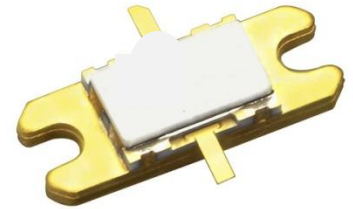


### FEATURES

- High Voltage Operation :  $V_{DS}=50V$
- High Power : 49.5dBm (typ.) @  $P_{sat}$
- High Efficiency: 70%(typ.) @  $P_{sat}$
- Linear Gain : 21.0dB(typ.) @  $f=0.9GHz$
- Proven Reliability



### DESCRIPTION

SEDI'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 device target applications are low current and wide band applications for high voltage.

### ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating	Unit
Operating-Voltage	$V_{DS}$		55	V
Drain-Source Voltage	$V_{DS}$	$V_{GS}=-8V$	200	V
Gate-Source Voltage	$V_{GS}$		-15	V
Total Power Dissipation	$P_t$	$T_c=25deg.C$	118.5	W
Storage Temperature	$T_{stg}$		-65 to +175	deg.C
Channel Temperature	$T_{ch}$		250	deg.C

### RECOMMENDED OPERATING CONDITION(Case Temperature $T_c=25deg.C$ )

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	$V_{DS}$		50	V
Forward Gate Current	$I_{GF}$	$R_G=5\ ohm$	<94.0	mA
Reverse Gate Current	$I_{GR}$	$R_G=5\ ohm$	>-5.4	mA
Channel Temperature	$T_{ch}$		$\leq 180$	deg.C

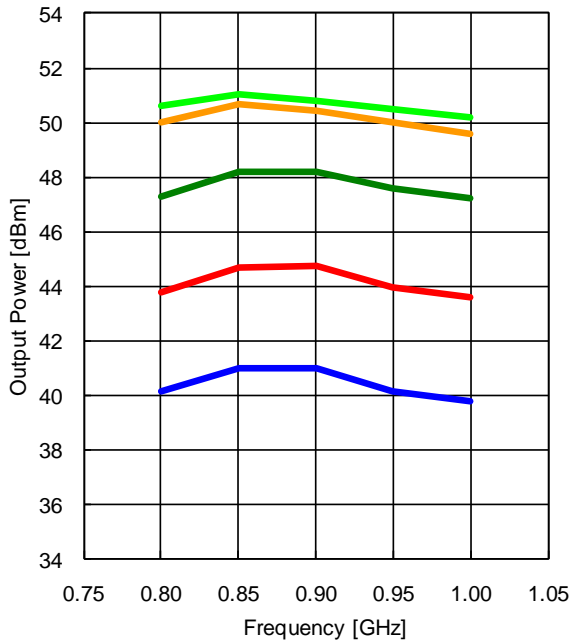
### ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25deg.C$ )

Item	Symbol	Condition	Limit			Unit
			min.	Typ.	Max.	
Pinch-Off Voltage	$V_p$	$V_{DS}=50V\ I_{DS}=27mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat}$	$V_{DS}=50V$	48.5	49.5	-	dBm
Drain Efficiency	$\eta_d$	$I_{DS}(DC)=400mA$	-	70	-	%
Linear Gain	GL	$f=0.9GHz$	19.0	21.0	-	dB
Thermal Resistance	$R_{th}$	Channel to Case $P_{DC}=72W$	-	1.5	1.9	deg.C/W

RoHS COMPLIANCE	Yes
-----------------	-----

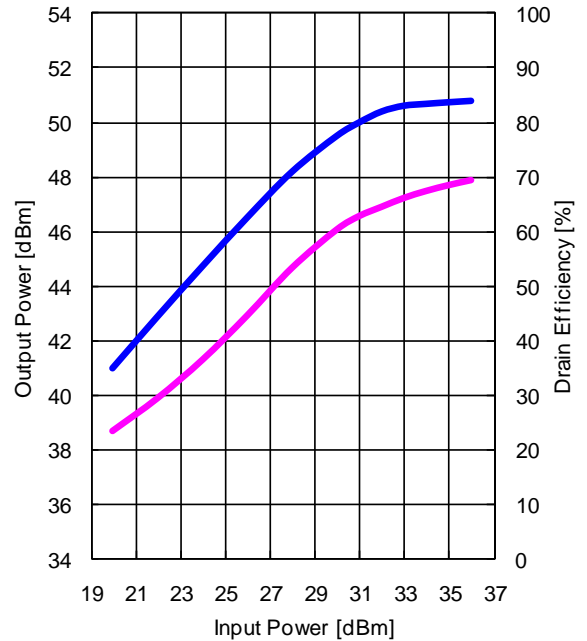
### RF Performance @f=0.9GHz fine tuned

**Output Power vs. Frequency**  
 $V_{DS}=50V$   $I_{DS(DC)}=400mA$



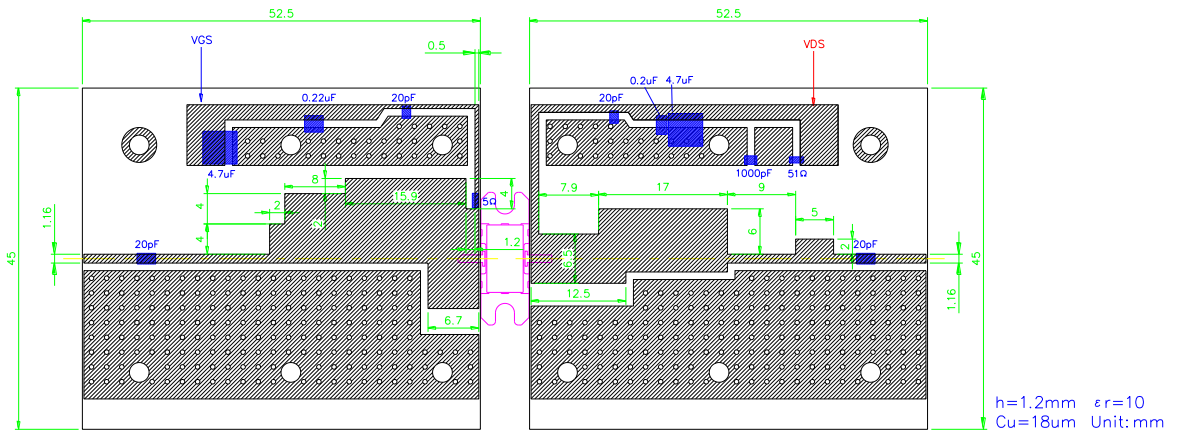
— Pin=20dBm    — Pin=24dBm    — Pin=28dBm  
— Pin=32dBm    — Pin=36dBm

**Output Power and Drain Efficiency vs. Input Power**  
 $V_{DS}=50V$   $I_{DS(DC)}=400mA$   $f=0.9GHz$

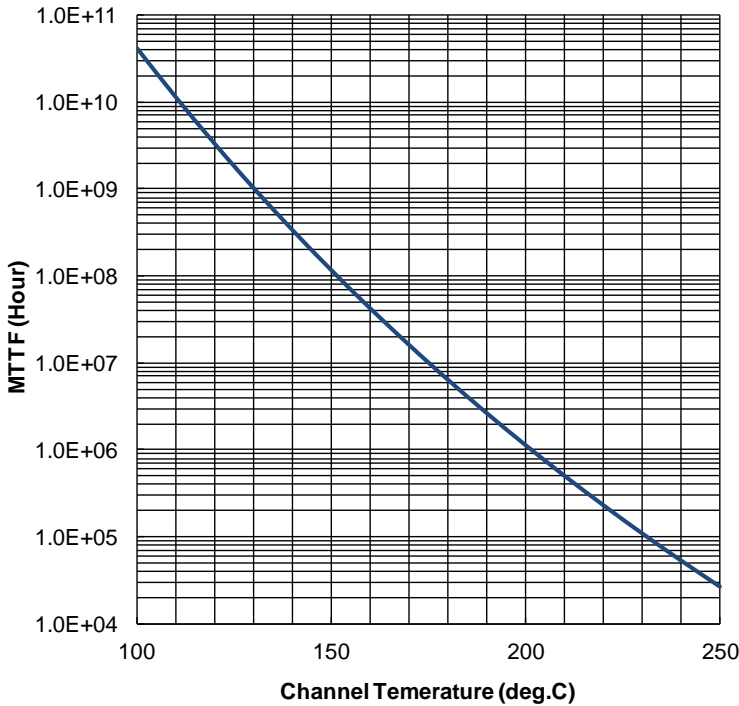


— Output Power    — Drain Efficiency

### Test Fixture



### MTTF Calculation - Estimated MTTF -



Ea = 1.6eV  
Confidence Level = 60%

Channel Temp. (deg.C)	MTTF (Hours)
160	4.25 x 10 <sup>7</sup>
180	6.40 x 10 <sup>6</sup>
200	1.13 x 10 <sup>6</sup>

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

$$MTTF_{use} = MTTF_{stress} * AF$$

Where;

AF : acceleration factor

Ea : activation energy (1.6eV)

k : Boltzman's constant (8.62 x 10<sup>-5</sup> eV/K)

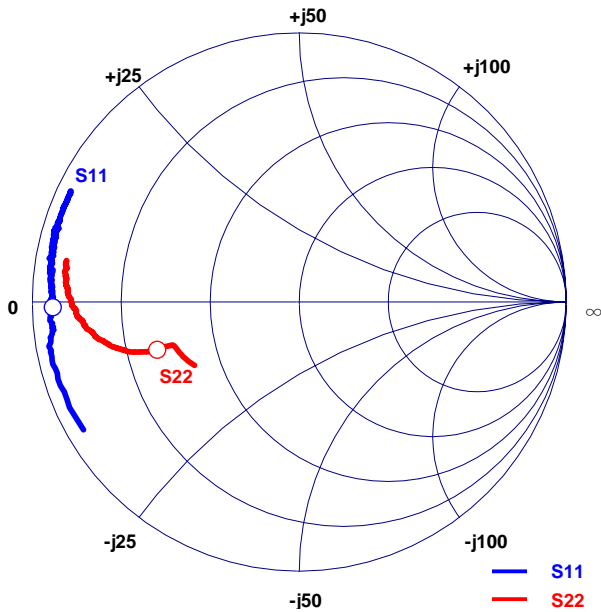
T<sub>stress</sub> : stress temperature (K)

T<sub>use</sub> : use tempetarure (K)

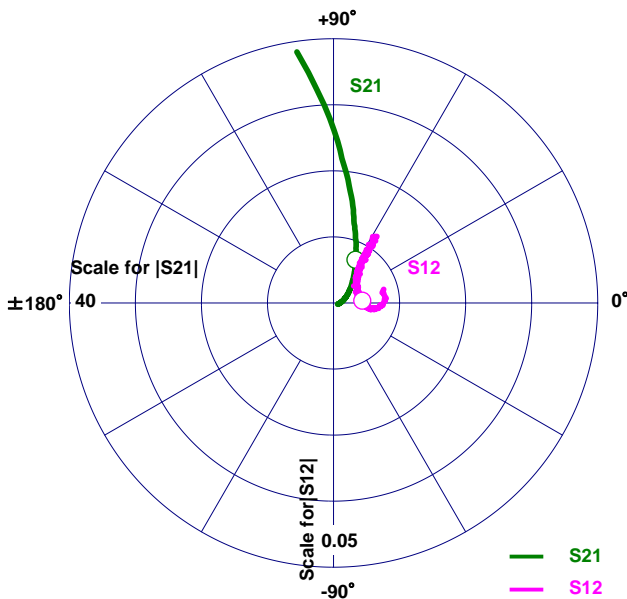
### ESD characteristic

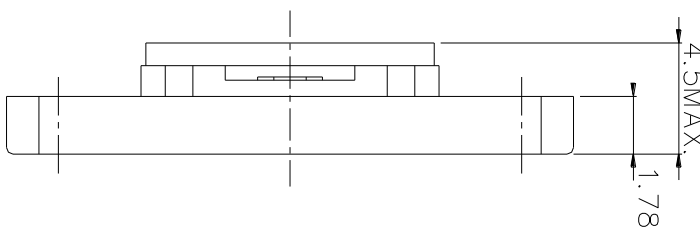
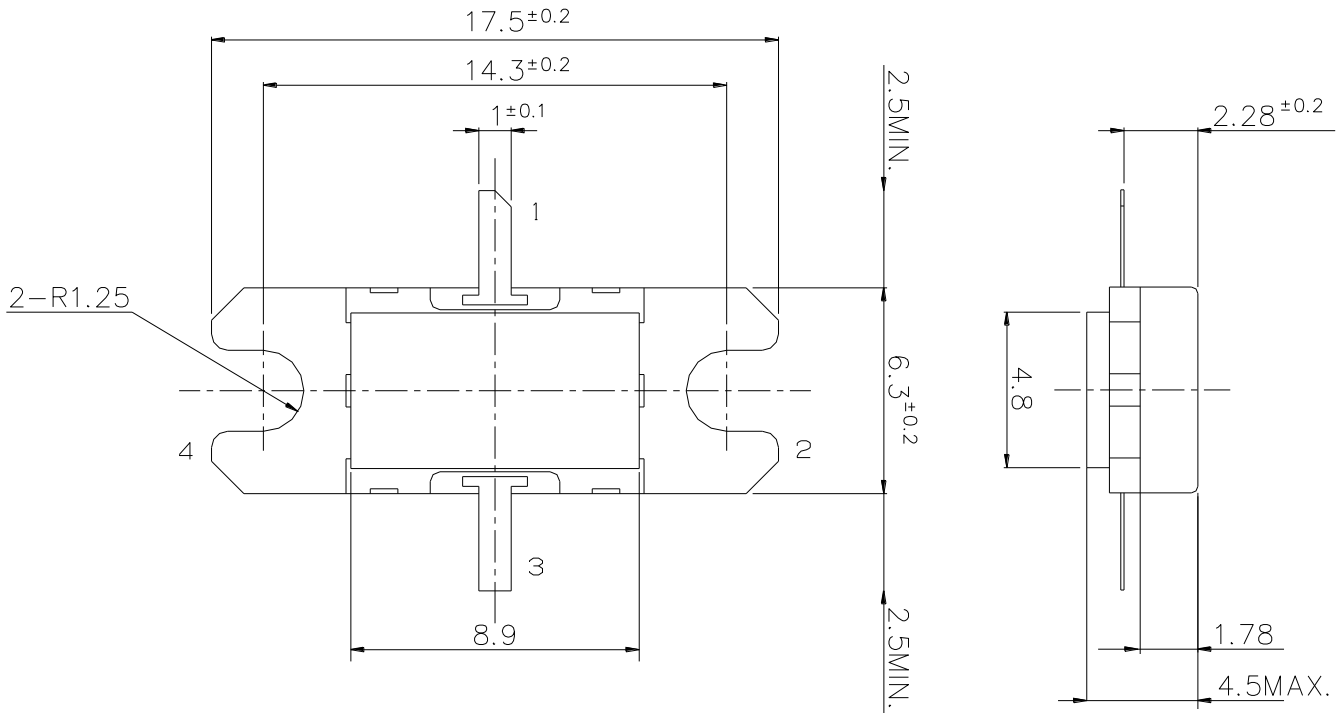
Test Methodology	Class
Human Body Model (per JESD22-A114)	1B
Machine Model (per JEIA/ESD22-A115)	A

S-Parameters @V<sub>DS</sub>=50V I<sub>DS</sub>=400mA f=0.1 to 3.1GHz  
 Z<sub>I</sub> = Z<sub>S</sub> = 50 ohm      Marker : 0.9GHz



Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.10	0.94	-149.56	38.39	98.31	0.010	15.12	0.46	-149.00
0.20	0.95	-166.84	19.71	84.32	0.009	-2.47	0.49	-159.85
0.30	0.93	-173.34	12.84	76.13	0.008	-6.99	0.51	-161.45
0.40	0.93	-176.59	9.50	68.91	0.007	-8.51	0.53	-161.72
0.50	0.92	-178.80	7.34	63.09	0.01	-10.03	0.56	-161.55
0.60	0.93	-179.50	5.97	57.35	0.01	-6.36	0.59	-161.98
0.70	0.93	-178.22	4.93	52.10	0.01	-4.67	0.62	-162.74
0.80	0.93	-176.77	4.18	47.45	0.01	-4.21	0.65	-163.36
0.90	0.93	-175.54	3.58	42.64	0.01	4.78	0.68	-164.69
1.00	0.93	-174.77	3.12	38.90	0.01	7.92	0.70	-165.72
1.10	0.94	-173.35	2.75	34.29	0.01	13.71	0.72	-166.96
1.20	0.94	-172.52	2.43	30.35	0.00	22.90	0.74	-168.31
1.30	0.94	-171.43	2.16	27.17	0.00	27.63	0.76	-169.44
1.40	0.94	-170.50	1.96	23.49	0.01	33.88	0.78	-171.03
1.50	0.94	-169.59	1.77	20.44	0.01	35.89	0.79	-172.38
1.60	0.94	-168.02	1.61	16.97	0.01	41.82	0.81	-173.59
1.70	0.95	-167.41	1.46	14.00	0.01	42.94	0.81	-175.05
1.80	0.95	-165.96	1.35	11.28	0.01	48.57	0.83	-175.93
1.90	0.94	-165.03	1.25	8.32	0.01	51.01	0.84	-177.48
2.00	0.95	-163.88	1.15	5.72	0.01	51.24	0.84	-178.50
2.10	0.94	-163.05	1.07	3.12	0.01	53.63	0.85	-179.42
2.20	0.95	-162.24	1.01	1.34	0.01	53.50	0.86	-179.12
2.30	0.95	-161.23	0.95	-1.31	0.01	54.42	0.87	-178.23
2.40	0.95	-160.21	0.88	-4.22	0.01	53.03	0.87	-176.98
2.50	0.95	-159.39	0.83	-5.73	0.01	55.11	0.87	-176.21
2.60	0.95	-158.54	0.79	-8.18	0.01	56.45	0.88	-175.04
2.70	0.95	-157.62	0.75	-10.15	0.01	55.46	0.88	-173.84
2.80	0.95	-156.83	0.72	-12.30	0.01	57.43	0.88	-173.00
2.90	0.95	-155.97	0.68	-14.02	0.01	57.27	0.88	-171.80
3.00	0.95	-155.17	0.65	-16.15	0.01	56.91	0.88	-171.18
3.10	0.95	-154.25	0.63	-17.77	0.01	56.86	0.88	-169.96





**PIN ASSIGNMENT**  
 1 : GATE  
 2 : SOURCE(Flange)  
 3 : DRAIN

Unit : mm



**SGNE070MK**

***High Voltage - High Power GaN-HEMT***

**For further information please contact:**

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