

## *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 devices, such as balun is not required.

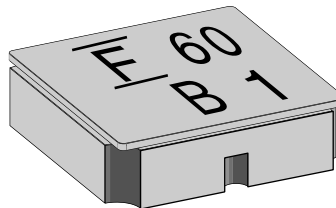
The F5CM series filters apply to the frequency range 700 MHz to 1000 MHz. High performance has been realized with high reliability and small size by using original materials and original design.

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

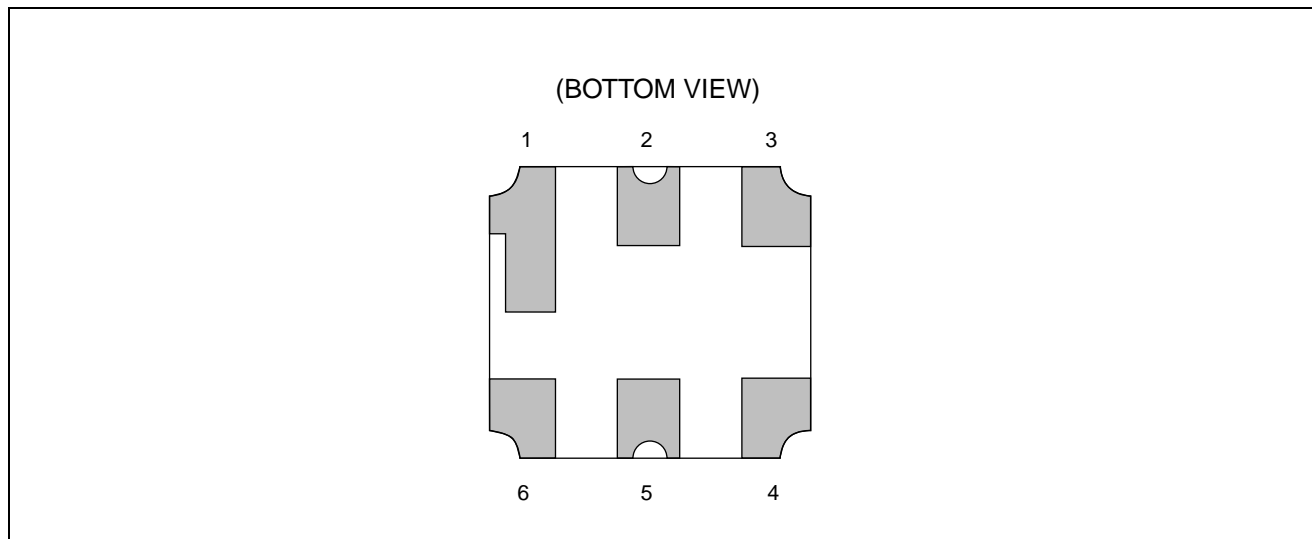
- Balanced/unbalanced I/O ports
- Ultra compact and light package (3.0 mm × 3.0 mm package)
- Any external matching network is not required
- Excellent stopband attenuation
- Small inband ripple
- Surface mount package (SMT)

### ■ PACKAGE



# F5CM Series (B2)

## ■ PIN ASSIGNMENT



## ■ PIN DESCRIPTION

- BALANCED IN/UNBALANCED OUT type (Tx filter)

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

- UNBALANCED IN/BALANCED OUT type (Rx filter)

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

# F5CM Series (B2)

## ■ ABSOLUTE MAXIMUM RATINGS

| Parameter             | Symbol | Rating |      | Unit |
|-----------------------|--------|--------|------|------|
|                       |        | Min.   | Max. |      |
| Operating temperature | Ta     | −30    | +85  | °C   |
| Storage temperature   | Tstg   | −40    | +100 | °C   |
| Input power           | Pin    | —      | +15  | dBm  |
| Input DC Voltage      | DCin   | −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 these ranges.

Always use piezoelectric devices within their recommended operating condition ranges. 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 FREQUENCIES

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

# F5CM Series (B2)

## ■ ELECTRICAL CHARACTERISTICS

### 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   |         |
| Inband ripple        | 890 MHz to 915 MHz   | —     | 1.2  | 1.5  | dB   |         |
| Absolute 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   |         |
| Inband ripple        | 935 MHz to 960 MHz   | —     | 0.9  | 1.2  | dB   |         |
| Absolute 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   |         |
| Inband ripple        | 935 MHz to 960 MHz   | —     | 0.8  | 1.3  | dB   |         |
| Absolute 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   |         |

# F5CM Series (B2)

## 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   |         |
| Inband ripple        | 925 MHz to 960 MHz   | —     | 1.8  | 2.5  | dB   |         |
| Absolute 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   |         |
| Inband ripple        | 824 MHz to 849 MHz   | —     | 0.9  | 1.6  | dB   |         |
| Absolute 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)

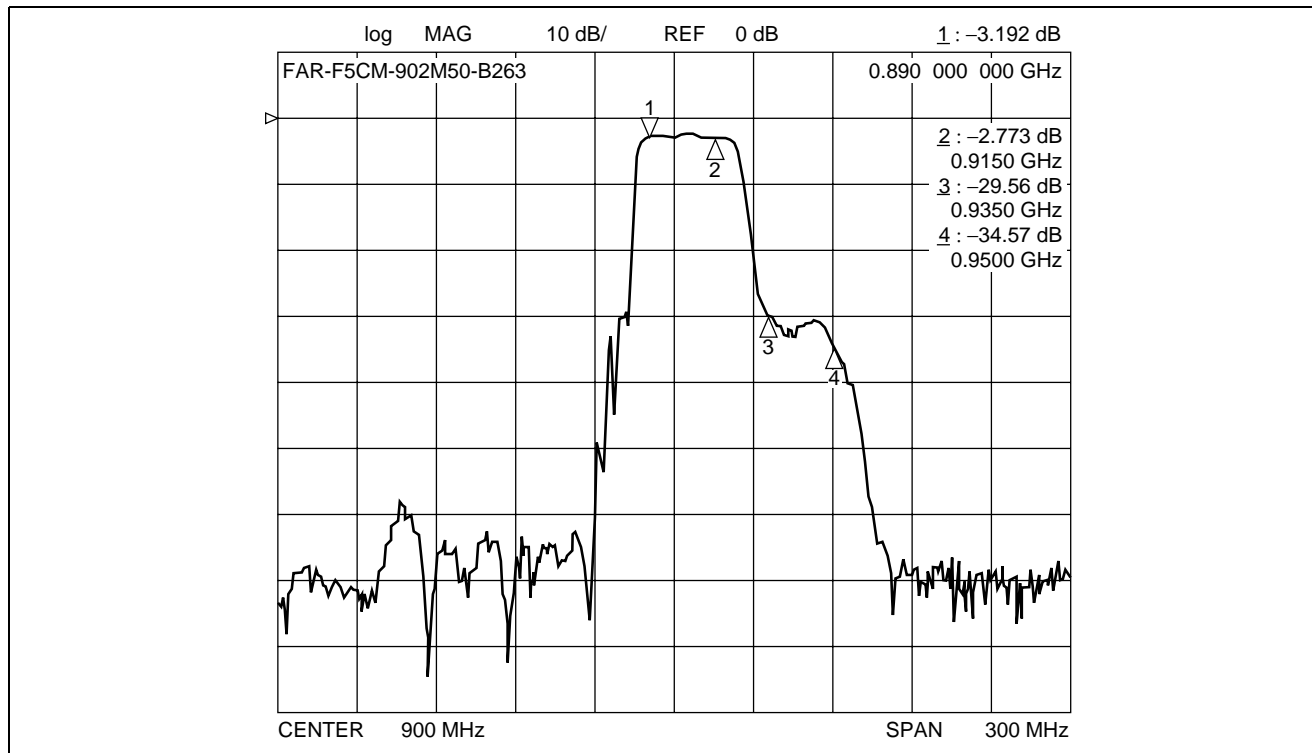
| Parameter            | Conditions           | Value |      |      | Unit | Remarks |
|----------------------|----------------------|-------|------|------|------|---------|
|                      |                      | Min.  | Typ. | Max. |      |         |
| Insertion loss       | 869 MHz to 894 MHz   | —     | 2.8  | 3.5  | dB   |         |
| Inband ripple        | 869 MHz to 894 MHz   | —     | 0.8  | 1.5  | dB   |         |
| Absolute 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   |         |

# F5CM Series (B2)

## ■ TYPICAL CHARACTERISTICS

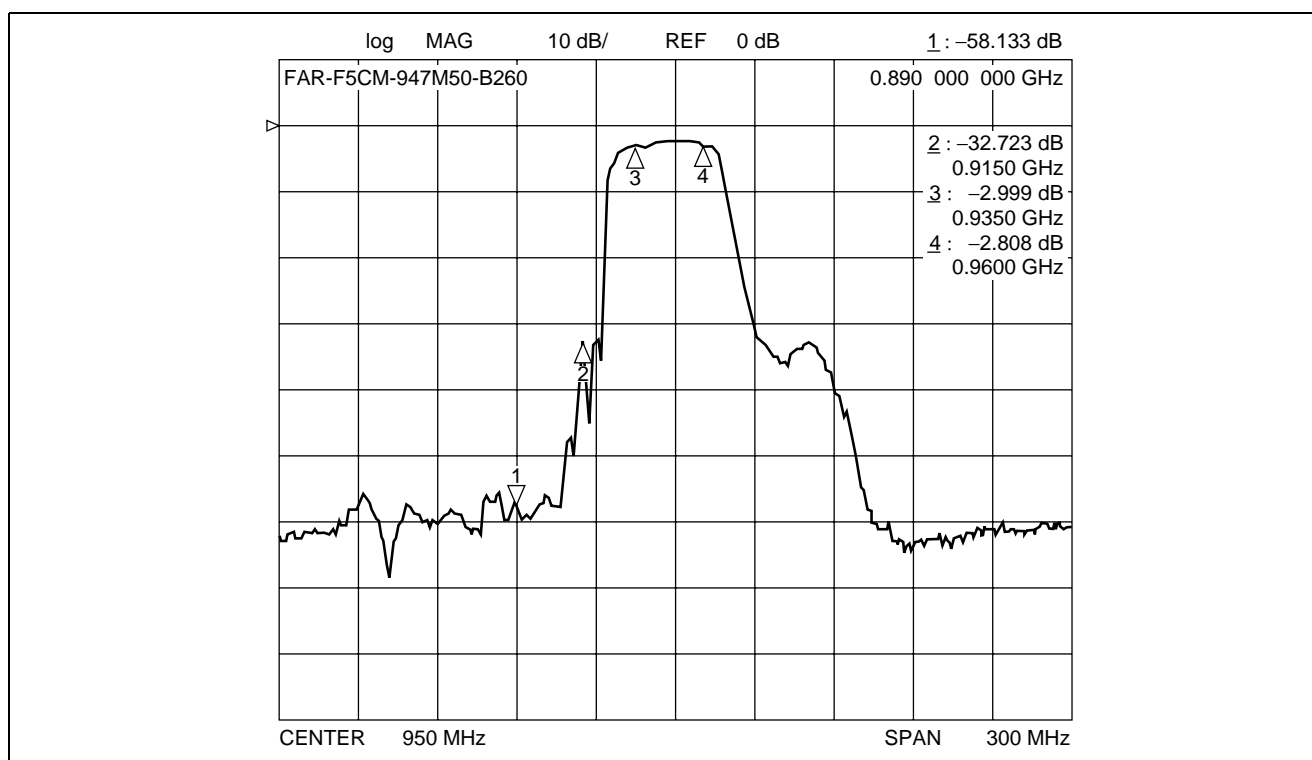
### 1. GSM (Tx) 50 ohms Balanced IN/50 ohms Unbalanced OUT

Part number: FAR-F5CM-902M50-B263



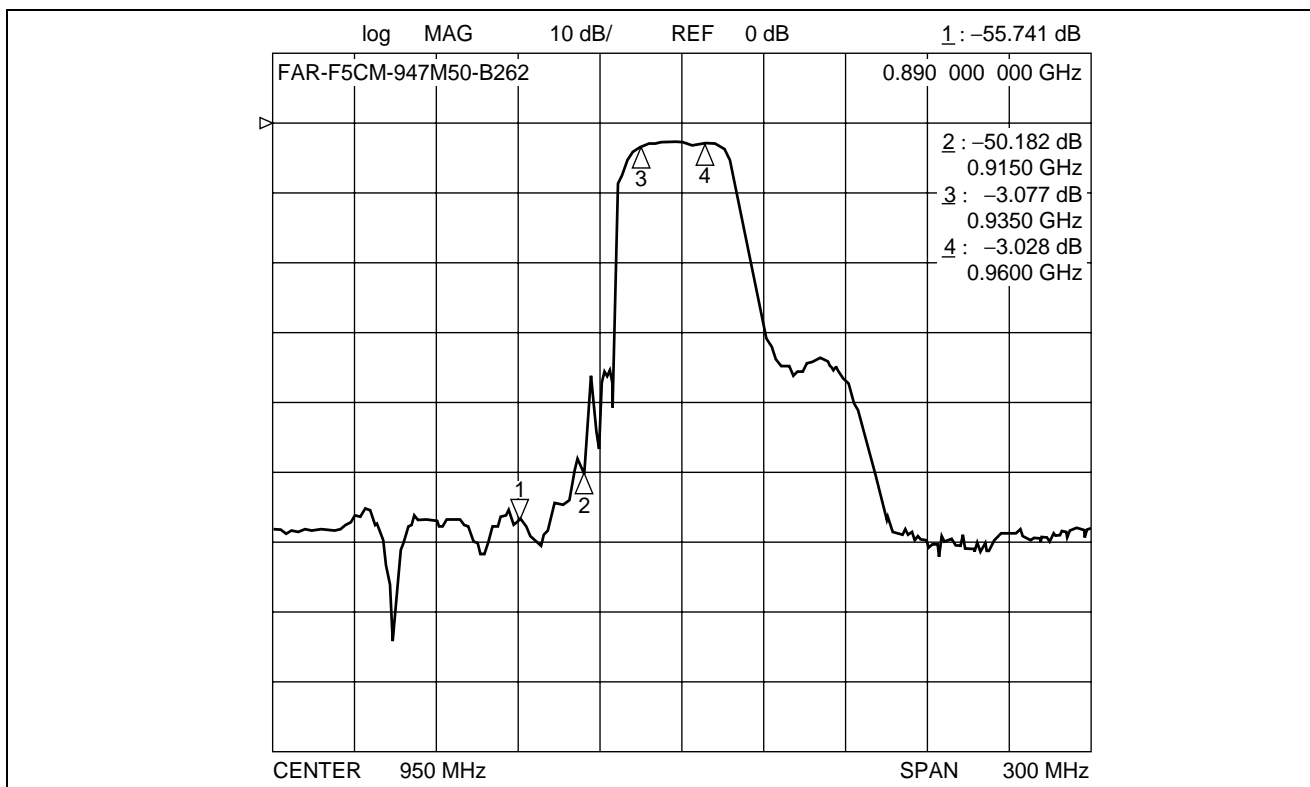
### 2. GSM (Rx) 50 ohms Unbalanced IN/50 ohms Balanced OUT

Part number: FAR-F5CM-947M50-B260



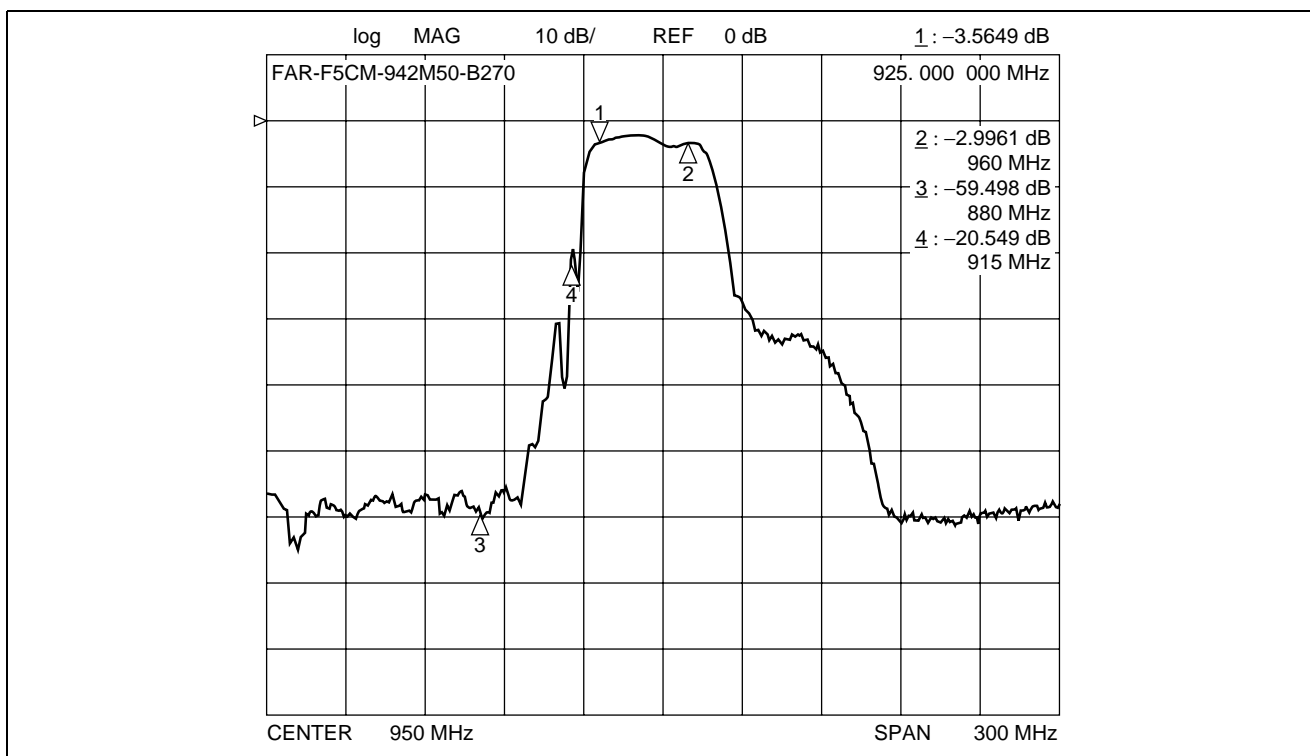
## 3. GSM (Rx) 50 ohms Unbalanced IN/150 ohms Balanced OUT

Part number: FAR-F5CM-947M50-B262



## 4. EGSM(Rx) 50 ohms Unbalanced IN/150 ohms Balanced OUT

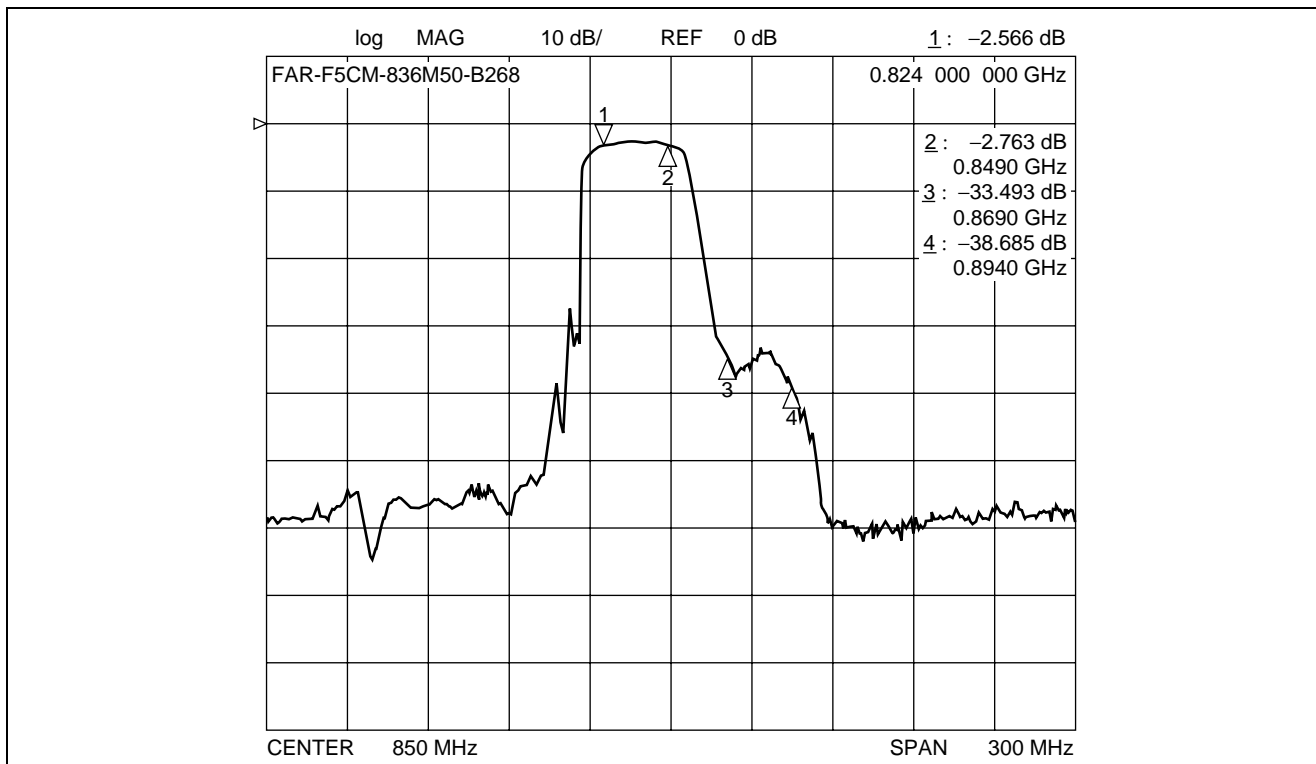
Part number: FAR-F5CM-942M50-B270



# F5CM Series (B2)

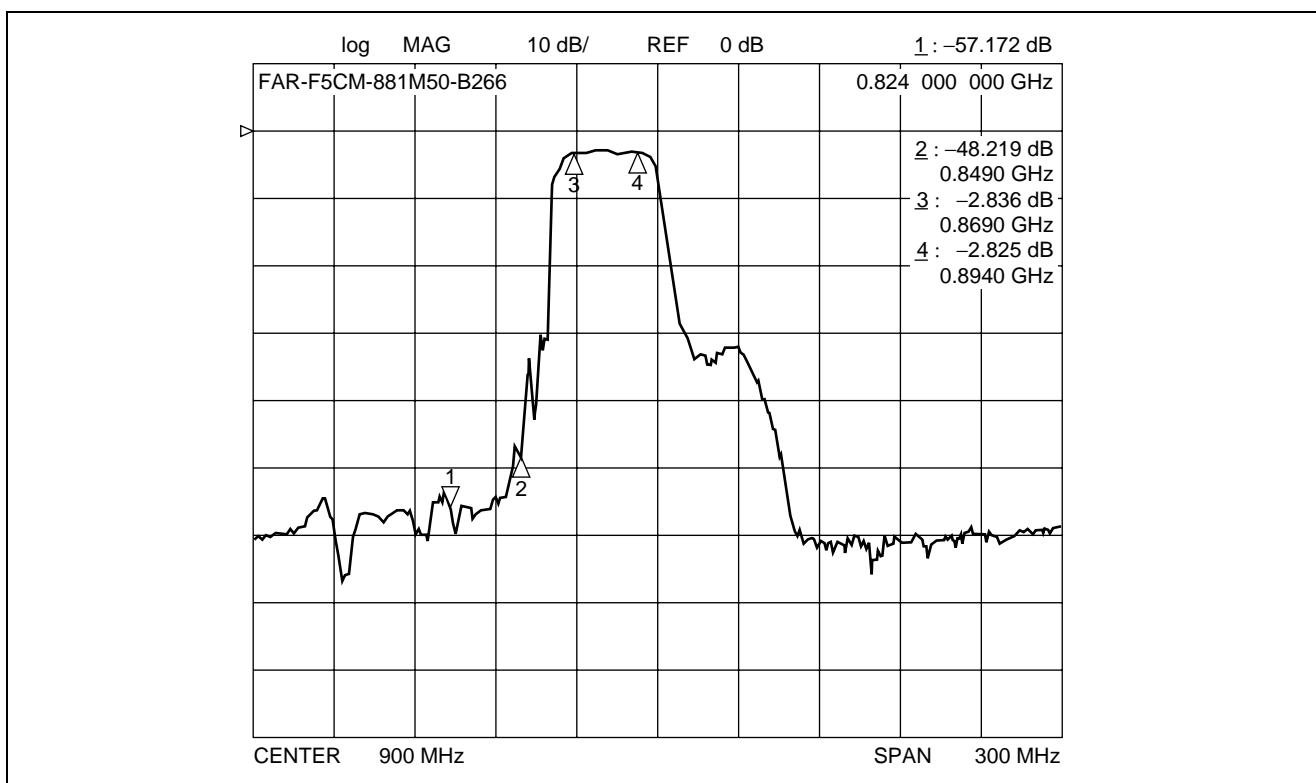
## 5. AMSP/TDMA/CDMA (Tx) 50 ohms Balanced IN/50 ohms Unbalanced OUT

Part number: FAR-F5CM-836M50-B268



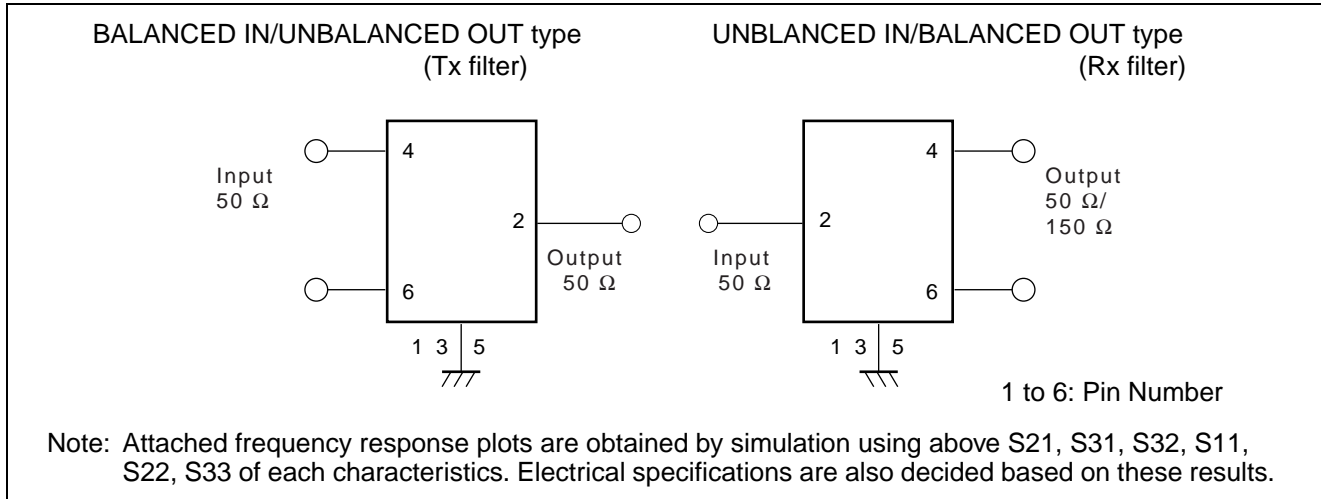
## 6. AMSP/TDMA/CDMA (Rx) 50 ohms Unbalanced IN/50 ohms Balanced OUT

Part number: FAR-F5CM-881M50-B266





## MEASUREMENT CIRCUIT



## PART NUMBER DESIGNATION

[Designation example]

FAR-F5CM-□□□□□□-B2□□-□  
 (1) (2) (3)

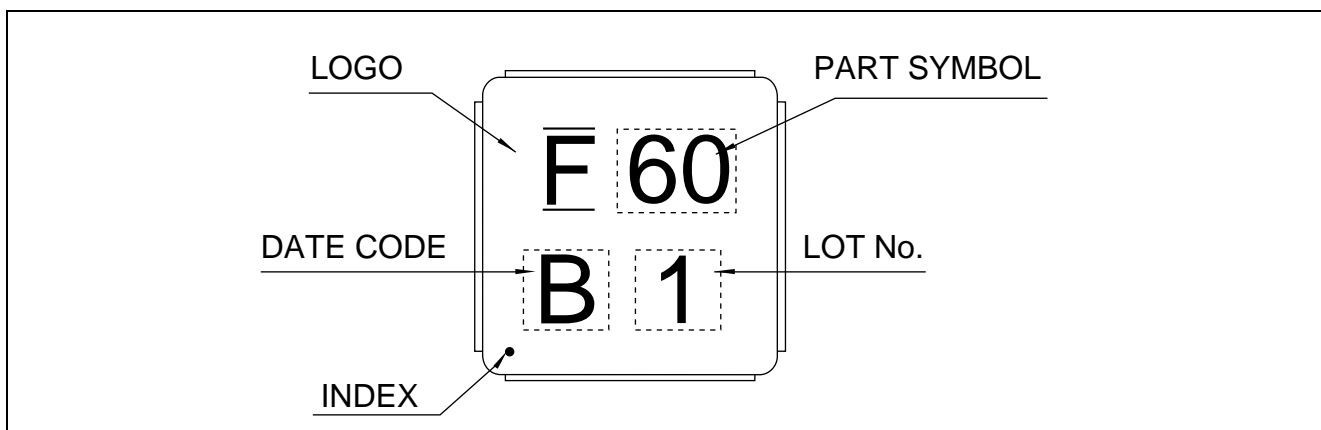
- (1) Frequency: Center frequency is specified in six alphanumeric.  
 Enter M (for MHz) at the decimal point.  
 Refer to below example.

[Example] 902.5 MHz ⇒ 902M50

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

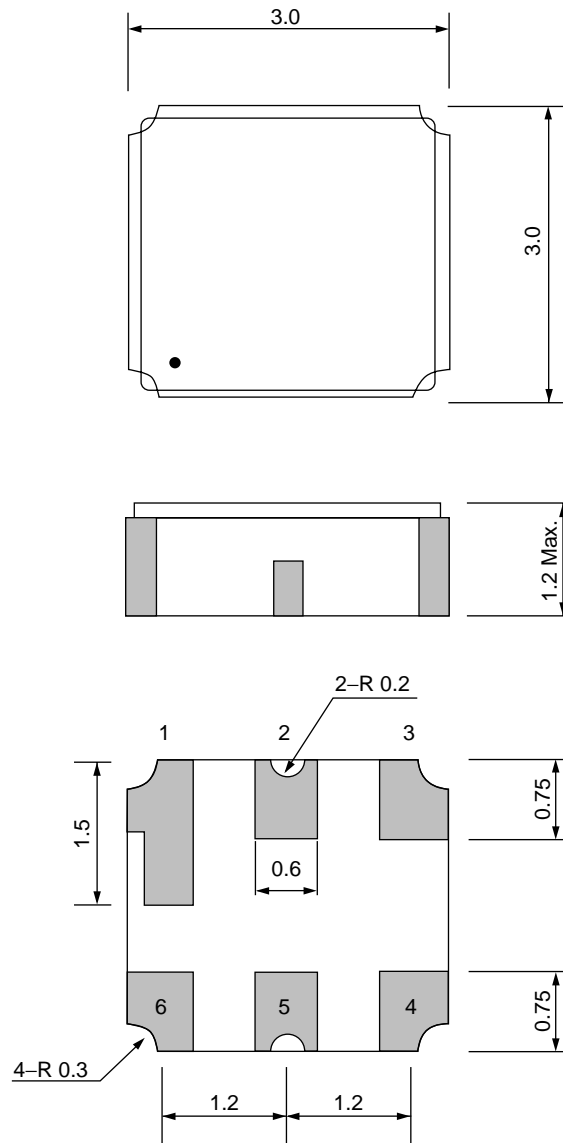
- (3) Packing: Y: 1000 pcs/reel  
 (Reeled tape) X: 5000 pcs/reel

## MARKING



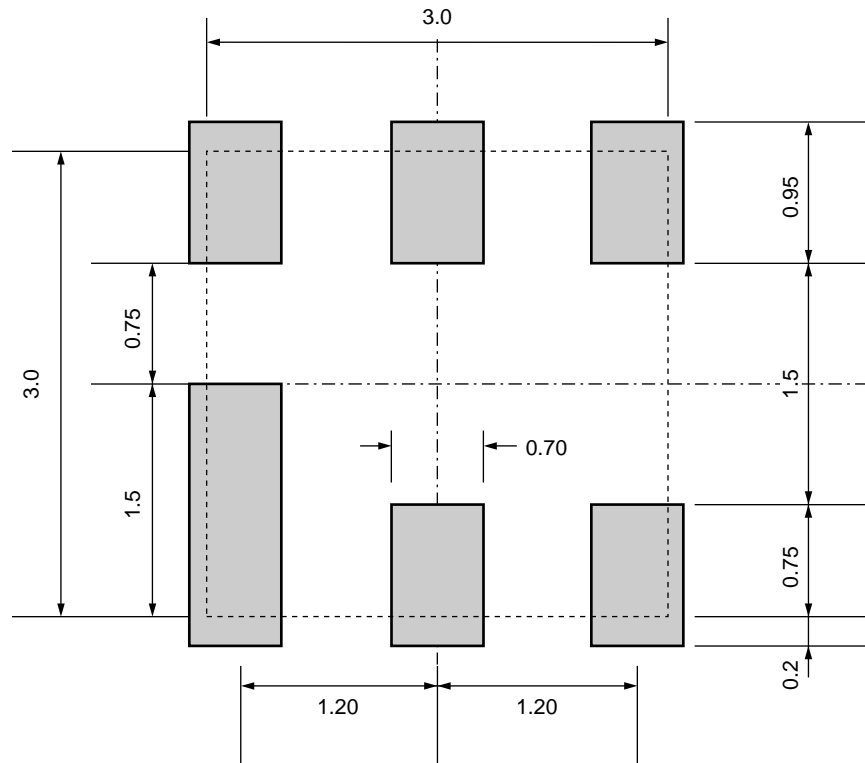
# F5CM Series (B2)

## ■ PACKAGE DIMENSION



Dimensions in mm

## ■ RECOMMENDED LAND PATTERN

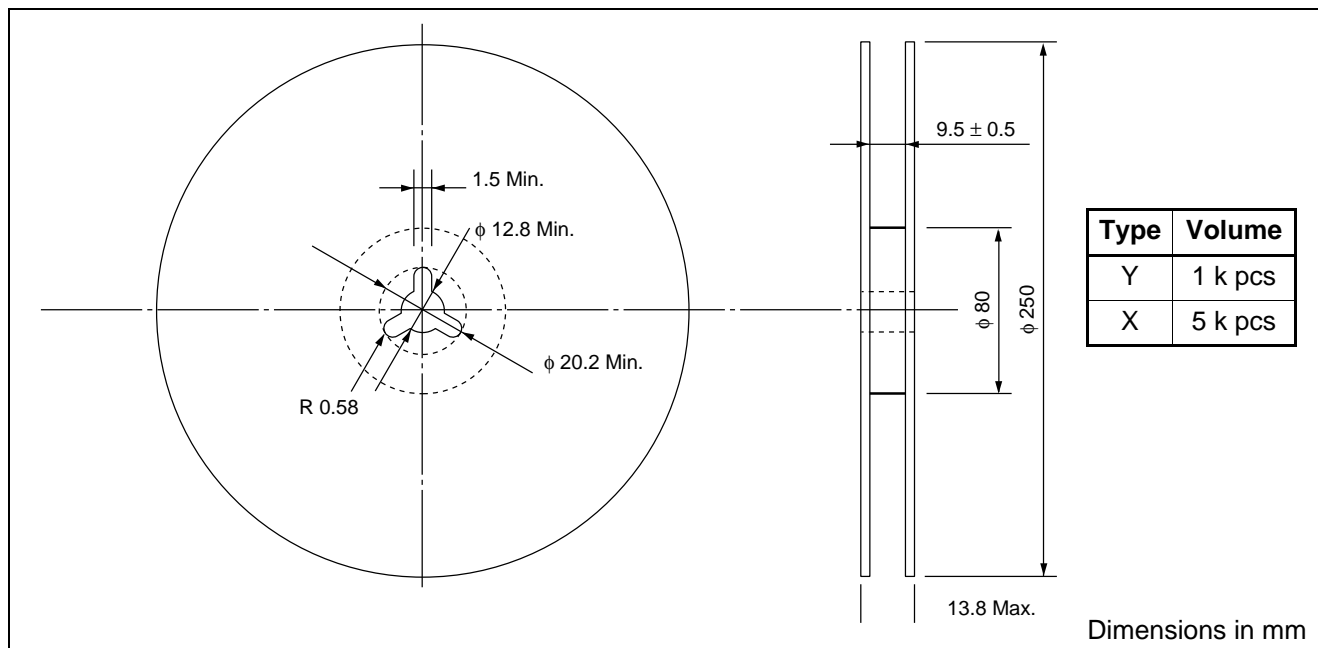


Dimensions in mm

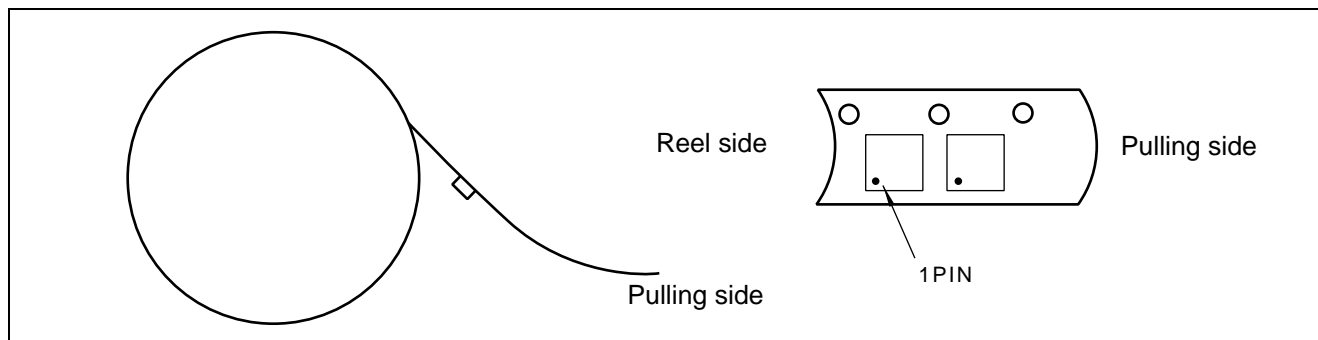
# F5CM Series (B2)

## ■ PACKING: Reel type

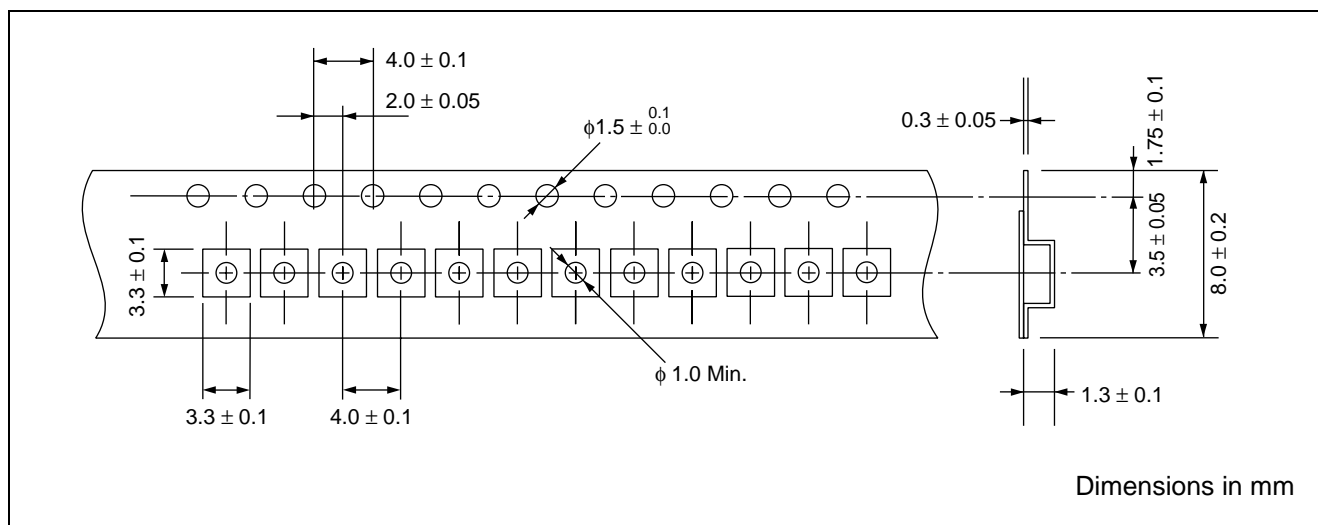
### 1. Reel Dimensions



### 2. Packing Style

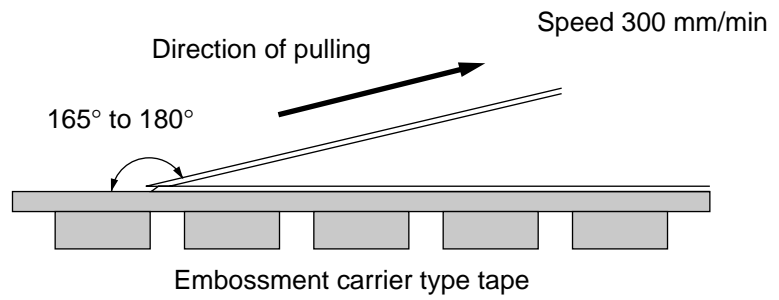


### 3. Tape Dimensions



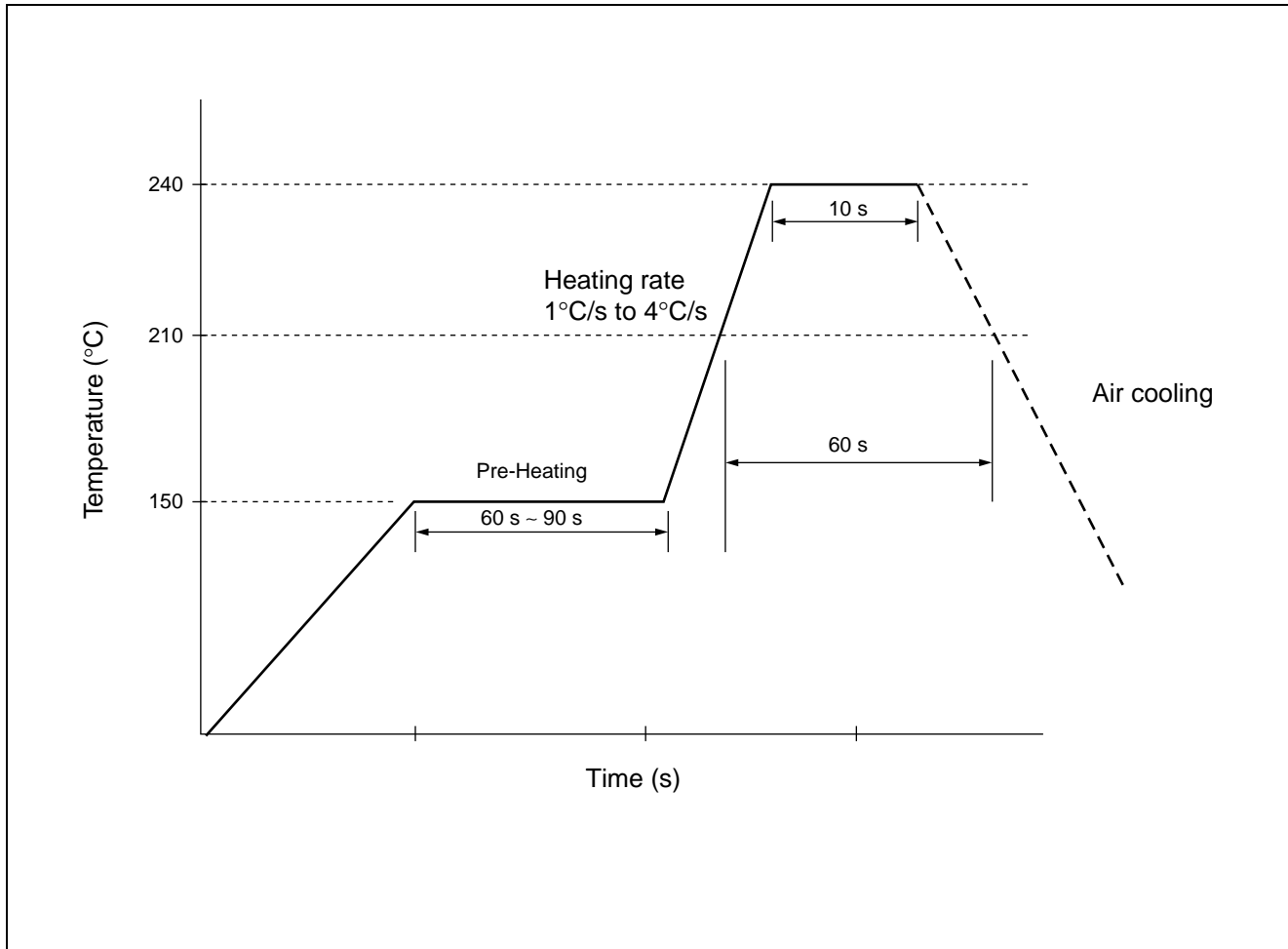
## 4. Peel Strength of Top Cover Tapes

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



# F5CM Series (B2)

## ■ RECOMMENDED REFLOW PROFILE



## ■ NOTE

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

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