

**GT010D****50V, DC – 8.0GHZ, 10W GAN HEMT****FEATURES**

- Operating Frequency Range: DC to 8.0GHz
- Operating Drain Voltage: +50V
- Maximum Output Power ( $P_{SAT}$ ): 15W
- Maximum Drain Efficiency: 64%
- Efficiency-Tuned P3dB Gain: 18.5dB
- Surface Mount Plastic Package



14 Pin 6x3 mm DFN Package

**DESCRIPTION**

The GT010D is a 15W (P3dB) unmatched discrete GaN-on-SiC HEMT which operates from DC to 8.0GHz on a 50V supply rail. The wide bandwidth of the GT010D makes it suitable for a variety of applications including cellular infrastructure, radar, communications, and test instrumentation, and can support both linear and pulsed mode of operations.

The device is housed in an industry-standard 6x3 mm surface mount DFN package. Lead-free and ROHS compliant.

**TYPICAL PERFORMANCE: POWER TUNED AT P3dB,  $T_A = 25^\circ\text{C}$** 

Parameter	3.4 GHz	3.6 GHz	3.8 GHz	Units
Gain	17	16.5	16	dB
Saturated Output Power	15	15	15	W
Drain Efficiency	56	58	55	%

$V_D = 50\text{V}$ ,  $I_{DQ} = 15\text{mA}$

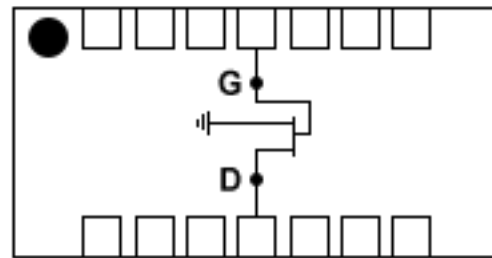
**TYPICAL PERFORMANCE: EFFICIENCY TUNED AT P3dB,  $T_A = 25^\circ\text{C}$** 

Parameter	3.4 GHz	3.6 GHz	3.8 GHz	Units
Gain	18.5	17.5	17	dB
Saturated Output Power	11	11	11	W
Drain Efficiency	64	64	62	%

$V_D = 50\text{V}$ ,  $I_{DQ} = 15\text{mA}$

**GT010D****50V, DC – 8.0GHZ, 10W GAN HEMT****ABSOLUTE MAXIMUM RATINGS**

Parameter	Rating	Units
Breakdown Voltage	>150	BV <sub>DS</sub> (V)
Gate Source Voltage	-8 to +2	V <sub>GS</sub> (V)
Operating Voltage	55	V (V)
Junction Temperature	+225	(°C)
Storage Temperature	-65 to +150	(°C)

**BLOCK DIAGRAM****ELECTRICAL SPECIFICATIONS: T<sub>A</sub> = 25°C**

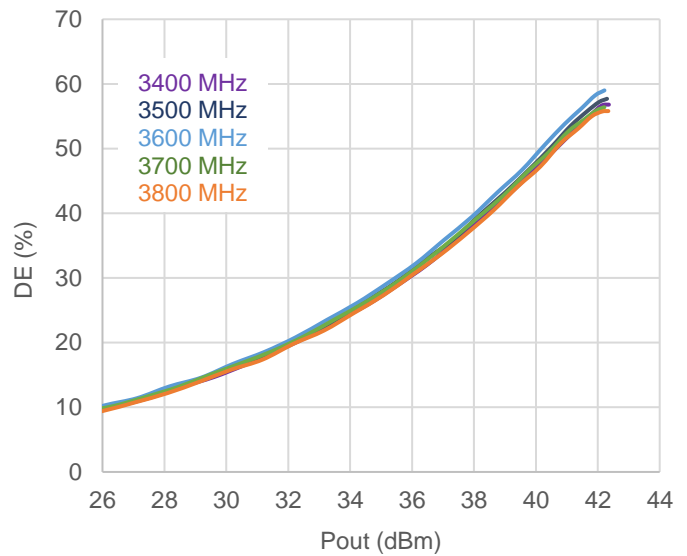
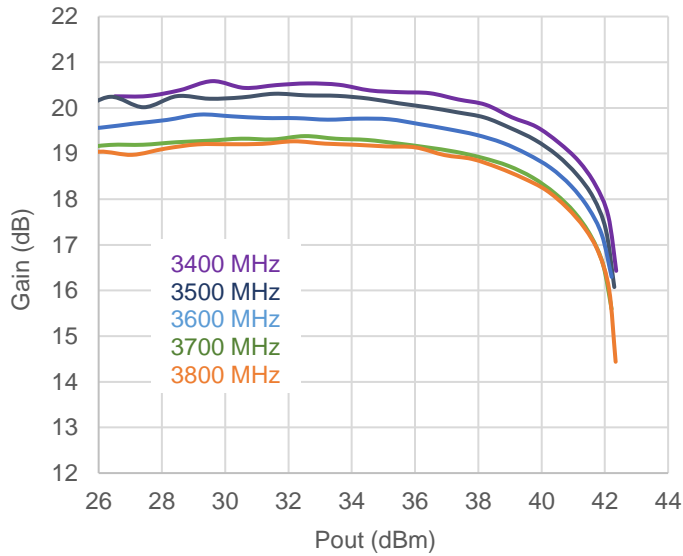
Parameter	Min.	Typ.	Max.	Units	Notes
Frequency Range	DC		8000	MHz	
<b>DC Characteristics</b>					
Drain Source Breakdown Voltage		>150		V <sub>DS</sub> (V)	
Drain Source Leakage Current		0.16		I <sub>DS</sub> (mA)	
Gate Threshold Voltage		-3.5 to -1.5		V <sub>GS</sub> (V)	
<b>Operating Conditions</b>					
Gate Voltage		-2.5		V <sub>G</sub> (V)	
Drain Voltage		50		V <sub>D</sub> (V)	
Quiescent Drain Current		15		I <sub>DQ</sub> (mA)	
<b>Thermal Characteristics</b>					
Thermal Resistance at Pave <sup>(1)</sup>		11.5		θ <sub>JC</sub> (°C/W)	T <sub>case</sub> = 85°C, T <sub>CH</sub> = 128°C P <sub>diss</sub> = 3.7W, P <sub>out</sub> = 1.1W

<sup>(1)</sup> T<sub>case</sub> is referred as temperature at the package back side. T<sub>CH</sub> is modeled peak junction temperature based on 3.6GHz load pull RF performance at 10dB back off.

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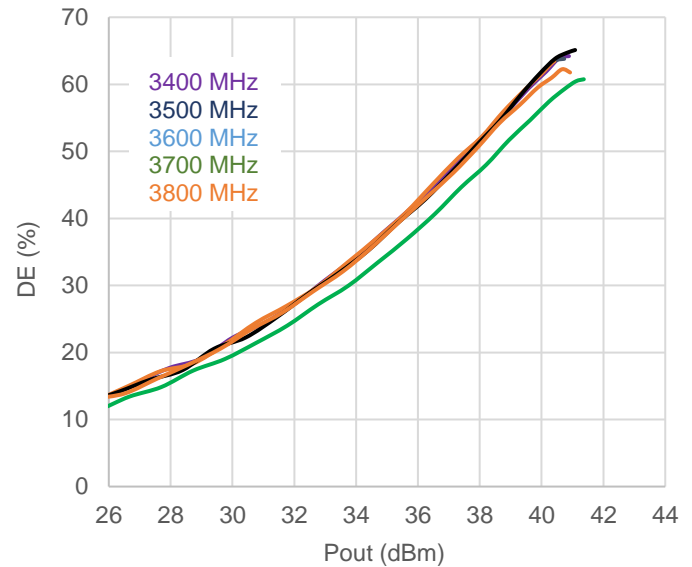
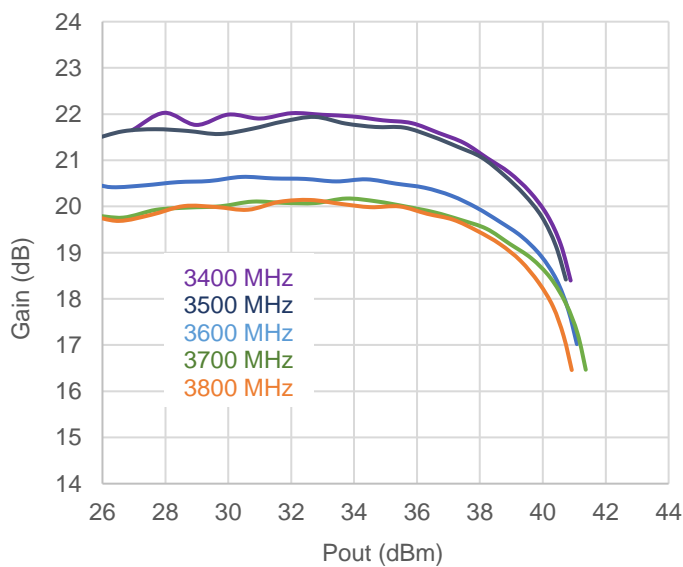
**PERFORMANCE PLOTS: MAX POWER TUNED LOAD PULL**

Test conditions:  $V_D = 50V$ ,  $V_G = -2.70V$ ,  $I_{DQ} = 16mA$ ,  $T = +25^\circ C$ , pulsed CW (10% duty cycle, 100 $\mu s$  width)



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**GT010D****50V, DC – 8.0GHZ, 10W GAN HEMT****LOAD PULL PERFORMANCE: MAX POWER TUNED**

Frequency (MHz)	Source Impedance ( $\Omega$ )	Load Impedance ( $\Omega$ )	P3dB (dBm)	Drain Efficiency (%)	G3dB (dB)
3400	2.9 – j4.7	30 + j24.4	42.2	56.7	17
3500	3.2 – j4.2	30.2 + j24.7	42.1	57.7	16.9
3600	3.3 – j4.1	28.6 + j24.8	42.2	58.9	16.4
3700	3.3 – j4.4	30 + j24.2	42.1	56.1	16.1
3800	3.4 – j4.3	29.7 + j20.1	42.2	55.7	15.9

Test conditions:  $V_D = +50V$ ,  $I_{DQ} = 16mA$ ,  $T = +25^\circ C$ , pulsed CW (10% duty cycle, 100 $\mu s$  width). Harmonics not optimized

**LOAD PULL PERFORMANCE: MAX EFFICIENCY TUNED**

Frequency (MHz)	Source Impedance ( $\Omega$ )	Load Impedance ( $\Omega$ )	P3dB (dBm)	Drain Efficiency (%)	G3dB (dB)
3400	2.2 – j2.3	20.4 + j41.1	40.8	64.1	18.7
3500	2.3 – j2.2	19.1 + j39	40.7	63.8	18.6
3600	2.7 – j2.1	20.7 + j37.7	40.9	64.9	17.5
3700	2.9 – j3.0	22.5 + j34.6	41.2	60.6	16.9
3800	2.7 – j2.2	20 + j35.6	40.7	62.2	17.1

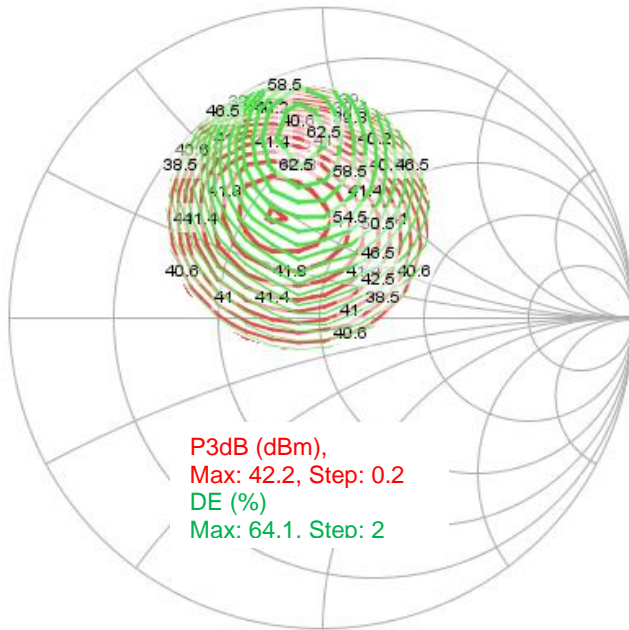
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**GT010D** **50V, DC – 8.0GHZ, 10W GAN HEMT**

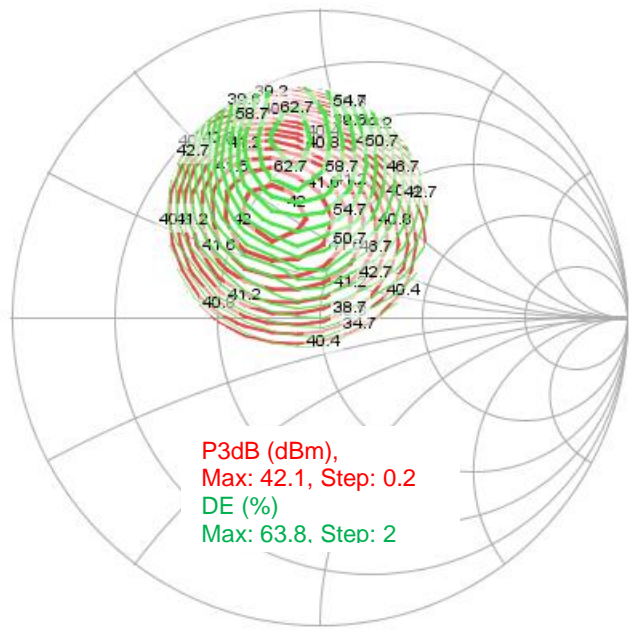
**LOADPULL CONTOURS**

Test conditions:  $V_D = +50V$ ,  $I_{DQ} = 16mA$ ,  $T = +25^\circ C$ , pulsed CW (10% duty cycle, 100 $\mu s$  width). Harmonics not optimized

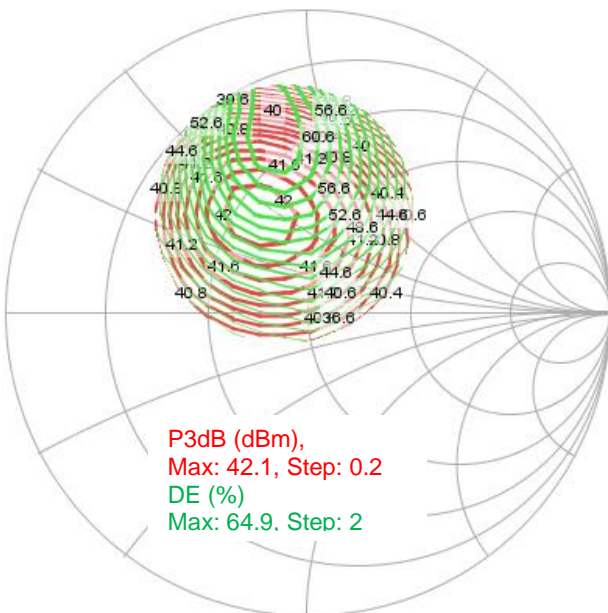
Contours at 3.4 GHz



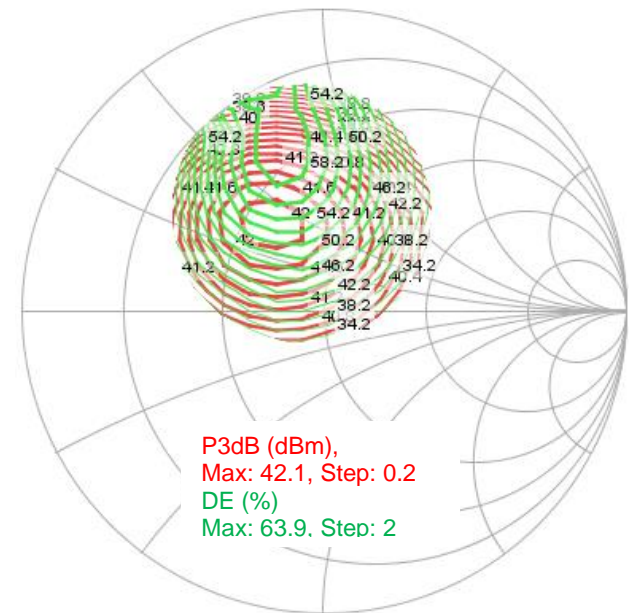
Contours at 3.5 GHz



Contours at 3.6 GHz

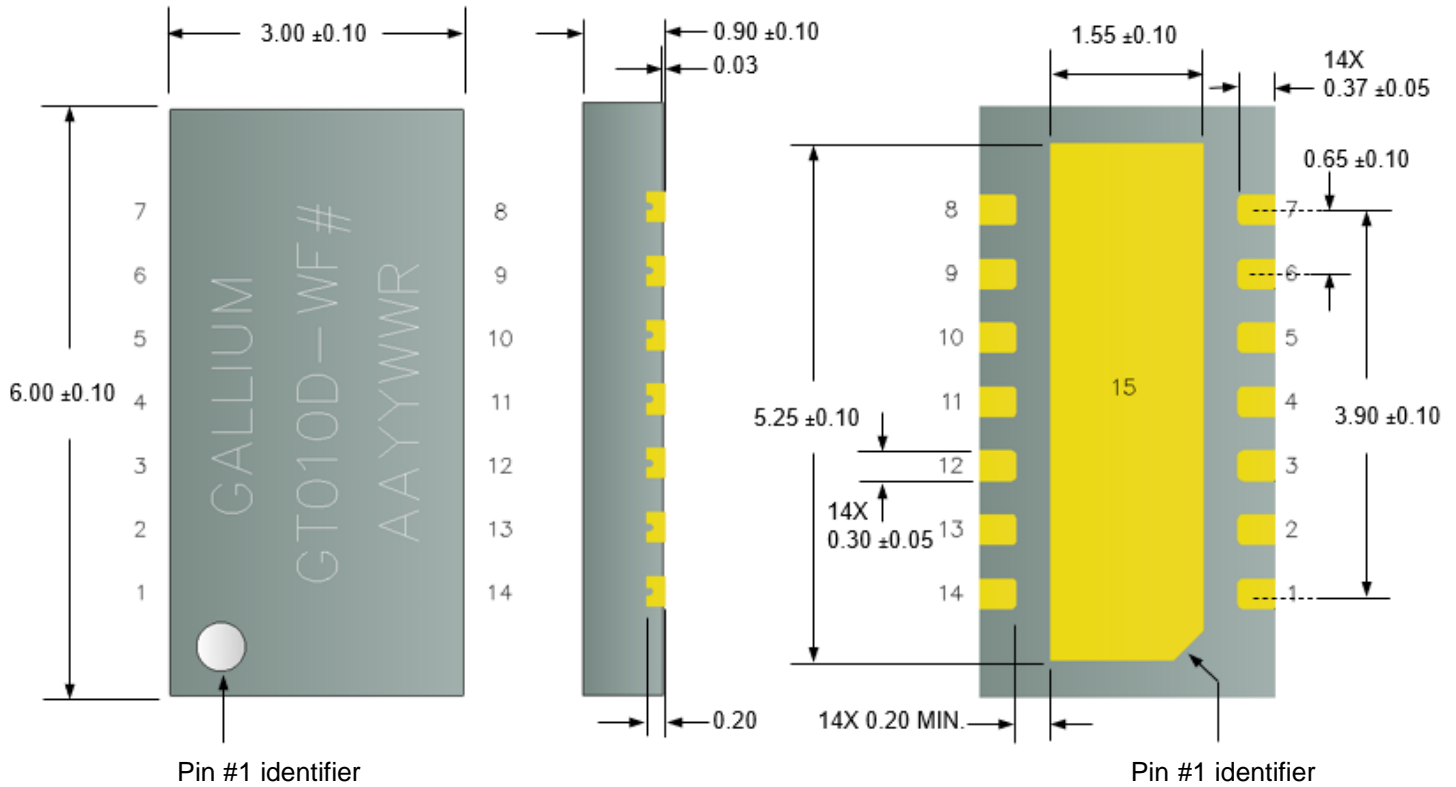


Contours at 3.8 GHz



**GT010D 50V, DC – 8.0GHZ, 10W GAN HEMT**

**PACKAGE DIMENSIONS**



Note: Dimension in mm

**PIN CONFIGURATION**

Pin	Input/Output
1, 2, 3	Not connected
4	RF Input / Gate Voltage
5, 6, 7, 8, 9, 10	Not connected
11	RF Output / Drain Voltage
12, 13, 14	Not connected
15 (Paddle)	Ground

**DEVICE LABEL**

Line 1:	COMPANY NAME: GALLIUM
Line 2:	PART NUMBER - WAFER #
Line 3:	AA: Assembly Code
	YYWW: Assembly Date Code
	R: Reserved code

**GT010D****50V, DC – 8.0GHZ, 10W GAN HEMT**

## GaN HEMT BIASING SEQUENCE

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### To turn the transistor ON

1. Set  $V_{GS}$  to -5V
2. Turn on  $V_{DS}$  to normal operation voltage (50V)
3. Slowly increase  $V_{GS}$  to set  $I_{DS}$  current (15mA)
4. Apply RF power

### To turn the transistor OFF

1. Turn the RF power off
2. Decrease  $V_{GS}$  to -5V
3. Turn off  $V_D$ . Wait a few seconds for drain capacitor to discharge
4. Turn off  $V_{GS}$

## CONTACT INFORMATION

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To request latest information and samples, please contact us at:

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Email: [sales@galliumsemi.com](mailto:sales@galliumsemi.com)