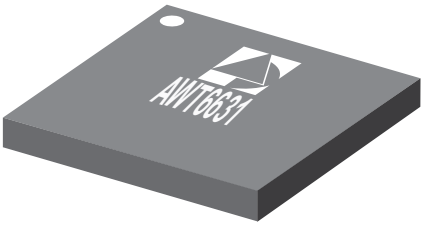
AWT6631

HELP3DC™ UMTS2100 (Band 1)
LTE/WCDMA/CDMA/TD-SCDMA Linear PAM
Data Sheet - Rev 2.7

FEATURES

- CDMA/EVDO, WCDMA/HSPA, LTE and TD-SCDMA Compliant
- 3rd Generation HELP™ technology
- High Efficiency (R99 waveform):
  - 41 % @ POUT = +28.25 dBm
  - 24 % @ POUT = +17 dBm
- Simpler Calibration with only 2 Bias Modes
- Optimized for SMPS Supply
- Low Quiescent Current: 8 mA
- Low Leakage Current in Shutdown Mode: <4 μA
- Internal Voltage Regulator
- Integrated "daisy chainable" directional couplers with CPLIN and CPLOUT Ports
- Optimized for a 50 Ω System
- Low Profile Miniature Surface Mount Package
- Internal DC blocks on IN/OUT RF ports
- 1.8 V Control Logic
- RoHS Compliant Package, 260 °C MSL-3



10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module

APPLICATIONS

- Wireless Handsets and Data Devices for:
  - WCDMA/HSPA/LTE IMT-Band
  - CDMA/EVDO Bandclass 6
  - TD-SCDMA 1.82/2.0 GHz Band
  - TD - LTE Band 33, 34, and 39

PRODUCT DESCRIPTION

The AWT6631 PA is designed to provide highly linear output for WCDMA, CDMA , LTE and TD-SCDMA handsets and data devices with high efficiency at both high and low power modes. This HELP3DC™ PA can be used with an external switch mode power supply (SMPS) to improve its efficiency and reduce current consumption further at medium and low output powers. A "daisy chainable" directional coupler is integrated in the module thus eliminating the need of external couplers. The device is manufactured on an advanced InGaP HBT MMIC technology offering state-of-the-art reliability, temperature stability, and ruggedness. There are two selectable bias modes that optimize efficiency for different output power levels, and a shutdown mode with low leakage current, which increases handset talk and standby time. The self-contained 3 mm x 3 mm x 1 mm surface mount package incorporates matching networks optimized for output power, efficiency, and linearity in a 50 Ω system.

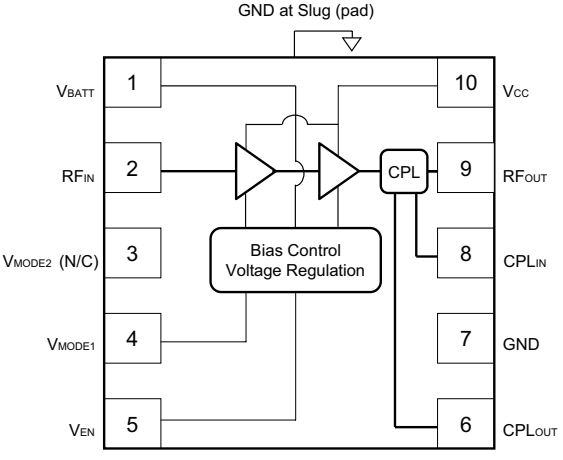


Figure 1: Block Diagram

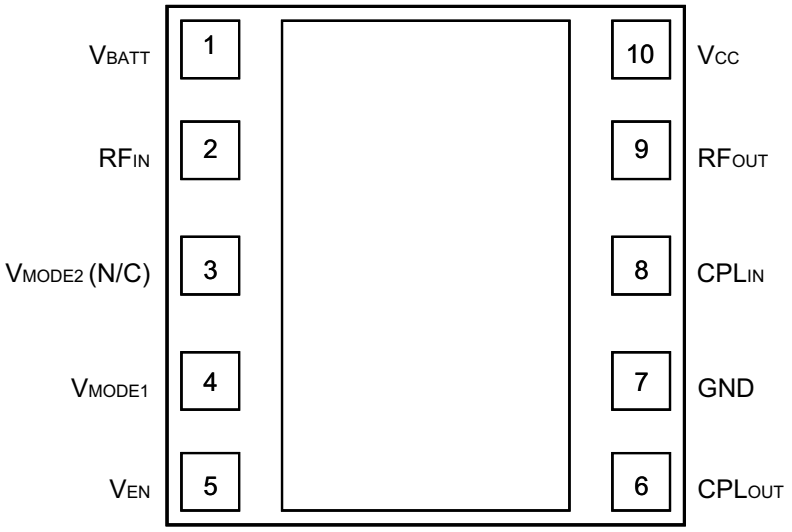


Figure 2: Pinout (X-ray Top View)

Table 1: Pin Description

PIN	NAME	DESCRIPTION
1	V_{BATT}	Battery Voltage
2	RF_{IN}	RF Input
3	V_{MODE2} (N/C)	No Connection
4	V_{MODE1}	Mode Control Voltage 1
5	V_{EN}	PA Enable Voltage
6	CPL_{OUT}	Coupler Output
7	GND	Ground
8	CPL_{IN}	Coupler Input
9	RF_{OUT}	RF Output
10	V_{CC}	Supply Voltage

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

PARAMETER	MIN	MAX	UNIT
Supply Voltage (V_{CC})	0	+5	V
Battery Voltage (V_{BATT})	0	+6	V
Control Voltages (V_{MODE1}, V_{ENABLE})	0	+3.5	V
RF Input Power (P_{IN})	-	+10	dBm
Storage Temperature (T_{STG})	-40	+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	UNITS	COMMENTS
Supply Voltage (V_{CC})	+0.5	+3.4	+4.35	V	P_{OUT} ≤ +28.25 dBm
Battery Voltage (V_{BATT})	+3.1	+3.4	+4.35	V	P_{OUT} ≤ +28.25 dBm
Enable Voltage (V_{ENABLE})	+1.35 0	+1.8 0	+3.1 +0.5	V	PA “on” PA “shut down”
Mode Control Voltage (V_{MODE1})	+1.35 0	+1.8 0	+3.1 +0.5	V	Low Bias Mode High Bias Mode
Case Temperature (T_C)	-30	-	+90	°C	

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

Table 4: Electrical Specifications - WCDMA Operation (R99 waveform)
(T_C = +25 °C, V_{CC} = +3.4 V, V_{BATT} = +3.4 V, V_{ENABLE} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating Frequency (f)	1920	-	1980	MHz	UMTS Band 1
RF Output Power (Pmax) (1) R99 WCDMA, HPM R99 WCDMA, LPM	 27.45 16.2	 28.25 17	 28.25 17	dBm	3GPP TS 24.121-1, Rel 8 Table C.11.1.3, for WCDMA Subtest 1
Gain	25 12	27 13	30 16	dB	HPM, P_{OUT} = 28.25 dBm LPM, P_{OUT} = 17 dBm
ACLR1 at 5 MHz offset (2)	- -	-41 -42	-37 -38	dBc	HPM, P_{OUT} = 28.25 dBm LPM, P_{OUT} = 17 dBm
ACLR2 at 10 MHz offset (2)	- -	-55 -55	-48 -48	dBc	HPM, P_{OUT} = 28.25 dBm LPM, P_{OUT} = 17 dBm
Power-Added Efficiency (2)	37 21	41 24	- -	%	HPM, P_{OUT} = 28.25 dBm LPM, P_{OUT} = 17 dBm
Quiescent Current (Icq) Low Bias Mode	-	9	14	mA	V_{MODE1} = +1.8 V
Mode Control Current	-	0.3	0.5	mA	through V_{MODE} pin, V_{MODE1} = 1.8 V
Enable Current	-	0.3	0.5	mA	through V_{ENABLE} pin
BATT Current	-	2.5	5	mA	through V_{BATT} pin, V_{MODE1} = +1.8 V
Leakage Current	-	4	7	µA	V_{BATT} = +4.2 V, V_{CC} = +4.2 V V_{ENABLE} = 0 V, V_{MODE1} = 0 V
Noise in Receive Band (3)	- -	-137 -143	-135 -138	dBm/ Hz	P_{OUT} < +28.25 dBm, V_{MODE1} = 0 V P_{OUT} < 17 dBm, V_{MODE1} = +1.8 V
Harmonics 2f_O 3f_O, 4f_O	 - -	 -39 -55	 -35 -50	dBc	P_{OUT} < +28.25 dBm
Input Impedance	-	-	2:1	VSWR	
Coupling Factor	-	20	-	dB	
Directivity	-	20	-	dB	
Coupler IN-OUT Daisy Chain Insertion Loss	-	<0.25	-	dB	698 - 2620 MHz Pin 8 to 6 Shutdown Mode
Spurious Output Level (all suprious outputs)	-	-	-70	dBc	P_{OUT} ≤ +28.25 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating conditions
Load mismatch stress with no permanent degradation of failure	8:1	-	-	VSWR	Applies over full operating range
Phase Delta (HPM-LPM)	-	10	-	Deg	

Notes:
(1) For operation at V_{CC} = +3.1 V, P_{OUT} is derated by 0.8 dB.
(2) ACLR and Efficiency measured at 1950 MHz.
(3) Noise measured at 2110 MHz to 2170 MHz.

Table 5: Electrical Specifications - LTE Operation (RB = 12, START = 0, QPSK)
(T_C = +25 °C, V_{CC} = V_{BATT} = +3.4 V, V_{ENABLE} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating Frequency (f)	1920	-	1980	MHz	UMTS Band 1
RF Output Power (Pmax) (1) LTE, HPM LTE, LPM	 26.45 15.2	 27.25 16	 27.25 16	dBm	TS 36.101 Rel 8 for LTE
Gain	25 12	27 13	30 16	dB	HPM, P_{OUT} = 27.25 dBm LPM, P_{OUT} = 16 dBm
ACLR E-UTRA (2) at ± 10 MHz offset	- -	-38 -38	- -	dBc	HPM, P_{OUT} = 27.25 dBm LPM, P_{OUT} = 16 dBm
ACLR1 UTRA (2) at ± 7.5 MHz offset	- -	-39 -39	- -	dBc	HPM, P_{OUT} = 27.25 dBm LPM, P_{OUT} = 16 dBm
ACLR2 UTRA (2) at ± 12.5 MHz offset	- -	-60 -60	- -	dBc	HPM, P_{OUT} = 27.25 dBm LPM, P_{OUT} = 16 dBm
Power-Added Efficiency (2)	- -	36 22	- -	%	HPM, P_{OUT} = 27.25 dBm LPM, P_{OUT} = 16 dBm
Noise emissions B34	-	-38	-35	dBm/ MHz	2010 - 2025 MHz, 100 RB QPSK LTE signal centered at 1970 MHz at LTE max power
LTE NS_05 PHS emissions	-	-48	-42	dBm/ 300 kHz	1884.5 - 1919.6 MHz
Spurious Output Level (all spurious outputs)	-	-	<-70	dBc	P_{OUT} ≤ +27.25 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating conditions
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range

Notes:
(1) For operation at V_{CC} = +3.1 V, P_{OUT} is derated by 0.8 dB.
(2) ACLR and Efficiency measured at 1950 MHz.

Table 6: Electrical Specifications - CDMA Operation (CDMA2000, RC-1)
(T_C = +25 °C, V_{CC} = V_{BATT} = +3.4 V, V_{ENABLE} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating Frequency (f)	1920	-	1980	MHz	Band Class 6
RF Output Power (Pmax) (1) CDMA, HPM CDMA, LPM	 26.7 15.7	 27.5 16.5	 - -	dBm	CDMA2000, RC-1
Gain	25 12	27 13	30 16	dB	HPM, P_{OUT} = 27.5 dBm LPM, P_{OUT} = 16.5 dBm
Adjacent Channel Power (2) at +1.25 MHz offset Primary Channel BW - 1.23 MHz Adjacent Channel BW = 30 kHz	- -	-50 -53	- -	dBc	HPM, P_{OUT} = 27.5 dBm LPM, P_{OUT} = 16.5 dBm
Adjacent Channel Power (2) at +1.98 MHz Primary Channel BW = 1.23 MHz Adjacent Channel BW = 30 kHz	- -	-55 -59	- -	dBc	HPM, P_{OUT} = 27.5 dBm LPM, P_{OUT} = 16.5 dBm
Power-Added Efficiency (2)	- -	38 23	- -	%	HPM, P_{OUT} = 27.5 dBm LPM, P_{OUT} = 16.5 dBm
Spurious Output Level (all spurious outputs)	-	-	-70	dBc	P_{OUT} ≤ +27.5 dBm In-band load VSWR < 5:1 Out-of-band load VSWR < 10:1 Applies over all operating conditions
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range

Notes:
(1) For operation at V_{CC} = +3.1 V, P_{OUT} is derated by 0.8 dB.
(2) ACLR and Efficiency measured at 1950 MHz.

Table 7: Electrical Specifications - EVDO Rev. B Operation
(T_C = +25 °C, V_{BATT} = V_{CC} = +3.4 V, V_{ENABLE} = +1.8 V, 50 Ω system, [10001] or [10101] Waveform)

PARAMETER	MIN	TYP	MAX	UNIT	COMMENTS
Spurious in PHS Band (1884.5 - 1919.6 MHz)	-	-45	-41	dBm/300 KHz	HPM, +18 dBm
Intermodulation IM3	-	-23	-13	dBm/MHz	HPM, +18 dBm

Table 8: Electrical Specifications - TD-LTE Operation, Band 39 (10 MHz QPSK, 12 RB, Start = 0)
(T_C = +25 °C, V_{CC} = +3.4 V, V_{BATT} = +3.4 V, V_{ENABLE} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating Frequency (f)	1900 1880	- -	1920 1920	MHz	UMTS Band 33 UMTS Band 39
RF Output Power (Pmax) (1) LTE (MPR = 0), HPM LTE (MPR = 0), LPM	 26 15.5	 27 16	 27 16	dBm	TS 36.101 Rel 8 for LTE
Gain	25 12	26.5 13	30 16	dB	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
LTE to LTE, E-UTRA (2)	- -	-37 -40	-36 -36	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
UTRA ACLR1 (2)	- -	-38 -40	-36 -36	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
UTRA ACLR2 (2)	- -	-60 -60	-42 -42	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Power-Added Efficiency (2)	- -	34 22	- -	%	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Quiescent Current (Icq) Low Bias Mode	-	8	-	mA	through V_{CC} pin
Harmonics 2f_O 3f_O, 4f_O	 - -	 - -	 -35 -50	dBc	P_{OUT} ≤ +27 dBm
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 conditions
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range

Notes:
(1) For operation at V_{CC} = +3.1 V, P_{OUT} is derated by 0.8 dB.
(2) ACLR and Efficiency measured at 1900 MHz.

Table 9: Electrical Specifications - TD-LTE Operation, Band 34 (10 MHz QPSK, 12 RB, Start = 0)
(T_C = +25 °C, V_{CC} = +3.4 V, V_{BATT} = +3.4 V, V_{ENABLE} = 0 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating Frequency (f)	2010	-	2025	MHz	Band 34
RF Output Power (Pmax) (1) LTE (MPR = 0), HPM LTE (MPR = 0), LPM	 26 15.5	 27 16	 27 16	dBm	TS 36.101 Rel 8 for LTE
Gain	25 12	27 13	30 16	dB	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
LTE to LTE, E-UTRA (2)	- -	-38 -38	-36 -36	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
UTRA ACLR1 (2)	- -	-39 -38	-36 -36	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
UTRA ACLR2 (2)	- -	-62 -60	-42 -42	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Power-Added Efficiency (2)	- -	35 23	- -	%	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Quiescent Current (Icq) Low Bias Mode	-	8	-	mA	through V_{CC} pin
Harmonics $2f_O$ $3f_O$, $4f_O$	 - -	 - -	 -35 -50	dBc	P_{OUT} ≤ +27 dBm
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 conditions
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range

Notes:
(1) For operation at V_{CC} = +3.1 V, P_{OUT} is derated by 0.8 dB.
(2) ACLR and Efficiency measured at 2017.5 MHz.

Table 10: Electrical Specifications - TD-SCDMA Operation
(T_C = +25 °C, V_{CC} = +3.4 V, V_{BATT} = +3.4 V, V_{ENABLE} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating Frequency (f)	1880	-	1920	MHz	3GPP TS 25.12 Section 5.2a,f
RF Output Power (Pmax) (1) TD-SCDMA, HPM TD-SCDMA, LPM	 26.2 15.2	 27 16	 27 16	dBm	 3GPP TS 25.62 Section 6.2.1
Gain	25 12	27 13	30 16	dB	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
ACLR1 at 1.6 MHz offset (2)	- -	-42 -42	- -	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
ACLR2 at 3.2 MHz offset (2)	- -	-55 -55	- -	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Power-Added Efficiency (2)	- -	36 20	- -	%	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Quiescent Current (Icq) Low Bias Mode	-	8	13	mA	V_{MODE1} = +1.8 V
Mode Control Current	-	0.3	0.5	mA	through V_{MODE} pin, V_{MODE1} = +1.8 V
Enable Current	-	0.3	0.5	mA	through V_{ENABLE} pin, V_{EN} = +1.8 V
BATT Current	-	2.5	5	mA	through V_{BATT} pin, V_{MODE1} = +1.8 V
Leakage Current	-	4	-	μA	V_{BATT} = +4.2 V, V_{CC} = +4.2 V V_{ENABLE} = 0 V, V_{MODE1} = 0 V
Harmonics $2f_O$ $3f_O$, $4f_O$	 - -	 - -	 -35 -50	dBc	P_{OUT} ≤ +27 dBm
Input Impedance	-	-	2:1	VSWR	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range

Notes:
(1) For operation at V_{CC} = +3.1 V, P_{OUT} is derated by 0.8 dB.
(2) ACLR and Efficiency measured at 1900 MHz.

Table 11: Electrical Specifications - TD-SCDMA Operation
(T_C = +25 °C, V_{CC} = +3.4 V, V_{BATT} = +3.4 V, V_{ENABLE} = +1.8 V, 50 Ω system)

PARAMETER	MIN	TYP	MAX	UNITS	COMMENTS
Operating Frequency (f)	2010	-	2025	MHz	3GPP TS 25.102 Section 5.2a
RF Output Power (Pmax) (1) TD-SCDMA, HPM TD-SCDMA, LPM	 26.2 15.2	 27 16	 27 16	dBm	3GPP TS 25.62 Section 6.2.1
Gain	25 12	27 13	30 16	dB	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
ACLR1 at 1.6 MHz offset (2)	- -	-42 -42	- -	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
ACLR2 at 3.2 MHz offset (2)	- -	-55 -55	- -	dBc	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Power-Added Efficiency (2)	- -	36 20	- -	%	HPM, P_{OUT} = 27 dBm LPM, P_{OUT} = 16 dBm
Quiescent Current (Icq) Low Bias Mode	-	8	13	mA	V_{MODE1} = +1.8 V
Mode Control Current	-	0.3	0.5	mA	through V_{MODE} pin, V_{MODE1} = +1.8 V
Enable Current	-	0.3	0.5	mA	through V_{ENABLE} pin, V_{EN} = +1.8 V
BATT Current	-	2.5	5	mA	through V_{BATT} pin, V_{MODE1} = +1.8 V
Leakage Current	-	4	-	µA	V_{BATT} = +4.2 V, V_{CC} = +4.2 V V_{ENABLE} = 0 V, V_{MODE1} = 0 V
Harmonics $2f_O$ $3f_O$, $4f_O$	 - -	 - -	 -35 -50	dBc	P_{OUT} ≤ +27 dBm
Input Impedance	-	-	2:1	VSWR	
Load mismatch stress with no permanent degradation or failure	8:1	-	-	VSWR	Applies over full operating range

Notes:
(1) For operation at VCC = +3.1 V, P_{OUT} is derated by 0.8 dB.
(2) ACLR and Efficiency measured at 2012.5 MHz.

APPLICATION INFORMATION

To ensure proper performance, refer to all related Application Notes on the ANADIGICS web site: http://www.anadigics.com

Shutdown Mode

The power amplifier may be placed in a shutdown mode by applying logic low levels (see Operating Ranges table) to the V_{ENABLE} and V_{MODE1} voltages.

Bias Modes

The power amplifier may be placed in either a Low Bias mode or a High Bias mode by applying the appropriate logic level (see Operating Ranges table) to V_{MODE1}. The Bias Control table lists the recommended modes of operation for various applications. V_{MODE2} is not necessary for this PA.

Two operating modes are available to optimize current consumption. High Bias/High Power operating mode is for P_{OUT} levels $\geq$ 16 dBm. At around 17 dBm output power, the PA should be "Mode Switched" to Low power mode for lowest quiescent current consumption.

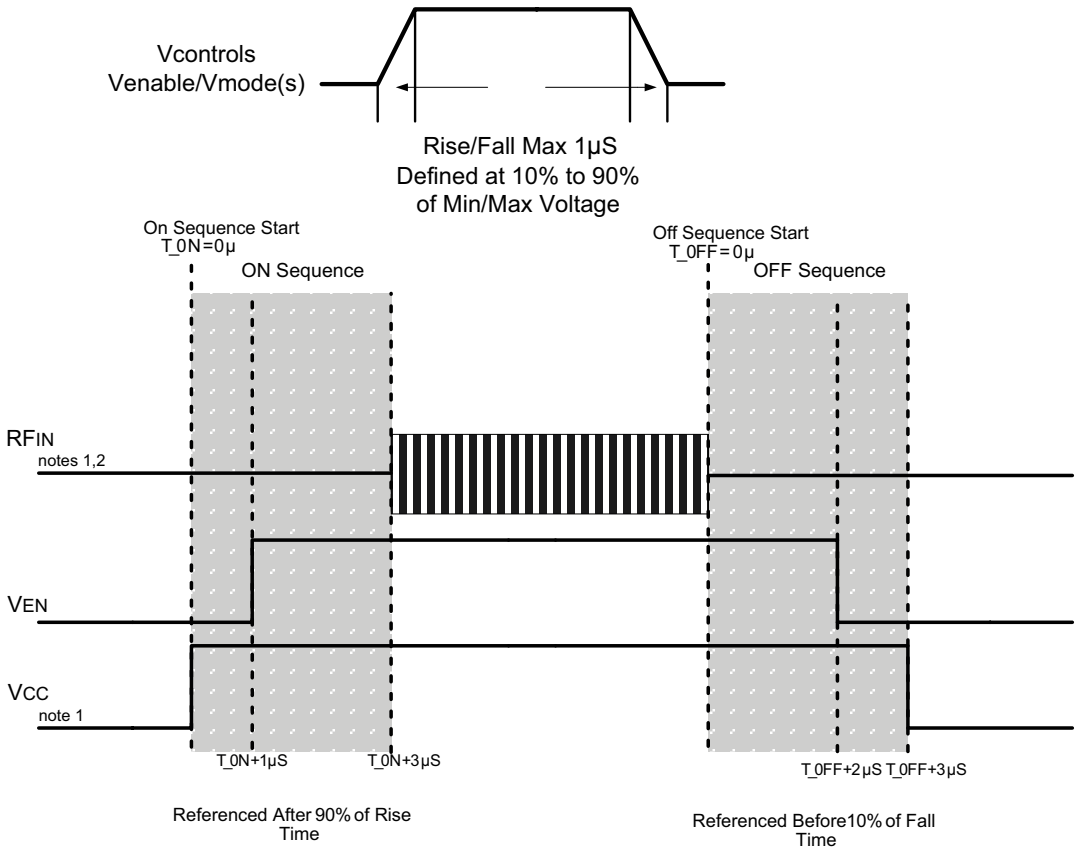


Figure 3: Recommended ON/OFF Timing Sequence

Notes:

(1) Level might be changed after RF is ON.

(2) RF OFF defined as $P_{IN} \leq$ -30 dBm.

(3) Switching simultaneously between V_{MODE} and V_{EN} is not recommended.

Table 12: Bias Control (CDMA, WCDMA and LTE)

APPLICATION	P_{OUT} LEVELS	BIAS MODE	V_{ENABLE}	V_{MODE1}	V_{CC}	V_{BATT}
High power (High Bias Mode)	> +16 dBm	High	+1.8 V	0 V	1.5 - 4.35 V	> 3.1 V
Med/low power (Low Bias Mode)	≤ +17 dBm	Low	+1.8 V	+1.8 V	0.5 - 4.35 V	> 3.1 V
Shutdown	-	Shutdown	0 V	0 V	0.5 - 4.35 V	> 3.1 V

Table 13: Bias Control (TD-SCDMA)

APPLICATION	P_{OUT} LEVELS	BIAS MODE	V_{ENABLE}	V_{MODE1}	V_{CC}	V_{BATT}
TD-SCDMA - high power (High Bias Mode)	> +15 dBm	High	+1.8 V	0 V	1.5 - 4.35 V	> 3.1 V
TD-SCDMA - med/low power (Low Bias Mode)	≤ +16 dBm	Low	+1.8 V	+1.8 V	0.5 - 4.35 V	> 3.1V
Shutdown	-	Shutdown	0 V	0 V	0.5 -4..35 V	> 3.1 V

PERFROMANCE DATA:

Figure 4: WCDMA Gain (dB) over Temperature (V_{BATT} = V_{CC} = 3.4 V)

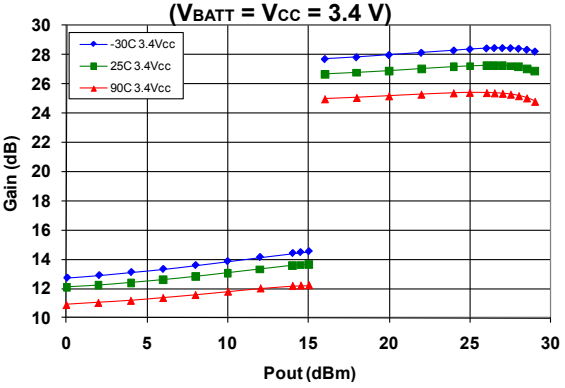


Figure 5: WCDMA Gain (dB) over Voltage (T_C = 25 °C)

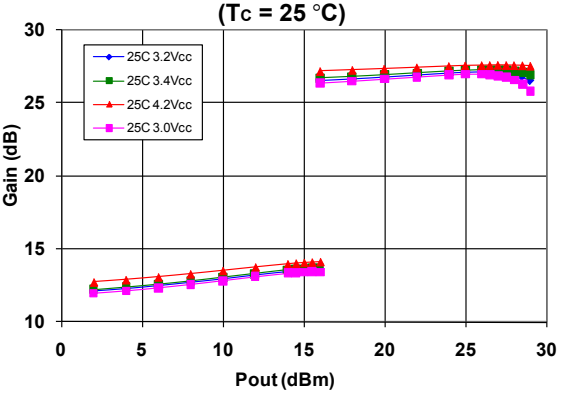


Figure 6: WCDMA PAE (%) over Temperature (V_{BATT} = V_{CC} = 3.4 V)

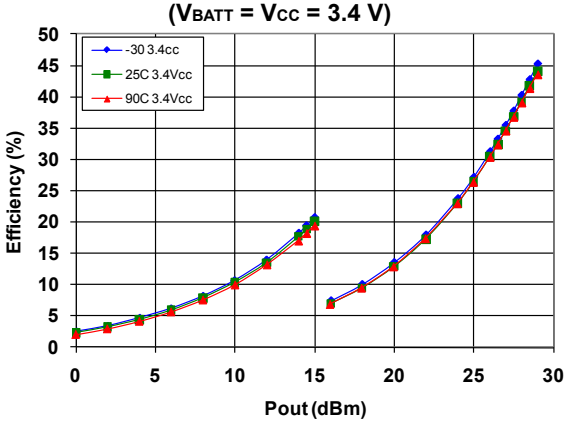


Figure 7: WCDMA PAE (%) over Voltage (T_C = 25 °C)

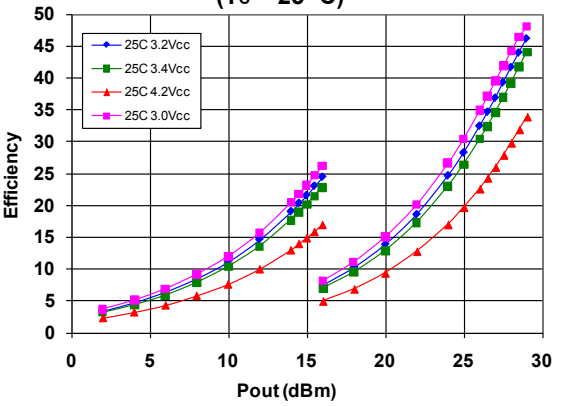


Figure 8: WCDMA ACLR1 (dBc) over Temperature (V_{BATT} = V_{CC} = 3.4 V)

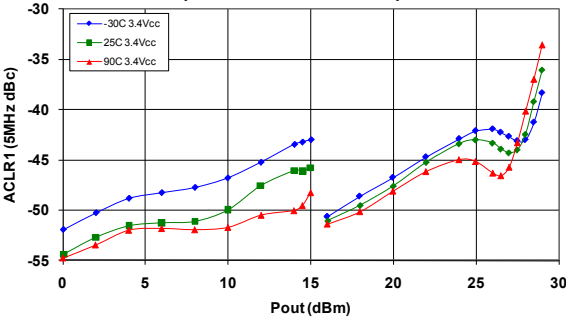
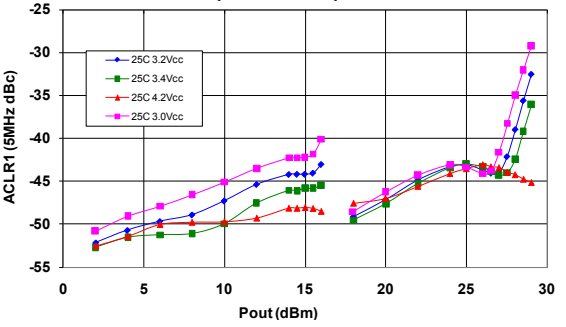


Figure 9: WCDMA ACLR1 (dBc) over Voltage (T_C = 25 °C)



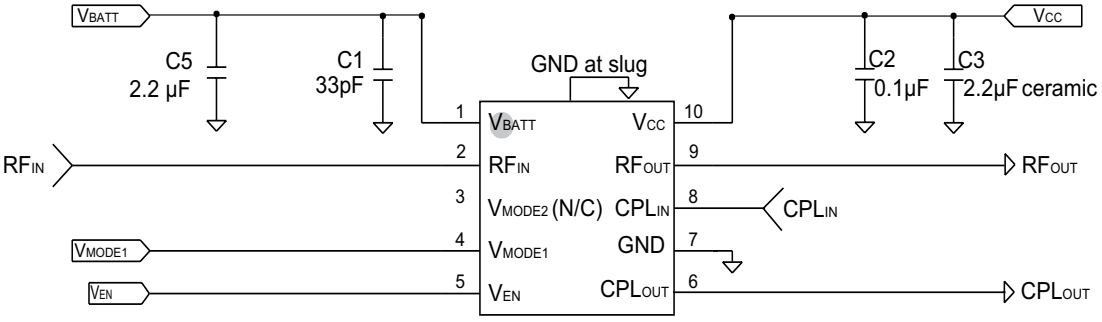


Figure 10: Evaluation Board Schematic

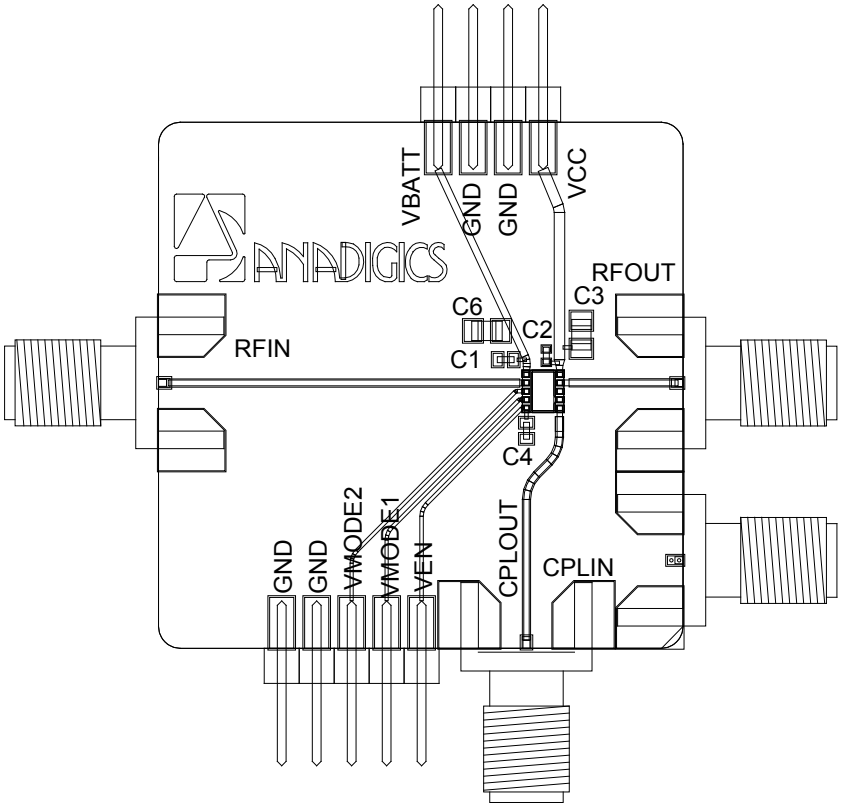


Figure 11: Evaluation Board Layout

HELP3DC™

The AWT6631 power amplifier module is based on ANADIGICS proprietary HELP3DC™ technology. The PA is designed to operate up to 17 dBm in the low power mode, thus eliminating the need for three gain states, while still maintaining low quiescent current and high efficiency in low and medium power levels. Average weighted efficiency can be increased by using an external switch mode power supply (SMPS) or DC/DC converter to reduce V_{CC}.

The directional "daisy chainable" coupler is integrated within the PA module, therefore there is no need for external couplers.

The AWT6631 has an integrated voltage regulator, which eliminates the need for an external constant voltage source. The PA is turn on/off is controlled by V_{EN} pin. A single V_{MODE} control logic (V_{MODE1}) is needed to operate this device. AWT6631 requires only two calibration sweeps for system calibration, thus saving calibration time.

Figure 5 shows one application example on mobile board. C1 and C2 are RF bypass caps and should be placed nearby pin 1 and pin 10. Bypass caps C4 and C5 may not be needed. Also a "T" matching topology is recommended at PA RF_{IN} and RF_{OUT} ports to provide matching between input TX Filter and Duplexer / Isolator.

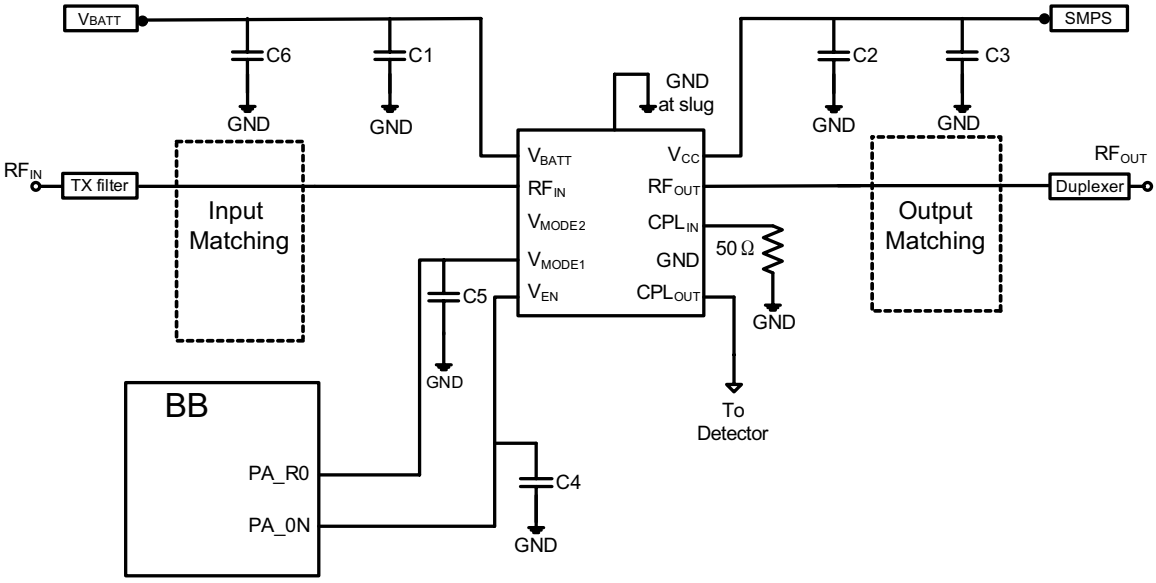
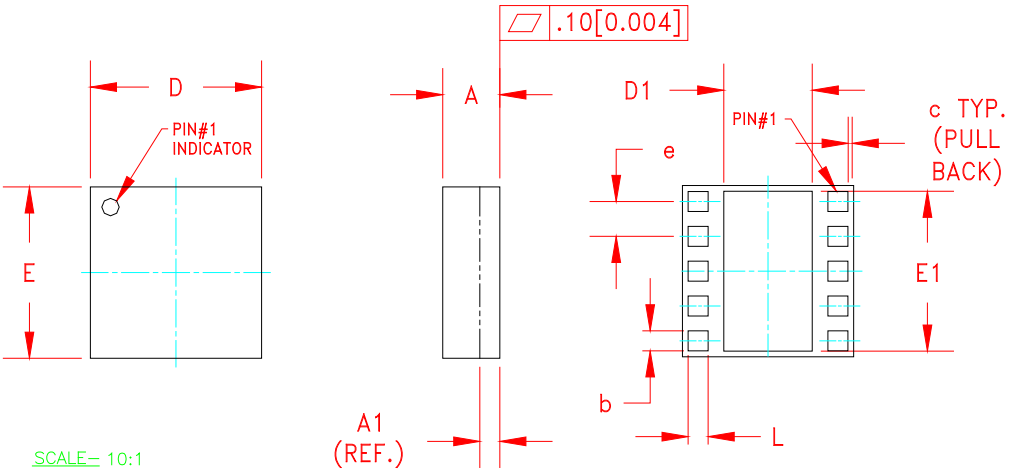


Figure 12: Typical Application Circuit

PACKAGE OUTLINE



SYMBOL	MILLIMETERS			INCHES			NOTE
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.	
A	0.91	1.03	1.13	0.035	0.041	0.044	–
A1	PLEASE REFER TO LAMINATE CONTROL DRAWING						–
b	0.32	0.35	0.40	0.013	0.014	0.016	3
c	–	0.10	–	–	0.004	–	–
D	2.88	3.00	3.12	0.113	0.118	0.123	–
D1	1.45	1.50	1.57	0.057	0.059	0.062	3
E	2.88	3.00	3.12	0.113	0.118	0.123	–
E1	2.70	2.75	2.85	0.106	0.108	0.112	3
e		0.60			0.024		3
L	0.32	0.35	0.40	0.013	0.014	0.016	3

NOTES:

1. CONTROLLING DIMENSIONS: MILLIMETERS
2. UNLESS SPECIFIED TOLERANCE=±0.076[0.003].
3. PADS (INCLUDING CENTER) SHOWN UNIFORM SIZE FOR REFERENCE ONLY. ACTUAL PAD SIZE AND LOCATION WILL VARY WITHIN MIN. AND MAX. DIMENSIONS ACCORDING TO SPECIFIC LAMINATE DESIGN.
4. UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.
5. LAMINATE CONTROL DRAWING SPECIFIED BY PART NUMBER.

Figure 13: Package Outline - 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module

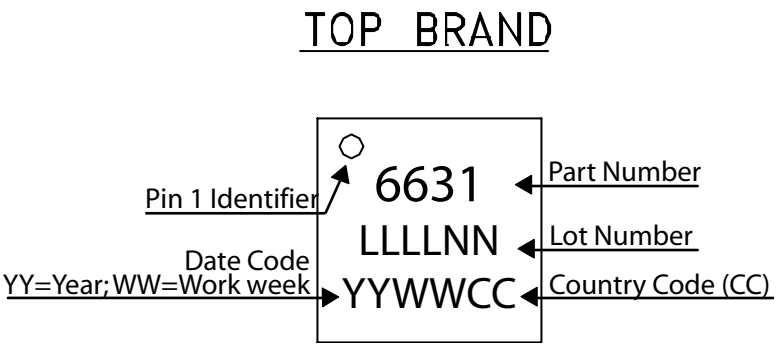
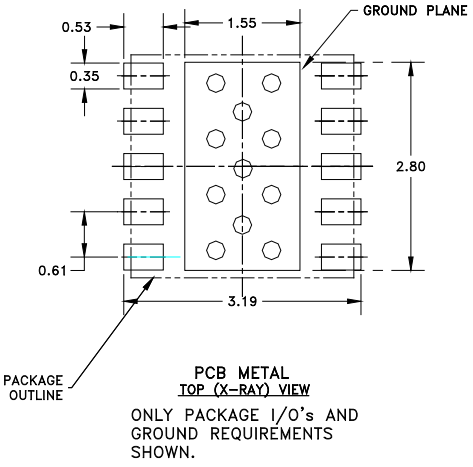


Figure 14: Branding Specification

PCB AND STENCIL DESIGN GUIDELINE



NOTES:

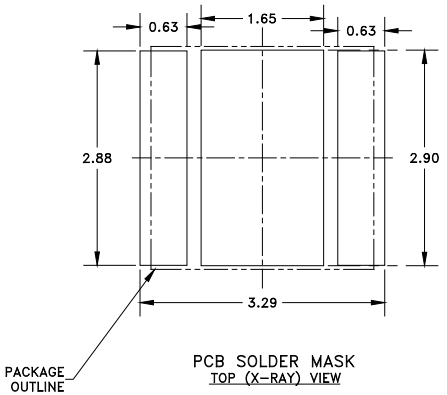
(1) OUTLINE DRAWING REFERENCE: P8002478_E

(2) UNLESS SPECIFIED DIMENSIONS ARE SYMMETRICAL ABOUT CENTER LINES SHOWN.

(3) DIMENSIONS IN MILLIMETERS.

(4) VIAS SHOWN IN PCB METAL VIEW ARE FOR REFERENCE ONLY. NUMBER & SIZE OF THERMAL VIAS REQUIRED DEPENDENT ON HEAT DISSIPATION REQUIREMENT AND THE PCB PROCESS CAPABILITY.

(5) RECOMMENDED STENCIL THICKNESS: APPROX. 0.150mm (6 Mils)



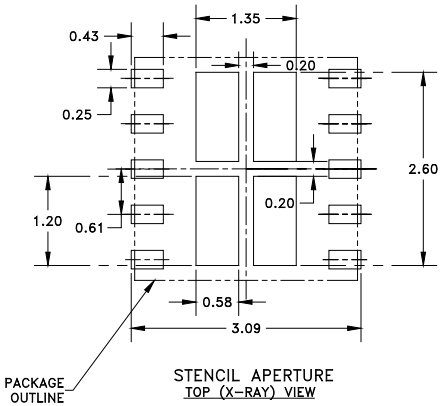
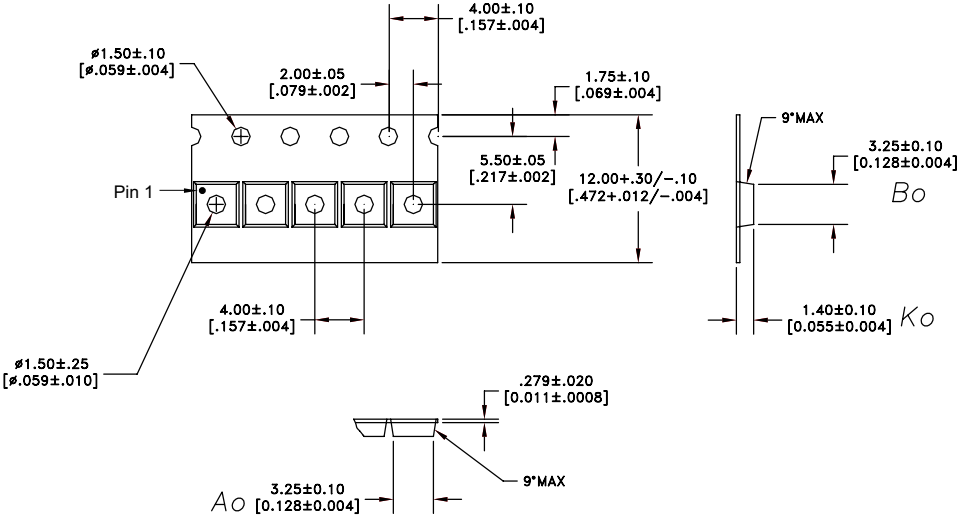


Figure 15: Recommended PCB Layout Information

COMPONENT PACKAGING



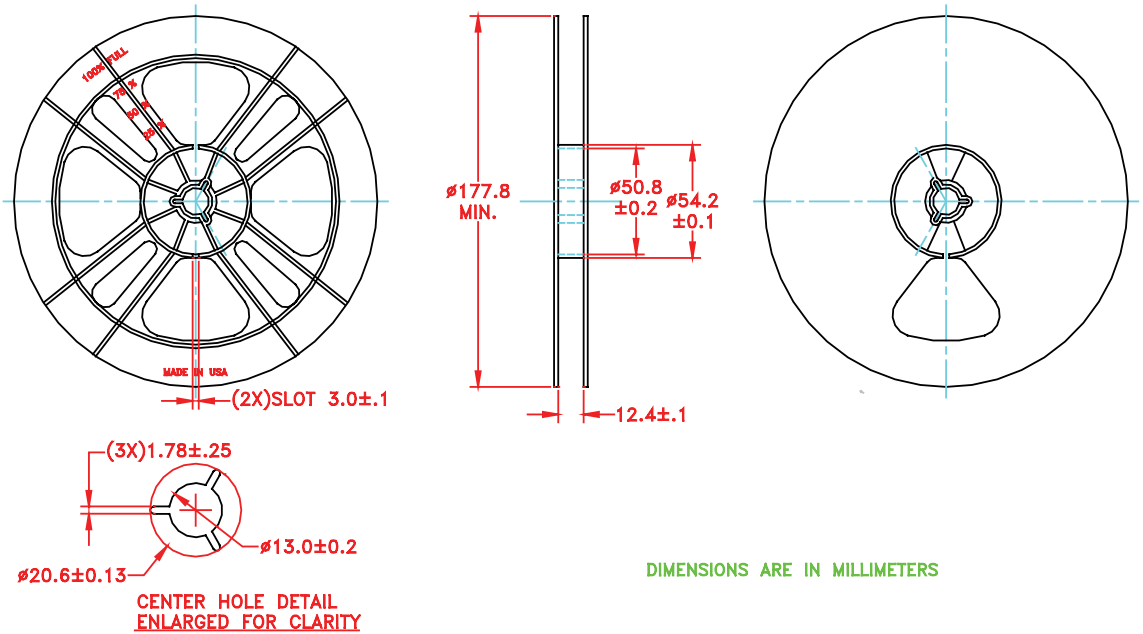
NOTES:

1. MATERIAL: 3000 (CARBON FILLED POLYCARBONATE)
100% RECYCLABLE.

DIMENSIONS ARE IN MILLIMETERS [INCHES]

DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994

Figure 16: Carrier Tape



DIMENSIONS ARE IN MILLIMETERS

NOTES:

1. MATERIAL: BLACK CARBON POLYSTYRENE
SURFACE RESISTIVITY: $1X10^4$ TO $1X10^8$ ohms/square

DIMENSIONING AND TOLERANCING PER ASME Y14.5M–1994

Figure 17: Reel

ORDERING INFORMATION

ORDER NUMBER	TEMPERATURE RANGE	PACKAGE DESCRIPTION	COMPONENT PACKAGING
AWT6631Q7	-30 °C to +90 °C	RoHS Compliant 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module	Tape and Reel, 2500 pieces per Reel
AWT6631P9	-30 °C to +90 °C	RoHS Compliant 10 Pin 3 mm x 3 mm x 1 mm Surface Mount Module	Partial Tape and Reel

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Warren, New Jersey 07059, U.S.A.
Tel: +1 (908) 668-5000
Fax: +1 (908) 668-5132

URL: http://www.anadigics.com

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