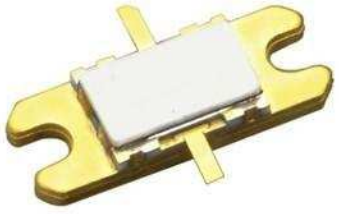
EGN16C105MK

High Voltage - High Power GaN-HEMT



FEATURES

- High Voltage Operation : V_{DS}=50V
- High Power : 50.5dBm (typ.) @ Psat
- High Efficiency: 65%(typ.) @ Psat
- Power Gain :19dB(typ.) @ f=1.6GHz
- 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 1.5GHz 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		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}		$\leq$ 55	V
Forward Gate Current	I_{GF}	R_G=5 ohm	$\leq$ 102	mA
Reverse Gate Current	I_{GR}	R_G=5 ohm	$\geq$ -3.9	mA
Channel Temperature	T_{ch}		$\leq$ 180	deg.C
Average Output Power	Pave.		$\leq$ 47.5	dBm

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

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	VDS=50V IDS=27.2mA	-1.0	-1.5	-2.0	V
Saturated Power	Psat *1	VDS=50V	49.5	50.5	-	dBm
Drain Efficiency	η_d *2	IDS(DC)=400mA	28	33	-	%
Power Gain	Gp *2	f=1.6GHz	18	19	-	dB
Thermal Resistance	R_{th}	Channel to Case at 52.5W P_{DC}	-	2.0	2.3	deg.C/W

*1 : 10%-duty RF pulse (DC supply constant)
*2 : Pout = 42.5dBm, CW modulation Signal (W-CDMA)

RoHS COMPLIANCE	Yes

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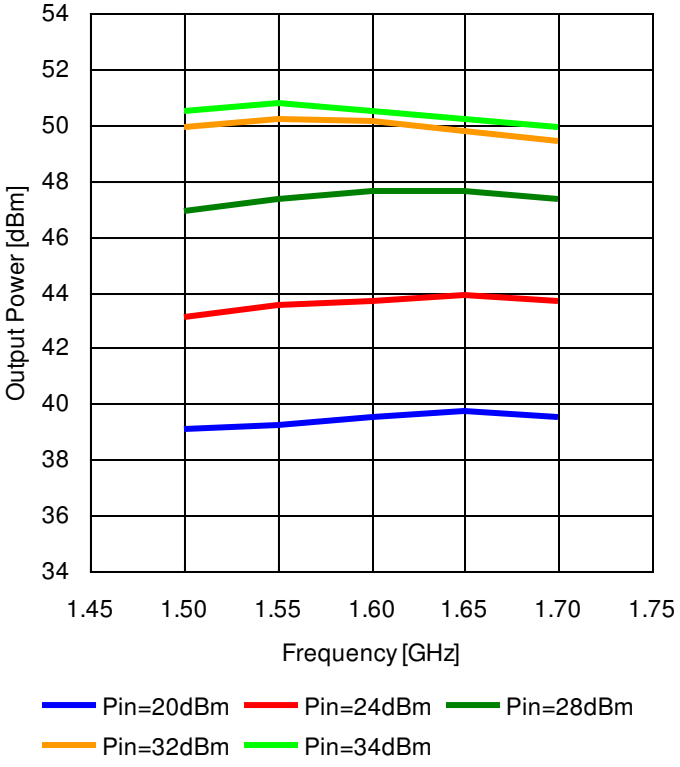
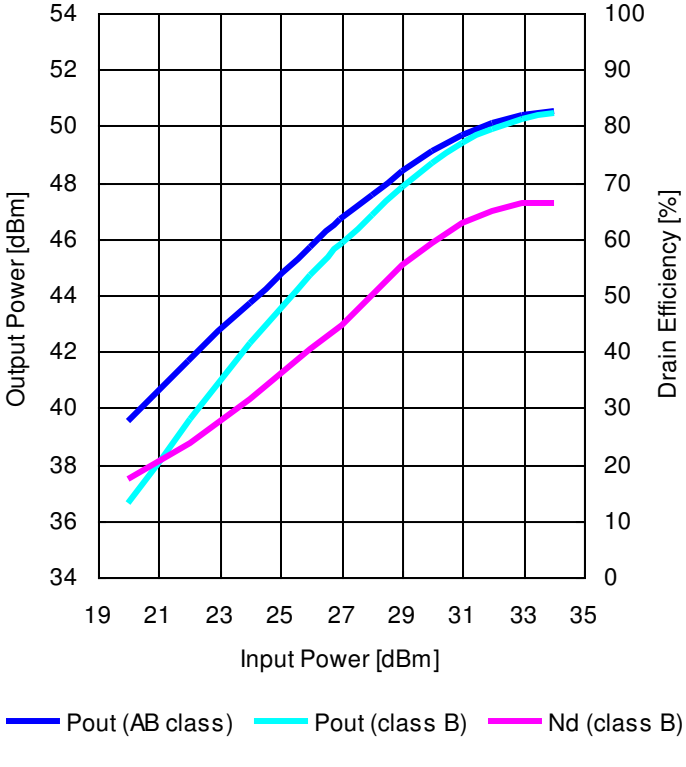
RF characteristics @f=1.6GHz fine tuned

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

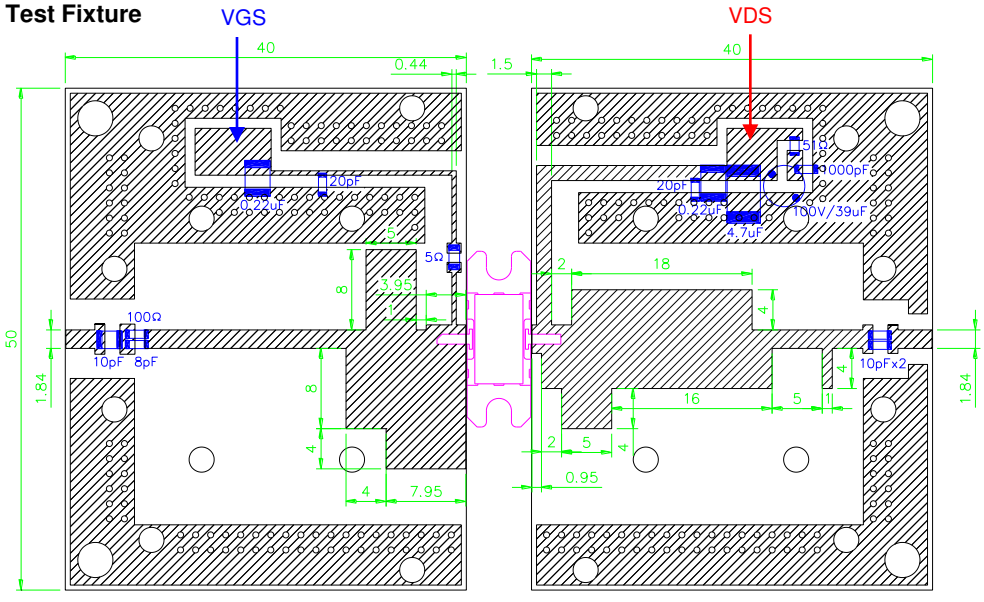


Output Power and Drain Efficiency vs. Input Power
VDS=50V, IDS(DC)=400mA, f=1.6GHz



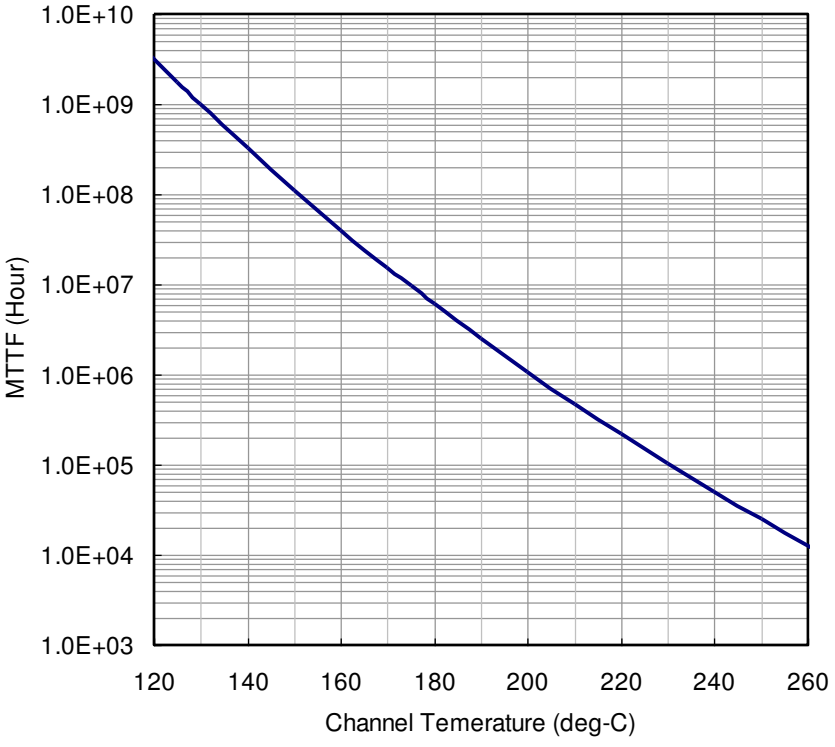
Pulse Signal (10%-duty, DC : constant)

Test Fixture



h=0.8mm εr=3.5
Cu=18um Unit: mm

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)

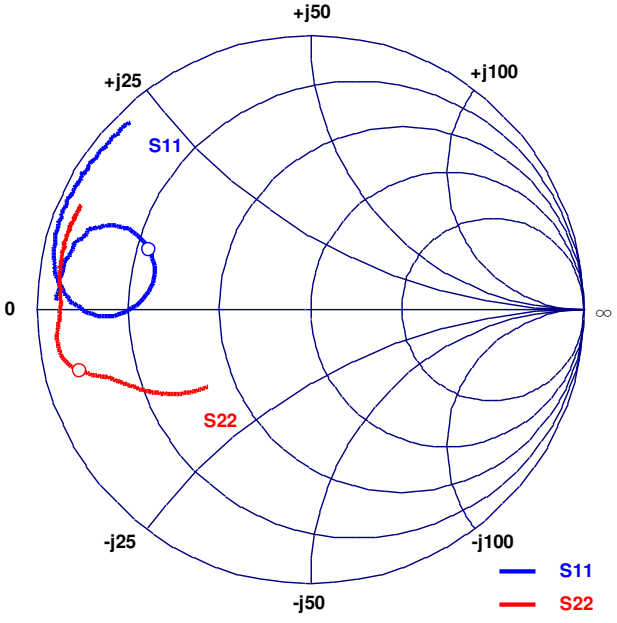
T_{use}: use temperature (K)

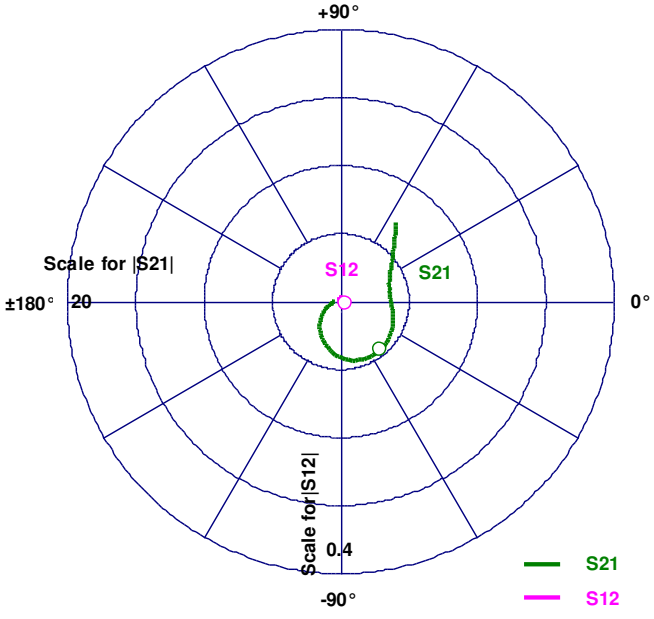
ESD characteristic

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

- Reference DATA -

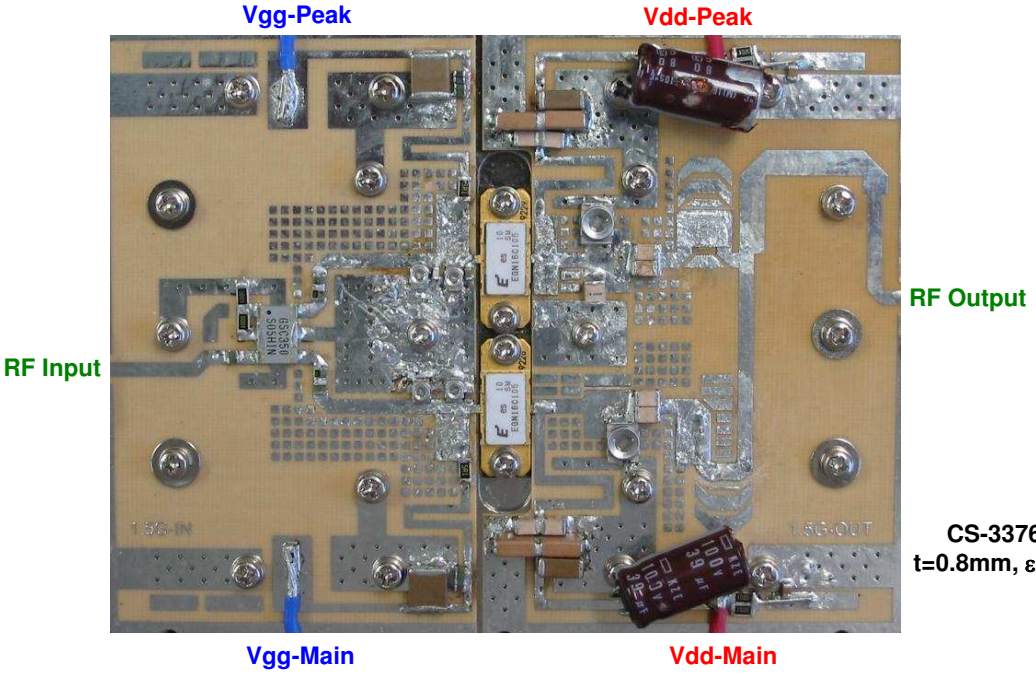
S-Parameters @VDS=50V, IDS(DC)=400mA, f=0.5 to4.5GHz
Zl = Zs = 50 ohm Marker : 1.6GHz



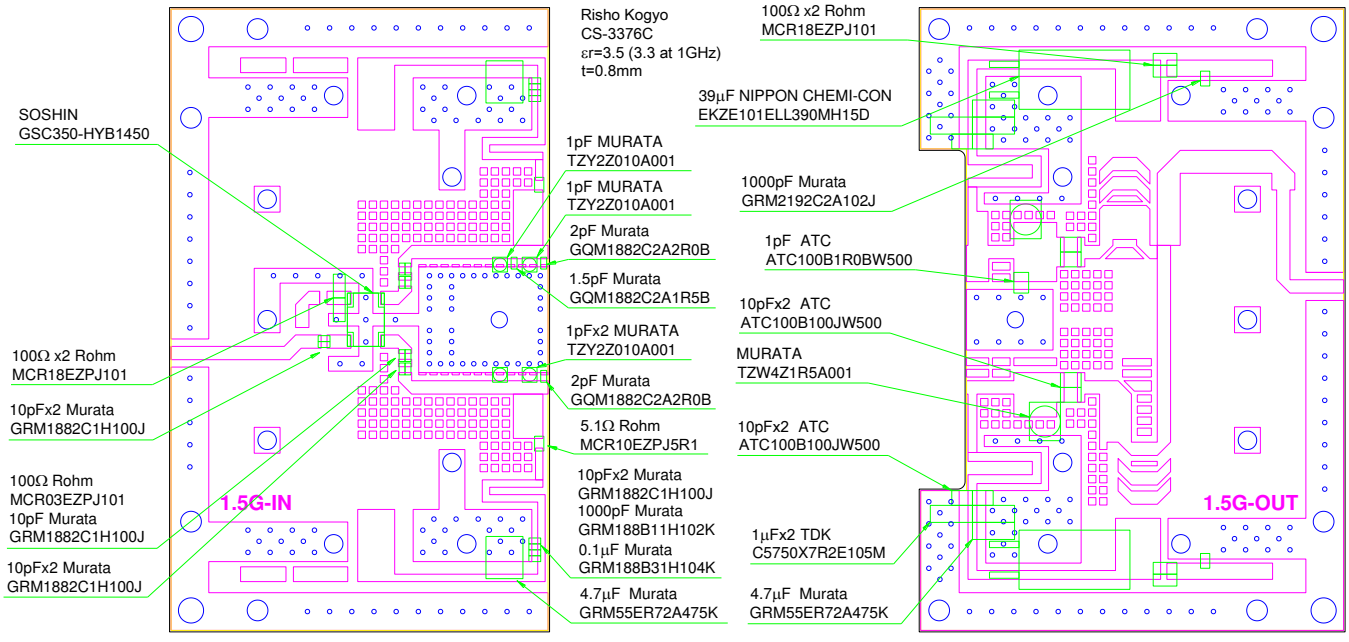


Freq.	S11		S21		S12		S22	
GHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.93	178.19	7.04	54.80	0.005	-4.93	0.47	-142.69
0.60	0.92	175.95	5.83	47.31	0.005	-3.55	0.52	-144.79
0.70	0.92	173.65	5.07	40.30	0.005	-0.79	0.57	-147.02
0.80	0.92	171.75	4.47	33.96	0.005	-0.42	0.61	-149.50
0.90	0.92	169.80	4.08	27.41	0.005	2.93	0.65	-152.03
1.00	0.90	167.74	3.85	20.49	0.005	5.77	0.68	-154.35
1.10	0.89	165.41	3.70	13.56	0.005	7.86	0.71	-156.43
1.20	0.88	163.26	3.66	5.80	0.005	12.46	0.74	-158.51
1.30	0.86	160.36	3.76	-3.05	0.006	9.03	0.76	-160.33
1.40	0.81	158.00	3.97	-14.11	0.006	6.85	0.79	-161.62
1.50	0.73	156.17	4.35	-29.41	0.007	-4.88	0.83	-162.82
1.60	0.62	159.87	4.63	-51.03	0.007	-24.98	0.87	-164.96
1.70	0.59	173.82	4.44	-78.55	0.006	-51.43	0.92	-168.44
1.80	0.72	-177.87	3.52	-105.63	0.004	-84.06	0.93	-172.87
1.90	0.83	-179.77	2.54	-125.84	0.002	-129.39	0.92	-175.94
2.00	0.90	176.85	1.81	-139.83	0.001	168.40	0.92	-177.82
2.10	0.93	173.61	1.33	-149.73	0.002	123.33	0.92	-179.69
2.20	0.94	170.97	1.00	-156.70	0.003	104.12	0.91	179.26
2.30	0.95	168.60	0.78	-162.75	0.003	94.17	0.91	178.02
2.40	0.96	166.62	0.62	-167.67	0.004	90.46	0.91	176.97
2.50	0.96	164.93	0.50	-171.51	0.005	86.35	0.91	175.86
2.60	0.97	163.29	0.41	-176.26	0.006	82.64	0.92	174.65
2.70	0.97	161.89	0.35	-179.53	0.006	83.49	0.92	173.62
2.80	0.97	160.32	0.29	176.53	0.007	77.21	0.92	172.53
2.90	0.97	159.31	0.25	173.78	0.007	79.98	0.92	171.64
3.00	0.97	157.89	0.22	170.39	0.007	79.64	0.93	170.81
3.10	0.97	156.86	0.19	167.79	0.008	78.29	0.92	169.55
3.20	0.97	155.17	0.17	164.01	0.008	78.99	0.92	168.78
3.30	0.97	154.01	0.15	160.67	0.009	77.11	0.93	167.82
3.40	0.97	152.37	0.13	159.19	0.009	77.58	0.93	166.82
3.50	0.97	151.07	0.12	155.47	0.010	79.52	0.93	165.85
3.60	0.97	149.56	0.11	151.47	0.011	78.79	0.93	164.81
3.70	0.96	148.09	0.10	148.14	0.011	77.35	0.93	163.96
3.80	0.96	146.57	0.09	144.90	0.013	78.64	0.93	163.02
3.90	0.96	145.08	0.09	141.08	0.014	78.82	0.93	161.94
4.00	0.96	143.21	0.08	136.84	0.016	76.52	0.93	160.93
4.10	0.95	141.90	0.08	132.38	0.017	73.28	0.93	160.23
4.20	0.96	139.47	0.07	132.09	0.019	72.83	0.92	159.16
4.30	0.95	138.10	0.07	121.79	0.020	67.30	0.92	158.11
4.40	0.95	135.75	0.07	116.37	0.021	63.70	0.92	156.67
4.50	0.95	133.94	0.06	113.07	0.023	60.77	0.92	155.78

Doherty Amplifier drawing



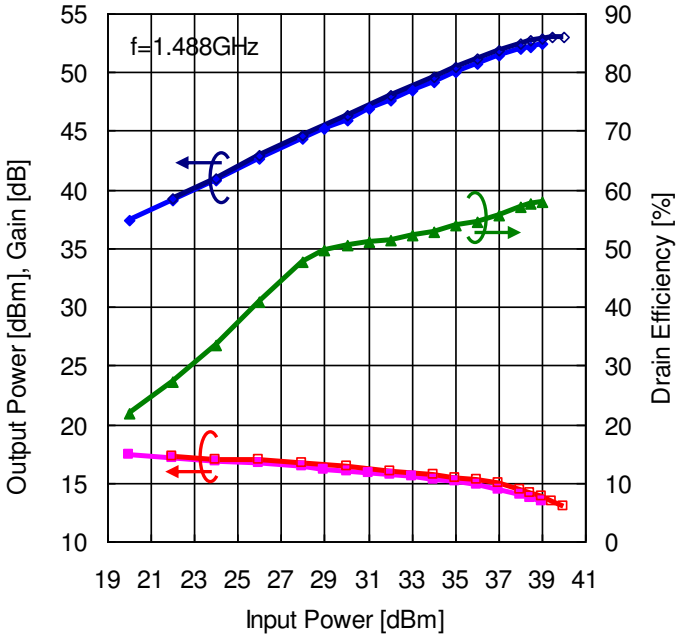
Test Fixture

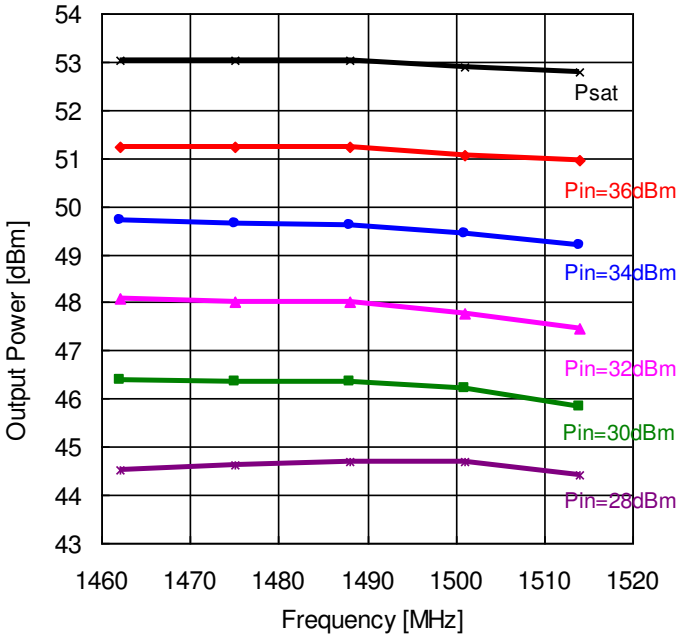


- Application DATA -

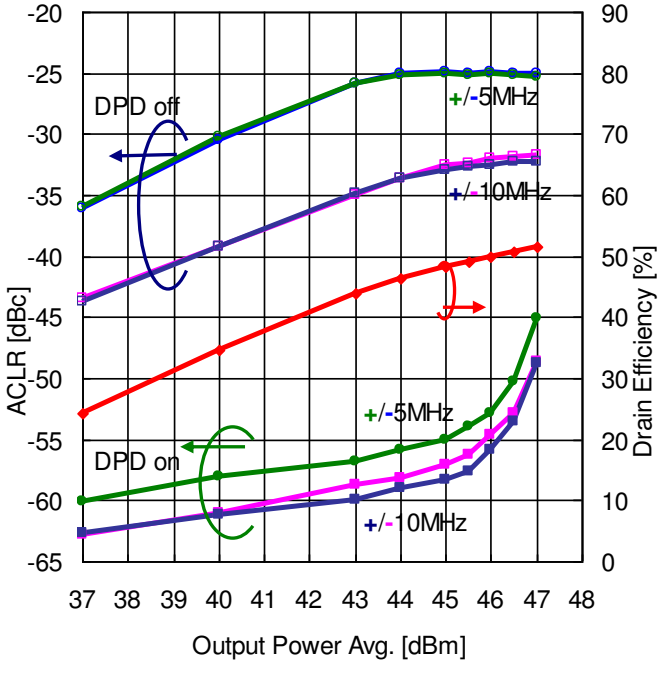
Doherty Amplifier characteristics

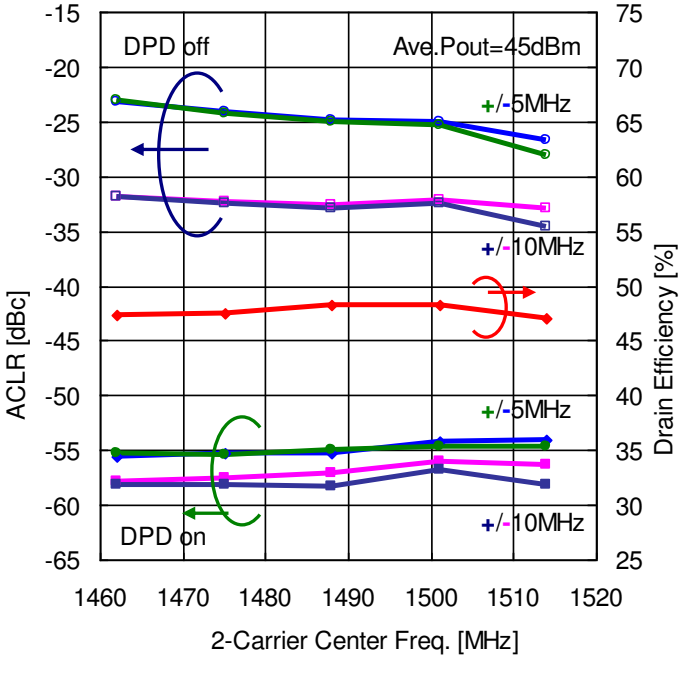
Test conditions : Vds=50V, Ids-main=400mA, Vgs-peak=-3.5V, Pulse Duty : 10% (12us/120us)



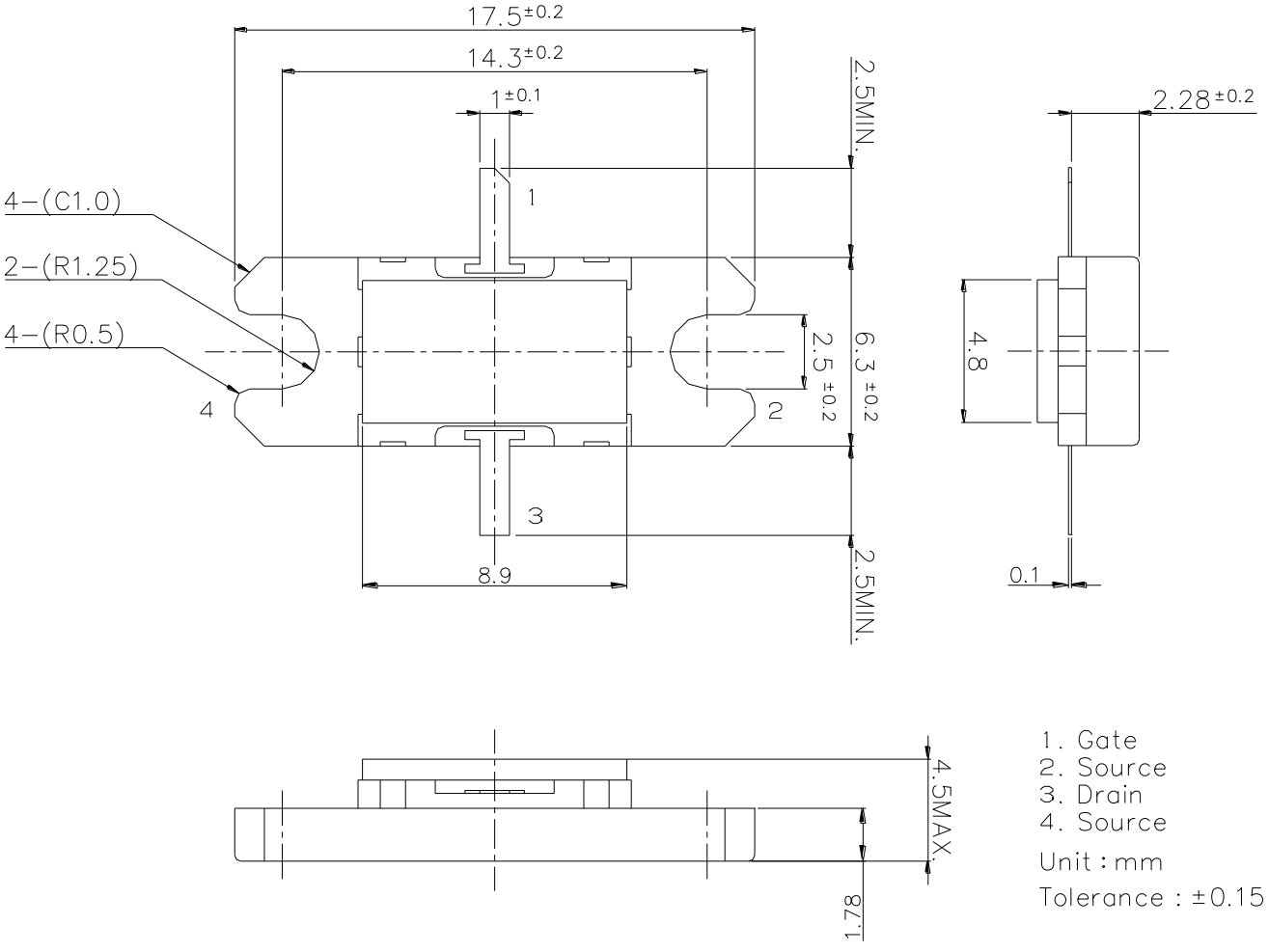


Test conditions : Vds=50V, Ids-main=400mA, Vgs-peak=-3. 5V
W-CDMA 2-carrier, 5MHz Spacing, PAR=7.8dB(0.01%), f1=1485.5MHz, f2=1490.5MHz





MK Package Outline
Metal-Ceramic Hermetic Package



For further information please contact:

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