FUJITSU MEDIA DEVICE
DATA SHEET

DS04-21713-1E

ASSP for Mobile Telephone

VCO (800 to 2000 MHz)

VC-24 Series

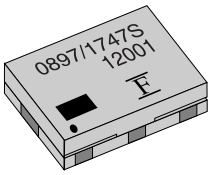
■ DESCRIPTION

With excellent C/N characteristics and low current consumption, this VCO series is suitable for use with GSM and DCS and is ideal to miniaturize dual-band mode products. The VC-24 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.

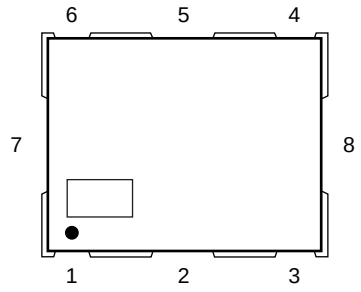
■ FEATURES

- 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 × 7.2 × 2.0 mm (Max.)
- SMD-type taping specifications suitable for automatic mounting and reflow soldering

■ PACKAGE



■ PIN ASSIGNMENT



■ PIN DESCRIPTION

Pin No.	Symbol	Description
1	Vt	Control voltage
2	GND	GND
3	V_{CC}	Power Supply Voltage
4	OUT	Output
5	GND	GND
6	V_{SW}	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
GSM/DCS	Tx	897	±17.5	2.8 ± 0.1	VC-2R8A24-0897/1747S
		1747	±37.5		
	Rx	1167	±17.5	2.8 ± 0.1	VC-2R8A24-1167/1617
		1617	±40		
	Rx	1202	±40	2.8 ± 0.1	VC-2R8A24-1202/1559P
		1559	±39		

■ ELECTRICAL CHARACTERISTICS

1. For GSM/DCS (Tx) (Part number : VC-2R8A24-0897/1747S)

• Absolute Maximum Ratings

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	—	+3.0	V
Control voltage	Vt	—	+3.0	V
SW voltage	V_{SW}	—	+3.0	V
Operating temperature	Ta	–10	+75	°C
Storage temperature	Tstg	–30	+85	°C
Storage humidity	Hstg	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_{SW} (V)		Center Frequency (MHz)	Current Consumption (mA) Typ.
		Min.	Max.		
GSM	Band1	0.0	0.1	897	0.0
DCS	Band2	2.7	2.8	1747	0.5

• **Electrical Characteristics**

Band1

(Ta = –10°C to +75°C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	38.0	mA
SW current	I_{SW}	V_{CC} = 2.8 V, Vt = 1.35 V, V_{SW} = 0 V	—	—	0.1	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.5 V	—	—	880.0	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.2 V	915.0	—	—	MHz
Control voltage sensitivity	Svt	(fmax – fmin) /1.7	32.0	38.0	44.0	MHz/V
Oscillator output	Po	V_{CC} = 2.8 V, Vt = 1.35 V	5.5	8.5	11.5	dBm
C/N	C/N	V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 10 kHz, BW = 1 Hz	—	—	–93.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 400 kHz, BW = 1 Hz	—	—	–123.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 10 MHz, BW = 1 Hz	—	—	–153.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 20 MHz, BW = 1 Hz	—	—	–162.0	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.35 V, Up to 3rd	—	—	–10.0	dBc
Power supply variation	Push	V_{CC} = 2.8 V ± 0.1 V, Vt = 1.35 V	—	—	±1000	kHz
Load variation	Pull	V_{CC} = 2.8 V , Vt = 1.35 V, VSWR = 2, All phases	—	—	±2000	kHz
Temperature drift	Td	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	±3000	kHz

Band2

(Ta = –10°C to +75°C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	38.0	mA
SW current	Isw	V_{CC} = 2.8 V, Vt = 1.35 V, V_{SW} = 2.8 V	—	—	1.0	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.5 V	—	—	1710.0	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.2 V	1785.0	—	—	MHz
Control voltage sensitivity	Svt	(fmax – fmin) /1.7	57.0	67.0	77.0	MHz/V
Oscillator output	Po	V_{CC} = 2.8 V, Vt = 1.35 V	4.5	7.5	10.5	dBm
C/N	C/N	V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 10 kHz, BW = 1 Hz	—	—	–90.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 400 kHz, BW = 1 Hz	—	—	–120.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 10 MHz, BW = 1 Hz	—	—	–150.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 20 MHz, BW = 1 Hz	—	—	–157.0	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.35 V, Up to 3rd	—	—	–10.0	dBc
Power supply variation	Push	V_{CC} = 2.8 V ± 0.1 V, Vt = 1.35 V	—	—	±2000	kHz
Load variation	Pull	V_{CC} = 2.8 V , Vt = 1.35 V, VSWR = 2, All phases	—	—	±4000	kHz
Temperature drift	Td	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	±5000	kHz

2. For GSM/DCS (Rx) (Part number : VC-2R8A24-1167/1617)

• Absolute Maximum Ratings

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	—	+3.0	V
Control voltage	Vt	—	+3.0	V
SW voltage	V_{SW}	—	+3.0	V
Operating temperature	Ta	–10	+75	°C
Storage temperature	Tstg	–30	+85	°C
Storage humidity	Hstg	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_{SW} (V)		Center Frequency (MHz)	Current Consumption (mA) Typ.
		Min.	Max.		
GSM	Band1	0.0	0.1	1167	0.0
DCS	Band2	2.7	2.8	1617	0.5

• Electrical Characteristics

Band1

(Ta = –10°C to +75°C)

Parameter	Sym-bol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	10.0	mA
SW current	Isw	V_{CC} = 2.8 V, Vt = 1.35 V, V_{SW} = 0 V	—	—	0.1	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.5 V	—	—	1150.0	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.2 V	1185.0	—	—	MHz
Control voltage sensitivity	Svt	(fmax – fmin) /1.7	29.0	36.0	43.0	MHz/V
Oscillator output	Po	V_{CC} = 2.8 V, Vt = 1.35 V	–6.0	–2.0	2.0	dBm
C/N	C/N	V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 10 kHz, BW = 1 Hz	—	—	–85.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 600 kHz, BW = 1 Hz	—	—	–123.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 1.6 MHz, BW = 1 Hz	—	—	–133.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 3 MHz, BW = 1 Hz	—	—	–142.0	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	–10.0	dBc
Power supply variation	Push	V_{CC} = 2.8 V ± 0.1 V, Vt = 1.35 V	—	—	±1000	kHz
Load variation	Pull	V_{CC} = 2.8 V , Vt = 1.35 V, VSWR = 2, All phases	—	—	±1500	kHz
Temperature drift	Td	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	±3000	kHz

Band2

(Ta = –10°C to +75°C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	10.0	mA
SW current	I_{SW}	V_{CC} = 2.8 V, Vt = 1.35 V, V_{SW} = 2.8 V	—	—	1.0	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.5 V	—	—	1577.5	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.2 V	1657.5	—	—	MHz
Control voltage sensitivity	Svt	(fmax – fmin) /1.7	56.0	66.0	76.0	MHz/V
Oscillator output	Po	V_{CC} = 2.8 V, Vt = 1.35 V	–6.0	–2.0	+2.0	dBm
C/N	C/N	V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 10 kHz, BW = 1 Hz	—	—	–85.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 400 kHz, BW = 1 Hz	—	—	–123.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 10 MHz, BW = 1 Hz	—	—	–133.0	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 20 MHz, BW = 1 Hz	—	—	–140.0	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.35 V, Up to 3rd	—	—	–10.0	dBc
Power supply variation	Push	V_{CC} = 2.8 V ± 0.1 V, Vt = 1.35 V	—	—	±1500	kHz
Load variation	Pull	V_{CC} = 2.8 V , Vt = 1.35 V, VSWR = 2, All phases	—	—	±2000	kHz
Temperature drift	Td	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	±5000	kHz

3. For GSM/DCS (Rx) (Part number : VC-2R8A24-1202/1559P)

• **Absolute Maximum Ratings**

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	0.0	+3.0	V
Control voltage	Vt	0.0	+2.5	V
SW voltage	V_{SW}	0.0	+3.0	V
Operating temperature	Ta	–20	+75	°C
Storage temperature	Tstg	–35	+85	°C
Storage humidity	Hstg	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_{SW} (V)		Center Frequency (MHz)	Current Consumption (mA) Typ.
		Min.	Max.		
GSM	Band1	0.0	0.3	1202	0.0
DCS	Band2	2.5	2.8	1559	0.4

• **Electrical Characteristics**

Band1

(Ta = –20°C to +75°C)

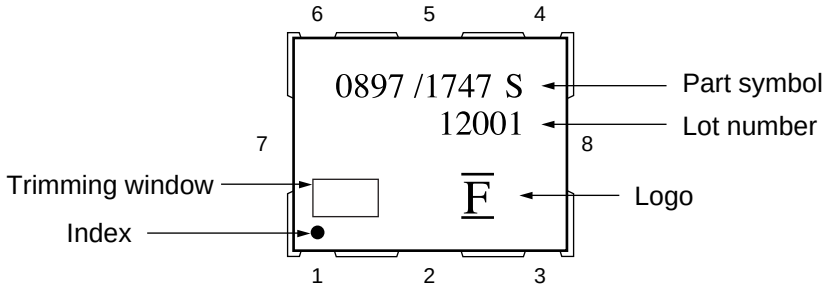
Parameter	Sym-bol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.5 V	—	—	9.0	mA
SW current	I_{SW}	V_{CC} = 2.8 V, Vt = 1.5 V, V_{SW} = 0 V	—	—	0.1	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.8 V	—	—	1162.0	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.2 V	1242.0	—	—	MHz
Control voltage sensitivity	Svt	(fmax – fmin) /1.4	66.0	76.0	86.0	MHz/V
Oscillator output	Po	V_{CC} = 2.8 V, Vt = 1.5 V	–5.0	–2.0	1.0	dBm
C/N	C/N	V_{CC} = 2.8 V, Vt = 1.5 V, Offset = 10 kHz, BW = 1 Hz	85.0	—	—	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.5 V, Offset = 3000 kHz, BW = 1 Hz	140.0	—	—	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.5 V, Up to 3rd	—	—	–10.0	dBc
Spurious	S_P	V_{CC} = 2.8 V, Vt = 1.5 V, Offset = 3 MHz (Min.)	—	—	–87.0	dBc
Power supply variation	Push	V_{CC} = 2.8 V ± 0.1 V, Vt = 1.5 V	—	—	±1000	kHz
Load variation	Pull	V_{CC} = 2.8 V, Vt = 1.5 V, VSWR = 2, All phases	—	—	±2000	kHz

Band2

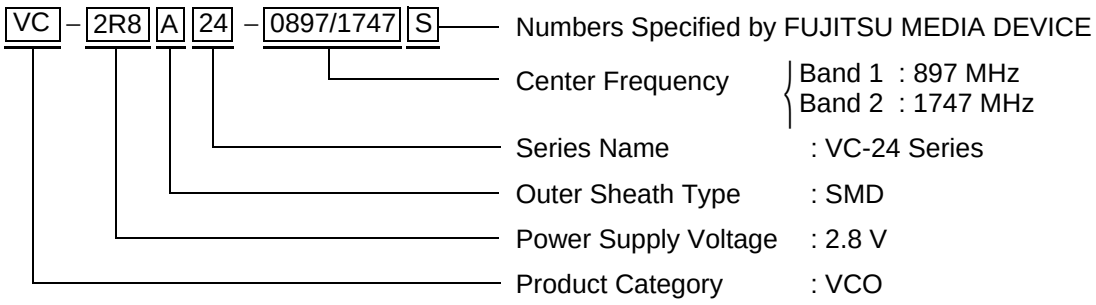
(Ta = –20°C to +75°C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.5 V	—	—	10.5	mA
SW current	I_{SW}	V_{CC} = 2.8 V, Vt = 1.5 V, V_{SW} = 2.8 V	—	—	1.0	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.8 V	—	—	1520.0	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.2 V	1598.0	—	—	MHz
Control voltage sensitivity	Svt	(fmax – fmin) /1.4	88.0	98.0	108.0	MHz/V
Oscillator output	Po	V_{CC} = 2.8 V, Vt = 1.5 V	–6.0	–2.0	2.0	dBm
C/N	C/N	V_{CC} = 2.8 V, Vt = 1.5 V, Offset = 10 kHz, BW = 1 Hz	85.0	—	—	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.5 V, Offset = 3000 kHz, BW = 1 Hz	135.0	—	—	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.5 V, 2nd, 3rd	—	—	–10.0	dBc
Spurious	S_P	V_{CC} = 2.8 V, Vt = 1.5 V, Offset = 3 MHz (Min.)	—	—	–82.0	dBc
Power supply variation	Push	V_{CC} = 2.8 V ± 0.1 V, Vt = 1.5 V	—	—	±1000	kHz
Load variation	Pull	V_{CC} = 2.8 V, Vt = 1.5 V, VSWR = 2, All phases	—	—	±2000	kHz

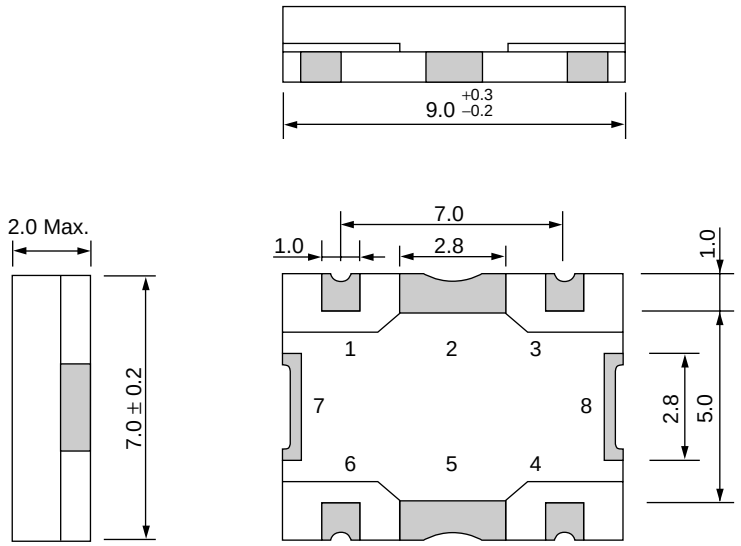
■ MARKING



■ PART NUMBER DESIGNATION

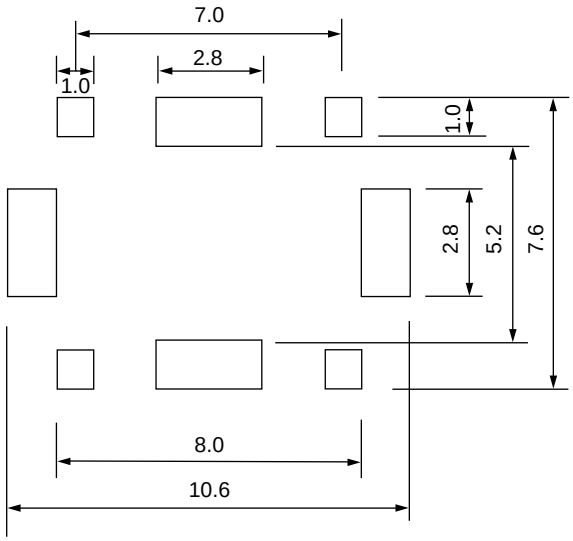


■ PACKAGE DIMENSION



Dimensions in mm

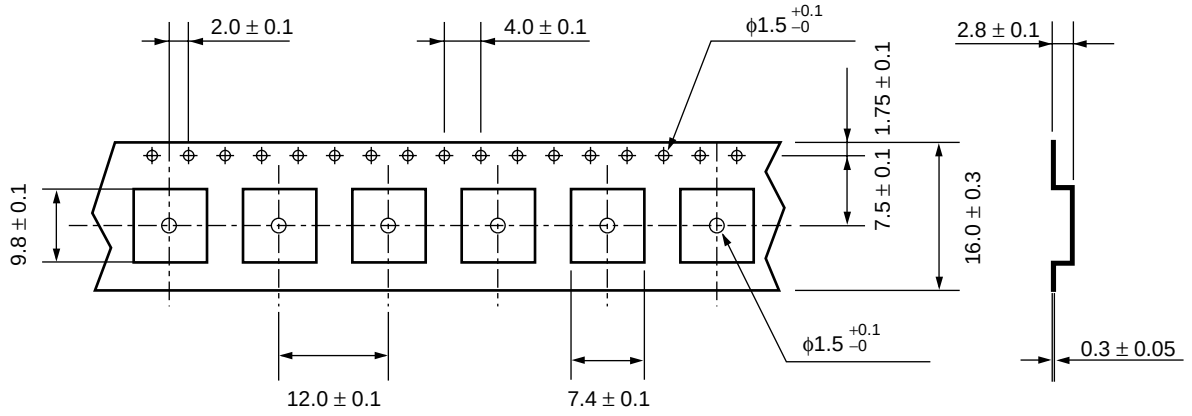
■ RECOMMENDED PATTERN FOR SOLDERING



Dimensions in mm
Dimension tolerance : ± 0.1 mm

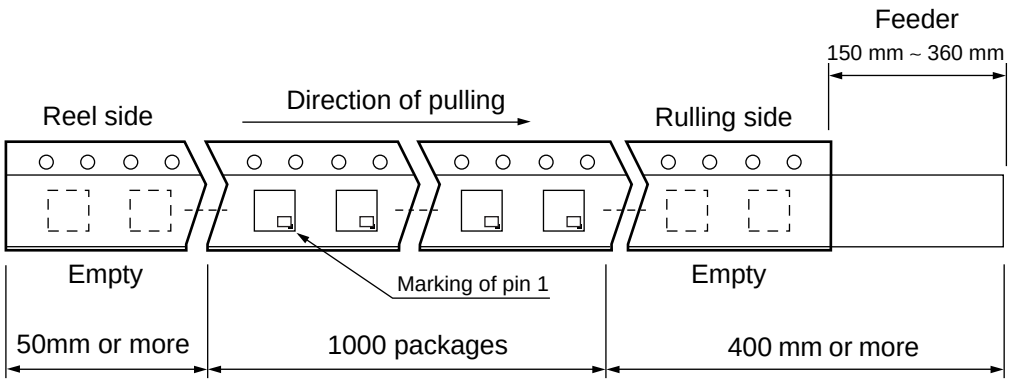
■ TAPING AND PACKAGING

(1) Carrier Tape and Packaging

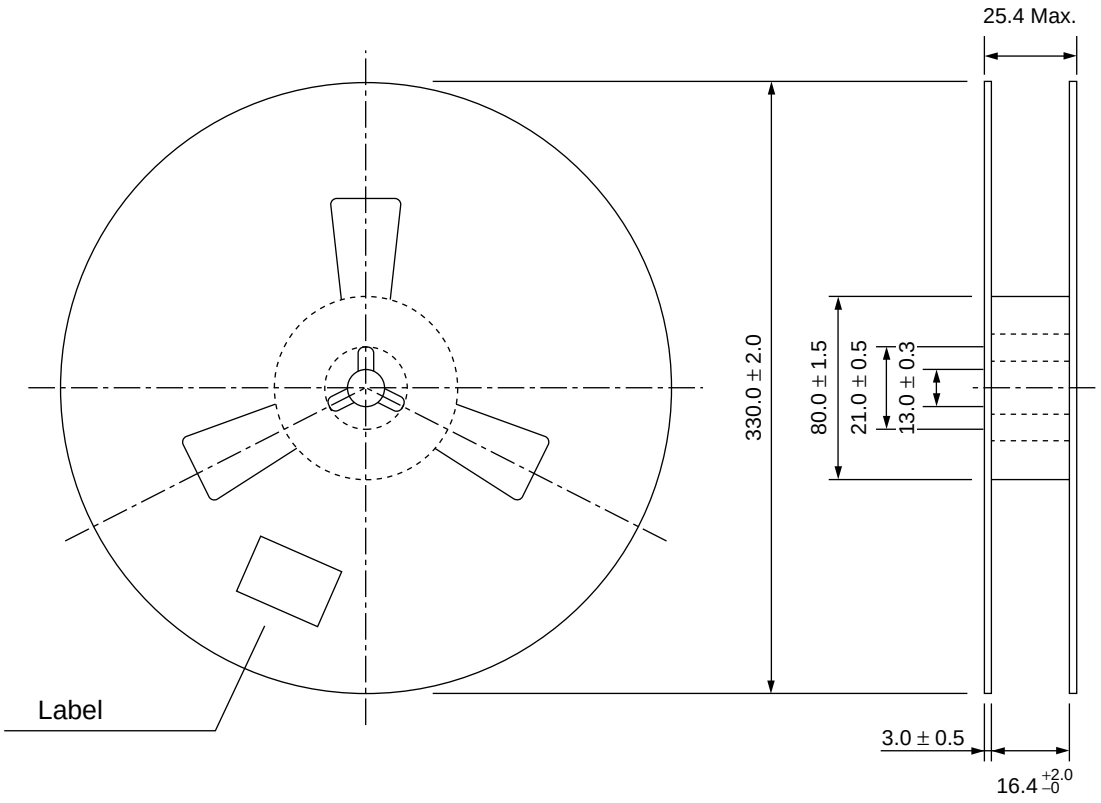


Dimensions in mm

(2) Taping Layout



(3) Reel Shape and Dimensions



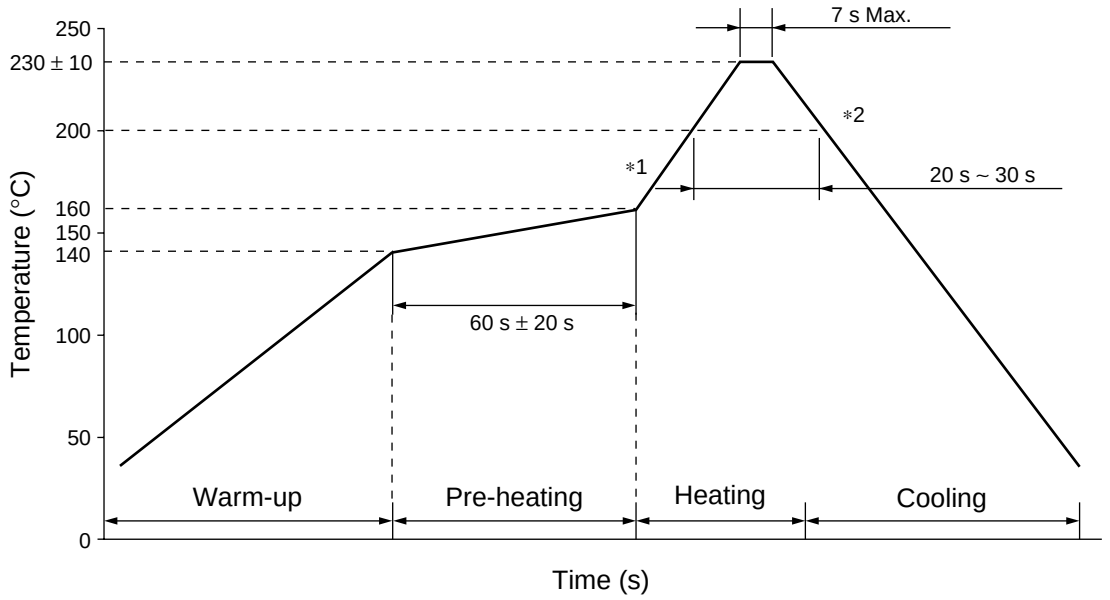
Note : The label specifies the part number, quantity, and lot number.

Volume : 1000 pcs/reel
Type : (L) 340 × (W) 340 × (t) 30 (mm)

Dimensions in mm

■ 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.
- 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.



∗1 : 10°C/s or less
∗2 : 8°C/s or less

■ 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.

FUJITSU MEDIA DEVICES LIMITED

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