

FEATURES

- High Voltage Operation : VDS=50V
- High Power : 47dBm (typ.) @ Psat
- High Efficiency : 65% (typ.) @ Psat
- Power Gain : 18.5dB (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 amplifiers with 50V operation, and gives you higher gain.

This new product is ideally suited for use in 2.1GHz 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		62.5	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=10ohm	≤ 50	V
Forward Gate Current	IGF		≤ 51	mA
Reverse Gate Current	IGR		≥ -1.7	mA
Channel Temperature	Tch		≤ 180	deg.C
Average Output Power	Pave.		≤ 44	dBm

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	Vp	VDS=50V, IDS=12mA	-1.0	-1.5	-2.0	V
Saturated Power	Psat *1	VDS=50V	46.0	47.0	-	dBm
Drain Efficiency	ηd *2	IDS(DC)=200mA	28.0	33.0	-	%
Power Gain	Gp *2	f=2.14GHz	17.5	18.5	-	dB
Thermal Resistance	Rth	Channel to Case at 39W PDC	-	3.0	3.6	deg.C/W

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

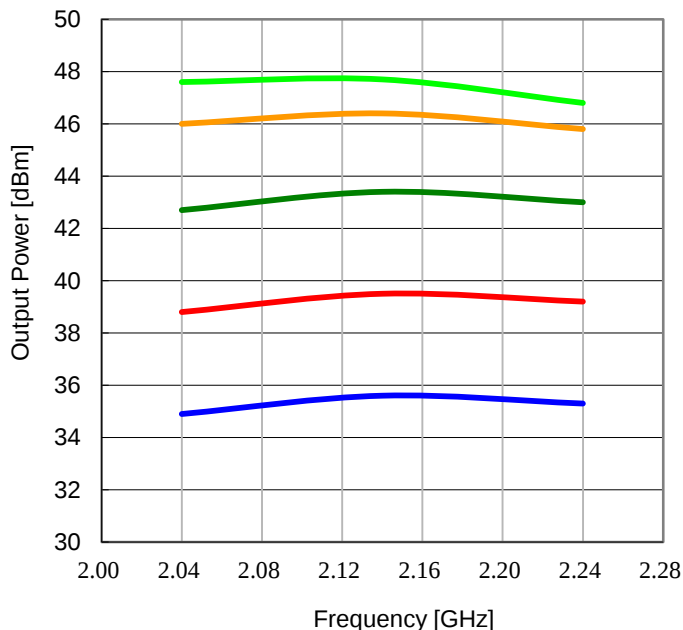
*2 : Pout=39dBm, CW modulation Signal (W-CDMA)

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

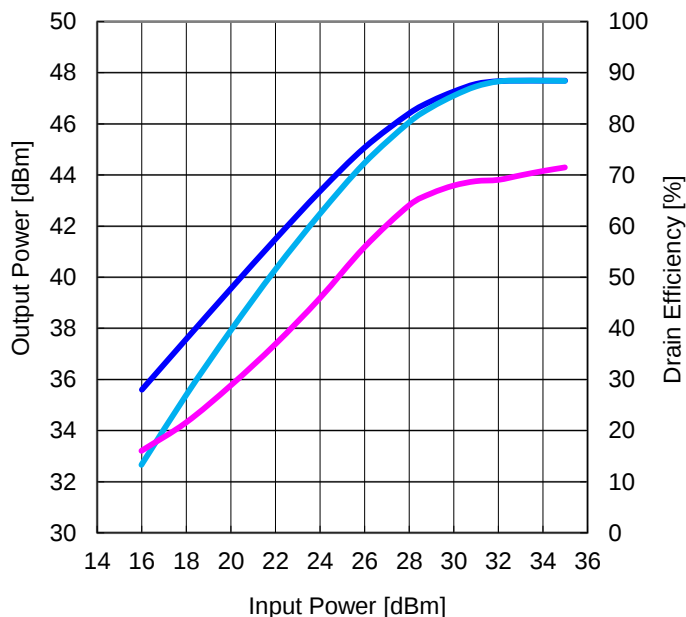
Output Power vs. Frequency

VDS=50V, IDS(DC)=200mA



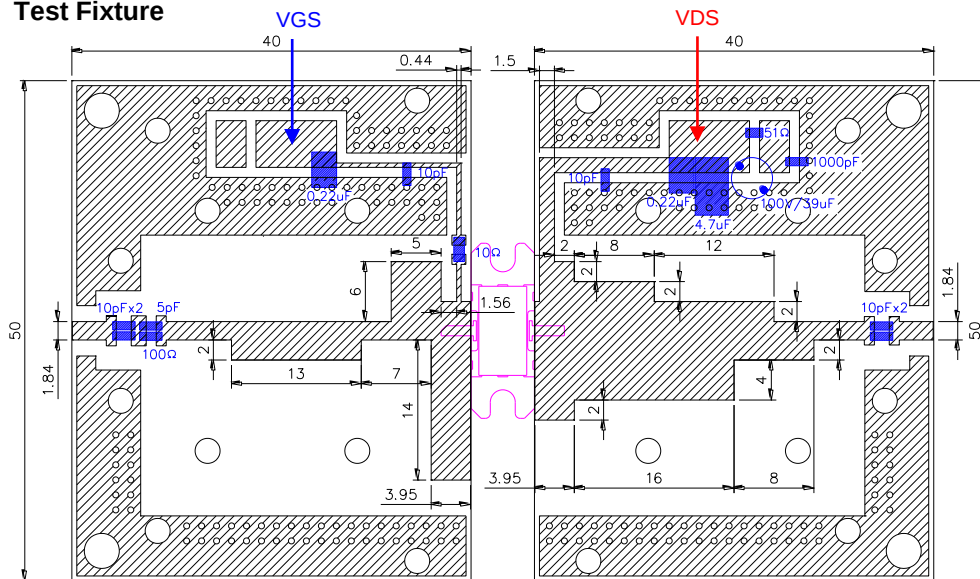
Pin=16dBm Pin=20dBm Pin=24dBm
Pin=28dBm Pin=32dBm

Output Power and Drain Efficiency vs. Input Power
VDS=50V, IDS(DC)=200mA, f=2.14GHz



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

Test Fixture

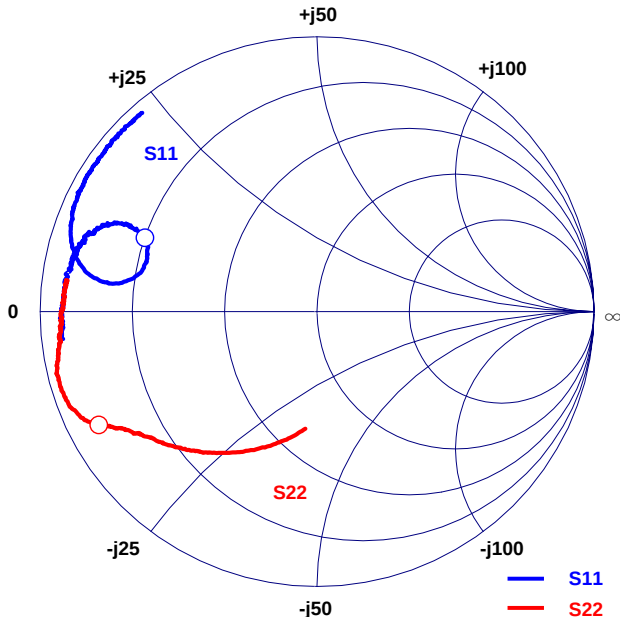


h=0.8mm $\epsilon_r=3.5$
Cu=18 μ m Unit: mm

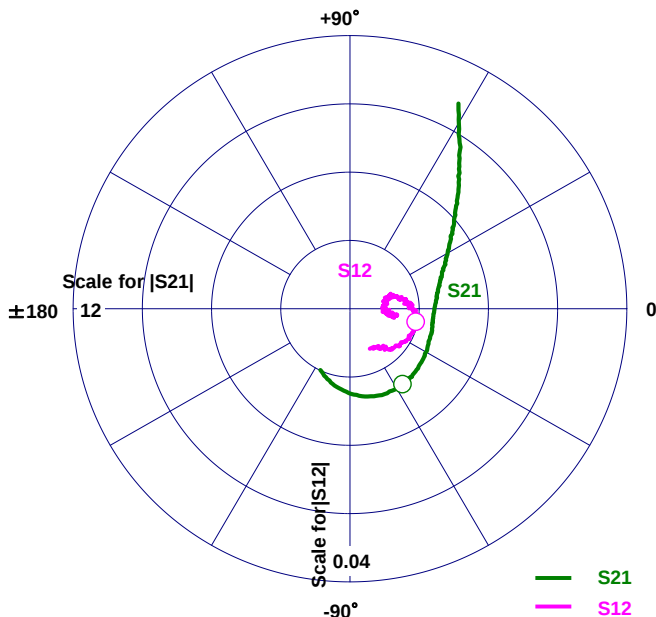
S-Parameters @VDS=50V, IDS(DC)=200mA, f=0.5 to 4.5GHz

ZI = Zs = 50ohm Marker : 2.14GHz

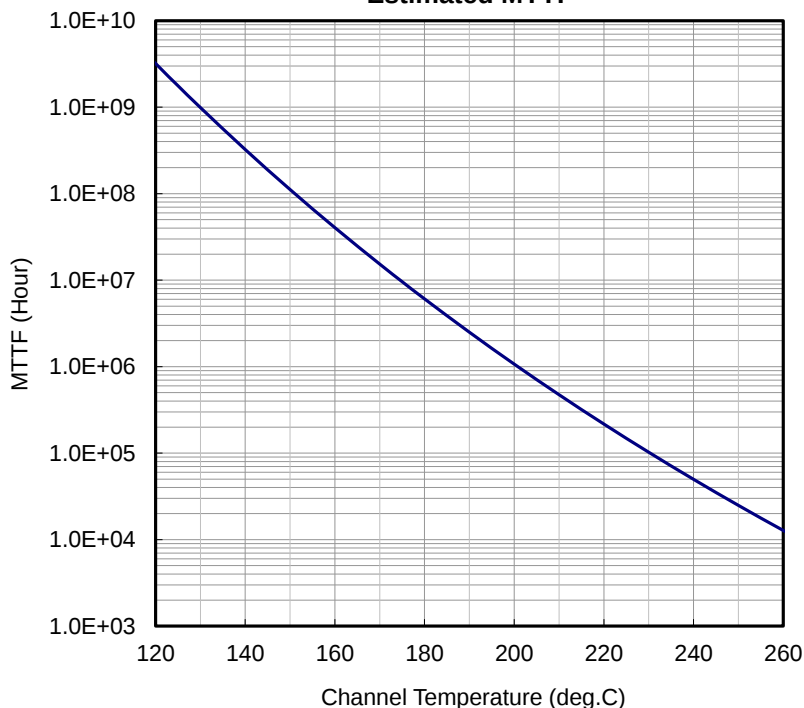
- Reference DATA -



Freq. GHz	S11			S21			S12			S22		
	MAG	ANG		MAG	ANG		MAG	ANG		MAG	ANG	
0.50	0.92	-173.77		10.17	62.44		0.007	-7.59		0.43	-95.67	
0.60	0.93	-176.93		8.42	55.58		0.007	-8.14		0.47	-102.68	
0.70	0.92	-179.58		7.19	48.93		0.006	-8.12		0.52	-109.01	
0.80	0.92	177.49		6.19	42.61		0.006	-8.27		0.56	-114.83	
0.90	0.92	175.33		5.52	36.56		0.005	-7.65		0.59	-119.83	
1.00	0.91	173.50		4.97	31.18		0.005	-3.39		0.62	-124.36	
1.10	0.92	171.36		4.57	25.07		0.005	-3.68		0.65	-128.34	
1.20	0.91	169.35		4.23	19.88		0.005	3.73		0.68	-131.80	
1.30	0.91	167.27		4.02	14.58		0.005	10.60		0.70	-135.18	
1.40	0.89	165.49		3.83	8.99		0.005	7.28		0.73	-137.98	
1.50	0.88	163.64		3.70	2.89		0.006	14.03		0.74	-140.66	
1.60	0.87	161.55		3.64	-3.15		0.006	17.92		0.76	-143.06	
1.70	0.85	159.65		3.65	-9.80		0.007	15.33		0.78	-145.06	
1.80	0.83	157.63		3.69	-17.84		0.008	12.85		0.80	-147.01	
1.90	0.80	156.25		3.76	-26.51		0.008	9.77		0.82	-148.81	
2.00	0.75	155.05		3.89	-37.32		0.009	4.57		0.84	-149.87	
2.10	0.69	156.30		3.98	-49.27		0.010	-7.14		0.87	-151.56	
2.20	0.65	159.77		4.01	-64.64		0.010	-17.61		0.91	-153.56	
2.30	0.64	165.62		3.88	-82.16		0.009	-33.38		0.94	-156.63	
2.40	0.69	170.56		3.48	-99.41		0.008	-48.27		0.96	-159.60	
2.50	0.76	172.28		2.99	-115.33		0.007	-63.96		0.97	-162.72	
2.60	0.83	170.95		2.47	-128.58		0.005	-74.19		0.96	-165.41	
2.70	0.87	168.66		2.00	-139.68		0.003	-91.00		0.96	-167.56	
2.80	0.90	165.85		1.64	-148.55		0.002	-101.05		0.95	-169.67	
2.90	0.92	163.76		1.36	-155.64		0.001	-149.57		0.94	-170.80	
3.00	0.94	161.32		1.14	-161.78		0.001	166.47		0.94	-172.42	
3.10	0.94	159.08		0.96	-167.13		0.002	132.38		0.93	-173.39	
3.20	0.95	157.17		0.82	-171.64		0.003	113.28		0.93	-174.57	
3.30	0.96	155.22		0.72	-176.23		0.003	118.78		0.93	-175.64	
3.40	0.97	153.42		0.63	-179.86		0.004	109.42		0.93	-176.64	
3.50	0.96	151.54		0.56	-176.50		0.005	104.45		0.92	-177.54	
3.60	0.97	149.92		0.50	-173.37		0.006	105.43		0.92	-178.62	
3.70	0.97	147.95		0.45	-169.97		0.007	99.66		0.93	-179.45	
3.80	0.96	146.15		0.41	-166.31		0.008	100.08		0.92	-179.33	
3.90	0.96	144.43		0.38	-163.62		0.009	100.44		0.92	-178.55	
4.00	0.96	142.86		0.35	-159.76		0.011	92.79		0.92	-177.69	
4.10	0.96	140.65		0.33	-157.20		0.013	89.53		0.91	-176.63	
4.20	0.96	138.55		0.31	-153.86		0.014	81.99		0.91	-175.61	
4.30	0.96	136.33		0.29	-150.84		0.015	77.14		0.91	-174.60	
4.40	0.96	133.82		0.28	-147.16		0.016	75.46		0.92	-173.80	
4.50	0.96	131.19		0.26	-144.01		0.018	70.87		0.91	-172.76	



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)

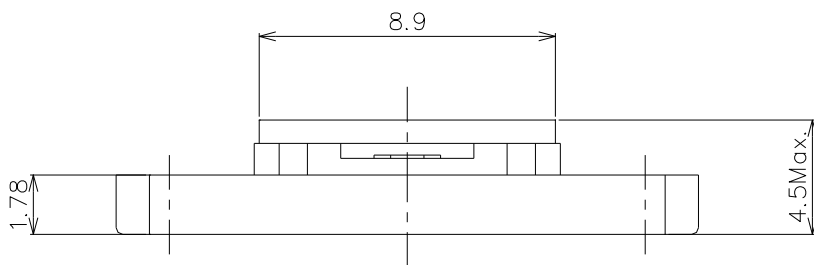
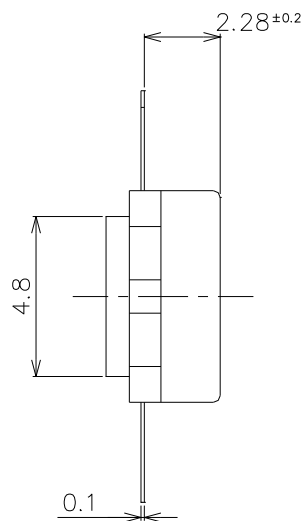
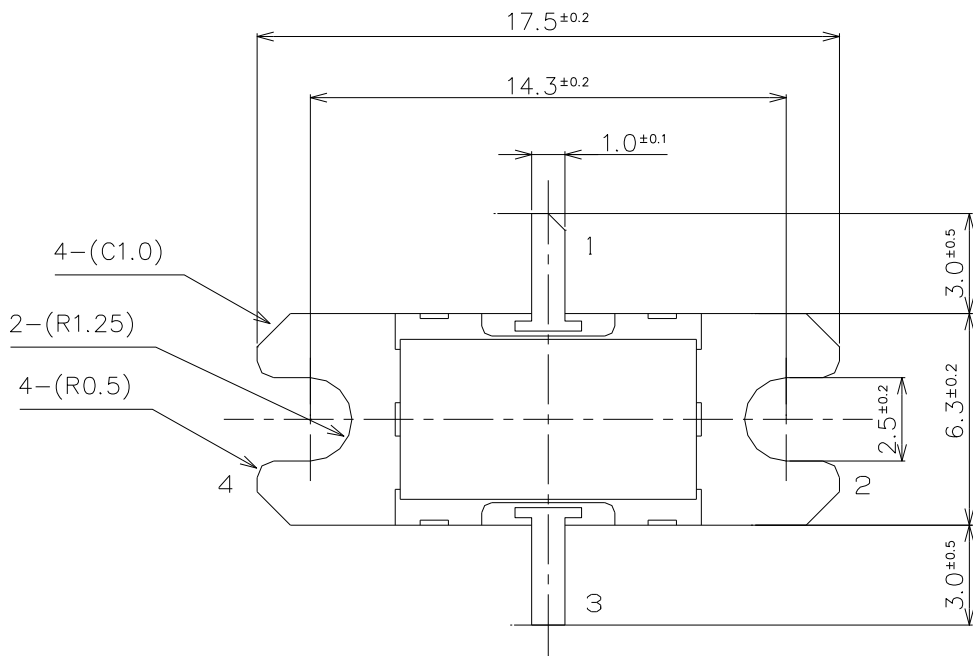
T_{stress} : stress temperature (K)

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



1. Gate
2. Source
3. Drain
4. Source

Unit : mm

Tolerance : ± 0.15



SGN21C050MK

High Voltage - High Power GaN-HEMT

For further information please contact:

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