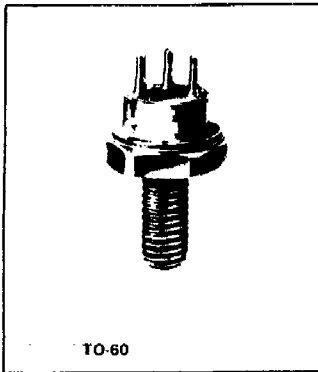


**RF Power Transistors**

**2N5102**



**High-Power Silicon N-P-N  
 Overlay Transistor**

For Class C, AM Operation in VHF Circuits

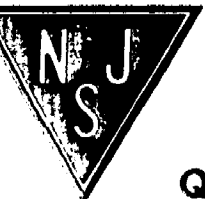
*Features:*

- 15 W output min. at 136 MHz
- For 24 V aircraft communication
- Load mismatch protection
- High voltage ratings
- Emitter grounded to case

**MAXIMUM RATINGS, Absolute-Maximum Values:**

|                                                                                |      |            |    |
|--------------------------------------------------------------------------------|------|------------|----|
| *COLLECTOR-TO-BASE VOLTAGE .....                                               | VCBO | 90         | V  |
| COLLECTOR-TO-EMITTER VOLTAGE:                                                  |      |            |    |
| With base-emitter junction reverse-biased, $V_{BE} = -1.5$ V .....             | VCEV | 100        | V  |
| *With external base-to-emitter resistance, $R_{BE} = 5 \Omega$ .....           | VCER | 50         | V  |
| *EMITTER-TO-BASE VOLTAGE .....                                                 | VEBO | 4          | V  |
| *CONTINUOUS COLLECTOR CURRENT .....                                            | IC   | 3.3        | A  |
| PEAK COLLECTOR CURRENT .....                                                   |      | 10         | A  |
| *CONTINUOUS BASE CURRENT .....                                                 | IB   | 1          | A  |
| *TRANSISTOR DISSIPATION:                                                       | PT   |            |    |
| At case temperatures up to 25°C .....                                          |      | 70         | W  |
| At case temperatures above 25°C .....                                          |      | See Fig. 6 |    |
| *TEMPERATURE RANGE:                                                            |      |            |    |
| Storage & Operating (Junction) .....                                           |      | -65 to 200 | °C |
| *LEAD TEMPERATURE (During soldering):                                          |      |            |    |
| At distances $\geq 1/32$ in. (0.8 mm) from insulating wafer for 10 s max ..... |      | 230        | °C |

\*In accordance with JEDEC registration data.



NJ Semi-Conductors reserves the right to change test conditions, parameters limits and package dimensions without notice information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

**Quality Semi-Conductors**

**ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_C$ ) = 25°C unless otherwise specified**

| CHARACTERISTIC                                                                                                      | SYMBOL                             | TEST CONDITIONS |                          |                 |                  |                |                  | LIMITS                 |          | UNITS              |
|---------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------|--------------------------|-----------------|------------------|----------------|------------------|------------------------|----------|--------------------|
|                                                                                                                     |                                    | VOLTAGE<br>V dc |                          |                 | CURRENT<br>mA dc |                |                  | MIN.                   | MAX.     |                    |
|                                                                                                                     |                                    | V <sub>CB</sub> | V <sub>CE</sub>          | V <sub>BE</sub> | I <sub>E</sub>   | I <sub>B</sub> | I <sub>C</sub>   |                        |          |                    |
| Collector Cutoff Current:<br>With base-emitter junction<br>reverse biased<br>At $T_C = 150^\circ\text{C}$           | I <sub>CEV</sub>                   |                 | 83                       | -1.5            |                  |                |                  | -                      | 20       | mA                 |
| With external base-to-emitter<br>resistance ( $R_{BE}$ ) = 5 $\Omega$                                               |                                    |                 | 30                       | -1.5            |                  |                |                  | -                      | 10       |                    |
| Emitter Cutoff Current                                                                                              | I <sub>EBO</sub>                   |                 |                          | -4              |                  |                |                  | -                      | 10       | mA                 |
| Collector-to-Emitter<br>Sustaining Voltage:<br>With base-emitter junction<br>reverse biased                         | V <sub>CEV(sus)</sub>              |                 |                          | -1.5            |                  |                | 600 <sup>a</sup> | 100                    | -        | V                  |
| With external base-to-emitter<br>resistance ( $R_{BE}$ ) = 5 $\Omega$                                               | V <sub>CER(sus)</sub>              |                 |                          |                 |                  |                | 200 <sup>a</sup> | 50                     | -        |                    |
| With base open                                                                                                      | V <sub>CEO(sus)</sub>              |                 |                          |                 |                  | 0              | 200 <sup>a</sup> | 35                     | -        |                    |
| Emitter-to-Base Breakdown<br>Voltage                                                                                | V <sub>(BR)EBO</sub>               |                 |                          |                 | 10               |                | 0                | 4                      | -        | V                  |
| DC Forward Current Transfer Ratio                                                                                   | $h_{FE}$                           |                 | 4<br>4                   |                 |                  |                | 3 A<br>0.5 A     | 10<br>10               | -<br>100 |                    |
| Magnitude of Common-Emitter,<br>Small-Signal, Short-Circuit Forward<br>Current Transfer Ratio<br>(f = 150 MHz)      | $h_{fe}$                           |                 | 24                       |                 |                  |                | 500              | 1                      | -        |                    |
| Output Capacitance (f = 1 MHz)                                                                                      | C <sub>ob</sub>                    | 30              |                          |                 | 0                |                |                  | -                      | 85       | pF                 |
| Available Amplifier Signal Input<br>Power <sup>b</sup><br>( $P_O = 15\text{ W}$ , $Z_G = 50\ \Omega$ , f = 136 MHz) | P <sub>i</sub>                     |                 |                          |                 |                  |                |                  | -                      | 6        | W                  |
| Collector Circuit Efficiency<br>( $P_{IE} = 6\text{ W}$ , $Z_G = 50\ \Omega$ , f = 136 MHz)                         | $\eta_C$                           |                 |                          |                 |                  |                |                  | 70                     | -        | %                  |
| Modulation <sup>c</sup><br>(f = 118 MHz)                                                                            | M                                  |                 | 24<br>(V <sub>CC</sub> ) |                 |                  |                |                  | 80                     | -        | %                  |
| Load Mismatch <sup>d</sup><br>(f = 118 MHz)                                                                         | LM                                 |                 | 24<br>(V <sub>CC</sub> ) |                 |                  |                | 1100             | Will not be<br>damaged |          |                    |
| Dynamic Input Impedance (See Fig.<br>10) ( $P_{IE} = 6\text{ W}$ , f = 150 MHz)                                     | Z <sub>IN</sub>                    |                 | 24<br>(V <sub>CC</sub> ) |                 |                  |                |                  | 1.7 + j 2.6<br>(typ)   |          | $\Omega$           |
| Thermal Resistance<br>(Junction to Case)                                                                            | R <sub><math>\theta</math>JC</sub> |                 |                          |                 |                  |                |                  | -                      | 2.5      | $^\circ\text{C/W}$ |

\*In accordance with JEDEC registration data.

<sup>a</sup>Pulsed through a 9-mH inductor; duty factor = 50%.

<sup>b</sup>Unmodulated carrier.

<sup>c</sup>See Figs. 9 & 10. Carrier Power, P<sub>CAR</sub> = 15 W;

$$V_{CC} \text{ modulation} = 100\%; M = \sqrt{\frac{2(P_{AM} - P_{CAR})}{P_{CAR}}} \times 100\%.$$

<sup>d</sup>Under conditions of footnote c, the transistor is subjected to all conditions of load mismatch from short-circuit to open-circuit.