GT020D 50V, DC – 7.0GHZ, 20W GAN HEMT

FEATURES

- Operating Frequency Range: DC to 7.0GHz
- Operating Drain Voltage: +50V
- Maximum Output Power (P_{SAT}): 35W
- Maximum Drain Efficiency: 68%
- Efficiency-Tuned P3dB Gain: 19dB
- Surface Mount Plastic Package

14 Pin 6x3 mm DFN Package

DESCRIPTION

The GT020D is a 35W (P3dB) unmatched discrete GaN-on-SiC HEMT which operates from DC to 7.0GHz on a 50V supply rail. The wide bandwidth of the GT020D 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°C

Parameter	3.4 GHz	3.6 GHz	3.8 GHz	Units
Gain	14.3	15.2	15.6	dB
Saturated Output Power	35	33	30	W
Drain Efficiency	58	57	52	%

V_D = 50V, I_{DQ} = 30mA

TYPICAL PERFORMANCE: EFFICIENCY TUNED AT P3dB, T_A = 25°C

Parameter	3.4 GHz	3.6 GHz	3.8 GHz	Units
Gain	16.4	17.2	19	dB
Saturated Output Power	20	20	20	W
Drain Efficiency	68	66	62	%

V_D = 50V, I_{DQ} = 30mA

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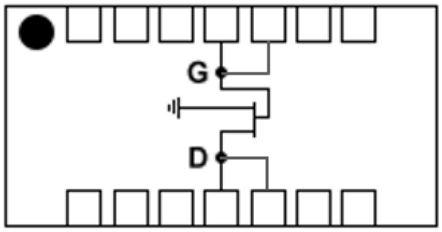
ABSOLUTE MAXIMUM RATINGS

Parameter	Rating	Units
Breakdown Voltage	>150	BV_{DG} (V)
Gate Source Voltage	-8 to +2	V_{GS} (V)
Operating Voltage	55	V (V)
Junction Temperature	+225	(°C)
Storage Temperature	-65 to +150	(°C)

BLOCK DIAGRAM



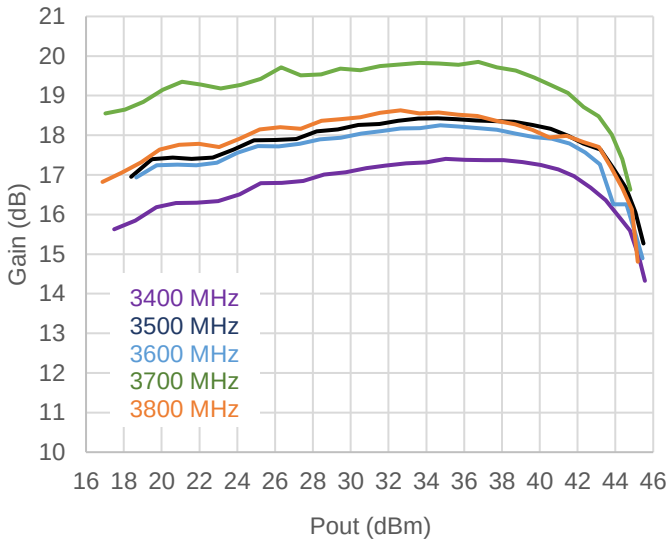
ELECTRICAL SPECIFICATIONS: T_A = 25°C

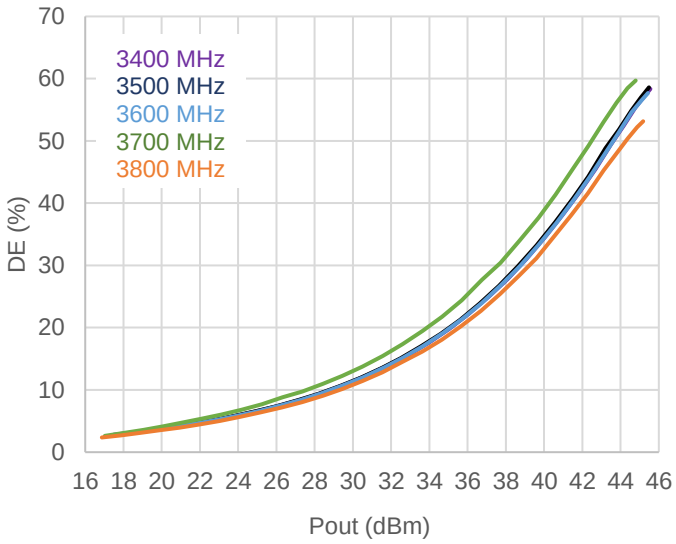
Parameter	Min.	Typ.	Max.	Units	Notes
Frequency Range	DC		7000	MHz	
DC Characteristics					
Drain Source Breakdown Voltage		>150		V_{DS} (V)	
Drain Source Leakage Current		0.32		I_{DS} (mA)	
Gate Threshold Voltage		-3.5 to -1.5		V_{GS} (V)	
Operating Conditions					
Gate Voltage		-2.5		V_G (V)	
Drain Voltage		50		V_D (V)	
Quiescent Drain Current		32		I_{DQ} (mA)	
Thermal Characteristics					
Thermal Resistance at Pave (1)		6.6		θ_{JC} (°C/W)	T_{case} = 85°C, T_{CH} = 135°C P_{diss} = 7.5W, P_{out} = 2.1W

(1) T_{case} is referred as temperature at the package back side. T_{CH} is modeled peak junction temperature based on 3.6GHz load pull RF performance at 10dB back off.

PERFORMANCE PLOTS: MAX POWER TUNED LOAD PULL

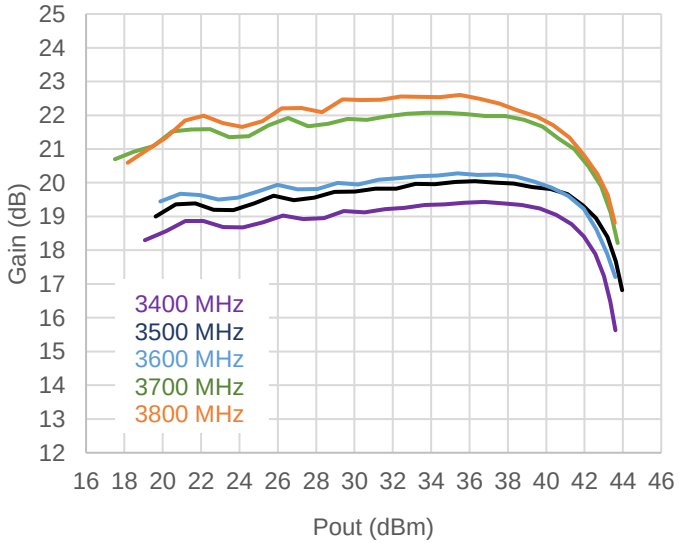
Test conditions: V_D = 50V, V_G = -2.74V, I_{DQ} = 24mA, T = +25°C, pulsed CW (50us width, 10.39% duty cycle)

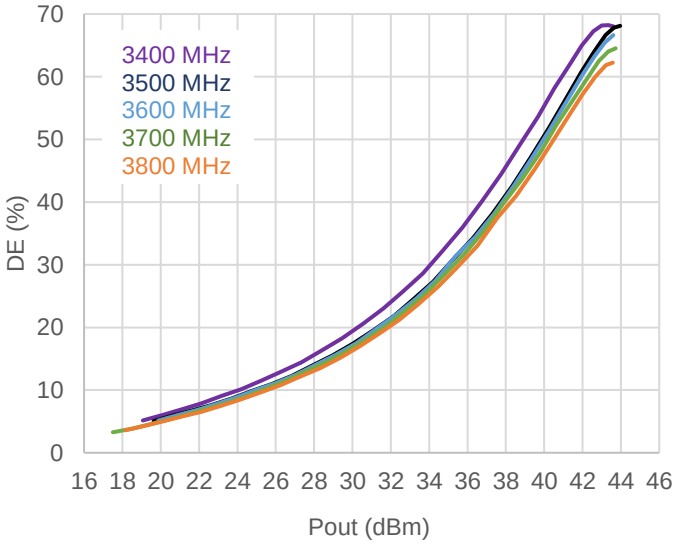




PERFORMANCE PLOTS: MAX EFFICIENCY TUNED LOAD PULL

Test conditions: V_D = 50V, V_G = -2.74V, I_{DQ} = 24mA, T = +25°C, pulsed CW (50us width, 10.39% duty cycle)





LOAD PULL PERFORMANCE: MAX POWER TUNED

Frequency (MHz)	Source Impedance (Ω)	Load Impedance (Ω)	P3dB (dBm)	Drain Efficiency (%)	G3dB (dB)
3400	2.3 - j0.34	12.1 + j5.28	45.6	58.4	14.3
3500	1.7 - j0.64	10.3 + j5.32	45.4	58.4	15.3
3600	1.7 - j0.81	10.3 + j5.34	45.3	57.1	15.2
3700	1.5 - j0.46	11.7 + j5.19	44.9	53.5	16.2
3800	1.7 - j0.11	10.2 + j5.35	45.0	52.6	15.6

Test conditions: V_D = +50V, I_{DQ} = 10mA, T = +25°C, pulsed CW (50us width, 10.39% duty cycle). Harmonics not optimized

LOAD PULL PERFORMANCE: MAX EFFICIENCY TUNED

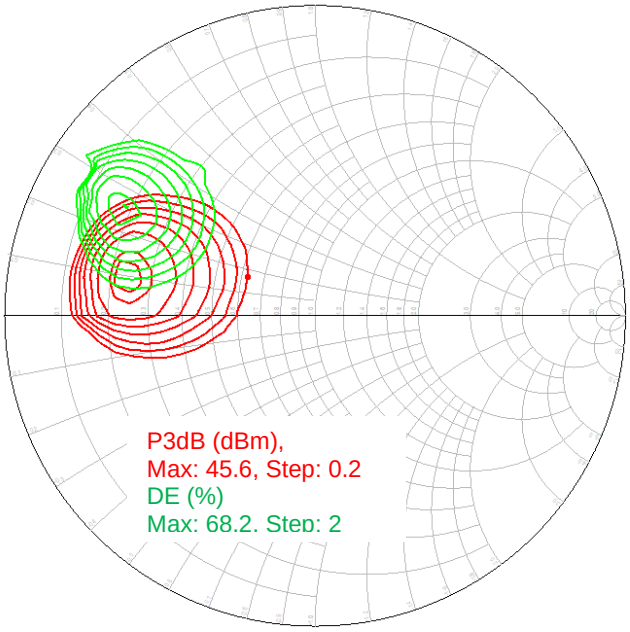
Frequency (MHz)	Source Impedance (Ω)	Load Impedance (Ω)	P3dB (dBm)	Drain Efficiency (%)	G3dB (dB)
3400	1.7 + j0.67	7.55 + j14.9	43.4	68.2	16.4
3500	1.4 + j 0.09	7.38 + j12.4	43.9	68.1	17.0
3600	1.3 - j 0.03	7.37 + j12.4	43.6	66.6	17.2
3700	0.96 + j0.35	7.26 + j12.7	43.4	64.1	19.0
3800	0.93 + j1.1	7.36 + j12.4i	43.3	61.9	19.6

Test conditions: V_D = +50V, I_{DQ} = 10mA, T = +25°C, pulsed CW (50us width, 10.39% duty cycle). Harmonics not optimized

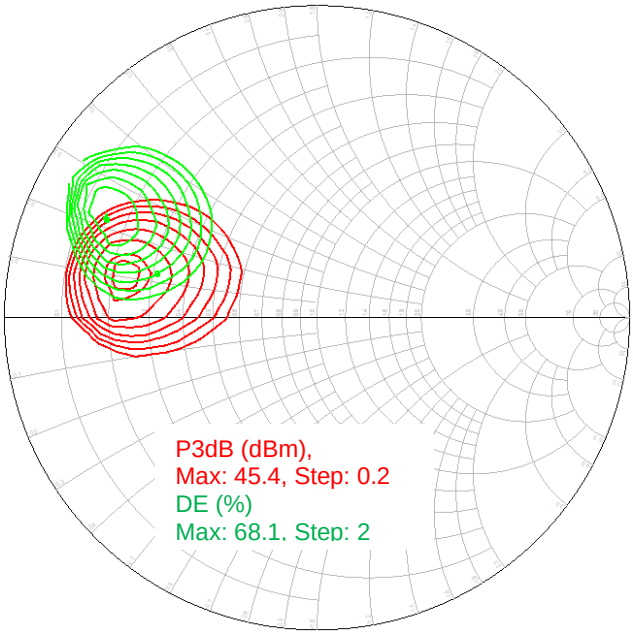
LOADPULL CONTOURS

Test conditions: V_D = +50V, I_{DQ} = 10mA, T = +25°C, pulsed CW (50us width, 10.39% duty cycle). Harmonics not optimized

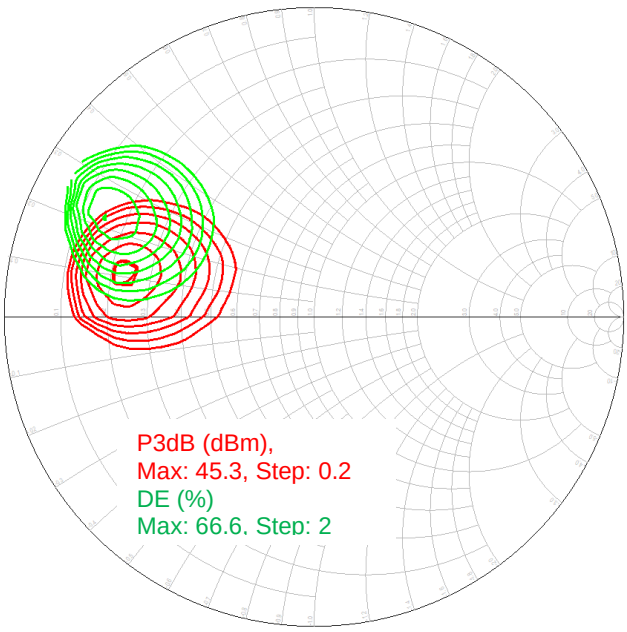
Contours at 3.4 GHz



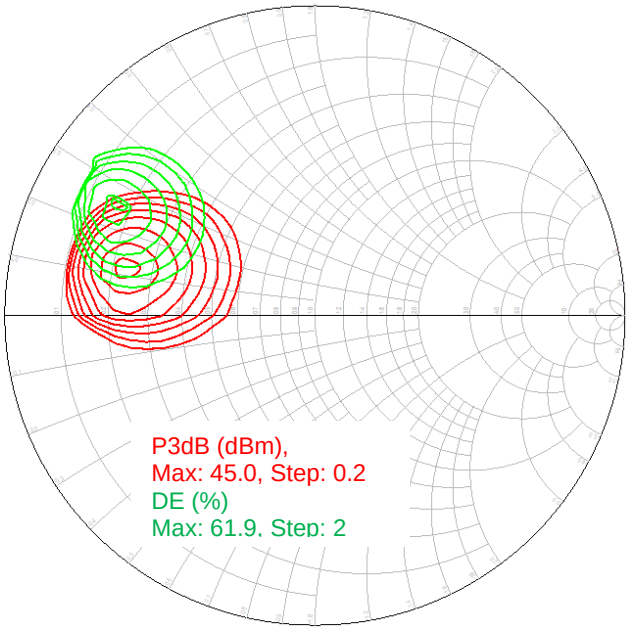
Contours at 3.5 GHz



Contours at 3.6 GHz



Contours at 3.8 GHz



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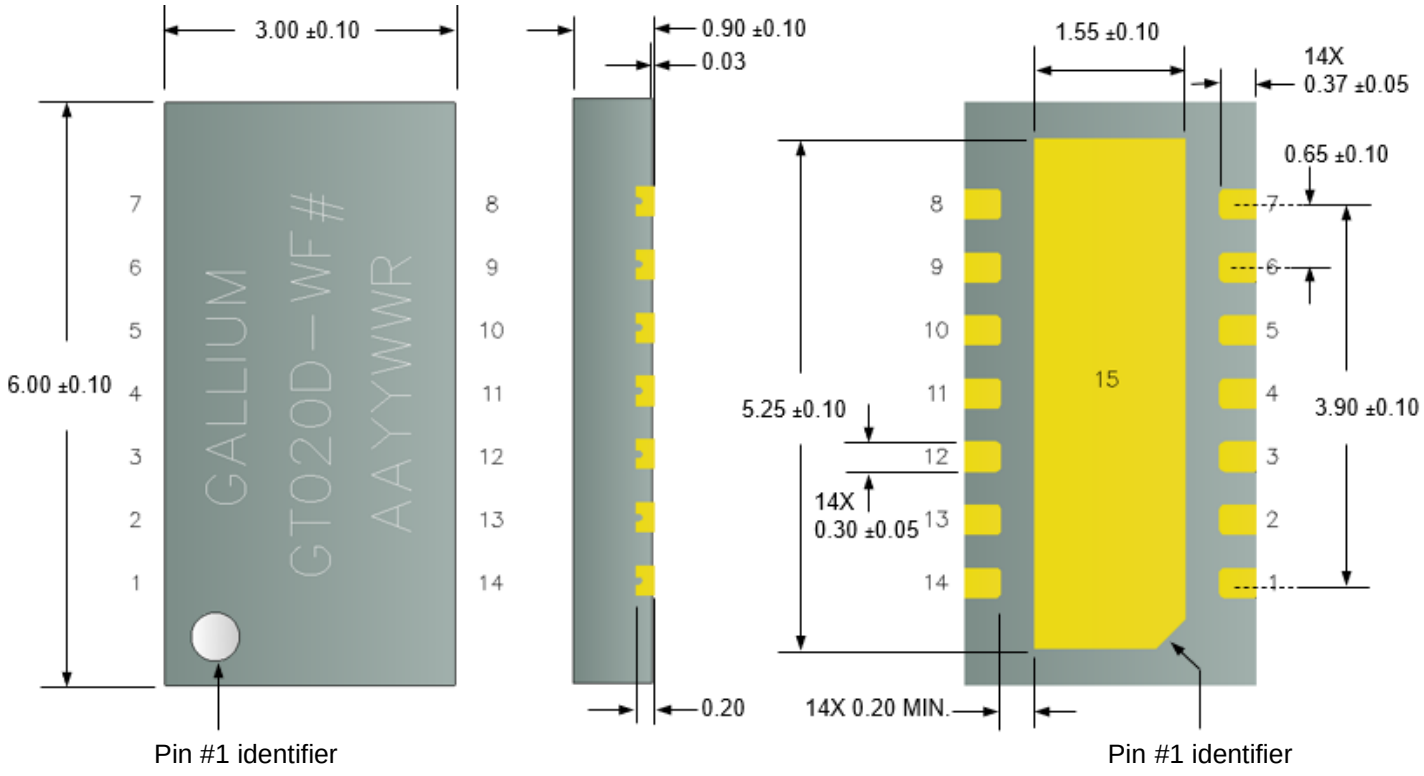
PACKAGE DIMENSIONS



Note: Dimension in mm

PIN CONFIGURATION

Pin	Input/Output
1, 2, 3	Not connected
4, 5	RF Input / Gate Voltage
6, 7, 8, 9	Not connected
10, 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

GaN HEMT BIASING SEQUENCE

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 (30mA)
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

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

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