

# MITSUBISHI RF POWER TRANSISTOR 2SC2131

## NPN EPITAXIAL PLANAR TYPE

### DESCRIPTION

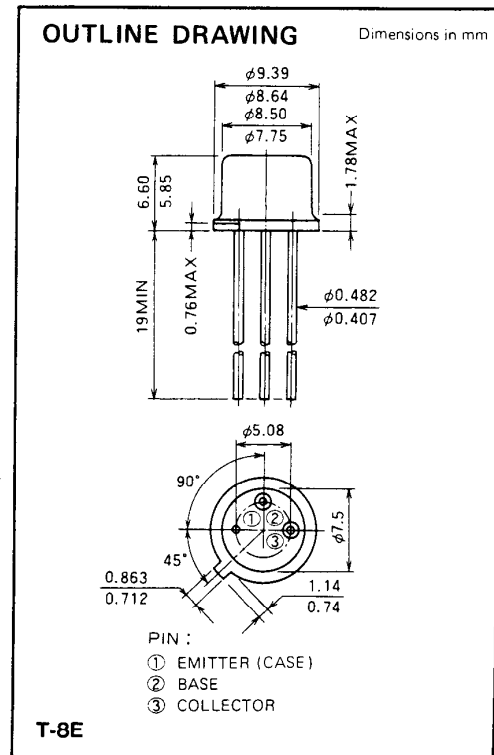
2SC2131 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in UHF band mobile radio applications.

### FEATURES

- High power gain:  $G_{pe} \geq 6.7\text{dB}$   
@  $V_{CC} = 13.5\text{V}$ ,  $P_O = 1.4\text{W}$ ,  $f = 500\text{MHz}$
- TO-39 metal sealed package for high reliability.
- Emitter ballasted construction, gold metallization for good performances.
- Emitter electrode is connected electrically to the case.

### APPLICATION

1 watt power amplifiers in UHF band mobile radio applications and driver amplifiers in general.



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

Symbol	Parameter	Conditions	Ratings	Unit
$V_{CBO}$	Collector to base voltage		40	V
$V_{EBO}$	Emitter to base voltage		4	V
$V_{CEO}$	Collector to emitter voltage	$R_{BE} = \infty$	18	V
$I_C$	Collector current		0.6	A
$P_C$	Collector dissipation	$T_a = 25^\circ\text{C}$	0.8	W
		$T_C = 25^\circ\text{C}$	4	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	187.5	$^\circ\text{C}/\text{W}$
$R_{th-c}$		Junction to case	37.5	$^\circ\text{C}/\text{W}$

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	$I_E = 1\text{mA}$ , $I_C = 0$	4			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	$I_C = 5\text{mA}$ , $I_E = 0$	40			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	$I_C = 50\text{mA}$ , $R_{BE} = \infty$	18			V
$I_{CBO}$	Collector cutoff current	$V_{CB} = 25\text{V}$ , $I_E = 0$			100	$\mu\text{A}$
$I_{EBO}$	Emitter cutoff current	$V_{EB} = 3\text{V}$ , $I_C = 0$			100	$\mu\text{A}$
$h_{FE}$	DC forward current gain*	$V_{CE} = 10\text{V}$ , $I_C = 0.1\text{A}$	10	50	180	—
$P_O$	Output power	$V_{CC} = 13.5\text{V}$ , $P_{in} = 0.3\text{W}$ , $f = 500\text{MHz}$	1.4	1.6		W
$\eta_C$	Collector efficiency		50	60		%

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

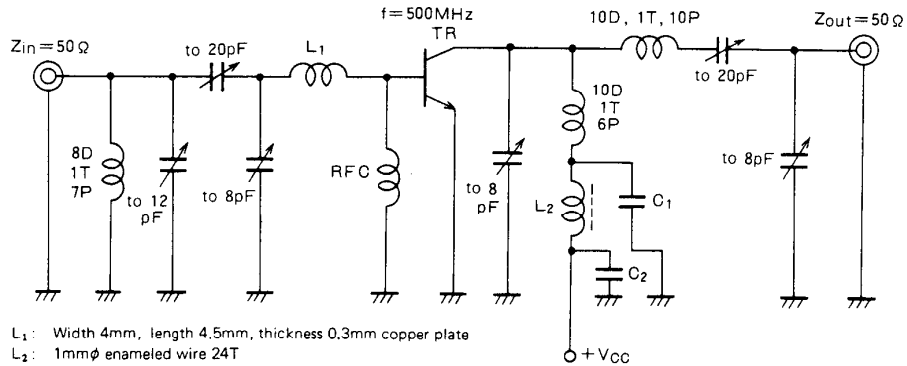
Above parameters, ratings, limits and conditions are subject to change.

NOV. '97



**NPN EPITAXIAL PLANAR TYPE**

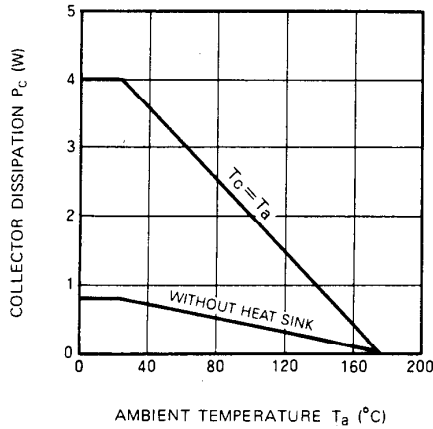
**TEST CIRCUIT**



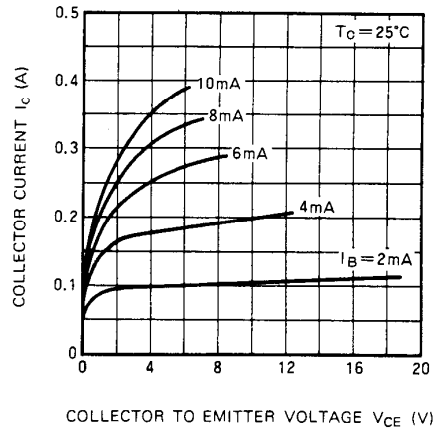
- L<sub>1</sub>: Width 4mm, length 4.5mm, thickness 0.3mm copper plate
  - L<sub>2</sub>: 1mmφ enameled wire 24T
  - RFC: 0.3mmφ enameled wire 25T to 30T
  - C<sub>1</sub>: 50pF, 100pF, 2200pF, 0.005μF, 0.0022μF in parallel
  - C<sub>2</sub>: 0.02μF, 0.047μF, 0.47μF in parallel
- Notes: Coils are made from 1.5mmφ silver plated copper wire except L<sub>1</sub>, L<sub>2</sub> & RFC  
 D: Inner diameter of coil      P: Pitch of coil  
 T: Turn number of coil      Coil dimensions in milli-meter

**TYPICAL PERFORMANCE DATA**

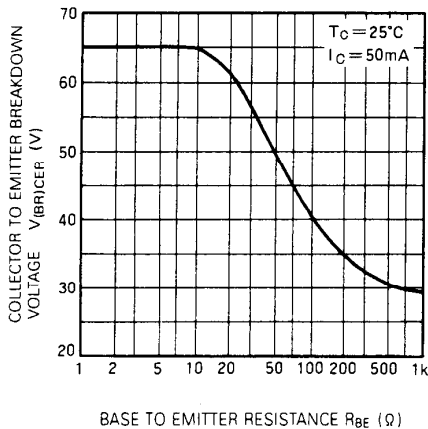
**COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE**



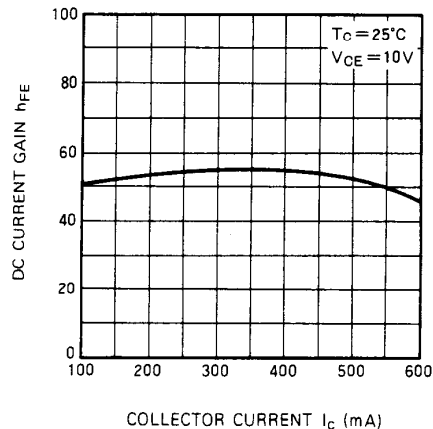
**COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE**



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

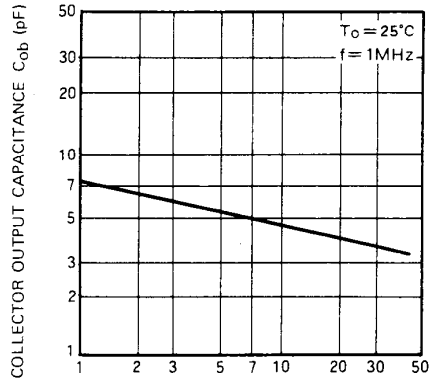


**DC CURRENT GAIN VS. COLLECTOR CURRENT**



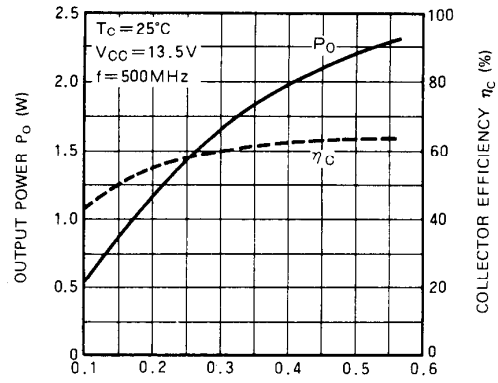
**NPN EPITAXIAL PLANAR TYPE**

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



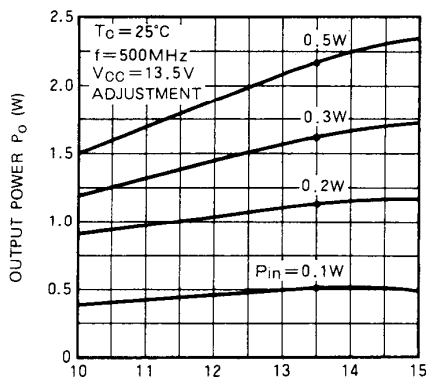
COLLECTOR TO BASE VOLTAGE  $V_{CB}$  (V)

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



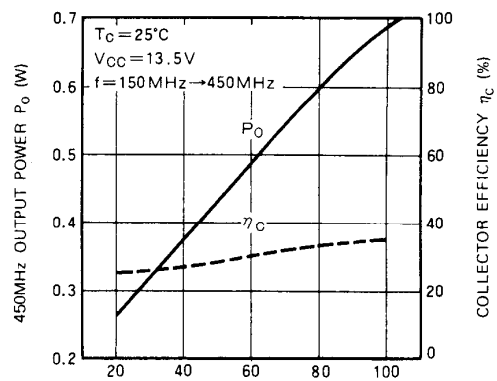
INPUT POWER  $P_{in}$  (W)

**OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE**



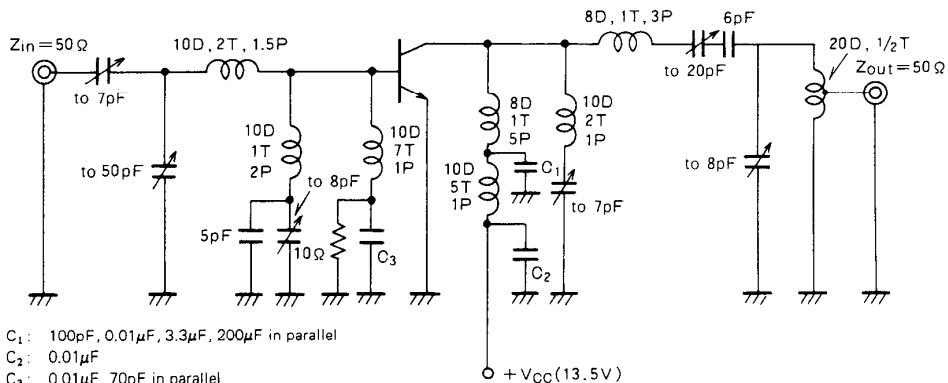
COLLECTOR SUPPLY VOLTAGE  $V_{CC}$  (V)

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



150MHz INPUT POWER  $P_{in}$  (mW)

**APPLICATION CIRCUIT TRIPLER CIRCUIT DIAGRAM (150MHz → 450MHz)**



- $C_1$ : 100pF, 0.01 $\mu\text{F}$ , 3.3 $\mu\text{F}$ , 200 $\mu\text{F}$  in parallel
  - $C_2$ : 0.01 $\mu\text{F}$
  - $C_3$ : 0.01 $\mu\text{F}$ , 70pF in parallel
- Notes: All coils are made from 1.5mm $\phi$  silver plated copper wire  
 D: Inner diameter of coil  
 T: Turn number of coil  
 P: Pitch of coil  
 Dimension in milli-meter