

The RF Line

NPN Silicon

RF Power Transistor

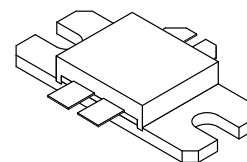
TPV8100B

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.

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

- 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.



CASE 398-03, STYLE 1

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CER}	40	Vdc
Collector–Base Voltage	V_{CBO}	65	Vdc
Emitter–Base Voltage	V_{EBO}	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 ($I_C = 10\text{ mA}$, $R_{be} = 75\ \Omega$)	$V_{(BR)CER}$	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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 2 \text{ Adc}$, $V_{CE} = 10 \text{ Vdc}$)	h_{FE}	30	—	120	—

DYNAMIC CHARACTERISTICS

Output Capacitance (each side) (2) ($V_{CB} = 28 \text{ V}$, $I_E = 0$, $f = 1 \text{ MHz}$)	C_{ob}	—	44	—	μF
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FUNCTIONAL TESTS IN CW (SOUND)

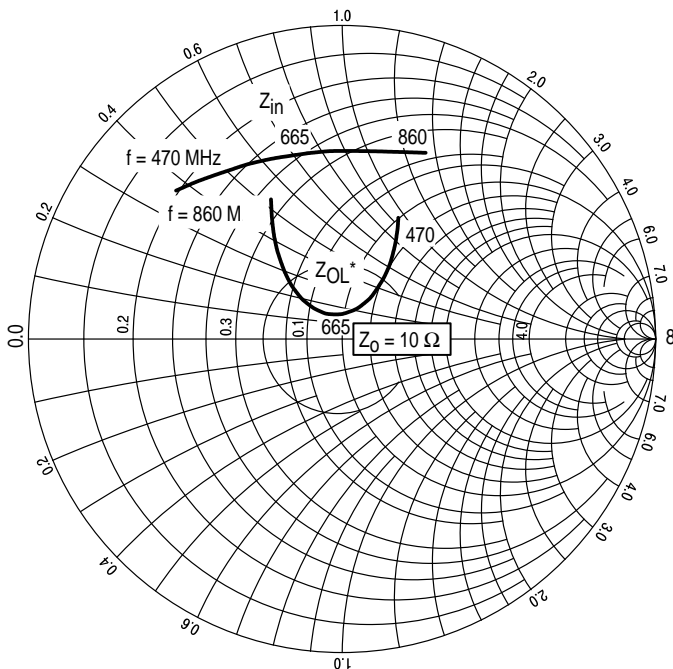
Common-Emitter Amplifier Power Gain ($V_{CC} = 28 \text{ V}$, $P_{out} = 100 \text{ W}$, $I_{CQ} = 2 \times 50 \text{ mA}$, $f = 860 \text{ MHz}$)	G_p	8.5	9.5	—	dB
Collector Efficiency ($V_{CC} = 28 \text{ V}$, $P_{out} = 100 \text{ W}$, $I_Q = 2 \times 50 \text{ mA}$, $f = 860 \text{ MHz}$)	η	55	58	—	%
Output Power @ 1 dB Compression ($P_{ref} = 25 \text{ W}$) ($V_{CC} = 28 \text{ V}$, $I_{CQ} = 2 \times 50 \text{ mA}$, $f = 860 \text{ MHz}$)	P_{out}	100	110	—	W

FUNCTIONAL TESTS IN VIDEO (STANDARD BLACK LEVEL)

Peak Output Power (synch.) ($V_{CC} = 28 \text{ V}$, $I_{CQ} = 2 \times 50 \text{ mA}$, $f = 860 \text{ MHz}$)	P_{out}	125	135	—	W
Peak Output Power (synch.) ($V_{CC} = 32 \text{ V}$, $I_{CQ} = 2 \times 25 \text{ mA}$, $f = 860 \text{ MHz}$)	P_{out}	150	160	—	W
Recommended Quiescent Current	I_{CQ}	—	—	2×0.3	A

NOTE:

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



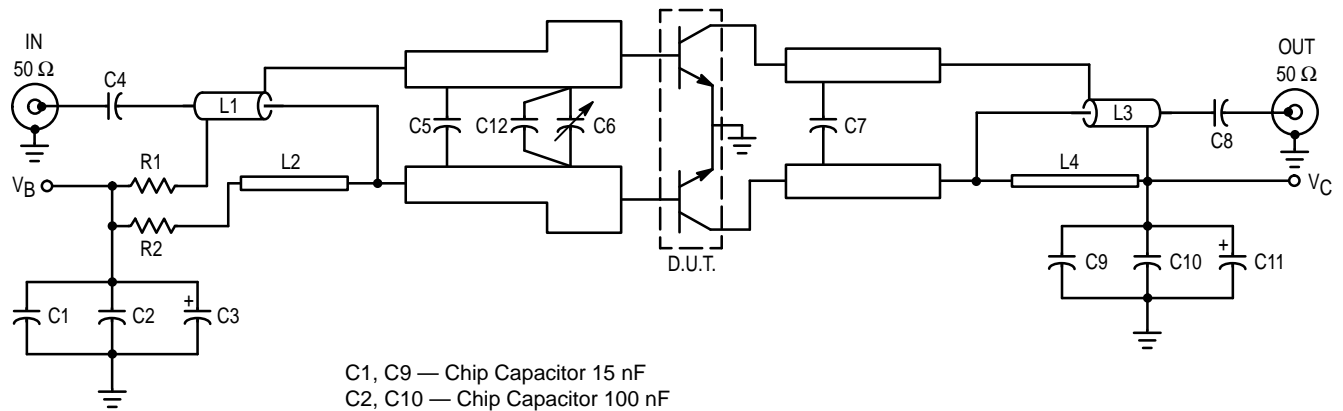
f (MHz)	Z_{in} (Ohms)	Z_{OL}^* (Ohms)
470	$1.95 + j3.67$	$10.0 + j9.50$
665	$3.65 + j6.82$	$9.23 + j1.30$
860	$6.66 + j13.8$	$4.45 + j5.22$

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

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

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

Figure 1. Series Equivalent Input/Output Impedances



- C1, C9 — Chip Capacitor 15 nF
- C2, C10 — Chip Capacitor 100 nF
- C3, C11 — Chip Capacitor 100 μF/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

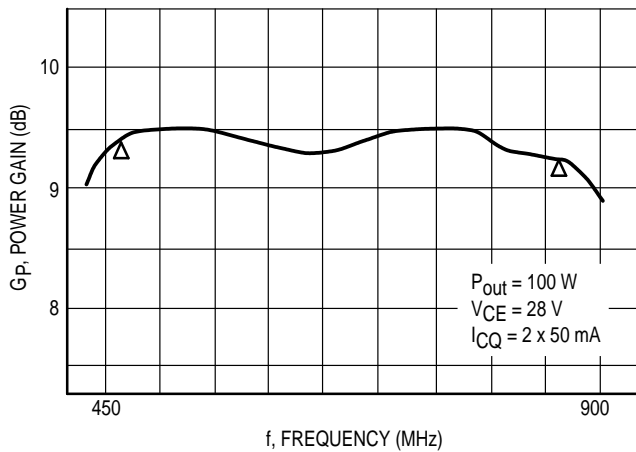


Figure 3. Power Gain versus Frequency

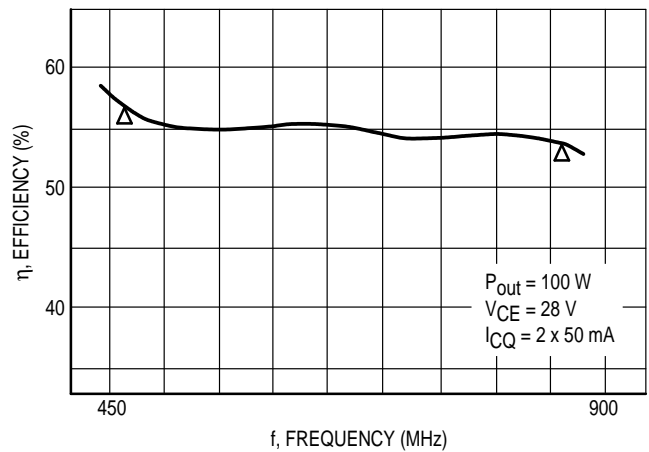


Figure 4. Collector Efficiency versus Frequency

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

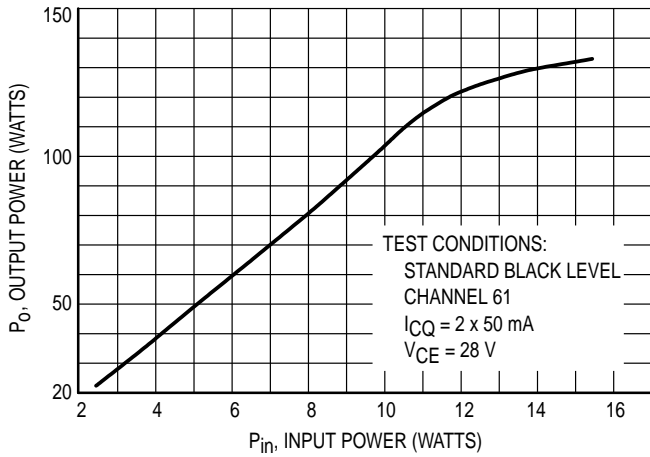
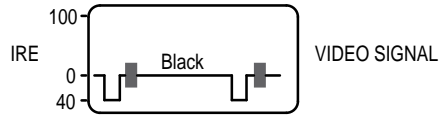


Figure 5. Peak Output Power versus Peak Input Power

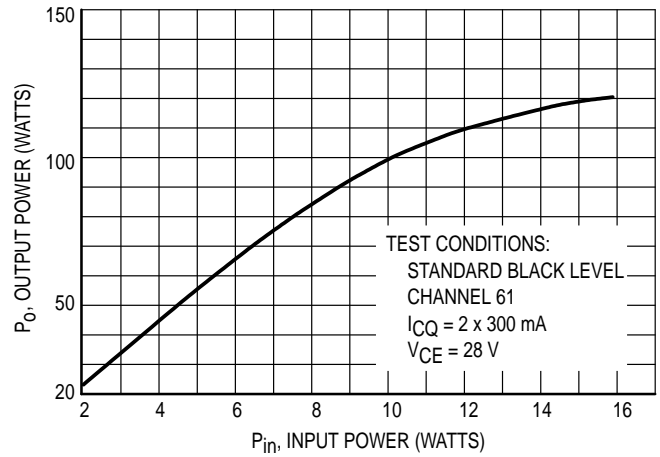


Figure 6. Peak Output Power versus Peak Input Power

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

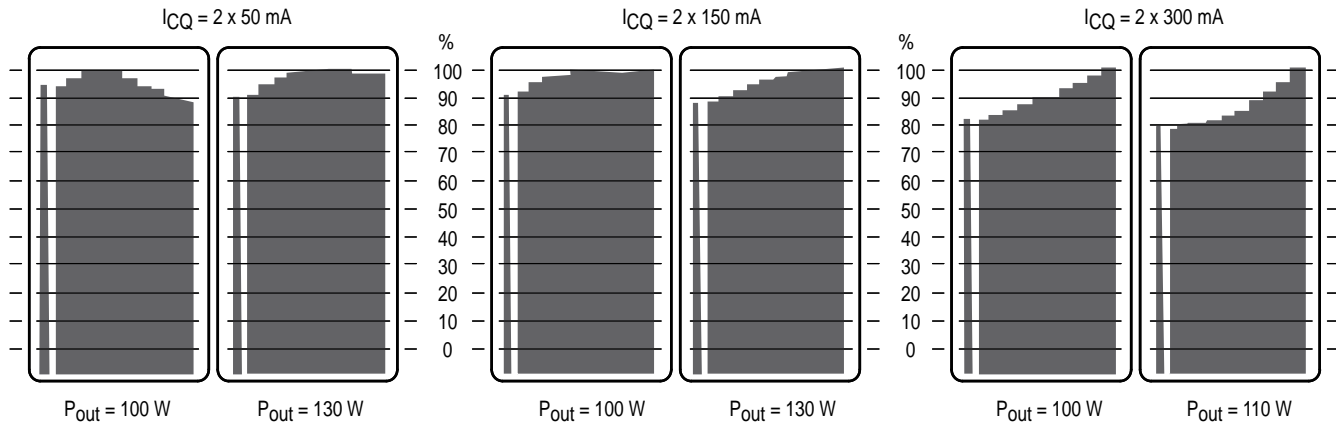
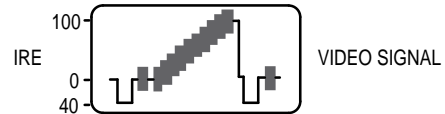


Figure 7. Gain versus Output Power

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

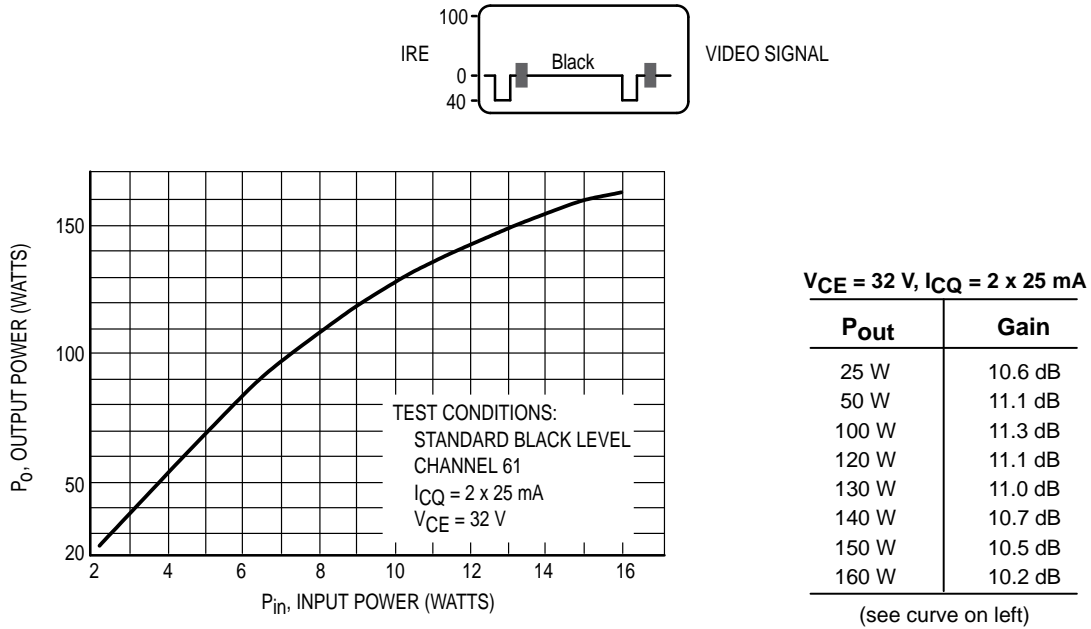


Figure 8. Peak Output Power versus Peak Input Power

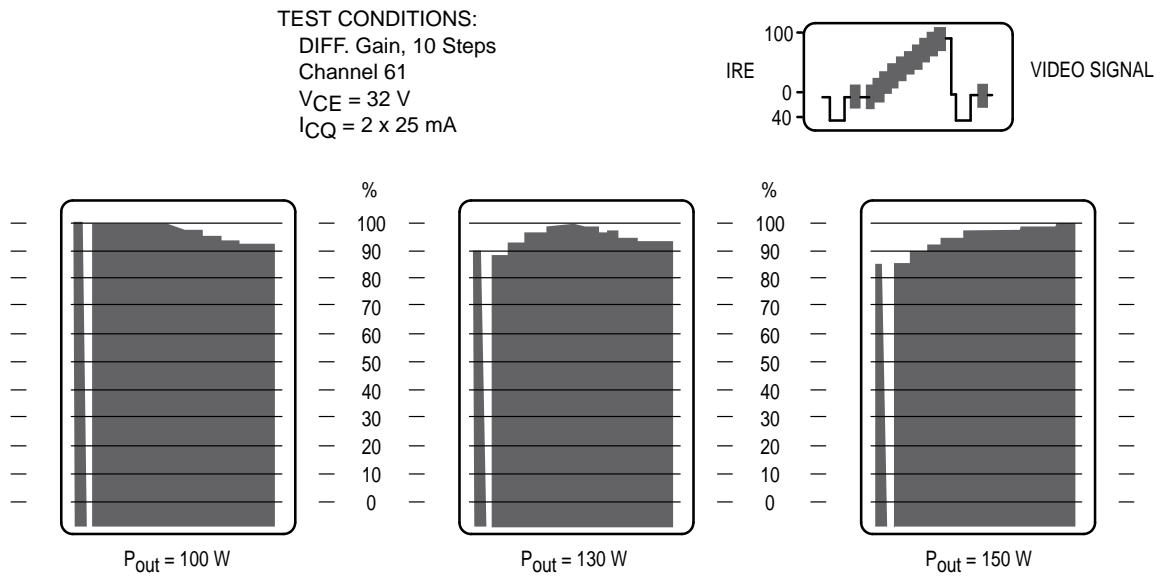


Figure 9. Differential Gain

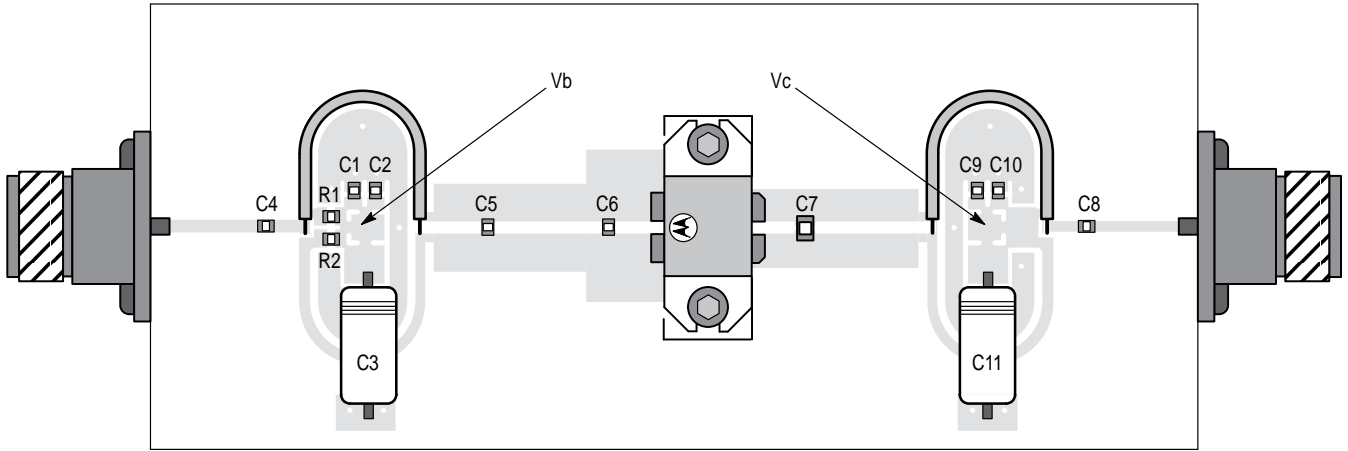
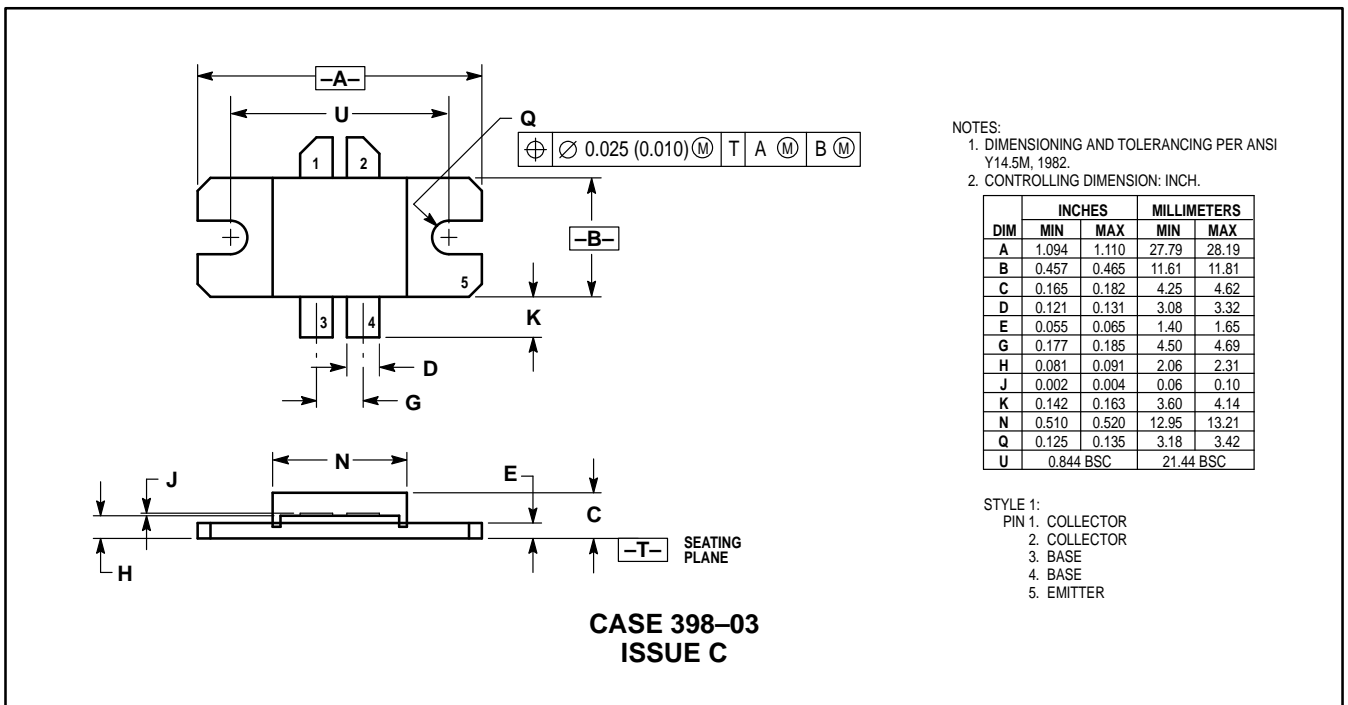


Figure 10. Components View

PACKAGE DIMENSIONS



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