



## MHz RANGE CRYSTAL UNIT

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 mm ...TSX-3225
- : 3.2 × 2.5 × 0.7 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	Conditions / 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 Please contact us about available frequencies.
Storage temperature	T_stg	-40 °C to +125 °C			Storage as single product.
Operating temperature	T_use	-40 °C to +85 °C			
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 Please contact us for requirements not listed in this specifications. *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	Please contact us for requirements not listed in this specifications. *1
Load capacitance	CL	7 pF to ∞			Please specify.
Motional resistance (ESR)	R <sub>1</sub>	As per table below		As per table below	-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\_nom ≤ ±2 × 10<sup>-6</sup> / year Max.

## Motional resistance (ESR)

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

(TSX-3225)	Frequency	Motional resistance
	16.0 MHz ≤ f_nom < 21.0 MHz	60 Ω Max.
	21.0 MHz ≤ f_nom ≤ 48.0 MHz	40 Ω Max.

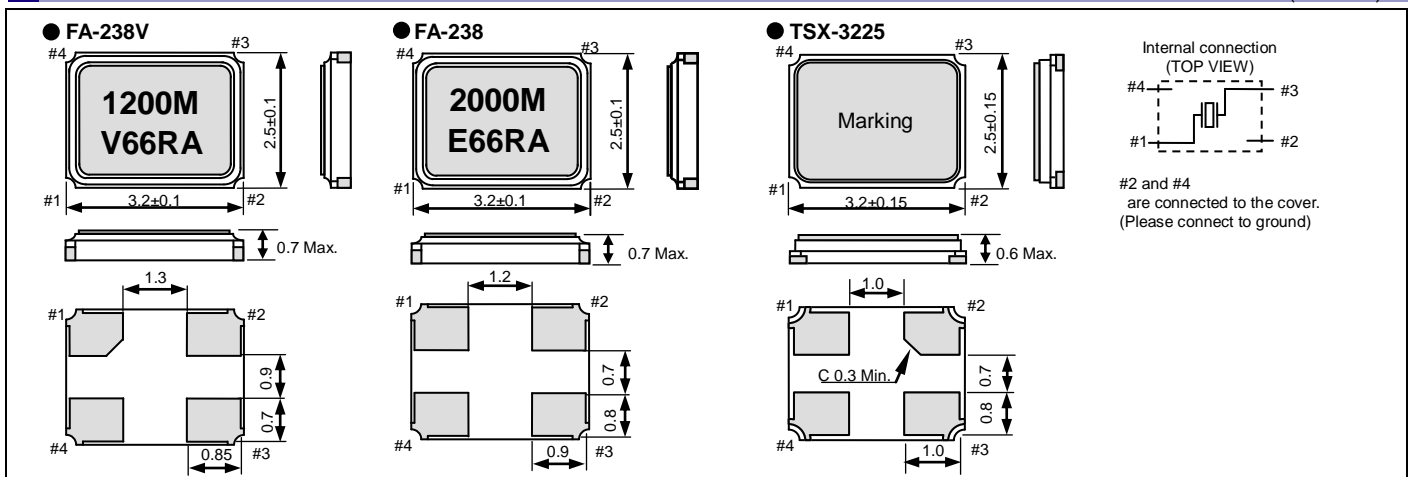
Product name FA-238V 12.000000MHz 12.0 +15.0-15.0  
(Standard form) ① ② ③ ④

①Model ②Frequency ③Load capacitance(pF) ④Frequency tolerance(× 10<sup>-6</sup>, +25 °C)

In addition to the above mentioned specification item, please specify frequency temperature characteristics and operating temperature range in case of inquiry.

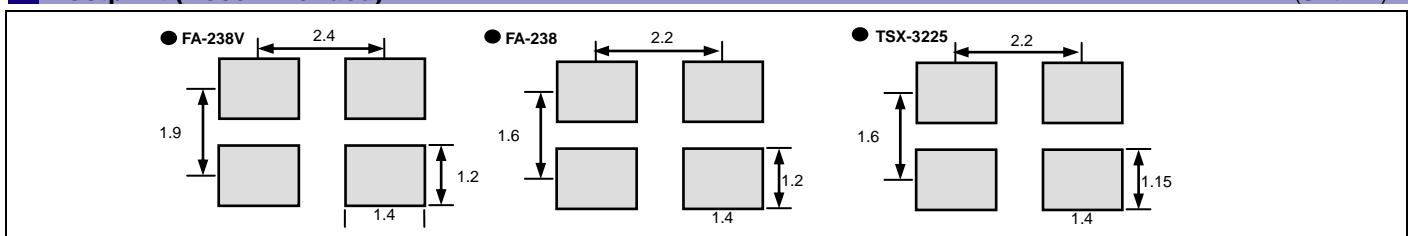
## External dimensions

(Unit:mm)



## Footprint (Recommended)

(Unit:mm)



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