

SA.31m, SA.33m & SA.35m

Miniature Rubidium Atomic Clock



Key Features

- High precision atomic clock
- Small form factor (smaller than most OCXOs)
- Standard quartz oscillator pinouts
- Low power consumption
- RoHS 6/6 compliant

Applications

- Stand-alone (free-run) stable frequency source (for UMTS or LTE)
- Extended holdover for CDMA and WiMAX base stations
- Stability for various other communication and transmission applications

The Symmetricom® SA.3Xm marks a major step forward in the evolution of rubidium atomic clocks. Based on a new generation of atomic clock technology, the SA.3Xm family has a completely new physics package that enables unprecedented miniaturization in a rubidium clock. It is suitable for applications requiring compact design, low power consumption, extended aging and precision in an economical and easily adaptable package.

Smallest Commercially Available Rubidium Clock

Symmetricom has leveraged significant advances in physics miniaturization and integration to design the world's first commercially available miniature atomic clock. The SA.3Xm has the physical dimensions and packaging of a small ovenized crystal oscillator (OCXO), measuring 51 mm X 51 mm (2" X 2") and standing at a mere 18 mm (0.7"). It consumes less power and has wide-spectrum temperature operation. This makes it accessible to a range of timing and synchronization applications, from telecom networks to test and measurement devices.

SA.31m

The SA.31m is targeted for applications where an economical solution for frequency stability is required, such as UMTS (WCDMA) or LTE. It can be used as an independent frequency source for base stations, and enable transition from costly TDM Backhaul transport to economic and efficient Ethernet transport.

SA.33m

The SA.33m has superior aging and tempco, and better stability and phase noise than the SA.31m. The SA.33m may be deployed in existing rubidium applications, such as extended holdover (for CDMA / CDMA 2000 or WiMAX).

SA.35m

The SA.35m is the premium grade of the entire SA.3Xm family. It has better aging, the best tempco, and the best stability performance amongst all the versions of the family. And, unlike the other two grades, the SA.35m has a 7200 second MDEV of less than or equal to $7E-13$ (7200 MDEV is not defined for the SA.31m and SA.33m). It is ideally suited for specific holdover and test and measurement applications. Economical for its performance level, the SA.35m delivers premium performance at a reasonable price.

Quantum™

Symmetricom invented portable atomic timekeeping with QUANTUM™, the world's first family of miniature and chip scale atomic clocks.

Choose QUANTUM™ class for best-in-class stability, size, weight and power consumption.

SA.31m, SA.33m & SA.35m

Specifications

ELECTRICAL SPECIFICATIONS

Output Frequency/Waveform:	10 MHz 3.3 volt AC MOS square wave		
Logic Level:	VL<0.5V, VH>2.7V (15pf load)		
Rise/Fail Time:	<10 ns		
Duty Cycle:	50%+/-10%		
Phase Noise (SSB)	SA.35m / SA.33m	SA.31m	
1Hz	<-70 dBc/Hz	<-65 dBc/Hz	
10Hz	<-87 dBc/Hz	<-85 dBc/Hz	
100Hz	<-114 dBc/Hz	<-112 dBc/Hz	
1kHz	<-130 dBc/Hz	<-130 dBc/Hz	
10kHz	<-140 dBc/Hz	<-140 dBc/Hz	
Spurious:			
Non-Harmonic:	<-85 dBc		
Temperature Coefficient [peak to peak]:			
	SA.35m	SA.33m	SA.31m
(0 C° to 70° C)	≤7E-11	≤1E-10	≤7E-10
(-10° C to 75° C)	≤1E-10	≤1.5E-10	≤1E-9
Accuracy at shipment:	±5E-11 (25° C)		
Retrace:	±5E-11 (on-off-on: 24hr, 48hr, 12hr @25° C)		
Control range:			
With analog input:	±1E-8, 0-5v into 5k Ω		
With digital input:	±1E-6 (with resolution ±1E-12)		
Warm-up time:	time to <1E-9 @25° C: <7.5 min (if mounted on the developer's kit heat sink: ≤9 min)		
Supply voltage/current:	+5 Vdc ±0.1 Vdc, Max. current <2.8 Amps		
Power consumption:	Warm-up: 14W max (-10°C to +75°C); Operating: 8W @ -10°C, 5W @ 25°C, 5W @ 75°C baseplate		
Voltage coefficient:	+5 Vdc ±0.1 Vdc: Magnitude (df/f) <2E-11 peak-to-peak		
Radiated Emissions:	Compliant to FCC part 15, Class B, if mounted properly to the host PCB		
Test / status:	Built-in self-test (BITE)		
ACMOS:	Service / fault-unlock		
Serial Port:	Symmetricom specific serial port protocol for status and control		

Aging:

Type	SA.35m / SA.33m	SA.31m
Daily*	±2.5E-11	±4E-11
Monthly*	±1E-10	±3E-10
Yearly	±1E-9	±1.5E-9

(*After 1 day & 1 month of operation respectively)

Short Term Stability (Allan deviation):

Type	SA.35m / SA.33m	SA.31m
t=1s	≤3E-11	≤5E-11
t=10s	≤1.6E-11	≤2.5E-11
t=100s	≤8E-12	≤1E-11

7200 MDEV: SA.35m ≤7E-13 (not specified for SA.31m and SA.33m)

Time drift in a 24-hr period (SA.33m & SA.35m only): <7µs over 0 to +60°C

MTBF:

Per MIL-HDBK-217F:
 ≥20 years @ 40°C (Ground, fixed, uncontrolled, GF)
 ≥17 years @ 40°C (Ground, fixed, controlled, GB)

Per Telcordia SSR 332, Issue 1:

≥20 years @ 40°C (Ground, fixed, uncontrolled)

Connector: 5 Pins match standard OCXO configurations

- Pin 1: Input frequency control
- Pin 2*: Baseplate (connect to GND externally)
- Pin 3: Output signal
- Pin 4*: Ground (signal & supply)
- Pin 5: Input supply (+)

* Pin 2 & Pin 4 are not connected internally

Three (3) additional pins for added functionality:

- Pin 6: BITE
- Pin 7: RS232 transmit (Tx)
- Pin 8: RS232 receive (Rx)

ENVIRONMENTAL

Operating temperature:	-10° C to +75° C base-plate
Magnetic field sensitivity:	<±7E-11/Gauss (up to ±2 Gauss)
Humidity:	GR-CORE-63, issue 3, March 2006
Vibration (operating):	GR-CORE-63, issue 3, March 2006
Storage & transport (Non operating):	
Temperature:	-55°C to +100°C
Shock & vibration:	GR-CORE-63, issue 3, March 2006

PHYSICAL

Weight:	<85 gm (<3 oz)
Size :	18 mm (0.7") H X 51 mm
Volume:	<46.5 cm ³ (< 2.8 in ³)

RoHS COMPLIANCE

• SA.31m, SA.33m, and SA.35m are 6/6 RoHS Compliant

