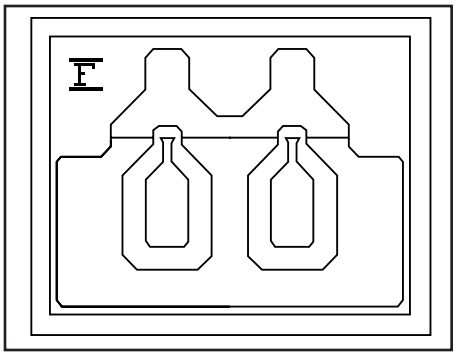
FHX04X, FHX05X, FHX06X

GaAs FET & HEMT Chips

FEATURES



- Low Noise Figure: 0.75dB (Typ.)@f=12GHz (FHX04)
- High Associated Gain: 10.5dB (Typ.)@f=12GHz
- Lg ≤ 0.25µm, Wg = 200µm
- Gold Gate Metallization for High Reliability

DESCRIPTION

The FHX04X, FHX05X, FHX06X are High Electron Mobility Transistors (HEMT) intended for general purpose, 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 -0.05 mA 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)

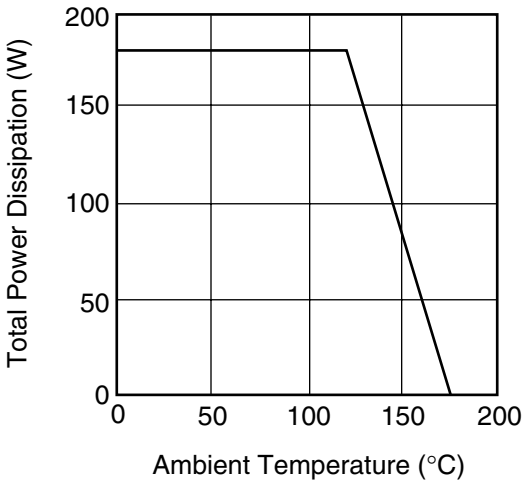
Item		Symbol	Test Conditions	Limit			Unit
				Min.	Typ.	Max.	
Saturated Drain Current		I_{DSS}	V_{DS} = 2V, V_{GS} = 0V	15	30	60	mA
Transconductance		g_m	V_{DS} = 2V, I_{DS} = 10mA	35	45	-	mS
Pinch-off Voltage		V_p	V_{DS} = 2V, I_{DS} = 1mA	-0.2	-0.7	-1.5	V
Gate Source Breakdown Voltage		V_{GSO}	I_{GS} = -10µA	-3.0	-	-	V
Noise Figure	FHX04X	NF	V_{DS} = 2V I_{DS} = 10mA f = 12GHz	-	0.75	0.85	dB
Associated Gain	FHX04X	G_{as}		9.5	10.5	-	dB
Noise Figure	FHX05X	NF		-	0.9	1.1	dB
Associated Gain	FHX05X	G_{as}		9.5	10.5	-	dB
Noise Figure	FHX06X	NF		-	1.1	1.35	dB
Associated Gain	FHX06X	G_{as}		9.5	10.5	-	dB
Maximum Available Gain		G_a(max)	Same as above, Gain matched	11.0	12.0	-	dB
Thermal Resistance		R_{th}	Channel to Case	-	220	300	°C/W

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

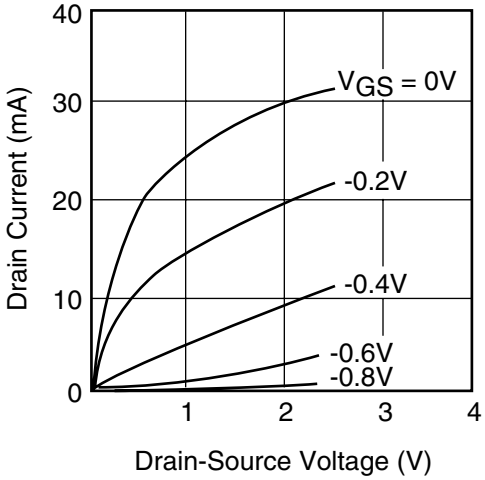
The chip must be enclosed in a hermetically sealed environment for optimum performance and reliability.

FUJITSU

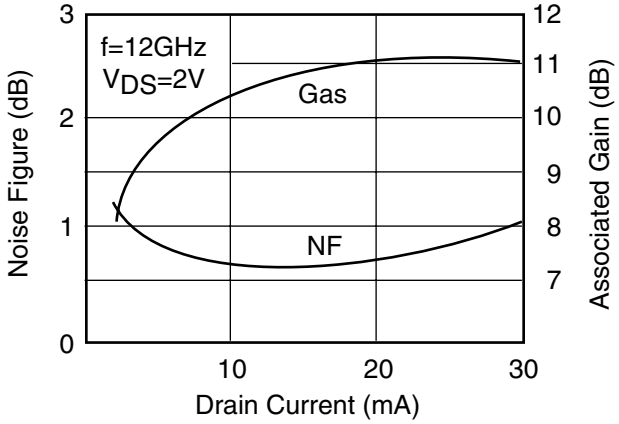
POWER DERATING CURVE



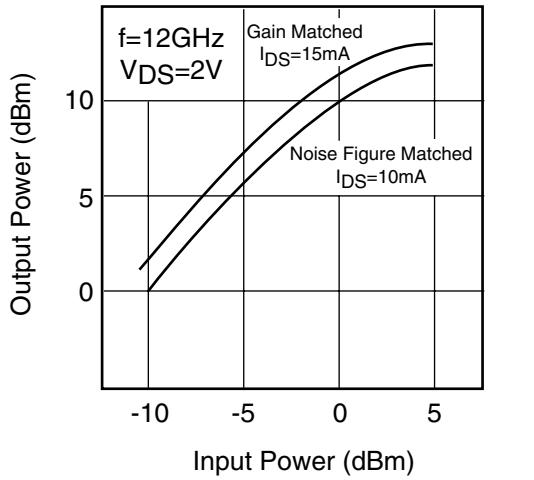
DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE

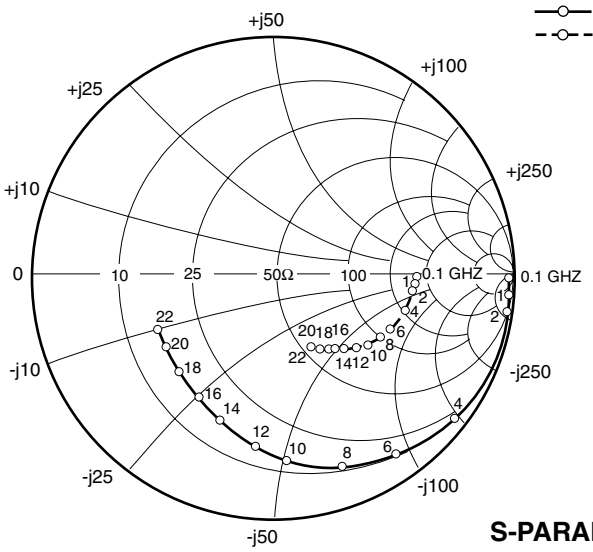


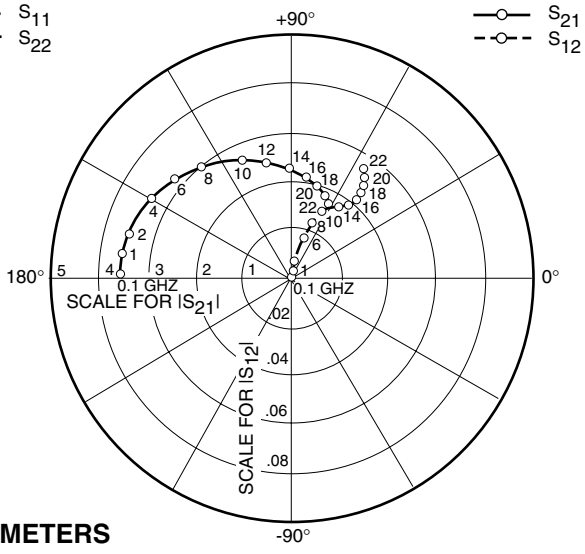
NF & Gas vs. I_{DS}



OUTPUT POWER vs. INPUT POWER







S-PARAMETERS

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

FREQUENCY (MHZ)	S11 MAG	S11 ANG	S21 MAG	S21 ANG	S12 MAG	S12 ANG	S22 MAG	S22 ANG
100	1.000	-0.9	3.721	179.2	.001	89.5	.606	-0.4
500	.999	-4.7	3.717	176.0	.007	87.7	.605	-2.1
1000	.996	-9.5	3.705	172.0	.013	86.4	.604	-4.2
2000	.983	-18.8	3.658	164.1	.026	81.0	.598	-8.3
4000	.928	-37.0	3.489	149.0	.049	72.3	.576	-16.0
6000	.877	-54.0	3.255	135.1	.068	66.0	.547	-22.9
8000	.811	-59.3	2.999	122.5	.082	60.3	.516	-28.9
10000	.748	-84.5	2.750	111.2	.093	57.3	.485	-34.2
12000	.694	-98.2	2.521	101.1	.101	55.2	.457	-39.1
14000	.649	-111.1	2.319	92.0	.108	54.6	.432	-43.7
16000	.614	-123.2	2.142	83.5	.114	55.0	.410	-48.4
18000	.588	-134.6	1.988	75.9	.121	56.2	.391	-53.2
20000	.570	-145.4	1.853	68.8	.130	57.8	.373	-58.4

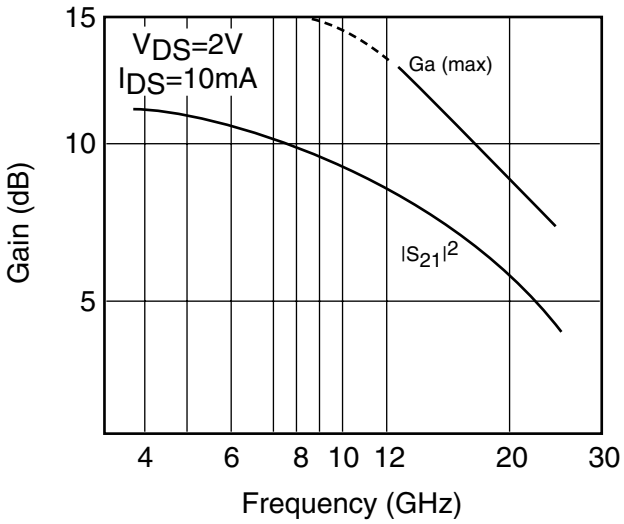
NOTE:* The data includes bonding wires.

n: number of wires

Gate n=2 (0.3mm length, 20um Dia Au wire)
Drain n=2 (0.3mm length, 20um Dia Au wire)
Source n=4 (0.3mm length, 20um Dia Au wire)

Download S-Parameters, click here

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



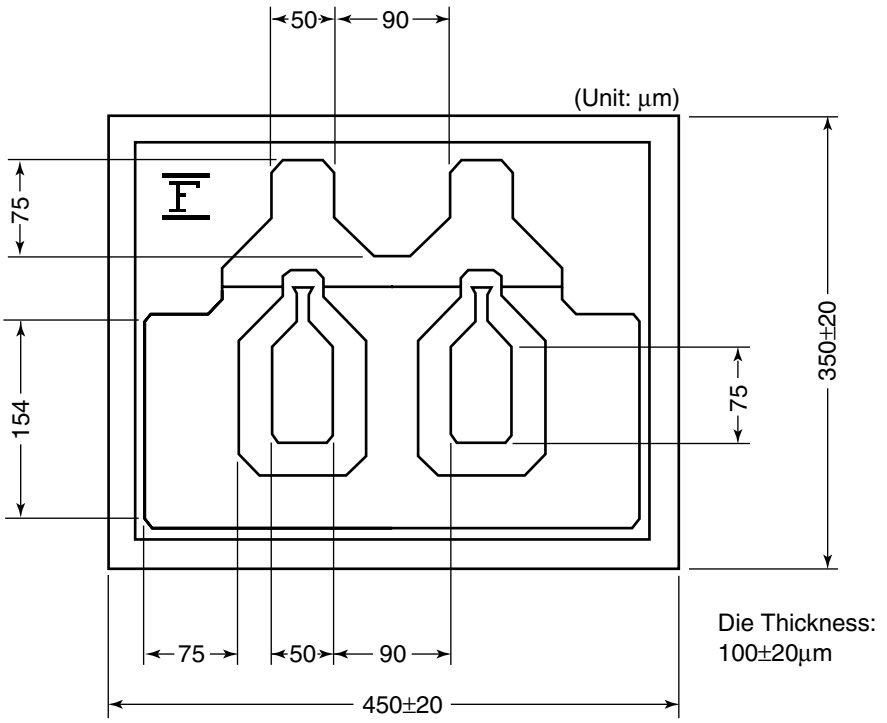
NOISE PARAMETERS

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

Freq. (GHz)	Γopt (MAG)	Γopt (ANG)	NFmin (dB)	Rn/50
2	0.80	16	0.33	0.50
4	0.74	31	0.35	0.45
6	0.68	46	0.44	0.40
8	0.63	61	0.53	0.30
10	0.58	75	0.63	0.23
12	0.52	89	0.72	0.18
14	0.47	102	0.84	0.14
16	0.42	114	0.97	0.12
18	0.38	126	1.09	0.10
20	0.33	137	1.22	0.09

FUJITSU

CHIP OUTLINE



For further information please contact:

FUJITSU COMPOUND SEMICONDUCTOR, INC.
2355 Zanker Rd.
San Jose, CA 95131-1138, U.S.A.
Phone: (408) 232-9500
FAX: (408) 428-9111
www.fcsi.fujitsu.com

FUJITSU MICROELECTRONICS, LTD.
Compound Semiconductor Division
Network House
Norreys Drive
Maidenhead, Berkshire SL6 4FJ
Phone:+44 (0)1628 504800
FAX:+44 (0)1628 504888

CAUTION

Fujitsu Compound Semiconductor 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 these products 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.**

Printed in U.S.A. FCSI0999M200

FUJITSU