AWT6521

Multi-Band LTE/CDMA/WCDMA/HSPA Power Amplifier

Data Sheet - Rev 2.4

FEATURES

- LTE, WCDMA/HSPA & CDMA/EVDO Applications
- High Output Power
  - +28.5 dBm or more in WCDMA (R99)
  - +27.5 dBm or more in CDMA (RC1)
- High power-added efficiency
  - 40% in high power mode (WCDMA mode)
- Low profile 5 mm x 7 mm x 1 mm package
- 2 input ports, 5 output ports, all matched to 50 Ω impedance
- Integrated voltage regulator
- Built-in Directional Coupler
- Internal DC block on IN/OUT RF ports
- Low leakage in shutdown mode
- ESD Protection on all pins
- RoHS-compliant package, MSL-3, 260°C

22 Pin 5 mm x 7 mm x 1 mm Surface Mount Module

APPLICATIONS

- LTE, WCDMA/HSPA handsets and data devices operating in UMTS Bands 1, 2, 3, 4, 5, 8 and 25
- CDMA/EVDO handsets and data devices operating in Band Class 0, 1, 6 and 15

PRODUCT DESCRIPTION

The AWT6521 Power Amplifier module is designed for 3G/4G handsets, smartphones, modems and modules operating in LTE, WCDMA/HSPA and CDMA/EVDO modes. The module includes two separate InGaP HBT amplifier chains - one to support 850/900 bands, the other for 1700/1900/2100MHz bands. An innovative design allows the module to switch output among as many as 5 different frequency bands. Both the input and output RF ports are internally matched to 50 Ω. The AWT6521 offers improved efficiency and low quiescent current, and includes integrated daisy chained couplers to simplify board design and layout.

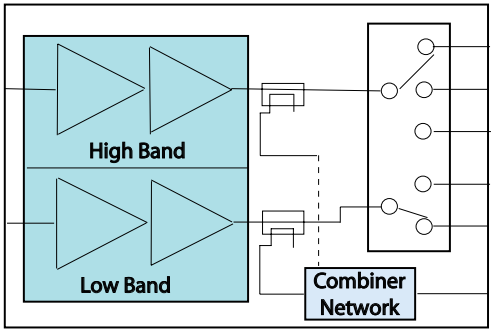


Figure 1: Block Diagram

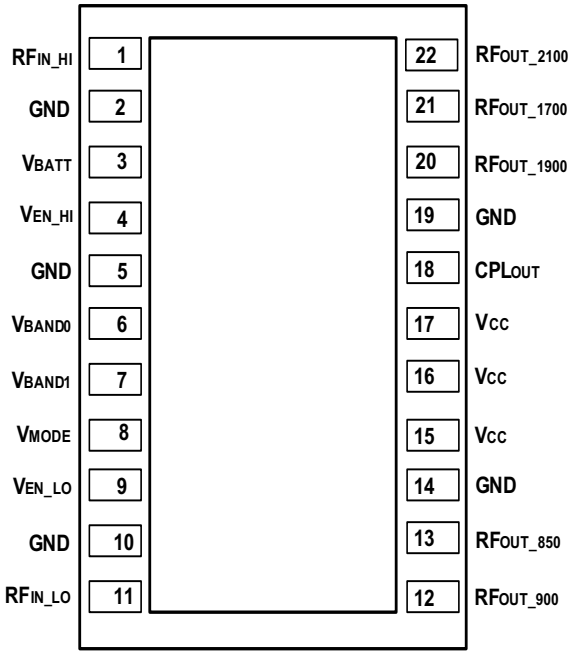


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
1	RF_{IN_HI}	RF Input for 1700/1800/1900 MHz Bands	12	RF_{OUT_900}	RF Output for 900 MHz Band
2	GND	Ground	13	RF_{OUT_850}	RF Output for 850 MHz Band
3	V_{BATT}	Battery Voltage	14	GND	Ground
4	V_{EN_HI}	Enable Voltage for High Bands	15	V_{CC}	Supply Voltage
5	GND	Ground	16	V_{CC}	Supply Voltage
6	V_{BAND0}	Low Band Select Voltage	17	V_{CC}	Supply Voltage
7	V_{BAND1}	High Band Select Voltage	18	$CPL_{\_OUT}$	Coupler Output Port
8	V_{MODE}	Mode Control Voltage	19	GND	Ground
9	V_{EN_LO}	Enable Voltage for Low Bands	20	RF_{OUT_1900}	RF Output for 1900 MHz Band
10	GND	Ground	21	RF_{OUT_1700}	RF Output for 1700 MHz Band
11	RF_{IN_LO}	RF input for 850/900 MHz Bands	22	RF_{OUT_2100}	RF Output for 2100 MHz Band

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{BATT}, V_{CC})	0	+5	V
Control Voltages (V_{MODE}, $V_{BAND0/1}$)	0	+3.5	V
Enable Voltages (V_{EN_HI}, V_{EN_LO})	0	+3.5	V
Input RF power (RF_{IN_HI}, RF_{IN_LO})	-	+10	dBm
Storage temperature	-30	+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: Operating Ranges

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Operating Frequency (f)	824 880 1710 1850 1920	- - - - -	849 915 1785 1915 1980	MHz	UMTS Band 5, BC 0 UMTS Band 8 UMTS Band 3 & 4, BC 15 UMTS Band 2 & 25, BC 1 UMTS Band 1, BC 6
Supply Voltage (V_{CC})	+0.5	+3.3	+4.35	V	
Supply Voltage (V_{BATT})	+2.9	+3.3	+4.35	V	
Control Voltages (V_{MODE1}, $V_{BAND0/1}$)	+1.35 0	+1.8 -	+3.1 +0.4	V	Select High State Select Low State
Enable Voltage (V_{EN_HI}, V_{EN_LO})	+1.35 0	+1.8 -	+3.1 +0.4	V	Select High State Select Low State
Output Power (UMTS) [1]					
R99, HPM	+27.9	+28.5	-	dBm	UMTS Band 1, 3, 4, 5
HSPA (MPR = 0), HPM	+26.9	+27.5	-		UMTS Band 1, 3, 4, 5
LTE (MPR = 0), HPM	+26.4	+27.0	-		UMTS Band 1, 3, 4, 5
R99, LPM	+15.4	+16.0	-		UMTS Band 1, 3, 4, 5
HSPA (MPR = 0), LPM	+14.4	+15.0	-		UMTS Band 1, 3, 4, 5
LTE (MPR = 0), LPM	+14.4	+15.0	-		UMTS Band 1, 3, 4, 5
R99, HPM	+28.4	+29.0	-		UMTS Band 2, 25
HSPA (MPR = 0), HPM	+27.4	+28.0	-		UMTS Band 2, 25
LTE (MPR = 0), HPM	+26.9	+27.5	-		UMTS Band 2, 25
R99, LPM	+15.4	+16.0	-		UMTS Band 2, 25
HSPA (MPR = 0), LPM	+14.4	+15.0	-		UMTS Band 2, 25
LTE (MPR = 0), LPM	+14.4	+15.0	-		UMTS Band 2, 25
R99, HPM	+28.2	+28.8	-		UMTS Band 8
HSPA (MPR = 0), HPM	+27.2	+27.8	-		UMTS Band 8
LTE (MPR = 0), HPM	+26.4	+27.0	-		UMTS Band 8
R99, LPM	+15.4	+16.0	-		UMTS Band 8
HSPA (MPR = 0), LPM	+14.4	+15.0	-		UMTS Band 8
LTE (MPR = 0), LPM	+14.4	+15.0	-		UMTS Band 8
CDMA Output Power [1]					
CDMA2000 (RC1), HPM	+27.1	+27.7	-	dBm	Band Class 6, 15
CDMA2000 (RC1), LPM	+14.4	+15.0	-		
CDMA2000 (RC1), HPM	+26.9	+27.5	-		Band Class 0
CDMA2000 (RC1), LPM	+14.4	+15.0	-		
CDMA2000 (RC1), HPM	+27.5	+28.1	-		Band Class 1
CDMA2000 (RC1), LPM	+14.4	+15.0	-		
Case Temperature (T_C)	-30	-	+105	°C	

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

Notes:
(1) For operations at 3.1 V or 105 °C, P_{OUT} is derated by 0.6 dB.

Table 4: Electrical Specifications - Band 1 (2100 MHz) WCDMA Operation (R99 waveform)
(+25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{EN_HI} = +1.8 V, V_{BAND0} = V_{BAND1} = 0 V, V_{EN_LO} = 0 V)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE}
Gain	25 10	27.5 12.5	31 16	dB	+28.5 dBm +16 dBm	0 V 1.8 V
ACLR1 at 5 MHz offset (1)	- -	-41 -42	-36.5 -37	dBc	+28.5 dBm +16 dBm	0 V 1.8 V
ACLR2 at 10 MHz offset (1)	- -	-55 <-60	-48 -48	dBc	+28.5 dBm +16 dBm	0 V 1.8 V
Power-Added Efficiency (1)	35 -	40 7	- -	%	+28.5 dBm +16 dBm	0 V 1.8 V
Mode Control Current	-	<0.06	0.12	mA	through V_{MODE} pin, V_{MODE} = +1.8 V	
Enable Current	-	<0.07	0.15	mA	through V_{ENABLE} H or L	
BAND Control Current	-	<0.01	0.06	mA	through V_{BAND0} and V_{BAND1} pins	
Quiescent Current	-	30	-	mA	V_{MODE} = 1.8 V	
BATT Current	-	45	-	mA	through V_{BATT} pin, V_{MODE} = +1.8 V	
Noise in Receive Band (2)	- -	-135 -138	- -	dBm/Hz	P_{OUT} < +28.25 dBm, V_{MODE} = 0 V P_{OUT} < +16 dBm, V_{MODE} = +1.8 V	
Harmonics 2f_O 3f_O, 4f_O	 - -	 -42 -50	 -30 -35	dBc		
Coupling Factor	-	27.5	-	dB		
Input Impedance	-	-	2:1	VSWR		
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} ≤ 28.5 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	
CDMA2000 (RC-1) Waveform					**P_{OUT}**	**V_{MODE}**
Adjacent Channel Power at + 1.25 MHz offset Primary Channel BW = 1.23 MHz	 - -	 -51 -51	 -46.5 -47	dBc	 +27.7 dBm +15 dBm	 0 V 1.8 V
Alternate Channel Power at + 1.98 MHz offset Primary Channel BW = 1.23 MHz	 - -	 -57 -59	 -54 -54	dBc	 +27.7 dBm +15 dBm	 0 V 1.8 V

Notes:
(1) ACLR and Efficiency measured at 1950 MHz.
(2) Noise measured at 2110 to 2170 MHz.

Table 5: Electrical Specifications - Band 1 (2100 MHz)
LTE Operation (RB = 12, Start = 0, QPSK)
(T_C = +25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{EN} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE1}
Gain	- -	27 13	- -	dB	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR1	- -	-42 -42	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR2	- -	-44 -44	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
Power-Added Efficiency (1)	- -	34 8	- -	%	+27 dBm +15 dBm	0 V 1.8 V
Spurious Output Level (all spurious outputs)	-	-	<-70	dBc	$P_{OUT} \leq$ 27 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	

Notes:
(1) ACLR and Efficiency measured at 1950 MHz.

Table 6: Electrical Specifications - Band 2 (1900 MHz) WCDMA Operation (R99 waveform)
(+25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{EN_HI} = V_{BAND1} = +1.8 V, V_{BAND0} = 0 V, V_{EN_LO} = 0 V)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE}
Gain	25.5 10.5	28 14.5	31 17	dB	+29 dBm +16 dBm	0 V 1.8 V
ACLR1 at 5 MHz offset (1)	- -	-41 -42	-36.5 -37	dBc	+29 dBm +16 dBm	0 V 1.8 V
ACLR2 at 10 MHz offset (1)	- -	-53 -60	-48 -48	dBc	+29 dBm +16 dBm	0 V 1.8 V
Power-Added Efficiency (1)	35 -	39 7	- -	%	+29 dBm +16 dBm	0 V 1.8 V
Mode Control Current	-	<0.06	0.12	mA	through V_{MODE} pin, V_{MODE} = +1.8 V	
Enable Current	-	<0.07	0.15	mA	through V_{ENABLE} H or L	
BAND Control Current	-	<0.03	0.1	mA	through V_{BAND1} pin	
Quiescent Current	-	30	-	mA	V_{MODE} = 1.8 V	
BATT Current	-	45	-	mA	through V_{BATT} pin, V_{MODE} = +1.8 V	
Noise in Receive Band (2)	- -	-135 -138	- -	dBm/Hz	P_{OUT} < +29 dBm, V_{MODE} = 0 V P_{OUT} < +16 dBm, V_{MODE} = +1.8 V	
Harmonics 2f_O 3f_O, 4f_O	 - -	 -40 -46	 -35 -35	dBc		
Coupling Factor	-	28	-	dB		
Input Impedance	-	-	2:1	VSWR		
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} ≤ 29 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	
CDMA2000 (RC-1) Waveform					**P_{OUT}**	**V_{MODE}**
Adjacent Channel Power (1) at + 1.25 MHz offset Primary Channel BW = 1.23 MHz	 - -	 -52 -51	 -46.5 -47	dBc	 +28.1 dBm +15 dBm	 0 V 1.8 V
Alternate Channel Power (1) at + 1.98 MHz offset Primary Channel BW = 1.23 MHz	 - -	 -56 -59	 -54 -54	dBc	 +28.1 dBm +15 dBm	 0 V 1.8 V

Notes:
(1) ACLR and Efficiency measured at 1880 MHz.
(2) Noise measured at 1930 to 1990 MHz.

Table 7: Electrical Specifications - Band 2 & 25 (1900 MHz)
LTE Operation (RB = 12, Start = 0, QPSK)
(T_C = +25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{ENABLE} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE1}
Gain	- -	27.5 14.5	- -	dB	+27.5 dBm +15 dBm	0 V 1.8 V
UTRA ACLR1	- -	-41 -42	- -	dBc	+27.5 dBm +15 dBm	0 V 1.8 V
UTRA ACLR2	- -	-44 -44	- -	dBc	+27.5 dBm +15 dBm	0 V 1.8 V
Power-Added Efficiency [1]	- -	33 8	- -	%	+27.5 dBm +15 dBm	0 V 1.8 V
Spurious Output Level (all spurious outputs)	-	-	<-70	dBc	$P_{OUT} \leq$ 27.5 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	

Notes:
(1) ACLR and Efficiency measured at 1880 MHz.

Table 8: Electrical Specifications - Band 3 & 4 (1700 MHz) WCDMA Operation (R99 waveform)
(+25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{EN_HI} = V_{BAND0} = +1.8 V, V_{BAND1} = 0 V, V_{EN_LO} = 0 V)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE}
Gain	24.5 10.5	27 13.5	30 16	dB	+28.5 dBm +16 dBm	0 V 1.8 V
ACLR1 at 5 MHz offset (1)	- -	-42 -43	-36.5 -37	dBc	+28.5 dBm +16 dBm	0 V 1.8 V
ACLR2 at 10 MHz offset (1)	- -	-55 -60	-48 -48	dBc	+28.5 dBm +16 dBm	0 V 1.8 V
Power-Added Efficiency (1) (without DC/DC Converter)	36 -	41 7	- -	%	+28.5 dBm +16 dBm	0 V 1.8 V
Mode Control Current	-	<0.06	0.12	mA	through V_{MODE} pin, V_{MODE} = +1.8 V	
Enable Current	-	<0.07	0.15	mA	through V_{ENABLE} H or L	
BAND Control Current	-	<0.03	0.1	mA	through V_{BAND0} pin	
Quiescent Current	-	34	-	mA	V_{MODE} = 1.8 V	
BATT Current	-	45	-	mA	through V_{BATT} pin, V_{MODE} = +1.8 V	
Noise in Receive Band	- -	-134 -142	- -	dBm/Hz	1574.4 - 1576.4 MHz 2110 - 2155 MHz	
Harmonics $2f_O$ $3f_O$, $4f_O$	 - -	 -42 -55	 -30 -35	dBc	P_{OUT} < +28.5 dBm	
Coupling Factor	-	27.5	-	dB		
Input Impedance	-	2:1	-	VSWR		
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} < +28.5 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	
CDMA2000 (RC-1) Waveform					**P_{OUT}**	**V_{MODE}**
Adjacent Channel Power (1) at + 1.25 MHz offset Primary Channel BW = 1.23 MHz	 - -	 -52 -51	 -46.5 -47	dBc	 +27.7 dBm +15 dBm	 0 V 1.8 V
Alternate Channel Power (1) at + 1.98 MHz offset Primary Channel BW = 1.23 MHz	 - -	 -57 -59	 -54 -54	dBc	 +27.7 dBm +15 dBm	 0 V 1.8 V

Notes:
(1) ACLR and Efficiency measured at 1747.5 MHz.

Table 9: Electrical Specifications - Band 3 & 4 (1700 MHz)
LTE Operation (RB = 12, Start = 0, QPSK)
(T_C = +25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{ENABLE} = +1.8 V, 0 Ω system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE1}
Gain	- -	27.5 13.5	- -	dB	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR1	- -	-41 -42	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR2	- -	-44 -44	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
Power-Added Efficiency (1)	- -	34 8	- -	%	+27 dBm +15 dBm	0 V 1.8 V
Spurious Output Level (all spurious outputs)	-	-	<-70	dBc	$P_{OUT} \leq$ 27 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	

Notes:
(1) ACLR and Efficiency measured at 1747.5 MHz.

Table 10: Electrical Specifications - Band 5 (850 MHz) WCDMA Operation (R99 waveform)
(+25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{EN_HI} = 0 V, V_{BAND1} = V_{BAND0} = +1.8 V, V_{EN_LO} = 1.8 V)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE}
Gain	25.5 9	28 13	31 16	dB	+28.5 dBm +16 dBm	0 V 1.8 V
ACLR1 at 5 MHz offset (1)	- -	-41 -44	-37 -37	dBc	+28.5 dBm +16 dBm	0 V 1.8 V
ACLR2 at 10 MHz offset (1)	- -	-57 -60	-48 -48	dBc	+28.5 dBm +16 dBm	0 V 1.8 V
Power-Added Efficiency (1)	35 -	40 8	- -	%	+28.5 dBm +16 dBm	0 V 1.8 V
Mode Control Current	-	<0.06	0.12	mA	through V_{MODE} pin, V_{MODE} = +1.8 V	
Enable Current	-	<0.07	0.15	mA	through V_{ENABLE} H or L	
BAND Control Current	-	<0.03	0.1	mA	through V_{BAND0} or V_{BAND1} pins	
Quiescent Current	-	32	-	mA	V_{MODE} = 1.8 V	
BATT Current	-	21	-	mA	through V_{BATT} pin, V_{MODE} = +1.8 V	
Noise in Receive Band (2)	- -	-136 -138	- -	dBm/Hz	P_{OUT} < +28.5 dBm, V_{MODE} = 0 V P_{OUT} < +16 dBm, V_{MODE} = +1.8 V	
Harmonics 2f_O 3f_O, 4f_O	- -	-44 -50	-35 -35	dBc	P_{OUT} < +28.5 dBm	
Coupling Factor	-	26.5	-	dB		
Input Impedance	-	-	2:1	VSWR		
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} < +28.5 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	
CDMA2000 (RC-1) Waveform					**P_{OUT}**	**V_{MODE}**
Adjacent Channel Power (1) at + 1.25 MHz offset Primary Channel BW = 1.23 MHz	- -	-51 -51	-46.5 -47	dBc	+27.5 dBm +15 dBm	0 V 1.8 V
Alternate Channel Power (1) at + 1.98 MHz offset Primary Channel BW = 1.23 MHz	- -	-60 -63	-57 -57	dBc	+27.5 dBm +15 dBm	0 V 1.8 V

Notes:
(1) ACLR and Efficiency measured at 836.5 MHz.
(2) Noise measured at 869 to 894 MHz.

Table 11: Electrical Specifications - Band 5 (850 MHz)
LTE Operation (MPR = 0 dB waveform, RB = 12, 10 MHz QPSK)
(T_C = +25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{ENABLE} = +1.8 V, 0 Ω system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE1}
Gain	- -	27 11	- -	dB	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR1	- -	-41 -42	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR2	- -	-45 -46	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
Power-Added Efficiency (1)	- -	34 8	- -	%	+27 dBm +15 dBm	0 V 1.8 V
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} ≤ 27 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	

Notes:
(1) ACLR and Efficiency measured at 836.5 MHz.

Table 12: Electrical Specifications - Band 8 (900 MHz) WCDMA Operation (R99 waveform)
(+25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{EN_HI} = V_{BAND1} = V_{BAND0} = 0 V, V_{EN_LO} = 1.8 V)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE}
Gain	25.5 8.5	27.5 11	31 15	dB	+28.8 dBm +16 dBm	0 V 1.8 V
ACLR1 at 5 MHz offset (1)	- -	-42 -43	-37 -37	dBc	+28.8 dBm +16 dBm	0 V 1.8 V
ACLR2 at 10 MHz offset (1)	- -	-56 -60	-48 -48	dBc	+28.8 dBm +16 dBm	0 V 1.8 V
Power-Added Efficiency (1)	35 -	40 8	- -	%	+28.8 dBm +16 dBm	0 V 1.8 V
Mode Control Current	-	<0.06	0.12	mA	through V_{MODE} pin, V_{MODE} = +1.8 V	
Enable Current	-	<0.07	0.15	mA	through V_{ENABLE} H or L	
BAND Control Current	-	<0.03	0.1	mA	through V_{BAND0} or V_{BAND1} pins	
Quiescent Current	-	33	-	mA	V_{MODE} = 1.8 V	
BATT Current	-	23	-	mA	through V_{BATT} pin, V_{MODE} = +1.8 V	
Noise in Receive Band (2)	- -	-136 -137	- -	dBm/Hz	P_{OUT} = +28.8 dBm, V_{MODE} = 0 V P_{OUT} = +16 dBm, V_{MODE} = +1.8 V	
Harmonics $2f_O$ $3f_O$, $4f_O$	- -	-42 -50	-30 -35	dBc	P_{OUT} < +28.8 dBm	
Coupling Factor	-	27.0	-	dB		
Leakage Current (Total)	-	<6	12	µA	V_{BATT} = +4.5 V, V_{CC} = +4.5 V, Shutdown Mode (All V_{BATT} & V_{CC} Pins)	
Input Impedance	-	-	2:1	VSWR		
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} < +28.8 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	

Notes:
(1) ACLR and Efficiency measured at 897.5 MHz.
(2) Noise measured at 925 to 960 MHz.

Table 13: Electrical Specifications - Band 8 (900 MHz)
LTE Operation (MPR = 0 dB waveform, RB = 12, 10 MHz QPSK)
(T_C = +25 °C, V_{BATT} = V_{CC} = +3.3 V, V_{ENABLE} = +1.8 V, 0 Ω system)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS	
					P_{OUT}	V_{MODE1}
Gain	- -	27.5 11	- -	dB	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR1	- -	-41 -42	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
UTRA ACLR2	- -	-45 -46	- -	dBc	+27 dBm +15 dBm	0 V 1.8 V
Power-Added Efficiency (1)	- -	34 8	- -	%	+27 dBm +15 dBm	0 V 1.8 V
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} ≤ 27 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating ranges	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range	

Notes:
(1) ACLR and Efficiency measured at 897.5 MHz.

LOGIC PROGRAMMING

Table 14: Logic Interface Specifications

MODE OF OPERATION	V_{EN_HI}	V_{EN_LO}	V_{BAND0}	V_{BAND1}	V_{MODE}
UMTS Band 1, CDMA BC 6	High	Low	Low	Low	X
UMTS Band 2 & 25, CDMA BC 1	High	Low	Low	High	X
UMTS Band 3 & 4, CDMA BC 15	High	Low	High	Low	X
UMTS Band 5, CDMA BC 0	Low	High	High	High	X
UMTS Band 8	Low	High	Low	Low	X
Standby Mode	Low	Low	X	X	X
Shutdown Mode	Low	Low	Low	Low	X
High Power Mode (HPM)	X	X	X	X	Low
Low Power Mode (LPM)	X	X	X	X	High

APPLICATION INFORMATION

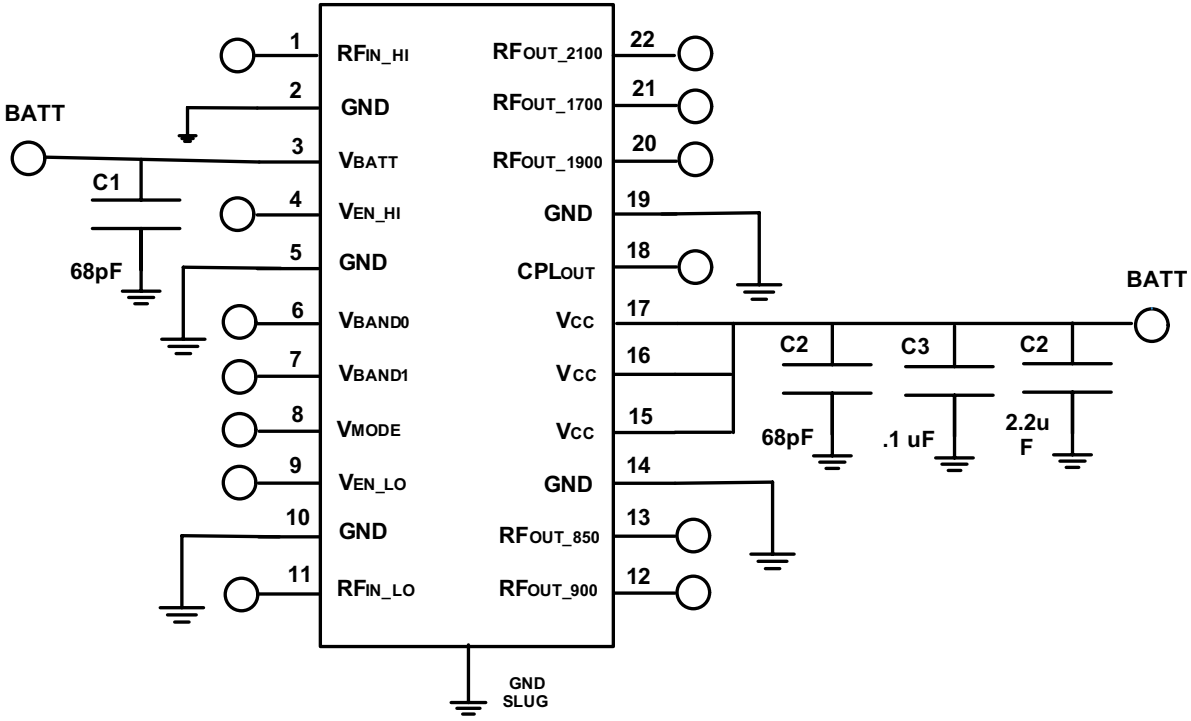
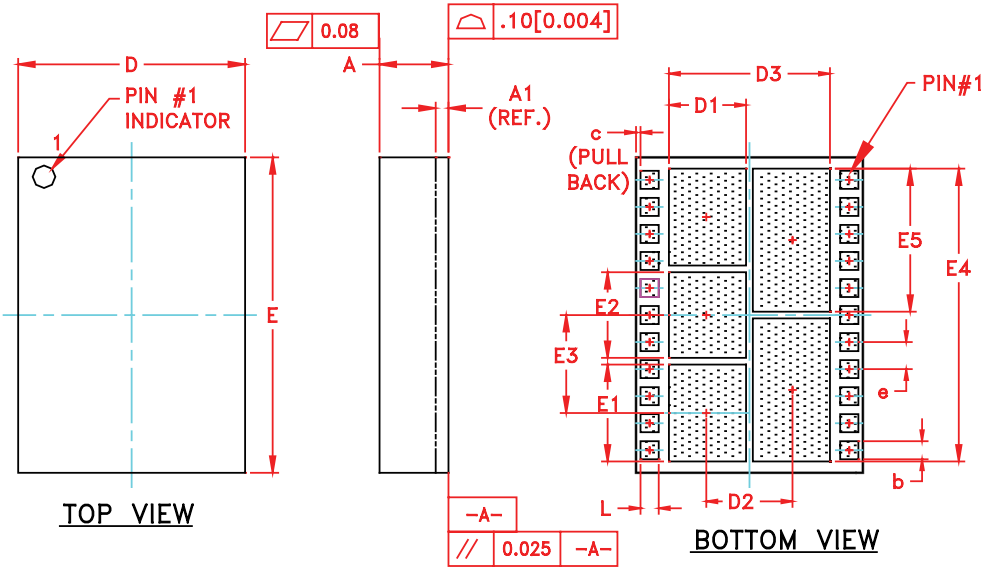


Figure 3 : Evaluation Board Schematic

PACKAGE OUTLINE



SYMBOL	MILLIMETERS			INCHES			NOTE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	0.844	0.964	1.084	0.033	0.038	0.043	–
A1	–	0.304	–	–	0.012	–	–
b	0.350	0.400	0.450	0.014	0.016	0.018	3
c	–	0.100	–	–	0.004	–	–
D	4.880	5.000	5.120	0.192	0.197	0.202	–
D1	1.575	1.625	1.675	0.062	0.064	0.066	3
D2	1.725	1.775	1.825	0.068	0.070	0.072	3
D3	3.350	3.400	3.450	0.132	0.134	0.136	3
E	6.880	7.000	7.120	0.271	0.276	0.280	–
E1	2.100	2.150	2.200	0.083	0.085	0.087	3
E2	1.850	1.900	1.950	0.073	0.075	0.077	3
E3	2.125	2.175	2.225	0.084	0.086	0.088	3
E4	6.450	6.500	6.550	0.254	0.256	0.258	3
E5	3.125	3.175	3.225	0.123	0.125	0.127	3
e		0.600			0.024		3
L	0.350	0.400	0.450	0.014	0.016	0.018	3

NOTES:

1. CONTROLLING DIMENSIONS: MILLIMETERS
2. UNLESS SPECIFIED TOLERANCE=±0.076[0.003].
3. ACTUAL PAD SIZE AND LOCATION WILL VARY WITHIN MIN. AND MAX. DIMENSIONS ACCORDING TO SPECIFIC LAMINATE DESIGN.
4. PITCH MEASUREMENT (e) TAKEN CENTERLINE TO CENTERLINE OF SOLDER MASK OPENINGS.
5. UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.

Figure 4: Package Outline - 22 Pin 5 mm x 7 mm x 1 mm Surface Mount Module

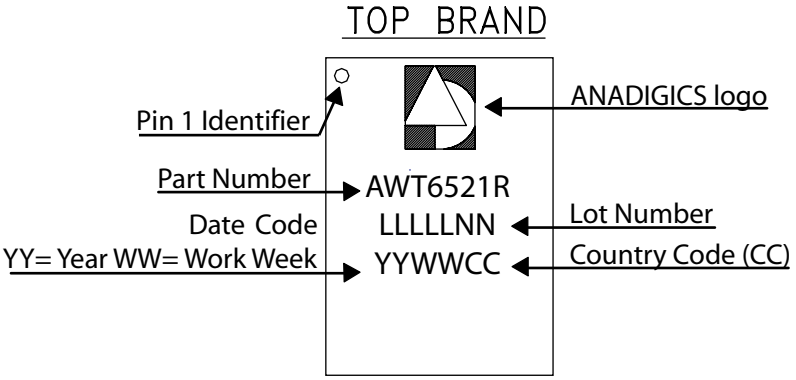


Figure 5: Branding Specification

PCB AND STENCIL DESIGN GUIDELINE

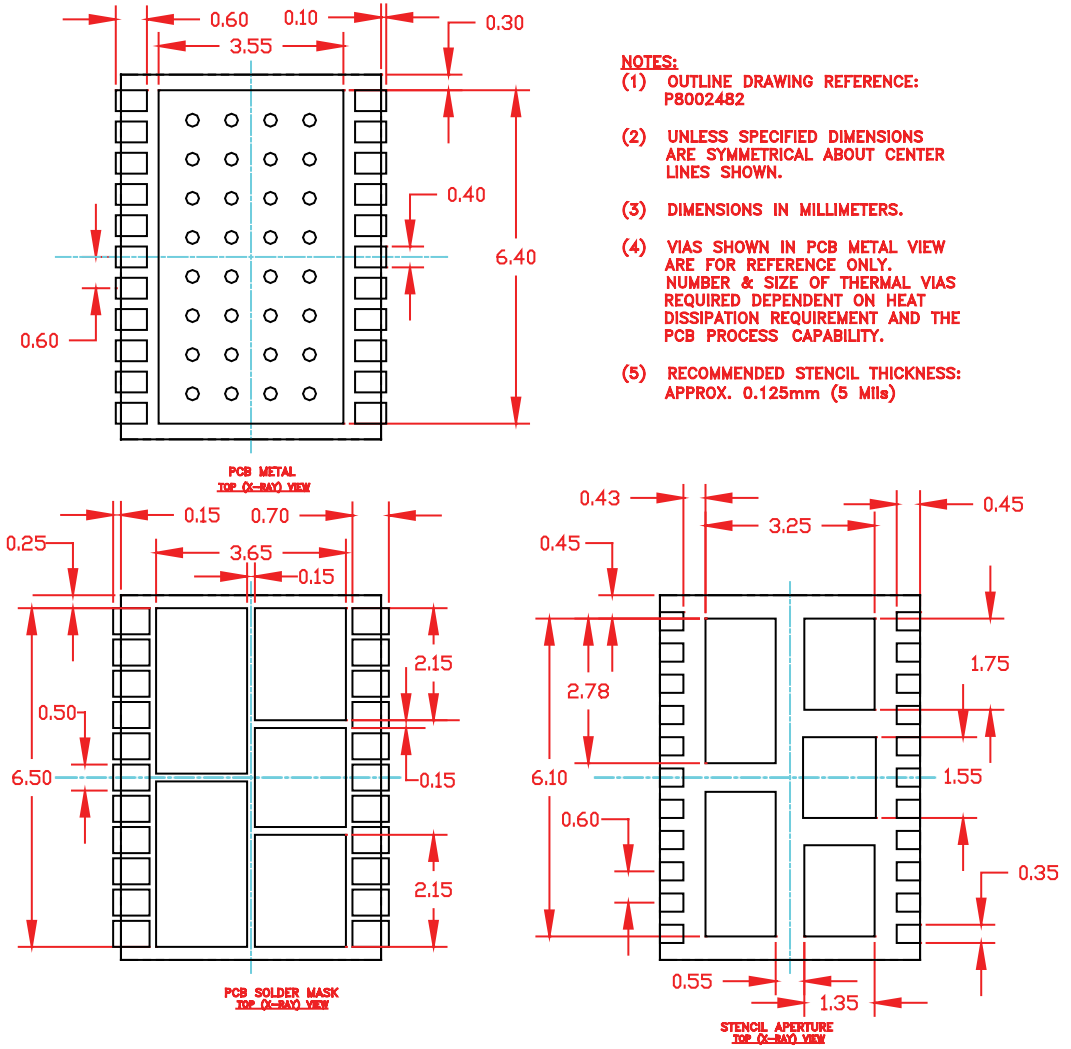
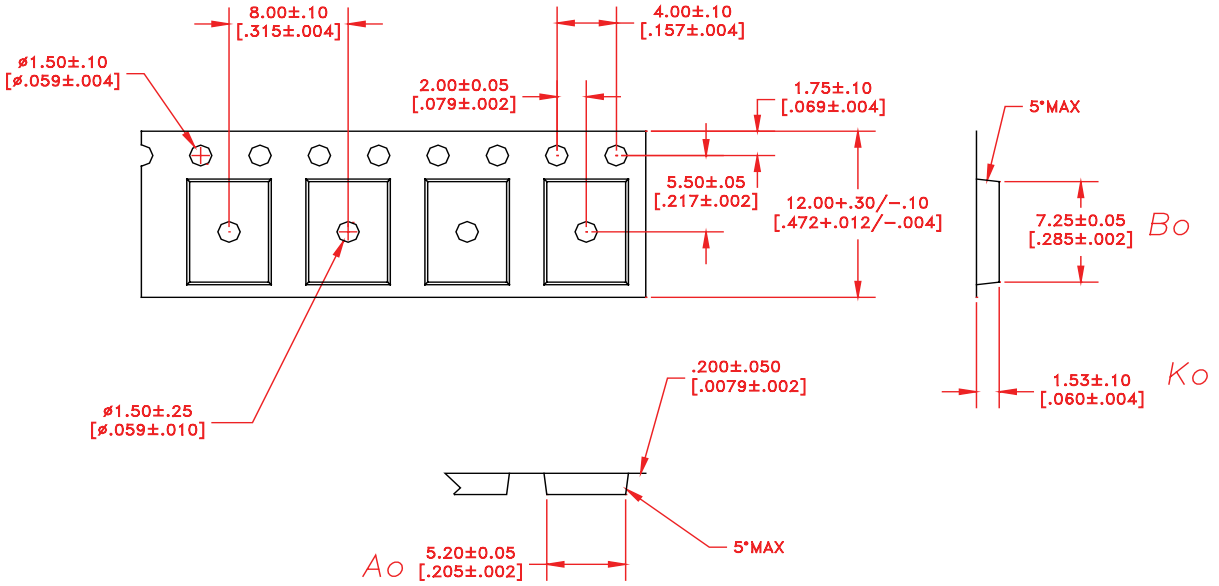


Figure 6: Recommended PCB Layout Information



NOTES:
(1) Material: 3000 (Carbon Filled Polycarbonate) 100% Recyclable.

Figure 7: Carrier Tape

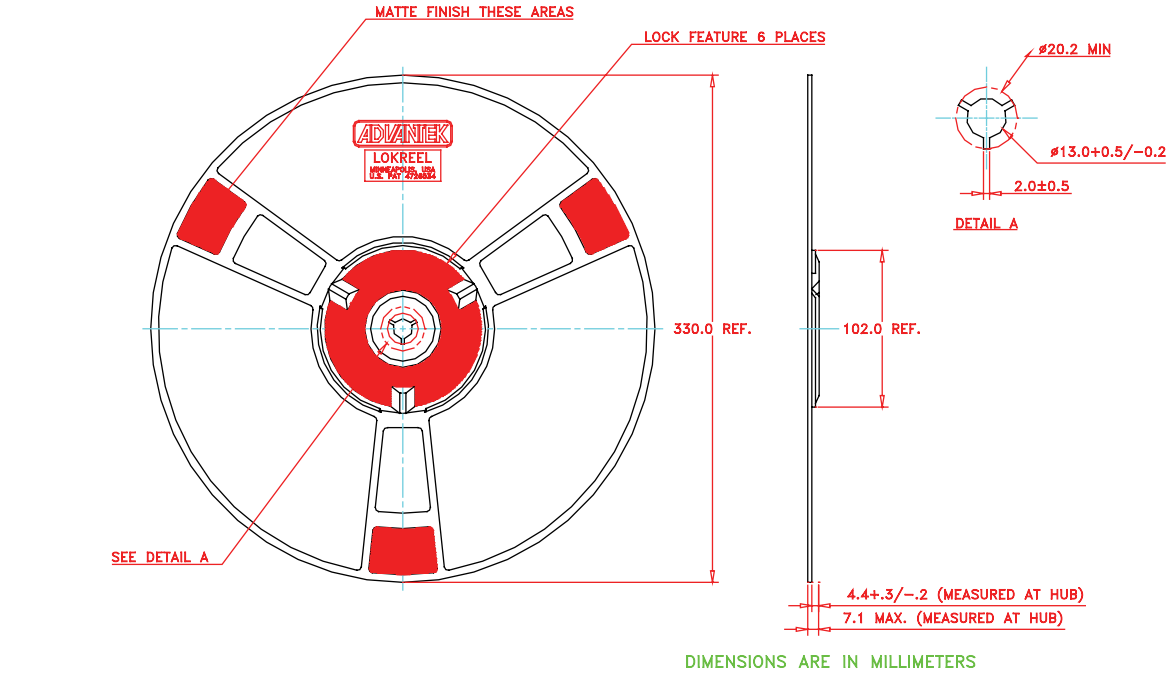


Figure 8: Reel

ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
AWT6521RM48P8	-30 °C to + 105 °C	RoHS Compliant 22 Pin 5 mm x 7 mm x 1 mm Surface Mount Module	Tape and Reel, 2500 pieces per Reel
AWT6521RM48P9	-30 °C to + 105 °C	RoHS Compliant 22 Pin 5 mm x 7 mm x 1 mm Surface Mount Module	Partial Tape and Reel

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