

High voltage NPN Darlington transistor for ignition coil

Features

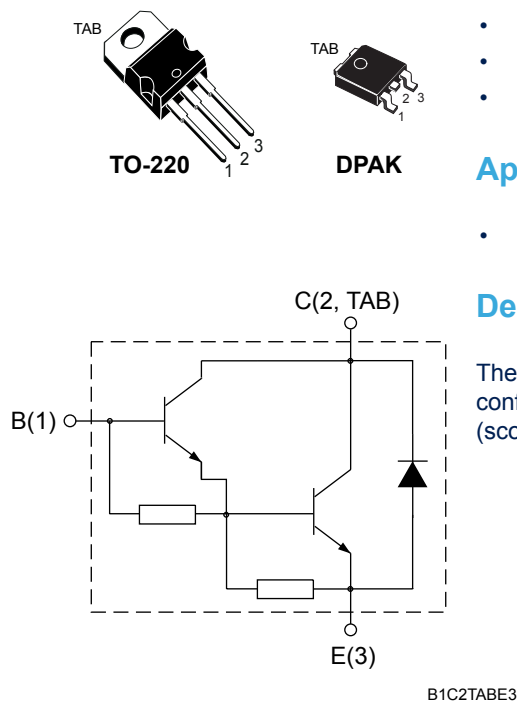
- High voltage special Darlington structure
- Very rugged Bipolar technology
- High DC current gain

Application

- High ruggedness electronic ignition for small engines

Description

The device is a high voltage NPN transistor in monolithic special Darlington configuration, designed for applications such as electronic ignition for small engines (scooters, lawnmowers, chainsaws).



Product status links

[ST901T](#)

[STD901T](#)

Product summary

Order code	ST901T
Marking	901T
Package	TO-220
Packing	Tube
Order code	STD901T
Marking	D901T
Package	DPAK
Packing	Tape and reel

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage ($V_{BE} = 0$)	500	V
V_{CEO}	Collector-emitter voltage ($I_B = 0$)	350	V
V_{EBO}	Emitter-base voltage ($I_C = 0$)	5	V
I_C	Collector current	4	A
I_{CM}	Collector peak current ($t_p < 5$ ms)	8	A
I_B	Base current	0.5	A
I_{BM}	Base peak current ($t_p < 5$ ms)	2.5	A
P_{TOT}	Total power dissipation at $T_C = 25$ °C for ST901T	100	W
	Total power dissipation at $T_C = 25$ °C for STD901T	35	
T_{stg}	Operating junction temperature range	-65 to 150	°C
T_J	Storage temperature range		°C

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case for ST901T	1.25	°C/W
	Thermal resistance, junction-to-case for STD901T	3.57	

2 Electrical characteristics

$T_C = 25\text{ °C}$ unless otherwise specified.

Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector cut-off current	$V_{BE} = 0\text{ V}, V_{CE} = 500\text{ V}$			100	μA
		$V_{BE} = 0\text{ V}, V_{CE} = 500\text{ V}, T_C = 125\text{ °C}$ ⁽¹⁾			500	
I_{CEO}	Collector cut-off current	$I_B = 0\text{ A}, V_{CE} = 350\text{ V}$			100	μA
		$I_B = 0\text{ A}, V_{CE} = 350\text{ V}, T_C = 125\text{ °C}$ ⁽¹⁾			500	
I_{EBO}	Emitter cut-off current	$I_C = 0\text{ A}, V_{EB} = 5\text{ V}$			10	μA
$V_{CEO(sus)}$ ⁽²⁾	Collector-emitter sustaining voltage	$I_B = 0\text{ A}, I_C = 10\text{ mA}$	350			V
$V_{CE(sat)}$ ⁽²⁾	Collector-emitter saturation voltage	$I_C = 2\text{ A}, I_B = 20\text{ mA}$			2	V
$V_{BE(sat)}$ ⁽²⁾	Base-emitter saturation voltage	$I_C = 2\text{ A}, I_B = 20\text{ mA}$			1.8	V
h_{FE}	DC current gain	$I_C = 2\text{ A}, V_{CE} = 2\text{ V}$	1800		3800	
		$I_C = 4\text{ A}, V_{CE} = 2\text{ V}$	500			
	Functional test	$V_{CC} = 24\text{ V}, L = 4\text{ mH}, V_{clamp} = 350\text{ V}$	4			A
t_s	Storage time	$V_{CC} = 12\text{ V}, L = 4\text{ mH}, I_C = 2\text{ A},$		15		μs
t_f	Fall time	$V_{clamp} = 250\text{ V}, I_{B(on)} = 20\text{ mA}, V_{BE(off)} = -3\text{ V}$		1.5		μs

1. Specified by design, not tested in production.

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

2.1 Electrical characteristics (curves)

Figure 1. Collector-emitter saturation voltage ($h_{FE} = 100$)

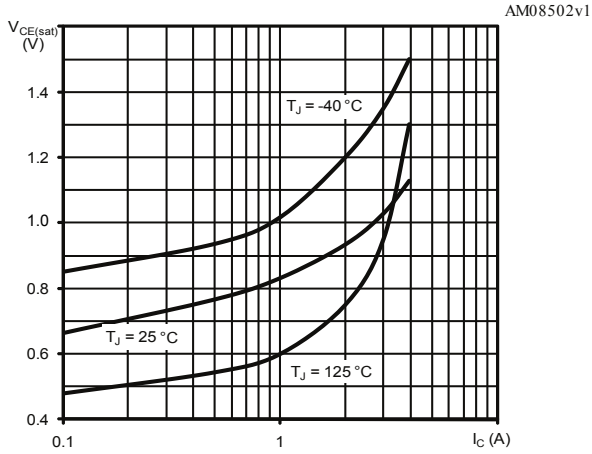


Figure 2. Base-emitter saturation voltage ($h_{FE} = 100$)

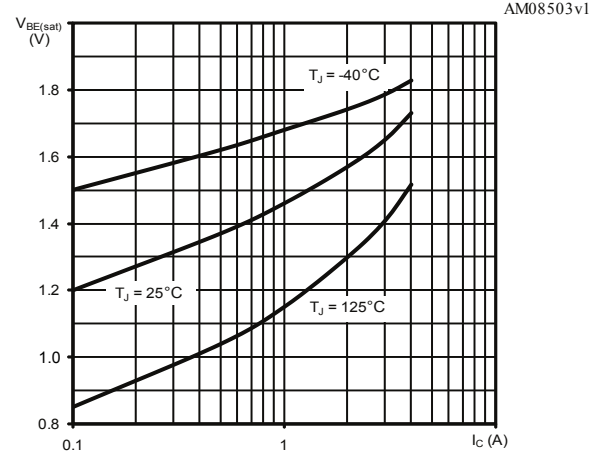


Figure 3. DC current gain ($V_{CE} = 2\text{ V}$)

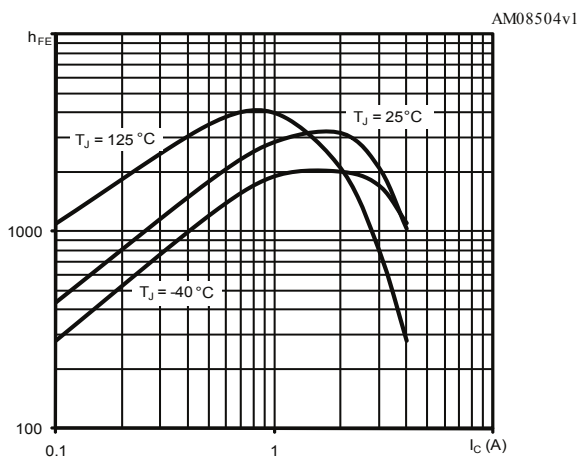
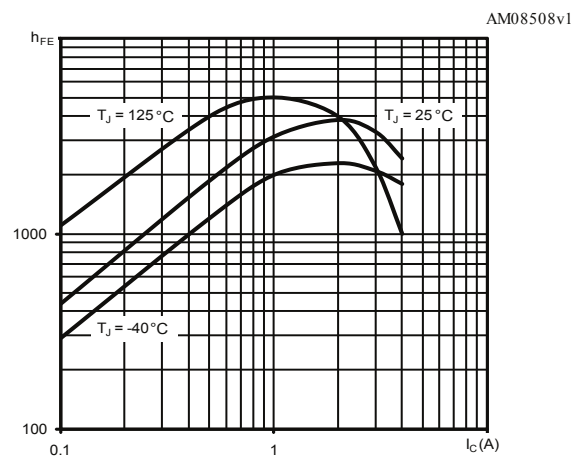


Figure 4. DC current gain ($V_{CE} = 5\text{ V}$)

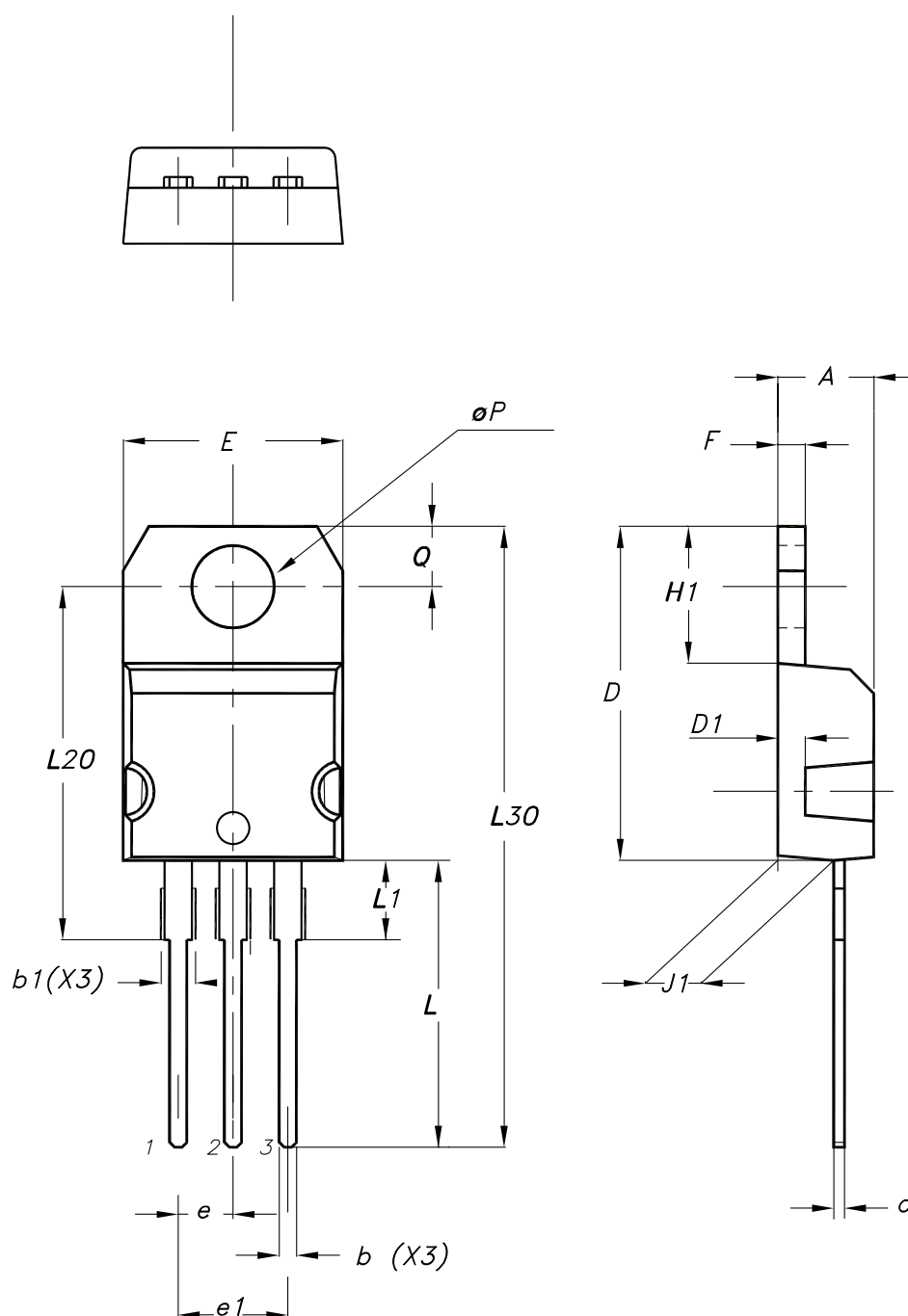


3 Package information

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 TO-220 type A package information

Figure 5. TO-220 type A package outline



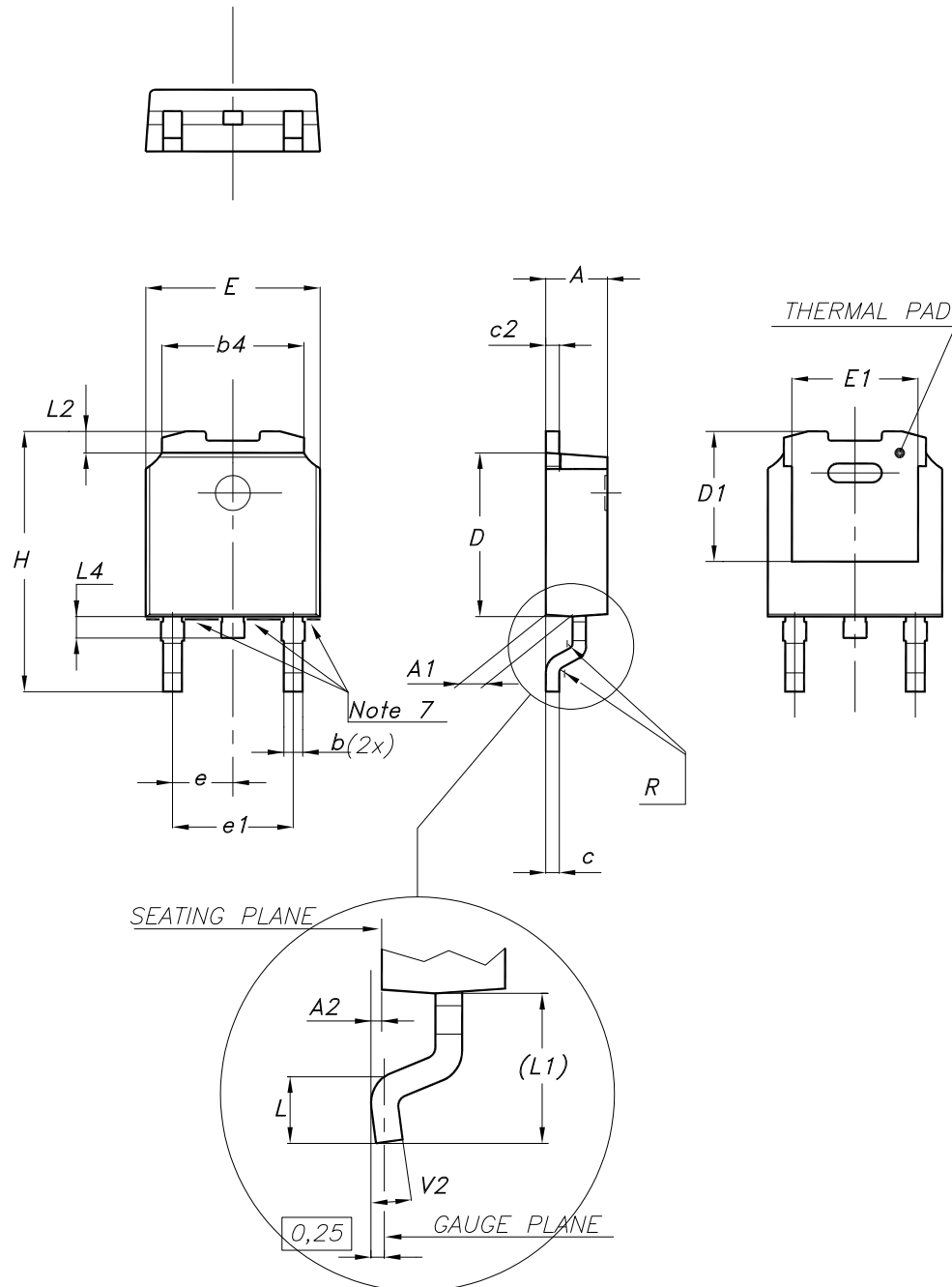
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Table 4. TO-220 type A package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.55
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10.00		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13.00		14.00
L1	3.50		3.93
L20		16.40	
L30		28.90	
øP	3.75		3.85
Q	2.65		2.95
Slug flatness		0.03	0.10

3.2 DPAK (TO-252) type A package information

Figure 6. DPAK (TO-252) type A package outline



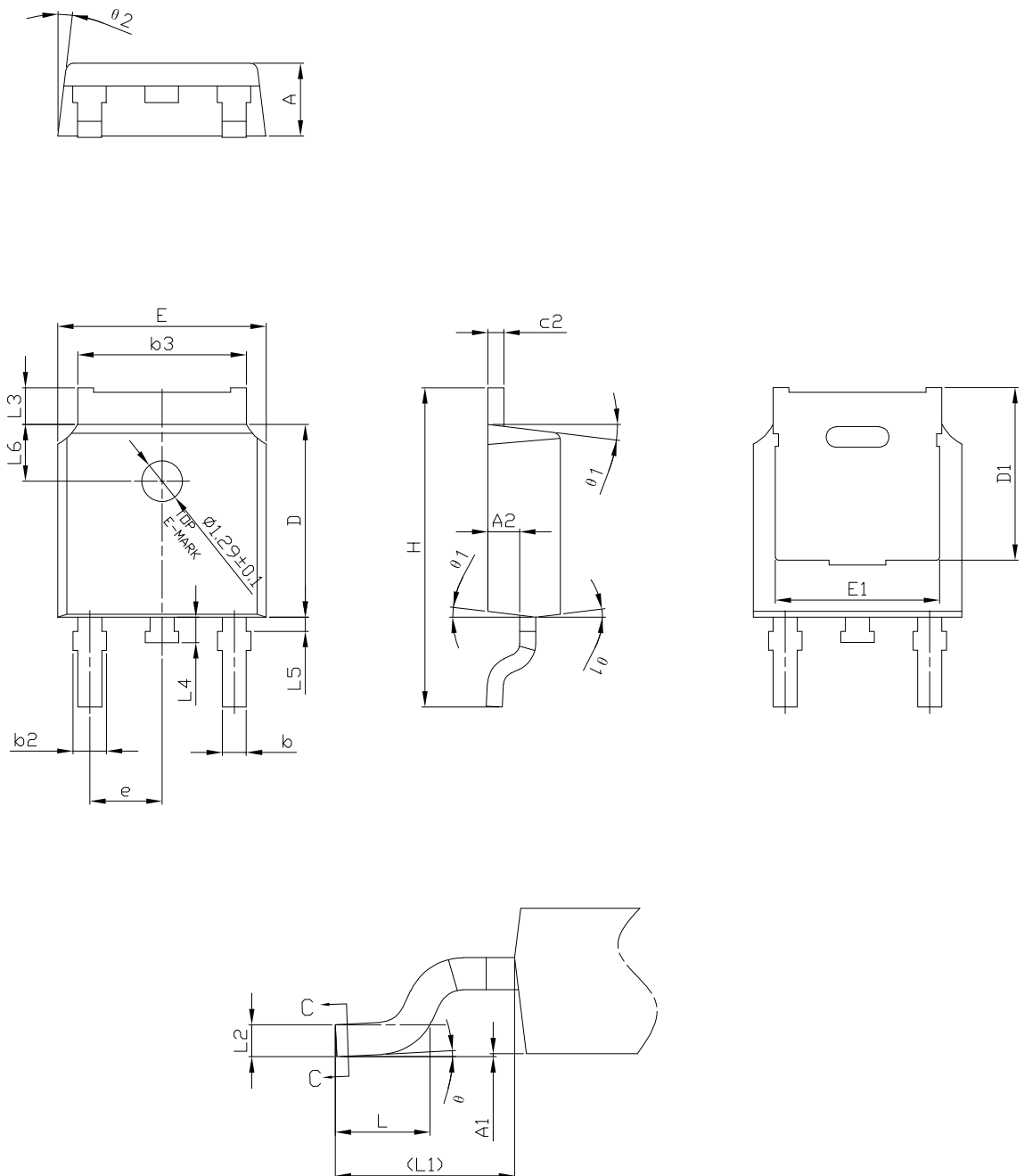
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Table 5. DPAK (TO-252) type A mechanical data

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°

3.3 DPAK (TO-252) type C3 package information

Figure 7. DPAK (TO-252) type C3 package outline

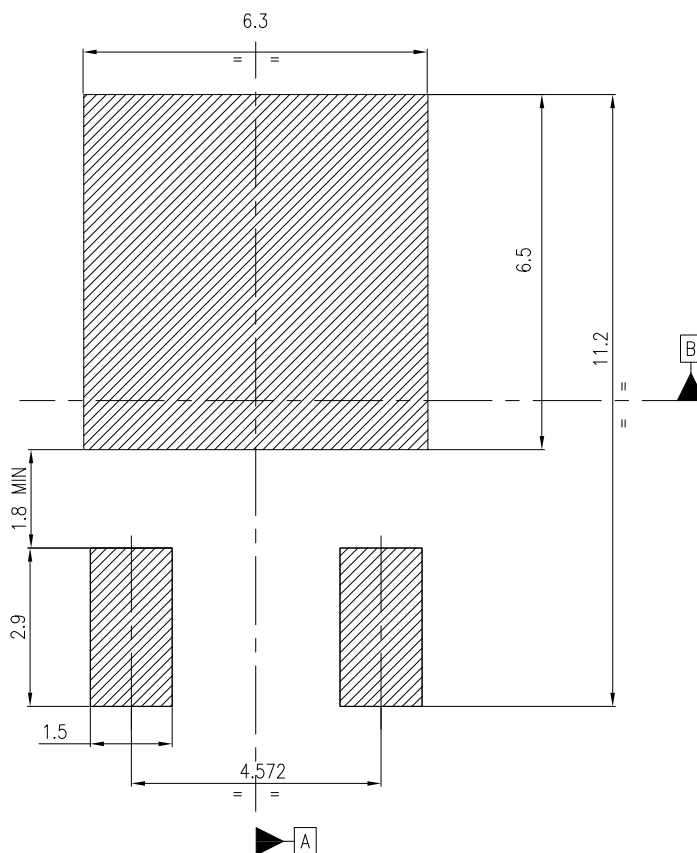


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Table 6. DPAK (TO-252) type C3 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	2.20	2.30	2.38
A1	0.00		0.10
A2	0.90	1.01	1.10
b	0.72		0.85
b2	0.72		1.10
b3	5.13	5.33	5.46
c	0.47		0.60
c2	0.47		0.60
D	6.00	6.10	6.20
D1	5.20	5.45	5.70
E	6.50	6.60	6.70
E1	5.00	5.20	5.40
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.51 BSC		
L3	0.90		1.25
L4	0.60	0.80	1.00
L5	0.15		0.75
L6	1.80 REF		
θ	0°		8°
θ1	5°	7°	9°
θ2	5°	7°	9°

Figure 8. 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 $\Phi 0.05$ A B

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Revision history

Table 7. Document revision history

Date	Version	Changes
14-Oct-2004	1	First release.
15-Jan-2005	2	DC current gain range has been modified.
25-Feb-2005	3	Added four drawings on page 3.
13-Oct-2005	4	Updated package mechanical data
11-Feb-2011	5	Inserted new order code STD901T
18-May-2023	6	Updated Section 3.1 TO-220 type A package information and Section 3.2 DPAK (TO-252) type A package information . Added Section 3.3 DPAK (TO-252) type C3 package information . Minor text changes.

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