

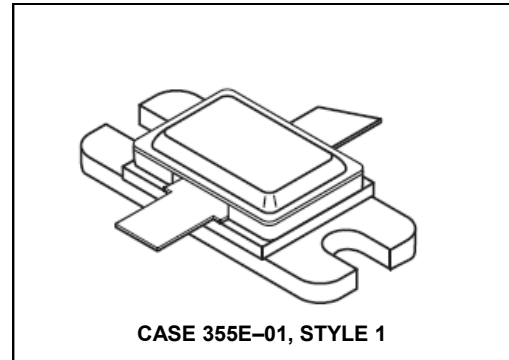
Microwave Pulse Power Silicon NPN Transistor 350W (peak), 1025–1150MHz

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 = 350 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 package
- Silicon nitride passivated
- Gold metallized, emitter ballasted for long life and resistance to metal migration
- Internal input and output matching
- Characterized using Mode–S pulse format

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 | 31 | Adc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ (1), (2) Derate above 25°C | P_D | 1590 9.1 | Watts $\text{W}/^\circ\text{C}$ |
| 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) | $R_{\theta JC}$ | 0.11 | $^\circ\text{C}/\text{W}$ |

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} measured using Mode–S pulse train, 128 μs burst 0.5 μs on, 0.5 μs off repeating at 6.4 ms interval.)

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

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

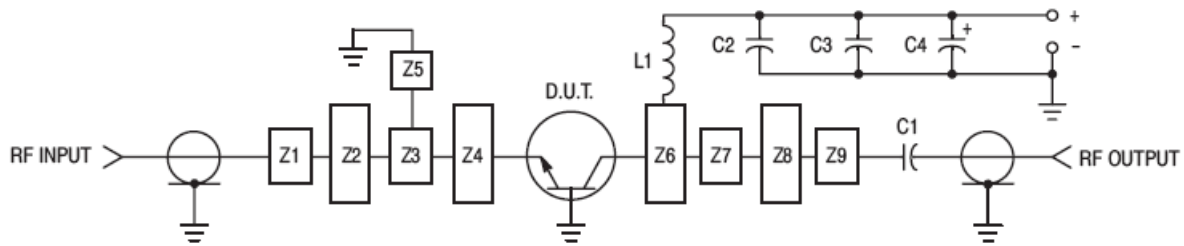
| | | | | | |
|--|----------|----|---|---|---|
| DC Current Gain ($I_C = 5.0 \text{ Adc}$, $V_{CE} = 5.0 \text{ Vdc}$) | h_{FE} | 20 | — | — | — |
|--|----------|----|---|---|---|

FUNCTIONAL TESTS

| | | | | | |
|---|----------|--------------------------------|-----|---|----|
| Common–Base Amplifier Power Gain ($V_{CC} = 50 \text{ Vdc}$, $P_{out} = 350 \text{ W Peak}$, $f = 1090 \text{ MHz}$) | G_{PB} | 8.5 | 9.0 | — | dB |
| Collector Efficiency ($V_{CC} = 50 \text{ Vdc}$, $P_{out} = 350 \text{ W Peak}$, $f = 1090 \text{ MHz}$) | η | 40 | — | — | % |
| Load Mismatch ($V_{CC} = 50 \text{ Vdc}$, $P_{out} = 350 \text{ W Peak}$, $f = 1090 \text{ MHz}$, $VSWR = 10:1$ All Phase Angles) | ψ | No Degradation in Output Power | | | |

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C1 — 75 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"
 ϵ_r = 2.55, 2 Oz. Copper

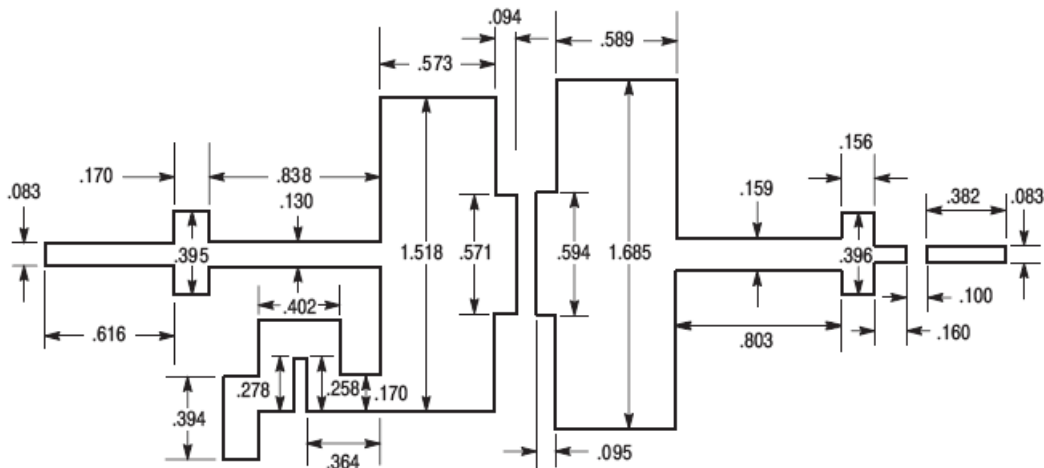
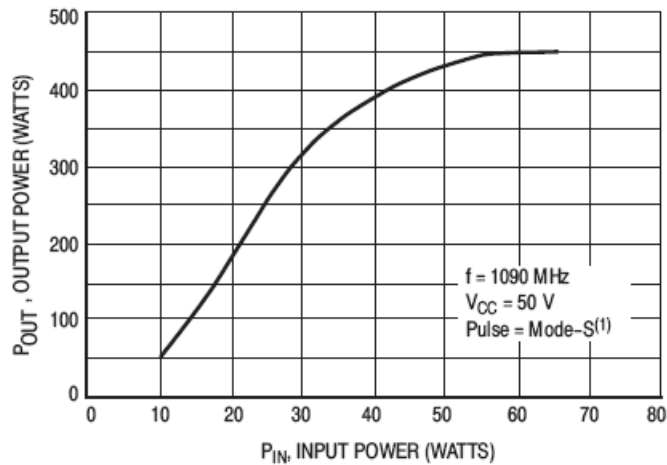
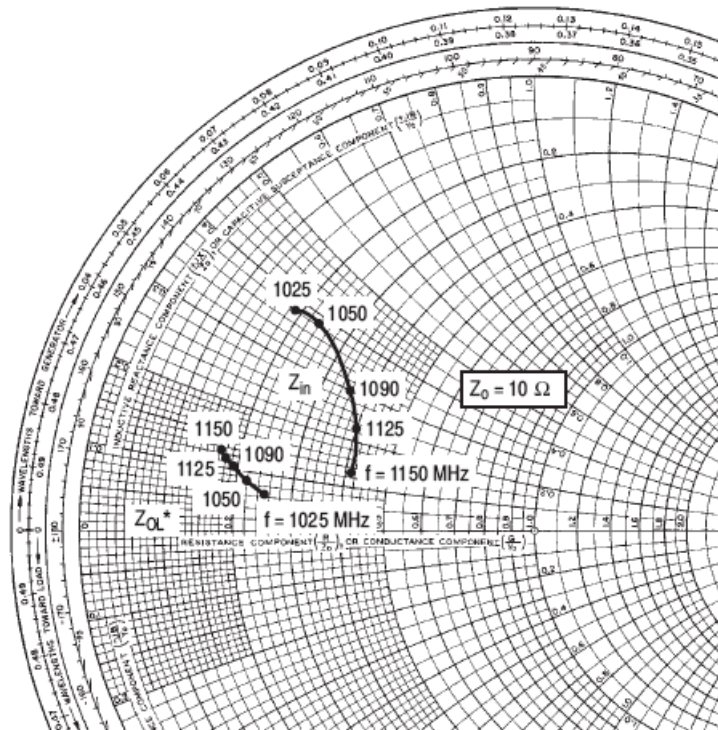


Figure 1. Test Circuit



(1) 128 μ s burst 0.5 μ s on, 0.5 μ s off
repeating at 6.4 ms interval.

Figure 2. Output Power versus Input Power



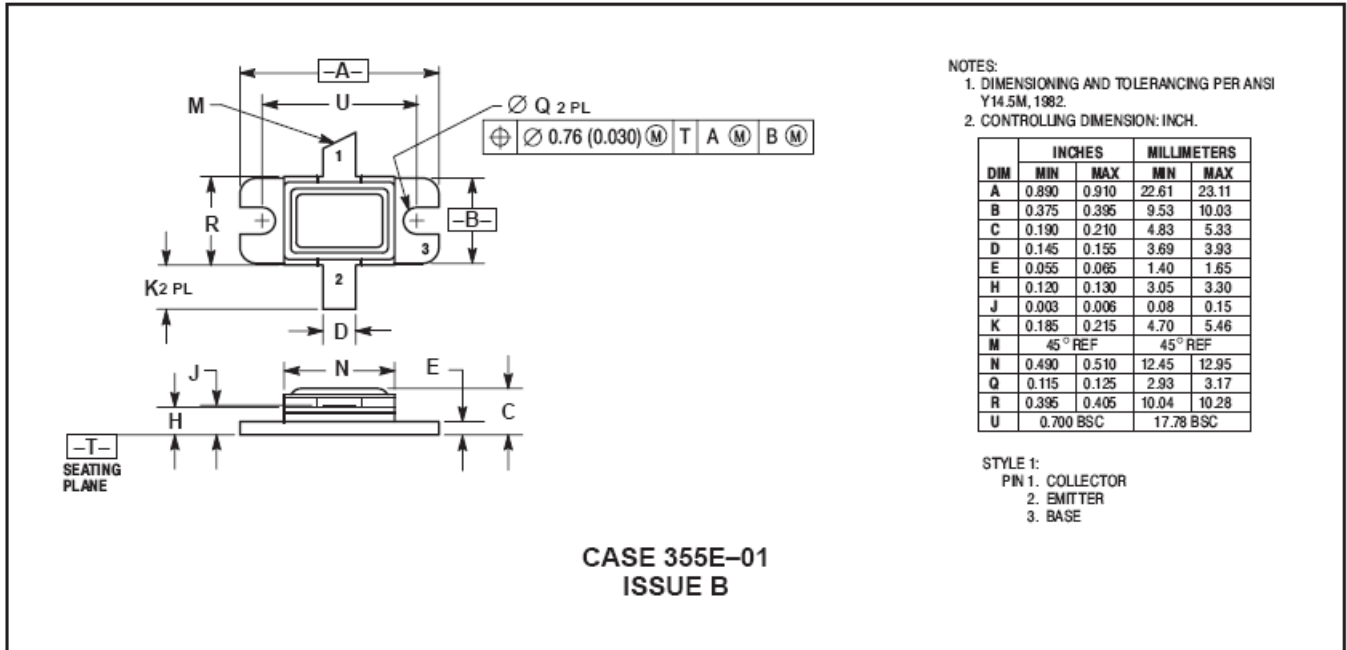
$P_{OUT} = 350 \text{ W Pk}$ $V_{CC} = 50 \text{ V}$

| f MHz | Z_{in} OHMS | $Z_{OL}^*(1)$ OHMS |
|----------|------------------|-----------------------|
| 1025 | $1.92 + j3.80$ | $2.52 + j0.70$ |
| 1050 | $2.44 + j3.92$ | $2.18 + j0.85$ |
| 1090 | $3.55 + j3.02$ | $1.94 + j1.13$ |
| 1125 | $4.11 + j2.27$ | $1.80 + j1.22$ |
| 1150 | $4.13 + j1.35$ | $1.71 + j1.31$ |

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

PACKAGE DIMENSIONS



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