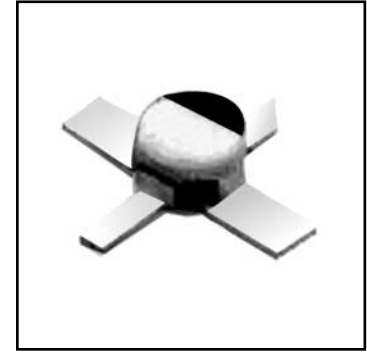


FHX35LG/LP

Super Low Noise HEMT

FEATURES

- Low Noise Figure: 1.2B (Typ.)@f=12GHz
- High Associated Gain: 10.0dB (Typ.)@f=12GHz
- $L_g \leq 0.25\mu\text{m}$, $W_g = 280\mu\text{m}$
- Gold Gate Metallization for High Reliability
- Cost Effective Ceramic Microstrip (SMT) Package



DESCRIPTION

The FHX35LG/LP is a High Electron Mobility Transistor(HEMT) intended for general purpose, low noise and high gain amplifiers in the 2-18GHz frequency range. This device is packaged in cost effective, low parasitic, hermetically sealed(LG) or epoxy-sealed(LP) metal-ceramic packages for high volume telecommunication, DBS, TVRO, VSAT or other low noise applications.

Fujitsu'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}	4.0	V
Gate-Source Voltage		V_{GS}	-3.0	V
Total Power Dissipation		P_t^*	290	mW
Storage Temperature	FHX35LG	T_{stg}	-65 to +175	$^\circ\text{C}$
	FHX35LP		-65 to +150	$^\circ\text{C}$
Channel Temperature	FHX35LG	T_{ch}	175	$^\circ\text{C}$
	FHX35LP		150	$^\circ\text{C}$

*Note: Mounted on Al_2O_3 board (30 x 30 x 0.65mm)

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

1. The drain-source operating voltage (V_{DS}) should not exceed 3 volts.
2. The forward and reverse gate currents should not exceed 0.2 and -0.075 mA respectively with gate resistance of 4000Ω .
3. The operating channel temperature (T_{ch}) should not exceed 80°C .

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

Item	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
Saturated Drain Current	I_{DSS}	$V_{DS} = 2\text{V}$, $V_{GS} = 0\text{V}$	15	40	85	mA
Transconductance	g_m	$V_{DS} = 2\text{V}$, $I_{DS} = 10\text{mA}$	40	60	-	mS
Pinch-off Voltage	V_p	$V_{DS} = 2\text{V}$, $I_{DS} = 1\text{mA}$	-0.2	-1.0	-2.0	V
Gate Source Breakdown Voltage	V_{GSO}	$I_{GS} = -10\mu\text{A}$	-3.0	-	-	V
Noise Figure	NF	$V_{DS} = 3\text{V}$, $I_{DS} = 10\text{mA}$ $f = 12\text{GHz}$	-	1.2	1.6	dB
Associated Gain	G_{as}		8.5	10.0	-	dB
Thermal Resistance	R_{th}	Channel to Case	-	220	300	$^\circ\text{C/W}$

AVAILABLE CASE STYLES: LG/LP

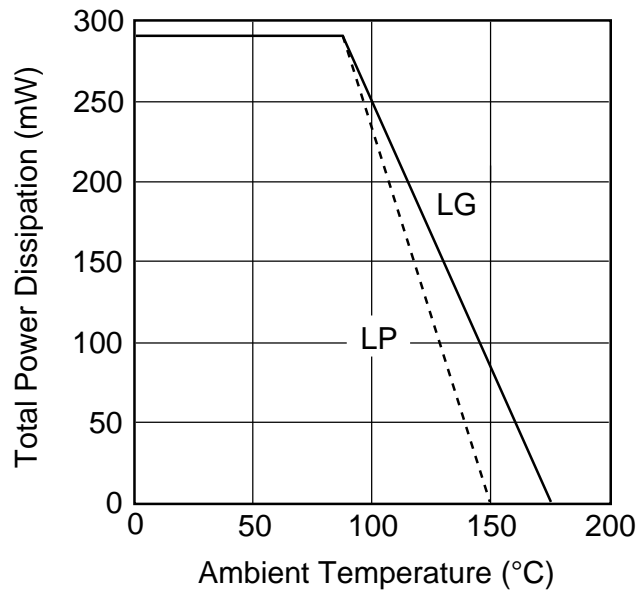
Note: RF parameters for LG/LP devices are measured on a sample basis as follows:

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)

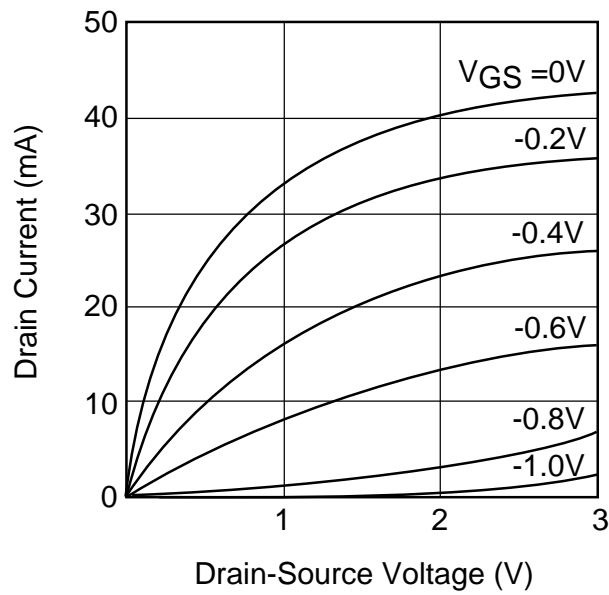
FHX35LG/LP

Super Low Noise HEMT

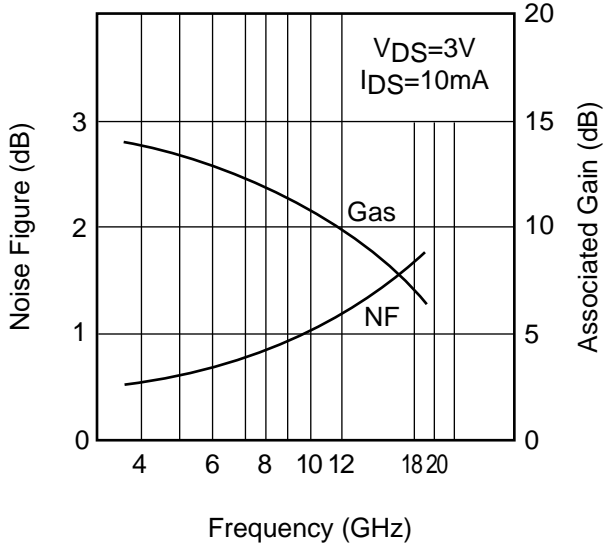
POWER DERATING CURVE



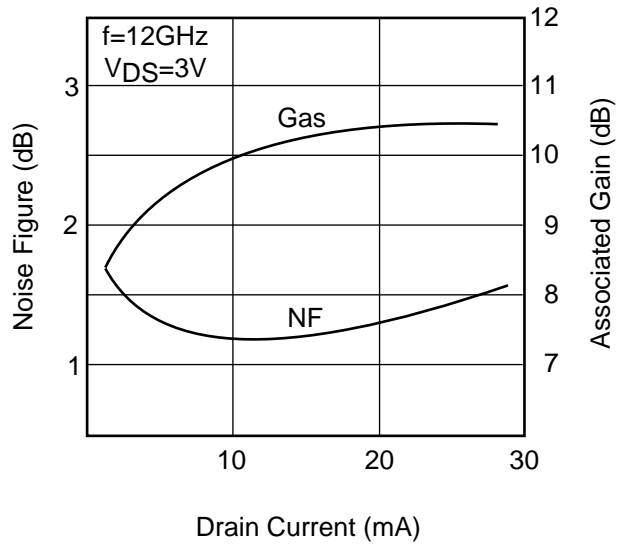
DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE



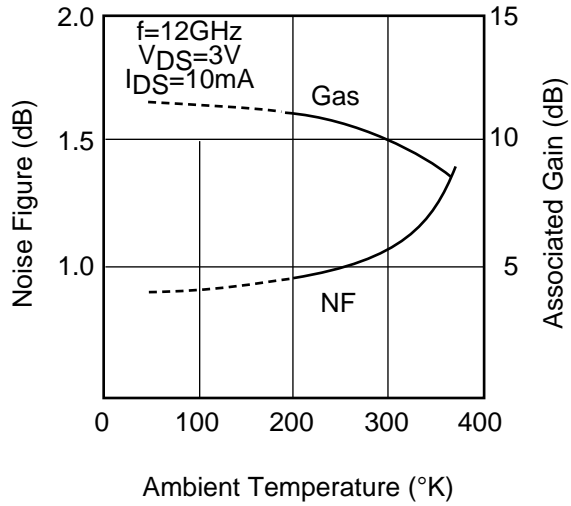
NF & Gas vs. FREQUENCY



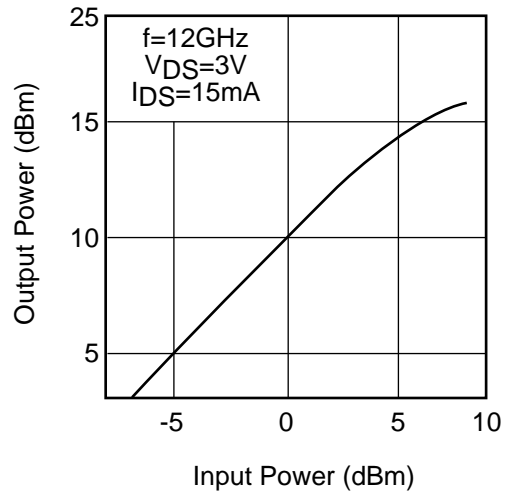
NF & Gas vs. I_{DS}



NF & Gas vs. TEMPERATURE



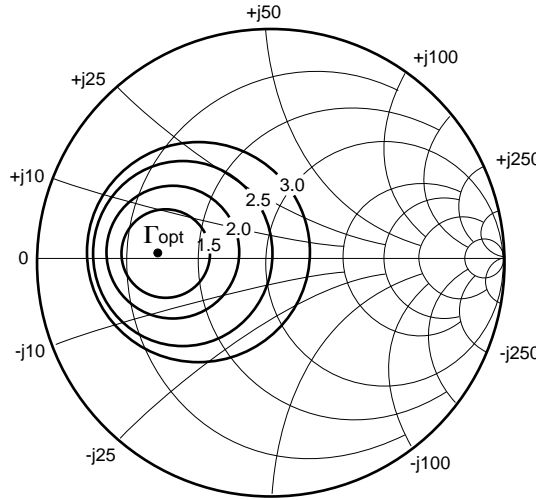
OUTPUT POWER vs. INPUT POWER



FHX35LG/LP

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TYPICAL NOISE FIGURE CIRCLE



f = 12 GHz
 $V_{DS} = 2V$
 $I_{DS} = 10mA$

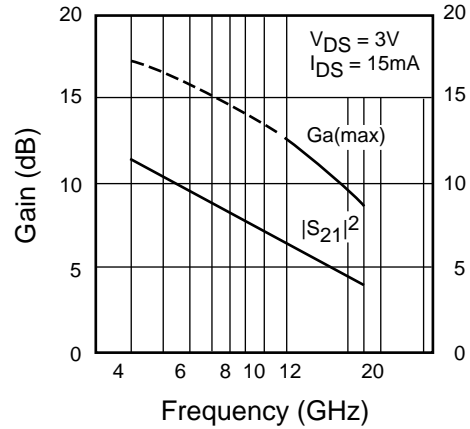
$\Gamma_{opt} = 0.56 \angle 175^\circ$
 $Rn/50 = 0.08$
 $NF_{min} = 1.2dB$

NOISE PARAMETERS FHX35LG

$V_{DS} = 3V, I_{DS} = 10mA$

Freq. (GHz)	Γ_{opt}		NFmin (dB)	Rn/50
	(MAG)	(ANG)		
2	0.81	32	0.40	0.58
4	0.74	63	0.50	0.42
6	0.69	93	0.68	0.30
8	0.64	127	0.86	0.20
10	0.60	148	1.03	0.12
12	0.56	175	1.20	0.08
14	0.53	-162	1.38	0.08
16	0.50	-139	1.54	0.10
18	0.48	-117	1.70	0.14

Ga(max) AND $|S_{21}|^2$ vs. FREQUENCY FHX35LG



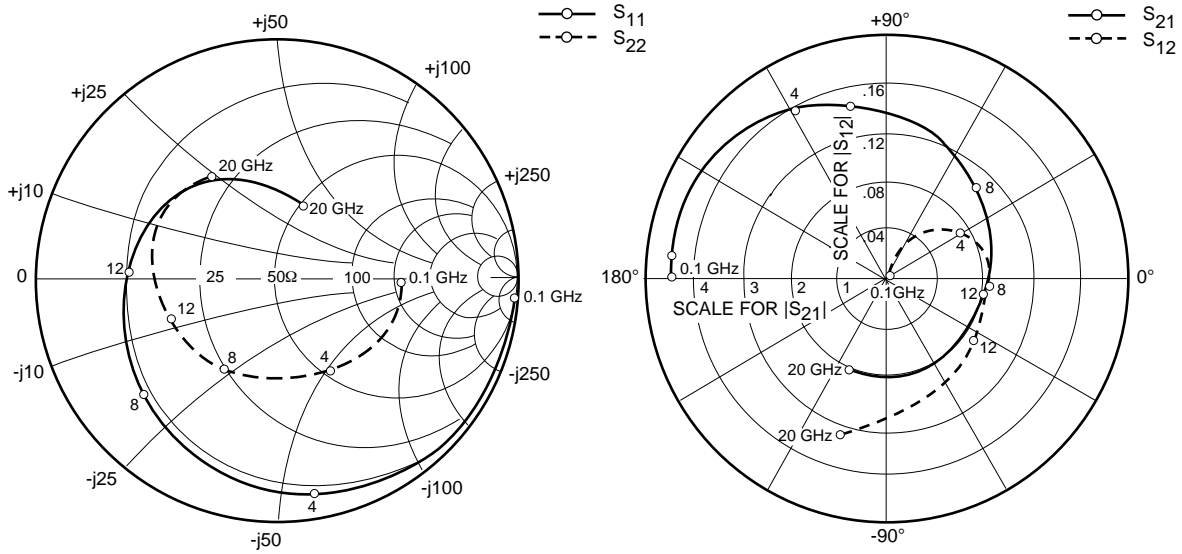
NOISE PARAMETERS FHX35LP

$V_{DS} = 3V, I_{DS} = 10mA$

Freq. (GHz)	Γ_{opt}		NFmin (dB)	Rn/50
	(MAG)	(ANG)		
2	0.85	30	0.40	0.29
4	0.76	55	0.50	0.26
6	0.69	81	0.68	0.19
8	0.62	109	0.86	0.12
10	0.55	138	1.03	0.06
12	0.50	168	1.20	0.04
14	0.45	-160	1.38	0.06
16	0.42	-126	1.54	0.13
18	0.39	-92	1.70	0.22

FHX35LG/LP

Super Low Noise HEMT



S-PARAMETERS FHX35LG

$V_{DS} = 3V, I_{DS} = 10mA$

FREQUENCY (MHZ)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	.996	-3.5	4.576	177.2	.002	81.2	.516	-2.5
500	.994	-12.1	4.548	169.0	.012	79.3	.517	-10.2
1000	.982	-23.5	4.471	158.5	.023	73.1	.513	-19.9
2000	.950	-44.7	4.304	139.3	.043	57.9	.498	-38.0
3000	.912	-64.6	4.026	121.0	.059	44.6	.483	-54.9
4000	.867	-84.0	3.742	103.1	.071	31.8	.462	-71.9
5000	.821	-101.6	3.436	86.6	.079	20.0	.446	-87.6
6000	.783	-117.5	3.132	71.6	.085	9.8	.439	-102.2
7000	.757	-130.9	2.881	57.9	.087	0.9	.441	-115.3
8000	.738	-142.8	2.659	45.0	.088	-7.1	.452	-126.7
9000	.726	-153.8	2.497	32.4	.090	-15.3	.468	-136.9
10000	.707	-164.5	2.347	20.2	.092	-21.7	.480	-146.1
11000	.680	-174.1	2.206	8.4	.090	-27.8	.494	-156.0
12000	.654	176.1	2.101	-3.4	.090	-35.5	.503	-164.8
13000	.638	166.0	2.035	-15.1	.091	-42.6	.514	-173.8
14000	.626	157.1	2.003	-26.2	.093	-49.6	.537	178.4
15000	.607	147.8	1.975	-37.6	.094	-55.8	.559	171.0
16000	.565	138.4	1.917	-50.1	.097	-64.7	.564	162.7
17000	.528	127.2	1.924	-62.9	.102	-73.3	.567	154.4
18000	.484	112.8	1.966	-77.1	.109	-86.2	.572	142.7
19000	.421	93.5	1.932	-91.7	.116	-96.2	.581	133.1
20000	.380	74.2	1.991	-107.4	.127	-110.9	.547	124.3

FHX35LG/LP

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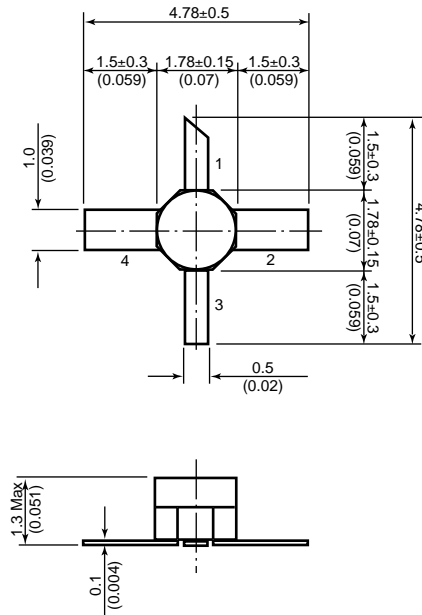
S-PARAMETERS

FHX35LP

$V_{DS} = 3V, I_{DS} = 10mA$

FREQUENCY (MHZ)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1000	.987	-20.9	4.008	159.2	.024	75.4	.591	-15.5
2000	.956	-40.5	3.889	141.7	.045	61.0	.569	-30.7
3000	.907	-59.7	3.704	125.0	.063	47.6	.536	-45.5
4000	.855	-78.5	3.504	108.2	.079	35.5	.503	-59.6
5000	.801	-96.6	3.279	91.4	.091	23.4	.467	-72.8
6000	.749	-113.7	3.044	76.0	.098	13.4	.434	-87.0
7000	.707	-129.7	2.822	61.3	.103	3.8	.417	-100.7
8000	.670	-143.9	2.607	48.9	.107	-4.6	.411	-113.3
9000	.639	-156.6	2.422	36.6	.109	-12.4	.411	-124.4
10000	.612	-169.4	2.300	24.2	.113	-19.5	.410	-134.5
11000	.580	178.0	2.168	11.6	.115	-26.7	.407	-145.3
12000	.561	165.0	2.061	-0.3	.117	-33.9	.409	-157.7
13000	.533	153.0	1.949	-12.0	.119	-40.6	.424	-167.7
14000	.519	141.9	1.884	-22.6	.122	-46.6	.440	-177.2
15000	.501	128.9	1.841	-34.1	.127	-55.3	.463	174.7
16000	.486	115.0	1.834	-47.7	.133	-63.1	.469	166.1
17000	.462	98.5	1.765	-60.8	.139	-73.4	.478	155.5
18000	.439	83.6	1.704	-74.4	.144	-83.3	.489	145.4

Case Style "LG/LP"
Metal-Ceramic Hermetic Package



Gold Plated Leads

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

Unit: mm(inches)

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Printed in U.S.A. FCSI0598M200