

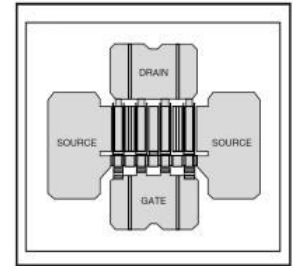
### FEATURES

- Medium Power Output:  $P_{1dB}=24.5\text{dBm(Typ.)}@8.0\text{GHz}$
- High Power Gain:  $G_{1dB}=10\text{dB(Typ.)}@8.0\text{GHz}$
- Proven Reliability

### DESCRIPTION

The FSX027X is a general purpose GaAs FET designed for medium power applications up to 12GHz. These devices have a wide dynamic range and are suitable for use in medium power, wide band, linear drive amplifiers or oscillators.

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



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

Parameter	Symbol	Condition	Rating	Unit
Drain-Source Voltage	$V_{DS}$		12	V
Gate-Source Voltage	$V_{GS}$		-5	V
Total Power Dissipation	$P_T$	$T_c = 25\text{deg.C}$	1.5	W
Storage Temperature	$T_{STG}$		-65 to +175	deg.C
Channel Temperature	$T_{CH}$		175	deg.C

Sumitomo Electric recommends the following conditions for the reliable operation of GaAs FETs:

1. The drain-source operating voltage ( $V_{DS}$ ) should not exceed 8 volts.
2. The forward and reverse gate currents should not exceed 1.4 and -0.2 mA respectively with gate resistance of 1000ohm.
3. The operating channel temperature ( $T_{CH}$ ) should not exceed 145deg.C.

### ELECTRICAL CHARACTERISTICS (Ambient Temperature $T_a=25\text{deg.C}$ )

Item	Symbol	Test Conditions	Limit			Unit
			Min.	Typ.	Max.	
Saturated Drain Current	$I_{DSS}$	$V_{DS} = 3V, V_{GS} = 0V$	70	110	150	mA
Transconductance	gm	$V_{DS} = 3V, I_{DS} = 54\text{mA}$	-	100	-	mS
Pinch-off Voltage	$V_p$	$V_{DS} = 3V, I_{DS} = 5.4\text{mA}$	-0.7	-1.2	-1.7	V
Gate Source Breakdown Voltage	$V_{GSO}$	$I_{GS} = -5.4\mu A$	-5.0	-	-	V
Noise Figure	NF	$V_{DS} = 3V, I_{DS} = 30\text{mA}$	-	2.5	-	dB
Associated Gain	$G_{as}$	$f = 8\text{GHz}$	-	9.5	-	dB
Output Power at 1dB G.C.P.	$P_{1dB}$	$V_{DS} = 8V, f = 4\text{GHz}$	-	24.5	-	dBm
		$I_{DS} = 0.7I_{DSS}, f = 8\text{GHz}$	23.5	24.5	-	dBm
		$I_{DS} = 0.7I_{DSS}, f = 12\text{GHz}$	-	23.5	-	dBm
Power Gain at 1dB G.C.P.	$G_{1dB}$	$V_{DS} = 8V, f = 4\text{GHz}$	-	14.0	-	dB
		$I_{DS} = 0.7I_{DSS}, f = 8\text{GHz}$	9.0	10.0	-	dB
		$I_{DS} = 0.7I_{DSS}, f = 12\text{GHz}$	-	6.5	-	dB
Thermal Resistance	$R_{th}$	Channel to Case	-	70	100	deg.C/W

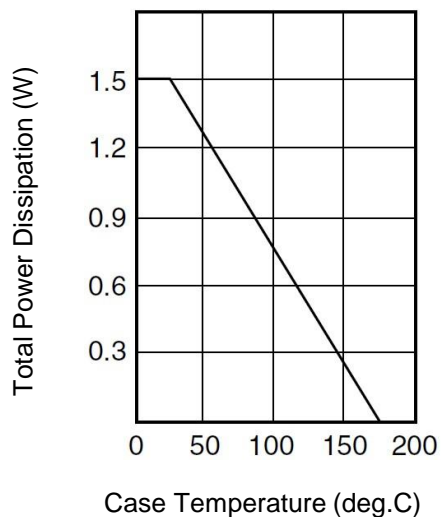
**Note:** RF parameter sample size 10pcs. criteria (accept/reject)=(2/3)

G.C.P.: Gain Compression Point

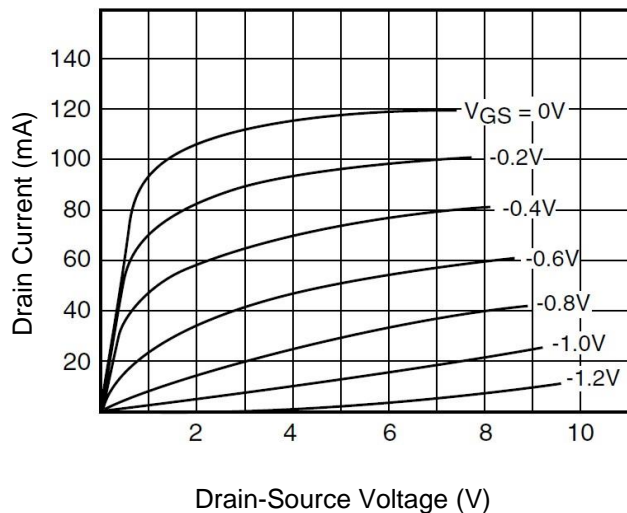
The chip must be enclosed in a hermetically sealed environment for optimum performance and reliability.

RoHS Compliance	Yes
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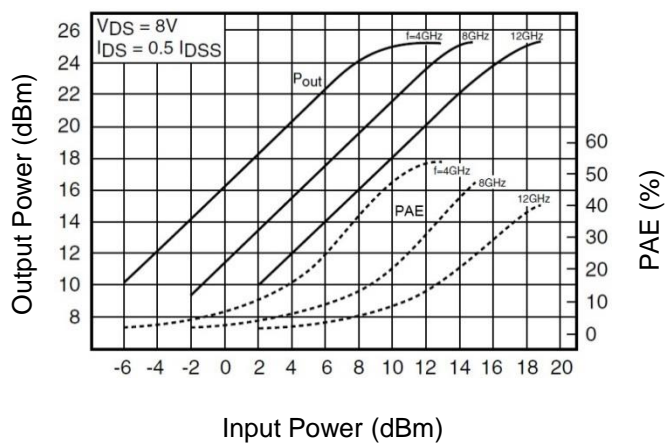
**POWER DERATING CURVE**



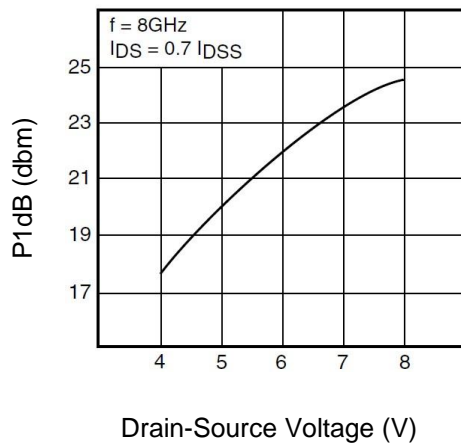
**DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE**



**OUTPUT POWER vs. INPUT POWER**



**$P_{1dB}$  vs.  $V_{DS}$**



## S-PARAMETERS

$V_{DS} = 8V$ ,  $I_{DS} = 75mA$

Freq (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1000	0.981	-41.2	7.117	153.2	0.023	67.6	0.633	-14.9
2000	0.946	-75.2	6.065	130.8	0.040	50.3	0.588	-26.6
3000	0.913	-100.3	5.015	113.3	0.050	37.4	0.548	-35.2
4000	0.882	-118.9	4.168	99.4	0.055	28.8	0.523	-42.1
5000	0.877	-132.7	3.520	87.9	0.058	22.2	0.506	-48.4
6000	0.867	-143.6	3.026	77.9	0.060	17.3	0.498	-54.7
7000	0.860	-152.5	2.644	69.0	0.062	13.6	0.499	-60.9
8000	0.854	-159.9	2.336	60.9	0.063	10.2	0.504	-67.1
9000	0.849	-166.3	2.089	53.1	0.064	7.0	0.515	-73.4
10000	0.845	-172.0	1.887	45.8	0.065	4.4	0.524	-79.0
11000	0.841	-177.2	1.716	36.7	0.065	2.1	0.539	-84.7
12000	0.837	178.3	1.569	32.0	0.065	0.0	0.550	-90.3
13000	0.834	174.1	1.441	25.4	0.066	-1.0	0.561	-95.7
14000	0.829	169.8	1.332	18.9	0.067	-3.5	0.574	-101.2
15000	0.826	166.1	1.238	12.6	0.067	-5.4	0.589	-106.8
16000	0.824	162.7	1.155	6.6	0.068	-6.1	0.603	-112.5
17000	0.817	159.3	1.074	0.4	0.069	-9.1	0.623	-118.0
18000	0.813	155.9	1.001	-5.5	0.068	-10.4	0.642	-123.1
19000	0.814	152.8	0.543	-11.3	0.069	-11.2	0.657	-127.9
20000	0.811	150.1	0.888	-16.9	0.069	-13.4	0.672	-132.7

NOTE:\* The data includes bonding wires.

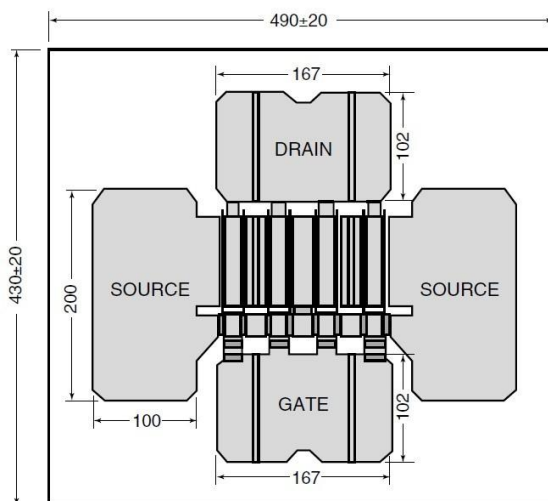
n: number of wires

Gate n=1 (0.2mm length, 25um Dia Au wire)

Drain n=1 (0.2mm length, 25um Dia Au wire)

Source n=4 (0.2mm length, 25um Dia Au wire)

## CHIP OUTLINE



Die Thickness:  $100 \pm 20 \mu\text{m}$   
(Unit:  $\mu\text{m}$ )

**■ 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.