

### FEATURES

- High Voltage Operation :  $V_{DS}=50V$
- High Power : 49.5dBm (typ.) @  $P_{sat}$
- High Efficiency : 70%(typ.) @  $P_{sat}$
- Power Gain : 17dB (typ.) @  $f=2.14GHz$
- Proven Reliability

### DESCRIPTION

SEI'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 and LTE design requirements as it offers high gain, long term reliability and ease of use.



### ABSOLUTE MAXIMUM RATINGS ( Case Temperature $T_c=25deg.C$ )

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	$P_t$		75	W
Storage Temperature	$T_{stg}$		-65 to +175	deg.C
Channel Temperature	$T_{ch}$		250	deg.C

### RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	$V_{DS}$		$\leq 55$	V
Forward Gate Current	$I_{GF}$	$RG=5ohm$	$\leq 76$	mA
Reverse Gate Current	$I_{GR}$	$RG=5ohm$	$\geq -2.6$	mA
Channel Temperature	$T_{ch}$		$\leq 180$	deg.C
Average Output Power	$P_{ave}$		$\leq 46.5$	dBm

### ELECTRICAL CHARACTERISTICS ( Case Temperature $T_c=25deg.C$ )

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	$V_p$	$V_{DS}=50V, I_{DS}=18mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$	48.5	49.5	-	dBm
Drain Efficiency	$\eta_d *2$	$I_{DS}(DC)=300mA$	28.0	33.0	-	%
Power Gain	$G_p *2$	$f=2.14GHz$	16.0	17.0	-	dB
Thermal Resistance	$R_{th}$	Channel to Case at 48W PDC	-	2.5	3.0	deg.C/W

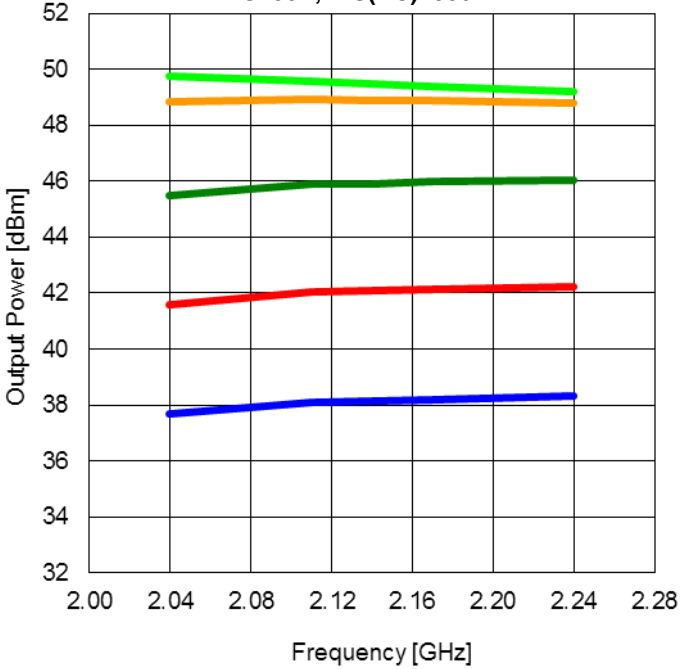
\*1 : 10%-duty RF pulse ( DC supply constant )

\*2 :  $P_{out}=41.5dBm$ , CW modulation Signal ( W-CDMA )

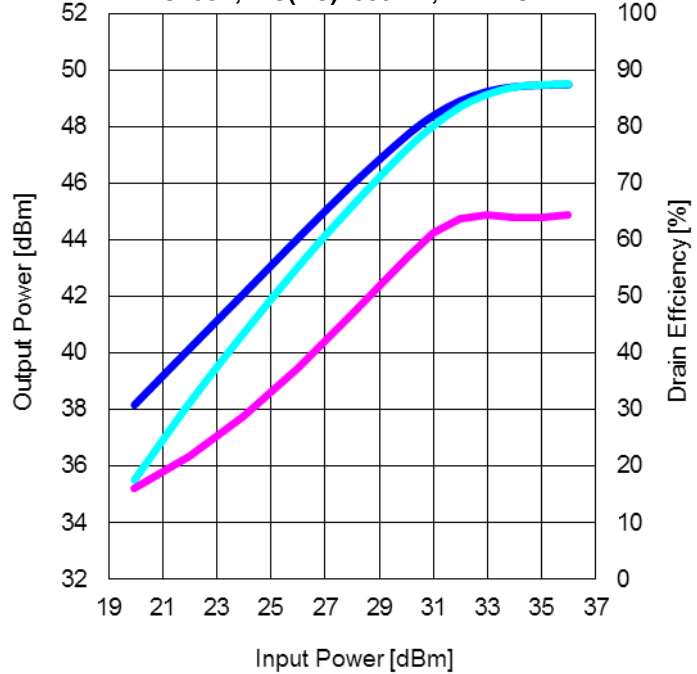
RoHS COMPLIANCE	Yes
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### RF characteristics @f=2.14GHz fine tuned

**Output Power vs. Frequency**  
**VDS=50V, IDS(DC)=300mA**



**Output Power and Drain Efficiency vs. Input Power**  
**VDS=50V, IDS(DC)=300mA, f=2.14GHz**

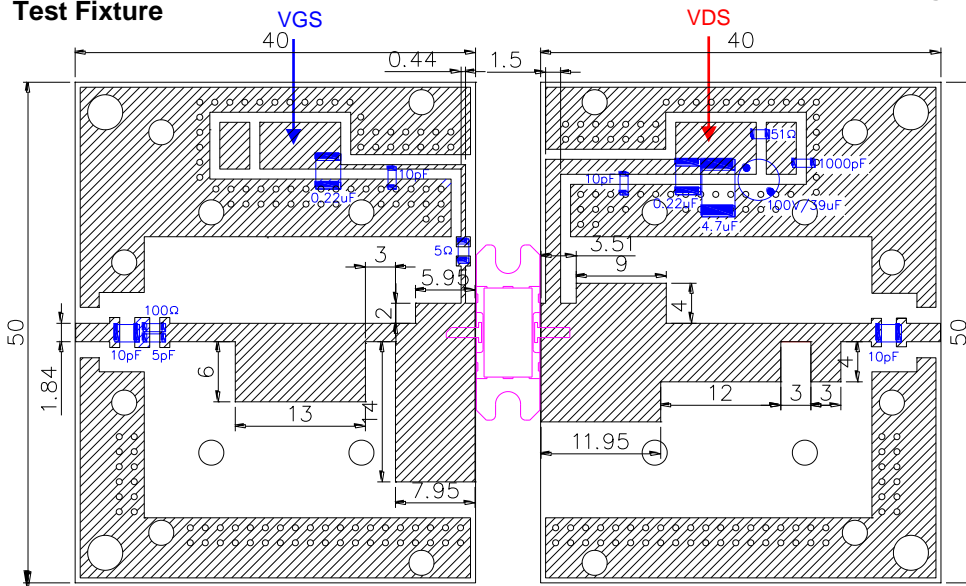


— Pin=20dBm    — Pin=24dBm    — Pin=28dBm  
— Pin=32dBm    — Pin=36dBm

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

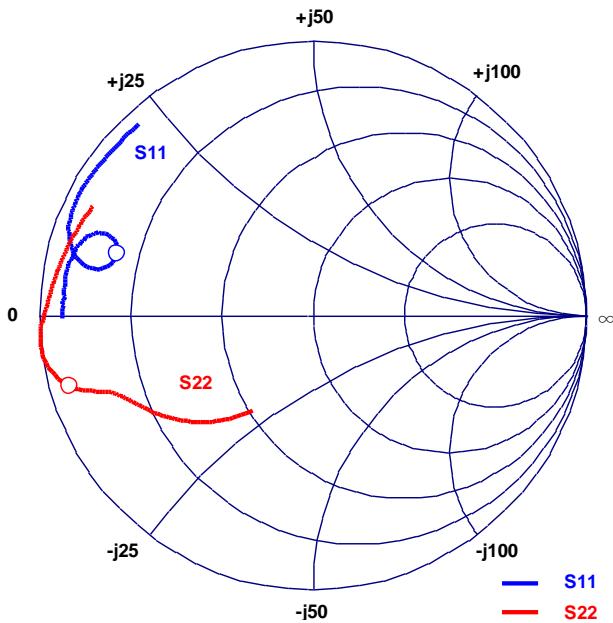
### Test Fixture

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

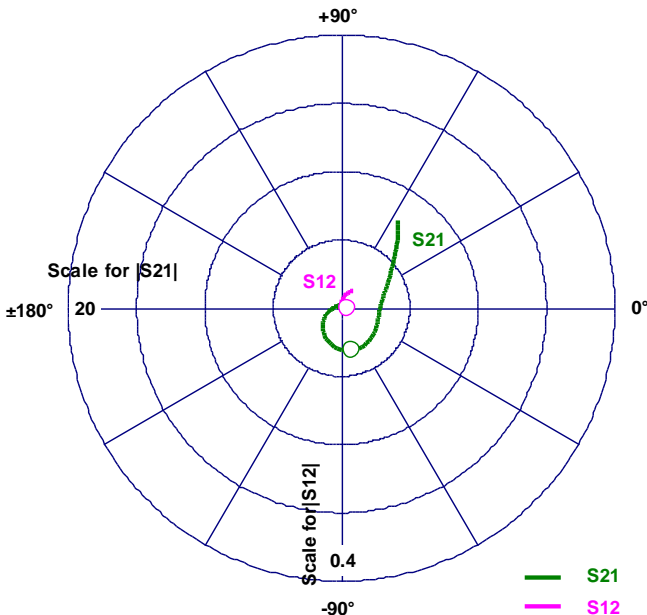


### - Reference DATA -

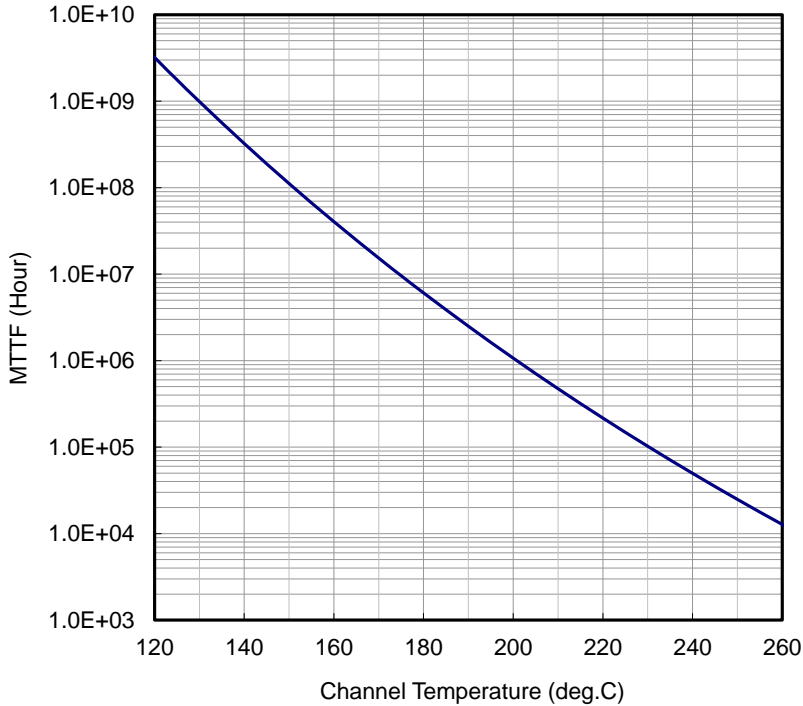
S-Parameters @VDS=50V, IDS(DC)=300mA, f=0.5 to 4.5GHz  
 ZI = Zs = 50ohm      Marker : 2.14GHz



Freq. GHz	S11			S21		S12		S22	
	MAG	ANG		MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.91	-179.23		7.69	56.69	0.006	-2.67	0.41	-122.21
0.60	0.91	177.91		6.42	50.11	0.005	-1.92	0.46	-126.68
0.70	0.91	176.02		5.43	43.58	0.005	-0.36	0.51	-131.08
0.80	0.91	174.22		4.70	37.42	0.005	3.29	0.55	-135.21
0.90	0.91	172.42		4.16	31.36	0.005	8.37	0.59	-138.75
1.00	0.91	170.84		3.75	25.54	0.005	13.50	0.62	-142.33
1.10	0.91	169.28		3.44	19.86	0.005	18.33	0.65	-145.39
1.20	0.91	167.64		3.20	14.24	0.005	23.07	0.68	-148.25
1.30	0.90	166.22		3.02	8.52	0.006	26.76	0.70	-150.92
1.40	0.90	164.71		2.90	2.67	0.006	30.16	0.72	-153.11
1.50	0.89	163.24		2.84	-3.63	0.007	30.41	0.74	-155.01
1.60	0.88	161.96		2.83	-10.51	0.007	29.17	0.76	-156.77
1.70	0.87	160.61		2.86	-18.20	0.008	28.02	0.77	-158.17
1.80	0.85	159.39		2.94	-26.80	0.009	24.55	0.79	-159.34
1.90	0.82	158.68		3.06	-37.43	0.010	17.37	0.82	-160.05
2.00	0.79	159.01		3.19	-50.50	0.011	8.66	0.85	-160.99
2.10	0.75	161.02		3.25	-66.55	0.011	-4.63	0.90	-162.39
2.20	0.75	164.57		3.13	-84.83	0.010	-18.95	0.95	-165.14
2.30	0.78	167.53		2.81	-103.34	0.008	-32.83	0.98	-168.74
2.40	0.83	168.17		2.37	-119.84	0.006	-43.42	1.00	-172.47
2.50	0.88	167.02		1.93	-133.65	0.003	-51.49	1.00	-175.80
2.60	0.91	165.14		1.56	-144.20	0.001	-47.71	0.99	-178.47
2.70	0.93	163.16		1.27	-152.61	0.001	60.61	0.98	179.54
2.80	0.94	161.41		1.05	-159.36	0.002	81.73	0.97	177.82
2.90	0.95	159.76		0.88	-164.86	0.003	85.79	0.97	176.27
3.00	0.95	158.10		0.75	-169.68	0.005	84.33	0.96	174.88
3.10	0.96	156.57		0.64	-173.64	0.006	84.67	0.96	173.60
3.20	0.96	155.09		0.56	-177.30	0.007	82.60	0.95	172.38
3.30	0.96	153.53		0.50	-179.17	0.008	80.20	0.95	171.04
3.40	0.96	152.09		0.44	-176.28	0.009	80.97	0.95	169.83
3.50	0.96	150.34		0.40	-172.88	0.010	78.65	0.94	168.59
3.60	0.96	148.87		0.36	-170.32	0.011	78.49	0.94	167.38
3.70	0.96	147.10		0.33	-167.30	0.012	78.87	0.93	166.07
3.80	0.95	145.64		0.30	-164.49	0.014	78.39	0.93	164.82
3.90	0.95	143.85		0.28	-161.79	0.016	75.48	0.93	163.46
4.00	0.95	142.27		0.26	-158.64	0.018	73.73	0.92	162.04
4.10	0.95	140.52		0.25	-155.80	0.021	69.88	0.92	160.66
4.20	0.95	138.76		0.23	-152.06	0.023	65.91	0.91	159.05
4.30	0.95	136.81		0.22	-149.15	0.025	61.63	0.91	157.44
4.40	0.94	134.73		0.21	-145.25	0.028	58.85	0.90	155.68
4.50	0.94	132.56		0.20	-141.37	0.031	54.83	0.90	153.75



**MTTF Calculation  
- Estimated MTTF -**



**Ea=1.6eV  
Confidence Level=90%**

Channel Temp. ( deg.C )	MTTF ( Hours )
160	4.05 x 10 <sup>7</sup>
180	6.07 x 10 <sup>6</sup>
200	1.07 x 10 <sup>6</sup>

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

$$MTTF_{use} = MTTF_{stress} \times AF$$

Where;

AF : acceleration factor

Ea : activation energy (1.6eV)

k : Boltzmann's constant (8.62x10<sup>-5</sup>eV/K)

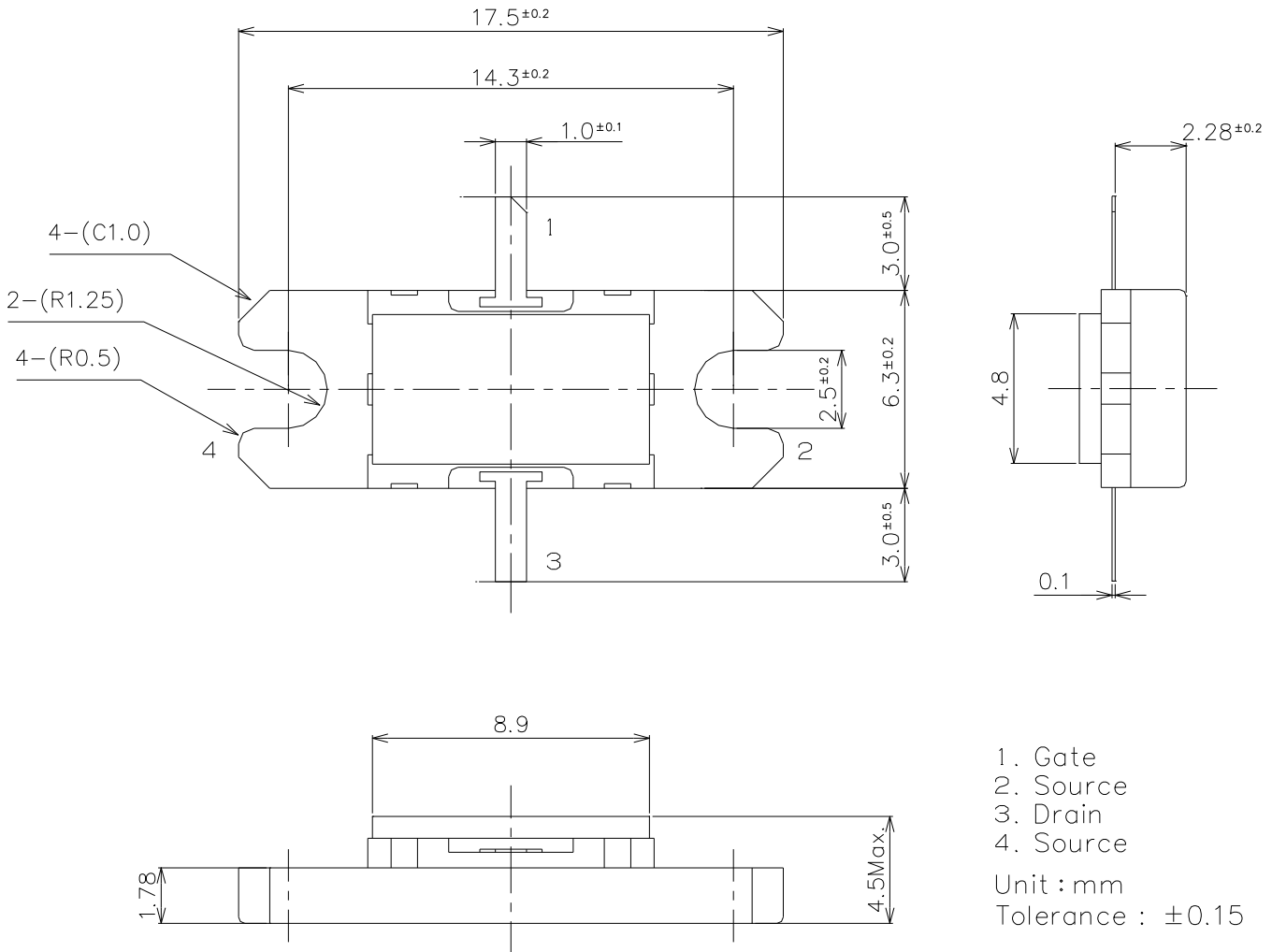
T<sub>stress</sub> : stress temperature (K)

T<sub>use</sub> : use temperature (K)

### ESD characteristic

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

**MK Package Outline**  
**Metal-Ceramic Hermetic Package**





# **EGN21C070MK**

***High Voltage - High Power GaN-HEMT***

**For further information please contact:**

**<http://global-sei.com/Electro-optic/about/office.html>**