

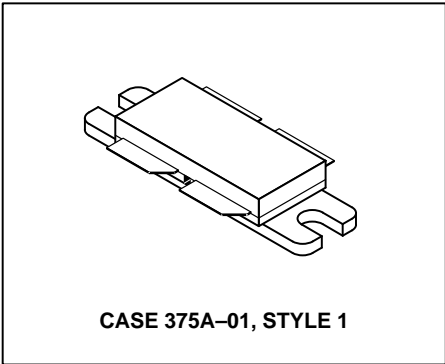
# The RF Line

## NPN Silicon

### RF Power Transistor

Designed for 26 Volt UHF large-signal, common emitter, Class AB linear amplifier applications in industrial and commercial FM/AM equipment operating in the range 800–960 MHz.

- Specified 26 Volt, 900 MHz Characteristics
  - Output Power = 150 Watts (PEP)
  - Minimum Gain = 8.0 dB @ 900 MHz, Class AB
  - Minimum Efficiency = 35% @ 900 MHz, 150 Watts (PEP)
  - Maximum Intermodulation Distortion –28 dBc @ 150 Watts (PEP)
- Characterized with Series Equivalent Large-Signal Parameters from 800 to 960 MHz
- Silicon Nitride Passivated
- 100% Tested for Load Mismatch Stress at all Phase Angles with 5:1 VSWR @ 26 Vdc, and Rated Output Power
- Gold Metallized, Emitter Ballasted for Long Life and Resistance to Metal Migration
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	$V_{CEO}$	28	Vdc
Collector–Emitter Voltage	$V_{CES}$	60	Vdc
Emitter–Base Voltage	$V_{EBO}$	4.0	Vdc
Collector–Current — Continuous	$I_C$	25	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	230 1.33	Watts W/°C
Storage Temperature Range	$T_{stg}$	–65 to +150	°C

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.75	°C/W

#### 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 ( $I_C = 100\text{ mAdc}$ , $I_B = 0$ )	$V_{(BR)CEO}$	28	37	—	Vdc
Collector–Emitter Breakdown Voltage ( $I_C = 50\text{ mAdc}$ , $V_{BE} = 0$ )	$V_{(BR)CES}$	60	85	—	Vdc
Emitter–Base Breakdown Voltage ( $I_E = 10\text{ mAdc}$ , $I_C = 0$ )	$V_{(BR)EBO}$	4.0	4.9	—	Vdc
Collector Cutoff Current ( $V_{CE} = 30\text{ Vdc}$ , $V_{BE} = 0$ )	$I_{CES}$	—	—	10	mAdc

#### ON CHARACTERISTICS

DC Current Gain ( $I_{CE} = 1.0\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ )	$h_{FE}$	30	75	120	—
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#### DYNAMIC CHARACTERISTICS

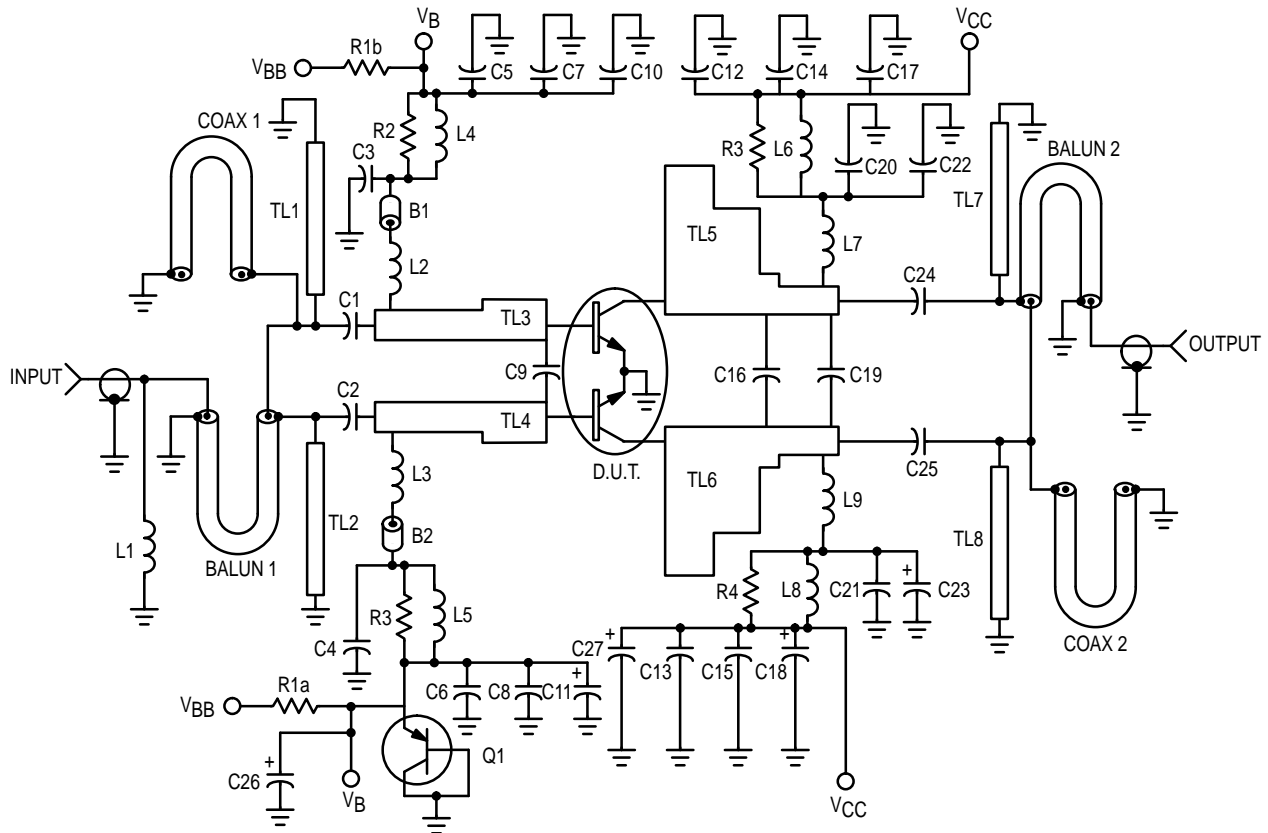
Output Capacitance ( $V_{CB} = 26\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ ) (1)	$C_{ob}$	—	75	—	pF
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(1) For information only. This part is collector matched.

(continued)

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

Characteristic	Symbol	Min	Typ	Max	Unit
<b>FUNCTIONAL CHARACTERISTICS</b>					
Common-Emitter Amplifier Power Gain $V_{CC} = 26\text{ Vdc}$ , $P_{out} = 150\text{ Watts (PEP)}$ , $I_{CQ} = 300\text{ mA}$ , $f_1 = 900\text{ MHz}$ , $f_2 = 900.1\text{ MHz}$	$G_{pe}$	8.0	9.0	—	dB
Collector Efficiency $V_{CC} = 26\text{ Vdc}$ , $P_{out} = 150\text{ Watts (PEP)}$ , $I_{CQ} = 300\text{ mA}$ , $f_1 = 900\text{ MHz}$ , $f_2 = 900.1\text{ MHz}$	$\eta$	30	40	—	%
3rd Order Intermodulation Distortion $V_{CC} = 26\text{ Vdc}$ , $P_{out} = 150\text{ Watts (PEP)}$ , $I_{CQ} = 300\text{ mA}$ , $f_1 = 900\text{ MHz}$ , $f_2 = 900.1\text{ MHz}$	IMD	—	-32	-28	dBc
Output Mismatch Stress $V_{CC} = 26\text{ Vdc}$ , $P_{out} = 150\text{ Watts (PEP)}$ , $I_{CQ} = 300\text{ mA}$ , $f_1 = 900\text{ MHz}$ , $f_2 = 900.1\text{ MHz}$ , $VSWR = 5:1$ (all phase angles)	$\psi$	No Degradation in Output Power Before and After Test			



- B1, B2 — Ferrite Bead, Ferroxcube #56-590-65-3B
- C1, C2, C24, C25 — 43 pF, B Case, ATC Chip Capacitor
- C3, C4, C20, C21 — 100 pF, B Case, ATC Chip Capacitor
- C5, C6, C12, C13 — 1000 pF, B Case, ATC Chip Capacitor
- C7, C8, C14, C15 — 1800 pF, AVX Chip Capacitor
- C9 — 9.1 pF, A Case, ATC Chip Capacitor
- C10, C11, C17, C18, C22, C23 — 10  $\mu\text{F}$ , Electrolytic Capacitor  
Panasonic
- C16 — 3.9 pF, B Case, ATC Chip Capacitor
- C19 — 0.8 pF, B Case, ATC Chip Capacitor
- C26 — 200  $\mu\text{F}$ , Electrolytic Capacitor Mallory Sprague
- C27 — 500  $\mu\text{F}$  Electrolytic Capacitor

- L1 — 5 Turns 24 AWG IDIA 0.059" Choke, 19.8 nH
- L2, L3, L7, L9 — 4 Turns 20 AWG IDIA 0.163" Choke
- L4, L5, L6, L8 — 12 Turns 22 AWG IDIA 0.140" Choke
- N1, N2 — Type N Flange Mount, Omni Spectra
- Q1 — Bias Transistor BD136 PNP
- R2, R3, R4, R5 — 4.0 x 39 Ohm 1/8 W Chips in Parallel
- R1a, R1b — 56 Ohm 1.0 W
- TL1- TL8 — See Photomaster
- Balun1, Balun2, Coax 1, Coax 2 — 2.20" 50 Ohm 0.088" o.d.  
Semi-rigid Coax, Micro Coax
- Board — 1/32" Glass Teflon,  $\epsilon_r = 2.55$ " Arlon (GX-0300-55-22)

**Figure 1. 900 MHz Power Gain Test Circuit**

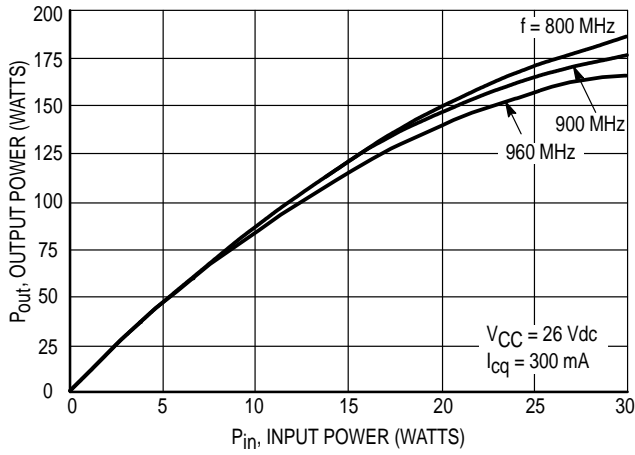


Figure 2. Output Power versus Input Power

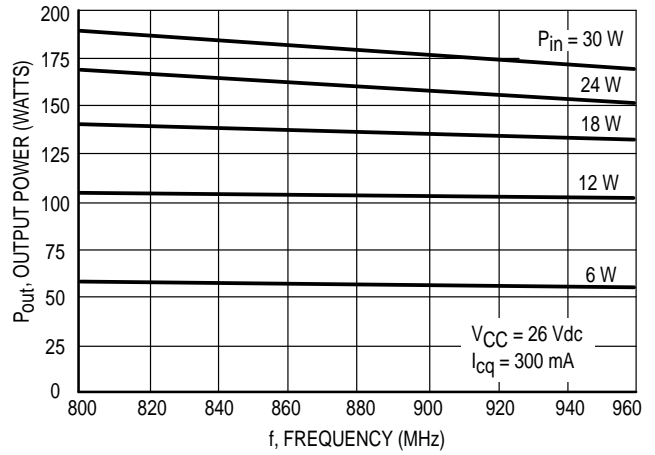


Figure 3. Output Power versus Frequency

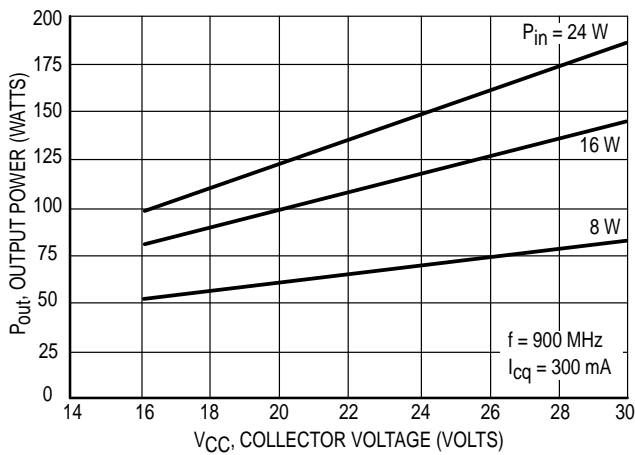


Figure 4. Output Power versus Supply Voltage

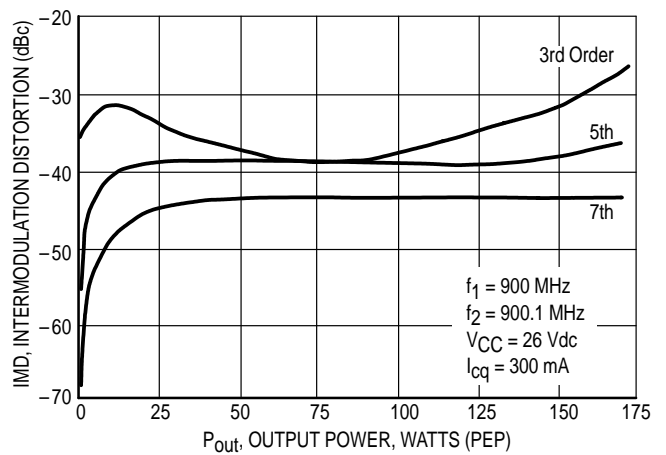


Figure 5. Intermodulation versus Output Power

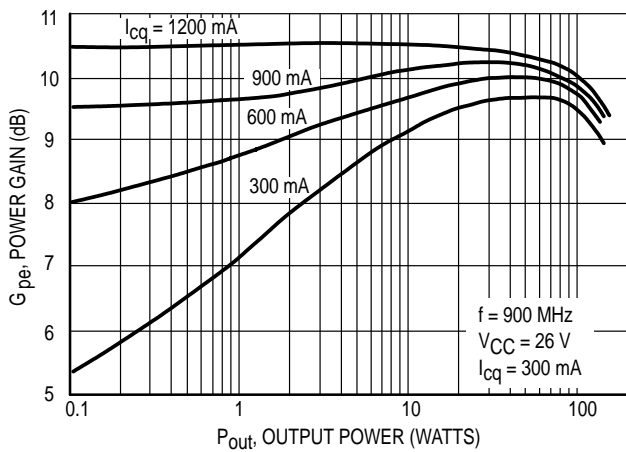


Figure 6. Power Gain versus Output Power

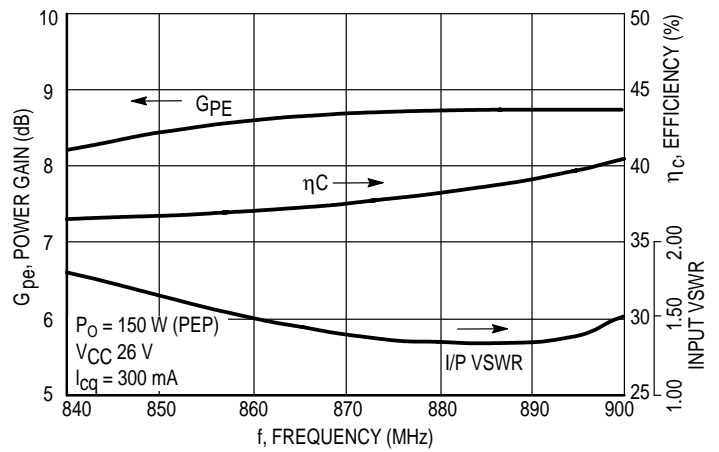
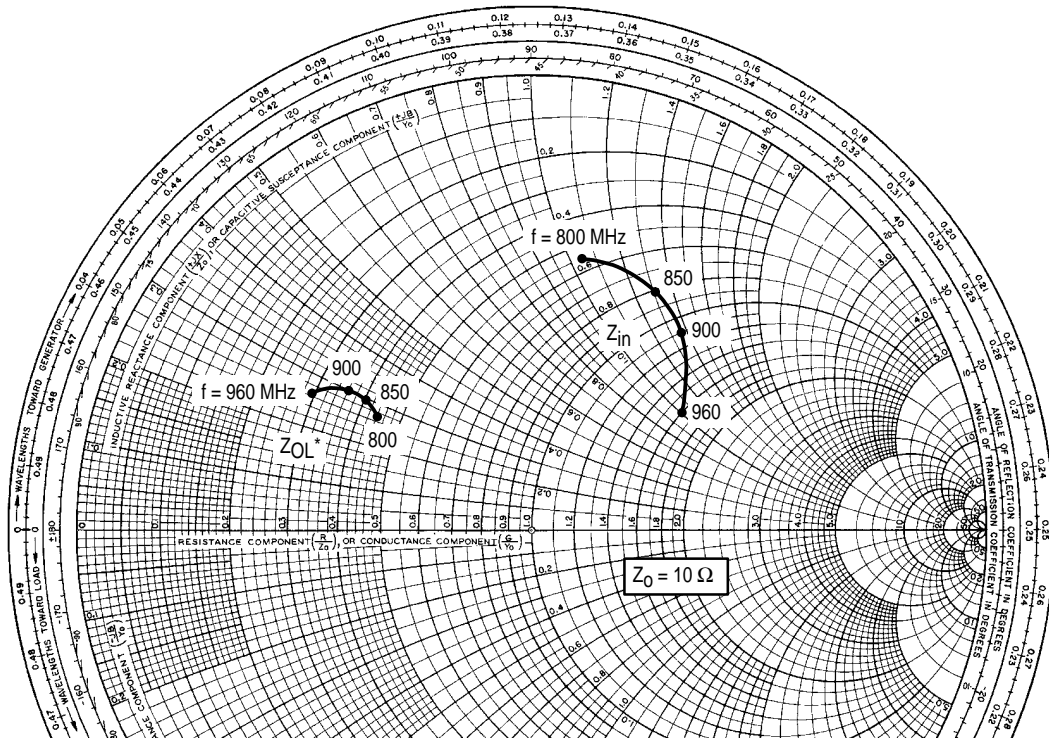


Figure 7. Broadband Test Fixture Performance



f MHz	Z <sub>in</sub> Ohms	Z <sub>OL</sub> <sup>*</sup> Ohms
800	5.51 + j10.6	4.52 + j2.64
850	8.17 + j13.2	4.21 + j2.98
900	11.2 + j13.8	3.68 + j2.97
960	16.8 + j10.1	2.98 + j2.71

NOTE: Z<sub>in</sub> & Z<sub>OL</sub><sup>\*</sup> are given from base-to-base and collector-to-collector respectively

Z<sub>OL</sub><sup>\*</sup> = Conjugate of optimum load impedance into which the device operates at a given output power, voltage and frequency.

**Figure 8. Input and Output Impedances with Circuit Tuned for Maximum Gain @ P<sub>O</sub> = 150 W (PEP), V<sub>CC</sub> = 26 V**

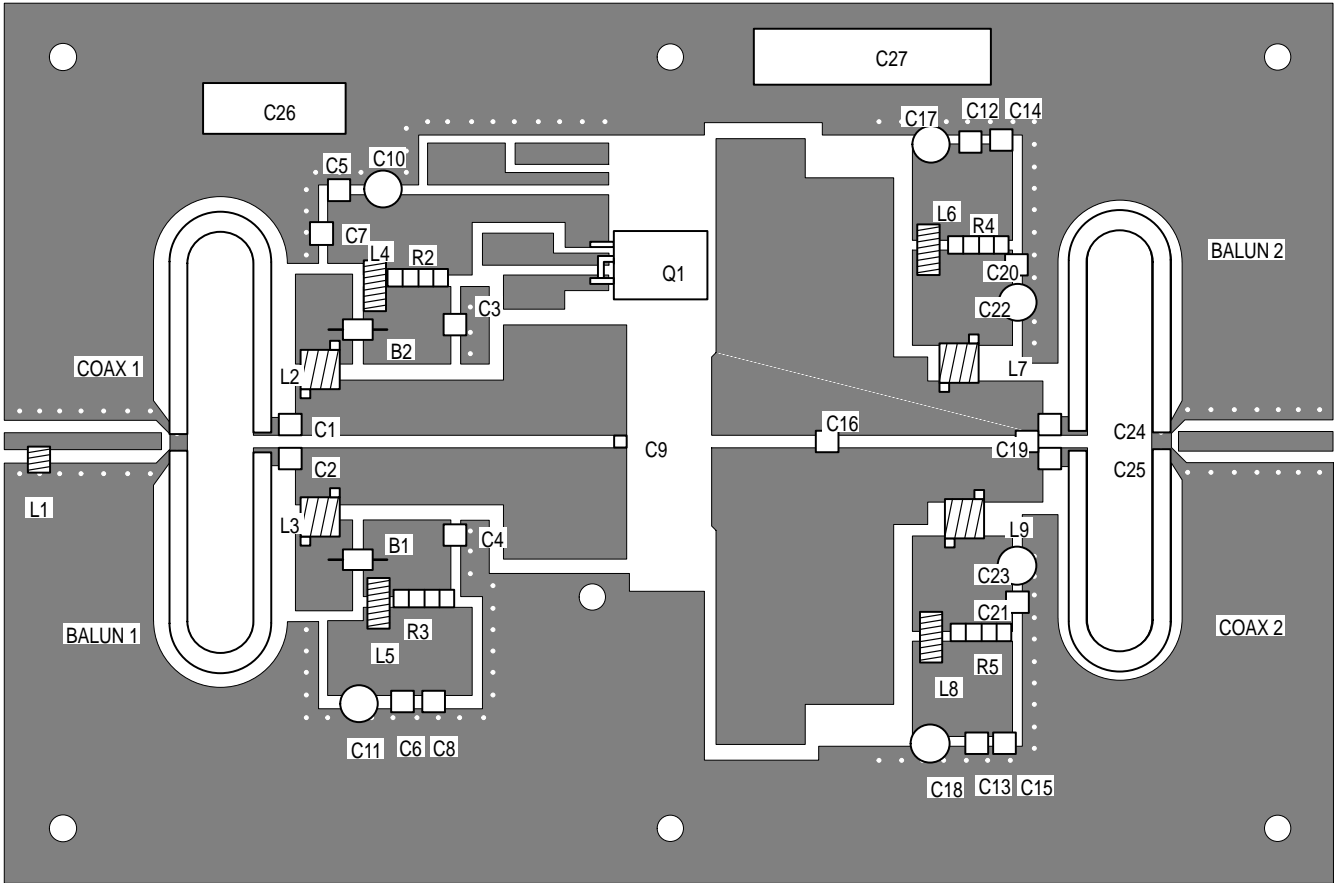
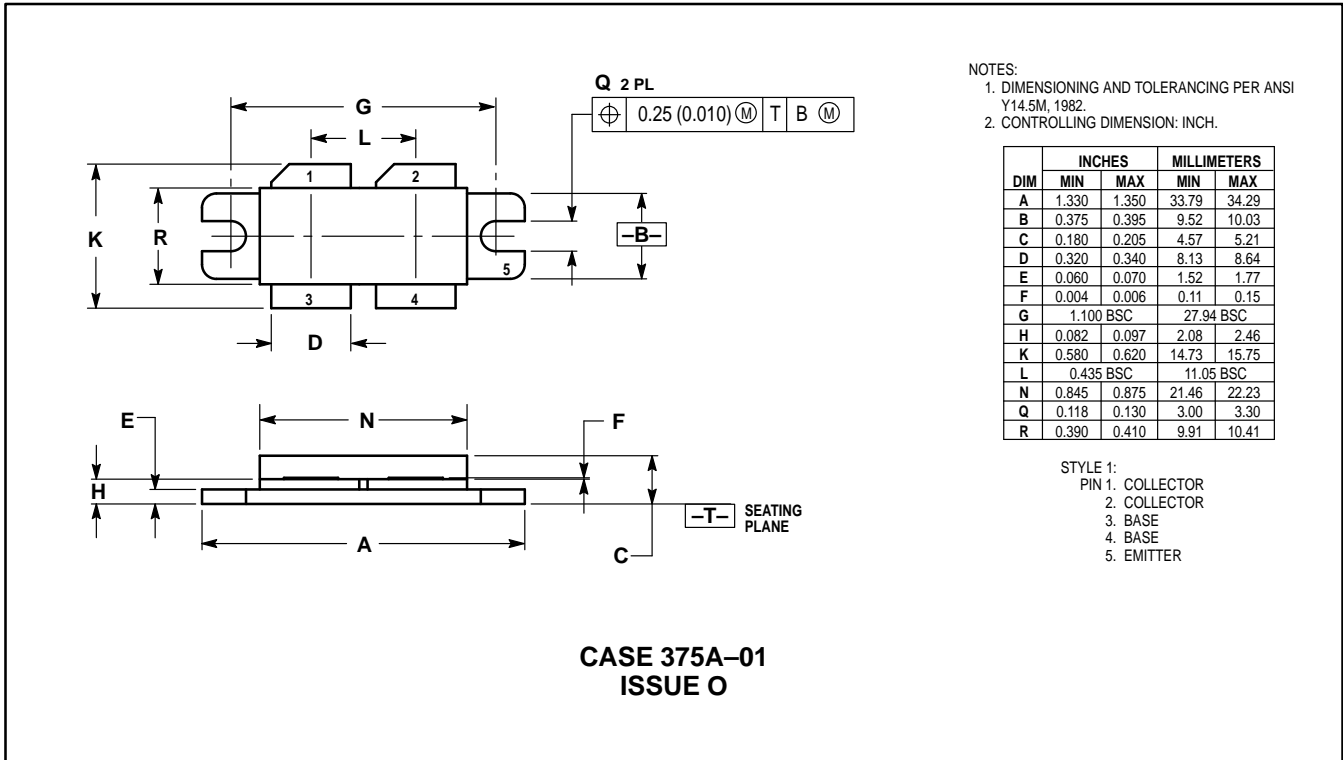


Figure 9. MRF899 Test Fixture Component Layout

## PACKAGE DIMENSIONS



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