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AWT6107

EGSM/DCS Dual Band

3.5V GPRS Power Amplifier Module

Advanced Product Information Rev. 1, January 2001

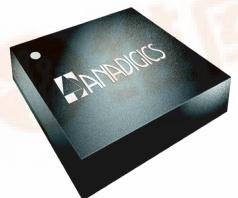


FEATURES

- InGaP HBT Technology
- High Efficiency 55% EGSM
- High Efficiency 50% DCS
- Low Leakage Current ($5\mu A$)
- SMT Module Package
- Small Footprint (9.2mm X 11.6mm)
- Low Profile (1.55 mm)
- 50Ω Input and Output Matching
- Minimal Number of External Components
- GPRS Capable (2 TX Slots)

APPLICATIONS

- EGSM/DCS Dual Band Handsets/PDA
- GPRS Class 10



**9.2x11.6 mm
MCM Module Package**

Description

The AWT6107 power amplifier module has been optimized for dual band operation (EGSM and DCS1800 bands). The amplifier is suitable for class 10 GPRS (2 TX Slots) handsets and similar communication systems. The module integrates practically all circuitry associated with the power amplifier function including bias management and matching components for 50Ω systems. This includes closed loop over control voltage protection making the amplifier extremely rugged. The maximum output power is achieved at a lower control voltage avoiding the need to use rail to rail operational amplifiers in the power control scheme.

The module uses a two stage EGSM power amplifier and a three stage DCS1800 power amplifier. Both power amplifier outputs have V_{CC} present at the output and require DC blocks when interfacing with other circuitry. The input signals have internal DC blocking and require no additional components.

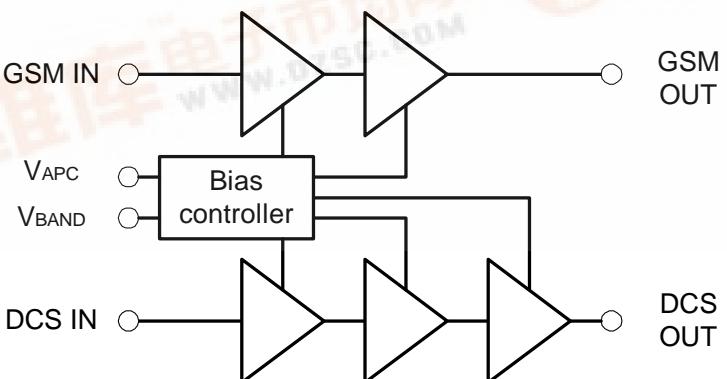


Figure 1: Block Diagram

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Absolute Minimum and Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of this data sheet. Exposure to maximum ratings for extended periods can adversely affect device reliability.

SIGNAL	MIN	MAX	UNITS
Supply Voltage (V_{CC})		+7	V
Input Power (RF_{IN})		+15	dBm
Control Voltage (V_{APC})		+ 4.3V	V
Storage Temperature (T_{STG})	-55	150	°C
Operating Temperature (T_C)	-25	85	°C
Maximum Reflow Temperature		235	°C

Table 1: Absolute Minimum and Maximum Ratings

ESD Precautions

Although protection circuitry has been designed into this device, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. Human body model HBM employed is resistance = 1500Ω , capacitance = 100pF.

Parameter	Method	Rating	UNIT
ESD Threshold Voltage (RF Ports)	HBM	TBD	V
ESD Threshold Voltage (Control Inputs)	HBM	TBD	V
ESD Threshold Voltage (RF Inputs)	CDM	TBD	V
ESD Threshold Voltage (Control Inputs)	CDM	TBD	V

Table 2: ESD Ratings

Operating conditions

The part can be safely operated over these conditions, however, the parametric performance is only guaranteed to the conditions defined in the electrical specification.

SIGNAL	MIN	MAX	UNITS
Supply Voltage (V_{CC})	3.0	4.5	V
Leakage Current ($V_{CC} = 4.5V$, $V_{APC} = 0V$)	0	50	μA
Operating Temperature (T_C)	-20	75	°C

Table 3: Operating Conditions

Electrical Specification

Power Control

Unless otherwise specified: $V_{CC} = 3.5V$, $Z_{IN} = Z_{OUT} = 50\Omega$, $T_c = 25^\circ C \pm 3$, Pulse Width = $1154\mu s$, Duty Cycle = 25%

SIGNAL	MIN	MAX	UNITS
Control Voltage (V_{APC})	0	3.0	V
Control Voltage (I_{APC})	0	0.1	mA
Operating Temperature (T_c)	-20	75	°C

Table 4: Operating Conditions

EGSM:

Test Conditions: $V_{CC} = 3.5V$, $Z_{IN} = Z_{OUT} = 50\Omega$, $T_c = 25^\circ C \pm 3$, $P_{IN} = 10\text{dBm}$, $P_{WIDTH} = 1154\mu s$, Duty Cycle = 25%,

$V_{BAND} = \text{LOW}$

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
Frequency	f_0	880		915	MHz
Control Voltage for P_{MAX}	V_{APC}		1.6	2.2	V
Input Power	P_{IN}	8	10	12	dBm
Output Power ($P_{IN} = 10\text{dBm}$)	P_{OUT}	34.5			dBm
Power Added Efficiency	PAE		55		%
Degraded Output Power $V_{CC} = 3.0V$, $V_{APC} = 2.2V$, $P_{IN} = 8\text{dBm}$, $T_c = 75^\circ C$		32			dBm
Isolation / Min. Output Power $V_{APC} = 0.2V$, $P_{IN} = 12\text{dBm}$	P_{MIN}			-30	dBm
Harmonic 2 nd 3 rd 4 f_0 to 12.75GHz				-4 -7 -7	dBm dBm dBm
Stability: Load 5:1 VSWR All phase angles				-70 or -36	dBc dBm
Ruggedness: $P_{IN} = 12\text{dBm}$, $V_{CC} = 4.5V$, $V_{APC} = 0.2 - 3.0V$				8:1 VSWR All Phases	
Noise Power $f_0 + 20\text{MHz}$			-85	-79	dBm/100 kHz
Switching Time V_{APC} on to 90% detected P_{OUT}				2	μs
Input VSWR				2:1	
2nd Harmonic power at DCS output				-20	dBm

Table 5: EGSM Electrical Specification

Electrical Specification

DCS:

Test Conditions: $V_{CC} = 3.5V$, $Z_{IN} = Z_{OUT} = 50\Omega$, $T_c = 25^\circ C \pm 3$, $P_{IN} = 8dBm$, $P_{WIDTH} = 1154\mu s$, Duty Cycle = 25%,

$V_{BAND} = HIGH$

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
Frequency	f_0	1710	-	1785	MHz
Control Voltage	P_{OUT}		1.6	2.2	V
Input Power	P_{IN}	6	8	10	dBm
Output Power DCS ($P_{IN} = 8dBm$)	P_{OUT}	31.5			dBm
Power Added Efficiency	PAE		50		%
Degraded Output Power $V_{CC} = 3.0V$, $V_{APC} = 2.2V$, $P_{IN} = 6dBm$, $T_c = 75^\circ C$		29.5			dBm
Isolation $V_{APC} = 0.2V$, $P_{IN} = 8dBm$				-30	dBm
Harmonics 2 nd 3 rd 4 f_0 to 12.75GHz				-4 -7 -7	dBm dBm dBm
Stability: Load 5:1 VSWR All phase angles				-70 or -36	dBc dBm
Ruggedness: $P_{IN} = 10 dBm$, $V_{CC} = 4.5V$, $V_{APC} = 0.2 - 3.0V$				8:1 VSWR All Phases	
Noise Power $f_0 + 20MHz$			-85		dBm/100 kHz
Switching Time V_{APC} on to 90% detected P_{OUT}				2	μs
Input VSWR				2:1	

Table 6: DCS Electrical Specification

Logic Level Definitions:

The band select pin (V_{BAND}) is used to select which amplifier will be enabled by the voltage applied to the V_{APC} input.

SIGNAL	MIN	MAX	UNITS
Logic High	2	3	V
Logic Low	0	0.5	V
Input bias current		10	μA

Table 7: Logic Level Definitions

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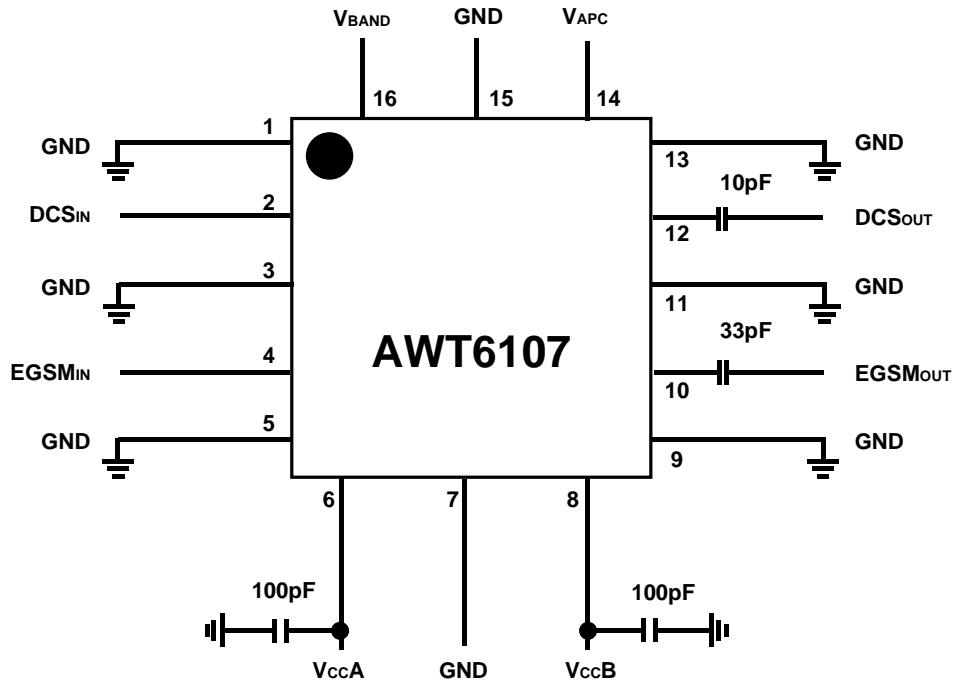


Figure 2: Evaluation Board Schematic

Pin	Name	Description
0	GND	Paddle
1	GND	Ground
2	DCS_IN	DCS RF input
3	GND	Ground
4	GSM_IN	GSM RF input
5	GND	Ground
6	VCCA	Supply voltage for bias and pre-amplifiers
7	GND	Ground
8	VCCB	Supply Voltage for output stages
9	GND	Ground
10	GSM_OUT	GSM RF output
11	GND	Ground
12	DCS	DCS RF output
13	GND	Ground
14	VAPC	Power Control
15	GND	Ground
16	VBAND	Band Select

Table 8: Pin Descriptions

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Dimensions in mm.

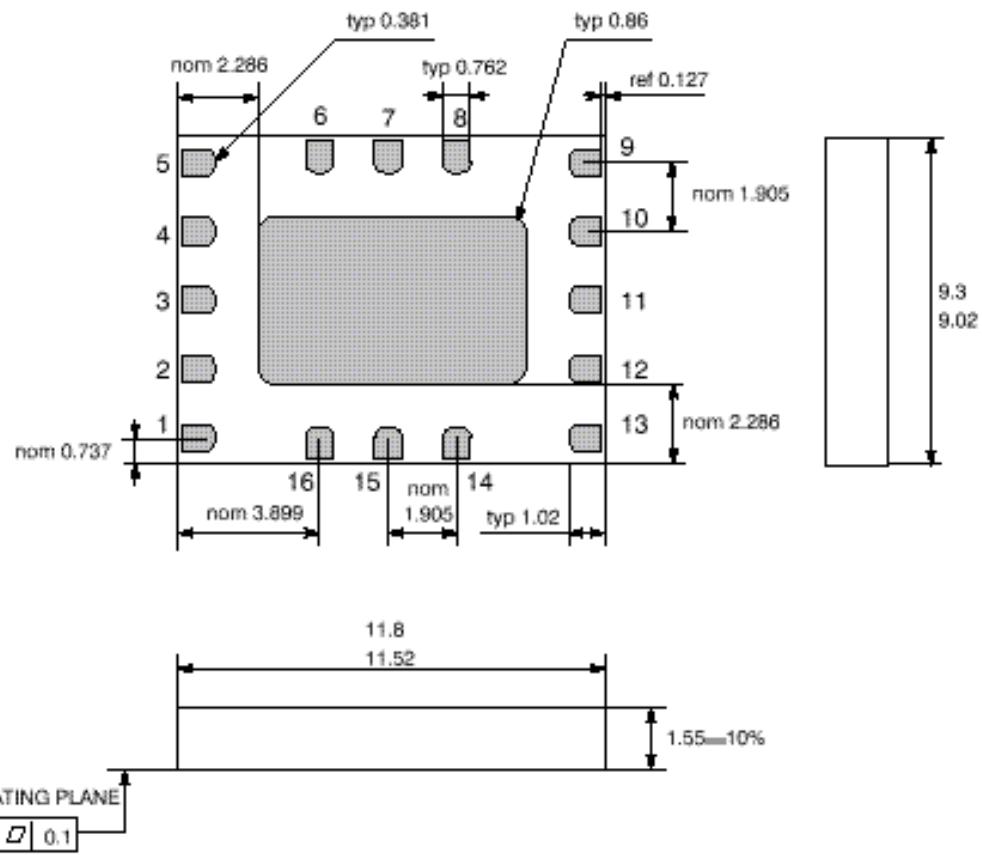


Figure 3: Package Outline Drawing (Bottom View)

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NOTES



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