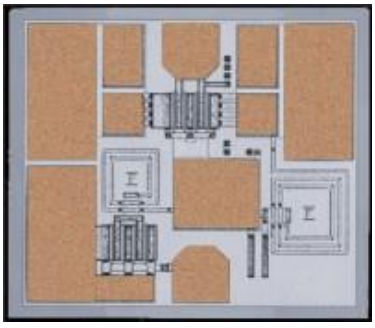
FMM5701X

24GHz Low Noise Amplifier MMIC



FEATURES

- Low Noise Figure: NF=1.4dB (Typ.) @ f=24GHz
- High Associated Gain: G_{as}=13.5dB (Typ.) @ f=24GHz
- Wide Frequency Band: 18 to 28GHz

DESCRIPTION

The FMM5701X is a LNA MMIC designed for applications in the 18 to 28GHz frequency range. This product is well suited for satellite communications and radio link applications where low noise and high gain is required.
Sumitomo Electric's stringent Quality Assurance Program assures the highest reliability and consistent performance.

ABSOLUTE MAXIMUM RATING (Ambient Temperature Ta=25deg.C)

Item	Symbol	Condition	Rating	Unit
Drain Voltage	V_{DD}		7.0	V
Gate Voltage	V_{GG}		-3.0	V
Storage Temperature	T_{stg}		-65 to +175	deg.C
Channel Temperature	T_{ch}		+175	deg.C

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

1. The drain-source operating voltage (V_{DD}) should not exceed 5 volts.
2. The drain-source operating current (I_D) should not exceed 12mA.
3. This product should be hermetically packaged.

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

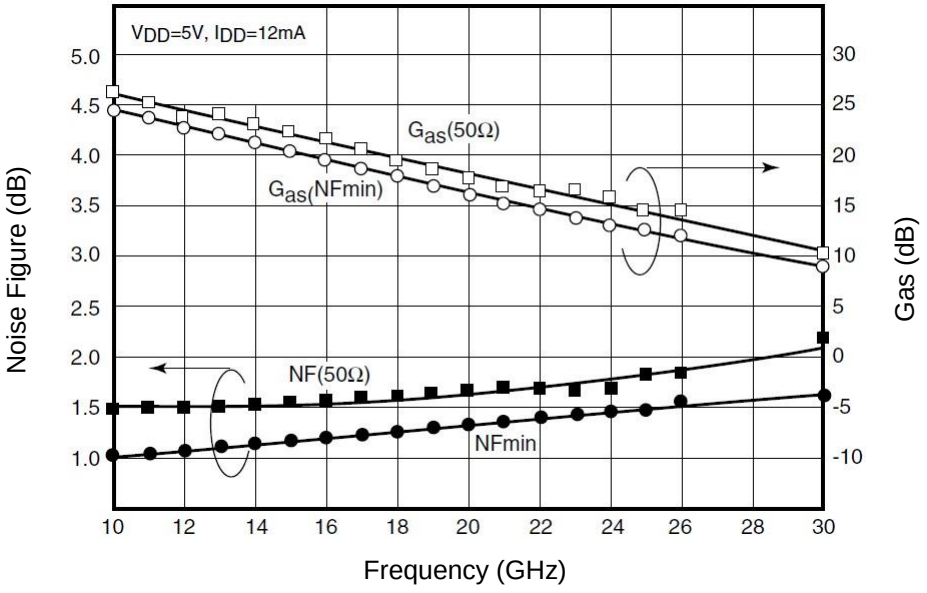
Item	Symbol	Conditions (2)		Limits			Unit
				Min.	Typ.	Max.	
Noise Figure	NF	V_{DS} = 5V I_D = 12mA	f=24GHz	-	1.5	1.8	dB
Associated Gain	G_{as}		f=24GHz	12.0	13.5	-	dB

Note 1: RF parameters sample size 10pcs. criteria (accept/reject) = (2/3)

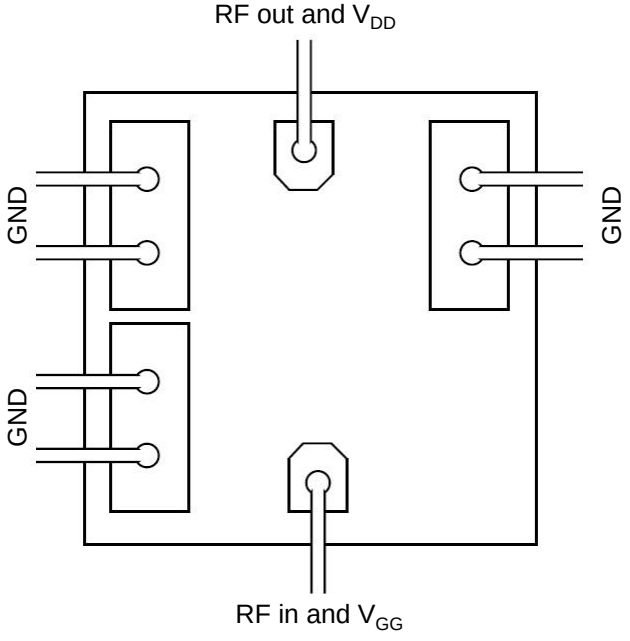
Note 2: Tuned for Γ opt

RoHS Compliance	Yes

NOISE FIGURE & G_{as} vs. FREQUENCY



BONDING LAYOUT



NOISE PARAMETERS

V_{DD}=5V, I_{DD}=12mA

Freq (GHz)	Γopt (MAG)	Γopt (ANG)	NFmin (dB)	Rn
2	0.793	13.4	0.78	0.47
4	0.670	26.9	0.84	0.39
6	0.582	38.5	0.90	0.34
8	0.526	54.4	0.97	0.27
10	0.492	69.1	1.03	0.23
12	0.475	84.7	1.09	0.19
14	0.468	101.6	1.16	0.14
16	0.464	120.1	1.22	0.10
18	0.458	140.4	1.28	0.07
20	0.441	162.9	1.35	0.05
22	0.408	-172.2	1.41	0.05
24	0.352	-144.5	1.47	0.07
26	0.266	-113.9	1.54	0.11
28	0.212	-88.5	1.60	0.16
30	0.202	-58.0	1.66	0.23

S-PARAMETERS

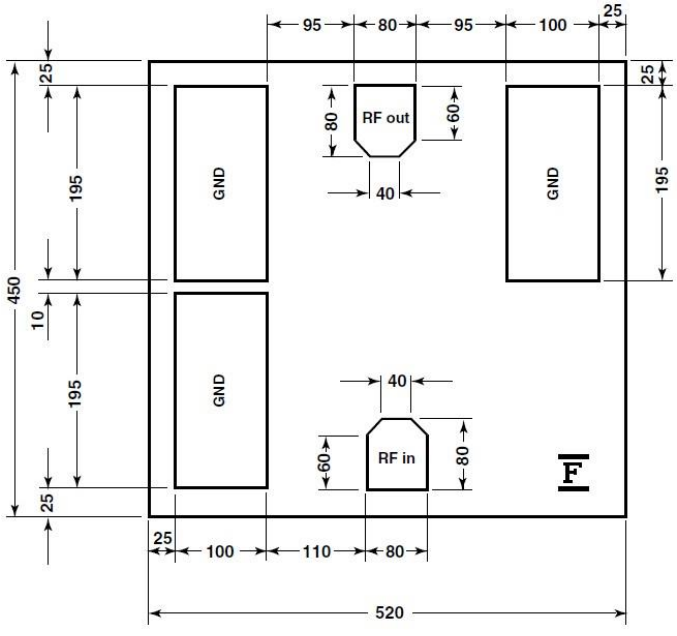
V_{DD} = 5V, I_{DS} = 12mA

Freq	S11		S21		S12		S22	
(MHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
15000	0.469	-131.8	8.289	130.9	0.017	23.3	0.350	-132.7
16000	0.492	-137.9	7.642	115.7	0.018	16.6	0.330	-138.4
17000	0.512	-145.8	6.987	101.5	0.020	10.9	0.311	-144.1
18000	0.542	-153.9	6.487	87.3	0.021	7.0	0.296	-149.0
19000	0.568	-162.7	5.950	73.6	0.023	2.3	0.287	-154.2
20000	0.598	-172.5	5.456	60.1	0.025	-3.6	0.283	-160.2
21000	0.615	178.2	5.027	47.5	0.026	-7.5	0.273	-165.6
22000	0.640	168.3	4.634	34.5	0.028	-10.9	0.268	-170.8
23000	0.663	158.5	4.258	22.0	0.030	-15.1	0.265	-176.5
24000	0.683	148.6	3.919	9.9	0.032	-17.9	0.262	178.5
25000	0.702	138.7	3.638	-2.2	0.035	-21.1	0.265	172.7
26000	0.722	128.8	3.318	-14.3	0.038	-27.0	0.267	166.4
27000	0.732	119.0	3.033	-25.1	0.040	-28.3	0.265	162.1
28000	0.737	109.4	2.820	-35.8	0.044	-31.7	0.266	155.5
29000	0.756	99.4	2.595	-47.7	0.048	-37.4	0.271	150.6
30000	0.762	90.3	2.370	-57.4	0.051	-40.3	0.270	144.9

NOTE:* The data includes bonding wires.

n: number of wires RF IN n=1 (0.3mm length, 25um Dia Au wire)
RF OUT n=1 (0.3mm length, 25um Dia Au wire)
GND n=6 (0.3mm length, 25um 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.