

**DESCRIPTION**

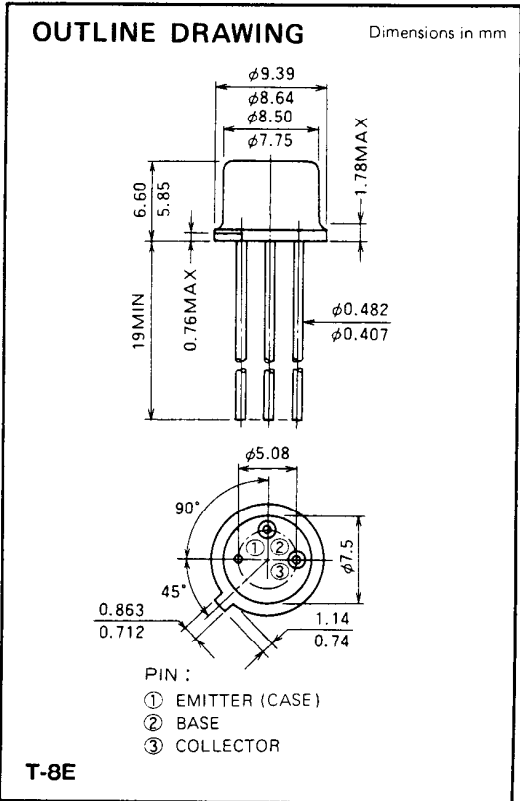
2SC2131 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in UHF band mobile radio applications.

**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               |
|------------|------------------------------|--------------------------|------------|--------------------|
| $V_{CB0}$  | Collector to base voltage    |                          | 40         | V                  |
| $V_{EB0}$  | Emitter to base voltage      |                          | 4          | V                  |
| $V_{CE0}$  | 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      | $^\circ\text{C/W}$ |
| $R_{th-c}$ |                              | Junction to case         | 37.5       | $^\circ\text{C/W}$ |

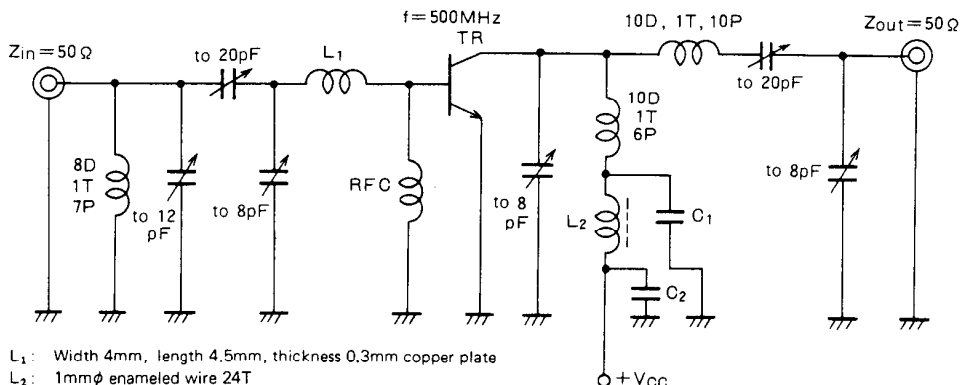
Note. Above parameters are guaranteed independently.

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

| Symbol        | Parameter                              | Test conditions  | Limits |     |     | Unit          |
|---------------|--|--|--------|-----|-----|---------------|
|               |  |  | Min    | Typ | Max |               |
| $V_{(BR)EB0}$ | Emitter to base breakdown voltage      | $I_E = 1\text{mA}$ , $I_C = 0$   | 4      |     |     | V             |
| $V_{(BR)CB0}$ | Collector to base breakdown voltage    | $I_C = 5\text{mA}$ , $I_E = 0$   | 40     |     |     | V             |
| $V_{(BR)CE0}$ | Collector to emitter breakdown voltage | $I_C = 50\text{mA}$ , $R_{BE} = \infty$                                | 18     |     |     | V             |
| $I_{CB0}$     | Collector cutoff current               | $V_{CB} = 25\text{V}$ , $I_E = 0$                                      |        |     | 100 | $\mu\text{A}$ |
| $I_{EB0}$     | 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.

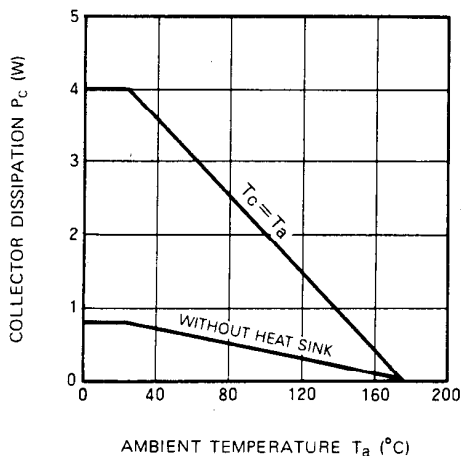
**TEST CIRCUIT**



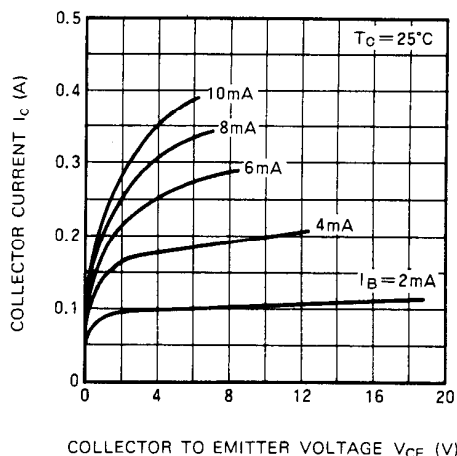
- L<sub>1</sub>: Width 4mm, length 4.5mm, thickness 0.3mm copper plate
- L<sub>2</sub>: 1mmφ enameled wire 24T
- RFC: 0.3mmφ enameled wire 25T to 30T
- C<sub>1</sub>: 50pF, 100pF, 2200pF, 0.005μF, 0.0022μF in parallel
- C<sub>2</sub>: 0.02μF, 0.047μF, 0.47μF in parallel
- Notes: Coils are made from 1.5mmφ 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**

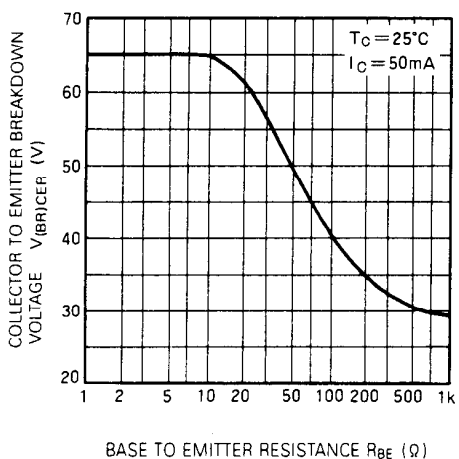
**COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE**



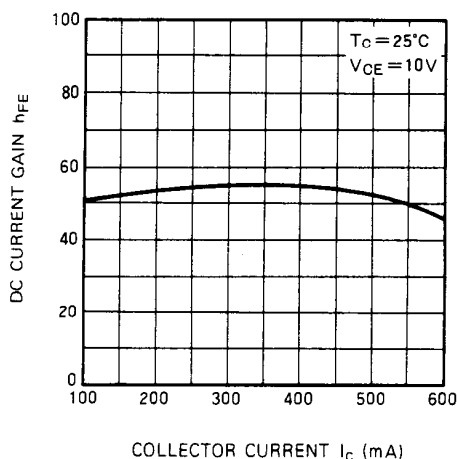
**COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE**



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

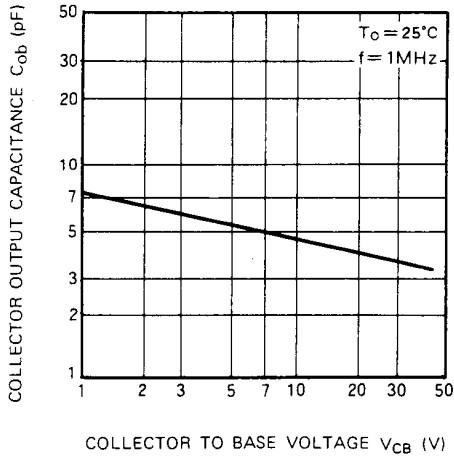


**DC CURRENT GAIN VS. COLLECTOR CURRENT**

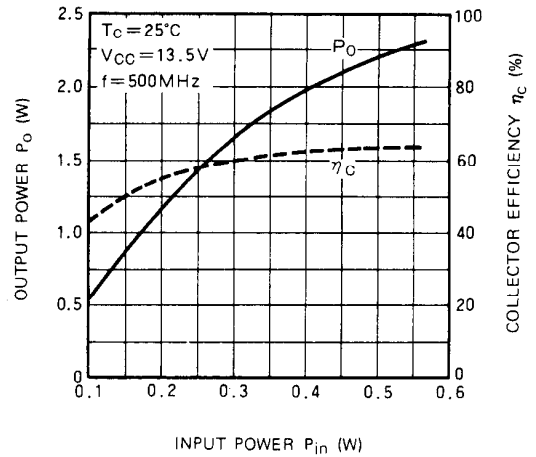


**NPN EPITAXIAL PLANAR TYPE**

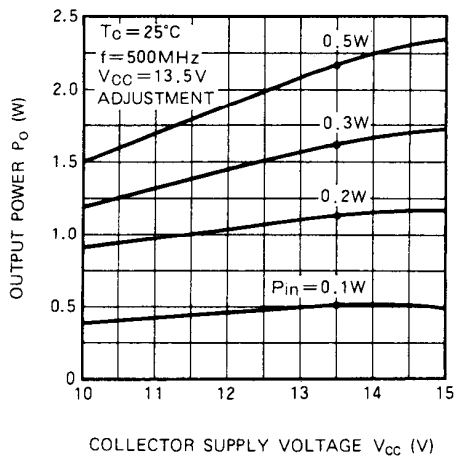
**COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE**



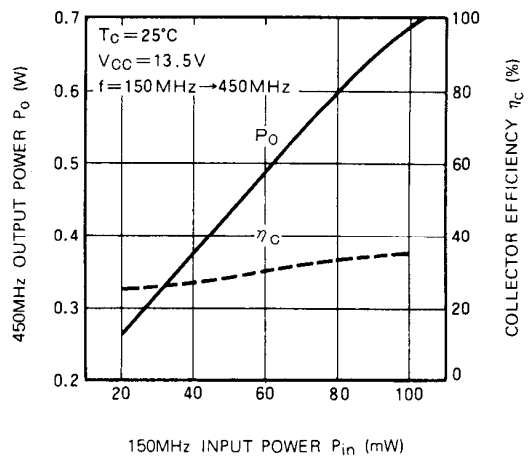
**OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER**



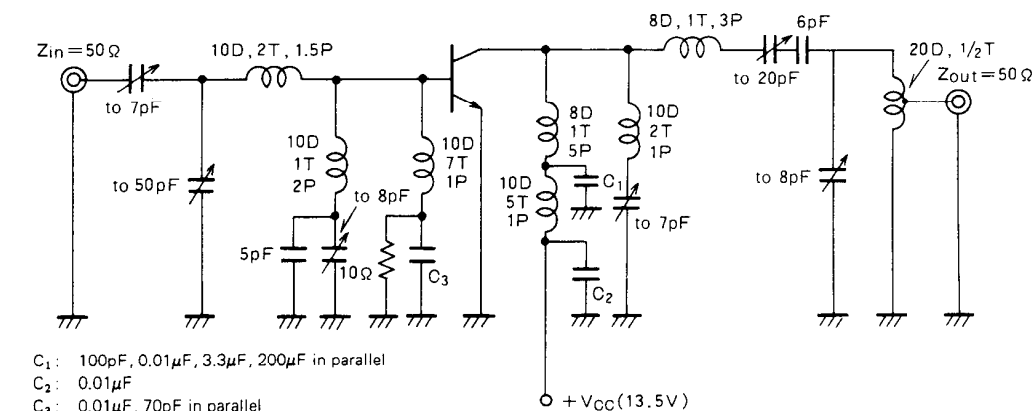
**OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE**



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



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



- C<sub>1</sub>: 100pF, 0.01μF, 3.3μF, 200μF in parallel
  - C<sub>2</sub>: 0.01μF
  - C<sub>3</sub>: 0.01μF, 70pF in parallel
- Notes: All coils are made from 1.5mmφ silver plated copper wire  
 D: Inner diameter of coil  
 T: Turn number of coil  
 P: Pitch of coil  
 Dimension in milli-meter