

# TOSHIBA

## MICROWAVE SEMICONDUCTORS TECHNICAL DATA

## MICROWAVE POWER GaAs FET

### JS9P04-AS

#### FEATURES:

■ HIGH POWER

P1dB= 26.0dBm @ f = 38GHz

■ CHIP FORM

■ HIGH GAIN

G1dB= 6.5dB @ f =38GHz

#### RF PERFORMANCE SPECIFICATIONS (Ta= 25°C)

CHARACTERISTICS	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Output Power at 1dB Compression Point	P1dB	VDS= 4.5V f= 38 GHz	dBm	24.5	26.0	-
Power Gain at 1dB Compression Point	G1dB		dB	5.5	6.5	-
Drain Current	IDS1		mA	-	360	600
Power Added Efficiency	$\eta_{add}$		%	-	20	-

#### ELECTRICAL CHARACTERISTICS (Ta= 25°C)

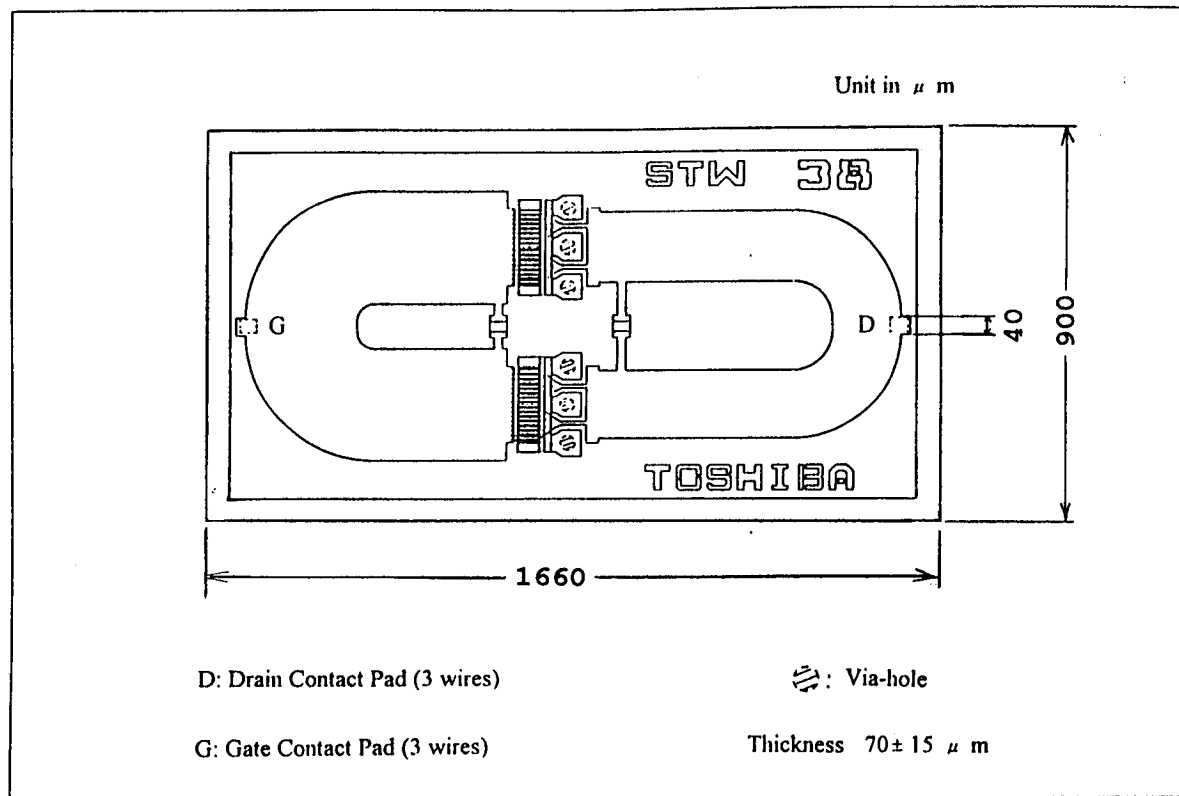
CHARACTERISTICS	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Transconductance	gm	VDS= 2V IDS= 0.2A	mS	-	400	-
Pinch-Off Voltage	VGSoff	VDS= 2V IDS= 3.0mA	V	-0.7	-1.5	-3.0
Saturated Drain Current	IDSS	VDS= 2V VGS= 0V	mA	-	500	800
Gate-Source Breakdown Voltage	VGSO	IGS= -1.6mA	V	-4.5	-	-

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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.

## 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  $290 \pm 10^\circ C$  for the preform to be well melted. The operating time should be kept within one minute.

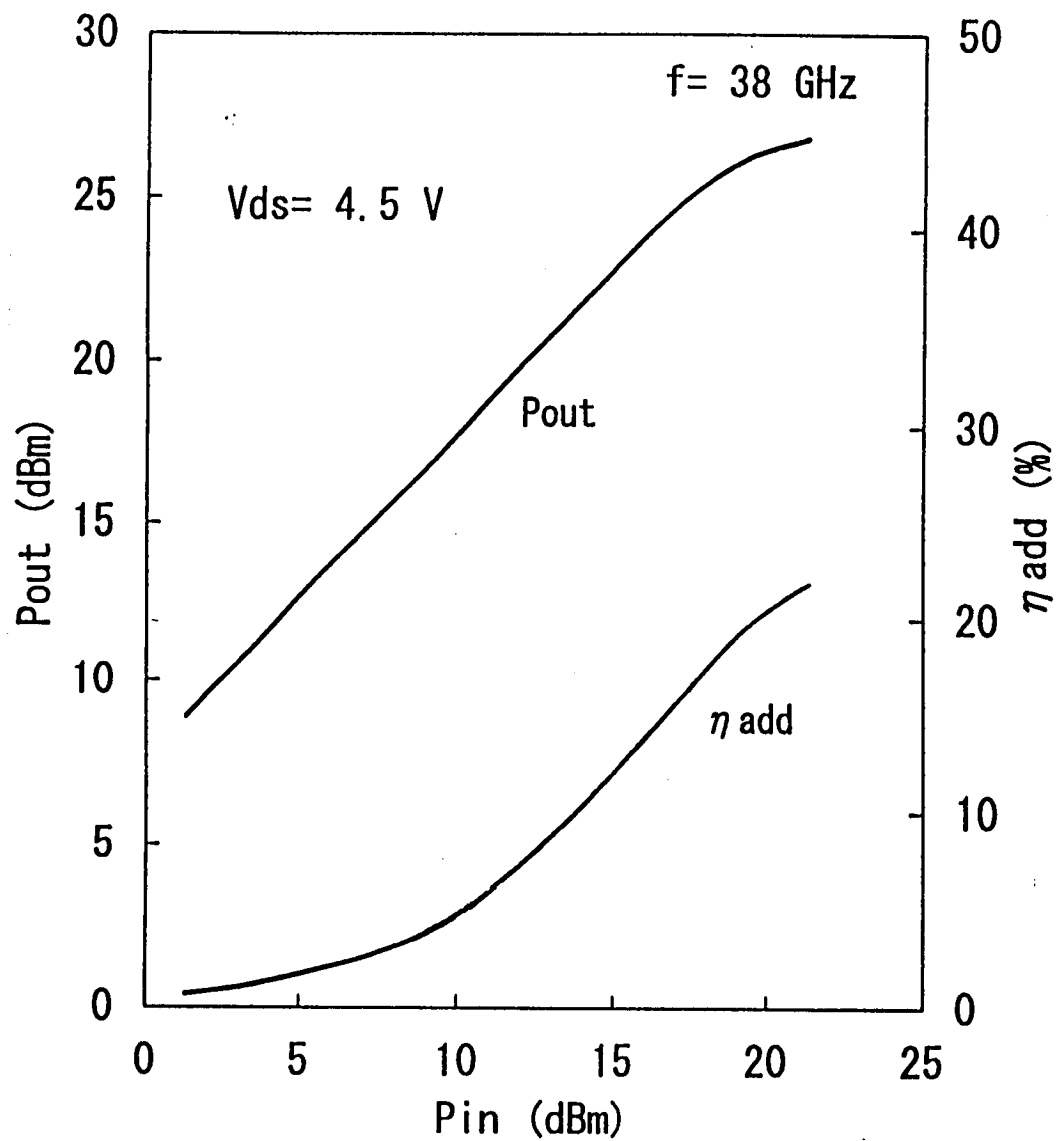
## WIRE BONDING

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

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

## OUTPUT POWER CHARACTERISTIC

Output Power vs. Input Power



## S-Parameter of JS9P04-AS

VDS=4.5V, IDS=300mA

Freq. (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
30.0	0.92	126.9	0.63	-84.5	0.039	-130.9	0.85	134.4
30.5	0.91	123.0	0.67	-89.0	0.042	-133.8	0.85	131.2
31.0	0.90	118.7	0.70	-93.6	0.046	-137.0	0.84	128.5
31.5	0.89	115.3	0.73	-98.0	0.048	-141.5	0.82	124.9
32.0	0.88	112.7	0.77	-102.0	0.051	-143.0	0.82	121.5
32.5	0.87	109.4	0.81	-106.4	0.056	-146.4	0.81	118.1
33.0	0.87	107.6	0.86	-110.3	0.062	-149.7	0.81	115.0
33.5	0.88	104.3	0.92	-114.7	0.065	-159.2	0.81	113.2
34.0	0.88	102.8	1.00	-117.9	0.066	-157.0	0.80	111.7
34.5	0.86	101.1	1.11	-122.3	0.084	-159.3	0.78	109.6
35.0	0.84	98.2	1.21	-129.0	0.093	-168.5	0.77	105.2
35.5	0.81	94.9	1.36	-133.6	0.102	-173.8	0.74	102.6
36.0	0.77	90.2	1.57	-141.1	0.121	-180.0	0.71	97.3
36.5	0.69	83.8	1.83	-150.4	0.144	171.2	0.65	91.2
37.0	0.57	72.9	2.14	-163.3	0.171	159.3	0.53	81.0
37.5	0.40	58.1	2.43	-178.9	0.201	144.7	0.38	66.0
38.0	0.18	26.5	2.62	162.8	0.223	127.0	0.20	43.2
38.5	0.13	-97.1	2.62	143.9	0.231	107.8	0.09	-60.5
39.0	0.31	-143.9	2.39	125.0	0.218	89.3	0.25	-130.1
39.5	0.43	-158.2	2.13	111.5	0.192	75.1	0.35	-150.4

Including bonding wire inductances