



Data Sheet No. 2N5153L

**Type 2N5153L**

**Geometry 9702**

**Polarity PNP**

**Qual Level: JAN - JANS**

**Generic Part Number:  
2N5153L**

**REF: MIL-PRF-19500/545**

**Features:**

- Silicon power transistor for use in high speed switching applications.
- Housed in a **TO-5** case.
- Also available in chip form using the **9702** chip geometry.
- The Min and Max limits shown are per **MIL-PRF-19500/545** which Semicoa meets in all cases.

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TO-5

**Maximum Ratings**

$T_C = 25^\circ\text{C}$  unless otherwise specified

| Rating                                                                               | Symbol    | Rating      | Unit                         |
|--------------------------------------------------------------------------------------|-----------|-------------|------------------------------|
| Collector-Emitter Voltage                                                            | $V_{CEO}$ | 80          | V                            |
| Collector-Base Voltage                                                               | $V_{CBO}$ | 100         | V                            |
| Emitter-Base Voltage                                                                 | $V_{EBO}$ | 5.5         | V                            |
| Collector Current, Continuous                                                        | $I_C$     | 2           | A                            |
| Collector Current, $P_W < 8.3$ ms, $< 1\%$ duty cycle                                | $I_C$     | 10          | A                            |
| Reverse Pulse Energy                                                                 |           | 15          | mJ                           |
| Power Disipation $T_A = 25^\circ\text{C}$ ambient<br>Derate above $25^\circ\text{C}$ | $P_T$     | 1.0<br>5.7  | Watt<br>mW/ $^\circ\text{C}$ |
| Operating Junction Temperature                                                       | $T_J$     | -65 to +200 | $^\circ\text{C}$             |
| Storage Temperature                                                                  | $T_{STG}$ | -65 to +200 | $^\circ\text{C}$             |



## Electrical Characteristics

 $T_C = 25^{\circ}\text{C}$  unless otherwise specified

| OFF Characteristics                                                            | Symbol        | Min | Max | Unit          |
|--------------------------------------------------------------------------------|---------------|-----|-----|---------------|
| Collector-Base Breakdown Voltage<br>$I_C = 100\text{ mA}$ , $I_B = 0$ , pulsed | $V_{(BR)CBO}$ | 80  | --- | V             |
| Base-Emitter Cutoff Current<br>$V_{EB} = 4\text{ V}$ , $I_C = 0$               | $I_{EBO1}$    | --- | 1.0 | $\mu\text{A}$ |
| $V_{EB} = 5.5\text{ V}$ , $I_C = 0$                                            | $I_{EBO2}$    | --- | 1.0 | mA            |
| Collector-Emitter Cutoff Current<br>$V_{CE} = 60\text{ V}$ , $V_{BE} = 0$      | $I_{CES1}$    | --- | 1.0 | $\mu\text{A}$ |
| $V_{CE} = 100\text{ V}$ , $V_{BE} = 0$                                         | $I_{CES2}$    | --- | 1.0 | mA            |
| $V_{CE} = 40\text{ V}$ , $I_B = 0$                                             | $I_{CEO}$     | --- | 50  | $\mu\text{A}$ |
| $V_{CE} = 60\text{ V}$ , $V_{BE} = +2\text{ V}$ , $T_C = 150^{\circ}\text{C}$  | $I_{CEX}$     | --- | 500 | $\mu\text{A}$ |

| ON Characteristics                                                                                   | Symbol         | Min | Max  | Unit |
|------------------------------------------------------------------------------------------------------|----------------|-----|------|------|
| <b>Forward Current Transfer Ratio</b><br>$I_C = 50\text{ mA}$ , $V_{CE} = 5\text{ V}$                | $h_{FE1}$      | 50  | ---  | ---  |
| $I_C = 2.5\text{ A}$ , $V_{CE} = 5\text{ V}$ , pulsed                                                | $h_{FE2}$      | 70  | 200  | ---  |
| $I_C = 5.0\text{ A}$ , $V_{CE} = 5\text{ V}$ , pulsed                                                | $h_{FE3}$      | 40  | ---  | ---  |
| $I_C = 2.55\text{ A}$ , $V_{CE} = 5\text{ V}$ pulsed, $T_C = -55^{\circ}\text{C}$                    | $h_{FE4}$      | 25  | ---  | ---  |
| <b>Base-Emitter Voltage, Nonsaturated</b><br>$V_{CE} = 5\text{ V}$ , $I_C = 2.5\text{ A}$ , pulsed   | $V_{BE}$       | --- | 1.45 | V dc |
| <b>Base-Emitter Saturation Voltage</b><br>$I_C = 2.5\text{ A}$ , $I_B = 250\text{ mA}$ , pulsed      | $V_{BE(sat)1}$ | --- | 1.45 | V dc |
| $I_C = 5\text{ A}$ , $I_B = 500\text{ mA}$ , pulsed                                                  | $V_{BE(sat)2}$ | --- | 2.2  | V dc |
| <b>Collector-Emitter Saturation Voltage</b><br>$I_C = 2.5\text{ A}$ , $I_B = 250\text{ mA}$ , pulsed | $V_{CE(sat)1}$ | --- | 0.75 | V dc |
| $I_C = 5\text{ A}$ , $I_B = 500\text{ mA}$ , pulsed                                                  | $V_{CE(sat)2}$ | --- | 1.5  | V dc |

| Small Signal Characteristics                                                                                                                                        | Symbol     | Min | Max | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|-----|------|
| <b>Magnitude of Common Emitter Small Signal Short Circuit Forward Current Transfer Ratio</b><br>$V_{CE} = 5\text{ V}$ , $I_C = 500\text{ mA}$ , $f = 10\text{ MHz}$ | $ h_{fe} $ | 7.0 | --- | ---  |
| <b>Common Emitter, Small Signal Short Circuit Forward Current Transfer Ratio</b><br>$V_{CE} = 5\text{ V}$ , $I_C = 100\text{ mA}$ , $f = 1\text{ kHz}$              | $h_{fe}$   | 50  | --- | ---  |
| <b>Open Circuit Output Capacitance</b><br>$V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 1\text{ MHz}$                                                                   | $C_{OBO}$  | --- | 250 | pF   |

| Switching Time                                                     | Symbol    | Min | Max | Unit          |
|--------------------------------------------------------------------|-----------|-----|-----|---------------|
| <b>Delay Time</b><br>$I_C = 5\text{ A}$ , $I_{B1} = 500\text{ mA}$ | $t_{ON}$  | --- | 0.5 | $\mu\text{s}$ |
| <b>Storage Time</b><br>$I_{B2} = -500\text{ mA}$                   | $t_s$     | --- | 1.4 | $\mu\text{s}$ |
| <b>Fall Time</b><br>$V_{BE(off)} = 3.7\text{ V}$                   | $t_f$     | --- | 0.5 | $\mu\text{s}$ |
| <b>Turn-Off Time</b><br>$R_L = 6\text{ ohms}$                      | $t_{OFF}$ | --- | 1.5 | $\mu\text{s}$ |