

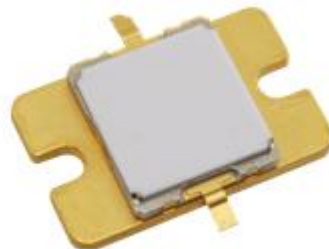
FEATURES

- High Voltage Operation : $V_{DS}=50V$
- High Power : 50.3dBm (typ.) @ P_{sat}
- High Efficiency : 70%(typ.) @ P_{sat}
- Power Gain : 18dB (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 2.14GHz 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}	$V_{GS}=-8V$	55	V
Drain-Source Voltage	V_{DS}		160	V
Gate-Source Voltage	V_{GS}		-15	V
Total Power Dissipation	P_t		97.8	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}		≤ 55	V
Forward Gate Current	I_{GF}	$R_G=50\Omega$	≤ 102	mA
Reverse Gate Current	I_{GR}	$R_G=50\Omega$	≥ -3.9	mA
Channel Temperature	T_{ch}		≤ 180	deg.C
Average Output Power	P_{ave}		≤ 47.3	dBm

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V, I_{DS}=27mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$ $I_{DS}(DC)=400mA$	49.5	50.3	-	dBm
Drain Efficiency	$\eta_d *2$		28.0	32.0	-	%
Power Gain	$G_p *2$		17.0	18.0	-	dB
3 rd Order Intermodulation Distortion	$IM3 *2$		-28.0	-32.0	-	dBc
Thermal Resistance	R_{th}	Channel to Case at 52.5W PDC	-	2.0	2.3	deg.C/W

*1 : 10%-duty RF pulse (DC supply constant), $f=2.14GHz$

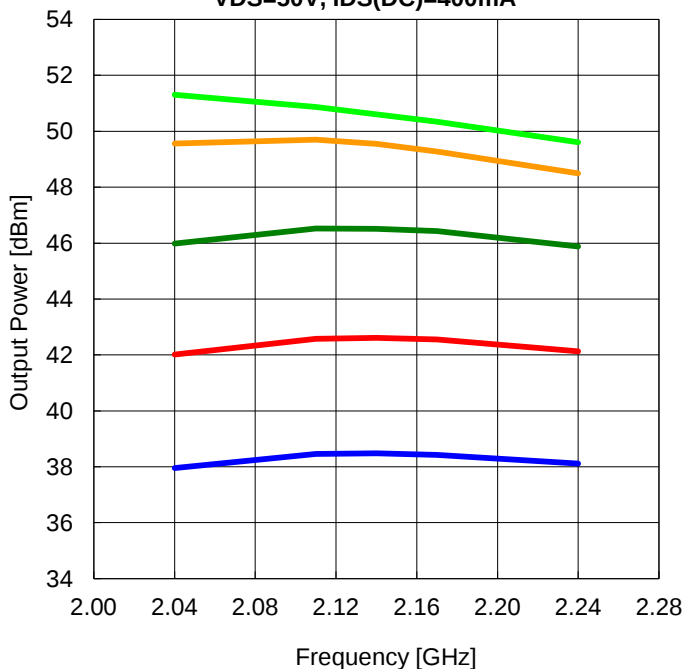
*2 : $P_{out}=42dBm, f_0=2.135GHz, f_1=2.145GHz, W-CDMA(3GPP3.4 12-00)$

BS-1 64ch 47.5% clipping modulation(Peak/Ave.=8.5dB@0.01% Probability on CCDF)

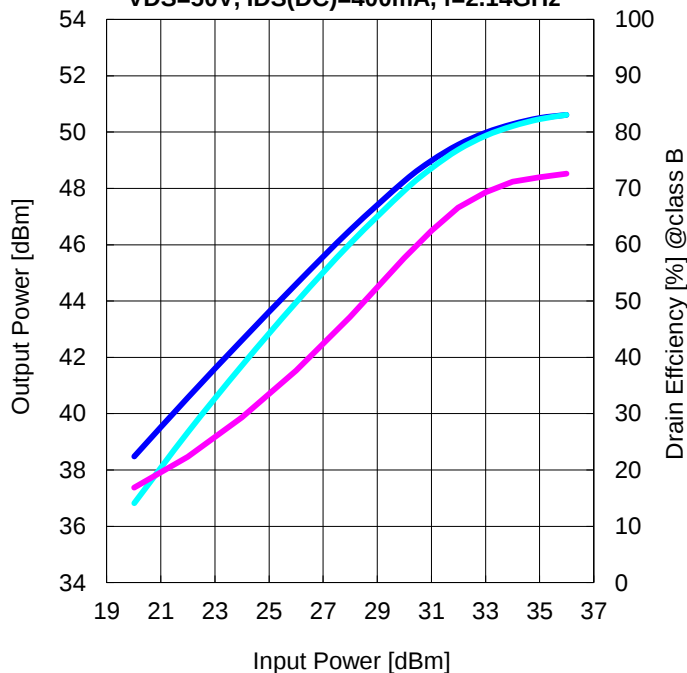
RoHS COMPLIANCE	Yes
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RF characteristics @f=2.14GHz fine tuned

Output Power vs. Frequency
VDS=50V, IDS(DC)=400mA



Output Power and Drain Efficiency vs. Input Power
VDS=50V, IDS(DC)=400mA, f=2.14GHz

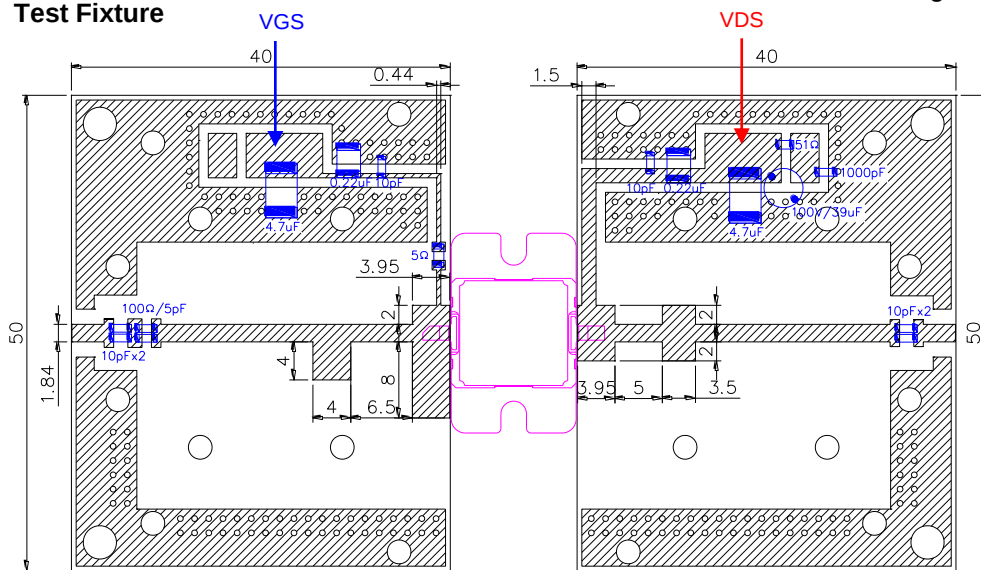


Pin=20dBm Pin=24dBm Pin=28dBm
Pin=32dBm Pin=36dBm

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

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

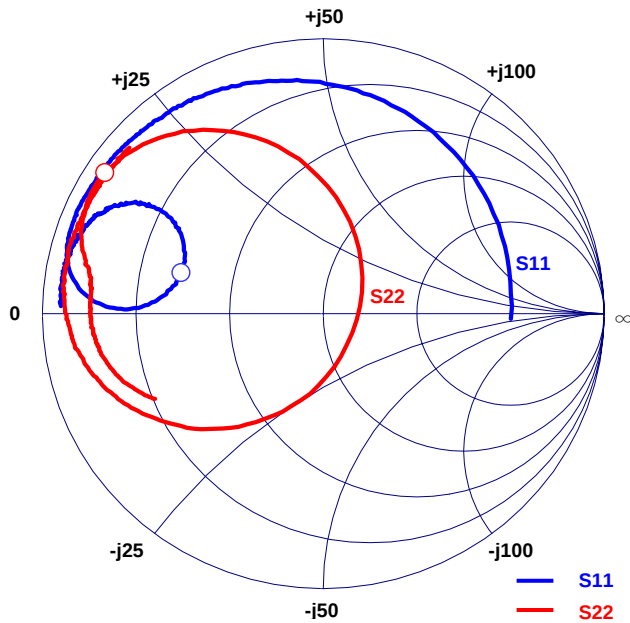
Test Fixture



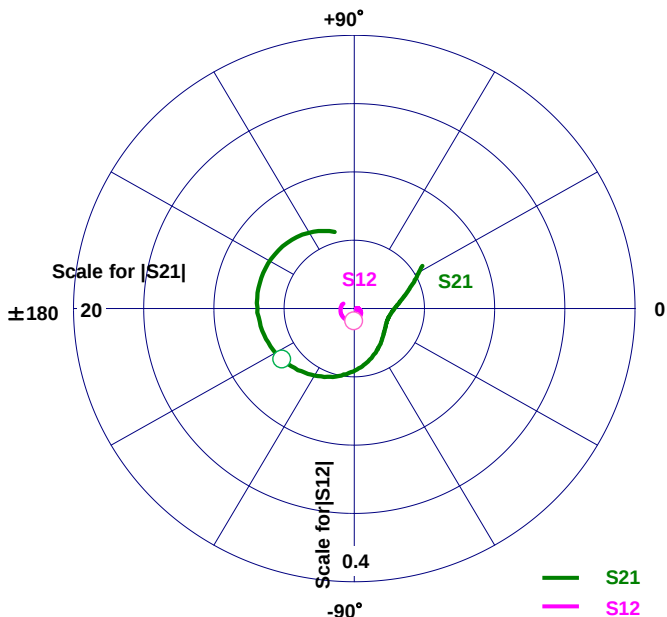
S-Parameters @VDS=50V, IDS(DC)=400mA, f=0.5 to 4.5GHz

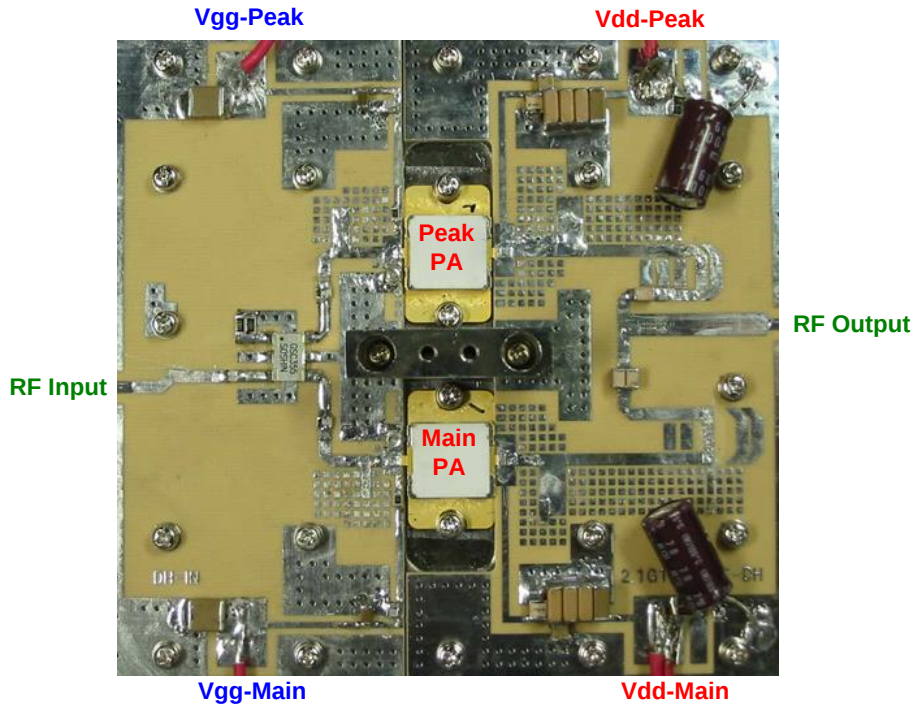
ZI = Zs = 50ohm Marker : 2.14GHz

- Reference DATA -

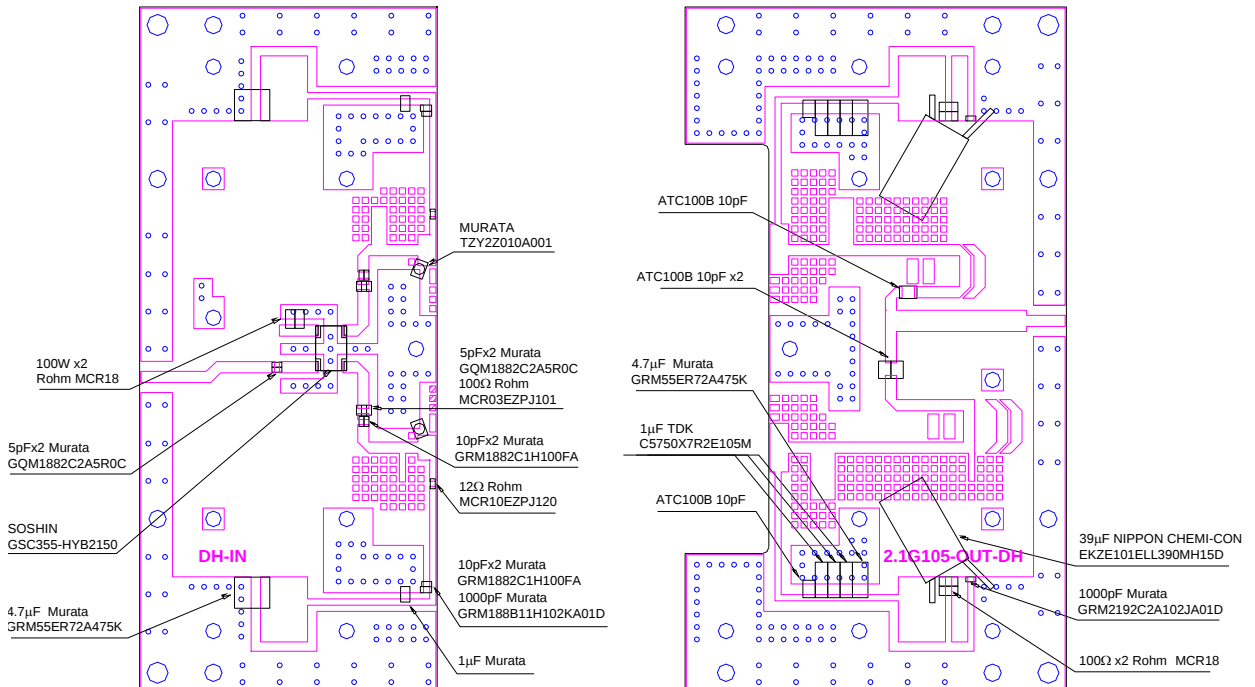


Freq. GHz	S11			S21			S12			S22		
	MAG	ANG		MAG	ANG		MAG	ANG		MAG	ANG	
0.50	0.93	178.34		5.77	32.71		0.004	-27.93		0.67	-152.62	
0.60	0.94	175.81		4.61	23.97		0.004	-25.86		0.72	-157.40	
0.70	0.94	173.50		3.82	16.22		0.003	-24.90		0.76	-161.52	
0.80	0.94	171.83		3.29	9.12		0.003	-17.55		0.78	-165.49	
0.90	0.94	169.46		2.95	2.13		0.003	-13.17		0.80	-168.94	
1.00	0.93	167.43		2.71	-4.46		0.003	-6.60		0.81	-172.13	
1.10	0.93	165.09		2.58	-10.90		0.003	-5.13		0.82	-175.02	
1.20	0.92	163.06		2.52	-17.64		0.003	-7.75		0.83	-177.72	
1.30	0.91	160.75		2.51	-24.39		0.004	5.78		0.83	179.69	
1.40	0.89	158.14		2.62	-31.70		0.005	0.88		0.83	177.50	
1.50	0.87	155.60		2.77	-40.76		0.006	-0.27		0.83	175.32	
1.60	0.85	152.87		3.03	-49.68		0.006	-7.41		0.83	173.41	
1.70	0.81	150.16		3.42	-60.92		0.008	-15.25		0.84	171.21	
1.80	0.75	147.90		3.93	-74.35		0.010	-22.34		0.85	169.12	
1.90	0.67	147.02		4.61	-90.86		0.012	-38.27		0.88	166.12	
2.00	0.58	150.12		5.35	-111.09		0.015	-60.13		0.91	161.03	
2.10	0.53	158.90		6.08	-134.35		0.017	-81.20		0.94	151.94	
2.20	0.55	170.58		6.68	-160.40		0.019	-107.85		0.90	137.93	
2.30	0.65	177.91		6.99	170.59		0.020	-138.17		0.75	118.18	
2.40	0.77	178.08		6.84	138.32		0.020	-169.78		0.46	87.92	
2.50	0.88	173.34		5.78	104.05		0.017	155.34		0.12	-10.41	
2.60	0.94	167.29		4.24	74.99		0.013	125.34		0.39	-112.17	
2.70	0.95	162.38		2.98	54.18		0.010	103.11		0.60	-135.91	
2.80	0.95	158.60		2.15	39.55		0.007	89.73		0.73	-149.65	
2.90	0.95	155.53		1.62	27.81		0.005	81.08		0.80	-158.53	
3.00	0.95	152.46		1.27	18.05		0.004	70.79		0.85	-164.97	
3.10	0.94	149.96		1.03	10.66		0.004	84.45		0.88	-170.44	
3.20	0.95	146.88		0.86	3.25		0.003	70.88		0.90	-175.14	
3.30	0.94	143.66		0.75	-3.19		0.004	84.31		0.91	-178.78	
3.40	0.93	140.47		0.66	-9.44		0.003	86.56		0.92	177.62	
3.50	0.93	137.06		0.61	-15.25		0.004	84.50		0.93	174.47	
3.60	0.92	132.68		0.57	-21.07		0.005	72.51		0.93	171.17	
3.70	0.92	128.24		0.55	-27.00		0.004	74.57		0.93	168.47	
3.80	0.91	122.60		0.55	-32.91		0.005	72.14		0.93	165.82	
3.90	0.90	115.51		0.56	-40.31		0.005	61.56		0.93	162.84	
4.00	0.88	107.05		0.58	-47.68		0.006	42.28		0.93	159.71	
4.10	0.86	96.25		0.63	-57.21		0.007	36.94		0.93	156.35	
4.20	0.82	81.62		0.70	-68.23		0.006	23.27		0.93	152.88	
4.30	0.77	61.85		0.79	-81.30		0.007	6.67		0.92	148.90	
4.40	0.71	34.19		0.89	-97.78		0.007	-20.41		0.92	144.48	
4.50	0.67	-1.61		0.98	-117.86		0.007	-44.32		0.92	138.81	





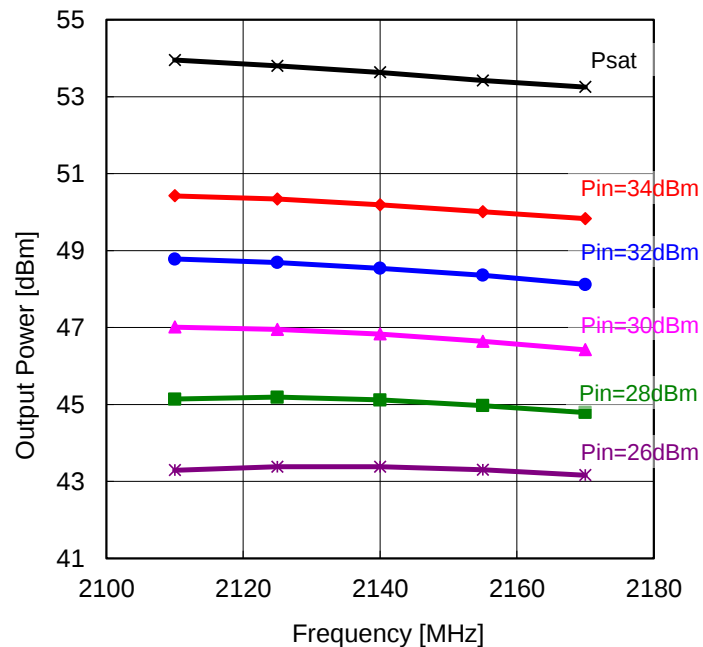
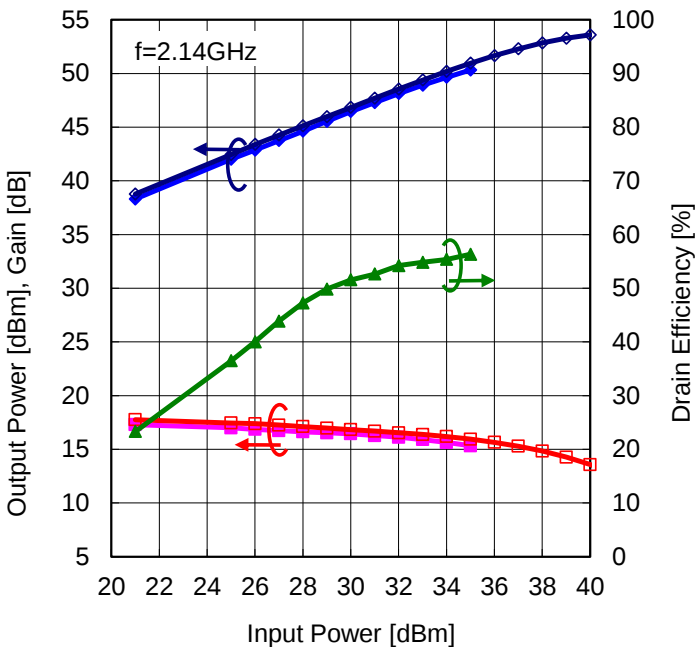
Test Fixture



CS3376C, t=0.8mm, Er=3.5

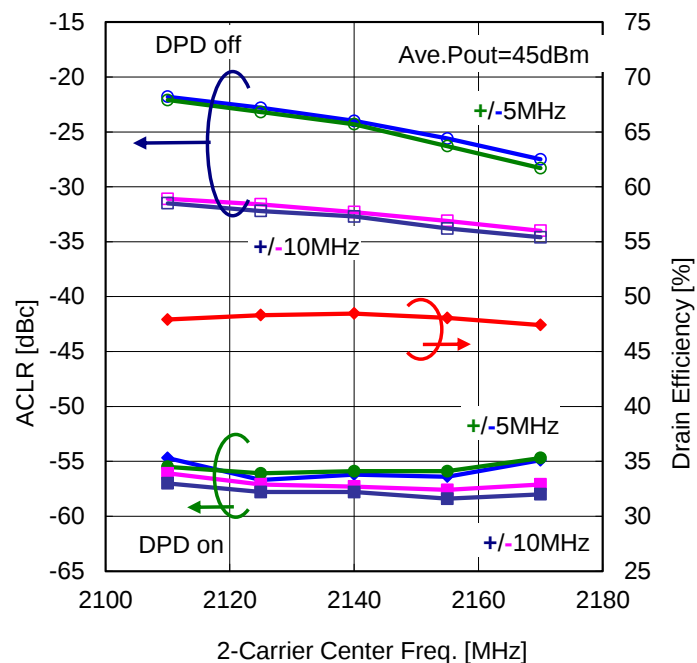
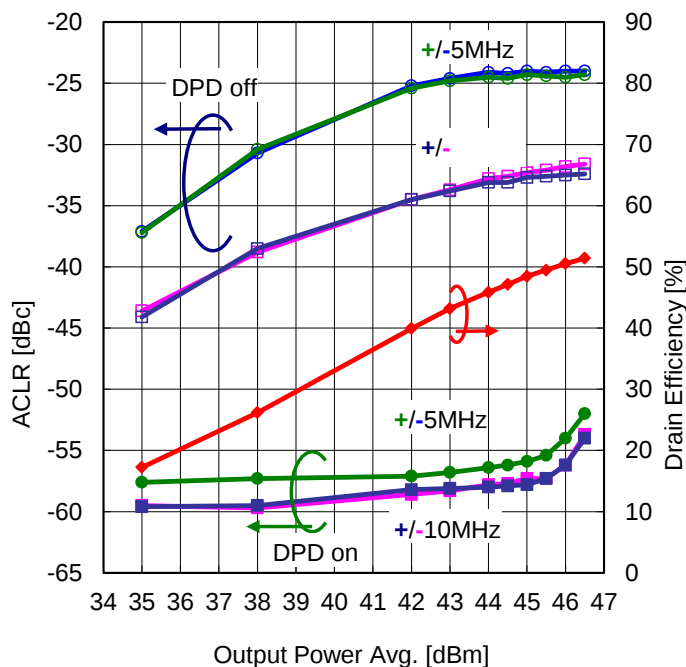
Doherty Amplifier characteristics

Test conditions : $V_{ds}=50V$, $I_{ds-main}=400mA$, $V_{gs-peak}=-3.5V$, Pulse Duty : 10% (6us/60us)

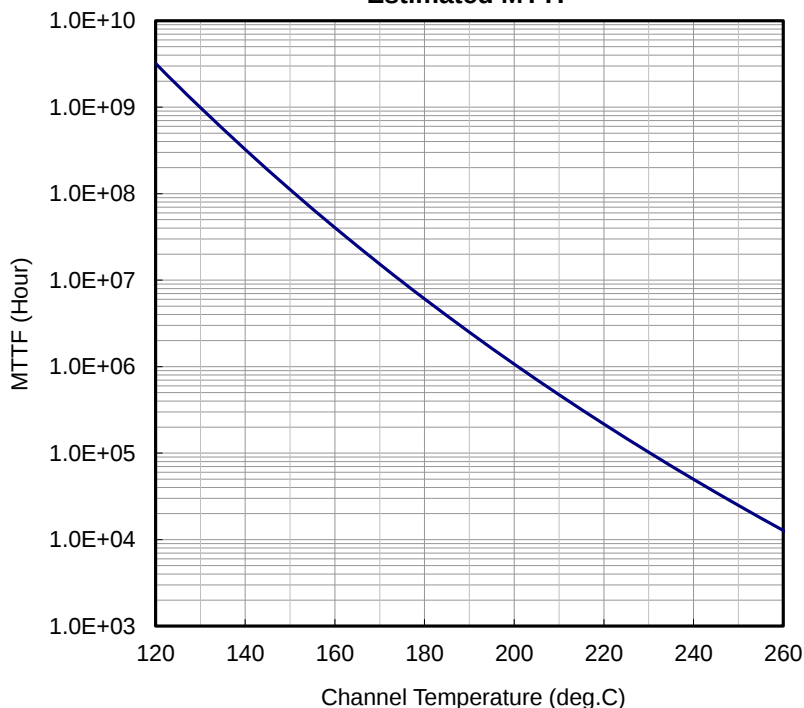


Test conditions : $V_{ds}=50V$, $I_{ds-main}=400mA$, $V_{gs-peak}=-3.5V$

W-CDMA 2-carrier, 5MHz Spacing, PAR=7.8dB(0.01%), $f_1=2137.5MHz$, $f_2=2142.5MHz$



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

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

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

Where;

AF : acceleration factor

Ea : activation energy (1.6eV)

k : Boltzmann's constant (8.62x10⁻⁵eV/K)

T_{stress} : stress temperature (K)

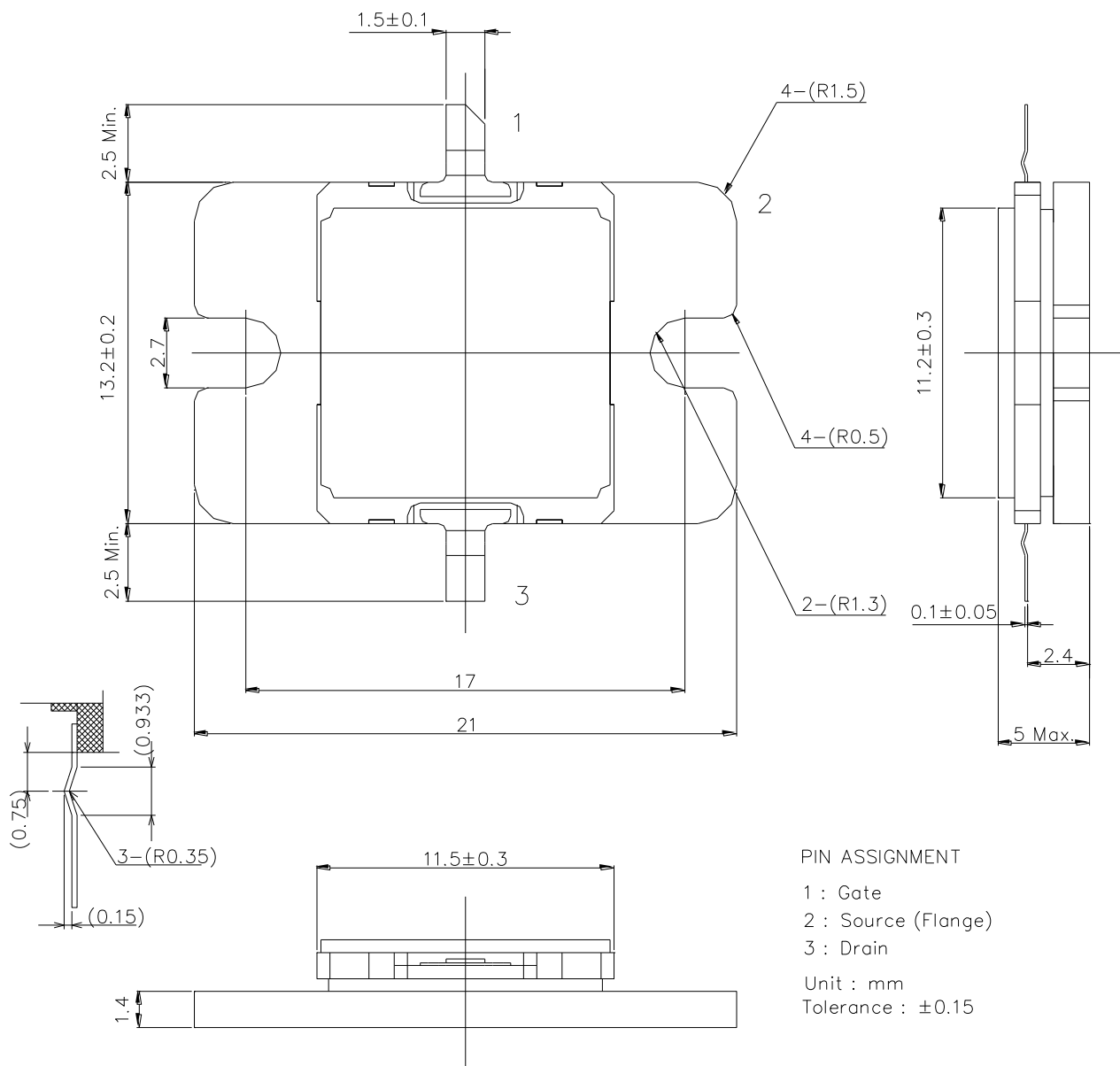
T_{use} : use temperature (K)

ESD characteristic

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

I2D Package Outline

Metal-Ceramic Hermetic Package





EGN21C105I2D

High Voltage - High Power GaN-HEMT

For further information please contact:

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