FUJITSU MEDIA DEVICE
DATA SHEET

DS04-21715-1E

ASSP for Mobile Telephone

VCO (700 to 2000 MHz)

VC-30 Series

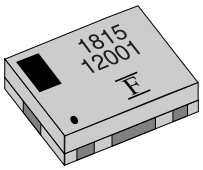
■ DESCRIPTION

With excellent C/N characteristics and low current consumption, this VCO series is ideal for CDMA, PCS and GSM mobile communication equipment. The VC-30 series can be used in any frequency band in the 700MHz to 2000MHz 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

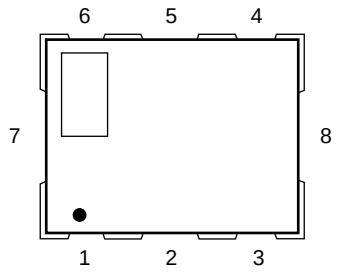
- Superior noise characteristics (C/N, S/N)
- High level of stability in response to ambient temperature and load variations
- FUJITSU MEDIA DEVICE's proprietary fabrication process provides the uniformity of the central frequency distribution
- Small size, light-weight, slim-package : 7.9 × 5.8 × 2.0 mm (Typ.)
- SMD-type taping specifications suitable for automatic mounting and reflow soldering

■ PACKAGE



■ PIN ASSIGNMENT

(TOP VIEW)



■ 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	GND	GND
7	GND	GND
8	GND	GND

■ PRODUCT LINEUP (STANDARD MODELS)

System	Center Frequency (MHz)	Band Width (MHz)	Power Supply Voltage (V)	Part Number
CDMA	1591	±10	2.8 ± 0.2	VC-2R8A30-1591
	967	±13	3.35 ± 0.25	VC-3R3A30-0967
PCS	1750	±30	3.3 ± 0.15	VC-3R3A30-1750
K-PCS	1635	±15	3.3 ± 0.15	VC-3R3A30-1635
GSM	1815	±105	2.8 ± 0.1	VC-2R8A30-1815

■ ELECTRICAL CHARACTERISTICS

1. For CDMA (Part number : VC-2R8A30-1591)

• Absolute Maximum Ratings

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	—	+ 3.0	V
Control voltage	Vt	—	+ 2.5	V
Operating temperature	Ta	–20	+85	°C
Storage temperature	Tstg	–35	+90	°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.

• Electrical Characteristics

(Ta = +25 °C±3 °C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	6.2	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.5 V	—	—	1581.0*	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.2 V	1601.0*	—	—	MHz
Control voltage sensitivity	kv	(fmax – fmin) / 1.7	25.0	—	37.0	MHz/V
Oscillator output	P_O	V_{CC} = 2.8 V, Vt = 1.35 V	–5.0	—	1.0	dBm
C/N	C/N	V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 1 kHz, BW = 1 Hz	65.0*	—	—	dBc/Hz
		V_{CC} = 2.8 V, Vt = 1.35 V, Offset = 20 kHz, BW = 1 Hz	96.0*	—	—	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.35 V, 2nd, 3rd	—	—	–10.0	dBc
Power supply variation	Push	V_{CC} = 2.8 V ± 0.2 V, Vt = 1.35 V	—	—	±1000	kHz
Load variation	Pull	V_{CC} = 2.8 V, Vt = 1.35 V, VSWR = 2 ALL PHASE	—	—	±1000	kHz
Temperature drift	Td	Ta = +25 (+60/–45) °C	—	—	±4000*	kHz

* : Ta = –20 °C to +85 °C

2. For CDMA (Part number : VC-3R3A30-0967)

• Absolute Maximum Ratings

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	—	+ 7.0	V
Operating temperature	Ta	–30	+80	°C
Storage temperature	Tstg	–40	+90	°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.

• Electrical Characteristics

(Ta = +25 °C ± 3 °C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 3.35 V, Vt = 1.7 V	—	—	6.0 6.4*	mA
Frequency	fmin	V_{CC} = 3.35 V, Vt = 0.7 V	—	—	954.0*	MHz
Frequency	fmax	V_{CC} = 3.35 V, Vt = 2.7 V	980.0*	—	—	MHz
Control voltage sensitivity	kv	(fmax – fmin) / 2.0	18.0*	23.0	28.0*	MHz/V
Oscillator output	P_O	V_{CC} = 3.35 V, Vt = 1.7 V	–5.0 –6.0*	–2.5 —	0.0 1.0*	dBm
C/N	C/N	V_{CC} = 3.35 V, Vt = 1.7 V, Offset = 1 kHz, BW = 1 Hz	70.0*	—	—	dBc/Hz
		V_{CC} = 3.35 V, Vt = 1.7 V, Offset = 10 kHz, BW = 1 Hz	100.0*	—	—	dBc/Hz
		V_{CC} = 3.35 V, Vt = 1.7 V, Offset = 30 kHz, BW = 1 Hz	110.0*	—	—	dBc/Hz
		V_{CC} = 3.35 V, Vt = 1.7 V, Offset = 60 kHz, BW = 1 Hz	115.0*	—	—	dBc/Hz
Higher harmonics	Hs	V_{CC} = 3.35 V, Vt = 1.7 V, 2nd, 3rd	—	—	–10.0*	dBc
Spurious	Sp	V_{CC} = 3.35 V, Vt = 1.7 V	—	—	–70.0*	dBc
Power supply variation	Push	V_{CC} = 3.35 V±0.25 V, Vt = 1.7 V	—	—	±800*	kHz
Load variation	Pull	V_{CC} = 3.35 V, Vt = 1.7 V, VSWR = 2 ALL PHASE	—	—	±1000*	kHz
Temperature drift	Td	Ta = +25 °C ± 55 °C	—	—	±3000*	kHz

* : Ta = –30 °C to +80 °C

3. For PCS (Part number : VC-3R3A30-1750)

• Absolute Maximum Ratings

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	—	+ 5.0	V
Control voltage	Vt	—	+ 5.0	V
Operating temperature	Ta	–30	+80	°C
Storage temperature	Tstg	–40	+125	°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.

- **Electrical Characteristics**

(Ta = –30 °C to +80 °C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 3.3 V, Vt = 1.65 V	—	—	8.5	mA
Frequency	fmin	V_{CC} = 3.3 V, Vt = 0.3 V	—	—	1720.0	MHz
Frequency	fmax	V_{CC} = 3.3 V, Vt = 3.0 V	1780.0	—	—	MHz
Control voltage sensitivity	kv	(fmax – fmin) / 2.7	28.0	34.0	40.0	MHz/V
Oscillator output	P_O	V_{CC} = 3.3 V, Vt = 1.65 V	–5.0	–2.0	1.0	dBm
C/N	C/N	V_{CC} = 3.3 V, Vt = 1.65 V, Offset = 300 Hz, BW = 1 Hz	60.0	—	—	dBc/Hz
		V_{CC} = 3.3 V, Vt = 1.65 V, Offset = 1 kHz, BW = 1 Hz	70.0	—	—	dBc/Hz
		V_{CC} = 3.3 V, Vt = 1.65 V, Offset = 10 kHz, BW = 1 Hz	90.0	—	—	dBc/Hz
		V_{CC} = 3.3 V, Vt = 1.65 V, Offset = 100 kHz, BW = 1 Hz	110.0	—	—	dBc/Hz
		V_{CC} = 3.3 V, Vt = 1.65 V, Offset = 625 kHz, BW = 1 Hz	129.0	—	—	dBc/Hz
		V_{CC} = 3.3 V, Vt = 1.65 V, Offset = 1.25 MHz, BW = 1 Hz	135.0	—	—	dBc/Hz
		V_{CC} = 3.3 V, Vt = 1.65 V, Offset ≥ 2 MHz, BW = 1 Hz	139.0	—	—	dBc/Hz
Higher harmonics	Hs	V_{CC} = 3.3 V, Vt = 1.65 V, Up to 3rd	—	—	–10.0	dBc
Spurious	Sp	V_{CC} = 3.3 V, Vt = 1.65 V, Up to 6 GHz	—	—	–70	dBc
		V_{CC} = 3.3 V, Vt = 1.65 V, Carrier±100 MHz	—	—	–80	dBc
Power supply variation	Push	V_{CC} = 3.3 V ± 0.15 V, Vt = 1.65 V	—	—	±600	kHz
Load variation	Pull	V_{CC} = 3.3 V, Vt = 1.65 V, VSWR = 2 ALL PHASE	—	—	±1200	kHz
Temperature drift	Td	Ta = +25 °C ± 55 °C	—	—	±6000	kHz

4. For K-PCS (Part number : VC-3R3A30-1635)

- **Absolute Maximum Ratings**

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	—	+ 6.0	V
Operating temperature	Ta	–20	+70	°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.

- **Electrical Characteristics**

(Ta = +25 °C ± 3 °C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 3.3 V, Vt = 1.5 V	—	—	8.5	mA
Frequency	fmin	V_{CC} = 3.3 V, Vt = 0.5 V	—	—	1620.0	MHz
Frequency	fmax	V_{CC} = 3.3 V, Vt = 2.5 V	1650.0	—	—	MHz
Control voltage sensitivity	kv	(fmax – fmin) / 2	22.0	27.0	32.0	MHz/V
Oscillator output	P_O	V_{CC} = 3.3 V, Vt = 1.5 V	–3.0	0.0	3.0	dBm
C/N	C/N	V_{CC} = 3.3 V, Vt = 1.5 V, Offset = 100 kHz, BW = 1 Hz	110.0	—	—	dBc/Hz
Higher harmonics	Hs	V_{CC} = 3.3 V, Vt = 1.5 V, 2nd, 3rd	—	—	–10.0	dBc
Power supply variation	Push	V_{CC} = 3.3 V ± 0.15 V, Vt = 1.5 V	—	—	±1000	kHz
Load variation	Pull	V_{CC} = 3.3 V, Vt = 1.5 V, VSWR = 2 ALL PHASE	—	—	±1000	kHz
Temperature drift	Td	Ta = +25 °C ± 45 °C	—	—	±3000	kHz

5. For GSM (Part number : VC-2R8A30-1815)

• Absolute Maximum Ratings

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Input DC voltage	V_{CC}	—	+ 3.0	V
Control voltage	Vt	—	+ 2.5	V
Operating temperature	Ta	–25	+70	°C
Storage temperature	Tstg	–40	+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.

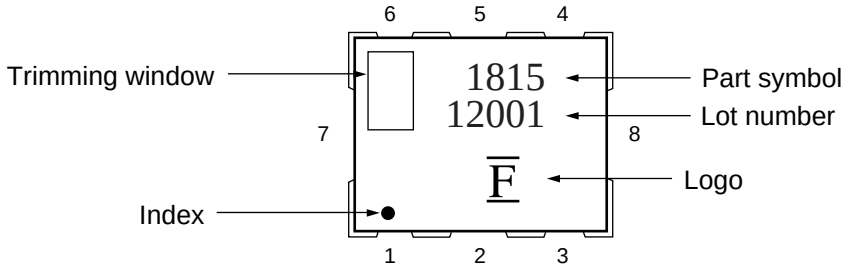
• Electrical Characteristics

(Ta = +25 °C ± 3 °C)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Current consumption	I_{CC}	V_{CC} = 2.8 V, Vt = 1.35 V	—	—	20.0*	mA
Frequency	fmin	V_{CC} = 2.8 V, Vt = 0.3 V	—	—	1710.0*	MHz
Frequency	fmax	V_{CC} = 2.8 V, Vt = 2.4 V	1920.0*	—	—	MHz
Control voltage sensitivity	kv	(fmax – fmin) / 2.1	110.0*	—	140.0*	MHz/V
Oscillator output	P_O	V_{CC} = 2.8 V, Vt = 1.35 V	3.0 2.0*	—	7.0 8.0*	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	118.0*	—	—	dBc/Hz
Higher harmonics	Hs	V_{CC} = 2.8 V, Vt = 1.35 V, Up to 3rd	—	—	–15.0*	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 PHASE	—	—	±2000*	kHz
Temperature drift	Td	Ta = +25 (+45/–50) °C	—	—	±8000*	kHz

* : Ta = –25 °C to +70 °C

■ MARKING

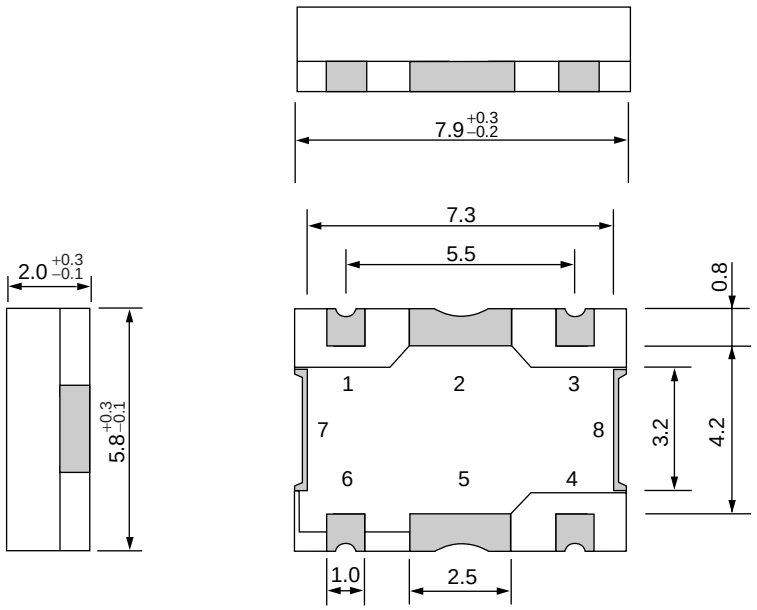


■ PART NUMBER DESIGNATION

VC – 2R8 A 30 – 1815

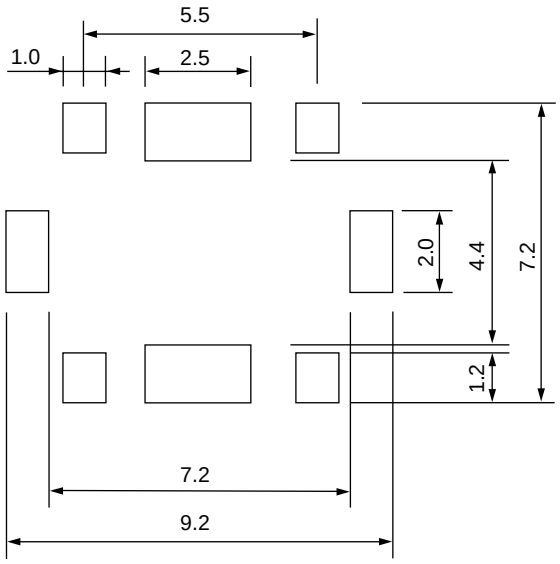
Center Frequency	: 1815 MHz
Series Name	: VC-30 Series
Outer Sheath Type	: SMD
Power Supply Voltage	: 2.8 V
Product Category	: VCO

■ PACKAGE DIMENSION



Dimensions in mm

■ RECOMMENDED PATTERN FOR SOLDERING

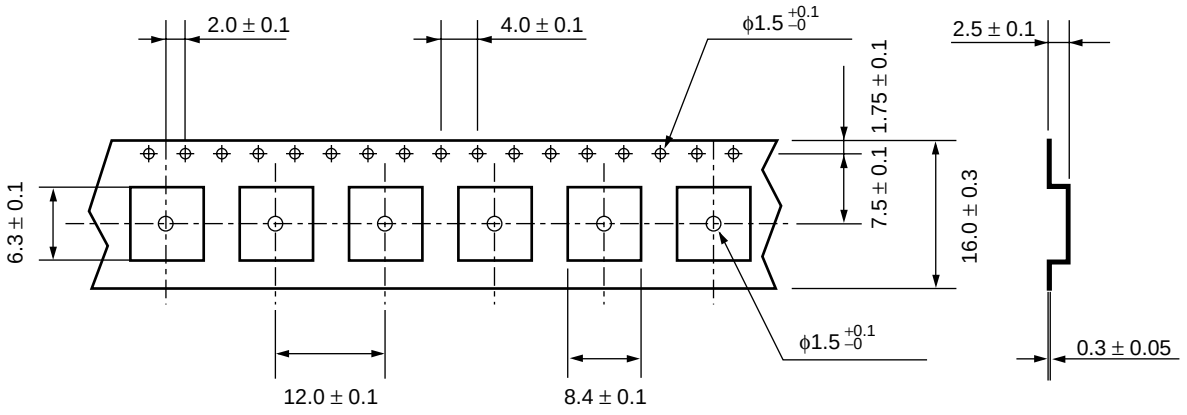


Dimensions in mm
Dimension tolerance : ± 0.1 mm

■ TAPING AND PACKAGING

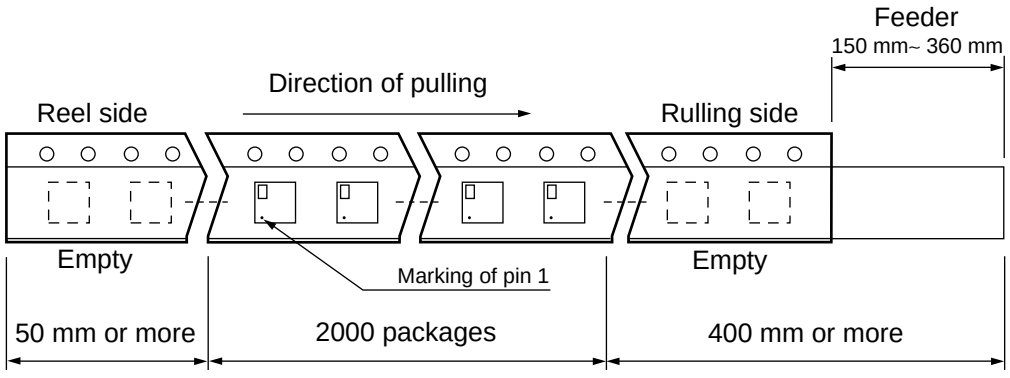
- **Volume : 2000 pcs/reel**

(1) Carrier Tape and Packaging



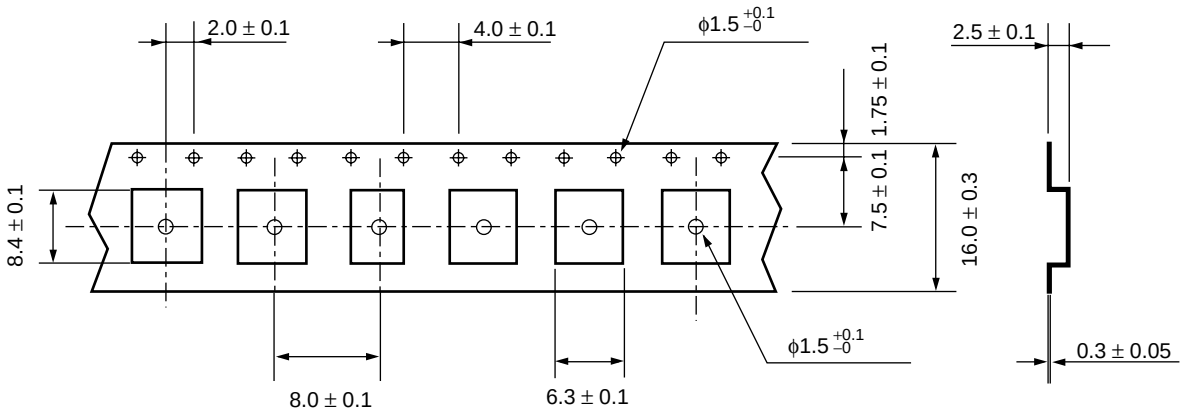
Dimensions in mm

(2) Taping Layout



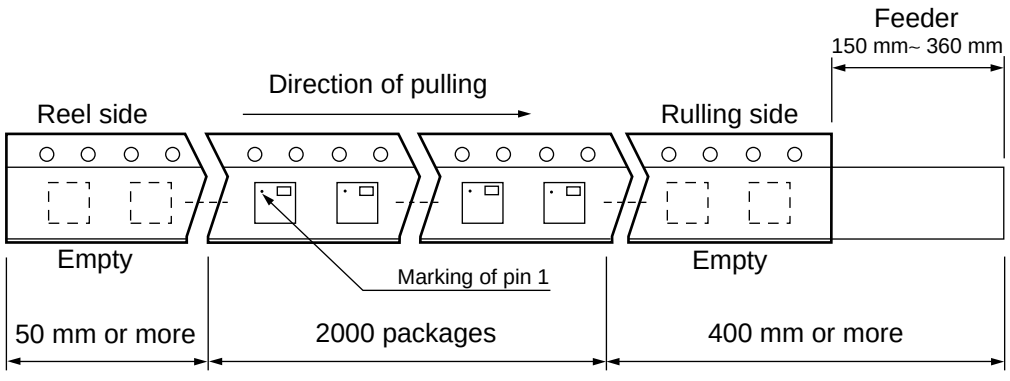
- **Volume : 3000 pcs/reel**

(1) Carrier Tape and Packaging

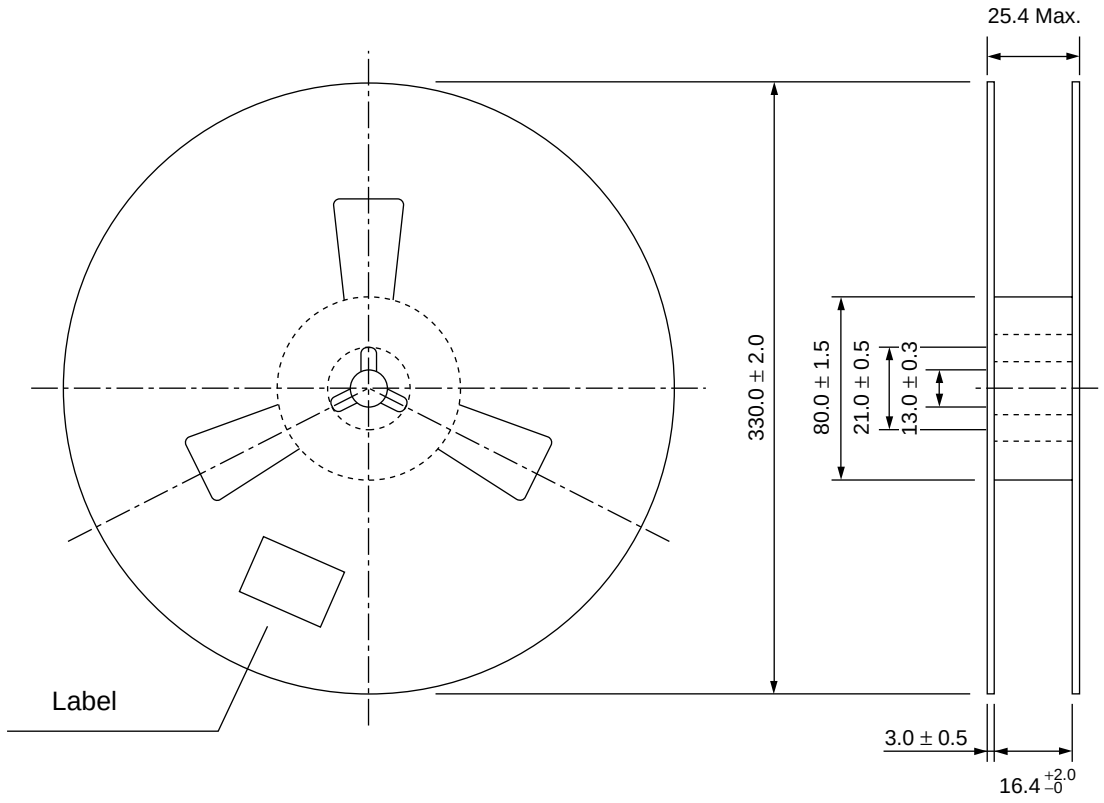


Dimensions in mm

(2) Taping Layout



- **Reel Shape and Dimensions**



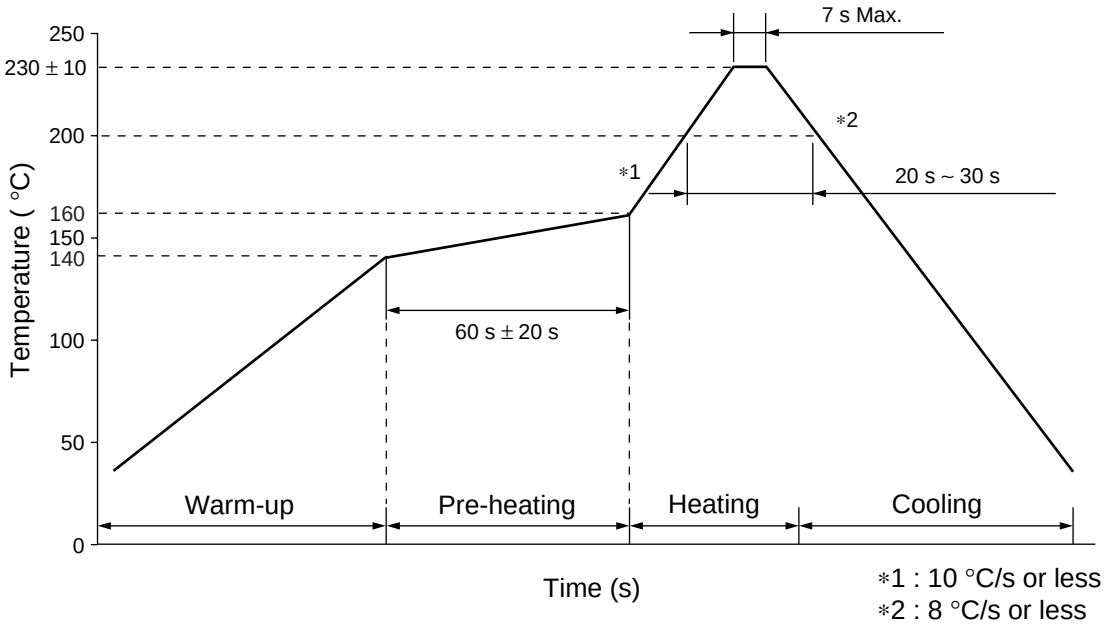
Note : The label specifies the part number, quantity, and lot number.

Volume : 2000 pcs/reel or 3000 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. (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.

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F0101

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