

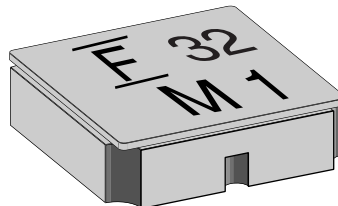
*ASSP Mobile Communication Systems***Piezoelectric SAW BPF  
(700 to 1000 MHz)****F5CE Series (D2 type)****DESCRIPTION**

The F5CE-D2 series of SAW bandpass filters apply to the frequency range 700 to 1000 MHz. These filters make it possible to provide high stopband attenuation and excellent passband flatness due to using unique DMS (Double Mode SAW) technology as design method. Moreover, these filters are provided in small 3.0 mm sq. package. This contributes to reduce weight and size of mobile communication units.

The F5CE-D2 series of SAW filters are suitable for interstage RF filter in mobile communication systems in the frequency range 700 to 1000 MHz. Standard devices are available for AMPS/CDMA/TDMA, GSM, PDC800 and ISM900.

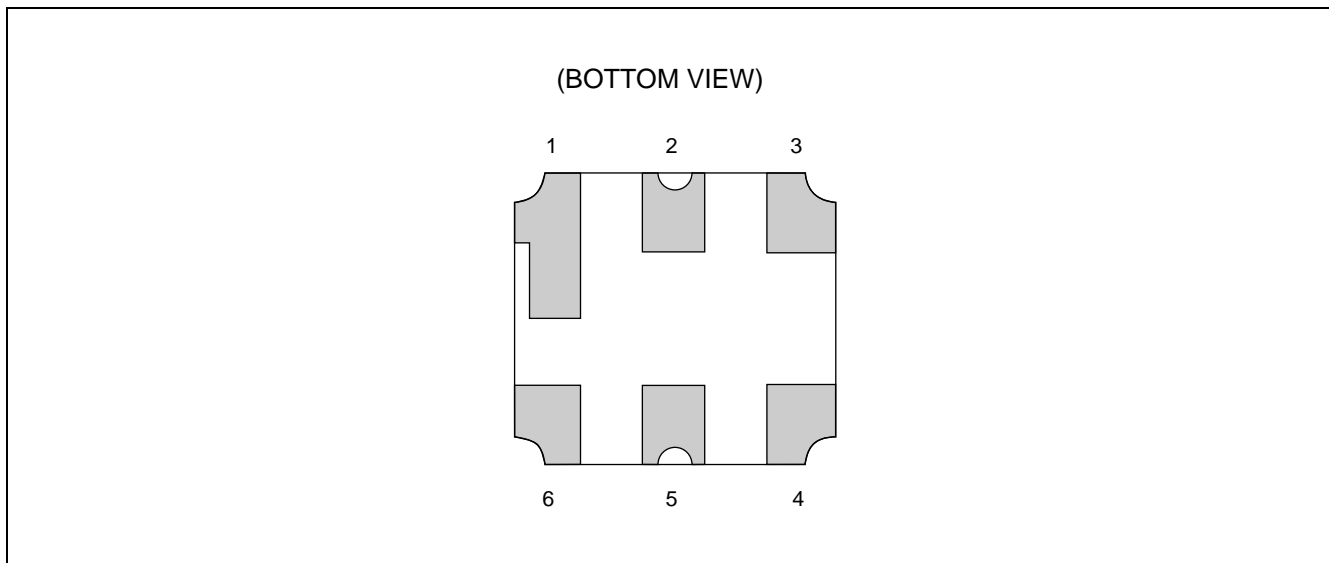
**FEATURES**

- Excellent stopband attenuation
- Low insertion loss and low passband ripple
- Ultra compact and light package (3.0 mm sq.)
- External matching circuits are not required. (50  $\Omega$  I/O)
- Surface mount package (SMT)
- Standard devices are available for mobile communication standards (AMPS/CDMA/TDMA, GSM, PDC800 and ISM900)

**PACKAGE**

# F5CE Series (D2 type)

## ■ PIN ASSIGNMENT



## ■ PIN DESCRIPTION

Pin no.	Pin name	Description
1	GND	Ground Pin
2	IN	Input Pin
3	GND	Ground Pin
4	GND	Ground Pin
5	OUT	Output Pin
6	GND	Ground 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 <sub>IN</sub>	—	+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.

# F5CE Series (D2 type)

## ■ 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

System		Center freq. (MHz)	B/W (MHz)	Part symbol	Part number	Remarks
PDC800	Tx	950.0	20	30	FAR-F5CE-950M00-D230	
	Rx	820.0	20	31	FAR-F5CE-820M00-D231	
AMPS /CDMA /TDMA	Tx	836.5	25	32	FAR-F5CE-836M50-D232	
	Rx	881.5	25	33	FAR-F5CE-881M50-D233	
GSM	Tx	902.5	25	34	FAR-F5CE-902M50-D234	
	Rx	947.5	25	35	FAR-F5CE-947M50-D235	
EGSM	Tx	897.5	35	41	FAR-F5CE-897M50-D241	
	Rx	942.5	35	63	FAR-F5CE-942M50-D263	
ISM900	—	915.0	7	38	FAR-F5CE-915M00-D238	
	—	915.0	26	36	FAR-F5CE-915M00-D236	

# F5CE Series (D2 type)

## ■ ELECTRICAL CHARACTERISTICS

### 1. PDC800 (Tx)

Part number : FAR-F5CE-950M00-D230

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	940 to 960 MHz	—	2.6	3.0	dB	
Inband ripple	940 to 960 MHz	—	0.7	1.2	dB	
Absolute attenuation	DC to 680 MHz	50	66	—	dB	
	680 to 696 MHz	50	69	—	dB	
	810 to 830 MHz	50	66	—	dB	
	1015 to 1106 MHz	35	42	—	dB	
	1106 to 1700 MHz	50	59	—	dB	
1700 to 2000 MHz	40	59	—	dB		
Inband VSWR (Return loss)	940 to 960 MHz	— (9.5)	1.8 (10.9)	2.0 —	— (dB)	

### 2. PDC800 (Rx)

Part number : FAR-F5CE-820M00-D231

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	810 to 830 MHz	—	2.5	3.0	dB	
Inband ripple	810 to 830 MHz	—	0.7	1.2	dB	
Absolute attenuation	DC to 760 MHz	50	65	—	dB	
	855 to 875 MHz	28	30	—	dB	
	875 to 920 MHz	35	38	—	dB	
	920 to 1200 MHz	45	60	—	dB	
	1200 to 2000 MHz	40	47	—	dB	
Inband VSWR (Return loss)	810 to 830 MHz	— (9.5)	1.7 (11.7)	2.0 —	— (dB)	

# F5CE Series (D2 type)

## 3. AMPS/CDMA/TDMA (Tx)

Part number : FAR-F5CE-836M50-D232

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	824 to 849 MHz	—	2.7	3.5	dB	
Inband ripple	824 to 849 MHz	—	0.9	1.6	dB	
Absolute attenuation	DC to 800 MHz	50	66	—	dB	
	869 to 1049 MHz	28	33	—	dB	
	1049 to 1200 MHz	50	60	—	dB	
	1200 to 2000 MHz	45	50	—	dB	
Inband VSWR (Return loss)	824 to 849 MHz	— (9.5)	1.8 (10.9)	2.0 —	— (dB)	

## 4. AMPS/CDMA/TDMA (Rx)

Part number : FAR-F5CE-881M50-D233

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	869 to 894 MHz	—	2.7	3.5	dB	
Inband ripple	869 to 894 MHz	—	0.9	1.6	dB	
Absolute attenuation	DC to 779 MHz	50	63	—	dB	
	779 to 849 MHz	45	50	—	dB	
	914 to 970 MHz	28	33	—	dB	
	970 to 1049 MHz	50	60	—	dB	
	1049 to 2000 MHz	40	50	—	dB	
Inband VSWR (Return loss)	869 to 894 MHz	— (9.5)	1.7 (11.7)	2.0 —	— (dB)	

# F5CE Series (D2 type)

## 5. GSM (Tx)

Part number : FAR-F5CE-902M50-D234

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	890 to 915 MHz	—	2.8	3.3	dB	
Inband ripple	890 to 915 MHz	—	0.8	1.4	dB	
Absolute attenuation	DC to 845 MHz	50	60	—	dB	
	845 to 870 MHz	45	50	—	dB	
	925 to 935 MHz	5	18	—	dB	
	935 to 980 MHz	28	33	—	dB	
	980 to 1200 MHz	50	60	—	dB	
Inband VSWR (Return loss)	890 to 915 MHz	—	1.7	2.1	—	
		(9.0)	(11.7)	—	(dB)	

## 6. GSM (Rx)

Part number : FAR-F5CE-947M50-D235

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	935 to 960 MHz	—	2.7	3.3	dB	
Inband ripple	935 to 960 MHz	—	0.7	1.4	dB	
Absolute attenuation	DC to 871 MHz	50	66	—	dB	
	890 to 915 MHz	30	40	—	dB	
	980 to 1025 MHz	25	34	—	dB	
	1025 to 2000 MHz	45	48	—	dB	
	2000 to 3000 MHz	30	33	—	dB	
Inband VSWR (Return loss)	935 to 960 MHz	—	1.9	2.1	—	
		(9.0)	(10.2)	—	(dB)	

# F5CE Series (D2 type)

## 7. EGSM (Tx)

Part number : FAR-F5CE-897M50-D241

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	880 to 915 MHz	—	3.6	4.5	dB	
Inband ripple	880 to 915 MHz	—	1.8	2.7	dB	
Absolute attenuation	DC to 845 MHz	50	55	—	dB	
	925 to 980 MHz	10	14	—	dB	
	980 to 1200 MHz	40	54	—	dB	
	1200 to 2100 MHz	35	50	—	dB	
	2100 to 3000 MHz	25	32	—	dB	
Inband VSWR (Return loss)	880 to 915 MHz	— (5.6)	2.7 (6.8)	3.2 —	— (dB)	

## 8. EGSM (Rx)

Part number : FAR-F5CE-942M50-D263

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	925 to 960 MHz	—	3.1	4.2	dB	Ta = -30 °C to +85 °C
		—	3.1	3.5	dB	Ta = +15 °C to +35 °C
Inband ripple	925 to 960 MHz	—	1.2	2.0	dB	
Absolute attenuation	DC to 871 MHz	50	62	—	dB	
	890 to 915 MHz	15	23	—	dB	
	980 to 1025 MHz	23	32	—	dB	
	1025 to 2000 MHz	40	45	—	dB	
	2000 to 3000 MHz	20	33	—	dB	
Inband VSWR (Return loss)	925 to 960 MHz	— (6.0)	1.7 (11.7)	3.0 —	— (dB)	

# F5CE Series (D2 type)

## 9. ISM900 (7 MHz Bandwidth)

Part number : FAR-F5CE-915M00-D238

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	911.5 to 918.5 MHz	—	3.2	3.5	dB	
Inband ripple	911.5 to 918.5 MHz	—	0.3	1.0	dB	
Absolute attenuation	DC to 600 MHz	50	66	—	dB	
	600 to 840 MHz	40	35	—	dB	
	869 to 894 MHz	35	40	—	dB	
	970 to 1500 MHz	40	45	—	dB	
	1500 to 3000 MHz	25	28	—	dB	
Inband VSWR (Return loss)	911.5 to 918.5 MHz	— (9.5)	1.8 (10.9)	2.0 —	— (dB)	

## 10. ISM900 (26 MHz Bandwidth)

Part number : FAR-F5CE-915M00-D236

(Ta = -30 °C to +85 °C)

Parameter	Conditions	Value			Unit	Remarks
		Min.	Typ.	Max.		
Insertion loss	902 to 928 MHz	—	2.6	3.5	dB	
Inband ripple	902 to 928 MHz	—	0.9	2.0	dB	
Absolute attenuation	DC to 800 MHz	50	70	—	dB	
	800 to 880 MHz	45	57	—	dB	
	950 to 1080 MHz	28	31	—	dB	
	1080 to 2000 MHz	45	60	—	dB	
	2000 to 3000 MHz	25	38	—	dB	
Inband VSWR (Return loss)	902 to 928 MHz	— (8.1)	1.7 (11.7)	2.3 —	— (dB)	

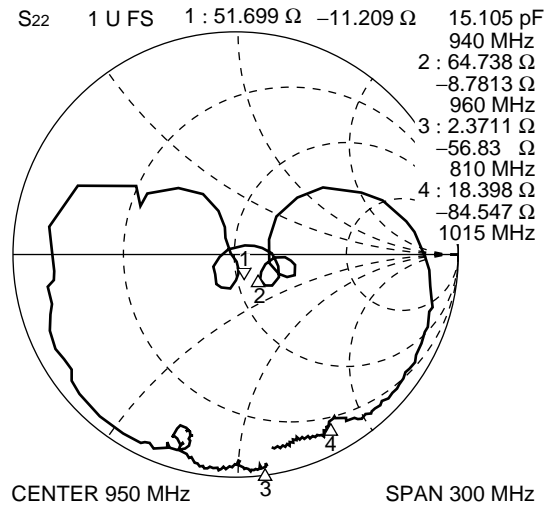
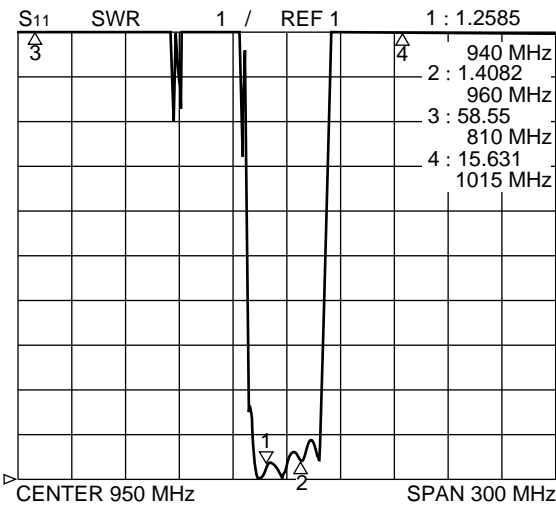
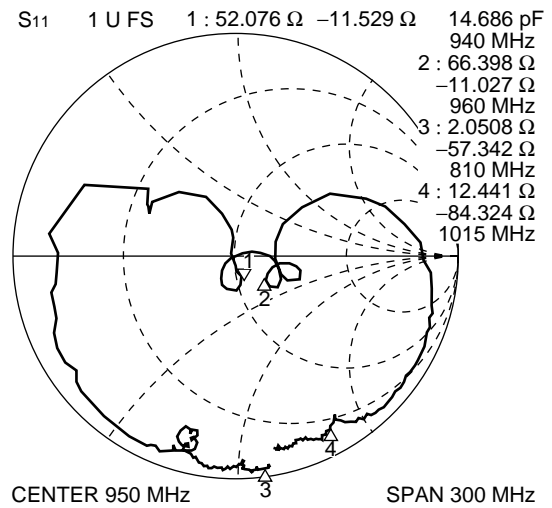
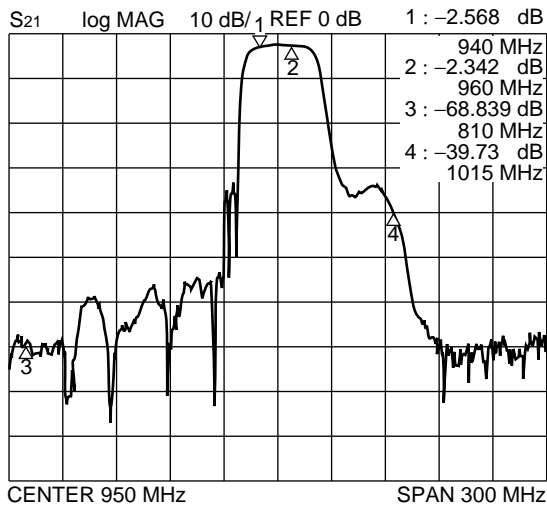


# F5CE Series (D2 type)

## ■ TYPICAL CHARACTERISTICS (STANDARD VERSION)

### 1. PDC800 (Tx)

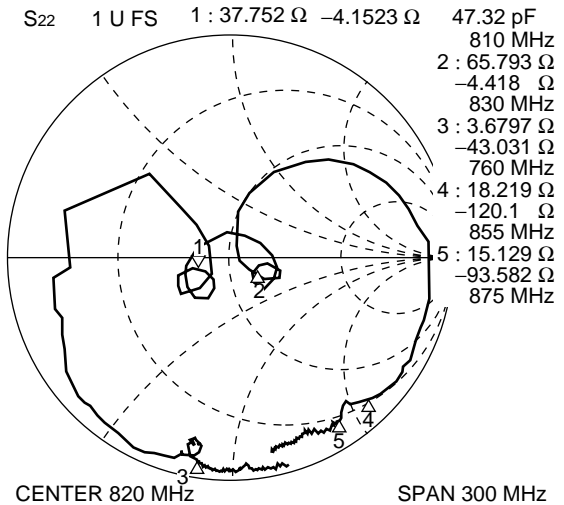
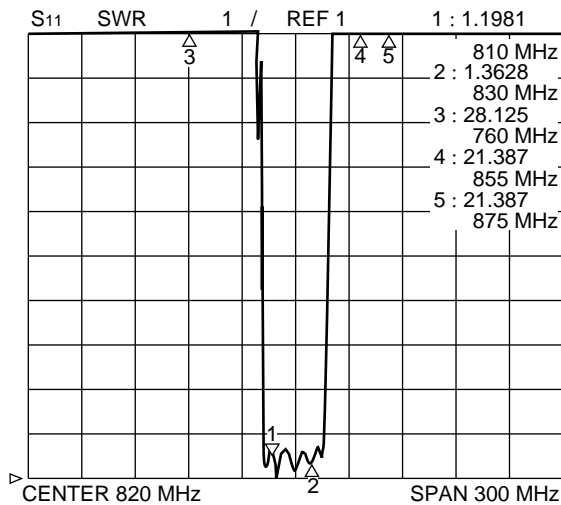
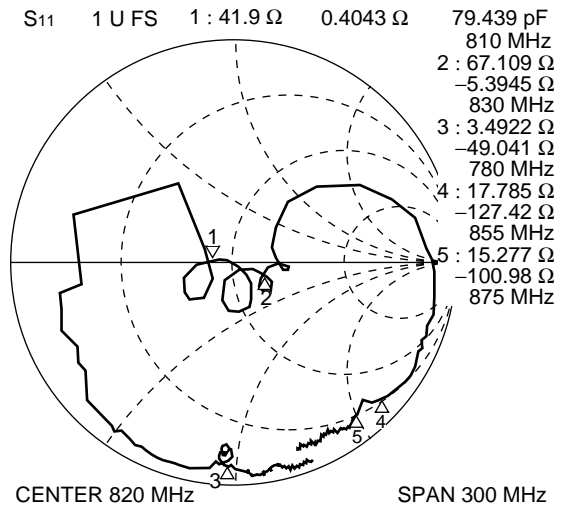
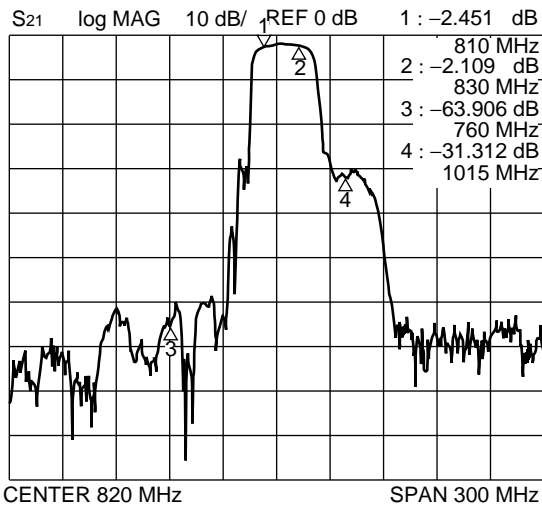
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# F5CE Series (D2 type)

## 2. PDC800 (Rx)

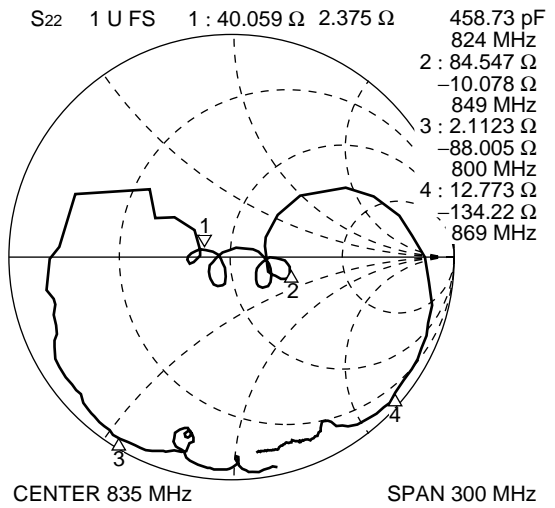
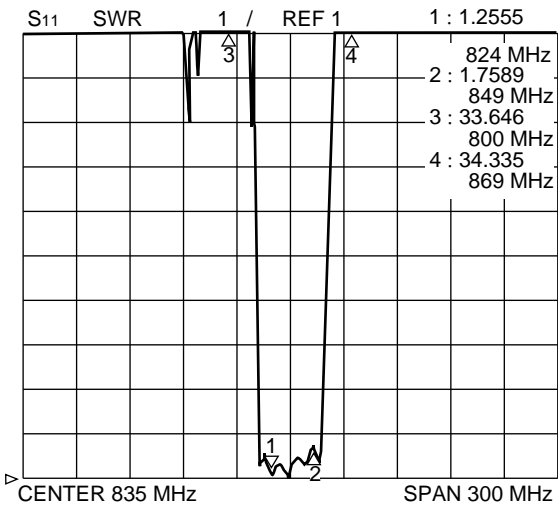
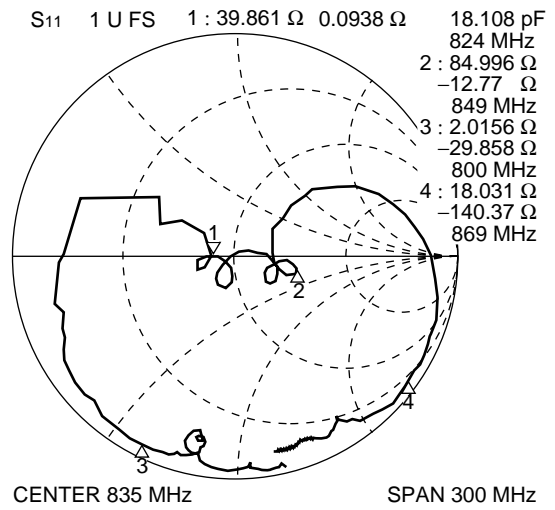
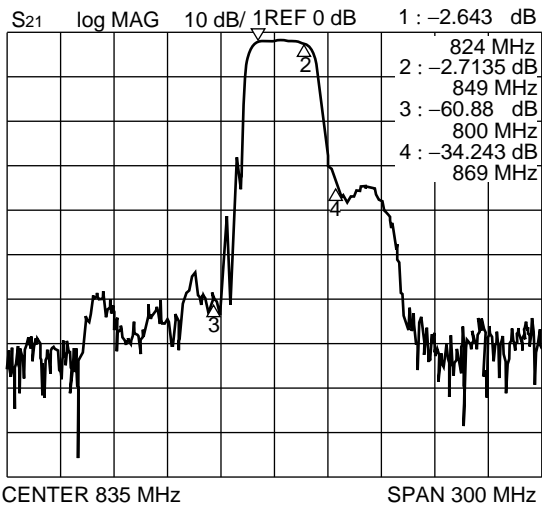
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# F5CE Series (D2 type)

## 3. AMPS/CDMA/TDMA (Tx)

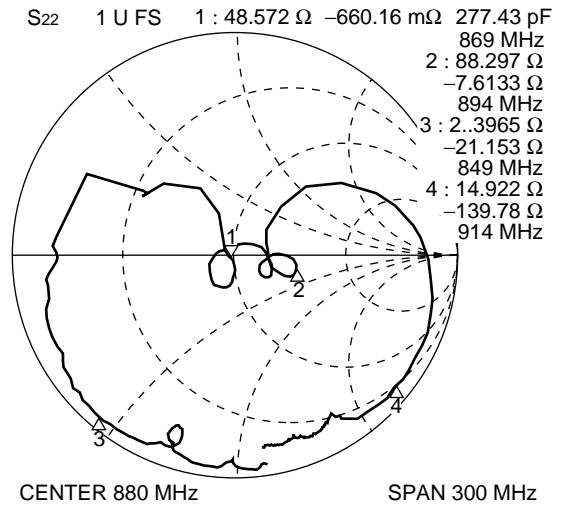
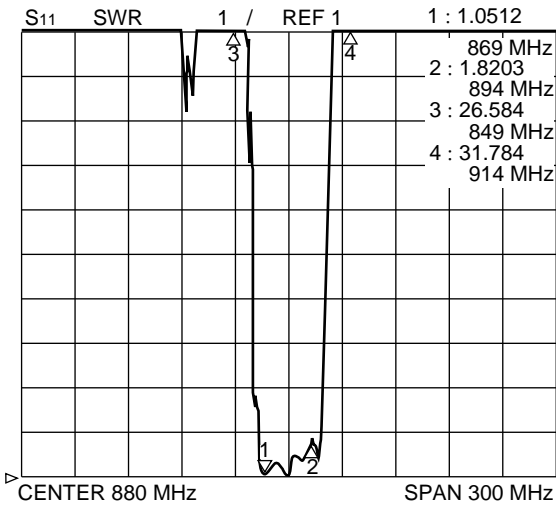
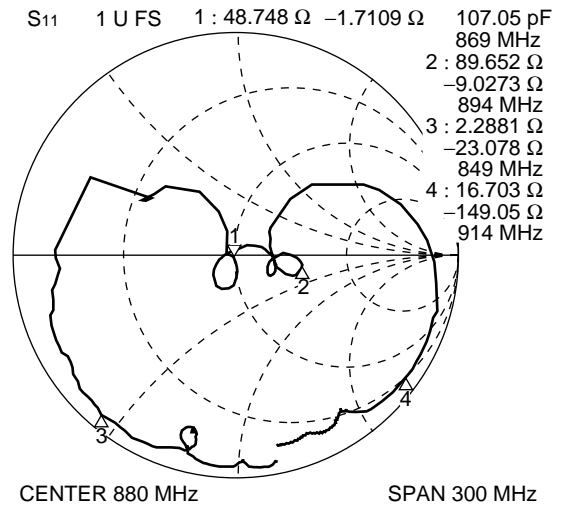
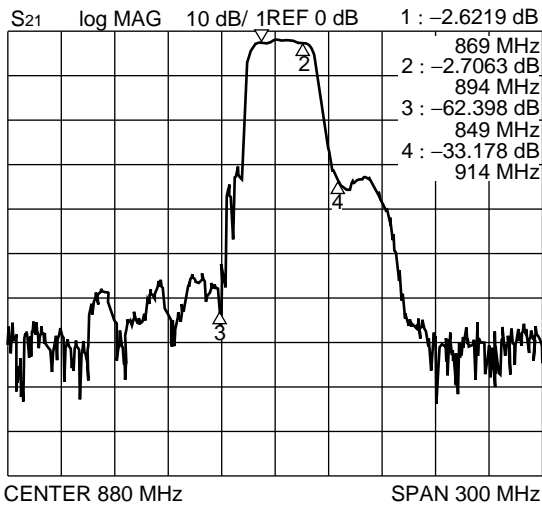
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# F5CE Series (D2 type)

## 4. AMPS/CDMA/TDMA (Rx)

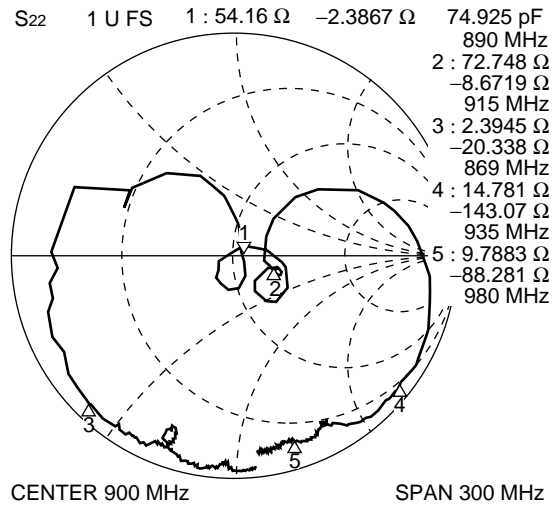
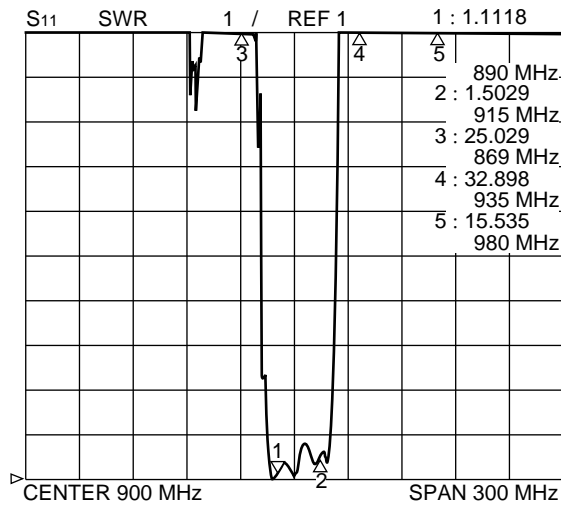
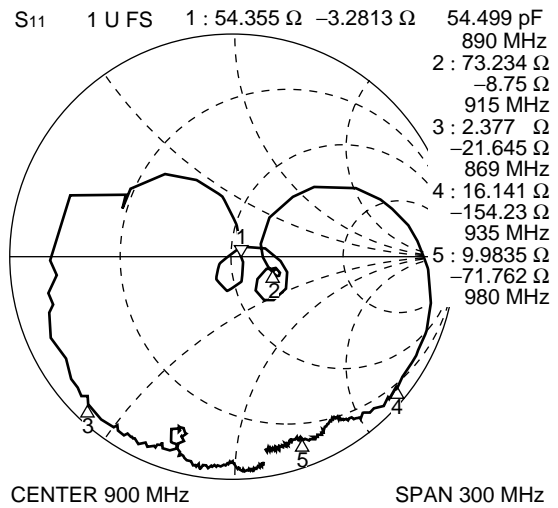
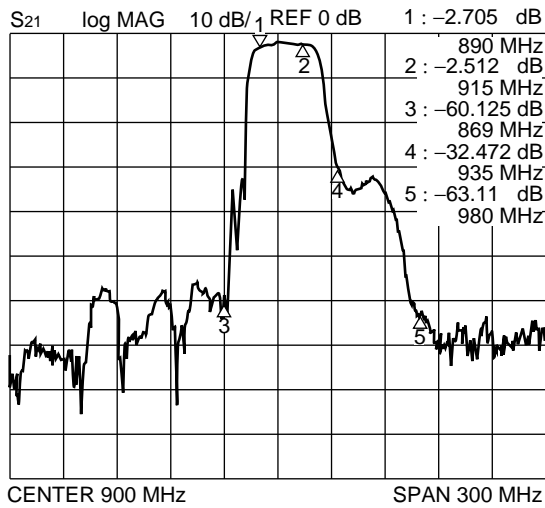
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# F5CE Series (D2 type)

## 5. GSM (Tx)

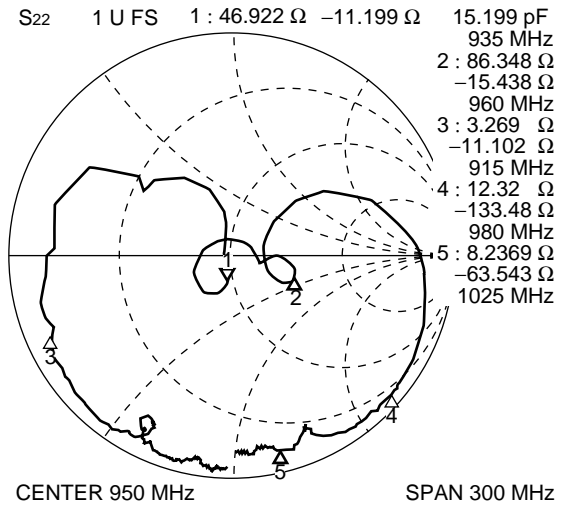
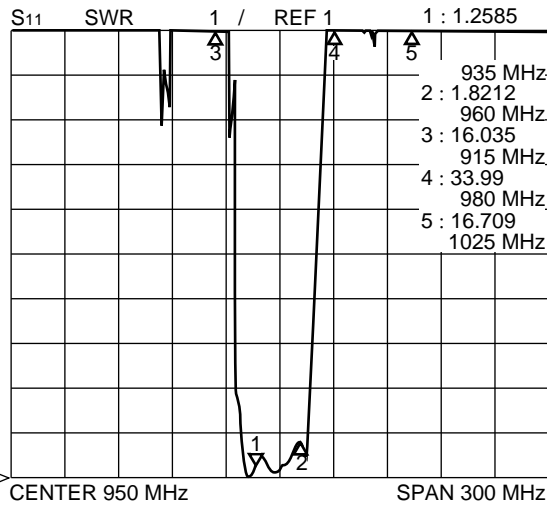
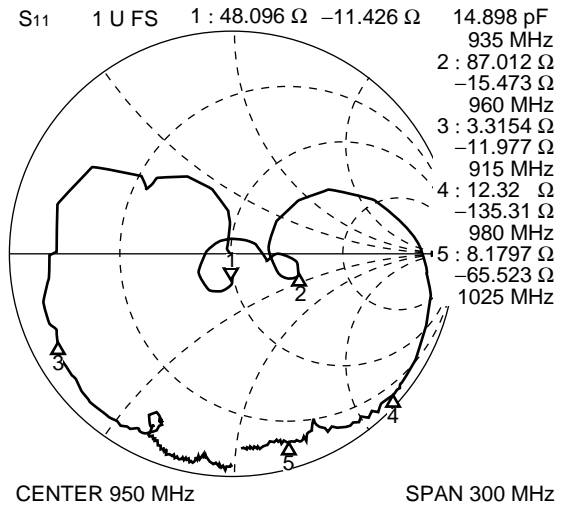
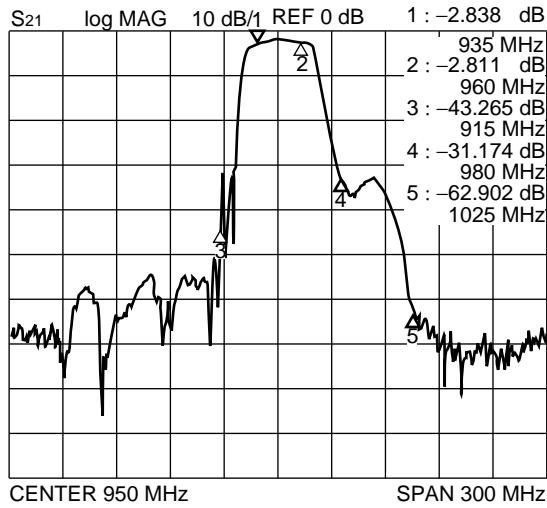
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# F5CE Series (D2 type)

## 6. GSM (Rx)

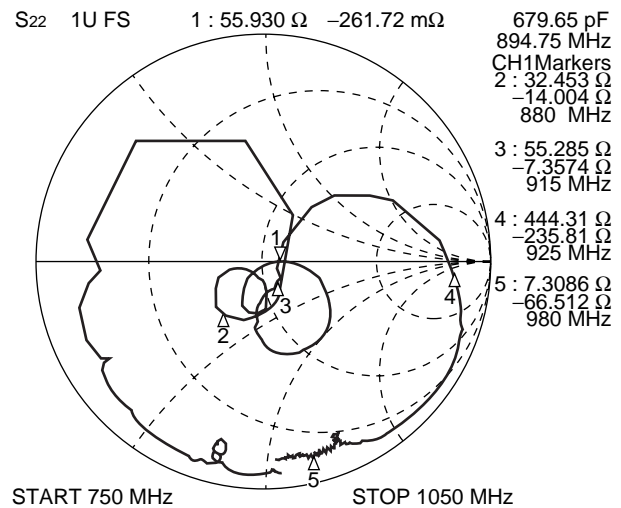
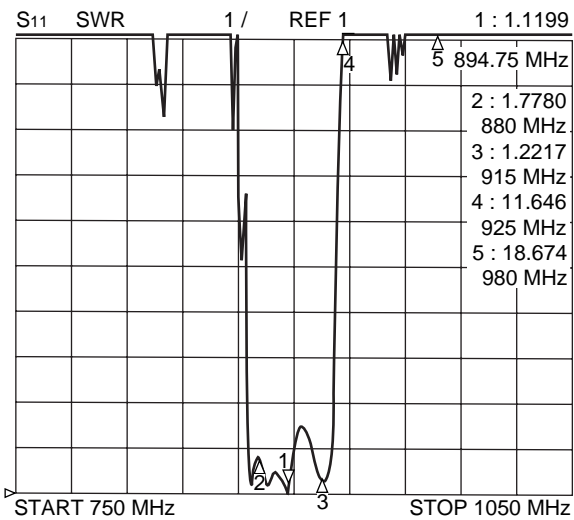
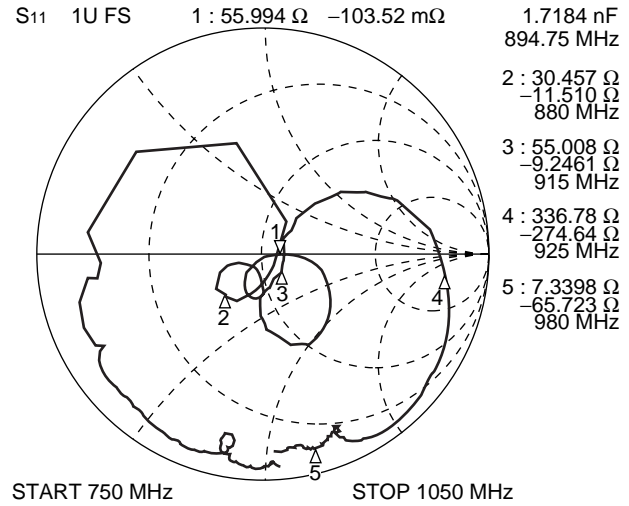
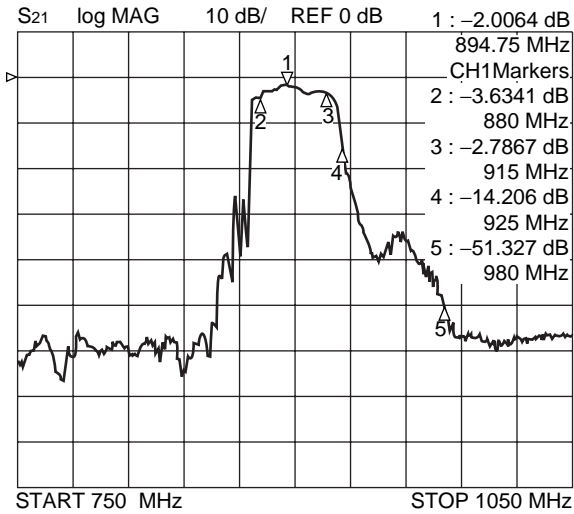
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# F5CE Series (D2 type)

## 7. EGSM (Tx)

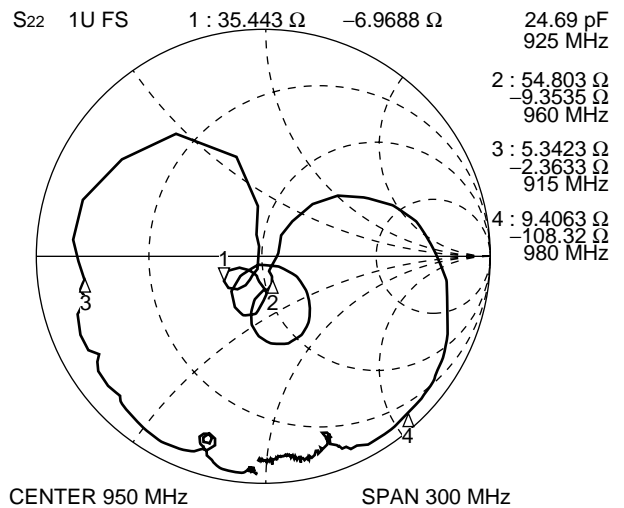
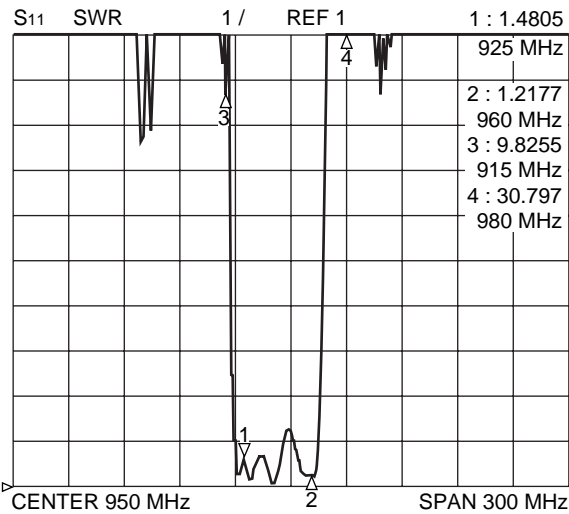
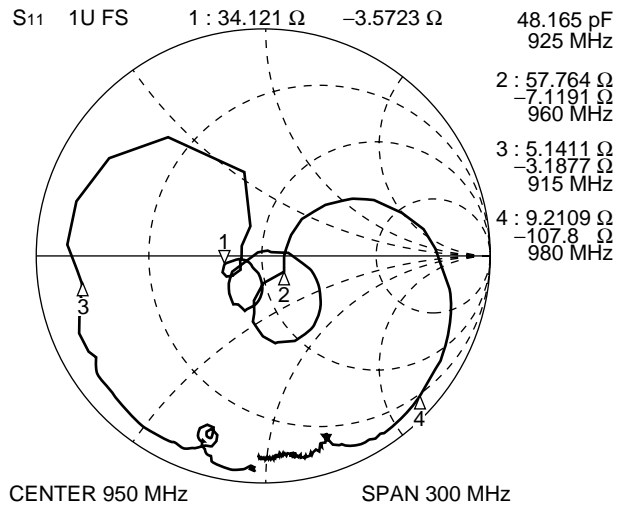
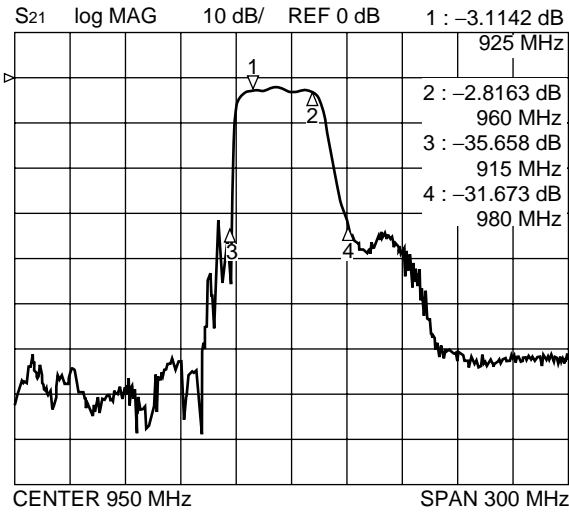
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# F5CE Series (D2 type)

## 8. EGSM (Rx)

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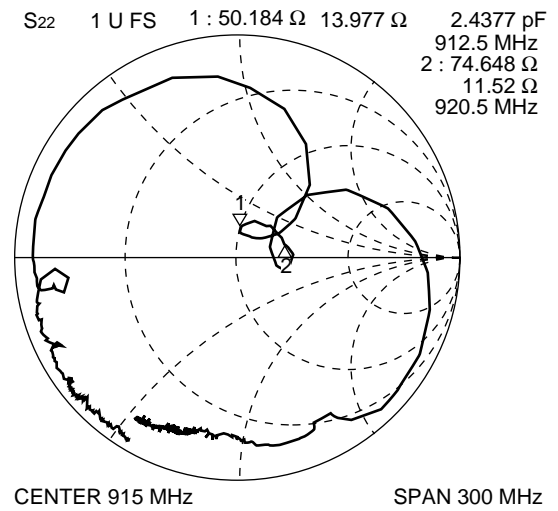
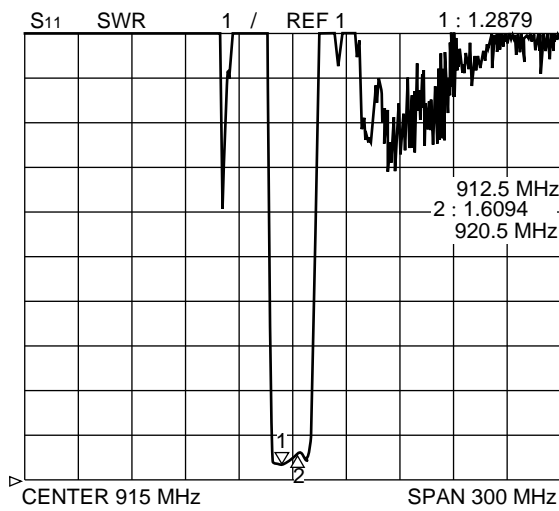
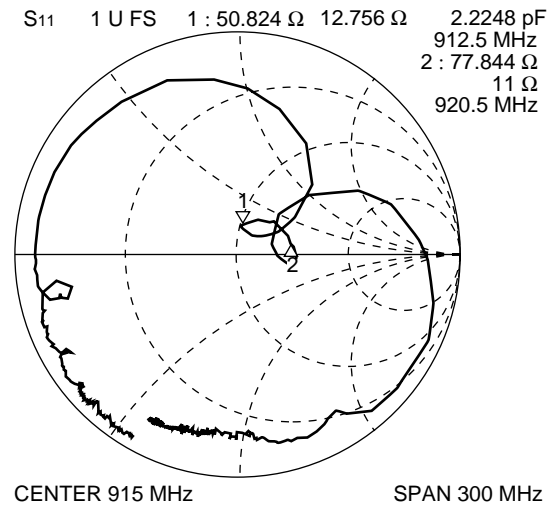
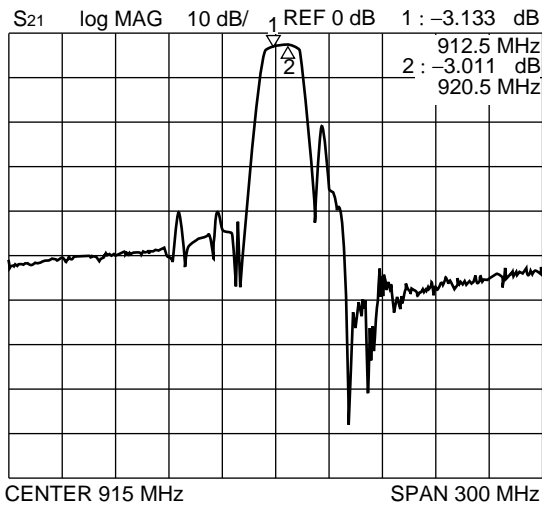




# F5CE Series (D2 type)

## 9. ISM900 (7 MHz Bandwidth)

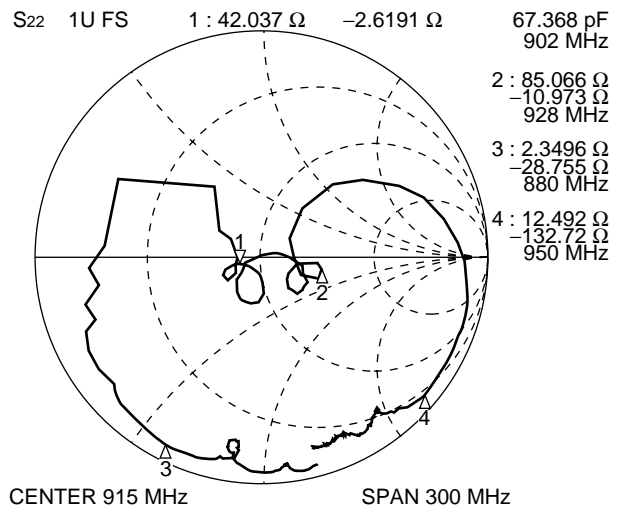
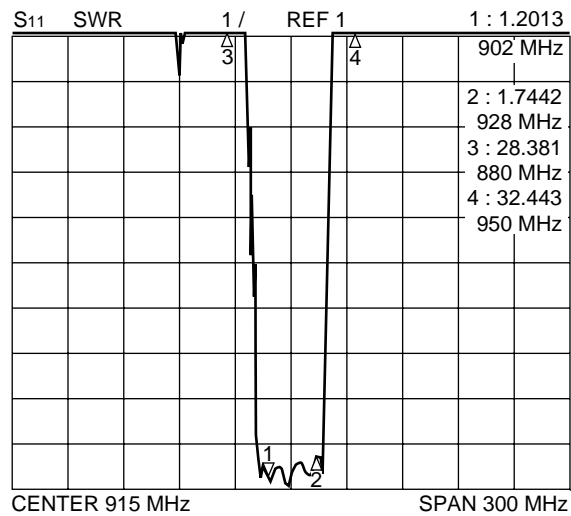
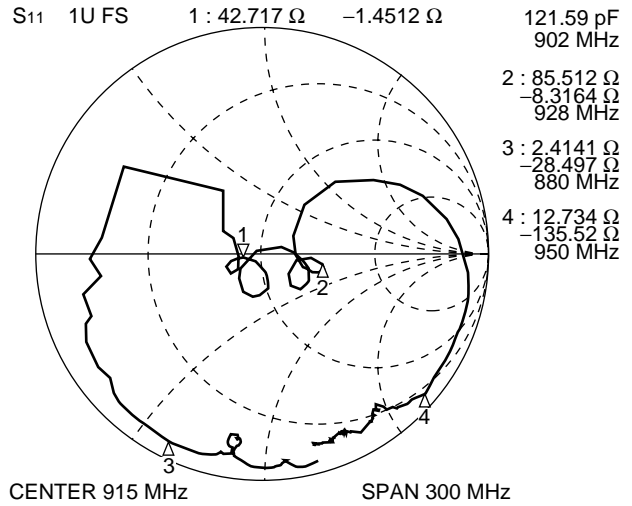
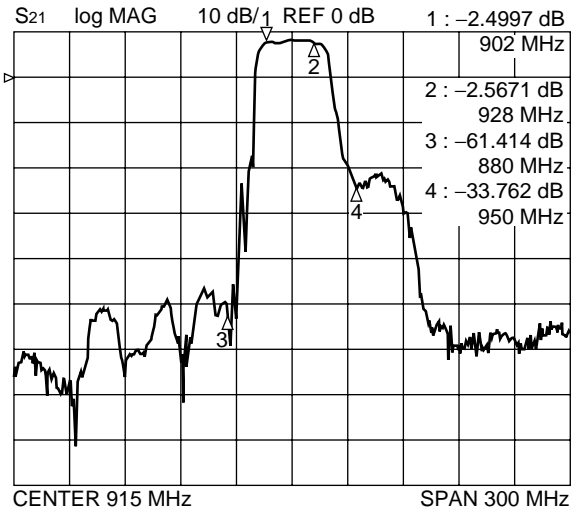
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# F5CE Series (D2 type)

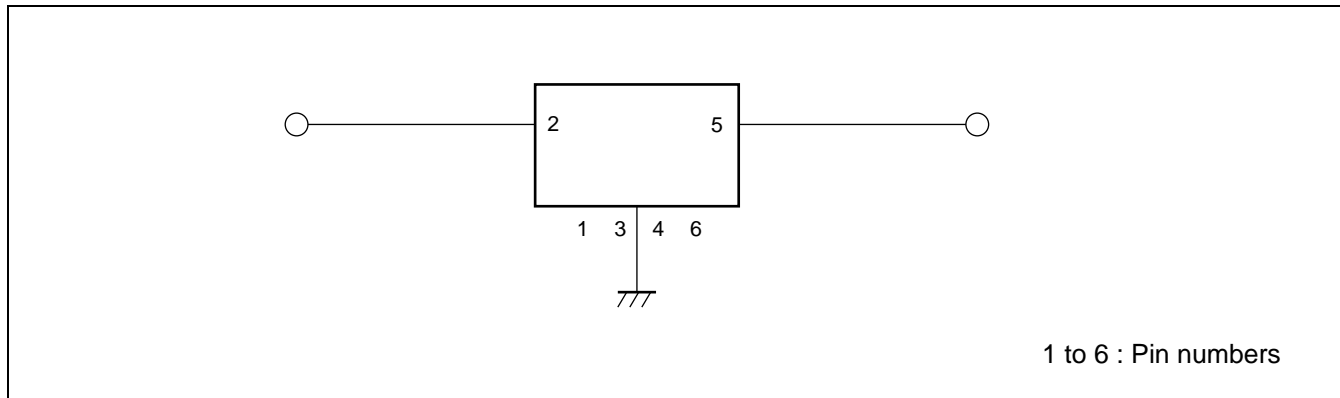
## 10. ISM900 (26 MHz Bandwidth)

Part number : FAR-F5CE-915M00-D236



# F5CE Series (D2 type)

## MEASURING CIRCUIT



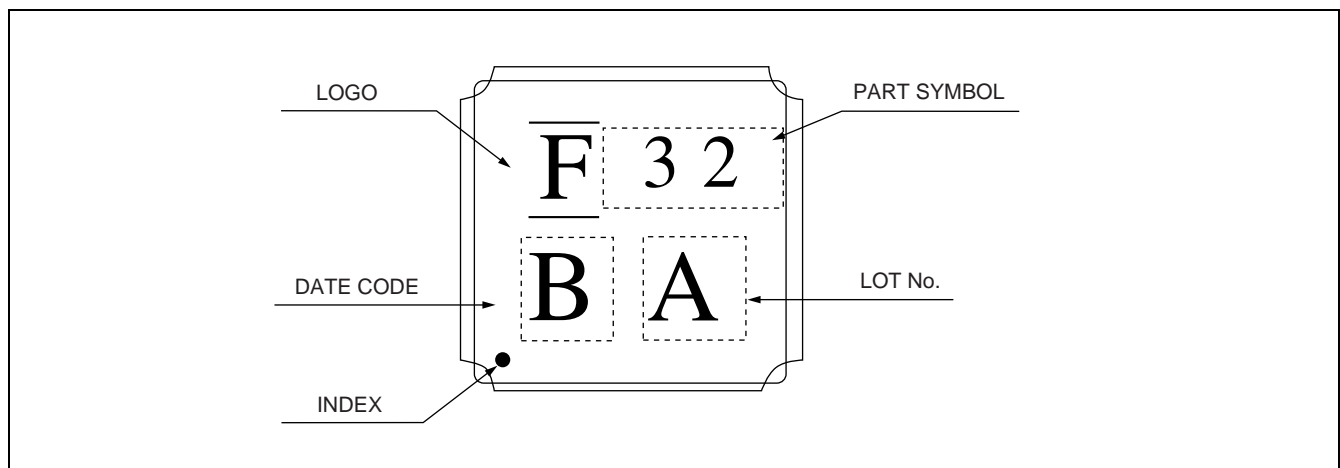
## PART NUMBER DESIGNATION

[Designation example]

FAR-F5CE-□□□M□□-D2□□-□  
(1) (2) (3)

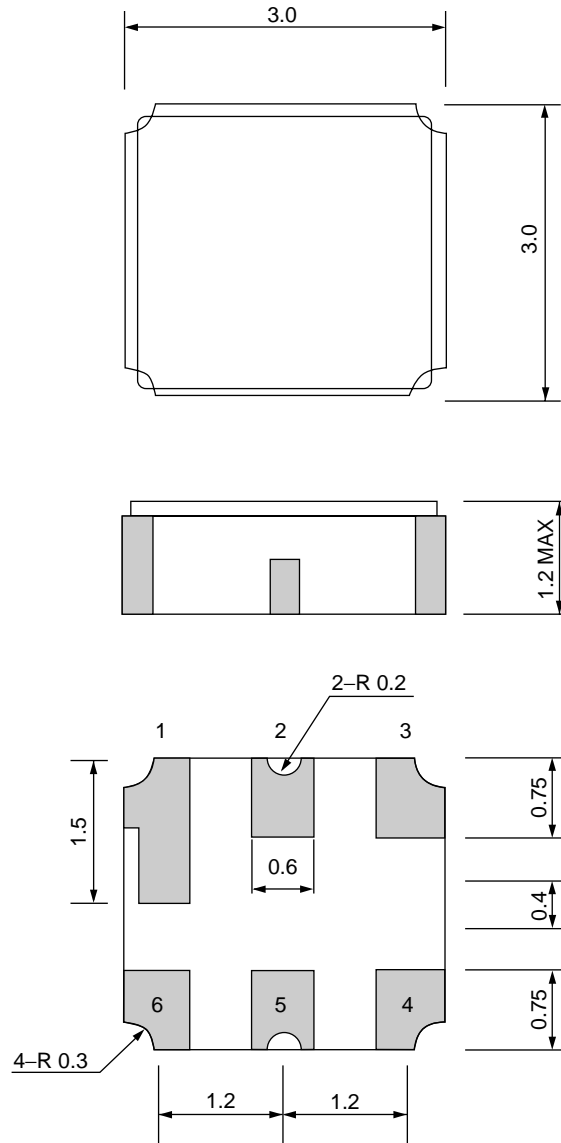
- (1) Frequency designation : Specify the nominal frequency in six alphanumeric characters.  
Enter M (for MHz) at the decimal point.  
Refer to standard frequencies.  
[Example] 836.5 MHz → 836M50
- (2) Serial number : Specify a characters from 01 to 99.  
Refer to standard frequencies.
- (3) Packing (Reeled tape) : Y : 1 kpcs/reel  
X : 5 kpcs/reel

## MARKING



# F5CE Series (D2 type)

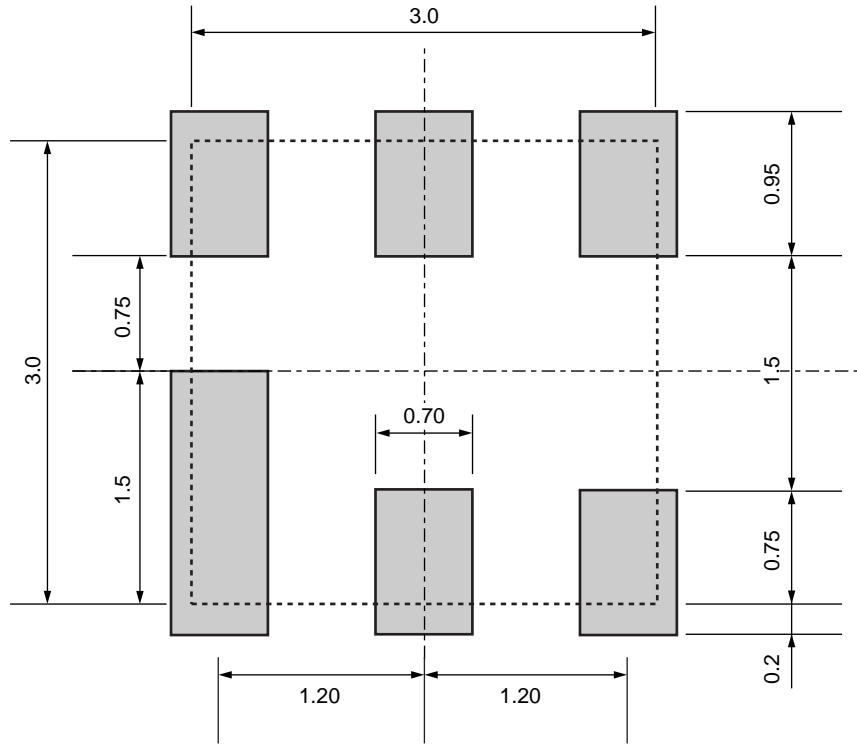
## ■ PACKAGE DIMENSION



Dimensions in mm

# F5CE Series (D2 type)

## RECOMMENDED LAND PATTERN

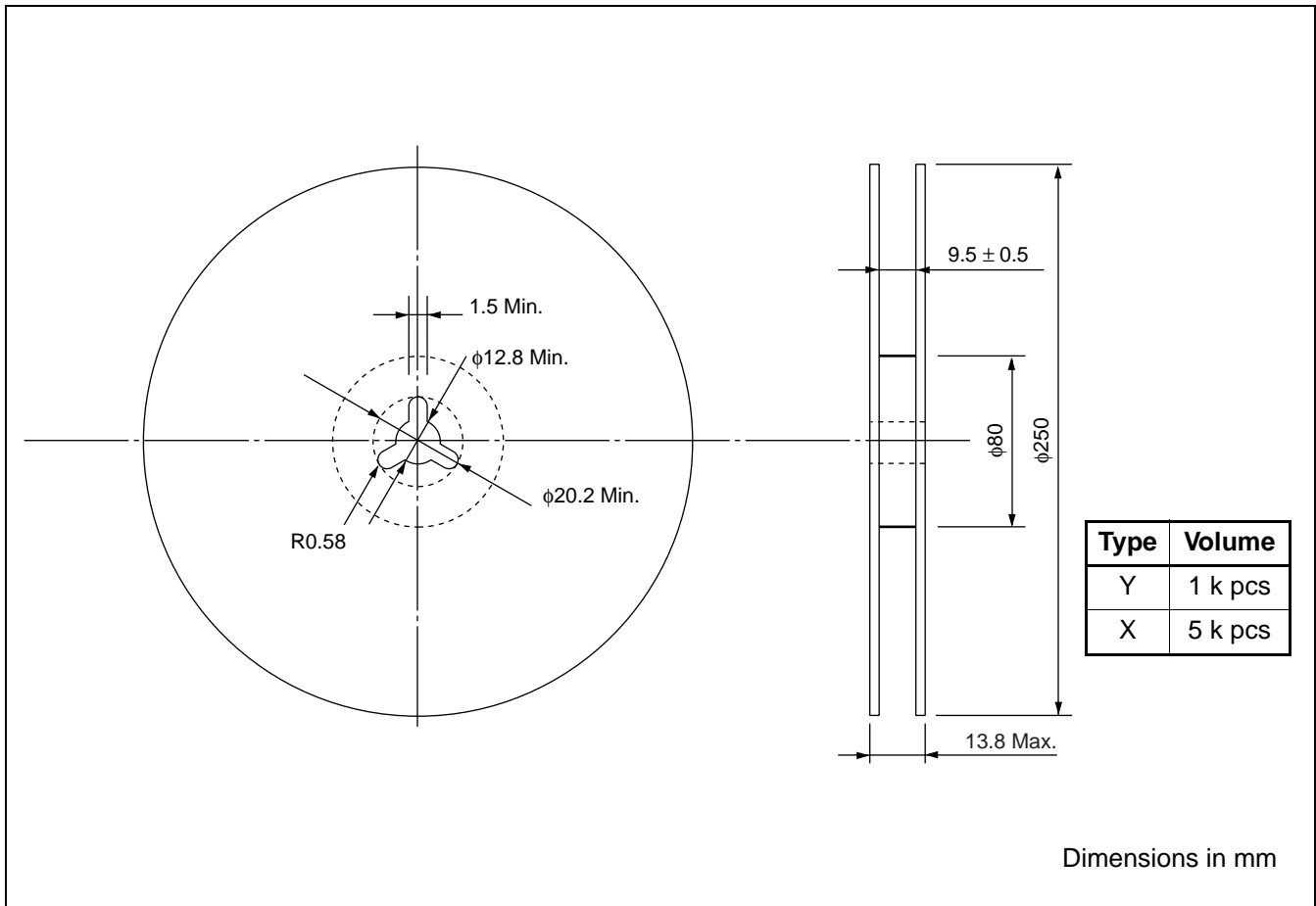


Dimensions in mm

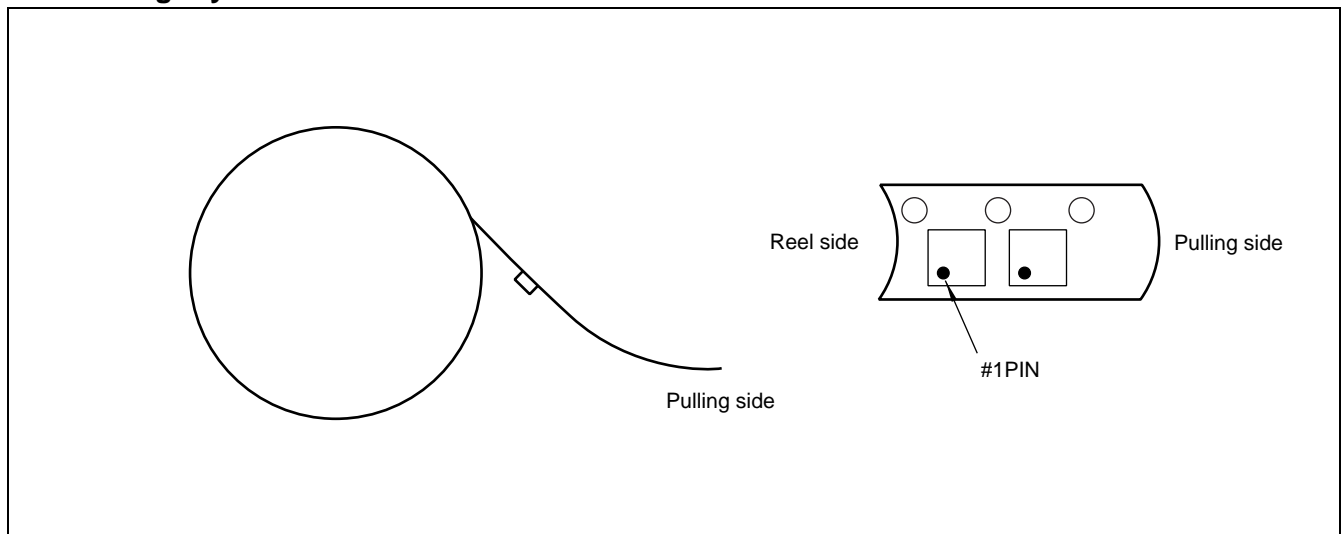
# F5CE Series (D2 type)

## ■ PACKING : Reel type

### 1. Reel Dimensions

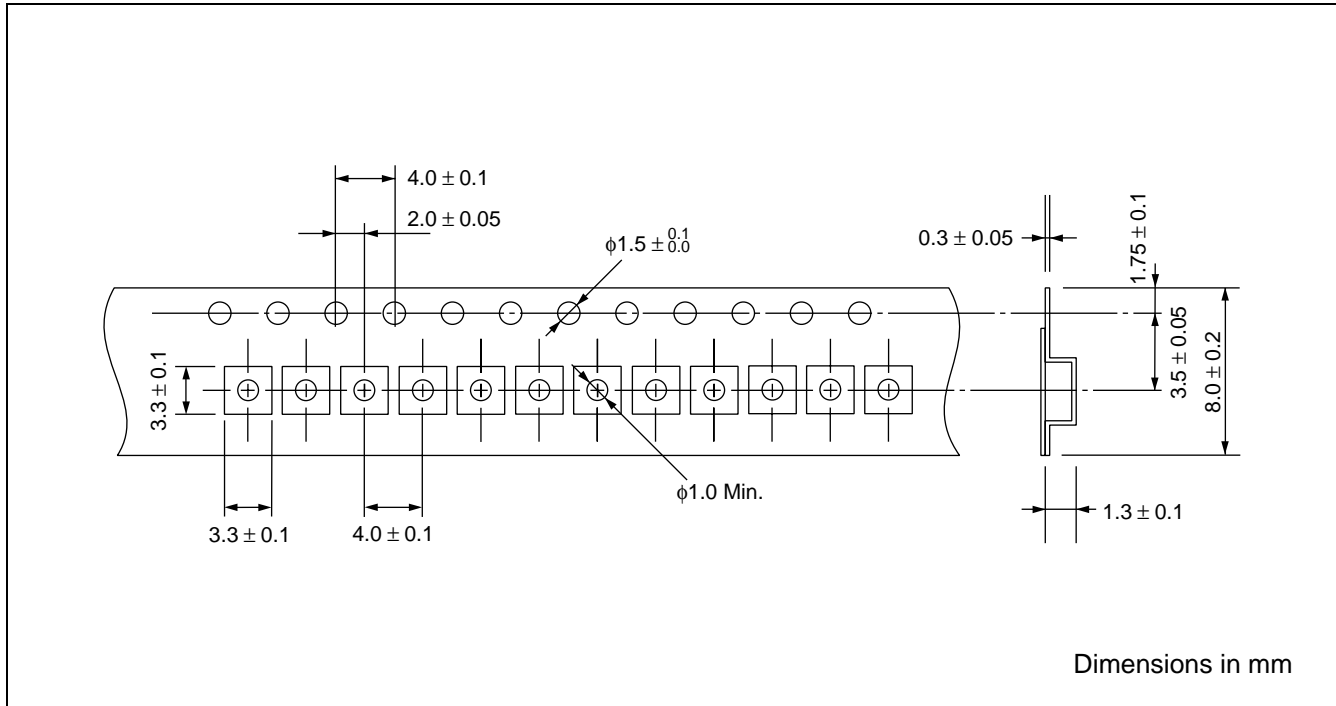


### 2. Packing Style



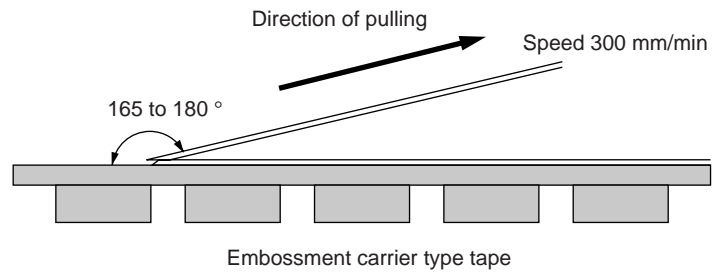
# F5CE Series (D2 type)

## 3. Tape Dimensions



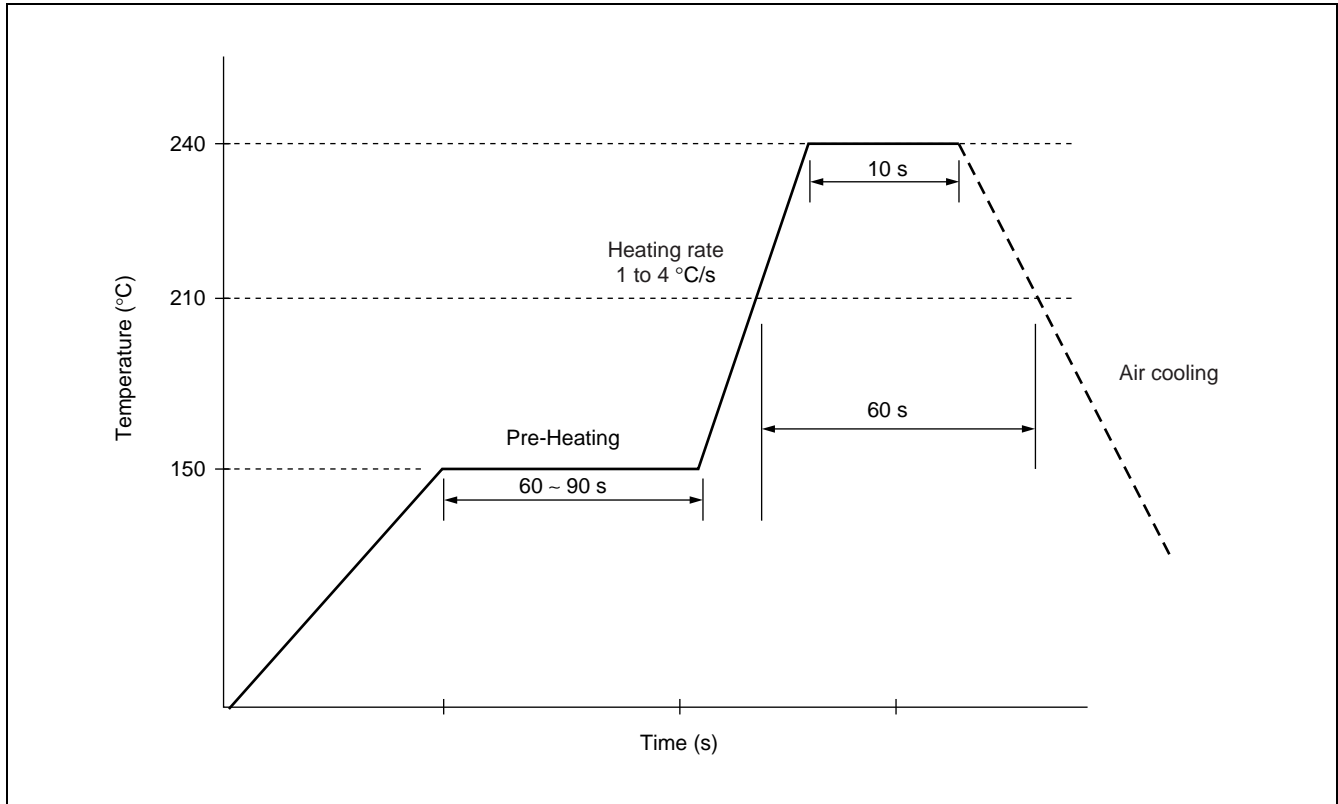
## 4. Peel strength of top cover tape

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



# F5CE Series (D2 type)

## RECOMMENDED REFLOW PROFILE



## NOTE

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



# F5CE Series (D2 type)

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