ACPF-7024

ISM Bandpass Filter (2401 – 2482 MHz)

Data Sheet

Lead (Pb) Free
RoHS 6 fully compliant

Description

The Avago ACPF-7024 is a miniaturized Bandpass Filter designed for use in the 2.4 GHz Industrial, Scientific and Medical (ISM) band.

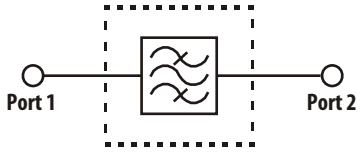
The ACPF-7024 is designed to enable concurrent operation of Wireless LAN and Bluetooth applications which coexist with other wireless standards, such as 2.5 GHz WiMAX, PCS, and LTE Bands 7 and 40, without performance degradations due to interference.

The ACPF-7024 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 ACPF-7024 also utilizes Avago Technologies' advanced Microcap bonded-wafer technology. This chip scale miniaturization process results in a package footprint of only 1.6 x 2.0 mm with a maximum height of 0.95 mm

The ACPF-7024 is compatible with high volume, lead-free SMT soldering processes and can be direct surface mounted to a PCB or a transfer molded module.

Functional Block Diagram



Features

- 50 Ω Input/Output
- No external matching required
- Low Insertion Loss, High Interference Rejection
- Miniature Size
  - 1.6 x 2.0 mm size
  - 0.95 mm Max Height
- High Power Rating
  - +27 dBm Abs Max Input Power
- Environmental
  - RoHS 6 Compliant
  - Halogen free
  - TBBPA Free

Specifications

- Performance guaranteed -30° to +85°C
- Low Insertion Loss

Applications

802.11 b/g/n WLAN or Bluetooth datacom in handsets, mobile and portable communications devices.

ACPF-7024 Electrical Specifications [2], $Z_0 = 50\ \Omega$, T_C [1] -30° C to +85° C unless otherwise specified

Symbol	Parameter	Units	Min	Typ [3]	Max
S21	Insertion Loss	dB			
	2401 – 2473 MHz			1.1	2.5
	2401 – 2480 MHz			1.2	3.5
	2480 – 2482 MHz (+25° C to +85° C)			2.6	5.0
	2480 – 2482 MHz (-30° C to +25° C)			2.0	3.0
ΔS21	Amplitude Ripple (p-p), 2401 – 2473 MHz	dB		0.8	2.0
S21	Attenuation, 800 – 2000 MHz	dB	30	33	
S21	Attenuation, 2000 – 2300 MHz	dB		42	
S21	Attenuation in LTE Band 40, 2300 – 2370 MHz	dB	30	45	
S21	Attenuation in LTE Band 40, 2370 – 2380 MHz	dB		37	
S21	Attenuation[4], 2496 – 2502 MHz (WiMAX)	dB			
	+25° C to +85° C			30	
	-30° C to +25° C			20	
S21	Attenuation, 2500 – 2502 MHz (LTE Band 7, WiMAX)	dB			
	+25° C to +85° C		30	45	
	0° C to +25° C		15	40	
	-30° C to +25° C		10	30	
S21	Attenuation [4], 2500 – 2510 MHz (LTE Band 7, low channel)	dB			
	+25°C to +85°C			50	
	–30°C to +25°C			45	
S21	Attenuation, 2502 – 2690 MHz (LTE Band 7, WiMAX)	dB	35	51	
S21	Attenuation, 2690 – 5000 MHz	dB	28	38	
S11, S22	Return Loss (SWR), 2401 – 2482 MHz	dB	9	12 (1.7)	(2.1)

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). Ports 1 and 2 are interchangeable (Filter is symmetrical).
3. Typical data is the average value (arithmetic mean) of the parameter over the indicated band at the specified temperature range.
4. Average insertion Loss with constant weighting over indicated frequency range.

Absolute Maximum Ratings [1]

Parameter	Unit	Value
Storage temperature	°C	-40 to +125
Maximum RF Input Power to Port 1 or Port 2	dBm	+27

Maximum Recommended Operating Conditions [2]

Parameter	Unit	Value
Operating temperature, T_C [3],	°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 Filter where it makes contact with the circuit board.

ACPF-7024 Typical Performance at $T_C = 25°C$

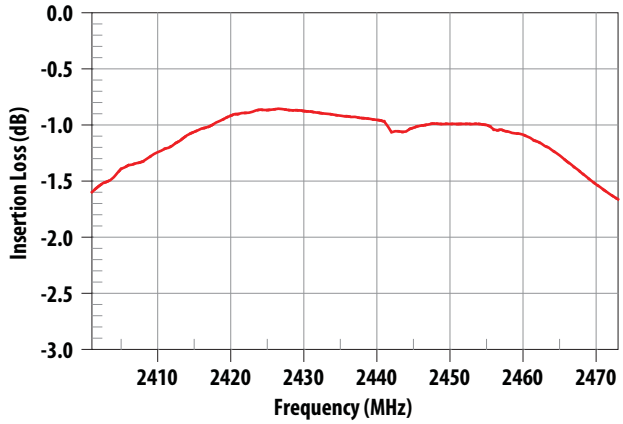


Figure 1. Insertion Loss, 2401 – 2473 MHz

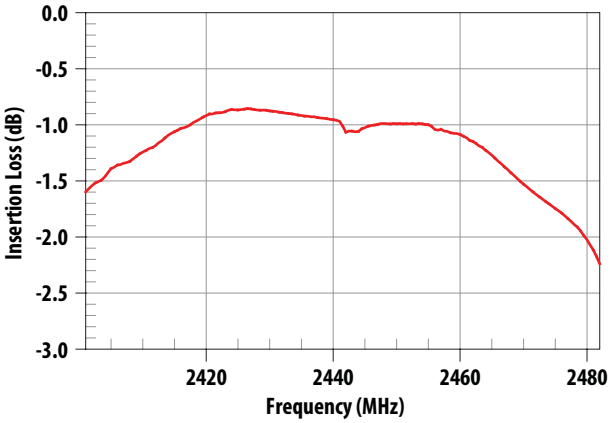


Figure 2. Insertion Loss, 2401 – 2482 MHz

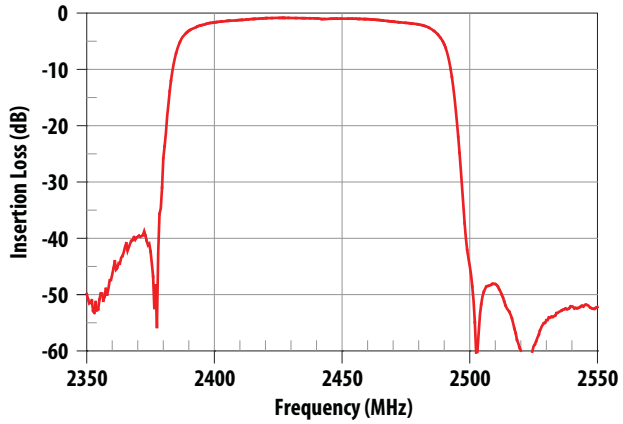


Figure 3. Attenuation, 2350 – 2550 MHz

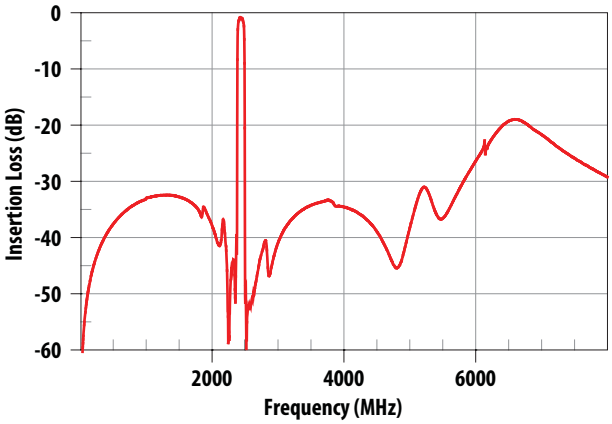


Figure 4. Wideband Attenuation, 0.05 – 8000 MHz

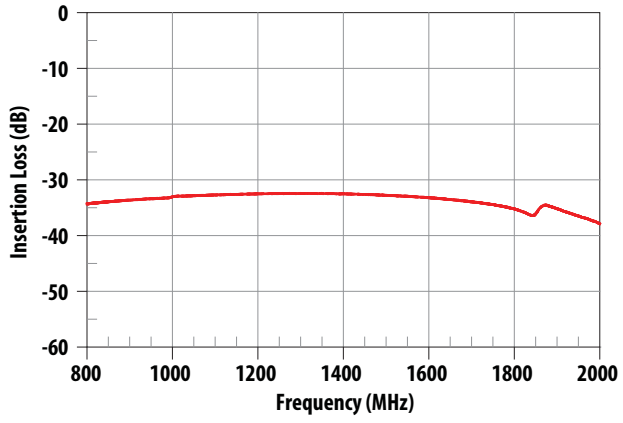


Figure 5. Attenuation, 800 – 2100 MHz

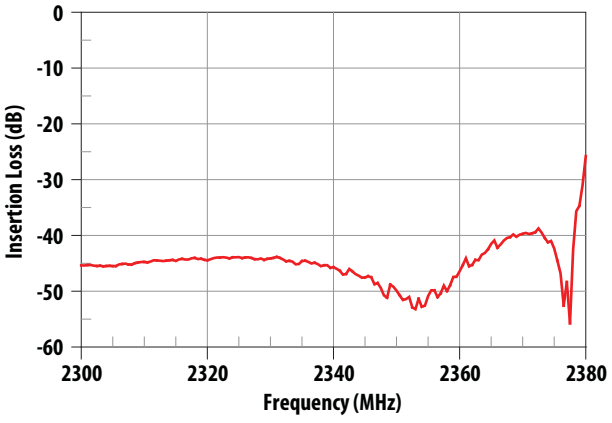


Figure 6. Rejection in LTE Band 40 (2300 – 2380 MHz)

ACPF-7024 Typical Performance at $T_C = 25°C$

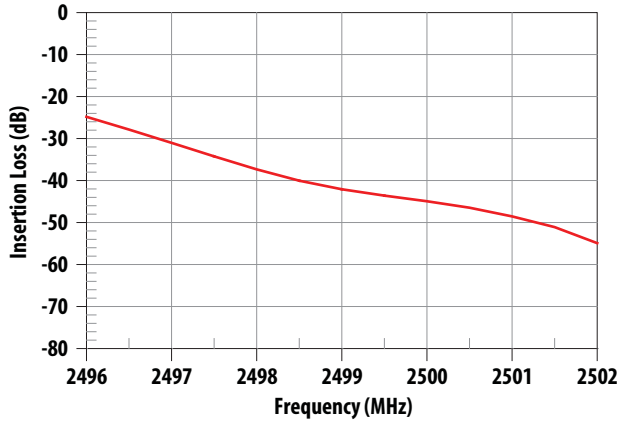


Figure 7. Attenuation, 2496 – 2502 MHz

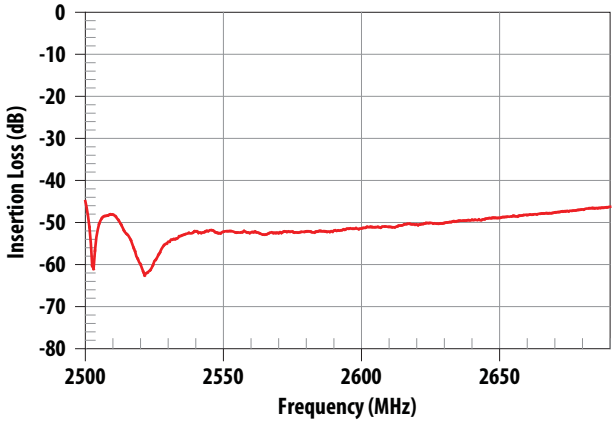


Figure 8. Rejection in 2.5 GHz WiMAX and LTE Band 7 (2500 – 2690 MHz)

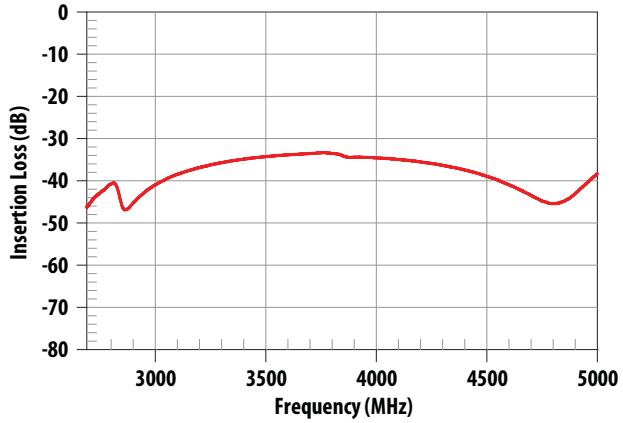


Figure 9. Attenuation, 2690 – 5000 MHz

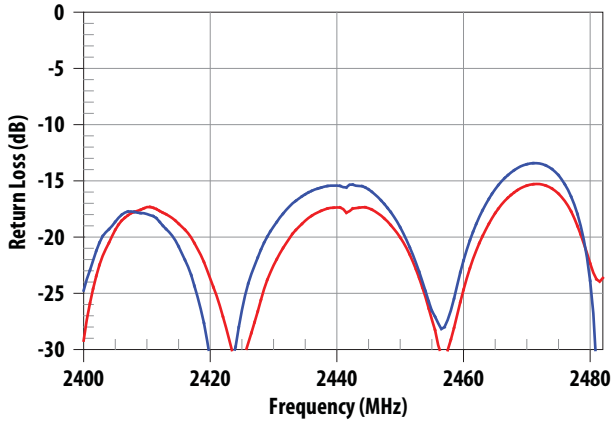


Figure 10. Input, Output Port Return Loss, 2400 – 2482 MHz

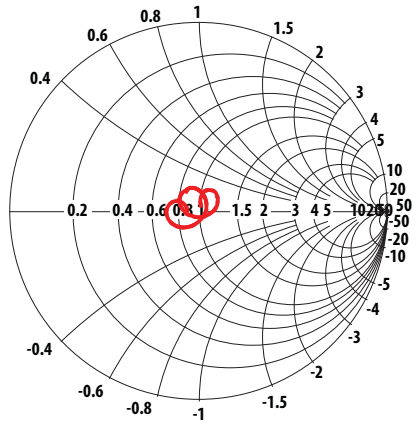


Figure 11. Input Port Impedance, 2400 – 2482 MHz

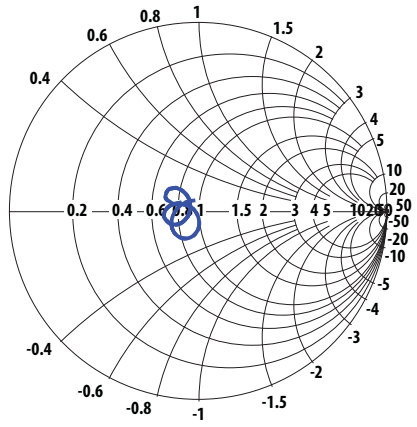
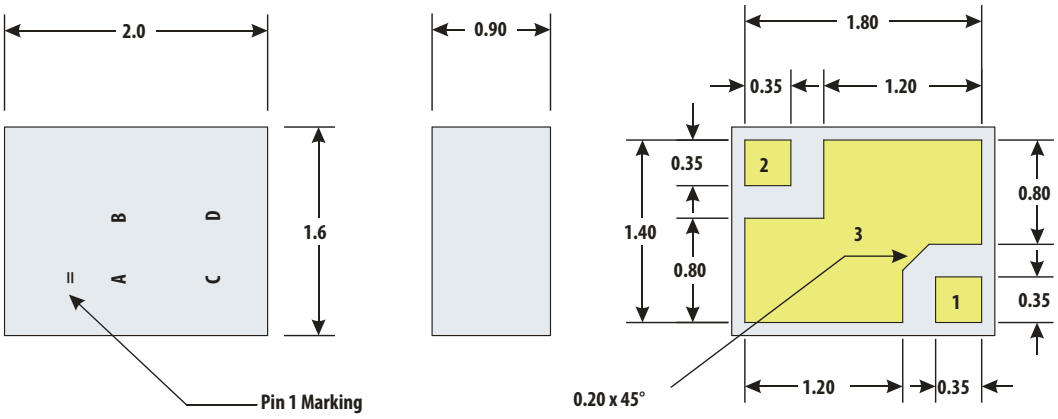


Figure 12. Output Port Impedance, 2400 – 2482 MHz

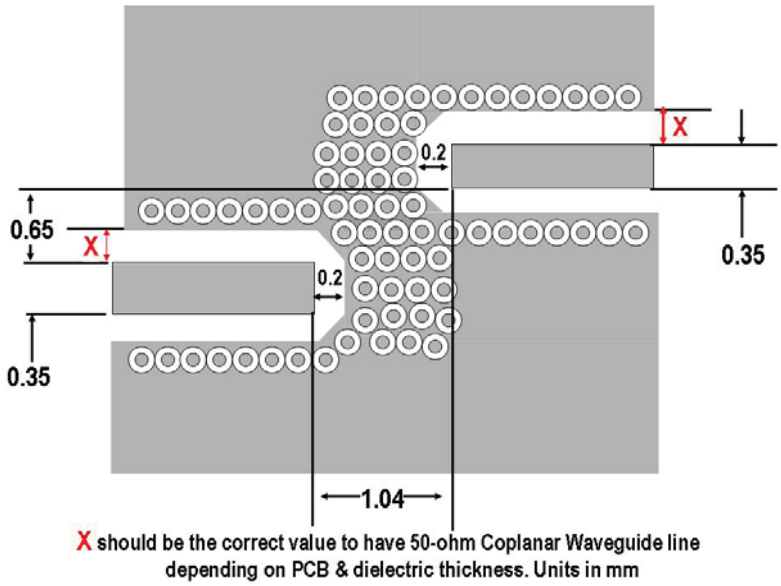
ACPF-7024



Notes
1. Dimensions in mm
   Tolerance: X.X ± 0.1 mm
   X.XX ± 0.05 mm
2. Dimensions nominal unless otherwise noted
3. Angles 45° nominal
4. Contact areas are gold plated
5. Marking:
   A = Work Week
   B = Date Code
   C, D = Lot Number

Pin Connections
1 Input/Output
2 Output/Input
3 Ground

Figure 13. Package Outline Drawing and Marking



Notes:
1. Dimensions in mm
2. Top view

Figure 14. Suggested PCB Layout (top view)

ACPF-7024

A PCB layout using the principles illustrated in the figure above is recommended to optimize performance of the ACPF-7024.

Note: This filter is symmetrical; 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."

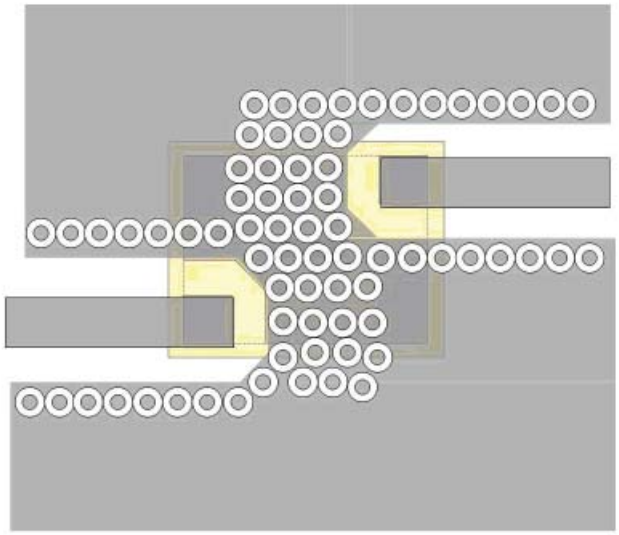
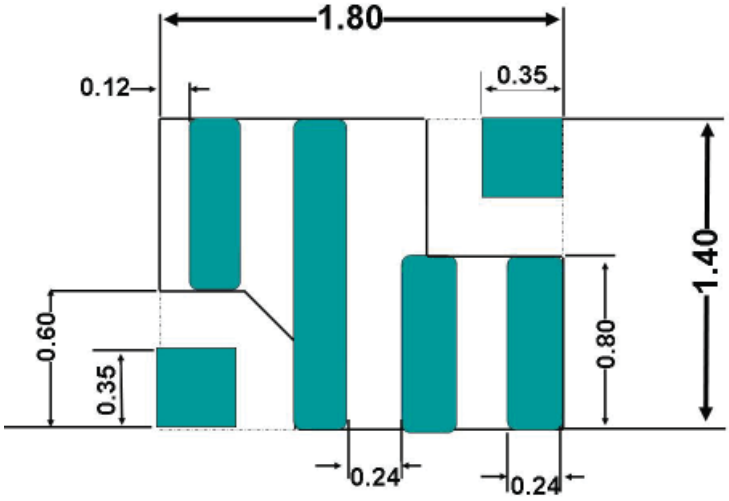


Figure 15. ACPF-7024 Superposed on PCB Layout (top view)



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

Figure 16. Recommended Solder Stencil (top view)

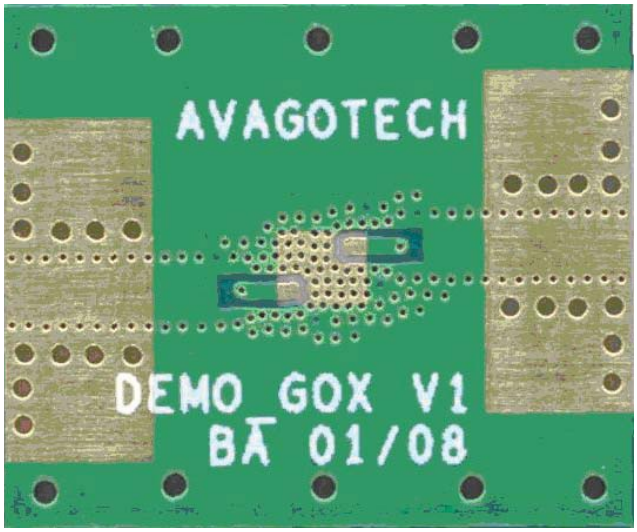


Figure 17. Evaluation board (SMA connectors) for ACPF-7024, top view

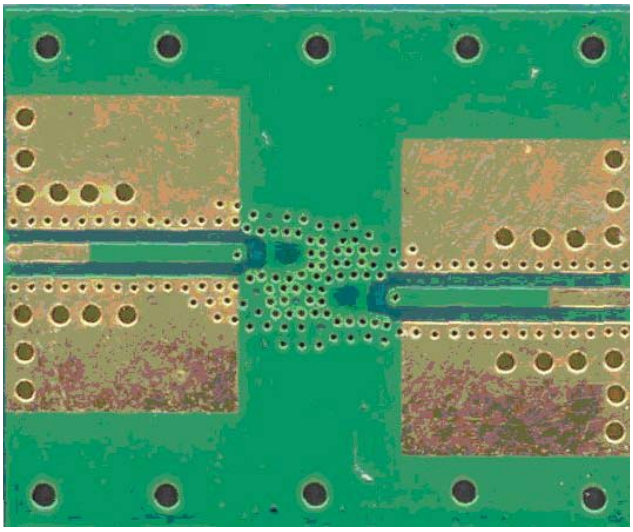


Figure 18. Evaluation board (SMA connectors) for ACPF-7024, bottom view

ACPF-7024

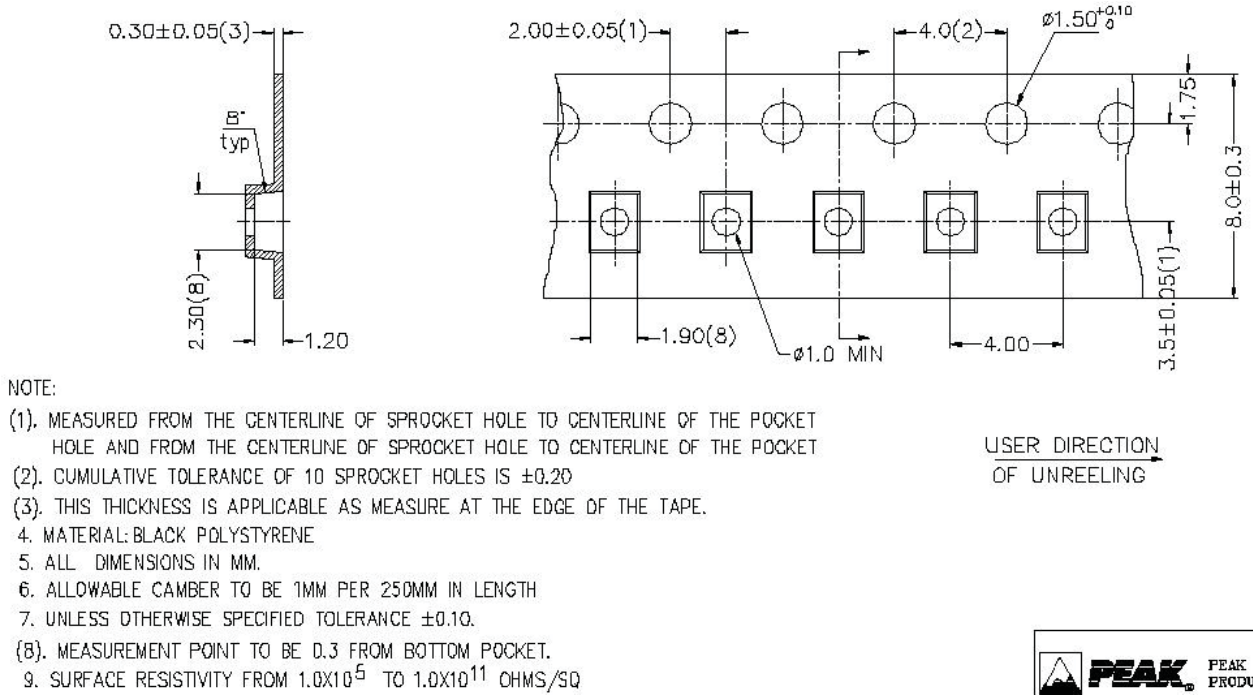


Figure 19. SMD Tape Packing

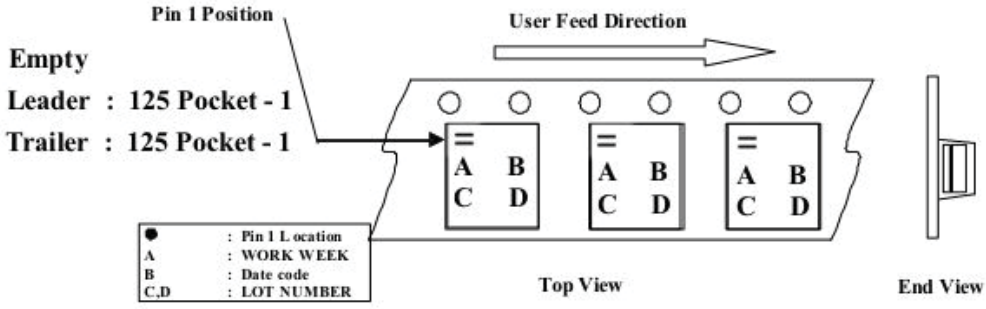
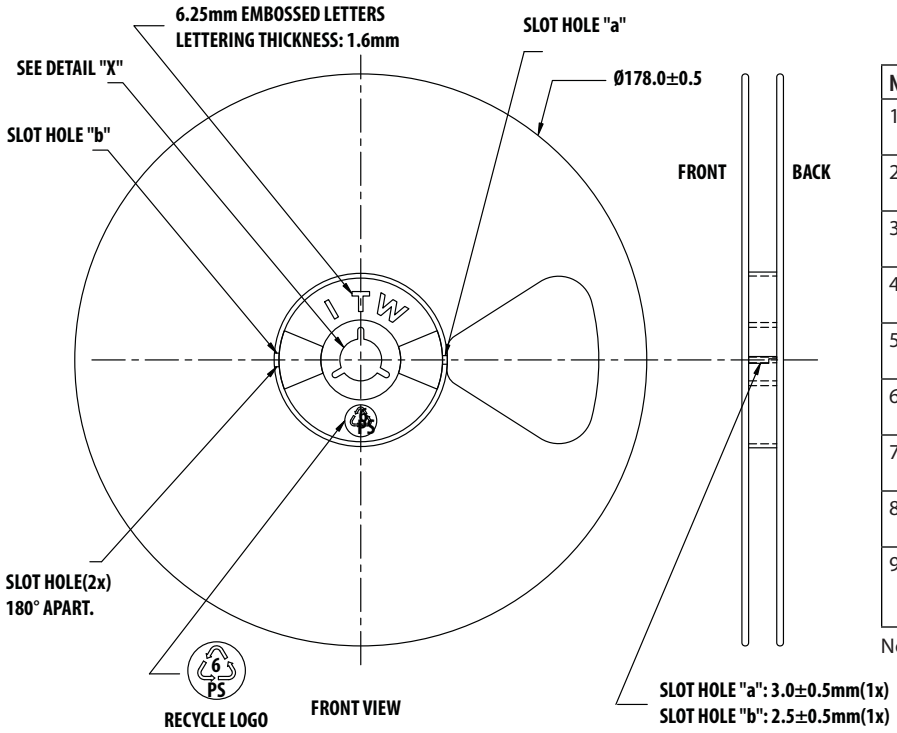


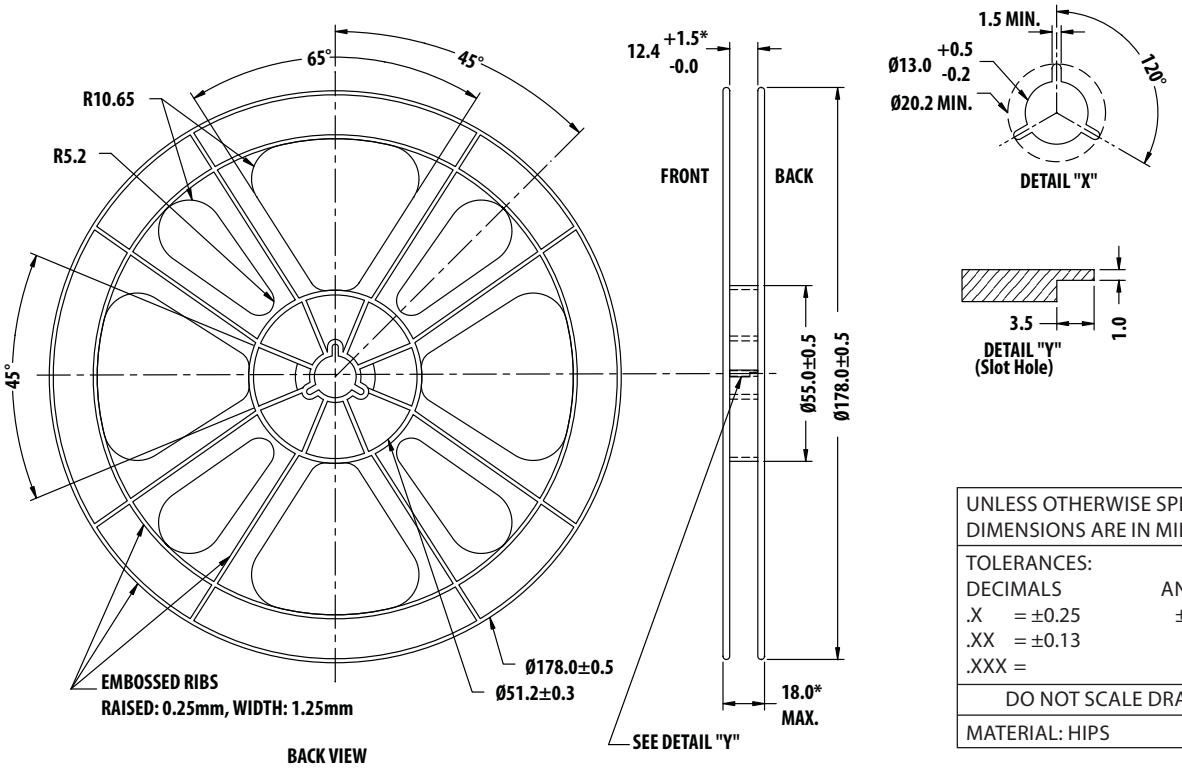
Figure 20. Orientation in Tape

ACPF-7024



No.	Color	Surface Resistivity
1.	Pantone 285U Dark Blue	Antistatic Coated 10^6–10^{11} per Ω square
2.	Black	Conductive <10^6 per Ω square
3.	White	Antistatic Impregnated 10^6–10^{11} per Ω square
4.	Pantone 3295C Dark Green	Antistatic Coated 10^6–10^{11} per Ω square
5.	Pantone 186C Dark Red	Antistatic Coated 10^6–10^{11} per Ω square
6.	Pantone 278C Light Blue	Antistatic Coated 10^6–10^{11} per Ω square
7.	White	Antistatic Coated 10^6–10^{11} per Ω square
8.	Natural	Antistatic Coated 10^6–10^{11} per Ω square
9.	Pantone 298C–299C Dull Light Blue	Antistatic Coated 10^6–10^{11} per Ω square

Note: X in Part Numbering donotes colour code



UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE IN MILLIMETERS	
TOLERANCES:	
DECIMALS	ANGLES
.X = ±0.25	±0.5°
.XX = ±0.13	
.XXX =	
DO NOT SCALE DRAWING	
MATERIAL: HIPS	

Notes:
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

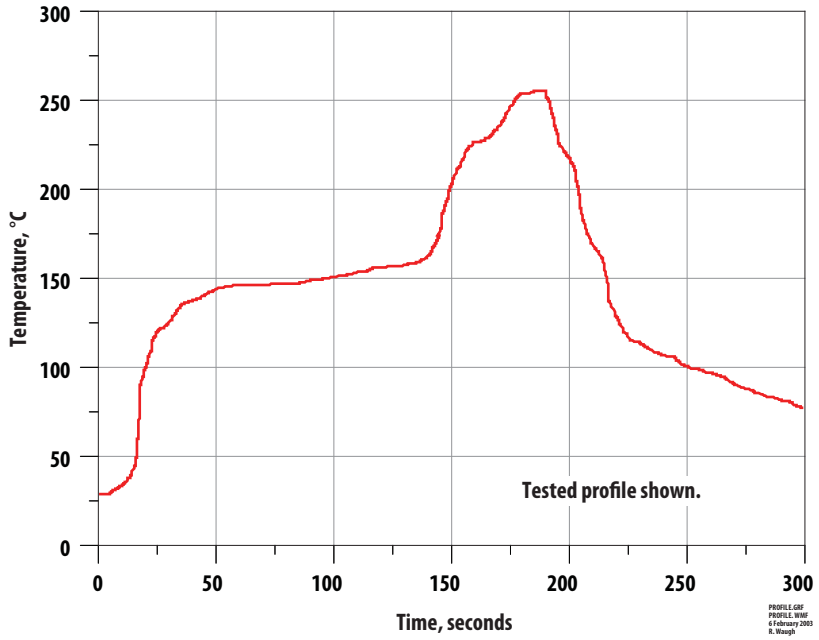


Figure 22. Verified SMT Solder Profile

Ordering Information

Part Number	No. of Devices	Container
ACPF-7024-BLK	100	Tape strip or Gel-Pack
ACPF-7024-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**

AV02-2603EN - July 27, 2011