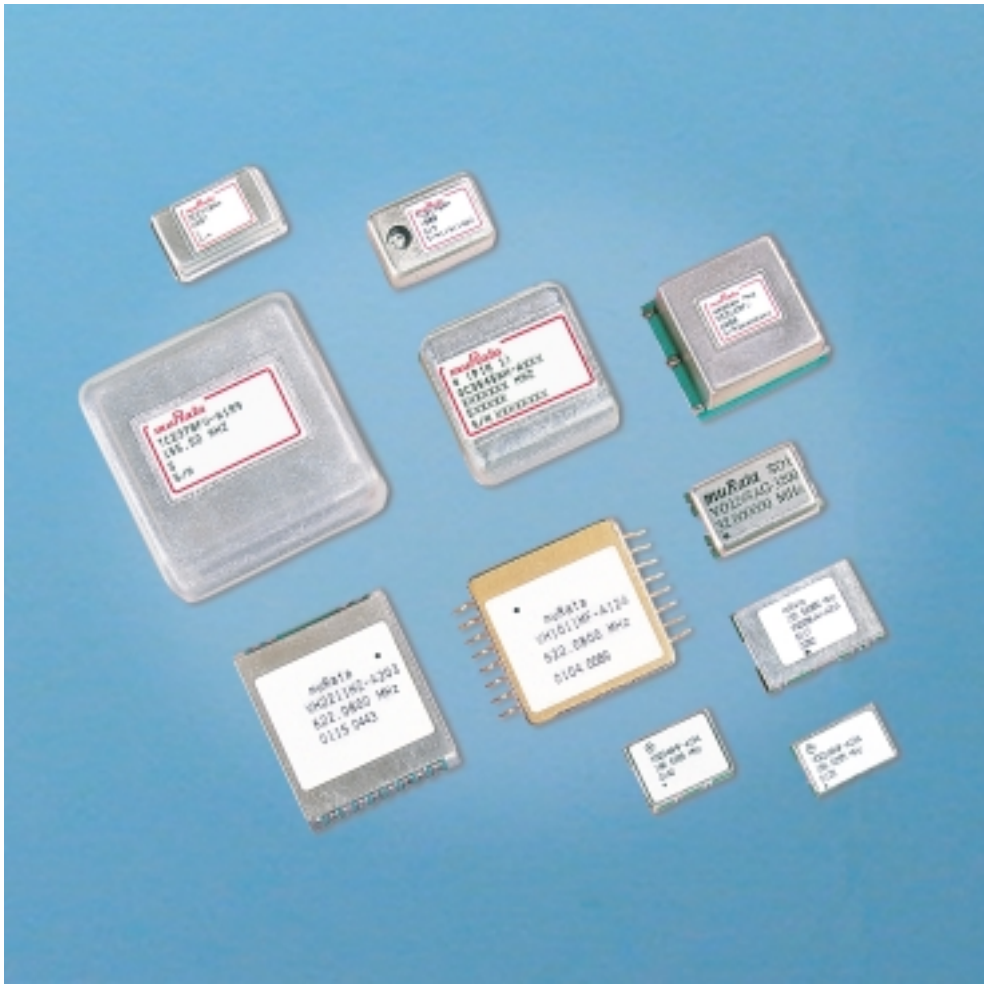
OSCILLATOR PRODUCTS CATALOG

O-20-A

muRata

Innovator in Electronics



Please visit our website
www.murata.com

CONTENTS

Introduction and Standards 1-4
RFQ Form/Quick Quote.....5
Part Numbering System 6
1 Temperature Compensating High Stability Crystal Oscillators 7–12
2 Voltage Controlled Oscillators.....13–18
3 Ovenized Crystal Oscillators.....19–25
4 Surface Mount Crystal Oscillators 26–28
5 Digitally Compensated Crystal Oscillators.....29
6 Microwave Oscillators – VCO 30–31
7 Phase Lock Loop Modules 32–33

If you have any questions concerning Crystal Oscillator products please contact:

Murata Electronics N.A., Inc.
State College Operations
1900 West College Avenue
State College, PA 16801-2799
Phone: 814-237-1431
Fax: 814-238-0490

Quality Control

Murata Electronics' Quality Control Department maintains product quality at a level equal to the company's high standards of performance and workmanship, which are certified to ISO-9001 and ISO-14000 requirements. The department is vested with the authority to exercise control over every phase of the manufacturing process. This control extends from incoming inspection of purchased material to in-process inspection, inspection of final product, packaging and shipping.

Environmental Testing

Product quality is guaranteed by our Quality Assurance Program. Many oscillators are custom designed to meet your needs.

Standard oscillator design parameters are:

Storage Temperature: –55°C to +85°C
(to +125°C Optional)

Vibration: 10G's, 10 to 500Hz
MIL-STD-202, Method 204

Shock: Test condition A
30g, 11msec., ½ sine
MIL-STD-202, Method 213,
Test Condition J

Altitude: Sea Level to space per
MIL-STD-202, Method 105

Seal: MIL-STD-202, Method 112
Test Condition D

More stringent specification levels are available. Consult our factory for details.

Other environmental conditions encountered by oscillators should be specified so that we may design units to meet your requirements. Such conditions would include soldering profiles, board washing, exposure to moisture, corrosive atmospheres, solvents, etc.

Standard environmental tests are conducted on site in the Corporate QA laboratory. Specialized environmental tests are conducted at independent testing laboratories.

Introduction and Standards

MURATA ELECTRONICS MANUFACTURES A COMPLETE LINE OF OSCILLATORS

We are a volume producer of TTL, CMOS, ECL and Sine Wave Clock Oscillators for the instrumentation and communication industries. Excellent frequency stability is achieved with TCXO, Temperature Compensated Crystal Oscillators and OCXO, Ovenized (Proportional Control) Crystal Oscillators. Special requirements are met with VCXO, Voltage Controlled Crystal Oscillators, which can be frequency modulated, with combinations of the basic types such as the TC/VCXO or OC/VCXO. Murata has full-line expertise from economy models to sophisticated, high stability, very low phase noise oscillators that are used as standards for microwave transmitters. Our oscillator production lines are closely monitored by Quality Control through Incoming, In-Process and Final Inspections.

The Crystal Oscillators featured in this catalog are manufactured exclusively at our manufacturing facility in State College, PA and are designed to meet the requirements of most high technology market applications today. However, oscillators can be custom designed to meet your needs. Send us your specifications. We have full-line capability backed by a well staffed engineering department. Murata will assist you in defining your oscillator requirements and provide the support to take your project from the conceptual stage through implementation, including fast prototype turnaround.

OSCILLATOR TECHNICAL PERFORMANCE

If you have a formal specification, send us a copy for quotation. If not, make a copy of our Specification and RFQ Form to help you specify an oscillator to meet your requirements. Select those specifications relevant to your application; cost increases as electrical and mechanical requirements become more stringent. Murata Electronics will produce a cost effective product which will meet all of your oscillator requirements. Since tradeoffs exist in many instances, we are always happy to quote options when cost/performance or cost/size tradeoffs exist.
Attach additional sheets to our specification sheet if necessary.

Introduction and Standards

The following material briefly describes our in-house standards and offers some cost/performance tradeoffs.

ENVIRONMENTAL CONDITIONS

See Page 1.

FREQUENCY RANGE

From less than 1Hz to 1GHz, Murata Electronics designs typically center around the "AT" cut crystals, but "SC," "IT," and other cuts are used for certain applications. Fundamental mode crystals from 3MHz and overtones from 5 to 400MHz are utilized in the oscillators. This range is extended through the use of dividers and multipliers. (Oscillators in the microwave range are available through the Murata RF and Microwave Products Group in State College, Pennsylvania.)

FREQUENCY STABILITY

Is generally defined in two ways:

1.0 Total Frequency Stability – the maximum frequency excursion from the nominal for all conditions. This is usually expressed as a ± fraction centered at the nominal frequency.

$$\text{FREQUENCY STABILITY [ppm]} \equiv \frac{\triangle f\,[\text{Hz}]}{f_c\,[\text{MHz}]}$$

2.0 Specific Stabilities –

2.1 Accuracy – the frequency setting tolerance at room temperature at time of shipment. Oscillators may incorporate external adjustments for exact calibration. TCXO's typically exhibit a resolution of ±1pp 10^7. For OCXO's, the typical resolution is to ±1pp 10^9.

2.2 Frequency Stability Versus Temperature – a maximum change from the nominal frequency. Oscillators relying on the temperature characteristics of the "AT" crystal can be designed to meet a stability requirement as tight as ±10ppm from –10°C to +60°C. Tighter stabilities to ±0.1ppm require temperature compensation techniques. Ovenized oscillators are used for stabilities to ±5pp 10^{10}.

2.3 Frequency Stabilities Versus Supply Voltage and Load Variation – these parameters may be improved by the use of voltage regulation and additional buffer stages. The tighter the stability requirements, the more complex the design.

2.4 Stability Versus Time – can be expressed over periods of milliseconds to years. Through use of high quality crystals typical aging rates of ±1ppm/year are achieved. For OCXO's, it is possible to achieve aging rates as low as ±5pp 10^{10} per day. Short term stability can be expressed as an Allan Variance over a range of gate times from less than 1msec to 10sec, or in terms of SSB phase noise in the frequency domain.

OUTPUT CHARACTERISTICS

Oscillator output waveforms are either sine or square waves.

1.0 Sine Waves – outputs are specified by stating the amplitude of the signal (mW or V_{RMS} and the nominal load impedance (typically) 50 ohms or 1K ohms).

Harmonic and Sub-Harmonic distortion less than –20dBc is standard.

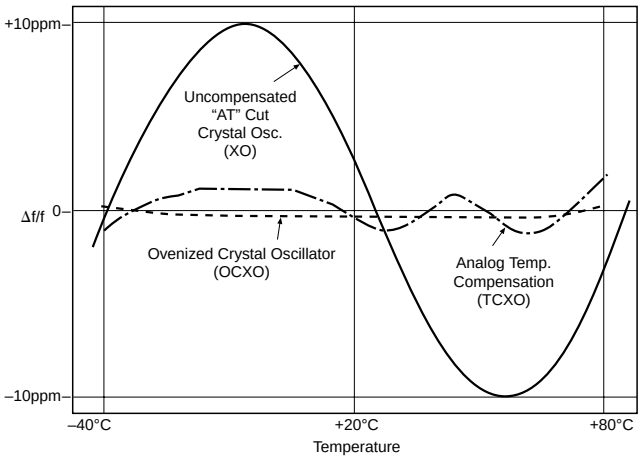
Deviations from the standards can be accommodated. Consult our engineering department.

2.0 Square Wave*

	TTL	CMOS	ECL
Logic "0" Level	0.4V Max.	1.0V Max.	–1.89V
Logic "1" Level	2.4V Min.	Vcc –1.0V	–0.89
Symmetry	40/60	40/60	40/60
Load	10 Gates	50pF Max.	50 ohms to –2VDC
Freq. Range	1Hz to 100MHz	1Hz to 100MHz	4.0MHz to 700MHz

*Specify logic type to be driven

RELATIVE FREQUENCY STABILITY OF TYPICAL CRYSTAL OSCILLATOR TYPES



Introduction and Standards

INPUT POWER CHARACTERISTICS

Specification of input voltage and current parameters is vital for the proper design of all oscillators. Voltage, power limits and regulation should be specified for all supplies available. If no regulation is listed, ±5% will be assumed and a voltage regulation circuit incorporated if needed. For ovenized oscillators, the oven input voltage may differ from the oscillator input voltage.

MECHANICAL SPECIFICATIONS

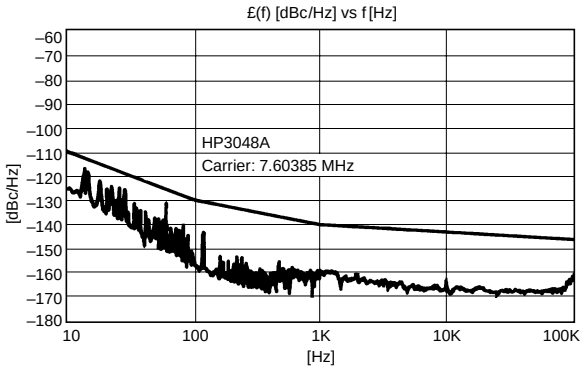
Mechanical Specifications are often unique to your application, but standard sizes and tolerances are ±0.030" for outer dimensions and ±0.010" to ±0.015" for pin spacing. Specify only those dimensions that are critical and let us supply you with a completed outline drawing.

The purpose of these standards is to help you define specifications without over-designing.

PHASE NOISE

Phase noise, which is a measure of the short term frequency fluctuations of the oscillator, is a critical parameter and the limiting factor in the performance of many systems. This is usually specified as the single sideband power density in a 1Hz bandwidth at a specified offset frequency from the carrier.

At Murata Electronics, we use a state-of-the-art phase noise measurement system, which can accurately characterize the phase noise of our oscillators. This system has a noise floor below –170dBc/Hz so that even the best sources may be measured. A typical graph produced by the HP3048A is shown.



VOLTAGE CONTROL/ VCXO

This capability allows the frequency of the oscillator to be changed via an external control voltage. The three most important parameters are:

1.0 Frequency Deviation – this is how far the center frequency will change as a function of the control voltage; usually specified in ± percentage or ppm. As the deviation is made larger, other stabilities such as, temperature and aging will usually degrade.

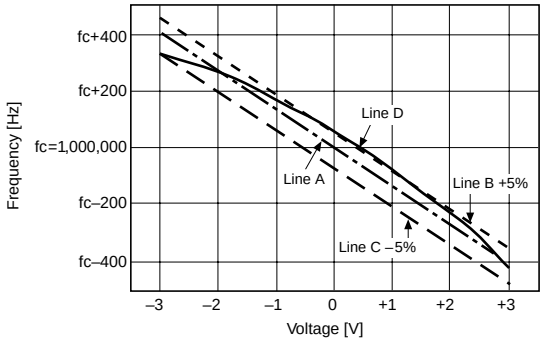
2.0 Linearity – the allowable error from the best straight line. This can be interpreted in a number of ways.

Murata defines linearity per MIL-0-55310, as a ± percentage of the total deviation, for example:

a) control voltage of ±3VDC
b) deviation of ± .04% (400ppm)
c) linearity of ±5%

For a center frequency of 1.0MHz, the total deviation of ±0.04% equals 800 ppm (800Hz). Line "A" shows the ideal transfer function. Line "B" shows the upper limit, which is 5% of the total deviation (0.05 x 800Hz) above the nominal curve. Conversely, line "C" shows the lower 5% limit. Line "D" shows a typical oscillator which meets the 5% specification.

3.0 Response Slope – the slope of the frequency versus the control voltage (i.e. for a negative slope, the output frequency decreases as the control voltage increases).



Note:
Frequency can also be controlled with a digital input signal (serial or parallel) instead of an analog voltage. Consult the factory for options.

RFQ Form /Quick Quote

1. Copy on your copier
2. Send us your specifications

OR

3. Dial (814) 237-1431 Fax (814) 237-1791
4. Ask for Crystal Oscillator Marketing or Customer Service

NAME _____ TITLE _____ DATE _____

COMPANY _____ DEPARTMENT _____

STREET _____ PHONE _____ FAX/EMAIL _____

CITY _____ STATE _____ ZIP _____

Customer Specification Dwg. No. _____

Frequency and Stability:

Frequency _____

Stability All Conditions _____

Stability @ 25°C _____

ΔF _____ From _____ °C To _____ °C

ΔF _____ Vs ΔB + _____ %

ΔF _____ Vs Time _____

25°C Setting Tolerance _____

Frequency Adjustment _____

Power Supply: Rise Time Fall Time

OSC _____ ± _____ at _____ mA

OSC _____ ± _____ at _____ mA

Oven _____ ± _____ at _____ mA

Output Wave Form:

Sine ☐

Output Level _____

Harmonic Dist. _____ Subs _____

Spurious _____

Load _____

Square: ☐ PECL ☐ LVPECL

☐ TTL ☐ CMOS ☐ ECL ☐ CML

☐ Others _____

Measured From _____ to _____

Duty Cycle _____ at _____ level

_____ Levels: Logic "0" _____ Logic "I"

Load: _____

Additional Comments: _____

_____

_____

Environmental:

Storage Temperature _____

Vibration _____

Shock _____

Moisture _____

Seal _____

Others _____

_____

VCXO (Freq. Control) Characteristics:

Freq. Deviation _____

Linearity _____

Control Voltage _____

Input Impedance _____

Modulation Freq. _____

Response Slope _____

Special _____

Mechanical:

Size _____

Termination _____

Finish _____

Mounting _____

Additions _____

_____

Special Notes: _____

_____

Cost vs. Performance Trade Off: _____

_____

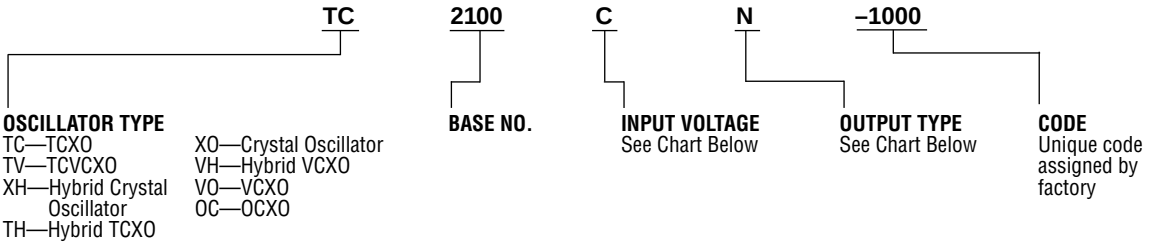
Application: _____

Estimated Annual Usage: _____

Target Price: _____

Part Numbering System

PART NUMBERING SYSTEM



INPUT VOLTAGE (±5% TOLERANCE STANDARD)

A	+5.0VDC
B	+7.5VDC
C	+10.0VDC
D	+12.0VDC
E	+15.0VDC
F	+3.3VDC
G	–5.0VDC
H	–5.2VDC
J	–12.0VDC
K	–4.5VDC
L	+4.0VDC
M	(OTHER)

OUTPUT TYPE

T	TTL
C	CMOS
H	HCMOS/TTL Compatible
E	ECL “10KH”
F	ECL “100K”
G	SINE, 0dBm, 50Ω LOAD
J	SINE, +3dBm, 50Ω LOAD
K	SINE, +7dBm, 50Ω LOAD
L	SINE, +10dBm, 50Ω LOAD
M	SINE, +13dBm, 50Ω LOAD
N	CLIPPED SINE, $1V_{p\text{-}p}$, 1kΩ LOAD
P	0dBm min., 50Ω LOAD
U	PECL
V	LVPECL
Z	CML

Temperature Compensating High Stability Crystal Oscillators

SURFACE MOUNT TCXO SERIES – TC2268

FEATURES

- Meets or exceeds Stratum 3
- Sine, Clipped Sine Wave or CMOS output
- SMT packaging

APPLICATIONS

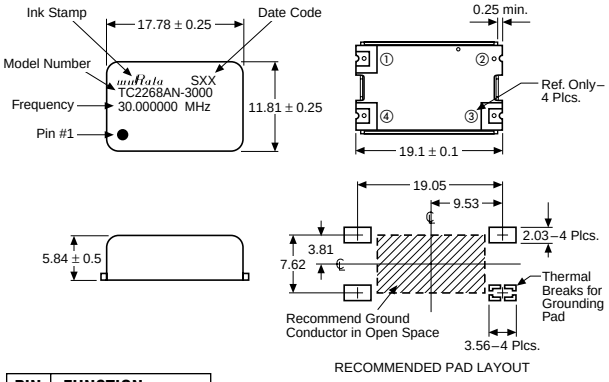
- Telecom clock
- Communications
- Wireless

SPECIFICATIONS

MODEL	TC2268
Standard Frequencies:*	10.00000MHz 15.0000MHz 16.000000MHz 16.384MHz 20.000000MHz 21.056700MHz 30.00000MHz 32.000MHz
Stability: All Conditions:	±3.0ppm worst case for first year product lifetime ±5.0ppm worst case for 10 year product lifetime
Operating Temp. Range:	0°C to +85°C
Frequency Deviation:	±1ppm min.
Phase Noise:	–74dBc @ 10Hz –104dBc @ 100Hz –130dBc @ 1KHz –140dBc @ ≥10KHz
Power Consumption for 5VDC ± 5%:	Ranges from 2mA to 20mA maximum at +25°C

*Possible frequency range of 5MHz to 50MHz.
Consult factory for other available frequencies.

TC2268



PIN	FUNCTION
1	N/C
2	Ground
3	Output Signal
4	Supply Voltage

Dimensions: mm

PART NUMBERING SYSTEM – TC2268

*Possible frequency range of 5MHz to 50MHz.
Consult factory for other available frequencies.

TC2268□ □ – □□□□

A = +5.0V
F = +3.3V

H = HCMOS
G = SINE, 0dBm, 50 Ohm Load
N = CLIPPED SINE, 1 Vp-p, 1K Ohm Load

Code assigned by factory

1

Temperature Compensating High Stability Crystal Oscillators

THRU HOLE TCXO SERIES – TC2110

FEATURES

- Sine Wave and HCMOS compatible outputs
- 4 Pin dip

APPLICATIONS

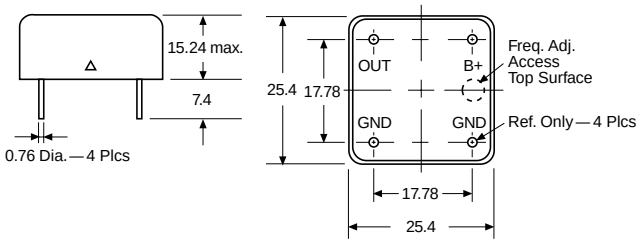
- Telecom clock
- Instrumentation
- Navigation
- Communications

SPECIFICATIONS

MODEL	TC2110
Standard Frequencies:*	3.577149MHz 8.192MHz 9.600MHz 10.000MHz 19.600MHz 27.00000MHz
Aging:	±1.0ppm per year worst case
Operating Temp. Range:	–20°C to +70°C
Frequency vs. Temperature:	±1ppm maximum
Mechanical Frequency Adjustment:	±5ppm minimum
Power Consumption for 5VDC ± 5%:	25mA maximum at +25°C

*Consult factory for other available frequencies.

TC2110



Dimensions: mm

PART NUMBERING SYSTEM – TC2110

TC2110□ □ – □□□□

- A = +5.0V
- H = HCMOS
  G = SINE, 0dBm, 50 Ohm Load
- Code assigned by factory

Temperature Compensating High Stability Crystal Oscillators

THRU HOLE TCXO SERIES – TC2178

FEATURES

- Sine, clipped SINE wave, HCMOS compatible output
- 3 pin dip

APPLICATIONS

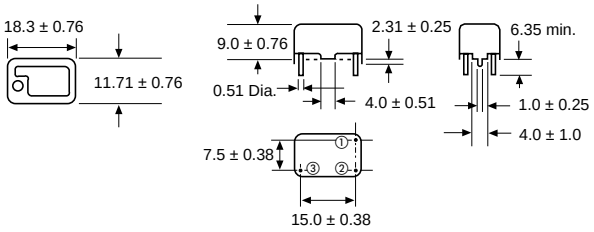
- Telecom clock
- Communications
- Wireless
- Instrumentation

SPECIFICATIONS

MODEL	TC2178
Standard Frequencies:*	6.144MHz 9.600MHz 10.000000MHz 12.8000MHz 13.5168MHz 15.360000MHz 16.000MHz 16.384MHz 19.5000MHz 24.00000MHz 25.00000MHz 32.000MHz 39.300MHz 44.950MHz 44.952MHz 128.000000MHz
Stability: All Conditions:	±5ppm worst case per 10 year product lifetime
Widest Operating Temp. Range:	0°C to +85°C
Electrical Frequency Deviation:	±6ppm minimum
Mechanical Frequency Adjustment:	±5ppm minimum
Control Voltage Range:	–4.5VDC to +4.5VDC
Phase Noise:	–60dBc @ 1Hz –90dBc @ 10Hz –110dBc @ 100Hz –130dBc @ ≥1KHz
Power Consumption for +5VDC Supply:	2mA to 50mA typical at +25°C

*Possible frequency range of 5MHz to 155.52MHz.
Consult factory for other available frequencies.

TC2178



PIN	FUNCTION
1	Common and Case
2	Output
3	+Vcc

Dimensions: mm

PART NUMBERING SYSTEM – TC2178

TC2178□ □ – □□□□

- A = +5.0V
- D = +12.0V

- H = HCMOS
- G = SINE, 0dBm, 50 Ohm Load
- J = SINE, +3dBm, 50 Ohm Load
- N = CLIPPED SINE, 1 Vp-p, 1K Ohm Load

Code assigned by factory

1

Temperature Compensating High Stability Crystal Oscillators

THRU HOLE TCXO SERIES – TC2378

FEATURES

- Meets or exceeds Stratum 3 requirements
- LVPECL (100EL series compatible)

APPLICATIONS

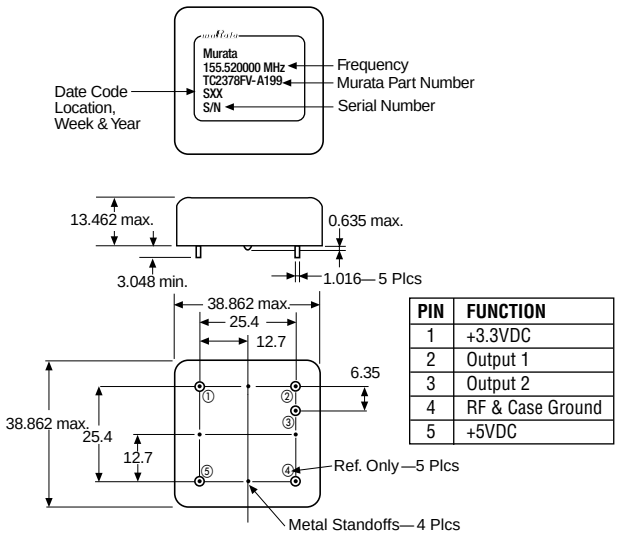
- Telecom clock

SPECIFICATIONS

MODEL	TC2378
Standard Frequencies:*	155.520000MHz 622.080MHz
Stability All Conditions:	±4.6ppm worst case per 10 years of product lifetime
Operating Temp. Range:	0°C to +70°C
Frequency Accuracy:	±0.5ppm max. at 25°C
Jitter:	30psec p-p max.
Power Consumption +5VDC Supply: +3.3VDC Supply:	 20mA maximum 70mA maximum
Frequency Vs ±5% Supply Variation:	±0.1ppm
24 Hr. Holdover Stability:	0.37ppm maximum (includes up to 20°C temperature drift and aging)

*Consult factory for other available frequencies.

TC2378



PIN	FUNCTION
1	+3.3VDC
2	Output 1
3	Output 2
4	RF & Case Ground
5	+5VDC

Dimensions: mm

PART NUMBERING SYSTEM – TC2378

TC2378□ □ – □□□□

- TC2378□: F = +3.3V
- □: V = LVPECL
- □□□□: Code assigned by factory

Temperature Compensating High Stability Crystal Oscillators

TC/VCXO SERIES – TV2178

FEATURES

- Meets or exceeds Stratum 4
- Sine, Clipped SINE and HCMOS compatible outputs
- 4 pin dip

APPLICATIONS

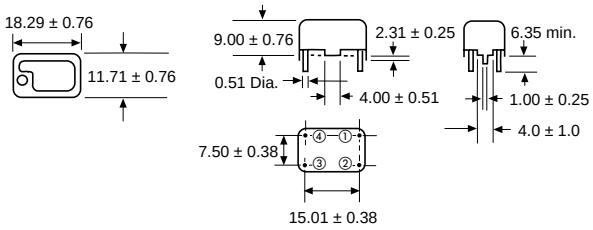
- Telecom clock
- Wireless communications
- Instrumentation

SPECIFICATIONS

MODEL	TV2178
Standard Frequencies:*	10.000000MHz 12.000000MHz 12.800000MHz 14.40000MHz 15.000MHz 15.3600MHz 16.384000MHz 19.6608MHz 20.000000MHz 35.000MHz 100.000000MHz
Stability All Conditions:	±5ppm worst case per 10 years of product lifetime
Operating Temp. Range:	–40°C to +85°C
Frequency Deviation:	±10ppm min. to ±40ppm maximum
Mechanical Frequency Adjustment:	±5ppm minimum
Control Voltage Range:	–4.5VDC to +4.5VDC
Phase Noise:	–60dBc @ 1Hz –90dBc @ 10Hz –110dBc @ 100Hz –130dBc @ ≥1KHz
Power Consumption for +5VDC Supply:	2mA to 25mA typical at +25°C

*Possible frequency range of 5MHz to 155.52MHz.
Consult factory for other available frequencies.

TV2178



PIN	FUNCTION
1	Common and Case
2	Output
3	+Vcc
4	+Vc Input

Dimensions: mm

PART NUMBERING SYSTEM – TV2178

TV2178□ □ – □□□□

A = +5.0VDC

H = HCMOS
G = SINE, 0dBm, 50 Ohm Load
J = SINE, +3dBm, 50 Ohm Load
N = CLIPPED SINE, 1 Vp-p, 1K Ohm Load

Code assigned by factory

1

Temperature Compensating High Stability Crystal Oscillators

TC/VCXO SERIES – TV2363

FEATURES

- Meets or exceeds SONET minimum clock requirements
- 100K ECL compatible output
- 24 Pin DIP

APPLICATIONS

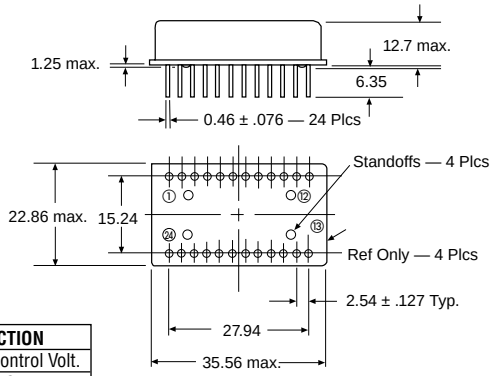
- Telecom clock
- OC-3

SPECIFICATIONS

MODEL	TV2363
Standard Frequencies:*	155.520MHz
Stability All Conditions:	±15ppm worst case for 20 year product lifetime
Operating Temp. Range:	–40°C to +85°C
Frequency Deviation:	±40ppm min. to ±60ppm maximum
Control Voltage Range:	–8VDC to +8VDC
VCXO Modulation Bandwidth:	DC to 1.4KHz
Jitter:	64psec p-p maximum
Aging:	±15ppm per 20 years
Power Consumption –4.5VDC Supply:	50mA maximum at +25°C
+12VDC Supply:	20mA maximum at +25°C

*Consult factory for other available frequencies.

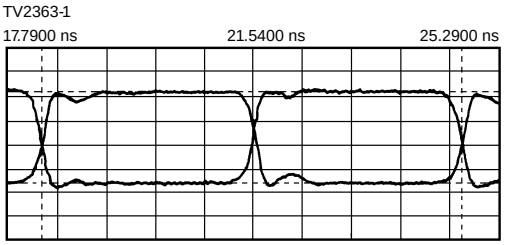
TV2363



PIN	FUNCTION
1	VC Control Volt.
2,8,10,12	Case/Gnd
9	VS2 Supply Volt. (+12V)
11	VS1 Supply Volt. (–4.5V)
14	Output Signal
16	Complementary Output Signal
13,15,17	Case/Gnd
Others	N/C

Dimensions: mm

100K ECL COMPLEMENTARY OUTPUT CHARACTERISTICS



Ch. 1 = 200.0 mVolts/div
Delta V = 768.75 mVolts
Timebase = 750 ps/div

PART NUMBERING SYSTEM – TV2363

TV2363□ □ – □□□□

- D = +12.0V
- F = ECL
- Code assigned by factory

Voltage Controlled Oscillators

SURFACE MOUNT VCXO FOR SONET – VH2211

FEATURES

- Meets or exceeds SONET minimum clock requirements
- CML, PECL or LVPECL output
- SMT packaging
- Available tape and reel
- Reflow solderable
- Very low jitter
- Low aging
- Tightly controlled Kv for PLL

APPLICATIONS

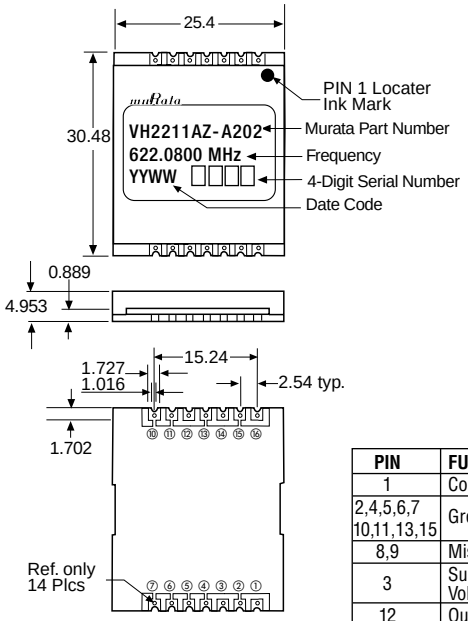
- OC-12, OC-48, OC-192 and OC-768
- Forward error correction frequencies available

SPECIFICATIONS

MODEL	VH2211
Standard Frequencies:*	622.0800MHz 666.514286MHz (15/14 of 622.0800MHz)
Stability All Conditions:	±20ppm worst case for 20 year lifetime
Operating Temp. Range:	0°C to +85°C
Control Voltage Range:	0.5 to 4.5VDC
Modulation Bandwidth:	100KHz minimum
Modulation Gain:	19.4ppm/V ≤Kv ≤29.0ppm/V
Jitter:	.001 UI max.
Phase Noise:	–60dBc @ 100Hz –90dBc @ 1KHz –110dBc @ 10KHz –125dBc @ ≥100KHz
Electrical Tuning:	±40ppm to ±60ppm
Power Consumption for +5.0VDC Supply:	50mA maximum
Sub-Harmonics	–45dBc maximum

*Consult factory for other available frequencies.

VH2211



Dimensions: mm

PIN	FUNCTION
1	Control Voltage
2,4,5,6,7 10,11,13,15	Ground
8,9	Missing
3	Supply Voltage (+5.0V)
12	Output Signal Q
14	Output Signal /Q
16	Disable

PART NUMBERING SYSTEM – VH2211

VH2211□ □ – □□□□

- VH2211□: A = +5.0V, H = –5.2V, F = +3.3V
- □: F = ECL, V = PECL, Z = CML
- □□□□: Code assigned by factory

Voltage Controlled Oscillators

SURFACE MOUNT VCXO FOR SONET – VO2246

FEATURES

- Inverted Mesa, AT cut fundamental mode crystal technology
- ECL, PECL or LVPECL compatible output
- Meets or exceeds SONET minimum clock requirements
- SMT packaging
- Available tape and reel
- Reflow solderable
- Very low jitter
- Low aging
- No subharmonics

APPLICATIONS

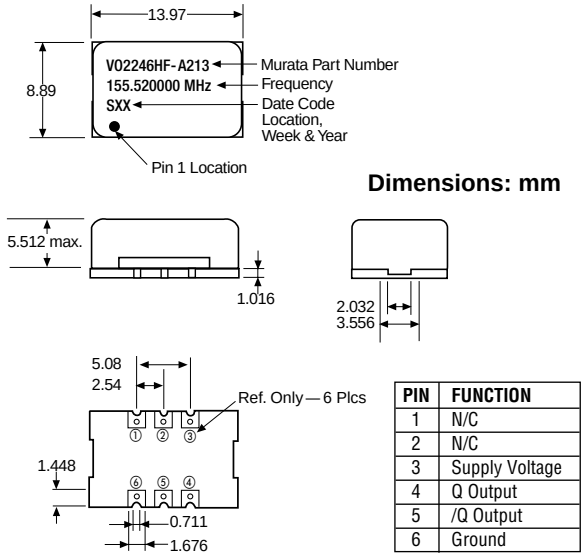
- Telecom clock
- Forward error correction frequencies

SPECIFICATIONS

MODEL	VO2246
Standard Frequencies:*	155.520000MHz 166.628500MHz
Stability All Conditions:	±20ppm worst case over 20 year product lifetime
Operating Temp. Range:	0°C to 70°C
Jitter:	.001 UI RMS max.
Phase Noise:	–80dBc @ 100Hz –110dBc @ 1KHz –135dBc @ 10KHz –140dBc @ ≥100KHz
Power Consumption:	65mA typical at +25°C

*Consult factory for other available frequencies.

VO2246



PIN	FUNCTION
1	N/C
2	N/C
3	Supply Voltage
4	Q Output
5	/Q Output
6	Ground

PART NUMBERING SYSTEM – VO2246

VO2246□ □ – □□□□

- A = +5.0V, H = –5.2V, F = +3.3
- F = 100K ECL, U = PECL, V = LVPECL
- Code assigned by factory

Voltage Controlled Oscillators

SURFACE MOUNT VCXO FOR SONET – VO2268

FEATURES

- SINE, 0dBm, 50Ohm load
- SMT packaging
- Available tape and reel
- Reflow solderable
- Very low jitter
- Low aging

APPLICATIONS

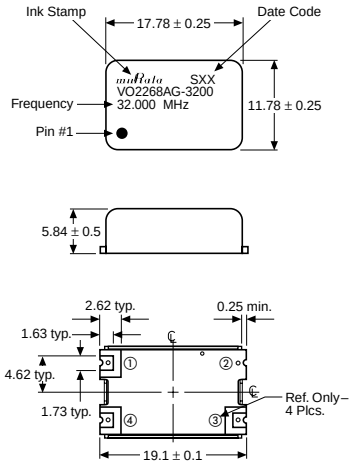
- Telecom clock
- Wireless communication
- Instrumentation

SPECIFICATIONS

MODEL	VO2268
Standard Frequencies:*	32.000000MHz 39.3216MHz
Stability All Conditions:	±40ppm worst case
Operating Temp. Range:	–40°C to 85°C
Frequency Deviation:	±40ppm min. over full tuning voltage range
Control Voltage Range:	+0.5VDC ≤ VC ≤ +4.5VDC
Jitter:	50 psec p-p max.
Phase Noise:	–80dBc @ 10Hz –110dBc @ 100Hz –130dBc @ 1KHz –140dBc @ 10KHz –140dBc @ 100KHz –140dBc @ >100KHz
Power Consumption for +5V Supply:	20mA typical at +25°C

*Consult factory for other available frequencies.

VO2268



Dimensions: mm

PIN	FUNCTION
1	EFC
2	Ground
3	Output Signal
4	Supply Voltage

PART NUMBERING SYSTEM – VO2268

VO2268□ □ – □□□□

- A = +5.0V
- G = SINE, 0dBm, 50 Ohm Load
- Code assigned by factory

Voltage Controlled Oscillators

SURFACE MOUNT VCXO FOR SONET – VO2286

FEATURES

- Meets or exceeds SONET Stratum 4 requirements
- Inverted Mesa, AT cut fundamental mode crystal technology
- ECL, PECL, LVPECL and CML compatible output
- SMT packaging
- Available tape and reel
- Reflow solderable
- Very low jitter
- Low aging
- FEC frequencies available
- No subharmonics

APPLICATIONS

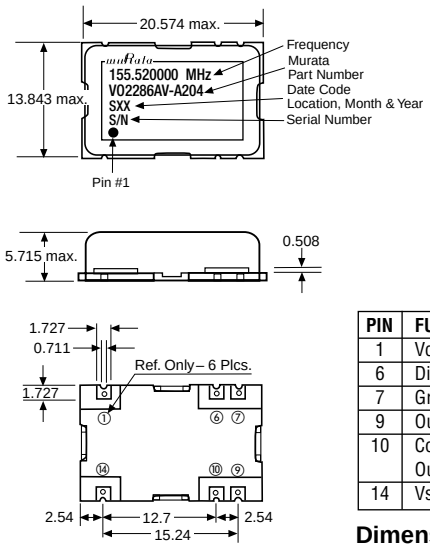
- OC-3
- Clock recovery PLL

SPECIFICATIONS

MODEL	VO2286
Standard Frequencies:*	155.520000MHz 166.628571MHz
Stability All Conditions:	±35ppm worst case for 20 year product lifetime
Operating Temp. Range:	0°C to 85°C
Control Voltage Range:	0.0 to 5.0VDC
Modulation Bandwidth:	DC to 50KHz
Modulation Sensitivity:	45ppm/V ≥ Kv ≥ 28ppm/V (others upon request)
Jitter:	.001 UI max.
Electrical Tuning:	±50ppm ≤ Freq. Deviation ≤ ±125ppm
Power Consumption:	10mA to 65mA

*Consult factory for other available frequencies.

VO2286



PIN	FUNCTION
1	Vc Control Voltage
6	Disable
7	Ground
9	Output Signal
10	Complementary Output
14	Vs Supply Voltage

Dimensions: mm

PART NUMBERING SYSTEM – VO2286

VO2286□ □ – □□□□

- A = +5.0V
- H = –5.2V
- F = +3.3V

- F = ECL
- U = PECL
- V = LVPECL
- Z = CML

Code assigned by factory

Voltage Controlled Oscillators

THRU HOLE VCXO FOR SONET – VH1011

FEATURES

- Meets or exceeds SONET minimum clock requirements
- 100K ECL, PECL compatible
- 16 pin gullwing packaging
- Very low jitter
- Low aging
- Tightly controlled Kv for PLL

APPLICATIONS

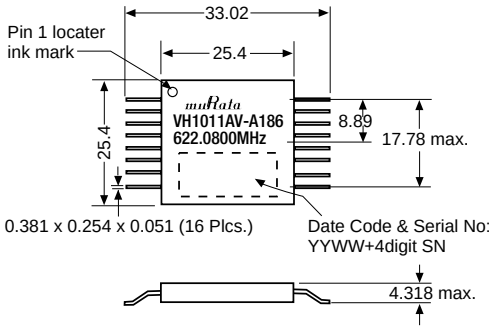
- OC-12, OC-48, OC-192 and OC-768
- Forward error correction frequencies available

SPECIFICATIONS

MODEL	VH1011
Standard Frequencies:*	622.080MHz 666.514286MHz (622.080MHz 15/14) 669.3265MHz
Stability All Conditions:	±20ppm over 10 year product lifetime
Operating Temp. Range:	0°C to 85°C
Frequency Deviation:	±40ppm to ±60ppm
Control Voltage Range:	–4.5VDC ≤ VC ≤ –0.5VDC
Modulation Bandwidth:	100KHz minimum
Modulation Sensitivity:	19.4ppm/V ≤ Kv ≤ 29.0ppm/V
Phase Noise:	–60dBc @ 100Hz –90dBc @ 1KHz –110dBc @ 10KHz –125dBc @ ≥100KHz
Power Consumption for –5VDC Supply:	65mA maximum
Sub-harmonics:	–35dBc maximum

*Consult factory for other available frequencies.

VH1011



PIN	FUNCTION
1	Control Voltage
8, 9	Supply Voltage +5.0V
14	Output Signal
12	Complementary Output
2-7,10	Ground

Dimensions: mm

PART NUMBERING SYSTEM – VH1011

VH1011□ □ – □□□□

A = +5.0V
H = –5.2V
F = +3.3V

F = ECL
U = PECL
V = LVPECL
Z = CML

Code assigned by factory

Voltage Controlled Oscillators

THRU HOLE VCXO FOR SONET – VO2386

FEATURES

- Meets or exceeds Stratum 4 requirements
- Inverted Mesa, AT cut fundamental mode crystal technology
- ECL, PECL, LVPECL and CML compatible output
- DIP packaging
- Very low jitter
- Low aging
- FEC frequencies available
- No subharmonics

APPLICATIONS

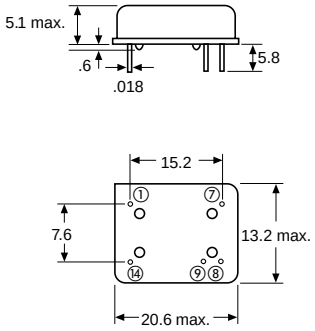
- Telecom clock
- Forward correction code applications

SPECIFICATIONS

MODEL	VO2386
Standard Frequencies:*	155.520000MHz
Stability All Conditions:	±35ppm worst case over 20 year product lifetime
Operating Temp. Range:	0°C to 85°C
Control Voltage Range:	0.0VDC to 5.25VDC
Modulation Bandwidth:	DC to 50 KHz
Modulation Sensitivity:	28ppm/V ≤ Kv ≤ 45ppm/V (other deviation upon request)
Electrical Tuning:	±50ppm minimum to ±125ppm maximum (others are available upon request)
Jitter:	.001 UI RMS max.
Power Consumption for +5VDC Supply:	10mA to 65mA typical at +25°C

*Consult factory for other available frequencies.

VO2386



PIN	FUNCTION
1	V_C, Control Voltage
7	Ground, Case/Ground
8	Q_1 Output Signal
9	Q_2 Complementary Output Signal
14	V_{CC}

Dimensions: mm

PART NUMBERING SYSTEM – VO2386

VO2386□ □ – □□□□

A = +5.0V
H = –5.2V
F = +3.3V

U = PECL
F = ECL 100K
V = LVPECL
Z = CML

Code assigned by factory

Ovenized Crystal Oscillators

SURFACE MOUNT – OC3125

FEATURES

- Meets or exceeds Stratum 3 requirements
- LVPECL output
- Hermetic surface mount packaging
- +3.3V supply

APPLICATIONS

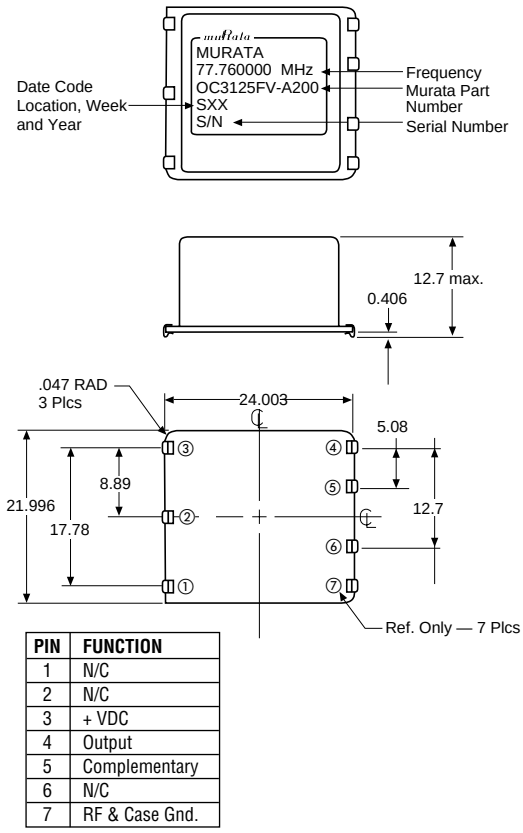
- Telecom clock

SPECIFICATIONS

MODEL	OC3125
Standard Frequencies:*	77.760000MHz
Stability All Conditions:	±4.6ppm maximum for 10 year product lifetime
Operating Temp. Range:	0°C to 70°C
Frequency Tolerance:	±0.5ppm maximum at 25°C
Supply Voltage Range:	+3.3VDC ± 5%
Jitter:	0.001 UI
Warm-up:	±0.20ppm of 2-hour frequency after 3 minutes maximum
Allan Variance:	$1x10^{-9}$ for τ = 1 sec
Power Consumption +3.3VDC Supply:	1.15A max. for 3 minutes max. for warmup at +25°C 300mA typical at +25°C

*Consult factory for other available frequencies.

OC3125



PIN	FUNCTION
1	N/C
2	N/C
3	+ VDC
4	Output
5	Complementary
6	N/C
7	RF & Case Gnd.

PART NUMBERING SYSTEM – OC3125

OC3125□ □ – □□□□

- F = +3.3
- V = LVPECL
- Code assigned by factory

Ovenized Crystal Oscillators

THRU HOLE – OCXO – OC2541

FEATURES

- Meets or exceeds Stratum 3 requirements
- HCMOS/TTL or Sine Wave output
- 8 pin DIP packaging
- Low phase noise
- SC cut crystal

APPLICATIONS

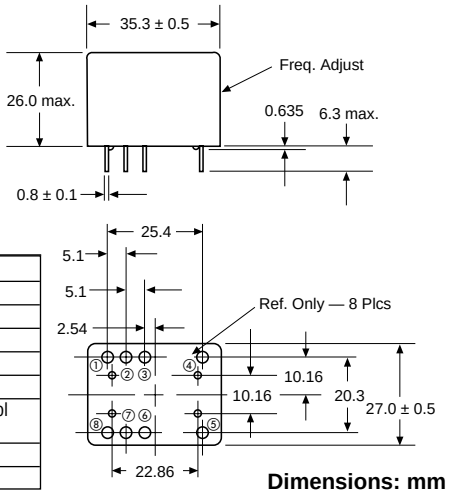
- Telecom clock
- VSAT
- Instrumentation
- Navigation
- Communications

SPECIFICATIONS

MODEL	OC2541
Standard Frequencies:*	10.000MHz
Stability All Conditions:	±0.1ppm/year
Operating Temp. Range:	0°C to 50°C
Frequency Deviation:	±1.0ppm maximum
Frequency vs Temperature:	±0.02ppm maximum
Control Voltage Range:	0VDC to +6VDC
Modulation Bandwidth:	DC to 150Hz minimum
Warm-up:	±0.1ppm typical after 3 minutes at 25°C
Phase Noise:	–123dBc @ 100Hz –135dBc @ 1KHz –140dBc @ ≥10KHz
Electrical Tuning:	±1ppm minimum
Harmonic Distortion Sine Wave Output Only:	–20dBc maximum
Power Consumption +15VDC Supply: +12VDC Supply:	 400mA maximum at startup 125mA typical at +25°C 250mA maximum at startup 90mA typical at +25°C

*Consult factory for other available frequencies.

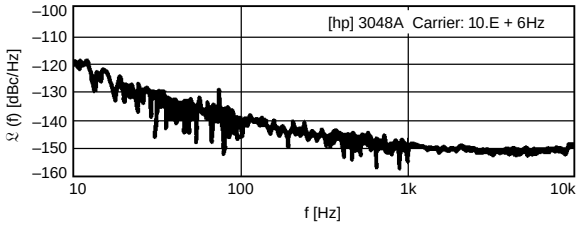
OC2541



PIN	FUNCTION
1	Output
2	N/C
3	N/C
4	Ground
5	N/C
6	Freq. Control Voltage
7	N/C
8	+12V

Dimensions: mm

TYPICAL PHASE NOISE CHARACTERISTICS – OC2541-DT



PART NUMBERING SYSTEM – OC2541

OC2541□ □ – □□□□

- D = +12.0V, E = –15.0V
- K = Sine, +7dBm, 50 Ohm load; H = HCMOS/TTL
- Code assigned by factory

Ovenized Crystal Oscillators

THRU HOLE OCXO FOR SONET – OC2545

FEATURES

- Meets or exceeds Stratum 3 requirements
- HCMOS/TTL or Sine Wave output
- 8 pin DIP packaging
- Low phase noise
- AT cut crystal

APPLICATIONS

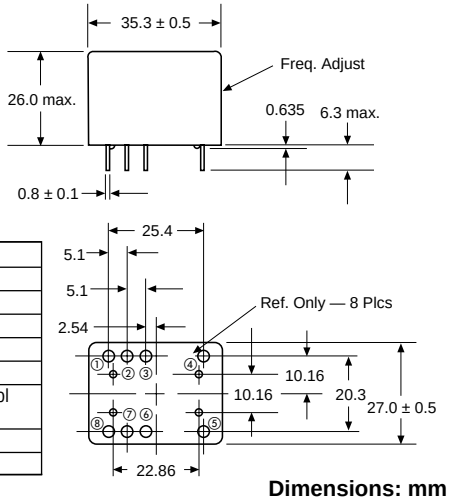
- Telecom clock
- Instrumentation
- Navigation
- Communications
- VSAT

SPECIFICATIONS

MODEL	OC2545
Standard Frequencies:*	10.000MHz 12.000MHz
Operating Temp. Range:	0°C to 60°C
Frequency Deviation:	±4.0ppm minimum
Frequency vs Temperature:	±0.2ppm maximum
Control Voltage Range:	0VDC to 6VDC
Modulation Bandwidth:	DC to 150Hz minimum
Warm-up:	±0.1ppm after 10 minutes at 25°C
Phase Noise:	–110dBc @ 10Hz –120dBc @ 100Hz –135dBc @ 1KHz –140dBc @ 10KHz
Harmonic Distortion Sine Wave output:	–25dBc maximum
Electrical Tuning:	±4ppm minimum for 0 to 6 volts
Power Consumption	250mA maximum at startup 90mA typical at +25°C

*Consult factory for other available frequencies.

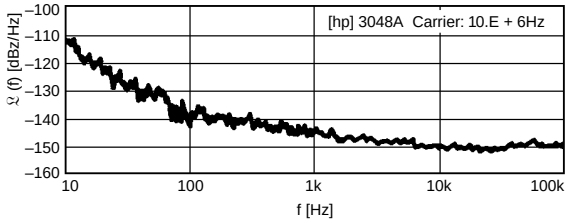
OC2545-DT



PIN	FUNCTION
1	Output
2	N/C
3	N/C
4	Ground
5	N/C
6	Freq. Control Voltage
7	N/C
8	+12V

Dimensions: mm

OC2545-DT



PART NUMBERING SYSTEM – OC2545

OC2545□ □ – □□□□

- D = +12.0V
- K = Sine, +7dBm, 50 Ohm load
- H = HCMOS/TTL
- Code assigned by factory

Ovenized Crystal Oscillators

THRU HOLE – OCXO FOR SONET – OC2566

FEATURES

- Meets or exceeds Stratum 3 requirements
- Sine Wave, HCMOS compatible output
- DIP packaging
- SC cut crystal

APPLICATIONS

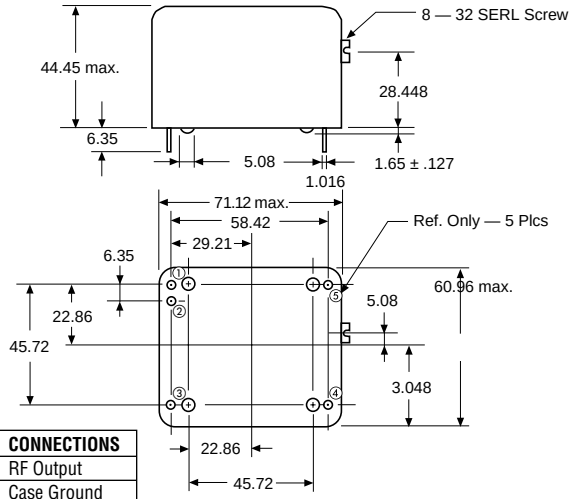
- Telecom clock
- Instrumentation
- Navigation
- Communications
- VSAT

SPECIFICATIONS

MODEL	OC2566
Standard Frequencies:*	3.000MHz
Stability All Conditions:	±0.20ppm maximum per year
Operating Temp. Range:	–30°C to 70°C
Frequency vs Temperature:	±25ppb maximum
Warm-up:	±0.1ppm after 5 minutes at 25°C
Frequency Adjustment:	±1.0ppm minimum from nominal
Power Consumption +15V Supply: +27V Supply:	50mA typical 400mA maximum
Output Level:	+13dBm to +18dBm (@50 Ohm load)
Harmonic Distortion:	–20dBc maximum

*Consult factory for other available frequencies.

OC2566



PIN	CONNECTIONS
1	RF Output
2	Case Ground
3	+15V OSC Input
4	Ground
5	+27V Oven Input

Dimensions: mm

PART NUMBERING SYSTEM – OC2566

OC2566□ □ – □□□□

- E = +15.0V
- H = HCMOS
  K = Sine, +7dBm, 50 Ohm load
  M = Sine, +13dBm, 50 Ohm load
- Code assigned by factory

Ovenized Crystal Oscillators

THRU HOLE OCXO FOR SONET – OC2644

FEATURES

- Fast warm-up SC cut crystal technology
- Meets or exceeds SONET Stratum 3 requirements
- HCMOS or SINE outputs
- Industry standard EURO packaging

APPLICATIONS

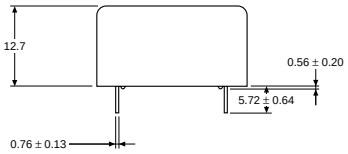
- Telecom clock
- Instrumentation
- VSAT
- Navigation
- Communications

SPECIFICATIONS

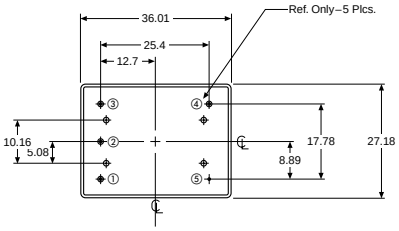
MODEL	OC2644
Standard Frequencies:*	10.000MHz 13.000000MHz 15.000MHz 16.384MHz 19.440MHz
Operating Temp. Range:	0°C to +70°C
Frequency Stability:	±10ppb
Control Voltage Range:	0VDC to +4.0VDC
Warm-up:	±0.1ppm of 24-hour frequency after 30 minutes at 25°C, worst case
Allan Variance:	$1x10^{10}$ maximum for τ = 1 sec
Phase Noise:	–115dBc/Hz @ 10Hz –135dBc/Hz @ 100Hz –145dBc/Hz @ 1KHz –150dBc/Hz @ 10KHz
Electrical Tuning:	±1.0ppm to ±2.0ppm
Aging:	±1.0ppb per day maximum at shipment date
Power Consumption:	750mA maximum at start up, 200mA typical at +25°C

*Consult factory for other available frequencies.

OC2644

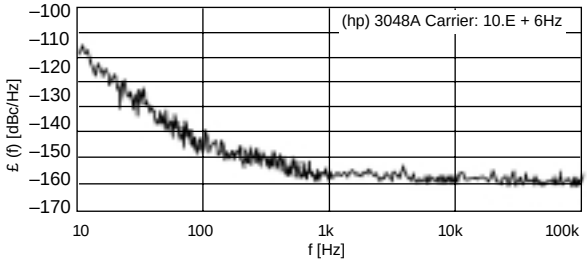


PIN	FUNCTION
1	Control Voltage
2	Ref. Voltage
3	Supply Voltage
4	RF Output
5	Ground



Dimensions: mm

TYPICAL PHASE NOISE (OC2644)



PART NUMBERING SYSTEM – OC2644

OC2644□ □ – □□□□

- D = +12.0V
  A = +5.0V
- H = HCMOS
  K = Sine, +7dBm, 50 Ohm load
- Code assigned by factory

Ovenized Crystal Oscillators

THRU HOLE OCXO FOR SONET – OC2710

FEATURES

- Meets Stratum 3 requirements
- HCMOS compatible output
- 14 pin DIP packaging

APPLICATIONS

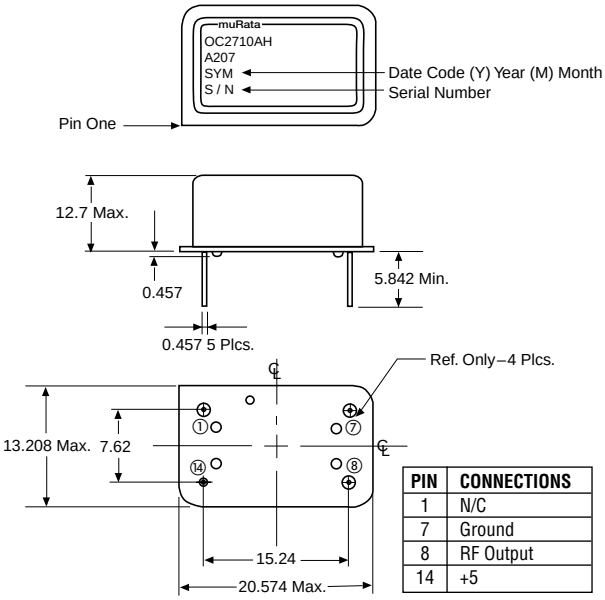
- Telecom clock
- A variety of power supply options
- Instrumentation
- Wireless communication

SPECIFICATIONS

MODEL	OC2710
Standard Frequencies:*	16.384MHz 19.440MHz 20.480MHz
Stability All Conditions:	±4.6ppm maximum for 10 year product lifetime
Operating Temp. Range:	0°C to +60°C
Frequency Deviation:	±0.5ppm maximum at 25°C
Control Voltage Range:	+0.5VDC to +4.5VDC
Warm-up:	±0.2ppm of 24-hour frequency after 30 minutes at 25°C
Electrical Tuning:	±10ppm to ±16.5ppm
Power Consumption For +5VDC Supply:	800 mA maximum at start-up, 200 mA typical stable at +25°C

*Consult factory for other available frequencies.
Possible frequency ranges of 5MHz to 45MHz.

OC2710



PIN	CONNECTIONS
1	N/C
7	Ground
8	RF Output
14	+5

Dimensions: mm

PART NUMBERING SYSTEM – OC2710

OC2710□ □ – □□□□

- A = +5.0V, F = +3.3V
- H = HCMOS
- Code assigned by factory

Note: Consult factory for other supply options available.

Ovenized Crystal Oscillators

THRU HOLE OCXO FOR SONET – OC3545

FEATURES

- Meets or exceeds Stratum 3 requirements
- Sine Wave or HCMOS/TTL compatible output
- Low phase noise

APPLICATIONS

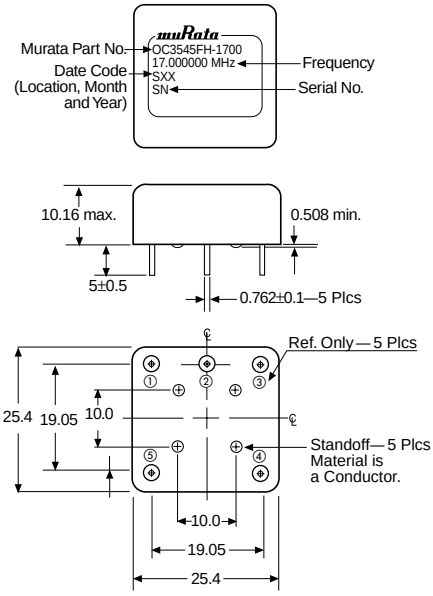
- Telecom clock
- Instrumentation
- Navigation
- Communications

SPECIFICATIONS

MODEL	OC3545
Standard Frequencies:*	9.830400MHz 12.800000MHz 14.1364MHz 15.00MHz 17.000000MHz
Stability All Conditions:	±4.6ppm for 20 years product lifetime max.
Operating Temp. Range:	0°C to +70°C
Frequency Tolerance:	±0.5ppm at 25°C
Warm-up:	±0.10ppm of 24-hour frequency after five minutes
Phase Noise:	–95dBc @ 10Hz –125dBc @ 100Hz –140dBc @ ≥1KHz
Power Consumption +3.3V Supply: +5.0V Supply:	 1.15 A maximum at turn on 330mA typical stable at +25°C 750mA maximum at turn on 200mA typical stable at +25°C

*Consult factory for other available frequencies.

OC3545



PIN	CONNECTIONS
1	RF Output
2	GND/Case
3	N/C
4	Oven Status
5	VCC

Dimensions: mm

PART NUMBERING SYSTEM – OC3545

OC3545□ □ – □□□□

- A = +5.0V
  F = +3.3
- J = Sine, +3dBm, 50 Ohm load
  H = HCMOS
- Code assigned by factory

Crystal Oscillators

SURFACE MOUNT CRYSTAL OSCILLATOR FOR SONET – XO2246

FEATURES

- Inverted Mesa, AT cut fundamental mode crystal technology
- ECL, PECL and LVPECL compatible output
- SMT packaging
- Available tape and reel
- Reflow solderable
- Very low jitter
- Low aging
- No subharmonics

APPLICATIONS

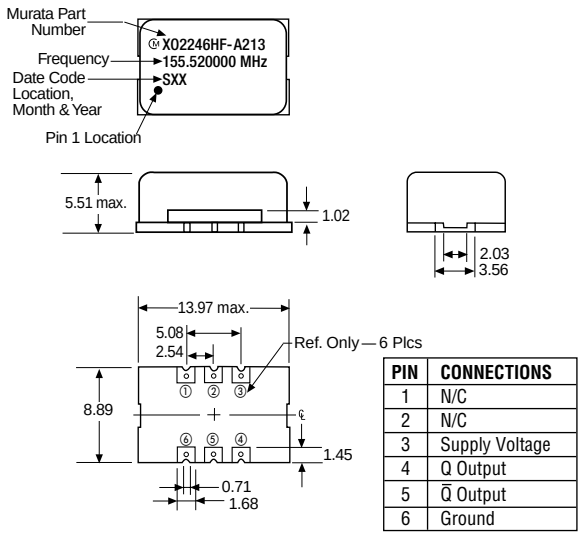
- Telecom clock
- Forward error correction

SPECIFICATIONS

MODEL	XO2246
Standard Frequencies:*	155.520000MHz 166.628500MHz
Stability:	±20ppm worst case over 20 year product lifetime
Operating Temp. Range:	0°C to 70°C
Jitter:	.001 UI RMS max.
Phase Noise:	–80dBc @ 100Hz –110dBc @ 1KHz –135dBc @ 10KHz –140dBc @ ≥100KHz
Power Consumption:	65mA typical at +25°C

*Consult factory for other available frequencies.

XO2246



PIN	CONNECTIONS
1	N/C
2	N/C
3	Supply Voltage
4	Q Output
5	$\overline{Q}$ Output
6	Ground

Dimensions: mm

PART NUMBERING SYSTEM – XO2246

XO2246□ □ – □□□□

- A = +5.0V
- H = –5.2V
- F = +3.3V

- F = 100K ECL
- U = PECL
- V = LVPECL

- Code assigned by factory

Crystal Oscillators

SURFACE MOUNT CRYSTAL OSCILLATOR FOR SONET – XO2266

FEATURES

- Inverted Mesa, AT cut fundamental mode crystal technology
- PECL compatible output
- SMT packaging
- Available tape and reel
- Reflow solderable
- Very low jitter
- Low aging
- No subharmonics

APPLICATIONS

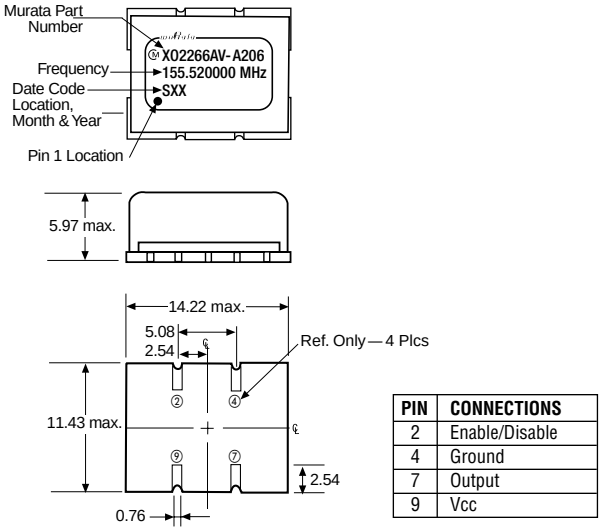
- Telecom clock
- Forward error correction

SPECIFICATIONS

MODEL	DC2300
Standard Frequencies:*	155.520000MHz
Stability:	±15ppm worst case over 10 year product lifetime
Operating Temp. Range:	0°C to 70°C
Power Consumption:	85mA maximum

*Consult factory for other available frequencies.

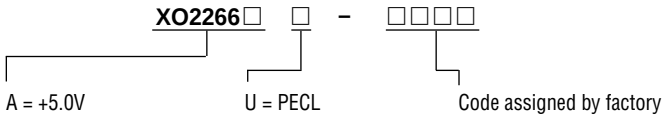
XO2266



PIN	CONNECTIONS
2	Enable/Disable
4	Ground
7	Output
9	Vcc

Dimensions: mm

PART NUMBERING SYSTEM – XO2266



Crystal Oscillators

SURFACE MOUNT CRYSTAL OSCILLATOR FOR SONET – X02286

FEATURES

- Inverted Mesa, AT cut fundamental mode crystal technology
- LVPECL compatible output
- SMT packaging
- Available tape and reel
- Reflow solderable
- Very low jitter
- Low aging
- No subharmonics

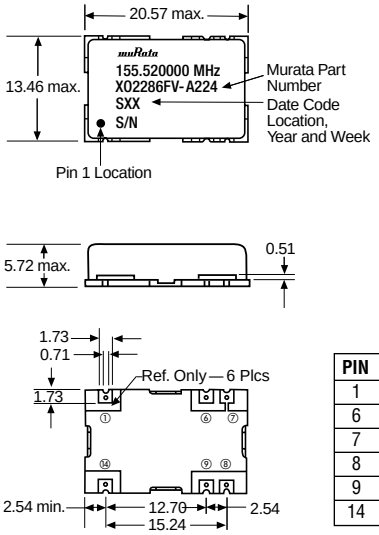
APPLICATIONS

- Telecom clock
- Forward error correction

SPECIFICATIONS

MODEL	X02286
Standard Frequencies:*	155.520000MHz 167.331646MHz
Stability:	±20ppm worst case over 10 year product lifetime
Operating Temp. Range:	0°C to 85°C
Jitter:	.001 UI RMS max.
Phase Noise:	–60dBc @ 100Hz –90dBc @ 1KHz –110dBc @ 10KHz –125dBc @ ≥100KHz
Power Consumption:	20mA max.

*Consult factory for other available frequencies.



PIN	CONNECTIONS
1	No Connect
6	No Connect
7	Ground
8	Output Signal
9	Complementary Output
14	Vs Supply Voltage

Dimensions: mm

PART NUMBERING SYSTEM – XO2286

XO2286□ □ – □□□□

- F = +3.3V
- LV = LVPECL
- Code assigned by factory

Digitally Compensated Crystal Oscillators

DC2300 SERIES FOR SONET

FEATURES

- Digitally compensated to improve thermal stability
- Meets or exceeds Stratum 3 requirements
- HCMOS/TTL compatible
- DIP packaging
- Low power consumption
- Accuracy of an OCXO

APPLICATIONS

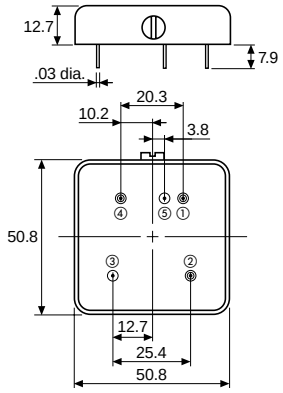
- Telecom clock
- Instrumentation
- Wireless communications

SPECIFICATIONS

MODEL	DC2300
Standard Frequencies:*	10.00000MHz
Stability All Conditions:	±0.1ppm to ±0.5ppm
Operating Temp. Range:	–40°C to 85°C
Control Voltage Range:	0VDC to +5VDC
Allan Variance:	$5x10^{-10}$ at one second
Phase Noise:	–90dBc @ 10Hz –125dBc @ 100Hz –140dBc @ 1KHz –140dBc @ 10KHz
Electrical Tuning:	±.5ppm min. for 0 to +5V
Power Consumption +5VDC Supply:	35mA typical

*Consult factory for other available frequencies.

DC2300



PINS	CONNECTIONS
1	Output
2	Serial I/O
3	GND
4	+5
5	GND

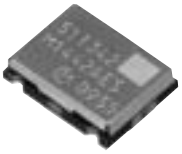
Dimensions: mm

PART NUMBERING SYSTEM – DC2300

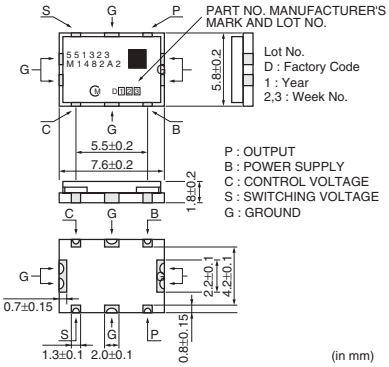
DC2300□ □ – □□□□

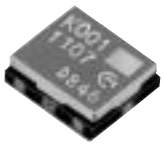
- A = +5.0V
- H = HCMOS
- Code assigned by factory

VCOs

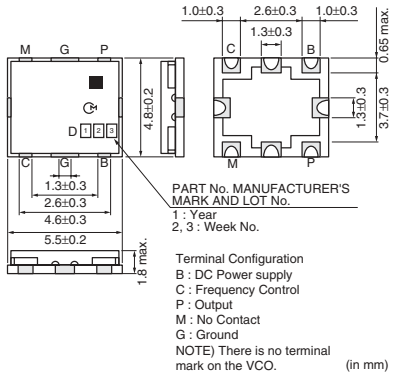


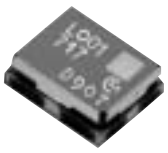
MQE95 Series



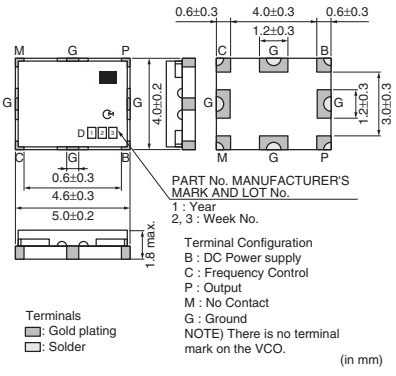


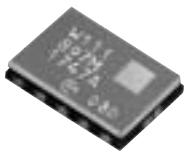
MQK Series



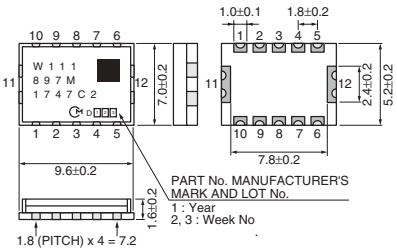


MQL Series





MQW1 Series



Series	Frequency Range	Size (mm)
MQE95 SERIES	700 to 2000MHz (Shift VCO)	7.6 X 5.8 X 1.8
MQK SERIES	700 to 2000MHz	5.5 X 4.8 X 1.65
MQL SERIES	700 to 2600MHz	5.0 X 4.0 X 1.65
MQW1 SERIES	700 to 2000MHz (Dual VCO)	9.6 X 7.0 X 1.65

Microwave Oscillators

VOLTAGE CONTROLLED (VCO) – MQE900/MQK/MQL SERIES

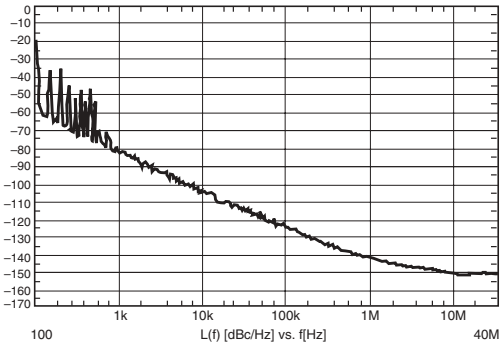
MQ□ Series

Application (System)		Part Number	Frequency (MHz)	VB	Vc (V)	Control Voltage Sensitivity (MHz/V)	Output Level (dBm)	Power Consumption (mA Max)	C/N (DBc/Hz)	Separation (KHz)
MQK Series										
GSM/DCS	1stLO	MQK001-927	880.0~975.0	2.80	0.5~2.3	71 ± 10	−6 ± 3	8.0	≥92	250.0
CDMA	1stLO	MQK002-967	954.0~980.0	2.95	0.7~2.7	24 ± 6	−1.5 ± 3	6.5	≥118	60.0
TDMA	1stLO	MQK001-1016A	981.0~1052.0	2.80	0.9~3.6	32 ± 3	−0.5 ± 2.5	7.0	≥117.5	60.0
WLL	1stLO	MQK301-1528	1466.0~1590.0	2.70	0.5~3.65	70 ± 10	−1 ± 3	12.0	120.00	600.0
MQL Series										
EPDC	1stLO	MQL005-717	680.0~758.0	3.3	0.5~2.5	50 ± 5	−2 ± 3	6.6	≥92	250.0
WCDMA	1stLO	MQL001-760	760.0~760.0	2.50	0.5~2.0	24 ± 4	−3 ± 2.5	4.5	≥135	10000.0
		MQL304-2330	2300.0~2360.0	2.20	0.5~3.5	50 ± 6	−1 ± 3	8.5	≥90	10.0
JCDMA	1stLO	MQL002-946	920.0~972.0	3.7	0.6~3.0	32.5 ± 4.5	0 ± 3	8.1	≥83	10.0
PHS	1stLO	MQL3H2-1668	1648.0~1688.0	2.70	0.5~2.2	38 ± 5	−0.5	≤ 8	≥110	100.0
PDC1.5G	1stLO	MQL302-1619	1607.05~1631.05	2.50	0.45~2.45	27 ± 6	−3 ± 3	≤ 7	≥100	100.0
DCS1800	1stLO	MQL302-1840	1790.0~1891.0	3.70	0.6~3.0	63.5 ± 8	0 ± 3	10.0	≥143	3000.0
GSM1900	1stLO	MQL302-1960	1920.0~2000.0	3.70	0.6~3.0	55 ± 7	0 ± 3	10.0	≥143	3000.0
		MQL301-1964	1920.0~2009.0	3.60	0.6~3.0	55 ± 7	−1.5 ± 3	10.0	≥143	3000.0

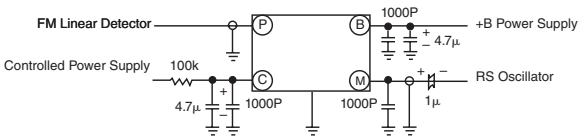
NOT ALL PART NUMBERS ON THIS PAGE ARE CURRENTLY AVAILABLE. PLEASE CONTACT YOUR LOCAL MURATA REPRESENTATIVE FOR UPDATED INFORMATION.

VCO TYPICAL CHARACTERISTICS

C/N Level

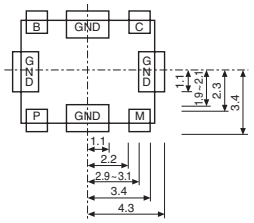


Test Circuit

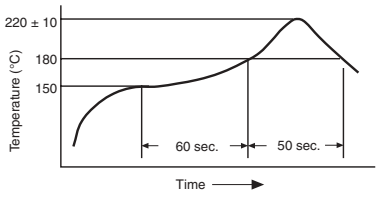


MOUNTING AND PACKAGING – MQE9

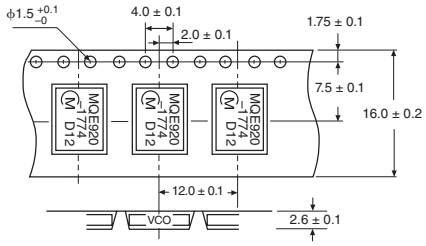
Recommended Mounting Dimensions: mm



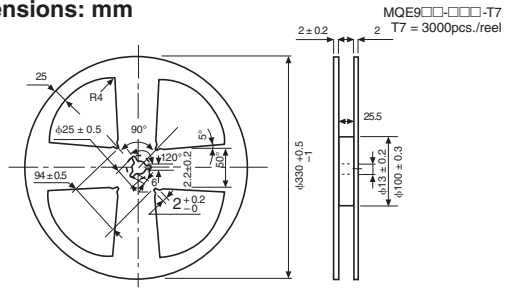
Reflow Soldering Conditions



Taping Specifications: mm

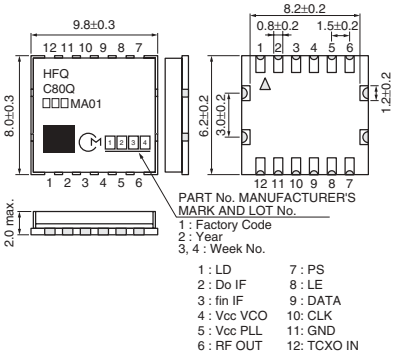


Reel Dimensions: mm



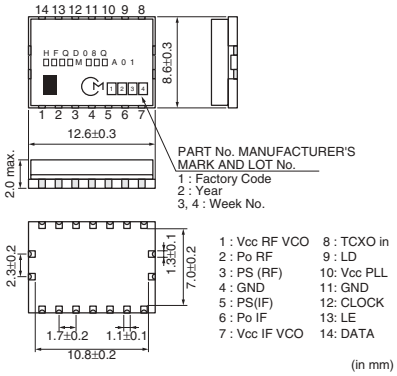
PLL Modules

HFQC80 Series

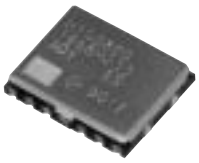


(in mm)

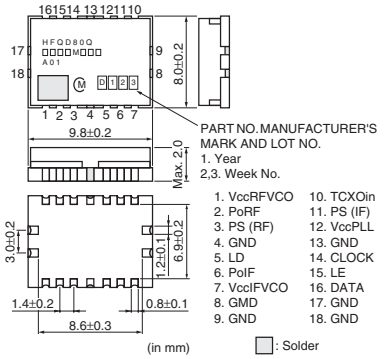
HFQD08 Series



(in mm)

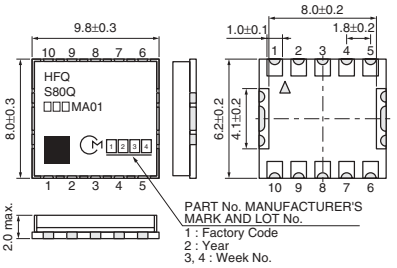


HFQD80 Series



(in mm) □: Solder

HFQS80 Series



(in mm)

Series	RF/Local Frequency Limits	IF/Local Frequency Limits	Module Structure	Size (mm)
HFQC80 SERIES	700 to 2000MHz	Only IF Port	RFVCO+Dual PLLIC (for CDMA)	9.8 X 8.0 X 1.85
HFQD08 SERIES	700 to 2000MHz	100 to 350MHz	RFVCO+IFVCO+Dual PLLIC	12.6 X 8.6 X 1.85
HFQD80 SERIES	700 to 2600MHz	100 to 760MHz	RFVCO+IFVCO+Dual PLLIC	9.8 X 8.0 X 1.85
HFQS80 SERIES	700 to 2500MHz	-	RFVCO+PLLIC	9.8 X 8.0 X 1.85

7

Microwave Oscillators

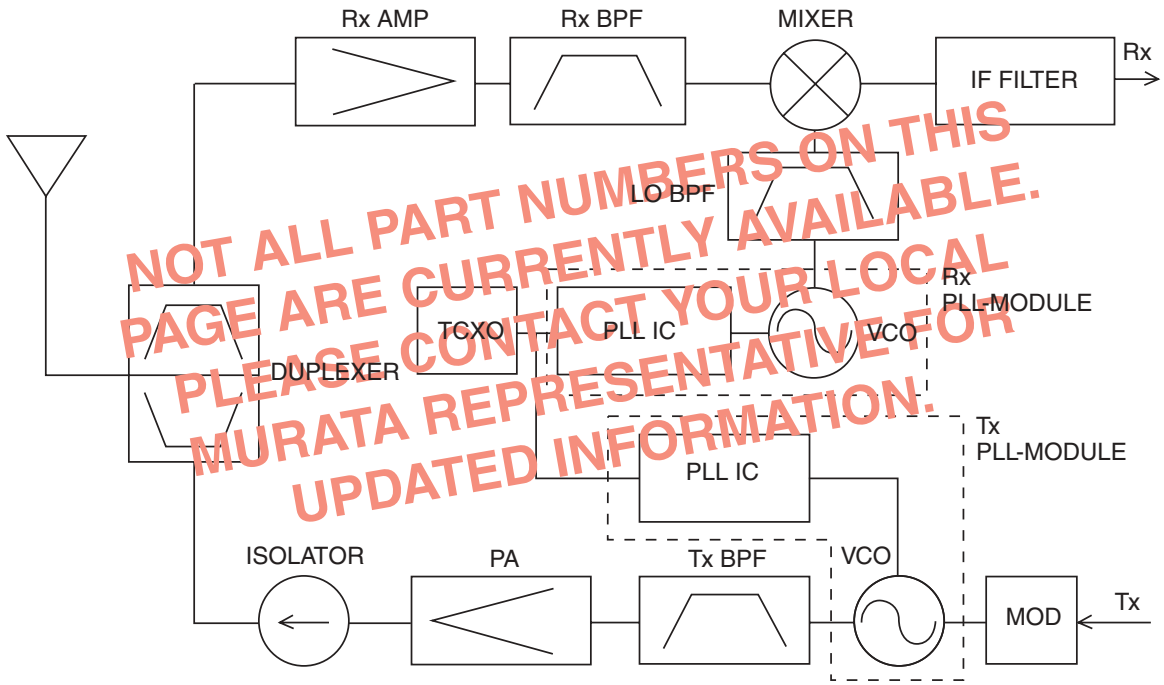
PHASE LOCK LOOP MODULE – HFQD08/HFQS14/HFQS80 SERIES

PLL MODULES

Application		Part Number	Operating Frequency Range (MHz)	Supply Voltage (1) (V)	Output Level (dBm)	Power Consumption (mA max.)	C/N (2) (dBc/Hz min.)	Lock-up Time (msec.max.)
VICS	Tx/Rx	HFQS80Q2489MA01	2489	3.0 ± 0.2	0 ± 3	23	–110	5.0
N-CDMA800	Tx/Rx	HFQD08B740M440A01	741.5 ± 19.5	2.8 ± 0.1	–4 ± 2.5	20	–138	5.0
ISM5.8	Tx/Rx	HFQS14D5820MA01	5820 ± 25	5.0 (3.0)	0 ± 3	37	—	1.0

(1) = Vcc1 (3.0) for VCO + Doubler, Vcc1 (5.0) for PLL-IC
(2) = Separation (kHz)

■ BLOCK DIAGRAM



NOT ALL PART NUMBERS ON THIS PAGE ARE CURRENTLY AVAILABLE. PLEASE CONTACT YOUR LOCAL MURATA REPRESENTATIVE FOR UPDATED INFORMATION.

All information contained in this catalog is available in PDF downloadable format at www.murata.com.

muRata®

Innovator in Electronics

Marketing Communications
2200 Lake Park Drive
Smyrna, Georgia 30080
Tel: 770-436-1300
Fax: 770-436-3030
www.murata.com

© 2001, Murata Electronics North America, Inc.

02/02