

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.

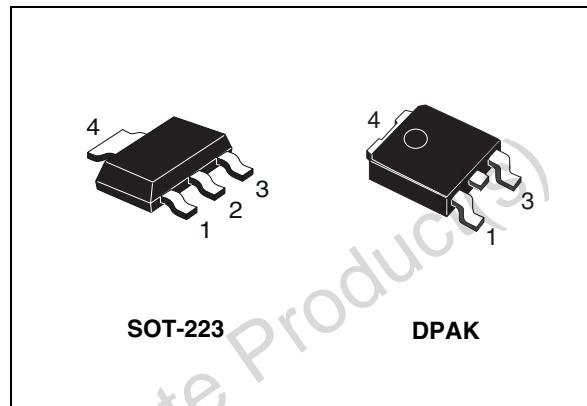


Figure 1. Internal schematic diagram

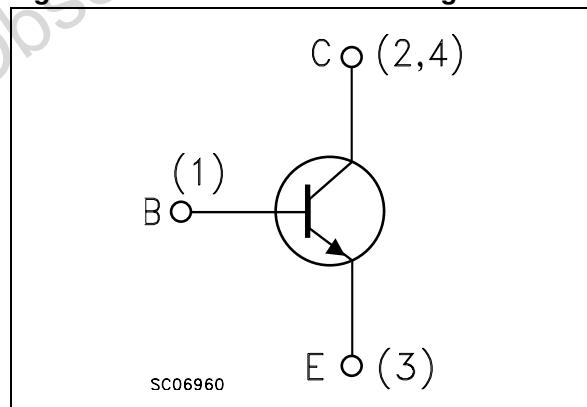


Table 1. Device summary

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
R_{thJA}	Thermal resistance junction-ambient for STN878 ⁽¹⁾	max	78

1. Device mounted on PCB area of 1 cm².

2 Electrical characteristics

$T_{case} = 25^\circ\text{C}$ unless otherwise specified.

Table 4. Electrical characteristics

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

1. Pulse test: pulse duration $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$

2.1 Electrical characteristics (curves)

Figure 2. DC current gain ($V_{CE} = 1$ V) Figure 3. DC current gain ($V_{CE} = 3$ V)

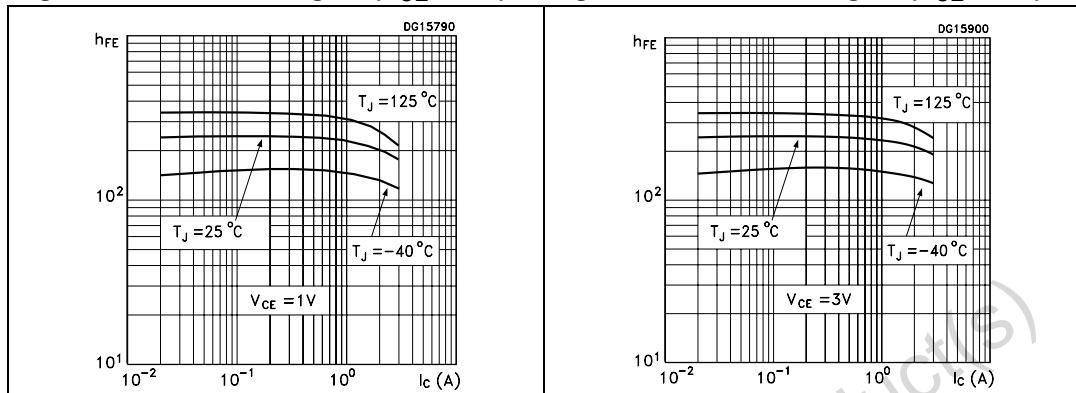


Figure 4. Collector-emitter saturation voltage

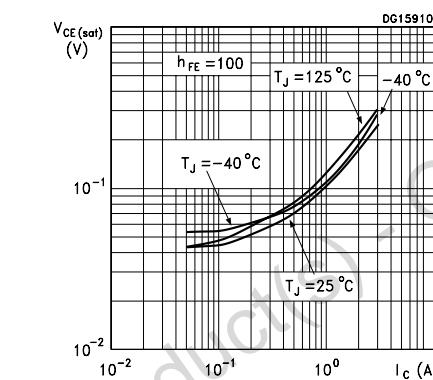


Figure 5. Base-emitter saturation voltage

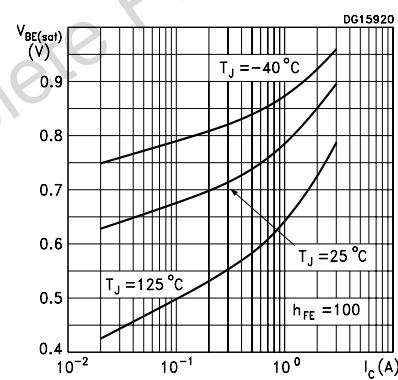
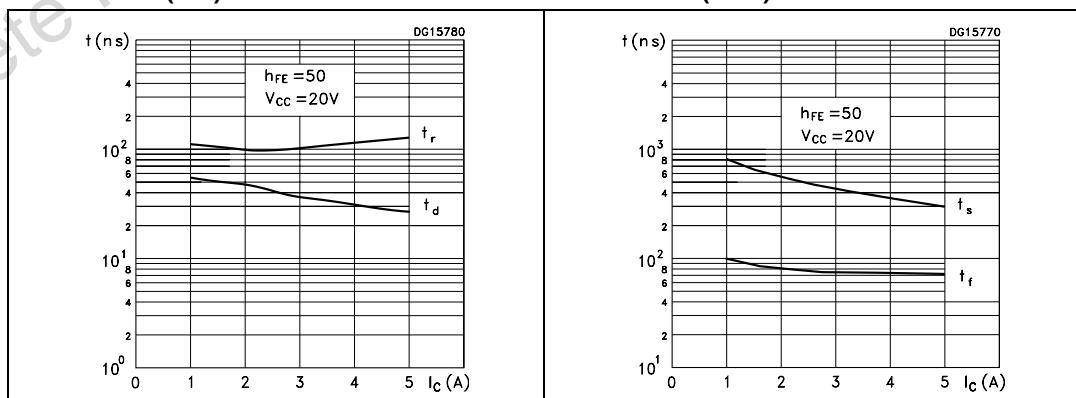
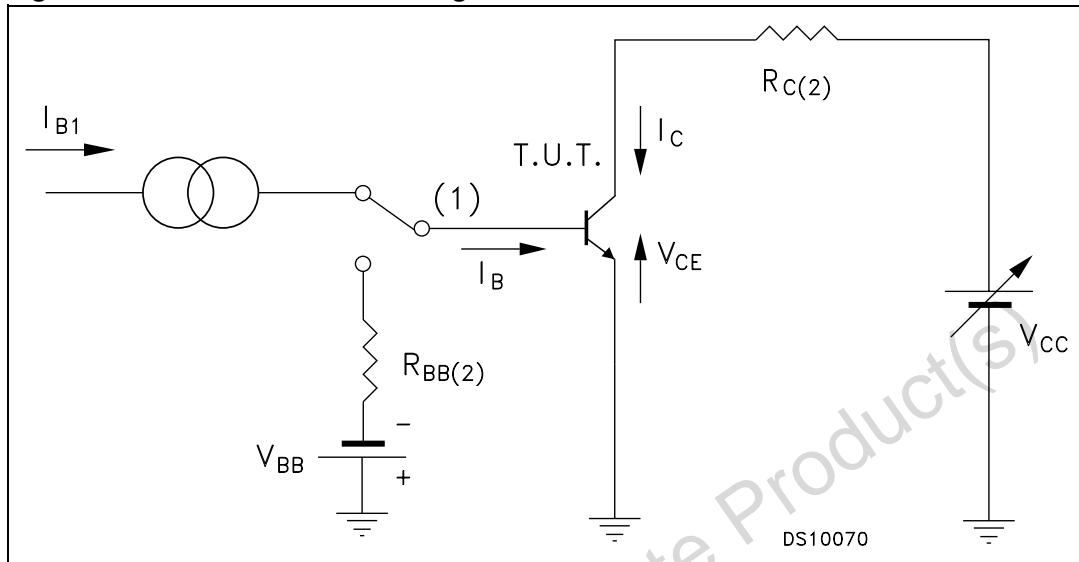


Figure 6. Resistive load switching time (ON) Figure 7. Resistive load switching time (OFF)



2.2 Test circuits

Figure 8. Resistive load switching test circuit



1. Fast electronic switch
2. Non-inductive resistor

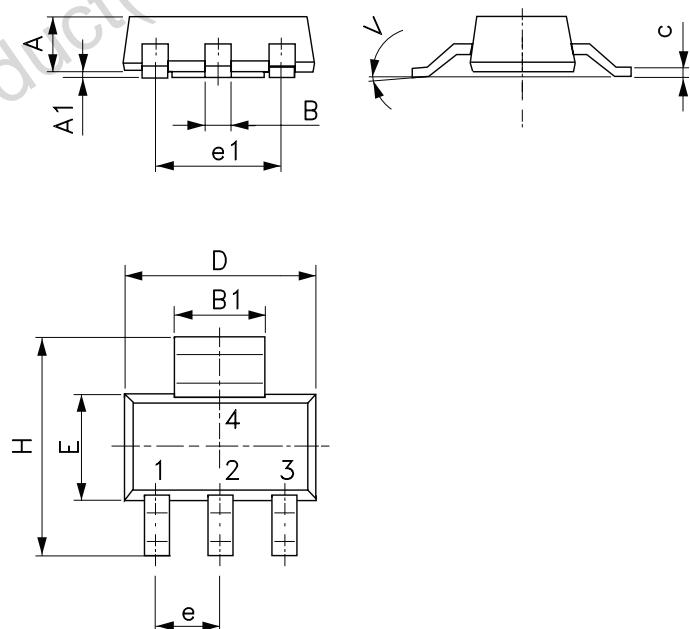
3 Package mechanical data

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.

Obsolete Product(s) - Obsolete Product(s)

SOT-223 mechanical data

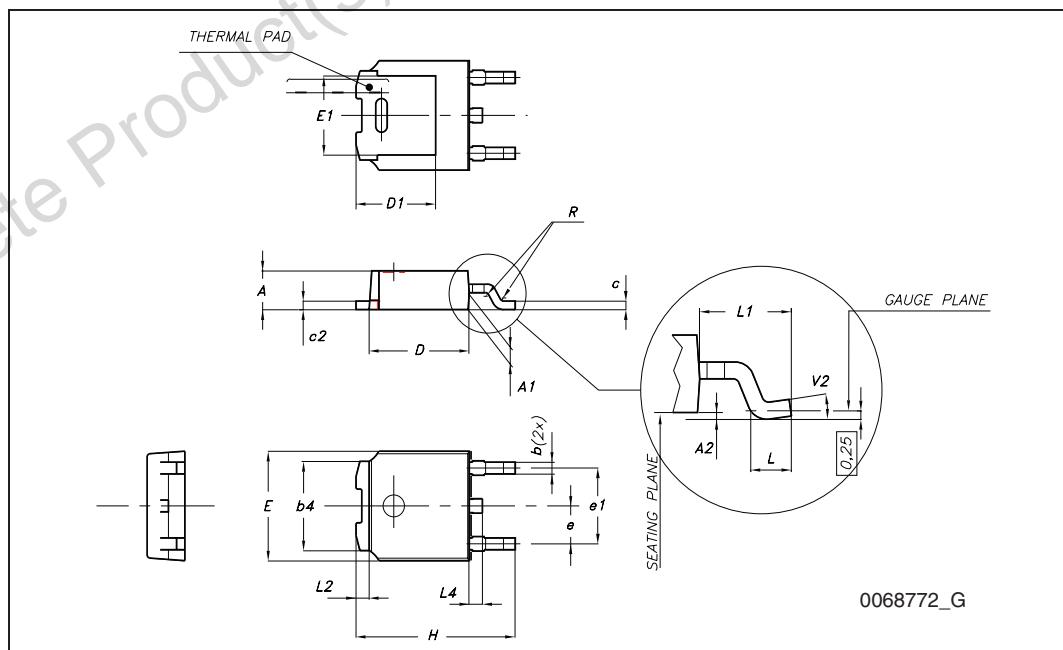
Dim.	mm.		
	Min.	Typ.	Max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10 °



0046067_M

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 <i>Table 1 on page 1</i> .

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY AN AUTHORIZED ST REPRESENTATIVE, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2010 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics](#):

[STD878T4](#) [STN878](#)