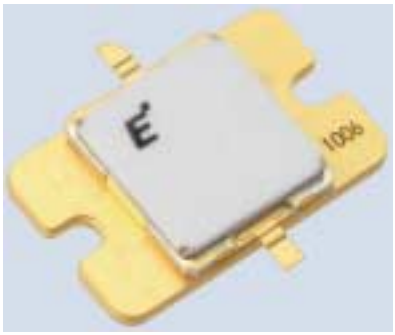
GaN-HEMT 160W

EGN26C160I2D

High Voltage - High Power GaN-HEMT



FEATURES

- High Voltage Operation : V_{DS}=50V
- High Power : 52.5dBm (typ.) @ Psat
- High Efficiency: 65%(typ.) @ Psat
- Power Gain : 16dB(typ.) @ f=2.6GHz
- 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 from 2.3GHz to 2.7GHz W-CDMA & LTE design requirements as it offers high gain, long term reliability and ease of use.

ABSOLUTE MAXIMUM RATINGS (Case Temperature Tc=25°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	°C
Channel Temperature	T_{ch}		250	°C

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		≤ 55	V
Forward Gate Current	I_{GF}	R_G=5Ω	≤ 153	mA
Reverse Gate Current	I_{GR}	R_G=5Ω	≥ -5.8	mA
Channel Temperature	T_{ch}		≤ 180	°C
Average Output Power	Pave.		≤ 49.5	dBm

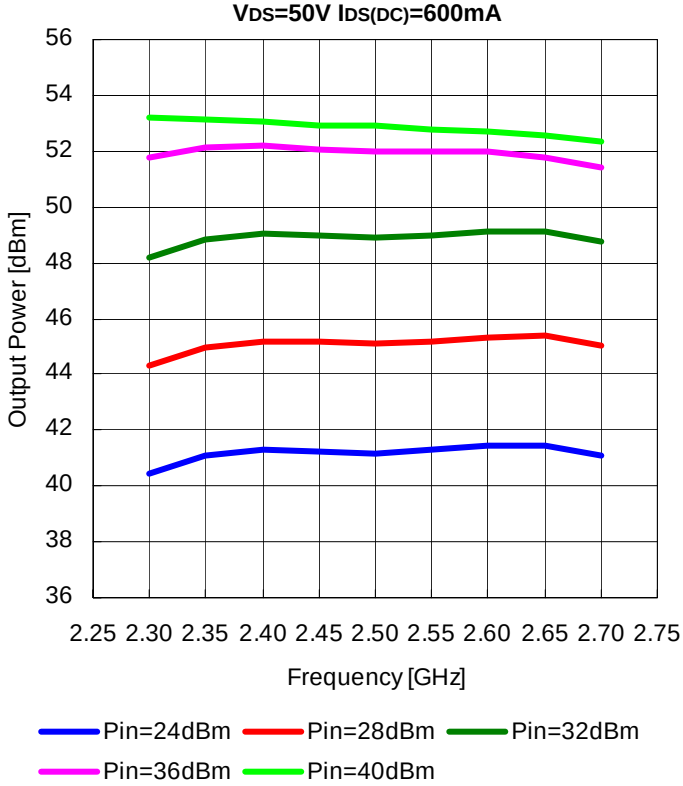
ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25°C)

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	Psat *1	V_{DS}=50V	51.5	52.5	-	dBm
Drain Efficiency	η_d *2	$I_{DS(DC)}$=600mA	25	30	-	%
Power Gain	Gp *2	f=2.60GHz	15	16	-	dB
Thermal Resistance	R_{th}	Channel to Case at 78W P_{DC}	-	1.4	1.6	°C/W

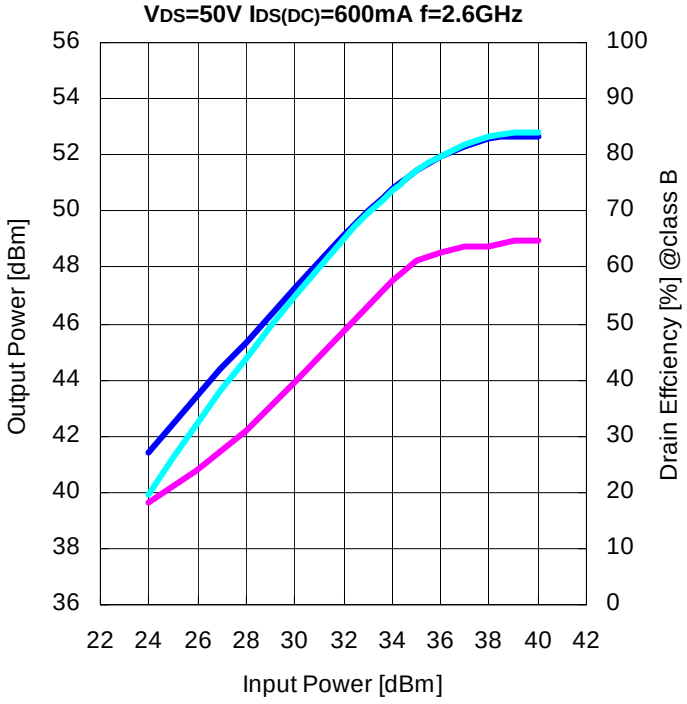
*1 : 10%-duty RF pulse (DC supply constant)
*2 : Pout = 44.5dBm, CW modulation Signal (W-CDMA or WiMAX)

RF characteristics @ f=2.6GHz fine tuned

Output Power vs. Frequency
VDS=50V IDS(DC)=600mA

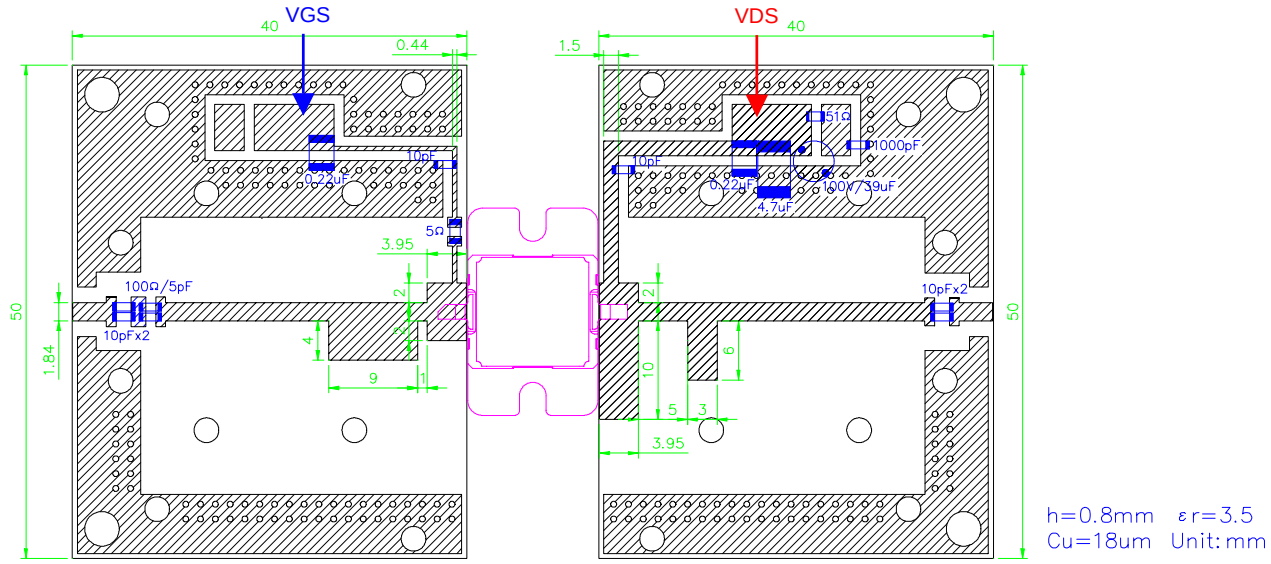


Output Power and Drain Efficiency vs. Input Power
VDS=50V IDS(DC)=600mA f=2.6GHz

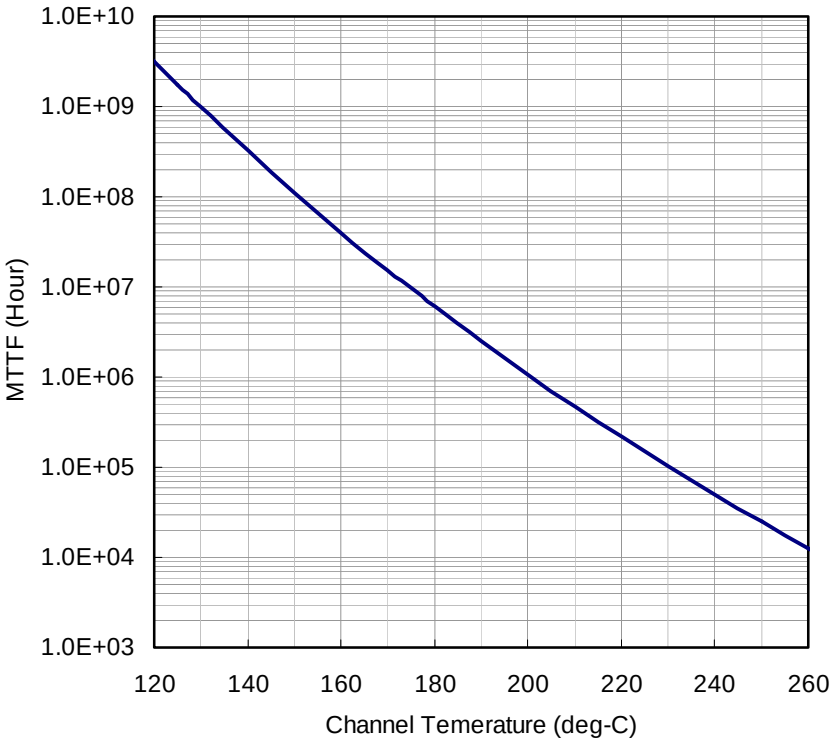


Pulse Signal (10%-duty, DC : constant)

Test Fixture



MTTF Calculation
– Estimated MTTF –



Ea=1.6eV
Confidence Level=90%

Channel Temp (deg-C)	MTTF (Hours)
160	4.05×10^7
180	6.07×10^6
200	1.07×10^6

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

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

Where;

AF: acceleration factor

Ea: activation energy (1.6 eV)

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

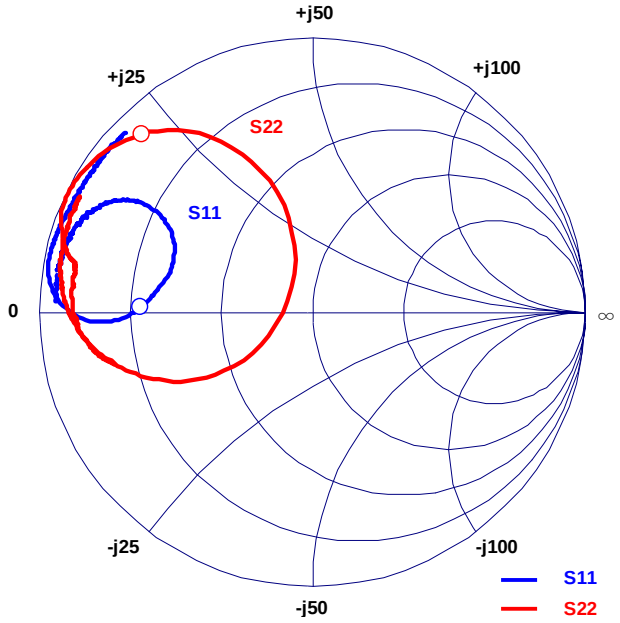
T_{stress}: stress temperature (K)

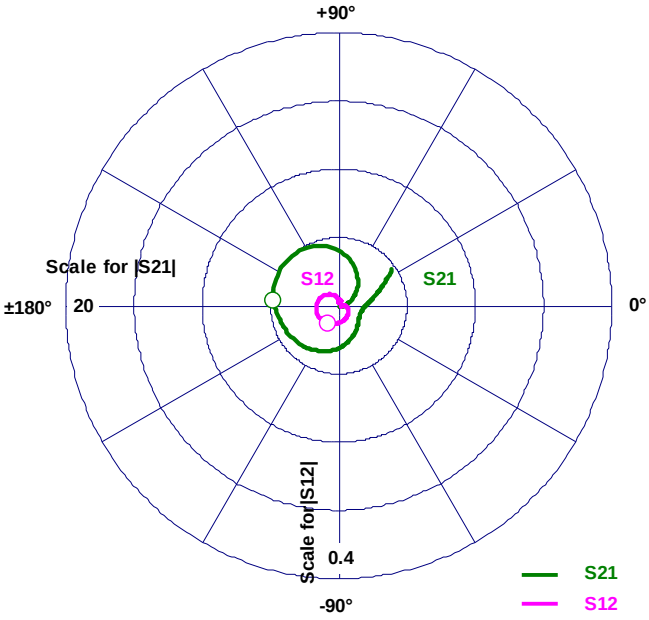
T_{use}: use temperature (K)

ESD Characteristics

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

S-Parameters @V_{DS}=50V, $I_{DS(DC)}$=600mA, f=0.5 to 4.5 GHz
$Z_l = Z_s$ = 50 ohm Marker : 2.6GHz





Freq.	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.94	177.74	4.71	34.10	0.003	-16.77	0.75	-165.38
0.60	0.95	175.84	3.73	26.54	0.003	-18.34	0.79	-167.78
0.70	0.95	173.65	3.05	19.01	0.003	-17.87	0.82	-170.48
0.80	0.94	172.27	2.57	13.42	0.003	-6.32	0.83	-172.82
0.90	0.95	170.62	2.27	7.66	0.003	-5.76	0.85	-175.05
1.00	0.95	168.80	2.02	1.84	0.003	7.28	0.86	-177.14
1.10	0.94	167.12	1.87	-3.03	0.003	9.86	0.87	-178.98
1.20	0.94	165.32	1.76	-8.82	0.003	14.44	0.88	179.01
1.30	0.93	163.56	1.69	-13.95	0.003	19.06	0.88	177.47
1.40	0.93	161.89	1.67	-19.26	0.004	21.94	0.89	175.69
1.50	0.92	159.58	1.68	-25.47	0.005	19.78	0.88	174.32
1.60	0.91	157.95	1.75	-31.15	0.006	17.99	0.88	173.05
1.70	0.90	155.98	1.85	-38.54	0.006	13.73	0.88	171.53
1.80	0.87	153.33	1.99	-46.45	0.008	6.70	0.88	170.31
1.90	0.83	150.71	2.22	-56.01	0.009	1.38	0.88	169.46
2.00	0.78	148.53	2.50	-67.41	0.011	-6.80	0.89	168.30
2.10	0.71	147.30	2.86	-81.10	0.014	-20.40	0.90	167.74
2.20	0.63	148.55	3.30	-97.85	0.017	-35.61	0.93	165.91
2.30	0.56	153.87	3.67	-116.92	0.020	-54.11	0.96	162.38
2.40	0.54	163.31	4.04	-137.68	0.023	-74.11	0.99	156.56
2.50	0.57	171.59	4.34	-160.07	0.026	-96.24	0.98	147.47
2.60	0.63	178.21	4.77	175.52	0.030	-120.77	0.90	133.90
2.70	0.74	-177.51	5.06	143.50	0.034	-153.77	0.63	114.19
2.80	0.89	179.84	4.55	105.86	0.032	169.78	0.16	115.91
2.90	0.97	172.72	3.22	71.86	0.024	136.35	0.39	-146.58
3.00	0.98	167.14	2.09	48.66	0.017	115.99	0.65	-158.58
3.10	0.98	163.75	1.39	34.20	0.012	104.40	0.78	-167.78
3.20	0.98	161.05	0.98	23.35	0.009	95.78	0.85	-174.41
3.30	0.97	158.74	0.72	14.61	0.008	93.63	0.89	-179.31
3.40	0.97	157.05	0.55	9.12	0.007	91.30	0.91	177.14
3.50	0.96	155.21	0.43	2.96	0.006	93.99	0.92	173.86
3.60	0.96	153.45	0.35	-1.77	0.006	95.27	0.93	171.18
3.70	0.96	151.82	0.29	-5.52	0.006	91.05	0.94	169.13
3.80	0.96	150.45	0.24	-10.02	0.007	90.37	0.94	166.69
3.90	0.96	148.67	0.21	-12.94	0.007	92.98	0.95	165.06
4.00	0.96	146.91	0.18	-16.37	0.007	83.86	0.95	162.93
4.10	0.96	145.05	0.16	-19.06	0.007	87.17	0.95	161.14
4.20	0.95	143.03	0.14	-21.34	0.008	78.03	0.95	159.10
4.30	0.96	141.08	0.13	-23.61	0.008	75.38	0.95	157.43
4.40	0.95	138.83	0.12	-25.88	0.008	70.12	0.95	155.58
4.50	0.95	136.20	0.11	-27.76	0.009	68.14	0.95	153.62

I2D Package Outline
Metal-Ceramic Hermetic Package