

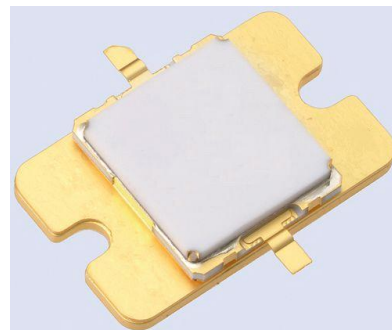
FEATURES

- High Voltage Operation : $V_{DS}=50V$
- High Power : 53.0dBm (typ.) @ P_{sat}
- High Efficiency: 68%(typ.) @ P_{sat}
- Power Gain : 18.5dB(typ.) @ $f=1.9GHz$
- 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 1.9GHz LTE design requirements as it offers high gain, long term reliability and ease of use.

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

Item	Symbol	Condition	Rating	Unit
Operating-Voltage	V_{DS}		55	V
Drain-Source Voltage	V_{DS}	$V_{GS}=-8V$	160	V
Gate-Source Voltage	V_{GS}		-15	V
Total Power Dissipation	P_t		173	W
Storage Temperature	T_{stg}		-65 to +175	deg.C
Channel Temperature	T_{ch}		250	deg.C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		≤ 55	V
Forward Gate Current	I_{GF}	$R_G=5\text{ ohm}$	≤ 204	mA
Reverse Gate Current	I_{GR}	$R_G=5\text{ ohm}$	≥ -7.8	mA
Channel Temperature	T_{ch}		≤ 180	deg.C
Average Output Power	$P_{ave.}$		≤ 50.0	dBm

ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25deg.C$)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V$ $I_{DS}=54.4mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$	52.2	53.0	-	dBm
Drain Efficiency	$\eta_d *2$	$I_{DS}(DC)=750mA$	28	32.0	-	%
Power Gain	$G_p *2$	$f=1.9GHz$	17.5	18.5	-	dB
Thermal Resistance	R_{th}	Channel to Case at 105W P_{DC}	-	1.1	1.3	deg.C/W

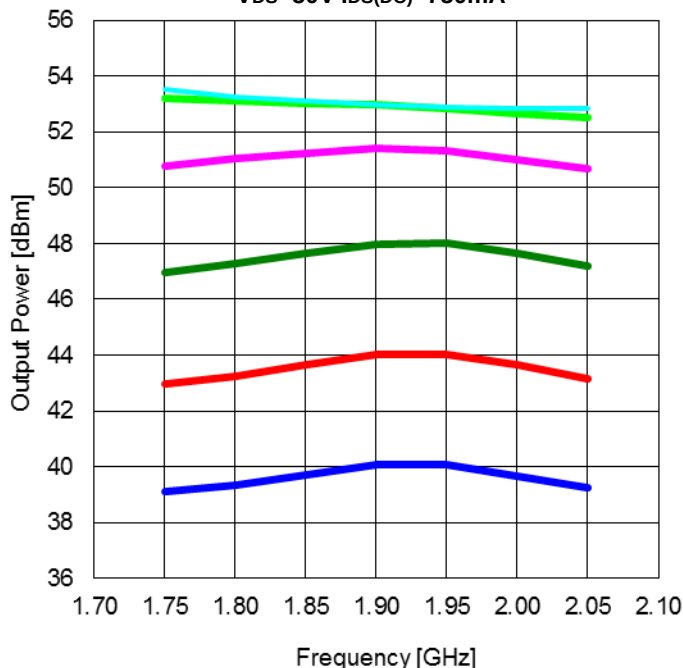
*1 : 10%-duty RF pulse (DC supply constant), $f=1.9GHz$

*2 : $P_{out} = 45dBm$, CW modulation Signal (W-CDMA)

RoHS COMPLIANCE**Yes**

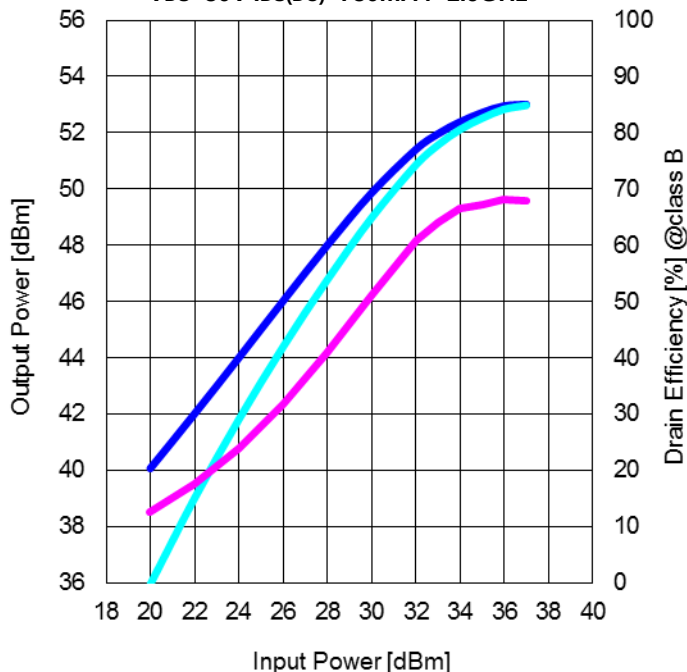
RF characteristics @ f=1.9GHz fine tuned

Output Power vs. Frequency
V_{DS}=50V I_{DS(DC)}=750mA



Pin=20dBm Pin=24dBm Pin=28dBm
Pin=32dBm Pin=36dBm Pin=38dBm

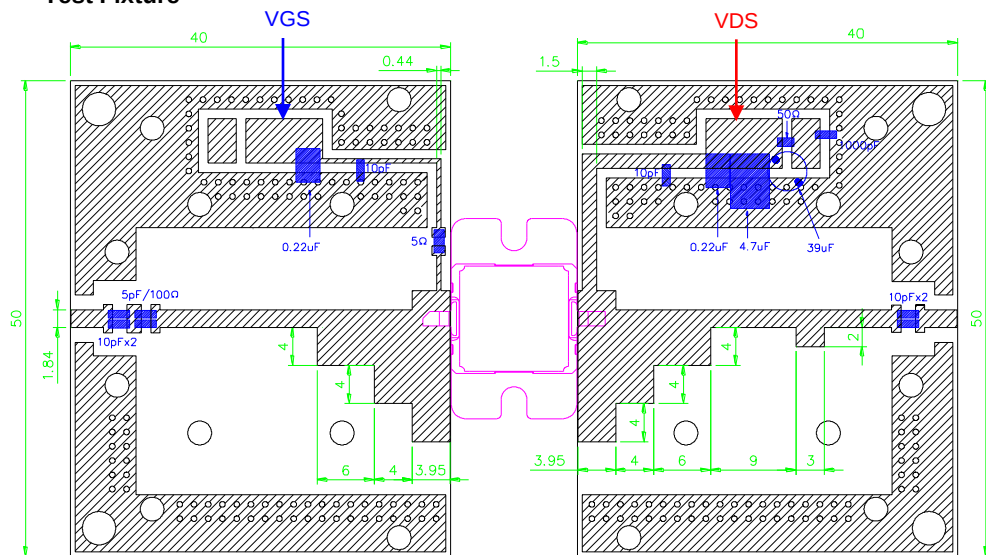
Output Power and Drain Efficiency vs. Input Power
V_{DS}=50V I_{DS(DC)}=750mA f=1.9GHz



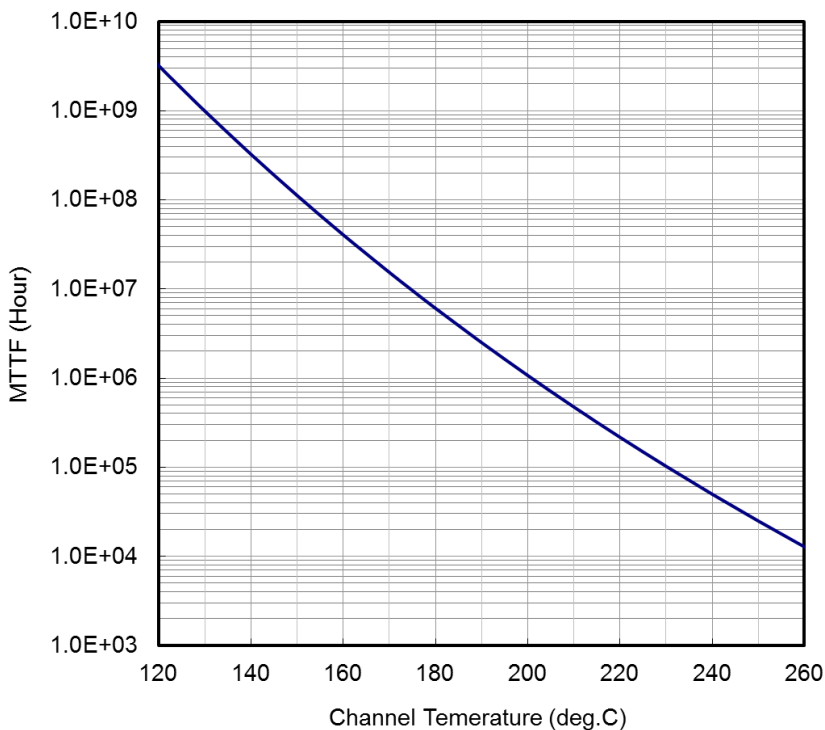
Pout Pout (class B) Nd (class B)

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

Test Fixture



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

$$AF = \exp\left[\frac{-Ea}{k}\left(\frac{1}{T_{\text{stress}}} - \frac{1}{T_{\text{use}}}\right)\right]$$

$$MTTF_{\text{use}} = MTTF_{\text{stress}} \cdot AF$$

Where;

AF: acceleration factor

Ea: activation energy (1.6 eV)

k: Boltzman's constant (8.62 x 10⁻⁵ eV/K)

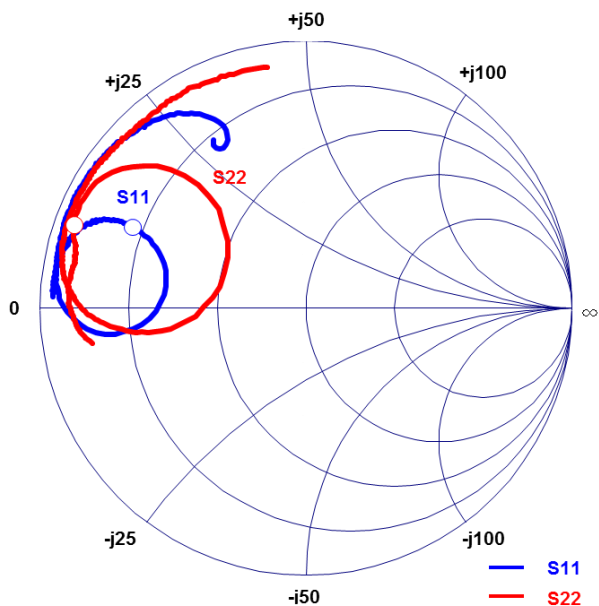
T_{stress}: stress temperature (K)

T_{use}: use temperature (K)

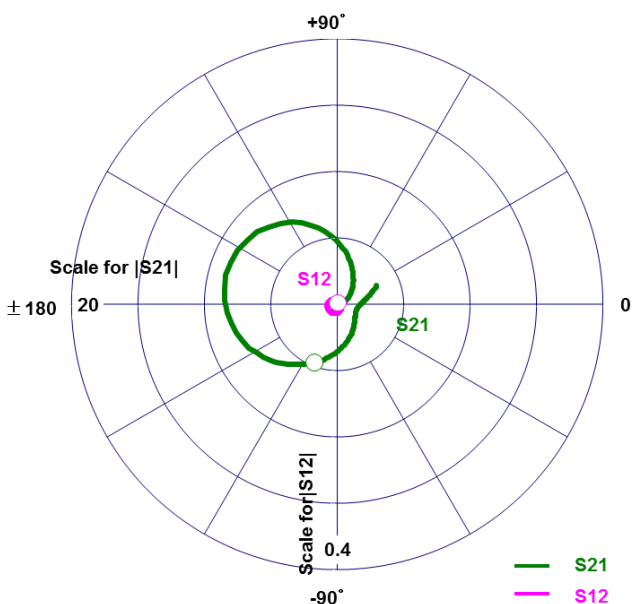
ESD Characteristics

Test Methodology	Class
Human Body Model (per JESD22-A114)	1B
Machine Model (per JEIA/ESD22-A115)	A

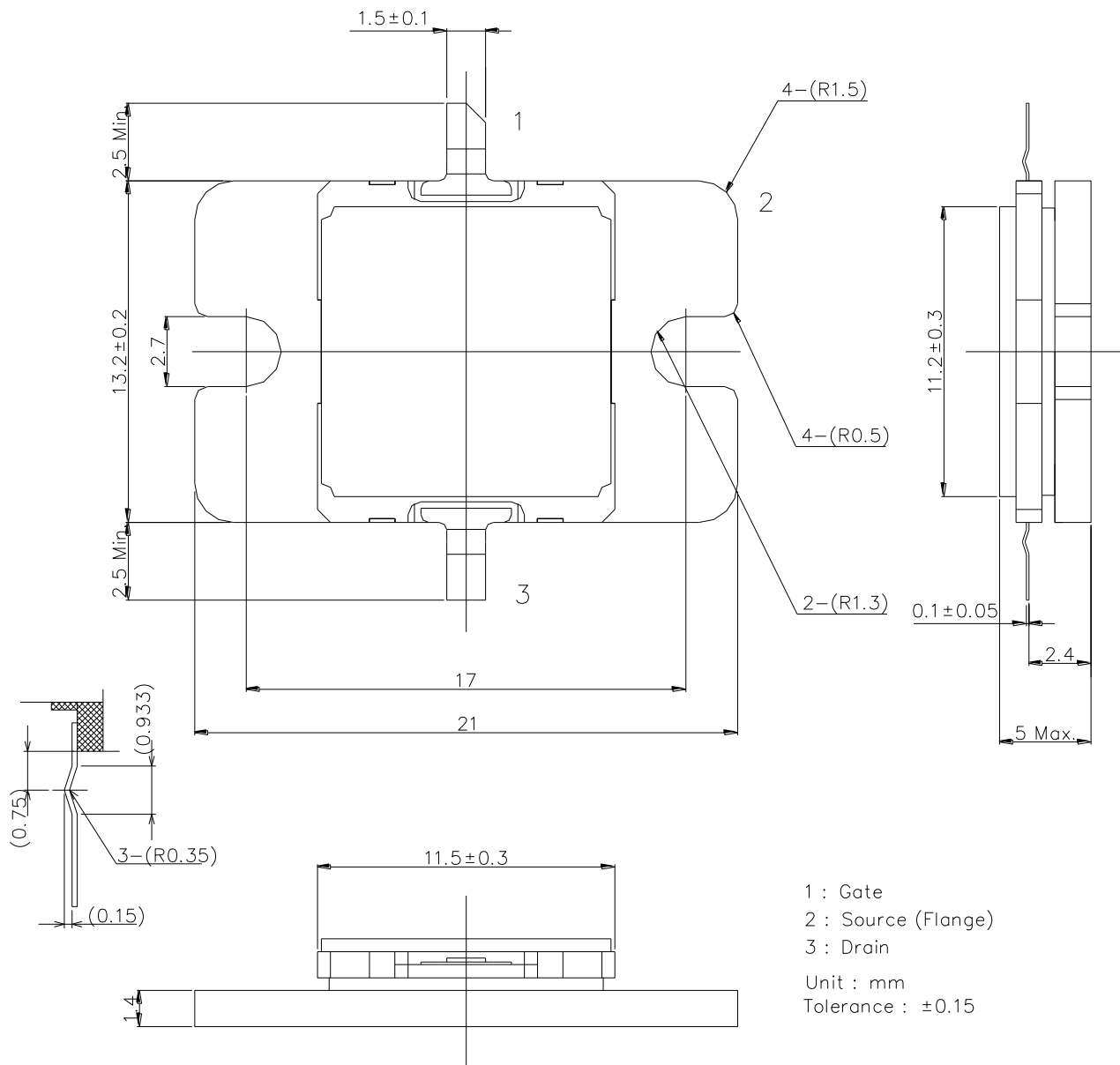
S-Parameters @V_{DS}=50V, I_{DS(DC)}=750mA, f=0.5 to 4.5 GHz
Z_I = Z_S = 50 ohm Marker : 1.9GHz



Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.95	177.22	3.28	24.96	0.002	-28.99	0.82	-170.62
0.60	0.95	175.54	2.60	16.68	0.002	-22.85	0.84	-173.09
0.70	0.96	174.07	2.15	9.26	0.002	-9.32	0.87	-175.78
0.80	0.95	172.50	1.87	2.75	0.002	8.82	0.88	-178.05
0.90	0.95	171.19	1.68	-3.49	0.002	11.00	0.89	-179.65
1.00	0.95	169.79	1.56	-9.93	0.002	21.56	0.89	-177.74
1.10	0.95	168.06	1.52	-16.00	0.002	25.17	0.90	-175.90
1.20	0.94	166.82	1.53	-22.77	0.003	15.52	0.90	-174.31
1.30	0.93	165.06	1.57	-29.76	0.003	18.67	0.89	-172.71
1.40	0.92	163.26	1.70	-37.30	0.004	14.76	0.89	-170.89
1.50	0.91	161.41	1.90	-47.04	0.005	7.06	0.89	-169.57
1.60	0.88	159.14	2.22	-57.65	0.005	-3.04	0.89	-168.27
1.70	0.85	157.47	2.74	-71.29	0.006	-15.95	0.89	-166.73
1.80	0.80	155.45	3.49	-88.61	0.008	-33.43	0.90	-164.75
1.90	0.72	155.05	4.74	-111.22	0.010	-57.00	0.93	-160.35
2.00	0.59	159.29	6.85	-144.08	0.013	-94.04	0.92	-149.10
2.10	0.62	-174.21	8.59	158.25	0.016	-157.54	0.56	130.98
2.20	0.90	-179.18	5.53	99.14	0.010	134.79	0.45	-173.95
2.30	0.95	173.00	2.99	68.56	0.006	91.76	0.70	-173.45
2.40	0.96	169.08	1.82	49.88	0.004	71.77	0.81	-177.93
2.50	0.96	166.56	1.20	36.22	0.002	64.55	0.87	-177.76
2.60	0.96	164.48	0.84	26.29	0.002	60.31	0.90	-174.50
2.70	0.96	162.89	0.61	18.55	0.002	45.81	0.92	-171.57
2.80	0.96	161.21	0.47	12.09	0.001	33.67	0.93	-168.87
2.90	0.96	159.82	0.38	6.41	0.001	51.88	0.94	-166.51
3.00	0.97	158.37	0.32	1.01	0.001	64.61	0.94	-164.07
3.10	0.96	156.89	0.27	-3.76	0.001	82.60	0.95	-161.80
3.20	0.96	155.56	0.24	-8.05	0.002	88.90	0.95	-159.74
3.30	0.96	153.93	0.21	-12.16	0.002	93.16	0.95	-157.43
3.40	0.96	152.28	0.19	-15.70	0.003	103.45	0.95	-155.18
3.50	0.96	150.63	0.18	-20.13	0.003	89.83	0.95	-152.71
3.60	0.95	148.89	0.17	-23.50	0.004	86.61	0.95	-150.02
3.70	0.95	146.73	0.17	-26.91	0.004	90.11	0.95	-146.84
3.80	0.95	144.38	0.17	-29.88	0.005	83.70	0.94	-143.47
3.90	0.95	141.81	0.18	-29.52	0.007	69.89	0.94	-139.98
4.00	0.94	138.66	0.21	-29.12	0.006	55.56	0.93	-135.94
4.10	0.92	134.59	0.28	-36.51	0.006	49.66	0.93	-131.69
4.20	0.91	130.25	0.35	-48.86	0.006	44.76	0.93	-126.04
4.30	0.88	123.67	0.46	-62.63	0.007	34.73	0.93	-118.80
4.40	0.77	115.17	0.65	-84.59	0.007	28.23	0.92	-110.25
4.50	0.72	119.07	0.58	-123.29	0.010	16.40	0.91	-99.06



I2D Package Outline Metal-Ceramic Hermetic Package





SGN19C210I2D

High Voltage - High Power GaN-HEMT

For further information please contact:

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