OCXO+Rb

QRb Sync

10 MHz or 100 MHz GPS/GNSS-DISCIPLINED LOW PHASE NOISE OCXO Rb CLOCK

Industry Leading ULN Oscillators and Disciplined Rb Combined

Exceptional Phase Noise

Excellent Stability

Low-G-Sensitivity

Internal Vibration Isolation Options

INSIDE SMARTIMING® TECHNOLOGY

Auto-Adaptive Smartiming+ SAASM/Non-SAASM GPS/GNSS Disciplining Technology @ 1 ns Resolution

APPLICATIONS

- High Dynamic Platforms
- Tactical Helicopter
- Tactical Airborne
- Drone (UAV/UGA)
- Shipboard
- Ground Communications
- Mobile Satcom
- Tactical Aerial Radar

"Quietly the Best"

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KEY FEATURES

• Frequency-Disciplined Outputs		10 MHz or 100 MHz (2 Outputs of Selected Frequency) *- Frequency outputs to 500 MHz upon request*
• Single Power Supply Voltage		+16 ±1 VDC
• Compact Size with Internal Vibration Isolation Options		
– Rb & OCXO Hard Mounted		6 x 5.7 x 1.1" (152.4 x 144.78 x 27.94 mm) (a)
– Rb Hard Mounted; OCXO Vibe Isolated		6 x 5.7 x 1.1" (152.4 x 144.78 x 27.94 mm) (b)
– Rb & OCXO Vibe Isolated		6 x 5.7 x 1.4" (152.4 x 144.78 x 35.56 mm) (c)
• Initial Frequency Accuracy at Power-On		±5E-8 (until OCXO locks to Rb)
• Frequency Offset Over Op Temp Range		<1E-10 over 0°C to +50°C
• Short-Term Stability		≤5E-12 at 1 sec, static; ≤2E-11 at 1 sec, dynamic
• Auto-Adaptive SmarTiming+ SAASM/Non-SAASM GPS/GNSS Disciplining Technology		
– REF Input		1PPS from SAASM/Non-SAASM GPS/GNSS
– REF Locking Resolution		1 ns
– REF Disciplining/Filtering/Controlling		Auto Adaptive
· Smart Loop Time Constant		280 - 100,000 sec, programmable
– REF Locking Mode (User Settable)		Sync or Track
– REF Types (PRS/Stratum 1 Source)		GPS, Cesium, E1/T1, eLoran, Maser
– OUT-Disciplined Time		1 PPS (2 Outputs)
– OUT Frequency Accuracy/Stability		
· PRS/Stratum 1 Locked		1E-12, typical
· Holdover (No PRS)		<5E-11/month
– OUT Time Accuracy/Stability		
· GPS Locked		<50 ns
· Holdover (No GPS)		< 2 µs/48 hrs or < 1 µs/24 hrs
• Power Consumption		34 Watts during warm-up 15 Watts, steady state @ +25°C
• Warm-up Time		< 10 min, setting time < 30 min (a & b) < 12 min, setting time < 30 min (c)
• Ultra-Low Aging		< 5E-11/ month
• Ultra-Low Phase Noise Output		10 MHz or 100 MHz
	10 kHz offset	-165 dBc/Hz -176 dBc/Hz
• Test Vibration Profile		0.01 g2/Hz random, 10-2000 Hz* *Testing can be completed using customer provided vibration profile upon request
• RS232 Standard Interface		Control & Monitoring Commands, 9600 b/s
• Weight		< 3 lbs (a & b) < 4 lbs (c)

Notes:

(a) Both Rb and OCXO are hard mounted within the assembly (no vibration isolation). Static or sine vibe environment applications.

(b) Rb is secured directly to assembly floor and OCXO is mounted on vibration isolation tray for use in dynamic environments.

(c) Both Rb & OCXO are mounted on vibration isolation trays for high vibration & shock level applications.

TYPICAL SPECIFICATIONS

SMARTIMING+® GPS/GNSS DISCIPLINING & FILTERING

1 PPS INPUT (PPSREF)				
Input Level	Logic High = +2.0 VDC, min to +5.5 VDC, max Logic Low = 0 VDC, min to +0.8 VDC, max			
Number of Inputs	1 (J3)			
Pulse Width at Logic High	20 ±1 µsec			
Rise / Fall Time	≤ 20 nsec / ≤ 1 µsec (10% to 90%)			
Source & Input Load Impedance	50 ohms, nominal			
Reference Types	GPS, E1/T1, Cesium, eLoran, Maser			
Disciplining & Filtering	Auto-adaptive thru the SmarTiming+® technology (request Whitepaper)			
Disciplining Modes	Sync (phase alignment) or Track (frequency alignment)			
Architecture Model	See Spectratime SRO-100 Manual			
1 PPS OUTPUTS (PPSOUT)				
Number of 1 PPS Outputs	2 (J4, J5)			
Start-up Time	10 seconds to 1 PPS Output			
Output Level	CMOS 0-5V			
Pulse Width at Logic High	400 µsec max ±40 µsec supply			
Rise / Fall Time	≤ 5 nsec / ≤ 50 nsec (20% to 80%)			
Input to Output Offset	≤ 70 nsec ±2 nsec			
Jitter	±5 nsec			
Output Load Impedance	50 ohms, nominal			
BIT OUTPUTS (TTL Compatible)				
PLL Lock (OCXO to Rb)	Status "0" indicates locked			
1 PPS Lock	Status "1" indicates locked and ready			
PPSOUT Holdover Time Stability		< 1µs / 24 hrs	< 3µs / 24 hrs	< 7µs / 24 hrs
Temperature Window		Within ±2°C	Within 20°C	Within 40°C
(After learning phase > 10 t)				
SMART LOOP TIME CONSTANT	Auto-Adaptive - 280 to 100,000 seconds			
Phase/Frequency	Sync/Trak Mode			
User Settable	RS-232 Command Interface			

ENVIRONMENTAL

VIBRATION	Lock Acquisition & Lock Holding MIL-STD-810F, Table 514.5C-6, General Exposure
TEST VIBRATION PROFILE, OPERATING	0.01 g^2/Hz random, 10-2000 Hz Testing can be completed using customer provided vibration profile upon request (duration, amplitude, frequency range)
DYNAMIC PHASE PERTURBATIONS	Custom profile available upon request (x degree per y interval under given vibration, temp & shock profiles)
G-SENSITIVITY	10 MHz OCXO Models: ≤2E-10/g per axis, typical 100 MHz OCXO Models: ≤3E-10/g per axis, typical - Can be specified to 1E-10/g per axis on some models - Effective g-sensitivity to ≤5E-12/g @ 2 kHz offset with 50 Hz vibe isolation system, typical
OPERATING TEMPERATURE	0° to +50°C
EXPOSURE TEMPERATURE	Normal operation after exposure from -40°C to +55°C
OPERATING & NON-OP PRESSURE	0.82 to 15.10 psia
HUMIDITY, SALT FOG	Conformal coat PCBs, 0 to 90%, condensing
OPERATING ALTITUDE	Sea level up to 50,000 ft (15.24 Km)

SCREENING

VIBRATION, NON-OPERATING	MIL-HDBK-2164, Figure 3, Z axis
THERMAL, NON-OPERATING	MIL-STD 202G, Method 107, Cond A, 1 hour dwell
SHOCK, OPERATING	30g, 11ms, half sine Testing can be completed using customer provided shock specs upon request (g level, duration, # of pulses, pulse format)

STANDARD 10 MHz MODEL SPECIFICATIONS

PART NUMBER		501-30428* * Specify part number **501-30427** if there are no environmental concerns and if vibe/shock testing is not required.		501-30429		501-30430	
DESCRIPTION		Both Rb & 10 MHz OCXO Hard Mounted		Rb Hard Mounted; 10 MHz OCXO Vibe Isolated		Both Rb & 10 MHz OCXO Vibe Isolated	
APPLICATIONS		Static or Sine Vibration Environments		Dynamic Environments; Significant Random Vibration		Dynamic Environments; High Random Vibration & Shock	
ELECTRICAL SPECIFICATIONS							
Frequency		10 MHz, sine					
Number of Outputs		2					
Output Level		+10 ±2 dBm, each output					
Output Load Impedance		50 ohms					
Harmonics		≤ -30 dBc					
Spurious		≤ -80 dBc					
Initial Accuracy at Turn-On		±5E-8 until OCXO locks to Rb					
Aging, Free-Running Freq Accuracy @ +25°C		≤ 5E-11/month after 30 min settling time					
Short Term Stability	1 second	≤5E-12, static; ≤2E-11, dynamic					
	10 seconds	≤5E-12, static; ≤2E-11, dynamic					
Frequency Offset Over Op Temp Range		≤ 1E-10, 0°C to +50°C					
Settling Time		≤ 30 minutes					
Warm-up Time		≤ 10 minutes				≤ 12 minutes	
Phase Noise L(f), dBc/Hz		Static	Dynamic** (no vibe isolation)	Static	Dynamic** (~50 Hz vibe isolation system)	Static	Dynamic** (~50 Hz vibe isolation system)
	Offset						
** Expected performance considering Test Vibration Profile. Testing can be completed using customer provided vibration profile upon request. *** Expected, not measured.	1 Hz	-105***	-85***	-105***	-85***	-105***	-85***
	10 Hz	-135	-95	-135	-95	-135	-95
	50 Hz	-145	-108	-145	-104	-145	-104
	100 Hz	-155	-114	-155	-125	-155	-125
	1 kHz	-164	-134	-164	-164	-164	-164
	2 kHz	-164	-141	-164	-164	-164	-164
	10 kHz	-165	-165	-165	-165	-165	-165
	100 kHz	-165	-165	-165	-165	-165	-165
Supply Voltage		+16 ±1 VDC					
Warm-up Power		34 Watts, typical					
Steady State Power		15 Watts, typical @ +25°C					
MECHANICAL SPECIFICATIONS							
Size (L x W x H)		6 x 5.7 x 1.1" (152.4 x 144.78 x 27.94 mm)				6 x 5.7 x 1.4" (152.4 x 144.78 x 35.56 mm)	
Mechanical Layout		See Figure 1				See Figure 2	
Weight		≤ 3 lbs (1.36 Kg)				≤ 4 lbs (1.81 Kg)	
Mounting		Helicoil, #4-40 (0.180" deep), on base, 4 places					
Connectors		RF Input / Outputs: SMA(f) ; Power & Monitoring: (2) 9-pin D-subs					
COMMUNICATION INTERFACE							
RS-232		See commands for control & monitoring below, including timing & locking control functions VMGA messages					
Protocol Speed		9600, n, 8, 1					

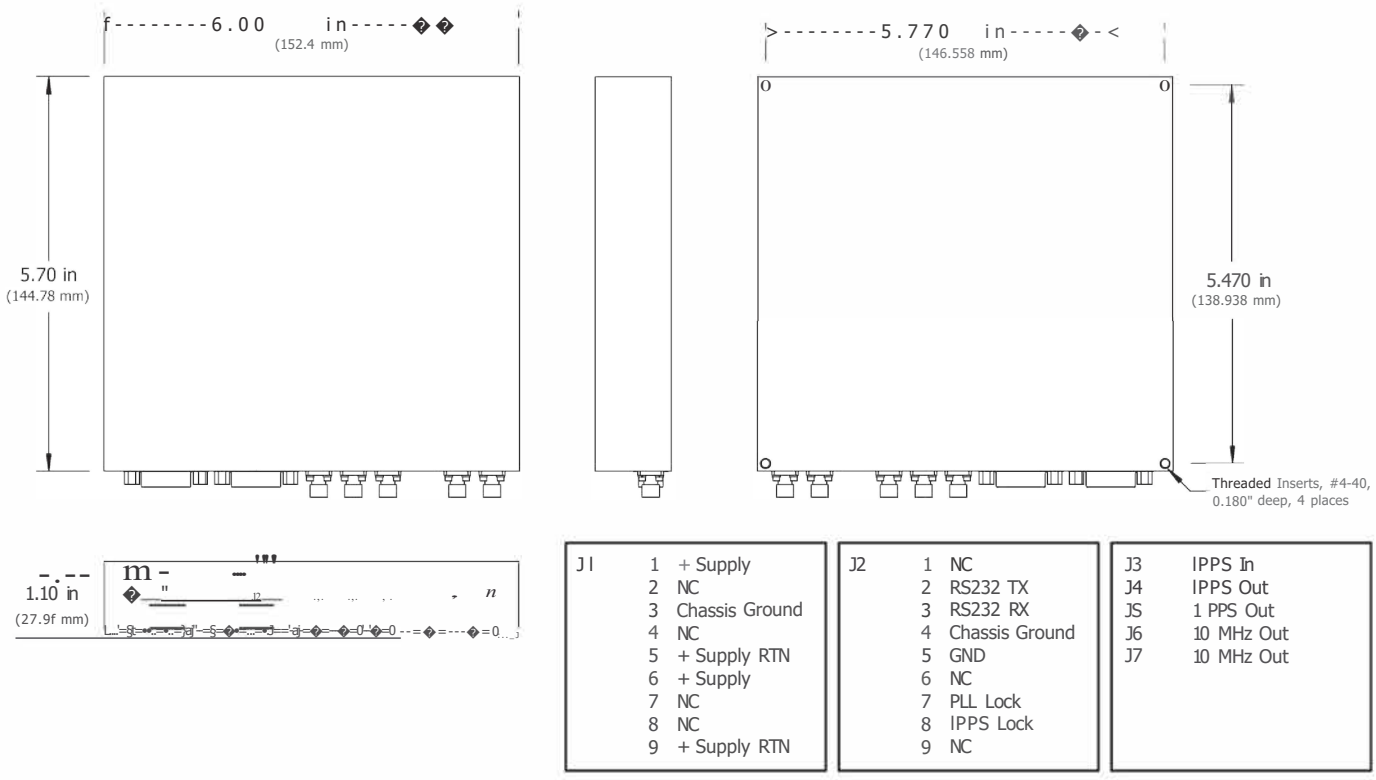

FIGURE 1

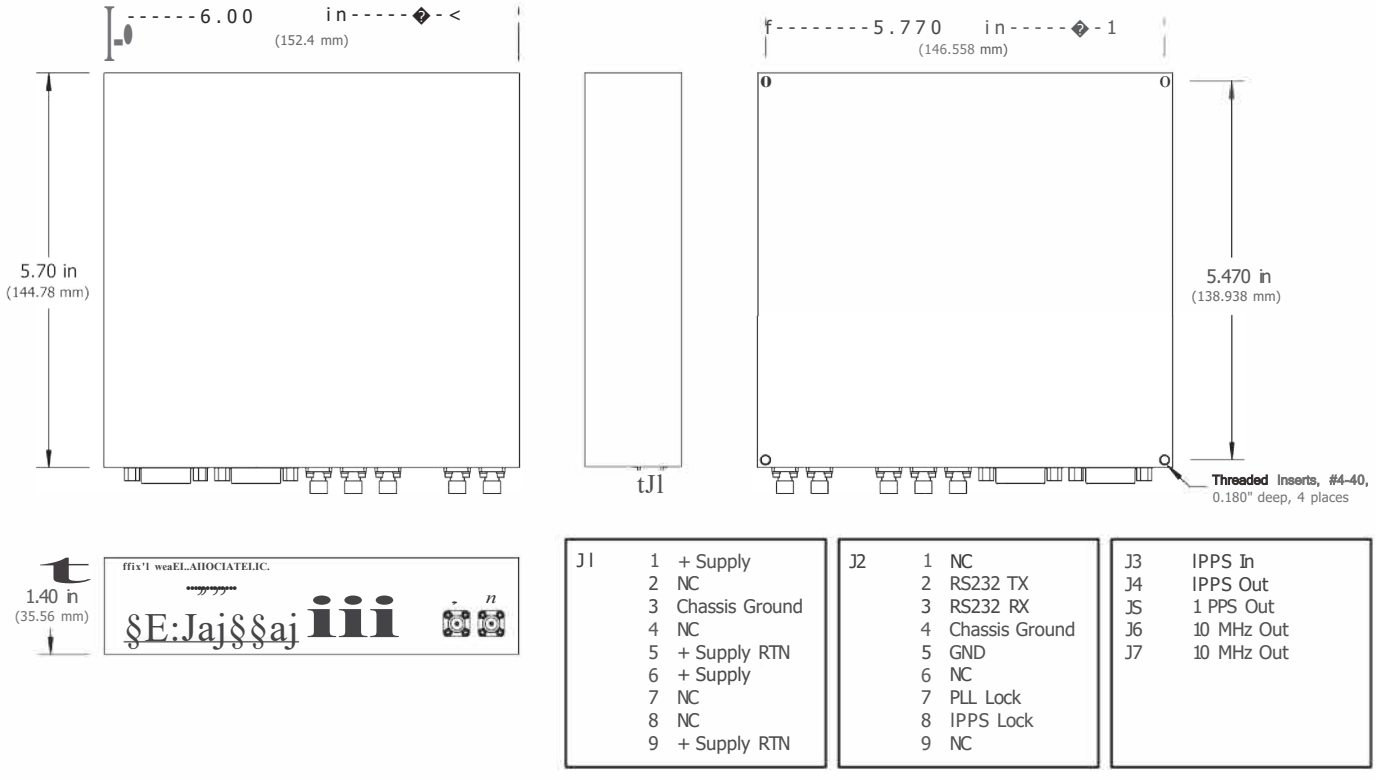

FIGURE 2