

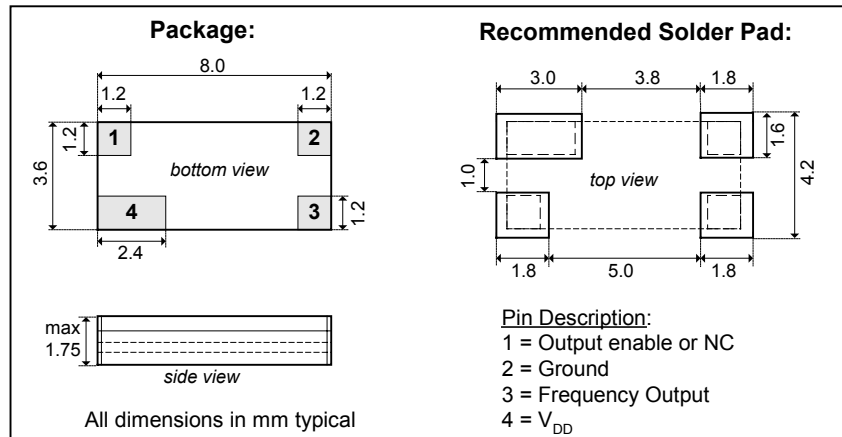


# Low Power Clock Oscillator 32768 Hz

*The World's Smallest Thermo-Compensated Oscillator*



## Dimensions



## KEY FEATURES

- ❑ Temperature compensation
- ❑ Small SMD ceramic package
- ❑ Low power consumption of 6 $\mu$ A
- ❑ Tri state output

## & BENEFITS

- ✓ Save space and components
- ✓ No more matching of quartz with IC
- ✓ Easy PCB design
- ✓ No more trouble with stray capacitors
- ✓ High shock and vibration resistance
- ✓ No need for external trimming components

## Typical Applications

- ❑ Clock drivers for Real Time Clocks
- ❑ Timekeeping in network servers and computers
- ❑ Data logger
- ❑ Electricity, gas and water metering
- ❑ Portable field communication
- ❑ Automotive dashboard
- ❑ High-end mobile phones

## Description

EM7602 is a low power, low frequency crystal oscillator, with a **three times better thermal drift than any conventional tuning fork crystal**. It consists of a torsional tuning fork crystal and a CMOS integrated circuit, both assembled in the same package. It is ideal for applications requiring a high timekeeping accuracy over full temperature range.

The oscillator are supplied in trays (91 oscillators per tray).

For pick-and-place equipment, the parts are available in 16mm tapes:

- 7" (178 mm) reel with 1000 oscillators
- 10" (254 mm) reel with 2000 oscillators
- 13" (330 mm) reel with 4000 oscillators

## Electrical Characteristics at 25°C

Output Frequency	F	32.768	kHz
Frequency tolerance (note 1)	$\Delta F/F$	$\pm 30$	ppm
Supply voltage	$V_{DD}$	2.3 – 3.6	V
Current Consumption (typ/max) (note 2)	$I_{DD}$	6/10	$\mu$ A
Duty cycle (min/max)		49/51	%
Output voltage (high) (note 3)	$V_{OH}$	$V_{DD} - 0.4$	V
Output voltage (low) (note 4)	$V_{OL}$	0.4	V
Output rise time (max) (note 5)	$t_r$	100	ns
Output fall time (max) (note 5)	$t_f$	100	ns
Start up time	$t_{start}$	1	s
Voltage coefficient		$\pm 1$	ppm/V
Turnover temperature (typ)	$T_0$	20	°C
Temperature coefficient (typ)	$\beta$	-0.012	ppm/°C <sup>2</sup>
Frequency stability (typ)			
0°C to +50°C	$\Delta F/F$	0 to -10	ppm
-20°C to +70°C		0 to -30	ppm
-40°C to +85°C		0 to -50	ppm

Note 1: Tighter tolerance on request

Note 2:  $V_{DD} = 3.3V$ , no load

Note 3:  $I_{OH} = -0.5mA$

Note 4:  $I_{OL} = 0.5mA$

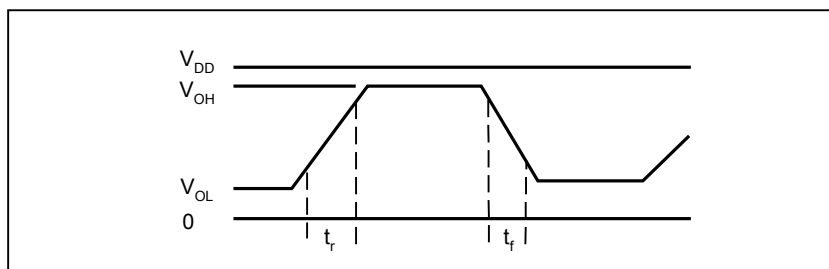
Note 5:  $C_L = 15pF$ , 10% to 90%



# Fact Sheet

## EM7602

### Output Wave Form:



### Environmental Characteristics:

		Conditions	Max. Dev.
Storage temp. range		-55°C to +125°C	
Industrial operating temp. range		-40°C to +85°C	
Shock resistance	$\Delta F/F$	5000 g, 0.3 ms, 1/2 sine	$\pm 5$ ppm
Vibration resistance	$\Delta F/F$	20 g / 10-2000 Hz	$\pm 5$ ppm

### Ordering Information, Terminations and Processing:

Part Nb	Termination	Delivery Form
EM7602V1SM4D	For SMD mounting	Tray (91 pieces)
EM7602V1SM4B	Au (gold) flashed pads	Tape & Reel (min. 1000 pieces)

Processing is by reflow soldering at 260°C / 20 s max.

**Note:** Instead of Au (gold) flashed pads, Sn (tin) plated pads are also available for SMD mounting, subject to availability and minimum order quantity. Please contact EM Microelectronic for availability of Sn (tin) plated pads and refer to EM7602V2 (version 2). For samples, only EM7602V1 is available at all times.

### Frequency Temperature Characteristics:

