



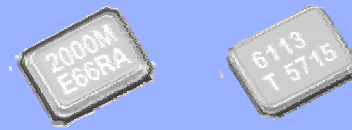
MHz RANGE CRYSTAL UNIT

MINIATURE SIZE LOW PROFILE SMD

FA-238V / FA-238

TSX-3225

- Frequency range : 12 MHz to 54 MHz
- Thickness : 0.6 mm Max. (TSX-3225)
- Overtone order : Fundamental
- Applications : Mobile phone, Bluetooth, W-LAN
ISM band radio, Clock for MPU



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	12.000 MHz to 15.999 MHz	16.000 MHz to 50.000 MHz	12.000 MHz to 54.000 MHz	Fundamental *1 For the out of standard specifications, please contact us for inquiries.
Temperature Range	T _{stg}	-40 °C to +125 °C		-40 °C to +85 °C	Store as bare product after unpacking
Storage temperature	T _{use}	-40 °C to +85 °C		-20 °C to +75 °C	Specified equivalent series must be satisfied
Operating temperature	DL	10 µW to 100 µW		100 µW Max.	
Level of drive	f _{tol}	±50 × 10 ⁻⁶ (standard), (±15 × 10 ⁻⁶ to ±50 × 10 ⁻⁶ is available)		±10 × 10 ⁻⁶	+25 °C For the out of standard specifications, please contact us for inquiries. *1
Frequency tolerance	f _{tem}	±30 × 10 ⁻⁶ / -20 °C to +70 °C		±10 × 10 ⁻⁶ / -20 °C to +75 °C	For the out of standard specifications, please contact us for inquiries. *1
Frequency versus temperature characteristics	CL	7 pF to ∞ (Standard: 10 pF)		9 pF to ∞ (Standard: 9 pF, 12 pF, 16 pF, ∞)	For the out of standard specifications, please contact us for inquiries.
Load capacitance	R _i	As per below table		As per below table	-40 °C to +85 °C, DL = 100 µW
Motional resistance (ESR)	f _{age}	±5 × 10 ⁻⁶ / year Max.		±1 × 10 ⁻⁶ / year Max.*2	+25 °C, First year
Frequency aging					

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

*2 40 MHz ≤ f : ±2 × 10⁻⁶ / year Max.

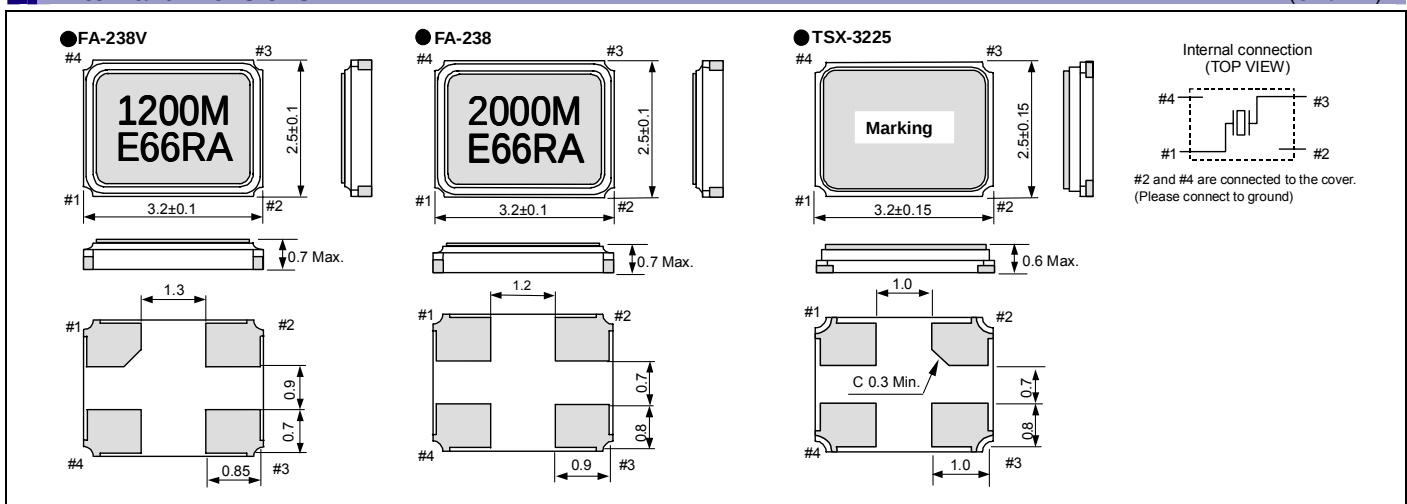
Motional resistance (ESR)

(FA-238V / FA-238) Frequency	Motional resistance
12.0 MHz ≤ f ≤ 13.0 MHz	100 Ω Max.
13.0 MHz < f < 20.0 MHz	80 Ω Max.
20.0 MHz ≤ f < 25.0 MHz	60 Ω Max.
25.0 MHz ≤ f < 30.0 MHz	50 Ω Max.
30.0 MHz ≤ f ≤ 50.0 MHz	40 Ω Max.

(TSX-3225) Frequency	Motional resistance
12.0 MHz ≤ f < 16.0 MHz	100 Ω Max.
16.0 MHz ≤ f < 21.0 MHz	60 Ω Max.
21.0 MHz ≤ f ≤ 54.0 MHz	40 Ω Max.

External dimensions

(Unit:mm)



Footprint (Recommended)

(Unit:mm)

