DATA SHEET

SKY65725-81: Shielded Low-Noise Amplifier Front-End Module with Pre-Filter for GPS/GNSS/BDS Applications

Applications

- GPS/GNSS/BDS radio receivers
- Global Navigation Satellite Systems (GLONASS)
- Fitness/activity trackers
- Smartphones
- Laptop PCs and tablets

Features

- Innovative proprietary shielded technology
- Wideband pre-filter
- Small signal gain: 16 dB typical
- Excellent out-of-band rejection
- Low noise figure: 1.5 dB typical
- Low current consumption
- Input/output impedance internally matched to 50 Ω
- Single DC supply: 1.8 V
- Minimal number of external components required
- Small MCM 9-pin, 1.6 x 1.6 x 0.8 mm) (MSL3, 260°C per JEDEC J-STD-020)

Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04–0074.

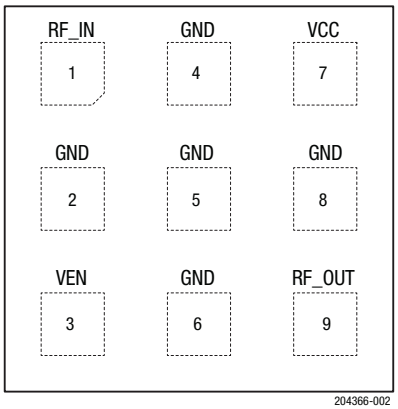


Figure 1. SKY65725-81 Pinout (Top View)

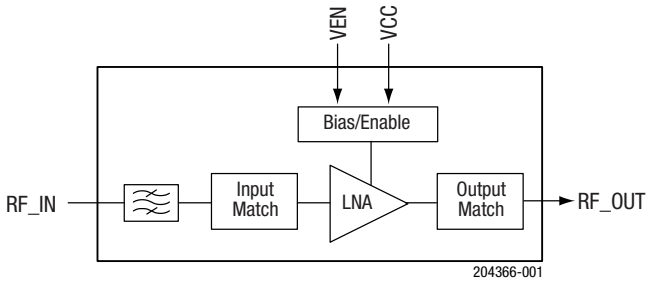


Figure 2. SKY65725-81 Block Diagram

Description

The SKY65725-81 is a shielded front-end module (FEM) with an integrated low-noise amplifier (LNA) and pre-filter designed for Global Positioning System/Global Navigation Satellite System/Beidou Navigation Satellite System (GPS/GNSS/BDS) receiver applications. The device provides high linearity, excellent gain, a high 1 dB input compression point (IP1dB), and a 1.5 dB typical noise figure (NF).

The pre-filter provides low in-band insertion loss and integrated notch filtering for excellent rejection of the cellular, PCS, and WLAN frequency bands. The SKY65725-81 uses surface-mount technology (SMT) in a Multi-Chip Module (MCM) package, which allows for a highly manufacturable and low-cost solution.

The pin configuration and package are shown in Figure 1. A functional block diagram is shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.

Table 1. SKY65725-81 Signal Descriptions

Pin	Name	Description	Pin	Name	Description
1	RF_IN	RF input	6	GND	Ground
2	GND	Ground	7	VCC	Supply voltage
3	VEN	LNA enable	8	GND	Ground
4	GND	Ground	9	RF_OUT	RF output
5	GND	Ground			

Technical Description

LNA Enable

The VEN signal (pin 3) enables or disables the LNA. A logic high signal powers on the LNA and a logic low signal powers off the device. An external series resistor can be used on this pin to adjust the LNA bias current.

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY65725-81 are provided in Table 2. The recommended operating conditions are specified in Table 3, and electrical specifications are provided in Table 4.

Table 2. SKY65725-81 Absolute Maximum Ratings[1]

Parameter	Symbol	Minimum	Maximum	Units
RF input power	Pin		+10	dBm
Supply voltage	Vcc	0	3.1	V
Storage temperature	Tstg	-55	+150	°C
Junction temperature	Tj		+150	°C
Electrostatic discharge: Human Body Model (HBM), Class 1A	ESD		250	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: *Industry-standard ESD handling precautions must be adhered to at all times to avoid damage to this device.*

Table 3. SKY65725-81 Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Units
Frequency range	f	1559	1575	1606	MHz
Supply voltage	Vcc	1.7	1.8	1.9	V
LNA enable: Enable (high) Disable (low)	 LNA_{ENABLE} $LNA_{DISABLE}$	 V_{CC} - 0.3	 0	 V_{CC} 0.3	 V V
Case operating temperature	Tc	-40	+25	+85	°C

Table 4. SKY65725-81 Electrical Specifications[1]
(VCC = 1.8 V, VEN = 1.8 V, f = 1575 MHz, Tc = +25 °C, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Small signal gain: f = 1575 MHz (GPS) f = 1602 MHz (GNSS) f = 1561 MHz (Beidou)	|S21|	PIN = -30 dBm	 14 13.5 14	 16 14.7 15.4	 18 18 18	 dB db dB
Noise figure: f = 1575 MHz (GPS) f = 1602 MHz (GNSS) f = 1561 MHz (Beidou)	NF			 1.5 1.8 1.8	 2.3 2.6 2.6	 dB dB dB
In-band third order input intercept point	IIP3	f1 = 1575 MHz @ PIN = –30 dBm f2 = 1576 MHz @ PIN = –30 dBm		-8		dBm
1 dB input compression point (in-band)	IP1dB			-15		dBm
Reverse isolation	|S12|	PIN = -30 dBm	20	30		dB
Input return loss	|S11|	PIN = -30 dBm	6	8		dB
Output return loss	|S22|	PIN = -30 dBm	10	15		dB
Supply current	Icc	No RF	2.3	3.5	6	mA
Shutdown current	Ileak	No RF, VEN = 0 V		0.1	1	uA
Out-of-band rejection	OOB	PIN = 0 dBm (in-band referred): @ 777 to 798 MHz @ 806 to 928 MHz @ 1710 to 1980 MHz @ 2400 to 2500 MHz @ 5160 to 5560 MHz		 60 55 45 60 65		 dBc dBc dBc dBc dBc

1. Performance is guaranteed only under the conditions listed in this Table and is not guaranteed over the full operating or storage temperature ranges. Operation at elevated temperatures may reduce reliability of the device.

Evaluation Board Description

An Evaluation Board is used to test the performance of the SKY65725-81. A schematic of the Evaluation Board is provided in Figure 3. An assembly diagram of the Evaluation Board is shown in Figure 4.

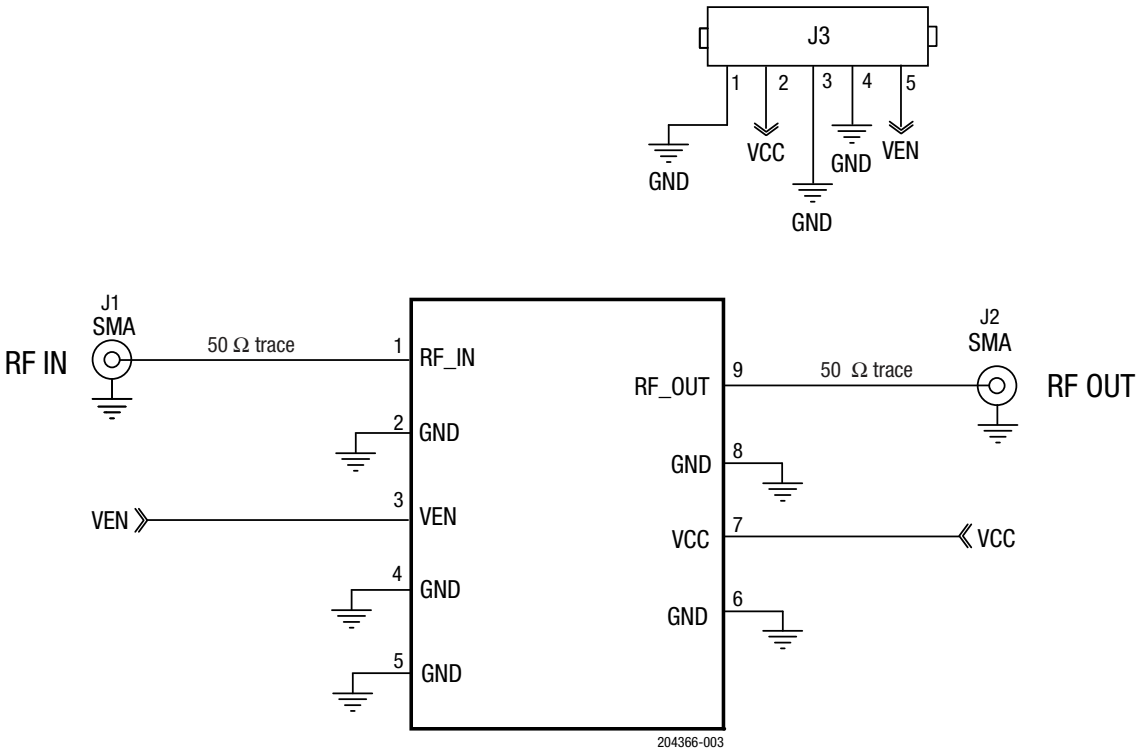


Figure 3. SKY65725-81 Evaluation Board Schematic

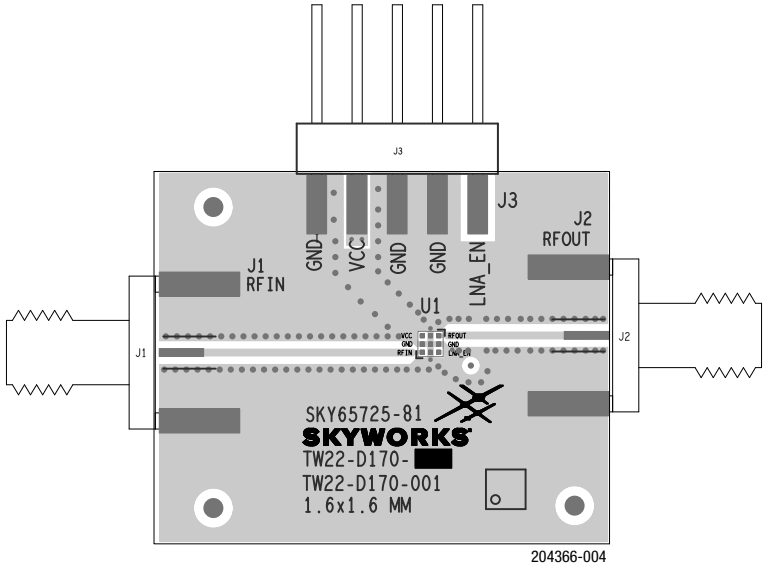


Figure 4. SKY65725-81 Evaluation Board Assembly Diagram

Package Dimensions

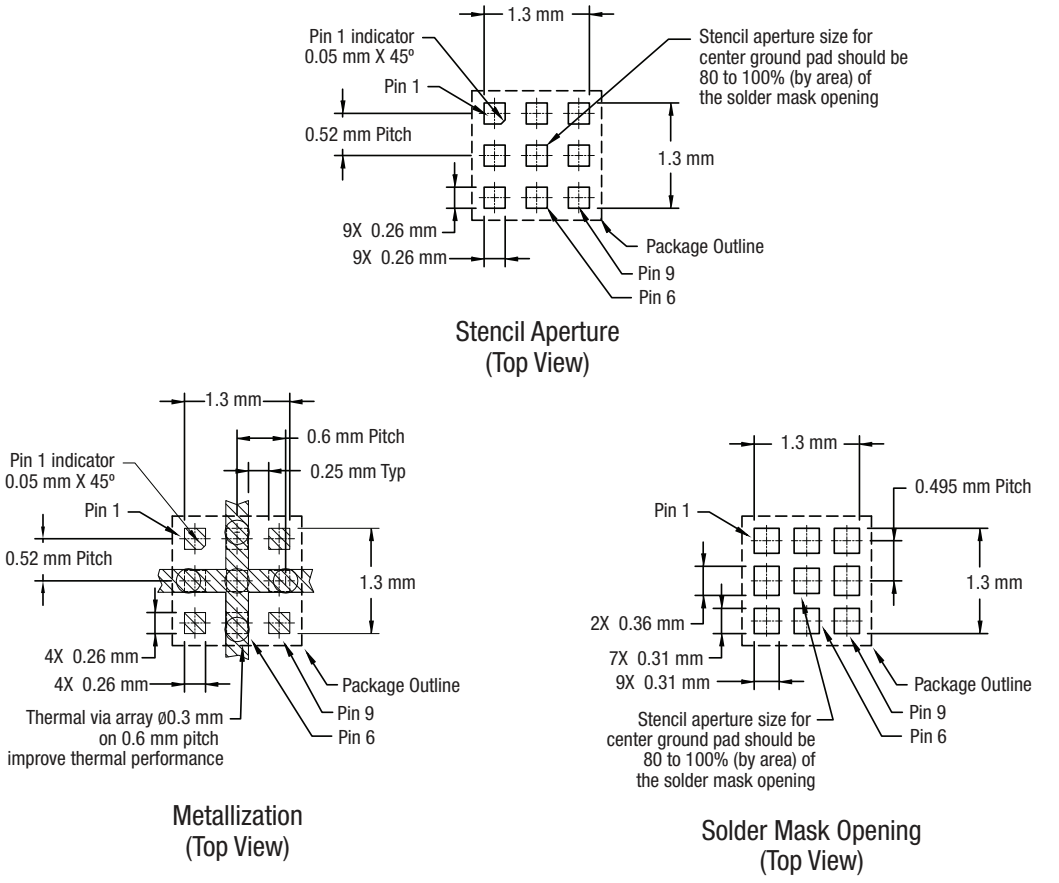
The PCB layout footprint for the SKY65725-81 is provided in Figure 5. Typical part marking is shown in Figure 6. Package dimensions are shown in Figure 7, and tape and reel dimensions are provided in Figure 8.

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 SKY65725-81 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C. It 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.



Notes:

1. *All measurements are in millimeters.*
2. *Thermal vias should be resin filled and capped in accordance with IPC-4761 type VII vias. Recommended Cu thickness is 30 to 35 µm.*

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Figure 5. SKY65725-81 PCB Layout Footprint

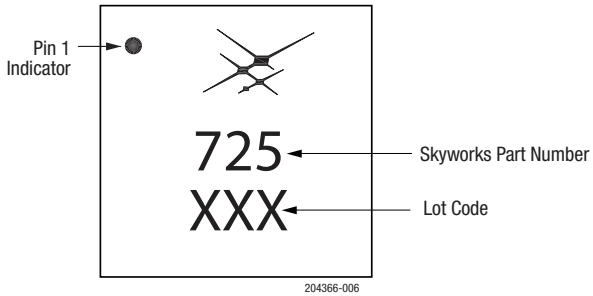


Figure 6. SKY65725-81 Typical Part Marking (Top View)

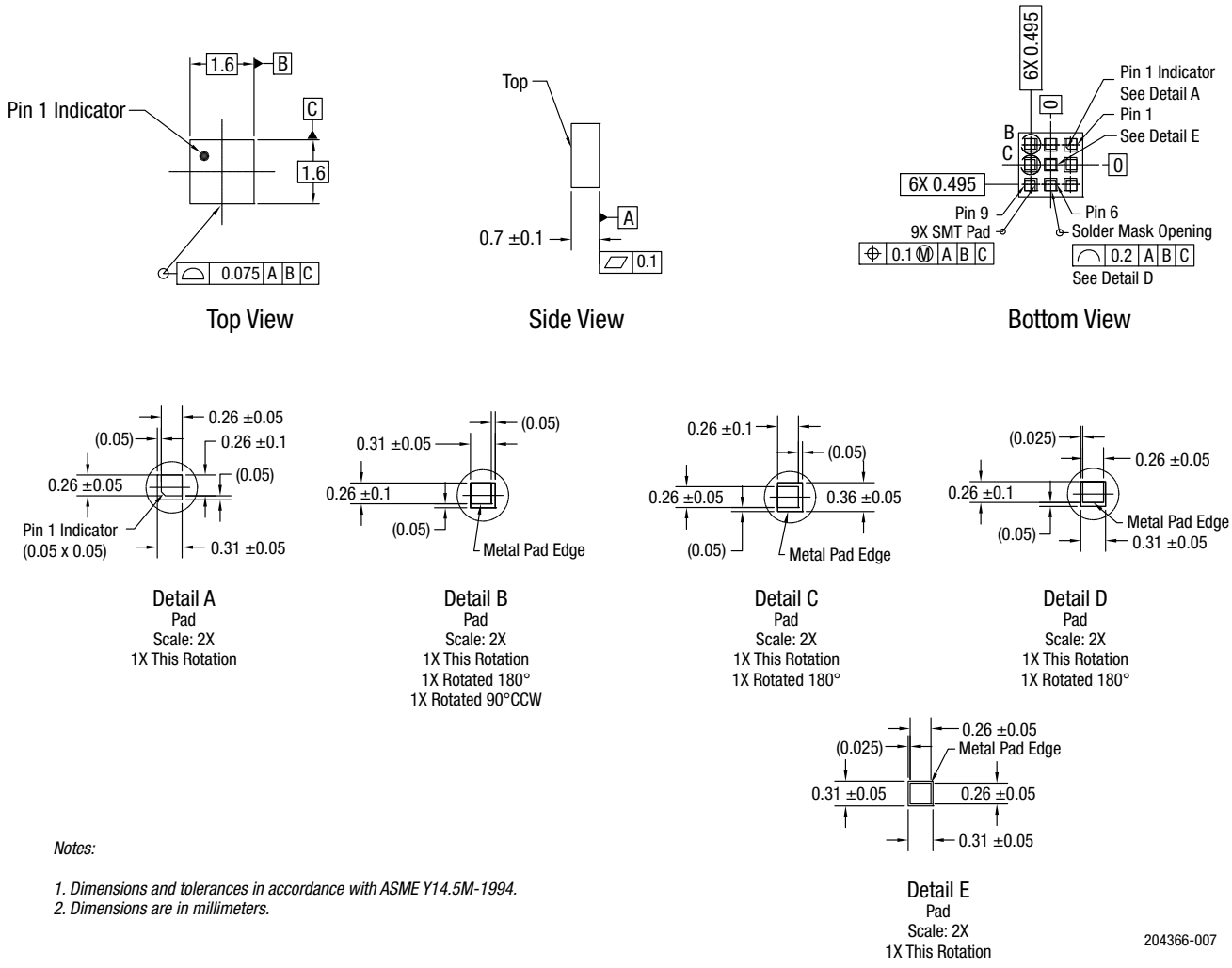
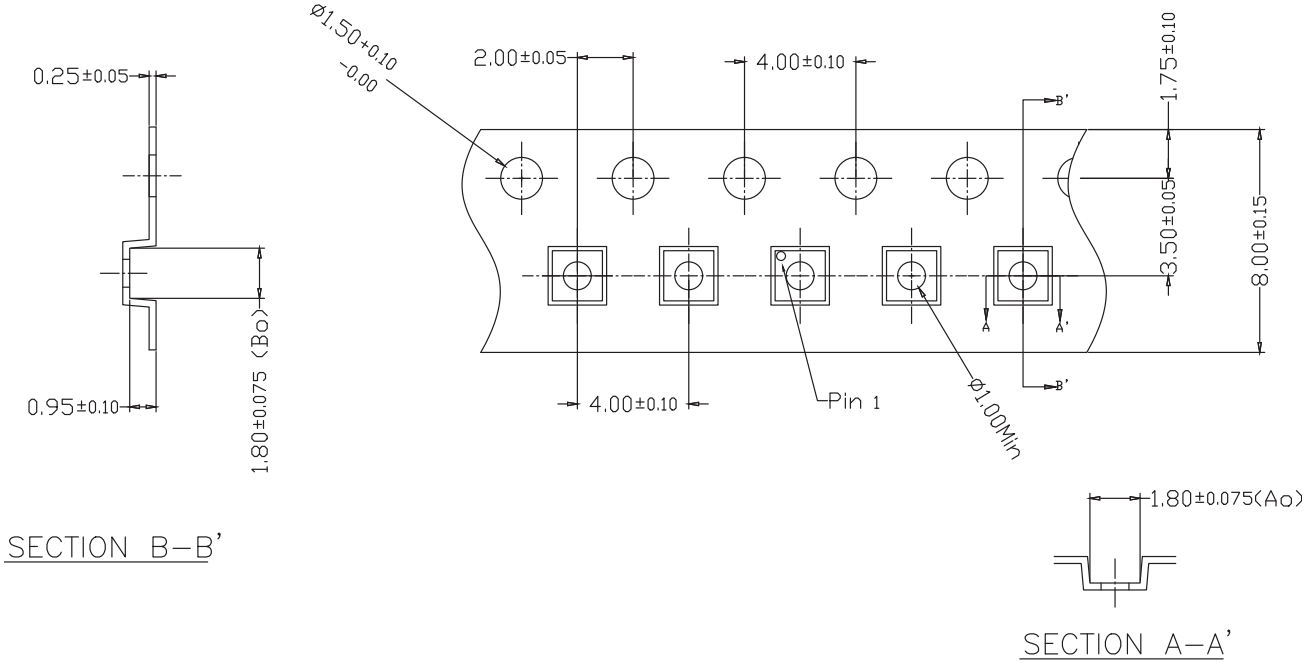


Figure 7. SKY65725-81 Package Dimensions



10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE : ±0.20mm
Ao & Bo MEASURED ON PLANE 0.30mm ABOVE THE BOTTOM OF THE POCKET.
ALL DIMENSIONS ARE IN MILLIMETERS.

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Figure 8. SKY65725-81 Tape and Reel Dimensions

Ordering Information

Part Number	Part Description	Evaluation Board Part Number
SKY65725-81	Shielded Low-Noise Amplifier Front-End Module with Pre-Filter for GPS/GNSS/BDS Applications	SKY65725-81EK1