

### Complementary power transistors

#### **Features**

- Complementary PNP-NPN devices
- New enhanced series
- High switching speed
- h<sub>FE</sub> grouping
- h<sub>FE</sub> improved linearity

### **Applications**

- General purpose circuits
- Audio amplifier
- Power linear and switching

### **Description**

The TIP41C is a base island technology NPN power transistor in TO-220 plastic package that make this device suitable for audio, power linear and switching applications. The complementary PNP type is TIP42C

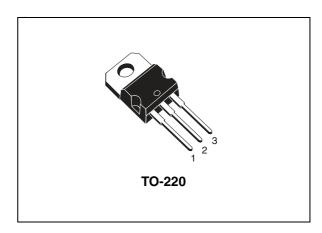


Figure 1. Internal schematic diagram

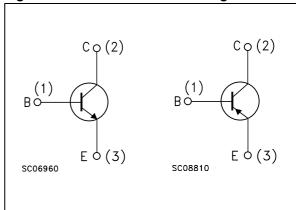


Table 1. Device summary

Order code Marking		Package	Packaging	
TIP41C (Note 1 on page 4)	TIP41C R TIP41C O TIP41C Y	TO-220	Tube	
TIP42C (Note 1 on page 4)	TIP42C R TIP42C O TIP42C Y	TO-220	Tube	

Contents TIP41C - TIP42C

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# 1 Absolute maximum ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V <sub>CBO</sub>	Collector-base voltage (I <sub>E</sub> = 0)	100	V
V <sub>CEO</sub>	Collector-emitter voltage (I <sub>B</sub> = 0)	100	V
V <sub>EBO</sub>	Emitte-base voltage (I <sub>C</sub> = 0)	5	V
I <sub>C</sub>	Collector current	6	Α
I <sub>CM</sub>	Collector peak current (t <sub>P</sub> < 5ms)	10	Α
I <sub>B</sub>	Base current	3	Α
P <sub>TOT</sub>	Total dissipation at T <sub>case</sub> = 25°C	65	W
T <sub>stg</sub>	Storage temperature	-65 to 150	°C
TJ	Max. operating junction temperature	150	°C

Note: For PNP types voltage and current values are negative

Electrical characteristics TIP41C - TIP42C

### 2 Electrical characteristics

(T<sub>case</sub> = 25°C; unless otherwise specified)

Table 3. Electrical characteristics

Symbol	Parameter	Test con	Min.	Тур.	Max.	Unit	
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
I <sub>CES</sub>	Collector cut-off current (V <sub>BE</sub> = 0)	V <sub>CE</sub> = 100 V				0.4	mA
V <sub>CEO(sus)</sub> <sup>(1)</sup>	Collector-emitter sustaining voltage (I <sub>B</sub> = 0)	I <sub>C</sub> = 30 mA		100			V
V <sub>CE(sat)</sub> <sup>(1)</sup>	Collector-emitter saturation voltage	I <sub>C</sub> = 6 A	$I_{B} = 0.6 A$			1.5	V
V <sub>BE(on)</sub> <sup>(1)</sup>	Base-emitter voltage	I <sub>C</sub> = 6 A	$V_{CE} = 4 V$			2	V
h <sub>FE</sub> <sup>(1)</sup>	DC current gain	$I_C = 0.3 A$ $I_C = 3 A$ Group R Group O Group Y	V <sub>CE</sub> = 4 V V <sub>CE</sub> = 4 V	30 15 15 24 42		75 28 44 75	

<sup>1.</sup> Pulsed duration = 300 ms, duty cycle  $\geq$ 1.5%.

Note: 1 Product is pre-selected in DC current gain (group R, group O and group Y).

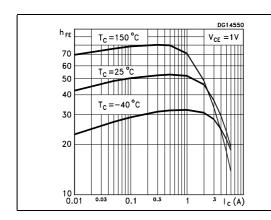
STMicroelectronics reserves the right to ship either groups according to production availability. Please contact your nearest STMicroelectronics sales office for delivery details.

Note: For PNP types voltage e current values are negative.

### 2.1 Typical characteristic (curves)

Figure 2. DC current gain (NPN)

Figure 3. DC current gain (PNP)



DG14600

T<sub>C</sub> = 25 °C

V<sub>CE</sub> = -1V

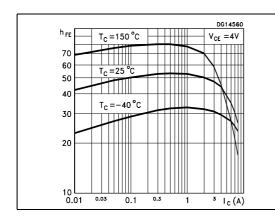
T<sub>C</sub> = 150 °C

T<sub>C</sub> = 150 °C

T<sub>C</sub> = -40 °C

Figure 4. DC current gain (NPN)

Figure 5. DC current gain (PNP)



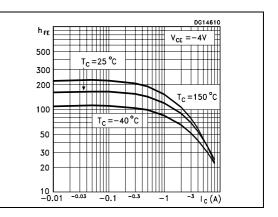
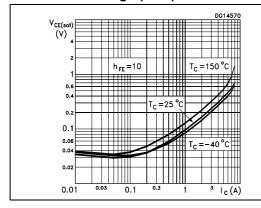
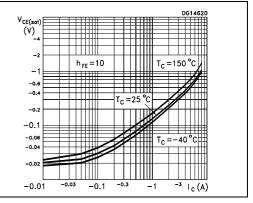


Figure 6. Collector-emitter saturation voltage (NPN)

Figure 7. Collector-emitter saturation voltage (PNP)





Electrical characteristics TIP41C - TIP42C

Figure 8. Base-emitter saturation voltage (NPN)

V<sub>BE(set)</sub> (v) 1.2 1.1 T<sub>c</sub>=25 °c T<sub>c</sub>=40 °c T<sub>c</sub>=150 °c T<sub>c</sub>=150

Figure 9. Base-emitter saturation voltage (PNP)

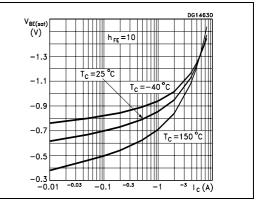
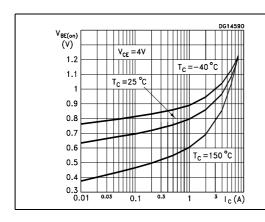


Figure 10. Base-emitter voltage (NPN)

Figure 11. Base-emitter voltage (PNP)



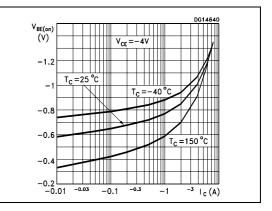
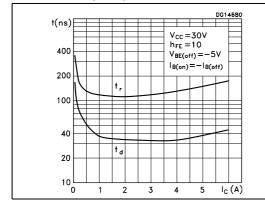
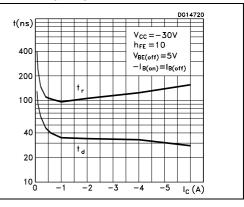


Figure 12. Resistive load switching time Figure 13. Resistive load switching time (NPN) (PNP)





TIP41C - TIP42C Electrical characteristics

Figure 14. Resistive load switching time Figure 15. Resistive load switching time (NPN) (PNP)

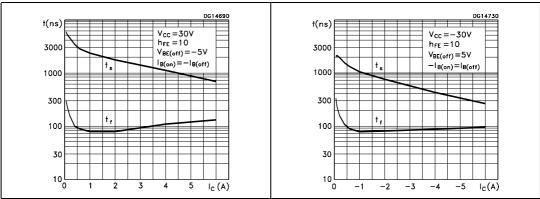
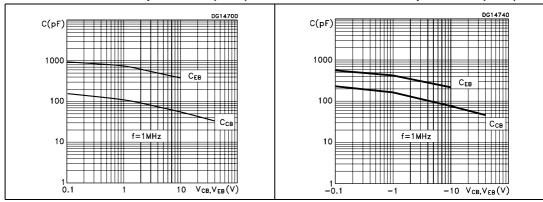


Figure 16. Collector-base and collector- Figure 17. Collector-base and collector- emitter capacitance (NPN) emitter capacitance (PNP)



Electrical characteristics TIP41C - TIP42C

### 2.2 Test circuit

Figure 18. Inductive load switching test circuit

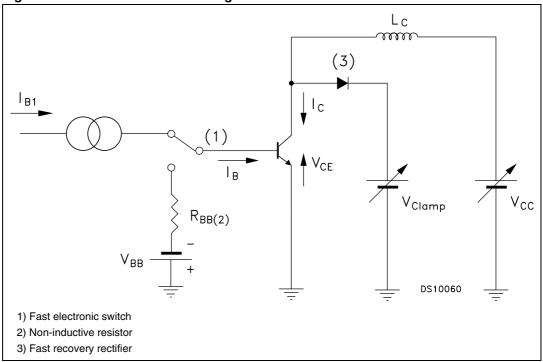
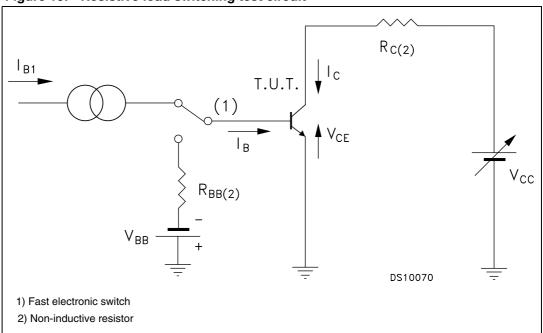


Figure 19. Resistive load switching test circuit



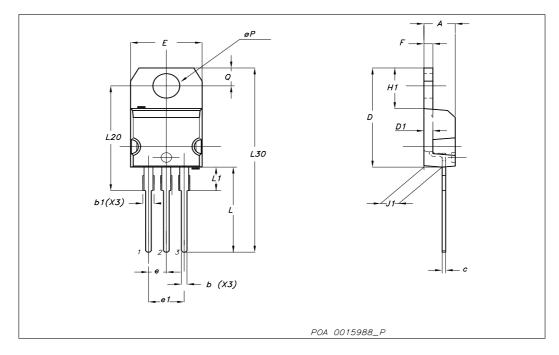
Note: For PNP types voltage e current values are negative.

## 3 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second level interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: <a href="https://www.st.com">www.st.com</a>

#### TO-220 mechanical data

Dim	mm			inch			
	Min	Тур	Max	Min	Тур	Max	
Α	4.40		4.60	0.173		0.181	
b	0.61		0.88	0.024		0.034	
b1	1.14		1.70	0.044		0.066	
С	0.49		0.70	0.019		0.027	
D	15.25		15.75	0.6		0.62	
D1		1.27			0.050		
E	10		10.40	0.393		0.409	
е	2.40		2.70	0.094		0.106	
e1	4.95		5.15	0.194		0.202	
F	1.23		1.32	0.048		0.051	
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	



TIP41C - TIP42C Revision history

# 4 Revision history

Table 4. Document revision history

Date	Revision	Changes	
24-Oct-2006	1	Initial release	
19-Nov-2007	2	Content reworked to improve readability, no technical changes	

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