

## COMPLEMENTARY SILICON POWER TRANSISTORS

- STMicroelectronics PREFERRED SALESTYPES
- COMPLEMENTARY PNP - NPN DEVICES

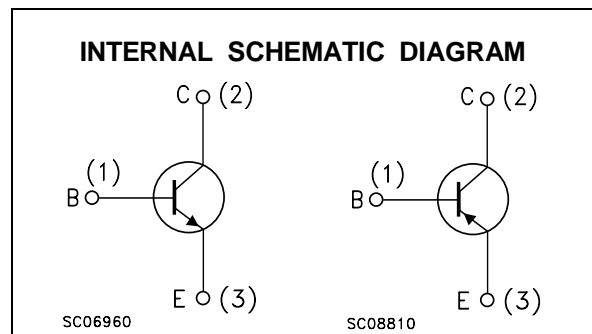
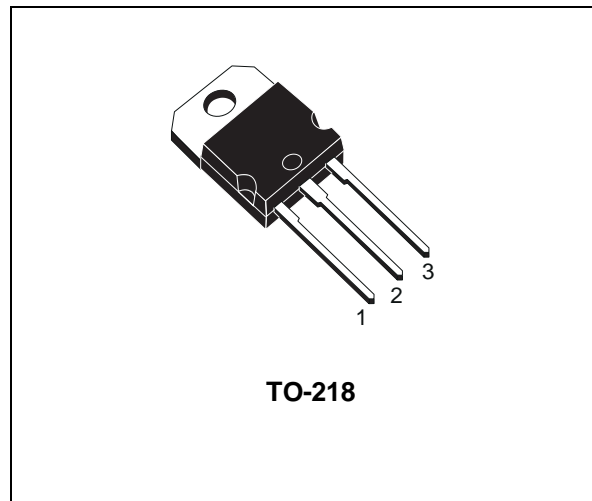
### APPLICATIONS

- GENERAL PURPOSE SWITCHING

### DESCRIPTION

The TIP33C is a silicon Epitaxial-Base NPN power transistor mounted in TO-218 plastic package. It is intended for use in linear and switching applications.

The complementary PNP type is TIP34C.



### ABSOLUTE MAXIMUM RATINGS

| Symbol    | Parameter  | Value |            | Unit             |
|-----------|--|-------|------------|------------------|
|           |  | NPN   | TIP33C     |                  |
|           |  | PNP   | TIP34C     |                  |
| $V_{CBO}$ | Collector-Base Voltage ( $I_E = 0$ )             |       | 140        | V                |
| $V_{CES}$ | Collector-Emitter Voltage ( $V_{BE} = 0$ )       |       | 140        | V                |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ )          |       | 100        | V                |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )               |       | 7          | V                |
| $I_C$     | Collector Current                                |       | 10         | A                |
| $I_{CM}$  | Collector Peak Current                           |       | 12         | A                |
| $I_B$     | Base Current                                     |       | 3          | A                |
| $P_{tot}$ | Total Dissipation at $T_c \leq 25^\circ\text{C}$ |       | 80         | W                |
| $T_{stg}$ | Storage Temperature                              |       | -65 to 150 | $^\circ\text{C}$ |
| $T_j$     | Max. Operating Junction Temperature              |       | 150        | $^\circ\text{C}$ |

For PNP types voltage and current values are negative.

## TIP33C / TIP34C

### THERMAL DATA

|                       |                                  |     |      |      |
|-----------------------|----------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case | Max | 1.56 | °C/W |
|-----------------------|----------------------------------|-----|------|------|

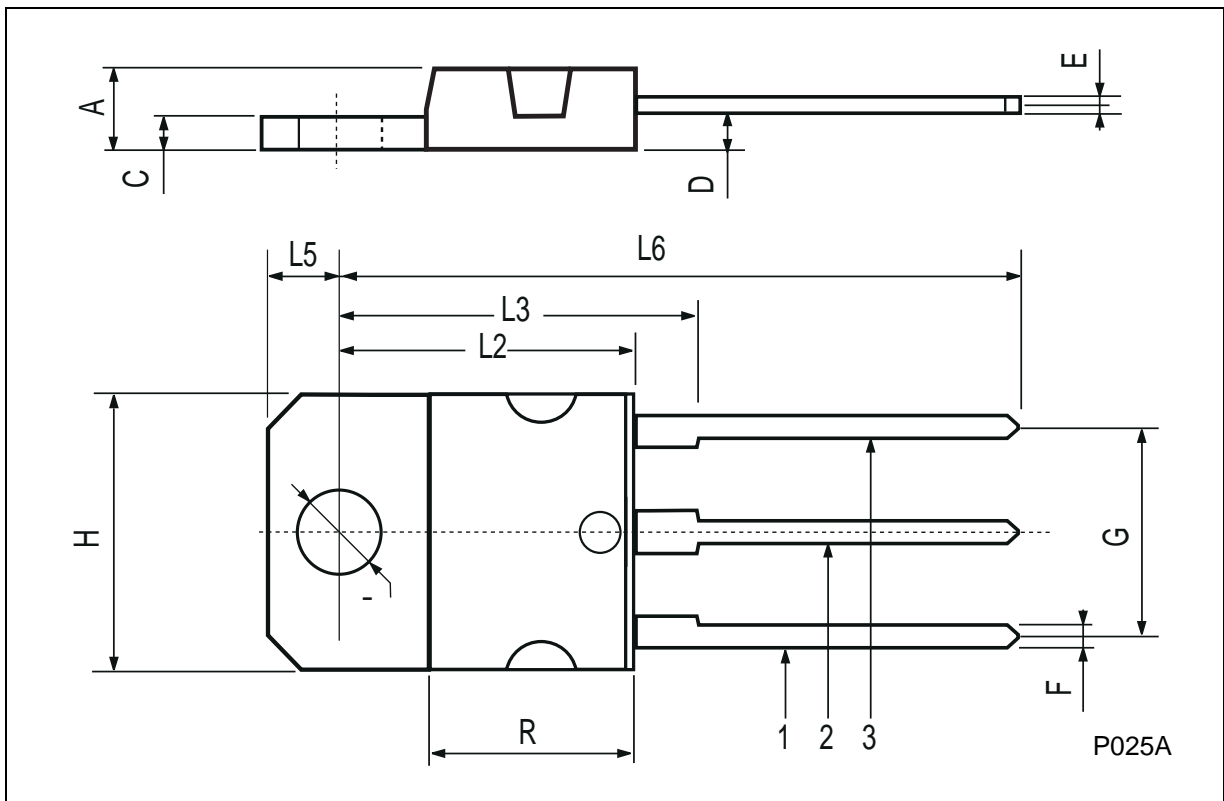
### ELECTRICAL CHARACTERISTICS (T<sub>case</sub> = 25 °C unless otherwise specified)

| Symbol  | Parameter   | Test Conditions  | Min.  | Typ. | Max.            | Unit           |
|---|---|--|---|------|-----------------|----------------|
| I <sub>CEs</sub>                                    | Collector Cut-off Current (V <sub>BE</sub> = 0)             | V <sub>CE</sub> = 140 V  |   |      | 400             | μA             |
| I <sub>CEO</sub>                                    | Collector Cut-off Current (I <sub>B</sub> = 0)              | V <sub>CE</sub> = 60 V   |   |      | 0.7             | mA             |
| I <sub>EBO</sub>                                    | Emitter Cut-off Current (I <sub>C</sub> = 0)                | V <sub>EB</sub> = 5 V  |   |      | 1               | mA             |
| V <sub>CEO(sus)*</sub>                              | Collector-Emitter Sustaining Voltage (I <sub>B</sub> = 0)   | I <sub>C</sub> = 30 mA   | 100   |      |                 | V              |
| V <sub>CE(sat)*</sub>                               | Collector-Emitter Saturation Voltage                        | I <sub>C</sub> = 3 A   | I <sub>B</sub> = 0.3 A  |      | 1               | V              |
|   |   | I <sub>C</sub> = 10 A  | I <sub>B</sub> = 2.5 A  |      | 4               | V              |
| V <sub>BE(on)*</sub>                                | Base-Emitter Voltage  | I <sub>C</sub> = 3 A   | V <sub>CE</sub> = 4 V   |      | 1.6             | V              |
|   |   | I <sub>C</sub> = 10 A  | V <sub>CE</sub> = 4 V   |      | 3               | V              |
| h <sub>FE*</sub>                                    | DC Current Gain   | I <sub>C</sub> = 1 A   | V <sub>CE</sub> = 4 V   | 40   |                 |                |
|   |   | I <sub>C</sub> = 3 A   | V <sub>CE</sub> = 4 V   | 20   | 100             |                |
| h <sub>fe</sub>                                     | Small Signal Current Gain                                   | I <sub>C</sub> = 0.5 A<br>f = 1 KHz  | V <sub>CE</sub> = 10 V  | 20   |                 |                |
| f <sub>T</sub>                                      | Transition frequency  | I <sub>C</sub> = 0.5 A<br>f = 1 MHz  | V <sub>CE</sub> = 10 V  | 3    |                 | MHz            |
| t <sub>on</sub><br>t <sub>s</sub><br>t <sub>f</sub> | RESISTIVE LOAD<br>Turn-on Time<br>Storage Time<br>Fall Time | V <sub>CC</sub> = 30V<br>V <sub>BB</sub> = - 6 V<br>t <sub>p</sub> = 20 μs | I <sub>C</sub> = 6 A<br>I <sub>B1</sub> = - I <sub>B2</sub> = 0.6 A |      | 0.6<br>0.4<br>1 | μs<br>μs<br>μs |

\* Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %

**TO-218 (SOT-93) MECHANICAL DATA**

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 4.7  |      | 4.9  | 0.185 |       | 0.193 |
| C    | 1.17 |      | 1.37 | 0.046 |       | 0.054 |
| D    |      | 2.5  |      |       | 0.098 |       |
| E    | 0.5  |      | 0.78 | 0.019 |       | 0.030 |
| F    | 1.1  |      | 1.3  | 0.043 |       | 0.051 |
| G    | 10.8 |      | 11.1 | 0.425 |       | 0.437 |
| H    | 14.7 |      | 15.2 | 0.578 |       | 0.598 |
| L2   | -    |      | 16.2 | -     |       | 0.637 |
| L3   |      | 18   |      |       | 0.708 |       |
| L5   | 3.95 |      | 4.15 | 0.155 |       | 0.163 |
| L6   |      | 31   |      |       | 1.220 |       |
| R    | -    |      | 12.2 | -     |       | 0.480 |
| ∅    | 4    |      | 4.1  | 0.157 |       | 0.161 |



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