

# ASSP

## PIEZOELECTRIC SAW BPF

### F5 SERIES (L2 Type)

#### SAW BANDPASS FILTER (700 to 1000 MHz)

#### DESCRIPTION

F5 series are wideband bandpass filters for use in the 700MHz to 1000MHz of frequency range.

F5 series uses a single lithium tantalate piezoelectric crystal ( $\text{LiTaO}_3$ ) that has large electromechanical coupling coefficient. This provides wide bandwidths and exceptional stability.

Our exclusive mounting technology makes F5 series very compact and surface mountable.

Standard L2 type is much lower Insertion Loss and High attenuation L2 type is much higher stopband attenuation than other filters. Further more, Impedance is realized at  $50 \Omega$  in passband.

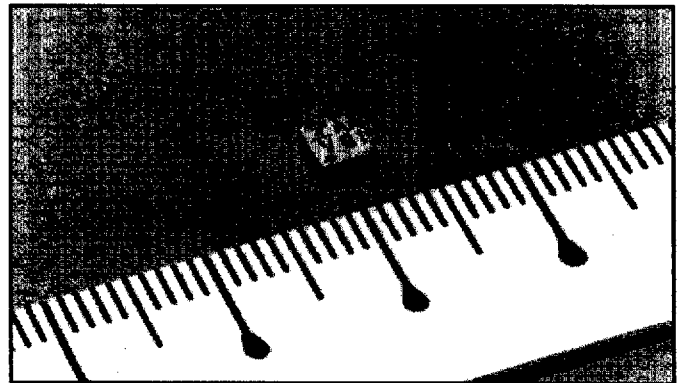
L2 type can be handled without outside matching circuit.

The F5 series is most suitable for use in handheld phones of both analog and digital systems.

#### FEATURES

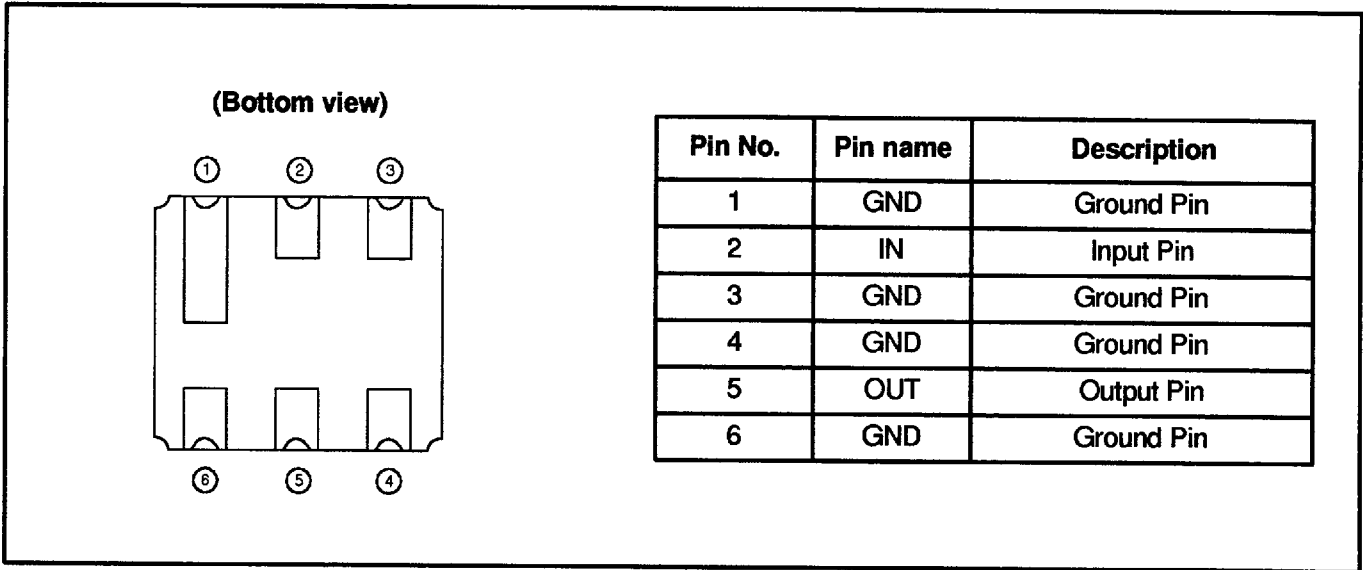
- Ultra compact and light (0.02 cc, 0.1 g)
- Outside matching circuit is unnecessary.
- Surface mount package (SMT)
- Wide variety of bandwidths for worldwide system (AMPS, ADC, ETACS, NMT, GSM, NTT, NTACS, PDC)
- Low insertion loss
- High power rating : 0.2 W guaranteed

#### PACKAGE



## F5 SERIES (L2 Type)

### PIN ASSIGNMENT



### MAXIMUM RATINGS

Item	Symbol	Rating	Unit
Operating temperature	Ta	-30 to +70 *1	°C
Storage temperature	Tstg	-40 to +100	
Maximum input level	Pin	+200	mW
Frequency range	-	+700 to +1000	MHz

\*1 This is also the Recommended Operating Conditions.

**STANDARD FREQUENCIES**

**STANDARD VERSION**

Center frequency (MHz)	Bandwidths (MHz)	System	Part Symbol	Part number
836.5	25	AMPS/ADC (Tx)	A A	FAR-F5CC-836M50-L2AA
881.5	25	AMPS/ADC (Rx)	A B	FAR-F5CC-881M50-L2AB
933.5	17	NTT (Tx)	B A	FAR-F5CC-933M50-L2BA
878.5	17	NTT (Rx)	B B	FAR-F5CC-878M50-L2BB
888.5	33	ETACS (Tx)	C A	FAR-F5CC-888M50-L2CA
933.5	33	ETACS (Rx)	C B	FAR-F5CC-933M50-L2CB
911.5	27	NTACS (Tx)	D A	FAR-F5CC-911M50-L2DA
856.5	27	NTACS (Rx)	D B	FAR-F5CC-856M50-L2DB
902.5	25	NMT/GSM (Tx)	E A	FAR-F5CC-902M50-L2EA
947.5	25	NMT/GSM (Rx)	E B	FAR-F5CC-947M50-L2EB
950.0	20	PDC (Tx)	F A	FAR-F5CC-950M00-L2FA
820.0	20	PDC (Rx)	F B	FAR-F5CC-820M00-L2FB

**HIGH ATTENUATION VERSION**

Center frequency (MHz)	Bandwidths (MHz)	System	Part Symbol	Part number
836.5	25	AMPS/ADC (Tx)	A Z	FAR-F5CC-836M50-L2AZ
881.5	25	AMPS/ADC (Rx)	A Y	FAR-F5CC-881M50-L2AY
902.5	25	NMT/GSM (Tx)	E Z	FAR-F5CC-902M50-L2EZ
947.5	25	NMT/GSM (Rx)	E Y	FAR-F5CC-947M50-L2EY

**F5 SERIES (L2 Type)**

**ELECTRICAL CHARACTERISTICS (STANDARD VERSION)**

**1. AMPS / ADC system (Tx)**

**Part number : FAR-F5CC-836M50-L2AA**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	824 to 849 MHz	-	2.0	3.5	dB	
In-band ripple	-	824 to 849 MHz	-	0.6	2.0	dB	
Absolute stopband attenuation	-	-	-	-	-	dB	
	-	869 to 894 MHz	20	27	-	dB	
	-	-	-	-	-	dB	
In-band VSWR	-	824 to 849 MHz	-	1.8	2.0	-	

**2. AMPS / ADC system (Rx)**

**Part number : FAR-F5CC-881M50-L2AB**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	869 to 894 MHz	-	2.5	3.5	dB	
In-band ripple	-	869 to 894 MHz	-	0.6	2.0	dB	
Absolute stopband attenuation	-	DC to 824 MHz	20	23	-	dB	
	-	824 to 849 MHz	20	28	-	dB	
	-	914 to 939 MHz	20	27	-	dB	
	-	939 to 1049 MHz	25	28	-	dB	
	-	1049 to 2000 MHz	20	21	-	dB	
In-band VSWR	-	869 to 894 MHz	-	1.8	2.0	-	

**ELECTRICAL CHARACTERISTICS (STANDARD VERSION)**

**3. ETACS system (Tx)**

Part number : FAR-F5CC-888M50-L2CA

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	872 to 905 MHz	-	3.0	5.0	dB	
In-band ripple	-	872 to 905 MHz	-	1.5	-	dB	
Absolute stopband attenuation	-	-	-	-	-	dB	
	-	917 to 950 MHz	10	15	-	dB	
	-	-	-	-	-	dB	
In-band VSWR	-	872 to 905 MHz	-	2.1	2.5	-	

**4. ETACS system (Rx)**

Part number : FAR-F5CC-933M50-L2CB

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	917 to 950 MHz	-	3.5	5.5	dB	
In-band ripple	-	917 to 950 MHz	-	2.0	-	dB	
Absolute stopband attenuation	-	DC to 872 MHz	20	32	-	dB	
	-	872 to 900 MHz	25	32	-	dB	
	-	900 to 905 MHz	10	15	-	dB	
	-	1007 to 1040 MHz	30	38	-	dB	
	-	1040 to 2000 MHz	20	26	-	dB	
In-band VSWR	-	917 to 950 MHz	-	2.0	2.5	-	

**F5 SERIES (L2 Type)**

**ELECTRICAL CHARACTERISTICS (STANDARD VERSION)**

**5. NTACS system (Tx)**

**Part number : FAR-F5CC-911M50-L2DA**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	898 to 925 MHz	-	2.5	3.5	dB	
In-band ripple	-	898 to 925 MHz	-	0.6	2.0	dB	
Absolute stopband attenuation	-	-	-	-	-	-	
	-	843 to 870 MHz	25	29	-	dB	
	-	-	-	-	-	-	
In-band VSWR	-	898 to 925 MHz	-	1.8	2.0	-	

**6. NTACS system (Rx)**

**Part number : FAR-F5CC-856M50-L2DB**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	843 to 870 MHz	-	2.5	3.5	dB	
In-band ripple	-	843 to 870 MHz	-	0.6	2.0	dB	
Absolute stopband attenuation	-	DC to 733 MHz	23	25	-	dB	
	-	733 to 760 MHz	35	40	-	dB	
	-	760 to 815 MHz	25	29	-	dB	
	-	898 to 953 MHz	25	35	-	dB	
	-	953 to 980 MHz	35	40	-	dB	
	-	980 to 1100 MHz	25	30	-	dB	
	-	1100 to 2000 MHz	20	21	-	dB	
In-band VSWR	-	843 to 870 MHz	-	1.9	2.5	-	

**ELECTRICAL CHARACTERISTICS (STANDARD VERSION)**

7. NMT / GSM system (Tx)

Part number : FAR-F5CC-902M50-L2EA

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	890 to 915 MHz	-	2.0	3.5	dB	
In-band ripple	-	890 to 915 MHz	-	0.6	2.0	dB	
Absolute stopband attenuation	-	-	-	-	-	dB	
	-	835 to 960 MHz	20	27	-	dB	
	-	-	-	-	-	dB	
In-band VSWR	-	890 to 915 MHz	-	1.8	2.0	-	

8. NMT / GSM system (Rx)

Part number : FAR-F5CC-947M50-L2EB

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	935 to 960 MHz	-	2.5	3.5	dB	
In-band ripple	-	935 to 960 MHz	-	0.6	2.0	dB	
Absolute stopband attenuation	-	DC to 800 MHz	20	25	-	dB	
	-	890 to 915 MHz	20	28	-	dB	
	-	980 to 1025 MHz	15	28	-	dB	
	-	1025 to 1070 MHz	35	40	-	dB	
	-	1070 to 1105 MHz	30	35	-	dB	
	-	1105 to 1600 MHz	20	25	-	dB	
	-	1600 to 2000 MHz	15	20	-	dB	
In-band VSWR	-	935 to 960 MHz	-	1.9	2.5	-	

**F5 SERIES (L2 Type)**

**ELECTRICAL CHARACTERISTICS (STANDARD VERSION)**

**9. PDC system (Tx)**

**Part number : FAR-F5CC-950M00-L2FA**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	940 to 960 MHz	-	2.0	3.0	dB	
In-band ripple	-	940 to 960 MHz	-	0.6	1.5	dB	
Absolute stopband attenuation	-	-	-	-	-	dB	
	-	810 to 830 MHz	20	25	-	dB	
	-	-	-	-	-	dB	
In-band VSWR	-	940 to 960 MHz	-	1.8	2.0	-	

**10. PDC system (Rx)**

**Part number : FAR-F5CC-820M00-L2FB**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	810 to 830 MHz	-	3.0	4.0	dB	
In-band ripple	-	810 to 830 MHz	-	0.5	1.5	dB	
Absolute stopband attenuation	-	DC to 740 MHz	20	25	-	dB	
	-	940 to 960 MHz	25	28	-	dB	
	-	1040 to 1060 MHz	25	30	-	dB	
	-	1060 to 2000 MHz	20	26	-	dB	
In-band VSWR	-	810 to 830 MHz	-	1.8	2.0	-	



**ELECTRICAL CHARACTERISTICS (HIGH ATTENUATION VERSION)**

**11. AMPS / ADC system (Tx) Part number : FAR-F5CC-836M50-L2AZ**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	824 to 849 MHz	-	3.0	4.0	dB	
In-band ripple	-	824 to 849 MHz	-	1.0	2.0	dB	
Absolute stopband attenuation	-	D.C. to 800MHz	25	28	-	dB	
	-	869 to 894 MHz	30	40	-	dB	
	-	894 to 1049 MHz	30	35	-	dB	
	-	1049 to 2000 MHz	20	26	-	dB	
In-band VSWR	-	824 to 849 MHz	-	2.0	2.5	-	

**12. AMPS / ADC system (Rx) Part number : FAR-F5CC-881M50-L2AY**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	869 to 894 MHz	-	2.8	4.0	dB	
In-band ripple	-	869 to 894 MHz	-	1.0	2.0	dB	
Absolute stopband attenuation	-	DC to 779 MHz	25	31	-	dB	
	-	779 to 804 MHz	35	40	-	dB	
	-	804 to 824 MHz	25	31	-	dB	
	-	824 to 849 MHz	20	31	-	dB	
	-	914 to 939 MHz	20	30	-	dB	
	-	939 to 1049 MHz	35	40	-	dB	
	-	1049 to 2000 MHz	20	26	-	dB	
In-band VSWR	-	869 to 894 MHz	-	2.0	2.5	-	

**F5 SERIES (L2 Type)**

**ELECTRICAL CHARACTERISTICS (HIGH ATTENUATION VERSION)**

**13. NMT / GSM system (Tx)**

**Part number : FAR-F5CC-902M50-L2EZ**

(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	890 to 915 MHz	-	3.2	4.0	dB	
In-band ripple	-	890 to 915 MHz	-	1.0	2.0	dB	
Absolute stopband attenuation	-	D.C. to 845MHz	32	36	-	dB	
	-	845 to 870 MHz	20	33	-	dB	
	-	935 to 980 MHz	20	40	-	dB	
	-	980 to 1200 MHz	30	32	-	-	
	-	1200 to 2000 MHz	15	25	-	-	
In-band VSWR	-	890 to 915 MHz	-	2.1	2.5	-	

**14. NMT / GSM system (Rx)**

**Part number : FAR-F5CC-947M50-L2EY**

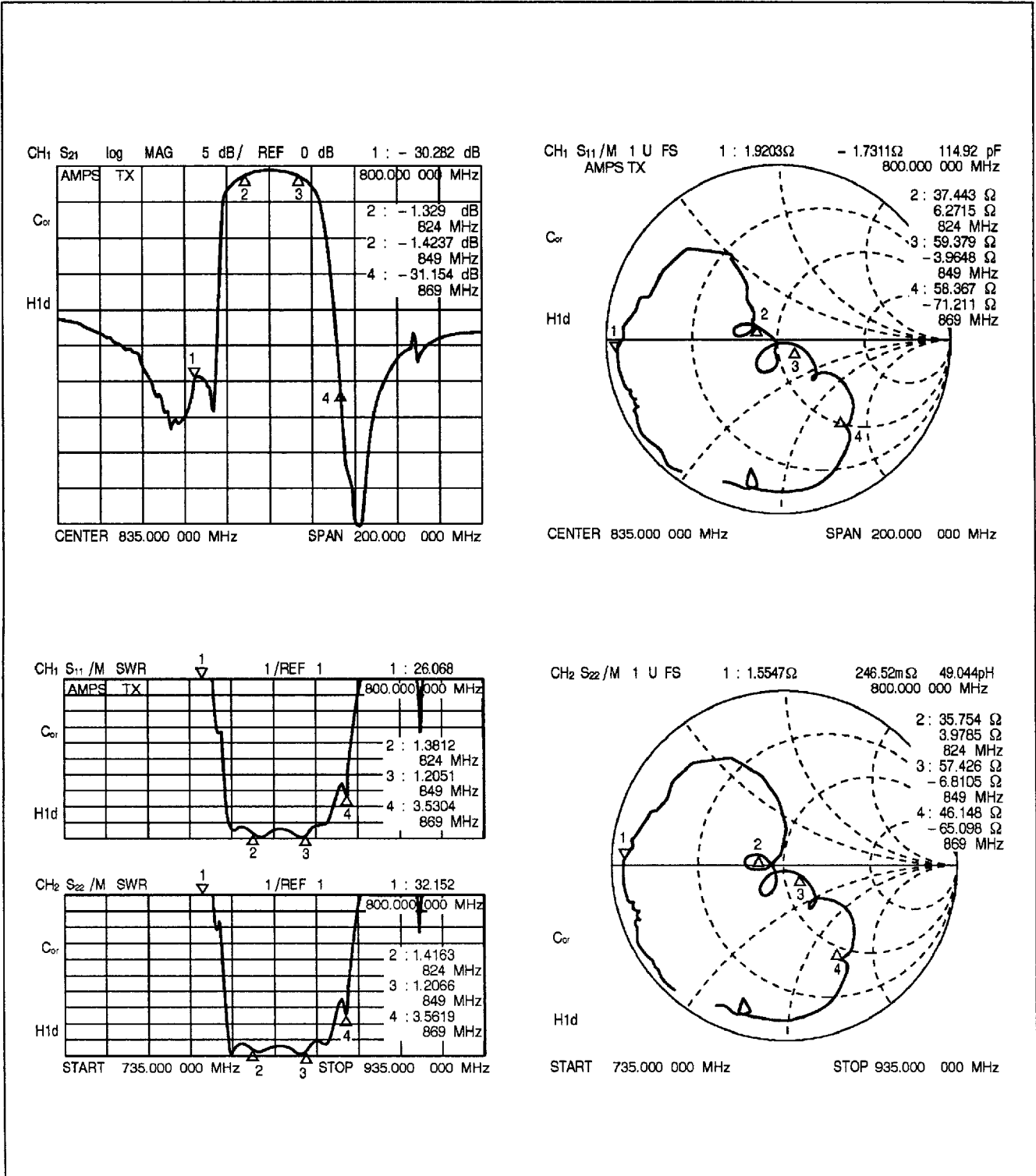
(Ta = -30 to 70°C)

Item	Symbol	Conditions	Rating			Unit	Remarks
			Min.	Typ.	Max.		
Insertion loss	IL	935 to 960 MHz	-	3.2	4.0	dB	
In-band ripple	-	935 to 960 MHz	-	1.0	2.0	dB	
Absolute stopband attenuation	-	DC to 870 MHz	32	35	-	dB	
	-	890 to 915 MHz	20	30	-	dB	
	-	980 to 1025 MHz	15	40	-	dB	
	-	1025 to 1070 MHz	35	38	-	dB	
	-	1070 to 1105 MHz	30	35	-	dB	
	-	1105 to 2000 MHz	20	25	-	dB	
In-band VSWR	-	935 to 960 MHz	-	2.1	2.5	-	

CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)

1. AMPS / ADC system (Tx)

Part number : FAR-F5CC-836M50-L2AA

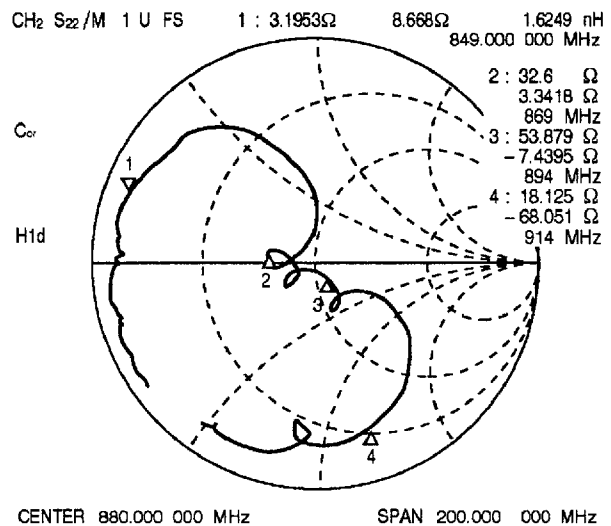
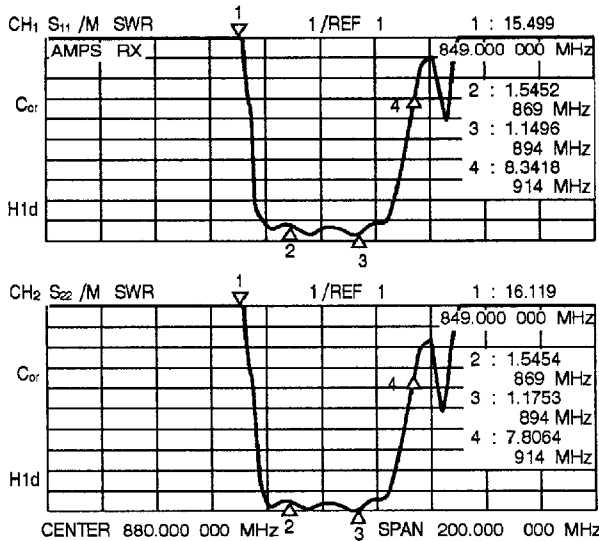
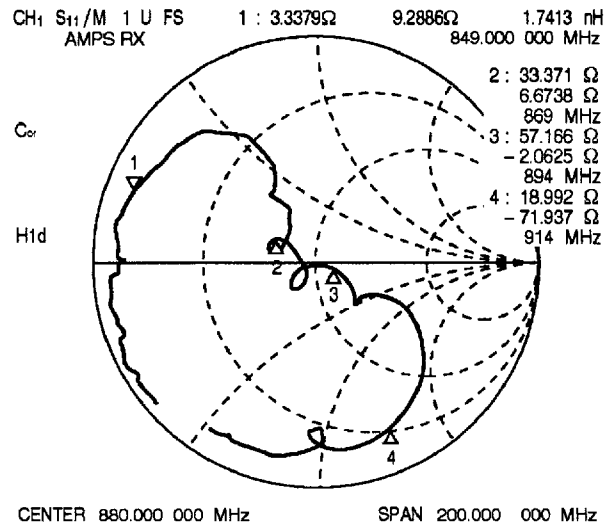
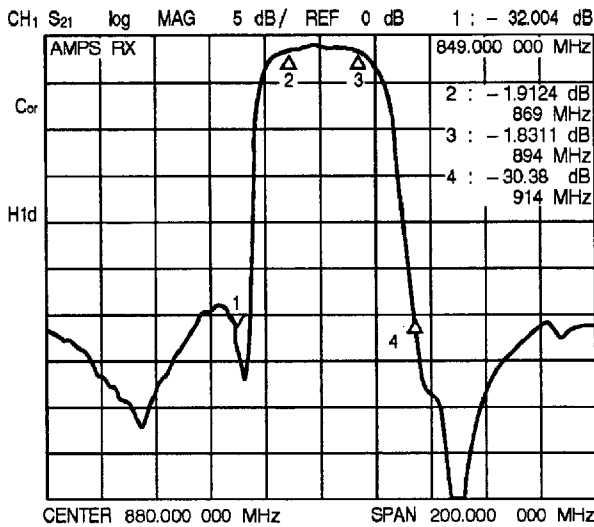


**F5 SERIES (L2 Type)**

**CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)**

**2. AMPS / ADC system (Rx)**

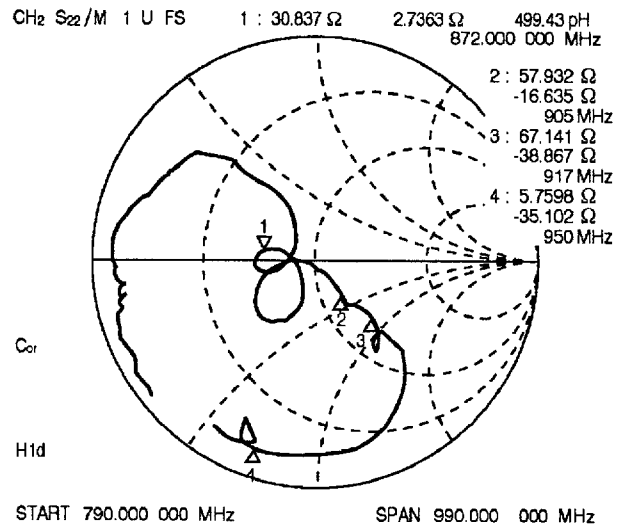
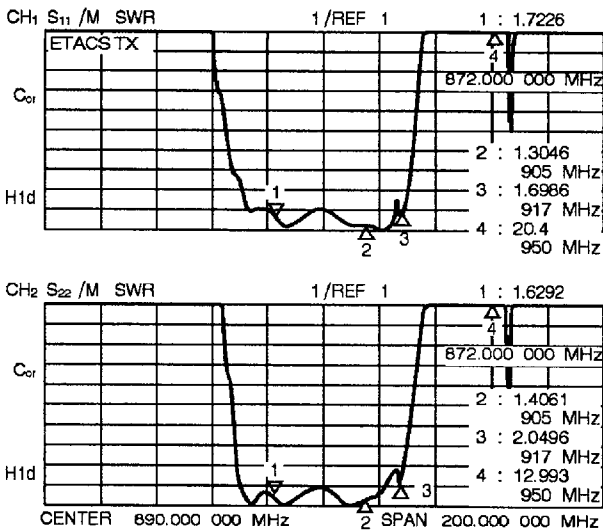
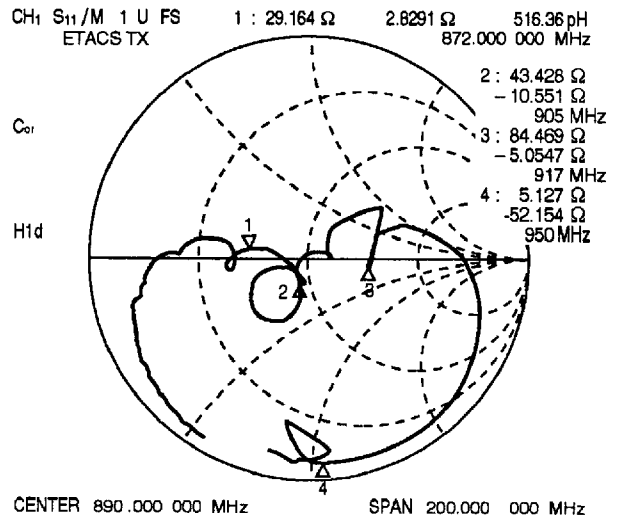
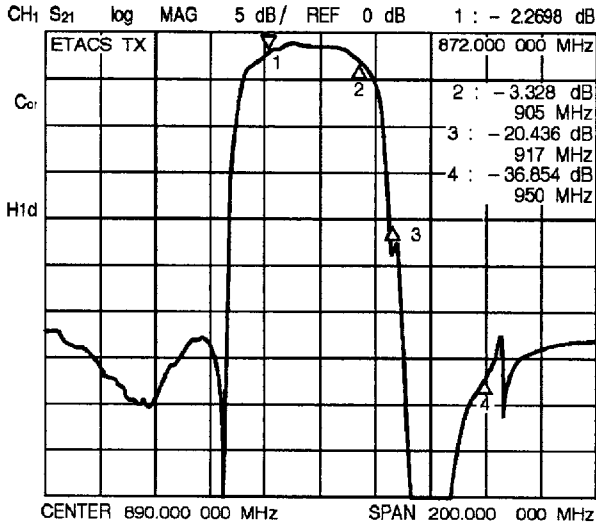
**Part number : FAR-F5CC-881M50-L2AB**



CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)

3. ETACS system (Tx)

Part number : FAR-F5CC-888M50-L2CA

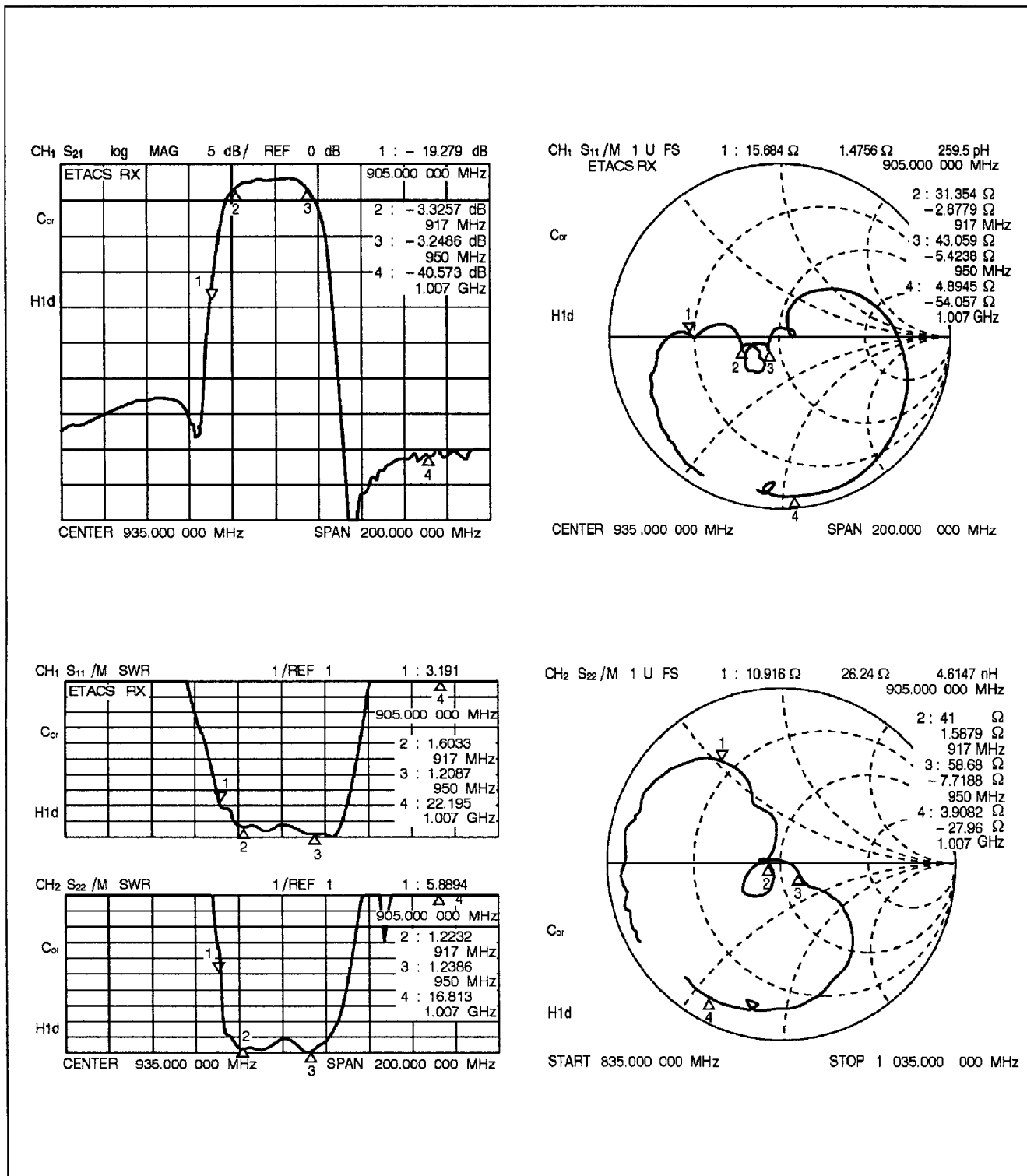


# F5 SERIES (L2 Type)

## CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)

### 4. ETACS system (Rx)

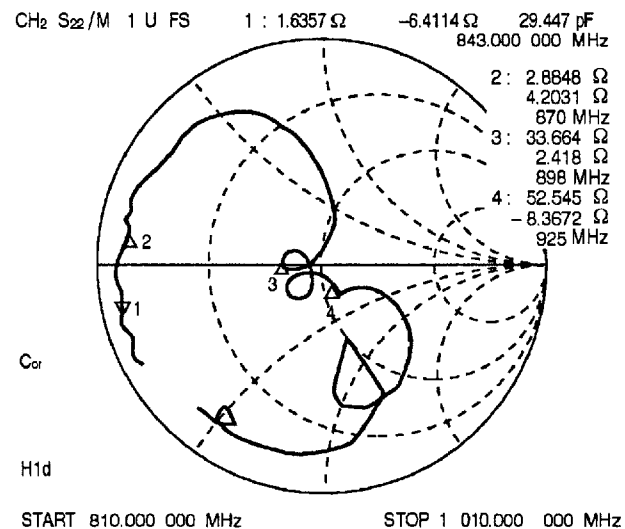
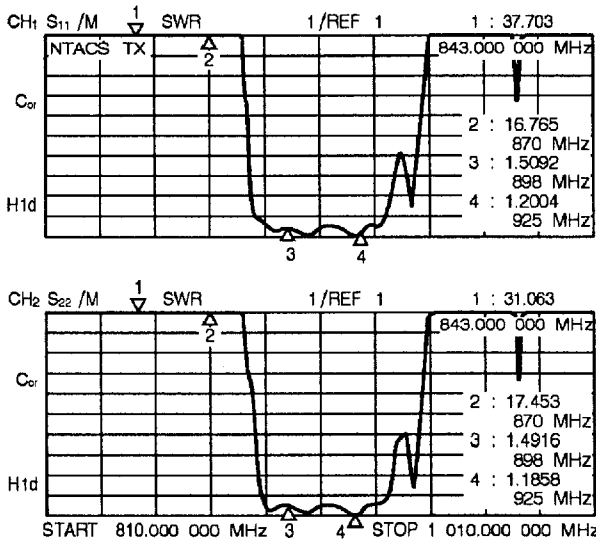
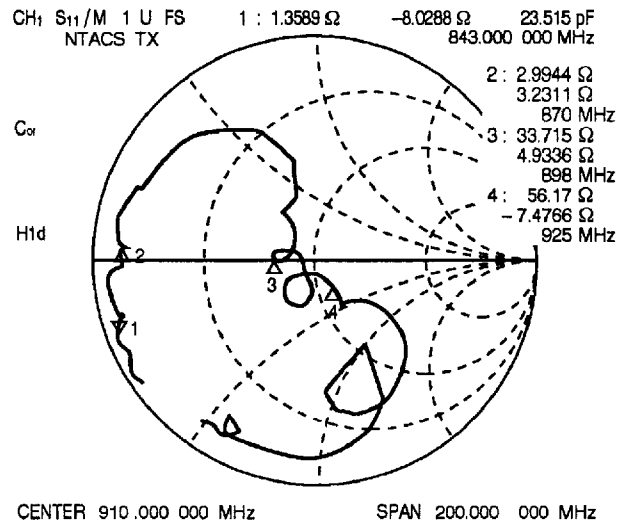
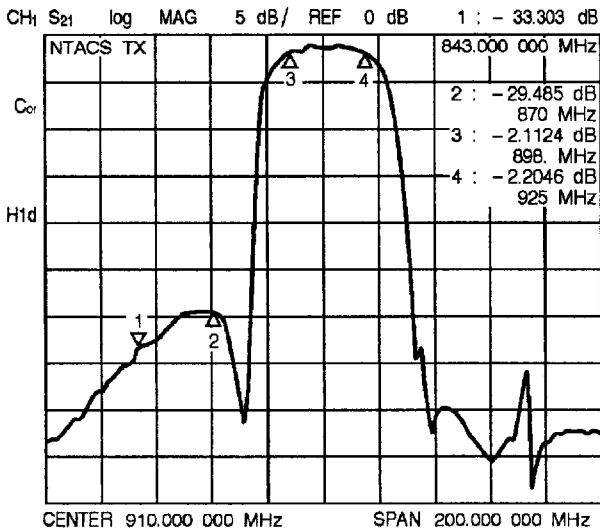
Part number : FAR-F5CC-933M50-L2CB



CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)

5. NTACS system (Tx)

Part number : FAR-F5CC-911M50-L2DA

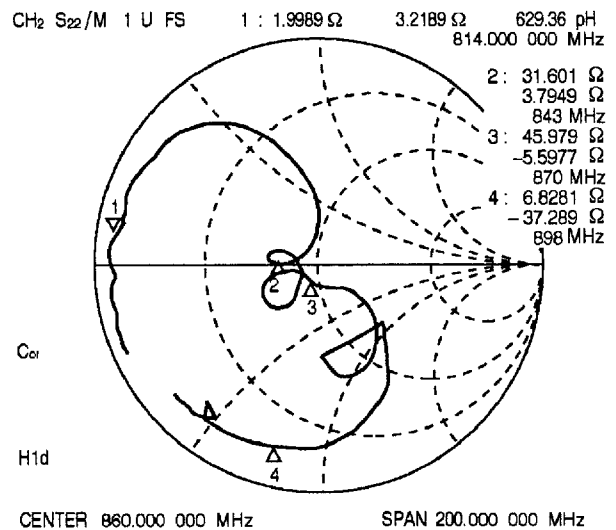
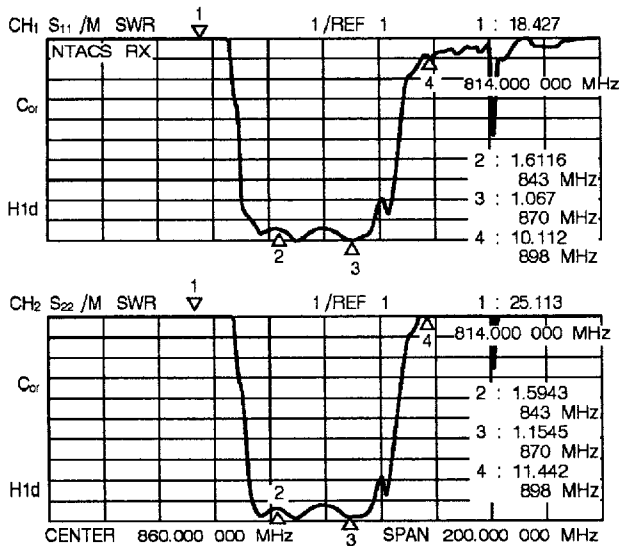
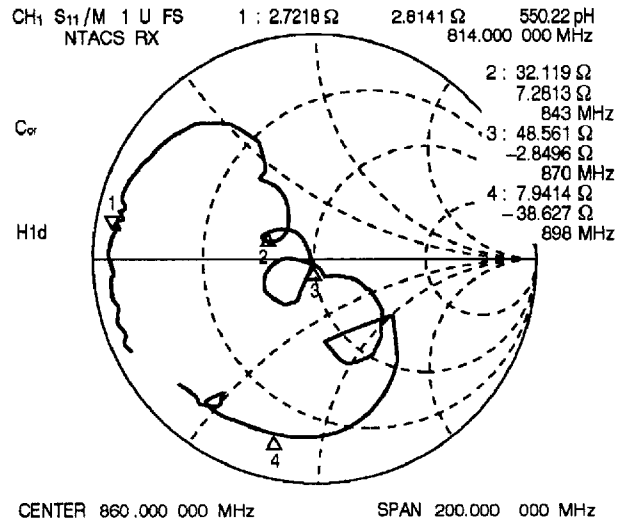
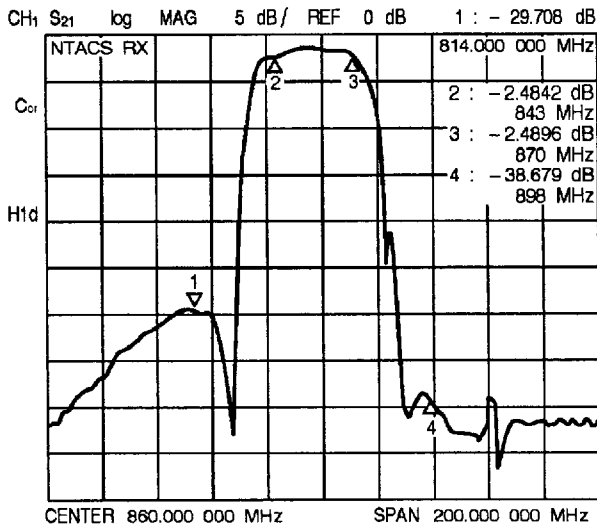


F5 SERIES (L2 Type)

CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)

6. NTACS system (Rx)

Part number : FAR-F5CC-856M50-L2DB

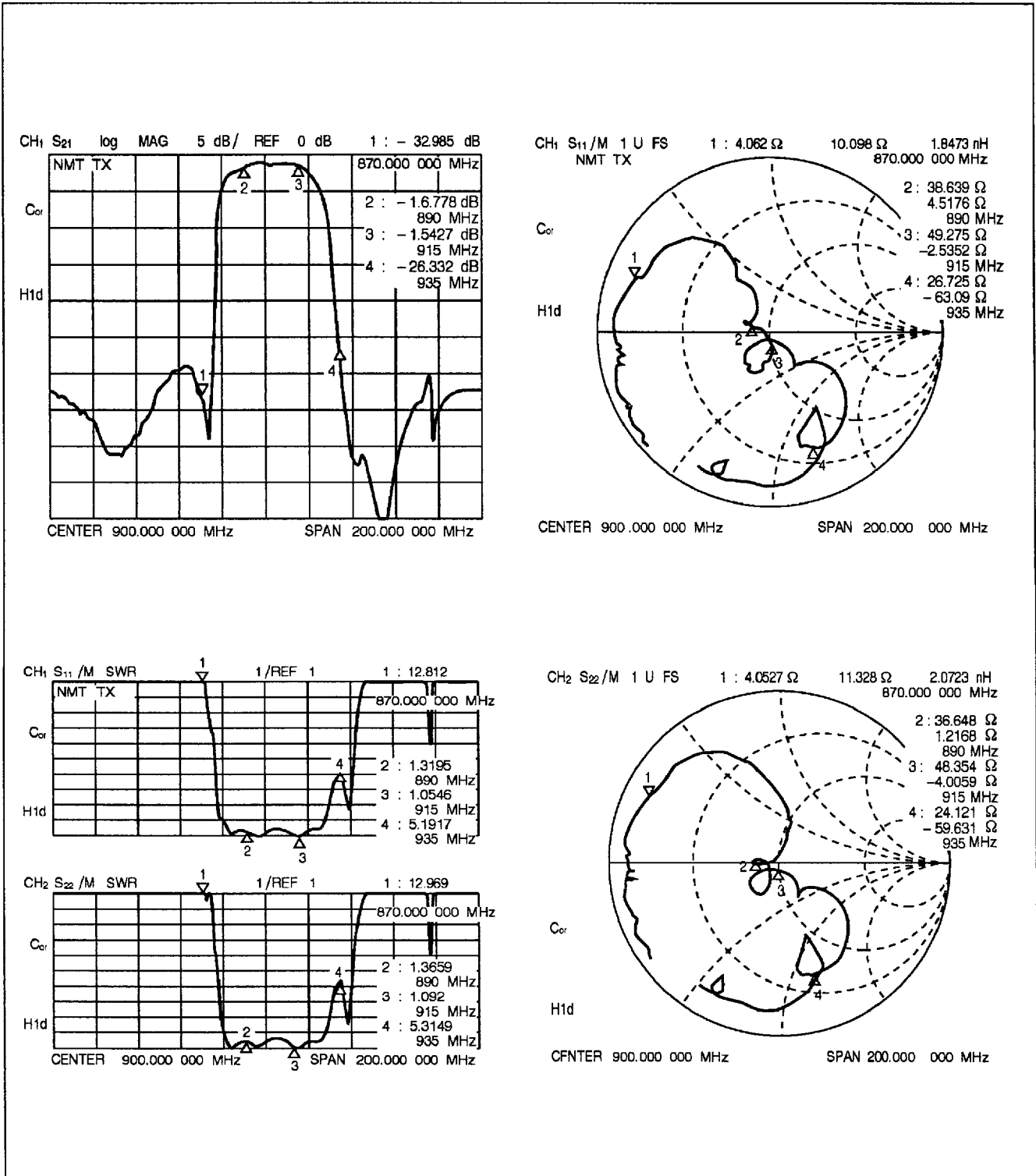




CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)

7. NMT / GSM system (Tx)

Part number : FAR-F5CC-902M50-L2EA

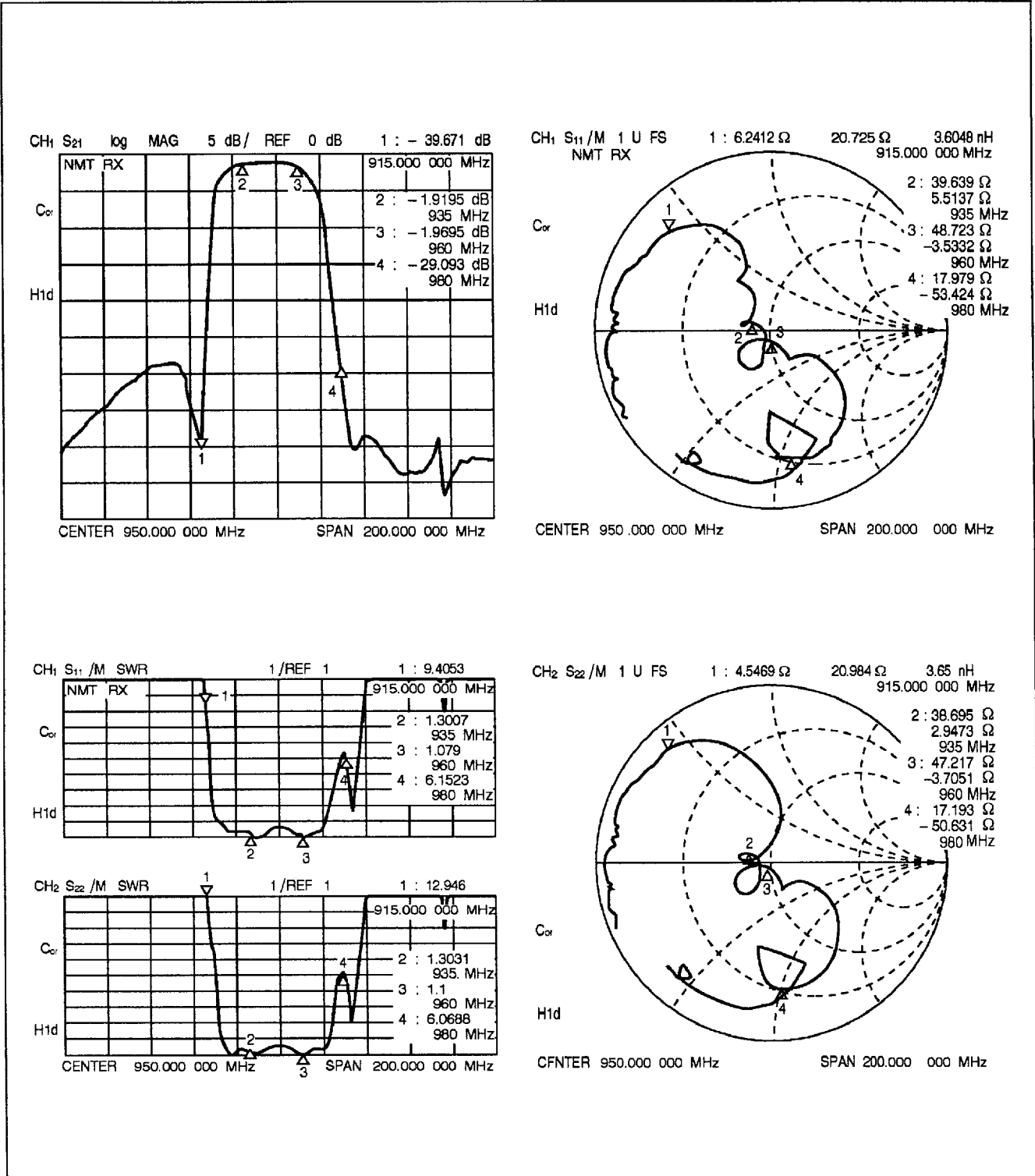


**F5 SERIES (L2 Type)**

**CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)**

**8. NMT / GSM system (Rx)**

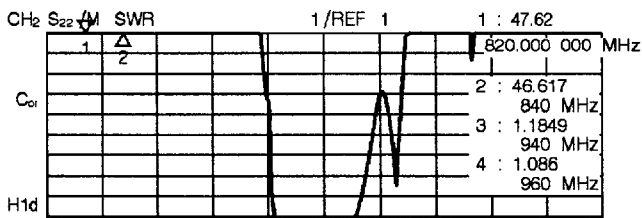
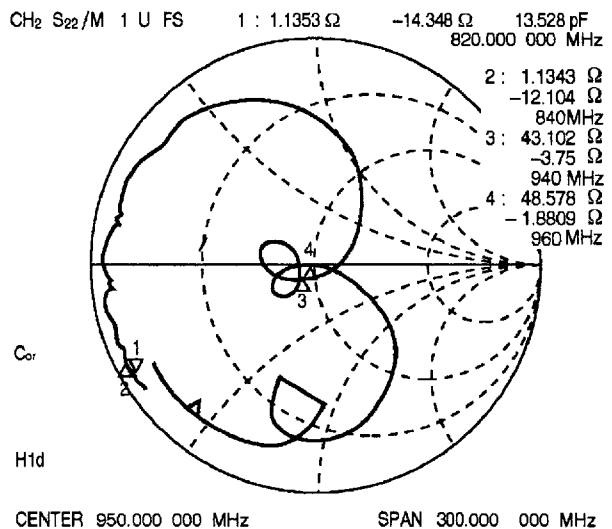
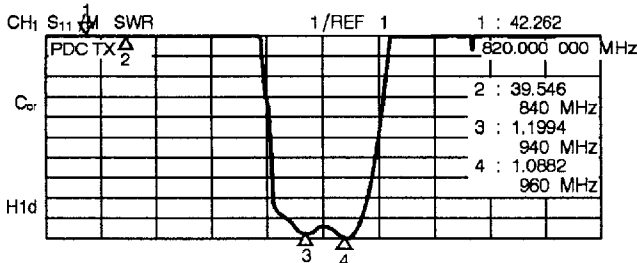
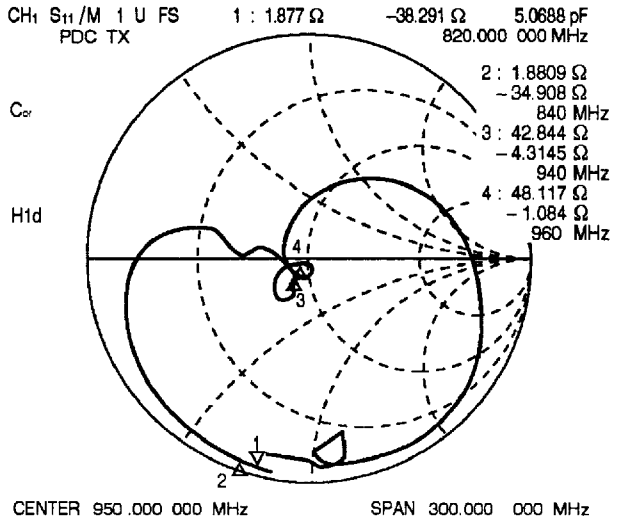
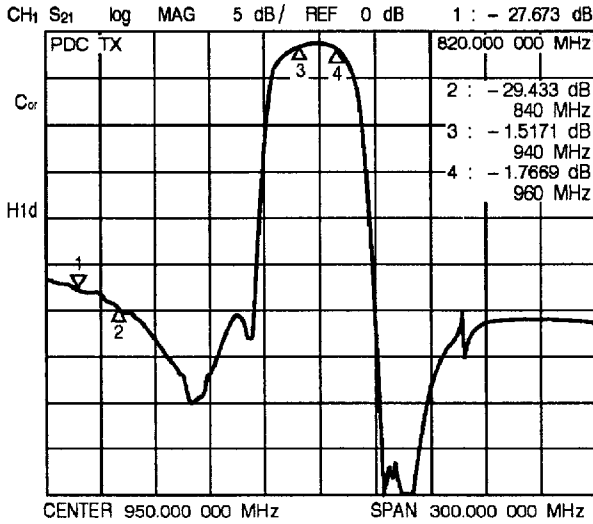
**Part number : FAR-F5CC-947M50-L2EB**



CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)

9. JDC system (Tx)

Part number : FAR-F5CC-950M00-L2FA

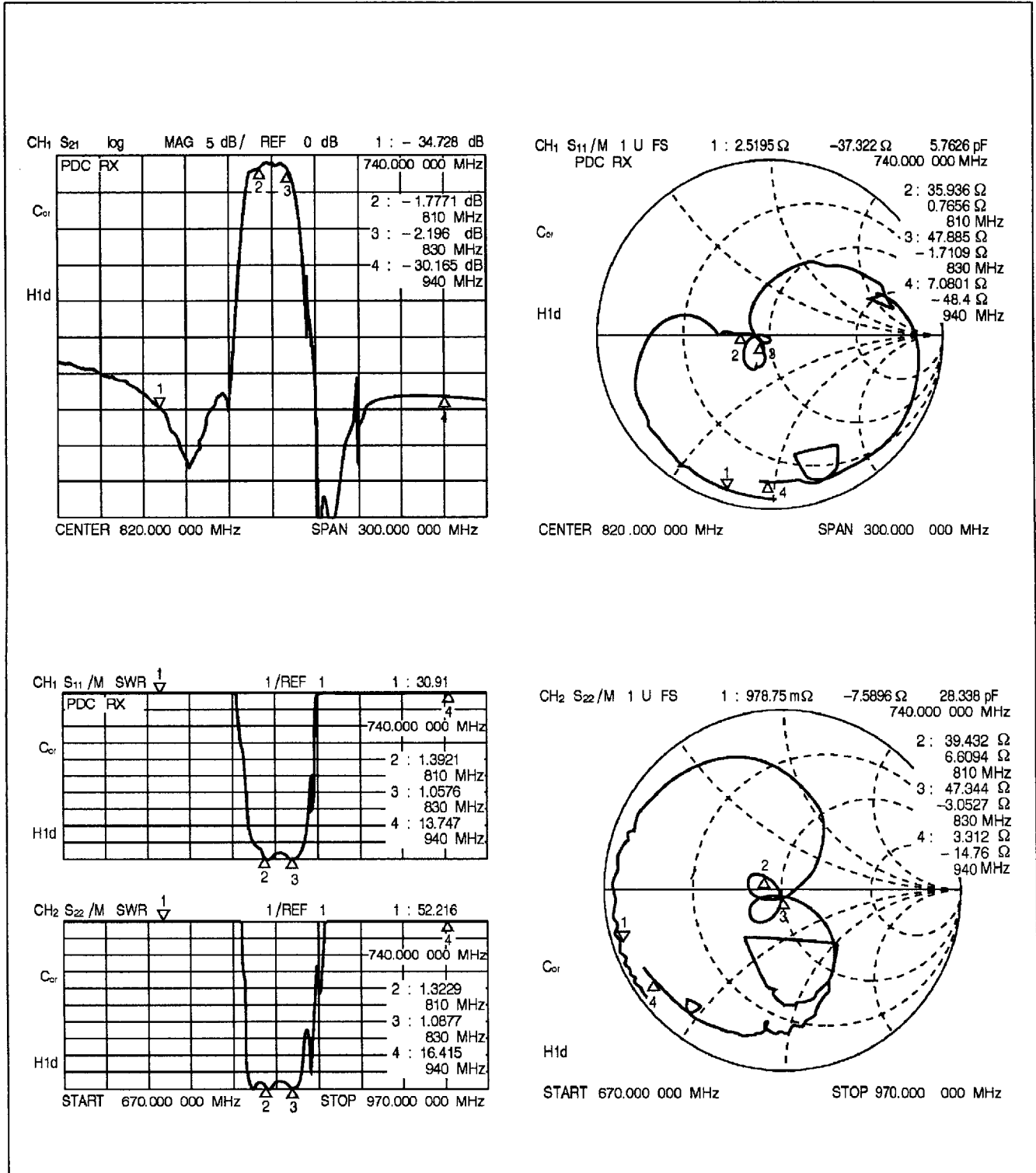


**F5 SERIES (L2 Type)**

**CHARACTERISTIC DATA EXAMPLES (STANDARD VERSION)**

**10. JDC system (Rx)**

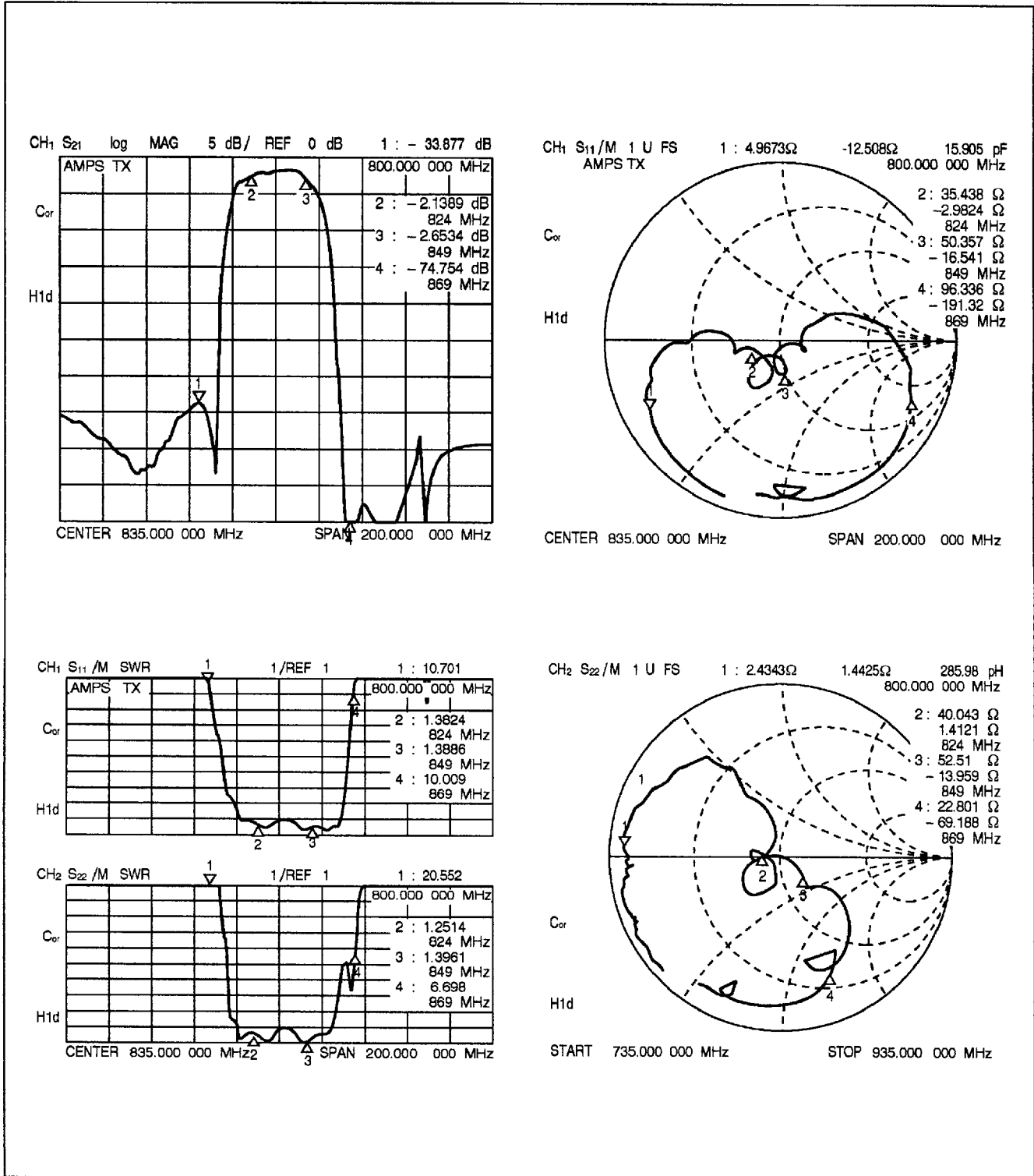
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CHARACTERISTIC DATA EXAMPLES (HIGH ATTENUATION VERSION)

11. AMPS / ADC system (Tx)

Part number : FAR-F5CC-836M50-L2AZ

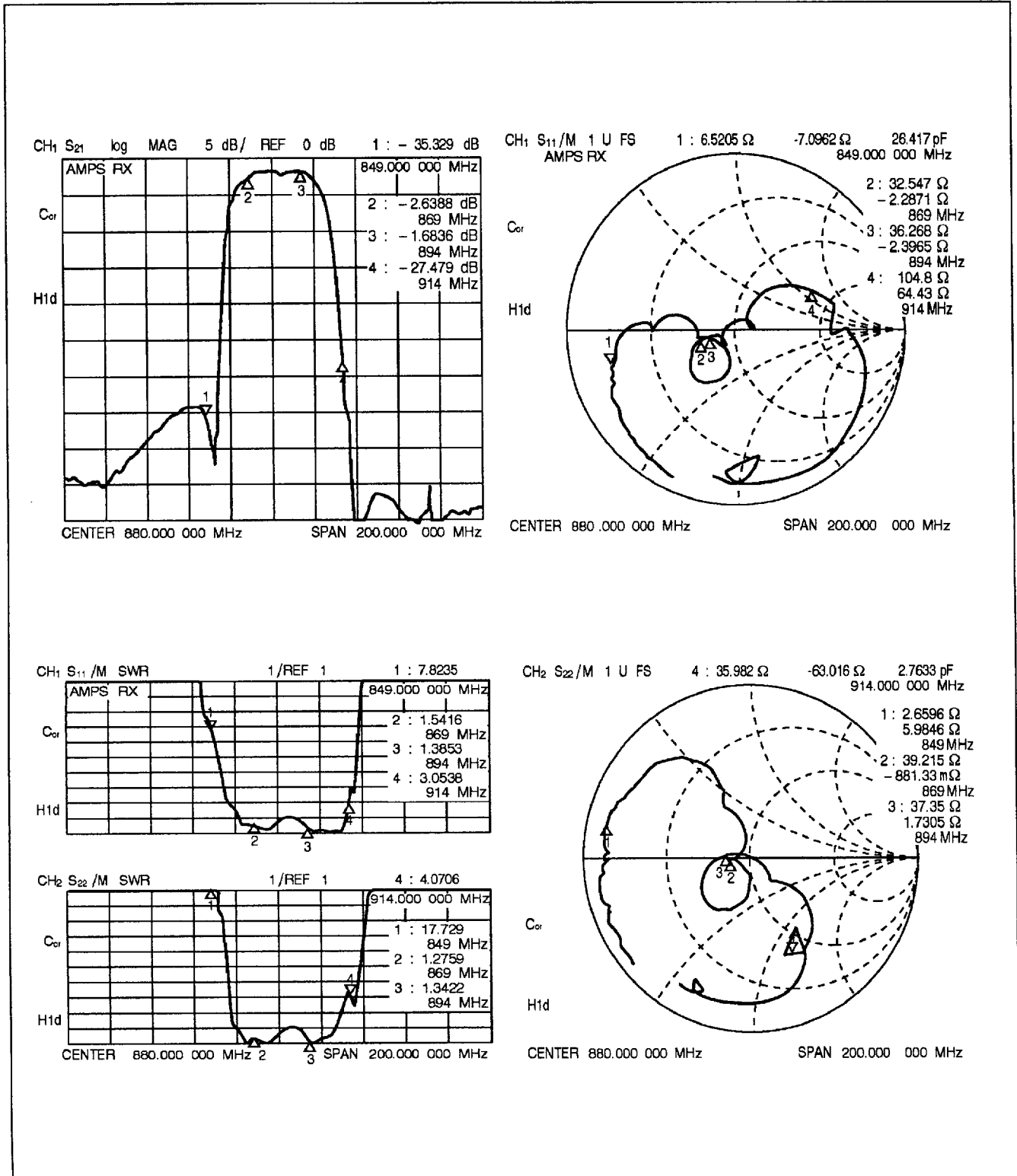


**F5 SERIES (L2 Type)**

**CHARACTERISTIC DATA EXAMPLES (HIGH ATTENUATION VERSION)**

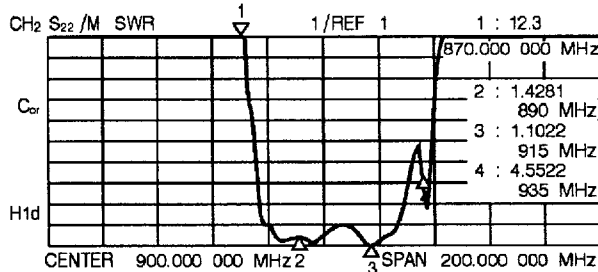
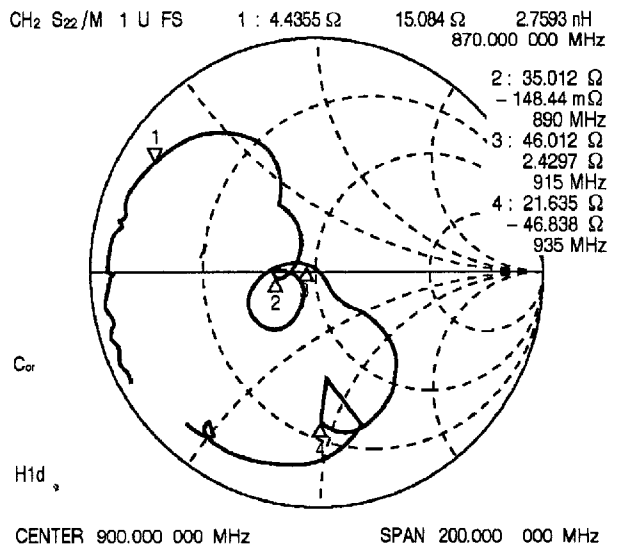
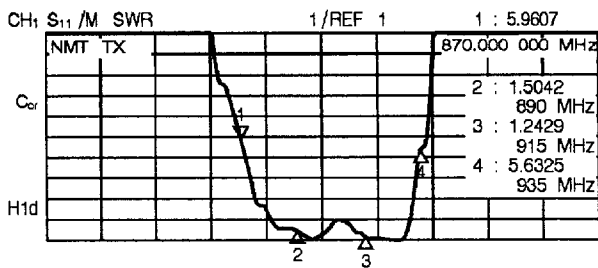
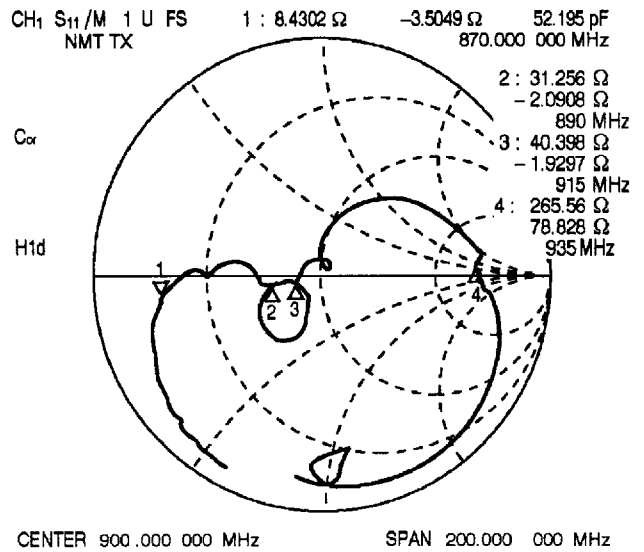
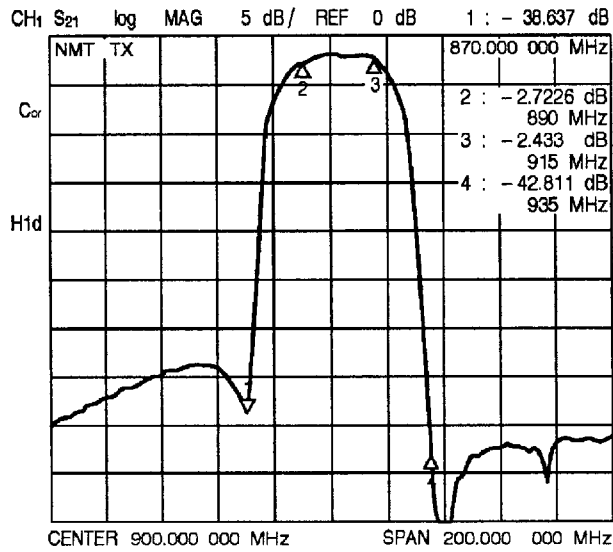
**12. AMPS / ADC system (Rx)**

**Part number : FAR-F5CC-881M50-L2AY**



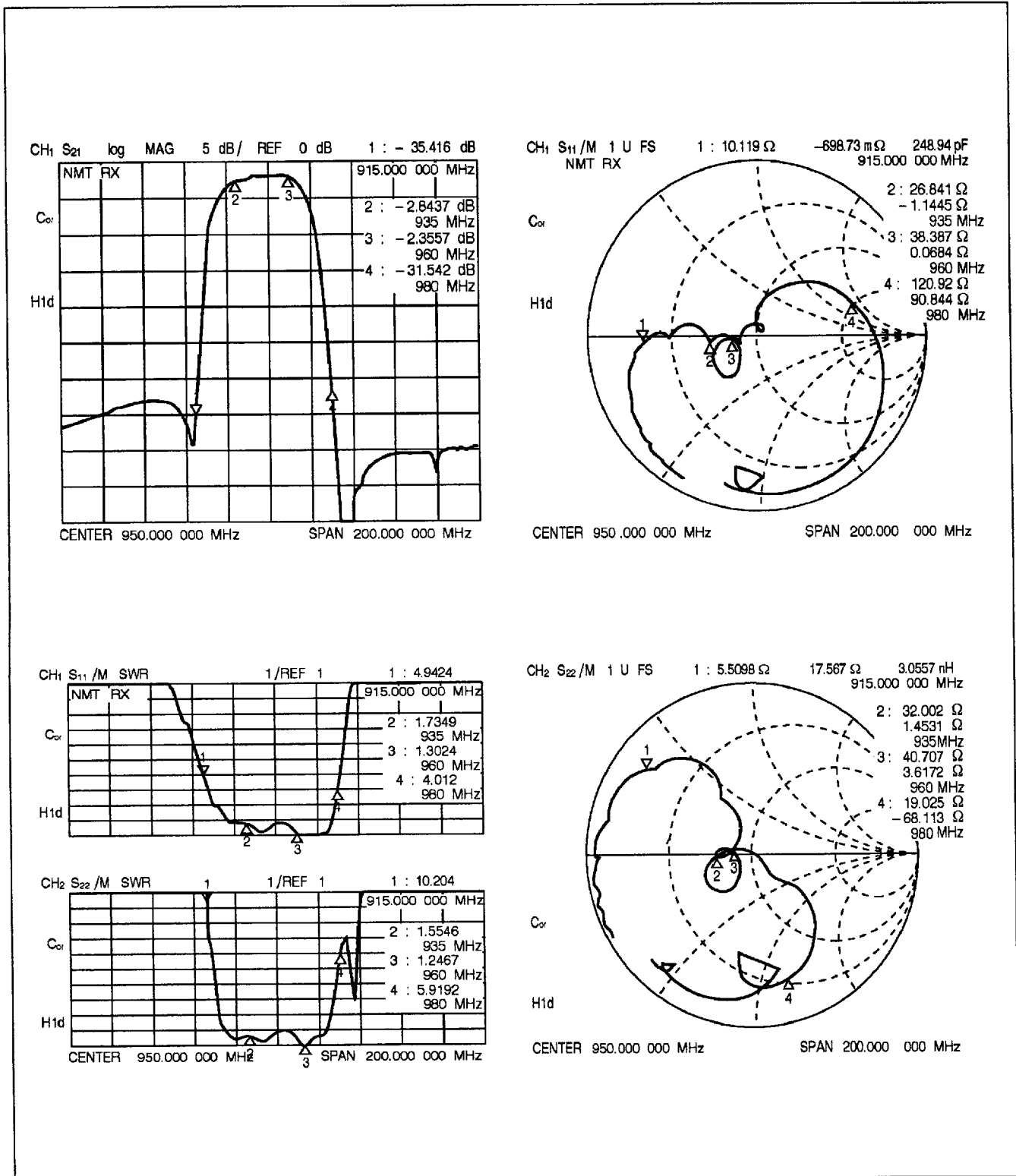
CHARACTERISTIC DATA EXAMPLES (HIGH ATTENUATION VERSION)

13. NMT / GSM system (Tx) Part number : FAR-F5CC-902M50-L2EZ



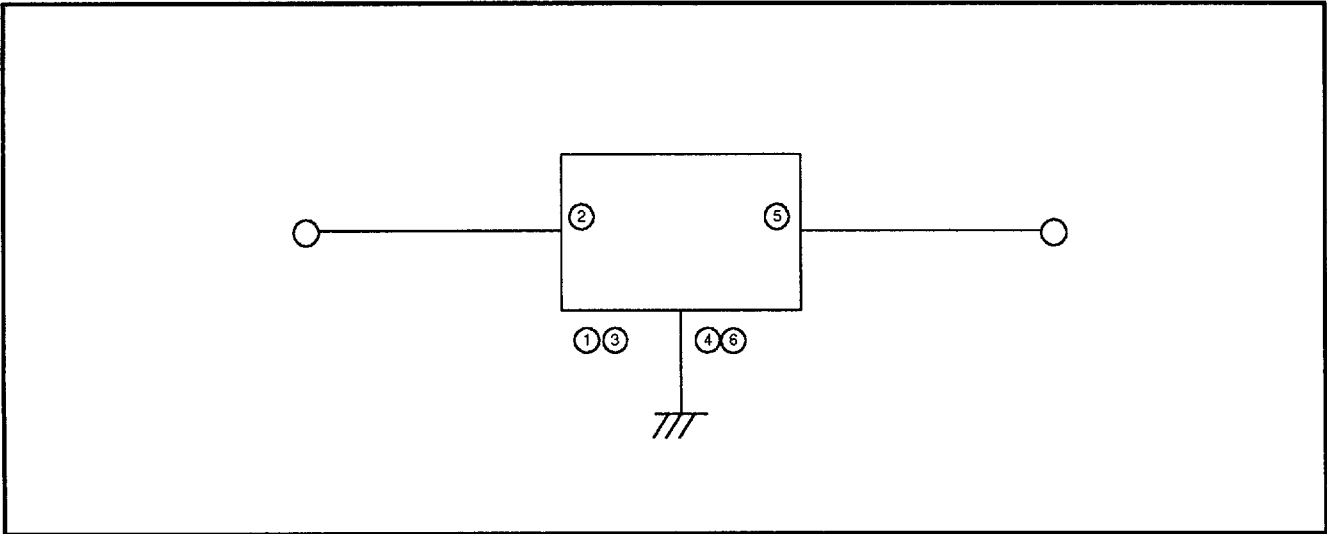
CHARACTERISTIC DATA EXAMPLES (HIGH ATTENUATION VERSION)

14. NMT / GSM system (Rx) Part number : FAR-F5CC-947M50-L2EY





**MEASURING CIRCUIT**



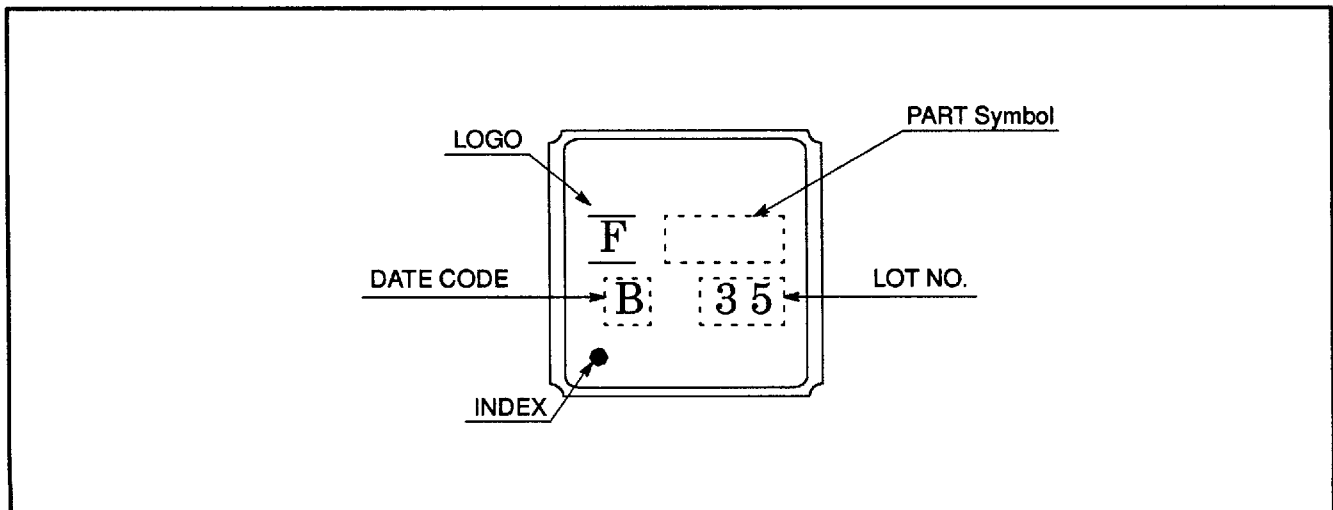
**PART NUMBER DESIGNATION**

[Designation example]

FAR-F5CC- □□□□□□ -L2 □□ -□  
 ①                      ②                      ③

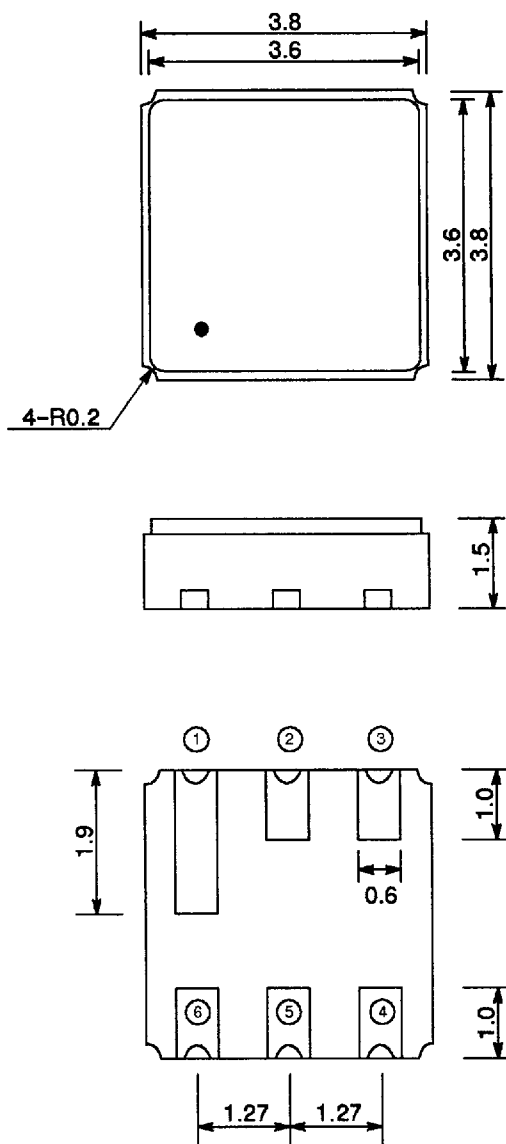
- ① Frequency designation : Specify the nominal frequency in six alphanumeric characters.  
Enter M (for MHz) at the decimal point.  
Refer to STANDARD FREQUENCIES.
- ② Serial number. : Specify a number from AA to ZZ.
- ③ Packaging (Reeled tape) : T → 1K pcs/reel  
R → 3K pcs/reel

**MARKING**



# F5 SERIES (L2 Type)

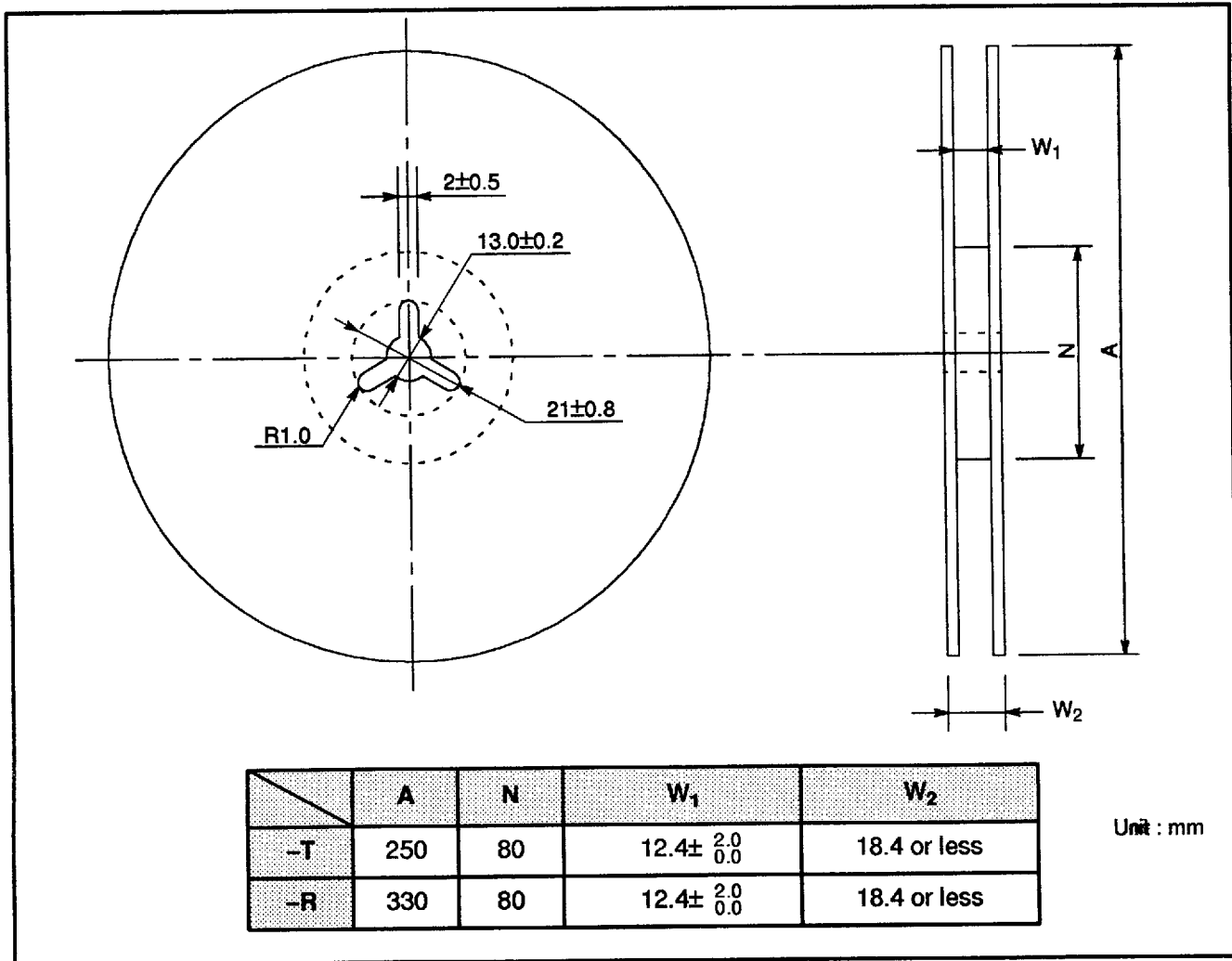
## DIMENSIONS



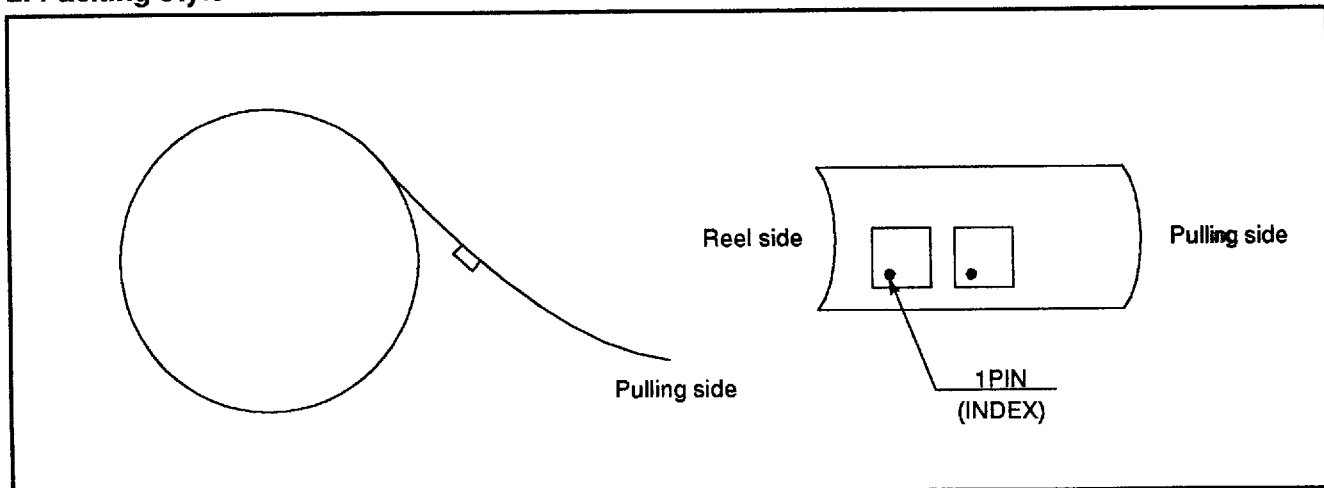
Unit : mm

**PACKING : Reel type**

**1. Reel dimension**



**2. Packing style**



F5 SERIES (L2 Type)

3. Tape dimension

