mmTron
Unleashing the mmWave Frontier

TMC261-D
17.3-21.2 GHz Linear Power Amplifier

Product Features

- RF frequency: 17 to 22 GHz
- Linear Gain: 24 dB
- P1dB: 31 dBm
- Die Size: X=3.5 mm, Y=2.5 mm, Z=0.1 mm
- Package Size: X=5 mm, Y=5 mm, Z=0.9 mm
- DC Bias Point: 18 VDC, 74 mA

Application

- SATCOM Downlink
- LEO Satellites
- Military Radar, EW

Product Description

The TMC261-D is a 17.3-21.2 GHz, linear power amplifier die product with high power-added efficiency. TMC261-D is designed for use in SATCOM, Instrumentation, Military Radar, and EW applications. The TMC261-D is a 50 W matched design with built-in DC blocking and ESD protection. To ensure rugged and reliable operation and moisture protection, the TMC261-D is designed for maximum reliability. Both bond pad and backside metallization are Au-based that is compatible with ribbon and wedge bonding and high conductivity epoxy and eutectic die attach methods. TMC261-D can be biased from 18V to 28V to adjust outpower levels in the 1 to more than 2W range while maintaining excellent PAE and NPR. The packaged version is available as TMC261 in a 20 lead overmold 5x5 QFN or upon request in a 28-pin 6x6 Air-Cavity QFN.

Electrical Performance : **Vdd = 18 V, Id1 = 54 mA, Id2 = 20 mA, TA = 25 °C, F = 20 GHz**				
	Min	**Typ**	**Max**	**Units**
Frequency	17.3		21.2	GHz
Small Signal Gain		24		dB
P1dB		31		dBm
P1dB (28V/74mA)		33		dBm
PAE @ NPR=13dB		35		%
Pout @ NPR=13dB		1.1		W
Return Loss		20		dB
Drain Voltage		18		V
Drain Bias Current		74		mA

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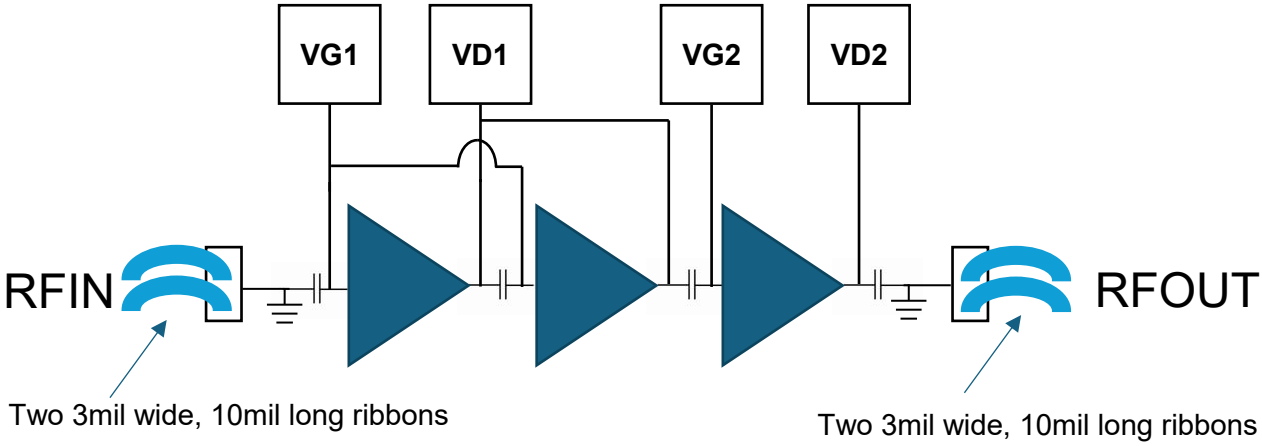
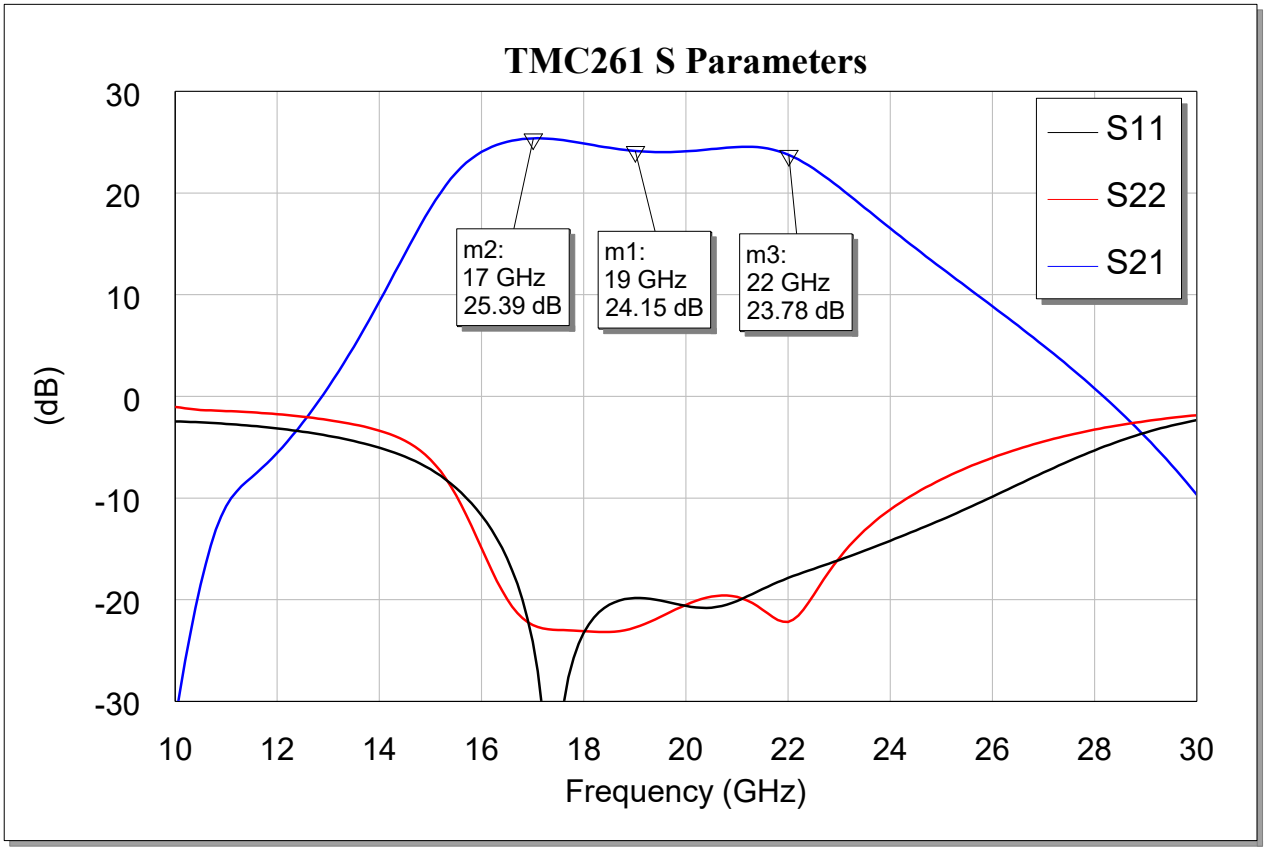
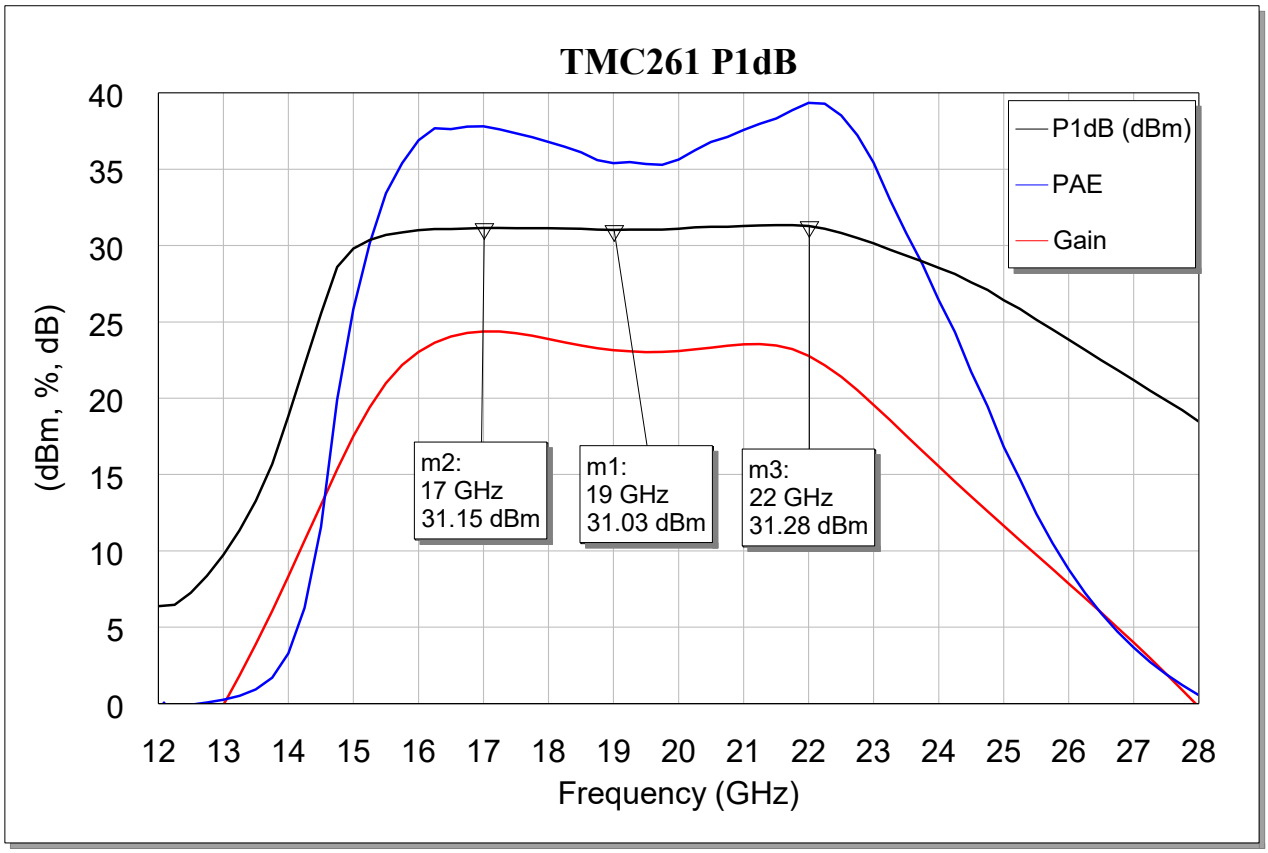
*Off chip bypassing for each supply pad 100pF to minimize components. Decades of capacitance from 100pF to 10uF for best linearity. One 1mil ball bond per supply pin is required, however VD2 can support 4 ball bonds.



Bias Sequencing: To turn ON the device, VG1, and VG2 are first set at -6V. Then set VD1 and VD2 to 18V. Finally, adjust VG1 and VG2 to achieve ID1 = 54mA and ID2 = 20mA. To turn OFF the device, you set VG1 and VG2 to -6V, then turn off the VD1 and VD2 followed by turning off VG1 and VG2.



*VD1 = VD2 = 18V, ID1 = 54mA, ID2 = 20mA, Tamb = 25C



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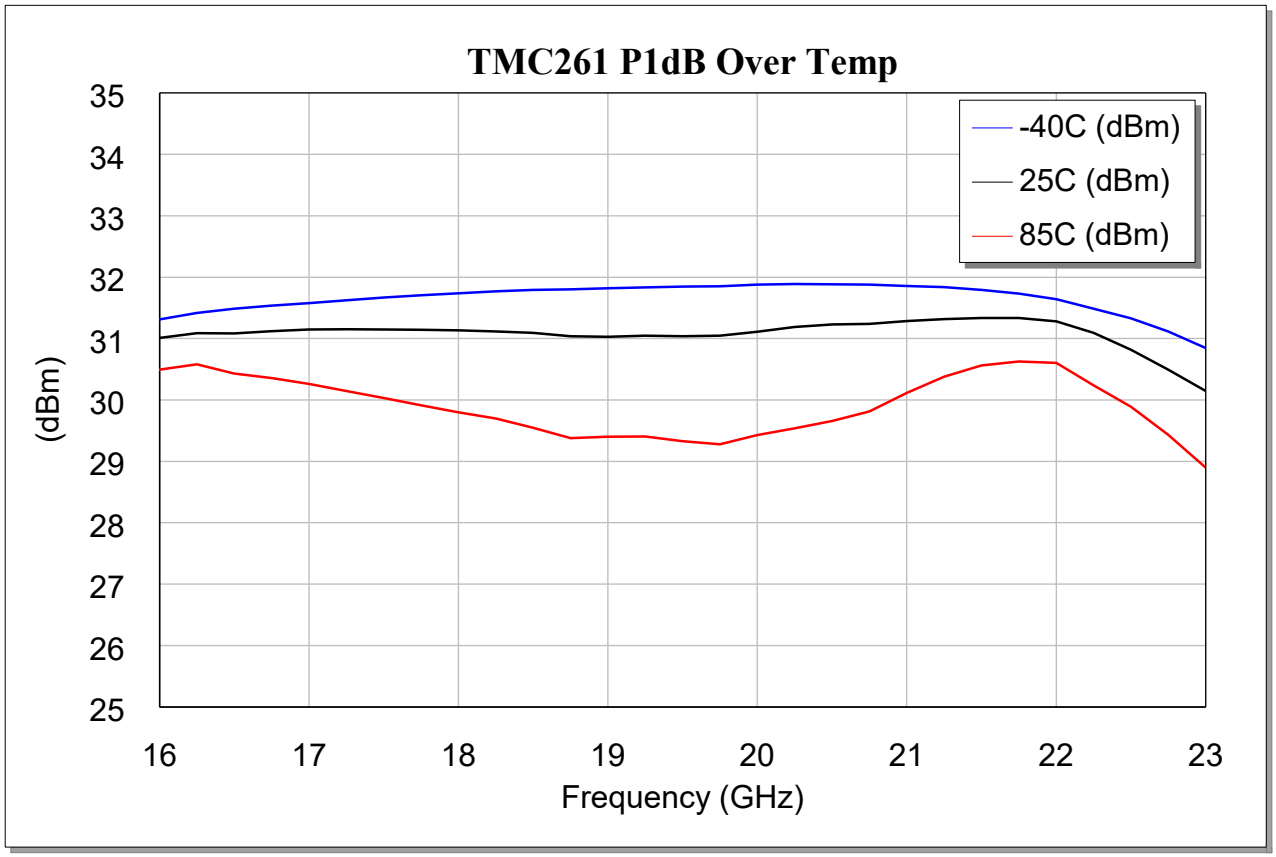
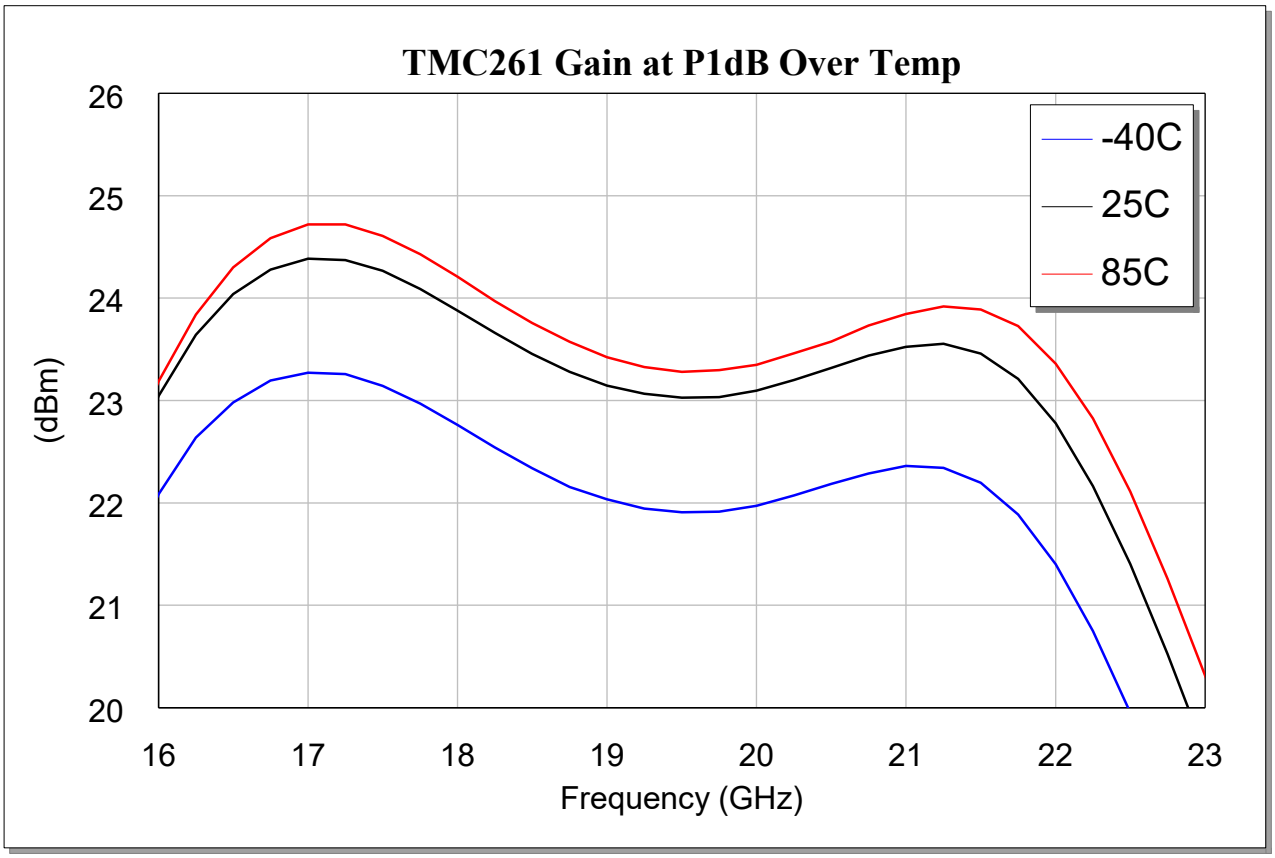


*VD1 = VD2 = 18V, ID1 = 54mA, ID2 = 20mA, Tamb = 25C
** Biased at Tamb and voltages fixed over temperature



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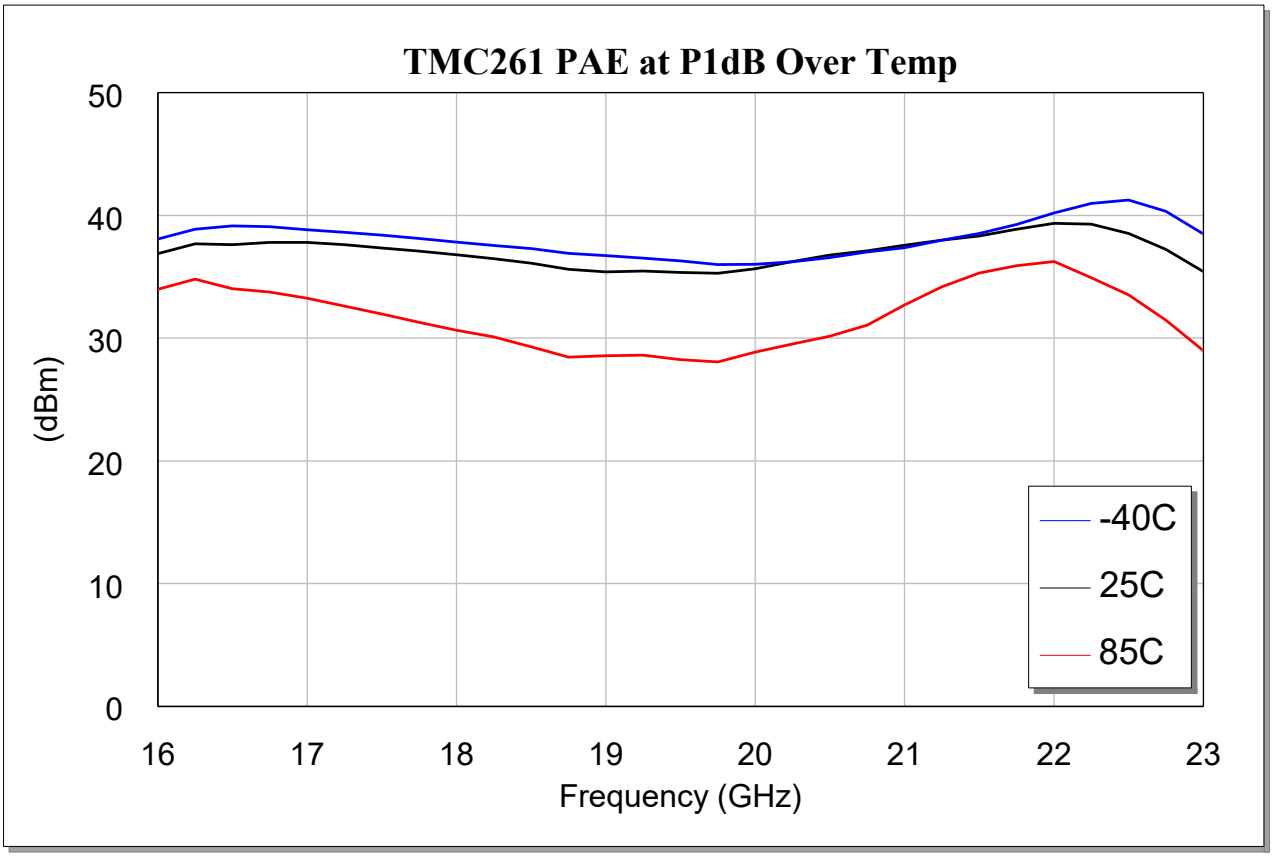

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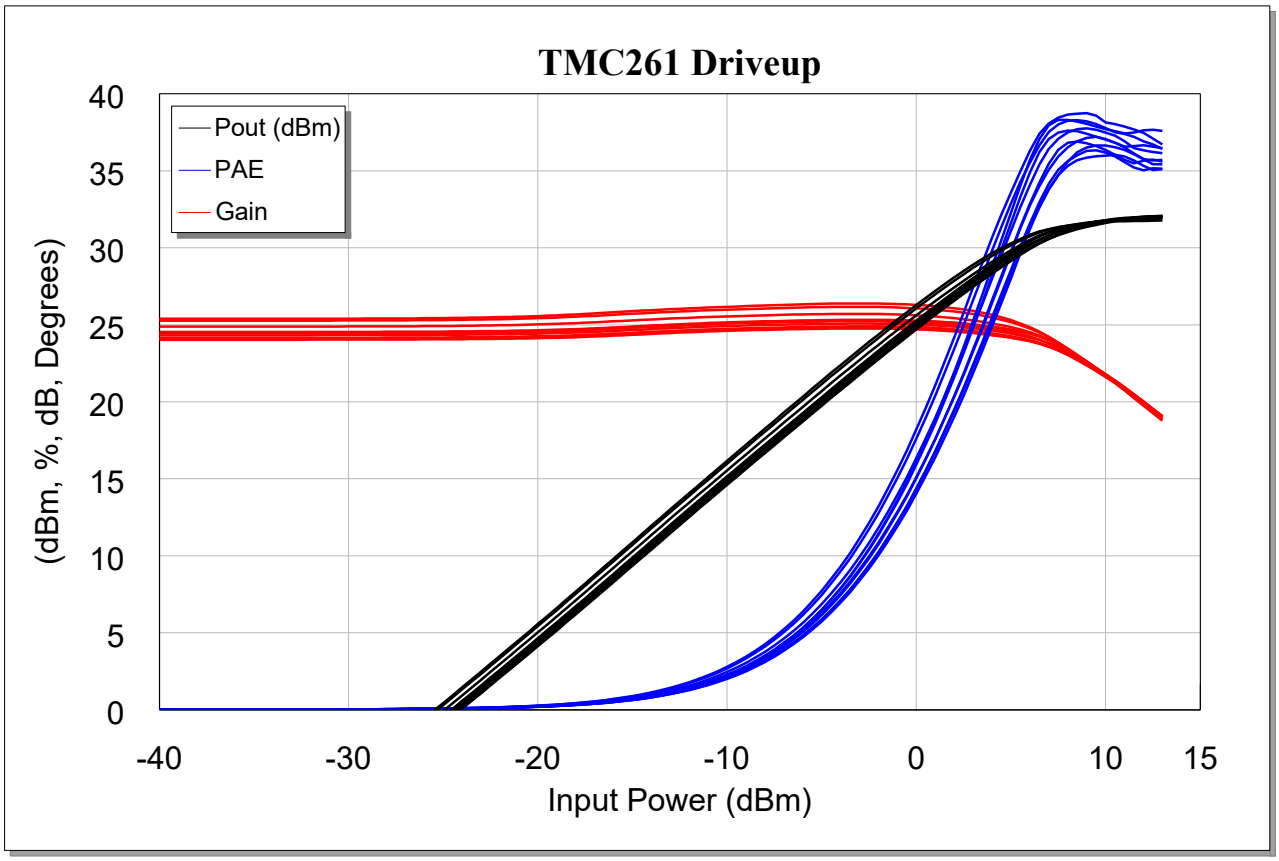

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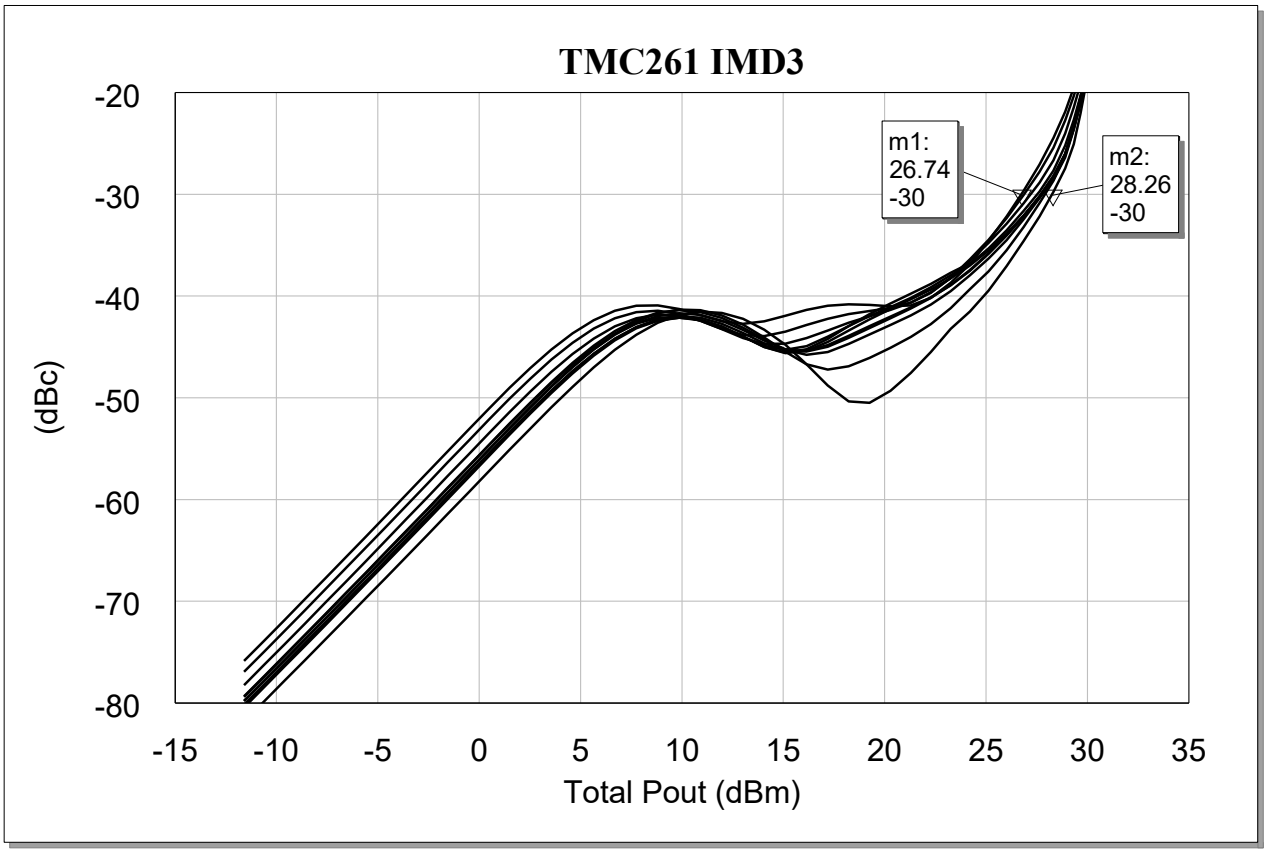


*VD1 = VD2 = 18V, ID1 = 54mA, ID2 = 20mA, Tamb = 25C, Tone Spacing = 100 MHz

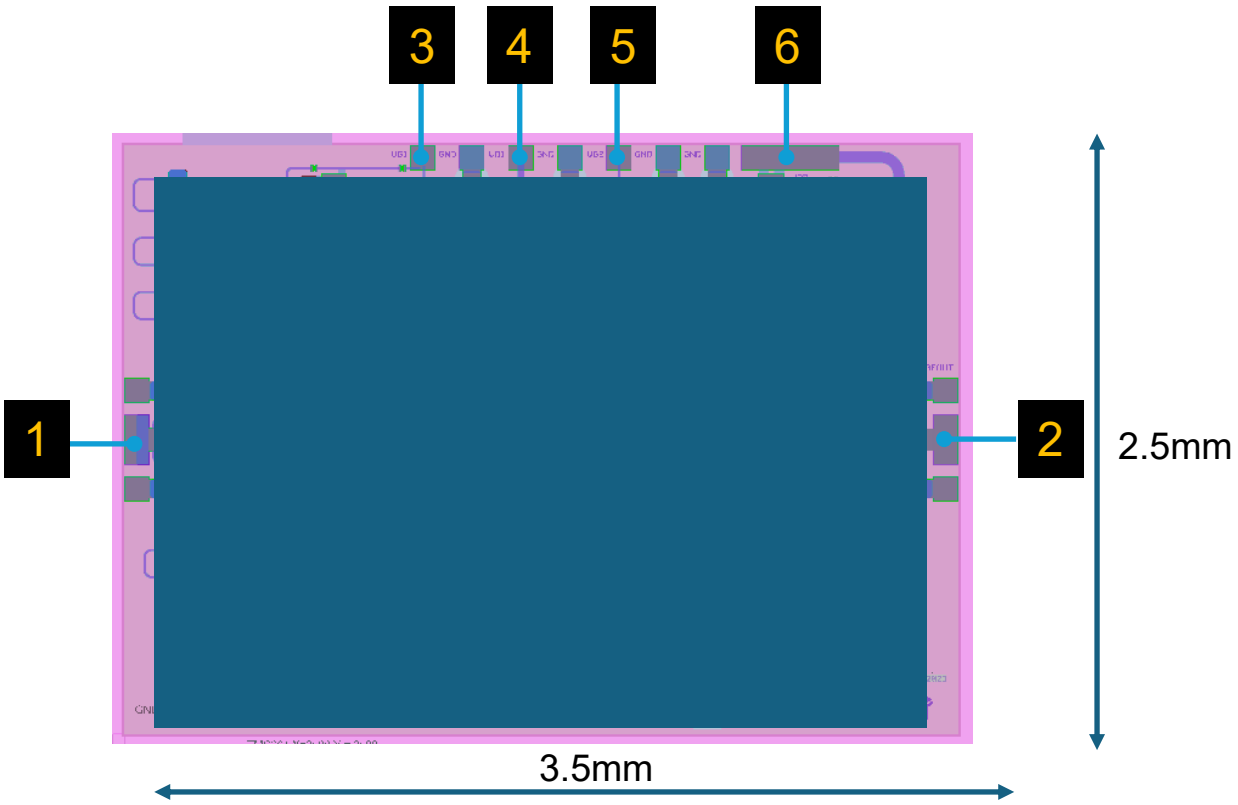
Recommended Biasing

The TMC261-D is operated with one positive supply VDD (VD1=VD2) and two negative supply voltages VG1 and VG2 (this optimizes linearity). The positive supply must be connected to VD1 and VD2 pads on the die. The negative voltages to VG1 and VG2 on the die. VG1 and VG2 are biased to -6V first, then VDD is gradually biased to +18V and finally, VG1 and VG2 are adjusted to around -4.1V and 4.2V, respectively, for ID1 = 54mA and ID2 = 20mA DC current.

Reverse the sequence during power down, i.e. bring the VG1 and VG2 to -6V, lower VDD to 0V, and then VG1 and VG2 to 0V.

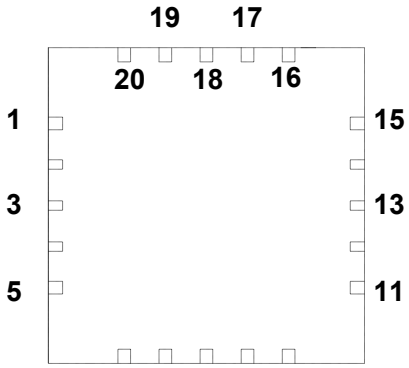
Assembly Technique

The TMC261-D is fabricated using a GaN-based semiconductor material structure and may be packaged in an air-cavity QFN or used as a die. The die is designed to allow either epoxy or eutectic attach.



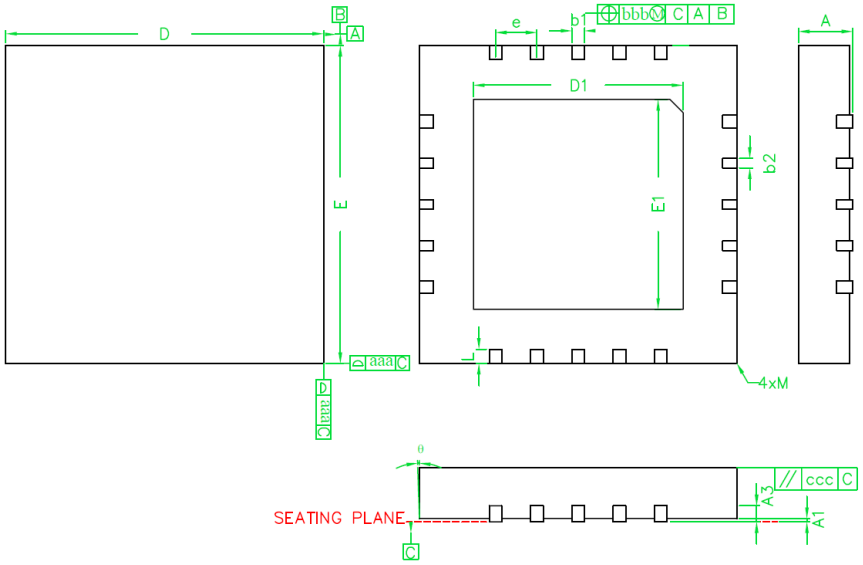
Pad #	Function
1	RFIN
2	RFOUT
3	VG1
4	VD1
5	VG2
6	VD2

TMC261-P5 Packaged Device, Functional Pinout



Pad#	Function
13	RF Output
16	VD2 Bias
17	VG2 Bias
19	VD1 Bias
20	VG1 Bias
3	RF Input
2,4,12,14,18	GND

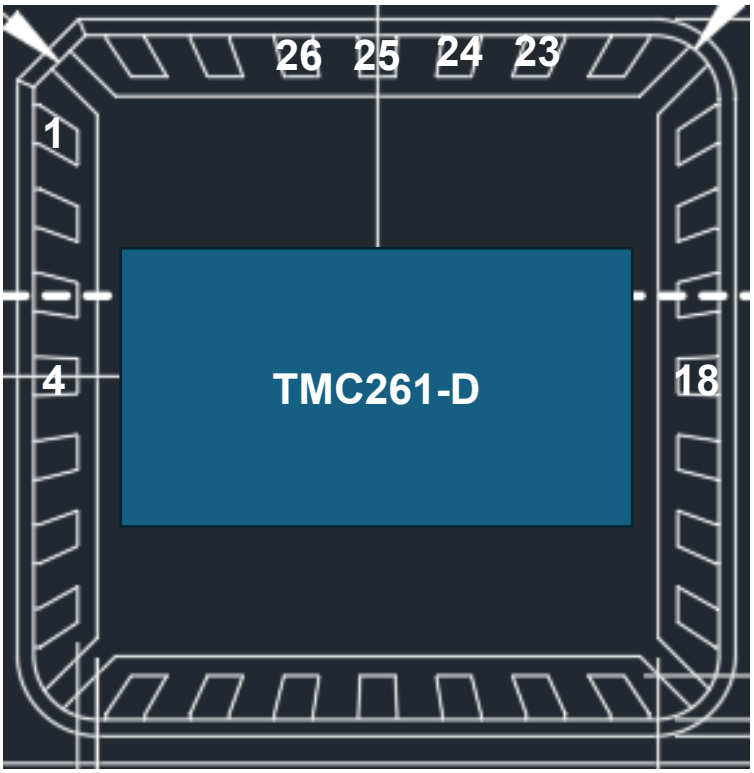
TMC261-P5 Overmold QFN Packaged Device, Assembly Drawing (all units in mm)



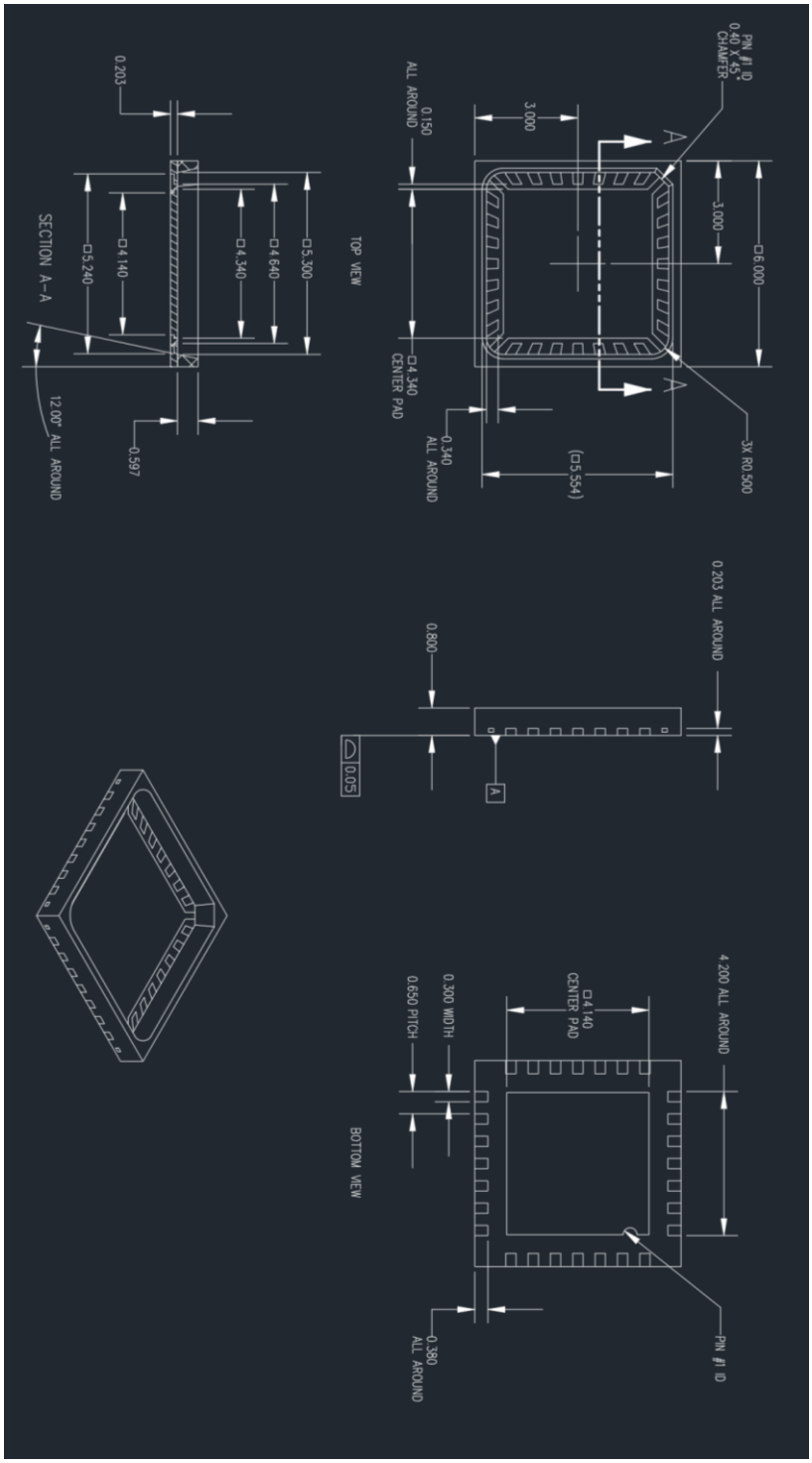
SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.80	0.90	1.00
A1	0	0.02	0.05
A3	----	0.25REF.	----
b1	0.15	0.20	0.25
b2	0.10	0.15	0.20
D	4.90	5.00	5.10
D1	----	3.30BSC	----
E	4.90	5.00	5.10
E1	----	3.30BSC	----
e	----	0.65BSC	----
L	0.18	0.23	0.28
θ	0	----	12°
aaa	----	0.25	----
bbb	----	0.10	----
ccc	----	0.10	----
M	----	----	0.05

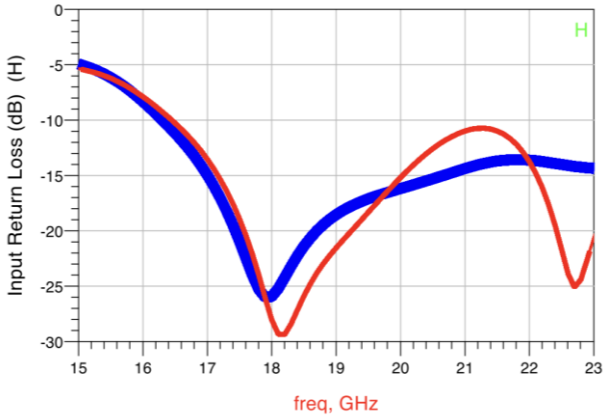
DXF and detailed assembly drawings are available on request.

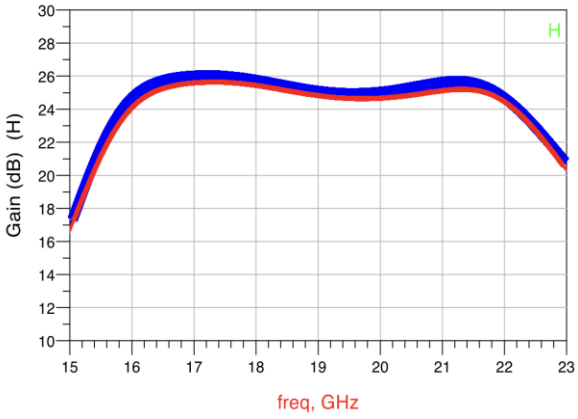


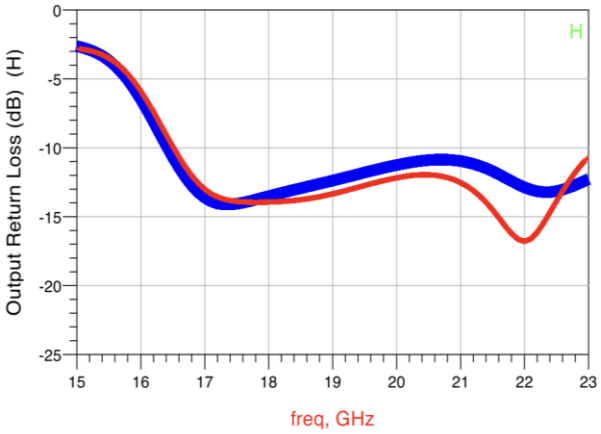


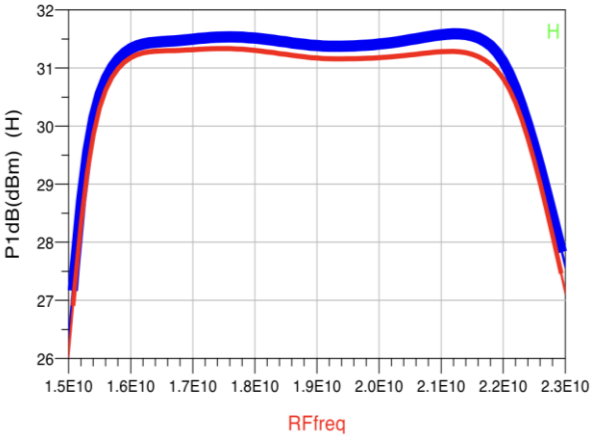
Pin#	Function
3	GND
4	RF Input
5	GND
17	GND
18	RF Output
19	GND
23	VD2 Bias
24	VG2 Bias
25	VD1 Bias
26	VG1 Bias
Other pins	GND


PIN #1 ID
0.40 X 45°
CHAMFER
0.150
ALL AROUND
3.000
3.000
6.000
A
A
14.340
CENTER PAD
0.340
ALL AROUND
(5.554)
3X R0.500
0.203
5.300
4.640
4.340
4.140
5.240
SECTION A-A
12.00° ALL AROUND
0.597
TOP VIEW
0.800
0.203 ALL AROUND
0.05
A
4.200 ALL AROUND
0.300 WIDTH
0.650 PITCH
4.140
CENTER PAD
BOTTOM VIEW
0.380
ALL AROUND
PIN #1 ID









Blue : Bare Die in a fixture (including wire bonds)
Red: Packaged on a PCB (including Package to PCB Transition)



Electrostatic Discharge Caution

This integrated circuit can be damaged by ESD. mmTron Inc. recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications. III-V MMICs are ESD-sensitive. Preventative ESD measures must be employed in all aspects of storage, handling, and assembly. MMIC ESD precautions, handling considerations, and die-attach and bonding methods are critical factors in successful III-V MMIC performance and reliability.



RoHS Compliant

This part is RoHS compliant, meeting the requirements of the EU Restriction of Hazardous Substances Directive 2002/95/EC, commonly known as RoHS. Six substances are regulated: lead, mercury, cadmium, chromium VI (hexavalent chromium), polybrominated biphenyls (PBB), and polybrominated biphenyl ethers (PBDE). RoHS compliance requires that any residual concentration of these substances is below the Directive's maximum concentration values (MCV): cadmium 100ppm by weight and all others 1000ppm by weight.

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