

TOSHIBA

MICROWAVE SEMICONDUCTORS TECHNICAL DATA

MICROWAVE POWER GaAs FET

JS9P10-AS

FEATURES:

■ HIGH POWER

$P_{1dB} = 24.0 \text{ dBm @ } f = 28 \text{ GHz}$

■ CHIP FORM

■ HIGH GAIN

$G_{1dB} = 9.5 \text{ dB @ } f = 28 \text{ GHz}$

RF PERFORMANCE SPECIFICATIONS (Ta= 25°C)

CHARACTERISTICS	SYMBOL	CONDITION	UNIT	MIN	TYP.	MAX.
Output Power at 1dB Compression Point	P _{1dB}	V _{DS} = 4.5V f= 28 GHz	dBm	23.0	24.0	—
Power Gain at 1dB Compression Point	G _{1dB}		dB	7.0	9.5	—
Drain Current	I _{DS1}		mA	—	180	300
Power Added Efficiency	η_{add}		%	—	28	—

ELECTRICAL CHARACTERISTICS (Ta= 25°C)

CHARACTERISTICS	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Transconductance	gm	V _{DS} = 2V I _{DS} = 0.1A	mS	—	200	—
Pinch-Off Voltage	V _{GSoff}	V _{DS} = 2V I _{DS} = 1.5mA	V	-0.7	-1.5	-3.0
Saturated Drain Current	I _{DSS}	V _{DS} = 2V V _{GS} = 0V	mA	—	250	400
Gate-Source Breakdown Voltage	V _{GS0}	I _{GS} = -0.8mA	V	-4.5	—	—

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*The information contained herein may be changed without prior notice. It is therefore advisable to contact TOSHIBA before proceeding with the design of equipment incorporating product.

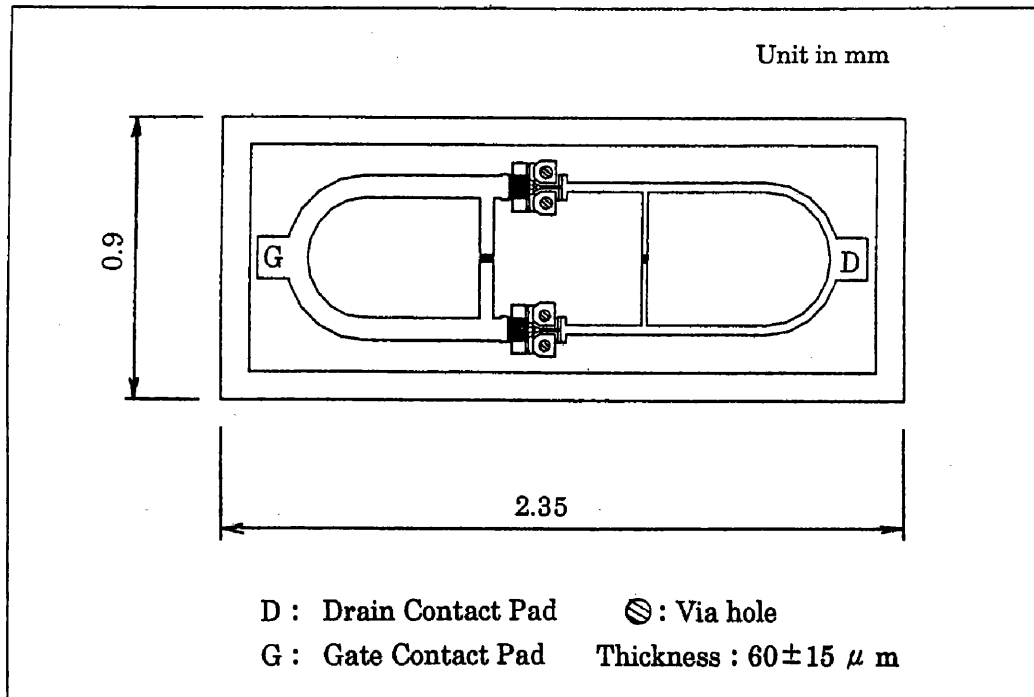
*The products described in this document contain strategic products subject to COCOM regulations. They should not be exported without authorization from the appropriate governmental authorities

TOSHIBA CORPORATION

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CHIP OUTLINE



ASSEMBLY PRECAUTIONS FOR CHIP

The operations must be performed in a clean and dry environment. This chips must be kept in the same environment when they are not used. All test instruments, assembly machines benches, tweezers and operators should be grounded to avoid damage due to electrostatic discharge. Careful attention must be paid in handling chips with tweezers because GaAs is more brittle than Si.

DIE ATTACHMENT

Die attachment can be accomplished with Au-Sn preform in nitrogen atmosphere. The operating temperature must be $290 \pm 10^\circ\text{C}$ for the preform to be well melted. The operating time should be kept within one minute.

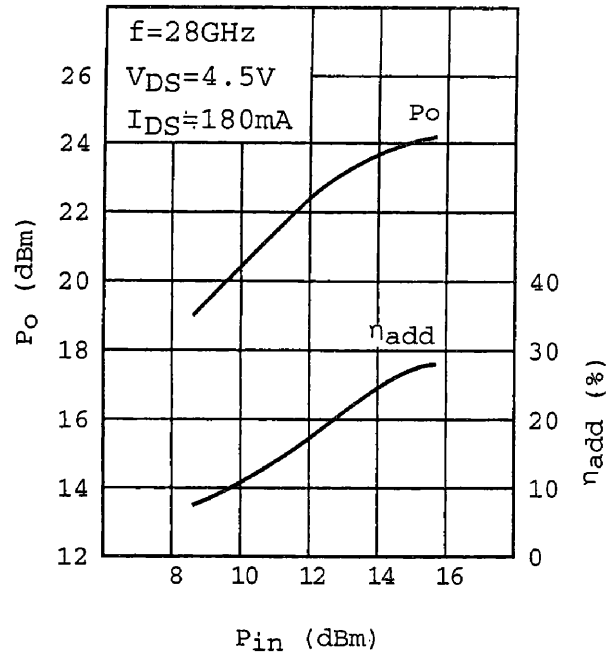
WIRE BONDING

Bonding should be performed with thermal compression wedge bonder in nitrogen atmosphere. The recommended condition of wire bonding are as follows :

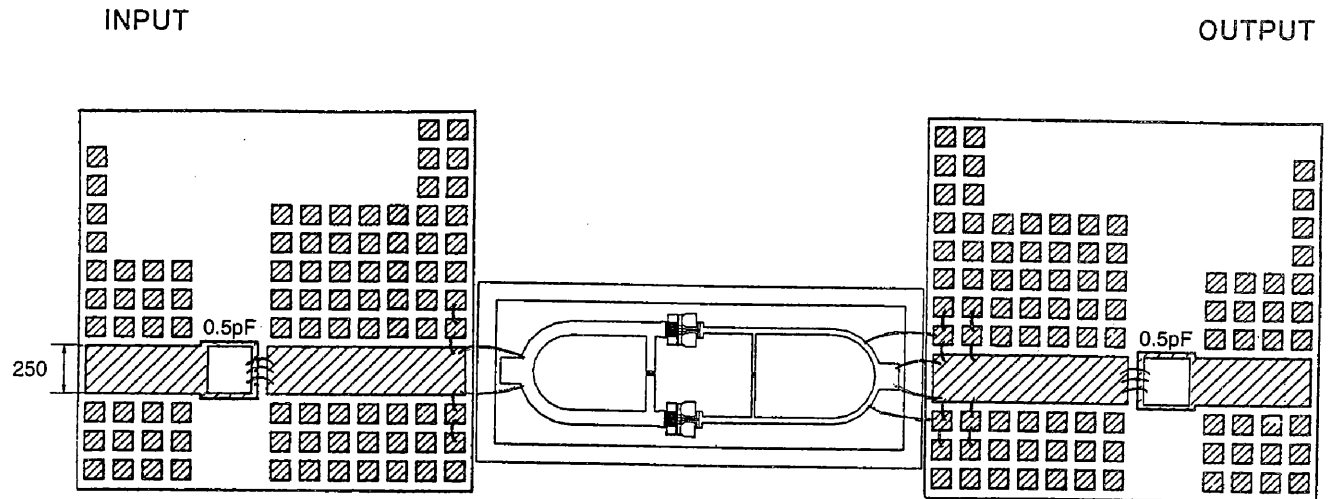
- (1) Operating temperature $200 \pm 10^\circ\text{C}$
- (2) Operating time 5 minutes max.
- (3) Bonding wire $25\mu\text{m}$ diameter pure Au

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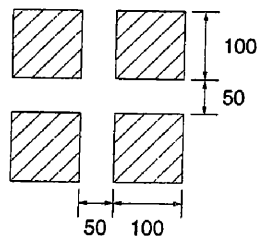
Output Power vs. Input Power



DRAWING OF MATCHING NETWORK



《MATCHING PATTERN》



Unit in μm

Material for Substrate : Al_2O_3 ($\epsilon_r = 9.7$)

Thickness : 0.254mm

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S-Parameter of JS9P10-AS

VDS = 4.5 V IDS = 150mA

freq (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
25.0	.90	112.5	0.98	-102.7	.038	-151.4	.77	113.2
25.2	.90	110.9	1.01	-105.8	.039	-153.4	.78	111.7
25.4	.90	109.6	1.04	-109.0	.041	-155.4	.78	110.0
25.6	.88	108.4	1.06	-112.0	.042	-157.8	.78	108.2
25.8	.85	107.5	1.07	-114.3	.043	-159.6	.78	106.6
26.0	.84	106.8	1.10	-116.1	.045	-159.9	.78	104.9
26.2	.84	106.0	1.13	-117.9	.048	-161.0	.77	103.3
26.4	.85	105.3	1.18	-119.6	.050	-162.3	.76	101.9
26.6	.85	104.2	1.24	-121.9	.053	-163.3	.75	100.3
26.8	.84	102.6	1.30	-124.5	.058	-164.4	.74	98.7
27.0	.82	100.0	1.36	-127.5	.063	-167.0	.73	97.6
27.2	.80	96.7	1.42	-130.4	.068	-170.7	.71	96.4
27.4	.79	93.5	1.49	-133.5	.072	-175.0	.68	94.4
27.6	.78	90.9	1.56	-136.9	.076	-178.8	.65	91.4
27.8	.77	88.6	1.63	-140.4	.080	177.4	.62	87.6
28.0	.75	85.9	1.69	-144.0	.083	173.1	.60	84.1
28.2	.72	82.5	1.77	-147.2	.085	169.0	.58	81.6
28.4	.70	78.3	1.85	-150.6	.087	166.2	.56	79.6
28.6	.69	73.6	1.96	-154.4	.091	164.2	.54	76.7
28.8	.67	68.6	2.07	-158.7	.096	161.6	.51	72.1
29.0	.64	63.1	2.19	-163.3	.102	158.1	.49	66.0

Including bonding wire inductances