

## INTRODUCTION

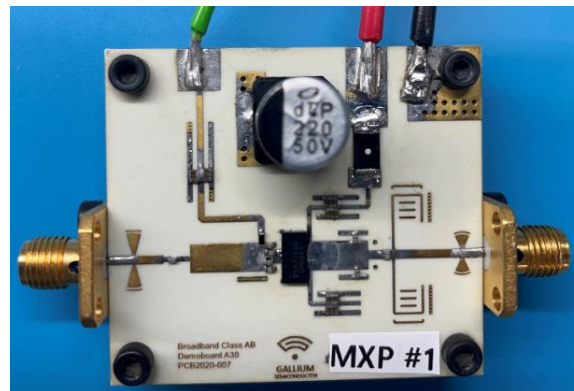
The GT030D is a 30W (P3dB) unmatched discrete GaN-on-SiC HEMT which operates from DC to 6.0GHz on a 50V supply rail. The wide bandwidth of the GT030D makes it suitable for a variety of applications including cellular infrastructure, radar, communications, and test instrumentation, and can support both CW and pulsed mode of operations. This application note provides detail performances for GT030D in two different broadband class AB amplifier demonstration boards.



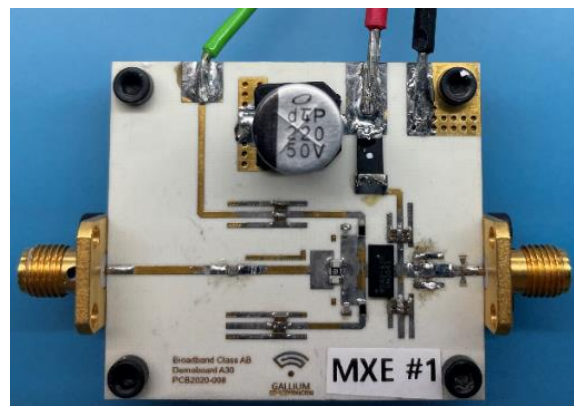
14 Pin 6x3 mm DFN Package

## DESCRIPTION

**GT030D-EB1842-01** is a Class AB evaluation amplifier circuit that was designed to demonstrate GT030D in its best Output Power performance between 1.8 – 4.2GHz frequency range



**GT030D-EB3040-01** is a Class AB evaluation amplifier circuit that was designed to demonstrate GT030D with its best Drain Efficiency performance between 3.0 – 4.0GHz frequency range



**GT030D****50V, DC – 6.0GHZ, 30W GAN HEMT****GT030D-EB1842-01 MEASURED PERFORMANCE <sup>(1)</sup>**

Parameter	1.8 GHz	2.6 GHz	2.8 GHz	3.4 GHz	3.8 GHz	4.2 GHz
P3dB Power Gain (dB)	9.3	10.0	10.0	9.5	10.7	9.4
Saturated Output Power (W)	39.1	47.3	47.8	42.5	44.2	37.7
Drain Efficiency (%)	49.6	53.6	55.5	49.4	55	54.4

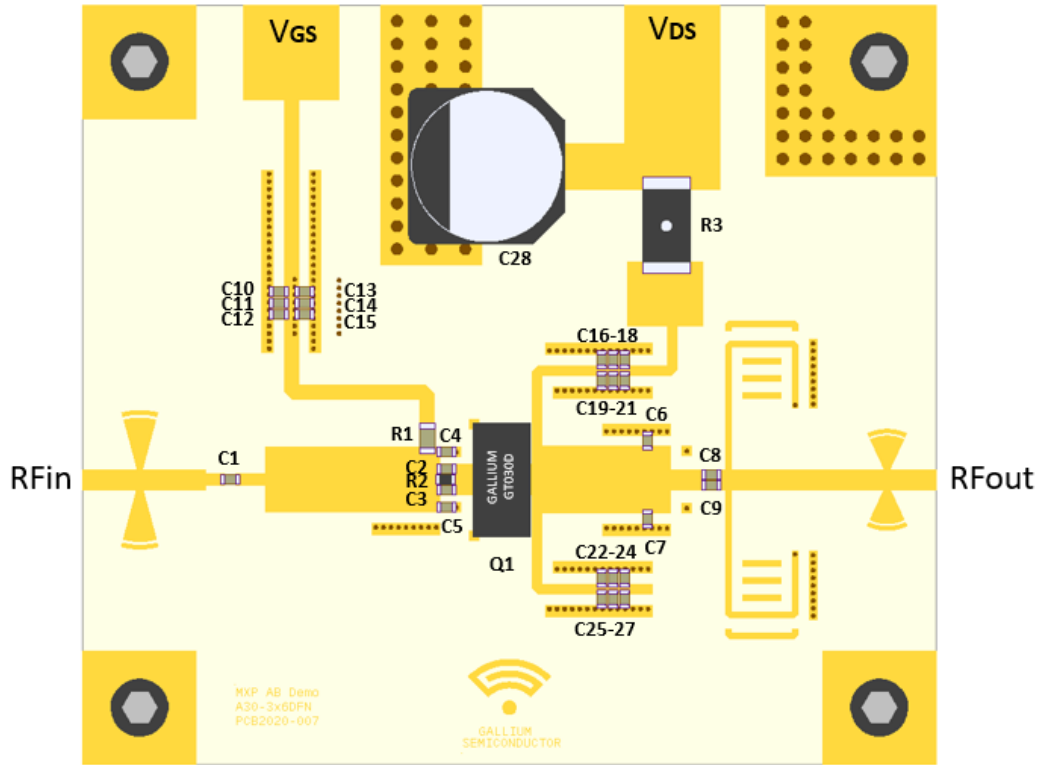
**GT030D-EB3040-01 MEASURED PERFORMANCE <sup>(1)</sup>**

Parameter	3.0 GHz	3.2 GHz	3.4 GHz	3.6 GHz	3.8 GHz	4.0 GHz
P3dB Power Gain (dB)	10.8	12.4	12.6	12.5	12.6	12.3
Saturated Output Power (W)	40.7	39.9	40.3	40.4	42.9	40.8
Drain Efficiency (%)	68.9	64.4	59.3	56.5	55.7	56.3

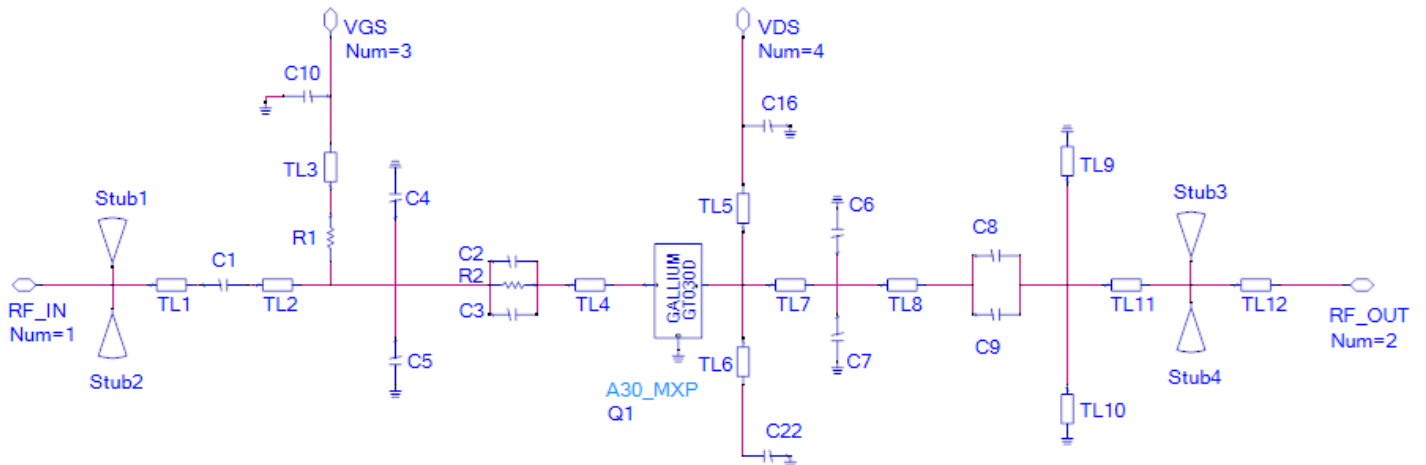
- <sup>(1)</sup> P3dB compression at 25°C,  $V_D = 50V$ ,  $I_{DQ} = 47mA$ , pulsed CW (10% duty cycle, 100 $\mu$ s width). Data are averaged from 5 samples.

**GT030D 50V, DC – 6.0GHZ, 30W GAN HEMT**

**GT030D-EB1842-01 – 1.8 – 4.2 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**



**GT030D-EB1842-01 SCHEMATIC DIAGRAM**



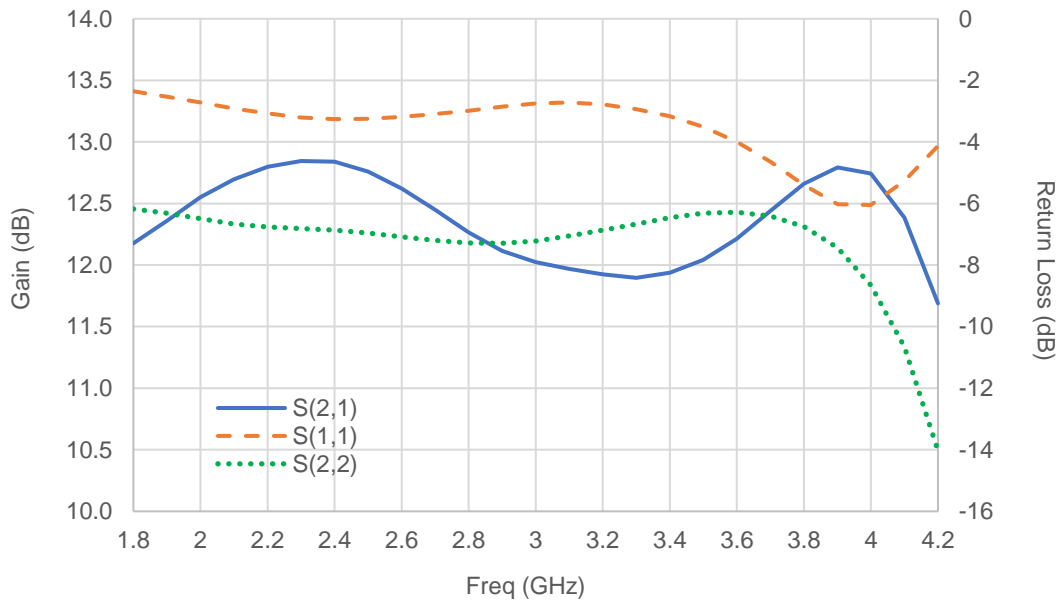
**GT030D****50V, DC – 6.0GHZ, 30W GAN HEMT****GT030D-EB1842-01 – 1.8 – 4.2 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD****GT030D-EB1842-01 – BILL OF MATERIALS**

Designator	Description	Quant	Manufacture	Part Number
C1	CAP, SMD 5.6 pF +/-0.1pF 0402	1	Passive Plus	PPI DKD0402N KIT
C2, C3	CAP, SMD 5.1 pF +/-0.1pF 0402	2	Passive Plus	PPI DKD0402N KIT
C4, C5	CAP, SMD 0.5 pF +/-0.1pF 0402	2	Passive Plus	PPI DKD0402N KIT
C6, C7	CAP, SMD 0.4 pF +/-0.1pF 0402	2	Passive Plus	PPI DKD0402N KIT
C8, C9	CAP, SMD 0.9 pF +/-0.1pF 0402	2	Passive Plus	PPI DKD0402N KIT
C10 - C27	CAP, CER 10000PF 50V X5R 0402	18	Taiyo Yuden	UMK105BJ103KV-F
C28	CAP, ALUM 220UF 20% 50V SMD	1	Nichicon	UWT1H221MNL1GS
R1	RES, SMD 499 Ohm 1% 1/5W 0603	1	Panasonic	ERJP03F4990V
R2	RES, SMD 15 OHM 1% 1/5W 0402	1	Vishay Dale	CRCW040215R0FKEDHP
R3	RES, SMD 0.1 OHM 1% 1/2W 2010	1	Vishay Dale	WSL2010R1000FEA
Q1	50V, DC – 6.0GHZ, 30W GAN HEMT	1	Gallium Semi	GT030D
PCB	ROGERS RO4350 20mil 1oz Cu			

**GT030D 50V, DC – 6.0GHZ, 30W GAN HEMT**

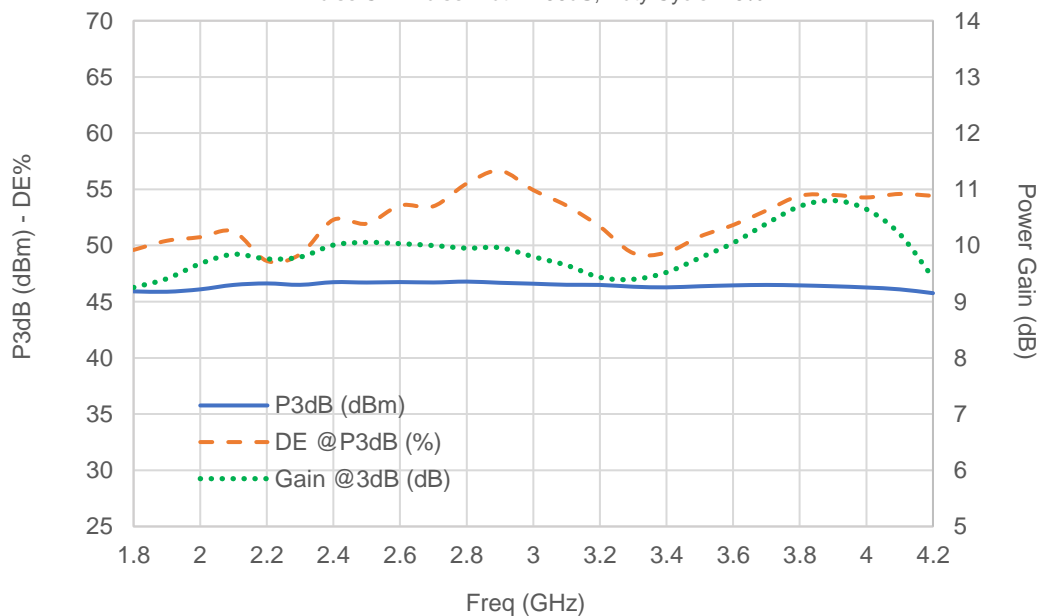
**GT030D-EB1842-01 – 1.8 – 4.2 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**

GT030D-EB1842-01 Small Singal Performance vs Frequency



GT030-EB1842-01 Output Power, Drain Efficiency and Gain vs Frequency

Vd = 50V; Idq = 47mA, @25°C  
Pulse CW: Pulse width=100uS, Duty Cycle=10%

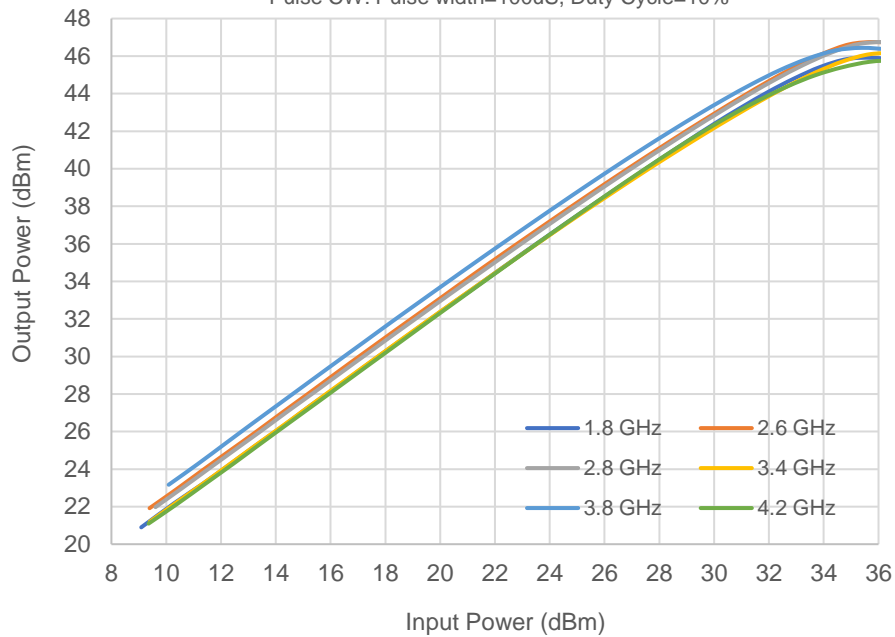


**GT030D 50V, DC – 6.0GHZ, 30W GAN HEMT**

**GT030D-EB1842-01 – 1.8 – 4.2 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**

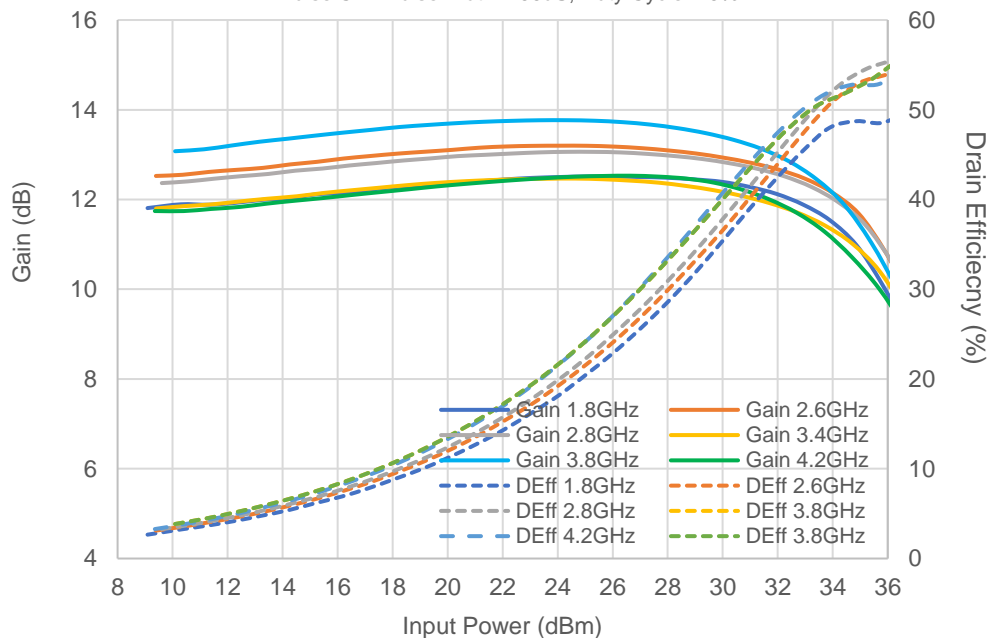
GT030D-EB1842-01 Output Power vs Input Power

Vd = 50V; Idq = 47mA, @25°C  
Pulse CW: Pulse width=100uS, Duty Cycle=10%



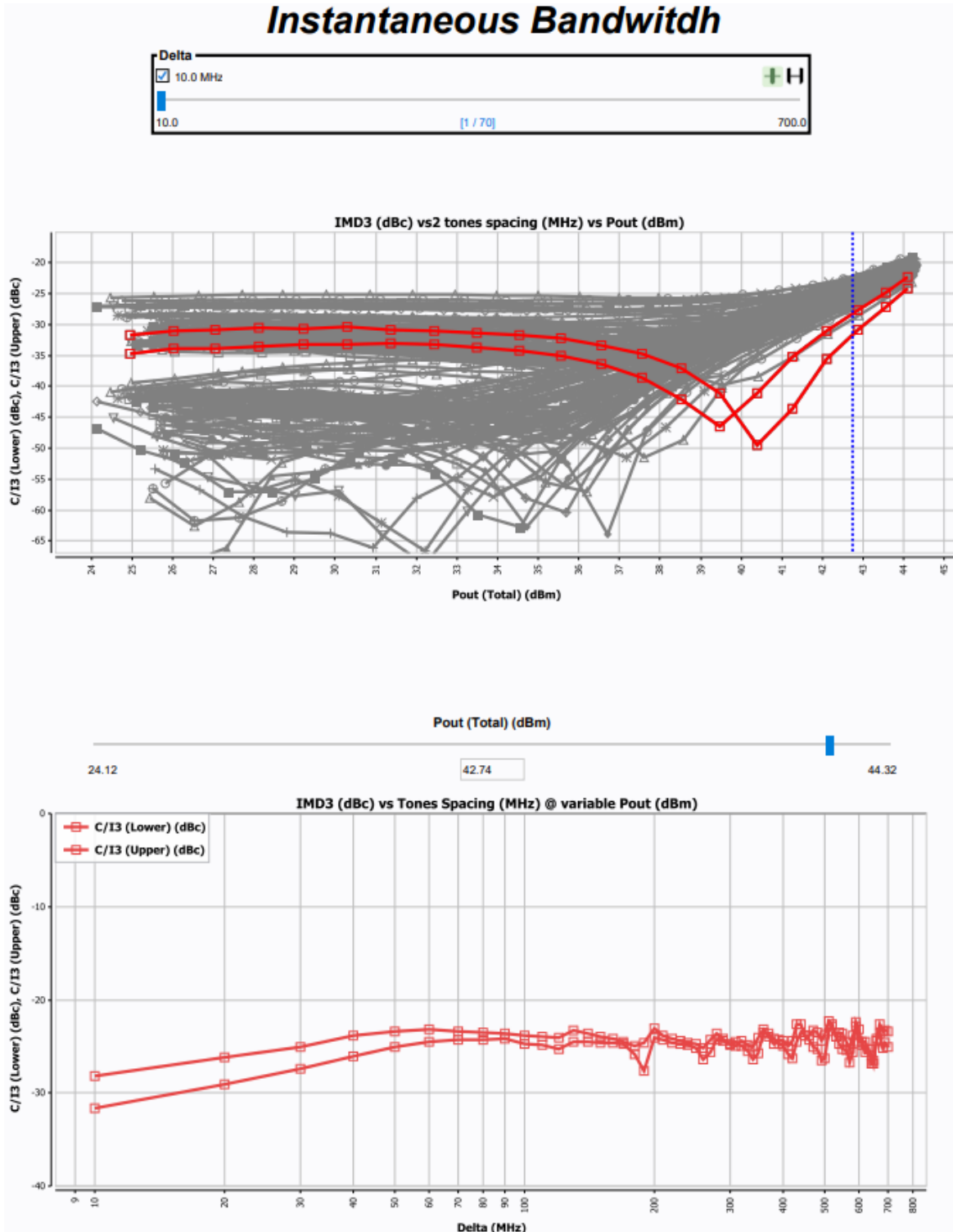
GT030D-EB1842-01 Gain and Drain Efficiency vs Input Power

Vd = 50V; Idq = 47mA, @25°C  
Pulse CW: Pulse width=100uS, Duty Cycle=10%



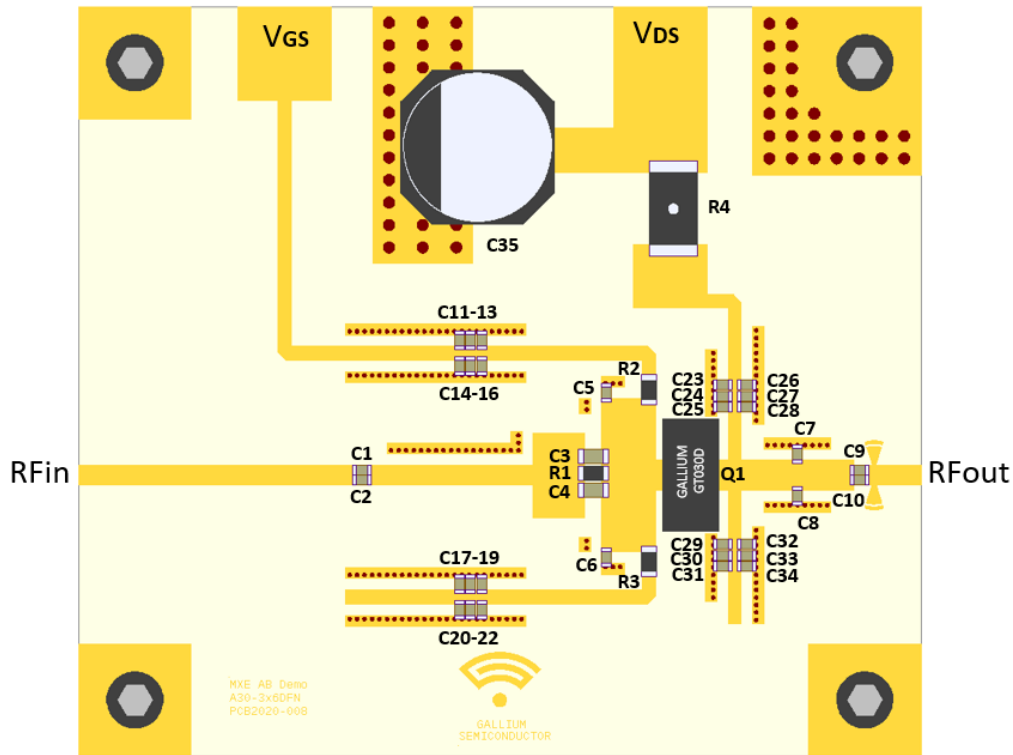
**GT030D 50V, DC – 6.0GHZ, 30W GAN HEMT**

**GT030D-EB1842-01 – 1.8 – 4.2 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**

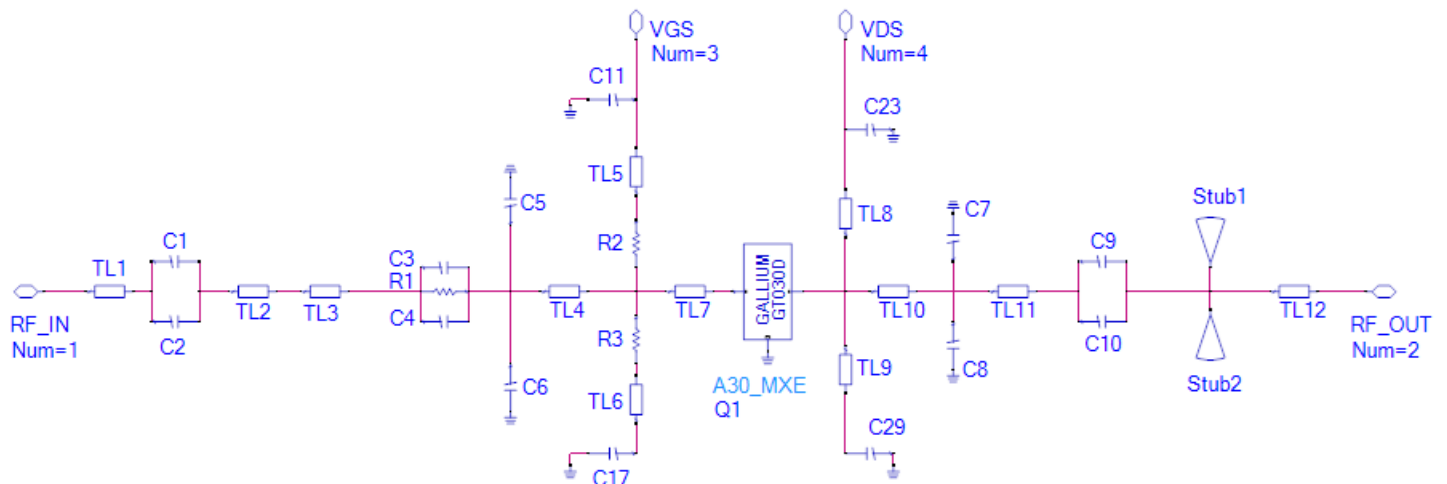


**GT030D 50V, DC – 6.0GHZ, 30W GAN HEMT**

**GT030D-EB3040-01 – 3.0 – 4.0 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**



**GT030D-EB3040-01 SCHEMATIC DIAGRAM**



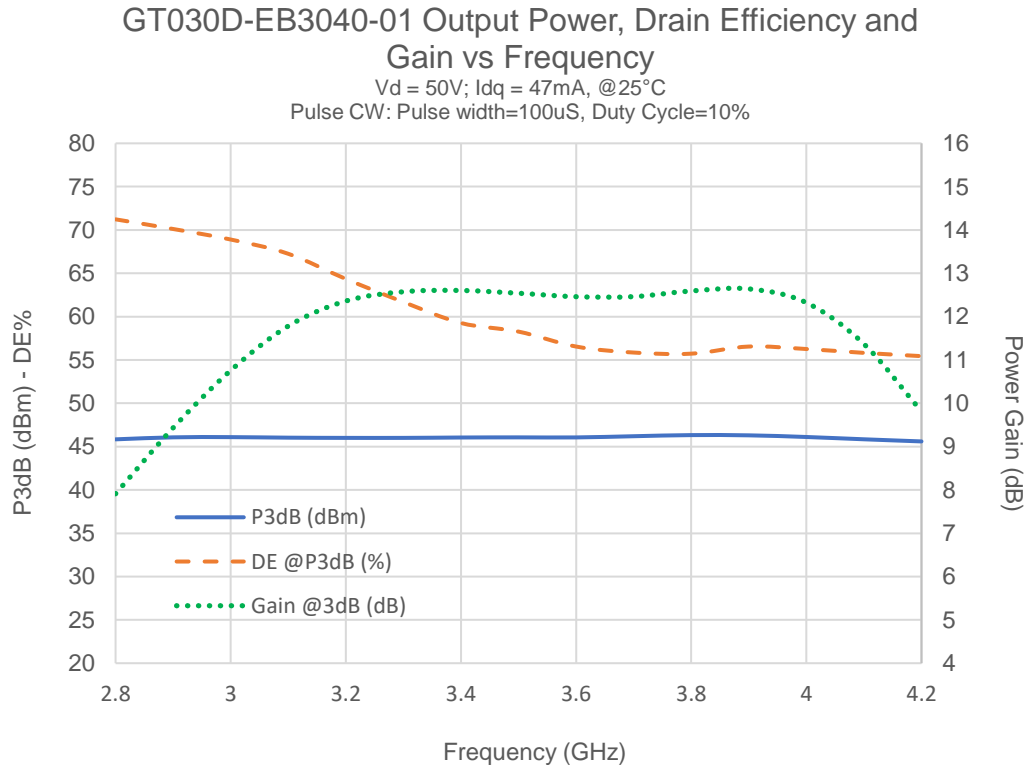
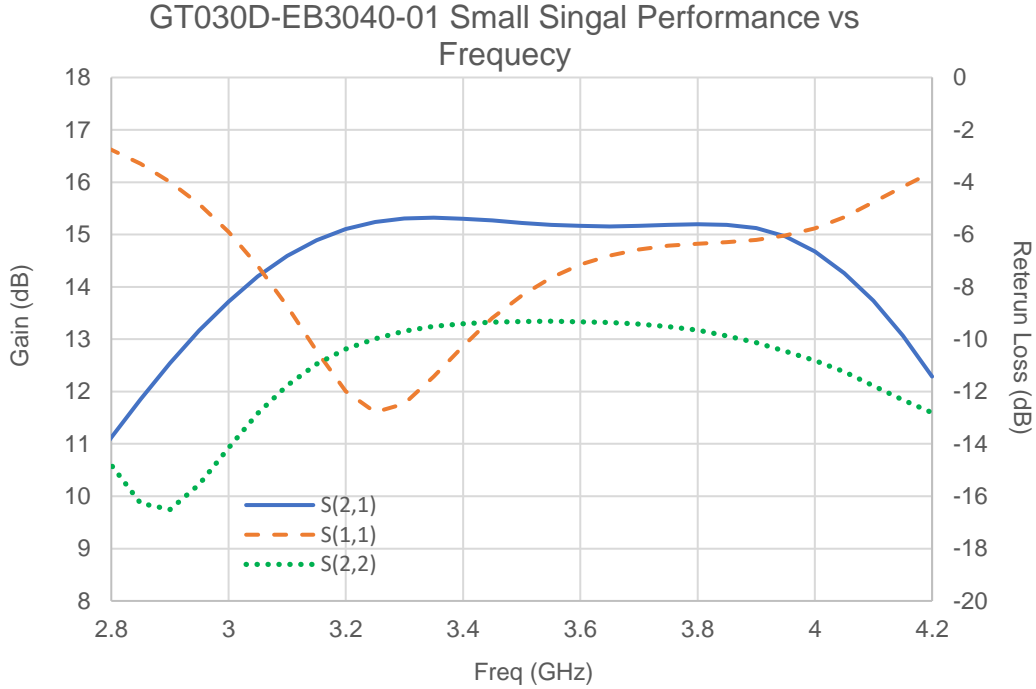


**GT030D****50V, DC – 6.0GHZ, 30W GAN HEMT****GT030D-EB3040-01 – 3.0 – 4.0 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD****GT030-EB3040-01 – BILL OF MATERIALS**

<b>Designator</b>	<b>Description</b>	<b>Quant</b>	<b>Manufacture</b>	<b>Part Number</b>
C1	CAP, SMD 0.4 pF +/-0.1pF 0402	1	Passive Plus	PPI DKD0402N KIT
C2	CAP, SMD 0.3 pF +/-0.1pF 0402	1	Passive Plus	PPI DKD0402N KIT
C3, C4	CAP, SMD 1.0 pF +/-0.1pF 0603	2	Passive Plus	PPI DKD0402N KIT
C5, C6	CAP, SMD 0.5 pF +/-0.1pF 0402	2	Passive Plus	PPI DKD0402N KIT
C7	CAP, SMD 0.6 pF +/-0.1pF 0402	1	Passive Plus	PPI DKD0402N KIT
C8	CAP, SMD 0.7 pF +/-0.1pF 0402	1	Passive Plus	PPI DKD0402N KIT
C9, C10	CAP, SMD 1.9 pF +/-0.1pF 0402	2	Passive Plus	PPI DKD0402N KIT
C11 – C34	CAP, CER 10000PF 50V X5R 0402	24	Taiyo Yuden	UMK105BJ103KV-F
C35	CAP, ALUM 220UF 20% 50V SMD	1	Nichicon	UWT1H221MNL1GS
R1	RES, SMD 180 OHM 1% 1/5W 0603	1	TE Connectivity	CRGH0603F180R
R2, R3	RES SMD 49.9 OHM 1% 1/4W 0603	2	Vishay Dale	RCS060349R9FKEA
R4	RES, SMD 0.1 OHM 1% 1/2W 2010	1	Vishay Dale	WSL2010R1000FEA
Q1	50V, DC – 6.0GHZ, 30W GAN HEMT	1	Gallium Semi	GT030D
PCB	ROGERS RO4350 20mil 1oz Cu			

**GT030D 50V, DC – 6.0GHZ, 30W GAN HEMT**

**GT030D-EB3040-01 – 3.0 – 4.0 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**

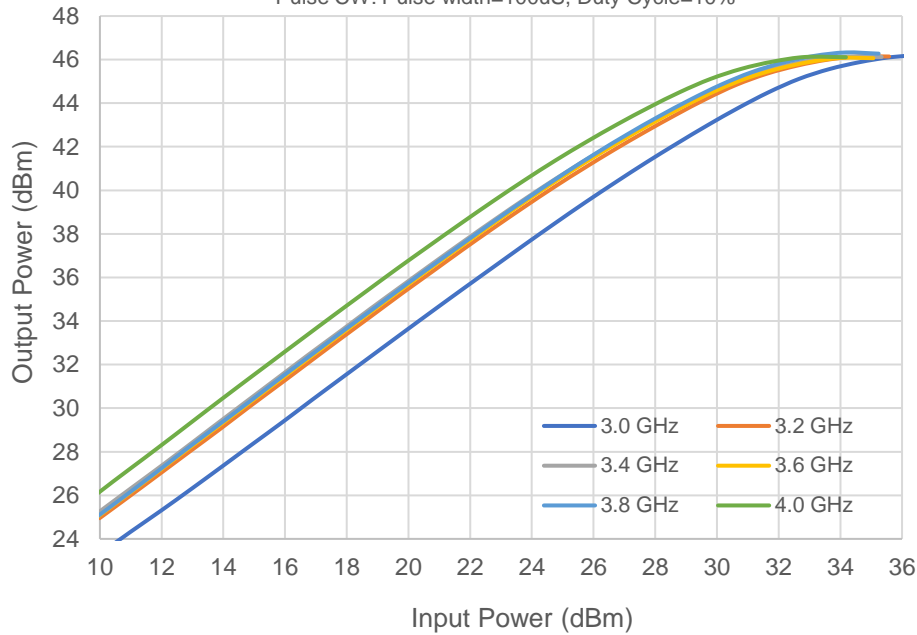


**GT030D 50V, DC – 6.0GHZ, 30W GAN HEMT**

**GT030D-EB3040-01 – 3.0 – 4.0 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**

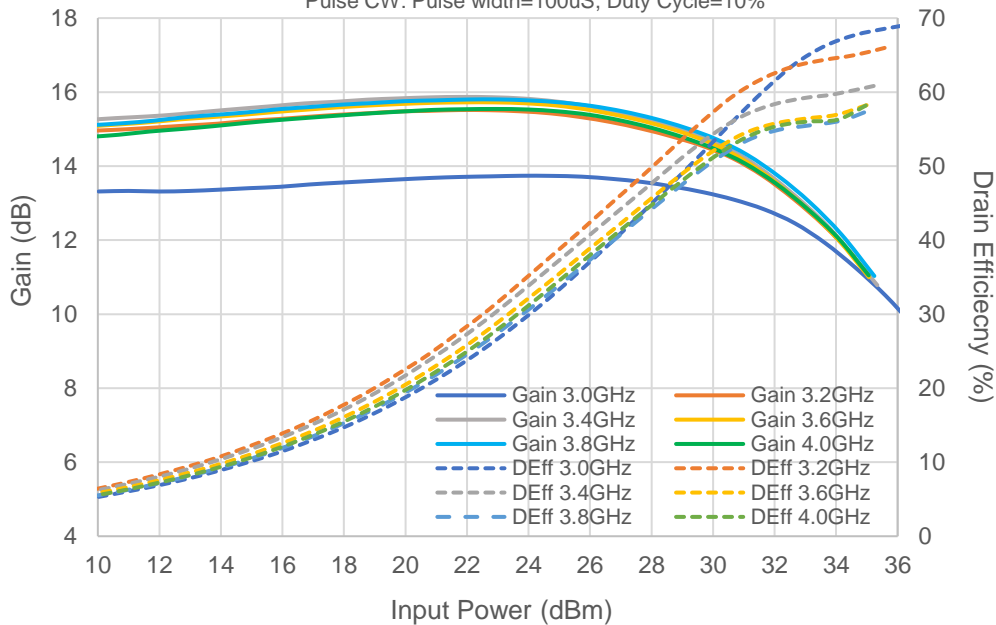
GT030D-EB3040-01 Output Power vs Input Power

Vd = 50V; Idq = 47mA, @25°C  
Pulse CW: Pulse width=100uS, Duty Cycle=10%



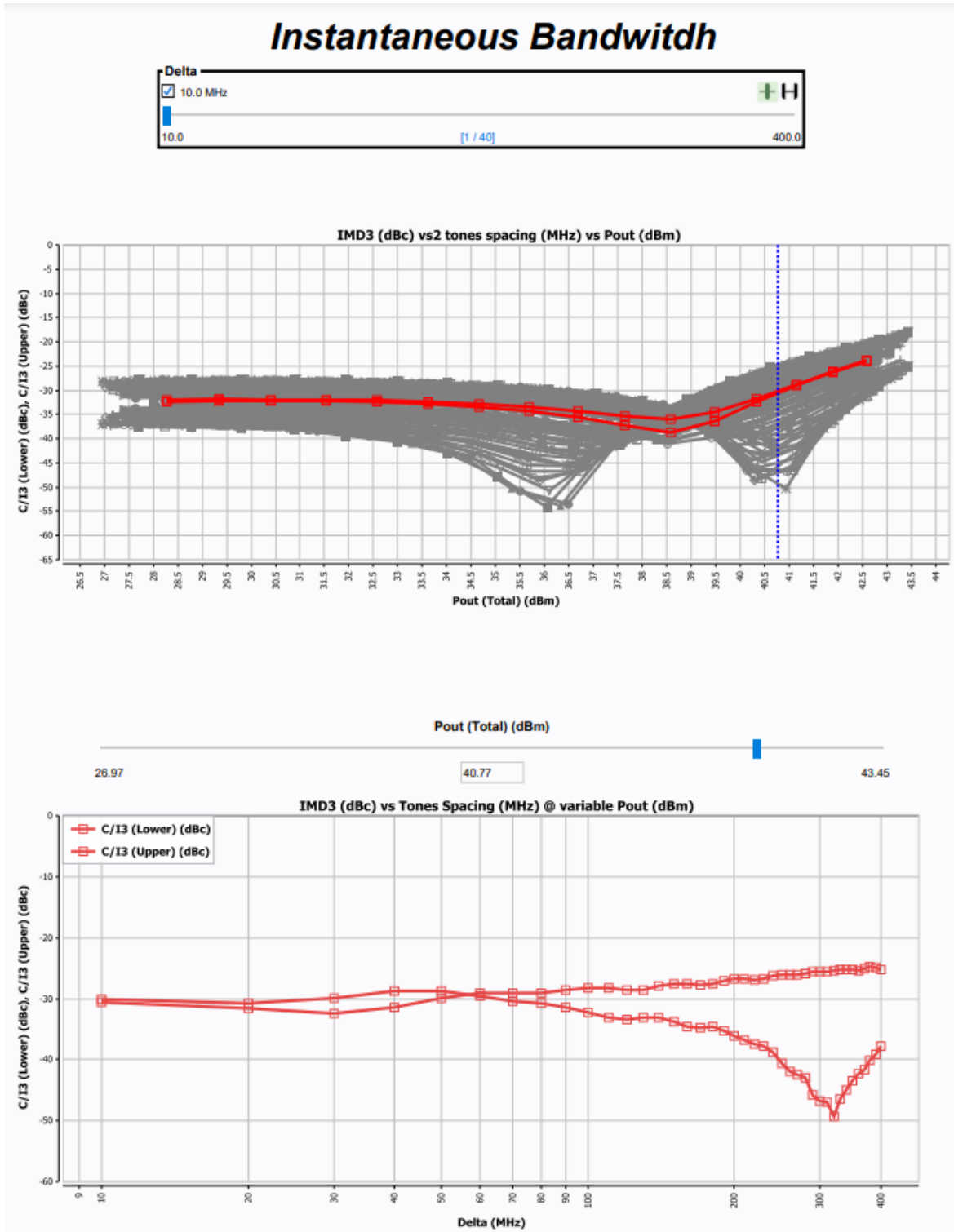
GT030D-EB3040-01 Gain and Drain Efficiency vs Input Power

Vd = 50V; Idq = 47mA, @25°C  
Pulse CW: Pulse width=100uS, Duty Cycle=10%



**GT030D** **50V, DC – 6.0GHZ, 30W GAN HEMT**

**GT030D-EB3040-01 – 3.0 – 4.0 GHz BROAD BAND CLASS AB DEMONSTRATION TEST BOARD**



## 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 (47mA)
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:

Web: <https://www.galliumsemi.com/>

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