1 Characteristics

Table 1. Absolute ratings (limiting values at 25 °C unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{RRM}	Repetitive peak reverse voltage		650	V
$I_{F(RMS)}$	Forward rms current		22	A
$I_{F(AV)}$	Average forward current	TO-220AC, DPAK, T_c = 145 °C(1), DC	4	A
		TO-220AC Ins,T_c = 125 °C(1), DC		
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal, T_c = 25 °C	38	A
		t_p = 10 ms sinusoidal, T_c = 125 °C	35	
		t_p = 10 µs square, T_c = 25 °C	200	
I_{FRM}	Repetitive peak forward current	TO-220AC, DPAK, T_c = 145 °C (1), T_j = 175 °C, δ = 0.1	17	A
		TO-220AC Ins,T_c = 125 °C (1), T_j = 175 °C, δ = 0.1		
T_{stg}	Storage temperature range		-55 to +175	°C
T_j	Operating junction temperature range(2)		-40 to +175	°C

1. *Value based on $R_{th(j-c)}$ max.*
2. *$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.*

Table 2. Thermal resistance parameters

Symbol	Parameter		Typ. value	Max. value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AC, DPAK, D^2PAK	1.8	2.7	°C/W
		TO-220AC Ins	3	4.5	

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R(1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	3	40	µA
		T_j = 150 °C		-	35	170	
V_F(2)	Forward voltage drop	T_j = 25 °C	I_F = 4 A	-	1.56	1.75	V
		T_j = 150 °C		-	1.98	2.50	

1. *t_p = 10 ms, δ < 2%*
2. *t_p = 500 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 1.35 \times I_{F(AV)} + 0.288 \times I_F{}^2{}_{(RMS)}$

For more information, please refer to the following application notes related to the power losses :

- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

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Table 4. Dynamic electrical characteristics

Symbol	Parameter	Test conditions	Typ.	Unit
Q_{cj}(1)	Total capacitive charge	V_R = 400 V	12.5	nC
C_j	Total capacitance	V_R = 0 V, T_c = 25 °C, F = 1 MHz	200	pF
		V_R = 400 V, T_c = 25 °C, F = 1 MHz	21	

1. *Most accurate value for the capacitive charge:* $Q_{cj}(V_R) = \int_0^{V_R} C_j(V)dV$

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1.1 Characteristics (curves)

Figure 1. Forward voltage drop versus forward current (typical values, low level)

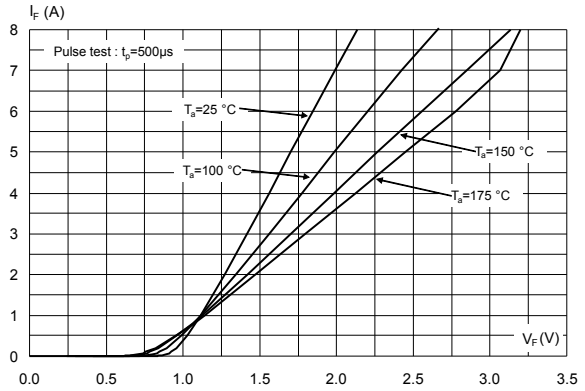

Figure 2. Forward voltage drop versus forward current (typical values, high level)

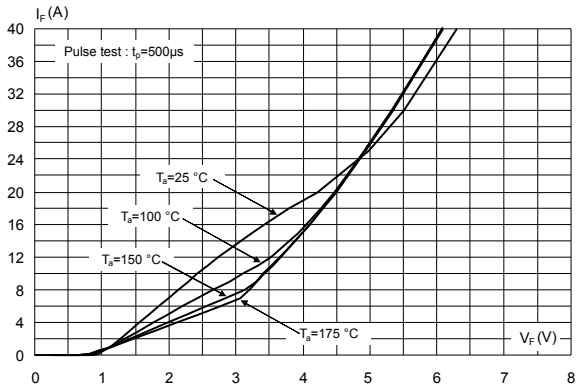

Figure 3. Reverse leakage current versus reverse voltage applied (typical values)

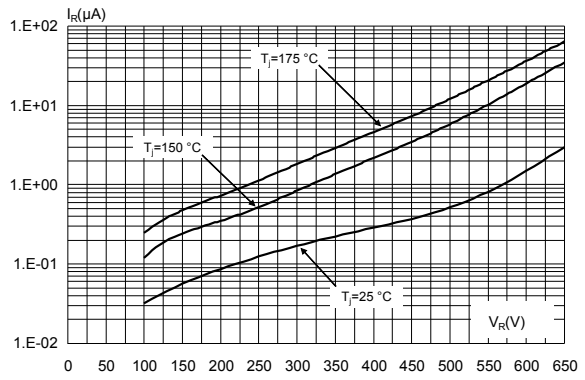

Figure 4. Peak forward current versus case temperature (TO-220AC, DPAK)

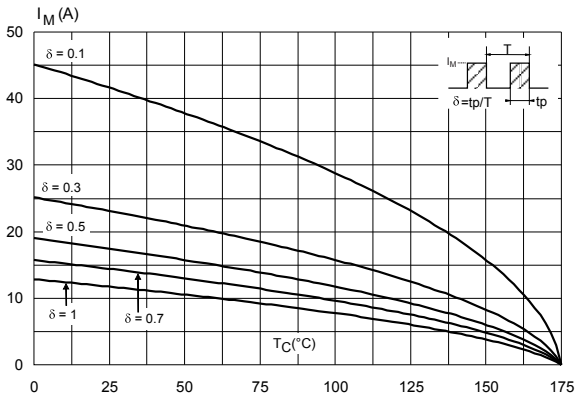

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Figure 5. Peak forward current versus case temperature (TO-220AC Ins.)

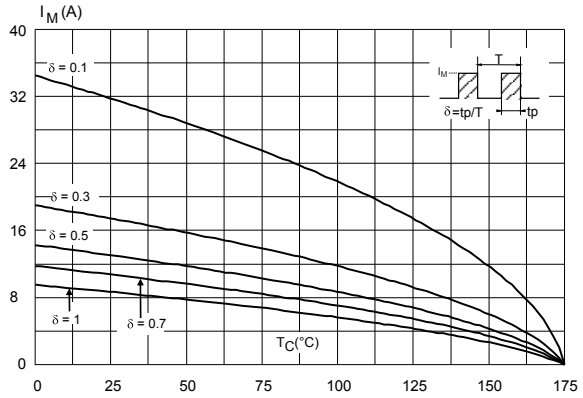


Figure 6. Junction capacitance versus reverse voltage applied (typical values)

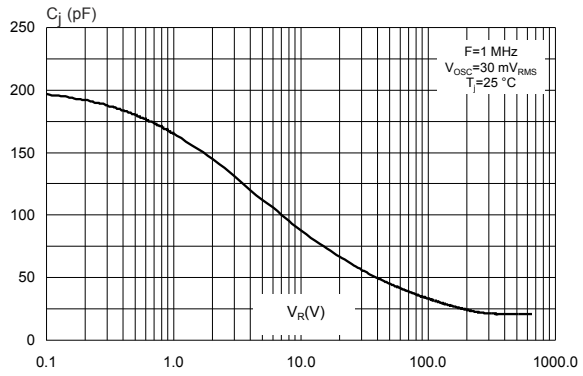


Figure 7. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC and DPAK)

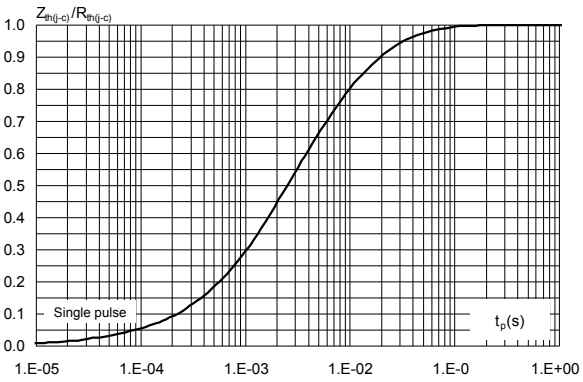


Figure 8. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AC Ins.)

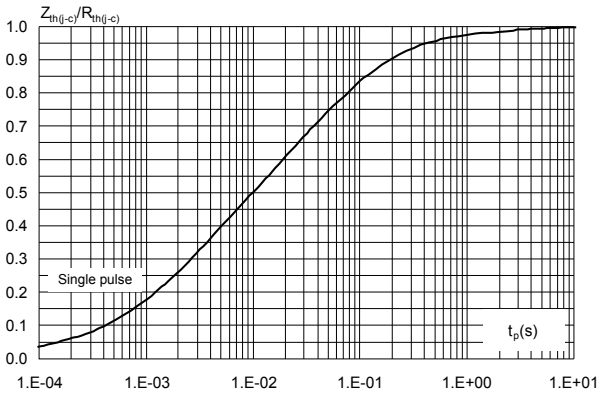


Figure 9. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

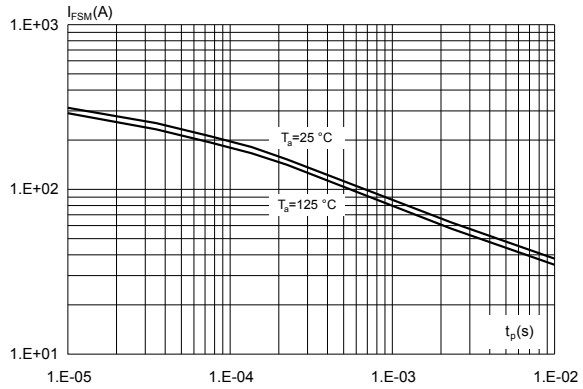
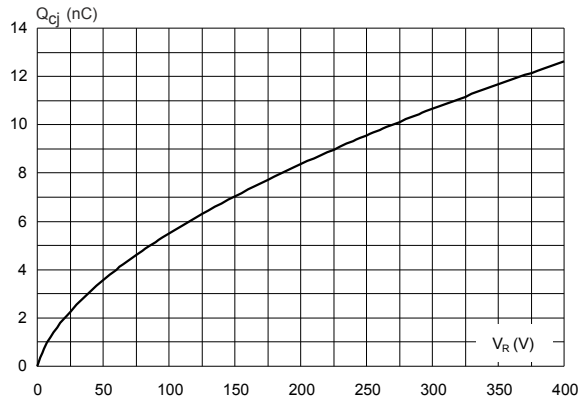


Figure 10. Total capacitive charges versus reverse voltage applied (typical values)



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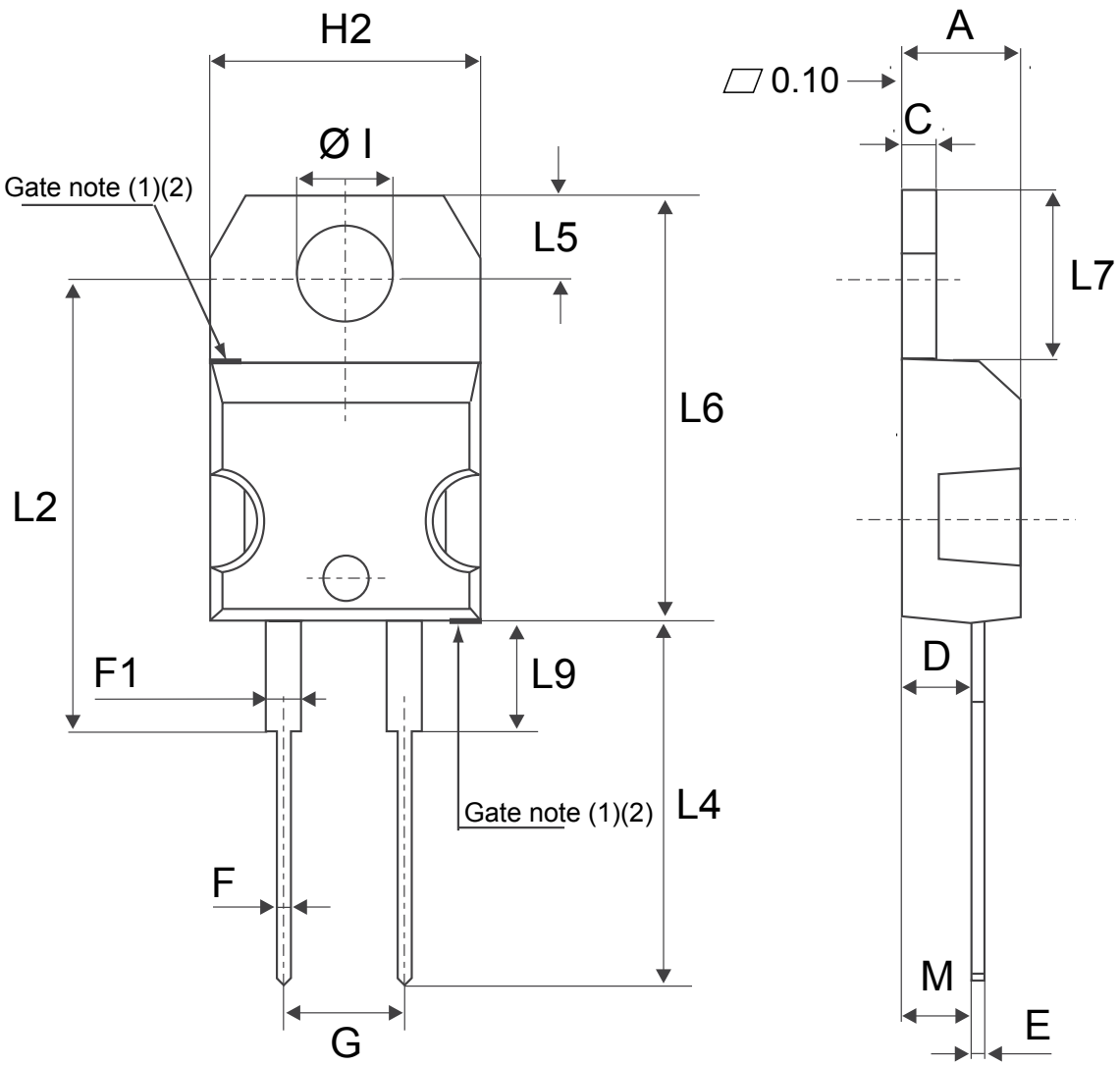
2 Package information

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.

2.1 TO-220AC package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 11. TO-220AC package outline



(1) :Max resin gate protusion 0.5 mm

(2) :Resin gate position is accepted in each of the two positions shown on the drawings or their symmetrical

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Table 5. TO-220AC package mechanical data

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
C	1.23	1.32	0.048	0.051
D	2.40	2.72	0.094	0.107
E	0.49	0.70	0.019	0.027
F	0.61	0.88	0.024	0.034
F1	1.14	1.70	0.044	0.066
G	4.95	5.15	0.194	0.202
H2	10.00	10.40	0.393	0.409
L2	16.40 typ.		0.645 typ.	
L4	13.00	14.00	0.511	0.551
L5	2.65	2.95	0.104	0.116
L6	15.25	15.75	0.600	0.620
L7	6.20	6.60	0.244	0.259
L9	3.50	3.93	0.137	0.154
M	2.60 typ.		0.102 typ.	
Diam	3.75	3.85	0.147	0.151

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2.2 TO-220AC ins. package information

- Epoxy meets UL 94,V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.70 N·m

Figure 12. **TO-220AC Ins. package outline**

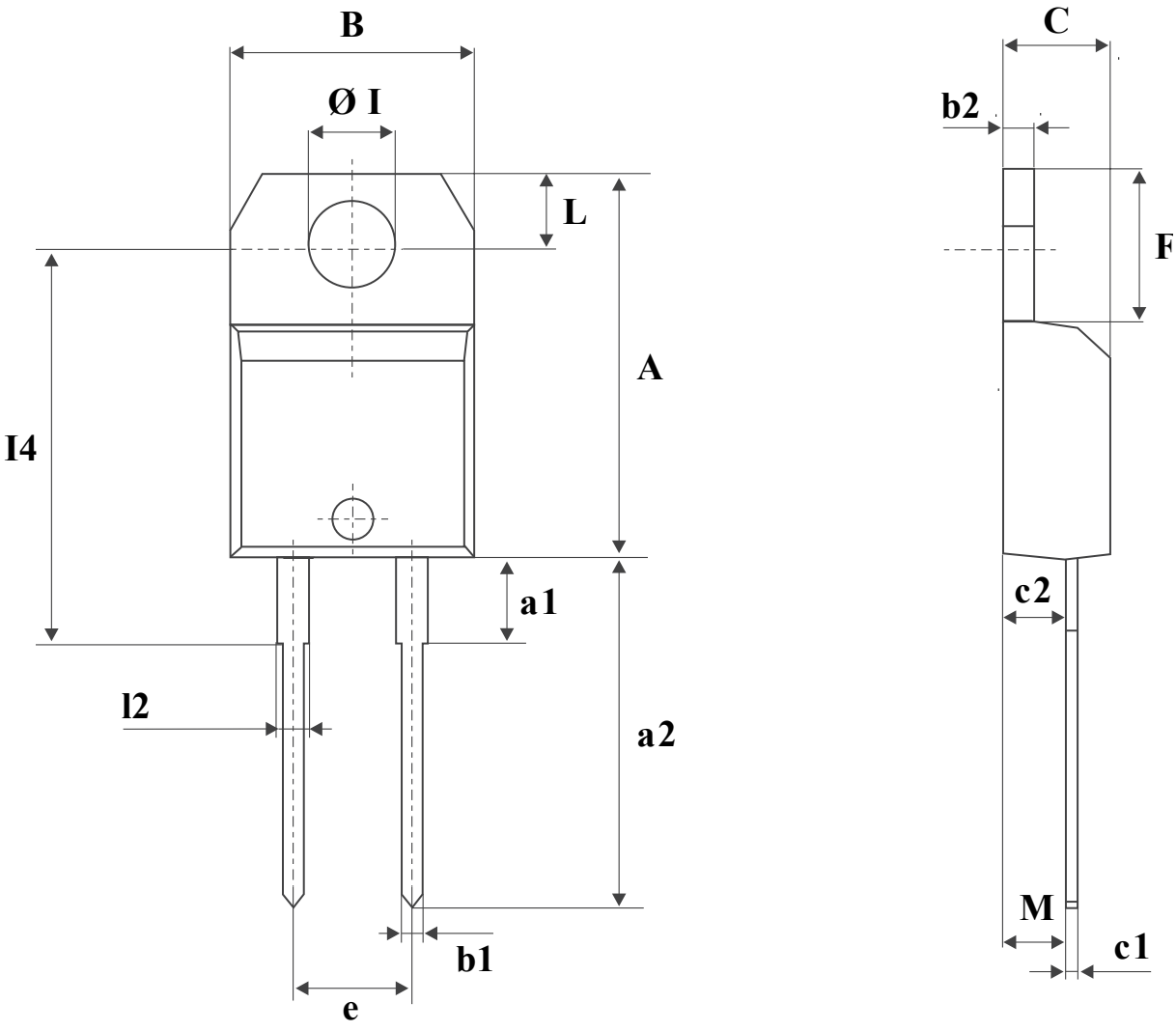

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Table 6. **TO-220AC Ins. package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.20		15.90	0.598		0.625
a1		3.75			0.147	
a2	13.00		14.00	0.511		0.551
B	10.00		10.40	0.393		0.409
b1	0.61		0.88	0.024		0.034
b2	1.23		1.32	0.048		0.051
C	4.40		4.60	0.173		0.181
c1	0.49		0.70	0.019		0.027
c2	2.40		2.72	0.094		0.107
e	4.80		5.40	0.189		0.212
F	6.20		6.60	0.244		0.259
L	2.65		2.95	0.104		0.116
l2	1.14		1.70	0.044		0.066
l4	15.80	16.40	16.80	0.622	0.645	0.661
M		2.60			0.102	
Øl	3.75		3.85	0.147		0.151

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2.3 DPAK package information

- Epoxy meets UL94, V0

Figure 13. **DPAK package outline**

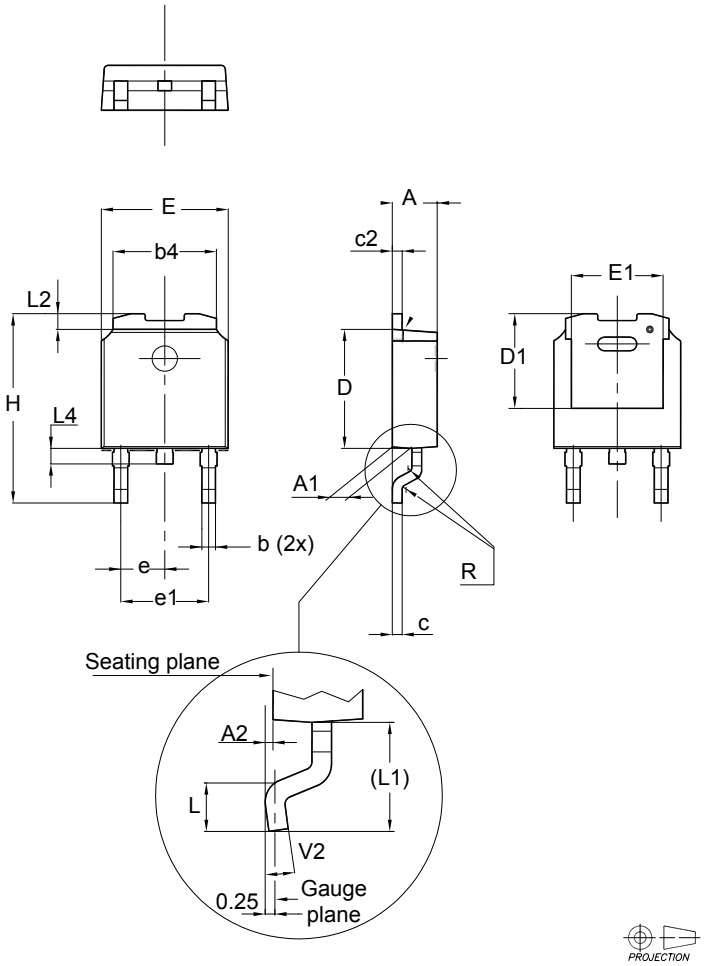

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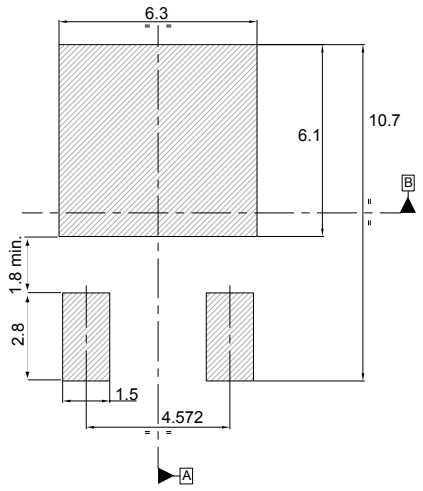
Table 7. DPAK mechanical data

Dim.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
b	0.64		0.90	0.025		0.035
b4	5.20		5.40	0.205		0.213
c	0.45		0.60	0.018		0.024
c2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
D1	4.95	5.10	5.25	0.195	0.201	0.207
E	6.40		6.60	0.252		0.260
E1	4.60	4.70	4.80	0.181	0.185	0.189
e	2.159	2.286	2.413	0.085	0.090	0.095
e1	4.445	4.572	4.699	0.175	0.180	0.185
H	9.35		10.10	0.368		0.398
L	1.00		1.50	0.039		0.059
(L1)	2.60	2.80	3.00	0.102	0.110	0.118
L2	0.65	0.80	0.95	0.026	0.031	0.037
L4	0.60		1.00	0.024		0.039
R		0.20			0.008	
V2	0°		8°	0°		8°

1. *Inches dimensions given for reference only*

Figure 14. DPAK recommended footprint (dimensions are in mm)



The device must be positioned within ⌖ 0.05 A B

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3 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPSC4H065D	STPSC4H065D	TO-220AC	1.86 g	50	Tube
STPSC4H065DI	STPSC 4H065DI	TO-220AC Ins.	2.12 g	50	Tube
STPSC4H065B-TR	STPSC 4H065	DPAK	0.32 g	2500	Tape and reel

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Revision history

Table 9. **Document revision history**

Date	Version	Changes
31-Aug-2012	1	First issue.
10-Oct-2012	2	Added Max. value to Table 3.
07-Nov-2013	3	Updated Figure 1, Figure 2, Figure 13, Figure 14, and Table 8.
07-Jan-2014	4	Added TO-220AC Ins. package.
15-Jul-2015	5	Updated Table 9.
09-Jan-2020	6	Updated Features.

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