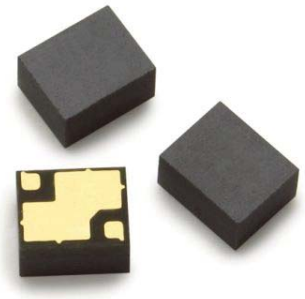
ACPF-8040

Bandpass Filter for 3GPP Band 40

Data Sheet

Lead (Pb) Free
RoHS 6 fully compliant



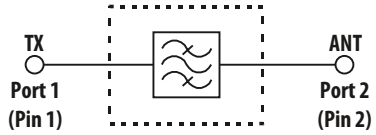
Description

The Avago ACPF-8040 is a miniaturized Bandpass Filter designed for use in 3GPP Band 40 wireless applications (2300 – 2400 MHz DL, 2300 – 2380 MHz UL).

The ACPF-8040 is designed to enable concurrent operation of 3GPP Band 40 with applications in adjacent frequency spectrum, such as ISM 2.4 GHz band (WLAN, Bluetooth). The ACPF-8040 uses 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-8040 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
  - +30 dBm Abs Max Input Power
- Environmental
  - RoHS 6 Compliant
  - Halogen free
  - TBBPA Free

Specifications (Typ, 25° C)

- Insertion Loss: ≤ 2.0 dB
- Rejection
  - IEEE 802.11 b/g/n signals: ≥ 35 dB Typ
  - 3GPP Band 7 and Band 38: ≥ 35 dB Typ

Applications

3GPP Band 40 applications in handsets, mobile and portable communications devices. Optimum performance 2300 – 2380 MHz, usable 2300 – 2400 MHz.

ACPF-8040 Electrical Specifications [2], $Z_0 = 50\ \Omega$, T_C [1]

			+25° C	+15° to +35° C		-30° to +85° C	
Symbol	**Parameter**	**Units**	**Typ [3]**	**Min**	**Max**	**Min**	**Max**
S21 (S12)	Insertion Loss 3GPP Band 40 (20 MHz channel average [4])						
	2300 – 2380 MHz	dB	1.3		1.7		2.0
	2380 – 2400 MHz		2.0		3.0		4.5
S21 (S12)	Insertion Loss 3GPP Band 40, (Single tone) 2300 – 2380 MHz	dB	1.3		2.5		2.7
S21 (S12)	20 MHz Channel Flatness (p-p) 2300 – 2380 MHz	dB	0.6		1.0		
S21 (S12)	Attenuation in Cell Rx Band 869 – 894 MHz	dB	32	30		30	
S21 (S12)	Attenuation in GPS Band 1574.4 – 1576.4 MHz	dB	33	30		30	
S21 (S12)	Attenuation in PCS Rx Band 1930.5 – 1989.5 MHz	dB	47	35		30	
S21 (S12)	Attenuation in WLAN/ISM 2.4GHz Band (Averaged per channel using 802.11b spectrum mask)						
	2401 – 2423 MHz (Channel 1)	dB	39	17		11	
	2404 – 2428 MHz (Channel 2)		46	35		22	
	2411 – 2433 MHz (Channel 3)		60	50		48	
	2416 – 2495 MHz (Channels 4 to 14)		62	52		50	
S21 (S12)	Attenuation in 3GPP Band 7, Band 38 2500 – 2690 MHz	dB	45	37		35	
S21 (S12)	Attenuation, 3400 – 3500 MHz	dB	11.4				
S21 (S12)	Attenuation in Band 40 2nd Harmonic 4600 – 4800 MHz	dB	26	25		25	
S11	Return Loss (SWR) at Ant (Port 1)	dB	17	9		9	
	2300 – 2380 MHz		(1.3)	(2.1)		(2.1)	
S22	Return Loss (SWR) at Tx/Rx (Port 2)	dB	18	9		9	
	2300 – 2380 MHz		(1.3)	(2.1)		(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).
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.
4. Channel average Insertion Loss is obtained by averaging |S21| over 20 MHz channels and converting to dB values.

ACPF-8040

Absolute Maximum Ratings [1]

Parameter	**Unit**	**Value**
Storage temperature	°C	-40 to +125
Maximum RF Input Power, 2300 – 2380 MHz	dBm	+30

Maximum Recommended Operating Conditions [2]

Parameter	**Unit**	**Value**
Operating temperature, Tc [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-8040 Typical Performance at T_C = 25° C

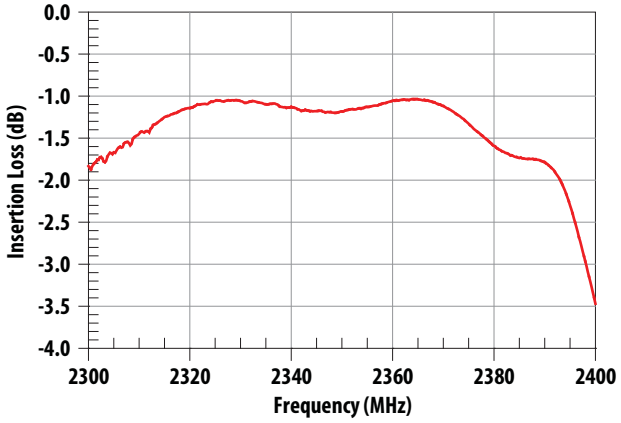


Figure 1. Insertion Loss, 3GPP Band 40

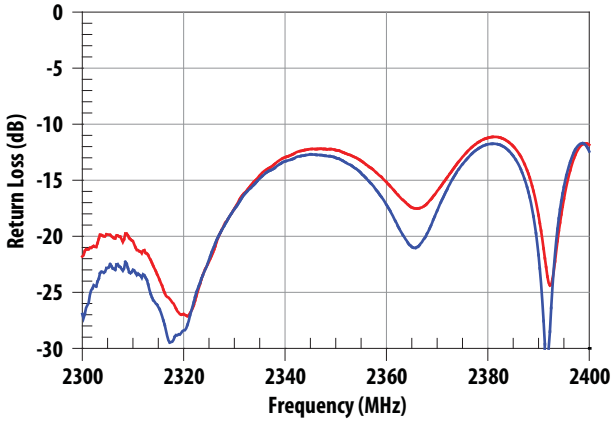


Figure 2. Return Loss, 3GPP Band 40

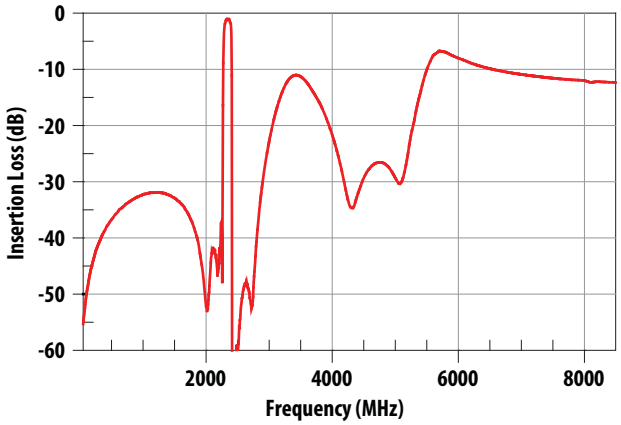


Figure 3. Wideband Attenuation, 50 – 8500 MHz

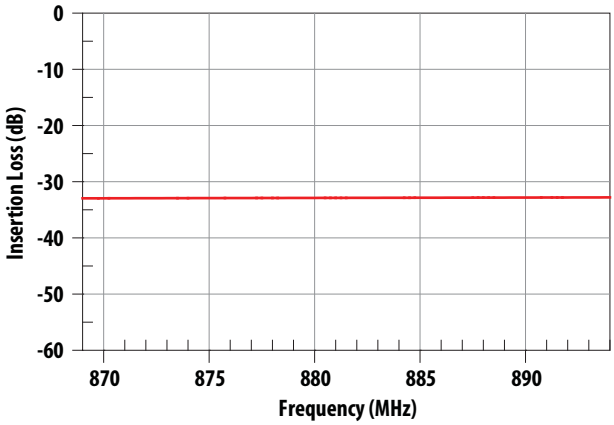


Figure 4. Attenuation, Cellular Rx Band

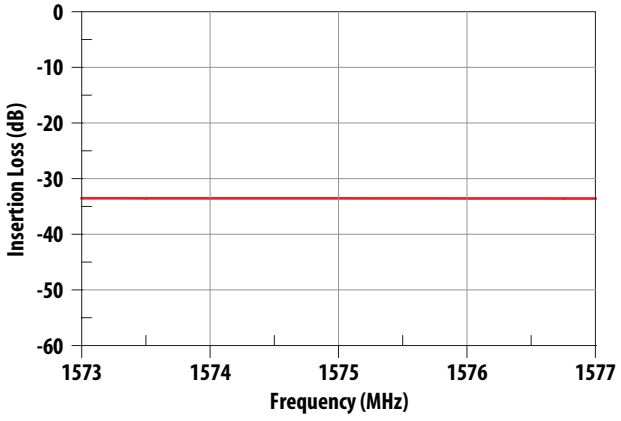


Figure 5. Attenuation, GPS Band

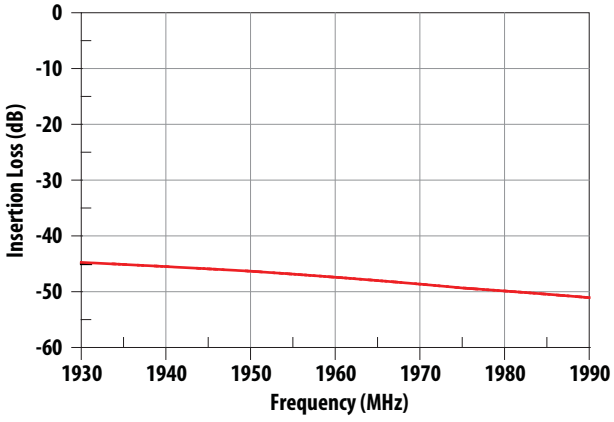


Figure 6. Attenuation, PCS Rx Band

ACPF-8040 Typical Performance at $T_C = 25° C$

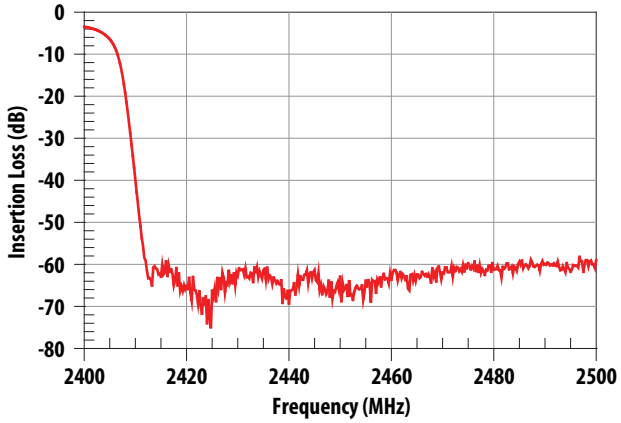


Figure 7. Attenuation, WLAN/2.5 GHz ISM Band

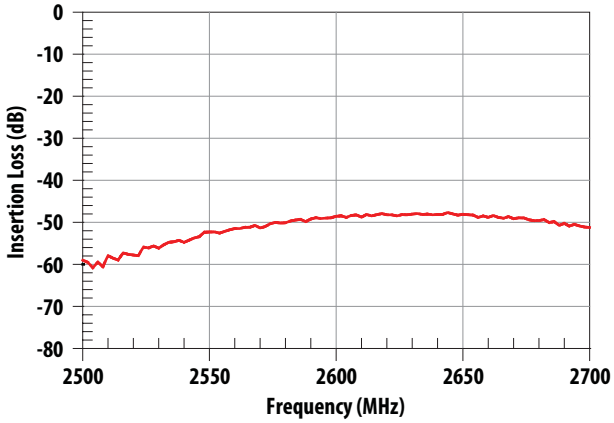


Figure 8. Attenuation, Band 7, Band 38

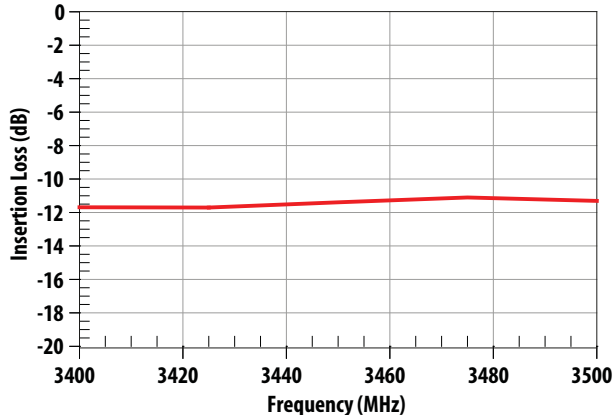


Figure 9. Attenuation, 3.4 – 3.5 GHz

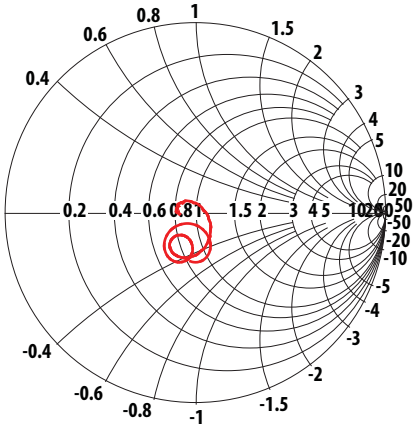


Figure 10. S11, 3GPP Band 40

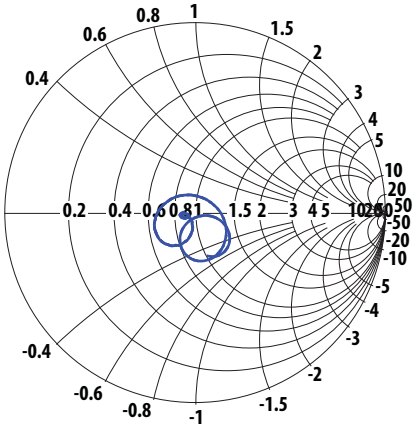


Figure 11. S22, 3GPP Band 40

ACPF-8040

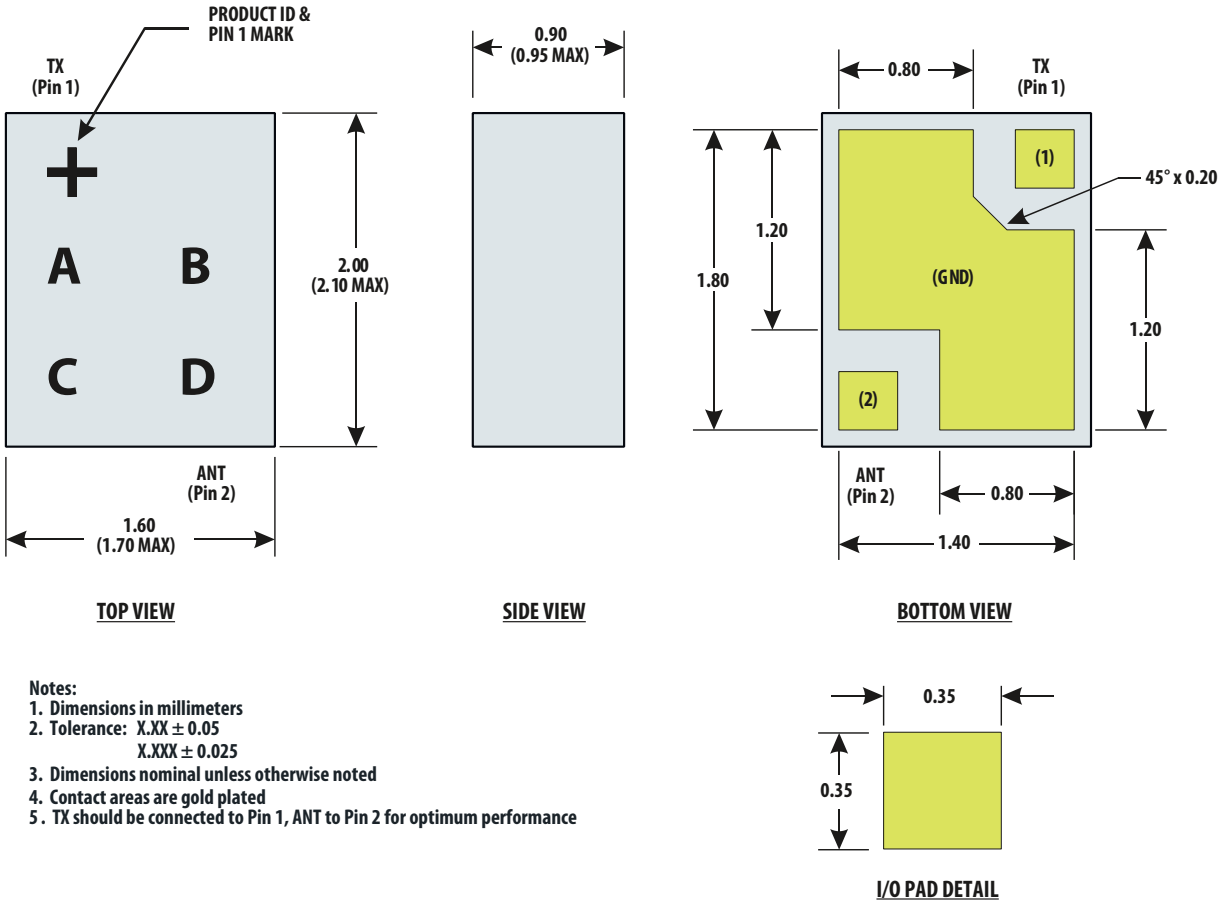
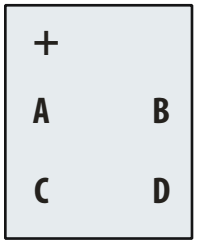


Figure 12. Package Outline Drawing and Marking



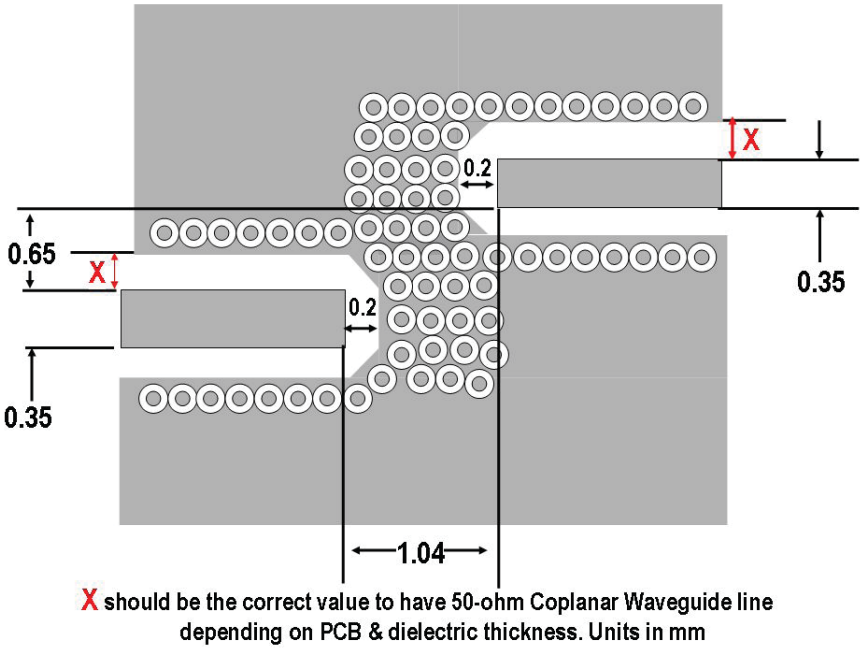
\+ = Product Identification (ACPF-8040 and Package Orientation Mark (Pin 1)

A = Work Week

B = Date Code

C, D = Manufacturing Lot Number

Figure 13. Package Marking



Notes:
1. Dimensions in mm
2. Top view

Figure 14. Suggested PCB Layout (top view)

A PCB layout using the principles illustrated in the figure above is recommended to optimize performance of the ACPF-8040.

Note: This filter is not completely symmetrical. Optimum performance is obtained with the Tx block connected to Pin 1 and the system Antenna connected to Pin 2.

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."

ACPF-8040

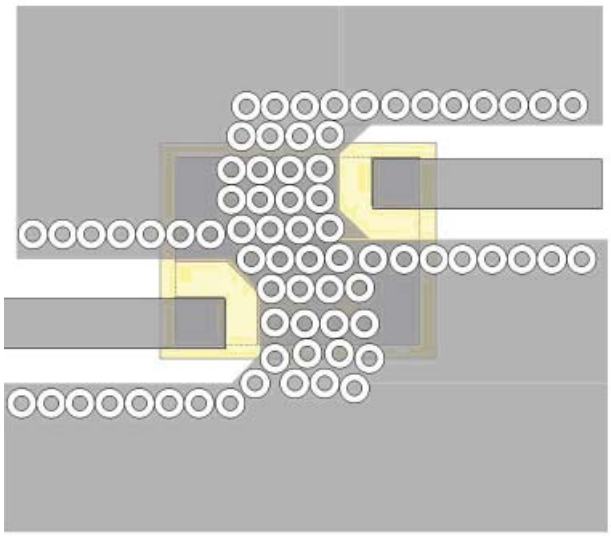
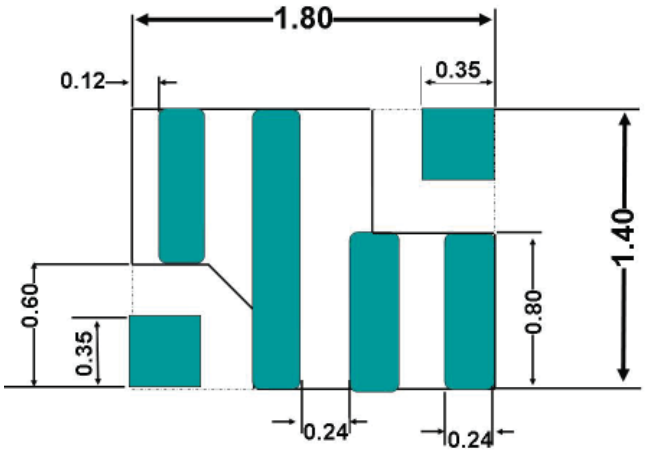


Figure 15. ACPF-8040 Superposed on PCB Layout (top view)



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)

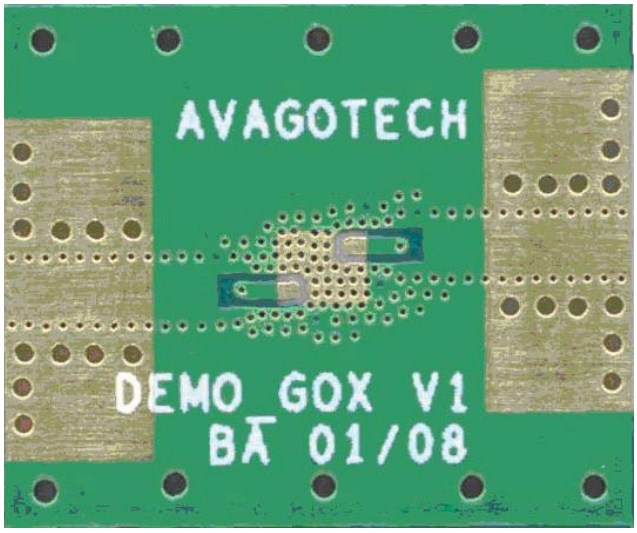


Figure 17. Evaluation board (SMA connectors) for ACPF-8040 (top view)

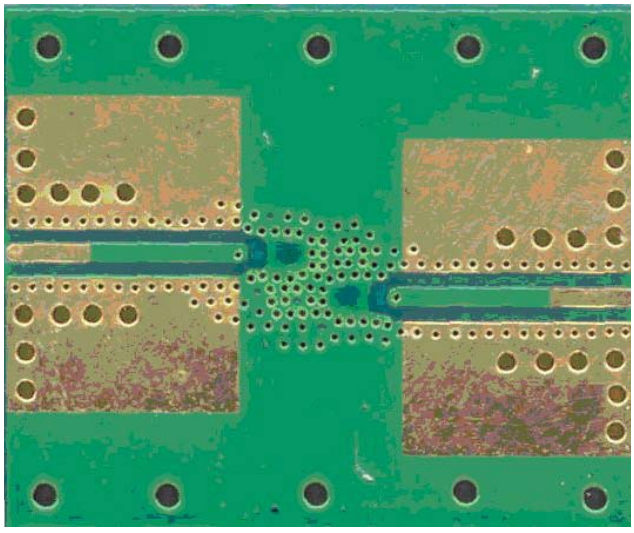


Figure 18. Evaluation board (SMA connectors) for ACPF-8040 (bottom view)

ACPF-8040

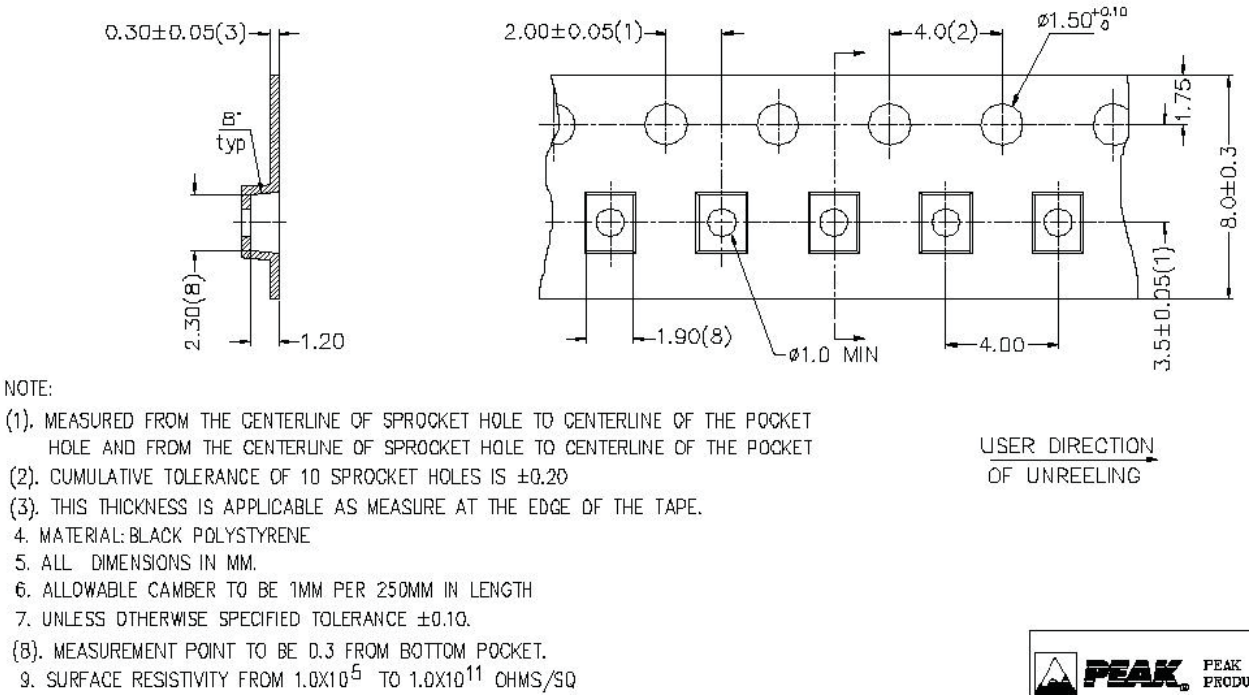


Figure 19. SMD Tape Packing

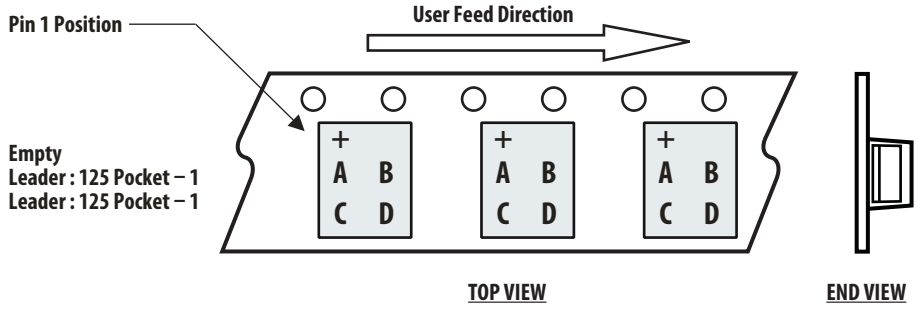
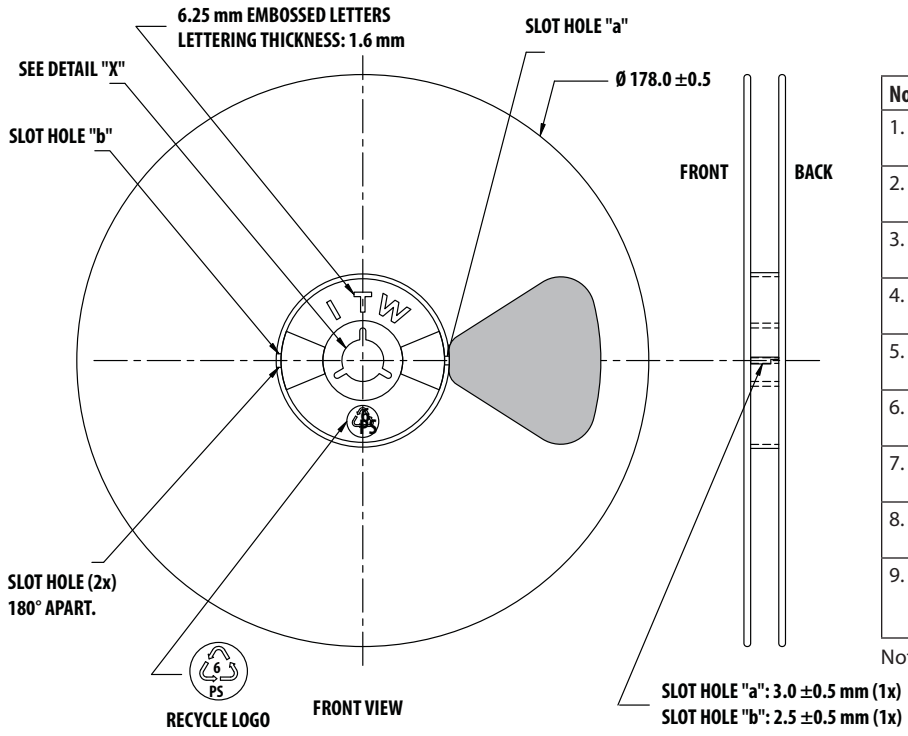


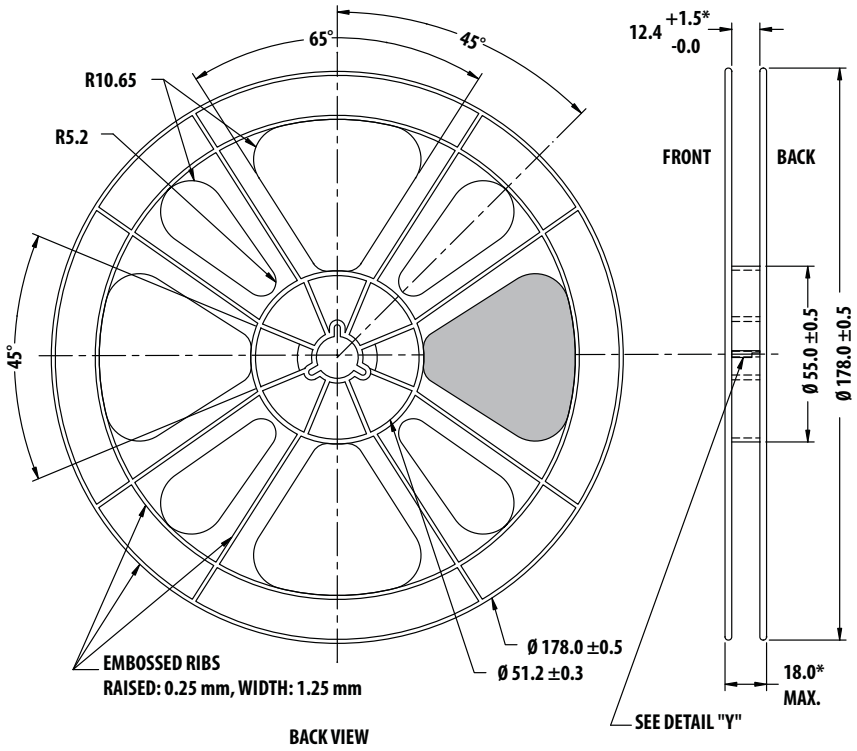
Figure 20. Orientation in Tape

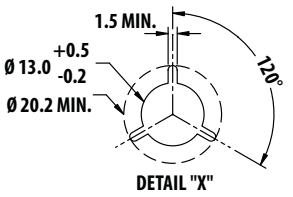
ACPF-8040

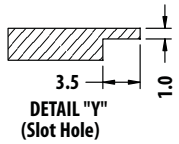


No.	Color	Surface Resistivity
1.	Pantone 285U Dark Blue	Antistatic Coated 10^6–10^{11} per Ω square
2.	Black	Conductive <10^6 per Ω square
3.	White	Antistatic Impregnated 10^6–10^{11} per Ω square
4.	Pantone 3295C Dark Green	Antistatic Coated 10^6–10^{11} per Ω square
5.	Pantone 186C Dark Red	Antistatic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

ACPF-8040

Package Moisture Sensitivity

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

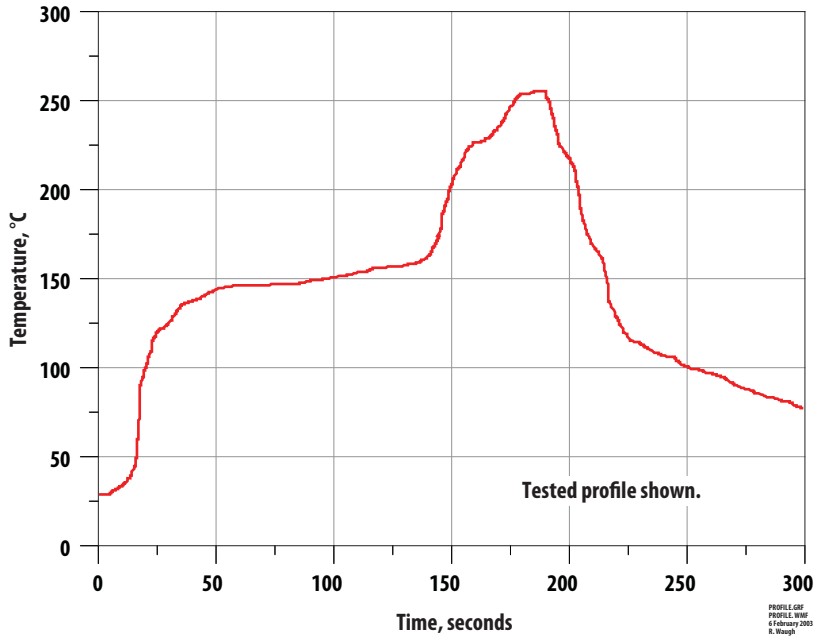


Figure 22. Verified SMT Solder Profile

Ordering Information

Part Number	No. of Devices	Container
ACPF-8040-BLK	100	Tape Strip or Anti-static Bag
ACPF-8040-TR1	3000	178 mm (7-inch) Reel

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

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AV02-3746EN - October 9, 2012