

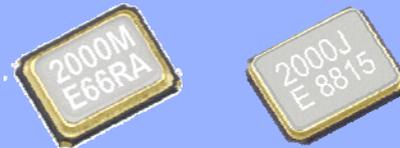
MHz RANGE CRYSTAL UNIT
MINIATURE SIZE LOW PROFILE SMD

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 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



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 ⁻⁶ (standard), (±15 × 10 ⁻⁶ to ±50 × 10 ⁻⁶ is available)		±10 × 10 ⁻⁶	+25 °C Please contact us for requirements not listed in this specifications. *1
Frequency versus temperature characteristics	f _{tem}	±30 × 10 ⁻⁶ / -20 °C to +70 °C		±10 × 10 ⁻⁶ / -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 ₁	As per table below		As per table below	-40 °C to +85 °C, DL = 100 μW
Frequency aging	f _{age}	±5 × 10 ⁻⁶ / year Max.		±1 × 10 ⁻⁶ / 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 × 10⁻⁶ / year Max.

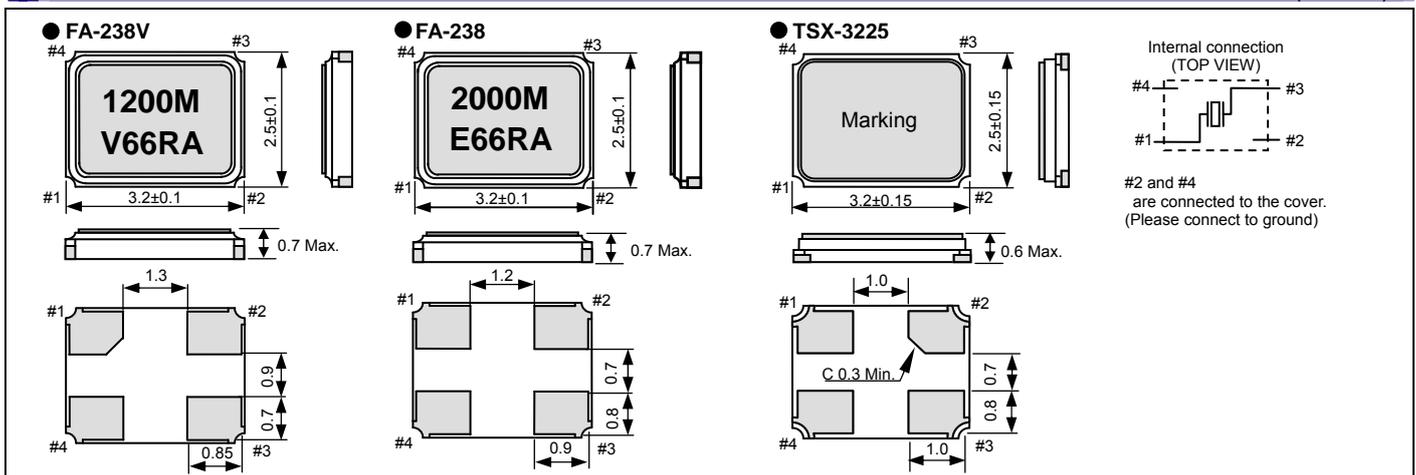
Motional resistance (ESR)

(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.

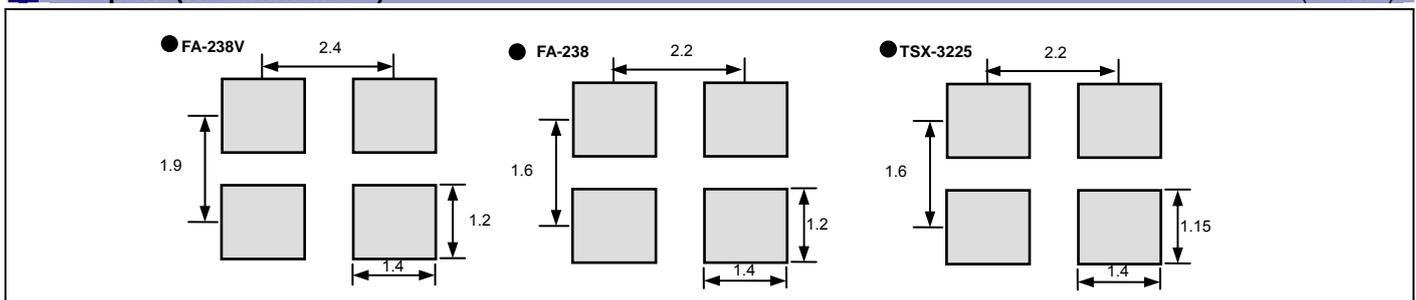
External dimensions

(Unit:mm)



Footprint (Recommended)

(Unit:mm)



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At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

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	<p>► Pb free.</p>
	<p>► Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)</p>
	<p>► The products have been designed for high reliability applications such as Automotive.</p>

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