



# VOLTAGE-CONTROLLED CRYSTAL OSCILLATOR (VCXO)

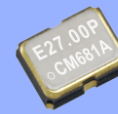
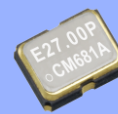
## MINIATURE SIZE LOW PROFILE, WIDE PULL RANGE

# VG-4231CE

- Frequency range : 3 MHz to 60 MHz
- Supply voltage : 3.3 V (PSCM / CSCM)  
2.8 V (PSBM / CSBM)  
1.8 V (PQEM / CQEM)
- Frequency control range :  $\pm 140 \times 10^{-6}$  (\*SCM / \*SBM)  
 $\pm 120 \times 10^{-6}$  (\*QEM)
- Low current consumption : 1.0 mA Typ. (27 MHz, 3.3 V)
- External dimensions :  $3.2 \times 2.5 \times 1.05$  mm



Product Number (please contact us)  
Q3614CE00xxxx00



Actual size



## Specifications (characteristics)

| Item                         | Symbol      | Specifications                   |                   |                   | Conditions / Remarks                                         |
|------------------------------|-------------|----------------------------------|-------------------|-------------------|--------------------------------------------------------------|
|                              |             | PSCM / CSCM                      | PSBM / CSBM       | PQEM / CQEM       |                                                              |
| Output frequency range       | $f_o$       | 3 MHz to 60 MHz                  |                   |                   | Please contact us for inquiries regarding other frequencies. |
| Supply voltage               | $V_{cc}$    | 3.3 V $\pm 0.3$ V                | 2.8 V $\pm 0.2$ V | 1.8 V $\pm 0.2$ V |                                                              |
| Storage temperature          | $T_{stg}$   | -40 °C to +125 °C                |                   |                   | Store as bare product.                                       |
| Operating temperature        | $T_{use}$   | As per below table               |                   |                   |                                                              |
| Frequency tolerance          | $f_{tol}$   | As per below table               |                   |                   | C : $V_c = 1.65$ V / B : $V_c = 1.40$ V / E : $V_c = 0.90$ V |
| Current consumption          | $I_{cc}$    | 7 mA Max.                        | 6.2 mA Max.       | 1.2 mA Max.       | No load condition                                            |
| Frequency control range      | $f_{cont}$  | $S: \pm 140 \times 10^{-6}$ Min. |                   |                   | $V_c = 1/2 V_{cc} \pm 1/2 V_{cc}$                            |
| Modulation characteristics   | BW          | 15 kHz Min.                      |                   |                   | $\pm 3$ dB (at 1 kHz)                                        |
| Input resistance             | $R_{in}$    | M : 5 M $\Omega$ Min.            |                   |                   | DC level                                                     |
| Frequency change polarity    | —           | Positive polarity                |                   |                   | $V_c = 0$ V to $V_{cc}$                                      |
| Symmetry                     | SYM         | 40 % to 60 %                     |                   |                   | CMOS load: 50 % $V_{cc}$ level                               |
| Output voltage               | $V_{OH}$    | $V_{cc} - 0.4$ V Min.            |                   |                   | $I_{OH} = -3.0$ mA                                           |
|                              | $V_{OL}$    | 0.4 V Max.                       |                   |                   | $I_{OL} = 3.0$ mA                                            |
| Output load condition (CMOS) | $L_{CMOS}$  | 15 pF Max.                       |                   |                   | CMOS load                                                    |
| Rise time and Fall time      | $t_r / t_f$ | 4 ns Max.                        |                   |                   | CMOS load: 20 % $V_{cc}$ to 80 % $V_{cc}$ level              |
| Start-up time                | $t_{str}$   | 5 ms Max.                        |                   |                   | Time at 90 % $V_{cc}$ to be 0 s                              |
| Frequency aging              | $f_{aging}$ | $\pm 5 \times 10^{-6}$ Max.      |                   |                   | +25 °C, 5 years                                              |

\* Please keep  $V_c$  pin open or ground while powering up  $V_{cc}$ .

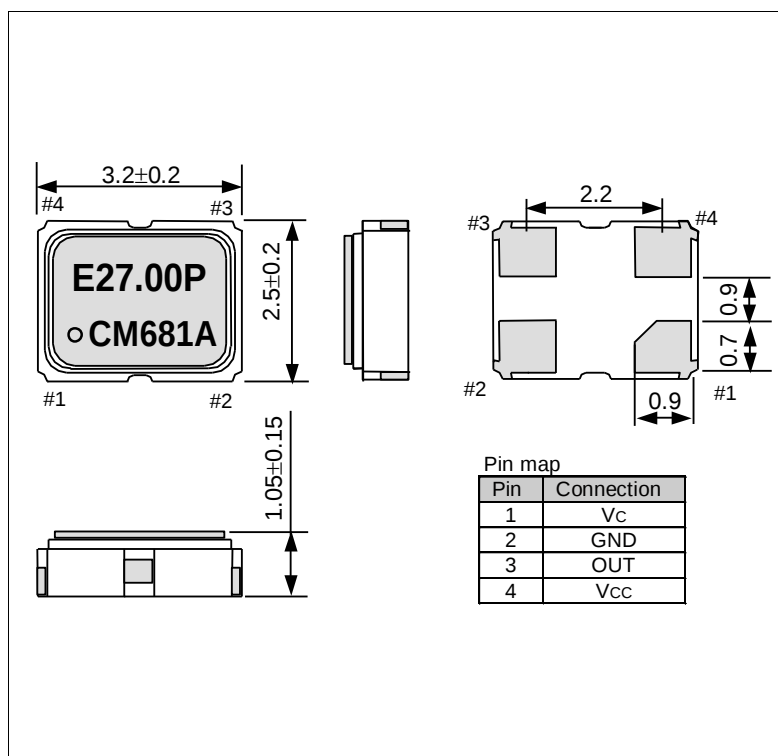
## Frequency tolerance / Temperature range / Absolute pull range

|                    | Frequency tolerance       | Temperature range | Absolute pull range                                        |
|--------------------|---------------------------|-------------------|------------------------------------------------------------|
| CSCM / CSBM / CQEM | C $\pm 30 \times 10^{-6}$ | -20 °C to +70 °C  | S : $\pm 100 \times 10^{-6}$ / Q : $\pm 80 \times 10^{-6}$ |
| PSCM / PSBM / PQEM | P $\pm 37 \times 10^{-6}$ | -40 °C to +85 °C  | S : $\pm 95 \times 10^{-6}$ / Q : $\pm 75 \times 10^{-6}$  |

\* Absolute pull range = Frequency control range - (Frequency tolerance + 5 years Aging + Free fall + Vibration)

## External dimensions

(Unit:mm)



## Footprint (Recommended)

(Unit:mm)

