TOSHIBA

MICROWAVE SEMICONDUCTOR
TECHNICAL DATA

MICROWAVE POWER GaAs FET

JS8836A-AS

FEATURES:

- HIGH POWER
  P_{1dB} = 29.5 dBm at f = 8 GHz
- HIGH GAIN
  G_{1dB} = 7.5 dB at f = 8 GHz
- SUITABLE FOR C-BAND AMPLIFIER
- ION IMPLANTATION
- CHIP FORM

RF PERFORMANCE SPECIFICATIONS (Ta = 25°C)

TYPE NUMBER				JS8836A-AS (CHIP)		
CHARACTERISTIC	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Output Power at 1dB Compression Point	P_{1dB}	V_{DS}=10V f = 8GHz	dBm	28.5	29.5	-
Power Gain at 1dB Compression Point	G_{1dB}		dB	6.5	7.5	-
Drain Current	I_{DS}		A	-	0.25	0.4
Power Added Efficiency	η_{add}		%	-	30	-

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

TYPE NUMBER				JS8836A-AS (CHIP)		
CHARACTERISTIC	SYMBOL	CONDITION	UNIT	MIN.	TYP.	MAX.
Trans-conductance	g_m	V_{DS}=3V I_{DS}=0.28A	mS	-	170	-
Pinch-off Voltage	V_{GSoff}	V_{DS}=3V I_{DS}=5mA	V	-2	-3.5	-5
Saturated Drain Current	I_{DSS}	V_{DS}=3V V_{GS}=0V	A	-	0.55	0.7
Gate to Source Breakdown Voltage	V_{GSO}	I_{GS}=-10μA	V	-5	-	-
Thermal Resistance	$R_{th(c-c)}$	Channel to case	°C/W	-	20	30

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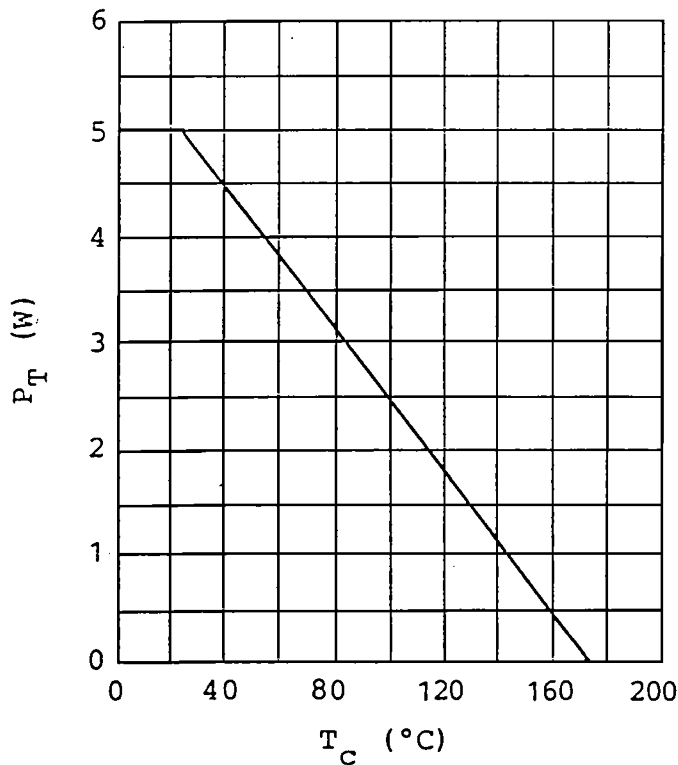
* The information contained herein may be changed without prior notice. It is therefore advisable to contact TOSHIBA before proceeding with the design of equipment incorporating this product.

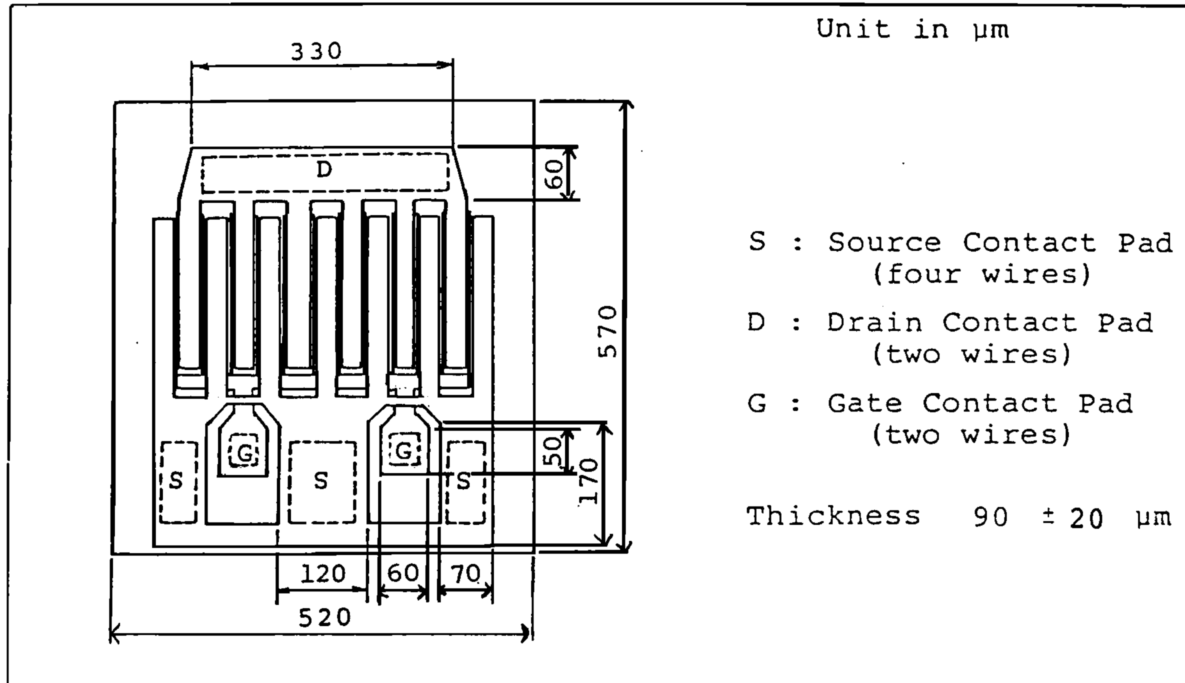
ABSOLUTE MAXIMUM RATINGS (Ta = 25° C)

TYPE NUMBER			JS8836A-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	0.7
Total Power Dissipation (Tc=25°C)	P_T	W	5.0
Channel Temperature	T_{ch}	°C	175
Storage Temperature	T_{stg}	°C	-65∿175

POWER DISSIPATION VS. CASE TEMPERATURE



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

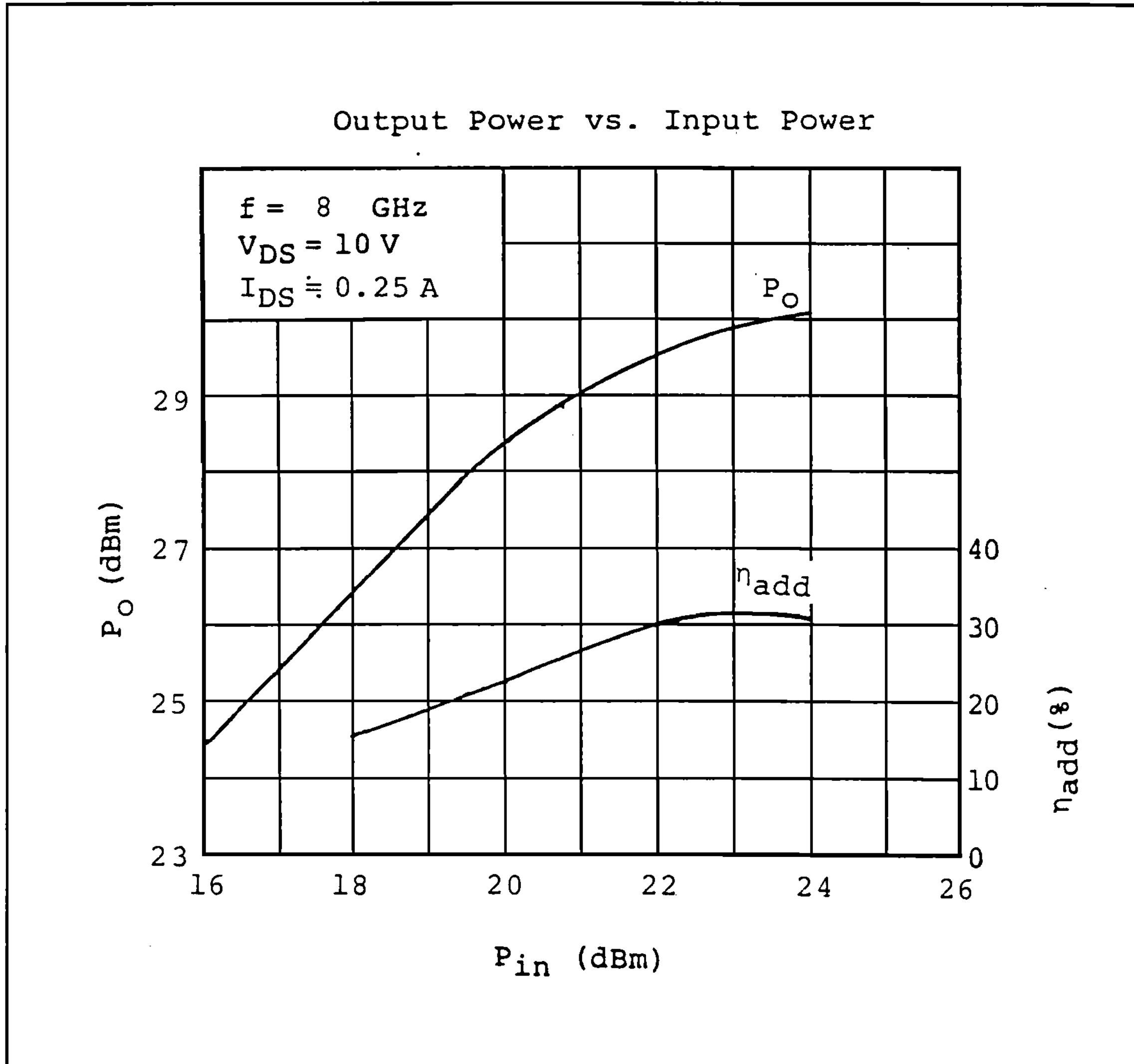
Die attachment can be accomplished with Au-Sn preform in nitrogen atmosphere. The operating temperature must be 290±10°C for the preform to be well melted. The operating time should be kept within one minute.

WIRE BONDING

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

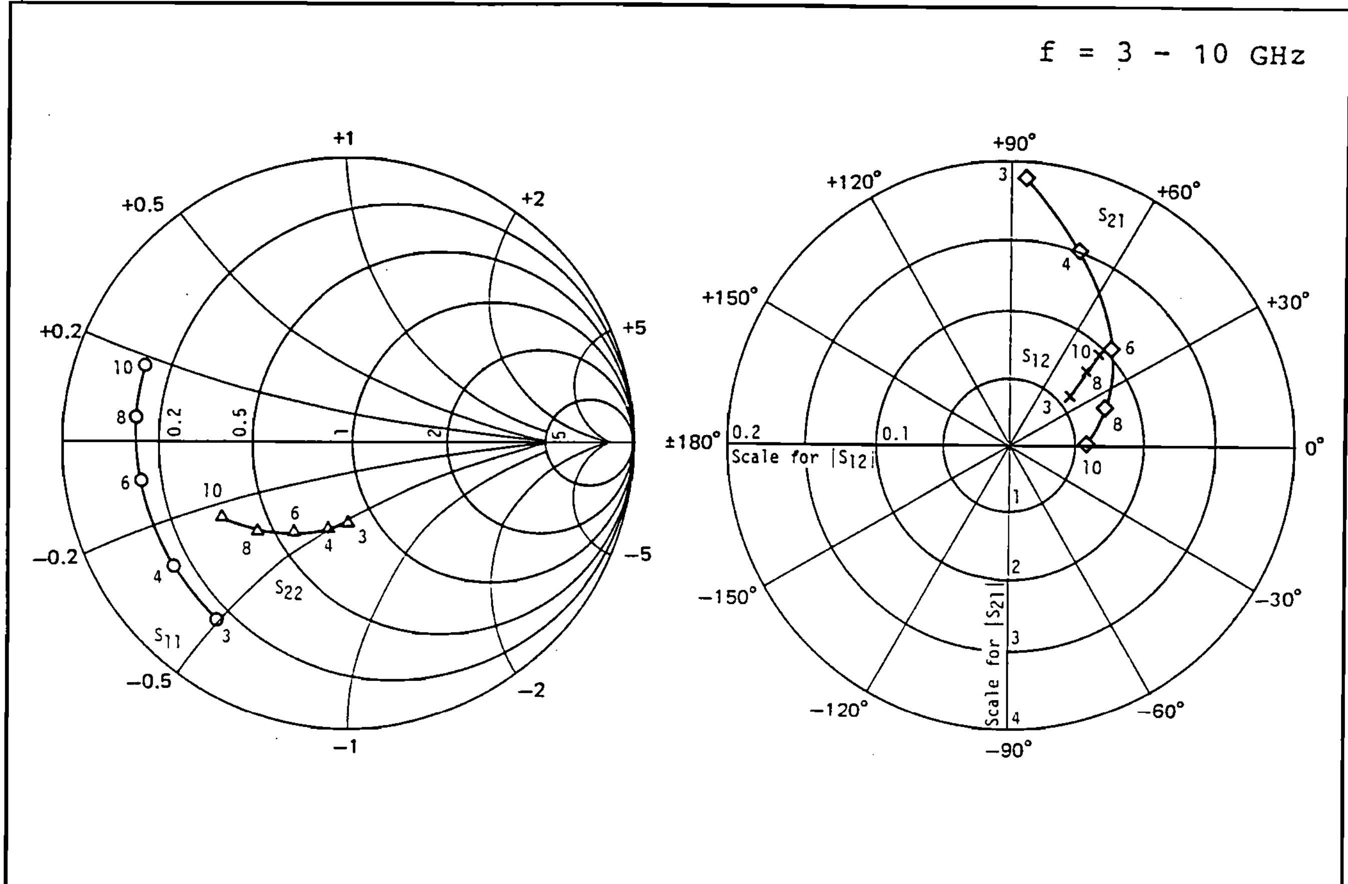
(1) Operating temperature .... 200 ± 10°C
(2) Operating time .... 5 minutes max.
(3) Bonding wire .... 25 μm diameter pure Au

OUTPUT POWER CHARACTERISTICS



JS8836A-AS S-PARAMETERS (MAGN. and ANGLES)

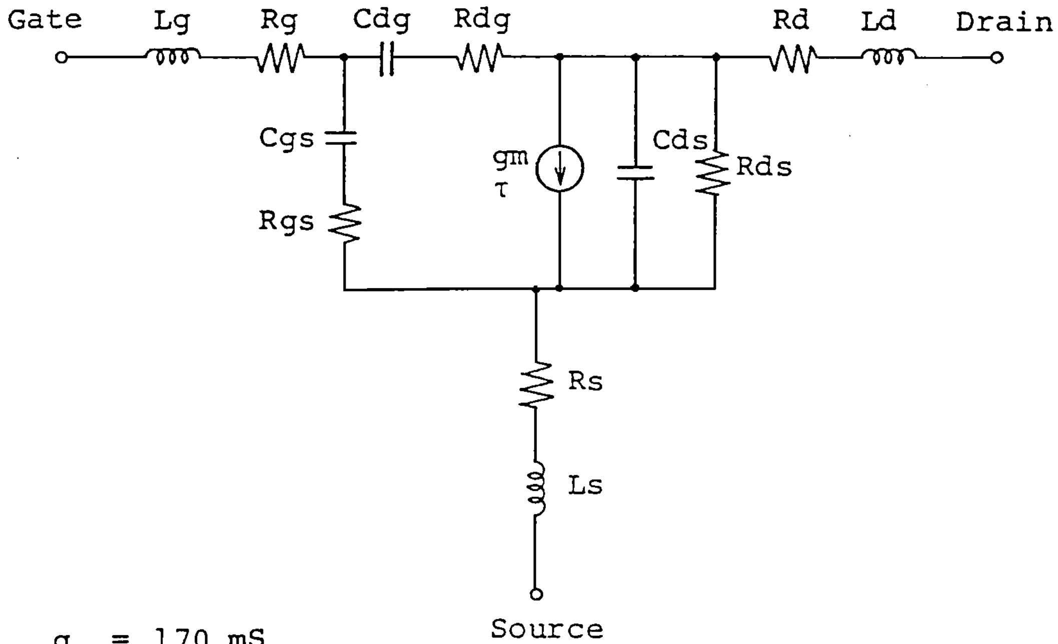
V_{DS} = 10 V, I_{DS} = 226 mA



FREQUENCY (GHz)	S_{11}		S_{12}		S_{21}		S_{22}	
3	0.77	-126	0.056	39	3.87	87	0.29	-89
4	0.74	-145	0.060	37	3.04	70	0.31	-102
5	0.74	-158	0.063	38	2.47	56	0.34	-112
6	0.74	-169	0.067	39	2.07	44	0.37	-120
7	0.74	-178	0.071	41	1.76	32	0.41	-128
8	0.75	174	0.077	43	1.52	21	0.44	-136
9	0.76	166	0.084	45	1.32	11	0.48	-143
10	0.77	160	0.092	45	1.15	1	0.52	-150

JS8836A-AS EQUIVALENT CIRCUIT
(Includes normal bonding wires)

V_{DS} = 10 V, I_{DS} = 226 mA



g_m = 170 mS
τ = 9.4 ps
Rg = 2.2 Ω
Rs = 1.7 Ω
Rd = 2.3 Ω
Rgs = 2.7 Ω
Rdg = 0.01 Ω
Rds = 72 Ω
Cgs = 1.7 pF
Cdg = 0.07 pF
Cds = 0.47 pF
Lg = 0.26 nH
Ls = 0.05 nH
Ld = 0.16 nH

Bonding wire condition

	Number (pcs)	Length (Approx.) (mm)	Dia. (μm)
Drain	2	0.4	ϕ25
Gate	2	0.4	ϕ25
Source	4	0.3	ϕ25