Contents

1	Electrical ratings 3
2	Electrical characteristics4
	2.1 Electrical characteristics (curves) 5
3	Package mechanical data 6
4	Revision history

1 Electrical ratings

Table 2. Absolute maximum ratings

			Value			
Symbol	Parameter	NPN		PNP		Unit
		BD135	BD139	BD136	BD140	
V_{CBO}	Collector-base voltage (I _E = 0)		80	-45	-80	V
V _{CEO}	Collector-emitter voltage (I _B = 0)	Collector-emitter voltage (I _B = 0) 45 80		-45	-80	V
V _{EBO}	Emitter-base voltage ($I_C = 0$)	5 -5		5	V	
I _C	Collector current	1.5		-1.5		Α
I _{CM}	Collector peak current	3 -3		3	Α	
Ι _Β	Base current	0.5 -0.5).5	Α	
P _{TOT}	Total dissipation at T _c ≤25 °C	12.5		W		
P _{TOT}	Total dissipation at T _{amb} ≤25 °C 1.25			W		
T _{stg}	Storage temperature	-65 to 150		°C		
T _j	Max. operating junction temperature 150			°C		

Table 3. Thermal data

Symbol	Parameter	Max value	Unit
R _{thj-case}	Thermal resistance junction-case	10	°C/W
R _{thj-amb}	Thermal resistance junction-ambient	100	°C/W

5/

2 Electrical characteristics

 $(T_{case} = 25 \, ^{\circ}C \text{ unless otherwise specified})$

Table 4. On/off states

Symbol	Parameter	Polarity	Test conditions	Value			Unit
Symbol			rest conditions	Min.	Тур.	Max.	Onit
I _{CBO}	Collector cut-off current (I _E =0)	NPN	V _{CB} = 30 V			0.1	μΑ
			$V_{CB} = 30 \text{ V}, T_{C} = 125 ^{\circ}\text{C}$			10	μΑ
.СВО		PNP	V _{CB} = -30 V			-0.1	μΑ
			$V_{CB} = -30 \text{ V}, T_{C} = 125 ^{\circ}\text{C}$			-10	μA
I _{EBO}	Emitter cut-off current (I _C =0)	NPN	V _{EB} = 5 V			10	μΑ
·EBO		PNP	V _{EB} = -5 V			-10	μΑ
V _{CEO(sus)} ⁽¹⁾	Collector-emitter sustaining voltage (I _B =0)	NPN	I _C = 30 mA BD135 BD139	45 80			V V
		PNP	I _C = -30 mA BD136 BD140	-45 -80			V V
v (1)	Collector-emitter saturation voltage	NPN	$I_C = 0.5 \text{ A}, I_B = 0.05 \text{ A}$			0.5	٧
V _{CE(sat)} (1)		PNP	I _C = -0.5 A, I _B = -0.05 A			-0.5	V
v (1)	Base-emitter voltage	NPN	I _C = 0.5 A, V _{CE} = 2 V			1	V
V _{BE} ⁽¹⁾		PNP	$I_C = -0.5 \text{ A}, V_{CE} = -2 \text{ V}$			-1	V
h (1)	DC current gain	NPN	$I_C = 5 \text{ mA}, V_{CE} = 2 \text{ V}$ $I_C = 150 \text{ mA}, V_{CE} = 2 \text{ V}$ $I_C = 0.5 \text{ A}, V_{CE} = 2 \text{ V}$	25 40 25		250	
h _{FE} ⁽¹⁾		PNP	$I_C = -5 \text{ mA}, V_{CE} = -2 \text{ V}$ $I_C = -150 \text{ mA}, V_{CE} = -2 \text{ V}$ $I_C = -0.5 \text{ A}, V_{CE} = -2 \text{ V}$	25 40 25		250	
h _{EF} ⁽¹⁾	h _{FE} groups –	NPN	I _C = 150 mA, V _{CE} = 2 V BD139-10 BD135-16/BD139-16	63 100		160 250	
n _{FE} (··/		PNP	I _C = -150 mA, V _{CE} = -2 V BD140-10 BD136-16/BD140-16	63 100		160 250	

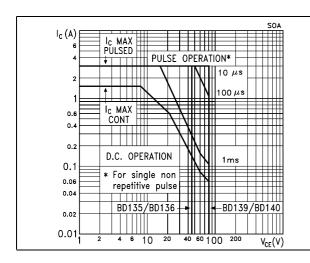
^{1.} Pulsed: pulse duration = 300 μ s, duty cycle 1.5%

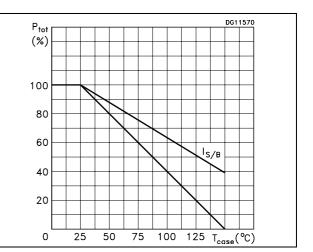
577

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

Figure 3. Derating





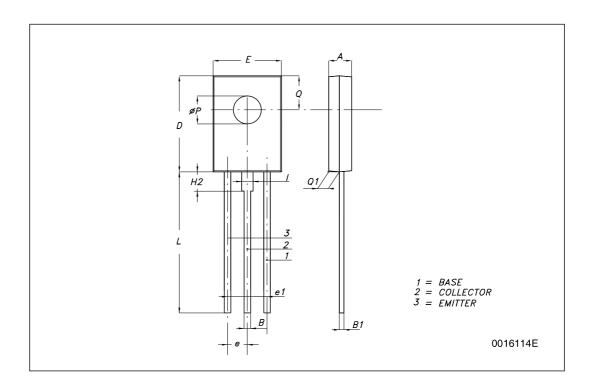
5//

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: www.st.com

577

DIM.	mm.				
	MIN.	TYP	MAX.		
Α	2.4		2.9		
В	0.64		0.88		
B1	0.39		0.63		
D	10.5		11.05		
E	7.4		7.8		
е	2.04	2.29	2.54		
e1	4.07	4.58	5.08		
L	15.3		16		
Р	2.9		3.2		
Q		3.8			
Q1	1		1.52		
H2		2.15			
I		1.27			





4 Revision history

Table 5. Document revision history

Date	Revision	Changes
16-Sep-2001	4	
22-May-2008	5	Mechanical data has been updated.

577

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.

© 2008 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 - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

577

9/9