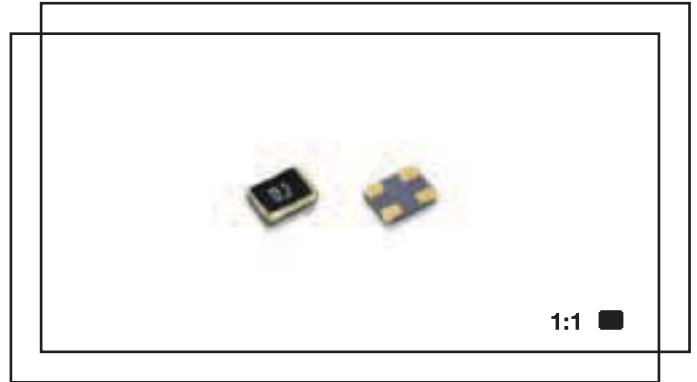


## XX sub miniature crystal (13.0 ~ 48.0)MHz

- # (3.2 x 2.5)mm ceramic package
- # 12mm tape and reel
- # Au-Sn vacuum seal
- #  $\pm 5$ ppm tolerance available
- # RoHS compliant



### Electrical specification

<b>Case style</b>	XX: height 0.6mm
<b>Frequency range</b>	(13.0 ~ 48)MHz, fundamental
<b>Standard frequencies</b>	13.0MHz, 16.0MHz, 20.00MHz, 25.00MHz, 26.0MHz, 32.0MHz
<b>Adjustment tolerance</b>	from $\pm 5$ ppm at +25°C, frequency dependent
<b>Temperature tolerance</b>	from $\pm 5$ ppm, frequency and temperature range dependent
<b>Operating temperature</b>	(-10 +60)°C ~ (-40 +85)°C
<b>Storage temperature</b>	(-55 +125)°C
<b>Load</b>	customer specified
<b>Shunt capacitance <math>C_0</math></b>	7.0pF max.
<b>Drive level</b>	10 $\mu$ W typical, 100 $\mu$ W max.
<b>Q factor</b>	80,000 typical
<b>Ageing</b>	$\pm 1$ ppm max. per year
<b>Insulation resistance</b>	500Meg. ohm min. at 100Vd.c.

### Ordering information

The XX smd crystals may be specified within their available frequency range together with load capacitance, adjustment tolerance, temperature tolerance and temperature range with each parameter coded as follows ....

**Example .... XX crystal, 16.00MHz, load 20pF,  $\pm 10$ ppm at +25°C,  $\pm 10$ ppm(-10 +60)°C**

**TFC PART NUMBER .... XX 16.00M H B B I**

'XX' .... crystal series: XX

'16.00M' .... frequency: 16.00M = 16.00MHz, frequency range from (13.0 ~ 48.0)MHz

'H' .... load capacitance: H = 20pF

'B' .... adjustment tolerance at +25°C: B =  $\pm 10$ ppm

'B' .... temperature tolerance: B =  $\pm 10$ ppm

'I' .... temperature range: I = (-10 +60)°C

**Load capacitance ....** A: 8pF, B: 9pF, C: 10pF, D: 12pF, F: 16pF,  
G: 18pF, H: 20pF, J: 32pF, S: series

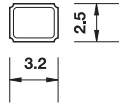
**Adjustment tolerance ....** A:  $\pm 5$ ppm, B:  $\pm 10$ ppm, P:  $\pm 15$ ppm, C:  $\pm 20$ ppm, D:  $\pm 25$ ppm,  
E:  $\pm 30$ ppm, G:  $\pm 50$ ppm, H:  $\pm 100$ ppm

**Temperature tolerance ....** A:  $\pm 5$ ppm, B:  $\pm 10$ ppm, P:  $\pm 15$ ppm, C:  $\pm 20$ ppm, D:  $\pm 25$ ppm,  
E:  $\pm 30$ ppm, G:  $\pm 50$ ppm, H:  $\pm 100$ ppm

**Temperature range ....** I: (-10 +60)°C, C: (-20 +70)°C, L: (-40 +85)°C

## XX sub miniature crystal

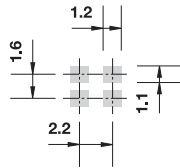
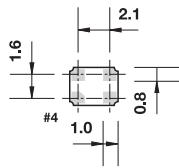
### XX dimensions(mm) shown twice full size



Suggested land pattern



Pad size (1.1 x 1.2)mm



Bottom view

Pads #2 and #4  
connected to metal top

### ESR - equivalent series resistance

frequency range(MHz)	cut/mode	esr( $\Omega$ )
(13.0)	AT1	<150
(13.0 ~ 19.5)	AT1	<100
(19.5 ~ 27.0)	AT1	<80
(27.0 ~ 48.0)	AT1	<60