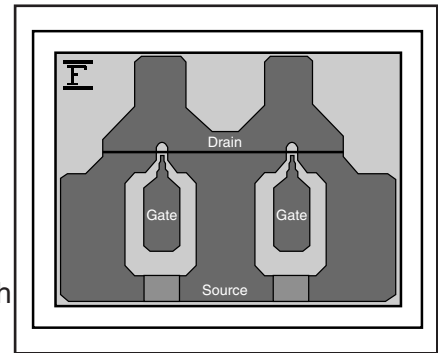


### FEATURES

- Low Noise Figure: 0.55dB (Typ.)@f=12GHz
- High Associated Gain: 12.0dB (Typ.)@f=12GHz
- $L_g \leq 0.15\mu\text{m}$ ,  $W_g = 280\mu\text{m}$
- 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 2-18GHz frequency range. The device is 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 | $P_{t*}$  | 290         | 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 0.1 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 Ta=25°C)

| Item                          | Symbol    | Condition                                    | Limit |      |      | Unit |
|-------------------------------|-----------|--|-------|------|------|------|
|                               |           |  | Min.  | Typ. | Max. |      |
| Saturated Drain Current       | $I_{DSS}$ | $V_{DS} = 2V, V_{GS} = 0V$                   | 10    | 40   | 85   | mA   |
| Transconductance              | $g_m$     | $V_{DS} = 2V, I_{DS} = 10mA$                 | 45    | 65   | -    | mS   |
| Pinch-off Voltage             | $V_p$     | $V_{DS} = 2V, I_{DS} = 1mA$                  | -0.1  | -1.0 | -2.0 | V    |
| Gate Source Breakdown Voltage | $V_{GSO}$ | $I_{GS} = -10\mu A$                          | -3.0  | -    | -    | V    |
| Noise Figure                  | NF        | $V_{DS} = 2V, I_{DS} = 10mA,$<br>$f = 12GHz$ | -     | 0.55 | 0.65 | dB   |
| Associated Gain               | $G_{as}$  |  | 10.0  | 12.0 | -    | dB   |
| Thermal Resistance            | $R_{th}$  | Channel to Case                              | -     | 155  | 200  | °C/W |

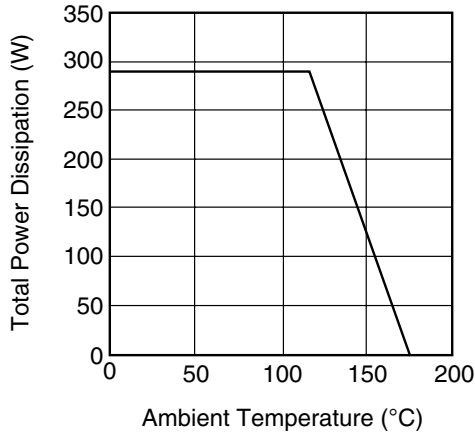
Note: RF parameter sample size 10pcs. criteria (accept/reject)=(2/3)

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

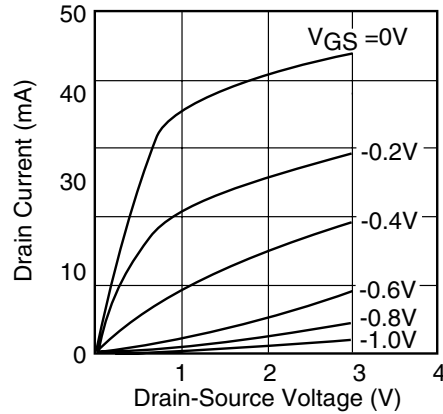
# FHX45X

## GaAs FET & HEMT Chips

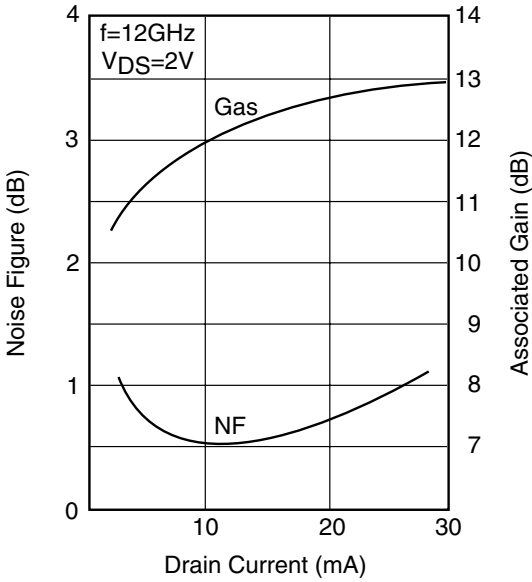
**POWER DERATING CURVE**



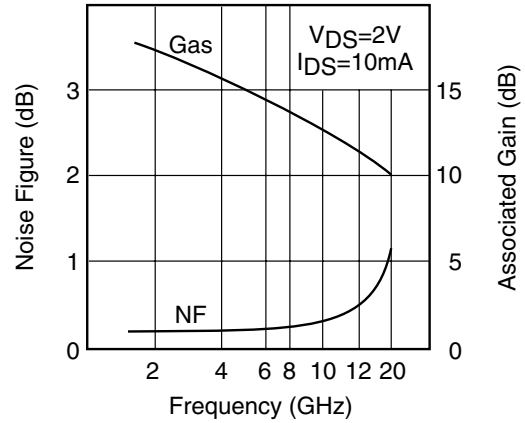
**DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE**



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



**NF & Gas vs. Frequency**

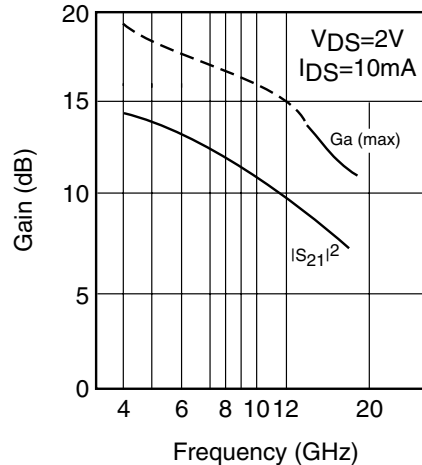


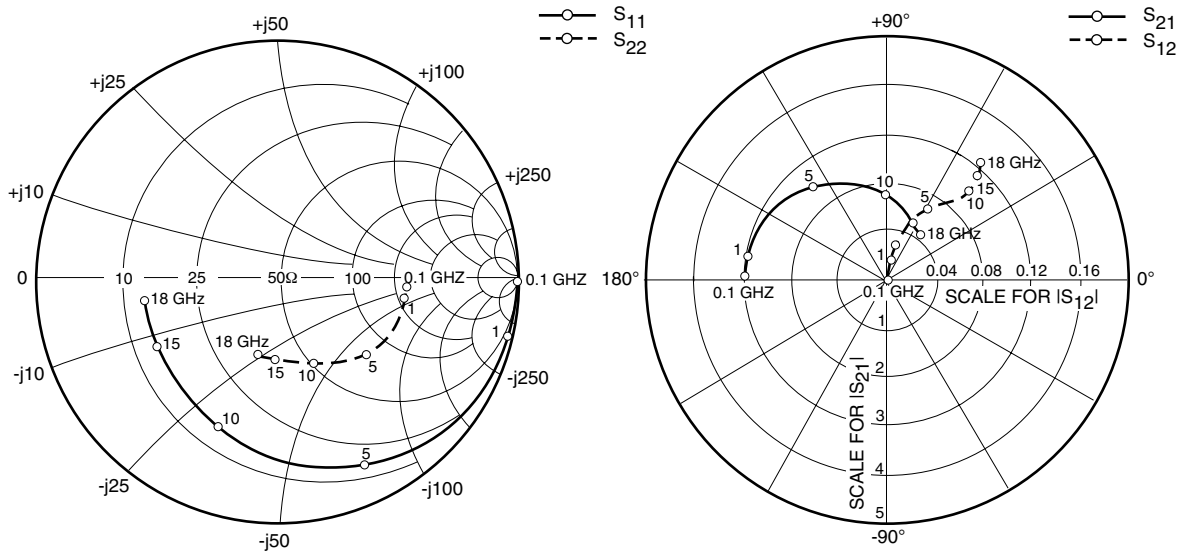
**FHX45X NOISE PARAMETERS**

V<sub>DS</sub>=2V, I<sub>DS</sub>=10mA

| Freq. (GHz) | Γ <sub>opt</sub> |       | NF <sub>min</sub> (dB) | R <sub>n</sub> /50 |
|-------------|------------------|-------|------------------------|--------------------|
|             | (MAG)            | (ANG) |                        |                    |
| 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<sub>a</sub> (max) & |S<sub>21</sub>|<sup>2</sup> vs. FREQUENCY**





### S-PARAMETERS

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

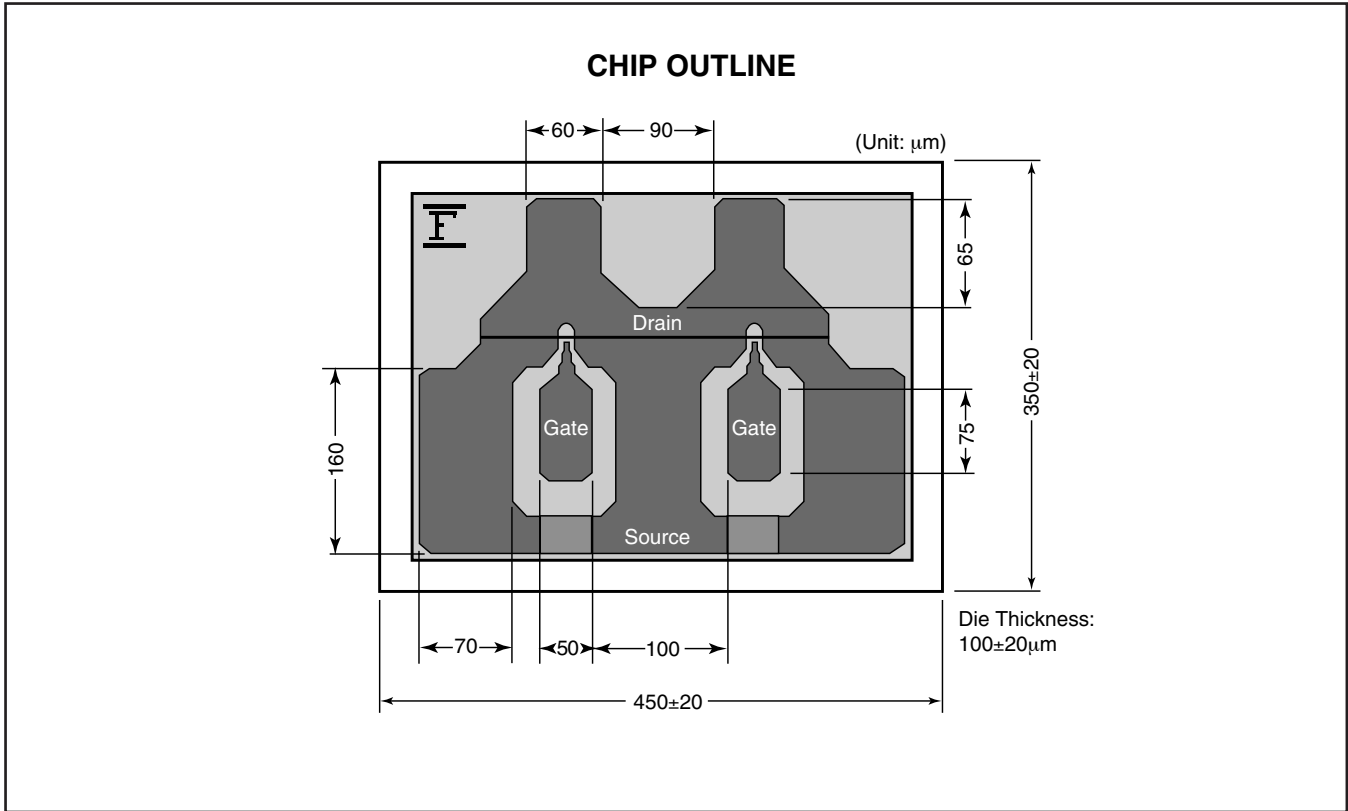
| FREQUENCY<br>(MHZ) | S11   |        | S21   |       | S12  |      | S22  |        |
|--------------------|-------|--------|-------|-------|------|------|------|--------|
|                    | MAG   | ANG    | MAG   | ANG   | MAG  | ANG  | MAG  | ANG    |
| 100                | 1.000 | -1.4   | 6.039 | 178.9 | .002 | 89.3 | .533 | -0.9   |
| 500                | 0.998 | -6.8   | 6.025 | 174.4 | .009 | 86.4 | .531 | -4.6   |
| 1000               | 0.991 | -13.6  | 5.981 | 168.8 | .017 | 82.8 | .528 | -9.2   |
| 2000               | 0.966 | -27.0  | 5.818 | 157.8 | .033 | 75.9 | .516 | -18.0  |
| 3000               | 0.928 | -39.9  | 5.572 | 147.4 | .048 | 69.6 | .497 | -26.4  |
| 4000               | 0.883 | -52.1  | 5.277 | 137.7 | .060 | 64.1 | .475 | -34.2  |
| 5000               | 0.835 | -63.6  | 4.959 | 128.8 | .070 | 59.3 | .452 | -41.4  |
| 6000               | 0.788 | -74.5  | 4.640 | 120.5 | .078 | 55.4 | .430 | -48.0  |
| 7000               | 0.744 | -84.8  | 4.333 | 112.9 | .085 | 52.3 | .408 | -54.0  |
| 8000               | 0.705 | -94.5  | 4.046 | 105.8 | .090 | 49.9 | .389 | -59.6  |
| 9000               | 0.671 | -103.8 | 3.782 | 99.3  | .094 | 48.1 | .372 | -64.9  |
| 10000              | 0.642 | -112.7 | 3.542 | 93.2  | .097 | 46.9 | .358 | -70.0  |
| 11000              | 0.618 | -121.1 | 3.324 | 87.5  | .100 | 46.2 | .346 | -74.9  |
| 12000              | 0.599 | -129.3 | 3.126 | 82.1  | .103 | 46.0 | .336 | -79.7  |
| 13000              | 0.584 | -137.1 | 2.948 | 77.0  | .106 | 46.2 | .329 | -84.4  |
| 14000              | 0.573 | -144.6 | 2.786 | 72.1  | .109 | 46.7 | .323 | -89.0  |
| 15000              | 0.566 | -151.7 | 2.639 | 67.4  | .112 | 47.3 | .319 | -93.7  |
| 16000              | 0.561 | -158.5 | 2.504 | 62.9  | .116 | 48.2 | .317 | -98.4  |
| 17000              | 0.560 | -165.1 | 2.382 | 58.5  | .120 | 49.1 | .317 | -103.1 |
| 18000              | 0.562 | -171.3 | 2.268 | 54.3  | .125 | 50.0 | .318 | -107.8 |

NOTE:\* The data includes bonding wires.

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

# FHX45X

## GaAs FET & HEMT Chips



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