

Low voltage NPN power transistor

Datasheet - production data

Features

- Surface-mounting TO-252 power package in tape and reel
- Complementary to the PNP type MJD32C

Application

General purpose linear and switching equipment

Description

The device is manufactured in planar technology with "base island" layout. The resulting transistor shows exceptional high gain performance coupled with very low saturation voltage.

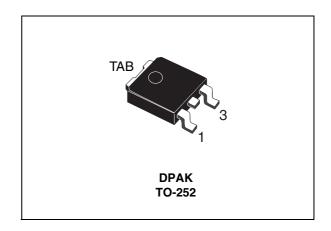


Figure 1. Internal schematic diagram

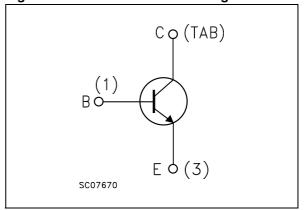


Table 1. Device summary

Order code	Marking	Package	Packaging
MJD31CT4	MJD31C	DPAK	Tape and reel

Electrical ratings MJD31C

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	3	Α
I _{CM}	Collector peak current	5	Α
I _B	Base current	1	Α
P _{TOT}	Total dissipation at $T_c = 25$ °C	15	W
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 max	8.3	°C/W
R _{thJPCB} (1)	Thermal resistance junction-pcb max	50	°C/W

^{1.} When mounted on FR-4 board of 1 inch², 2 oz Cu.

2 Electrical characteristics

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

Table 4. Electrical characteristics

Symbol	Parameter	Test conditions		Min.	Тур.	Max.	Unit
I _{CES}	Collector cut-off current (V _{BE} = 0)	V _{CE} = 100 V			-	20	μΑ
I _{CEO}	Collector cut-off current (I _B = 0)	V _{CB} = 60 V			-	50	μΑ
I _{EBO}	Emitter cut-off current (I _C = 0)	V _{EB} = 5 V			-	0.1	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 = 375 mA		-	1.2	٧
V _{BE(on)} (1)	Base-emitter on voltage	I _C = 3 A	V _{CE} = 4 V		ı	1.8	V
h _{FE}	DC current gain	$I_C = 1 A$ $I_C = 3 A$	$V_{CE} = 4 V$ $V_{CE} = 4 V$	25 10	-	50	

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

2.1 Electrical characteristic (curves)

Figure 2. Safe operating area

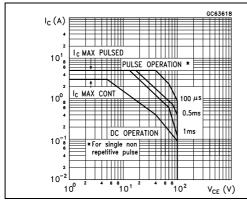
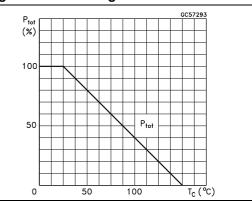


Figure 3. Derating curve



Electrical characteristics MJD31C

Figure 4. DC current gain (V_{CE} = 2 V) Figure 5. DC current gain (V_{CE} = 4 V)

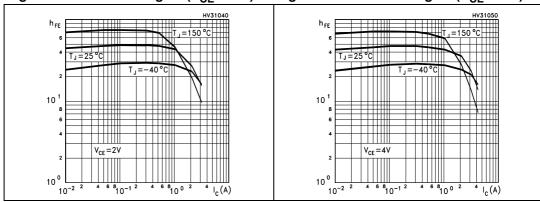


Figure 6. **Collector-emitter saturation** voltage

Figure 7. **Base-emitter saturation** voltage

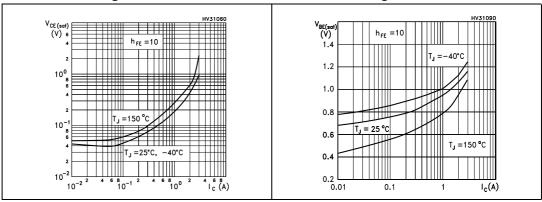
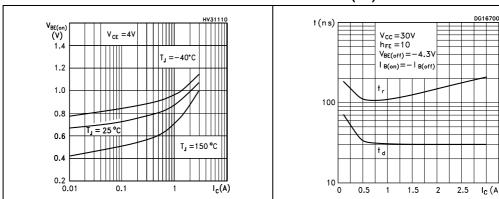


Figure 8. Base-emitter on voltage

Figure 9. Resistive load switching time

I_C(A)



t (n s)

V_{CC} = 30V V_{BE(off)} = -4.3V

h_{FE} = 10 | g(on) = -1 g(off)

1000

100

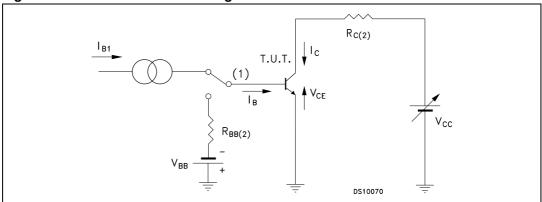
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0 0.5 1 1.5 2 2.5 I_C (A)

Figure 10. Resistive load switching time (off)

2.2 Test circuits

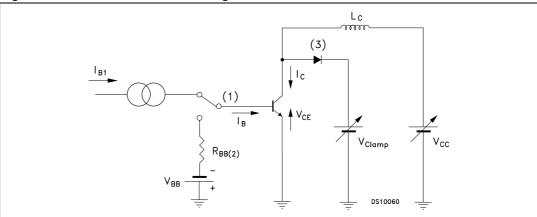
Figure 11. Resistive load switching test circuit



- 1. Fast electronic switch
- 2. Non-inductive resistor

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Figure 12. Inductive load switching test circuit



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

3 Package mechanical data

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Table 5. DPAK (TO-252) mechanical data

Dim	mm				
Dim.	Min.	Тур.	Max.		
Α	2.20		2.40		
A1	0.90		1.10		
A2	0.03		0.23		
b	0.64		0.90		
b4	5.20		5.40		
С	0.45		0.60		
c2	0.48		0.60		
D	6.00		6.20		
D1		5.10			
Е	6.40		6.60		
E1		4.70			
е		2.28			
e1	4.40		4.60		
Н	9.35		10.10		
L	1		1.50		
L1		2.80			
L2		0.80			
L4	0.60		1		
R		0.20			
V2	0°		8°		

THERMAL PAD

E1

D1

R

CAUGE PLANE

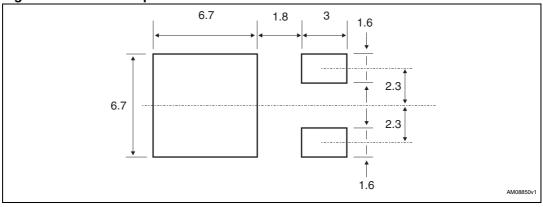
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Figure 13. DPAK (TO-252) drawing

Table 6. DPAK (TO-252) tape and reel mechanical data

Таре				Reel		
Dim.	mm		Dim.	mm		
Dim.	Min.	Max.	Dilli.	Min.	Max.	
A0	6.8	7	Α		330	
В0	10.4	10.6	В	1.5		
B1		12.1	С	12.8	13.2	
D	1.5	1.6	D	20.2		
D1	1.5		G	16.4	18.4	
Е	1.65	1.85	N	50		
F	7.4	7.6	Т		22.4	
K0	2.55	2.75				
P0	3.9	4.1		Base qty.	2500	
P1	7.9	8.1		Bulk qty.	2500	
P2	1.9	2.1				
R	40					
Т	0.25	0.35				
W	15.7	16.3				

Figure 14. DPAK footprint^(a)



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a. All dimensions are in millimeters

Figure 15. Tape for DPAK (TO-252)

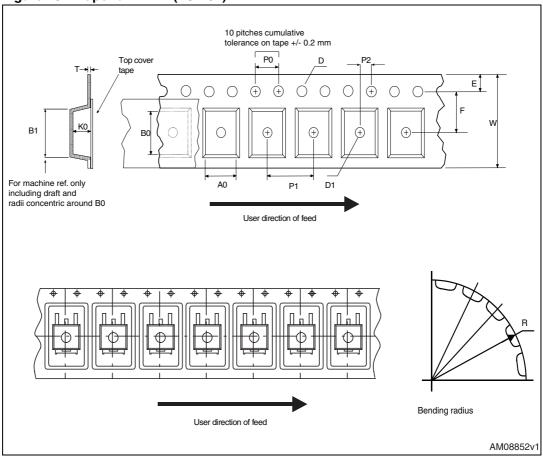
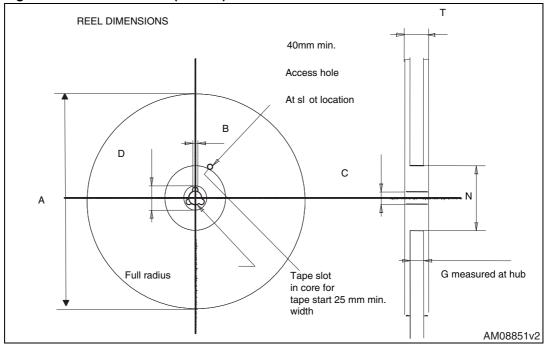


Figure 16. Reel for DPAK (TO-252)



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Revision history MJD31C

4 Revision history

Table 7. Document revision history

Date	Revision	Changes
01-Dec-2000	1	Initial release.
20-Apr-2007	2	Added new graphics.
09-Nov-2009	3	Updated package mechanical data.
14-Jan-2010	4	Modified Table 3 on page 2.
19-Jun-2012	5	Updated: mechanical data

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