



# TIP41CN TIP42CN

## COMPLEMENTARY SILICON POWER TRANSISTORS

PRELIMINARY DATA

- n COMPLEMENTARY PNP-NPN DEVICES
- n NEW ENHANCED SERIES
- n HIGH SWITCHING SPEED
- n  $h_{FE}$  GROUPING
- n  $h_{FE}$  IMPROVED LINEARITY

### APPLICATION

- n GENERAL PURPOSE CIRCUITS
- n AUDIO AMPLIFIER
- n POWER LINEAR AND SWITCHING

### DESCRIPTION

The TIP41CN is a silicon base island technology NPN power transistor Jedec TO-220 plastic package with improved performances than the industry standard TIP41C that make this device suitable for audio, power linear and switching applications.

The complementary PNP type is TIP42CN.

Figure 1: Package

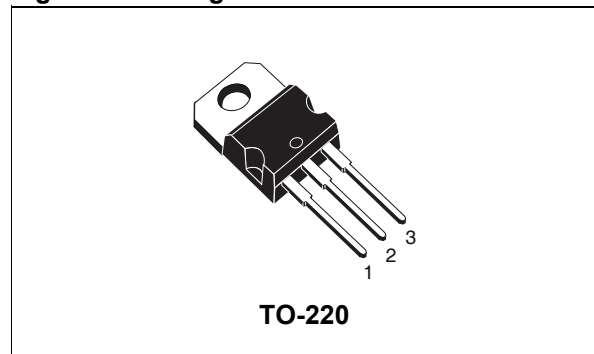


Figure 2: Internal Schematic Diagram

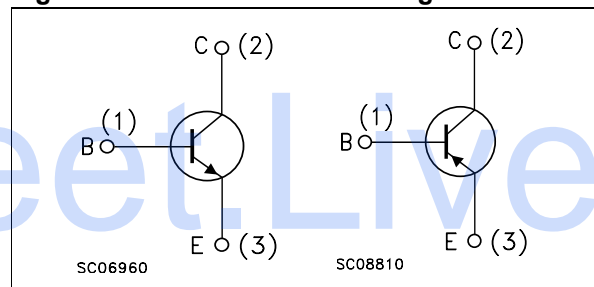


Table 1: Order Codes

| Part Number | Marking                             | Package | Packaging |
|-------------|-------------------------------------|---------|-----------|
| TIP41CN (#) | TIP41C NR<br>TIP41C NO<br>TIP41C NY | TO-220  | Tube      |
| TIP42CN (#) | TIP42C NR<br>TIP42C NO<br>TIP42C NY | TO-220  | Tube      |

# See:note on page 2

Table 2: Absolute Maximum Ratings

| Symbol    | Parameter                               | Value |         | Unit |
|-----------|---|-------|---------|------|
|           |   | NPN   | TIP41CN |      |
|           |   | PNP   | TIP42CN |      |
| $V_{CBO}$ | Collector-Base Voltage ( $I_E = 0$ )    |       | 100     | V    |
| $V_{CEO}$ | Collector-Emitter Voltage ( $I_B = 0$ ) |       | 100     | V    |
| $V_{EBO}$ | Emitter-Base Voltage ( $I_C = 0$ )      |       | 5       | V    |
| $I_C$     | Collector Current                       |       | 6       | A    |
| $I_{CM}$  | Collector Peak Current ( $t_p < 5ms$ )  |       | 10      | A    |

## TIP41CN / TIP42CN

| Symbol    | Parameter  | Value      |         | Unit             |
|-----------|--|------------|---------|------------------|
|           |  | NPN        | TIP41CN |                  |
|           |  | PNP        | TIP42CN |                  |
| $I_B$     | Base Current   | 3          |         | A                |
| $P_{tot}$ | Total Dissipation at $T_C \leq 25\text{ }^\circ\text{C}$ | 65         |         | 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.

**Table 3: Electrical Characteristics ( $T_{case} = 25\text{ }^\circ\text{C}$  unless otherwise specified)**

| Symbol           | Parameter  | Test Conditions                            | Min. | Typ. | Max. | Unit |
|------------------|--|--|------|------|------|------|
| $I_{CEO}$        | Collector Cut-off Current<br>( $I_B = 0$ )               | $V_{CE} = 60\text{ V}$                     |      |      | 0.7  | mA   |
| $I_{EBO}$        | Emitter Cut-off Current<br>( $I_C = 0$ )                 | $V_{EB} = 5\text{ V}$                      |      |      | 1    | mA   |
| $I_{CES}$        | Collector Cut-off Current<br>( $V_{BE} = 0$ )            | $V_{CE} = 100\text{ V}$                    |      |      | 0.4  | mA   |
| $V_{CEO(sus)}^*$ | Collector-Emitter<br>Sustaining Voltage<br>( $I_B = 0$ ) | $I_C = 30\text{ mA}$                       | 100  |      |      | V    |
| $V_{CE(sat)}^*$  | Collector-Emitter<br>Saturation Voltage                  | $I_C = 6\text{ A}$ $I_B = 0.6\text{ A}$    |      |      | 1.5  | V    |
| $V_{BE(on)}^*$   | Base-Emitter Voltage                                     | $I_C = 6\text{ A}$ $V_{CE} = 4\text{ V}$   |      |      | 2    | V    |
| $h_{FE}^*$       | DC Current Gain  | $I_C = 0.3\text{ A}$ $V_{CE} = 4\text{ V}$ | 30   |      |      |      |
|                  |  | $I_C = 3\text{ A}$ $V_{CE} = 4\text{ V}$   |      |      |      |      |
|                  |  | Group R                                    | 15   |      | 28   |      |
|                  |  | Group O                                    | 24   |      | 44   |      |
|                  |  | Group Y                                    | 42   |      | 75   |      |

\* Pulsed: Pulsed duration = 300  $\mu\text{s}$ , duty cycle  $\leq 2\%$ .

For PNP types voltage and current values are negative.

# Note: Product is pre-selected in DC current gain (Group R, Group O and Group Y). STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

Figure 3: DC Current Gain (NPN)

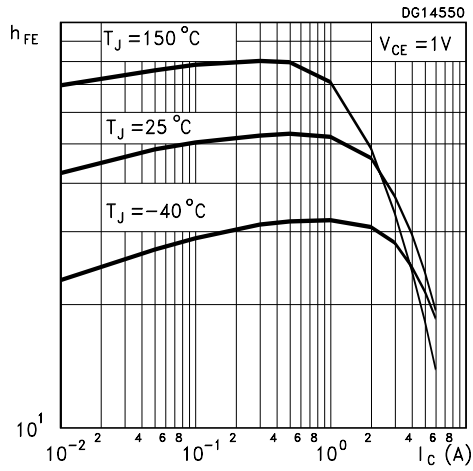


Figure 4: DC Current Gain (NPN)

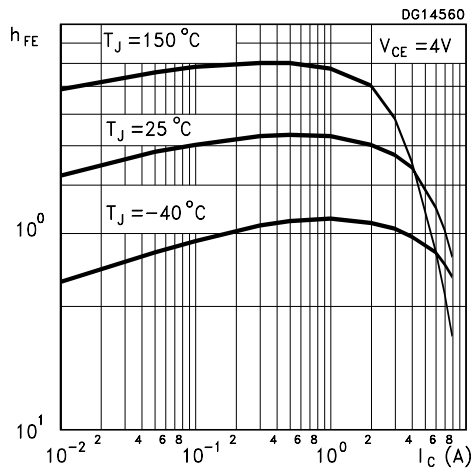


Figure 5: Collector-Emitter Saturation Voltage (NPN)

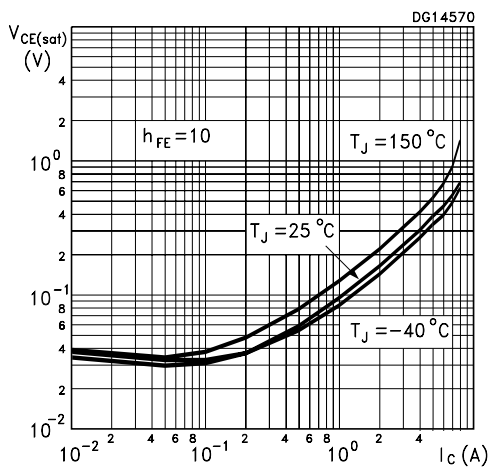


Figure 6: DC Current Gain (PNP)

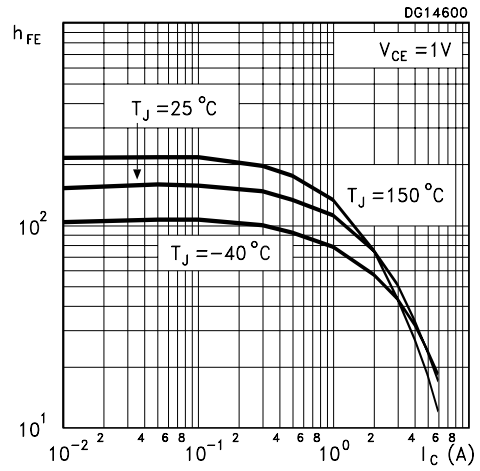


Figure 7: DC Current Gain (PNP)

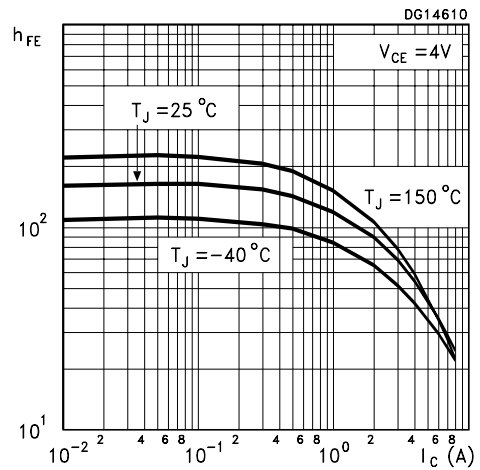


Figure 8: Collector-Emitter Saturation Voltage (PNP)

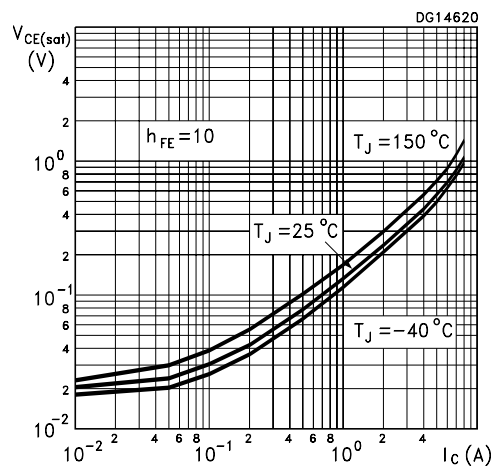


Figure 9: Base-Emitter Saturation Voltage (NPN)

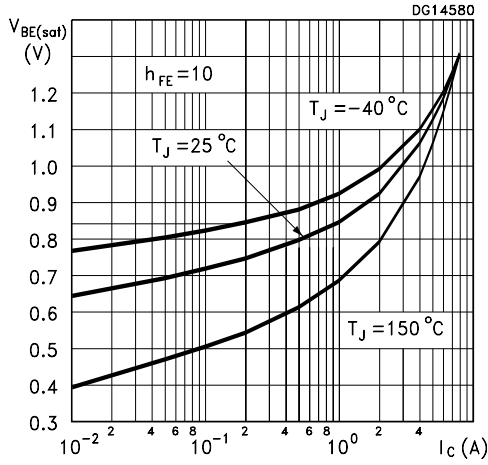


Figure 10:  $BT_{(ON)}$  Time (NPN)

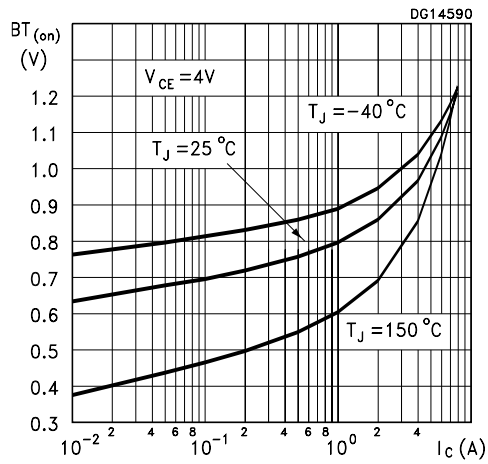


Figure 11: Resistive Load Switching Time (NPN)

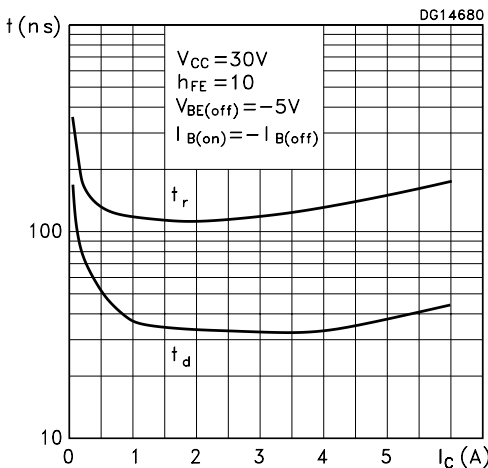


Figure 12: Base-Emitter Saturation Voltage (PNP)

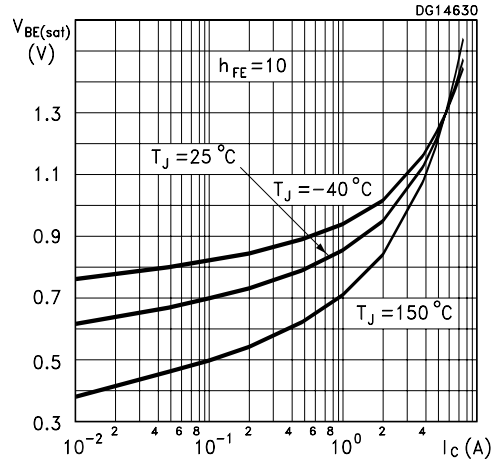


Figure 13:  $BT_{(ON)}$  Time (PNP)

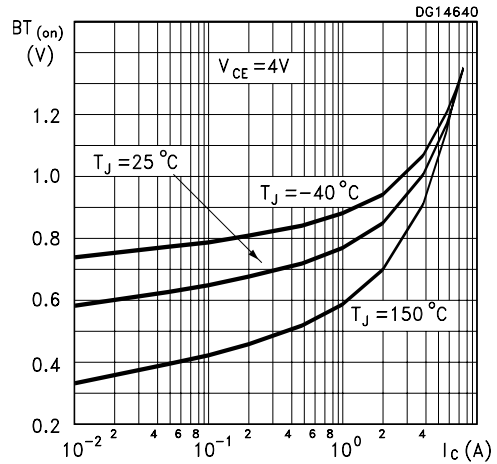
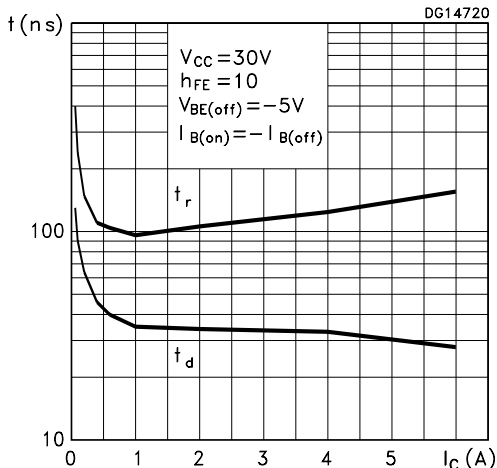
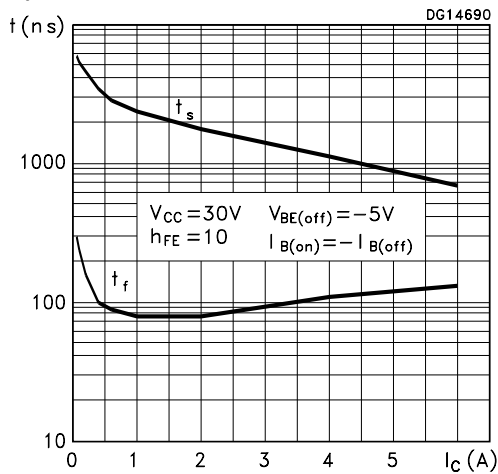


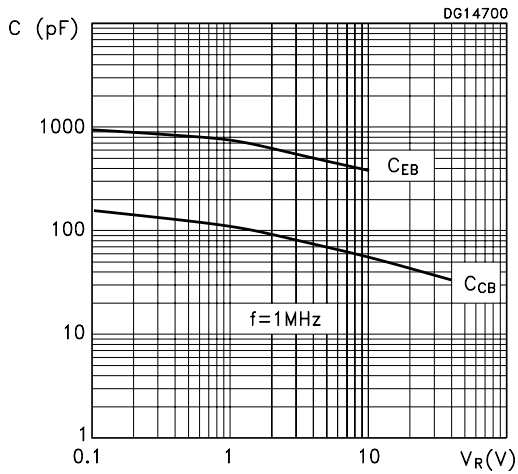
Figure 14: Resistive Load Switching Time (PNP)



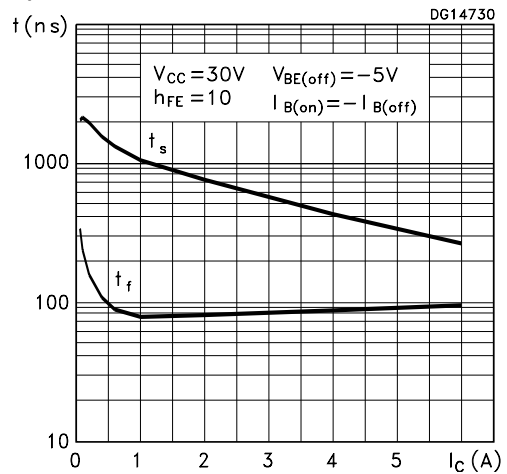
**Figure 15: Resistive Load Switching Time (NPN)**



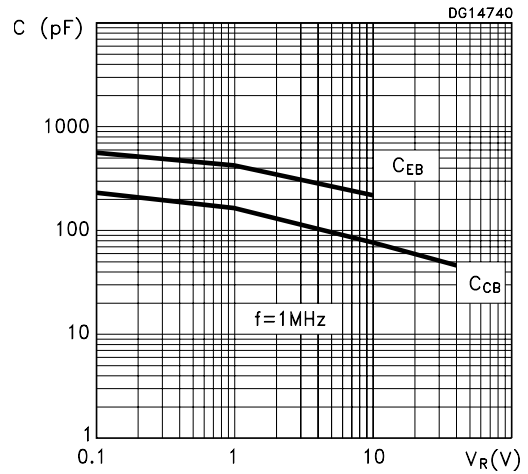
**Figure 16: Collector-Base e Collector-Emitter Capacitance (NPN)**



**Figure 17: Resistive Load Switching Time (PNP)**

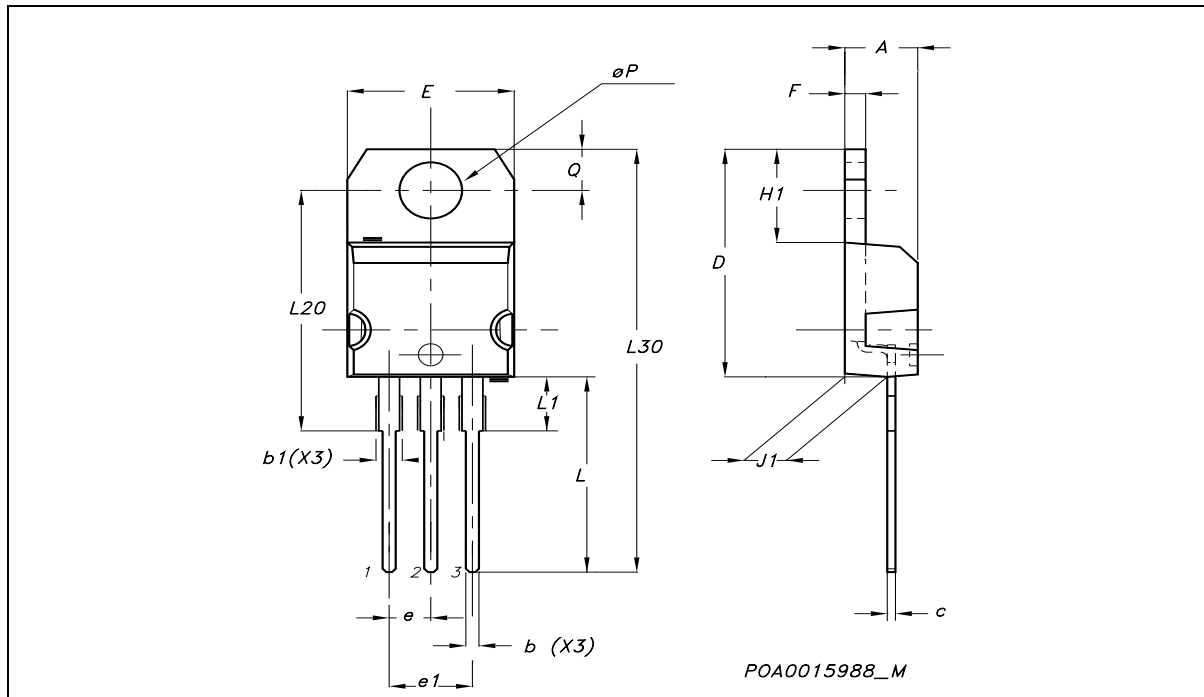


**Figure 18: Collector-Base e Collector-Emitter Capacitance (PNP)**



**TO-220 MECHANICAL DATA**

| DIM. | mm.   |       |       | inch  |       |       |
|------|-------|-------|-------|-------|-------|-------|
|      | MIN.  | TYP   | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40  |       | 4.60  | 0.173 |       | 0.181 |
| b    | 0.61  |       | 0.88  | 0.024 |       | 0.034 |
| b1   | 1.15  |       | 1.70  | 0.045 |       | 0.066 |
| c    | 0.49  |       | 0.70  | 0.019 |       | 0.027 |
| D    | 15.25 |       | 15.75 | 0.60  |       | 0.620 |
| E    | 10    |       | 10.40 | 0.393 |       | 0.409 |
| e    | 2.40  |       | 2.70  | 0.094 |       | 0.106 |
| e1   | 4.95  |       | 5.15  | 0.194 |       | 0.202 |
| F    | 1.23  |       | 1.32  | 0.048 |       | 0.052 |
| H1   | 6.20  |       | 6.60  | 0.244 |       | 0.256 |
| J1   | 2.40  |       | 2.72  | 0.094 |       | 0.107 |
| L    | 13    |       | 14    | 0.511 |       | 0.551 |
| L1   | 3.50  |       | 3.93  | 0.137 |       | 0.154 |
| L20  |       | 16.40 |       |       | 0.645 |       |
| L30  |       | 28.90 |       |       | 1.137 |       |
| øP   | 3.75  |       | 3.85  | 0.147 |       | 0.151 |
| Q    | 2.65  |       | 2.95  | 0.104 |       | 0.116 |



**Table 4:**

| <b>Version</b> | <b>Release Date</b> | <b>Change Designator</b>        |
|----------------|---------------------|---------------------------------|
| 18-Mar-2005    | 1                   | First release.                  |
| 06-Apr-2005    | 2                   | Further curves have been added. |

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