



# GaN-HEMT 75W

# EGN26C070I2D

High Voltage - High Power GaN-HEMT

### FEATURES

- High Voltage Operation :  $V_{DS}=50V$
- High Power : 48.8dBm (typ.) @  $P_{sat}$
- High Efficiency: 70%(typ.) @  $P_{sat}$
- Power Gain : 18dB(typ.) @  $f=2.6GHz$
- 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 in 2.6GHz WiMAX design requirements as it offers high gain, long term reliability and ease of use.



### ABSOLUTE MAXIMUM RATINGS (Case Temperature $T_c=25^{\circ}C$ )

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	$P_t$		75	W
Storage Temperature	$T_{stg}$		-65 to +175	$^{\circ}C$
Channel Temperature	$T_{ch}$		250	$^{\circ}C$

### RECOMMENDED OPERATING CONDITION

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	$V_{DS}$		$\leq 50$	V
Forward Gate Current	$I_{GF}$	$R_G=5\Omega$	$\leq 76$	mA
Reverse Gate Current	$I_{GR}$	$R_G=5\Omega$	$\geq -2.6$	mA
Channel Temperature	$T_{ch}$		$\leq 180$	$^{\circ}C$
Average Output Power	$P_{ave.}$		$\leq 45.8$	dBm

### ELECTRICAL CHARACTERISTICS (Case Temperature $T_c=25^{\circ}C$ )

Item	Symbol	Condition	Limit			Unit
			min.	Typ.	Max.	
Pinch-Off Voltage	$V_p$	$V_{DS}=50V$ $I_{DS}=18mA$	-1.0	-1.5	-2.0	V
Saturated Power	$P_{sat} *1$	$V_{DS}=50V$	48.0	48.8	-	dBm
Drain Efficiency	$\eta_d *2$	$I_{DS}(DC)=300mA$	30	35	-	%
Power Gain	$G_p *2$	$f=2.60GHz$	17.0	18.0	-	dB
Thermal Resistance	$R_{th}$	Channel to Case at 48W $P_{DC}$	-	2.5	3.0	$^{\circ}C/W$

\*1 : 10%-duty RF pulse (DC supply constant)

\*2 :  $P_{out} = 40.8dBm$ , CW modulation Signal (W-CDMA or WiMAX)



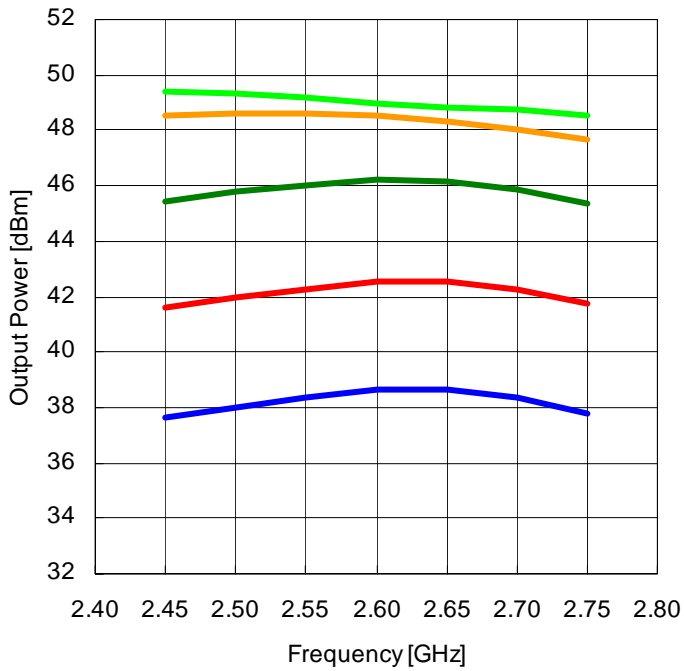
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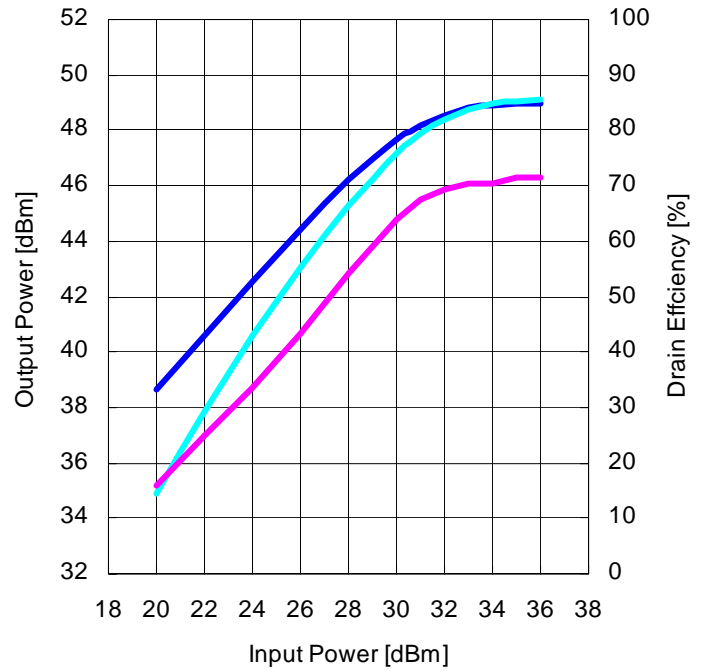
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RF characteristics @f=2.6GHz fine tuned

Output Power vs. Frequency  
V<sub>DS</sub>=50V I<sub>DS(DC)</sub>=300mA



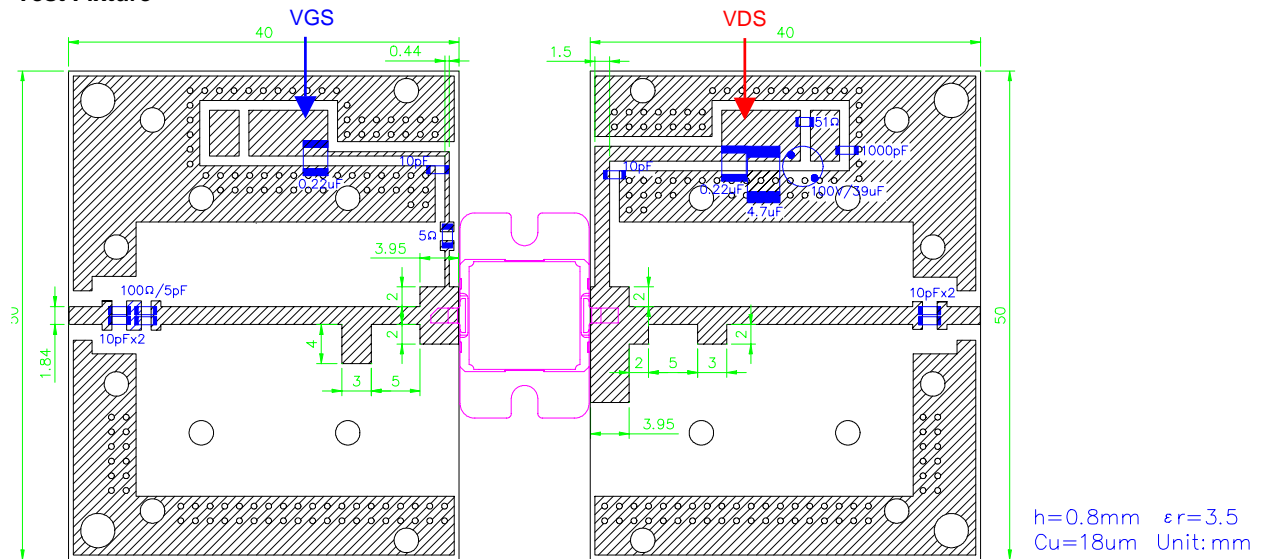
Output Power and Drain Efficiency vs. Input Power  
V<sub>DS</sub>=50V I<sub>DS(DC)</sub>=300mA f=2.6GHz



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



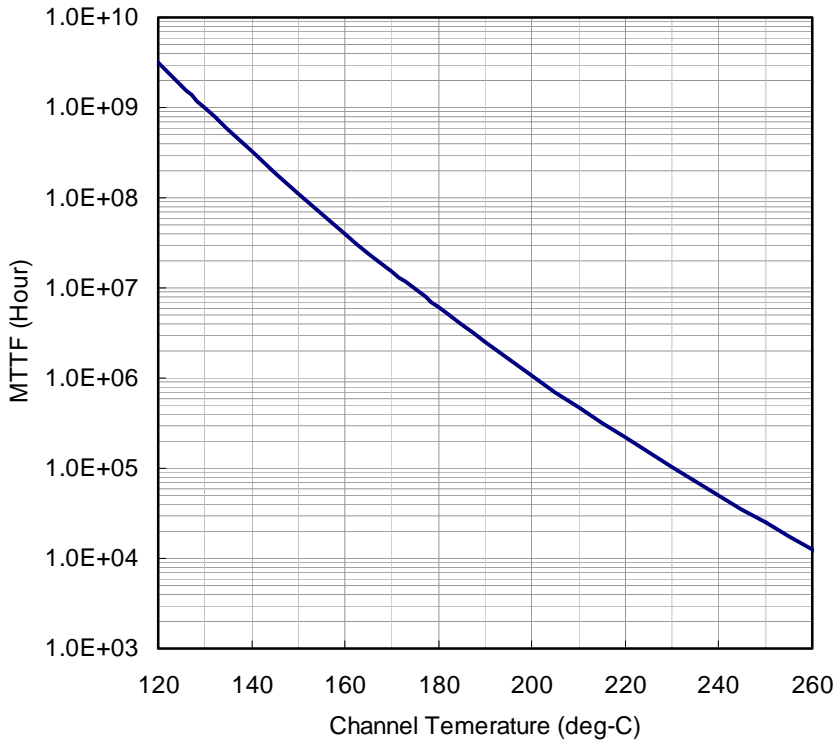


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MTTF Calculation  
- Estimated MTTF -



Ea=1.6eV  
Confidence Level=90%

Channel Temp (deg-C)	MTTF (Hours)
160	4.05 x 10 <sup>7</sup>
180	6.07 x 10 <sup>6</sup>
200	1.07 x 10 <sup>6</sup>

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

$$MTTF_{use} = MTTF_{stress} * AF$$

Where;

AF: acceleration factor

Ea: activation energy (1.6 eV)

k: Boltzman's constant (8.62 x 10<sup>-5</sup> eV/K)

T<sub>stress</sub>: stress temperature (K)

T<sub>use</sub>: use temperature (K)

### ESD characteristic

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



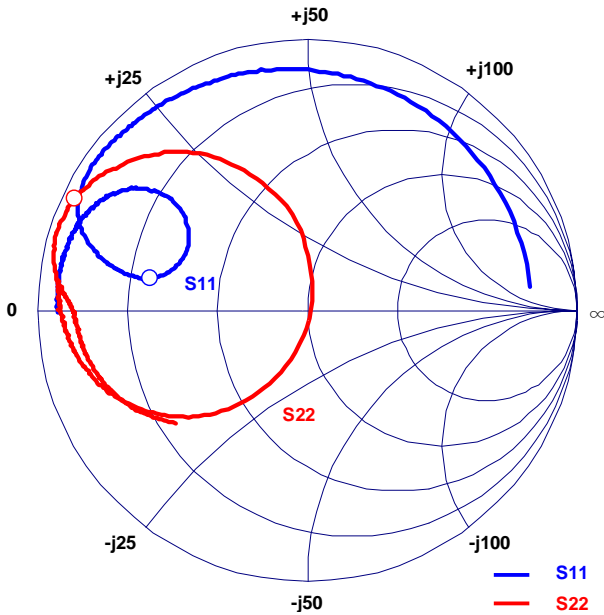
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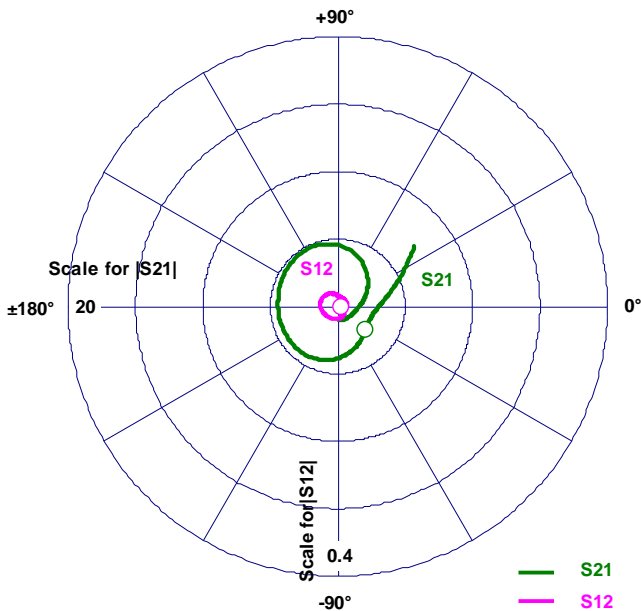
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- Reference DATA -

S-Parameters @V<sub>DS</sub>=50V, I<sub>DS(DC)</sub>=300mA, f=0.5 to 4.5 GHz  
Z<sub>I</sub> = Z<sub>s</sub> = 50 ohm      Marker : 2.6GHz



Freq. GHz	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
0.50	0.92	-179.38	7.27	38.59	0.005	-21.40	0.64	-139.61
0.60	0.93	177.50	5.78	29.90	0.004	-25.21	0.69	-145.37
0.70	0.93	175.00	4.78	22.21	0.004	-23.88	0.74	-150.32
0.80	0.93	172.67	4.06	15.44	0.004	-22.95	0.77	-154.74
0.90	0.93	170.46	3.56	9.10	0.003	-20.95	0.79	-158.51
1.00	0.93	167.90	3.18	2.67	0.003	-15.87	0.81	-161.91
1.10	0.92	165.65	2.91	-3.29	0.003	-15.06	0.82	-164.74
1.20	0.92	163.38	2.73	-9.04	0.003	-6.10	0.83	-167.52
1.30	0.91	160.65	2.62	-14.79	0.003	2.05	0.84	-170.08
1.40	0.90	158.57	2.57	-20.45	0.004	1.09	0.85	-172.06
1.50	0.89	155.88	2.56	-26.84	0.005	1.15	0.85	-174.01
1.60	0.88	153.15	2.62	-33.51	0.005	0.18	0.86	-175.85
1.70	0.86	150.62	2.72	-40.92	0.006	-2.89	0.86	-177.77
1.80	0.82	147.54	2.87	-49.37	0.007	-2.79	0.86	-179.35
1.90	0.78	144.67	3.10	-58.92	0.009	-10.48	0.87	179.12
2.00	0.72	142.18	3.38	-70.02	0.010	-17.99	0.89	177.89
2.10	0.65	140.90	3.68	-82.84	0.012	-29.34	0.91	176.09
2.20	0.57	142.67	3.98	-97.53	0.013	-42.71	0.93	173.85
2.30	0.51	149.15	4.21	-113.59	0.015	-56.28	0.95	170.55
2.40	0.50	158.05	4.35	-130.07	0.016	-72.67	0.97	166.25
2.50	0.54	165.22	4.39	-146.41	0.018	-88.20	0.97	161.07
2.60	0.59	168.66	4.41	-162.28	0.019	-104.90	0.96	154.57
2.70	0.65	168.97	4.43	-178.17	0.020	-119.25	0.92	147.43
2.80	0.71	168.19	4.51	-166.04	0.021	-135.88	0.85	138.84
2.90	0.76	166.92	4.67	148.97	0.023	-153.30	0.73	127.32
3.00	0.82	164.65	4.79	128.76	0.025	-173.84	0.54	113.08
3.10	0.88	161.29	4.74	105.81	0.026	163.66	0.26	93.37
3.20	0.93	156.53	4.37	81.44	0.026	141.73	0.06	-93.08
3.30	0.96	150.12	3.68	59.15	0.022	120.70	0.35	-120.99
3.40	0.96	144.39	2.97	40.92	0.020	103.89	0.56	-135.95
3.50	0.95	138.78	2.40	26.63	0.017	91.93	0.69	-146.76
3.60	0.94	133.18	1.98	14.73	0.015	83.65	0.77	-154.74
3.70	0.94	127.30	1.68	4.55	0.015	77.27	0.82	-160.84
3.80	0.93	120.42	1.48	-4.96	0.014	71.79	0.85	-165.88
3.90	0.92	112.32	1.32	-14.08	0.013	64.06	0.87	-170.19
4.00	0.90	103.04	1.22	-22.60	0.013	56.19	0.89	-173.54
4.10	0.89	91.30	1.16	-32.34	0.014	47.09	0.91	-176.48
4.20	0.87	76.21	1.11	-43.21	0.013	38.73	0.92	-179.22
4.30	0.85	57.16	1.10	-55.40	0.014	26.65	0.92	178.45
4.40	0.84	33.80	1.05	-69.39	0.013	10.73	0.93	175.78
4.50	0.83	6.07	1.00	-85.26	0.013	-0.35	0.93	173.43



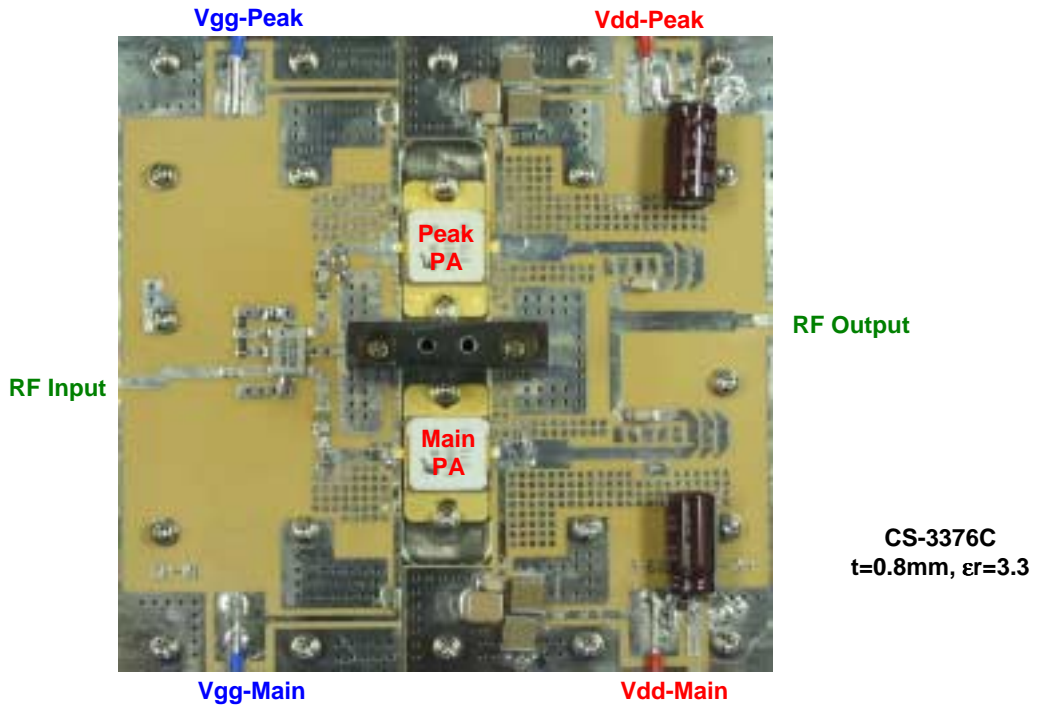


**- Application DATA -**

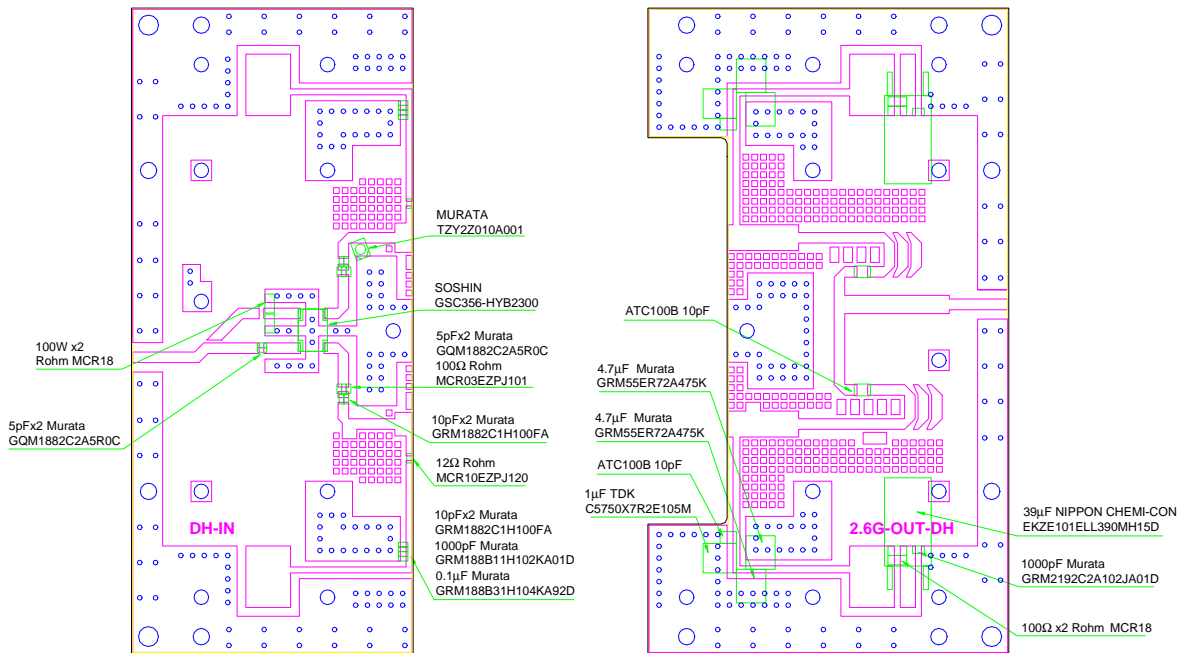
Doherty Amplifier drawing

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**Test Fixture**



CS3376C, t=0.8mm, Er=3.5



SUMITOMO ELECTRIC DEVICE INNOVATIONS



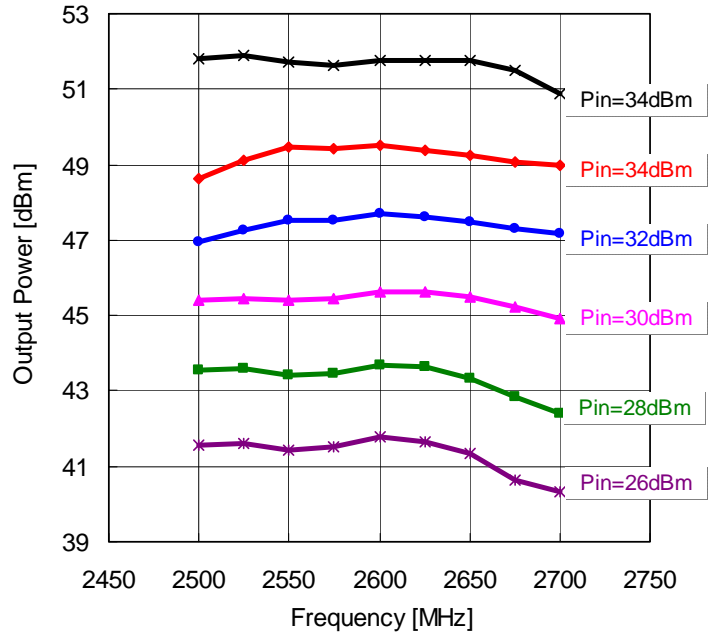
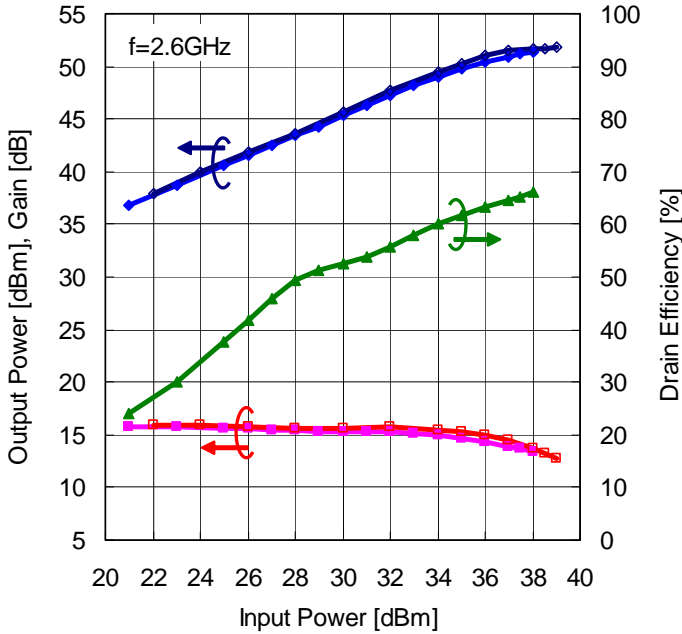
# - Application DATA -

Doherty Amplifier characteristics

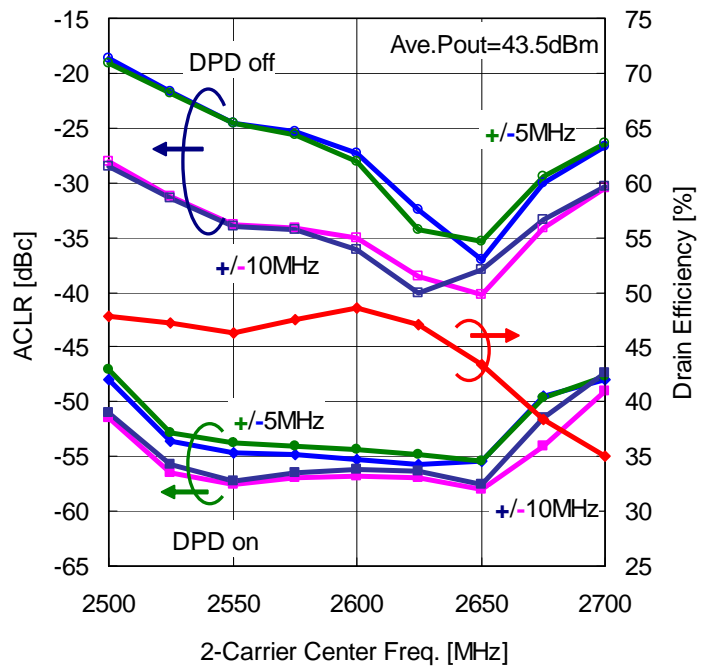
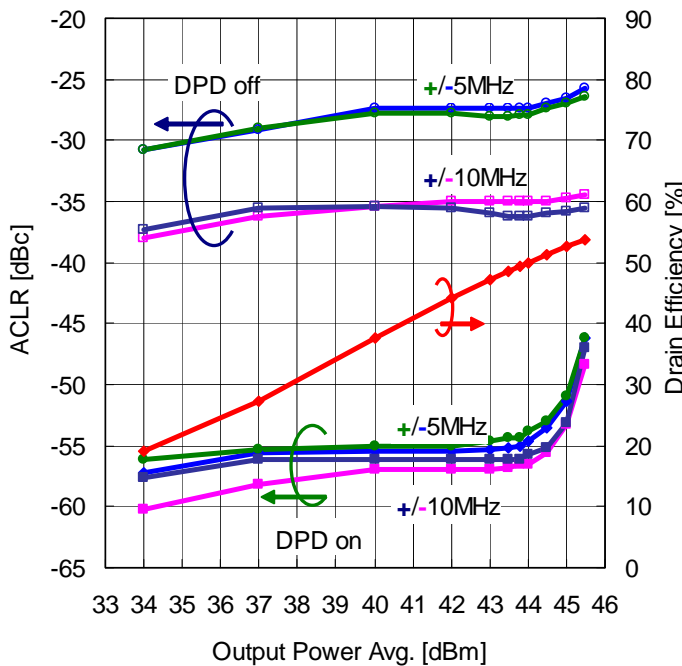
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Test conditions :  $V_{ds}=50V$ ,  $I_{ds-main}=200mA$ ,  $V_{gs-peak}=-3.5V$ , Pulse Duty : 10% (6 $\mu s$ /60 $\mu s$ )



Test conditions :  $V_{ds}=50V$ ,  $I_{ds-main}=200mA$ ,  $V_{gs-peak}=-3.5V$   
W-CDMA 2-carrier, 5MHz Spacing, PAR=7.8dB(0.01%),  $f_1=2587.5MHz$ ,  $f_2=2602.5MHz$





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## I2D Package Outline Metal-Ceramic Hermetic Package

