GaN-HEMT 30W

EGN21C030MK

High Voltage - High Power GaN-HEMT

FEATURES

- High Voltage Operation : V_{DS}=50V
- High Power : 45.0dBm (typ.) @ Psat
- Power Gain : 19dB(typ.) @ f=2.14GHz
- 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 2.1GHz W-CDMA design requirements as it offers high gain, long term reliability and ease of use.

ABSOLUTE MAXIMUM RATINGS (Case Temperature Tc=25ºC)

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		37.5	W
Storage Temperature	T_{stg}		-65 to +175	ºC
Channel Temperature	T_{ch}		250	ºC

RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		≤ 55	V
Forward Gate Current	I_{GF}	R_G=15Ω	≤ 69	mA
Reverse Gate Current	I_{GR}	R_G=15Ω	≥ -1.1	mA
Channel Temperature	T_{ch}		≤ 180	ºC
Average Output Power	Pave.		≤ 42.0	dBm

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25ºC)

Item	Symbol	Condition	Limit			Unit
			min.	Typ.	Max.	
Pinch-Off Voltage	V_p	V_{DS}=50V I_{DS}=7.8mA	-1.0	-1.5	-2.0	V
Saturated Power	Psat *1	V_{DS}=50V	44.0	45.0	-	dBm
Drain Efficiency	ηd *2	$I_{DS(DC)}$=150mA	10.5	12.5	-	%
Power Gain	Gp *2	f=2.14GHz	18.0	19.0	-	dB
Thermal Resistance	R_{th}	Channel to Case at 24W P_{DC}	-	5.0	6.0	ºC/W

*1 : 10%-duty RF pulse (DC supply constant)
*2 : Pout = 31.5dBm, CW

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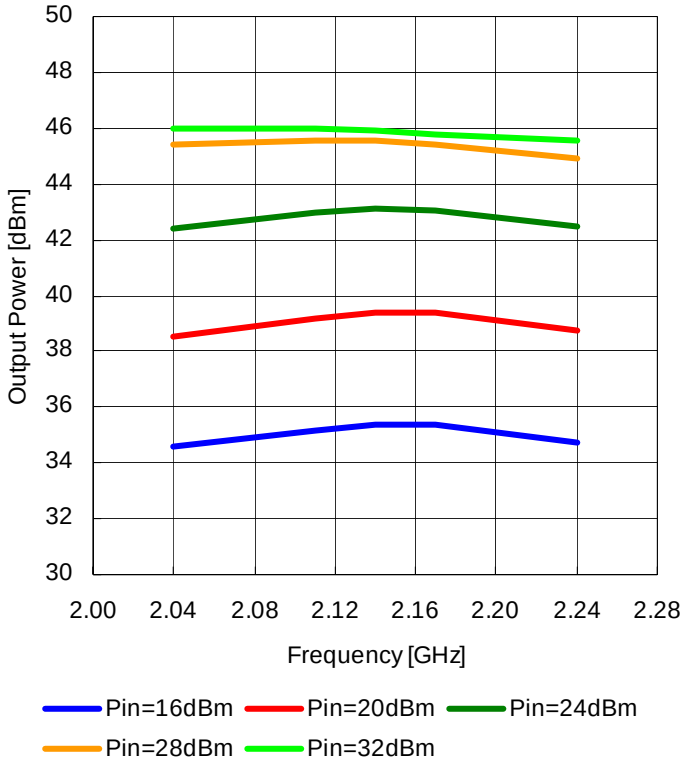
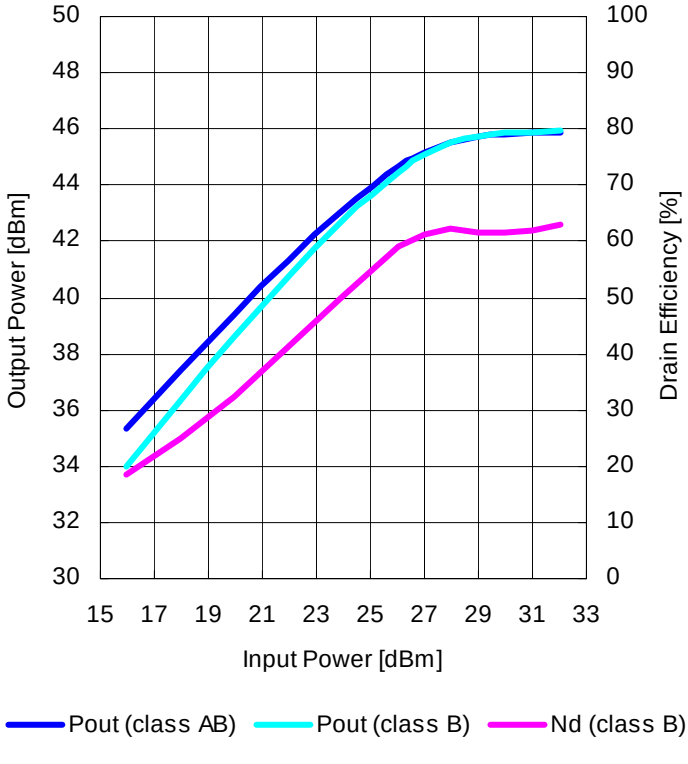
RF characteristics @f=2.14GHz fine tuned

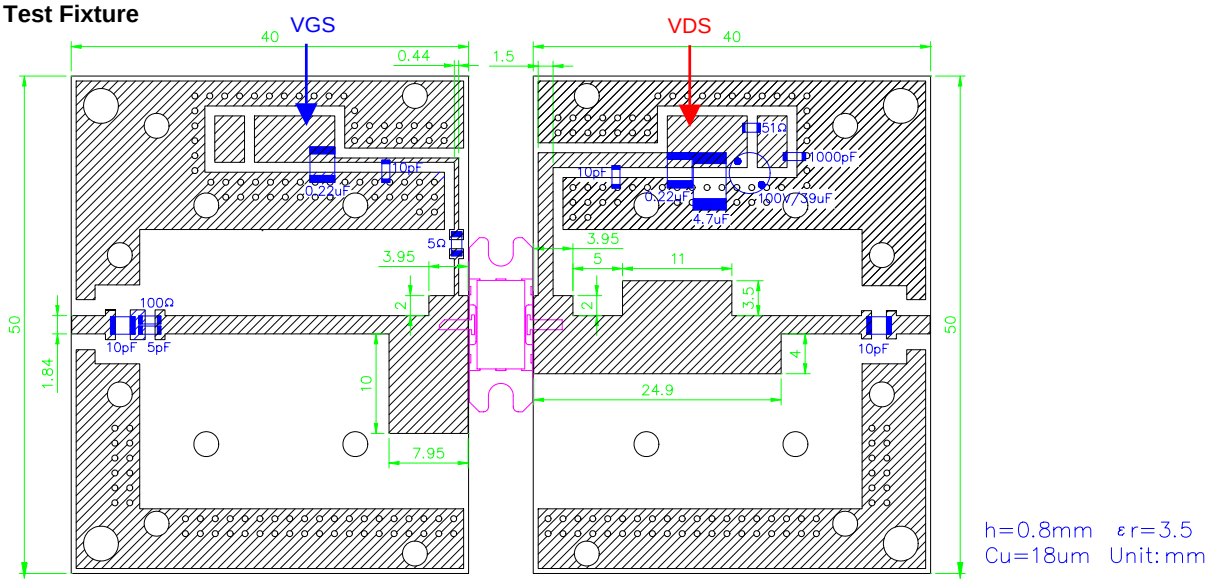
Output Power vs. Frequency
VDS=50V, IDS(DC)=150mA



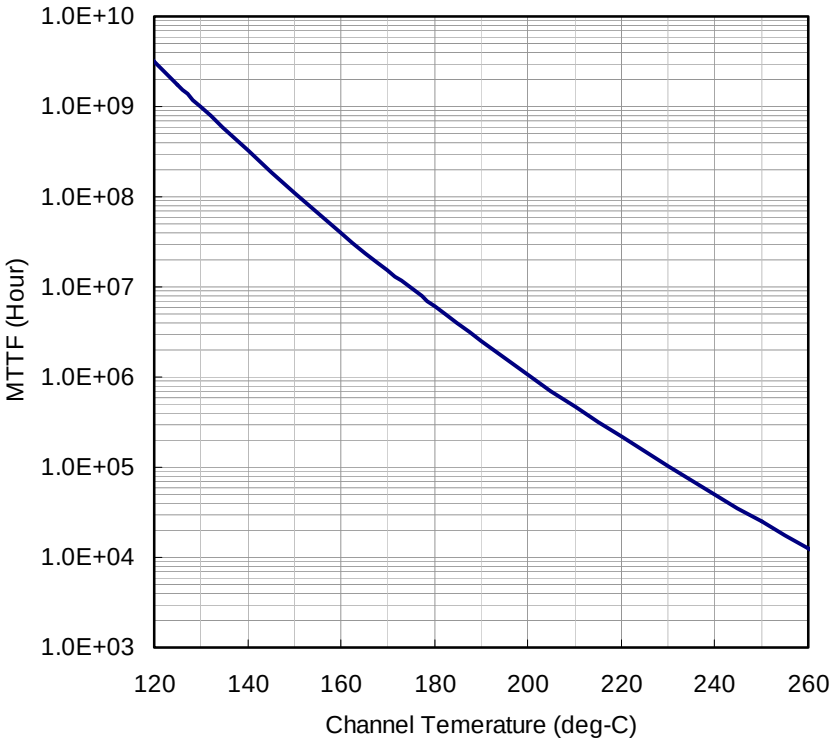
Output Power and Drain Efficiency vs. Input Power
VDS=50V, IDS(DC)=150mA, f=2.14GHz



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)

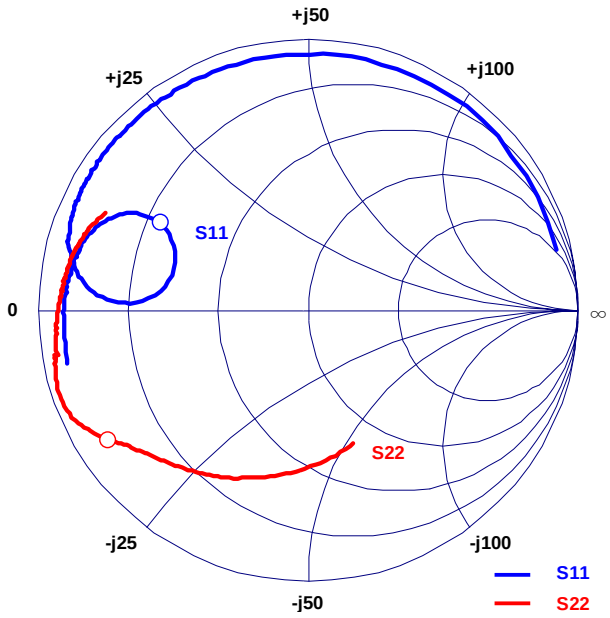
T_{use}: use temperature (K)

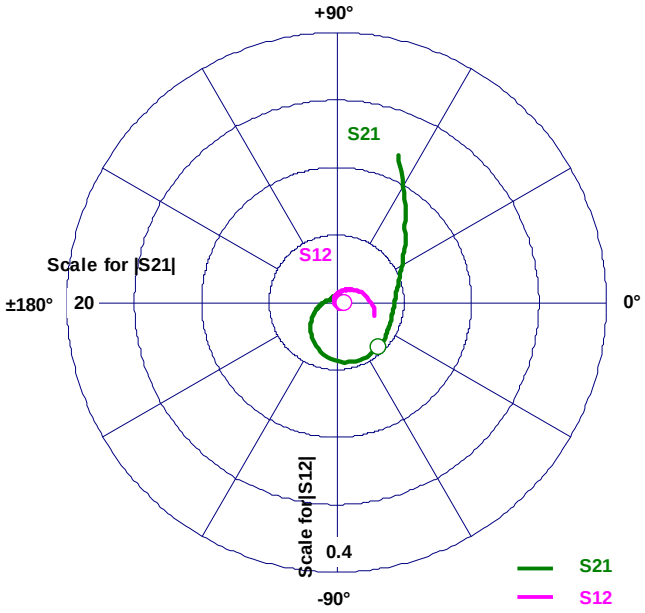
ESD characteristic

Test Methodology	Class
Human Body Model (per JESD22-A114)	0
Machine Model (per JEIA/ESD22-A115)	A

- Reference DATA -

S-Parameters @V_{DS}=50V, $I_{DS(DC)}$=150mA, f=0.5 to 5.5GHz
$Z_l = Z_s$ = 50 ohm Marker : 2.14GHz





Freq.	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.92	-167.76	11.88	67.33	0.007	-1.05	0.52	-71.31
0.60	0.91	-172.44	9.91	60.12	0.008	-9.94	0.55	-79.39
0.70	0.91	-176.35	8.50	53.22	0.007	-8.07	0.57	-87.12
0.80	0.91	-179.64	7.40	46.87	0.007	-10.93	0.60	-94.46
0.90	0.90	177.22	6.61	39.83	0.007	-8.43	0.62	-101.38
1.00	0.90	174.37	5.93	34.28	0.007	-5.18	0.65	-107.51
1.10	0.90	172.14	5.46	28.05	0.006	-8.73	0.68	-112.74
1.20	0.89	169.65	5.09	22.56	0.006	-11.64	0.70	-117.63
1.30	0.88	167.20	4.78	16.88	0.005	-8.15	0.71	-122.04
1.40	0.88	164.80	4.53	10.93	0.006	3.38	0.73	-126.03
1.50	0.87	162.30	4.38	4.93	0.007	7.18	0.75	-129.81
1.60	0.85	160.12	4.27	-1.03	0.007	-0.84	0.77	-133.16
1.70	0.84	157.53	4.21	-7.87	0.007	7.36	0.79	-136.27
1.80	0.81	155.22	4.21	-14.31	0.008	2.46	0.80	-139.10
1.90	0.78	152.62	4.27	-22.78	0.008	5.59	0.82	-141.54
2.00	0.73	150.55	4.35	-31.36	0.008	-2.59	0.84	-144.10
2.10	0.67	149.70	4.49	-41.55	0.010	-6.62	0.86	-145.87
2.20	0.60	150.44	4.58	-53.44	0.011	-17.62	0.90	-148.41
2.30	0.54	156.11	4.58	-68.01	0.011	-26.30	0.92	-151.11
2.40	0.52	165.55	4.47	-82.96	0.011	-34.31	0.95	-153.98
2.50	0.57	174.45	4.09	-100.02	0.012	-53.88	0.97	-157.62
2.60	0.66	177.90	3.58	-115.25	0.009	-67.79	0.97	-161.15
2.70	0.75	177.13	3.04	-128.27	0.008	-87.49	0.97	-164.01
2.80	0.81	174.57	2.53	-138.81	0.006	-89.61	0.96	-166.41
2.90	0.86	171.89	2.14	-148.70	0.005	-103.89	0.96	-168.36
3.00	0.89	168.51	1.79	-155.37	0.004	-137.30	0.95	-170.12
3.10	0.91	166.09	1.53	-162.57	0.003	-132.30	0.95	-171.70
3.20	0.93	163.76	1.32	-167.51	0.002	171.39	0.94	-173.24
3.30	0.94	160.96	1.15	-172.75	0.003	-179.32	0.94	-174.55
3.40	0.94	158.76	1.01	-177.44	0.003	139.32	0.94	-175.89
3.50	0.95	156.39	0.90	178.06	0.003	132.52	0.93	-177.18
3.60	0.95	154.54	0.81	175.02	0.005	127.36	0.93	-178.48
3.70	0.95	152.38	0.73	170.36	0.005	122.70	0.93	-179.59
3.80	0.95	150.32	0.68	167.48	0.006	112.99	0.93	179.18
3.90	0.95	147.92	0.63	163.44	0.007	102.76	0.92	177.96
4.00	0.95	145.49	0.58	160.11	0.009	106.05	0.92	176.76
4.10	0.95	143.02	0.56	156.87	0.010	95.65	0.92	175.67
4.20	0.95	140.18	0.52	152.60	0.011	87.44	0.91	174.45
4.30	0.95	137.45	0.51	149.28	0.013	86.12	0.91	173.35
4.40	0.95	133.74	0.49	145.93	0.015	77.51	0.91	172.11
4.50	0.95	129.79	0.48	140.55	0.017	73.28	0.91	170.84
4.60	0.95	124.99	0.48	136.95	0.020	66.34	0.90	169.42
4.70	0.95	120.07	0.48	131.34	0.021	58.68	0.90	168.05
4.80	0.95	113.93	0.48	126.35	0.024	52.95	0.90	166.61
4.90	0.95	106.51	0.50	120.05	0.027	44.93	0.89	165.05
5.00	0.95	97.54	0.50	113.46	0.031	37.57	0.89	163.57
5.10	0.95	86.55	0.53	105.86	0.036	28.40	0.88	161.77
5.20	0.95	73.45	0.55	96.22	0.041	19.22	0.87	160.12
5.30	0.95	56.67	0.57	85.88	0.047	7.98	0.86	158.23
5.40	0.94	37.29	0.60	71.99	0.053	-4.75	0.85	156.31
5.50	0.95	13.73	0.60	58.10	0.060	-19.80	0.83	154.40

MK Package Outline
Metal-Ceramic Hermetic Package