

# MITSUBISHI RF POWER TRANSISTOR 2SC2133

## NPN EPITAXIAL PLANAR TYPE

### DESCRIPTION

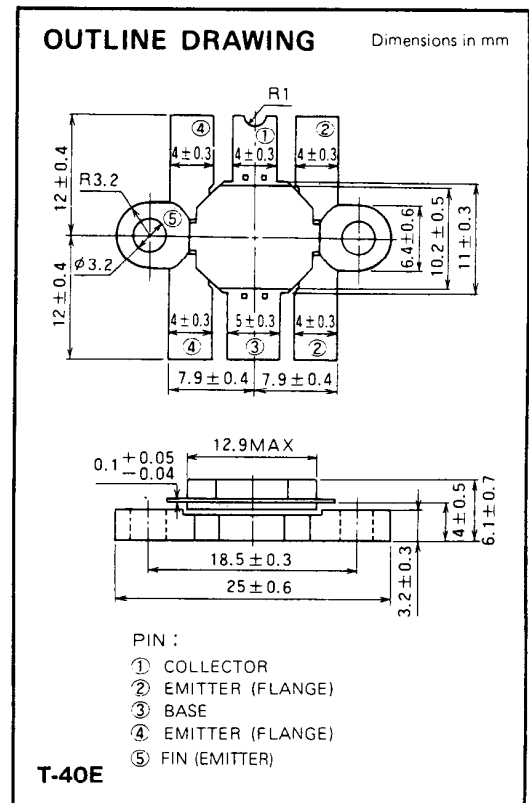
2SC2133 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in UHF band 24 to 28 volts operation applications.

### FEATURES

- High power gain:  $G_{pe} \geq 8.2\text{dB}$   
@  $V_{CC} = 28\text{V}$ ,  $P_O = 30\text{W}$ ,  $f = 220\text{MHz}$
- 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  $V_{CC} = 28\text{V}$ ,  $P_O = 30\text{W}$ ,  $f = 220\text{MHz}$ ,  $T_C = 25^\circ\text{C}$ .
- Equivalent input series impedance:  $Z_{in} = 1.2 + j3.3\Omega$   
@  $V_{CC} = 28\text{V}$ ,  $P_O = 30\text{W}$ ,  $f = 220\text{MHz}$

### APPLICATION

10 to 15 watts output linear power amplifiers such as TV transposer amplifiers in VHF band.



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

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CBO}$	Collector to base voltage		55	V
$V_{EBO}$	Emitter to base voltage		4	V
$V_{CEO}$	Collector to emitter voltage	$R_{BE} = \infty$	35	V
$I_C$	Collector current		5	A
$P_C$	Collector dissipation	$T_a = 25^\circ\text{C}$	3.75	W
		$T_C = 25^\circ\text{C}$	75	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	40	$^\circ\text{C}/\text{W}$
$R_{th-c}$		Junction to case	2	$^\circ\text{C}/\text{W}$

Note. Above parameters are guaranteed independently.

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

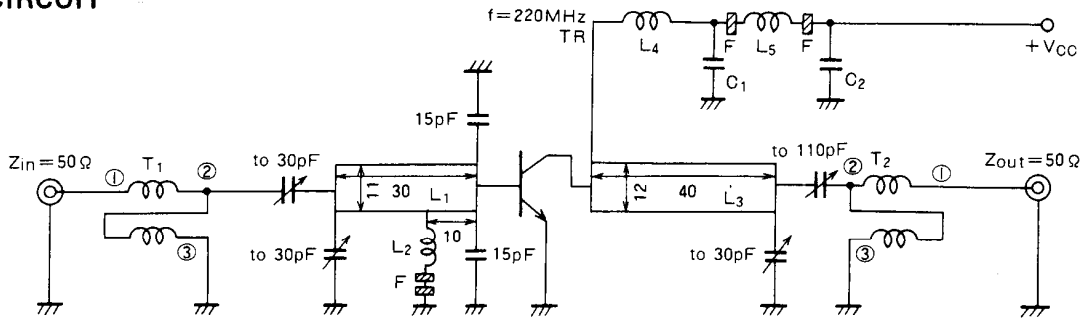
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter to base breakdown voltage	$I_E = 10\text{mA}$ , $I_C = 0$	4			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	$I_C = 10\text{mA}$ , $I_E = 0$	55			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	$I_C = 50\text{mA}$ , $R_{BE} = \infty$	35			V
$I_{CBO}$	Collector cutoff current	$V_{CB} = 35\text{V}$ , $I_E = 0$			2	mA
$I_{EBO}$	Emitter cutoff current	$V_{EB} = 3\text{V}$ , $I_C = 0$			1	mA
$h_{FE}$	DC forward current gain *	$V_{CE} = 25\text{V}$ , $I_C = 0.2\text{A}$	20	50	110	—
$P_O$	Output power	$V_{CC} = 28\text{V}$ , $P_{in} = 4.5\text{W}$ , $f = 220\text{MHz}$	30	34		W
$\eta_C$	Collector efficiency		55	60		%

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

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

**NPN EPITAXIAL PLANAR TYPE**

**TEST CIRCUIT**

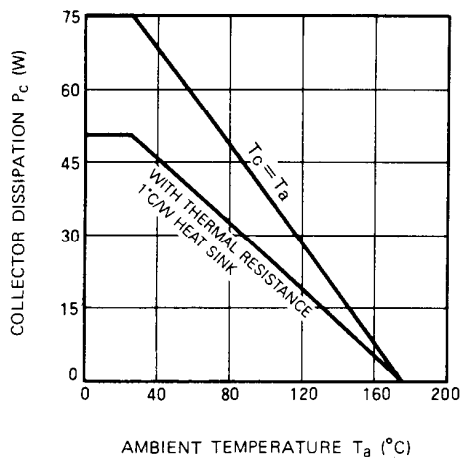


- L<sub>1</sub>, L<sub>3</sub>: Thickness 0.2mm copper plate
- L<sub>2</sub>: 10D, 7T, 2P, φ1.0 silver plated copper wire
- L<sub>4</sub>: 12D, 3T, 3P, φ1.6 silver plated copper wire
- L<sub>5</sub>: 10D, 15T, φ1.0 enameled wire
- T<sub>1</sub>: 4:1 transformer
- T<sub>2</sub>: 1:4 transformer
- F: Ferrite Sealed Bead
- C<sub>1</sub>: 330pF, 1000pF, 4700pF, 0.01μF, 0.1μF, 4.7μF in parallel
- C<sub>2</sub>: 330pF, 1000pF, 4700pF, 0.01μF, 0.1μF, 4.7μF in parallel

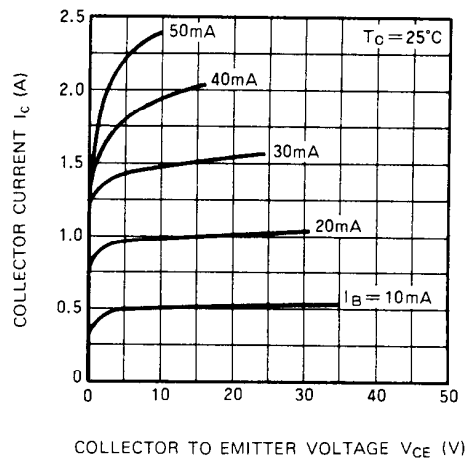
Note:  
D: Inner diameter of coil  
T: Turn number of coil  
P: Pitch of coil  
Dimension in milli-meter

**TYPICAL PERFORMANCE DATA**

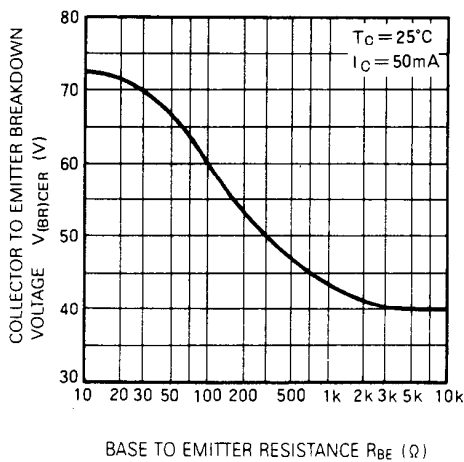
**COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE**



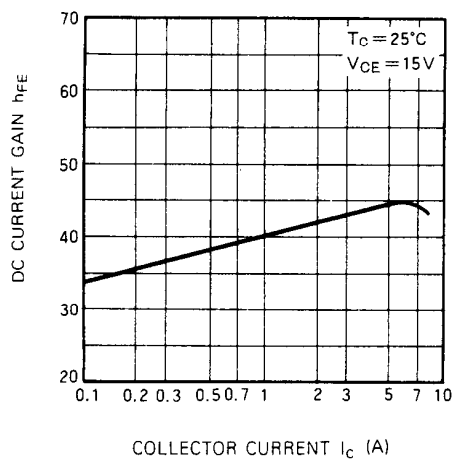
**COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE**



**COLLECTOR TO EMITTER BREAKDOWN VOLTAGE VS. BASE TO EMITTER RESISTANCE**

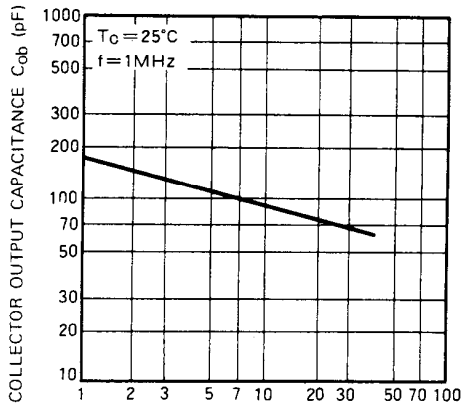


**DC CURRENT GAIN VS. COLLECTOR CURRENT**



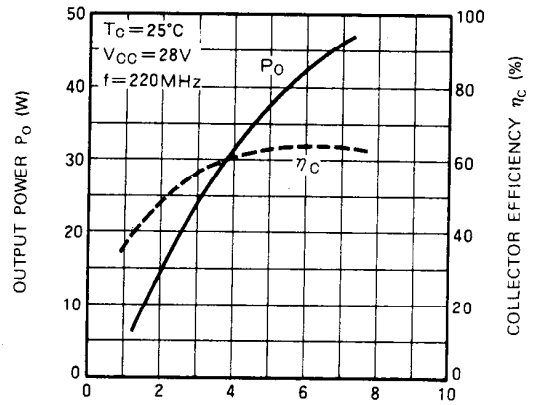
**NPN EPITAXIAL PLANAR TYPE**

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



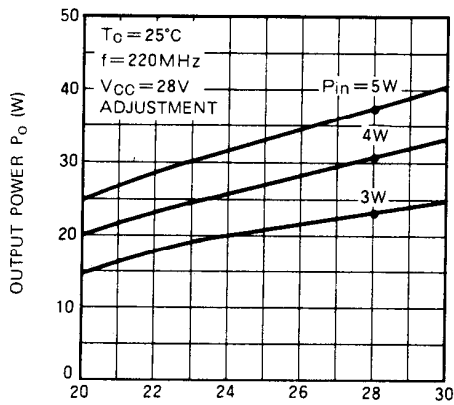
COLLECTOR TO BASE VOLTAGE  $V_{cb}$  (V)

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



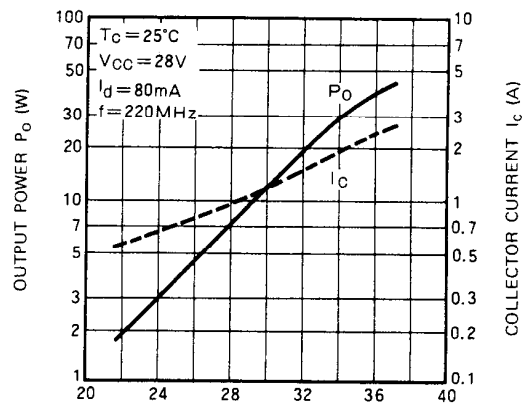
INPUT POWER  $P_{in}$  (W)

**OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE**



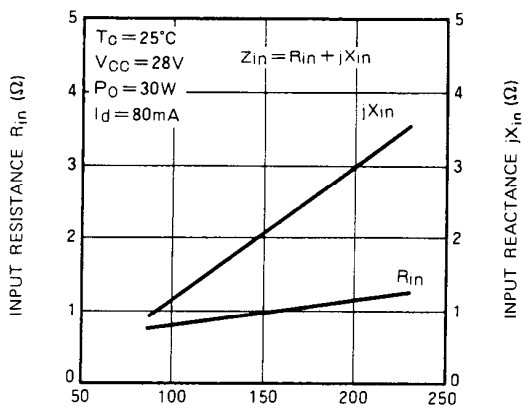
COLLECTOR SUPPLY VOLTAGE  $V_{cc}$  (V)

**IN CASE AB OPERATING OUTPUT POWER COLLECTOR CURRENT VS. INPUT POWER**



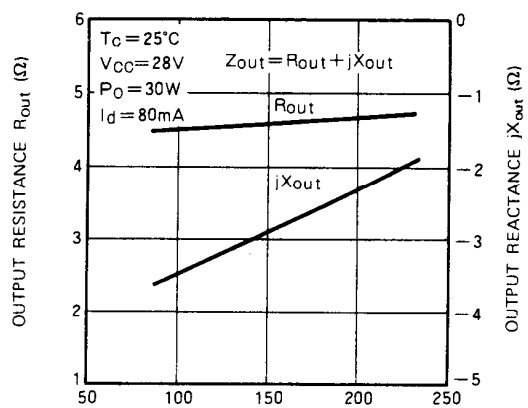
INPUT POWER  $P_{in}$  (dBm)

**INPUT IMPEDANCE VS. FREQUENCY**



FREQUENCY  $f$  (MHz)

**OUTPUT IMPEDANCE VS. FREQUENCY**



FREQUENCY  $f$  (MHz)