

## Features

- Frequency Range DC-12GHz
- 41.5dBm Nominal  $P_{3dB}$
- Maximum PAE at 6GHz of 65%
- Drain Bias 28V
- Technology: GaN on SiC
- Lead-free and RoHS compliant
- Chip Dimensions: 0.81 x 1.14 x 0.10mm

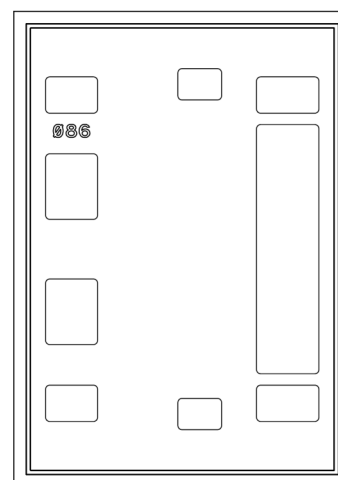
## Applications

- Aerospace & Defense
- Broadband Wireless

## Description

The ICPB2002 is a GaN on SiC discrete HEMT, designed to operate either pulsed or CW from DC to 12GHz. The design is optimized for power and efficiency using field plate technology.

## Image



## RF Performance | Simulated Conditions unless otherwise stated | $T_A=25^{\circ}\text{C}$ , $V_D=28\text{V}$ CW

Parameter	Units	Typical		
		3	6	10
Frequency	GHz	3	6	10
Output Power $P_{3dB}$	dBm	41.5	41.5	41.5
Bias Current	mA	50	50	50
PAE @ $P_{3dB}$	%	68	65	58
Gain @ $P_{3dB}$	dB	19.5	14	10

## Recommended operating conditions

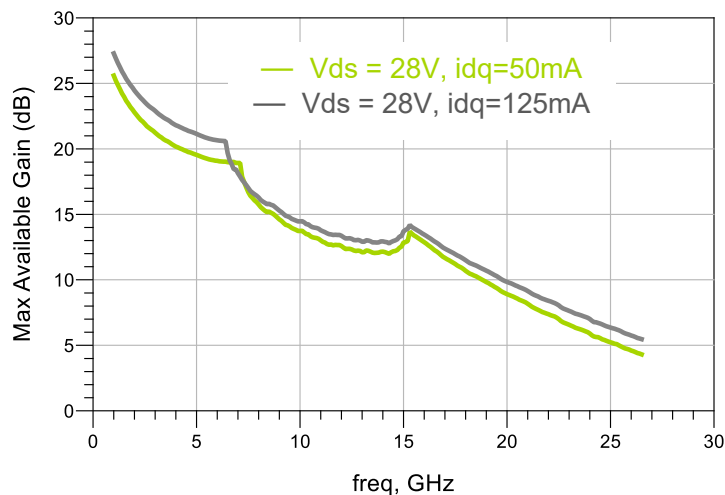
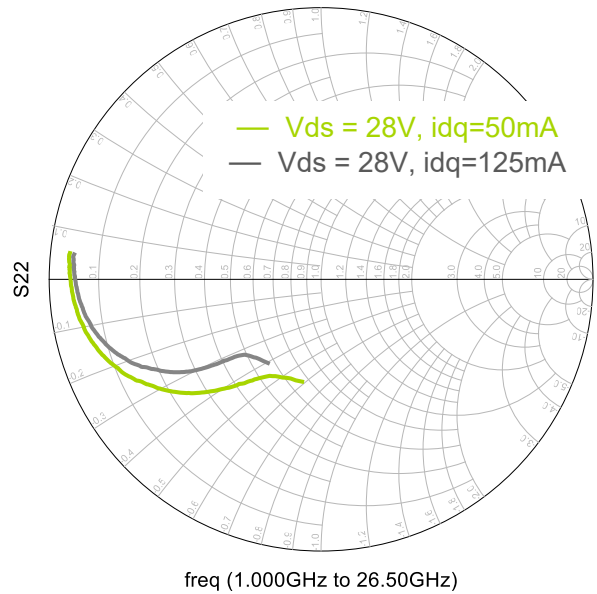
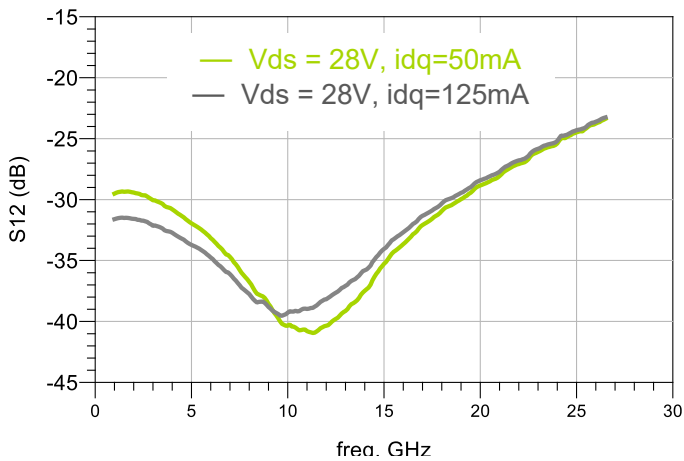
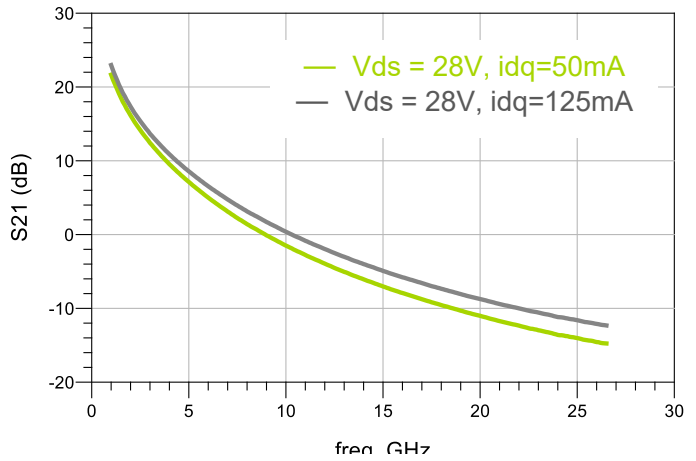
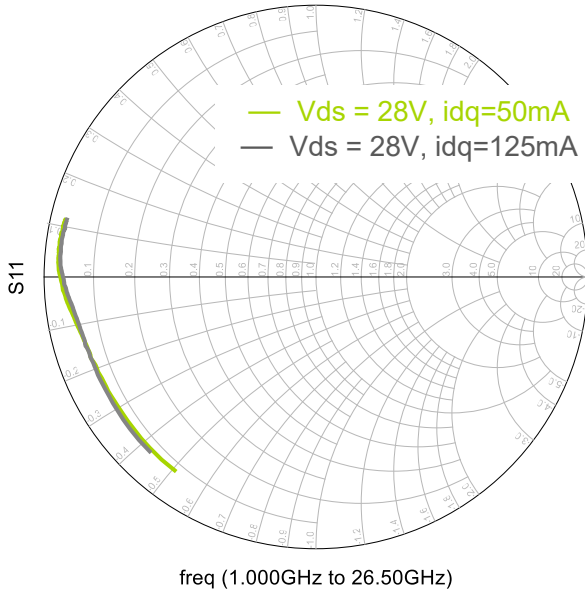
Parameter	Value
Drain Voltage ( $V_{DG}$ )	12-32 V
Drain Quiescent Current ( $I_D$ )	0.05-0.125A
Drain current RF Drive ( $I_D$ )	1A
Gate Voltage ( $V_G$ )	-2.6V
Power Dissipation (CW)	20W
Channel Temperature (Max)	225°C

## Absolute Maximum Ratings

Parameter	Absolute Maximum
Drain to Gate Voltage ( $V_{DG}$ )	80 V
Gate Voltage Range ( $V_G$ )	-20V to 0V
Gate Current ( $I_G$ )	-2.5 to 7.5mA
Power Dissipation (CW)	30W
CW Input Power	+34dBm
Channel Temperature	275°C
Storage Temperature	-65°C to +150°C

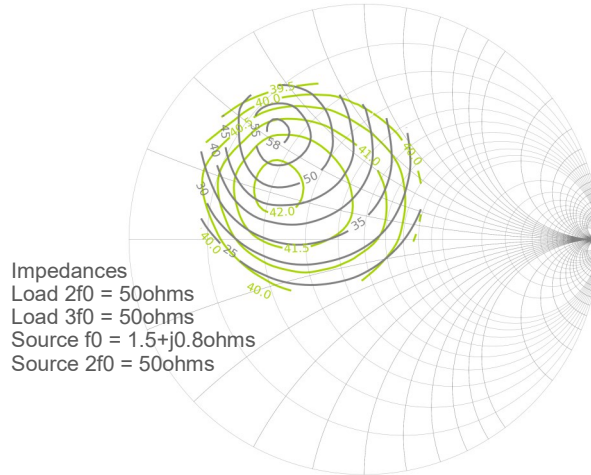
Exceeding any one or combination of these limits may cause permanent damage to this device. ICONIC RF does not recommend sustained operation near these survivability limits.

## S-parameters | $T_A = 25^\circ\text{C}$



## Load Pull Data 10GHz

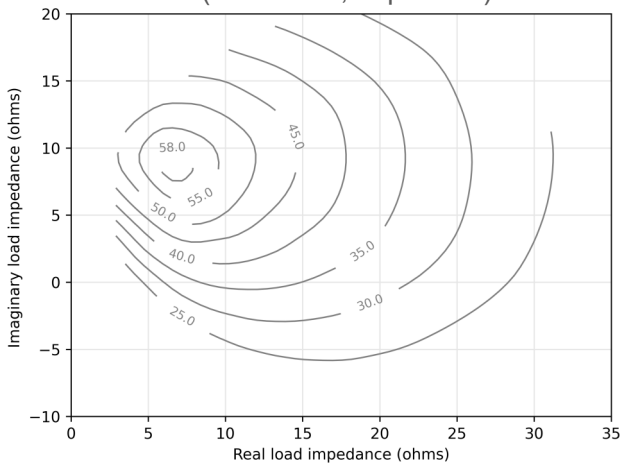
P3dB Output Power and PAE contours  
(Vds = 28V, idq=50mA, Z0=20ohms)



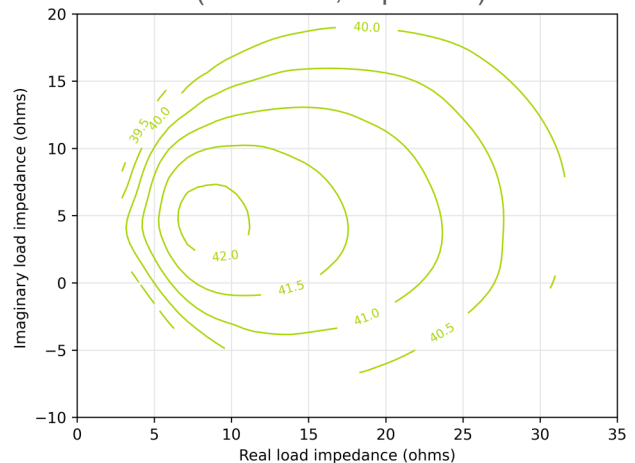
Max PAE = 58.4%  
at Zload = 5.9+j9.3 ohms

Max Power = 42dBm  
at Zload = 7.5+j4.7 ohms

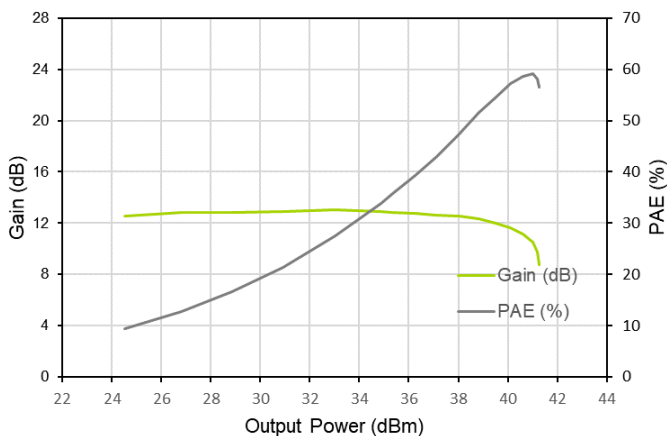
P3dB PAE contours  
(Vds = 28V, idq=50mA)



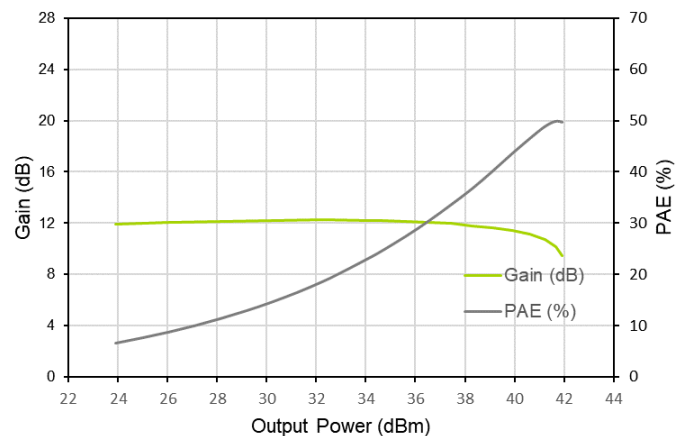
P3dB Output Power contours  
(Vds = 28V, idq=50mA)



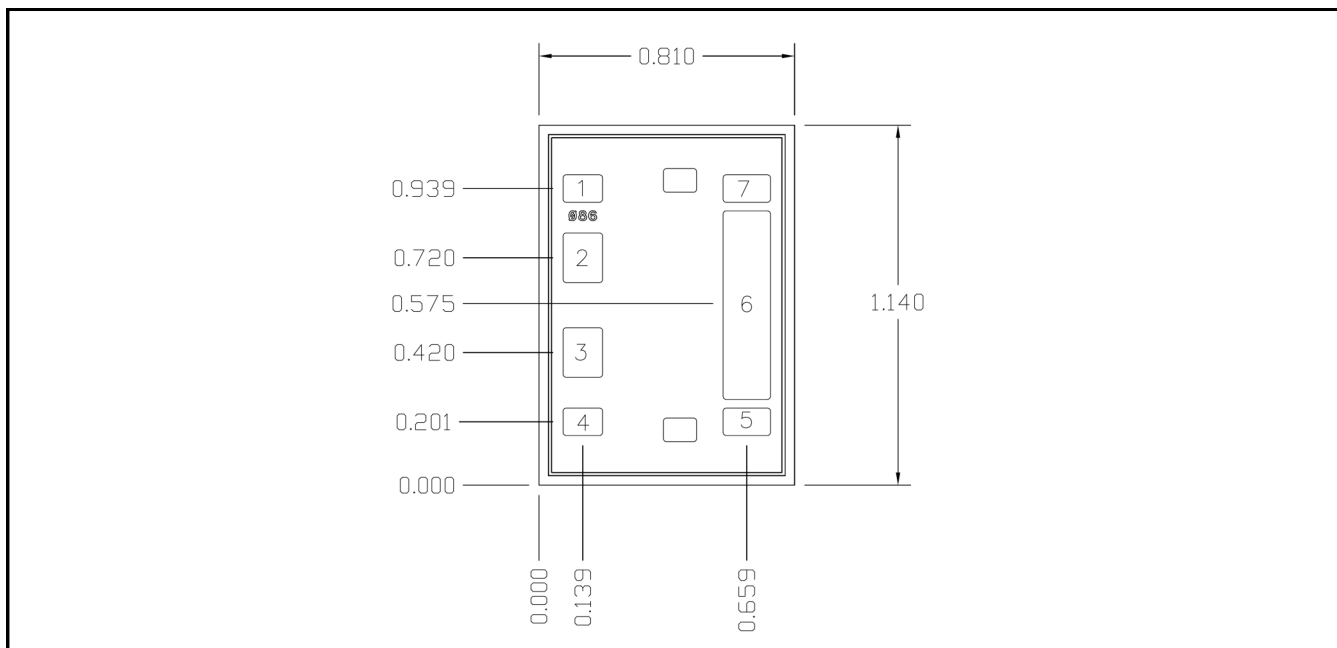
Gain and PAE vs Output Power  
(Vds=28V, idq=50mA, Max PAE tune)



Gain and PAE vs Output Power  
(Vds=28V, idq=50mA, Max Power tune)



## Mechanical Drawing



## Bond Pads

Pad Number	Description	Dimensions (mm)
1,4	Gate Resistor	0.125 x 0.087
2,3	Gate	0.125 x 0.157
5,7	Drain Resistor	0.150 x 0.087
6	Drain	0.150 x 0.597
Die Backside	Source	0.810 x 1.140

## Bias-Up Procedure

1. Set  $V_G = -5V$
2. Set  $V_D$  to 28V
3. Adjust  $V_G$  positive until  $I_D$  quiescent is 0.05A
4. Limit  $I_D$  to 2A
5. Apply RF Signal

## Bias-down Procedure

1. Turn off RF
2. Turn off  $V_D$ , allow drain capacitor to discharge
3. Turn off  $V_G$ .

## Assembly Guidance

Die attach of component using adhesive

- Vacuum collets are preferred method of pickup
- Silver sintered epoxy is recommended

## Interconnect assembly Notes

- Ball Bonding is preferred technique
- Force, time and ultrasonic parameters are critical
- Aluminum wire bonding is not recommended
- Bond Wire diameter of 1.5mil is recommended

## Handling Procedures

Please observe the following precautions to avoid damage:

## Static Sensitivity

Integrated Circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

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