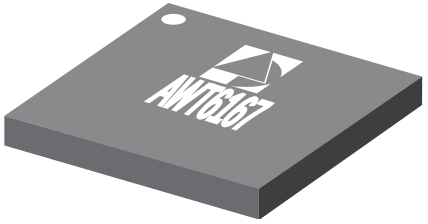
AWT6167

GSM900/DCS
Dual Band Power Amplifier Module
With Integrated Power Control

ADVANCED PRODUCT INFORMATION - Rev 0.1

FEATURES

- Integrated Vreg (regulated supply)
- Harmonic Performance ≤ -25 dBm
- High Efficiency (PAE) at Pmax:
  -GSM900, 56 %
  -DCS, 53 %
- +35 dBm GSM900 Output Power at 3.5 V
- +33 dBm DCS Output Power at 3.5 V
- 55 dB dynamic range
- GPRS Class 12 Capable



18 Pin
6 mm x 6 mm x 1.3 mm
Amplifier Module

APPLICATIONS

- Dual Band Handsets & PDAs

PRODUCT DESCRIPTION

As with previous generations, the AWT6167 integrated CMOS power control scheme simplifies the design of the transmitter by eliminating the need for external power control circuitry.

The AWT6167 input and output terminals are internal matched to 50 ohms and DC blocked, reducing the number of external components required in the final application. Both PA die, GSM900 and DCS, are fabricated using state of the art InGaP HBT technology, known for it is proven reliability and temperature stability.

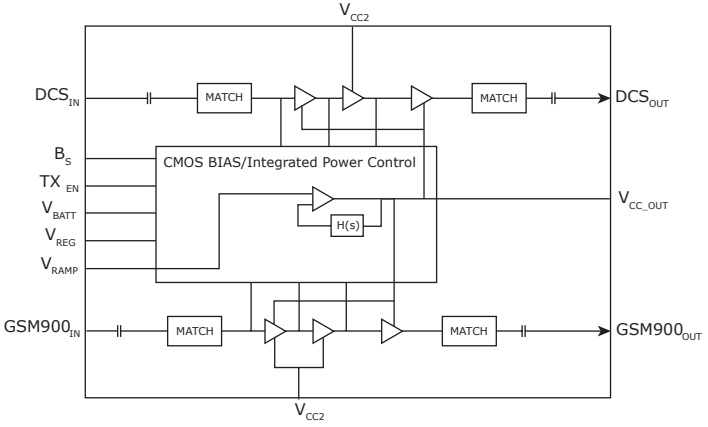


Figure 1: Block Diagram

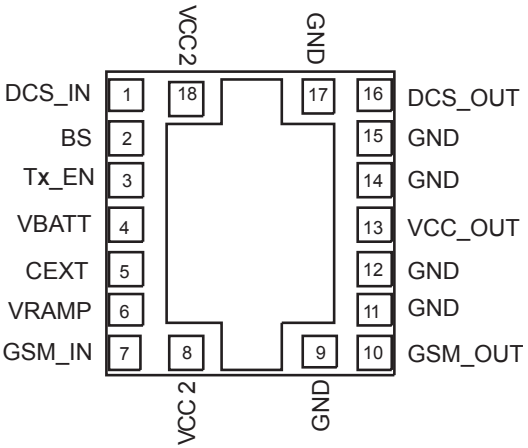


Figure 2: Pinout (X- ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
1	DCS_IN	DCS RF Input	10	GSM_OUT	GSM900 RF Output
2	BS	Band Select Logic Input	11	GND	Ground
3	TX_EN	TX Enable Logic Input	12	GND	Ground
4	VBATT	Battery Supply Connection	13	VCC_OUT	Control Voltage Output which must be connected to VCC2
5	CEXT	Bypass	14	GND	Ground
6	VRAMP	Analog Signal used to control the output power	15	GND	Ground
7	GSM_IN	GSM900 RF Input	16	DCS_OUT	DCS RF Output
8	VCC2	VCC Control Input for GSM900 Pre-amplifier	17	GND	Ground
9	GND	Ground	18	VCC2	VCC Control Input for DCS Pre-amplifier

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{BATT})	-	+7	V
RF Input Power (RF_{IN})	-	11	dBm
Control Voltages (V_{RAMP})	-0.3	1.8	V
Storage Temperature (T_{STG})	- 55	150	°C

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Table 3: ESD Ratings

PARAMETER	METHOD	RATING	UNIT
ESD Threshold voltage (RF ports)	HBM	>2.5	kV
ESD Threshold voltage (control inputs)	HBM	>2.5	kV

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 = 1500 Ω, capacitance = 100 pF.

Table 4: Digital Inputs

PARAMETER	MIN	TYP	MAX	UNIT
Logic High Voltage (V_{IH})	1.2	-	3.0	V
Logic Low Voltage (V_{IL})	-	-	0.5	V
Logic High Current (I_{IH})	-	-	30	µA
Logic Low Current (I_{IL})	-	-	30	µA

Table 5: Control Logic Table

MODE	Tx_EN	BS
PA Enable	HIGH	X
GSM900 Mode	HIGH	LOW
DCS Mode	HIGH	HIGH
PA Disable	LOW	X

Table 6: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Case Temperature (T_C)	-20	-	85	°C	
Supply Voltage (V_{BATT})	3.0	3.5	4.8	V	
Power Supply Leakage Current	-	1	10	µA	V_{BATT} = 4.8 V, V_{RAMP} = 0 V, TX_EN = LOW, No RF applied
Control Voltage Range	0.2	-	1.6	V	
Turn on time (T_{ON})	-	-	1	µs	V_{RAMP} = 0.2 V, TX_EN = LOW → High P_{IN} = 5 dBm
Turn off time (T_{OFF})	-	-	1	µs	V_{RAMP} = 0.2 V, TX_EN = HIGH → LOW P_{IN} = 5 dBm
Rise Time (T_{RISE})	-	-	1	µs	P_{OUT} = -10 dBm →P_{MAX} (within 0.2 dB)
Fall Time (T_{FALL})	-	-	1	µs	P_{OUT} = P_{MAX}→ -10 dBm (within 0.2 dB)
V_{RAMP} Input Capacitance	-	3	-	pF	
V_{RAMP} Input Current	-	-	10	µA	
Duty Cycle	-	-	50	%	

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical specifications.

Table 7: Electrical Characteristics for GSM900

(V_{BATT} = 3.5 V, P_{IN} = 3.0 dBm, Pulse Width =1154 µs, Duty 25%, Z_{IN} = Z_{OUT} = 50 Ω, T_C = 25 °C, V_{RAMP} = 1.6 V, BS = LOW, TX_EN = HIGH)

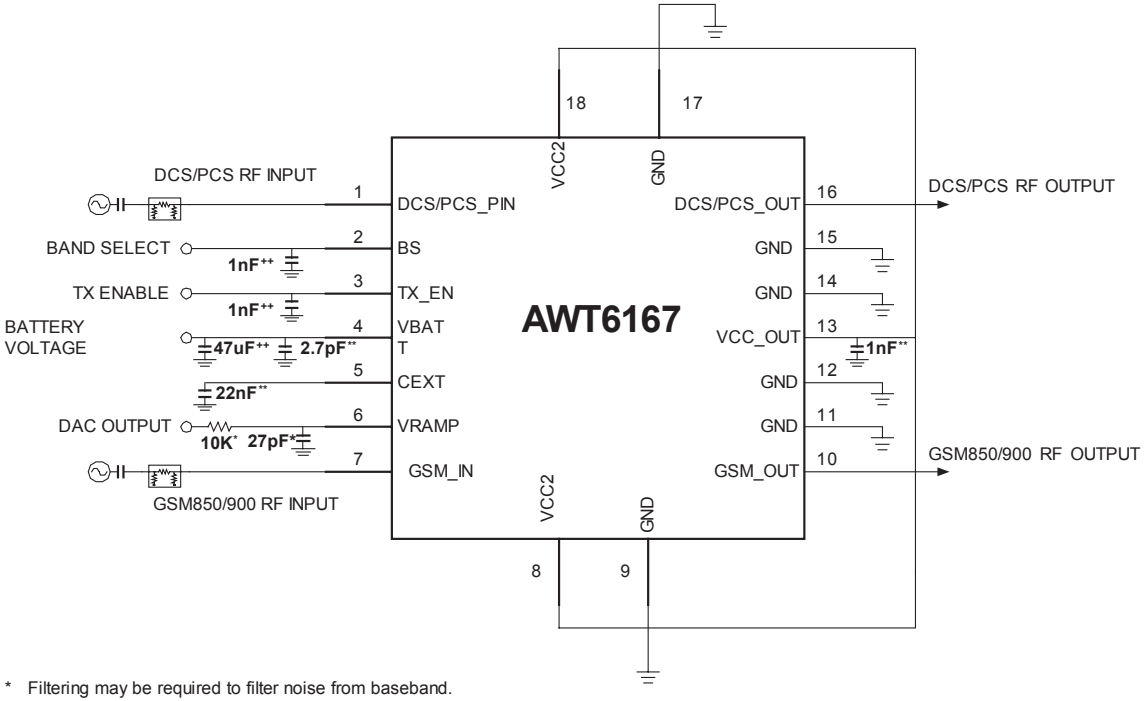
PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Operating Frequency (F_o)	880	-	915	MHz	
Input Power	0	3.0	5	dBm	
Output Power, P_{MAX}	34.5	35.0	-	dBm	Freq = 880 to 915 MHz
Degraded Output Power	32.5	33.5	-	dBm	V_{BATT} = 3.0 V, T_C = 85 ^{O}C, P_{IN} = 0 dBm
PAE @ P_{MAX}	-	56	-	%	Freq = 880 to 915 MHz
Forward Isolation 1	-	-35	-	dBm	TX_EN = LOW, P_{IN} = 5 dBm
Forward Isolation 2	-	-25	-	dBm	TX_EN = HIGH, V_{RAMP} = 0.2 V, P_{IN} = 5 dBm
Cross Isolation ($2F_o$ @ DCS Port)	-	-30	-	dBm	V_{RAMP} = 0.2 V to V_{RAMP_MAX}
Harmonics 2fo n*F_o, (n ≥ 3), Fo ≤ 12.75 GHz	- -	-25 -30	- -	dBm	Over all output power levels
Stability	VSWR = 8:1 All Phases, P_{OUT} ≤ 34.5 dBm				
	-	-	-36	dBm	F_{OUT} < 1 GHz
	-	-	-30	dBm	F_{OUT} > 1 GHz
Ruggedness	-	-	10:1	VSWR	All load phases, P_{OUT} < 34.5 dBm
RX Noise Power	-	-84	-	dBm	F_{TX} = 915 MHz, RBW = 100 kHz, F_{RX} = 925 to 935 MHz, P_{OUT} ≤ 34.5 dBm
	-	-87	-	dBm	F_{TX} = 915 MHz, RBW = 100 kHz, F_{RX} = 935 to 960 MHz, P_{OUT} ≤ 34.5 dBm
Input VSWR	-	1.5:1	-	-	Over all output power levels

Table 8: Electrical Characteristics for DCS

(V_{BATT} = 3.5 V, P_{IN} = 3.0 dBm, Pulse Width =1154 µs, Duty 25%, Z_{IN} = Z_{OUT} = 50 Ω, T_C = 25 °C, V_{RAMP} = 1.6 V, BS = HIGH, TX_EN = HIGH)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Operating Frequency (F_o)	1710	-	1785	MHz	
Input Power	0	3.0	5	dBm	
Output Power, P_{MAX}	32	33	-	dBm	
Degraded Output Power	30	31	-	dBm	V_{BATT} = 3.0 V, T_C = 85 °C, P_{IN} = 0 dBm
PAE @ P_{MAX}	-	53	-	%	Freq = 1710 to 1785 MHz
Forward Isolation 1	-	-40	-	dBm	TX_EN = LOW, V_{RAMP} = 0.2 V P_{IN} = 5 dBm,
Forward Isolation 2	-	-18	-	dBm	TX_EN = HIGH, V_{RAMP} = 0.2 V, P_{IN} = 5 dBm
Harmonics 2fo n*F_o, (n ≥ 3), Fo ≤ 12.75 GHz	- -	-20 -30	- -	dBm	Over all output power levels
Stability	VSWR = 8:1 All Phases, P_{OUT} ≤ 32 dBm				
	-	-	-36	dBm	F_{OUT} < 1 GHz
	-	-	-30	dBm	F_{OUT} > 1 GHz
Ruggedness	-	-	10:1	VSWR	All load phases, P_{OUT} < 32 dBm
RX Noise Power	-	-86	-	dBm	F_{TX} = 1785 MHz, RBW = 100 kHz, F_{RX} = 1805 to 1880 MHz, P_{OUT} ≤ 32 dBm
Input VSWR	-	1.5:1	-	-	Over all output power levels

APPLICATION INFORMATION



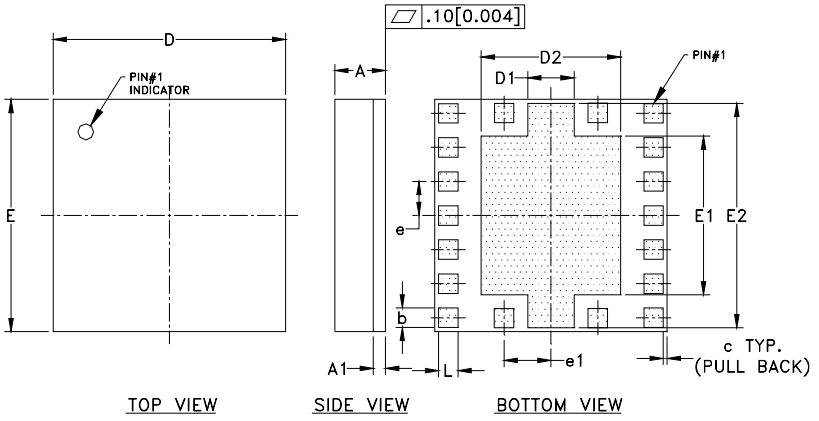
* Filtering may be required to filter noise from baseband.

** This component should be placed as close to the device pin as possible.

++ These components are recommended as good design practice for improving noise rejection characteristics. The values specified are not critical as they may not be required in the final application.

Figure 3: Application Schematic

PACKAGE OUTLINE



SYMBOL	MILLIMETERS			INCHES			NOTE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	1.16	1.31	1.46	0.045	0.051	0.057	–
A1	–	0.30	–	–	0.012	–	–
b	–	0.50	–	–	0.020	–	–
c	–	0.10	–	–	0.004	–	–
D	5.88	6.00	6.12	0.231	0.236	0.240	–
D1	–	1.19	–	–	0.047	–	–
D2	–	3.58	–	–	0.141	–	–
E	5.88	6.00	6.12	0.231	0.236	0.240	–
E1	–	4.08	–	–	0.161	–	–
E2	–	5.79	–	–	0.228	–	–
e	–	0.89	–	–	0.035	–	–
e1	–	1.22	–	–	0.048	–	–
L	–	0.50	–	–	0.020	–	–

NOTES:

1. CONTROLLING DIMENSIONS: MILLIMETERS
2. UNLESS SPECIFIED TOLERANCE=±0.076[0.003].
3. –
   –
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Figure 4: Package Outline

1. PIN 1 INDICATOR:	LASER MARK
2. ANADIGICS LOGO SIZE:	X=0.040±0.010 Y=0.048±0.010
3. TEXT:	TYPE: ELITE SIZE: AS LARGE AS POSSIBLE
4. PART NUMBER:	AWT6167
5. YEAR AND WORK WEEK:	YYWW: YY = YEAR, WW = WORK WEEK
6. WAFER LOT NUMBER: – WAFER ID:	LLLLL = WAFER LOT# –SS = WAFER I.D.
7. BOM NUMBER:	BBBB–N
8. COUNTRY CODE:	CC = TH for THAILAND, TW for TAIWAN, PH for PHILIPPINES, CH for CHINA, ID for INDONESIA, HK for HONG KONG

Figure 5: Branding Specification

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