

## NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/544

### Devices

2N5152  
2N5152L

2N5154  
2N5154L

### Qualified Level

JAN  
JANTX  
JANTXV

### MAXIMUM RATINGS

| Ratings                                                                                           | Symbol         | All Units   | Units            |
|---------------------------------------------------------------------------------------------------|----------------|-------------|------------------|
| Collector-Emitter Voltage                                                                         | $V_{CEO}$      | 80          | Vdc              |
| Collector-Base Voltage                                                                            | $V_{CBO}$      | 100         | Vdc              |
| Emitter-Base Voltage                                                                              | $V_{EBO}$      | 5.5         | Vdc              |
| Collector Current                                                                                 | $I_C^{(3,4)}$  | 2.0         | Adc              |
| Total Power Dissipation<br>@ $T_A = +25^\circ\text{C}^{(1)}$<br>@ $T_C = +25^\circ\text{C}^{(2)}$ | $P_T$          | 1.0<br>11.8 | W<br>W           |
| Operating & Storage Temperature Range                                                             | $T_j, T_{stg}$ | -65 to +200 | $^\circ\text{C}$ |

### THERMAL CHARACTERISTICS

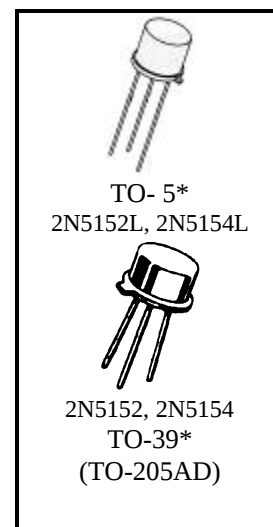
| Characteristics                      | Symbol          | Max. | Unit               |
|--------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 15   | $^\circ\text{C/W}$ |

1) Derate linearly 5.7 mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$

2) Derate linearly 66.7 mW/ $^\circ\text{C}$  for  $T_C > +25^\circ\text{C}$

3) Derate linearly 80 mW/ $^\circ\text{C}$  for  $T_C > +25^\circ\text{C}$

4) This value applies for  $P_W \leq 8.3$  ms, duty cycle  $\leq 1\%$



\*See appendix A for package outline

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

| Characteristics | Symbol | Min. | Max. | Unit |
|-----------------|--------|------|------|------|
|-----------------|--------|------|------|------|

### OFF CHARACTERISTICS

|                                                                                                         |               |    |            |                         |
|---------------------------------------------------------------------------------------------------------|---------------|----|------------|-------------------------|
| Collector-Emitter Breakdown Voltage<br>$I_C = 100$ mAdc, $I_B = 0$                                      | $V_{(BR)CEO}$ | 80 |            | Vdc                     |
| Emitter-Base Cutoff Current<br>$V_{EB} = 4.0$ Vdc, $I_C = 0$<br>$V_{EB} = 5.5$ Vdc, $I_C = 0$           | $I_{EBO}$     |    | 1.0<br>1.0 | $\mu\text{Adc}$<br>mAdc |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 60$ Vdc, $V_{BE} = 0$<br>$V_{CE} = 100$ Vdc, $V_{BE} = 0$ | $I_{CES}$     |    | 1.0<br>1.0 | $\mu\text{Adc}$<br>mAdc |
| Collector-Base Cutoff Current<br>$V_{CE} = 40$ Vdc, $I_B = 0$                                           | $I_{CEO}$     |    | 50         | $\mu\text{Adc}$         |

# 2N5152, 2N5154 JAN SERIES

## ELECTRICAL CHARACTERISTICS (con't)

| Characteristics                                                                                                                                | Symbol               | Min.     | Max.        | Unit |
|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------|-------------|------|
| <b>ON CHARACTERISTICS</b>                                                                                                                      |                      |          |             |      |
| Forward Current Transfer Ratio<br>I <sub>C</sub> = 50 mAdc, V <sub>CE</sub> = 5 Vdc<br>2N5152<br>2N5154                                        | h <sub>FE</sub>      | 20<br>50 |             |      |
| I <sub>C</sub> = 2.5 Adc, V <sub>CE</sub> = 5 Vdc<br>2N5152<br>2N5154                                                                          |                      | 30<br>70 | 90<br>200   |      |
| I <sub>C</sub> = 5 Adc, V <sub>CE</sub> = 5 Vdc<br>2N5152<br>2N5154                                                                            |                      | 20<br>40 |             |      |
| Collector-Emitter Saturation Voltage<br>V <sub>CE</sub> = 5 Vdc, I <sub>C</sub> = 2.5 Adc<br>I <sub>C</sub> = 5 Adc, I <sub>B</sub> = 500 Adc  | V <sub>CE(sat)</sub> |          | 0.75<br>1.5 | Vdc  |
| Base-Emitter Voltage non-saturated<br>I <sub>C</sub> = 2.5 Adc, I <sub>B</sub> = 250 mAdc<br>I <sub>C</sub> = 5 Adc, I <sub>B</sub> = 500 mAdc | V <sub>BE</sub>      |          | 1.45        | Vdc  |
| Base-Emitter Saturation Voltage<br>I <sub>C</sub> = 2.5 Adc, I <sub>B</sub> = 250 mAdc<br>I <sub>C</sub> = 5 Adc, I <sub>B</sub> = 500 mAdc    | V <sub>BE(sat)</sub> |          | 1.45<br>2.2 | Vdc  |

## DYNAMIC CHARACTERISTICS

|                                                                                                                                                                             |                  |          |     |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------|-----|----|
| Magnitude of Common Emitter Small-Signal Short Circuit Forward-Current Transfer Ratio<br>I <sub>C</sub> = 500 mAdc, V <sub>CE</sub> = 5 Vdc, f = 10 MHz<br>2N5152<br>2N5154 | h <sub>fe</sub>  | 6<br>7   |     |    |
| Small-Signal Short Circuit Forward-Current Transfer Ratio<br>I <sub>C</sub> = 100 mAdc, V <sub>CE</sub> = 5 Vdc, f = 1 kHz<br>2N5152<br>2N5154                              | h <sub>fe</sub>  | 20<br>50 |     |    |
| Output Capacitance<br>V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0, f = 1.0 MHz                                                                                             | C <sub>obo</sub> |          | 250 | pF |

## SWITCHING CHARACTERISTICS

|                                                                    |                  |  |     |    |
|--------------------------------------------------------------------|------------------|--|-----|----|
| Turn-On Time<br>I <sub>C</sub> = 5 Adc, I <sub>B1</sub> = 500 mAdc | t <sub>on</sub>  |  | 0.5 | μs |
| Turn-Off Time<br>R <sub>L</sub> = 6Ω                               | t <sub>off</sub> |  | 1.5 | μs |
| Storage Time<br>I <sub>B2</sub> = -500 mAdc                        | t <sub>s</sub>   |  | 1.4 | μs |
| Fall Time<br>V <sub>BE(OFF)</sub> = 3.7 Vdc                        | t <sub>f</sub>   |  | 0.5 | μs |

## SAFE OPERATING AREA

|                                                                                                                                                                                                                                                                                                  |  |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| <b>DC Tests</b><br>T <sub>C</sub> = +25°C, 1 Cycle, t <sub>p</sub> = 1.0 s<br><b>Test 1</b><br>V <sub>CE</sub> = 5.8Vdc, I <sub>C</sub> = 2.0 Adc<br><b>Test 2</b><br>V <sub>CE</sub> = 32 Vdc, I <sub>C</sub> = 340 mAdc<br><b>Test 3</b><br>V <sub>CE</sub> = 80 Vdc, I <sub>C</sub> = 20 mAdc |  |  |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|