700MHz Band Application

1 SUMMARY

The characteristics of 700MHz band have evaluated as follows. The evaluation circuit structure and measured data are reviewed.

2 MEASURED DATA

DC Characteristics

General Condition: V_{DD}=2.5 or 2.8V, Ta=+25°C

Parameter	Symbol	Condition	Measurement Data		Unit
			V_{DD}=2.5V	V_{DD}=2.8V	
Supply Voltage	V_{DD}		2.5	2.8	V
Control Voltage (High)	V_{CTL}1(H)		1.8	1.8	V
Control Voltage (Low)	V_{CTL}1(L)		0.0	0.0	V
LNA Operating Current1 (High Gain Mode)	I_{DD}1	V_{CTL}=1.8V	2.03	2.33	mA
LNA Operating Current2 (Low Gain Mode)	I_{DD}2	V_{CTL}=0V	9.0	10.4	uA
Control Current	I_{CTL}	V_{CTL}=1.8V	6.2	6.2	uA

RF Characteristics1（High Gain Mode）

General Condition: : V_{DD}=2.5 or 2.8V, V_{CTL}=1.8V, fRF=750MHz, Zs=Zl=50ohm, Ta=+25°C

With Application Circuit

Parameter	Symbol	Condition	Measurement Data		Unit
			V_{DD}=2.5V	V_{DD}=2.8V	
Small Signal Gain1	Gain1	Exclude Input & Output PCB, Connector Losses (0.11dB)	16.9	17.5	dB
Isolation1	ISO1	Exclude Input & Output PCB, Connector Losses (0.11dB)	-29.0	-29.3	dB
Noise Figure1	NF1	Exclude PCB, Connector Losses (0.06dB)	1.29	1.25	dB
Input Power 1dB Compression1	P-1dB(IN)_1		-9.4	-9.6	dBm
Input 3rd Order Intercept Point1	IIP3H1_1	f1=fRF, f2=fRF+100kHz, Pin=-30dBm	-2.7	-2.8	dBm
RF IN VSWR1	VSWRi_1		2.16	2.05	-
RF OUT VSWR1	VSWRo_1		1.91	1.93	-

RF Characteristics2（Low Gain Mode）

General Condition: V_{DD}=2.5 or 2.8V, V_{CTL}=0V, fRF=750MHz, Zs=Zl=50ohm, Ta=+25°C

With Application Circuit

Parameter	Symbol	Condition	Measurement Data		Unit
			V_{DD}=2.5V	V_{DD}=2.8V	
Small Signal Gain2	Gain2	Exclude Input & Output PCB, Connector Losses (0.11dB)	-3.3	-3.3	dB
Noise Figure2	NF2	Exclude PCB, Connector Losses (0.06dB)	2.1	2.1	dB
Input Power 1dB Compression2	P-1dB(IN)_2		16.0	16.3	dBm
Input 3rd Order Intercept Point2	IIP3_2	f1=fRF, f2=fRF+100kHz, Pin=-20dBm	16.8	16.7	dBm
RF IN VSWR2	VSWRi_2		1.90	1.89	-
RF OUT VSWR2	VSWRo_2		2.33	2.29	-

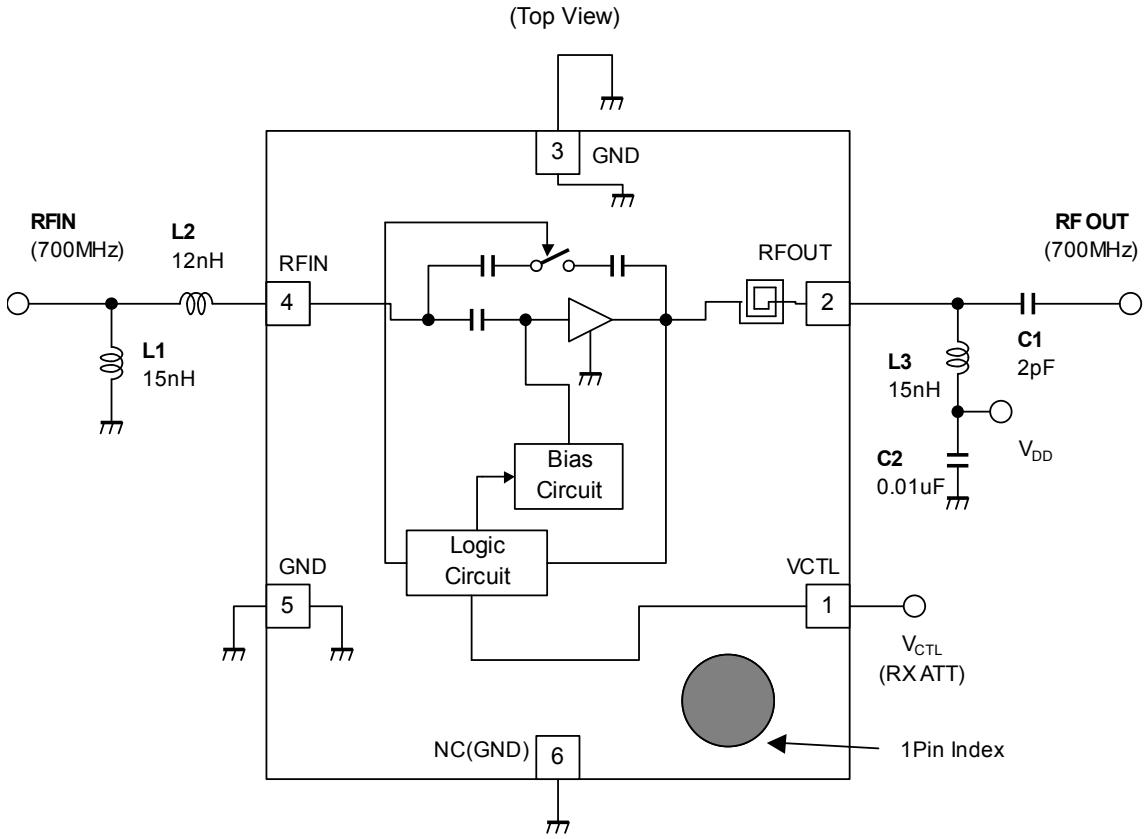
RF Characteristics3

General Condition: V_{DD}=2.5 or 2.8V, fRF=750MHz, Zs=Zl=50ohm, Ta=+25°C

With Application Circuit

Parameter	Symbol	Condition	Measurement Data		Unit
			V_{DD}=2.5V	V_{DD}=2.8V	
Gain Dynamic Range	GDR	(Gain at High Gain Mode)-(Gain at Low Gain Mode)	20.2	20.8	dB

3 APPLICATION CIRCUIT



Parts List

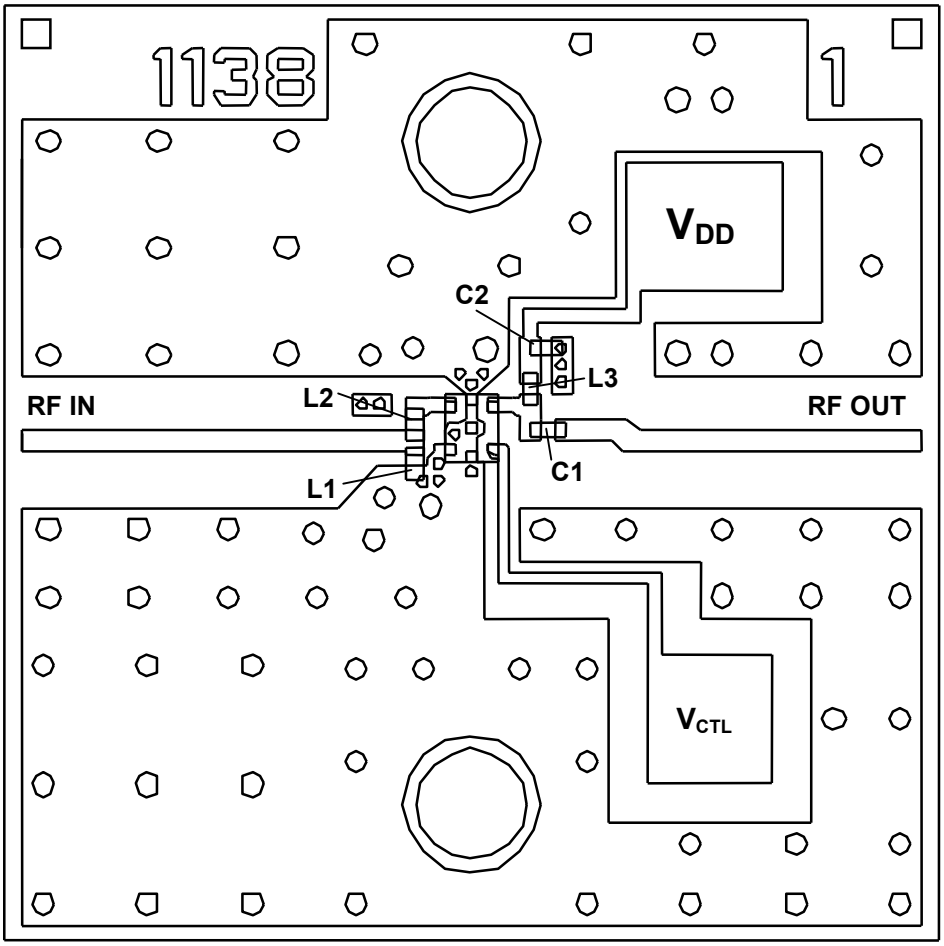
Parts ID	Comments
L1, L2	MURATA LQP03T Series
L3	TDK MLK0603 Series
C1, C2	MURATA GRM03 Series

4 Truth table

Control Voltage	State	
V_{CTL}	LNA I_{DD}	Bypass
L	OFF	ON
H	ON	OFF

"L"=0～0.3V、"H"=1.36～1.9V

5 PCB DESIGN



PCB (FR-4):
t=0.2mm
MICROSTRIP LINE WIDTH=0.4mm (Z_0=50ohm)
PCB SIZE=17.0mm x 17.0mm

CAUTION

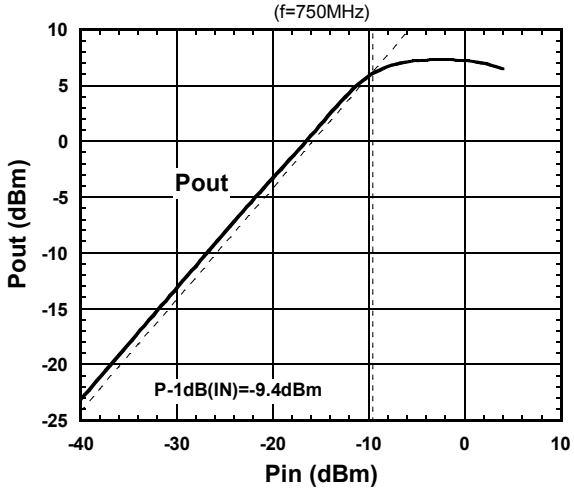
In order not to couple with terminal RFIN and RFOUT, please layout ground pattern under the IC.

6 Characteristics

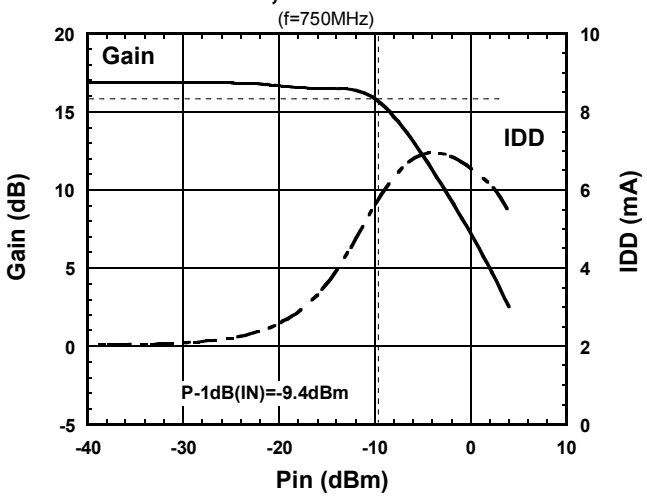
■ Typical characteristics (High Gain Mode, V_{DD}=2.5V)

Condition: Ta=+25°C, V_{DD}=2.5V, V_{CTL}=1.8V

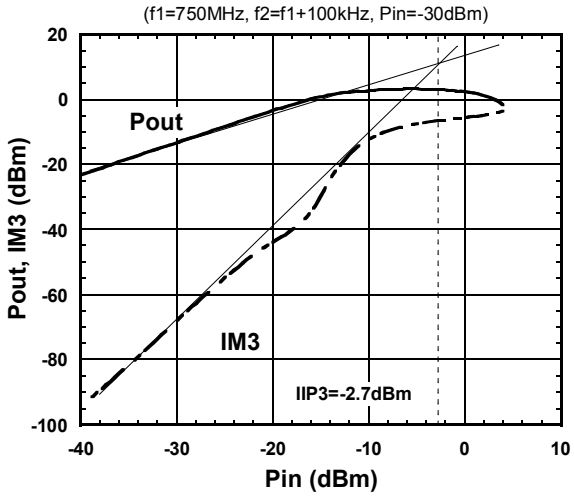
High Gain
Pout vs. Pin



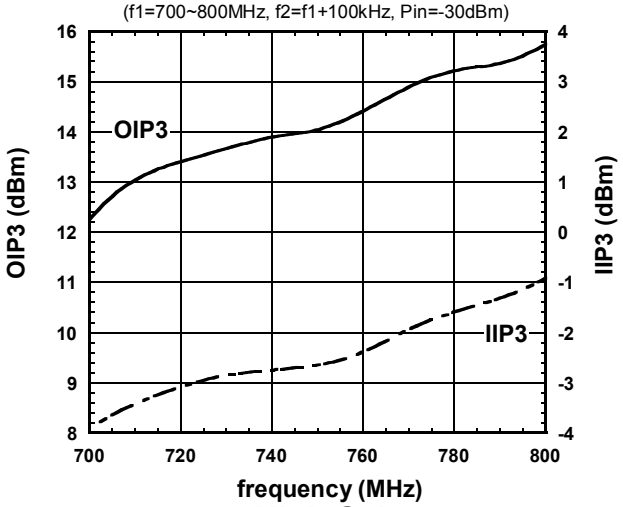
High Gain
Gain, IDD vs. Pin



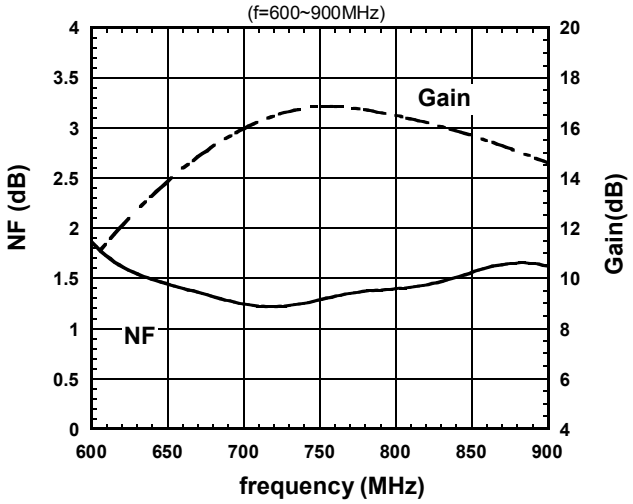
High Gain
Pout, IM3 vs. Pin



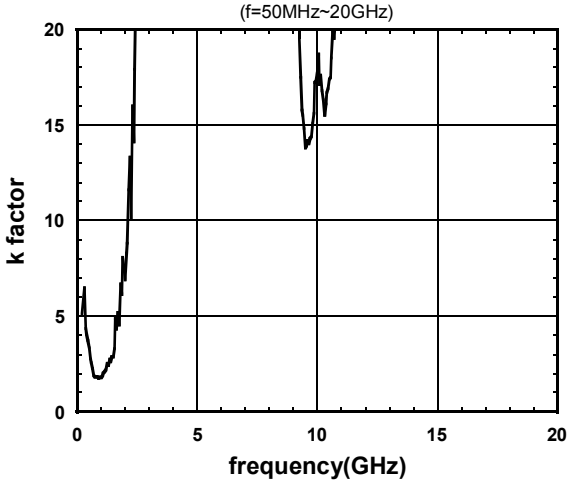
High Gain
OIP3,IIP3 vs. frequency



High Gain
NF, Gain vs. frequency

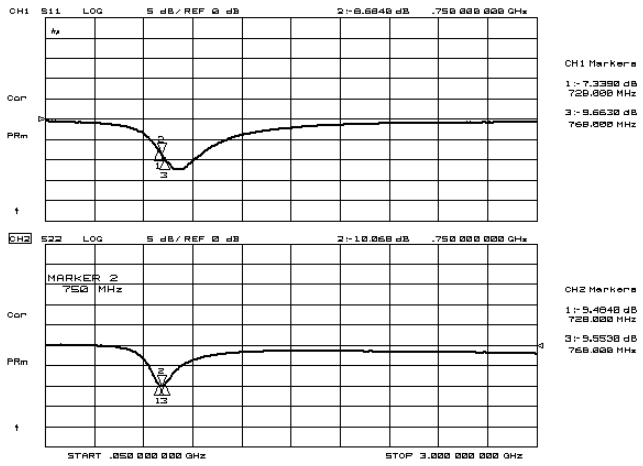


High Gain
k factor vs. frequency

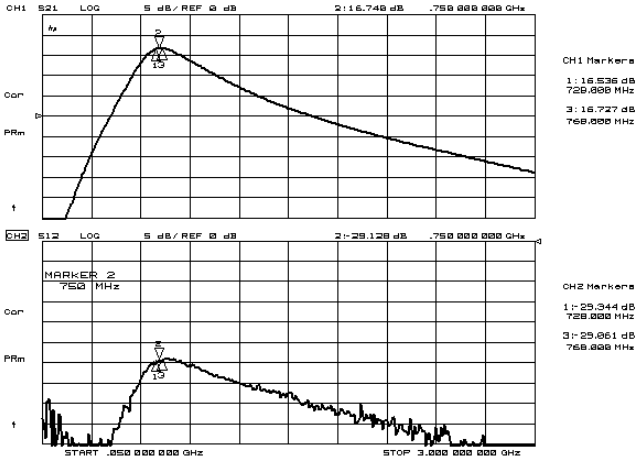


■ Typical characteristics (High Gain Mode, V_{DD}=2.5V)

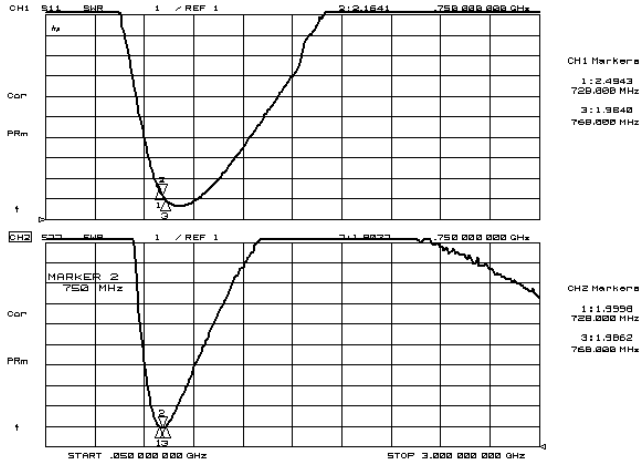
Condition: Ta=+25°C, V_{DD}=2.5V, V_{CTL}=1.8V



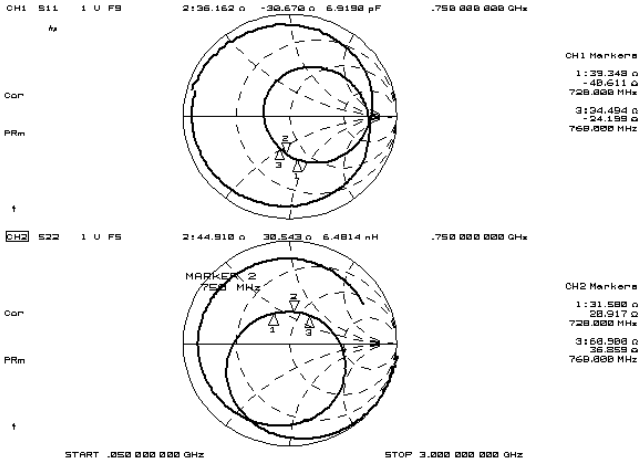
S11, S22



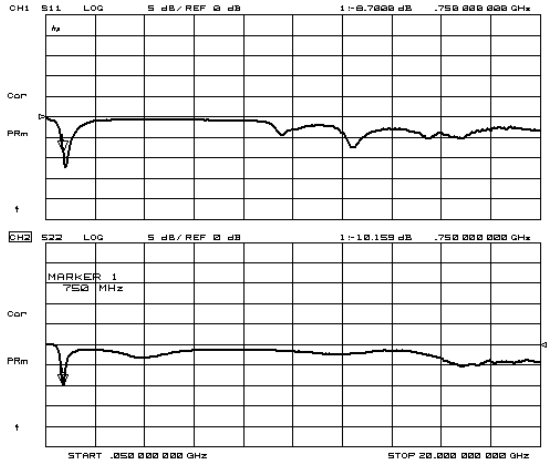
S21, S12



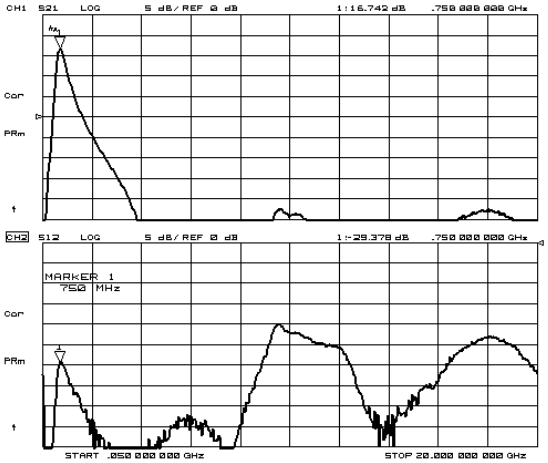
VSWR



Zin, Zout



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

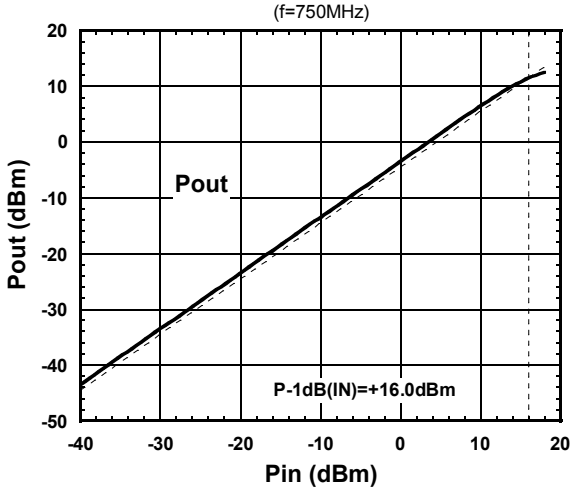


S21, S12
(f=50MHz~20GHz)

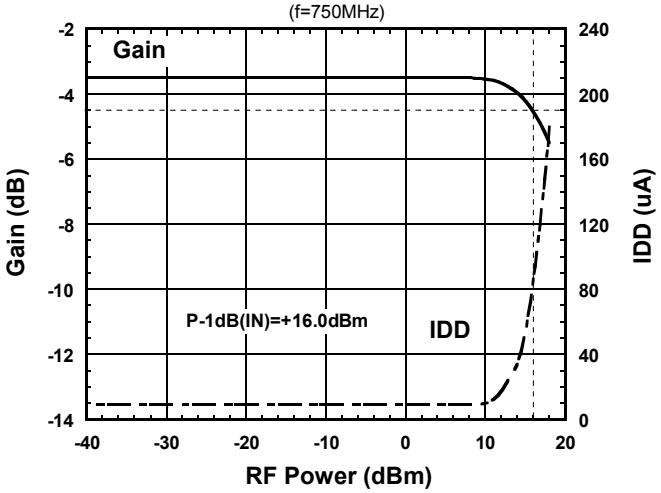
■ Typical characteristics (Low Gain Mode, V_{DD}=2.5V)

Condition: Ta=+25°C, V_{DD}=2.5V, V_{CTL}=0V

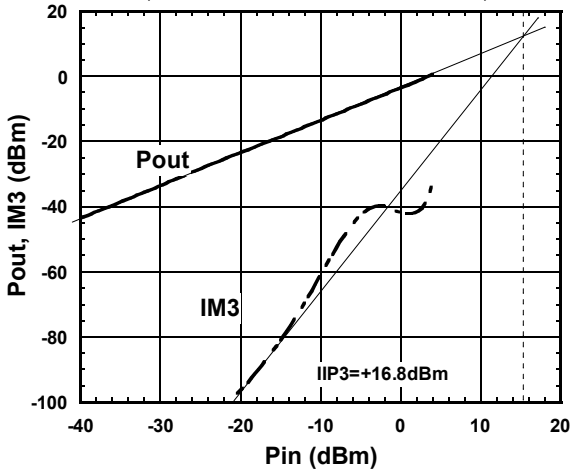
Low Gain
Pout vs. Pin
(f=750MHz)



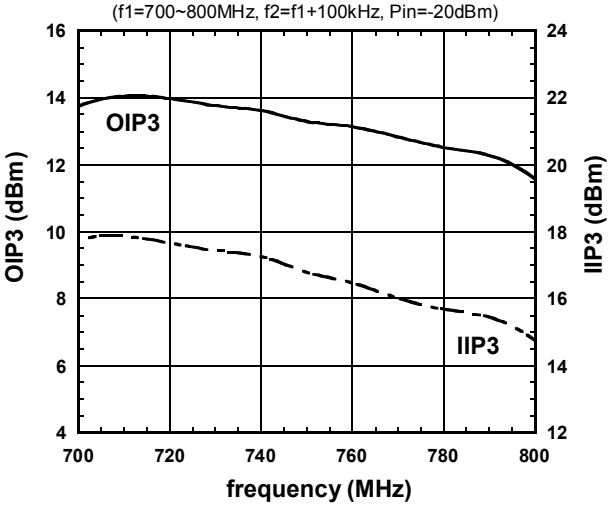
Low Gain
Gain, IDD vs. Pin
(f=750MHz)



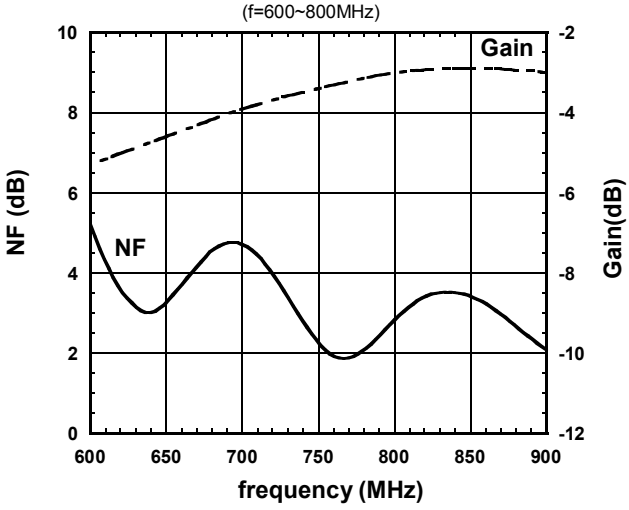
Low Gain
Pout, IM3 vs. Pin
(f1=750MHz, f2=f1+100kHz, Pin=-20dBm)



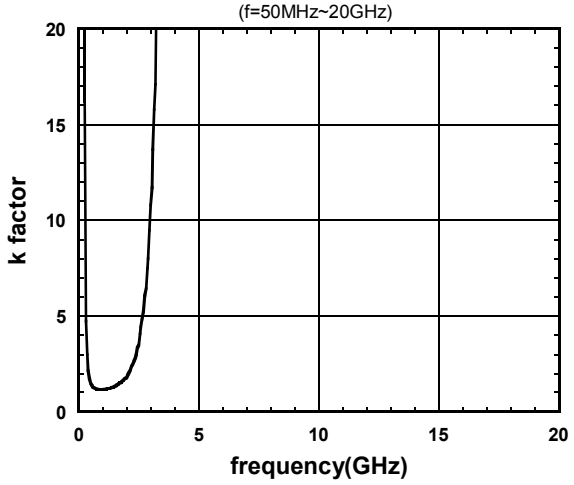
Low Gain
OIP3,IIP3 vs. frequency
(f1=700~800MHz, f2=f1+100kHz, Pin=-20dBm)



Low Gain
NF, Gain vs. frequency
(f=600~800MHz)

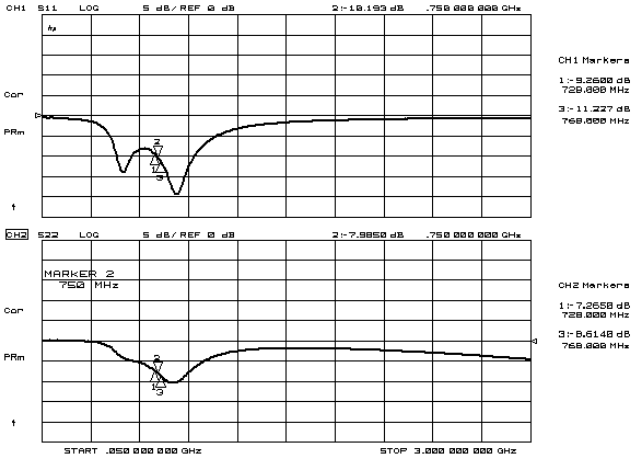


Low Gain
k factor vs. frequency
(f=50MHz~20GHz)

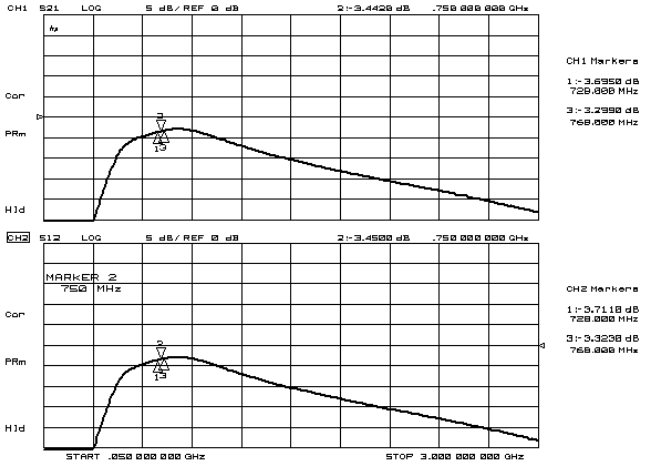


■ Typical characteristics (Low Gain Mode, V_{DD}=2.5V)

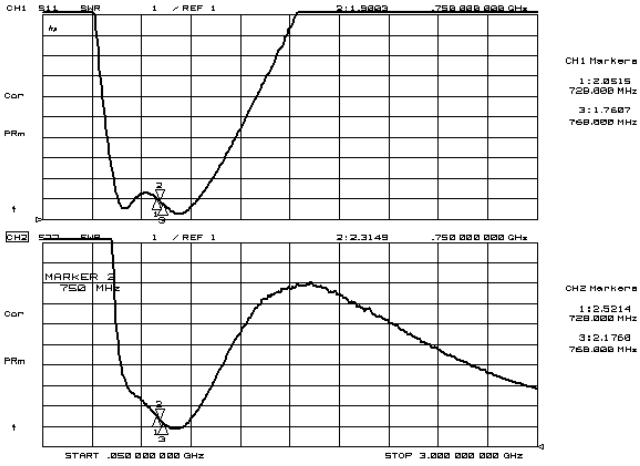
Condition: Ta=+25°C, V_{DD}=2.5V, V_{CTL}=0V



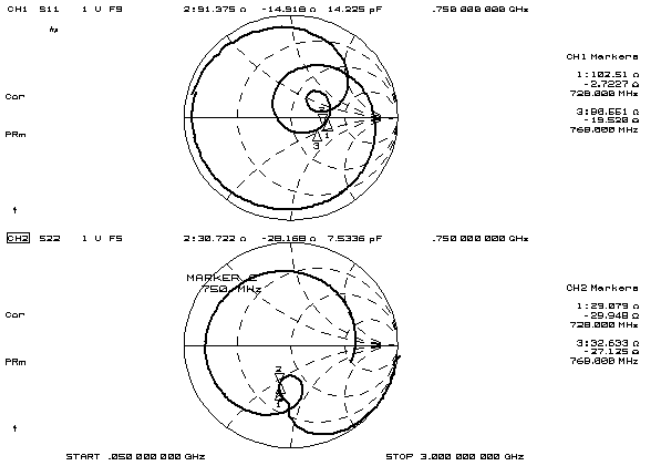
S11, S22



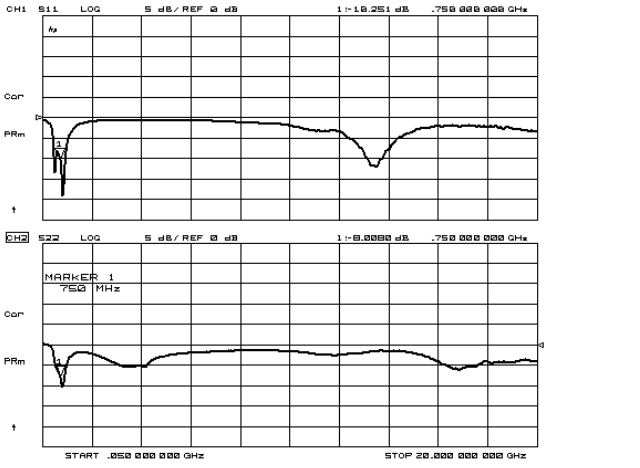
S21, S12



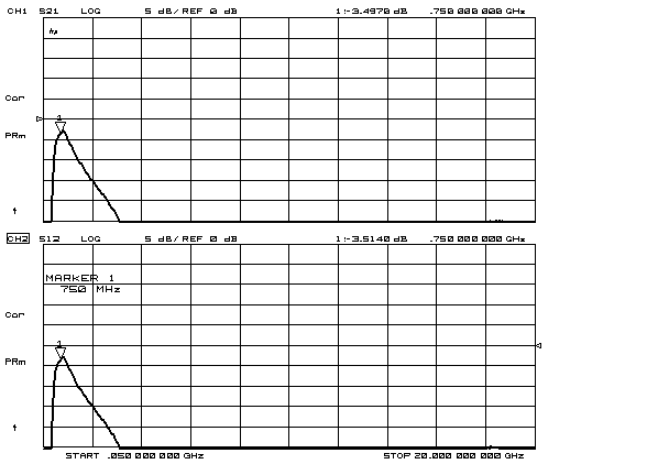
VSWR



Zin, Zout



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

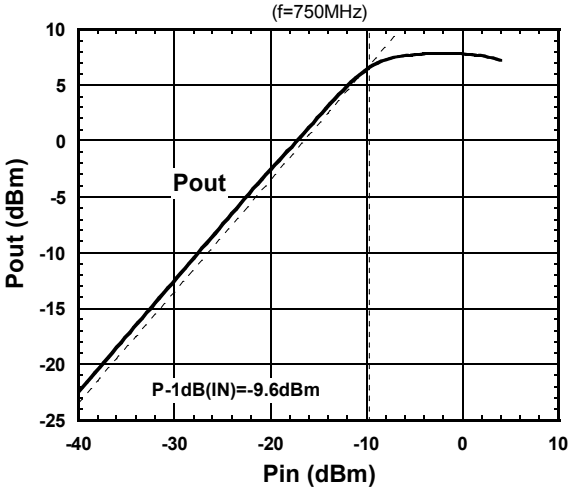


S21, S12
(f=50MHz~20GHz)

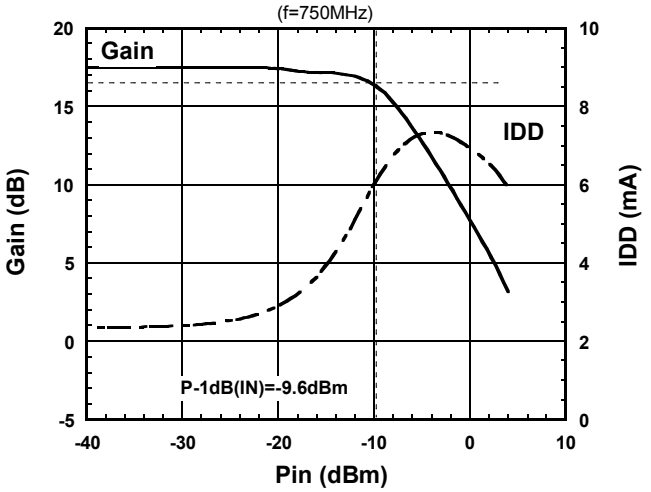
■ Typical characteristics (High Gain Mode, V_{DD}=2.8V)

Condition: Ta=+25°C, V_{DD}=2.8V, V_{CTL}=1.8V

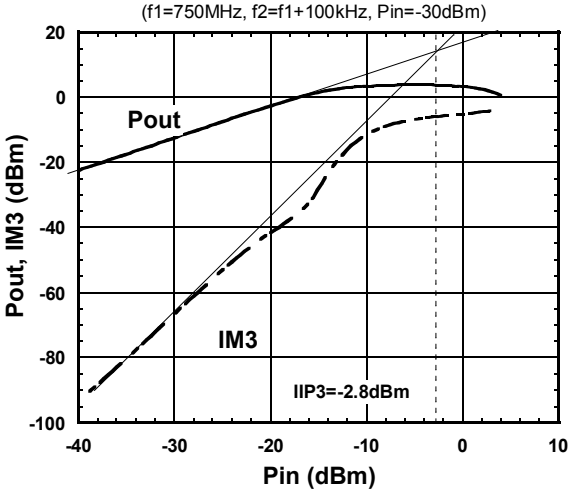
High Gain
Pout vs. Pin



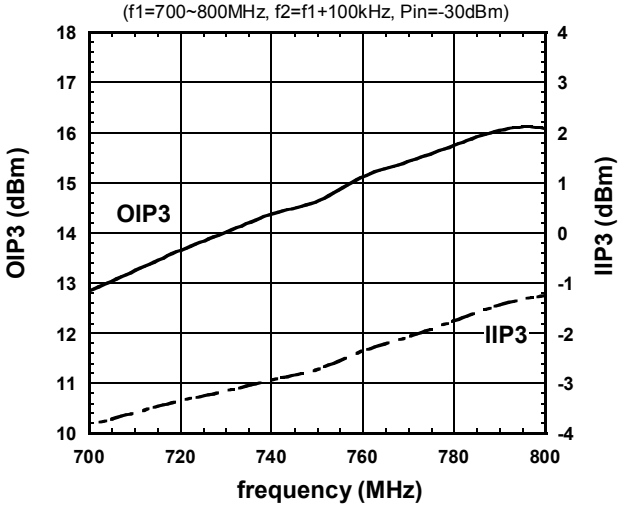
High Gain
Gain, IDD vs. Pin



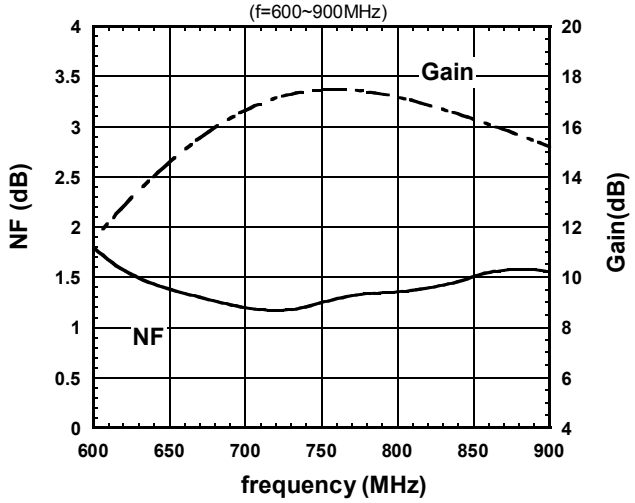
High Gain
Pout, IM3 vs. Pin



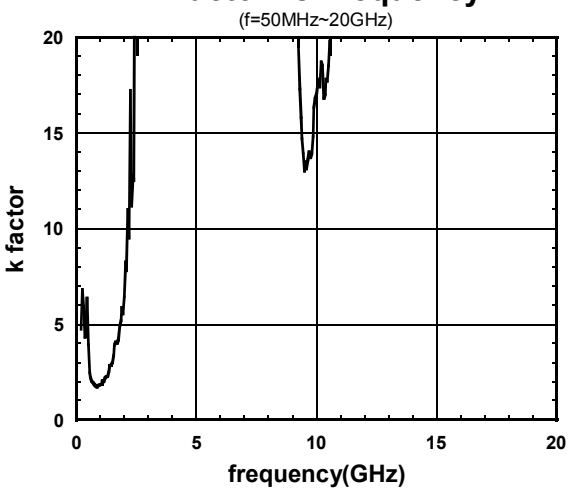
High Gain
OIP3,IIP3 vs. frequency



High Gain
NF, Gain vs. frequency

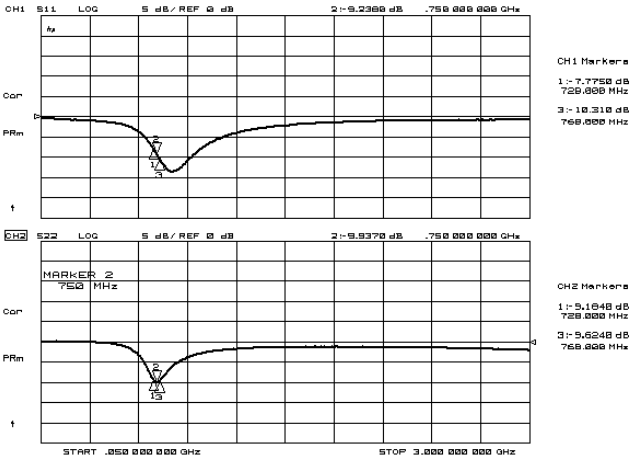


High Gain
k factor vs. frequency

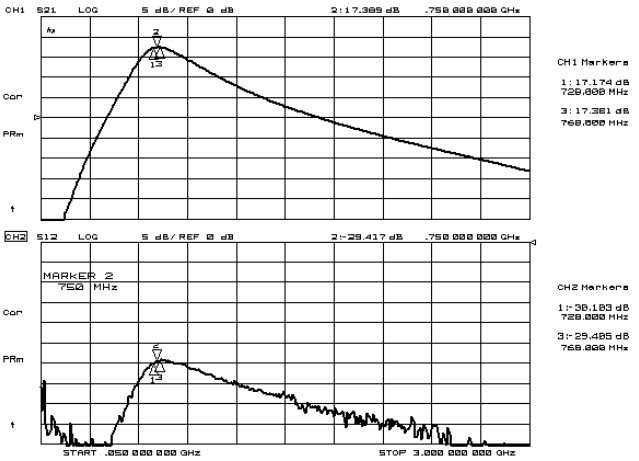


■ Typical characteristics (High Gain Mode, V_{DD}=2.8V)

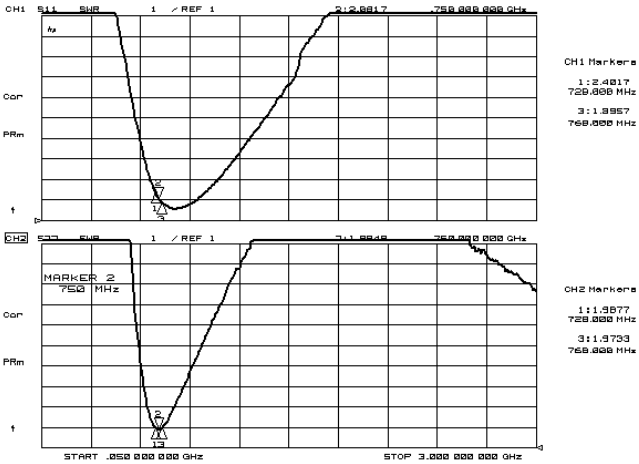
Condition: Ta=+25°C, V_{DD}=2.8V, V_{CTL}=1.8V



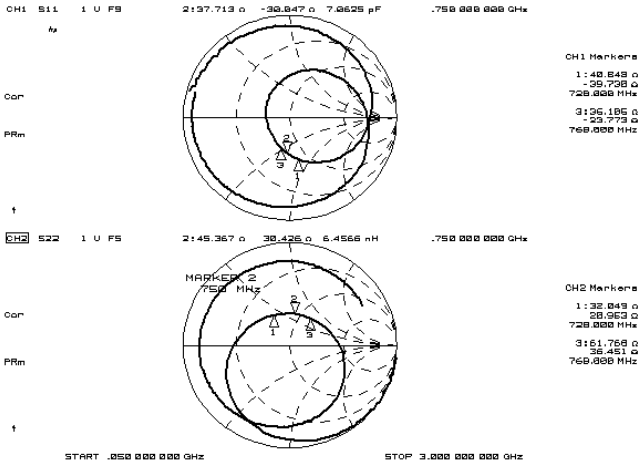
S11, S22



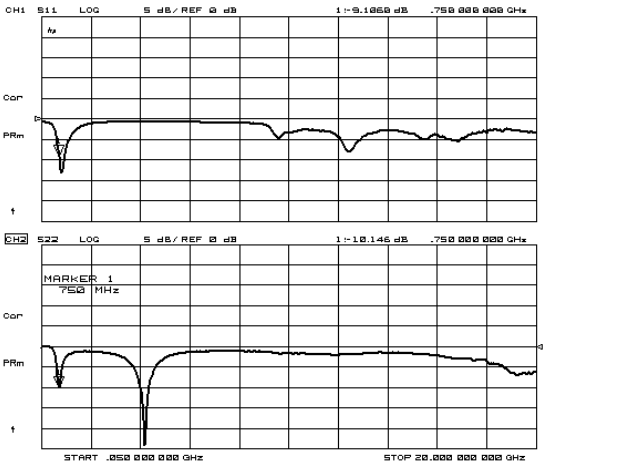
S21, S12



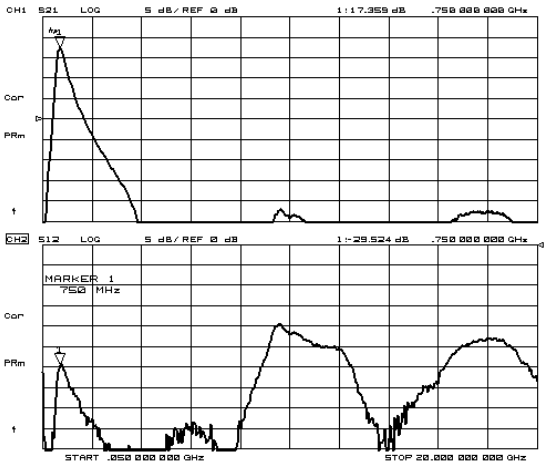
VSWR



Zin, Zout



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

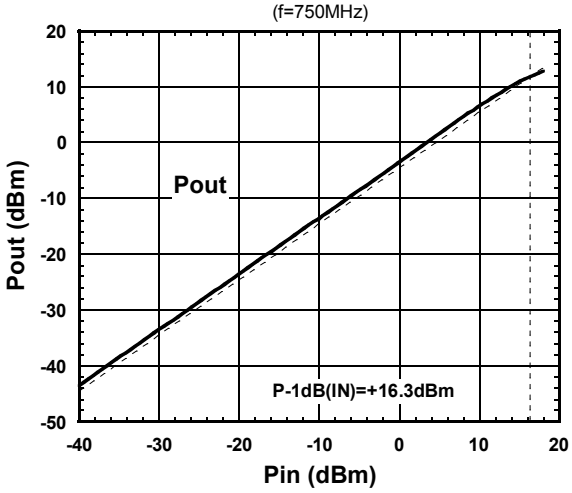


S21, S12
(f=50MHz~20GHz)

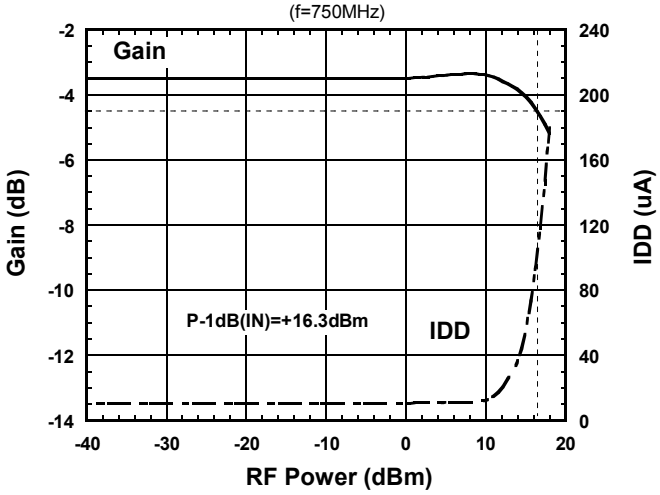
■ Typical characteristics (Low Gain Mode, V_{DD}=2.8V)

Condition: Ta=+25°C, V_{DD}=2.8V, V_{CTL}=0V

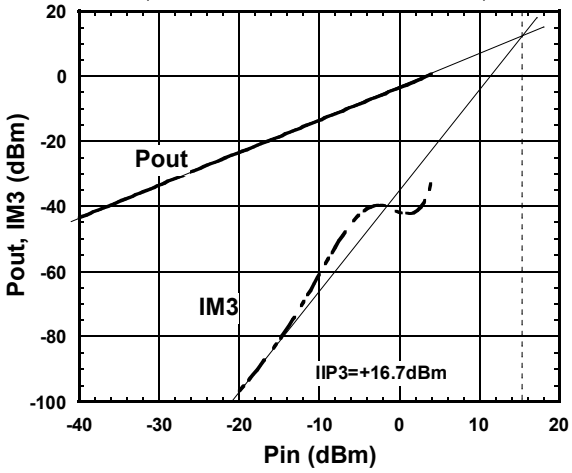
Low Gain
Pout vs. Pin
(f=750MHz)



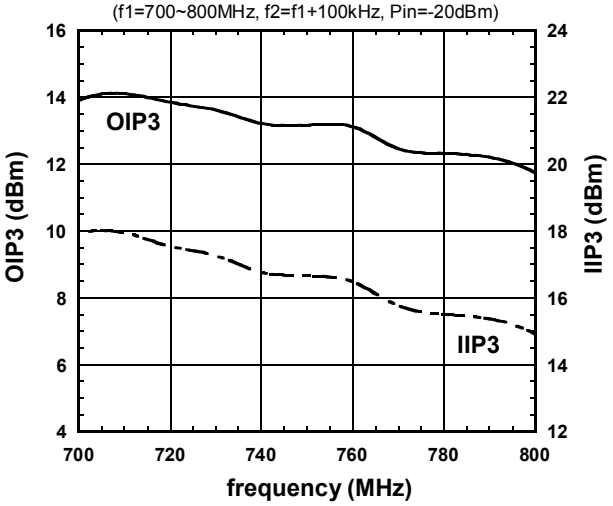
Low Gain
Gain, IDD vs. Pin
(f=750MHz)



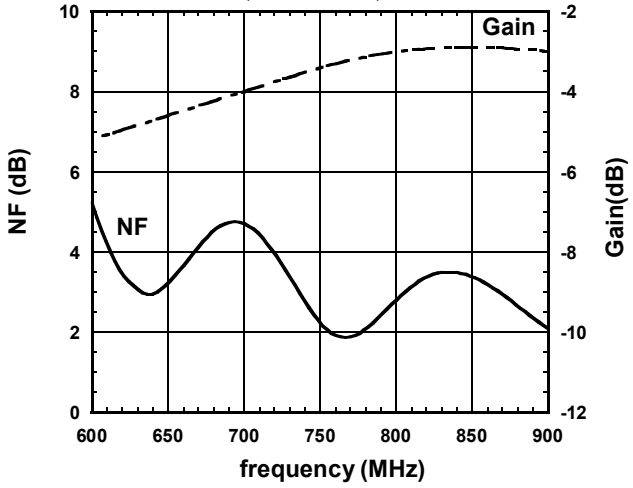
Low Gain
Pout, IM3 vs. Pin
(f1=750MHz, f2=f1+100kHz, Pin=-20dBm)



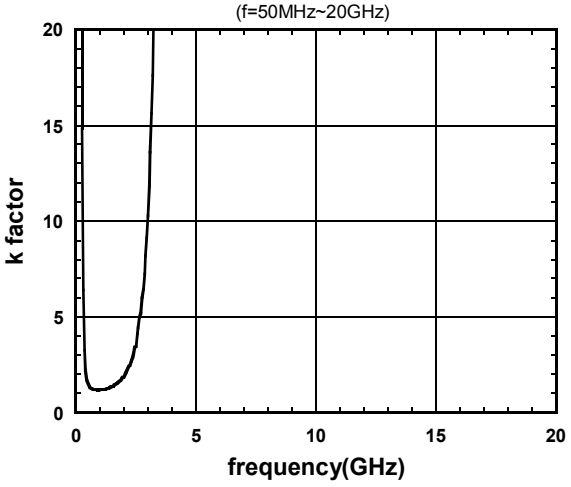
Low Gain
OIP3,IIP3 vs. frequency
(f1=700~800MHz, f2=f1+100kHz, Pin=-20dBm)



Low Gain
NF, Gain vs. frequency
(f=600~800MHz)

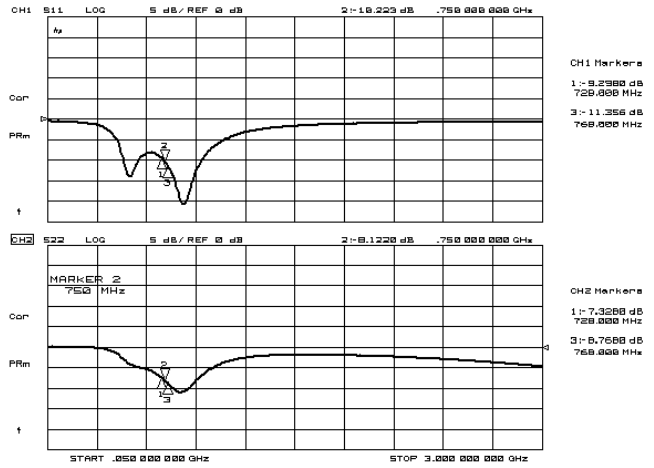


Low Gain
k factor vs. frequency
(f=50MHz~20GHz)

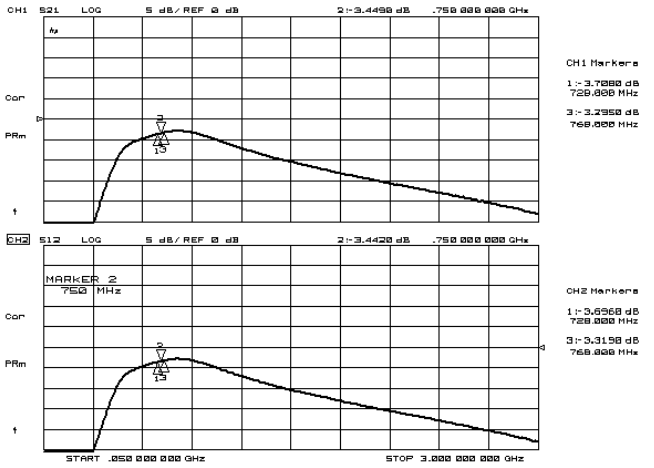


■ Typical characteristics (Low Gain Mode, V_{DD}=2.8V)

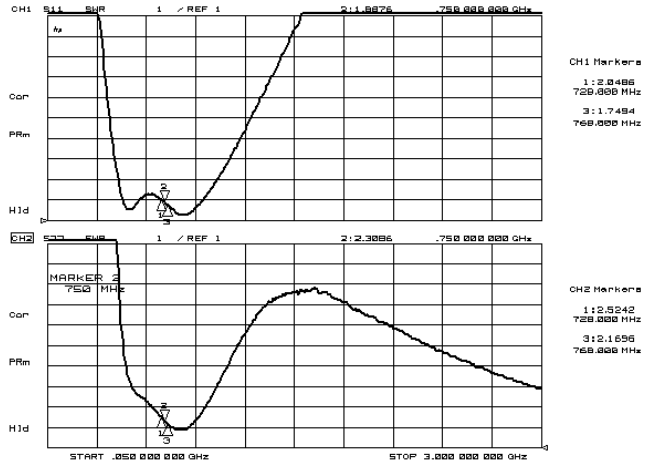
Condition: Ta=+25°C, V_{DD}=2.8V, V_{CTL}=0V



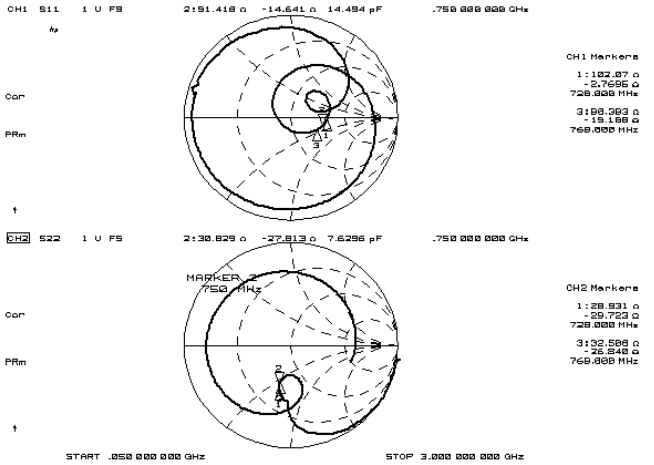
S11, S22



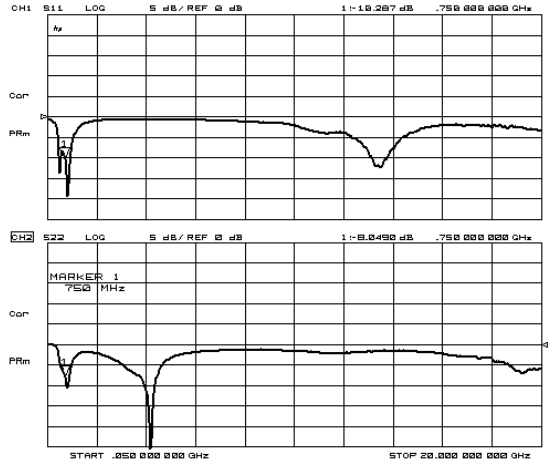
S21, S12



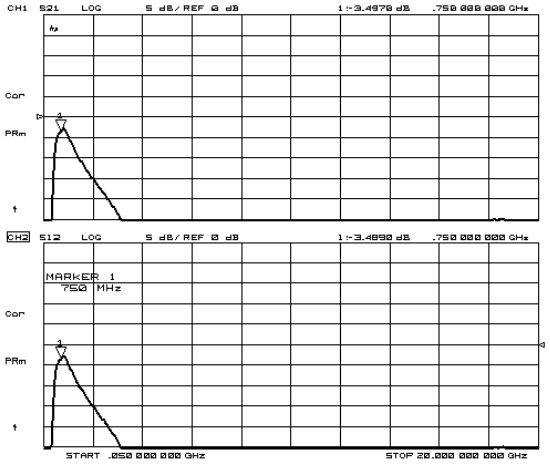
VSWR



Zin, Zout



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



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