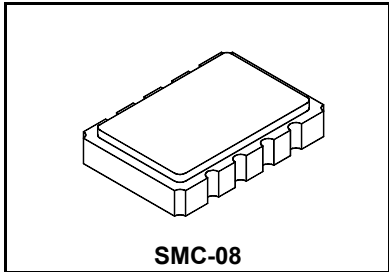


OP4009B

**672.163 MHz
Optical
Timing Clock**



- 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 ± 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 |

Electrical Characteristics

| Characteristic | Sym | Notes | Minimum | Typical | Maximum | Units | |
|---|--|--|------------|-----------|----------|-------------------|-----------|
| Operating Frequency | Absolute Frequency | f_O | 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 \bar{Q} Output | Voltage into 50 Ω (VSWR \leq 1.2) | V_O | 1, 3 | 0.60 | | 1.1 | V_{P-P} |
| | | 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 \bar{Q} Jitter | RMS Jitter | | 3, 4, 6, 7 | 2 | | ps _{P-P} | |
| | | No Noise on V_{CC} | 3, 4, 6, 7 | 12 | | ps _{P-P} | |
| | | 200 mV _{P-P} from 1 MHz to $\frac{1}{2} f_O$ on | 3 | 12 | | ps _{P-P} | |
| Input Impedance (Tuning Port) | | | 1 | | | K Ω | |
| Output DC Resistance (between Q & \bar{Q}) | | 1, 3 | 50 | | | K Ω | |
| DC Power Supply | Operating Voltage | V_{CC} | 1, 3 | 3.13 | 3.3, 5.0 | 5.25 | Vdc |
| | | Operating Current | I_{CC} | 1, 3 | | | 70 |
| Operating Case Temperature | | T_C | 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:

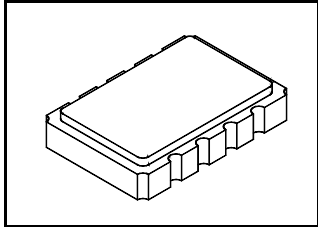
1. Unless otherwise noted, all specifications include any combination of load VSWR, Vcc, and temperature, with Q and \bar{Q} terminated into 50 ohm loads to ground (see typical test circuit).
2. Useful tuning range is in excess of what is required over temp, aging, pushing, pulling & accuracy.
3. The design, manufacturing process, and specifications of this device are subject to change without notice.
4. Only under the nominal conditions of 50 Ω 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_{CC} 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.

Discontinued

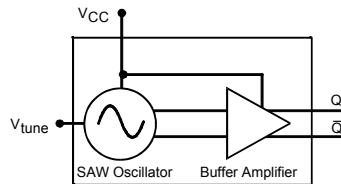
OP Performance Curves and Application

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

SMC-8 8-Terminal Surface Mount Case



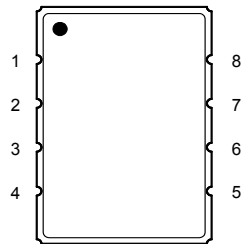
BLOCK DIAGRAM



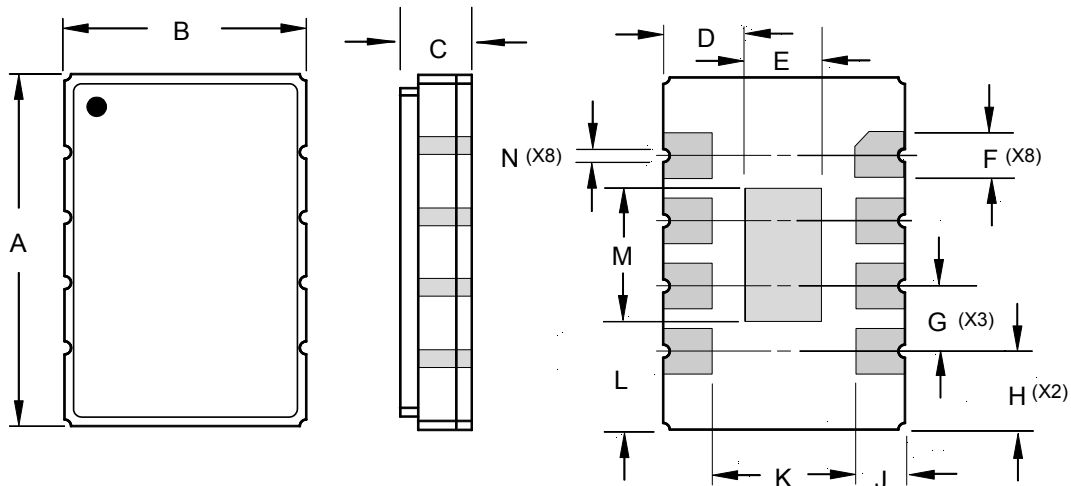
| Dimension | mm | | Inches | |
|-----------|--------------|-------|---------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 13.46 | 13.97 | 0.530 | 0.550 |
| B | 9.14 | 9.66 | 0.360 | 0.380 |
| C | 1.93 Nominal | | 0.076 Nominal | |
| D | 3.56 Nominal | | 0.141 Nominal | |
| E | 2.24 Nominal | | 0.088 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 | |

ELECTRICAL CONNECTIONS

| Terminal Number | Connection |
|-----------------|------------------|
| 1 | V _{CC} |
| 2 | Ground |
| 3 | Enable/Disable |
| 4 | Q Output |
| 5 | \bar{Q} Output |
| 6 | Ground |
| 7 | |
| 8 | TUNE Input |
| LID | Ground |



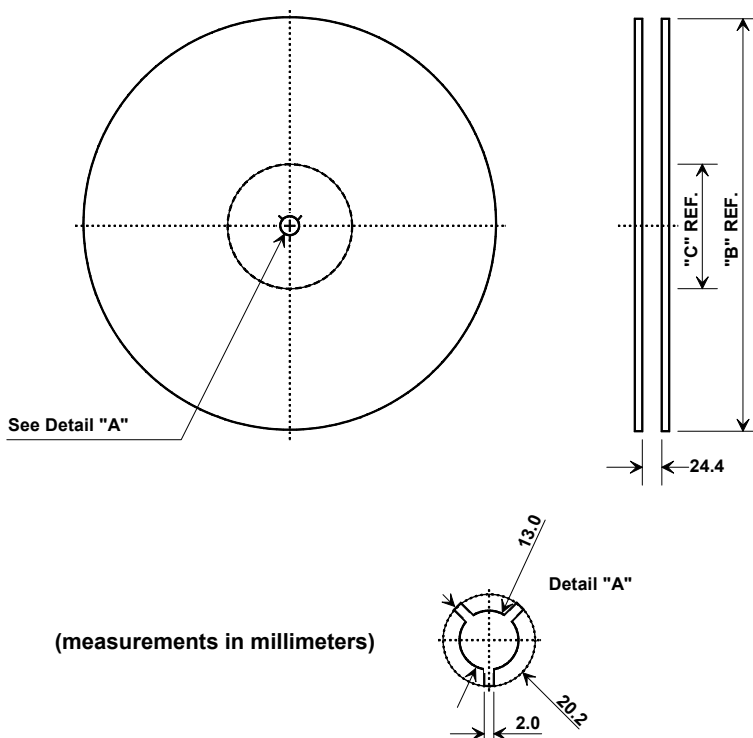
TOP VIEW



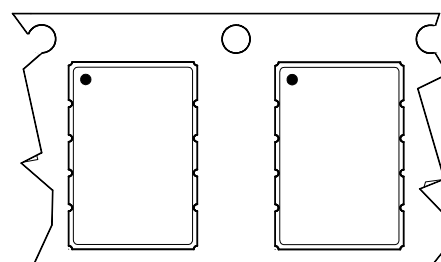
Discontinued

SMC-08 Case

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



(measurements in millimeters)



Orientation in Tape Carrier as Shipped

Dimensions

| Carrier Tape Dimensions | | Cover Tape Size |
|-------------------------|-----------------------|-----------------|
| Ao | .383 ± .004 (9.7 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 | |

