FAIRCHILD
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RMPA1850
Quad Band GSM/GPRS Power Amplifier Module

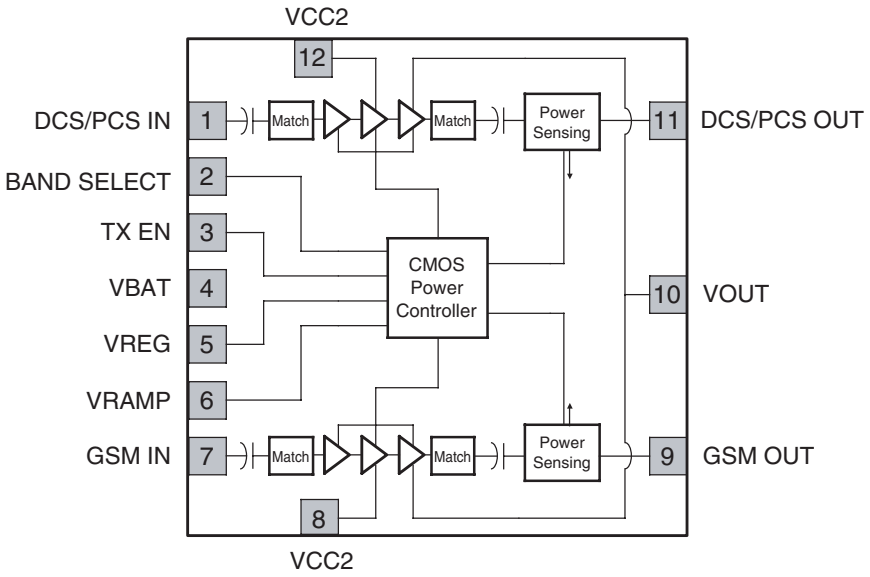
Features

- Quad band, matched module
- High efficiency- 55% GSM850/900, 50% DCS/PCS
- Integrated power control function
- Compact 7*10*1.6mm module
- InGaP HBT technology
- GPRS class 12 capable
- Ruggedness 10:1
- 50 dB power control range

General Description

The RMPA1850 power amplifier module (PAM) is designed for GSM/GPRS cellular handset applications. The PAM a fully input and output 50Ω matched. It also includes integrated power control and band select.

Functional Block Diagram



GSM850/GSM900 BAND

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Frequency	824		849	MHz	GSM850 band
	880		915	MHz	GSM900 band
Output Power	34	34.5		dBm	GSM850 band
	34.5	35		dBm	GSM900 band
Power Added Efficiency	50	55		%	@ Pout max
Input Power Range	0	3		dBm	
2nd Harmonics			-10	dBm	
3rd Harmonics			-15	dBm	
Forward isolation			-30	dBm	
Cross Isolation			-30	dBm	Vramp, TX_EN = 0.2V, Pin = 5 dBm, @2fo
Input VSWR			2.5:1		
Vramp for Max. Pout		1.4	1.8	V	
Vramp for Min. Pout	0.3			V	
Power control range		50		dB	Vramp = 0.1 to 1.8V
Ruggedness	no permanent damage				Output VSWR = 10:1, Pout ≤ 34.5 dBm
Stability			-36	dBm	Load 8:1
Output Noise Power, 20 MHz offset		-82		dBm	RBW = 100 KHz

DCS/PCS BAND

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Frequency	1710		1785	MHz	DCS band
	1850		1910	MHz	PCS band
Output Power	32.5	33		dBm	DCS band
	32	32.5		dBm	PCS band
Power Added Efficiency	45	50		%	@ Pout max
Input Power Range	0	3		dBm	
2nd Harmonics			-15	dBm	
3rd Harmonics			-10	dBm	
Forward isolation			-30	dBm	
Cross Isolation			-20	dBm	Vramp, TX_EN = 0.2V, Pin = 5 dBm, @2fo
Input VSWR			2.5:1		
Vramp for Max. Pout		1.4	1.8	V	
Vramp for Min. Pout	0.3			V	
Power control range		50		dB	Vramp = 0.1 to 1.8V
Ruggedness	no permanent damage				Output VSWR = 10:1,Pout ≤ 32.5dBm
Stability			-36	dBm	Load 8:1
Noise Power, 20 MHz offset		-82		dBm	RBW = 100 KHz, 20 MHz offset

1. V_{BATT} = 3.5V, V_{REG} = 2.8V, P_{IN} = 3 dBm, TX-EN = high, T = 25°C, 12.5% duty cycle

Absolute Ratings

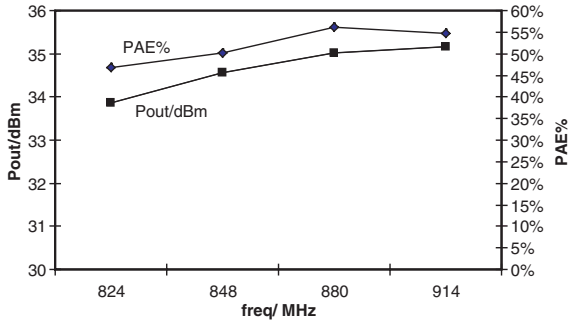
Parameter	Minimum	Maximum	Units
Supply Voltage, V_{BATT}		+6	V
Power Control Voltage		+2.5	V
Input RF Power		+12	dBm
Duty Cycle at Max. Power		50	%
Storage Temperature	-40	+150	°C
Operating Temperature	-30	+85	°C

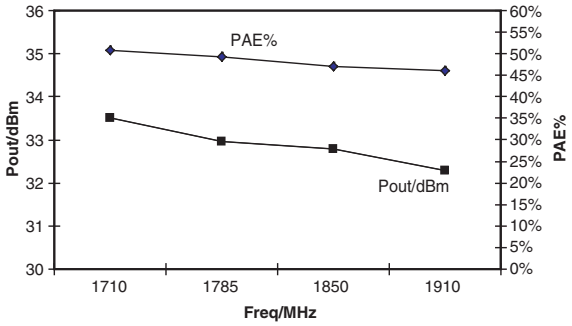
Recommended Operating Conditions

Parameter	Specification			Condition (Temp = +25°C, Vcc = 3.5V)
	Min.	Max.	Unit	
VBAT Supply Voltage	3.0V	3.5V	4.8V	
VBAT Supply Leakage Current		12µA		TX_EN = Low
VREG Voltage	2.7V	2.8V	2.9V	
VREG Current		10mA		TX_EN = High
		1µA		TX_EN = Low
TX_EN Logic Level to Enable	1.9V			
TX_EN Logic Level to Disable			0.6V	
Current into TX_EN Pin		0.1µA	5µA	
Current into Band Select Pin		0.1µA	5µA	
Band Select Logic Level to enable DCS Band	1.9V			
Band Select Logic Level to enable GSM Band			0.6V	
Vramp Pin Transconductance		83µA/V		

P_{out} and PAE% vs. Frequency

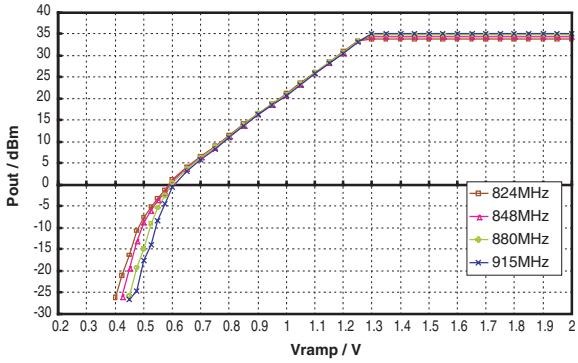
V_{BATT} = 3.5V, V_{REG} = 2.8V, P_{IN} = 3 dBm, V_{RAMP} = 1.6V, T = 25°C, 25% duty cycle

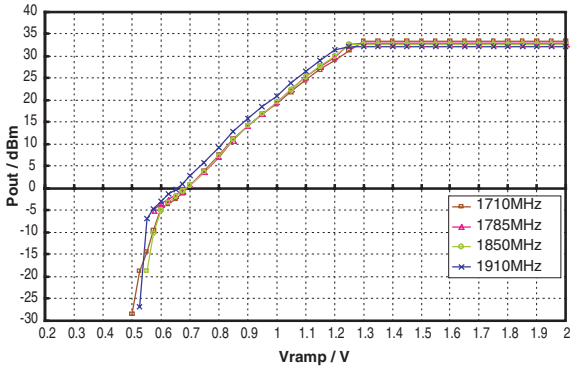




Power Control: P_{out} vs. V_{RAMP}

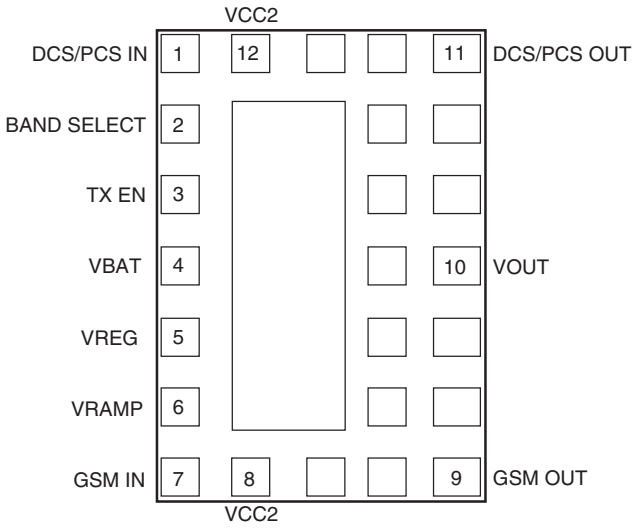
V_{BATT} = 3.5V, V_{REG} = 2.8V, P_{IN} = 3 dBm, T = 25°C, 25% duty cycle



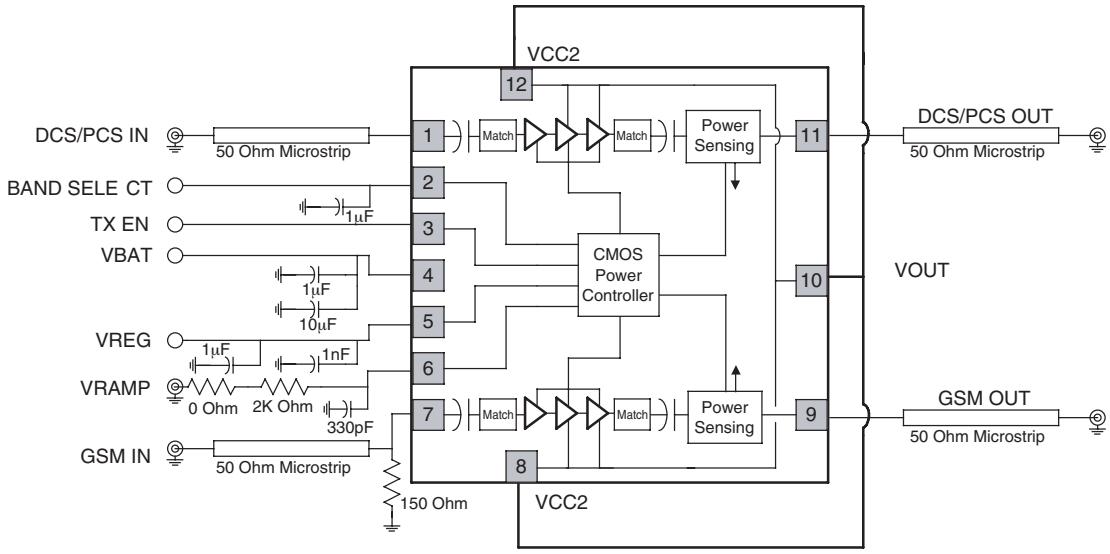


Signal Descriptions

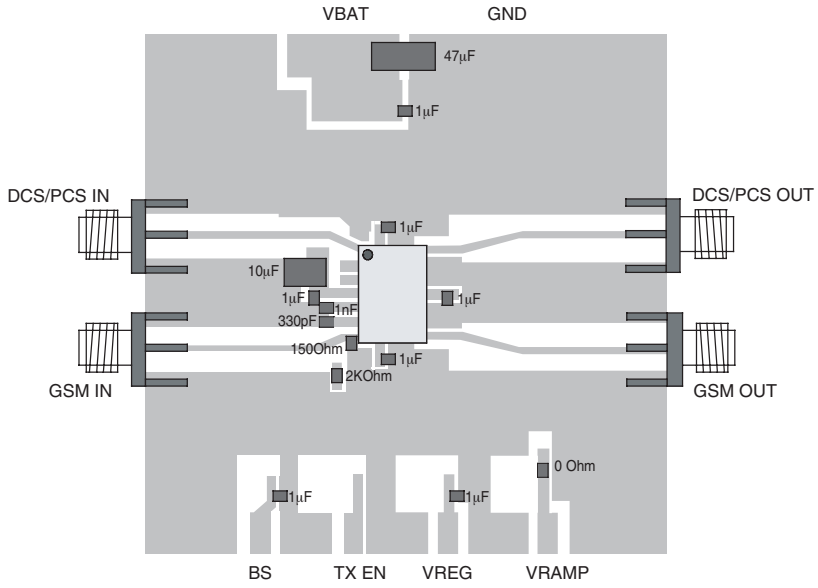
Pin	Function	Description
1	DCS/PCS IN	50Ω RF input of DCS/PCS band.
2	Band Select	Logic high for DCS/PCS and logic low for GSM850/EGSM900 band.
3	TX_EN	Logic high to enable the PA module function.
4	VBAT	Power supply to the PA module. This should be connected to battery. The decoupling capacitor is required to filter the interference.
5	VREG	Normally, 2.8 volts are required at this node for the operation of control circuits.
6	VRAMP	Ramping signal from DAC to control the power level.
7	GSM IN	50Ω RF input of GSM850/EGSM900 band.
8	VCC2	Power supply for the driver stage of the GSM850/EGSM900 band. This is internally connected to VBAT node within the module.
9	GSM OUT	50Ω RF output of GSM850/EGSM900 band.
10	VOUT	Power supply for the power stages of GSM850/EGSM900 and DCS/PCS band. This is internally connected to VBAT node within the module.
11	DCS/PCS OUT	50Ω RF output of DCS/PCS band.
12	VCC2	Power supply for the driver stage of the GSM850/EGSM900 and DCS/PCS band. This is internally connected to VBAT node within the module.



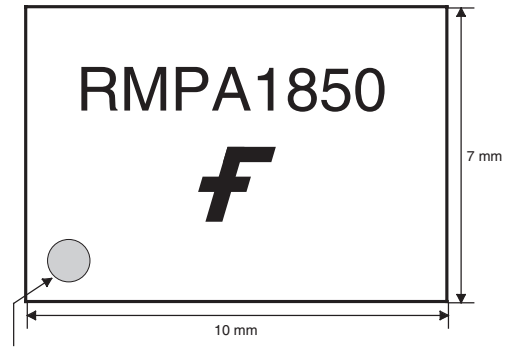
Evaluation Board Schematic



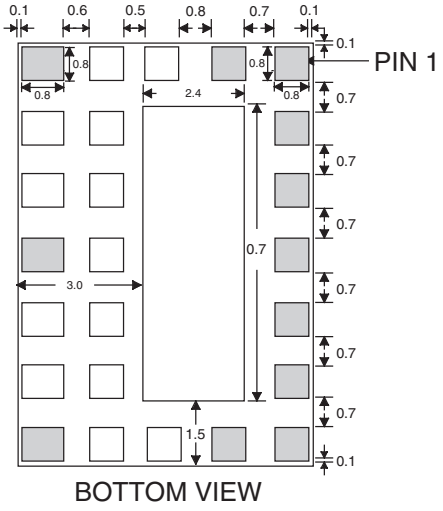
Evaluation Board



Package Outline (All dimensions in mm)



TOP VIEW



BOTTOM VIEW

SIDE VIEW

Application Information

CAUTION: THIS IS AN ESD SENSITIVE DEVICE

Precautions to Avoid Permanent Device Damage:

- Cleanliness: Observe proper handling procedures to ensure clean devices and PCBs. Devices should remain in their original packaging until component placement to ensure no contamination or damage to RF, DC & ground contact areas.
- Device Cleaning: Standard board cleaning techniques should not present device problems provided that the boards are properly dried to remove solvents or water residues.
- Static Sensitivity: Follow ESD precautions to protect against ESD damage:
  - A properly grounded static-dissipative surface on which to place devices.
  - Static-dissipative floor or mat.
  - A properly grounded conductive wrist strap for each person to wear while handling devices.
- General Handling: Handle the package on the top with a vacuum collet or along the edges with a sharp pair of bent tweezers. Avoiding damaging the RF, DC, & ground contacts on the package bottom. Do not apply excessive pressure to the top of the lid.
- Device Storage: Devices are supplied in heat-sealed, moisture-barrier bags. In this condition, devices are protected and require no special storage conditions. Once the sealed bag has been opened, devices should be stored in a dry nitrogen environment.

Device Usage:

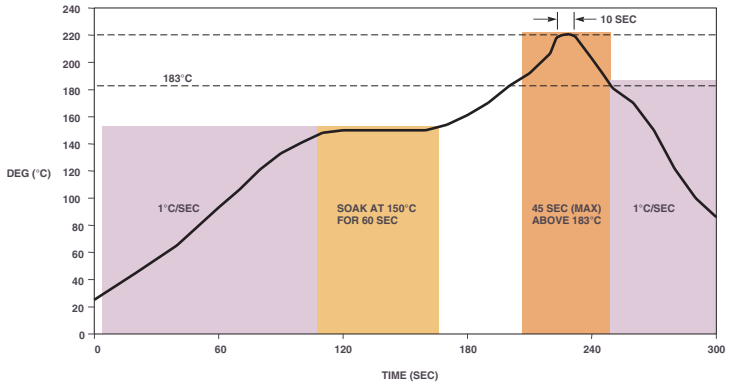
Fairchild RF recommends the following procedures prior to assembly.

- Dry-bake devices at 125°C for 24 hours minimum. Note: The shipping trays cannot withstand 125°C baking temperature
- Assemble the dry-baked devices within 7 days of removal from the oven.
  - During the 7-day period, the devices must be stored in an environment of less than 60% relative humidity and a maximum temperature of 30°C
  - If the 7-day period or the environmental conditions have been exceeded, then the dry-bake procedure must be repeated.

Solder Materials & Temperature Profile:

- Reflow soldering is the preferred method of SMT attachment. Hand soldering is not recommended.
  - Reflow Profile
    - Ramp-up: During this stage the solvents are evaporated from the solder paste. Care should be taken to prevent rapid oxidation (or paste slump) and solder bursts caused by violent solvent out-gassing. A typical heating rate is 1- 2°C/sec.
    - Pre-heat/soak: The soak temperature stage serves two purposes; the flux is activated and the board and devices achieve a uniform temperature. The recommended soak condition is: 120-150 seconds at 150°C.
    - Reflow Zone: If the temperature is too high, then devices may be damaged by mechanical stress due to thermal mismatch or there may be problems due to excessive solder oxidation. Excessive time at temperature can enhance the formation of inter-metallic compounds at the lead/board interface and may lead to early mechanical failure of the joint. Reflow must occur prior to the flux being completely driven off. The duration of peak reflow temperature should not exceed 10 seconds. Maximum soldering temperatures should be in the range 215-220°C, with a maximum limit of 225°C.
- Cooling Zone: Steep thermal gradients may give rise to excessive thermal shock. However, rapid cooling promotes a finer grain structure and a more crack-resistant solder joint. The illustration below indicates the recommended soldering profile.
- Solder Joint Characteristics: Proper operation of this device depends on a reliable void-free attachment of the heatsink to the PWB. The solder joint should be 95% void-free and be a consistent thickness.
- Rework Considerations: Rework of a device attached to a board is limited to reflow of the solder with a heat gun. The device should not be subjected to more than 225°C and reflow solder in the molten state for more than 5 seconds. No more than 2 rework operations should be performed.

Recommended Solder Reflow Profile



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CROSSVOLT™	GlobalOptoisolator™	MicroPak™	QFET®	SuperSOT™-8
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Definition of Terms

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