

MITSUBISHI RF POWER TRANSISTOR 2SC2539

NPN EPITAXIAL PLANAR TYPE

DESCRIPTION

2SC2539 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in VHF band mobile radio applications.

FEATURES

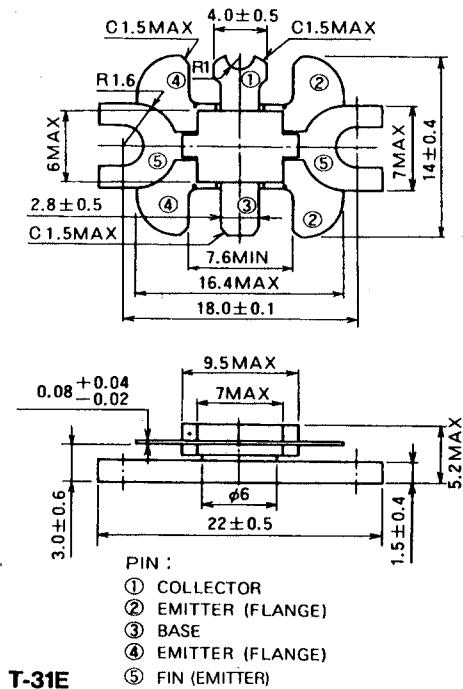
- High power gain: $G_{pe} \geq 14.5\text{dB}$
@ $V_{CC} = 13.5\text{V}$, $P_O = 14\text{W}$, $f = 175\text{MHz}$
- Emitter ballasted construction and gold metallization for high reliability and good performances.
- Low thermal resistance ceramic package with flange.
- Ability of withstanding more than 20:1 load VSWR when operated at $V_{CC} = 15.2\text{V}$, $P_O = 18\text{W}$, $f = 175\text{MHz}$, $T_C = 25^\circ\text{C}$.
- Equivalent input/output series impedance:
 $Z_{in} = 1.7 - j4.4\Omega$ @ $P_O = 14\text{W}$, $V_{CC} = 13.5\text{V}$, $f = 175\text{MHz}$
 $Z_{out} = 6 - j7.4\Omega$

APPLICATION

10 to 14 watts output power amplifiers in VHF band mobile radio applications.

OUTLINE DRAWING

Dimensions in mm



T-31E

ABSOLUTE MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector to base voltage		35	V
V_{EBO}	Emitter to base voltage		4	V
V_{CER}	Collector to emitter voltage	$R_{BE} = \infty$	17	V
I_C	Collector current		3.5	A
P_C	Collector dissipation	$T_a = 25^\circ\text{C}$	2.5	W
		$T_C = 25^\circ\text{C}$	35	W
T_j	Junction temperature		175	$^\circ\text{C}$
T_{stg}	Storage temperature		-55 to 175	$^\circ\text{C}$
R_{th-a}	Thermal resistance	Junction to ambient	60	$^\circ\text{C/W}$
R_{th-c}		Junction to case	4.3	$^\circ\text{C/W}$

Note. Above parameters are guaranteed independently.

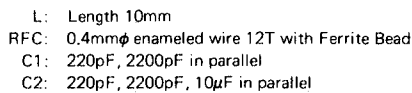
ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter to base breakdown voltage	$I_E = 10\text{mA}$, $I_C = 0$	4			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	$I_C = 10\text{mA}$, $I_E = 0$	35			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	$I_C = 50\text{mA}$, $R_{BE} = \infty$	17			V
I_{CBO}	Collector cutoff current	$V_{CB} = 25\text{V}$, $I_E = 0$			1000	μA
I_{EBO}	Emitter cutoff current	$V_{EB} = 3\text{V}$, $I_C = 0$			1000	μA
h_{FE}	DC forward current gain*	$V_{CE} = 10\text{V}$, $I_C = 0.1\text{A}$	10	50	180	—
P_O	Output power	$V_{CC} = 13.5\text{V}$, $P_{in} = 0.5\text{W}$, $f = 175\text{MHz}$	14	17		W
η_C	Collector efficiency		60	65		%

Note. * Pulse test, $P_W = 150\mu\text{s}$, duty=5%.

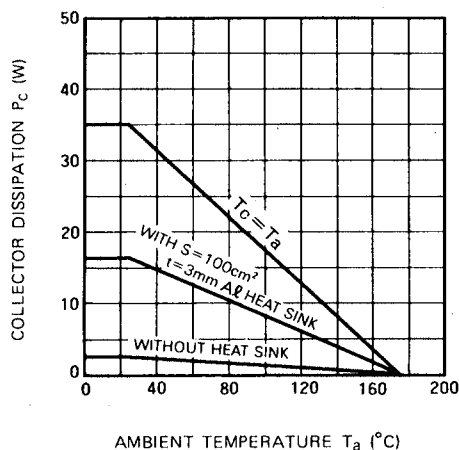
Above parameters, ratings, limits and conditions are subject to change.

TEST CIRCUIT



NOTES: All coils are made from 1.5mm ϕ silver plated copper wire
D: Inner diameter of coil
T: Turn number of coil
P: Pitch of coil
Dimension in milli-meter

COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE



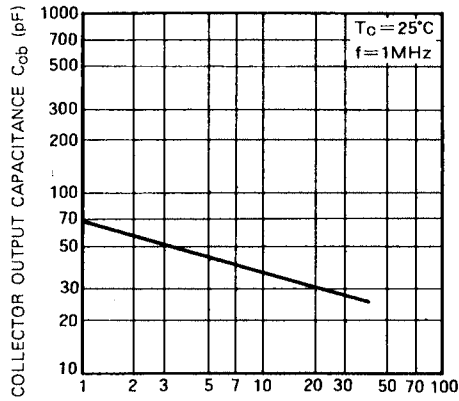
Graph showing Collector Current I_C (A) versus Collector to Emitter Voltage V_{CE} (V) for a 2N4350 JFET at $T_C = 25^\circ\text{C}$. The curves are plotted for various base current values I_B (mA): 0, 5, 10, 15, 20, 25, 30, and 35. The graph shows that I_C increases with V_{CE} and is approximately equal to I_B for $V_{CE} > 2\text{V}$.

A graph showing the Collector to Emitter Breakdown Voltage ($V_{(BR)CER}$) in Volts (V) on the Y-axis versus the Base to Emitter Resistance (R_{BE}) in Ohms (Ω) on the X-axis. The Y-axis ranges from 10 to 60 V, and the X-axis is logarithmic, ranging from 10 to 10k Ω . The curve shows a constant breakdown voltage of approximately 48 V for R_{BE} values from 10 Ω to 500 Ω . At $R_{BE} = 500 \Omega$, the voltage drops sharply to about 22 V at $R_{BE} = 1k \Omega$, and then gradually decreases to approximately 19 V at $R_{BE} = 10k \Omega$. The test conditions are $T_C = 25^\circ C$ and $I_C = 50 mA$.

Graph showing DC current gain h_{FE} versus collector current I_C (A) for a 2N3866 JFET. The graph is plotted on a logarithmic scale for both axes. The y-axis (h_{FE}) ranges from 10 to 110. The x-axis (I_C) ranges from 0.01 to 10 A. The curve shows that h_{FE} increases with I_C up to approximately 4 A, after which it slightly decreases. The conditions are $T_C = 25^\circ\text{C}$ and $V_{CE} = 10\text{V}$.

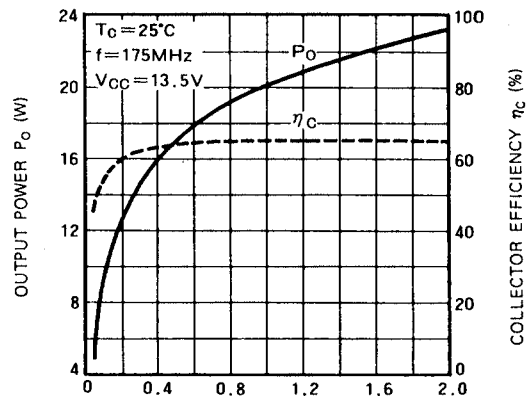
Collector Current I_C (A)	DC Current Gain h_{FE}
0.01	28
0.02	35
0.05	42
0.1	48
0.2	55
0.5	65
1	72
2	78
4	78
5	75
10	65

**COLLECTOR OUTPUT CAPACITANCE VS.
COLLECTOR TO BASE VOLTAGE**



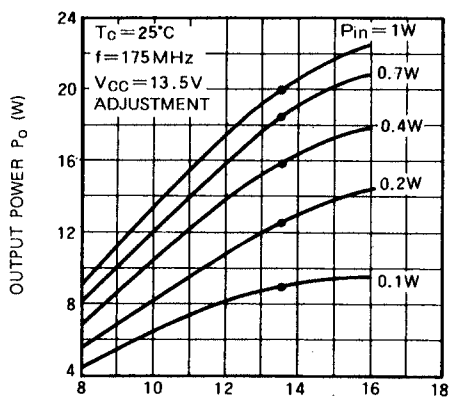
COLLECTOR TO BASE VOLTAGE V_{CB} (V)

**OUTPUT POWER, COLLECTOR
EFFICIENCY VS. INPUT POWER**



INPUT POWER P_{in} (W)

**OUTPUT POWER VS. COLLECTOR
SUPPLY VOLTAGE**



COLLECTOR SUPPLY VOLTAGE V_{CC} (V)