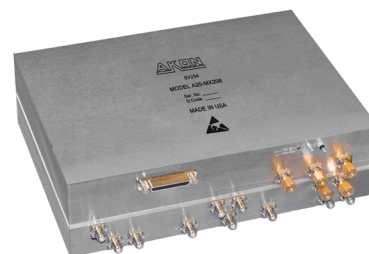
J22-15 PIN MICRO-D INTERFACE	
PIN	FUNCTION
1	+15 V
2	+15 V RTN/GND
3	-15 V
4	-15 V RTN/GND
5	B7
6	B8
7	B9
8	B10
9	B11
10	B12
11	B13
12	GND
13	B46
14	B47
15	B48

J19-21 PIN MICRO-D INTERFACE	
PIN	FUNCTION
1	+15 V
2	+15 V RTN/GND
3	+15 V
4	+15 V RTN/GND
5	-15 V
6	-15 V RTN/GND
7	B26
8	B27
9	B28
10	B29
11	B30
12	B31
13	GND
14	B32
15	B33
16	B34
17	B35
18	B36
19	B37
20	GND
21	SPARE

CONNECTOR DESIGNATION	
CONNECTOR	FUNCTION
J1	RF IN
J2	RF BITE
J3	IF OUT
J4	IF IN
J5	RF OUT
J6	LO1
J7	LO2
J8	LO3
J9	NC
J10	NC
J11	FROM DTO
J12	ACT DET. 1
J13	ACT DET. 2
J14	ACT DET. 3
J17	POWER/CONTROL 1 LO
J18	POWER/CONTROL UP CONVERTER
J19	POWER CONTROL 3 CH. ACT. DET.
J21	EXT. 50 OHM TERM.
J22	POWER CONTROL DOWN CONVERTER

FEATURES:

- 2 - 18 GHz FREQUENCY RANGE
- COMPLEMENTARY MATCHED Rx & Tx MODULES
- RF PROCESSOR & DRFM DIRECT INTERFACE
- HIGH SENSITIVITY
- HIGH DYNAMIC RANGE
- FOR MILITARY TACTICAL ENVIRONMENT



GENERAL

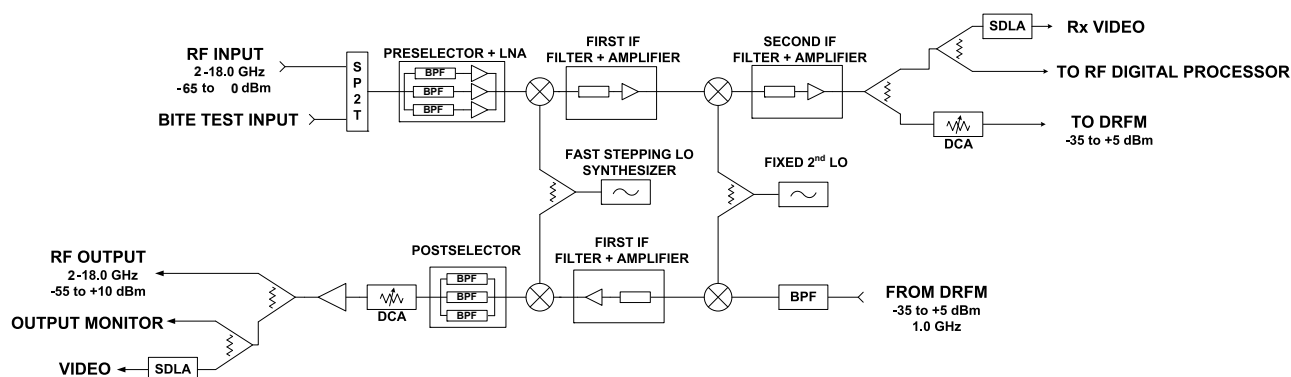
AKON's model **A20-MX208** is a critical part of our line of products which include matching receiver/tuners, fast stepping LO synthesizers, and transmit up converters for use in modern highly integrated EW/ECM systems. These subsystems are designed so that the customer can supply his own DRFM and receiver/signal processor subsystems, leveraging the customer's internal digital processor, software and DSP capability, and allowing the simple purchase of the required microwave components to complete the ECM system.

It has been Akon's observation that the majority of receiver/processors and DRFMs operate with RF inputs in the range of 750 MHz to 1250 MHz, 500 MHz instantaneous bandwidth. Akon has designed our line of complementary microwave subsystems to directly interface with these customer designed items.

INTEGRATED ECM CONVERTER SUBSYSTEM

The Tuner (down converter), Fast Stepping LO and Up Converter work as an integrated subsystem to accept the broadband RF inputs, down convert to a 1 GHz IF for use by the RF Processor and DRFM, and then re-convert the DRFM output back up to the original RF frequency. This is done synchronously by using the same LO source for both up and down conversion processes, and the same IF frequencies in both converters. Both converters incorporate digitally controlled attenuators to compress the input RF dynamic range down to 40 dB for use by the DRFM, and then to proportionally re-expand that range back in the up-converter. Both converters also incorporate high speed SDLAs so the customer has real time information on instantaneous Rx and Tx levels. The up-converter has sufficient output power to drive most HPAs be they either solid state or TWT. See sections below for more detailed descriptions of the individual

AKON INTEGRATED ECM CONVERTER SUBSYSTEM WITH SYNCHRONOUS UP/DOWN FREQUENCY CONVERSION



2 - 18 GHZ TUNER SPECIFICATIONS

modules.

TECHNICAL CONSIDERATIONS

2 - 18 GHZ TUNER AND UPCONVERTER PAIR

Tuner

This tuner accepts RF input in the range of 2.0 to 18 GHz, and provides a 1 GHz output with 500 MHz instantaneous bandwidth. Tuner architecture is of the "Type-2" variety. This tuner provides 20 dB of gain to the RF Processor port and variable gain to the DRFM port to reduce dynamic range to 40 dB. The noise figure is on the order of 15 dB.

This tuner starts with a pair of SP4T switches which function as both dynamic range expander and BITE input selector. Following that is a SP2T switch which bypasses the 6 to 18 signals around the pre-converter, and sends signals from 2 to 6 GHz to the pre-converter. The pre-converter stage takes the signals in 2 bands, one from 2.0 to 3.6 GHz and 3.6 to 6.0 GHz, mixes them with a 12 GHz LO, which then puts those signals out in the 6.0 to 8.4 and 8.4 to 10.0 bands.

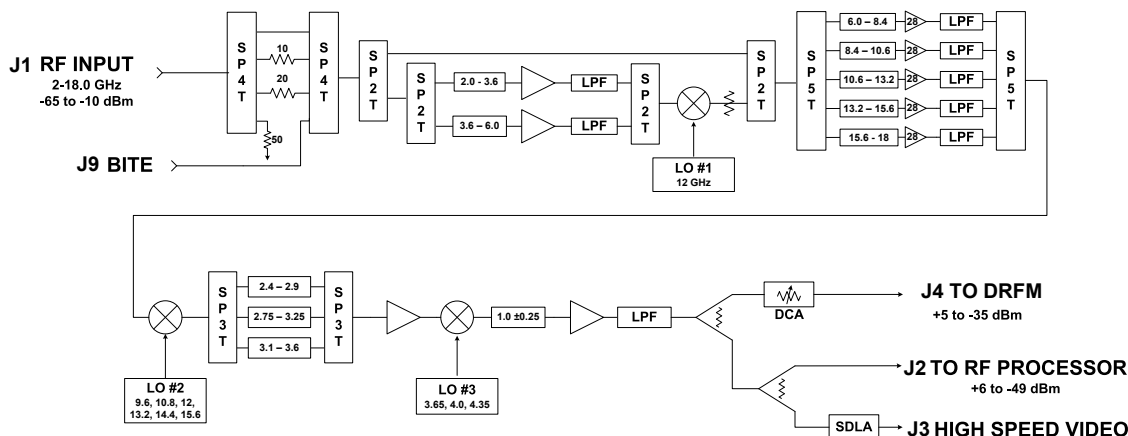
Following the bypass and pre-converter is the main low noise preselector, which divides the 6 to 18 band into five sub-bands of 2400 MHz width each. Architecture is "Type

Input Frequency Range (GHz)	2.0 to 18.0
Input Dynamic Range (dBm)	-65 to -10
Max RF input, no damage (dBm)	+20 CW, +50 peak, 1 μ s
RF Channels (GHz)	2.0 - 3.6 3.6 - 6.0 6.0 - 8.4 8.4 - 10.6
First IF Frequency (GHz)	2.4 - 3.6
Second IF Frequency (GHz)	1.0, 500 MHz 1 dB BW
Second IF Bandwidth (MHz)	500 (1.0 dB)
Conversion Gain (dB)	20
Conversion Gain Adjustment (dB)	30, 0.5 dB resolution
Noise Figure (dB)	15 typ, 16 max
LO1 (GHz)	12
LO2 (GHz)	9.0, 10.8, 12, 13.2, 14.4, 15.6
LO3 (GHz)	3.65, 4.0, 4.35
Image Rejection (dB)	60
Spurious (dBc)	-60
DC Power	+12 Built in DC - DC Converter

2" where the individual preselector channels have the LNAs after the sub-octave bandpass filters, which eliminates LNA harmonic spurious from causing false signals in the system.

Following the preselector is the first down conversion mixer, which down converts each preselector band into a first IF band of 2.4 to 3.6 GHz, which is 1200 MHz wide. Following

2 - 18 GHZ TUNER BLOCK DIAGRAM



this mixer, this IF band is then further sub-divided into three 500 MHz wide bands with overlap, in a switch-filter bank. Following this filter bank is the first IF amplifier.

Following the amplifier is the second conversion mixer, which mixes the selected first IF sub-band with the proper LO frequency to result in a 1.0 GHz second FI signal with 500 MHz bandwidth. This mixer is followed by the second IF bandpass filter and second IF amplifier. This IF amplifier is followed by a low pass filter to eliminate the amplifier's harmonic, and then a network of power dividers to provide the various outputs to the Receiver Processor, a high speed SDLA which provides Rx video, and through a DCA to the DRFM. The DCA is used to compress they dynamic range down to 40 dB for the DRFM.

TUNER AND UPCONVERTER PAIR

Upconverter

The 1 GHz output signal from the DRFM first passes through a bandwidth limiting and anti-aliasing filter which restricts the operating band to 750 MHz to 1250 MHz. Following this filter the first conversion mixer where the signal is mixed with the same LO as was used in the down converter, to result in a first IF signal in the 2.4 to 3.6 GHz band. A switch filter bank selects one of three 500 MHz wide segments of this band, same as was used for the down conversion. This filter bank is followed by

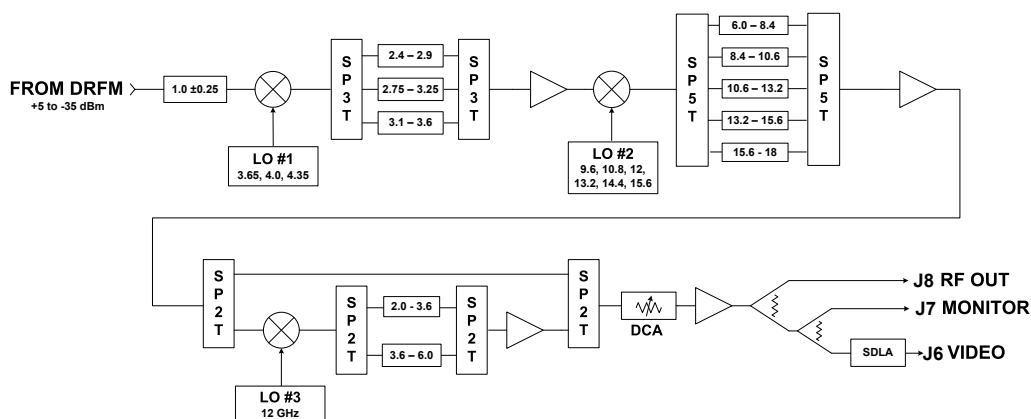
an amplifier to bring the signal back up to a level which is good for mixer drive.

The signal is then mixed in the second mixer, again with the same LO signal as was used in the tuner, to convert the DRFM signal into the corresponding frequency in the 6 to 18 GHz band. The second mixer is followed by another switch filter bank post selector as was used in the Tuner. This filtering eliminates images, harmonics

UPCONVERTER SPECIFICATIONS

Input Frequency (GHz)	1.0	
Input Bandwidth (MHz)	500	
Maximum IF Input (dBm)	+5	
Conversion Gain (max)	5	
Conversion Gain Adjustment Range (dB)	15.5	
RF Channels (GHz)	2.0 - 3.6 3.6 - 6.0 6.0 - 8.4 8.4 - 10.6	10.6 - 13.2 13.2 - 15.6 15.6 - 18.0
LO1 (GHz)	3.65, 4.0, 4.35	
LO2 (GHz)	9.6, 10.8, 12, 13.2, 14.4, 15.6	
LO3 (GHz)	12	
Spurious (dBc)	-60 typ	
Output P-1 (dBm)	+15	
Harmonics (dBc)	-30	

2 - 18 GHz Upconverter Block Diagram



and spurious mixer products. Following this filter bank is an RF amplifier to bring the signal amplitude up to a level suitable for use in the post-converter.

Signals originally received in the 6 to 18 GHz band are bypassed around the post converter. Signals originally in the 2 to 6 GHz band are then routed into the post converter where they are again mixed with the 12 GHz LO, and are converted back to their original frequency. The post converter contains the same filters following the mixer as were used in the Tuner pre-converter, which again will eliminate mixer spurious.

Following the bypass and post converter is a DCA which is used to control overall conversion gain in order to expand the dynamic range from the DRFM's 40 dB back to 55 dB. After the DCA is the final RF amplifier covering the original 2 to 18 GHz, and can provide up to +15 dBm RF drive to the customer's HPA for transmission. Following this final amplifier is a network of power splitters which provide the main RF output, a monitor port output, and signal to a high speed SDLA which provides log video output of the actual signal sent to the HPA, so that output amplitude can be monitored and controlled.

Local Oscillator

The LO assembly for this Tuner and Up-converter pair is relatively simple, in that only nine fixed frequencies are needed. Those frequencies are: 3.65, 4.0, 4.35, 9.6, 10.8, 12.0, 13.2, 14.4 and 15.6 GHz. This assembly consists of a 100 MHz TCXO as the main frequency generating element. This very stable and low noise oscillator drives a comb generator, which is followed by a network of filters, switches, mixers and amplifiers, which generate the required frequencies.

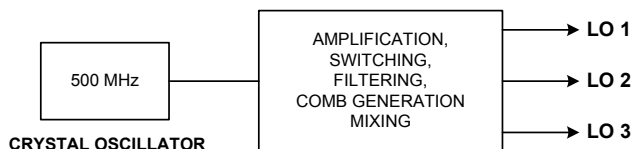
PACKAGING

All three assemblies are similarly packaged in MIL grade environment-proof aluminum enclosures of approximately 8.5" x 6.0" x 2.3". Wedge locks are on the edges for secure mounting into the equipment rack. RF interconnections are via SMA connectors, DC and control signals are brought in on micro-D connectors. Units are powered from +/- 12 VDC.

LO Specifications

LO1 (GHz)	3.65, 4.0, 4.35
LO2 (GHz)	9.6, 10.8, 12, 13.2, 14.4, 15.6
LO3 (GHz)	12
Switching Time (ns)	<100
Overall Accuracy (ppm)	+/- 30
Phase Noise (dBc)	-90 @ 1 kHz

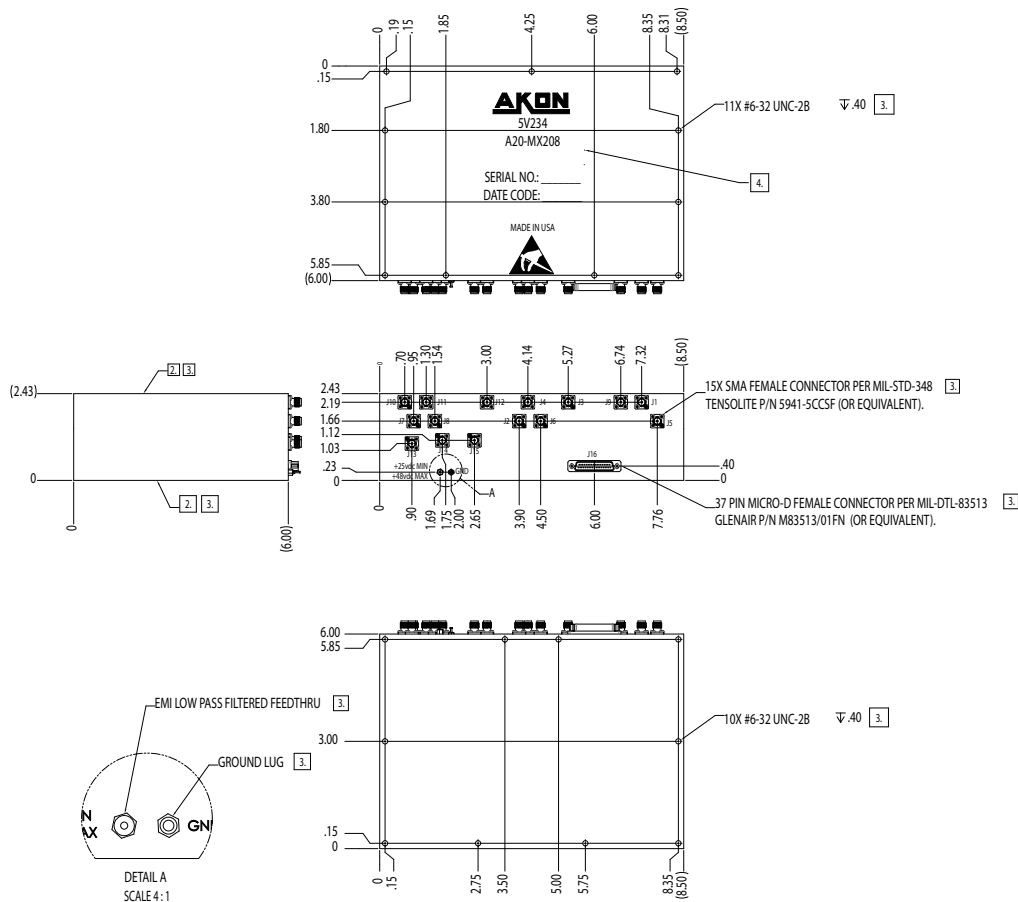
LO Block Diagram



OPTIONS

Customized versions of these assemblies are available on a special-order basis, which can have different RF input frequency ranges (including millimeter bands), different conversion gains, different IF (to/from DRFM, RF processor) center frequencies and bandwidths. Akon additionally provides other associated microwave EW assemblies such as Digital Frequency Discriminators, Extended Range High Speed DLVAs, Switch Matrices, Switched Filter Banks, Front End Amplifiers, and ECM. Please contact Akon directly with your specific needs and discuss the options with one of Akon's EW experts to determine the best solution for your microwave requirements.

OUTLINE DRAWING:



CONNECTORS	
CONNECTOR	ASSIGNMENT
J1	RF IN (-60 TO +10dBm)
J2	RF MONITOR (-60 TO -10dBm In)
J3	VIDEO
J4	TO DRFM
J5	FROM DRFM (0.3 GHz +/- 0.25 GHz)
J6	VIDEO OUT
J7	BIT OUT
J8	RF OUT (2.4 - 18 GHz)
J9	BITE INPUT
J10	TO RFP 3.1-3.6 GHz
J11	TO RFP 2.75-3.25 GHz
J12	TO RFP 2.4-2.9 GHz
J13	RF MONITOR 100 MHz (+2dBm MIN)
J14	RF MONITOR 1200 MHz (+2dBm)
J15	TO DRFM 1200 MHz (+2 dBm)
J16	CONTROL

J6 CONNECTOR PIN ASSIGNMENTS			
PIN	ASSIGNMENT	PIN	ASSIGNMENT
1	B0	20	SPARE
2	B1	21	SPARE
3	B2	22	B15
4	B3	23	B16
5	B4	24	B17
6	B5	25	B18
7	B6	26	B19
8	B7	27	B20
9	B8	28	B21
10	B9	29	B22
11	B10	30	B23
12	B11	31	B24
13	B12	32	B25
14	B13	33	B26
15	B14	34	B27
16	DIGITAL GND	35	B28
17	SPARE	36	DIGITAL GND
18	SPARE	37	SPARE
19	SPARE		

Glossary of Terms - Logging Products

This is a general list of terms and relationships commonly used in specifying Detector Log Video Amplifiers (DLVAs), Extended Range Detector Log Video Amplifiers (ERDLVAs), RF Log Amplifiers and Log IF Amplifiers.

Absolute Accuracy: This is a measure of total power uncertainty around a fixed mathematical straight line (defined as a reference line) as the RF frequency, RF power and temperature are varied. The absolute accuracy includes the effects of log linearity, frequency, temperature variation and output D.C. offset variation and is measured in $\pm$ dBs. See Figure 1.

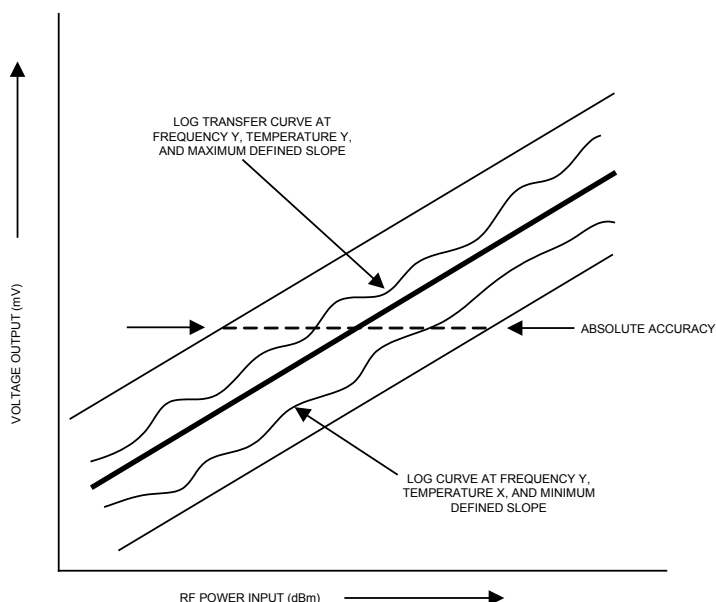


Figure 1

C.W. Immunity Dynamic Range: This defines the C.W. range above “threshold” sensitivity level so that a pulse level at threshold sensitivity level can be measured within a specified error value, while rejecting the C.W. level.

C.W. Rejection Time: This describes the time required by the device design to cancel the maximum specified C.W. level so that the pulse level at the threshold sensitivity value can be measured within specified error value. Rejection time can be different when C.W. turns “on” and when C.W. turns “off” and needs to be specified for a given device design.

Dynamic Range: Defined in dBs from T.S.S. to end of logging range. Dynamic range is a very popular term that is generally confused with logging range.

D.C. Output Offset: This is defined as the output D.C. voltage with no RF signal applied and input RF port terminated into a 50 ohms.

D.C. Output Offset Variation: This is defined as the output offset voltage variation with no RF signal applied and as the temperature is varied.

Dwell Time (t_d): This is defined as the minimum time for the output pulse to be “Flat” within $\pm X$ dB for the test condition of minimum required pulse width. It is generally equal to pulse width less settling time (t_s). Known also as “Flat Top.”

Fall Time (t_f): This is defined as the time required for the trailing edge of the pulse to fall from 90% value to 10% value for a given RF power level. Generally, the RF level is the highest power level of the “logging range.”

Frequency Flatness: This is defined as the output voltage variation at a constant temperature and constant RF input power as the RF frequency is varied. It is expressed in $\pm$ dBs. See Figure 2.

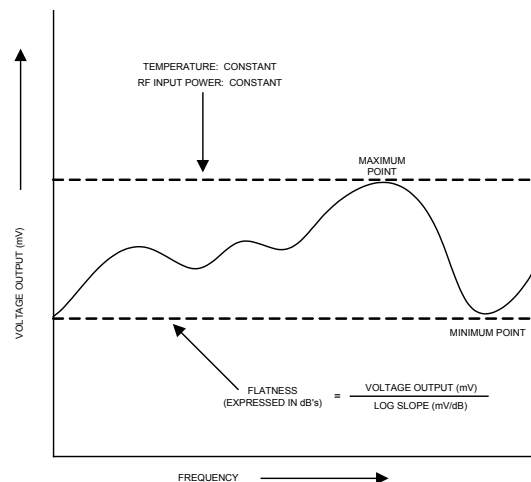


Figure 2

Incremental Log Slope: This is defined as slope of the best fit straight line or slope of a defined fixed slope straight line which passes through the actual output voltage data over a limited logging dynamic range, say every 1.0 dB or 2.0 dB.

Log Slope: This is defined as the slope of the best fit straight line or slope of a defined fixed slope straight line which passes through the actual output voltage data over the entire logging dynamic range. It is expressed in $\text{mV/dB} \pm \% \text{ mV/dB}$.

Log Linearity: Describes the deviation of the actual output voltage from a straight line behavior and is expressed in dBs. Log linearity can be defined in two ways:

Deviation from a straight line whose slope is computed by the least squares method (best fit),

(or)

Deviation from a straight line whose slope (mV/dB) is fixed. This definition takes on added importance in direction finding systems or any time accurate measurement of the relative power between two signals is required.

Linearity is defined at a given temperature and at a given frequency. See Figure 3.

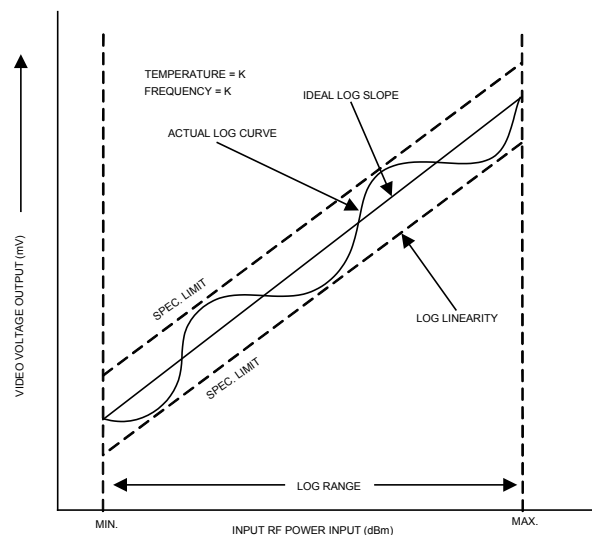


Figure 3

Logging Dynamic Range or Logging Range: Defined in decibels (dBs) from usable sensitivity to end of logging range. Essentially indicates the range over which the signal information is processed and exhibits a straight line relationship with defined linearity between RF input power

expressed in dBm and linear video output voltage usually expressed in millivolts (mV). See Figure 4.

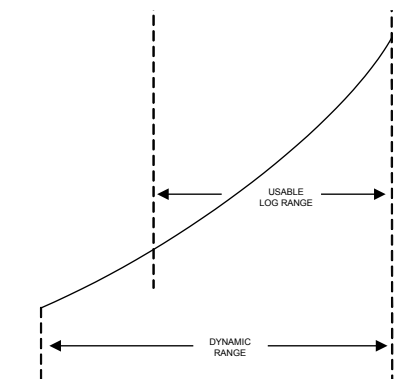


Figure 4

Partial Recovery Time: This parameter is critical when two pulse amplitudes need to be measured which are closely time spaced. This is defined as the time required for the output training edge to fall from 1.0 dB below peak to X dB below peak. Commonly, partial recovery is measured for a 16 dB or 20 dB drop in the output training edge voltage.

Propagation Delay: This is commonly defined as the propagation delay from 50% RF input to 50% video output. However, a more appropriate way of defining the delay time is from 50% RF input to 10% video output as the compression process changes the rise time as a function of power level. Sometimes called delay time. See Figure 5.

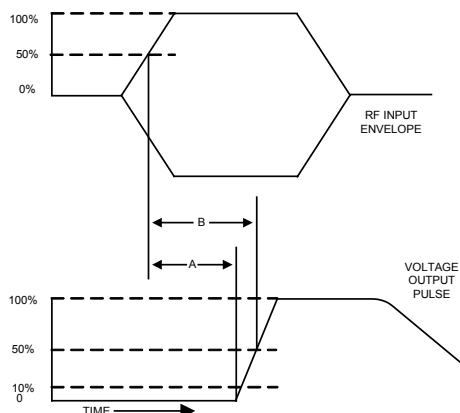


Figure 5. Alternate Definitions of Propagation Delay

Pulse-on-Pulse or Pulse-on-C.W.: This describes a requirement in the unit whereas pulse amplitude of the signal riding on a C.W. or RF noise level can be accurately measured. Usually, the pulse level can be either weaker or stronger than a specified C.W. or noise level and in both cases needs to be measured accurately.

Recovery Time (t_{rec}): This is defined as the time difference between a threshold sensitivity minimum specified pulse width and a maximum logging range level pulse at the maximum specified pulse width so that the threshold sensitivity pulse can be measured within $\pm X$ dB (usually ± 1.0 dB) of its value if the high level, wide pulse width would not be present. Generally, recovery time is defined from the 90% point of the falling video pulse to a point of ± 1.0 dB of the base line. The DLVA is now “recovered” and able to accept a new RF pulse. Recovery time is sometimes known as Shadow Time because any new pulse occurring during recovery time would be “shadowed”.

RF Bandwidth or Frequency Range: This defines the frequency range over which the specified performance and frequency flatness is achieved. Generally, the bandwidth can exceed the normal frequency range. If a particular band-shape is required, then the amount of rejection at the low and/or high end of the frequency range should be specified. This is particularly important in the case of Log IF Amplifiers. Filtering can be integrated, if necessary.

Rise Time (t_r): This is defined as the time response between 10% to 90% of the video output. See Figure 6.

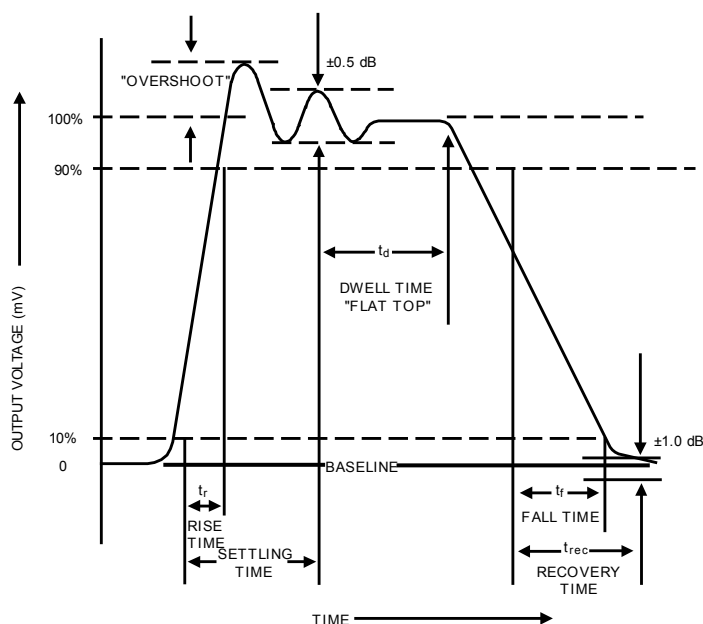


Figure 6. Pulse Characteristics

Settling Time (t_s): This is defined as the time from 10% video output to a time when the video output has settled to $\pm X$ dB (commonly ± 0.5 dB) of its final steady state value. It is generally 1.5 x rise time t_r .

Tangential Signal Sensitivity (T.S.S.): This is the input RF power level (expressed in dBm) at which the device output exhibits a minimum Signal-to-Noise Ratio (SNR) of 8.0 dB at the specified video bandwidth.

Temperature Variation: This is defined as the output voltage variation referred to the input power (in dBs) at a given power level and given frequency, as temperature is varied.

Threshold Sensitivity: Same as usable sensitivity.

Total Response Time: This is defined as time from 50% RF to when the video output has settled within $\pm X$ dB (commonly ± 0.5 dB) of its final steady state value. It is usually equal to propagation delay plus settling time.

Trailing Edge Discontinuity Range: This defines a range in dBs from a given peak value so that trailing edge does not show any perturbation, ringing, change of sign, etc. Usually, this range is from 1.0 dB below peak to 16 dB below peak level, and is critical when pulse width is required to be measured. Usually, discontinuity or perturbation is defined as abnormality wider than 5.0 nanoseconds in width.

Trailing Edge Re-Entrance: This specification describes and limits the trailing edge under shoot, its positive excursion and ringing behavior during the recovery time. Usually, the positive excursion or ringing of the trailing edge is specified to be below a level equivalent to threshold sensitivity.

Usable or Operational Sensitivity: The usable or operational sensitivity is generally equivalent to a 14 dB output Signal-to-Noise Ratio (SNR). In general terms, this is approximately 5 dB stronger than the equivalent Tangential Signal Sensitivity (T.S.S.).

USEFUL EQUATIONS AND RELATIONSHIPS

Minimum Detectable Signal (M.D.S.):

$$M.D.S. = 144 + NF + 10 \log B_r B_v - B_v^2$$

Where NF = Noise Figure (dB)
 B_r = RF Bandwidth (MHz)
 B_v = Video Band I (MHz)

Also known as maximum sensitivity, or S_{max} .

Tangential Signal Sensitivity (T.S.S.): Generally, a signal 4 dB stronger than minimum detectable signal.

$$T.S.S. = M.D.S. + 4 \text{ dB}$$

Also defined as a pulse where signal-to-noise ratio (SNR) at RF is equal to 4 dB or video output SNR is equal to 8 dB.

Usable Sensitivity (S_u): The point where initiation of logging begins and RF Input Power and Video Output Voltage are (or approximate) a straight line. Generally, a signal 5 dB stronger than Tangential Sensitivity Signal

$$S_u = T.S.S. + 5 \text{ dB}$$

Relationship Between Video Bandwidth (B_v) and Rise Time (t_r):

$$B_v = \frac{0.3}{t_r} \quad B_v = 0.5/t_r$$

where: B_v is in Hz
 t_r is in seconds

Glossary of Terms - Tuner, Converter, Receiver Products

This is a general list of terms and relationships commonly used in specifying Tuners and Receiver products

RF Frequency Range: The total input or output RF (microwave) frequency range, from low to high, covered or processed by the unit.

IF Frequency Range: The lower frequency input or output frequency range, low to high, that the unit feeds to or accepts from the Customer's equipment.

Instantaneous Bandwidth: The total bandwidth of the signal that is processed by the equipment at a given time.

Input Dynamic Range: The total range of input signal power levels, low to high, that the equipment is expected to process linearly, at any given time.

Dynamic Range Extender: An attenuator on the equipment input port to allow the equipment to linearly process signals at higher power levels than those specified at the top end of the Input Dynamic Range. Thus extending the Input Dynamic Range to higher levels.

Spurious Free Dynamic Range (SFDR): The dynamic range, beginning at system threshold, up until harmonics or other spurious signals generated in the LNA or elsewhere, exceed system threshold level and become detectable.

System Threshold: The lowest level signal that can be processed by the system. Determined to a great extent by noise figure and instantaneous bandwidth.

Minimum Detectable Signal (MDS): The lowest level signal that is detectable by the equipment. It can be calculated to the first order by the equation:

$$MDS = -114 + NF + 10 \log(B_r)$$

NF is in dB

B_r = RF channel bandwidth (MHz)

If detection video bandwidth is known, the equation becomes:

$$MDS = -114 + NF + 10 \log(\sqrt{2B_r B_v} - 2B_v^2)$$

B_v = video detection bandwidth (MHz)

Tangential Sensitivity (TSS): $MDS + 4 \text{ dB}$

Minimum Operating Sensitivity: $TSS + 5 \text{ dB}$

$$MDS = -114 + NF + 10 \log(\sqrt{2B_r B_v} - 2B_v^2)$$

GLOSSARY OF TERMS - TUNER, CONVERTER, RECEIVER PRODUCTS (CONT'D)

Wherein NF is in dB and Bandwidth is in Megahertz. $B_r = R_F$ channel bandwidth, B_v = video detection bandwidth.

Tangential Sensitivity: (TSS): MDS + 4 dB.

Minimum Operating Sensitivity: TSS + 5 dB

Noise Figure: The amount by which the signal to noise ratio is degraded when a signal is processed by a piece of equipment or component.

Intermediate Frequency (IF): In a frequency converter assembly or tuner the input signal is frequently converted to one or more alternate frequencies before being converted to the final frequency.

Type 1 Tuner: A microwave tuner/downconverter architecture where the unit's low noise amplifier is located prior to the preselection bandpass filtering in the RF chain.

Type 2 Tuner:

Approach 1: A microwave tuner/downconverter architecture where the unit's low noise amplifier is located after the preselection bandpass filtering in the RF chain.

(or)

Approach 2: A microwave tuner/downconverter architecture where the unit's multiple low noise amplifiers are located one in each of the preselection bandpass filter channels in the RF chain.

Signal to Noise Ratio (SNR): The ratio of signal power to integrated noise power in an RF channel.

Noise Spectral Density: The amount of noise power per unit of bandwidth.

Conversion Gain: The signal power gain (or loss) from input to output.

MODEL NUMBER INDEX

Model Number	Catalog Page	Model Number	Catalog Page
A15-MH069	13	A55-MX008	109
A15-MH082	30	A55-OL018	111
A15-MH094	30	A60-ML006	90
A15-MH095	30	A60-ML008	88
A15-MH096	30	A65-MH002	47
A15-MH137	17	A65-MH003	47
A15-MH138	17	A65-MH004	47
A15-MH139	17	A65-MH005	47
A15-MH155-1	17	A65-MH011	47
A15-MH225	26	A65-MH012	47
A15-MH226	26	A65-MH044	47
A15-MH227	26	A65-MH045	47
A15-MH228	26	A65-MH046	47
A15-ML053	15	A65-MH047	47
A15-ML054	15	A65-MH048	47
A15-ML055	15	A65-MH049	47
A15-ML074	28	A65-MH050	47
A15-ML089	15	A65-MH051	47
A16-1H004	22	A65-MH052	47
A16-MH005	22	A65-MH053	47
A16-OH003	22	A65-MH054	47
A17-1H011	20	A65-MH055	47
A17-MH012	20	A65-MH056	47
A17-OH010	20	A65-MH057	47
A20-MH166	103	A65-MH058	47
A20-MH204	113	A65-MH059	47
A20-MH205	116	A65-MH060	47
A20-MH211	74	A65-MH061	48
A20-MH260	95	A65-MH062	48
A20-MX152	82	A65-MH063	48
A20-MX209	92	A65-MH064	48
A25-MH229	106	A65-MH065	48
A35-MH137	34	A65-MH066	48
A35-MH138	37	A65-MH067	48
A35-MH139	40	A65-MH068	48
A35-MX141	68	A65-MH076	48
A35-MX195	43	A65-MH077	48
A50-8X003	7	A65-MH078	48
A50-MH009	10	A65-MH079	48

MODEL NUMBER INDEX CONT'D

Model Number Catalog Page

A65-MH080	48
A65-MH081	48
A65-MH082	48
A65-MH083	48
A65-MH084	48
A65-MH085	48
A65-MH086	48
A65-MH087	48
A65-MH088	48
A65-MH089	48
A65-MH090	48
A65-MH091	48
A65-MH092	48
A65-MH093	48
A65-MH094	48
A85-12X003	54
A90-MX010	86
GEX-0518-N1	5
GEX-2018-N1	4
GEX-2018-N2	4
GEX-2018-N3	4
GEX-2018-N4	4
GEX-2018-N5	4
GEX-2018-N6	4
GEX-2018-N7	4
PCS-2018	2
PCS-2060	2
PCS-6018	2