AWT6202

GSM850/GSM900/DCS/PCS Quad Band PowerPlexer™ with Integrated Power Control

ADVANCED PRODUCT INFORMATION - Rev 0.3

FEATURES

- ANADIGICS developed technologies (InGaP HBT/pHEMT)
- High Module Efficiency:
  45% GSM900 (Equivalent 57% PA Efficiency)
  40% DCS (Equivalent 52% PA Efficiency)
- Fully Compliant Harmonics Under Mismatch
- Integrated Power Control Scheme
- Integrated Reference Voltage
- Integrated PA/Switch/Low Pass Filters
- Symmetrical low loss receive paths
- High isolation switch (TX to RX, RX on/off)
- ESD protected antenna port (15 kV)
- Small footprint (6 mm x 6 mm x 1.0 mm)
- GPRS capable (class 12)
- Power control range >50dB

APPLICATIONS

- Dual/Tri/Quad BandHandsets and PDAs

PRODUCT DESCRIPTION

The AWT6202 is the third generation GSM PowerPlexer™. It has been developed to minimize time to market for GSM handset and PDA designers.

This highly integrated module requires only basic RF decoupling and DC blocking on the receive and antenna ports. All the RF ports are 50 Ω. The part also has an excellent ESD rating of 1 kV on RF inputs and 15 kV on the antenna port.

The temperature stability of the high gain HBT PAs are ideal for supporting class 12 GPRS, while the low loss pHEMT switch provides high isolation with very low current consumption.

The integrated power control scheme reduces the number of external components associated with a power control function, and facilitates fast and easy production calibration. The power control range is typically 55 dB.

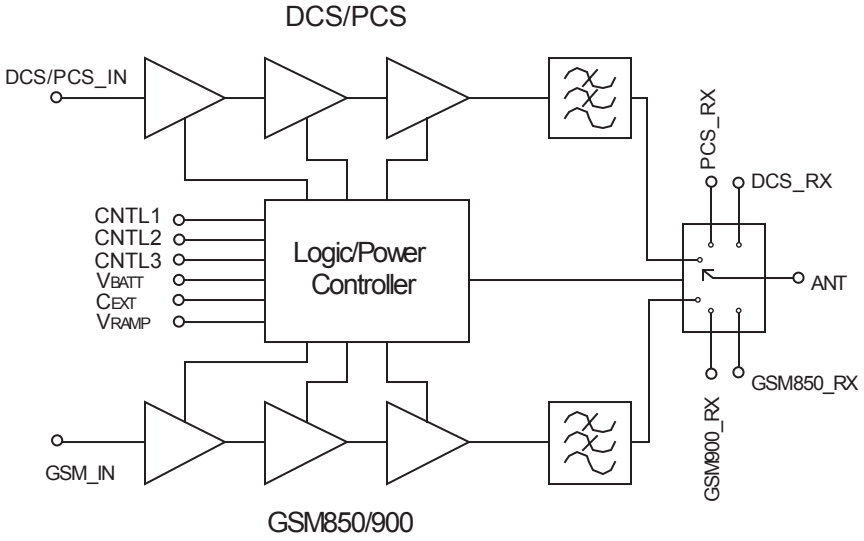


Figure 1: Functional Block Diagram

ELECTRICAL CHARACTERISTICS

Table 1: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{CC})	-	+7	V
Input Power (RF_{IN})	-	+11	dBm
Power Control Voltage (V_{RAMP})	-	1.8	V
Storage Temperature (T_{STG})	-55	150	°C
Maximum Reflow Temperature	-	240	°C

Exceeding 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.

Table 2: ESD Ratings

PARAMETER	METHOD	RATING	UNIT
ESD Threshold Voltage (Antenna Port)	HBM	15	kV
ESD Threshold Voltage (Control Inputs)	HBM	1	kV
ESD Threshold Voltage (RF Inputs)	HBM	1	kV
ESD Threshold Voltage (RX Ports)	HBM	300	V

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.

Table 3: Logic Level Definitions
(V_{CC} = 3.0 to 4.8 V, T_C = 25 ± 3 °C)

PARAMETER	MIN	TYP	MAX	UNIT
VOH	1.2	-	3	V
VOL	-0.2	-	0.5	V
Input Bias Current	-	-	10	μA

Table 4: Logic Control Table

MODE	CNTL 1	CNTL2	CNTL3	DESCRIPTION
SHUTDOWN	0	0	0	Low current state where module is disabled.
GSM850_RX_EN	1	0	1	This mode enables a low loss path from the antenna to GSM850_RX port. PAs are disabled.
GSM900_RX_EN	0	1	0	This mode enables a low loss path from the antenna to GSM900_RX port. PAs are disabled.
DCS_RX_EN	1	1	0	This mode enables a low loss path from the antenna to DCS_RX port. PAs are disabled.
PCS_RX_EN	0	0	1	This mode enables a low loss path from the antenna to PCS_RX port. PAs are disabled.
GSM_TX_EN	1	0	0	Switch is in transmit mode and GSM850/900 PA is enabled.
DCS_PCS_TX_EN	1	1	1	Switch is in transmit mode and DCS/PCS PA is enabled.
Not USed	0	1	1	Not Used. PAs Disabled.

Table 5: Control Timing

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Switching Delay from RX to TX Mode	-	0.5	-	µs	
Switching Delay from TX to RX Mode	-	0.5	-	µs	
Switching Delay from RX to Shutdown	-	0.5	-	µs	
Switching Delay from TX to Shutdown	-	0.5	-	µs	
P_{OUT} Rise Time	-	1	-	µs	Time for power at antenna to rise from -10 dBm to within 0.2 dB of maximum output power.
P_{OUT} Fall Time	-	1	-	µs	Time for power at antenna to fall from maximum output power to within 0.2 dB of -10 dBm.

Table 6: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Supply Voltage (V_{BATT})	3.0	3.5	4.8	V	
Power Down Current (V_{BATT} = 4.8 V)	0	-	10	µA	
RX Current (V_{BATT} = 4.8 V)	0	-	30	µA	
Control Voltage (V_{RAMP})	0.2	-	1.6	V	
V_{RAMP} Input Capacitance	-	3	-	pF	
Case Temperature (T_C)	-20	-	85	°C	
Duty Cycle	-	-	50	%	

Parametric performance is guaranteed under specified operating conditions.

Table 7: Receiver Specifications
(Mode = RX (see control table), V_{BATT} = 3.5 V, Z_{IN} = Z_{OUT} = 50 Ω, T_C = 25 ± 3 °C)

PARAMETER	MIN	TYP	MAX	UNIT	Comments
GSM850/900 Insertion loss	-	1.0	-	dB	F_{IN} = 869 to 960 MHz, V_{BATT} = 3.0 to 4.8 V, T_C = -20 to +85°C
DCS/PCS Insertion loss	-	1.2	-	dB	F_{IN} = 1805 to 1990 MHz , V_{BATT} = 3.0 to 4.8 V, T_C = -20 to +85°C
Receiver Return loss	15	-	-	dB	F_{IN} = 869 to 960 MHz
	15	-	-	dB	F_{IN} = 1805 to 1990 MHz
Receiver Isolation ANT to RX_OFF	25	-	-	dB	F_{IN} = 869 to 960 MHz
	25	-	-	dB	F_{IN} = 1805 to 1990 MHz
TX Power at RX ports	-	-10	-	dBm	GSM850/900 P_{OUT} = 33.2 dBm
	-	-13	-	dBm	DCS/PCS P_{OUT} = 30.3 dBm

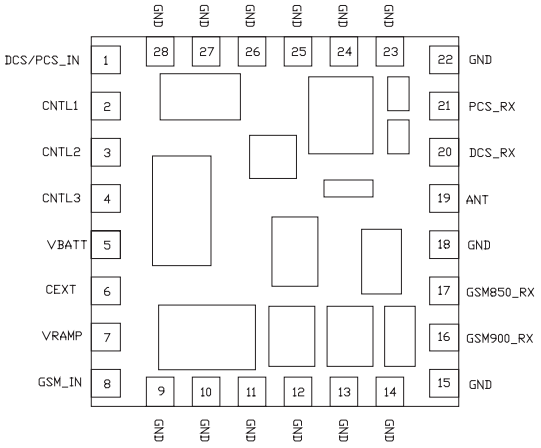
Table 8: GSM850/900 Electrical Specification
(Mode = GSM_TX_EN, V_{BATT} = 3.5 V, Z_{IN} = Z_{OUT} = 50 ς, T_C = 25 ± 3 °C, P_{IN} = 3 dBm, P_{WIDTH} = 1154 µs, Duty Cycle = 25%)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Frequency (F_{IN})	824 880	- -	849 915	MHz MHz	
Input Power (P_{IN})	0	3	5	dBm	
Output Power (P_{OUT})	33.2	33.7	-	dBm	V_{RAMP} = 1.6 V
Degraded Output Power	30.8	31.7	-	dBm	V_{BATT} = 3.0 V, V_{RAMP} = 1.6 V, P_{IN} = 0 dBm, T_C = 85°C
Module Efficiency (PA+Switch+Filter)	-	45	-	%	V_{RAMP} = 1.6 V, PIN = 3 dBm, V_{BATT} = 3.5 V
Forward Isolation 1	-	-55	-51	dBm	P_{IN} = 5 dBm, V_{BATT} = 3 to 4.8 V Mode = GSM900_RX_EN or GSM850_RX_EN, see control table
Forward Isolation 2	-	-25	-10	dBm	V_{RAMP} = 0.2 V, PIN = 5 dBm, V_{BATT} = 3 to 4.8 V Mode = GSM_TX_EN, see control table
Harmonic 2nd 3fo to 12.75 GHz	- -	-40 -40	- -	dBm	V_{BATT} = 3 to 4.8 V, P_{OUT} = 5 to 33.2 dBm
Stability: < 1GHz > 1GHz	- -	- -	-36 -30	dBm	VSWR =10:1 All angles V_{BATT} = 3 to 4.8 V, P_{OUT} = 5 to 33.2 dBm, T_C = -20 to 85 °C
Ruggedness	10:1	-	-	VSWR	P_{IN} = 5 dBm, V_{BATT} = 4.8 V, P_{OUT} = 5 to 33.2 dBm, All phases of load
RX Band Noise	-	-88	-84	dBm	F_{IN} = 849 MHz F_{OUT} = 869 to 894 MHz RBW = VBW = 100 kHz, P_{OUT} = 5 to 33.2 dBm
	-	-81	-78	dBm	F_{IN} = 915 MHz F_{OUT} = 925 to 935 MHz RBW = VBW = 100 kHz, P_{OUT} = 5 to 33.2 dBm
	-	-88	-84	dBm	F_{IN} = 915 MHz F_{OUT} = 935 to 960 MHz RBW = VBW = 100 kHz, P_{OUT} = 5 to 33.2d Bm
Input VSWR	-	-	2.5:1		All power levels

Table 9: DCS/PCS Electrical Specification
(Mode = DCS_PCS_TX_EN, V_{BATT} = 3.5 V, Z_{IN} = Z_{OUT} = 50 Ω, T_C = 25 ± 3 °C, P_{IN} = 3 dBm, P_{WIDTH} = 1154 μs, Duty Cycle = 25%)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Frequency (F_{IN})	1710 1850	- -	1785 1910	MHz MHz	
Input Power (P_{IN})	0	3	5	dBm	
Output Power DCS/PCS (P_{OUT})	30.3	31.3	-	dBm	V_{RAMP} = 1.6 V
Degraded Output Power	28.0	29.0	-	dBm	V_{BATT} = 3.0 V, V_{RAMP} = 1.6 V, P_{IN} = 0 dBm, Tc = 85°C
Module Efficiency (PA+Switch+Filter)	-	40	-	%	V_{BATT} = 3.5 V, V_{RAMP} = 1.6 V, P_{IN} = 3 dBm,
Forward Isolation 1	-	-55	-51	dBm	P_{IN} = 5 dBm, V_{BATT} = 3 to 4.8 V Mode = DCS_RX_EN or PCS_RX_EN, see control table
Forward Isolation 2	-	-25	-10	dBm	V_{RAMP} = 0.2 V, P_{IN} = 5 dBm, V_{BATT} = 3 to 4.8 V Mode = DCS_PCS_TX_EN, see control table
Harmonics 2fo to 12.75 GHz	-	-40	-	dBm	V_{BATT} = 3 to 4.8 V, P_{OUT} = 0 to 30.3dBm
Stability: < 1GHz > 1GHz	- -	- -	-36 -30	dBm	VSWR =10:1 All angles V_{BATT} = 3 to 4.8 V, P_{OUT} = 0 to 30.4 dBm, T_C = -20 to 85 °C
Ruggedness:	10:1	-	-	VSWR	P_{IN} = 5 dBm, V_{BATT} = 4.8 V, P_{OUT} = 0 to 30.3 dBm, All phases of load
RX Band Noise	-	-88	-84	dBm	F_{IN} = 1785 or 1910 MHz, F_{OUT} = 1805 to 1880 MHz, or 1930 to 1990 MHz P_{OUT} = 0 to 30.3 dBm, RBW = VBW = 100 kHz
Input VSWR	-	-	2.5:1		All power levels

Figure 2: Pinout (X-Ray View)

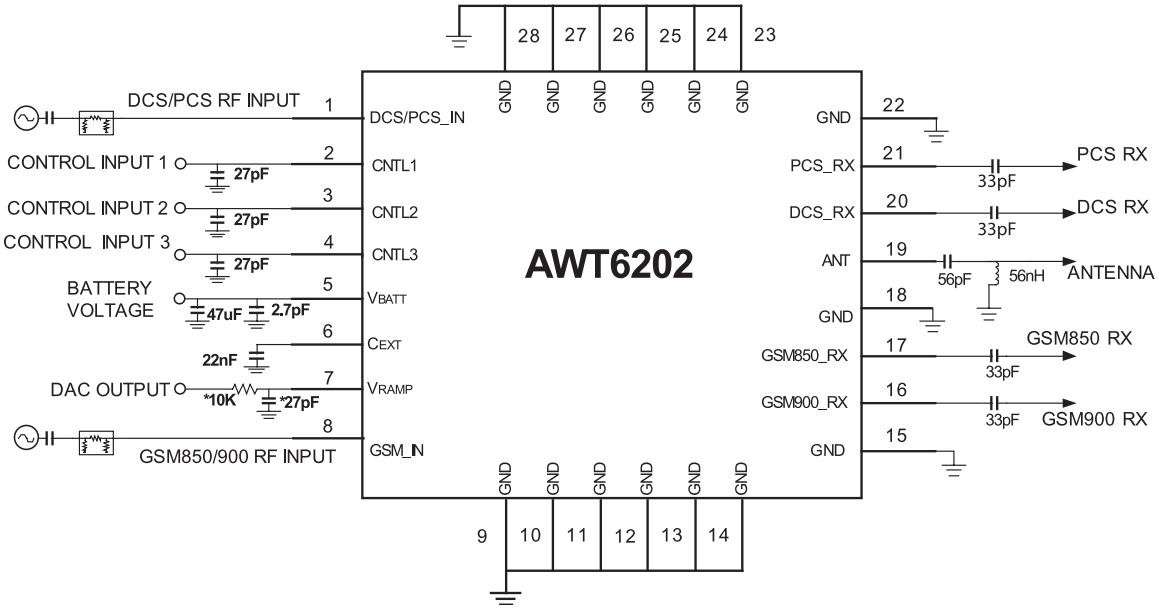


Note: unassigned pins are ground pads

Table 10: Pinout Description

PIN	NAME	FUNCTION	PIN	NAME	FUNCTION
1	DCS/PCS_IN	DCS/PCS RF Input	15	GND	Ground
2	CNTL1	Control logic input	16	GSM900_RX	GSM900 receive port
3	CNTL2	Control logic input	17	GSM850_RX	GSM850 receive port
4	CNTL3	Control logic input	18	GND	Ground
5	V_{BATT}	Battery supply connection	19	ANT	Antenna port
6	C_{EXT}	Bypass	20	DCS_RX	DCS receive port
7	V_{RAMP}	Analog input for power control	21	PCS_RX	PCS receive port
8	GSM_IN	GSM850/900 RF Input	22	GND	Ground
9	GND	Ground	23	GND	Ground
10	GND	Ground	24	GND	Ground
11	GND	Ground	25	GND	Ground
12	GND	Ground	26	GND	Ground
13	GND	Ground	27	GND	Ground
14	GND	Ground	28	GND	Ground

APPLICATION INFORMATION



* May be required to filter baseband noise

Figure 3: Recommended Application Circuit

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