FHX45X

GaAs HEMT Chips

## FEATURES
- Low Noise Figure: 0.55dB (Typ.)@f=12GHz
- High Associated Gain: 12.0dB (Typ.)@f=12GHz
- Lg ≤ 0.15um, Wg = 280um
- Gold Gate Metallization for High Reliability

DESCRIPTION

The FHX45X is a Super High Electron Mobility Transistor (SuperHEMT™) intended for general purpose, ultra-low noise and high gain amplifiers in the 2 to 18GHz frequency range. The device is well suited for telecommunication, DBS, TVRO, VSAT or other low noise applications.

Sumitomo Electric stringent Quality Assurance Program assures the highest reliability and consistent performance.
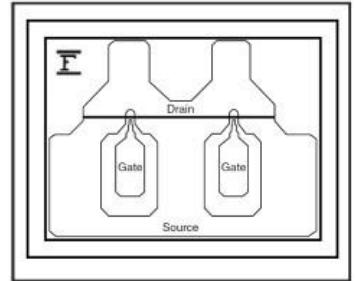
ABSOLUTE MAXIMUM RATING (Ambient Temperature Ta=25deg.C)

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*}	290	mW
Storage Temperature	T_{stg}	-65 to +175	deg.C
Channel Temperature	T_{ch}	175	deg.C

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

Sumitomo Electric 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 0.1 and -0.075 mA respectively with gate resistance of 4000ohm.
3. The operating channel temperature (T_{ch}) should not exceed 80deg.C.

## ELECTRICAL CHARACTERISTICS (Ambient Temperature Ta=25deg.C)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Saturated Drain Current	I_{DSS}	V_{DS} = 2V, V_{GS} = 0V	10	40	85	mA
Transconductance	gm	V_{DS} = 2V, I_{DS} = 10mA	45	65	-	mS
Pinch-off Voltage	Vp	V_{DS} = 2V, I_{DS} = 1mA	-0.1	-1.0	-2.0	V
Gate Source Breakdown Voltage	V_{GSO}	I_{GS} = -10uA	-3.0	-	-	V
Noise Figure	NF	V_{DS} = 2V, I_{DS} = 10mA	-	0.55	0.65	dB
Associated Gain	G_{as}	f = 12GHz	10.0	12.0	-	dB
Thermal Resistance	R_{th}	Channel to Case	-	155	200	deg.C/W

Note: RF parameter sample size 10pcs. criteria (accept/reject)=(2/3)
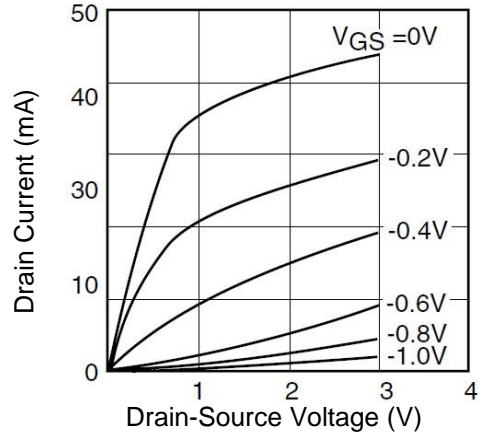
The chip must be enclosed in a hermetically sealed environment for optimum performance and reliability.
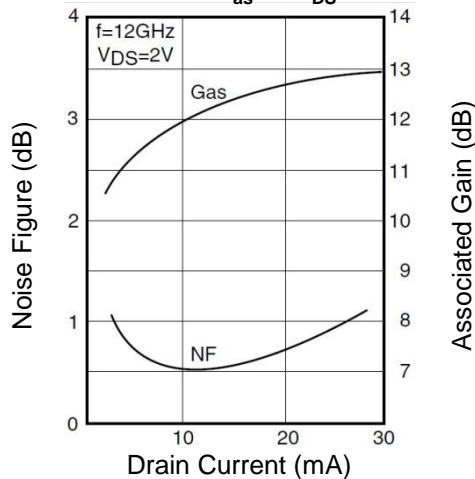
RoHS Compliance	Yes

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POWER DERATING CURVE
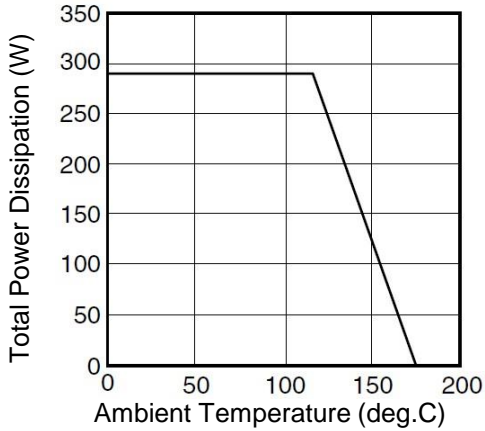
DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE

NF & G_{as} vs. I_{DS}

NF & G_{as} vs. Frequency
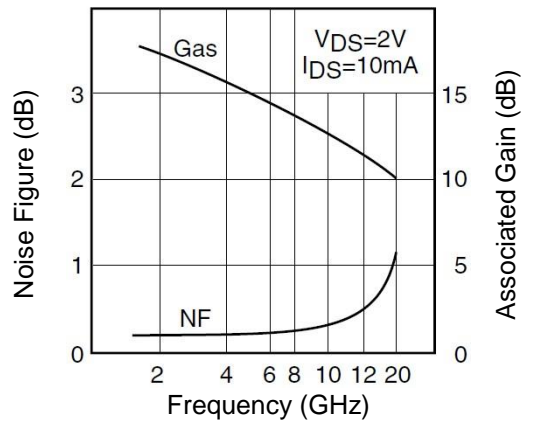
FHX45X NOISE PARAMETERS

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

Freq.	Γ opt		NFmin	Rn/50
(GHz)	(MAG)	(ANG)	(dB)	
2	0.83	12.7	0.28	0.21
4	0.72	28.2	0.30	0.19
6	0.65	45.2	0.34	0.17
8	0.62	62.6	0.39	0.15
10	0.61	79.4	0.47	0.13
12	0.60	94.5	0.55	0.11
14	0.58	106.7	0.67	0.10
16	0.55	115.0	0.81	0.09
18	0.47	118.4	1.00	0.09

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

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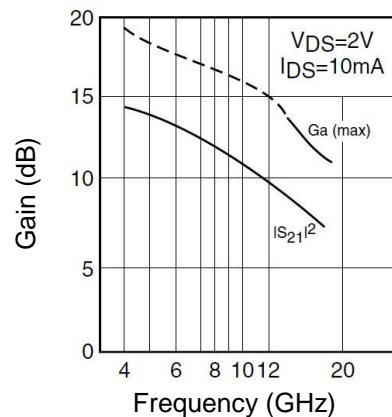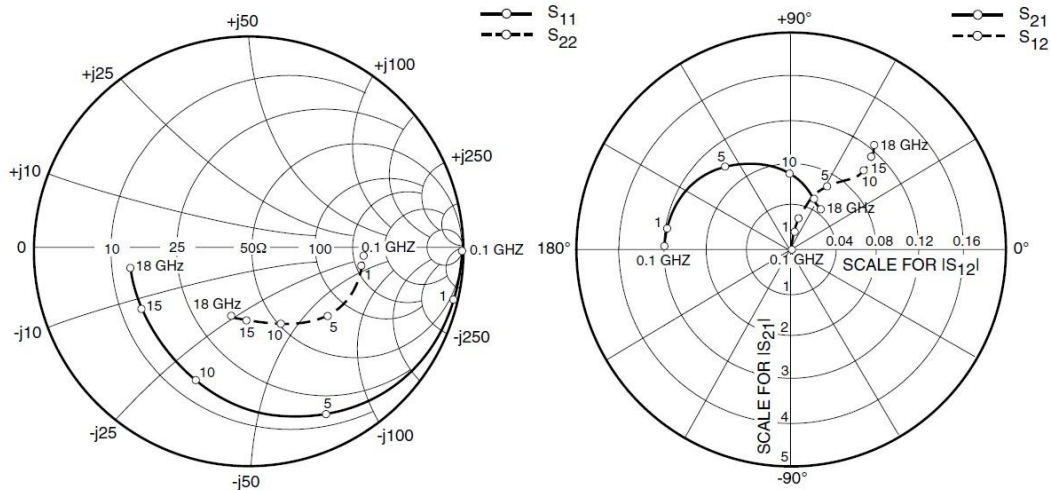
S-PARAMETERS

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

Freq	S11		S21		S12		S22	
(MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	1.000	-1.4	6.039	178.9	0.002	89.3	0.533	-0.9
500	0.998	-6.8	6.025	174.4	0.009	86.4	0.531	-4.6
1000	0.991	-13.6	5.981	168.8	0.017	82.8	0.528	-9.2
2000	0.966	-27.0	5.818	157.8	0.033	75.9	0.516	-18.0
3000	0.928	-39.9	5.572	147.4	0.048	69.6	0.497	-26.4
4000	0.883	-52.1	5.277	137.7	0.060	64.1	0.475	-34.2
5000	0.835	-63.6	4.959	128.8	0.070	59.3	0.452	-41.4
6000	0.788	-74.5	4.640	120.5	0.078	55.4	0.430	-48.0
7000	0.744	-84.8	4.333	112.9	0.085	52.3	0.408	-54.0
8000	0.705	-94.5	4.046	105.8	0.090	49.9	0.389	-59.6
9000	0.671	-103.8	3.782	99.3	0.094	48.1	0.372	-64.9
10000	0.642	-112.7	3.542	93.2	0.097	46.9	0.358	-70.0
11000	0.618	-121.1	3.324	87.5	0.100	46.2	0.346	-74.9
12000	0.599	-129.3	3.126	82.1	0.103	46.0	0.336	-79.7
13000	0.584	-137.1	2.948	77.0	0.106	46.2	0.329	-84.4
14000	0.573	-144.6	2.786	72.1	0.109	46.7	0.323	-89.0
15000	0.566	-151.7	2.639	67.4	0.112	47.3	0.319	-93.7
16000	0.561	-158.5	2.504	62.9	0.116	48.2	0.317	-98.4
17000	0.560	-165.1	2.382	58.5	0.120	49.1	0.317	-103.1
18000	0.562	-171.3	2.268	54.3	0.125	50.0	0.318	-107.8

NOTE:* The data includes bonding wires.

n: number of wires	Gate	n=2 (0.3mm length, 25um Dia Au wire)
	Drain	n=2 (0.3mm length, 25um Dia Au wire)
	Source	n=4 (0.3mm length, 25µm Dia Au wire)

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CHIP OUTLINE

(Unit: um)

Die Thickness:
100±20um
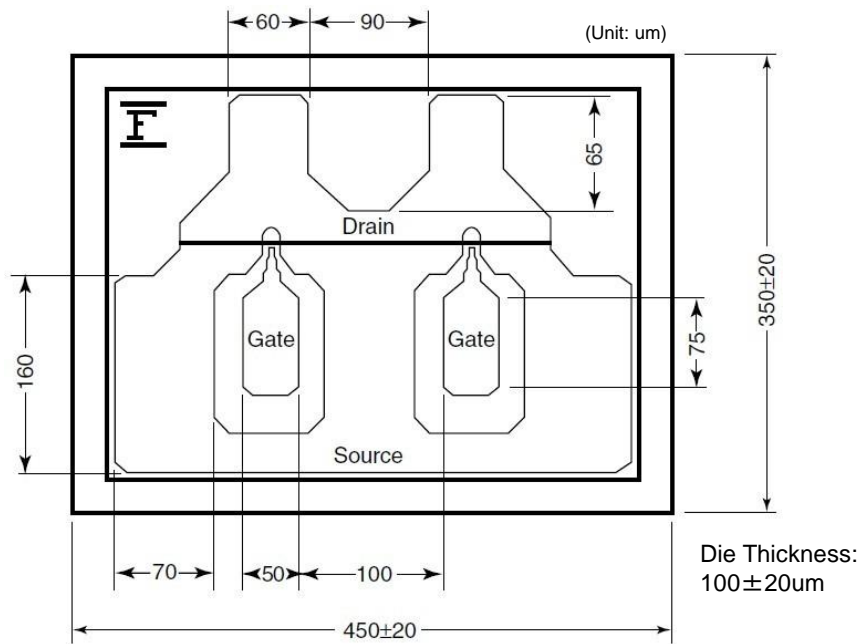
■ **BARE DIE INDEMNIFICATION**

All devices are DC probed and visually inspected at SEI, and non-compliant devices are removed. The RF electrical characteristics of the bare dice are warranted by the sampling inspection procedures. The standard sampling inspection procedure shall include the number of the sampling dice, position of the sampling dice in the wafer and RF electrical characteristics of the sampling dice measured in the test fixture. Customer shall understand that all the bare dice will not be 100% RF tested by SEI. It is the customer responsibility to verify performance of the devices.

Customer shall comply with the storage and handling requirements for condition and period of storage of the bare dice agreed by customer and SEI. Warranty will not apply when customer disregards the storage and handling requirements.

Warranty will not apply to the electrical characteristics and product quality to the bare dice after assembly by customer.

SEI will indemnify customer for warranty failures, provided however that the indemnification to customer shall be limited to supply of bare dice for substitution.

CAUTION

Sumitomo Electric Device Innovations, 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 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.

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