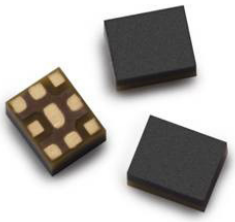
ACMD-6307

LTE Band 7 Duplexer

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant



Description

The Avago ACMD-6307 is a highly miniaturized duplexer designed for use in LTE Band 7 (2500 – 2570 MHz UL, 2620 – 2690 MHz DL) handsets and mobile data terminals.

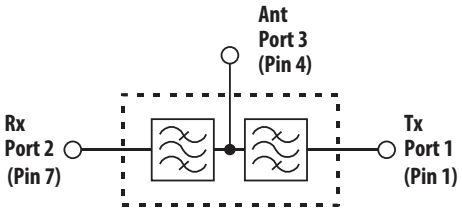
Low Insertion Loss in the Tx channel minimizes current drain from the power amplifier, while low Rx channel Insertion Loss improves receiver sensitivity.

The ACMD-6307 enhances the sensi¬tivity and dynamic range of handset receivers by providing high isolation of the transmitted signal from the receiver input and high rejection of transmit-generated noise in the receive band.

The ACMD-6307 is designed with Avago Technologies' innovative Film Bulk Acoustic Resonator (FBAR) technology, which makes possible ultra-small, high-Q filters at a fraction of their usual size. The excellent power handling capability of FBAR bulk-mode resonators supports the high output power levels used in mobile communications applications, while adding virtually no distortion.

The ACMD-6307 also utilizes Avago Technologies' advanced Microcap bonded-wafer, chip scale packaging technology. This process allows the filters to be assembled into a molded chip-on-board module with an overall size of only 1.6 x 2.0 mm and height of 0.9 mm. The ACMD-6307 is compatible with standard 1.6 x 2.0 mm duplexer PCB footprints.

Functional Block Diagram



Features

- Miniature Size
  - 1.6 x 2.0 mm size
  - 0.90 mm max height
  - Standard 1.6 x 2.0 mm PCB footprint
- High Isolation
- High Rejection for Coexistence with Wi-Fi
- High Power Rating
  - 33 dBm Abs Max Tx Power
- Environmental
  - RoHS Compliant
  - Halogen free
  - TBBPA Free

Specifications

- Rx Band Performance, 2620-2690 MHz, – 20 to +85°C
  - Insertion Loss: 2.9 dB Max
  - Rx Noise Blocking: 50 dB Min
- Tx Band Performance, 2500-2570 MHz, – 20 to +85°C
  - Insertion Loss: 3.1 dB Max
  - Tx Interferer Blocking: 55 dB Min

Applications

Smartphones, tablets, data terminals, and other mobile/portable communication devices operating in the LTE Band 7 frequency range.

ACMD-6307 Electrical Specifications [2], Z0=50 Ω, TC [1] as indicated

			–20°C		+25°C			+85°C	
Symbol	**Parameter**	**Units**	**Min**	**Max**	**Min**	**Typ[3]**	**Max**	**Min**	**Max**
	Antenna Port to Receive Port								
S23	Insertion Loss in Receive Band 2620 – 2690 MHz	dB		2.9		0.9	2.5		2.9
S23	Attenuation in Transmit Band 2500 – 2570 MHz	dB	45		45	63		45	
S23	Attenuation, 50 – 2380 MHz	dB	40		40	55		40	
S23	Attenuation, 2380 – 2484 MHz	dB	40		40	54		40	
S23	Attenuation, 2775 – 6000 MHz	dB	40		40	60		40	
S22	Return Loss (SWR) of Rx Port in Rx Band 2620 – 2690 MHz	dB	9	(2.1)	9	16 (1.4)	(2.1)	9	(2.1)
S33	Return Loss (SWR) of Ant Port in Rx Band 2620 – 2690 MHz	dB	9	(2.1)	9	11 (1.8)	(2.1)	9	(2.1)
	Transmit Port to Antenna Port								
S31	Insertion Loss in Transmit Band 2500 – 2510 MHz 2510 – 2570 MHz	dB		 3.1 2.0		 1.8 1.3	 2.7 2.0		 2.7 2.5
S31	Attenuation in Receive Band 2620 – 2690 MHz	dB	45		45	63		45	
S31	Attenuation, 50 – 1565 MHz	dB	35		35	59		35	
S31	Attenuation in GNSS Rx Bands 1565 – 1585 MHz (GPS) 1597 – 1607 MHz (GLONASS)	dB	 35 35		 35 35	 46 46		 35 35	
S31	Attenuation, 1607 – 1680 MHz	dB	25		25	46		25	
S31	Attenuation, 1805 – 1880 MHz	dB	30		30	46		30	
S31	Attenuation, 2110 – 2170 MHz	dB	30		30	53		30	
S31	Attenuation in Wi-Fi Band 2400 – 2483 MHz [4]	dB	35		35	49		25	
S31	Attenuation in Tx 2nd Harmonic Band 5000 – 5140 MHz	dB	25		25	48		25	
S31	Attenuation, 5150 – 5850 MHz	dB	20		20	36		20	
S31	Attenuation in Tx 3rd Harmonic Band 7500 – 7710 MHz	dB	18		18	26		18	
S11	Return Loss (SWR) of Tx Port in Tx Band 2500 – 2570 MHz	dB	10	(1.9)	10	20 (1.2)	(1.9)	10	(1.9)
S33	Return Loss (SWR) of Ant Port in Tx Band 2500 – 2570 MHz	dB	10	(1.9)	10	20 (1.2)	(1.9)	10	(1.9)
	Isolation Transmit Port to Receive Port								
S21	Tx-Rx Isolation in Rx Band 2620 – 2690 MHz	dB	50		50	60		50	
S21	Tx-Rx Isolation in Tx Band 2500 – 2570 MHz	dB	55		55	64		55	

Notes:
1. T_C is the case temperature and is defined as the temperature of the underside of the Duplexer where it makes contact with the circuit board.
2. Min/Max specifications are guaranteed at the indicated temperature with the input power to the Tx ports equal to or less than +29 dBm over all Tx frequencies unless otherwise noted.
3. Typical data is the average value of the parameter over the indicated band at the specified temperature. Typical values may vary over time.
4. Channel average Insertion Loss, which is obtained by averaging |S21| over the center 19 MHz of channels and converting to dB value.

Absolute Maximum Ratings [1]

Parameter	Unit	Value
Storage temperature	°C	–65 to +125
Maximum RF Input Power to Tx Port	dBm	+33

Maximum Recommended Operating Conditions [2]

Parameter	Unit	Value
Operating temperature, T_C [3] , Tx Power ≤ 29 dBm, CW	°C	–40 to +100
Operating temperature, T_C [3] , Tx Power ≤ 30 dBm, CW	°C	–40 to +85

Notes:
1. Operation in excess of any one of these conditions may result in permanent damage to the device.
2. The device will function over the recommended range without degradation in reliability or permanent change in performance, but is not guaranteed to meet electrical specifications.
3. T_C is defined as case temperature, the temperature of the underside of the duplexer where it makes contact with the circuit board.

ACMD-6307 Typical Performance at Tc = 25°C

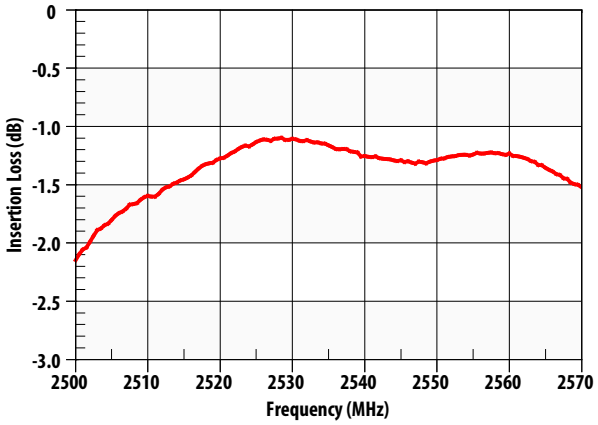


Figure 1. Tx–Ant Insertion Loss.

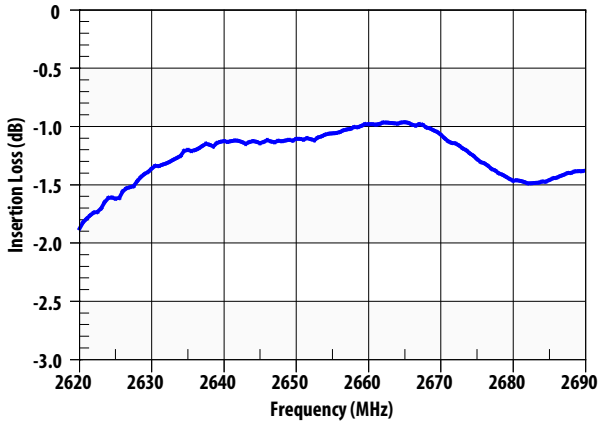


Figure 2. Ant–Rx Insertion Loss.

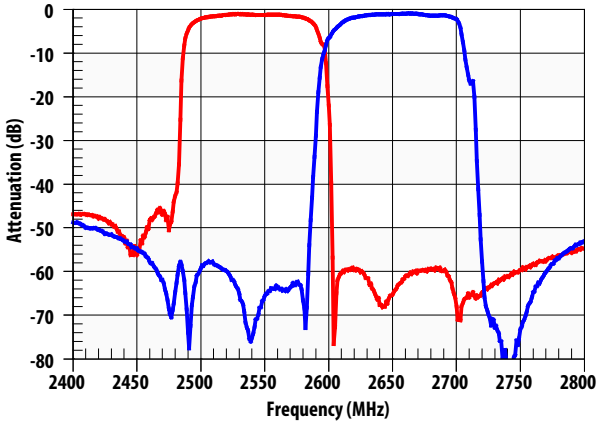


Figure 3. Tx Rejection in Rx Band and Rx Rejection in Tx Band.

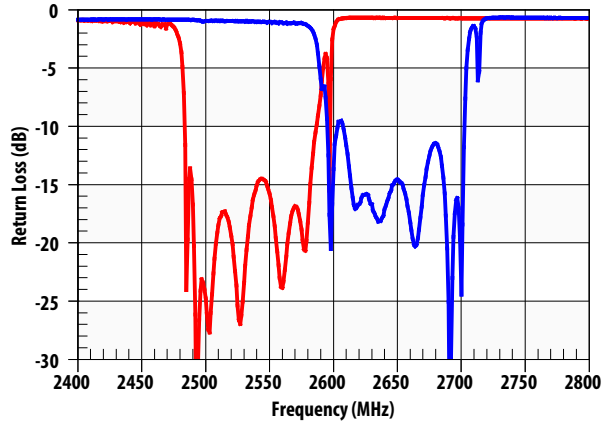


Figure 4. Tx and Rx Port Return Loss.

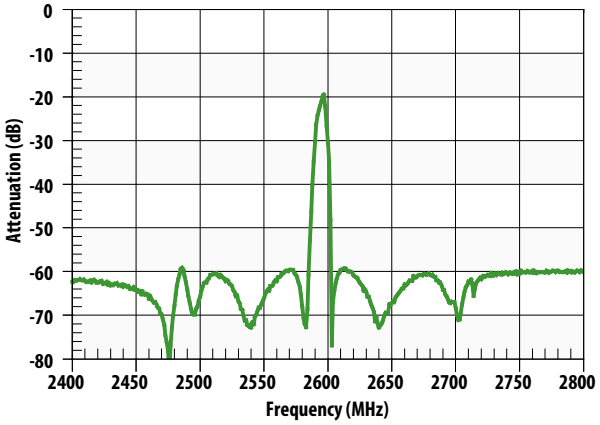


Figure 5. Tx–Rx Isolation.

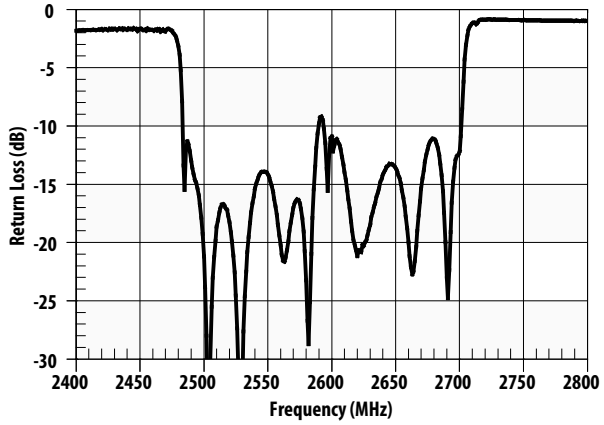


Figure 6. Antenna Port Return Loss.

ACMD-6307 Typical Performance at Tc = 25°C

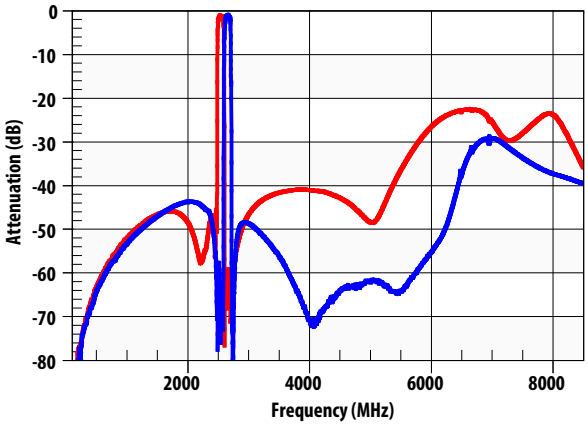


Figure 7. Tx–Ant and Ant–Rx Wideband Insertion Loss.

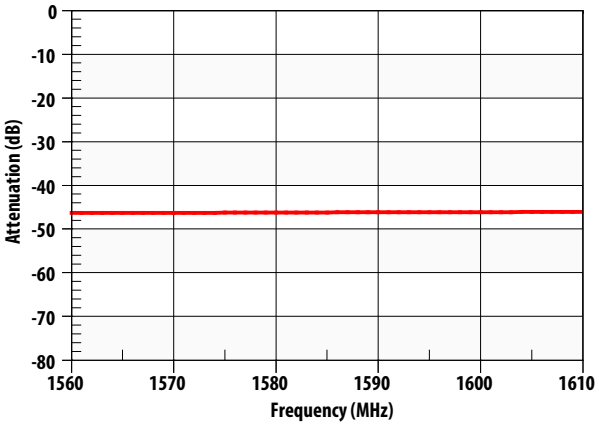


Figure 8. Tx–Ant Rejection in GPS Band.

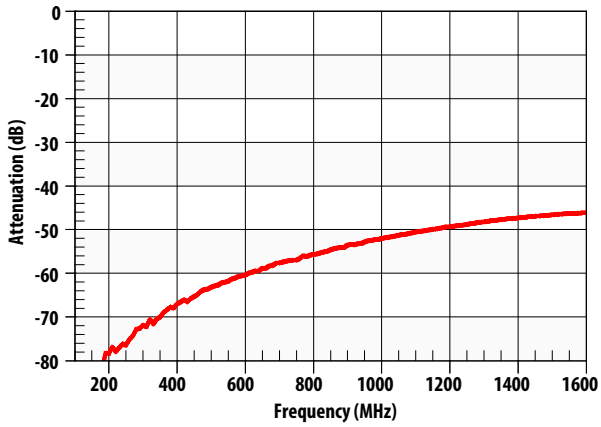


Figure 9. Tx–Ant Low Frequency Rejection, 100 – 1600 MHz.

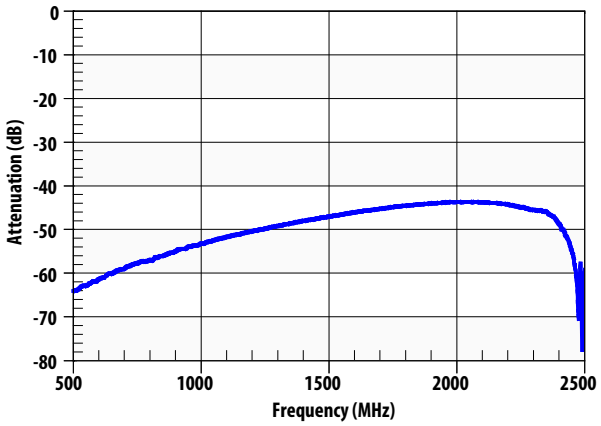


Figure 10. Ant–Rx Low Frequency Rejection, 500 – 2500 MHz.

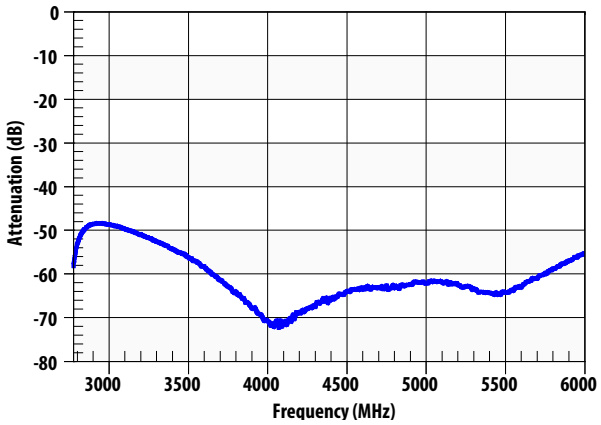


Figure 11. Ant–Rx Rejection, 2775 – 6000.

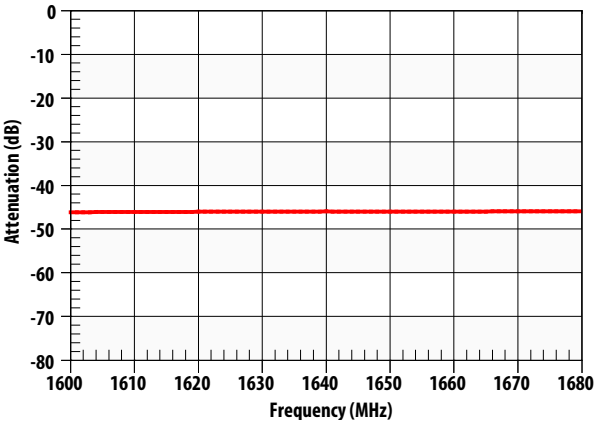


Figure 12. Tx–Ant Low Frequency Rejection, 1600 – 1680 MHz.

ACMD-6307 Typical Performance at Tc = 25°C

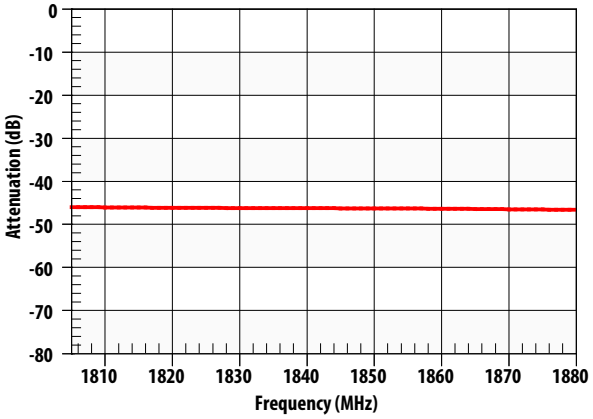


Figure 13. Tx–Ant Low Frequency Rejection, 1805 – 1880 MHz.

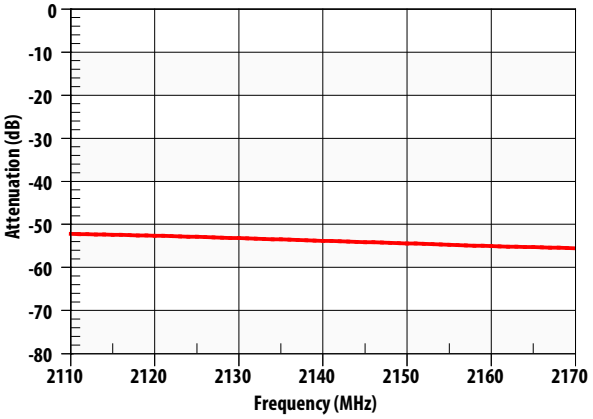


Figure 14. Tx–Ant Low Frequency Rejection, 2110 – 2170 MHz.

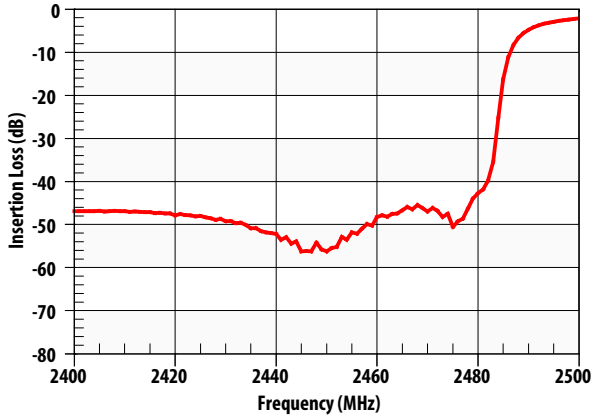


Figure 15. Tx–Ant Low Frequency Rejection, 2400 – 2450 MHz.

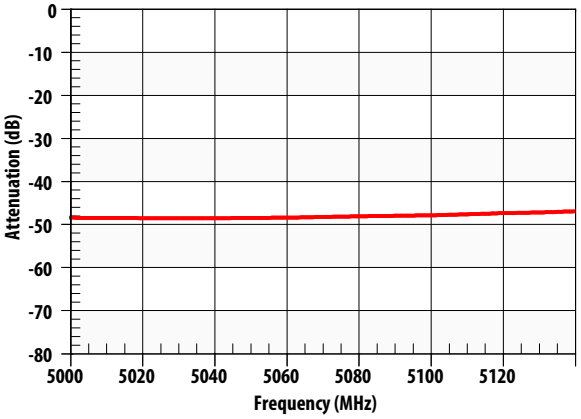


Figure 16. Tx–Ant Low Frequency Rejection at Tx 2nd Harmonic, 5000 – 5140 MHz.

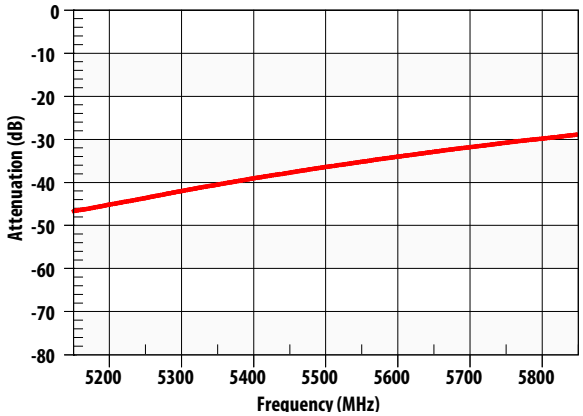


Figure 17. Tx–Ant Low Frequency Rejection, 5150 – 5850 MHz.

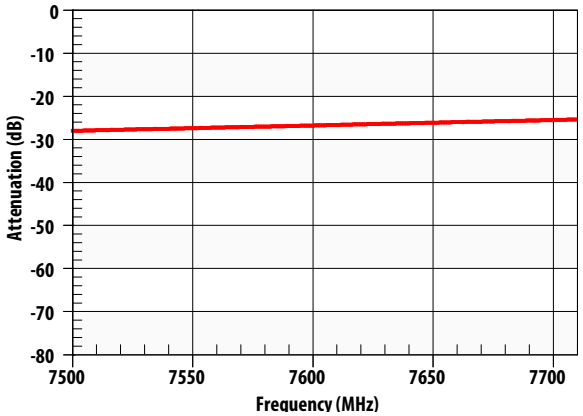


Figure 18. Tx–Ant Low Frequency Rejection, 7500 – 7710 MHz.

ACMD-6307 Typical Performance at Tc = 25°C

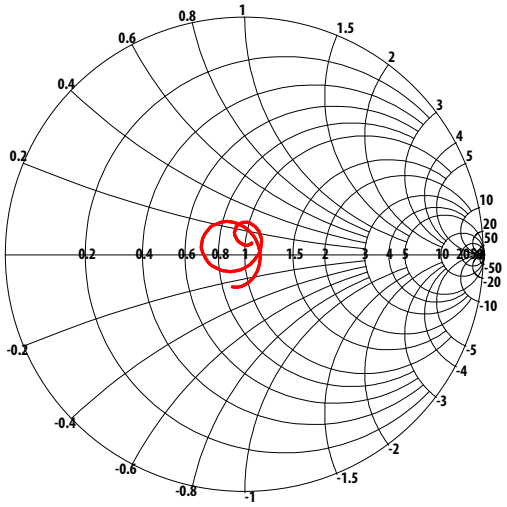


Figure 19. Tx Port Impedance in Tx Band.

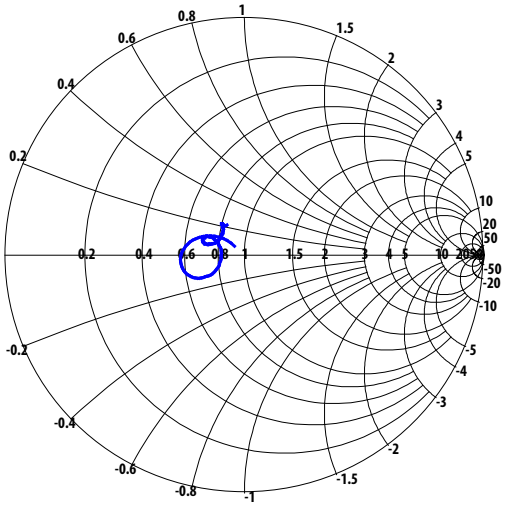


Figure 20. Rx Port Impedance in Rx Band.

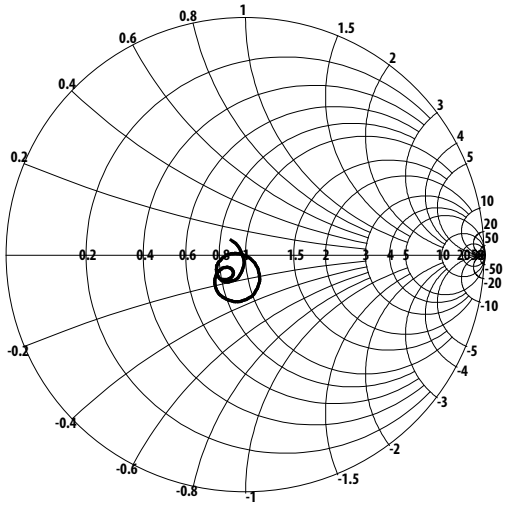


Figure 21. Ant Port Impedance in Tx Band.

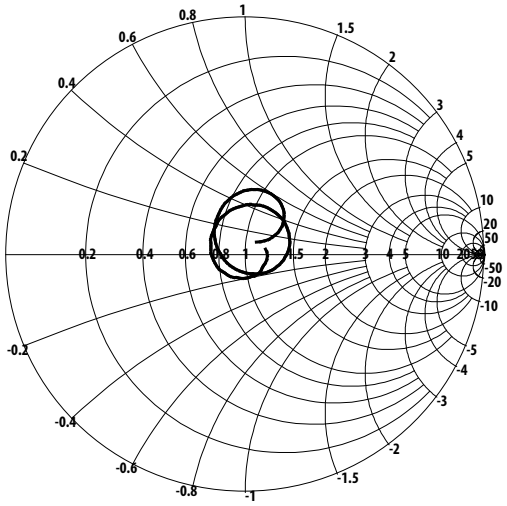
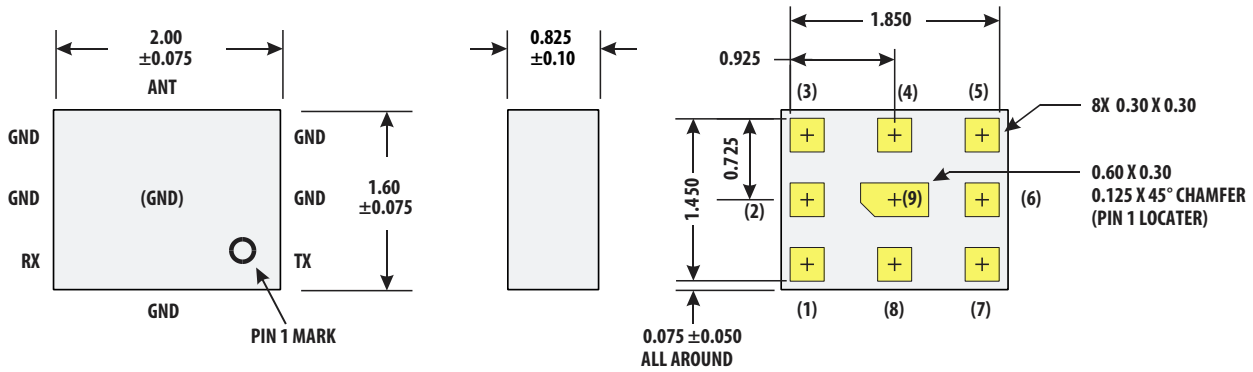


Figure 22. Ant Port Impedance in Rx Band.

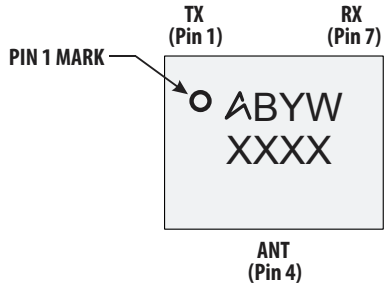


Unless Otherwise Specified:
1. Dimensions in millimeters
2. Dimensions are nominal
3. Tolerances: X.XX ± 0.05
   X.XXX ± 0.025
4. Contact areas are gold plated

Pin Connections:

1	Tx
2, 3	Gnd
4	Ant
5, 6	Gnd
7	Rx
8, 9	Gnd

Figure 23. Package Outline Drawing.



A = Avago Technologies
B = ACMD-6307
Y = Year, last digit
W = Work Week *
XXXX = Lot Number

***Refer to Appendix A for Work Week Cross Reference**

Figure 24. Product Marking and Pin Orientation.

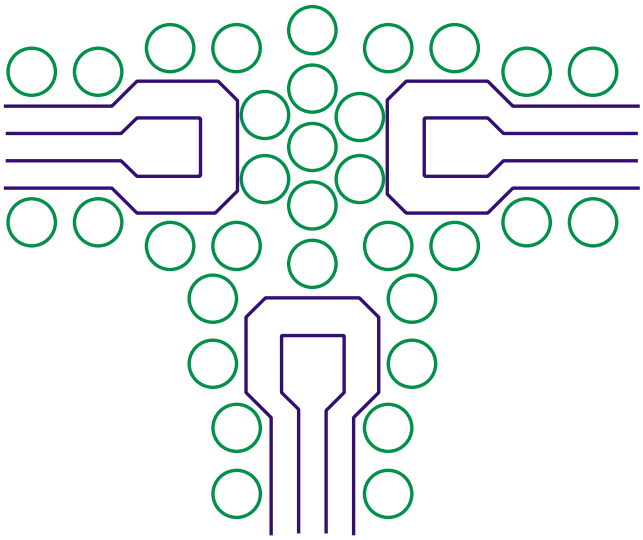


Figure 25. PCB Layout.

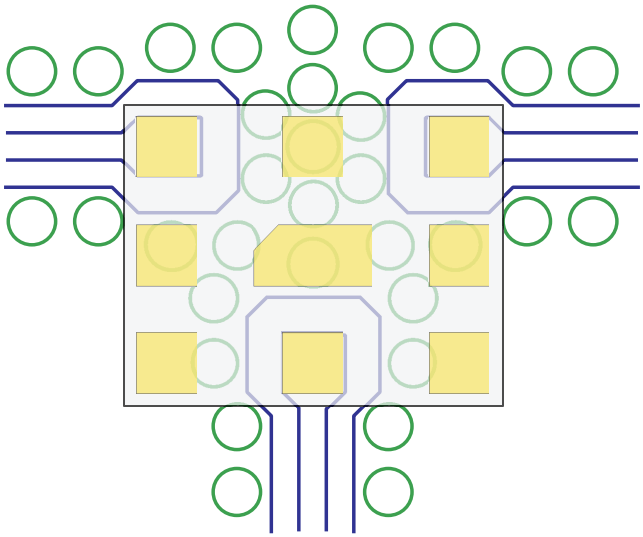


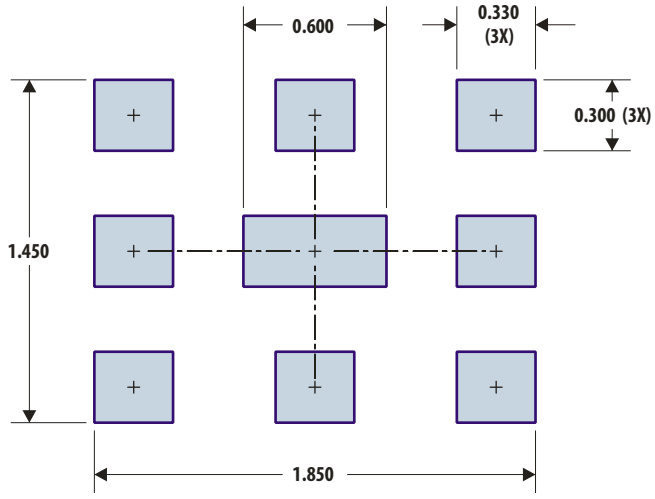
Figure 26. ACMD-6307 Superposed on PCB Pattern

A circuit board layout using the principles illustrated in the figure above is recommended to optimize performance of the ACMD-6307.

It is important to maximize isolation between the Tx and Rx ports. High isolation is achieved by: (1) maintaining a continuous ground plane around the I/O connections and duplexer mounting area, and (2) surrounding the I/O ports with sufficient ground vias to enclose the connections in a "Faraday cage."

The ground vias under the duplexer mounting area are also needed to provide adequate heat sinking for the device.

The 2nd metal layer under the duplexer is a continuous ground plane.



Notes:
1. Dimensions in mm

Figure 27. PCB Land Print

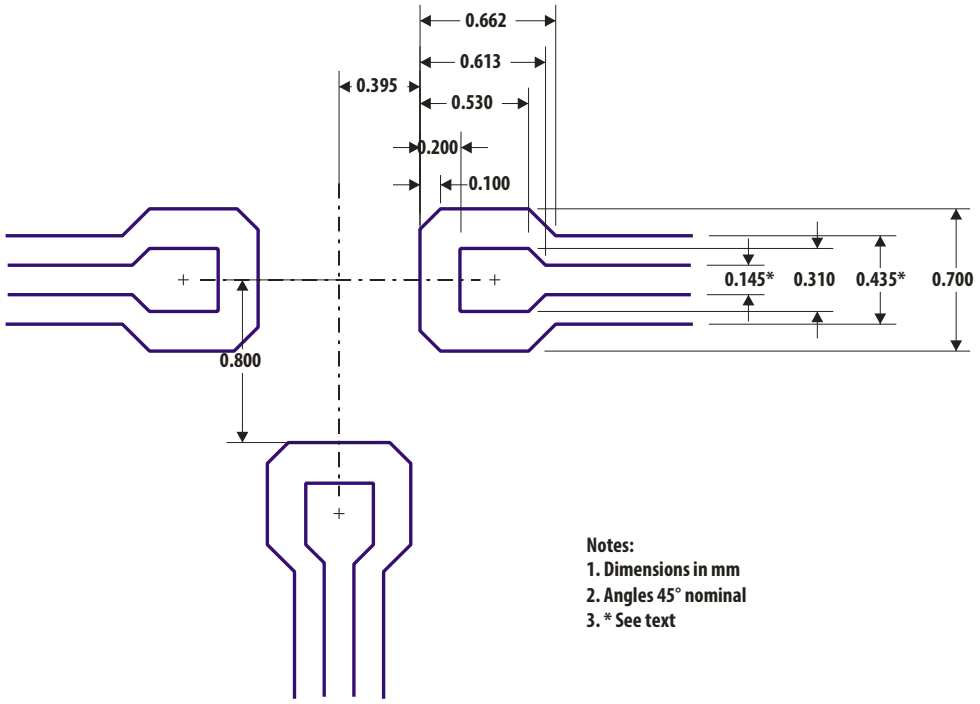


Figure 28. PCB Detail, Metal Dimensions

The transmission line dimensions shown are designed to achieve an impedance of 50 ohms for a 75µm thick PCB layer with a dielectric constant of 3.4.

If other PCB materials or thicknesses are used, the two dimensions indicated with an "*" (line width and spacing) should be adjusted to retain a Zo of 50 ohms.

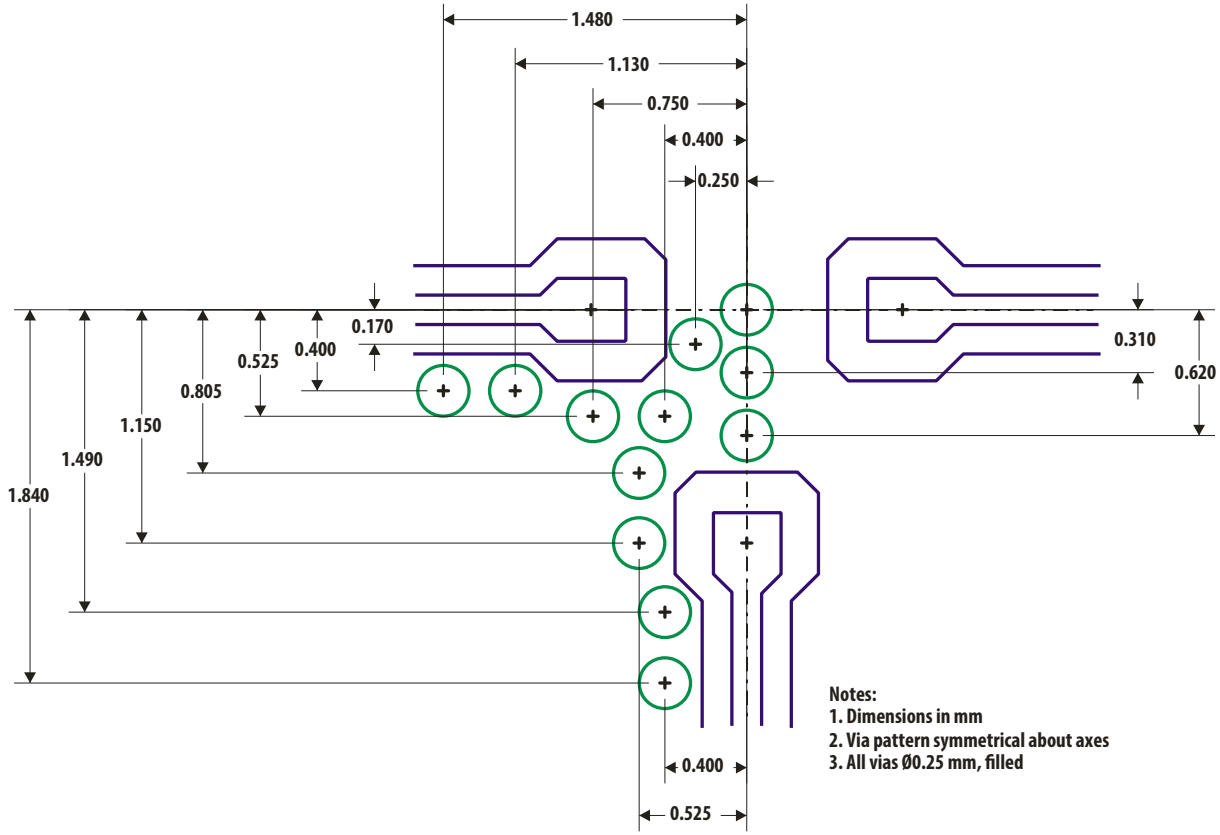
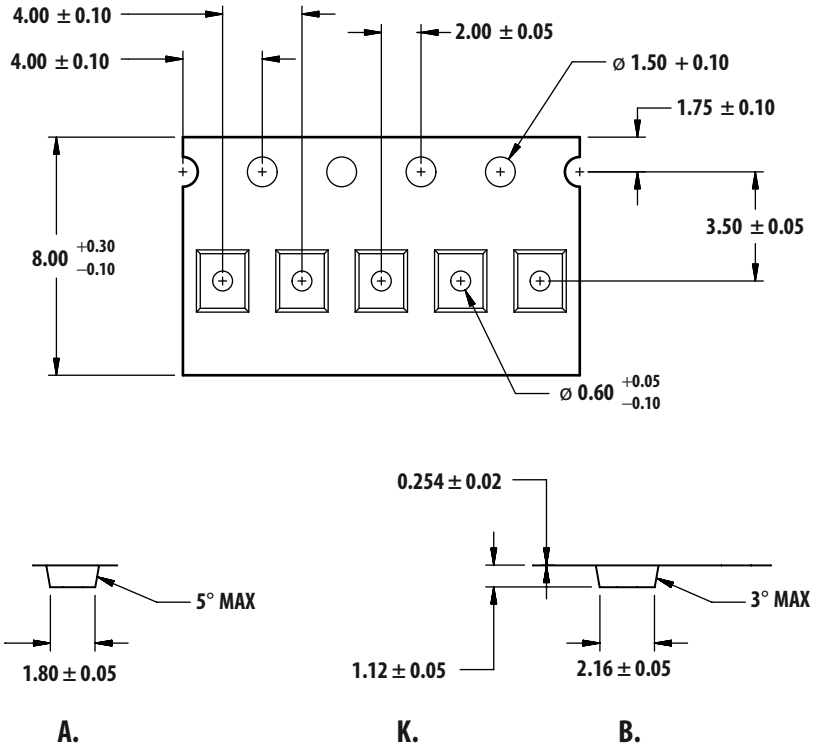


Figure 29. PCB Detail, Via Dimension



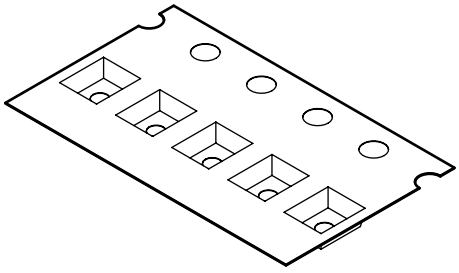


Figure 30. SMT Tape Packing

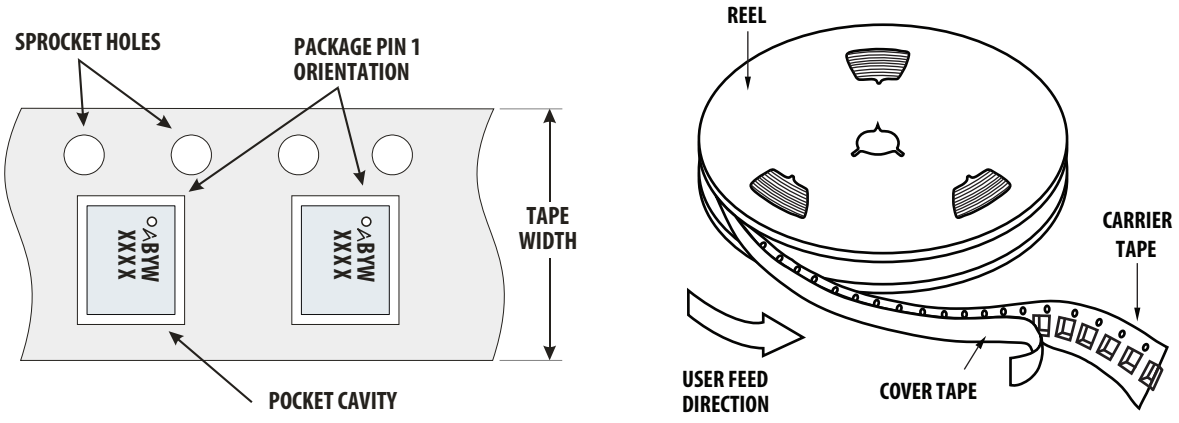
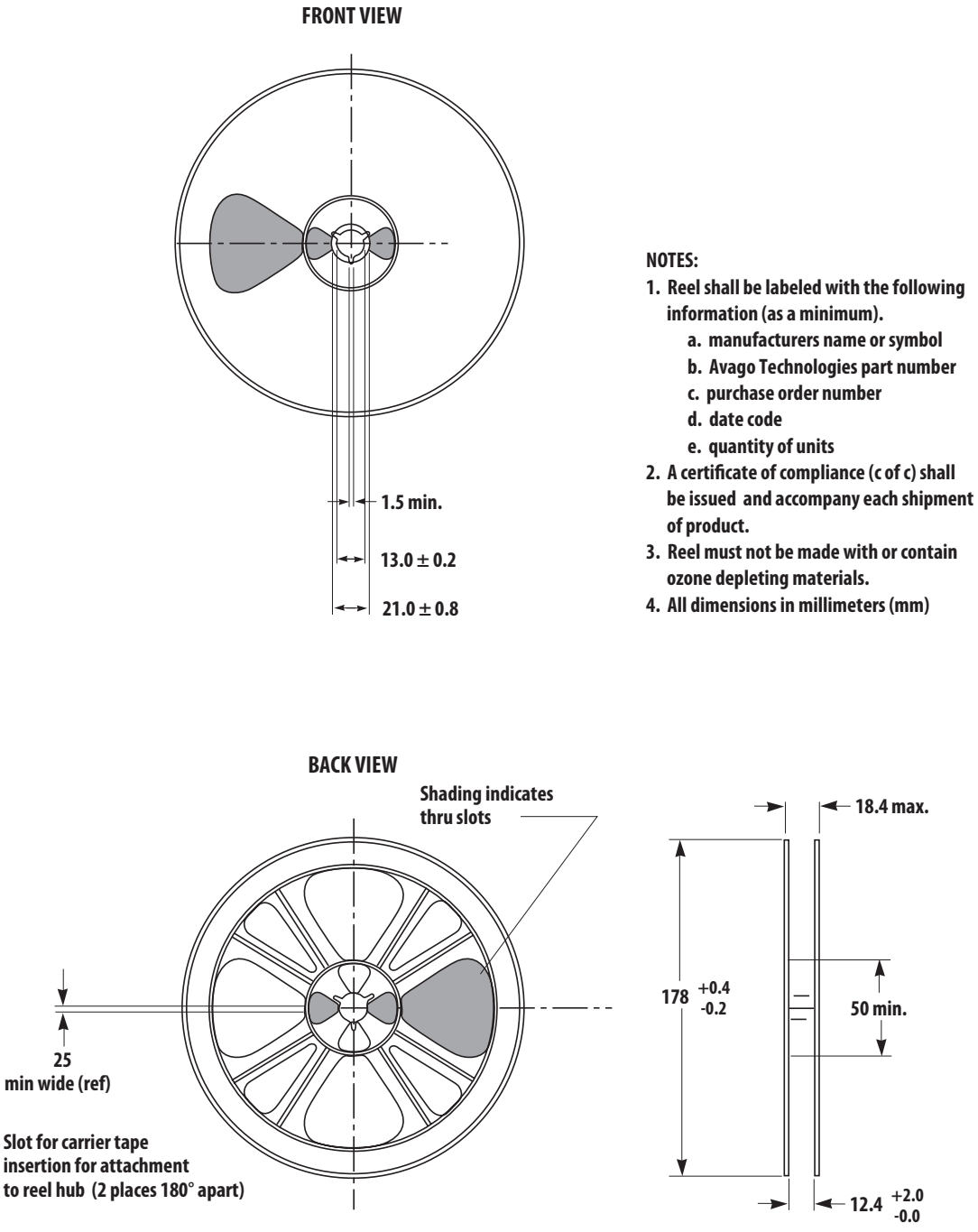


Figure 31. Orientation in Tape and Direction of Feed



NOTES:

1. Reel shall be labeled with the following information (as a minimum).
   a. manufacturers name or symbol
   b. Avago Technologies part number
   c. purchase order number
   d. date code
   e. quantity of units
2. A certificate of compliance (c of c) shall be issued and accompany each shipment of product.
3. Reel must not be made with or contain ozone depleting materials.
4. All dimensions in millimeters (mm)

Figure 32. SMT Reel Drawing

Package Moisture Sensitivity

Feature	Test Method	Performance
Moisture Sensitivity Level (MSL) at 260° C	JESD22-A113D	Level 3

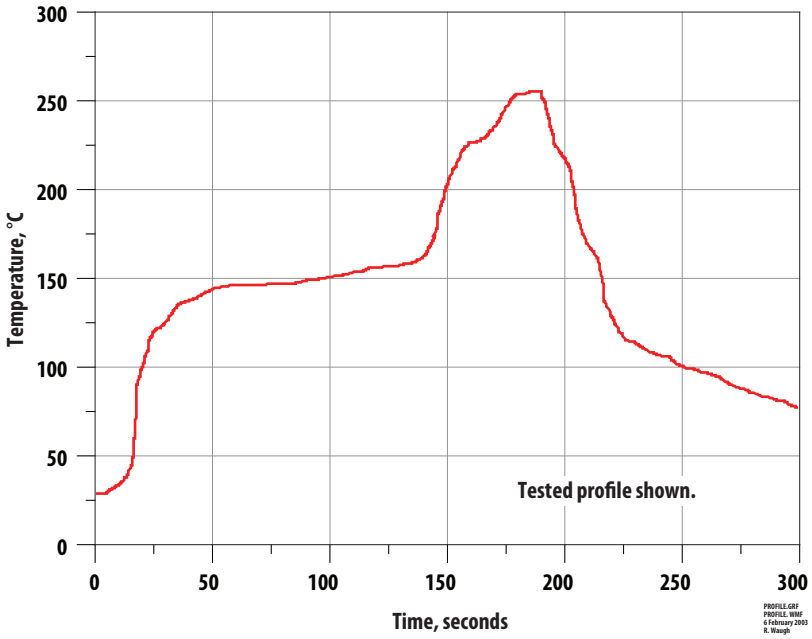


Figure 33. Verified SMT Solder Profile

Ordering Information

Part Number	No. of Devices	Container
ACMD-6307-BLK	100	Tape Strip or Anti-static Bag
ACMD-6307-TR1	3000	178 mm (7-inch) Reel

Appendix A – Package Marking Cross Reference

Marking "W"	Work Week	Marking "W"	Work Week
1	1	S	27
2	2	T	28
3	3	U	29
4	4	V	30
5	5	W	31
6	6	X	32
7	7	Y	33
8	8	Z	34
9	9	a	35
A	10	b	36
B	11	c	37
C	12	d	38
D	13	e	39
E	14	f	40
F	15	g	41
G	16	m	42
H	17	n	43
J	18	q	44
K	19	r	45
L	20	t	46
M	21	<	47
N	22	>	48
O	23	/	49
P	24	\	50
Q	25	(	51
R	26	)	52

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

AV02-4520EN - May 29, 2014