

# FHX04LG, 05LG, 06LG

Super Low Noise HEMT

## FEATURES

- Low Noise Figure: 0.75dB (Typ.)@f=12GHz (FHX04)
- High Associated Gain: 10.5dB (Typ.)@f=12GHz
- $L_g \leq 0.25\mu\text{m}$ ,  $W_g = 200\mu\text{m}$
- Gold Gate Metallization for High Reliability
- Cost Effective Ceramic Microstrip (SMT) Package
- Tape and Reel Packaging Available



## DESCRIPTION

The FHX04LG, FHX05LG, FHX06LG is a High Electron Mobility Transistor(HEMT) intended for general purpose, low noise and high gain amplifiers in the 2-18GHz frequency range. The devices are packaged in cost effective, low parasitic, hermetically sealed metal-ceramic package for high volume telecommunication, TVRO, VSAT or other low noise applications.

Eudyna's stringent Quality Assurance Program assures the highest reliability and consistent performance.

## ABSOLUTE MAXIMUM RATING (Ambient Temperature $T_a=25^\circ\text{C}$ )

Item	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	3.5	V
Gate-Source Voltage	$V_{GS}$	-3.0	V
Total Power Dissipation	$P_t^*$	180	mW
Storage Temperature	$T_{stg}$	-65 to +175	$^\circ\text{C}$
Channel Temperature	$T_{ch}$	175	$^\circ\text{C}$

\*Note: Mounted on  $\text{Al}_2\text{O}_3$  board (30 x 30 x 0.65mm)

Eudyna recommends the following conditions for the reliable operation of GaAs FETs:

1. The drain-source operating voltage ( $V_{DS}$ ) should not exceed 2 volts.
2. The forward and reverse gate currents should not exceed 0.2 and -0.05 mA respectively with gate resistance of 4000 $\Omega$ .
3. The operating channel temperature ( $T_{ch}$ ) should not exceed 80 $^\circ\text{C}$ .

## ELECTRICAL CHARACTERISTICS (Ambient Temperature $T_a=25^\circ\text{C}$ )

Item	Symbol	Condition	Limit			Unit	
			Min.	Typ.	Max.		
Saturated Drain Current	$I_{DSS}$	$V_{DS} = 2\text{V}$ , $V_{GS} = 0\text{V}$	15	30	60	mA	
Transconductance	$g_m$	$V_{DS} = 2\text{V}$ , $I_{DS} = 10\text{mA}$	35	45	-	mS	
Pinch-off Voltage	$V_p$	$V_{DS} = 2\text{V}$ , $I_{DS} = 1\text{mA}$	-0.2	-0.7	-1.5	V	
Gate Source Breakdown Voltage	$V_{GSO}$	$I_{GS} = -10\mu\text{A}$	-3.0	-	-	V	
Noise Figure	FHX04LG	NF	-	0.75	0.85	dB	
Associated Gain		$G_{as}$	$V_{DS} = 2\text{V}$ , $I_{DS} = 10\text{mA}$ , $f = 12\text{GHz}$	9.5	10.5	-	dB
Noise Figure	FHX05LG	NF		-	0.9	0.11	dB
Associated Gain		$G_{as}$		9.5	10.5	-	dB
Noise Figure	FHX06LG	NF		-	1.1	1.35	dB
Associated Gain		$G_{as}$		9.5	10.5	-	dB
Thermal Resistance	$R_{th}$	Channel to Case		-	300	400	$^\circ\text{C}/\text{W}$

## AVAILABLE CASE STYLES: LG

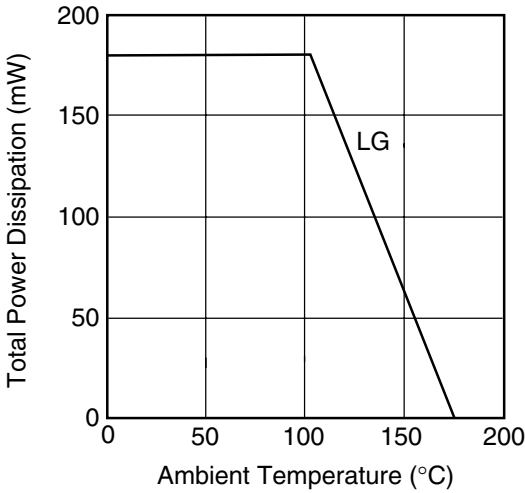
Note: RF parameters are measured on a sample basis as follows:

Lot qty.	Sample qty.	Accept/Reject
1200 or less	125	(0,1)
1201 to 3200	200	(0,1)
3201 to 10000	315	(1,2)
10001 or over	500	(1,2)

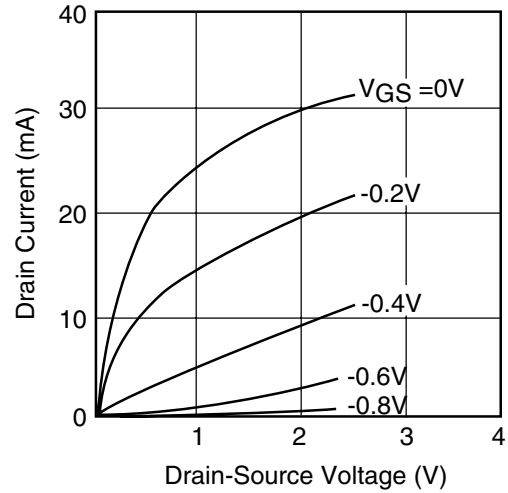
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**POWER DERATING CURVE**

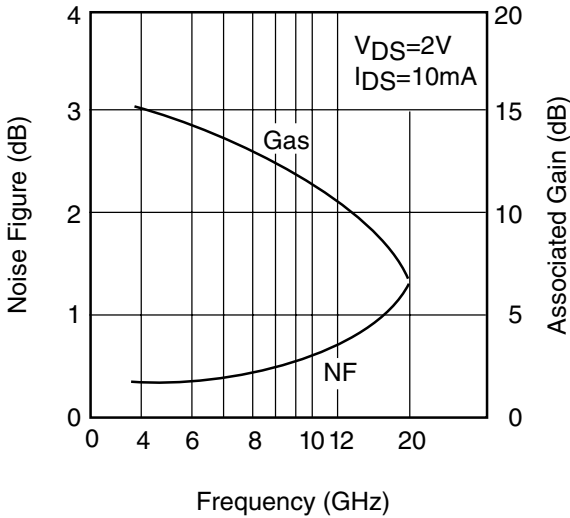


**DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE**



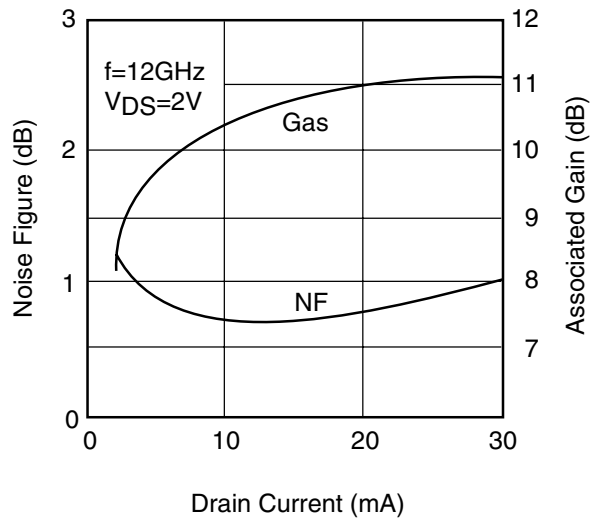
**NF & Gas vs. FREQUENCY**

FHX04LG



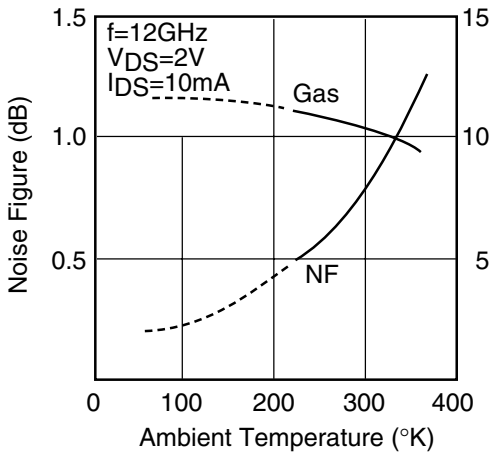
**NF & Gas vs. I<sub>DS</sub>**

FHX04LG

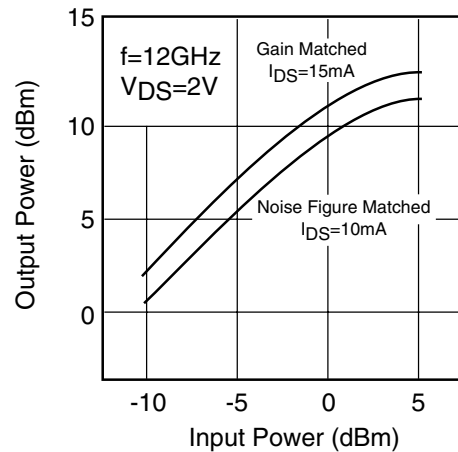


**NF & Gas vs. TEMPERATURE**

FHX04LG



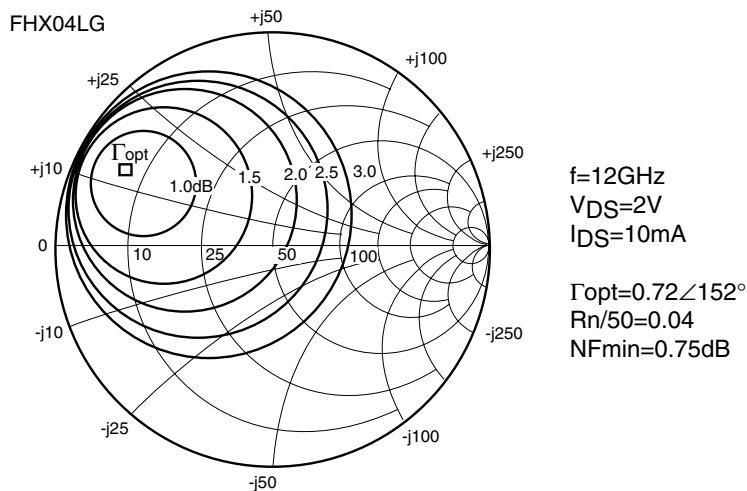
**OUTPUT POWER vs. INPUT POWER**



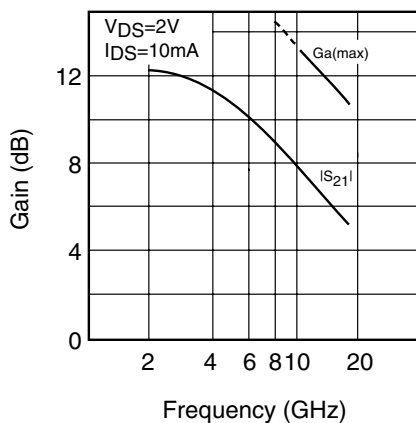
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## TYPICAL NOISE FIGURE CIRCLE



## Ga(max) AND $|S_{21}|$ vs. FREQUENCY FHX04LG



## NOISE PARAMETERS

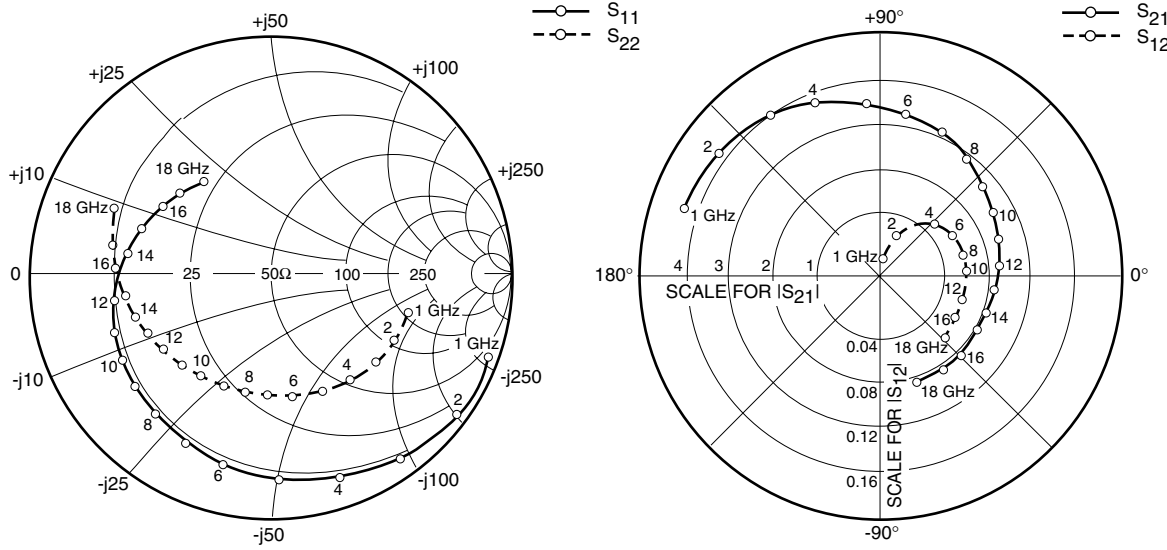
FHX04LG

$V_{DS}=2\text{V}, I_{DS}=10\text{mA}$

Freq. (GHz)	$\Gamma_{opt}$		NFmin (dB)	Rn/50
	(MAG)	(ANG)		
2.0	0.99	29.0	0.33	0.43
4.0	0.97	53.0	0.35	0.30
6.0	0.93	77.0	0.45	0.20
8.0	0.87	101.0	0.55	0.12
10.0	0.80	127.0	0.66	0.07
12.0	0.72	152.0	0.75	0.04
14.0	0.63	178.0	0.88	0.03
16.0	0.53	-156.0	1.05	0.05
18.0	0.42	-129.0	1.30	0.09

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## S-PARAMETERS

FHX04LG

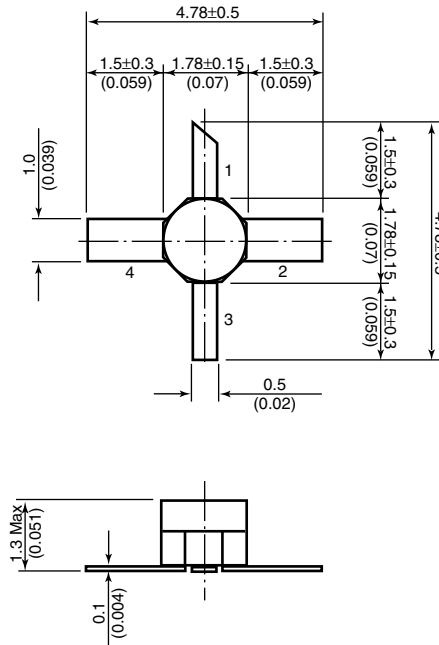
$V_{DS} = 2V, I_{DS} = 10mA$

FREQUENCY (GHZ)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.0	.990	-19.3	4.232	162.1	.016	75.1	.576	-14.3
2.0	.965	-37.5	4.115	144.1	.030	64.8	.563	-28.1
3.0	.928	-55.2	3.923	127.4	.042	53.3	.546	-41.2
4.0	.886	-72.1	3.737	110.9	.052	41.9	.525	-54.4
5.0	.844	-88.3	3.518	95.6	.059	32.2	.505	-67.6
6.0	.804	-103.4	3.302	80.8	.063	23.9	.489	-80.7
7.0	.771	-117.4	3.090	66.4	.066	16.6	.484	-93.0
8.0	.741	-129.6	2.876	53.1	.065	11.5	.487	-104.5
9.0	.717	-140.3	2.703	40.7	.066	4.9	.497	-115.1
10.0	.695	-150.8	2.592	28.6	.065	-0.3	.503	-124.9
11.0	.675	-161.2	2.476	16.4	.064	-3.0	.517	-135.7
12.0	.650	-171.5	2.374	4.2	.064	-6.4	.534	-145.8
13.0	.630	178.9	2.277	-7.8	.063	-9.3	.552	-156.1
14.0	.607	170.2	2.176	-19.1	.064	-12.5	.585	-164.6
15.0	.585	161.8	2.144	-30.7	.065	-16.4	.617	-171.7
16.0	.557	151.8	2.151	-43.2	.066	-22.2	.642	177.8
17.0	.522	140.9	2.142	-56.9	.067	-29.4	.673	169.5
18.0	.480	128.4	2.136	-71.2	.068	-39.2	.694	159.7

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## Case Style "LG" Metal-Ceramic Package



### Gold Plated Leads

1. Gate
2. Source
3. Drain
4. Source

Unit: mm(inches)

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Eudyna Devices Inc. products contain **gallium arsenide (GaAs)** which can be hazardous to the human body and the environment. For safety, observe the following procedures:

- Do not put this product into the mouth.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Observe government laws and company regulations when discarding this product. This product must be discarded in accordance with methods specified by applicable hazardous waste procedures.

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