

## SEMICONDUCTOR TECHNICAL DATA

## The RF Line

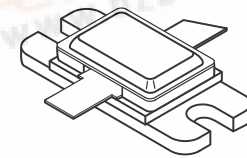
# Microwave Pulse Power Transistor

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 Watts 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

## MRF10350

**350 W (PEAK)**  
**1025–1150 MHz**  
**MICROWAVE POWER**  
**TRANSISTOR**  
**NPN SILICON**



CASE 355E-01, STYLE 1

### 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 $25^\circ\text{C}$	$P_D$	1590 9.1	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)	$R_{\theta JC}$	0.11	$^\circ\text{C}/\text{W}$

#### 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  $\theta_{JC}$  measured using Mode-S pulse train, 128  $\mu\text{s}$  burst 0.5  $\mu\text{s}$  on, 0.5  $\mu\text{s}$  off repeating at 6.4 ms interval.)

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

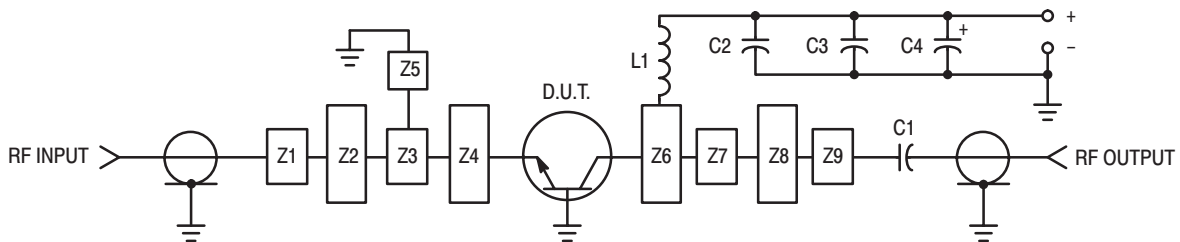
Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector–Emitter Breakdown Voltage ( $I_C = 60\text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	65	—	—	Vdc
Collector–Base Breakdown Voltage ( $I_C = 60\text{ mAdc}$ , $I_E = 0$ )	$V_{(BR)CBO}$	65	—	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10\text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = 36\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	—	—	25	mA dc

**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 ( $V_{CC} = 50\text{ Vdc}$ , $P_{out} = 350\text{ W Peak}$ , $f = 1090\text{ MHz}$ )	GPB	8.5	9.0	—	dB
Collector Efficiency ( $V_{CC} = 50\text{ Vdc}$ , $P_{out} = 350\text{ W Peak}$ , $f = 1090\text{ MHz}$ )	$\eta$	40	—	—	%
Load Mismatch ( $V_{CC} = 50\text{ Vdc}$ , $P_{out} = 350\text{ W Peak}$ , $f = 1090\text{ MHz}$ , VSWR = 10:1 All Phase Angles)	$\psi$	No Degradation in Output Power			



- C1 — 75 pF 100 Mil Chip Capacitor
- C2 — 39 pF 100 Mil Chip Capacitor
- C3 — 0.1  $\mu\text{F}$
- C4 — 100  $\mu\text{F}$ , 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

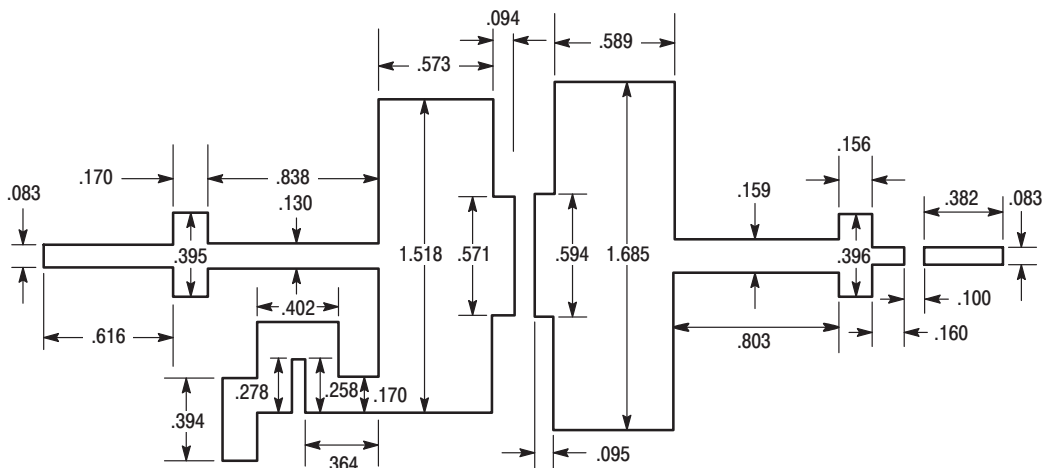
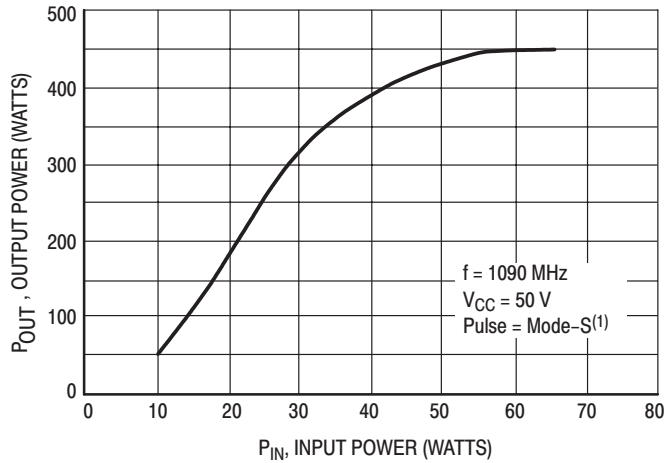
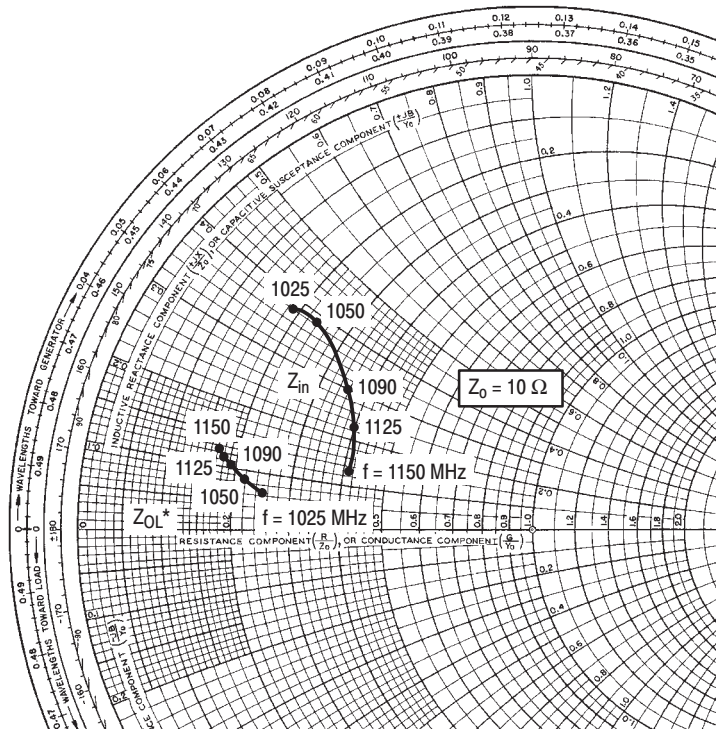


Figure 1. Test Circuit



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

Figure 2. Output Power versus Input Power



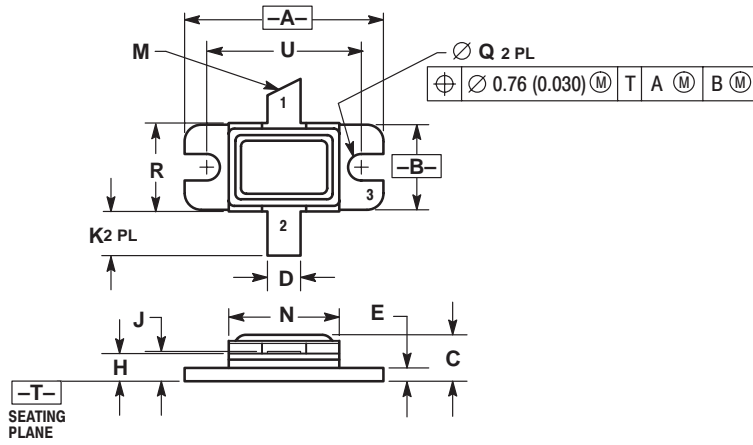
$P_{OUT} = 350$  W Pk  $V_{CC} = 50$  V

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



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.890	0.910	22.61	23.11
B	0.375	0.395	9.53	10.03
C	0.190	0.210	4.83	5.33
D	0.145	0.155	3.69	3.93
E	0.055	0.065	1.40	1.65
H	0.120	0.130	3.05	3.30
J	0.003	0.006	0.08	0.15
K	0.185	0.215	4.70	5.46
M	45° REF		45° REF	
N	0.490	0.510	12.45	12.95
Q	0.115	0.125	2.93	3.17
R	0.395	0.405	10.04	10.28
U	0.700 BSC		17.78 BSC	

STYLE 1:  
 PIN 1. COLLECTOR  
 2. EMITTER  
 3. BASE

**CASE 355E-01  
ISSUE B**

*Specifications subject to change without notice.*

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REV 1