FUJITSU SEMICONDUCTOR
DATA SHEET

DS04-23119-4E

ASSP Mobile Communication Systems

Piezoelectric SAW BPF (700 MHz to 1000 MHz)

F5CM Series (B2)

■ DESCRIPTION

The F5CM series of SAW filters have balanced in/unbalanced out or unbalanced in/balanced out of I/O ports. Therefore these filters are suitable for the design using balanced type of IC. By using these filters, any transforming devises, such as balun is not required.

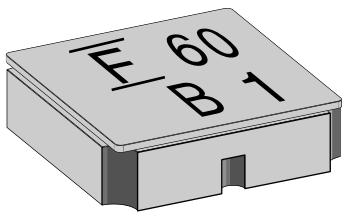
The F5CM series filters apply to the frequency range 700 MHz to 1000 MHz. High performance has been realized with high reliability and small size by using original materials and original design.

The F5CM series filters are suitable for RF interstage filter in mobile communication systems and standard parts are available for GSM and AMPS/TDMA/CDMA standards.

■ FEATURES

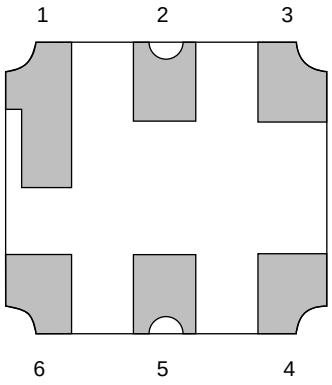
- Balanced/unbalanced I/O ports
- Ultra compact and light package (3.0 mm × 3.0 mm package)
- Any external matching network is not required
- Excellent stop-band attenuation
- Small pass-band ripple
- Surface mount package (SMT)

■ PACKAGE



■ PIN ASSIGNMENT

(BOTTOM VIEW)



■ PIN DESCRIPTIONS

• BALANCED IN/UNBALANCED OUT type (Tx filter)

Pin no.	Pin name	Description
1	GND	Ground Pin
2	OUT	Unbalanced output Pin
3	GND	Ground Pin
4	IN	Balanced Input Pin
5	GND	Ground Pin
6	IN	Balanced Input Pin

• UNBALANCED IN/BALANCED OUT type (Rx filter)

Pin no.	Pin name	Description
1	GND	Ground Pin
2	IN	Unbalanced Input Pin
3	GND	Ground Pin
4	OUT	Balanced Output Pin
5	GND	Ground Pin
6	OUT	Balanced Output Pin

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Operating temperature	Ta	–30	+85	°C
Storage temperature	Tstg	–40	+100	°C
Input power	P_{IN}	—	+15	dBm
Input DC Voltage	—	–5	+5	V

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

■ RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Value		Unit
		Min.	Max.	
Operating temperature	Ta	–30	+85	°C

WARNING: The recommended operating conditions are required in order to ensure the normal operation of the piezoelectric device. All of the device's electrical characteristics are warranted when the device is operated within this range.

Always use piezoelectric devices within their recommended operating conditionranges. Operation outside these ranges may adversely affect reliability and could result in device failure.

No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet. Users considering application outside the listed conditions are advised to contact their FUJITSU representatives beforehand.

■ STANDARD DEVICES

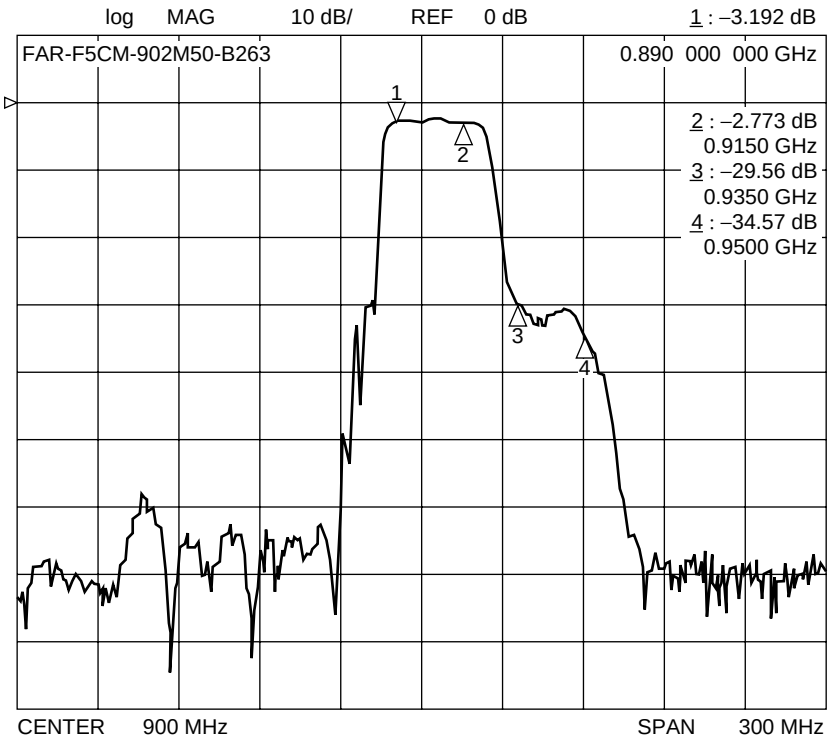
System		Frequency (MHz)	Band width (MHz)	Input type/ Impedance	Output type/ Impedance	Part number	Part symbol
GSM	Tx	902.5	25	Balance 50 Ω	Unbalance 50 Ω	FAR-F5CM-902M50-B263	63
	Rx	947.5	25	Unbalance 50 Ω	Balance 50 Ω	FAR-F5CM-947M50-B260	60
					Balance 150 Ω	FAR-F5CM-947M50-B262	62
EGSM	Rx	942.5	25	Unbalance 50 Ω	Balance 50 Ω	FAR-F5CM-942M50-B270	70
AMPS/ TDMA/ CDMA	Tx	836.5	25	Balance 50 Ω	Unbalance 50 Ω	FAR-F5CM-836M50-B268	68
	Rx	881.5	25	Unbalance 50 Ω	Balance 50 Ω	FAR-F5CM-881M50-B266	66

■ ELECTRICAL CHARACTERISTICS AND TYPICAL FREQUENCY RESPONSE

1. GSM (Tx) 50 ohms Balanced IN/50 ohms Unbalanced OUT
Part number : FAR-F5CM-902M50-B263

(Ta = –30 °C to +85 °C)

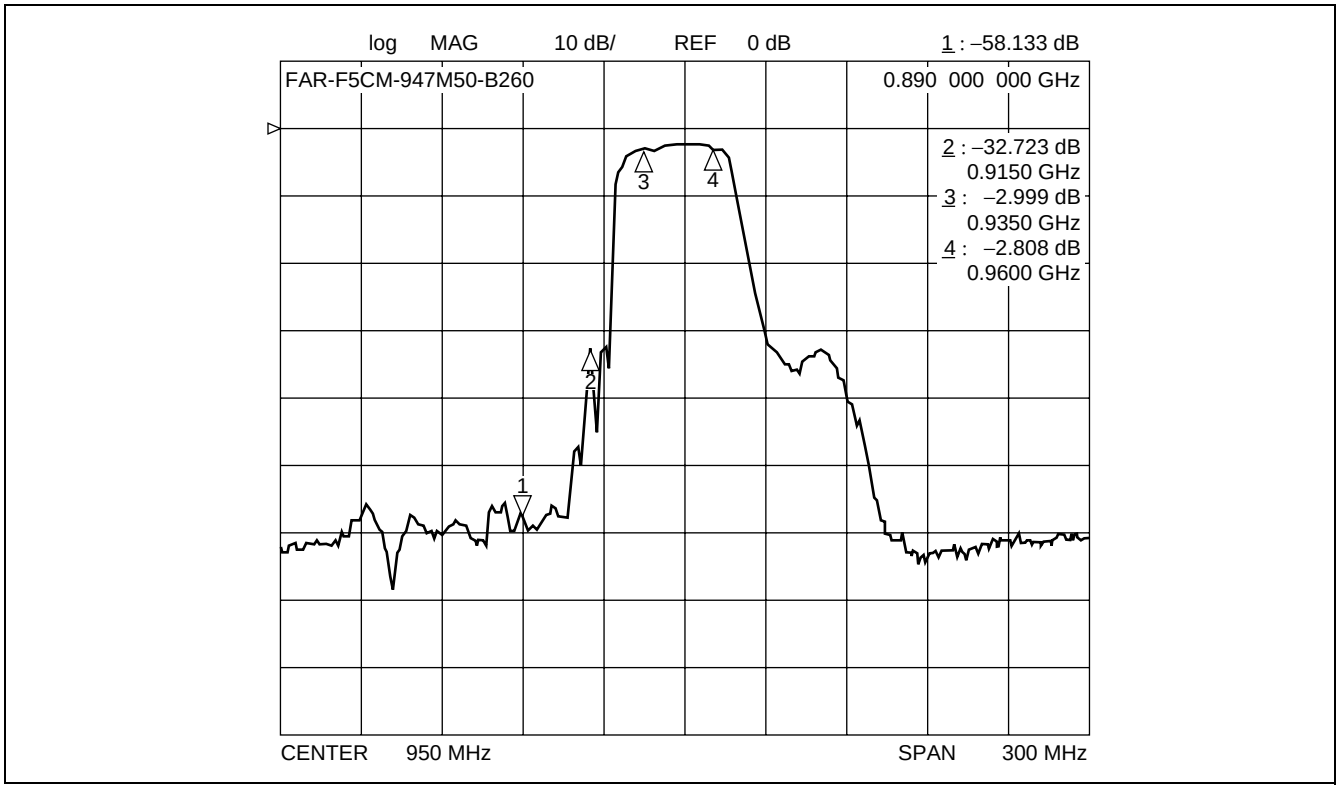
Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	890 MHz to 915 MHz	—	3.2	3.5	dB	
Pass-band ripple	890 MHz to 915 MHz	—	1.2	1.5	dB	
Absolute stop-band attenuation	DC to 845 MHz	45	58	—	dB	
	845 MHz to 870 MHz	25	50	—	dB	
	935 MHz to 980 MHz	25	30	—	dB	
	980 MHz to 2000 MHz	40	58	—	dB	
	2000 MHz to 3000 MHz	30	37	—	dB	



2. GSM (Rx) 50 ohms Unbalanced IN/50 ohms Balanced OUT
Part number : FAR-F5CM-947M50-B260

(Ta = –30 °C to +85 °C)

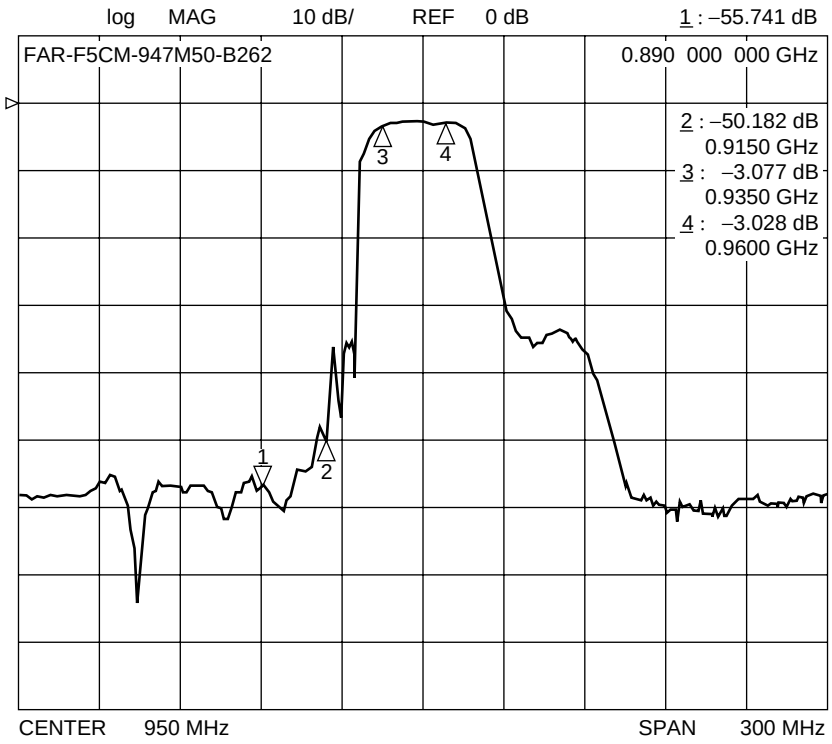
Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	935 MHz to 960 MHz	—	3.0	3.3	dB	
Pass-band ripple	935 MHz to 960 MHz	—	0.9	1.2	dB	
Absolute stop-band attenuation	DC to 890 MHz	45	56	—	dB	
	890 MHz to 915 MHz	25	31	—	dB	
	980 MHz to 1025 MHz	25	30	—	dB	
	1025 MHz to 2000 MHz	40	50	—	dB	
	2000 MHz to 3000 MHz	35	45	—	dB	



3. GSM (Rx) 50 ohms Unbalanced IN/150 ohms Balanced OUT
Part number : FAR-F5CM-947M50-B262

(Ta = –30 °C to +85 °C)

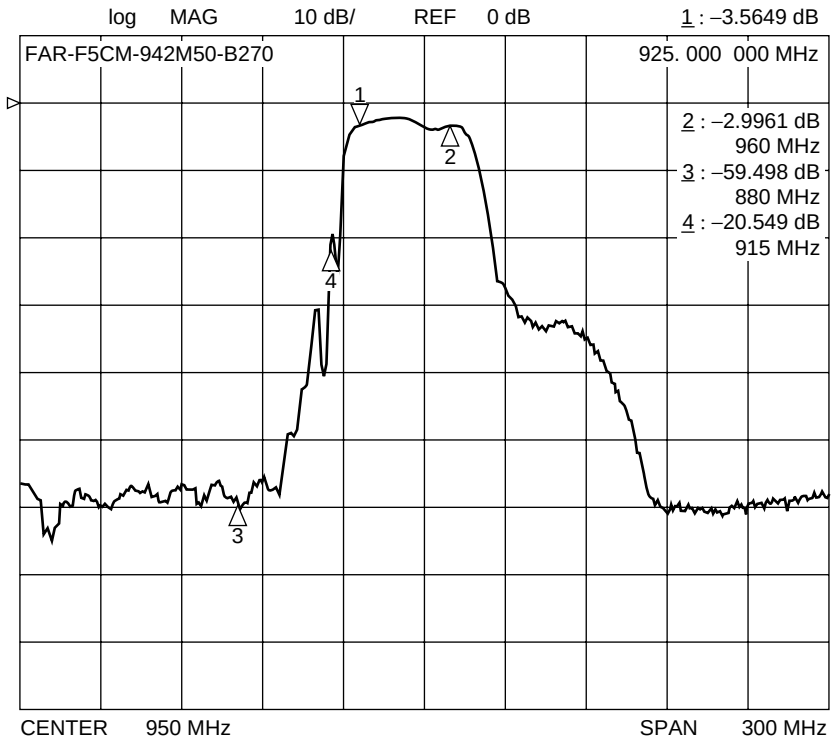
Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	935 MHz to 960 MHz	—	3.3	3.8	dB	
Pass-band ripple	935 MHz to 960 MHz	—	0.8	1.3	dB	
Absolute stop-band attenuation	DC to 890 MHz	45	55	—	dB	
	890 MHz to 915 MHz	25	48	—	dB	
	980 MHz to 1025 MHz	23	29	—	dB	
	1025 MHz to 2000 MHz	40	50	—	dB	
	2000 MHz to 3000 MHz	35	39	—	dB	



4. EGSM (Rx) 50 ohms Unbalanced IN/50 ohms Balanced OUT
Part number : FAR-F5CM-942M50-B270

(Ta = –30 °C to +85 °C)

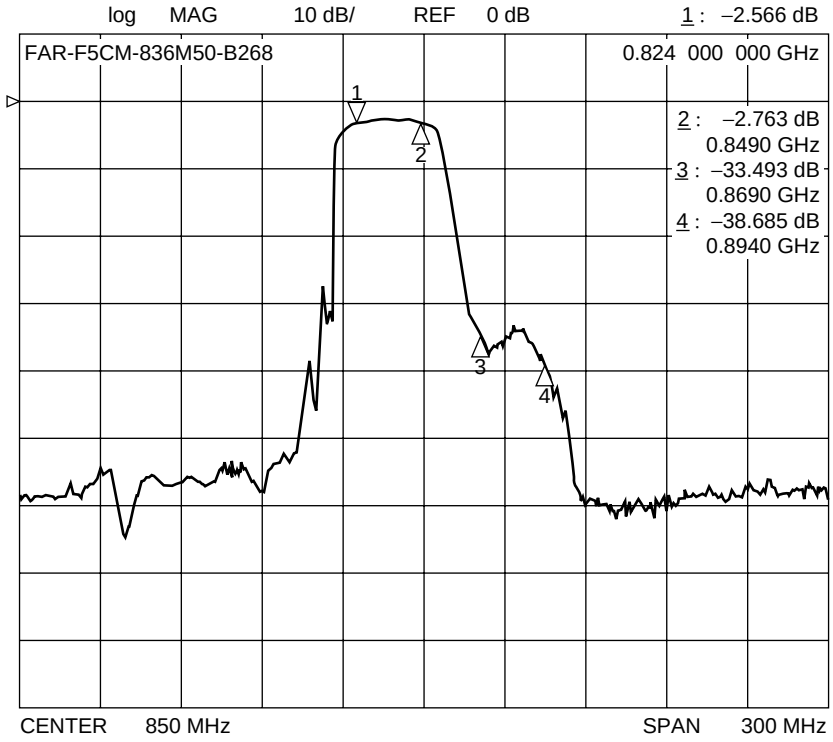
Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	925 MHz to 960 MHz	—	3.8	4.5	dB	
Pass-band ripple	925 MHz to 960 MHz	—	1.8	2.5	dB	
Absolute stop-band attenuation	DC to 880 MHz	50	55	—	dB	
	880 MHz to 915 MHz	15	22	—	dB	
	980 MHz to 1025 MHz	23	27	—	dB	
	1025 MHz to 2000 MHz	40	44	—	dB	
	2000 MHz to 3000 MHz	25	39	—	dB	



5. AMPS/TDMA/CDMA (Tx) 50 ohms Balanced IN/50 ohms Unbalanced OUT
Part number : FAR-F5CM-836M50-B268

(Ta = –30 °C to +85 °C)

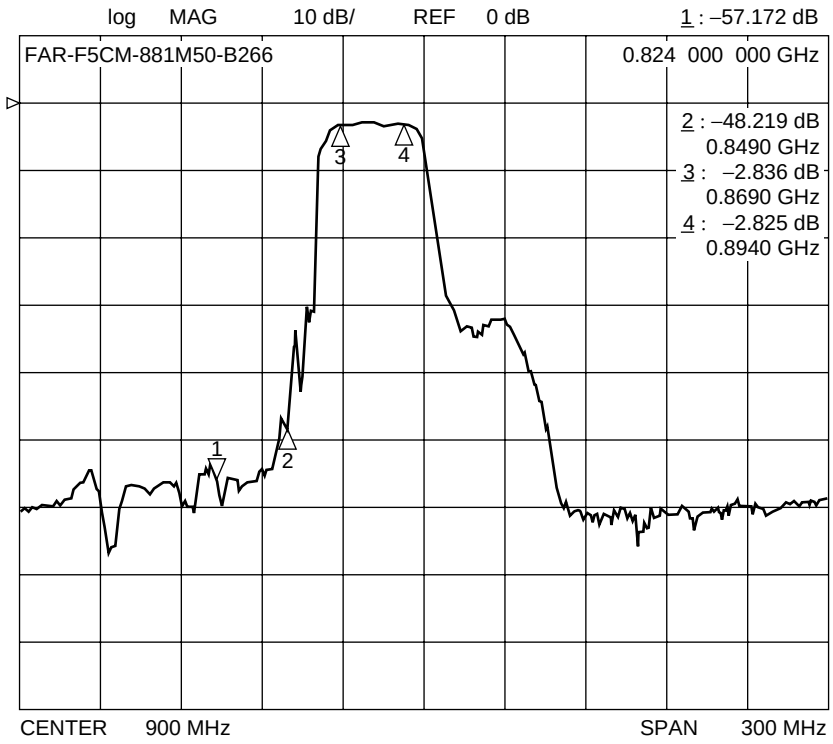
Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	824 MHz to 849 MHz	—	2.8	3.5	dB	
Pass-band ripple	824 MHz to 849 MHz	—	0.9	1.6	dB	
Absolute stop-band attenuation	DC to 800 MHz	45	52	—	dB	
	869 MHz to 920 MHz	25	33	—	dB	
	920 MHz to 2000 MHz	35	46	—	dB	
	2000 MHz to 3000 MHz	25	33	—	dB	



6. AMPS/TDMA/CDMA (Rx) 50 ohms Unbalanced IN/50 ohms Balanced OUT
Part number : FAR-F5CM-881M50-B266

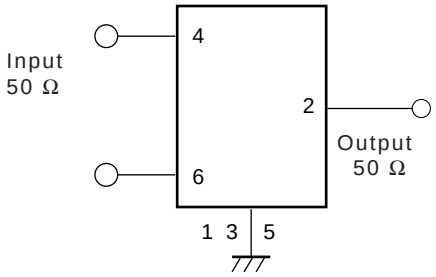
(Ta = –30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	869 MHz to 894 MHz	—	2.8	3.5	dB	
Pass-band ripple	869 MHz to 894 MHz	—	0.8	1.5	dB	
Absolute stop-band attenuation	DC to 800 MHz	45	55	—	dB	
	800 MHz to 849 MHz	30	47	—	dB	
	940 MHz to 1000 MHz	30	38	—	dB	
	1000 MHz to 2000 MHz	35	47	—	dB	
	2000 MHz to 3000 MHz	25	32	—	dB	

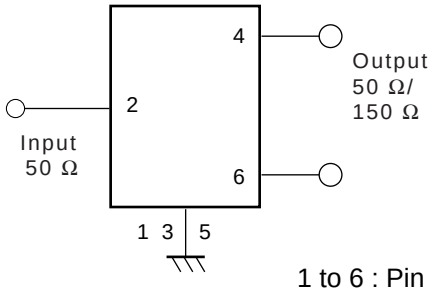


■ MEASURMENT CIRCUIT

BALANCED IN/UNBALANCED OUT type
(Tx filter)



UNBLANCED IN/BALANCED OUT type
(Rx filter)



1 to 6 : Pin Number

Note : Attached frequency response plots are obtained by simulation using above S21, S31, S32, S11, S22, S33 of each characteristics. Electrical specifications are also decided based on these results.

■ PART NUMBER DESIGNATION

[Designation example]

FAR–F5CM–□□□□□□–B2□□–□
(1) (2) (3)

(1) Frequency : Center frequency is specified in six alphanumeric.
Enter M (for MHz) at the decimal point.
Refer to below example.

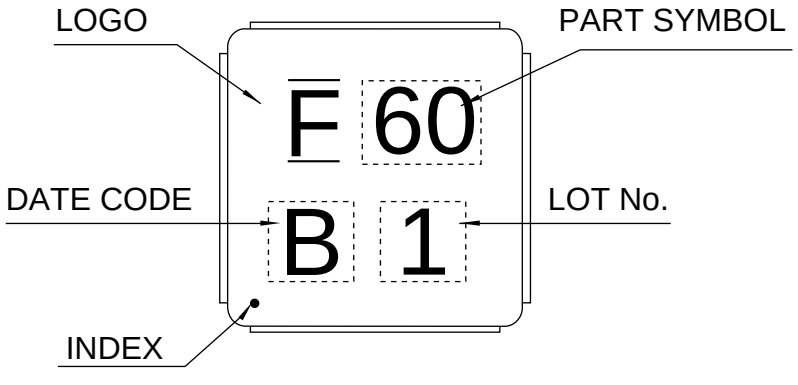
[Example]902.5 MHz ⇒ 902M50

(2) Part symbol : Specified characters from 60 to 79.

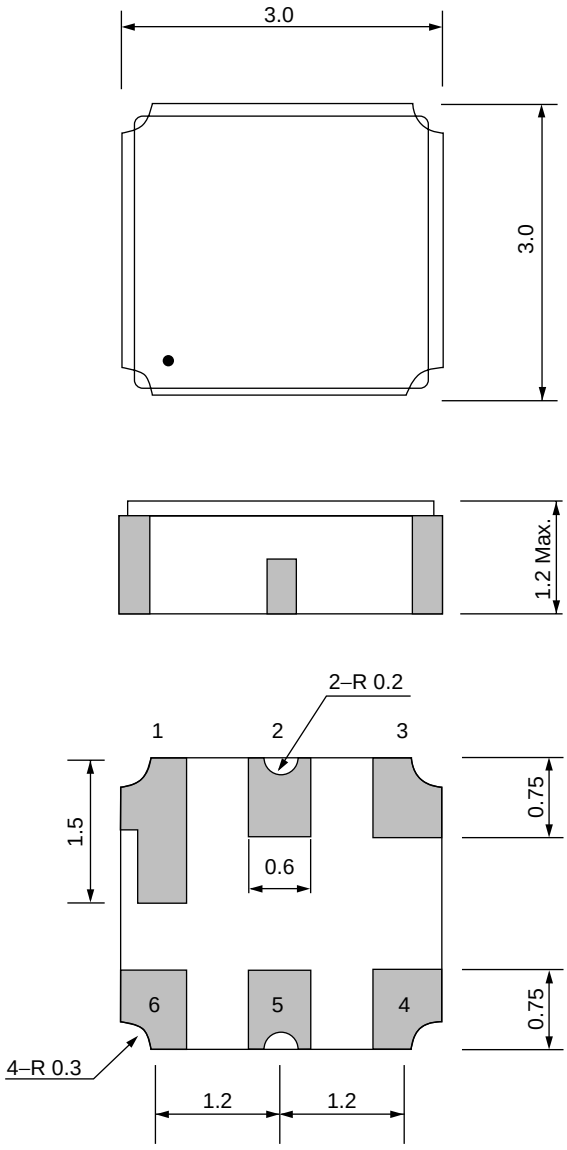
(3) Packing : Y : 1 k pcs/reel

(Reeled tape) X : 5 k pcs/reel

■ MARKING

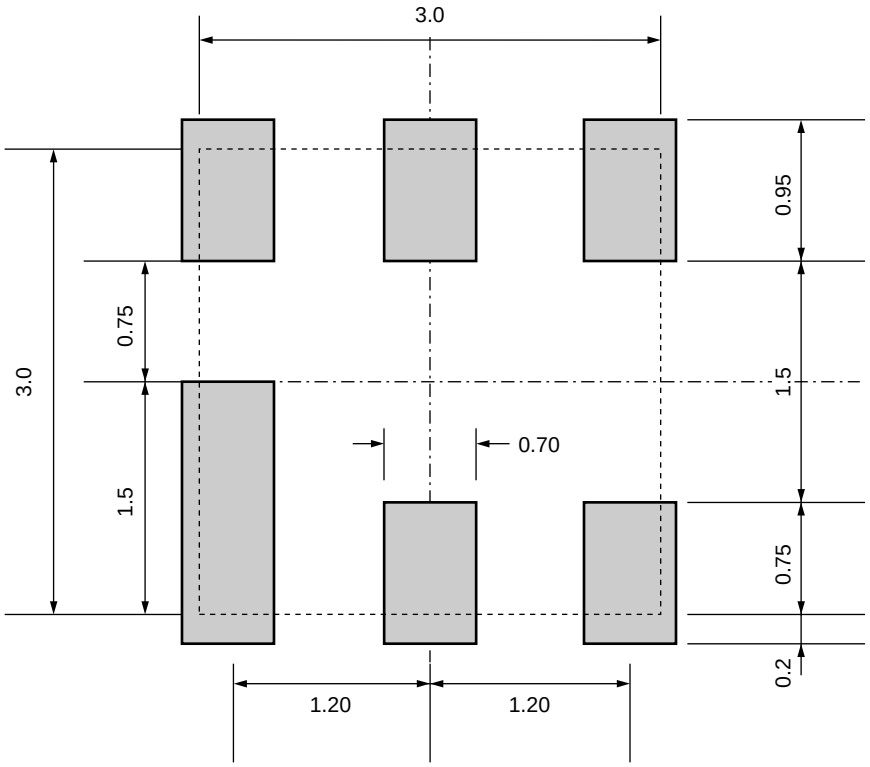


■ PACKAGE DIMENSION



Dimensions in mm.

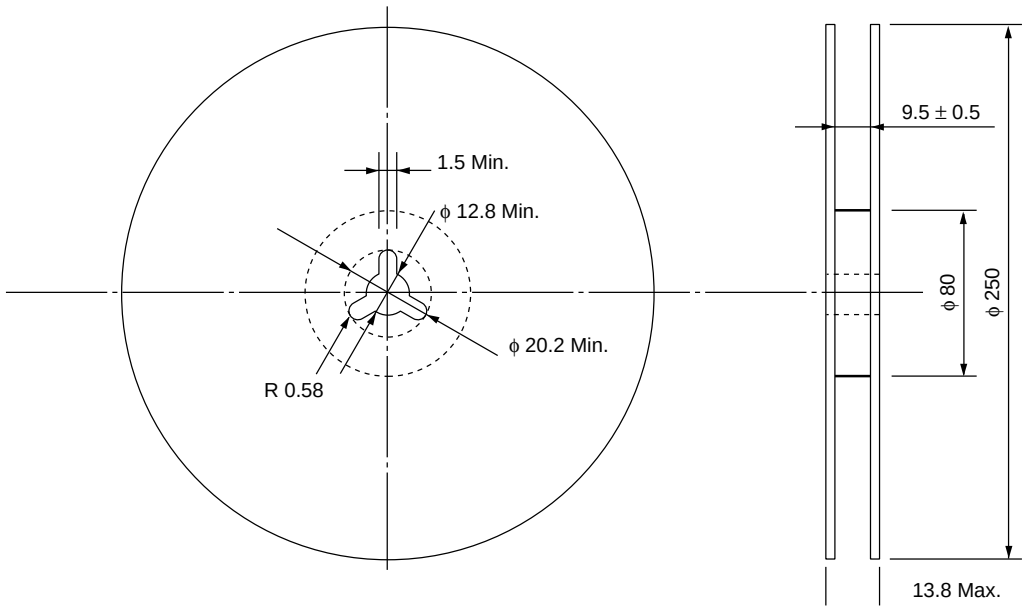
■ RECOMMENDED LAND PATTERN



Dimensions in mm.

■ PACKING

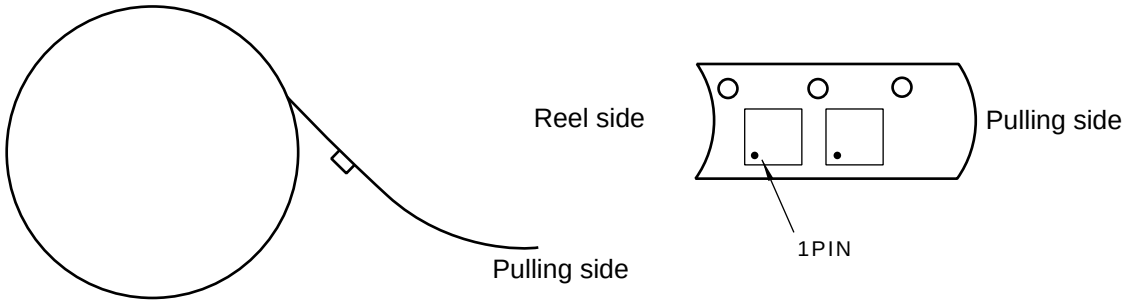
1. Reel Dimensions



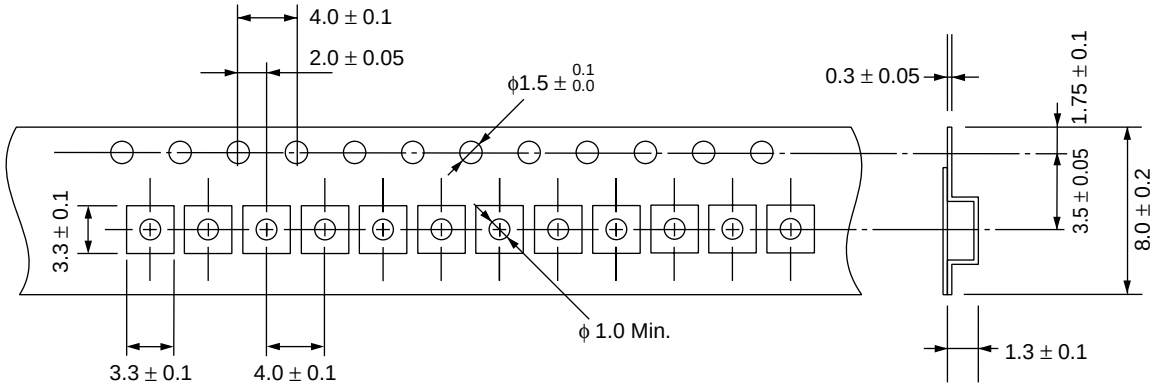
Type	Volume
Y	1 k pcs
X	5 k pcs

Dimensions in mm.

2. Packing Style



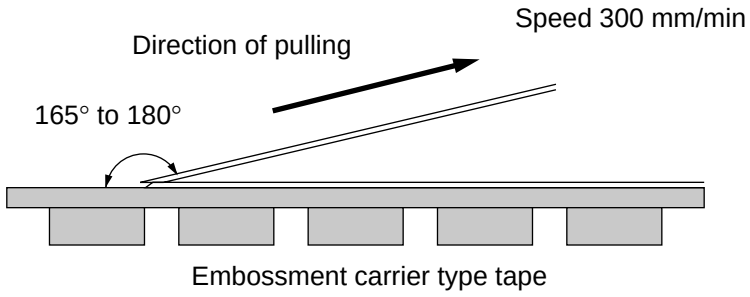
3. Tape Dimensions



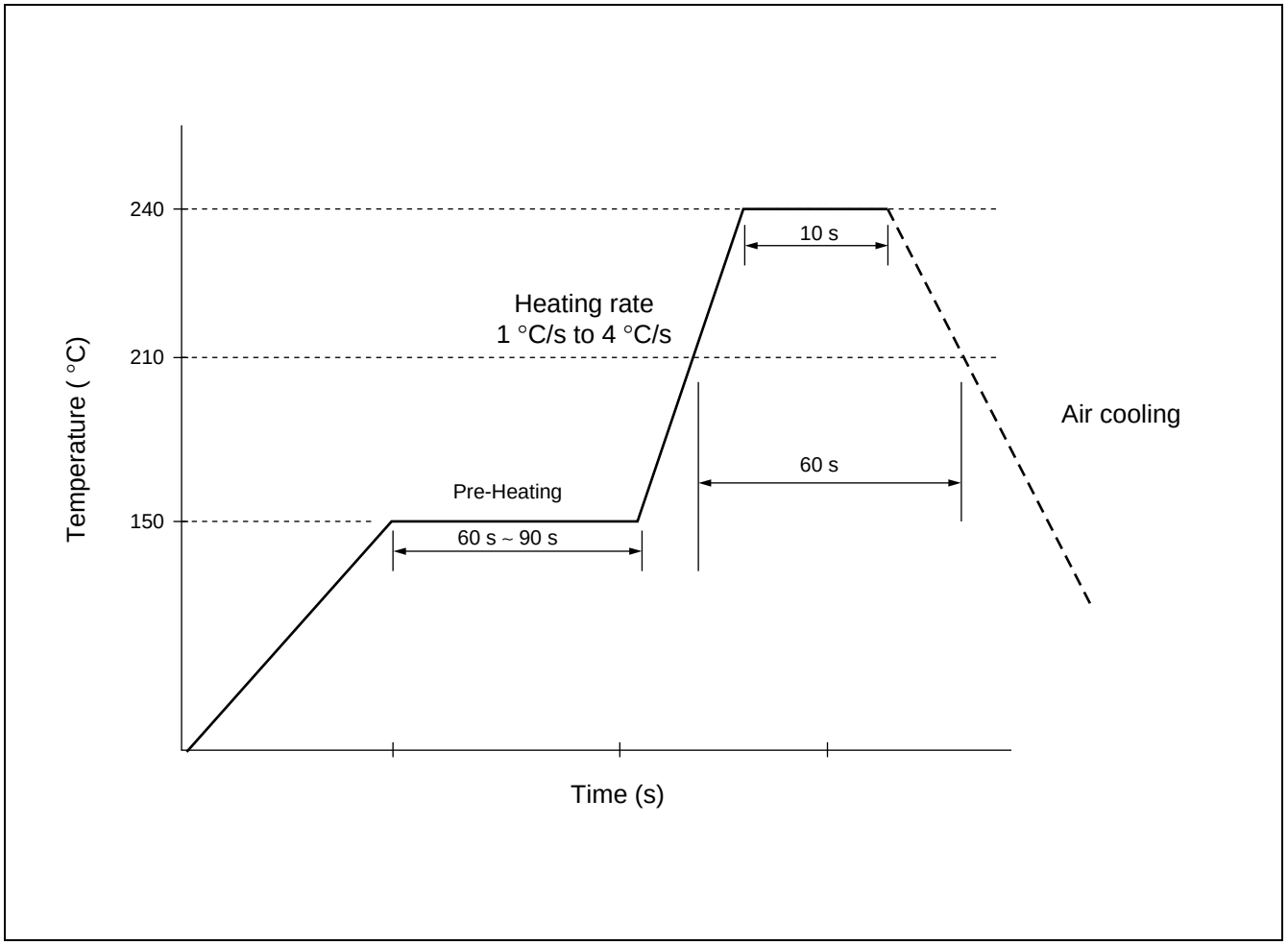
Dimensions in mm.

4. Peel Strength of Top Cover Tapes

Peel off by the force of 0.1 N to 1.0 N under the condition at the right.
(Conforms to EIA.)



■ RECOMMENDED REFLOW PROFILE



■ NOTE

Mass-produced product order is accepted by a unit of 1000.

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