

The RF Line

NPN Silicon

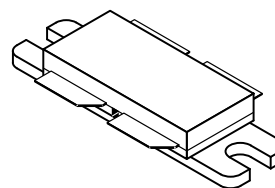
RF Power Transistor

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.

MRF899

**150 W, 900 MHz
RF POWER
TRANSISTOR
NPN SILICON**



CASE 375A-01, STYLE 1

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°C	P_D	230 1.33	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	–65 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

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

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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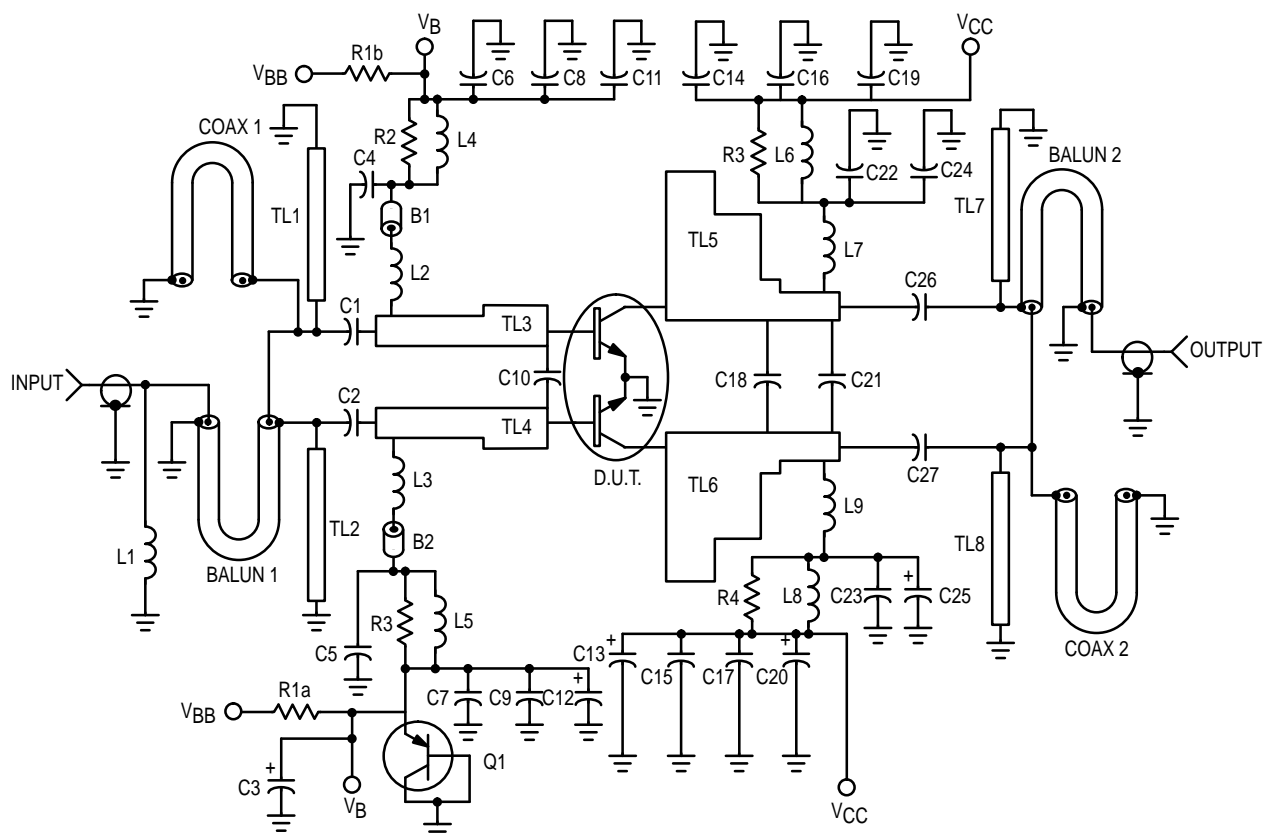
NOTE:

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
FUNCTIONAL CHARACTERISTICS					
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 $V_{CC} = 26\text{ Vdc}$, $P_{out} = 150\text{ Watts (PEP)}$, $I_{CQ} = 300\text{ mA}$, $f_1 = 900\text{ MHz}$, $f_2 = 900.1\text{ MHz}$	η	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)	ψ	No Degradation in Output Power Before and After Test			



B1, B2 — Ferrite Bead, Ferroxcube #56-590-65-3B
 C1, C2, C26, C27 — 43 pF, B Case, ATC Chip Capacitor
 C3 — 200 μF Lytic Capacitor
 C4, C5, C22, C23 — 100 pF, B Case, ATC Chip Capacitor
 C6, C7, C14, C15 — 1000 pF, B Case, ATC Chip Capacitor
 C10 — 9.1 pF, A Case, ATC Chip Capacitor
 C13 — 500 μF Electrolytic Capacitor
 C18 — 3.9 pF, B Case, ATC Chip Capacitor
 C21 — 0.8 pF, B Case, ATC Chip Capacitor
 C8, C9, C16, C17 — CDR32BP182AJWS, 1800 pF, AVX Chip Capacitor
 C11, C12, C19, C20, C24, C25 — 10 μF , Electrolytic Capacitor Panasonic

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, on 10-20 Ω Resistor
 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
 Board — 1/32" Glass Teflon, $\epsilon_r = 2.55$ Arlon (GX-0300-55-22)

Figure 1. 900 MHz Power Gain Test Circuit

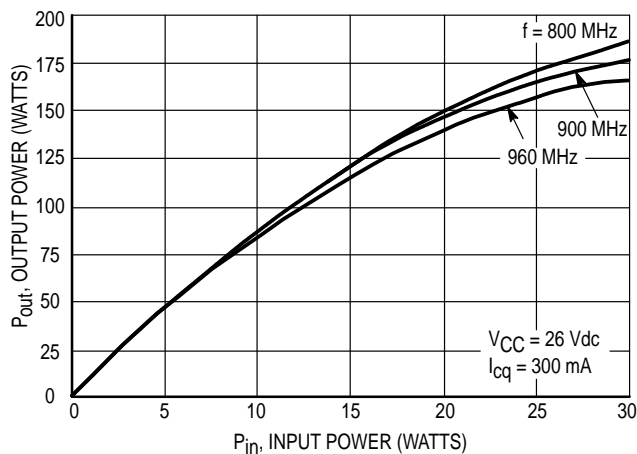


Figure 2. Output Power versus Input Power

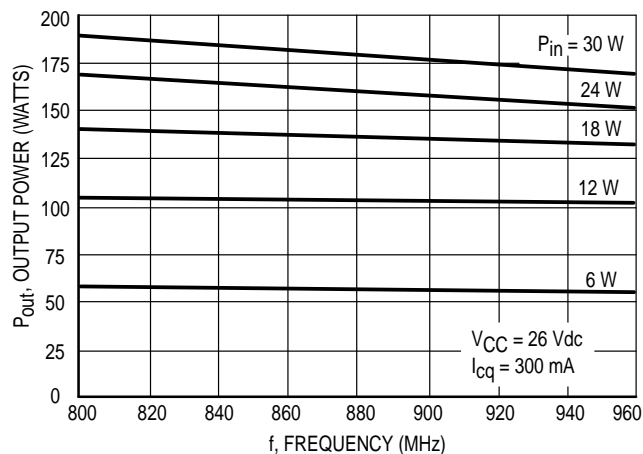


Figure 3. Output Power versus Frequency

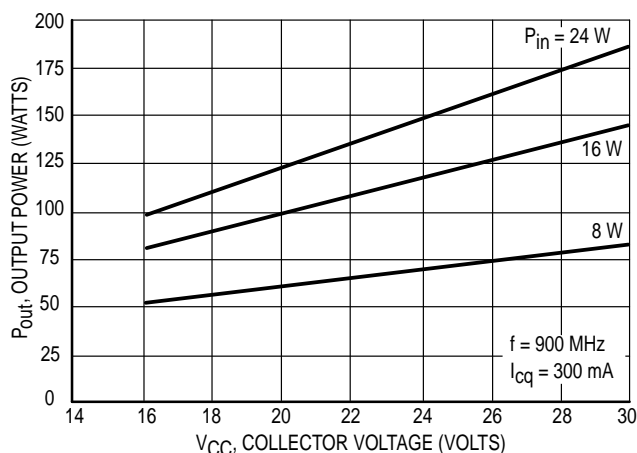


Figure 4. Output Power versus Supply Voltage

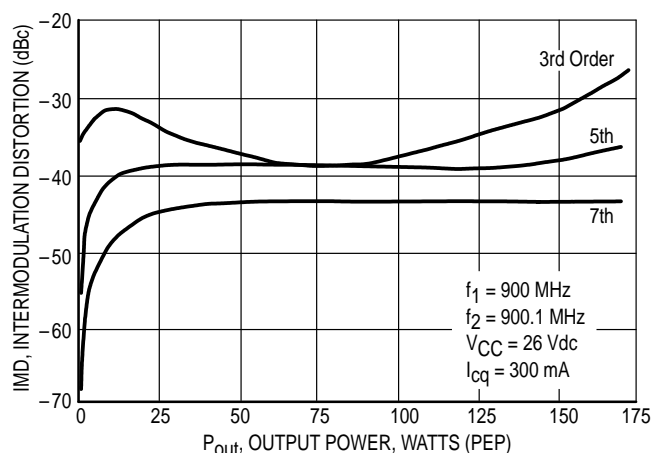


Figure 5. Intermodulation versus Output Power

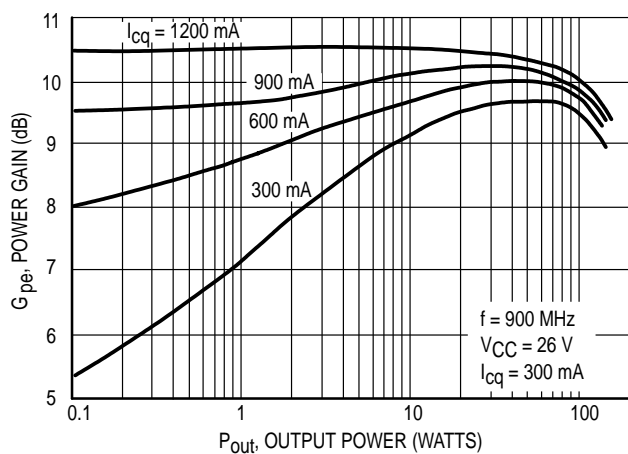


Figure 6. Power Gain versus Output Power

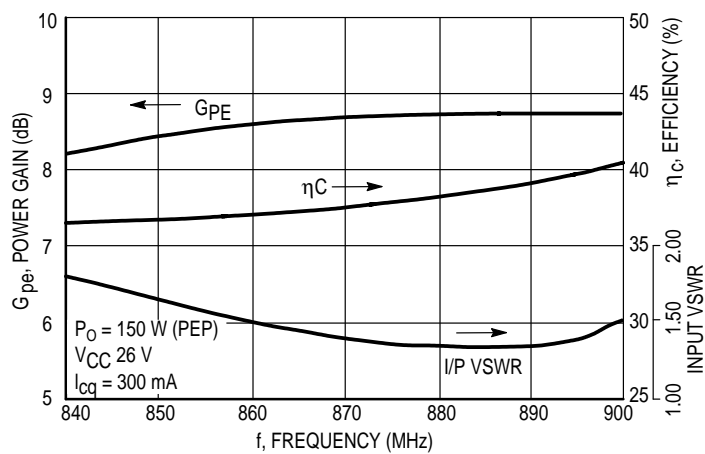
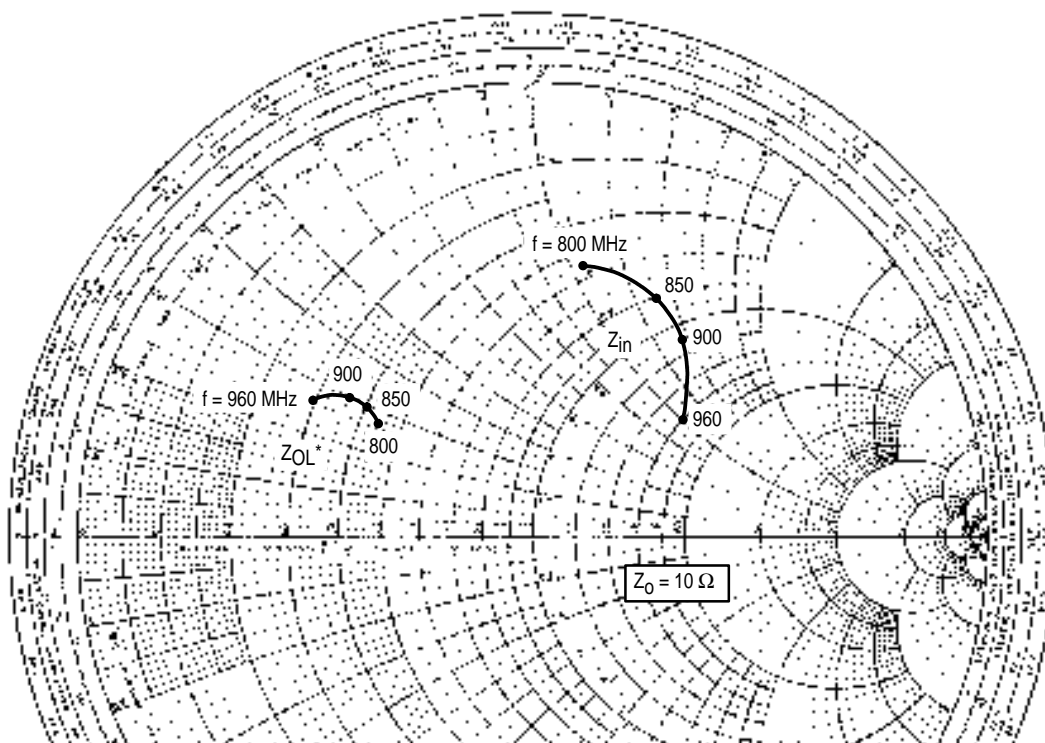


Figure 7. Broadband Test Fixture Performance



f MHz	Z_{in} Ohms	Z_{OL}^* 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_{in} & Z_{OL}^* are given from base-to-base and collector-to-collector respectively

Z_{OL}^* = 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 @ $P_O = 150$ W (PEP), $V_{CC} = 26$ V

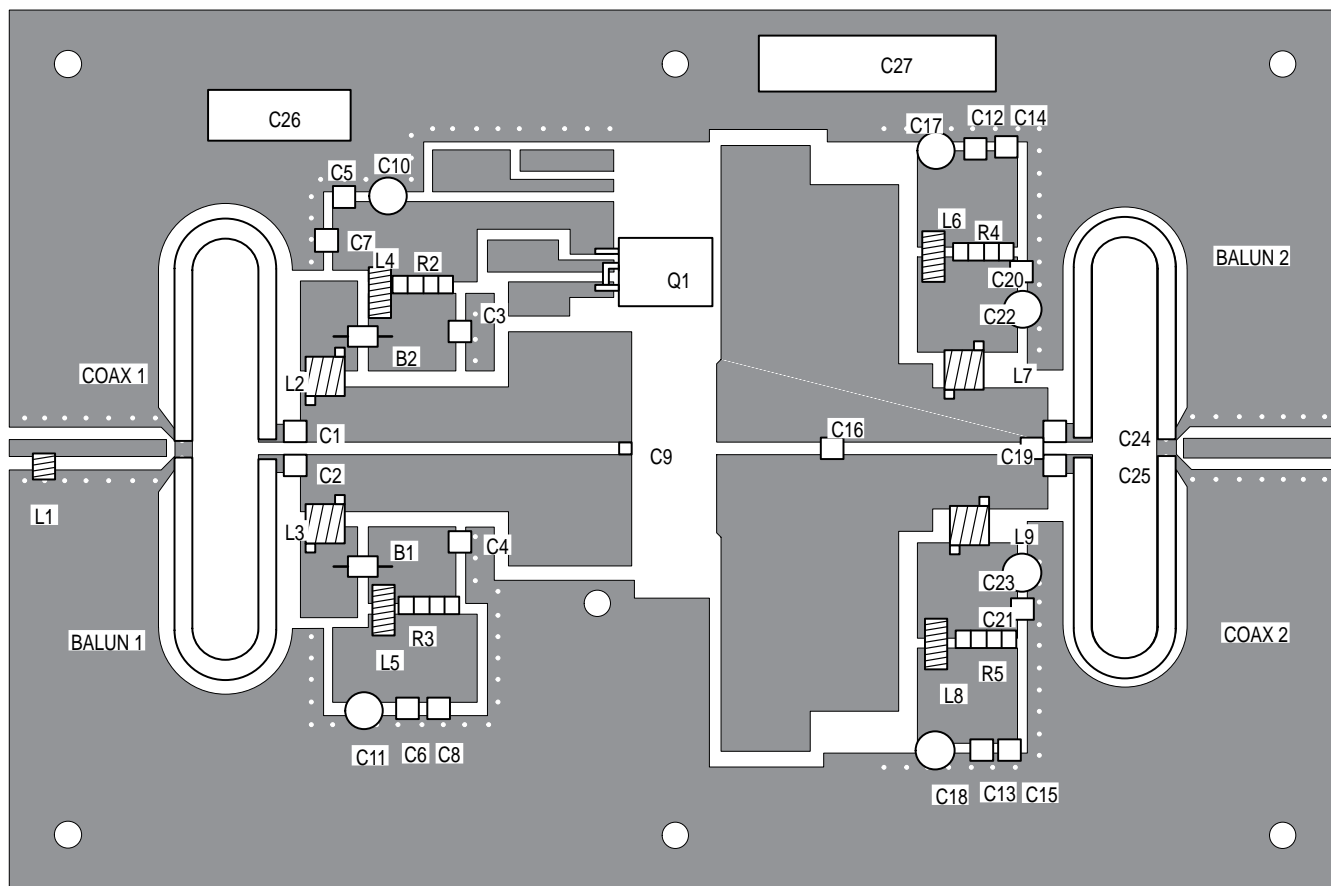
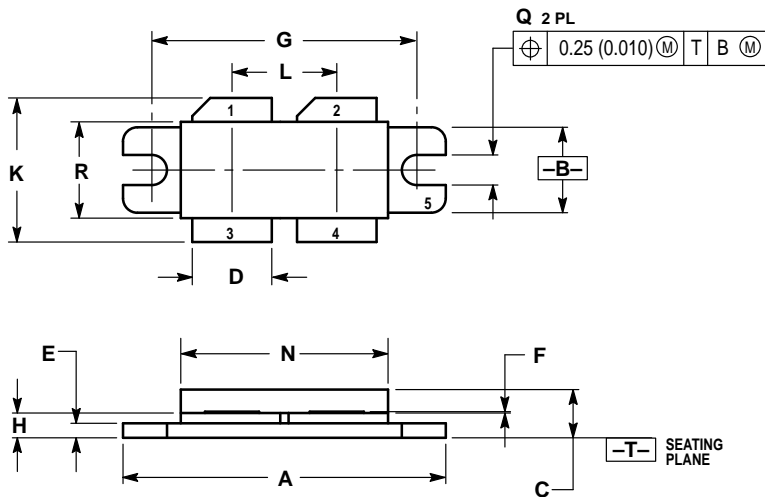


Figure 9. MRF899 Test Fixture Component Layout

PACKAGE DIMENSIONS




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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.330	1.350	33.79	34.29
B	0.375	0.395	9.52	10.03
C	0.180	0.205	4.57	5.21
D	0.320	0.340	8.13	8.64
E	0.060	0.070	1.52	1.77
F	0.004	0.006	0.11	0.15
G	1.100 BSC		27.94 BSC	
H	0.082	0.097	2.08	2.46
K	0.580	0.620	14.73	15.75
L	0.435 BSC		11.05 BSC	
N	0.845	0.875	21.46	22.23
Q	0.118	0.130	3.00	3.30
R	0.390	0.410	9.91	10.41

- STYLE 1:
1. PIN 1. COLLECTOR
 2. COLLECTOR
 3. BASE
 4. BASE
 5. EMITTER

CASE 375A-01 ISSUE O

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MRF899/D

