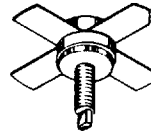


**MOTOROLA**  
**SEMICONDUCTOR**  
**TECHNICAL DATA**
**Advance Information**  
**The RF Line**  
**VHF Power Transistor**

The TP2325 is designed for use in 12.5 V VHF amplifiers operating under Class A, B or C conditions.

Its construction which incorporates gold metallization and diffused ballast resistors enables the part to be used at its maximum ratings and be able to withstand an infinite VSWR at all phase angles.

- 175 MHz
- 25 W —  $P_{out}$
- 12.5 V —  $V_{CC}$
- Gold Metallization for Reliability

**TP2325**
**25 W — 175 MHz**  
**VHF POWER**  
**TRANSISTOR**  
**NPN SILICON**
**2**

**CASE 145D-01, STYLE 1**  
**(.380 SOE)**
**MAXIMUM RATINGS**

| Rating                         | Symbol    | Value        | Unit |
|--------------------------------|-----------|--------------|------|
| Collector-Emitter Voltage      | $V_{CEO}$ | 16           | Vdc  |
| Collector-Base Voltage         | $V_{CBO}$ | 36           | Vdc  |
| Emitter-Base Voltage           | $V_{EBO}$ | 4            | Vdc  |
| Collector Current — Continuous | $I_C$     | 8            | Adc  |
| Operating Junction Temperature | $T_J$     | 200          | °C   |
| Storage Temperature Range      | $T_{stg}$ | - 65 to +200 | °C   |

**THERMAL CHARACTERISTICS**

| Characteristic                       | Symbol          | Max | Unit |
|--------------------------------------|-----------------|-----|------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 2.2 | °C/W |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

**OFF CHARACTERISTICS**

|  |               |    |   |   |      |
|--|---------------|----|---|---|------|
| Collector-Emitter Breakdown Voltage ( $I_C = 50\text{ mA}$ , $I_B = 0$ )             | $V_{(BR)CEO}$ | 16 | — | — | Vdc  |
| Collector-Base Breakdown Voltage ( $I_C = 50\text{ mA}$ , $I_E = 0$ )                | $V_{(BR)CBO}$ | 36 | — | — | Vdc  |
| Emitter-Base Breakdown Voltage ( $I_E = 5\text{ mA}$ , $I_C = 0$ )                   | $V_{(BR)EBO}$ | 4  | — | — | Vdc  |
| Collector Cutoff Current ( $V_{CB} = 15\text{ V}$ , $I_E = 0$ )                      | $I_{CBO}$     | —  | — | 5 | mAdc |
| Collector-Emitter Breakdown Voltage ( $I_C = 50\text{ mA}$ , $R_{BE} = 10\ \Omega$ ) | $V_{(BR)CER}$ | 35 | — | — | Vdc  |

**ON CHARACTERISTICS**

|  |          |    |   |   |   |
|--|----------|----|---|---|---|
| DC Current Gain ( $I_C = 1\text{ A}$ , $V_{CE} = 5\text{ V}$ ) | $h_{FE}$ | 10 | — | — | — |
|--|----------|----|---|---|---|

**FUNCTIONAL TESTS**

|  |          |     |   |   |    |
|--|----------|-----|---|---|----|
| Common-Emitter Amplifier Power Gain<br>( $V_{CE} = 12.5\text{ V}$ , $P_{out} = 25\text{ W}$ , $f = 175\text{ MHz}$ ) | $G_{PE}$ | 6.2 | — | — | dB |
| Collector Efficiency ( $V_{CE} = 12.5\text{ V}$ , $P_{out} = 25\text{ W}$ , $f = 175\text{ MHz}$ )                   | $\eta_c$ | 60  | — | — | %  |

This document contains information on a new product. Specifications and information herein are subject to change without notice.

2

## The RF Line VHF Power Transistors

The TP2330 device is intended for use in VHF transmitter output stages where high gain is desired.

Use of gold metallization and diffused emitter ballast resistors result in enhanced reliability and ruggedness.

- 175 MHz
- 30 W —  $P_{out}$
- 12.5 V —  $V_{CC}$
- High Gain — 10 dB @ 175 MHz

### MAXIMUM RATINGS

| Rating   | Symbol    | Value       | Unit          |
|--|-----------|-------------|---------------|
| Collector-Emitter Voltage  | $V_{CEO}$ | 16          | Vdc           |
| Collector-Base Voltage   | $V_{CBO}$ | 36          | Vdc           |
| Emitter-Base Voltage   | $V_{EBO}$ | 4           | Vdc           |
| Collector Current — Continuous   | $I_C$     | 8           | Adc           |
| Total Device Dissipation (at $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ ) | $P_D$     | 80<br>0.46  | Watts<br>W/°C |
| Operating Junction Temperature   | $T_J$     | 200         | °C            |
| Storage Temperature Range  | $T_{stg}$ | -65 to +200 | °C            |

### THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Max | Unit |
|--------------------------------------|-----------------|-----|------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 2.2 | °C/W |

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

### OFF CHARACTERISTICS

|  |               |    |   |    |      |
|--|---------------|----|---|----|------|
| Collector-Emitter Breakdown Voltage ( $I_C = 50\text{ mA}$ , $I_B = 0$ ) | $V_{(BR)CEO}$ | 16 | — | —  | Vdc  |
| Collector-Base Breakdown Voltage ( $I_C = 50\text{ mA}$ , $I_E = 0$ )    | $V_{(BR)CBO}$ | 36 | — | —  | Vdc  |
| Emitter-Base Breakdown Voltage ( $I_E = 5\text{ mA}$ , $I_C = 0$ )       | $V_{(BR)EBO}$ | 4  | — | —  | Vdc  |
| Collector Cutoff Current ( $V_{CE} = 15\text{ V}$ , $V_{BE} = 0$ )       | $I_{CES}$     | —  | — | 10 | mAdc |

### ON CHARACTERISTICS

|  |          |    |   |     |   |
|--|----------|----|---|-----|---|
| DC Current Gain ( $I_C = 1\text{ A}$ , $V_{CE} = 5\text{ V}$ ) | $h_{FE}$ | 20 | — | 250 | — |
|--|----------|----|---|-----|---|

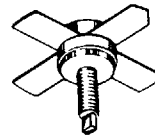
### DYNAMIC CHARACTERISTICS

|  |          |   |    |     |    |
|--|----------|---|----|-----|----|
| Output Capacitance ( $V_{CB} = 15\text{ V}$ , $I_E = 0$ , $f = 1\text{ MHz}$ ) | $C_{ob}$ | — | 70 | 100 | pF |
|--|----------|---|----|-----|----|

(continued)

**TP2330  
TP2330F**

30 W — 175 MHz  
VHF POWER  
TRANSISTORS  
NPN SILICON



CASE 145D-01, STYLE 1  
(380 SOE)  
TP2330



CASE 211-07, STYLE 1  
(380 SOE F)  
TP2330F

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

| Characteristic  | Symbol            | Min      | Typ                                 | Max    | Unit   |    |
|---|-------------------|----------|-------------------------------------|--------|--------|----|
| <b>FUNCTIONAL TESTS</b>   |                   |          |                                     |        |        |    |
| Common-Emitter Amplifier Power Gain<br>( $V_{CE} = 12.5\text{ V}$ , $P_{Out} = 30\text{ W}$ , $f = 175\text{ MHz}$ )                        | TP2330<br>TP2330F | GPE      | 10<br>9                             | —<br>— | —<br>— | dB |
| Collector Efficiency ( $V_{CE} = 12.5\text{ V}$ , $P_{Out} = 30\text{ W}$ , $f = 175\text{ MHz}$ )  |                   | $\eta_c$ | 60                                  | —      | —      | %  |
| Load Mismatch<br>( $V_{CE} = 12.5\text{ V}$ , $P_{Out} = 30\text{ W}$ , $f = 175\text{ MHz}$ ,<br>Load VSWR = $\infty$ 1, All Phase Angles) |                   | $\psi$   | No Degradation in Output Power      |        |        |    |
| Input Impedance, Common Emitter (Typ)<br>( $V_{CE} = 12.5\text{ V}$ , $P_{Out} = 30\text{ W}$ , $f = 175\text{ MHz}$ )                      |                   |          | $Z_{in} = 1.05 + j0.5\text{ Ohms}$  |        |        |    |
| Load Impedance, Common Emitter (Typ)<br>( $V_{CE} = 12.5\text{ V}$ , $P_{Out} = 30\text{ W}$ , $f = 175\text{ MHz}$ )                       |                   |          | $Z_{Load} = 2.7 + j0.2\text{ Ohms}$ |        |        |    |

2

**TYPICAL CHARACTERISTICS**

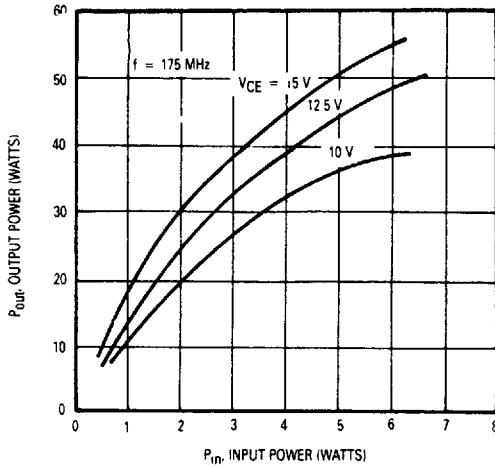


Figure 1. Output Power versus Frequency

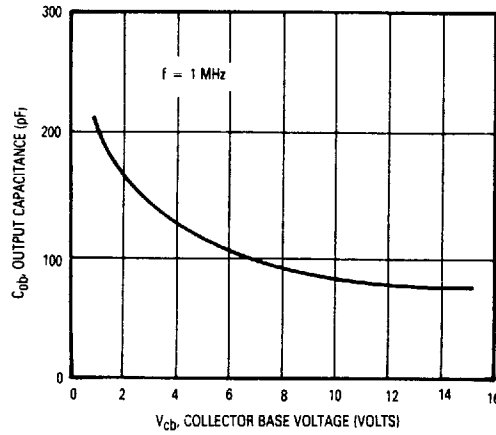


Figure 2. Output Capacitance versus Voltage

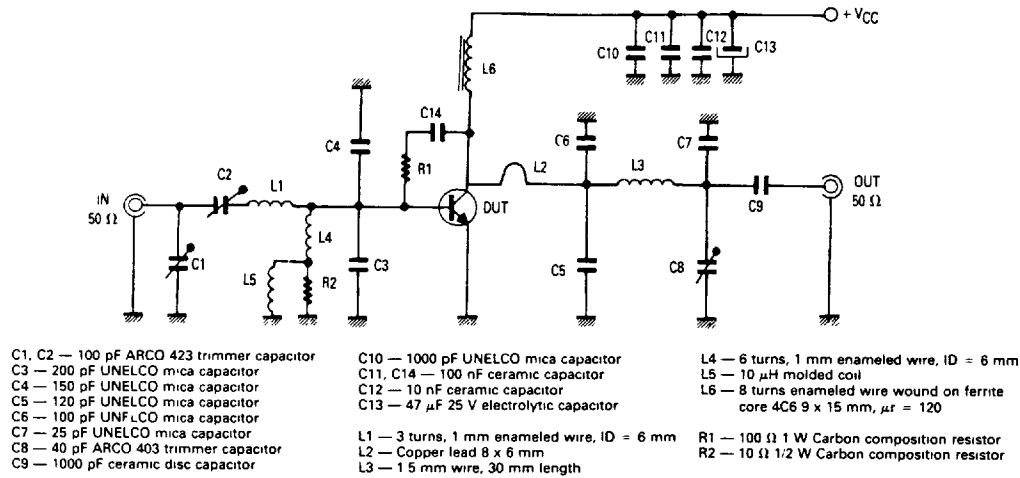


Figure 3. 175 MHz Test Circuit