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# PF08109B

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

**RENESAS**

ADE-208-821C (Z)

Rev.3  
Feb. 2001

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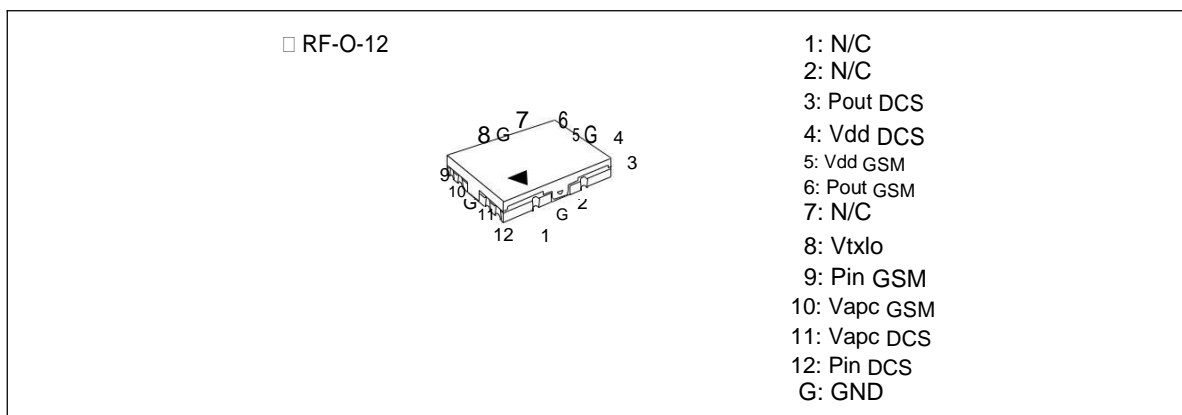
## Application

- 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



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### Absolute Maximum Ratings

(T<sub>c</sub> = 25°C)

Item	Symbol	Rating	Unit
Supply voltage	V <sub>dd</sub>	8	V
Supply current	I <sub>dd</sub> GSM	3	A
	I <sub>dd</sub> DCS	2	A
V <sub>txlo</sub> voltage	V <sub>txlo</sub>	4	V
V <sub>apc</sub> voltage	V <sub>apc</sub>	4	V
Input power	P <sub>in</sub>	10	dBm
Operating case temperature	T <sub>c</sub> (op)	-30 to +100	°C
Storage temperature	T <sub>stg</sub>	-30 to +100	°C
Output power	P <sub>out</sub> GSM	5	W
	P <sub>out</sub> 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<sub>c</sub> = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Drain cutoff current	I <sub>ds</sub>			100	∞A	V <sub>dd</sub> = 8 V, V <sub>apc</sub> = 0 V
V <sub>apc</sub> control current	I <sub>apc</sub>			3	mA	V <sub>apc</sub> = 2.2 V
V <sub>txlo</sub> control current	I <sub>txlo</sub>			100	∞A	V <sub>txlo</sub> = 2.4 V

## Electrical Characteristics for E-GSM mode

(Tc = 25°C)

Test conditions unless otherwise noted:

f = 880 to 915 MHz, Vdd<sub>GSM</sub> = 3.5 V, Pin<sub>GSM</sub> = 0 dBm, Rg = Rl = 50 Ω, Tc = 25°C, Vapc<sub>DCS</sub> = 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)	$\eta_{T(H)}$	41	50		%	Pout <sub>GSM</sub> = 35.5dBm, Vtxlo = 0.1V, Vapc <sub>GSM</sub> = 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)	$\eta_{T(L)}$	27	35		%	Pout <sub>GSM</sub> = 30.8dBm, Vtxlo = 2.4V, Vapc <sub>GSM</sub> = controlled
Output power (1)(Hi)	Pout (1)(Hi)	35.5	36.0		dBm	Vapc <sub>GSM</sub> = 2.2V, Vtxlo = 0.1V
Output power (1)(Lo)	Pout (1)(Lo)	30.8	31.3		dBm	Vapc <sub>GSM</sub> = 2.2V, Vtxlo = 2.4V
Output power (2)(Hi)	Pout (2)(Hi)	33.5	34.0		dBm	Vdd <sub>GSM</sub> = 3.0V, Vapc <sub>GSM</sub> = 2.2V, Tc = +85°C, Vtxlo = 0.1V
Output power (2)(Lo)	Pout (2)(Lo)	28.8	29.3		dBm	Vdd <sub>GSM</sub> = 3.0V, Vapc <sub>GSM</sub> = 2.2V, Tc = +85°C, Vtxlo = 2.4V
Isolation			-42	-36	dBm	Vapc <sub>GSM</sub> = 0.2V, Vtxlo = 0.1V
Isolation at DCS RF-output when GSM is active			-23	-17	dBm	Pout <sub>GSM</sub> = 35.5dBm, Vtxlo = 0.1V Measured at f = 1760 to 1830MHz
Switching time	t <sub>r</sub> , t <sub>f</sub>		1	2	μs	Pout <sub>GSM</sub> = 0 to 35.5dBm, Vtxlo = 0.1V
Stability		No parasitic oscillation				Vdd <sub>GSM</sub> = 3.0 to 5.1V, Pout <sub>GSM</sub> δ 35.5dBm, Vtxlo = 0.1, 2.4V, Vapc <sub>GSM</sub> δ 2.2V, GSMpulse. Rg = 50Ω, Output VSWR = 6 : 1 All phases
Load VSWR tolerance		No degradation				Vdd <sub>GSM</sub> = 3.0 to 5.1V, t = 20sec., Pout <sub>GSM</sub> δ 35.5dBm, Vtxlo = 0.1, 2.4V, Vapc <sub>GSM</sub> δ 2.2V, GSM pulse. Rg = 50Ω, Output VSWR = 10 : 1 All phases

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### Electrical Characteristics for DCS1800 mode

(T<sub>c</sub> = 25°C)

Test conditions unless otherwise noted:

f = 1710 to 1785 MHz, V<sub>dd DCS</sub> = 3.5 V, Pin<sub>DCS</sub> = 0 dBm, R<sub>g</sub> = R<sub>l</sub> = 50 Ω, T<sub>c</sub> = 25°C, V<sub>apc GSM</sub> = 0.1

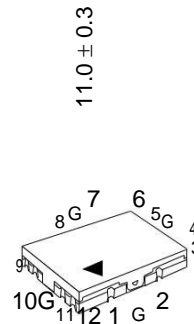
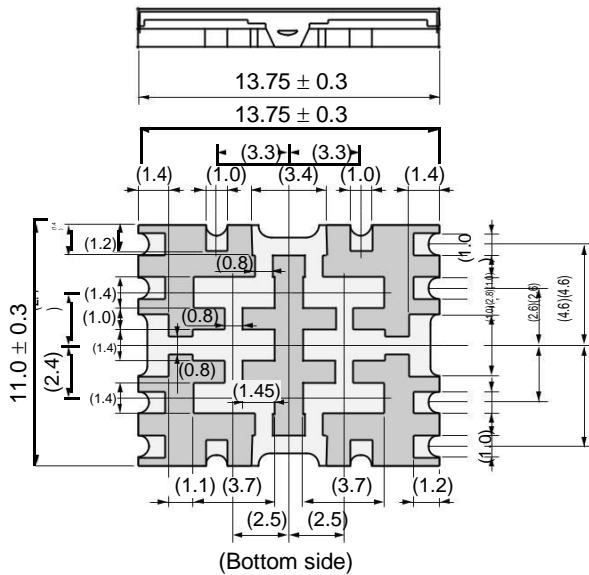
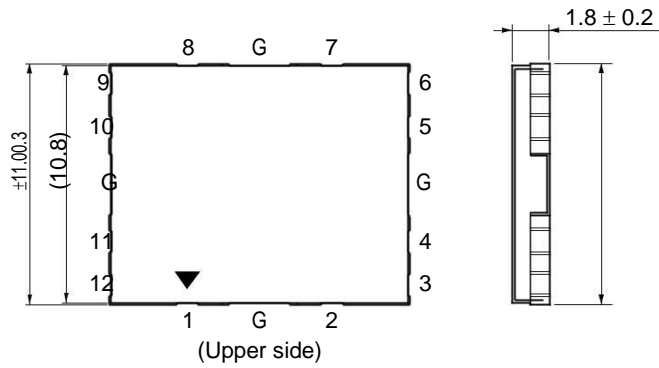
V Pulse operation with pulse width 577 μs and duty cycle 1:8 shall be used.

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Frequency range	f	1710		1785	MHz	
Total efficiency (Hi)	$\eta_{T(H)}$	36	43		%	P <sub>out DCS</sub> = 32.7dBm, V <sub>apc DCS</sub> = 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)	$\eta_{T(L)}$	17	25		%	P <sub>out DCS</sub> = 26.7dBm, V <sub>apc DCS</sub> = controlled
Output power (1)	P <sub>out</sub> (1)	32.7	33.2		dBm	V <sub>apc DCS</sub> = 2.2V,
Output power (2)	P <sub>out</sub> (2)	30.7	31.2		dBm	V <sub>dd DCS</sub> = 3.0V, V <sub>apc DCS</sub> = 2.2V, T <sub>c</sub> = +85°C
Isolation			-42	-36	dBm	V <sub>apc DCS</sub> = 0.2V
Isolation at GSM RF-output when DCS is active			-10	0	dBm	P <sub>out DCS</sub> = 32.7dBm, Measured at f = 1710 to 1785MHz
Switching time	t <sub>r</sub> , t <sub>f</sub>		1	2	μs	P <sub>out DCS</sub> = 0 to 32.7dBm
Stability		No parasitic oscillation				V <sub>dd DCS</sub> = 3.0 to 5.1V, P <sub>out DCS</sub> δ 32.7dBm, V <sub>apc DCS</sub> δ 2.2V, DCS pulse. R <sub>g</sub> = 50Ω, Output VSWR = 6 : 1 All phases
Load VSWR tolerance		No degradation				V <sub>dd DCS</sub> = 3.0 to 5.1V, P <sub>out DCS</sub> δ 32.7dBm, t = 20sec., V <sub>apc DCS</sub> δ 2.2V, DCS pulse. R <sub>g</sub> = 50 , Output VSWR = 10 : 1 All phases

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## Package Dimensions

Unit: mm



- 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

Remark:  
Coplanarity of bottom side of terminals are less than  $0 \pm 0.1$ mm.

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