



- Quartz SAW Stabilized and Filtered "Diff Sine" Technology
- Fundamental-Mode Oscillation at 672.163 MHz
- Voltage Tunable for Phase Lock Loop Operations
- Optical Timing Reference for Forward Error Correction Applications
- Complies with Directive 2002/95/EC (RoHS)



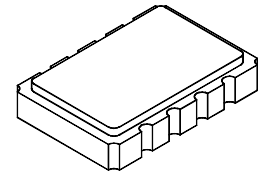
The output of this device is generated and filtered by narrowband quartz SAW elements at 672.163 MHz. The configuration of this clock is intended to provide a pure signal for optical timing applications in noisy signal environments. The Q/Qbar differential output swing of  $\pm 1$  volt about 0 Vdc has symmetry better than  $\pm 1\%$  into loads from 40 to 70 ohms; determined by customer application. The long term frequency accuracy is set by an external reference source allowing this device to complete a Phase Lock Loop design without the usual noise and jitter problems associated with PLL's.

#### Absolute Maximum Ratings

Rating	Value	Units
DC Supply Voltage	0 to 5.5	Vdc
Tuning Voltage	0 to 5.5	Vdc
Case Temperature	-55 to 100	°C

**OP4009B**

**672.163 MHz  
Optical  
Timing Clock**



**SMC-08**

#### Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Operating Frequency	Absolute Frequency	f <sub>O</sub>	1, 9		672.163		MHz
	Tuning Range		2	±100			ppm
	Tuning Voltage		1	0		+3	V
	Tuning Linearity		1, 8		±3	±5	%
	Tuning Sensitivity	df/dv	2, 10	140		300	ppm/V
	Modulation Bandwidth			125	265		kHz
Q and Q̄ Output	Voltage into 50 Ω (VSWR≤1.2)	V <sub>O</sub>	1,3	0.60		1.1	V <sub>P-P</sub>
	Operating Load VSWR		1,3			2:1	
	Symmetry		3, 4, 5	49		51	%
	Harmonic Spurious		3, 4, 6			-30	dBc
	Nonharmonic Spurious		3, 4, 6, 7			-60	dBc
Phase Noise	@ 100 Hz offset				-75		dBc/Hz
	@ 1 kHz offset				-105		dBc/Hz
	@ 10 kHz offset				-125		dBc/Hz
	Noise Floor				-155		dBc/Hz
Q and Q̄ Jitter	RMS Jitter		3, 4, 6, 7		2		pSp-P
	No Noise on V <sub>CC</sub>		3, 4, 6, 7		12		pSp-P
	200 mV <sub>P-P</sub> from 1 MHz to ½ f <sub>O</sub> on		3		12		pSp-P
Input Impedance (Tuning Port)				1			KΩ
Output DC Resistance (between Q & Q̄)			1, 3	50			KΩ
DC Power Supply	Operating Voltage	V <sub>CC</sub>	1, 3	3.13	3.3, 5.0	5.25	Vdc
	Operating Current	I <sub>CC</sub>	1, 3			70	mA
Operating Case Temperature		T <sub>C</sub>	1, 3	-40		+85	°C
Lid Symbolization (YY=Year, WW=Week)		RFM OP4009B YYWW					



**CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.**

**COCOM CAUTION: Approval by the U.S. Department of Commerce is required prior to export of this device.**

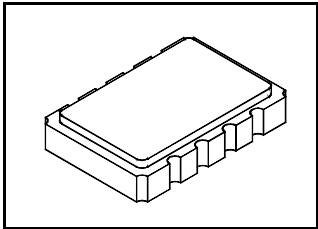
#### Notes:

1. Unless otherwise noted, all specifications include any combination of load VSWR, Vcc, and temperature, with Q and  $\bar{Q}$  terminated into 50 ohm loads to ground (see typical test circuit).
2. Useful tuning range is in excess of what is required over temp, aging, pushing, pulling & accuracy.
3. The design, manufacturing process, and specifications of this device are subject to change without notice.
4. Only under the nominal conditions of 50  $\Omega$  load impedance with VSWR  $\leq 1.2$  and nominal power supply voltage.
5. Symmetry is defined as the pulse width (in percent of total period) measured at the 50% points of Q or  $\bar{Q}$  (see timing definitions).
6. Jitter and other spurious outputs induced by externally generated electrical noise on V<sub>CC</sub> or mechanical vibration are not included in this specification, except where noted. External voltage regulation and careful PCB layout are recommended for optimum performance.
7. Applies to period jitter of Q and  $\bar{Q}$ . Measurements are made with the Tektronix CSA803 signal analyzer with at least 1000 samples.
8. Linearity is a function of the percentage variation from a permitted linear deviation versus the amount of frequency tuning range (see linearity definition).
9. One or more of the following United States patents apply: 4,616,197; 4,670,681; 4,760,352.

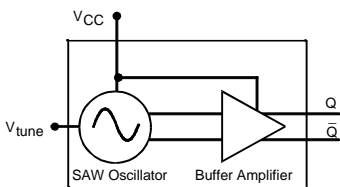
OP Performance Curves and Application Information

See the OP4005B Data Sheet for typical OP performance curves and application information.

SMC-8 8-Terminal Surface Mount Case

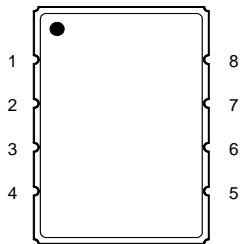


BLOCK DIAGRAM



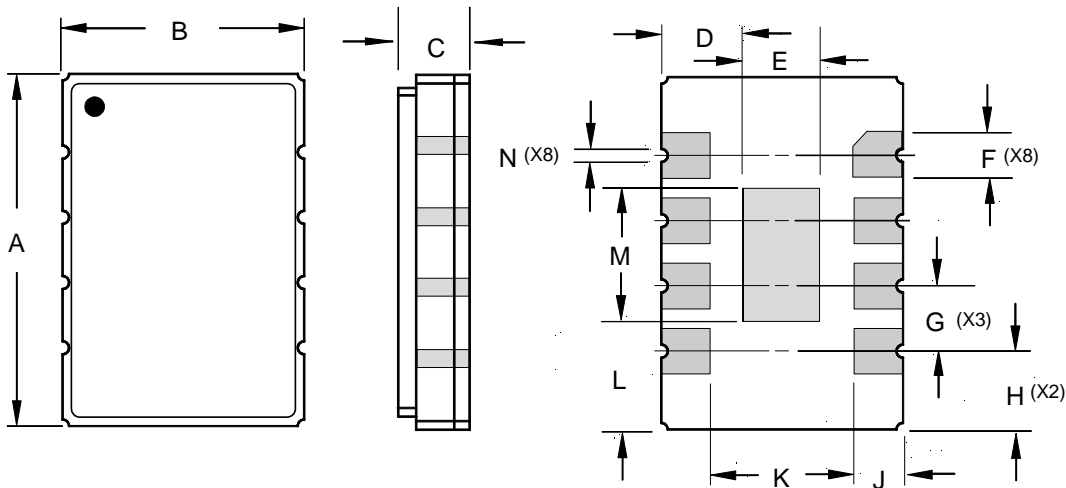
ELECTRICAL CONNECTIONS

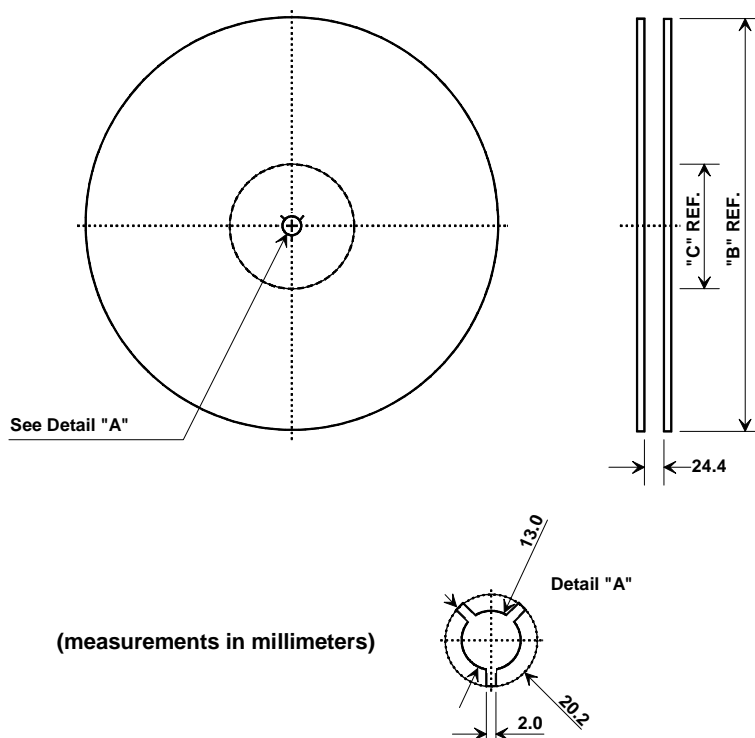
Terminal Number	Connection
1	V <sub>CC</sub>
2	Ground
3	Enable/Disable
4	Q Output
5	$\overline{Q}$ Output
6	Ground
7	
8	TUNE Input
LID	Ground



TOP VIEW

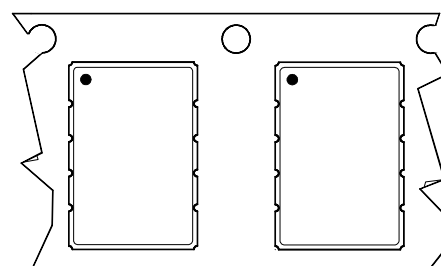
Dimension	mm		Inches	
	MIN	MAX	MIN	MAX
A	13.46	13.97	0.530	0.550
B	9.14	9.66	0.360	0.380
C	1.93 Nominal		0.076 Nominal	
D	3.56 Nominal		0.141 Nominal	
E	2.24 Nominal		0.088 Nominal	
F	1.27 Nominal		0.050 Nominal	
G	2.54 Nominal		0.100 Nominal	
H	3.05 Nominal		0.120 Nominal	
J	1.93 Nominal		0.076 Nominal	
K	5.54 Nominal		0.218 Nominal	
L	4.32 Nominal		0.170 Nominal	
M	4.83 Nominal		0.190 Nominal	
N	0.50 Nominal		0.020 Nominal	





#### SMC-08 Case

Reel Size			Quantity Per Reel	
"B" Nominal	"C" Nominal		Min	Max
13 Inch	330 mm	100 mm	200	1000



Orientation in Tape Carrier as Shipped

#### Dimensions

Carrier Tape Dimensions		Cover Tape Size
Ao	.383 ± .004 (9.7 mm)	21.3 mm
Bo	.554 ± .004 (14.1 mm)	
Ko	.130 ± .004 (3.3 mm )	
P	12 mm	
W	24 mm	
Tape Length	60 m	
Pockets/m	83	

