EGN21C160I2D

GaN-HEMT 160W

High Voltage - High Power GaN-HEMT

FEATURES

- High Voltage Operation : V_{DS}=50V
- High Power : 52.5dBm (typ.) @ Psat
- High Efficiency: 68%(typ.) @ Psat
- Power Gain : 18dB(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 from 1.8GHz to 2.2GHz W-CDMA & LTE design requirements as it offers high gain, long term reliability and ease of use.

ABSOLUTE MAXIMUM RATINGS (Case Temperature Tc=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		132	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=5 ohm	≤ 153	mA
Reverse Gate Current	I_{GR}	R_G=5 ohm	≥ -5.8	mA
Channel Temperature	T_{ch}		≤ 180	deg.C
Average Output Power	Pave.		≤ 49.5	dBm

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25deg.C)

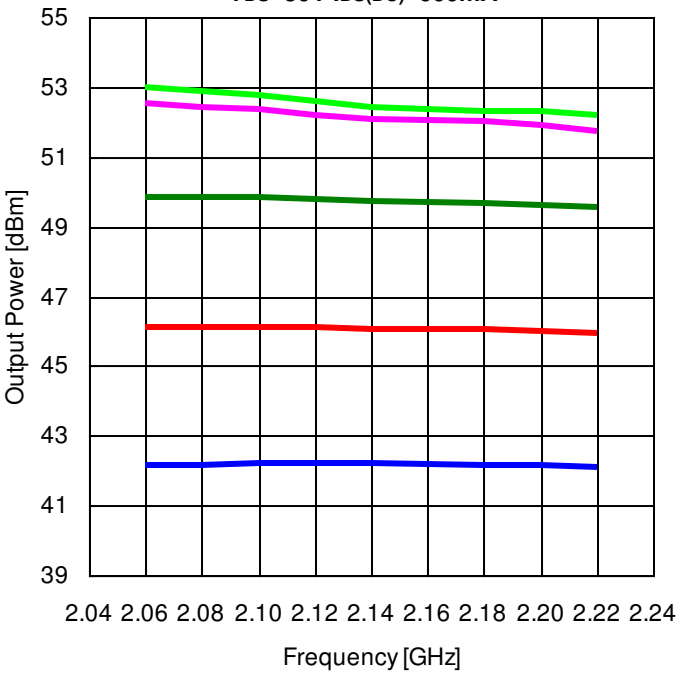
Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	VDS=50V IDS=40.8mA	-1.0	-1.5	-2.0	V
Saturated Power	Psat *1	VDS=50V	51.7	52.5	-	dBm
Drain Efficiency	η_d *2	IDS(DC)=600mA	28	32	-	%
Power Gain	Gp *2		17.0	18.0	-	dB
3rd Order Inter-modulation Distortion	IM3 *2		-28	-32	-	dBc
Thermal Resistance	R_{th}	Channel to Case at 78W P_{DC}	-	1.4	1.6	deg.C/W

*1 : 10%-duty RF pulse (DC supply constant), f=2.14GHz
*2 : Pout = 44.5dBm, f0=2.135GHz, f1=2.145GHz, W-CDMA(3GPP3.4 12-00) BS-1 64ch 47.5% clipping modulation (Peak/Avg.=8.5dB@0.01% Probability on CCDF).

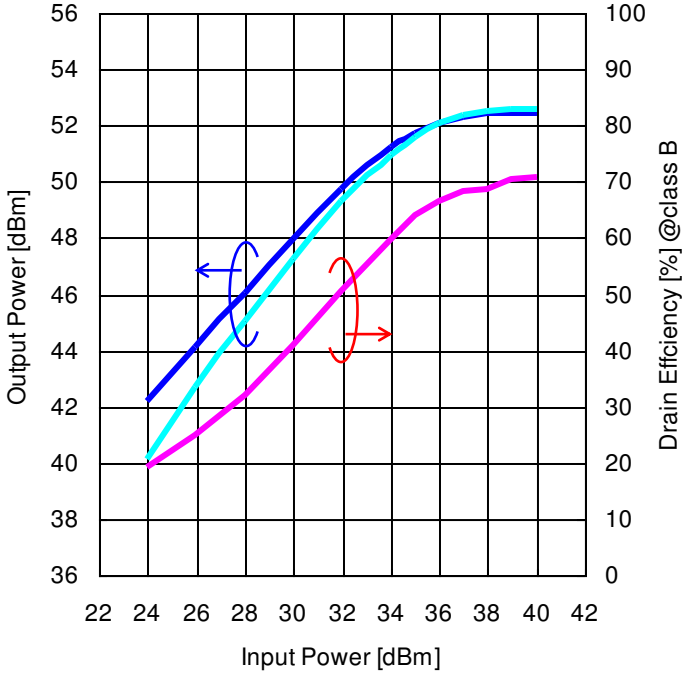
RoHS COMPLIANCE	Yes

RF characteristics @ f=2.14GHz fine tuned

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

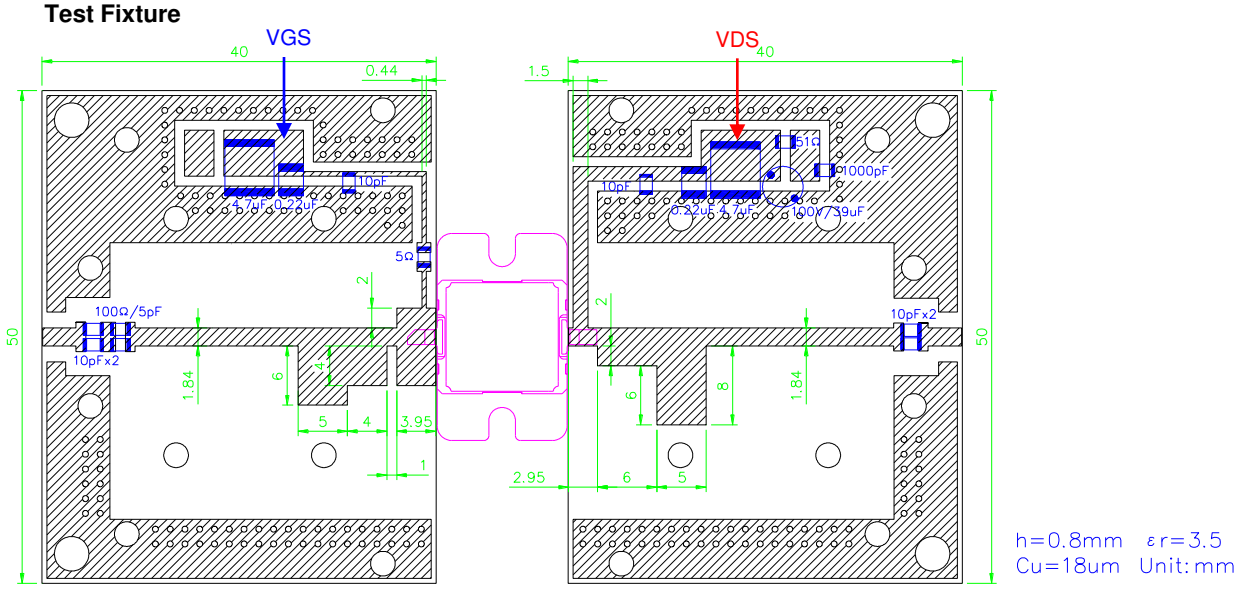


Output Power and Drain Efficiency vs. Input Power
VDS=50V IDS(DC)=600mA f=2.14GHz

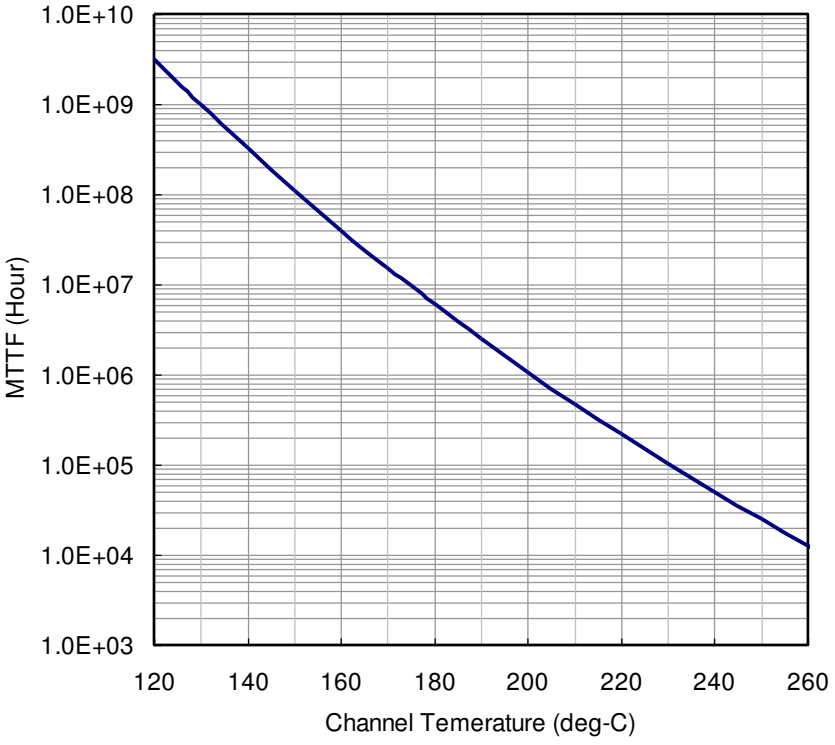


Pulse Signal (10%-duty, DC : constant)

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)

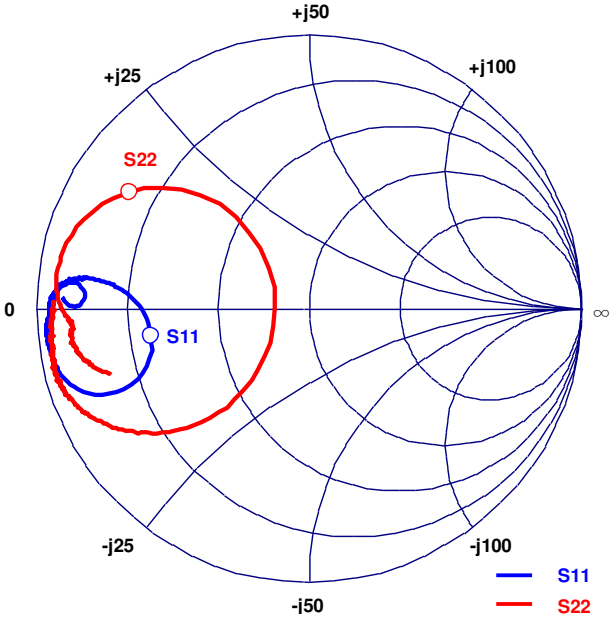
T_{stress}: stress temperature (K)

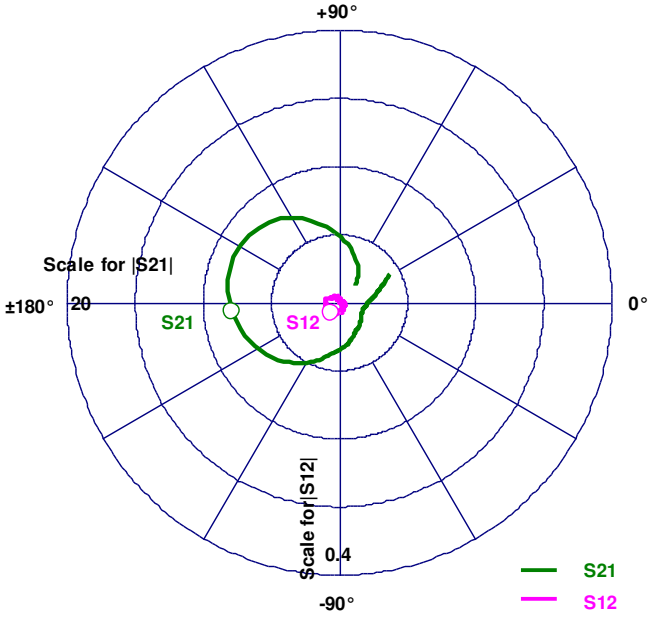
T_{use}: use temperature (K)

ESD Characteristics

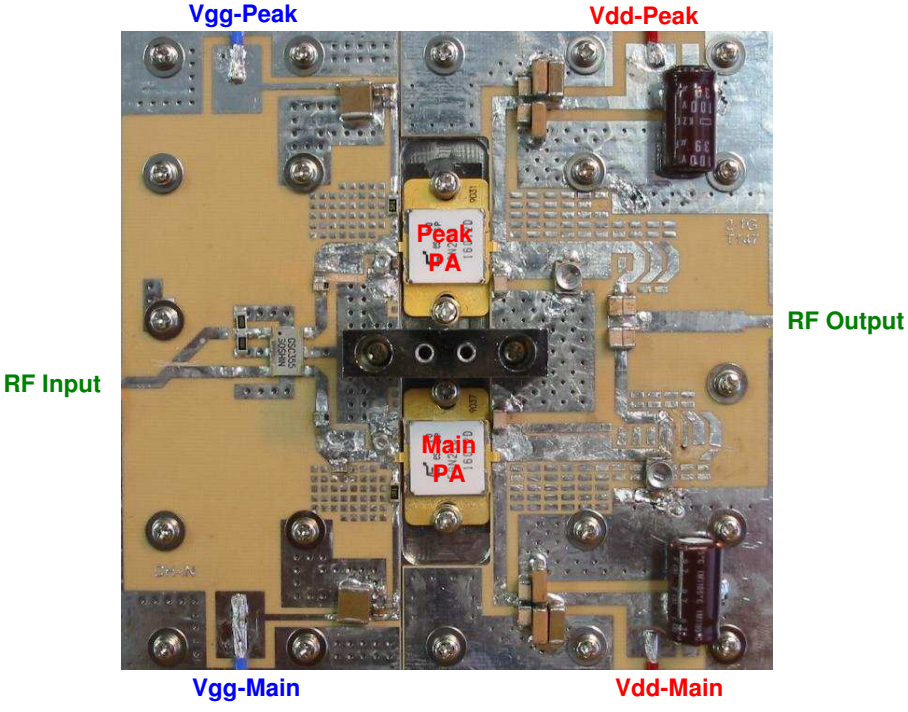
Test Methodology	Class
Human Body Model (per JESD22-A114)	1A
Machine Model (per JEIA/ESD22-A115)	A

S-Parameters @V_{DS}=50V, $I_{DS(DC)}$=600mA, f=0.5 to 4.5 GHz
$Z_l = Z_s$ = 50 ohm Marker : 2.14GHz

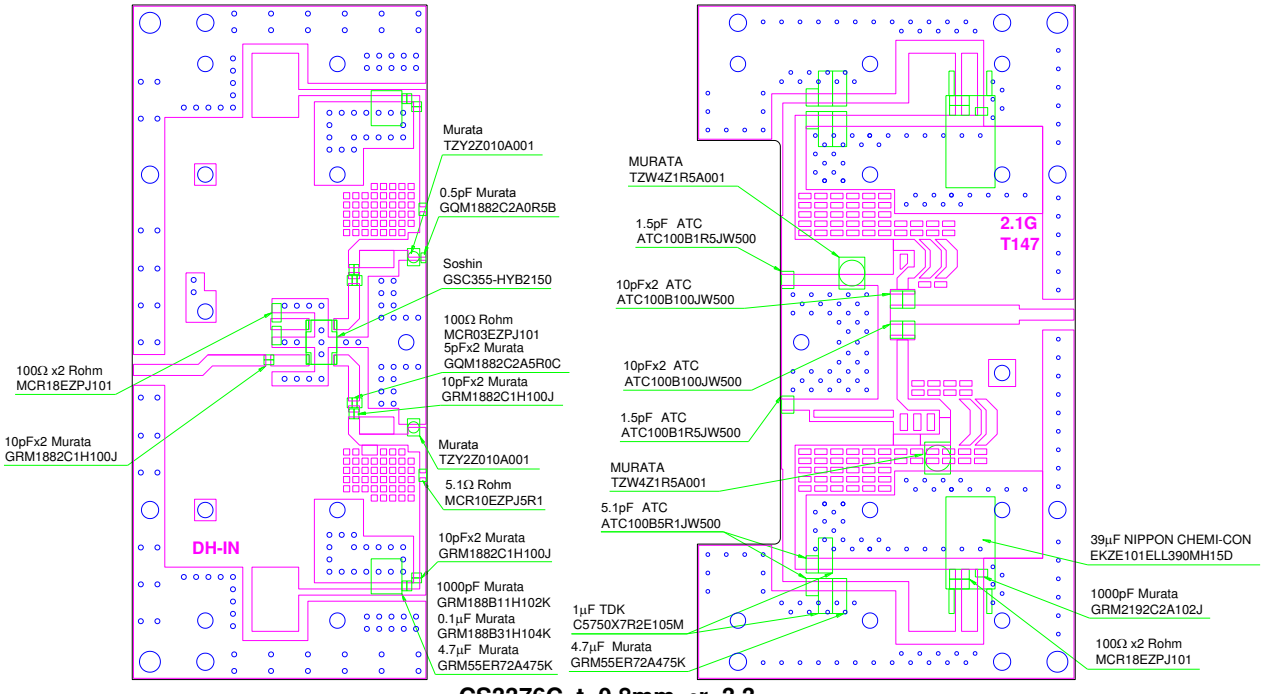




Freq.	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.95	-177.86	4.25	28.41	0.002	-1.35	0.76	-161.58
0.60	0.95	-178.57	3.36	20.45	0.002	-16.76	0.80	-163.44
0.70	0.95	-179.49	2.81	12.95	0.003	-46.35	0.83	-165.42
0.80	0.95	179.69	2.43	5.42	0.002	-25.36	0.85	-167.05
0.90	0.95	178.89	2.15	-1.19	0.002	-1.36	0.86	-168.59
1.00	0.95	178.61	1.99	-7.65	0.002	-22.07	0.86	-170.11
1.10	0.94	177.83	1.87	-14.41	0.004	46.52	0.87	-170.99
1.20	0.94	177.25	1.84	-20.13	0.005	17.81	0.87	-172.26
1.30	0.93	176.23	1.88	-27.50	0.004	25.31	0.88	-173.01
1.40	0.92	175.39	1.95	-34.90	0.004	14.56	0.88	-174.13
1.50	0.91	174.71	2.17	-43.56	0.006	6.56	0.87	-174.82
1.60	0.89	173.74	2.40	-55.68	0.004	-6.49	0.87	-175.56
1.70	0.86	172.97	2.70	-66.76	0.009	-6.32	0.87	-176.26
1.80	0.82	172.06	3.26	-81.68	0.008	-27.44	0.88	-177.01
1.90	0.77	172.54	3.90	-99.49	0.012	-44.73	0.91	-179.56
2.00	0.70	174.19	5.22	-120.95	0.012	-82.64	0.93	174.41
2.10	0.60	-178.09	7.14	-156.37	0.018	-103.80	0.89	158.61
2.20	0.68	-157.43	8.32	149.83	0.021	-167.81	0.43	128.49
2.30	0.91	-161.52	5.37	95.98	0.012	149.38	0.34	-128.23
2.40	0.95	-167.50	3.01	62.84	0.006	105.74	0.67	-137.57
2.50	0.96	-170.49	1.72	44.68	0.006	67.47	0.81	-146.46
2.60	0.97	-172.10	1.14	29.86	0.005	51.92	0.87	-151.77
2.70	0.97	-173.30	0.70	21.50	0.003	91.62	0.91	-155.48
2.80	0.96	-174.11	0.53	18.04	0.004	6.56	0.93	-158.33
2.90	0.97	-174.65	0.41	6.41	0.004	-110.89	0.94	-160.41
3.00	0.97	-175.21	0.30	3.55	0.002	-82.78	0.95	-161.98
3.10	0.96	-175.75	0.26	-3.85	0.004	-173.95	0.96	-163.56
3.20	0.96	-176.34	0.19	-12.59	0.004	129.72	0.96	-164.81
3.30	0.96	-176.90	0.15	-12.07	0.004	149.66	0.96	-165.66
3.40	0.96	-177.18	0.13	-22.45	0.007	104.61	0.97	-166.96
3.50	0.96	-177.77	0.09	-19.63	0.008	136.61	0.96	-168.30
3.60	0.95	-178.26	0.08	-20.63	0.003	144.13	0.96	-169.16
3.70	0.95	-178.51	0.06	-26.13	0.005	136.93	0.96	-169.87
3.80	0.95	-179.22	0.05	-20.35	0.006	95.58	0.95	-170.81
3.90	0.94	179.95	0.04	-28.32	0.006	64.82	0.95	-171.92
4.00	0.94	178.92	0.02	-5.92	0.010	100.79	0.95	-172.82
4.10	0.94	177.37	0.04	81.92	0.009	96.82	0.95	-174.34
4.20	0.91	174.78	0.11	81.59	0.005	87.03	0.95	-175.92
4.30	0.82	176.22	0.27	36.74	0.008	79.65	0.94	-177.78
4.40	0.88	179.45	0.25	-20.02	0.008	55.15	0.94	-179.05
4.50	0.90	177.60	0.17	-34.21	0.006	23.45	0.94	178.25

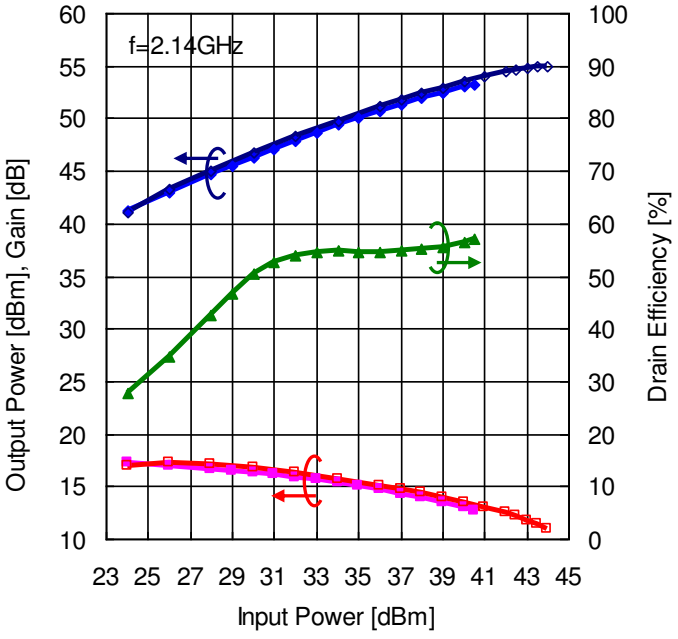


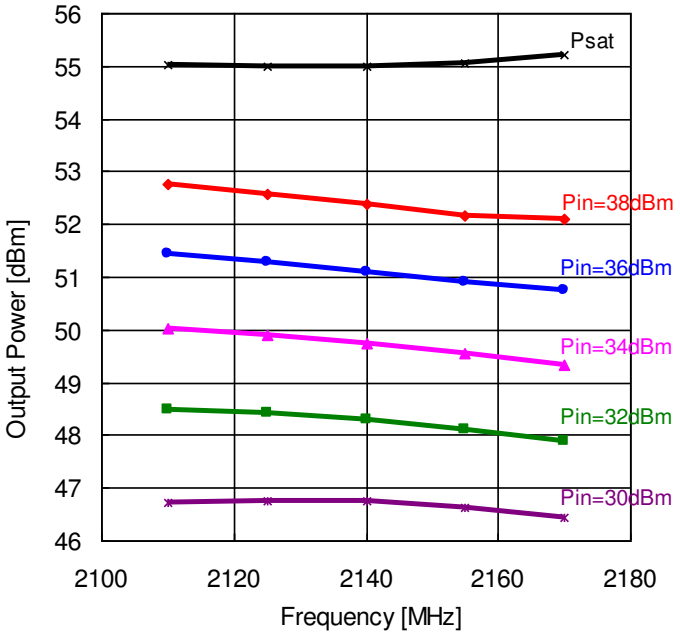
Test Fixture



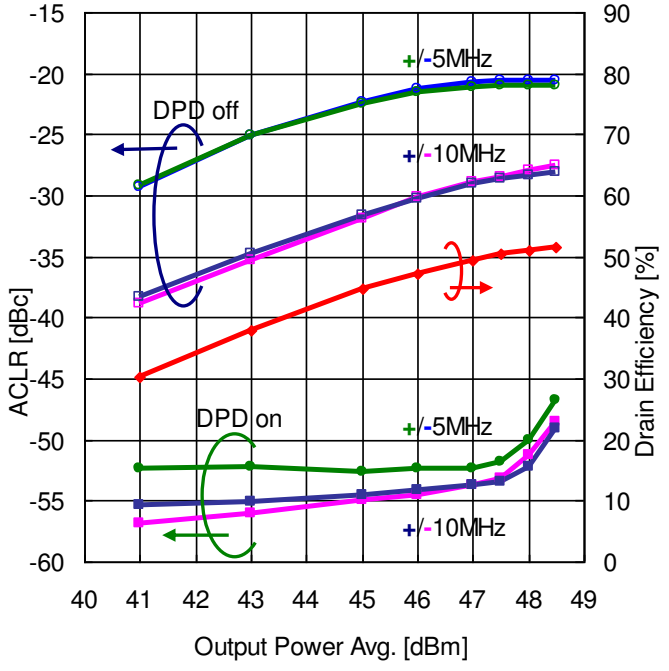
CS3376C, t=0.8mm, εr=3.3

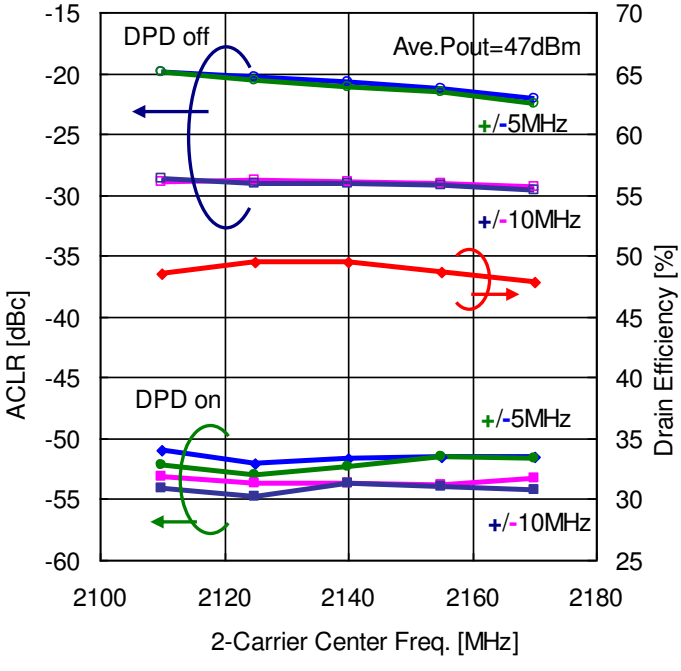
Test conditions : Vds=50V, Ids-main=600mA, Vgs-peak=-3.5V, Pulse Duty : 10% (6us/60us)



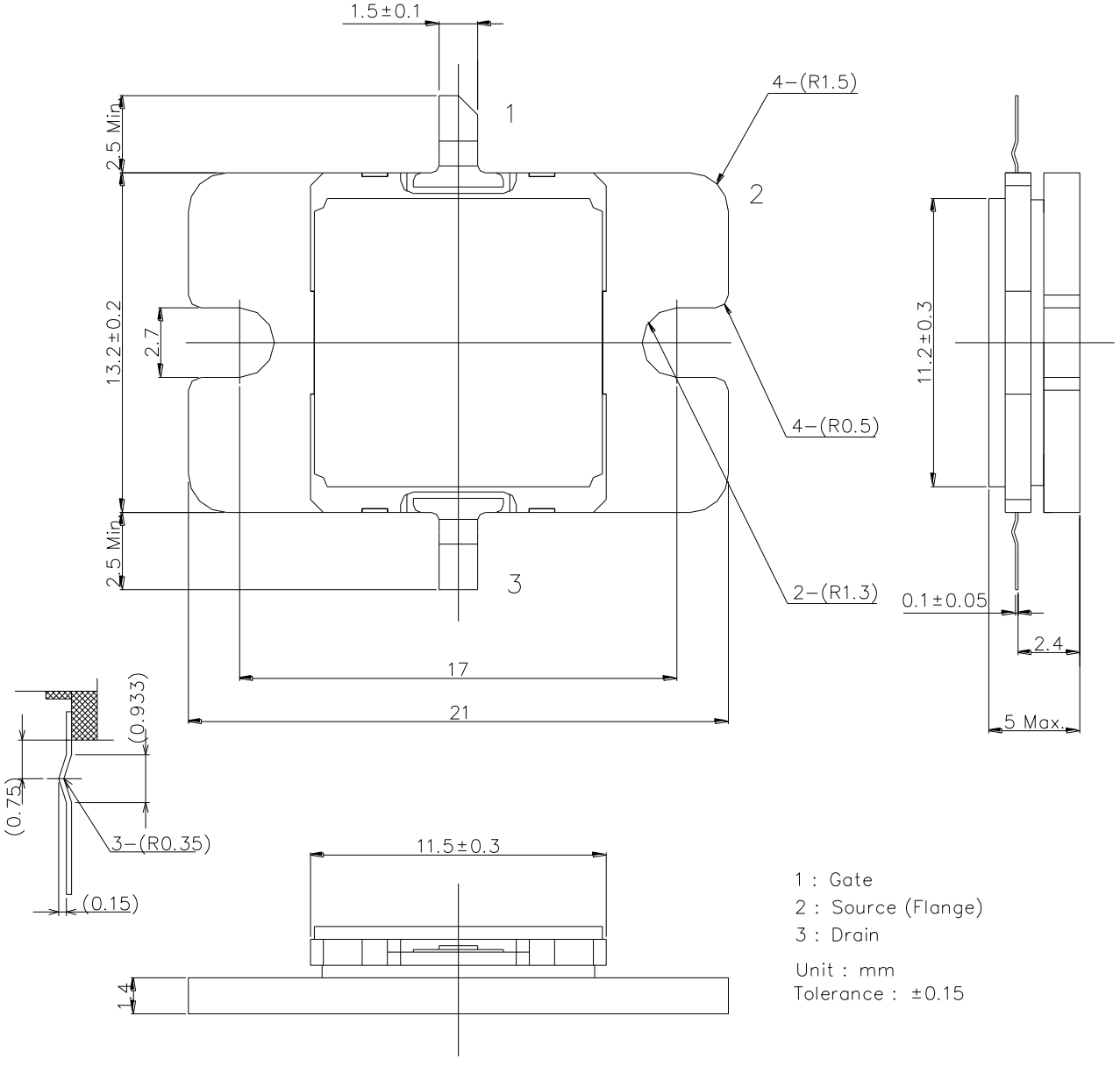


Test conditions : Vds=50V, Ids-main=600mA, Vgs-peak=-3.5V
W-CDMA 2-carrier, 5MHz Spacing, PAR=7.8dB(0.01%), f1=2137.5MHz, f2=2142.5MHz





I2D Package Outline
Metal-Ceramic Hermetic Package



For further information please contact:

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