

NJG1125PB5

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■ABSOLUTE MAXIMUM RATINGS

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

PARAMETER	SYMBOL	CONDITIONS	RATINGS	UNITS
Operating voltage	V_{DD}		5.0	V
Inverter supply voltage	V_{INV}		5.0	V
Control voltage	V_{CTL}	$V_{CTL1}, 2, 3$	5.0	V
Input power	P_{in}	$V_{DD}=2.7\text{V}$	+15	dBm
Power dissipation	P_D	At on PCB Board	300	mW
Operating temperature	T_{opr}		-40~+85	$^{\circ}\text{C}$
Storage temperature	T_{stg}		-55~+125	$^{\circ}\text{C}$

■ELECTRICAL CHARACTERISTICS 1 (DC)

GENERAL CONDITIONS: $V_{DD}=V_{INV}=2.85\text{V}$, $T_a=+25^{\circ}\text{C}$

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating voltage	V_{DD}		2.7	2.85	3.6	V
Inverter supply voltage	V_{INV}		2.7	2.85	3.6	V
Control voltage1 (High)	$V_{CTL1(H)}$		1.52	1.85	$V_{INV}+0.3$	V
Control voltage1 (Low)	$V_{CTL1(L)}$		0	0	0.3	V
Control voltage 2 (High)	$V_{CTL2(H)}$		1.52	1.85	$V_{INV}+0.3$	V
Control voltage 2 (Low)	$V_{CTL2(L)}$		0	0	0.3	V
Control voltage 3 (High)	$V_{CTL3(H)}$		1.52	1.85	$V_{INV}+0.3$	V
Control voltage 3 (Low)	$V_{CTL3(L)}$		0	0	0.3	V
Operating current1 2.1GHz High gain mode	I_{DD1}	$V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.85\text{V}$, RF OFF	-	2.4	3.1	mA
Operating current2 800MHz High gain mode	I_{DD2}	$V_{CTL1}=1.85\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.85\text{V}$, RF OFF	-	2.4	3.1	mA
Operating current3 1.7GHz High gain mode	I_{DD3}	$V_{CTL1}=0\text{V}$, $V_{CTL2}=1.85\text{V}$, $V_{CTL3}=1.85\text{V}$, RF OFF	-	2.4	3.1	mA
Operating current4 Low gain mode	I_{DD4}	$V_{CTL3}=0\text{V}$, RF OFF	-	0	5	μA
Inverter current1	I_{INV1}	$V_{CTL3}=1.85\text{V}$	-	80	130	μA
Inverter current2	I_{INV2}	$V_{CTL3}=0\text{V}$	-	45	80	μA
Control current1	I_{CTL1}	$V_{CTL1}=1.85\text{V}$	-	3	10	μA
Control current2	I_{CTL2}	$V_{CTL2}=1.85\text{V}$	-	3	10	μA
Control current3	I_{CTL3}	$V_{CTL3}=1.85\text{V}$	-	3	10	μA

■ELECTRICAL CHARACTERISTICS 2 (2.1GHz Band High Gain Mode)

GENERAL CONDITIONS: $V_{DD}=V_{INV}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=0V$, $V_{CTL3}=1.85V$, $f_{RF}=2140MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50ohm$

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain1	Gain1	Exclude PCB & connector losses (IN: 0.09dB, OUT: 0.36dB)	15.0	17.0	19.3	dB
Noise figure1	NF1	Exclude PCB & connector losses (IN: 0.09dB)	-	1.75	2.00	dB
Pin at 1dB gain compression point1	P-1dB(IN)1		-16.0	-12.5	-	dBm
Input 3rd order intercept point1	IIP3_1	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, Pin=-30dBm	-6.0	0.0	-	dBm
RF Input VSWR1	VSWRi1		-	1.7	2.2	
RF Output VSWR1	VSWRo1		-	1.8	2.3	

■ELECTRICAL CHARACTERISTICS 3 (2.1GHz Band Low Gain Mode)

GENERAL CONDITIONS: $V_{DD}=V_{INV}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=0V$, $V_{CTL3}=0V$, $f_{RF}=2140MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50ohm$

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain2	Gain2	Exclude PCB & connector losses (IN: 0.09dB, OUT: 0.36dB)	-11.0	-8.0	-6.0	dB
Noise figure2	NF2	Exclude PCB & connector losses (IN: 0.09dB)	-	8.5	11.5	dB
Pin at 1dB gain compression point2	P-1dB(IN)2		+5.0	+12.0	-	dBm
Input 3rd order intercept point2	IIP3_2	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, Pin=-16dBm	0.0	+14.0	-	dBm
RF Input VSWR2	VSWRi2		-	2.0	2.4	
RF Output VSWR2	VSWRo2		-	1.5	2.0	

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■ELECTRICAL CHARACTERISTICS 4 (800MHz Band High Gain Mode)

GENERAL CONDITIONS: $V_{DD}=V_{INV}=2.7V$, $V_{CTL1}=1.85V$, $V_{CTL2}=0V$, $V_{CTL3}=1.85V$, $f_{RF}=885MHz$,
 $T_a=+25^{\circ}C$, $Z_s=Z_l=50ohm$

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain ₃	Gain ₃	Exclude PCB & connector losses (IN: 0.06dB, OUT: 0.16dB)	14.5	16.5	18.5	dB
Noise figure ₃	NF ₃	Exclude PCB & connector losses (IN: 0.06dB)	-	1.50	1.70	dB
Pin at 1dB gain compression point ₃	P-1dB(IN) ₃		-16.0	-9.0	-	dBm
Input 3rd order intercept point ₃	IIP3_3	f ₁ =f _{RF} , f ₂ =f _{RF} +100kHz, Pin=30dBm	-8.0	-1.0	-	dBm
RF Input VSWR ₃	VSWR _{i3}		-	1.5	2.0	
RF Output VSWR ₃	VSWR _{o3}		-	1.5	2.1	

■ELECTRICAL CHARACTERISTICS 5 (800MHz Band Low Gain Mode)

GENERAL CONDITIONS: $V_{DD}=V_{INV}=2.7V$, $V_{CTL1}=1.85V$, $V_{CTL2}=0V$, $V_{CTL3}=0V$, $f_{RF}=885MHz$,
 $T_a=+25^{\circ}C$, $Z_s=Z_l=50ohm$

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain ₄	Gain ₄	Exclude PCB & connector losses (IN: 0.06dB, OUT: 0.16dB)	-8.5	-6.5	-4.5	dB
Noise figure ₄	NF ₄	Exclude PCB & connector losses (IN: 0.06dB)	-	6.5	9.5	dB
Pin at 1dB gain compression point ₄	P-1dB(IN) ₄		+3.5	+11.0	-	dBm
Input 3rd order intercept point ₄	IIP3_4	f ₁ =f _{RF} , f ₂ =f _{RF} +100kHz, Pin=-20dBm	0.0	+12.0	-	dBm
RF Input VSWR ₄	VSWR _{i4}		-	2.0	2.5	
RF Output VSWR ₄	VSWR _{o4}		-	1.9	2.2	

■ELECTRICAL CHARACTERISTICS 6 (1.7GHZ Band High Gain Mode)

GENERAL CONDITIONS: $V_{DD}=V_{INV}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=1.85V$, $V_{CTL3}=1.85V$, $f_{RF}=1860MHz$,
 $T_a=+25^{\circ}C$, $Z_s=Z_l=50ohm$

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain5	Gain5	Exclude PCB & connector losses (IN: 0.10dB, OUT: 0.31dB)	15.5	17.5	19.0	dB
Noise figure5	NF5	Exclude PCB & connector losses (IN: 0.10dB)	-	1.65	1.80	dB
Pin at 1dB gain compression point5	P-1dB(IN)5		-16.0	-11.5	-	dBm
Input 3rd order intercept point5	IIP3_5	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, Pin=-30dBm	-6.0	+1.0	-	dBm
RF Input VSWR5	VSWRi5		-	2.0	2.6	
RF Output VSWR5	VSWRo5		-	1.9	2.4	

■ELECTRICAL CHARACTERISTICS 6 (1.7GHZ Band Low Gain Mode)

GENERAL CONDITIONS: $V_{DD}=V_{INV}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=1.85V$, $V_{CTL3}=0V$, $f_{RF}=1860MHz$,
 $T_a=+25^{\circ}C$, $Z_s=Z_l=50ohm$

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain6	Gain6	Exclude PCB & connector losses (IN: 0.10dB, OUT: 0.31dB)	-11.5	-9.0	-7.0	dB
Noise figure6	NF6	Exclude PCB & connector losses (IN: 0.10dB)	-	9.5	12.0	dB
Pin at 1dB gain compression point6	P-1dB(IN)6		+4.0	+12.5	-	dBm
Input 3rd order intercept point6	IIP3_6	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, Pin=-16dBm	0.0	+14.0	-	dBm
RF Input VSWR6	VSWRi6		-	1.7	2.3	
RF Output VSWR6	VSWRo6		-	1.4	2.0	

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■ TERMINAL INFORMATION

No.	SYMBOL	DESCRIPTION
1	GND	Ground terminal. (0V)
2	VINV	Inverter voltage supplies terminal.
3	VCTL3	Control voltage supply terminal. The high level voltage of this terminal selects High Gain Mode. The low level voltage of this terminal selects Low Gain Mode.
4	RFOUT3	Output terminal of 1.7GHz band. This terminal is also the power supply terminal of the LNA, please use inductor (L10) to connect power supply.
5	GND	Ground terminal. (0V)
6	RFOUT2	Output terminal of 2.1GHz band. This terminal is also the power supply terminal of the LNA, please use inductor (L6) to connect power supply.
7	GND	Ground terminal. (0V)
8	RFOUT1	Output terminal of 800MHz band. This terminal is also the power supply terminal of the LNA, please use inductor (L3) to connect power supply.
9	VCTL2	Control voltage supply terminal. The frequency band (2Ghz / 800MHz / 1.7GHz) selects by 2bit control signal. (Please refer to truth table.)
10	VCTL1	
11	GND	Ground terminal. (0V)
12	RFIN1	RF input terminal of 800MHz band. The RF signal is input through external matching circuit connected to this terminal. The DC blocking capacitor is not required.
13	GND	Ground terminal. (0V)
14	RFIN2	RF input terminal of 2.1GHz band. The RF signal is input through external matching circuit connected to this terminal. The DC blocking capacitor is not required.
15	GND	Ground terminal. (0V)
16	RFIN3	RF input terminal of 1.7GHz band. The RF signal is input through external matching circuit connected to this terminal. The DC blocking capacitor is not required.

CAUTION

- 1) Ground terminal (1, 5, 7, 11, 13, 15) should be connected to the ground plane as low inductance as possible.

■ TRUTH TABLE

Control voltage			Operating state					
V _{CTL1} (Band Sel1)	V _{CTL2} (Band Sel2)	V _{CTL3} (Gain Sel1)	2.1GHz Band		800MHz Band		1.7GHz Band	
			LNA	Bypass	LNA	Bypass	LNA	Bypass
L	L	L	OFF	ON	OFF	ON	OFF	ON
L	L	H	ON	OFF	OFF	OFF	OFF	OFF
H	L	L	OFF	ON	OFF	ON	OFF	ON
H	L	H	OFF	OFF	ON	OFF	OFF	OFF
L	H	L	OFF	ON	OFF	ON	OFF	ON
L	H	H	OFF	OFF	OFF	OFF	ON	OFF
H	H	L	Don't Care					
H	H	H						

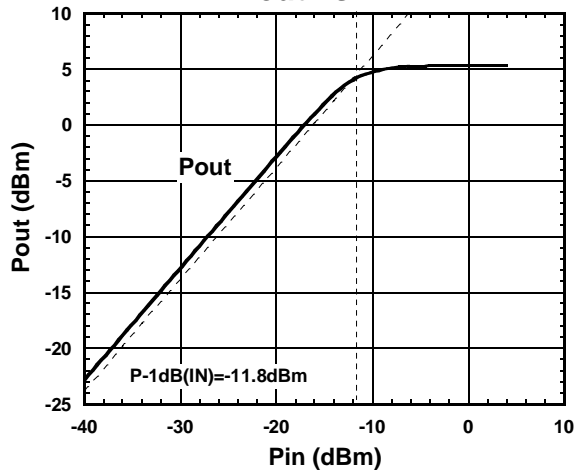
“L”=0 ~ 0.3V, “H”=1.52 ~ V_{INV}+0.3 V

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■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)

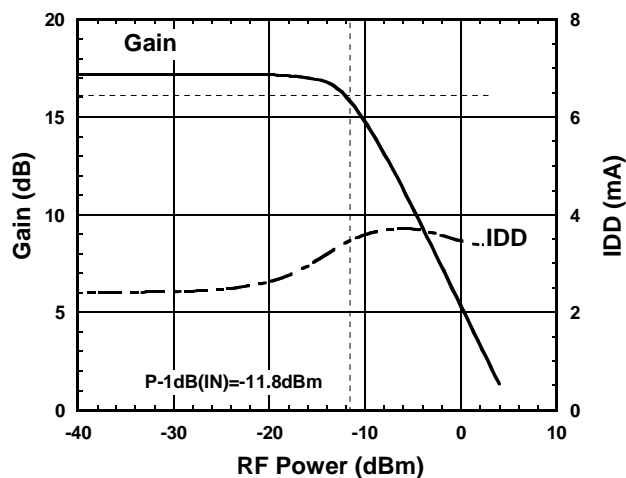
**2.1GHz@High Gain
Pout vs. Pin**



Condition

Ta=+25°C,
f=2140MHz,
V_{DD}=V_{INV}=2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85V

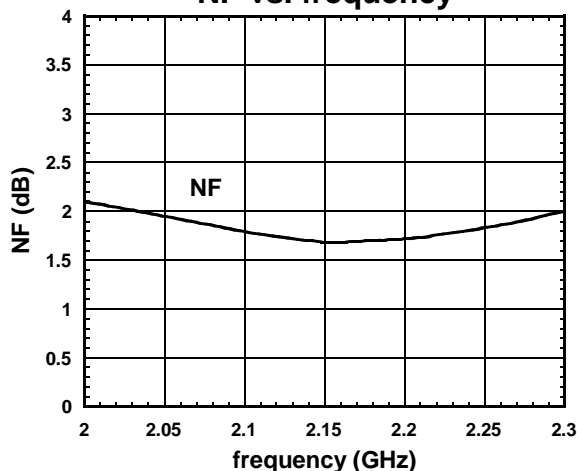
**2.1GHz@High Gain
Gain, IDD vs. Pin**



Condition

Ta=+25°C,
f=2140MHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85V

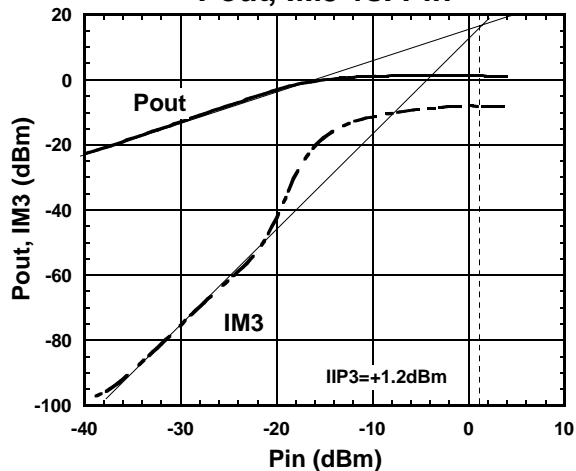
**2.1GHz@High Gain
NF vs. frequency**



Condition

Ta=+25°C,
f=2~2.3GHz,
V_{DD}=V_{INV}=2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85V

**2.1GHz@High Gain
Pout, IM3 vs. Pin**

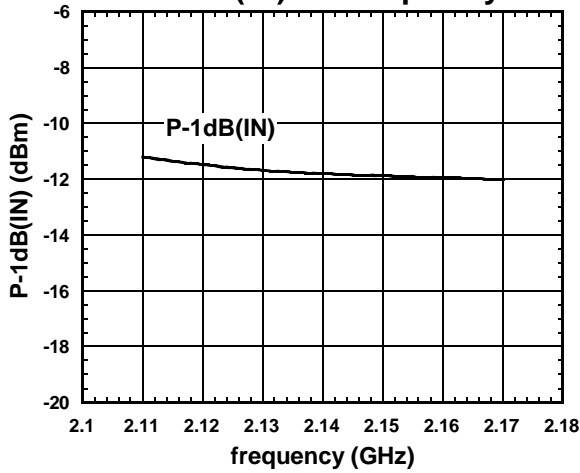


Condition

Ta=+25°C,
f1=2140MHz, f2=f1+100kHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85V

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)

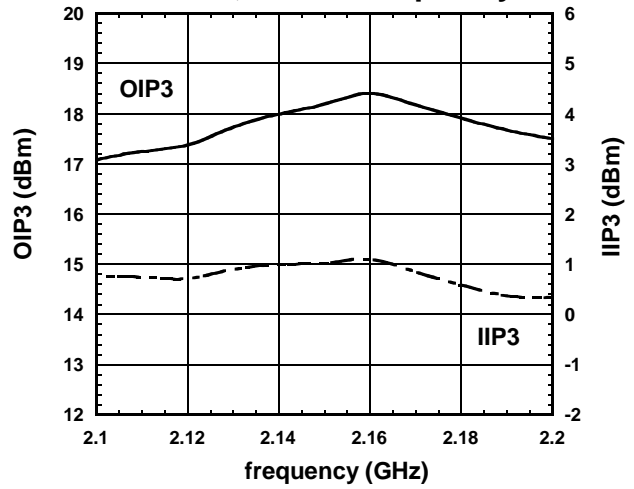
**2.1GHz@High Gain
P-1dB(IN) vs. frequency**



Condition

Ta=+25°C,
f=2.1~2.2GHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85V

**2.1GHz@High Gain
OIP3,IIP3 vs. frequency**



Condition

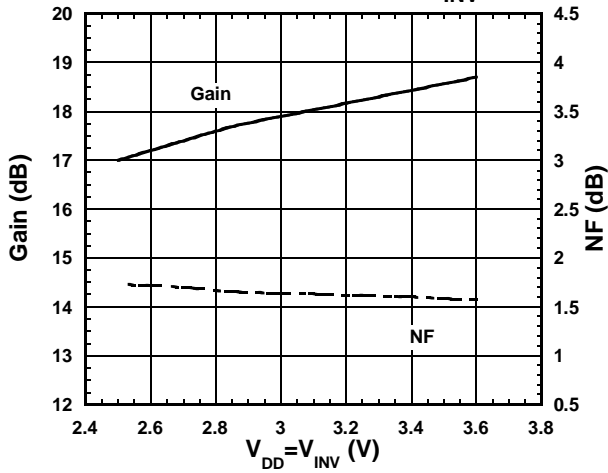
Ta=+25°C,
f1=2.1~2.2GHz, f2=f1+100kHz,
Pin=-30dBm,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85V

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■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)

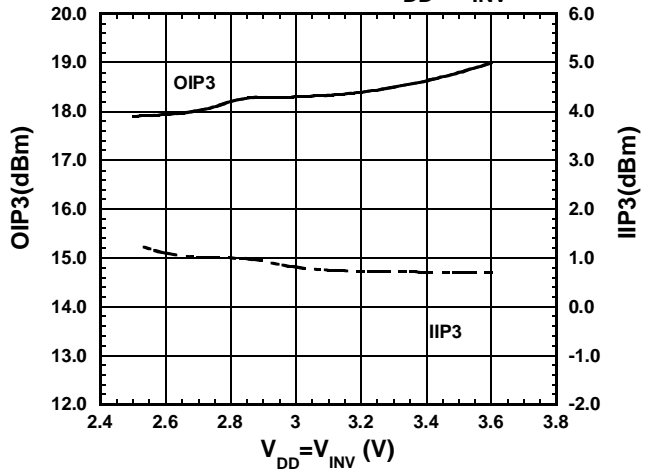
2.1GHz@High Gain
Gain, NF vs. V_{DD} , V_{INV}



Condition

$T_a = +25^\circ\text{C}$,
 $f = 2140\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

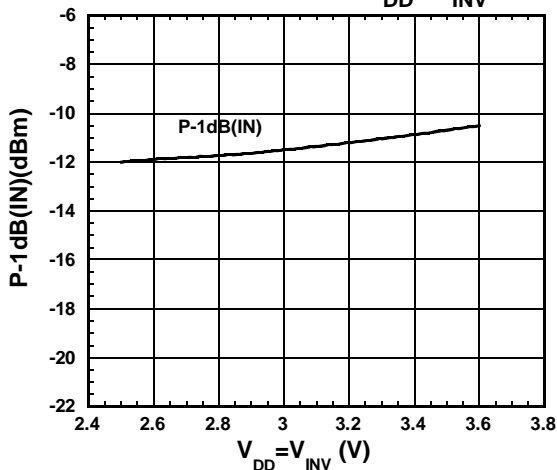
2.1GHz@High Gain
OIP3, IIP3 vs. V_{DD} , V_{INV}



Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 2140\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $P_{in} = -30\text{dBm}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

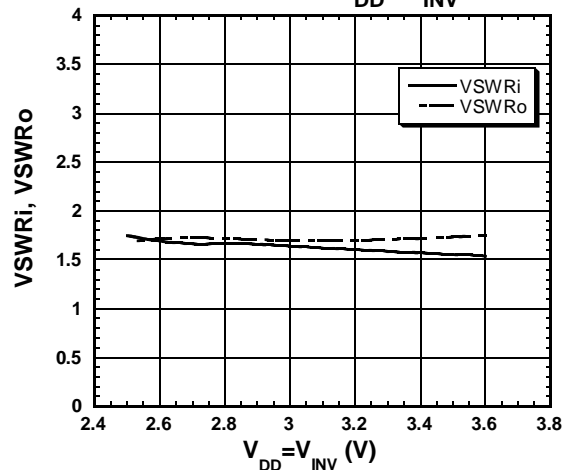
2.1GHz@High Gain
P-1dB(IN) vs. V_{DD} , V_{INV}



Condition

$T_a = +25^\circ\text{C}$,
 $f = 2140\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

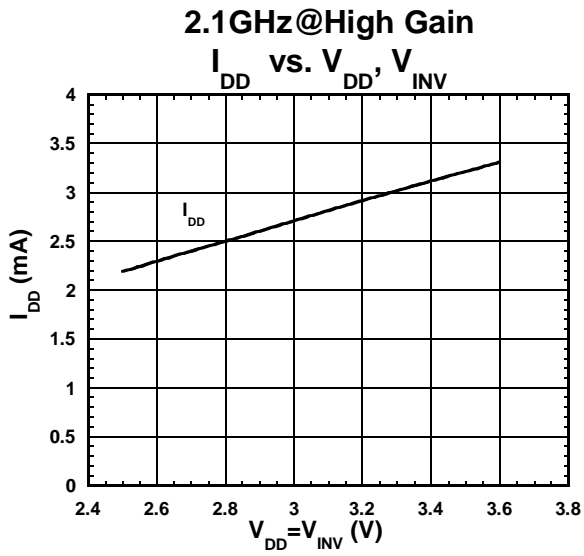
2.1GHz@High Gain
VSWR vs. V_{DD} , V_{INV}



Condition

$T_a = +25^\circ\text{C}$,
 $f = 2140\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)



Condition

$T_a = +25^\circ\text{C}$,

RF=OFF,

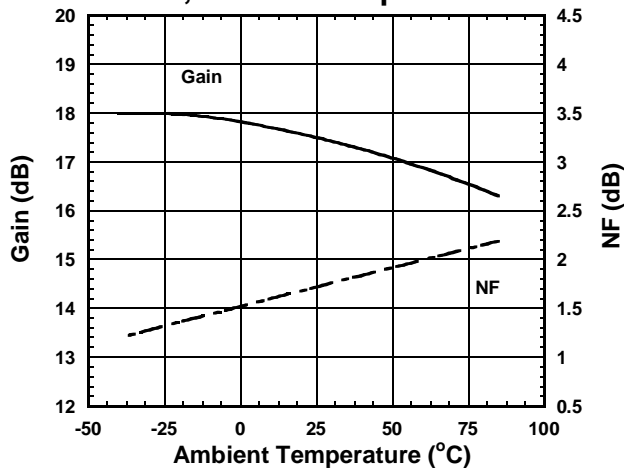
$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

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■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)

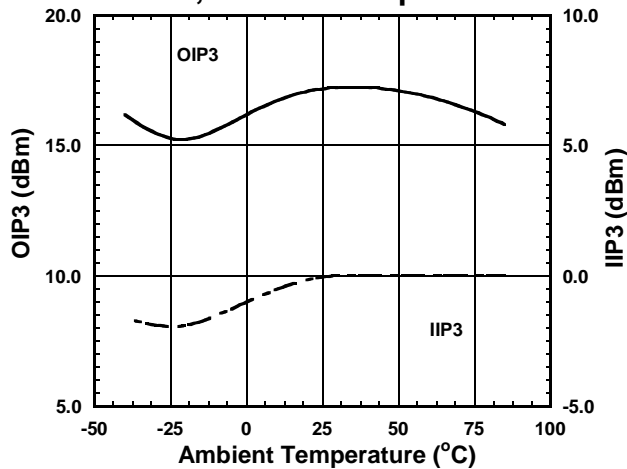
**2.1GHz@High Gain
Gain, NF vs. Temperature**



Condition

f=2140MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

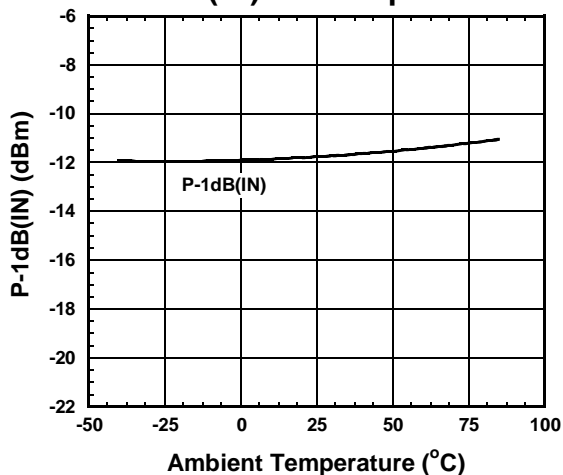
**2.1GHz@High Gain
OIP3, IIP3 vs. Temperature**



Condition

f1=2140MHz, f2=f1+100kHz,
 $P_{in} = -30dBm$,
 $V_{DD} = V_{INV} = 2.7V$
 $V_{CTL1} = 0V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

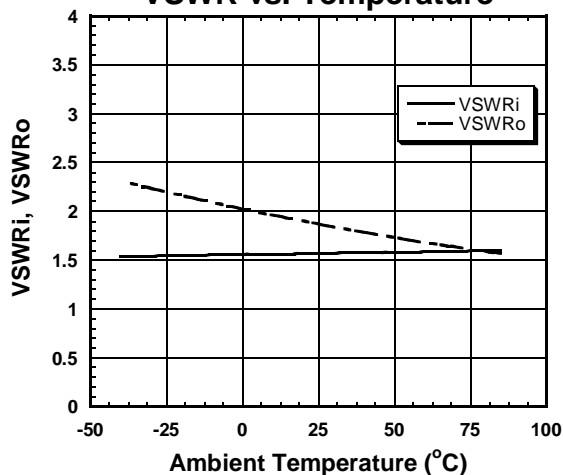
**2.1GHz@High Gain
P-1dB(IN) vs. Temperature**



Condition

f=2140MHz,
 $V_{DD} = V_{INV} = 2.7V$
 $V_{CTL1} = 0V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

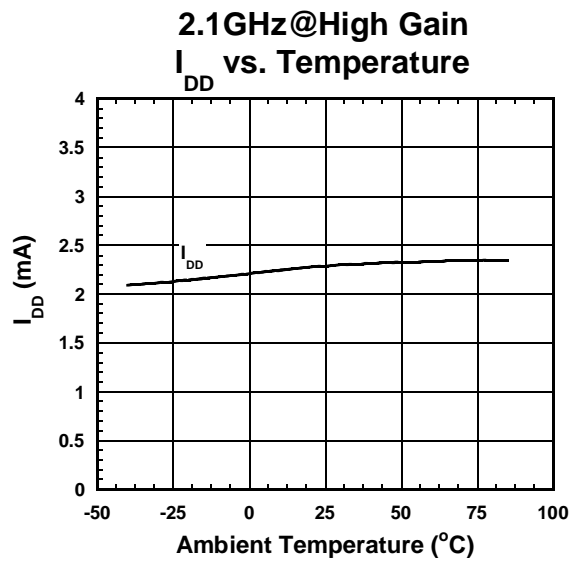
**2.1GHz@High Gain
VSWR vs. Temperature**



Condition

f=2140MHz,
 $V_{DD} = V_{INV} = 2.7V$
 $V_{CTL1} = 0V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)



Condition

RF=OFF,

V_{DD}= V_{INV} =2.7V

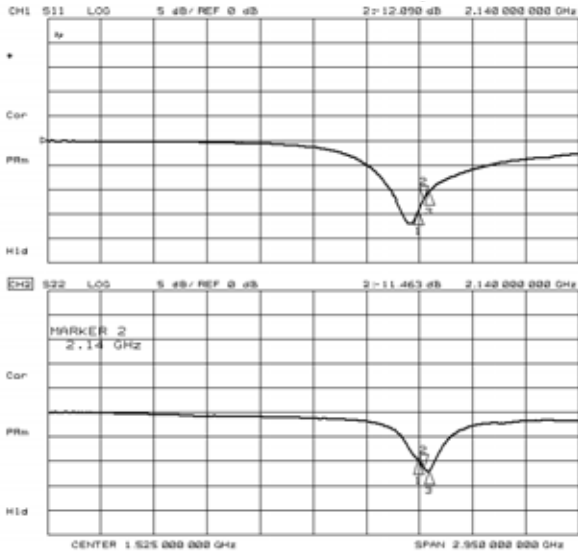
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85V

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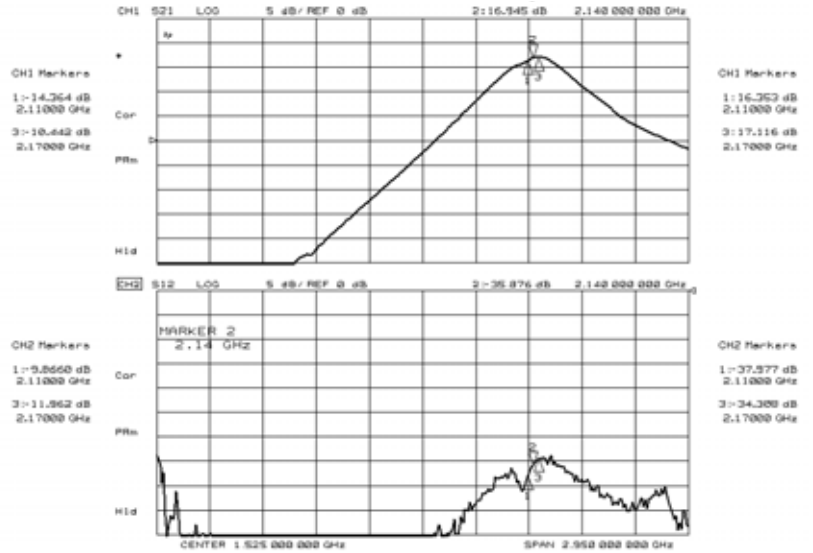
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■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)

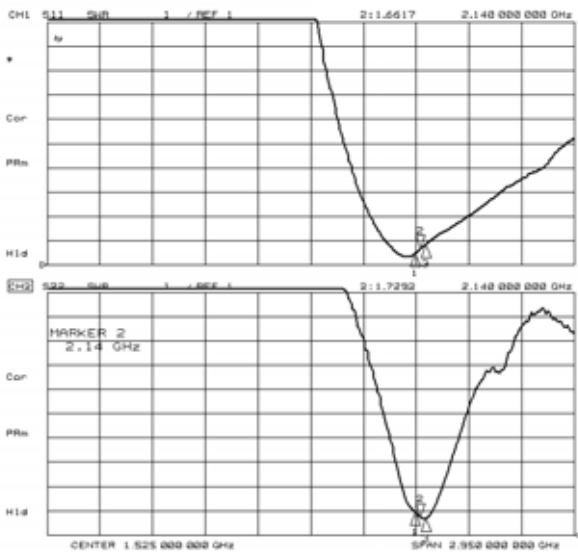
Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.85\text{V}$



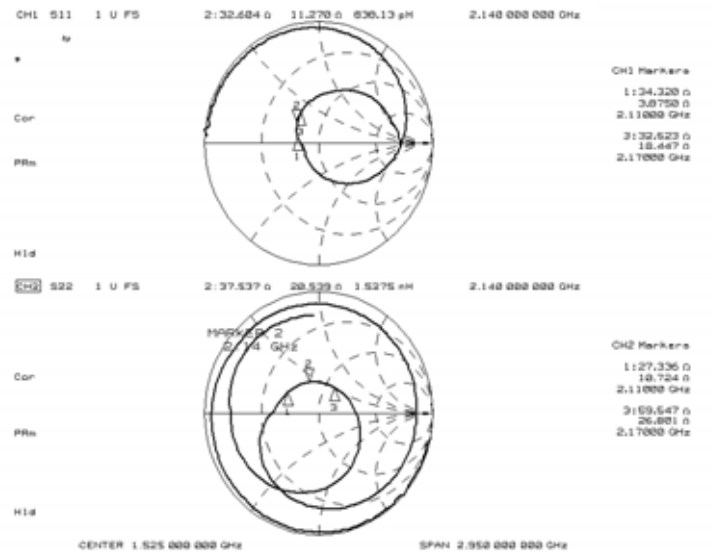
S11, S22



S 21, S12



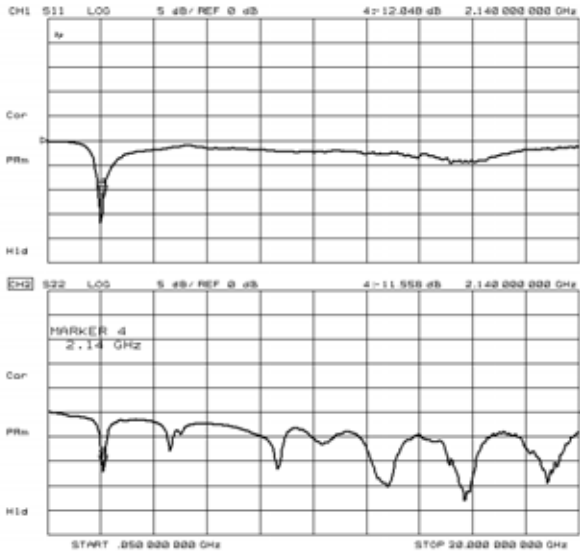
VSWR



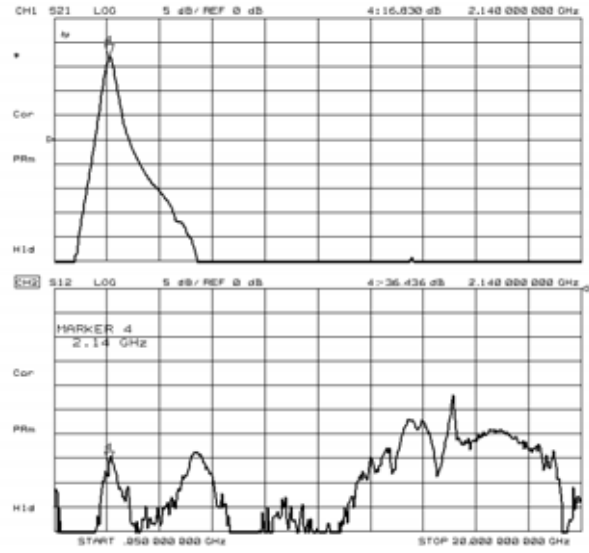
Zin, Zout

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band High Gain Mode)

Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.85\text{V}$

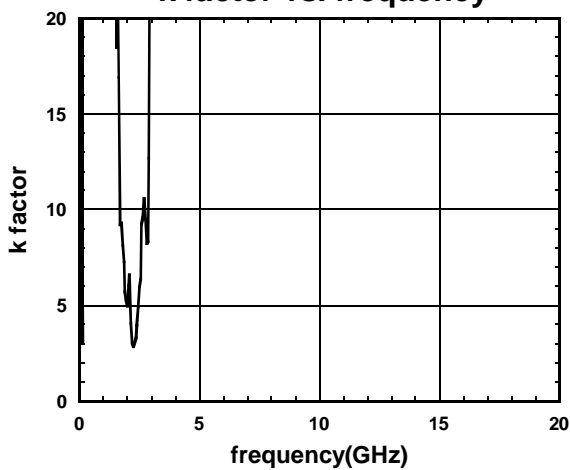


S11, S22
(f=50MHz~20GHz)



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

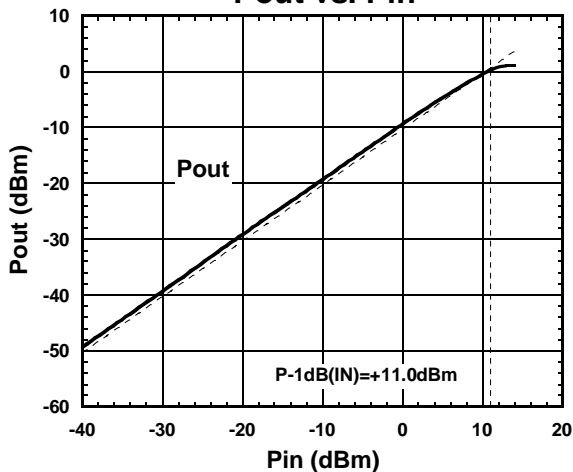
2.1GHz @High Gain k factor vs. frequency



k factor
(f=50MHz~20GHz)

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

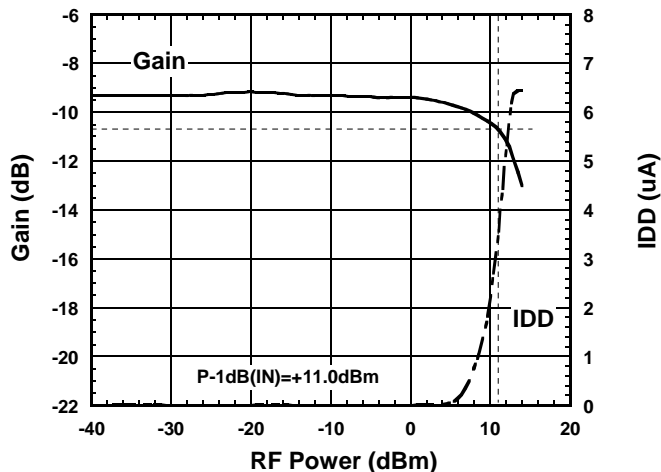
**2.1GHz@Low Gain
Pout vs. Pin**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 2140\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

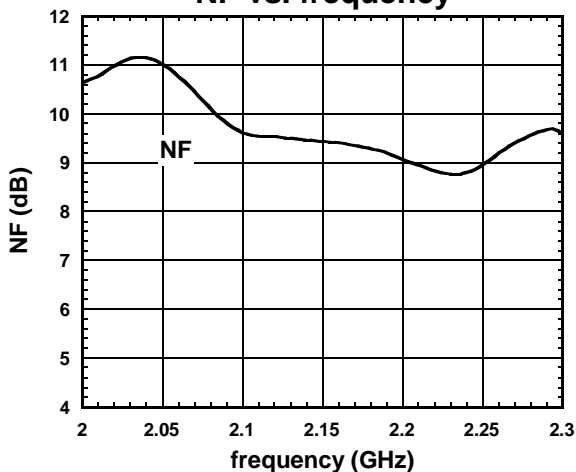
**2.1GHz@Low Gain
Gain, IDD vs. Pin**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 2140\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

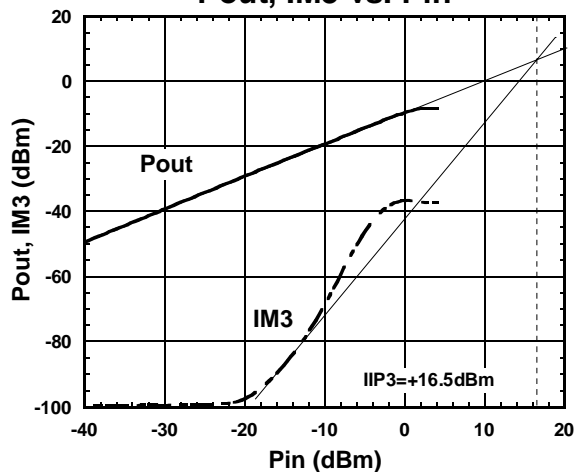
**2.1GHz@Low Gain
NF vs. frequency**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 2 \sim 2.3\text{GHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

**2.1GHz@Low Gain
Pout, IM3 vs. Pin**

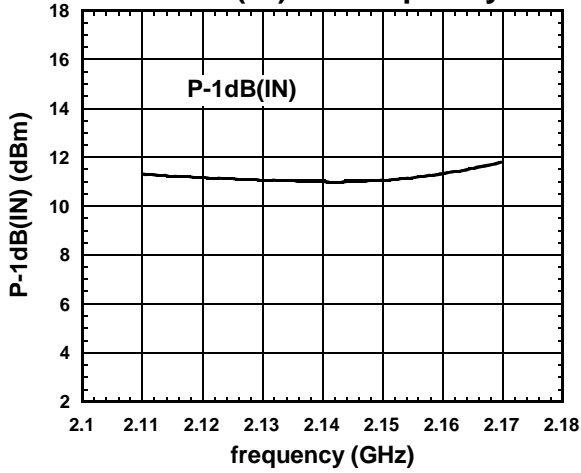


Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 2140\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

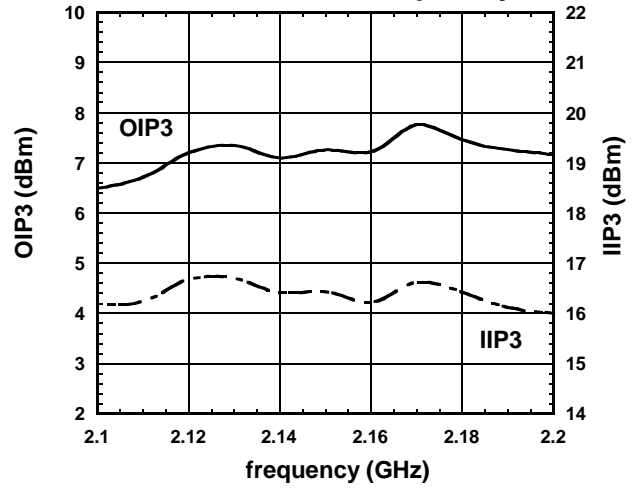
**2.1GHz@Low Gain
P-1dB(IN) vs. frequency**



Condition

Ta=+25°C,
f=2.1~2.2GHz,
V_{DD}=V_{INV}=2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=0V

**2.1GHz@Low Gain
OIP3,IIP3 vs. frequency**



Condition

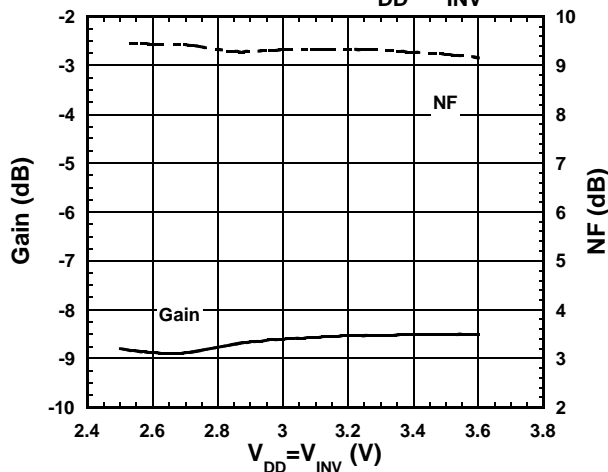
Ta=+25°C,
f1=2.1~2.2GHz, f2=f1+100kHz,
Pin=-16dBm,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=0V

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■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

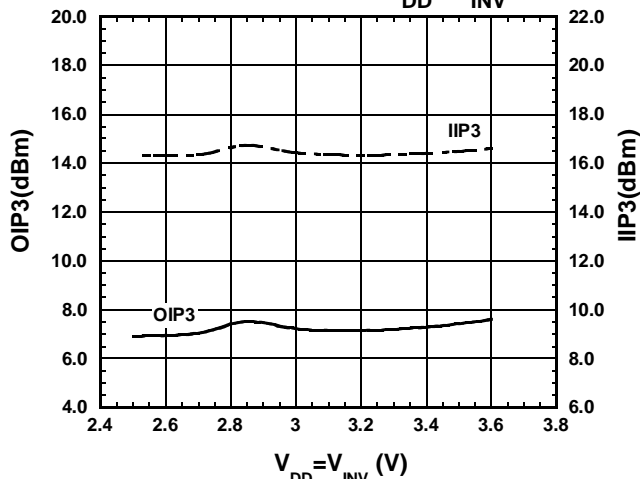
2.1GHz@Low Gain
Gain, NF vs. V_{DD} , V_{INV}



Condition

Ta=+25°C,
f=2140MHz,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=0V

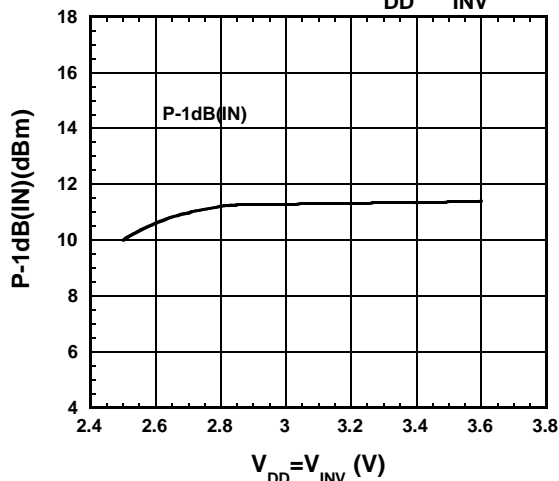
2.1GHz@Low Gain
OIP3, IIP3 vs. V_{DD} , V_{INV}



Condition

Ta=+25°C,
f1=2140MHz, f2=f1+100kHz,
Pin=-16dBm,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=0V

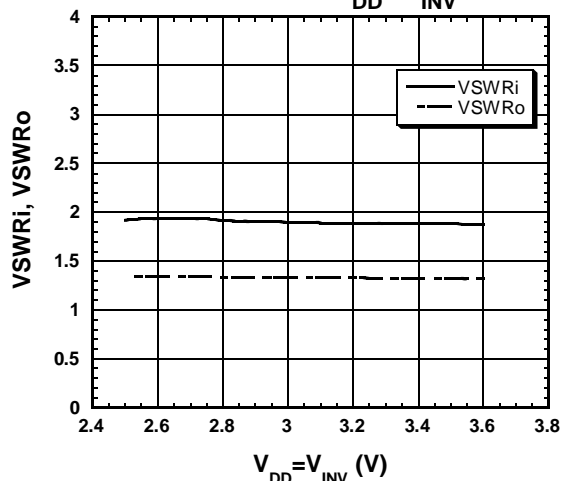
2.1GHz@Low Gain
P-1dB(IN) vs. V_{DD} , V_{INV}



Condition

Ta=+25°C,
f=2140MHz,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=0V

2.1GHz@Low Gain
VSWR vs. V_{DD} , V_{INV}

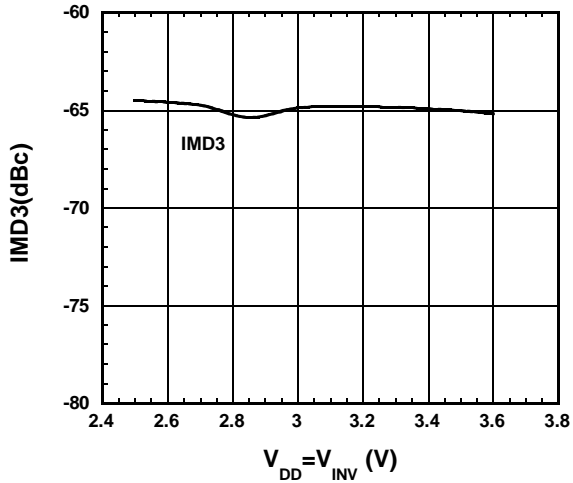


Condition

Ta=+25°C,
f=2140MHz,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=0V

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

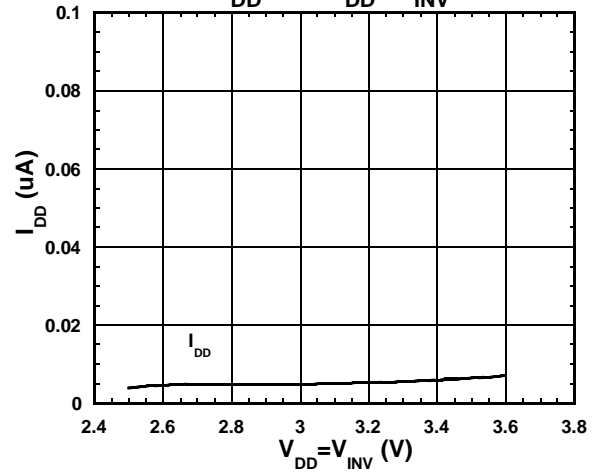
2.1GHz@Low Gain
IMD3 vs. V_{DD} , V_{INV}



Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 2140\text{MHz}$, $f_2 = f_1 + 2140.1\text{MHz}$,
 $P_{in} = -16\text{dBm}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

2.1GHz@Low Gain
 I_{DD} vs. V_{DD} , V_{INV}



Condition

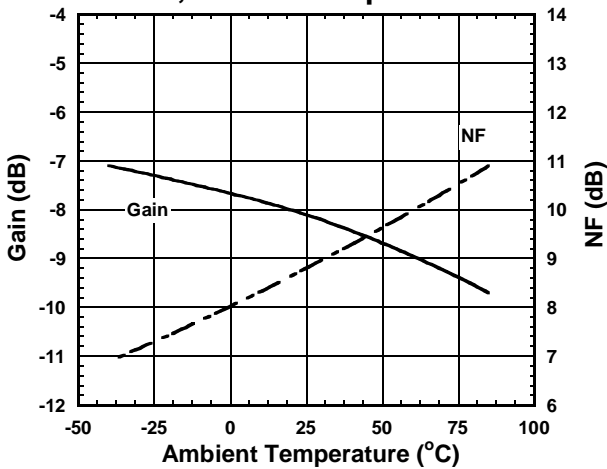
$T_a = +25^\circ\text{C}$,
 $\text{RF} = \text{OFF}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

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■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

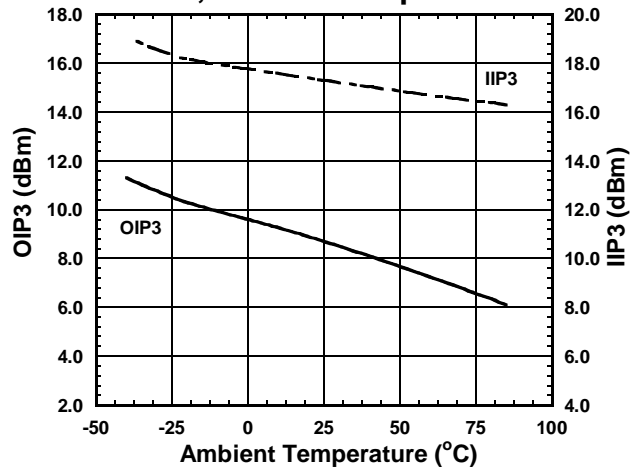
**2.1GHz@Low Gain
Gain, NF vs. Temperature**



Condition

$f=2140\text{MHz}$,
 $V_{DD}=V_{INV}=2.7\text{V}$,
 $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

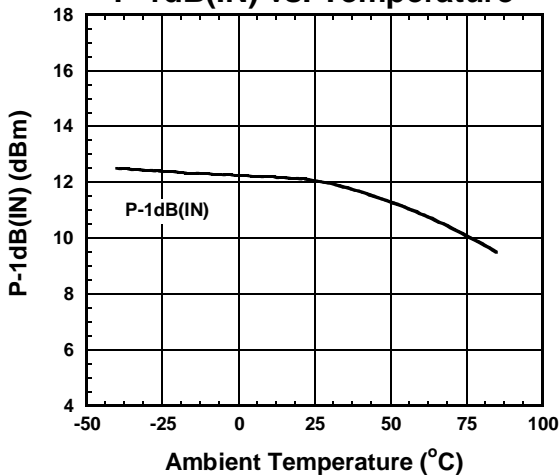
**2.1GHz@Low Gain
OIP3, IIP3 vs. Temperature**



Condition

$f_1=2140\text{MHz}$, $f_2=f_1+100\text{kHz}$,
 $P_{in}=-16\text{dBm}$,
 $V_{DD}=V_{INV}=2.7\text{V}$
 $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

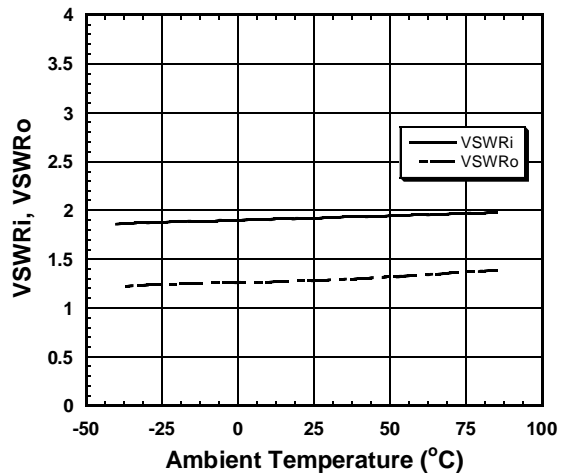
**2.1GHz@Low Gain
P-1dB(IN) vs. Temperature**



Condition

$f=2140\text{MHz}$,
 $V_{DD}=V_{INV}=2.7\text{V}$
 $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

**2.1GHz@Low Gain
VSWR vs. Temperature**

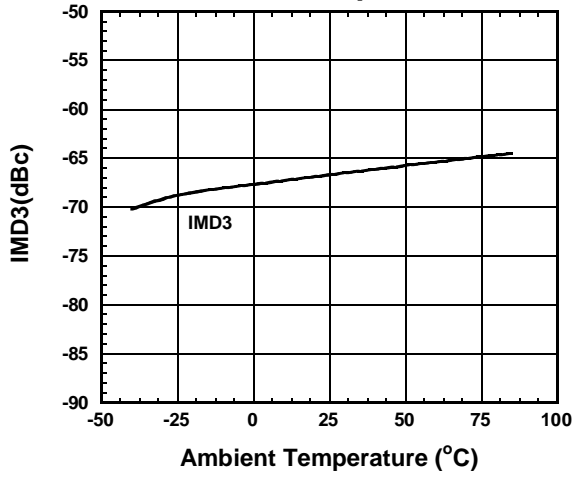


Condition

$f=2140\text{MHz}$,
 $V_{DD}=V_{INV}=2.7\text{V}$
 $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

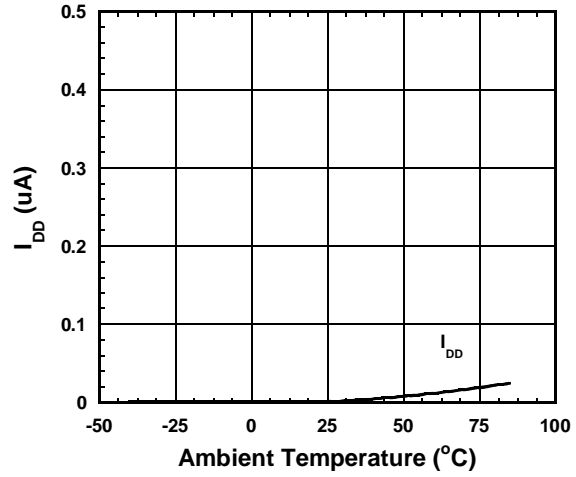
**2.1GHz@Low Gain
IMD3 vs. Temperature**



Condition

$f_1=2140\text{MHz}$, $f_2=f_1+100\text{kHz}$,
 $P_{in}=-16\text{dBm}$,
 $V_{DD}=V_{INV}=2.7\text{V}$
 $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

**2.1GHz@Low Gain
 I_{DD} vs. Temperature**



Condition

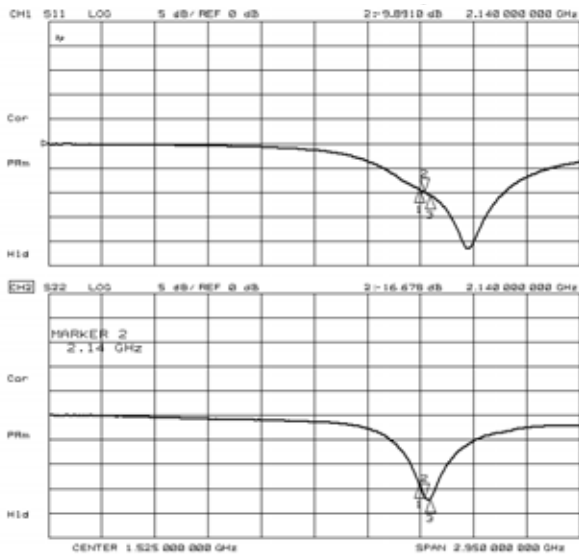
RF=OFF,
 $V_{DD}=V_{INV}=2.7\text{V}$
 $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

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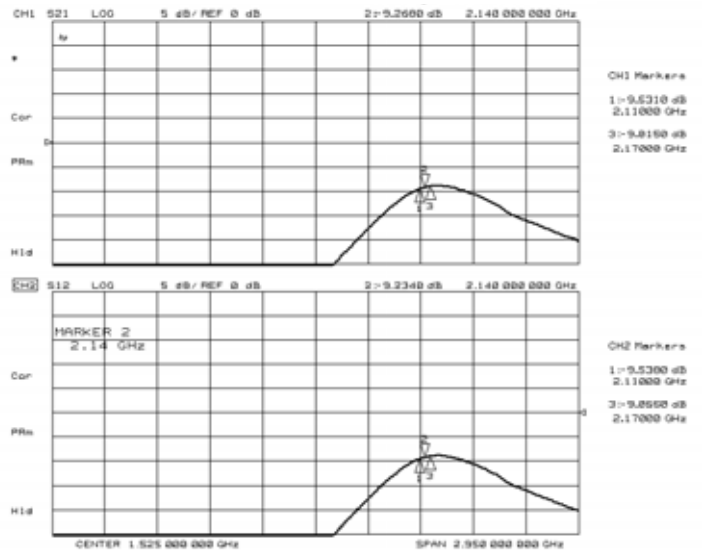
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■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

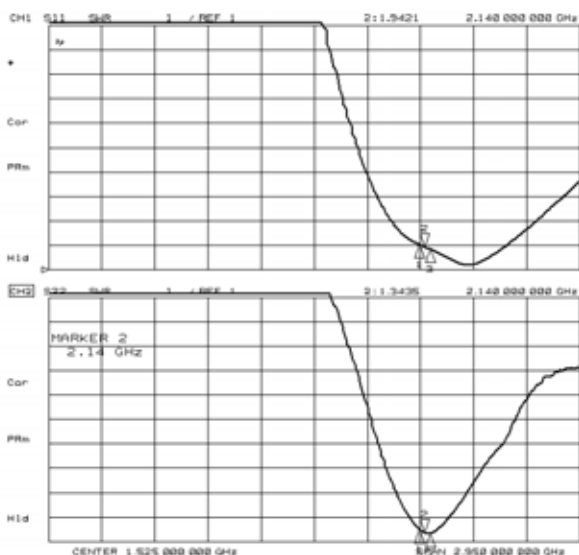
Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$



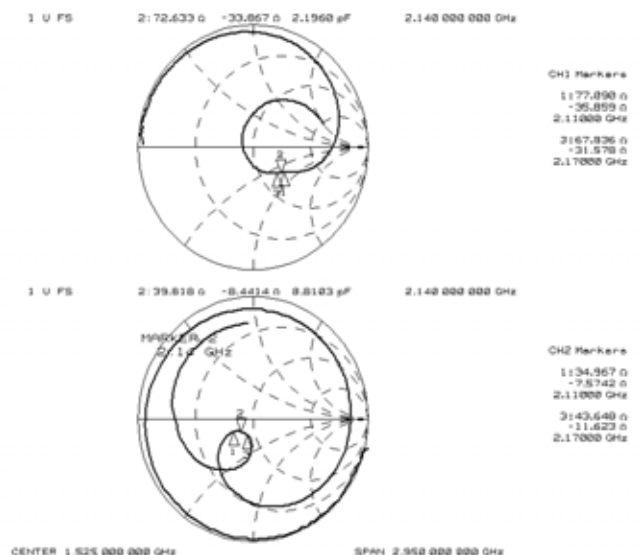
S11, S22



S21, S12



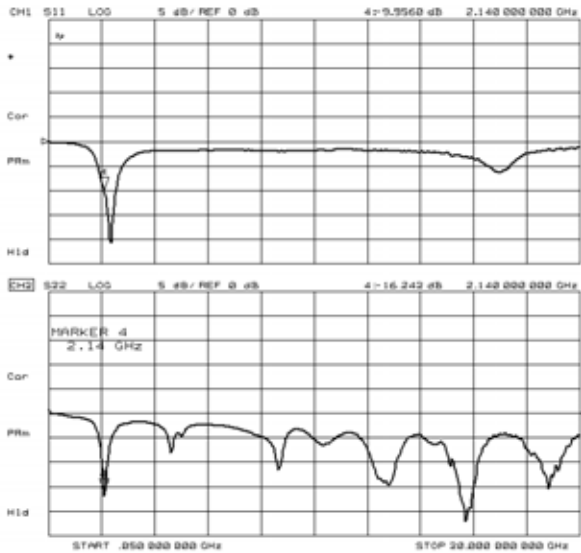
VSWR



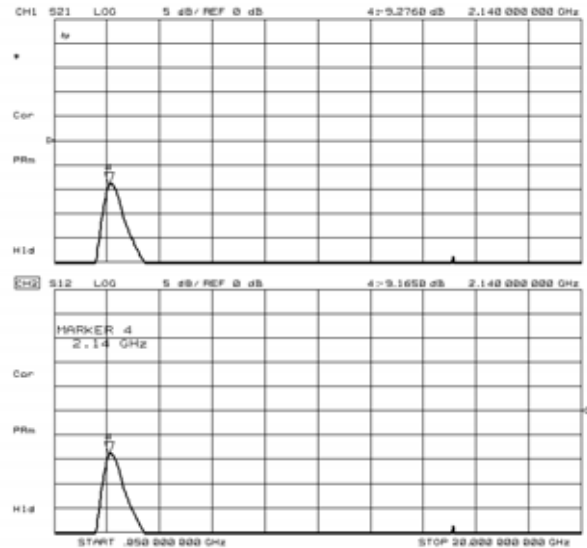
Zin, Zout

■ ELECTRICAL CHARACTERISTICS (2.1GHz Band Low Gain Mode)

Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

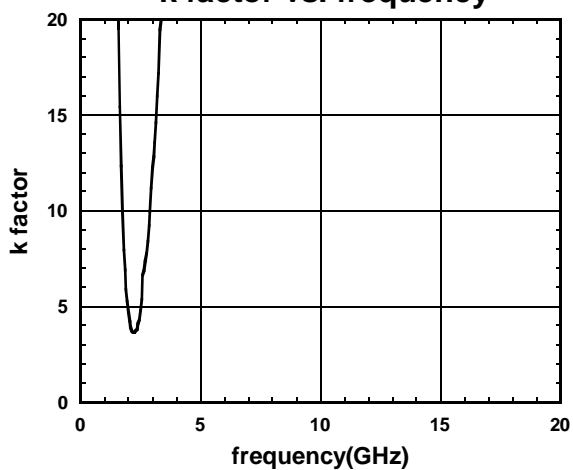


S11, S22
($f=50\text{MHz}\sim 20\text{GHz}$)



S21, S12
($f=50\text{MHz}\sim 20\text{GHz}$)

2.1GHz @Low Gain k factor vs. frequency



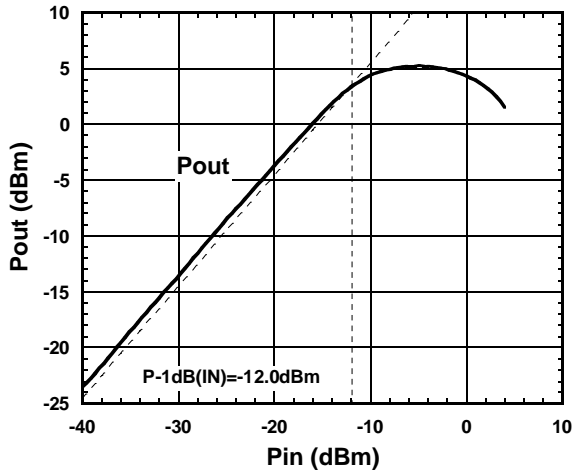
k factor
($f=50\text{MHz}\sim 20\text{GHz}$)

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■ ELECTRICAL CHARACTERISTICS (800MHz Band High Gain Mode)

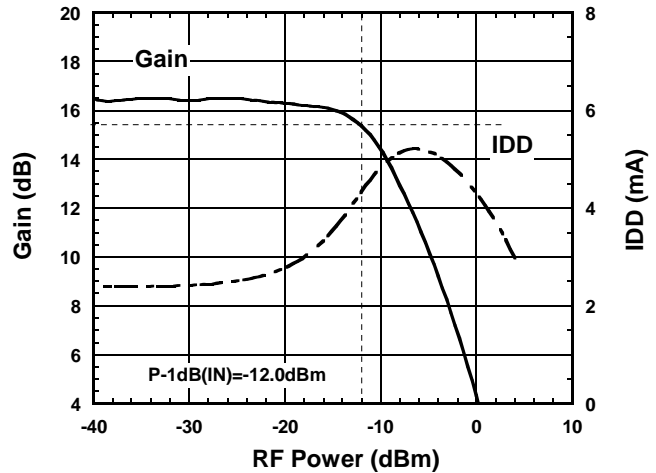
**800MHz@High Gain
Pout vs. Pin**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 885\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

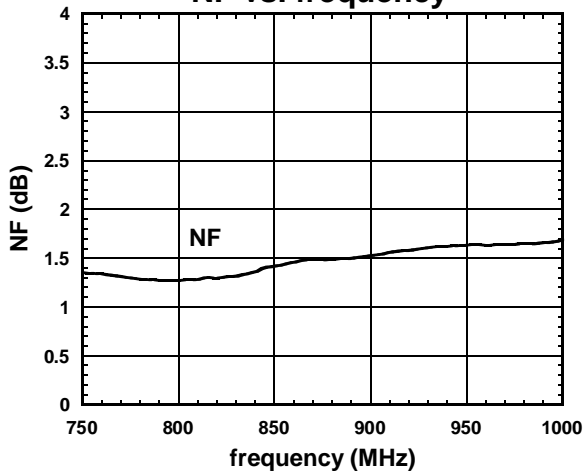
**800MHz@High Gain
Gain, IDD vs. Pin**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 885\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

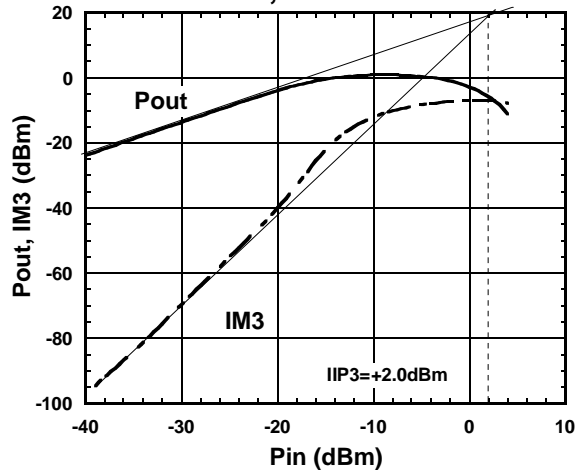
**800MHz@High Gain
NF vs. frequency**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 750\text{M} \sim 1\text{GHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

**800MHz@High Gain
Pout, IM3 vs. Pin**

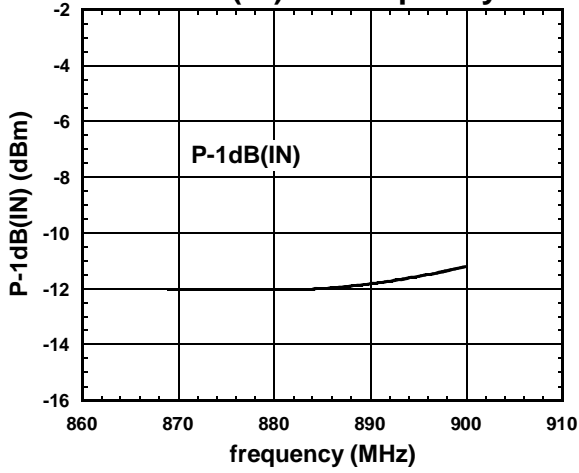


Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 885\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

■ ELECTRICAL CHARACTERISTICS (800MHz Band High Gain Mode)

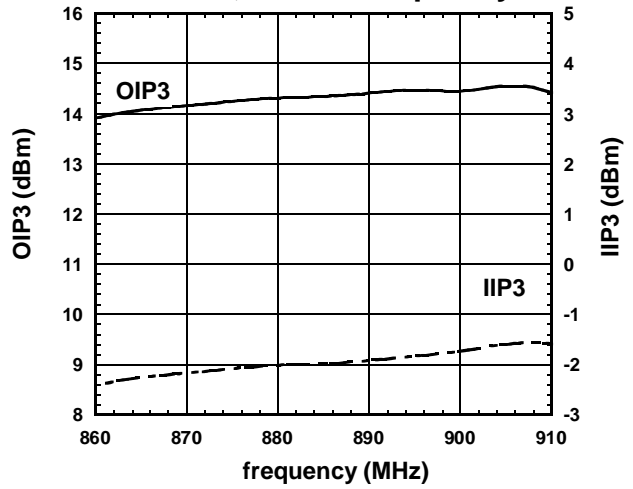
**800MHz@High Gain
P-1dB(IN) vs. frequency**



Condition

Ta=+25°C,
f=869~900MHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=1.85V, V_{CTL2}=0V, V_{CTL3}=1.85V

**800MHz@High Gain
OIP3,IIP3 vs. frequency**



Condition

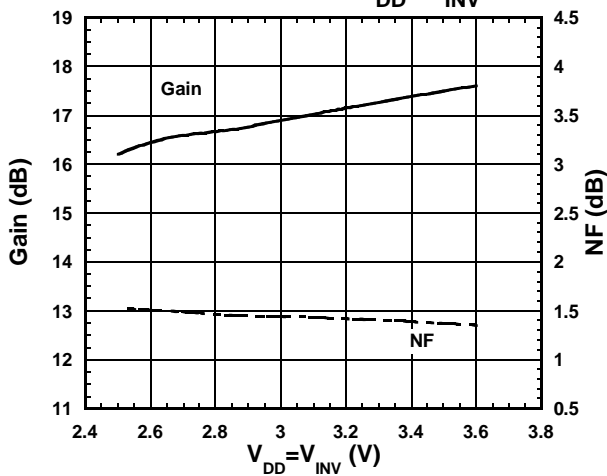
Ta=+25°C,
f1=860~910MHz, f2=f1+100kHz,
Pin=-30dBm,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=1.85V, V_{CTL2}=0V, V_{CTL3}=1.85V

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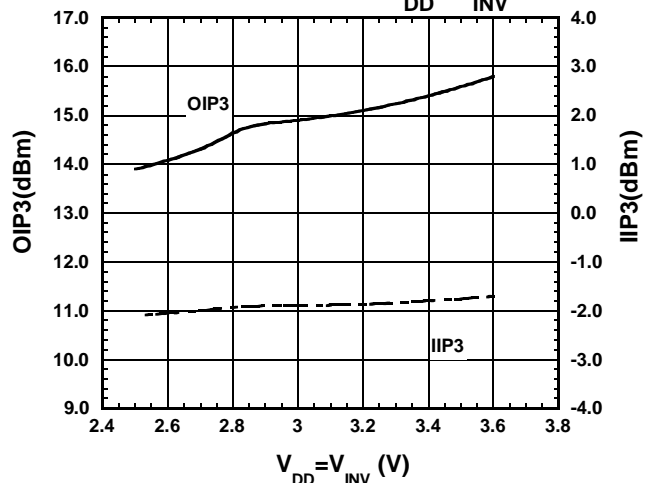
■ ELECTRICAL CHARACTERISTICS (800MHz Band High Gain Mode)

800MHz@High Gain
Gain, NF vs. V_{DD} , V_{INV}



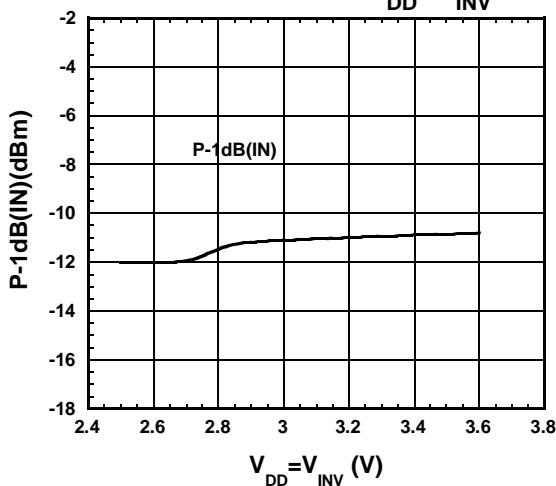
Condition
 $T_a = +25^\circ\text{C}$,
 $f = 885\text{MHz}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

800MHz@High Gain
OIP3, IIP3 vs. V_{DD} , V_{INV}



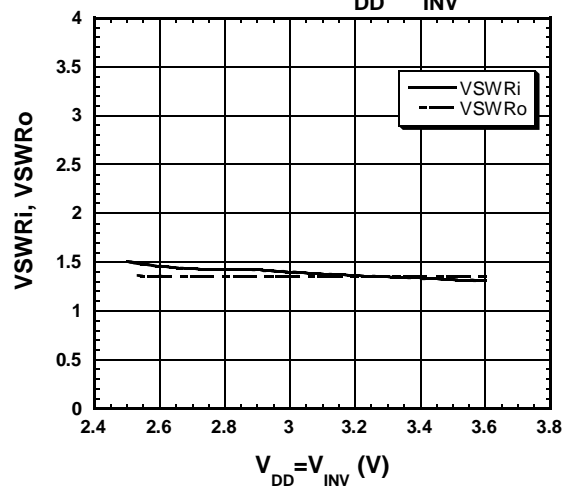
Condition
 $T_a = +25^\circ\text{C}$,
 $f_1 = 885\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $P_{in} = -30\text{dBm}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

800MHz@High Gain
P-1dB(IN) vs. V_{DD} , V_{INV}



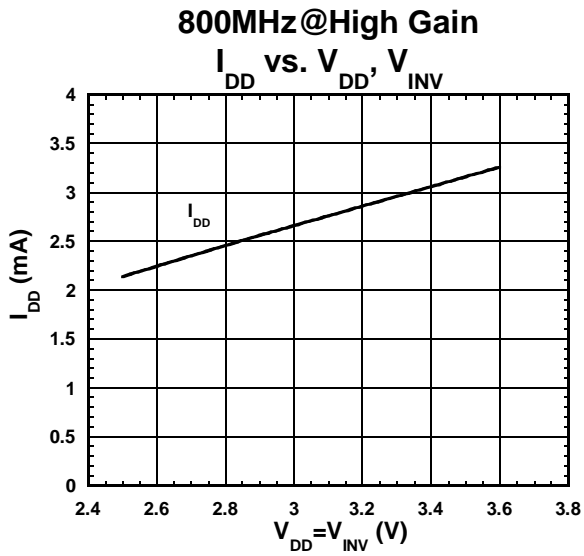
Condition
 $T_a = +25^\circ\text{C}$,
 $f = 885\text{MHz}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

800MHz@High Gain
VSWR vs. V_{DD} , V_{INV}



Condition
 $T_a = +25^\circ\text{C}$,
 $f = 885\text{MHz}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

■ ELECTRICAL CHARACTERISTICS (800MHz Band High Gain Mode)



Condition

$T_a = +25^\circ\text{C}$,

RF=OFF

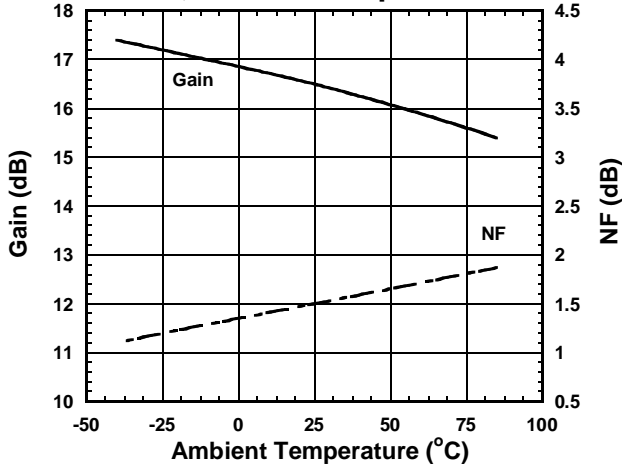
$V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$

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■ ELECTRICAL CHARACTERISTICS (800MHz Band High Gain Mode)

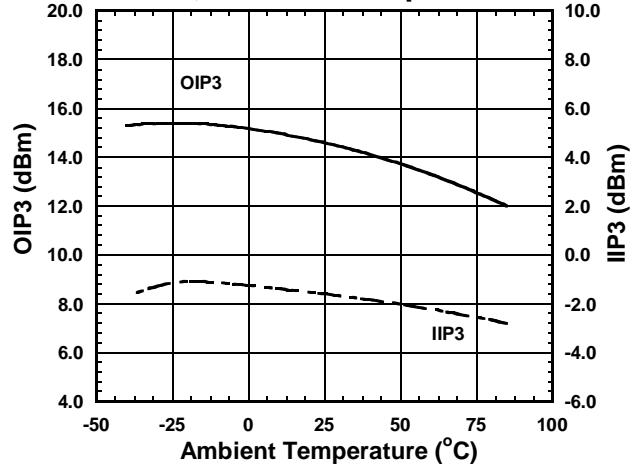
**800MHz@High Gain
Gain, NF vs. Temperature**



Condition

f=885MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

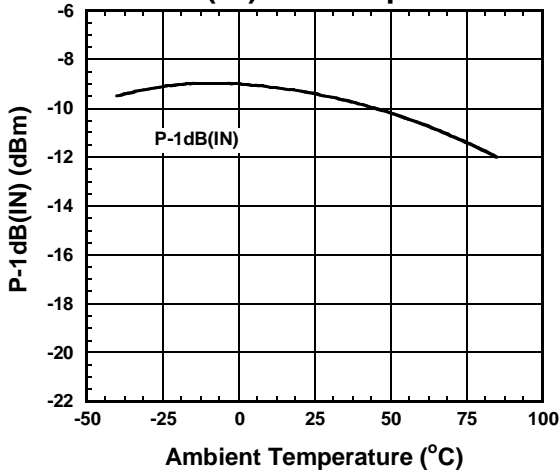
**800MHz@High Gain
OIP3, IIP3 vs. Temperature**



Condition

f1=885MHz, f2=f1+100kHz,
 $P_{in} = -30dBm$,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

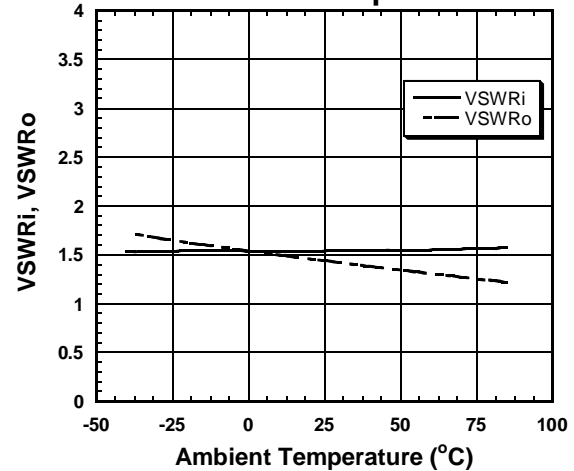
**800MHz@High Gain
P-1dB(IN) vs. Temperature**



Condition

f=885MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

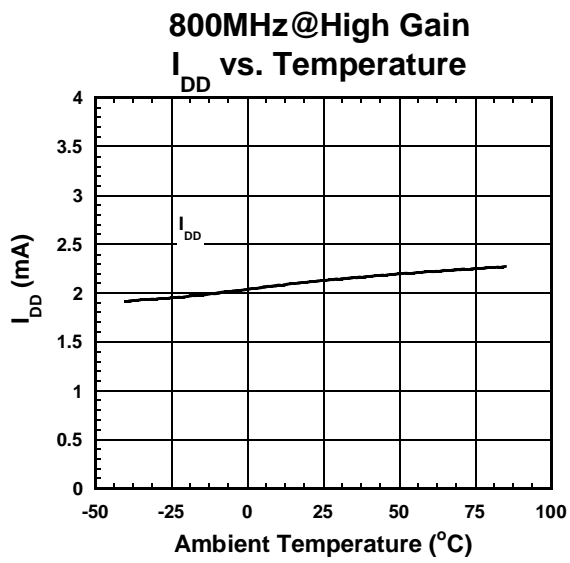
**800MHz@High Gain
VSWR vs. Temperature**



Condition

f=885MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

■ ELECTRICAL CHARACTERISTICS (800MHz Band High Gain Mode)



Condition

RF=OFF

$V_{DD} = V_{INV} = 2.7V$,

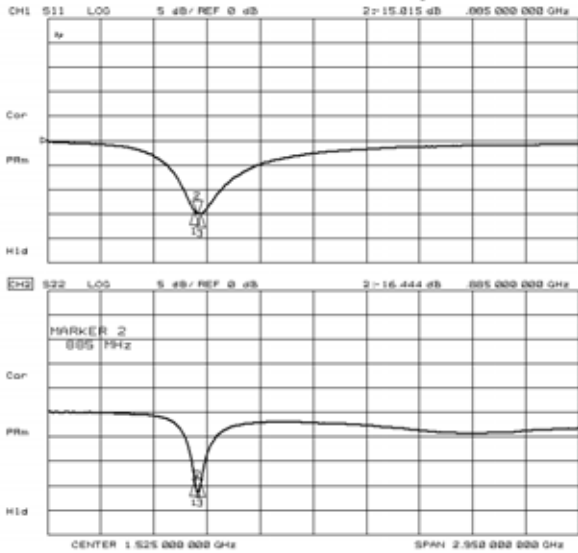
$V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 1.85V$

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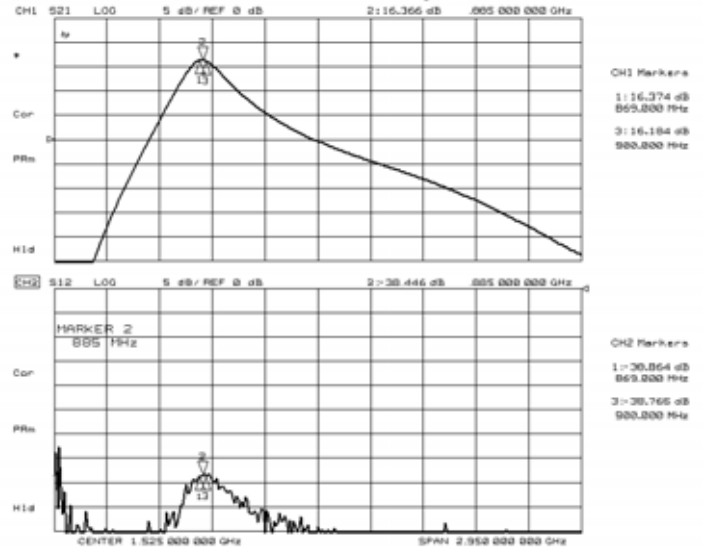
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■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)

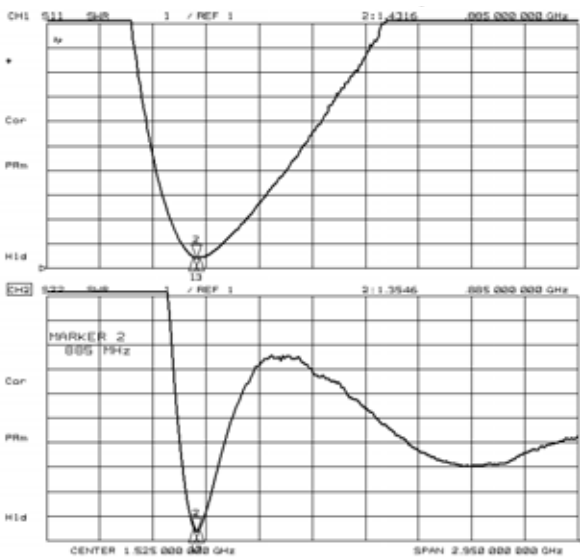
Condition: $T_a = +25^\circ\text{C}$, $V_{DD} = V_{INV} = 2.7\text{V}$, $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.85\text{V}$



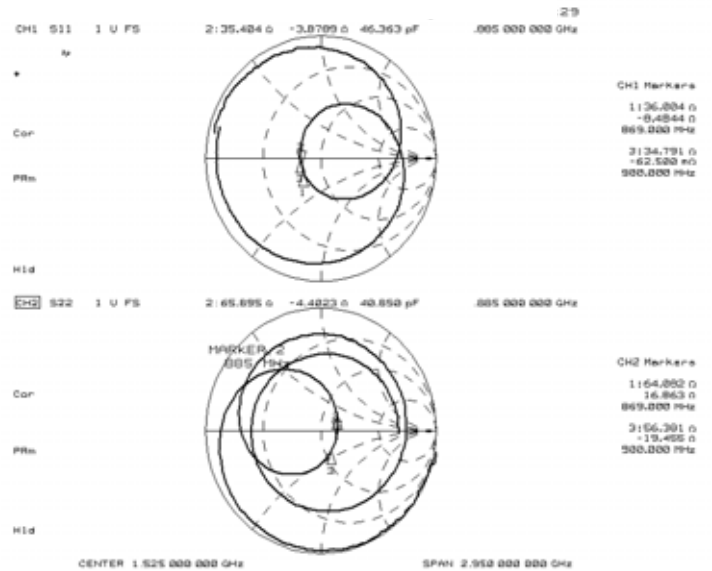
S11, S22



S21, S12



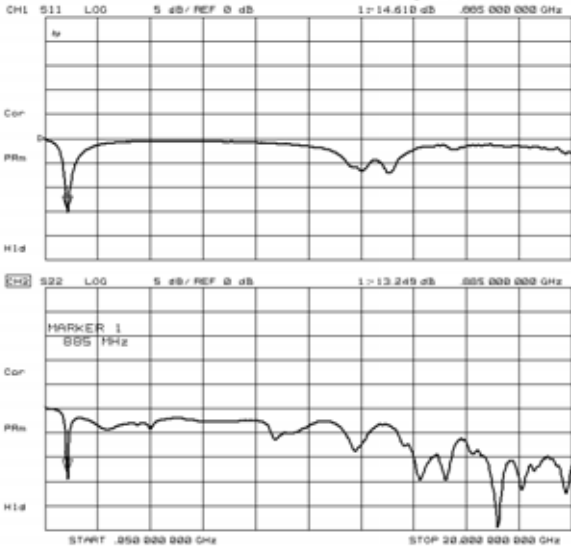
VSWR



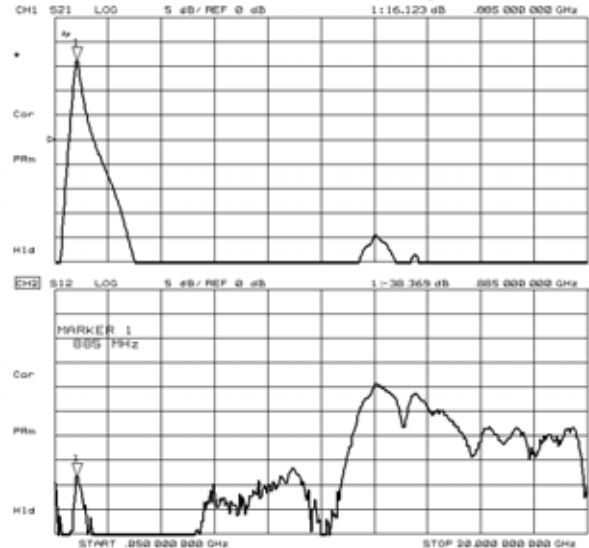
Zin, Zout

■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)

Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=1.85\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.85\text{V}$

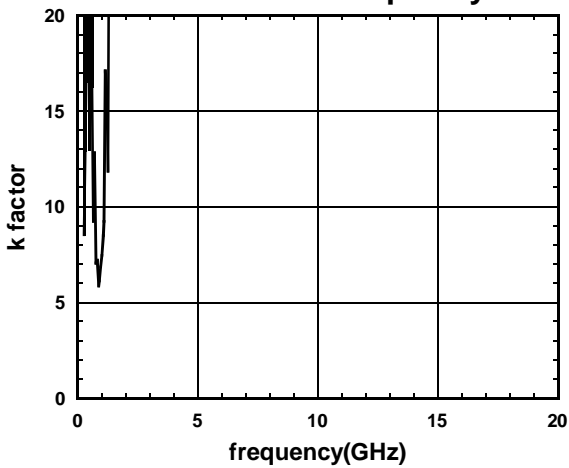


S11, S22
($f=50\text{MHz}\sim 20\text{GHz}$)



S21, S12
($f=50\text{MHz}\sim 20\text{GHz}$)

800MHz @High Gain k factor vs. frequency



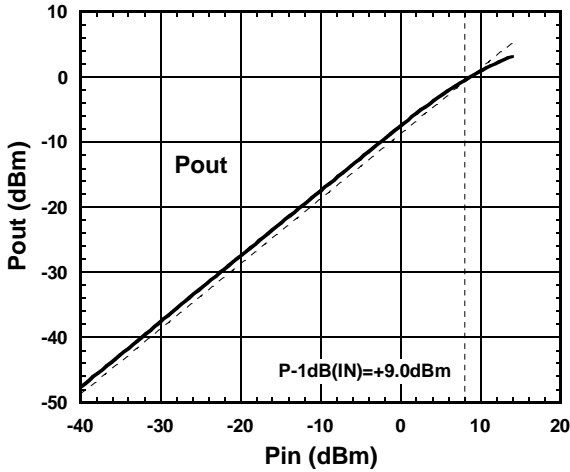
k factor
($f=50\text{MHz}\sim 20\text{GHz}$)

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■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)

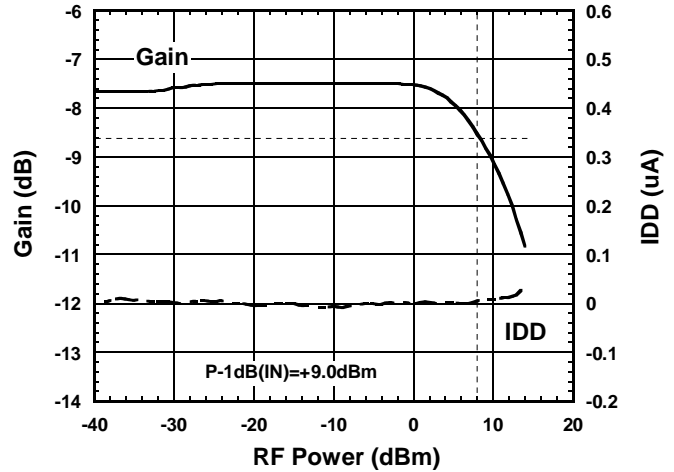
**800MHz@Low Gain
Pout vs. Pin**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 885\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

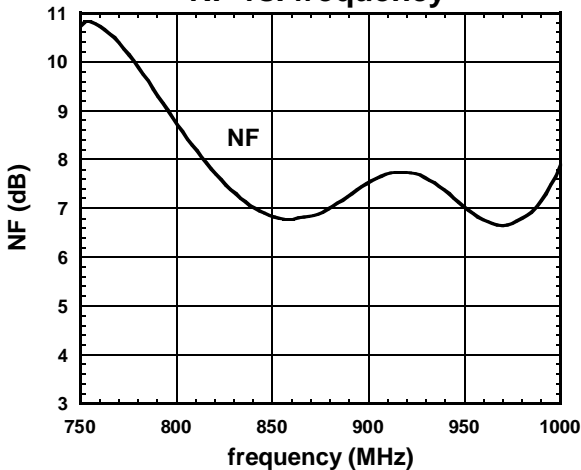
**800MHz@Low Gain
Gain, IDD vs. Pin**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 885\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

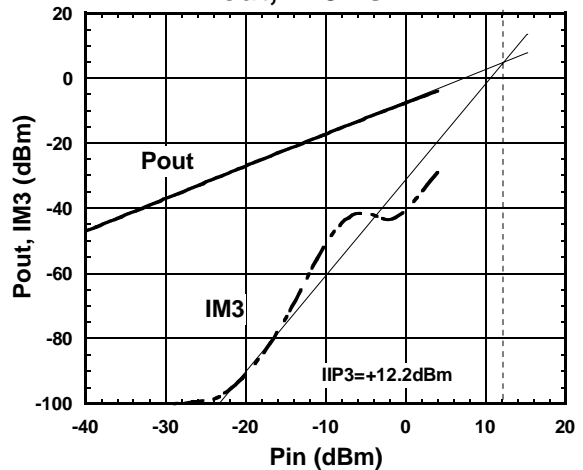
**800MHz@Low Gain
NF vs. frequency**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 750\sim 1\text{GHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

**800MHz@Low Gain
Pout, IM3 vs. Pin**

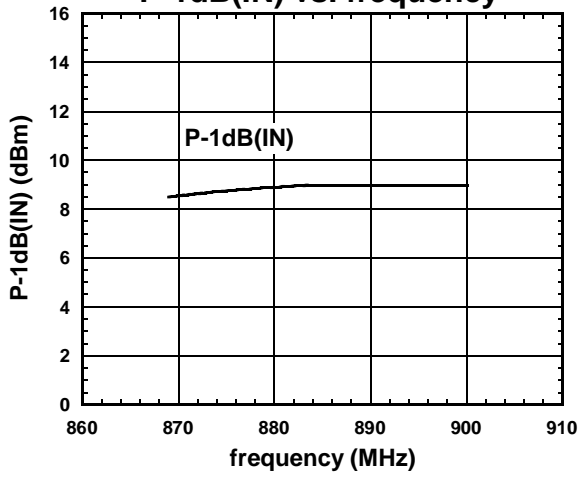


Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 885\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)

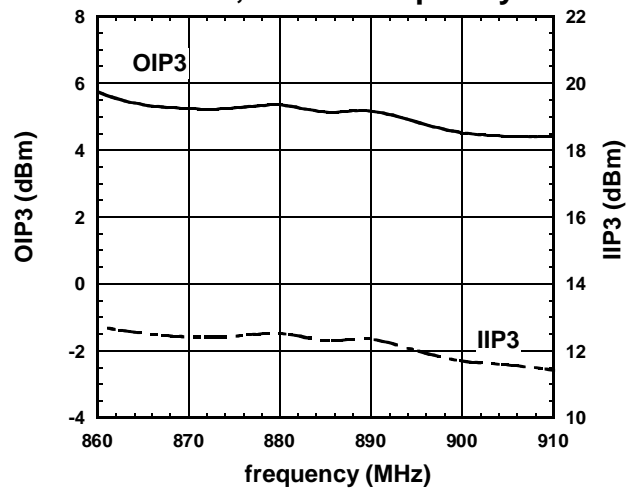
**800MHz@Low Gain
P-1dB(IN) vs. frequency**



Condition

$T_a = +25^\circ\text{C}$,
 $f = 869 \sim 900\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

**800MHz@Low Gain
OIP3, IIP3 vs. frequency**



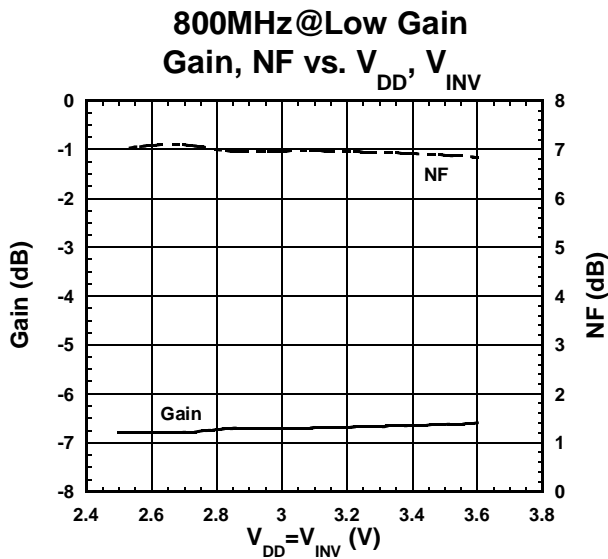
Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 860 \sim 910\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $P_{in} = -20\text{dBm}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

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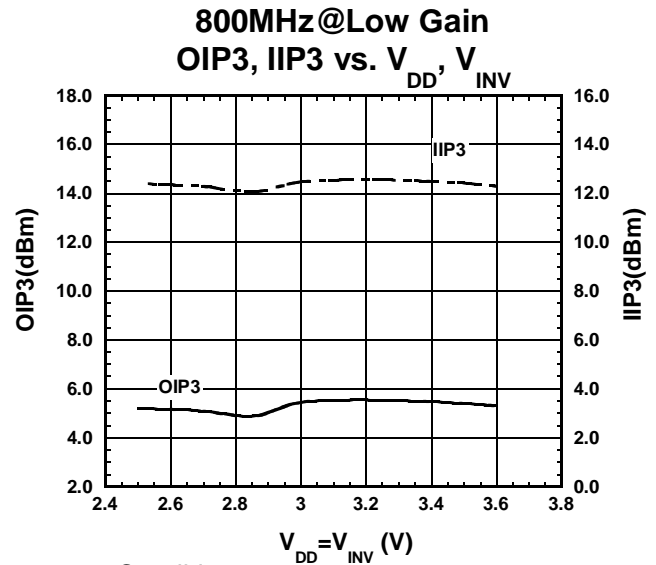
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■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)



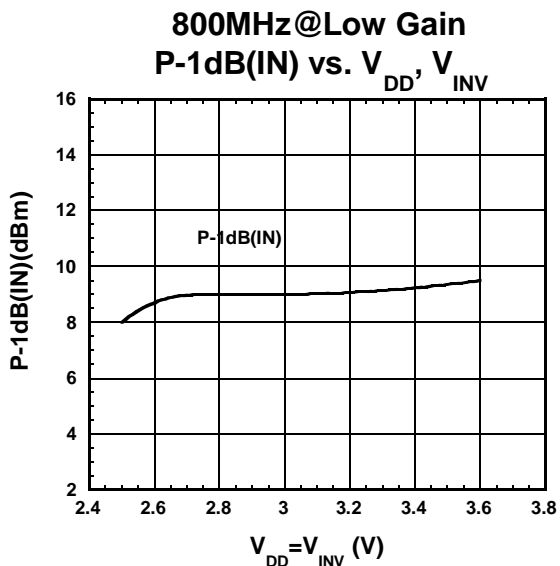
Condition

Ta=+25°C,
f=885MHz,
V_{CTL1}=1.85V, V_{CTL2}=0V, V_{CTL3}=0V



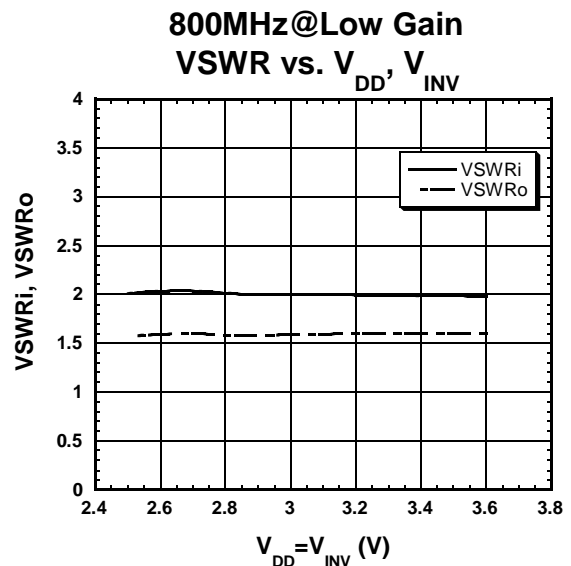
Condition

Ta=+25°C,
f1=885MHz, f2=f1+100kHz,
Pin=-20dBm,
V_{CTL1}=1.85V, V_{CTL2}=0V, V_{CTL3}=0V



Condition

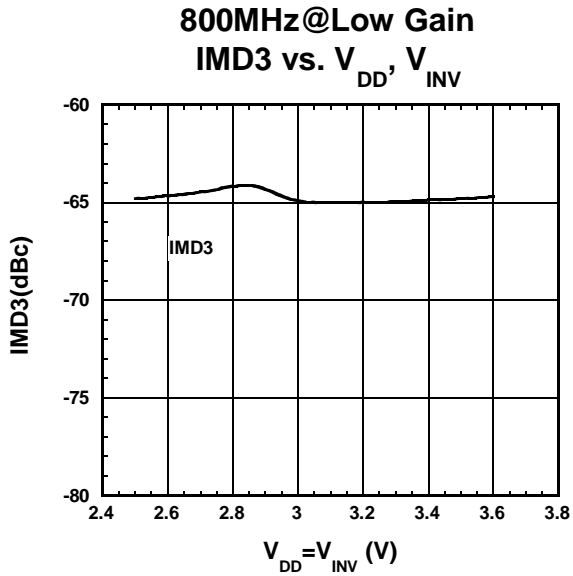
Ta=+25°C,
f=885MHz,
V_{CTL1}=1.85V, V_{CTL2}=0V, V_{CTL3}=0V



Condition

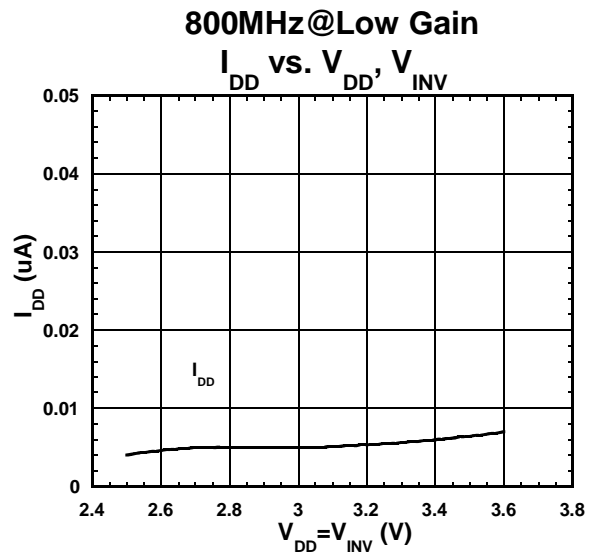
Ta=+25°C,
f=885MHz,
V_{CTL1}=1.85V, V_{CTL2}=0V, V_{CTL3}=0V

■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)



Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 885\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $P_{in} = -20\text{dBm}$,
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$



Condition

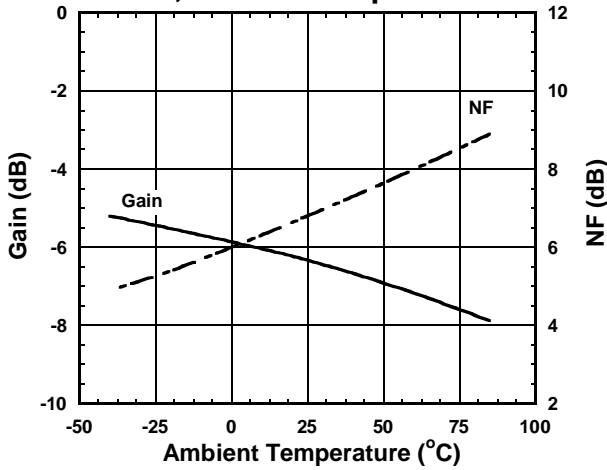
$T_a = +25^\circ\text{C}$,
 $\text{RF} = \text{OFF}$
 $V_{CTL1} = 1.85\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

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■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)

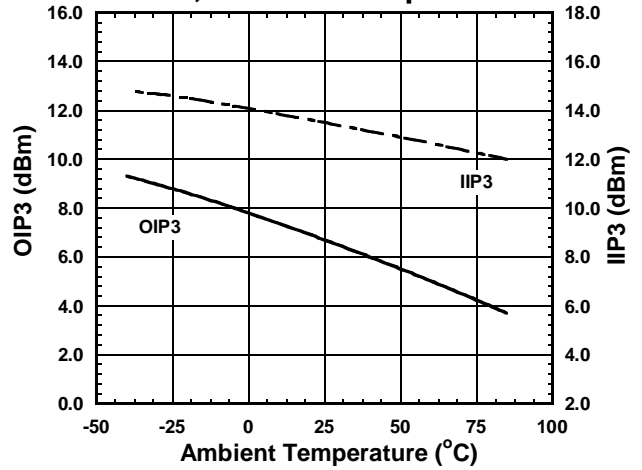
800MHz@Low Gain
Gain, NF vs. Temperature



Condition

f=885MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 0V$

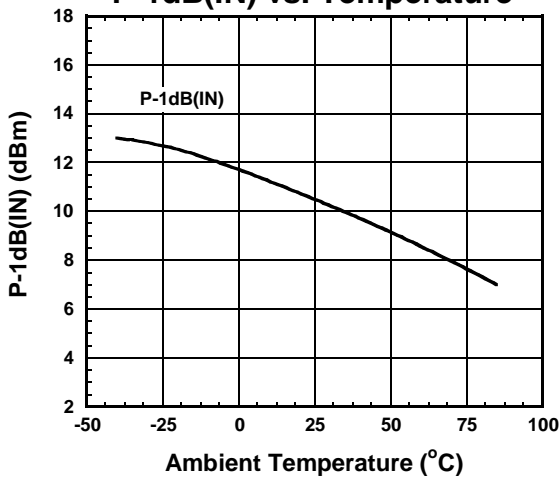
800MHz@Low Gain
OIP3, IIP3 vs. Temperature



Condition

f1=885MHz, f2=f1+100kHz,
 $P_{in} = -20dBm$,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 0V$

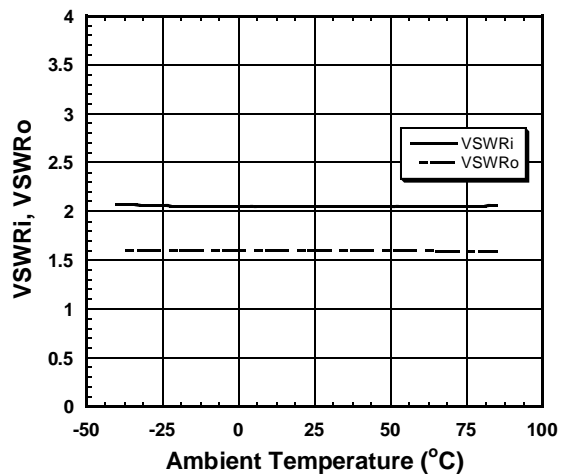
800MHz@Low Gain
P-1dB(IN) vs. Temperature



Condition

f=885MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 0V$

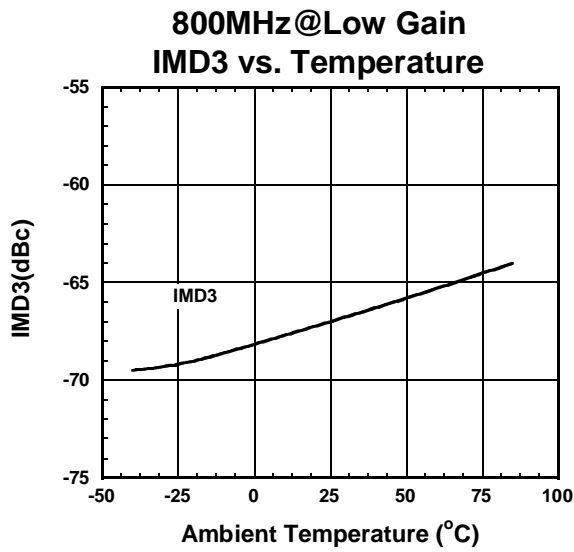
800MHz@Low Gain
VSWR vs. Temperature



Condition

f=885MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 1.85V$, $V_{CTL2} = 0V$, $V_{CTL3} = 0V$

■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)



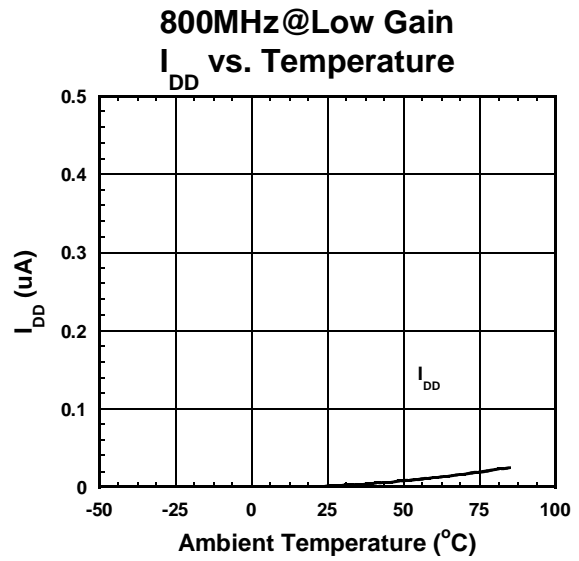
Condition

$f_1=885\text{MHz}$, $f_2=f_1+100\text{kHz}$,

$P_{in}=-20\text{dBm}$,

$V_{DD}=V_{INV}=2.7\text{V}$,

$V_{CTL1}=1.85\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$



Condition

RF=OFF

$V_{DD}=V_{INV}=2.7\text{V}$,

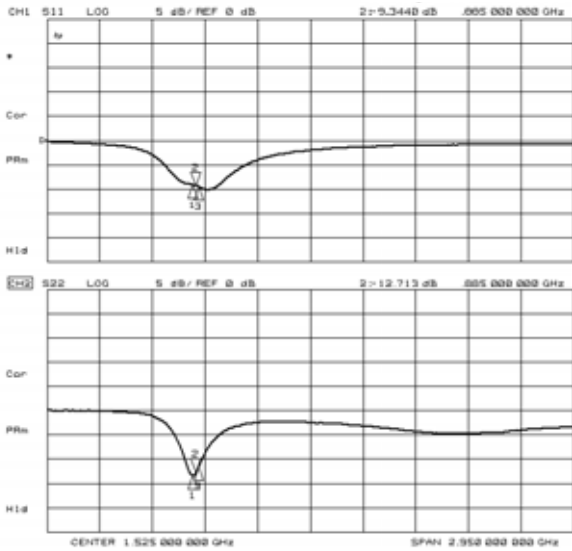
$V_{CTL1}=1.85\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

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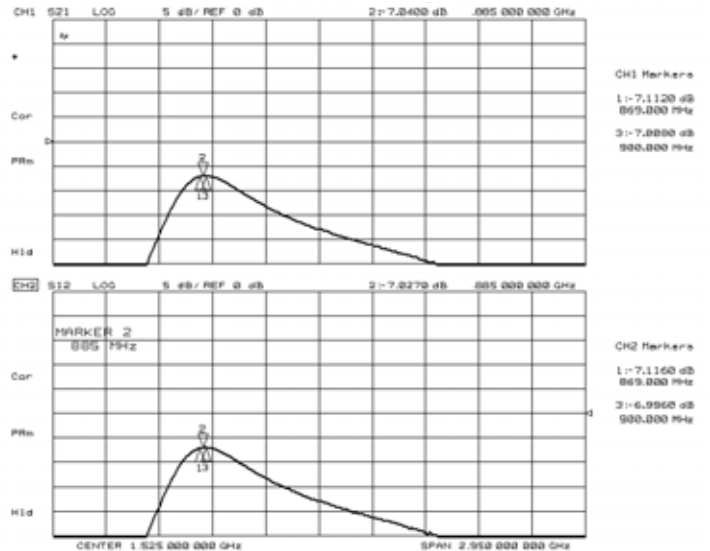
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■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)

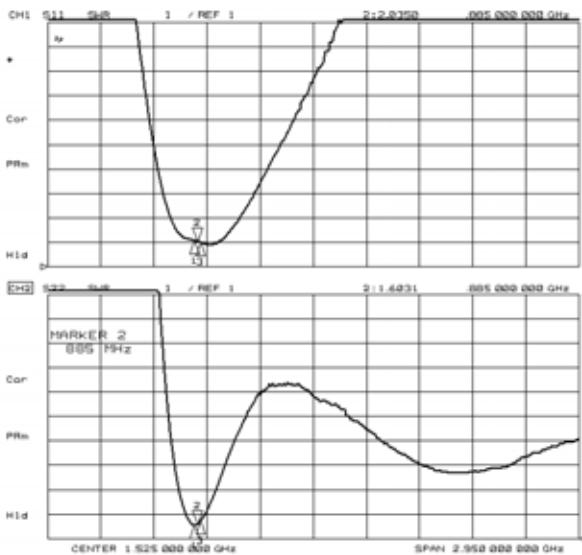
Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=1.85\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$



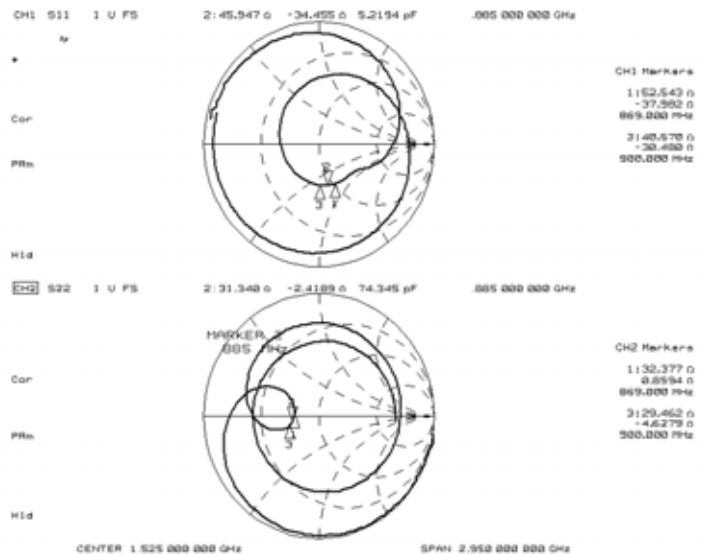
S11, S22



S21, S12



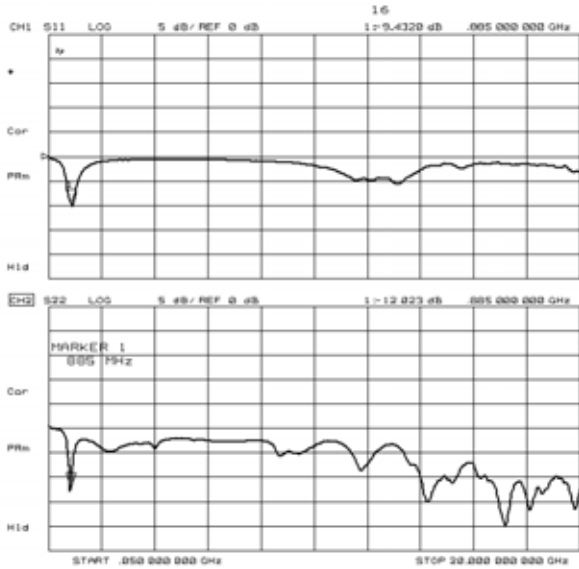
VSWR



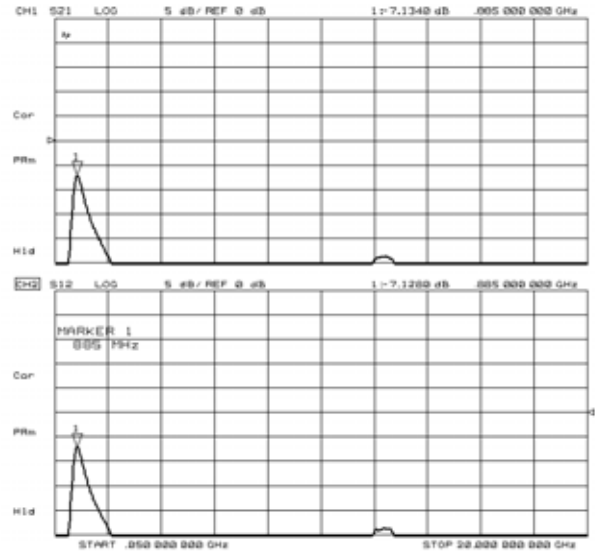
Zin, Zout

■ ELECTRICAL CHARACTERISTICS (800MHz Band Low Gain Mode)

Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=1.85\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

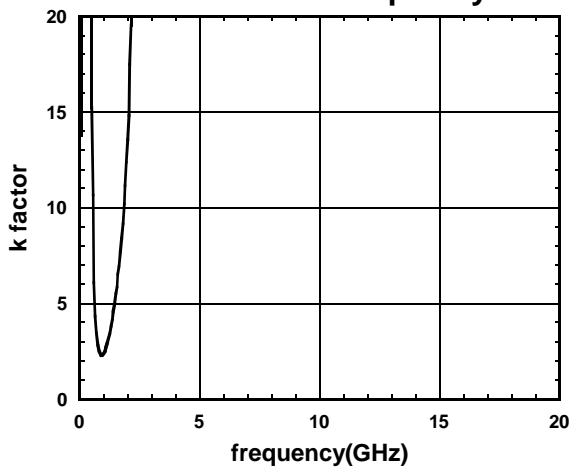


S11, S22
($f=50\text{MHz}\sim 20\text{GHz}$)



S21, S12
($f=50\text{MHz}\sim 20\text{GHz}$)

800MHz @Low Gain k factor vs. frequency



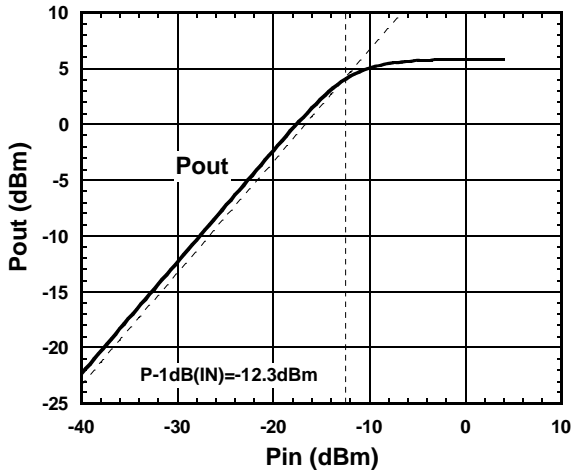
k factor
($f=50\text{MHz}\sim 20\text{GHz}$)

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ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)

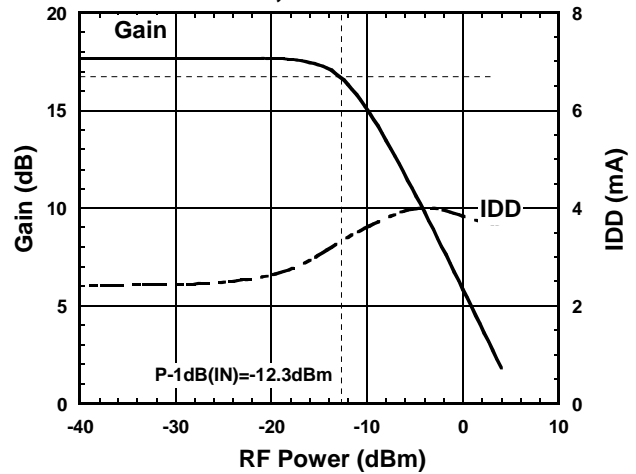
1.7GHz@High Gain
Pout vs. Pin



Condition

$T_a = +25^\circ\text{C}$,
 $f = 1860\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

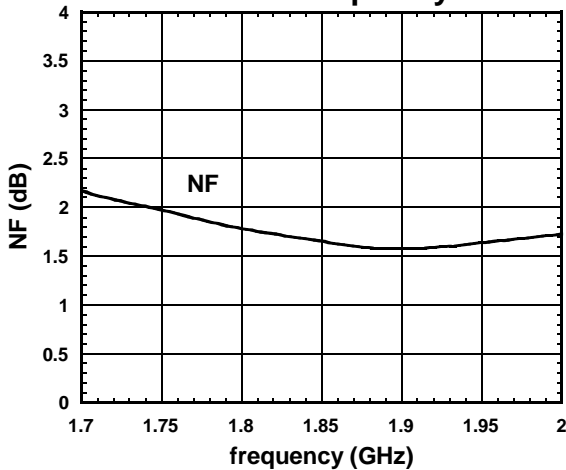
1.7GHz@High Gain
Gain, IDD vs. Pin



Condition

$T_a = +25^\circ\text{C}$,
 $f = 1860\text{MHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

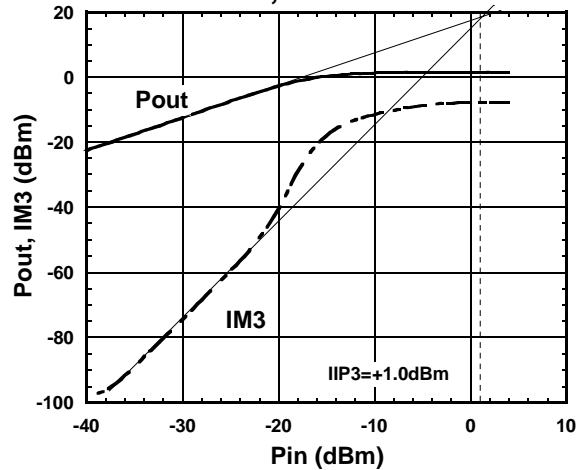
1.7GHz@High Gain
NF vs. frequency



Condition

$T_a = +25^\circ\text{C}$,
 $f = 1.7 \sim 2\text{GHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

1.7GHz@High Gain
Pout, IM3 vs. Pin

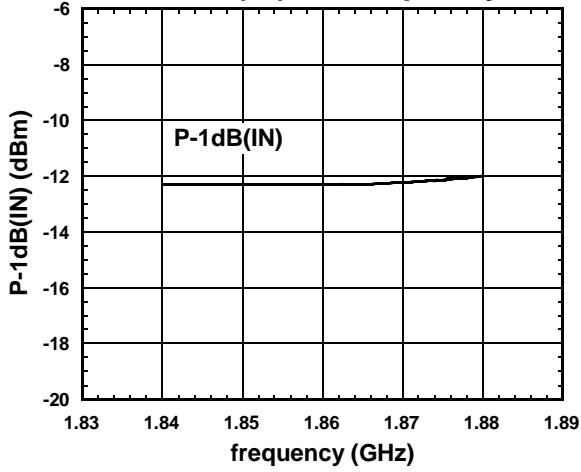


Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 1860\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $V_{DD} = V_{INV} = 2.7\text{V}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)

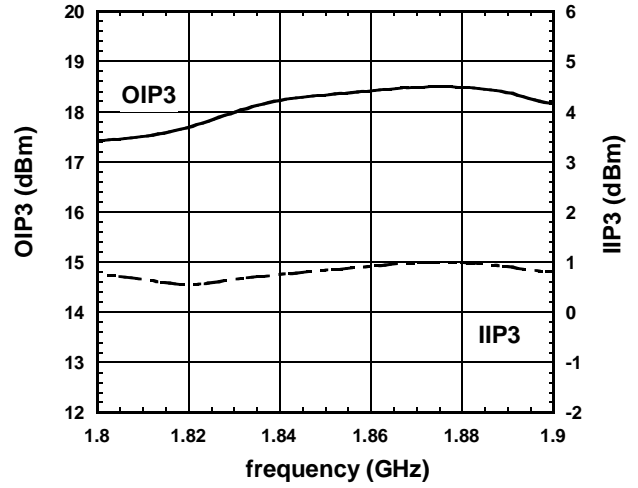
**1.7GHz@High Gain
P-1dB(IN) vs. frequency**



Condition

Ta=+25°C,
f=1.84~1.88GHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=1.85V

**1.7GHz@High Gain
OIP3,IIP3 vs. frequency**



Condition

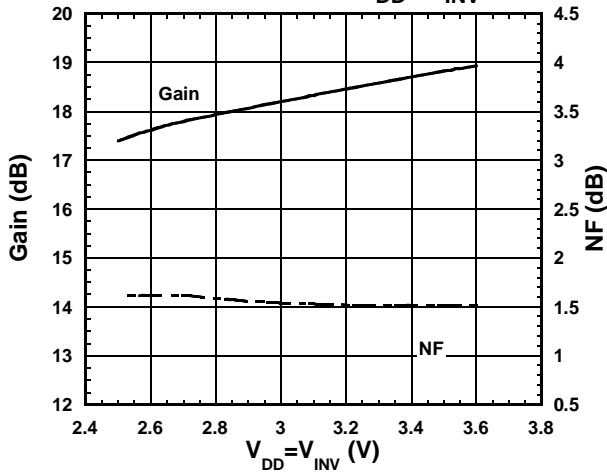
Ta=+25°C,
f1=1.8~1.90GHz, f2=f1+100kHz,
Pin=-30dBm,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=1.85V

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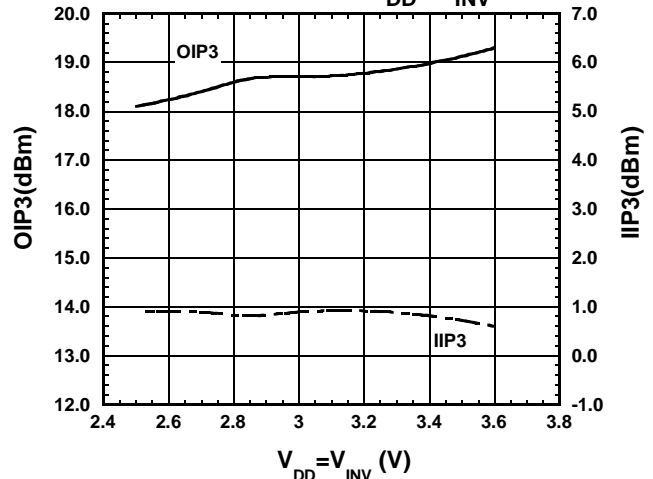
■ ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)

1.7GHz@High Gain
Gain, NF vs. V_{DD} , V_{INV}



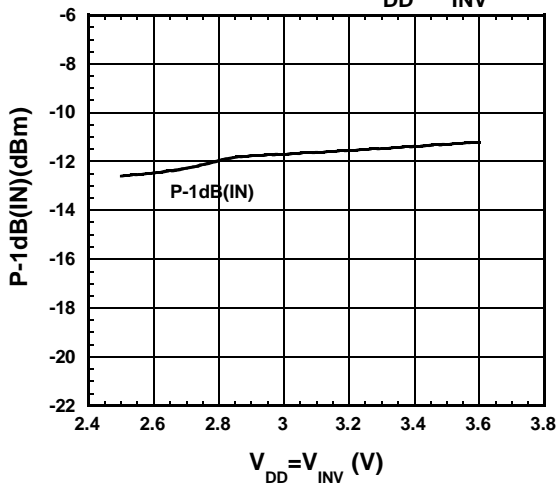
Condition
 $T_a = +25^\circ\text{C}$,
 $f = 1860\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

1.7GHz@High Gain
OIP3, IIP3 vs. V_{DD} , V_{INV}



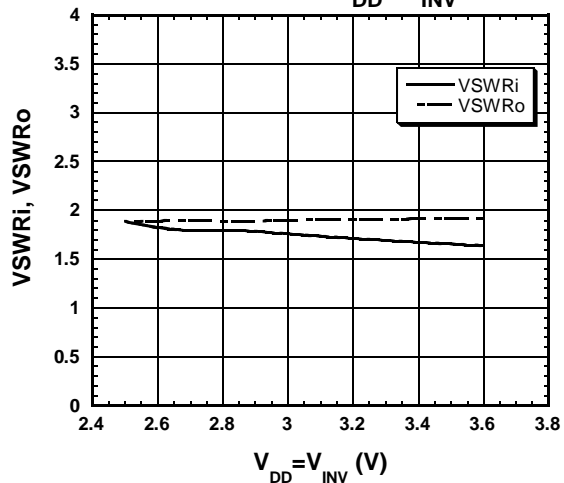
Condition
 $T_a = +25^\circ\text{C}$,
 $f_1 = 1860\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $P_{in} = -30\text{dBm}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

1.7GHz@High Gain
P-1dB(IN) vs. V_{DD} , V_{INV}



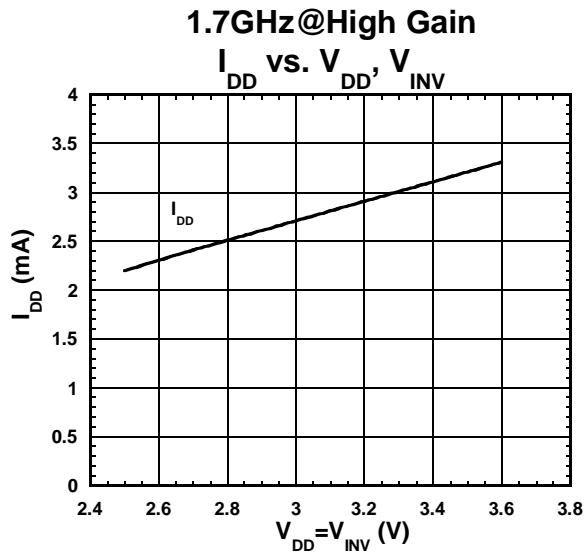
Condition
 $T_a = +25^\circ\text{C}$,
 $f = 1860\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

1.7GHz@High Gain
VSWR vs. V_{DD} , V_{INV}



Condition
 $T_a = +25^\circ\text{C}$,
 $f = 1860\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)



Condition

$T_a = +25^\circ\text{C}$,

RF=OFF

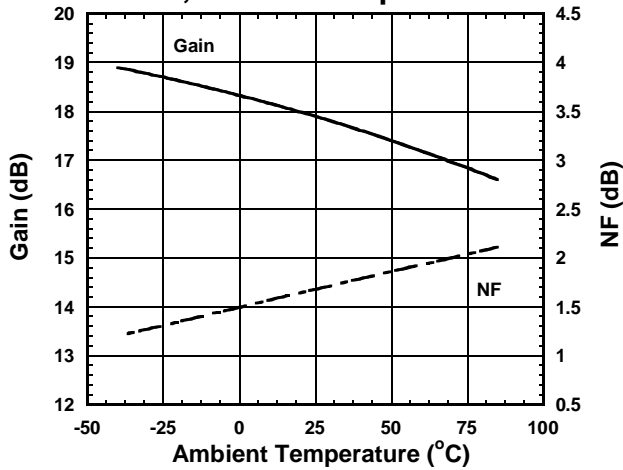
$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.85\text{V}$, $V_{CTL3} = 1.85\text{V}$

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■ ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)

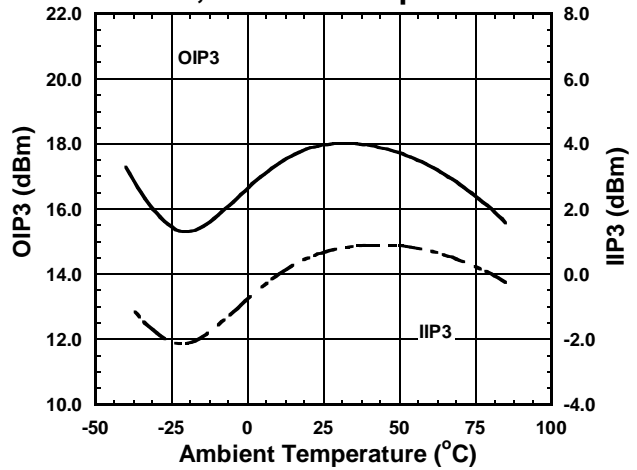
**1.7GHz@High Gain
Gain, NF vs. Temperature**



Condition

f=1860MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 1.85V$

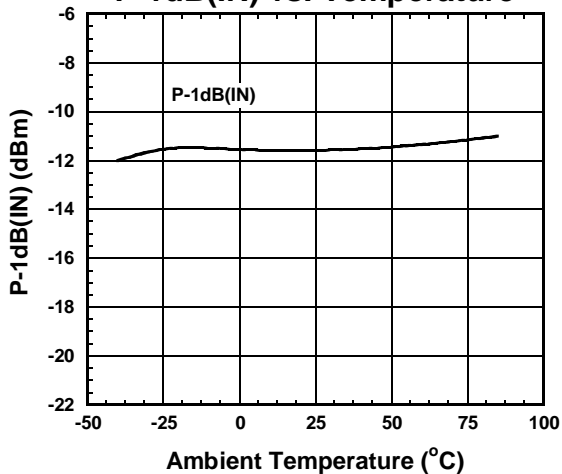
**1.7GHz@High Gain
OIP3, IIP3 vs. Temperature**



Condition

f1=1860MHz, f2=f1+100kHz,
 $P_{in} = -30dBm$,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 1.85V$

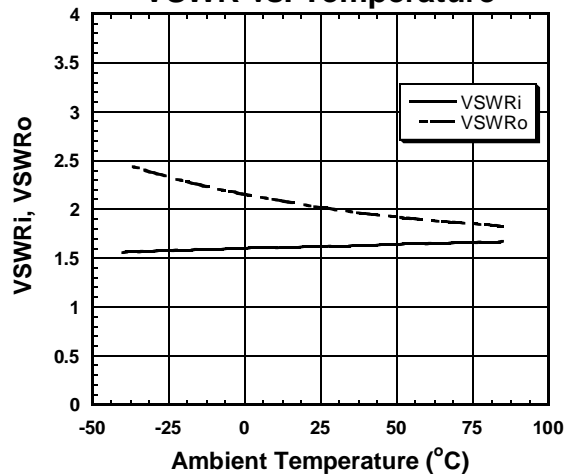
**1.7GHz@High Gain
P-1dB(IN) vs. Temperature**



Condition

f=1860MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 1.85V$

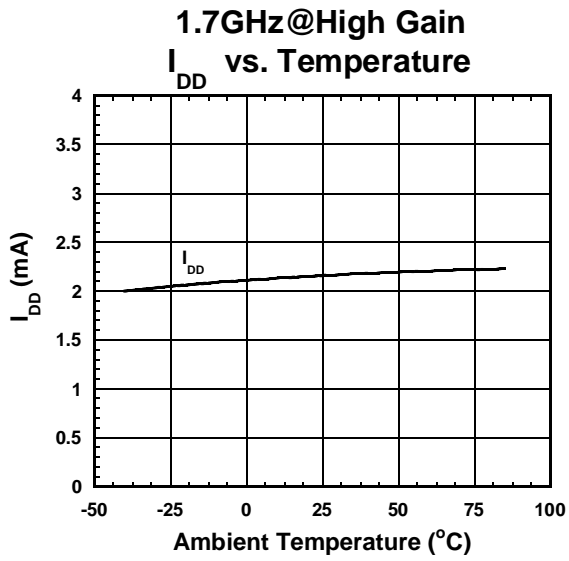
**1.7GHz@High Gain
VSWR vs. Temperature**



Condition

f=1860MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 1.85V$

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)



Condition

RF=OFF

V_{DD}= V_{INV} =2.7V,

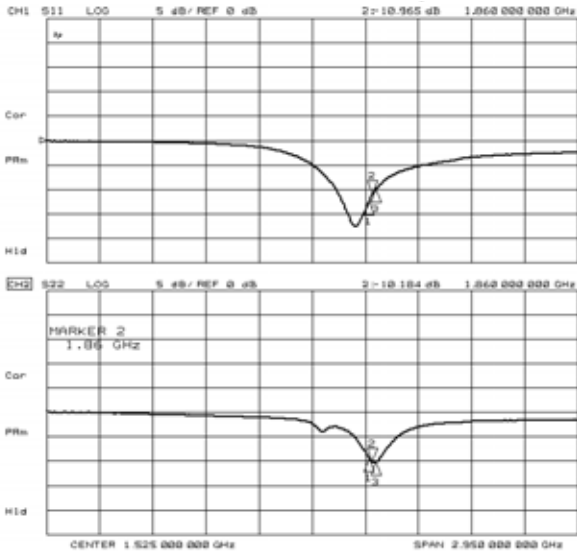
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=1.85V

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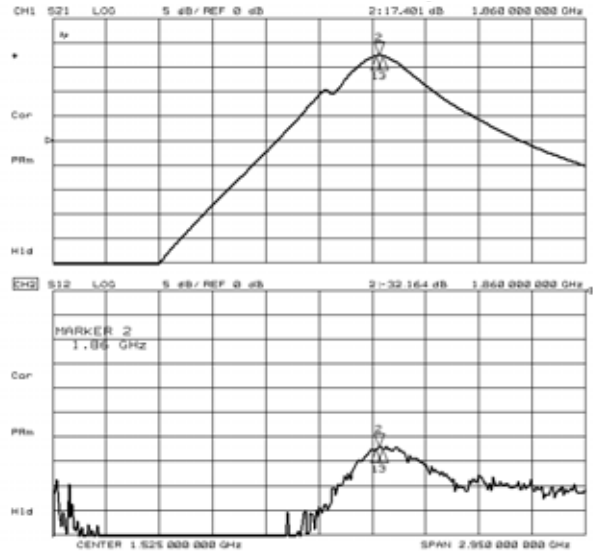
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■ ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)

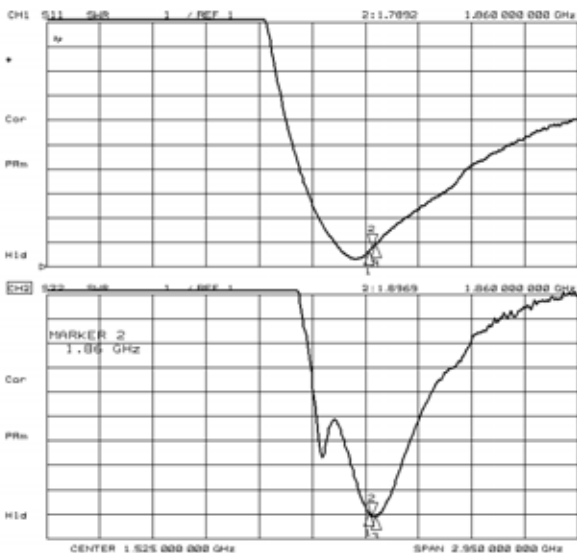
Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=1.85\text{V}$, $V_{CTL3}=1.85\text{V}$



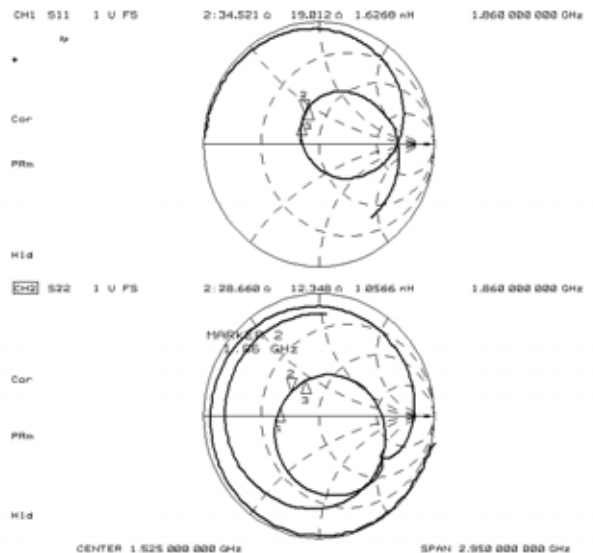
S11, S22



S21, S12



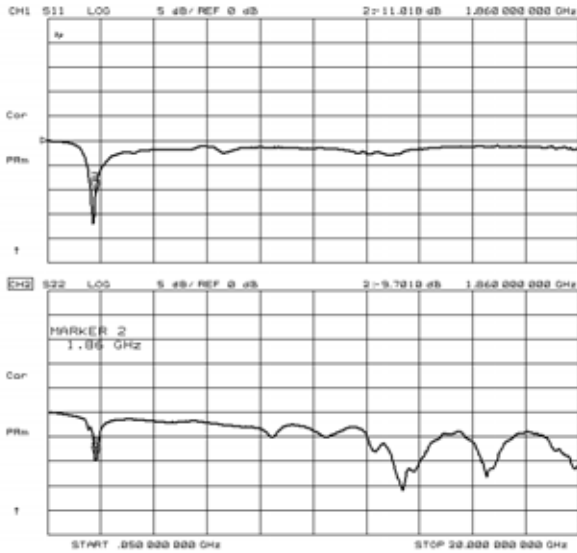
VSWR



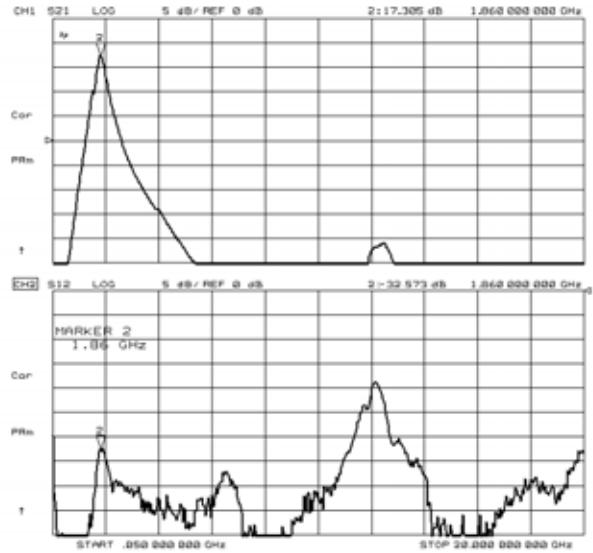
Zin, Zout

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band High Gain Mode)

Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=1.85\text{V}$, $V_{CTL3}=1.85\text{V}$

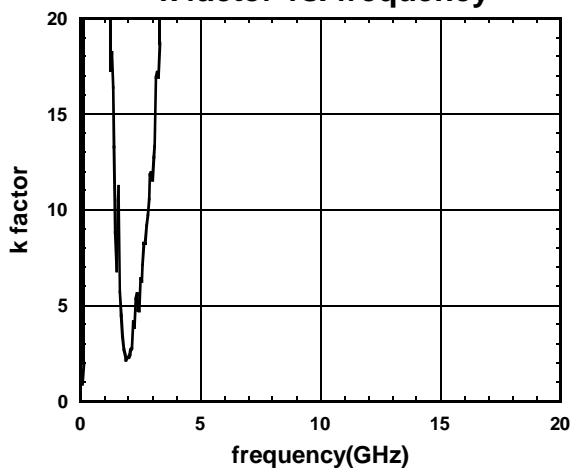


S11, S22
(f=50MHz~20GHz)



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

1.7GHz @High Gain k factor vs. frequency



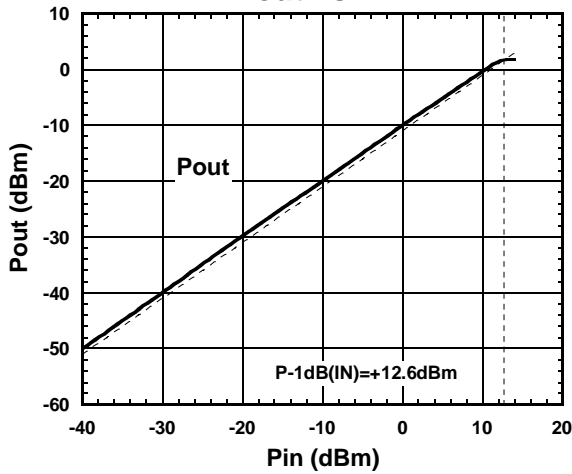
k factor
(f=50MHz~20GHz)

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■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)

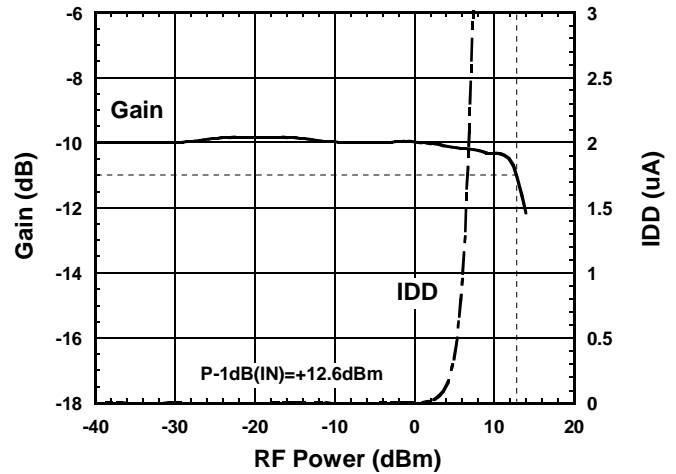
**1.7GHz@Low Gain
Pout vs. Pin**



Condition

Ta=+25°C,
f=1860MHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

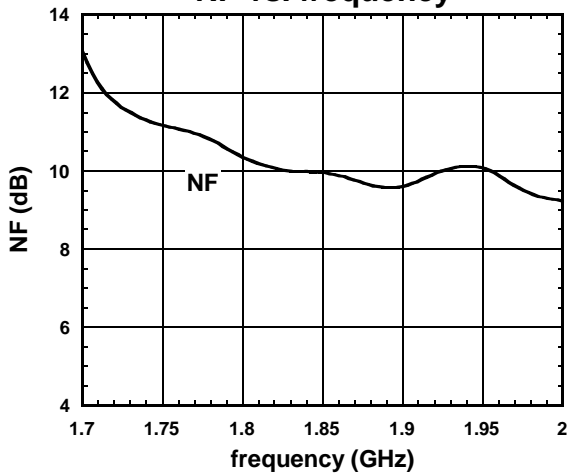
**1.7GHz@Low Gain
Gain, IDD vs. Pin**



Condition

Ta=+25°C,
f=1860MHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

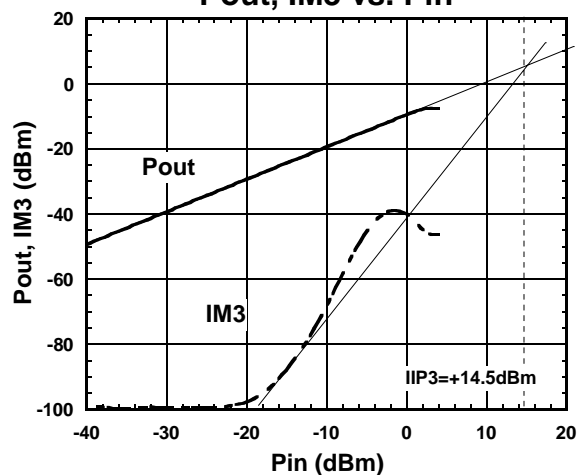
**1.7GHz@Low Gain
NF vs. frequency**



Condition

Ta=+25°C,
f=1.7~2.0GHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

**1.7GHz@Low Gain
Pout, IM3 vs. Pin**

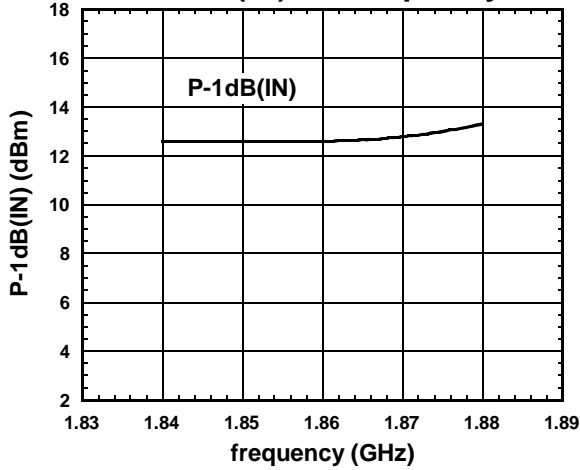


Condition

Ta=+25°C,
f1=1860MHz, f2=f1+100kHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)

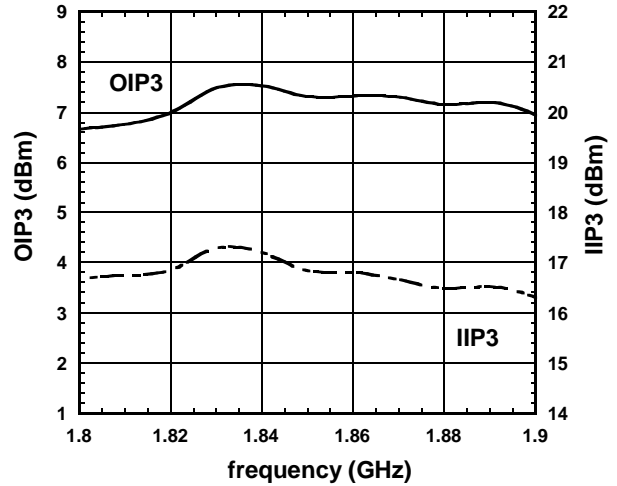
1.7GHz@Low Gain
P-1dB(IN) vs. frequency



Condition

Ta=+25°C,
f=1.84~1.88GHz,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

1.7GHz@Low Gain
OIP3,IIP3 vs. frequency



Condition

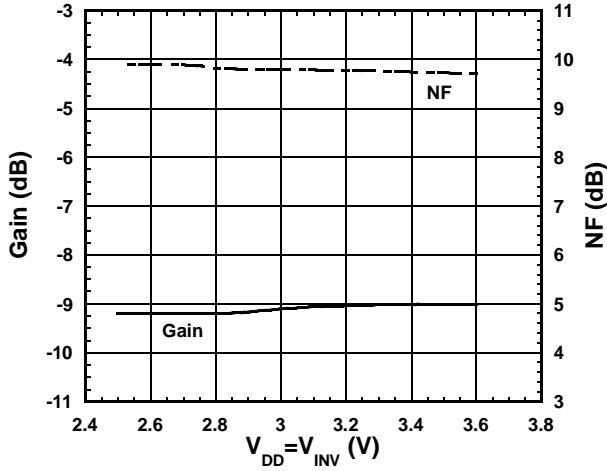
Ta=+25°C,
f1=1.8~1.9GHz, f2=f1+100kHz,
Pin=-16dBm,
V_{DD}= V_{INV} =2.7V,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

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■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)

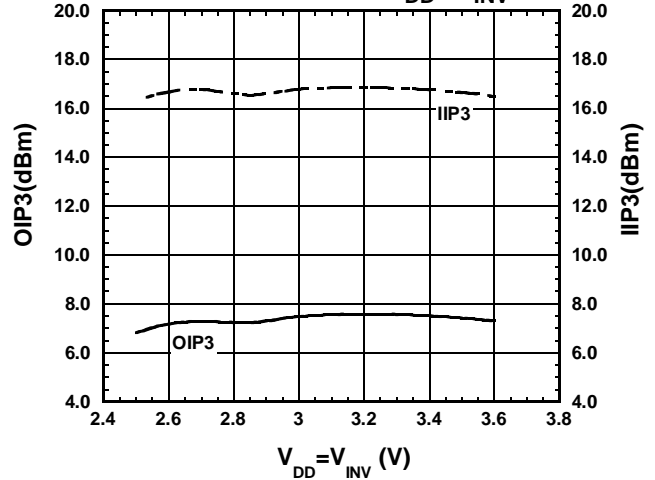
1.7GHz@Low Gain
Gain, NF vs. V_{DD} , V_{INV}



Condition

T_a=+25°C,
f=1860MHz,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

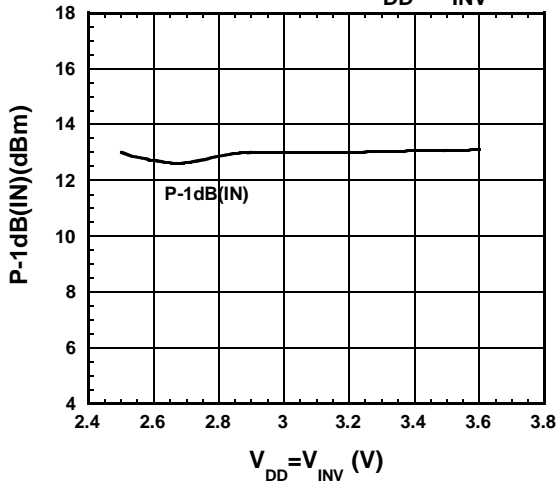
1.7GHz@Low Gain
OIP3, IIP3 vs. V_{DD} , V_{INV}



Condition

T_a=+25°C,
f₁=1860MHz, f₂=f₁+100kHz,
Pin=-16dBm,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

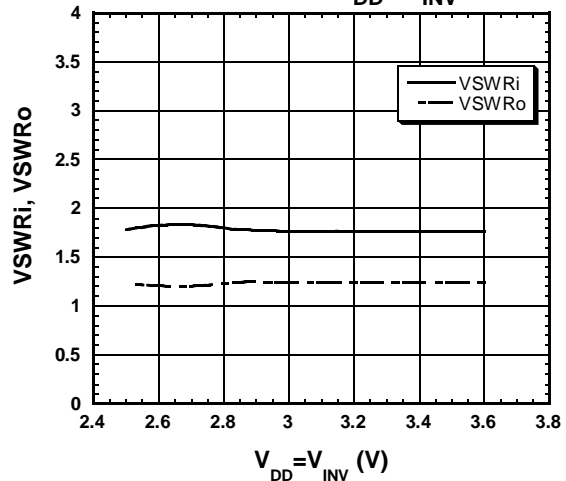
1.7GHz@Low Gain
P-1dB(IN) vs. V_{DD} , V_{INV}



Condition

T_a=+25°C,
f=1860MHz,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

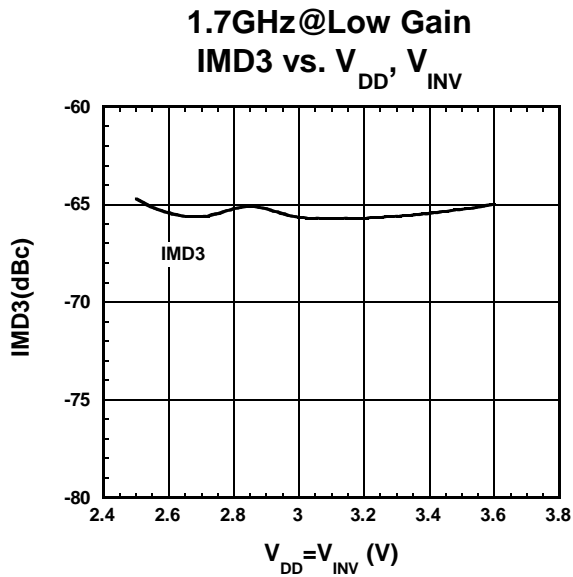
1.7GHz@Low Gain
VSWR vs. V_{DD} , V_{INV}



Condition

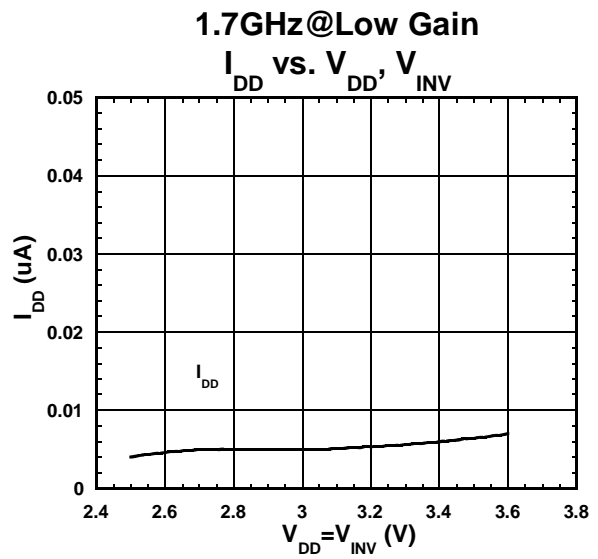
T_a=+25°C,
f=1860MHz,
V_{CTL1}=0V, V_{CTL2}=1.85V, V_{CTL3}=0V

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)



Condition

$T_a = +25^\circ\text{C}$,
 $f_1 = 1860\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $\text{Pin} = -16\text{dBm}$,
 $V_{\text{CTL}1} = 0\text{V}$, $V_{\text{CTL}2} = 1.85\text{V}$, $V_{\text{CTL}3} = 0\text{V}$



Condition

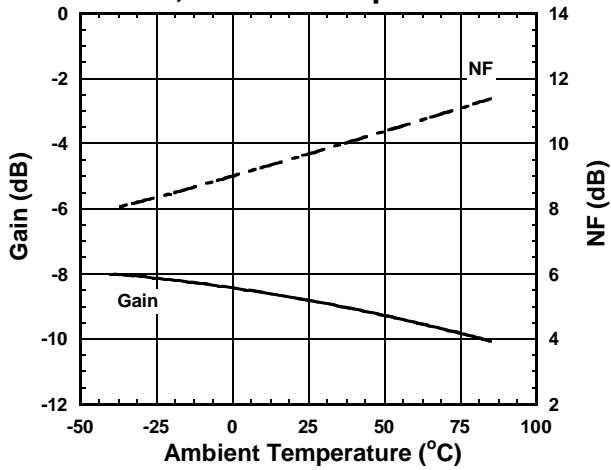
$T_a = +25^\circ\text{C}$,
 $\text{RF} = \text{OFF}$,
 $V_{\text{CTL}1} = 0\text{V}$, $V_{\text{CTL}2} = 1.85\text{V}$, $V_{\text{CTL}3} = 0\text{V}$

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■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)

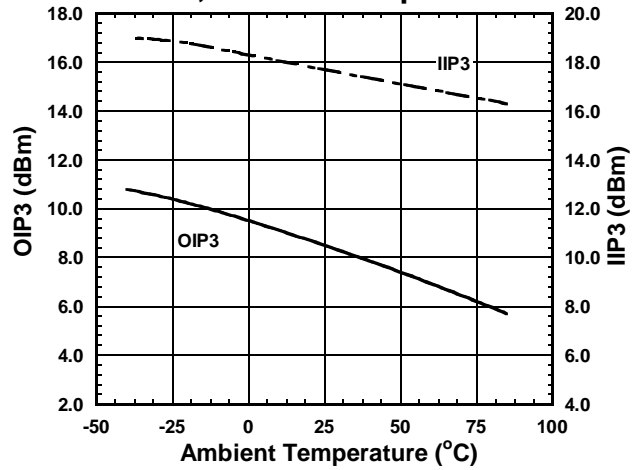
**1.7GHz@Low Gain
Gain, NF vs. Temperature**



Condition

f=1860MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 0V$

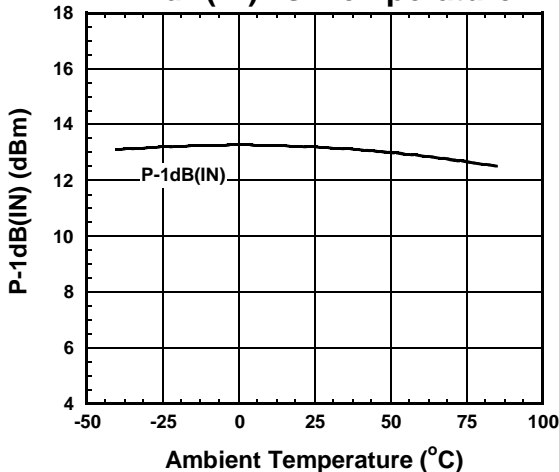
**1.7GHz@Low Gain
OIP3, IIP3 vs. Temperature**



Condition

f1=1860MHz, f2=f1+100kHz,
 $P_{in} = -16dBm$,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 0V$

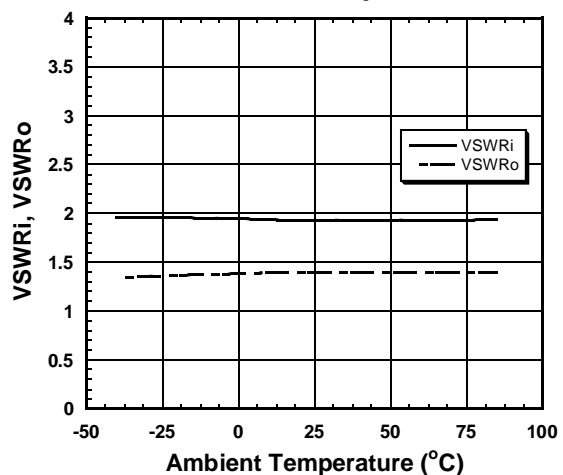
**1.7GHz@Low Gain
P-1dB(IN) vs. Temperature**



Condition

f=1860MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 0V$

**1.7GHz@Low Gain
VSWR vs. Temperature**

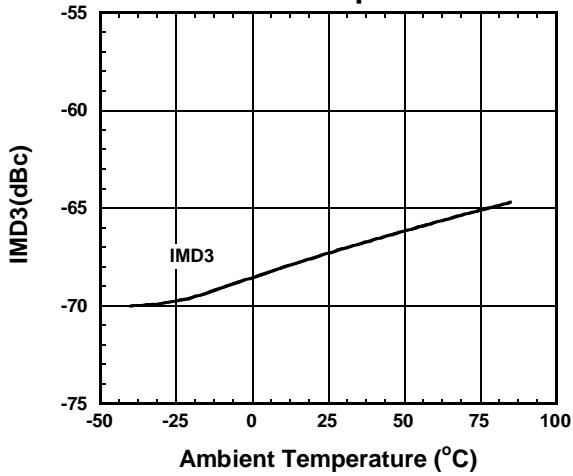


Condition

f=1860MHz,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 0V$

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)

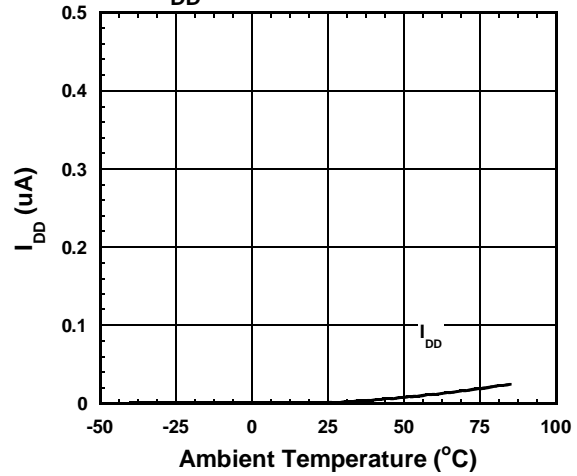
**1.7GHz@Low Gain
IMD3 vs. Temperature**



Condition

f1=1860MHz, f2=f1+100kHz,
Pin=-16dBm,
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 0V$

**1.7GHz@Low Gain
 I_{DD} vs. Temperature**



Condition

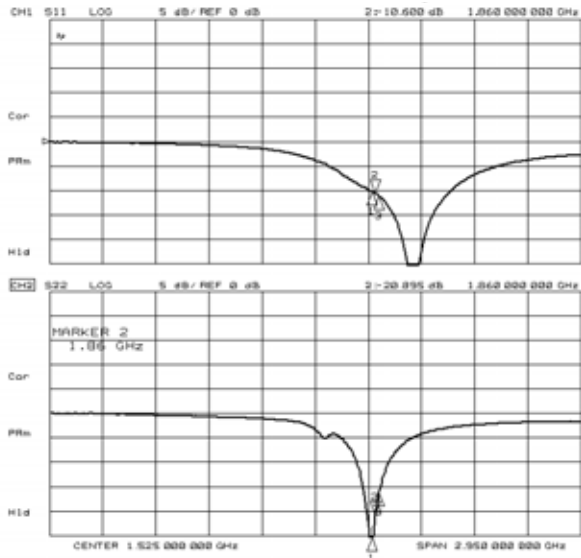
RF=OFF
 $V_{DD} = V_{INV} = 2.7V$,
 $V_{CTL1} = 0V$, $V_{CTL2} = 1.85V$, $V_{CTL3} = 0V$

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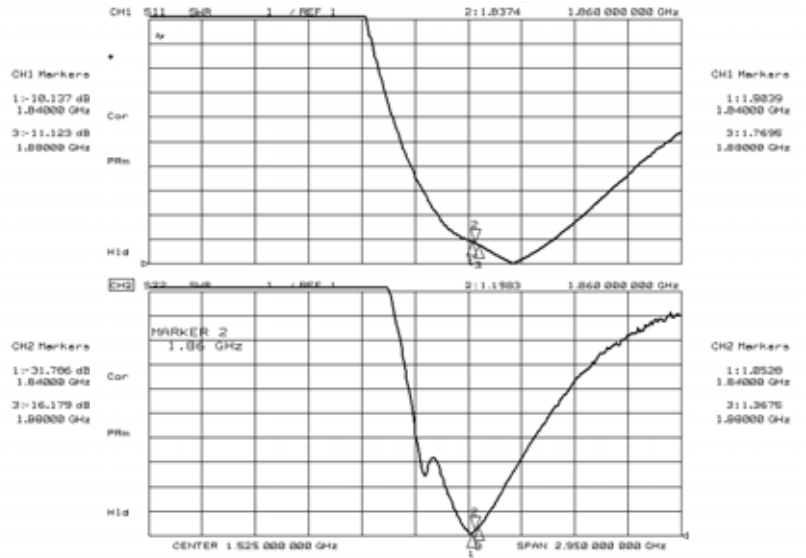
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■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)

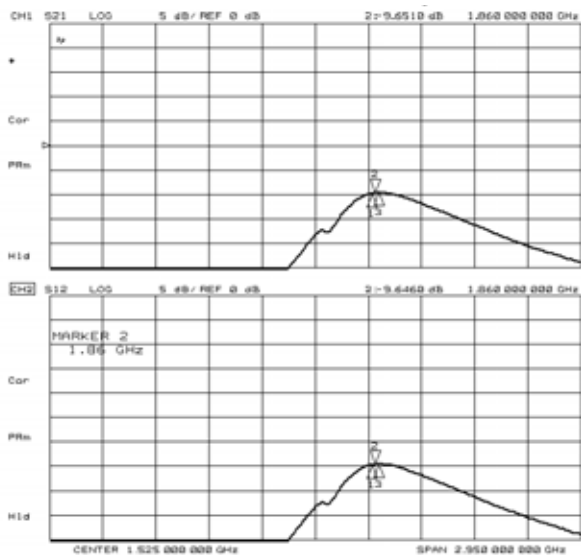
Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=1.85\text{V}$, $V_{CTL3}=0\text{V}$



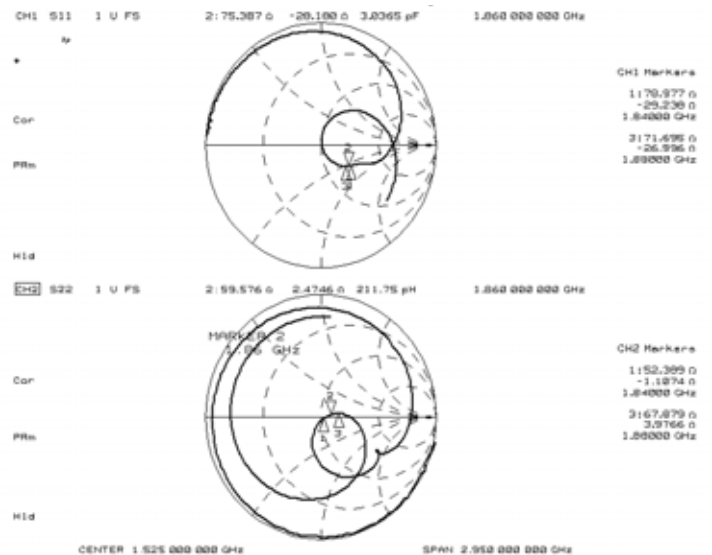
S11, S22



S21, S12



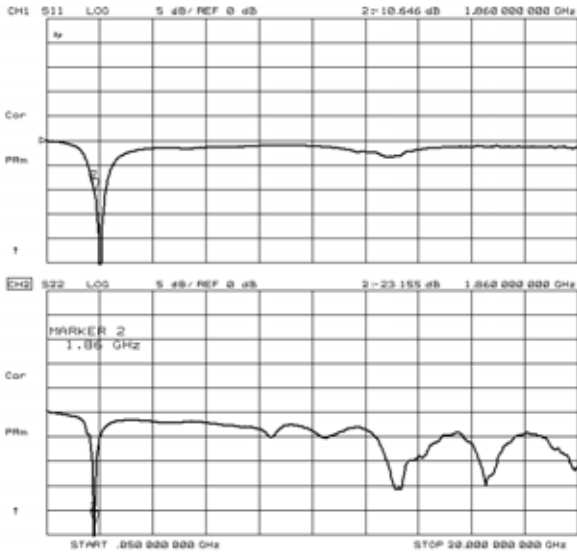
VSWR



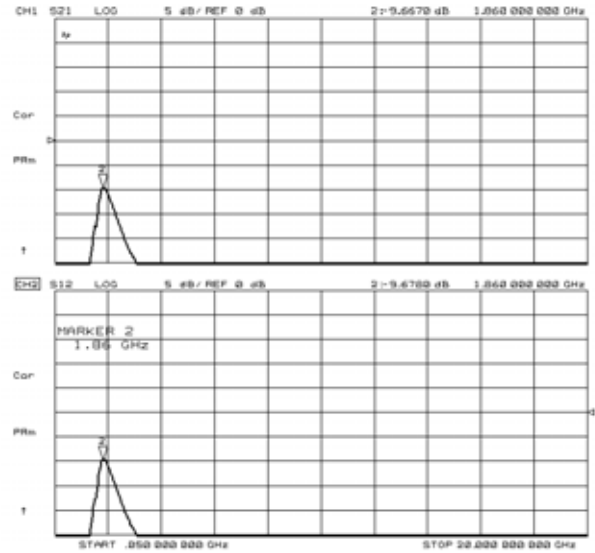
Zin, Zout

■ ELECTRICAL CHARACTERISTICS (1.7GHz Band Low Gain Mode)

Condition: $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=1.85\text{V}$, $V_{CTL3}=0\text{V}$

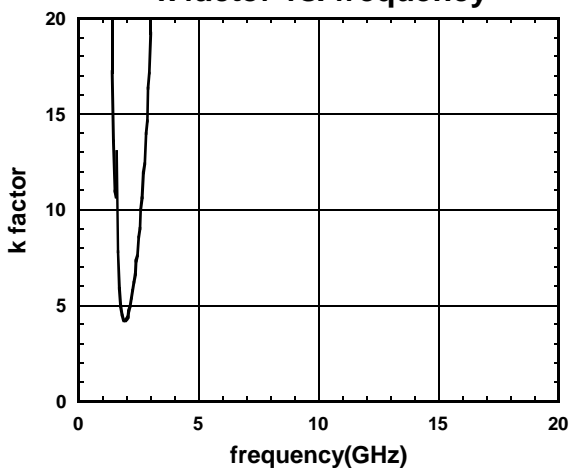


S11, S22
($f=50\text{MHz}\sim 20\text{GHz}$)



S21, S12
($f=50\text{MHz}\sim 20\text{GHz}$)

1.7GHz @Low Gain k factor vs. frequency



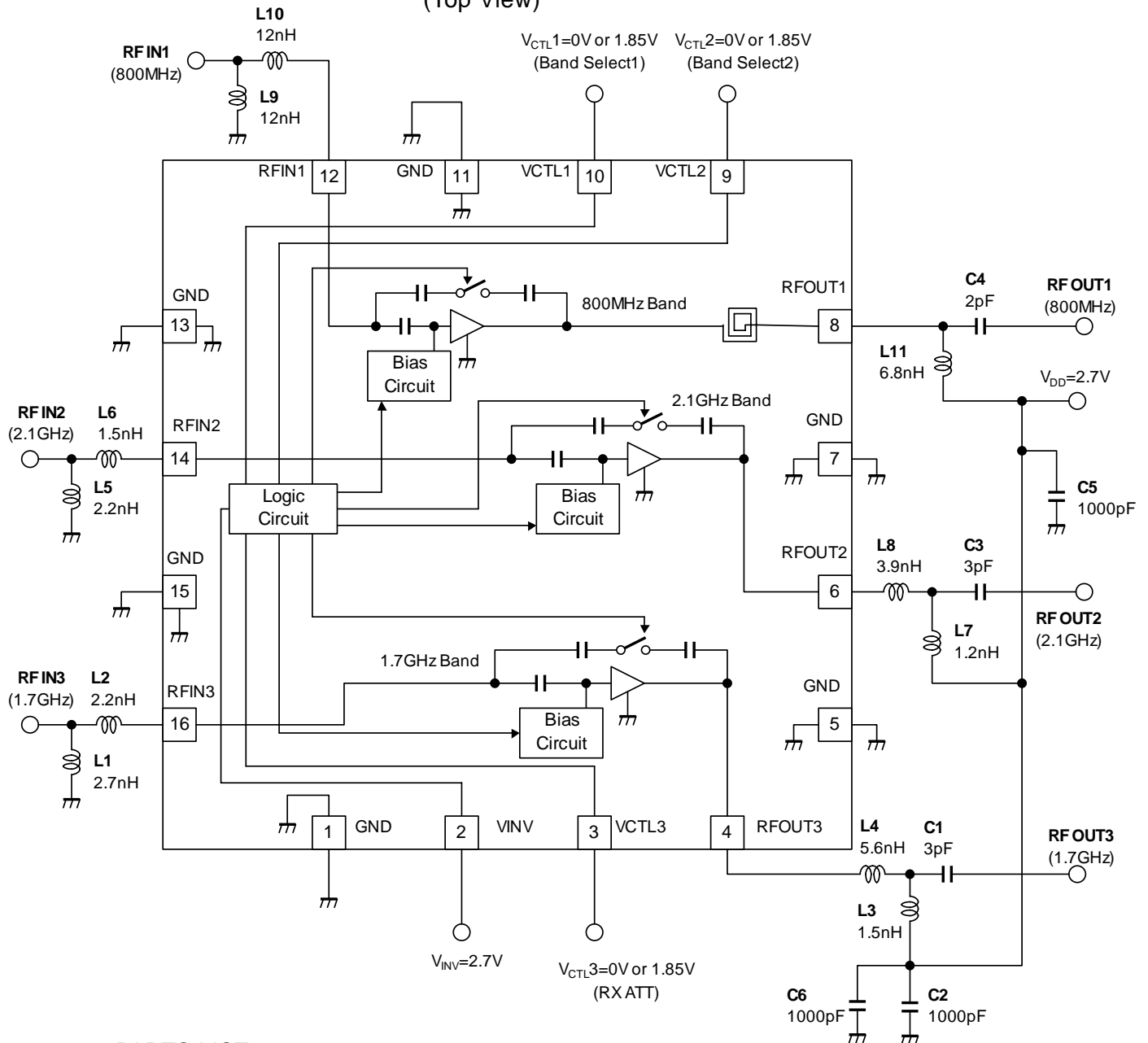
k factor
($f=50\text{MHz}\sim 20\text{GHz}$)

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TEST CIRCUIT

(Top View)



PARTS LIST

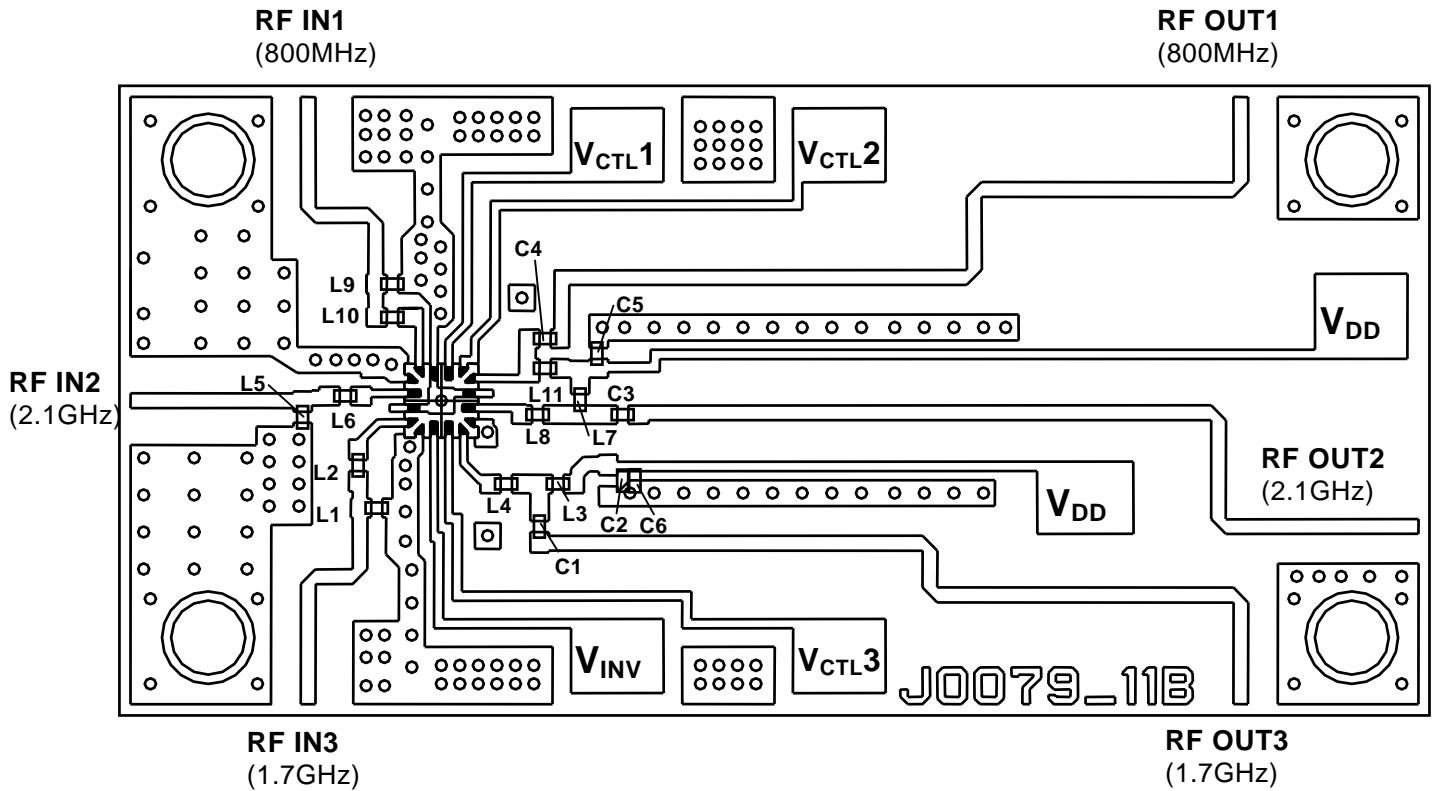
Parts ID	Comment
L1~ L11	MURATA (LQP03T) 0603size
C1~C6	MURATA (GRM03) 0603size

PRECAUTIONS

- 1) Please locate C2, C6 close to L3.
- 2) Please locate C4 close to L6, L10.
- 3) Ground terminal should be connected to the ground plane as low inductance as possible.

RECOMMENDED DESIGN

(Top View)



PCB (FR-4)

t=0.2mm

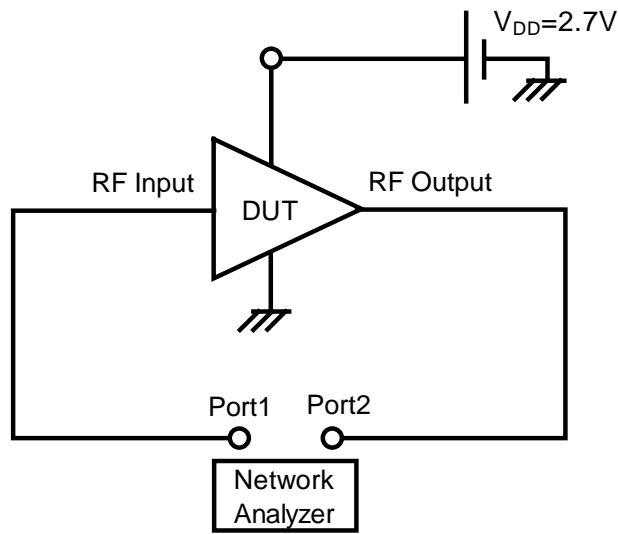
MICROSTRIP LINE WIDTH=0.4mm ($Z_0=50\text{ohm}$)

PCB SIZE=35.4mm X 17.0mm

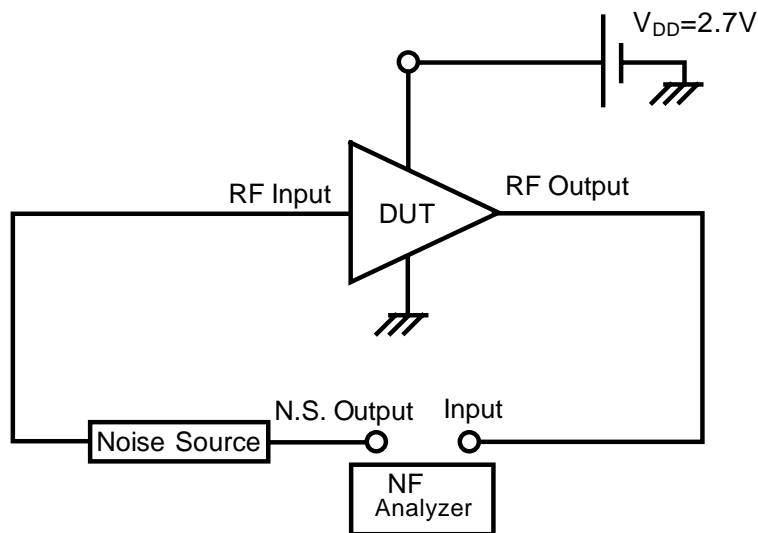
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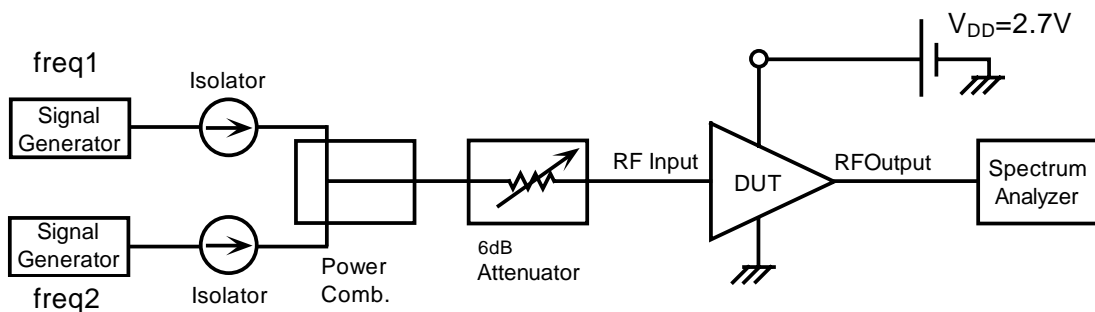
MEASUREMENT BLOCK DIAGRAM



S parameter Measurement Block Diagram

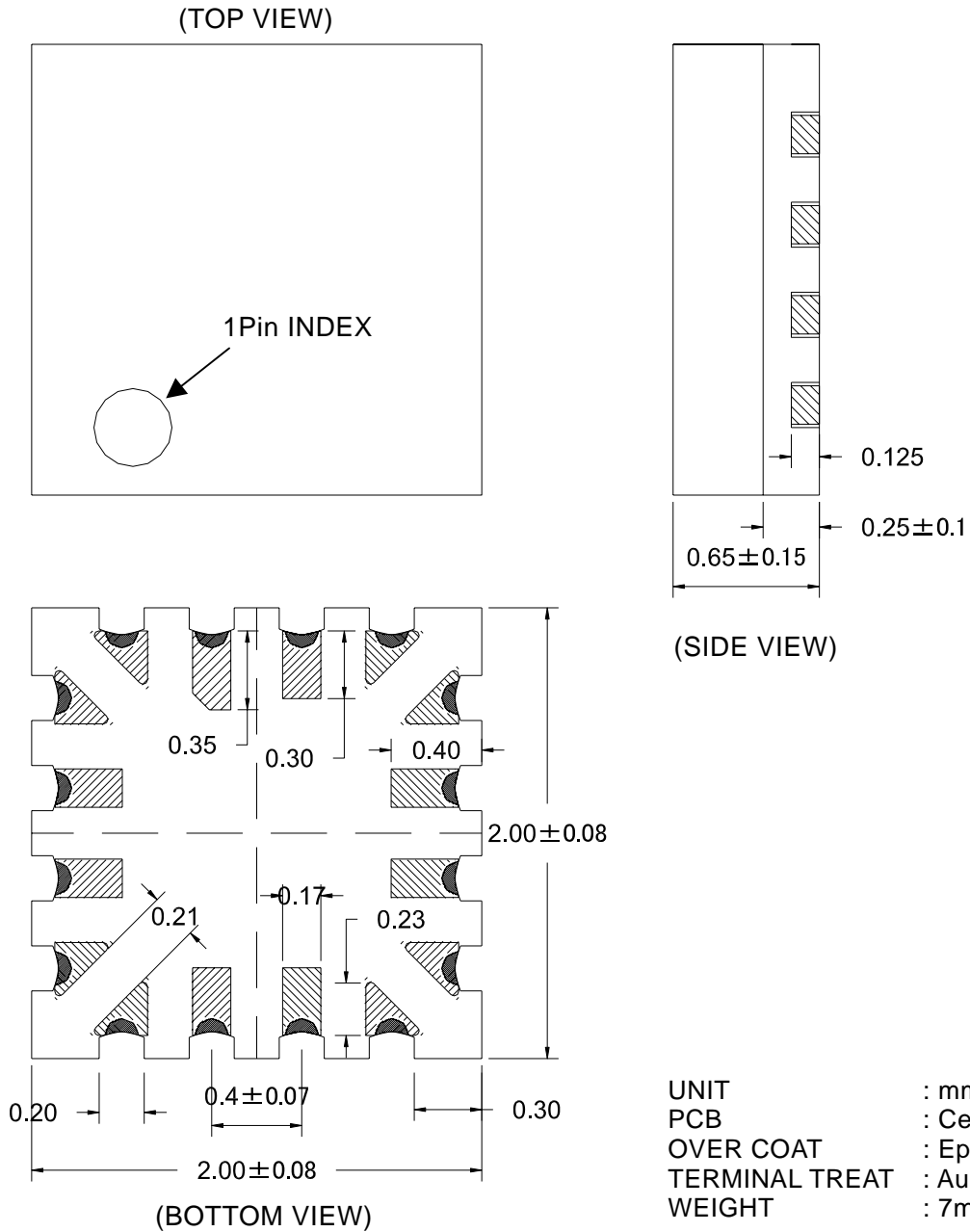


Noise Figure Measurement Block Diagram



IF and IM3 measurement for IIP3

■ PACKAGE OUTLINE (FFP16-B5)



Cautions on using this product

This product contains Gallium-Arsenide (GaAs) which is a harmful material.

- Do NOT eat or put into mouth.
- Do NOT dispose in fire or break up this product.
- Do NOT chemically make gas or powder with this product.
- To waste this product, please obey the relating law of your country.

[CAUTION]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.

This product may be damaged with electric static discharge (ESD) or spike voltage. Please handle with care to avoid these damages.