



### Features

- Frequency Range 1.0MHz to 150MHz
- Frequency Stability  $\pm 25$  or  $\pm 50$ ppm
- Operating Voltage: 1.71V to 3.60V
- Operating Temperature Range
  - Commercial: 0° to +70°C
  - Ext. Commercial: -20 to +70°C
  - Industrial: -40° to +85°C
  - Ext. Industrial: -40° to +105°C
- Operating and Standby Current
  - 7mA operating (40MHz)
  - 15 $\mu$ A Standby
- Ultra-Miniature Footprint
  - 2.5 x 2.0 x 0.85mm
  - 3.2 x 2.5 x 0.85mm
  - 5.0 x 3.2 x 0.85mm
  - 7.0 x 5.0 x 0.85mm
- Excellent Shock & Vibration Resistance
- Pb free, RoHS, REACH SVHC Compliant
- ISO9001 (2008) Qualified



### Description

The Euroquartz EMEM8003 oscillator range are programmable MEMS (Micro Electro-Mechanical System) devices offering excellent jitter and stability performance over a wide range of supply voltages and temperature ranges (up to -40° to +105°C). EMEM8003 parts incorporate an all-silicon resonator that is robust and performs well in high shock and vibration environments.

EMEM8003 oscillators are available in four, industry-standard SMD packages: 7 x 5mm, 5 x 3.2mm, 3.2 x 2.5mm and 2.5 x 2.0mm. The part may be 'dropped in' to most PCB footprints as standard crystal oscillators.

The programmable EMEM8003 series are available on very short leadtimes.

### Electrical Specifications

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Frequency	$f_0$	Single frequency	1		150	MHz
Frequency Tolerance	$\Delta f$	Includes frequency variations due to initial tolerance, temperature and power supply voltage.			$\pm 10, \pm 25$ & $\pm 50$	ppm
Ageing	$\Delta f$	1 year @ 25°			$\pm 5$	ppm
Supply Current, Standby	$I_{DD}$	T = 25°C			15	$\mu$ A
Output Startup Time <sup>2</sup>	$T_{SU}$	T=25°C		1.0	1.3	ms
Output Disable Time	$T_{DA}$			20	100	ns
Output Duty Cycle	SYM		45		55	%
Input Logic Levels Input Logic High Input Logic Low	$V_{IH}$ $V_{IL}$		0.75* $V_{DD}$		0.25* $V_{DD}$	Volts

1. Absolute maximum ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated beyond these limits.
2. Output frequency to within 100ppm of final stable output frequency.
3. See typical cycle to cycle jitter graph for frequency dependence.

### Absolute Maximum Ratings

Item	Min.	Max.	Unit	Condition
Supply Voltage	-0.3	+4.0	V	
Input Voltage	-0.3	VDD+0.3	V	
Junction Temp.	-	+150	°C	
Storage Temp.	-55	+150	°C	
Soldering Temp.	-	+260	°C	40 sec. max.
ESD				
HBM		4000	V	
MM		200		
CDM		1500		

### Standby Function

Standby# (Pin 1)	Output (Pin 3)
High Level	Output ON
Open (not connected)	Output ON
Low Level	High Impedance

### Recommended Operating Conditions

Parameter	Symbol	Range
Supply Voltage	V <sub>DD</sub>	1.71 ~3.60V
Output Load	Z <sub>L</sub>	R>10kΩ, C≤15pF
Operating Temperature		
Option 1	T	-40 to +105°C
Option 2		-40 to +85°C
Option 3		-20 to +70°C

### Ordering Information

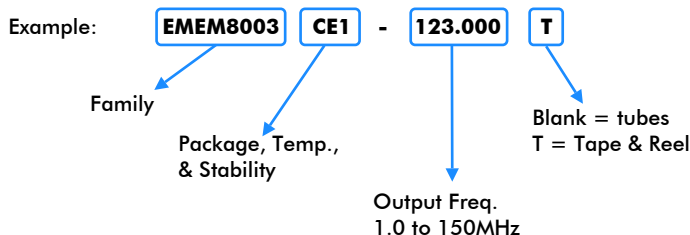
Package (Plastic QFN)	Temperature	Stability	Frequency	Packing Option
P=A: 7.0 x 5.0mm	T=C: 0° ~ +70°C	S=1: ±50ppm	XXX.XXX	Blank: Tubes T: Tape & Reel
P=B: 5.0 x 3.2mm	T=E: -20° ~ +70°C	S=2: ±25ppm		
P=C: 3.2 x 2.5mm	T=I: -40° ~ +85°C	S=3: ±10ppm		
P=D: 2.5 x 2.0mm	T=L: -40° ~ +105°C			

Order in the form: **EMEM8003PTS-FREQUENCY-SUPPLY FORMAT**

Example: **EMEM8003CE1-123.000T**

This is an 123.000MHz Oscillator in a plastic 3.2 x 2.5mm package; stability ±50ppm over -20° to +70°C, shipped in tape and reel.

### Ordering Code



\* See Ordering Information for details

### Electrical Specifications

VDD = 1.8V

Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
Supply Current No load	I <sub>DD</sub>	C <sub>L</sub> = 0p R <sub>L</sub> = ∞ T = 25°C	1MHz 27MHz 70MHz 150MHz		5.7 6.4 7.7 10.0	6.0 6.8 8.0 11.0	mA
Output Logic Levels Output Logic High Output Logic Low	V <sub>OH</sub> V <sub>OL</sub>	-6mA 6mA		0.8*V <sub>DD</sub>		0.2*V <sub>DD</sub>	ns
Output Transition time Rise Time Fall Time	t <sub>r</sub> t <sub>f</sub>	C <sub>L</sub> = 15pF; T = 25°C 20%/80%*V <sub>DD</sub>			1.5 1.2	3 3	ns
Output Transition time Rise Time Fall Time	t <sub>r</sub> t <sub>f</sub>	C <sub>L</sub> = 15pF; T = 25°C 10%/90%*V <sub>DD</sub>			2.6 1.9	4 4	ns
Period Jitter	J <sub>P</sub>	F = 100MHz <sup>3</sup>			10	105	ps rms

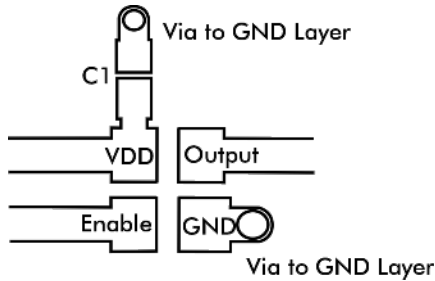
VDD = 2.5V

Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
Supply Current No load	I <sub>DD</sub>	C <sub>L</sub> = 0p R <sub>L</sub> = ∞ T = 25°C	1MHz 27MHz 70MHz 150MHz		5.7 6.7 8.4 11.4	6.0 7.1 8.8 12.7	mA
Output Logic Levels Output Logic High Output Logic Low	V <sub>OH</sub> V <sub>OL</sub>	-6mA 6mA		0.8*V <sub>DD</sub>		0.2*V <sub>DD</sub>	ns
Output Transition time Rise Time Fall Time	t <sub>r</sub> t <sub>f</sub>	C <sub>L</sub> = 15pF; T = 25°C 20%/80%*V <sub>DD</sub>			1.1 0.9	2 2	ns
Output Transition time Rise Time Fall Time	t <sub>r</sub> t <sub>f</sub>	C <sub>L</sub> = 15pF; T = 25°C 10%/90%*V <sub>DD</sub>			1.9 1.5	3.5 3	ns
Period Jitter	J <sub>P</sub>	F = 100MHz <sup>3</sup>			5	10	ps rms

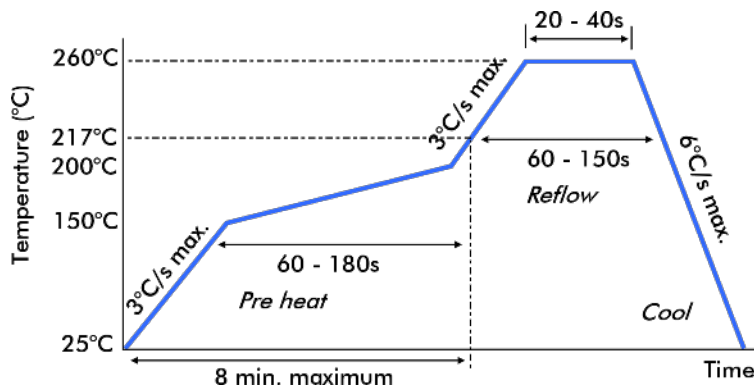
VDD = 3.3V

Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
Supply Current No load	I <sub>DD</sub>	C <sub>L</sub> = 0p R <sub>L</sub> = ∞ T = 25°C	1MHz 27MHz 70MHz 150MHz		5.7 7.0 9.1 13.1	6.0 7.4 9.6 15.0	mA
Output Logic Levels Output Logic High Output Logic Low	V <sub>OH</sub> V <sub>OL</sub>	-6mA 6mA		0.9*V <sub>DD</sub>		0.1*V <sub>DD</sub>	ns
Output Transition time Rise Time Fall Time	t <sub>r</sub> t <sub>f</sub>	C <sub>L</sub> = 15pF; T = 25°C 20%/80%*V <sub>DD</sub>			1.1 0.9	2 2	ns
Output Transition time Rise Time Fall Time	t <sub>r</sub> t <sub>f</sub>	C <sub>L</sub> = 15pF; T = 25°C 10%/90%*V <sub>DD</sub>			1.5 1.5	3 3	ns
Period Jitter	J <sub>P</sub>	F = 100MHz <sup>3</sup>			5	10	ps rms

### Board Layout (Recommended)



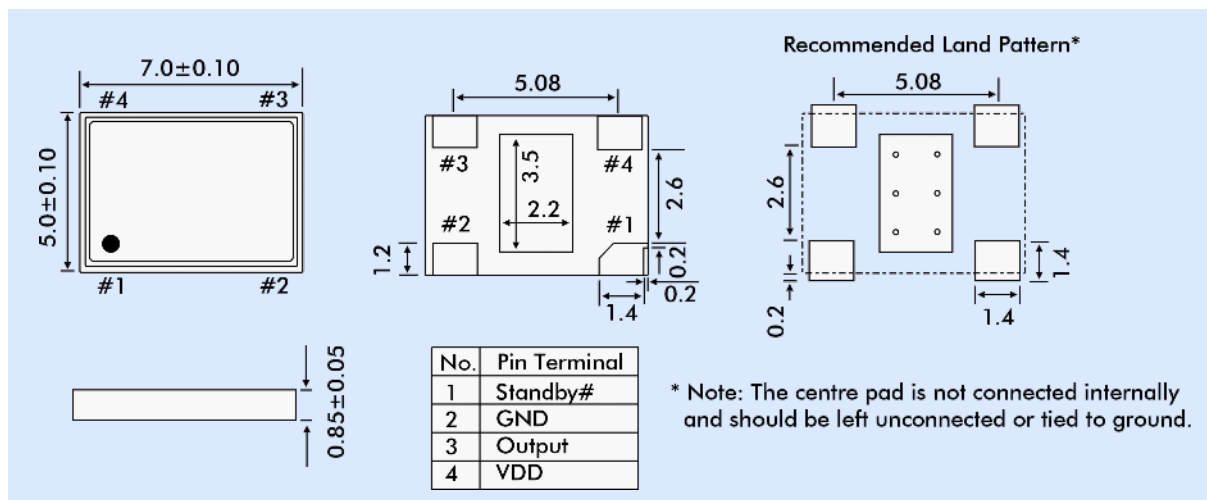
### Solder Reflow Profile



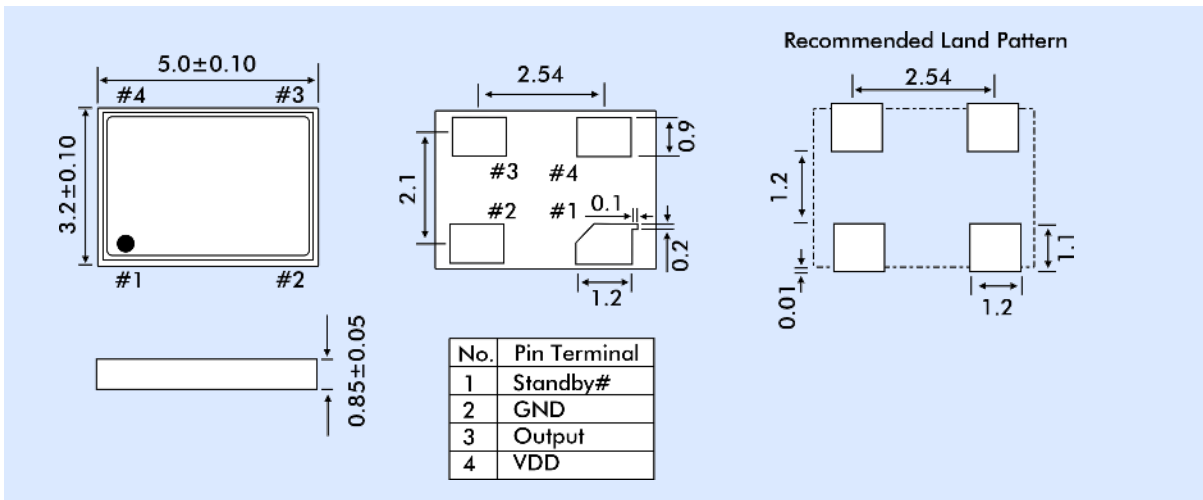
MSL1 @ 260°C refer to JSTD-020C	
Ramp-up Rate (200°C to Peak Temp.)	3°C/s max.
Preheat Time 150°C to 200°C	60-180s
Time maintained above 217°C	60-150s
Peak Temperature	255-260°C
Time within 5°C of actual peak	20-40s
Ramp-Down Rate	6°C/s max.
Time 25°C to Peak Temperature	8 min max.

### PACKAGE DIMENSIONS

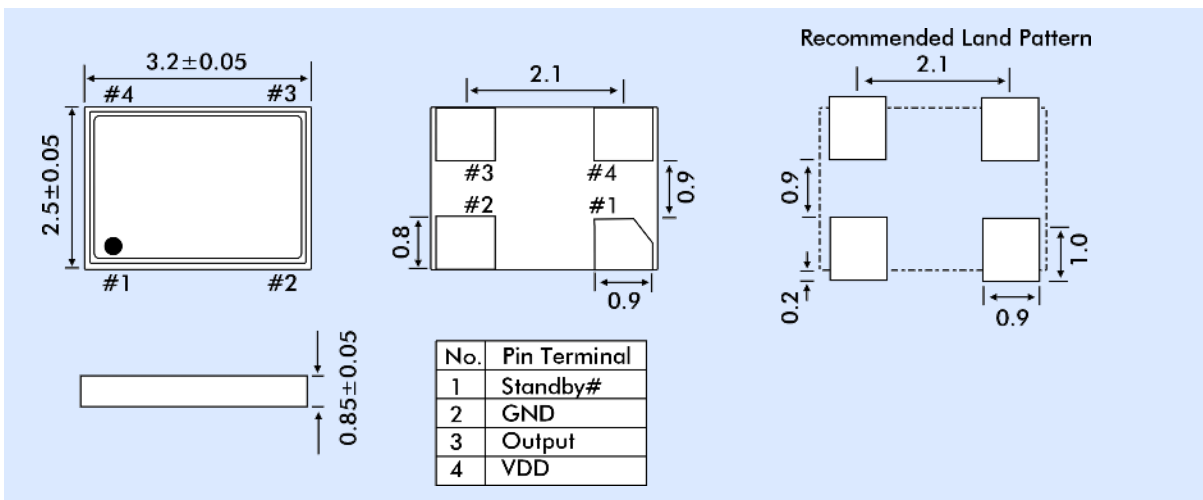
#### 7.0 x 5.0mm Plastic Package



### 5.0 x 3.2mm Plastic Package



### 3.2 x 2.5mm Plastic Package



### 2.5 x 2.0mm Plastic Package

