Revised: 27 August 2018

RoHS Compliant

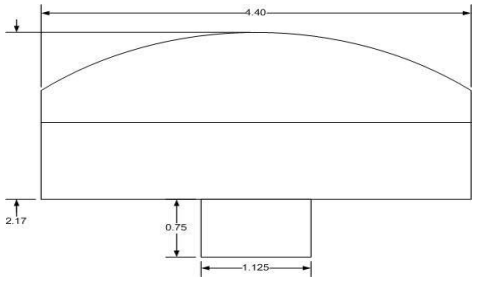
CE

Model SRA (Super Rugged Antenna)

Summary Specifications and Railroad Qualification Test Results

SRA Physical and Environmental Characteristics for Standard and Mag-Mount RS-232 and RS-422 Models

Dimensions	4.40" D x 2.17" H (no stem), 2.92" H (w stem)
	11.18 mm D x 5.51 mm H (no stem) - 74.2 mm (w)
Weight	1.75 lb. (793.8 Grams) w/o Retaining Nut
Connector	Series D38999-III, TV01, 13 pin Recep, #11 Shell
Mounting	1.125" Hole (28.58 mm)
Base	6061 Alum. - Anodized Black
Radome	HDPE - Pipe Grade - Black
* Mechanical Drawing does not include I/O mating connector	



Through-Hole Mount Version with Low-Profile Radome

SRA Environmental Specifications (Tested)

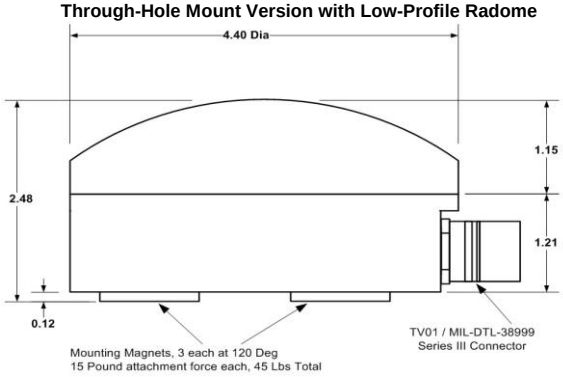
Operating Temp	-40 F to +185 F (-40 C to +85 C)
Storage Temp	-40 F to +185 F (-40 C to +85 C)
Altitude - EN/IEC 60950	-330 to +19,685 Ft. (-100 M to + 6,000 M)

Vibration:

Test Standard:	*Testing for:*
IEC 61373 (1999) Sec.8	Functional Random Vibration, Cat.1, Class A, Body Mounted
IEC 61373 (1999) Sec.9	Simulated Long Life (Vibration), Cat.1, Class A, Body Mounted
IEC 61373 (1999) Sec.10	Shunting Shock Test, Cat.1, Class A, Body Mounted

Operating Humidity:

Standard:	*Test Reference:*	
EN 50155 (2001) Sec.10.2.3 Railroad App.	Cooling:	Ref IEC 68-2-1 Test Ad.
EN 50155 (2001) Sec.10.2.4 Railroad App.	Dry Heat: 85C (185 F)	Ref IEC 68-2-2 Test Bd.
EN 50155 (2001) Sec.10.2.5 Railroad App.	Damp Heat: 85C (185 F)	Ref IEC 68-2-30 Test Db.
Synergy Systems, LLC, Low Temperature Storage	-55C Max (-67F)	EN6008-2-1 for Cat. Ab (Short Term)
Ingress Protection:	IP65	IEC 60529



Magnetic Mount Version with Low Profile Radome

MTBF:

Ground Benign	1,086,207 hours at 35 decrees C (123.9 yrs)
Ground Mobile	241,842 hours at 50 degrees C (27.6 yrs)

EMC:

Test Standard - Levels/Limits:	*Testing For:*	*Levels/Limits:*
EN 50155 (2001) Sec.10.2.6.1 Railroad App.	Supply Over Voltage (Trapezoid)	1.4 x Um at Section 10.2.6.1
EN 50155 (2001) Sec.10.2.6.2 Railroad App	Surges	IEC 61000-4-5 - 2kV Line to Line / 2kV Line to PE
EN 50155 (2001) Sec.10.2.6.4 Railroad App.	Electrostatic Discharge	IEC 61000-4-2 - 6kV Contact / 8kV Air
EN 50155 (2001) Sec.10.2.7 Railroad App.	Electrical Fast Transients	IEC 61000-4-4 - 2kV on DC Mains and I/O Lines
EN 50155 (2001) Sec.10.2.8.1 Railroad App.	RF Electromagnetic Field Amp. Mod.	IEC 61000-4-3 - 80-1000MHz 10V/m 80%AM Mod -1kHz
Synergy Systems, LLC Specification	Direct power surge	300v Across DC Mains, 200 Milliseconds

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SRA PERFORMANCE SPECIFICATIONS

With embedded u-Blox LEA-6 Series GPS or LEA-M8 Series Multi-GNSS Modules

(See http://www.u-Box.com for specific model specifications and feature details)

EMC - Continued

Test Standard - Levels/Limits:	*Testing For:*	*Levels/Limits:*
EN50121-3-2:2000 Table 9: 9.2	ESD	IEC 61000-4-2, Criteria B - 8kV Air/6kV Contact
EN50121.3.2:2000 Table 7: 7.1	Transient Burst (Cables)	IEC 61000-4-4, 2kV 5/50ns Tr/Th 5KHz Rep. Criteria B
FCC	Part 15 (10/2012) Class B	Passed
Industry Canada Verification	ICES-003 (issue 5:2012)	Passed
JCA0212S05	Power Isolation	1,500 VDC
ADuM1402	Data Isolation	2,500 V RMS

Built-In GNSS Antenna:

General	Antenna Description	Dielectric Patch antenna
		SAW Filter with 2 Stage active LNA
Performance	Receiving Frequency	GPS L1 Band (1575.42MHz) - GNSS adds GLONASS, BeiDou, QZSS & Galileo frequencies
	Output Impedance	50 ohms
	Polarization's	Right Hand Circular (RHC)
	Axial Ratio at Zenith	BeiDou 2.0 dB(typ); GPS 1.5 dB(typ), GLONASS 3.00 dB(typ)
	VSWR	2.0 Typical
	Elev. Angle Coverage	5~90 degree
	Az. Bearing Coverage	360 degree
	Over-all Gain	25 dB (typ)
	Noise Figure	BeiDou 2.5 dB; GPS 2.2 dB; GLONASS 2.4dB
	LNA Characteristic	K=>1 Un-conditionally Stable

Receiver Module:

General	Receiver Type	SRA-LEA-6, 50 channels - GPS L1 Frequency, C/A Code	
		LEA-M8, 72 channels - GLONASS, BeiDou, QZSS & GALILEO L1 frequency	
Performance	Time-To-First-Fix	Cold Start (Autonomous)	29 s
		Warm Start (Autonomous)	29 s
		Hot Start (Autonomous)	<1 s
		Aided Starts	<1 s
	Sensitivity	Tracking & Navigation	-160 dBm
		Reacquisition -160 dBm	-160 dBm
		Cold Start (Autonomous)	-144 dBm
	Horizontal Position Accuracy	Autonomous	< 2.5 m
		SBAS	< 2.0 m
	Accuracy of Time pulse Signal	GPS	<25 ns without sawtooth correction
		Multi-GNSS (GLONASS, QZSS, BeiDou)	<25 ns when paired with GPS
		Time Pulse Configurable:	0.25 … 1000 Hz
	Max Navigation Update Rate		4 Hz
	Velocity Accuracy		0.1m/s
	Heading Accuracy		0.5 degrees
	Dynamics		≤ 4 g
	Operational Limits	Velocity	515 m/s (1000 knots)

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SRA PERFORMANCE SPECIFICATIONS

With embedded u-Blox LEA Series GPS and Multi-GNSS Modules

(See http://www.u-Blox.com for specific module specifications and feature details)

RECEIVER TIMING PERFORMANCE:

1PPS Output (varies with embedded module and GNSS or combination of GNSS selected)	Physical Interface	RS-422 or RS-232 depending on SRA part number
	Pulse Mode	Rising/Falling/None
	Pulse Period	1000 ms (default) SW adjustable 1 ms to 60 s
	Pulse Length	100 ms (default) SW adjustable Max = 1 us
	Pulse accuracy	<25 ns w/GPS, 1us w/GLONASS
	Time Source	UTC/GPS (Depends on GNSS Selected)
	Cable Delay	SW adjustable in ns
	User Delay	SW adjustable in ns
	Synchronization Mode	Enable/Disable

Note: Pulse accuracy decreases with increased velocity

SRA BASIC ELECTRICAL SPECIFICATIONS:

Main Power	12 VDC +/- 2.4 VDC
Power Consumption	60mA @ 12 volts, 0.72 watts (typical), <1 watt max (depends on embedded module)
Isolation	Power……...1500 VDC ----------XP Power - JCA0212S05
	Data……..2500 VRMS ---------Analog Devices - ADuM1402

SERIAL PROTOCOLS:

Port	*Interface*	*Protocols*	*Defaults*
TX	RS-422	u-Blox binary, u-Blox-NMEA	u-Blox binary, u-Blox-NMEA at 4800 or 9600, 8-N-1
RX	RS-422	u-Blox binary, u-Blox-NMEA	u-Blox binary, u-Blox-NMEA at 4800 or 9600, 8-N-1
TX	RS-232	u-Blox binary, u-Blox-NMEA	u-Blox binary, u-Blox-NMEA at 4800 or 9600, 8-N-1
RX	RS-232	u-Blox binary, u-Blox-NMEA	u-Blox binary, u-Blox-NMEA at 4800 or 9600, 8-N-1

Port supports baud rates from up to 230.4 kBit/s

MESSAGES:

Control: **u-Blox – Binary:**	See u-Blox Software Specifications for complete description of all binary messages

Data Out: **u-Blox – NMEA Messages:**	DTM, GBS, GGA, GLL, GSA, GSV, GRS, GST, RMC, VTG, TXT, ZDA

Note: 1. The number of NMEA messages transmitted per second may be limited if a 4800 baud output rate is selected.
2. Original SRA-LEA-5 version EOL - firm as of March 2016
3. Standard u-Blox output messages shown above. All u-Blox binary and NMEA messages are available. Specific, user defined output messages, and message output rates, can be set at the factory prior to shipment. In this case, user required messages are documented in a "Customer Configuration Request" (CCR) file. A dash number (-) is assigned to the product part number for identification.

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