Eudyna GaN-HEMT 90W

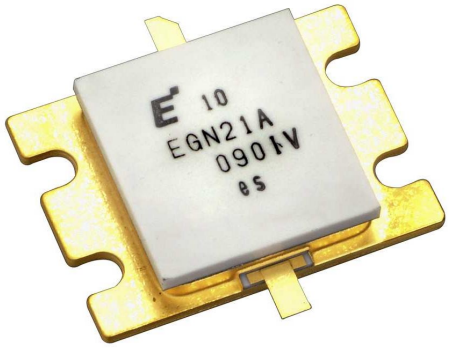
EGN21A090IV

Preliminary

High Voltage - High Power GaN-HEMT

FEATURES

- High Voltage Operation : V_{DS}=50V
- High Gain: 15dB(typ.) at P_{out}=42dBm(Avg.)
- High Efficiency: 35%(typ.) at P_{out}=42dBm(Avg.)
- Broad Frequency Range : 2100 to 2200MHz
- Proven Reliability



DESCRIPTION

The EGN21A090IV is a 90 Watt GaN-HEMT that offers high efficiency, high gain, ease of matching, greater consistency and broad bandwidth for high power L-band amplifiers with 50V operation. This device is targeted for high voltage, low current operation in digitally modulated base station applications - ideally suited for W-CDMA base station amplifiers and other HPA designs while offering ease of use.

ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating	Unit
Drain-Source Voltage	V_{DS}		120	V
Gate-Source Voltage	V_{GS}	T_c=25°C	-5	V
Total Power Dissipation	P_t		160	W
Storage Temperature	T_{stg}		-65 to +175	°C
Channel Temperature	T_{ch}		250	°C

RECOMMENDED OPERATING CONDITION(Case Temperature Tc= 25°C)

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	V_{DS}		50	V
Forward Gate Current	I_{GF}	R_G=5 Ω	<19.4	mA
Reverse Gate Current	I_{GR}	R_G=5 Ω	>-7.2	mA
Channel Temperature	T_{ch}		200	°C

ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25°C)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	V_p	V_{DS}=50V I_{DS}=36mA	-1.0	-2.0	-3.5	V
Gate-Drain Breakdown Voltage	V_{GDO}	I_{GS}= -18 mA	-	-350	-	V
3rd Order Inter modulation Distortion	IM_3	V_{DS}=50V	-	-32	-	dBc
Power Gain	G_p	$I_{DS(DC)}$=500mA	14.0	15.0	-	dB
Drain Efficiency	η_d	P_{out}=42dBm(Avg.) Note 1	-	35	-	%
Thermal Resistance	R_{th}	Channel to Case	-	1.2	1.4	°C/W

Note 1 : IM3 and Gain test condition as follows:
IM3 & Gain : fo=2.135GHz, f1=2.145GHz W-CDMA(3GPP3.4 12-00) BS-1 64ch 67% clipping modulation(Peak/Avg. = 8.5dB@0.01% Probability(CCDF)) measured over 3.84MHz at fo-10MHz and fl+10MHz.

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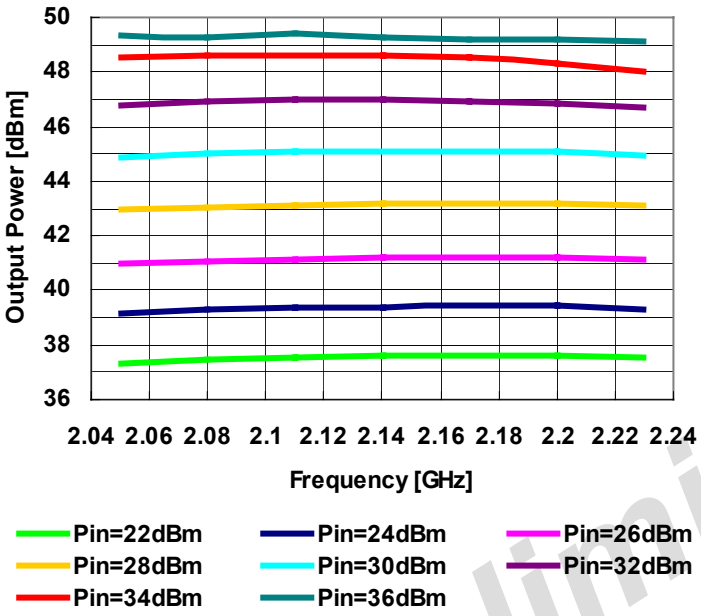
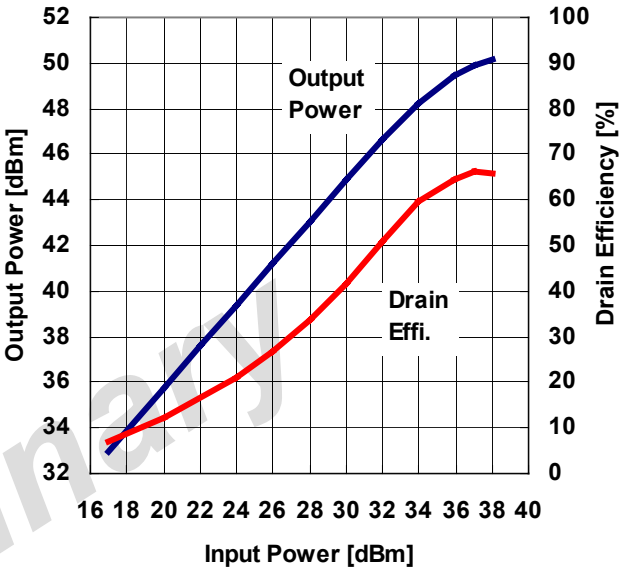
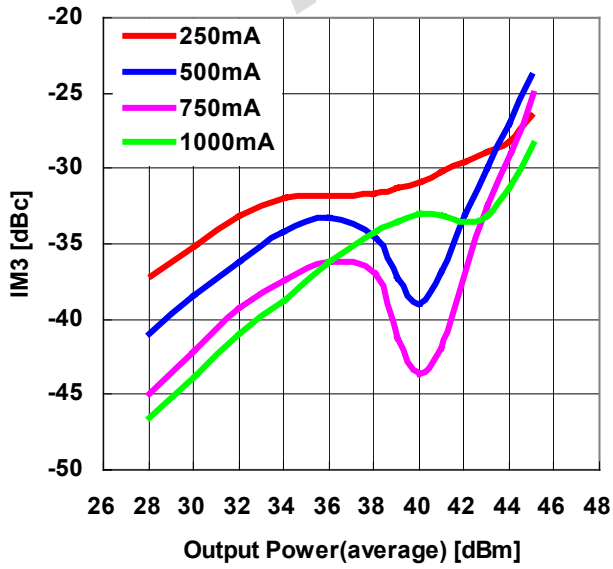
Output Power vs. Frequency
V_{DS}=50V, I_{DS}=500mA



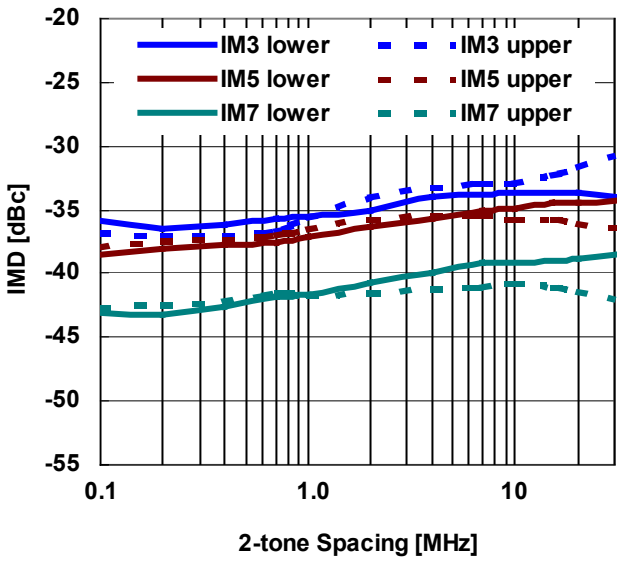
Output Power and Drain Efficiency vs. Input Power
V_{DS}=50V, I_{DS}=500mA, f=2.14GHz



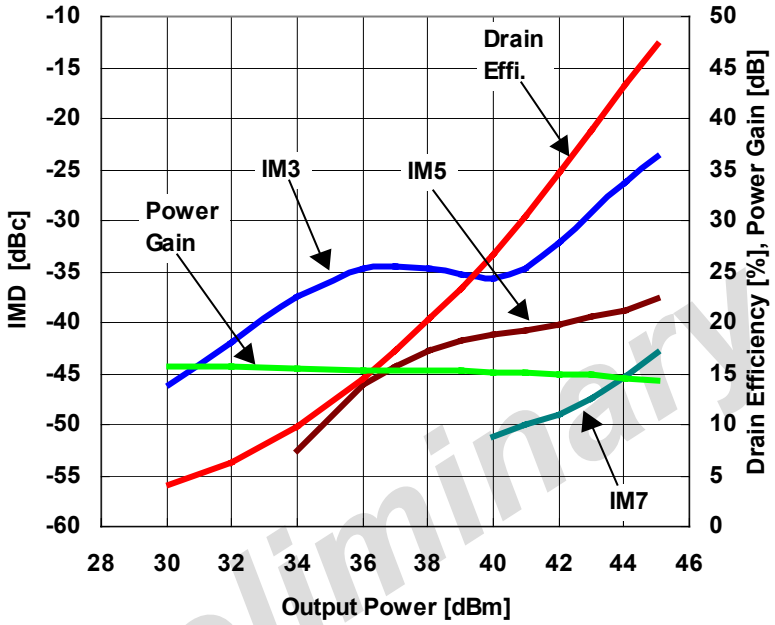
2-tone IMD vs. Output Power
V_{DS}=50V, f_1=2.135GHz, f_2=2.145GHz, 10MHz Spacing



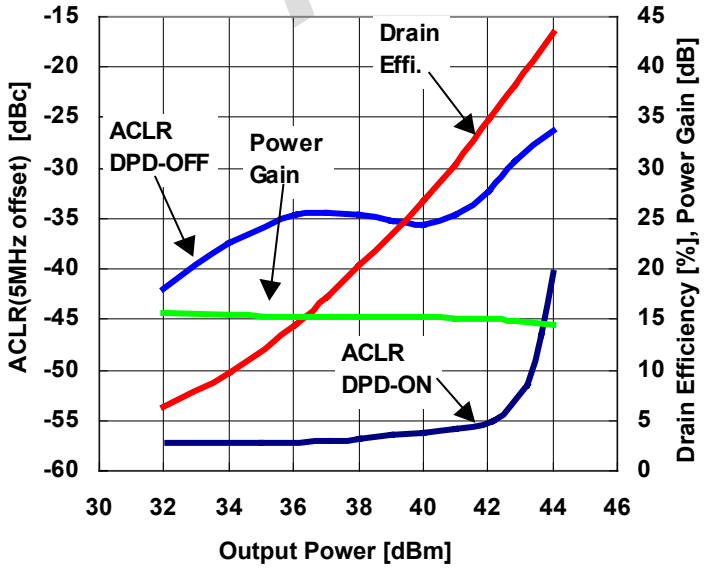
2-tone IMD vs. Tone Spacing, V_{DS}=50V, I_{DS}=500mA
P_{out}=42dBm(average) Center Frequency=2.14GHz



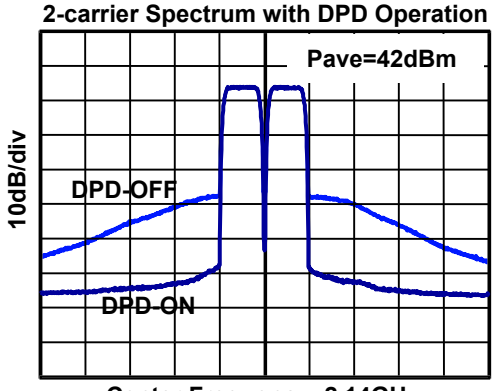
2-Carrier IMD, Drain Efficiency and Power Gain vs. Output Power
V_{DS}=50V, I_{DS}=500mA, f_1=2.135GHz, f_2=2.145GHz(10MHz Spacing)
Peak/Avg. = 8.5dB@0.01% Probability(CCDF)



2-Carrier ACLR, Drain Efficiency and Power Gain vs. Output Power with DPD Operation (note
V_{DS}=50V, I_{DS}=500mA
f_1=2.1375GHz, f_2=2.1425GHz(5MHz Spacing)
Peak/Avg. = 6.5dB@0.01% Probability(CCDF);
Single Carrier Signal
Note) Digital Predistortion evaluation test system:
PMC-Sierra PALADIN-15 DPD chip-set



2-carrier Spectrum with DPD Operation



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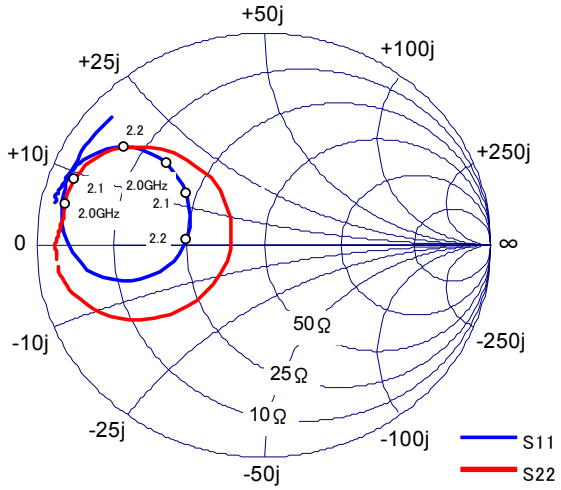
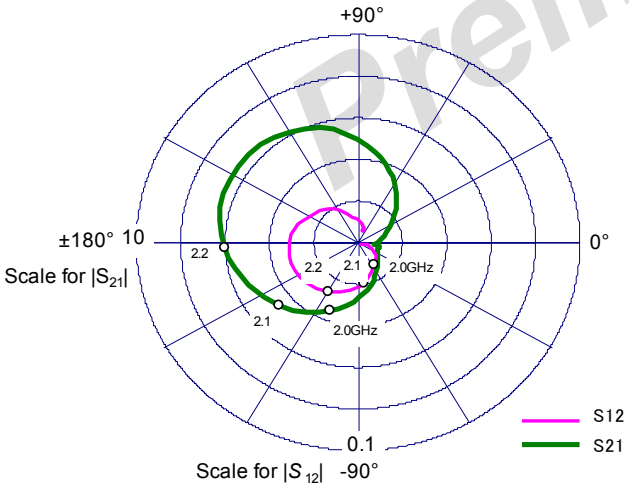
S-Parameters @V_{DS}=50V, I_{DS}=500mA, f=1 to 3 GHz,
$Z_l = Z_s$ = 50 ohm





Freq	S11		S21		S12		S22	
[GHz]	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.00	0.939	167.7	0.960	-10.5	0.002	-36.3	0.910	-175.8
1.10	0.944	165.7	0.927	-15.6	0.002	-30.4	0.915	-177.3
1.20	0.938	163.8	0.927	-20.8	0.001	-27.5	0.915	-178.8
1.30	0.932	161.9	0.966	-26.4	0.002	-18.0	0.915	179.9
1.40	0.921	159.4	1.034	-32.6	0.002	-15.1	0.911	178.3
1.50	0.905	156.3	1.149	-39.6	0.003	-12.9	0.907	177.2
1.60	0.888	152.8	1.333	-48.4	0.003	-11.3	0.900	175.7
1.70	0.853	149.1	1.614	-58.9	0.004	-12.9	0.898	174.2
1.80	0.800	145.1	2.025	-72.0	0.006	-22.3	0.892	172.7
1.90	0.707	140.5	2.649	-89.3	0.009	-35.9	0.889	171.0
2.00	0.573	138.0	3.506	-111.5	0.013	-55.8	0.895	167.8
2.10	0.415	144.1	4.661	-140.3	0.020	-82.5	0.887	159.6
2.11	0.400	145.8	4.792	-143.4	0.020	-85.4	0.881	158.4
2.12	0.386	147.9	4.921	-146.8	0.021	-88.5	0.877	157.2
2.13	0.373	150.2	5.043	-150.2	0.022	-92.1	0.871	155.7
2.14	0.361	153.1	5.178	-153.7	0.022	-95.9	0.863	154.3
2.15	0.353	156.1	5.327	-157.4	0.023	-98.7	0.854	152.7
2.16	0.343	159.3	5.452	-160.9	0.024	-102.9	0.844	151.0
2.17	0.339	163.0	5.598	-164.8	0.025	-106.1	0.830	149.3
2.18	0.335	167.3	5.741	-168.9	0.026	-110.2	0.810	147.2
2.19	0.337	171.6	5.888	-173.0	0.026	-114.2	0.792	145.2
2.20	0.341	176.1	6.022	-177.4	0.027	-118.8	0.769	143.2
2.30	0.604	-163.9	6.500	132.8	0.032	-167.5	0.321	126.1
2.40	0.843	-177.7	4.706	85.1	0.025	147.6	0.345	-138.6
2.50	0.901	170.6	2.943	54.4	0.017	118.4	0.646	-146.8
2.60	0.915	163.1	1.950	35.3	0.013	100.5	0.781	-155.9
2.70	0.912	156.9	1.399	21.7	0.010	84.4	0.848	-162.4
2.80	0.916	150.7	1.068	10.2	0.008	74.9	0.884	-167.2
2.90	0.907	144.2	0.852	0.4	0.007	70.5	0.903	-170.3
3.00	0.901	138.0	0.717	-8.2	0.006	72.0	0.910	-173.4