

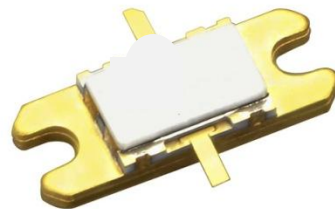
FEATURES

- High Voltage Operation : $V_{DS}=50V$
- High Power : 40.5dBm (typ.) @ P_{sat}
- High Efficiency: 55%(typ.) @ P_{sat}
- Linear Gain : 16.0dB(typ.) @ $f=3.5GHz$
- 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	$T_c=25deg.C$	45	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}	$R_G=50\ ohm$	<13.0	mA
Reverse Gate Current	I_{GR}	$R_G=50\ ohm$	>-0.5	mA
Channel Temperature	T_{ch}		≤ 180	deg.C

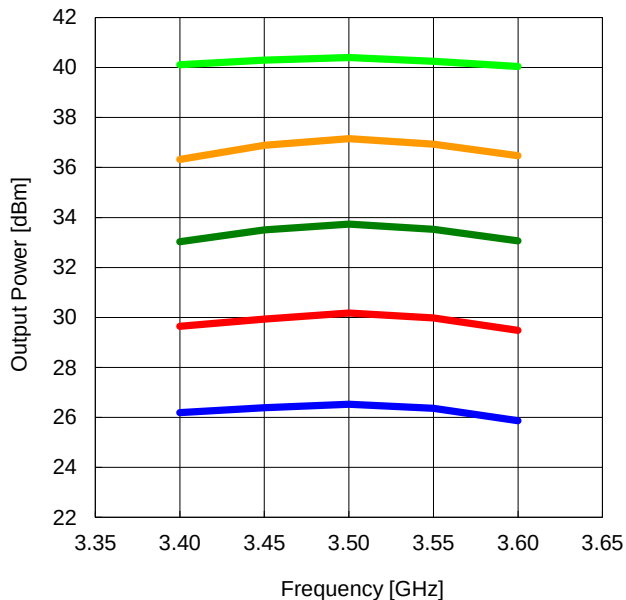
ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25deg.C$)

Item	Symbol	Condition	Limit			Unit
			min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V\ I_{DS}=2.6mA$	-1.0	-1.5	-2.0	V
Saturated Power	P_{sat}	$V_{DS}=50V$	39.5	40.5	-	dBm
Drain Efficiency	η_d	$I_{DS}(DC)=100mA$	-	55	-	%
Linear Gain	GL	$f=3.5GHz$	15.0	16.0	-	dB
Thermal Resistance	R_{th}	Channel to Case $P_{DC}=18W$	-	4.5	5.0	deg.C/W

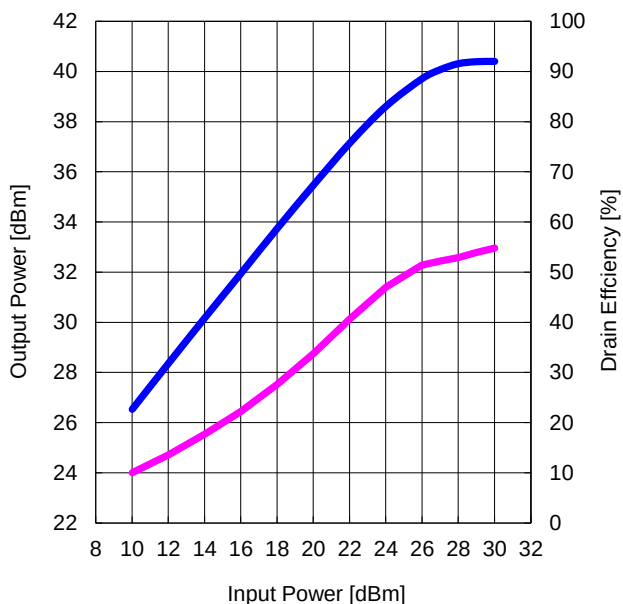
RoHS COMPLIANCE	Yes
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RF Performance @f=3.5GHz fine tuned

Output Power vs. Frequency
V_{DS}=50V I_{DS(DC)}=100mA



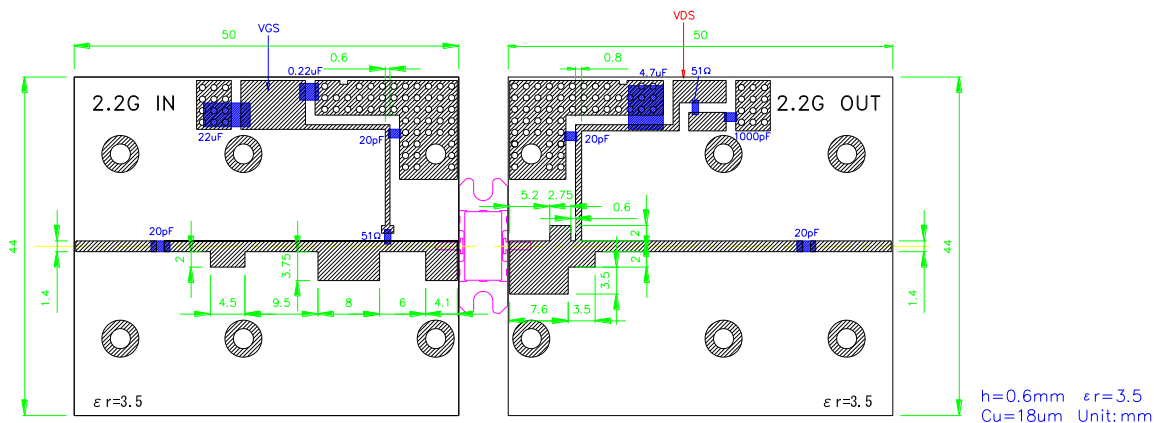
Output Power and Drain Efficiency vs. Input Power
V_{DS}=50V I_{DS(DC)}=100mA f=3.5GHz



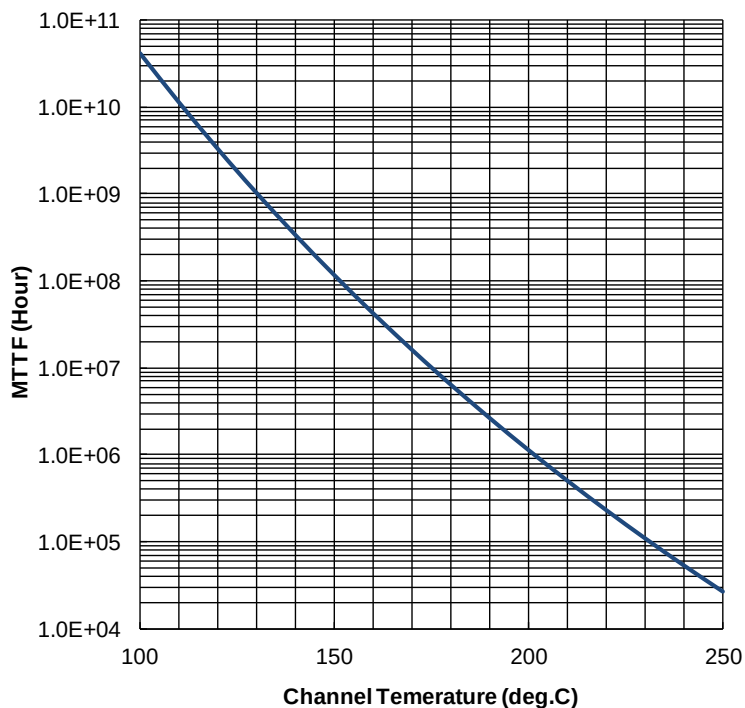
Pin=10dBm Pin=14dBm Pin=18dBm
Pin=22dBm Pin=30dBm

Pout Nd

Test Fixture



MTTF Calculation – Estimated MTTF –



Ea = 1.6eV
Confidence Level = 60%

Channel Temp. (deg.C)	MTTF (Hours)
160	4.25×10^7
180	6.40×10^6
200	1.13×10^6

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

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

Where;

AF : acceleration factor

Ea : activation energy (1.6eV)

k : Boltzman's constant (8.62×10^{-5} eV/K)

T_{stress} : stress temperature (K)

T_{use} : use tempetarure (K)

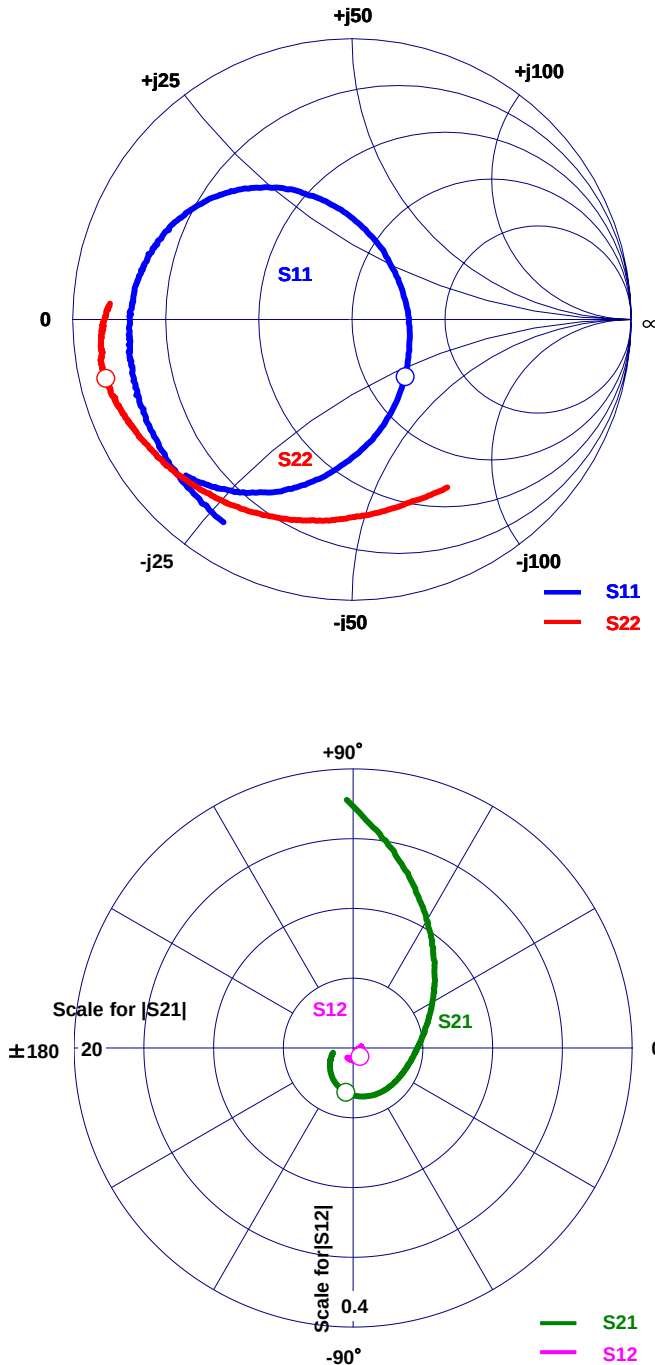
ESD characteristic

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

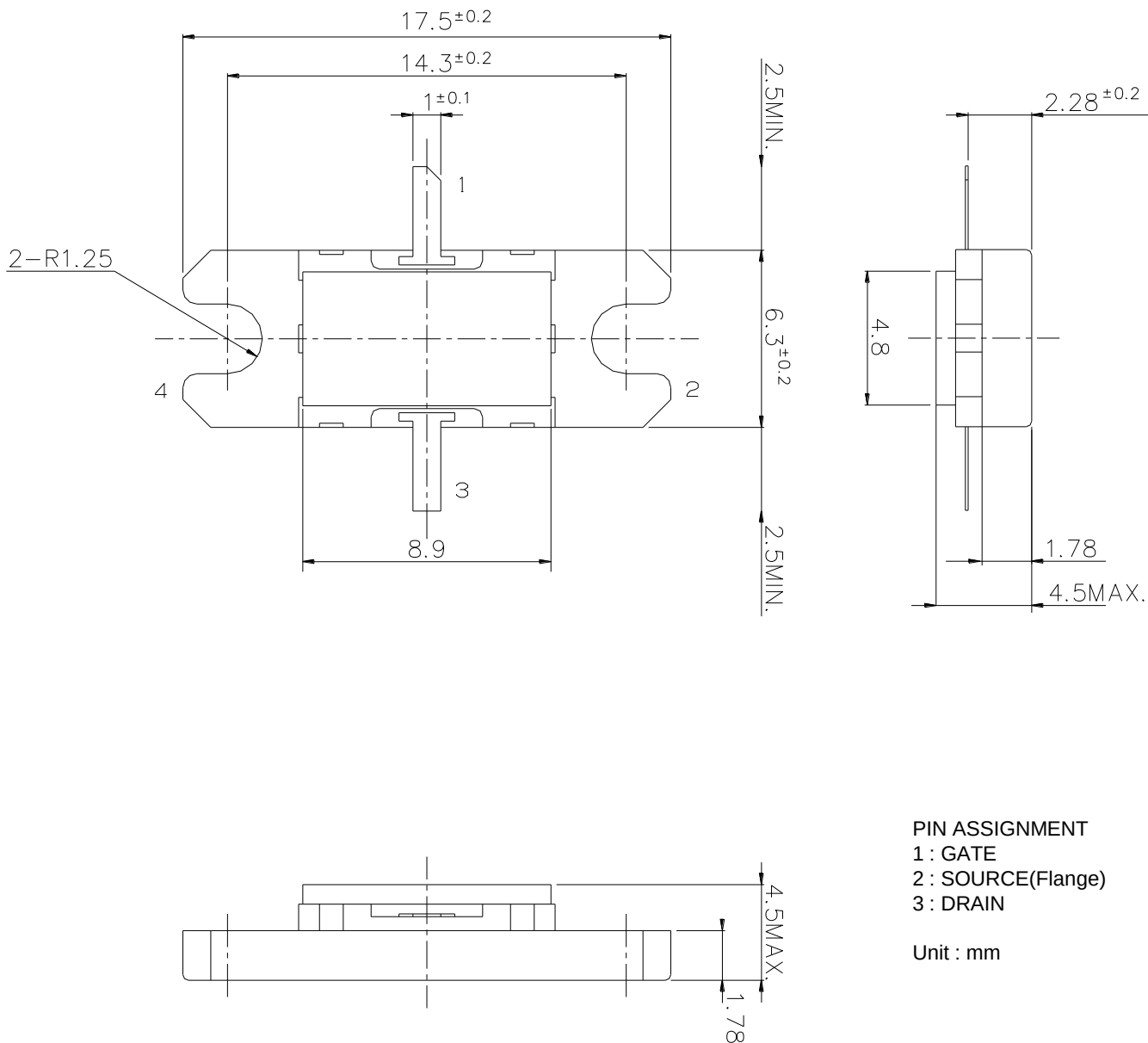
S-Parameters @ $V_{DS}=50V$ $I_{DS}=100mA$ $f=0.5$ to $4.5GHz$

$Z_I = Z_S = 50 \text{ ohm}$

Marker : 3.5GHz



Freq. GHz	S11			S21			S12			S22		
	MAG	ANG		MAG	ANG		MAG	ANG		MAG	ANG	
0.50	0.86	-122.50		17.79	91.49		0.012	12.43		0.69	-60.28	
0.60	0.84	-133.40		15.16	82.04		0.012	4.40		0.69	-67.77	
0.70	0.83	-142.30		13.26	73.59		0.011	-2.05		0.69	-75.01	
0.80	0.82	-149.62		11.63	65.91		0.011	-7.69		0.69	-81.75	
0.90	0.82	-156.13		10.40	58.98		0.011	-12.13		0.70	-88.02	
1.00	0.81	-161.61		9.28	52.53		0.011	-15.48		0.71	-93.90	
1.10	0.81	-166.79		8.44	46.10		0.010	-18.35		0.72	-99.23	
1.20	0.81	-171.76		7.69	40.31		0.010	-21.74		0.74	-104.40	
1.30	0.80	-176.12		7.05	34.45		0.009	-22.20		0.75	-109.10	
1.40	0.79	-179.92		6.50	29.38		0.009	-22.80		0.76	-113.57	
1.50	0.79	-175.95		6.04	24.11		0.008	-25.12		0.77	-117.70	
1.60	0.79	-172.08		5.67	18.96		0.008	-22.11		0.78	-121.40	
1.70	0.78	-168.50		5.34	14.32		0.007	-23.95		0.80	-125.19	
1.80	0.77	-164.78		5.04	9.46		0.007	-18.52		0.80	-128.77	
1.90	0.76	-160.71		4.80	4.65		0.007	-21.25		0.81	-131.87	
2.00	0.74	-157.07		4.61	-0.06		0.007	-20.42		0.82	-134.69	
2.10	0.73	-152.91		4.44	-4.82		0.007	-20.58		0.83	-137.48	
2.20	0.71	-148.48		4.28	-10.04		0.007	-19.37		0.83	-140.19	
2.30	0.69	-143.75		4.18	-15.15		0.007	-10.77		0.85	-142.89	
2.40	0.66	-138.92		4.09	-20.48		0.007	-10.71		0.85	-145.27	
2.50	0.63	-133.48		4.00	-25.46		0.008	-12.79		0.86	-147.52	
2.60	0.59	-127.61		3.92	-31.50		0.009	-12.71		0.86	-149.70	
2.70	0.55	-120.73		3.87	-37.48		0.009	-12.24		0.87	-151.68	
2.80	0.50	-113.04		3.83	-43.93		0.010	-12.52		0.87	-153.90	
2.90	0.44	-103.68		3.80	-50.49		0.011	-17.46		0.88	-155.34	
3.00	0.37	-91.99		3.75	-57.73		0.012	-20.65		0.88	-157.57	
3.10	0.30	-75.99		3.69	-65.39		0.012	-25.58		0.89	-159.59	
3.20	0.24	-53.87		3.60	-73.38		0.014	-31.89		0.90	-161.07	
3.30	0.20	-20.17		3.51	-81.85		0.015	-36.74		0.90	-162.97	
3.40	0.22	-17.88		3.37	-90.41		0.015	-44.26		0.90	-164.76	
3.50	0.28	-46.92		3.22	-99.30		0.016	-51.16		0.91	-166.64	
3.60	0.36	-66.73		3.03	-107.77		0.016	-58.86		0.91	-168.30	
3.70	0.44	-81.71		2.84	-115.93		0.018	-66.15		0.91	-170.03	
3.80	0.51	-93.24		2.62	-124.15		0.017	-74.28		0.90	-172.21	
3.90	0.58	-102.64		2.40	-131.46		0.018	-82.01		0.90	-173.65	
4.00	0.64	-110.53		2.22	-138.39		0.018	-89.23		0.90	-175.13	
4.10	0.69	-117.52		2.03	-144.69		0.017	-98.49		0.90	-177.11	
4.20	0.74	-123.15		1.87	-150.58		0.017	-104.05		0.89	-178.72	
4.30	0.77	-128.34		1.73	-156.07		0.016	-108.70		0.88	-179.56	
4.40	0.79	-132.83		1.59	-161.27		0.016	-114.35		0.88	-177.85	
4.50	0.81	-136.98		1.48	-166.60		0.016	-121.03		0.87	-176.28	





SGNE010MK

High Voltage - High Power GaN-HEMT

For further information please contact:

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