

## isc Silicon NPN Darlington Power Transistor

2SD1409

## DESCRIPTION

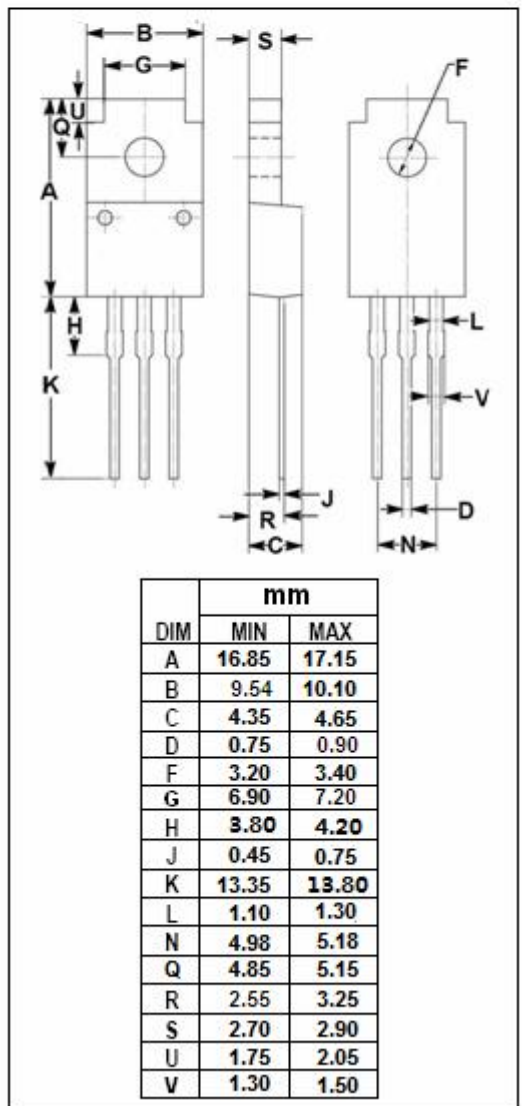
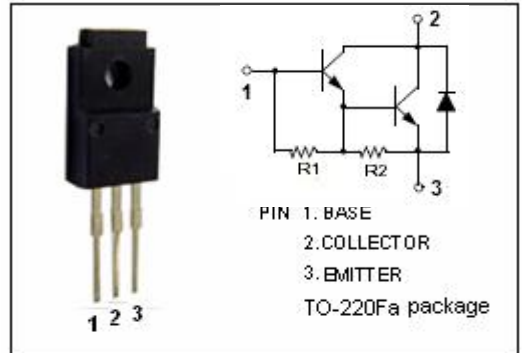
- High Collector-Emitter Breakdown Voltage-  
:  $V_{(BR)CEO} = 400V(\text{Min})$
- High DC Current Gain  
:  $h_{FE} = 600(\text{Min}) @ I_C = 2A, V_{CE} = 2V$
- Minimum Lot-to-Lot variations for robust device performance and reliable operation

## APPLICATIONS

- Igniter applications
- High voltage switching applications

ABSOLUTE MAXIMUM RATINGS( $T_a = 25^\circ\text{C}$ )

| SYMBOL    | PARAMETER                                                 | VALUE   | UNIT             |
|-----------|-----------------------------------------------------------|---------|------------------|
| $V_{CBO}$ | Collector-Base Voltage                                    | 600     | V                |
| $V_{CEO}$ | Collector-Emitter Voltage                                 | 400     | V                |
| $V_{EBO}$ | Emitter-Base Voltage                                      | 5       | V                |
| $I_C$     | Collector Current-Continuous                              | 6       | A                |
| $I_B$     | Base Current-Continuous                                   | 1       | A                |
| $P_C$     | Collector Power Dissipation<br>@ $T_a = 25^\circ\text{C}$ | 2       | W                |
|           | Collector Power Dissipation<br>@ $T_c = 25^\circ\text{C}$ | 25      |                  |
| $T_J$     | Junction Temperature                                      | 150     | $^\circ\text{C}$ |
| $T_{stg}$ | Storage Temperature Range                                 | -55~150 | $^\circ\text{C}$ |



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## ELECTRICAL CHARACTERISTICS

T<sub>c</sub>=25°C unless otherwise specified

| SYMBOL               | PARAMETER                            | CONDITIONS                                                            | MIN | TYP. | MAX | UNIT |
|----------------------|--------------------------------------|-----------------------------------------------------------------------|-----|------|-----|------|
| V <sub>(BR)CEO</sub> | Collector-Emitter Breakdown Voltage  | I <sub>C</sub> = 10mA ; I <sub>B</sub> = 0                            | 400 |      |     | V    |
| V <sub>CE(sat)</sub> | Collector-Emitter Saturation Voltage | I <sub>C</sub> = 4A; I <sub>B</sub> = 40mA                            |     |      | 2.0 | V    |
| V <sub>BE(sat)</sub> | Base-Emitter Saturation Voltage      | I <sub>C</sub> = 4A; I <sub>B</sub> = 40mA                            |     |      | 2.5 | V    |
| V <sub>ECF</sub>     | C-E Diode Forward Voltage            | I <sub>F</sub> = 4A                                                   |     |      | 3.0 | V    |
| I <sub>CBO</sub>     | Collector Cutoff Current             | V <sub>CB</sub> = 600V; I <sub>E</sub> = 0                            |     |      | 0.5 | mA   |
| I <sub>EBO</sub>     | Emitter Cutoff Current               | V <sub>EB</sub> = 5V; I <sub>C</sub> = 0                              |     |      | 3.0 | mA   |
| h <sub>FE-1</sub>    | DC Current Gain                      | I <sub>C</sub> = 2A ; V <sub>CE</sub> = 2V                            | 600 |      |     |      |
| h <sub>FE-2</sub>    | DC Current Gain                      | I <sub>C</sub> = 4A ; V <sub>CE</sub> = 2V                            | 100 |      |     |      |
| C <sub>OB</sub>      | Output Capacitance                   | I <sub>E</sub> = 0; V <sub>CB</sub> = 10V; f <sub>test</sub> = 1.0MHz |     | 35   |     | pF   |

## Switching times

|                  |              |                                                                                                                                    |  |     |  |    |
|------------------|--------------|------------------------------------------------------------------------------------------------------------------------------------|--|-----|--|----|
| t <sub>on</sub>  | Turn-on Time | I <sub>B1</sub> = I <sub>B2</sub> = 40mA<br>R <sub>L</sub> = 25Ω ; V <sub>CC</sub> = 100V<br>P <sub>W</sub> =20 μs ; Duty Cycle≤1% |  | 1.0 |  | μs |
| t <sub>stg</sub> | Storage Time |                                                                                                                                    |  | 8.0 |  | μs |
| t <sub>f</sub>   | Fall Time    |                                                                                                                                    |  | 5.0 |  | μs |

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