

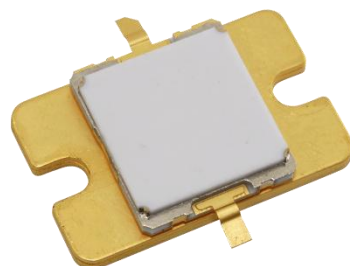
FEATURES

- High Voltage Operation : $V_{DS}=50V$
- High Power : 53.0dBm (typ.) @ P_{sat}
- High Efficiency: 62%(typ.) @ P_{sat}
- Power Gain : 16.3dB(typ.) @ $f=2.655GHz$
- 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 2.6GHz LTE design requirements as it offers high gain, long term reliability and ease of use.

**ABSOLUTE MAXIMUM RATINGS (Case Temperature $T_c=25$ deg.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}		≤ 55	V
Forward Gate Current	I_{GF}	$R_G=5\text{ ohm}$	≤ 204	mA
Reverse Gate Current	I_{GR}	$R_G=5\text{ ohm}$	≥ -7.8	mA
Channel Temperature	T_{ch}		≤ 180	deg.C
Average Output Power	$P_{ave.}$		≤ 50.5	dBm

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	$V_{DS}=50V$ $I_{DS}=54.4mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$	52.0	53.0	-	dBm
Drain Efficiency	$\eta_d *2$	$I_{DS}(DC)=750mA$	25	30	-	%
Power Gain	$G_p *2$	$f=2.655GHz$	15.3	16.3	-	dB
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)

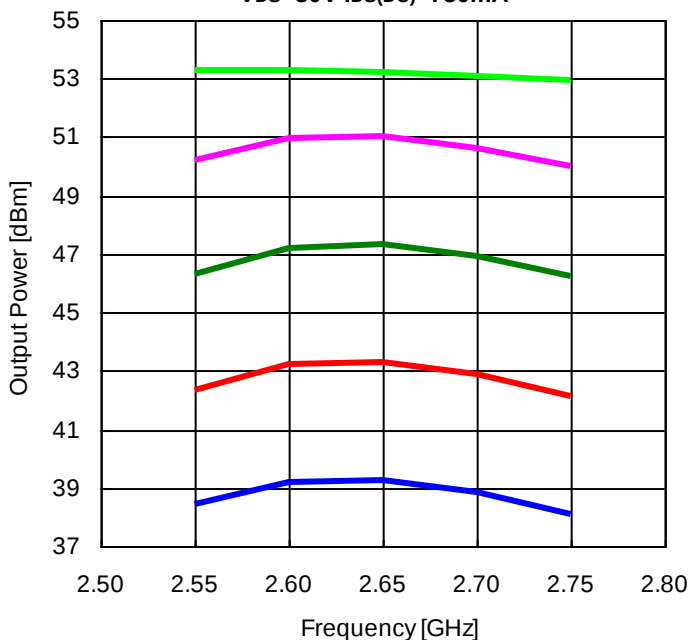
*2 : $P_{out} = 45.0dBm$, CW modulation Signal (W-CDMA)

RoHS COMPLIANCE	Yes
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High Voltage - High Power GaN-HEMT

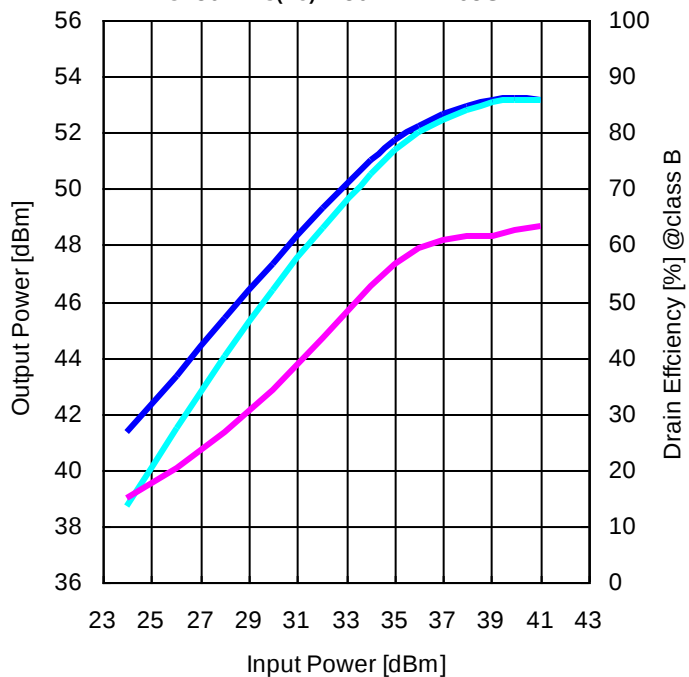
RF characteristics @ f=2.65GHz fine tuned

Output Power vs. Frequency



Pin=22dBm Pin=26dBm Pin=30dBm
Pin=34dBm Pin=40dBm

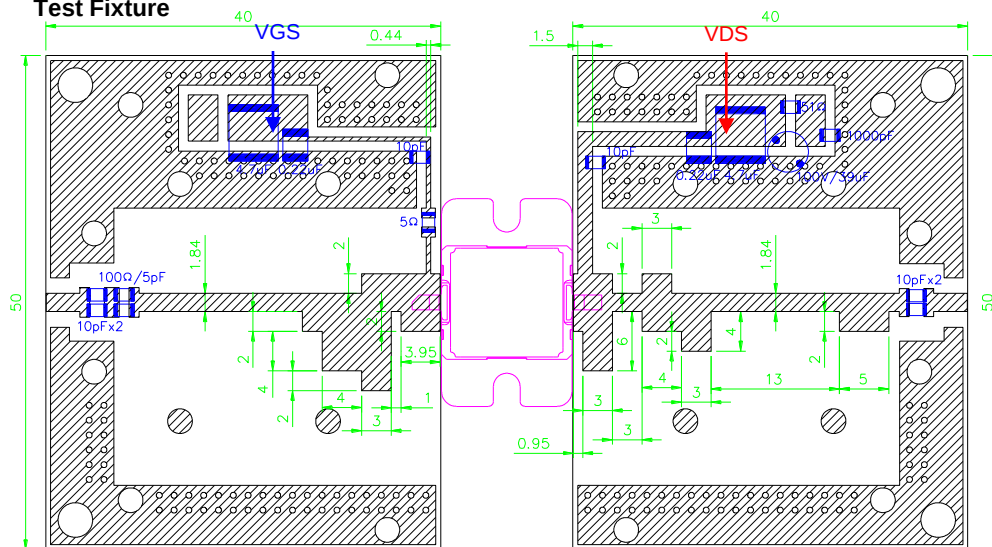
Output Power and Drain Efficiency vs. Input Power



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

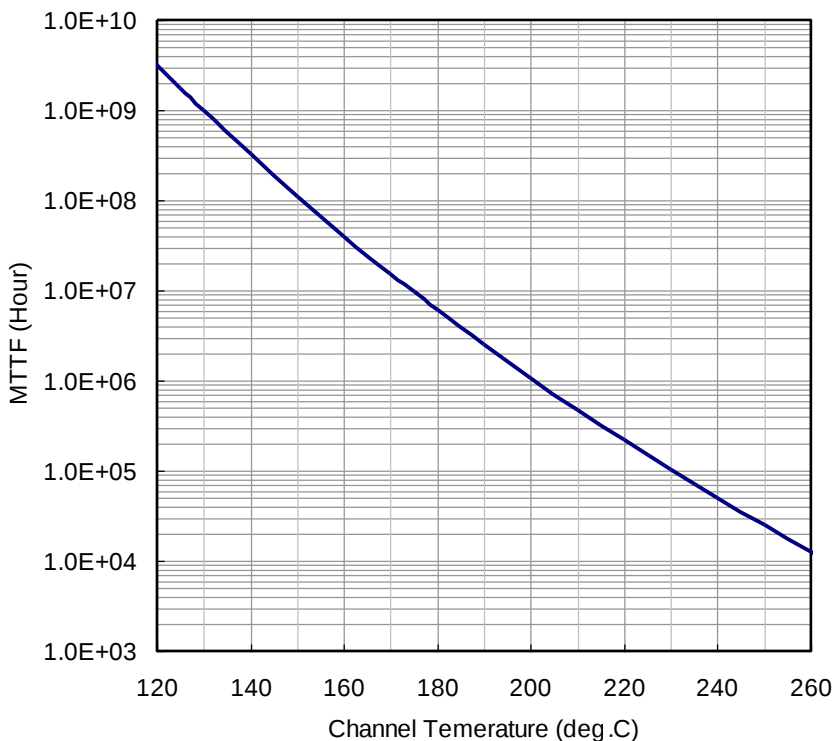
Pulse Signal (10%-duty, DC : constant)

Test Fixture



$\epsilon_r = 3.5$ at 1MHz
 $\epsilon_r = 3.3$ at 1GHz
 $h = 0.8\text{mm}$
 $Cu = 18\mu\text{m}$ Unit: mm

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

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

$$MTTF_{\text{use}} = MTTF_{\text{stress}} \cdot AF$$

Where;

AF: acceleration factor

Ea: activation energy (1.6 eV)

k: Boltzman's constant (8.62 x 10⁻⁵ eV/K)

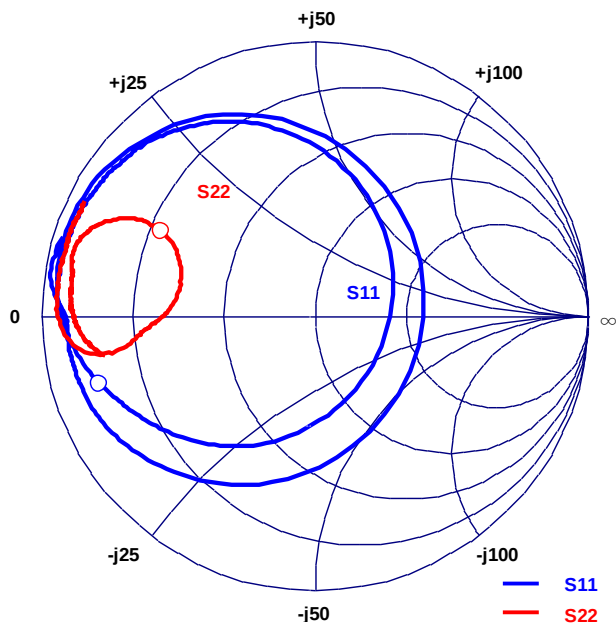
T_{stress}: stress temperature (K)

T_{use}: use temperature (K)

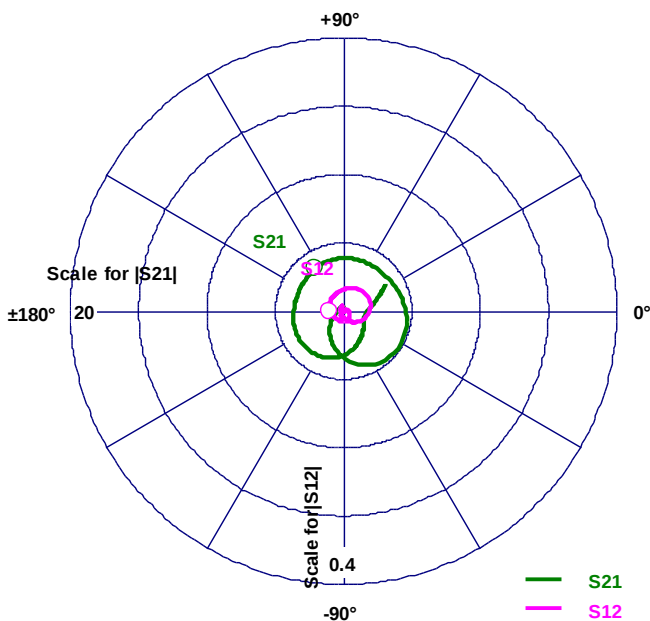
ESD Characteristics

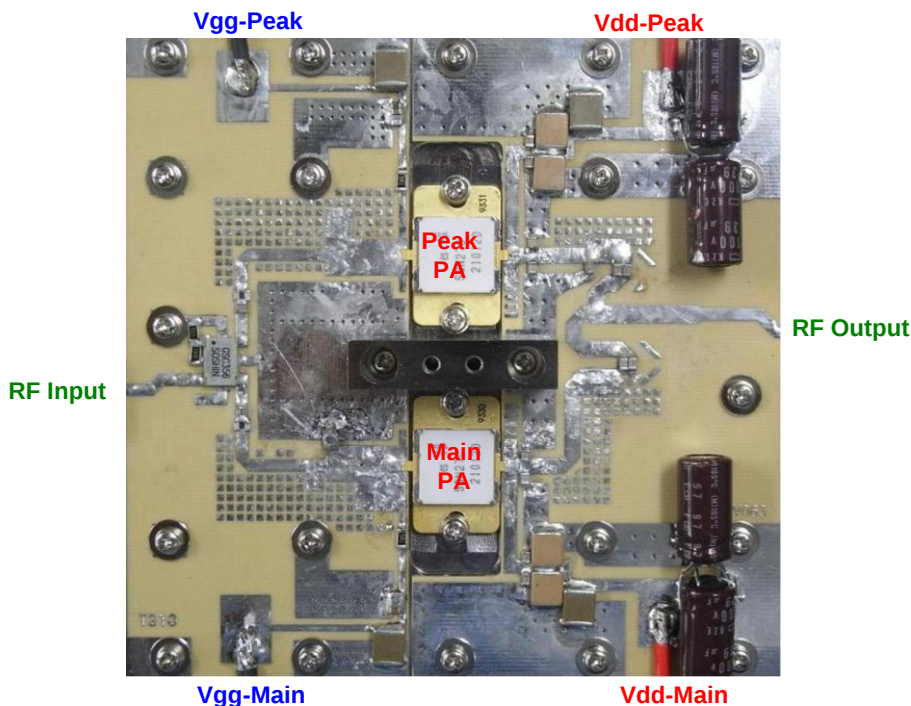
Test Methodology	Class
Human Body Model (per JESD22-A114)	1B
Machine Model (per JEIA/ESD22-A115)	A

S-Parameters @V_{DS}=50V, I_{DS(DC)}=750mA, f=0.5 to 4.5 GHz
Z_I = Z_S = 50 ohm Marker : 2.65GHz

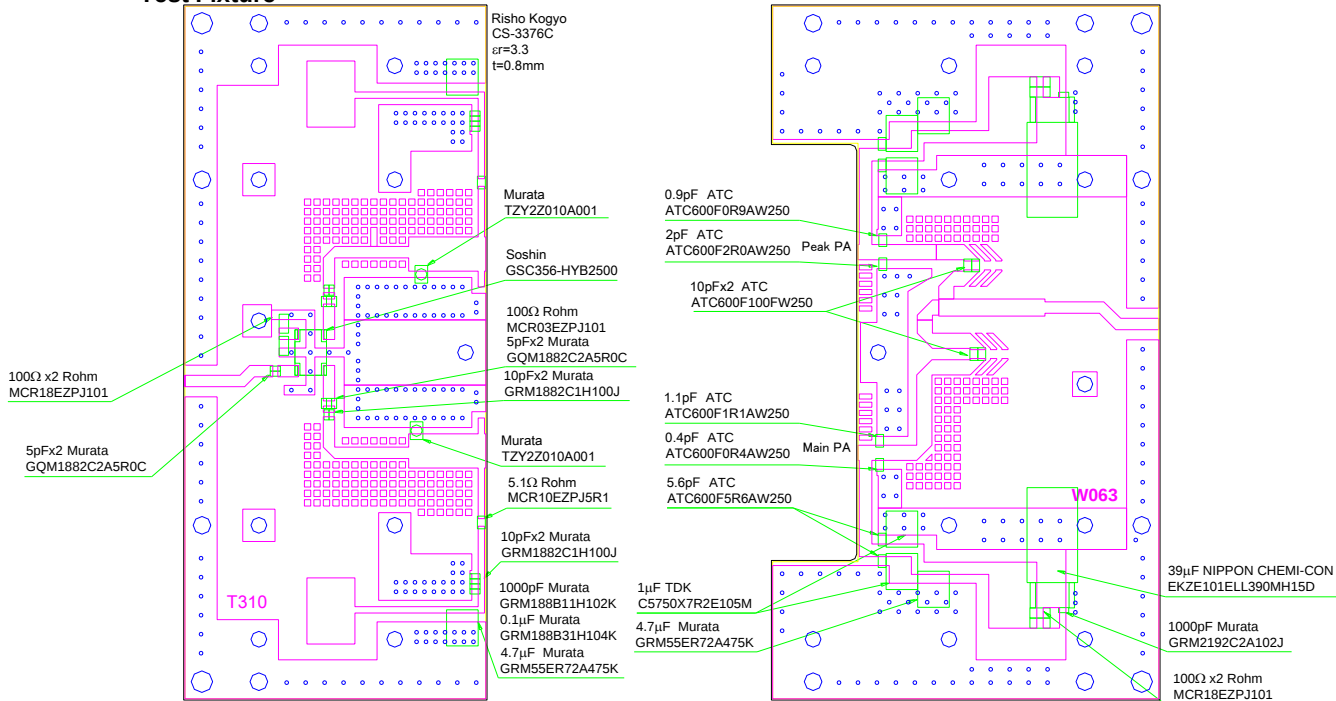


Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.95	172.40	3.72	31.91	0.003	-18.54	0.78	-169.14
0.60	0.95	169.50	2.97	23.82	0.002	-13.10	0.81	-171.09
0.70	0.94	166.91	2.48	16.31	0.002	-8.96	0.84	-173.27
0.80	0.95	164.17	2.14	9.82	0.002	-3.77	0.85	-175.14
0.90	0.94	161.30	1.92	3.69	0.002	1.11	0.87	-177.10
1.00	0.94	158.24	1.77	-2.41	0.002	6.13	0.88	-178.71
1.10	0.94	154.78	1.68	-8.54	0.003	12.04	0.89	-179.56
1.20	0.93	151.14	1.66	-14.56	0.003	15.90	0.89	-178.10
1.30	0.92	146.91	1.68	-21.03	0.004	16.27	0.90	-176.63
1.40	0.90	141.46	1.74	-28.04	0.004	17.77	0.90	-175.11
1.50	0.88	134.83	1.88	-36.04	0.005	9.64	0.90	-173.85
1.60	0.84	126.66	2.08	-45.15	0.006	6.41	0.90	-172.50
1.70	0.78	115.55	2.38	-56.16	0.008	-3.66	0.90	-171.44
1.80	0.68	99.80	2.77	-70.26	0.010	-13.33	0.90	-170.02
1.90	0.53	76.24	3.23	-87.81	0.012	-30.21	0.91	-168.69
2.00	0.34	34.60	3.66	-109.57	0.014	-51.13	0.91	-166.94
2.10	0.28	-40.39	3.85	-132.70	0.015	-74.01	0.91	-164.28
2.20	0.41	-94.96	3.80	-154.99	0.016	-96.87	0.90	-161.28
2.30	0.56	-122.24	3.63	-174.60	0.016	-117.52	0.87	-158.16
2.40	0.66	-138.97	3.53	-168.06	0.016	-134.45	0.83	-155.41
2.50	0.74	-150.32	3.53	-150.95	0.017	-150.86	0.77	-152.64
2.60	0.80	-158.91	3.61	-133.37	0.018	-168.39	0.69	-151.12
2.70	0.85	-166.51	3.75	-113.83	0.020	-171.71	0.60	-152.61
2.80	0.90	-174.64	3.83	-92.88	0.023	-151.37	0.52	-160.03
2.90	0.94	-176.00	3.89	-71.42	0.024	-131.37	0.51	-171.47
3.00	0.96	-164.28	3.96	-49.59	0.027	-109.76	0.55	-179.99
3.10	0.94	-147.44	4.15	-26.42	0.031	-88.65	0.61	-175.81
3.20	0.83	-118.81	4.65	-1.85	0.037	-61.43	0.66	-172.33
3.30	0.50	-51.64	4.83	-43.92	0.041	-19.24	0.78	-169.69
3.40	0.50	-73.37	3.38	-90.84	0.031	-28.86	0.92	-175.64
3.50	0.72	-122.31	1.97	-119.78	0.019	-61.04	0.94	-177.83
3.60	0.82	-142.37	1.21	-136.86	0.011	-83.11	0.94	-173.73
3.70	0.87	-153.98	0.81	-149.05	0.008	-106.81	0.95	-170.89
3.80	0.89	-161.88	0.58	-158.57	0.005	-124.16	0.95	-168.63
3.90	0.90	-167.39	0.44	-166.31	0.004	-152.15	0.94	-166.43
4.00	0.91	-171.99	0.36	-175.02	0.004	-173.95	0.94	-164.47
4.10	0.91	-175.99	0.31	-174.42	0.004	-166.28	0.95	-162.39
4.20	0.91	-178.97	0.28	-160.76	0.005	-150.52	0.95	-160.30
4.30	0.93	-178.15	0.27	-137.06	0.005	-134.51	0.94	-157.81
4.40	0.97	-172.74	0.23	-97.30	0.006	-113.73	0.94	-155.93
4.50	0.96	-162.89	0.15	-50.57	0.006	-93.53	0.94	-153.52



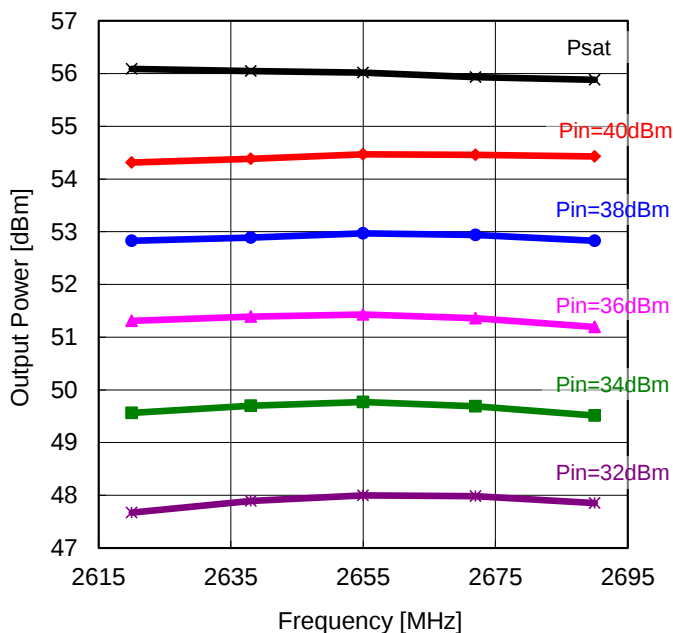
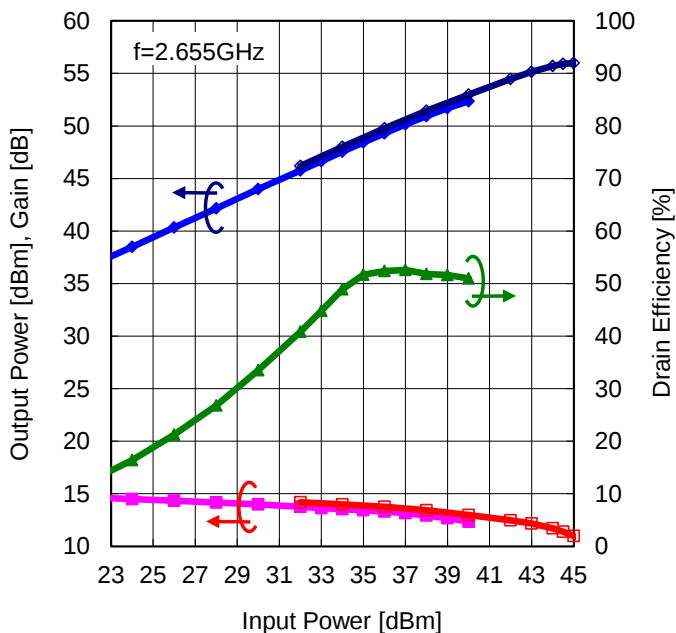


Test Fixture

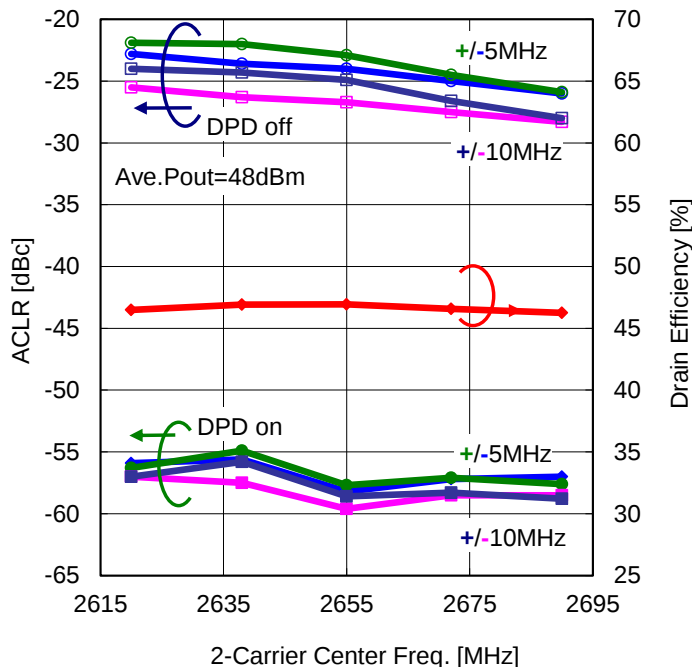
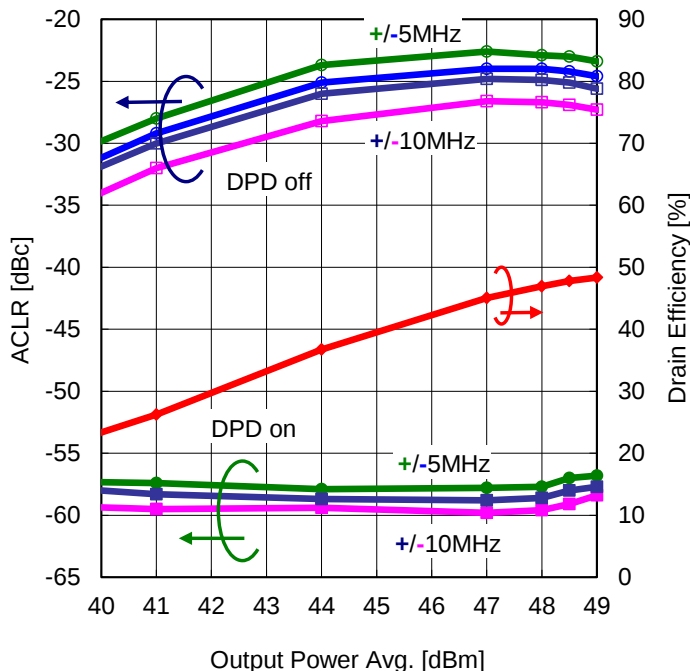


CS3376C, $t=0.8\text{mm}$, $\epsilon_r=3.3$

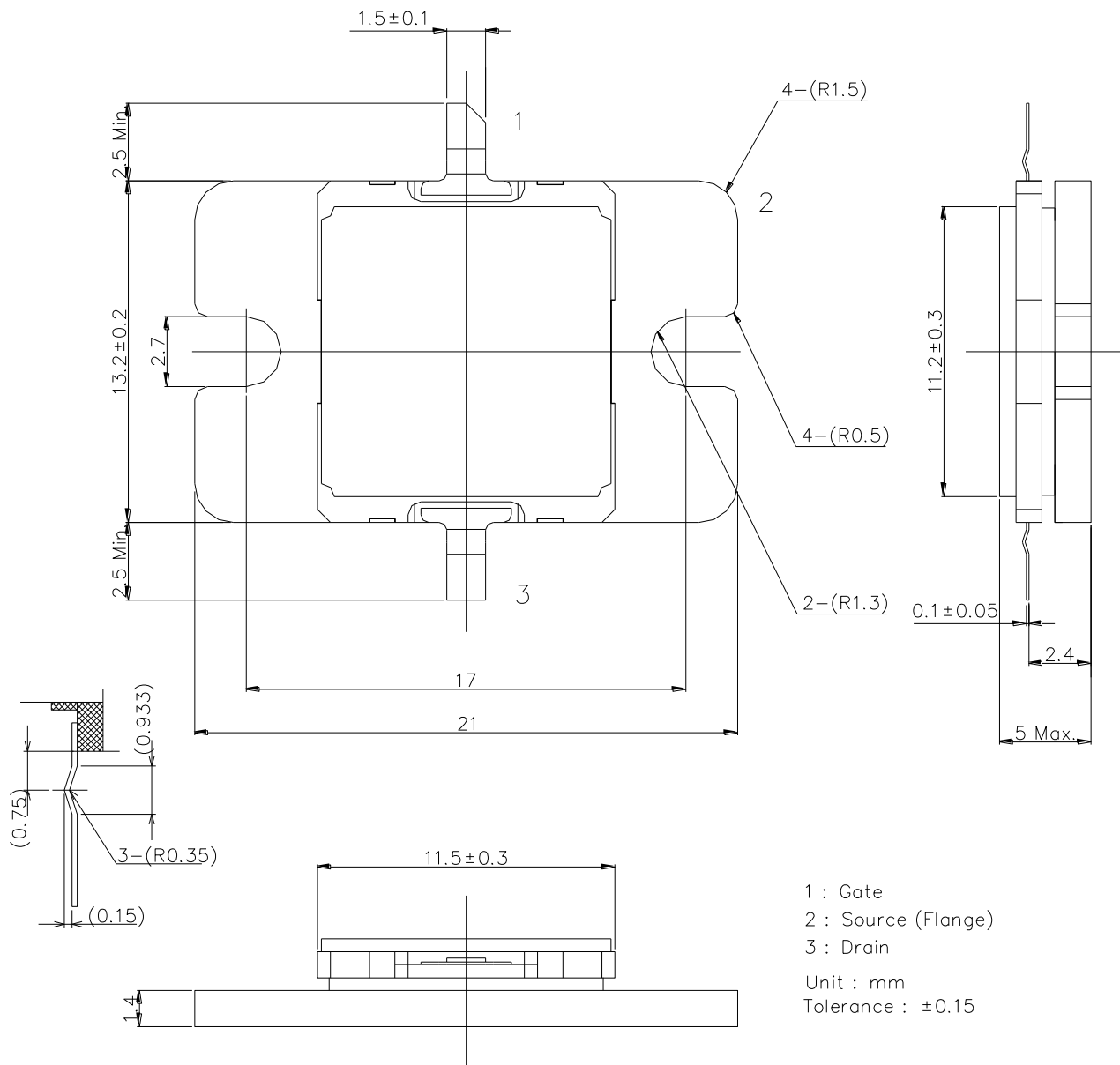
Test conditions : $V_{ds}=50V$, $I_{ds-main}=750mA$, $V_{gs-peak}=-4.05V$, Pulse Duty : 10% (6 μs /60 μs)



Test conditions : $V_{ds}=50V$, $I_{ds-main}=750mA$, $V_{gs-peak}=-4.05V$
W-CDMA 4-carrier, PAR=6.2dB(0.01%), $f_c=26555MHz$



I2D Package Outline Metal-Ceramic Hermetic Package





SGN27C210I2D

High Voltage - High Power GaN-HEMT

For further information please contact:

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