

FEATURES

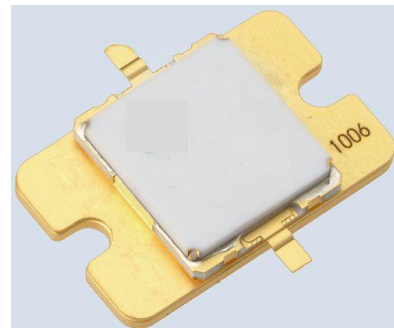
- High Voltage Operation : $V_{DS}=50V$
- High Power : 52.3dBm (typ.) @ P_{sat}
- High Efficiency: 68%(typ.) @ P_{sat}
- Power Gain : 18dB(typ.) @ $f=1.96GHz$
- Proven Reliability

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 from 1.8GHz to 2.0GHz

W-CDMA & LTE design requirements as it offers high gain, long term reliability and ease of use.

**ABSOLUTE MAXIMUM RATINGS (Case Temperature $T_c=25\text{deg.C}$)**

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		132	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}	$R_G=5\text{ ohm}$	≤ 153	mA
Reverse Gate Current	I_{GR}	$R_G=5\text{ ohm}$	≥ -5.8	mA
Channel Temperature	T_{ch}		≤ 180	deg.C
Average Output Power	$P_{ave.}$		≤ 49.5	dBm

ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25\text{deg.C}$)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V$ $I_{DS}=40.8mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$, $I_{DS}(DC)=0mA$	51.5	52.3	-	dBm
Drain Efficiency	$\eta_d *2$	$V_{DS}=50V$,	28	35	-	%
Power Gain	$G_p *2$	$I_{DS}(DC)=600mA$	17.0	18.0	-	dB
Thermal Resistance	R_{th}	Channel to Case at 78W P_{DC}	-	1.4	1.6	deg.C/W

*1 : 10%-duty RF pulse (DC supply constant), $f=1.96GHz$

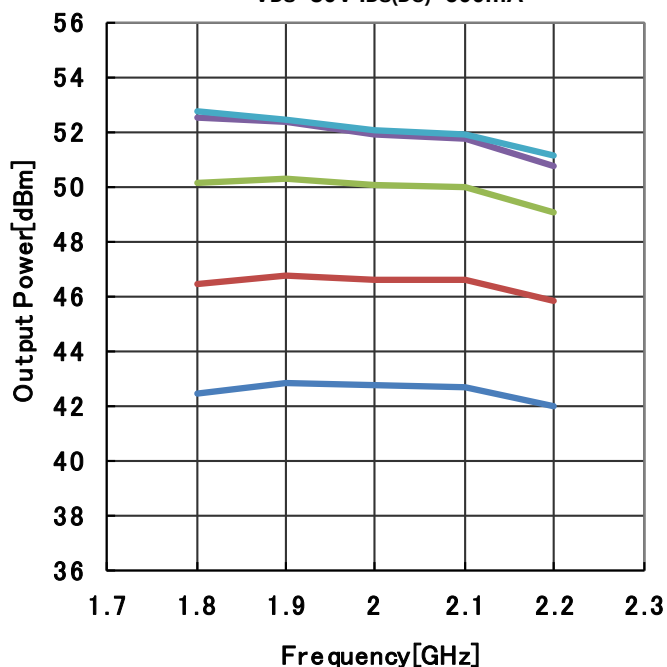
*2 : $P_{out} = 44.5dBm$, $f=1.96GHz$, W-CDMA(3GPP3.4 12-00) BS-1 64ch 65.0% clipping modulation (Peak/Avg.=8.5dB@0.01% Probability on CCDF).

RoHS COMPLIANCE

Yes

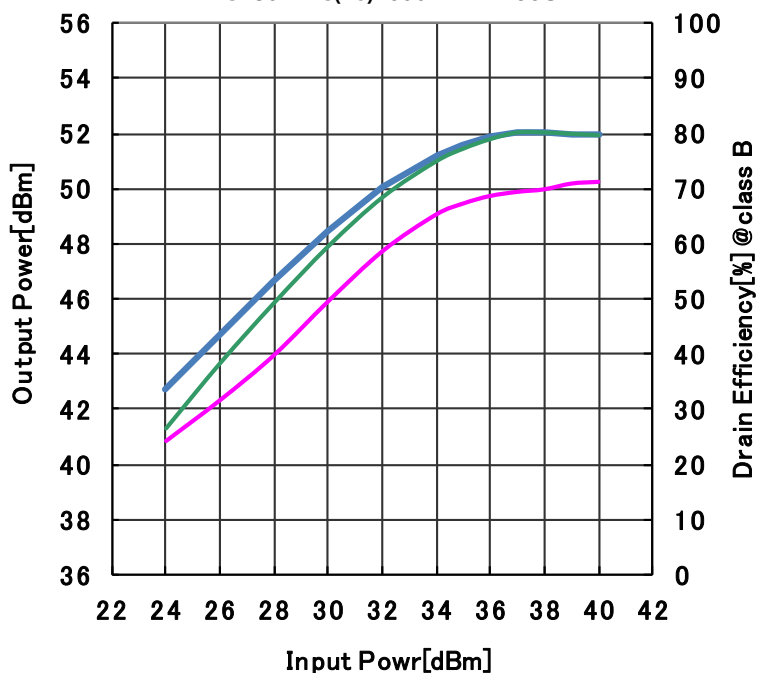
RF characteristics @ $f=1.96\text{GHz}$ fine tuned

Output Power vs. Frequency
 $V_{DS}=50\text{V}$ $I_{DS(DC)}=600\text{mA}$



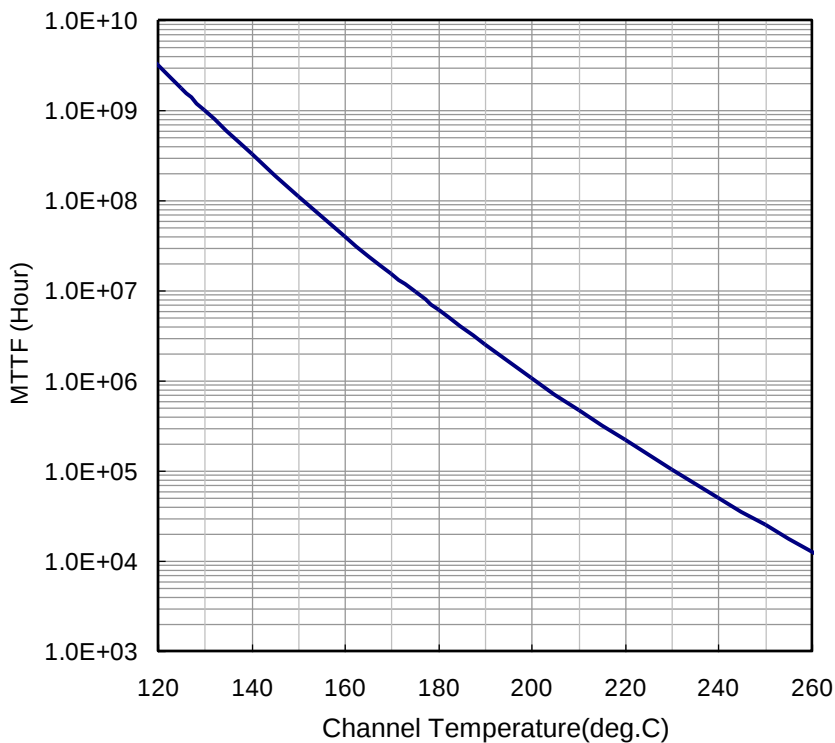
Pin=24dBm Pin=28dBm Pin=32dBm
Pin=36dBm Pin=38dBm

Output Power and Drain Efficiency vs. Input Power
 $V_{DS}=50\text{V}$ $I_{DS(DC)}=600\text{mA}$ $f=1.96\text{GHz}$



Pout (class AB) Pout (class B)
Pulse Signal (10%-duty, DC : constant)

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)

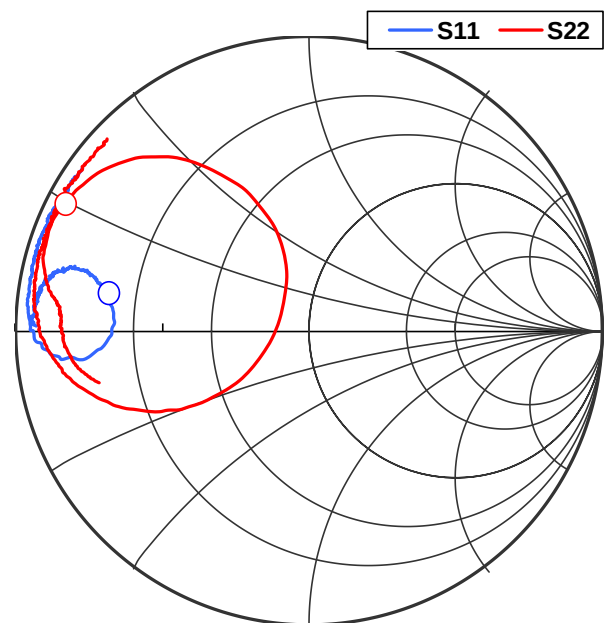
T_{stress}: stress temperature (K)

T_{use}: use temperature (K)

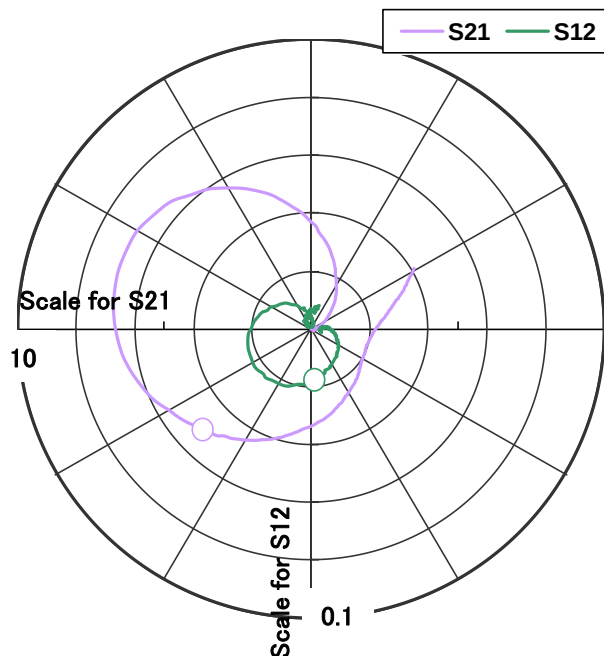
ESD Characteristics

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

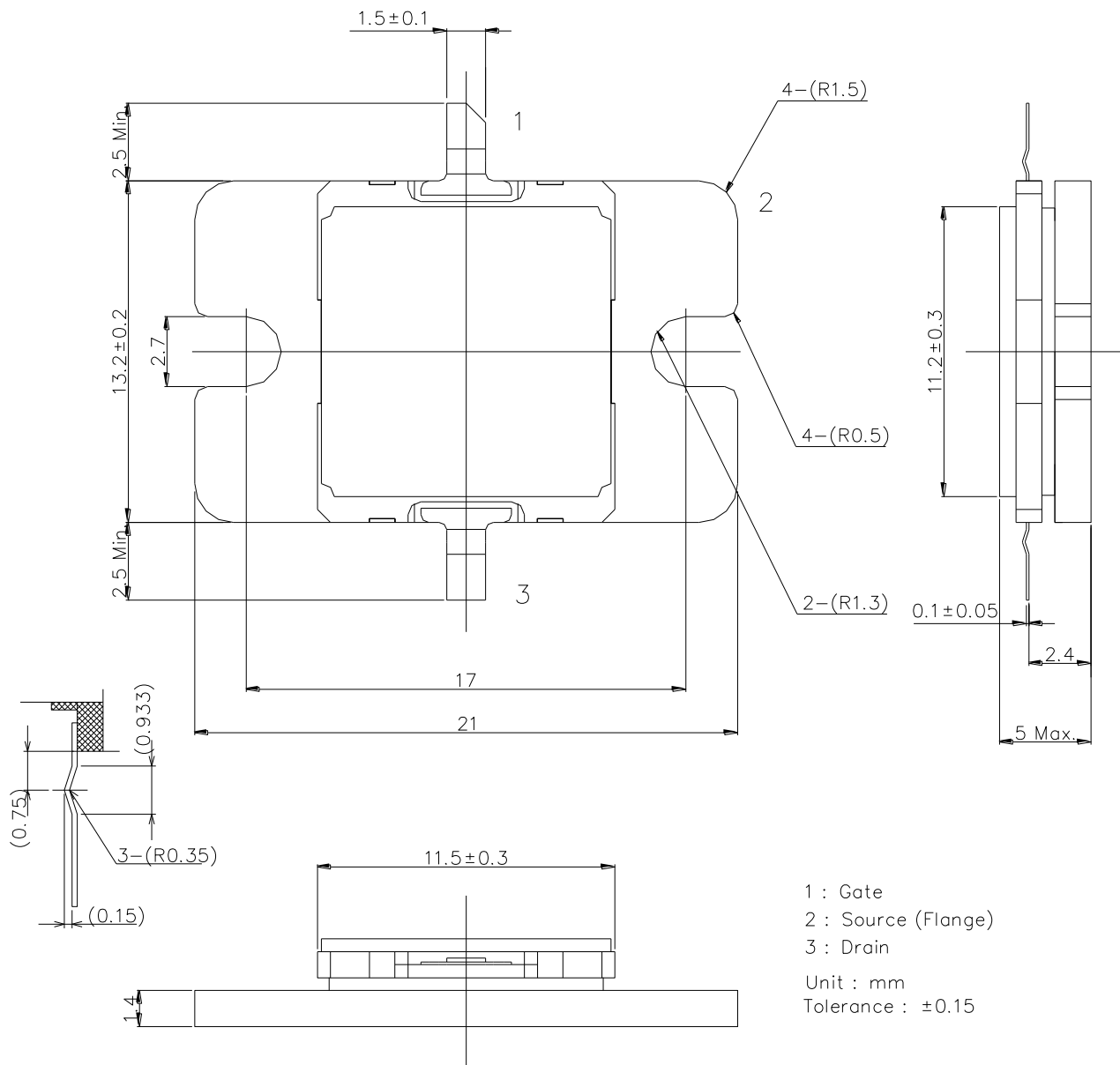
S-Parameters @V_{DS}=50V, I_{DS(DC)}=600mA, f=0.5 to 4.5 GHz
Z_I = Z_S = 50 ohm Marker : 1.96GHz



Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.5	0.929651	178.7886	4.109597	30.65875	0.00377	-21.7156	0.73678	-166.351
0.6	0.94372	176.9841	3.34755	21.75485	0.003224	-8.66256	0.770846	-168.847
0.7	0.934763	175.8756	2.809574	14.22824	0.003028	-5.8704	0.7986	-171.236
0.8	0.937306	174.6532	2.435826	6.87037	0.003069	-2.59781	0.814665	-173.608
0.9	0.933597	173.3777	2.218783	-0.31207	0.003425	3.014989	0.828499	-175.936
1	0.929739	171.5249	2.072833	-7.86288	0.003475	4.314881	0.83824	-177.684
1.1	0.926114	170.3443	2.015898	-14.8251	0.004183	4.314553	0.841473	-179.692
1.2	0.916168	169.5075	2.01462	-22.7436	0.004617	2.634269	0.846807	178.5276
1.3	0.891919	167.8527	2.052501	-31.0561	0.005536	4.673885	0.846844	177.2321
1.4	0.89164	167.0049	2.208518	-40.9244	0.006169	-1.3731	0.853726	175.9783
1.5	0.860461	166.3999	2.407003	-51.6515	0.007574	-8.00308	0.855153	174.9759
1.6	0.842549	164.881	2.699812	-65.5846	0.00912	-18.2711	0.865252	173.2836
1.7	0.800525	164.901	3.102606	-80.0859	0.011326	-33.8065	0.890035	171.4559
1.8	0.769739	165.2001	3.624727	-98.5858	0.012972	-49.7519	0.92193	167.6701
1.9	0.728879	167.3265	4.462103	-120.791	0.01502	-71.8446	0.948299	159.9468
2	0.68329	172.1268	5.587538	-150.038	0.019363	-98.9822	0.908817	145.106
2.1	0.708453	-175.531	6.857336	162.543	0.023327	-147.254	0.531556	114.7112
2.2	0.908807	-176.492	4.83017	106.0834	0.015784	152.5865	0.292037	-145.083
2.3	0.954233	177.3164	2.635421	73.85593	0.008022	118.1013	0.655407	-156.266
2.4	0.963741	173.865	1.554382	55.22289	0.004653	95.82247	0.798102	-166.088
2.5	0.962023	171.9637	0.996796	43.25205	0.003104	91.2853	0.861944	-172.538
2.6	0.964124	170.1638	0.673951	33.63394	0.002015	73.92284	0.898683	-177.049
2.7	0.964422	168.9002	0.488976	25.88698	0.001355	60.40018	0.919021	179.2637
2.8	0.966632	167.6364	0.361221	20.58154	0.000623	58.64767	0.929407	176.2327
2.9	0.968217	166.5472	0.281166	14.93522	0.000613	124.5739	0.943444	173.835
3	0.967494	165.5649	0.222547	10.48053	0.000801	112.0964	0.94863	171.6223
3.1	0.965476	164.2773	0.181456	4.606195	0.000732	126.5646	0.948514	169.2356
3.2	0.969952	163.5093	0.15125	1.589776	0.001114	135.7958	0.952063	167.4855
3.3	0.971981	162.4895	0.126981	-1.84206	0.002281	143.0247	0.953306	165.7146
3.4	0.971058	161.3794	0.106537	-5.19963	0.002325	127.7831	0.958508	163.7329
3.5	0.967177	160.2758	0.090368	-7.80242	0.003254	136.2912	0.953991	162.0096
3.6	0.966286	158.9789	0.078095	-11.5844	0.003606	118.1527	0.958046	160.1284
3.7	0.961343	157.622	0.067075	-14.7341	0.004646	107.3256	0.957285	157.9503
3.8	0.970964	156.6782	0.05549	-13.9956	0.005367	98.9238	0.957458	156.3911
3.9	0.964409	154.9489	0.039192	-11.2055	0.00529	99.37699	0.954883	153.8338
4	0.961864	153.3016	0.021169	45.18343	0.006031	93.8742	0.959037	151.6245
4.1	0.93681	151.3502	0.138335	62.72905	0.006075	79.68228	0.958423	148.8873
4.2	0.949101	151.2832	0.148243	-3.21287	0.006261	77.50125	0.94804	146.5335
4.3	0.954547	149.3683	0.119396	-18.3354	0.006566	82.73615	0.950442	143.505
4.4	0.956742	147.3582	0.111649	-23.9114	0.007066	78.32989	0.949607	140.2793
4.5	0.950722	144.2212	0.111885	-30.4364	0.008224	71.08285	0.949692	136.526



I2D Package Outline Metal-Ceramic Hermetic Package





SGN19C160I2D

High Voltage - High Power GaN-HEMT

For further information please contact:

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