

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_{CE}
- Gold Metallization for Reliability

TP2325

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25 W — 175 MHz
 VHF POWER
 TRANSISTOR
 NPN SILICON



CASE 1450-01, STYLE 1
 (380 SOE)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	18	Vdc
Collector-Base Voltage	V_{CBO}	38	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	$T_{Storage}$	-65 to +200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R_{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	mAadc
Collector-Emitter Breakdown Voltage ($I_C = 50 \text{ mA}, R_{EE} = 10 \Omega$)	$V_{(BR)CER}$	35	—	—	Vdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 1 \text{ A}, V_{CG} = 5 \text{ V}$)	β_{FE}	10	—	—	—
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FUNCTIONAL TESTS

Common-Emitter Amplifier Power Gain $(V_{CE} = 12.5 \text{ V}, P_{out} = 25 \text{ W}, f = 175 \text{ MHz})$	G_{PE}	8.2	—	—	dB
Collector Efficiency ($V_{CE} = 12.5 \text{ V}, P_{out} = 25 \text{ W}, f = 175 \text{ MHz}$)	η_C	60	—	—	%

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

The RF Line VHF Power Transistors

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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	mA
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	80 0.48	Watts W/ $^\circ\text{C}$
Operating Junction Temperature	T_J	200	$^\circ\text{C}$
Storage Temperature Range	T_{Stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R_{JC}	2.2	$^\circ\text{C}/\text{W}$

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	mA
ON CHARACTERISTICS					
DC Current Gain ($I_C = 1 \text{ A}, V_{CE} = 5 \text{ V}$)	h_{FE}	20	—	250	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 15 \text{ V}, I_C = 0, f = 1 \text{ MHz}$)	C_{ob}	—	70	100	pF

(continued)

TP2330 TP2330F

30 W — 175 MHz
VHF POWER
TRANSISTORS
NPN SILICON



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



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

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

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common-Emitter Amplifier Power Gain ($V_{CE} = 12.5 \text{ V}$, $P_{out} = 30 \text{ W}$, $f = 175 \text{ MHz}$)	TP2330 TP2330F	GPE 9	—	—	dB
Collector Efficiency ($V_{CE} = 12.5 \text{ V}$, $P_{out} = 30 \text{ W}$, $f = 175 \text{ MHz}$)	% _C	69	—	—	%
Load Mismatch ($V_{CE} = 12.5 \text{ V}$, $P_{out} = 30 \text{ W}$, $f = 175 \text{ MHz}$, Load VSWR = ∞ , All Phase Angles)	φ	No Degradation in Output Power			
Input Impedance, Common Emitter (Typ) ($V_{CE} = 12.5 \text{ V}$, $P_{out} = 30 \text{ W}$, $f = 175 \text{ MHz}$)		$Z_{in} = 1.05 + j0.6 \text{ Ohms}$			
Load Impedance, Common Emitter (Typ) ($V_{CE} = 12.5 \text{ V}$, $P_{out} = 30 \text{ W}$, $f = 175 \text{ MHz}$)		$Z_{load} = 2.7 + j0.2 \text{ Ohms}$			

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TYPICAL CHARACTERISTICS

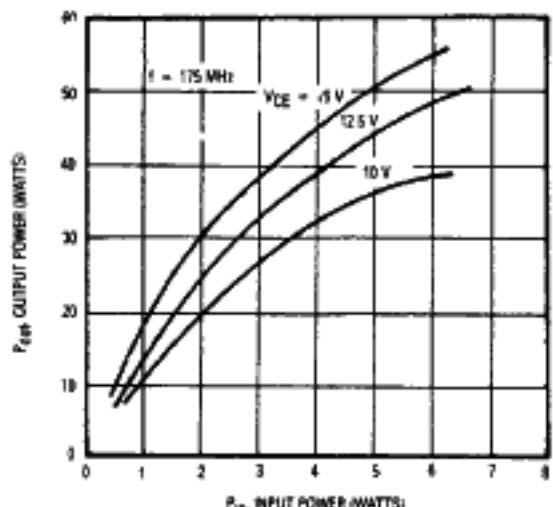


Figure 1. Output Power versus Frequency

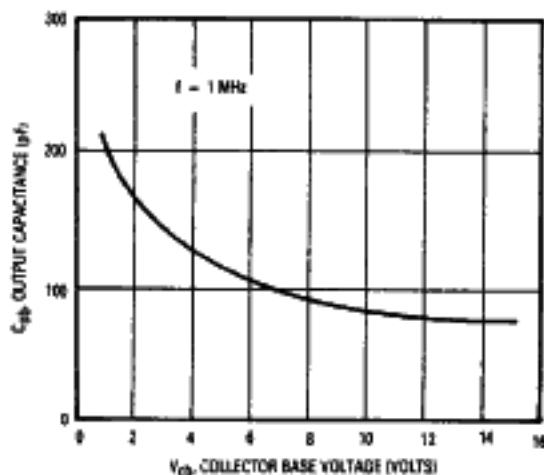
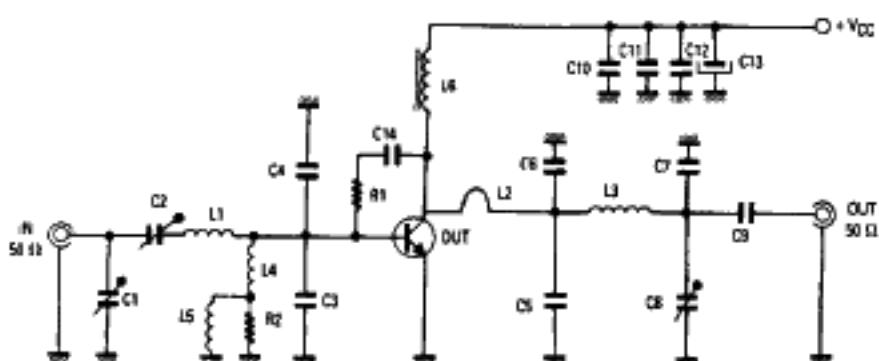


Figure 2. Output Capacitance versus Voltage



C1, C2 = 100 pF ARCO 423 trimmer capacitor
 C3 = 200 pF UNELOCO mica capacitor
 C4 = 150 pF UNELOCO mica capacitor
 C5 = 120 pF UNELOCO mica capacitor
 C6 = 100 pF UNELOCO mica capacitor
 C7 = 25 pF UNELOCO mica capacitor
 C8 = 40 pF ARCO 423 trimmer capacitor
 C9 = 1000 pF ceramic disk capacitor

C10 = 1000 pF UNELOCO mica capacitor
 C11, C14 = 100 nF ceramic capacitor
 C12 = 10 nF ceramic capacitor
 C13 = 47 μF 25 V electrolytic capacitor
 L1 = 3 turns, 1 mm enameled wire, ID = 6 mm
 L2 = Copper lead 8 x 6 mm
 L3 = 15 mm wire, 30 mm length
 L4 = 6 turns, 1 mm enameled wire, ID = 6 mm
 L5 = 10 μH molded coil
 L6 = 8 turns enameled wire wound on ferrite core 4C6 9 x 16 mm, $\mu_r = 120$
 R1 = 100 Ω 1 W Carbon composition resistor
 R2 = 10 Ω 1/2 W Carbon composition resistor

Figure 3. 175 MHz Test Circuit

MOTOROLA RF DEVICE DATA