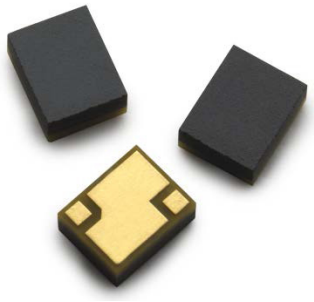
ACPF-7141

Bandpass Filter for LTE Band 41

Data Sheet

Lead (Pb) Free
RoHS 6 fully
compliant



Description

The Avago ACPF-7141 is a miniature Bandpass Filter designed for use in LTE Band 41 (2496 – 2690 MHz) wireless applications.

The ACPF-7141 is designed to enable concurrent operation of Band 41 with applications in adjacent 2.4 GHz Bands (Wi-Fi, WLAN, Bluetooth, ISM).

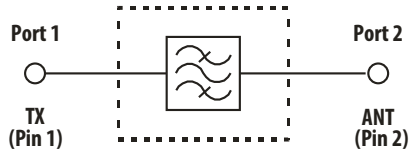
The ACPF-7141 utilizes Avago Technologies' innovative Film Bulk Acoustic Resonator (FBAR) technology, which makes possible ultra-small, high-Q filters at a fraction of their usual size.

The ACPF-7141 is compatible with high volume, lead-free SMT soldering processes and can be direct surface mounted to a PCB or a transfer molded module.

Applications

LTE Band 41 applications such as smartphones, tablets, and other mobile or portable communications devices.

Functional Block Diagram



Features

- 50 Ω Input/Output
- No external matching required
- Low Insertion Loss, High Interference Rejection
- Specifications guaranteed –20 °C to +85 °C
- High Power Rating
  - +31 dBm Abs Max Input Power
- Miniature Size
  - 2.0 × 1.6 mm Footprint
  - 0.90 mm Max Height
- Environmental
  - RoHS 6 Compliant
  - Halogen free
  - TBBPA Free

Specifications

- Band 41 Insertion Loss ≤ 2.1 dB (Typ., 25 °C)
- IEEE 802.11 b/g/n, Ch 1-13 Rejection ≥ 35 dB (Typ., 25 °C)

Electrical Specifications [1], $Z_0 = 50\ \Omega$, T_C [2] –20 °C to +85 °C, unless otherwise specified

Symbol	Parameter	Units	Min.	Typ. [3]	Max.
S21	Insertion Loss, Band 41	dB			
	2496 – 2500 MHz (+25 °C)			2.8	
	2496 – 2500 MHz (–20 °C to –5 °C)				3.9
	2496 – 2500 MHz (–5 °C to +85 °C)				3.7
	2500 – 2520 MHz (+25 °C)			2.4	3.3
	2500 – 2520 MHz (–20 °C to +85 °C)				3.8
	2520 – 2680 MHz (+25 °C)			2.0	3.0
	2520 – 2680 MHz (–20 °C to +85 °C)				3.2
	2680 – 2690 MHz (+25 °C)			2.2	3.6
	2680 – 2690 MHz (–20 °C to +85 °C)				3.8
S21	Attenuation, 0 – 699 MHz	dB	35	76	
S21	Attenuation, 699 – 916 MHz	dB	35	56	
S21	Attenuation, 916 – 1248 MHz	dB	25	47	
S21	Attenuation, 1248 – 1565 MHz	dB	25	35	
S21	Attenuation, 1565 – 1615 MHz	dB	30	40	
S21	Attenuation, 1615 – 1660 MHz	dB	25	34	
S21	Attenuation, 1660 – 1750 MHz	dB	18	27	
S21	Attenuation, 1750 – 2400 MHz	dB	12	22	
S21	Attenuation, Wi-Fi 802.11 b/g/n Band [4]	dB			
	2401 – 2453 MHz (Wi-Fi Ch 1–7)		35	45	
	2436 – 2468 MHz (Wi-Fi Ch 8–10)		35	44	
	2451 – 2473 MHz (Wi-Fi Ch 11)		30	44	
	2456 – 2478 MHz (Wi-Fi Ch 12)		—	30	
	2461 – 2483 MHz (Wi-Fi Ch 13)		—	18	
S21	Attenuation, 2750 – 2850 MHz	dB	20	37	
S21	Attenuation, 2850 – 3000 MHz	dB	18	28	
S21	Attenuation, 3000 – 4992 MHz	dB	20	27	
S21	Attenuation, 4992 – 5380 MHz	dB	24	32	
S21	Attenuation, 5380 – 7488 MHz	dB	20	32	
S21	Attenuation, 7488 – 8070 MHz	dB	20	30	
S11, S22	Return Loss (SWR), 2496 –2690 MHz	dB	8	16 (1.4)	(2.3)

Notes:
1. Min./Ma.x. specifications are guaranteed at the indicated temperature, unless otherwise noted.
2. 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.
3. Typical data is the average value (arithmetic mean) of the parameter over the indicated band at +25 °C.
4. Wi-Fi Channel Average Attenuation, which is obtained by averaging |S21| over the center 19 MHz of the channels and converting to dB value.

Absolute Maximum Ratings [1]

Parameter	Unit	Value
Storage temperature	°C	–40 to +125
Maximum RF Input Power to Pin 1 (Tx) [2]	dBm	+31
Maximum DC Voltage, any Pin to Gnd or between Pins [3]	V_{DC}	0

Maximum Recommended Operating Conditions [4]

Parameter	Unit	Value
Operating temperature, T_C [5]	°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 ACPF-7141 is not symmetrical. Pin 1 is designed for higher power handling and is intended to be connected to the Tx blocks with Pin 2 connected to the system antenna.
3. Internal DC resistance of any port to ground or between ports is approximately a short circuit.
4. 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.
5. T_C is defined as case temperature, the temperature of the underside of the filter where it makes contact with the circuit board.

Applications Information

The ACPF-7141 is not symmetrical. Pin 1 should be connected to the highest system power level (e.g., Tx block) and Pin 2 to the Antenna.

The DC resistance from Pin 1 and Pin2 to Gnd is approximately zero. If either port is connected to adjacent components having a DC voltage present, blocking capacitors should be used.

ACPF-7141 Typical Performance at T_c = 25 °C

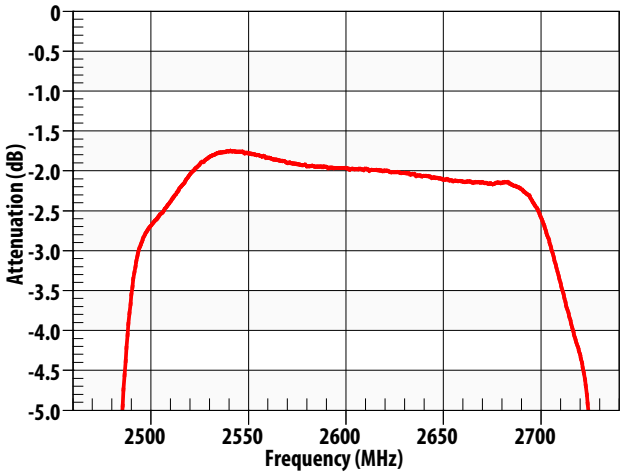


Figure 1. Insertion Loss in Passband, 2460 – 2740 MHz

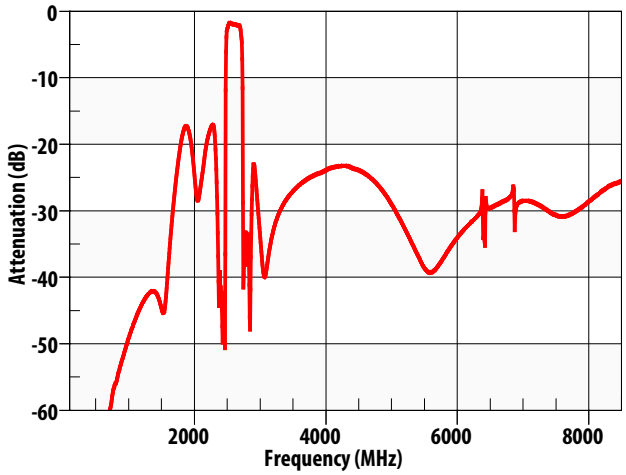


Figure 2. Insertion Loss, wideband

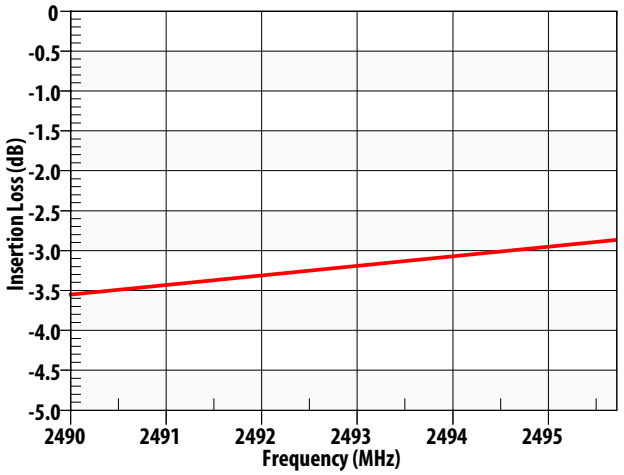


Figure 3. Insertion Loss, low side of Passband, 2490 – 2500 MHz

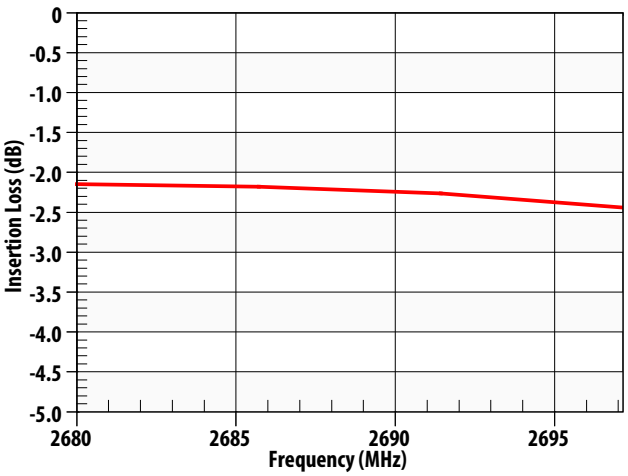


Figure 4. Insertion Loss, high side of Passband, 2680 – 2700 MHz

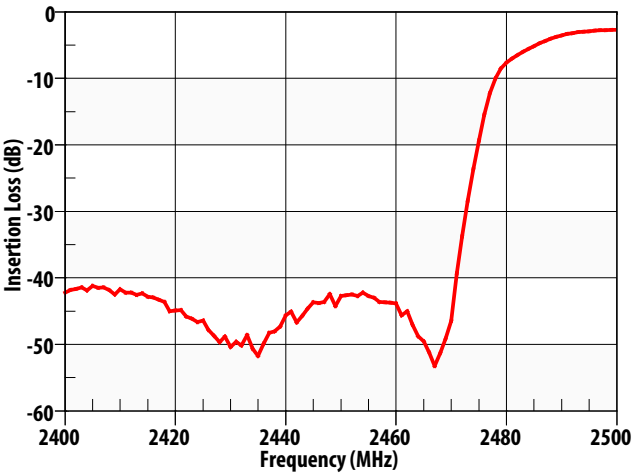


Figure 5. Attenuation, Wi-Fi Band (2400 – 2500 MHz)

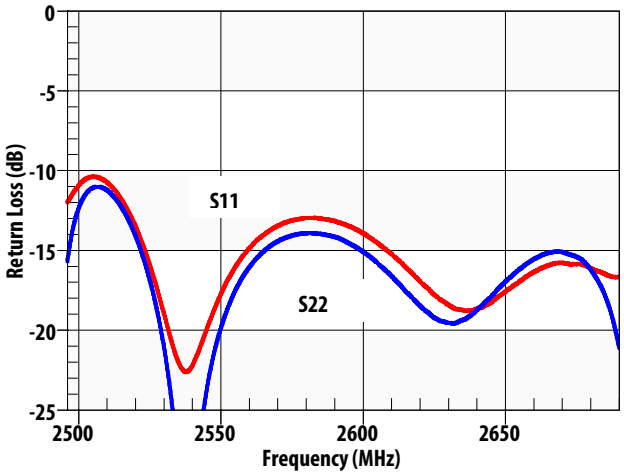


Figure 6. In/Out Return Loss, Band 41 (2496 – 2690 MHz)

ACPF-7141 Typical Performance at T_c = 25 °C

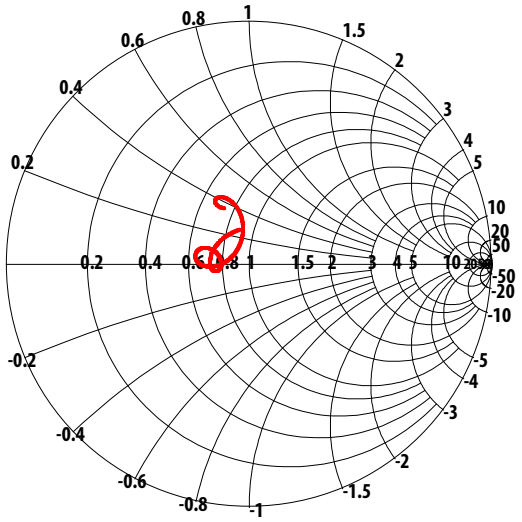


Figure 7. S11 (Port 1, Tx), 3GPP Band 41 (2496 – 2690 MHz)

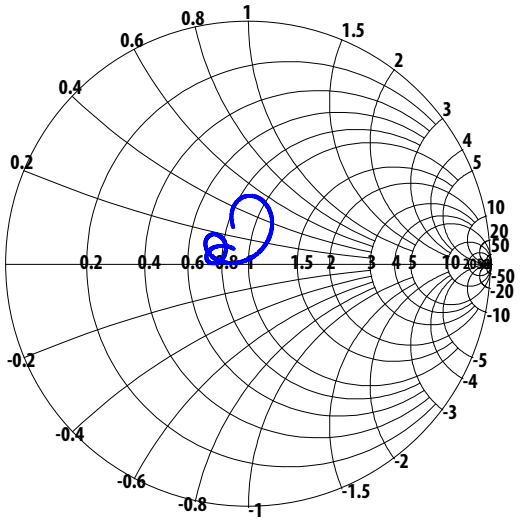
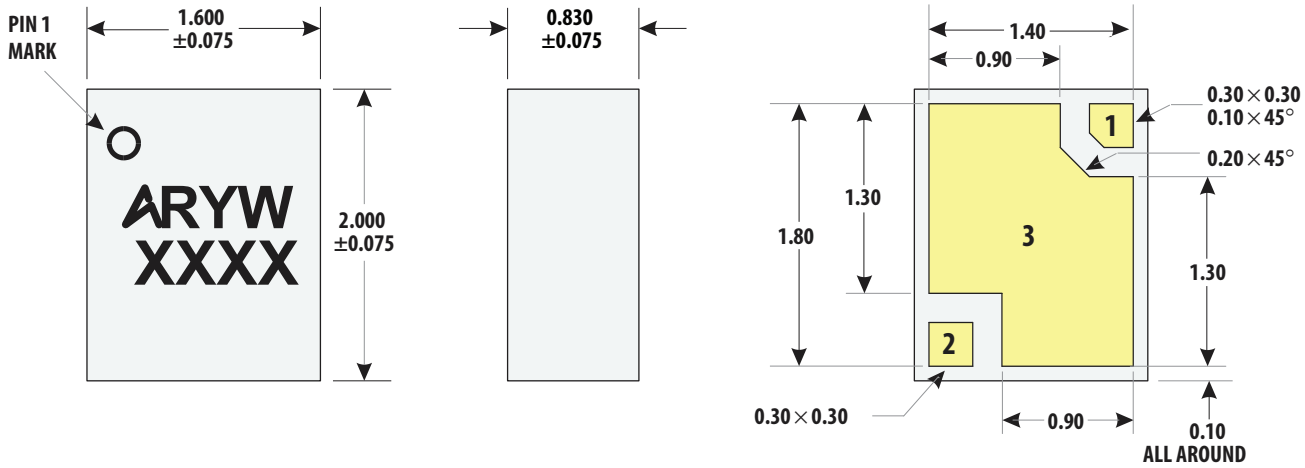


Figure 8. S22 (Port 2, Ant), 3GPP Band 41 (2496 – 2690 MHz)



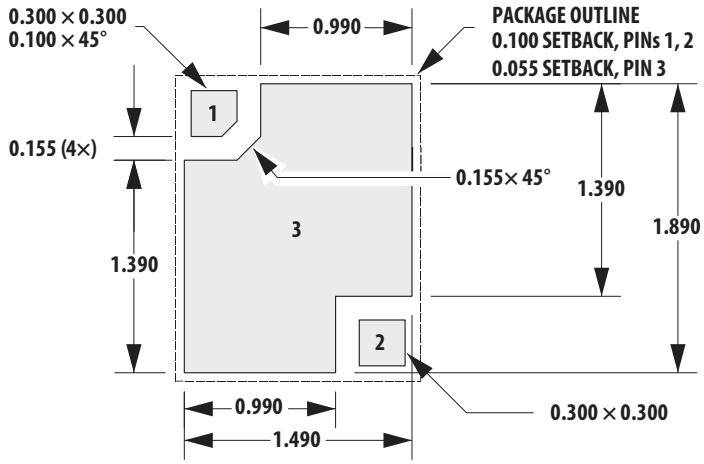
TOP VIEW SIDE VIEW BOTTOM VIEW

Notes:
1. Dimensions in millimeters
2. Tolerance, unless otherwise specified in drawing:
   X.XX ± 0.05 mm
   X.XXX ± 0.025 mm
3. Dimensions nominal. unless otherwise specified
4. Contact areas are gold plated
6. Package marking:
   "A" = Avago logo
   R = ACPF-7141
   Y = Year (last digit)
   W = Work Week
   XXXX = Lot Number

Pin Connections:

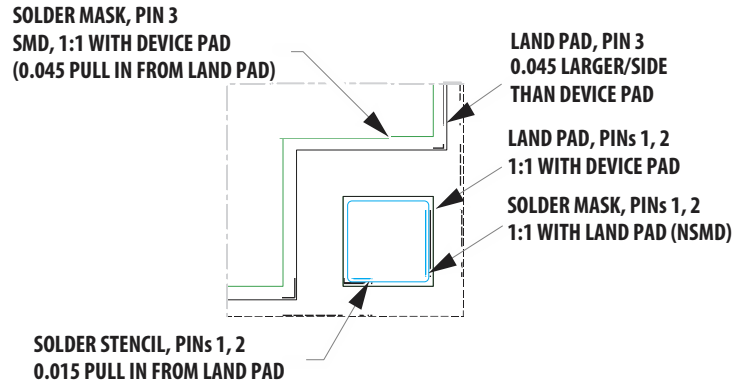
1	TX
2	ANT
3	Ground

Figure 9. Package Outline Drawing and Marking



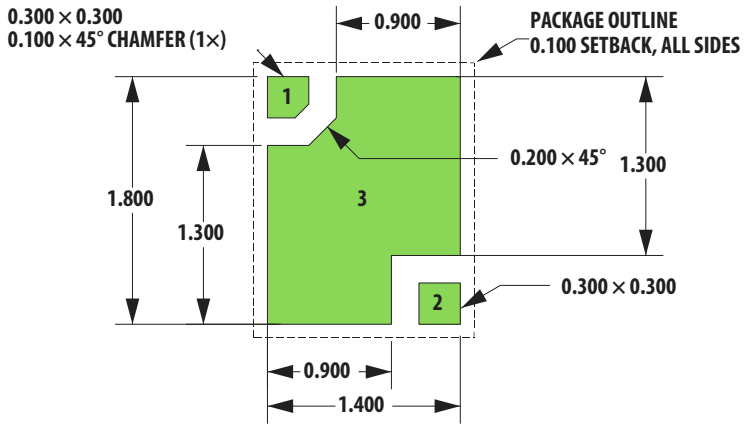
Notes:
1. Top view.
2. Dimensions in mm.
3. Note: Land pattern only, RF ground vias not shown.

Figure 10. Landing Pad



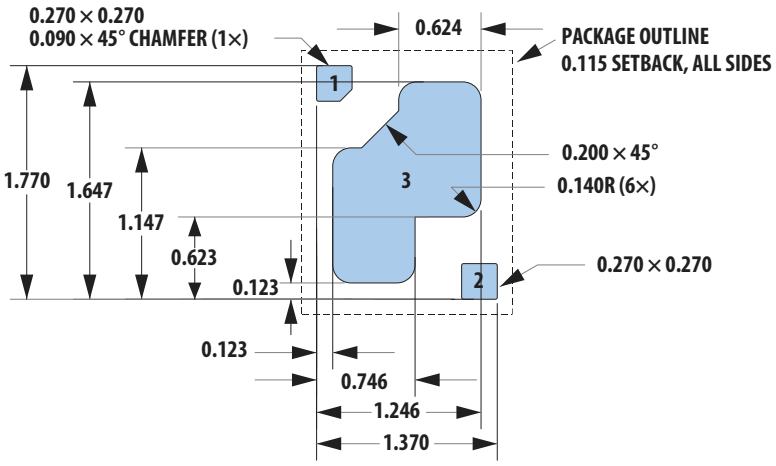
Notes:
1. Top view.
2. Dimensions in mm.

Figure 11. Typical Pad Construction



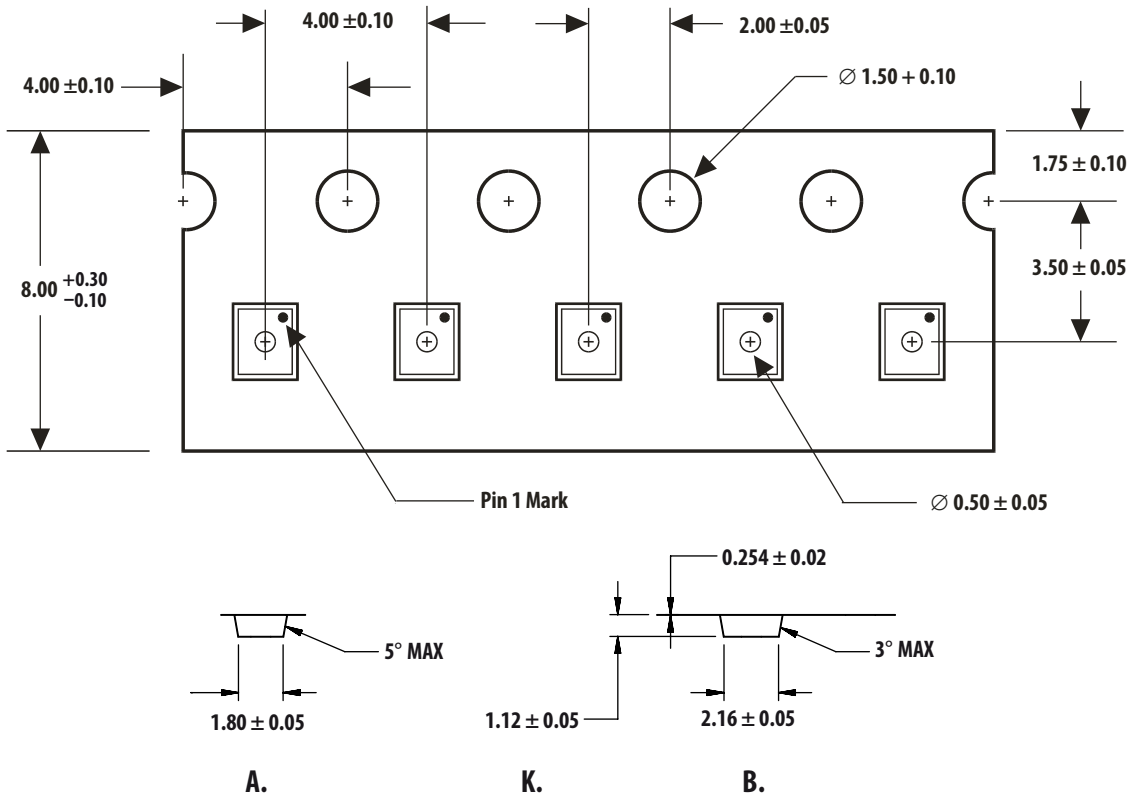
Notes:
1. Top view
2. Dimensions in mm

Figure 12. Solder Mask



Notes:
1. Top view.
2. Dimensions in mm.
3. Typical stencil thickness = 75 µm.

Figure 13. Solder Stencil



Dimensions in mm.

Figure 14. SMD Tape Packing

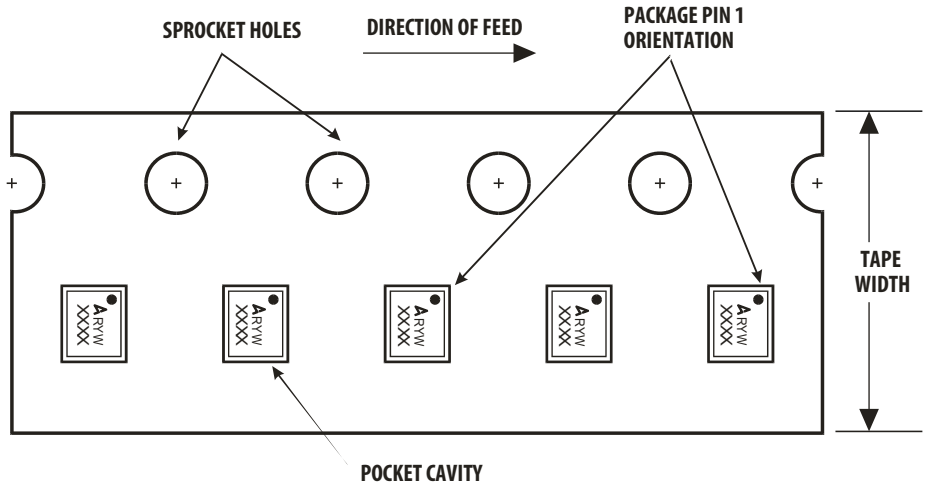


Figure 15. Orientation in Tape and Direction of Feed

Reel Drawing

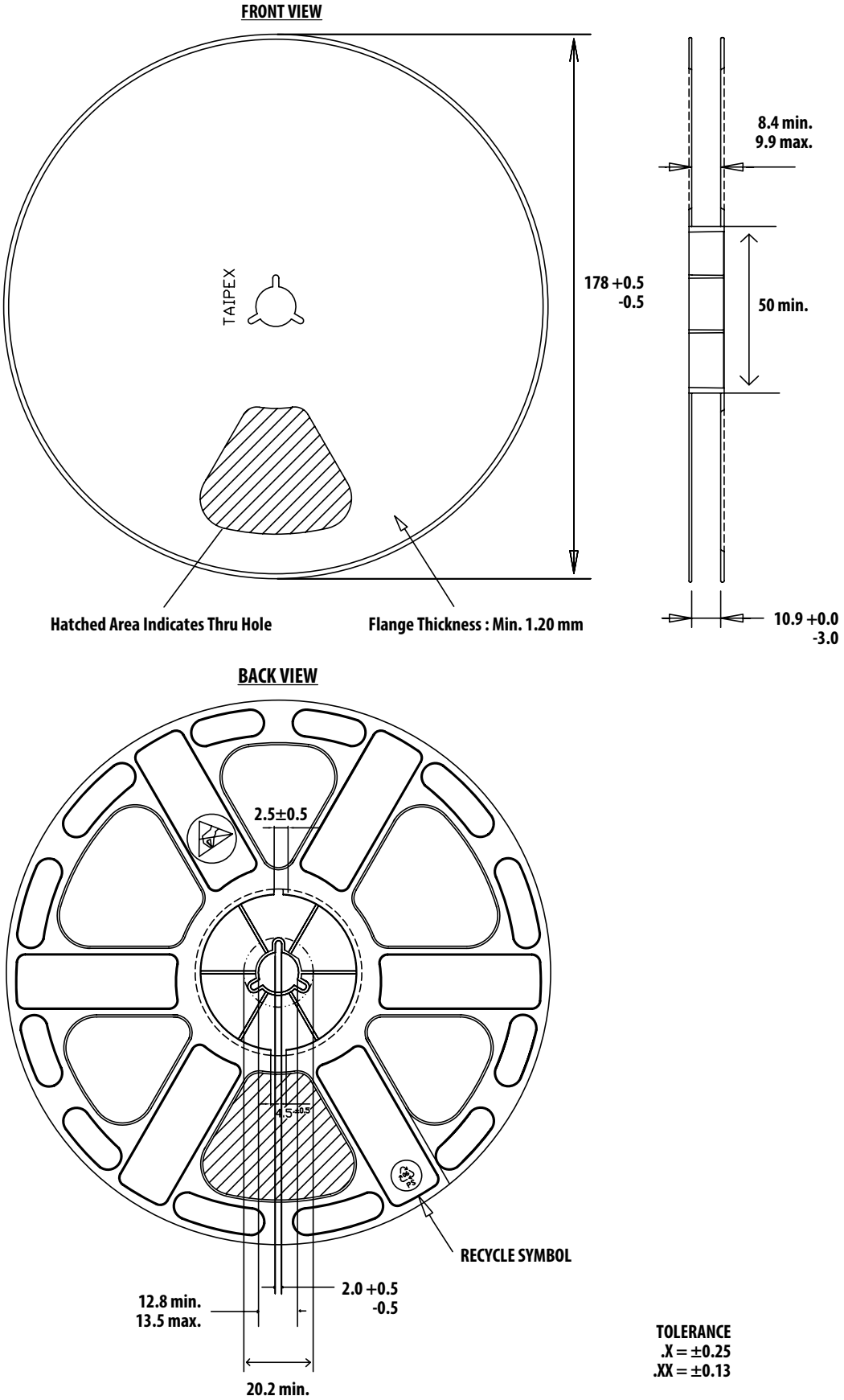


Figure 16. SMT Reel Drawing

Package Moisture Sensitivity

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

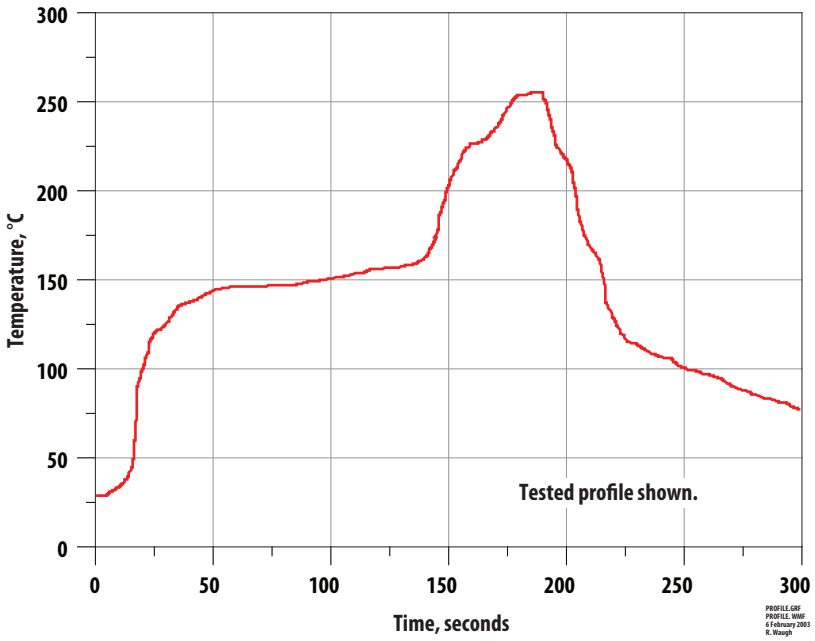


Figure 17. Verified SMT Solder Profile

Ordering Information

Part Number	No. of Devices	Container
ACPF-7141-BLK	100	Tape strip or Gel-Pack
ACPF-7141-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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