TQM 7M4009

(Preliminary data sheet)

3V Quad-Band GSM850/GSM900/DCS/PCS Power Amplifier Module

Description:

Advanced quad-band, compact 3V power amplifier module designed for mobile handset applications. The small size and high performance is achieved with high-reliability InGaP HBT technology and advanced assembly techniques. The module is fully integrated, providing a simple 50 Ohms interface on all input and output ports. Despite its very compact size, the module has exceptional efficiency in all bands. Band select and power control inputs on the module are fully CMOS compatible

Features:

-- Extremely compact size – 6x6x1.4 mm^3.

-- Band select, and single V_{apc} CMOS compatible power control input.

-- High efficiency – typical GSM850 47%, GSM900 55%, DCS/PCS 50%.

-- GPRS class 12.

-- +2 dBm min. input.

-- 50 ? input and output impedances.

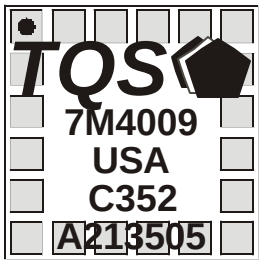
-- High-reliability InGaP technology.

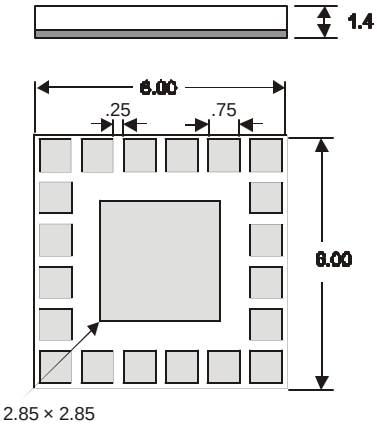
-- Few external components.

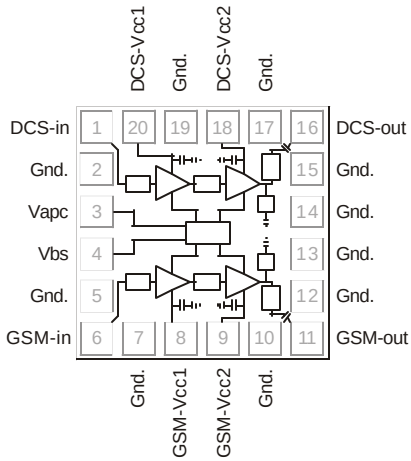
Description:

The module is built around a highly integrated dual power amplifier InGaP die. By virtue of advanced design techniques, exceptional performance is achieved with only two stages in each amplifier. On-die interstage matching is employed using a high Q passives technology. Together these technologies allow an extremely compact size to be achieved with excellent electrical performance. The module includes a CMOS die to implement a band-select function and to provide a CMOS compatible input power control voltage range. The module has a band select input. Excellent performance is achieved across the 824 – 849 MHz, 880 – 915 MHz, 1710 – 1785 MHz, and 1850 – 1910 MHz bands. Module construction is a low-profile overmolded land-grid array on laminate.

Package Outline:







Dimensions in mm

All specifications subject to change without notice

Absolute Maximum Ratings:

Parameter	Symbol	Min.	Max.	Units
Supply voltage	V_{bat}	-0.5	6.0	V_{dc}
DC supply current	I_{bat}		2.4	A
Power control voltage	V_{ramp}	-0.5	3.0	V
Duty cycle at max. power	?		50	%
Output load	VSWR		10:1	
Operating case temperature	T_c	-30	100	ºC
Storage temperature	T_s	-55	150	ºC
Input power	P_{in}		15	dBm

Note: The amplifier will survive over the full range specified for any individual input, while other parameters are nominal and with no RF input.

Operating Parameters:

Parameter	Symbol	Min.	Typ.	Max.	Units
Supply voltage	V_{bat}	2.9	3.5	4.5	V_{dc}
Supply current	I_{bat}		1.6		A
Band select voltage GSM	V_{bs}-L	0.0		0.5	V
DCS/PCS	V_{bs}-H	2.0		3.0	
Leakage current Tx_{en} Low, Vramp = 0.19V	I_l		1	20	?A
Load impedances	Z_0		50		?

Typical Performance:

GSM850 Electrical Characteristics:

Test conditions (unless noted): V_{bat} = +3.5 V, V_{apc} = 1.8 V, P_{in} = 4 dBm, Duty Cycle =25%, T_c = 25ºC

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Frequency Range	f	824		849	MHz	
Input Power for P_{out} max.	P_{in}	2.0	4.0	6.0	dBm	
Output Power	P_{out}	33.0 31.0	34.5 32.6		dBm	$T_C$min ? T_C ??? $T_C$max V_{bat} = 2.9 V
Power Added Efficiency	?	40	47		%	P_{out} = P_{out} max.
Power Control Voltage	V_{apc}	0.2		1.8	V	
Power Control Current	I_{apc}			0.1	mA	
Power Control Slope	P_{out}/V_{apc}			80 150 200	dB/V	7.5 < P_{out} ? 35.5 -10 < P_{out} ? 7.5 -34.5 < P_{out} ? -10 $T_C$min ? T_C ? ?$T_C$max
Input VSWR				3.0:1		-3 ? P_{out} ? 34.5 dBm
Forward Isolation	Iso			-35.0	dBm	V_{apc} ? 0.2 V, P_{in} = -5 dBm
Harmonics	$2f_0$ $3f_0$ $> 3f_0$			-7.0 -7.0 -7.0	dBm	Pout ? 34.5 dBm $T_C$min ? T_C ? ?$T_C$max
Rx noise power: 925 - 935 MHz 935 - 960 MHz				 -74.0 -82.0	dBm	 RBW = 100 kHz P_{out} ? 34.5 dBm
Stability				8:1		All phase angles V_{apc} ? 1.8 V P_{in} = 4 dBm, P_{out} ? 34.5 dBm
Ruggedness				10:1		All phase angles V_{apc} ? 1.8 V P_{in} = 4 dBm, P_{out} ? 34.5 dBm

GSM900 Electrical Characteristics:

Test conditions (unless noted): V_{bat} = +3.5 V, V_{apc} = 1.8 V, P_{in} = 4 dBm, Duty Cycle =25%, T_c = 25ºC

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Frequency Range	f	880		915	MHz	
Input Power for P_{out} max.	P_{in}	2.0	4.0	6.0	dBm	
Output Power	P_{out}	34.5 32.0	35.0 33.5		dBm	$T_C$min ? T_C ???$T_C$max V_{bat} = 2.9 V
Power Added Efficiency	?	50	55		%	P_{out} = P_{out} max.
Power Control Voltage	V_{apc}	0.2		1.8	V	
Power Control Current	I_{apc}			0.1	mA	
Power Control Slope	P_{out}/V_{apc}			80 150 200	dB/V	7.5 < P_{out} ? 35.5 -10 < P_{out} ? 7.5 -34.5 < P_{out} ? -10 $T_C$min ? T_C ? ?$T_C$max
Input VSWR				2.5:1		-3 ? P_{out} ? 34.5 dBm
Forward Isolation	Iso			-35.0	dBm	V_{apc} ? 0.2 V, P_{in} = -5 dBm
Cross-band Isolation	Iso			-13.0	dBm	P_{out} ? 34.5 dBm
Harmonics	$2f_0$ $3f_0$ $> 3f_0$			-7.0 -7.0 -7.0	dBm	Pout ? 34.5 dBm $T_C$min ? T_C ? ?$T_C$max
Rx noise power: 925 - 935 MHz 935 - 960 MHz				 -74.0 -82.0	dBm	 RBW = 100 kHz P_{out} ? 34.5 dBm
Stability				8:1		All phase angles V_{apc} ? 1.8 V P_{in} = 4 dBm, P_{out} ? 34.5 dBm
Ruggedness				10:1		All phase angles V_{apc} ? 1.8 V P_{in} = 4 dBm, P_{out} ? 34.5 dBm

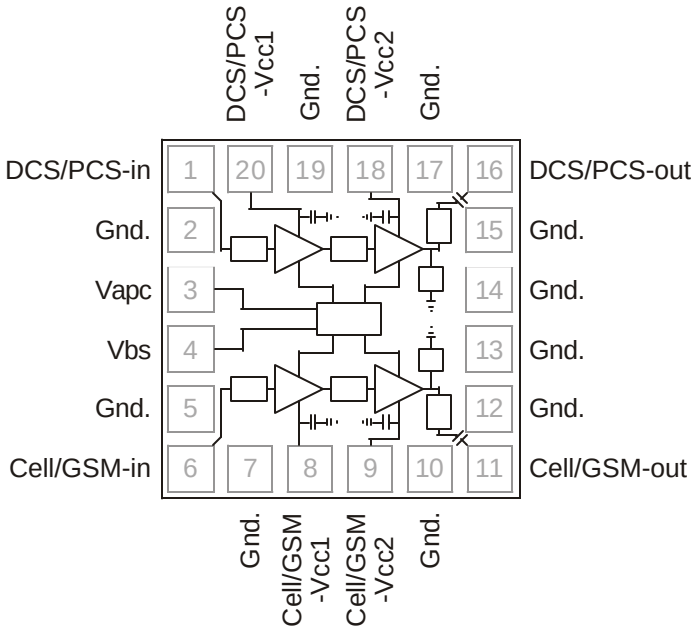
DCS1800/PCS1900 Electrical Characteristics:

Test conditions (unless noted): V_{bat} = +3.5 V, V_{apc} = 1.8 V, P_{in} = 4 dBm, Duty Cycle = 25%, T_c = 25ºC

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Frequency Range	f	1710 1850		1785 1910	MHz	
Input Power for P_{out} max.	P_{in}	2.0	4.0	6.0	dBm	
Output Power	P_{out}	32.0 29.5	32.5 31.0		dBm	V_{bat} = 2.9 V, $T_C$min ? T_C ? $T_C$max
Power Added Efficiency	?	45	50		%	P_{out} = P_{out} max.
Power Control Voltage	V_{apc}	0.2		1.8	V	
Power Control Current	I_{apc}			0.1	mA	
Power Control Slope	P_{out}/V_{apc}			80.0 150.0 200.0	dB/V	7.5 < P_{out} ? 32.5 -10 < P_{out} ? 7.5 -34.5 < P_{out} ? -10 $T_C$min ? T_C ? $T_C$max
Input VSWR				3.0:1		-3 ? P_{out} ? 32.5 dBm
Forward Isolation	Iso			-35	dBm	V_{apc} ? 0.2 V, $P_{??}$ = -5 dBm
Harmonics	$2f_0$ $3f_0$ $> 3f_0$			-7.0 -7.0 -7.0	dBm	P_{out} ? 32.5 dBm, $T_C$min ? T_C ? $T_C$max
Rx noise power 1805 - 1880 MHz				-76.0	dBm	RBW = 100 kHz P_{out} ? 32.5 dBm
Stability				8:1		All phase angles V_{apc} ? 1.8 V P_{in} = 4 dBm, P_{out} ? 34.5 dBm
Ruggedness				10:1		All phase angles V_{apc} ? 1.8 V P_{in} = 4 dBm, P_{out} ? 34.5 dBm

Pin Out:

Top view



Pin	Symbol	Description
1	RFin - DCS/PCS	DCS/PCS power in
2	Gnd.	
3	V_{apc}	Control voltage
4	V_{bs}	Band select voltage
5	Gnd.	
6	RFin - GSM	GSM power in
7	Gnd.	
8	$V_{cc}1$ - GSM	GSM stage 1 input voltage
9	$V_{cc}2$ - GSM	GSM stage 2 input voltage
10	Gnd.	
11	RF_{out} - GSM	GSM power out
12	Gnd.	
13	Gnd.	
14	Gnd.	
15	Gnd.	
16	RF_{out} - DCS/PCS	DCS/PCS power out
17	Gnd.	
18	$V_{cc}2$ - DCS/PCS	DCS/PCS stage 2 input voltage
19	Gnd.	
20	$V_{cc}1$ - DCS/PCS	DCS/PCS stage 1 input voltage

Schematic: