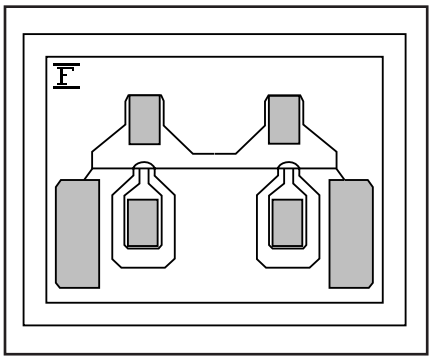
FHX13X, FHX14X

GaAs FET & HEMT Chips

FEATURES

- Low Noise Figure: 0.45dB (Typ.)@f=12GHz (FHX13)
- High Associated Gain: 13.0dB (Typ.)@f=12GHz
- Lg ≤ 0.15µm, Wg = 200µm
- Gold Gate Metallization for High Reliability



DESCRIPTION

The FHX13X, FHX14X are Super High Electron Mobility Transistor (SuperHEMT™) intended for general purpose, ultra-low noise and high gain amplifiers in the 2-18GHz frequency range. The devices are well suited for 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 Ta=25°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	°C
Channel Temperature	T_{ch}	175	°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 2 volts.
2. The forward and reverse gate currents should not exceed 0.2 and -0.05mA respectively with gate resistance of 4000Ω.
3. The operating channel temperature (T_{ch}) should not exceed 80°C.

ELECTRICAL CHARACTERISTICS (Ambient Temperature Ta=25°C)

Item		Symbol	Test Conditions	Limit			Unit
				Min.	Typ.	Max.	
Saturated Drain Current		I_{DSS}	V_{DS} = 2V, V_{GS} = 0V	10	30	60	mA
Transconductance		g_m	V_{DS} = 2V, I_{DS} = 10mA	35	50	-	mS
Pinch-off Voltage		V_p	V_{DS} = 2V, I_{DS} = 1mA	-0.1	-0.7	-1.5	V
Gate Source Breakdown Voltage		V_{GSO}	I_{GS} = -10µA	-3.0	-	-	V
Noise Figure	FHX13X	NF	V_{DS} = 2V I_{DS} = 10mA f = 12GHz	-	0.45	0.50	dB
Associated Gain	FHX13X	G_{as}		11.0	13.0	-	dB
Noise Figure	FHX14X	NF		-	0.55	0.60	dB
Associated Gain	FHX14X	G_{as}		11.0	13.0	-	dB
Thermal Resistance		R_{th}	Channel to Case	-	220	300	°C/W

Note: RF parameter sample size 10pcs. criteria (accept/reject)=(2/3)

The chip must be enclosed in a hermetically sealed environment for optimum performance and reliability.

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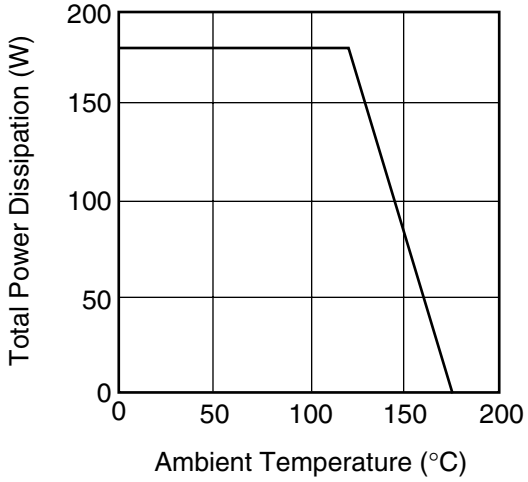
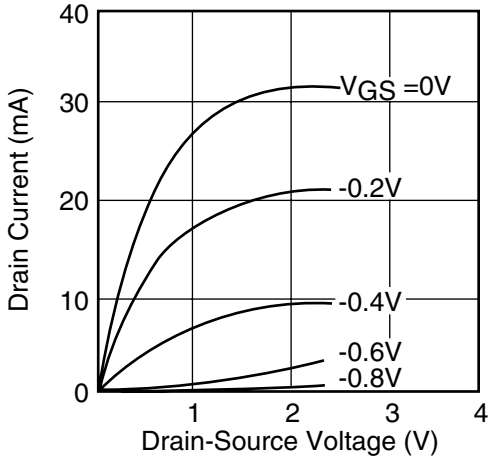
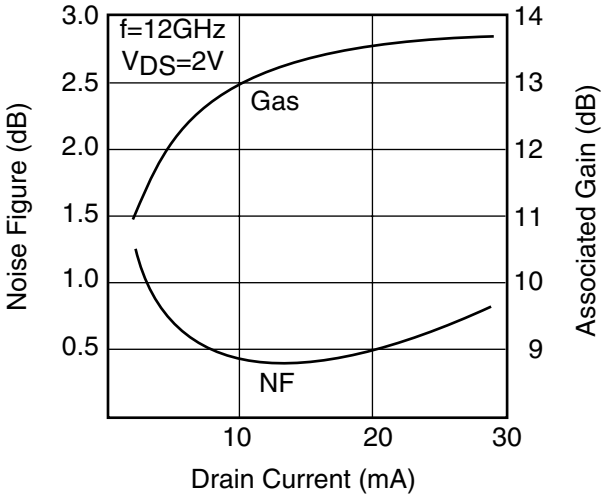
POWER DERATING CURVE



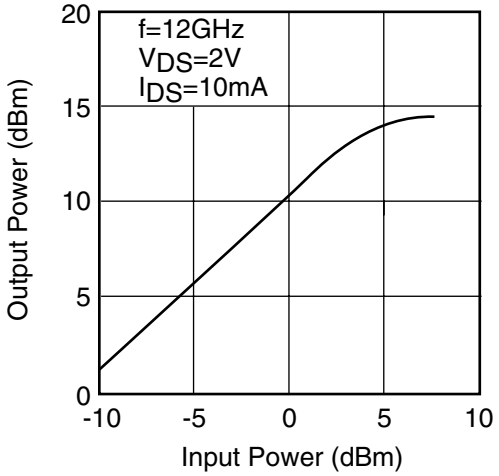
DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE



NF & Gas vs. I_{DS}



OUTPUT POWER vs. INPUT POWER

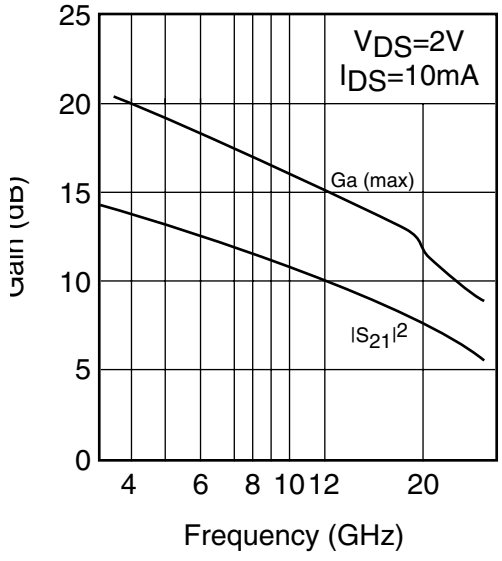


NOISE PARAMETERS

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

Freq. (GHz)	Γopt (MAG)	Γopt (ANG)	NFmin (dB)	Rn/50
2	0.92	13	0.28	0.65
4	0.84	25	0.30	0.54
6	0.77	38	0.32	0.41
8	0.71	51	0.34	0.31
10	0.66	65	0.39	0.23
12	0.61	79	0.45	0.17
14	0.58	93	0.56	0.12
16	0.56	108	0.68	0.09
18	0.54	122	0.86	0.07
20	0.52	136	1.03	0.07
22	0.50	150	1.22	0.07
24	0.46	162	1.43	0.07

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



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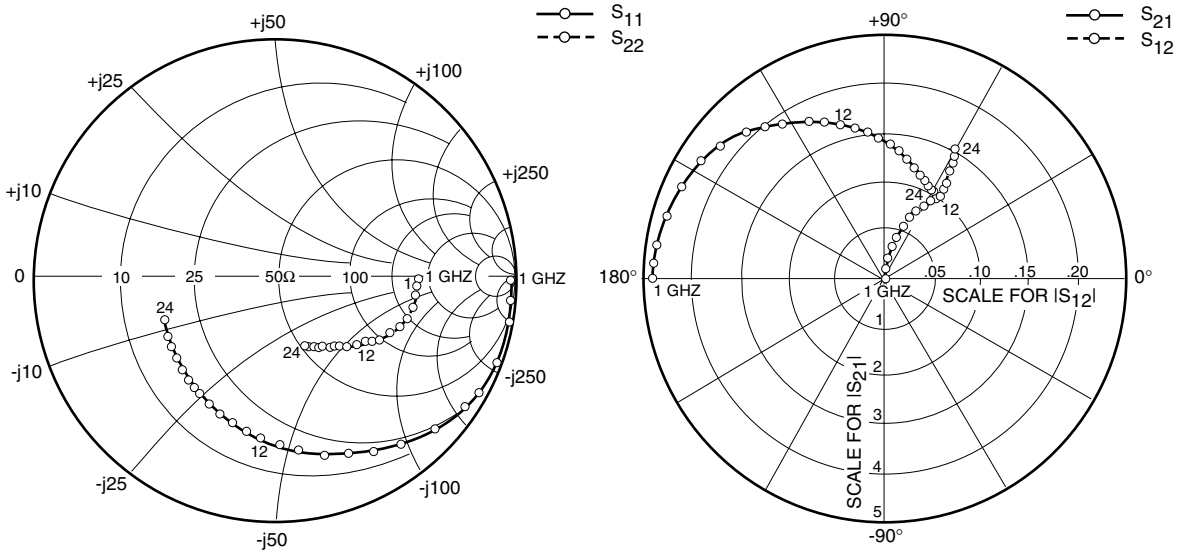


S-PARAMETERS

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

FREQUENCY	S11		S21		S12		S22	
(MHZ)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	1.000	-0.9	4.899	179.2	0.001	89.5	0.601	-0.5
500	0.999	-4.7	4.894	175.9	0.006	87.7	0.601	-2.3
1000	0.995	-9.4	4.876	171.9	0.013	85.5	0.599	-4.6
2000	0.981	-18.6	4.806	163.9	0.025	81.1	0.591	-9.2
3000	0.958	-27.7	4.696	156.1	0.037	77.0	0.580	-13.5
4000	0.929	-36.4	4.555	148.6	0.048	73.2	0.565	-17.7
5000	0.895	-44.9	4.392	141.5	0.057	69.8	0.548	-21.5
6000	0.860	-53.0	4.215	134.8	0.066	66.8	0.530	-25.0
7000	0.823	-60.7	4.034	128.4	0.074	64.2	0.512	-28.3
8000	0.786	-68.1	3.852	122.4	0.080	62.0	0.493	-31.3
9000	0.751	-75.3	3.675	116.8	0.086	60.2	0.475	-34.0
10000	0.718	-82.1	3.506	111.5	0.092	58.9	0.458	-36.6
11000	0.687	-88.7	3.345	106.5	0.096	57.8	0.442	-39.0
12000	0.659	-95.0	3.194	101.8	0.101	57.1	0.426	-41.3
13000	0.633	-101.2	3.054	97.3	0.105	56.6	0.412	-43.6
14000	0.610	-107.2	2.923	93.0	0.108	56.4	0.399	-45.8
15000	0.590	-113.0	2.801	88.9	0.112	56.4	0.386	-47.9
16000	0.572	-118.7	2.688	85.0	0.116	56.6	0.375	-50.1
17000	0.556	-124.2	2.584	81.3	0.120	56.9	0.364	-52.3
18000	0.543	-129.6	2.487	77.7	0.124	57.3	0.353	-54.6
19000	0.532	-134.9	2.397	74.2	0.129	57.8	0.344	-56.9
20000	0.523	-140.0	2.314	70.8	0.133	58.4	0.335	-59.4
21000	0.516	-145.0	2.236	67.5	0.138	58.9	0.326	-62.0
22000	0.511	-149.8	2.164	64.4	0.144	59.5	0.318	-64.7
23000	0.507	-154.6	2.096	61.3	0.150	60.0	0.310	-67.5
24000	0.505	-159.2	2.033	58.3	0.156	60.5	0.303	-70.5

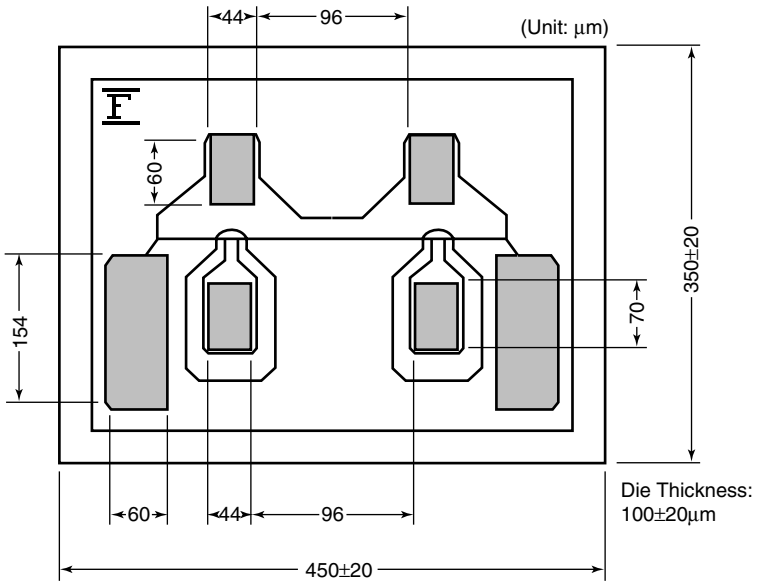
NOTE:* The data includes bonding wires.

n: number of wires Gate n=2 (0.3mm length, 20µm Dia Au wire)

Drain n=2 (0.3mm length, 20µm Dia Au wire)

Source n=4 (0.3mm length, 20µm Dia Au wire)

CHIP OUTLINE



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