

## MHz RANGE CRYSTAL UNIT

### MINIATURE SIZE LOW PROFILE SMD

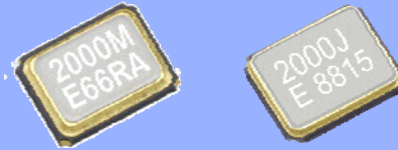
# FA-238V / FA-238

# TSX-3225

- Frequency range : 12 MHz to 60 MHz (FA-238, FA-238V)
- External dimensions : 3.2 × 2.5 × 0.6 t (mm) ... TSX-3225  
: 3.2 × 2.5 × 0.7 t (mm) ... FA-238V / FA-238
- Overtone order : Fundamental
- Applications : Mobile phone, Bluetooth, W-LAN  
ISM band radio, Clock for MPU



Product Number (please contact us)  
 FA-238V : Q22FA23V0xxxx00  
 FA-238 : Q22FA2380xxxx00  
 TSX-3225 : X1E000021xxxx00



Actual size

FA-238V / FA-238

TSX-3225

### Specifications (characteristics)

Item	Symbol	For Clock		For RF Reference	Remarks
		FA-238V	FA-238	TSX-3225	
Nominal frequency range	f_nom	12.000 MHz to 15.999 MHz	16.000 MHz to 60.000 MHz	16.000 MHz to 48.000 MHz	Fundamental *1 For the out of standard specifications, please contact us for inquiries.
Temperature Range	T_stg T_use	-40 °C to +125 °C -40 °C to +85 °C			Store as bare product after unpacking
Level of drive	DL	200 μW Max.			Recommended: 1 to 100 μW
Frequency tolerance	f_tol	±50 × 10 <sup>-6</sup> (standard), (±15 × 10 <sup>-6</sup> to ±50 × 10 <sup>-6</sup> is available)		±10 × 10 <sup>-6</sup>	+25 °C For the out of standard specifications, please contact us for inquiries. *1
Frequency versus temperature characteristics	f_tem	±30 × 10 <sup>-6</sup> / -20 °C to +70 °C		±10 × 10 <sup>-6</sup> / -20 °C to +75 °C	For the out of standard specifications, please contact us for inquiries. *1
Load capacitance	CL	7 pF to ∞			For the out of standard specifications, please contact us for inquiries.
Motional resistance (ESR)	R <sub>1</sub>	As per below table		As per below table	-40 °C to +85 °C, DL = 100 μW
Frequency aging	f_age	±5 × 10 <sup>-6</sup> / year Max.		±1 × 10 <sup>-6</sup> / year Max.*2	+25 °C, First year

\*1 FA-238: For over 40 MHz, only the standard specification applies.

\*2 40 MHz ≤ f<sub>nom</sub> : ±2 × 10<sup>-6</sup> / year Max.

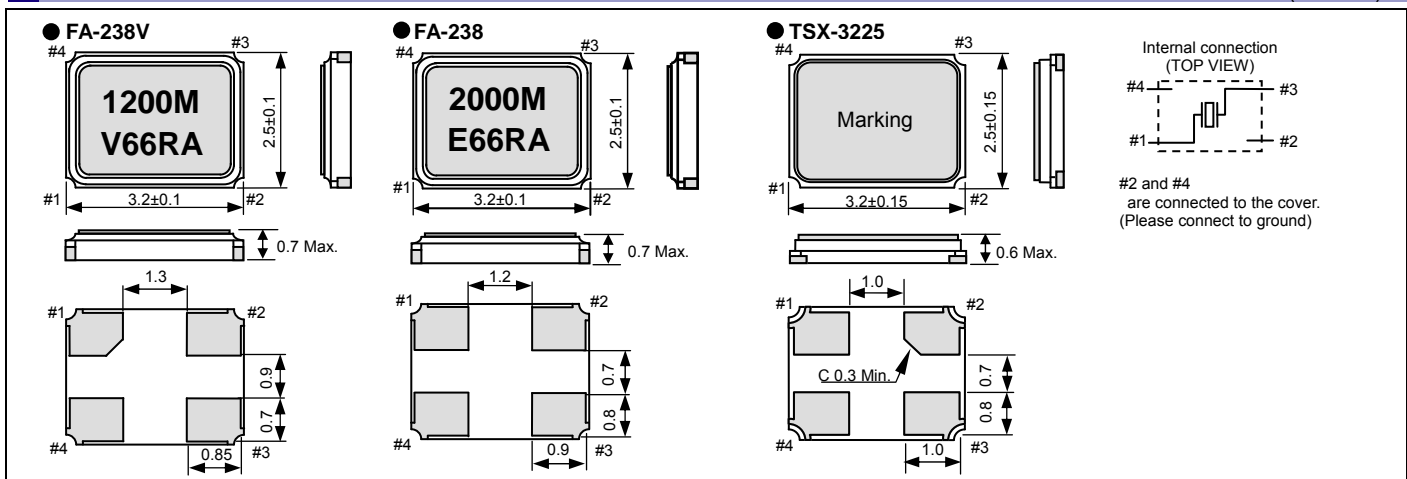
### Motional resistance (ESR)

(FA-238V / FA-238) Frequency	Motional resistance
12.0 MHz ≤ f <sub>nom</sub> ≤ 13.0 MHz	100 Ω Max.
13.0 MHz < f <sub>nom</sub> < 20.0 MHz	80 Ω Max.
20.0 MHz ≤ f <sub>nom</sub> < 25.0 MHz	60 Ω Max.
25.0 MHz ≤ f <sub>nom</sub> < 30.0 MHz	50 Ω Max.
30.0 MHz ≤ f <sub>nom</sub> ≤ 60.0 MHz	40 Ω Max.

(TSX-3225) Frequency	Motional resistance
16.0 MHz ≤ f <sub>nom</sub> < 21.0 MHz	60 Ω Max.
21.0 MHz ≤ f <sub>nom</sub> ≤ 48.0 MHz	40 Ω Max.

### External dimensions

(Unit:mm)



### Footprint (Recommended)

(Unit:mm)

