

TOSHIBA

MICROWAVE SEMICONDUCTOR

TECHNICAL DATA

MICROWAVE POWER GaAs FET

JS8838A-AS

FEATURES:

- HIGH POWER
P_{1dB} = 33.5 dBm at f = 8 GHz
- HIGH GAIN
G_{1dB} = 5.5 dB at f = 8 GHz
- SUITABLE FOR C-BAND AMPLIFIER
- ION IMPLANTATION

RF PERFORMANCE SPECIFICATIONS (T_a = 25° C)

TYPE NUMBER				JS8838A-AS (CHIP)		
CHARACTERISTIC	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Output Power at 1dB Compression Point	P _{1dB}	V _{DS} = 10V f = 8GHz	dBm	32.5	33.5	-
Power Gain at 1dB Compression Point	G _{1dB}		dB	4.5	5.5	-
Drain Current	I _{DS}		A	-	0.65	1.0
Power Added Efficiency	η _{add}		%	-	25	-

ELECTRICAL CHARACTERISTICS (T_a = 25° C)

TYPE NUMBER				JS8838A-AS (CHIP)		
CHARACTERISTIC	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Trans-conductance	g _m	V _{DS} = 3V I _{DS} = 0.8A	mS	-	500	-
Pinch-off Voltage	V _{GSoff}	V _{DS} = 3V I _{DS} = 10mA	V	-2	-3.5	-5
Saturated Drain Current	I _{DSS}	V _{DS} = 3V V _{GS} = 0V	A	-	1.6	2.0
Gate to Source Breakdown Voltage	V _{GS0}	I _{GS} = -30μA	V	-5	-	-
Thermal Resistance	R _{th(c-c)}	Channel to case	°C/W	-	10	15

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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 this product.



TOSHIBA CORPORATION

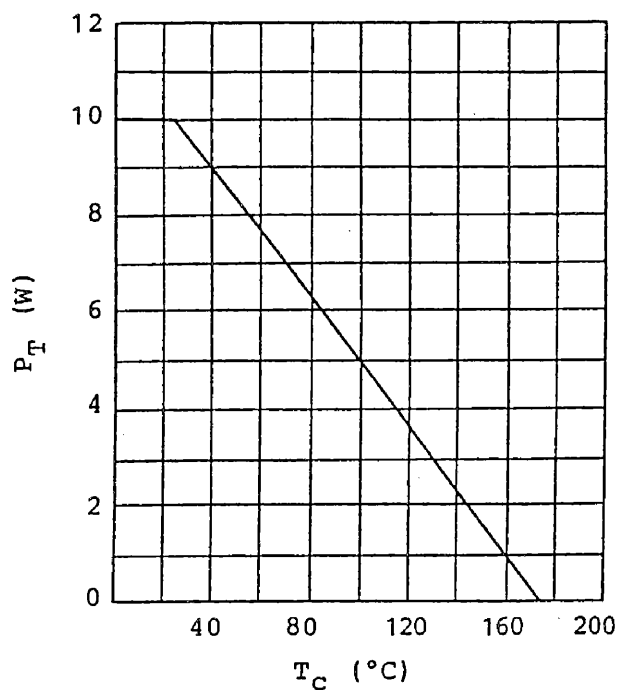
Revised May, 1989

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ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

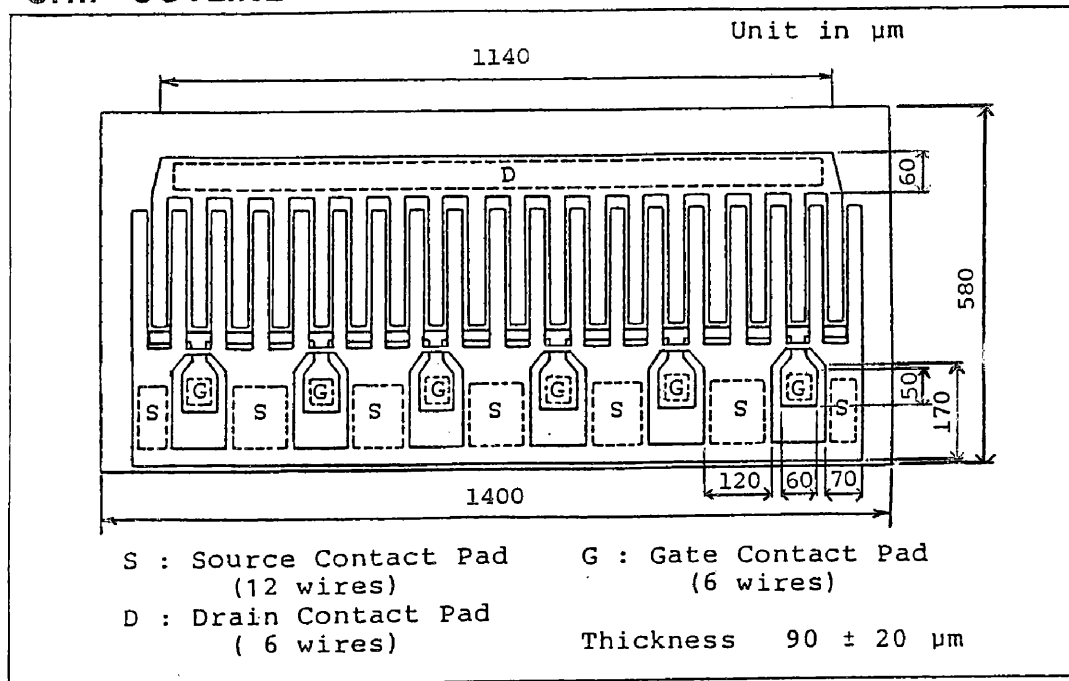
TYPE NUMBER			JS8838A-AS (CHIP)
CHARACTERISTIC	SYMBOL	UNIT	RATING
Drain-Source Voltage	V_{DS}	V	15
Gate-Source Voltage	V_{GS}	V	-5
Drain Current	I_D	A	2.0
Total Power Dissipation ($T_c=25^\circ\text{C}$)	P_T	W	10
Channel Temperature	T_{ch}	$^\circ\text{C}$	175
Storage Temperature	T_{stg}	$^\circ\text{C}$	-65~175

POWER DISSIPATION VS. CASE TEMPERATURE



JS3838A-AS

CHIP OUTLINE



ASSEMBLY PRECAUTIONS FOR CHIP

The operations must be performed in a clean and dry environment. The 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.

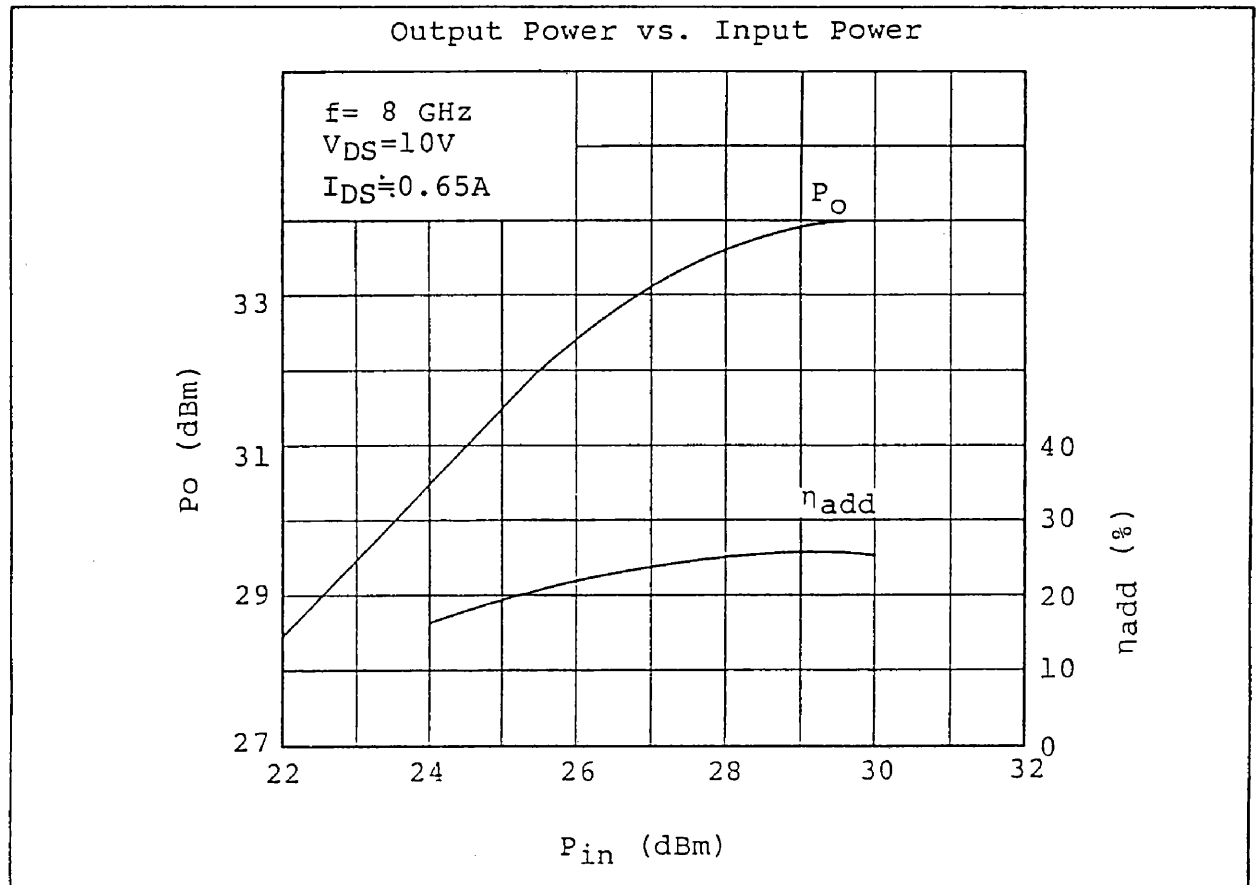
WIRE BONDING

Bonding should be performed with thermal compression wedge bonder in nitrogen atmosphere. The recommended conditions 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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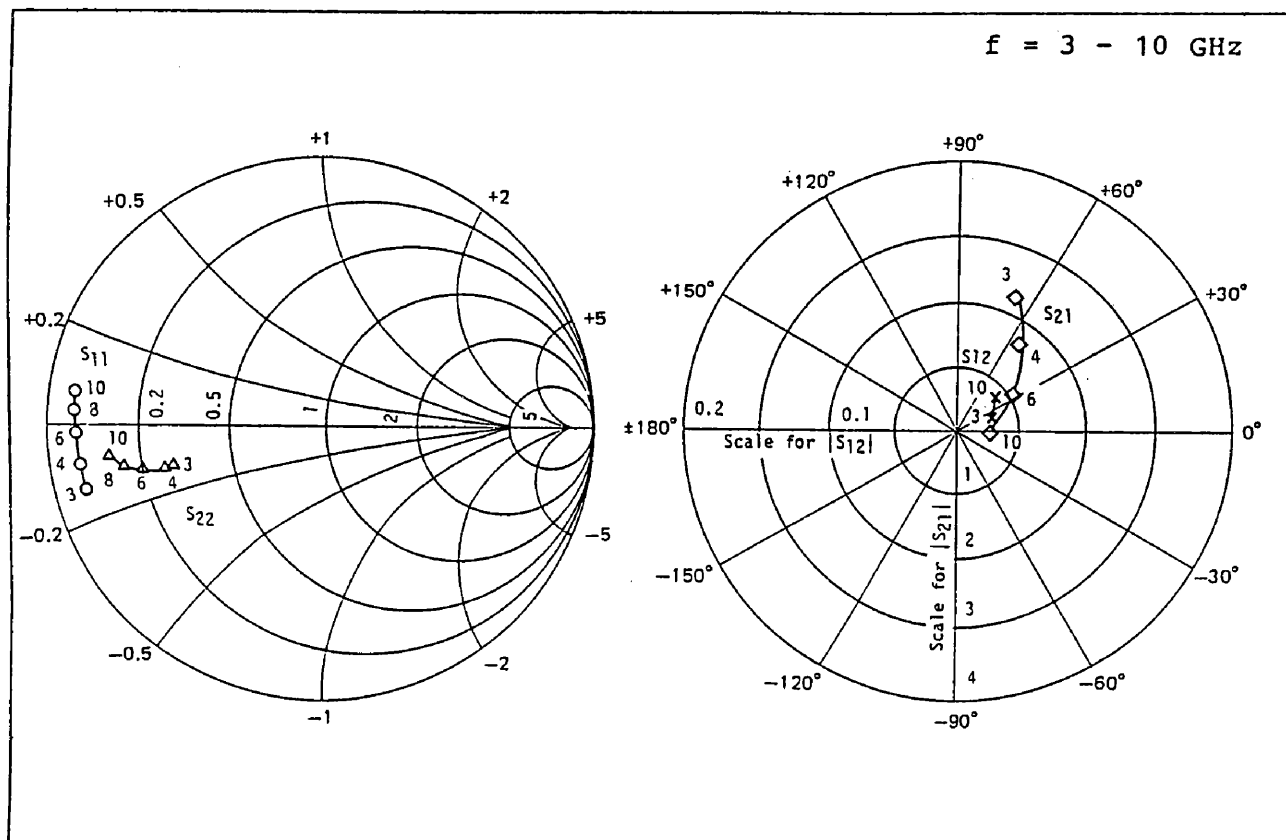
OUTPUT POWER CHARACTERISTIC



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JS8838A-AS S-PARAMETERS (MAGN. and ANGLES)

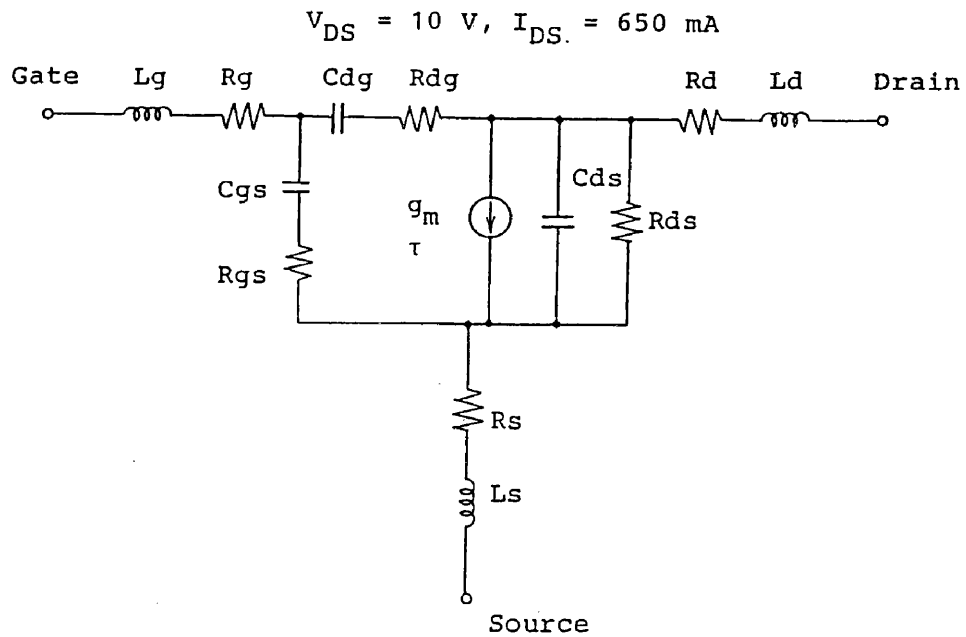
$V_{DS} = 10 \text{ V}$, $I_{DS} = 650 \text{ mA}$



FREQUENCY (GHz)	S_{11}		S_{12}		S_{21}		S_{22}	
3	0.89	-164	0.033	19	2.22	67	0.56	-164
4	0.89	-170	0.033	21	1.63	55	0.59	-164
5	0.89	-175	0.033	25	1.27	44	0.63	-165
6	0.89	-178	0.033	29	1.02	34	0.67	-165
7	0.90	179	0.035	34	0.84	25	0.70	-167
8	0.90	177	0.036	38	0.71	16	0.73	-168
9	0.90	175	0.039	42	0.60	9	0.76	-170
10	0.91	172	0.041	46	0.51	2	0.78	-171

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JS8838A-AS EQUIVALENT CIRCUIT (Includes normal bonding wires)



Bonding wire condition

$g_m = 500 \text{ mS}$
 $\tau = 9.4 \text{ ps}$
 $R_g = 0.73 \Omega$
 $R_s = 0.58 \Omega$
 $R_d = 0.77 \Omega$
 $R_{gs} = 0.89 \Omega$
 $R_{dg} = 0.01 \Omega$
 $R_{ds} = 24 \Omega$
 $C_{gs} = 5.00 \text{ pF}$
 $C_{dg} = 0.20 \text{ pF}$
 $C_{ds} = 1.41 \text{ pF}$
 $L_g = 0.086 \text{ nH}$
 $L_s = 0.018 \text{ nH}$
 $L_d = 0.052 \text{ nH}$

	Number (pcs)	Length (Approx.) (mm)	Dia. (μm)
Drain	6	0.4	$\phi 25$
Gate	6	0.4	$\phi 25$
Source	12	0.3	$\phi 25$