ICPB2002 | Discrete Power GaN HEMT 12 Watt

ICONIC RF
a MICROCHIP company

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

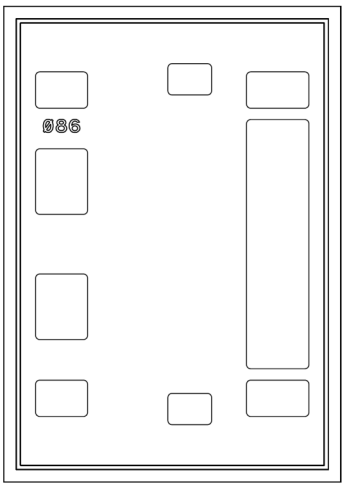
Applications

- 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°C, V_D=28V CW

Parameter	Units	Typical		
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

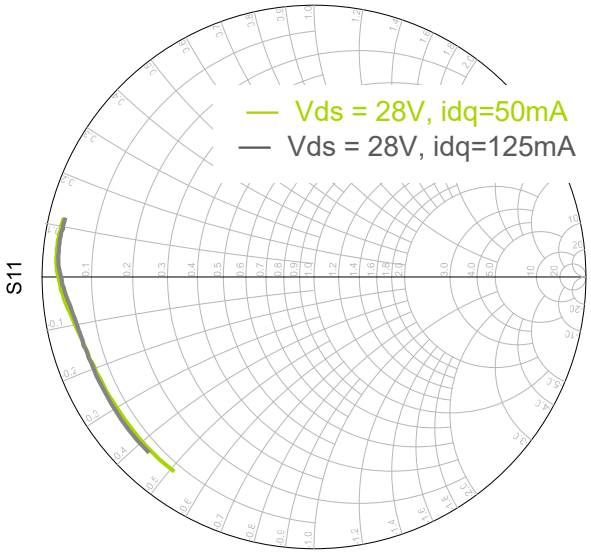
Parameter	Value
Drain Voltage (V_{DG})	12-32 V
Drain Quiescent Current (I_D)	0.05-0.125A
Drain current RF Drive (I_D)	1A
Gate Voltage (V_G)	-2.6V
Power Dissipation (CW)	20W
Channel Temperature (Max)	225°C

Absolute Maximum Ratings

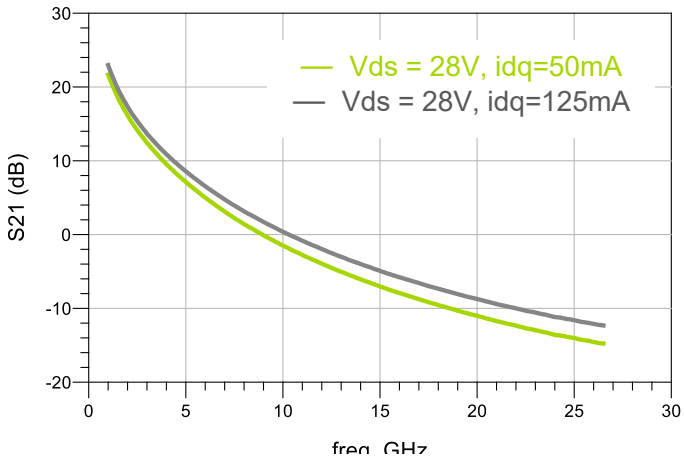
Parameter	Absolute Maximum
Drain to Gate Voltage (V_{DG})	80 V
Gate Voltage Range (V_G)	-20V to 0V
Gate Current (I_G)	-2.5 to 7.5mA
Power Dissipation (CW)	30W
CW Input Power	+34dBm
Channel Temperature	275°C
Storage Temperature	-65°C to +150°C

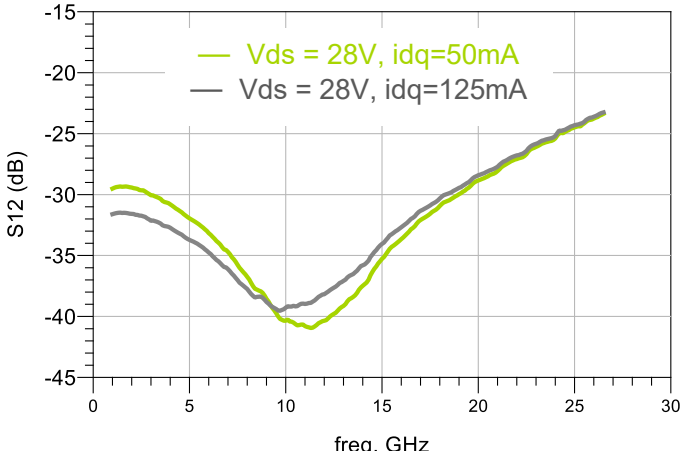
Exceeding any one or combination of these limits may cause permanent damage to this device.
ICONIC RF does not recommend sustained operation near these survivability limits.

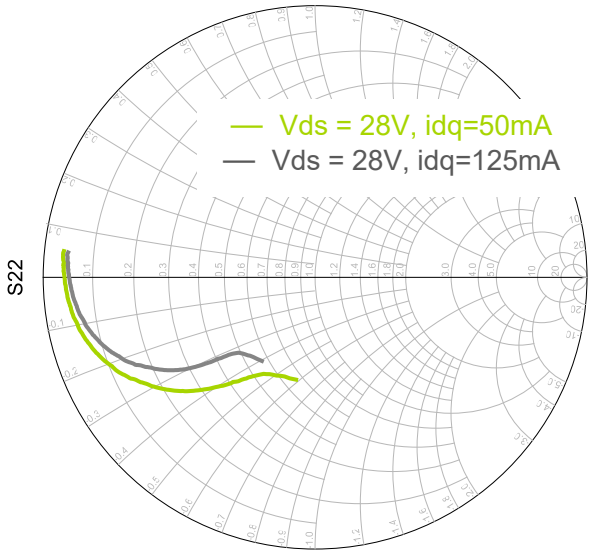
S-parameters | T_A = 25ºC



freq (1.000GHz to 26.50GHz)







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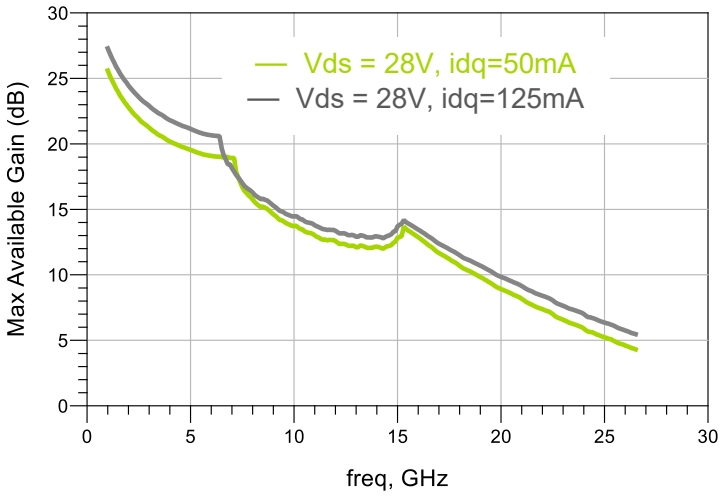
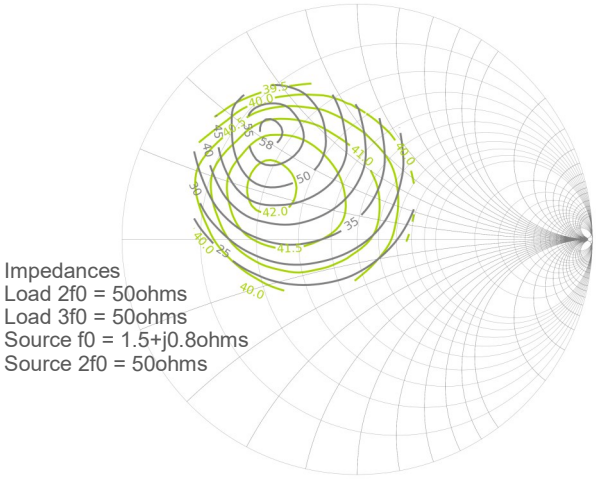


Load Pull Data 10GHz

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

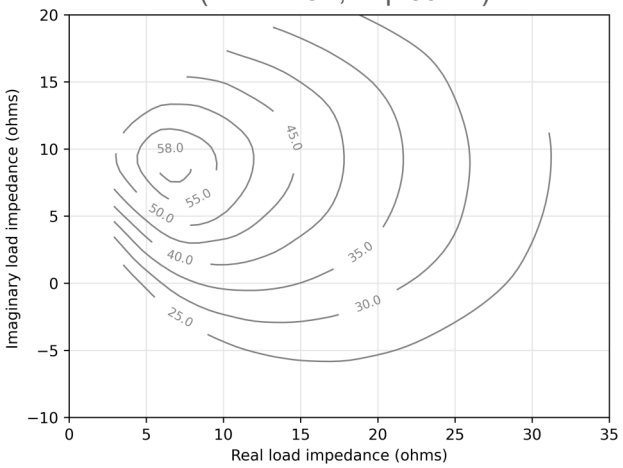


Max PAE = 58.4%
at Zload = 5.9+j9.3 ohms

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

Impedances
Load 2f0 = 50ohms
Load 3f0 = 50ohms
Source f0 = 1.5+j0.8ohms
Source 2f0 = 50ohms

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



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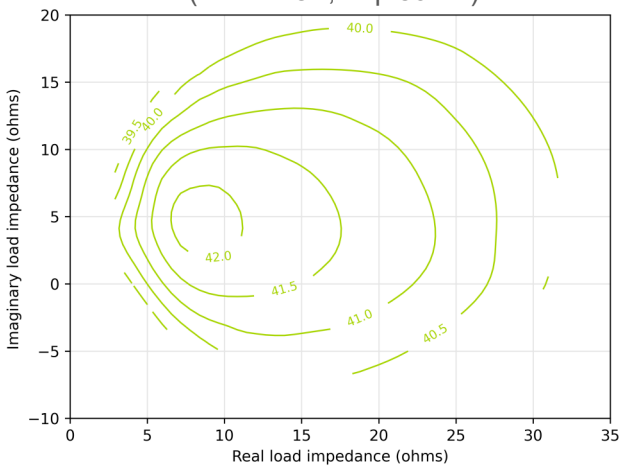
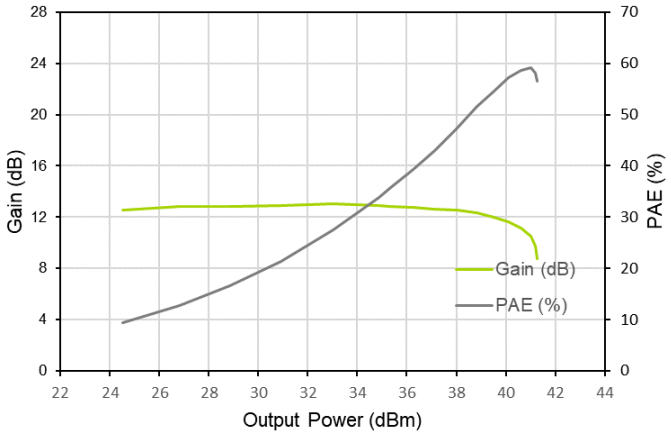


Gain and PAE vs Output Power
(Vds=28V, idq=50mA, Max PAE tune)



Gain and PAE vs Output Power
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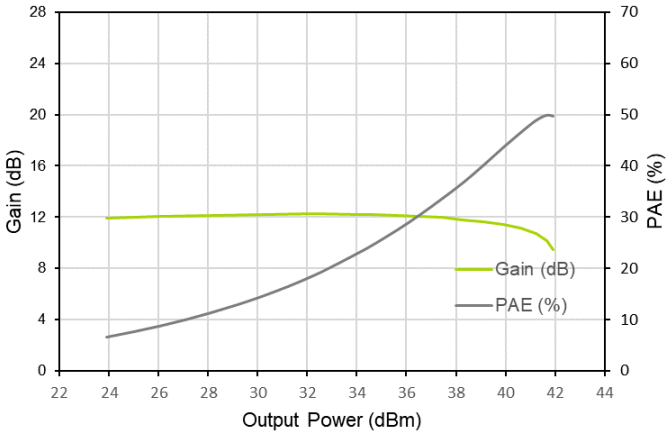
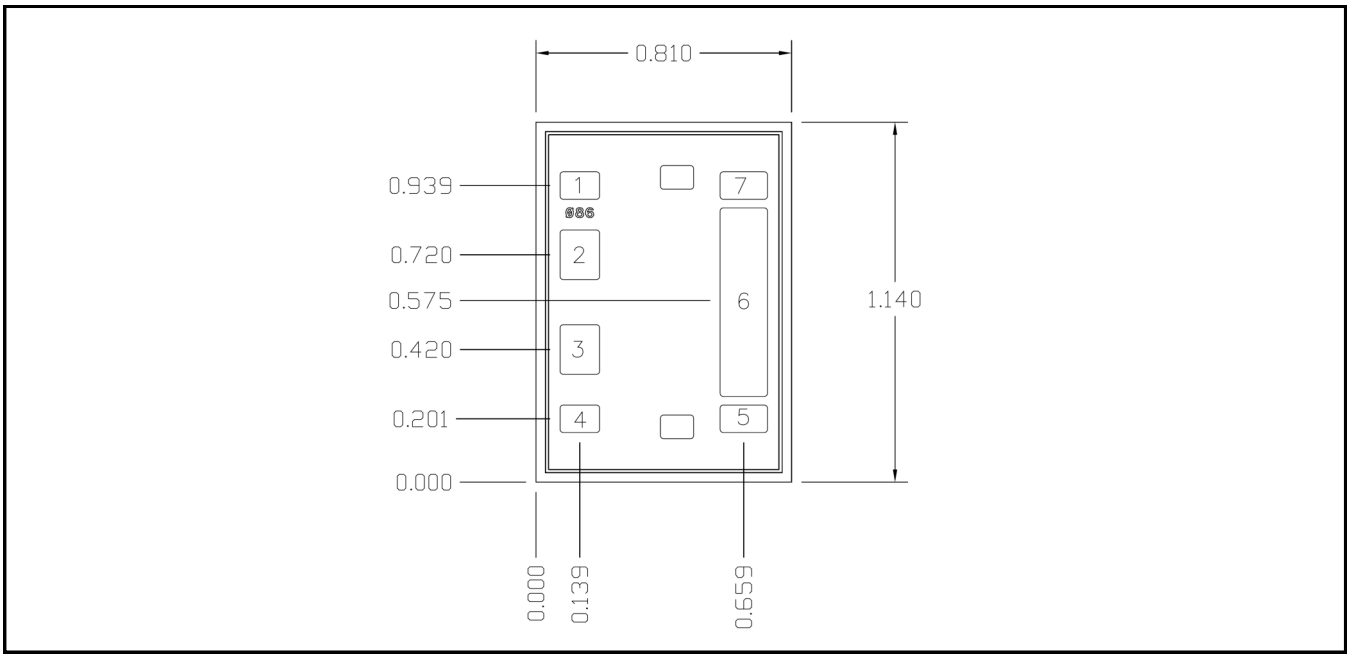


Mechanical Drawing



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 ID 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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