

To all our customers

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The semiconductor operations of Mitsubishi Electric and Hitachi were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Hitachi, Hitachi, Ltd., Hitachi Semiconductors, and other Hitachi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

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Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

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Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

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PF08109B

MOS FET Power Amplifier Module
for E-GSM and DCS1800 Dual Band Handy Phone



ADE-208-821C (Z)

Rev.3
Feb. 2001

Application

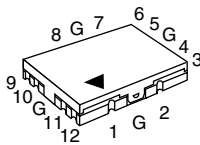
- Dual band Amplifier for E-GSM (880 MHz to 915 MHz) and DCS1800 (1710 MHz to 1785 MHz)
- For 3.5 V nominal battery use

Features

- 2 in / 2 out dual band amplifire
- Simple external circuit including output matching circuit
- High gain 3stage amplifier : 0 dBm input Typ
- Lead less thin & Small package : $11 \times 13.75 \times 1.8$ mm Typ
- High efficiency : 50% Typ at nominal output power for E-GSM
43% Typ at 32.7 dBm for DCS1800

Pin Arrangement

• RF-O-12



1: N/C
2: N/C
3: Pout_{DCS}
4: Vdd_{DCS}
5: Vdd_{GSM}
6: Pout_{GSM}
7: N/C
8: Vtxlo
9: Pin_{GSM}
10: Vapc_{GSM}
11: Vapc_{DCS}
12: Pin_{DCS}
G: GND

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Absolute Maximum Ratings

(T_c = 25°C)

Item	Symbol	Rating	Unit
Supply voltage	V _{dd}	8	V
Supply current	I _{dd} _{GSM}	3	A
	I _{dd} _{DCS}	2	A
V _{txlo} voltage	V _{txlo}	4	V
V _{apc} voltage	V _{apc}	4	V
Input power	P _{in}	10	dBm
Operating case temperature	T _c (op)	−30 to +100	°C
Storage temperature	T _{stg}	−30 to +100	°C
Output power	P _{out} GSM	5	W
	P _{out} DCS	3	W

Note: The maximum ratings shall be valid over both the E-GSM-band (880 MHz to 915 MHz), and the DCS1800-band (1710 MHz to 1785 MHz).

Electrical Characteristics for DC

(T_c = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Drain cutoff current	I _{ds}	—	—	100	μA	V _{dd} = 8 V, V _{apc} = 0 V
V _{apc} control current	I _{apc}	—	—	3	mA	V _{apc} = 2.2 V
V _{txlo} control current	I _{txlo}	—	—	100	μA	V _{txlo} = 2.4 V

Electrical Characteristics for E-GSM mode

(Tc = 25°C)

Test conditions unless otherwise noted:

f = 880 to 915 MHz, Vdd_{GSM} = 3.5 V, Pin_{GSM} = 0 dBm, Rg = Rl = 50 Ω, Tc = 25°C, Vapc_{DCS} = 0.1 V

Pulse operation with pulse width 577 μs and duty cycle 1:8 shall be used.

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Frequency range	f	880	—	915	MHz	
Total efficiency (Hi)	$\eta_{T(Hi)}$	41	50	—	%	Pout _{GSM} = 35.5dBm, Vtxlo = 0.1V, Vapc _{GSM} = controlled
2nd harmonic distortion	2nd H.D.	—	−45	−38	dBc	
3rd harmonic distortion	3rd H.D.	—	−45	−40	dBc	
Input VSWR	VSWR (in)	—	1.5	3	—	
Total efficiency (Lo)	$\eta_{T(Lo)}$	27	35	—	%	Pout _{GSM} = 30.8dBm, Vtxlo = 2.4V, Vapc _{GSM} = controlled
Output power (1)(Hi)	Pout (1)(Hi)	35.5	36.0	—	dBm	Vapc _{GSM} = 2.2V, Vtxlo = 0.1V
Output power (1)(Lo)	Pout (1)(Lo)	30.8	31.3	—	dBm	Vapc _{GSM} = 2.2V, Vtxlo = 2.4V
Output power (2)(Hi)	Pout (2)(Hi)	33.5	34.0	—	dBm	Vdd _{GSM} = 3.0V, Vapc _{GSM} = 2.2V, Tc = +85°C, Vtxlo = 0.1V
Output power (2)(Lo)	Pout (2)(Lo)	28.8	29.3	—	dBm	Vdd _{GSM} = 3.0V, Vapc _{GSM} = 2.2V, Tc = +85°C, Vtxlo = 2.4V
Isolation	—	—	−42	−36	dBm	Vapc _{GSM} = 0.2V, Vtxlo = 0.1V
Isolation at DCS RF-output when GSM is active	—	—	−23	−17	dBm	Pout _{GSM} = 35.5dBm, Vtxlo = 0.1V Measured at f = 1760 to 1830MHz
Switching time	t _r , t _f	—	1	2	μs	Pout _{GSM} = 0 to 35.5dBm, Vtxlo = 0.1V
Stability	—	No parasitic oscillation			—	Vdd _{GSM} = 3.0 to 5.1V, Pout _{GSM} ≤ 35.5dBm, Vtxlo = 0.1, 2.4V, Vapc _{GSM} ≤ 2.2V, GSMpulse. Rg = 50Ω, Output VSWR = 6 : 1 All phases
Load VSWR tolerance	—	No degradation			—	Vdd _{GSM} = 3.0 to 5.1V, t = 20sec., Pout _{GSM} ≤ 35.5dBm, Vtxlo = 0.1, 2.4V, Vapc _{GSM} ≤ 2.2V, GSM pulse. Rg = 50Ω, Output VSWR = 10 : 1 All phases

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Electrical Characteristics for DCS1800 mode

(Tc = 25°C)

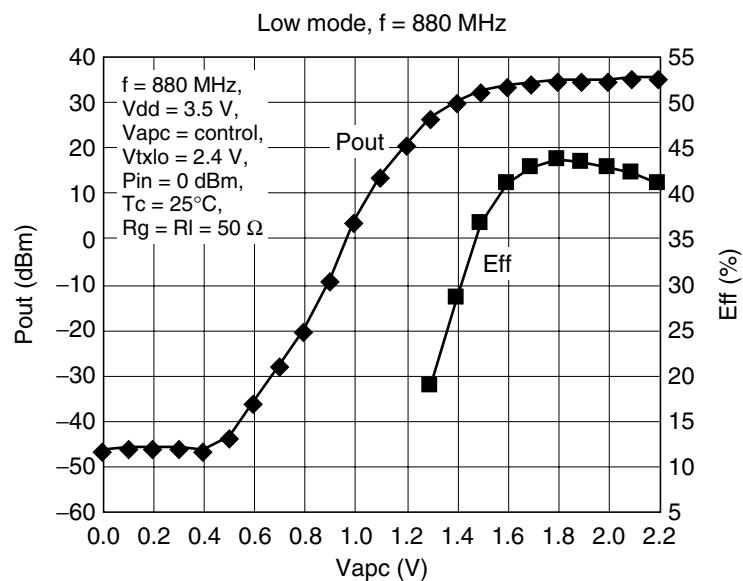
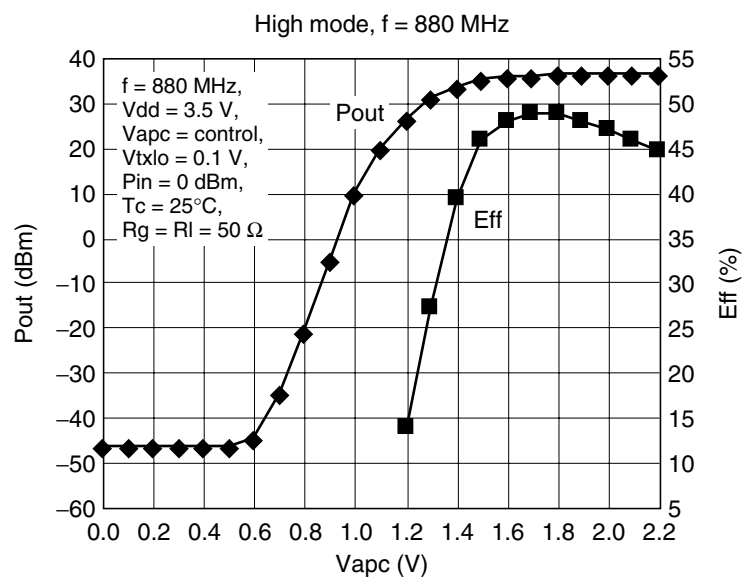
Test conditions unless otherwise noted:

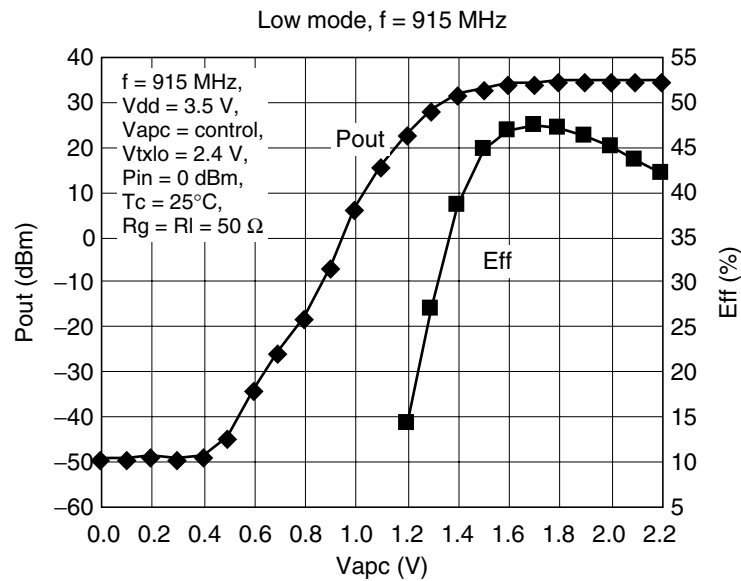
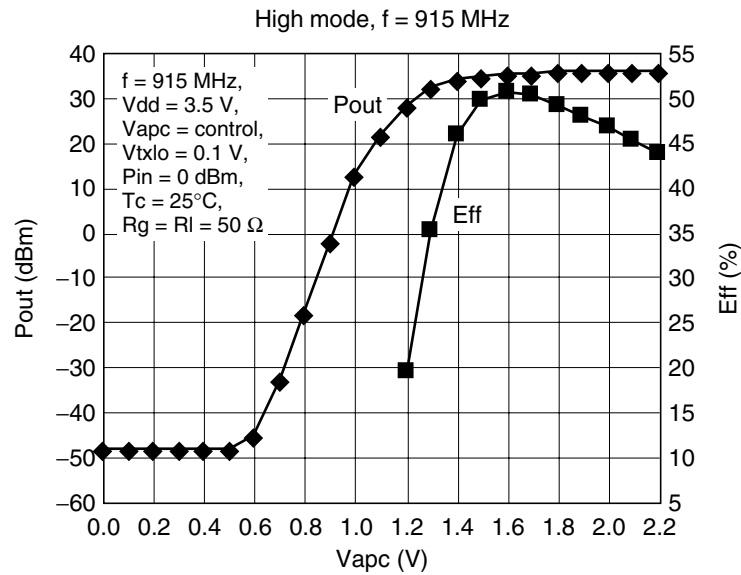
f = 1710 to 1785 MHz, Vdd_{DCS} = 3.5 V, Pin_{DCS} = 0 dBm, Rg = Rl = 50 Ω, Tc = 25°C, Vapc_{GSM} = 0.1 V

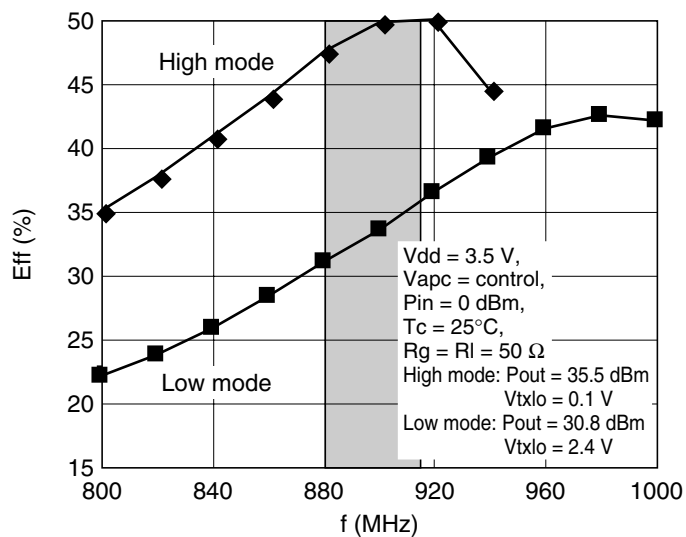
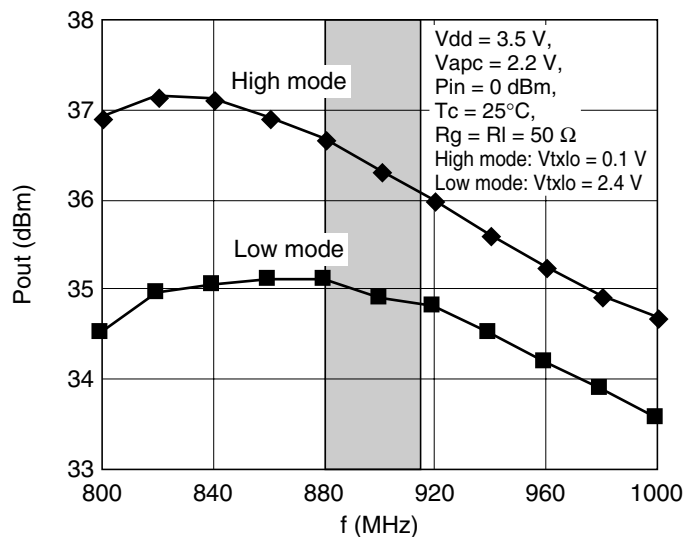
Pulse operation with pulse width 577 μs and duty cycle 1:8 shall be used.

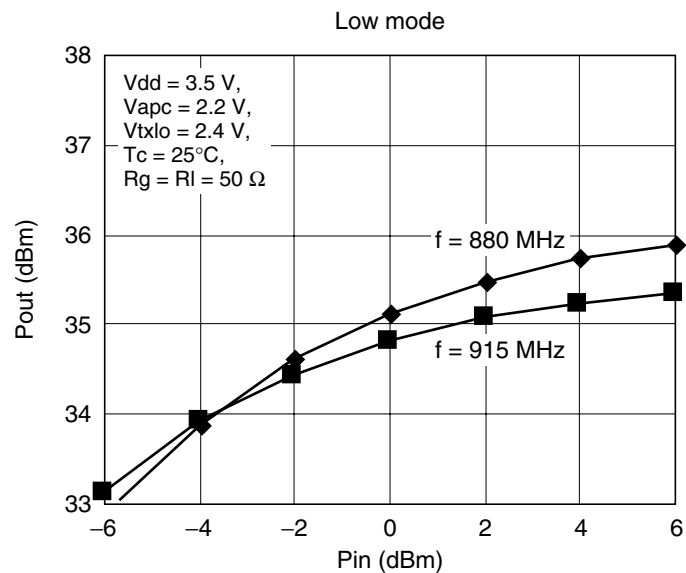
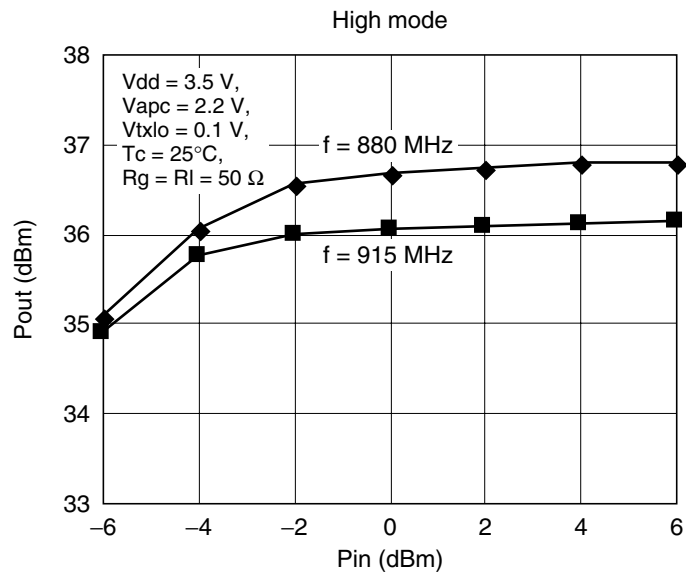
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Frequency range	f	1710	—	1785	MHz	
Total efficiency (Hi)	$\eta_{T(Hi)}$	36	43	—	%	Pout _{DCS} = 32.7dBm, Vapc _{DCS} = controlled
2nd harmonic distortion	2nd H.D.	—	-45	-38	dBc	
3rd harmonic distortion	3rd H.D.	—	-45	-40	dBc	
Input VSWR	VSWR (in)	—	1.5	3	—	
Total efficiency (Lo)	$\eta_{T(Lo)}$	17	25	—	%	Pout _{DCS} = 26.7dBm, Vapc _{DCS} = controlled
Output power (1)	Pout (1)	32.7	33.2	—	dBm	Vapc _{DCS} = 2.2V,
Output power (2)	Pout (2)	30.7	31.2	—	dBm	Vdd _{DCS} = 3.0V, Vapc _{DCS} = 2.2V, Tc = +85°C
Isolation	—	—	-42	-36	dBm	Vapc _{DCS} = 0.2V
Isolation at GSM RF-output when DCS is active	—	—	-10	0	dBm	Pout _{DCS} = 32.7dBm, Measured at f = 1710 to 1785MHz
Switching time	t _r , t _f	—	1	2	μs	Pout _{DCS} = 0 to 32.7dBm
Stability	—	No parasitic oscillation			—	Vdd _{DCS} = 3.0 to 5.1V, Pout _{DCS} ≤ 32.7dBm, Vapc _{DCS} ≤ 2.2V, DCS pulse. Rg = 50Ω, Output VSWR = 6 : 1 All phases
Load VSWR tolerance	—	No degradation			—	Vdd _{DCS} = 3.0 to 5.1V, Pout _{DCS} ≤ 32.7dBm, t = 20sec., Vapc _{DCS} ≤ 2.2V, DCS pulse. Rg = 50Ω, Output VSWR = 10 : 1 All phases

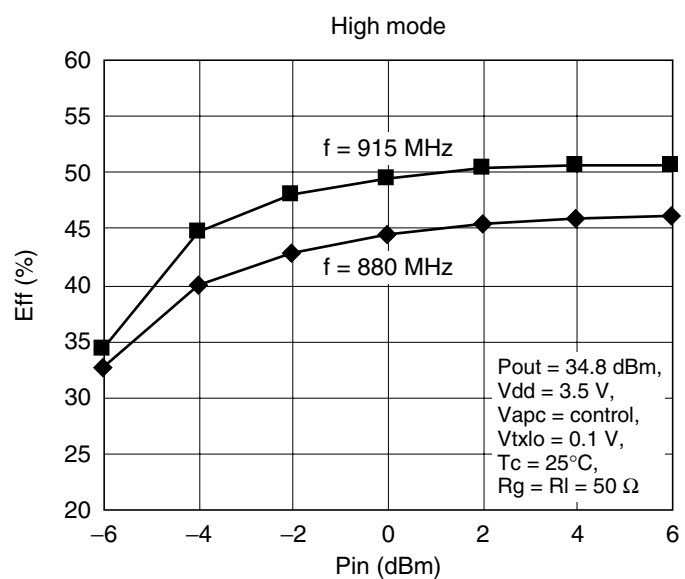
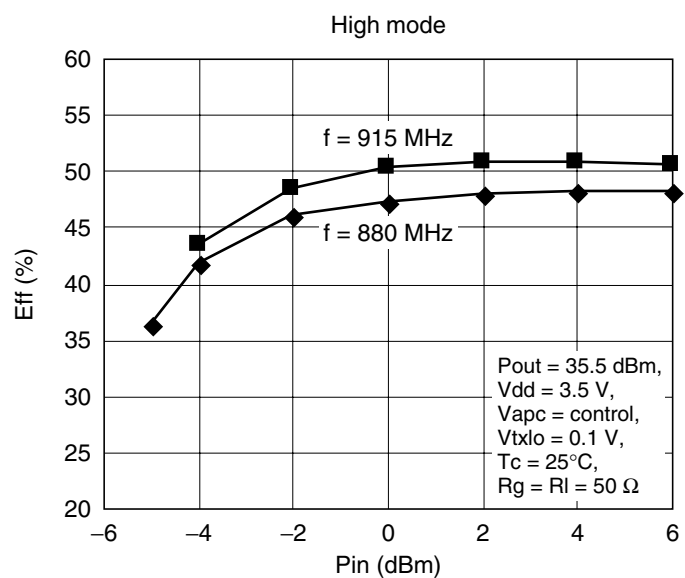
Characteristic Curves

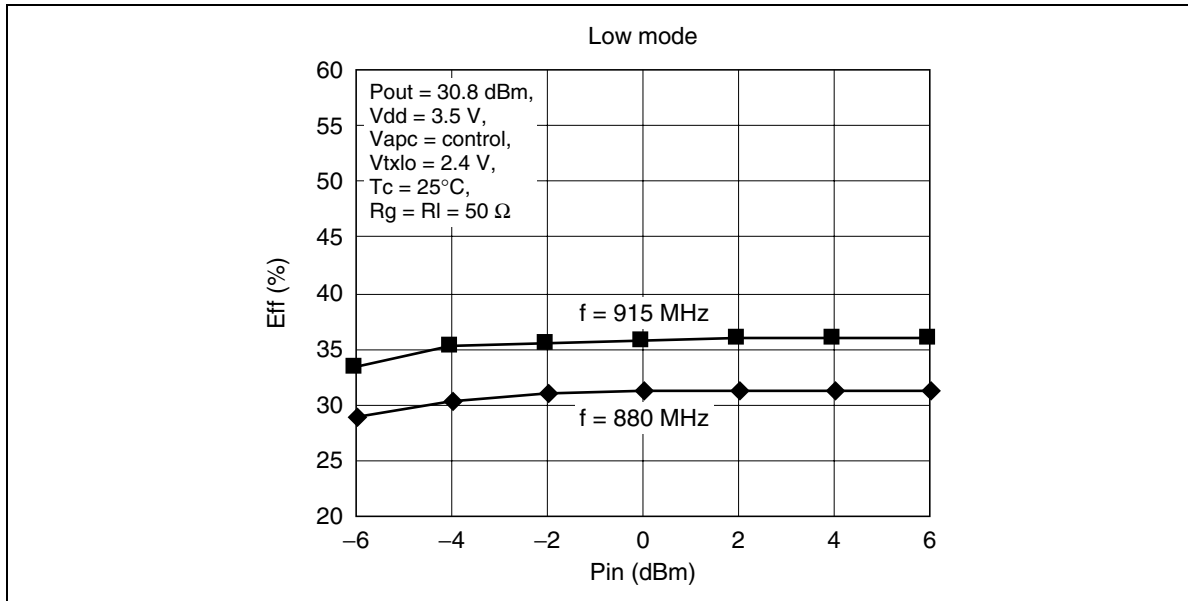


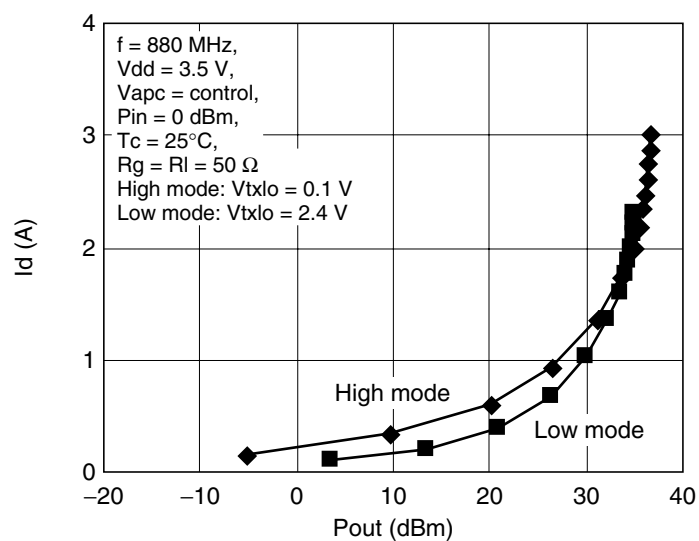
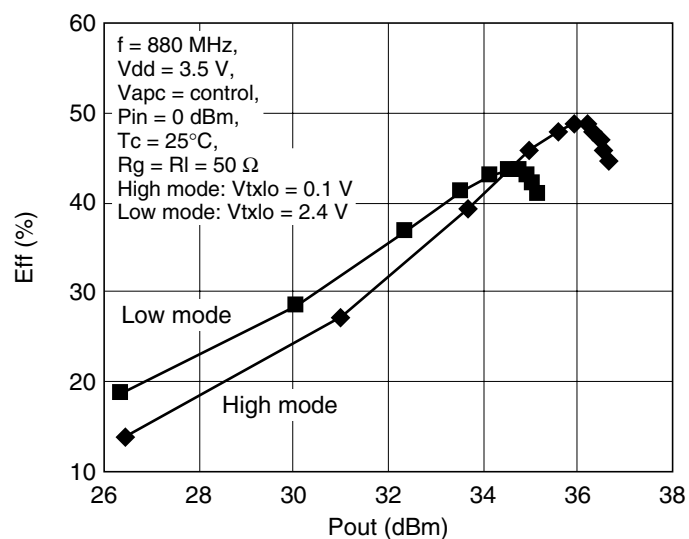


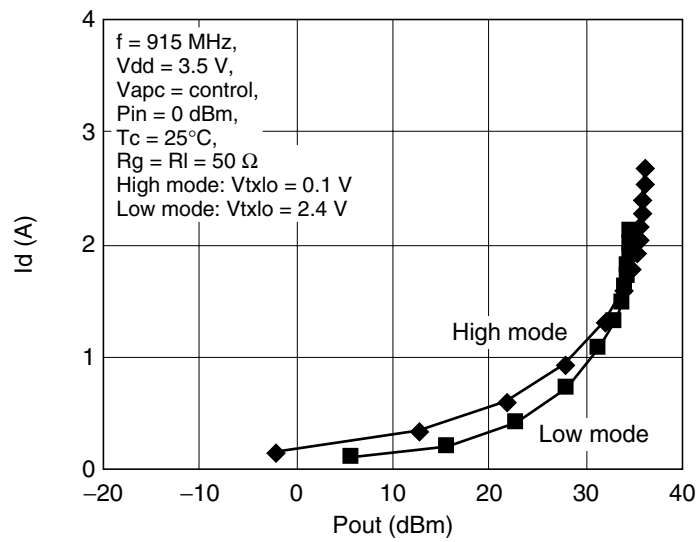
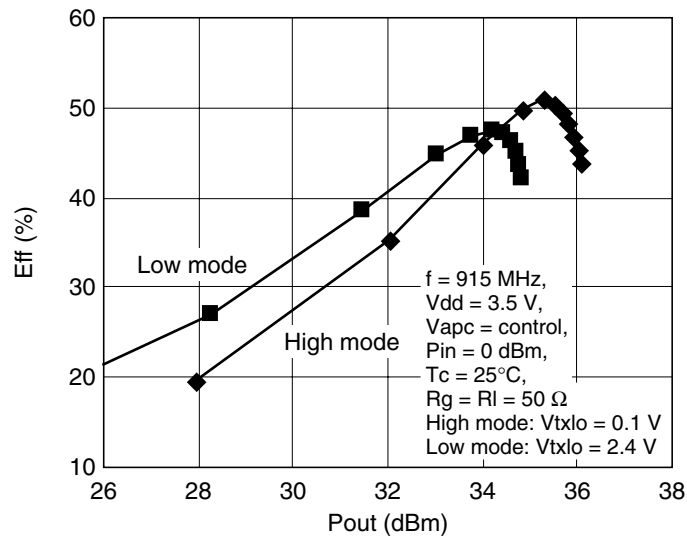


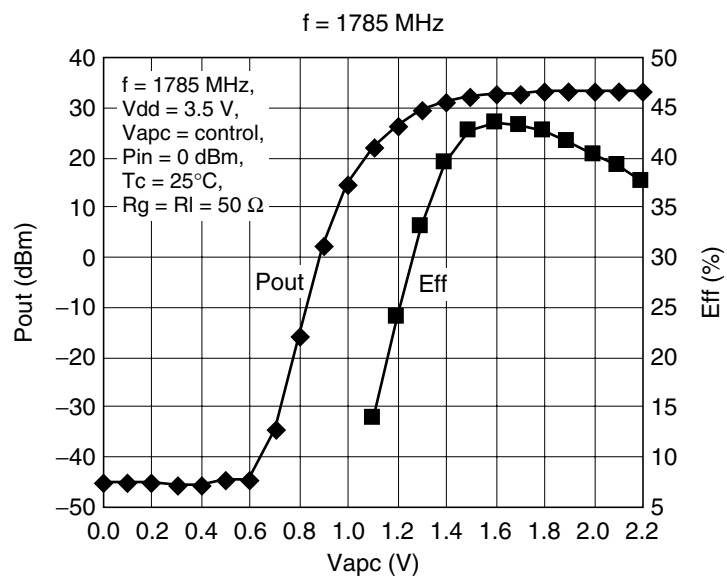
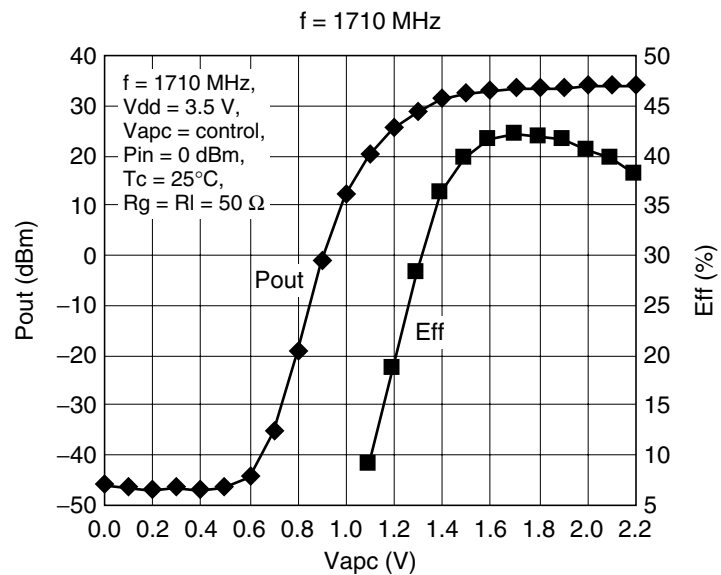


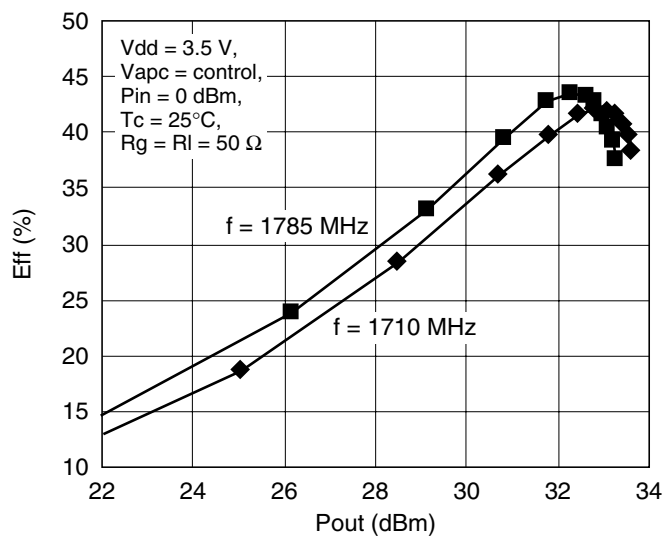


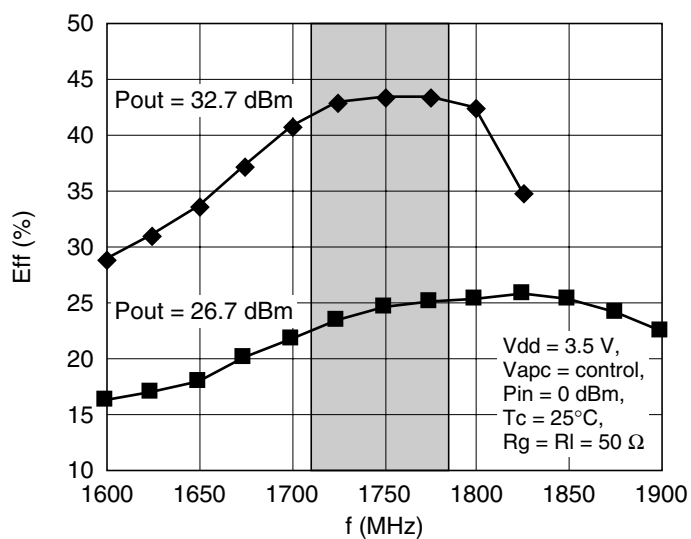
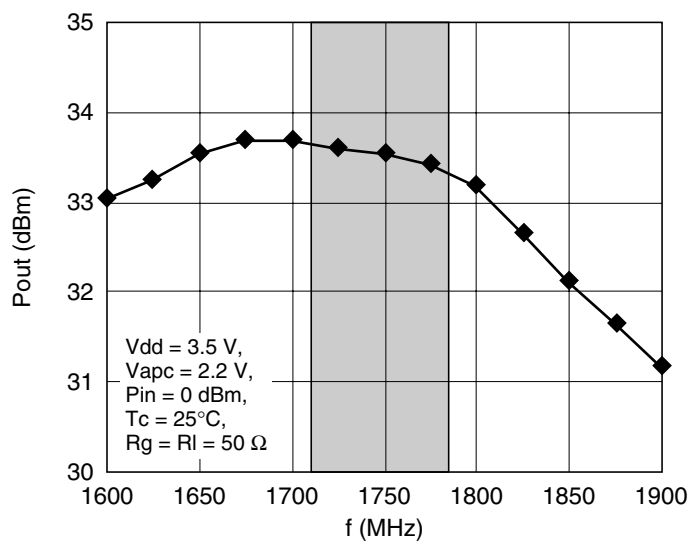


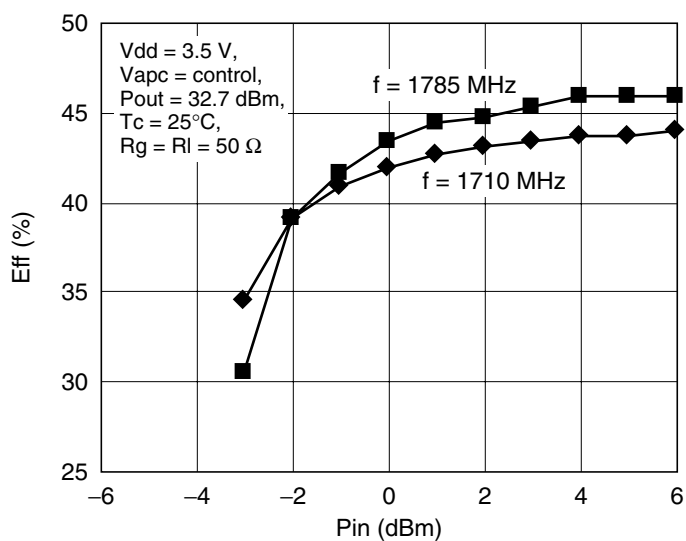
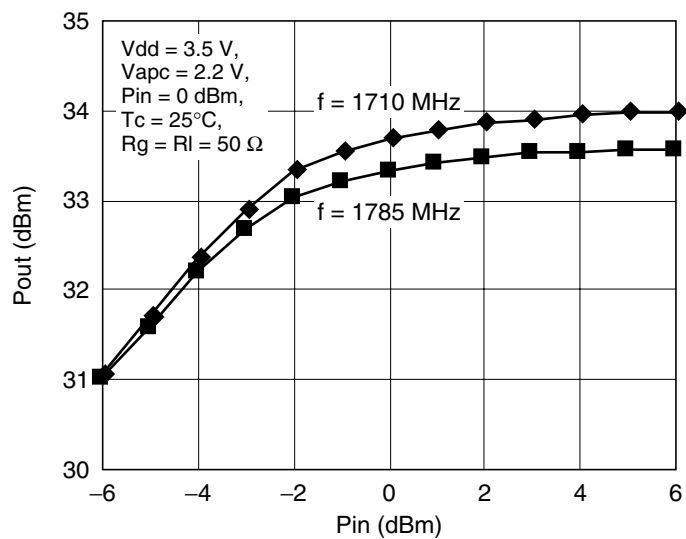


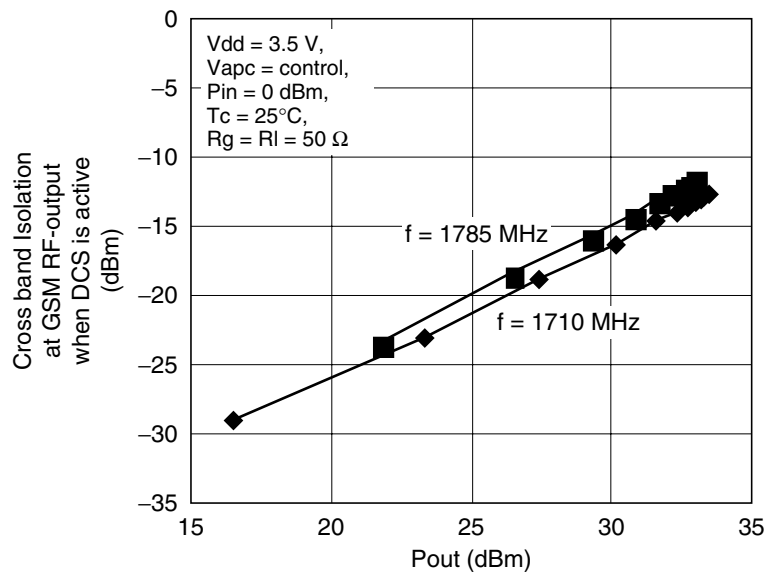
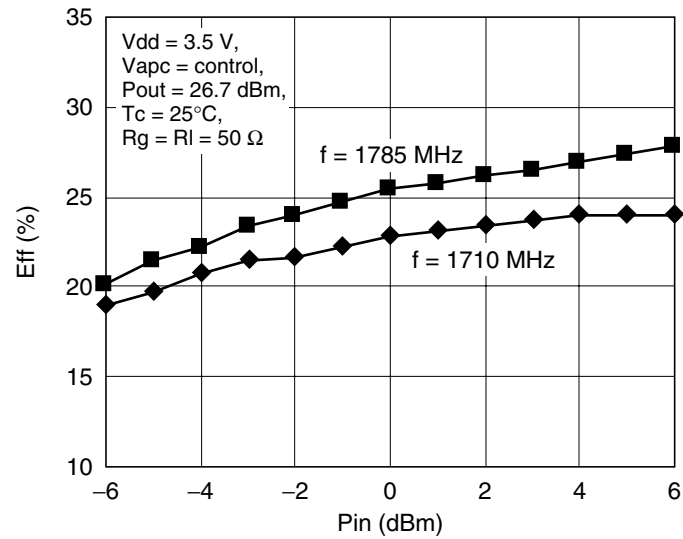


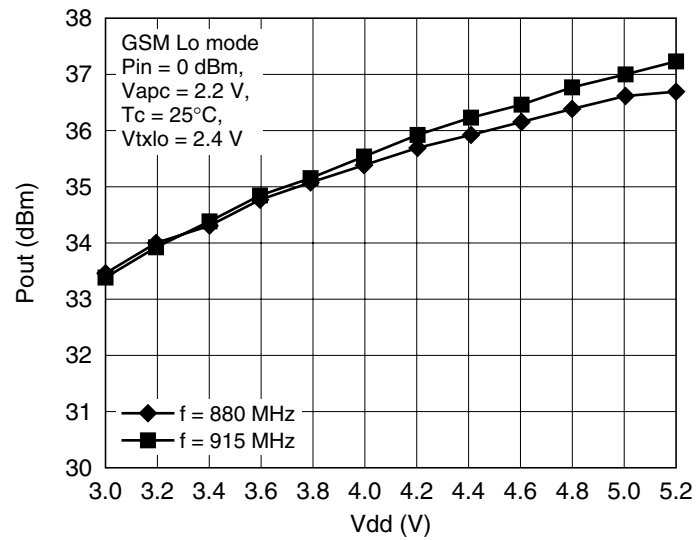
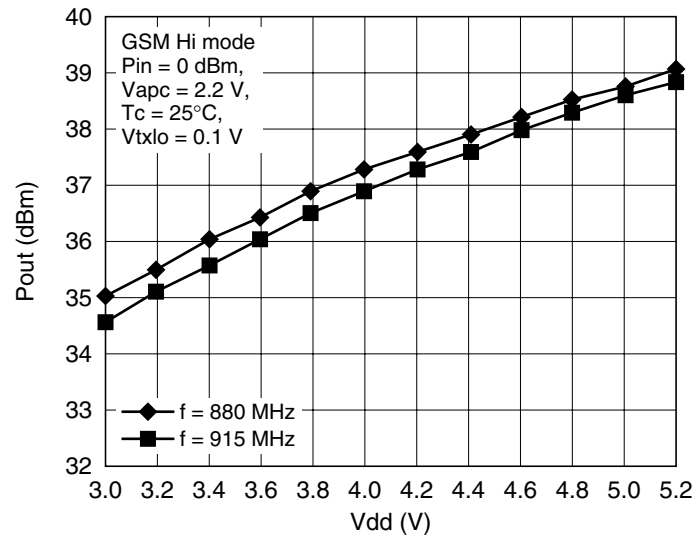


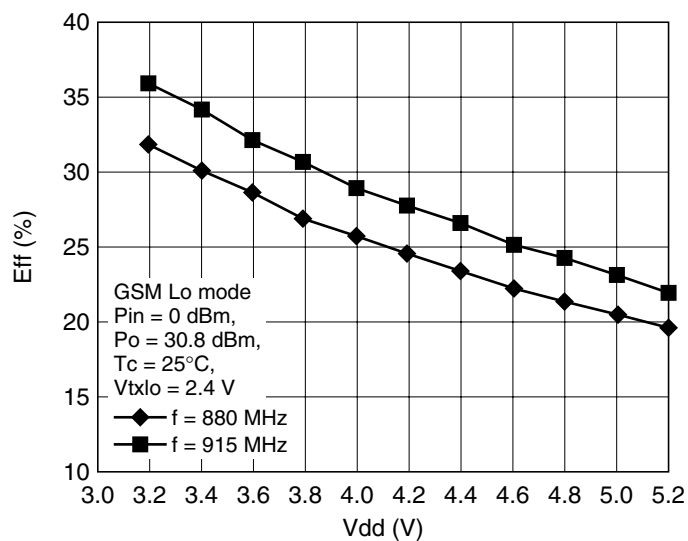
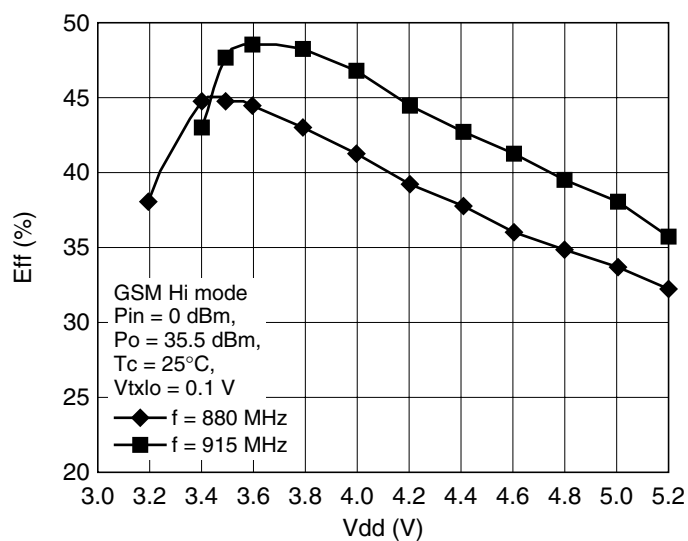


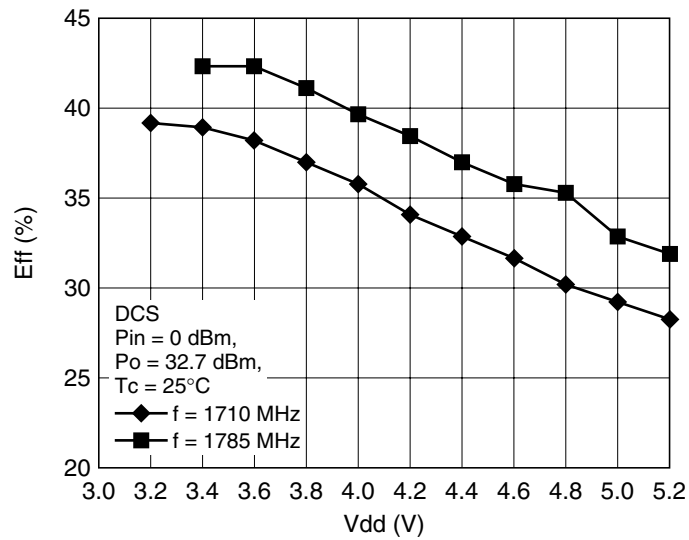
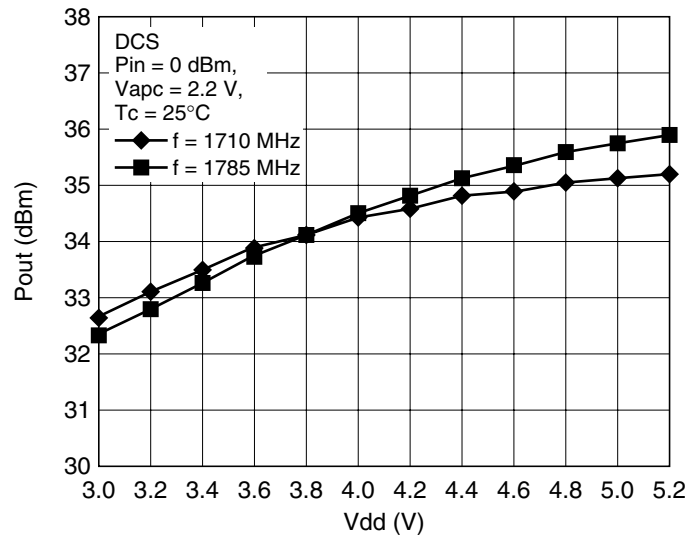


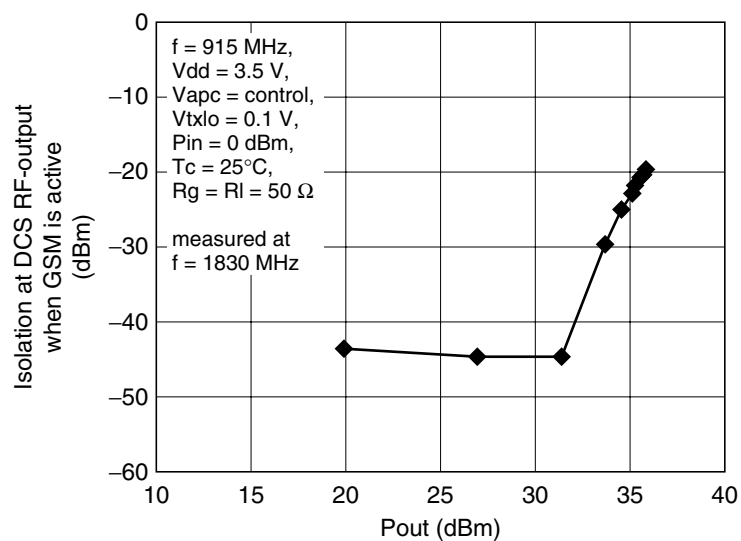
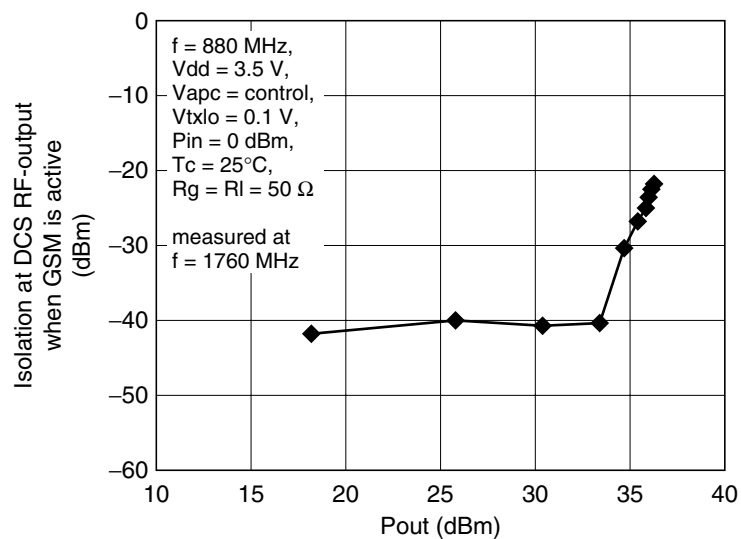








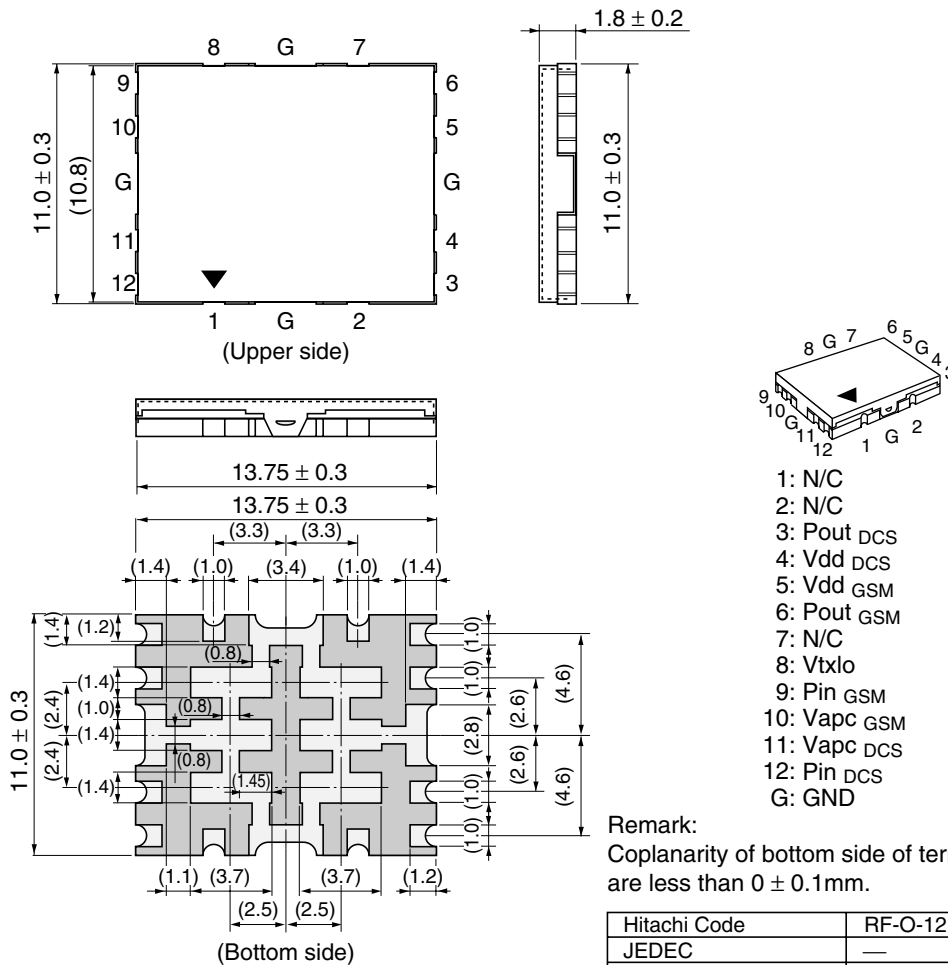




PF08109B

Package Dimensions

Unit: mm



Hitachi Code	RF-O-12
JEDEC	—
JEITA	—
Mass (reference value)	—

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