

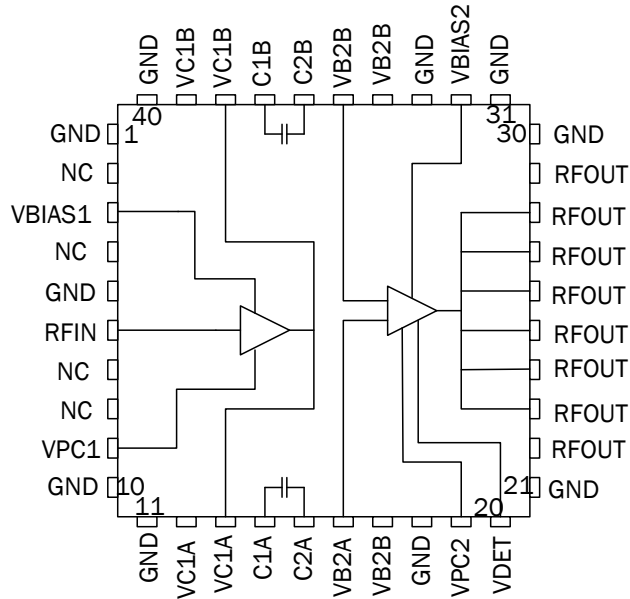


### Features

- Single Supply Voltage 5.0V
- 18dB Typical Gain Across Band
- $P_{OUT} = 25\text{dBm} < 2.5\% \text{ EVM}$
- 4.9GHz to 5.9GHz Frequency Range

### Applications

- IEEE802.11a/n and IEEE802.16e Applications
- HyperLAN
- WiFi Systems
- Commercial and Consumer Systems
- Portable Battery-Powered Equipment
- Spread-Spectrum and MMDS Systems



Functional Block Diagram

### Product Description

RFMD's SZM-5066Z is a high-linearity class AB Heterojunction Bipolar Transistor (HBT) amplifier housed in a low-cost, surface-mountable, plastic QFN multi-chip module package. The SZM-5066Z is made with InGaP-on-GaAs device technology and fabricated with MOCVD for an ideal combination of low cost and high reliability.

This product is specifically designed for 802.11a/n and 802.16e applications in the 4.9GHz to 5.85GHz bands and can operate from a single voltage supply. The external output match and bias adjustability allows load line optimization for other applications covering 4.9GHz to 5.85GHz. It features an output power detector and high RF overdrive robustness. The RoHS compliant, Green package has a matte tin finish, designated by the 'Z' suffix.

### Optimum Technology Matching® Applied

- |   |                                      |                                     |                                    |
|---|--------------------------------------|-------------------------------------|------------------------------------|
| <input type="checkbox"/> GaAs HBT             | <input type="checkbox"/> SiGe BiCMOS | <input type="checkbox"/> GaAs pHEMT | <input type="checkbox"/> GaN HEMT  |
| <input type="checkbox"/> GaAs MESFET          | <input type="checkbox"/> Si BiCMOS   | <input type="checkbox"/> Si CMOS    | <input type="checkbox"/> BiFET HBT |
| <input checked="" type="checkbox"/> InGaP HBT | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT     | <input type="checkbox"/> LD MOS    |

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## Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	-0.5 to 6.0	V <sub>DC</sub>
Power Control Voltage (V <sub>PC</sub> )	-0.5 to 6.0	V
DC Supply Current	1000	mA
Input RF Power	+10	dBm
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C
Moisture sensitivity	TBD	



**Caution!** ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

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RoHS (Restriction of Hazardous Substances): Compliant per EU Directive 2002/95/EC.

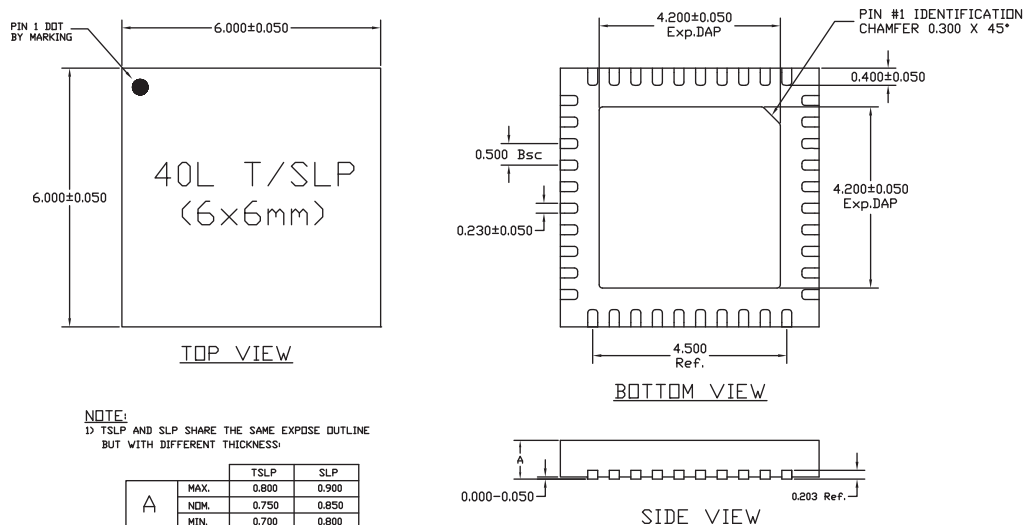
Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Typical Conditions</b>					Temp = 25 °C, V <sub>CC</sub> = V <sub>PC1</sub> = V <sub>PC2</sub> = 5.0V, using a standard IEEE802.11a waveform at 54Mbps, 64 QAM, unless otherwise noted
<b>Compliance</b>					IEEE802.11a/n
Frequency	5.1		5.9	GHz	
Output Power	24	25		dBm	
EVM		2.5	3.0	%	Measured at P <sub>OUT</sub> = 25dBm, Increase in EVM over EVM floor. Frequency = 5.1GHz to 5.85GHz, -40 °C to +85 °C, Duty Cycle
Gain		18		dB	Frequency = 5.1GHz to 5.9GHz
Gain Flatness		1.5		dB	Over 5.1GHz to 5.9GHz
Gain Variance			1.25	±dB	-40 °C to +85 °C; F, β
Power Detect	+10		+29	dBm	Usable power detection range
Power Detect Voltage	0.1		1.7	V	
Current					
Operating		800	925	mA	at RF P <sub>OUT</sub> = +25dBm, V <sub>CC</sub> = +5V (54Mbps)
Quiescent		730	825	mA	RF = OFF, V <sub>CC</sub> = V <sub>PC</sub> = 5.0V
I <sub>VPC</sub>		5	10	mA	
Leakage		2	6	μA	
Power Supply		5.0		V	
V <sub>PC1</sub> and V <sub>PC2</sub> Input Voltage		5.0		V <sub>DC</sub>	
Turn-on Time		1.5	1.8	μS	Output stable to within 90% of final gain

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Compliance, cont.</b>					IEEE802.11a/n
2nd Harmonic					
Freq = 4.900GHz to 5.15GHz		-20		dBm/MHz	At rated output power using a standard IEEE802.11a waveform at 6Mbps
Freq = 5.15GHz to 5.85GHz		-20		dBm/MHz	At rated output power using a standard IEEE802.11a waveform at 6Mbps
3rd Harmonic		-29		dBm/MHz	At rated output power across full frequency range using a standard IEEE802.11a waveform at 6Mbps
Input and Output Return Loss		-15	-10	dB	
Stable into Output VSWR			4:1		No spurs above -47dBm; at P <sub>OUT</sub> = 0dBm to 30dBm
No Damage into Output VSWR			10:1		at rated P <sub>OUT</sub>
<b>SZM-5066ZWD410</b>					
Frequency	5.1		5.90	GHz	
Output Power	24	25		dBm	
EVM		2.5	3.0	%	Measured at P <sub>OUT</sub> = 25dBm, increase in EVM over EVM floor. Frequency = 5.1GHz to 5.85GHz, -40 °C to +85 °C, Duty Cycle
Stability	0		30	dBm	PA should be stable when P <sub>OUT</sub> is measured from 0dBm to 30dBm
Gain		33		dB	Frequency = 5.10GHz to 5.90GHz
Gain Flatness		1.5		dB	Over 5.10GHz to 5.90GHz
Gain Variance			1.25	dB	-40 °C to +85 °C; F, Beta
Power Detect	10		29	dBm	Usable power detection range
Power Detect Voltage	0.1		1.7	V	
Current					
Operating		900	1000	mA	At RF P <sub>OUT</sub> = +25dBm, V <sub>CC</sub> = +5V (54Mbps)
Quiescent		820	850	mA	RF = OFF, V <sub>CC</sub> = V <sub>PC</sub> = 5.0V
I <sub>VPC</sub>		5	10	mA	
Leakage		2	6	uA	
Power Supply		5		V	
VPC1 and VPC2 Input Voltage		5		V <sub>DC</sub>	
Turn-on Time		1.5	1.8	uS	Output stable to within 90% of final gain
2nd Harmonic					
Freq = 4.900GHz to 5.150GHz		-20		dBm/MHz	At rated output power using a standard IEEE802.11a waveform at 6Mbps
Freq = 5.15GHz to 5.85GHz		-20		dBm/MHz	At rated output power using a standard IEEE802.11a waveform at 6Mbps
3rd Harmonic		-29		dBm/MHz	At rated output power across full frequency range using a standard IEEE802.11a waveform at 6Mbps
Input and Output Return Loss		-15	-10	dB	
Stable into Output VSWR			4:1		No spurs above -47dBm; at P <sub>OUT</sub> = 0dBm to 30dBm
No Damage into Output VSWR			10:1		at rated P <sub>OUT</sub>

Pin	Function	Description
2,4,7,8	NC	No Connection; Can be connected to GND or Open or to other pin.
1,5,10,11,18,21,30,31,33,40	GND	These are no connect pins and are not wired inside the package. It is recommended to connect them as shown in the application circuit to achieve the stated performance.
3	VBIAS1	This is the supply voltage for the active bias circuit of the 1st stage.
6	RFIN	This is the RF input pin.
9	VPC1	Power up/down control pin for the 1st stage. An external series resistor is required for proper setting of bias levels depending on control voltage. The voltage on this pin should never exceed the voltage on pin 3 by more than 0.5V unless the supply current from pin 3 is limited <10mA.
12,13,38,39	VC1A, VC1B	These four pins are connected internally to the collector of the 1st stage RF device. To achieve specified performance, the layout of these pins should match the Recommended Land Pattern.
14,15,36,37	C1A, C2A, C1B, C2B	These pins have capacitors across them internally mounted to the package as shown in the block diagram. They are used as tuning and coupling elements between the 1st and 2nd stages.
16,17,34,35	VB2A,VB2B	These four pins are connected internally to the base of the 2nd stage RF device. To achieve specified performance, the layout of these pins should match the Recommended Land Pattern.
19	VPC2	Power up/down control pin for the 2nd stage. An external series resistor is required for proper setting of bias levels depending on control voltage. The voltage on this pin should never exceed the voltage on pin 32 by more than 0.5V unless the supply current from pin 32 is limited <10mA.
20	VDET	This is the output port for the power detector. It samples the power at the input of the second stage.
22,23,24,25,26,27,28,29	RFOUT	These are the RF output pins and DC connections to the 2nd stage collector.
32	VBIAS2	This is the supply voltage for the active bias circuit of the 2nd stage.

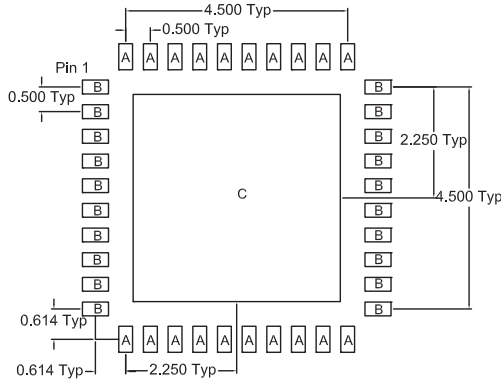
## Package Drawing

QFN, 40-Pin, 6.0mm x 6.0mm x 0.5mm



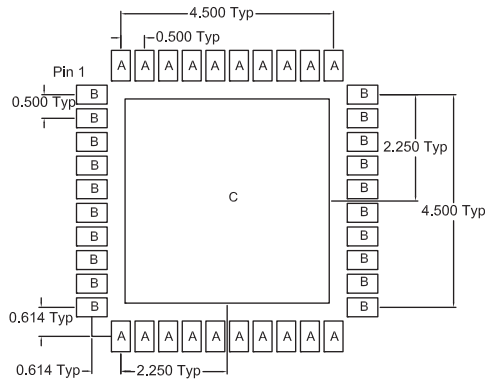
**PCB Metal Land Pattern**

A = 0.280 x 0.528 (mm) Typ  
 B = 0.528 x 0.280 (mm) Typ  
 C = 4.200 (mm) Sq



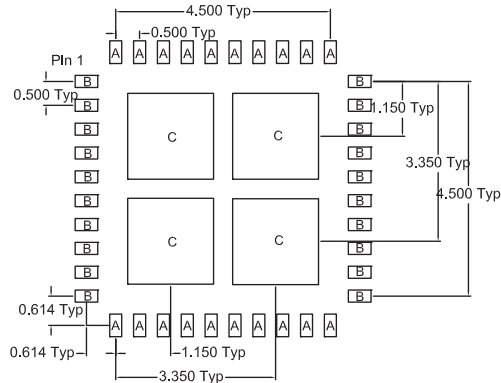
**PCB Solder Mask Pattern**

A = 0.400 x 0.648 (mm) Typ  
 B = 0.648 x 0.400 (mm) Typ  
 C = 4.320 (mm) Sq



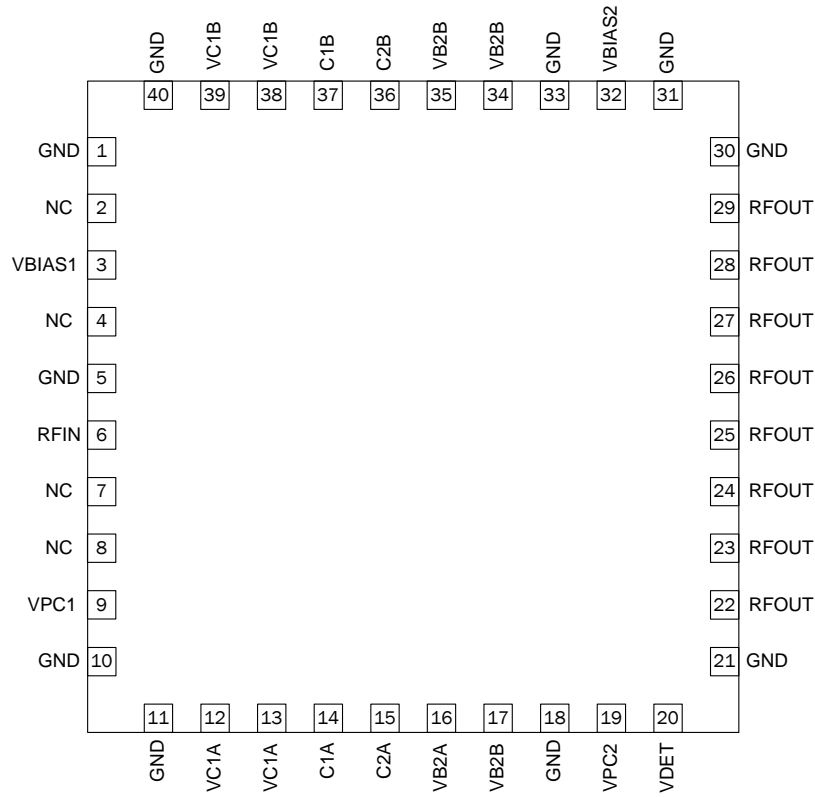
**PCB Stencil Pattern**

A = 0.252 x 0.475 (mm) Typ  
 B = 0.475 x 0.252 (mm) Typ  
 C = 1.800 (mm) Sq Typ

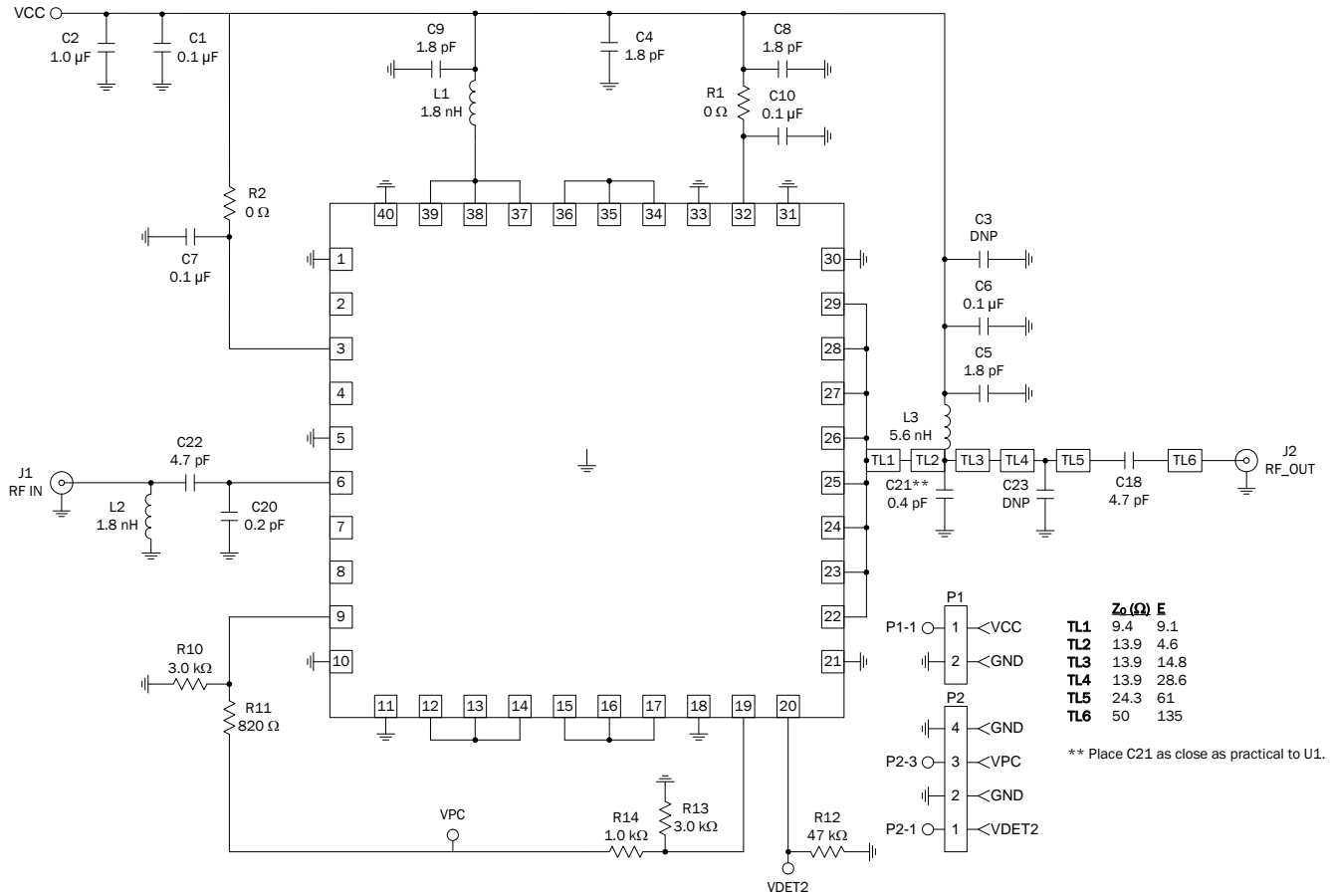


Note: Thermal vias for center slug “C” should be incorporated into the PCB design. The number and size of thermal vias will depend on the application. Example of the number and size of vias can be found on the RFMD evaluation board layout.

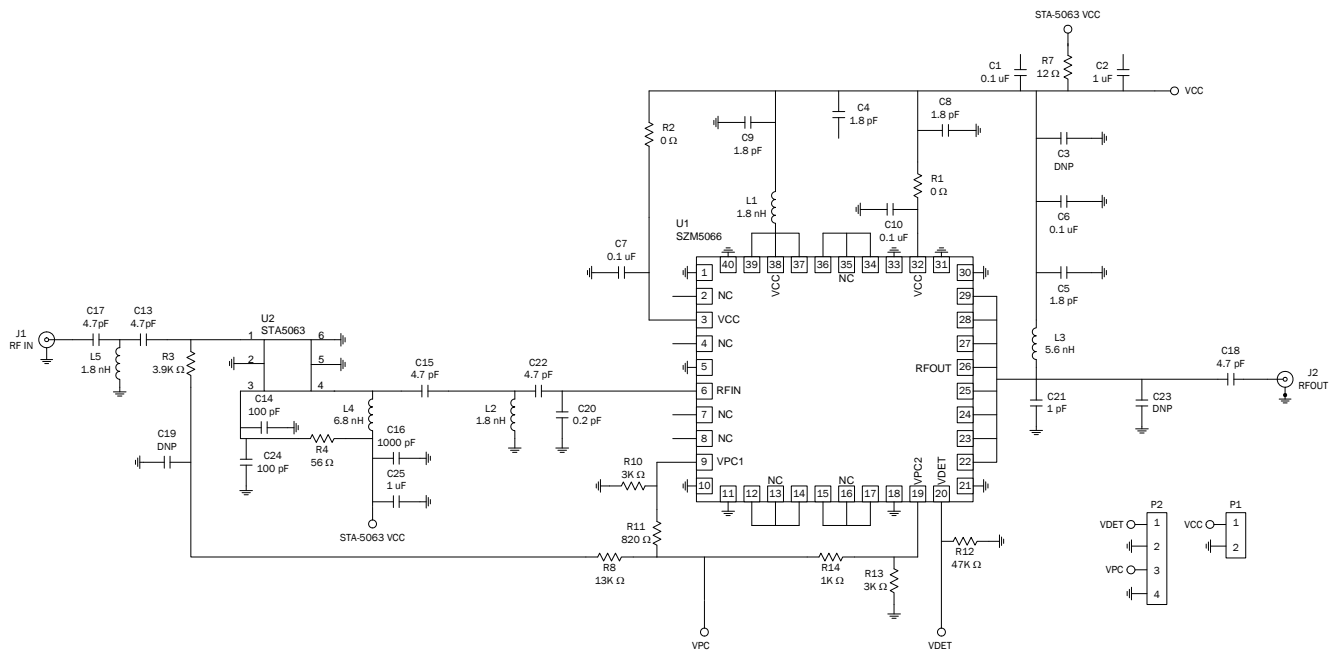
## Pin Out (Top View)



**Evaluation Board Schematic**



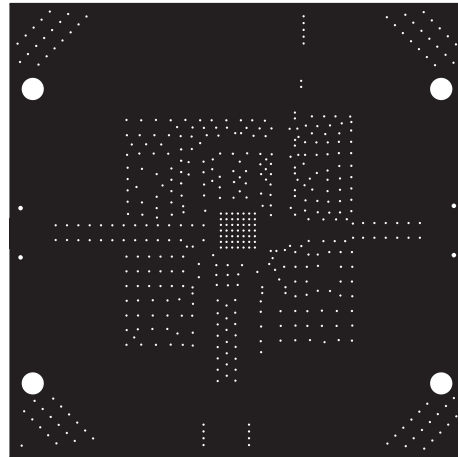
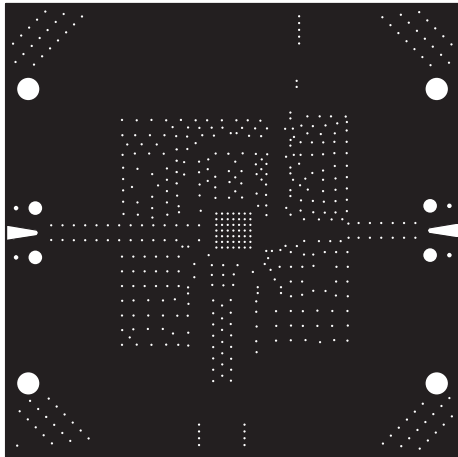
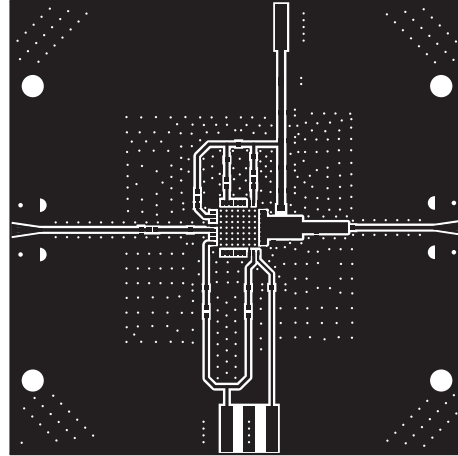
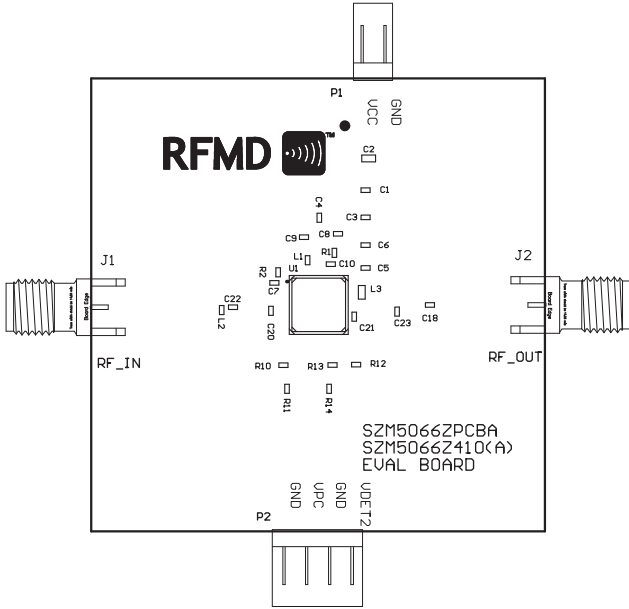
## Evaluation Board Schematic - SZM-5066ZWPCBA-410





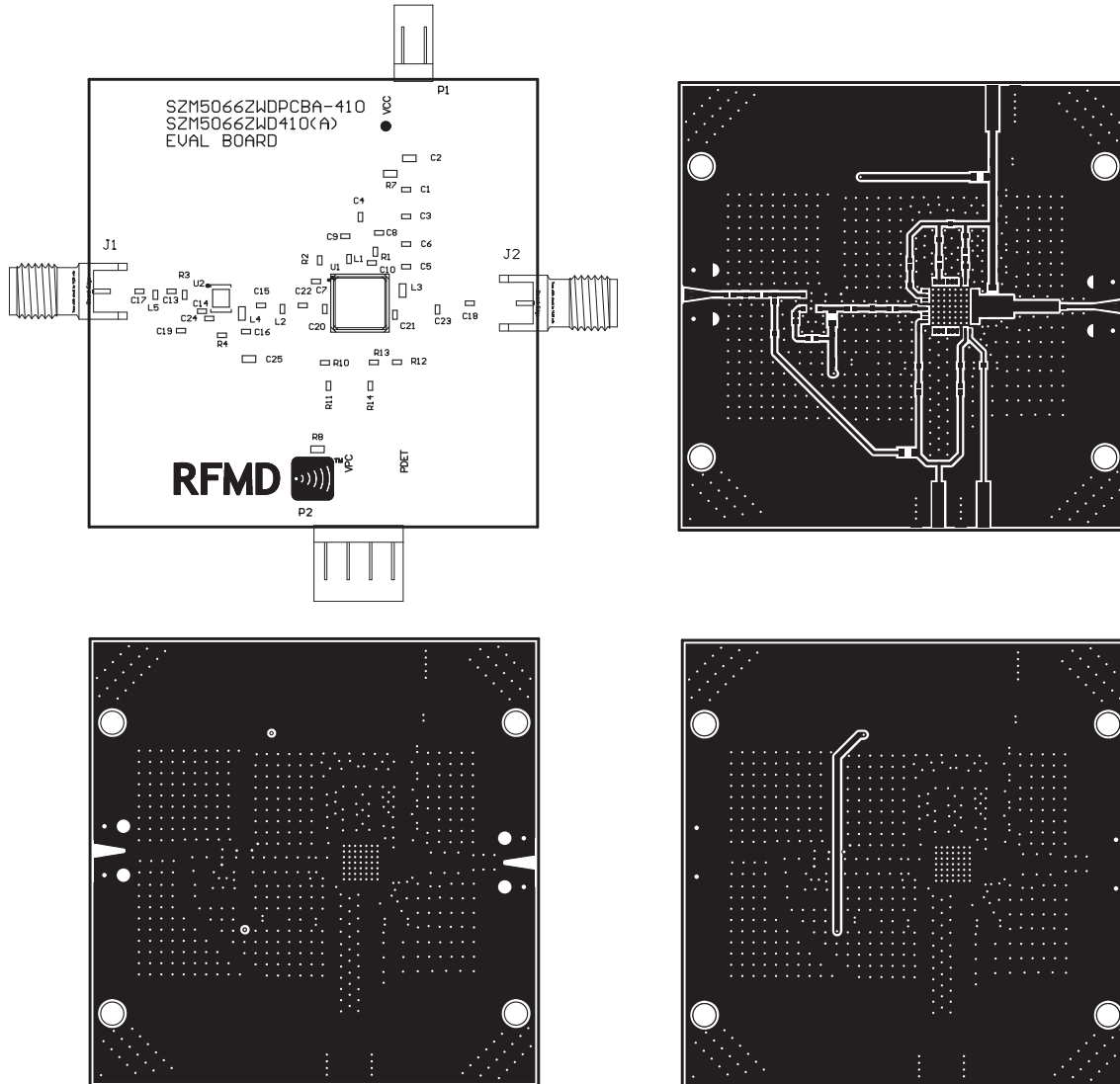
**Evaluation Board Layout  
Board Size 2" x 2"**

**Board Thickness 0.32", Board Material R04003, Multi-Layer**

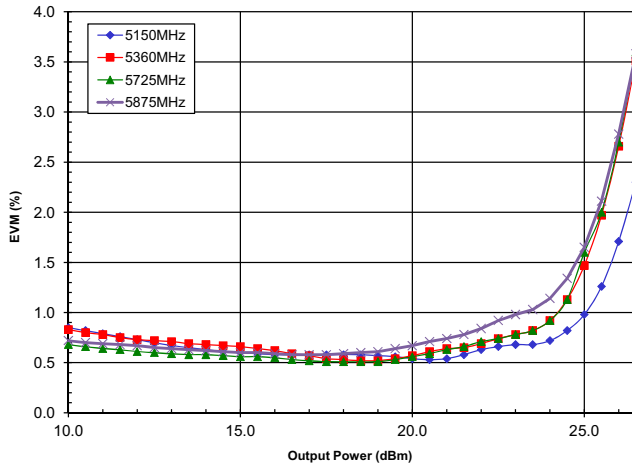


## Evaluation Board Layout - SZM-5066Z + STA-5063 Board Size 2" x 2"

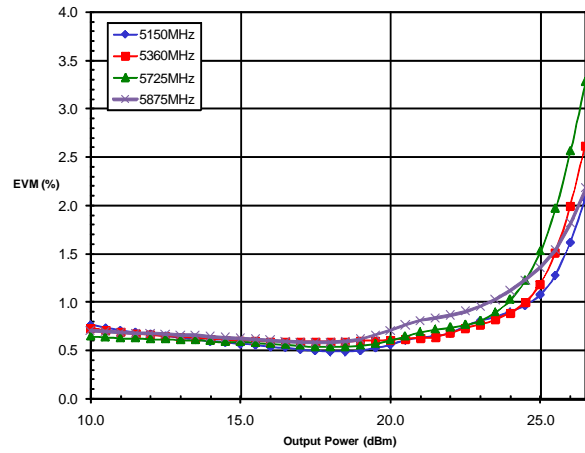
Board Thickness 0.32", Board Material R04003, Multi-Layer



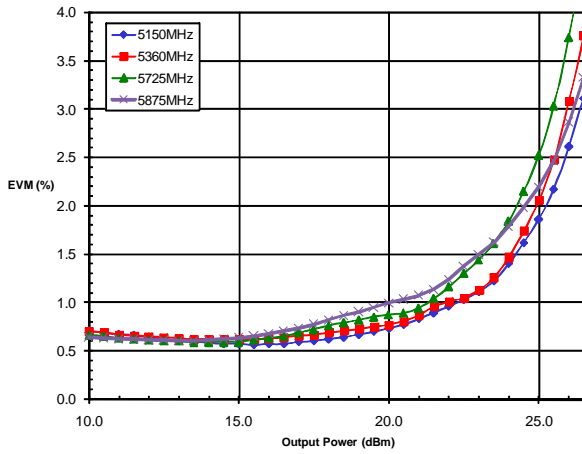
**EVM (%) versus P<sub>OUT</sub>(dBm)**  
-40° C



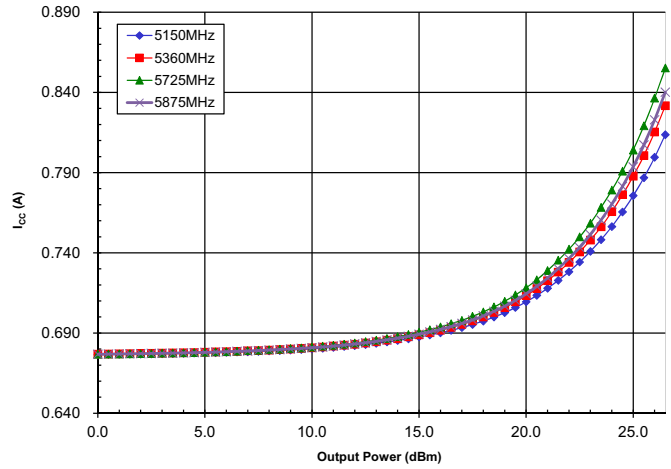
**EVM(%) vs. P<sub>out</sub>(dBm)**  
25° C



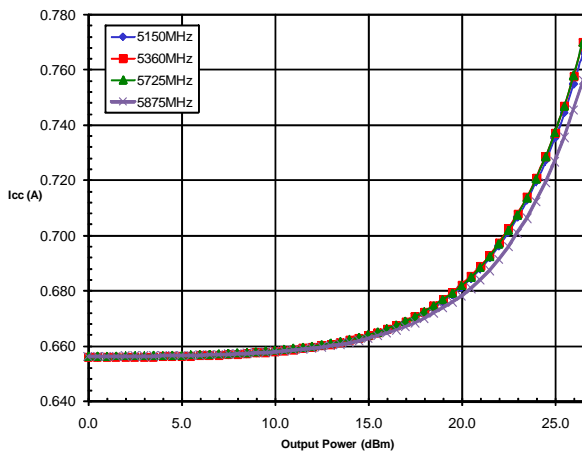
**EVM(%) vs. P<sub>out</sub>(dBm)**  
85° C



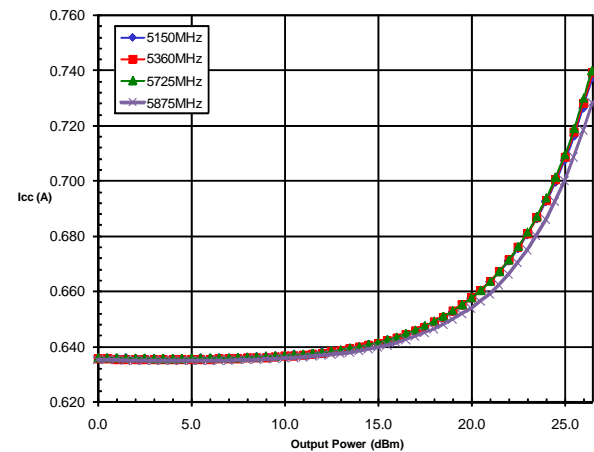
**I<sub>cc</sub> (A) versus P<sub>OUT</sub> (dBm)**  
-40° C



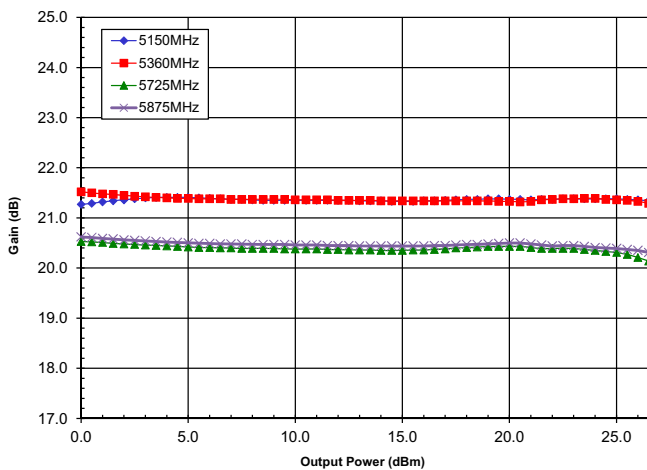
**I<sub>cc</sub>(A) vs. P<sub>out</sub>(dBm)**  
25° C



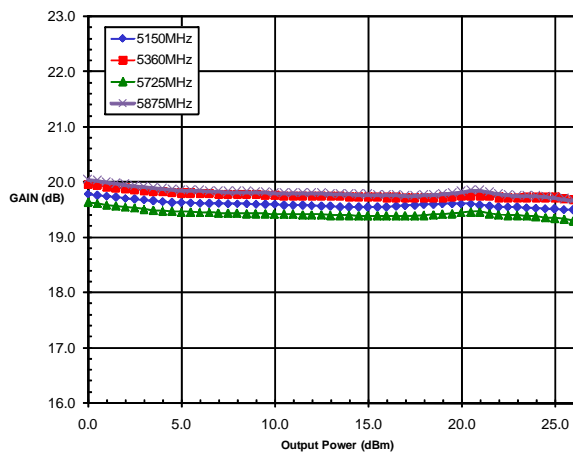
**I<sub>cc</sub>(A) vs. P<sub>out</sub>(dBm)**  
85° C



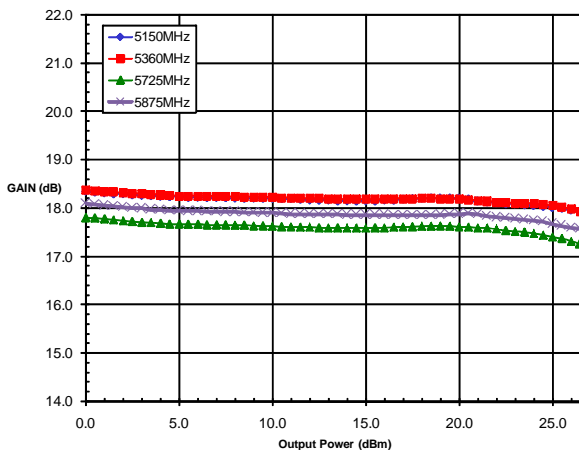
Gain (dB) versus  $P_{out}$  (dBm)  
-40° C



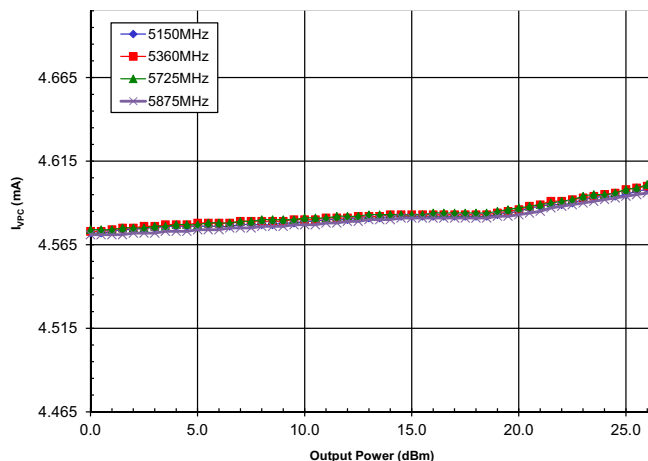
Gain(dB) vs. Pout(dBm)  
25° C



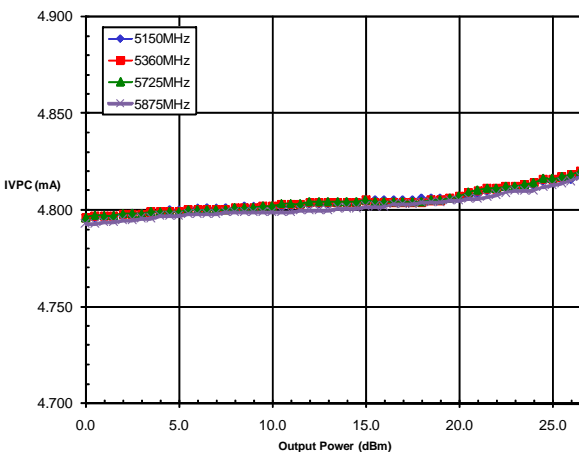
Gain(dB) vs. Pout(dBm)  
85° C



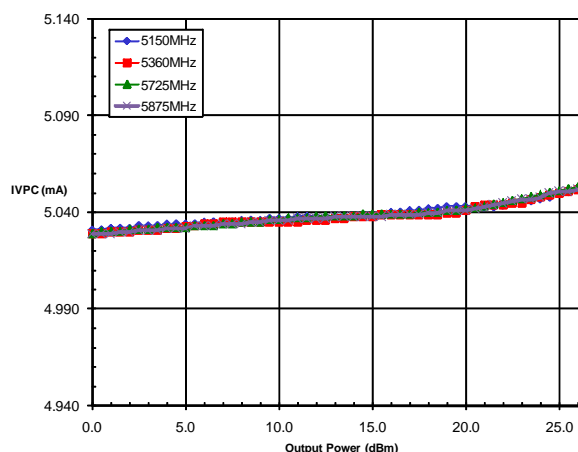
$I_{VPC}$  (mA) versus  $P_{out}$  (dBm)  
-40° C



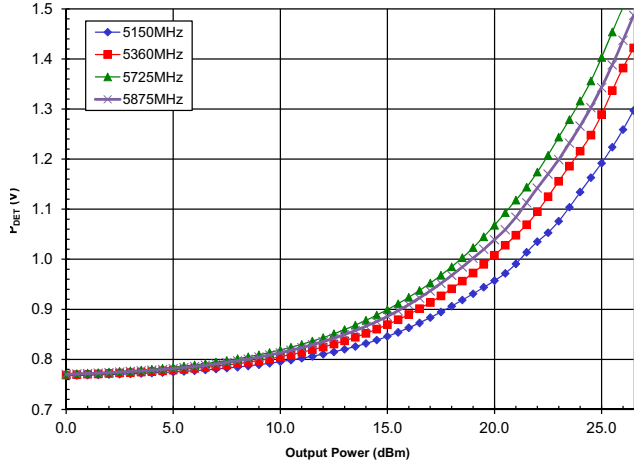
$I_{VPC}$ (mA) vs. Pout(dBm)  
25° C



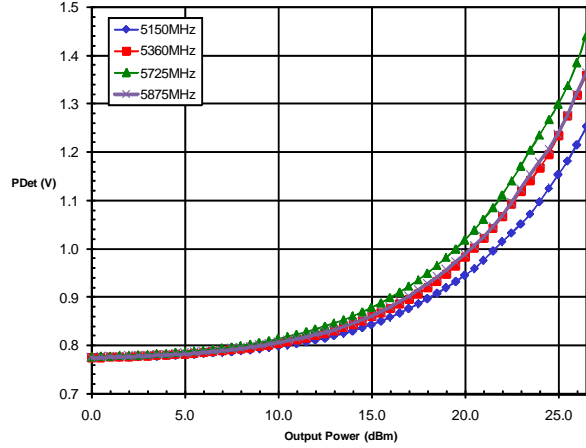
$I_{VPC}$ (mA) vs. Pout(dBm)  
85° C



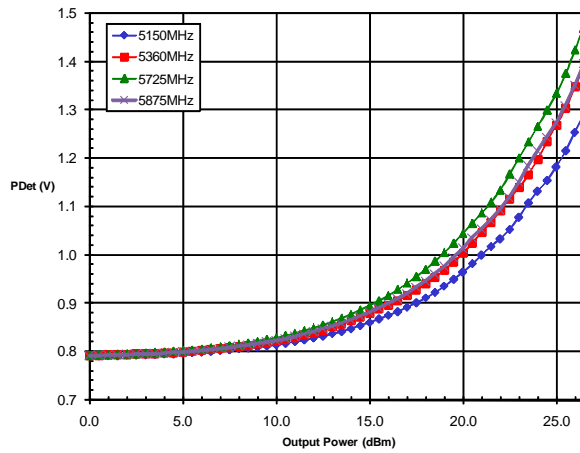
Power Detect (V) versus P<sub>OUT</sub> (dBm)  
-40° C



Power Detect (V) vs. P<sub>out</sub>(dBm)  
25° C



Power Detect (V) vs. P<sub>out</sub>(dBm)  
85° C



## Ordering Information

Ordering Code	Description
SZM5066Z	Standard 25 piece bag
SZM5066ZSR	Standard 100 piece reel
SZM5066ZTR13	Standard 2500 piece reel
SZM5066ZWDPC-410	Fully assembled SZM5066Z PCBA with STA5063 driver and 5 loose sample pieces
SZM5066ZPCK-410	Fully assembled SZM5066ZPCBA410 and 5 loose sample pieces