

APPLICATION NOTE FOR LTE BAND-13 2fo IMPROVEMENT

This application note shows an example in order to improve LTE band-13 2fo. The example of electrical characteristics are shown as follows:

■ ELECTRICAL CHARACTERISTICS (DC)

 General conditions: $T_a=+25^{\circ}\text{C}$

PARAMETER	SYMBOL	CONDITIONS	MEASURED DATA	UNITS
Supply Voltage	V_{DD}		2.8	V
Control Voltage (High)	$V_{CTL(H)}$		1.8	V
Control Voltage (Low)	$V_{CTL(L)}$		0	V
Supply Current1	I_{DD1}	Active mode, $V_{DD}=2.8\text{V}$, $V_{CTL}=1.8\text{V}$	6.05	mA
Supply Current2	I_{DD2}	Stand-by mode, $V_{DD}=2.8\text{V}$, $V_{CTL}=0\text{V}$	0.1	μA
Control Current	I_{CTL}	$V_{CTL}=1.8\text{V}$	6.8	μA

■ ELECTRICAL CHARACTERISTICS (RF)

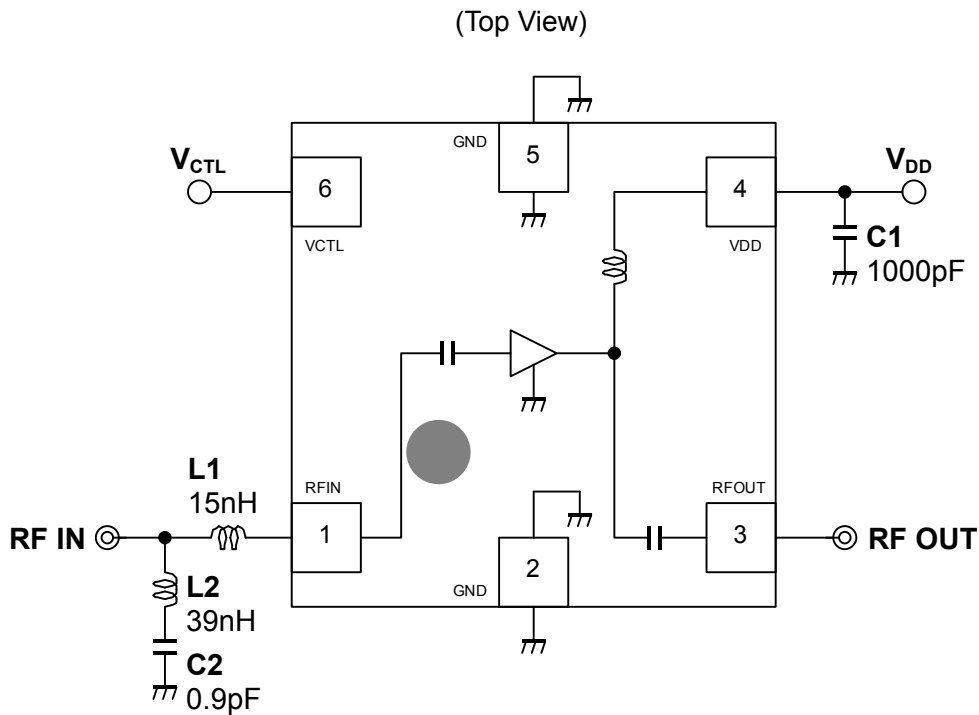
 General conditions: $V_{DD}=2.8\text{V}$, $V_{CTL}=1.8\text{V}$, $f_{RF}=1575\text{MHz}$, $T_a=+25^{\circ}\text{C}$, $Z_s=Z_l=50\text{ohm}$, with application circuit

PARAMETER	SYMBOL	CONDITIONS	MEASURED DATA		UNITS
			Application Circuit 1	Application Circuit 2	
Small Signal Gain	Gain	Exclude PCB and connector Losses (0.17dB)	15.6	15.5	dB
Noise Figure	NF	Exclude PCB and connector Losses (0.08dB)	0.62	0.93	dB
Input Power at 1dB Gain Compression Point	$P_{-1\text{dB}(IN)}$		-6.7	-7.7	dBm
Input 3rd Order Intercept Point	IIP3	$f_1=f_{RF}$, $f_2=f_1\pm 1\text{MHz}$, $\text{Pin}=-30\text{dBm}$	+4.2	+3.3	dBm
Out of Band Input 3rd Order Intercept Point	IIP3_OB	$f_1=1712.7\text{MHz}$ $\text{Pin}=-20\text{dBm}$, $f_2=1850\text{MHz}$ $\text{Pin}=-65\text{dBm}$	+8.7	+9.3	dBm
700MHz Harmonic	2fo	Input jammer tone: 787.76MHz at -25dBm Measure the harmonic tone at 1575.52MHz	-84.1	-139.1	dBm
RF IN VSWR	VSWR _i		2.32	1.85	-
RF OUT VSWR	VSWR _o		1.41	1.62	-

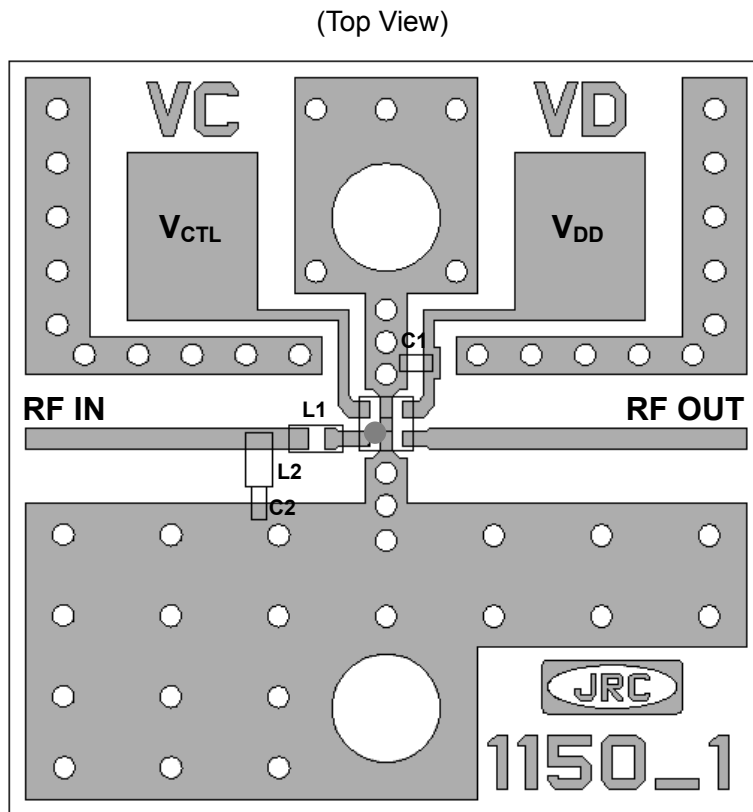
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Application Circuit 1

■ BLOCK DIAGRAM



■ EVALUATION BOARD



Parts list

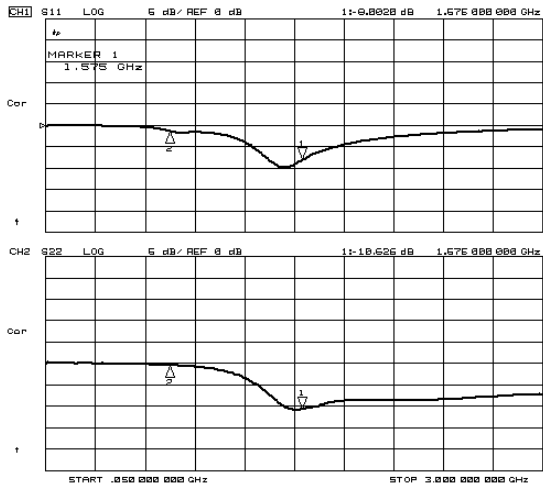
Parts ID	Manufacture
L1, L2	LQW15A Series (MURATA)
C1, C2	GRM03 Series (MURATA)

PCB (FR-4):
 t=0.2mm
 MICROSTRIP LINE WIDTH
 =0.4mm ($Z_0=50\Omega$)
 PCB SIZE
 =14.0mm x 14.0mm

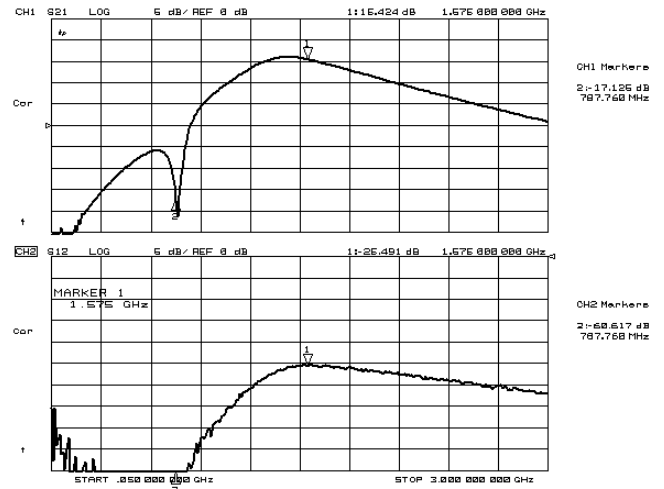
Application Circuit 1

ELECTRICAL CHARACTERISTICS

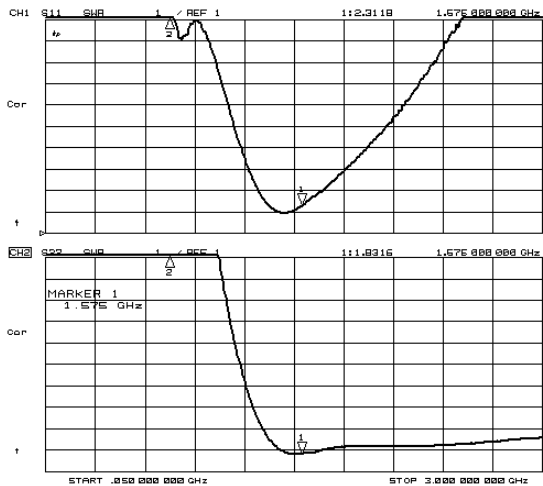
Conditions: $V_{DD}=2.8V$, $V_{CTL}=1.8V$, $T_a=25^\circ C$, $Z_S=Z_L=50\Omega$, with application circuit



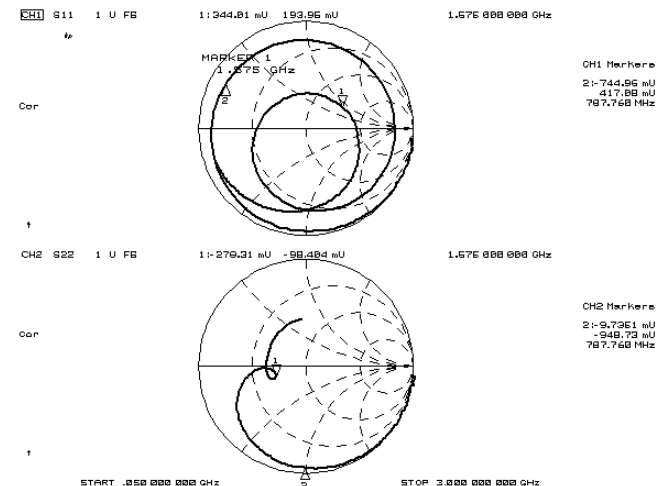
S11, S22



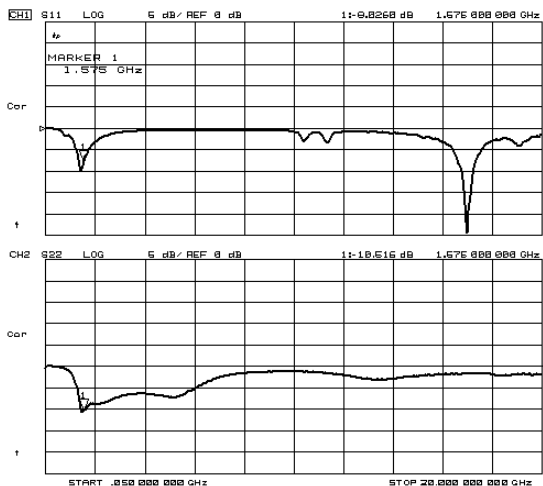
S21, S12



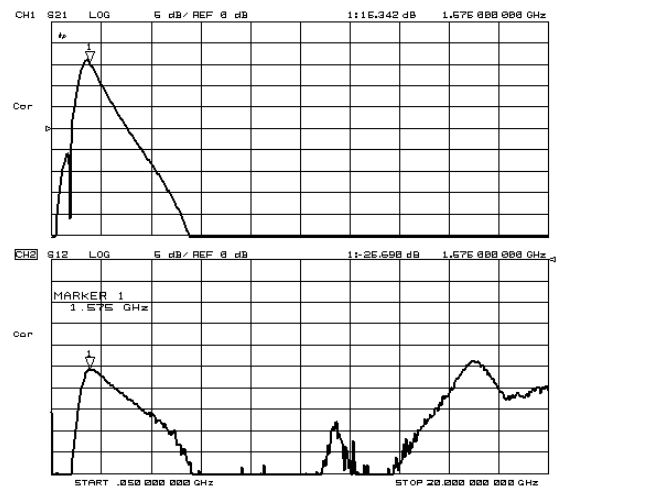
VSWR_i, VSW_o



Z_{in}, Z_{out}



S11, S22 (f=50M~20GHz)

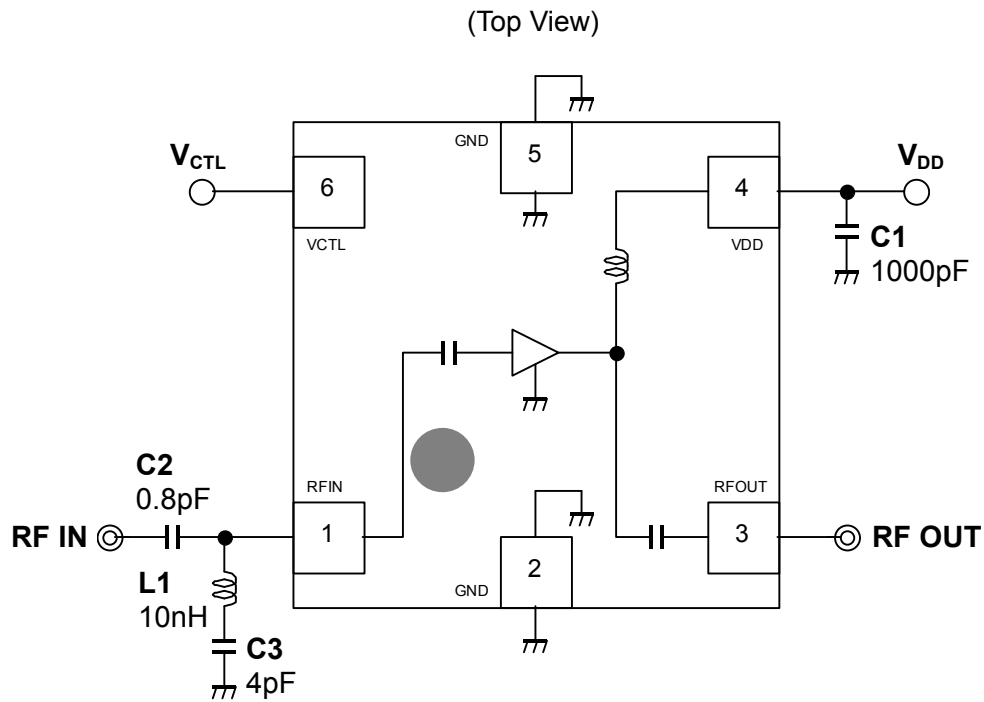


S21, S12 (f=50M~20GHz)

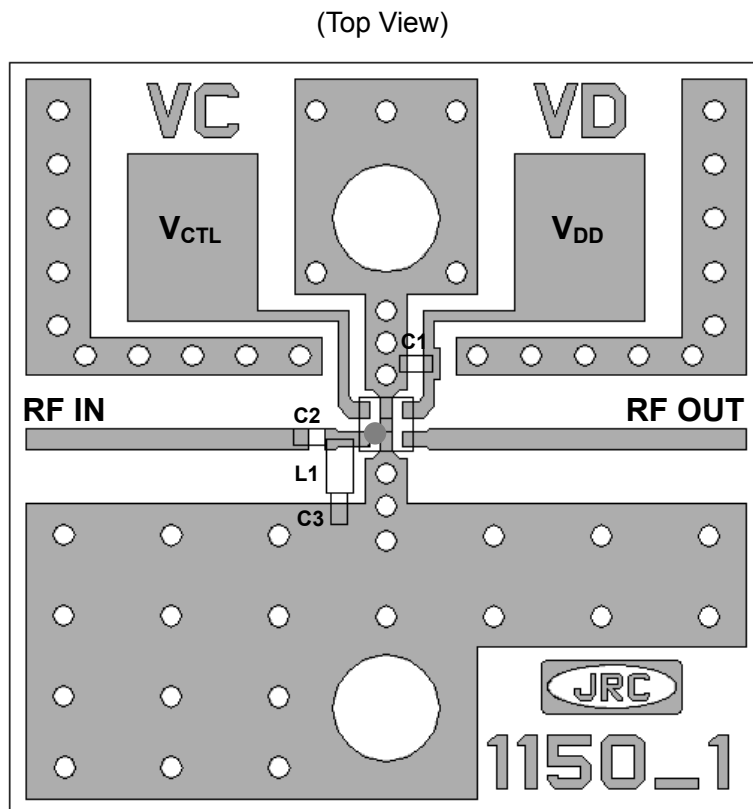
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Application Circuit 2

■ BLOCK DIAGRAM



■ EVALUATION BOARD



Parts list

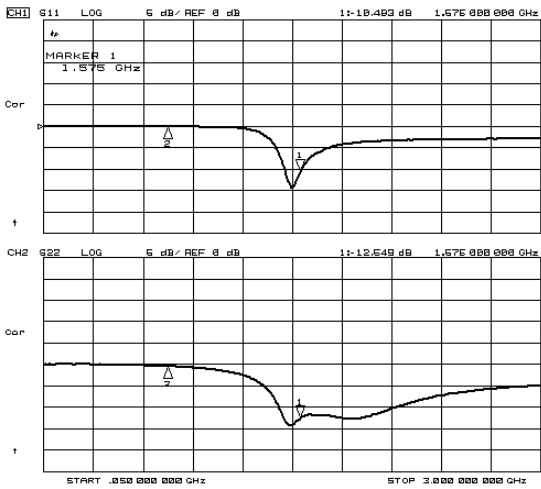
Parts ID	Manufacture
L1	LQW15A Series (MURATA)
C1~C3	GRM03 Series (MURATA)

PCB (FR-4):
 $t=0.2\text{mm}$
 MICROSTRIP LINE WIDTH
 $=0.4\text{mm}$ ($Z_0=50\Omega$)
 PCB SIZE
 $=14.0\text{mm} \times 14.0\text{mm}$

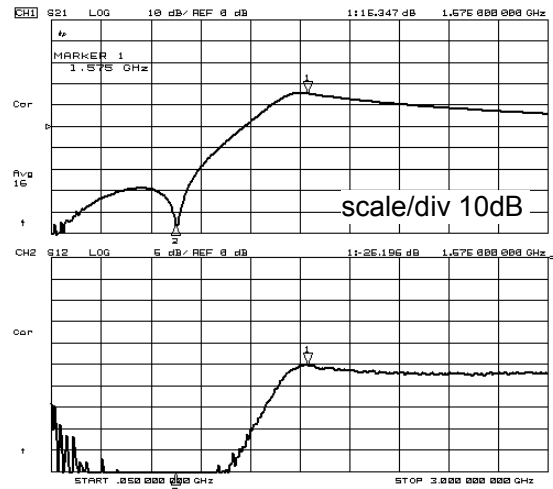
Application Circuit 2

ELECTRICAL CHARACTERISTICS

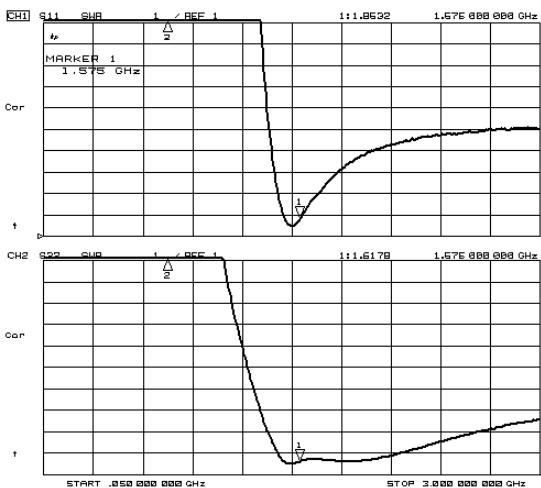
Conditions: $V_{DD}=2.8V$, $V_{CTL}=1.8V$, $T_a=25^\circ C$, $Z_S=Z_L=50\Omega$, with application circuit



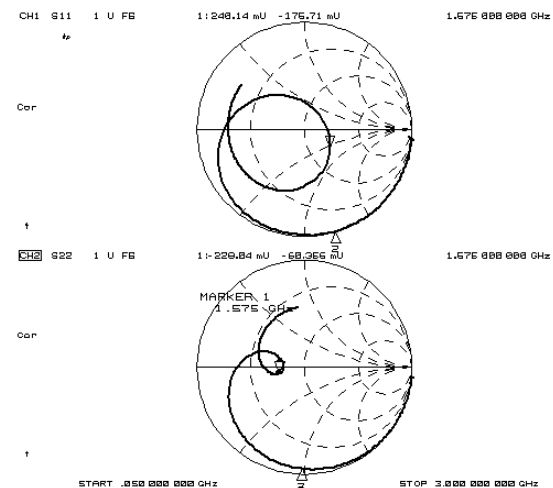
S11, S22



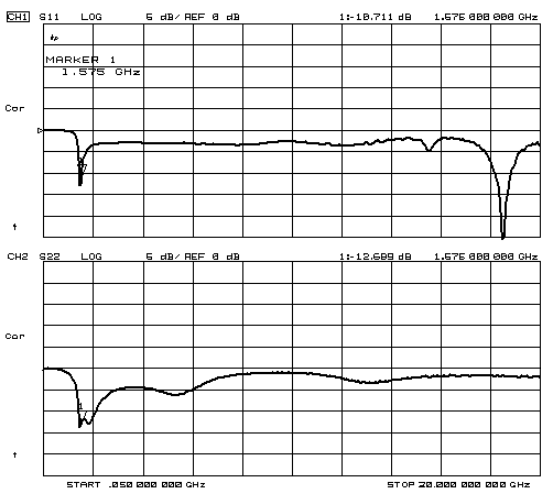
S21, S12



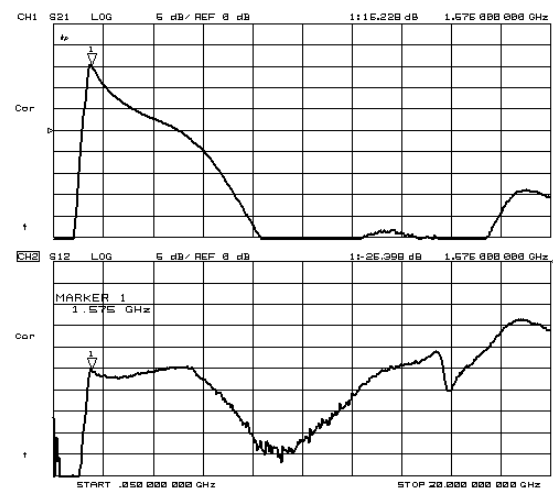
VSWR_i, VSW_o



Z_{in}, Z_{out}



S11, S22 (f=50M~20GHz)

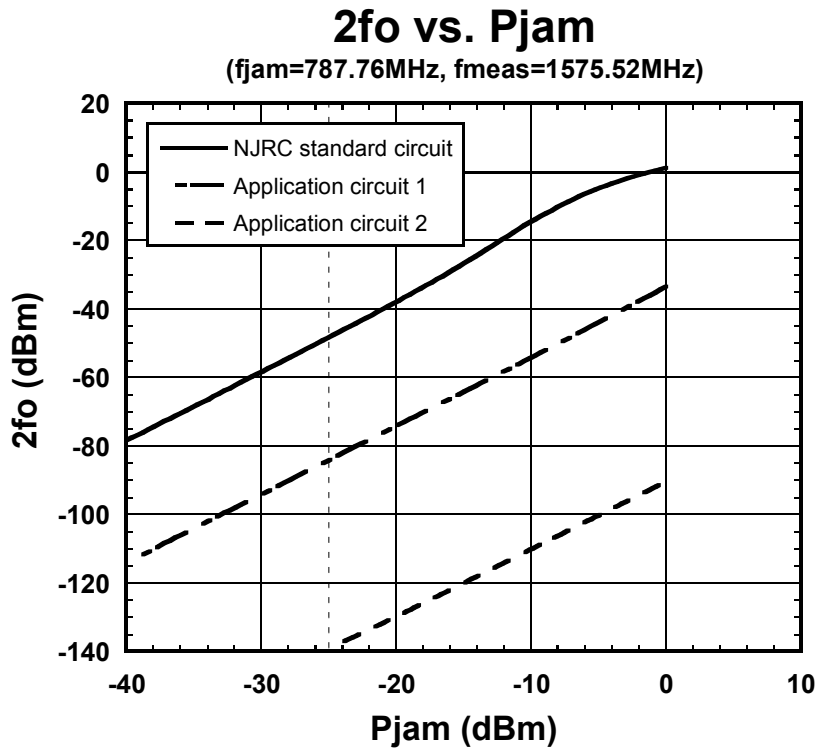


S21, S12 (f=50M~20GHz)

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ELECTRICAL CHARACTERISTICS

Conditions: $V_{DD}=2.8V$, $V_{CTL}=1.8V$, $T_a=25^\circ C$, $Z_s=Z_l=50\Omega$, with application circuit



MEASUREMENT BLOCK DIAGRAM

