

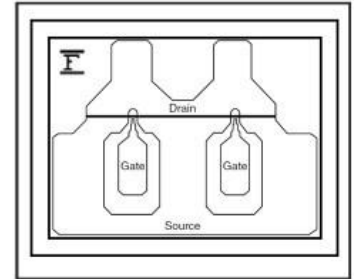
### FEATURES

- Low Noise Figure: 1.2dB (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

### DESCRIPTION

The FHX35X is a High Electron Mobility Transistor(HEMT) intended for general purpose, low noise and high gain amplifiers in the 2 to 18GHz frequency range. This device is well suited for telecommunication, DBS, TVRO, VSAT or other low noise applications.

Sumitomo Electric's stringent Quality Assurance Program assures the highest reliability and consistent performance.



### ABSOLUTE MAXIMUM RATING (Ambient Temperature $T_a=25\text{deg.C}$ )

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	$T_{stg}$	-65 to +175	deg.C
Channel Temperature	$T_{ch}$	175	deg.C

\*Note: Mounted on  $\text{Al}_2\text{O}_3$  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 3 volts.
2. The forward and reverse gate currents should not exceed 0.2 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 $T_a=25\text{deg.C}$ )

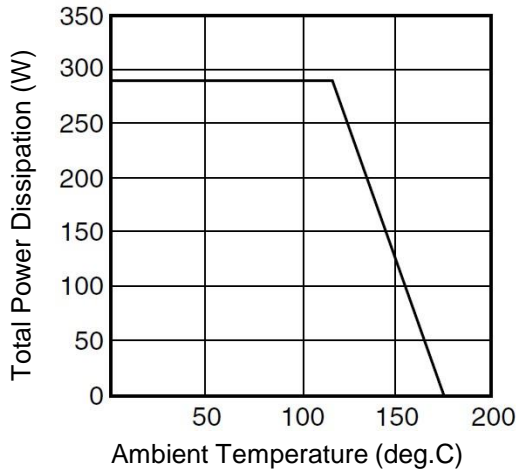
Item	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
Saturated Drain Current	$I_{DSS}$	$V_{DS} = 2V, V_{GS} = 0V$	15	40	85	mA
Transconductance	gm	$V_{DS} = 2V, I_{DS} = 10\text{mA}$	40	60	-	mS
Pinch-off Voltage	$V_p$	$V_{DS} = 2V, I_{DS} = 1\text{mA}$	-0.2	-1.0	-2.0	V
Gate Source Breakdown Voltage	$V_{GSO}$	$I_{GS} = -10\mu\text{A}$	-3.0	-	-	V
Noise Figure	NF	$V_{DS} = 3V$ $I_{DS} = 10\text{mA}$ $f = 12\text{GHz}$	-	1.2	1.6	dB
Associated Gain						
Thermal Resistance	$R_{th}$	Channel to Case	-	155	200	deg.C/W

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

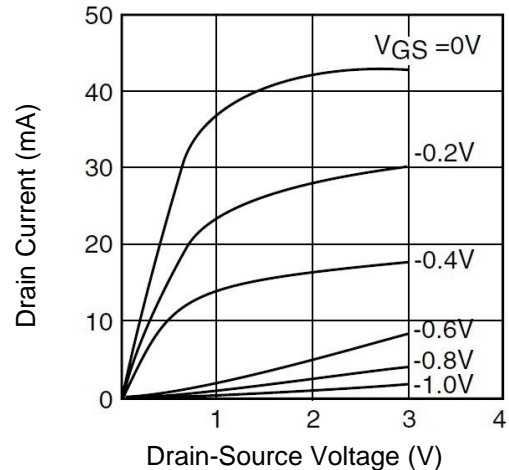
The chip must be enclosed in a hermetically sealed environment for optimum performance and reliability.

<b>RoHS Compliance</b>	<b>Yes</b>
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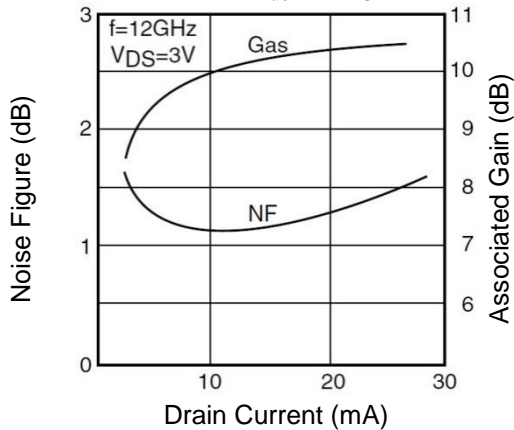
### POWER DERATING CURVE



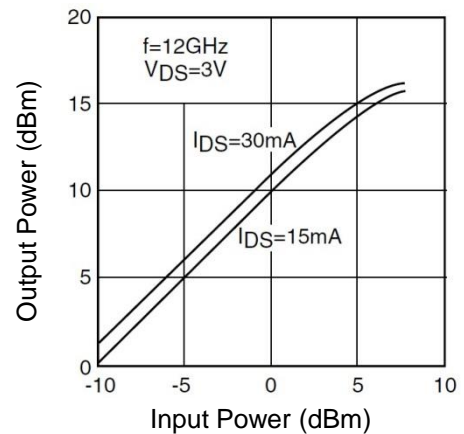
### DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE



### NF & Gas vs. IDS



### OUTPUT POWER vs. INPUT POWER

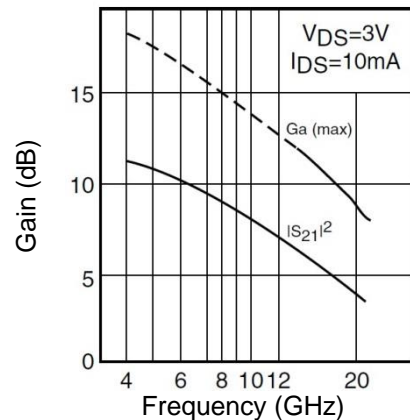


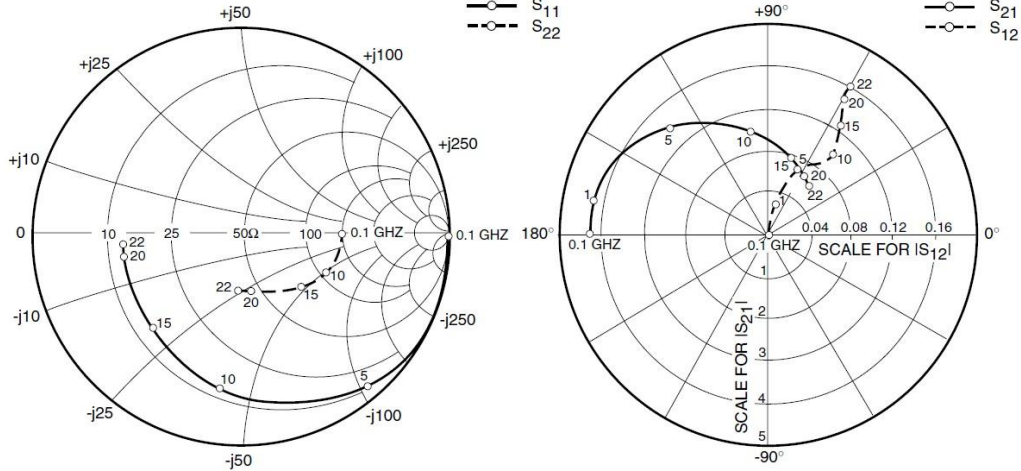
### FHX35X NOISE PARAMETERS

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

Freq. (GHz)	$\Gamma_{opt}$		NFmin (dB)	Rn/50
	(MAG)	(ANG)		
2	0.81	20	0.40	0.67
4	0.77	39	0.50	0.56
6	0.74	57	0.68	0.46
8	0.71	78	0.86	0.37
10	0.69	92	1.03	0.29
12	0.67	109	1.20	0.22
14	0.65	124	1.38	0.17
16	0.64	139	1.54	0.13
18	0.63	153	1.70	0.10
20	0.62	165	1.88	0.08
22	0.62	177	2.05	0.07

### Ga(max) & |S21|^2 vs. FREQUENCY





### S-PARAMETERS

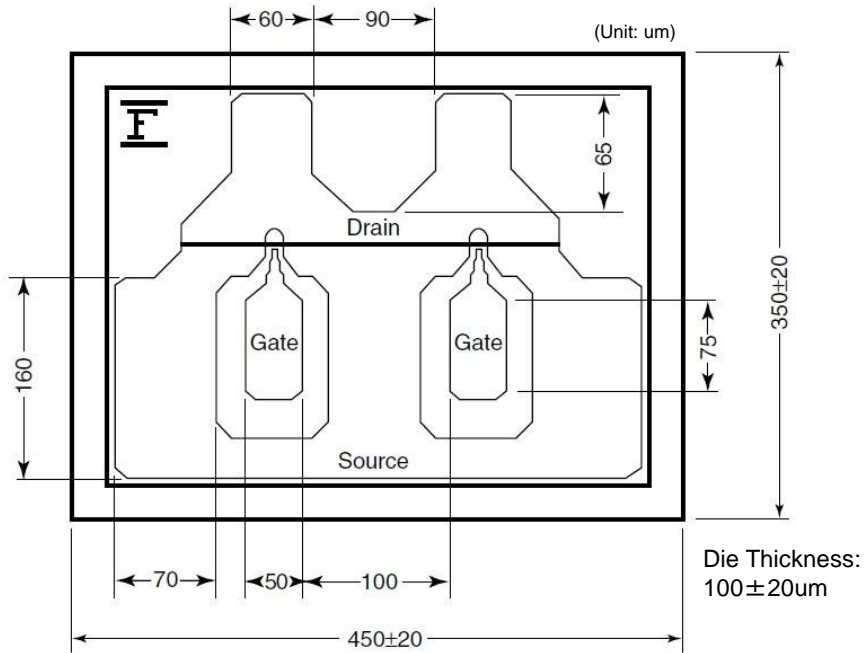
$V_{DS} = 3V, I_{DS} = 10mA$

Freq (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	1.000	-1.3	4.235	178.9	0.002	89.4	0.506	-0.7
500	0.998	-6.7	4.227	174.7	0.009	86.8	0.505	-3.3
1000	0.993	-13.3	4.200	169.2	0.017	83.6	0.503	-6.7
2000	0.973	-26.3	4.097	159.2	0.033	77.5	0.493	-13.1
3000	0.943	-38.8	3.941	149.4	0.048	71.9	0.478	-19.2
4000	0.907	-50.6	3.752	140.3	0.060	67.0	0.460	-24.8
5000	0.869	-61.8	3.546	131.8	0.071	62.8	0.441	-29.9
6000	0.831	-72.2	3.337	123.9	0.080	59.4	0.422	-34.6
7000	0.795	-81.9	3.134	116.7	0.087	56.7	0.403	-38.8
8000	0.763	-91.0	2.943	110.1	0.093	54.6	0.386	-42.8
9000	0.734	-99.5	2.766	103.9	0.097	53.2	0.371	-46.5
10000	0.709	-107.5	2.604	98.2	0.102	52.3	0.357	-50.1
11000	0.688	-115.0	2.457	92.8	0.105	51.8	0.344	-53.6
12000	0.670	-122.0	2.323	87.8	0.109	51.8	0.333	-57.1
13000	0.655	-128.7	2.202	83.1	0.112	52.2	0.323	-60.7
14000	0.644	-135.0	2.093	78.6	0.116	52.8	0.314	-64.3
15000	0.634	-141.0	1.993	74.3	0.119	53.7	0.306	-68.0
16000	0.627	-146.7	1.903	70.2	0.124	54.7	0.300	-71.8
17000	0.622	-152.1	1.820	66.3	0.128	55.8	0.294	-75.8
18000	0.619	-157.3	1.744	62.6	0.134	56.9	0.289	-80.0
19000	0.618	-162.2	1.675	59.0	0.140	58.0	0.285	-84.3
20000	0.617	-167.0	1.610	55.5	0.146	59.0	0.282	-88.8
21000	0.618	-171.5	1.551	52.1	0.154	59.9	0.280	-93.5
22000	0.621	-175.8	1.495	48.8	0.162	60.6	0.279	-98.3

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)

**CHIP OUTLINE**



**■ 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.