

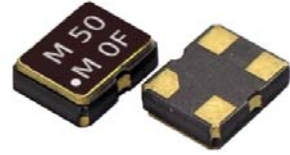
Temperature Compensated Crystal Oscillators [TCXO " M "]

CMOS Output

| | | | | | | | | | | |
|------|-------------------------|----------------|------|-----|------|-------|-------|-------|---------|--------|
| TCXO | Output Enable / Disable | -40 to +105 °C | CMOS | SMD | 15pF | 1.8 V | 2.5 V | 3.3 V | Min. | Max. |
| M_1T | | | | | | | | | 9.5 MHz | 60 MHz |

Features

- Wide frequency range : [9.5 MHz ~ 60.0 MHz]
- Frequency stability as tight as ± 2.5 ppm over -40°C to 85°C
- Frequency stability as tight as ± 5.0 ppm over -40°C to 105°C (available)



General specifications of all available packages , at Ta=+25°C , CL=15pF

| Output Waveform | | Square wave [CMOS] . Waveform code is " T " | | | | |
|---|------------------------|---|----------------------------|----------------------------|-----------------------|---------------|
| Type | | M211T | M221T | M321T | | |
| Package (Size) | | 2.0 x 1.6 x 0.7 mm | 2.5 x 2.0 x 0.9 mm | 3.2 x 2.5 x 1.0 mm | | |
| Frequency Range | | 10.0 ~ 52.0 MHz | 9.5 ~ 60.0 MHz | 9.5 ~ 60.0 MHz | | |
| Supply Voltage Range | | + 1.8 V (code is " 18 ") | + 2.5 V (code is " 25 ") | + 3.3 V (code is " 33 ") | | |
| Current Consumption | | 6 mA (max.) | 7 mA (max.) | 8 mA (max.) | | |
| Standard Frequency [MHz] | | 12.000 , 20.000 , 24.000 , 25.000 , 26.000 , 40.000 , 50.000 , 60.000 | | | | |
| Initial Calibration Tolerance | | ± 2.0 ppm (max.) at +25°C ± 2 °C. after reflow | | | | |
| Frequency Stability | | ± 2.5 ppm | ± 5.0 ppm | ± 10.0 ppm | X : not available | |
| Frequency Stability vs Temperature | - 40°C to + 85°C | ○ | ○ | ○ | △ : please contact us | |
| | - 40°C to + 105°C | △ | △ | ○ | ○ : available | |
| Frequency Stability | vs Aging at Ta= + 25°C | ± 1.0 ppm (max.) , per year | | | | |
| | vs Voltage Change | ± 0.3 ppm (max.) , for a $\pm 5\%$ input voltage change . | | | | |
| | vs Load Change | ± 0.3 ppm (max.) , for a $\pm 10\%$ load condition change . | | | | |
| Output Logic High " 1 " | | V _{DD} of 90% (min.) | | | | |
| Output Logic Low " 0 " | | V _{DD} of 10% (max.) | | | | |
| Rise Time and fall time | | 10.0 nsec. (max.) ; 10% \leftrightarrow 90% of the waveform | | | | |
| Duty Cycle | | 50 % \pm 5 % | | | | |
| Start-Up Time. | | 5.0 msec. (max.) | | | | |
| Output Load | | 15 pF | | | | |
| Output Enable / Disable Function on Pad1 (Don't use in the OPEN condition) | | V _{DD} of 70% (min.) to enable output | | | | |
| | | V _{DD} of 30% (max.) to disable output | | | | |
| RMS Jitter (12KHz ~ 20MHz) | 50MHz as example | 0.3 psec (typ.) , 1.0 psec (max.) | | | | |
| Phase Noise | | 10 Hz | 100 Hz | 1 KHz | 10 KHz | 100 KHz |
| Offset / dBc / Hz [typ.] | | -85 dBc / Hz | -111 dBc / Hz | -133 dBc / Hz | -149 dBc / Hz | -154 dBc / Hz |
| Storage Temperature | | -55°C to +125°C | | | | |

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Temperature Compensated Crystal Oscillators [TCXO " M "]

CMOS wave output code " T "

Part Number Format and Exmple

| [1] | [2] | [3] | [4] | - | [5] | - | [6] | / | [7] |
|-------------|-------------------------|-------------|----------------|---|------------------|---|---------------------|---|-----------------------|
| Holder Type | Enable/Disable Function | Output Wave | Supply Voltage | | Center Frequency | | Frequency Stability | | Operating Temp. Range |

| | | | | | | | | | | | |
|----------|-----|-----|---|---|----|---|--------|---|-----|---|---------|
| Examples | (1) | M32 | 1 | T | 33 | - | 40.000 | - | 5.0 | / | -40+105 |
| | (2) | M22 | 1 | T | 18 | - | 38.400 | - | 2.5 | / | -40+85 |

Ex (1) : M321T33 - 40.000 - 5.0 / -40+105 [TCXO , 3225 SMD package , OE on pad1 , CMOS output , 3.3V , 40.000MHz , ±5.0ppm from -40°C to 105°C]

Ex (2) : M221T18 - 38.400 - 2.5 / -40+85 [TCXO , 2520 SMD package , OE on pad1 , CMOS output , 1.8V , 38.400MHz , ±2.5ppm from -40°C to 85°C]

| | |
|-------|--|
| [1] | Holder Type " M " stands for TCXO |
| [2] | Enable / Disable Function on pad1 , ex M321 --- OE on pad1 |
| [3] | " T " stands for Square Wave ex : M321T --- TCXO , 3225 SMD package , CMOS output |
| [4] | Supply voltage , " 18 " stands for +1.8V ; " 25 " stands for +2.5V ; " 33 " stands for +3.3V |
| [5] | Center Frequency in MHz |
| [6] | Frequency stability in ± _ ppm ; ex 1 : ± 2.5ppm --- 2.5 , ex 2 : ± 5.0ppm --- 5.0 |
| [7] | Operating temperature range in °C ex 1 : -40 °C to 85°C ----- -40+85 ; ex 2 : -40 °C to 105°C ----- -40+105 |

Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

| [M211T] | [M221T] |
|--|--|
| <p style="text-align: center;">[M211T]</p> | <p style="text-align: center;">[M221T]</p> |
| [M321T] | |
| <p style="text-align: center;">[M321T]</p> | |

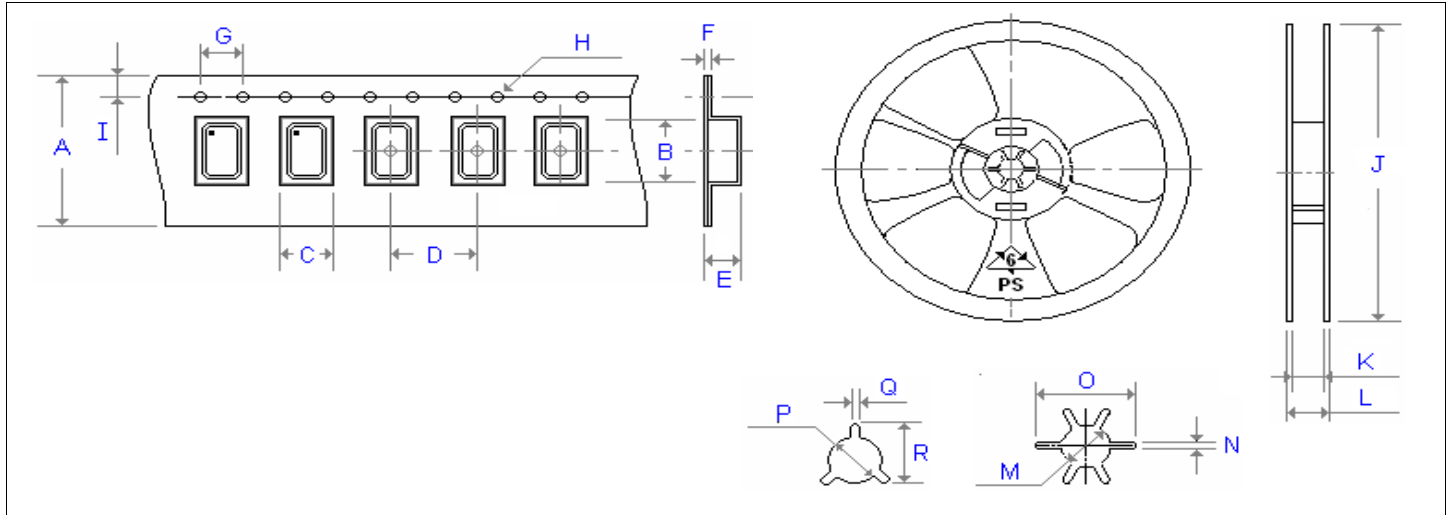
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Emboss Taping and Reel Specifications

[VCXO]

[(VC)TCXO]



Carrier Type Dimensions (unit : mm)

| | A | B | C | D | E | F | G | H | I | pcs / reel |
|-------------|------|------|------|------|-----|-----|-----|--------|------|------------|
| G_324 (6) | 8.0 | 3.4 | 2.7 | 4.0 | 1.4 | 0.3 | 4.0 | ∅ 1.50 | 1.75 | 3000 |
| G_534 | 12.0 | 5.3 | 3.6 | 8.0 | 1.4 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 1000 |
| G_576 | 16.0 | 7.3 | 5.3 | 8.0 | 1.9 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 1000 |
| G_42 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| G_43 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| G_62 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| G_63 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_22 | 8.0 | 2.8 | 2.3 | 4.0 | 1.1 | 0.3 | 4.0 | ∅ 1.50 | 1.75 | 3000 |
| (V)M_32 | 8.0 | 3.4 | 2.7 | 4.0 | 1.4 | 0.3 | 4.0 | ∅ 1.50 | 1.75 | 3000 |
| (V)MQ_326 | 12.0 | 3.6 | 2.9 | 4.0 | 1.7 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 3000 |
| (V)M_53 | 12.0 | 5.3 | 3.6 | 8.0 | 1.4 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 1000 |
| (V)M_57 | 16.0 | 7.4 | 5.5 | 8.0 | 2.8 | 0.4 | 4.0 | ∅ 1.50 | 1.75 | 500 |
| (V)M_42 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_43 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_62 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |
| (V)M_63 | 24.0 | 12.4 | 10.3 | 16.0 | 5.0 | 0.3 | 4.0 | ∅ 1.55 | 1.75 | 500 |

Reel Dimensions (unit : mm)

| | J | K | L | P | Q | R | pcs / reel |
|-------------|--------|------|-------|------|-----|------|------------|
| G_324 (6) | 180.0 | 9.0 | 12.0 | 13.2 | 2.1 | - | 3000 |
| G_534 | 180.0 | 13.0 | 16.0 | 13.2 | 2.5 | - | 1000 |
| G_576 | 180.0 | 17.2 | 19.3 | 13.3 | 2.2 | 22.0 | 1000 |
| G_42 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| G_43 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| G_62 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| G_63 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_22 | 178.00 | 8.40 | 11.40 | 13.2 | 2.1 | - | 3000 |
| (V)M_32 | 180.0 | 9.0 | 12.0 | 13.2 | 2.1 | - | 3000 |
| (V)MQ_326 | 180.0 | 13.0 | 16.0 | 13.2 | 2.5 | - | 3000 |
| (V)M_53 | 180.0 | 13.0 | 16.0 | 13.2 | 2.5 | 19.5 | 1000 |
| (V)M_57 | 180.0 | 17.2 | 19.3 | 13.3 | 2.2 | 22.0 | 500 |
| (V)M_42 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_43 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_62 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |
| (V)M_63 | 330.0 | 30.0 | 25.0 | 13.4 | 2.5 | 19.5 | 500 |

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