

W-CDMA Triple Band LNA GaAs MMIC

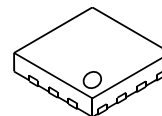
■GENERAL DISCRIPTION

NJG1133MD7 is a triple band LNA IC designed for W-CDMA /UMTS cellular phone of 2.1GHz, 1.7GHz and 800MHz band.

This IC has a LNA pass-through function to select high gain mode or low gain mode. The LNA of 1.7GHz band can be used to 1.5GHz band by changing application circuit.

An ultra-small and ultra-thin package of EQFN14-D7 is adopted.

■PACKAGE OUTLINE



NJG1133MD7

■FEATURES

- Low operation voltage +2.8V typ.
- Low control voltage +1.8V typ.
- Low current consumption 2.3mA typ. @High Gain Mode
48μA typ. @Low Gain Mode
- Small and thin package EQFN14-D7 (Package size: 1.6 x 1.6 x 0.397mm typ.)

[High Gain Mode]

- High gain 16.0dB typ. @ f_{RF} =2140MHz, 885MHz, 1860MHz, 1495MHz
- Low noise figure 1.35dB typ. @ f_{RF} =2140MHz, 1860MHz
1.40dB typ. @ f_{RF} =885MHz
1.55dB typ. @ f_{RF} =1495MHz
- High input IP3 +0.5dBm typ. @ f_{RF} =2140.0+2140.1MHz, Pin=-30dBm
-2.0dBm typ. @ f_{RF} =885.0+885.1MHz, Pin=-30dBm
0dBm typ. @ f_{RF} =1860.0+1860.1MHz, Pin=-30dBm
0dBm typ. @ f_{RF} =1495.0+1495.1MHz, Pin=-30dBm

[Low Gain Mode]

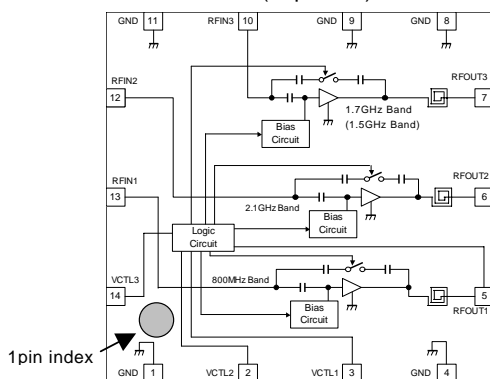
- Gain -3.5dB typ. @ f_{RF} =2140MHz
-3.0dB typ. @ f_{RF} =885MHz, 1495MHz
-4.0dB typ. @ f_{RF} =1860MHz
- High input IP3 +12dBm typ. @ f_{RF} =2140.0+2140.1MHz, Pin=-16dBm
+12dBm typ. @ f_{RF} =885.0+885.1MHz, Pin=-20dBm
+15dBm typ. @ f_{RF} =1860.0+1860.1MHz, Pin=-16dBm
+15dBm typ. @ f_{RF} =1495.0+1495.1MHz, Pin=-16dBm

[Variable gain width]

- 19.5dB typ. @ f_{RF} =2140MHz, 1495MHz
- 19.0dB typ. @ f_{RF} =885MHz
- 20.0dB typ. @ f_{RF} =1860MHz

■PIN CONFIGURATION

(Top View)



Pin Connection

- | | |
|-------------------------|-------------------------|
| 1. GND | 8. GND |
| 2. VCTL2 | 9. GND |
| 3. VCTL1 | 10. RFIN3 (1.7G/1.5GHz) |
| 4. GND | 11. GND |
| 5. RFOUT1 (800MHz) | 12. RFIN2 (2.1GHz) |
| 6. RFOUT2 (2.1GHz) | 13. RFIN1 (800MHz) |
| 7. RFOUT3 (1.7G/1.5GHz) | 14. VCTL3 |

Note: Specifications and description listed in this datasheet are subject to change without prior notice.

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■ABSOLUTE MAXIMUM RATINGS

($T_a=+25^{\circ}\text{C}$, $Z_s=Z_l=50\Omega$)

PARAMETERS	SYMBOL	CONDITIONS	RATINGS	UNITS
Operating voltage	V_{DD}		5.0	V
Control voltage	V_{CTL}	VCTL1,2,3 terminal	5.0	V
Input power	P_{in}		+15	dBm
Power dissipation	P_D	on PCB board, $T_{jmax}=125^{\circ}\text{C}$	1300	mW
Operating temperature	T_{opr}		-40~+85	$^{\circ}\text{C}$
Storage temperature	T_{stg}		-55~+150	$^{\circ}\text{C}$

■ELECTRICAL CHARACTERISTICS 1 (DC)

($V_{DD}=2.8\text{V}$, $T_a=+25^{\circ}\text{C}$, $Z_s=Z_l=50\Omega$)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Operating voltage	V_{DD}		2.7	2.8	3.6	V
Control voltage1 (High)	$V_{CTL1(H)}$		1.36	1.8	3.6	V
Control voltage1 (Low)	$V_{CTL1(L)}$		0	0	0.3	V
Control voltage 2 (High)	$V_{CTL2(H)}$		1.36	1.8	3.6	V
Control voltage 2 (Low)	$V_{CTL2(L)}$		0	0	0.3	V
Control voltage 3 (High)	$V_{CTL3(H)}$		1.36	1.8	3.6	V
Control voltage 3 (Low)	$V_{CTL3(L)}$		0	0	0.3	V
Operating current 1 2.1GHz Band High Gain mode	I_{DD1}	$V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.8\text{V}$, RF OFF	-	2.3	3.1	mA
Operating current 2 800MHz Band high Gain mode	I_{DD2}	$V_{CTL1}=1.8\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.8\text{V}$, RF OFF	-	2.3	3.1	mA
Operating current 3 1.7GHz Band High Gain mode	I_{DD3}	$V_{CTL1}=0\text{V}$, $V_{CTL2}=1.8\text{V}$, $V_{CTL3}=1.8\text{V}$, RF OFF	-	2.3	3.1	mA
Operating current 4 1.5GHz Band High Gain mode	I_{DD4}	$V_{CTL1}=1.8\text{V}$, $V_{CTL2}=1.8\text{V}$, $V_{CTL3}=1.8\text{V}$, RF OFF	-	2.3	3.1	mA
Operating current 5	I_{DD5}	$V_{CTL3}=0\text{V}$, RF OFF	-	48	85	μA
Control current 1	I_{CTL1}	$V_{CTL1}=1.8\text{V}$	-	5.5	8.5	μA
Control current 2	I_{CTL2}	$V_{CTL2}=1.8\text{V}$	-	5.5	8.5	μA
Control current 3	I_{CTL3}	$V_{CTL3}=1.8\text{V}$	-	5.5	8.5	μA

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

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=0V$, $V_{CTL3}=1.8V$, $f_{RF}=2140MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 1	Gain1	Exclude PCB & connector losses (IN: 0.09dB, OUT: 0.36dB)	14.5	16.0	17.5	dB
Noise figure 1	NF1	Exclude PCB & connector losses (IN: 0.09dB)	-	1.35	1.5	dB
Input Power at 1dB gain compression point 1	P-1dB(IN)_1		-15.0	-11.5	-	dBm
Input 3rd order intercept point 1	IIP3_1	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, $P_{in}=-30dBm$	-9.0	+0.5	-	dBm
RF Input VSWR 1	VSWRi1		-	1.5	2.0	
RF Output VSWR 1	VSWRo1		-	2.0	2.5	

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

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=0V$, $V_{CTL3}=0V$, $f_{RF}=2140MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 2	Gain2	Exclude PCB & connector losses (IN: 0.09dB, OUT: 0.36dB)	-5.0	-3.5	-2.0	dB
Noise figure 2	NF2	Exclude PCB & connector losses (IN: 0.09dB)	-	3.5	6.0	dB
Input Power at 1dB gain compression point 2	P-1dB(IN)_2		+5.0	+14.0	-	dBm
Input 3rd order intercept point 2	IIP3_2	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, $P_{in}=-16dBm$	0	+12.0	-	dBm
RF Input VSWR 2	VSWRi2		-	1.6	2.0	
RF Output VSWR 2	VSWRo2		-	1.9	2.3	

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

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=1.8V$, $V_{CTL2}=0V$, $V_{CTL3}=1.8V$, $f_{RF}=885MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 3	Gain3	Exclude PCB & connector losses (IN: 0.06dB, OUT: 0.16dB)	14.3	16.0	17.3	dB
Noise figure 3	NF3	Exclude PCB & connector losses (IN: 0.06dB)	-	1.40	1.65	dB
Input Power at 1dB gain compression point 3	P-1dB(IN)_3		-16.0	-9.5	-	dBm
Input 3rd order intercept point 3	IIP3_3	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, $P_{in}=-30dBm$	-10.0	-2.0	-	dBm
RF Input VSWR 3	VSWRi3		-	1.8	2.3	
RF Output VSWR 3	VSWRo3		-	2.2	2.7	

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

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=1.8V$, $V_{CTL2}=0V$, $V_{CTL3}=0V$, $f_{RF}=885MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 4	Gain4	Exclude PCB & connector losses (IN: 0.06dB, OUT: 0.16dB)	-4.5	-3.0	-2.0	dB
Noise figure 4	NF4	Exclude PCB & connector losses (IN: 0.06dB)	-	3.0	6.0	dB
Input Power at 1dB gain compression point 4	P-1dB(IN)4		+4.5	+17.0	-	dBm
Input 3rd order intercept point 4	IIP3_4	$f1=f_{RF}$, $f2=f_{RF}+100kHz$, $P_{in}=-20dBm$	+2.0	+12.0	-	dBm
RF Input VSWR 4	VSWRi4		-	1.4	2.1	
RF Output VSWR 4	VSWRo4		-	1.8	2.2	

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

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=1.8V$, $V_{CTL3}=1.8V$, $f_{RF}=1860MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 5	Gain5	Exclude PCB & connector losses (IN: 0.10dB, OUT: 0.31dB)	14.5	16.0	17.5	dB
Noise figure 5	NF5	Exclude PCB & connector losses (IN: 0.10dB)	-	1.35	1.6	dB
Input Power at 1dB gain compression point 5	P-1dB(IN)_5		-16.0	-8.0	-	dBm
Input 3rd order intercept point 5	IIP3_5	$f_1=f_{RF}$, $f_2=f_{RF}+100kHz$, $P_{in}=-30dBm$	-9.0	0	-	dBm
RF Input VSWR 5	VSWRi5		-	2.1	2.6	
RF Output VSWR 5	VSWRo5		-	1.8	2.2	

■ELECTRICAL CHARACTERISTICS 7 (1.7GHz Band Low Gain Mode)

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=0V$, $V_{CTL2}=1.8V$, $V_{CTL3}=0V$, $f_{RF}=1860MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_l=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 6	Gain6	Exclude PCB & connector losses (IN: 0.10dB, OUT: 0.31dB)	-5.5	-4.0	-2.0	dB
Noise figure 6	NF6	Exclude PCB & connector losses (IN: 0.10dB)	-	4.0	6.5	dB
Input Power at 1dB gain compression point 6	P-1dB(IN)_6		+4.0	+16.0	-	dBm
Input 3rd order intercept point 6	IIP3_6	$f_1=f_{RF}$, $f_2=f_{RF}+100kHz$, $P_{in}=-16dBm$	0	+15.0	-	dBm
RF Input VSWR 6	VSWRi6		-	1.7	2.2	
RF Output VSWR 6	VSWRo6		-	2.4	2.7	

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■ELECTRICAL CHARACTERISTICS 8 (1.5GHz Band High Gain Mode)

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=1.8V$, $V_{CTL2}=1.8V$, $V_{CTL3}=1.8V$, $f_{RF}=1495MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_L=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 7	Gain7	Exclude PCB & connector losses (IN: 0.09dB, OUT: 0.30dB)	14.5	16.0	18.0	dB
Noise figure 7	NF7	Exclude PCB & connector losses (IN: 0.09dB)	-	1.55	1.75	dB
Input Power at 1dB gain compression point 7	P-1dB(IN)_7		-16.0	-9.0	-	dBm
Input 3rd order intercept point 7	IIP3_7	$f_1=f_{RF}$, $f_2=f_{RF}+100kHz$, $P_{in}=-30dBm$	-6.0	0	-	dBm
RF Input VSWR 7	VSWRi7		-	2.5	2.8	
RF Output VSWR 7	VSWRo7		-	1.8	2.4	

■ELECTRICAL CHARACTERISTICS 9 (1.5GHz Band Low Gain Mode)

(General conditions: $V_{DD}=2.7V$, $V_{CTL1}=1.8V$, $V_{CTL2}=1.8V$, $V_{CTL3}=0V$, $f_{RF}=1495MHz$, $T_a=+25^{\circ}C$, $Z_s=Z_L=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Small signal gain 8	Gain8	Exclude PCB & connector losses (IN: 0.09dB, OUT: 0.30dB)	-5.0	-3.0	-2.0	dB
Noise figure 8	NF8	Exclude PCB & connector losses (IN: 0.09dB)	-	3.0	6.0	dB
Input Power at 1dB gain compression point 8	P-1dB(IN)_8		+4.0	+16.0	-	dBm
Input 3rd order intercept point 8	IIP3_8	$f_1=f_{RF}$, $f_2=f_{RF}+100kHz$, $P_{in}=-16dBm$	0	+15.0	-	dBm
RF Input VSWR 8	VSWRi8		-	1.5	2.1	
RF Output VSWR 8	VSWRo8		-	1.8	2.3	

■ELECTRICAL CHARACTERISTICS 10

(General conditions: $V_{DD}=2.7V$, $T_a=+25^{\circ}C$, $Z_s=Z_L=50\Omega$, with application circuit)

PARAMETERS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Variable-width gain 1 (2.1GHz Band)	GDR_1	(Gain@High Gain mode) - (Gain@Low Gain mode), $f=2140MHz$ $V_{CTL1}=0V$, $V_{CTL2}=0V$, $V_{CTL3}=0$ or $1.8V$	17.5	19.5	21.0	dB
Variable-width gain 2 (800MHz Band)	GDR_2	(Gain@High Gain mode) - (Gain@Low Gain mode), $f=885MHz$ $V_{CTL1}=1.8V$, $V_{CTL2}=0V$, $V_{CTL3}=0$ or $1.8V$	17.5	19.0	20.5	dB
Variable-width gain3 (1.7GHz Band)	GDR_3	(Gain@High Gain mode) - (Gain@Low Gain mode), $f=1860MHz$ $V_{CTL1}=0V$, $V_{CTL2}=1.8V$, $V_{CTL3}=0$ or $1.8V$	18.0	20.0	21.5	dB
Variable-width gain 4 (1.5GHz Band)	GDR_4	(Gain@High Gain mode) - (Gain@Low Gain mode), $f=1495MHz$ $V_{CTL1}=1.8V$, $V_{CTL2}=1.8V$, $V_{CTL3}=0$ or $1.8V$	17.5	19.5	21.0	dB

■ 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(or 1.5GHz) 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	OFF	ON	OFF	ON	OFF	ON
H	H	H	OFF	OFF	OFF	OFF	ON	OFF

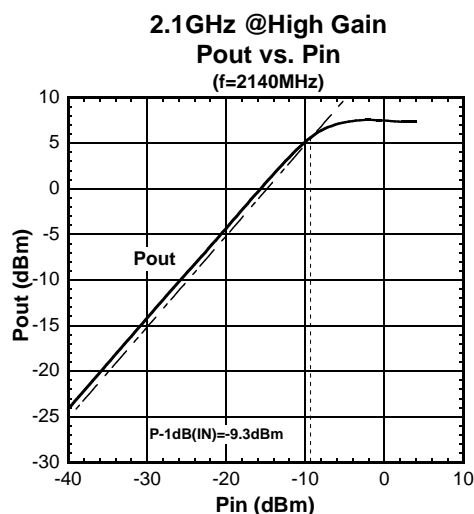
“L”=0 ~ 0.30V, “H”=1.36 ~ 1.9 V

■ TERMINAL INFORMATION

No.	SYMBOL	DESCRIPTION
1	GND	GND terminal (0V)
2	VCTL2	Control voltage supply terminal. The frequency band (2GHz / 800MHz / 1.7GHz or 1.5GHz) is selected by 2bit control signal. (Please refer to truth table.)
3	VCTL1	
4	GND	GND terminal (0V)
5	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.
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	RFOUT3	Output terminal of 1.7GHz(or 1.5GHz) band. This terminal is also the power supply terminal of the LNA, please use inductor (L9) to connect power supply.
8	GND	GND terminal (0V)
9	GND	GND terminal (0V)
10	RFIN3	RF input terminal of 1.7GHz(or 1.5GHz) band. The RF signal is input through external matching circuit connected to this terminal. The DC blocking capacitor is not required.
11	GND	GND terminal (0V)
12	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.
13	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.
14	VCTL3	Control voltage supply terminal. High gain mode or low gain mode is selected by applying this terminal.

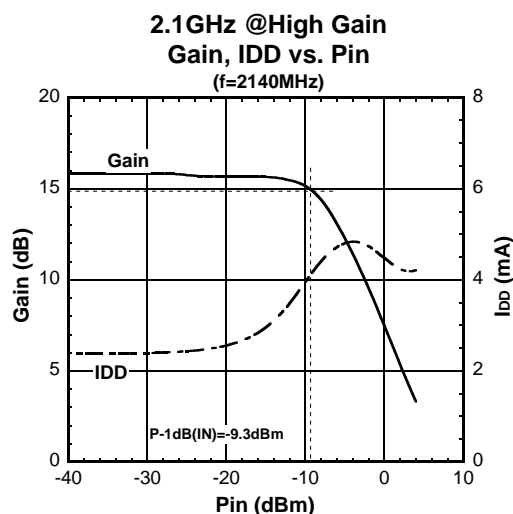
Notes: Ground terminal (No.1, 4, 8, 9, 11) should be connected with the ground plane as short as possible.

■ ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)



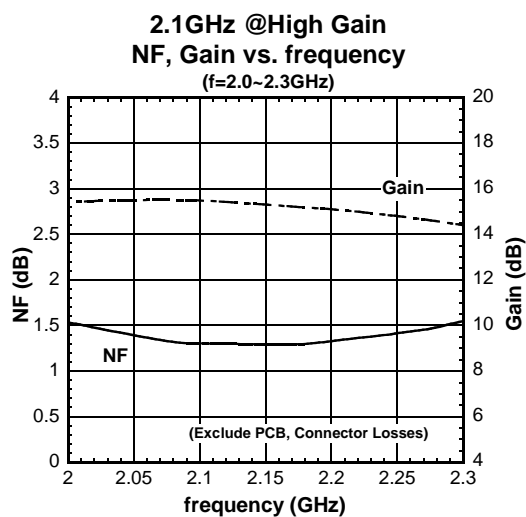
Condition

Ta=+25°C,
V_{DD}=2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.8V



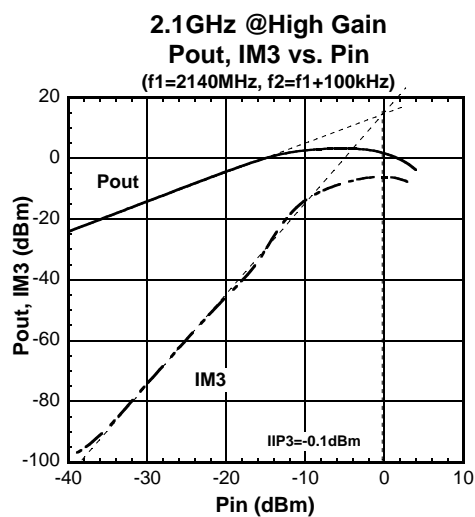
Condition

Ta=+25°C,
V_{DD}=2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.8V



Condition

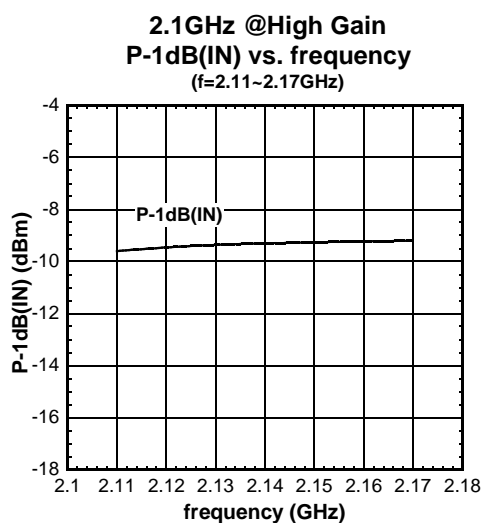
Ta=+25°C,
V_{DD}=2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.85



Condition

Ta=+25°C,
V_{DD}=2.7V,
V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.8V

■ ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)

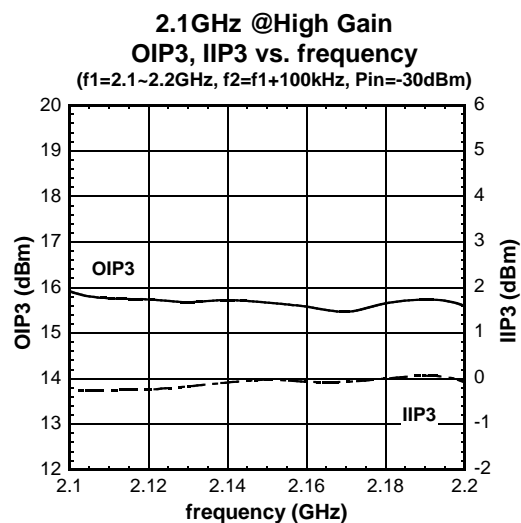


Condition

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

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

$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.8\text{V}$



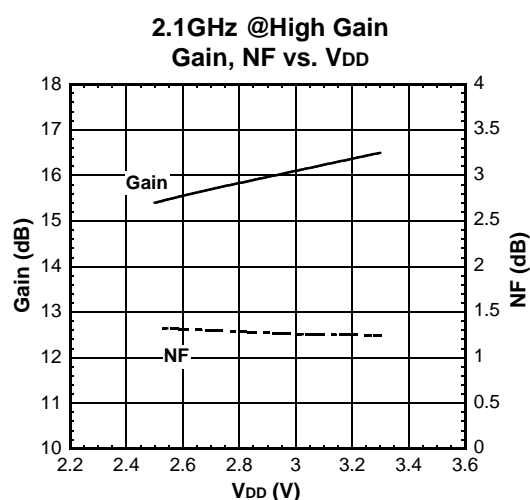
Condition

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

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

$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.8\text{V}$

■ ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)

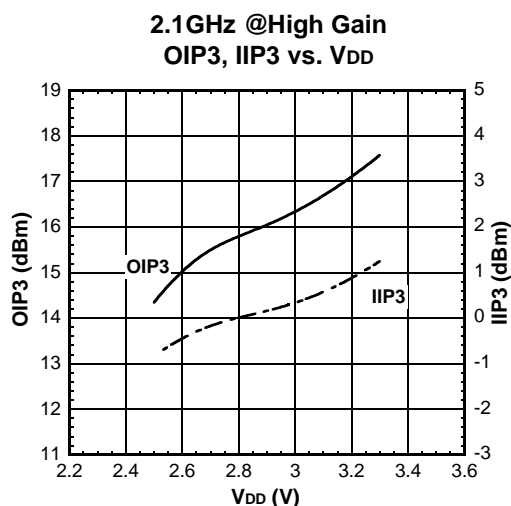


Condition

T_a=+25°C,

f=2140MHz,

V_{CTL}1=0V, V_{CTL}2=0V, V_{CTL}3=1.8V



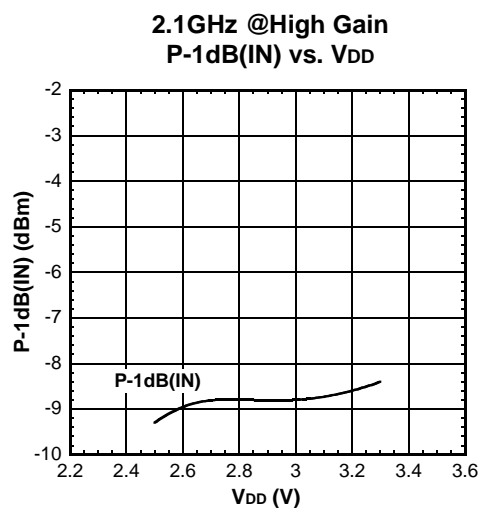
Condition

T_a=+25°C,

f₁=2140MHz, f₂=f₁+100kHz,

Pin=-30dBm,

V_{CTL}1=0V, V_{CTL}2=0V, V_{CTL}3=1.8V

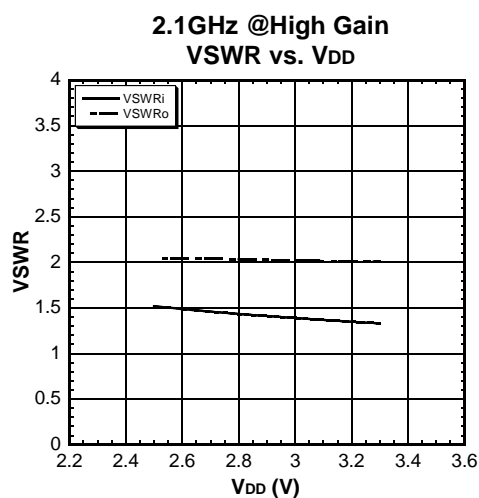


Condition

T_a=+25°C,

f=2140MHz,

V_{CTL}1=0V, V_{CTL}2=0V, V_{CTL}3=1.8V



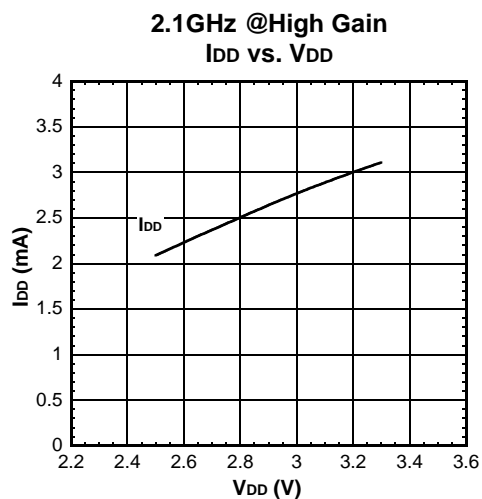
Condition

T_a=+25°C,

f=2140MHz,

V_{CTL}1=0V, V_{CTL}2=0V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)



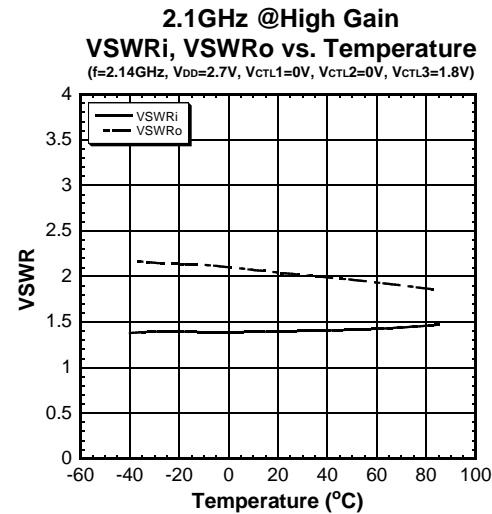
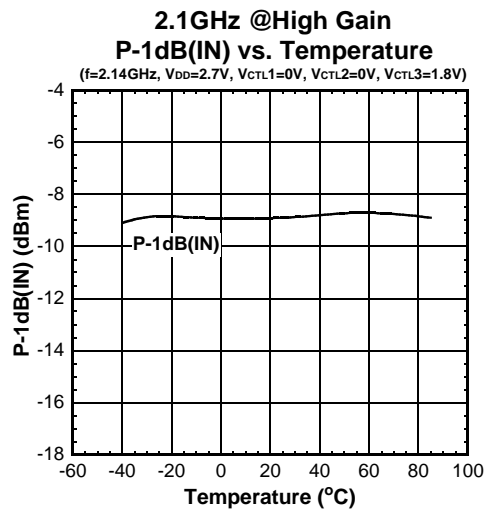
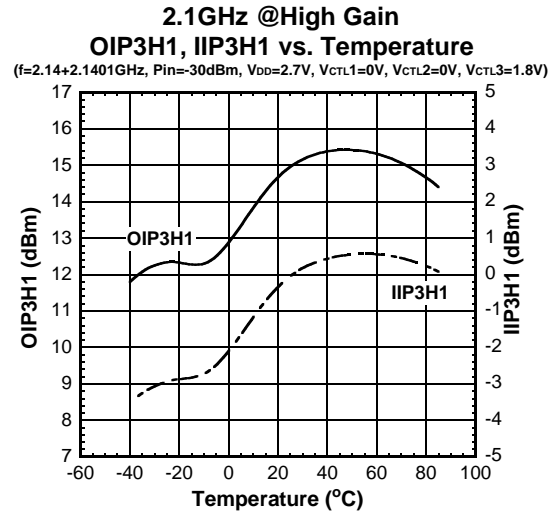
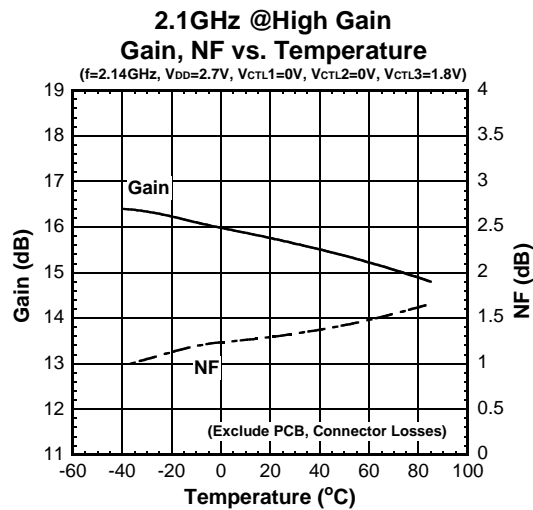
Condition

T_a=+25°C,

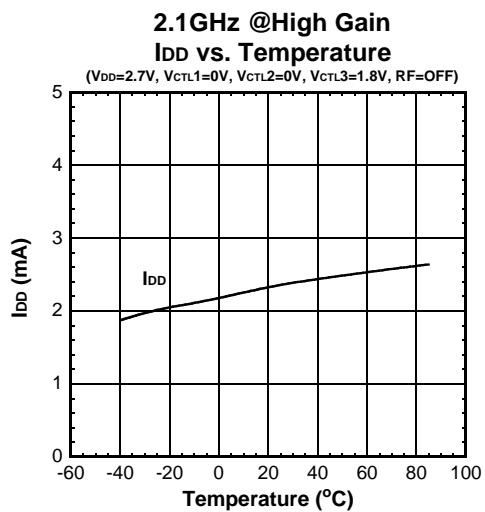
RF=OFF,

V_{CTL}1=0V, V_{CTL}2=0V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)



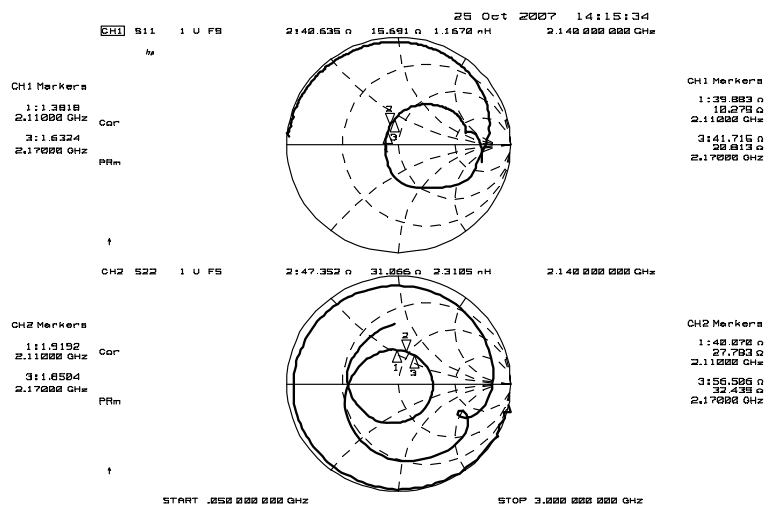
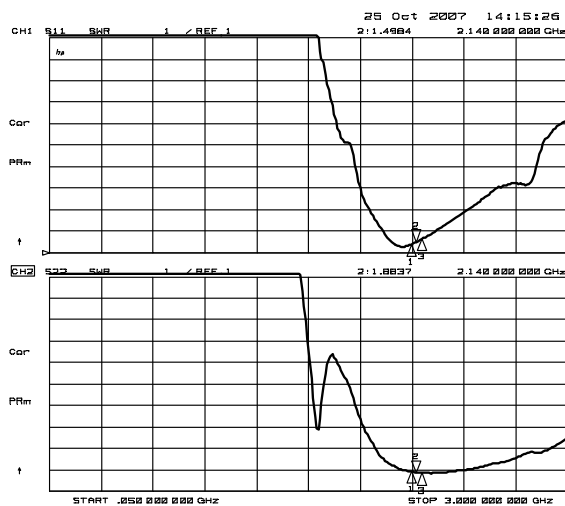
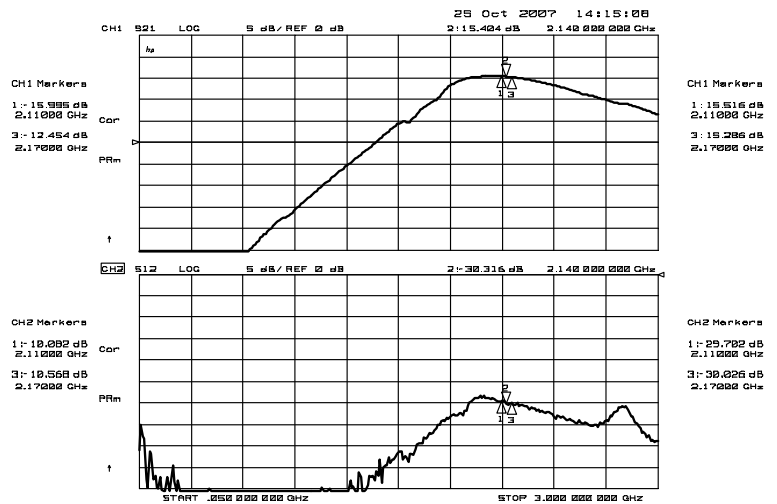
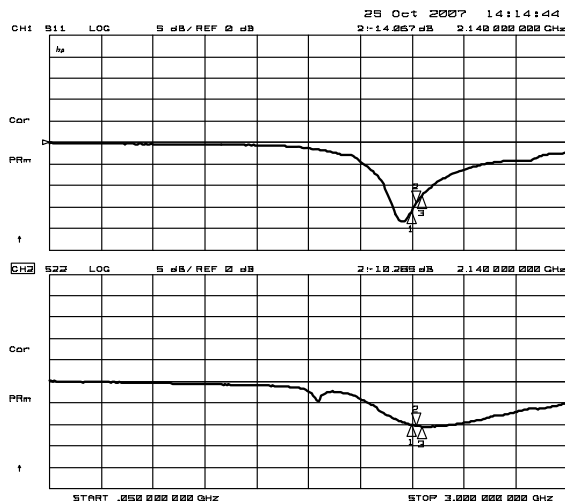
■ ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)



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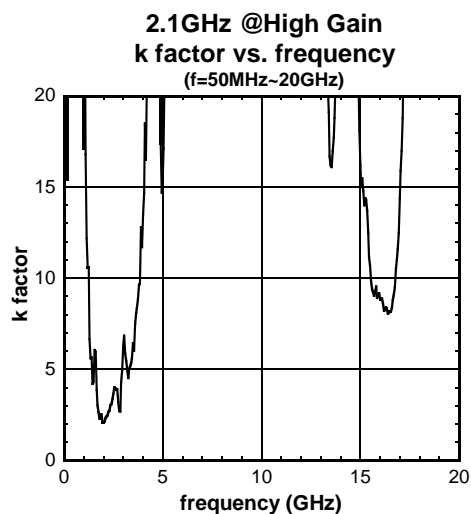
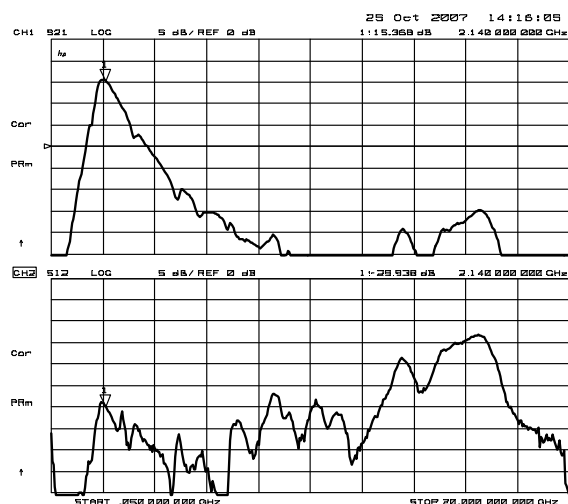
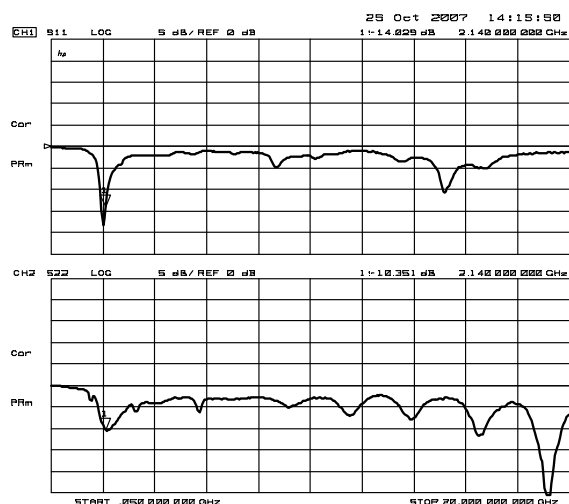
ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)

Condition : Ta=+25°C, V_{DD}=2.7V, V_{CTL1}=0V, V_{CTL2}=0V, V_{CTL3}=1.8V

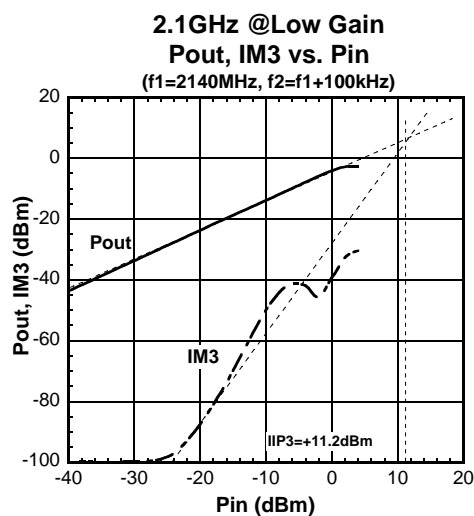
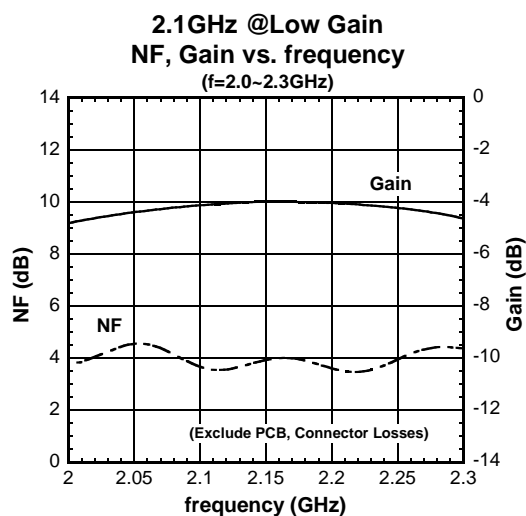
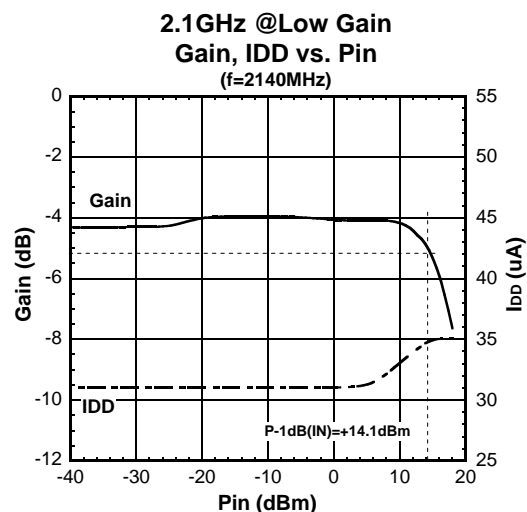
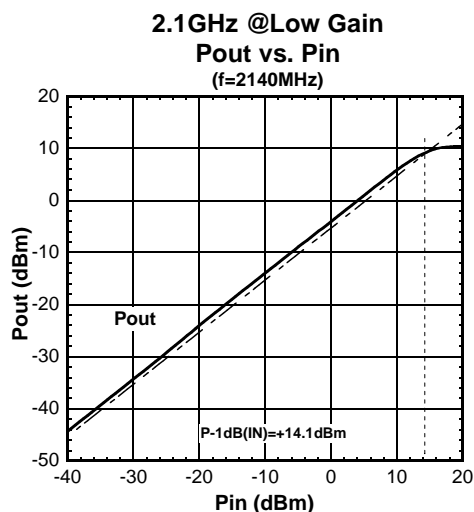


■ELECTRICAL CHARACTERISTICS (2.1GHz band High Gain mode)

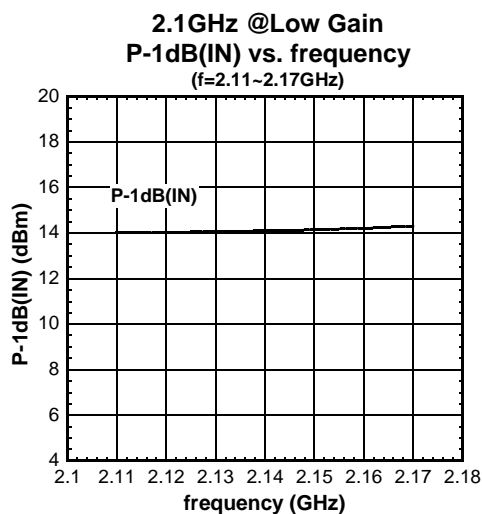
Condition : $T_a=+25^{\circ}\text{C}$, $V_{DD}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=1.8\text{V}$



■ ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)



■ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)

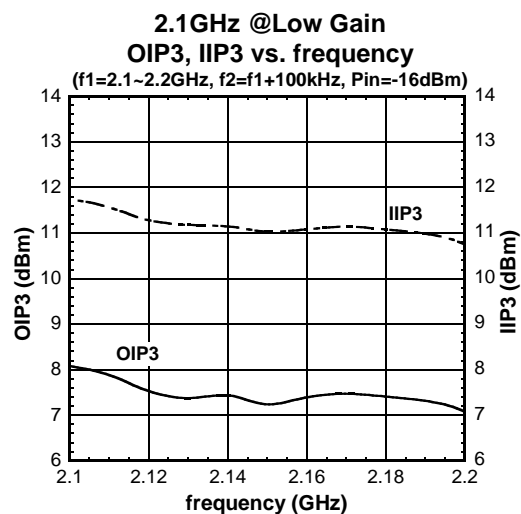


Condition

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

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

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



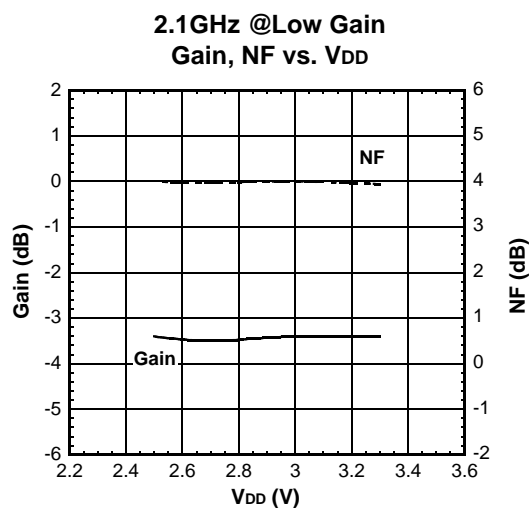
Condition

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

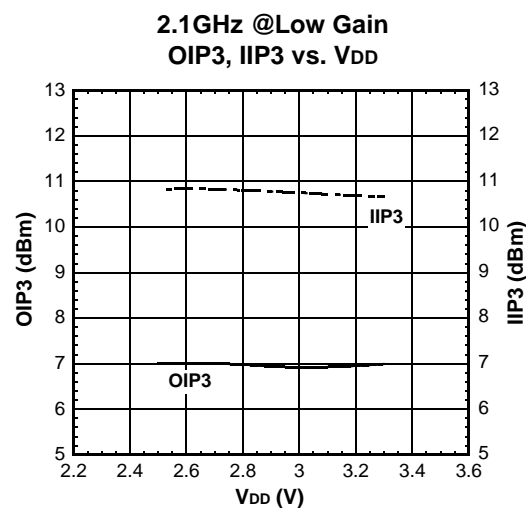
$V_{DD} = 2.7\text{V}$,

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

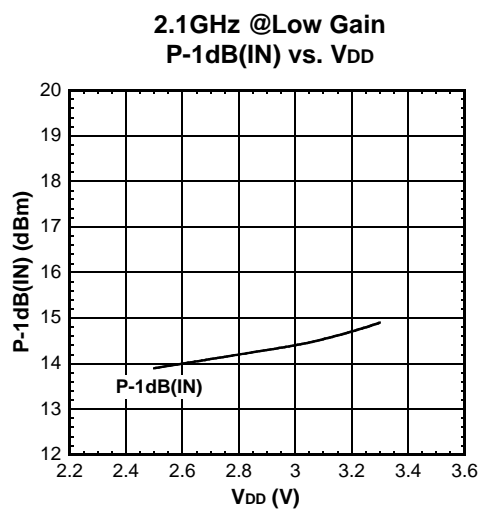
■ ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)



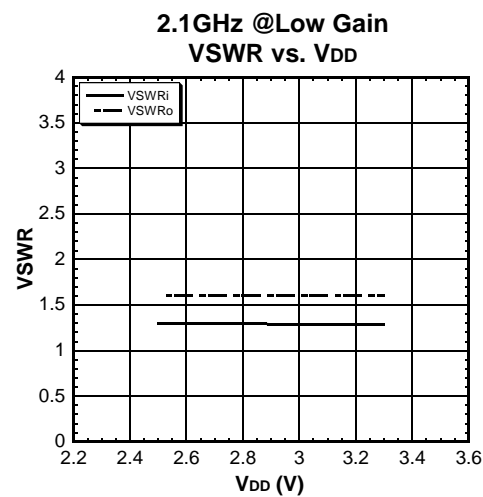
Condition
 $T_a = +25^\circ\text{C}$,
 $f = 2140\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$



Condition
 $T_a = +25^\circ\text{C}$,
 $f_1 = 2140\text{MHz}$, $f_2 = f_1 + 100\text{kHz}$,
 $\text{Pin} = -16\text{dBm}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

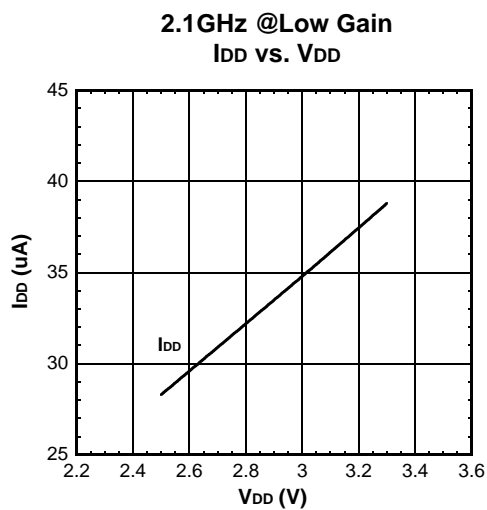


Condition
 $T_a = +25^\circ\text{C}$,
 $f = 2140\text{MHz}$,
 $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$



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

■ ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)



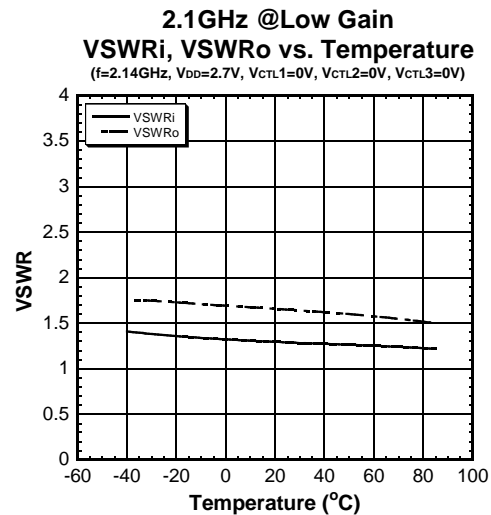
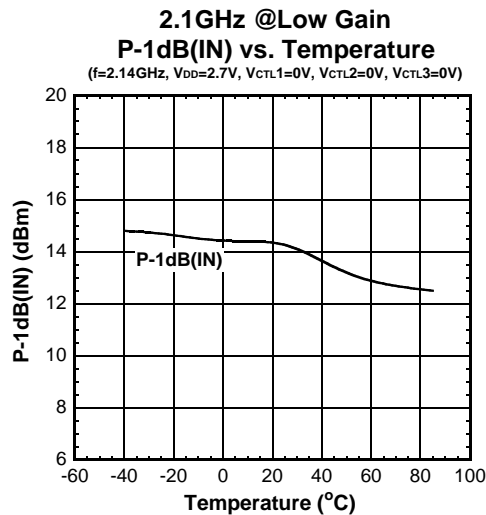
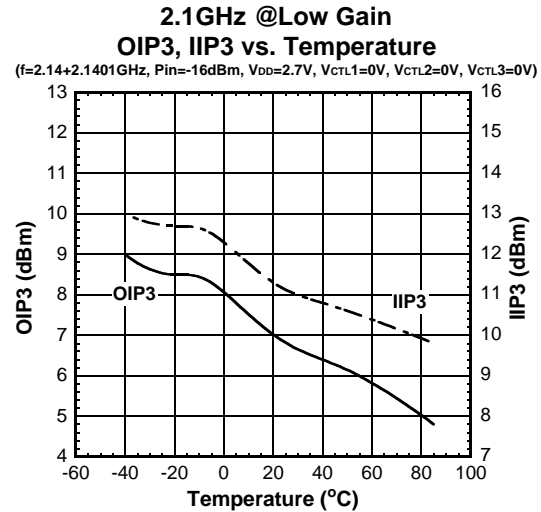
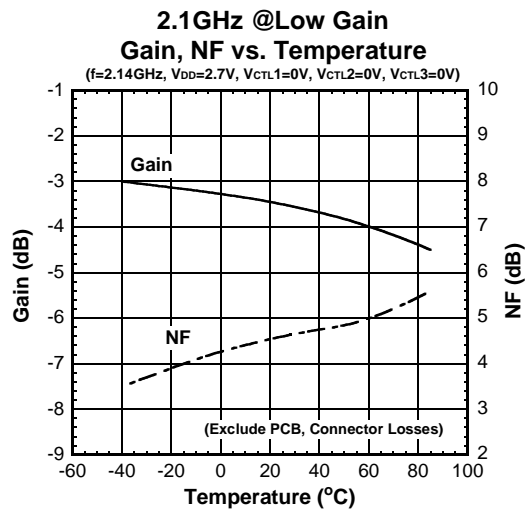
Condition

T_a=+25°C,

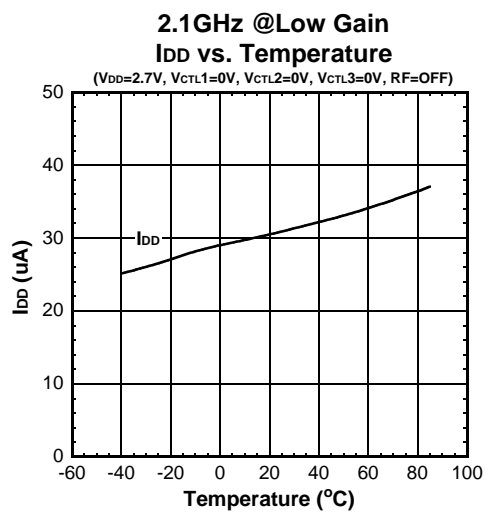
R_F=OFF,

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

■ ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)



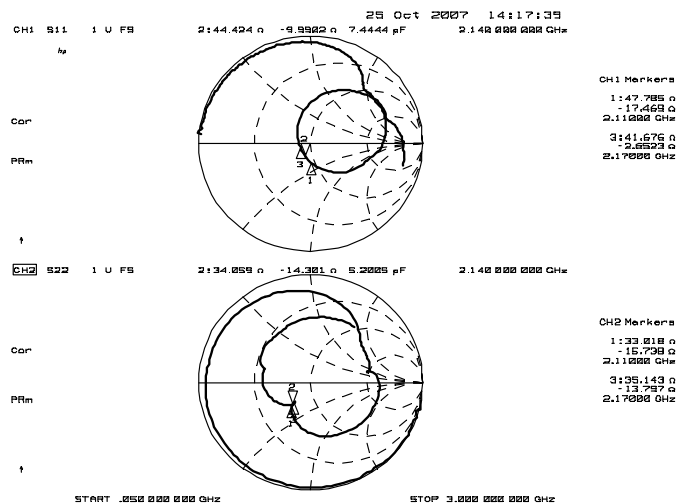
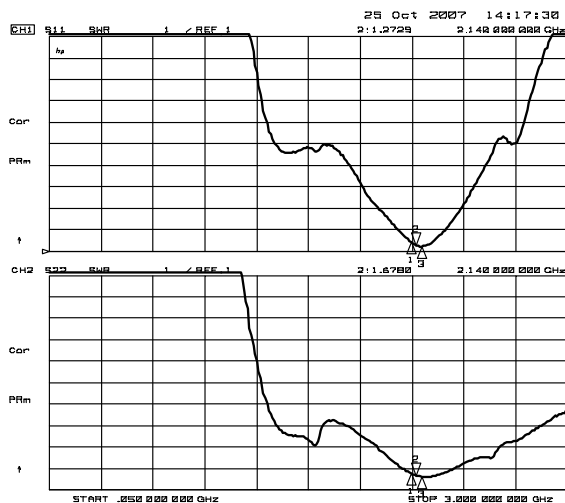
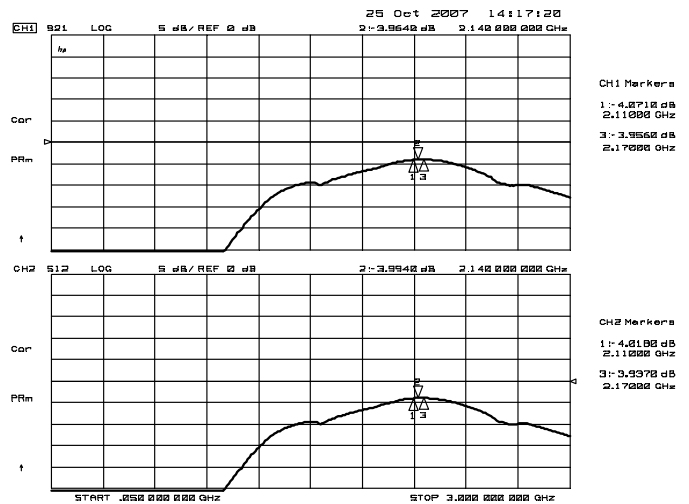
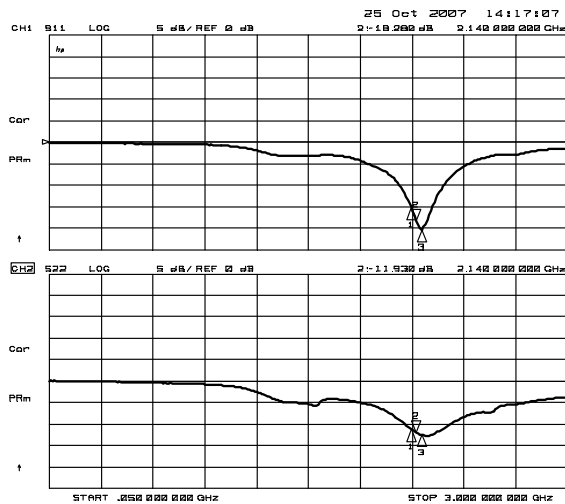
■ ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)



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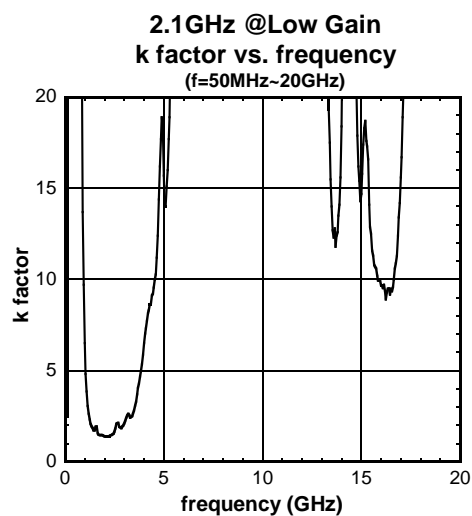
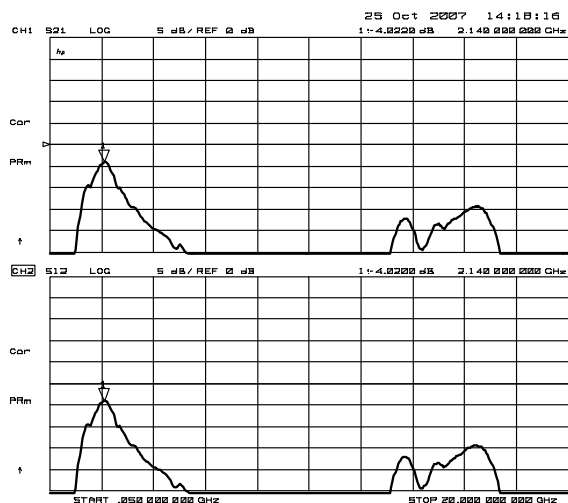
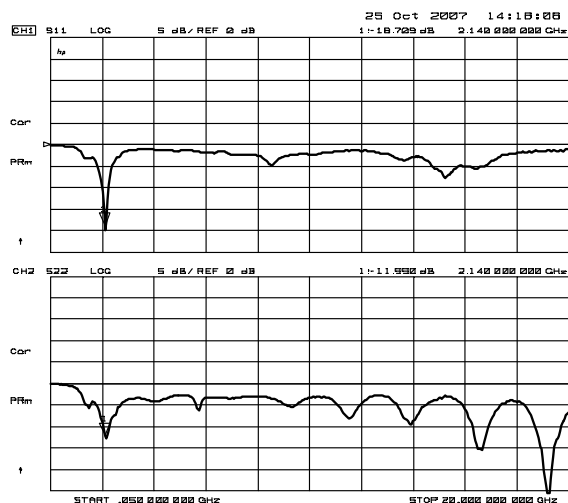
ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)

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

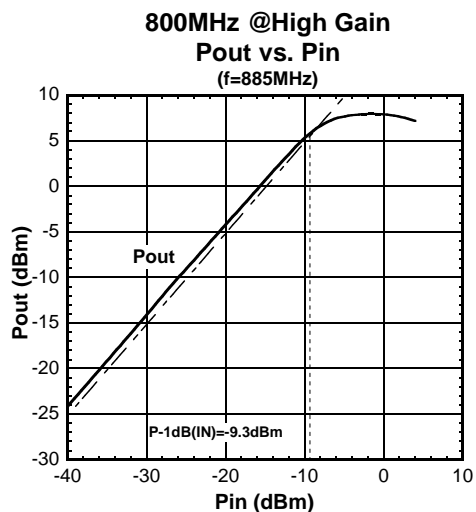


■ELECTRICAL CHARACTERISTICS (2.1GHz band Low Gain mode)

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

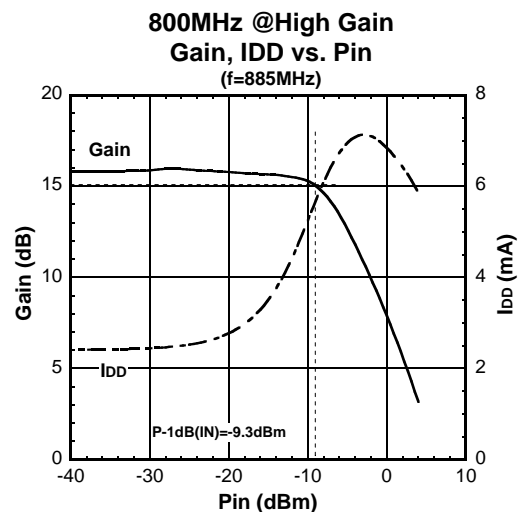


■ ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)



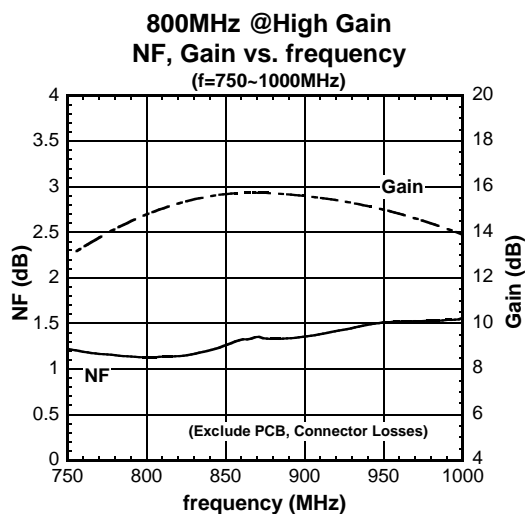
Condition

Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL1}=1.8V, V_{CTL2}=0V, V_{CTL3}=1.8V



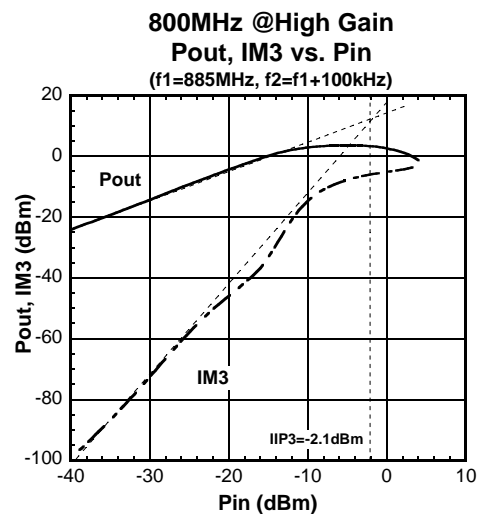
Condition

Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL1}=1.8V, V_{CTL2}=0V, V_{CTL3}=1.8V



Condition

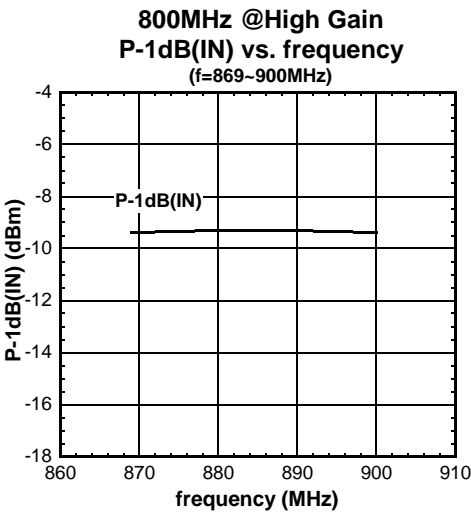
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL1}=1.8V, V_{CTL2}=0V, V_{CTL3}=1.8V



Condition

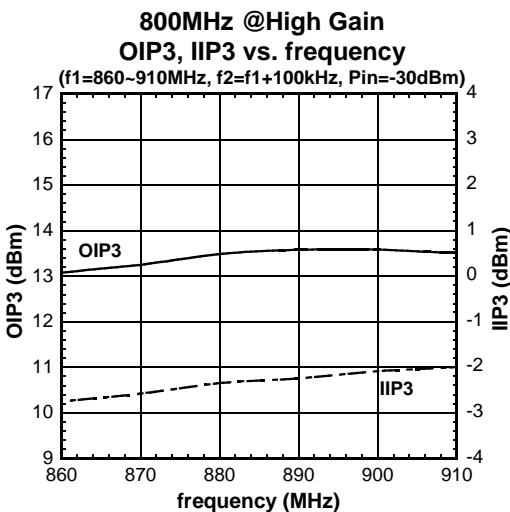
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL1}=1.8V, V_{CTL2}=0V, V_{CTL3}=1.8V

■ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)



Condition

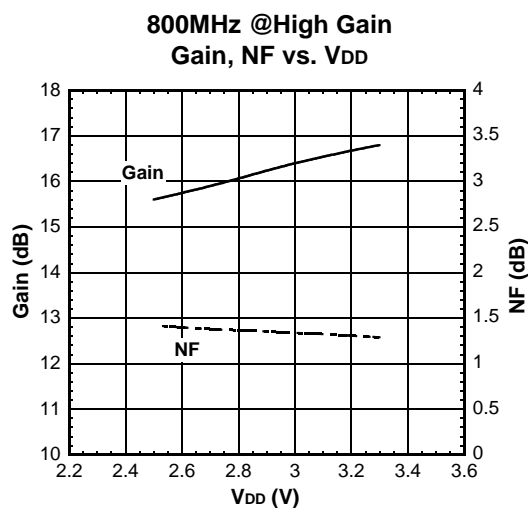
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=1.8V



Condition

Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)

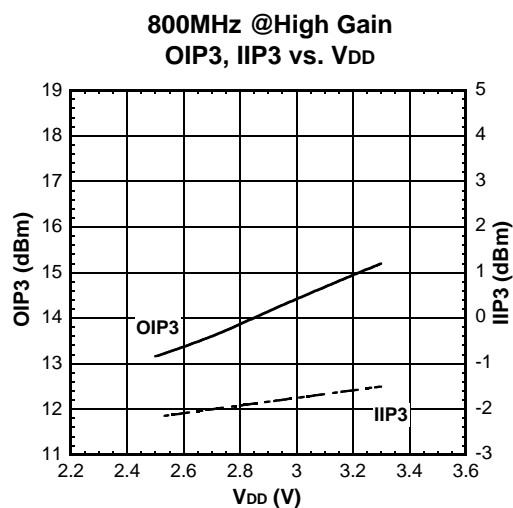


Condition

T_a=+25°C,

f=885MHz,

V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=1.8V



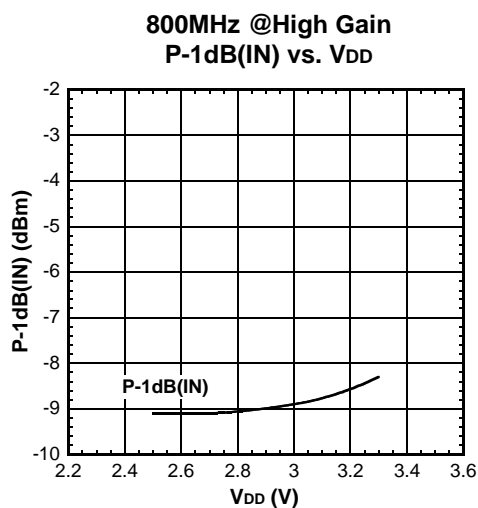
Condition

T_a=+25°C,

f₁=885MHz, f₂=f₁+100kHz,

P_{in}=-30dBm,

V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=1.8V

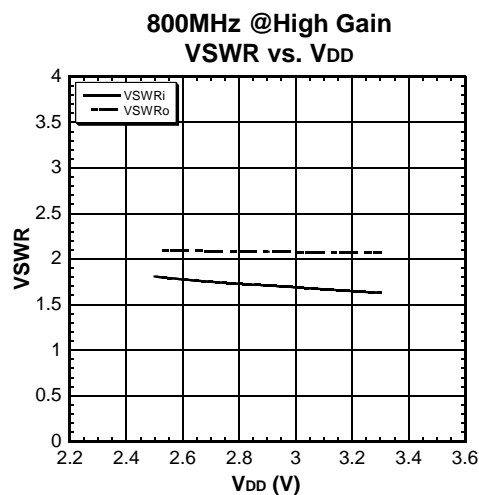


Condition

T_a=+25°C,

f=885MHz,

V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=1.8V



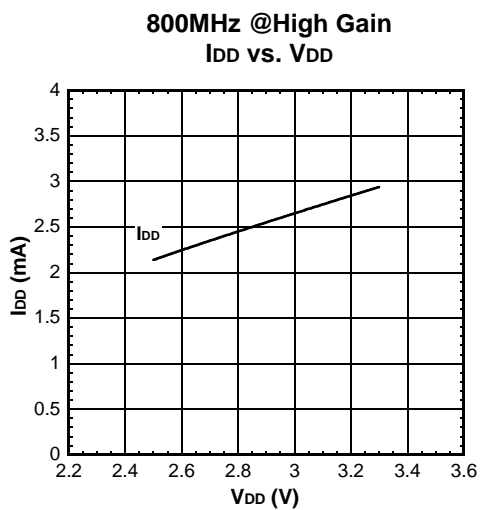
Condition

T_a=+25°C,

f=885MHz,

V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)



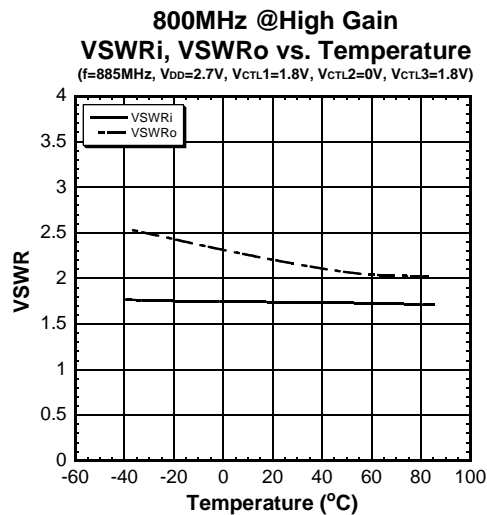
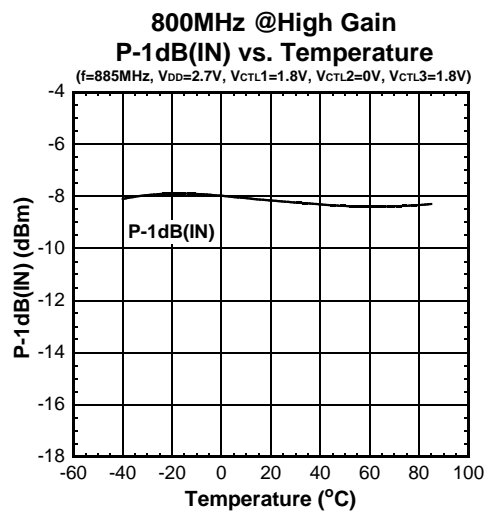
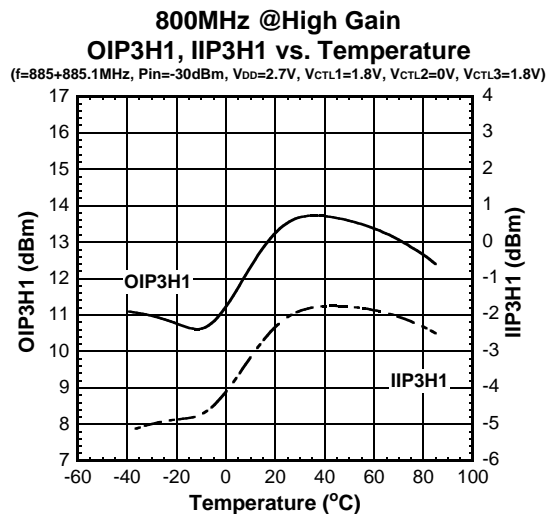
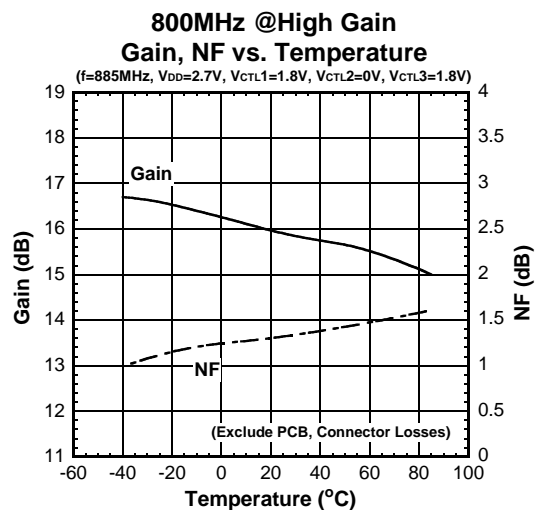
Condition

T_a=+25°C,

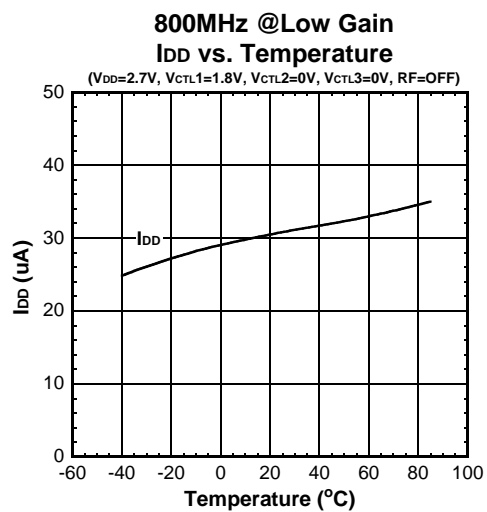
RF=OFF

V_{CTL1}=1.8V, V_{CTL2}=0V, V_{CTL3}=1.8V

■ ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)



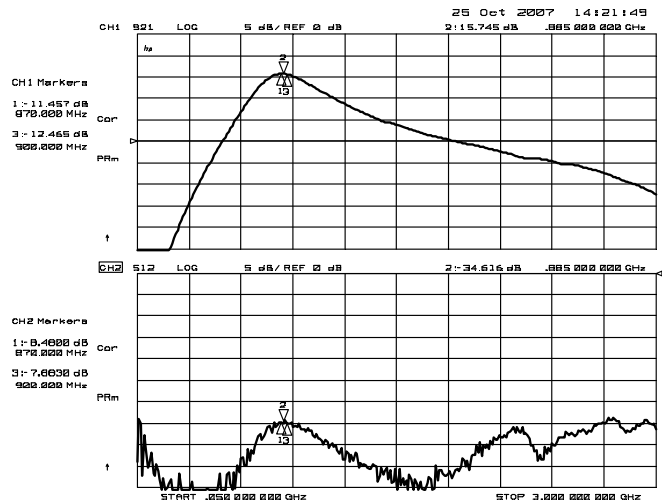
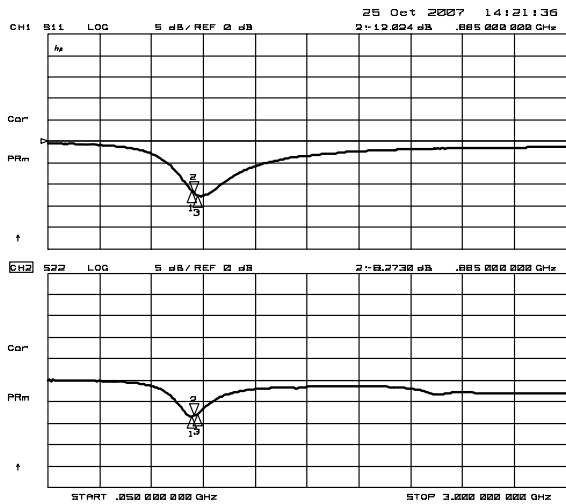
■ ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)



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ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)

Condition : $T_a = +25^\circ\text{C}$, $V_{DD} = 2.7\text{V}$, $V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.8\text{V}$

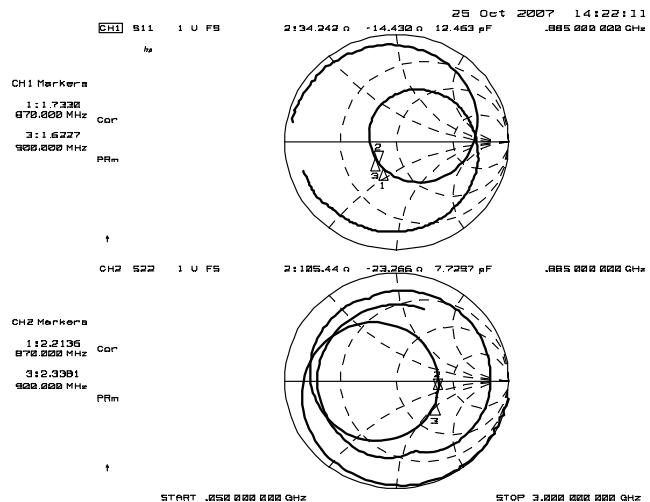
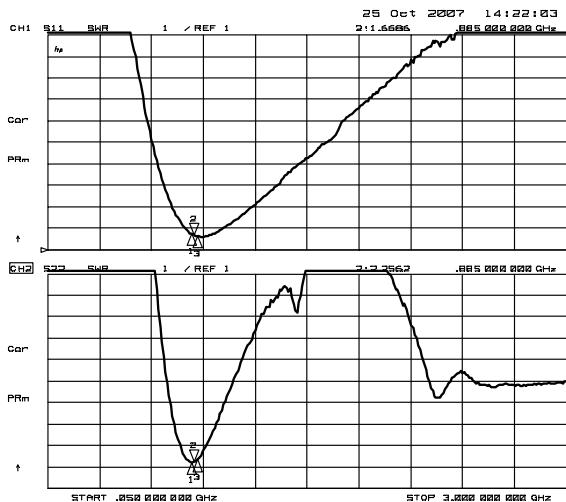


CH1 Markers
1:-11.457 dB
870.000 MHz
3:-12.465 dB
900.000 MHz

CH1 Markers
1:15.781 dB
870.000 MHz
3:15.639 dB
900.000 MHz

CH2 Markers
1:-8.400 dB
870.000 MHz
3:-7.603 dB
900.000 MHz

CH2 Markers
1:-34.811 dB
870.000 MHz
3:-34.955 dB
900.000 MHz



CH1 Markers
1:1.7330
870.000 MHz
3:1.6227
900.000 MHz

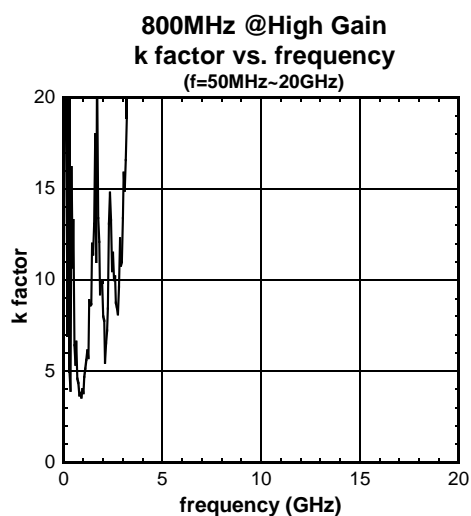
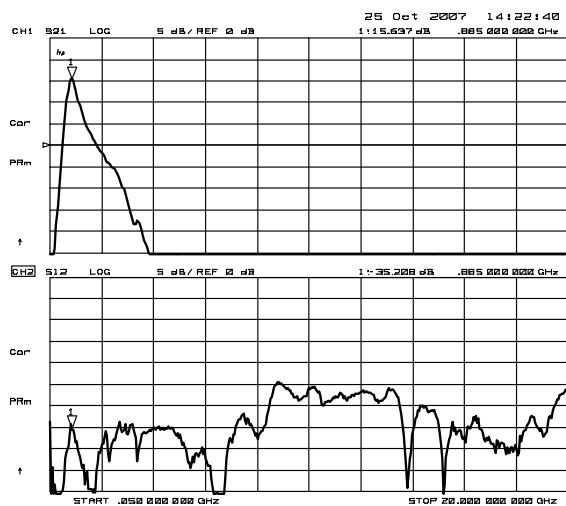
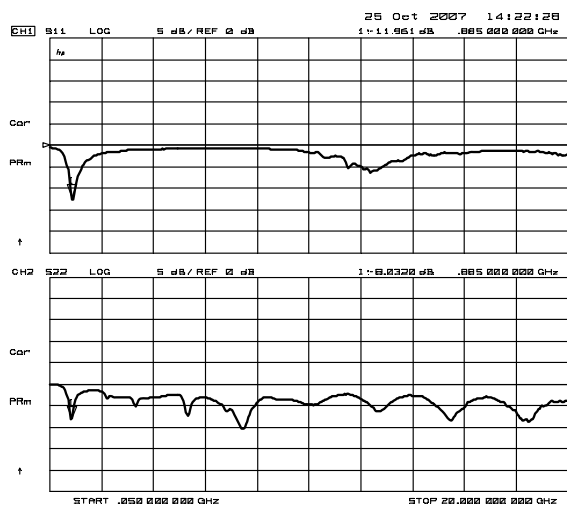
CH1 Markers
1:35.605 n
-19.605 n
870.000 MHz
3:33.105 n
-19.801 n
900.000 MHz

CH2 Markers
1:12.2136
870.000 MHz
3:12.3091
900.000 MHz

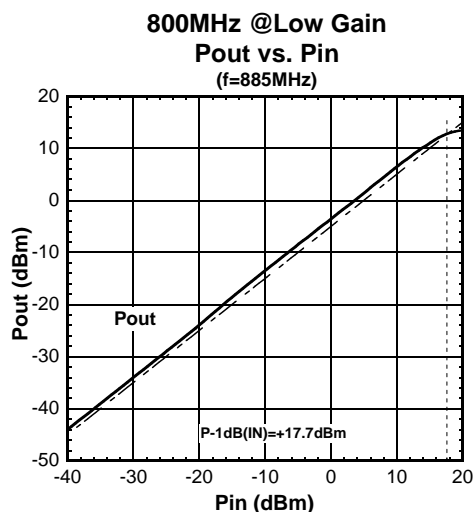
CH2 Markers
1:189.54 n
7.3182 n
870.000 MHz
3:187.377 n
-44.509 n
900.000 MHz

■ELECTRICAL CHARACTERISTICS (800MHz band High Gain mode)

Condition : $T_a = +25^\circ\text{C}$, $V_{DD} = 2.7\text{V}$, $V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 1.8\text{V}$



■ ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)

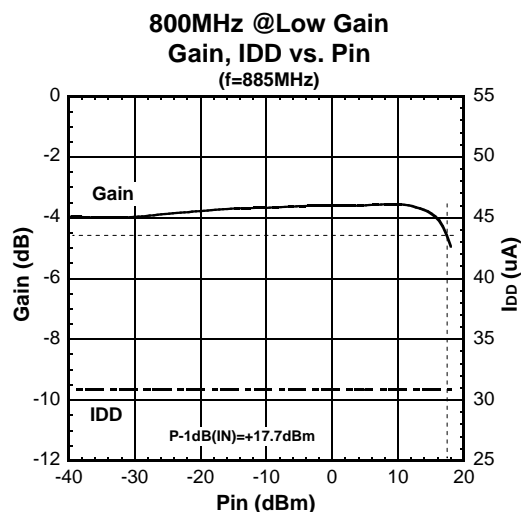


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

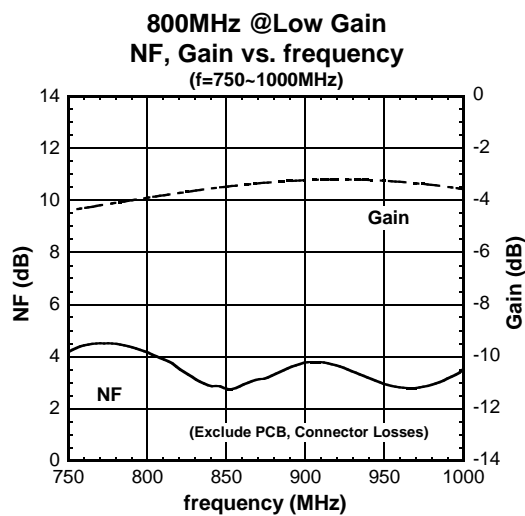


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

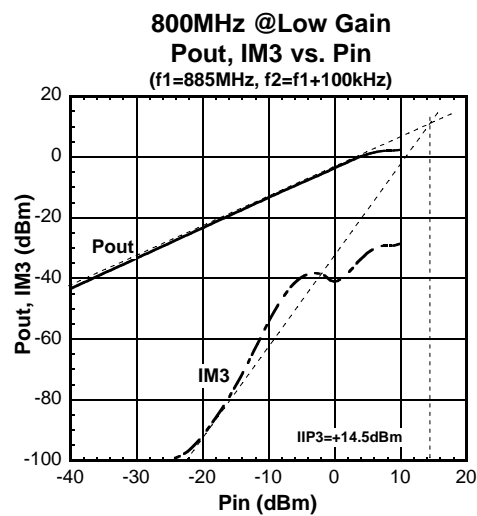


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$



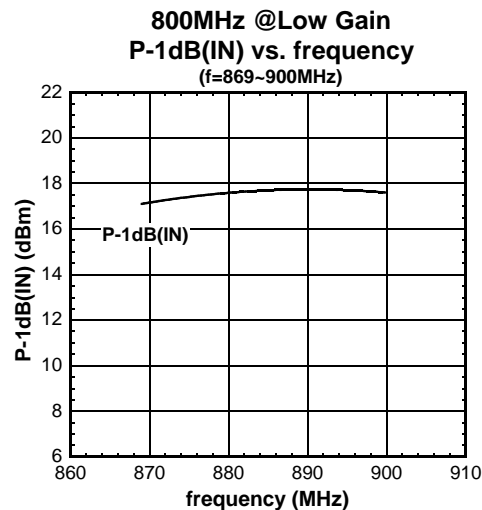
Condition

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

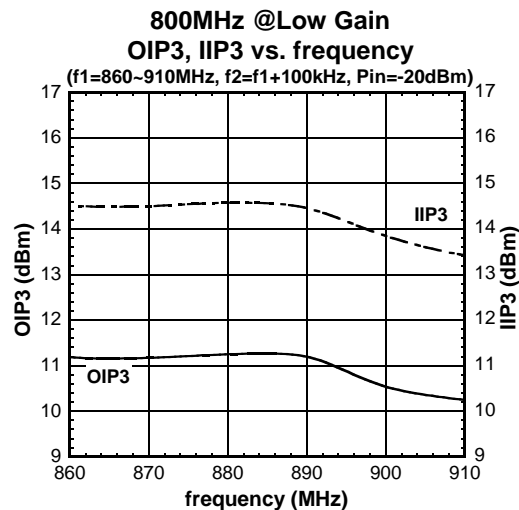
$V_{DD} = 2.7\text{V}$,

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

■ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)

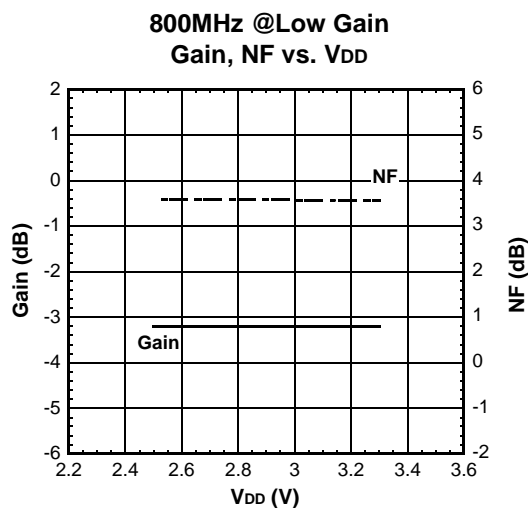


Condition
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=0V



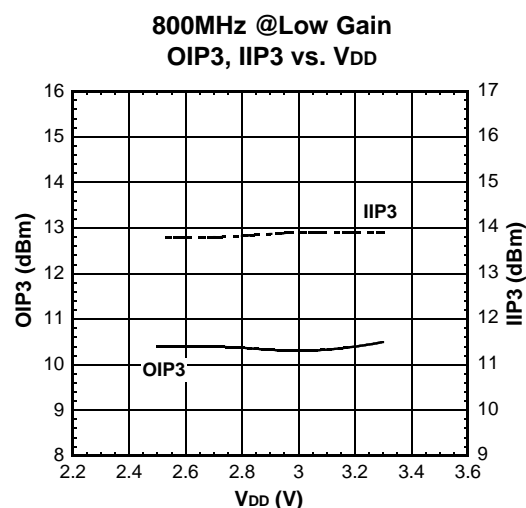
Condition
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=0V

■ ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)



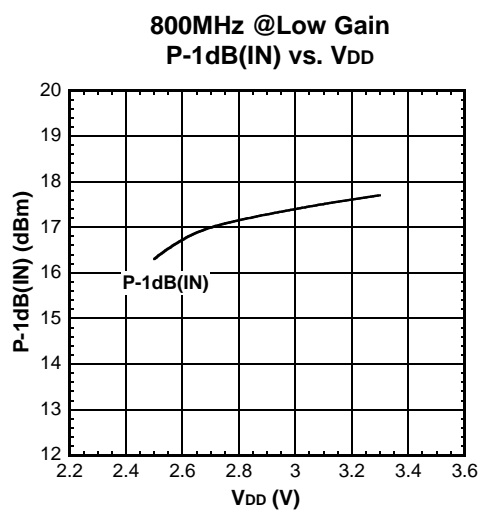
Condition

T_a=+25°C,
f=885MHz,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=0V



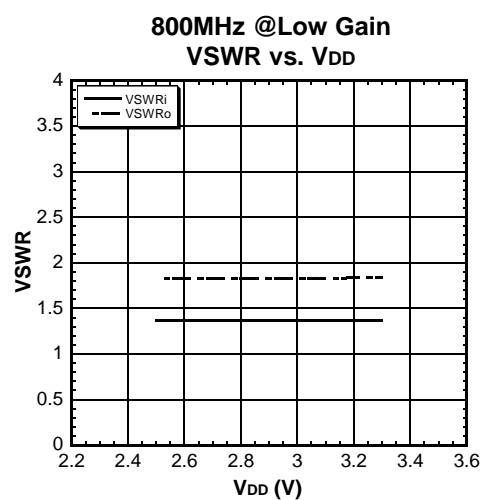
Condition

T_a=+25°C,
f1=885MHz, f2=f1+100kHz,
Pin=-20dBm,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=0V



Condition

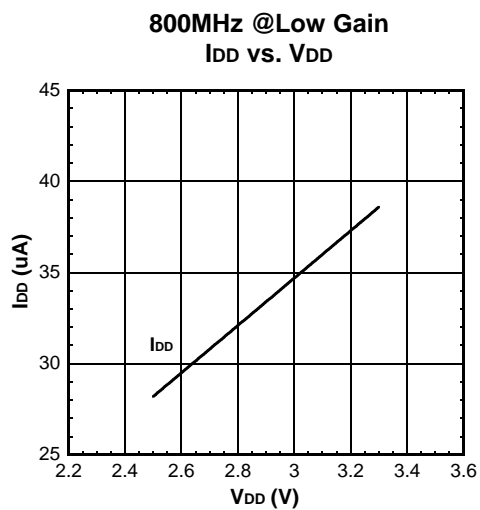
T_a=+25°C,
f=885MHz,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=0V



Condition

T_a=+25°C,
f=885MHz,
V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=0V

■ ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)



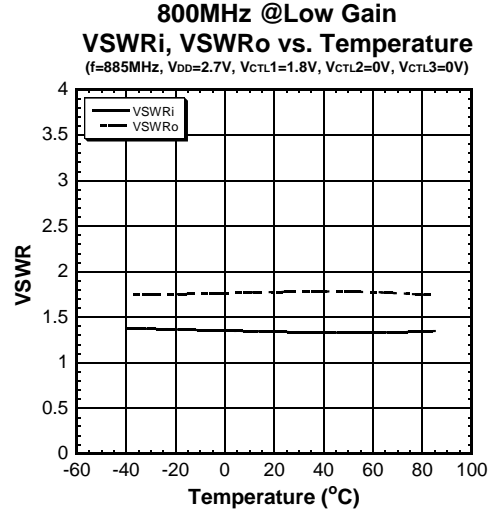
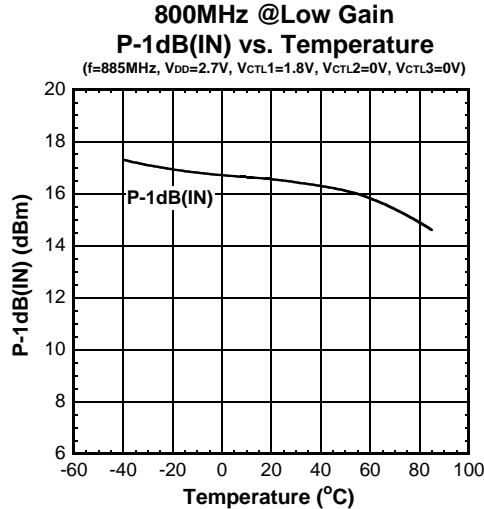
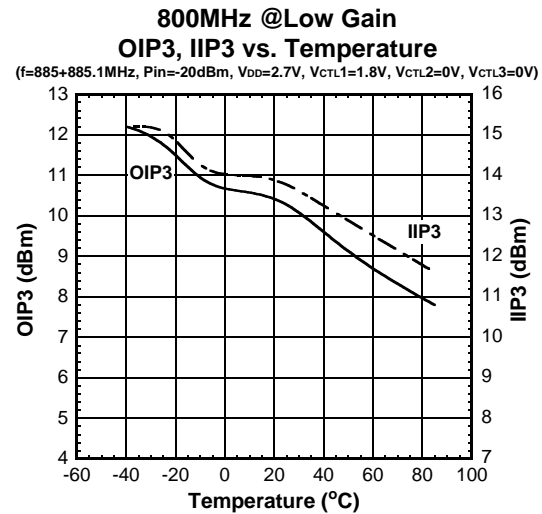
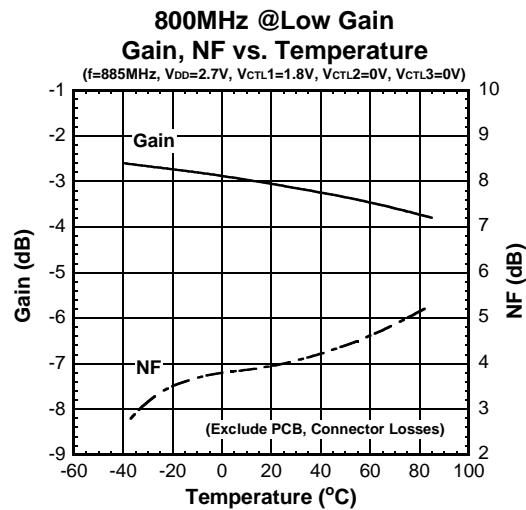
Condition

T_a=+25°C,

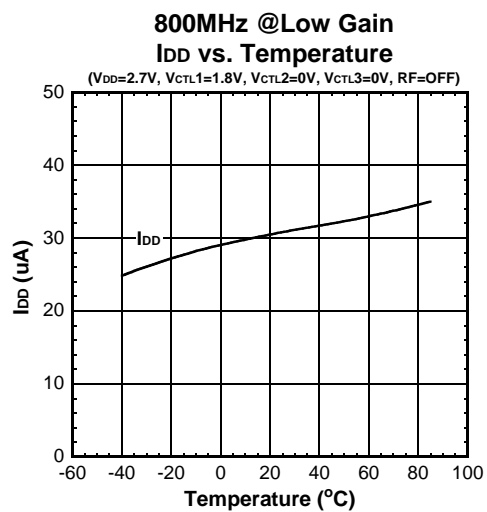
R_F=OFF

V_{CTL}1=1.8V, V_{CTL}2=0V, V_{CTL}3=0V

■ ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)



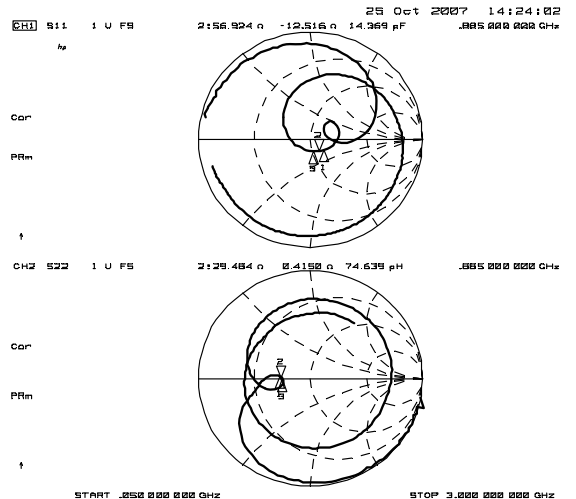
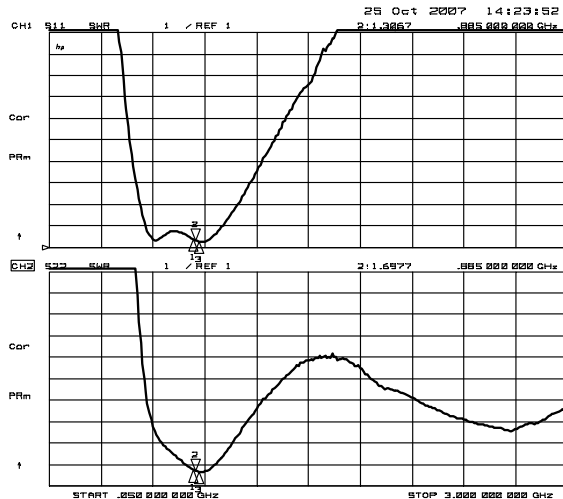
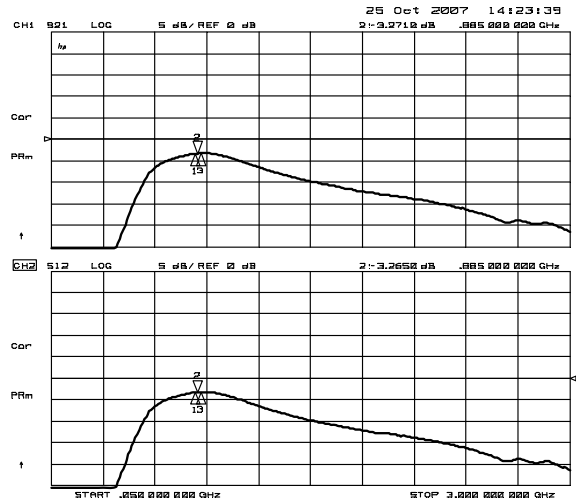
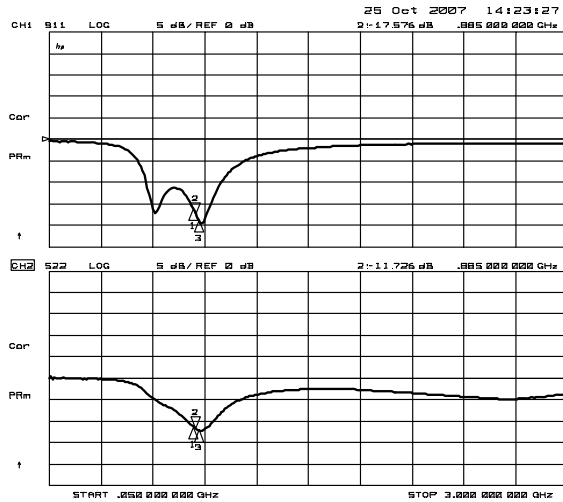
■ ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)



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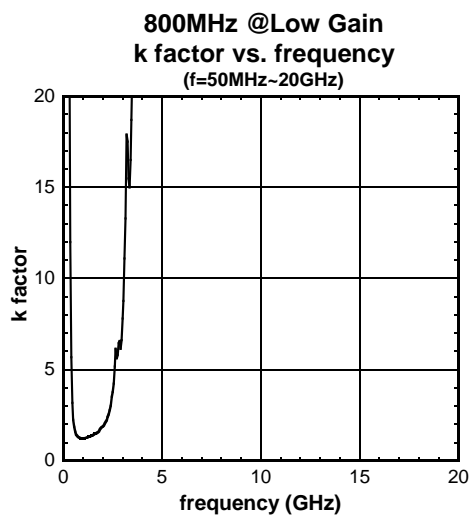
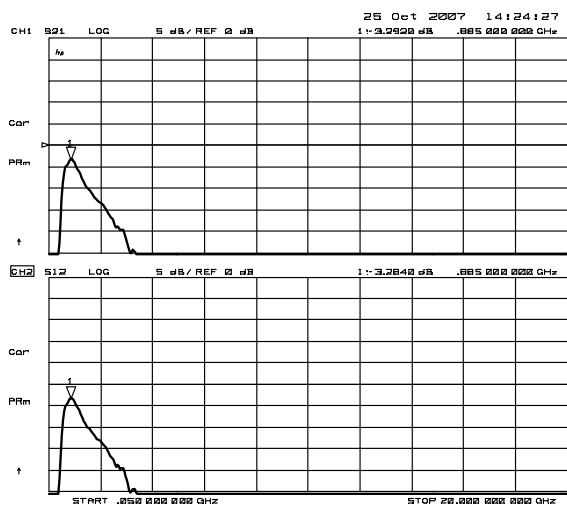
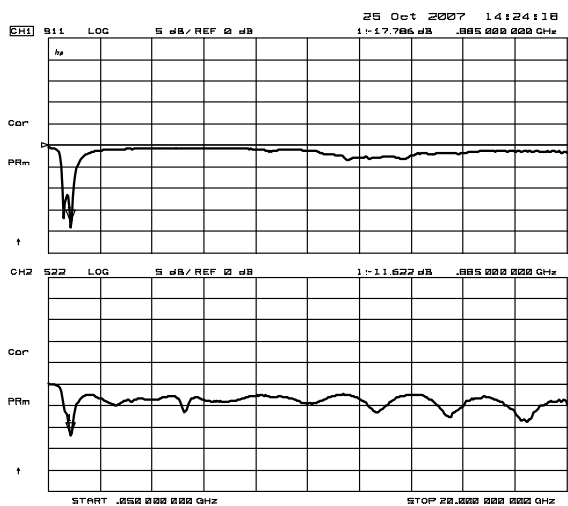
ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)

Condition : $T_a = +25^\circ\text{C}$, $V_{DD} = 2.7\text{V}$, $V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 0\text{V}$, $V_{CTL3} = 0\text{V}$

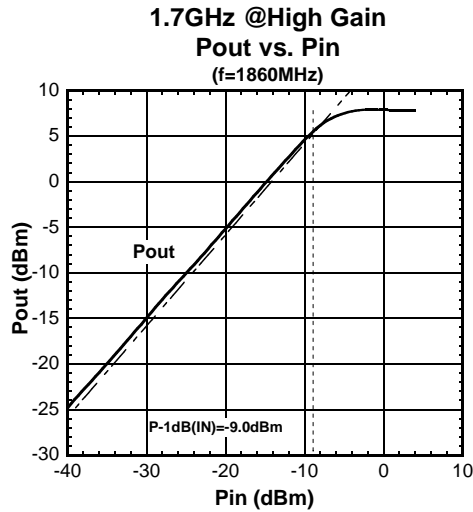


■ELECTRICAL CHARACTERISTICS (800MHz band Low Gain mode)

Condition : $T_a=+25^{\circ}\text{C}$, $V_{DD}=2.7\text{V}$, $V_{CTL1}=1.8\text{V}$, $V_{CTL2}=0\text{V}$, $V_{CTL3}=0\text{V}$

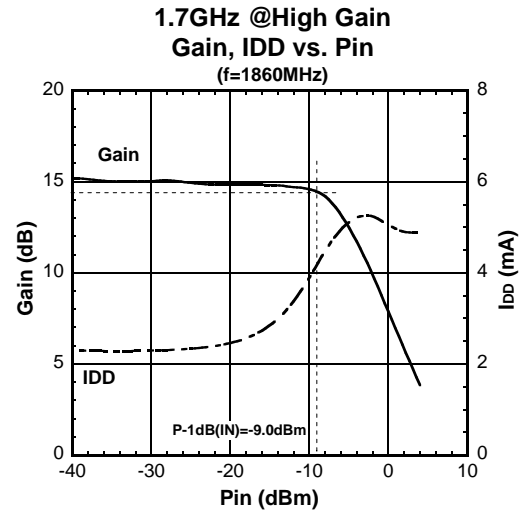


■ ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)



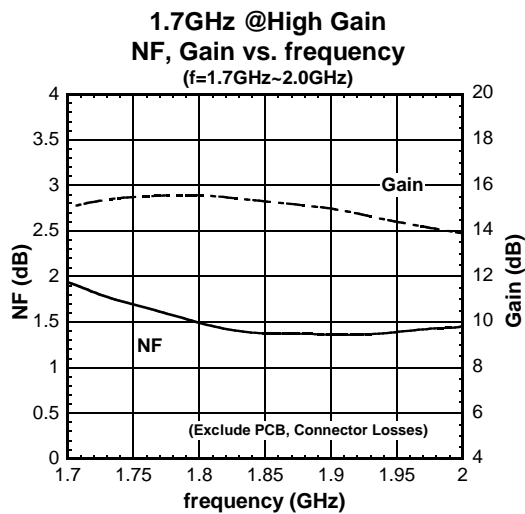
Condition

Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



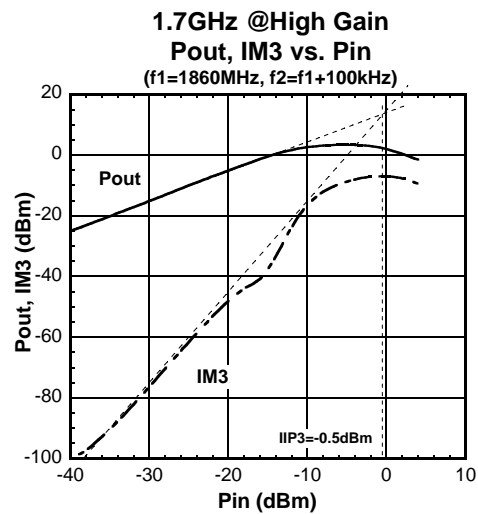
Condition

Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



Condition

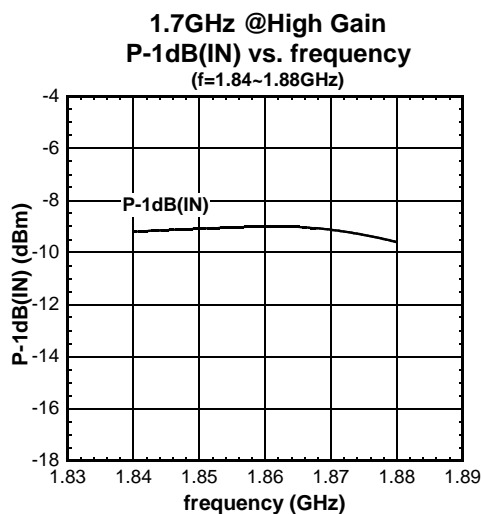
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



Condition

Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)

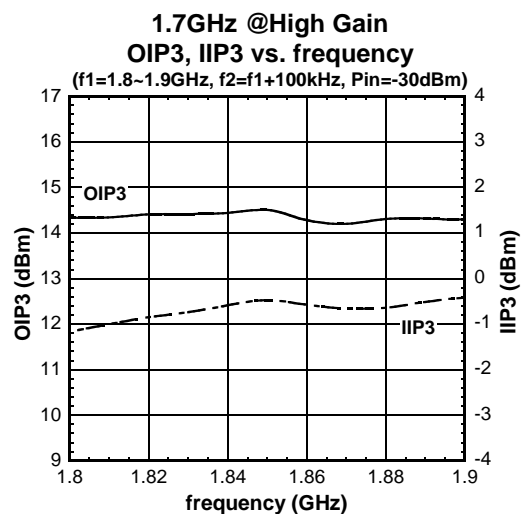


Condition

Ta=+25°C,

V_{DD}= 2.7V,

V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



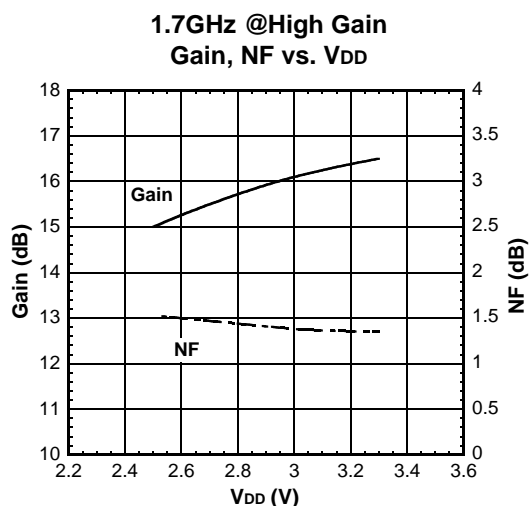
Condition

Ta=+25°C,

V_{DD}= 2.7V,

V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)

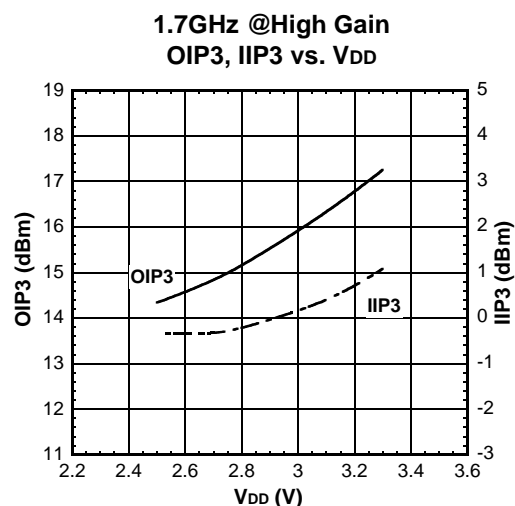


Condition

T_a=+25°C,

f=1860MHz,

V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



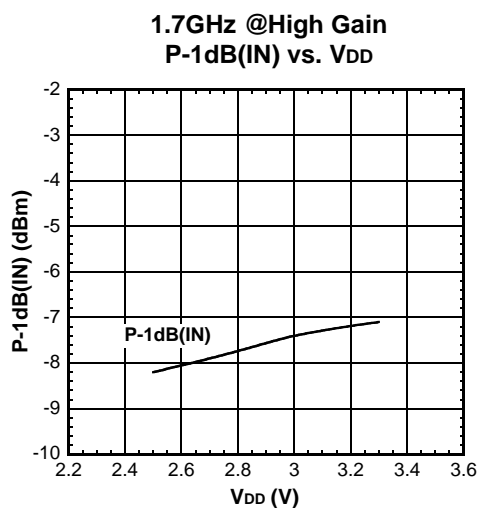
Condition

T_a=+25°C,

f₁=1860MHz, f₂=f₁+100kHz,

Pin=-30dBm,

V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

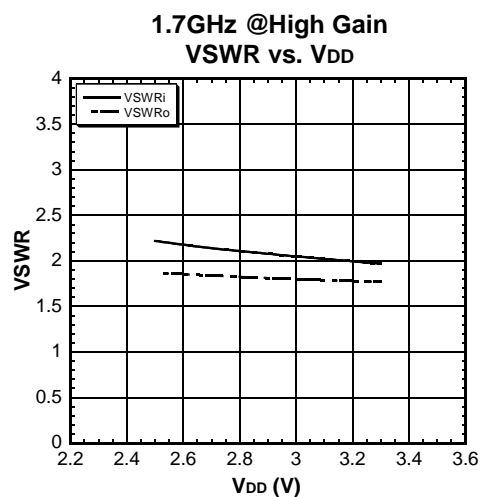


Condition

T_a=+25°C,

f=1860MHz,

V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



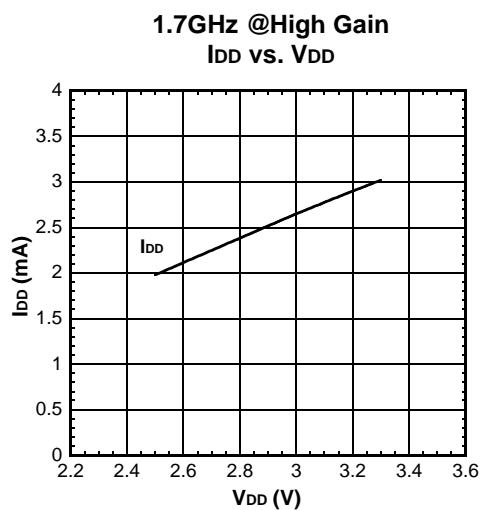
Condition

T_a=+25°C,

f=1860MHz,

V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)



Condition

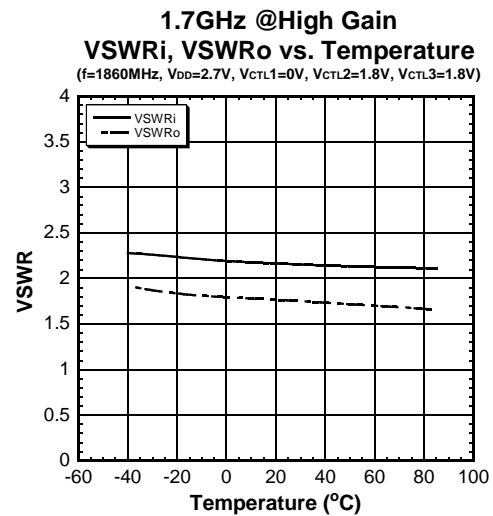
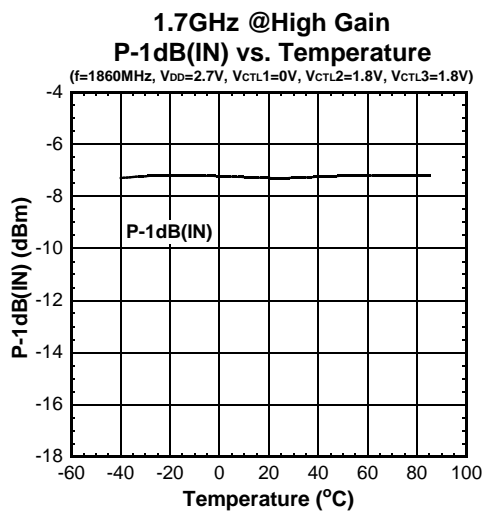
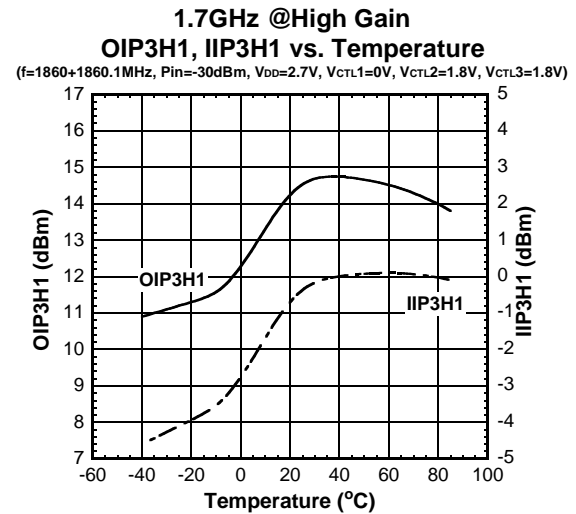
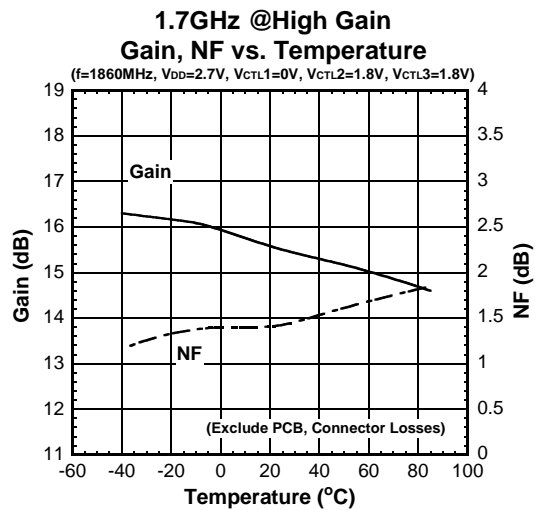
T_a=+25°C,

RF=OFF

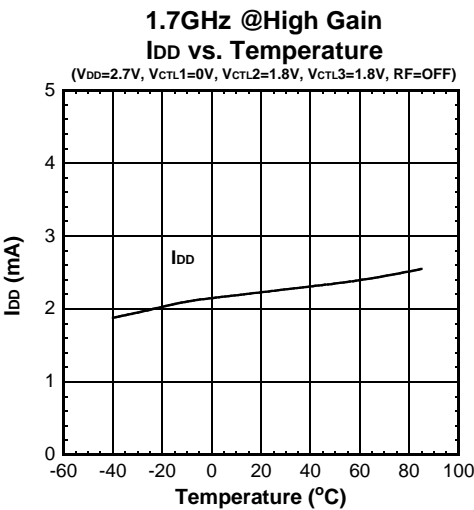
V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

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■ ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)



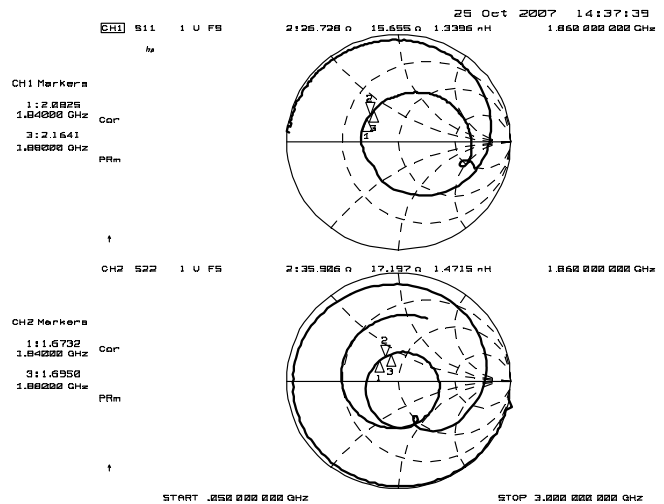
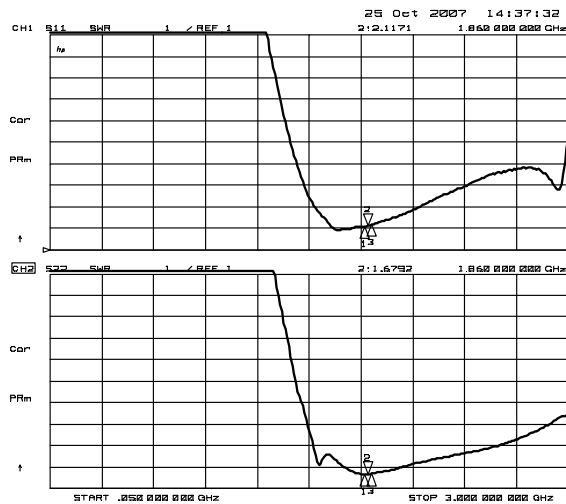
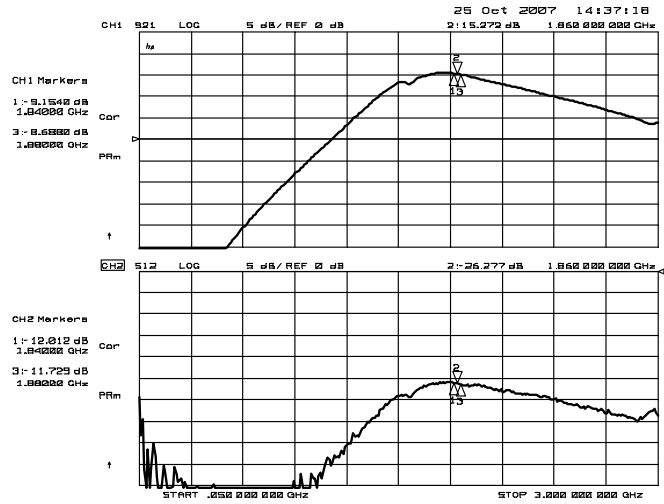
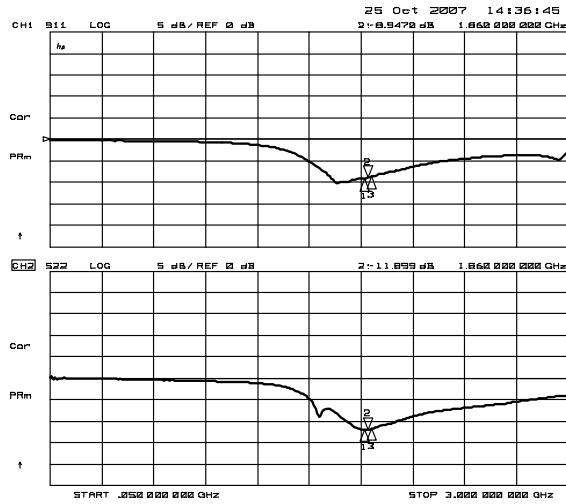
■ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)



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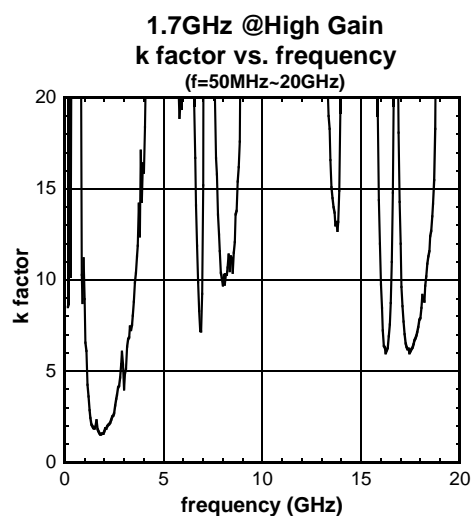
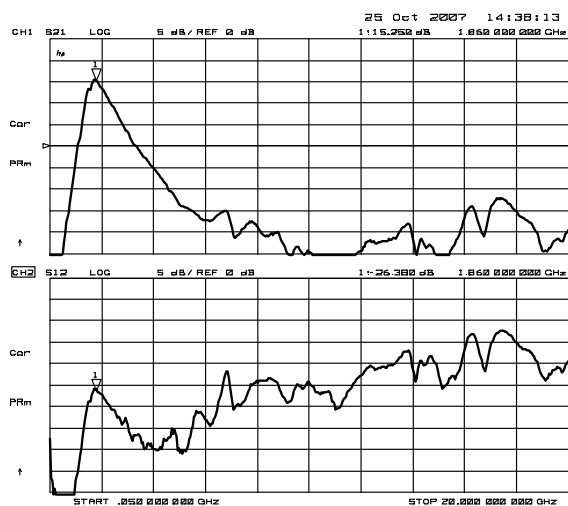
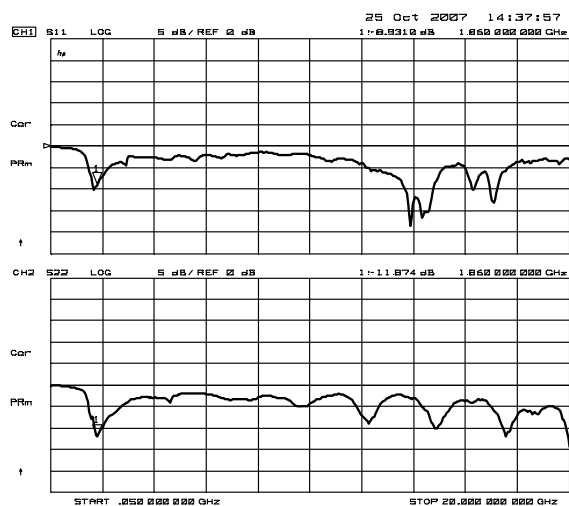
ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)

Condition : $T_a = +25^\circ\text{C}$, $V_{DD} = 2.7\text{V}$, $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 1.8\text{V}$

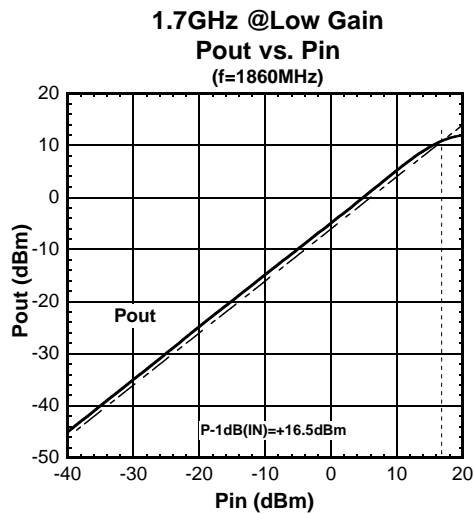


■ELECTRICAL CHARACTERISTICS (1.7GHz band High Gain mode)

Condition : $T_a=+25^{\circ}\text{C}$, $V_{DD}=2.7\text{V}$, $V_{CTL1}=0\text{V}$, $V_{CTL2}=1.8\text{V}$, $V_{CTL3}=1.8\text{V}$



■ ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)

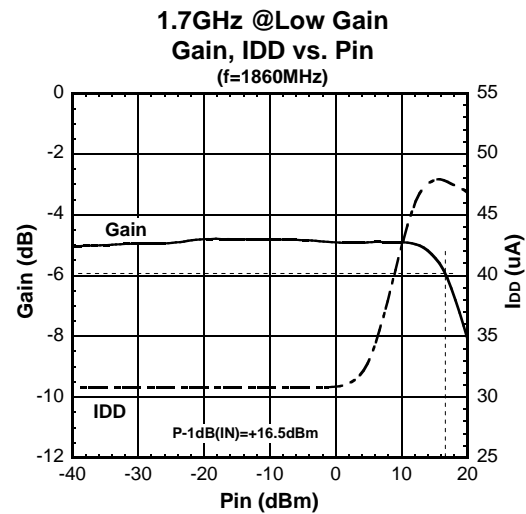


Condition

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

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

$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$

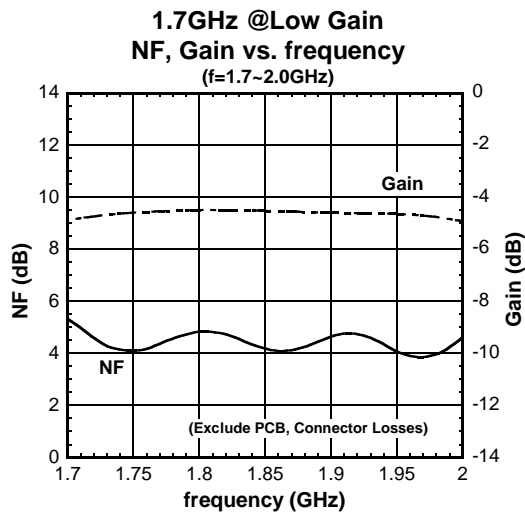


Condition

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

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

$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$

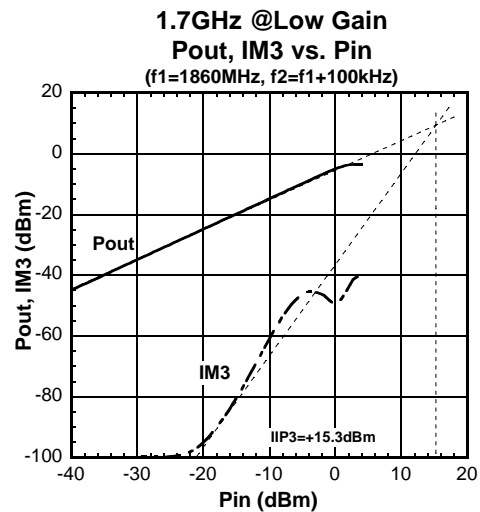


Condition

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

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

$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$



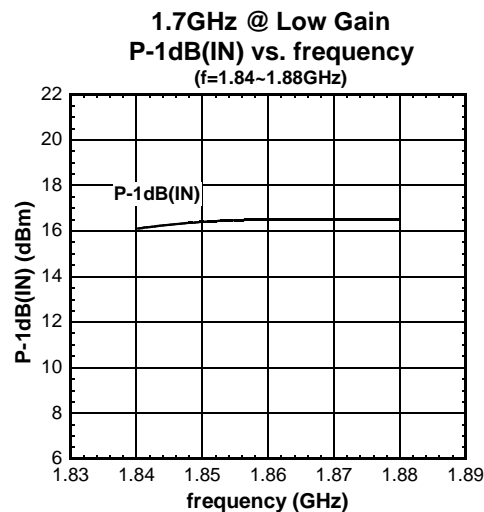
Condition

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

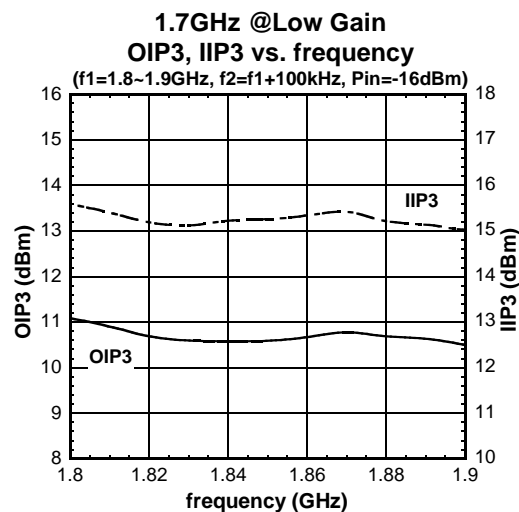
$V_{DD} = 2.7\text{V}$,

$V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$

■ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)

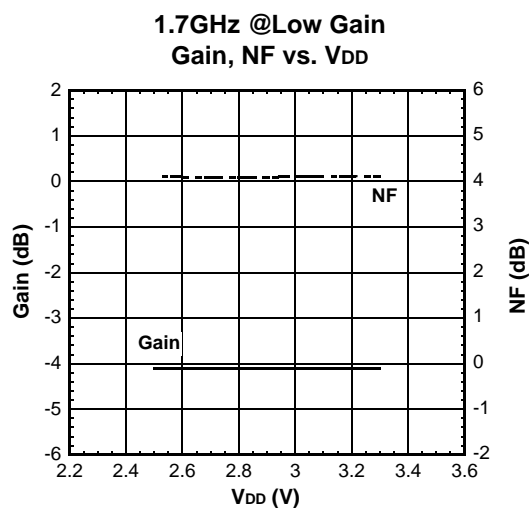


Condition
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=0V



Condition
Ta=+25°C,
V_{DD}= 2.7V,
V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=0V

■ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)

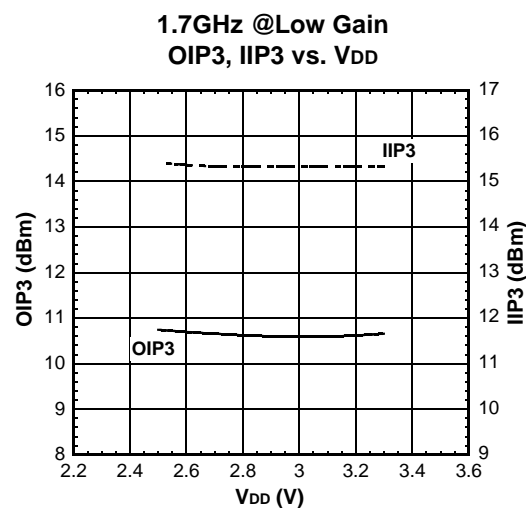


Condition

T_a=+25°C,

f=1860MHz,

V_{CTL1}=0V, V_{CTL2}=1.8V, V_{CTL3}=0V



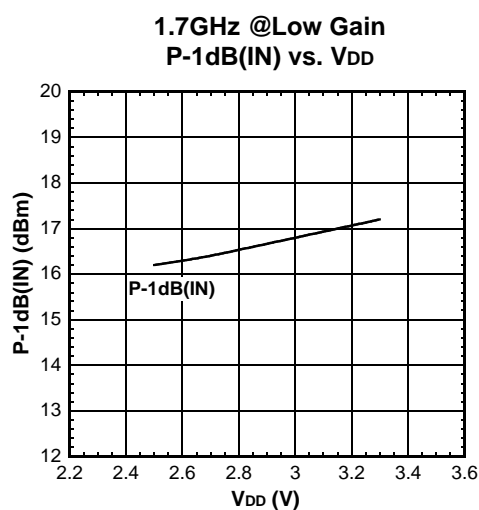
Condition

T_a=+25°C,

f₁=1860MHz, f₂=f₁+100kHz,

Pin=-16dBm,

V_{CTL1}=0V, V_{CTL2}=1.8V, V_{CTL3}=0V

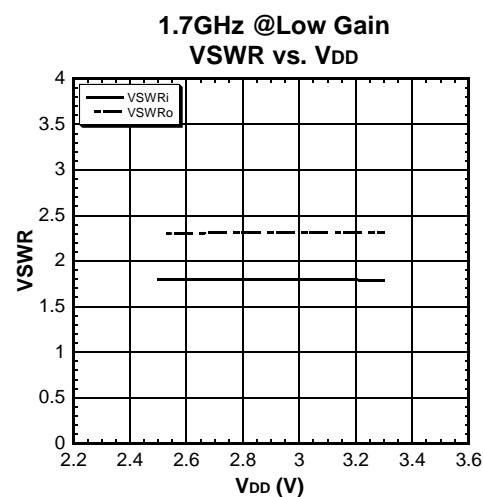


Condition

T_a=+25°C,

f=1860MHz,

V_{CTL1}=0V, V_{CTL2}=1.8V, V_{CTL3}=0V



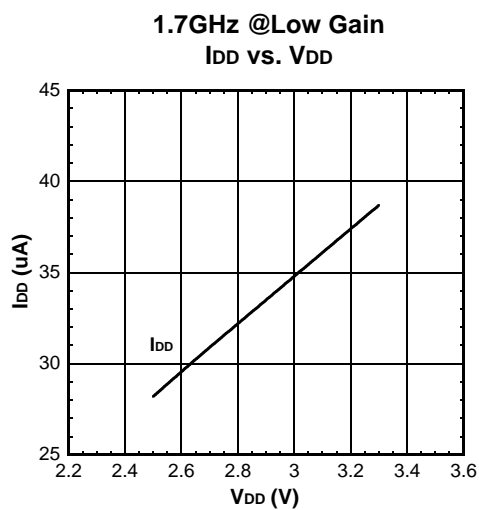
Condition

T_a=+25°C,

f=1860MHz,

V_{CTL1}=0V, V_{CTL2}=1.8V, V_{CTL3}=0V

■ ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)



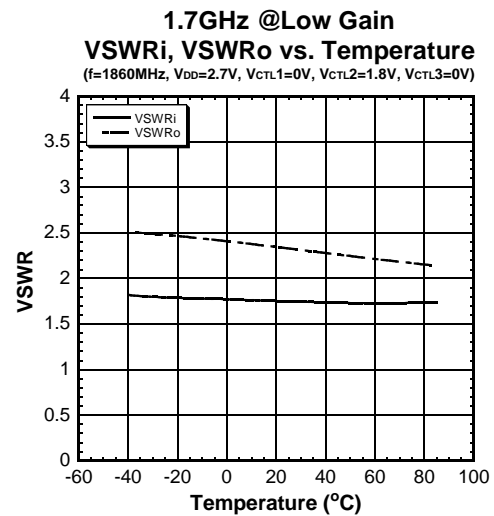
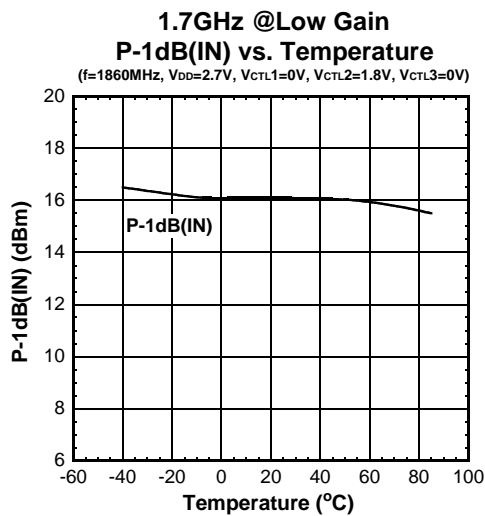
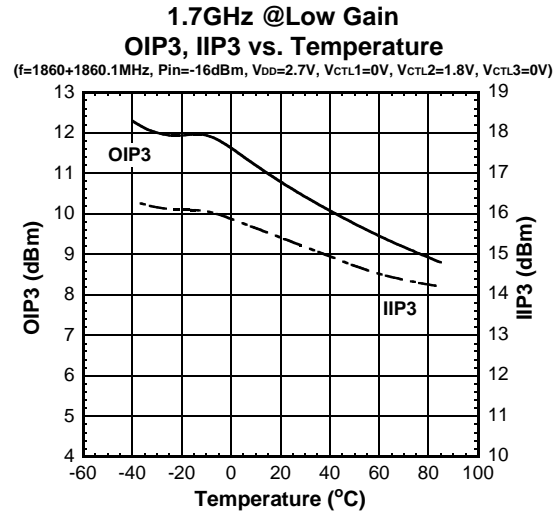
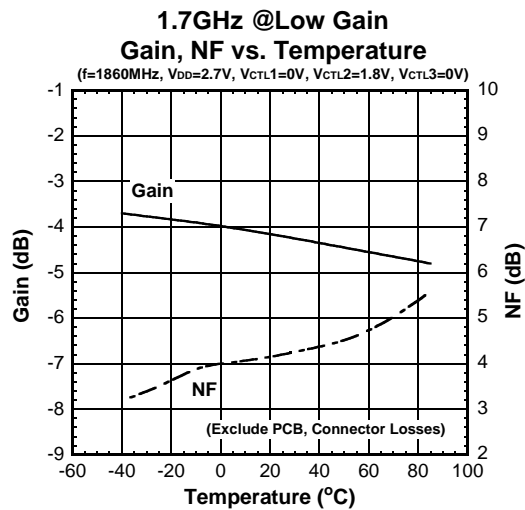
Condition

T_a=+25°C,

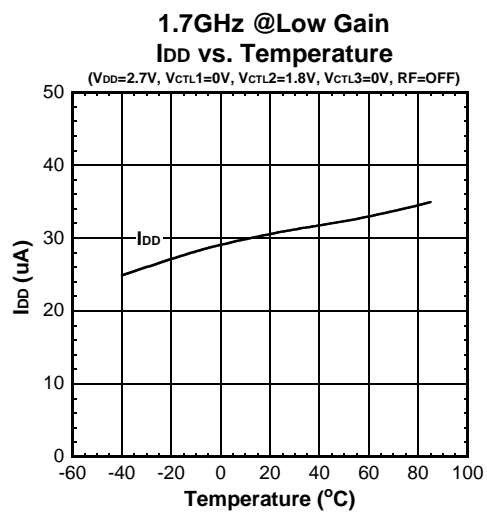
R_F=OFF,

V_{CTL}1=0V, V_{CTL}2=1.8V, V_{CTL}3=0V

■ ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)



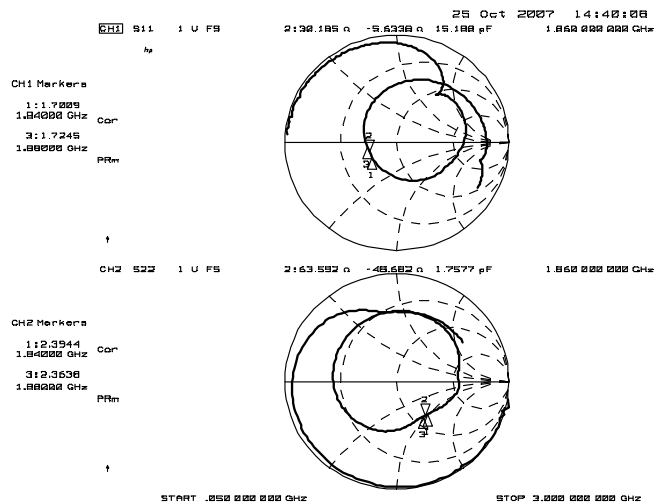
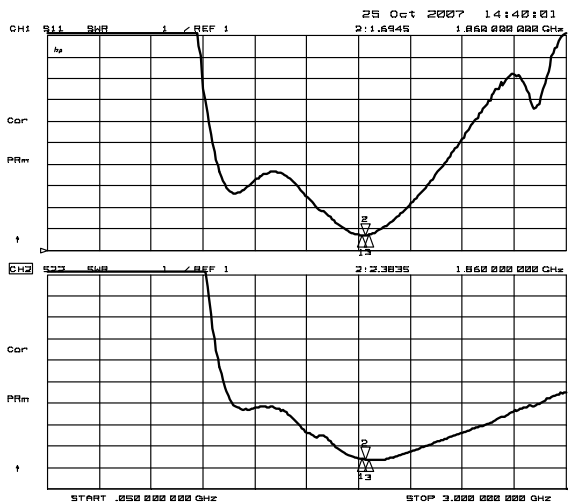
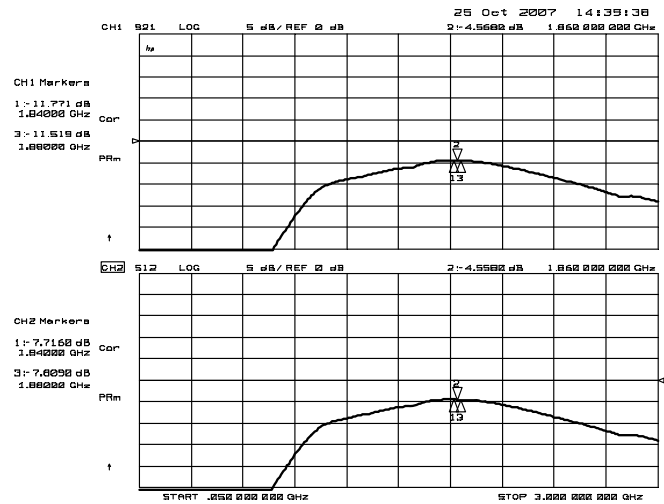
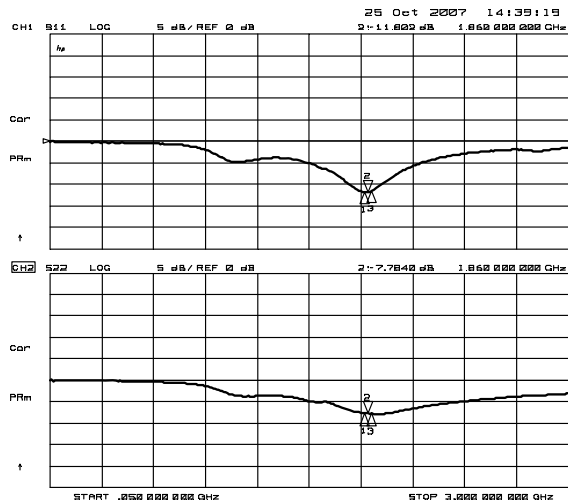
■ ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)



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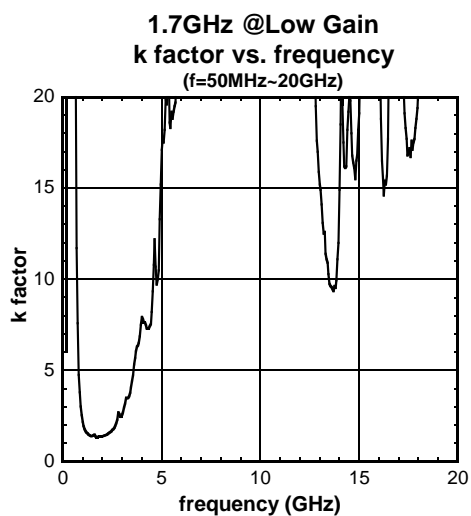
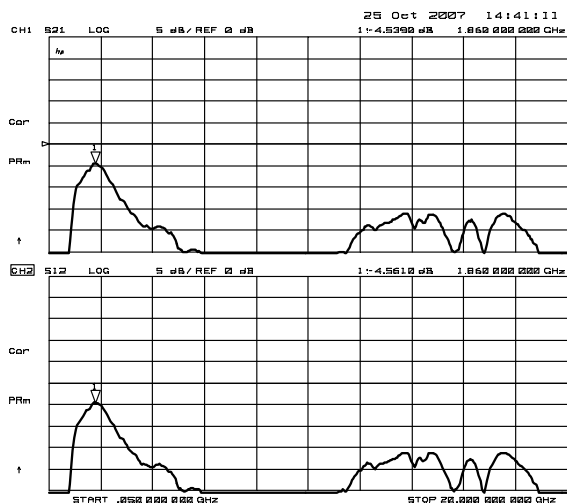
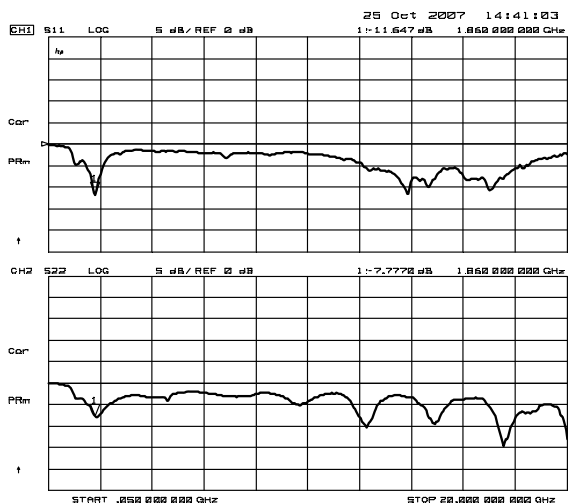
ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)

Condition : $T_a = +25^\circ\text{C}$, $V_{DD} = 2.7\text{V}$, $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$

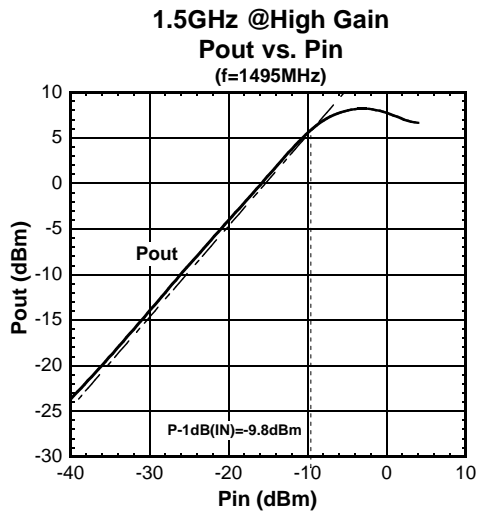


■ELECTRICAL CHARACTERISTICS (1.7GHz band Low Gain mode)

Condition : $T_a = +25^{\circ}\text{C}$, $V_{DD} = V_{INV} = 2.7\text{V}$, $V_{CTL1} = 0\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$



■ ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)

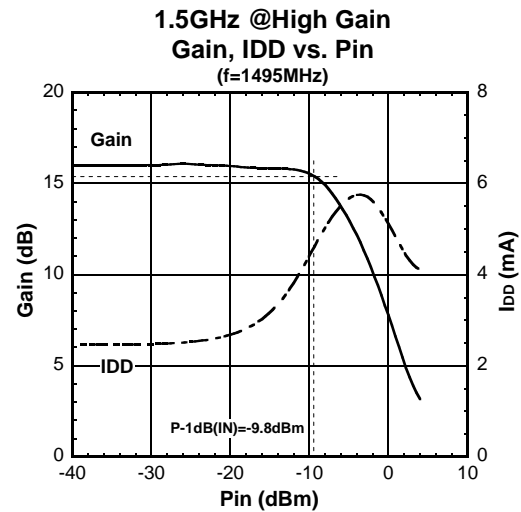


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 1.8\text{V}$

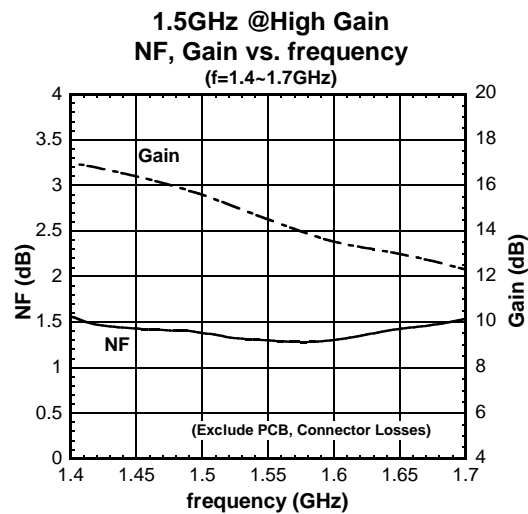


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 1.8\text{V}$

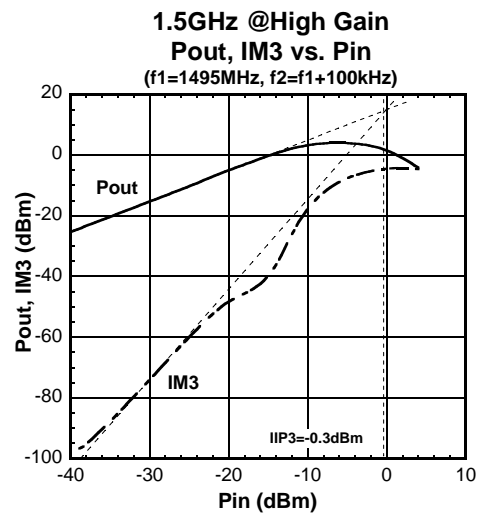


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 1.8\text{V}$



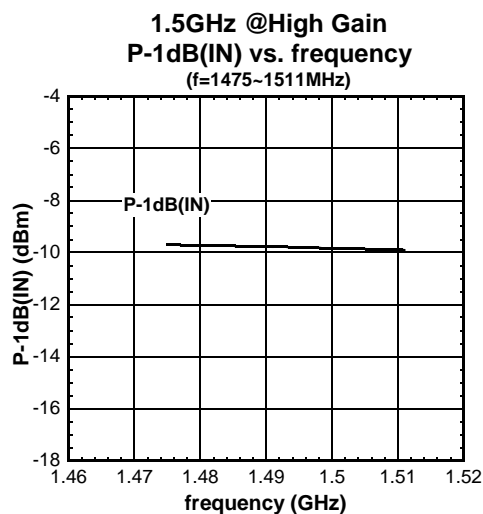
Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 1.8\text{V}$

■ ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)

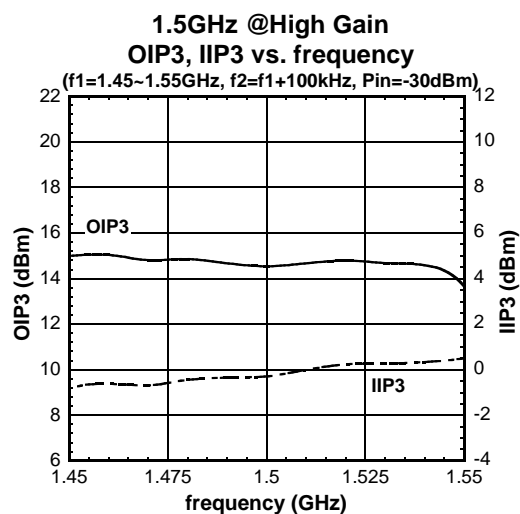


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 1.8\text{V}$



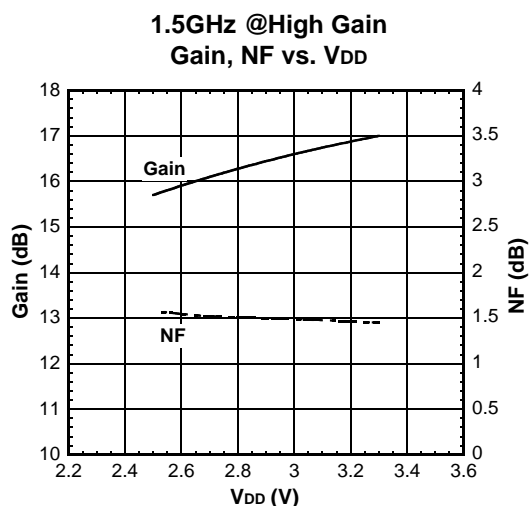
Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 1.8\text{V}$

■ ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)

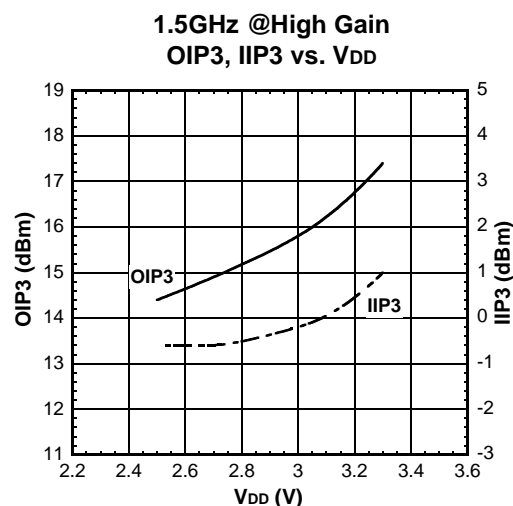


Condition

T_a=+25°C,

f=1495MHz,

V_{CTL}1=1.8V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



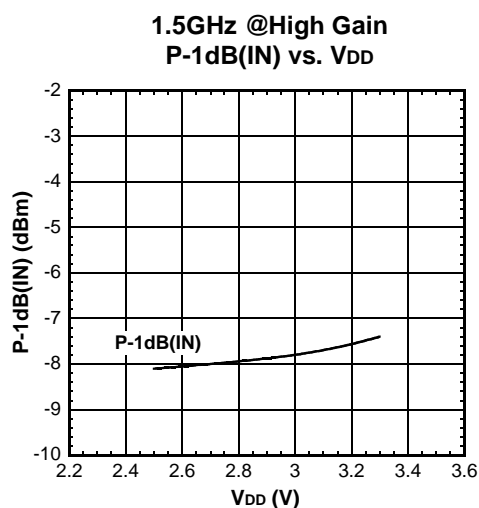
Condition

T_a=+25°C,

f₁=1495MHz, f₂=f₁+100kHz,

Pin=-30dBm,

V_{CTL}1=1.8V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

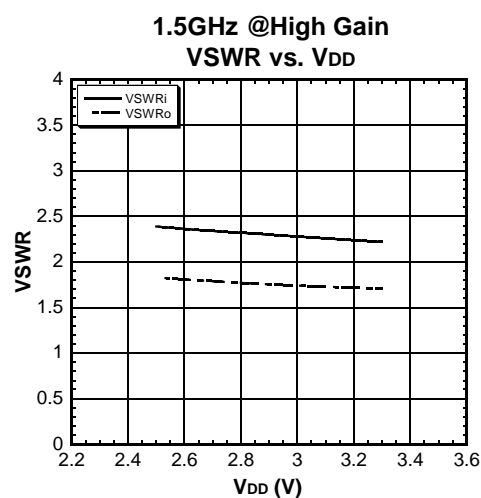


Condition

T_a=+25°C,

f=1495MHz,

V_{CTL}1=1.8V, V_{CTL}2=1.8V, V_{CTL}3=1.8V



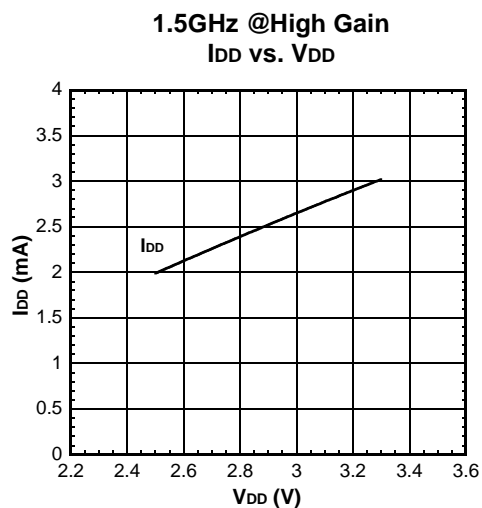
Condition

T_a=+25°C,

f=1495MHz,

V_{CTL}1=1.8V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)



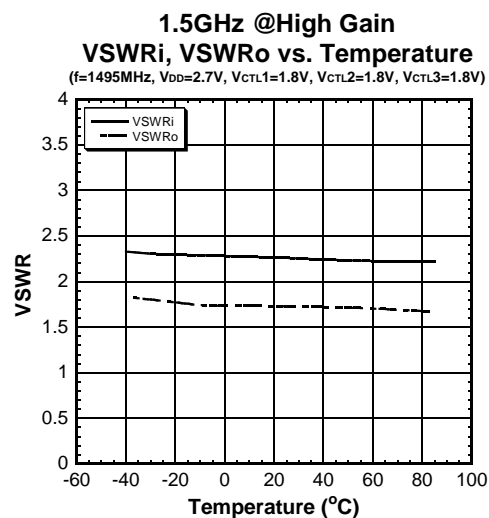
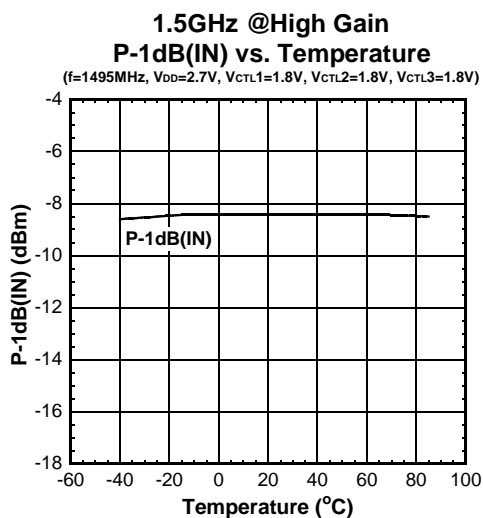
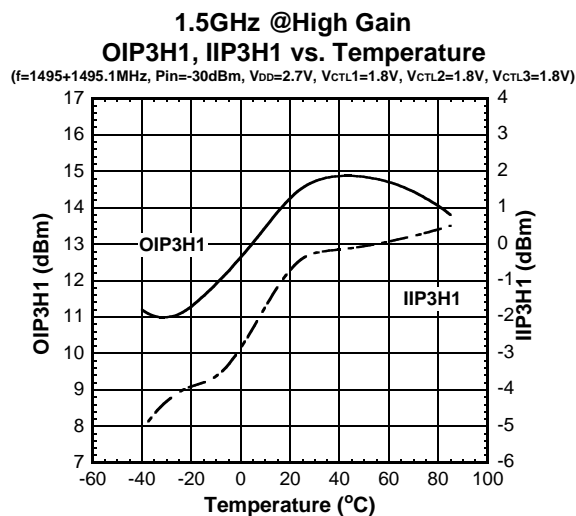
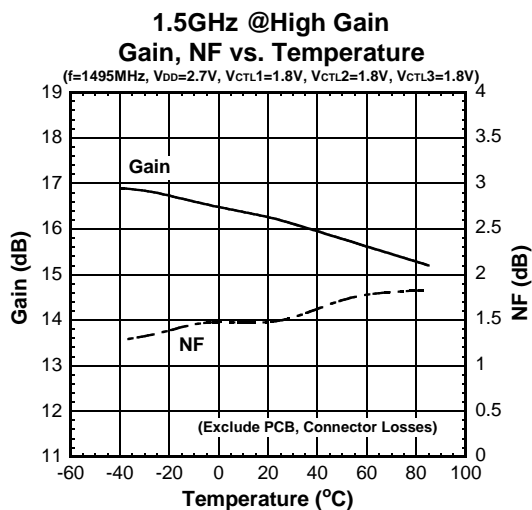
Condition

T_a=+25°C,

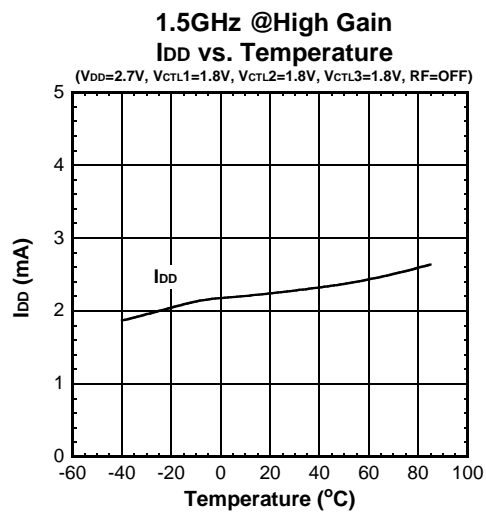
RF=OFF

V_{CTL}1=1.8V, V_{CTL}2=1.8V, V_{CTL}3=1.8V

■ ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)



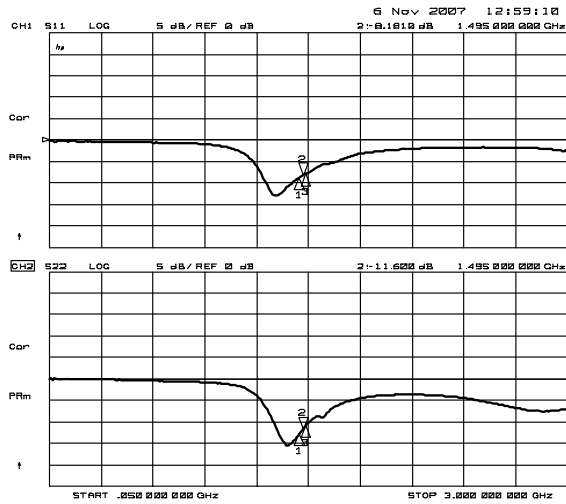
■ ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)



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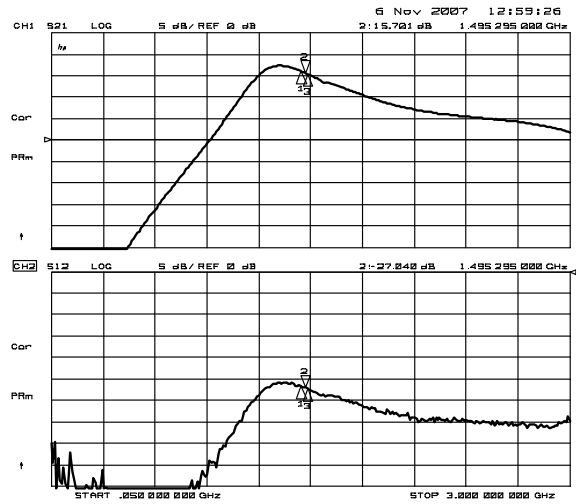
ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)

Condition : Ta=+25°C, V_{DD}= 2.7V, V_{CTL1}=1.8V, V_{CTL2}=1.8V, V_{CTL3}=1.8V



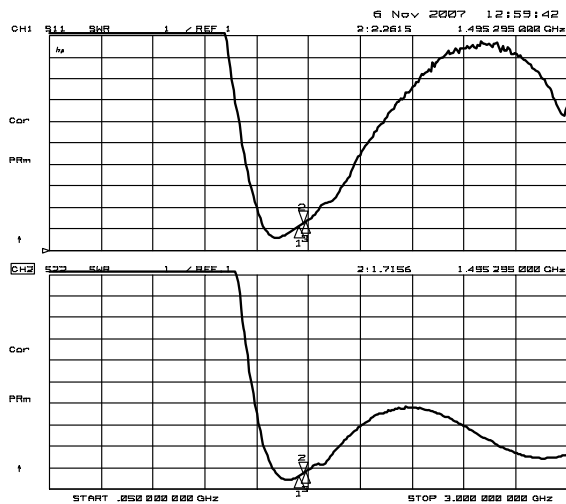
CH1 Markers

Marker	Frequency (GHz)	Value (dB)
1	1.47500	-8.7268
2	1.47500	-7.8380
3	1.51100	-8.1185



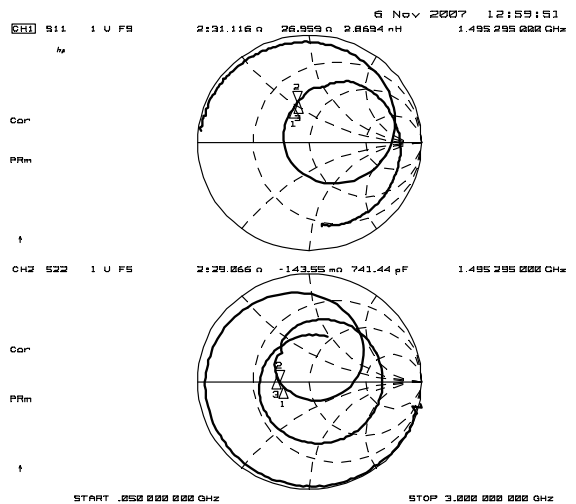
CH1 Markers

Marker	Frequency (GHz)	Value (dB)
1	1.47500	16.029
2	1.47500	15.400
3	1.51100	15.180



CH1 Markers

Marker	Frequency (GHz)	Value
1	1.47500	2.1388
2	1.47500	2.3541
3	1.51100	2.3541

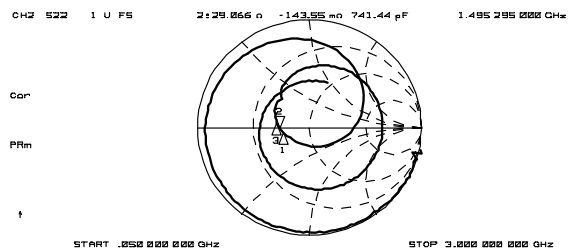


CH1 Markers

Marker	Frequency (GHz)	Value (nH)
1	1.47500	31.122
2	1.47500	24.085
3	1.51100	27.222

CH2 Markers

Marker	Frequency (GHz)	Value
1	1.47500	11.6075
2	1.47500	11.6130
3	1.51100	11.6130

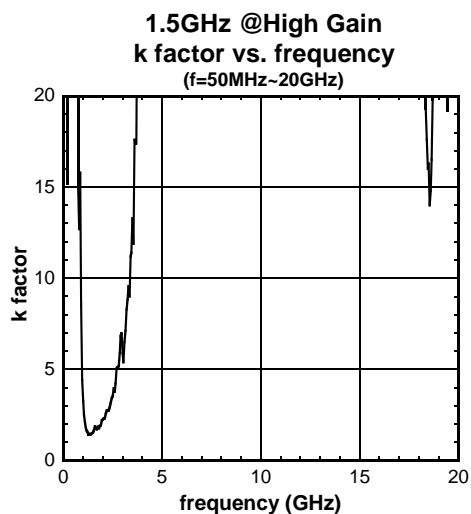
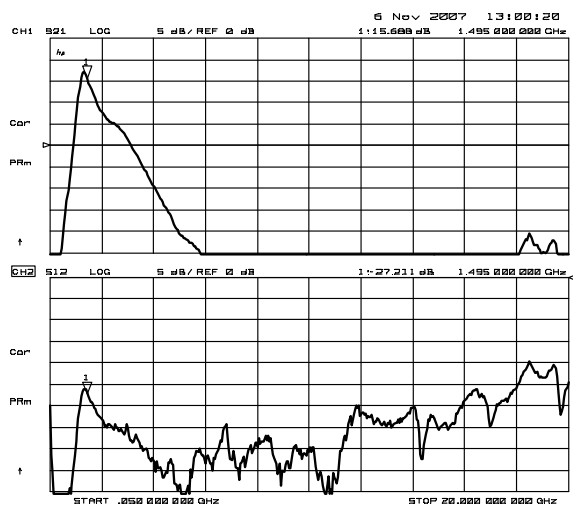
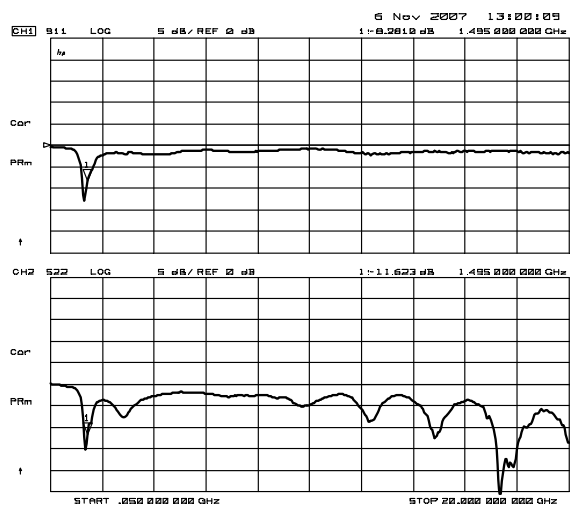


CH2 Markers

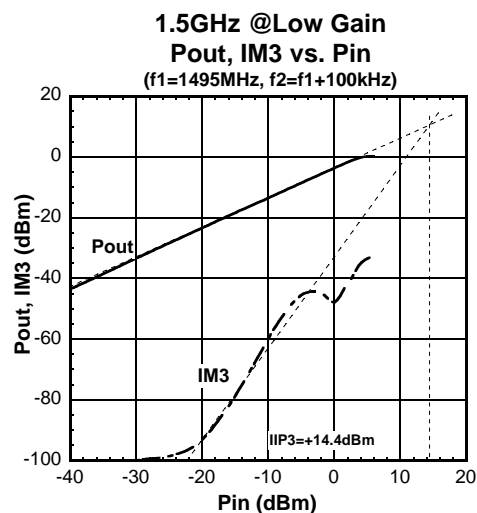
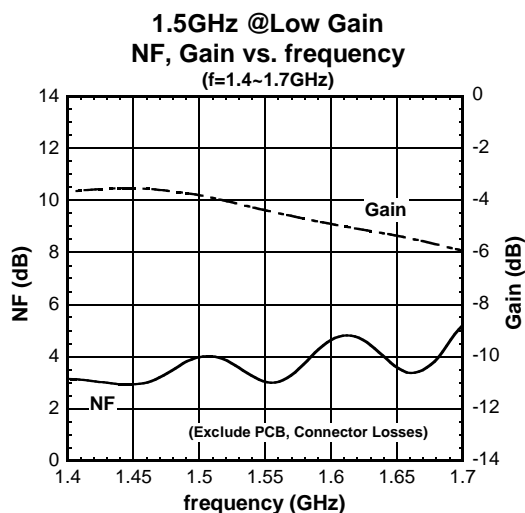
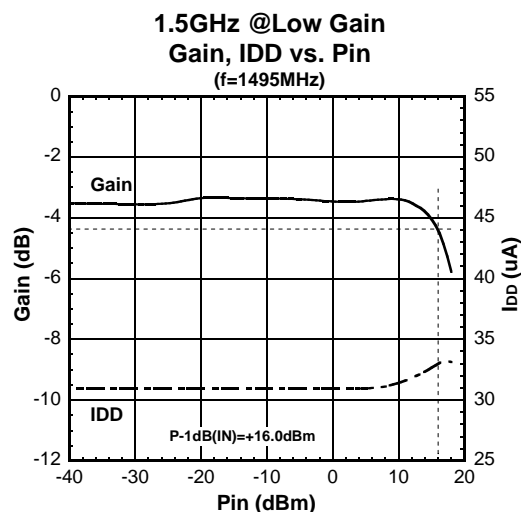
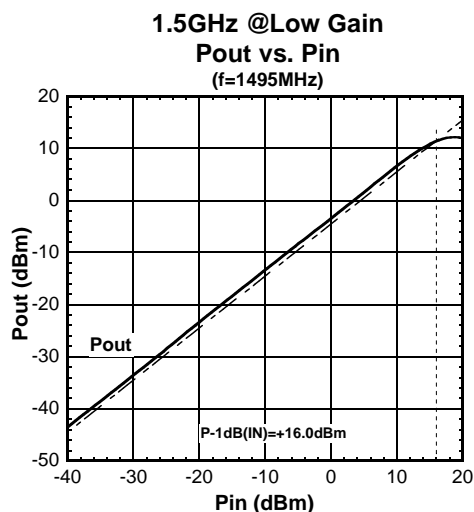
Marker	Frequency (GHz)	Value (nH)
1	1.47500	31.343
2	1.47500	31.445
3	1.51100	27.593

■ELECTRICAL CHARACTERISTICS (1.5GHz band High Gain mode)

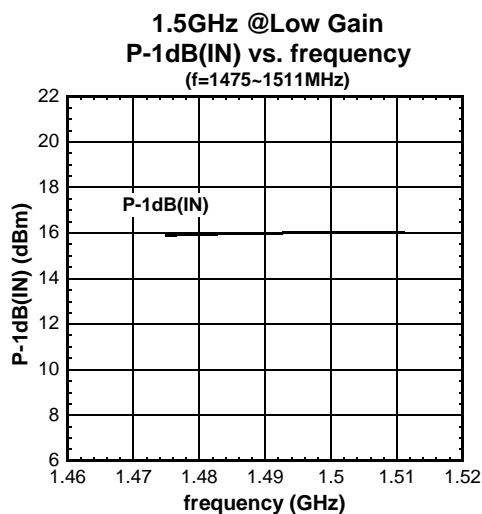
Condition : $T_a=+25^{\circ}\text{C}$, $V_{DD}=2.7\text{V}$, $V_{CTL1}=1.8\text{V}$, $V_{CTL2}=1.8\text{V}$, $V_{CTL3}=1.8\text{V}$



■ ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)



■ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)

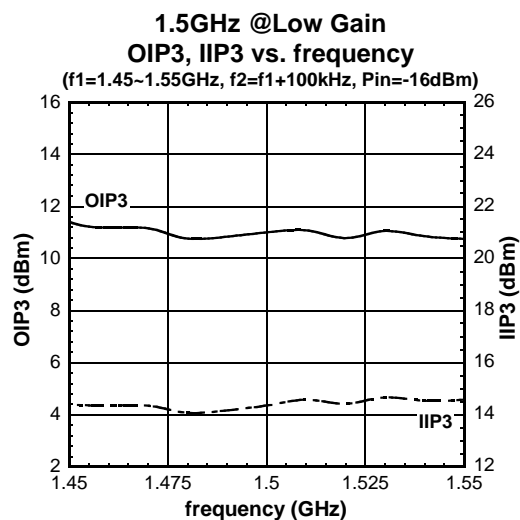


Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$



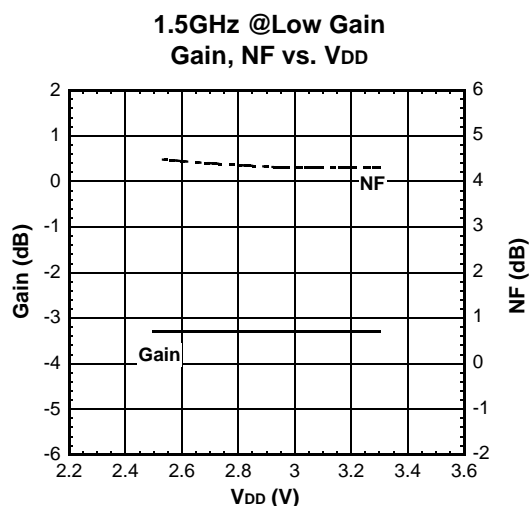
Condition

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

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

$V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$

■ ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)

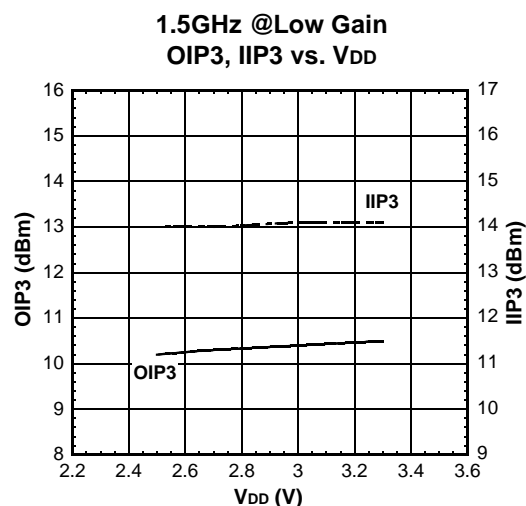


Condition

T_a=+25°C,

f=1495MHz,

V_{CTL1}=1.8V, V_{CTL2}=1.8V, V_{CTL3}=0V



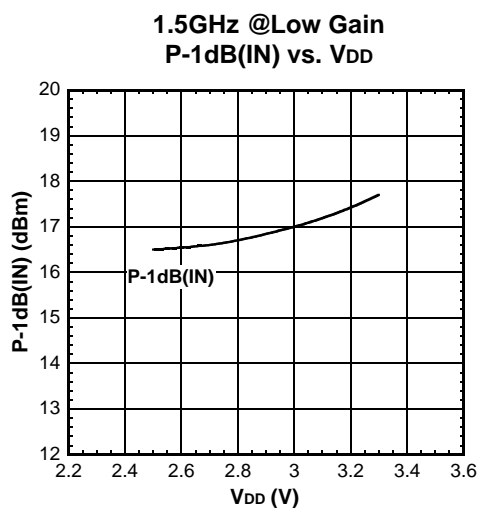
Condition

T_a=+25°C,

f₁=1495MHz, f₂=f₁+100kHz,

Pin=-16dBm,

V_{CTL1}=1.8V, V_{CTL2}=1.8V, V_{CTL3}=0V

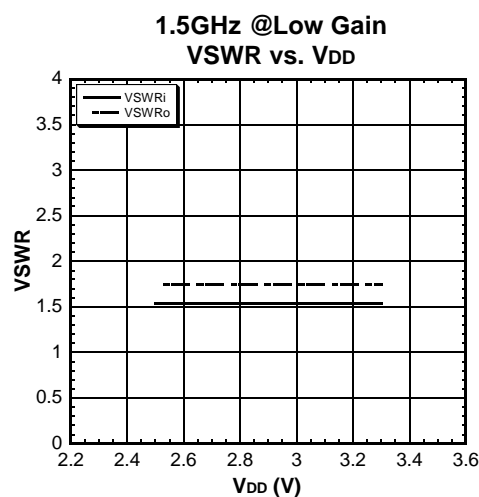


Condition

T_a=+25°C,

f=1495MHz,

V_{CTL1}=1.8V, V_{CTL2}=1.8V, V_{CTL3}=0V



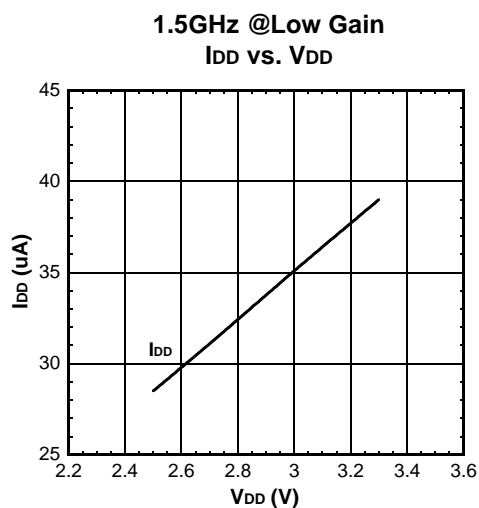
Condition

T_a=+25°C,

f=1495MHz,

V_{CTL1}=1.8V, V_{CTL2}=1.8V, V_{CTL3}=0V

■ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)



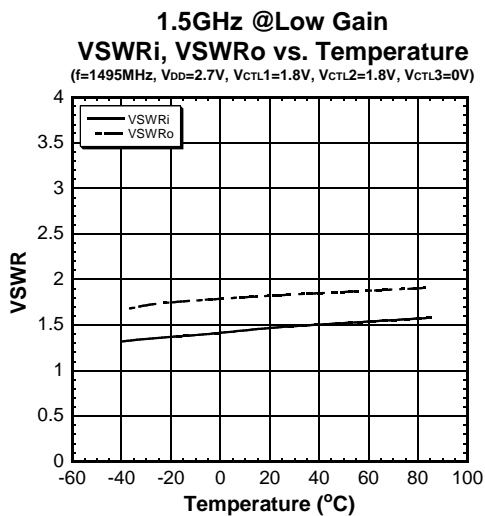
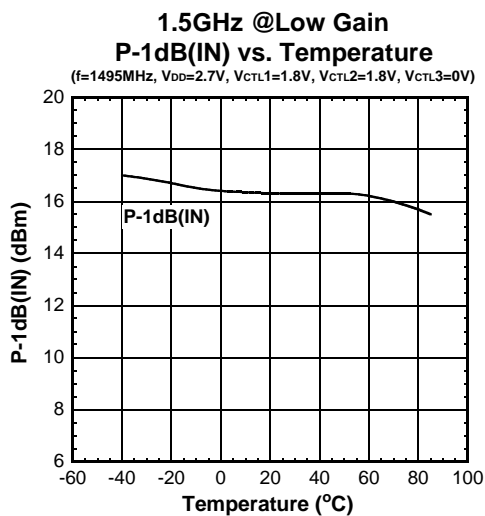
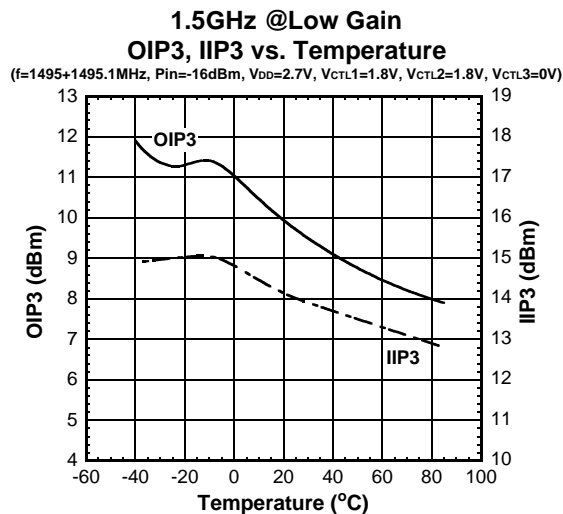
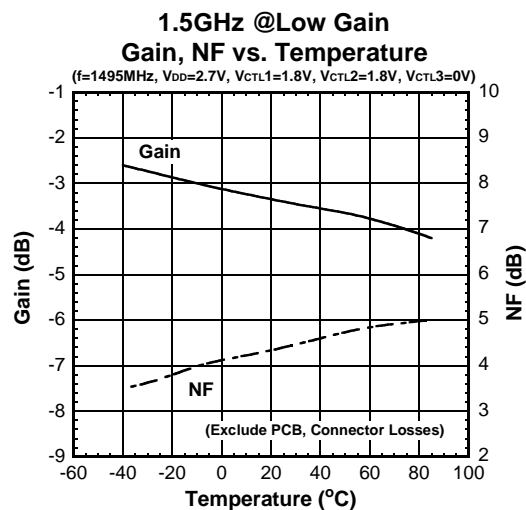
Condition

T_a=+25°C,

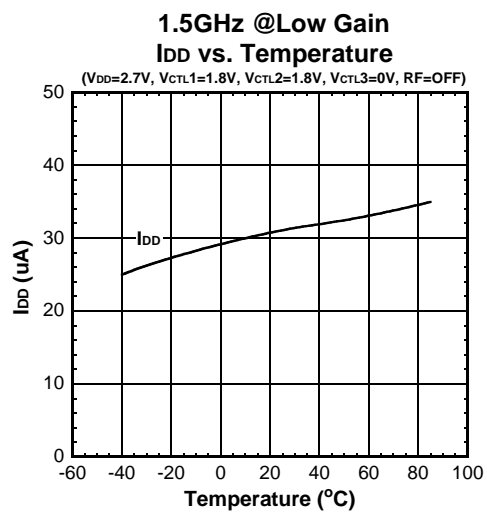
RF=OFF,

V_{CTL}1=1.8V, V_{CTL}2=1.8V, V_{CTL}3=0V

■ ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)



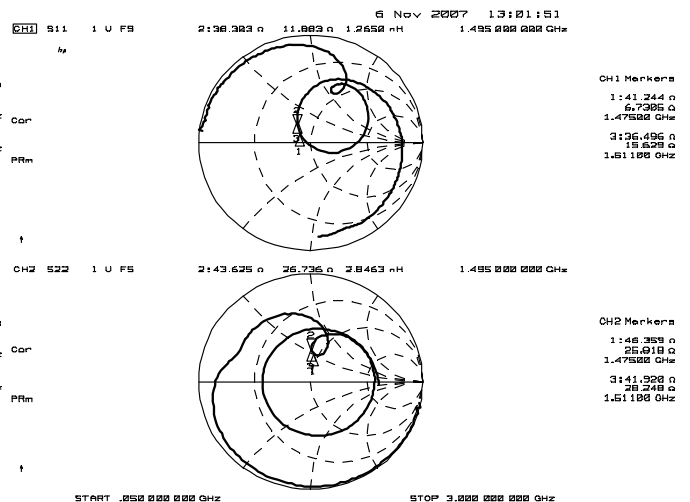
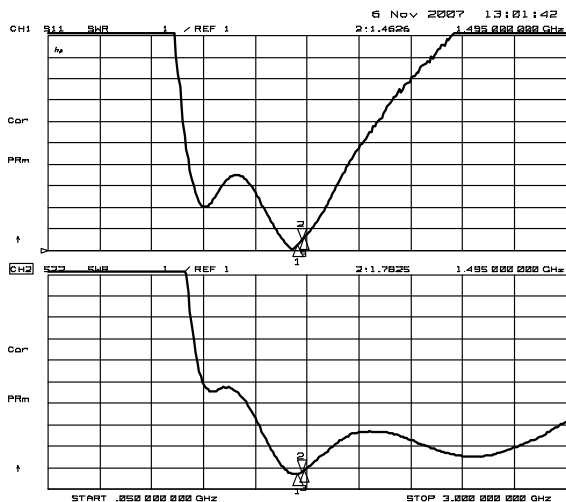
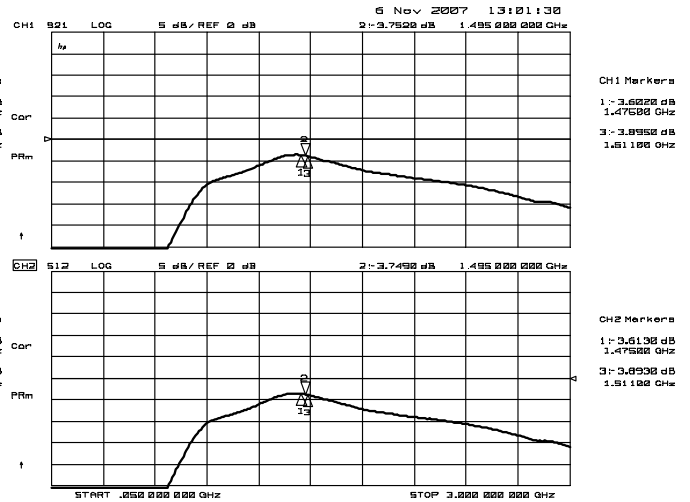
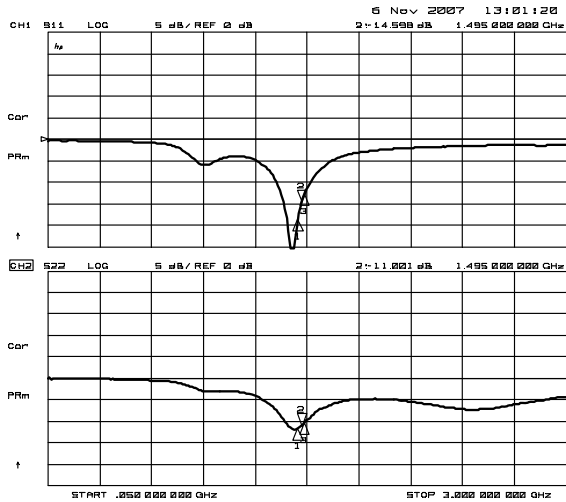
■ ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)



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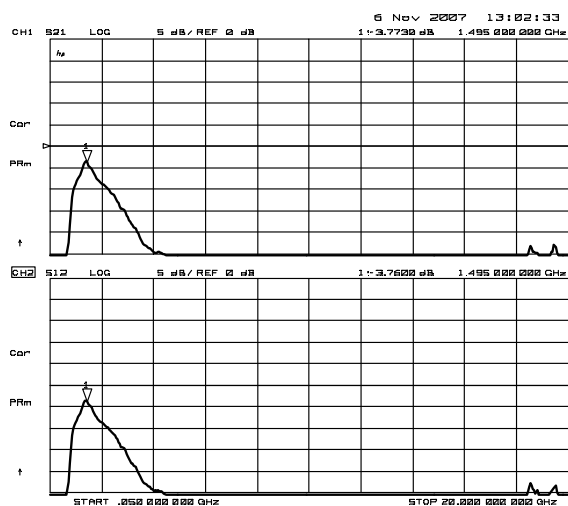
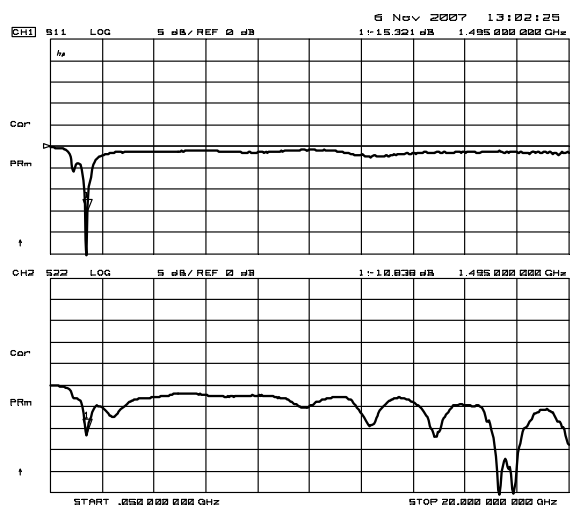
ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)

Condition : $T_a = +25^\circ\text{C}$, $V_{DD} = 2.7\text{V}$, $V_{CTL1} = 1.8\text{V}$, $V_{CTL2} = 1.8\text{V}$, $V_{CTL3} = 0\text{V}$

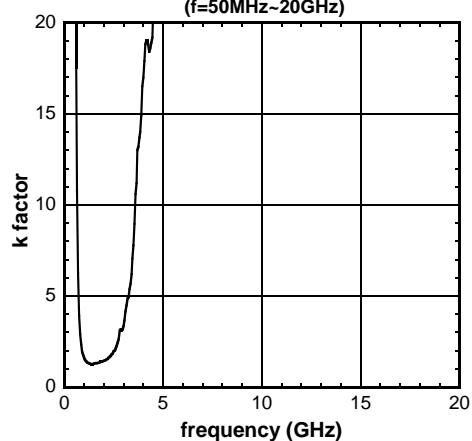


■ELECTRICAL CHARACTERISTICS (1.5GHz band Low Gain mode)

Condition : $T_a=+25^{\circ}\text{C}$, $V_{DD}=V_{INV}=2.7\text{V}$, $V_{CTL1}=1.8\text{V}$, $V_{CTL2}=1.85\text{V}$, $V_{CTL3}=0\text{V}$



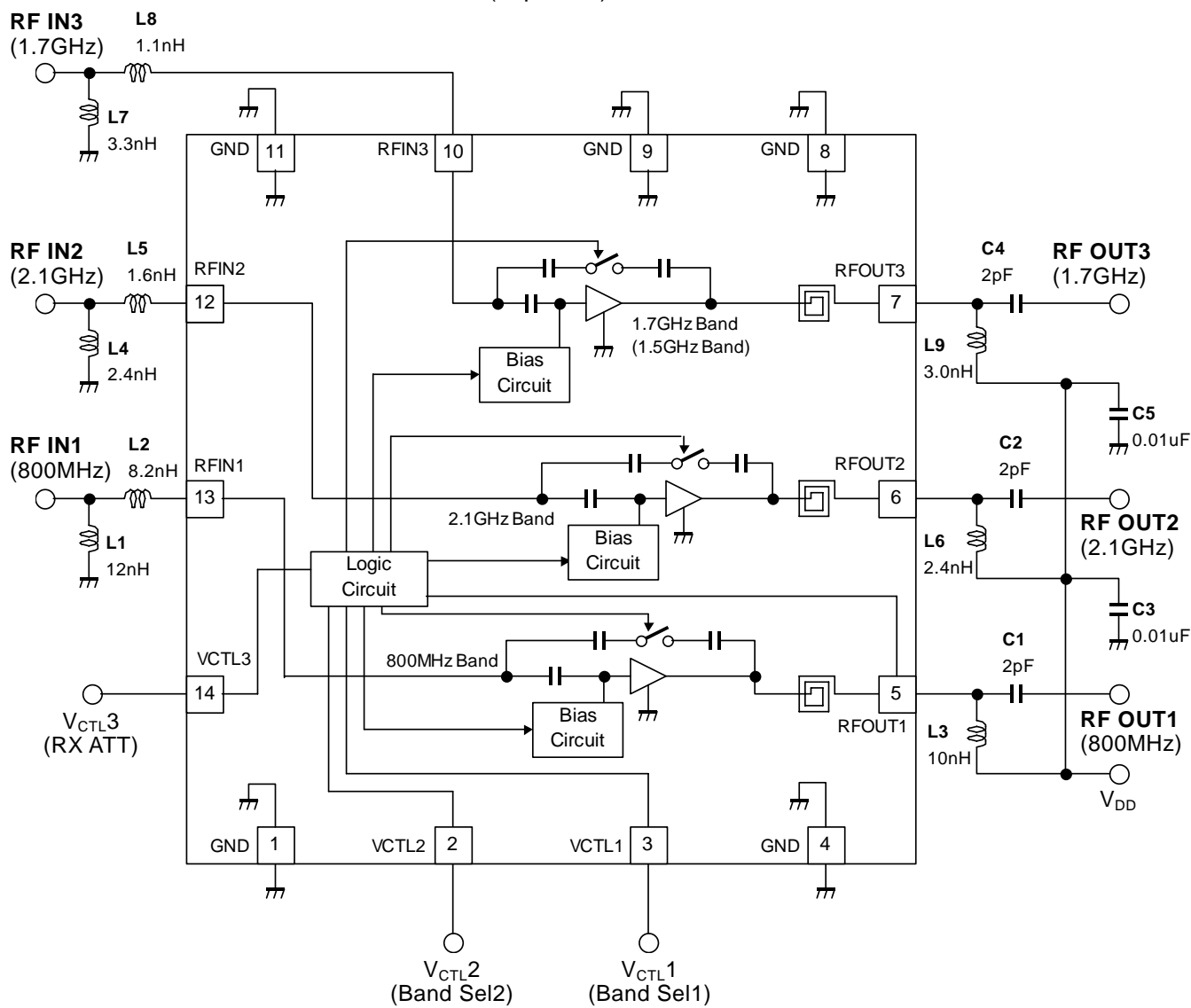
1.5GHz @Low Gain
k factor vs. frequency
(f=50MHz~20GHz)



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APPLICATION CIRCUIT 1 (2.1GHz/800MHz/1.7GHz Band)

(Top View)



PARTS LIST

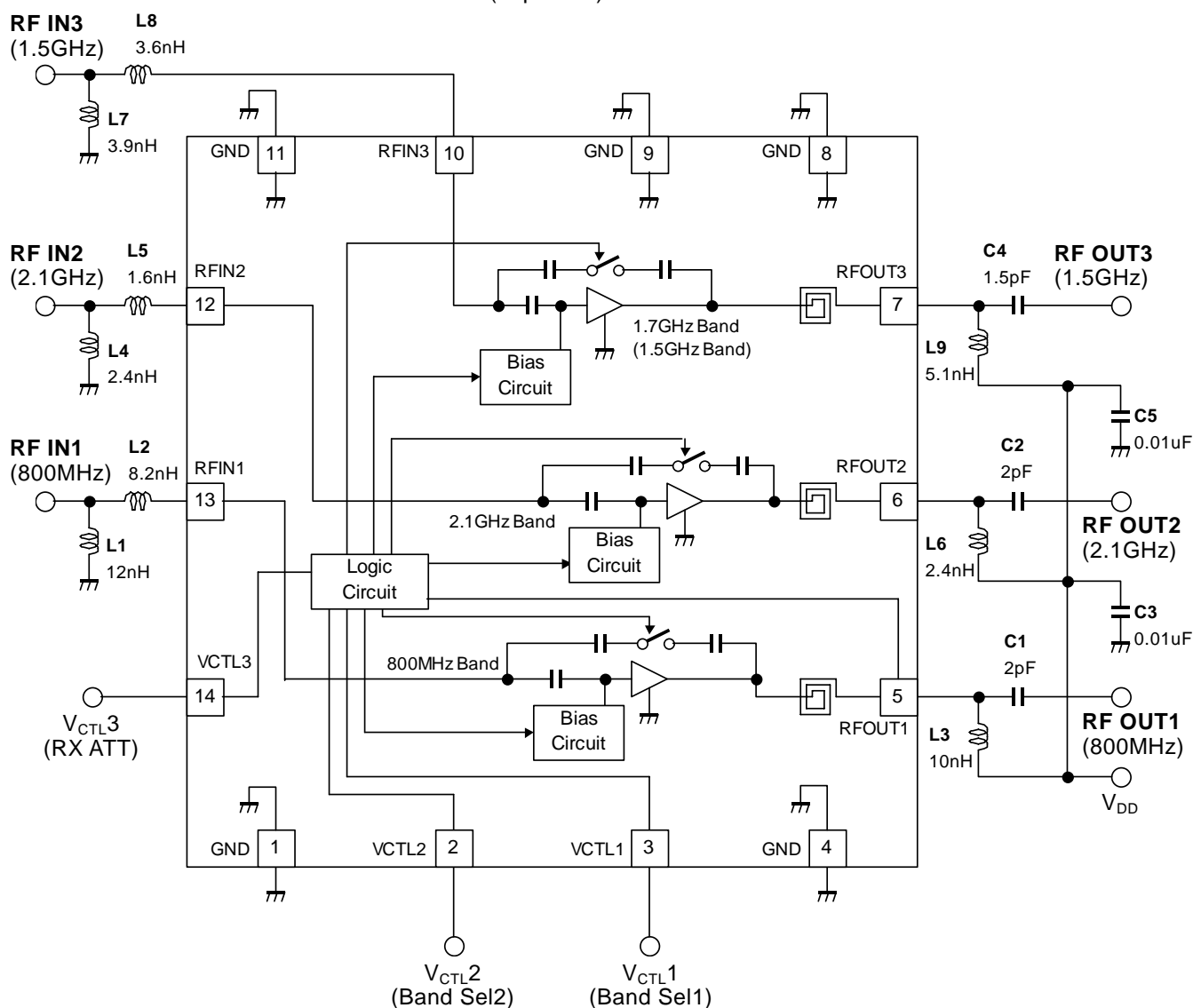
Parts ID	Notes
L1, L2, L4 ~L9	MURATA (LQP03T) 0603 Size
L3	TDK (MLK0603) 0603 Size
C1~C5	MURATA (GRM03) 0603 Size

PRECAUTIONS

- 1) Please locate bypass capacitor C3 proximity to inductor L3 and L6.
- 2) Please locate bypass capacitor C5 proximity to inductor L9.
- 3) Ground terminal should be connected with the ground plane as short as possible.

■ APPLICATION CIRCUIT 2 (2.1GHz/800MHz/1.5GHz Band)

(Top View)



PARTS LIST

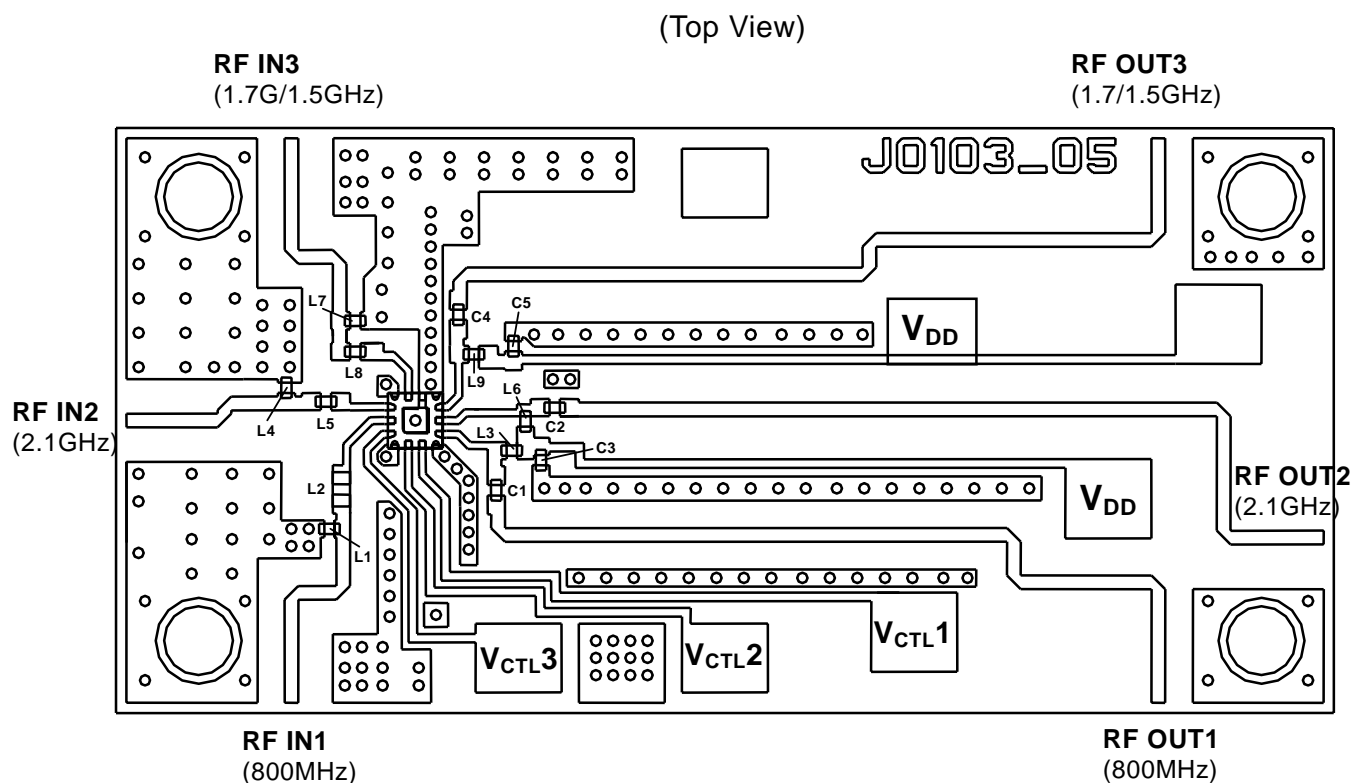
Parts ID	Notes
L1, L2, L4 ~L9	MURATA (LQP03T) 0603 Size
L3	TDK (MLK0603) 0603 Size
C1~C5	MURATA (GRM03) 0603 Size

PRECAUTIONS

- 1) Please locate bypass capacitor C3 proximity to inductor L3 and L6.
- 2) Please locate bypass capacitor C5 proximity to inductor L9.
- 3) Ground terminal should be connected with the ground plane as short as possible.

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■ TEST PCB LAYOUT



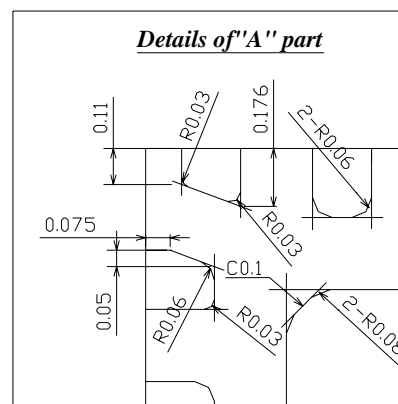
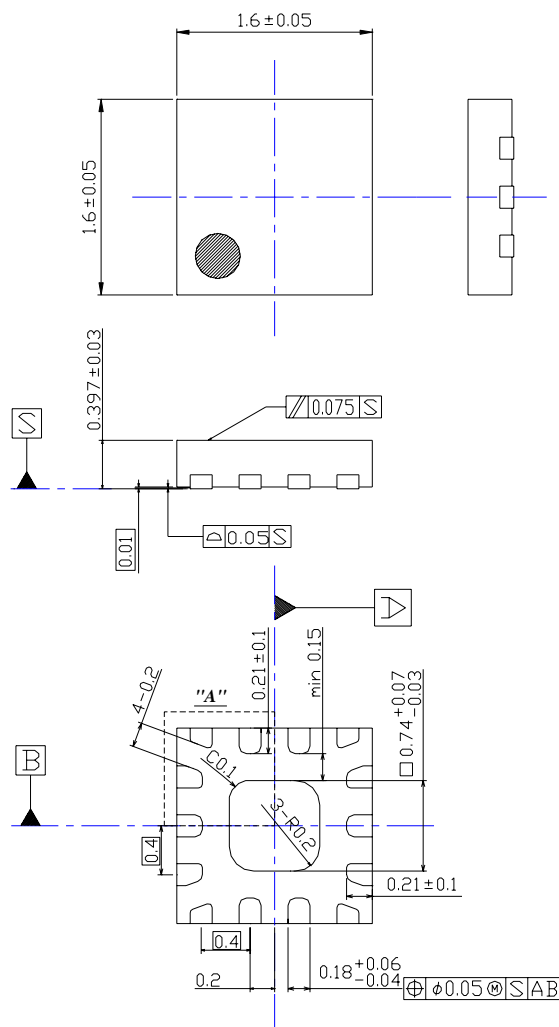
PCB (FR-4):

$t=0.2\text{mm}$

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

PCB SIZE=35.4mm x 17.0mm

■ PACKAGE OUTLINE (EQFN14-D7)



Units : mm
 Board : Cu
 Terminal treat : SnBi
 Molding material : Epoxy resin
 Weight : 3.3mg

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.

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

[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