

# FLL21E135IX

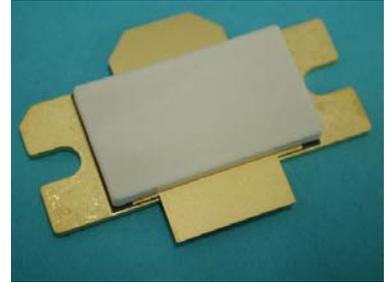
## L,S-band High Power GaAs FET

### FEATURES

- High Voltage Operation (VDS=28V) GaAs FET
- High Gain: 15.5dB(typ.) at Pout=44.8dBm(Avg.)
- Broad Frequency Range : 2110 to 2170MHz
- High Reliability

### DESCRIPTION

The FLL21E135IX is a high power GaAs FET that offers high efficiency, ease of matching, greater consistency and broad bandwidth for high power L-band amplifiers. This device is target for high voltage, low current operation in digitally modulated base station amplifiers. This product is ideally suited for W-CDMA and Multi-carrier PCS base station amplifiers while offering high gain, long term reliability and ease of use.



### ABSOLUTE MAXIMUM RATING

Item	Symbol	Condition	Rating	Unit
Drain-Source Voltage	$V_{DS}$	Tc=25°C (Case Temperature)	32	V
Gate-Source Voltage	$V_{GS}$		-3	V
Total Power Dissipation	$P_T$		175	W
Storage Temperature	$T_{stg}$	-	65 to +175	°C
Channel Temperature	$T_{ch}$	-	200	°C

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

Item	Symbol	Condition	Limit	Unit
DC Input Voltage	$V_{DS}$		<28	V
Forward Gate Current	$I_{GF}$	$R_G=2\Omega$	<529	mA
Reverse Gate Current	$I_{GR}$	$R_G=2\Omega$	>-48	mA
Channel Temperature	$T_{ch}$		155	°C

### ELECTRICAL CHARACTERISTICS (Case Temperature Tc=25°C)

Item	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Pinch-Off Voltage	$V_P$	$V_{DS}=5V, I_{DS}=226mA$	-0.1	-0.2	-0.5	V
Gate-Source Breakdown Boltage	$V_{GSO}$	$I_{GS}=-2.26mA$	-5	-	-	V
3rd Order Intermodulation Distortion	$IM_3$	$V_{DS}=28V$	-	-33	-30	dBc
Power Gain	$G_P$	$I_{DS}(DC)=1000mA$	14.5	15.5	-	dB
Drain Efficiency	$\eta_D$	$P_{out}=44.8dBm(Avg.)$	-	26	-	%
Adjacent Channel Leakage Power Ratio	ACLR	Note 1	-	-35	-	dBc
Thermal Resistance	$R_{th}$	Channel to Case	-	0.8	1.0	°C/W

Note 1 :  $IM_3$ , ACLR and Gain test conditions as follows

$IM_3$  & Gain :  $f_0=2.1325GHz, f_1=2.1475GHz$  W-CDMA(3GPP3.4 12-0) BS-1 64ch non clipping modulation measured over 3.84MHz at  $f_0-15MHz$  and  $f_1+15MHz$ .

ACLR :  $f_0=2.1325GHz$  W-CDMA (3GPP3.4 12-0) BS-1 64ch non clipping modulation, measured over 3.84MHz at  $f_0+/-5MHz$

ESD	CLASS III	2000V ~
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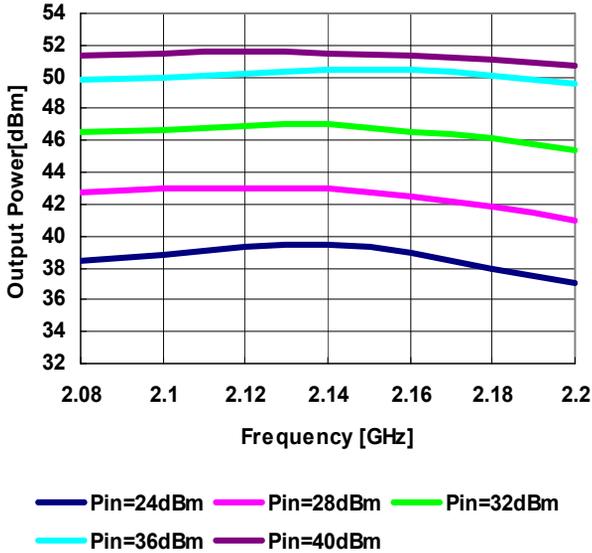
Note : Based on EIAJ ED-4701 C-111A(C=100pF, R=1.5kΩ)

### CASE STYLE : IX

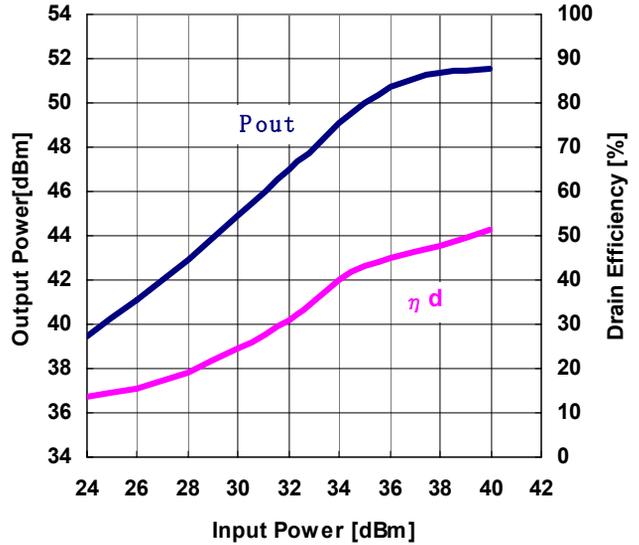
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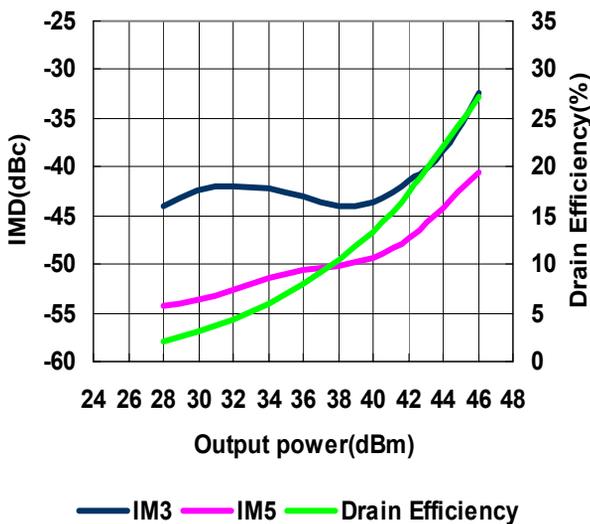
Output Power vs. Frequency  
VDS=28V, IDS=1000mA



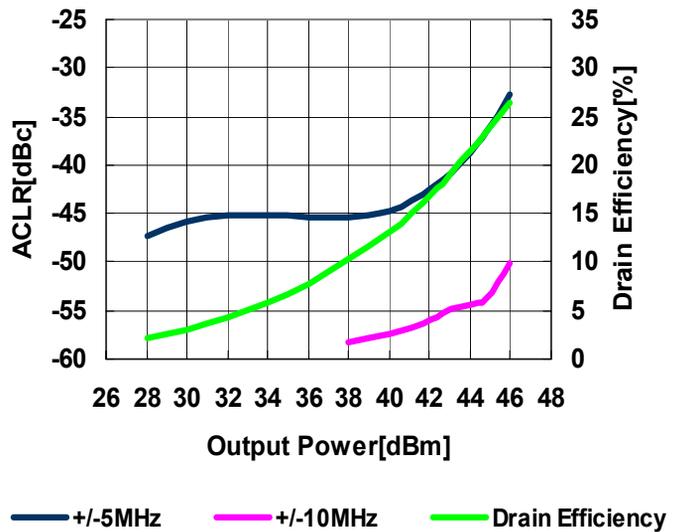
Output Power & Drain Efficiency vs. Input Power  
VDS=28V, IDS=1000mA, f=2.14GHz



Two-Carrier IMD(ACLR) vs. Output Power  
VDS=28V, IDS=1000mA, fo=2.1325, f1=2.1475GHz  
W-CDMA 3-GPP BS-1 64ch Modulation



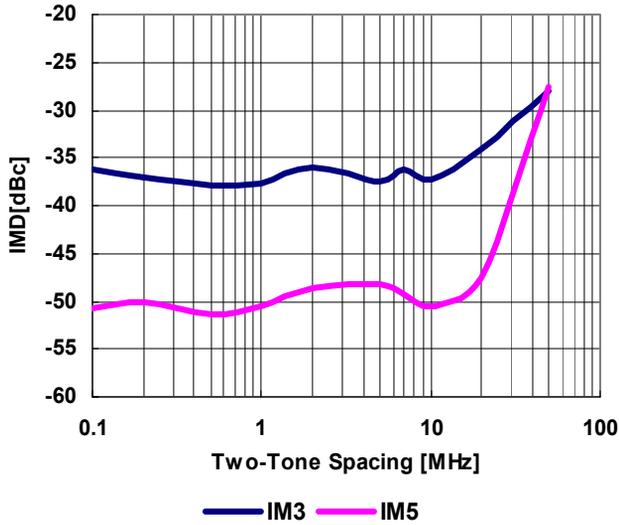
Single-Carrier ACLR vs. Output Power  
VDS=28V, IDS=1000mA, fo=2.1325GHz  
W-CDMA 3GPP BS-1 64ch Modulation



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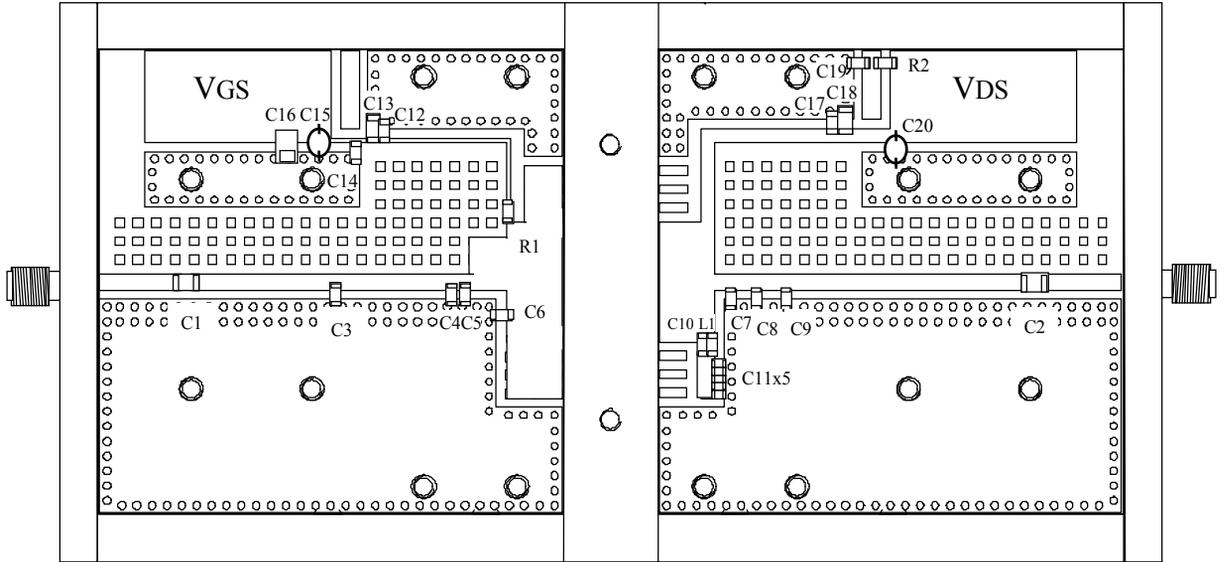
CW IMD vs. Tone Spacing  
@VDS=28V, IDS=1000mA, fc=2.14GHz  
Pout=44.8dBm



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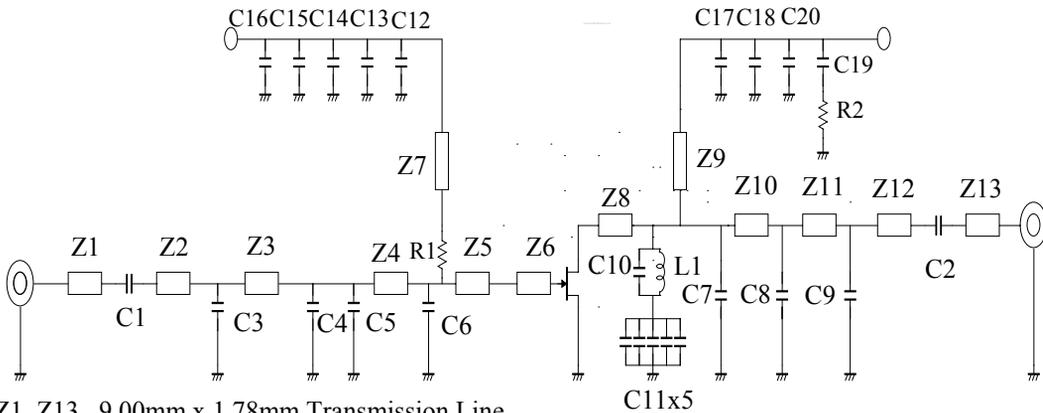
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### Board Layout



### Circuit Diagram of the Board

$\epsilon_r=3.5$   $t=0.8\text{mm}$



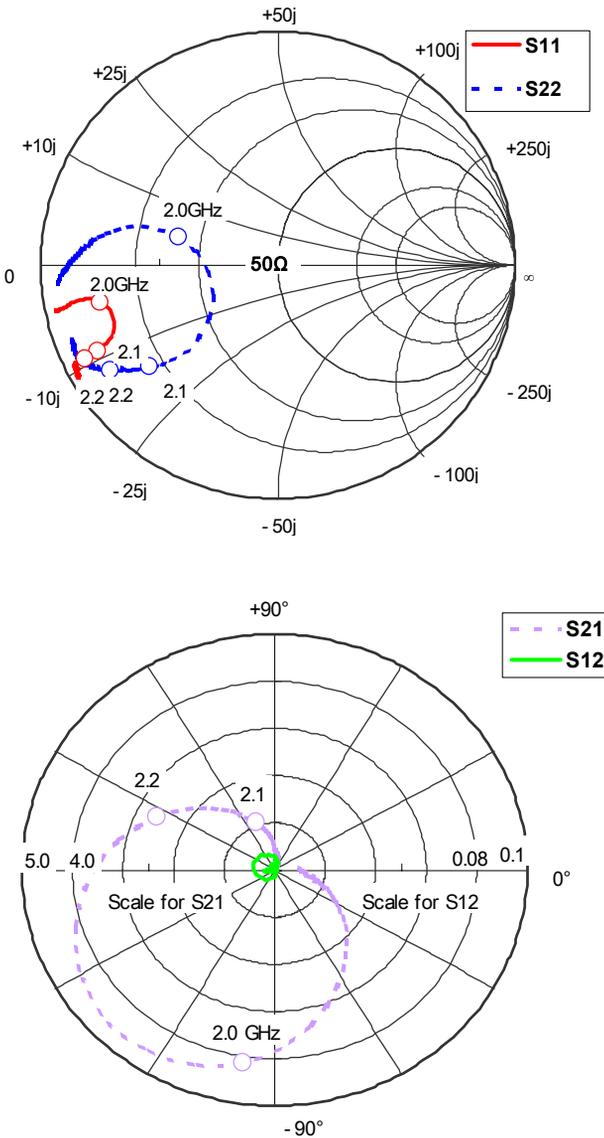
Z1, Z13	9.00mm x 1.78mm	Transmission Line
Z2	15.3mm x 1.78mm	Transmission Line
Z3	14.5mm x 1.78mm	Transmission Line
Z4	4.00mm x 6.00mm	Transmission Line
Z5	2.00mm x 19.0mm	Transmission Line
Z6	4.00mm x 25.0mm	Transmission Line
Z7	23.0mm x 0.5mm	Transmission Line
Z8	6.00mm x 13.0mm	Transmission Line
Z9	23.0mm x 1.5mm	Transmission Line
Z10,Z11	3.00mm x 1.78mm	Transmission Line
Z12	26.8mm x 1.78mm	Transmission Line

C1,C2	10pF	C20	22uF
C3,C5,C6,C9	1.0pF	L1	3.3nF
C4,C7	2.0pF	R1	2.0ohm
C8	0.5pF	R2	51ohm
C10	1.5pF	Board	
C11	0.1uF	input size	$\epsilon_r=3.5$ $t=0.8\text{mm}$
C12,C17	20pF		50mm x 50mm
C13,C18	100nF	output size	$\epsilon_r=3.5$ $t=0.8\text{mm}$
C14,C19	1000pF		50mm x 50mm
C15,C16	10uF		

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## L,S-band High Power GaAs FET

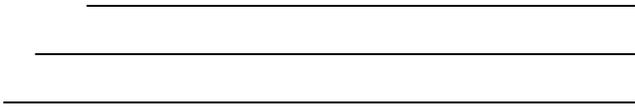
■ S-Parameters @VDS=28V, IDS=1000mA, f=1.0 to 3.0 GHz



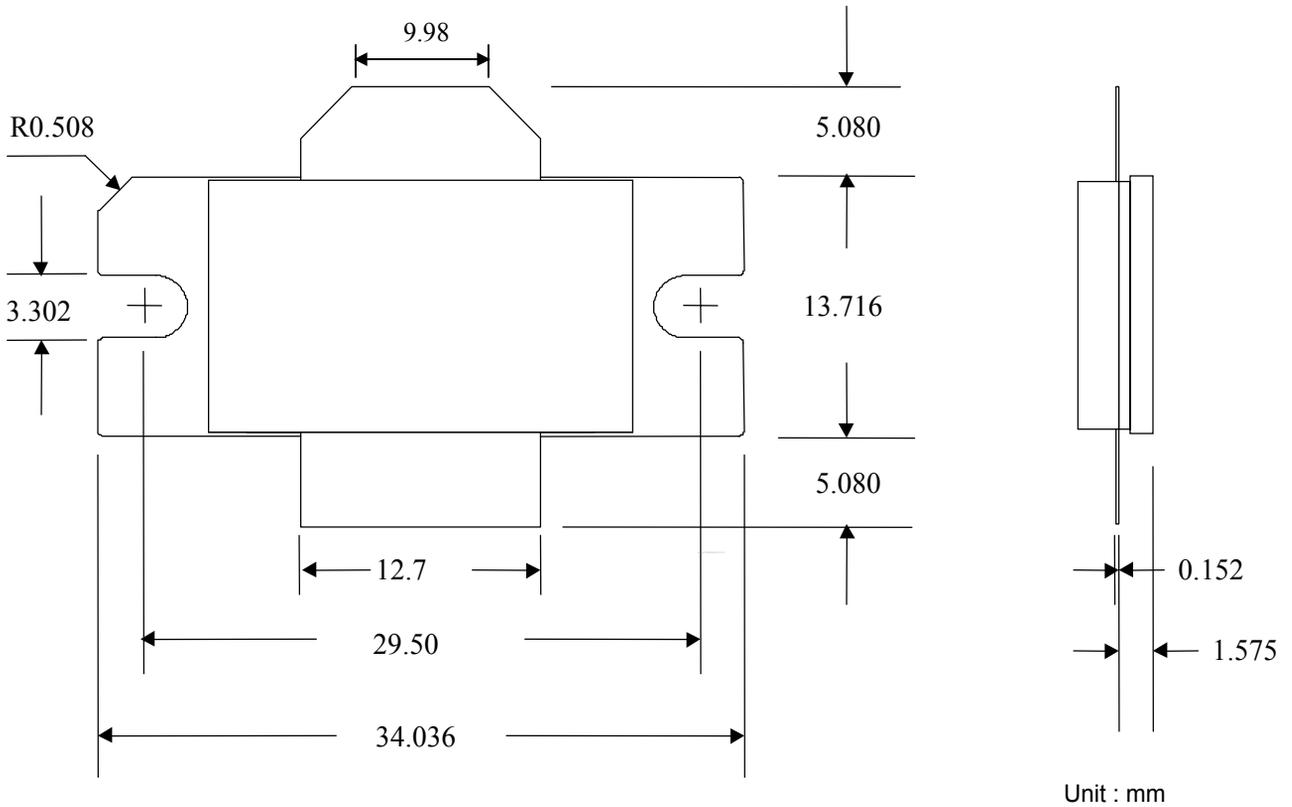
Freq. [GHz]	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.00	0.9744	-172.9	0.1231	19.18	0.0009	118.28	0.9739	-173.7
1.10	0.9752	-172.1	0.1202	19.694	0.0009	106.99	0.9682	-173.7
1.20	0.9708	-171.1	0.1285	21.086	0.0011	111.32	0.9685	-173.3
1.30	0.972	-170.6	0.1399	19.632	0.0007	110.55	0.964	-173.3
1.40	0.971	-169.9	0.1663	20.479	0.0014	112.61	0.9622	-173
1.50	0.9704	-169.3	0.2107	17.23	0.0012	120.57	0.9597	-173.1
1.60	0.9645	-169	0.2931	15.203	0.0014	132.46	0.9495	-173.9
1.70	0.9551	-168.3	0.4614	2.7031	0.002	130.35	0.9362	-175.2
1.80	0.9453	-168.4	0.7228	-11.03	0.0019	129.76	0.9077	-178
1.90	0.9072	-168.8	1.5261	-33.93	0.0023	90.866	0.8355	176.25
2.00	0.768	-168.1	4.1355	-98.92	0.0044	-121.8	0.4363	164.03
2.10	0.8443	-154.3	2.5913	154.54	0.0079	124.86	0.6937	-141.3
2.11	0.8433	-154.4	2.3576	148.65	0.0072	120.82	0.717	-142.2
2.12	0.8573	-154.4	2.1471	143.12	0.0069	110.87	0.7382	-143.1
2.13	0.8653	-153.9	1.9666	137.99	0.0068	107.11	0.7538	-143.9
2.14	0.8734	-154.2	1.8015	133.25	0.0062	103.85	0.7726	-144.6
2.15	0.8798	-154	1.6495	128.59	0.006	100.67	0.7845	-145.3
2.16	0.8892	-154.3	1.5161	124.1	0.0061	97.466	0.7953	-145.9
2.17	0.889	-154.4	1.3868	120.14	0.0057	93.934	0.8075	-146.3
2.18	0.8948	-154.1	1.2676	116.57	0.0055	85.692	0.8167	-146.9
2.19	0.9036	-154.4	1.1656	113.03	0.0049	85.248	0.8283	-147.1
2.20	0.9047	-153.9	1.0698	109.89	0.0046	86.496	0.8358	-147.6
2.30	0.9392	-154.1	0.519	93.307	0.0026	64.547	0.8916	-150.6
2.40	0.9523	-153.7	0.3389	81.392	0.0016	60.732	0.9169	-152.6
2.50	0.9558	-153.3	0.2188	73.554	0.0003	99.556	0.9269	-154
2.60	0.9623	-152.9	0.1707	67.904	0.0007	-174.6	0.9309	-155
2.70	0.9609	-152.3	0.1227	60.783	0.002	-170.4	0.936	-156.3
2.80	0.9642	-151	0.1082	63.903	0.0026	-168.3	0.9324	-157.5
2.90	0.9716	-150.9	0.0977	50.797	0.0032	-179.6	0.9288	-158.7
3.00	0.9716	-150	0.0769	51.905	0.0044	-177	0.9252	-160.3

# FLL21E135IX

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## IX Package Outline



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