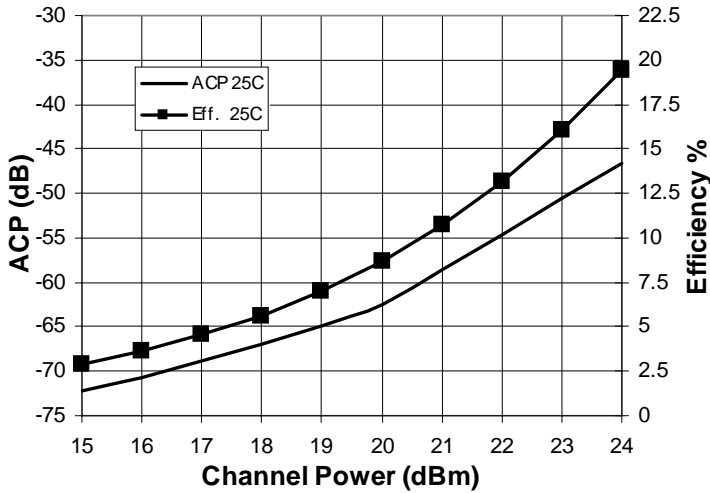




Product Description

The SPB-3018 is high-efficiency InGaP/GaAs Heterojunction Bipolar Transistor (HBT) amplifier RFIC. This amplifier incorporates an on-chip Class AB bias circuit which provides excellent efficiency while maintaining good linearity. The on-chip bias also allows the device output power (and current) to drive up towards saturation as the input power increases. The SPB-3018 is an ideal choice for multi-carrier as well as digital wireless telecom or general wireless applications in the 400-2500 MHz range.

Typical ACP (IS-95) & Efficiency @ 1960MHz



Preliminary

SPB-3018

SPB-3018Z



**400 - 2500 MHz 1W Medium Power
Active Bias InGaP/GaAs HBT Amplifier**



Product Features

- Available in Lead Free, RoHS compliant, & Green packaging
- Efficient Class AB operation
- P1dB = 30 dBm @ 1960MHz
- High Linearity/ACP performance
- MSL 1 moisture rating
- Power shutdown using V_{PC} (less than 5uA I_{DQ})

Applications

- W-CDMA, PCS, Cellular Systems
- Multi-Carrier Applications

Symbol	Parameters	Units	Frequency	Min.	Typ.	Max.
P_{1dB}	Output Power at 1 dB Compression *	dBm	880 MHz 1960 MHz 2140 MHz		30 30 30	
S_{21}	Small Signal Gain	dBm	880 MHz 1960 MHz 2140 MHz	12	18 13.5 13	15
S_{11}	Input VSWR		880 MHz 1960 MHz 2140 MHz		1.3:1 1.2:1 1.3:1	
ACP	Channel Power IS-95 at 880/1960MHz, -55dBc ACP WCDMA at 2140MHz, -50dBc ACP	dBm	880 MHz 1960 MHz 2140 MHz		21.5 22 21	
NF	Noise Figure	dB	880 MHz 1960 MHz 2140 MHz		5 4 4	
V_D	Device Operating Voltage	V		4.75	5	5.25
I_{DQ}	Device Quiescent Current	mA		180	220	260
$R_{TH, j-l}$	Thermal Resistance (junction - lead)	$^{\circ}C/W$			30	

Test Conditions: $T_a = 25^{\circ}C$ $Z_0 = 50$ Ohms

*Device operating current at P1dB ramps up to approximately 420mA @880MHz, 410mA @1960MHz and 370mA @2140MHz

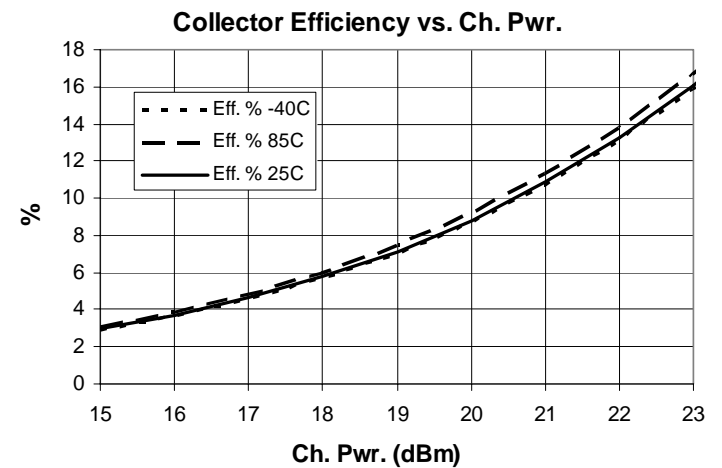
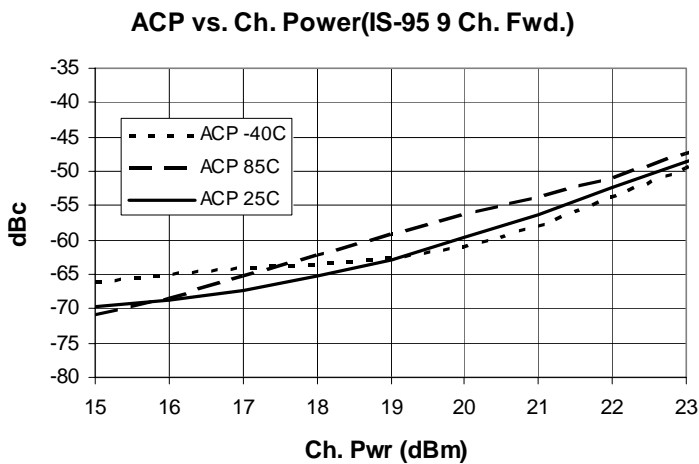
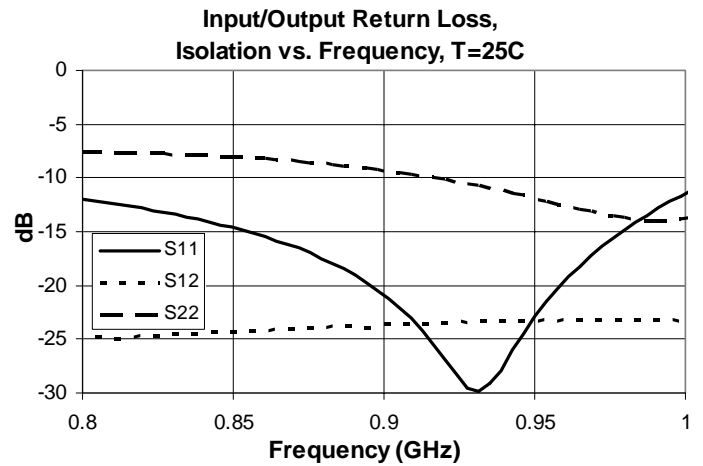
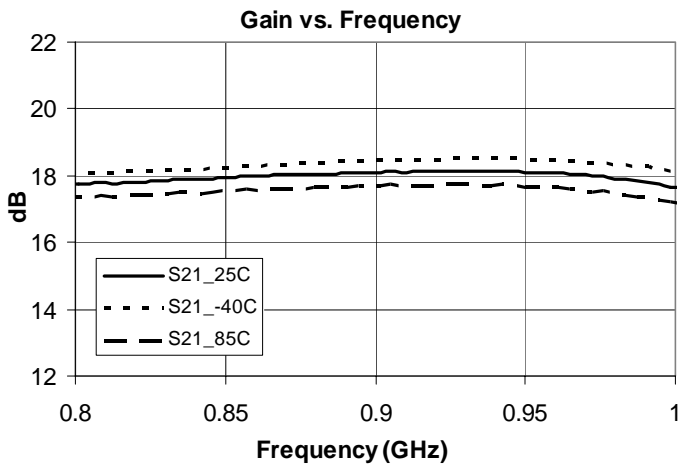
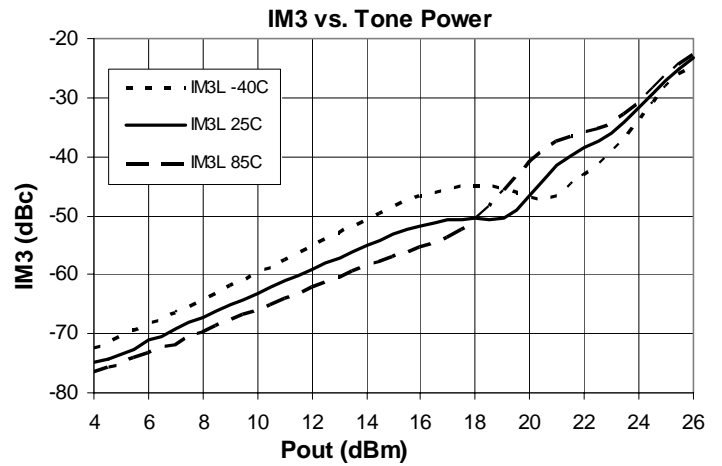
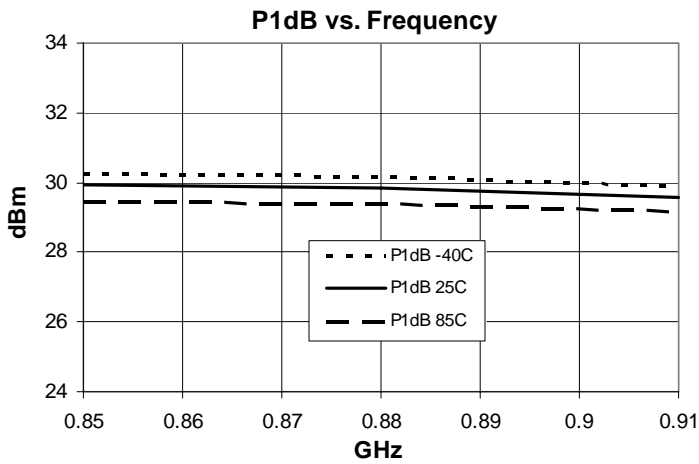
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880 MHz Application Circuit Data, $V_{cc}=5V$, $I_D=210mA$

Preliminary

SPB-3018 400-2500 MHz Cascadable MMIC Amplifier

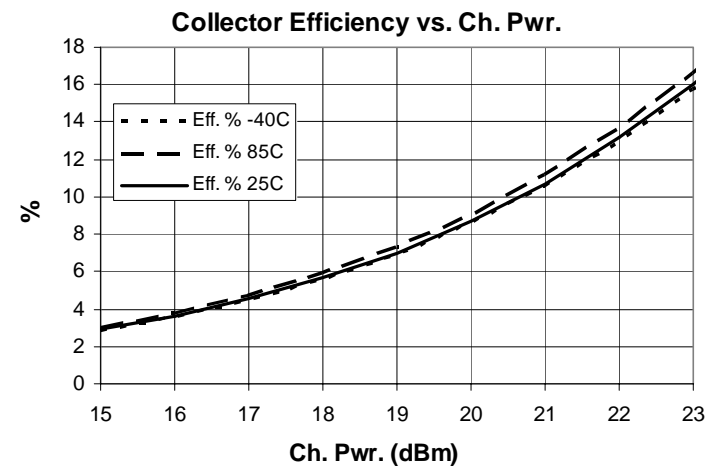
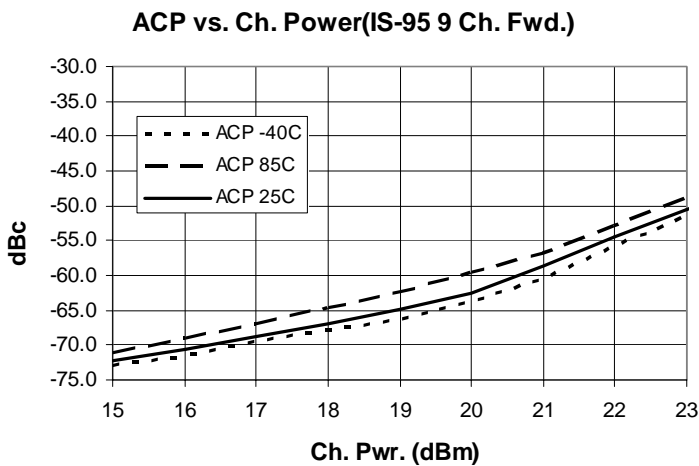
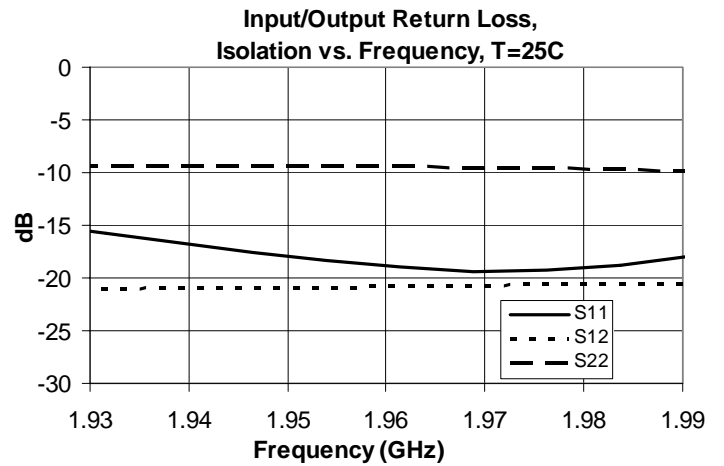
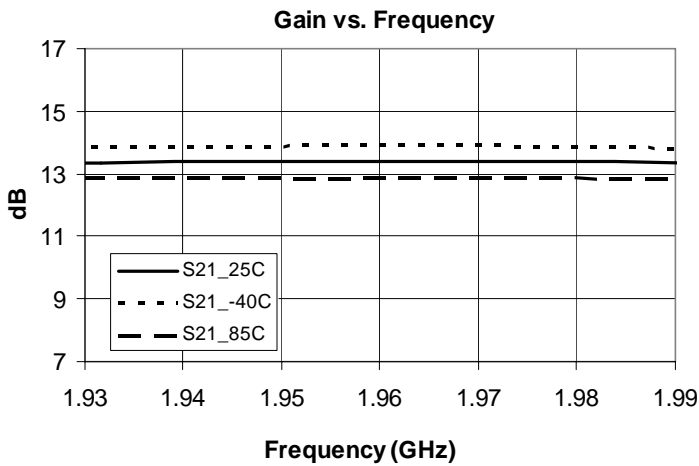
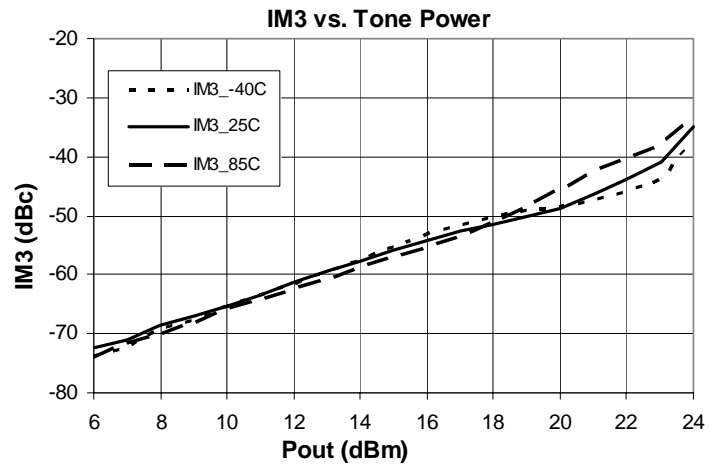
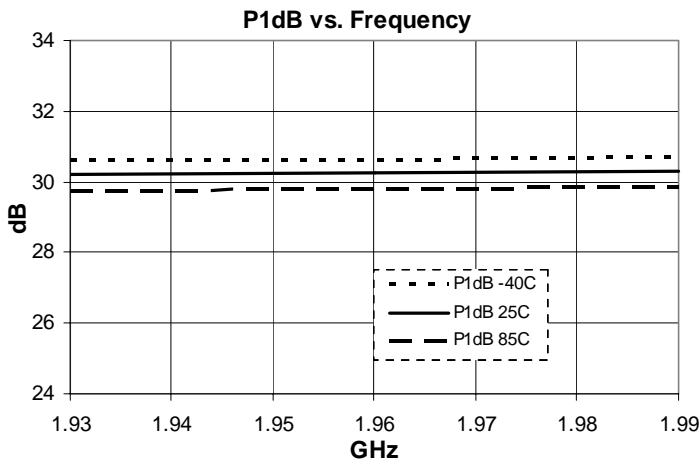




1960 MHz Application Circuit Data, $V_{cc}=5V$, $I_D=210mA$

Preliminary

SPB-3018 400-2500 MHz Cascadable MMIC Amplifier

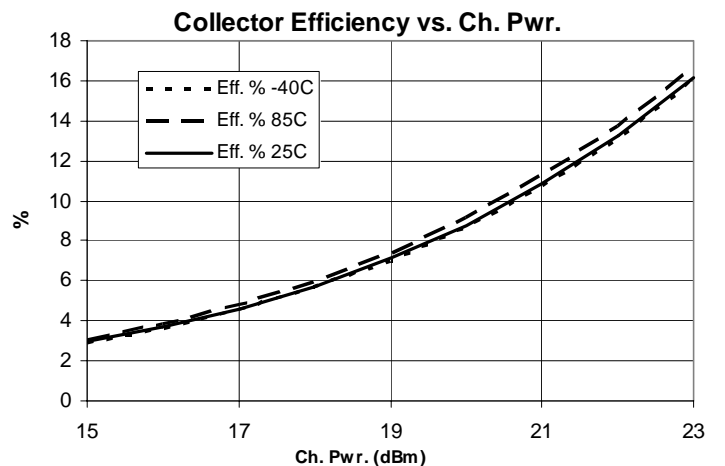
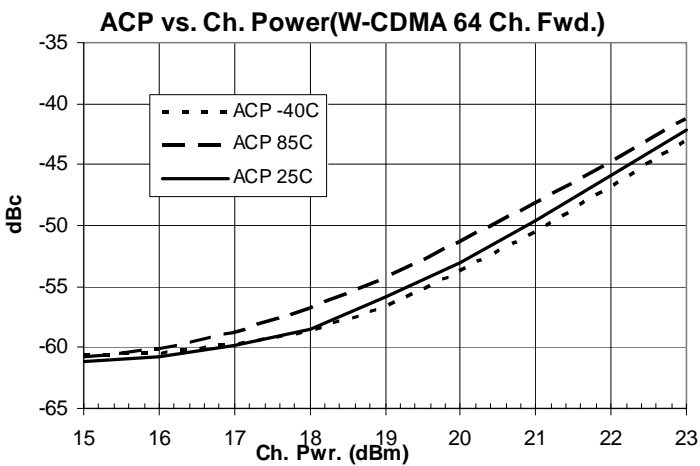
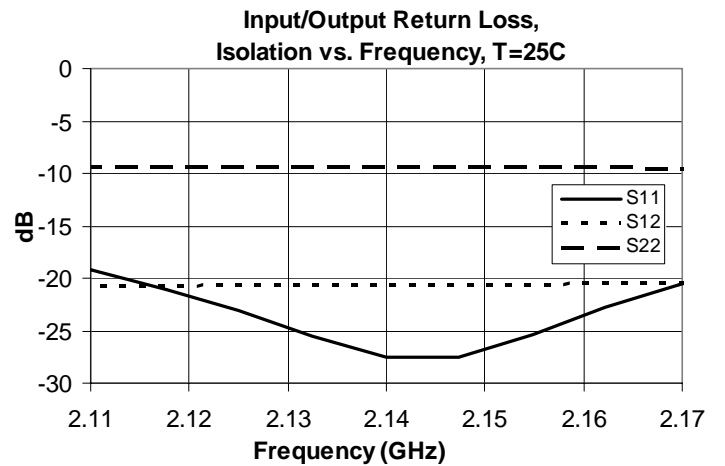
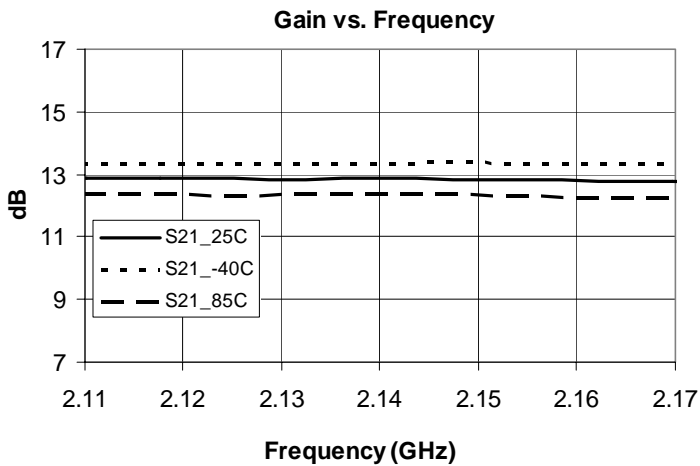
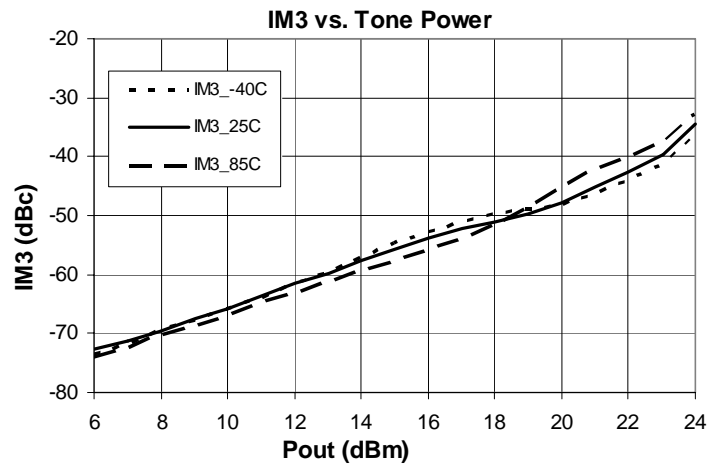
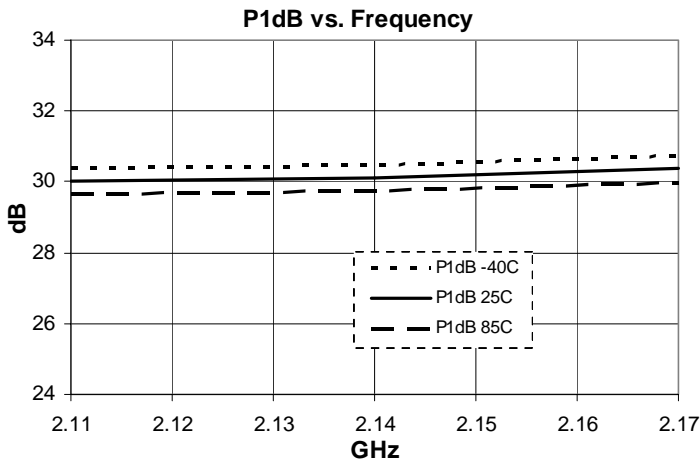




2140 MHz Application Circuit Data, $V_{cc}=5V$, $I_D=210mA$

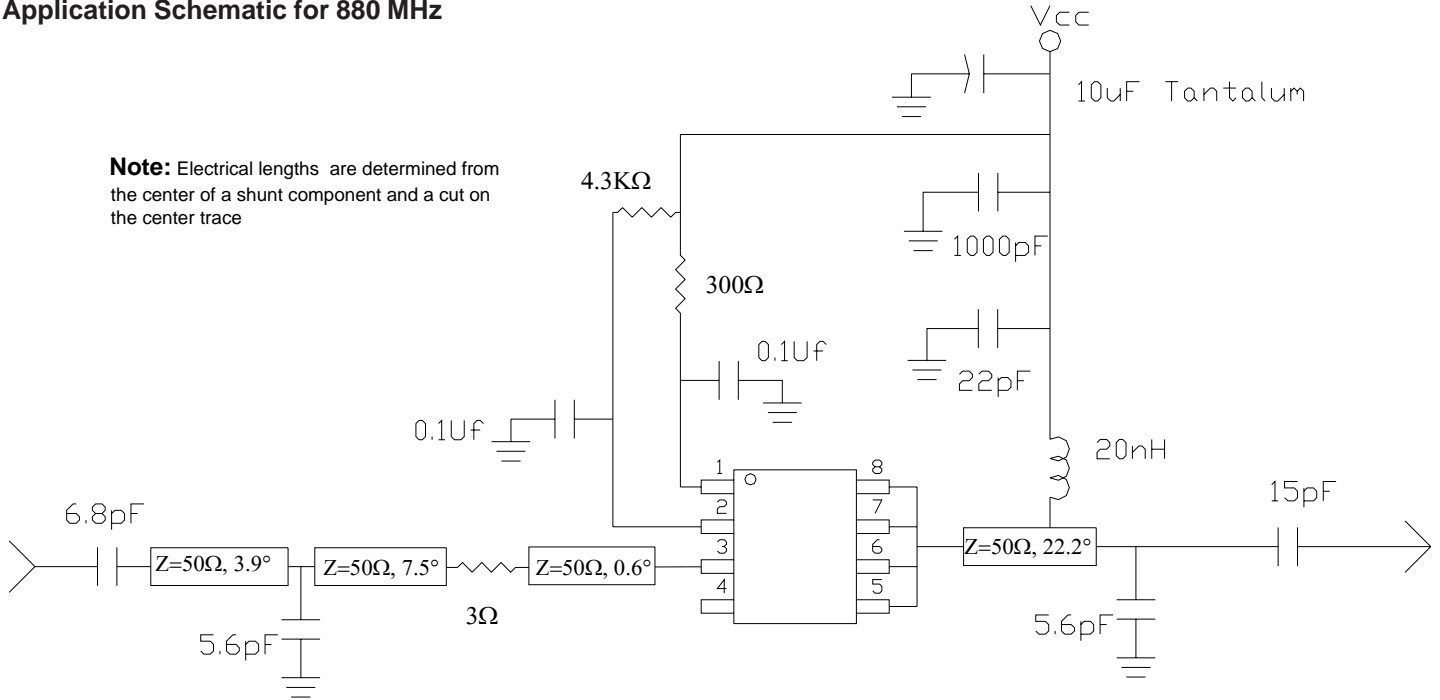
Preliminary

SPB-3018 400-2500 MHz Cascadable MMIC Amplifier

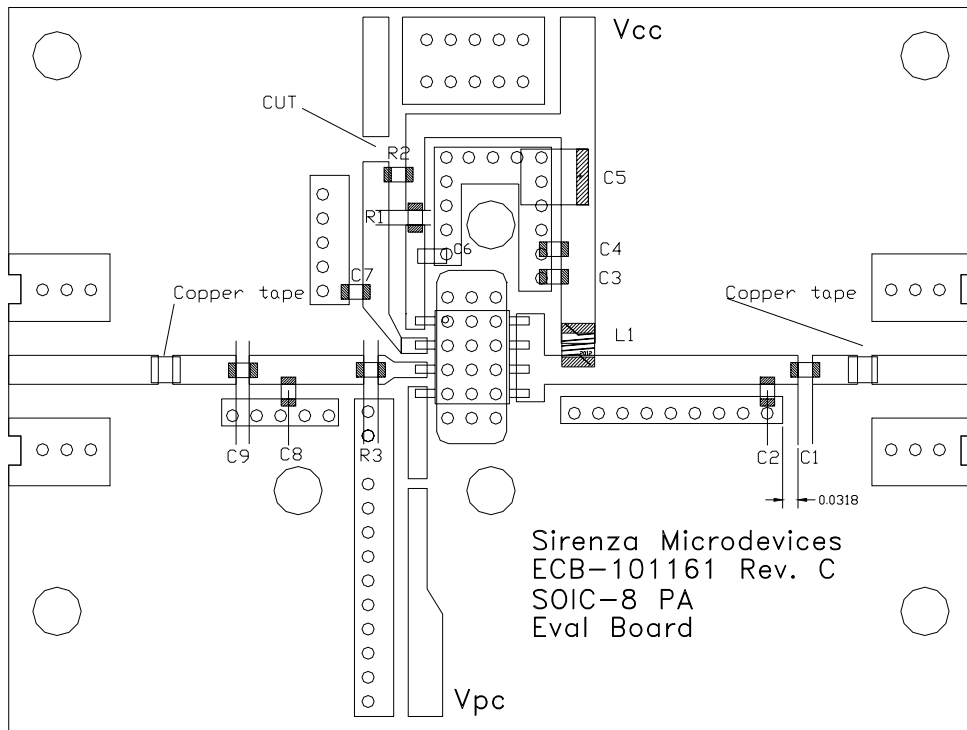


Application Schematic for 880 MHz

Note: Electrical lengths are determined from the center of a shunt component and a cut on the center trace



Evaluation Board Layout for 880 MHz

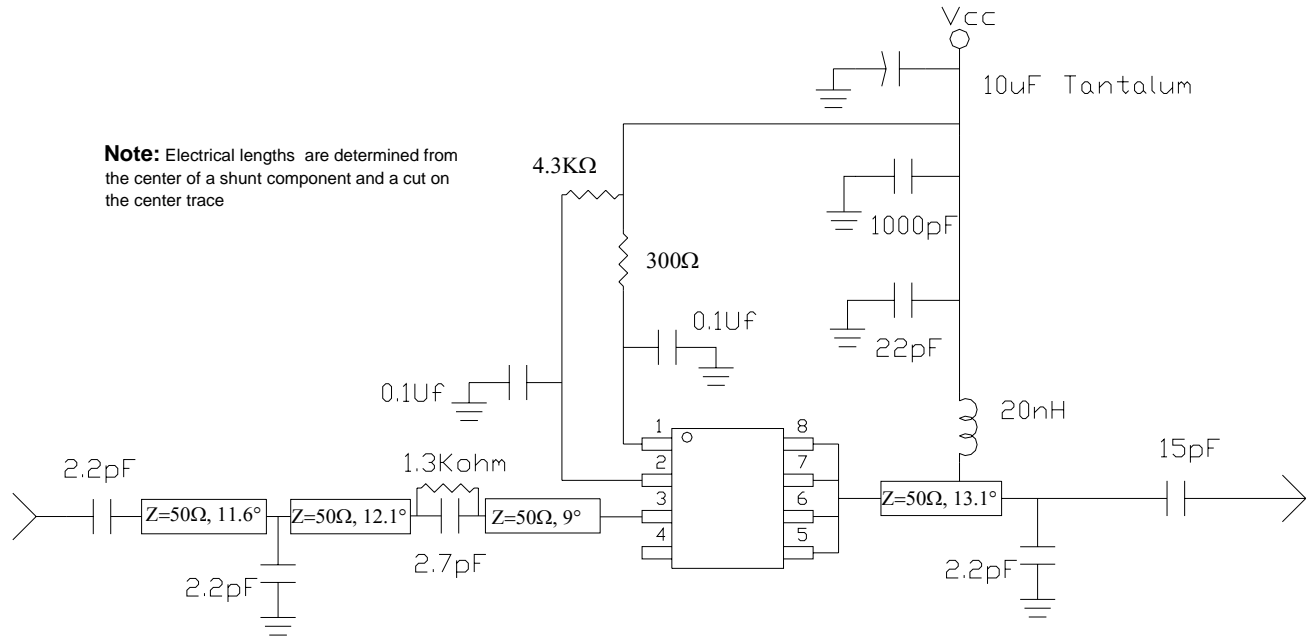


Bill of Materials:

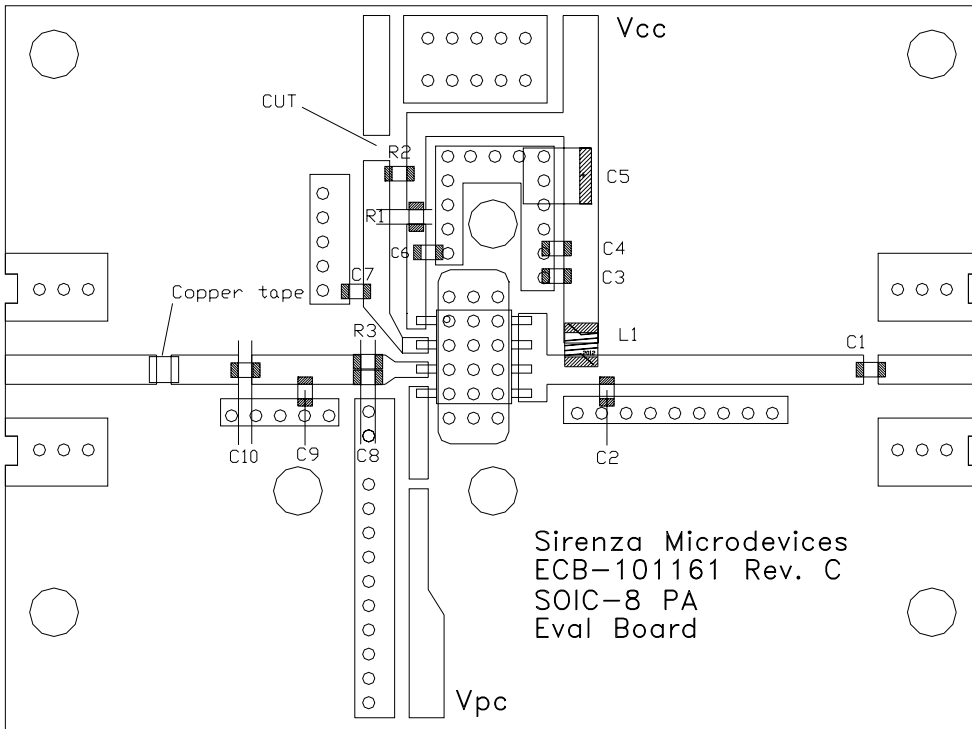
- C1 15pF 0603 Capacitor
- C2 5.6pF 0603 Capacitor
- C3 47pF 0603 Capacitor
- C4 1000pF 0603 capacitor
- C5 10uF Tantalum capacitor
- C6,C7 0.1uF 0603 capacitor
- C8 5.6pF 0603 capacitor
- C9 6.8pF 0603 capacitor
- R1 300Ω 0603 res (5%)
- R2 4.3KΩ 0603 res (5%)
- R3 3Ω 0603 res (5%)
- L1 20nH Coilcraft 0805HQ-20NX Inductor
- Connectors 2x 142-0751-821 Johnson Comp.
- Heat sink EEF-101407
- PCB ECB-101161 Rev. C

Application Schematic for 1960 MHz

1960 MHz Demo Board



Evaluation Board Layout for 1960 MHz

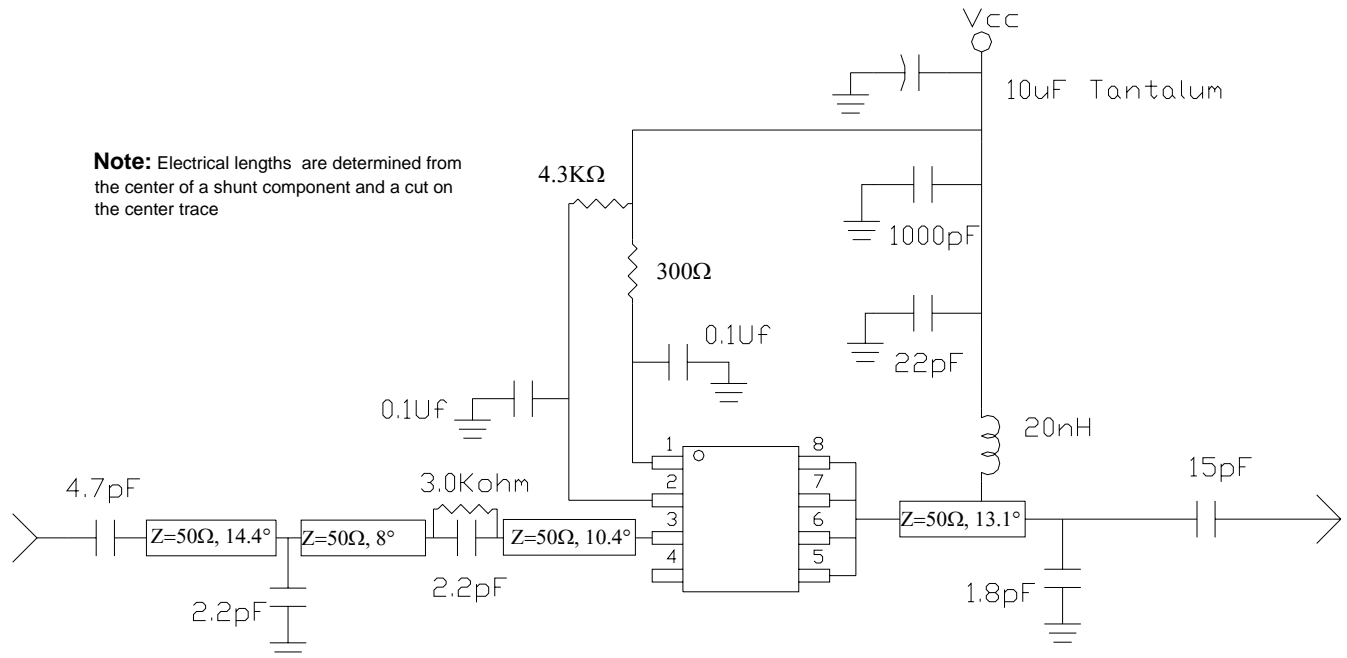


Bill of Materials:

- C1 15pF 0603 Capacitor
- C2 2.2pF 0603 Capacitor
- C3 22pF 0603 Capacitor
- C4 1000pF 0603 capacitor
- C5 10uF Tantalum capacitor
- C6,C7 0.1uF 0603 capacitor
- C8 2.7pF 0603 capacitor
- C9,10 2.2pF 0603 capacitor
- R1 300Ω 0603 res (5%)
- R2 4.3KΩ 0603 res (5%)
- R3 1.3kΩ 0603 res (5%)
- L1 20nH Coilcraft 0805HQ-20NX Inductor
- Connectors 2x 142-0751-821 Johnson Comp.
- Heat sink EEF-101407
- PCB ECB-101161 Rev. C

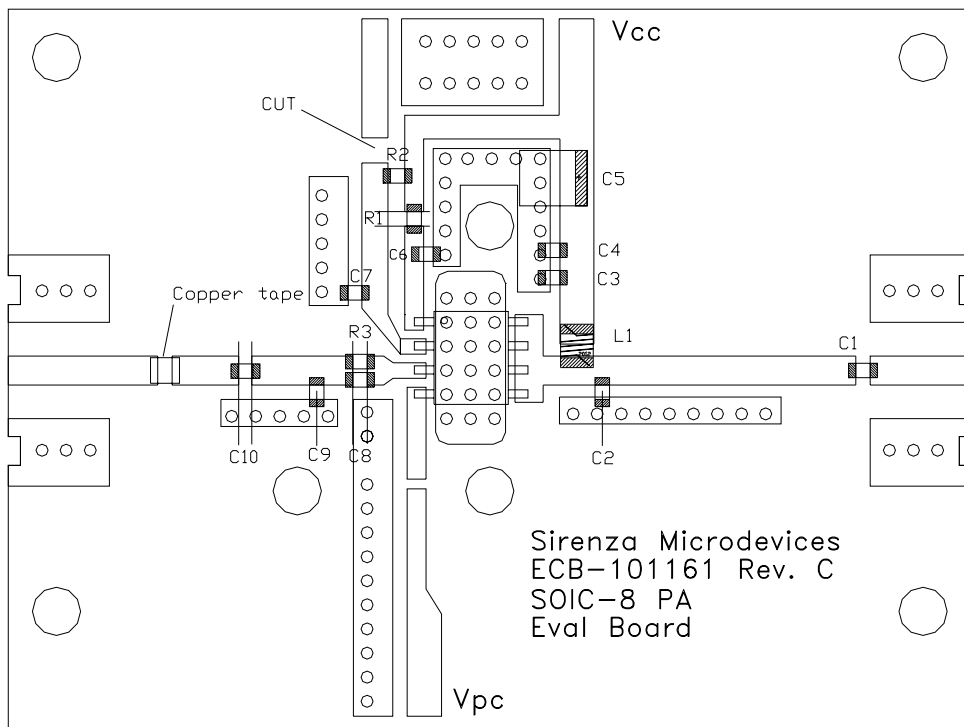
Application Schematic for 2140 MHz

2140 MHz Demo Board



Note: Electrical lengths are determined from the center of a shunt component and a cut on the center trace

Evaluation Board Layout for 2140 MHz

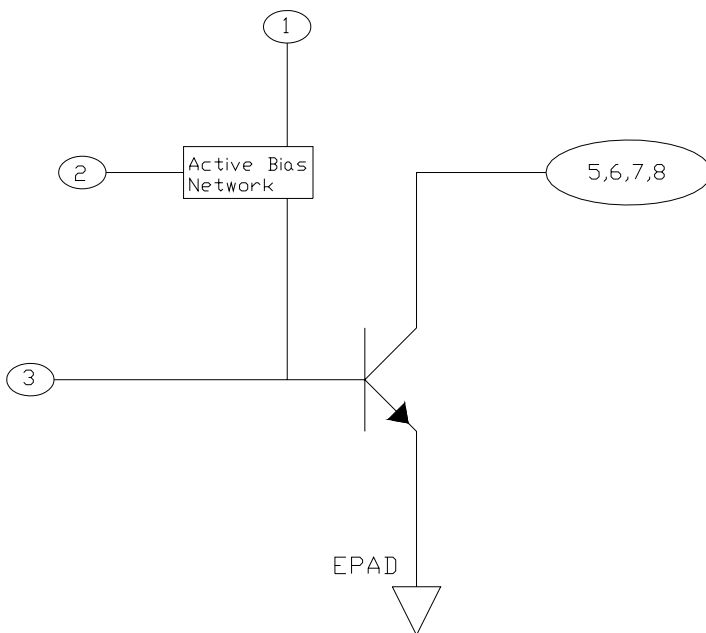


Bill of Materials:

- C1 15pF 0603 Capacitor
- C2 1.8pF 0603 Capacitor
- C3 22pF 0603 Capacitor
- C4 1000pF 0603 capacitor
- C5 10uF Tantalum capacitor
- C6,C7 0.1uF 0603 capacitor
- C8,C9 2.2pF 0603 capacitor
- C10 4.7pF 0603 capacitor
- R1 300Ω 0603 res (5%)
- R2 4.3KΩ 0603 res (5%)
- R3 3KΩ 0603 res (5%)
- L1 20nH Coilcraft 0805HQ-20NX Inductor
- Connectors 2x 142-0751-821 Johnson Comp.
- Heat sink EEF-101407
- PCB ECB-101161 Rev. C

Pin #	Function	Description
1	Vbias	Vbias is the bias control pin for the active bias network. Recommended configuration is shown in the Application Schematic.
2	V _{PC}	V _{PC} is the bias control pin for the active bias network.
3	RF IN	RF input pin. This pin requires the use of an external DC blocking capacitor as shown in the Application Schematic.
4	N/C	
5,6,7,8	RF OUT/ BIAS	RF output and bias pins. Bias should be supplied to this pin through an external RF choke. Because DC biasing is present on this pin, a DC blocking capacitor should be used in most applications (see application schematic). The supply side of the bias network should be well bypassed. An output matching network is necessary for optimum performance.
EPAD	GND	Exposed area on the bottom side of the package needs to be soldered to the ground plane of the board for thermal and RF performance. Several vias should be located under the EPAD as shown in the recommended land pattern (page 9).

Simplified Device Schematic



Absolute Maximum Ratings

Parameter	Absolute Limit
Max Device Current (I _{DQ})	400 mA
Max Device Voltage (V _D)	6 V
Max. RF Input Power	+26 dBm
Max. Operating Dissipated Power (quiescent)	2.0 W
Max. Junction Temp. (T _J)	+150°C
Operating Temp. Range (T _L)	-40°C to +85°C
Max. Storage Temp.	+150°C

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Bias Conditions should also satisfy the following expression:

$$I_D V_D < (T_J - T_L) / R_{TH}, \quad |I| \quad T_L = T_{LEAD}$$



ESD Class 1B, 500V HBM

Appropriate precautions in handling, packaging and testing devices must be observed.

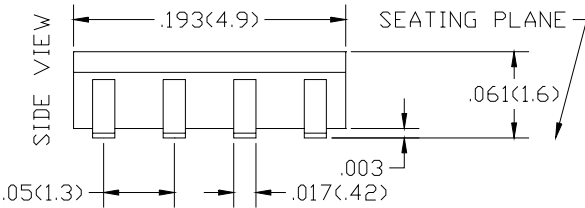
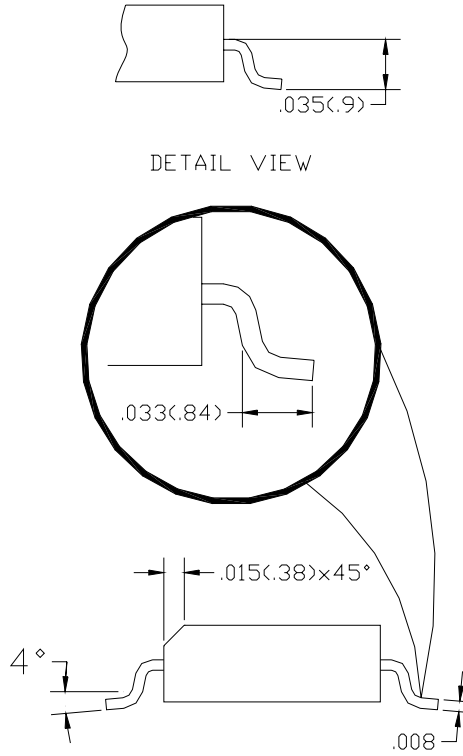
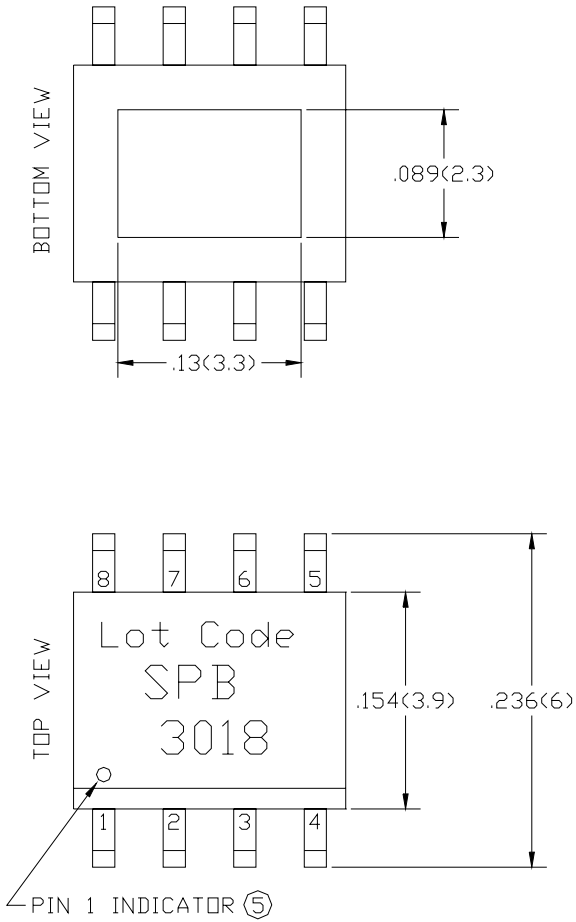
MSL (Moisture Sensitivity Level) Rating: Level 1

Part Ordering Information

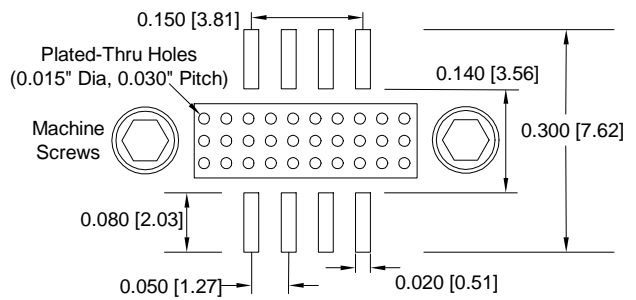
Part Number	Reel Size	Devices / Reel
SPB-3018	7"	500
SPB-3018Z	7"	500

Package Outline Drawing

(See SMDI MPO-101644 for tolerances, available on our website)



Recommended Land Pattern



Note: DIMENSIONS ARE IN INCHES [MM]