EGN21C210I2D

High Voltage - High Power GaN-HEMT

FEATURES

-High Voltage Operation : V_{DS}=50V
-High Power : 53.0dBm (typ.) @ Psat
-High Efficiency: 68%(typ.) @ Psat
-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 & 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		173	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}	R_G=5 ohm	$\leq$ 204	mA
Reverse Gate Current	I_{GR}	R_G=5 ohm	$\geq$ -7.8	mA
Channel Temperature	T_{ch}		$\leq$ 180	deg.C
Average Output Power	Pave.		$\leq$ 50.0	dBm

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

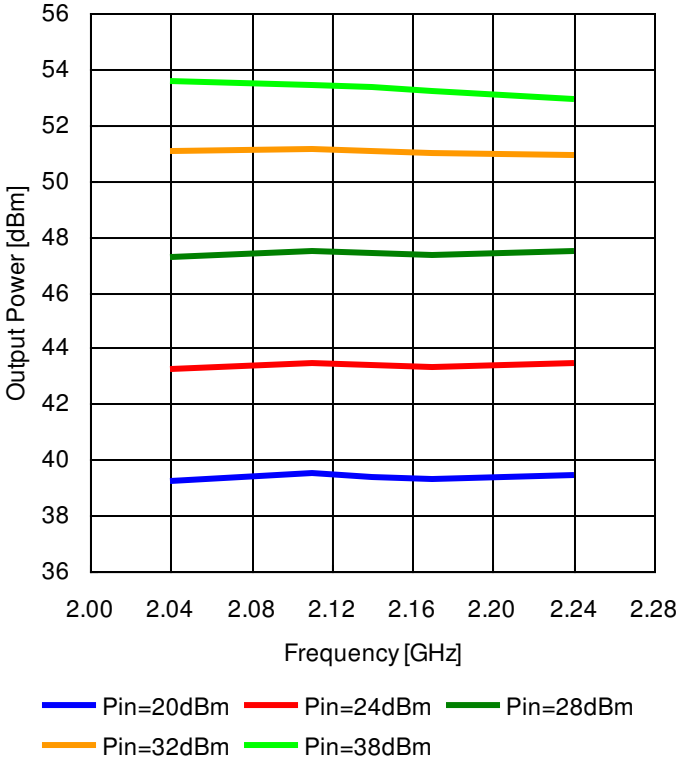
Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	VDS=50V IDS=54.4mA	-1.0	-1.5	-2.0	V
Saturated Power	Psat *1	VDS=50V	52.2	53.0	-	dBm
Drain Efficiency	η_d *2	IDS(DC)=750mA	28.0	32.0	-	%
Power Gain	Gp *2		17.0	18.0	-	dB
3rd Order Inter-modulation Distortion	IM3 *2		-28	-32	-	dBc
Thermal Resistance	R_{th}	Channel to Case at 105W P_{DC}	-	1.1	1.3	deg.C/W

*1 : 10%-duty RF pulse (DC supply constant), f=2.14GHz
*2 : Pout = 45dBm, 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).

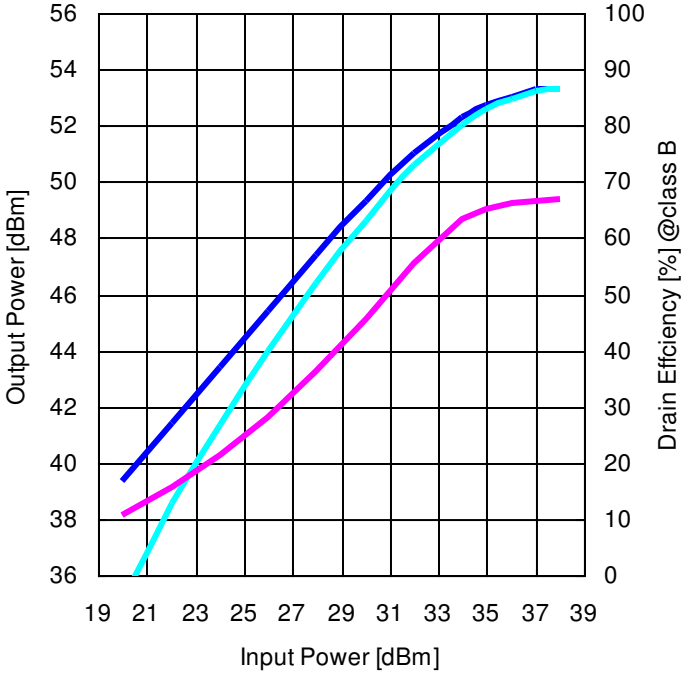
RoHS COMPLIANCE	Yes

RF characteristics @f=2.14GHz fine tuned

Output Power vs. Frequency
V_{DS}=50V $I_{DS(DC)}$=750mA

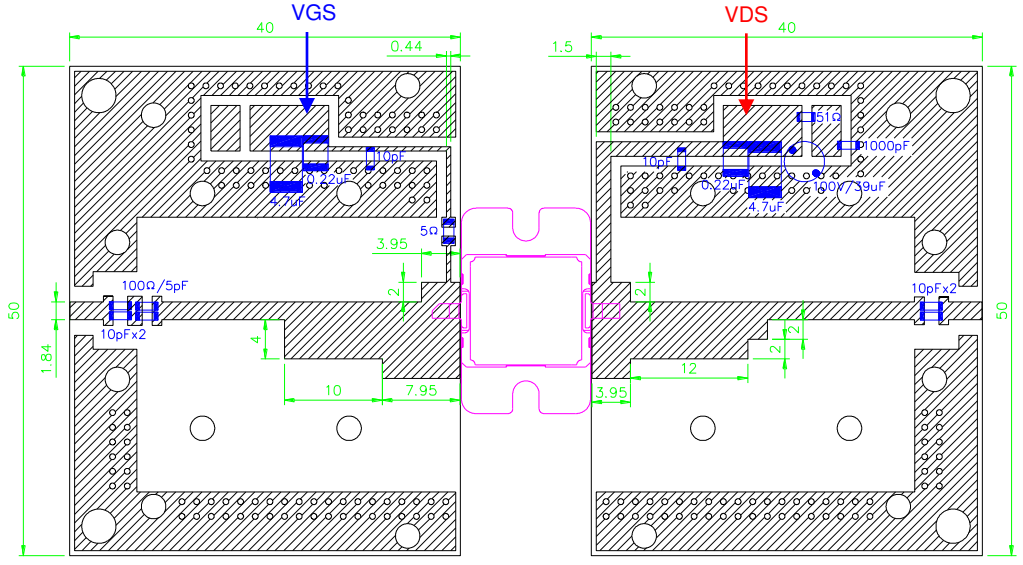


Output Power and Drain Efficiency vs. Input Power
V_{DS}=50V $I_{DS(DC)}$=750mA f=2.14GHz

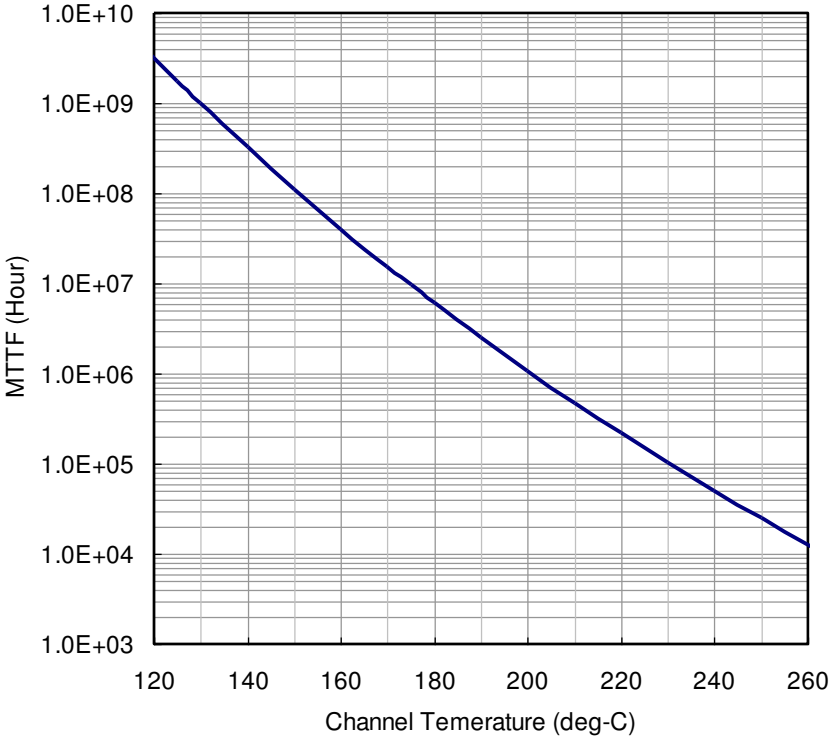


Pulse Signal (10%-duty, DC : constant)

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)

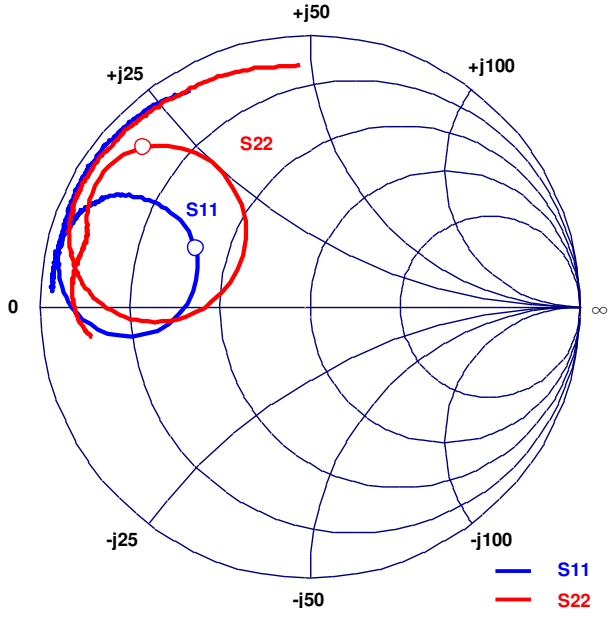
T_{use}: use temperature (K)

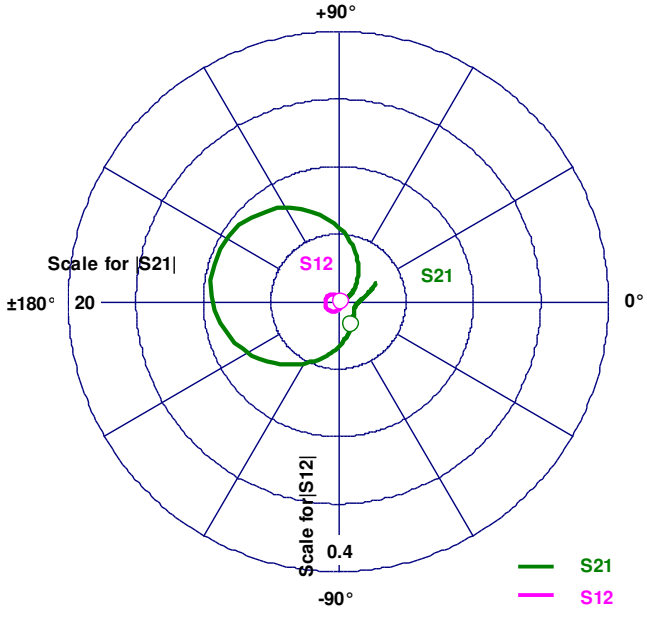
ESD characteristic

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

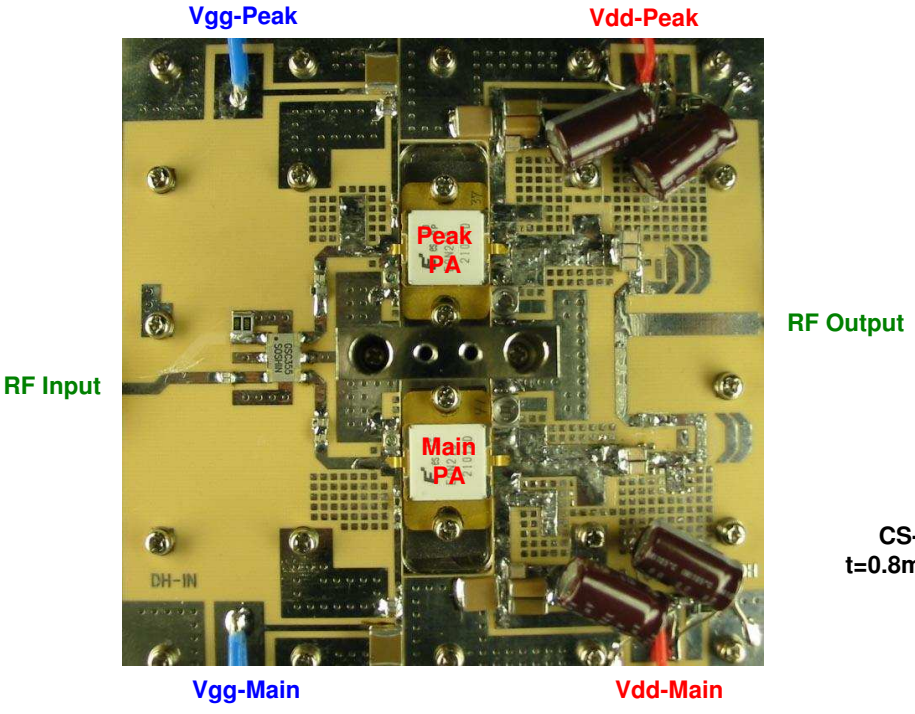
- Reference DATA -

S-Parameters @V_{DS}=50V, $I_{DS(DC)}$=750mA, f=0.5 to 4.5 GHz
$Z_l = Z_s$ = 50 ohm Marker : 2.14GHz



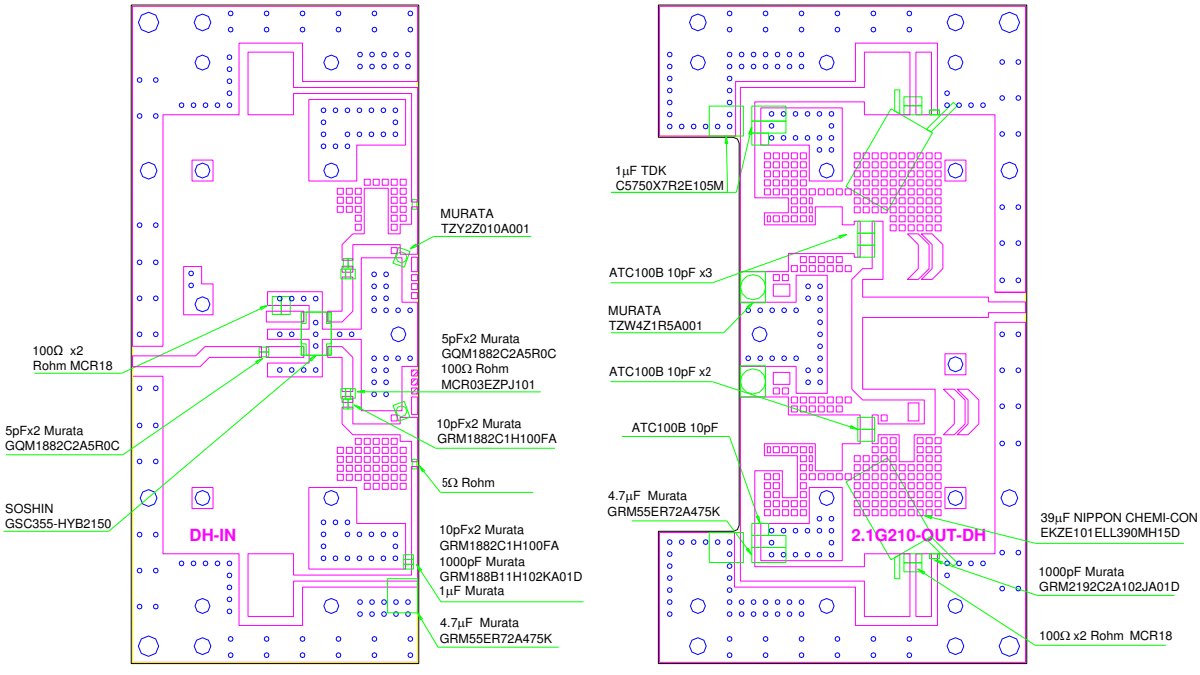


Freq.	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.95	176.51	3.18	25.30	0.002	-22.89	0.81	-171.87
0.60	0.96	174.61	2.50	17.03	0.002	-18.05	0.84	-174.65
0.70	0.96	173.14	2.06	9.59	0.002	-8.32	0.86	-177.18
0.80	0.96	171.13	1.77	3.13	0.002	-13.74	0.87	-179.84
0.90	0.95	170.13	1.57	-3.11	0.002	-5.17	0.88	178.05
1.00	0.95	168.06	1.44	-8.90	0.002	12.74	0.88	175.89
1.10	0.95	166.63	1.37	-14.79	0.002	5.91	0.88	173.73
1.20	0.95	165.12	1.35	-20.75	0.002	21.61	0.88	171.73
1.30	0.94	162.94	1.36	-27.12	0.003	17.48	0.88	169.91
1.40	0.94	161.68	1.43	-33.42	0.003	22.50	0.87	168.30
1.50	0.93	159.93	1.55	-41.01	0.004	8.27	0.87	166.85
1.60	0.92	157.70	1.75	-49.52	0.004	3.83	0.86	165.37
1.70	0.89	155.18	2.08	-59.50	0.005	-2.70	0.86	163.82
1.80	0.86	153.03	2.56	-71.97	0.006	-18.16	0.86	162.41
1.90	0.82	149.78	3.31	-87.65	0.007	-33.27	0.87	160.01
2.00	0.74	146.89	4.58	-108.73	0.010	-58.88	0.90	155.90
2.10	0.57	146.57	6.86	-139.60	0.015	-93.93	0.90	145.08
2.20	0.48	-176.68	9.55	163.83	0.019	-159.61	0.58	123.10
2.30	0.86	-178.23	6.51	101.64	0.013	133.01	0.39	-179.13
2.40	0.94	171.52	3.58	67.17	0.008	94.39	0.66	-175.88
2.50	0.95	166.32	2.13	47.07	0.005	72.68	0.79	178.35
2.60	0.95	163.27	1.39	33.22	0.003	60.25	0.85	173.35
2.70	0.96	160.81	0.97	23.21	0.003	50.70	0.89	169.50
2.80	0.96	158.94	0.73	15.46	0.002	46.42	0.92	166.34
2.90	0.96	157.33	0.56	8.08	0.002	48.35	0.93	163.31
3.00	0.96	155.49	0.45	1.64	0.002	56.49	0.94	160.72
3.10	0.96	154.06	0.38	-3.57	0.002	81.03	0.94	158.00
3.20	0.96	152.36	0.32	-8.77	0.002	83.29	0.95	155.11
3.30	0.96	150.79	0.28	-13.43	0.001	92.89	0.95	152.59
3.40	0.96	149.37	0.26	-18.12	0.003	87.35	0.95	149.75
3.50	0.97	147.59	0.24	-22.16	0.003	91.49	0.95	147.20
3.60	0.96	145.93	0.23	-26.13	0.003	77.02	0.95	144.17
3.70	0.96	144.22	0.22	-31.16	0.004	71.95	0.94	141.17
3.80	0.96	142.47	0.22	-35.59	0.004	81.45	0.94	137.88
3.90	0.96	140.14	0.22	-39.58	0.005	77.12	0.94	134.07
4.00	0.95	137.97	0.23	-45.46	0.006	69.99	0.93	129.63
4.10	0.95	135.21	0.25	-50.46	0.006	56.43	0.92	125.02
4.20	0.94	132.29	0.28	-57.15	0.007	44.64	0.91	119.49
4.30	0.94	128.97	0.33	-64.42	0.007	38.66	0.91	112.23
4.40	0.93	124.43	0.40	-73.60	0.006	23.54	0.90	103.80
4.50	0.91	119.05	0.50	-85.32	0.007	18.47	0.89	92.32



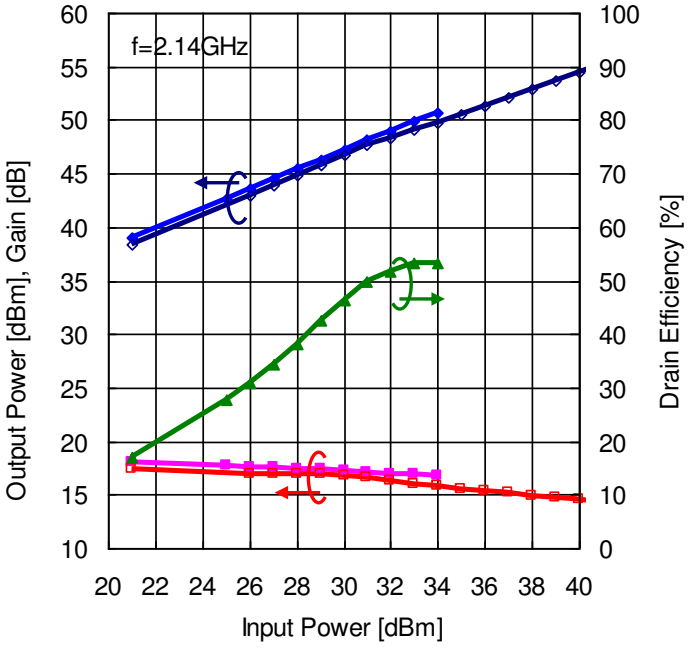
CS-3376C
t=0.8mm, εr=3.3

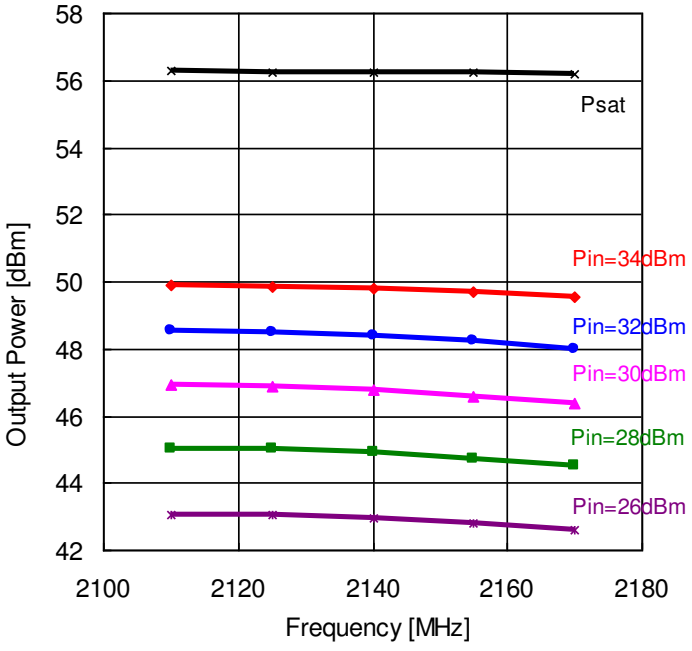
Test Fixture



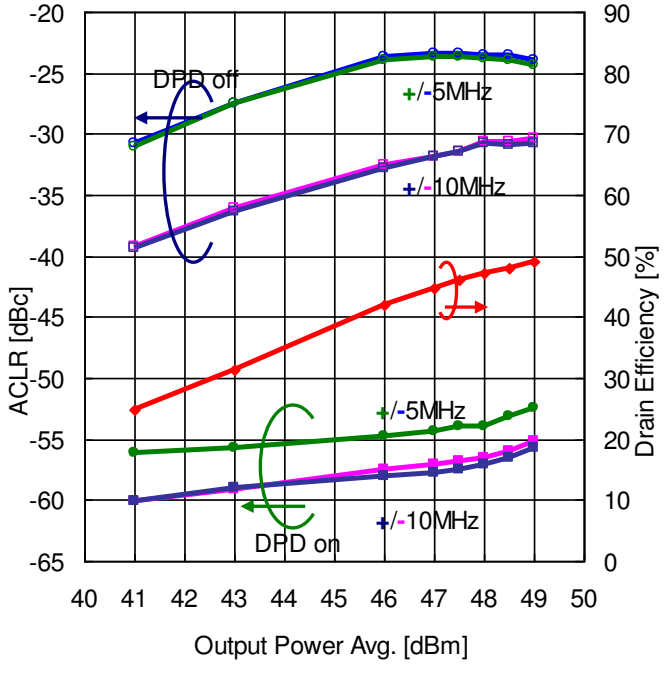
CS3376C, t=0.8mm, Er=3.5

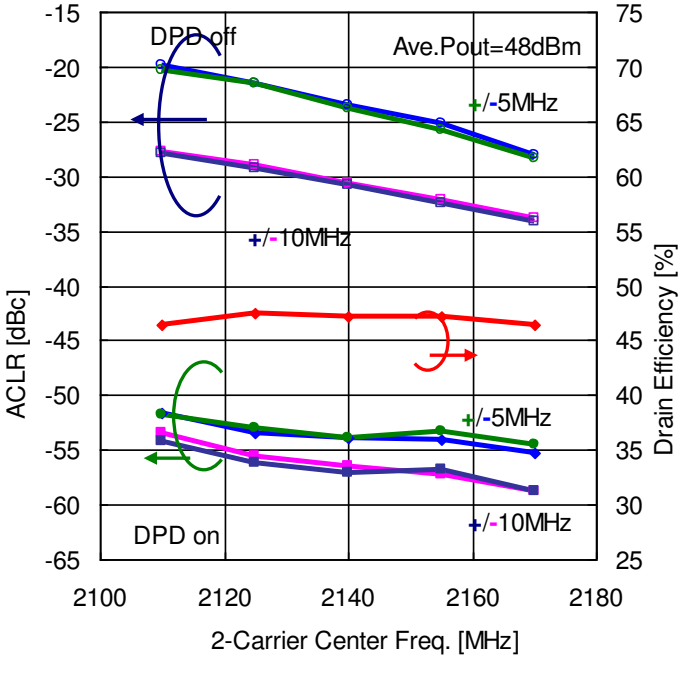
Test conditions : Vds=50V, Ids-main=750mA, Vgs-peak=-3.5V, Pulse Duty : 10% (6us/60us)



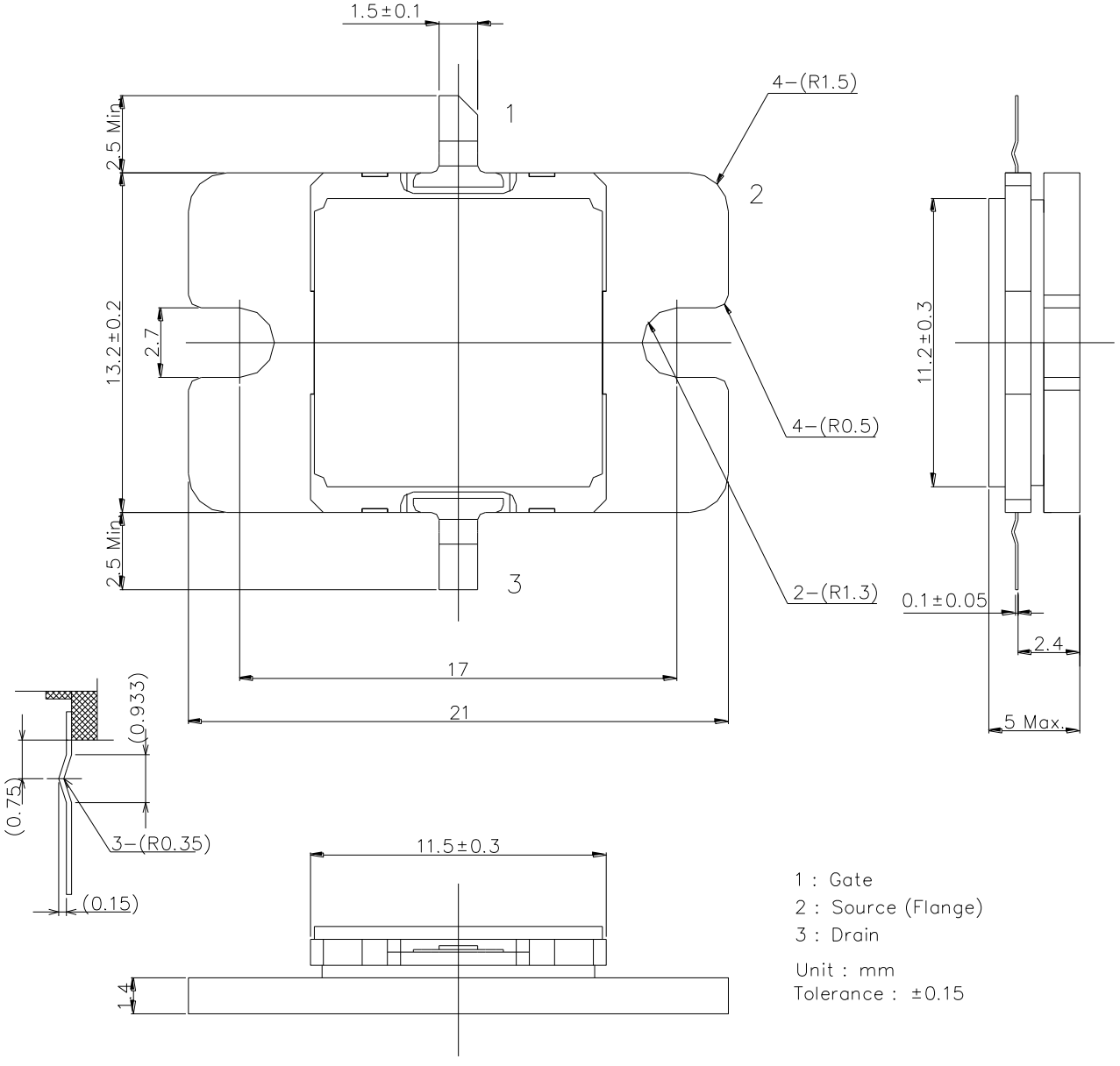


Test conditions : Vds=50V, Ids-main=750mA, Vgs-peak=-3.5V
W-CDMA 2-carrier, 5MHz Spacing, PAR=7.8dB(0.01%), f1=2137.5MHz, f2=2142.5MHz





I2D Package Outline
Metal-Ceramic Hermetic Package



For further information please contact:

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