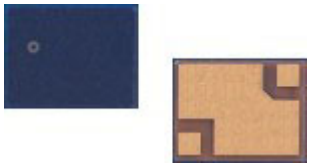
BROADCOM®

Data Sheet

ACPF-8440

Band 40F Filter for HPUE



Overview

The Broadcom ACPF-8440 is a miniature Band 40F (2300–2400 MHz) Tx/Rx bandpass filter designed for use in High Power User Equipment (HPUE) applications.

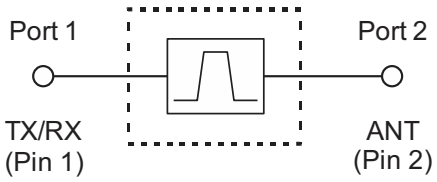
The ACPF-8440 supports +33 dBm (LTE modulation) power requirements for HPUE applications. Low insertion loss in Band 40F reduces power amplifier output and minimizes current consumption, important for HPUE applications.

The ACPF-8440 is designed with Broadcom's innovative Film Bulk Acoustic Resonator (FBAR) technology, which makes possible ultra-small, high-Q filters at a fraction of their usual size.

The ACPF-8440 also utilizes Broadcom's advanced Microcap bonded-wafer technology. This miniaturization process results in a package size of only 1.4 x 1.8 mm and maximum height of 0.800 mm.

The ACPF-8440 is compatible with high volume, lead-free SMT soldering processes.

Functional Block Diagram



Features

- Low Insertion Loss:
  - Minimizes PA output
  - Minimizes current consumption
- High Power Rating: Designed for HPUE:
  - +33 dBm Avg, +38 dBm Peak (LTE modulation)
- High rejection in ISM Band and low harmonics:
  - Enables coexistence with Wi-Fi
- 50Ω Input/Output:
  - No external matching required
- Subminiature Size:
  - 1.4 x 1.8 mm Footprint
  - 0.800 mm Max Height
- Environmental:
  - RoHS 6 Compliant
  - Halogen free
  - TBBPA Free

Specifications

- Performance guaranteed from –20°C to +85°C
- Band 40F Insertion Loss: 1.7 dB Max

Applications

HPUE wireless applications operating in Band 40F.

Table 1: Electrical Specifications[a], Z0 = 50Ω, T_C[b] = –20°C to +85°C, unless otherwise specified.

Symbol	Parameter	Min.	Typ.[c]	Max.	Unit
S21	Insertion Loss Band 40F, 2300–2400 MHz	—	0.9	1.7	dB
S21	Attenuation, 100–800 MHz	31	40	—	dB
S21	Attenuation, 800–1559 MHz	27	33	—	dB
S21	Attenuation, 1559–1606 MHz	27	32	—	dB
S21	Attenuation, 1606–2100 MHz	27	33	—	dB
S21	Attenuation, 2100–2235 MHz	32	44	—	dB
S21	Attenuation, Wi-Fi 802.11 b/g/n Band[d] 2422.5–2441.5 MHz, Wi-Fi Ch 5	11	24	—	dB
	2427.5–2446.5 MHz, Wi-Fi Ch 6	20	62	—	
	2432.5–2451.5 MHz, Wi-Fi Ch 7	52	64	—	
	2437.5–2456.5 MHz, Wi-Fi Ch 8	52	61	—	
	2442.5–2461.5 MHz, Wi-Fi Ch 9	51	57	—	
	2447.5–2466.5 MHz, Wi-Fi Ch 10	51	56	—	
	2452.5–2471.5 MHz, Wi-Fi Ch 11	51	56	—	
	2457.5–2476.5 MHz, Wi-Fi Ch 12	51	57	—	
	2462.5–2481.5 MHz, Wi-Fi Ch 13	51	60	—	
S21	Attenuation, 2496–2690 MHz	32	39	—	dB
S21	Attenuation, 2690–4600 MHz	32	43	—	dB
S21	Attenuation, 4600–4800 MHz	35	40	—	dB
S21	Attenuation, 4800–6000 MHz	30	37	—	dB
S21	Attenuation, 6000–8200 MHz	20	30	—	dB
S11, S22	Return Loss (SWR), Tx/Rx, Ant, 2300–2400 MHz	9	18 (1.3)	(2.1)	dB

a. Min./Max. specifications are guaranteed at the indicated temperature (unless otherwise noted).

b. T_C is the case temperature and is defined as the temperature of the underside of the Filter where it contacts the circuit board.

c. Typical data is the average value (arithmetic mean) of the parameter over the indicated band at +25°C.

d. Wi-Fi Channel Average Attenuation, obtained by averaging |S21| over the 19 MHz channel and converting to dB value.

Table 2: Absolute Maximum Ratings[a]

Parameter	Unit	Value
Storage temperature	°C	–40 to +125
Maximum Average RF Input Power to Tx/Rx (Pin 1, Port 1)[b,c]	dBm	+33
Maximum Peak RF Input Power to Tx/Rx (Pin 1, Port 1)[b,c]	dBm	+38
Maximum DC Voltage, Pin 1 or Pin 2 to GND[d]	VDC	+5

a. Operation in excess of any one of these conditions may result in permanent damage to the device.

b. LTE modulation. Applies over temperature range of T_C = –20° to +85°C.

c. The ACPF-8440 is not symmetrical. The higher system power (Tx) should be connected to the Input side of the filter, Port 1 (Pin 1).

d. The DC resistance from Pin 1 (Tx/Rx) and Pin 2 (Ant) to ground of this device is typically hundreds of kΩ to MΩ.

Table 3: Maximum Recommended Operating Conditions[a]

Parameter	Unit	Value
Operating temperature, T_C[b]	°C	–30 to +85

a. 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.

b. T_C is defined as case temperature, the temperature of the underside of the device where it contacts the circuit board.

Typical Performance at T_C = 25°C

Figure 1: Insertion Loss, 2300–2400 MHz

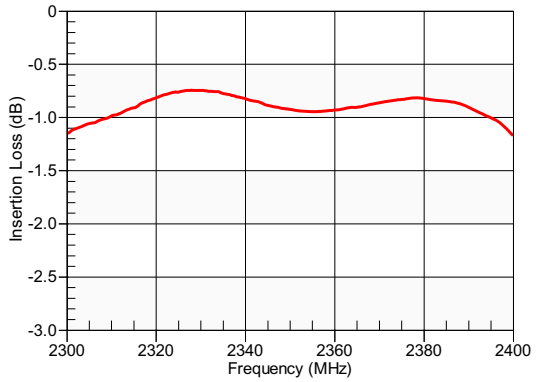


Figure 2: Wideband Attenuation, 100–8500 MHz

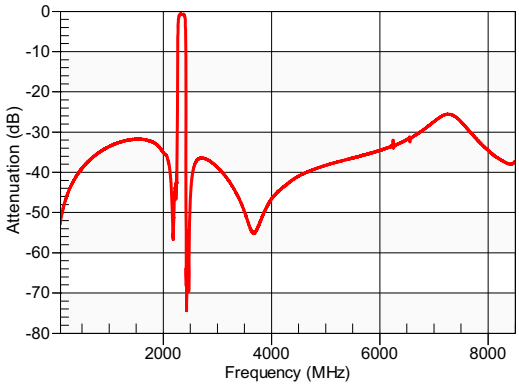


Figure 3: Attenuation, 100–800 MHz

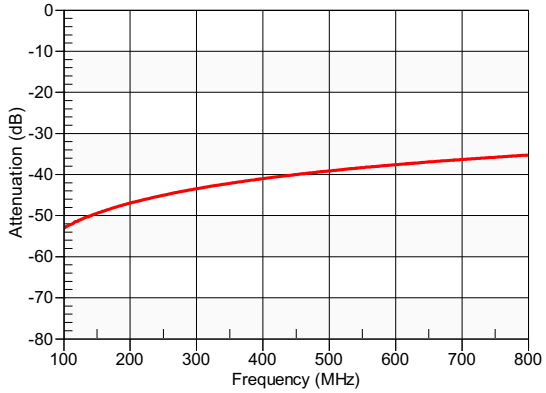


Figure 4: Attenuation, 800–1559 MHz

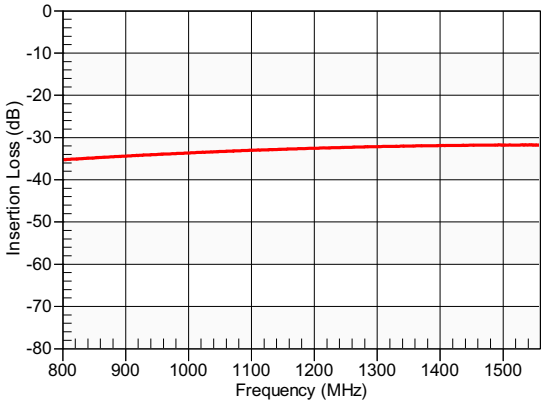


Figure 5: Attenuation 1559–1606 MHz

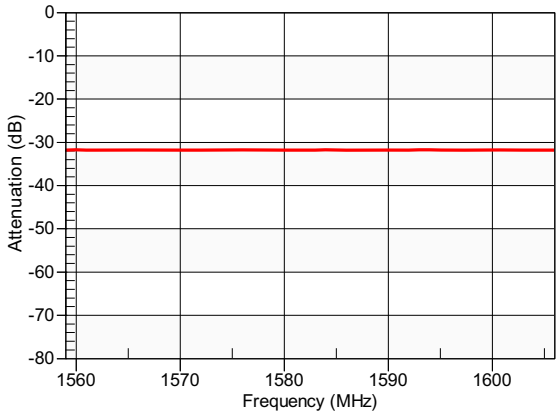
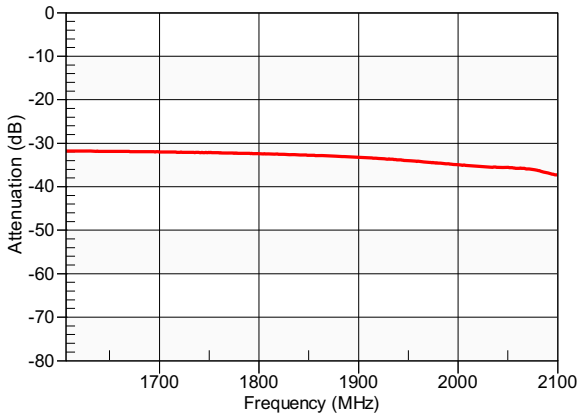


Figure 6: Attenuation 1606–2100 MHz



Typical Performance at T_C = 25°C

Figure 7: Attenuation 2496–2690 MHz

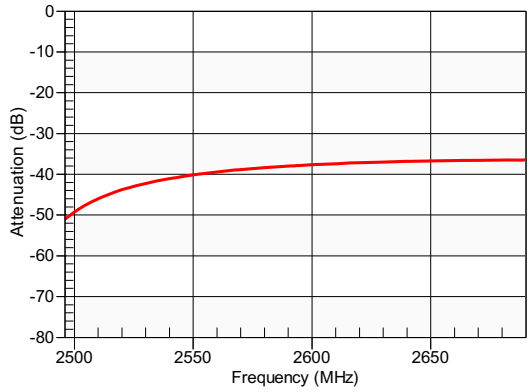


Figure 8: Attenuation 2690–4600 MHz

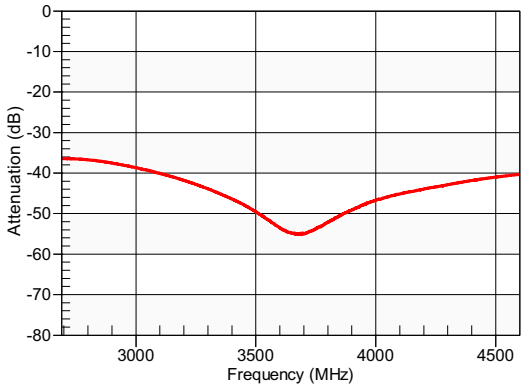


Figure 9: Attenuation 4600–4800 MHz

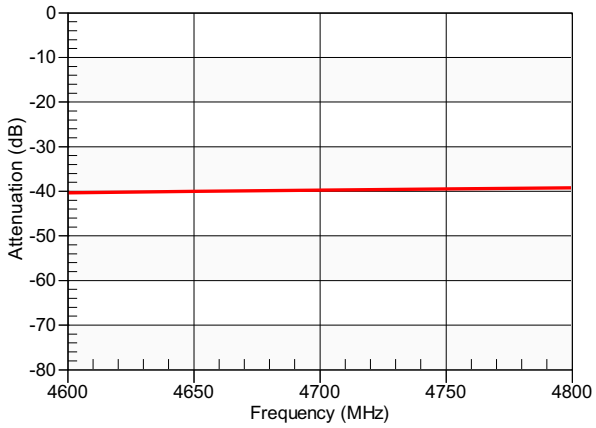


Figure 10: Attenuation 4800–6000 MHz

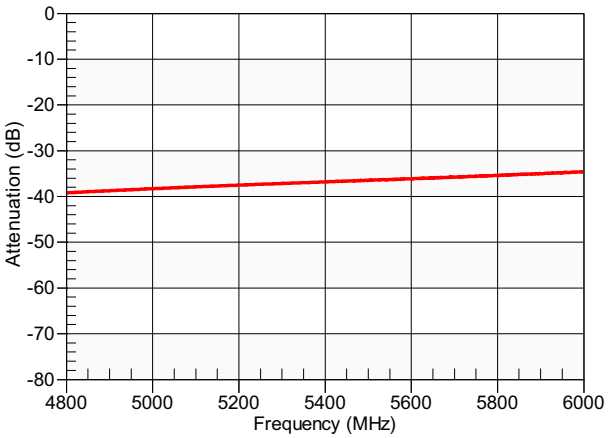


Figure 11: Input Return Loss (S11), 2300–2400 MHz

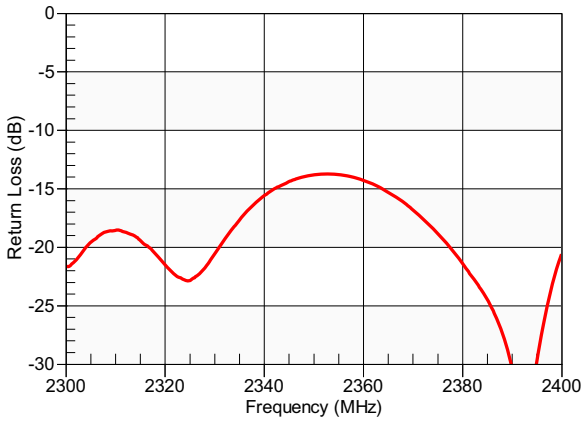
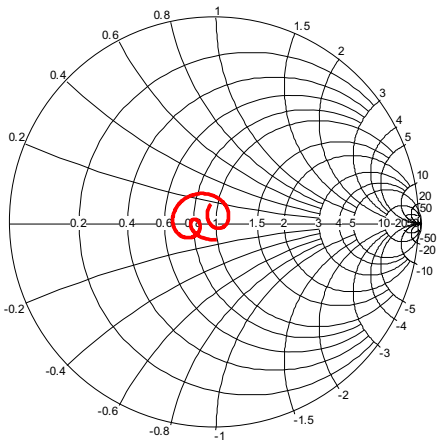


Figure 12: Input Port Impedance (S11), 2300–2400 MHz



Typical Performance at T_C = 25°C

Figure 13: Output Return Loss (S22), 2300–2400 MHz

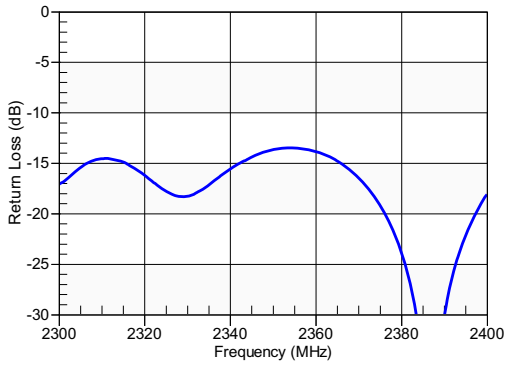


Figure 14: Output Port Impedance (S22), 2300–2400 MHz

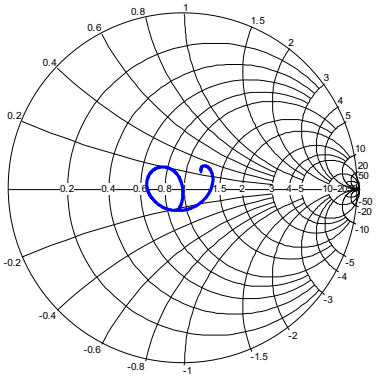
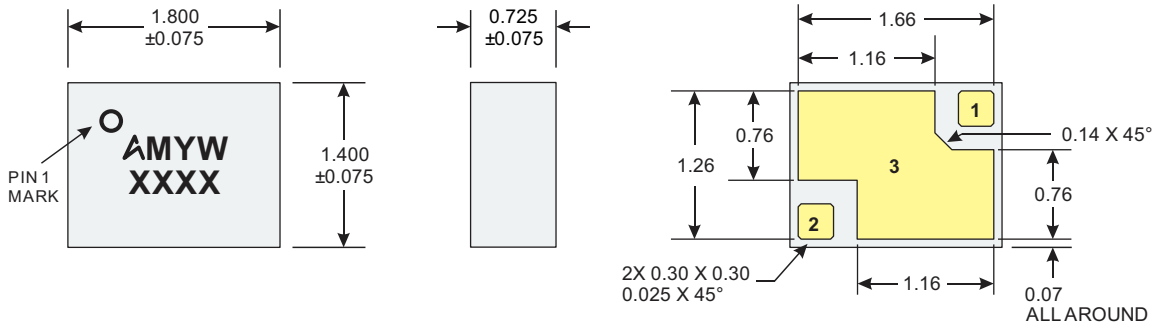


Figure 15: Package Outline Drawing and Marking



TOP VIEW SIDE VIEW BOTTOM VIEW

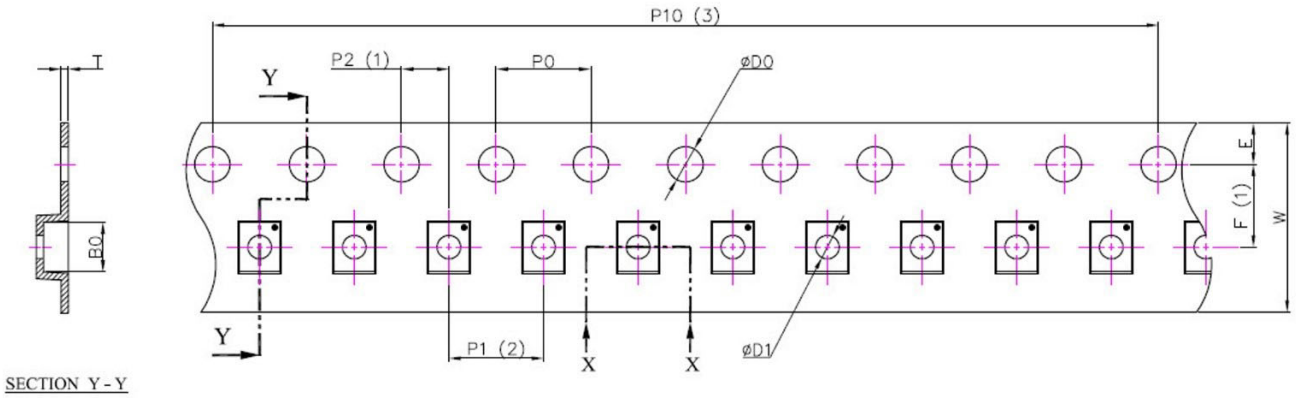
Unless Otherwise Specified:

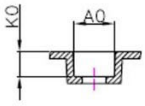
1. Dimensions in millimeters
2. Dimensions are nominal
3. Tolerances: X. XX ± 0.05
   X. XXX ± 0.025
4. Contact areas are gold plated
5. Package marking:
   "A" = Avago logo
   M = ACPF-8440
   Y = Year (last digit)
   W = Work Week
   XXXX = Lot number

Pin Connections

1 Tx/Rx
2 Ant
3 GND

Figure 16: SMD Tape Packing and Pin 1 Mark Location



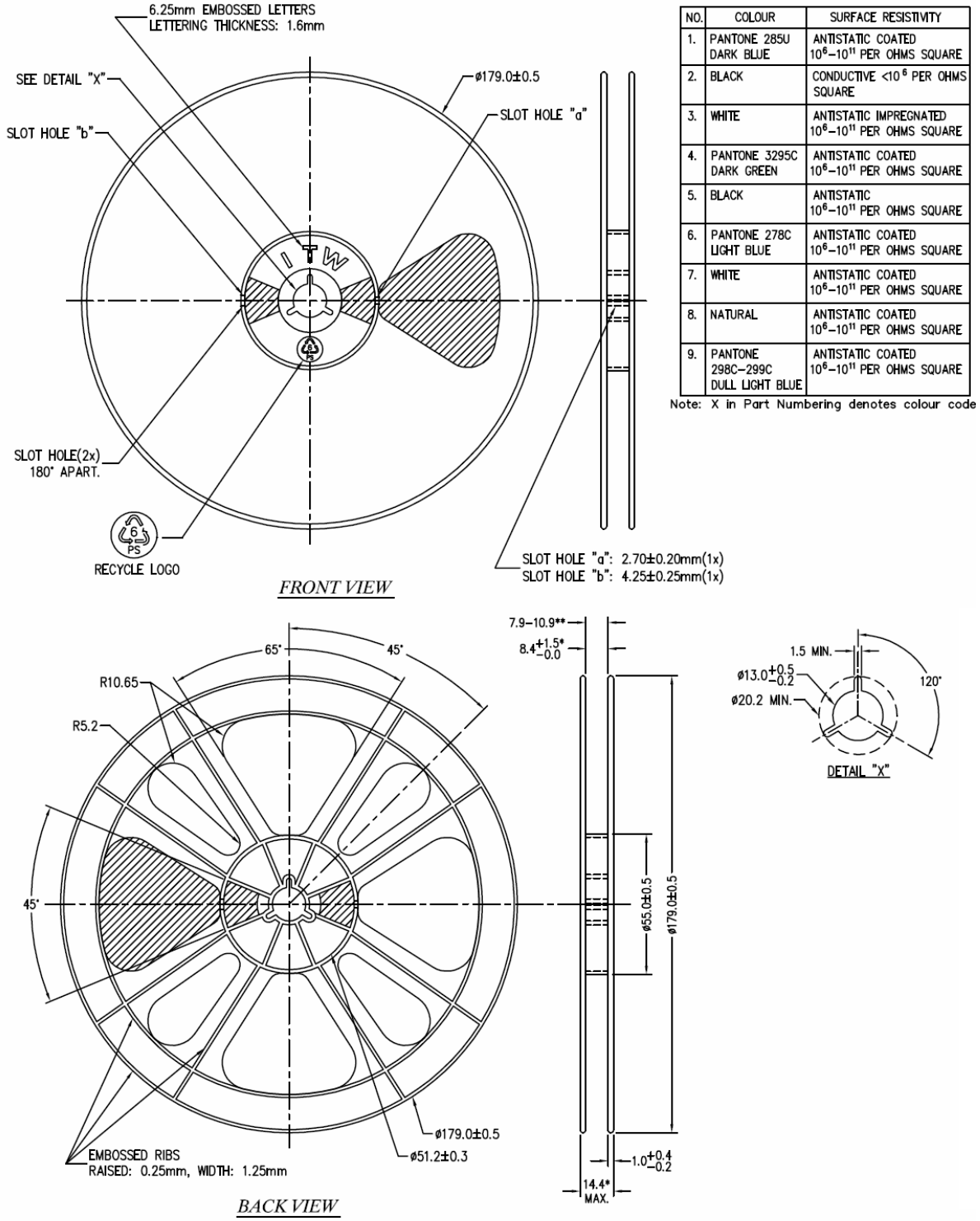


Dimension List			
Annote	Milimeter	Annote	Milimeter
A0	1.70±0.10	P2	2.00±0.05
B0	2.10±0.10	P10	40.00±0.20
K0	1.05±0.10	E	1.75±0.10
D0	$1.50^{+0.10}_{-0}$	F	3.50±0.05
D1	1.00±0.10	T	0.30±0.05
P0	4.00±0.10	W	$8.00^{+0.20}_{-0.10}$
P1	4.00±0.10		

NOTE(S):

1) MEASURE FROM CENTERLINE OF SPROCKET HOLE TO CENTERLINE OF POCKET.
2) MEASURE FROM CENTERLINE OF POCKET TO CENTERLINE OF POCKET.
3) PITCH TOLERANCE FOR SPROCKET HOLE, 10 PITCH CUMULATIVE TOLERANCE IS ±0.2mm.
4) ALLOWABLE CAMBER TO BE 1mm PER 250mm IN LENGTH FOR SINGLE WINDING AND 2mm PER 250mm IN LENGTH FOR CROSS WINDING.

Figure 17: SMT Reel Drawing



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.	BLACK	ANTISTATIC 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

NOTES:
1. * MEASURED AT HUB AREA
2. ** MEASURED AT OUTER FLANGE.
3. ALL FLANGE EDGES TO BE ROUNDED.
4. CREF. OLD P/D: H-JE0008-01 & H-JE0012-01)

Table 4: Package Moisture Sensitivity

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

Figure 18: Verified SMT Solder Profile

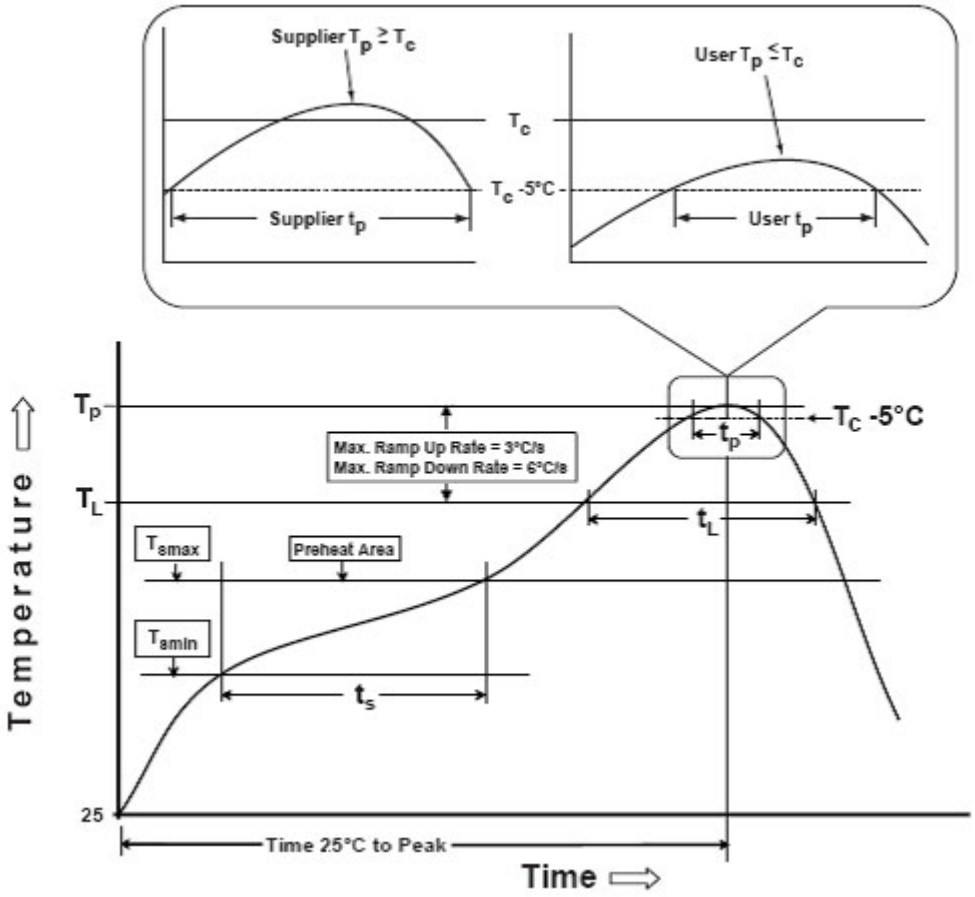


Table 5: Ordering Information

Part Number	Number of Devices	Container
ACPF-8440-BLK	100	Tape strip or Gel-Pack
ACPF-8440-TR1	3000	178 mm (7-inch) reel

BROADCOM®

Lead (Pb) Free
RoHS 6 fully compliant
RoHS 6 fully compliant options available;
-xxxE denotes a lead-free product