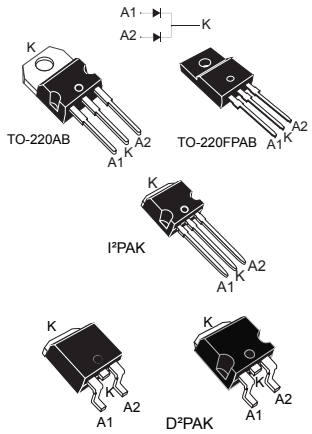
STPS20LCD80C

Datasheet

Power Schottky rectifier



Features

- High junction temperature capability
- Avalanche capability specified
- Insulated package: TO-220FPAB
  - Insulating voltage = 2000 VRMS sine
- ECOPACK®2 compliant component for D²PAK, I²PAK, TO-220AB and TO-220FPAB on demand

Description

This device is a dual Schottky rectifier suited for high frequency switch mode power supply.

Available in TO-220AB, TO-220FPAB, I^2PAK and D^2PAK, this device is intended to be used in LCD screens or adaptors providing such applications with good efficiency at both low and high load.

Product status	
STPS20LCD80C	
Product summary	
$I_{F(AV)}$	2 x 10 A
V_{RRM}	80 V
T_j (max)	175 °C
V_F (typ)	0.66 V

1 Characteristics

Table 1. Absolute ratings (limiting values, per diode, at T_{amb} 25 °C, unless otherwise stated)

Symbol	Parameter				Value	Unit
V_{RRM}	Repetitive peak reverse voltage				80	V
$I_{F(RMS)}$	Forward rms current				30	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	TO-220AB,D^2PAK, I^2PAK	T_C = 145 °C	Per diode	10	A
			T_C = 140 °C	Per device	20	
		TO-220FPAB	T_C = 120 °C	Per diode	10	
			T_C = 85 °C	Per device	20	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal			150	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C			230	W
T_{stg}	Storage temperature range				-65 to + 175	°C
T_j	Maximum operating junction temperature (1)				+ 175	°C

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

Table 2. Thermal parameter

Symbol	Parameter			Value	Unit
$R_{th(j-c)}$	Junction to case	TO-220AB, D^2PAK, I^2PAK	Per diode	3.20	°C/W
		TO-220FPAB		6.10	
		TO-220AB, D^2PAK, I^2PAK	Total	1.95	
		TO-220FPAB		5.05	
$R_{th(c)}$	Coupling	TO-220AB, D^2PAK, I^2PAK	-	0.70	°C/W
		TO-220FPAB		4.00	

When the diodes 1 and 2 are used simultaneously:

$\Delta T_{j\ (diode1)} = P_{(diode1)} \times R_{th(j-c)}$ (per diode) + $P_{(diode2)} \times R_{th(c)}$

Table 3. Static electrical characteristics (per diode)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	$V_R = V_{RRM}$	-	3.2	15	µA
		T_j = 125 °C		-	2.8	8	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 10 A	-	0.815	0.880	V
		T_j = 125 °C		-	0.660	0.710	
		T_j = 25 °C	I_F = 20 A	-	1.030	1.160	
		T_j = 125 °C		-	0.765	0.865	

1. *Pulse test: t_p = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

$P = 0.555 \times I_{F(AV)} + 0.0155\ I_F{}^2{}_{(RMS)}$

1.2 Characteristics (curves)

Figure 1. Average forward power dissipation versus average forward current (per diode)

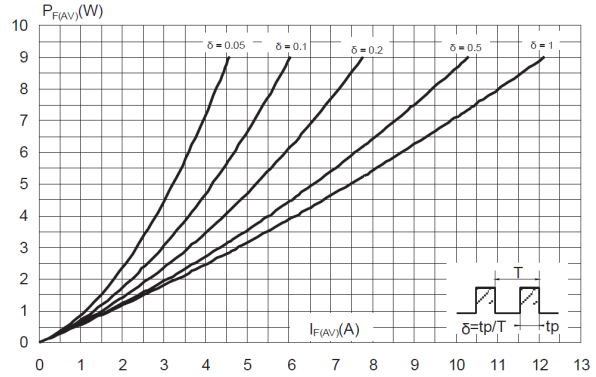


Figure 2. Average forward current versus ambient temperature (δ = 0.5, per diode)

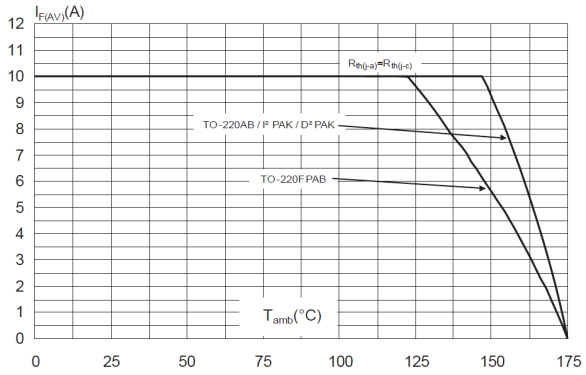


Figure 3. Normalized avalanche power derating versus pulse duration (T_j = 125 °C)

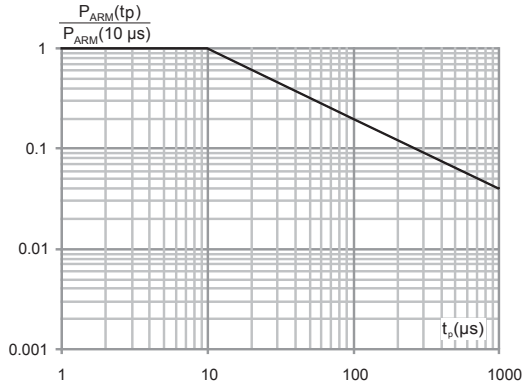


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration (TO-220AB, D^2PAK,I^2PAK)

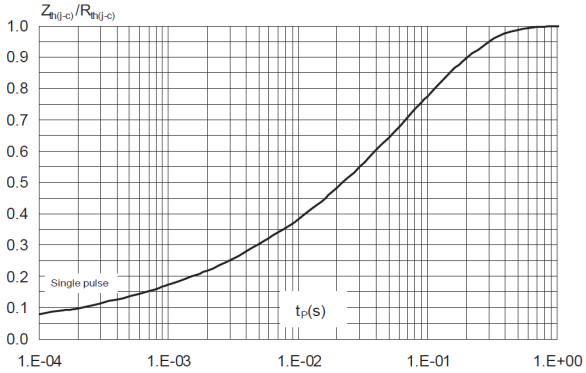


Figure 5. Relative thermal impedance junction to case versus pulse duration (TO-220FPAB)

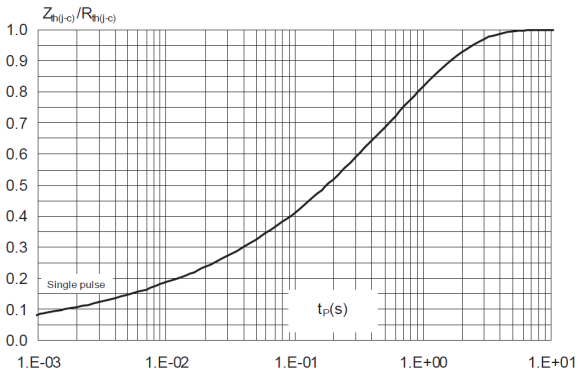


Figure 6. Reverse leakage current versus reverse voltage applied (typical values, per diode)

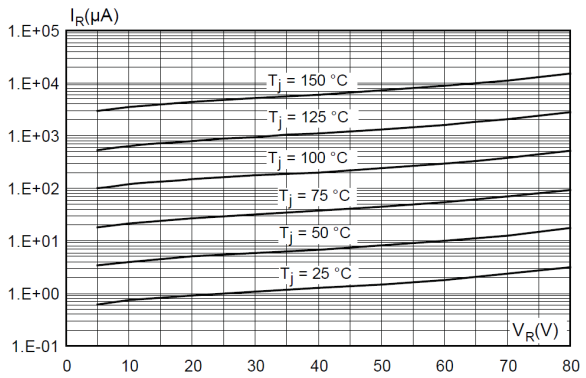


Figure 7. Junction capacitance versus reverse voltage applied (typical values, per diode)

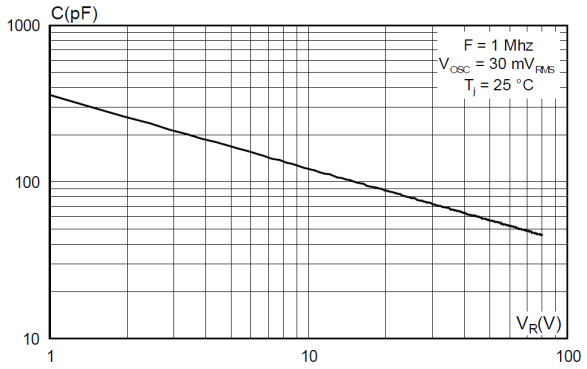


Figure 8. Forward voltage drop versus forward current (per diode)

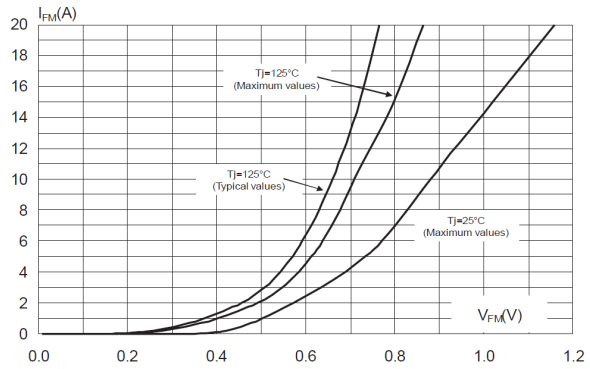


Figure 9. Reverse safe operating area

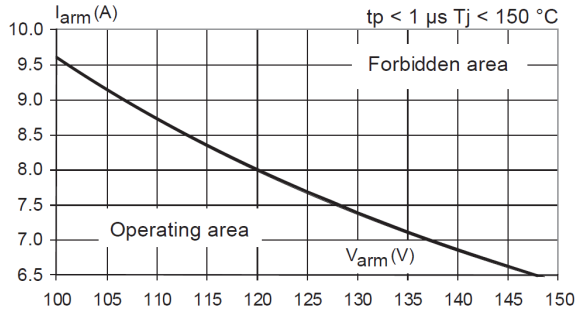
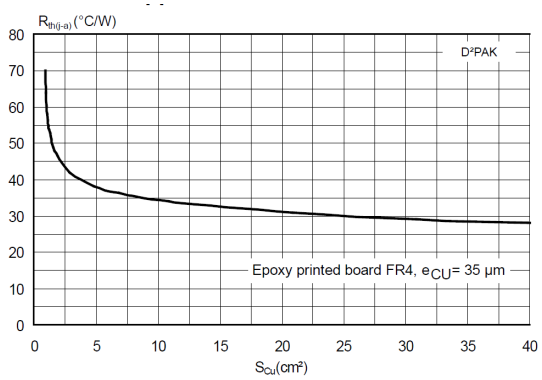


Figure 10. Thermal resistance junction to ambient versus copper surface under tab for D^2PAK



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-220AB package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.7 N·m

Figure 11. TO-220AB package outline

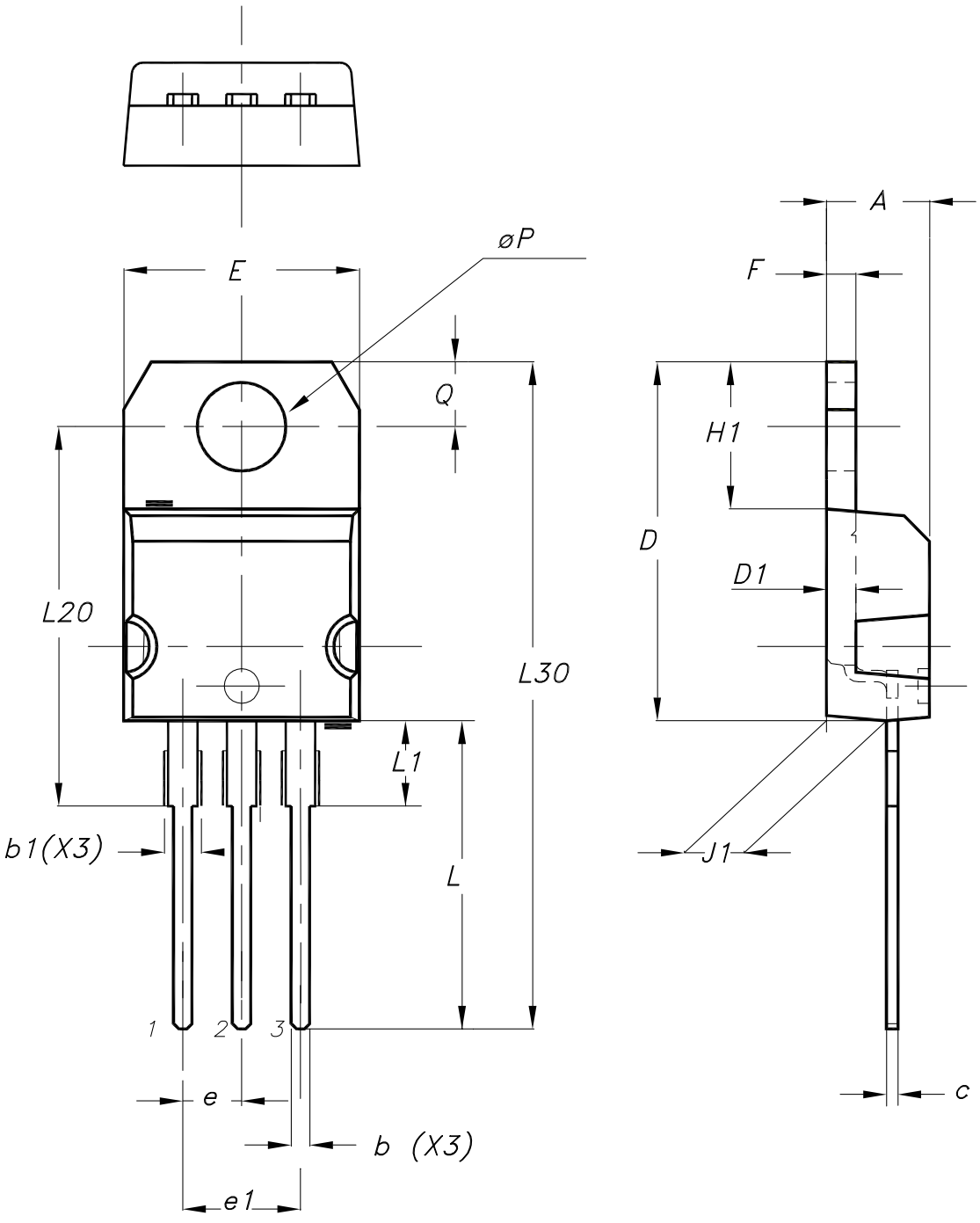


Table 4. TO-220AB package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
b	0.61	0.88	0.240	0.035
b1	1.14	1.55	0.045	0.061
c	0.48	0.70	0.019	0.028
D	15.25	15.75	0.600	0.620
D1	1.27 typ.		0.050 typ.	
E	10.00	10.40	0.394	0.409
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
F	1.23	1.32	0.048	0.052
H1	6.20	6.60	0.244	0.260
J1	2.40	2.72	0.094	0.107
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L20	16.40 typ.		0.646 typ.	
L30	28.90 typ.		1.138 typ.	
θP	3.75	3.85	0.148	0.152
Q	2.65	2.95	0.104	0.116

2.2 TO-220FPAB package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0
- Recommended torque value: 0.55 N·m
- Maximum torque value: 0.7 N·m

Figure 12. TO-220FPAB package outline

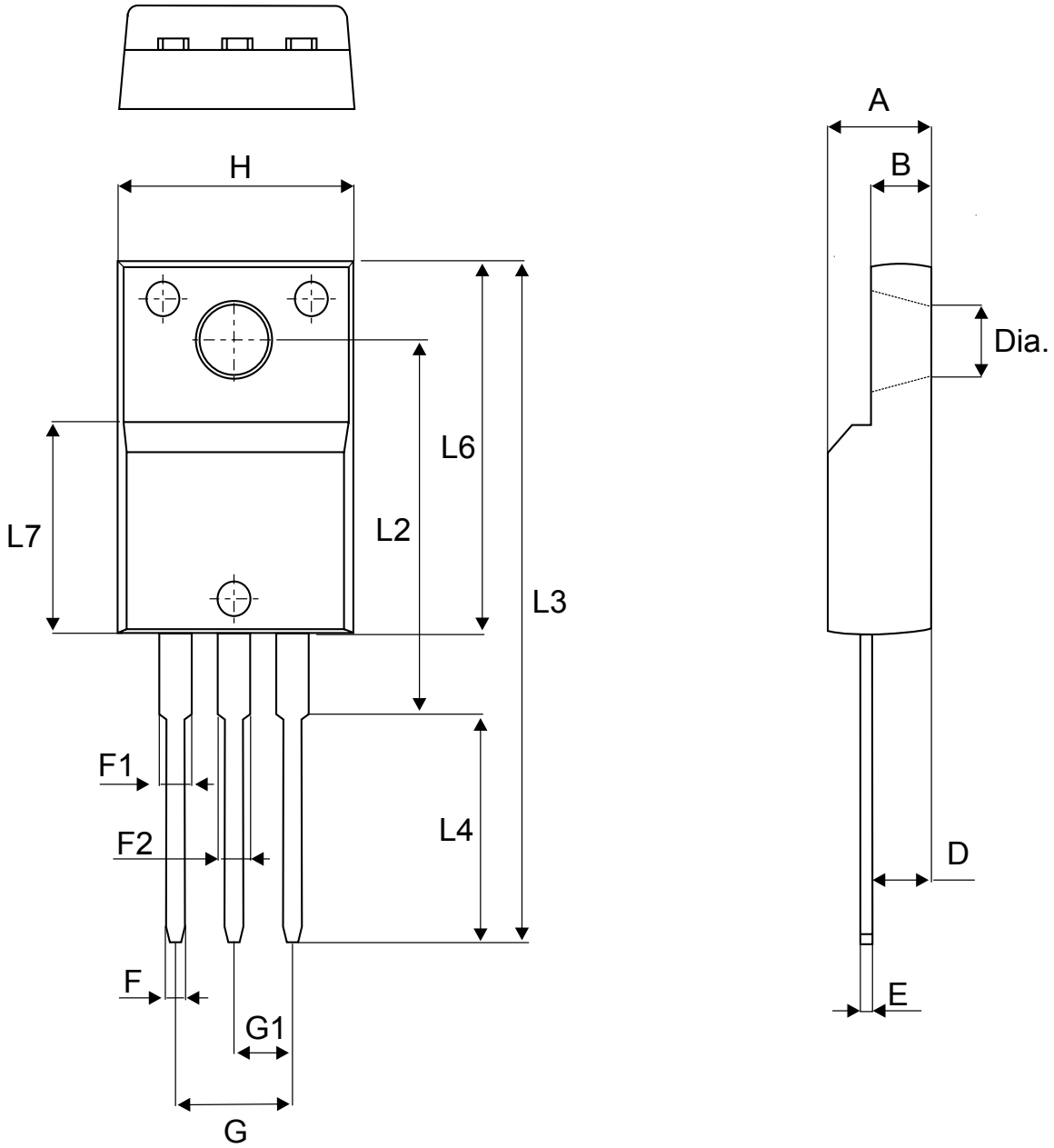


Table 5. **TO-220FPAB package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches (for reference only)	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.1739	0.1818
B	2.5	2.7	0.0988	0.1067
D	2.50	2.75	0.0988	0.1087
E	0.45	0.70	0.0178	0.0277
F	0.75	1.0	0.0296	0.0395
F1	1.15	1.70	0.0455	0.0672
F2	1.15	1.70	0.0455	0.0672
G	4.95	5.20	0.1957	0.2055
G1	2.40	2.70	0.0949	0.1067
H	10.00	10.40	0.3953	0.4111
L2	16.00 typ.		0.6324 typ.	
L3	28.60	30.60	1.1304	1.2095
L4	9.80	10.6	0.3874	0.4190
L5	2.90	3.60	0.1146	0.1423
L6	15.90	16.40	0.6285	0.6482
L7	9.00	9.30	0.3557	0.3676
Dia	3.0	3.20	0.1186	0.1265

2.3 I²PAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

Figure 13. I²PAK package outline

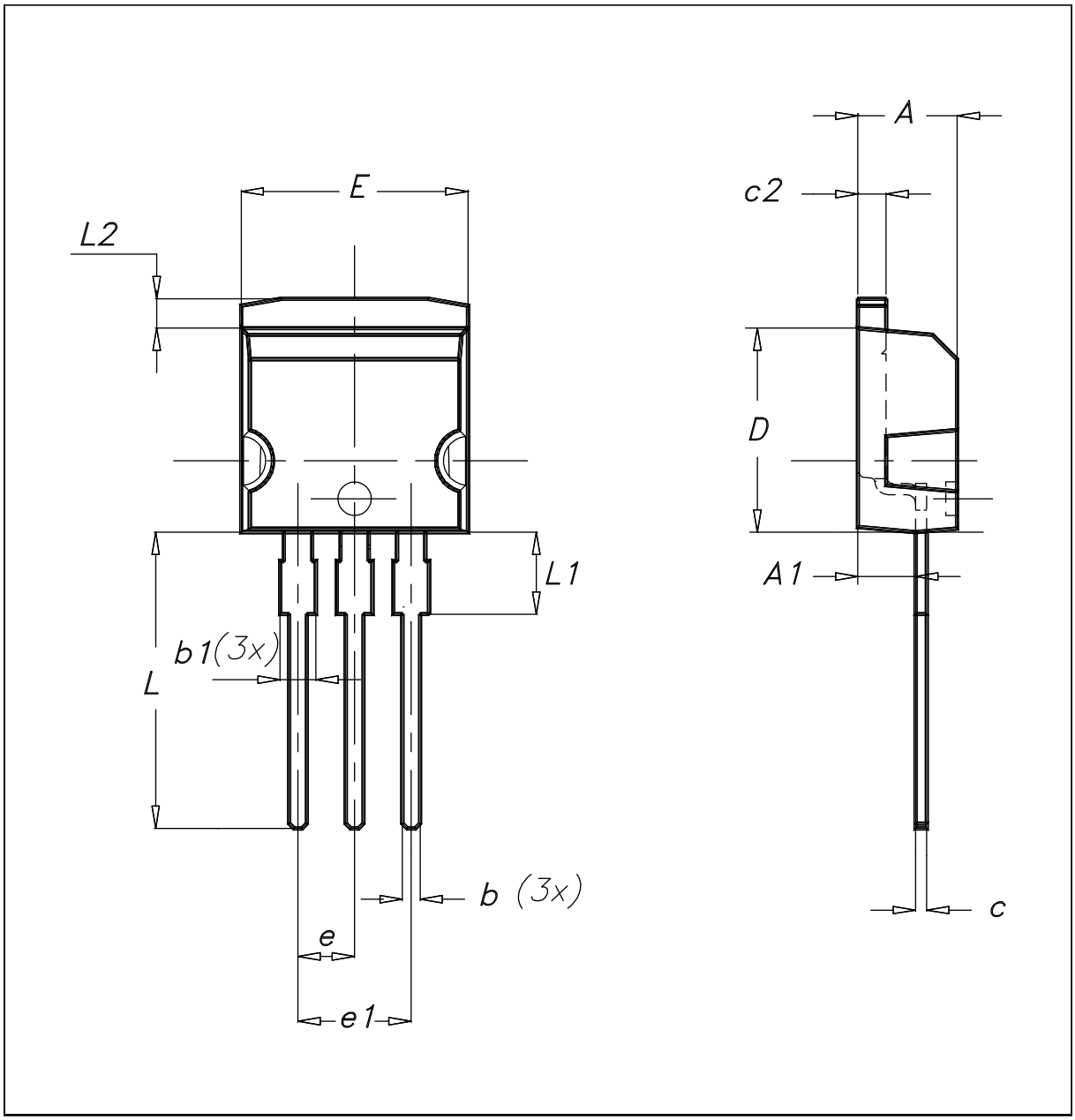


Table 6. I²PAK package mechanical data

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.40	4.60	0.173	0.181
A1	2.40	2.72	0.094	0.107
b	0.61	0.88	0.024	0.035
b1	1.14	1.70	0.044	0.067
c	0.49	0.70	0.019	0.028
c2	1.23	1.32	0.048	0.052
D	8.95	9.35	0.352	0.368
e	2.40	2.70	0.094	0.106
e1	4.95	5.15	0.195	0.203
E	10.00	10.40	0.394	0.409
L	13.00	14.00	0.512	0.551
L1	3.50	3.93	0.138	0.155
L2	1.27	1.40	0.050	0.055

2.4 D²PAK package information

- Cooling method: by conduction (C)
- Epoxy meets UL 94,V0

Figure 14. D²PAK package outline

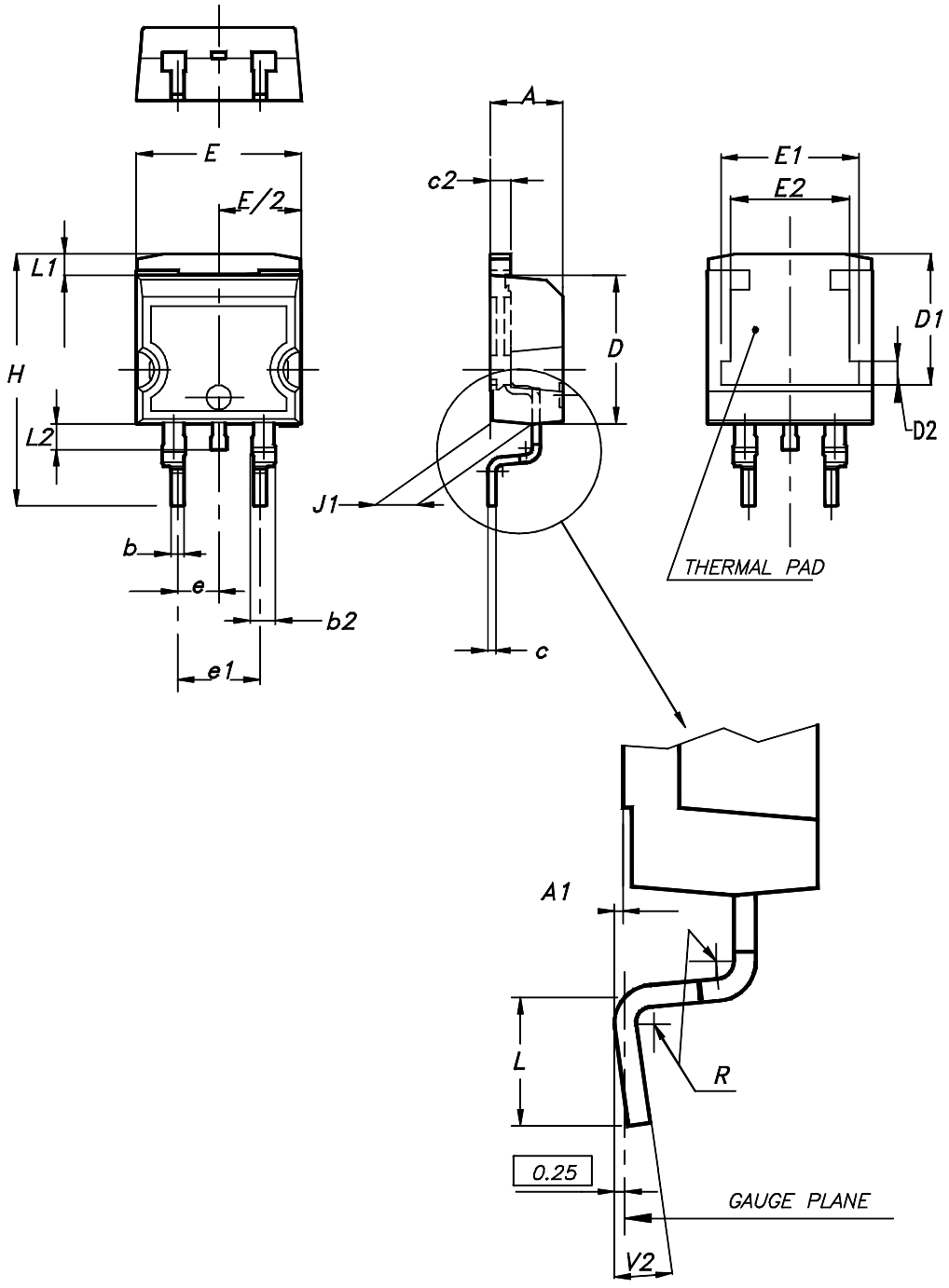
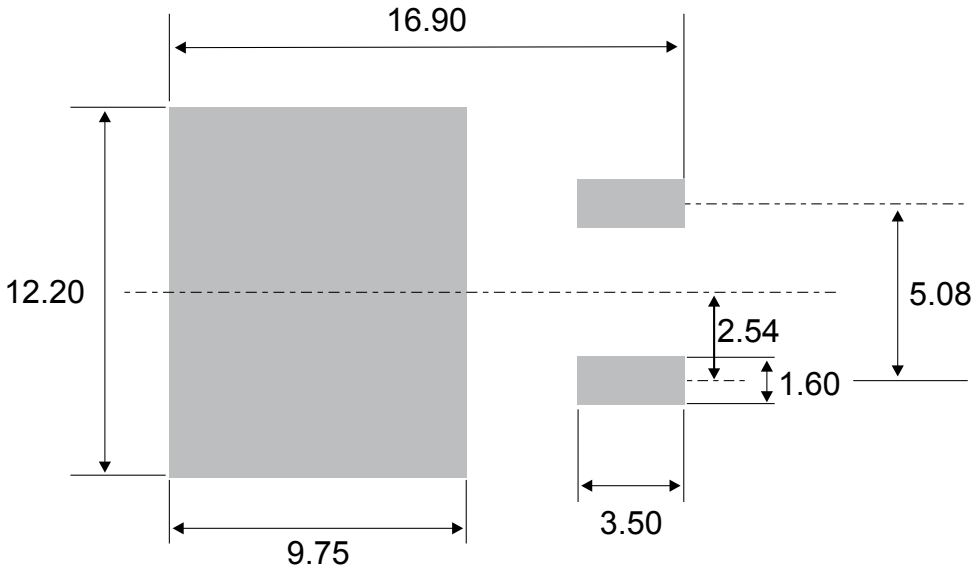


Table 7. **D²PAK package mechanical data**

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.36	4.60	0.172	0.181
A1	0.00	0.25	0.000	0.010
b	0.70	0.93	0.028	0.037
b2	1.14	1.70	0.045	0.067
c	0.38	0.69	0.015	0.027
c2	1.19	1.36	0.047	0.053
D	8.60	9.35	0.339	0.368
D1	6.90	8.00	0.272	0.311
D2	1.10	1.50	0.043	0.060
E	10.00	10.55	0.394	0.415
E1	8.10	8.90	0.319	0.346
E2	6.85	7.25	0.266	0.282
e	2.54 typ.		0.100	
e1	4.88	5.28	0.190	0.205
H	15.00	15.85	0.591	0.624
J1	2.49	2.90	0.097	0.112
L	1.90	2.79	0.075	0.110
L1	1.27	1.65	0.049	0.065
L2	1.30	1.78	0.050	0.070
R	0.4 typ.		0.015	
V2	0°	8°	0°	8°

Figure 15. D²PAK Recommended footprint



3 Ordering information

Table 8. **Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
STPS20LCD80CT	STPS20LCD80C	TO-220AB	1.95 g	50	Tube
STPS20LCD80CFP	STPS20LCD80C	TO-220FPAB	1.9 g	50	Tube
STPS20LCD80CR	STPS20LCD80C	I^2PAK	1.5 g	50	Tube
STPS20LCD80CG-TR	STPS20LCD80C	D^2PAK	1.38 g	1000	Tape and reel

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
11-Jan-2011	1	First full version, consolidating the previous internal release of march 2013. Updated the DPAK package information.
29-Jul-2015	2	Updated features, and packages silhouette in cover page. Updated Section 2: "Characteristics" and Section 2.1:"Characteristics (curves)" Updated Section 3.2: "D²PAK package information.
10-Apr-2018	3	Updated I²PAK package information.