Table 1. SKY85006-11 Signal Descriptions

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	12	RF_OUT	RF Output
2	RF_IN	RF Input	13	GND	Ground
3	GND	Ground	14	GND	Ground
4	EN	PA enable	15	VCC3	Power supply for third stage
5	N/C	No connect	16	GND	Ground
6	MODE	High-linearity/DPD mode control	17	GND	Ground
7	VDET	Power detector output	18	VCC2	Power supply for second stage
8	GND	Ground	19	GND	Ground
9	GND	Ground	20	VCC1	Power supply for first stage
10	GND	Ground	21	GND	Ground pad
11	GND	Ground			

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY85006-11 are provided in Table 2.The recommended operating conditions are specified in Table 3.

The electrical specifications are provided in Tables 4 through 8.

Table 2. SKY85006-11 Absolute Maximum Ratings[1]

Parameter	Symbol	Minimum	Maximum	Units
Supply voltage	V_{CC1}, V_{CC2}, V_{CC3}	-0.3	+5.5	V
DC input on EN	V_{IN}	-0.3	+3.6	V
RF input power (RF out terminated in 50 Ω)	P_{IN}		+12.0	dBm
Operating temperature range	T_A	-40	+85	°C
Junction temperature	T_J		+150	°C
Storage temperature range	T_{STG}	-40	+150	°C
Electrostatic discharge: Human Body Model (HBM), Class 1C (all pins)	ESD		 1500	 V

1 Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

***ESD HANDLING**: Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

Table 3. SKY85006-11 Recommended Operating Conditions

Parameter	Symbol	Min	Typ	Max	Units
Ambient temperature	T_A	-40	+25	+85	°C
Supply voltage, relative to GND = 0 V	V_{CC}	3.0	5.0	5.5	V

Table 4. SKY85006-11 Electrical Specifications: DC Characteristics[1]
(V_{CC} = 5.0 V, MODE = 0.0 V, EN = V_{ENH}, T_A = 25 °C as Measured on the Evaluation Board (De-Embedded to the Device), All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Supply current (sum of all VCCs)	$I_{CC-802.11b}$ $I_{CC-802.11n}$ $I_{CC-802.11ac}$ I_{CQ}	P_{OUT} = +28 dBm P_{OUT} = +26 dBm P_{OUT} = +23 dBm No RF, MODE = 0 V No RF, MODE = 3.3 V (DPD mode)		510 430 340 210 140	550 470 370	mA mA mA mA mA
Supply current	I_{CC}	V_{EN} = 0 V, No RF			150	µA
Thermal conductivity	Θ_{JC}				26.5	°C/W

1 Performance is guaranteed only under the conditions listed in this table.

Table 5. SKY85006-11 Electrical Specifications: AC Characteristics: 802.11g/n/ac Transmit Characteristics[1]
(V_{CC} = 5.0 V, MODE = 0.0 V, EN = 3.3 V, T_A = 25 °C as Measured on the Evaluation Board (De-Embedded to the Device), All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Frequency range	f_{L-U}		2400		2500	MHz
Output power	P_{OUT}	MCS10, HT40, -43 dB DEVM MCS10, HT40, -40 dB DEVM MCS8, HT40, -35 dB EVM MCS7, HT20, -30 dB EVM 802.11b, CCK signal, BT = 0.045, mask MCS0, HT20, mask	 +22 +23 +24 +27 +26	+23 +23.5 +24 +26 +29 +28		dBm dBm dBm dBm dBm dBm
+1 dB output compression point	OP1dB	No modulation	+29	+31		dBm
Out-of-band	OOB	MCS0 to MCS9, HT20. In-band output power at which power in the 2310 to 2390 MHz or 2483 to 2500 MHz restricted bands does not exceed -41.2 dBm/MHz.		+22		dBm
Input return loss	|S11|		10	15		dB
Output return loss	|S22|			6		dB
Small signal gain	|S21|	P_{IN} = -25 dBm	32	35		dB
Gain variation over band	ΔS21	P_{IN} = -25 dBm, f_{IN} = 2400 to 2500 MHz	-1.5		+1.5	dB
Harmonics	2f 3f	P_{OUT} = 29 dBm, 802.11b, 1 Mbps		-40	-35 -50	dBm/MHz dBm/MHz
Rise and fall time	t_R, t_F				0.5	µs
Stability	STAB	CW, P_{OUT} = +29 dBm, 0.1 GHz to 20 GHz, Load VSWR = 4:1	All non-harmonically related outputs < -42 dBm/MHz			
Ruggedness	RUG	P_{IN} = +10 dBm, Load VSWR = 10:1	No damage			

1 Performance is guaranteed only under the conditions listed in this table.

Table 6. SKY85006-11 Electrical Specifications: AC Characteristics: 802.11g/n/ac Transmit Characteristics[1]
(V_{CC} = 3.3 V, MODE = 0.0 V, EN = 3.3 V, T_A = 25 °C as Measured on the Evaluation Board (De-Embedded to the Device), All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Frequency range	f_{L-U}		2400		2500	MHz
Output power	P_{OUT}	MCS10, HT40, -43 dB EVM MCS8, HT40, -35 dB EVM MCS7, HT20, -30 dB EVM 802.11b, CCK signal, BT = 0.045, mask MCS0, HT20, mask		+19 +21 +22 +26 +26		dBm dBm dBm dBm dBm
+1 dB output compression point	OP1dB	No modulation		+28		dBm
Out-of-band	OOB	MCS0 to MCS9, HT20. In-band output power at which power in the 2310 to 2390 MHz or 2483 to 2500 MHz restricted bands does not exceed -41.2 dBm/MHz.		19		dB
Small signal gain	|S21|	P_{IN} = -25 dBm		34		dB
Gain variation over band	ΔS21	P_{IN} = -25 dBm, f_{IN} = 2400 to 2500 MHz	-1.5		+1.5	dB
Harmonics	2f 3f	P_{OUT} = +26 dBm, 802.11b, 1 Mbps		-40 -40		dBm/MHz dBm/MHz
Rise and fall time	t_R, t_F				500	µs

1 Performance is guaranteed only under the conditions listed in this table.

Table 7. SKY85006-11 Electrical Specifications: Logic Characteristics[1]
(V_{CC} = 5.0 V, MODE = 0.0 V, EN = V_{ENH}, T_A = 25 °C as Measured on the Evaluation Board (De-Embedded to the Device), All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Logic voltage: High (module on) Low (module off)	 V_{ENH} V_{ENL}		 1.8 0		 3.6 0.4	V
Input current logic voltage: High Low	 I_{ENH} I_{ENL}	V_{EN} = 0.4 V		 1	 250 20	µA
Enable pin input impedance	Z_{EN}	Passive pull-down		20		kΩ

1 Performance is guaranteed only under the conditions listed in this table.

Table 8. SKY85006-11 Electrical Specifications: Logarithmic Power Detector Characteristics[1]
(V_{CC} = 5.0 V, MODE = 0.0 V, EN = V_{ENH}, T_A = 25 °C as Measured on the Evaluation Board, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Frequency range	f		2400		2500	MHz
Power detect range	PDR	CW, measured at RF_OUT	+5		+29	dBm
DC source impedance on DET	PDZ_{SRC}			2.0		kΩ
DC load impedance	PDZ_{LOAD}			1		MΩ
Output voltage	PDV_{DC} PDV_{P5} PDV_{P29}	No RF P_{OUT} = +5 dBm CW P_{OUT} = +29 dBm CW	0.150 0.2 0.775	0.2 0.27 0.850	0.25 0.35 0.925	V
Detector slope	Slope	+5 ≤ P_{OUT} ≤ +29		23		mV/dB
Power detect low-pass filter, -3 dB corner frequency	$LPF\text{-}3_{DB}$			2		MHz

1 Performance is guaranteed only under the conditions listed in this table.

Evaluation Board Description

The SKY85006-11-EK1 Evaluation Board is used to test the performance of the SKY85006-11 PA. A typical application schematic diagram is provided in Figure 3. Table 9 provides the Bill of Materials (BOM) list for Evaluation Board components. A photograph of the Evaluation Board is shown in Figure 4.

Evaluation Board Test Procedure

1. Connect a spectrum analyzer to the RF signal output port J1.
2. Connect a signal generator to the RF signal input port J3. Set it to the desired RF frequency at a power level of -30 dBm or less to the Evaluation Board.
3. Connect GND to J2 pin 2.
4. Connect 5 V or 3.3 V supply to J2 pin 5.
5. In order to measure the detector voltage, connect a volt meter to J4 pin 1.
6. Connect a +3.3 V supply to J4 pin 6 to enable the PA.
7. Take measurements.

CAUTION: *If the input signal exceeds the rated power, the Evaluation Board can be permanently damaged.*

NOTE: *It is important to adjust the VCC voltage source so that the target supply voltage (+5 or +3.3) is measured at the board. The high collector currents will drop the collector voltage significantly if long leads are used. Adjust the bias voltage to compensate.*

Circuit Design Considerations

The following design considerations are general in nature and must be followed regardless of final use or configuration:

- Paths to ground should be made as short as possible.
- The ground pad of the SKY85006-11 has special electrical and thermal grounding requirements. This pad is the main thermal conduit for heat dissipation. Since the circuit board acts as the heat sink, it must shunt as much heat as possible from the device.

  Therefore, design the connection to the ground pad to dissipate the maximum wattage produced by the circuit board. Multiple vias to the grounding layer are required.

  For further information, refer to the Skyworks Application Note, *PCB Design Guidelines for High Power Dissipation Packages*, document number 201211.
- Bypass capacitors should be used on the DC supply lines. An RF inductor is required on the VCC supply line to block RF signals from the DC supply. Refer to the schematic drawing in Figure 4 for further details.
- The RF lines should be well separated from each other with solid ground in between traces to maximize input-to-output isolation.

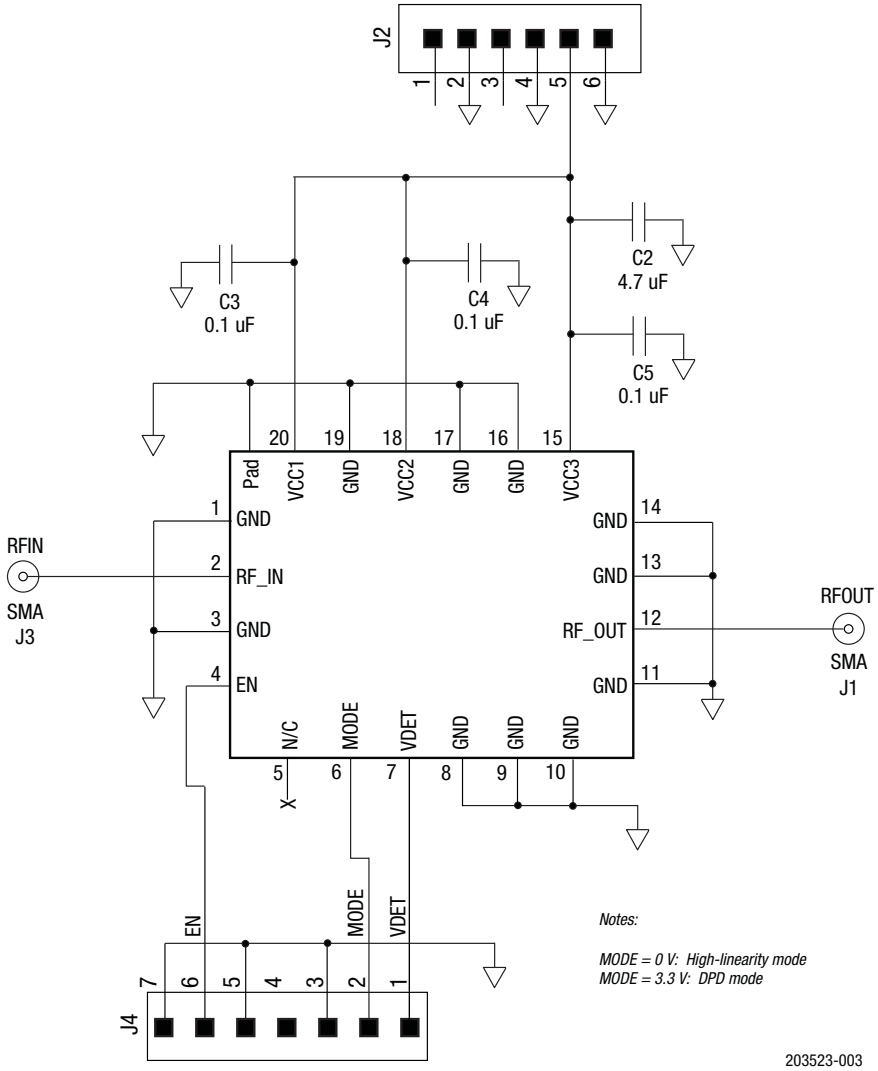


Figure 3. SKY85006-11 Evaluation Board Schematic Diagram

Table 9. SKY85006-11 Evaluation Board Bill of Materials

Component	Value	Manufacturer	Mfr Part Number	Package	Description
C2	4.7uF	Murata	GRM188R60J475KE190	0603	Ceramic capacitor, 4.7 uF, 10%, X5R, 16 V,
C3, C4, C5	0.1 uF	Taio Yuden	EM105B7104KV	0402	Ceramic capacitor, 0.1 uF, 10%, X7R, 16 V, (RSI)

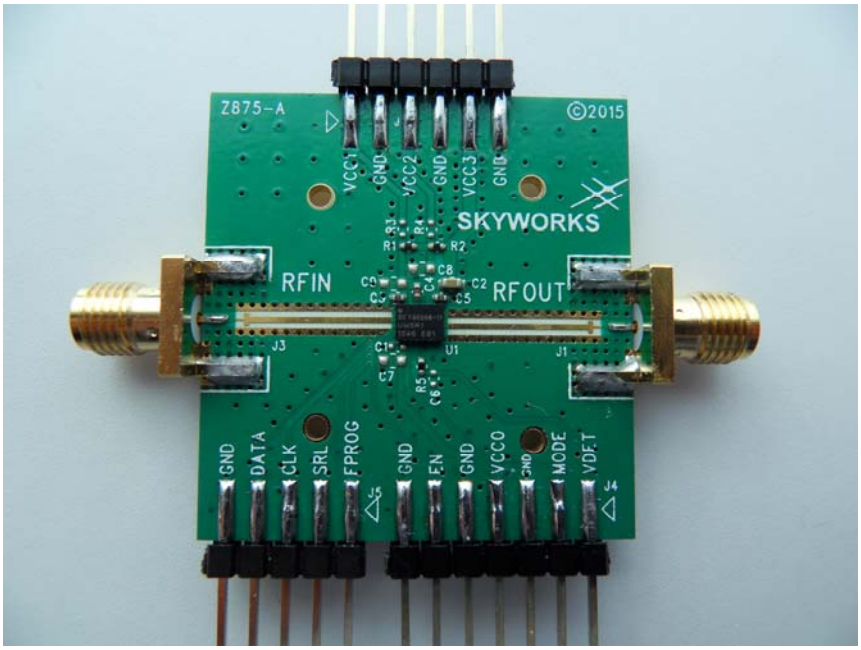


Figure 4. SKY85006-11 Evaluation Board

Package Dimensions

Typical part markings for the SKY85006-11 are shown in Figure 5. The PCB layout footprint for the SKY85006-11 is provided in Figure 6. Package dimensions are shown in Figure 7, and tape and reel dimensions are provided in Figure 8.

Package and Handling Information

Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SKY85006-11 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C, and can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information* (Document Number 200164).

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.

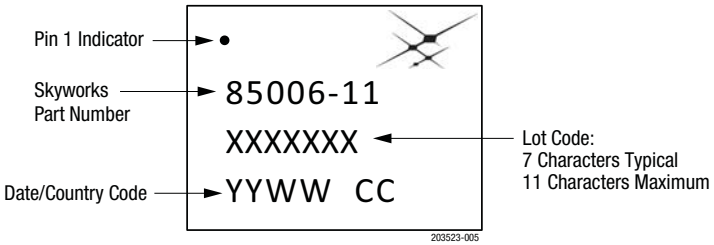
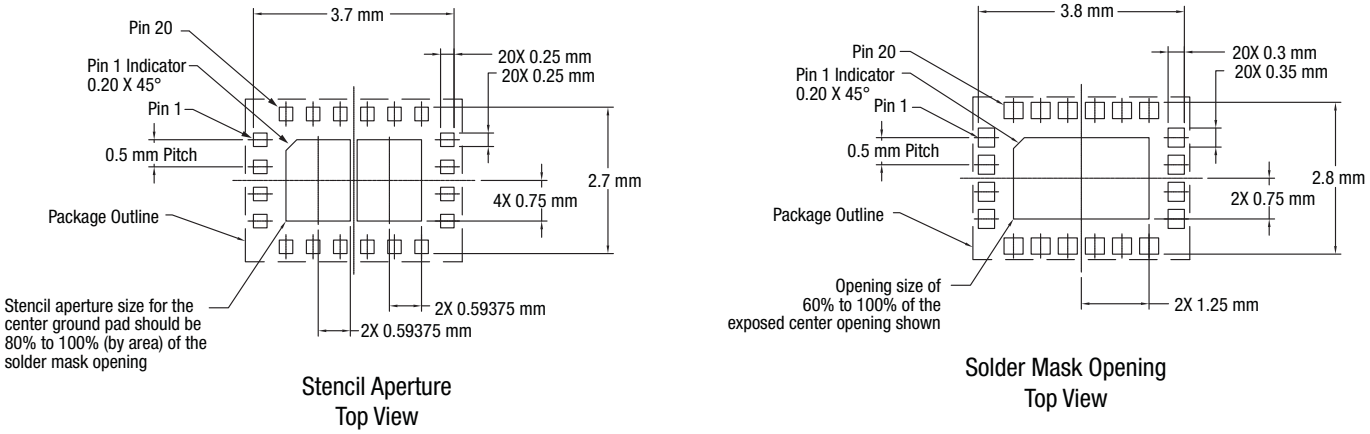


Figure 5. SKY85006-11 Typical Part Markings (Top View)

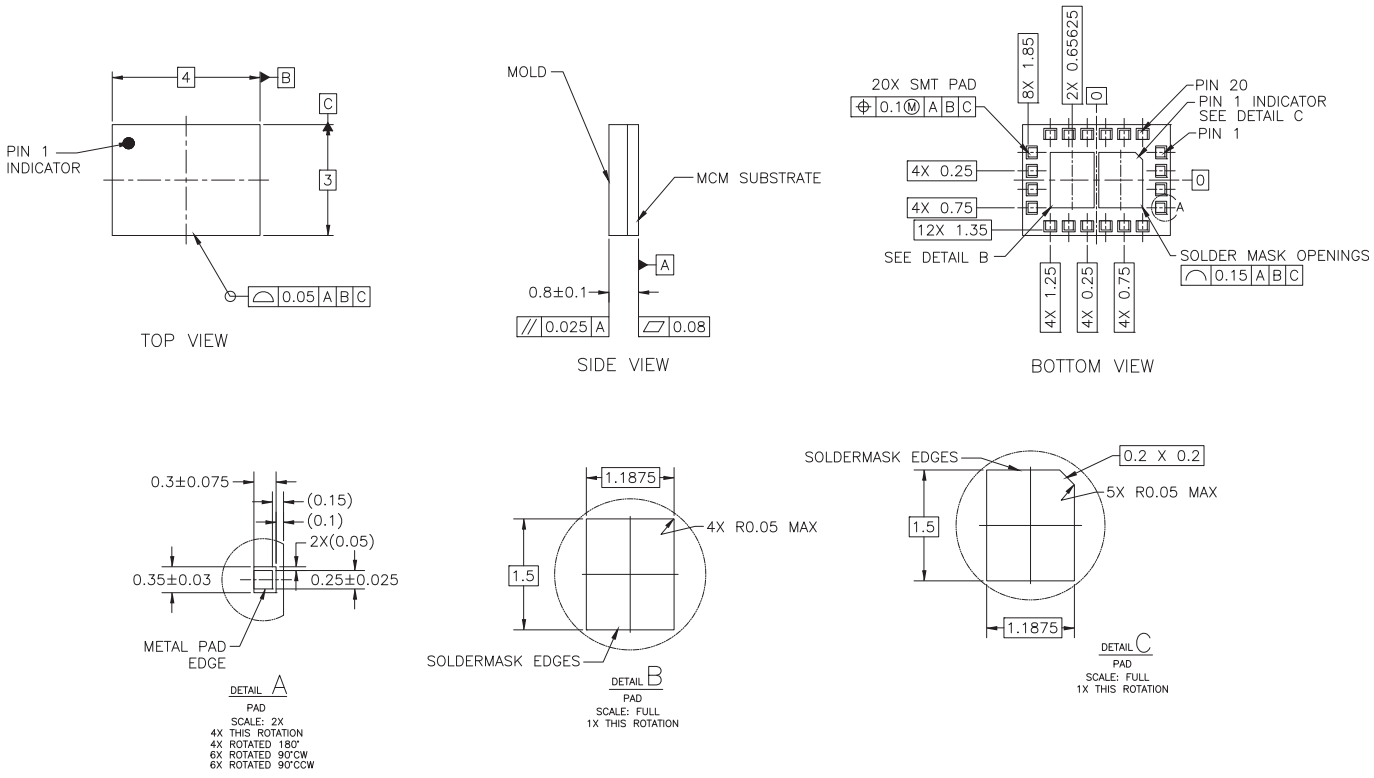


Notes:

1. Thermal vias should be resin filled and capped in accordance with IPC-4761 Type VII vias.
2. Recommended Cu thickness is 30 to 35 µm.

203523-006

Figure 6. SKY85006-11 PCB Layout Footprint

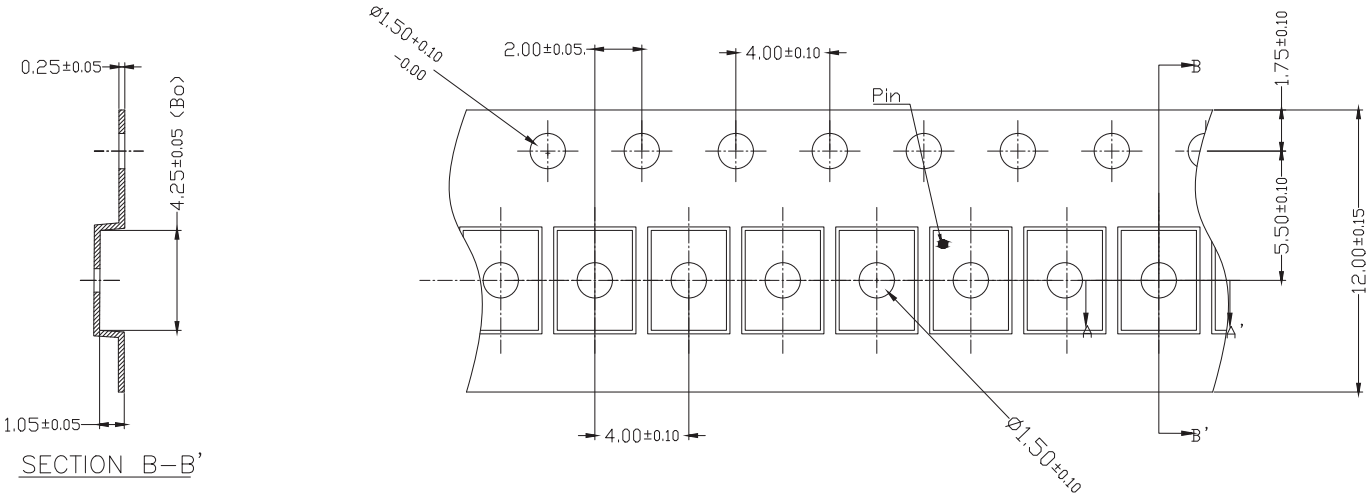


NOTES: UNLESS OTHERWISE SPECIFIED.

1. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M–1994.
2. SEE APPLICABLE BONDING DIAGRAM AND DEVICE ASSEMBLY DRAWING FOR DIE AND COMPONENT PLACEMENT.
3. PAD DEFINITIONS PER DETAILS ON DRAWING.
4. PCB TYPE 5L NS SSV 250 MCM (CORELESS).
5. THIS PACKAGE USES CONFORMAL SHIELDING.

203523-007

Figure 7. SKY85006-11 Package Dimensions



1. CARRIER TAPE MUST MEET ALL SKYWORKS REQUIREMENTS OF GP01-D233 PROCUREMENT SPEC FOR TAPE AND REEL
2. CARRIER TAPE SHALL BE BLACK CONDUCTIVE POLYCARBONATE.
3. COVER TAPE SHALL BE TRANSPARENT CONDUCTIVE MATERIAL
4. ESD-SURFACE RESISTIVITY SHALL MEET GP01-D233
5. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE : ±0.20mm
6. Ao & Bo MEASURED ON PLANE 0.30mm ABOVE THE BOTTOM OF THE POCKET.
7. ALL DIMENSIONS ARE IN MILLIMETERS.

203523-008

Figure 8. SKY85006-11 Tape and Reel Dimensions

Ordering Information

Product Description	Product Part Number	Evaluation Board Part Number
SKY85006-11: 2.4 GHz High Power Wireless LAN PA	SKY85006-11	SKY85006-11EK1

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Skyworks:

SKY85006-11EK1