TIP122FP
TIP127FP

Complementary power Darlington transistors

Features

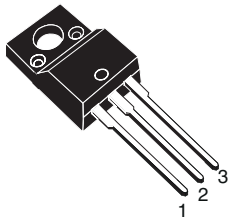
- Low collector-emitter saturation voltage
- Complementary NPN - PNP transistors
- TO-220FP isolated package UL compliant

Application

- General purpose linear and switching

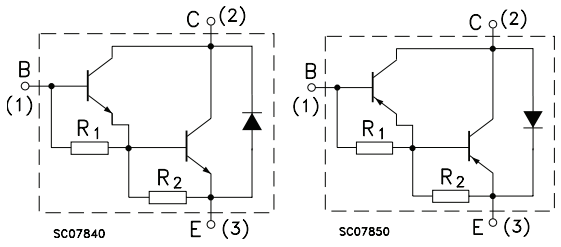
Description

The devices are manufactured in planar technology with “base island” layout and monolithic Darlington configuration. The resulting transistors show exceptional high gain performance coupled with very low saturation voltage.



TO-220FP

Figure 1. Internal schematic diagrams



NPN: R_1 = 7 kΩ R_2 = 70 Ω **PNP: R_1 = 16 kΩ R_2 = 60 Ω**

Table 1. Device summary

Order codes	Marking	Polarity	Package	Packaging
TIP122FP	TIP122FP	NPN	TO-220FP	Tube
TIP127FP	TIP127FP	PNP		

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
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	5	A
I_{CM}	Collector peak current	8	A
I_B	Base current	0.12	A
P_{TOT}	Total dissipation at $T_c \leq 25$ °C $T_{amb} \leq 25$ °C	30 2	W
T_{STG}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	

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

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case max.	4.2	°C/W
R_{thJA}	Thermal resistance junction-ambient max.	62.5	

2 Electrical characteristics

T_{case} = 25 °C unless otherwise specified.

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEO}	Collector cut-off current (I_B = 0)	V_{CE} = 50 V			0.5	mA
I_{CBO}	Collector cut-off current (I_B = 0)	V_{CE} = 100 V			0.2	mA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 5 V			2	mA
$V_{CEO(sus)}$(1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 30 mA	100			V
$V_{CE(sat)}$(1)	Collector-emitter saturation voltage	I_C = 3 A I_B = 12 mA I_C = 5 A I_B = 20 mA			2 4	V V
$V_{BE(on)}$(1)	Base-emitter on voltage	I_C = 3 A V_{CE} = 3 V			2.5	V
h_{FE}(1)	DC current gain	I_C = 0.5 A V_{CE} = 3 V I_C = 3 A V_{CE} = 3 V	1000 1000			

1. Pulse test: pulse duration ≤ 300 µs, duty cycle ≤ 2 %.

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

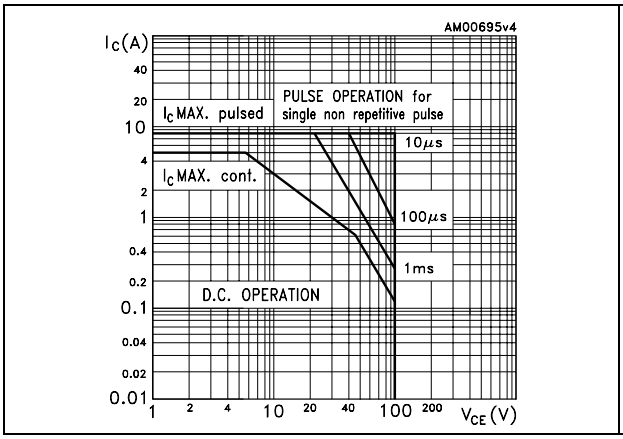


Figure 3. Derating curve

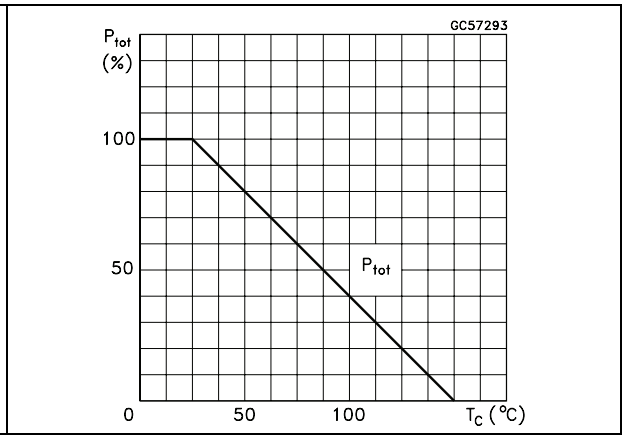


Figure 4. DC current gain for NPN type

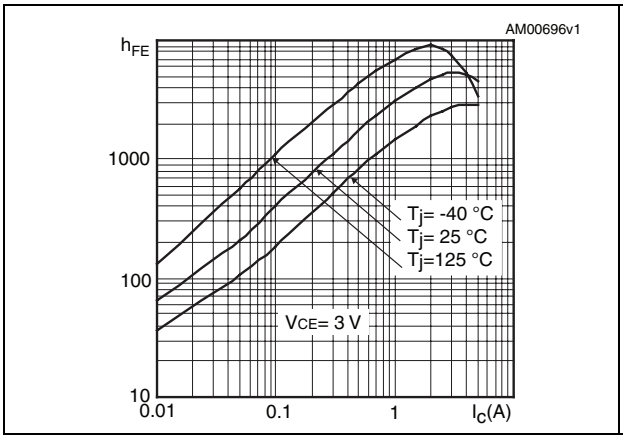


Figure 5. DC current gain for PNP type

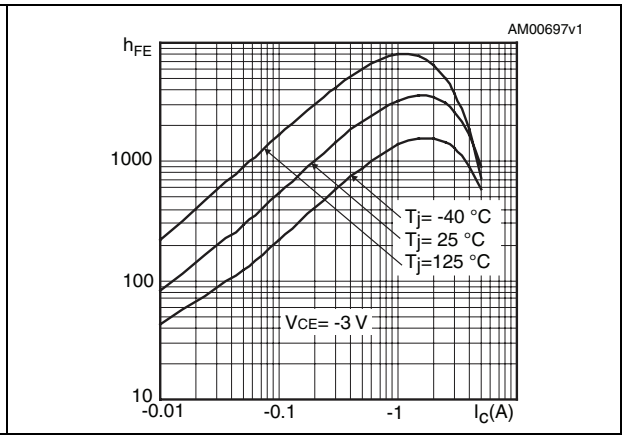


Figure 6. Collector-emitter saturation voltage for NPN type

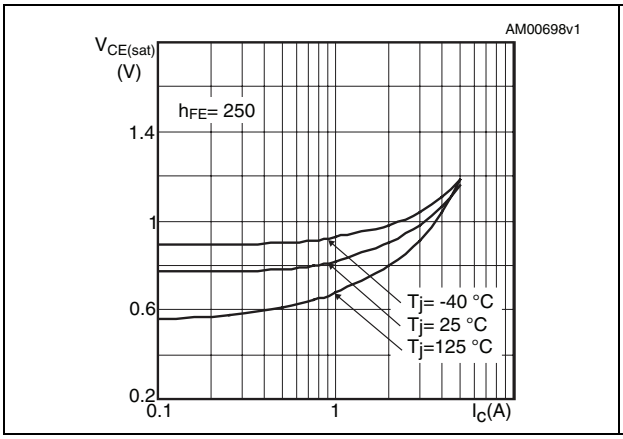


Figure 7. Collector-emitter saturation voltage for PNP type

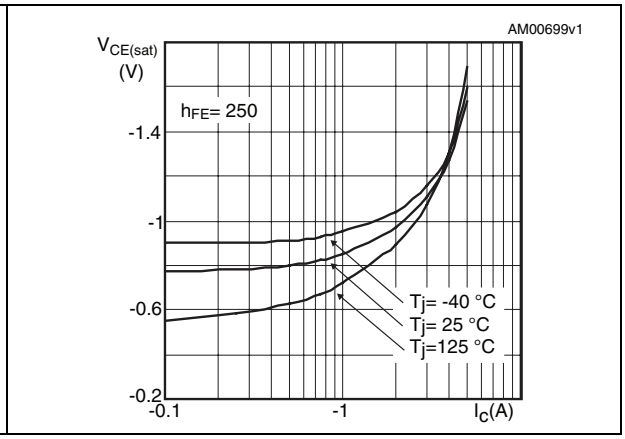


Figure 8. Base-emitter saturation voltage for NPN type

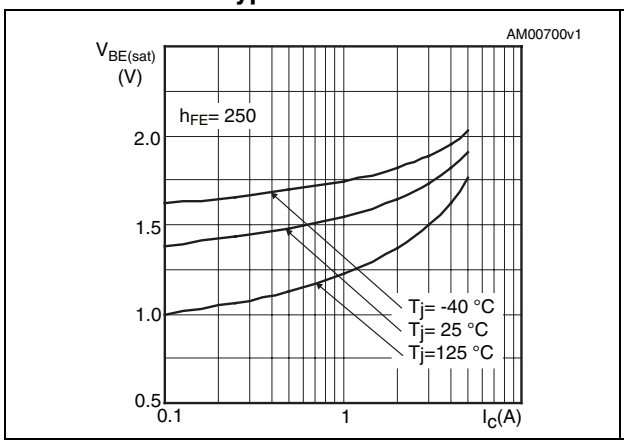


Figure 9. Base-emitter saturation voltage for PNP type

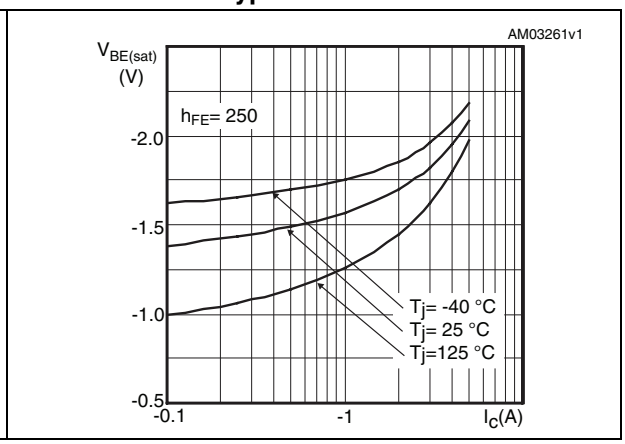


Figure 10. Base-emitter on voltage for NPN type

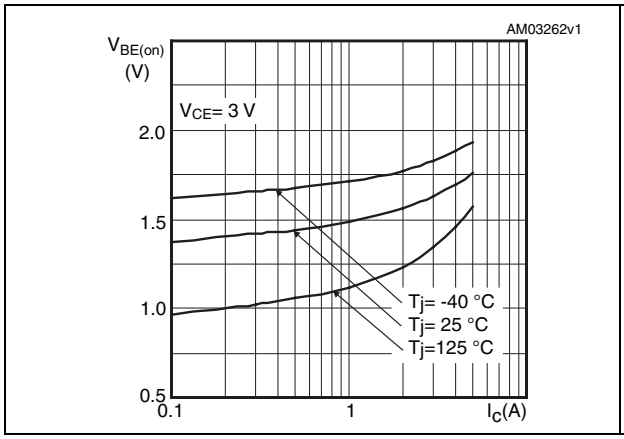


Figure 11. Base-emitter on voltage for PNP type

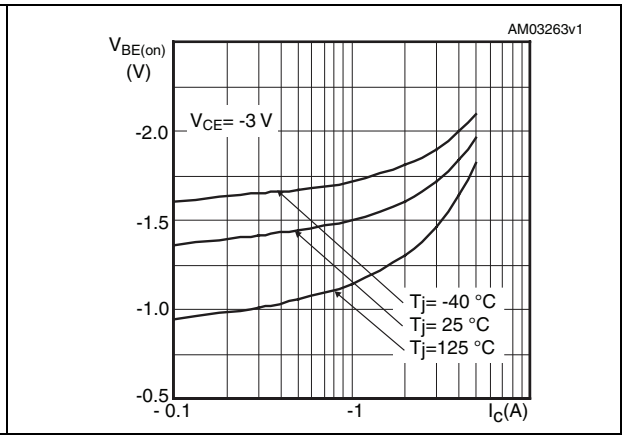


Figure 12. Switching time on resistive load for NPN type (on)

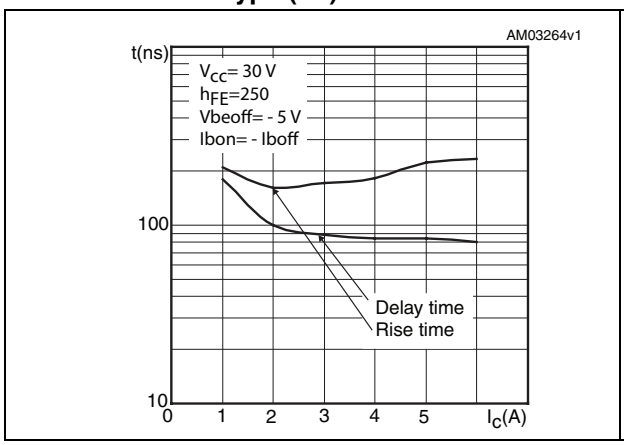


Figure 13. Switching time on resistive load for PNP type (on)

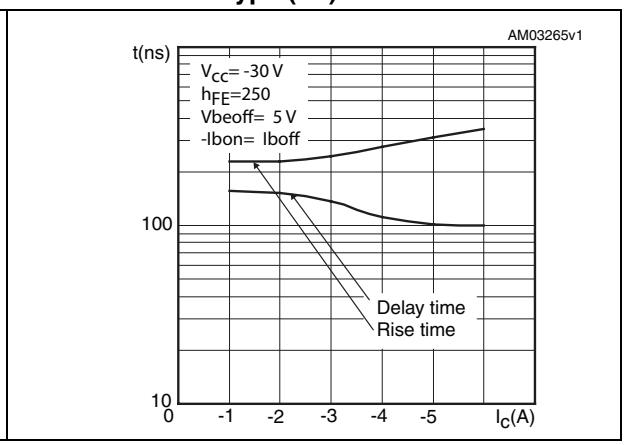


Figure 14. Switching time on resistive load for NPN type (off)

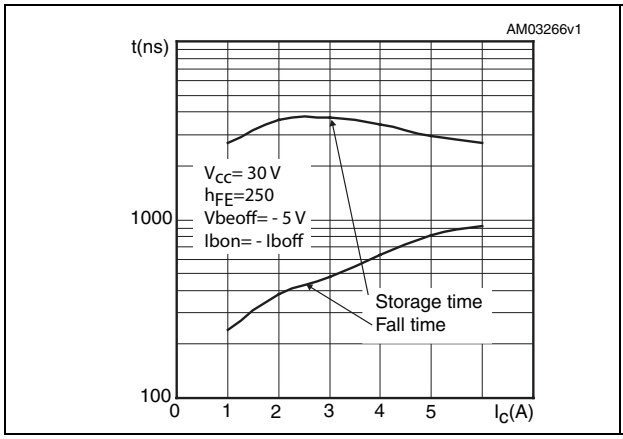


Figure 15. Switching time on resistive load for PNP type (off)

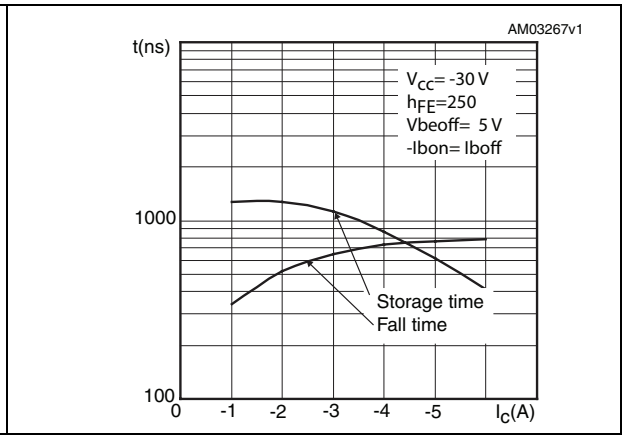


Figure 16. Capacitances for NPN type

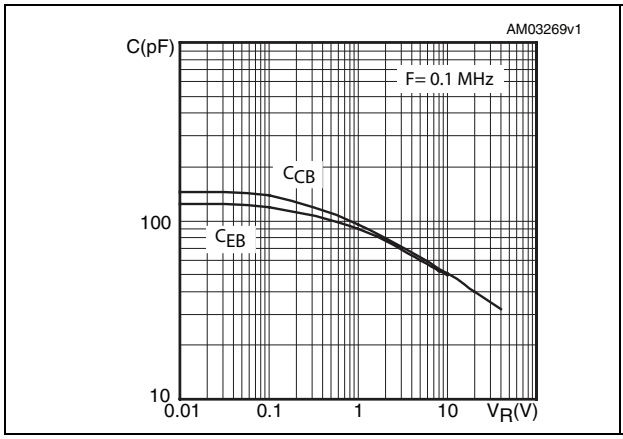
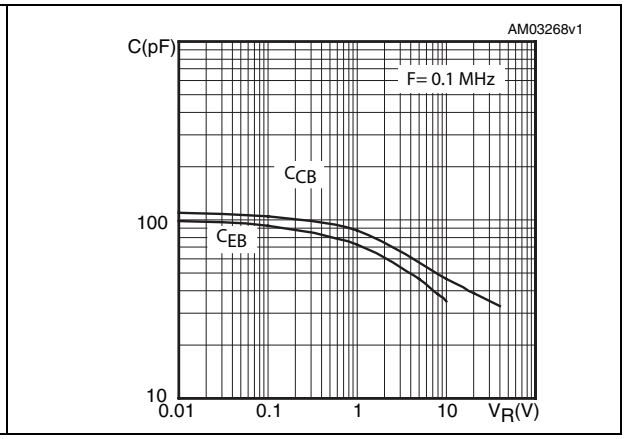
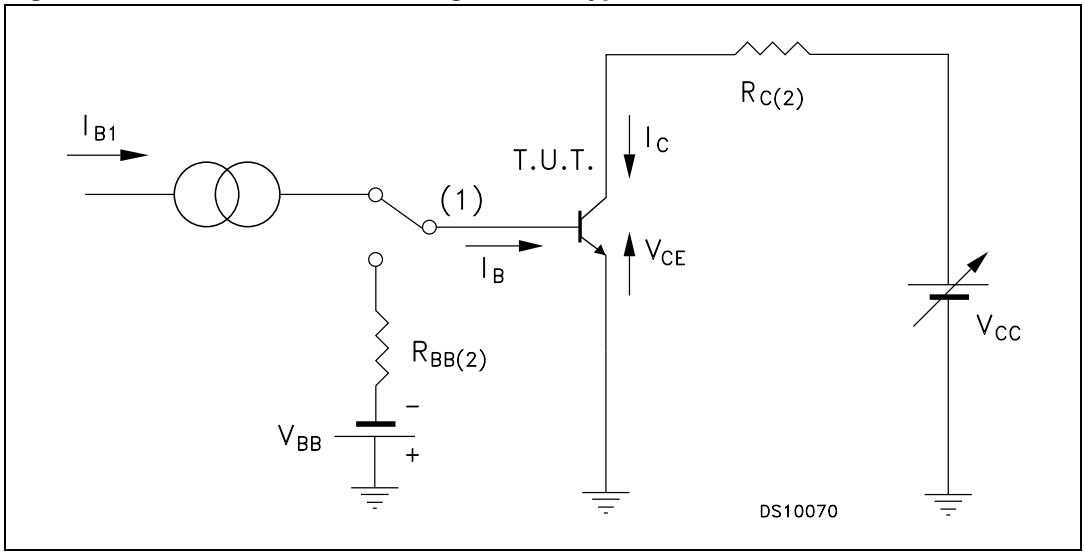


Figure 17. Capacitances for PNP type



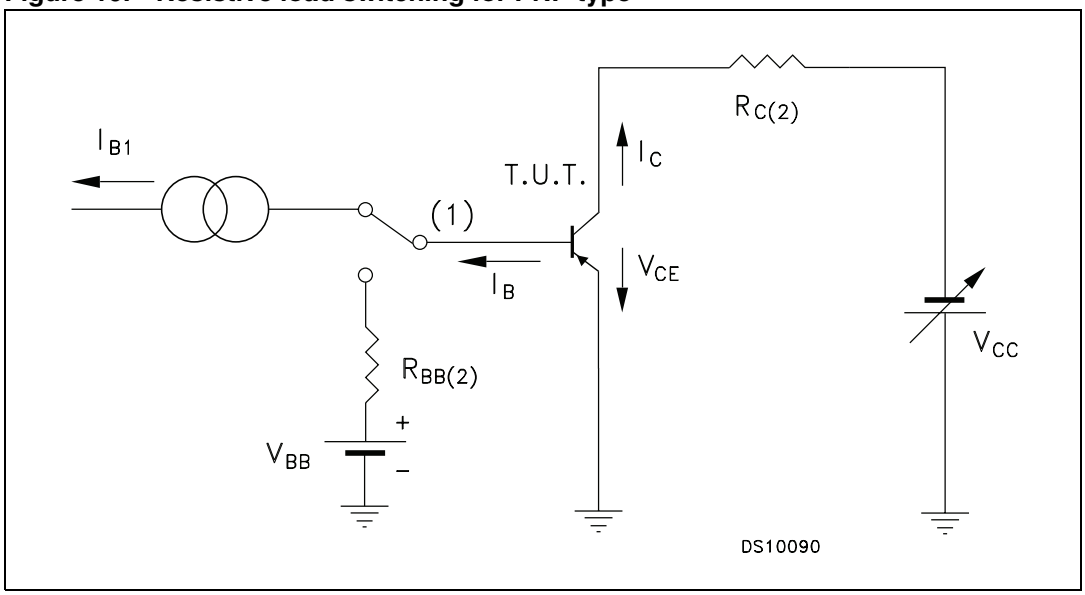
3 Test circuits

Figure 18. Resistive load switching for NPN type



1. Fast electronic switch
2. Non-inductive resistor

Figure 19. Resistive load switching for PNP type



1. Fast electronic switch
2. Non-inductive resistor

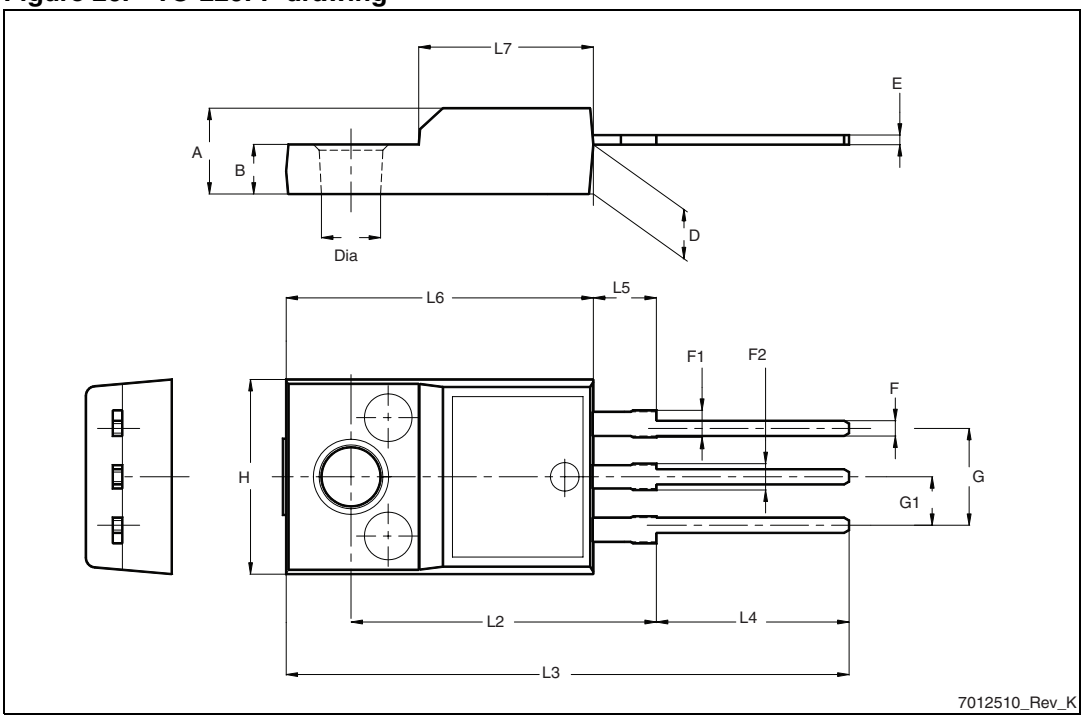
4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 5. TO-220FP mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

Figure 20. TO-220FP drawing



5 Revision history

Table 6. Document revision history

Date	Revision	Changes
21-Jun-2004	4	Document migration, no content change
02-Dec-2009	5	Updated *Section 2.1: Electrical characteristics (curves)* and TO-220FP package mechanical data