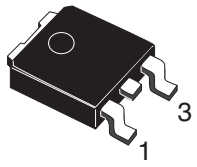
TRD136D

High voltage fast-switching NPN power transistor

Preliminary data

Features

- High voltage capability
- Low spread of dynamic parameters
- Minimum lot-to-lot spread for reliable operation
- Very high switching speed
- Integrated antiparallel collector-emitter diode



TO-252 (DPAK)

Applications

- Electronic ballast for fluorescent lighting
- Electronic transformer for halogen lamps

Description

This device is an NPN power transistor manufactured using high voltage multi epitaxial planar technology for high switching speeds. It uses a cellular emitter structure with planar edge termination to enhance switching speeds while maintaining a satisfactory RBSOA.

Figure 1. Internal schematic diagram

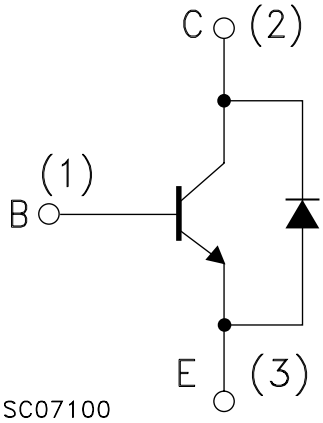


Table 1. Device summary

Part number	Marking	Package	Packaging
TRD136DT4	TRD136D	TO-252	Tape and reel

This is preliminary information on a new product now in development or undergoing evaluation. Details are subject to change without notice.

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1 Electrical ratings

Table 2. Absolute maximum rating

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage (V_{BE} = 0)	700	V
V_{CEO}	Collector-emitter voltage (I_B = 0)	400	V
V_{EBO}	Emitter-base voltage (I_C = 0)	9	V
I_C	Collector current	3	A
I_{CM}	Collector peak current (t_P < 5ms)	6	A
I_B	Base current	1.5	A
I_{BM}	Base peak current (t_P < 5ms)	3	A
P_{tot}	Total dissipation at $T_c \leq 25°C$	20	W
T_{stg}	Storage temperature	-65 to 150	°C
T_J	Max. operating junction temperature	150	°C

2 Electrical characteristics

(T_{case} = 25°C unless otherwise specified)

Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CEV}	Collector cut-off current (V_{BE} =-1.5V)	V_{CE} = 700 V V_{CE} = 700 V T_C = 100 °C			1 5	mA mA
I_{EBO}	Emitter cut-off current (I_C =0)	V_{EB} = 9 V			1	mA
$V_{CEO(sus)}$ (1)	Collector-emitter sustaining voltage (I_B = 0)	I_C = 10 mA	400			V
$V_{CE(sat)}$ (1)	Collector-emitter saturation voltage	I_C = 0.5 A I_B = 0.1 A I_C = 0.6 A I_B = 60 mA I_C = 2 A I_B = 0.5 A			0.5 0.7 1	V V V
$V_{BE(sat)}$ (1)	Base-emitter saturation voltage	I_C = 1 A I_B = 0.2 A I_C = 2 A I_B = 0.5 A			1.2 1.6	V V
h_{FE}	DC current gain	I_C = 10 mA V_{CE} = 5 V I_C = 2 A V_{CE} = 5 V	10 10		 20	
t_s t_f	Inductive load Storage time Fall time	I_C = 1 A I_{B1} = 0.2 A $V_{BE(off)}$ = -5 V R_{BB} = 0 Ω V_{Clamp} = 200 V L = 50 mH (see *Figure 11*)		0.8 0.16		µs µs
V_F	Diode forward voltage	I_F = 1 A			2.5	V

1. Pulsed duration = 300 ms, duty cycle ≤ 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

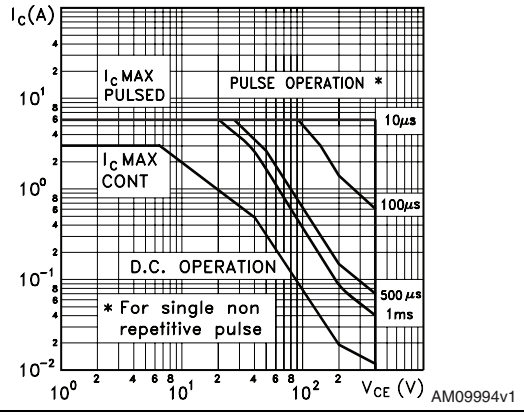


Figure 3. Derating curve

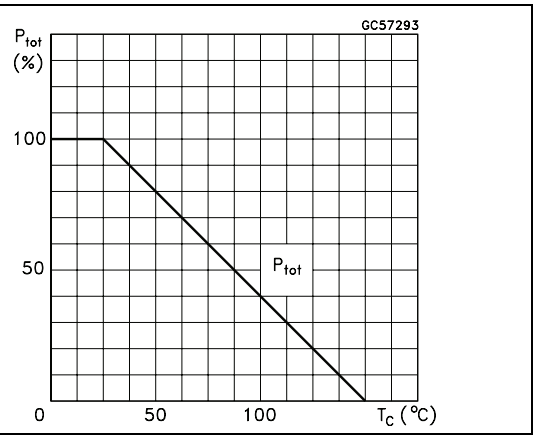


Figure 4. DC current gain (V_{CE} = 1 V)

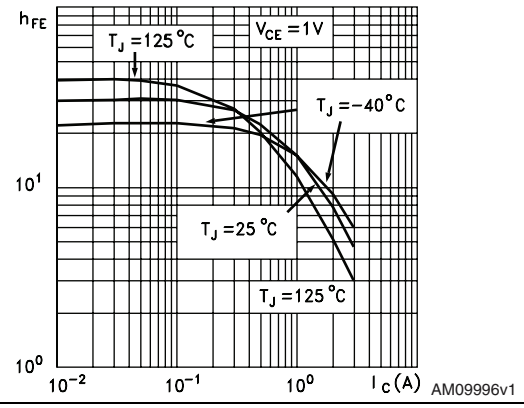


Figure 5. DC current gain (V_{CE} = 5 V)

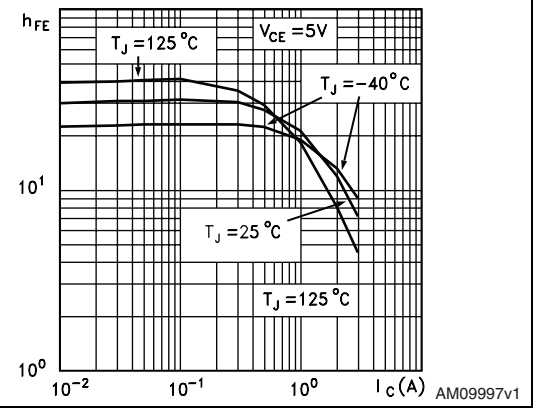


Figure 6. Collector-emitter saturation voltage

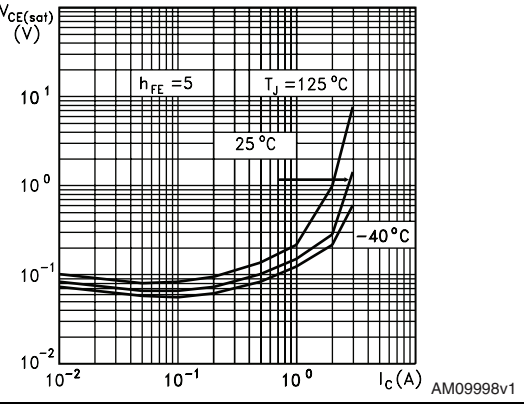


Figure 7. Base-emitter saturation voltage

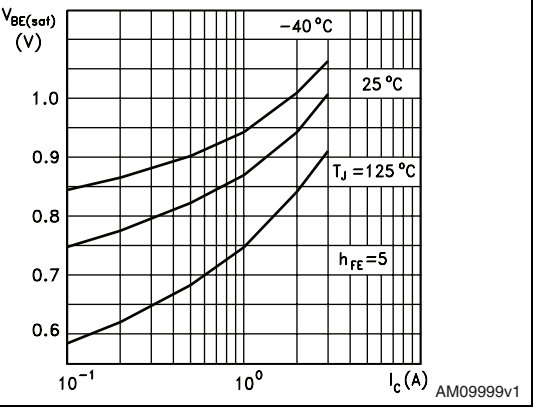


Figure 8. Freewheel diode forward voltage

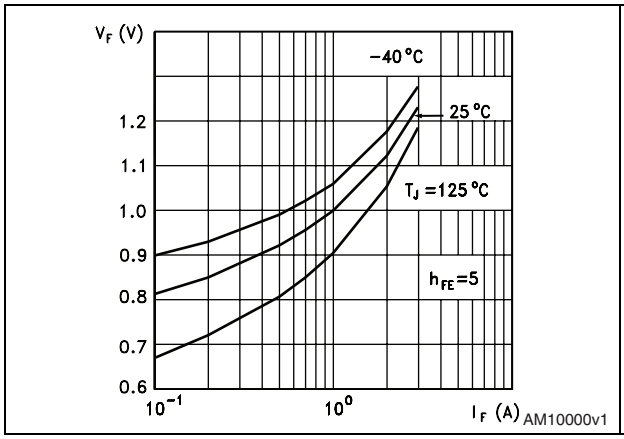


Figure 9. Resistive load switching time

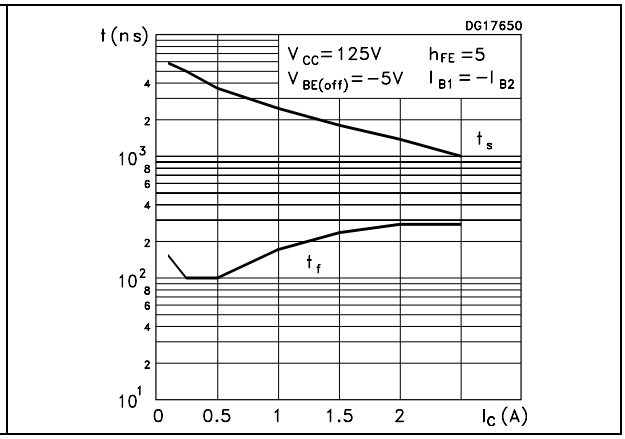
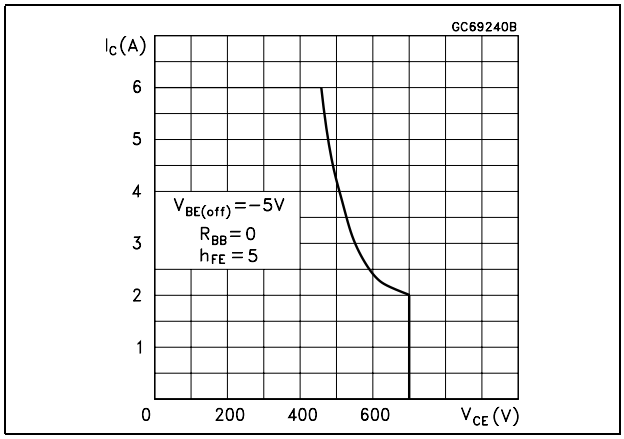
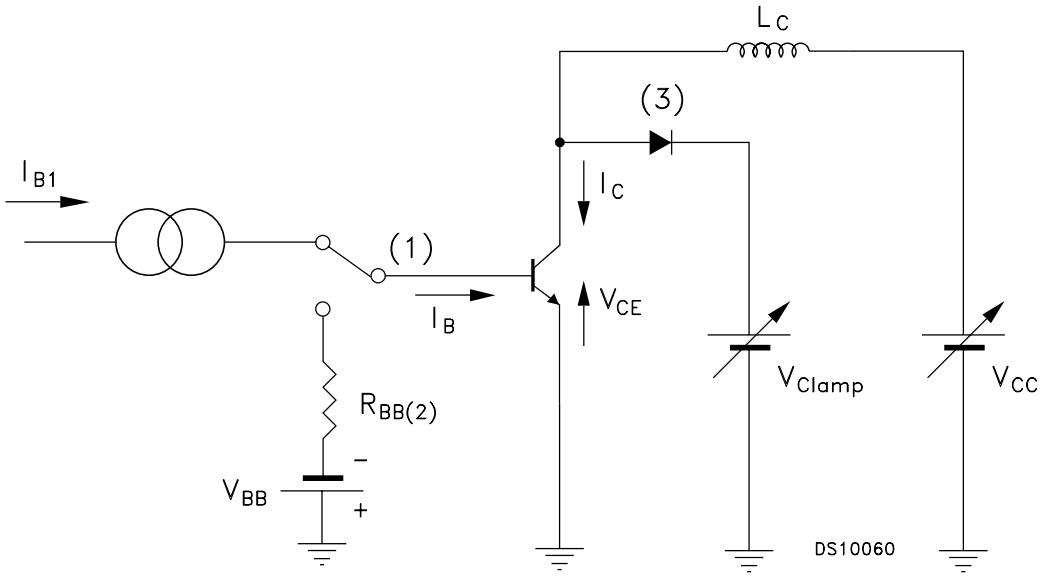


Figure 10. Reverse biased safe operating area



2.2 Test circuits

Figure 11. Inductive load switching test circuit



1) Fast electronic switch
2) Non-inductive resistor
3) Fast recovery rectifier

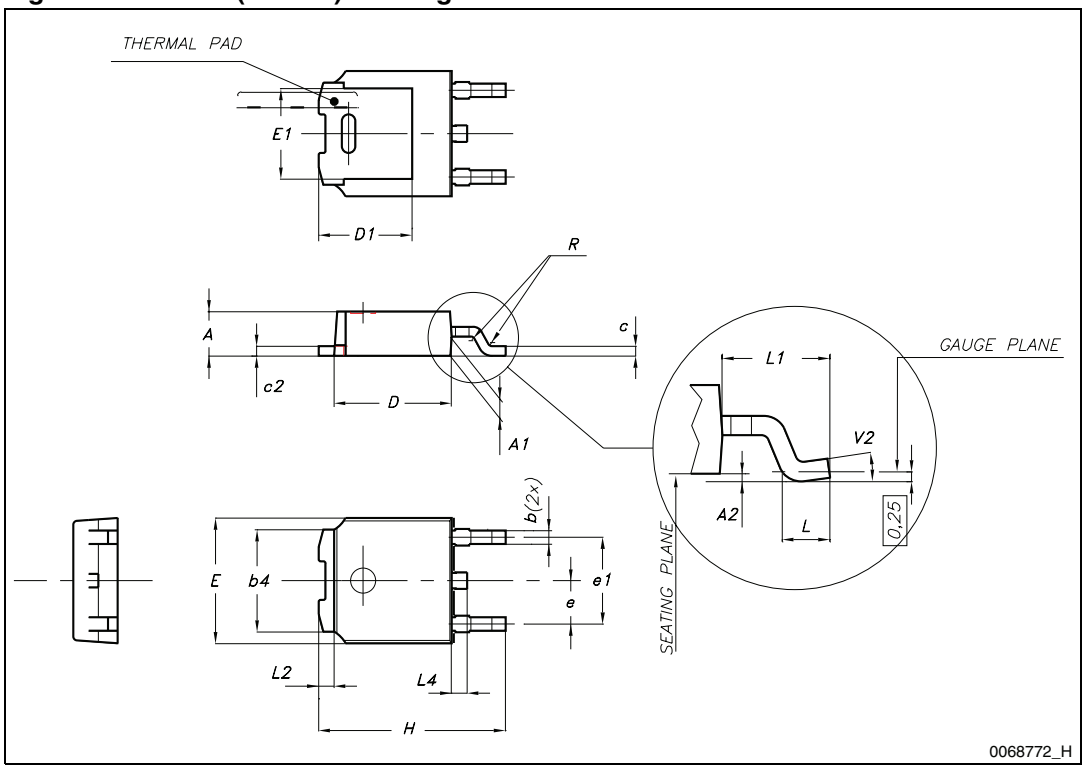
3 Package mechanical data

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.

Table 4. DPAK (TO-252) 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		1.50
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°

Figure 12. DPAK (TO-252) drawing



4 Revision history

Table 5. Document revision history

Date	Revision	Changes
28-Jun-2011	1	First release

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