DATA SHEET

NEC

BIPOLAR ANALOG INTEGRATED CIRCUITS

μPC8119T, μPC8120T

VARIABLE GAIN AMPLIFIER SILICON MMIC FOR TRANSMITTER AGC OF DIGITAL CELLULAR TELEPHONE

DESCRIPTION

The μPC8119T and μPC8120T are silicon monolithic integrated circuits designed as variable gain amplifier. Due to 100 MHz to 1.9 GHz operation, these ICs are suitable for RF transmitter AGC stage of digital cellular telephone. Two types of gain control let users choose in accordance with system design. 3 V supply voltage and mini mold package contribute to make system lower voltage, decreased space and fewer components.

The μPC8119T and μPC8120T are manufactured using NEC's 20 GHz f_T NESAT™ III silicon bipolar process. This process uses silicon nitride passivation film and gold electrodes. These materials can protect chip surface from external pollution and prevent corrosion / migration. Thus, this IC has excellent performance, uniformity and reliability.

FEATURES

- Recommended operating frequency : f = 100 MHz to 1.92 GHz
- Supply voltage : V_{CC} = 2.7 to 3.3 V
- Low current consumption : I_{CC} = 11 mA TYP. @ V_{CC} = 3.0 V
- Gain control voltage : V_{AGC} = 0.6 to 2.4 V (recommended)
- Two types of gain control : μPC8119T = V_{AGC} up vs. Gain down (Forward control)
  μPC8120T = V_{AGC} up vs. Gain up (Reverse control)
- AGC control can be constructed by external control circuit.
- High-density surface mounting

APPLICATIONS

- 1.9 GHz cordless telephone (PHS base-station and so on)
- 800 MHz to 900 MHz or 1.5 GHz Digital cellular telephone (PDC800M, PDC1.5G and so on)

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form	Gain Control Type
μPC8119T-E3	6-pin minimold	C2M	Embossed tape 8 mm wide. 1, 2, 3 pins face to perforation side of the tape. Qty 3 kp/reel.	Forward control
μPC8120T-E3		C2N		Reverse control

Remark To order evaluation samples, please contact your local NEC sales office.
(Part number for sample order: μPC8119T, μPC8120T)

Caution Electro-static sensitive devices

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

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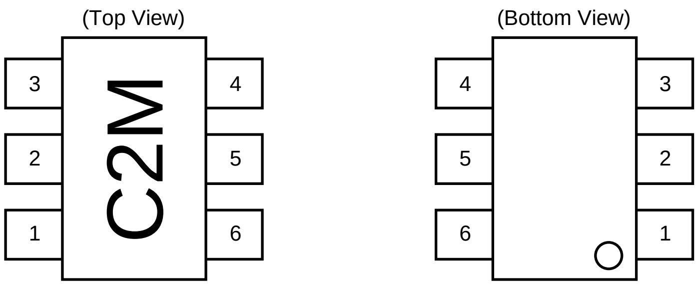
The mark ★ shows major revised points.

PIN CONNECTIONS



Marking is a example for μPC8119T.

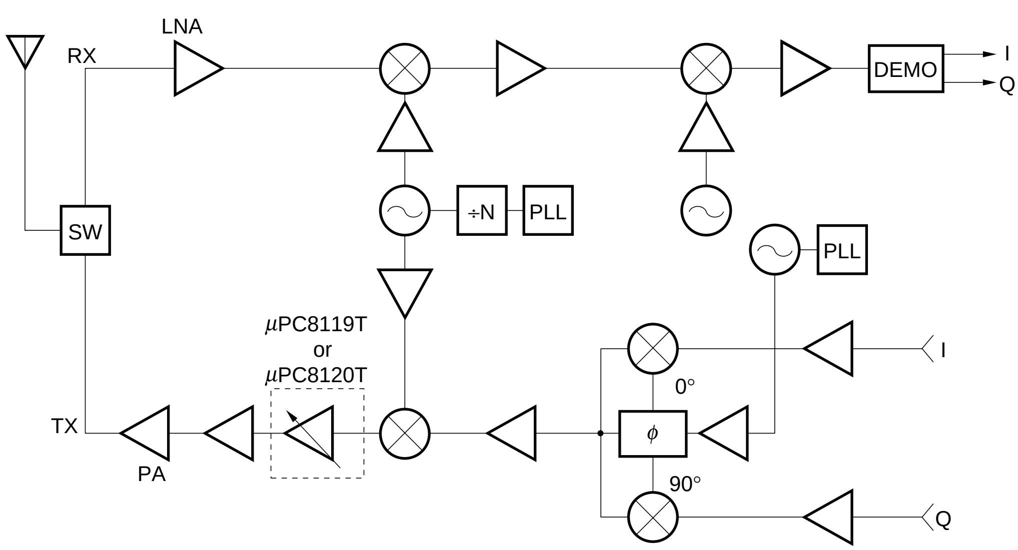
Pin No.	Pin Name
1	INPUT
2	GND
3	GND
4	OUTPUT
5	V_{CC}
6	V_{AGC}

VARIABLE GAIN AMPLIFIER PRODUCT LINE-UP

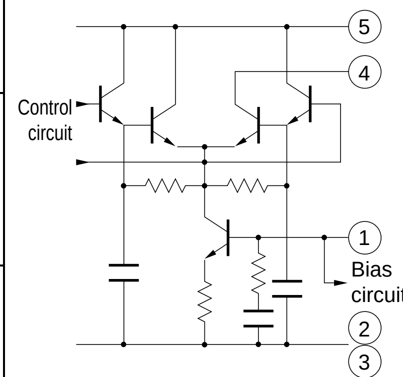
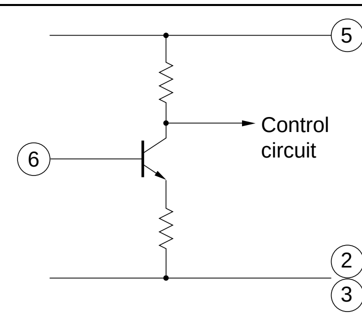
Part No.	V_{CC} (V)	I_{CC} (mA)	V_{AGC} (V)	V_{AGC} up vs.Gain	f (GHz)	$P_{O\,(1\,dB)}$	Features
μPC2723T	4.5 to 5.5	15	3.3 to 5.0	down	up to 1.1	–4	
μPC8119T	2.7 to 3.3	11	0.6 to 2.4	down	0.1 to 1.92	+3	Excellent V_{CC} fluctuation
μPC8120T	2.7 to 3.3	11	0.6 to 2.4	up	0.1 to 1.92	+3	
μPC8130TA	2.7 to 3.3	11	0.6 to 2.4	up	0.8 to 1.5	+5	Low distortion
μPC8131TA	2.7 to 3.3	11	0 to 2.4	down	0.8 to 1.5	+5	Low distortion

Remark Typical performance. Please refer to ELECTRICAL CHARACTERISTICS in detail.
To know the associated product, please refer to each latest data sheet.

SYSTEM APPLICATION EXAMPLE



PIN EXPLANATION

<table>
<tr><th>Pin No.</th><th>Pin Name</th><th>Applied Voltage V</th><th>Pin Voltage V[Note]</th><th>Function and Applications</th><th>Internal Equivalent Circuit</th></tr>
<tr><td>1</td><td>IN</td><td>–</td><td>1.2</td><td>RF input pin. This pin should be coupled with capacitor (eg 1000 pF) for DC cut. This pin can be input from 50 Ω impedance signal source without matching circuit.</td><td rowspan="3">
</td></tr>
<tr><td>2
3</td><td>GND</td><td>0</td><td>–</td><td>Ground pin. This pin should be connected to system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible.</td></tr>
<tr><td>4</td><td>OUT</td><td>Voltage as same as V_{CC} through external inductor</td><td>–</td><td>RF output pin. This pin is designed as open collector of high impedance.
This pin must be externally equipped with matching circuits.</td></tr>
<tr><td>5</td><td>V_{CC}</td><td>2.7 to 3.3</td><td>–</td><td>Supply voltage pin. This pin must be externally equipped with low pass filter (eg π type) in order to suppress leakage from input pin. This pin also must be equipped with bypass capacitor (eg 1000 pF) to minimize ground impedance.</td><td></td></tr>
<tr><td>6</td><td>V_{AGC}</td><td>0 to 3.3</td><td>–</td><td>Gain control pin. The relation between product number and control performance is shown below;
<table>
<tr><th>Part No.</th><th>V_{AGC} up vs. Gain</th></tr>
<tr><td>μPC8119T</td><td>↘ down</td></tr>
<tr><td>μPC8120T</td><td>↗ up</td></tr>
</table></td><td>
</td></tr>
</table>

Note Pin voltage is measured at V_{CC} = 3.0 V.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Conditions	Ratings	Unit
Supply Voltage	V_{CC}	T_A = +25°C	3.6	V
Gain Control Voltage	V_{AGC}	T_A = +25°C	3.6	mA
Operating Ambient Temperature	T_A		–40 to +85	°C
Storage Temperature	T_{stg}		–55 to +150	°C
Power Dissipation of Package	P_D	Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB T_A = +85°C	280	mW

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Notice
Supply Voltage	V_{CC}	2.7	3.0	3.3	V	Same voltage should be applied to 4 and 5 pins.
Gain Control Voltage	V_{AGC}	0.6	–	2.4	V	$I_{AGC} \leq 0.1$ mA
Input Level	P_{in}	–	–	–18	dBm	$P_{adj} \leq -60$ dBc @ $\Delta f = \pm 50$ kHz Note 1
		–	–	–10		$P_{adj} \leq -60$ dBc @ $\Delta f = \pm 600$ kHz Note 2
Operating Ambient Temperature	T_A	–40	+25	+85	°C	
Operating Frequency	f	100	–	1920	MHz	With external output-matching
AGC Pin Drive Current	I_{AGC}	0.5	–	–	mA	$V_{AGC} \leq 3.3$ V

Notes 1. Adjacent Channel Interference (P_{adj}) wave form condition: f = 950 MHz or 1440 MHz, π/4QPSK modulation signal, data rate = 42 kbps, rolloff ratio = 0.5, PN9 bits (pseudo random pattern)

2. Adjacent Channel Interference (P_{adj}) wave form condition: f = 1900 MHz, π/4QPSK modulation signal, data rate = 384 kbps, rolloff ratio = 0.5, PN9 bits (pseudo random pattern)

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, T_A = +25°C, $V_{CC} = V_{out}$ = 3.0 V, $Z_S = Z_L$ = 50 Ω, External matched output port)

Parameter	Symbol	Test Conditions	μPC8119T			μPC8120T			Unit
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Circuit Current	I_{CC}	No signal, $I_{CC} = I_{VCC} + I_{out}$	7.5	11	15	7.5	11	15	mA
Maximum Power Gain	G_{PMAX}	f = 950 MHz, P_{in} = –30 dBm f = 1440 MHz, P_{in} = –30 dBm	10 10	12.5 13	15 16	10.5 10.5	13 13.5	15.5 16.5	dB
Gain Control Range[Note]	GCR	f = 950 MHz, Pin = –30 dBm f = 1440 MHz, Pin = –30 dBm	40 35	50 45	– –	40 35	50 45	–	dB
Noise Figure	NF	f = 950 MHz, G_{PMAX} f = 1440 MHz, G_{PMAX}	– –	8.5 7.5	11.5 10.5	– –	9.0 7.5	12 10.5	dB
Isolation	ISL	f = 950 MHz, G_{PMAX} f = 1440 MHz, G_{PMAX}	27 31	32 36	– –	26 30	31 35	– –	dB
Input Return Loss	RL_{in}	f = 950 MHz, G_{PMAX} f = 1440 MHz, G_{PMAX}	3 3	6 6	– –	3 3	6 6	– –	dB
1 dB Compression Output Power	$P_{O\ (1\ dB)}$	f = 950 MHz, G_{PMAX} f = 1440 MHz, G_{PMAX}	0 +1.0	+3 +4	– –	+0.5 0	+3.5 +3	– –	dBm

Note Gain Control Range (GCR) specification: GCR = $G_{PMAX} - G_{PMIN}$ (dB)
Conditions μPC8119T: G_{PMAX} @ V_{AGC} = 0 V, G_{PMIN} @ $V_{AGC} = V_{CC}$
μPC8120T: G_{PMAX} @ $V_{AGC} = V_{CC}$, G_{PMIN} @ V_{AGC} = 0 V

Remark Measured on TEST CIRCUIT 1 and 2

STANDARD CHARACTERISTICS FOR REFERENCE

(Unless otherwise specified, T_A = +25°C, $V_{CC} = V_{out}$ = 3.0 V, $Z_S = Z_L$ = 50 Ω, External matched output port)

Parameter	Symbol	Test Conditions	Reference Value		Unit
			μPC8119T	μPC8120T	
Maximum Power Gain	G_{PMAX}	f = 1900 MHz, P_{in} = –30 dBm	12.5	13	dB
Gain Control Range[Note]	GCR	f = 1900 MHz, P_{in} = –30 dBm	22	22	dB
Noise Figure	NF	f = 1900 MHz, G_{PMAX}	7.2	7.3	dB
1 dB Compression Output Power	$P_{O\ (1\ dB)}$	f = 1900 MHz, G_{PMAX}	+3.0	+2.5	dBm

Note Gain Control Range (GCR) specification: GCR = $G_{PMAX} - G_{PMIN}$ (dB)
Conditions μPC8119T: G_{PMAX} @ V_{AGC} = 0 V, G_{PMIN} @ $V_{AGC} = V_{CC}$
μPC8120T: G_{PMAX} @ $V_{AGC} = V_{CC}$, G_{PMIN} @ V_{AGC} = 0 V

Remark Measured on APPLICATION CIRCUIT EXAMPLE

TEST CIRCUIT1 (f = 950 MHz, both products in common)

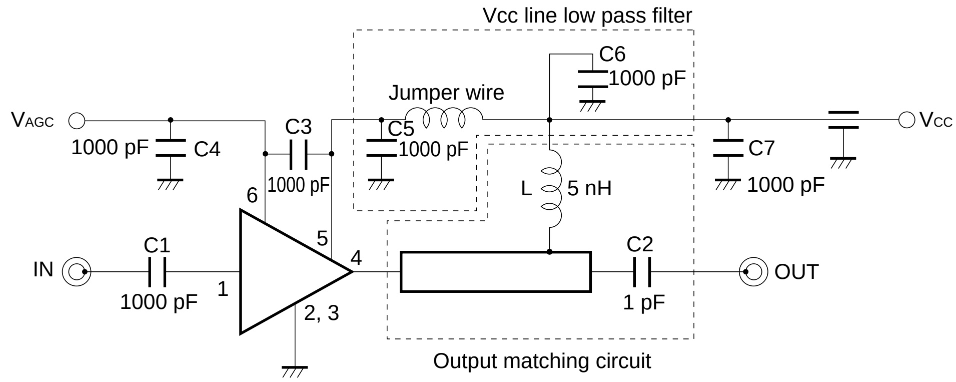
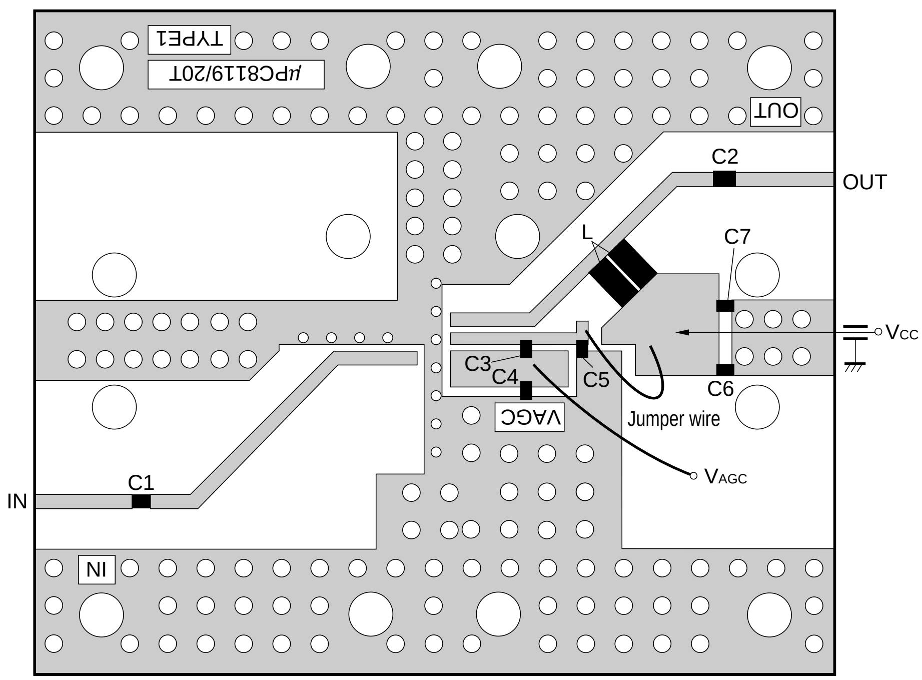


ILLUSTRATION OF TEST CIRCUIT1 ASSEMBLED ON EVALUATION BOARD



COMPONENT LIST

Form	Symbol	Value
Chip capacitor	C1, C3 to C7	1000 pF
	C2	1 pF[Note 1]
Chip inductor	L	5 nH (10 nH × 2 pcs parallel)[Note 2]
Jumper wire	Jumper wire	5 nH

Notes 1. 1 pF : Murata Mfg. Co., Ltd. GR40CK010C

2. 10 nH : Murata Mfg. Co., Ltd. LQP31A10NG04

TEST CIRCUIT2 (f = 1440 MHz, both products in common)

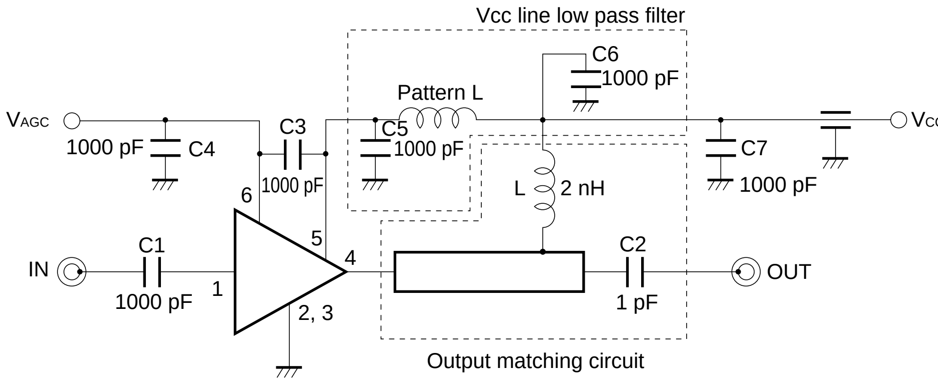
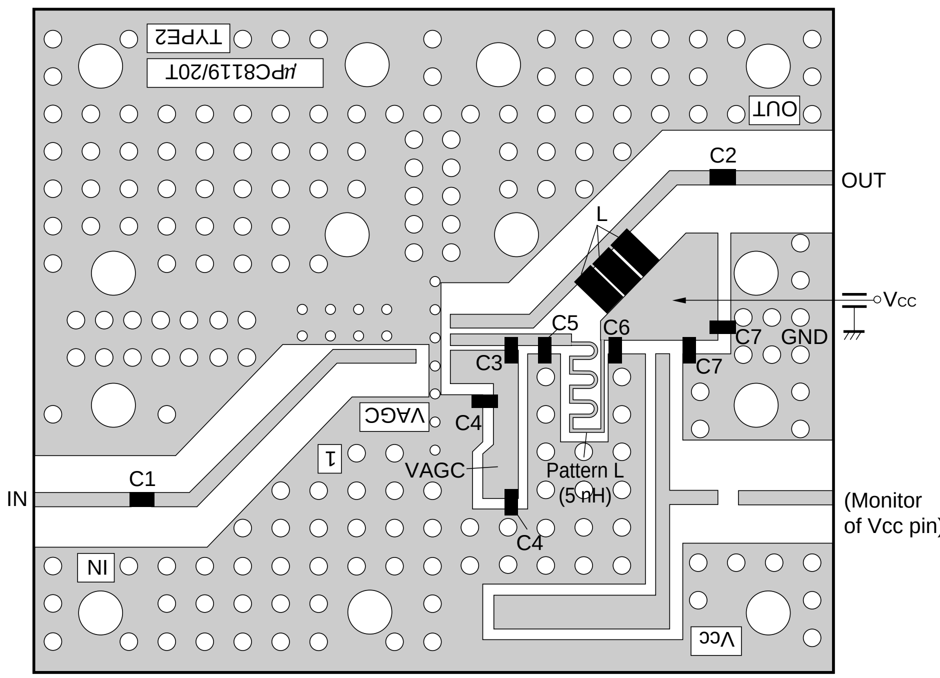


ILLUSTRATION OF TEST CIRCUIT2 ASSEMBLED ON EVALUATION BOARD



COMPONENT LIST

Form	Symbol	Value
Chip capacitor	C1, C3 to C7	1000 pF
	C2	1 pF[Note 1]
Chip inductor	L	2 nH (4.7 nH + 6.8 nH × 2 pcs parallel)[Note 2]
Printed on board	Pattern L	5 nH

Notes 1. 1 pF : Murata Mfg. Co., Ltd. GR40CK010C

2. 4.7 nH : Murata Mfg. Co., Ltd. LQP31A4N7J04

6.8 nH : Murata Mfg. Co., Ltd. LQP31A6N8J04

APPLICATION CIRCUIT EXAMPLE (f = 1900 MHz, both products in common)

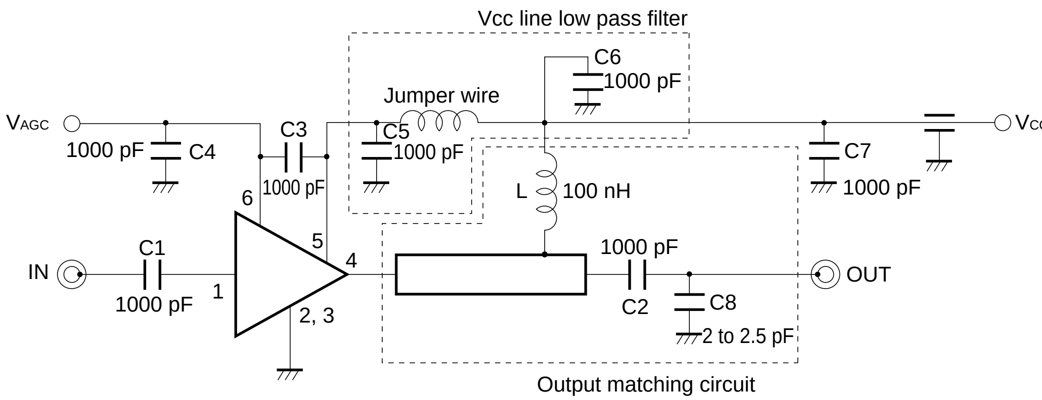
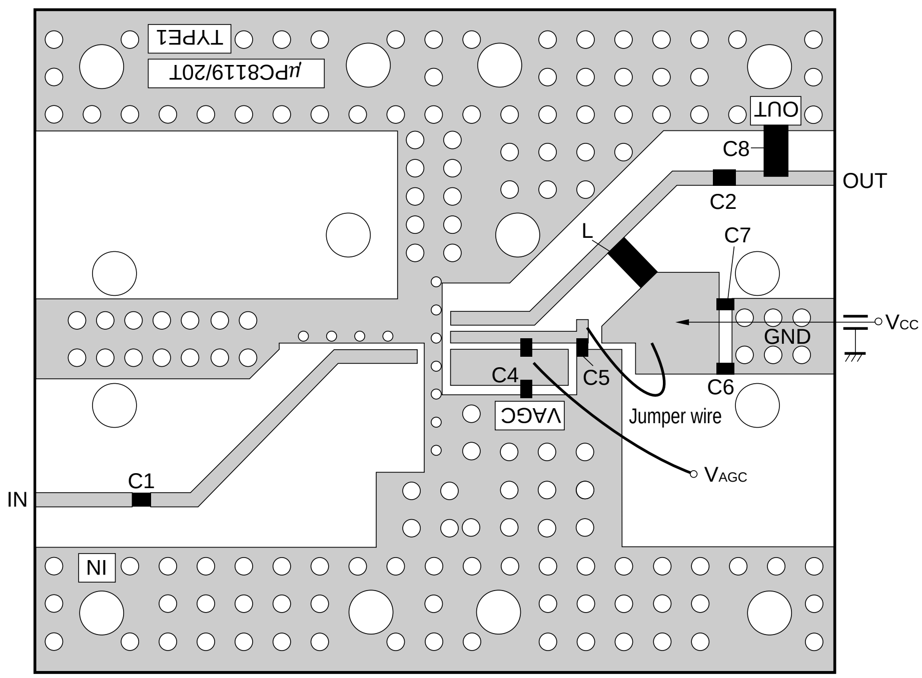


ILLUSTRATION OF APPLICATION CIRCUIT EXAMPLE ASSEMBLED ON EVALUATION BOARD

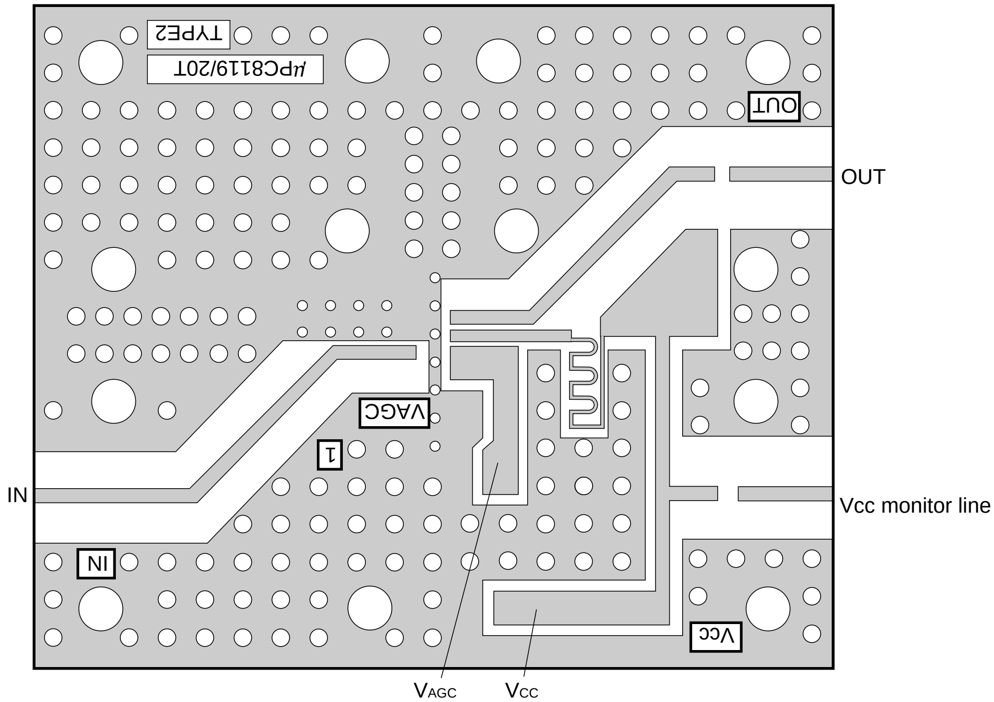


COMPONENT LIST

Form	Symbol	Value
Chip capacitor	C1 to C7	1000 pF
	C8	2 to 2.5 pF
Chip inductor	L	100 nH Note
Printed on board	Jumper wire	5 nH

Note 100 nH: Murata Mfg. Co., Ltd. LQP31A10NG04

LLUSTRATION AND EXPLANATIONS OF EVALUATION BOARD



EXPLANATION

<1> This board prints the pattern inductor which inductance is as same as jumper wire in TEST CIRCUITs (inductance: approx. 5 nH to 6 nH).

<2> Input leakage to V_{CC} pin can be monitored through ‘V_{CC} monitor line’. This leakage can be suppressed with π type low pass filter attached to V_{CC} pin. The filter performance depends on parallel capacitors.

<3> After adjusted low pass filter, monitor line should be removed before output matching circuit is attached.

EVALUATION BOARD CHARACTERS

(1) 35 μm thick double-sided copper clad 35 × 42 × 0.4 mm polyimide board

(2) Back side: GND pattern

(3) Solder plated patterns

(4) ○ ◯: Through holes

ATTENTION Test circuit or print pattern in this sheet is for testing IC characteristics.
In the case of actual system application, external circuits including print pattern and matching circuit constant of output port should be designed in accordance with IC’s S parameters and environmental components.

APPLICATION for μPC8119T, μPC8120T

1. TO GET MINIMUM GAIN

–1. V_{CC} line filtering

A low pass filter must be attached to V_{CC} line in order to suppress RF input leakage to V_{CC}. (The low pass filter: for example π type.) This filter must be inserted between V_{CC} pin and matching inductor. If the low pass filter is not attached to this point, minimum output level would not go down under the leakage level. For example, μPC8119T's RF input leakage level to V_{CC} shows –30 dBm at 950 MHz and –17 dBm at 1440 dBm.

> π type low pass filter constant example
> Pattern L = 5 to 6 nH, C5 = C6 = 1000 pF (Refer to TEST CIRCUIT1, 2 and APPLICATION CIRCUIT EXAMPLE)
> In the case of testing on 'μPC8119/20T TYPE2' board, monitor the input leakage to V_{CC} pin through 'V_{CC} monitor line' and adjust parallel capacitors to suppress leakage.

–2. Capacitor feed-back between V_{AGC} and V_{CC} pins

Feed-back capacitor between V_{AGC} and V_{CC} pins must be externally attached in order to decrease impedance difference.

2. TO GET MAXIMUM GAIN

–1. Output matching

As for external matching circuit, only output port should be equipped in order to get maximum gain. Output port matching in accordance with impedance of these ICs and next stage must keep the points as follows;

<1> AC points

- IC output impedance at maximum gain must be used.
- Inductance of L must be chosen to get $S_{22} \simeq$ –20 dBm at maximum gain.

<2> DC point

- On LC matching, L of low DC resistance must be chosen to apply voltage as same as V_{CC} to output pin.

3. OTHERS

–1. Input connection

Input port does not need to match externally. These ICs can be connected to front stage through coupling capacitor (eg 1000 pF) for DC cut.

–2. V_{CC} ON/OFF while voltage applied to V_{AGC}

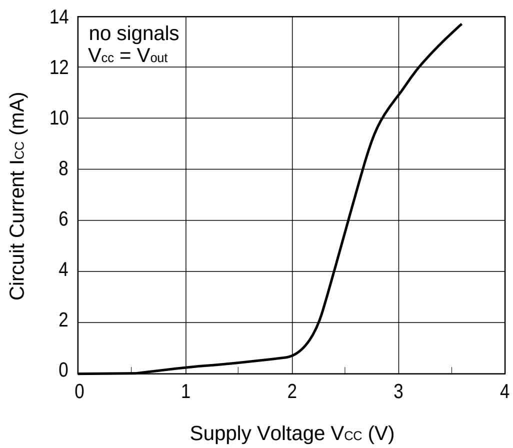
Due to internal transistor's voltage rating, ON/OFF can be controlled with V_{CC} voltage while 3.0 V or less is applied to V_{AGC}.

For the usage and application of μPC8119T and μPC8120T, please refer to the application note (Document No. P12763E).

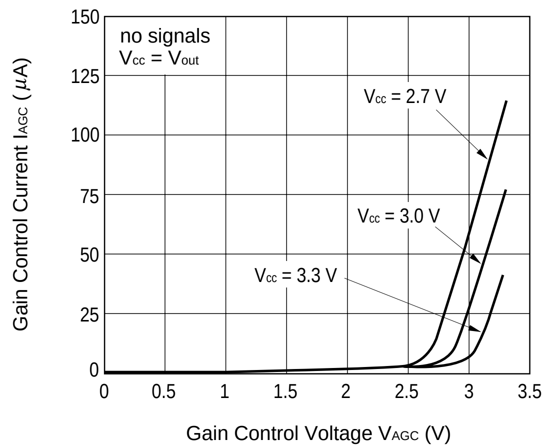
TYPICAL CHARACTERISTICS (T_A = +25°C)

— μPC8119T —

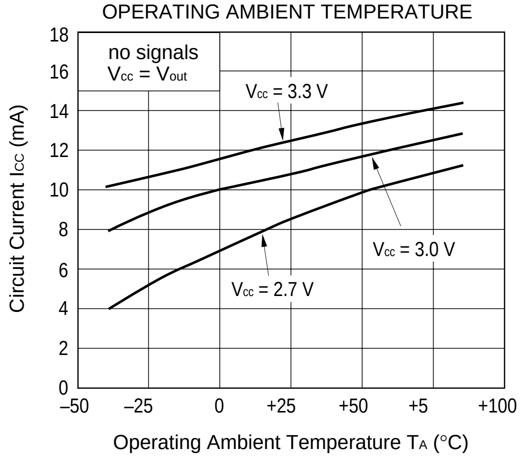
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



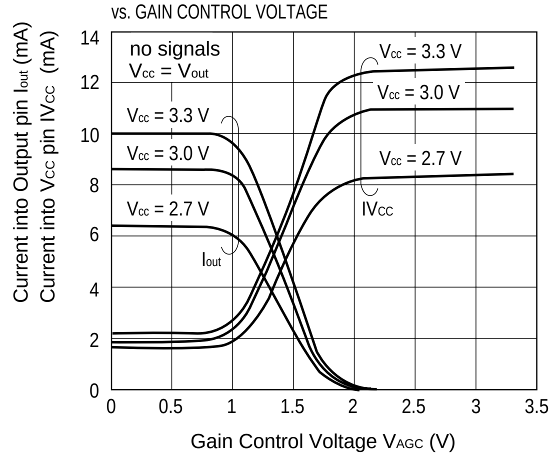
GAIN CONTROL CURRENT vs. GAIN CONTROL VOLTAGE



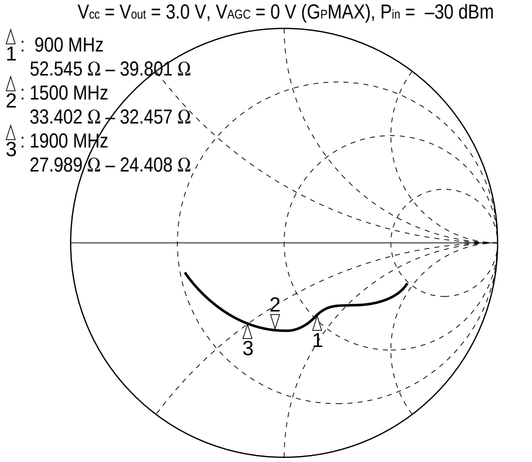
CIRCUIT CURRENT vs.
OPERATING AMBIENT TEMPERATURE



CURRENT INTO OUTPUT PIN AND CURRENT INTO Vcc PIN
vs. GAIN CONTROL VOLTAGE

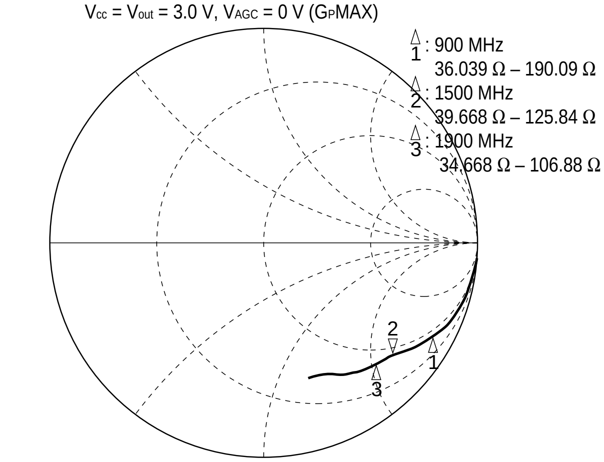


S11 vs. FREQUENCY
Vcc = Vout = 3.0 V, VAGC = 0 V (GPMAX), Pin = –30 dBm



START 100.000 000 MHz STOP 3 100.000 000 MHz

S22 vs. FREQUENCY
Vcc = Vout = 3.0 V, VAGC = 0 V (GPMAX)

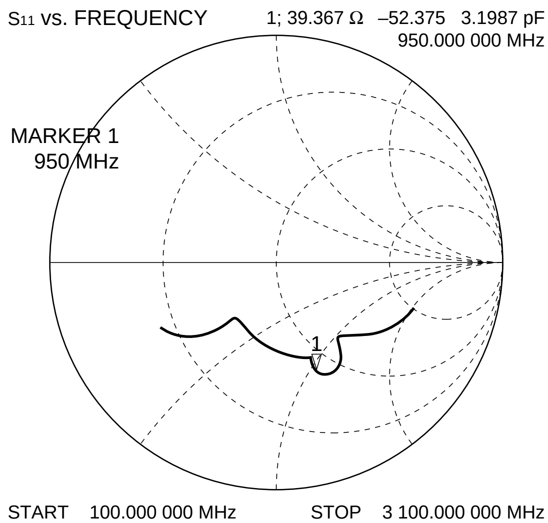


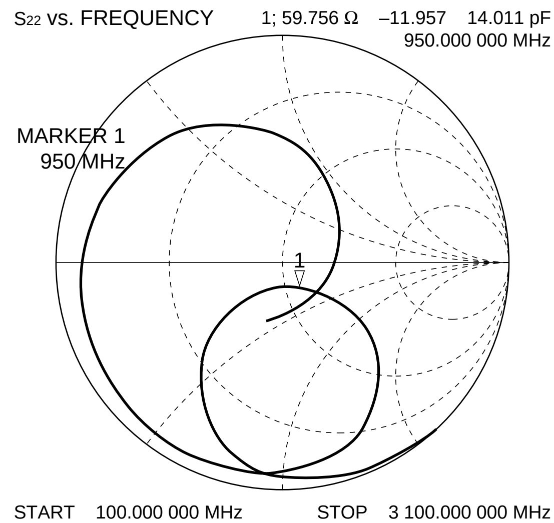
START 100.000 000 MHz STOP 3 100.000 000 MHz

—— μPC8119T ——

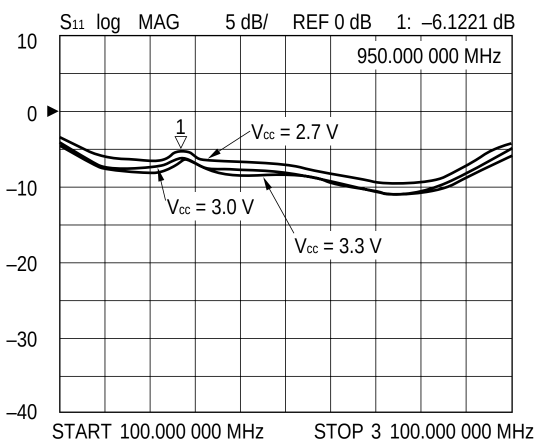
Output port matching at f = 950 MHz

$V_{cc} = V_{out} = 3.0$ V, $V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm

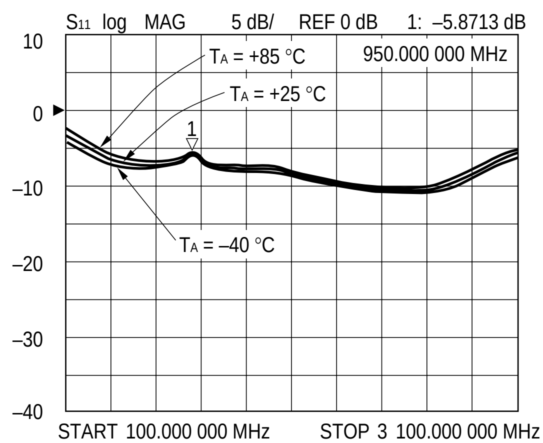




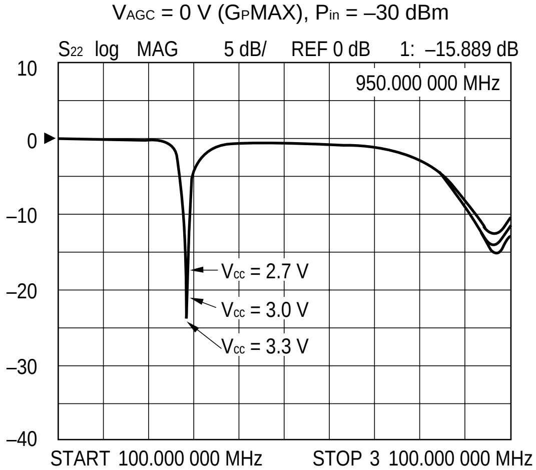
S_{11} vs. FREQUENCY
$V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



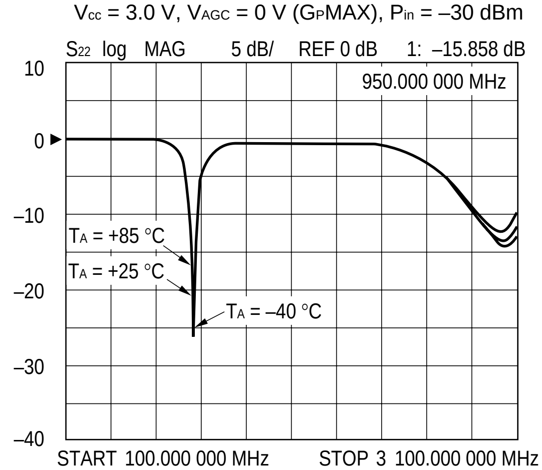
S_{11} vs. FREQUENCY
$V_{cc} = 3.0$ V, $V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



S_{22} vs. FREQUENCY
$V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



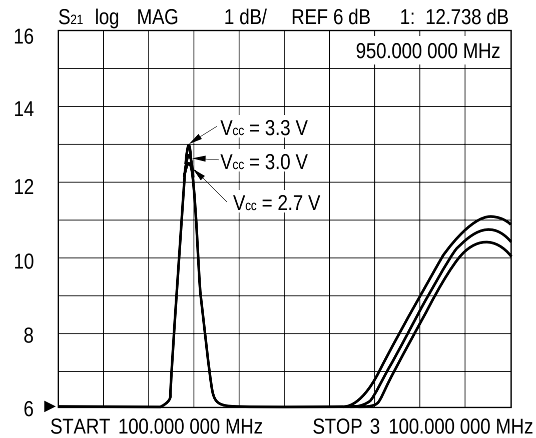
S_{22} vs. FREQUENCY
$V_{cc} = 3.0$ V, $V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



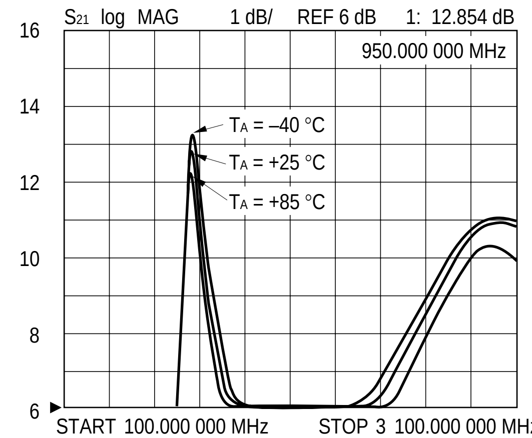
— μPC8119T —

Output port matching at f = 950 MHz

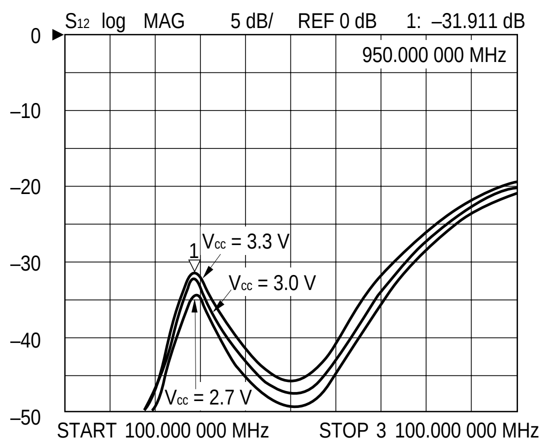
S_{21} vs. FREQUENCY
V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm



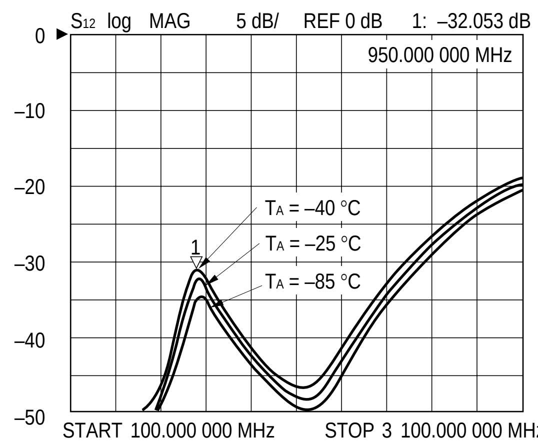
S_{21} vs. FREQUENCY
V_{cc} = 3.0 V, V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm



S_{12} vs. FREQUENCY
V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm



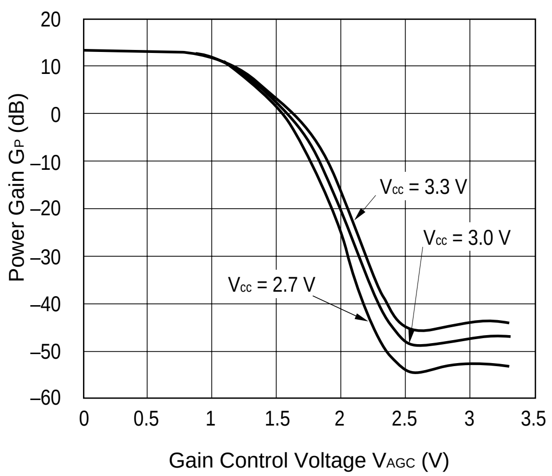
S_{12} vs. FREQUENCY
V_{cc} = 3.0 V, V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm



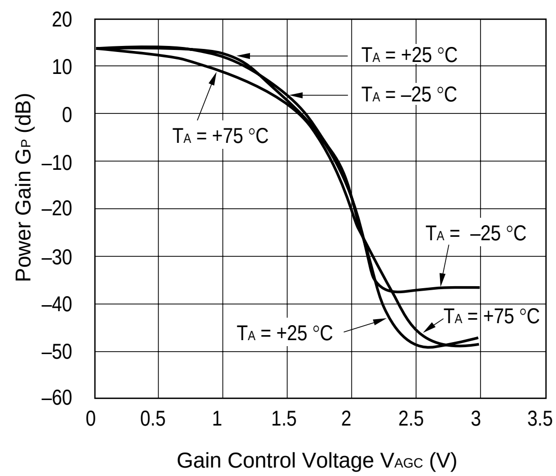
——— μPC8119T ———

Output port matching at f = 950 MHz

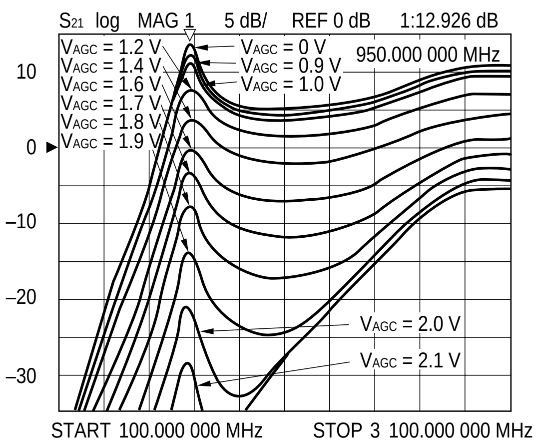
POWER GAIN vs. GAIN CONTROL VOLTAGE



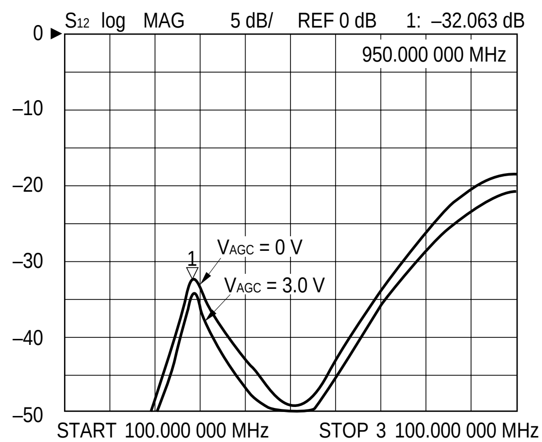
POWER GAIN vs. GAIN CONTROL VOLTAGE



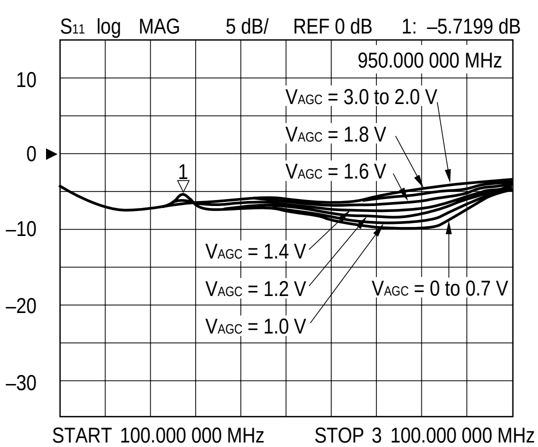
S21 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



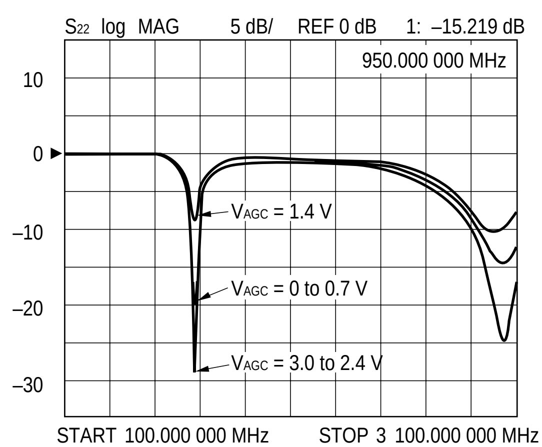
S12 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



S11 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

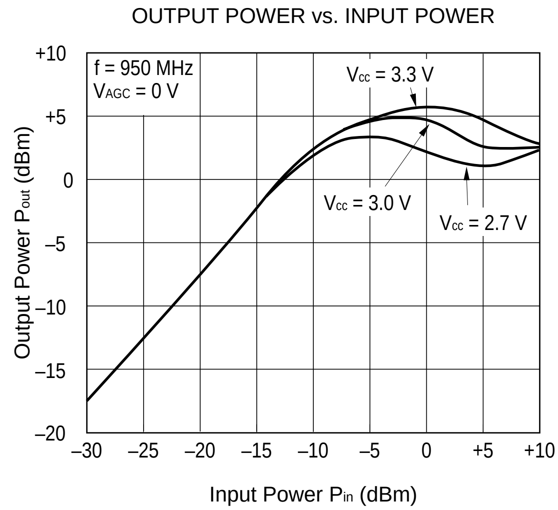


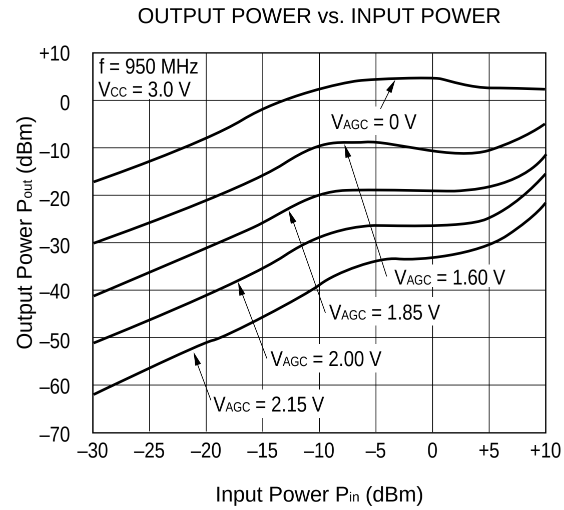
S22 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

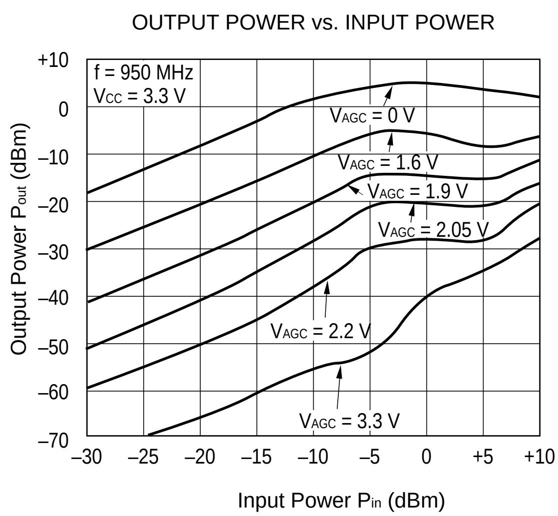


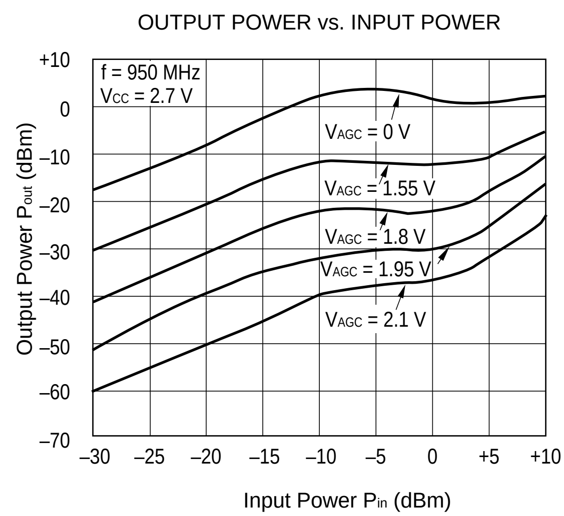
— μPC8119T —

Output port matching at f = 950 MHz





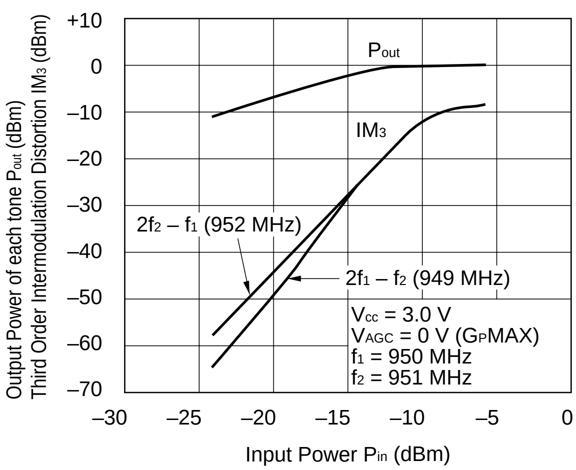




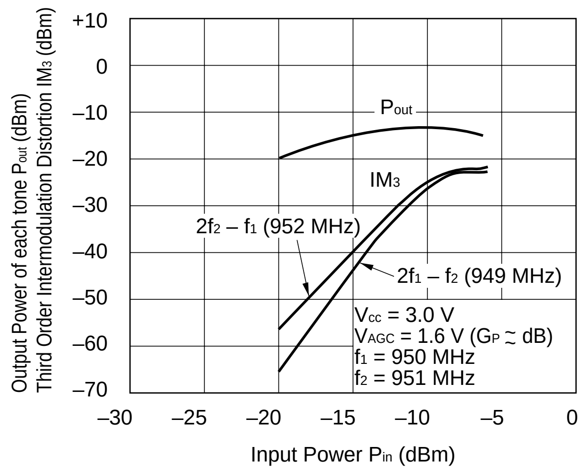
—— μPC8119T ——

Output port matching at f = 950 MHz

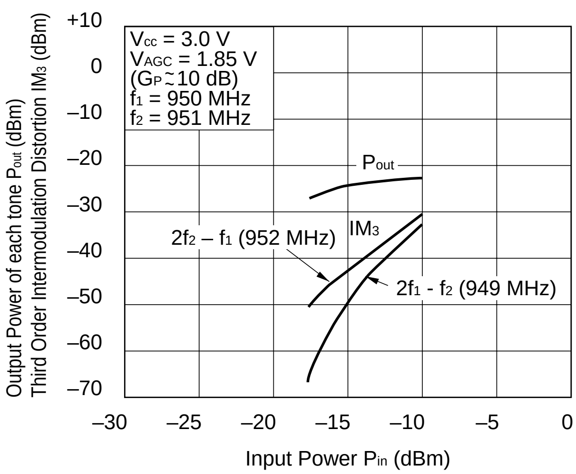
OUTPUT POWER AND IM_3 vs. INPUT POWER



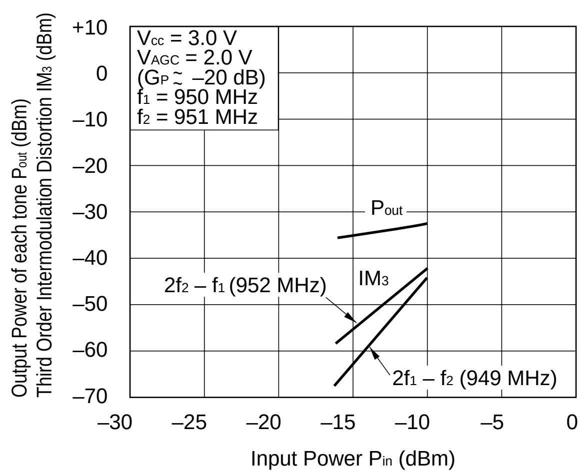
OUTPUT POWER AND IM_3 vs. INPUT POWER



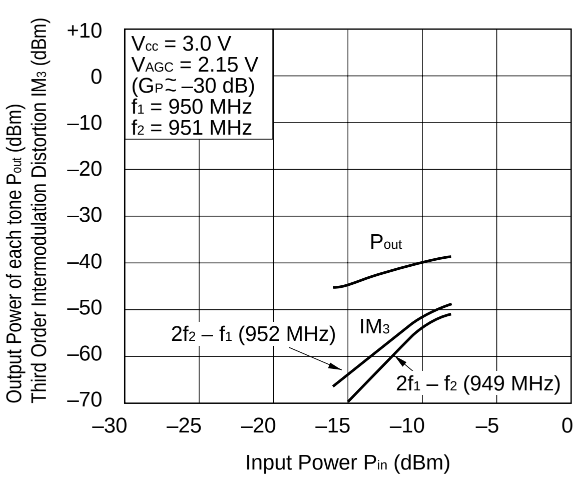
OUTPUT POWER AND IM_3 vs. INPUT POWER



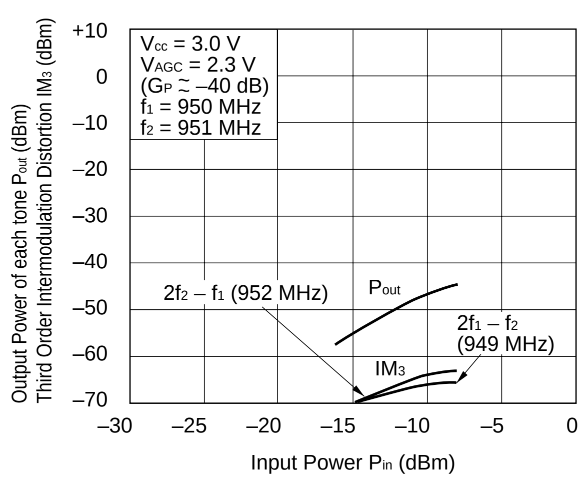
OUTPUT POWER AND IM_3 vs. INPUT POWER



OUTPUT POWER AND IM_3 vs. INPUT POWER

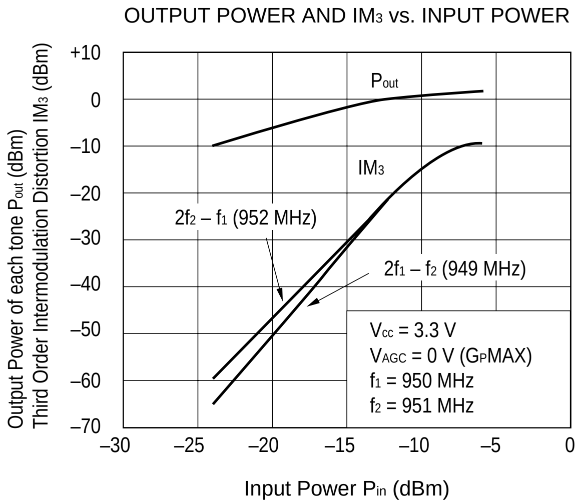


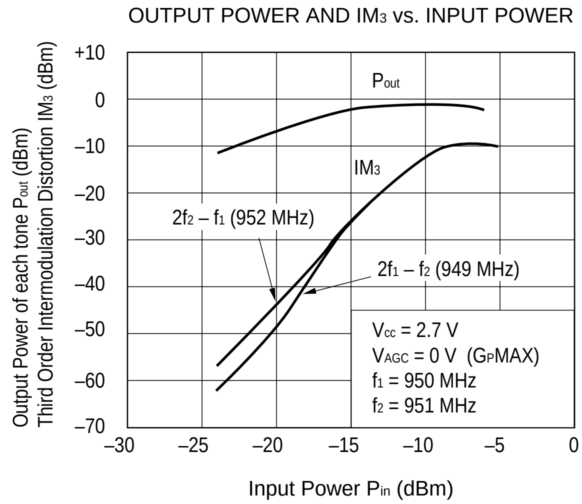
OUTPUT POWER AND IM_3 vs. INPUT POWER

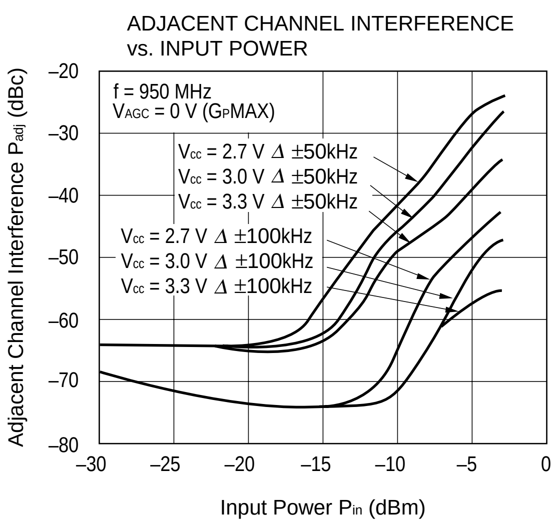


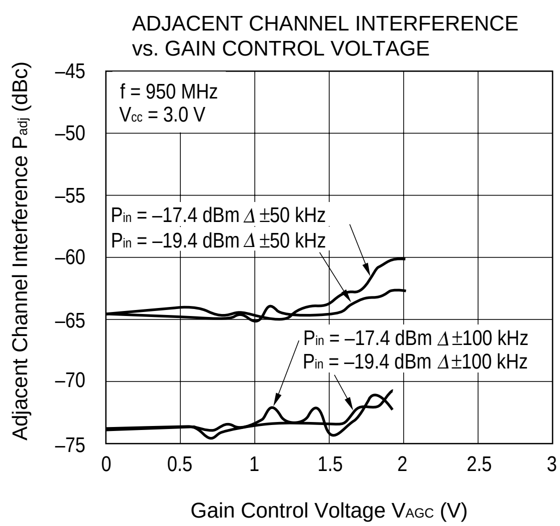
—— μPC8119T ——

Output port matching at f = 950 MHz







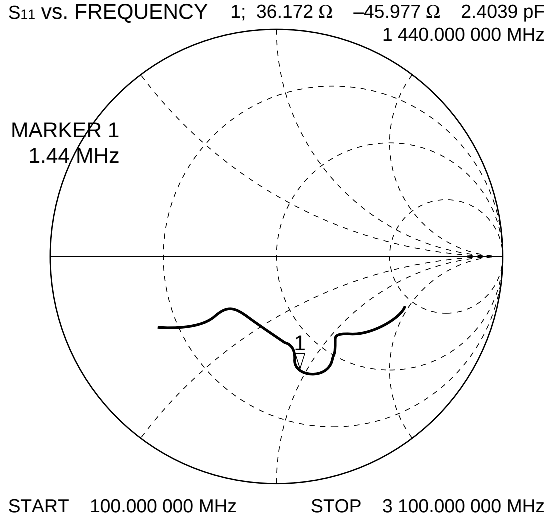


— μPC8119T —

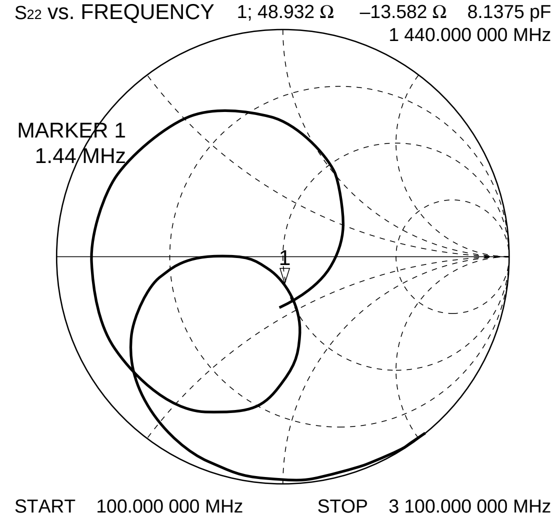
Output port matching at f = 1440 MHz

V_{CC} = 3.0 V, V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm

S_{11} vs. FREQUENCY 1; 36.172 Ω –45.977 Ω 2.4039 pF 1 440.000 000 MHz

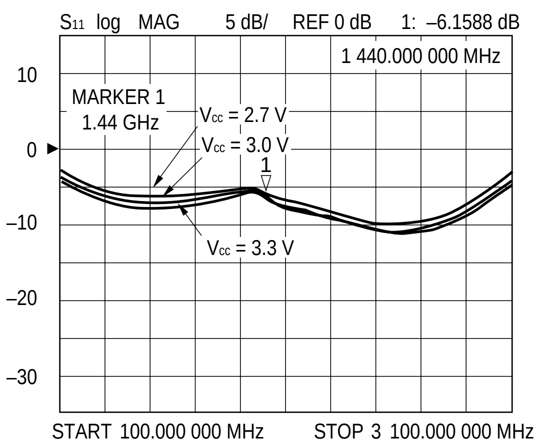


S_{22} vs. FREQUENCY 1; 48.932 Ω –13.582 Ω 8.1375 pF 1 440.000 000 MHz



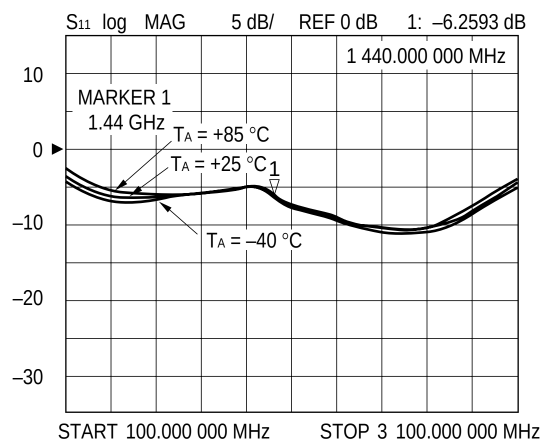
S_{11} vs. FREQUENCY

V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm



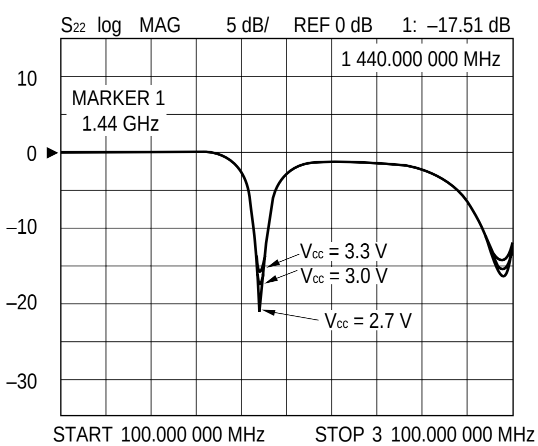
S_{11} vs. FREQUENCY

V_{CC} = 3.0 V, V_{AGC} = 0 V (G_PMAX) , P_{in} = –30 dBm



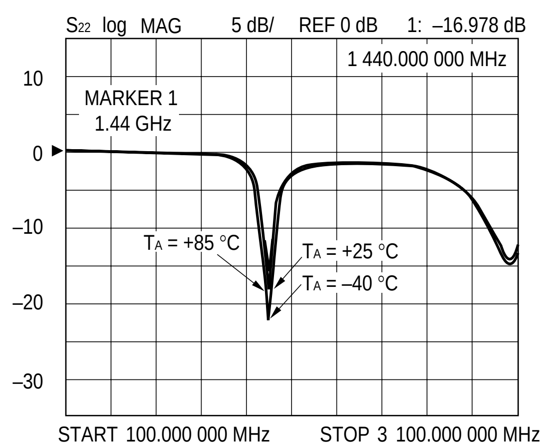
S_{22} vs. FREQUENCY

V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm



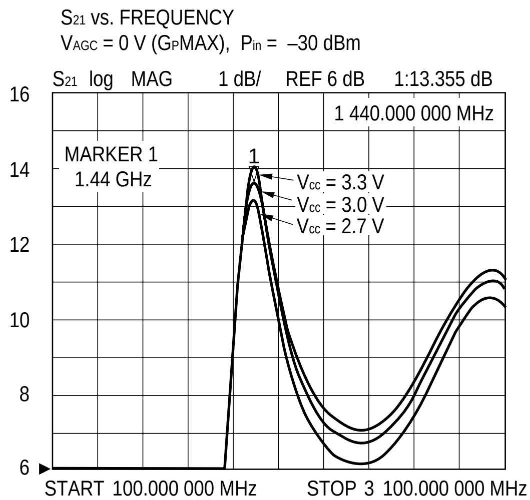
S_{22} vs. FREQUENCY

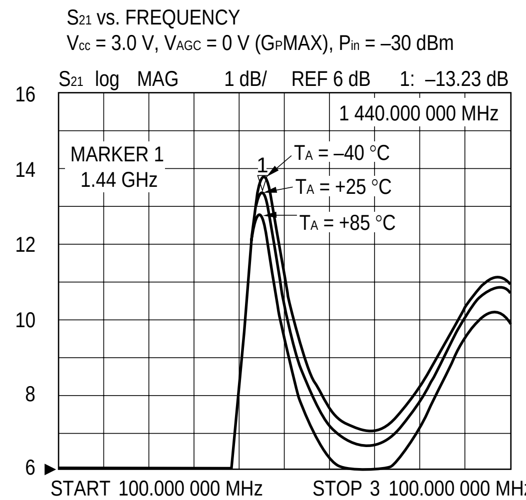
V_{CC} = 3.0 V, V_{AGC} = 0 V (G_PMAX), P_{in} = –30 dBm

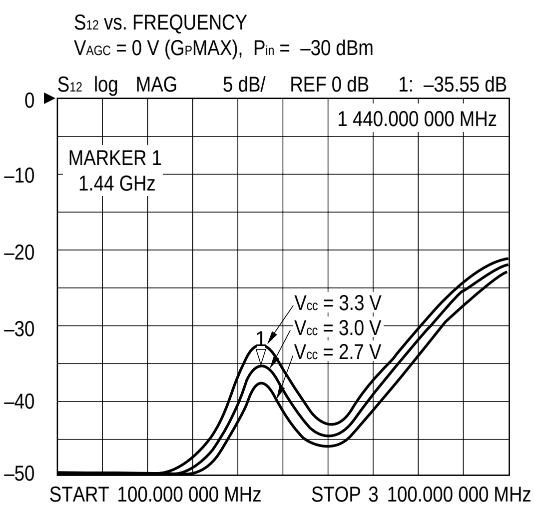


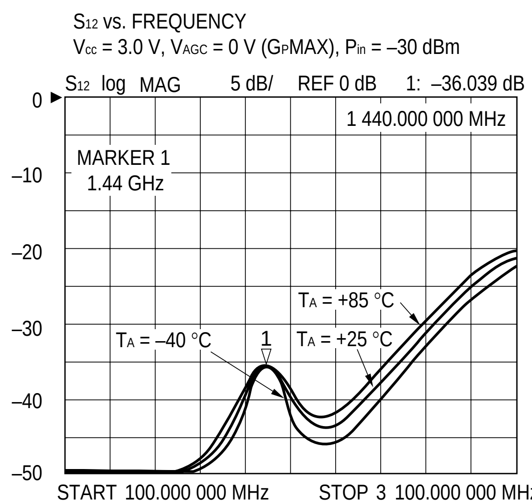
— μPC8119T —

Output port matching at f = 1440 MHz





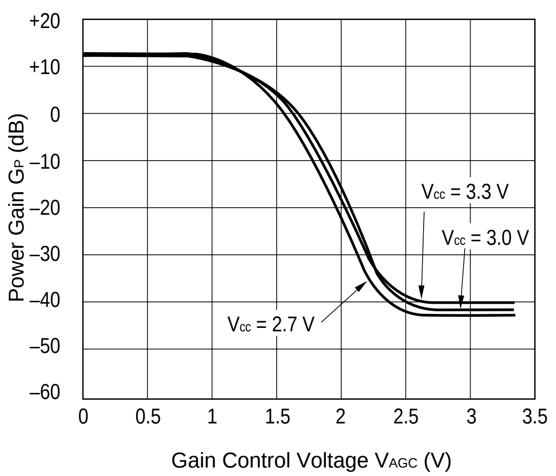




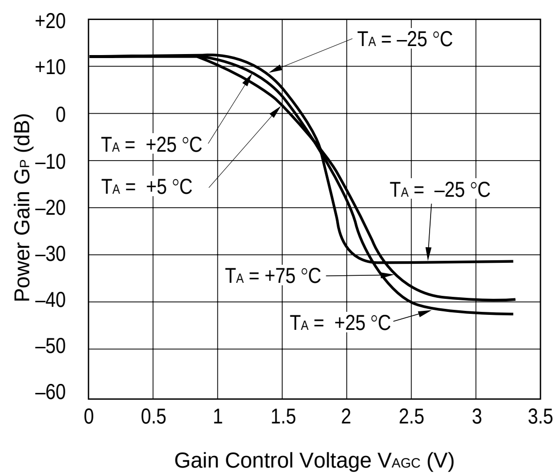
—— μPC8119T ——

Output port matching at f = 1440 MHz

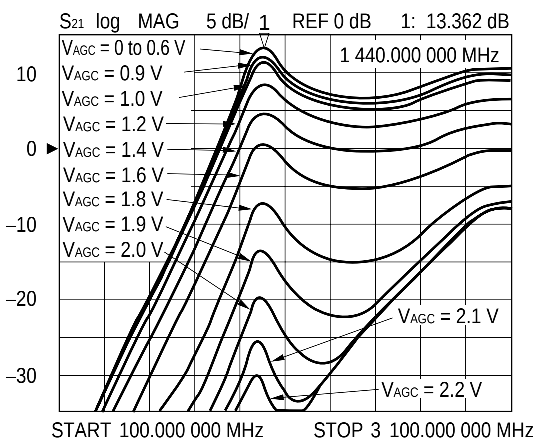
POWER GAIN vs. GAIN CONTROL VOLTAGE



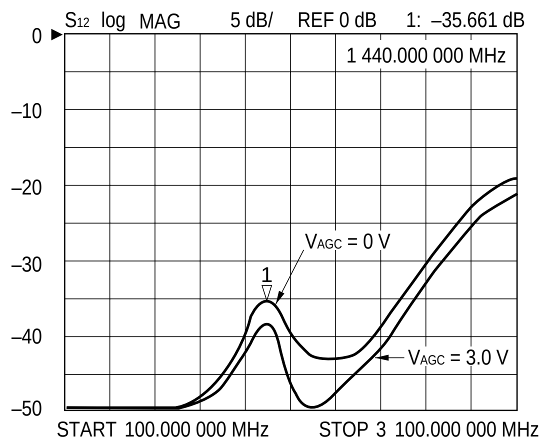
POWER GAIN vs. GAIN CONTROL VOLTAGE



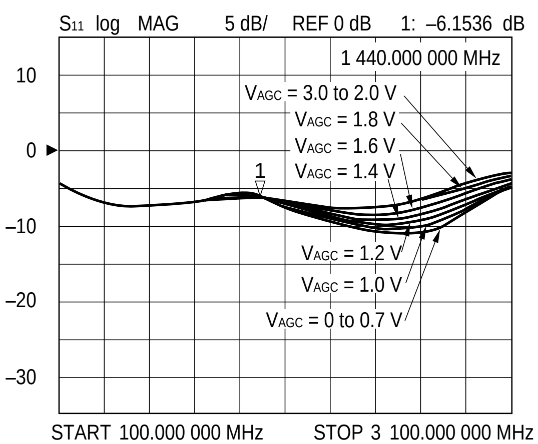
S21 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



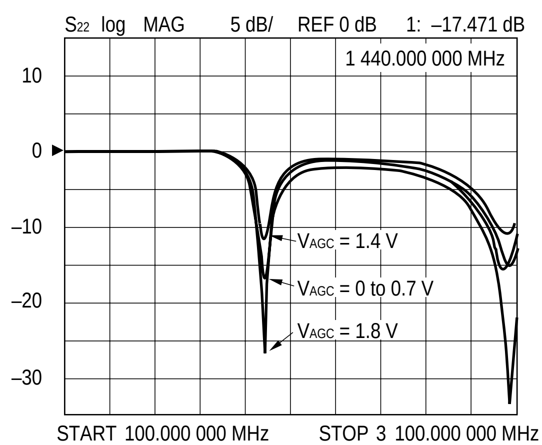
S12 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



S11 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

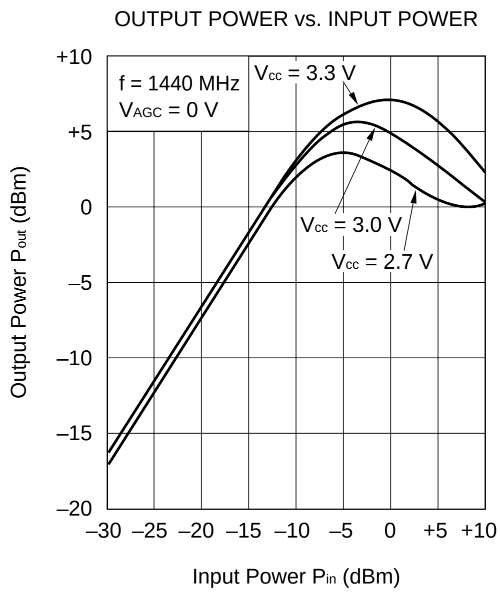


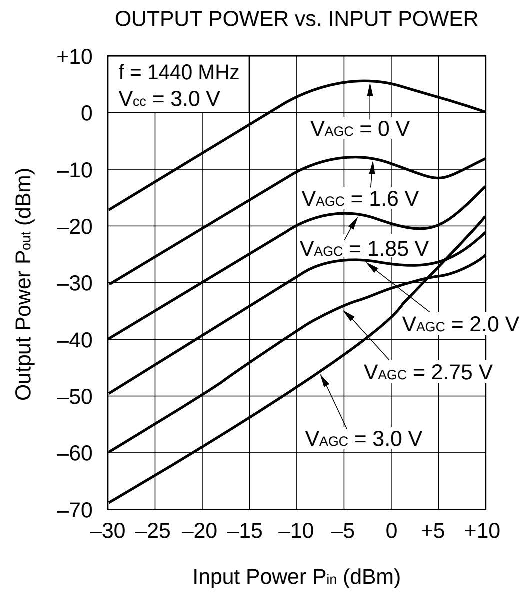
S22 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

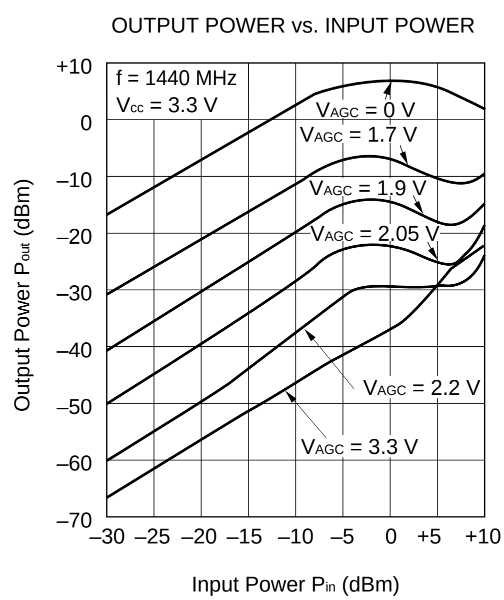


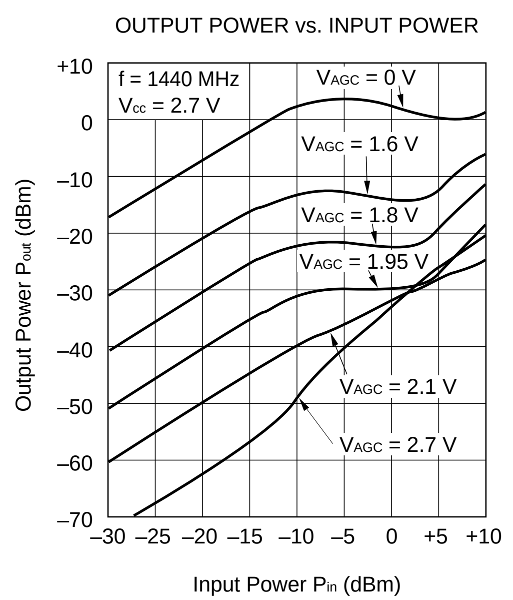
μPC8119T

Output port matching at f = 1440 MHz



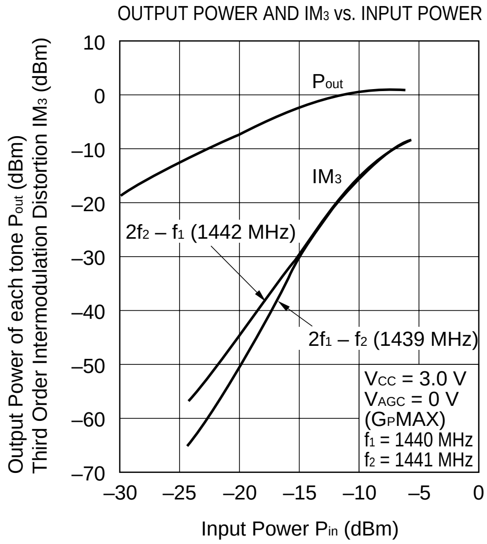


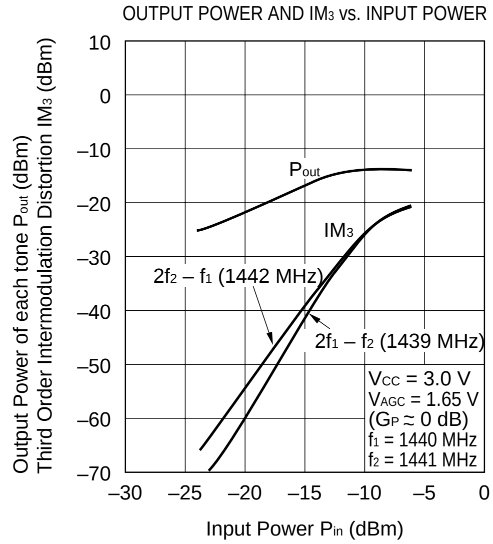


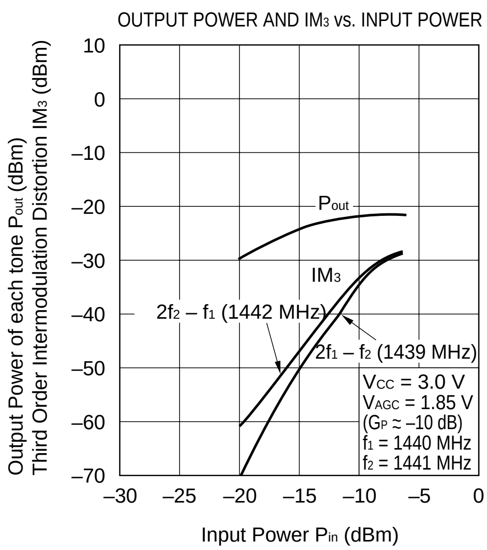


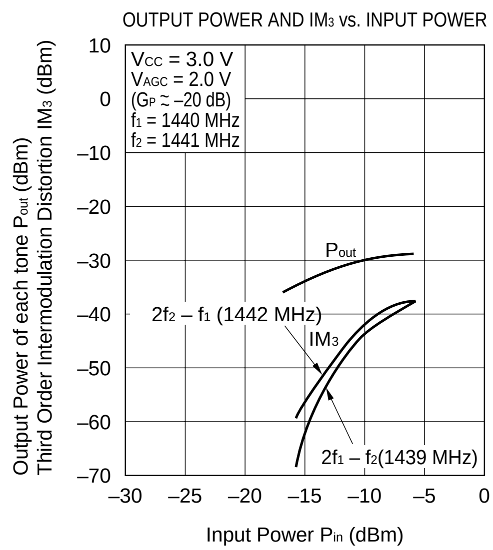
μPC8119T

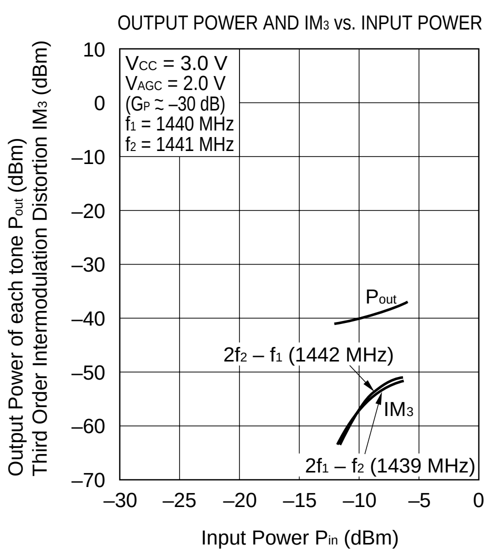
Output port matching at f = 1440 MHz





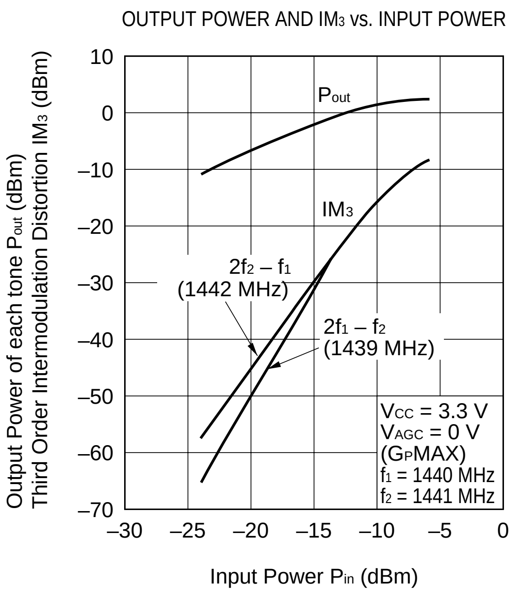


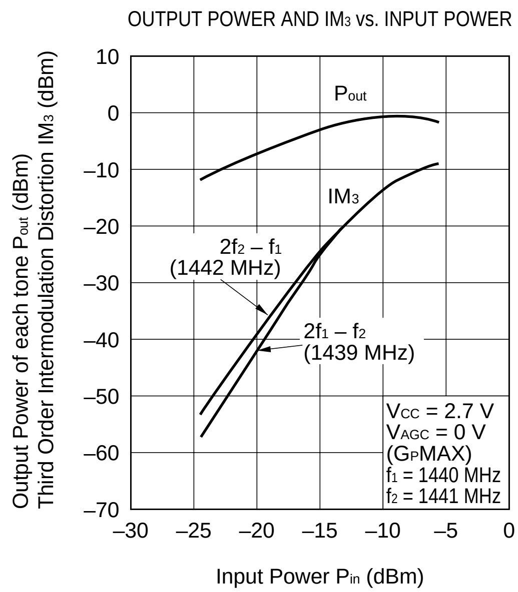


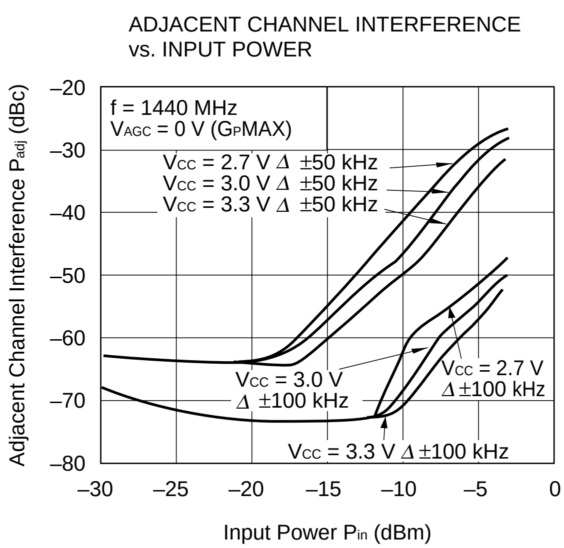


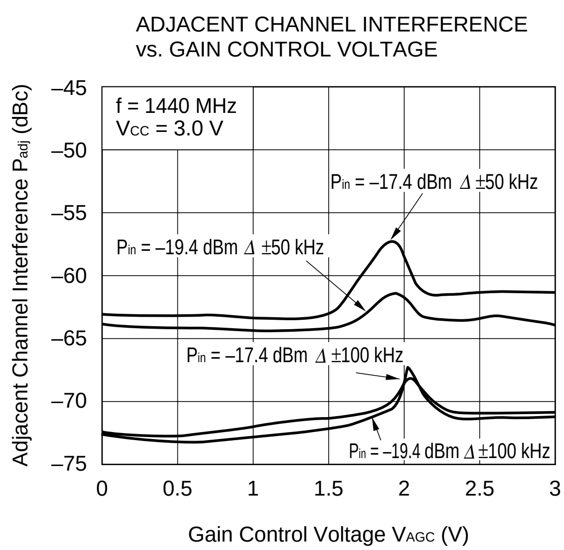
—— μPC8119T ——

Output port matching at f = 1440 MHz





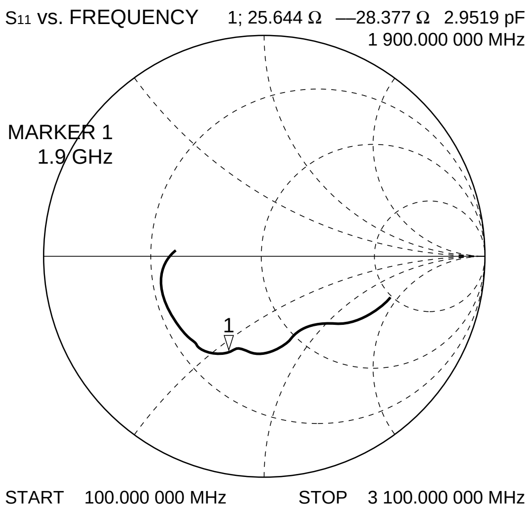


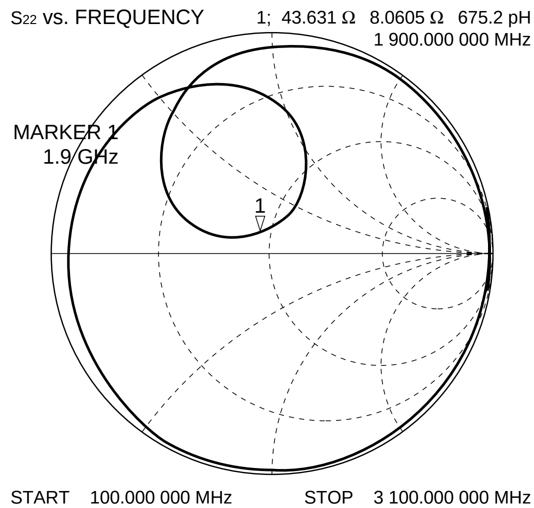


—— μPC8119T ——

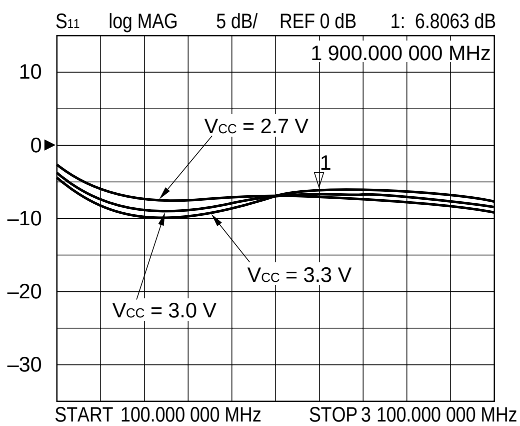
Output port matching at f = 1900 MHz

$V_{CC} = V_{out} = 3.0$ V, $V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm

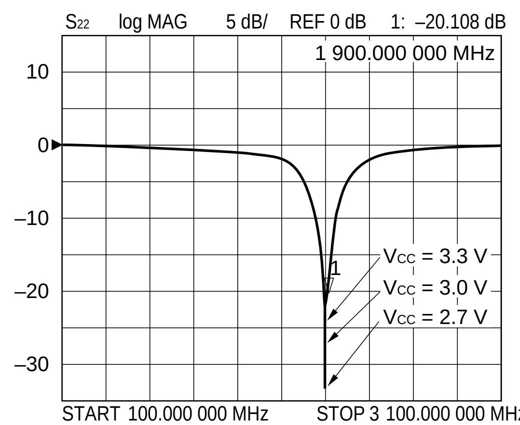




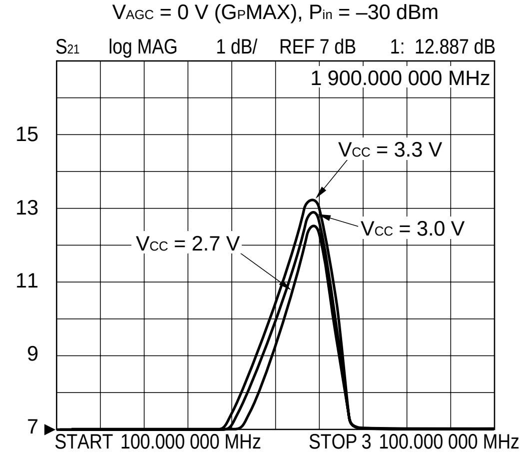
S11 vs. FREQUENCY
$V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



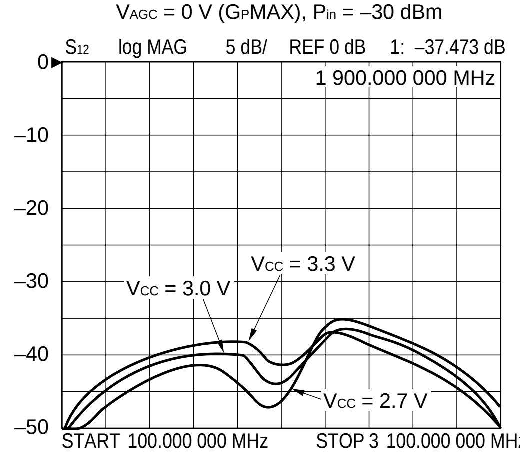
S22 vs. FREQUENCY
$V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



S21 vs. FREQUENCY
$V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



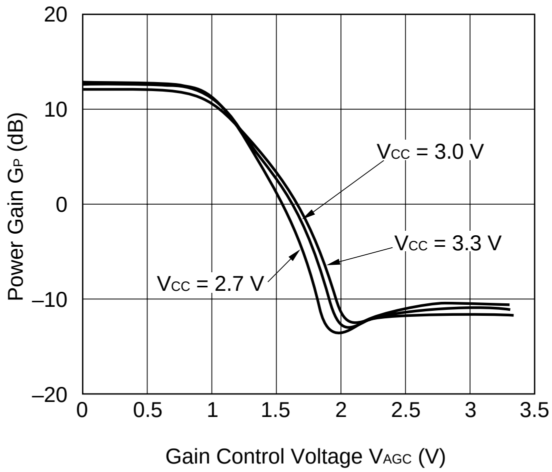
S12 vs. FREQUENCY
$V_{AGC} = 0$ V (G_PMAX), $P_{in} = -30$ dBm



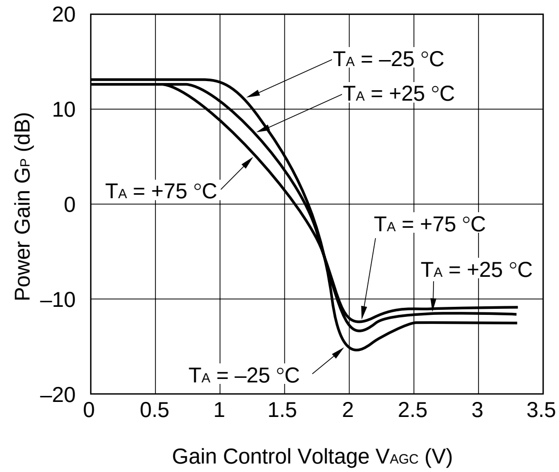
—— μPC8119T ——

Output port matching at f = 1900 MHz

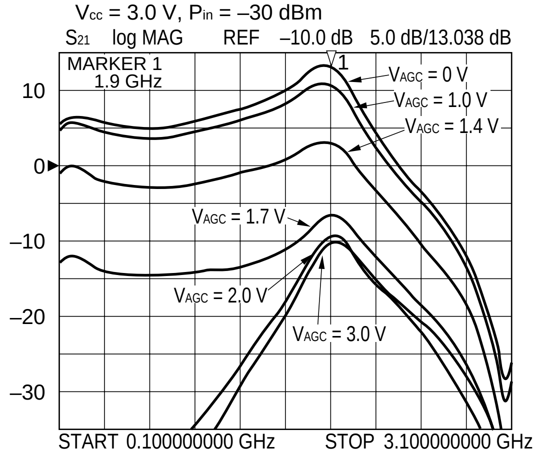
POWER GAIN vs. GAIN CONTROL VOLTAGE



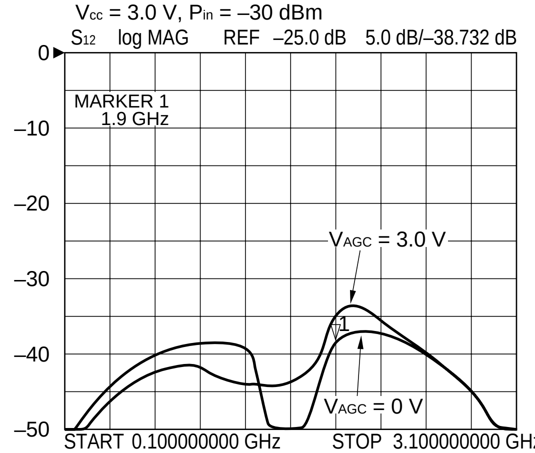
POWER GAIN vs. GAIN CONTROL VOLTAGE



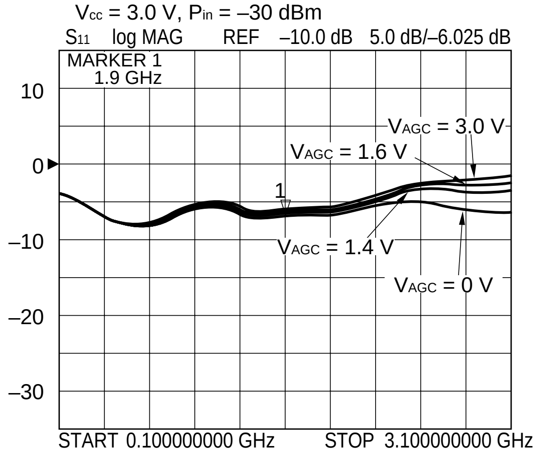
S21 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



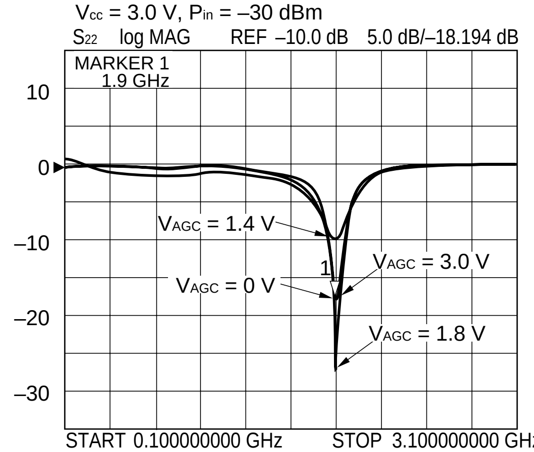
S12 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



S11 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



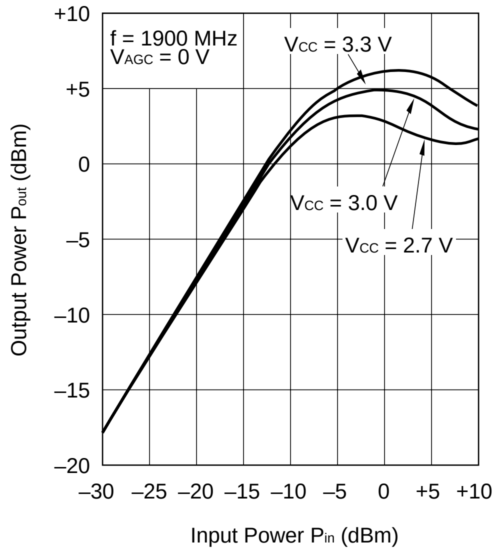
S22 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



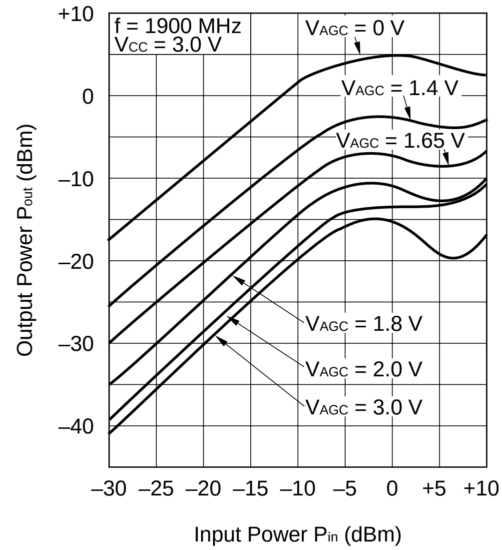
— μPC8119T —

Output port matching at f = 1900 MHz

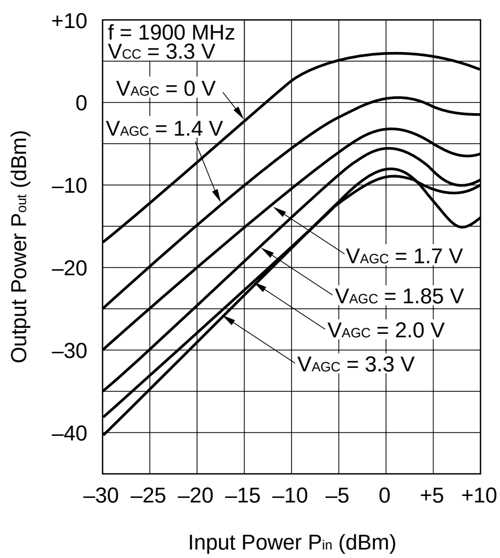
OUTPUT POWER vs. INPUT POWER



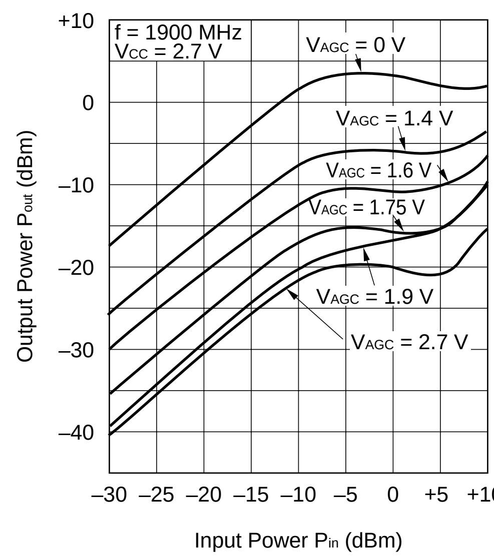
OUTPUT POWER vs. INPUT POWER



OUTPUT POWER vs. INPUT POWER



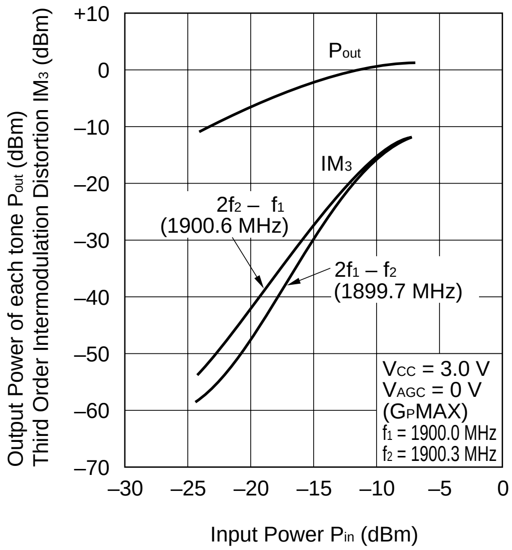
OUTPUT POWER vs. INPUT POWER



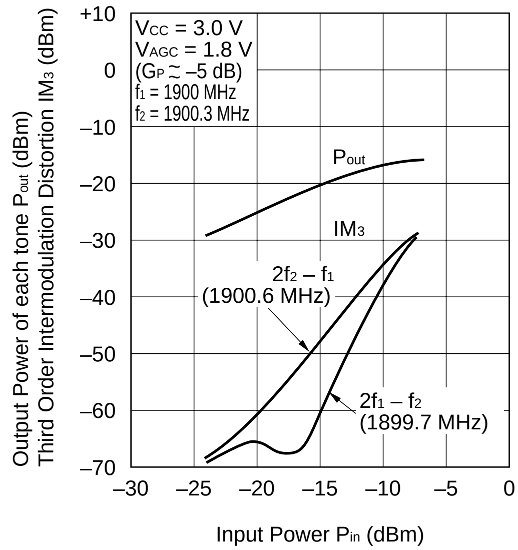
— μPC8119T —

Output port matching at f = 1900 MHz

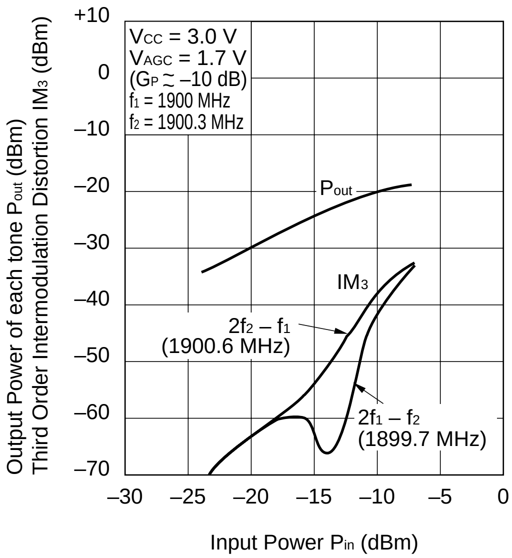
OUTPUT POWER AND IM3 vs. INPUT POWER



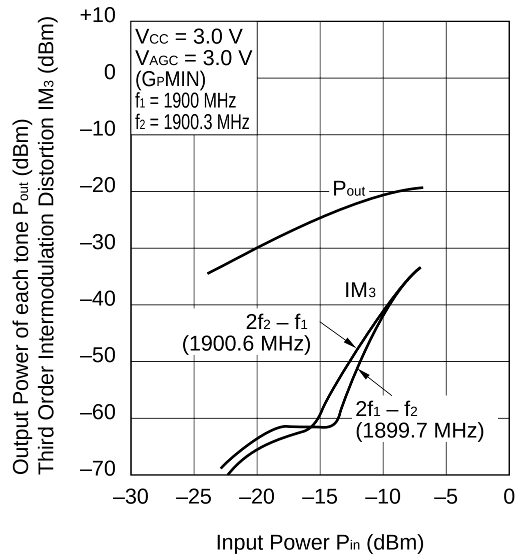
OUTPUT POWER AND IM3 vs. INPUT POWER



OUTPUT POWER AND IM3 vs. INPUT POWER



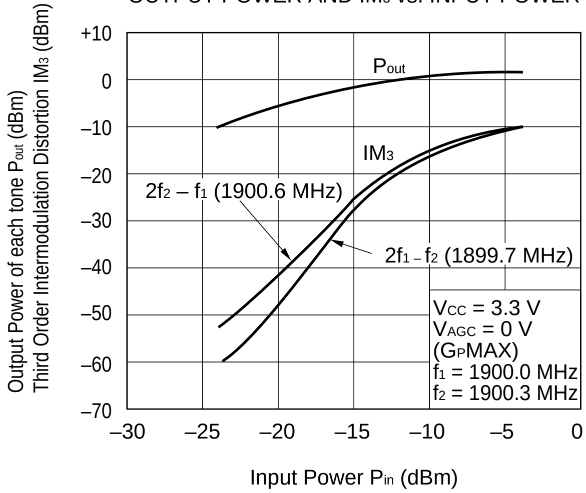
OUTPUT POWER AND IM3 vs. INPUT POWER



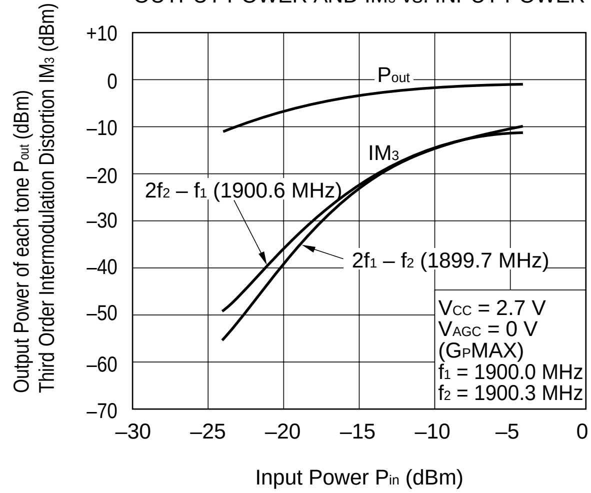
— μPC8119T —

Output port matching at f = 1900 MHz

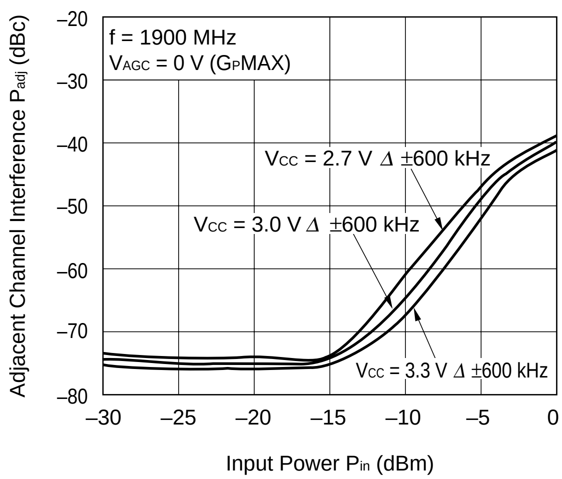
OUTPUT POWER AND IM_3 vs. INPUT POWER



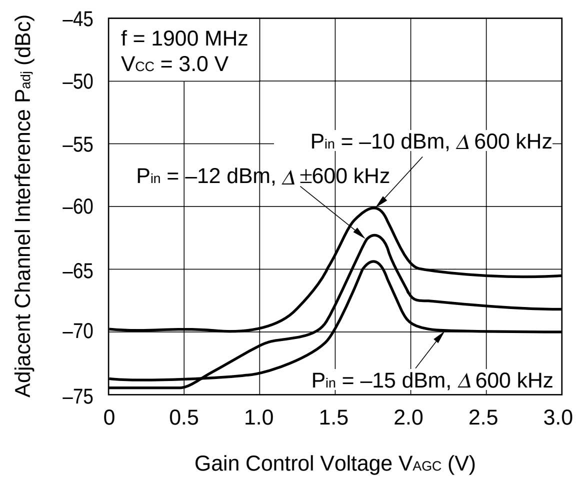
OUTPUT POWER AND IM_3 vs. INPUT POWER



ADJACENT CHANNEL INTERFERENCE vs. INPUT POWER

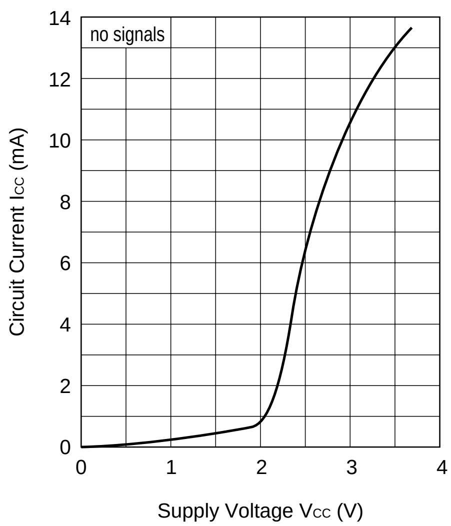


ADJACENT CHANNEL INTERFERENCE vs. GAIN CONTROL VOLTAGE

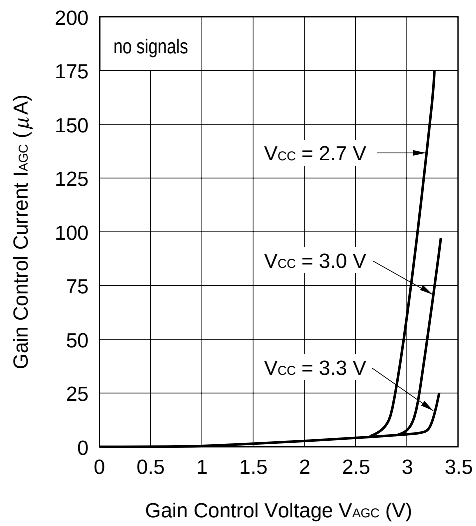


μPC8120T

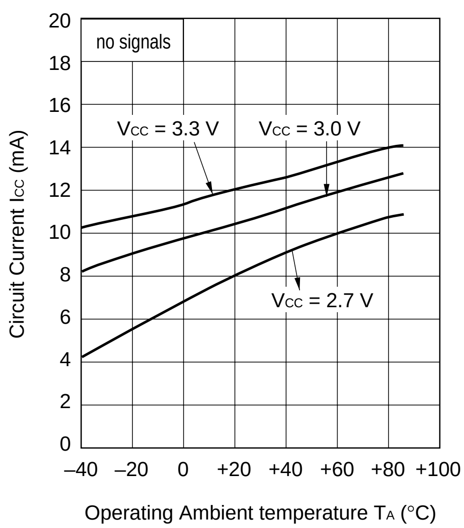
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



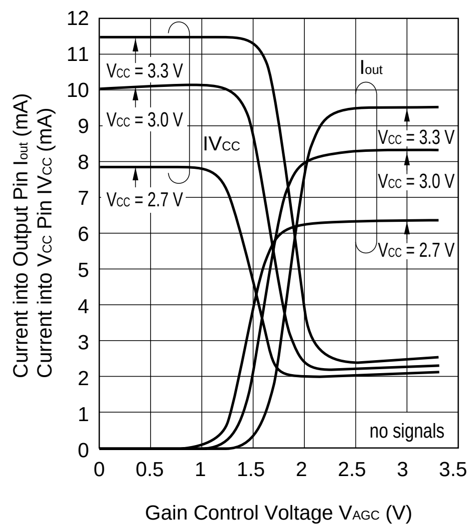
GAIN CONTROL CURRENT vs. GAIN CONTROL VOLTAGE



CIRCUIT CURRENT vs. OPERATING AMBIENT TEMPERATURE

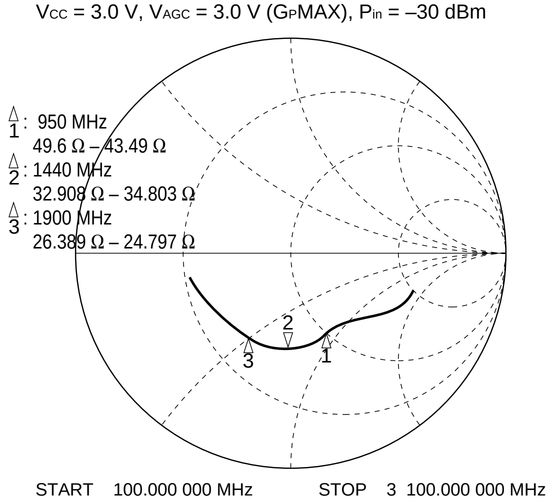


CURRENT INTO OUTPUT PIN AND CURRENT INTO VCC PIN vs. GAIN CONTROL VOLTAGE



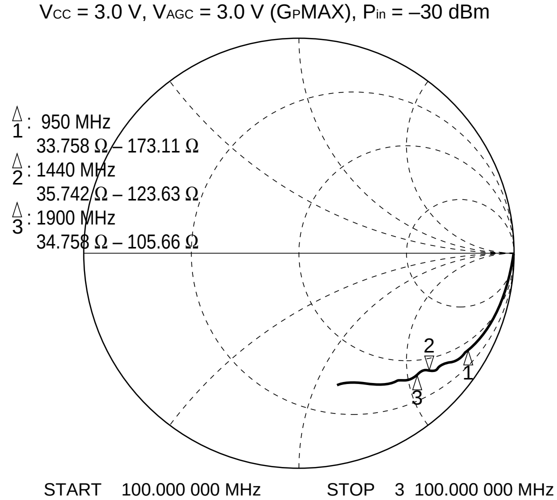
S_{11} vs. FREQUENCY

V_{CC} = 3.0 V, V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm



S_{22} vs. FREQUENCY

V_{CC} = 3.0 V, V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

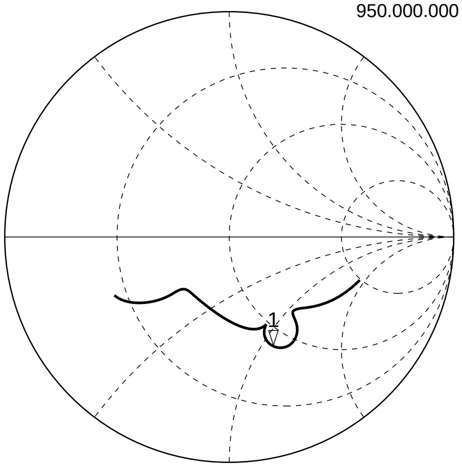


— μPC8120T —

Output port matching at f = 950 MHz

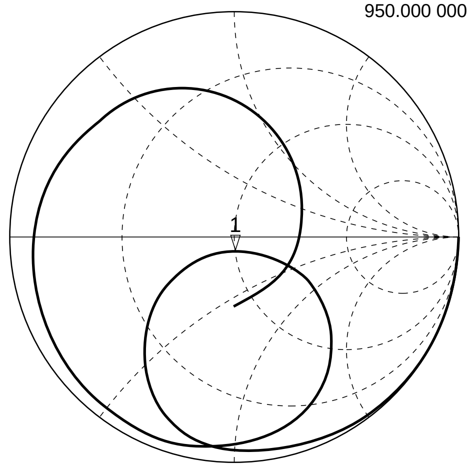
V_{CC} = 3.0 V, V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

S_{11} vs. FREQUENCY 1; 42.344 Ω –55.41 Ω 3.0235 pF 950.000.000 MHz



START 100.000 000 MHz STOP 3 100.000 000 MHz

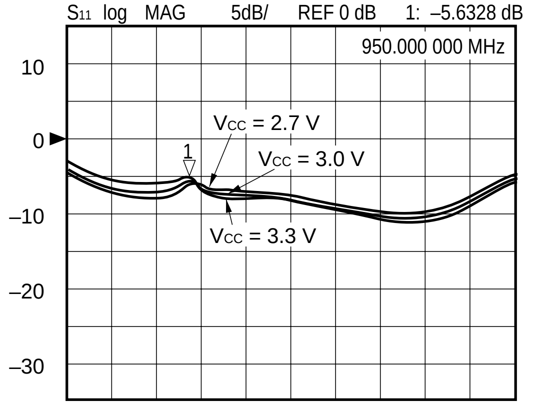
S_{22} vs. FREQUENCY 1; 50.91 Ω –5.9805 Ω 28.013 pF 950.000 000 MHz



START 100.000 000 MHz STOP 3 100.000 000 MHz

S_{11} vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

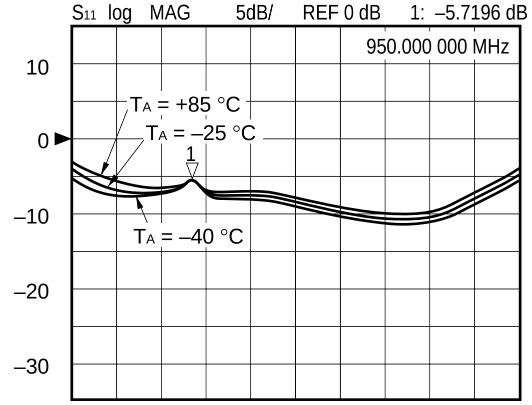
S_{11} log MAG 5dB/ REF 0 dB 1: –5.6328 dB



START 100.000 000 MHz STOP 3 100.000 000 MHz

S_{11} vs. FREQUENCY
V_{CC} = 3.0 V V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

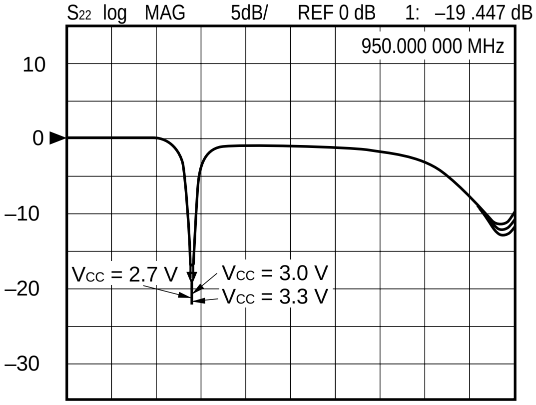
S_{11} log MAG 5dB/ REF 0 dB 1: –5.7196 dB



START 100.000 000 MHz STOP 3 100.000 000 MHz

S_{22} vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

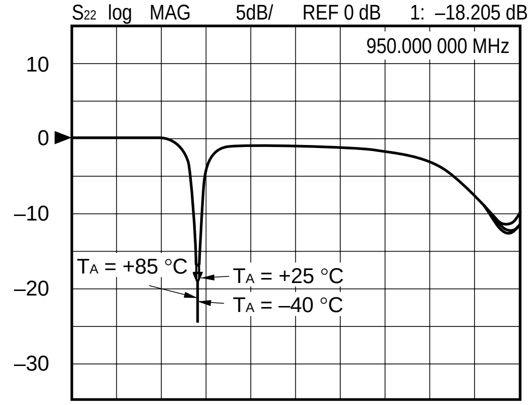
S_{22} log MAG 5dB/ REF 0 dB 1: –19 .447 dB



START 100.000 000 MHz STOP 3 100.000 000 MHz

S_{22} vs. FREQUENCY
V_{CC} = 3.0 V, V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

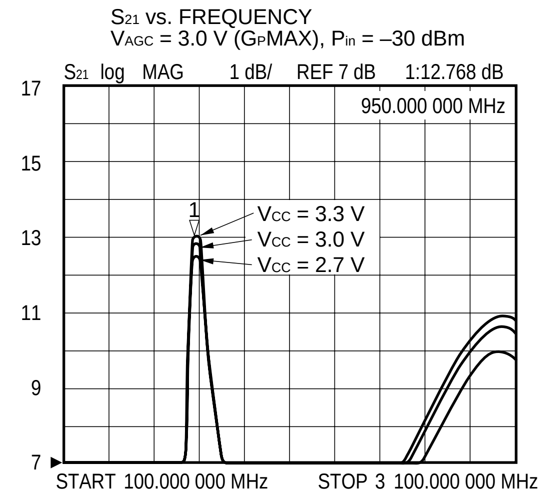
S_{22} log MAG 5dB/ REF 0 dB 1: –18.205 dB

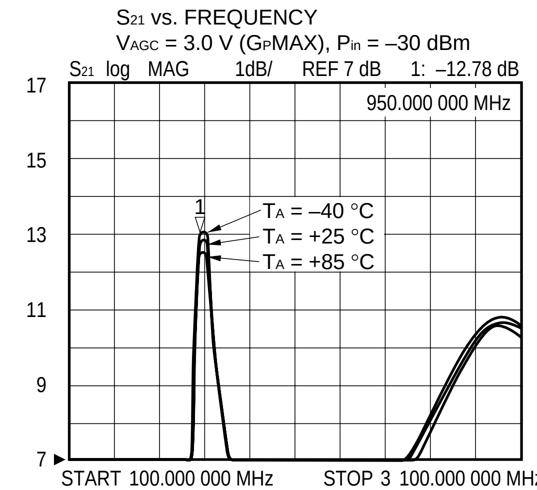


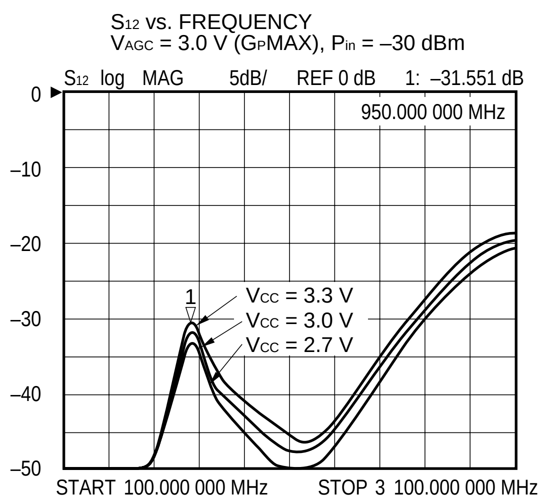
START 100.000 000 MHz STOP 3 100.000 000 MHz

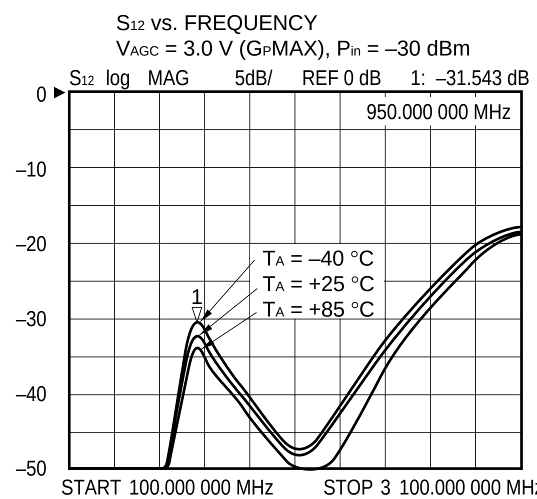
— μPC8120T —

Output port matching at f = 950 MHz





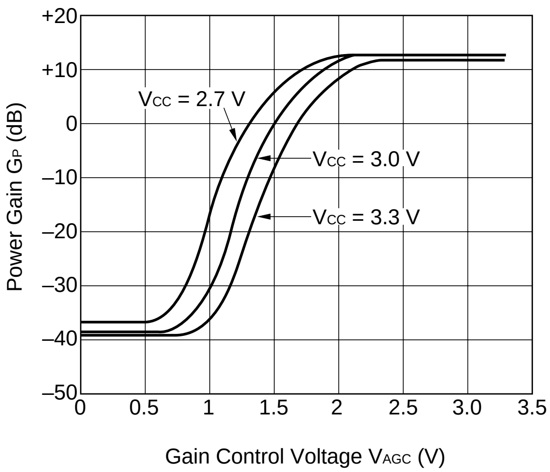




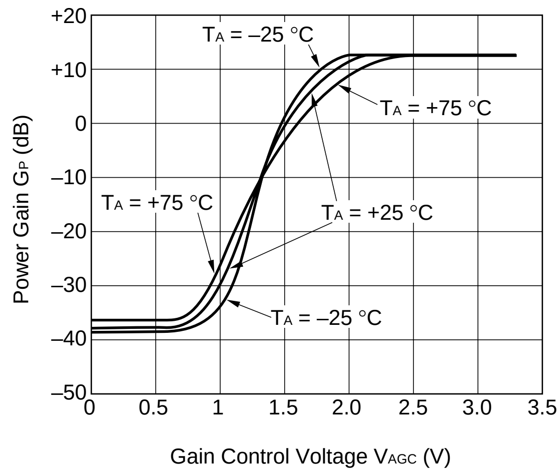
——— μPC8120T ———

Output port matching at f = 950 MHz

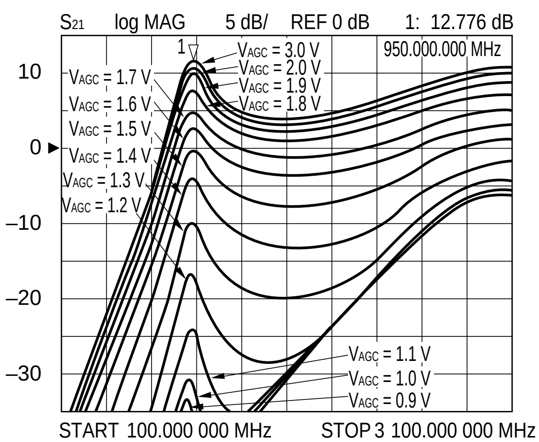
POWER GAIN vs. GAIN CONTROL VOLTAGE



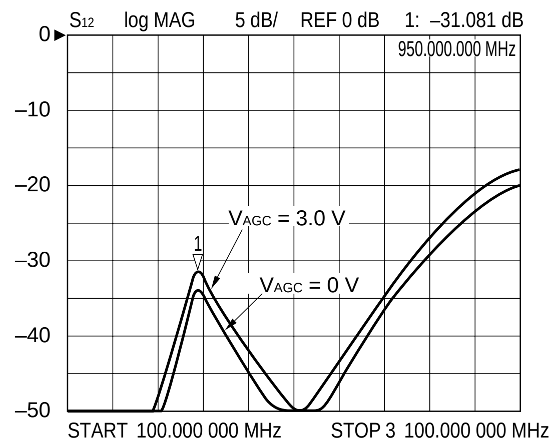
POWER GAIN vs. GAIN CONTROL VOLTAGE



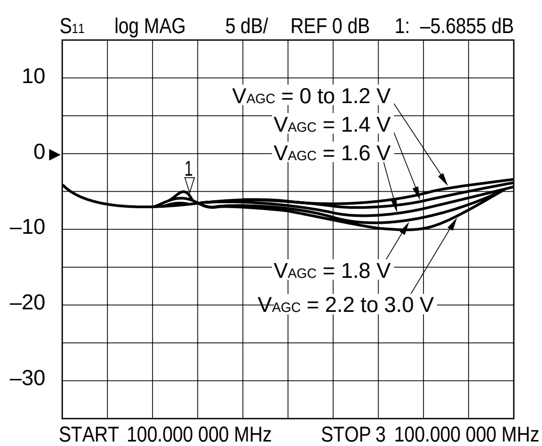
S21 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



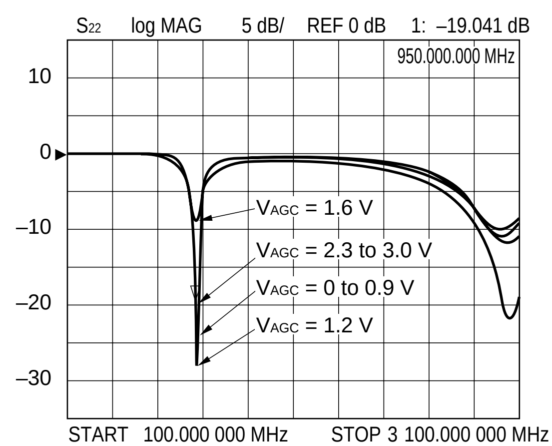
S12 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



S11 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

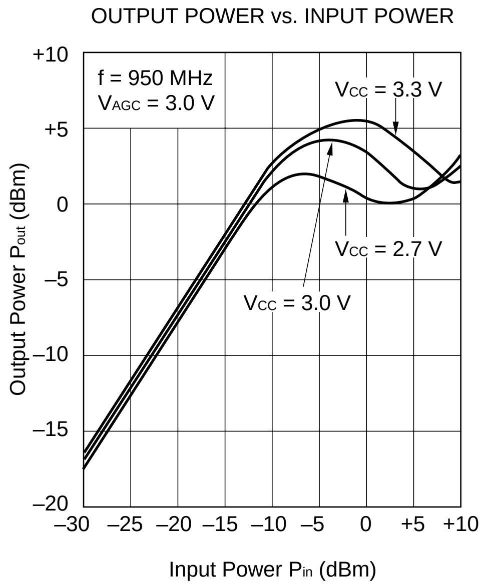


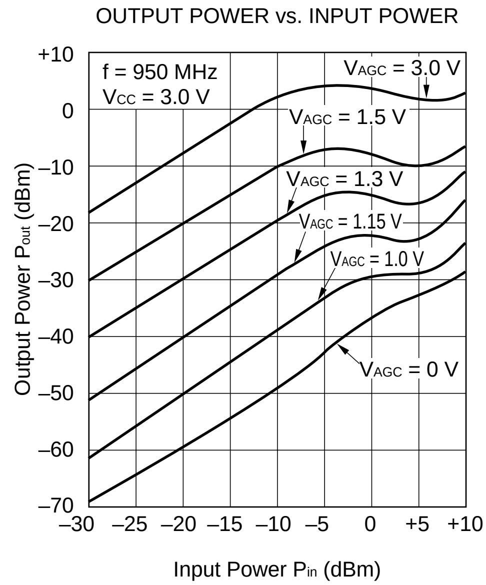
S22 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

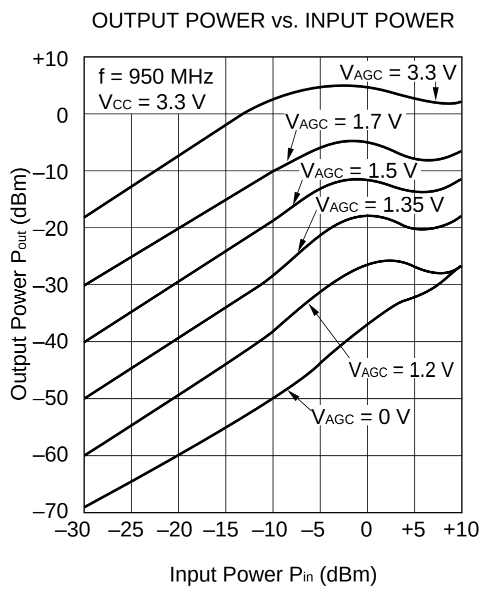


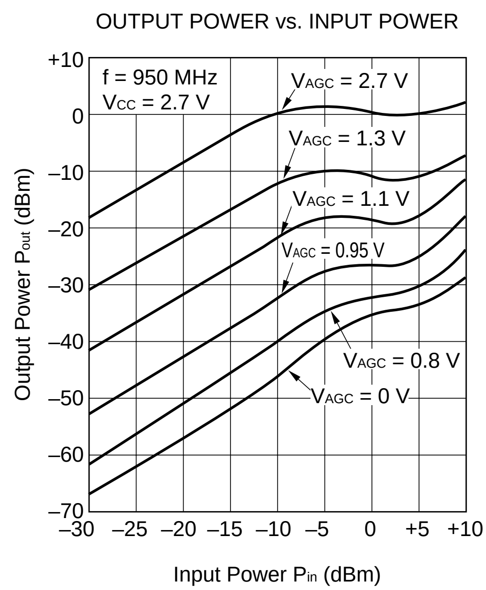
—— μPC8120T ——

Output port matching at f = 950 MHz



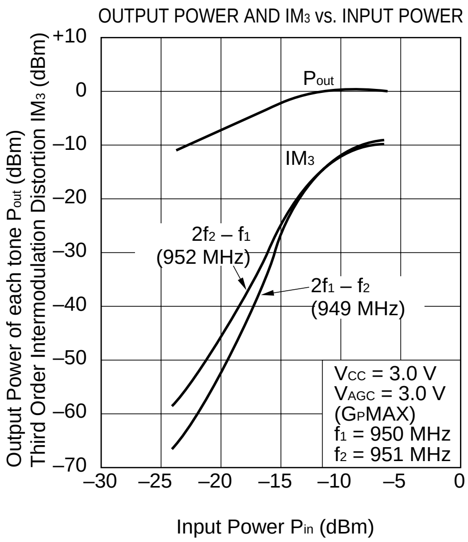


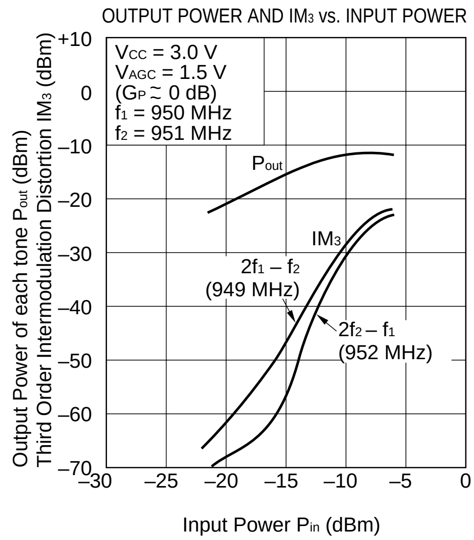


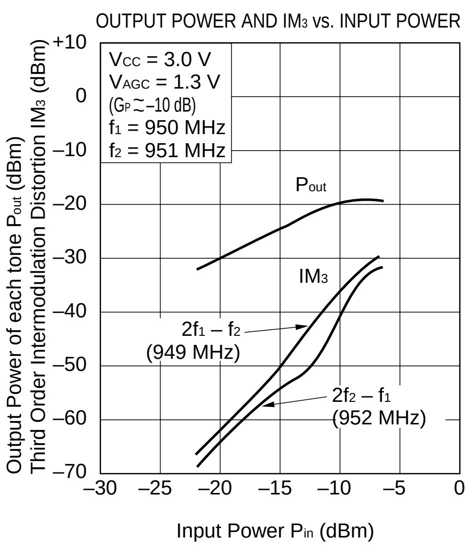


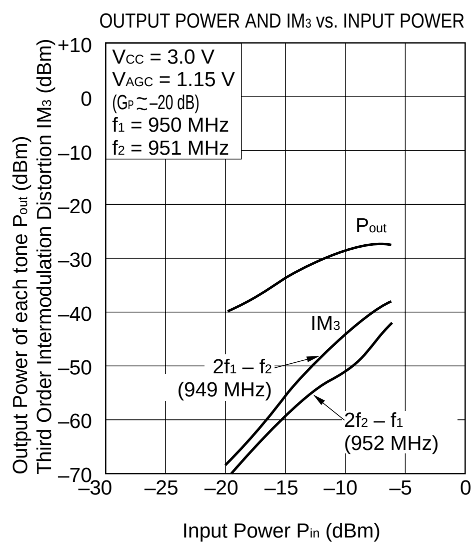
——— μPC8120T ———

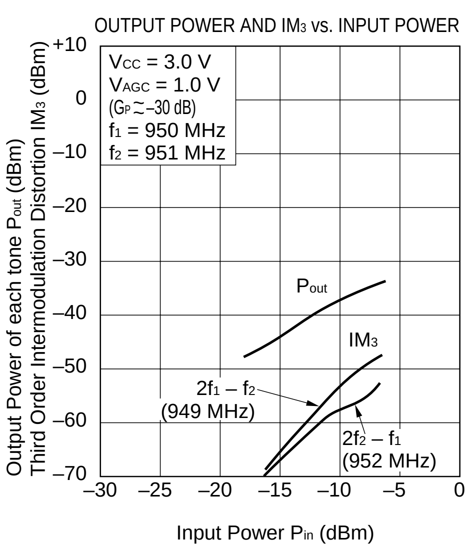
Output port matching at f = 950 MHz

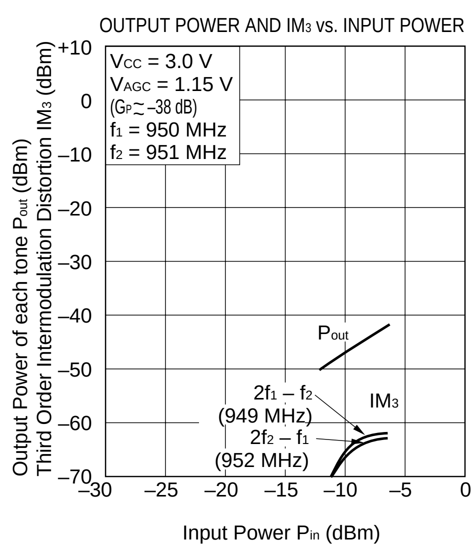








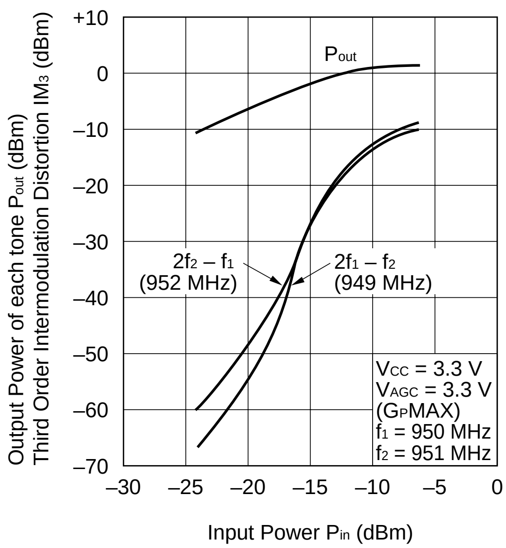




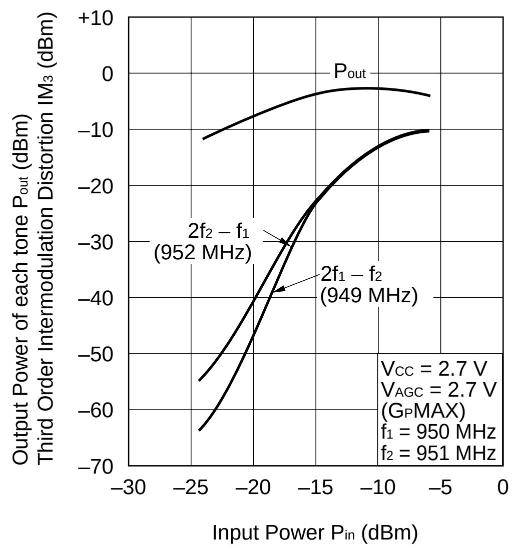
— μPC8120T —

Output port matching at f = 950 MHz

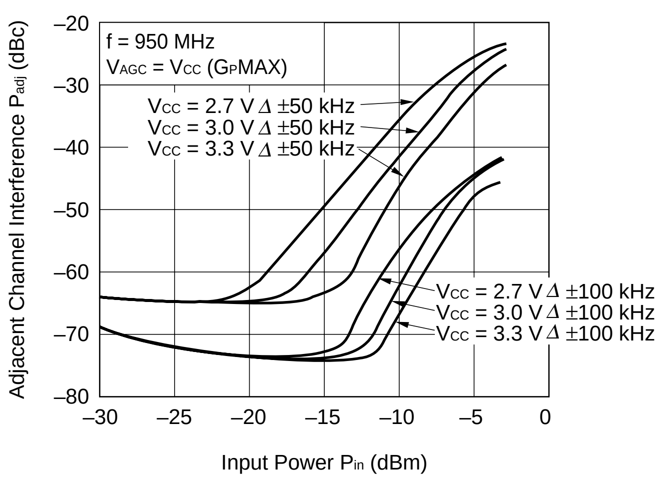
OUTPUT POWER AND IM3 vs. INPUT POWER



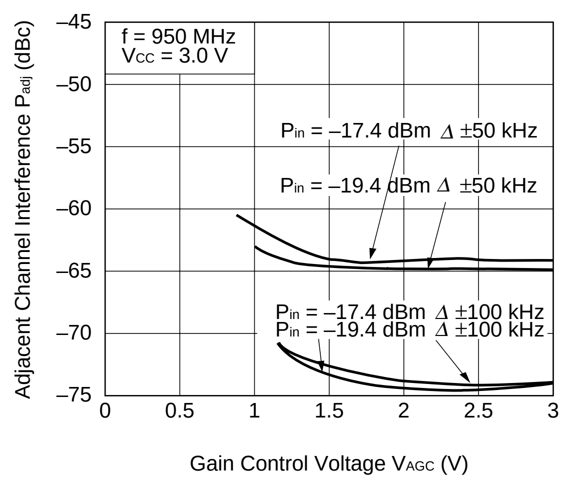
OUTPUT POWER AND IM3 vs. INPUT POWER



ADJACENT CHANNEL INTERFERENCE vs. INPUT POWER



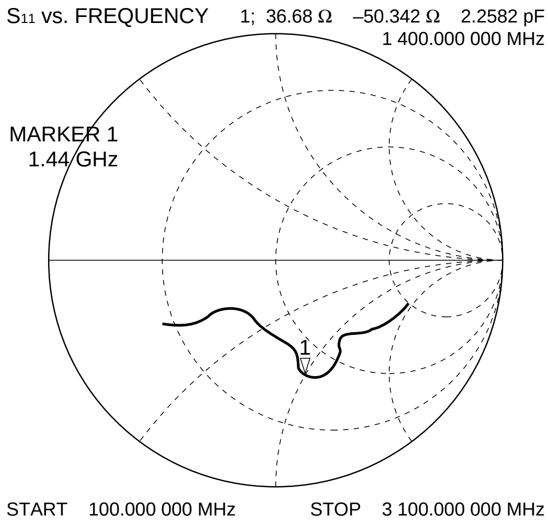
ADJACENT CHANNEL INTERFERENCE vs. GAIN CONTROL VOLTAGE

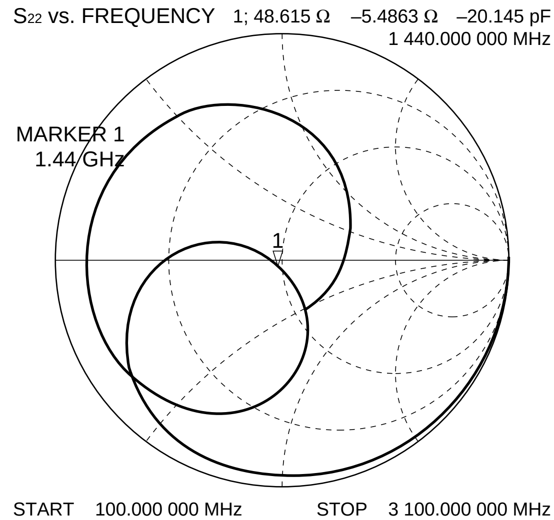


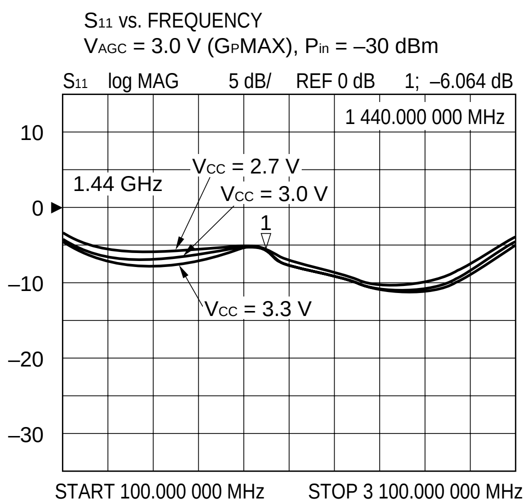
——— μPC8120T ———

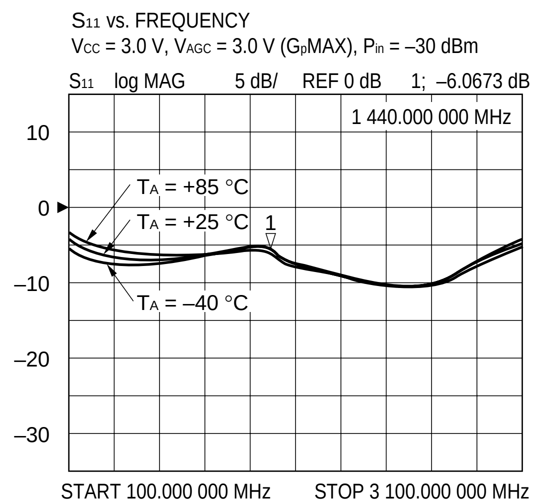
Output port matching at f = 1440 MHz

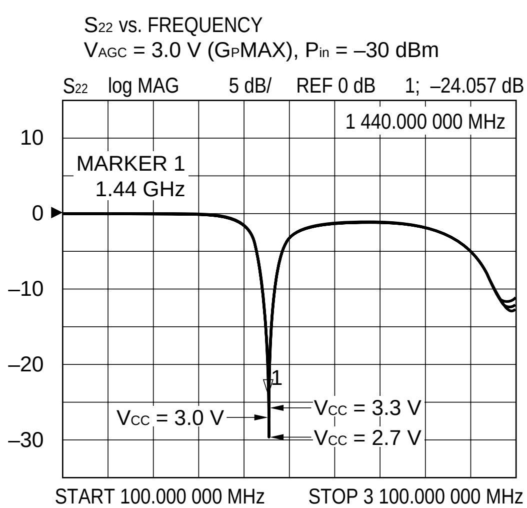
V_{CC} = 3.0 V , V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

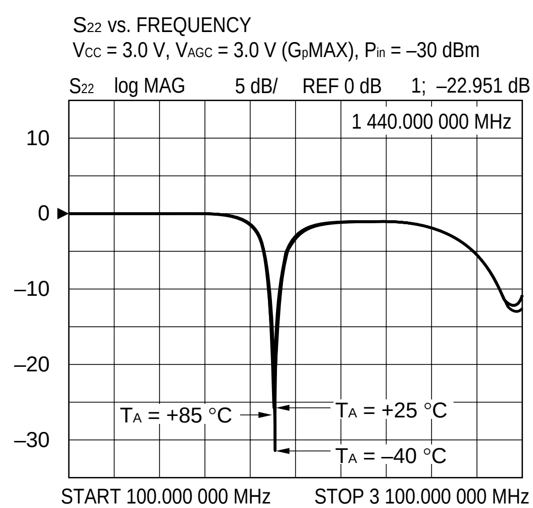








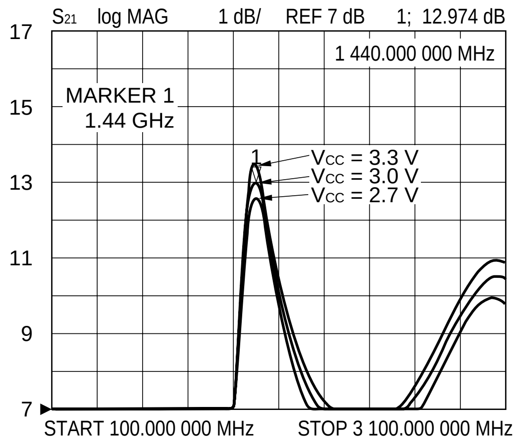




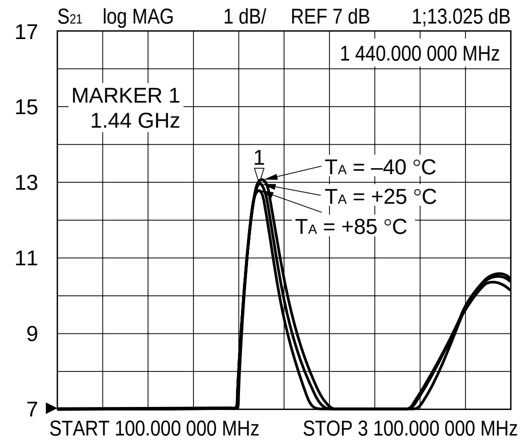
— μPC8120T —

Output port matching at f = 1440 MHz

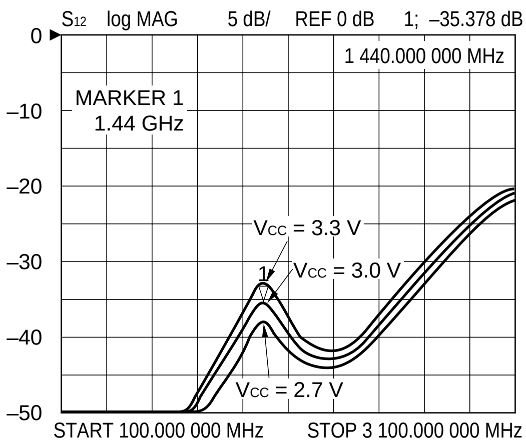
S21 vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm



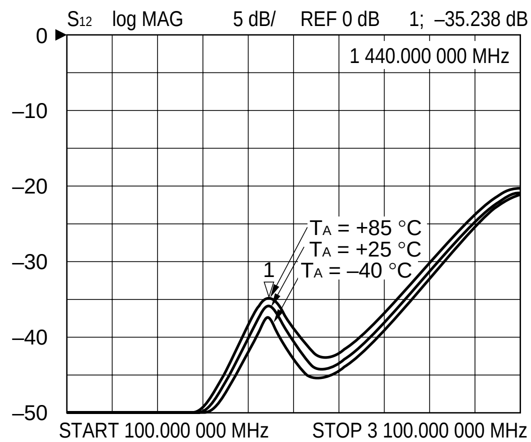
S21 vs. FREQUENCY
V_{AGC} = 3.0 V, (G_PMAX), P_{in} = –30 dBm



S12 vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm



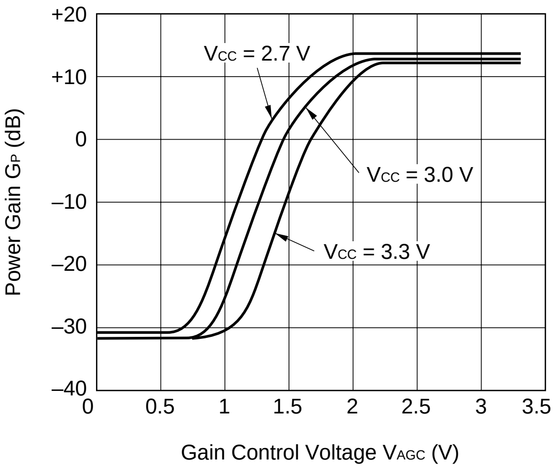
S12 vs. FREQUENCY
V_{AGC} = 3.0 V, (G_PMAX), P_{in} = –30 dBm



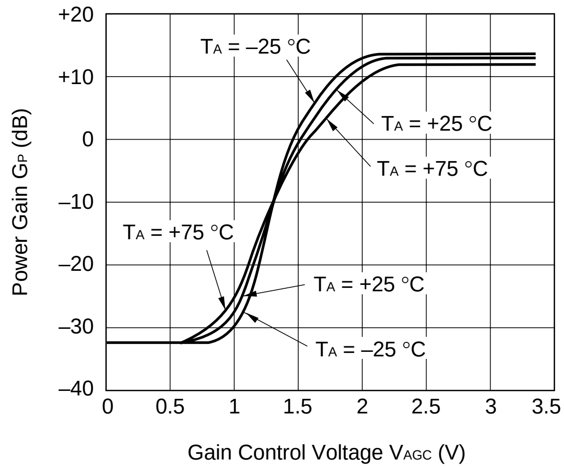
—— μPC8120T ——

Output port matching at f = 1440 MHz

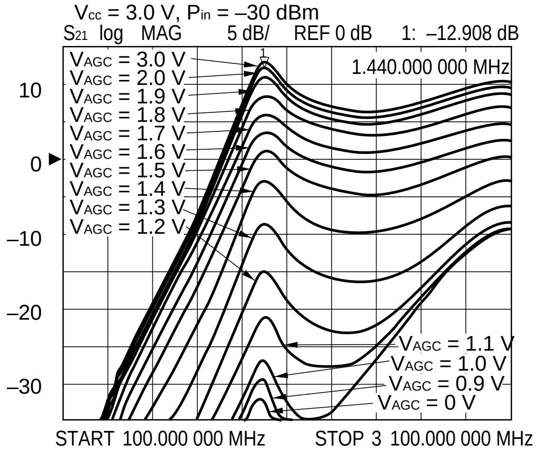
POWER GAIN vs. GAIN CONTROL VOLTAGE



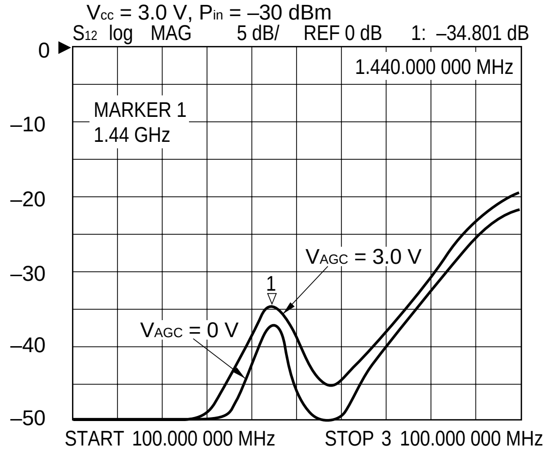
POWER GAIN vs. GAIN CONTROL VOLTAGE



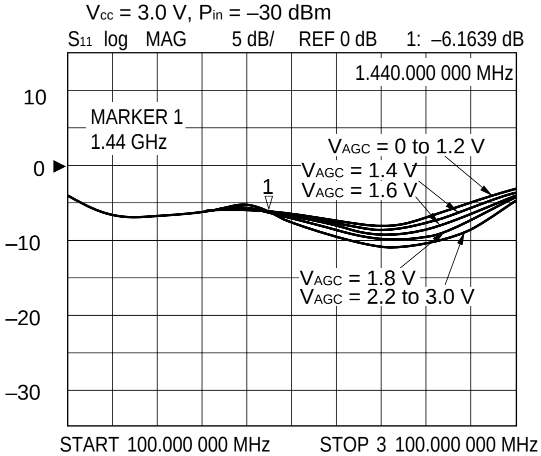
S21 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



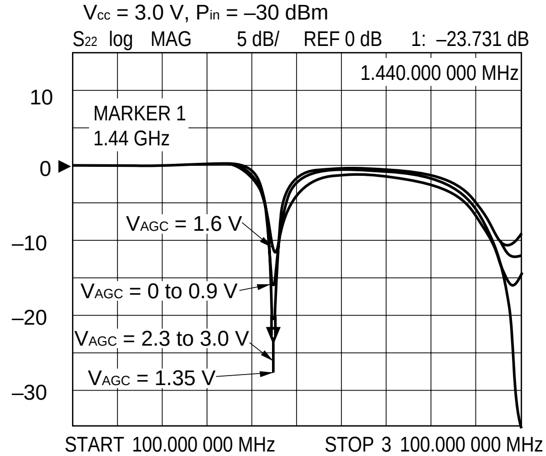
S12 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



S11 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



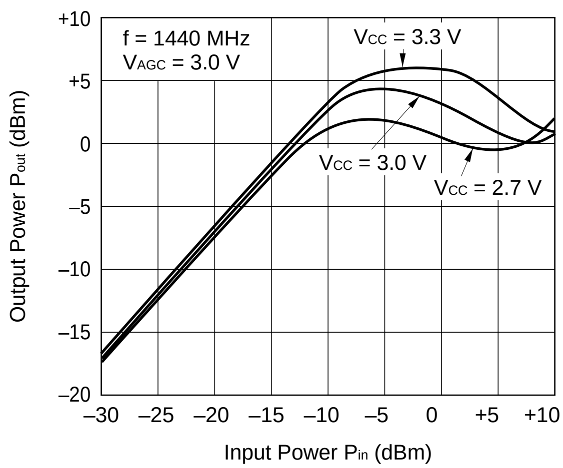
S22 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



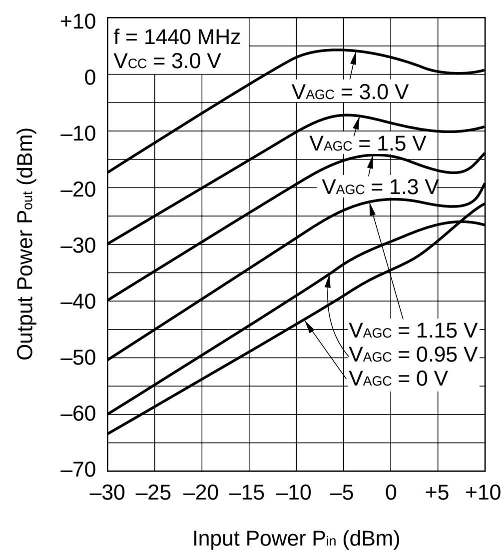
——— μPC8120T ———

Output port matching at f = 1440 MHz

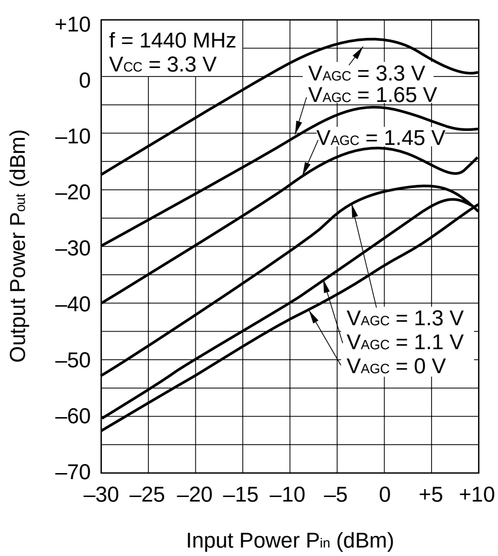
OUTPUT POWER vs. INPUT POWER



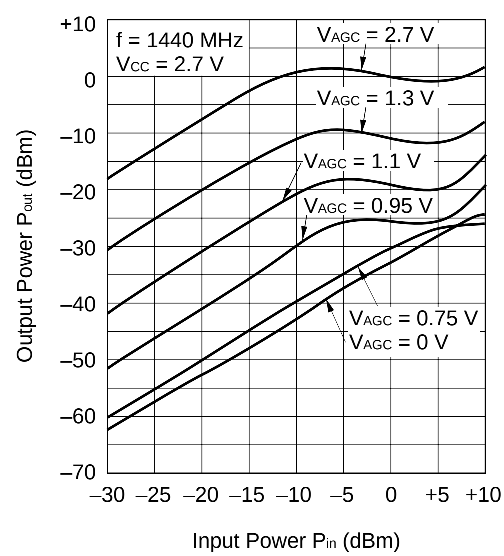
OUTPUT POWER vs. INPUT POWER



OUTPUT POWER vs. INPUT POWER



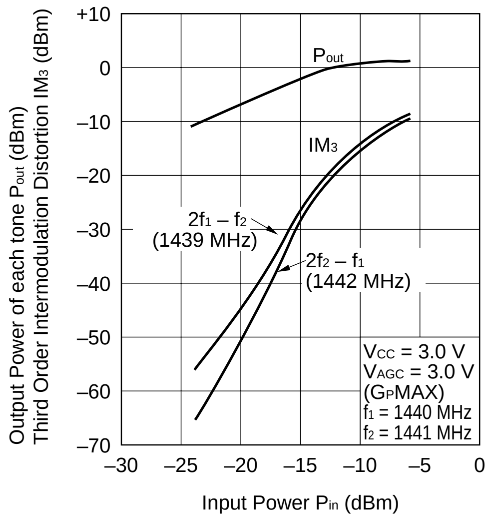
OUTPUT POWER vs. INPUT POWER



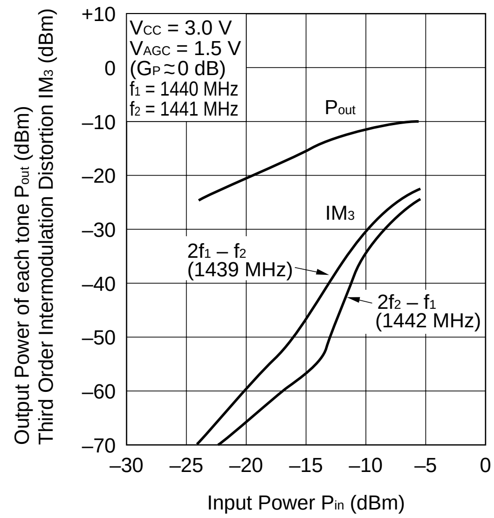
— μPC8120T —

Output port matching at f = 1440 MHz

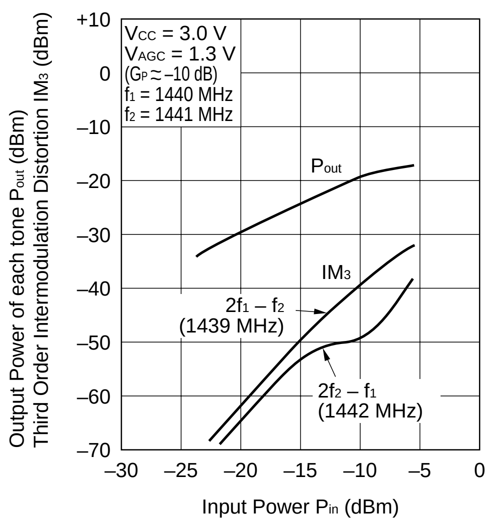
OUTPUT POWER AND IM_3 vs. INPUT POWER



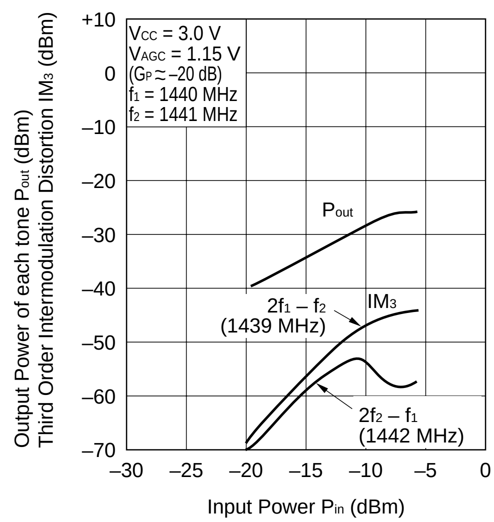
OUTPUT POWER AND IM_3 vs. INPUT POWER



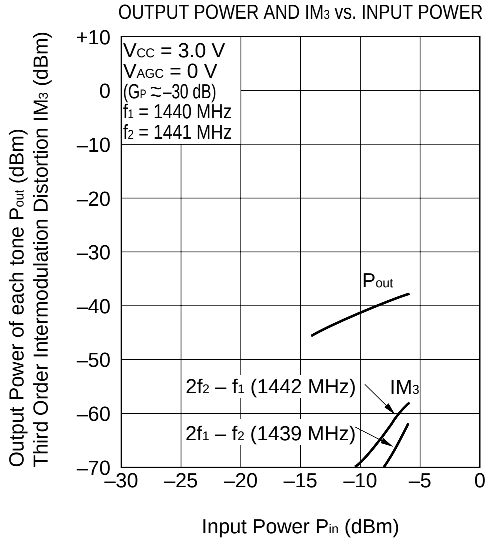
OUTPUT POWER AND IM_3 vs. INPUT POWER



OUTPUT POWER AND IM_3 vs. INPUT POWER



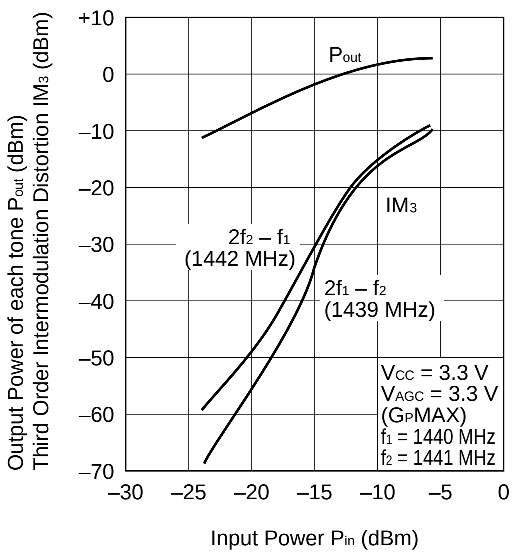
OUTPUT POWER AND IM_3 vs. INPUT POWER



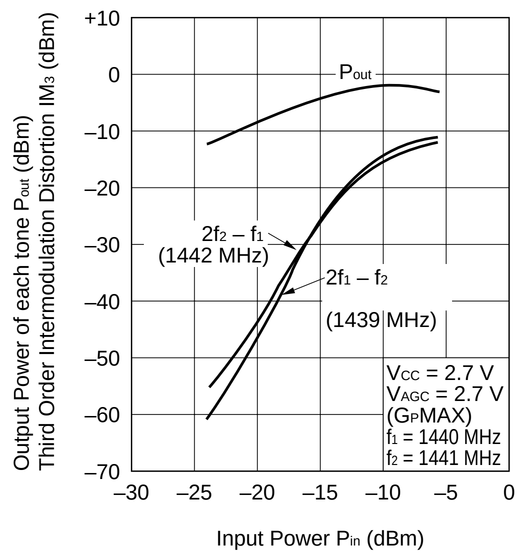
— μPC8120T —

Output port matching at f = 1440 MHz

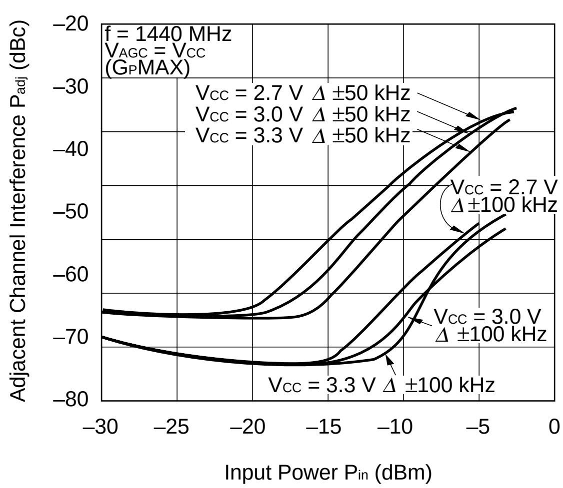
OUTPUT POWER AND IM3 vs. INPUT POWER



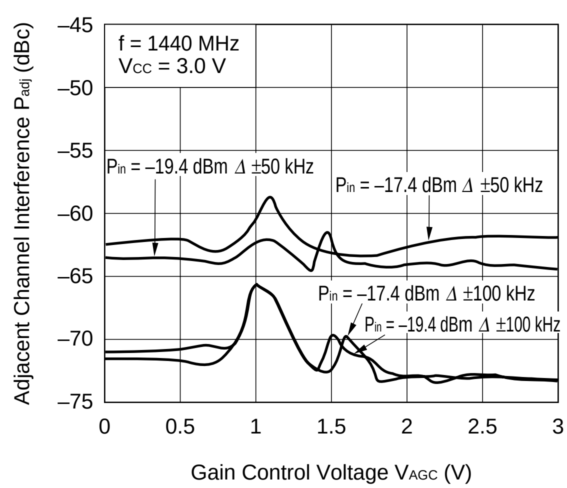
OUTPUT POWER AND IM3 vs. INPUT POWER



ADJACENT CHANNEL INTERFERENCE vs. INPUT POWER



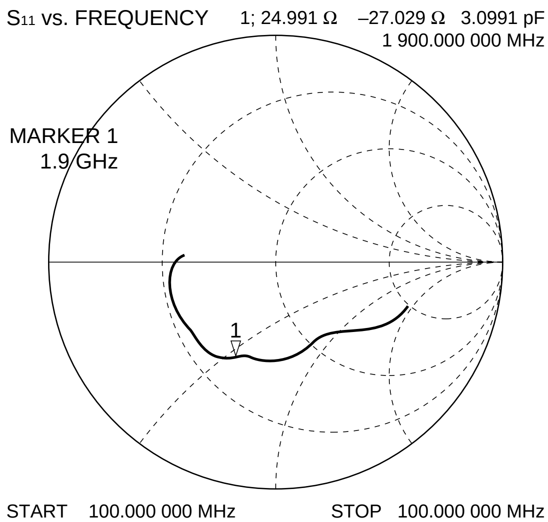
ADJACENT CHANNEL INTERFERENCE vs. GAIN CONTROL VOLTAGE

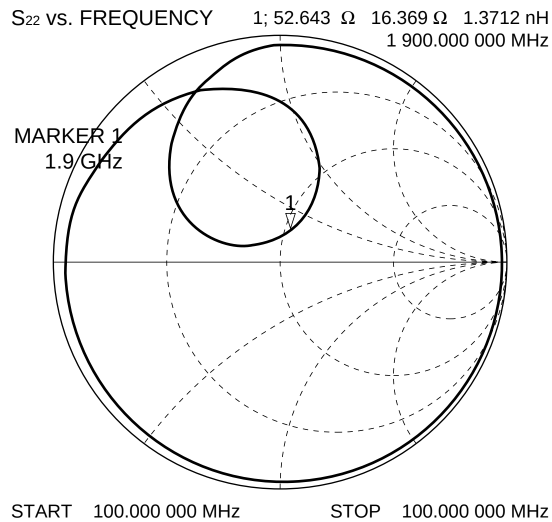


— μPC8120T —

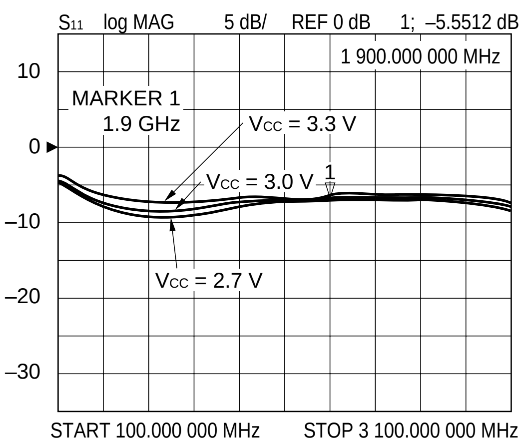
Output port matching at f = 1900 MHz

V_{CC} = 3.0 V, V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm

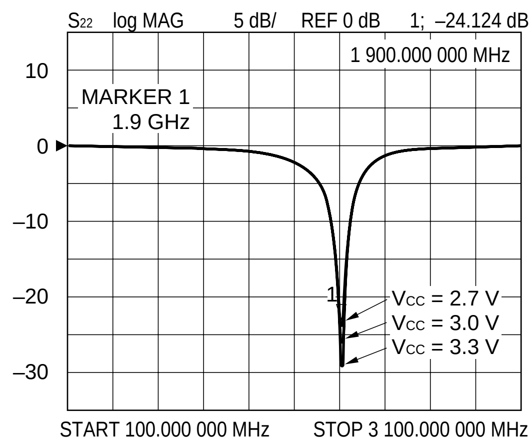




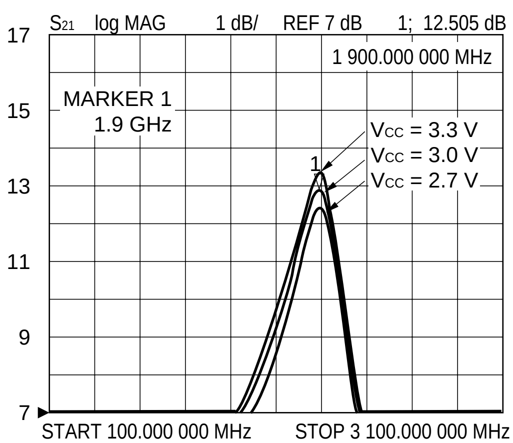
S_{11} vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm



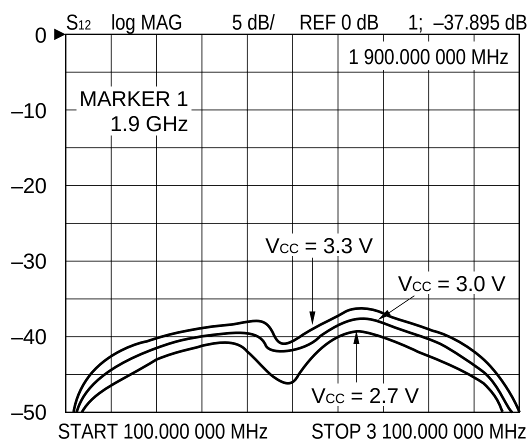
S_{22} vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm



S_{21} vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm



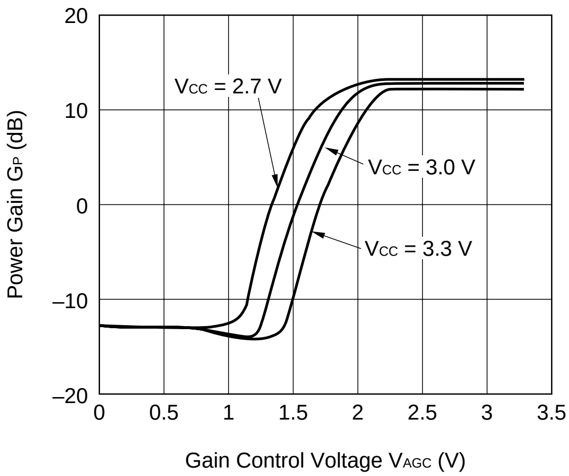
S_{12} vs. FREQUENCY
V_{AGC} = 3.0 V (G_PMAX), P_{in} = –30 dBm



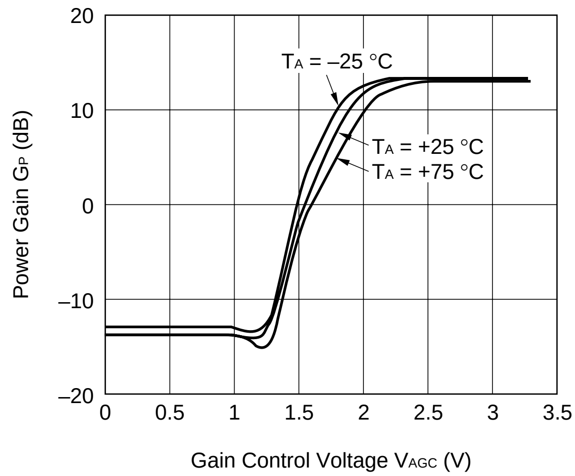
—— μPC8120T ——

Output port matching at f = 1900 MHz

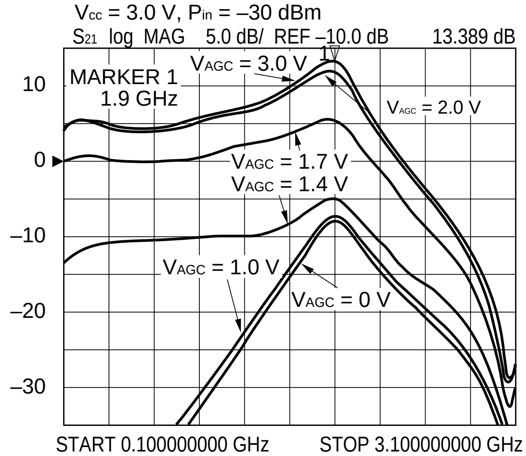
POWER GAIN vs. GAIN CONTROL VOLTAGE



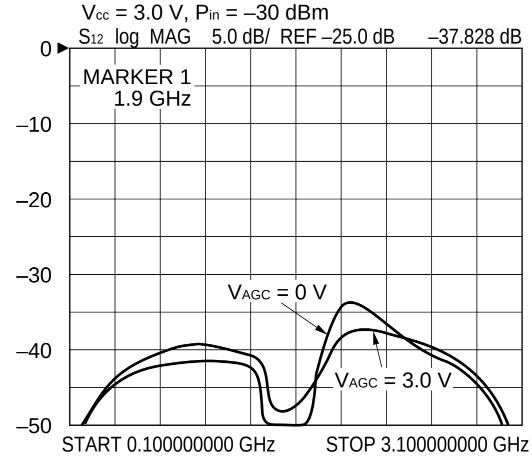
POWER GAIN vs. GAIN CONTROL VOLTAGE



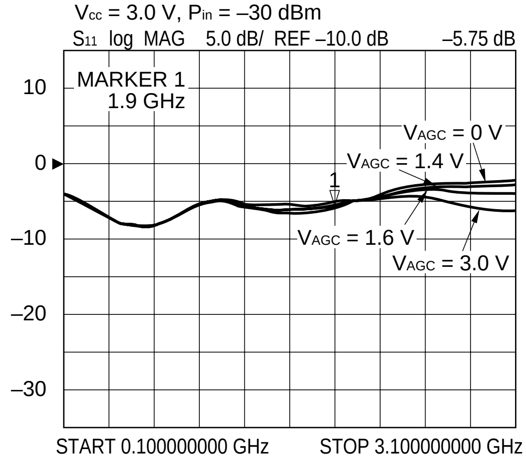
S21 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



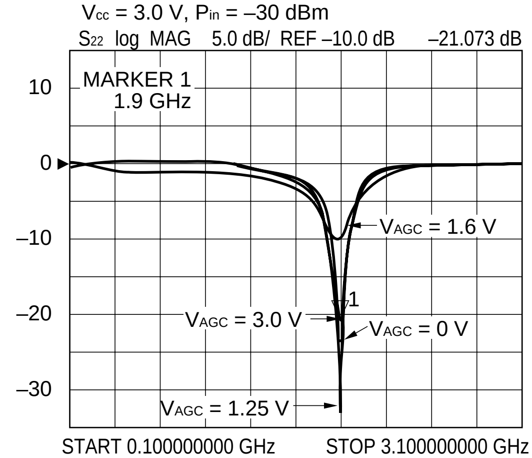
S12 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm



S11 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

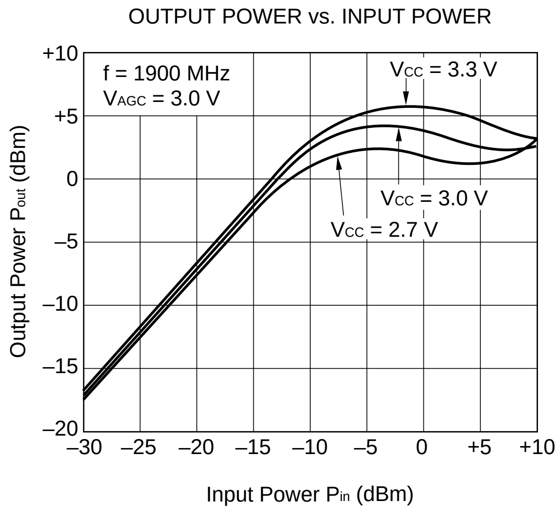


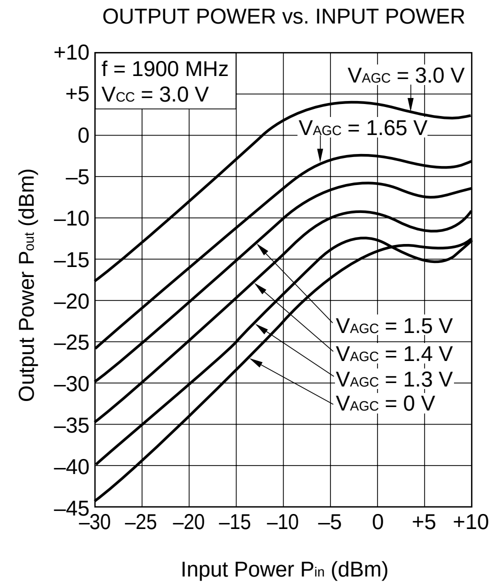
S22 vs. FREQUENCY DEPENDENCE OF GAIN CONTROL VOLTAGE
Vcc = 3.0 V, Pin = –30 dBm

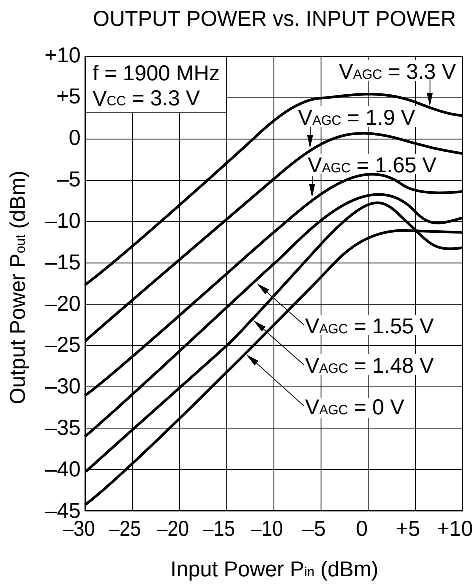


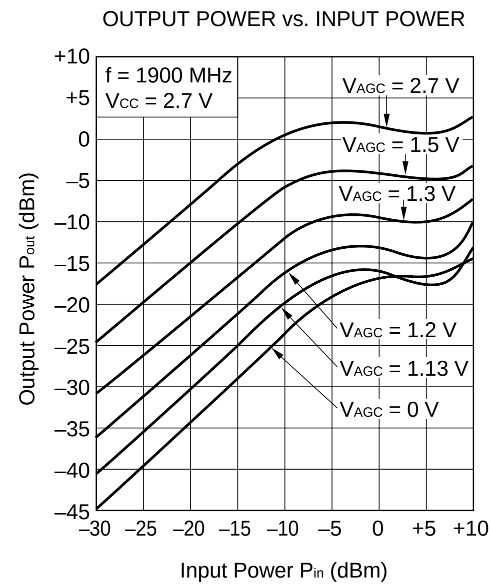
—— μPC8120T ——

Output port matching at f = 1900 MHz





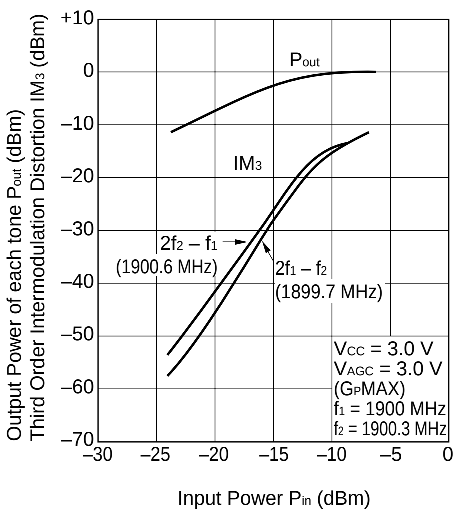




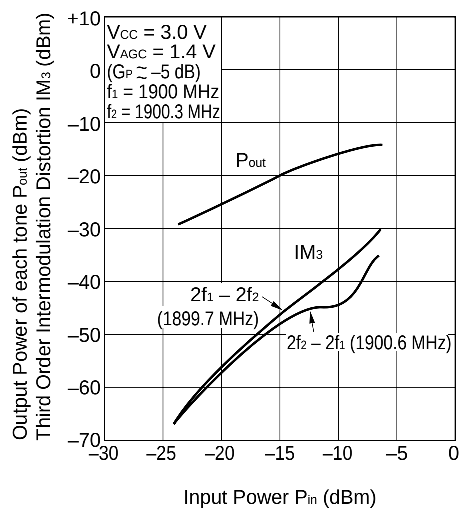
— μPC8120T —

Output port matching at f = 1900 MHz

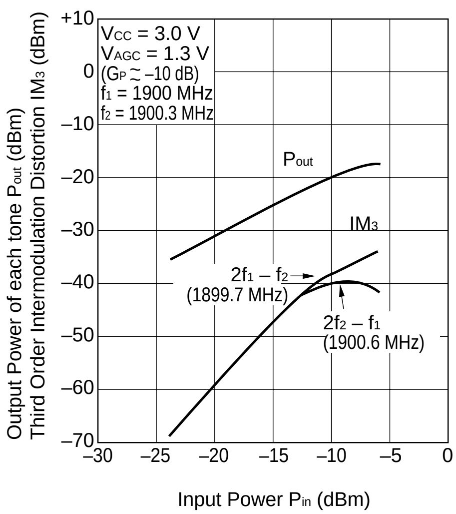
OUTPUT POWER AND IM3 vs. INPUT POWER



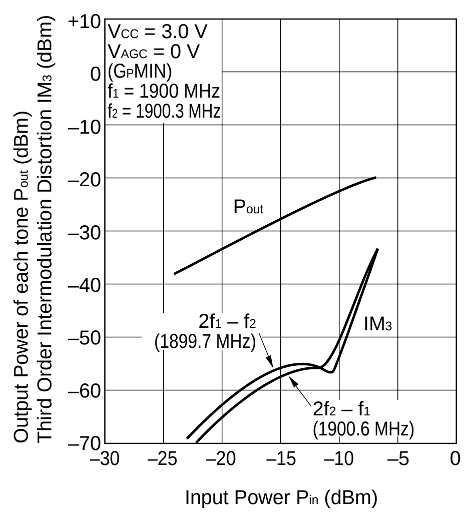
OUTPUT POWER AND IM3 vs. INPUT POWER



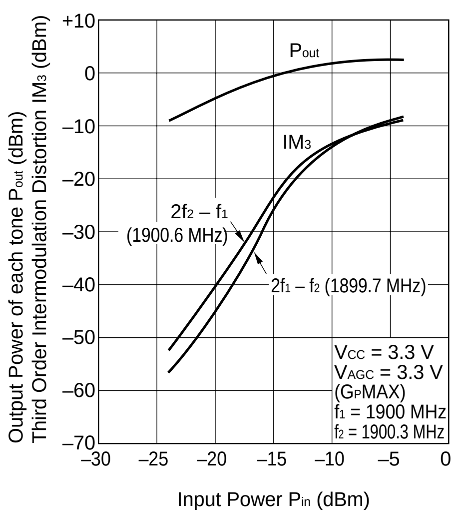
OUTPUT POWER AND IM3 vs. INPUT POWER



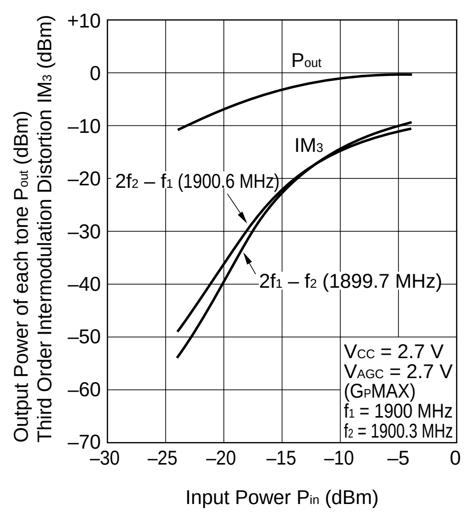
OUTPUT POWER AND IM3 vs. INPUT POWER



OUTPUT POWER AND IM3 vs. INPUT POWER



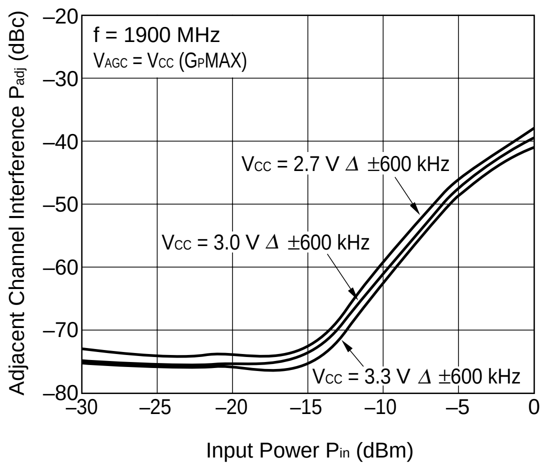
OUTPUT POWER AND IM3 vs. INPUT POWER



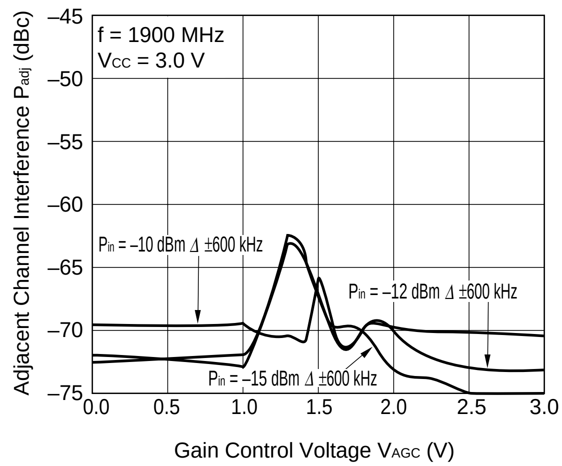
— μPC8120T —

Output port matching at f = 1900 MHz

ADJACENT CHANNEL INTERFERENCE
vs. INPUT POWER

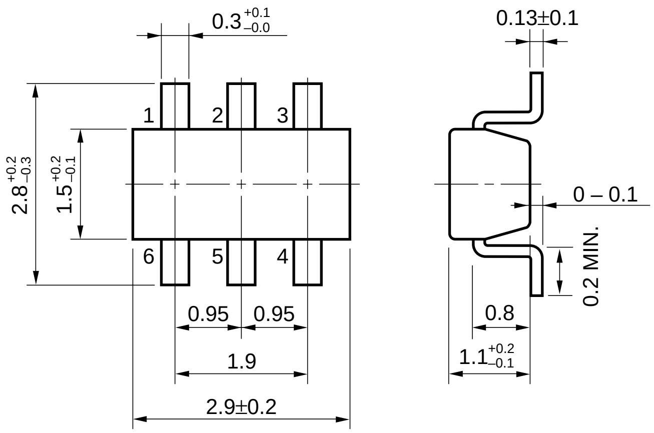


ADJACENT CHANNEL INTERFERENCE
vs. GAIN CONTROL VOLTAGE



PACKAGE DIMENSIONS

6 PIN MINIMOLD PACKAGE (UNITS: mm)



NOTES ON CORRECT USE

(1) Observe precautions for handling because of electro-static sensitive devices.
(2) Form a ground pattern as wide as possible to minimize ground impedance (to prevent undesired oscillation).
(3) Keep the track length of the ground pins as short as possible.
(4) A low pass filter must be attached to V_{CC} line.
(5) A matching circuit must be externally attached to output port.

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your NEC sales representative.

μPC8119T, μPC8120T

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared Reflow	Package peak temperature: 235°C or below Time: 30 seconds or less (at 210°C) Count: 3, Exposure limit[Note]: None	IR35-00-3
VPS	Package peak temperature: 215°C or below Time: 40 seconds or less (at 200°C) Count: 3, Exposure limit[Note]: None	VP15-00-3
Wave Soldering	Soldering bath temperature: 260°C or below Time: 10 seconds or less Count: 1, Exposure limit[Note]: None	WS60-00-1
Partial Heating	Pin temperature: 300°C Time: 3 seconds or less (per side of device) Exposure limit[Note]: None	–

Note After opening the dry pack, keep it in a place below 25°C and 65% RH for the allowable storage period.

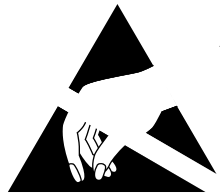
Caution Do not use different soldering methods together (except for partial heating).

For details of the recommended soldering conditions for surface mounting, refer to information document SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (C10535E).

[MEMO]

[MEMO]

[MEMO]



ATTENTION

OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

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