

Automotive-grade low voltage NPN power transistor

Features

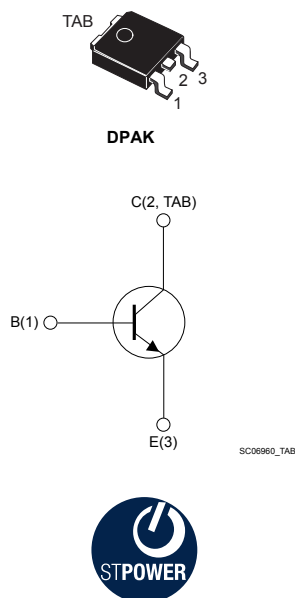
- AEC-Q101 qualified 
- Surface-mounting TO-252 power package in tape and reel
- Complementary to the PNP type [MJD32CT4-A](#)

Application

- General purpose linear and switching equipment

Description

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



Product status link

[MJD31CT4-A](#)

Product summary

Order code	MJD31CT4-A
Marking	MJD31C
Package	DPAK
Packing	Tape and reel

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base voltage ($I_E = 0$ A)	100	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$ A)	100	V
V_{EBO}	Collector-base voltage ($I_C = 0$ A)	5	V
I_C	Collector current	3	A
I_{CM}	Collector peak current	5	A
I_B	Base current	1	A
P_{TOT}	Total power dissipation at $T_C = 25$ °C	15	W
T_{stg}	Storage temperature range	-65 to 150	°C
T_J	Operating junction temperature range		°C

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	8.3	°C/W
$R_{thJA}^{(1)}$	Thermal resistance, junction-to-ambient	50	°C/W

1. When mounted on a standard 1 inch² area of FR-4 PCB with 2-oz copper.

2 Electrical characteristics

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

Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current	$V_{CE} = 100\text{ V}, V_{BE} = 0\text{ V}$		-	20	μA
I_{CEO}	Collector cut-off current	$V_{CB} = 60\text{ V}, I_B = 0\text{ V}$		-	50	μA
I_{EBO}	Emitter cut-off current	$V_{EB} = 5\text{ V}, I_C = 0\text{ A}$		-	0.1	mA
$V_{CEO(sus)}^{(1)}$	Collector-emitter sustaining voltage	$I_C = 30\text{ V}, I_B = 0\text{ A}$	100	-		V
$V_{CE(sat)}^{(1)}$	Collector-emitter saturation voltage	$I_C = 3\text{ A}, I_B = 375\text{ mA}$		-	1.2	V
$V_{BE(on)}^{(1)}$	Base-emitter on voltage	$I_C = 3\text{ A}, V_{CE} = 4\text{ V}$		-	1.8	V
h_{FE}	DC current gain	$I_C = 1\text{ A}, V_{CE} = 4\text{ V}$	25	-		
		$I_C = 3\text{ A}, V_{CE} = 4\text{ V}$	10	-	50	

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

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

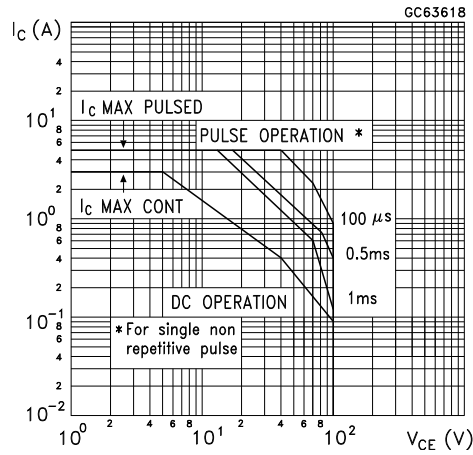


Figure 2. Derating curves

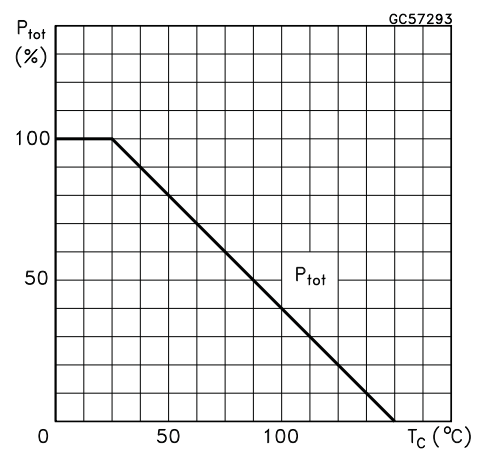


Figure 3. DC current gain ($V_{CE} = 2$ V)

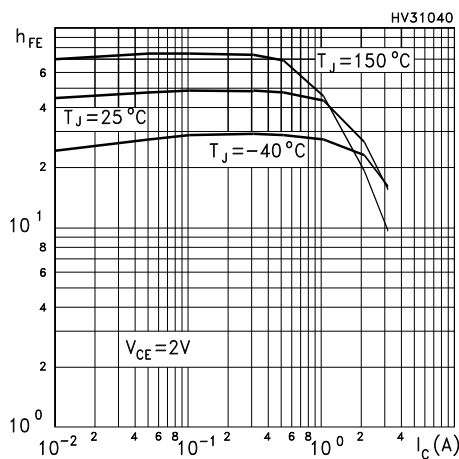


Figure 4. DC current gain ($V_{CE} = 4$ V)

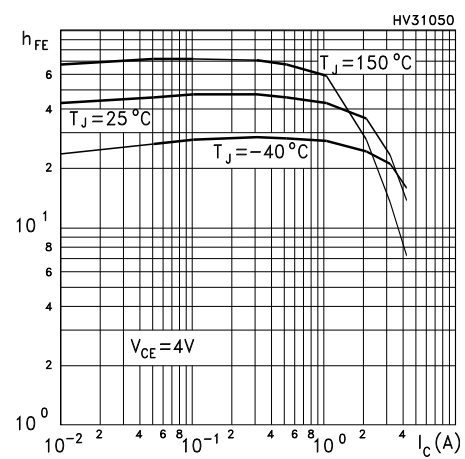


Figure 5. Collector-emitter saturation voltage

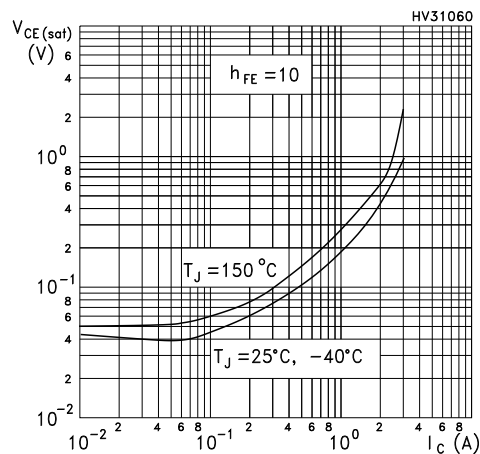


Figure 6. Base-emitter saturation voltage

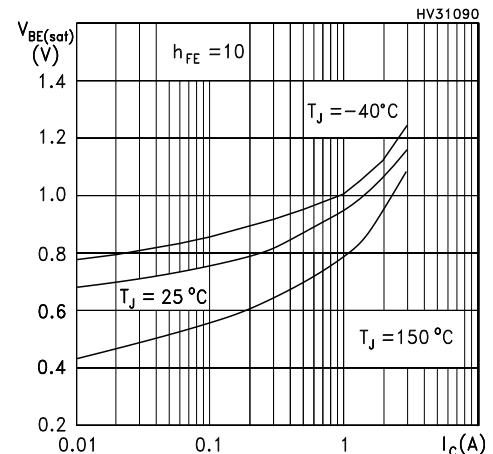


Figure 7. Base-emitter on voltage

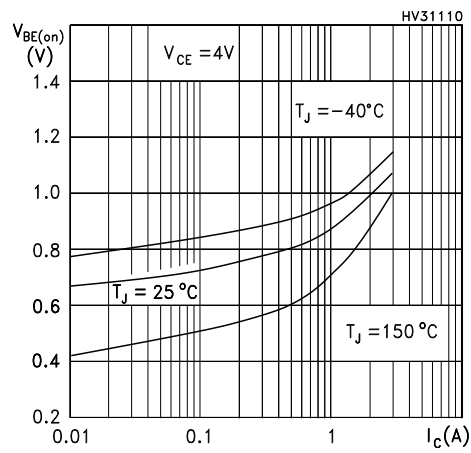


Figure 8. Resistive load switching time (on)

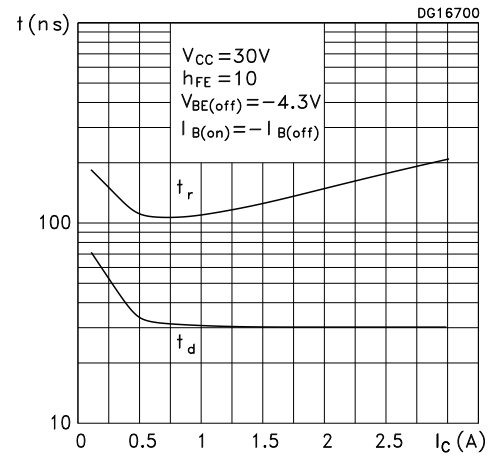
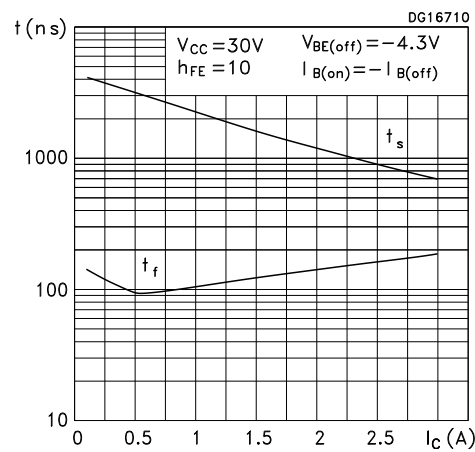


Figure 9. Resistive load switching time (off)

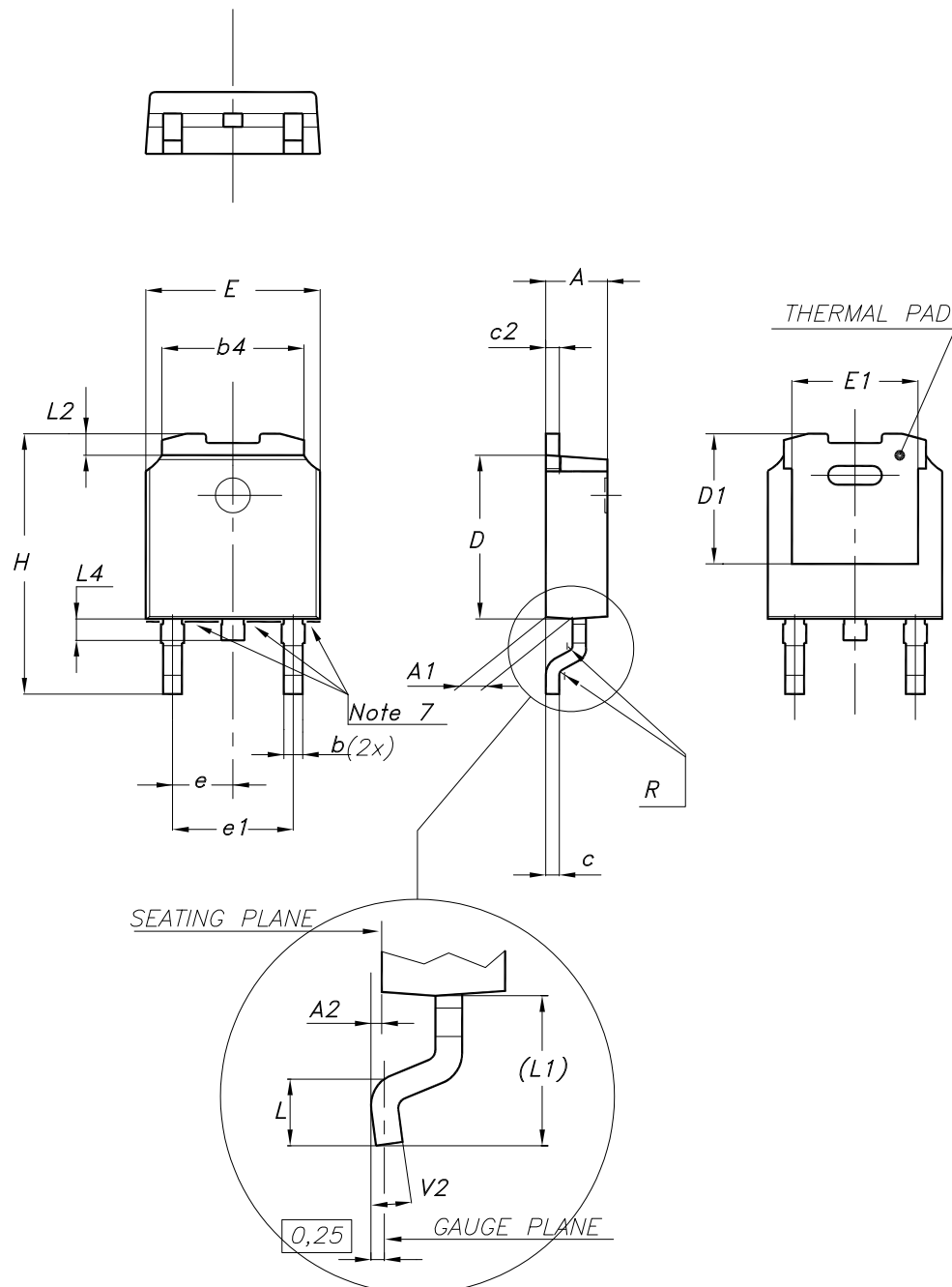


3 Package information

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.

3.1 DPAK (TO-252) package information

Figure 10. DPAK (TO-252) type A package outline

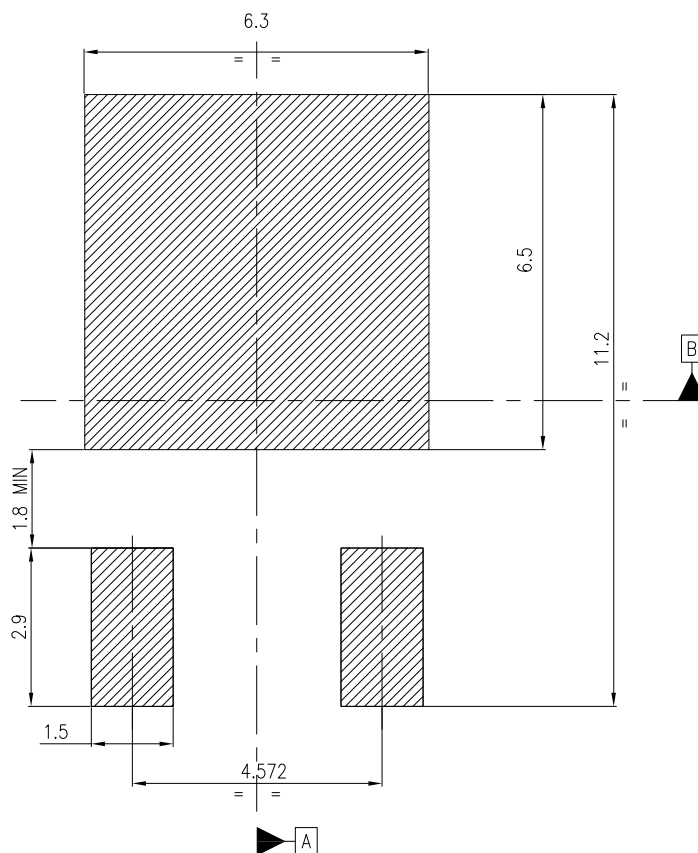


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Table 4. DPAK (TO-252) type A mechanical data

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	4.95	5.10	5.25
E	6.40		6.60
E1	4.60	4.70	4.80
e	2.159	2.286	2.413
e1	4.445	4.572	4.699
H	9.35		10.10
L	1.00		1.50
(L1)	2.60	2.80	3.00
L2	0.65	0.80	0.95
L4	0.60		1.00
R		0.20	
V2	0°		8°

Figure 11. DPAK (TO-252) recommended footprint (dimensions are in mm)



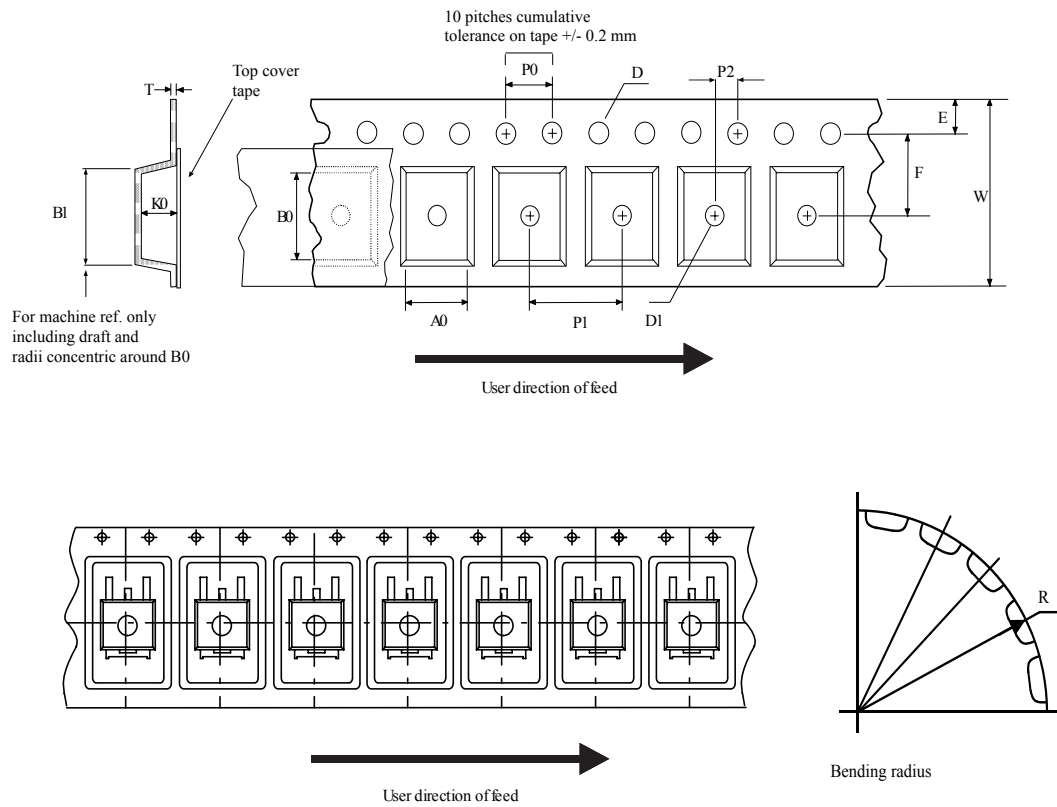
Notes:

- 1) This footprint is able to ensure insulation up to 630 Vrms (according to CEI IEC 664-1)
- 2) The device must be positioned within $\boxed{\Phi 0.05 \text{ A B}}$

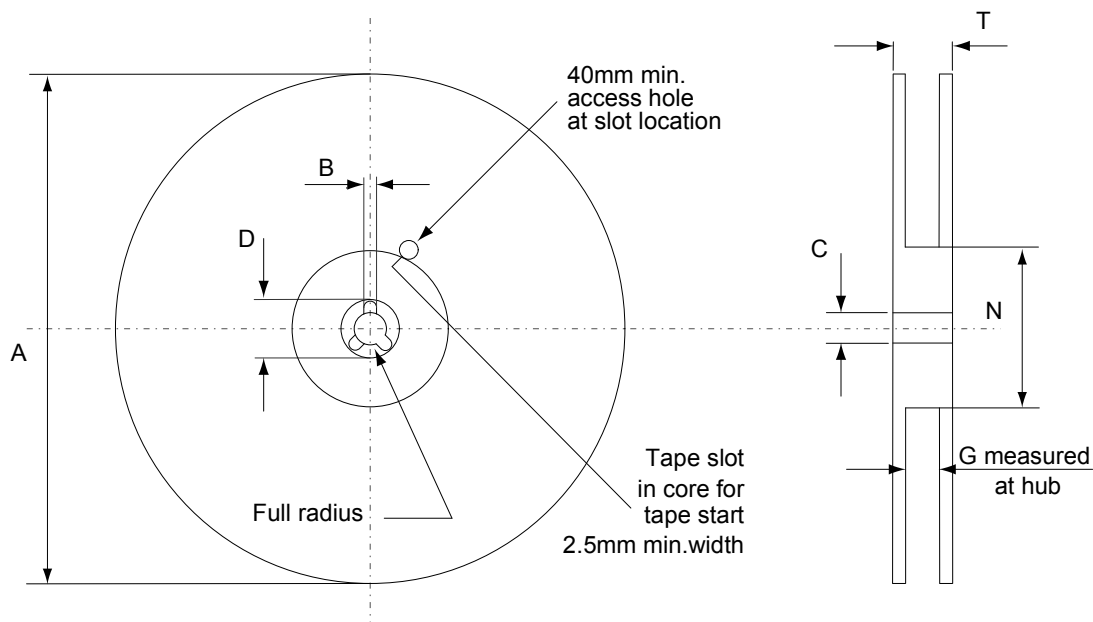
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3.2 DPAK (TO-252) packing information

Figure 12. DPAK (TO-252) tape outline



AM08852v1

Figure 13. DPAK (TO-252) reel outline


AM06038v1

Table 5. DPAK (TO-252) tape and reel mechanical data

Tape			Reel		
Dim.	mm		Dim.	mm	
	Min.	Max.		Min.	Max.
A0	6.8	7	A		330
B0	10.4	10.6	B	1.5	
B1		12.1	C	12.8	13.2
D	1.5	1.6	D	20.2	
D1	1.5		G	16.4	18.4
E	1.65	1.85	N	50	
F	7.4	7.6	T		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				
T	0.25	0.35			
W	15.7	16.3			

Revision history

Table 6. Document revision history

Date	Revision	Changes
24-Apr-2007	1	Initial release.
09-Nov-2009	2	Updated package mechanical data.
14-Jan-2010	3	Modified <i>Table 3</i> on <i>page 2</i> .
19-Jun-2012	4	Modified: mechanical data
04-Jul-2024	5	Updated Features . Removed section test circuits. Updated Section 3.1: DPAK (TO-252) package information. Minor text changes.

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