

FEATURES

- High Voltage Operation : VDS=50V
- High Power : 43.5dBm (typ.) @ Psat
- Power Gain : 19dB (typ.) @ f=2.14GHz
- Proven Reliability

DESCRIPTION

SEI's GaN-HEMT offers high efficiency, ease of matching, greater consistency and broad bandwidth for high power L-band amplifiers with 50V operation, and gives you higher gain.

This new product is ideally suited for use in 2.1GHz W-CDMA and LTE design requirements as it offers high gain, long term reliability and ease of use.

**ABSOLUTE MAXIMUM RATINGS (Case Temperature Tc=25deg.C)**

Item	Symbol	Condition	Rating	Unit
Operating Voltage	VDS	VGS=-8V	55	V
Drain-Source Voltage	VDS		160	V
Gate-Source Voltage	VGS		-15	V
Total Power Dissipation	Pt		32.1	W
Storage Temperature	Tstg		-65 to +175	deg.C
Channel Temperature	Tch		250	deg.C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	VDS	RG=15ohm	≤ 55	V
Forward Gate Current	IGF		≤ 46	mA
Reverse Gate Current	IGR		≥ -0.7	mA
Channel Temperature	Tch		≤ 180	deg.C
Average Output Power	Pave.		≤ 40.5	dBm

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25deg.C)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	Vp	VDS=50V, IDS=5.2mA	-1.0	-1.5	-2.0	V
Saturated Power	Psat *1	VDS=50V	42.5	43.5	-	dBm
Drain Efficiency	ηd *2	IDS(DC)=100mA	10.5	12.5	-	%
Power Gain	Gp *2	f=2.14GHz	18.0	19.0	-	dB
Thermal Resistance	Rth	Channel to Case at 21W PDC	-	6.0	7.0	deg.C/W

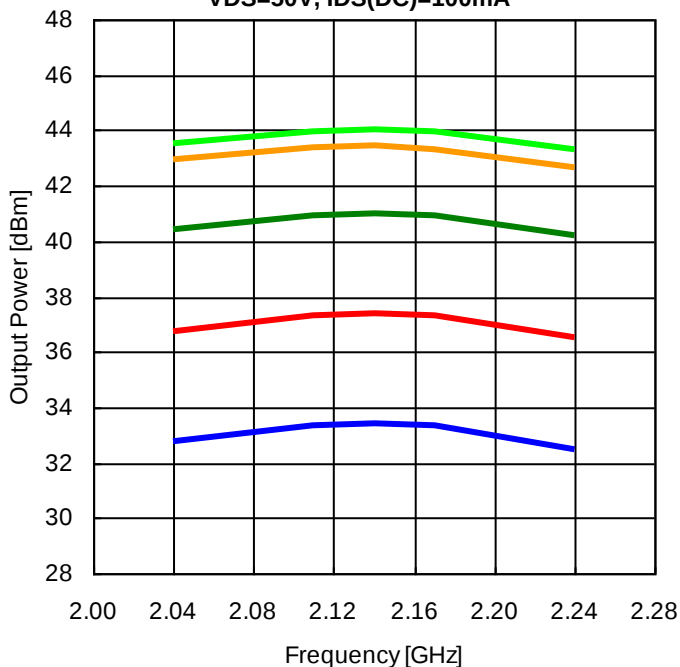
*1 : 10%-duty RF pulse (DC supply constant)

*2 : Pout=30dBm, CW

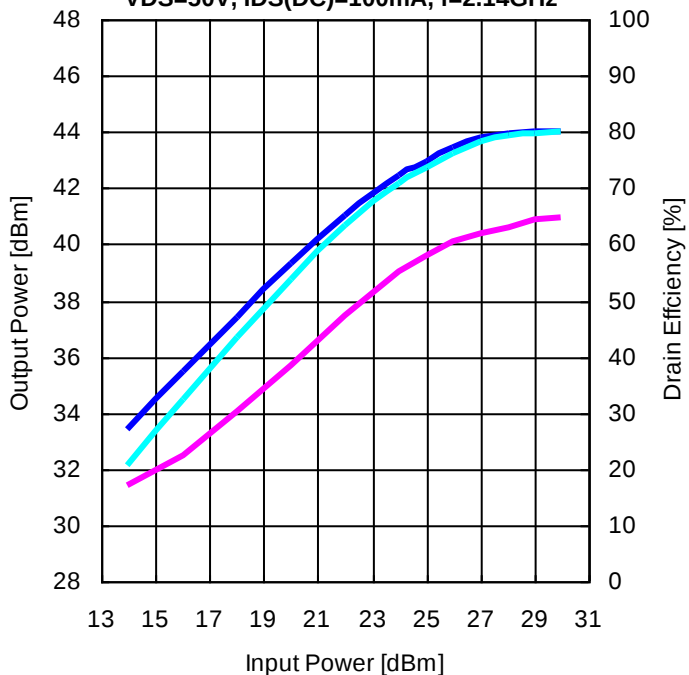
RoHS COMPLIANCE	Yes
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RF characteristics @f=2.14GHz fine tuned

Output Power vs. Frequency
VDS=50V, IDS(DC)=100mA



Output Power and Drain Efficiency vs. Input Power
VDS=50V, IDS(DC)=100mA, f=2.14GHz

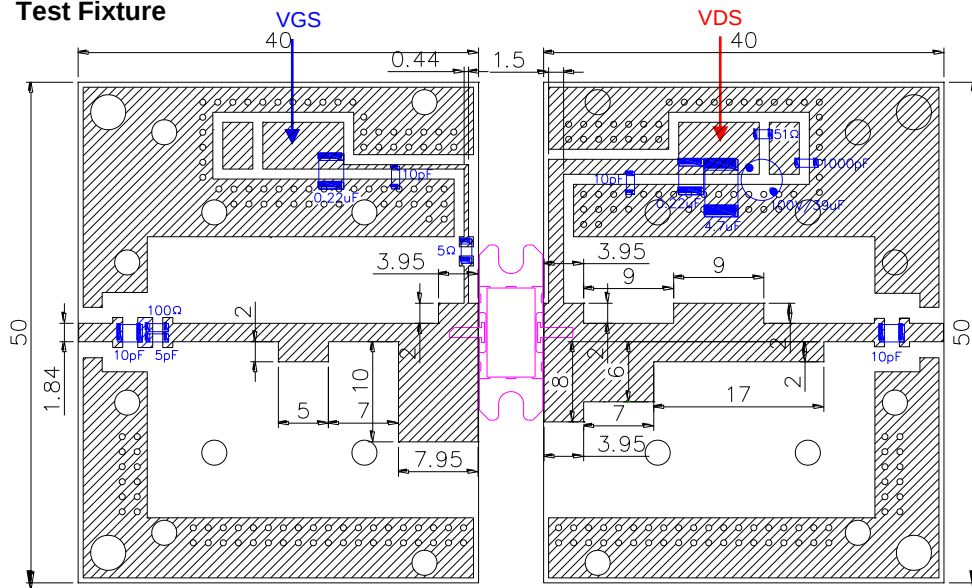


Pin=14dBm Pin=18dBm Pin=22dBm
Pin=26dBm Pin=30dBm

Pout (class AB) Pout (class B) Nd (class B)

Pulse Signal (10%-duty, DC : constant)

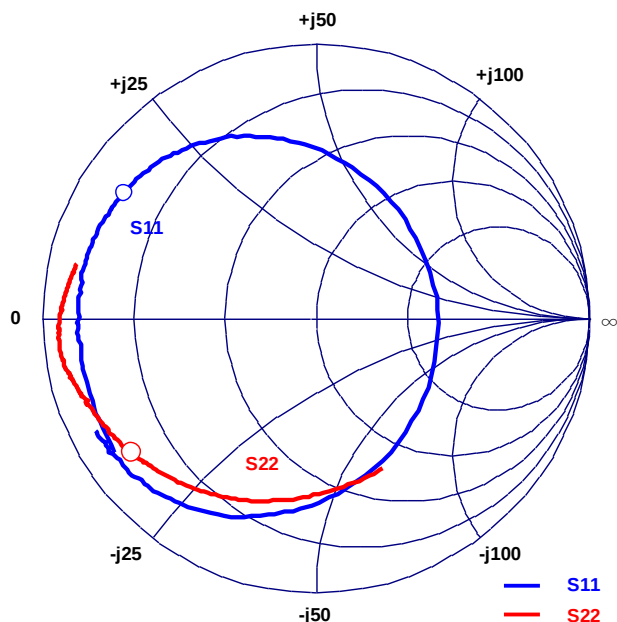
Test Fixture



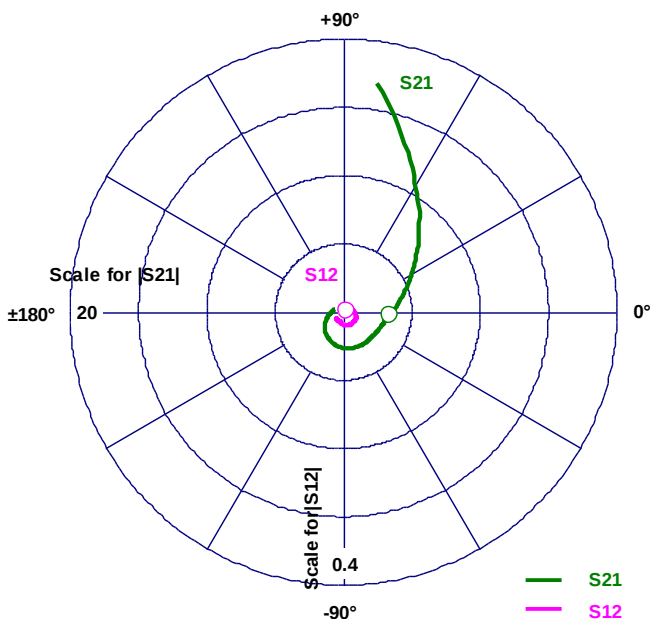
h=0.8mm $\epsilon_r=3.5$
Cu=18um Unit:mm

S-Parameters @VDS=50V, IDS(DC)=100mA, f=0.5 to 5.5GHz
Zl = Zs = 50ohm Marker : 2.14GHz

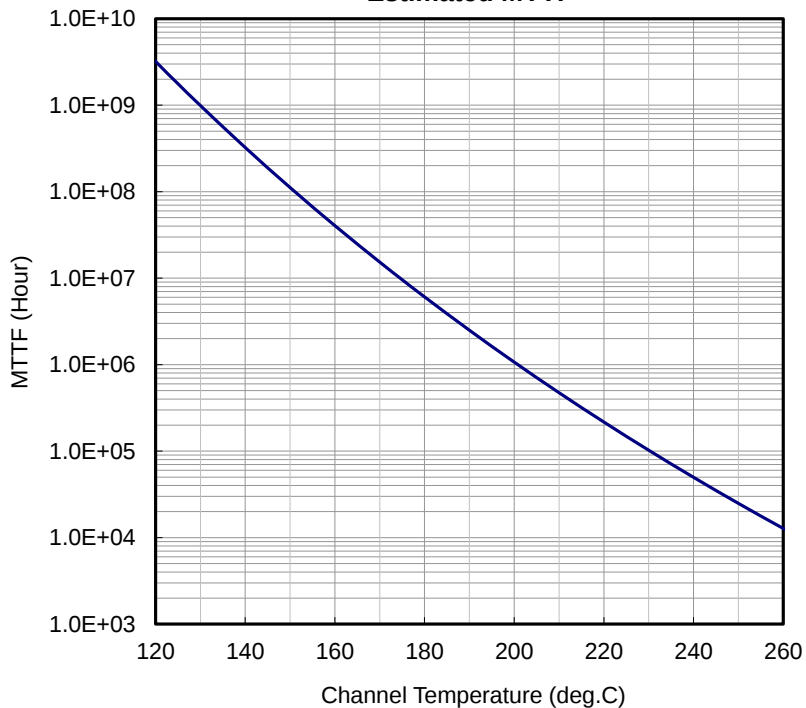
- Reference DATA -



Freq. GHz	S11			S21			S12			S22		
	MAG	ANG		MAG	ANG		MAG	ANG		MAG	ANG	
0.50	0.88	-146.18		16.94	81.44		0.010	5.38		0.60	-66.00	
0.60	0.88	-154.55		14.18	73.42		0.011	-4.66		0.61	-73.24	
0.70	0.87	-161.40		12.14	65.99		0.011	-5.37		0.62	-80.40	
0.80	0.87	-166.49		10.47	59.51		0.010	-11.13		0.64	-87.36	
0.90	0.87	-171.15		9.25	52.52		0.010	-15.60		0.66	-94.01	
1.00	0.87	-175.53		8.13	47.24		0.009	-15.56		0.68	-100.12	
1.10	0.87	-178.91		7.31	41.29		0.008	-18.70		0.69	-105.62	
1.20	0.87	177.35		6.64	36.41		0.008	-22.14		0.71	-110.46	
1.30	0.86	173.92		6.02	31.34		0.007	-21.64		0.73	-115.24	
1.40	0.87	170.69		5.50	26.41		0.007	-14.40		0.74	-119.58	
1.50	0.87	167.62		5.08	21.68		0.006	-18.14		0.76	-123.69	
1.60	0.86	164.64		4.70	17.45		0.007	-15.73		0.77	-127.50	
1.70	0.86	161.32		4.39	12.82		0.006	-13.23		0.78	-130.99	
1.80	0.86	158.57		4.10	9.15		0.006	-8.54		0.80	-134.32	
1.90	0.85	155.12		3.87	4.41		0.006	-6.30		0.81	-137.36	
2.00	0.84	152.07		3.66	0.54		0.005	-5.60		0.82	-140.28	
2.10	0.84	149.07		3.49	-3.39		0.005	4.54		0.83	-142.73	
2.20	0.83	145.33		3.34	-7.11		0.005	9.44		0.84	-145.20	
2.30	0.83	142.42		3.20	-11.26		0.006	10.56		0.85	-147.43	
2.40	0.81	138.40		3.12	-15.01		0.007	18.87		0.86	-149.55	
2.50	0.81	134.15		3.02	-19.73		0.008	15.70		0.86	-151.73	
2.60	0.79	129.94		2.95	-24.18		0.008	18.41		0.87	-153.68	
2.70	0.77	124.87		2.90	-28.52		0.009	10.65		0.88	-155.43	
2.80	0.75	119.63		2.83	-32.99		0.010	23.07		0.88	-157.04	
2.90	0.72	113.60		2.84	-38.73		0.011	15.95		0.89	-158.52	
3.00	0.69	106.31		2.80	-43.13		0.011	14.77		0.89	-160.01	
3.10	0.65	98.33		2.80	-49.69		0.013	10.31		0.90	-161.33	
3.20	0.61	87.98		2.81	-55.45		0.015	6.57		0.90	-162.74	
3.30	0.56	76.44		2.80	-62.29		0.016	-0.10		0.91	-164.01	
3.40	0.52	60.95		2.77	-69.66		0.017	-2.46		0.92	-165.14	
3.50	0.47	42.98		2.77	-77.81		0.019	-8.38		0.92	-166.64	
3.60	0.45	21.46		2.67	-85.91		0.020	-18.74		0.93	-167.78	
3.70	0.45	-2.47		2.61	-95.63		0.021	-26.56		0.94	-169.27	
3.80	0.47	-26.11		2.48	-104.03		0.022	-34.29		0.94	-170.44	
3.90	0.52	-46.95		2.33	-113.69		0.022	-42.69		0.94	-172.08	
4.00	0.58	-64.96		2.15	-121.91		0.022	-52.06		0.94	-173.41	
4.10	0.63	-79.35		1.97	-130.15		0.023	-62.15		0.94	-174.74	
4.20	0.69	-91.24		1.78	-137.39		0.022	-70.06		0.94	-176.23	
4.30	0.73	-101.75		1.62	-144.45		0.021	-77.96		0.94	-177.46	
4.40	0.77	-109.58		1.46	-149.99		0.020	-83.26		0.94	-178.81	
4.50	0.80	-116.64		1.32	-155.92		0.018	-94.04		0.94	-179.99	
4.60	0.83	-122.60		1.20	-160.53		0.018	-99.05		0.93	-178.68	
4.70	0.84	-127.59		1.09	-164.99		0.017	-103.89		0.93	-177.46	
4.80	0.86	-132.05		1.00	-170.33		0.016	-107.20		0.93	-176.21	
4.90	0.87	-135.91		0.92	-173.47		0.015	-111.91		0.92	-174.99	
5.00	0.88	-139.53		0.84	-177.57		0.015	-119.02		0.92	-173.75	
5.10	0.89	-142.60		0.78	-179.41		0.014	-121.97		0.91	-172.57	
5.20	0.89	-145.72		0.72	-175.88		0.015	-125.04		0.91	-171.34	
5.30	0.89	-148.03		0.68	-172.69		0.014	-126.75		0.90	-169.94	
5.40	0.90	-150.59		0.64	-169.71		0.015	-133.39		0.90	-168.69	
5.50	0.90	-152.95		0.60	-166.63		0.014	-134.49		0.90	-167.23	



MTTF Calculation - Estimated MTTF -



Ea=1.6eV
Confidence Level=90%

Channel Temp. (deg.C)	MTTF (Hours)
160	4.05 x 10 ⁷
180	6.07 x 10 ⁶
200	1.07 x 10 ⁶

$$AF = \exp[(-Ea / k)(1/T_{stress} - 1/T_{use})]$$

$$MTTF_{use} = MTTF_{stress} \times AF$$

Where;

AF : acceleration factor

Ea : activation energy (1.6eV)

k : Boltzmann's constant (8.62x10⁻⁵eV/K)

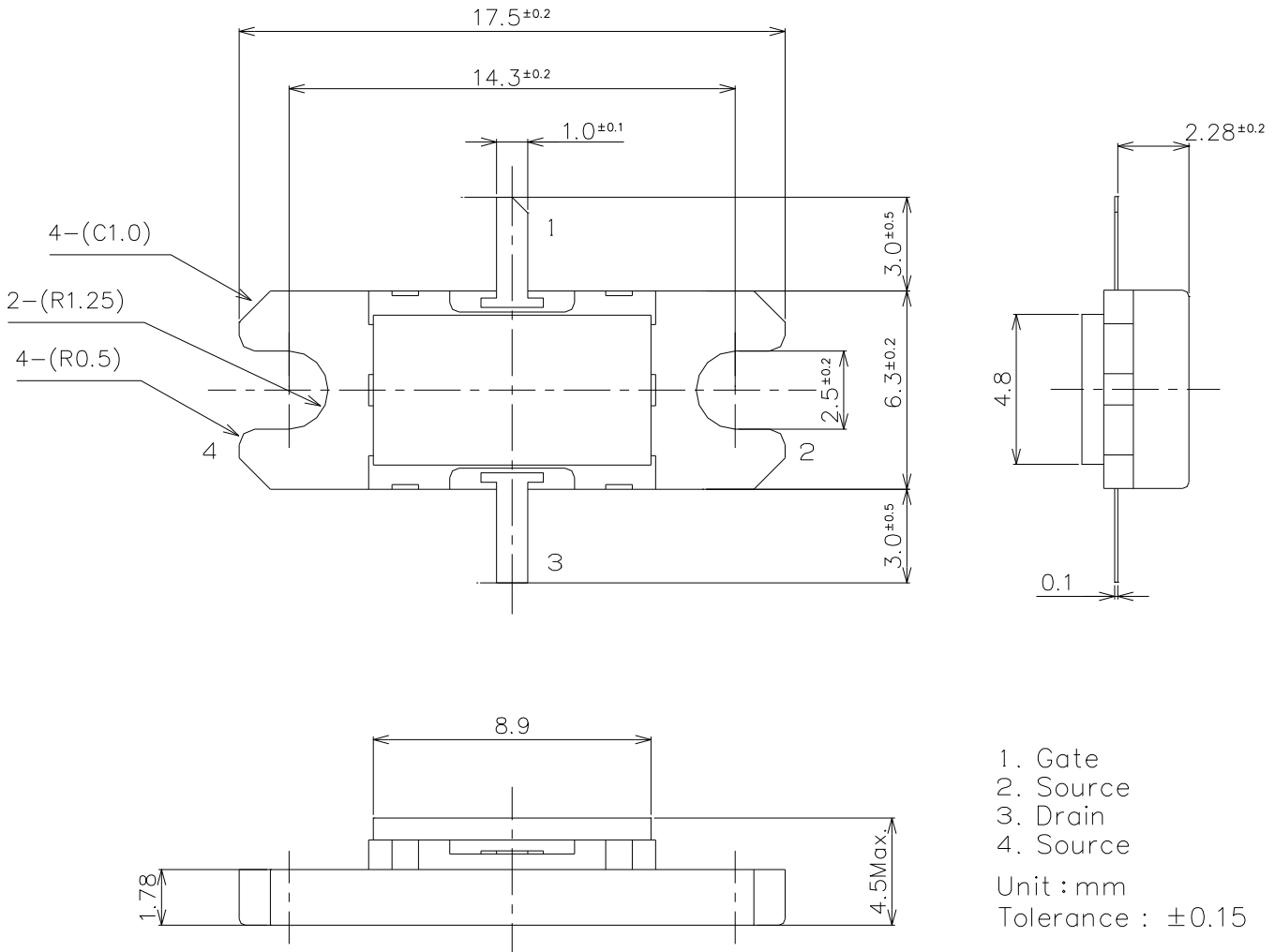
T_{stress} : stress temperature (K)

T_{use} : use temperature (K)

ESD characteristic

Test Methodology	Class
Human Body Model (per JESD22-A114)	0
Machine Model (per JEIA/ESD22-A115)	A

MK Package Outline Metal-Ceramic Hermetic Package





EGN21C020MK

High Voltage - High Power GaN-HEMT

For further information please contact:

<http://global-sei.com/Electro-optic/about/office.html>