ACPF-7005

PCS (A-G) / UMTS Band 2 Tx Bandpass Filter

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant

Description

The Avago ACPF-7005 is a miniaturized Bandpass Filter designed for use in handsets and mobile data terminals operating in the PCS (Blocks A-G)/UMTS Band 2 Tx frequency range (1850.6 – 1914.4 MHz).

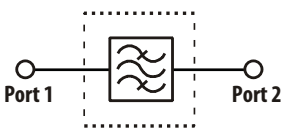
In typical cellular phone architectures, this transmit filter is placed between the driver amplifier and the power amplifier. The high out-of-band rejection of the ACPF-7005 enhances receiver sensitivity by reducing noise in the Rx band which would otherwise be amplified by the transmit chain. The high rejection feature keeps unwanted signals out of the receive path.

The Avago ACPF-7005 rivals split-band surface acoustic wave (SAW) transmit filters. As a high rejection, single filter solution, the ACPF-7005 eliminates the need for switching. This saves board space and external components, while eliminating switch loss and reducing programming complexity.

The ACPF-7005 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 ACPF-7005 also utilizes Avago Technologies' advanced Microcap bonded-wafer, chip scale packaging technology. This process allows this filters to be assembled into a molded chip-on-board module with an overall size of only 1.6 x 2.0 mm and maximum height of 1.1 mm.

Functional Block Diagram



Features

- 50 Ω Input/Output
- High rejection enables elimination of switches
- Miniature Size
  - 1.6 x 2.0 mm size
  - 1.1 mm Max Height
- High Power Rating
  - +30 dBm Abs Max Tx Power
- Environmental
  - RoHS 6 Compliant
  - Halogen free
  - TBBPA Free

Specifications

- Performance guaranteed –10° to +85°C
  - Tx Band Insertion Loss: 3.5 dB Max
  - Rx Band Rejection: 33 dB Min

Applications

Handsets or data terminals operating in the PCS (Blocks A-G)/UMTS Band 2 frequency range.

ACPF-7005 Electrical Specifications [2], Z_0=50 Ω, T_C [1] as indicated

			– 10°C			+25°C			+85°C		
Symbol	**Parameter**	**Units**	**Min**	**Typ [3]**	**Max**	**Min**	**Typ [3]**	**Max**	**Min**	**Typ [3]**	**Max**
S21	Insertion Loss in Tx Band	dB									
	1850.6 – 1852.0 MHz				3.5		2.0	3.5			3.5
	1852.0 – 1912.0 MHz				3.2		1.0	3.2			3.2
	1912.0 – 1914.4 MHz				3.5		1.1	3.5			3.5
ΔS21	Amplitude Ripple (p-p) 1850.6 – 1852.0 MHz	dB			0.5		0.1	0.5			0.5
ΔS21	Amplitude Ripple (p-p) within any 5 MHz Channel in Tx Band (1850.6 – 1914.4 MHz)	dB			1.0		0.5	1.0			1.0
S21	Attenuation, 0 – 1580 MHz	dB	25			25	35		25		
S21	Attenuation in Rx Band (1930.6 – 1994.4 MHz)	dB	33			33	57		33		
S21	Attenuation in Tx 2nd Harmonic Band (3700 – 3829 MHz)	dB	10			10	14		10		
S21	Attenuation in Tx 3rd Harmonic Band (5550 – 5743 MHz)	dB	10			10	13		10		
S11 S22	Return Loss (SWR) in Tx Band (1850.6 – 1914.4 MHz)	dB	7		(2.6)	7	18 (1.3)	(2.6)	7		(2.6)

Notes:
1. T_C is the case temperature and is defined as the temperature of the underside of the Filter where it makes contact with the circuit board.
2. Min/Max specifications are guaranteed at the indicated temperature (unless otherwise noted).
3. Typical data is the average value (arithmetic mean) of the parameter over the indicated band at the specified temperature. Typical values may vary over time.

Absolute Maximum Ratings [1]

Parameter	**Unit**	**Value**
Storage temperature	°C	–40 to +125
Maximum RF Input Power	dBm	+30

Maximum Recommended Operating Conditions [2]

Parameter	**Unit**	**Value**
Operating temperature, T_C [3], Tx Power ≤ 29 dBm	°C	–30 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.

ACPF-7005 Typical Performance at T_C = 25°C

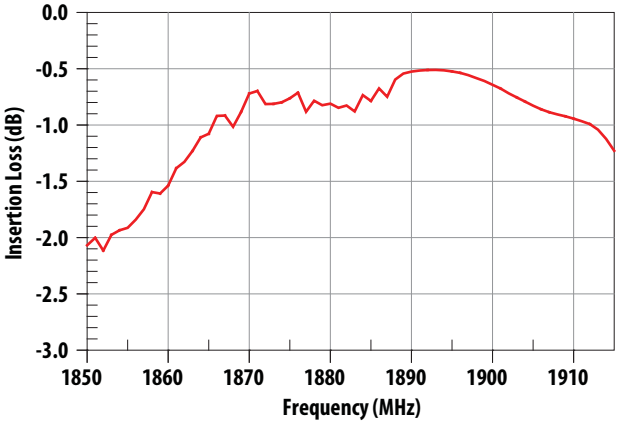


Figure 1. Insertion Loss in Tx Band (1850 – 1915 MHz)

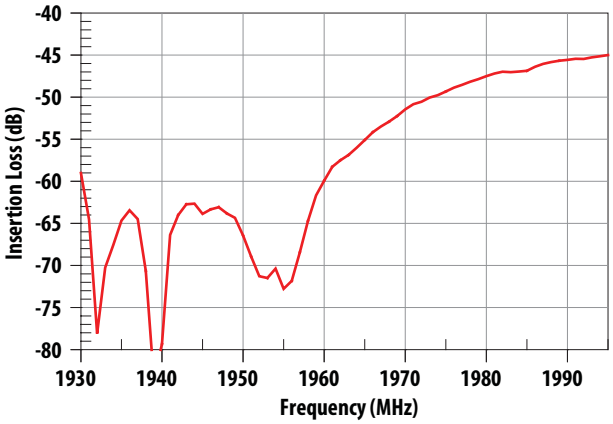


Figure 2. Rejection in Rx Band (1930 – 1995 MHz)

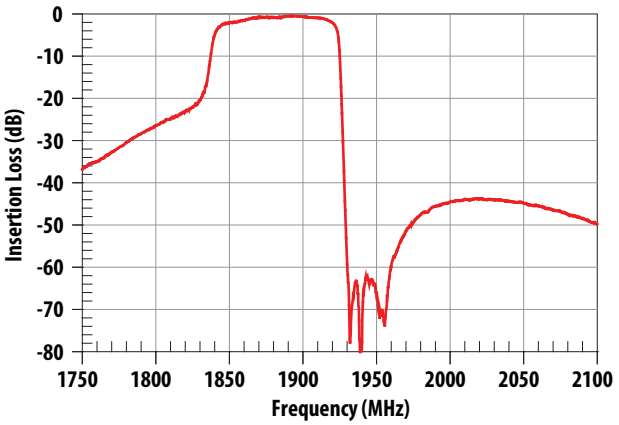


Figure 3. Insertion Loss, 1750 – 2100 MHz

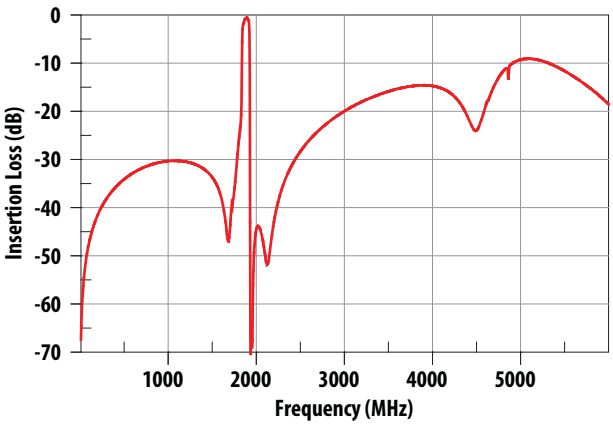


Figure 4. Wideband Insertion Loss, 0.3 – 6000 MHz

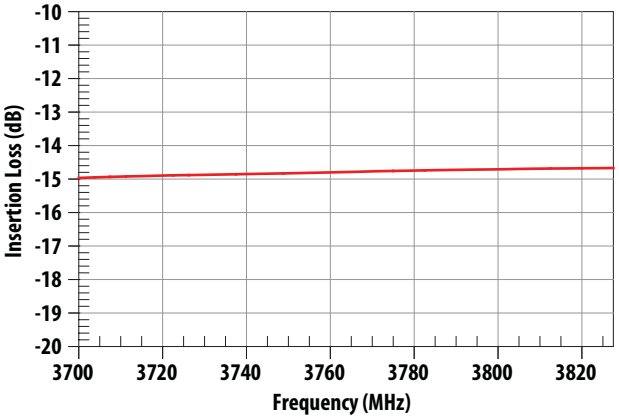


Figure 5. Rejection at Tx Second Harmonic

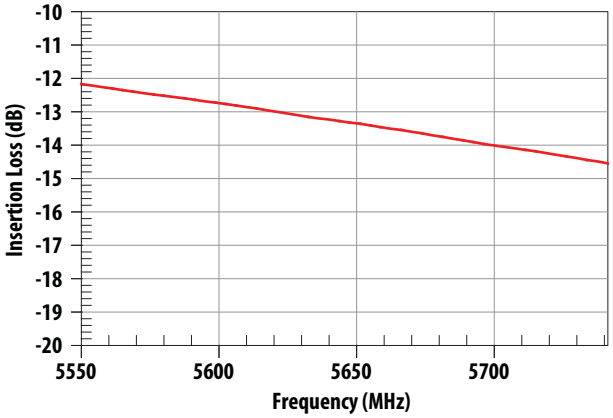


Figure 6. Rejection at Tx Third Harmonic

ACPF-7005 Typical Performance at $T_C = 25°C$

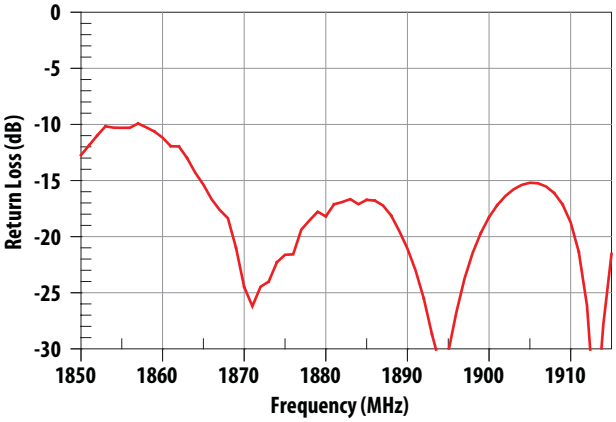


Figure 7. Input Port Return Loss in Tx Band

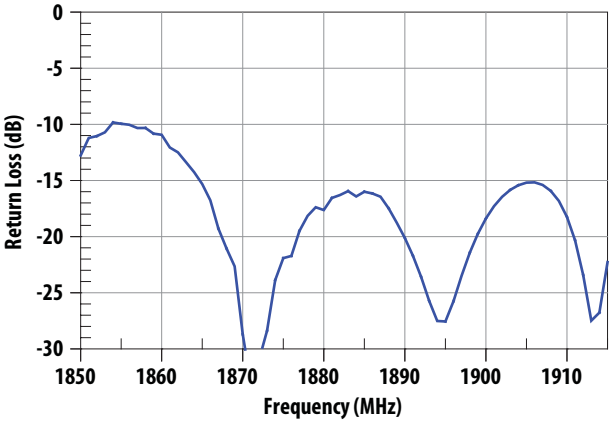


Figure 8. Output Port Return Loss in Tx Band

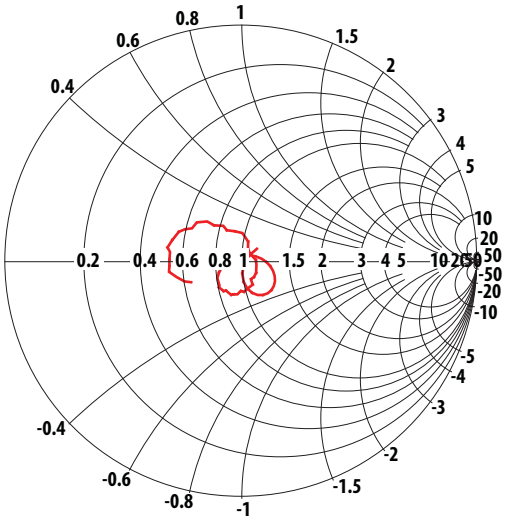


Figure 9. Input Port Impedance (S11) in Tx Band

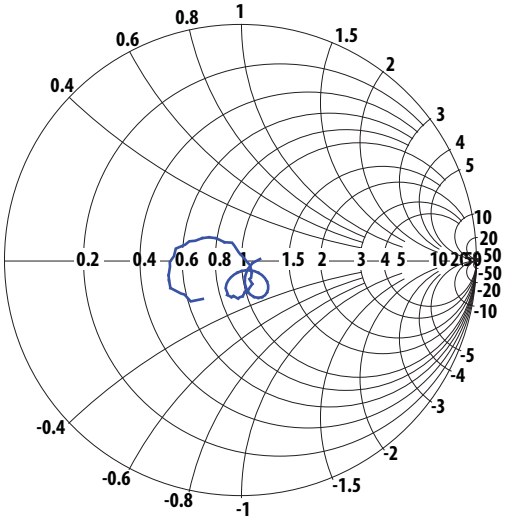


Figure 10. Output Port Impedance (S22) in Tx Band

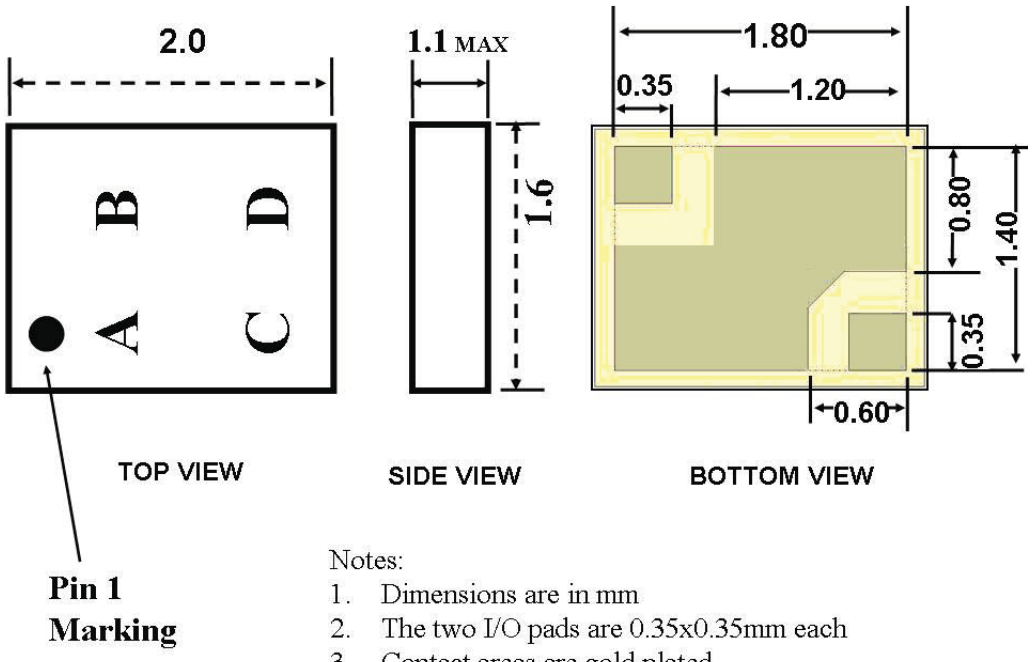


Figure 11. Package Outline Drawing

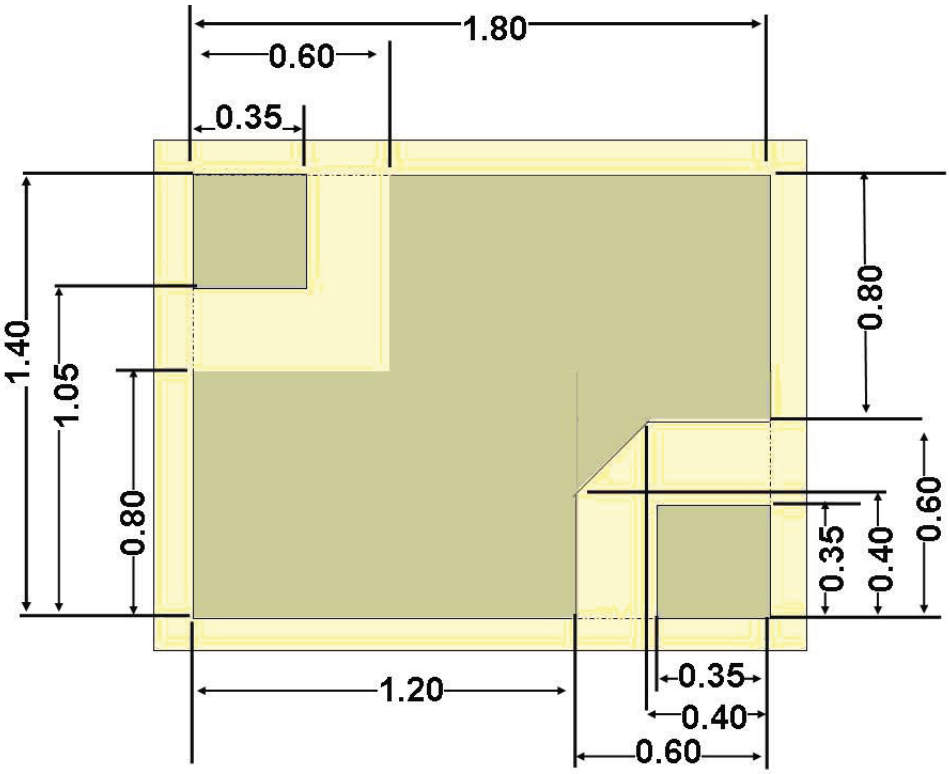
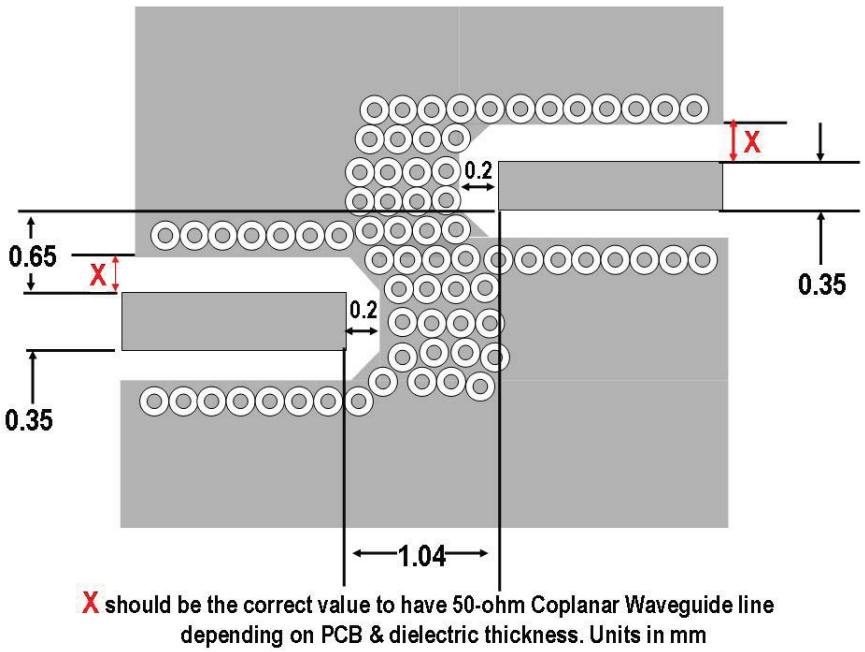


Figure 12. Bottom View Detail (mm)



Notes:
1. Dimensions in mm
2. Top view

Figure 13. Suggested PCB Layout (top view)

A PCB layout using the principles illustrated in the figure above is recommended to optimize performance of the ACPF-7005.

Note: This filter is symmetrical, so either port can be used for either the Input or Output.

It is important to maximize isolation between the Input and Output ports to maintain out-of-band rejection.

High isolation is achieved by: (1) maintaining a continuous ground plane around the I/O connections, and (2) surrounding the I/O ports with sufficient ground vias to enclose the connections in a "Faraday cage."

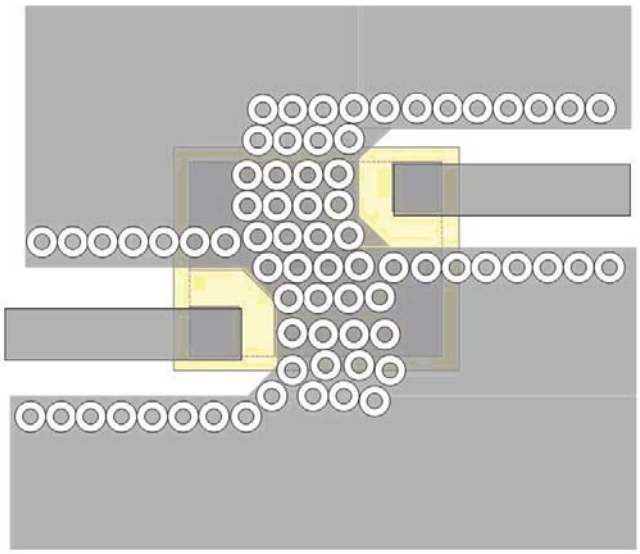
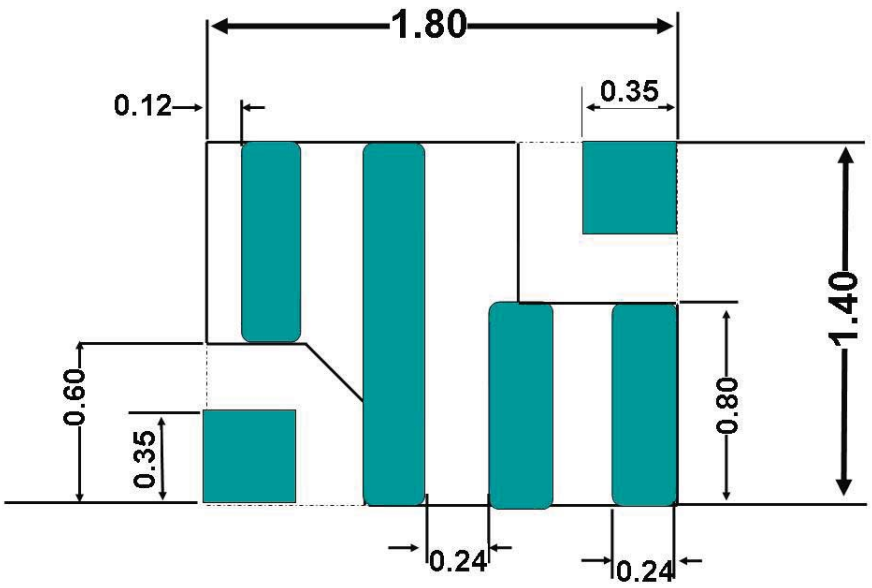


Figure 14. ACPF-7005 Superposed on PCB Layout (top view)



Notes:
1. Dimensions in mm
2. Top view
3. Chamfer or radius all corners 0.05 mm min

Figure 15. Recommended Solder Stencil (top view)

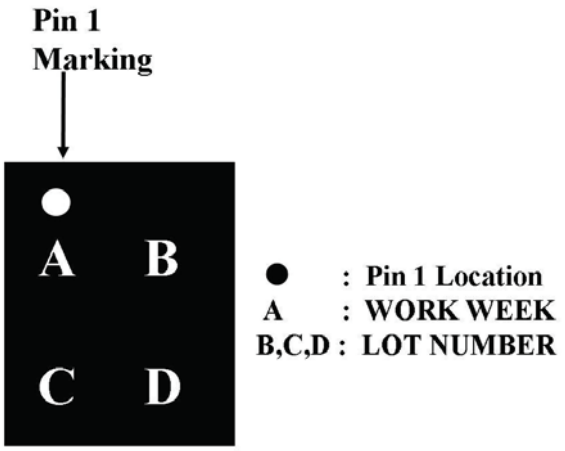


Figure 16. Product Marking and Pin Orientation

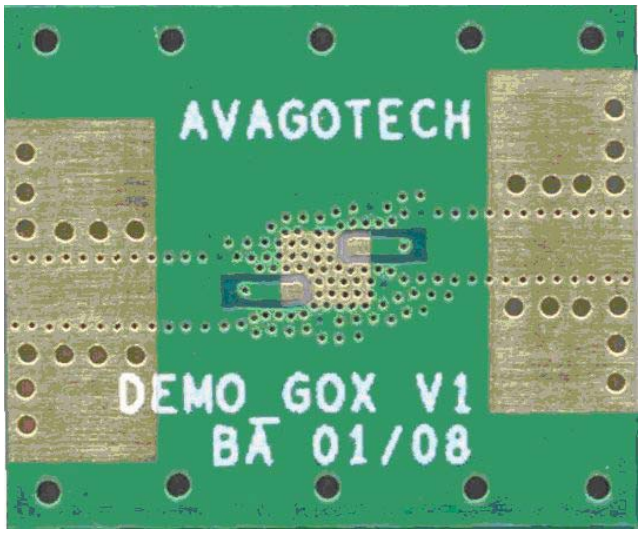


Figure 17. Evaluation board (SMA connectors) for ACPF-7005, top view

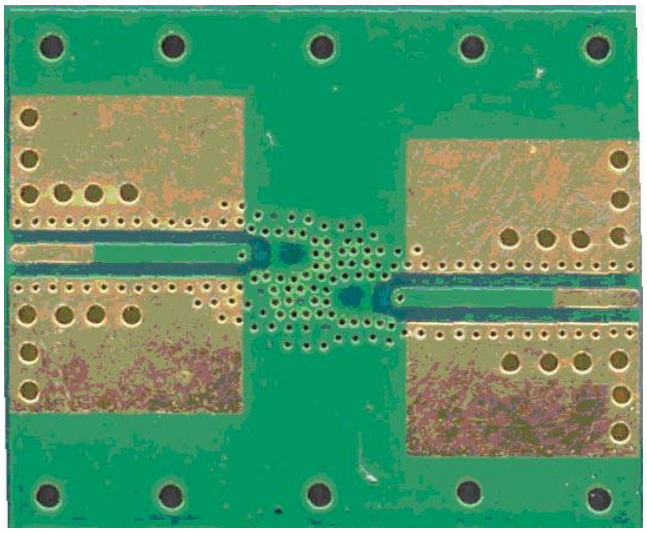
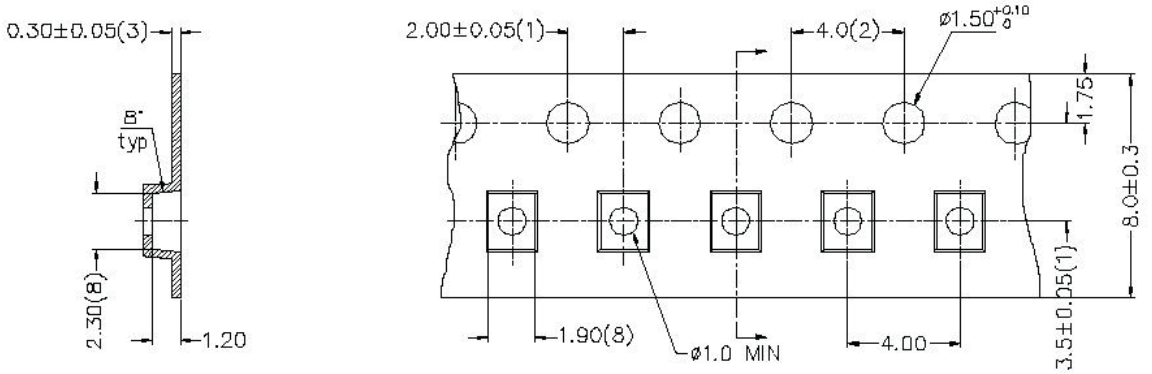


Figure 18. Evaluation board (SMA connectors) for ACPF-7005, bottom view



NOTE:

(1). MEASURED FROM THE CENTERLINE OF SPROCKET HOLE TO CENTERLINE OF THE POCKET HOLE AND FROM THE CENTERLINE OF SPROCKET HOLE TO CENTERLINE OF THE POCKET

(2). CUMULATIVE TOLERANCE OF 10 SPROCKET HOLES IS ±0.20

(3). THIS THICKNESS IS APPLICABLE AS MEASURE AT THE EDGE OF THE TAPE.

4. MATERIAL: BLACK POLYSTYRENE

5. ALL DIMENSIONS IN MM.

6. ALLOWABLE CAMBER TO BE 1MM PER 250MM IN LENGTH

7. UNLESS OTHERWISE SPECIFIED TOLERANCE ±0.10.

(8). MEASUREMENT POINT TO BE 0.3 FROM BOTTOM POCKET.

9. SURFACE RESISTIVITY FROM $1.0X10^{5}$ TO $1.0X10^{11}$ OHMS/SQ

USER DIRECTION OF UNREELING

PEAK PRODU

Figure 19. SMD Tape Packing

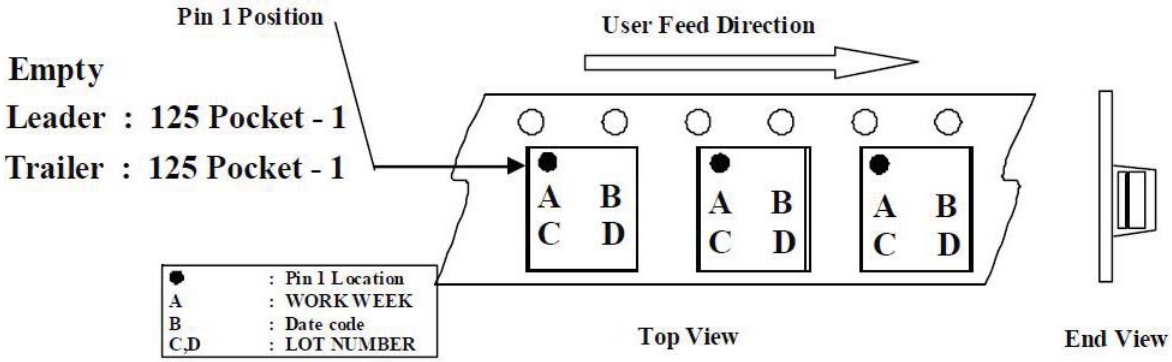
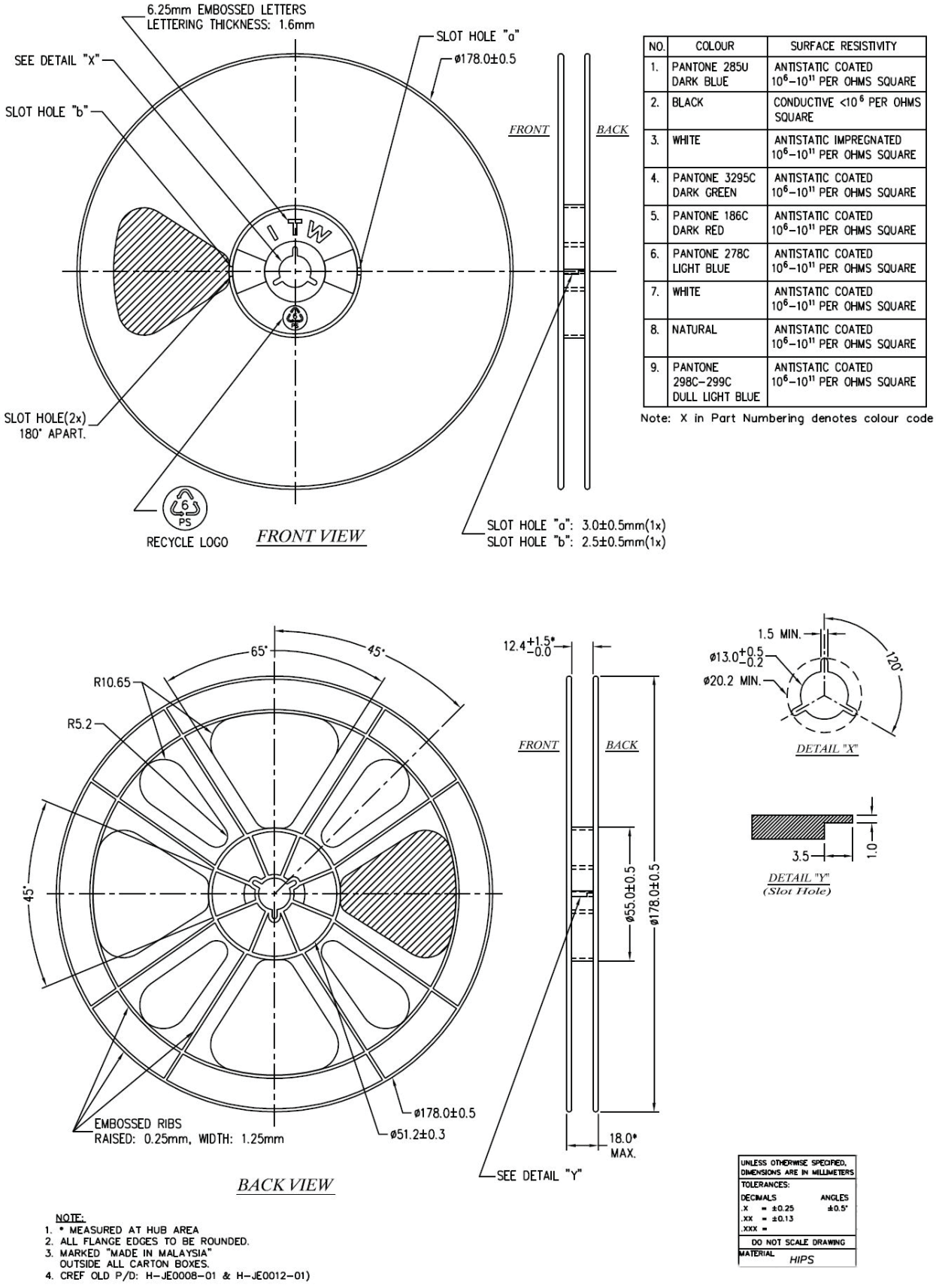


Figure 20. Orientation in Tape



NO.	COLOUR	SURFACE RESISTIVITY
1.	PANTONE 285U DARK BLUE	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
2.	BLACK	CONDUCTIVE <10^6 PER OHMS SQUARE
3.	WHITE	ANTISTATIC IMPREGNATED 10^6–10^{11} PER OHMS SQUARE
4.	PANTONE 3295C DARK GREEN	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
5.	PANTONE 186C DARK RED	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
6.	PANTONE 278C LIGHT BLUE	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
7.	WHITE	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
8.	NATURAL	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE
9.	PANTONE 298C–299C DULL LIGHT BLUE	ANTISTATIC COATED 10^6–10^{11} PER OHMS SQUARE

Note: X in Part Numbering denotes colour code

NOTE:
1. * MEASURED AT HUB AREA
2. ALL FLANGE EDGES TO BE ROUNDED.
3. MARKED "MADE IN MALAYSIA" OUTSIDE ALL CARTON BOXES.
4. CREF OLD P/D: H-JE0008-01 & H-JE0012-01)

Figure 21. SMT Reel Drawing

Package Moisture Sensitivity

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

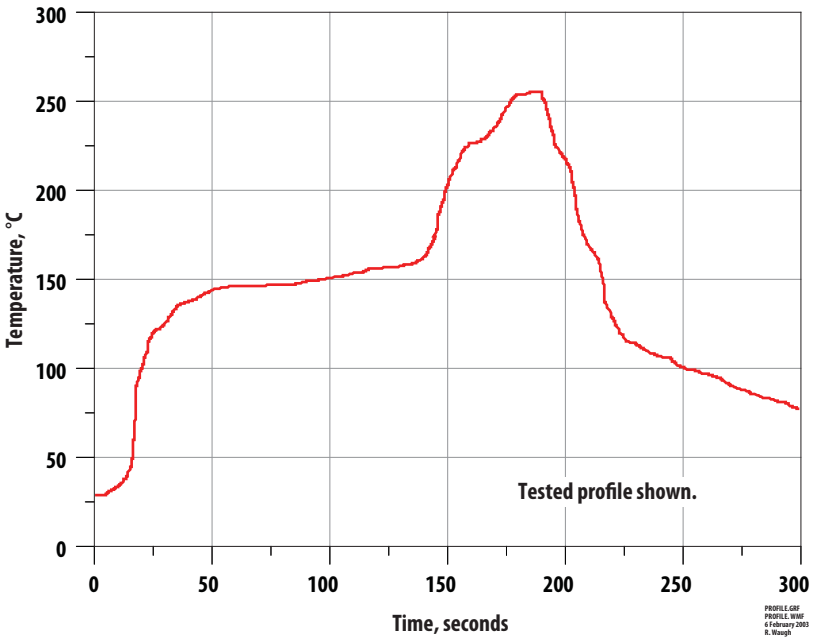


Figure 22. Verified SMT Solder Profile

Ordering Information

Part Number	No. of Devices	Container
ACPF-7005-BLK	100	Anti-static Bag
ACPF-7005-TR1	3000	7-inch (178 mm) Reel

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

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