

# 1 Electrical ratings

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

**Table 1. Electrical characteristics**

Symbol	Parameter	Value	Unit
$V_{\text{CBO}}$	Collector-base voltage ( $I_{\text{E}} = 0\text{ A}$ )	1200	V
$V_{\text{CES}}$	Collector-emitter voltage ( $V_{\text{BE}} = 0\text{ V}$ )	1200	V
$V_{\text{CEO}}$	Collector-emitter voltage ( $I_{\text{B}} = 0\text{ A}$ )	550	V
$V_{\text{EBO}}$	Collector-base voltage ( $I_{\text{C}} = 0\text{ A}$ )	9	V
$I_{\text{C}}$	Collector current	5	A
$I_{\text{CM}}$	Collector peak current ( $t_{\text{p}} < 5\text{ ms}$ )	8	A
$I_{\text{B}}$	Base current	2	A
$I_{\text{BM}}$	Base peak current ( $t_{\text{p}} < 5\text{ ms}$ )	4	A
$P_{\text{TOT}}$	Total power dissipation at $T_{\text{C}} = 25\text{ °C}$	100	W
$T_{\text{stg}}$	Storage temperature range	-65 to 150	°C
$T_{\text{J}}$	Operating junction temperature range		°C

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{\text{thJC}}$	Thermal resistance, junction-to-case	1.25	°C/W
$R_{\text{thJA}}$	Thermal resistance, junction-to-ambient	62.5	°C/W

## 2 Electrical characteristics

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

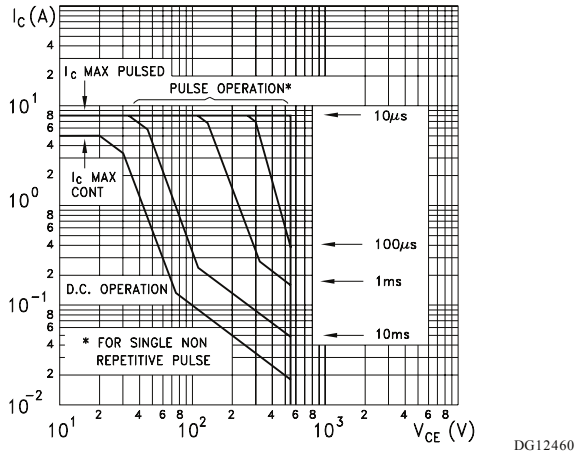
**Table 3. Electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{\text{CES}}$	Collector cut-off current	$V_{\text{CE}} = 1200 \text{ V}, V_{\text{BE}} = 0 \text{ V}$			100	$\mu\text{A}$
$I_{\text{CEO}}$	Emitter cut-off current	$V_{\text{CE}} = 550 \text{ V}$			100	$\mu\text{A}$
$V_{\text{CEO(sus)}}^{(1)}$	Collector-emitter sustaining voltage	$I_{\text{C}} = 100 \text{ mA}, I_{\text{B}} = 0 \text{ A}$	550			V
$V_{\text{EBO}}$	Emitter-base voltage	$I_{\text{C}} = 0 \text{ A}, I_{\text{E}} = 10 \text{ mA}$	9			V
$V_{\text{CE(sat)}}^{(1)}$	Collector-emitter saturation voltage	$I_{\text{C}} = 1 \text{ A}, I_{\text{B}} = 0.2 \text{ A}$			0.5	V
		$I_{\text{C}} = 2 \text{ A}, I_{\text{B}} = 0.4 \text{ A}$			0.7	
		$I_{\text{C}} = 3 \text{ A}, I_{\text{B}} = 1 \text{ A}$			1.5	
$V_{\text{BE(sat)}}^{(1)}$	Base-emitter saturation voltage	$I_{\text{C}} = 2 \text{ A}, I_{\text{B}} = 0.4 \text{ A}$			1.5	V
		$I_{\text{C}} = 3 \text{ A}, I_{\text{B}} = 1 \text{ A}$			1.5	
$h_{\text{FE}}^{(1)}$	DC current gain	$I_{\text{C}} = 1 \text{ mA}, V_{\text{CE}} = 5 \text{ V}$	10			
		$I_{\text{C}} = 10 \text{ mA}, V_{\text{CE}} = 5 \text{ V}$	10			
		$I_{\text{C}} = 0.8 \text{ A}, V_{\text{CE}} = 3 \text{ V}$	14		32	
		$I_{\text{C}} = 2 \text{ A}, V_{\text{CE}} = 5 \text{ V}$	9		28	
	Resistive load					
$t_{\text{on}}$	Turn-on time	$I_{\text{C}} = 2 \text{ A}, I_{\text{B1}} = 0.4 \text{ A}, I_{\text{B2}} = -0.8 \text{ A},$ $t_{\text{p}} = 30 \mu\text{s}, V_{\text{CC}} = 150 \text{ V}$ (see Figure 11. Resistive load switching test circuit)			0.5	$\mu\text{s}$
$t_{\text{s}}$	Storage time			2.5	3.0	
$t_{\text{f}}$	Fall time			0.2	0.3	
$E_{\text{AR}}$	Repetitive avalanche energy	$L = 2 \text{ mH}, C = 1.8 \text{ nF}, V_{\text{CC}} = 50 \text{ V},$ $V_{\text{BE}} = -5 \text{ V}$ (see Figure 12. Energy rating test circuit)	6			mJ

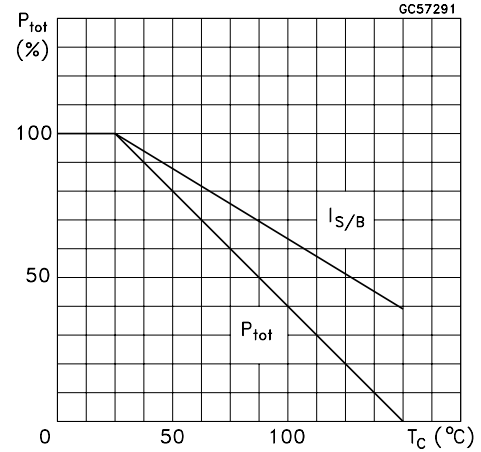
1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

## 2.1 Electrical characteristics (curves)

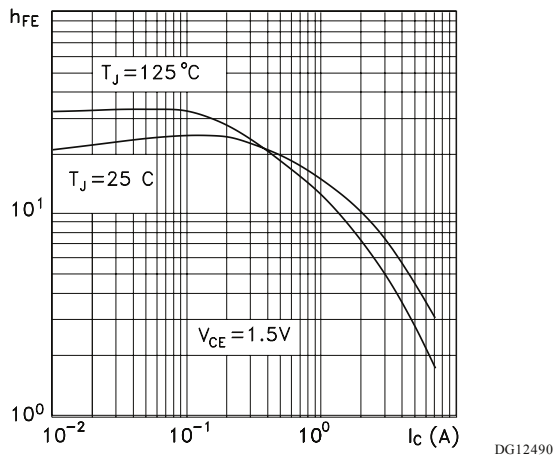
**Figure 1. Safe operating area**



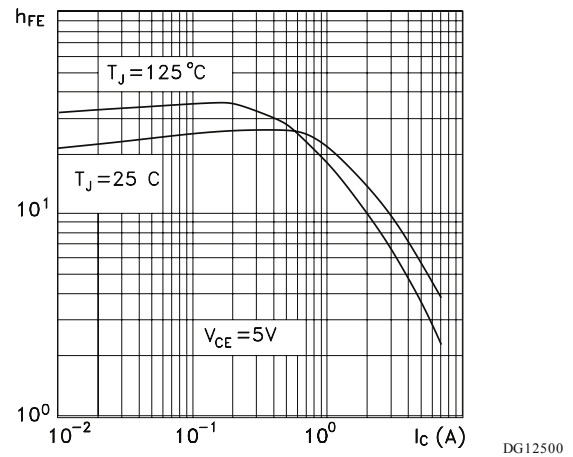
**Figure 2. Derating curve**



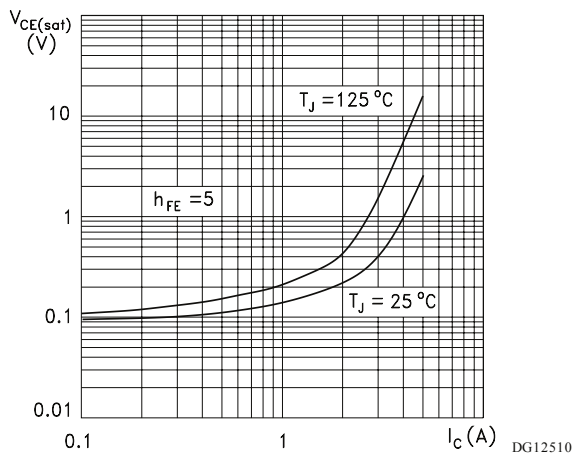
**Figure 3. DC current gain at  $V_{CE} = 1.5V$**



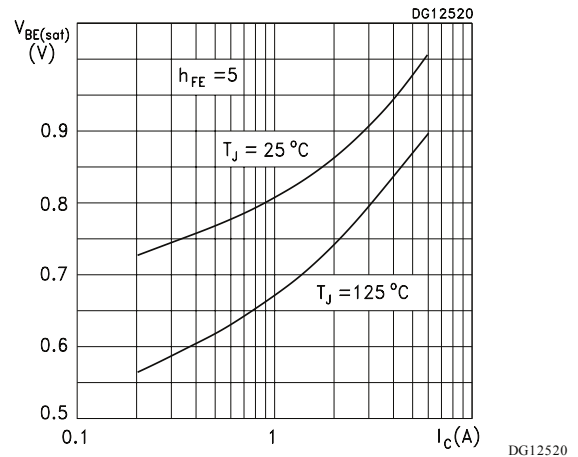
**Figure 4. DC current gain at  $V_{CE} = 5V$**



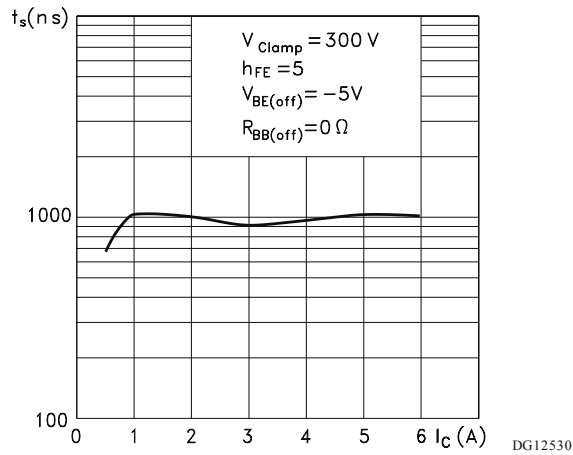
**Figure 5. Collector emitter saturation voltage**



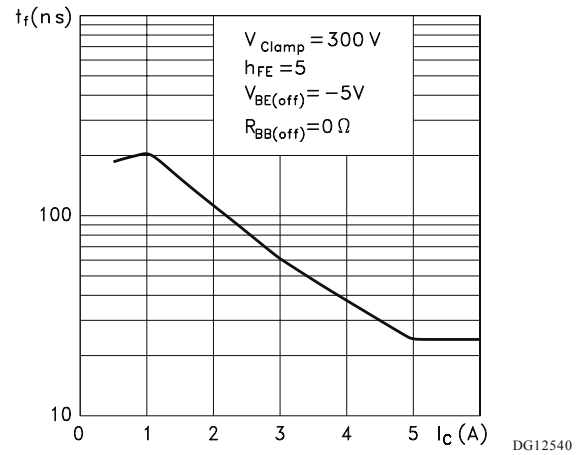
**Figure 6. Base emitter saturation voltage**



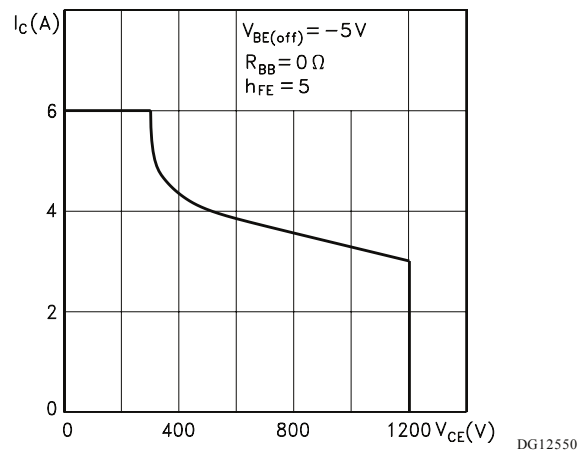
**Figure 7. Inductive load storage time**



**Figure 8. Inductive load fall time**

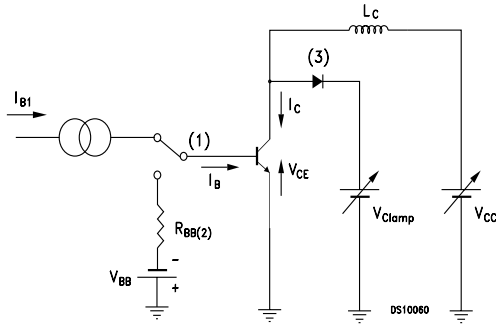


**Figure 9. Reverse biased safe operating area**

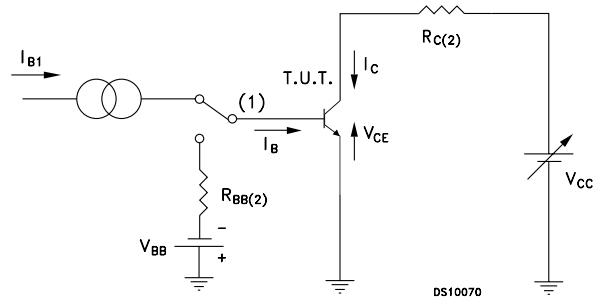


### 3 Test circuits

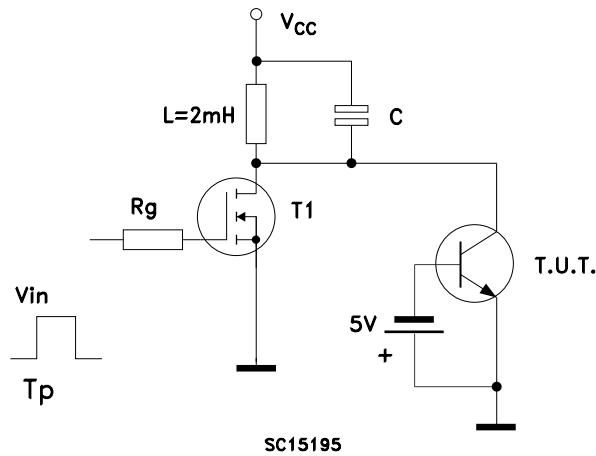
**Figure 10. Inductive load switching test circuit**



**Figure 11. Resistive load switching test circuit**



**Figure 12. Energy rating test circuit**

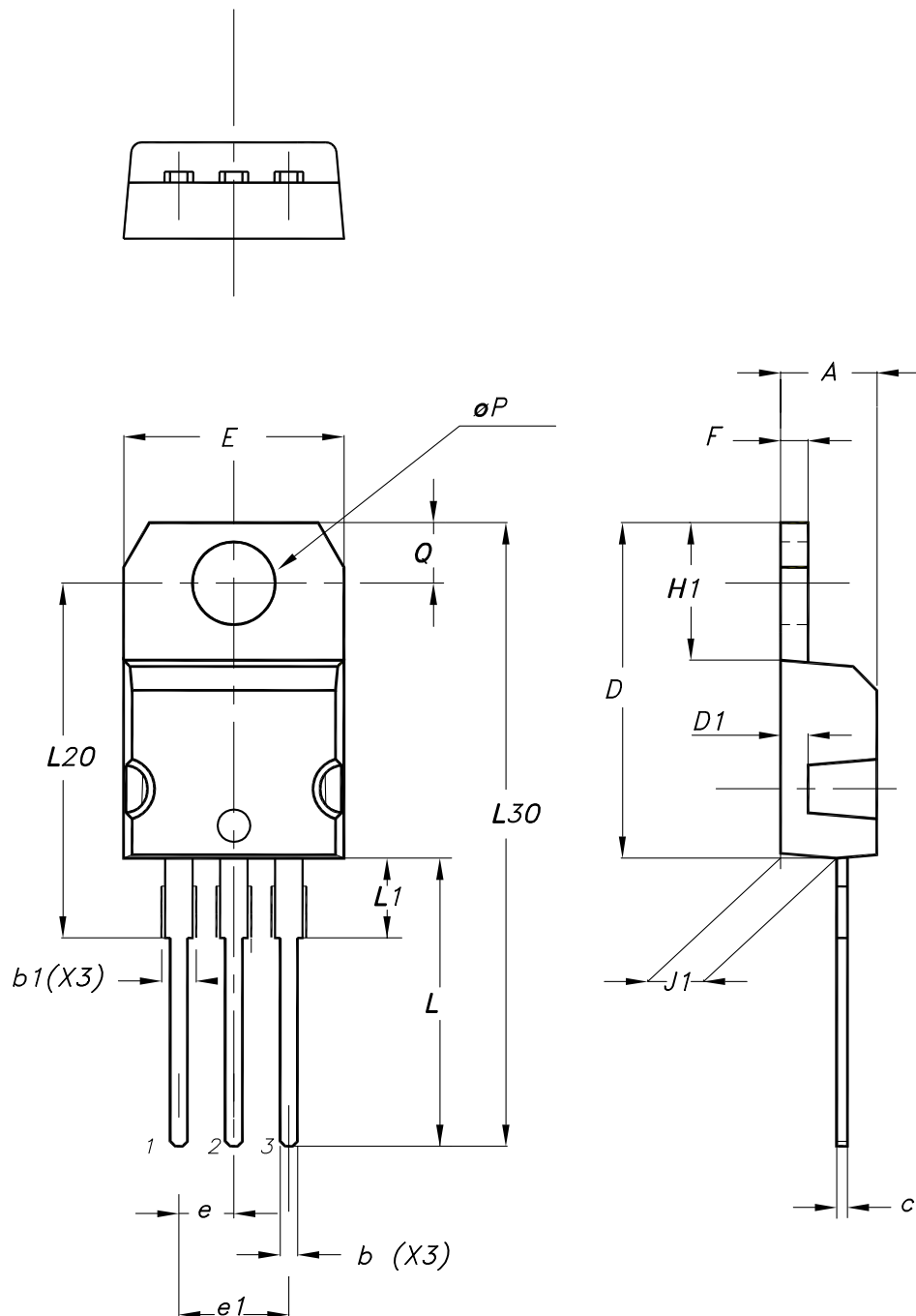


## 4 Package information

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](http://www.st.com). ECOPACK is an ST trademark.

### 4.1 TO-220 type A package information

Figure 13. TO-220 type A package outline



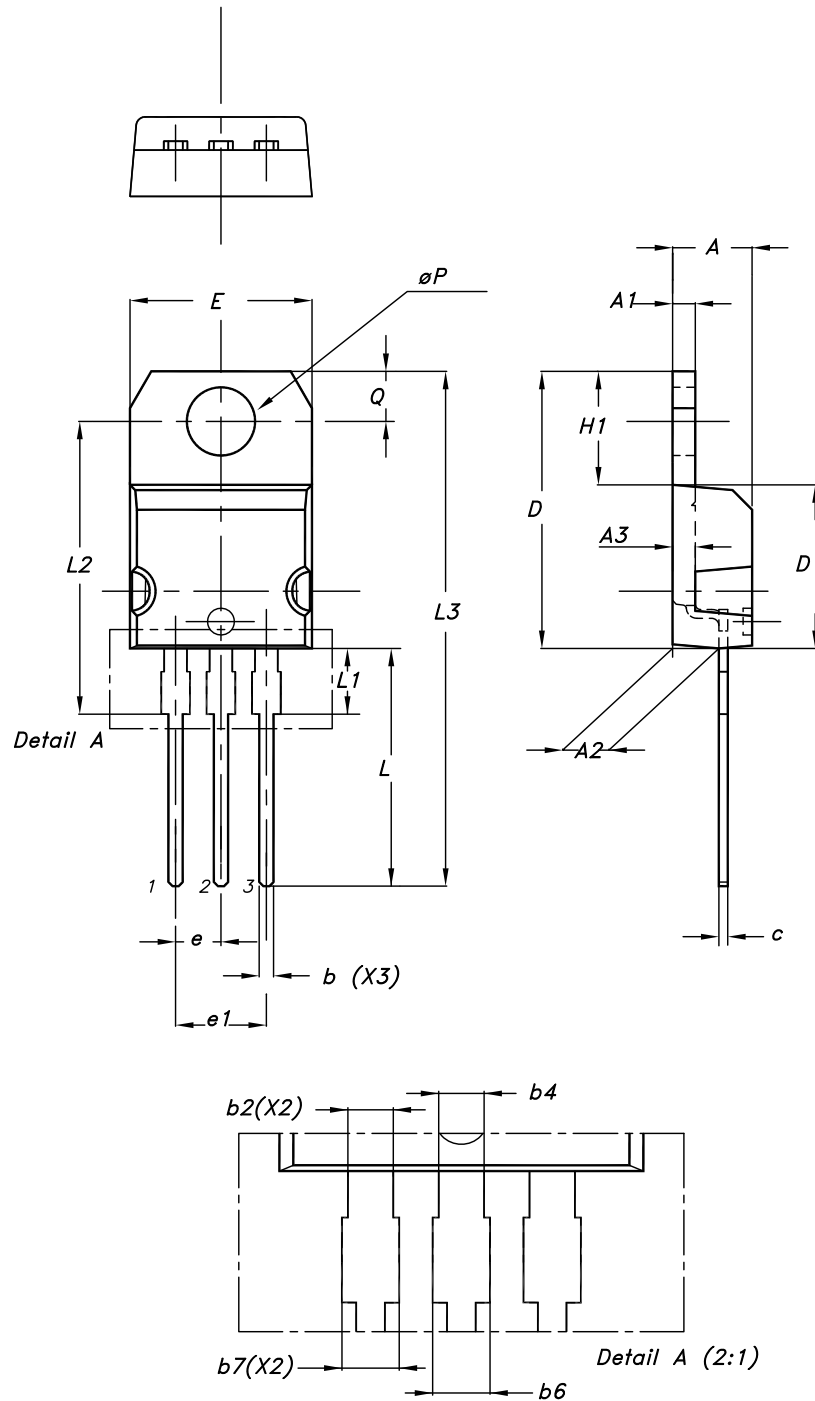
0015988\_typeA\_Rev\_23

**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

## 4.2 TO-220 type H package information

Figure 14. TO-220 type H package outline



0015988\_H\_23



**Table 5. TO-220 type H package mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.40	4.45	4.50
A1	1.22		1.32
A2	2.49	2.59	2.69
A3	1.17	1.27	1.37
b	0.78		0.87
b2	1.25		1.34
b4	1.20		1.29
b6			1.50
b7			1.45
c	0.49		0.56
D	15.40	15.50	15.60
D1	9.05	9.15	9.25
E	10.08	10.18	10.28
e	2.44	2.54	2.64
e1	4.98	5.08	5.18
H1	6.25	6.35	6.45
L	13.20	13.40	13.60
L1	3.50	3.70	3.90
L2	16.30	16.40	16.50
L3	28.70	28.90	29.10
ØP	3.75	3.80	3.85
Q	2.70	2.80	2.90
Slug flatness		0.03	0.10

## Revision history

**Table 6. Document revision history**

Date	Revision	Changes
8-Dec-2003	3	Minor text changes.
12-Apr-2021	4	Updated package and related information. Added <a href="#">Section 4.2 TO-220 type H package information</a> . Minor text changes.

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