



GaN-HEMT 160W

EGNC160MK

High Voltage - High Power GaN-HEMT

FEATURES

- High Voltage Operation : $V_{DS}=50V$
- High Power : 52.5dBm (typ.) @ P_{sat}
- High Efficiency: 70%(typ.) @ P_{sat}
- Linear Gain : 18dB(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 new product is ideally suited for use in 0.9GHz LTE design requirements as it offers high gain, long term reliability and ease of use.



ABSOLUTE MAXIMUM RATINGS (Case Temperature $T_c=25^{\circ}C$)

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	$^{\circ}C$
Channel Temperature	T_{ch}		250	$^{\circ}C$

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		≤ 55	V
Forward Gate Current	I_{GF}	$R_G=10\Omega$	≤ 153	mA
Reverse Gate Current	I_{GR}	$R_G=10\Omega$	≥ -5.8	mA
Channel Temperature	T_{ch}		≤ 180	$^{\circ}C$
Average Output Power	$P_{ave.}$		≤ 49.5	dBm

ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25^{\circ}C$)

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	$P_{sat} *1$	$V_{DS}=50V$	51.5	52.5	-	dBm
Drain Efficiency	$\eta_d *2$	$I_{DS}(DC)=600mA$	30	35	-	%
Power Gain	$G_p *2$	$f=0.9GHz$	17	18	-	dB
Thermal Resistance	R_{th}	Channel to Case at 78W P_{DC}	-	1.4	1.6	$^{\circ}C/W$

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

*2 : $P_{out} = 44.5dBm$, CW modulation Signal (W-CDMA)



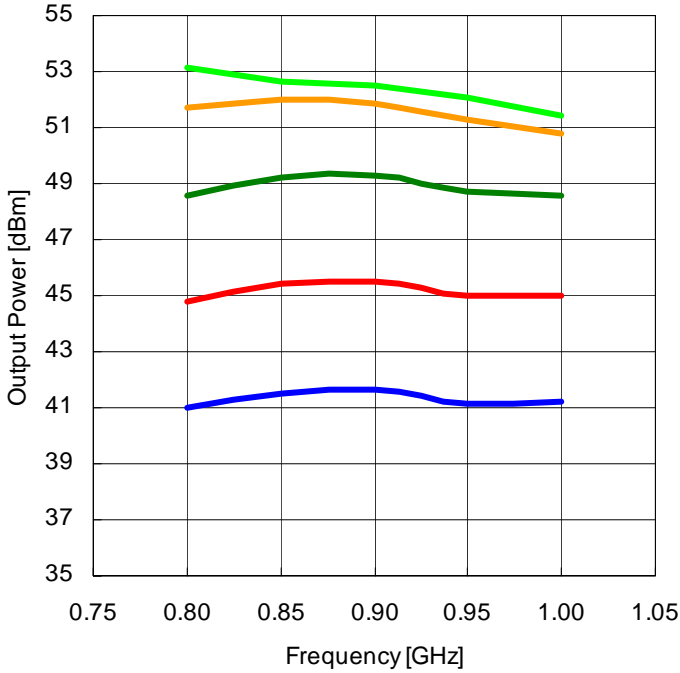
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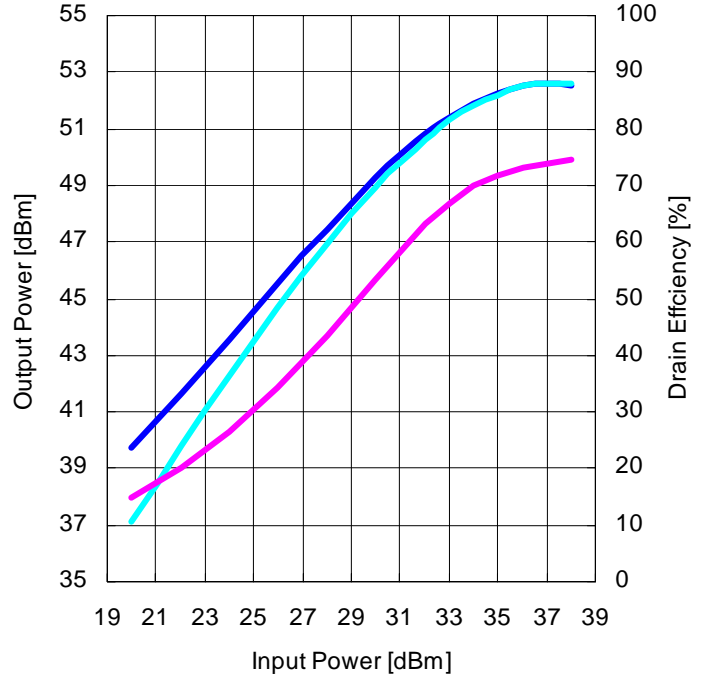
RF characteristics @f=0.9GHz fine tuned

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



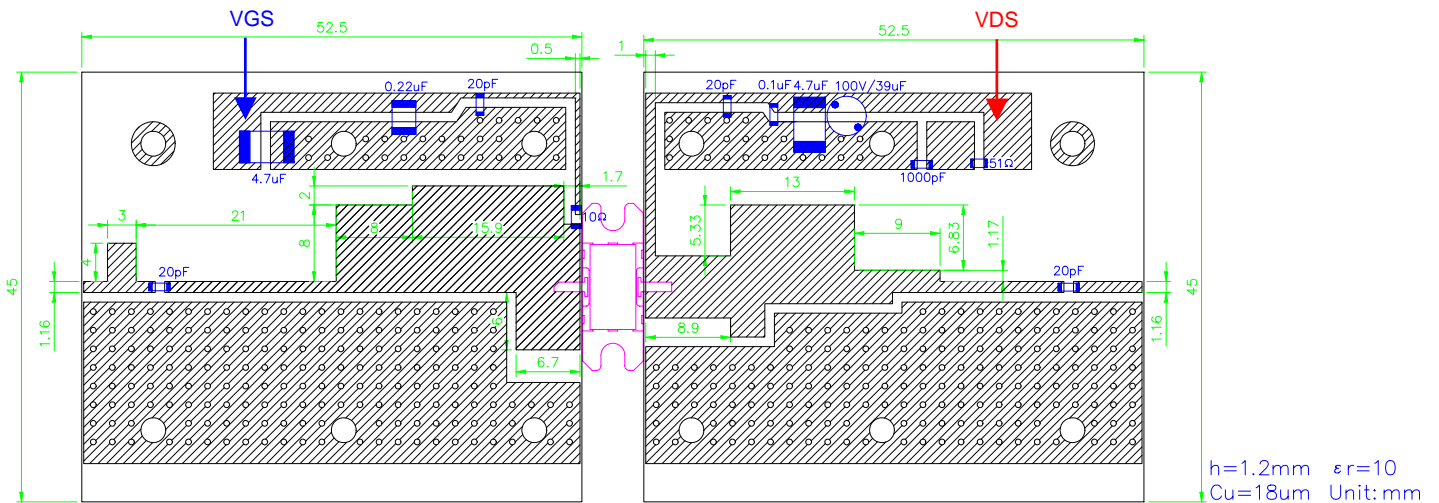
Output Power and Drain Efficiency vs. Input Power
V_{DS}=50V, I_{DS(DC)}=600mA, f=0.9GHz



— Pin=22dBm — Pin=26dBm — Pin=30dBm
— Pin=34dBm — Pin=38dBm

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

Test Fixture



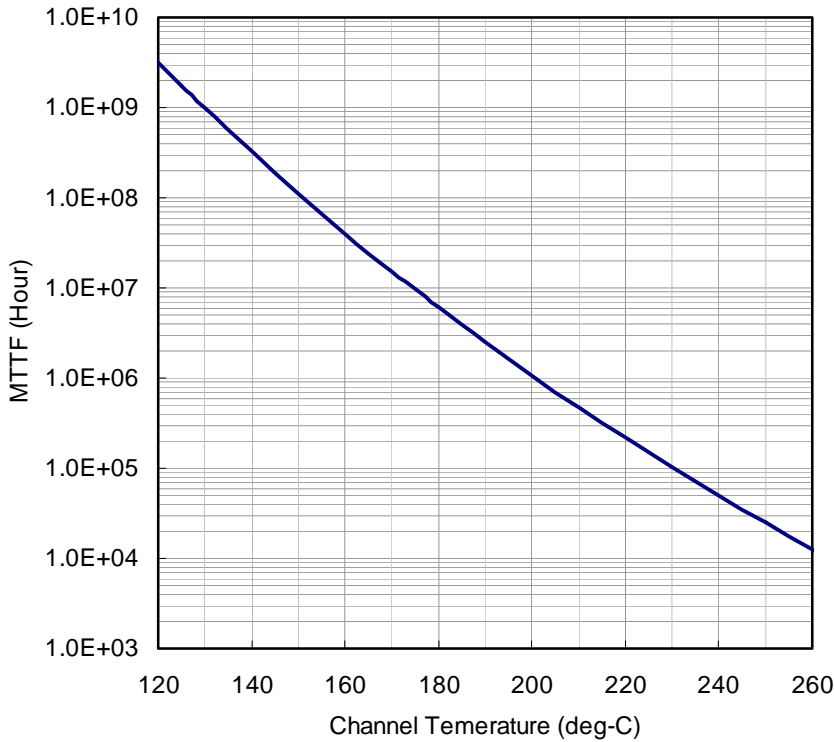


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MTTF Calculation
- Estimated MTTF -



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

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

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

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 characteristic

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



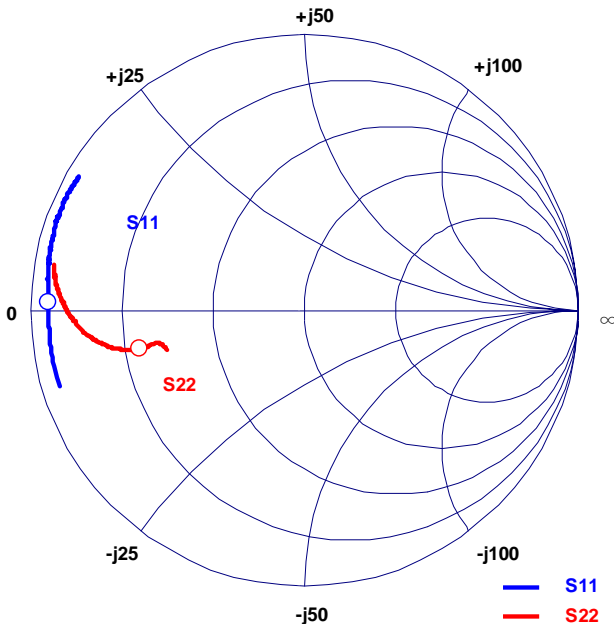
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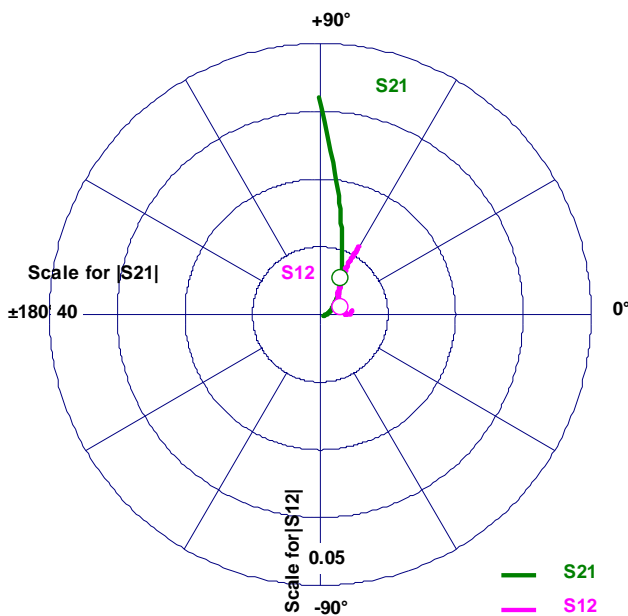
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- Reference DATA -

S-Parameters @V_{DS}=50V, I_{DS(DC)}=600mA, f=0.1 to 3.1GHz
Z_I = Z_s = 50 ohm Marker : 0.9GHz



Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.10	0.94	-162.94	32.06	90.42	0.006	8.57	0.53	-164.19
0.20	0.94	-172.50	16.75	80.36	0.006	2.15	0.54	-167.32
0.30	0.94	-176.96	10.86	72.55	0.005	0.42	0.57	-167.51
0.25	0.94	-175.04	13.21	76.24	0.005	-0.50	0.55	-167.55
0.40	0.94	-179.69	7.88	65.86	0.005	-0.60	0.59	-166.93
0.50	0.94	178.14	6.09	59.63	0.005	0.94	0.62	-166.99
0.60	0.94	176.52	4.88	54.02	0.004	4.65	0.65	-167.04
0.70	0.94	175.01	4.02	48.67	0.004	8.39	0.68	-167.74
0.80	0.94	173.73	3.37	43.95	0.004	13.35	0.70	-168.60
0.90	0.94	172.35	2.87	39.14	0.004	19.61	0.73	-169.50
1.00	0.95	171.32	2.48	35.01	0.004	25.20	0.75	-170.64
1.10	0.95	170.02	2.16	30.70	0.004	32.98	0.77	-171.68
1.20	0.95	169.01	1.91	26.75	0.004	38.35	0.79	-172.90
1.30	0.95	167.83	1.69	22.92	0.005	44.06	0.81	-173.89
1.40	0.96	166.70	1.51	19.48	0.005	48.18	0.82	-175.20
1.50	0.96	165.76	1.35	15.93	0.005	51.83	0.83	-176.27
1.60	0.96	164.60	1.23	12.97	0.006	51.94	0.84	-177.36
1.70	0.96	163.62	1.11	9.54	0.006	55.70	0.86	-178.48
1.80	0.96	162.66	1.02	6.61	0.007	56.91	0.87	-179.53
1.90	0.96	161.83	0.93	3.82	0.007	58.14	0.87	179.40
2.00	0.96	160.75	0.87	1.24	0.008	58.46	0.88	178.23
2.10	0.96	159.81	0.81	-1.61	0.008	58.80	0.89	177.31
2.20	0.96	158.75	0.74	-4.07	0.009	58.90	0.90	176.46
2.30	0.96	157.91	0.70	-6.82	0.009	59.79	0.90	175.73
2.40	0.96	156.89	0.66	-9.67	0.010	61.46	0.91	174.89
2.50	0.96	155.91	0.63	-11.92	0.011	61.32	0.91	174.07
2.60	0.96	154.93	0.59	-14.23	0.011	61.39	0.92	173.35
2.70	0.96	153.79	0.56	-16.62	0.012	61.48	0.92	172.56
2.80	0.96	152.75	0.54	-18.80	0.012	60.88	0.92	171.89
2.90	0.96	151.87	0.52	-20.97	0.013	60.34	0.93	171.07
3.00	0.96	150.65	0.50	-23.08	0.014	60.60	0.93	170.39
3.10	0.96	149.53	0.48	-25.64	0.014	60.29	0.93	169.67





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MK Package Outline Metal-Ceramic Hermetic Package

