



GaN-HEMT 105W

EGN16C105MK

High Voltage - High Power GaN-HEMT

FEATURES

- High Voltage Operation : $V_{DS}=50V$
- High Power : 50.5dBm (typ.) @ P_{sat}
- High Efficiency: 65%(typ.) @ P_{sat}
- Power Gain : 19dB(typ.) @ $f=1.6GHz$
- 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 1.5GHz W-CDMA & LTE design requirements as it offers high gain, long term reliability and ease of use.



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

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}	$R_G=5\Omega$	≤ 102	mA
Reverse Gate Current	I_{GR}	$R_G=5\Omega$	≥ -3.9	mA
Channel Temperature	T_{ch}		≤ 180	$^\circ C$
Average Output Power	$P_{ave.}$		≤ 47.5	dBm

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

Item	Symbol	Condition	Limit			Unit
			min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V$ $I_{DS}=27.2mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$	49.5	50.5	-	dBm
Drain Efficiency	$\eta_d *2$	$I_{DS}(DC)=400mA$	28	33	-	%
Power Gain	$G_p *2$	$f=1.6GHz$	18	19	-	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 : $P_{out} = 42.5dBm$, CW modulation Signal (W-CDMA)

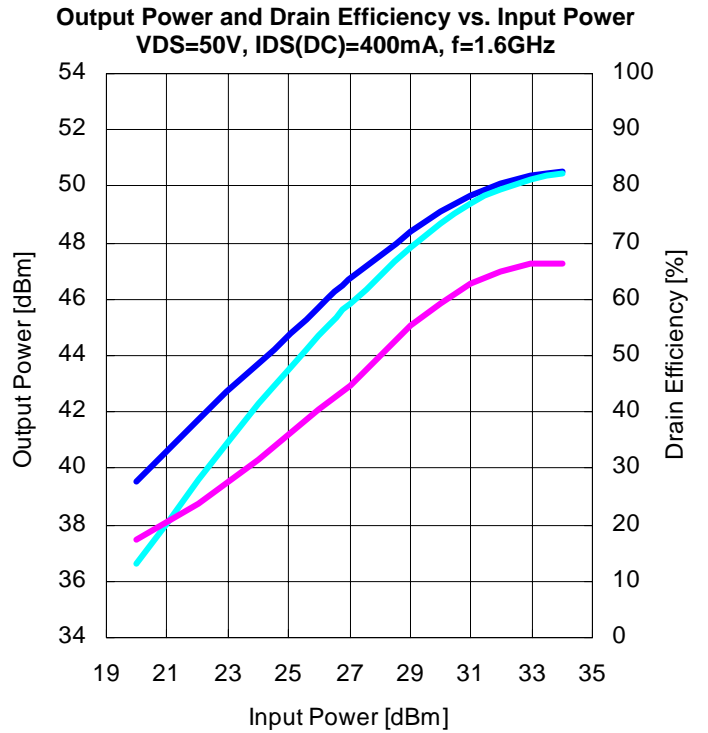
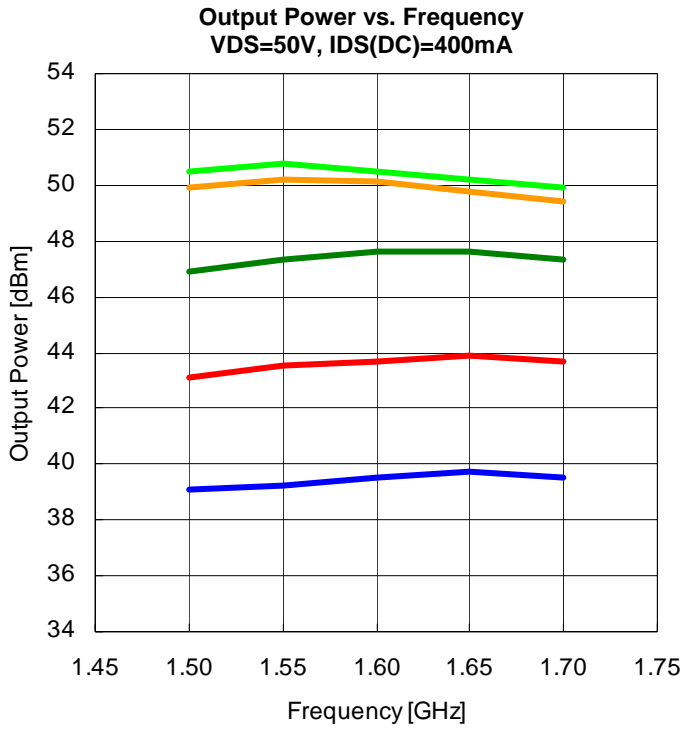


GaN-HEMT 105W

EGN16C105MK

RF characteristics @f=1.6GHz fine tuned

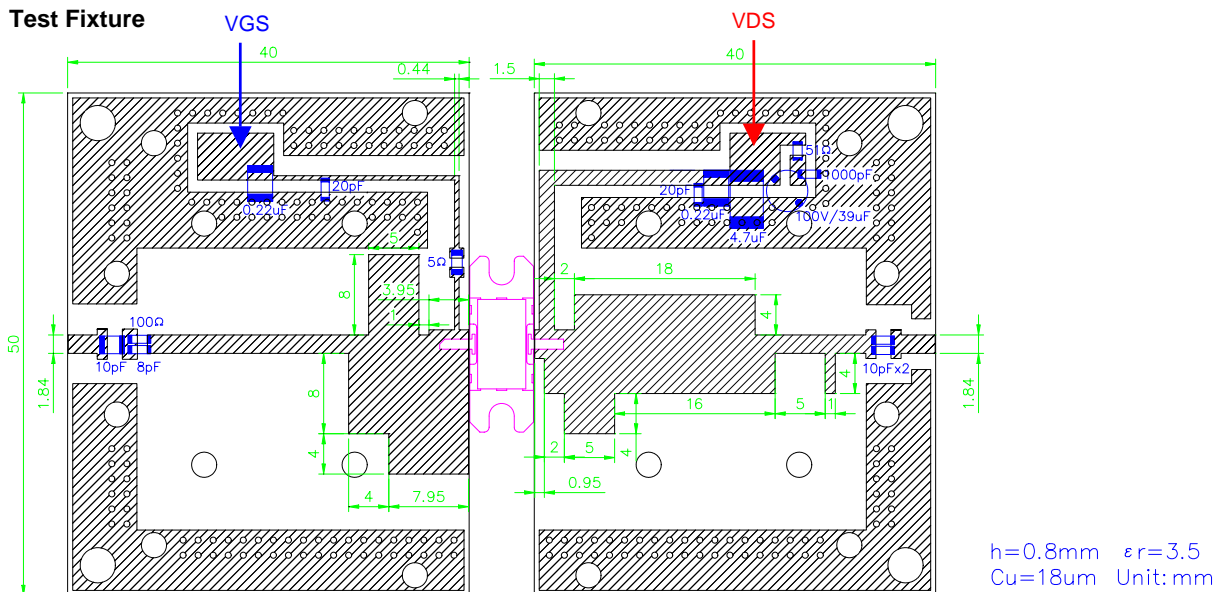
High Voltage - High Power GaN-HEMT



— Pin=20dBm — Pin=24dBm — Pin=28dBm
— Pin=32dBm — Pin=34dBm

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

Pulse Signal (10%-duty, DC : constant)



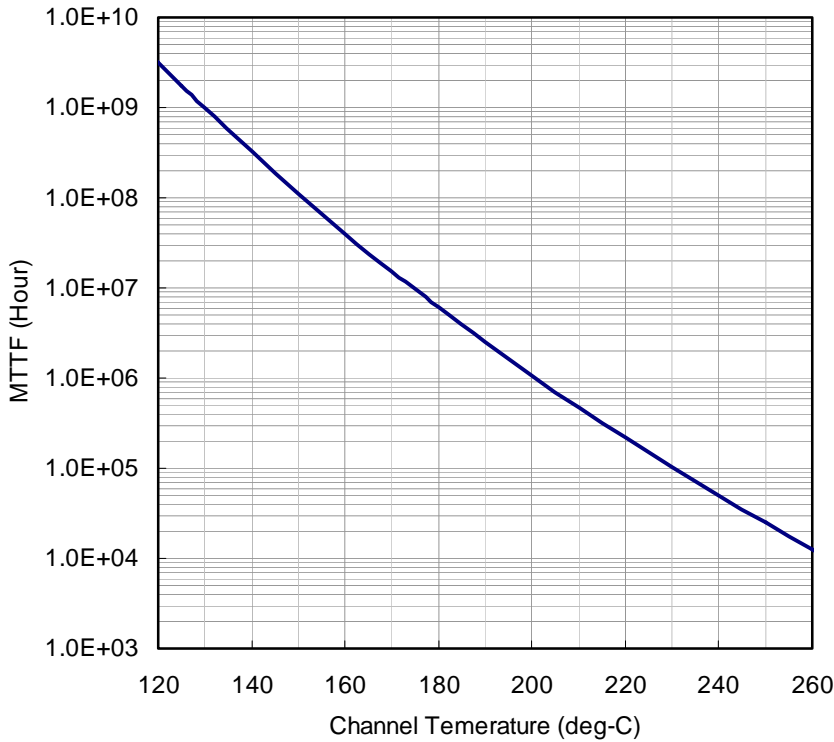


GaN-HEMT 105W

EGN16C105MK

High Voltage - High Power GaN-HEMT

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



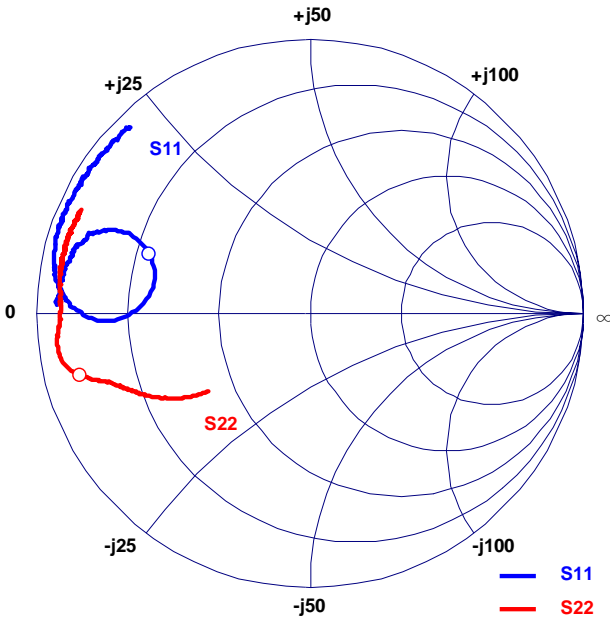
GaN-HEMT 105W

EGN16C105MK

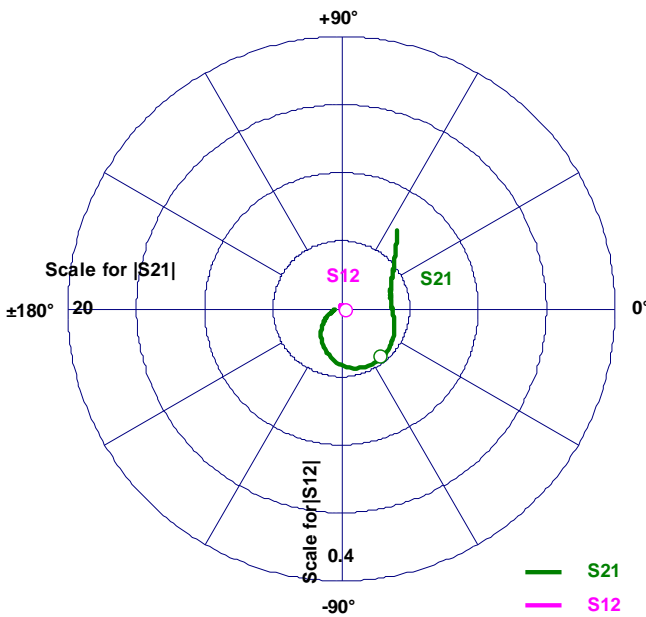
High Voltage - High Power GaN-HEMT

S-Parameters @VDS=50V, IDS(DC)=400mA, f=0.5 to 4.5GHz
 ZI = Zs = 50 ohm Marker : 1.6GHz

- Reference DATA -



Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.93	178.19	7.04	54.80	0.005	-4.93	0.47	-142.69
0.60	0.92	175.95	5.83	47.31	0.005	-3.55	0.52	-144.79
0.70	0.92	173.65	5.07	40.30	0.005	-0.79	0.57	-147.02
0.80	0.92	171.75	4.47	33.96	0.005	-0.42	0.61	-149.50
0.90	0.92	169.80	4.08	27.41	0.005	2.93	0.65	-152.03
1.00	0.90	167.74	3.85	20.49	0.005	5.77	0.68	-154.35
1.10	0.89	165.41	3.70	13.56	0.005	7.86	0.71	-156.43
1.20	0.88	163.26	3.66	5.80	0.005	12.46	0.74	-158.51
1.30	0.86	160.36	3.76	-3.05	0.006	9.03	0.76	-160.33
1.40	0.81	158.00	3.97	-14.11	0.006	6.85	0.79	-161.62
1.50	0.73	156.17	4.35	-29.41	0.007	-4.88	0.83	-162.82
1.60	0.62	159.87	4.63	-51.03	0.007	-24.98	0.87	-164.96
1.70	0.59	173.82	4.44	-78.55	0.006	-51.43	0.92	-168.44
1.80	0.72	-177.87	3.52	-105.63	0.004	-84.06	0.93	-172.87
1.90	0.83	-179.77	2.54	-125.84	0.002	-129.39	0.92	-175.94
2.00	0.90	176.85	1.81	-139.83	0.001	168.40	0.92	-177.82
2.10	0.93	173.61	1.33	-149.73	0.002	123.33	0.92	-179.69
2.20	0.94	170.97	1.00	-156.70	0.003	104.12	0.91	-179.26
2.30	0.95	168.60	0.78	-162.75	0.003	94.17	0.91	-178.02
2.40	0.96	166.62	0.62	-167.67	0.004	90.46	0.91	-176.97
2.50	0.96	164.93	0.50	-171.51	0.005	86.35	0.91	-175.86
2.60	0.97	163.29	0.41	-176.26	0.006	82.64	0.92	-174.65
2.70	0.97	161.89	0.35	-179.53	0.006	83.49	0.92	-173.62
2.80	0.97	160.32	0.29	-176.53	0.007	77.21	0.92	-172.53
2.90	0.97	159.31	0.25	-173.78	0.007	79.98	0.92	-171.64
3.00	0.97	157.89	0.22	-170.39	0.007	79.64	0.93	-170.81
3.10	0.97	156.86	0.19	-167.79	0.008	78.29	0.92	-169.55
3.20	0.97	155.17	0.17	-164.01	0.008	78.99	0.92	-168.78
3.30	0.97	154.01	0.15	-160.67	0.009	77.11	0.93	-167.82
3.40	0.97	152.37	0.13	-159.19	0.009	77.58	0.93	-166.82
3.50	0.97	151.07	0.12	-155.47	0.010	79.52	0.93	-165.85
3.60	0.97	149.56	0.11	-151.47	0.011	78.79	0.93	-164.81
3.70	0.96	148.09	0.10	-148.14	0.011	77.35	0.93	-163.96
3.80	0.96	146.57	0.09	-144.90	0.013	78.64	0.93	-163.02
3.90	0.96	145.08	0.09	-141.08	0.014	78.82	0.93	-161.94
4.00	0.96	143.21	0.08	-136.84	0.016	76.52	0.93	-160.93
4.10	0.95	141.90	0.08	-132.38	0.017	73.28	0.93	-160.23
4.20	0.96	139.47	0.07	-132.09	0.019	72.83	0.92	-159.16
4.30	0.95	138.10	0.07	-121.79	0.020	67.30	0.92	-158.11
4.40	0.95	135.75	0.07	-116.37	0.021	63.70	0.92	-156.67
4.50	0.95	133.94	0.06	-113.07	0.023	60.77	0.92	-155.78





GaN-HEMT 105W

EGN16C105MK

High Voltage - High Power GaN-HEMT

