

## *ASSP for Mobile Telephone*

# VCO (800 to 2000 MHz)

## VC-23 Series

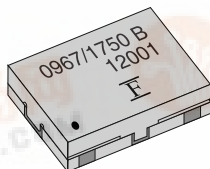
### ■ DESCRIPTION

With excellent C/N characteristics and low current consumption, this VCO series is suitable for use with AMPS, CDMA and PCS and is ideal to miniaturize dual-band mode products. The VC-23 series can be used in any frequency band in the 800 MHz to 2000 MHz range. The device utilizes FUJITSU MEDIA DEVICE's high-frequency design technology, high-density mounting technology, and frequency adjustment technology to provide a high level of reliability in addition to high performance and small size.

### ■ FEATURES

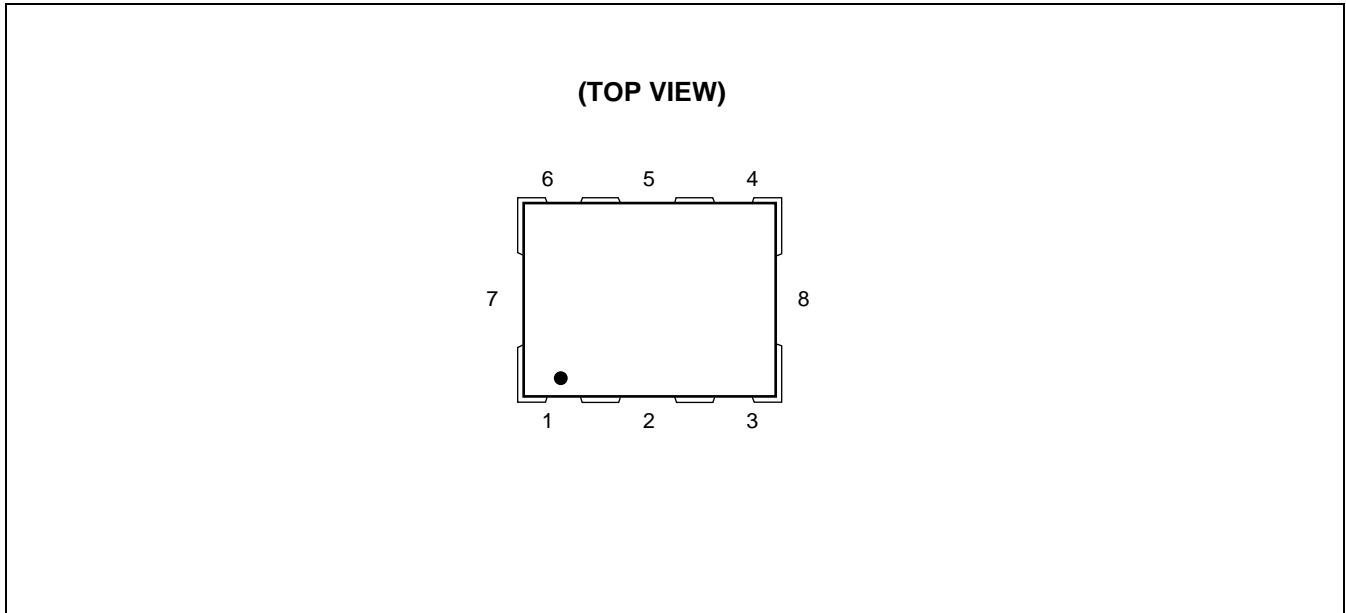
- Superior noise characteristics (C/N, S/N)
- Frequency switching type
- High level of stability in response to ambient temperature and load variations
- FUJITSU MEDIA DEVICE's proprietary fabrication process provides a uniform central frequency distribution
- Small size, light-weight, slim-package :  $9.3 \times 7.3 \times 2.0$  mm (Max.)
- SMD-type taping specifications suitable for automatic mounting and reflow soldering

### ■ PACKAGE



# VC-23 Series

## ■ PIN ASSIGNMENT



## ■ PIN DESCRIPTION

Pin No.	Symbol	Description
1	V <sub>t</sub>	Control voltage
2	GND	GND
3	V <sub>cc</sub>	Power supply voltage
4	OUT	Output
5	GND	GND
6	V <sub>sw</sub>	Band select
7	GND	GND
8	GND	GND

## ■ PRODUCT LINEUP (STANDARD MODELS)

System	Center Frequency (MHz)	Band Width (MHz)	Power Supply Voltage (V)	Part Number
AMPS•CDMA/PCS	967	±13	3.0 ± 0.15	VC-3R0A23-0967/ 1750B
	1750	±30		

# VC-23 Series

## ■ ELECTRICAL CHARACTERISTICS

### • Absolute Maximum Ratings

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V <sub>CC</sub>	−0.6	+6.0	V
Control voltage	V <sub>t</sub>	−0.6	+6.0	V
SW voltage	V <sub>SW</sub>	−0.6	+6.0	V
Operating temperature	T <sub>a</sub>	−30	+80	°C
Storage temperature	T <sub>stg</sub>	−30	+85	°C
Storage humidity	H <sub>stg</sub>	5	95	%

WARNING: VCO can be permanently damaged by application of stress (voltage, temperature, humidity, etc.) in excess of absolute maximum ratings. Do not exceed these ratings.

### • Band Selection Mode

Band Width	Selection Mode	V <sub>SW</sub> (V)		Center Frequency (MHz)	Current Consumption (mA) Typ.
		Min.	Max.		
CDMA	Band1	0.0	0.15	967	0.0
PCS	Band2	2.85	3.0	1750	0.4

# VC-23 Series

## • Electrical Characteristics

### Band1

(Ta = -30°C to +80°C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I <sub>CC</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	—	—	10.0	mA
SW current	I <sub>SW</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	—	0.4	0.7	mA
Frequency	f <sub>min</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 0.3 V	—	—	954.0	MHz
Frequency	f <sub>max</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 2.7 V	980.0	—	—	MHz
Control voltage sensitivity	S <sub>vt</sub>	(f <sub>max</sub> – f <sub>min</sub> ) / 2.4	18.0	—	30.0	MHz/V
Oscillator output	P <sub>o</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	-5.0	—	1.0	dBm
C/N	C/N	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 0.3 kHz, BW = 1 Hz	—	—	-60.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 1 kHz, BW = 1 Hz	—	—	-70.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 10 kHz, BW = 1 Hz	—	—	-100.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 30 kHz, BW = 1 Hz	—	—	-110.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 60 kHz, BW = 1 Hz	—	—	-119.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, BW = 1 Hz, Offset = 60 kHz (Ta = 25°C)	—	—	-120.0	dBc/Hz
Higher harmonics	H <sub>s</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Up to 3rd	—	—	-10.0	dBc
Spurious	S <sub>P</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	—	—	-80.0	dBc
Power supply variation	Push	V <sub>CC</sub> = 3.0 V ± 0.15 V, V <sub>t</sub> = 1.5 V	—	—	±1000	kHz
Load variation	Pull	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, VSWR = 2, All phases	—	—	±1000	kHz
Temperature drift	T <sub>d</sub>	Ta = +25°C ± 55°C	—	—	±3000	kHz

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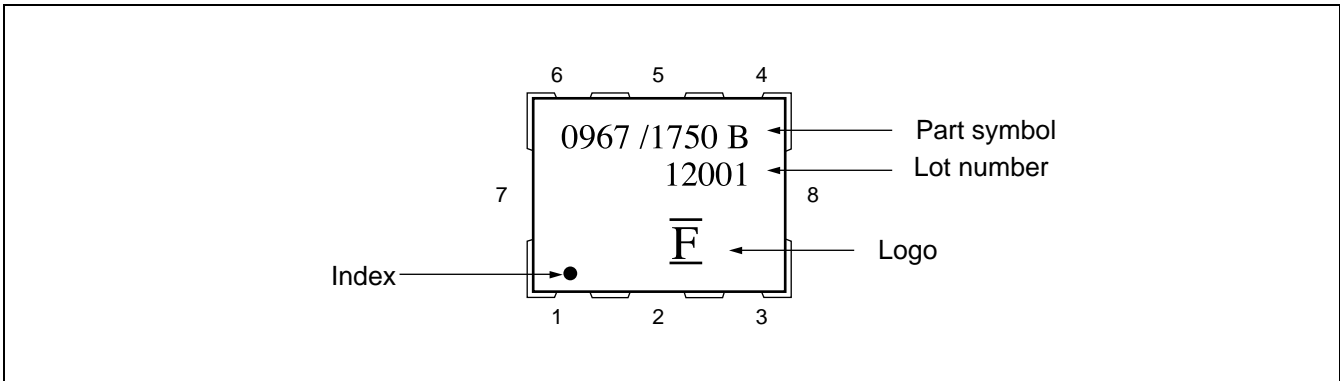
## Band2

(Ta = -30°C to +80°C)

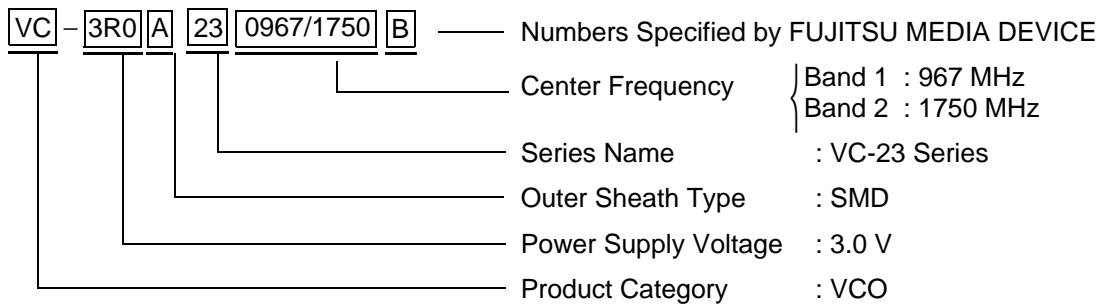
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I <sub>cc</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	—	—	10.0	mA
SW current	I <sub>sw</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	—	0.4	0.7	mA
Frequency	f <sub>min</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 0.3 V	—	—	1720.0	MHz
Frequency	f <sub>max</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 2.7 V	1780.0	—	—	MHz
Control voltage sensitivity	S <sub>vt</sub>	(f <sub>max</sub> – f <sub>min</sub> ) / 2.4	30.0	—	50.0	MHz/V
Oscillator output	P <sub>o</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	-5.0	—	1.0	dBm
C/N	C/N	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 0.3 kHz, BW = 1 Hz	—	—	-60.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 1 kHz, BW = 1 Hz	—	—	-70.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 10 kHz, BW = 1 Hz	—	—	-90.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 100 kHz, BW = 1 Hz	—	—	-115.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 625 kHz, BW = 1 Hz	—	—	-130.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset = 1250 kHz, BW = 1 Hz	—	—	-138.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, BW = 1 Hz, Offset = 1250 kHz (Ta = 25°C)	—	—	-139.0	dBc/Hz
		V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Offset > 2000 kHz, BW = 1 Hz	—	—	-141.0	dBc/Hz
Higher harmonics	P <sub>s</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, Up to 3rd	—	—	-10.0	dBc
Spurious	S <sub>p</sub>	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V	—	—	-80.0	dBc
Power supply variation	Push	V <sub>CC</sub> = 3.0 V ± 0.15 V, V <sub>t</sub> = 1.5 V	—	—	±1000	kHz
Load variation	Pull	V <sub>CC</sub> = 3.0 V, V <sub>t</sub> = 1.5 V, VSWR = 2, All phases	—	—	±1000	kHz
Temperature drift	T <sub>d</sub>	Ta = +25°C ± 55°C	—	—	±3000	kHz

# VC-23 Series

## ■ MARKING

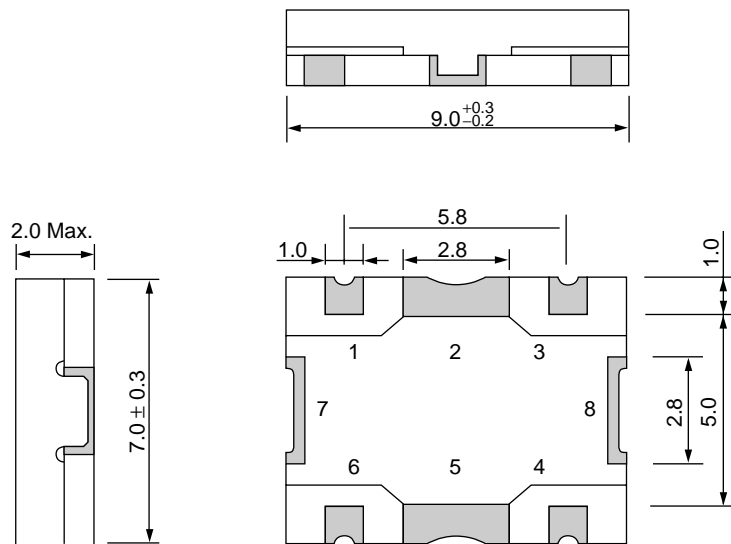


## ■ PART NUMBER DESIGNATION



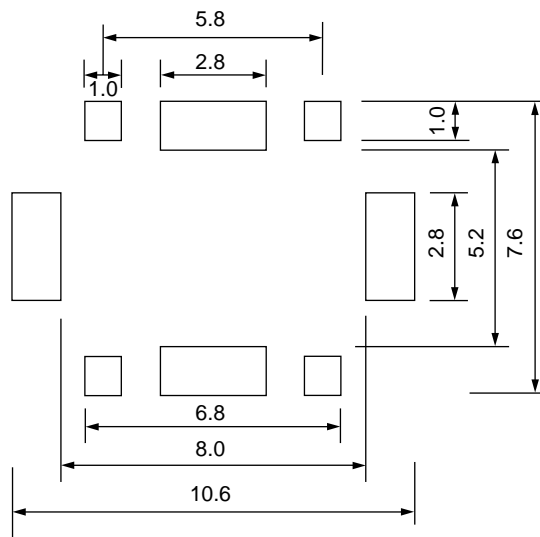
# VC-23 Series

## ■ PACKAGE DIMENSION



Dimensions in mm

## ■ RECOMMENDED PATTERN FOR SOLDERING

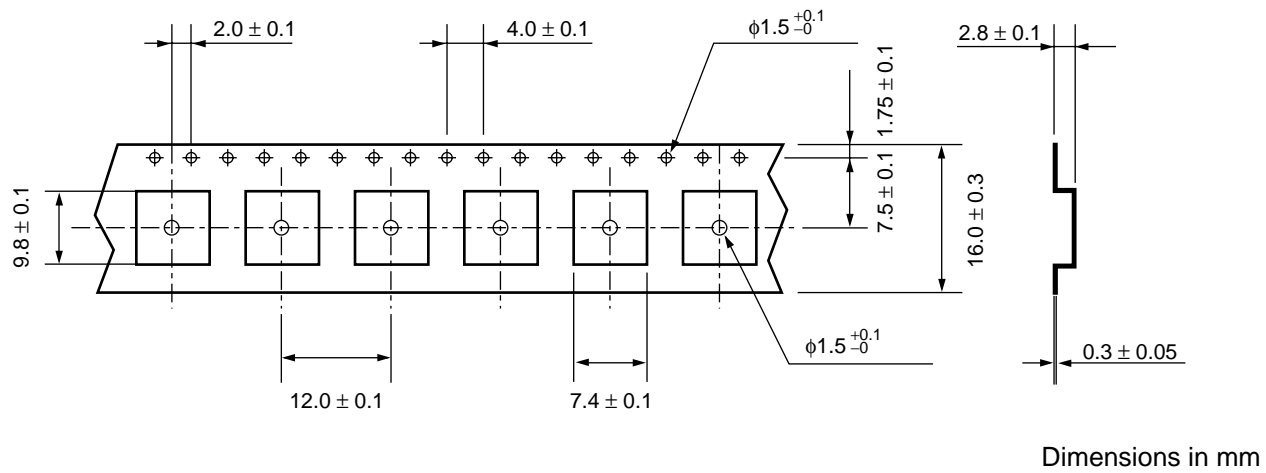


Dimensions in mm  
Dimension tolerance :  $\pm 0.1$  mm

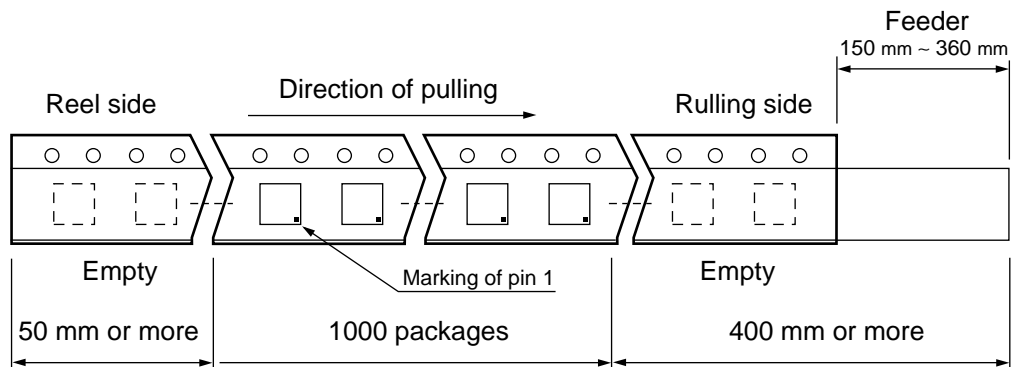
# VC-23 Series

## ■ TAPING AND PACKAGING

### (1) Carrier Tape and Packaging



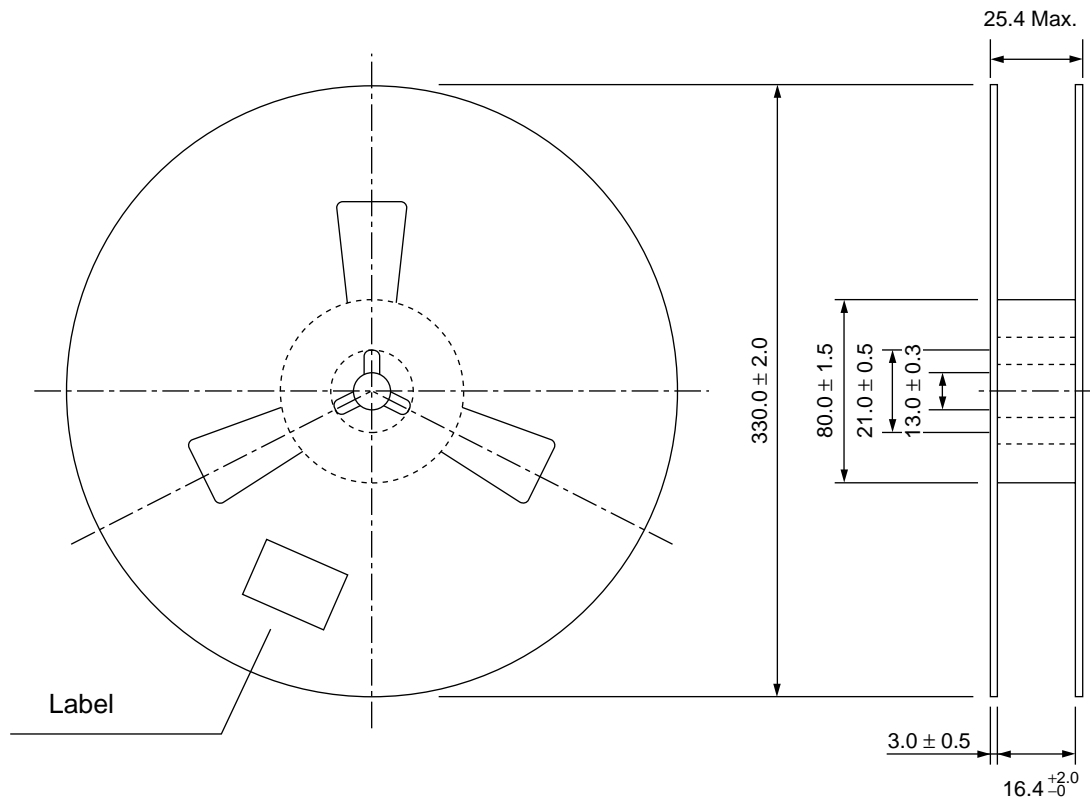
### (2) Taping Layout





# VC-23 Series

## (3) Reel Shape and Dimensions



Note : The label specifies the part number, quantity, and lot number.

Volume : 1000 pcs/reel

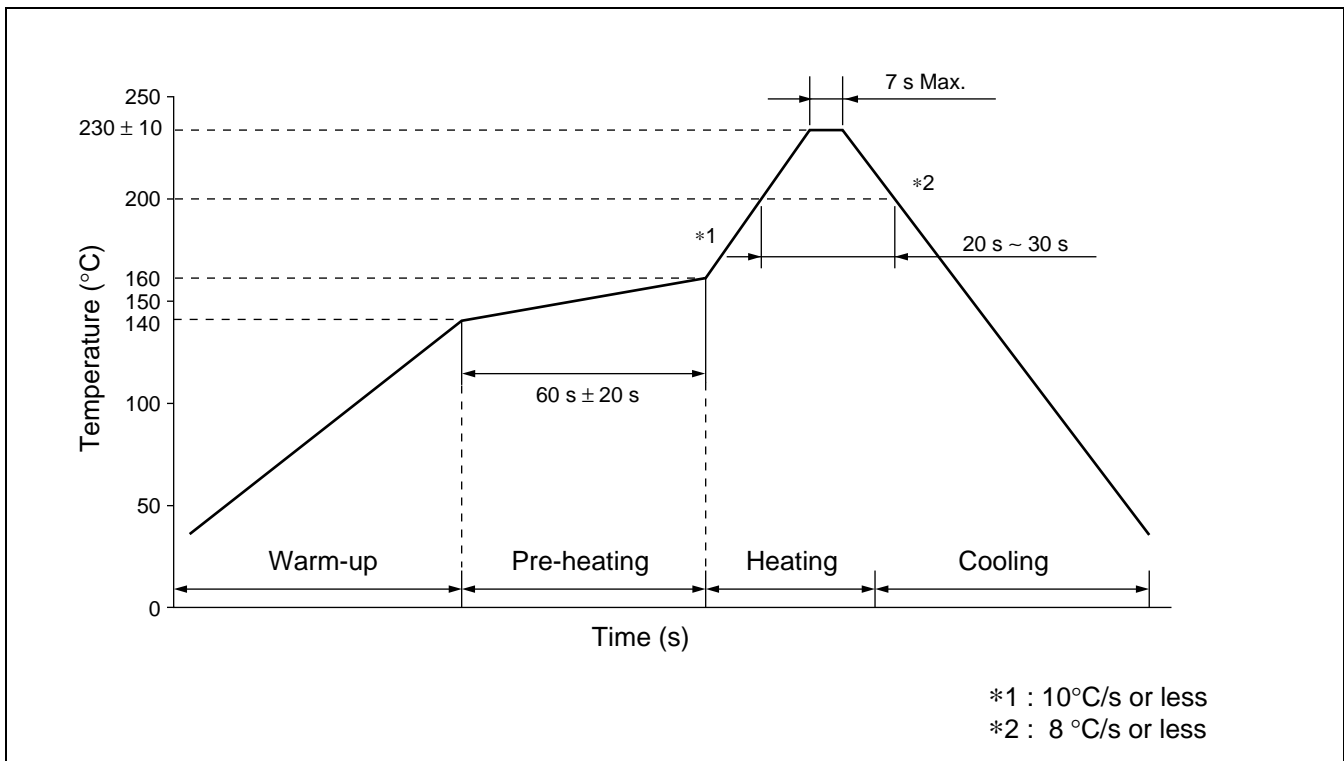
Type : (L)  $340 \times$  (W)  $340 \times$  (t) 30 (mm)

Dimensions in mm

# VC-23 Series

## ■ REFLOW MOUNTING CONDITIONS (RECOMMENDED)

- Perform mounting using the temperature profile shown below. To prevent thermal stress to the VCO, ensure gentle temperature gradients and use preheating whenever possible. (Recommended preheating: 140°C to 160°C for 60 s ± 20 s)
- Always consult FUJITSU MEDIA DEVICE beforehand if mounting more than once.
- Never remove a VCO that has already been mounted and attempt to reuse.
- For mounting, use a general-purpose flux suitable for mounting electronic components.



## ■ WASHING CONDITIONS

- Washing solution: Use isopropyl alcohol.
- Washing procedure: Immersion or steam cleaning is recommended.
- Washing time: For immersion: Less than 5 minutes at 40°C or less.  
For steam: Less than 2 minutes at 90°C or less is recommended.

# VC-23 Series

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