DATA SHEET

NEC

BIPOLAR ANALOG INTEGRATED CIRCUITS

μPC2762TB,μPC2763TB,μPC2771TB

3 V, SUPER MINIMOLD SILICON MMIC MEDIUM OUTPUT POWER AMPLIFIER FOR MOBILE COMMUNICATIONS

DESCRIPTION

The μPC2762TB, μPC2763TB and μPC2771TB are silicon monolithic integrated circuits designed as amplifier for mobile communications. Each of the ICs is packaged in super minimold package which is smaller than conventional minimold. The μPC2762TB, μPC2763TB and μPC2771TB have compatible pin connections and performance to μPC2762T, μPC2763T and μPC2771T of conventional minimold version. So, in the case of reducing your system size, μPC2762TB, μPC2763TB and μPC2771TB are suitable to replace from μPC2762T, μPC2763T and μPC2771T.

These IC is 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

- High-density surface mounting : 6-pin super minimold package (2.0 × 1.25 × 0.9 mm)
- Supply voltage : V_{CC} = 2.7 to 3.3 V
- Medium output power : μPC2762TB: $P_{O(1\ dB)}$ = +8.0 dBm TYP. @ 0.9 GHz
  μPC2763TB: $P_{O(1\ dB)}$ = +9.5 dBm TYP. @ 0.9 GHz
  μPC2771TB: $P_{O(1\ dB)}$ = +11.5 dBm TYP. @ 0.9 GHz
- Power gain : μPC2762TB: G_P = 13 dB TYP. @ 0.9 GHz
  μPC2763TB: G_P = 20 dB TYP. @ 0.9 GHz
  μPC2771TB: G_P = 21 dB TYP. @ 0.9 GHz

APPLICATIONS

- Buffer amplifiers for mobile telephones : μPC2762TB, μPC2763TB
- PA driver for PDC800M : μPC2771TB

ORDERING INFORMATION

Part Number	Package	Marking	Supplying Form
μPC2762TB-E3	6-pin super minimold	C1Z	Embossed tape 8 mm wide. 1, 2, 3 pins face to perforation side of the tape. Qty 3 kp/reel.
μPC2763TB-E3		C2A	
μPC2771TB-E3		C2H	

Remark To order evaluation samples, please contact your local NEC sales office.
(Part number for sample order: μPC2762TB, μPB2763TB, μPC2771TB)

Caution Electro-static sensitive devices

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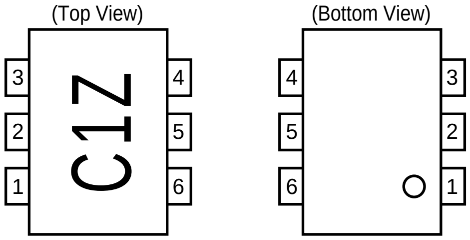
The mark ★ shows major revised points.

PIN CONNECTIONS



Marking is an example of µPC2762TB

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

★ PRODUCT LINE-UP (T_A = +25 °C, V_{CC} = V_{out} = 3.0 V, Z_L = Z_S = 50 Ω)

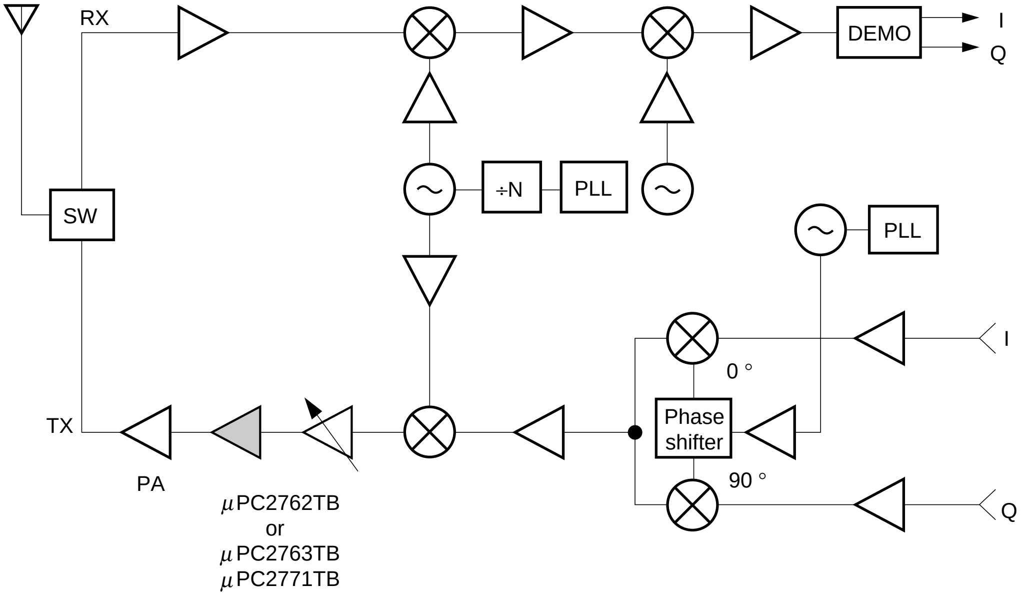
Part No.	f_u (GHz)	$P_{O\ (1\ dB)}$ (dBm)	$P_{O\ (sat)}$ (dBm)	G_P (dB)	I_{CC} (mA)	Package	Marking
µPC2762T	2.9	+8.0	+9.0	13	26.5	6-pin minimold	C1Z
µPC2762TB						6-pin super minimold	
µPC2763T	2.7	+9.5	+11.0	20	27.0	6-pin minimold	C2A
µPC2763TB						6-pin super minimold	
µPC2771T	2.2	+11.5	+12.5	21	36.0	6-pin minimold	C2H
µPC2771TB						6-pin super minimold	

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

Notice The package size distinguishes between minimold and super minimold.

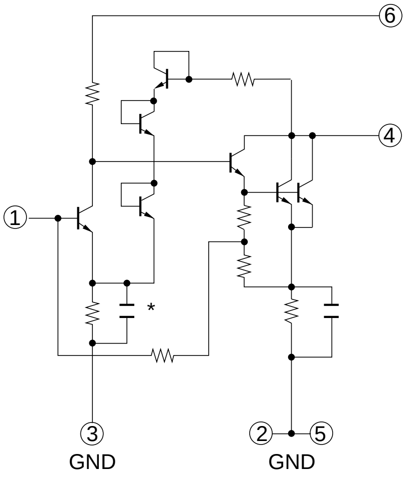
SYSTEM APPLICATION EXAMPLE

Digital cellular telephone



Note The insertion point is different due to the specifications of conjunct devices.
For conjunction with your devices, refer to the data sheets to confirm their conbination.

PIN EXPLANATION

Pin No.	Pin Name	Applied Voltage (V)	Pin Voltage (V)Note	Function and Applications	Internal Equivalent Circuit
1	INPUT	–	1.31 1.01 0.97	Signal input pin. A internal matching circuit, configured with resistors, enables 50 Ω connection over a wide band. A multi-feedback circuit is designed to cancel the deviations of h_{FE} and resistance. This pin must be coupled to signal source with capacitor for DC cut.	 * μPC2762TB does not have this capacitance.
4	OUTPUT	Voltage as same as V_{CC} through external inductor	–	Signal output pin. The inductor must be attached between V_{CC} and output pins to supply current to the internal output transistors.	
6	V_{CC}	2.7 to 3.3	–	Power supply pin, which biases the internal input transistor. This pin should be externally equipped with bypass capacitor to minimize its impedance.	
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.	

Note Pin voltage is measured at V_{CC} = 3.0 V. Above: μPC2762TB, Center: μPC2763TB, Below: μPC2771TB.

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Conditions	Ratings		Unit
			μPC2762TB μPC2763TB	μPC2771TB	
Supply Voltage	V_{CC}	T_A = +25 °C, pin 4 and 6	3.6		V
Total Circuit Current	I_{CC}	T_A = +25 °C	70	77.7	mA
Power Dissipation	P_D	Mounted on double copper clad 50 × 50 × 1.6 mm epoxy glass PWB T_A = +85 °C	200		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	+10	+13	dBm

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Supply Voltage	V_{CC}	2.7	3.0	3.3	V	Same voltage should be applied to pin 4 and 6.
Operating Ambient Temperature	T_A	–40	+25	+85	°C	–
Operating Frequency	f_{opt}	0.8	–	1.9	GHz	Only for μPC2771TB

ELECTRICAL CHARACTERISTICS (T_A = +25 °C, $V_{CC} = V_{out}$ = 3.0 V, $Z_L = Z_S$ = 50 Ω)

μPC2762TB, μPC2763TB

Parameter	Symbol	Test Conditions	μPC2762TB			μPC2763TB			Unit
			MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Circuit Current	I_{CC}	No signal	–	26.5	35.0	–	27.0	35.0	mA
Power Gain	G_P	f = 0.9 GHz f = 1.9 GHz	11 11.5	13 15.5	16 17.5	18 18	20 21	23 24	dB
Noise Figure	NF	f = 0.9 GHz f = 1.9 GHz	– –	6.5 7.0	8.0 9.0	– –	5.5 5.5	7.0 7.5	dB
Upper Limit Operating Frequency	f_u	3 dB down below from gain at f = 0.1 GHz	2.7	2.9	–	2.3	2.7	–	GHz
Isolation	ISL	f = 0.9 GHz f = 1.9 GHz	22 20	27 25	– –	25 24	30 29	– –	dB
Input Return Loss	RL_{in}	f = 0.9 GHz f = 1.9 GHz	6.0 5.5	9.0 8.5	– –	8.0 8.0	11.0 11.0	– –	dB
Output Return Loss	RL_{out}	f = 0.9 GHz f = 1.9 GHz	8.0 9.0	11.0 12.0	– –	5.0 6.0	7.0 9.0	– –	dB
1 dB Gain Compression Output Level	$P_{O\ (1\ dB)}$	f = 0.9 GHz f = 1.9 GHz	+5.5 +4.5	+8.0 +7.0	– –	+7.0 +4.0	+9.5 +6.5	– –	dBm

μPC2771TB

Parameter	Symbol	Test Conditions	μPC2771TB			Unit
			MIN.	TYP.	MAX.	
Circuit Current	I_{CC}	No signal	–	36.0	45.0	mA
Power Gain	G_P	f = 0.9 GHz f = 1.5 GHz	19 18	21 21	24 24	dB
Noise Figure	NF	f = 0.9 GHz f = 1.5 GHz	– –	6.0 6.0	7.5 7.5	dB
Upper Limit Operating Frequency	f_u	3 dB down below from gain at f = 0.1 GHz	1.8	2.2	–	GHz
Isolation	ISL	f = 0.9 GHz f = 1.5 GHz	25 25	30 30	– –	dB
Input Return Loss	RL_{in}	f = 0.9 GHz f = 1.5 GHz	10 10	14 14	– –	dB
Output Return Loss	RL_{out}	f = 0.9 GHz f = 1.5 GHz	6.5 5.5	9.0 8.5	– –	dB
1 dB Gain Compres-Sion Output Level	$P_{O\ (1\ dB)}$	f = 0.9 GHz f = 1.5 GHz	+9.0 +7.0	+11.5 +9.5	– –	dBm
Saturated Output Power Level	$P_{O\ (sat)}$	f = 0.9 GHz f = 1.5 GHz	– –	+12.5 +11	– –	dBm

STANDARD CHARACTERISTICS FOR REFERENCE (T_A = +25 °C, $V_{CC} = V_{out}$ = 3.0 V, $Z_L = Z_S$ = 50 Ω)

μPC2762TB, μPC2763TB

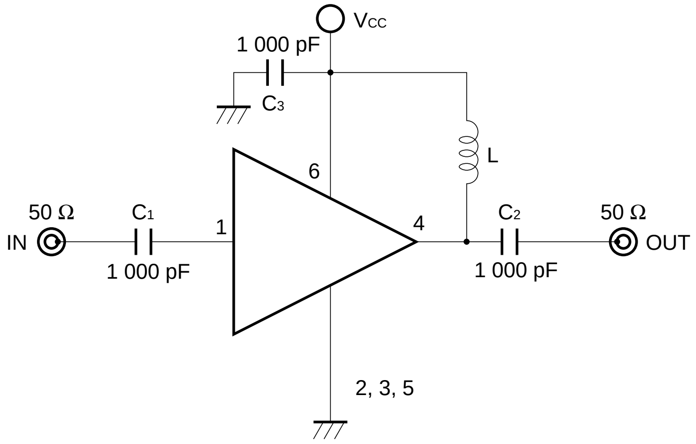
Parameter	Symbol	Test Conditions		Reference						Unit
				μPC2762TB			μPC2763TB			
				MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Saturated Output Power Level	$P_{O\ (sat)}$	f = 0.9 GHz f = 1.9 GHz		– –	+9.0 +8.5	– –	– –	+11.0 +8.0	– –	dBm
Adjacent channel power	P_{adj}	f = 0.9 GHz π/4 QPSK wave[Note] P_O = +4 dBm	Δf = ±50 kHz Δf = ±100 kHz	– –	–64 –64	– –	– –	–61 –62	– –	dBc
Third order intermodulation distortion	IM_3	2 sine wave input. Output of each tone $P_{O\ (each)}$ = +4 dBm	f_1 = 0.900 GHz f_2 = 0.902 GHz	–	–16	–	–	–27	–	dBc
			f_1 = 1.900 GHz f_2 = 1.902 GHz	–	–10	–	–	–14	–	dBc

★ μPC2771TB

Parameter	Symbol	Test Conditions		Reference			Unit
				μPC2771TB			
				MIN.	TYP.	MAX.	
Adjacent channel power 1	$P_{adj}1$	f = 0.9 GHz π/4 QPSK wave[Note] P_O = +7 dBm	Δf = ±50 kHz Δf = ±100 kHz	– –	–61 –72	– –	dBc
Adjacent channel power 2	$P_{adj}2$	f = 1.5 GHz π/4 QPSK wave[Note] P_O = +7 dBm	Δf = ±50 kHz Δf = ±100 kHz	– –	–59 –71	– –	dBc
Third order intermodulation distortion	IM_3	2 sine wave input. Output of each tone $P_{O\ (each)}$ = +7 dBm	f_1 = 0.900 GHz f_2 = 0.902 GHz	–	–18	–	dBc
			f_1 = 1.500 GHz f_2 = 1.502 GHz	–	–12	–	dBc

Note π/4 DQPSK modulated wave input, data rate 42 kbps, Filter roll off α = 0.5, PN 9

TEST CIRCUIT



COMPONENTS OF TEST CIRCUIT FOR MEASURING ELECTRICAL CHARACTERISTICS

	Type	Value
C_1, C_2	Bias Tee	1 000 pF
C_3	Capacitor	1 000 pF
L	Bias Tee	1 000 nH

EXAMPLE OF ACTUAL APPLICATION COMPONENTS

	Type	Value	Operating Frequency
C_1 to C_3	Chip capacitor	1 000 pF	100 MHz or higher
L	Chip inductor	100 nH	100 MHz or higher
		10 nH	2.0 GHz or higher

INDUCTOR FOR THE OUTPUT PIN

The internal output transistor of this IC consumes 20 mA, to output medium power. To supply current for output transistor, connect an inductor between the Vcc pin (pin 6) and output pin (pin 4). Select large value inductance, as listed above.

The inductor has both DC and AC effects. In terms of DC, the inductor biases the output transistor with minimum voltage drop to output enable high level. In terms of AC, the inductor make output-port-impedance higher to get enough gain. In this case, large inductance and Q is suitable.

For above reason, select an inductance of 100 Ω or over impedance in the operating frequency. The gain is a peak in the operating frequency band, and suppressed at lower frequencies.

The recommendable inductance can be chosen from example of actual application components list as shown above.

CAPACITORS FOR THE V_{CC}, INPUT, AND OUTPUT PINS

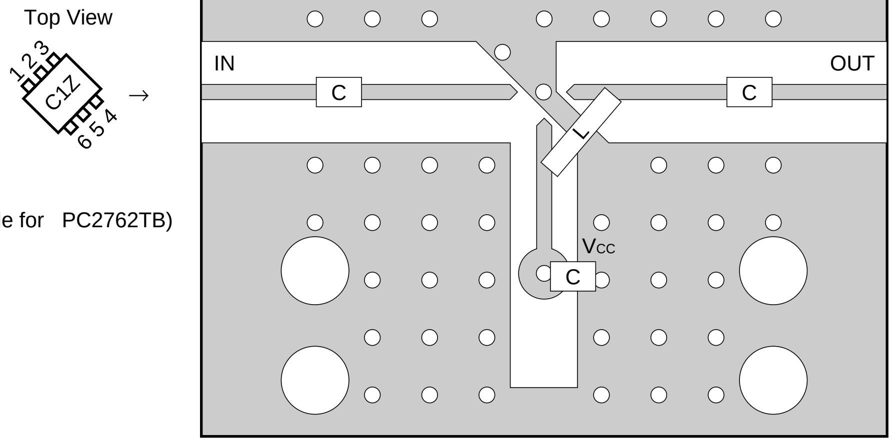
Capacitors of 1 000 pF are recommendable as the bypass capacitor for the Vcc pin and the coupling capacitors for the input and output pins.

The bypass capacitor connected to the Vcc pin is used to minimize ground impedance of Vcc pin. So, stable bias can be supplied against Vcc fluctuation.

The coupling capacitors, connected to the input and output pins, are used to cut the DC and minimize RF serial impedance. Their capacitance are therefore selected as lower impedance against a 50 Ω load. The capacitors thus perform as high pass filters, suppressing low frequencies to DC.

To obtain a flat gain from 100 MHz upwards, 1 000 pF capacitors are used in the test circuit. In the case of under 10 MHz operation, increase the value of coupling capacitor such as 10 000 pF. Because the coupling capacitors are determined by equation, $C = 1/(2\pi Rfc)$.

ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD



Mounting direction
(Marking is an example for PC2762TB)

COMPONENT LIST

	Value
C	1 000 pF
L	Example: 10 nH

Notes

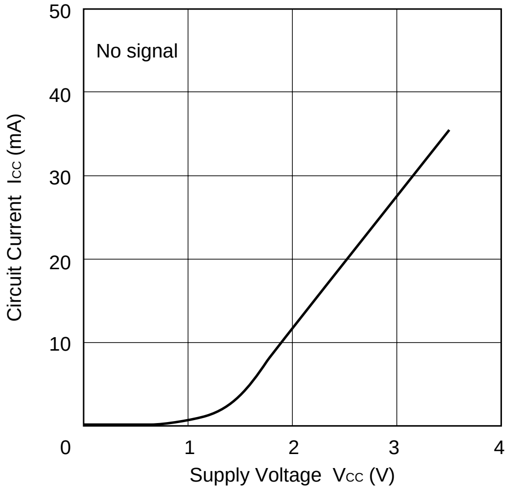
1. 30 × 30 × 0.4 mm double sided copper clad polyimide board.
2. Back side: GND pattern
3. Solder plated on pattern
4. ○ ○: Through holes

For more information on the use of this IC, refer to the following application note: USAGE AND APPLICATION OF SILICON MEDIUM-POWER HIGH-FREQUENCY AMPLIFIER MMIC (P12152E).

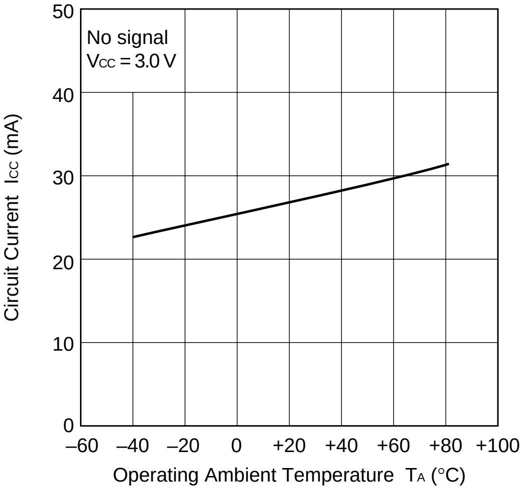
★ TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25 °C)

– μPC2762TB –

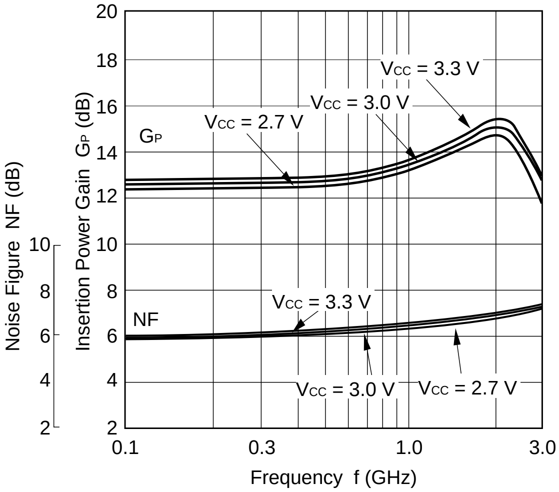
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



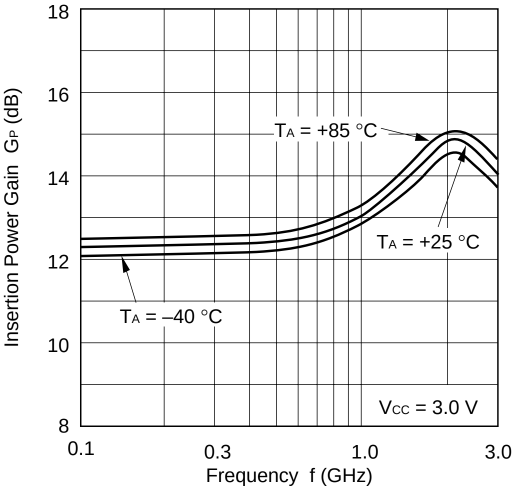
CIRCUIT CURRENT vs. OPERATING AMBIENT TEMPERATURE



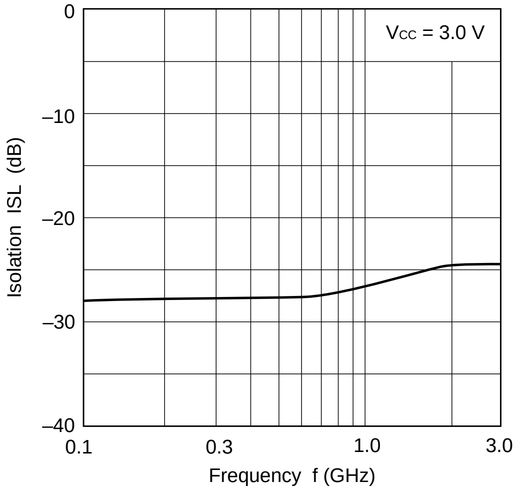
NOISE FIGURE AND INSERTION POWER GAIN vs. FREQUENCY



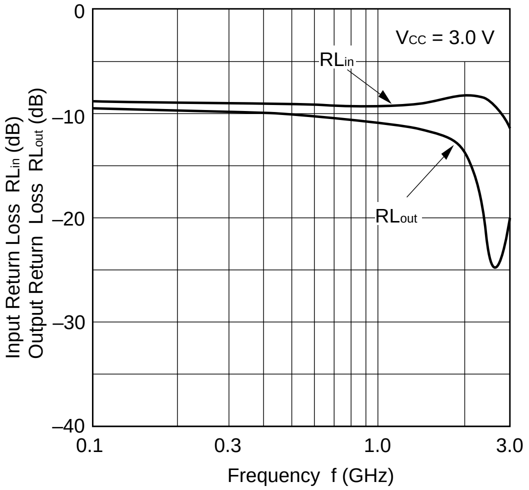
INSERTION POWER GAIN vs. FREQUENCY



ISOLATION vs. FREQUENCY



INPUT RETURN LOSS, OUTPUT RETURN LOSS vs. FREQUENCY



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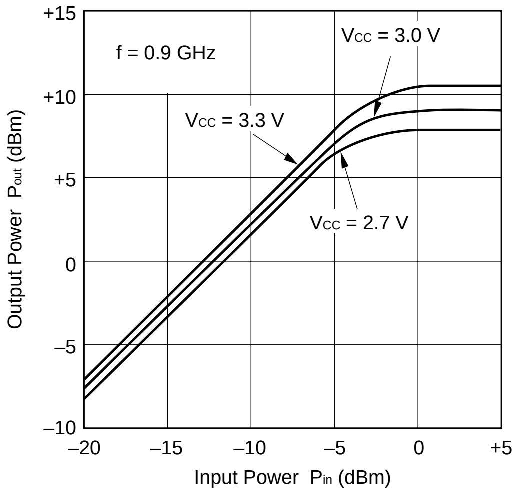
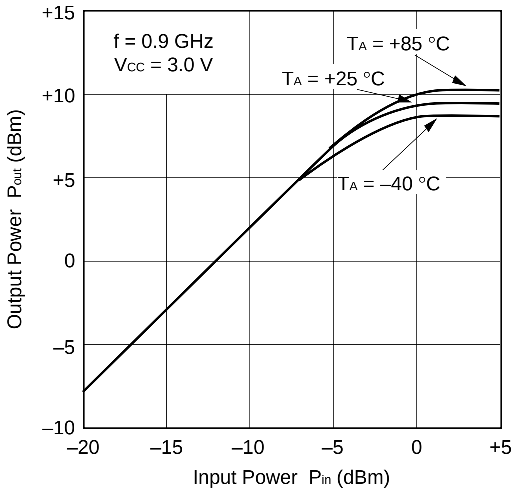
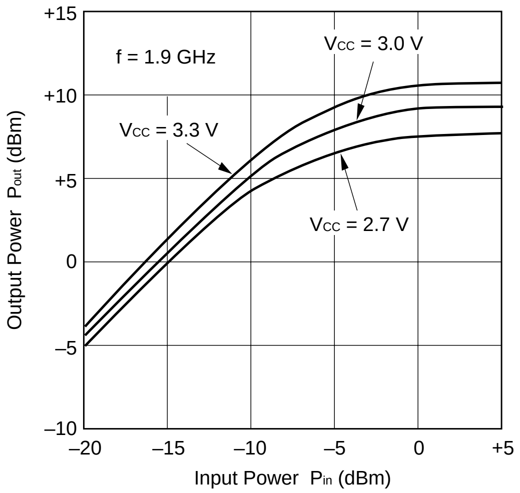
OUTPUT POWER vs. INPUT POWER



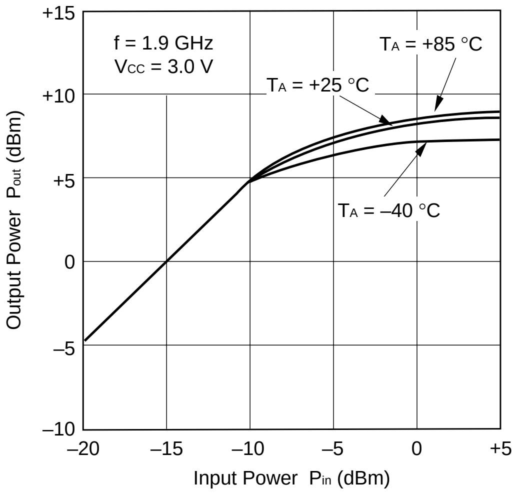
OUTPUT POWER vs. INPUT POWER



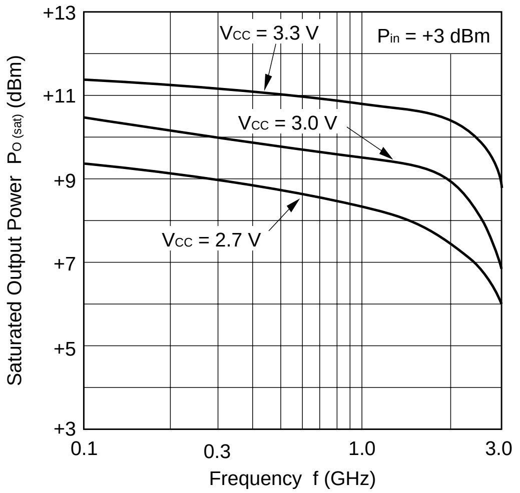
OUTPUT POWER vs. INPUT POWER



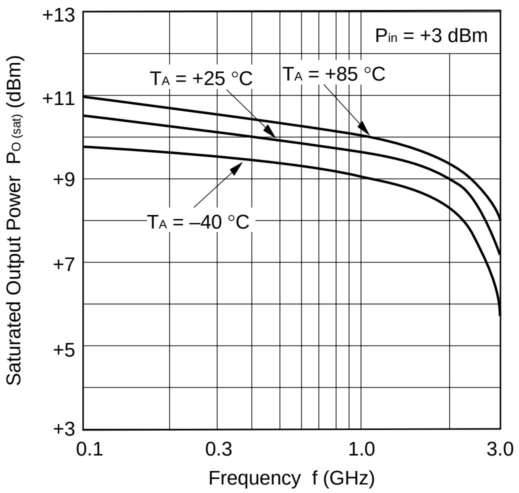
OUTPUT POWER vs. INPUT POWER



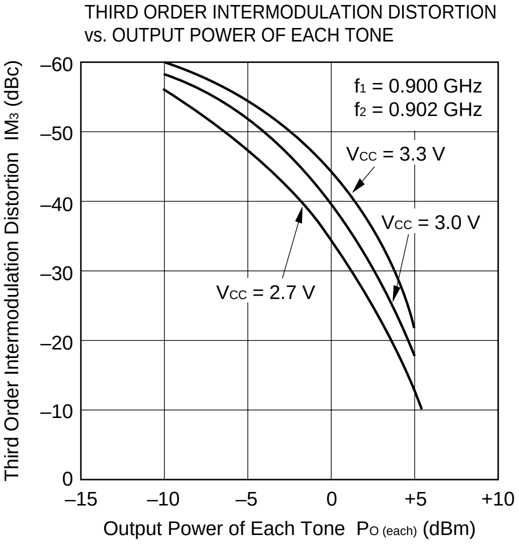
SATURATED OUTPUT POWER vs. FREQUENCY

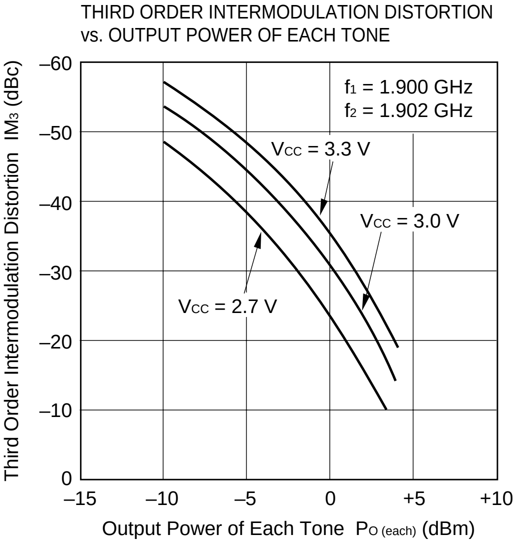


SATURATED OUTPUT POWER vs. FREQUENCY



– μPC2762TB –

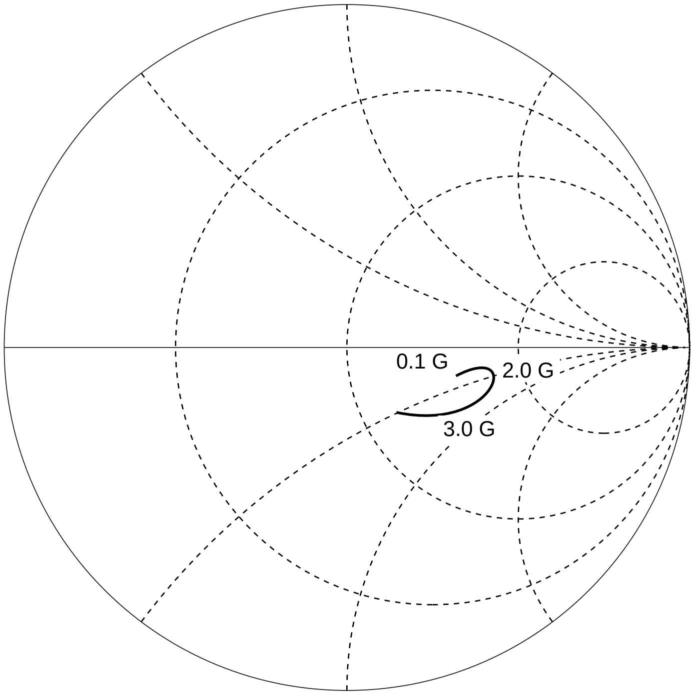

THIRD ORDER INTERMODULATION DISTORTION
vs. OUTPUT POWER OF EACH TONE
Third Order Intermodulation Distortion IM3 (dBc)
–60
–50
–40
–30
–20
–10
0
–15
–10
–5
0
+5
+10
Output Power of Each Tone PO (each) (dBm)
f1 = 0.900 GHz
f2 = 0.902 GHz
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V


THIRD ORDER INTERMODULATION DISTORTION
vs. OUTPUT POWER OF EACH TONE
Third Order Intermodulation Distortion IM3 (dBc)
–60
–50
–40
–30
–20
–10
0
–15
–10
–5
0
+5
+10
Output Power of Each Tone PO (each) (dBm)
f1 = 1.900 GHz
f2 = 1.902 GHz
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V

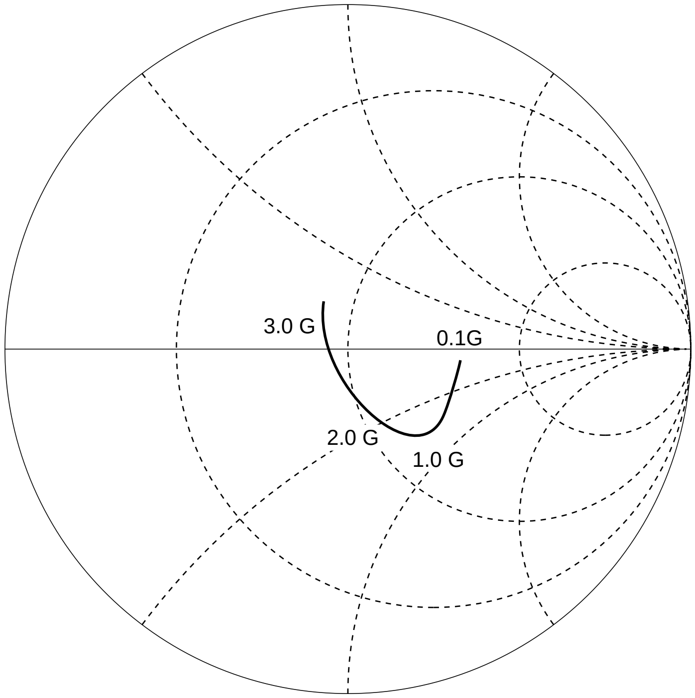
★ **S-PARAMETER (T$_A$ = +25 °C, V$_{CC}$ = V$_{out}$ = 3.0 V)**

– μPC2762TB –

S$_{11}$-FREQUENCY



S$_{22}$-FREQUENCY



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

μPC2762TB

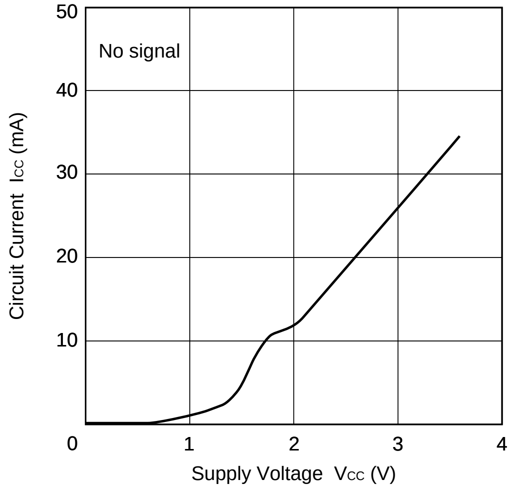
V_{CC} = V_{out} = 3.0 V, I_{CC} = 29 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K
MHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	
100.0000	0.338	–1.3	4.560	–3.4	0.039	1.0	0.310	–5.5	2.23
200.0000	0.346	–2.0	4.581	–7.6	0.039	2.7	0.311	–9.5	2.20
300.0000	0.348	–1.2	4.616	–11.3	0.039	6.8	0.302	–12.3	2.20
400.0000	0.340	–1.9	4.661	–15.8	0.040	8.1	0.296	–16.2	2.18
500.0000	0.329	–3.1	4.689	–19.5	0.040	11.6	0.290	–20.2	2.20
600.0000	0.324	–6.2	4.726	–23.6	0.041	13.7	0.292	–24.1	2.12
700.0000	0.341	–8.1	4.844	–27.4	0.042	15.8	0.291	–26.2	2.01
800.0000	0.359	–7.6	4.927	–31.5	0.043	18.1	0.292	–28.3	1.90
900.0000	0.378	–6.5	5.057	–35.8	0.044	19.3	0.284	–30.9	1.77
1000.0000	0.375	–5.1	5.179	–41.0	0.045	20.3	0.280	–35.3	1.72
1100.0000	0.363	–5.2	5.306	–45.9	0.047	22.1	0.285	–40.0	1.64
1200.0000	0.353	–6.7	5.400	–51.0	0.047	23.7	0.288	–43.4	1.62
1300.0000	0.357	–8.8	5.567	–56.5	0.048	26.1	0.288	–45.7	1.54
1400.0000	0.377	–11.7	5.706	–61.7	0.049	24.5	0.285	–47.9	1.44
1500.0000	0.402	–12.7	5.820	–68.0	0.052	26.7	0.282	–52.8	1.32
1600.0000	0.414	–13.2	5.987	–73.7	0.052	26.8	0.285	–58.1	1.27
1700.0000	0.426	–13.6	6.081	–80.1	0.055	29.0	0.288	–62.0	1.18
1800.0000	0.434	–16.1	6.182	–86.7	0.056	28.2	0.291	–66.1	1.14
1900.0000	0.448	–19.0	6.229	–93.2	0.057	28.5	0.286	–70.4	1.09
2000.0000	0.463	–21.7	6.328	–99.7	0.057	28.0	0.282	–76.2	1.07
2100.0000	0.483	–23.9	6.382	–106.7	0.058	28.5	0.282	–81.5	1.01
2200.0000	0.492	–25.8	6.431	–113.8	0.058	29.0	0.282	–86.9	0.99
2300.0000	0.492	–29.7	6.424	–121.2	0.060	30.1	0.278	–91.7	0.99
2400.0000	0.486	–34.6	6.329	–128.8	0.060	30.2	0.268	–98.4	1.01
2500.0000	0.489	–40.4	6.146	–136.1	0.062	31.1	0.260	–104.5	1.02
2600.0000	0.500	–44.6	5.997	–143.1	0.061	32.1	0.251	–111.3	1.05
2700.0000	0.511	–48.5	5.822	–149.9	0.064	31.4	0.248	–116.7	1.03
2800.0000	0.511	–50.4	5.693	–157.0	0.066	34.0	0.237	–121.5	1.04
2900.0000	0.494	–52.9	5.553	–163.0	0.065	33.8	0.222	–128.3	1.11
3000.0000	0.465	–55.9	5.334	–169.5	0.065	35.5	0.203	–134.5	1.20
3100.0000	0.441	–60.6	5.157	–175.5	0.066	35.5	0.189	–141.1	1.27

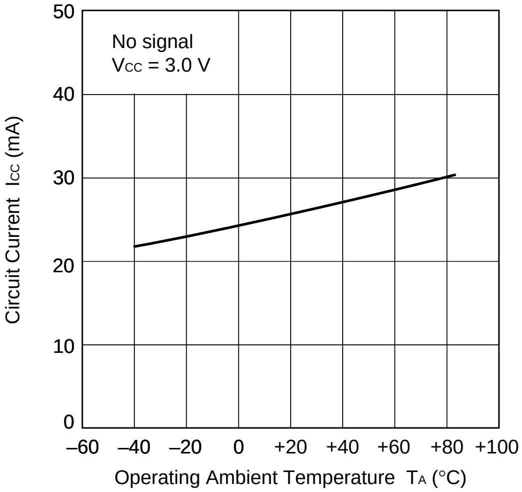
★ TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25 °C)

– µPC2763TB –

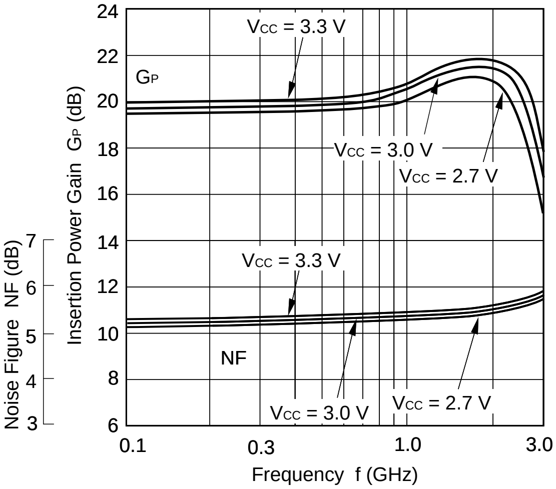
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



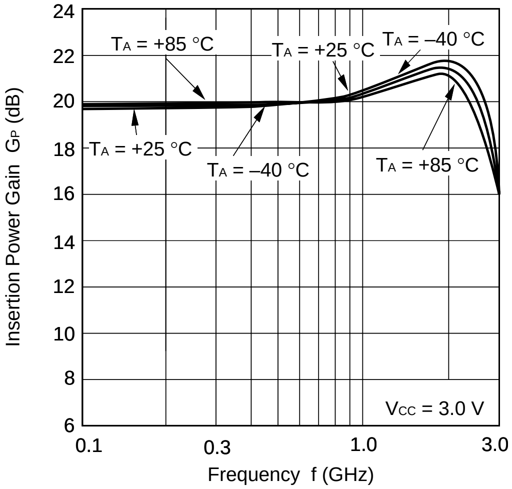
CIRCUIT CURRENT vs. OPERATING AMBIENT TEMPERATURE



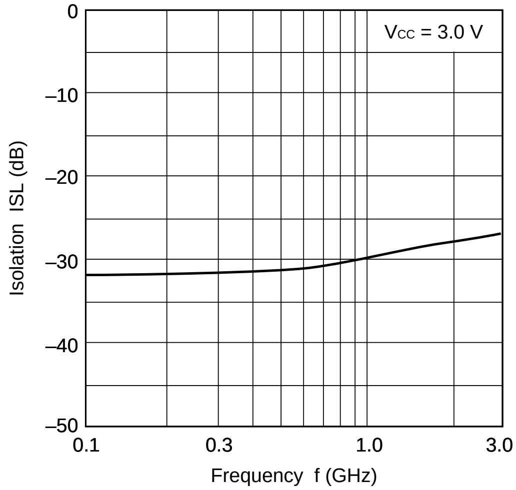
NOISE FIGURE AND INSERTION POWER GAIN vs. FREQUENCY



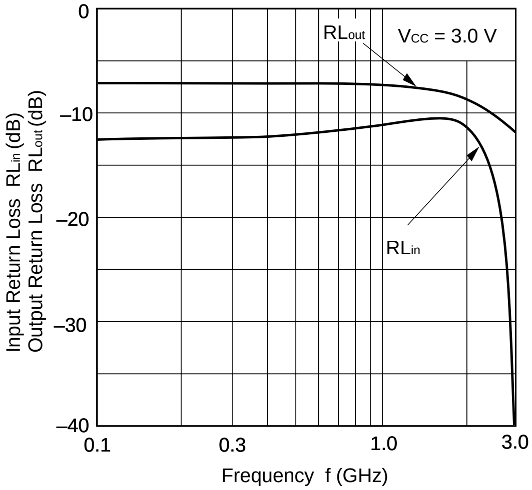
INSERTION POWER GAIN vs. FREQUENCY



ISOLATION vs. FREQUENCY

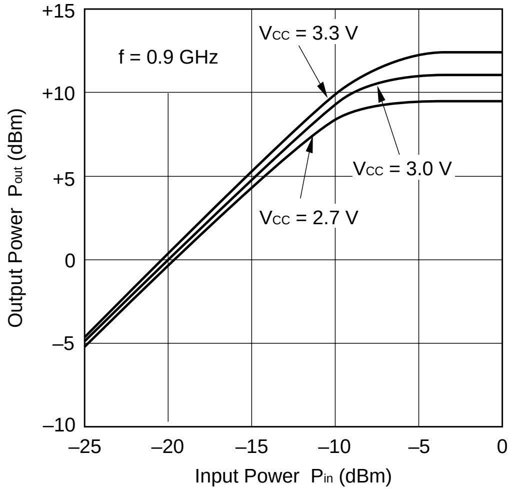


INPUT RETURN LOSS, OUTPUT RETURN LOSS vs. FREQUENCY

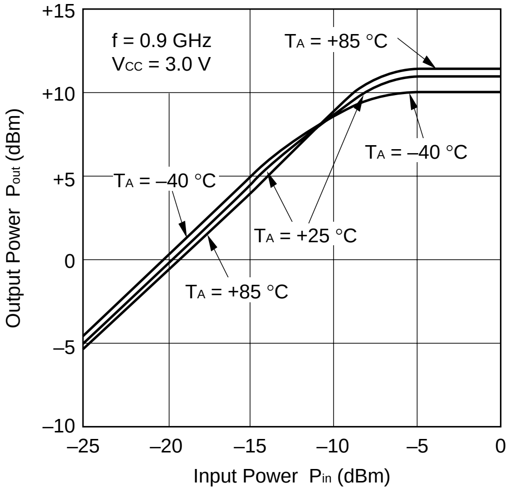


– μPC2763TB –

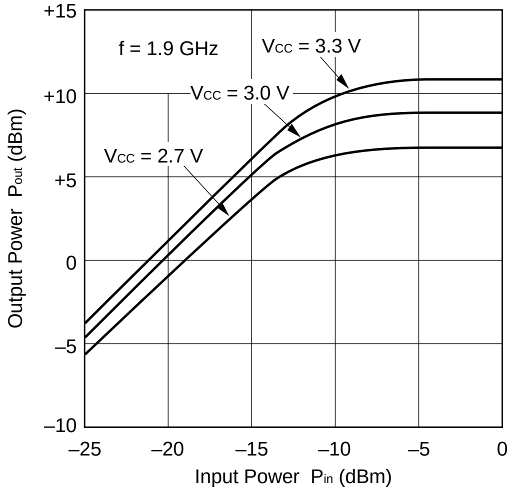
OUTPUT POWER vs. INPUT POWER



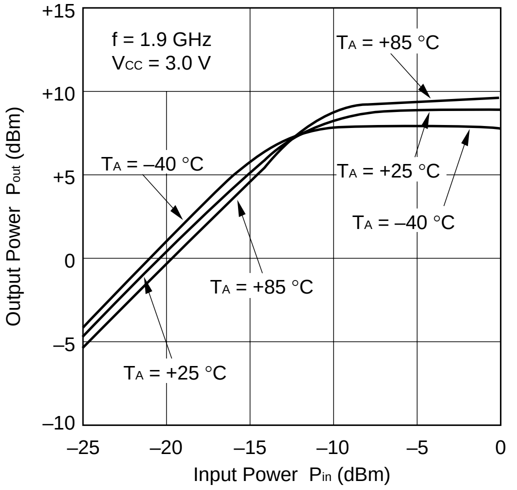
OUTPUT POWER vs. INPUT POWER



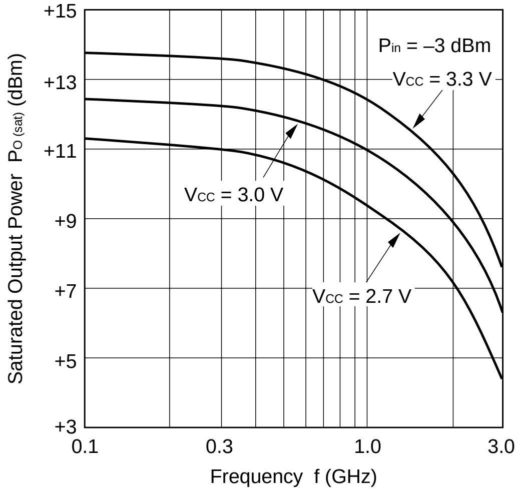
OUTPUT POWER vs. INPUT POWER



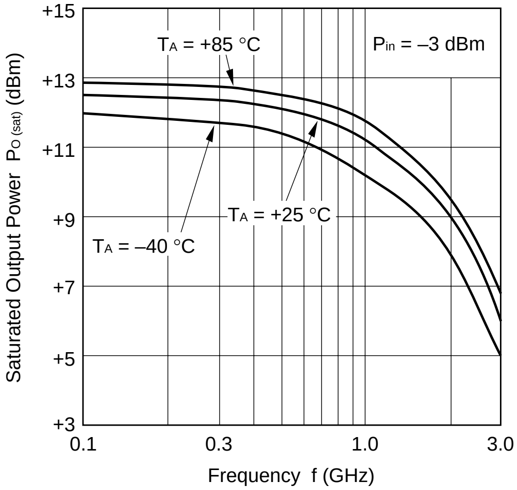
OUTPUT POWER vs. INPUT POWER



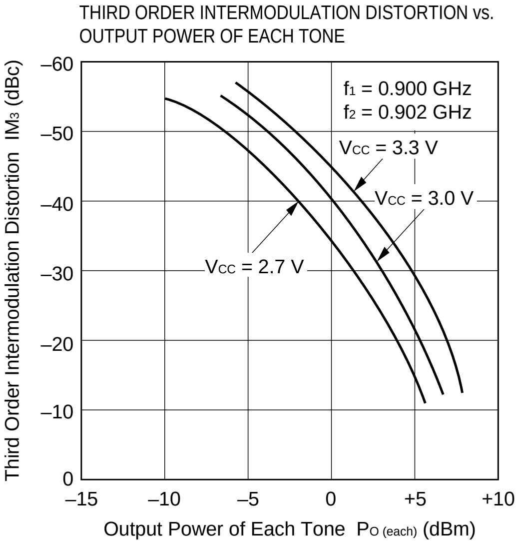
SATURATED OUTPUT POWER vs.
FREQUENCY

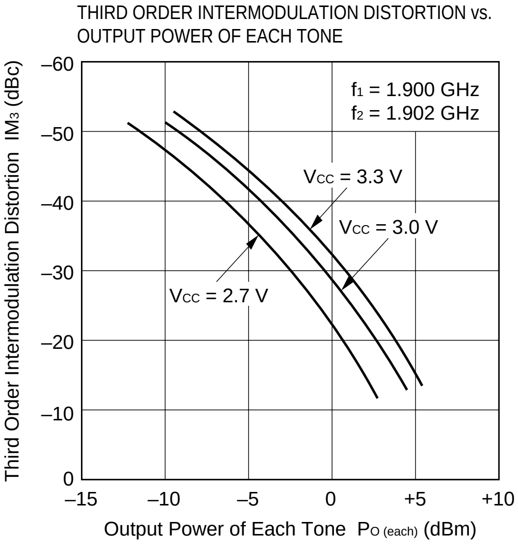


SATURATED OUTPUT POWER vs.
FREQUENCY



– μPC2763TB –

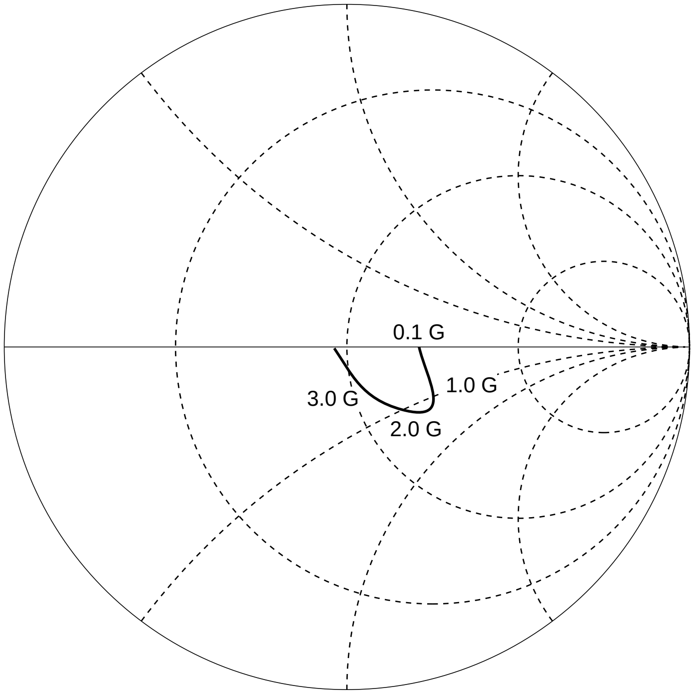

THIRD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE
f1 = 0.900 GHz
f2 = 0.902 GHz
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V
Third Order Intermodulation Distortion IM3 (dBc)
–60
–50
–40
–30
–20
–10
0
–15
–10
–5
0
+5
+10
Output Power of Each Tone PO (each) (dBm)


THIRD ORDER INTERMODULATION DISTORTION vs. OUTPUT POWER OF EACH TONE
f1 = 1.900 GHz
f2 = 1.902 GHz
VCC = 3.3 V
VCC = 3.0 V
VCC = 2.7 V
Third Order Intermodulation Distortion IM3 (dBc)
–60
–50
–40
–30
–20
–10
0
–15
–10
–5
0
+5
+10
Output Power of Each Tone PO (each) (dBm)

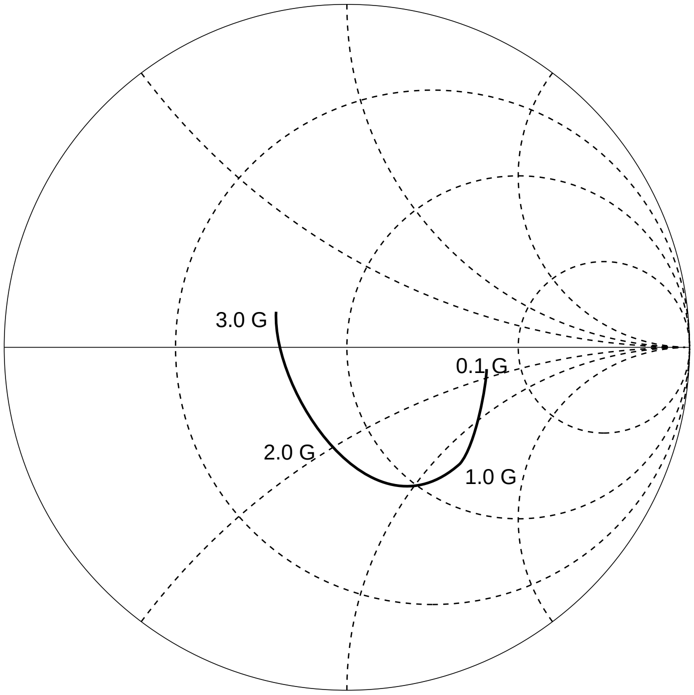
★ S-PARAMETER (T$_A$ = +25 °C, V$_{CC}$ = V$_{out}$ = 3.0 V)

– μPC2763TB –

S$_{11}$-FREQUENCY



S$_{22}$-FREQUENCY



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

μPC2763TB

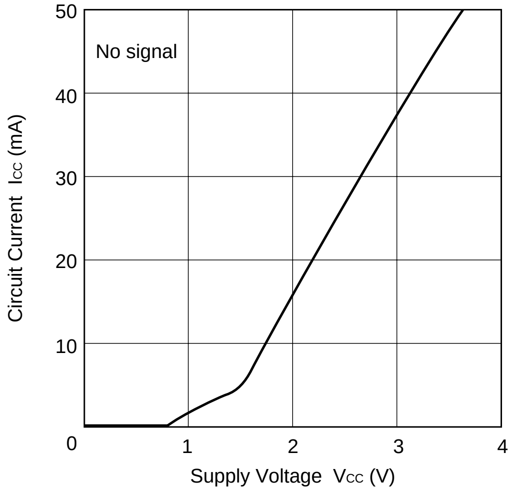
$V_{CC} = V_{out}$ = 3.0 V, I_{CC} = 28 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K
MHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	
100.0000	0.231	–1.4	10.210	–3.8	0.023	2.4	0.406	–4.1	1.68
200.0000	0.242	–0.2	10.305	–8.5	0.023	7.8	0.412	–7.5	1.66
300.0000	0.250	2.7	10.464	–12.9	0.024	9.3	0.407	–9.9	1.58
400.0000	0.245	2.8	10.655	–18.2	0.024	13.4	0.407	–13.9	1.55
500.0000	0.242	2.0	10.863	–22.8	0.026	16.1	0.405	–17.6	1.44
600.0000	0.241	–2.2	11.093	–28.1	0.027	19.9	0.414	–21.6	1.37
700.0000	0.263	–5.3	11.544	–33.2	0.028	22.3	0.419	–24.6	1.25
800.0000	0.291	–5.6	11.843	–39.0	0.029	22.5	0.424	–27.7	1.16
900.0000	0.316	–5.1	12.291	–45.1	0.029	23.9	0.424	–31.9	1.09
1000.0000	0.322	–4.0	12.676	–52.4	0.030	25.6	0.425	–37.1	1.02
1100.0000	0.318	–5.4	13.066	–59.8	0.031	24.1	0.438	–42.5	0.96
1200.0000	0.309	–9.0	13.311	–67.3	0.031	27.0	0.442	–47.8	0.96
1300.0000	0.322	–14.2	13.661	–75.8	0.033	28.8	0.441	–51.2	0.90
1400.0000	0.344	–20.6	13.845	–83.9	0.033	28.5	0.434	–56.0	0.87
1500.0000	0.371	–23.7	13.824	–93.0	0.035	30.1	0.435	–62.2	0.82
1600.0000	0.380	–27.5	13.890	–101.5	0.035	28.1	0.439	–68.9	0.80
1700.0000	0.388	–30.6	13.634	–110.5	0.036	29.2	0.439	–74.6	0.78
1800.0000	0.378	–36.4	13.236	–119.6	0.035	29.9	0.428	–81.3	0.84
1900.0000	0.378	–42.1	12.724	–127.9	0.035	30.9	0.411	–87.0	0.89
2000.0000	0.375	–46.6	12.290	–136.1	0.035	32.9	0.393	–93.4	0.94
2100.0000	0.369	–50.5	11.707	–144.0	0.035	33.0	0.385	–99.6	0.99
2200.0000	0.351	–53.8	11.130	–151.7	0.036	35.7	0.373	–104.9	1.06
2300.0000	0.331	–59.8	10.524	–159.1	0.036	36.8	0.359	–110.3	1.13
2400.0000	0.306	–66.4	9.824	–165.9	0.034	38.7	0.336	–117.5	1.31
2500.0000	0.300	–73.1	9.152	–172.3	0.035	40.1	0.321	–123.3	1.41
2600.0000	0.294	–75.8	8.583	–178.2	0.034	43.8	0.306	–129.4	1.55
2700.0000	0.290	–77.1	8.029	176.2	0.035	46.3	0.299	–133.9	1.58
2800.0000	0.270	–77.7	7.610	170.6	0.037	47.7	0.288	–138.6	1.63
2900.0000	0.248	–78.7	7.240	166.1	0.039	51.1	0.270	–143.6	1.67
3000.0000	0.219	–82.3	6.827	161.2	0.039	53.6	0.253	–150.1	1.79
3100.0000	0.198	–88.7	6.516	156.9	0.040	55.1	0.244	–156.2	1.88

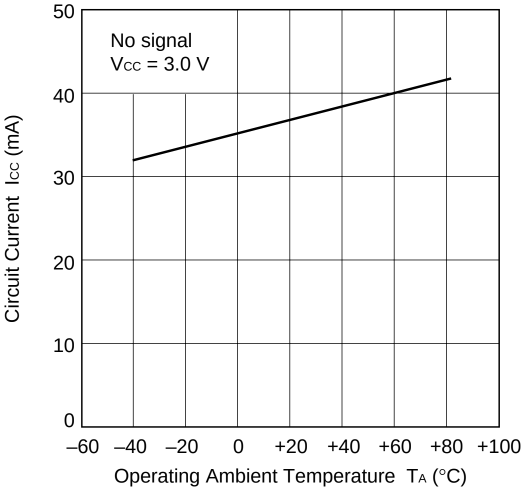
★ TYPICAL CHARACTERISTICS (Unless otherwise specified, T_A = +25 °C)

– μPC2771TB –

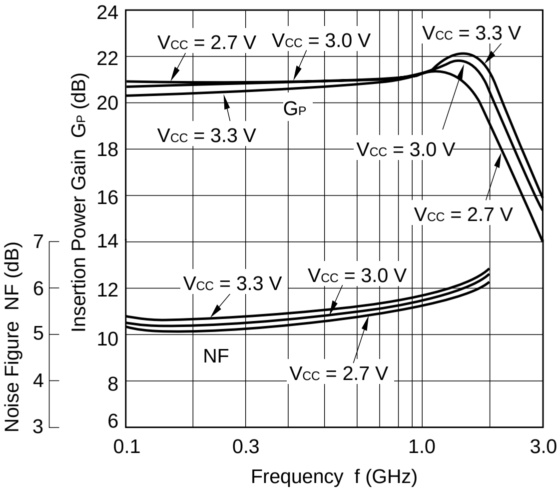
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



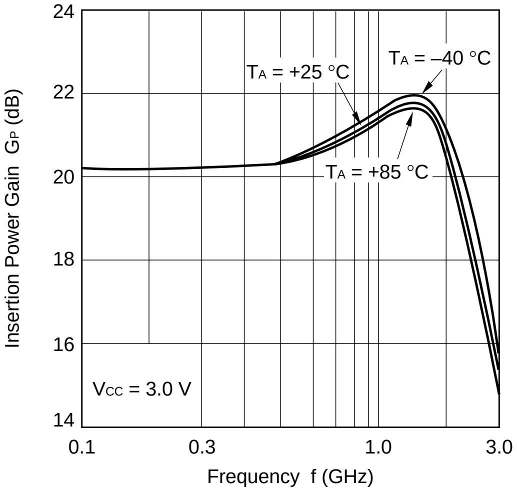
CIRCUIT CURRENT vs. OPERATING AMBIENT TEMPERATURE



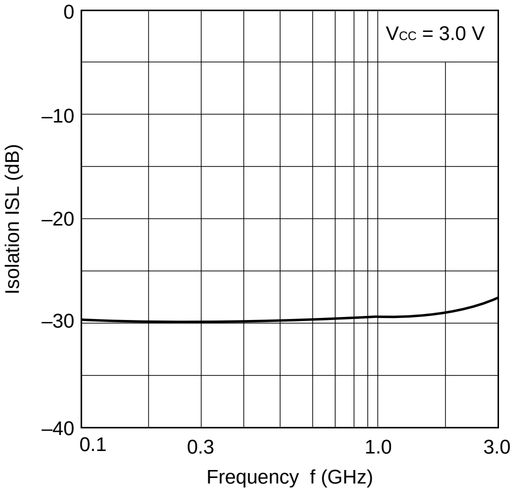
NOISE FIGURE AND INSERTION POWER GAIN vs. FREQUENCY



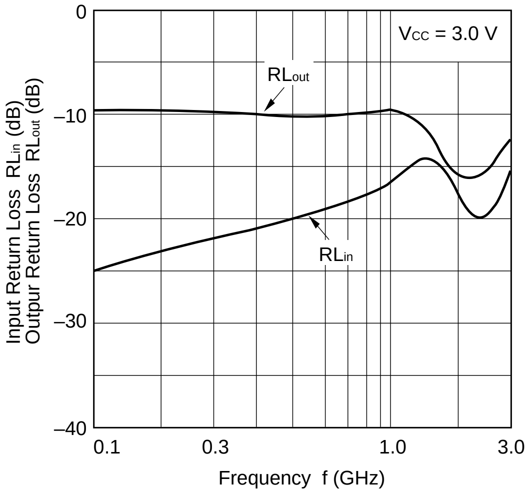
INSERTION POWER GAIN vs. FREQUENCY



ISOLATION vs. FREQUENCY

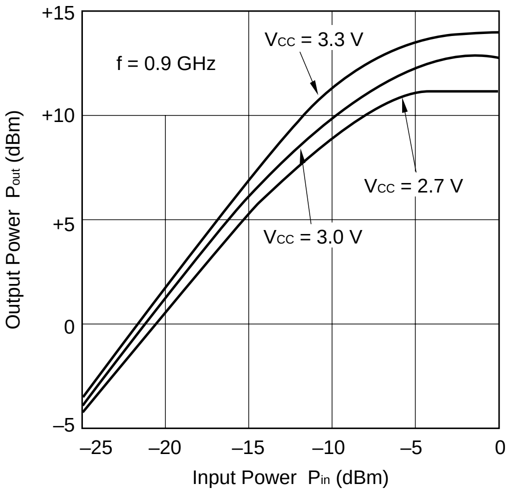


INPUT RETURN LOSS, OUTPUT RETURN LOSS vs. FREQUENCY

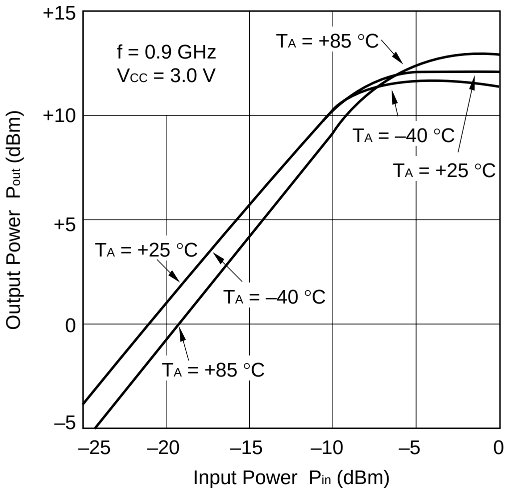


– μPC2771TB –

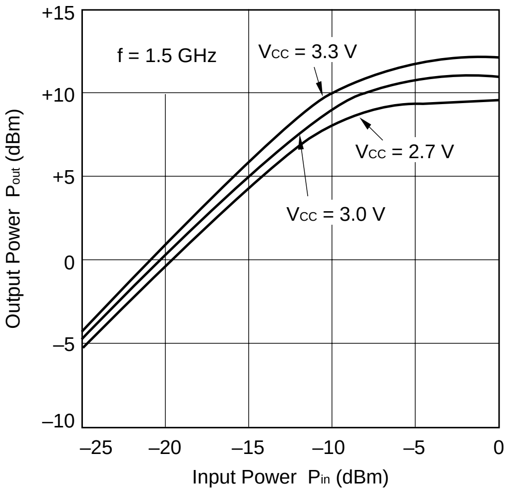
OUTPUT POWER vs. INPUT POWER



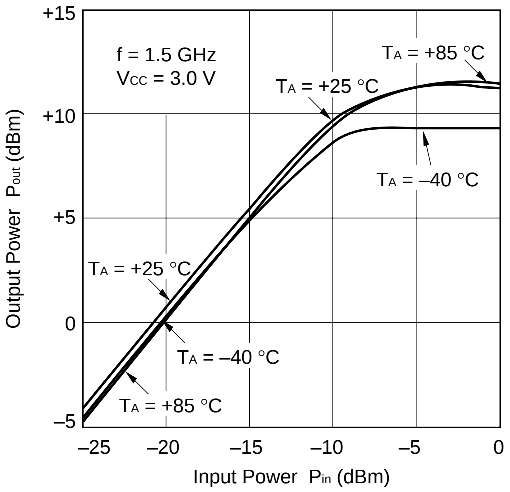
OUTPUT POWER vs. INPUT POWER



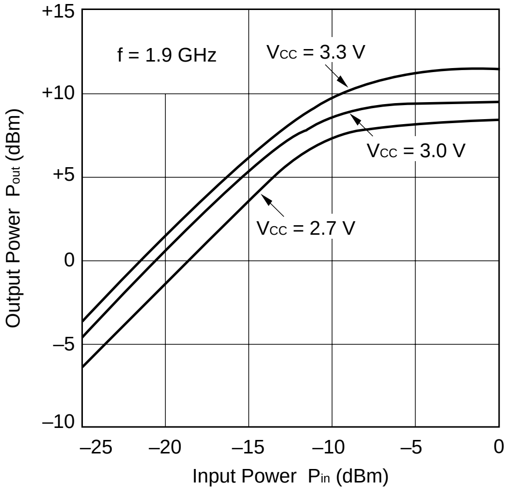
OUTPUT POWER vs. INPUT POWER



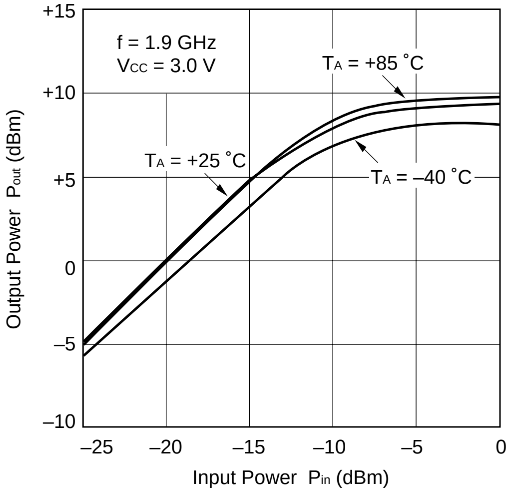
OUTPUT POWER vs. INPUT POWER



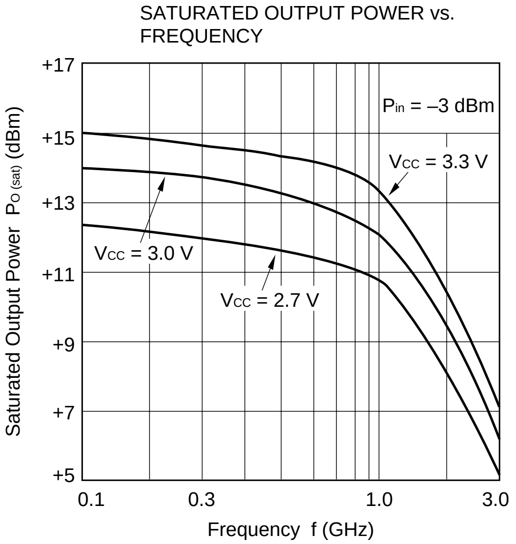
OUTPUT POWER vs. INPUT POWER

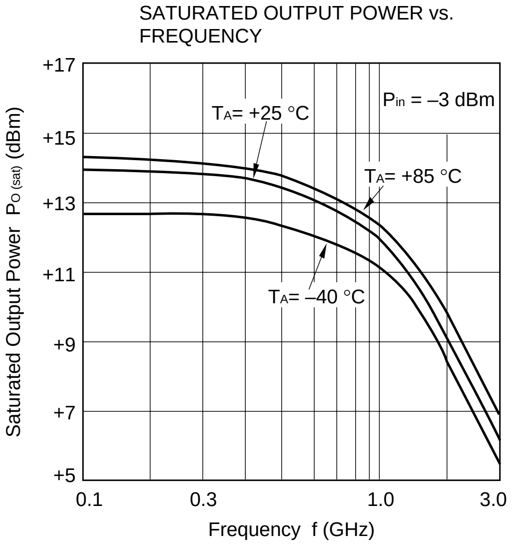


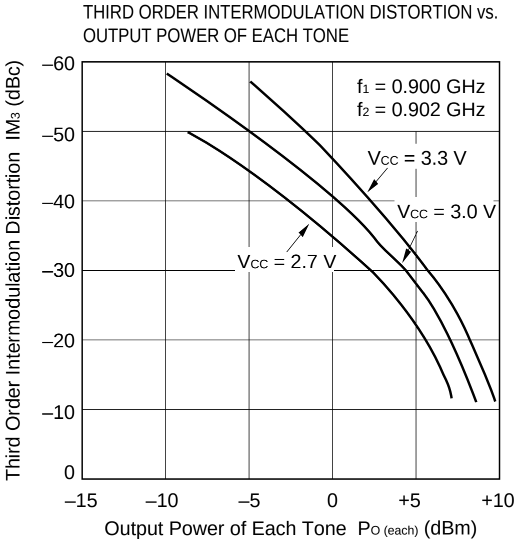
OUTPUT POWER vs. INPUT POWER

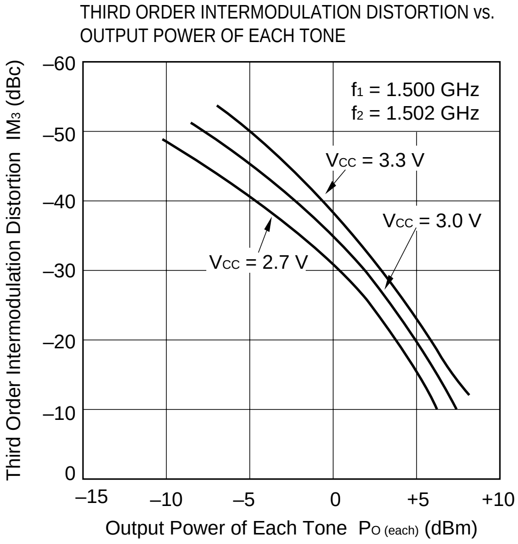


– μPC2771TB –


SATURATED OUTPUT POWER vs.
FREQUENCY
Saturated Output Power $P_{O\,(sat)}$ (dBm)
+17
+15
+13
+11
+9
+7
+5
0.1
0.3
1.0
3.0
Frequency f (GHz)
P_{in} = –3 dBm
V_{CC} = 3.3 V
V_{CC} = 3.0 V
V_{CC} = 2.7 V


SATURATED OUTPUT POWER vs.
FREQUENCY
Saturated Output Power $P_{O\,(sat)}$ (dBm)
+17
+15
+13
+11
+9
+7
+5
0.1
0.3
1.0
3.0
Frequency f (GHz)
P_{in} = –3 dBm
T_A= +25 °C
T_A= +85 °C
T_A= –40 °C

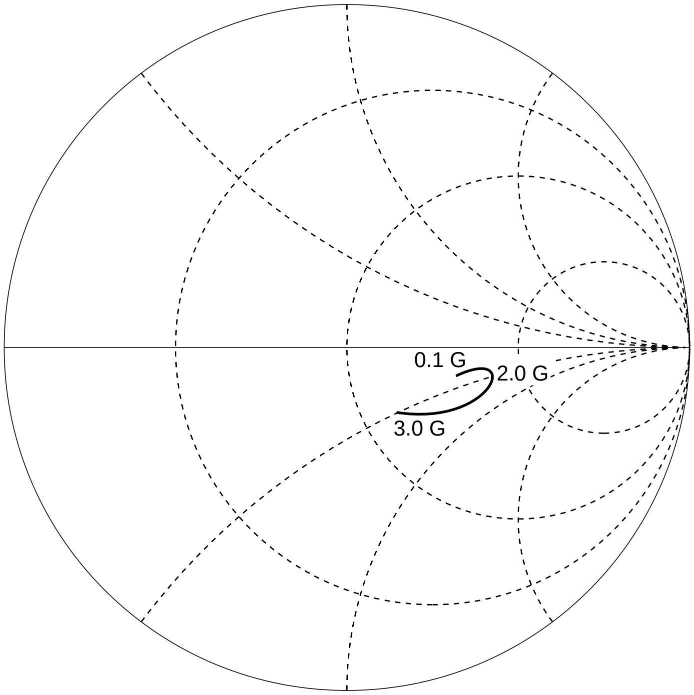

THIRD ORDER INTERMODULATION DISTORTION vs.
OUTPUT POWER OF EACH TONE
Third Order Intermodulation Distortion IM_3 (dBc)
–60
–50
–40
–30
–20
–10
0
–15
–10
–5
0
+5
+10
Output Power of Each Tone $P_{O\,(each)}$ (dBm)
f_1 = 0.900 GHz
f_2 = 0.902 GHz
V_{CC} = 3.3 V
V_{CC} = 3.0 V
V_{CC} = 2.7 V


THIRD ORDER INTERMODULATION DISTORTION vs.
OUTPUT POWER OF EACH TONE
Third Order Intermodulation Distortion IM_3 (dBc)
–60
–50
–40
–30
–20
–10
0
–15
–10
–5
0
+5
+10
Output Power of Each Tone $P_{O\,(each)}$ (dBm)
f_1 = 1.500 GHz
f_2 = 1.502 GHz
V_{CC} = 3.3 V
V_{CC} = 3.0 V
V_{CC} = 2.7 V

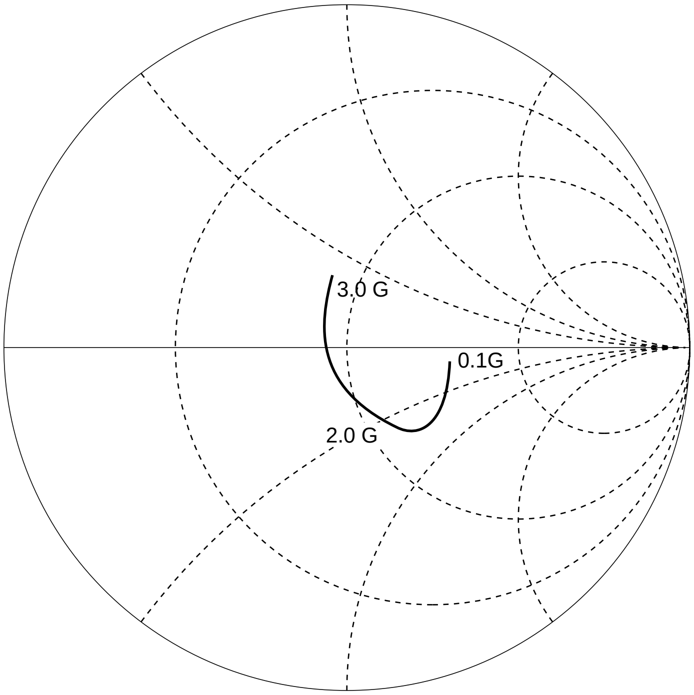
★ **S-PARAMETER (T$_A$ = +25 °C, V$_{CC}$ = V$_{out}$ = 3.0 V)**

– µPC2771TB –

S$_{11}$-FREQUENCY



S$_{22}$-FREQUENCY



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

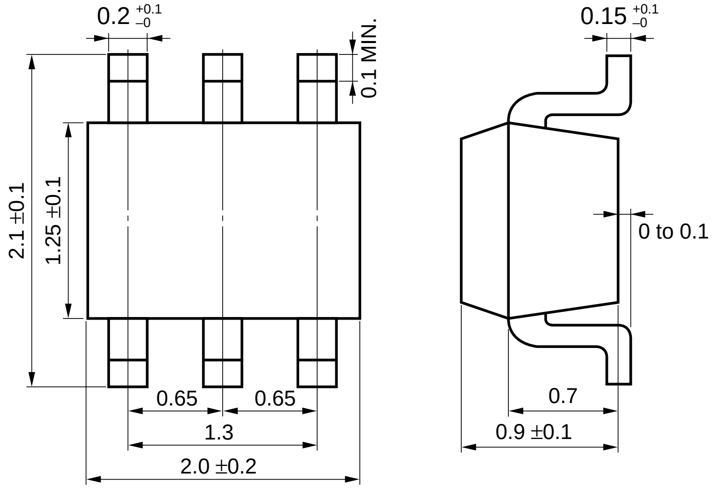
μPC2771TB

$V_{CC} = V_{out} = 3.0$ V, $I_{CC} = 35$ mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K
MHz	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	MAG.	ANG.	
100.0000	0.045	19.7	10.570	–4.7	0.028	0.8	0.327	–6.2	1.65
200.0000	0.057	37.0	10.638	–9.5	0.028	5.0	0.325	–11.5	1.63
300.0000	0.075	41.3	10.775	–14.1	0.029	8.6	0.323	–16.2	1.58
400.0000	0.090	43.3	11.004	–19.4	0.030	11.1	0.326	–20.9	1.49
500.0000	0.105	42.2	11.275	–24.4	0.030	14.9	0.331	–26.4	1.45
600.0000	0.118	40.2	11.586	–30.0	0.031	15.8	0.342	–32.0	1.37
700.0000	0.138	34.9	12.041	–35.9	0.031	19.8	0.350	–37.3	1.29
800.0000	0.163	32.5	12.367	–42.1	0.032	20.1	0.359	–42.8	1.20
900.0000	0.186	29.4	12.844	–48.8	0.032	23.2	0.361	–49.4	1.15
1000.0000	0.202	26.3	13.300	–56.6	0.032	23.9	0.371	–56.1	1.11
1100.0000	0.219	21.7	13.771	–64.6	0.033	24.9	0.389	–62.5	1.03
1200.0000	0.233	15.4	14.082	–73.5	0.033	26.6	0.400	–69.3	0.99
1300.0000	0.252	8.4	14.365	–83.2	0.036	28.8	0.405	–75.4	0.92
1400.0000	0.267	–0.1	14.336	–92.6	0.036	30.0	0.402	–83.6	0.91
1500.0000	0.285	–6.8	14.142	–102.4	0.036	32.0	0.406	–91.6	0.90
1600.0000	0.293	–13.9	13.929	–112.0	0.037	31.6	0.413	–99.3	0.89
1700.0000	0.304	–20.9	13.428	–121.6	0.039	32.5	0.414	–105.8	0.88
1800.0000	0.290	–28.1	12.722	–131.0	0.038	34.7	0.401	–113.7	0.96
1900.0000	0.285	–35.3	11.966	–139.6	0.038	36.1	0.387	–120.8	1.03
2000.0000	0.273	–41.8	11.232	–147.5	0.038	37.4	0.378	–127.6	1.09
2100.0000	0.267	–47.4	10.500	–154.8	0.039	39.1	0.366	–133.1	1.14
2200.0000	0.254	–51.6	9.815	–161.7	0.040	41.4	0.356	–138.0	1.20
2300.0000	0.237	–57.1	9.168	–168.0	0.041	43.7	0.342	–142.8	1.28
2400.0000	0.221	–61.1	8.570	–173.7	0.041	48.3	0.325	–148.3	1.37
2500.0000	0.212	–68.8	7.967	–179.7	0.042	48.3	0.322	–152.6	1.44
2600.0000	0.208	–72.2	7.507	174.9	0.043	50.8	0.314	–156.7	1.49
2700.0000	0.202	–74.1	7.004	170.0	0.045	53.7	0.309	–160.1	1.53
2800.0000	0.190	–76.3	6.667	164.7	0.047	54.2	0.303	–164.0	1.56
2900.0000	0.178	–76.7	6.336	160.7	0.051	57.7	0.292	–167.8	1.55
3000.0000	0.154	–82.3	6.003	155.6	0.051	56.5	0.287	–172.8	1.62
3100.0000	0.147	–88.0	5.772	151.3	0.054	59.3	0.279	–176.4	1.61

PACKAGE DIMENSIONS

6 pin super 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 the V_{CC} pin.
(4) The inductor must be attached between V_{CC} and output pins. The inductance value should be determined in accordance with desired frequency.
(5) The DC cut 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.

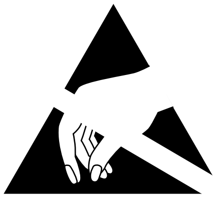
Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared Reflow	Package peak temperature: 235 °C or below Time: 30 seconds or less (at 210 °C) Count: 3, Exposure limit: None[Note]	IR35-00-3
VPS	Package peak temperature: 215 °C or below Time: 40 seconds or less (at 200 °C) Count: 3, 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).

[MEMO]



ATTENTION

OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

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  "Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.
  Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots
  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)
  Specific: Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.
  The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

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