STD878
STN878

High current, high performance, low voltage NPN transistors

Features

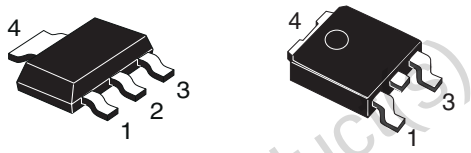
- Very low collector to emitter saturation voltage
- DC current gain, h_{FE} >100
- 5 A continuous collector current

Applications

- Power management in portable equipment
- Voltage regulation in bias supply circuits
- Switching regulator in battery charger applications
- Heavy load driver

Description

The devices are manufactured in low voltage NPN planar technology with “base island” layout. the resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.



SOT-223 DPAK

Figure 1. Internal schematic diagram

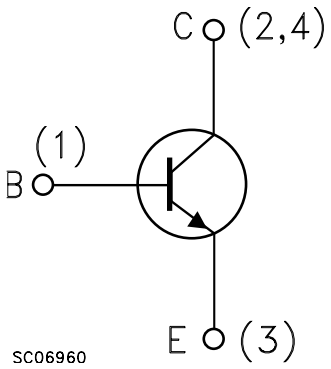


Table 1. Device summary

Order codes	Markings	Packages	Packaging
STD878T4	D878	DPAK	Tape and reel
STN878	N878	SOT-223	Tape and reel

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage (I_E = 0)	45	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	30	V
V_{EBO}	Emitter-base voltage (I_C = 0)	6	V
I_C	Collector current	5	A
I_{CM}	Collector peak current (t_P < 5 ms)	10	A
P_{TOT}	Total dissipation at T_C = 25 °C for STD878	15	W
	Total dissipation at T_{amb} = 25 °C for STN878	1.6	
T_{STG}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance junction-case for STD878 max	8.3	°C/W
R_{thJA}	Thermal resistance junction-ambient for STN878 (1) max	78	°C/W

1. Device mounted on PCB area of 1 cm^2.

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector cut-off current (I_E = 0)	V_{CB} = 30 V V_{CB} = 30 V; T_C = 100 °C			10 100	µA µA
I_{EBO}	Emitter cut-off current (I_C = 0)	V_{EB} = 6 V			10	µA
$V_{(BR)CEO}$ (1)	Collector-emitter breakdown voltage (I_B = 0)	I_C = 10 mA	30			V
$V_{(BR)CBO}$	Collector-base breakdown voltage (I_E = 0)	I_C = 100 µA	45			V
$V_{(BR)EBO}$	Emitter-base breakdown voltage (I_C = 0)	I_E = 100 µA	6			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.5 A I_B = 5 mA I_C = 2 A I_B = 50 mA I_C = 5 A I_B = 0.25 A I_C = 6 A I_B = 0.25 A I_C = 8 A I_B = 0.4 A I_C = 10 A I_B = 0.5 A		 0.7 1 1.2	0.15 0.35 0.7 	V V V V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 2 A I_B = 50 mA I_C = 6 A I_B = 0.25 A		 1.2	1.1 	V V
h_{FE} (1)	DC current gain	I_C = 10 mA V_{CE} = 1 V I_C = 500 mA V_{CE} = 1 V I_C = 5 A V_{CE} = 1 V I_C = 5 A V_{CE} = 1 V T_c = 100 °C I_C = 8 A V_{CE} = 1 V I_C = 10 A V_{CE} = 1 V	120 100 70 	200 200 100 100 55 35	 300 	
 t_d t_r t_s t_f	Resistive load Delay time Rise time Storage time Fall time	 I_C = 3 A V_{CC} = 20 V I_{B1} = - I_{B2} = 60 mA see *Figure 8*		 180 160 250 80	 220 210 300 100	 ns ns ns ns

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

2.1 Electrical characteristics (curves)

Figure 2. DC current gain (V_{CE} = 1 V)

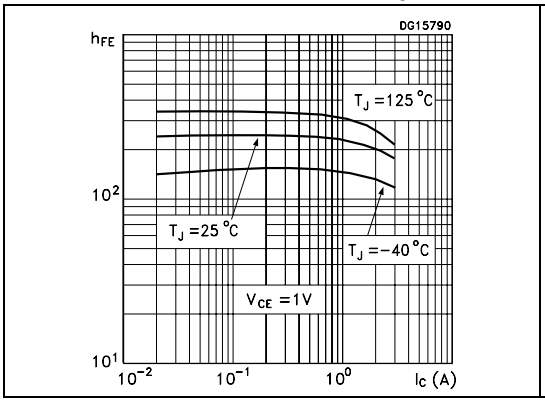


Figure 3. DC current gain (V_{CE} = 3 V)

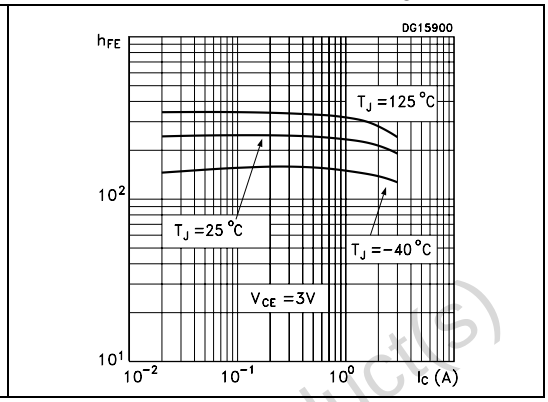


Figure 4. Collector-emitter saturation voltage

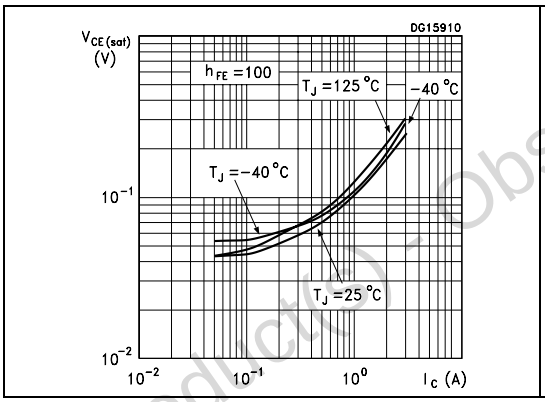


Figure 5. Base-emitter saturation voltage

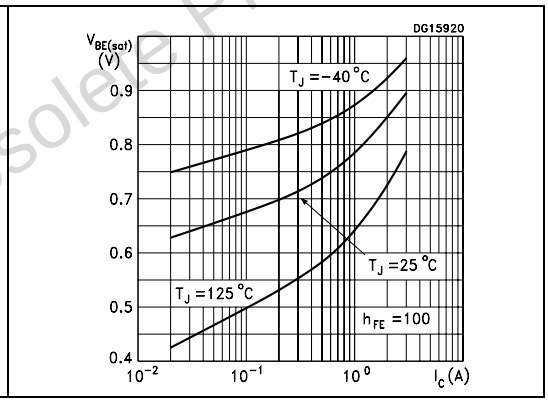


Figure 6. Resistive load switching time (ON)

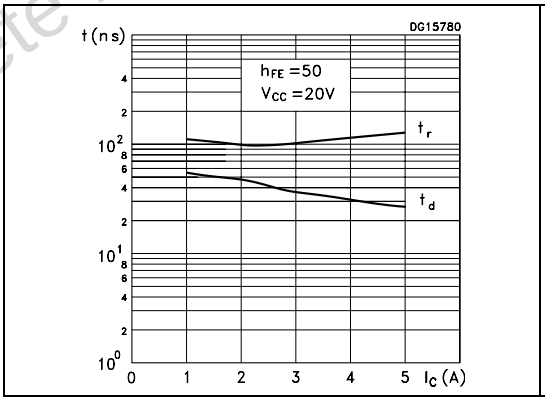
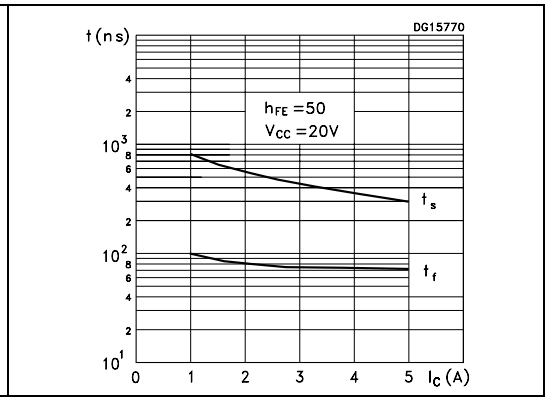
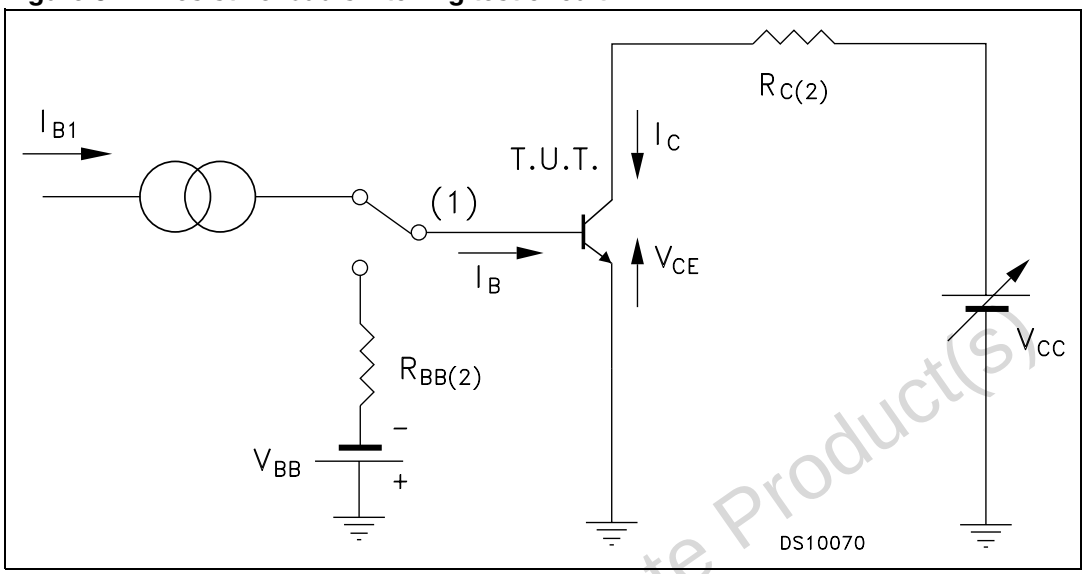


Figure 7. Resistive load switching time (OFF)



2.2 Test circuits

Figure 8. Resistive load switching test circuit



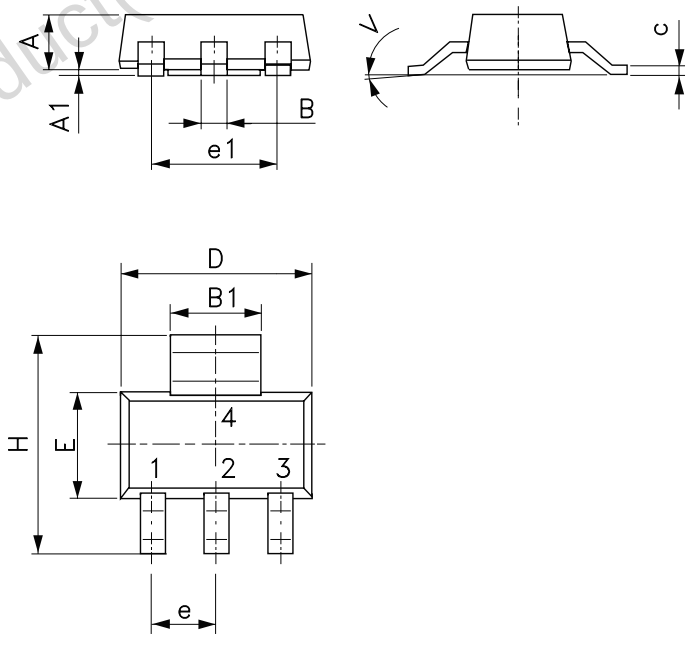
1. Fast electronic switch
2. Non-inductive resistor

3 Package mechanical data

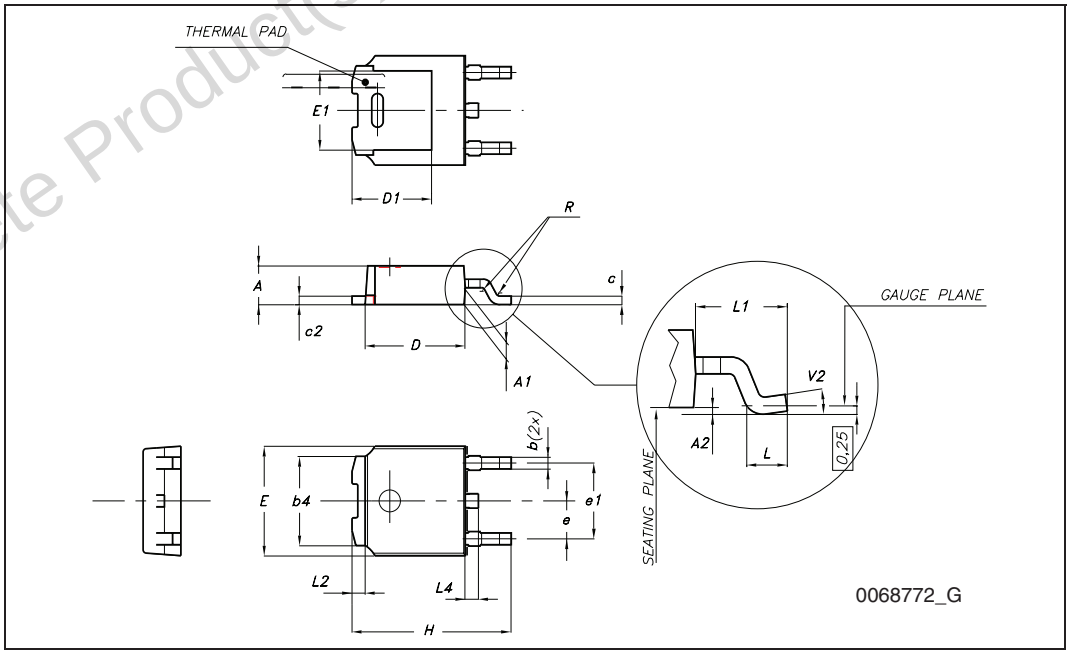
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

SOT-223 mechanical data

Dim.	mm.		
	Min.	Typ.	Max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10 °



TO-252 (DPAK) mechanical data			
DIM.	mm.		
	min.	typ	max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
21-Aug-2007	1	Initial release.
30-Aug-2010	2	Inserted STD878T4 order code *Table 1 on page 1*.

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