

## DISCRIPTION

2SC3019 is silicon NPN epitaxial planar type transistor designed for RF power amplifiers in UHF band.

## FEATURES

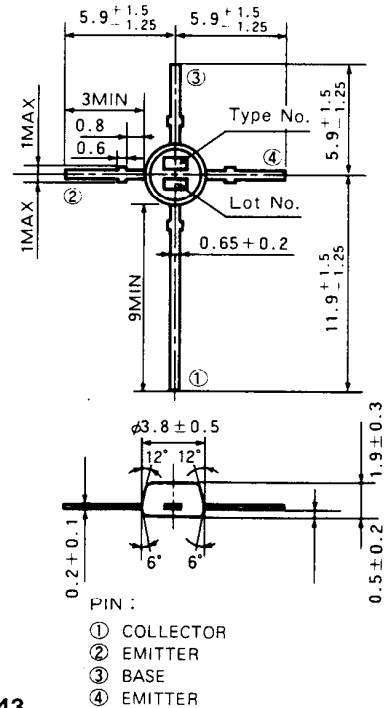
- High power gain:  $G_{pe} \geq 14\text{dB}$   
@  $P_o = 0.5\text{W}$ ,  $f = 520\text{MHz}$ ,  $V_{CC} = 12.5\text{V}$
- Emitter ballasted construction for high reliability and good performance
- Small-disc-mold type package
- Collector dissipation:  $P_C = 0.6\text{W}$ , (@  $T_a = 25^\circ\text{C}$ )
- Input/Output impedance:  
 $Z_{in} = 2.6 - j3.0\Omega$ ,  $Z_{out} = 16.5 - j56\Omega$   
@  $f = 520\text{MHz}$ ,  $V_{CC} = 12.5\text{V}$ ,  $P_o = 0.5\text{W}$

## APPLICATION

Exciter stage in UHF band mobile radio application

## OUTLINE DRAWING

Dimensions in mm



T-43

## 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                  |
| $V_{CEO}$  | Collector to emitter voltage | $R_{BE} = \infty$        | 17         | V                  |
| $I_C$      | Collector current            |                          | 0.4        | A                  |
| $P_C$      | Collector dissipation        | $T_a = 25^\circ\text{C}$ | 0.6        | W                  |
|            |                              | $T_C = 25^\circ\text{C}$ | 0.9        | W                  |
| $T_j$      | Junction temperature         |                          | 135        | $^\circ\text{C}$   |
| $T_{stg}$  | Storage temperature          |                          | -55 to 135 | $^\circ\text{C}$   |
| $R_{th-a}$ | Thermal resistance           | Junction to ambient      | 250        | $^\circ\text{C/W}$ |
| $R_{th-c}$ |                              | Junction to case         | 166        | $^\circ\text{C/W}$ |

Note. Above parameters are guaranteed independently.

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

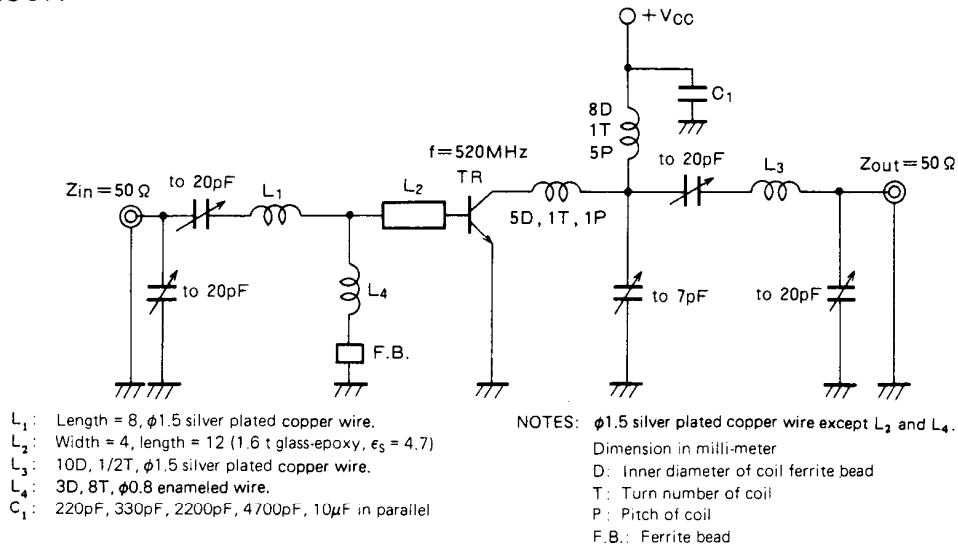
| Symbol        | Parameter                              | Test conditions                                                        | Limits |     |     | Unit          |
|---------------|----------------------------------------|------------------------------------------------------------------------|--------|-----|-----|---------------|
|               |                                        |                                                                        | Min    | Typ | Max |               |
| $V_{(BR)EBO}$ | Emitter to base breakdown voltage      | $I_E = 1\text{mA}$ , $I_C = 0$                                         | 4.0    |     |     | V             |
| $V_{(BR)CBO}$ | Collector to base breakdown voltage    | $I_C = 1\text{mA}$ , $I_E = 0$                                         | 35     |     |     | V             |
| $V_{(BR)CEO}$ | Collector to emitter breakdown voltage | $I_C = 10\text{mA}$ , $R_{BE} = \infty$                                | 17     |     |     | V             |
| $I_{CBO}$     | Collector cutoff current               | $V_{CB} = 15\text{V}$ , $I_E = 0$                                      |        |     | 500 | $\mu\text{A}$ |
| $I_{EBO}$     | Emitter cutoff current                 | $V_{EB} = 3\text{V}$ , $I_C = 0$                                       |        |     | 500 | $\mu\text{A}$ |
| $h_{FE}$      | DC forward current gain*               | $V_{CE} = 10\text{V}$ , $I_C = 50\text{mA}$                            | 20     | 70  | 180 | —             |
| $P_o$         | Output power                           | $V_{CC} = 12.5\text{V}$ , $f = 520\text{MHz}$ , $P_{in} = 20\text{mW}$ | 500    | 600 |     | mW            |
| $\eta_C$      | Collector efficiency                   |                                                                        | 40     | 50  |     | %             |

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

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

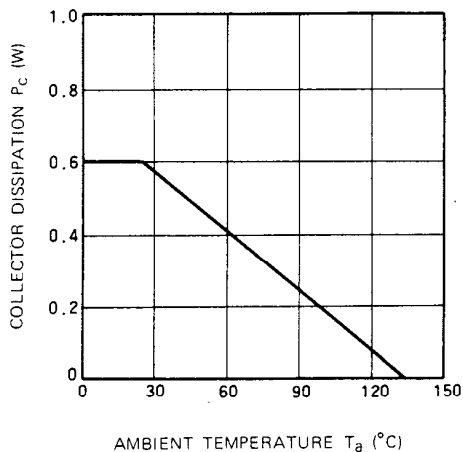
**NPN EPITAXIAL PLANAR TYPE**

**TEST CIRCUIT**

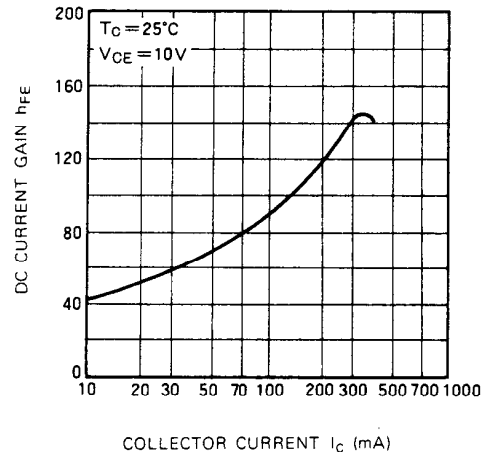


**TYPICAL PERFORMANCE DATE**

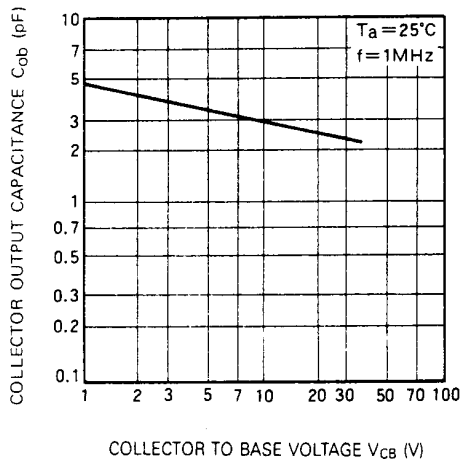
**COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE**



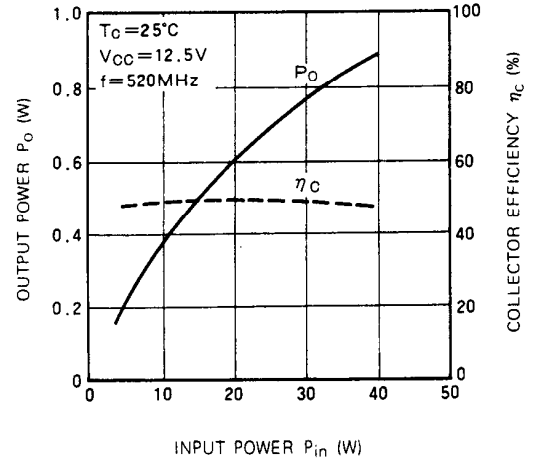
**DC CURRENT GAIN VS. COLLECTOR CURRENT**



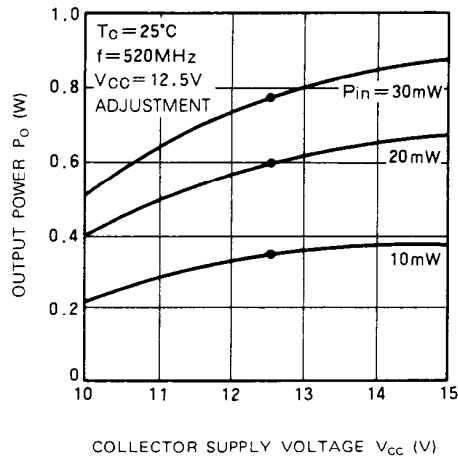
**COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE**



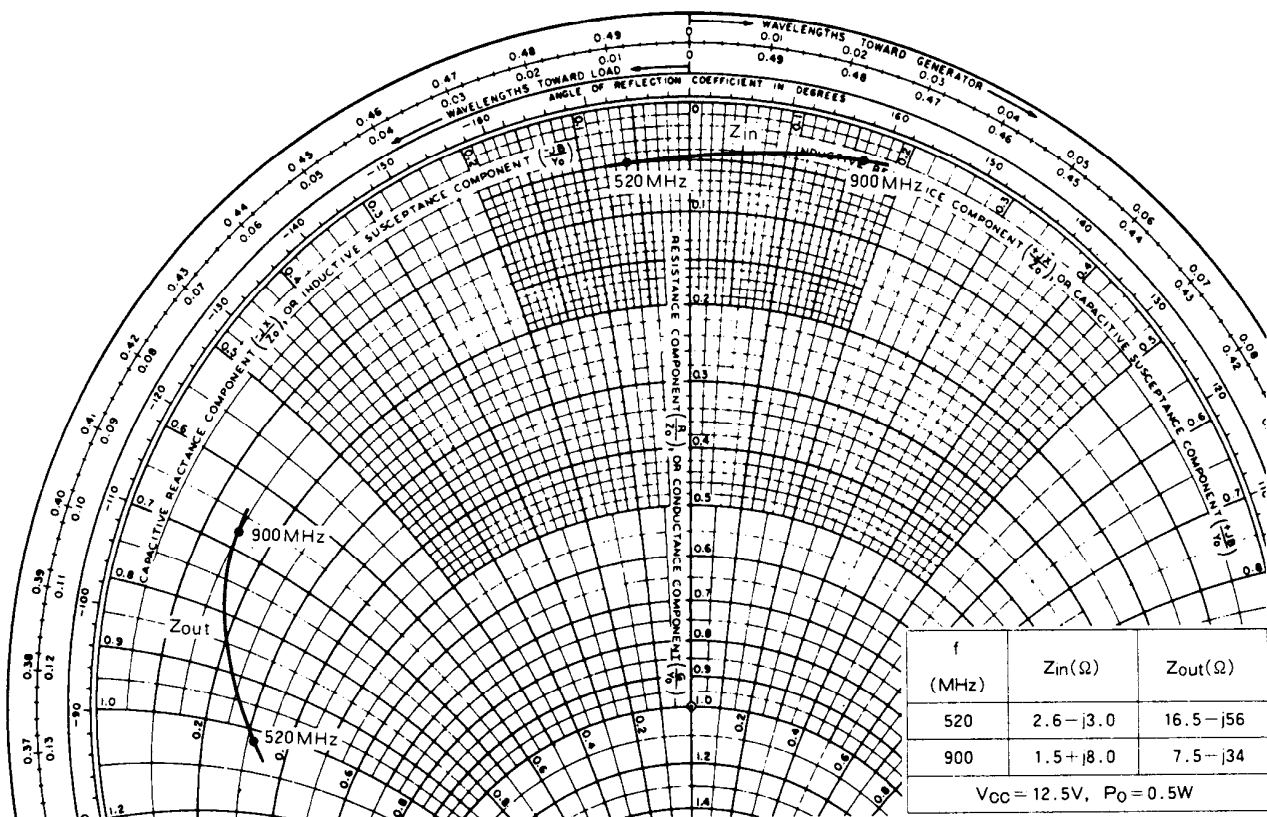
**OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER**



**OUTPUT POWER VS.  
COLLECTOR SUPPLY VOLTAGE  
CHARACTERISTICS**



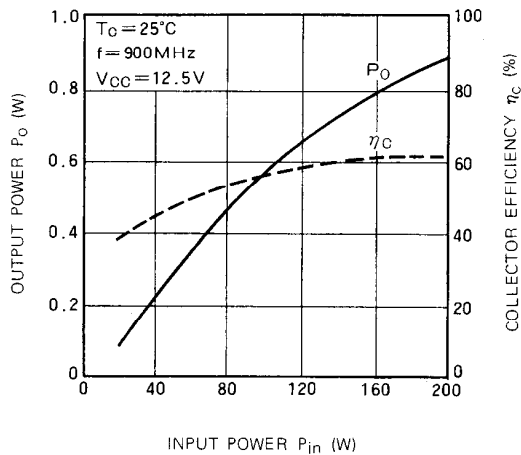
**INPUT/OUTPUT IMPEDANCE**



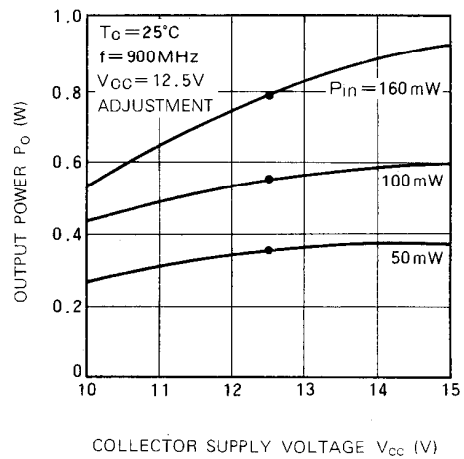
**NPN EPITAXIAL PLANAR TYPE**

**REFERENCE DATA (f = 900MHz)**

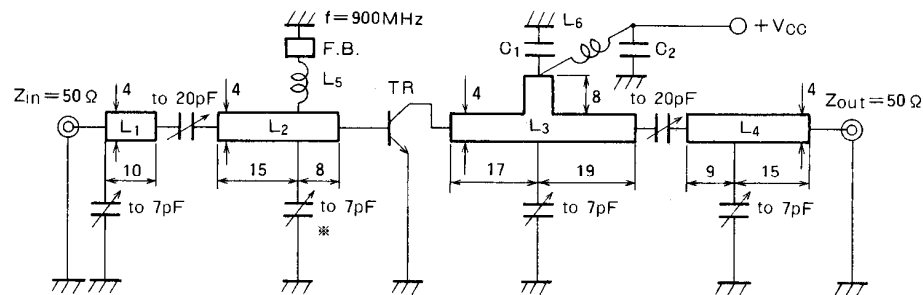
**OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER**



**OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE**



**TEST CIRCUIT**



- $L_1$  to  $L_4$ : Strip-line: 1.6 t glass-terfon  $\epsilon_r = 2.7$
- $L_5$ : 4D, 6T, AWG #20 enameled wire ( $\phi 0.8\text{ mm}$ )
- $L_6$ : 4D, 5T, AWG #20 enameled wire ( $\phi 0.8\text{ mm}$ )
- F.B.: Ferrite bead
- $C_1$ : 1000pF in parallel
- $C_2$ : 100pF, 56pF, 560pF, 4.7 $\mu\text{F}$  in parallel

Unit: mm

**MATCHING PATTERN**

