

AC5186

3300 MHz to 3600 MHz

Small-Cell High-Efficiency Power Amplifier Module

PRODUCT DATA SHEET – Rev. 0.2

FEATURES



- InGaP/GaAs HBT Technology, Fully Integrated, 3-Stage Power Amplifier
- Wide instantaneous signal bandwidth: 100 MHz
- High-efficiency: 25.5% PAE @ +28 dBm
- High linearity: +28 dBm with < -50 dBc ACLR with DPD (100 MHz NR, 8.5 dB PAR signal)
- Small Signal Gain: 31 dB
- Single supply voltage: 5.0 V
- Enable On/Off function: PAEN = 1.5 to 3.3 V
- 50Ω Input & Output Internally Matched
- LGA(16-pin, 5 x 5 x 0.85 mm) package, RoHS Compliant

APPLICATIONS

- FDD and TDD 4G LTE and 5G systems
- Supports 3GPP Bands 22, 42, n77 and n78
- Customer Premises Equipment (CPE)
- Driver amplifier for micro-base and macro-base stations
- Enterprise small cell and massive MIMO

PRODUCT DESCRIPTION

The AC5186 is a fully matched, a highly efficient, wide instantaneous bandwidth power amplifier (PA) with high gain and linearity. The PA is designed for FDD and TDD 4G LTE and 5G systems operating in the 3300 MHz to 3600 MHz band. The device is manufactured using an advanced InGaP HBT MMIC technology offering state-of-the-art reliability, temperature stability, and ruggedness. The self-contained 5 mm x 5 mm x 0.85 mm surface mount package incorporates RF matching networks optimized for output power, efficiency, and linearity in a 50 Ω system.

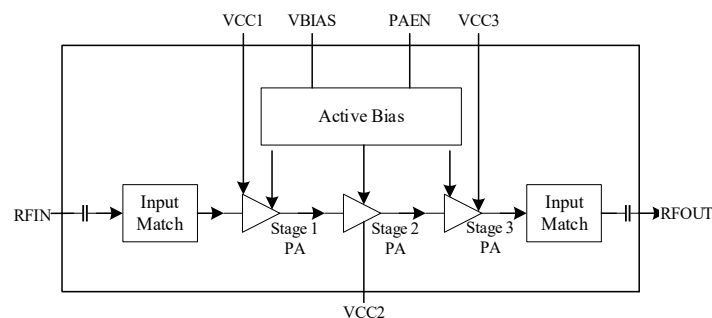


Figure 1: Block Diagram

PINNING INFORMATION



Figure 2:16 Pin 5.0mm x 5.0mm x 0.85 mm
Surface Mount Module

Table 1: Pin Description

PIN	DESCRIPTION	SIMPLIFIED OUTLINE
2	RF Input	
1,3,4,7,8,10,11,13,15	Ground	
5	BIAS Voltage	
6	PA enable	
9	RF Output	
12	Supply Voltage	
14	Supply Voltage	
16	Supply Voltage	

Figure 3: Pinout (X-ray Top View)

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V _{CC}	Supply Voltage (VCC1, VCC2, VCC3, VBIAS)	0	+5.5	V
V _{EN}	PA enable (PAEN)	0	+3.6	V
P _{IN}	RF Input Power	-	TBD	dBm, CW
T _C	Operating temperature	-40	+110	°C
T _J	Junction Temperature	-	+1750	°C
T _{STG}	Storage Temperature	-55	+150	°C

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 adversely affect reliability.

Table 3: Operating Ranges

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
f	Operating Frequency	3300	-	3600	MHz
V _{CC}	Supply Voltage	+4.75	+5.0	+5.25	V
V _{EN}	PA enable:				
	On	+1.5	+2.0	+3.3	V
	Off	0	-	+0.5	V
P _{OUT}	RF Output Power ⁽¹⁾	-	+28	-	dBm

Electrical specifications for the device are measured at specified conditions. Parametric performance is not guaranteed over all recommended operating conditions.

Notes:

(1) RF Output Power is used during production test.

Table 4: Electrical Specifications⁽¹⁾**(T_C = +25 °C, VCC1 = VCC2 = VCC3 = VBIAS = +5.0V, VEN = +2.0V, 50Ω System, Unless Otherwise Noted)**

PARAMETER	COMMENTS	MIN.	TYP.	MAX.	UNIT
Frequency Range		3300		3600	MHz
Small signal gain	P _{IN} = -30 dBm		31		dB
Gain @ +28 dBm	P _{OUT} = +28 dBm		31		dB
Input Return Loss	P _{IN} = -30 dBm		13		dB
Output Return Loss	P _{IN} = -30 dBm		12		dB
Output P _{1dB}	CW Tone		+33.5		dBm
Output P _{3dB}	CW Tone		+34.5		dBm
ACLR	P _{OUT} = +28 dBm (100 MHz NR, 8.5 dB PAR signal)		-28		dBc
Power-Added Efficiency	CW, P _{OUT} = +28 dBm		25.5		%
Quiescent Current	No RF power		240		mA
Harmonics	2f ₀ at +28dBm, CW signal		TBD		dBc
	3f ₀ at +28dBm, CW signal		TBD		
Load mismatch stress with no permanent degradation or failure ⁽²⁾	V _{CC} = +5 V, P _{OUT} = 28 dBm Applies over full operating temperature range		TBD		VSWR
RF turn-on/off time ⁽³⁾	Measured from 50% PA enable voltage level to 90% of RF amplitude		TBD		μs

Notes:

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

(2) Not tested in production. Verified by design.

(3) RF turn-on time is measured from the time the PA enable reaches 50% of PA enable "on" level to the time at which the RF output power achieves 90% of the average steady-state "on" level. RF turn-off time is measured from the time the PA enable reaches 50% of PA enable "on" level to the time at which the RF output power decreases to 10% of the average steady-state "on" level.

APPLICATION INFORMATION

Printed-Circuit Board (PCB) Material:

Rogers RO4350B, thickness = 0.254 mm, $\epsilon_r = 3.66$, copper plating thickness = 35um.

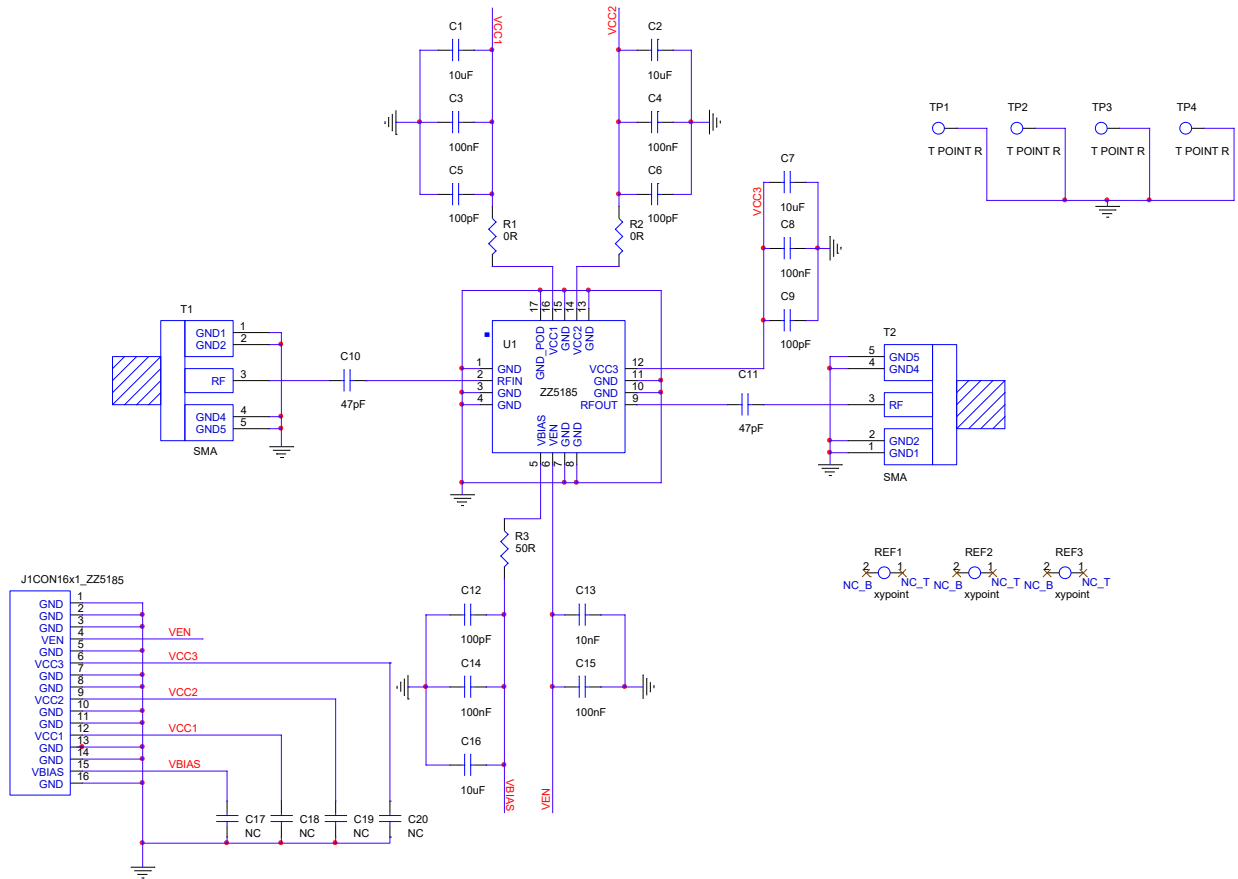


Figure 4: Application Circuit Schematic

Table 5: Evaluation Board Bill of Materials

Component	Value	Manufacturer	Footprint	Description
C10, C11	47 pF	Murata	0402	DC block capacitor
C5, C6, C9, C12	100 pF	Murata	0402	De-coupling capacitor
C13	10 nF	Murata	0402	De-coupling capacitor
C3, C4, C8, C14, C15	100 nF	Murata	0402	De-coupling capacitor
C1, C2, C7, C16	10 uF	Murata	0603	De-coupling capacitor
C17, C18, C19, C20	NC			
R1, R2	0 Ω		0402	
R3	50 Ω		0402	

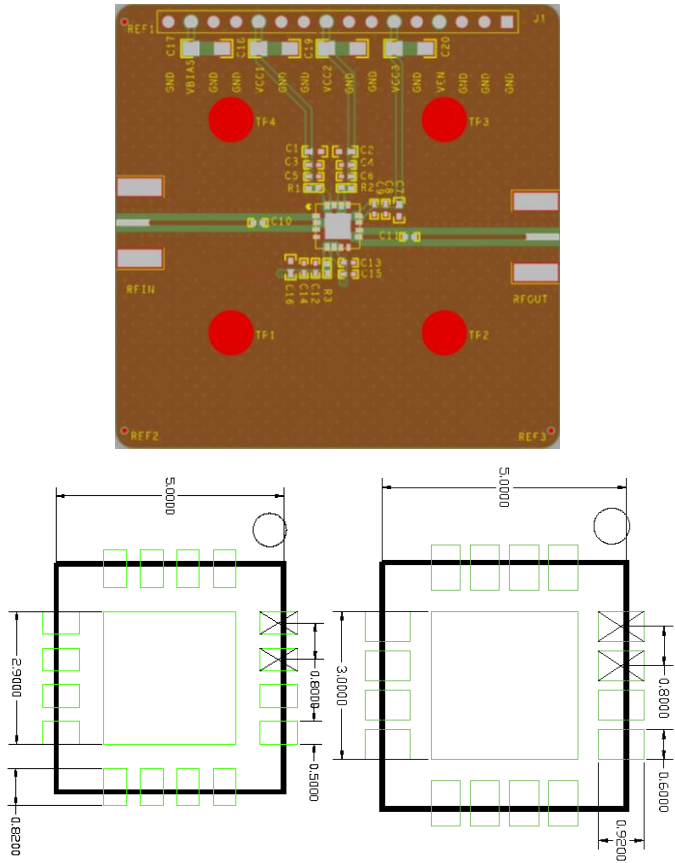


Figure 5: PCB Footprint and Top Layer View & Solder Mask Layer

PACKAGE OUTLINE

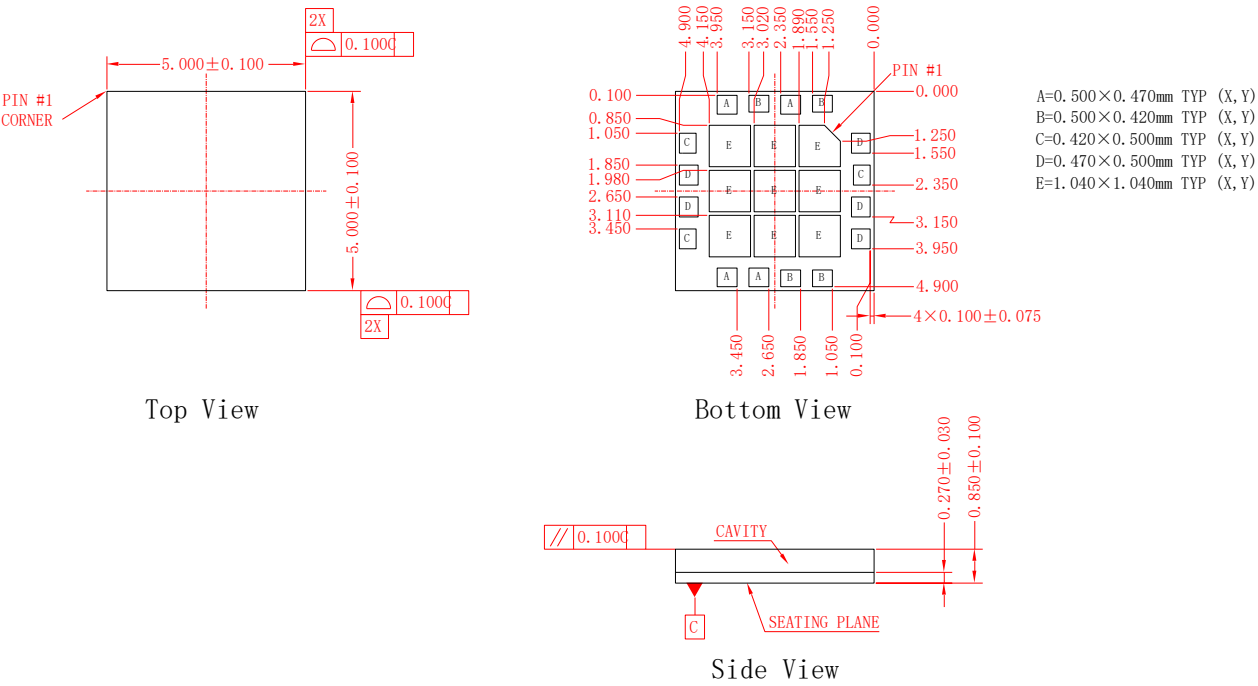


Figure 6: Package Outline - 16 Pin 5 mm x 5 mm x 0.85 mm Surface Mount Module

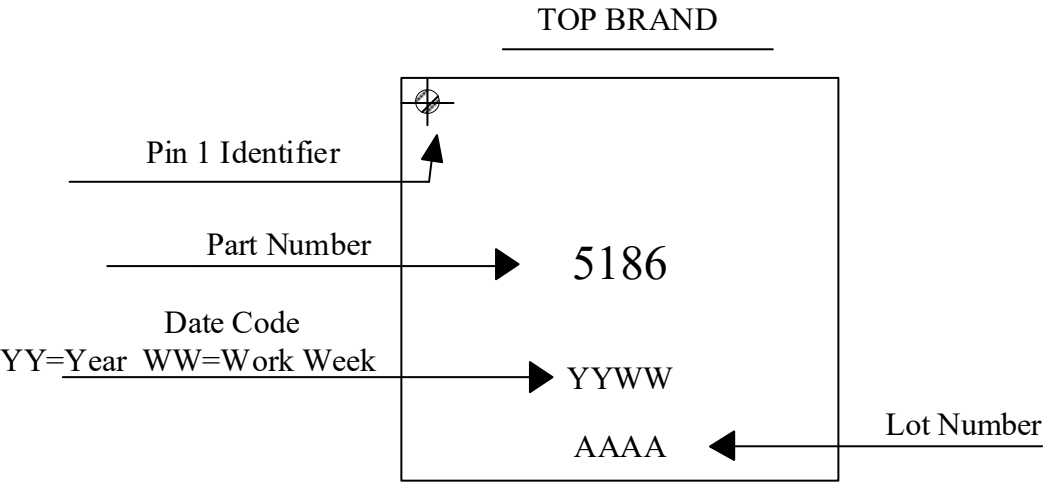


Figure 7: Branding Specification

COMPONENT PACKAGING

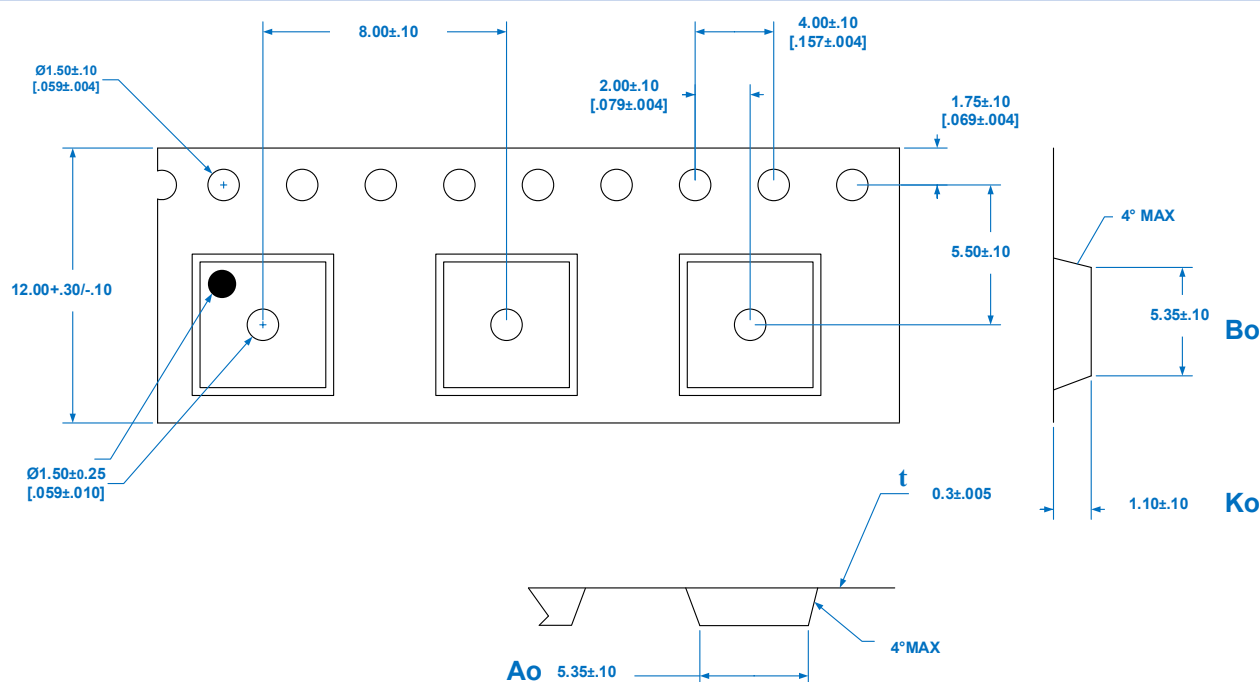


Figure 8: Tape & Reel Packaging

Table 6: Tape & Reel Dimensions

PACKAGE TYPE	TAPE WIDTH	POCKET PITCH	REEL CAPACITY	MAX. REEL DIA
5 mm x 5 mm x 0.85 mm	12 mm	8 mm	3000	13"

ESD PRECAUTIONS & MSL RATING

Table 7: Handling Precautions

PARAMETER	RATING	STANDARD
ESD – Human Body Model (HBM)	Class 1C	ESDA/JEDEC JS-001-2017
ESD – Charged Device Model (CDM)	Class C1	ESDA / JEDEC JS-002-2018
MSL – Moisture Sensitivity Level	Level 3	IPC/JEDEC J-STD-020



Caution!
ESD-Sensitive
Device

SOLDERABILITY

Compatible with both Lead-free (260°C Max. reflow temperature) and Tin/Lead (245°C Max. reflow temperature) soldering processes.

Package lead plating: NiPdAu.

RoHS COMPLIANCE

This device is compliant with the 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment), as amended by Directive 2015/863/EU.

ORDERING INFORMATION

Table 8: Ordering information

PART NUMBER	DESCRIPTION	EVALUATION BOARD P/N.
AC5186	Small-Cell High-Efficiency Power Amplifier Module	EVB-AC5186

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