### MHz RANGE CRYSTAL UNIT

# **FA-238V FA-238 TSX-3225**

 Frequency range 12 MHz to 60 MHz(FA-238,FA-238V)  $3.2\times2.5\times0.6$  mm  $\cdots$  TSX-3225 External dimensions :

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** 

FA-238V : Q22FA23V0xxxx17 FA-238 : Q22FA2380xxxx17 TSX-3225 : X1E000021xxxx17





FA-238V/FA-238

TSX-3225

#### Specifications (characteristics)

Itom	Symbol	For Clock		For RF Reference	Conditions / Remarks	
Item		FA-238V	FA-238	TSX-3225	Conditions / Remarks	
Nominal frequency range	f_nom	12.000 MHz to	16.000 MHz to	16.000 MHz to	Fundamental *1	
Nominal frequency range		15.999 MHz	60.000 MHz	48.000 MHz	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 (+105 C)			Please contact us about +85 C < T use	
Level of drive	DL	200 μW Max.			Recommended: 1 to 100 µW	
Frequency tolerance	f_tol	±50 × 10 <sup>-6</sup> (standard),		±10 × 10 <sup>-8</sup>	+25 C Please contact us for requirements not	
requeries tolerance		(±15 × 10 <sup>-6</sup> to ±50 × 1	10 <sup>-6</sup> is available)	±10 ∧ 10	listed in this specifications. *1	
Frequency versus	uency versus 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	
temperature characteristics	I_telli				this specifications. *1	
Load capacitance	CL	7 pF to ∞			Please specify.	
Motional resistance (ESR)	R1	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> / ye	ar Max.	±1 × 10 <sup>-8</sup> / year Max.*2	+25 C, First year	

<sup>\*1</sup> FA-238: For over 40 MHz, only the standard specification applies. \*2 40 MHz ≤ f nom: ±2 × 10-8 / year Max.

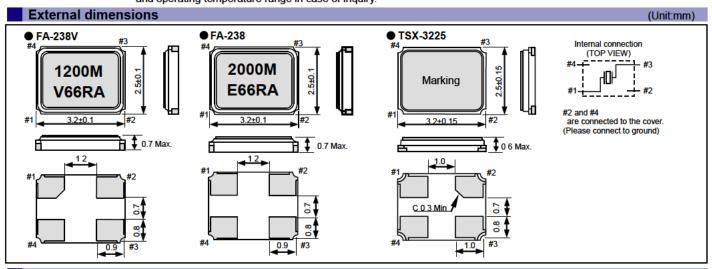
#### Motional resistance (ESR)

(FA-238V / FA-238) Frequency	Motional resistance
$12.0 \text{ MHz} \leq f_{nom} \leq 13.0 \text{ MHz}$	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 O Max

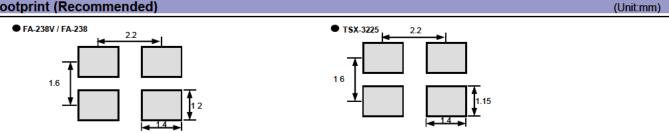
(TSX-3225) Frequency	Motional resistance
16.0 MHz ≤ f_nom < 21.0 MHz	60 Ω Max.
$21.0 \text{ MHz} \le f_{nom} \le 48.0 \text{ MHz}$	40 Ω Max.

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

④Frequency tolerance(× 10<sup>-6</sup>, +25 C) ①Model ②Frequency ③Load capacitance(pF) In addition to the above mentioned specification item, please specify frequency temperature characteristics and operating temperature range in case of inquiry.



### Footprint (Recommended)



## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

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.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

### **WORKING FOR HIGH QUALITY**

In order provide high quality and reliable products and services than meet customer needs, Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired IATF 16949 certification that is requested strongly by major automotive manufacturers as standard.

IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

Explanation of the mark that are using it for the catalog



►Pb free.



► 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.)



▶ Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.



▶ Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc.).

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Other applications requiring similar levels of reliability as the above

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