

SILICON MMIC LOW CURRENT AMPLIFIERS FOR CELLULAR/CORDLESS TELEPHONES

DESCRIPTION

The μ PC8128TA, μ PC8151TA and μ PC8152TA are silicon monolithic integrated circuits designed as buffer amplifiers for cellular / cordless telephones. These amplifiers can realize low current consumption with external chip inductor (example: 100 μ size) which can not be realized on internal 50 Ω wideband matched IC. These low current amplifiers operate on 3.0 V.

These ICs are manufactured using NEC's 20 GHz fr 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, these ICs have excellent performance, uniformity and reliability.

FEATURES

- Low current consumption : μ PC8128TA ; $I_{CC} = 2.8$ mA TYP. @ $V_{CC} = 3.0$ V
 μ PC8151TA ; $I_{CC} = 4.2$ mA TYP. @ $V_{CC} = 3.0$ V
 μ PC8152TA ; $I_{CC} = 5.6$ mA TYP. @ $V_{CC} = 3.0$ V
- Supply voltage : $V_{CC} = 2.4$ to 3.3 V
- High efficiency : μ PC8128TA ; $P_{O(1\text{ dB})} = -4.0$ dBm TYP. @ $f = 1$ GHz
 μ PC8151TA ; $P_{O(1\text{ dB})} = +2.5$ dBm TYP. @ $f = 1$ GHz
 μ PC8152TA ; $P_{O(1\text{ dB})} = -4.5$ dBm TYP. @ $f = 1$ GHz
- Power gain variation : μ PC8128TA, 8151TA ; $G_P = 12.5$ dB TYP. @ $f = 1$ GHz
 μ PC8152TA ; $G_P = 23.0$ dB TYP. @ $f = 1$ GHz
- Operating frequency : 100 to 1 900 MHz (Output port LC matching)
- Excellent isolation : μ PC8128TA ; ISL = 39 dB TYP. @ $f = 1$ GHz
 μ PC8151TA ; ISL = 38 dB TYP. @ $f = 1$ GHz
 μ PC8152TA ; ISL = 40 dB TYP. @ $f = 1$ GHz

APPLICATION

- Buffer Amplifiers on 800 to 1 900 MHz cellular / cordless telephones

Caution Electro-static sensitive devices

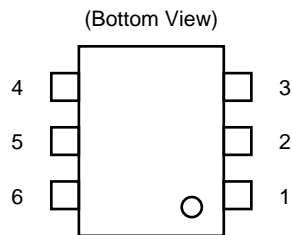
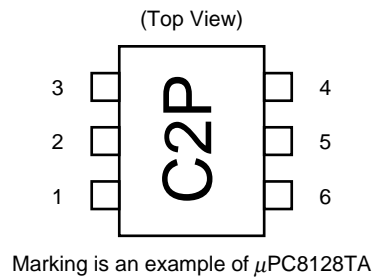
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 Not all devices/types available in every country. Please check with local NEC representative for availability and additional information.

ORDERING INFORMATION

Part Number	Package	Marking	Feature	Supplying Form
μ PC8128TA-E3	6-pin minimold	C2P	2.8 mA Low I _{CC}	Embossed tape 8 mm wide. 1, 2, 3 pins face the perforation side of the tape. Qty 3 kpcs/reel.
μ PC8151TA-E3		C2U	4 mA High P _O	
μ PC8152TA-E3		C2V	5 mA High G _P	

Remark To order evaluation samples, please contact your local NEC sales office.
(Part number for sample order: μ PC8128TA, μ PC8151TA, μ PC8152TA)

PIN CONNECTIONS



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

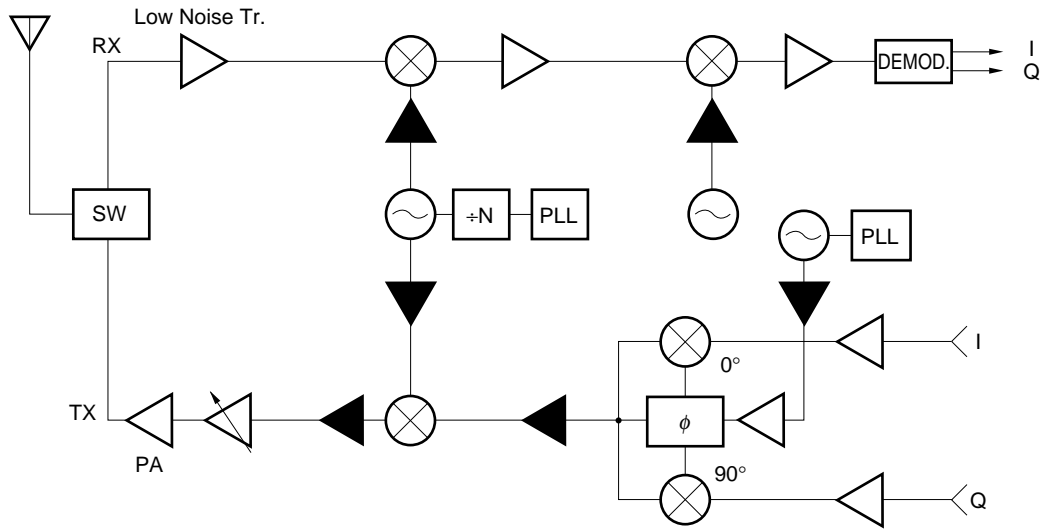
★ **PRODUCT LINE-UP** ($T_A = +25\text{ }^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$, $Z_S = Z_L = 50\ \Omega$)

Parameter Part No.	I _{CC} (mA)	1.00 GHz output port matching frequency			1.66 GHz output port matching frequency			1.90 GHz output port matching frequency			Package	Marking
		G _P (dB)	ISL (dB)	P _O (1 dB) (dB)	G _P (dB)	ISL (dB)	P _O (1 dB) (dB)	G _P (dB)	ISL (dB)	P _O (1 dB) (dB)		
μ PC8128TA	2.8	12.5	39	-4.0	13	39	-4.0	13	37	-4.0	6-pin minimold	C2P
μ PC8128TB											6-pin super minimold	
μ PC8151TA	4.2	12.5	38	+2.5	15	36	+1.5	15	34	+0.5	6-pin minimold	C2U
μ PC8151TB											6-pin super minimold	
μ PC8152TA	5.6	23	40	-4.5	19.5	38	-8.5	17.5	35	-8.5	6-pin minimold	C2V
μ PC8152TB											6-pin super minimold	

Remark Typical performance. Please refer to ELECTRICAL CHARACTERISTICS in detail.

SYSTEM APPLICATION EXAMPLE

Location examples in digital cellular



These ICs can be added to your system around ▲ parts, when you need more isolation or gain. The application herein, however, shows only examples, therefore the application can depend on your kit evaluation.

PIN EXPLANATION

Pin No.	Pin Name	Applied Voltage (V)	Pin Voltage (V) ^{Note}	Function and Applications	Internal Equivalent Circuit
1	INPUT	–	0.90 ----- 1.06 ----- 0.80	Signal input pin. A internal matching circuit, configured with resistors, enables 50 Ω connection over a wide band. This pin must be coupled to signal source with capacitor for DC cut.	<p>μPC8128TA, μPC8151TA</p>
2 3 5	GND	0	–	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. All the ground pins must be connected together with wide ground pattern to decrease impedance difference.	
4	OUTPUT	voltage as same as V_{cc} through external inductor	–	Signal output pin. This pin is designed as collector output. Due to the high impedance output, this pin should be externally equipped with LC matching circuit to next stage. For L, a size 1005 chip in-ductor can be chosen.	<p>μPC8152TA</p>
6	V_{cc}	2.4 to 3.3	–	Power supply pin. This pin should be externally equipped with bypass capacitor to minimize its impedance.	

Note Pin voltage is measured at $V_{cc} = 3.0$ V. Above: μ PC8128TA, Center: μ PC8151TA, Below: μ PC8152TA

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Conditions	Ratings	Unit
Supply Voltage	V _{CC}	T _A = +25°C, Pin 4, Pin 6	3.6	V
Total Circuit Current	I _{CC}	T _A = +25°C	15	mA
Total Power Dissipation	P _D	Mounted on double sided copper clad 50 × 50 × 1.6 mm epoxy glass PWB (T _A = +85°C)	280	mW
Operating Ambient Temperature	T _A		-40 to +85	°C
Storage Temperature	T _{stg}		-55 to +150	°C
Input Power	P _{in}	T _A = +25°C	+5	dBm

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Supply Voltage	V _{CC}	2.4	3.0	3.3	V	The same voltage should be applied to pin 4 and pin 6.
Operating Ambient Temperature	T _A	-40	+25	+85	°C	
Operating Frequency	f	0.1	-	1.9	GHz	Matched output port with external LC

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$, $Z_s = Z_L = 50\ \Omega$, at LC matched frequency)

Parameter	Symbol	Conditions	μ PC8128TA			μ PC8151TA			μ PC8152TA			Unit
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Circuit Current	I_{CC}	No signal	1.8	2.8	3.8	2.8	4.2	5.8	4.2	5.6	7.1	mA
Power Gain	G_P	f = 1.00 GHz f = 1.66 GHz f = 1.90 GHz	9.5 10 10	12.5 13 13	14.5 15 15	9.5 12 12	12.5 15 15	14.5 17 17	20 16.5 14.5	23 19.5 17.5	25 21.5 19.5	dB
Isolation	ISL	f = 1.00 GHz f = 1.66 GHz f = 1.90 GHz	34 34 32	39 39 37	– – –	33 31 29	38 36 34	– – –	35 33 30	40 38 35	– – –	dB
Gain 1 dB Compression Output Power	$P_{O(1\text{ dB})}$	f = 1.00 GHz f = 1.66 GHz f = 1.90 GHz	–7.5 –8.5 –8.5	–4.0 –4.0 –4.0	– – –	–1.0 –2.5 –3.0	+2.5 +1.5 +0.5	– – –	–7.5 –11.5 –11.5	–4.5 –8.5 –8.5	– – –	dBm
Saturated Output Power ^{Note} ($P_{in} = -6\text{ dBm}$)	$P_{O(sat)}$	f = 1.00 GHz f = 1.66 GHz f = 1.90 GHz	– – –	– – –	– – –	– – –	– – –	– – –	–2.5 –5.5 –6.0	+0.5 –2.5 –3.0	– – –	dBm
Noise Figure	NF	f = 1.00 GHz f = 1.66 GHz f = 1.90 GHz	– – –	6.0 6.0 6.0	7.5 7.5 7.5	– – –	6.0 6.0 6.0	7.5 7.5 7.5	– – –	3.5 4.0 4.5	5.0 5.5 6.0	dB
Input Return Loss (Without matching circuit)	RL_{in}	f = 1.00 GHz f = 1.66 GHz f = 1.90 GHz	2 2 2.5	5 5 5.5	– – –	2 1 1	5 4 4	– – –	8.5 7.5 8.5	11.5 10.5 11.5	– – –	dB

Note Saturated output power is specified only in μ PC8152TA which has flat saturated region.

STANDARD CHARACTERISTICS (Unless otherwise specified, $T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$, $Z_s = Z_L = 50\ \Omega$, at LC matched frequency)

Parameter	Symbol	Conditions	Reference Value			Unit
			μ PC8128TA	μ PC8151TA	μ PC8152TA	
Output Return Loss (With external matching circuit)	RL_{out}	f = 1.00 GHz f = 1.66 GHz f = 1.90 GHz	10 25 14	10 18 12	15 7.5 7	dB
3rd Order Intermodulation Distortion ($P_{O(each)} = -20\text{ dBm}$)	IM_3	$f_1 = 1.000\text{ GHz}, f_2 = 1.001\text{ GHz}$ $f_1 = 1.660\text{ GHz}, f_2 = 1.661\text{ GHz}$ $f_1 = 1.900\text{ GHz}, f_2 = 1.901\text{ GHz}$	–50 –46 –46	–62 –56 –54	–51 –43 –42	dBc

TEST CIRCUIT

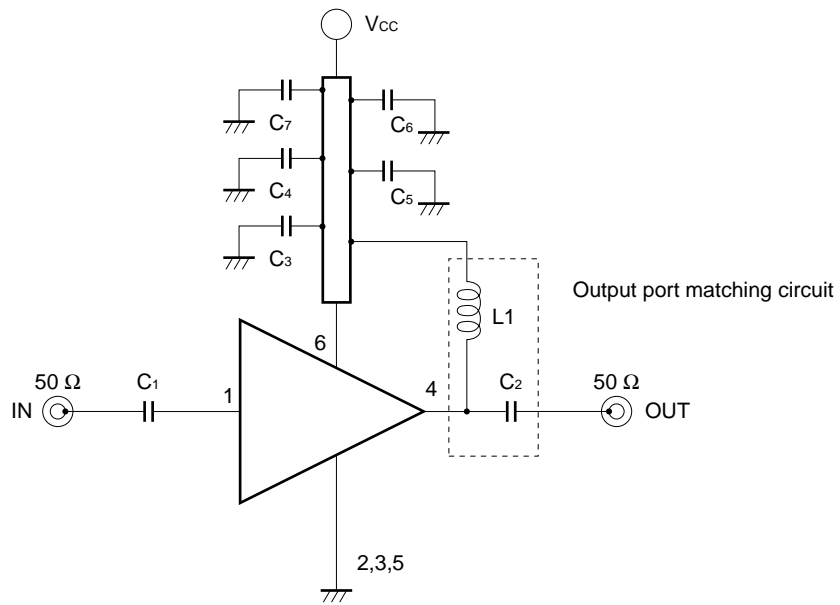
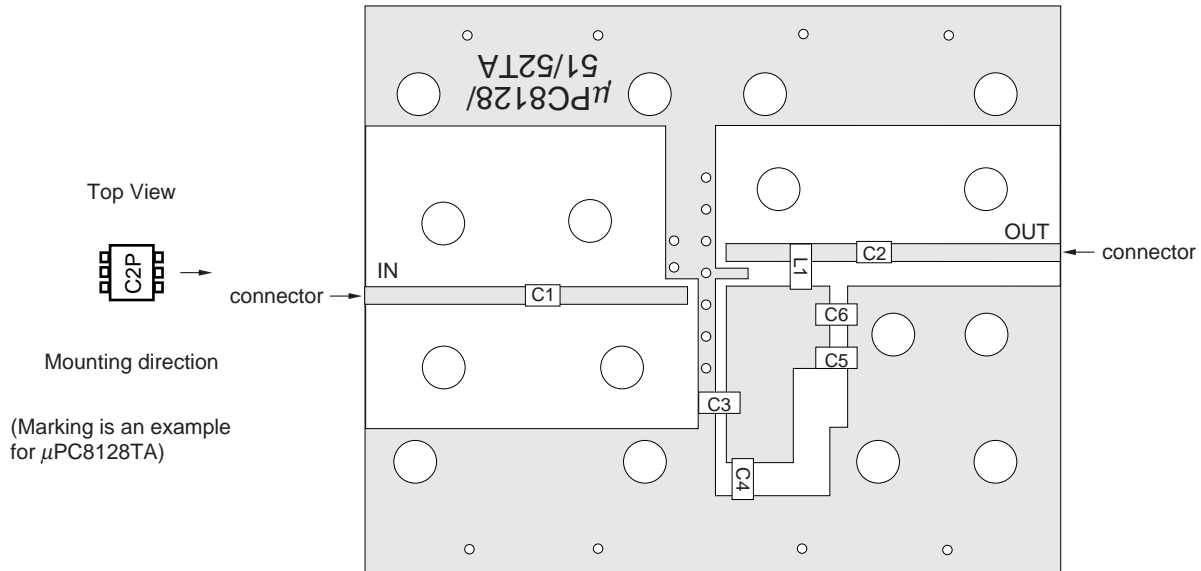


ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

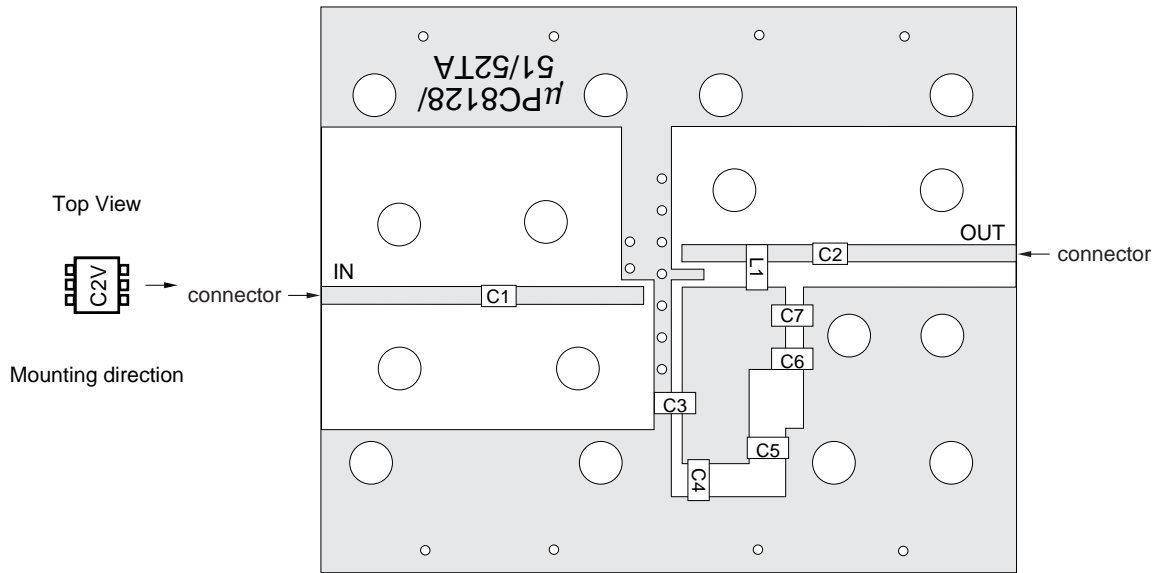
μ PC8128TA/ μ PC8151TA



COMPONENT LIST

	1.00 GHz output port matching	1.66 GHz output port matching	1.90 GHz output port matching
C1, C3 to C6	1 000 pF	1 000 pF	1 000 pF
C2	1.0 pF	0.75 pF	0.75 pF
L1	8.2 nH	3.3 nH	2.7 nH

μ PC8152TA



COMPONENT LIST

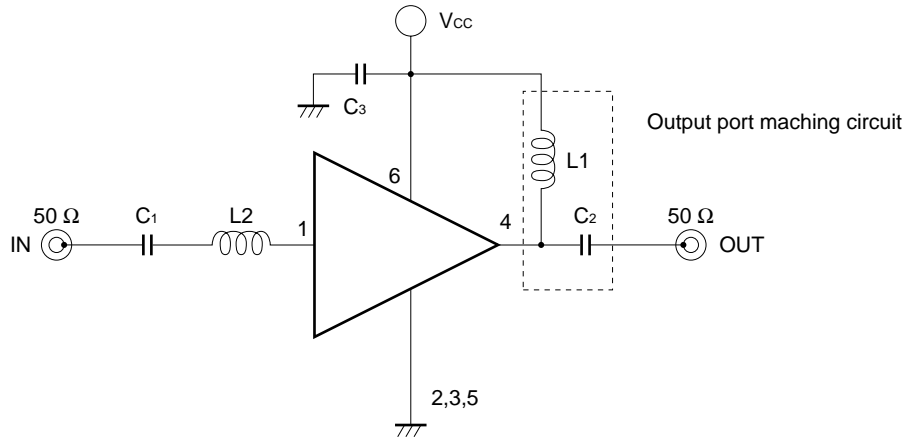
	1.00 GHz output port matching	1.66 GHz output port matching	1.90 GHz output port matching
C1, C3 to C7	1 000 pF	1 000 pF	1 000 pF
C2	1.5 pF	1.0 pF	1.5 pF
L1	8.2 nH	2.7 nH	1.8 nH

NOTES (μ PC8128TA, μ PC8151TA, μ PC8152TA in common)

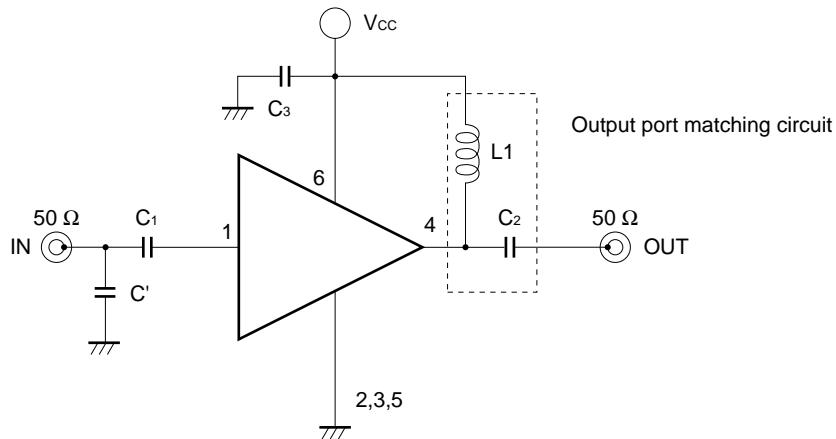
1. 42 × 35 × 0.4 mm double sided copper clad polyimide board.
2. Back side: GND pattern
3. Solder plated on pattern
4. ○ ○ ○ : Through holes

EXAMPLE OF APPLICATION CIRCUIT (μ PC8128TA, μ PC8151TA)

In improving R_{Lin} of μ PC8128TA and μ PC8151TA at 1.00 GHz, L2 should be attached.

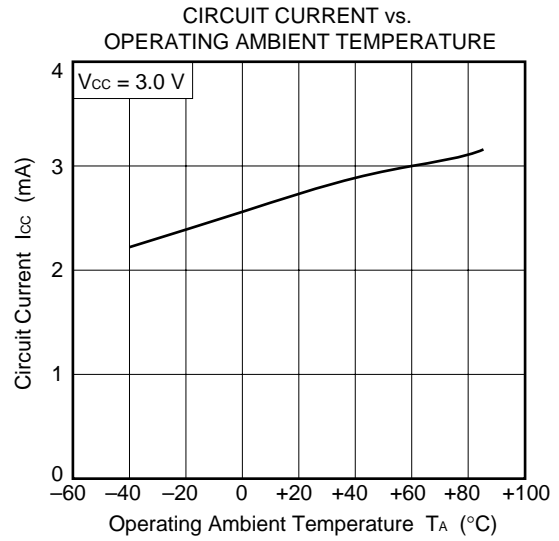
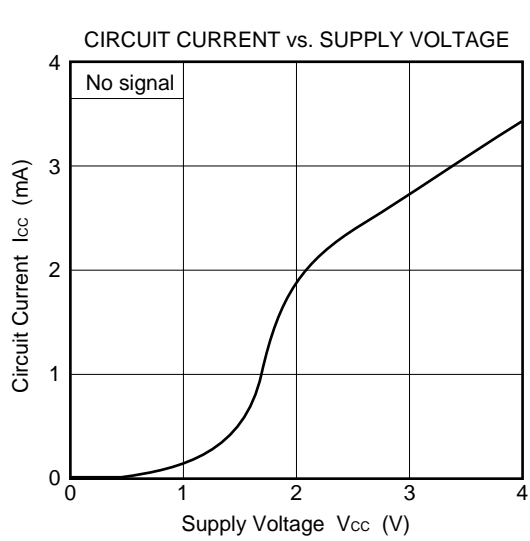


In improving R_{Lin} of μ PC8128TA and μ PC8151TA at 1.66 to 1.90 GHz, C' should be attached.



★ TYPICAL CHARACTERISTICS (Unless otherwise specified, $T_A = +25^\circ\text{C}$)

– μ PC8128TA –



- μ PC8128TA -

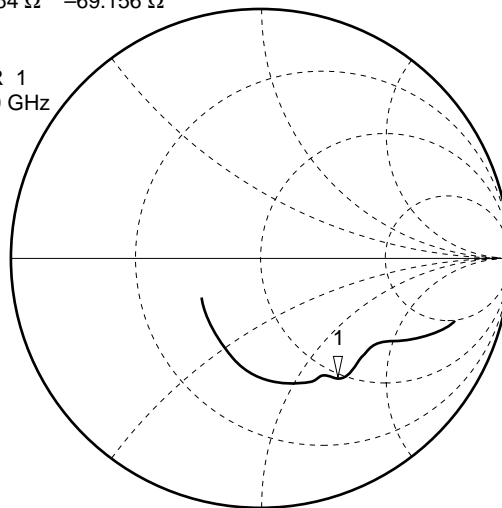
1.00 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

T_A = +25°C, V_{CC} = V_{out} = 3.0 V

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 45.664 Ω -69.156 Ω

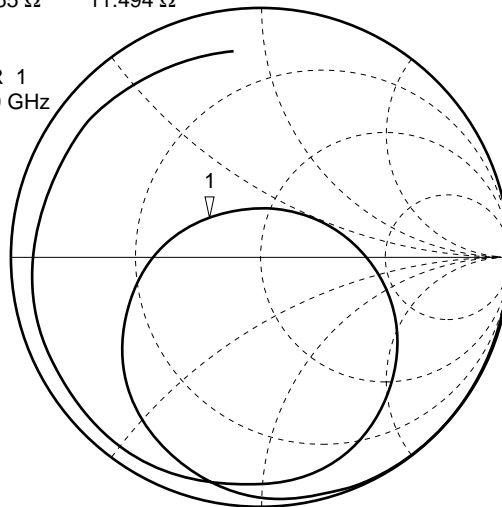
MARKER 1
 1.0 GHz



START 0.100000000 GHz
 STOP 3.100000000 GHz

S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 30.865 Ω 11.494 Ω

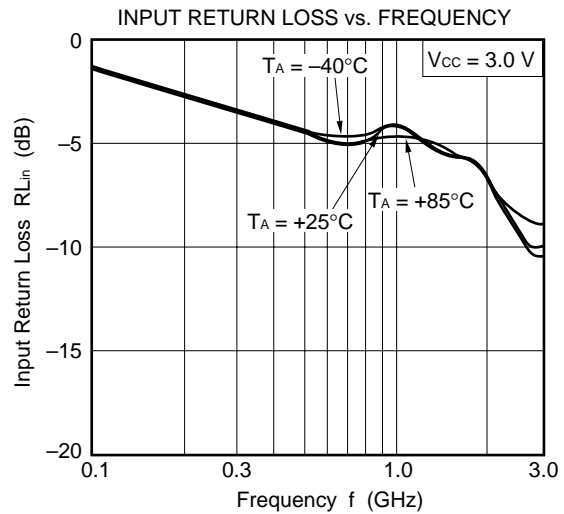
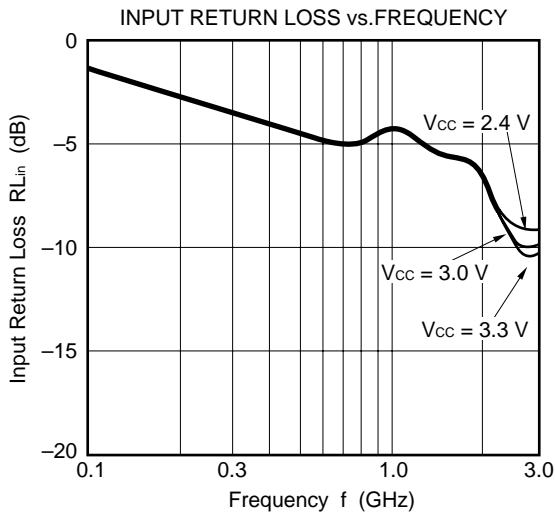
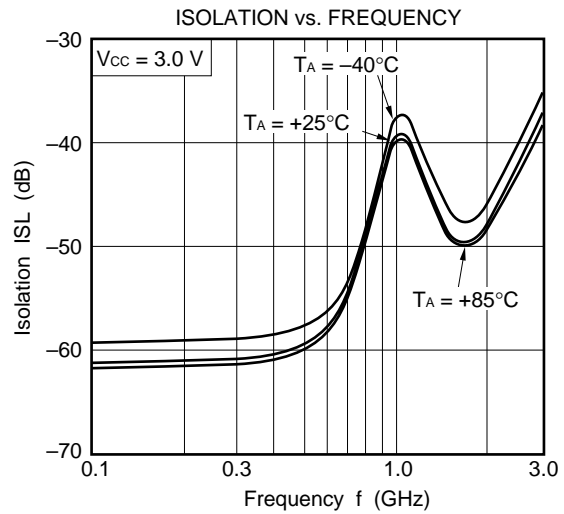
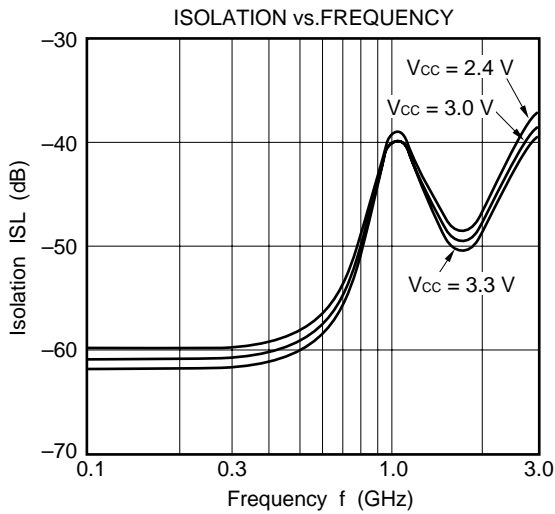
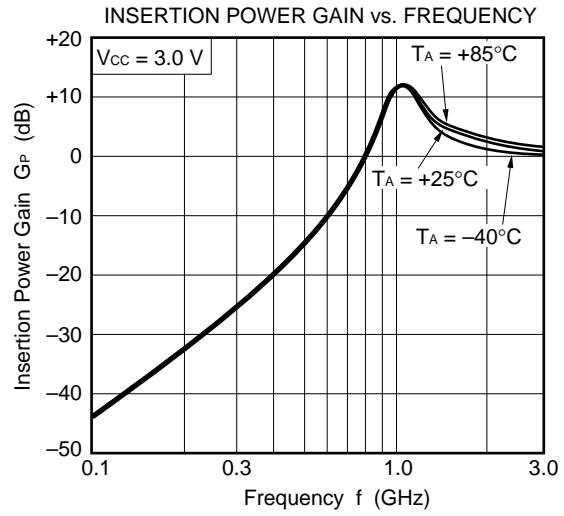
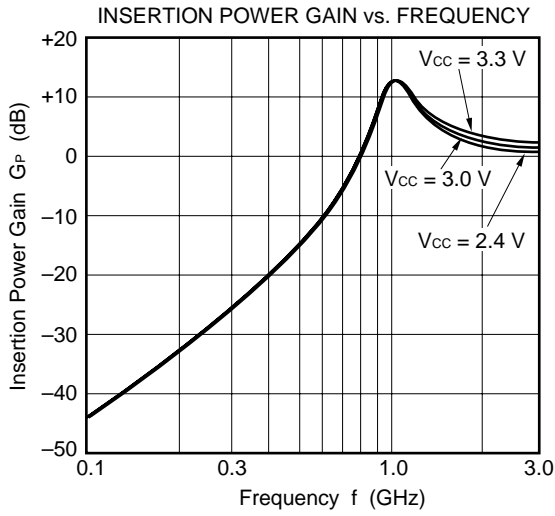
MARKER 1
 1.0 GHz



START 0.100000000 GHz
 STOP 3.100000000 GHz

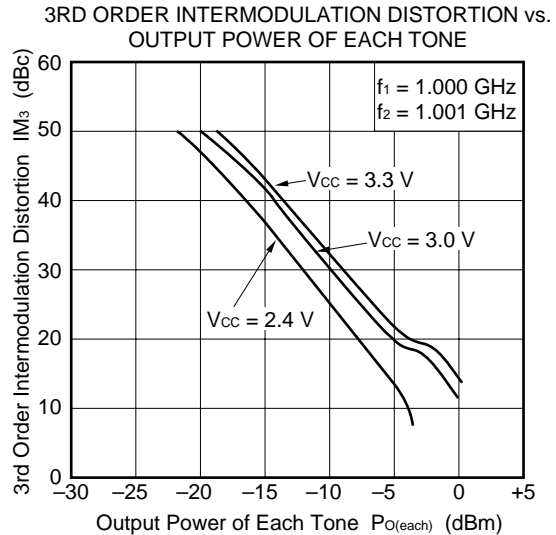
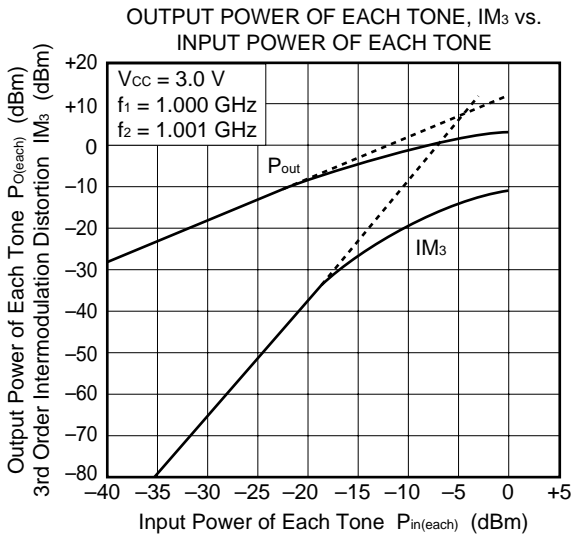
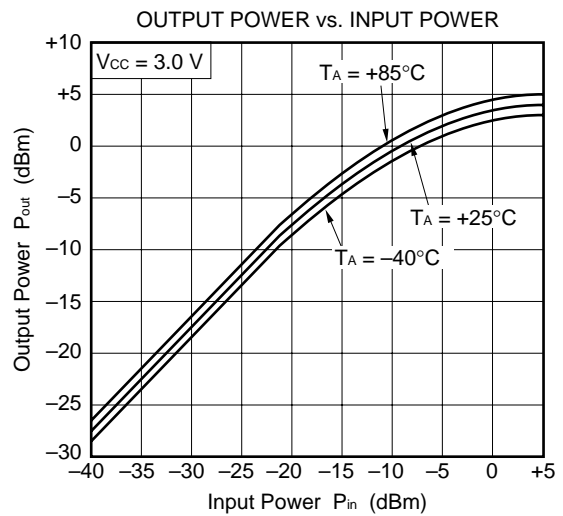
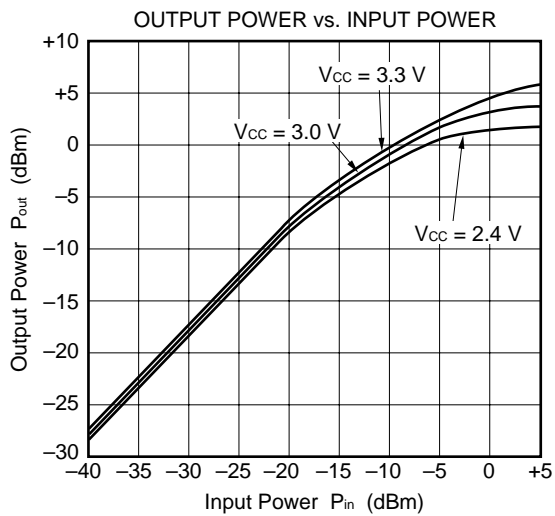
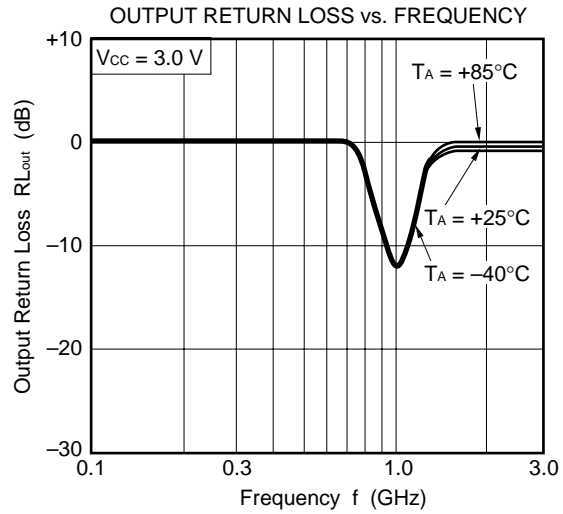
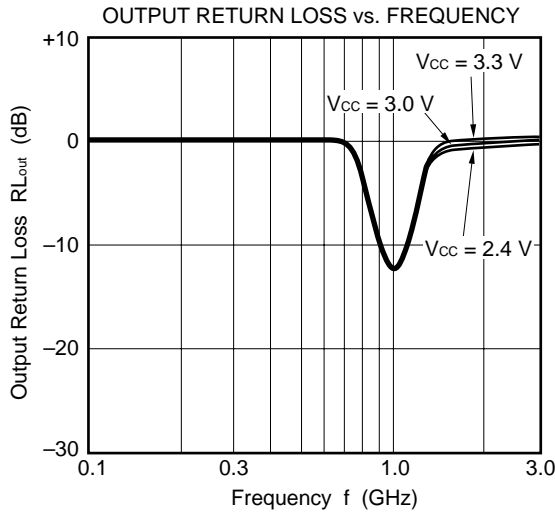
- μ PC8128TA -

1.00 GHz OUTPUT PORT MATCHING



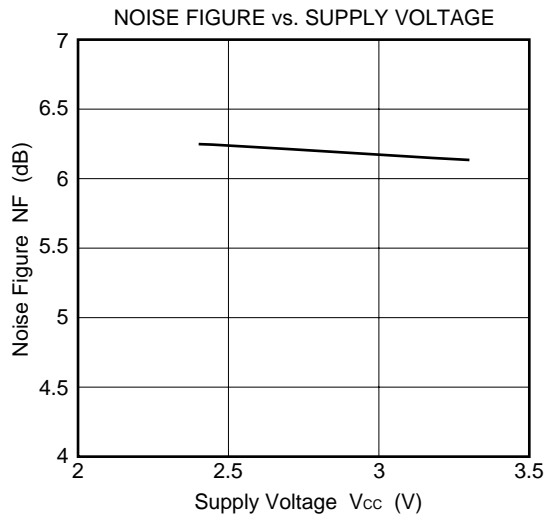
- μ PC8128TA -

1.00 GHz OUTPUT PORT MATCHING



- μ PC8128TA -

1.00 GHz OUTPUT PORT MATCHING



– μ PC8128TA –

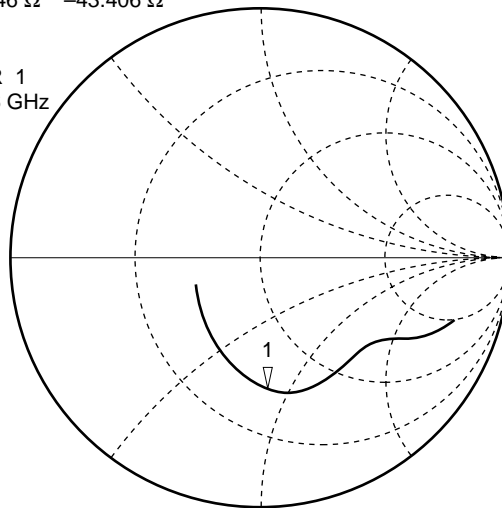
1.66 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

$T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 27.846 Ω -43.406 Ω

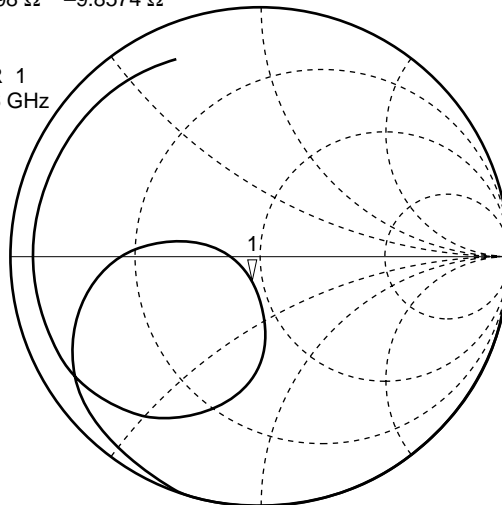
MARKER 1
 1.66 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 46.598 Ω -9.8574 Ω

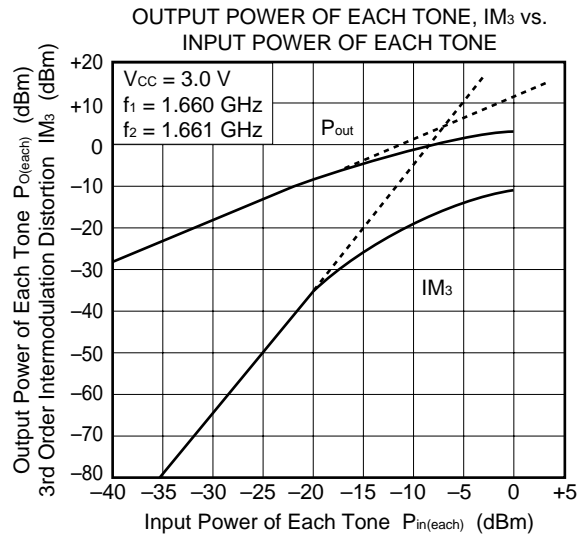
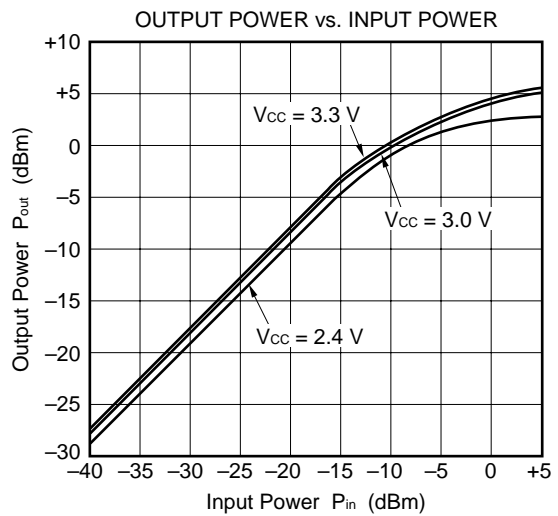
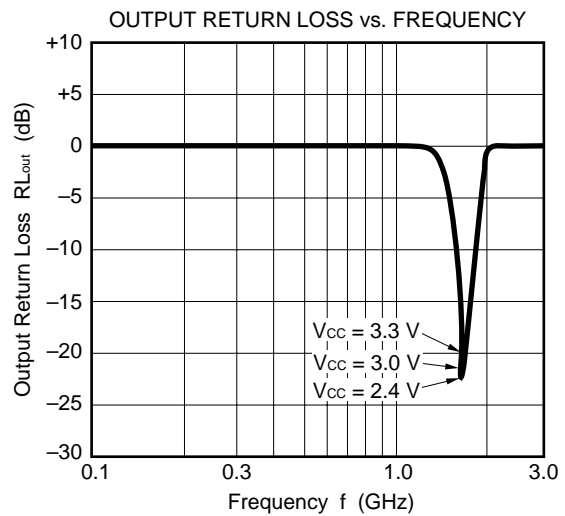
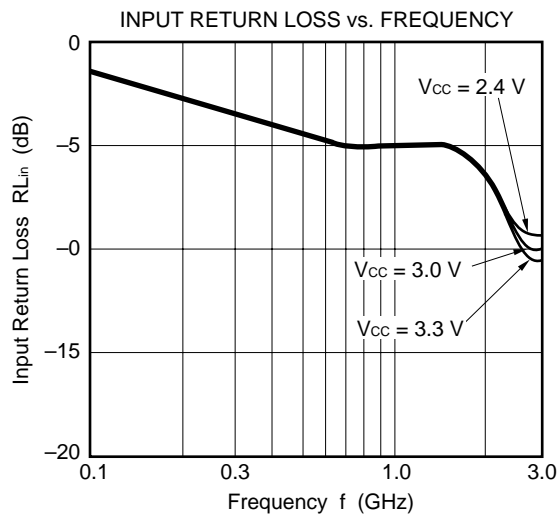
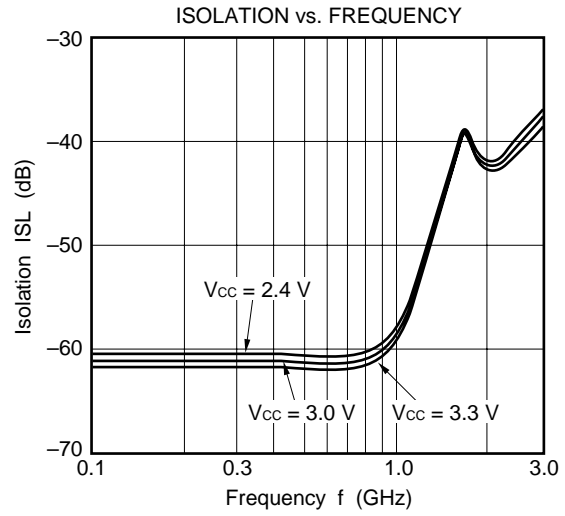
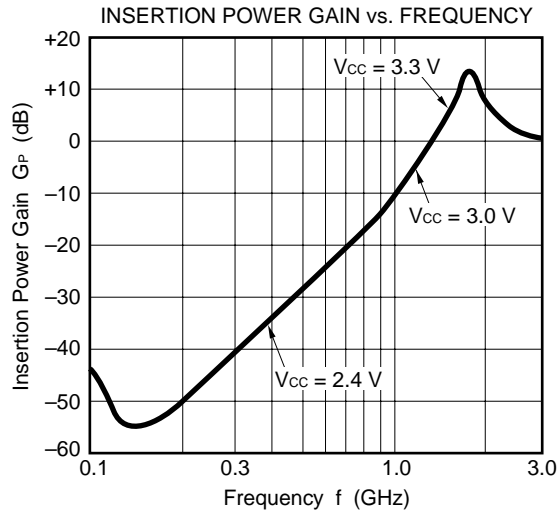
MARKER 1
 1.66 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

- μ PC8128TA -

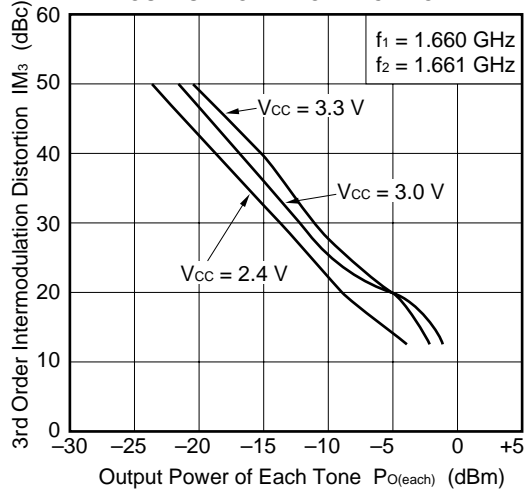
1.66 GHz OUTPUT PORT MATCHING



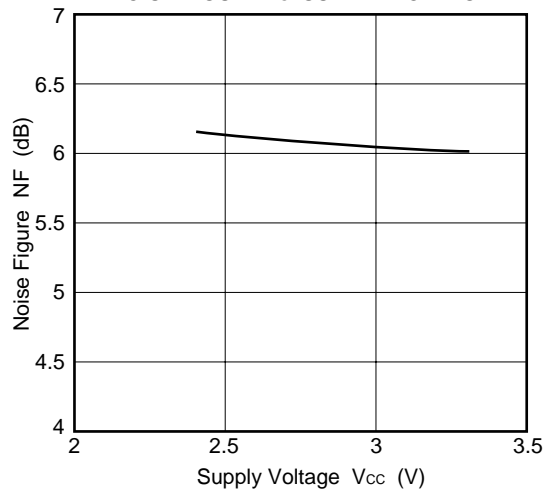
- μ PC8128TA -

1.66 GHz OUTPUT PORT MATCHING

3RD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE



NOISE FIGURE vs. SUPPLY VOLTAGE



- μ PC8128TA -

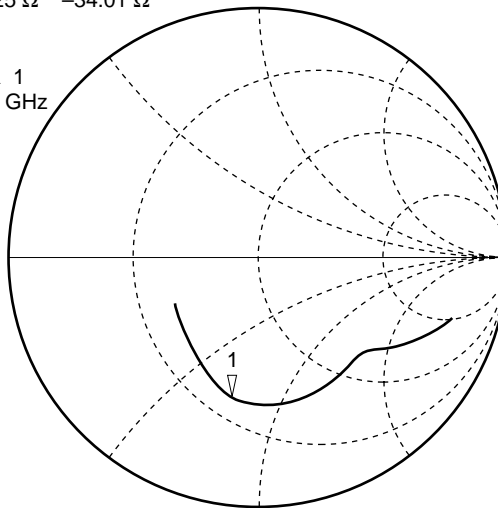
1.90 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

$T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 24.725 Ω -34.01 Ω

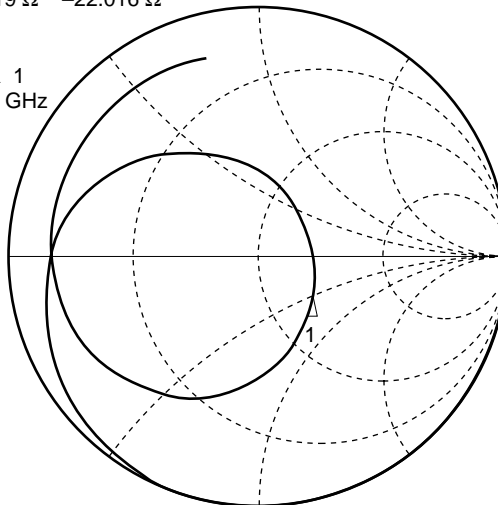
MARKER 1
 1.9 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 74.719 Ω -22.016 Ω

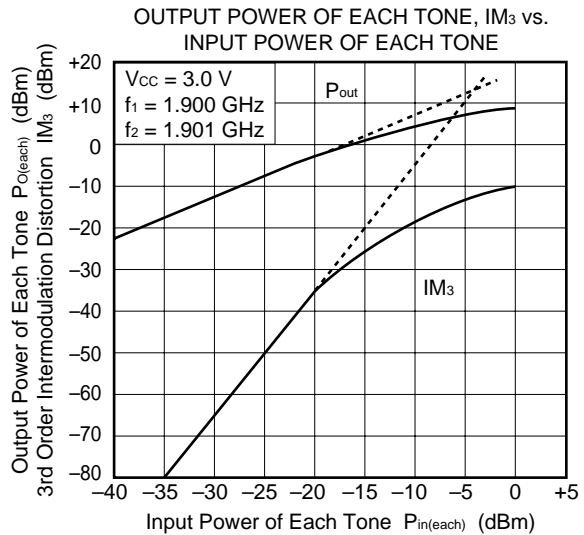
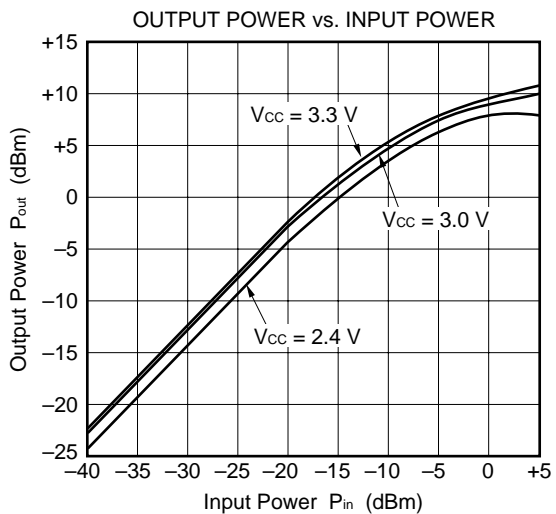
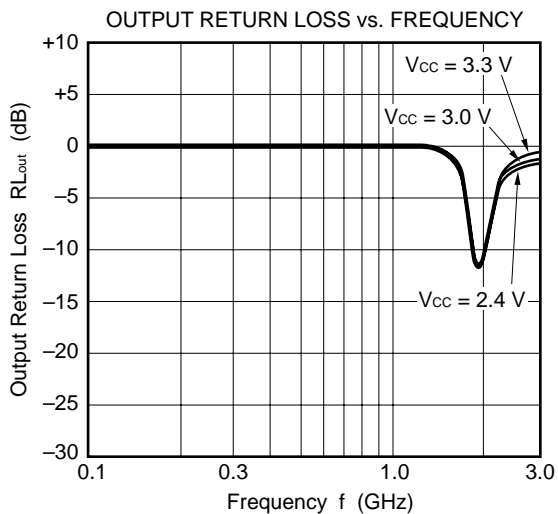
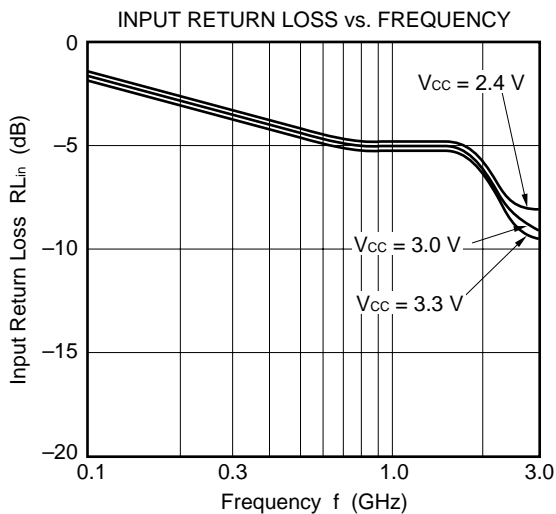
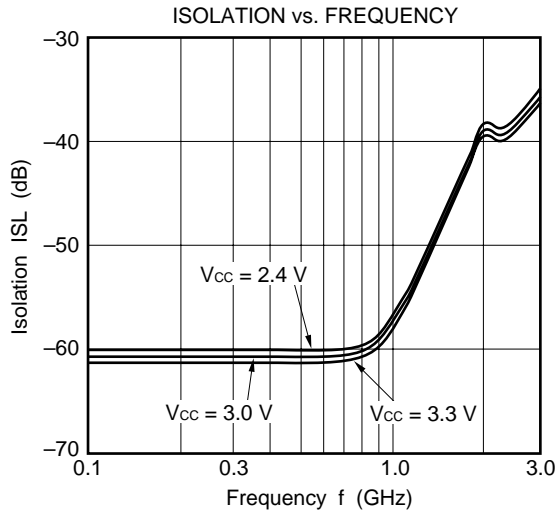
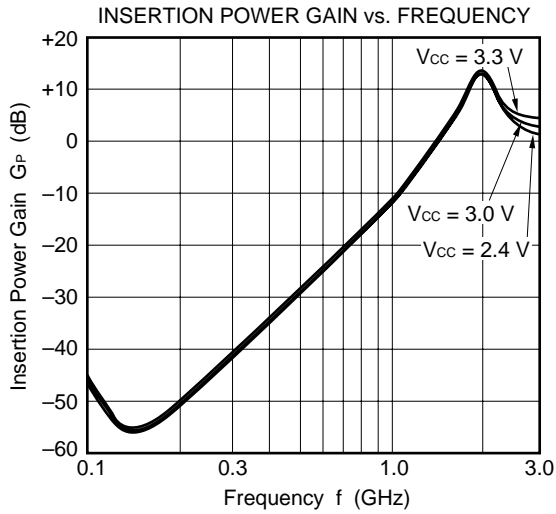
MARKER 1
 1.9 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

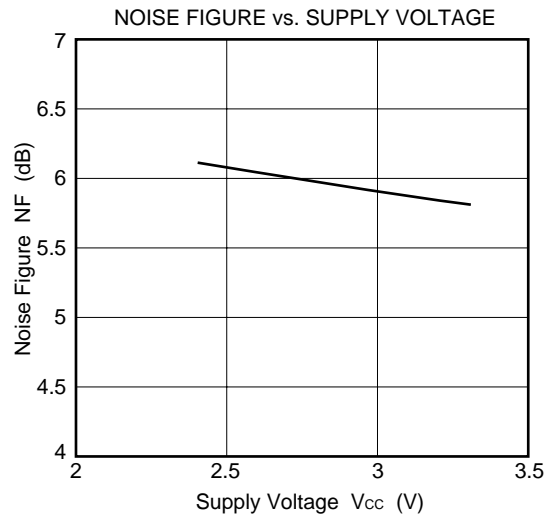
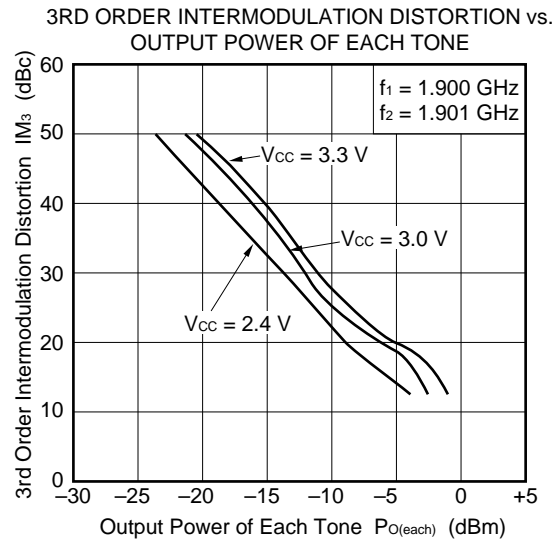
- μ PC8128TA -

1.90 GHz OUTPUT PORT MATCHING



- μ PC8128TA -

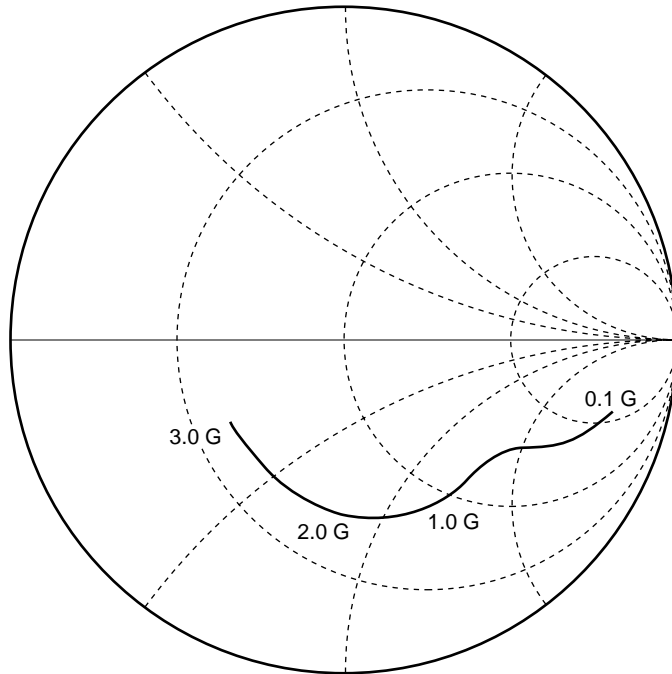
1.90 GHz OUTPUT PORT MATCHING



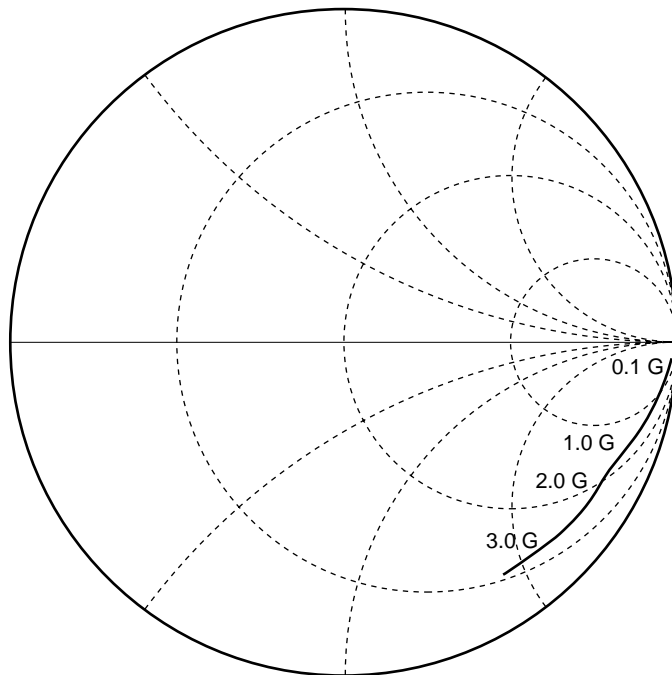
S-PARAMETERS ($V_{CC} = V_{out} = 3.0\text{ V}$)

– μ PC8128TA –

S₁₁-FREQUENCY



S₂₂-FREQUENCY



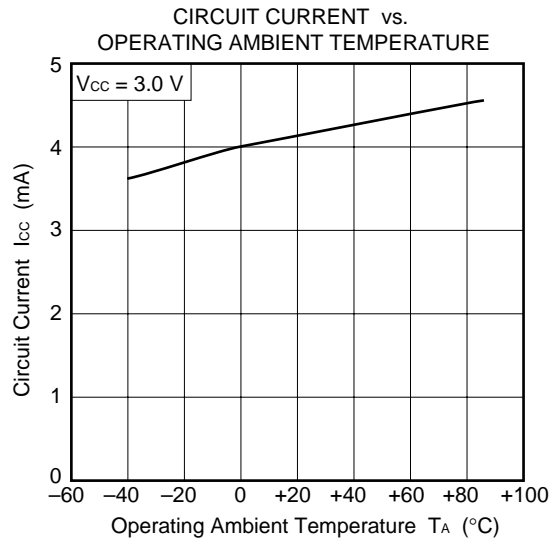
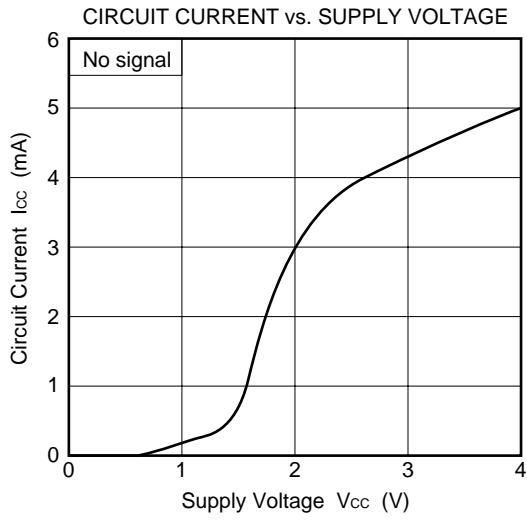
TYPICAL S-PARAMETER VALUES (T_A = +25°C)

μ PC8128TA

V_{CC} = V_{out} = 3.0 V, I_{CC} = 2.8 mA

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100.0000	0.844	-15.1	1.057	-177.8	0.000	121.5	0.991	-2.3
200.0000	0.743	-24.5	1.100	-175.2	0.002	125.8	0.993	-4.9
300.0000	0.663	-29.4	1.170	-173.5	0.003	116.7	0.978	-7.4
400.0000	0.614	-32.8	1.283	-173.4	0.005	91.7	0.975	-9.7
500.0000	0.584	-35.7	1.416	-174.9	0.005	76.0	0.965	-11.8
600.0000	0.571	-38.6	1.551	-178.1	0.005	60.6	0.958	-13.8
700.0000	0.563	-41.8	1.712	177.2	0.005	61.5	0.946	-15.8
800.0000	0.561	-45.8	1.838	171.9	0.006	59.2	0.937	-17.7
900.0000	0.561	-49.6	1.975	165.8	0.006	56.7	0.927	-19.5
1000.0000	0.560	-54.3	2.095	158.8	0.006	62.0	0.917	-20.9
1100.0000	0.562	-59.3	2.194	151.8	0.006	64.4	0.913	-22.6
1200.0000	0.556	-64.3	2.248	145.0	0.005	64.2	0.904	-23.9
1300.0000	0.552	-69.6	2.319	137.1	0.005	58.9	0.898	-25.2
1400.0000	0.549	-74.9	2.366	130.1	0.004	67.4	0.893	-26.5
1500.0000	0.541	-80.3	2.338	122.3	0.005	83.7	0.888	-27.4
1600.0000	0.532	-85.6	2.381	115.8	0.003	99.8	0.887	-28.4
1700.0000	0.523	-90.6	2.297	108.6	0.005	111.2	0.884	-29.4
1800.0000	0.511	-95.6	2.267	101.9	0.005	114.8	0.885	-30.3
1900.0000	0.501	-100.5	2.191	96.5	0.006	128.6	0.886	-31.8
2000.0000	0.491	-105.0	2.142	90.8	0.007	135.8	0.883	-32.9
2100.0000	0.480	-109.6	2.100	85.9	0.009	140.4	0.884	-34.3
2200.0000	0.473	-113.9	2.032	80.8	0.011	136.3	0.884	-35.8
2300.0000	0.463	-118.1	2.030	76.6	0.013	141.9	0.882	-37.5
2400.0000	0.454	-122.2	1.996	72.2	0.015	138.9	0.880	-39.5
2500.0000	0.446	-126.1	1.948	67.6	0.017	139.2	0.878	-41.4
2600.0000	0.439	-129.7	1.921	63.2	0.018	142.2	0.877	-43.5
2700.0000	0.433	-133.5	1.916	59.8	0.022	136.6	0.871	-45.7
2800.0000	0.428	-136.8	1.858	54.8	0.023	134.1	0.863	-48.2
2900.0000	0.424	-140.0	1.931	50.3	0.025	135.3	0.868	-50.3
3000.0000	0.422	-143.5	1.895	46.6	0.028	134.2	0.845	-53.2
3100.0000	0.420	-146.8	1.928	39.4	0.030	131.5	0.834	-55.9

– μ PC8151TA –



- μ PC8151TA -

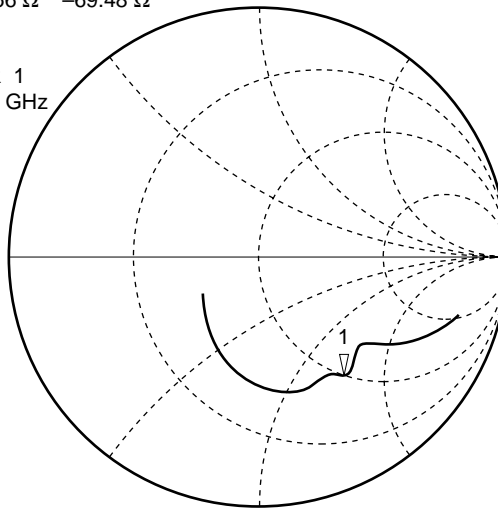
1.00 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

$T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 52.156 Ω -69.48 Ω

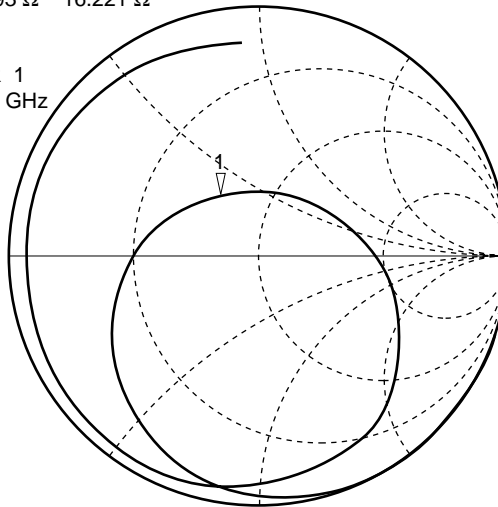
MARKER 1
 1.0 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 32.893 Ω 16.221 Ω

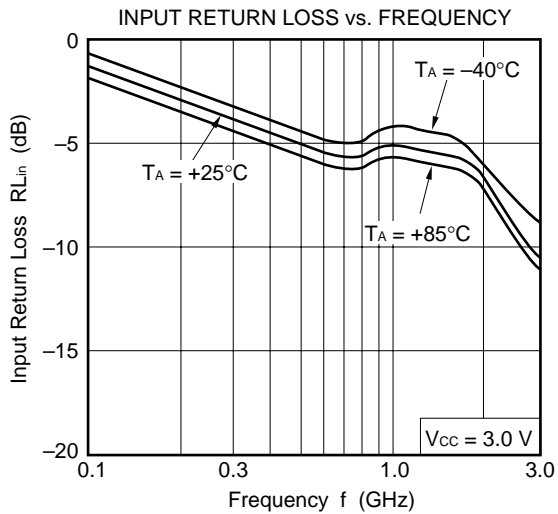
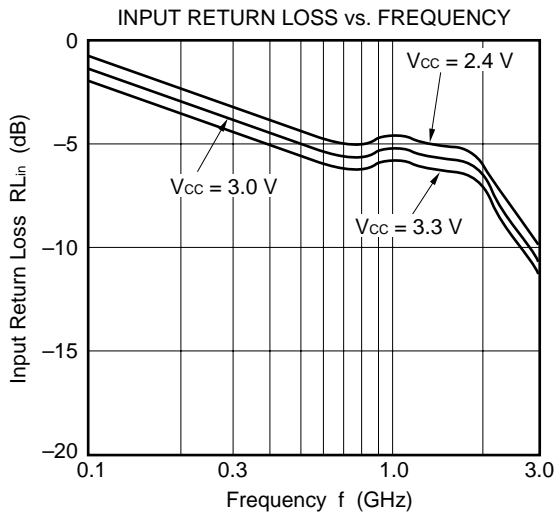
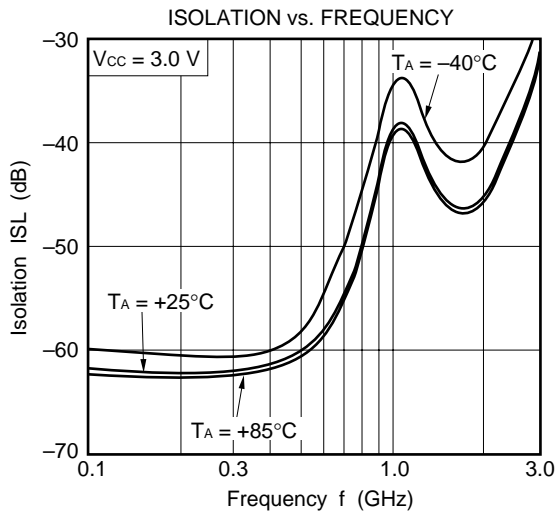
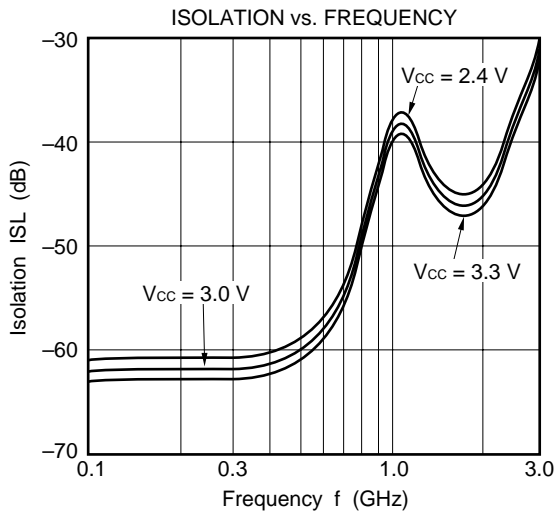
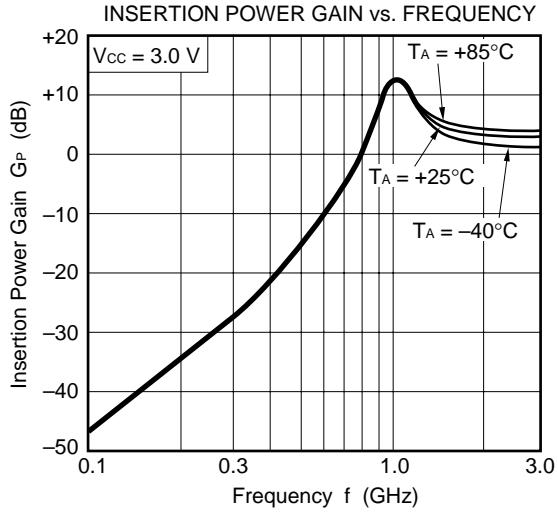
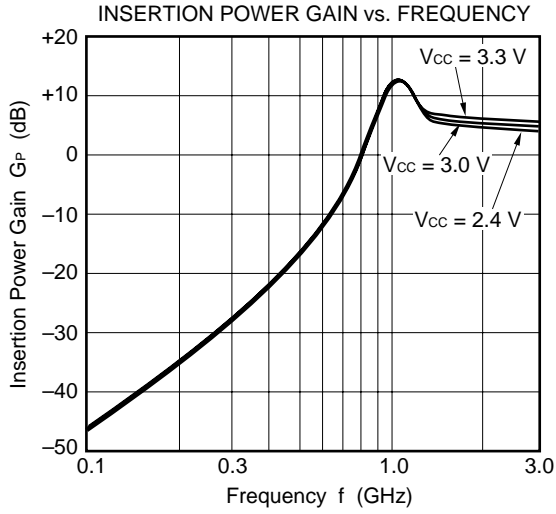
MARKER 1
 1.0 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

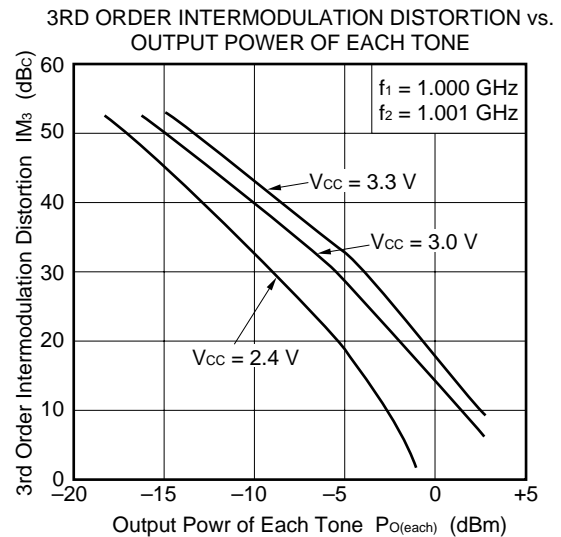
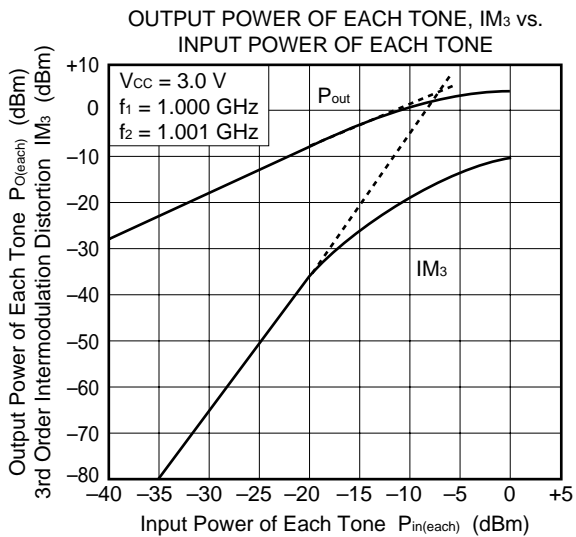
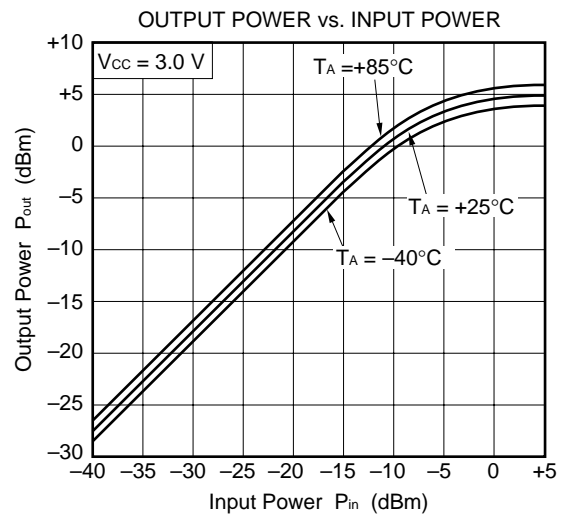
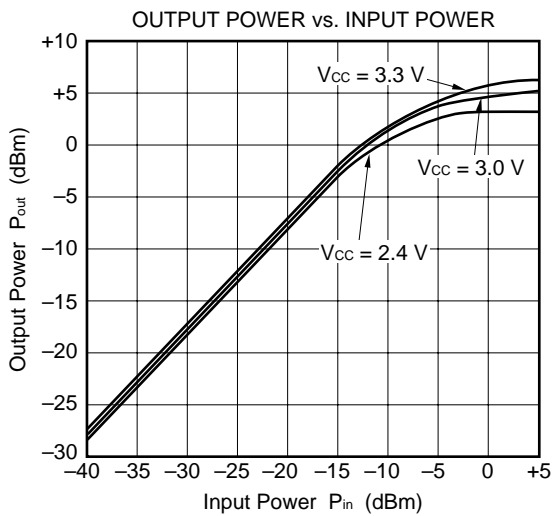
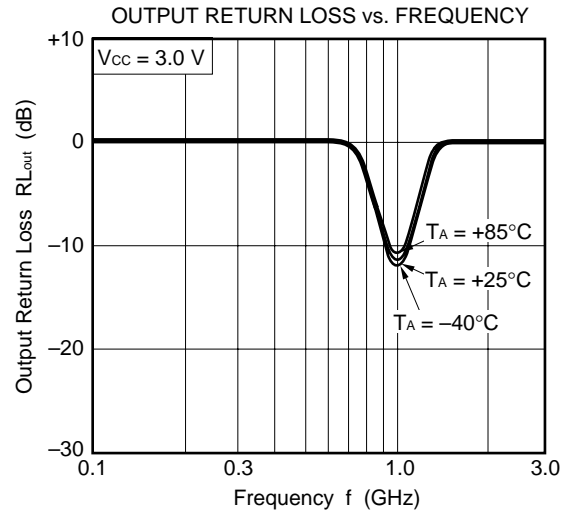
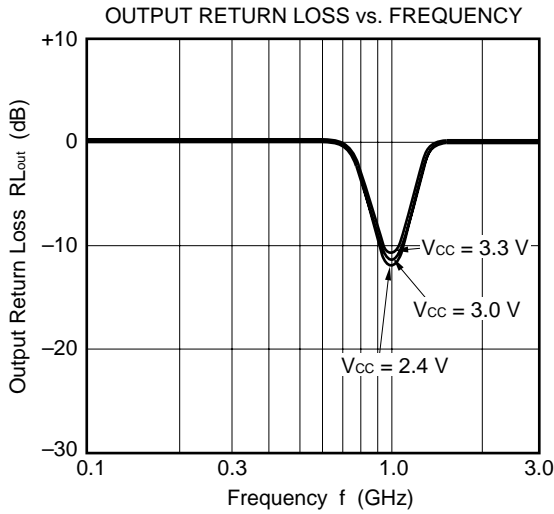
- μ PC8151TA -

1.00 GHz OUTPUT PORT MATCHING



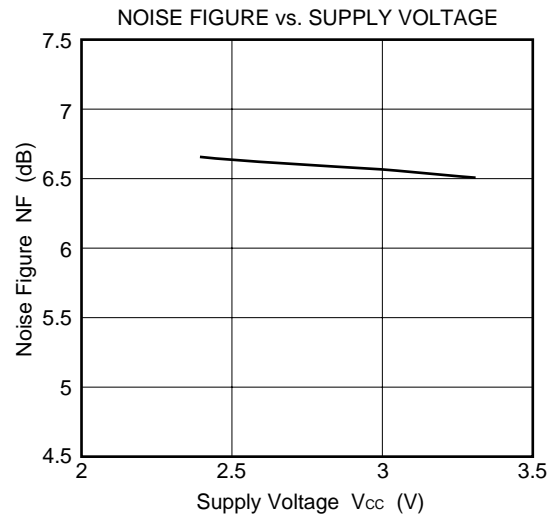
- μ PC8151TA -

1.00 GHz OUTPUT PORT MATCHING



– μ PC8151TA –

1.00 GHz OUTPUT PORT MATCHING



– μ PC8151TA –

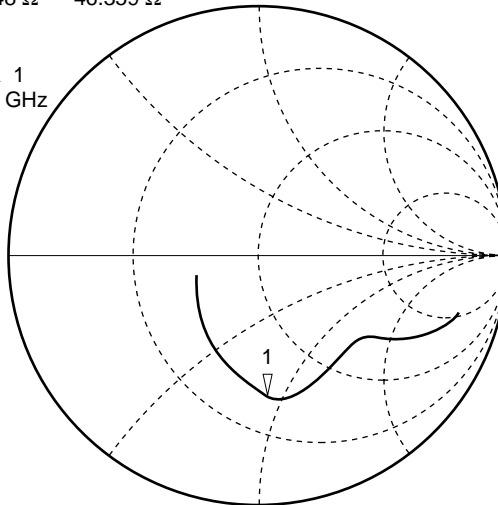
1.66 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

$T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 26.748 Ω -46.359 Ω

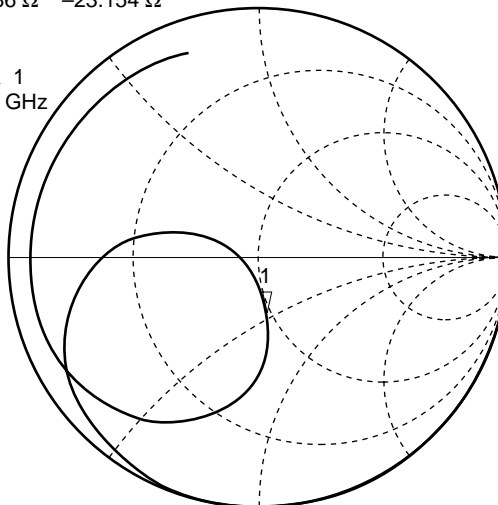
MARKER 1
 1.66 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 49.086 Ω -23.154 Ω

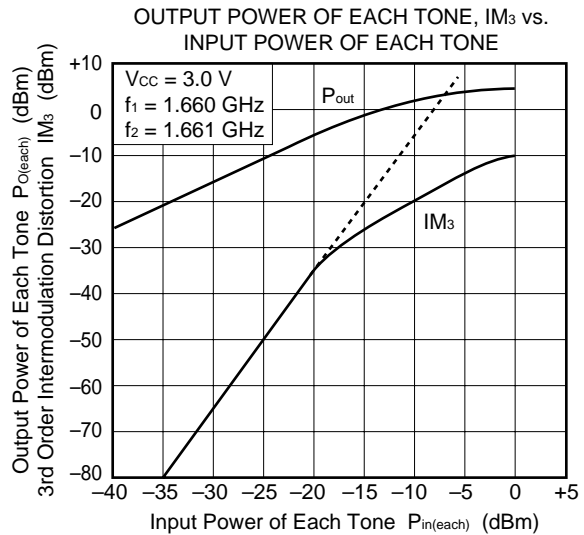
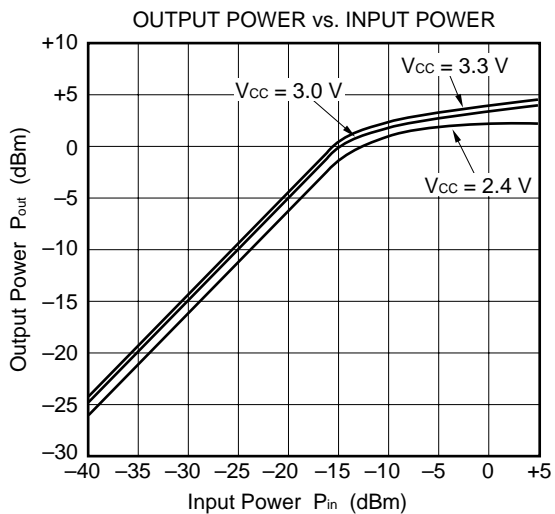
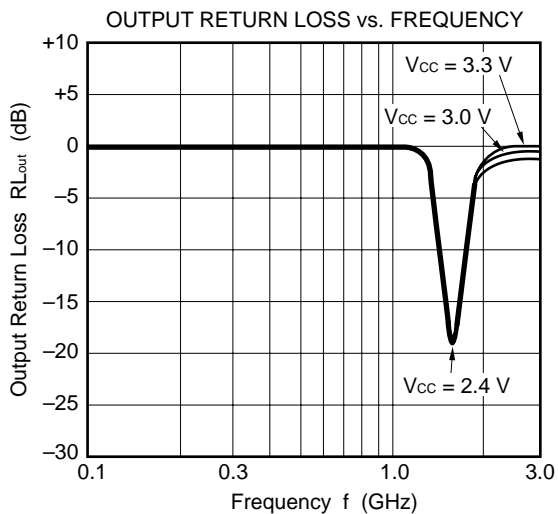
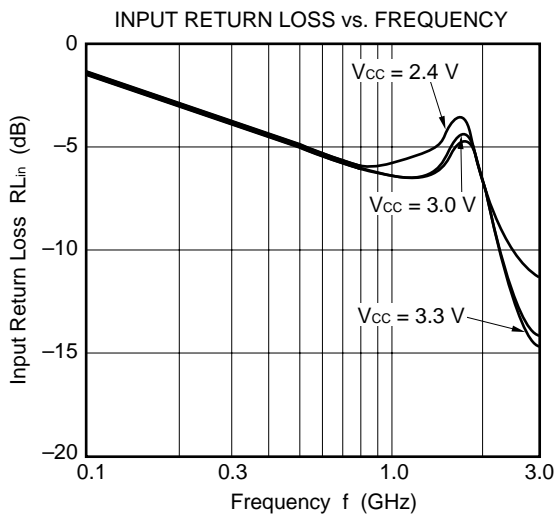
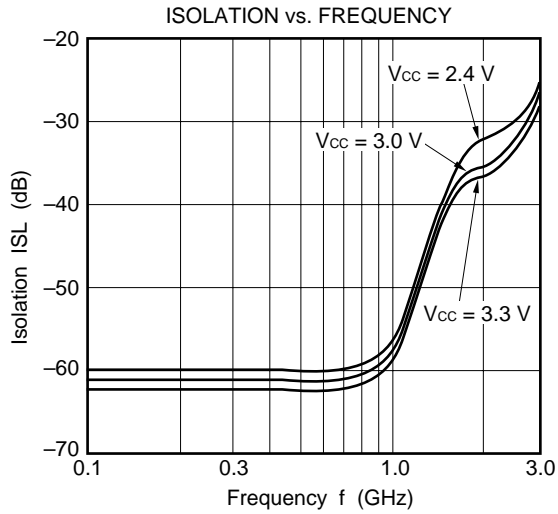
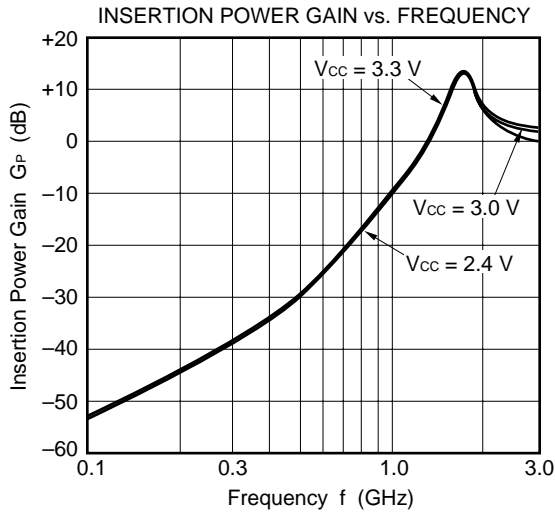
MARKER 1
 1.66 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

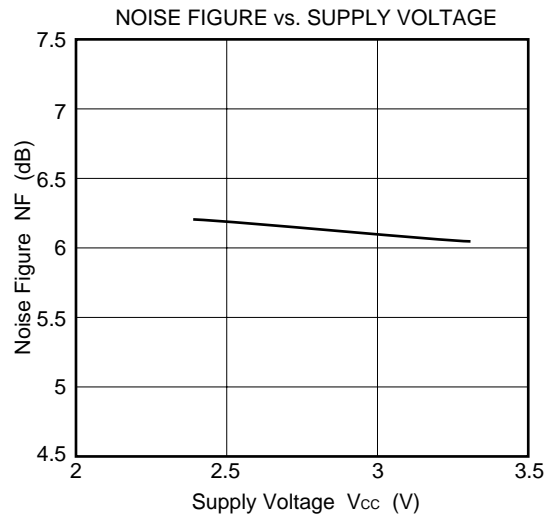
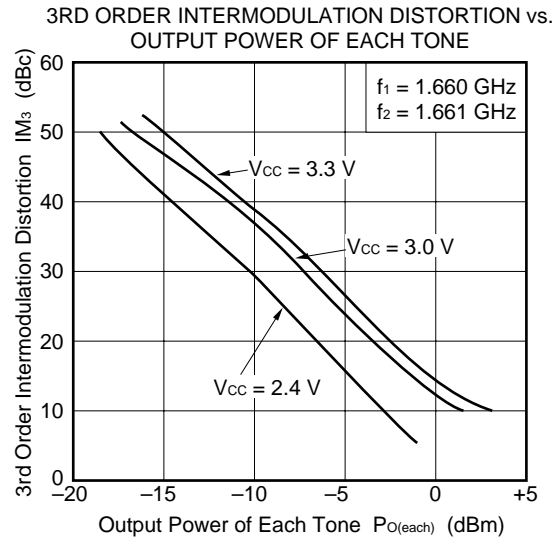
- μ PC8151TA -

1.66 GHz OUTPUT PORT MATCHING



- μ PC8151TA -

1.66 GHz OUTPUT PORT MATCHING



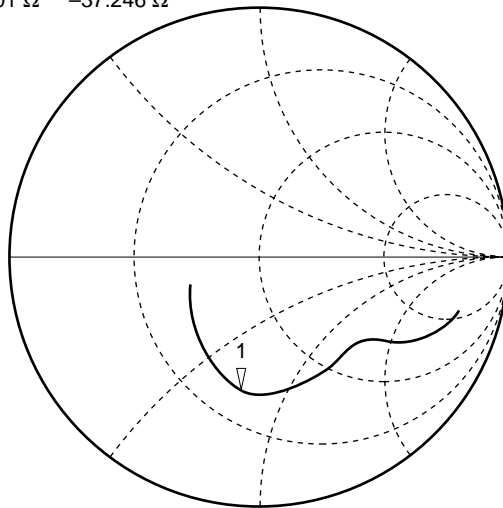
– μ PC8151TA –

1.90 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

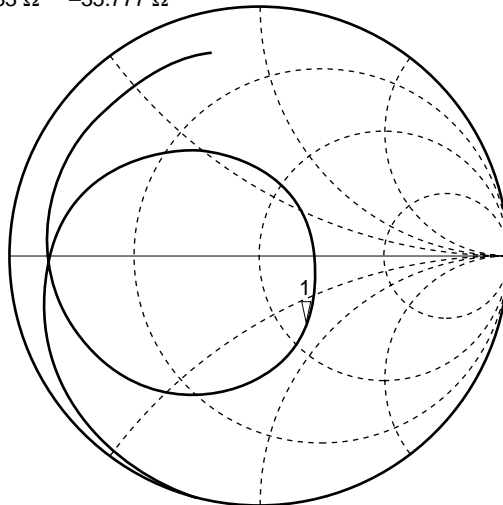
$T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 24.301 Ω -37.246 Ω



START 0.10000000 GHz
 STOP 3.10000000 GHz

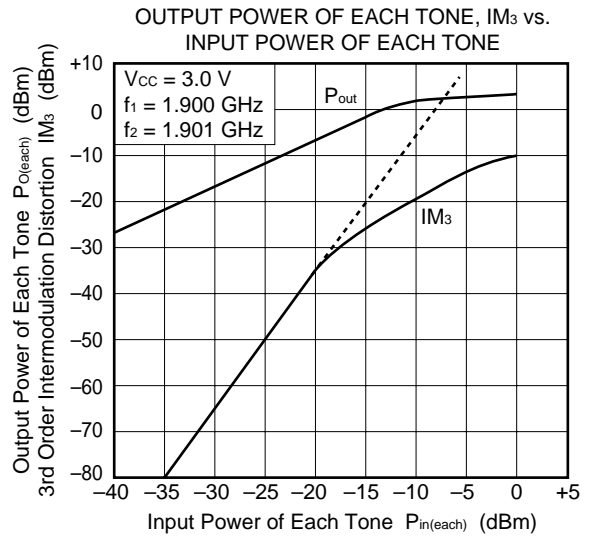
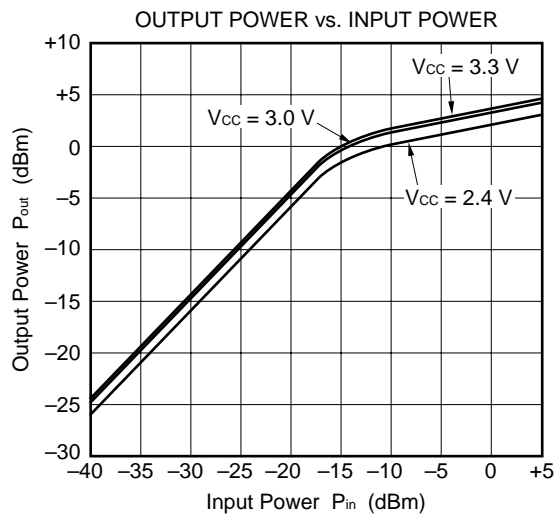
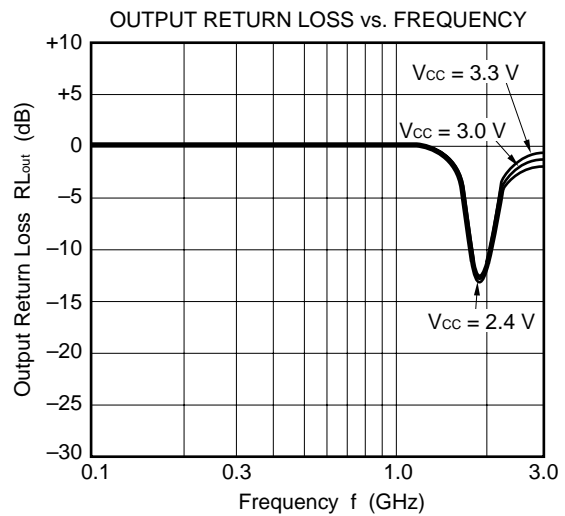
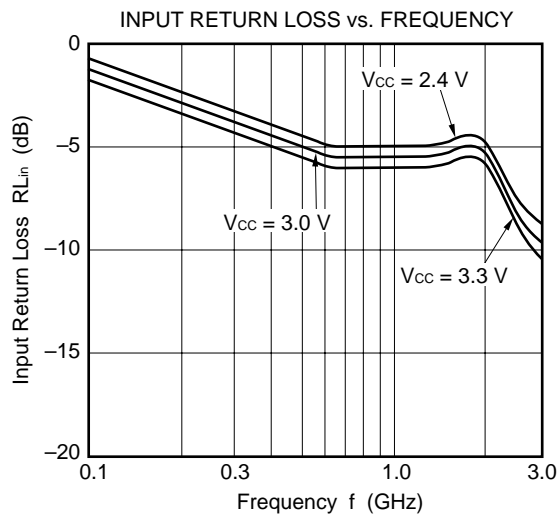
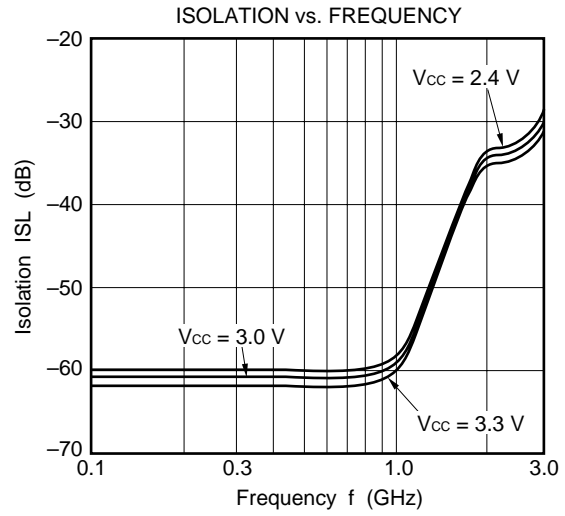
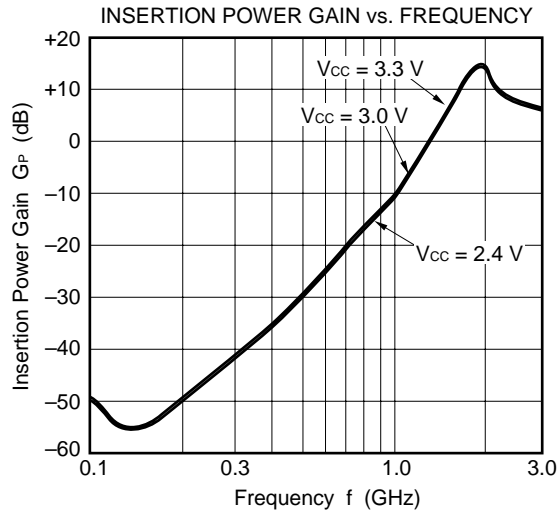
S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 64.633 Ω -35.777 Ω



START 0.10000000 GHz
 STOP 3.10000000 GHz

- μ PC8151TA -

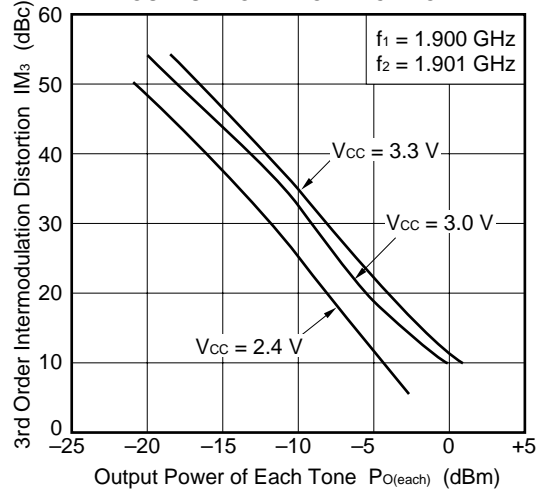
1.90 GHz OUTPUT PORT MATCHING



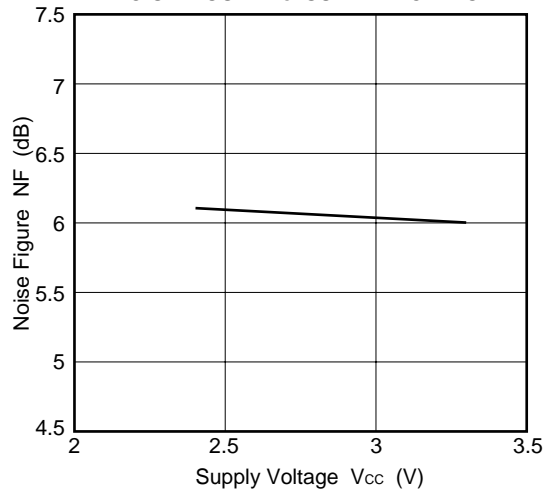
- μ PC8151TA -

1.90 GHz OUTPUT PORT MATCHING

3RD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE



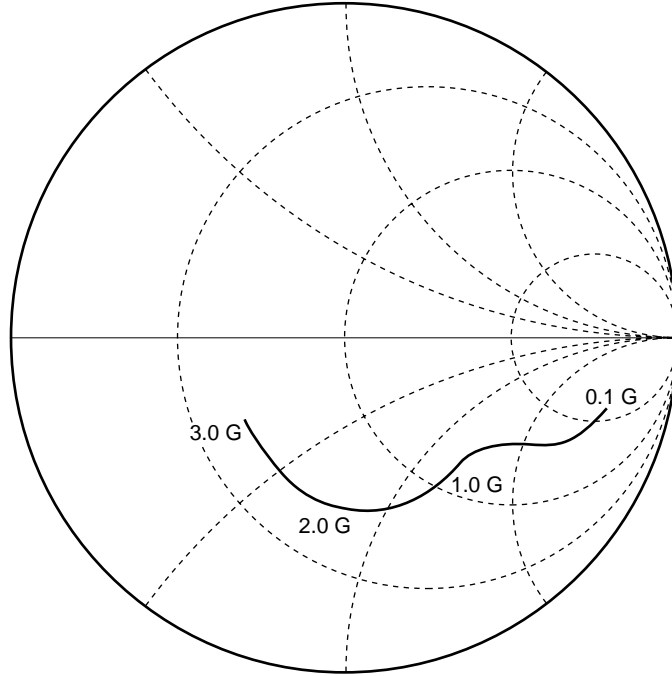
NOISE FIGURE vs. SUPPLY VOLTAGE



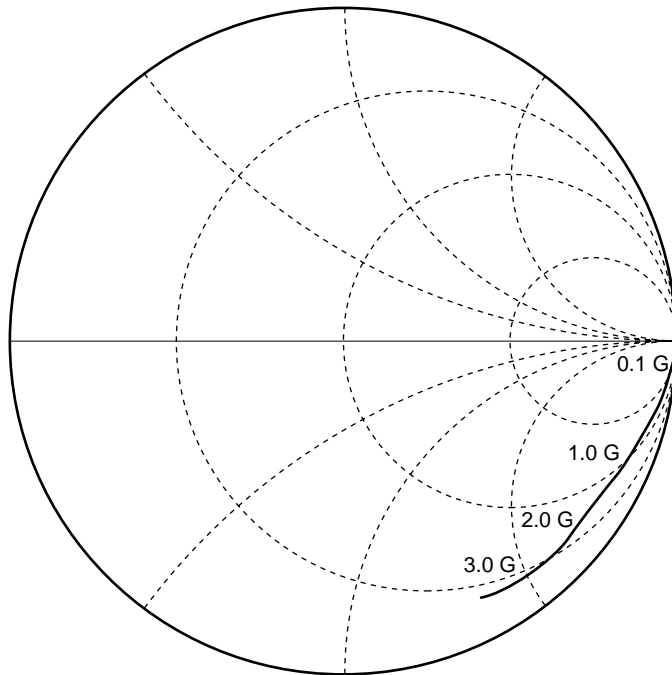
S-PARAMETERS ($V_{CC} = V_{out} = 3.0\text{ V}$)

– μ PC8151TA –

S₁₁-FREQUENCY



S₂₂-FREQUENCY



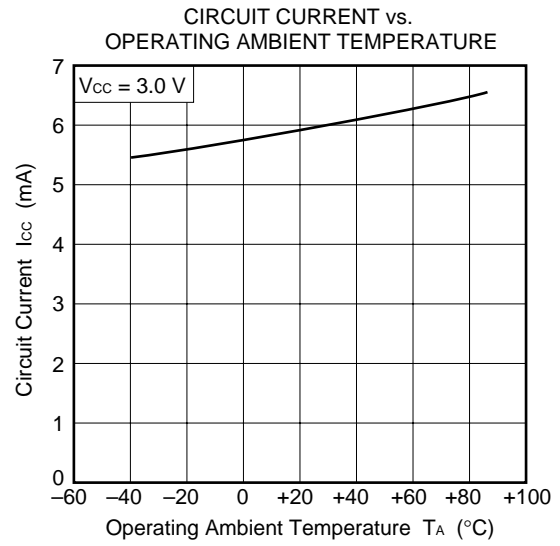
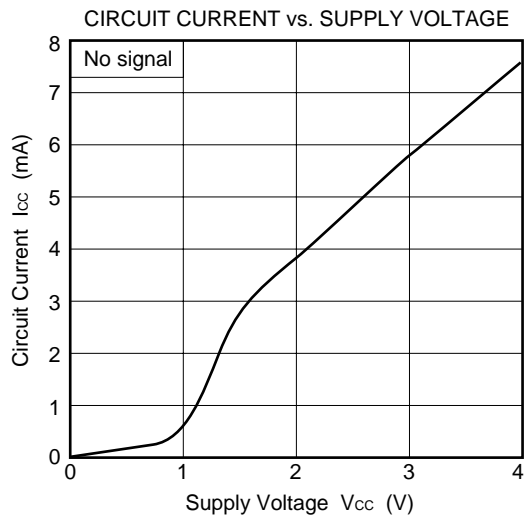
TYPICAL S-PARAMETER VALUES (T_A = +25°C)

μ PC8151TA

V_{CC} = V_{out} = 3.0 V, I_{CC} = 4.2 mA

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100.0000	0.835	-15.3	1.153	-179.7	0.001	136.7	0.989	-2.5
200.0000	0.735	-24.9	1.155	-178.2	0.002	127.6	0.989	-5.2
300.0000	0.647	-29.8	1.183	-176.1	0.003	101.3	0.974	-7.5
400.0000	0.594	-33.5	1.262	-174.9	0.005	92.9	0.967	-10.1
500.0000	0.558	-36.0	1.365	-174.6	0.005	70.8	0.960	-12.2
600.0000	0.540	-38.6	1.481	-175.8	0.005	76.3	0.955	-14.3
700.0000	0.527	-40.7	1.633	-178.5	0.005	82.1	0.943	-16.4
800.0000	0.523	-43.7	1.771	178.5	0.005	70.2	0.940	-18.3
900.0000	0.521	-46.9	1.925	174.4	0.006	64.5	0.931	-20.4
1000.0000	0.523	-50.9	2.095	169.4	0.007	78.8	0.922	-21.9
1100.0000	0.530	-54.7	2.250	163.8	0.006	78.4	0.919	-23.8
1200.0000	0.532	-59.0	2.374	158.2	0.006	87.5	0.912	-25.3
1300.0000	0.533	-63.6	2.537	151.5	0.004	87.0	0.908	-26.9
1400.0000	0.539	-68.7	2.674	145.0	0.006	93.9	0.904	-28.3
1500.0000	0.540	-73.9	2.739	137.2	0.006	100.5	0.900	-29.8
1600.0000	0.538	-78.9	2.861	130.2	0.007	114.3	0.898	-31.0
1700.0000	0.532	-84.1	2.850	122.9	0.007	116.4	0.894	-32.1
1800.0000	0.525	-89.5	2.885	115.5	0.008	125.3	0.896	-33.3
1900.0000	0.517	-94.6	2.847	109.3	0.010	132.2	0.894	-34.9
2000.0000	0.503	-99.6	2.838	102.9	0.011	139.9	0.891	-36.1
2100.0000	0.491	-104.2	2.821	97.1	0.014	141.8	0.894	-37.6
2200.0000	0.479	-108.8	2.762	91.0	0.015	145.2	0.896	-39.1
2300.0000	0.466	-113.4	2.785	85.9	0.019	145.4	0.898	-41.2
2400.0000	0.451	-117.4	2.760	80.5	0.021	145.3	0.899	-43.1
2500.0000	0.438	-121.4	2.700	75.1	0.024	143.4	0.900	-45.3
2600.0000	0.427	-125.0	2.687	69.9	0.027	144.1	0.900	-47.7
2700.0000	0.417	-128.8	2.682	65.7	0.030	142.8	0.899	-50.2
2800.0000	0.410	-131.9	2.616	60.0	0.034	139.4	0.891	-53.0
2900.0000	0.406	-135.0	2.723	54.7	0.037	138.1	0.902	-55.6
3000.0000	0.402	-137.8	2.673	50.2	0.041	136.9	0.881	-58.9
3100.0000	0.404	-141.0	2.703	42.0	0.045	134.1	0.871	-62.0

– μ PC8152TA –



– μ PC8152TA –

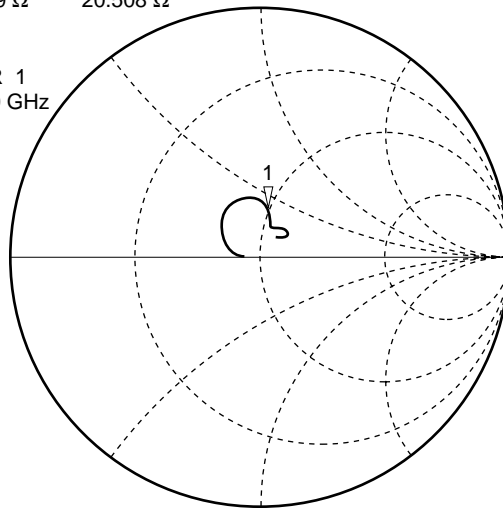
1.00 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

$T_A = +25^\circ\text{C}$, $V_{CC} = V_{out} = 3.0\text{ V}$

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 51.59 Ω 20.508 Ω

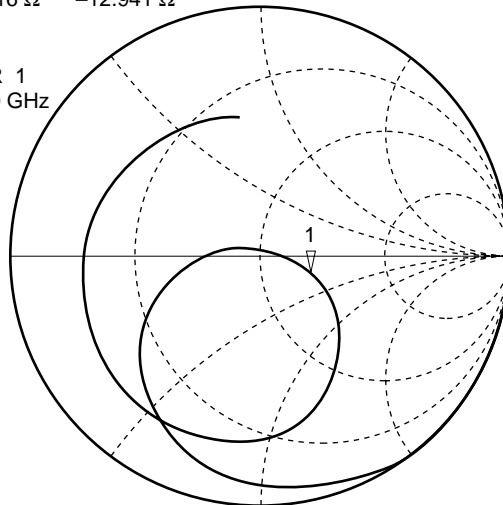
MARKER 1
 1.0 GHz



START 0.100000000 GHz
 STOP 3.100000000 GHz

S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 75.816 Ω -12.941 Ω

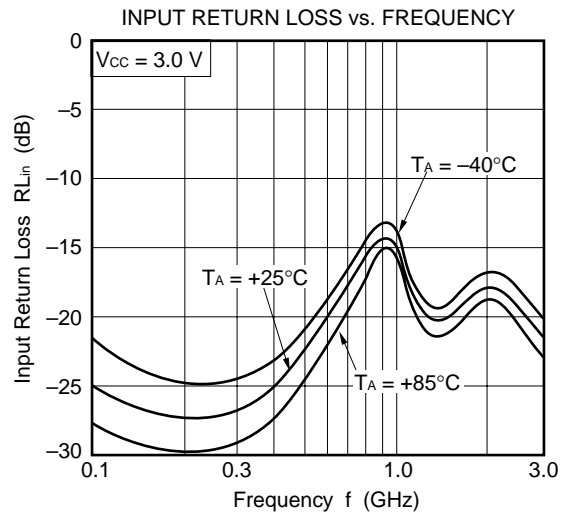
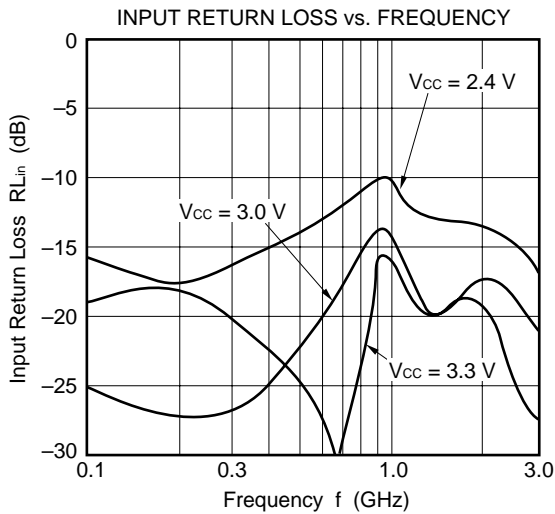
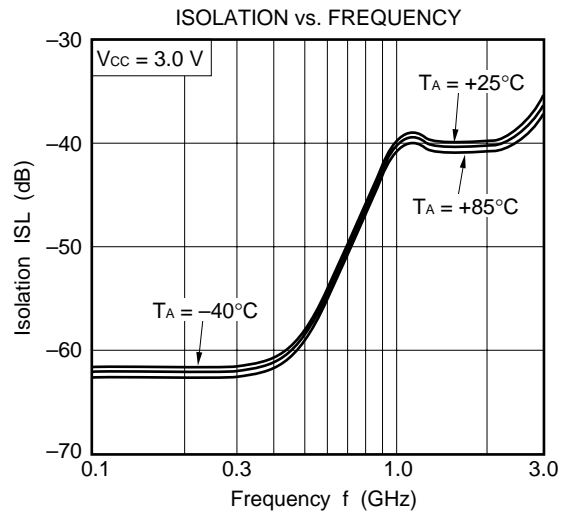
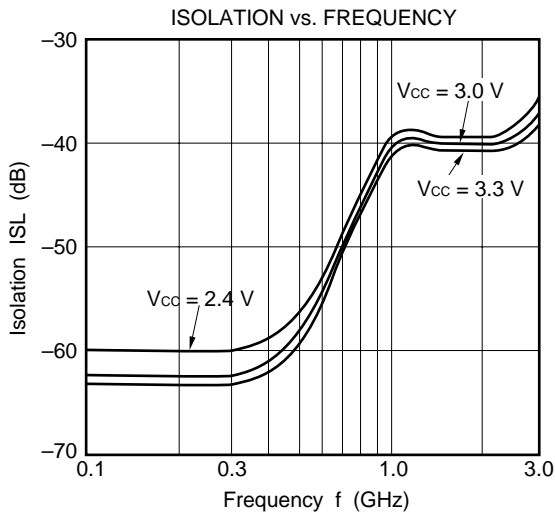
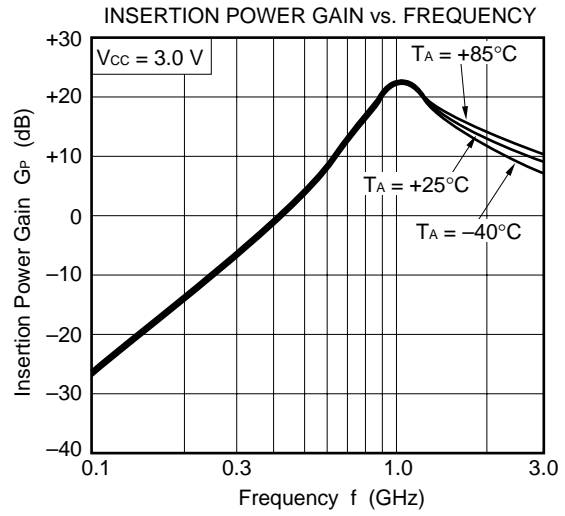
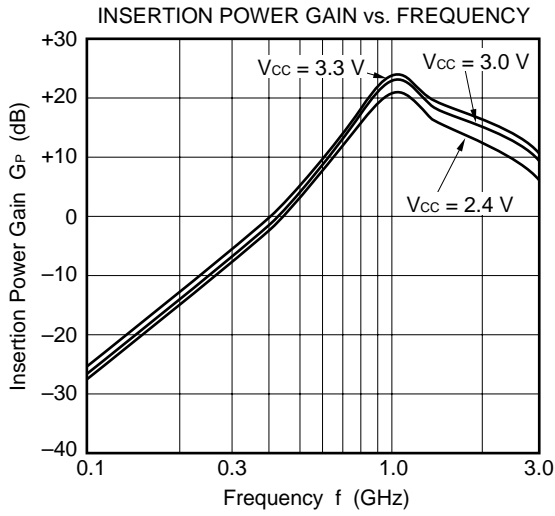
MARKER 1
 1.0 GHz



START 0.100000000 GHz
 STOP 3.100000000 GHz

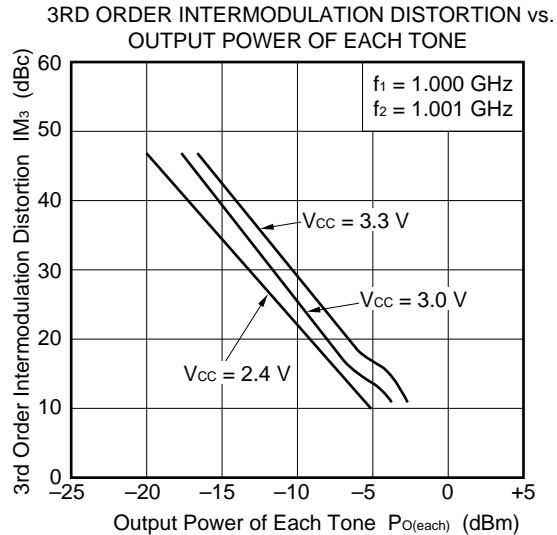
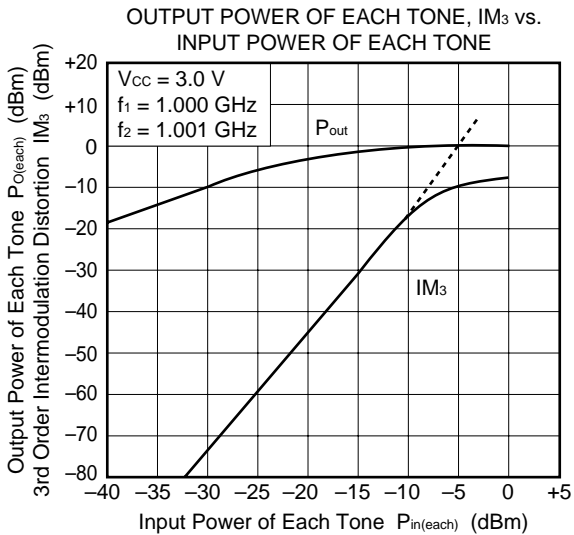
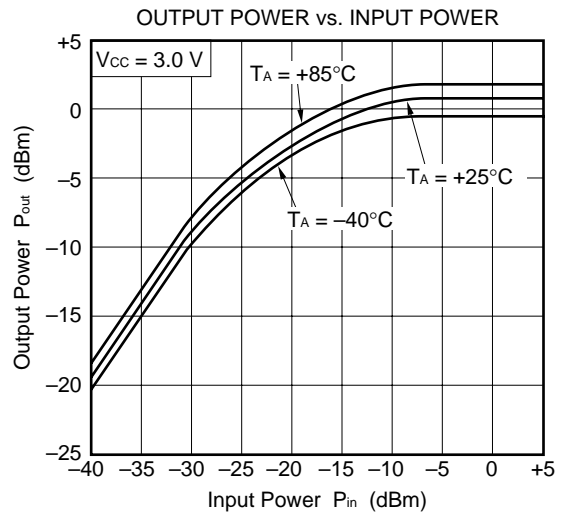
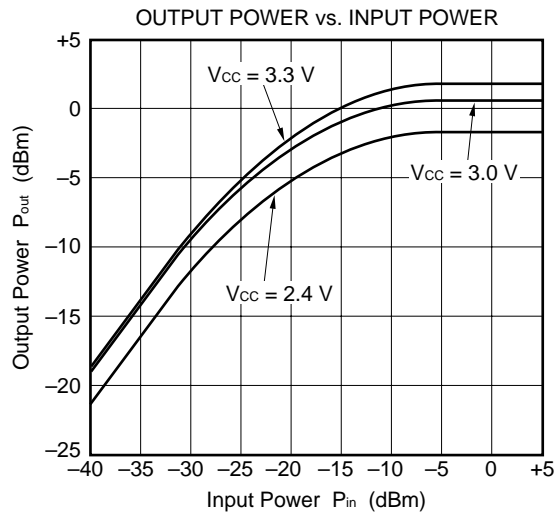
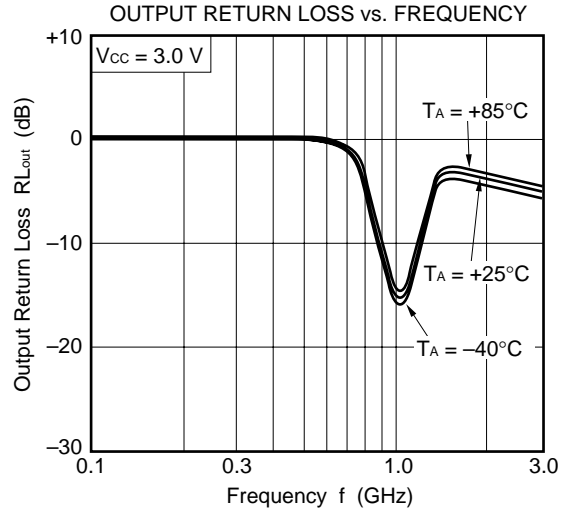
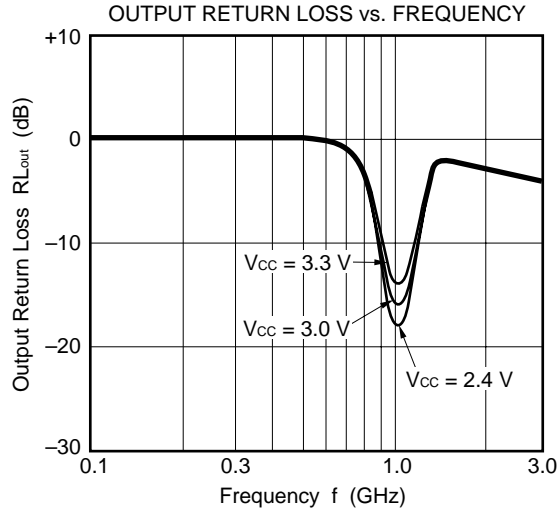
- μ PC8152TA -

1.00 GHz OUTPUT PORT MATCHING



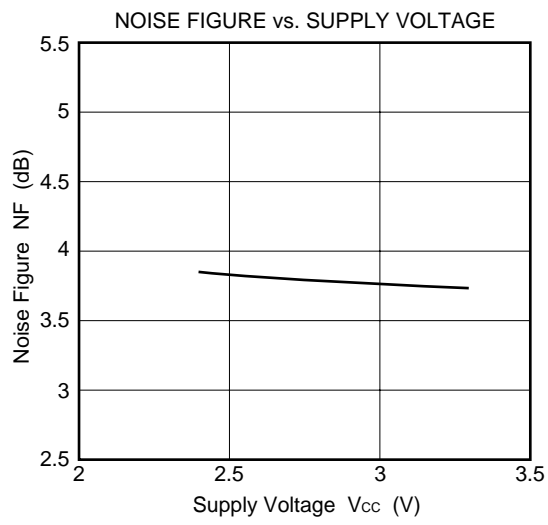
– μ PC8152TA –

1.00 GHz OUTPUT PORT MATCHING



- μ PC8152TA -

1.00 GHz OUTPUT PORT MATCHING



- μ PC8152TA -

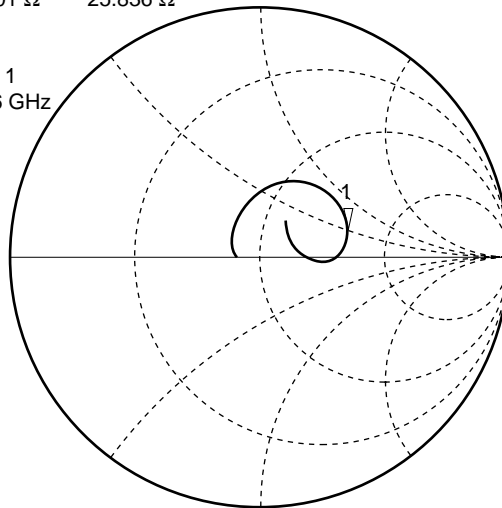
1.66 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

T_A = +25°C, V_{CC} = V_{out} = 3.0 V

S₁₁
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 98.301 Ω 25.836 Ω

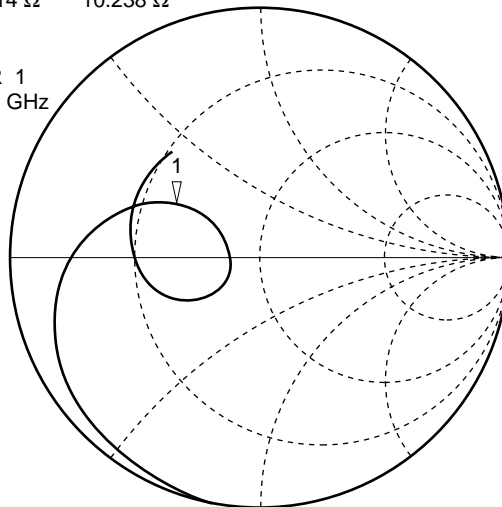
MARKER 1
 1.66 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

S₂₂
 REF 1.0 Units
 1 200.0 mUnits/
 ▽ 22.714 Ω 10.238 Ω

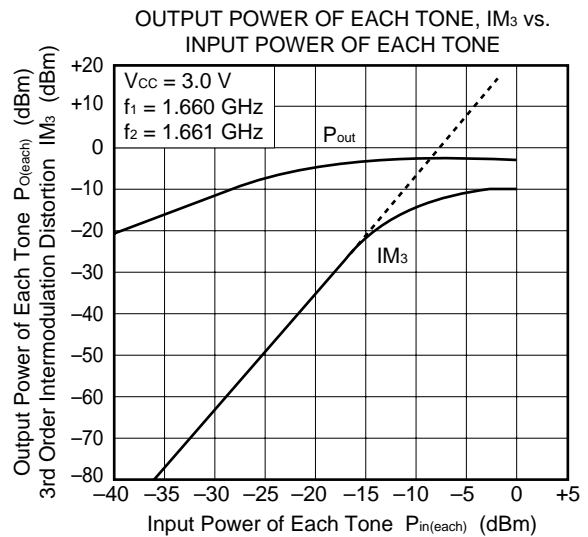
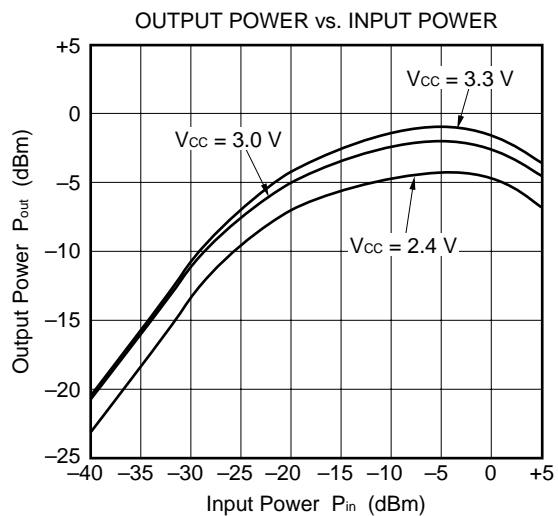
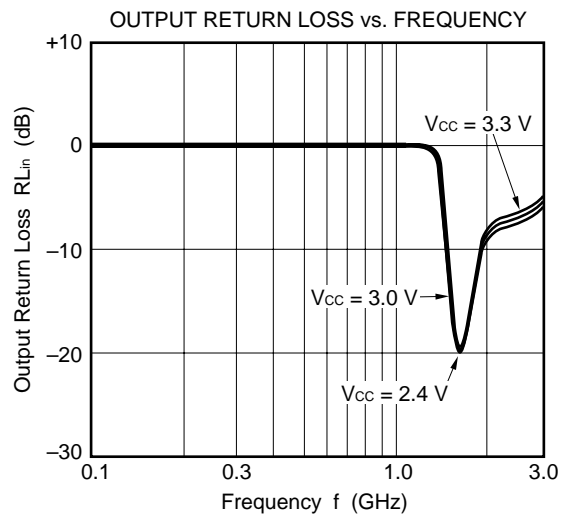
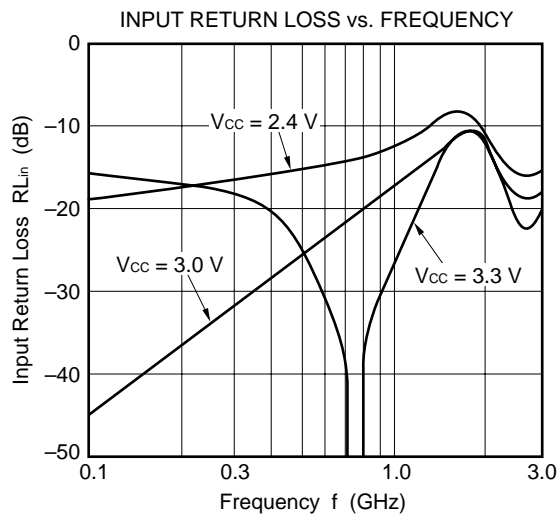
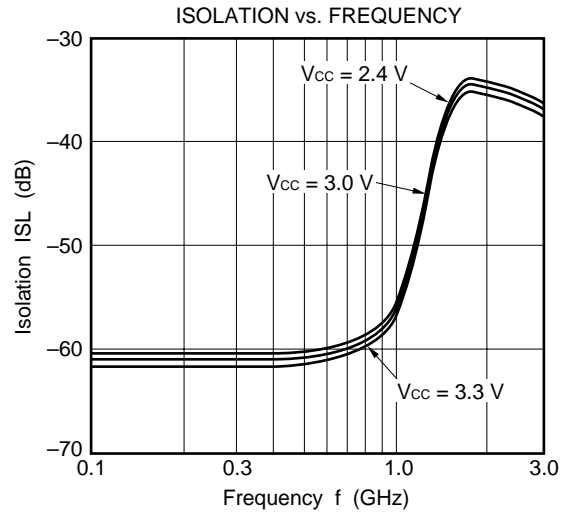
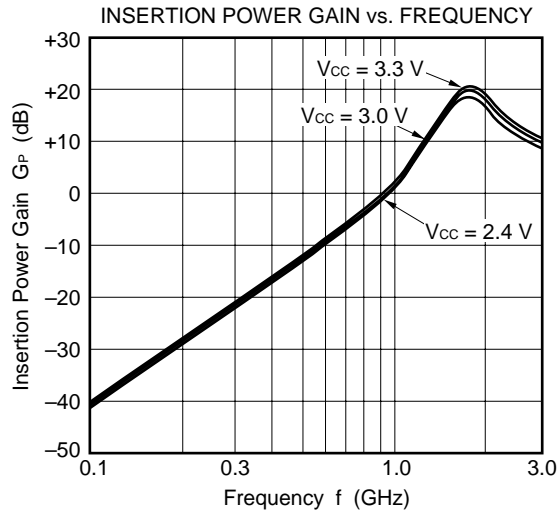
MARKER 1
 1.66 GHz



START 0.10000000 GHz
 STOP 3.10000000 GHz

– μ PC8152TA –

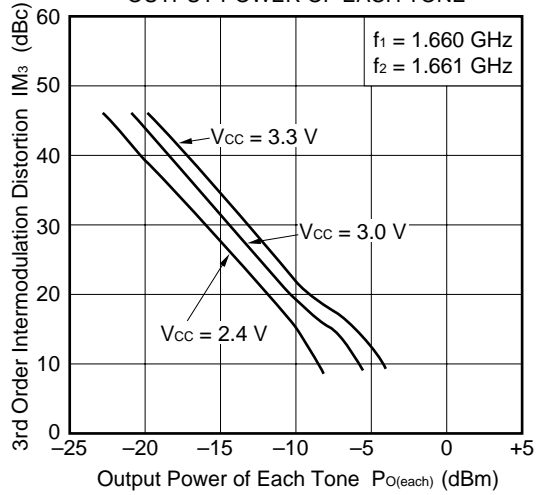
1.66 GHz OUTPUT PORT MATCHING



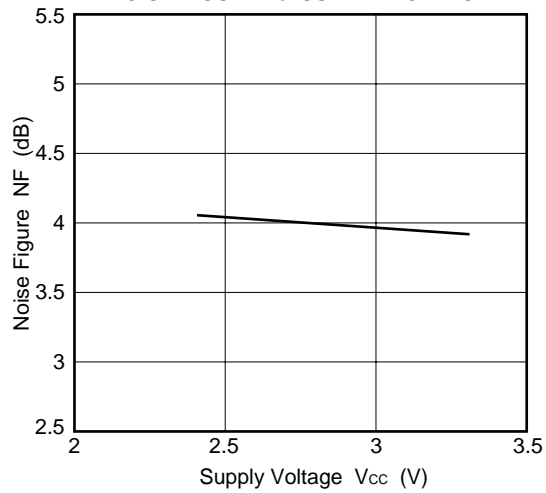
- μ PC8152TA -

1.66 GHz OUTPUT PORT MATCHING

3RD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE



NOISE FIGURE vs. SUPPLY VOLTAGE



- μ PC8152TA -

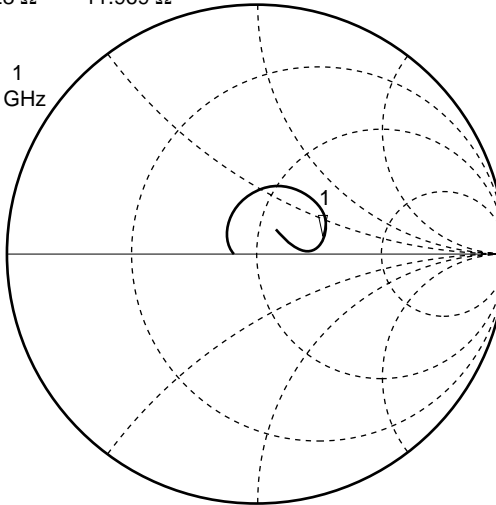
1.90 GHz OUTPUT PORT MATCHING

S-PARAMETERS (monitored at connector on board)

T_A = +25°C, V_{CC} = V_{out} = 3.0 V

S₁₁
REF 1.0 Units
1 200.0 mUnits/
∇ 85.828 Ω 11.969 Ω

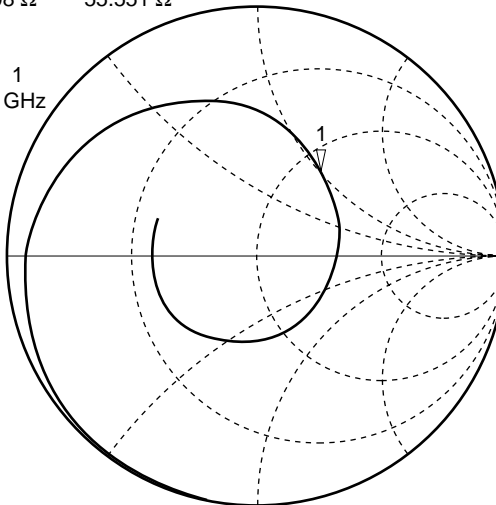
MARKER 1
1.9 GHz



START 0.10000000 GHz
STOP 3.10000000 GHz

S₂₂
REF 1.0 Units
1 200.0 mUnits/
∇ 62.398 Ω 55.551 Ω

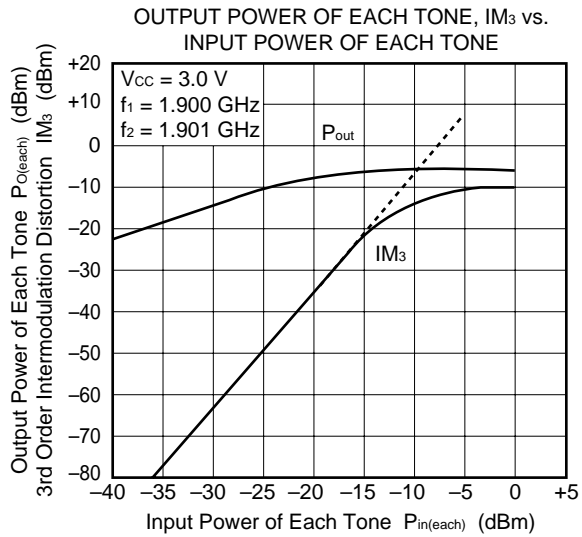
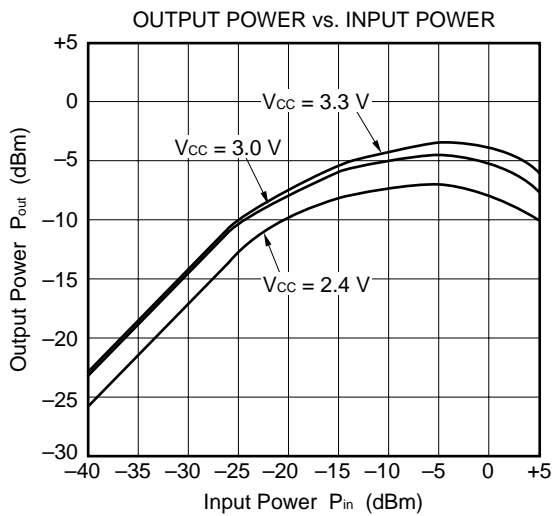
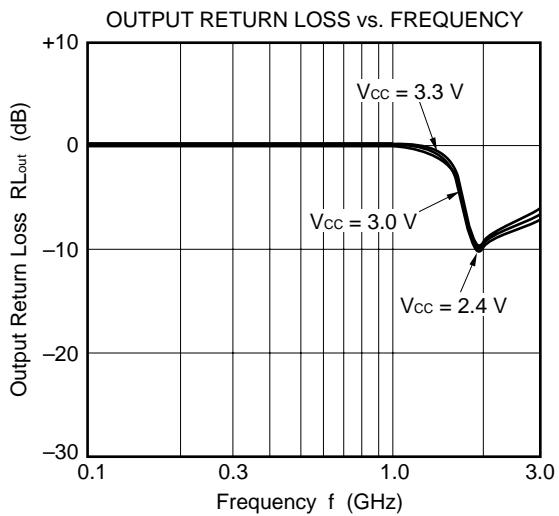
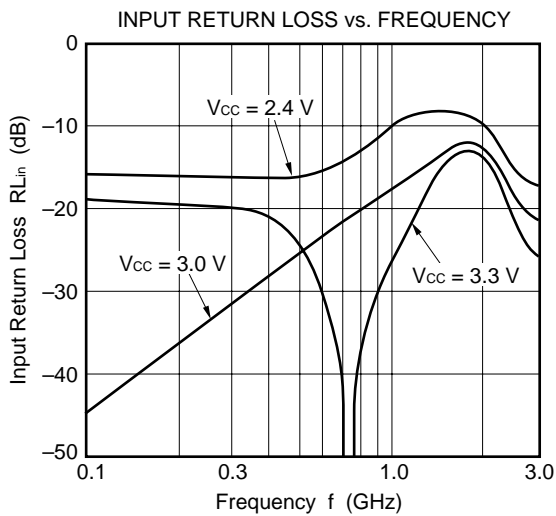
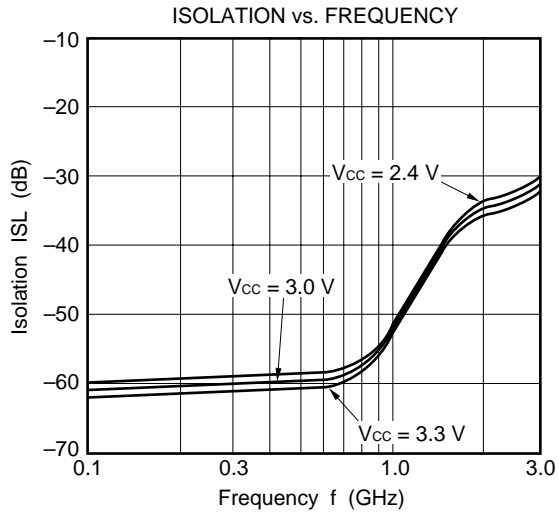
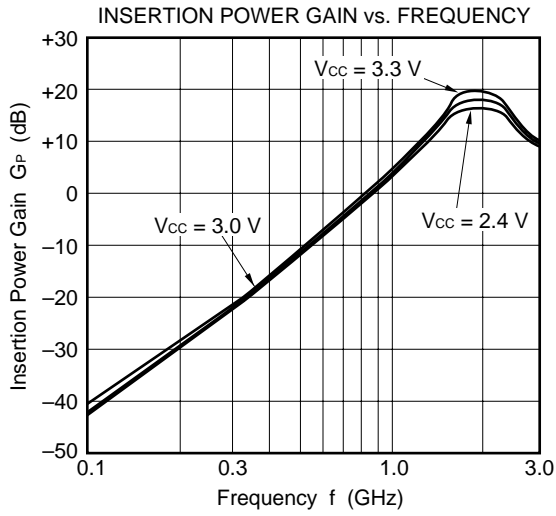
MARKER 1
1.9 GHz



START 0.10000000 GHz
STOP 3.10000000 GHz

- μ PC8152TA -

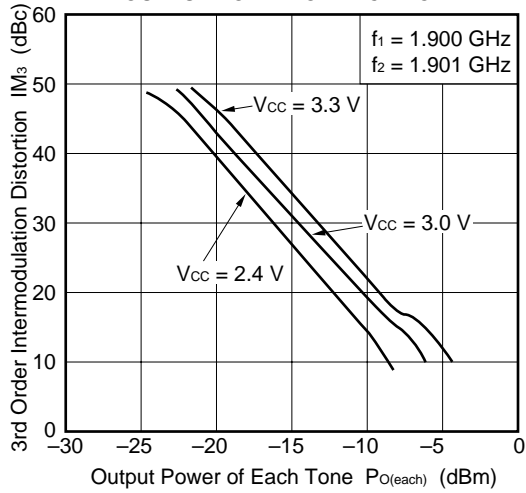
1.90 GHz OUTPUT PORT MATCHING



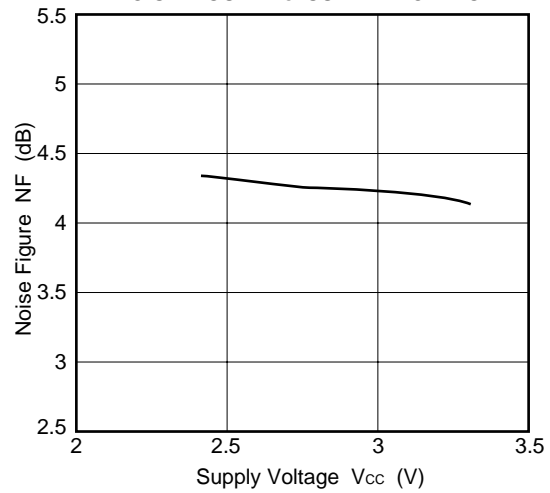
– μ PC8152TA –

1.90 GHz OUTPUT PORT MATCHING

3RD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE



NOISE FIGURE vs. SUPPLY VOLTAGE

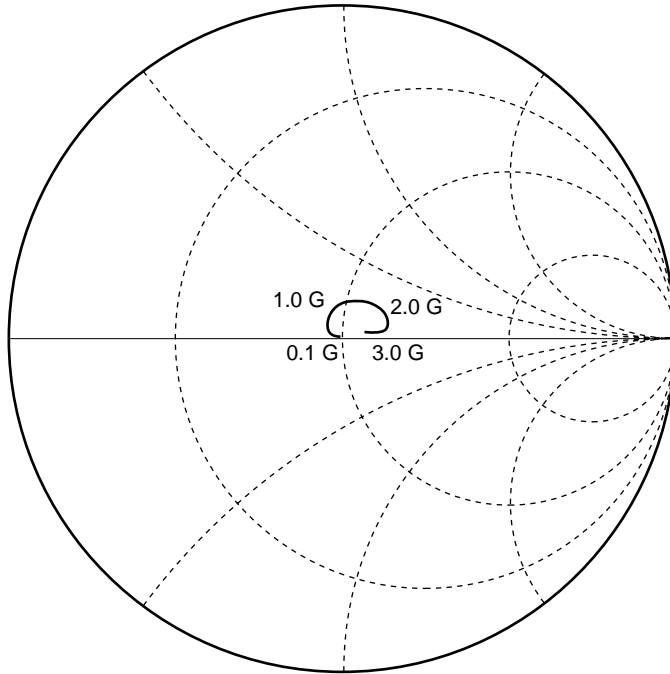


Remark The graphs indicate nominal characteristics.

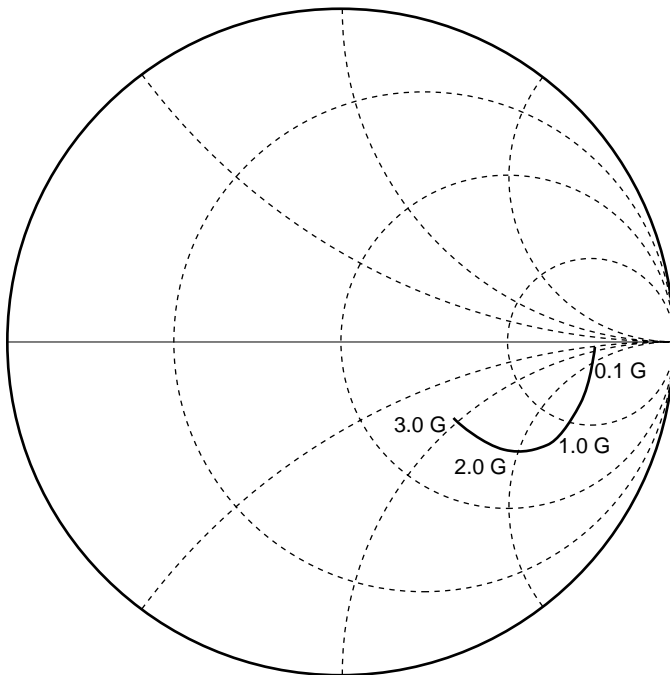
S-PARAMETERS ($V_{CC} = V_{out} = 3.0\text{ V}$)

– μ PC8152TA –

S₁₁-FREQUENCY



S₂₂-FREQUENCY



TYPICAL S-PARAMETER VALUES (T_A = +25°C)

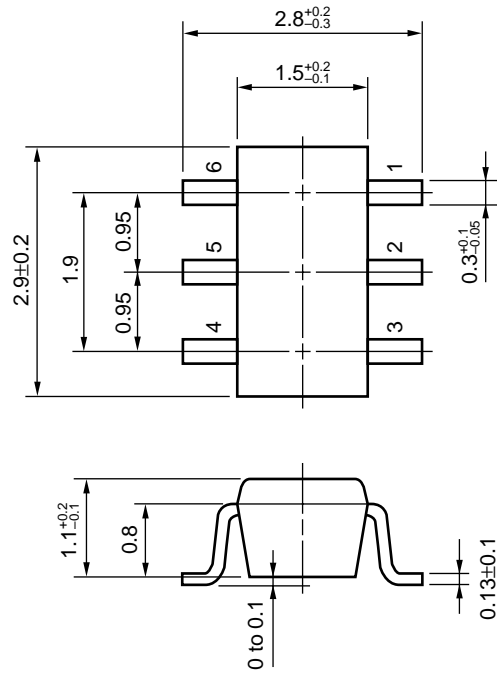
μ PC8152TA

V_{CC} = V_{out} = 3.0 V, I_{CC} = 5.6 mA

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.
100.0000	0.016	99.3	5.070	-0.3	0.001	86.5	0.763	-2.4
200.0000	0.012	60.5	5.380	-6.7	0.002	83.7	0.763	-4.5
300.0000	0.013	129.6	5.670	-14.1	0.004	87.4	0.749	-6.2
400.0000	0.046	165.9	5.885	-21.3	0.008	87.3	0.748	-8.0
500.0000	0.090	122.2	6.322	-30.5	0.012	29.2	0.753	-10.0
600.0000	0.074	112.6	6.459	-40.1	0.006	17.1	0.747	-12.1
700.0000	0.085	105.9	6.700	-50.0	0.005	32.4	0.742	-14.2
800.0000	0.097	100.9	6.748	-59.7	0.005	39.6	0.740	-16.2
900.0000	0.110	94.5	6.835	-69.4	0.006	45.9	0.735	-18.6
1000.0000	0.119	87.7	6.861	-79.3	0.005	38.9	0.726	-20.9
1100.0000	0.124	79.3	6.783	-88.9	0.006	48.3	0.719	-23.3
1200.0000	0.131	73.3	6.739	-97.6	0.006	49.5	0.706	-25.7
1300.0000	0.136	65.1	6.702	-106.5	0.006	45.9	0.691	-27.9
1400.0000	0.137	58.8	6.538	-114.7	0.007	51.2	0.673	-29.9
1500.0000	0.143	52.5	6.381	-122.9	0.006	51.4	0.649	-31.5
1600.0000	0.147	47.6	6.291	-129.8	0.007	47.2	0.628	-33.0
1700.0000	0.146	40.8	5.925	-136.9	0.006	47.2	0.606	-33.9
1800.0000	0.142	35.5	5.668	-143.8	0.007	40.7	0.582	-34.7
1900.0000	0.138	29.1	5.338	-149.7	0.007	50.9	0.562	-35.3
2000.0000	0.138	26.9	5.254	-155.0	0.006	46.6	0.541	-35.3
2100.0000	0.131	22.6	4.964	-160.4	0.005	45.6	0.523	-35.7
2200.0000	0.126	19.8	4.707	-165.7	0.006	53.1	0.507	-35.7
2300.0000	0.118	16.8	4.594	-170.4	0.005	62.5	0.493	-35.7
2400.0000	0.113	17.6	4.336	-175.1	0.004	61.5	0.478	-35.7
2500.0000	0.103	16.6	4.101	179.9	0.005	65.3	0.468	-35.6
2600.0000	0.100	18.0	3.894	175.6	0.004	82.7	0.456	-35.5
2700.0000	0.091	21.3	3.682	172.0	0.005	73.5	0.450	-35.6
2800.0000	0.087	23.3	3.485	167.4	0.006	92.8	0.438	-35.7
2900.0000	0.083	27.0	3.360	163.9	0.005	108.9	0.436	-35.2
3000.0000	0.081	31.3	3.175	160.5	0.007	104.3	0.424	-35.7
3100.0000	0.078	36.2	3.072	156.3	0.006	98.8	0.419	-35.4

★ PACKAGE DIMENSIONS

6-PIN MINIMOLD (UNIT: 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). All the ground pins must be connected together with wide ground pattern to decrease impedance difference.
- (3) The bypass capacitor should be attached to Vcc line.
- (4) The inductor (L) should be attached between output and Vcc pins. The L and series capacitor (C2) values should be adjusted for applied frequency to match impedance to next stage.
- (5) The DC capacitor must be attached to input pin.

RECOMMENDED SOLDERING CONDITIONS

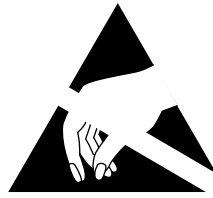
This product should be soldered under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your NEC sales representative.

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: None ^{Note}	IR35-00-3
VPS	Package peak temperature: 215°C or below Time: 40 seconds or less (at 200°C) Count: 3, Exposure limit: None ^{Note}	VP15-00-3
Wave Soldering	Soldering bath temperature: 260°C or below Time: 10 seconds or less Count: 1, Exposure limit: None ^{Note}	WS60-00-1
Partial Heating	Pin temperature: 300°C Time: 3 seconds or less (per side of device) Exposure limit: None ^{Note}	—

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



ATTENTION

OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

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"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

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