



GaN-HEMT 105W

EGNC105MK

High Voltage - High Power GaN-HEMT

FEATURES

- High Voltage Operation : $V_{DS}=50V$
- High Power : 51dBm (typ.) @ P_{sat}
- High Efficiency: 70%(typ.) @ P_{sat}
- Linear Gain : 20dB(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		97.8	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}	$R_G=10\Omega$	≤ 102	mA
Reverse Gate Current	I_{GR}	$R_G=10\Omega$	≥ -3.9	mA
Channel Temperature	T_{ch}		≤ 180	$^{\circ}C$
Average Output Power	$P_{ave.}$		≤ 48.0	dBm

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

Item	Symbol	Condition	Limit			Unit
			min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V$ $I_{DS}=27mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$	50.0	51.0	-	dBm
Drain Efficiency	$\eta_d *2$	$I_{DS}(DC)=400mA$	-	35	-	%
Power Gain	$G_p *2$	$f=0.9GHz$	19	20	-	dB
Thermal Resistance	R_{th}	Channel to Case at 52.5W P_{DC}	-	2.0	2.3	$^{\circ}C/W$

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

*2 : $P_{out} = 43dBm$, CW modulation Signal (W-CDMA)

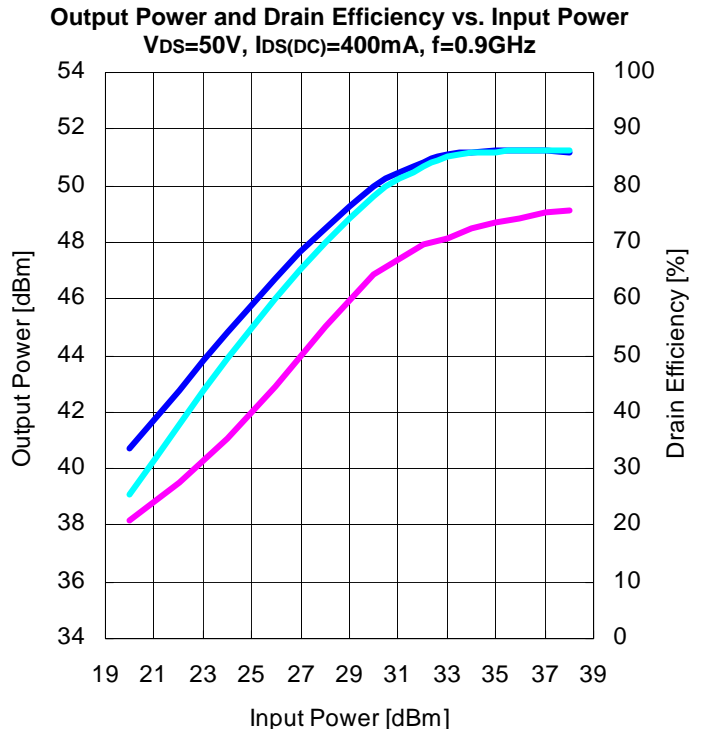
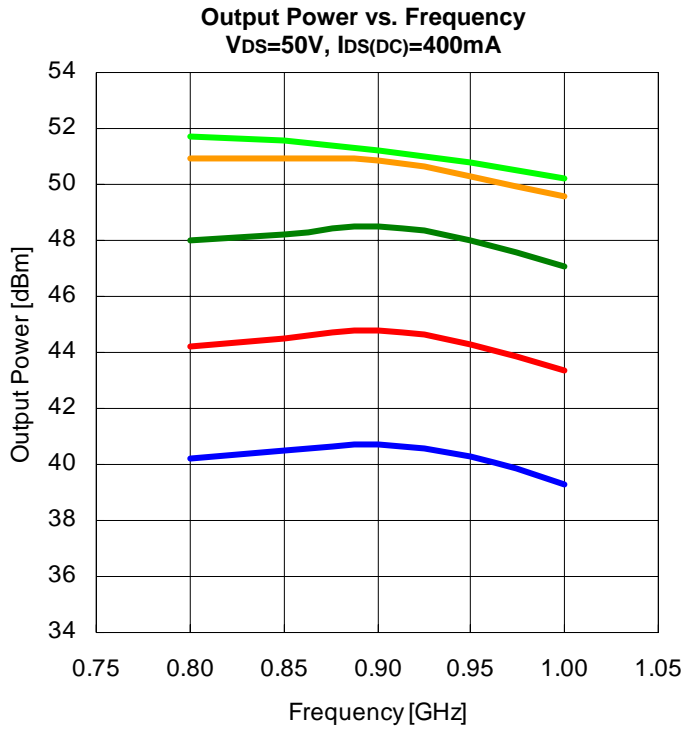


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RF characteristics @f=0.9GHz fine tuned

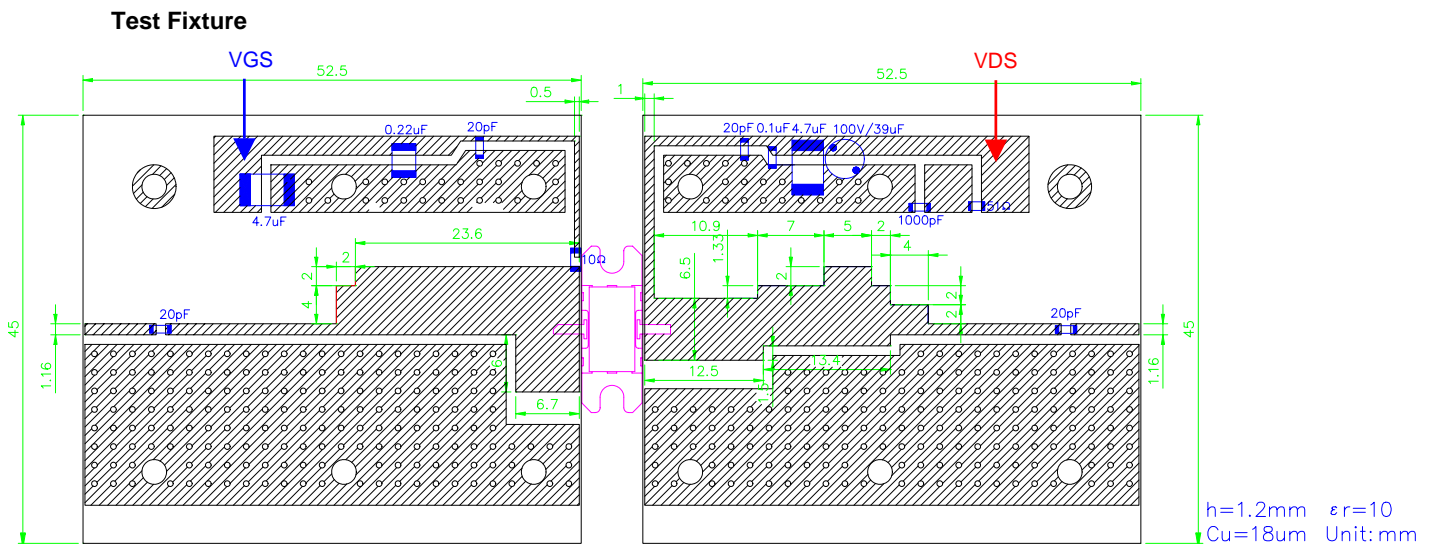
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— Pin=20dBm — Pin=24dBm — Pin=28dBm
— Pin=32dBm — Pin=36dBm

— Pout (class AB) — Pout (class B) — Nd (class B)

Pulse Signal (10% duty, DC : constant)



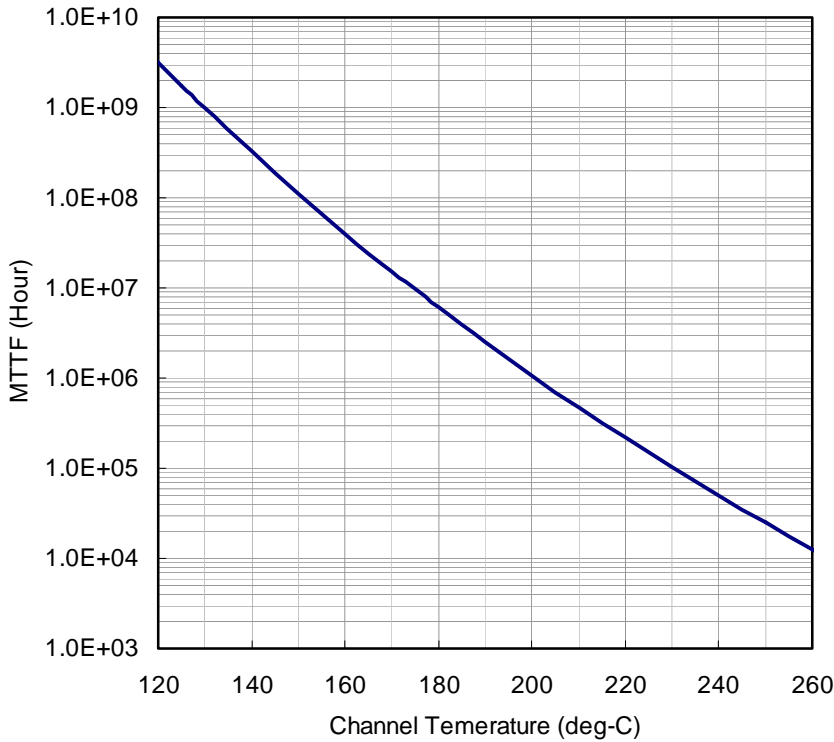


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MTTF Calculation
- Estimated MTTF -



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)	1B
Machine Model (per JEI/ESD22-A115)	A



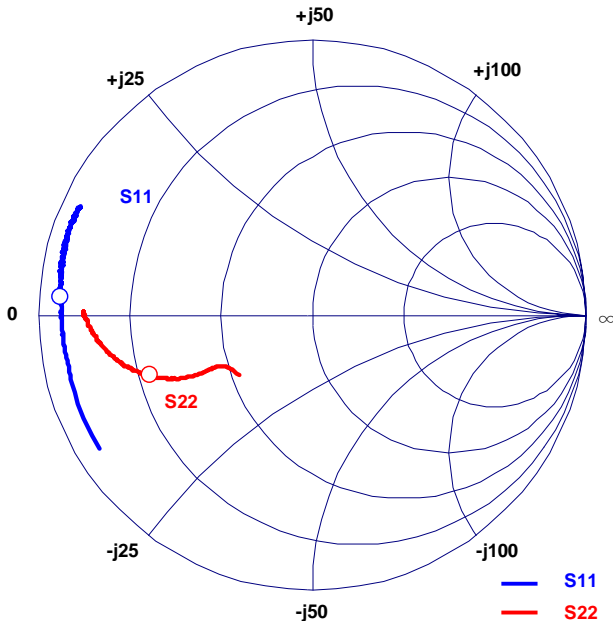
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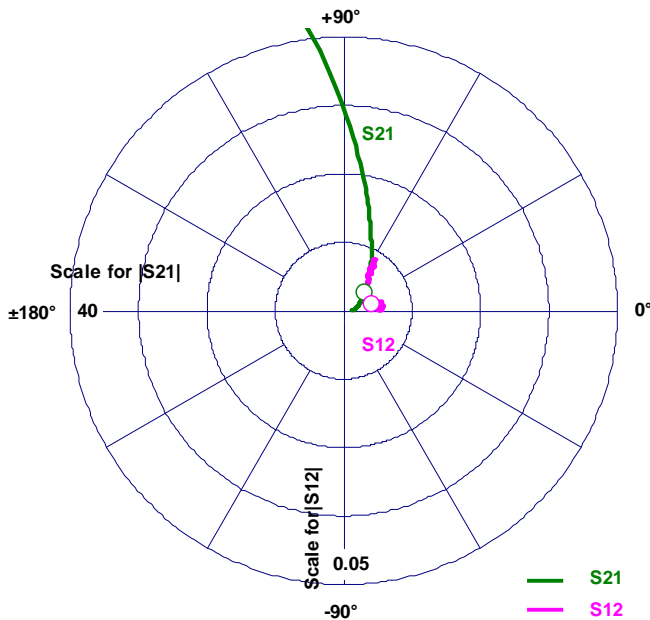
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- Reference DATA -

S-Parameters @V_{DS}=50V, I_{DS(DC)}=400mA, 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	0.92	-148.22	45.34	99.41	0.007	15.81	0.35	-140.53
0.20	0.91	-165.24	22.86	84.79	0.007	5.81	0.38	-150.52
0.30	0.91	-171.57	15.02	75.99	0.007	1.07	0.41	-151.91
0.25	0.91	-168.81	18.17	79.96	0.007	3.40	0.39	-151.66
0.40	0.91	-175.16	11.00	68.42	0.007	4.90	0.45	-152.34
0.50	0.92	-177.74	8.55	61.93	0.006	1.50	0.49	-153.14
0.60	0.92	-179.67	6.92	56.29	0.006	4.83	0.53	-154.35
0.70	0.92	178.72	5.72	50.53	0.006	8.84	0.57	-155.92
0.80	0.92	177.08	4.84	45.60	0.005	10.34	0.60	-157.68
0.90	0.92	175.91	4.14	40.76	0.005	14.42	0.63	-159.71
1.00	0.92	174.65	3.59	36.33	0.005	21.99	0.66	-161.40
1.10	0.93	173.52	3.17	32.02	0.005	29.88	0.69	-163.42
1.20	0.93	172.31	2.80	27.93	0.005	36.73	0.71	-165.20
1.30	0.93	170.92	2.50	24.22	0.006	42.38	0.73	-167.14
1.40	0.93	170.03	2.24	20.52	0.006	47.11	0.75	-168.98
1.50	0.93	169.35	2.04	17.12	0.007	49.54	0.77	-170.99
1.60	0.93	168.05	1.86	14.00	0.008	51.80	0.78	-172.73
1.70	0.94	167.19	1.72	11.02	0.008	55.96	0.80	-174.59
1.80	0.94	166.33	1.57	8.03	0.009	55.63	0.81	-176.29
1.90	0.94	165.40	1.44	5.48	0.009	55.97	0.82	-177.89
2.00	0.95	164.36	1.34	2.41	0.010	57.40	0.83	-179.54
2.10	0.94	163.58	1.25	0.05	0.011	57.83	0.84	179.10
2.20	0.94	162.72	1.18	-2.54	0.011	59.61	0.85	177.76
2.30	0.94	162.38	1.11	-4.56	0.012	59.84	0.85	176.14
2.40	0.94	160.97	1.06	-7.49	0.013	60.46	0.86	175.03
2.50	0.94	160.46	1.00	-10.00	0.014	60.04	0.86	173.33
2.60	0.94	159.16	0.95	-11.74	0.015	59.43	0.87	172.24
2.70	0.94	158.42	0.91	-13.93	0.016	57.40	0.87	170.88
2.80	0.94	157.69	0.87	-16.65	0.017	58.60	0.87	169.64
2.90	0.94	156.91	0.85	-18.29	0.018	55.56	0.87	168.31
3.00	0.94	155.85	0.82	-20.77	0.020	56.57	0.87	166.96
3.10	0.93	155.32	0.79	-22.77	0.021	56.80	0.87	165.79





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MK Package Outline Metal-Ceramic Hermetic Package

