

PF08109B

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

HITACHI

ADE-208-821C (Z)
4th Edition
Feb. 2001

Application

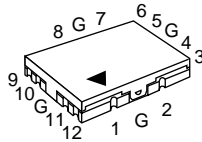
- Dual band Amplifier for E-GSM (880 MHz to 915 MHz) and DCS1800 (1710 MHz to 1785 MHz)
- For 3.5 V nominal battery use

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 × 13.75 × 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

Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

Item	Symbol	Rating	Unit
Supply voltage	Vdd	8	V
Supply current	I _{dd} _{GSM}	3	A
	I _{dd} _{DCS}	2	A
Vtxlo voltage	Vtxlo	4	V
Vapc voltage	Vapc	4	V
Input power	Pin	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 (Tc = 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
Vapc control current	I _{apc}	—	—	3	mA	V _{apc} = 2.2 V
Vtxlo 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, V_{dd GSM} = 3.5 V, Pin_{GSM} = 0 dBm, R_g = R_l = 50 Ω, Tc = 25°C, V_{apc 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)	η _{T(Hi)}	41	50	—	%	Pout _{GSM} = 35.5dBm, Vtxlo = 0.1V,
2nd harmonic distortion	2nd H.D.	—	-45	-38	dBc	Vapc _{GSM} = controlled
3rd harmonic distortion	3rd H.D.	—	-45	-40	dBc	
Input VSWR	VSWR (in)	—	1.5	3	—	
Total efficiency (Lo)	η _{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	V _{dd 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	V _{dd 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			—	V _{dd GSM} = 3.0 to 5.1V, Pout _{GSM} ≤ 35.5dBm, Vtxlo = 0.1, 2.4V, Vapc _{GSM} ≤ 2.2V, GSMpulse. R _g = 50Ω, Output VSWR = 6 : 1 All phases
Load VSWR tolerance	—	No degradation			—	V _{dd GSM} = 3.0 to 5.1V, t = 20sec., Pout _{GSM} ≤ 35.5dBm, Vtxlo = 0.1, 2.4V, Vapc _{GSM} ≤ 2.2V, GSM pulse. R _g = 50Ω, Output VSWR = 10 : 1 All phases

Electrical Characteristics for DCS1800 mode (Tc = 25°C)

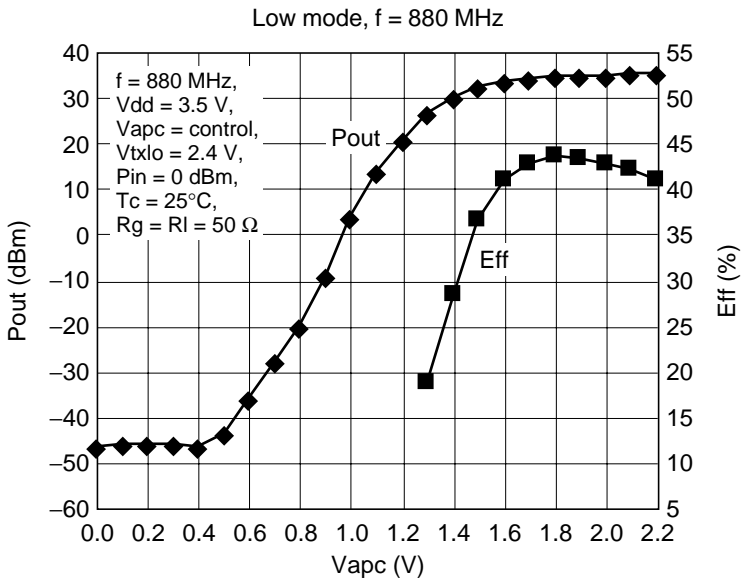
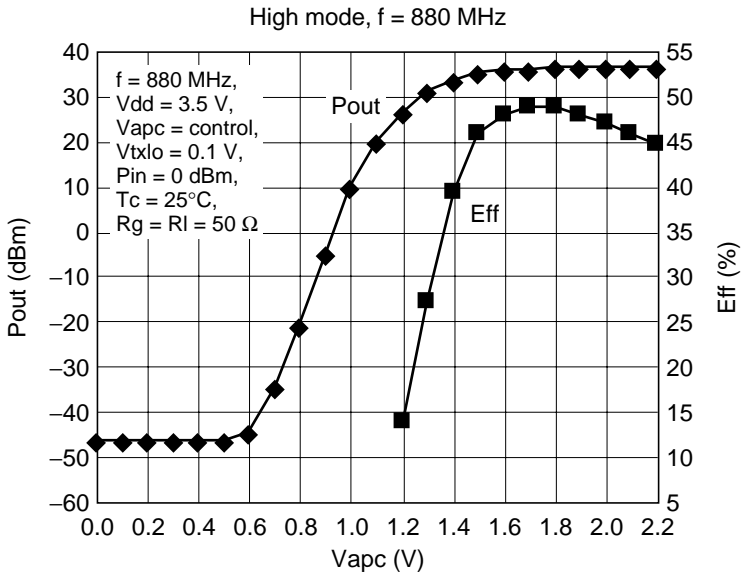
Test conditions unless otherwise noted:

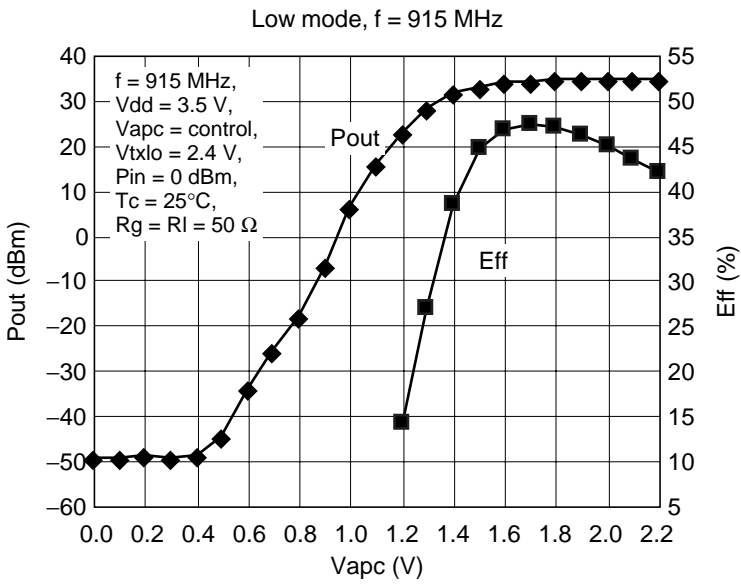
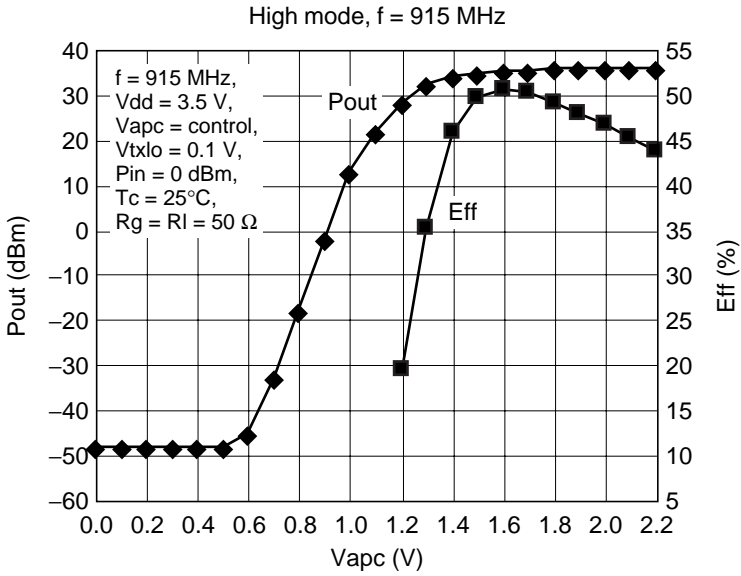
f = 1710 to 1785 MHz, Vdd_{DCS} = 3.5 V, Pin_{DCS} = 0 dBm, Rg = Rl = 50 Ω, Tc = 25°C, Vapc_{GSM} = 0.1 V

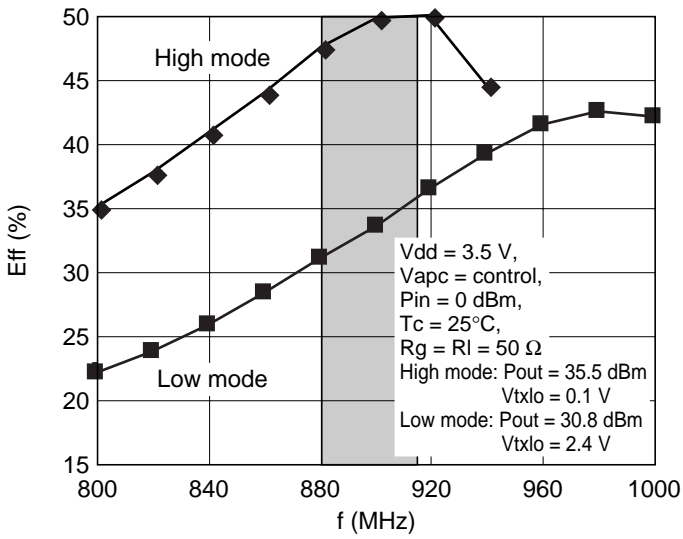
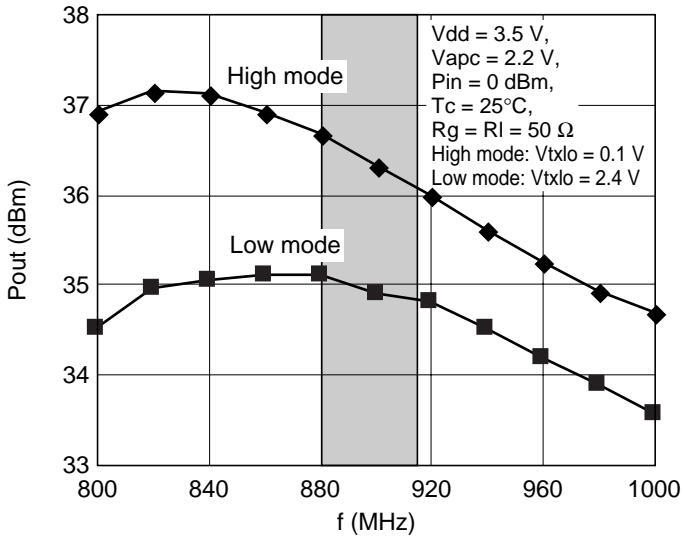
Pulse operation with pulse width 577 μs and duty cycle 1:8 shall be used.

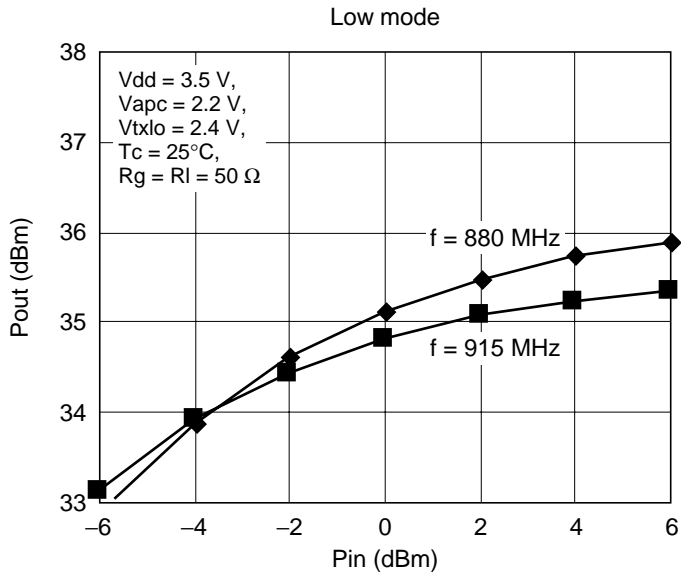
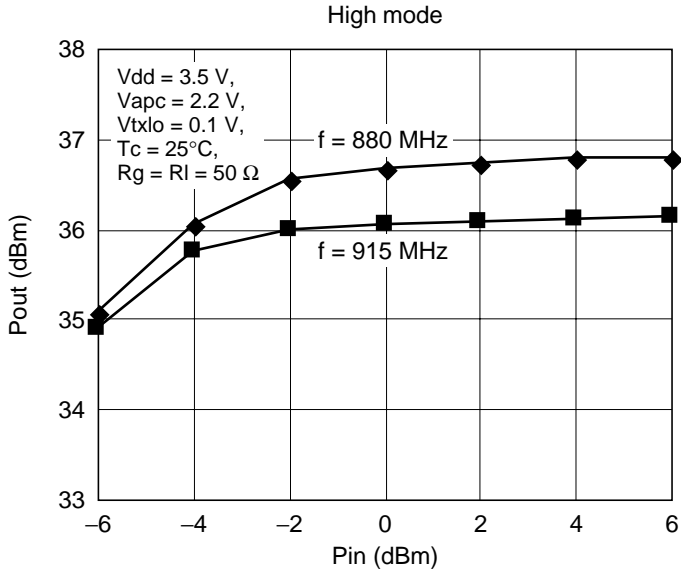
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Frequency range	f	1710	—	1785	MHz	
Total efficiency (Hi)	$\eta_{T(Hi)}$	36	43	—	%	Pout _{DCS} = 32.7dBm,
2nd harmonic distortion	2nd H.D.	—	-45	-38	dBc	Vapc _{DCS} = controlled
3rd harmonic distortion	3rd H.D.	—	-45	-40	dBc	
Input VSWR	VSWR (in)	—	1.5	3	—	
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

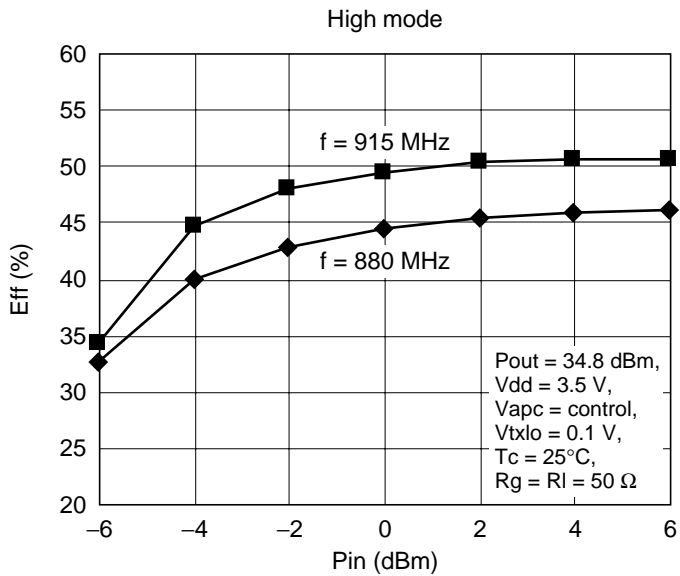
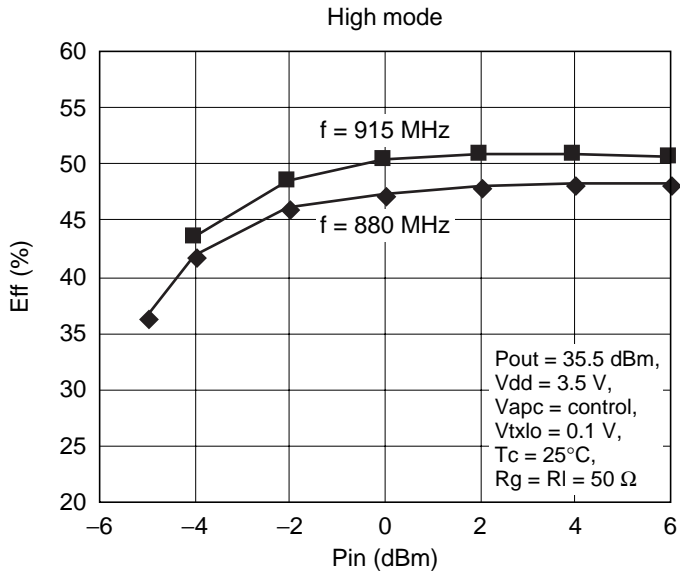
Characteristic Curves

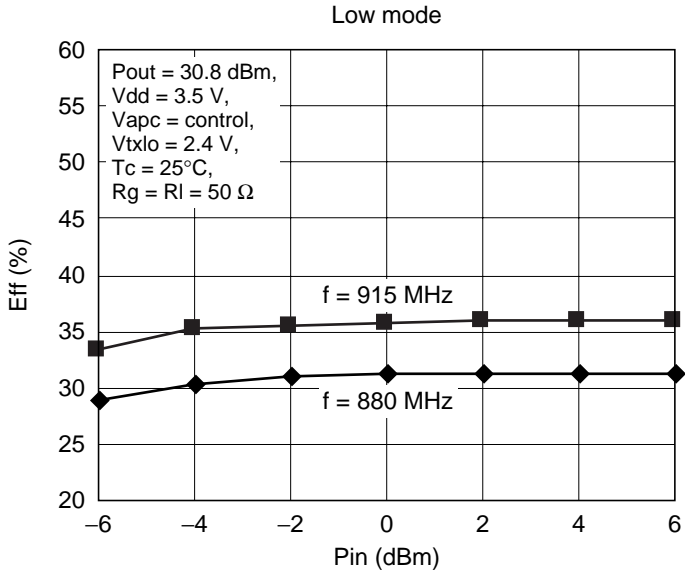


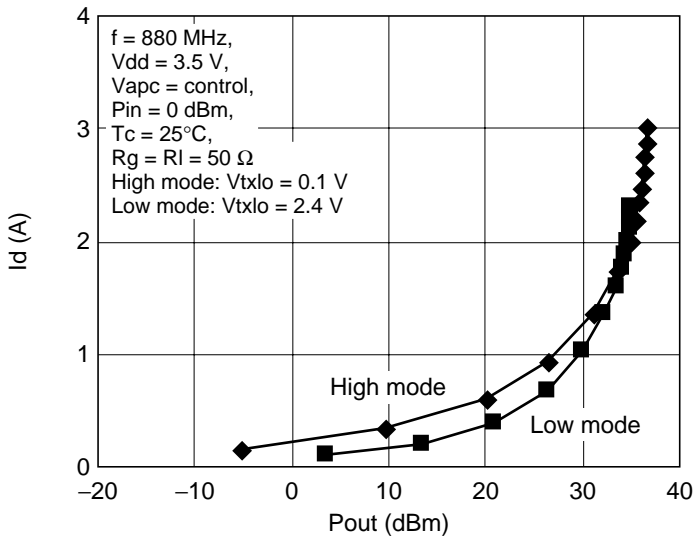
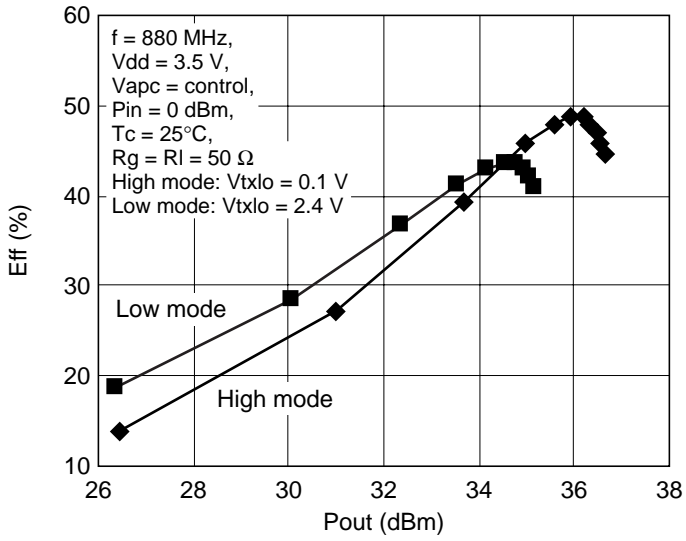


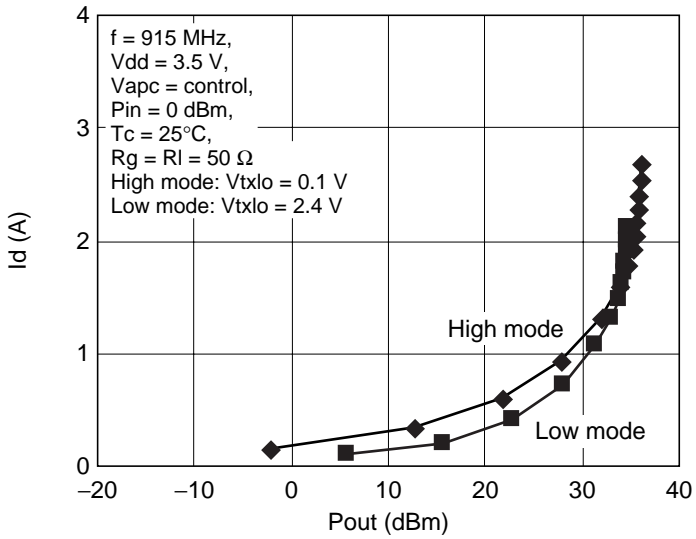
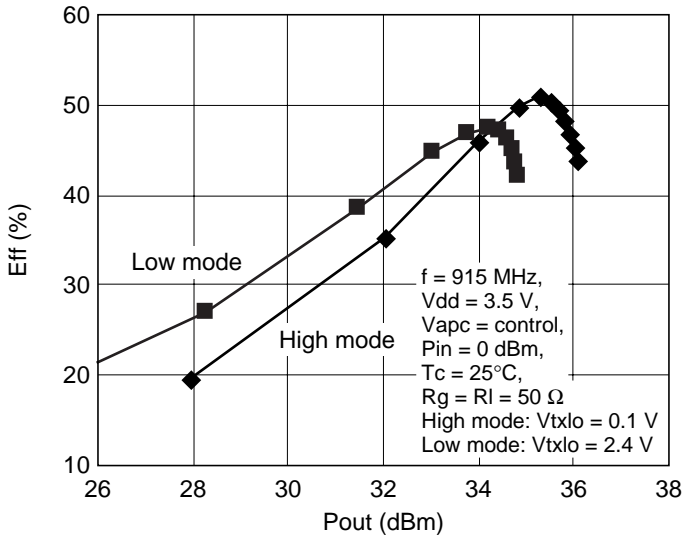


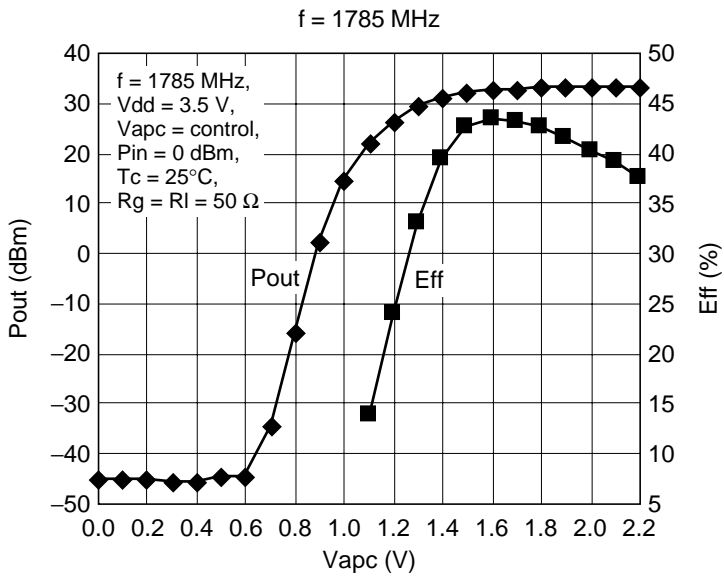
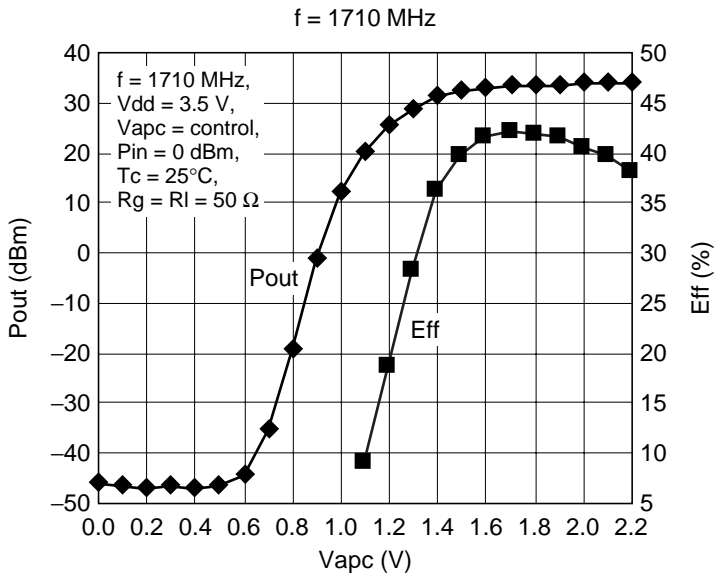


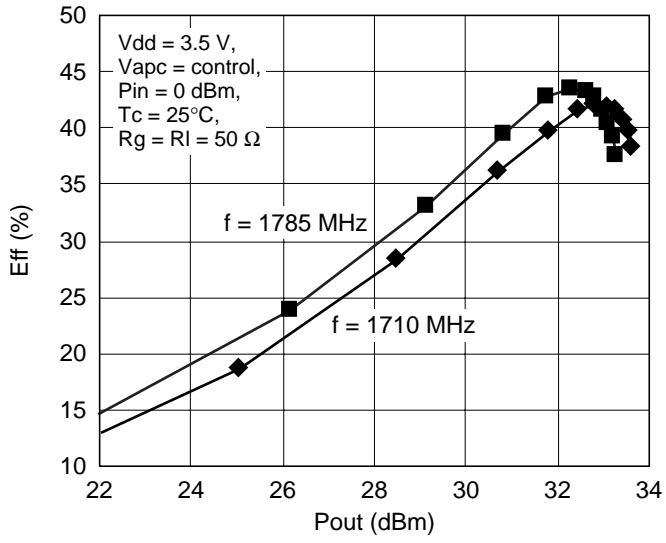


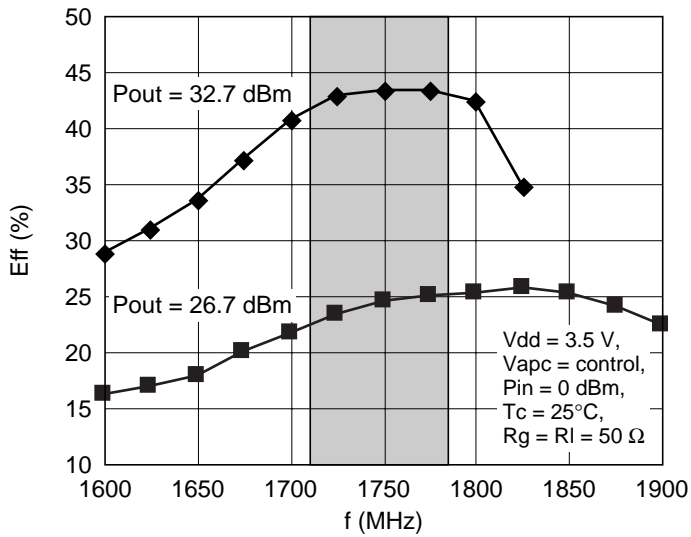
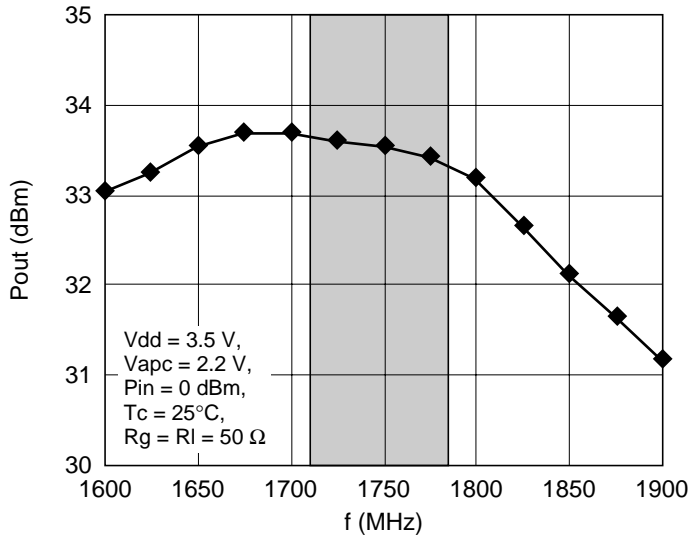


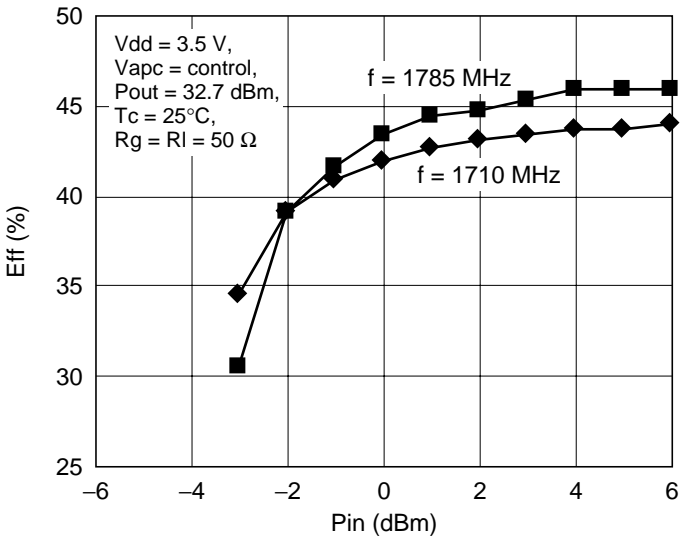
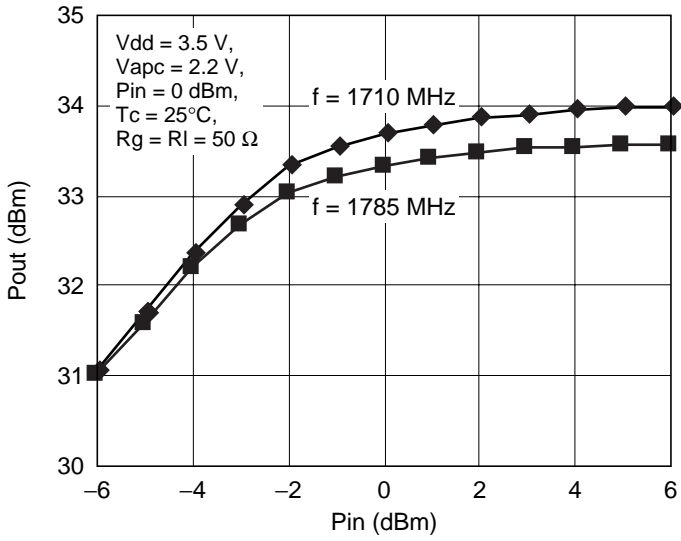


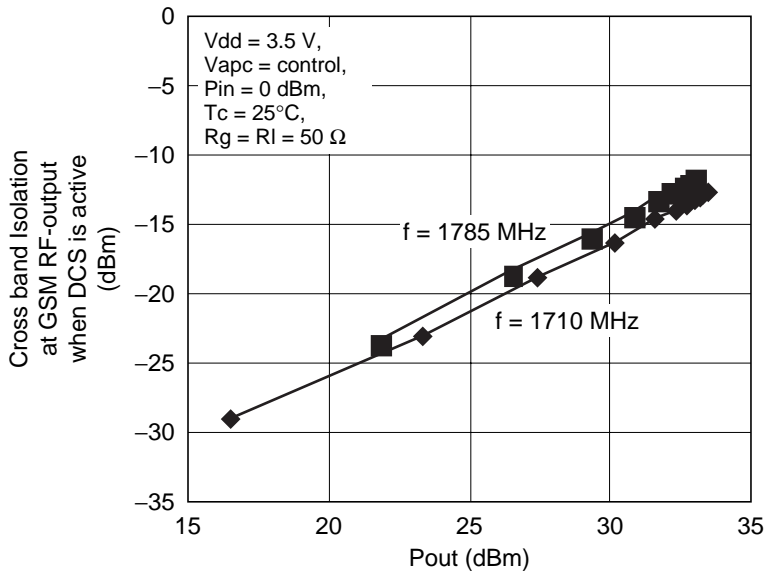
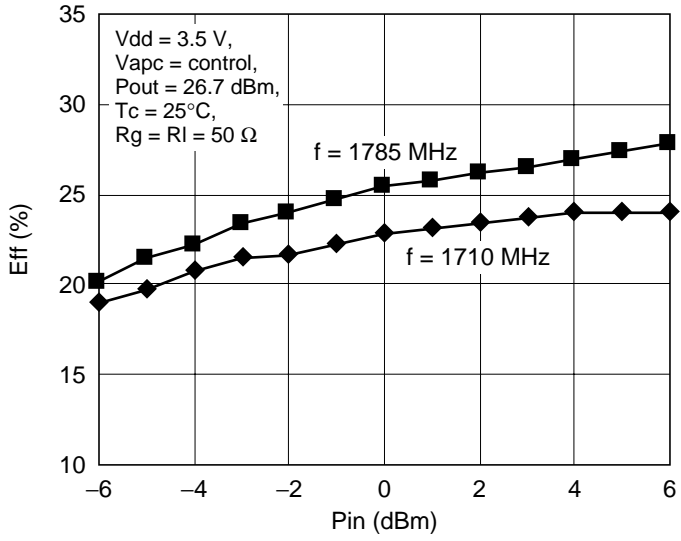


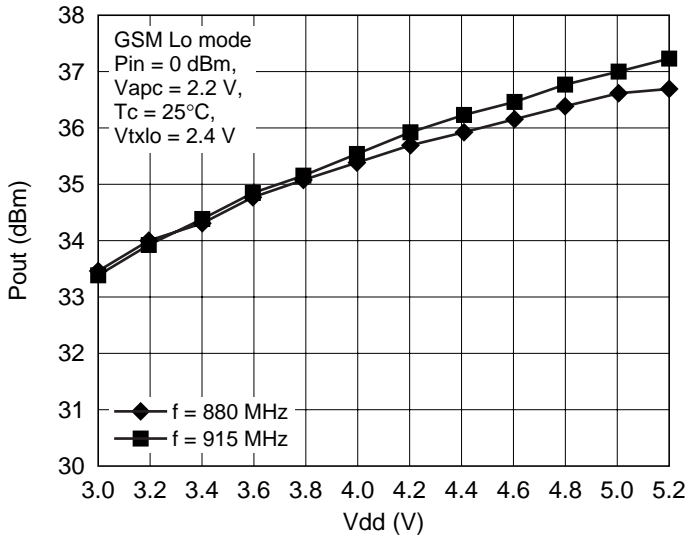
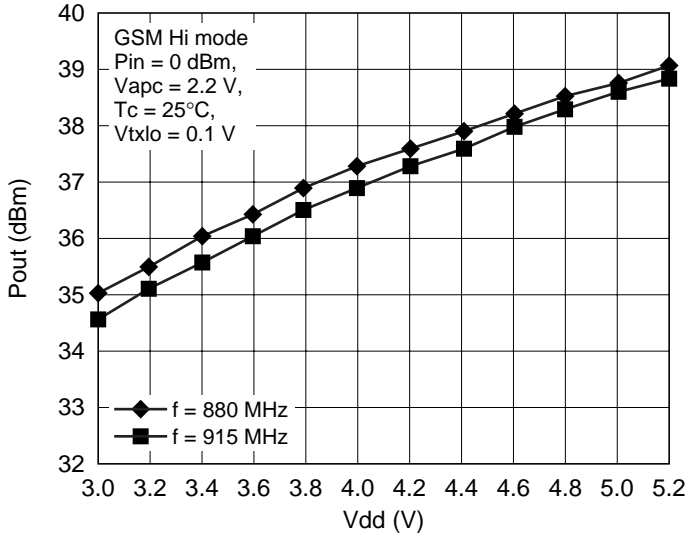


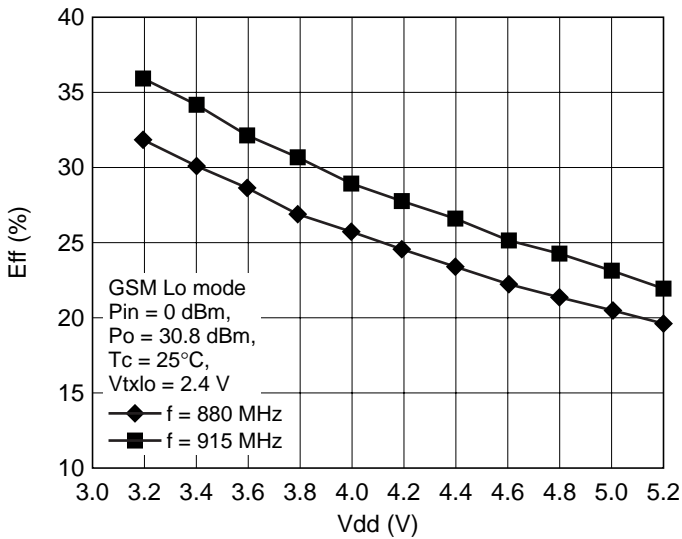
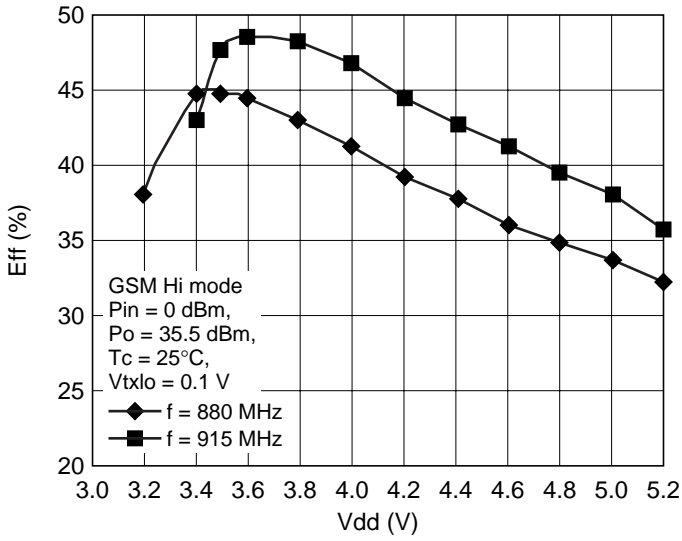


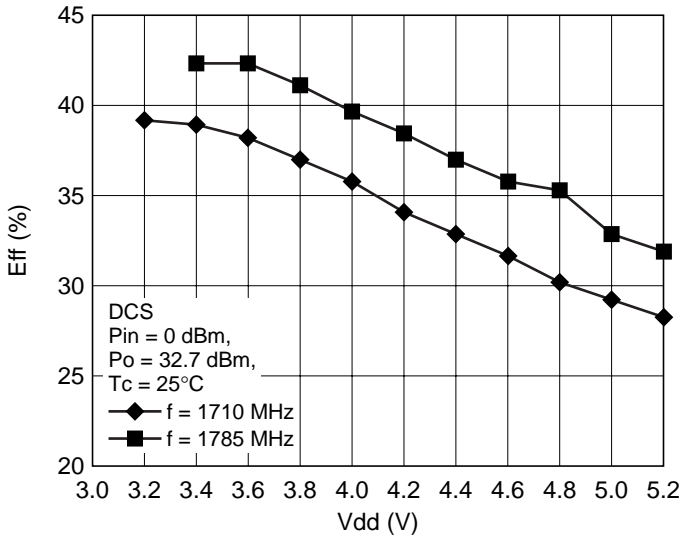
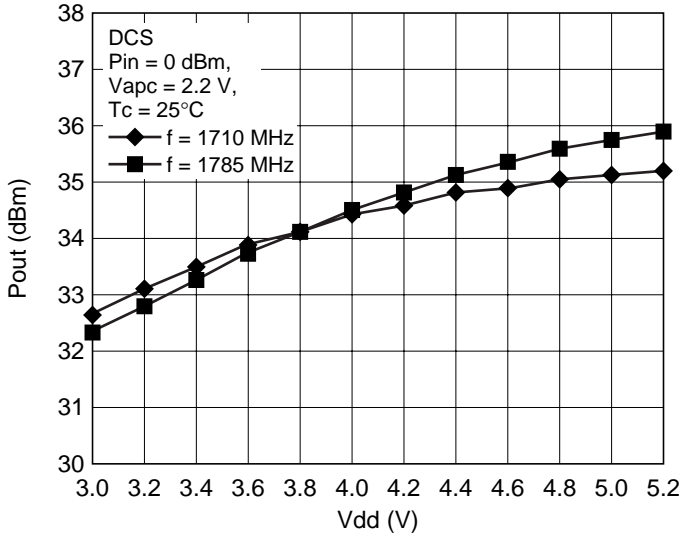


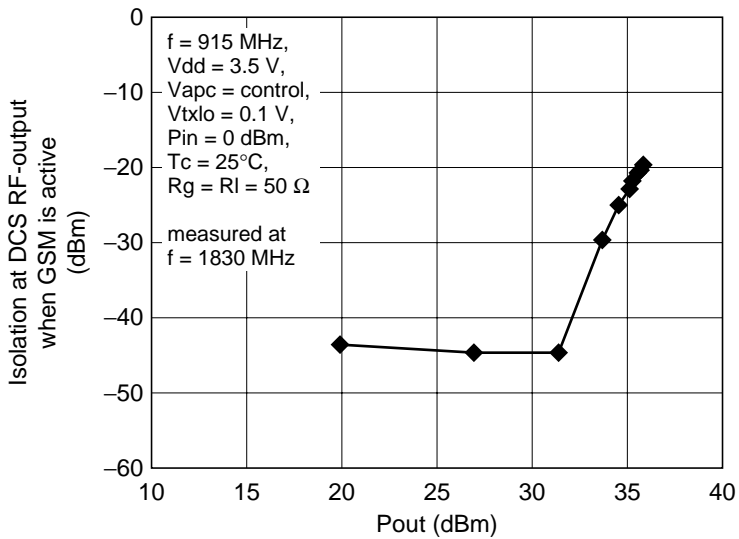
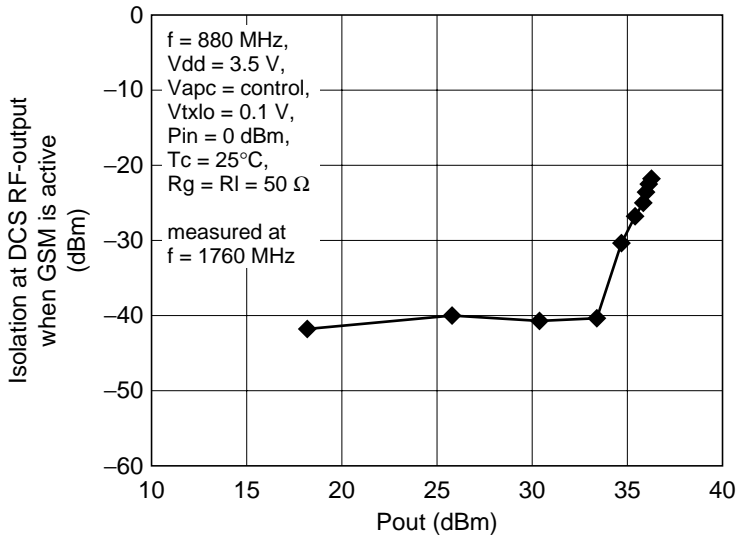












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