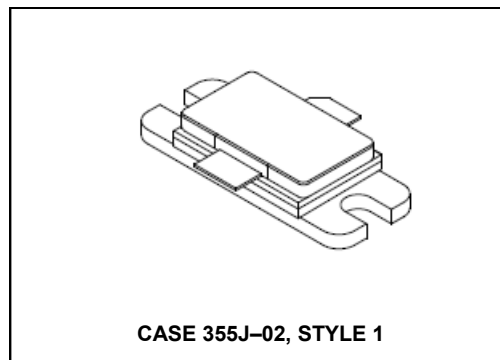


Microwave Pulse Power Silicon NPN Transistor
500W (peak), 1025–1150MHz

Rev. V1

Designed for 1025–1150 MHz pulse common base amplifier applications such as TCAS, TACAN and Mode-S transmitters.

- Guaranteed performance @ 1090 MHz
Output power = 500 W peak
Gain = 8.5 dB min, 9.0 dB (typ.)
- 100% tested for load mismatch at all phase angles with 10:1 VSWR
- Hermetically sealed industry package
- Silicon nitride passivated
- Gold metalized, emitter ballasted for long life and resistance to metal migration
- Internal input and output matching
- Characterized with 10 μ s, 1% duty cycle pulses

Product Image

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	65	Vdc
Collector–Base Voltage	V_{CBO}	65	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Peak (1)	I_C	29	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1), (2) Derate above 25°C	P_D	1460 8.3	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	–65 to +200	$^\circ\text{C}$
Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	0.12	$^\circ\text{C/W}$

NOTES:

1. Under pulse RF operating conditions.
2. These devices are designed for RF operation. The total device dissipation rating applies only when the devices are operated as pulsed RF amplifiers.
3. Thermal Resistance is determined under specified RF operating conditions by infrared measurement techniques. (Worst case θ_{JC} value measured @ 32 μ s, 2%.)

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ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 60\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	65	—	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 60\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 10\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 36\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	25	mAdc

ON CHARACTERISTICS

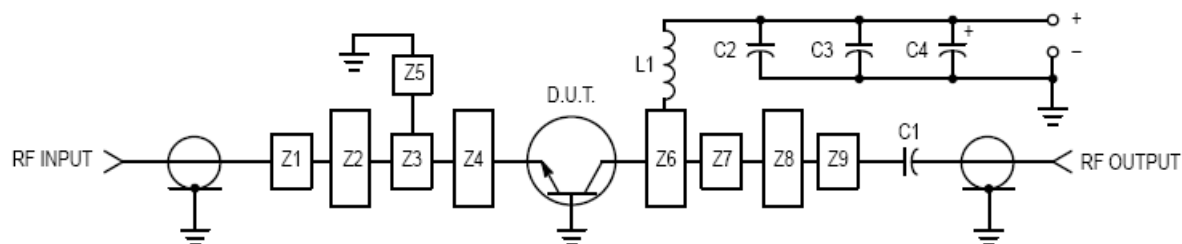
DC Current Gain ($I_C = 5.0\text{ Adc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	20	—	—	—
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FUNCTIONAL TESTS

Common–Base Amplifier Power Gain ($V_{CC} = 50\text{ Vdc}$, $P_{out} = 500\text{ W Peak}$, $f = 1090\text{ MHz}$)	G_{PB}	8.5	9.0	—	dB
Collector Efficiency ($V_{CC} = 50\text{ Vdc}$, $P_{out} = 500\text{ W Peak}$, $f = 1090\text{ MHz}$)	η	40	45	—	%
Load Mismatch ($V_{CC} = 50\text{ Vdc}$, $P_{out} = 500\text{ W Peak}$, $f = 1090\text{ MHz}$, $VSWR = 10:1$ All Phase Angles)	ψ	No Degradation in Output Power			

Microwave Pulse Power Silicon NPN Transistor 500W (peak), 1025–1150MHz

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C1 — 82 pF 100 Mil Chip Capacitor
C2 — 39 pF 100 Mil Chip Capacitor
C3 — 0.1 μ F
C4 — 100 μ F, 100 Vdc, Electrolytic
L1 — 3 Turns #18 AWG, 1/8" ID, 0.18 Long

Z1–Z9 — Microstrip, See Details
Board Material — Teflon, Glass Laminate
Dielectric Thickness = 0.030"
 $\epsilon_r = 2.55$, 2 Oz. Copper

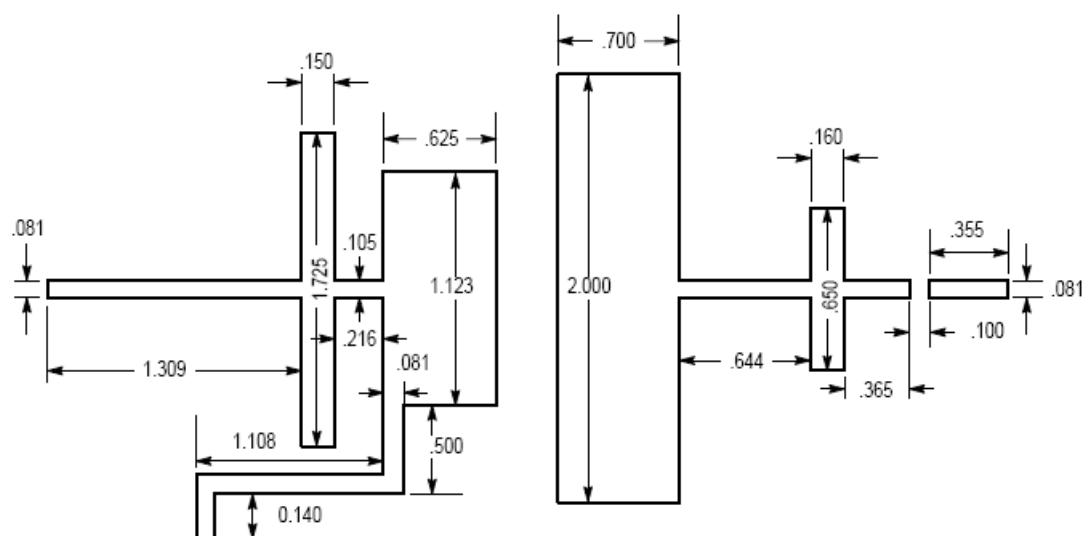


Figure 1. Test Circuit

Microwave Pulse Power Silicon NPN Transistor 500W (peak), 1025–1150MHz

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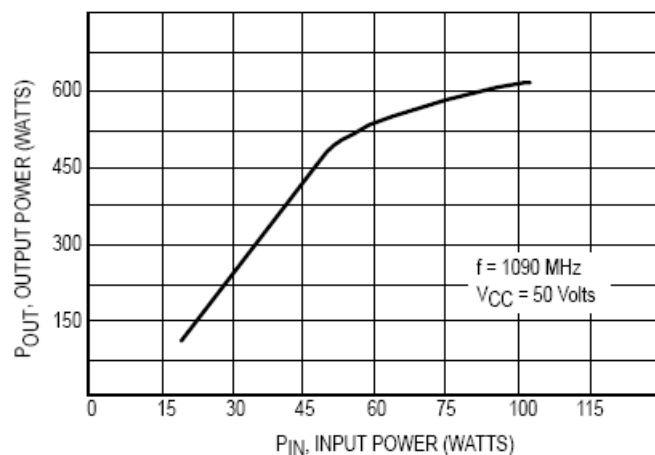
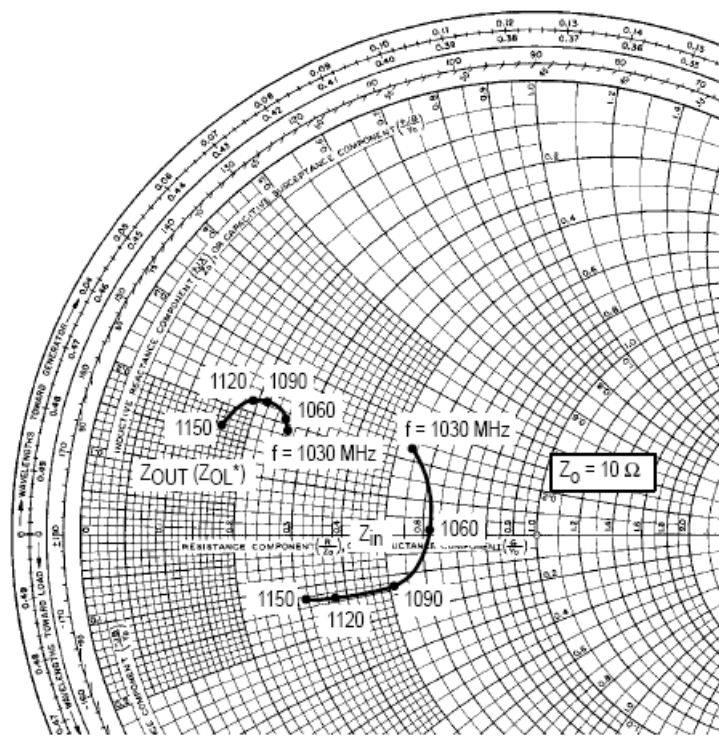


Figure 2. Output Power versus Input Power

Microwave Pulse Power Silicon NPN Transistor 500W (peak), 1025–1150MHz

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$P_{OUT} = 500 \text{ W Pk}$ $V_{CC} = 50 \text{ V}$

f MHz	Z_{in} OHMS	$Z_{OL}^* (Z_{OUT})$ OHMS
1030	$5.3 + j2.25$	$2.6 + j1.89$
1060	$6.2 + j0.2$	$2.56 + j2.0$
1090	$5.2 - j1.4$	$2.12 + j2.2$
1120	$3.7 - j1.35$	$1.9 + j2.15$
1150	$3.15 - j1.3$	$1.6 + j1.62$

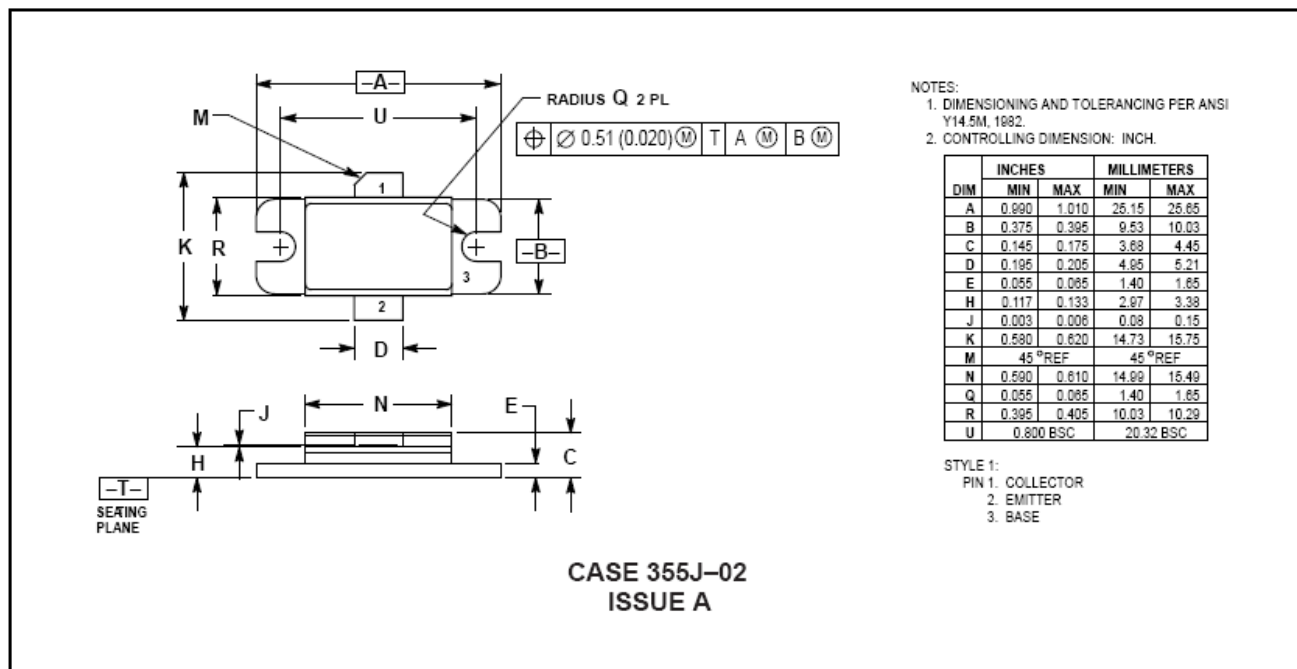
Z_{OL}^* is the conjugate of the optimum load impedance into which the device operates at a given output power voltage and frequency.

Figure 3. Series Equivalent Input/Output Impedances

Microwave Pulse Power Silicon NPN Transistor 500W (peak), 1025–1150MHz

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PACKAGE DIMENSIONS



Microwave Pulse Power Silicon NPN Transistor 500W (peak), 1025–1150MHz

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