

The RF Line NPN Silicon RF Power Transistor

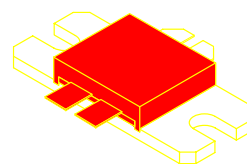
The TPV8100B is designed for output stages in band IV and V TV transmitter amplifiers. It incorporates high value emitter ballast resistors, gold metallizations and offers a high degree of reliability and ruggedness.

Including double input and output matching networks, the TPV8100B features high impedances. It can easily operate in a full 470 MHz to 860 MHz bandwidth in a single and simple circuit.

- To be used class AB for TV band IV and V.
- Specified 28 Volts, 860 MHz Characteristics
Output Power = 125 Watts (peak sync.)
Output Power = 100 Watts (CW)
Minimum Gain = 8.5 dB
- Specified 32 Volts, 860 MHz Characteristics
Output Power = 150 Watts (peak sync.)
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.

TPV8100B

**150 W, 470–860 MHz
NPN SILICON
RF POWER TRANSISTOR**



CASE 398-03, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CE}	40	Vdc
Collector–Base Voltage	V_{CB}	65	Vdc
Emitter–Base Voltage	V_{EB}	4	Vdc
Collector–Current — Continuous	I_C	12	Adc
Total Device Dissipation @ 25°C Case Derate above 25°C	P_D	215 1.25	Watts W/°C
Operating Junction Temperature	T_J	200	°C
Storage Temperature Range	T_{stg}	–65 to +150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case (1)	$R_{\theta JC}$	0.8	°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 ($I_C = 10\text{ mA}$, $R_{be} = 75\ \Omega$)	$V_{(BR)CE}$	30	—	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 10\text{ mAdc}$)	$V_{(BR)EBO}$	4	—	—	Vdc
Collector–Base Breakdown Voltage ($I_E = 20\text{ mAdc}$)	$V_{(BR)CBO}$	65	—	—	Vdc
Collector–Emitter Leakage ($V_{CE} = 28\text{ V}$, $R_{be} = 75\ \Omega$)	I_{CER}	—	—	10	mA

NOTE:

1. Thermal resistance is determined under specified RF operating condition.

(continued)



ELECTRICAL CHARACTERISTICS — continued (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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ON CHARACTERISTICS

DC Current Gain (I _C = 2 Adc, V _{CE} = 10 Vdc)	h _{FE}	30	—	120	—
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DYNAMIC CHARACTERISTICS

Output Capacitance (each side) (2) (V _{CB} = 28 V, I _E = 0, f = 1 MHz)	C _{ob}	—	44	—	pF
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FUNCTIONAL TESTS IN CW (SOUND)

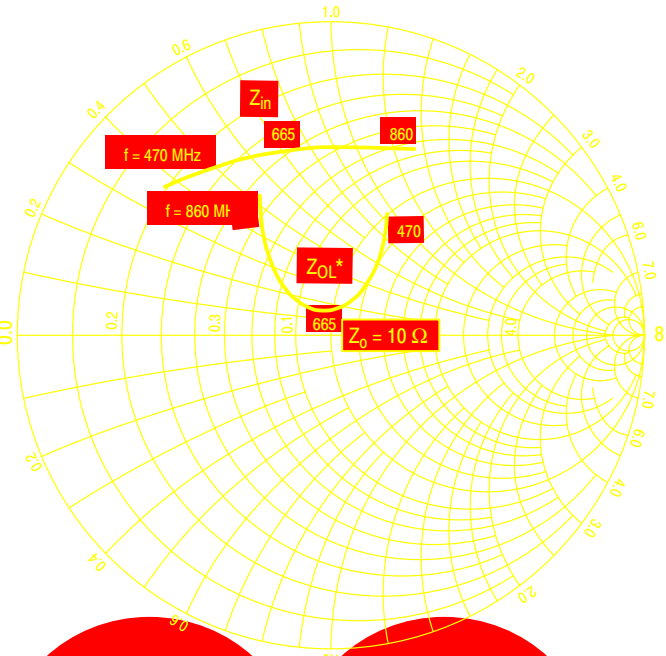
Common-Emitter Amplifier Power Gain (V _{CC} = 28 V, P _{out} = 100 W, I _{CQ} = 2 x 50 mA, f = 860 MHz)	G _p	8.5	9.5	—	dB
Collector Efficiency (V _{CC} = 28 V, P _{out} = 100 W, I _{CQ} = 2 x 50 mA, f = 860 MHz)	η	55	58	—	%
Output Power @ 1 dB Compression (P _{ref} = 25 W) (V _{CC} = 28 V, I _{CQ} = 2 x 50 mA, f = 860 MHz)	P _{out}	100	110	—	W

FUNCTIONAL TESTS IN VIDEO (STANDARD BLACK LEVEL)

Peak Output Power (synch.) (V _{CC} = 28 V, I _{CQ} = 2 x 50 mA, f = 860 MHz)	P _{out}	125	135	—	W
Peak Output Power (synch.) (V _{CC} = 32 V, I _{CQ} = 2 x 25 mA, f = 860 MHz)	P _{out}	150	160	—	W
Recommended Quiescent Current	I _{CQ}	—	—	2 x 0.3	A

NOTE:

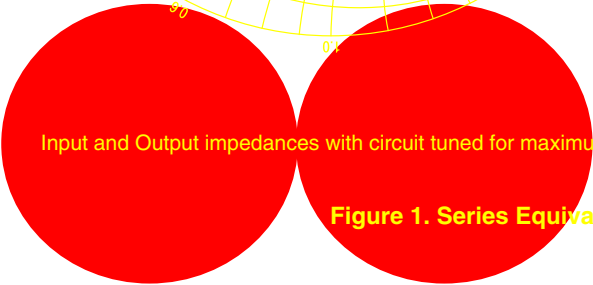
2. Value of "C_{ob}" is that of die only. It is not measurable in TPV8100B because of internal matching network.



f (MHz)	Z _{in} (Ohms)	Z _{OL} * (Ohms)
470	1.95 + j3.67	10.0 + j9.50
665	3.65 + j6.82	9.23 + j1.30
860	6.66 + j13.8	4.45 + j5.22

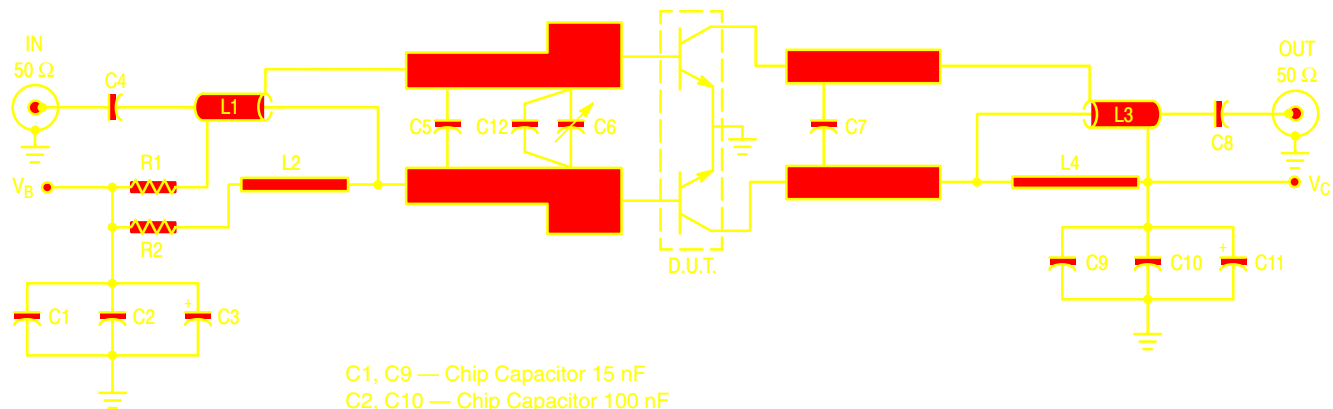
Z_{OL}* = Conjugate of optimum load impedance into which
Z_{OL}* = the device operates at a given output power,
Z_{OL}* = voltage, current and frequency.

NOTE: Z_{in} & Z_{OL}* are given from base-to-base and
NOTE: collector-to-collector respectively.



Input and Output impedances with circuit tuned for maximum linearity @ V_{CC} = 28 V / I_{CQ} = 2 x 50 mA / P_{out} = 100 W

Figure 1. Series Equivalent Input/Output Impedances



- C1, C9 — Chip Capacitor 15 nF
 C2, C10 — Chip Capacitor 100 nF
 C3, C11 — Chip Capacitor 100 μ F/40 V
 C4 — Chip Capacitor 15 pF ATC 100A
 C5 — Chip Capacitor 5.6 pF ATC 100A
 C6 — Trimmer Capacitor 1–4 pF
 C7 — Chip Capacitor 12 pF ATC 100B
 C8 — Chip Capacitor 15 pF ATC 100A
 C12 — Chip Capacitor 12 pF ATC 100A
 L1, L3 — Coaxial Wire 25 Ω /85 Mils/40 mm
 L2, L4 — Printed Board Inductance
 R1, R2 — Chip Resistor 1 Ω 0805 5%

Figure 2. Test Circuit

TYPICAL CHARACTERISTICS CW — WIDEBAND

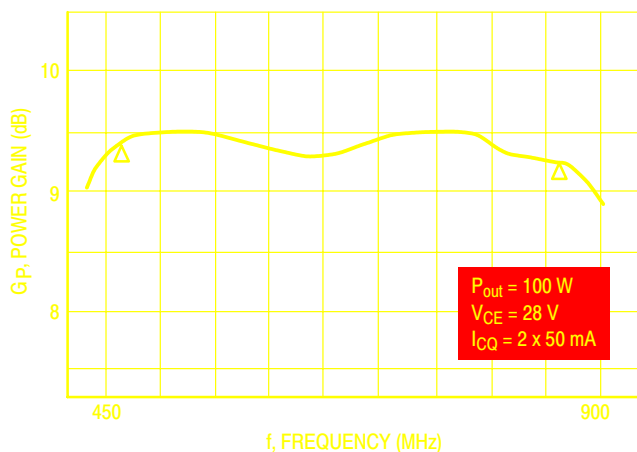


Figure 3. Power Gain versus Frequency

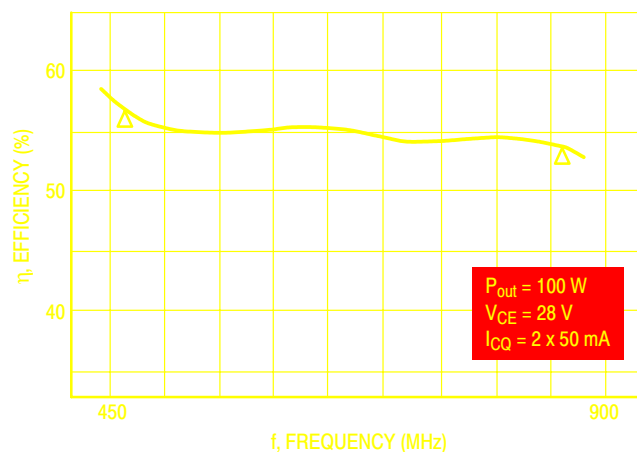


Figure 4. Collector Efficiency versus Frequency

TYPICAL VIDEO CHARACTERISTICS @ $f = 800 \text{ MHz}$
 $V_{CE} = 28 \text{ V}$

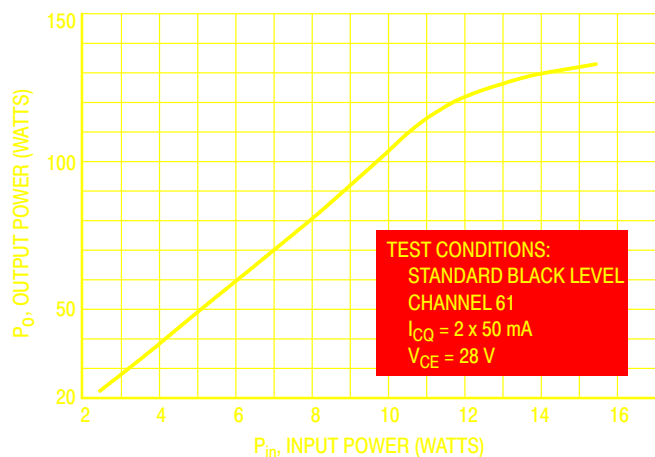
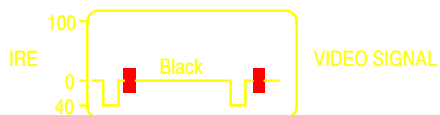


Figure 5. Peak Output Power versus Peak Input Power

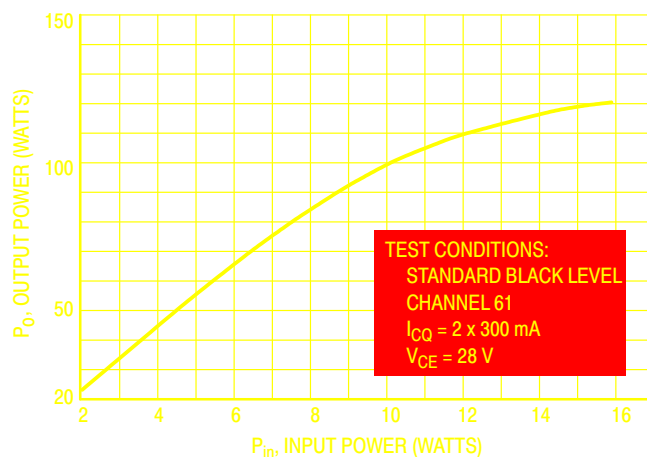


Figure 6. Peak Output Power versus Peak Input Power

TEST CONDITIONS:
 DIFF. Gain, 10 Steps
 Channel 61
 $V_{CE} = 28 \text{ V}$

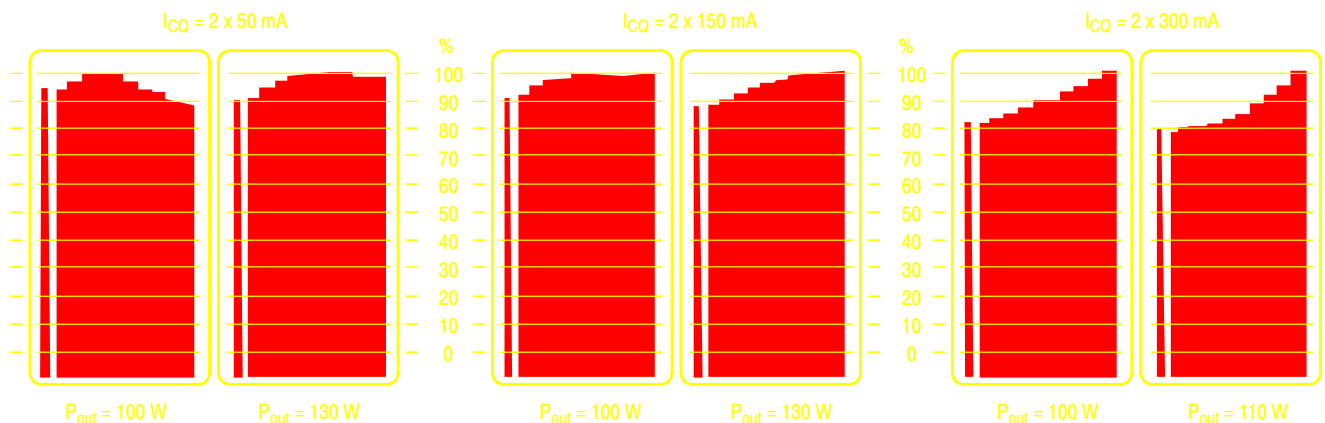
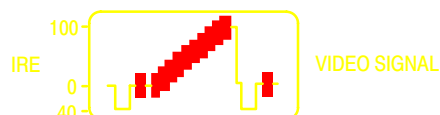


Figure 7. Gain versus Output Power

TYPICAL VIDEO CHARACTERISTICS @ $f = 800 \text{ MHz}$
 $V_{CE} = 32 \text{ V}$

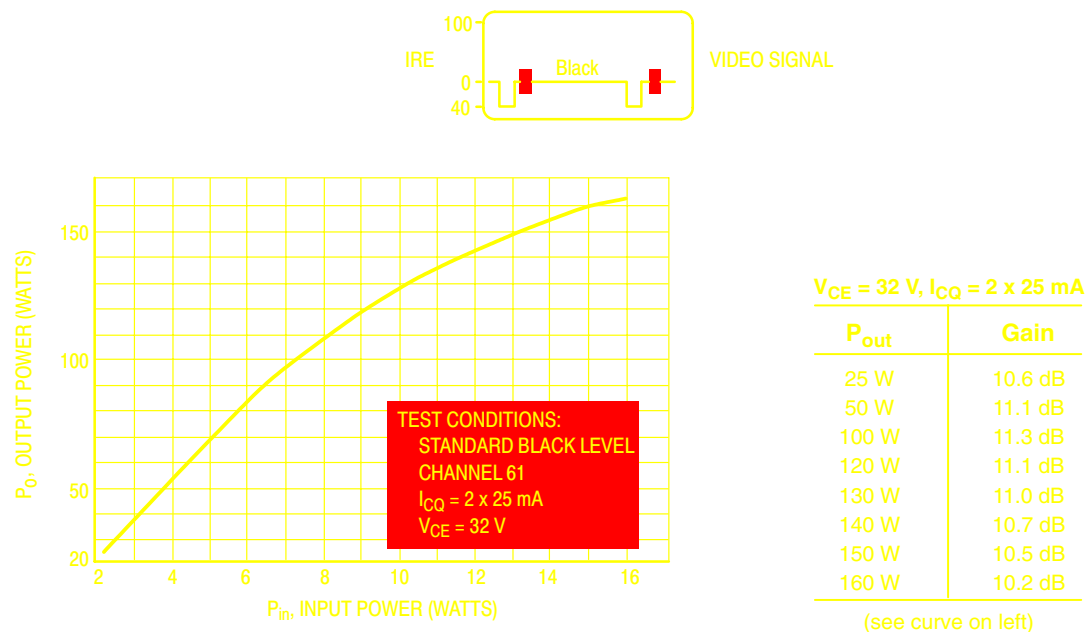


Figure 8. Peak Output Power versus Peak Input Power

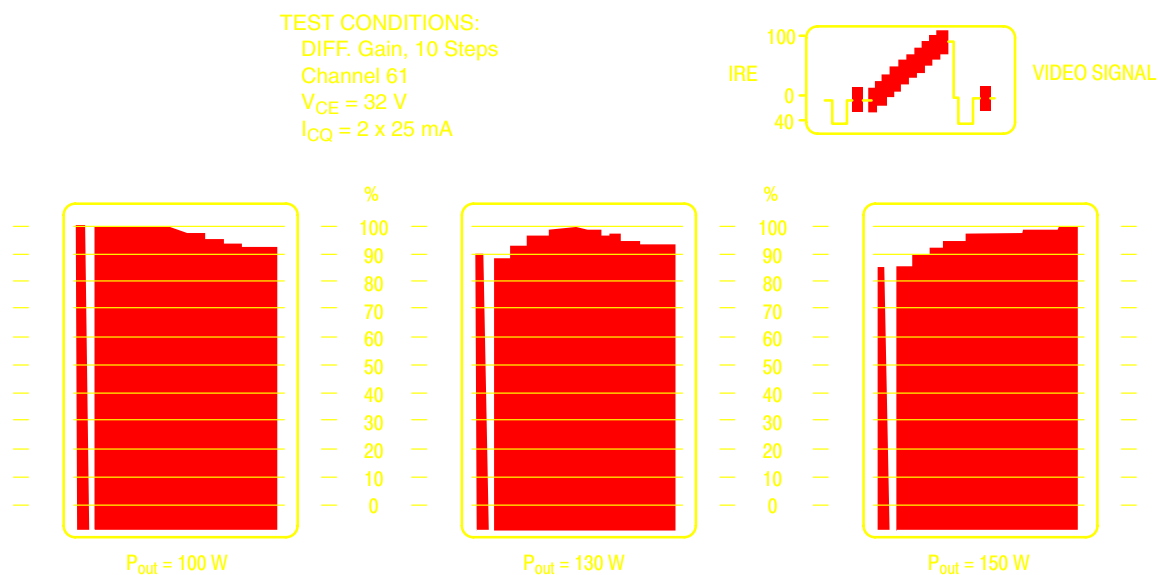


Figure 9. Differential Gain

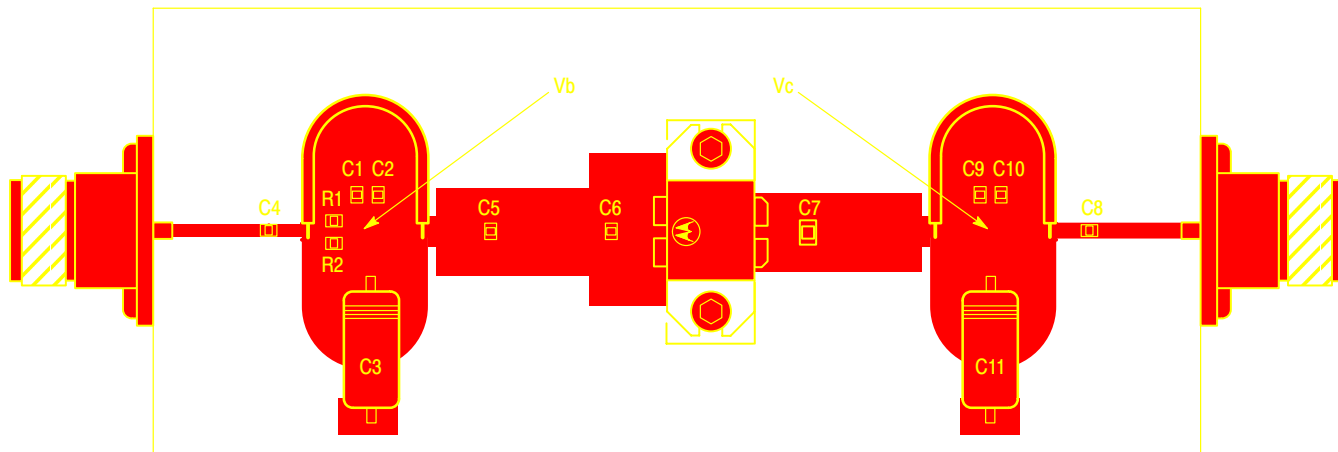
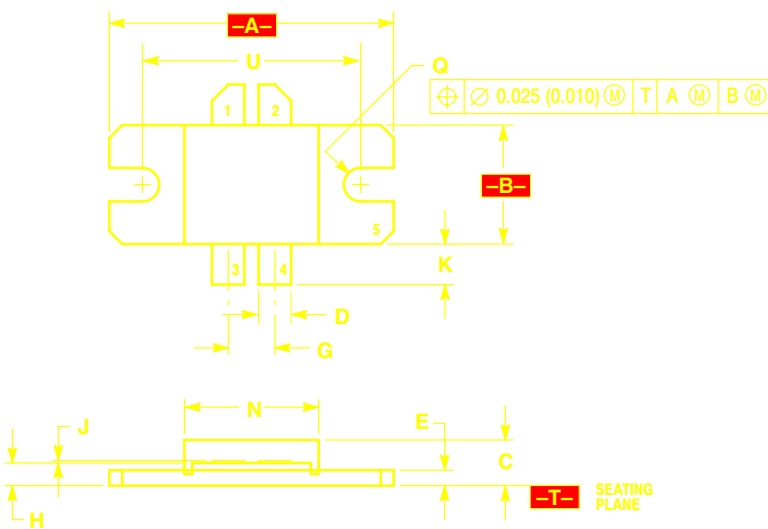


Figure 10. Components View

PACKAGE DIMENSIONS



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

DIM	MIN	MAX	MIN	MAX
A	1.094	1.110	27.79	28.19
B	0.457	0.465	11.61	11.81
C	0.165	0.182	4.25	4.62
D	0.121	0.131	3.08	3.32
E	0.055	0.065	1.40	1.65
G	0.177	0.185	4.50	4.69
H	0.081	0.091	2.06	2.31
J	0.002	0.004	0.06	0.10
K	0.142	0.163	3.60	4.14
N	0.510	0.520	12.95	13.21
Q	0.125	0.135	3.18	3.42
U	0.844 BSC		21.44 BSC	

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

CASE 398-03
ISSUE C

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TPV8100B/D

