
PF08103A

MOS FET Power Amplifier Module
for E-GSM900 and DCS1800 Dual Band Handy Phone

HITACHI

ADE-208-685B (Z)
3rd Edition
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Application

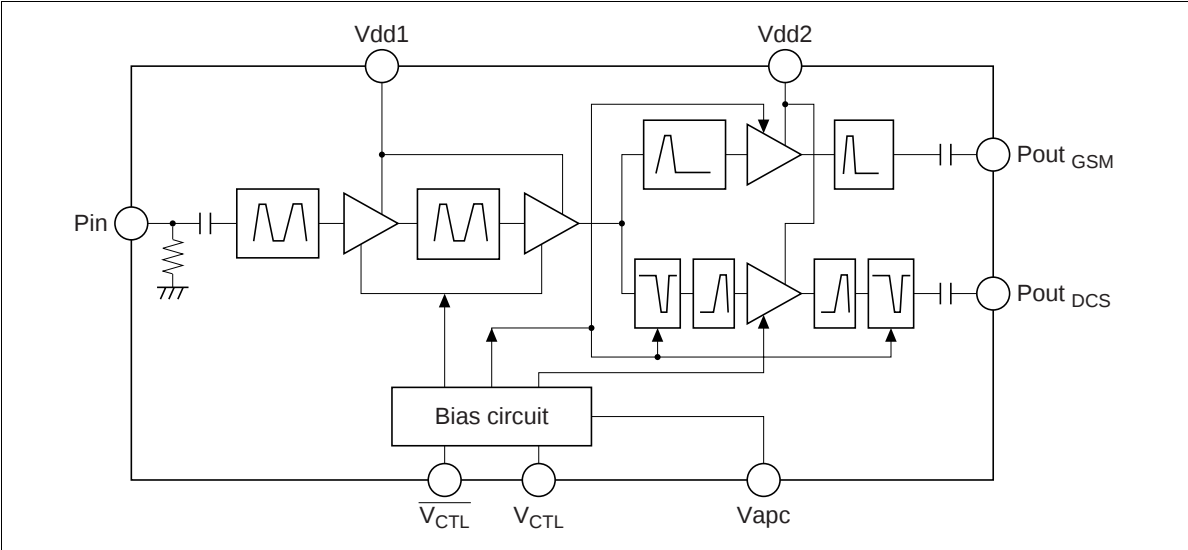
- Dual band amplifier for E-GSM900 (880 to 915 MHz) and DCS1800 (1710 to 1785 MHz).
- For 4.8 V nominal battery use

Features

- 1 in / 2 out dual band amplifier
- Simple external circuit including output matching circuit
- Simple band switching and power control
- High gain 3stage amplifier : +4.5 dBm input
- Lead less thin & Small package : 11 × 13.75 × 1.8 mm
- High efficiency : 48% Typ at 34.5 dBm for E-GSM
36% Typ at 31.5 dBm for DCS1800

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Internal Circuit Block Diagram



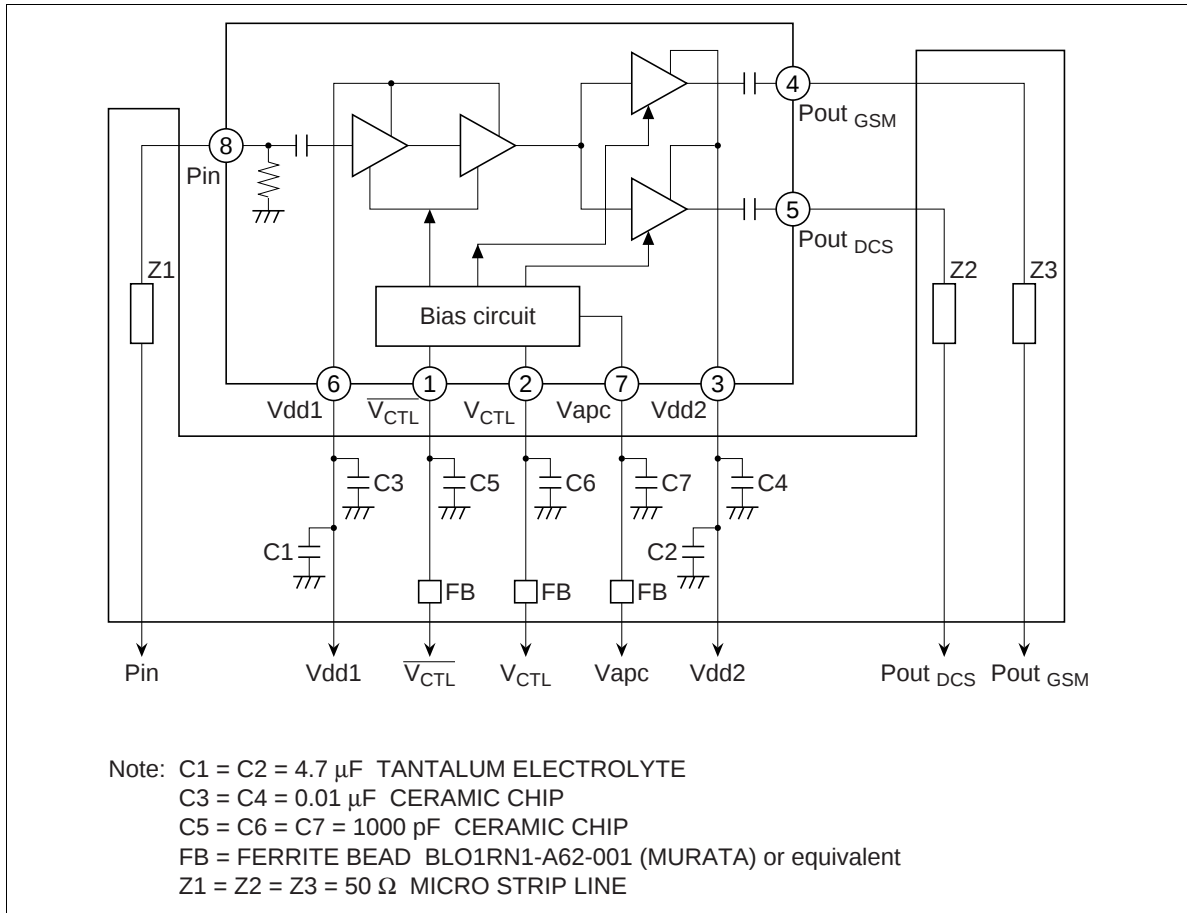
Band Select and Power Control (H: 2 V Min, L: 0.3 V Max)

Operating Mode	V _{CTL}	$\overline{V_{CTL}}$	V _{apc}
GSM Tx ON	H	L	Control
DCS Tx ON	L	H	Control
Tx OFF	L	L	< 0.2 V

Current of Control Pin

Control Pin	Equivalent Input Circuit	Control Current
V _{CTL}		160 μ A Max at 3 V
$\overline{V_{CTL}}$		80 μ A Max at 3 V
V _{apc}		3 mA Max at 3 V

Internal Diagram and External Circuit



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Absolute Maximum Ratings (T_c = 25°C)

Item	Symbol	Rating	Unit
Supply voltage	V _{DD}	8.5	V
Supply current	I _{DD GSM}	3	A
	I _{DD DCS}	3	A
V _{CTL} , $\overline{V_{CTL}}$ voltage	V _{CTL} , $\overline{V_{CTL}}$	4	V
Vapc voltage	Vapc	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 (880-915 MHz), and the DCS-band (1710-1785 MHz).

Electrical Characteristics for DC (T_c = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Drain cutoff current	I _{ds}	—	—	20	μA	V _{dd} = 6.0 V, V _{apc} = 0 V, V _{CTL} = 0 V, $\overline{V_{CTL}}$ = 0 V
		—	—	300	μA	V _{dd} = 8.5 V, V _{apc} = 0 V, V _{CTL} = 0 V, $\overline{V_{CTL}}$ = 0 V, T _c = −20 to +80°C
V _{CTL} control current	I _{CTL}	—	100	160	μA	V _{CTL} = 3.0 V
$\overline{V_{CTL}}$ control current	$\overline{I_{CTL}}$	—	50	80	μA	$\overline{V_{CTL}}$ = 3.0 V

Electrical Characteristics for GSM900 mode (T_c = 25°C)

Test conditions unless otherwise noted:

f = 880 to 915MHz, V_{dd1} = V_{dd2} = 4.8V, Pin = +4.5dBm, V_{CTL} = 2.0V, $\overline{V_{CTL}}$ = 0.3V, R_g = R_l = 50Ω, T_c = 25°C, 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	
Control voltage range	V _{apc}	0.2	—	3.0	V	
V _{apc} control current	I _{apc}	—	—	3	mA	V _{apc} = 3.0V
Total efficiency	η _T	43	48	—	%	P _{out GSM} = 34.5dBm,
2nd harmonic distortion	2nd H.D.	—	−45	−35	dBc	V _{apc} = control
3rd harmonic distortion	3rd H.D.	—	−45	−35	dBc	
4th~8th harmonic distortion	4th~8th H.D.	—	—	−35	dBc	
Input VSWR	VSWR (in)	—	2	3	—	
Output power (1)	P _{out} (1)	35.0	35.7	—	dBm	V _{apc} = 3.0V
Output power (2)	P _{out} (2)	33.0	34.0	—	dBm	V _{dd} = 4.2V, V _{apc} = 3.0V, T _c = +85°C, Pin = +3dBm
Isolation	—	—	−40	−20	dBm	V _{apc} = 0.2 V
Isolation at DCS RF-output when GSM is active	—	—	−30	−20	dBm	P _{out GSM} = 34.5dBm (GSM mode) Measured at f = 1760 to 1830MHz
Switching time	t _r , t _f	—	1	2	μs	P _{out GSM} = −15 to 35.0dBm
Stability	—	No parasitic oscillation All spurious < −36 dBm			—	V _{DD} = 4.2 to 6.3V, P _{out} ≤ 35.0dBm, V _{apc} ≤ 3.0V GSM pulse. R _g = 50Ω, T _c = −20 to +85°C, Output VSWR = 6 : 1 All phases, RES BW = 3MHz
Load VSWR tolerance	—	No degradation or Permanent degradation			—	V _{DD} = 4.2 to 6.3V, P _{out GSM} ≤ 35.0dBm, V _{apc} ≤ 3.0V GSM pulse. R _g = 50Ω, t = 30sec., T _c = −20 to +85°C, Output VSWR = 10 : 1 All phases
Noise power	P _{noise1}	—	—	−73	dBm	f ₀ = 915MHz, frx = f ₀ +10MHz P _{out GSM} = 35dBm, RES BW = 100kHz
	P _{noise2}	—	—	−85	dBm	f ₀ = 915MHz, frx = f ₀ +20MHz P _{out GSM} = 35dBm, RES BW = 100kHz
	P _{noise3}	—	—	−77	dBm	frx = 1805 to 1880MHz P _{out GSM} = 35dBm, RES BW = 100kHz
Slope P _{out} /V _{apc}	—	—	—	200	dB/V	P _{out GSM} = 0 to 35dBm

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

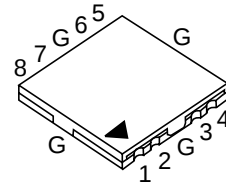
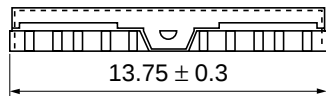
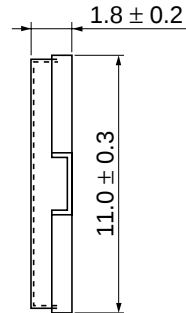
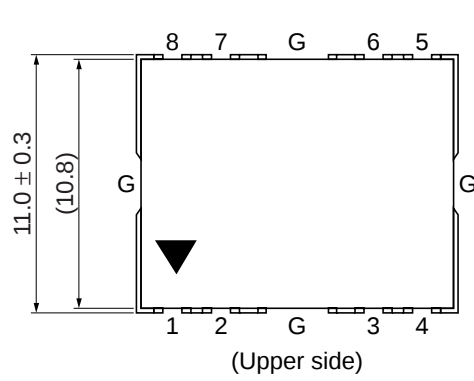
Test conditions unless otherwise noted:

f = 1710 to 1785MHz, V_{dd1} = V_{dd2} = 4.8V, Pin = +4.5dBm, V_{CTL} = 0.3V, $\overline{V_{CTL}}$ = 2.0V, R_g = R_l = 50Ω, T_c = 25°C, 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	
Control voltage range	V _{apc}	0.2	—	3.0	V	
V _{apc} control current	I _{apc}	—	—	3	mA	V _{apc} = 3.0V
Total efficiency	η _T	33	36	—	%	P _{out DCS} = 31.5dBm,
2nd harmonic distortion	2nd H.D.	—	−45	−35	dBc	V _{apc} = control
3rd harmonic distortion	3rd H.D.	—	−45	−35	dBc	
4th~8th harmonic distortion	4th~8th H.D.	—	—	−35	dBc	
Input VSWR	VSWR (in)	—	3	5	—	
Output power (1)	P _{out} (1)	32.5	33.0	—	dBm	V _{apc} = 3.0V
Output power (2)	P _{out} (2)	31	31.5	—	dBm	V _{dd} = 4.8V, V _{apc} = 3.0V, T _c = +85°C, Pin = +3dBm
Isolation	—	—	−35	−30	dBm	V _{apc} = 0.2V
Switching time	t _r , t _f	—	1	2	μs	P _{out DCS} = −15 to 32.0dBm
Stability	—	No parasitic oscillation			—	V _{DD} = 4.2 to 6.3V, P _{out DCS} ≤ 32.5dBm, V _{apc} ≤ 3.0V DCS pulse. R _g = 50Ω, T _c = −20 to +85°C, Output VSWR = 6 : 1 All phases
Load VSWR tolerance	—	No degradation			—	V _{DD} = 4.2 to 6.3V, P _{out DCS} ≤ 32.5dBm, V _{apc} ≤ 3.0V DCS pulse. R _g = 50Ω, t = 30sec., T _c = −20 to +85°C, Output VSWR = 10 : 1 All phases
Noise power	P _{noise1}	—	—	−77	dBm	f ₀ = 1785MHz, frx = f ₀ +20MHz, P _{out DCS} = 31.5dBm, RES BW = 30kHz
	P _{noise2}	—	—	−74	dBm	frx = 925 to 935MHz, P _{out DCS} = 31.5dBm, RES BW = 30kHz
	P _{noise3}	—	—	−85	dBm	frx = 935 to 960MHz, P _{out DCS} = 31.5dBm, RES BW = 30kHz
Slope P _{out} /V _{apc}	—	—	—	200	dB/V	P _{out DCS} = 0 to 32.0dBm
Intermodulation	—	—	—	−20	dBm	P _{out} = 31.5dBm, Interferer.CW f ₀ +800kHz, P _{interferer} = −9dBm, RES BW = 300kHz, Measure at f ₀ −800kHz

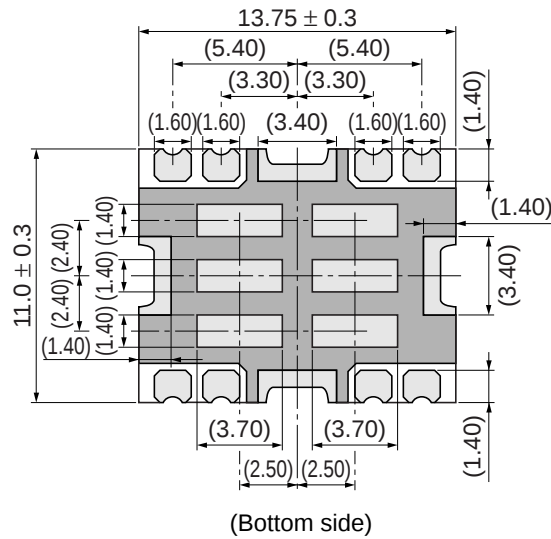
Package Dimensions

Unit: mm



Pin arrangement

- 1 : V_{CTL}
- 2 : V_{CTL}
- 3 : V_{dd2}
- 4 : $P_{out_{GSM}}$
- 5 : $P_{out_{DCS}}$
- 6 : V_{dd1}
- 7 : V_{apc}
- 8 : Pin
- G : GND



Remark:
Coplanarity of bottom side of terminals
are less than 0 ± 0.1 mm.

Hitachi Code	RF-O
JEDEC	—
EIAJ	—
Weight (reference value)	—

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