STB10N60M2, STD10N60M2, STP10N60M2

N-channel 600 V, 0.55 Ω typ., 7.5 A MDmesh M2 Power MOSFET in a D²PAK, DPAK and TO-220 packages

TAB

D²PAK

TAB

DPAK

TAB

TO-220

D(2, TAB)

G(1)

S(3)
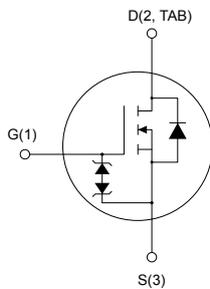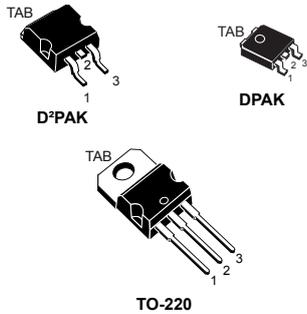
AM01476v1_tab

Features

Order codes	V_{DS} @ T_J max.	$R_{DS(on)}$ max.	I_D	Package
STB10N60M2				D²PAK
STD10N60M2	650 V	0.60 Ω	7.5 A	DPAK
STP10N60M2				TO-220

- Extremely low gate charge
- Excellent output capacitance (C_{oss}) profile
- 100% avalanche tested
- Zener-protected

Applications

- Switching applications

Description

These devices are N-channel Power MOSFETs developed using the MDmesh M2 technology. Thanks to their strip layout and improved vertical structure, these devices exhibit low on-resistance and optimized switching characteristics, rendering them suitable for the most demanding high-efficiency converters.

STPOWER

Product status links
STB10N60M2
STD10N60M2
STP10N60M2

DS9703 - Rev 5 - July 2025
For further information, contact your local STMicroelectronics sales office.

www.st.com

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{GS}	Gate-source voltage	±25	V
I_D	Drain current (continuous) at T_C = 25 °C	7.5	A
	Drain current (continuous) at T_C = 100 °C	4.9	
I_{DM}[1]	Drain current (pulsed)	30	A
P_{TOT}	Total power dissipation at T_C = 25 °C	85	W
dv/dt[2]	Peak diode recovery voltage slope	15	V/ns
dv/dt[3]	MOSFET dv/dt ruggedness	50	
T_{stg}	Storage temperature range	-55 to 150	°C
T_J	Operating junction temperature range		°C

1. Pulse limited by safe operating area.
2. I_{SD} ≤ 7.5 A, di/dt ≤ 400 A/µs, V_{DS}(peak) < $V_{(BR)DSS}$, V_{DD} = 400 V.
3. V_{DS} ≤ 480 V.

Table 2. Thermal data

Symbol	Parameter	Value			Unit
		D^{2}PAK	DPAK	TO-220	
R_{thJC}	Thermal resistance, junction-to-case		1.47		°C/W
R_{thJA}	Thermal resistance, junction-to-ambient	30[1]	50[1]	62.5	°C/W

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

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}[1]	Avalanche current, repetitive or not repetitive	1.5	A
E_{AS}[2]	Single pulse avalanche energy	110	mJ

1. Pulse width limited by T_J max.
2. Starting T_J = 25 °C, I_D = I_{AR}, V_{DD} = 50 V.

2 Electrical characteristics

(T_C = 25 °C unless otherwise specified).

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V, I_D = 1 mA	600			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0 V, V_{DS} = 600 V			1	µA
		V_{GS} = 0 V, V_{DS} = 600 V, T_C = 125 °C[1]			100	
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = ±25 V			±10	µA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	2	3	4	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D = 3 A		0.55	0.60	Ω

1. *Specified by design, not tested in production.*

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 100 V, f = 1 MHz, V_{GS} = 0 V	-	400	-	pF
C_{oss}	Output capacitance		-	22	-	pF
C_{rss}	Reverse transfer capacitance		-	0.84	-	pF
$C_{oss\ eq.}$[1]	Equivalent output capacitance	V_{DS} = 0 to 480 V, V_{GS} = 0 V	-	83	-	pF
R_G	Intrinsic gate resistance	f = 1 MHz, I_D = 0 A	-	6.4	-	Ω
Q_g	Total gate charge	V_{DD} = 480 V, I_D = 7.5 A, V_{GS} = 0 to 10 V (see Figure 16. Test circuit for gate charge behavior)	-	13.5	-	nC
Q_{gs}	Gate-source charge		-	2.1	-	nC
Q_{gd}	Gate-drain charge		-	7.2	-	nC

1. *$C_{oss\ eq.}$ is defined as a constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DSS}.*

Table 6. Switching times

| Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 300 V, I_D = 3.75 A,	-	8.8	-	ns
t_r	Rise time	R_G = 4.7 Ω, V_{GS} = 10 V	-	8	-	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 15. Test circuit for resistive load switching times and	-	32.5	-	ns
t_f	Fall time	Figure 20. Switching time waveform)	-	13.2	-	ns

Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		7.5	A
I_{SDM} [1]	Source-drain current (pulsed)		-		30	A
V_{SD} [2]	Forward on voltage	V_{GS} = 0 V, I_{SD} = 7.5 A	-		1.6	V
t_{rr}	Reverse recovery time	I_{SD} = 7.5 A, di/dt = 100 A/µs,	-	270		ns
Q_{rr}	Reverse recovery charge	V_{DD} = 60 V	-	2		µC
I_{RRM}	Reverse recovery current	(see Figure 17. Test circuit for inductive load switching and diode recovery times)	-	14.4		A
t_{rr}	Reverse recovery time	I_{SD} = 7.5 A, di/dt = 100 A/µs,	-	376		ns
Q_{rr}	Reverse recovery charge	V_{DD} = 60 V, T_J = 150 °C	-	2.8		µC
I_{RRM}	Reverse recovery current	(see Figure 17. Test circuit for inductive load switching and diode recovery times)	-	15		A

1. *Pulse width is limited by safe operating area.*

2. *Pulse test: pulse duration = 300 µs, duty cycle 1.5%.*

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area for D²PAK and TO-220
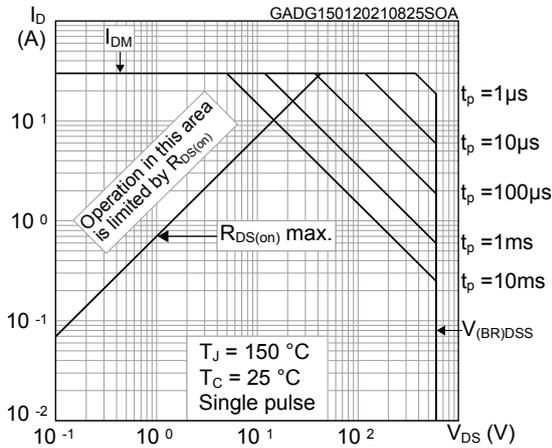
Figure 2. Maximum transient thermal impedance for D²PAK and TO-220
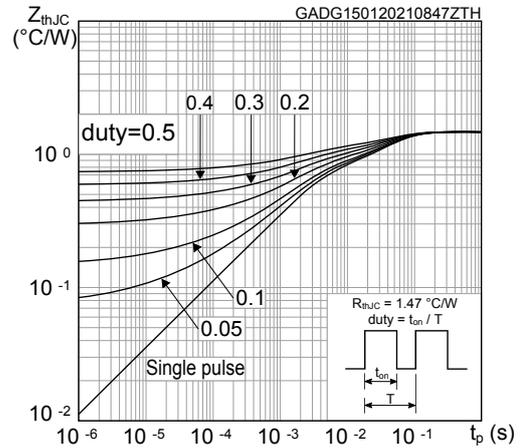
Figure 3. Safe operating area for DPAK
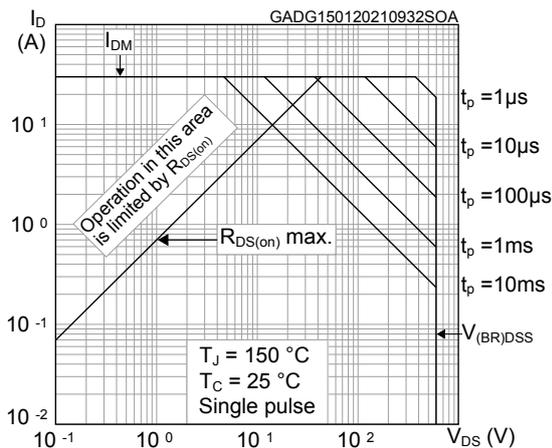
Figure 4. Maximum transient thermal impedance for DPAK
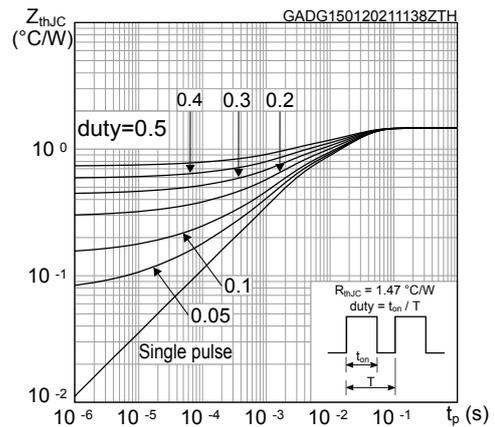
Figure 5. Output characteristics
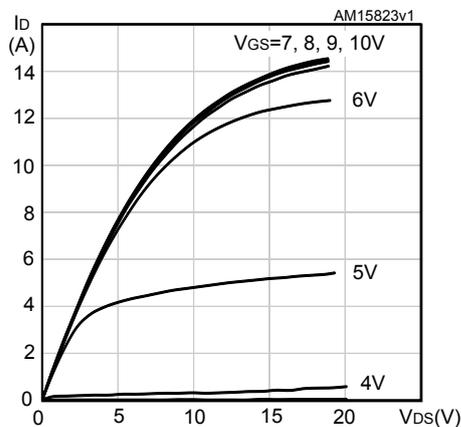
Figure 6. Transfer characteristics
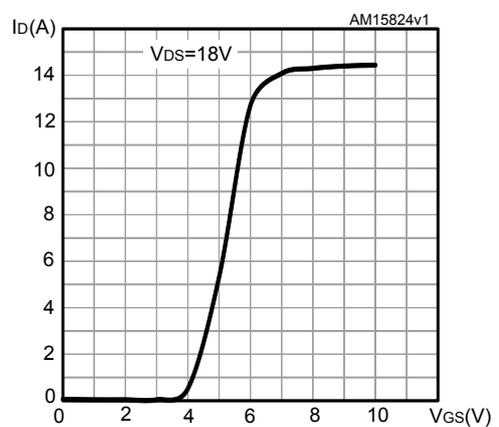
Figure 7. Gate charge vs gate-source voltage
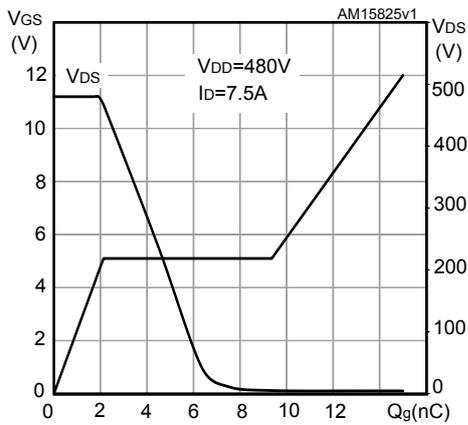

Figure 8. Static drain-source on-resistance
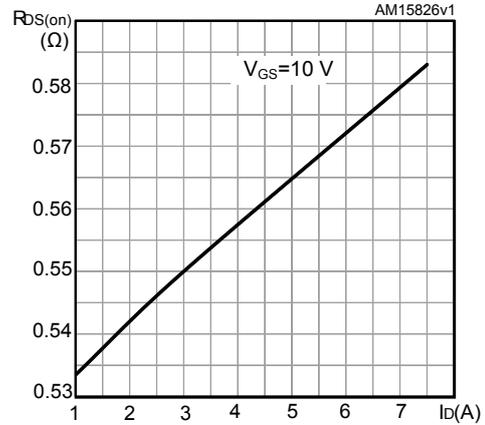
Figure 9. Capacitance variations
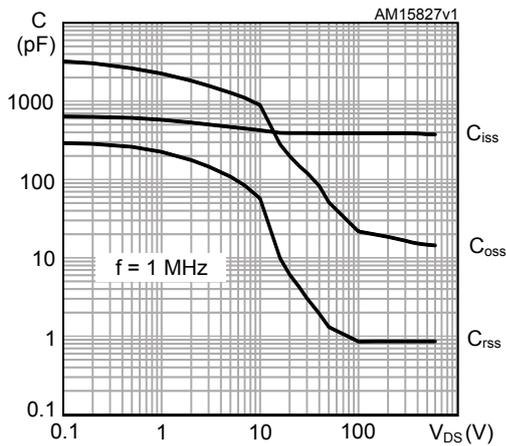
Figure 10. Normalized gate threshold voltage vs temperature
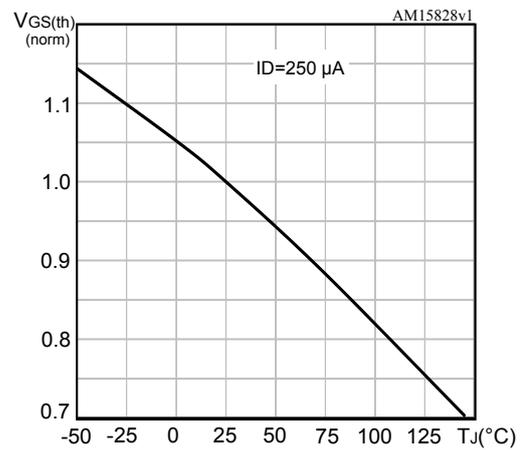
Figure 11. Normalized on-resistance vs temperature
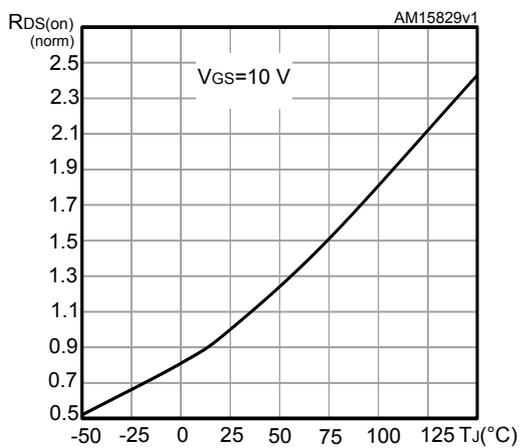
Figure 12. Normalized $V_{(BR)DSS}$ vs temperature
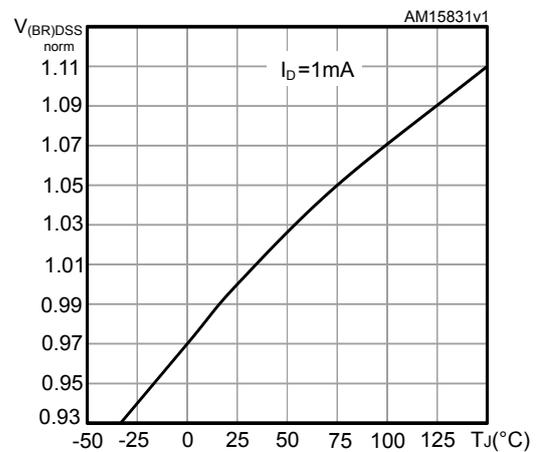
Figure 13. Source-drain diode forward characteristics
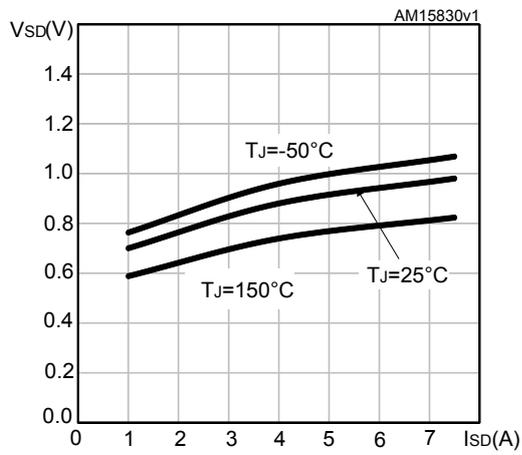
Figure 14. Output capacitance stored energy
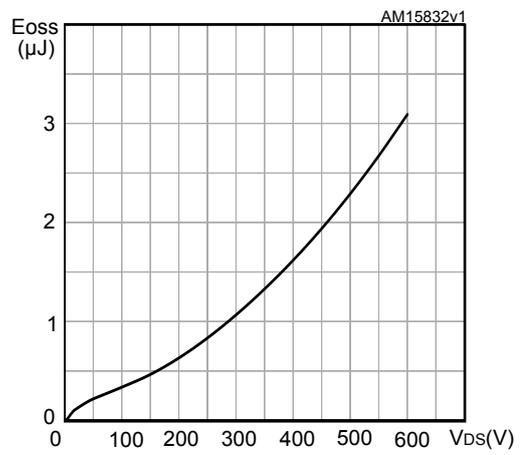
3 Test circuits

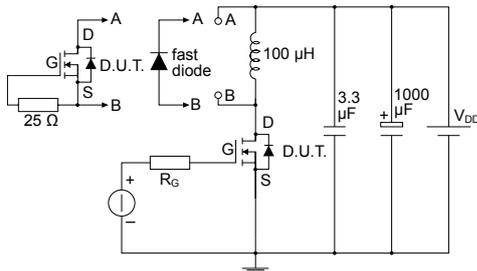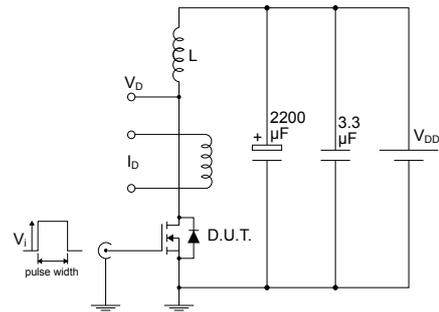**Figure 15. Test circuit for resistive load switching times**
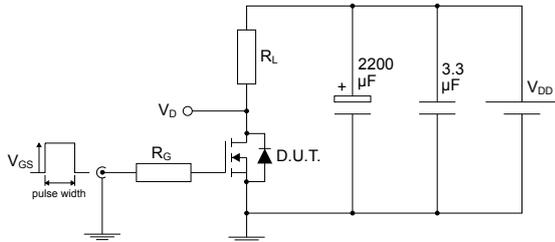
AM01468v1

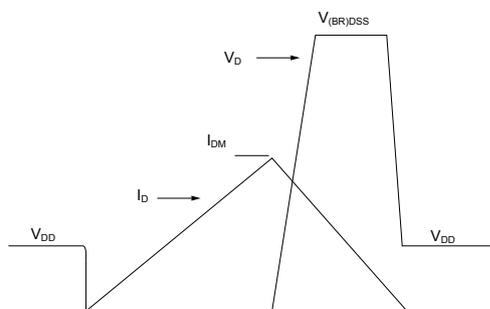**Figure 16. Test circuit for gate charge behavior**
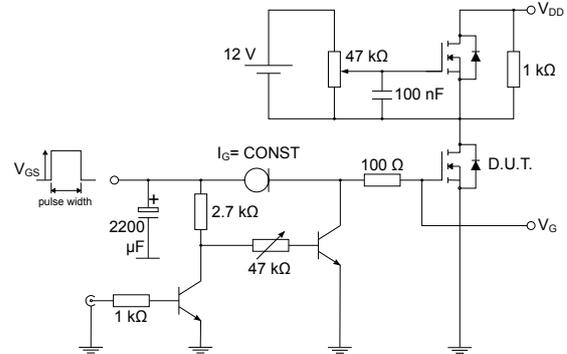
AM01469v1

Figure 17. Test circuit for inductive load switching and diode recovery times

AM01470v1

Figure 18. Unclamped inductive load test circuit

AM01471v1

Figure 19. Unclamped inductive waveform

AM01472v1

Figure 20. Switching time waveform
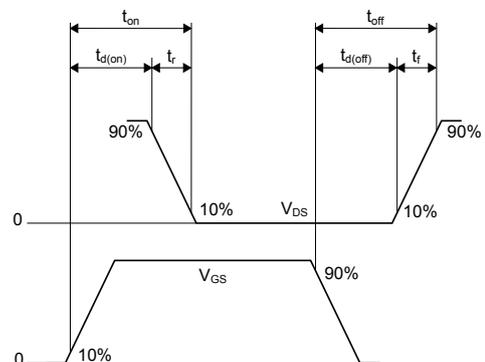
AM01473v1

4 Package information

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.

4.1 D²PAK (TO-263) type A package information

Figure 21. D²PAK (TO-263) type A package outline

0079457_27

Table 8. D²PAK (TO-263) type A package mechanical data

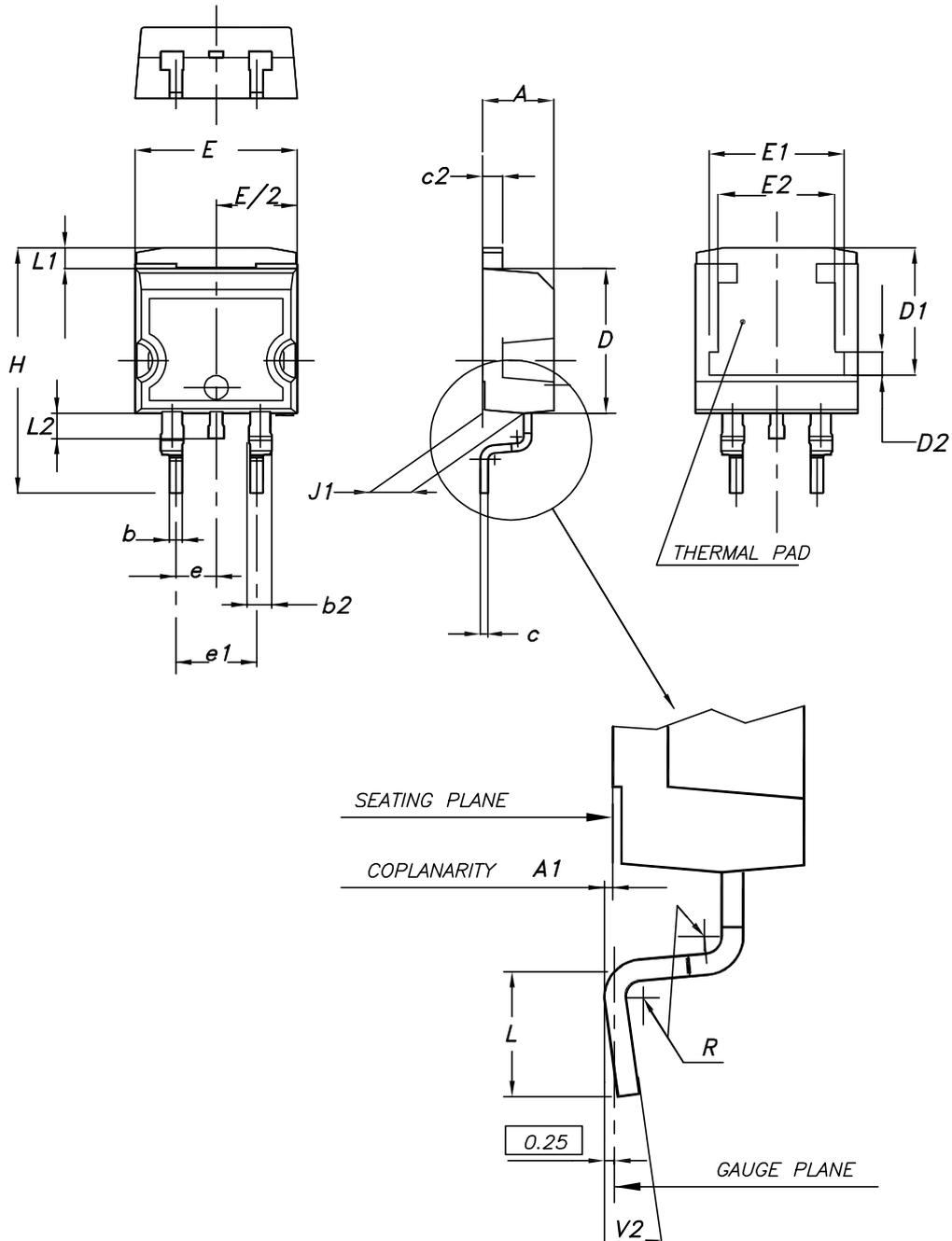| Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
A1	0.03		0.23
b	0.70		0.93
b2	1.14		1.70
c	0.45		0.60
c2	1.23		1.36
D	8.95		9.35
D1	7.50	7.75	8.00
D2	1.10	1.30	1.50
E	10.00		10.40
E1	8.30	8.50	8.70
E2	6.85	7.05	7.25
e		2.54	
e1	4.88		5.28
H	15.00		15.85
J1	2.49		2.69
L	2.29		2.79
L1	1.27		1.40
L2	1.30		1.75
R		0.40	
V2	0°		8°

Figure 22. D²PAK (TO-263) recommended footprint (dimensions are in mm)
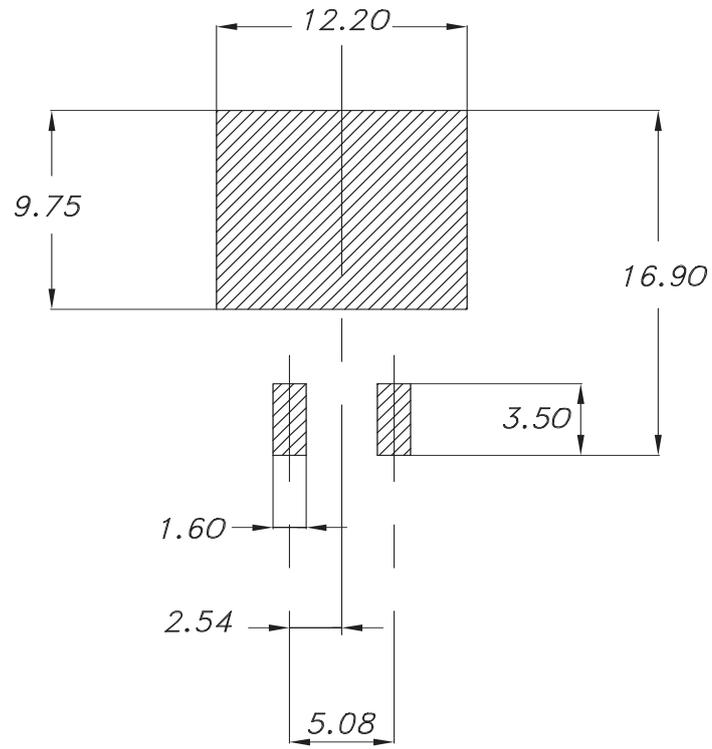
0079457_Rev27_footprint

4.2 DPAK (TO-252) type A package information

Figure 23. DPAK (TO-252) type A package outline
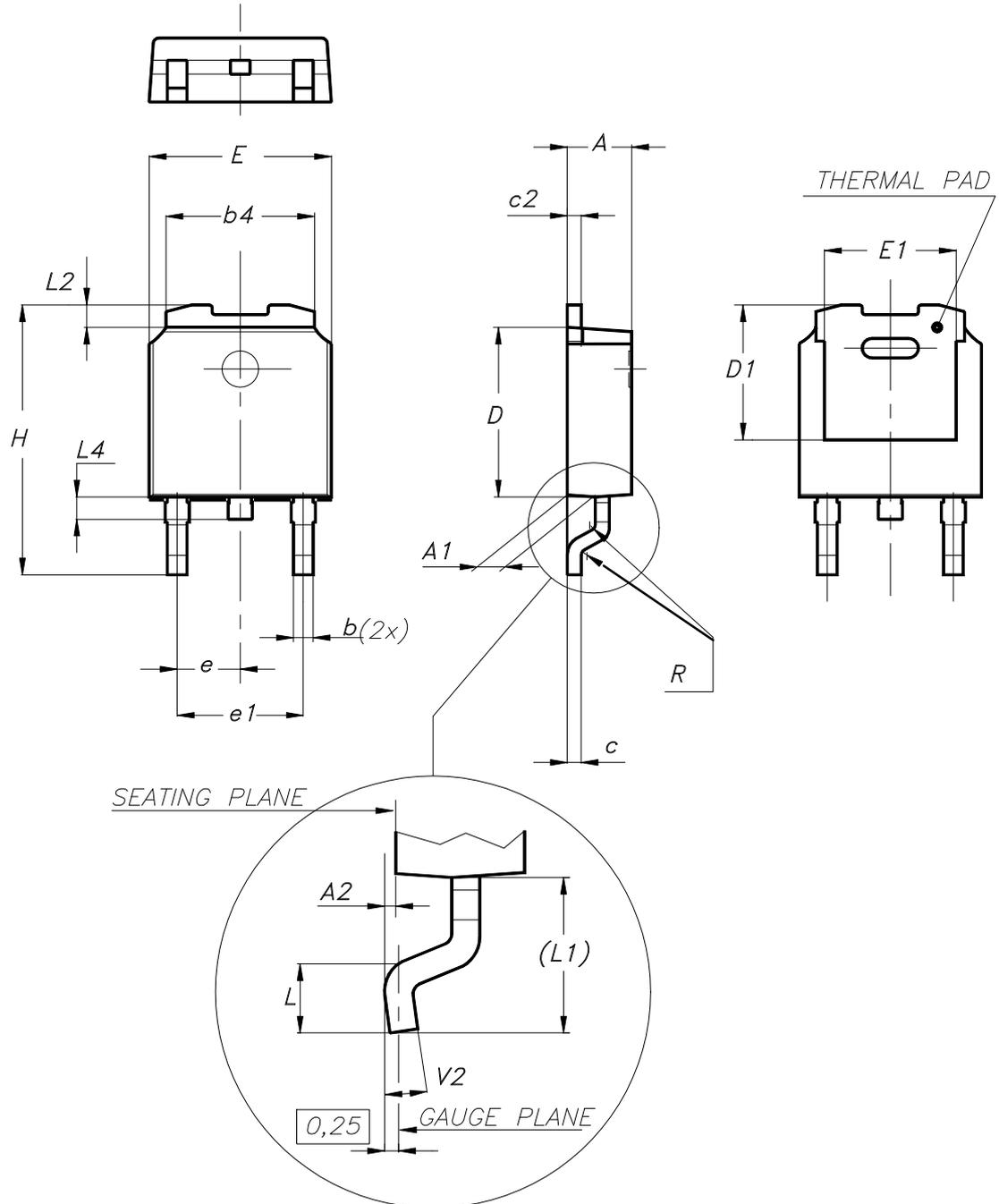

0068772_A_36

Table 9. 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°

4.3 DPAK (TO-252) type C package information
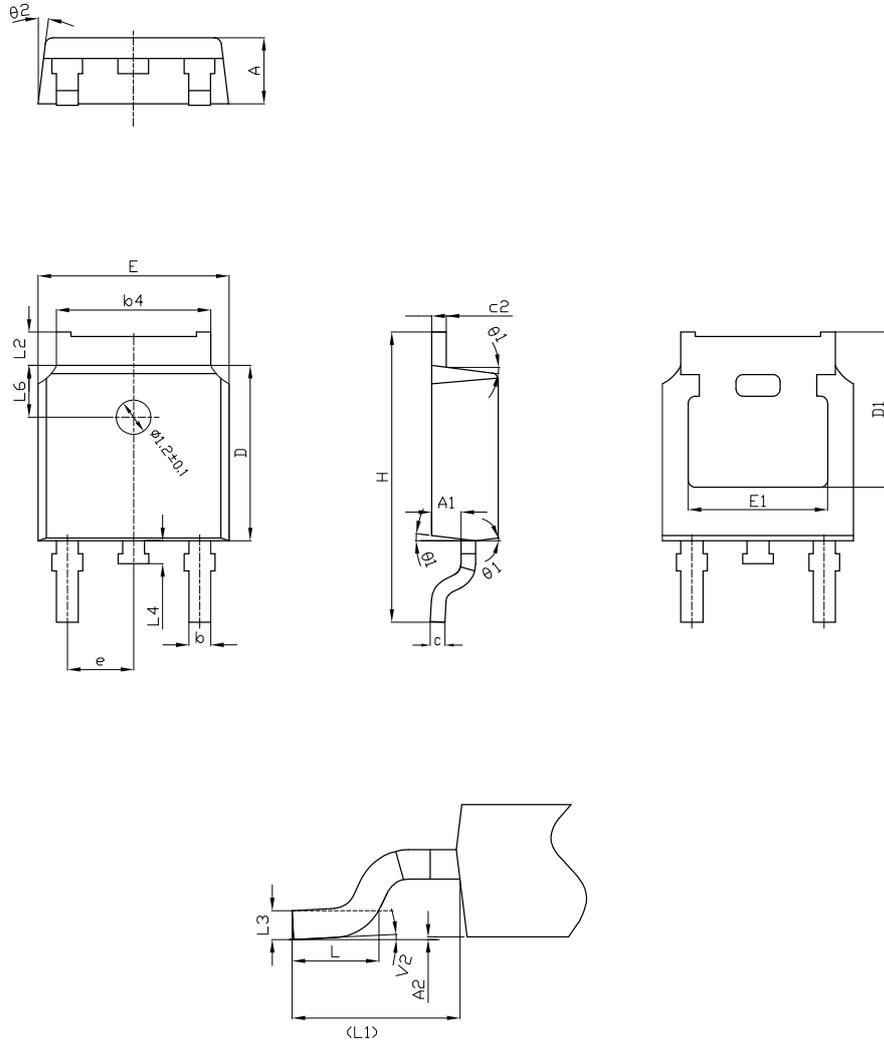
**Figure 24. DPAK (TO-252) type C package outline**

0068772_C_36

Table 10. DPAK (TO-252) type C mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	2.20	2.30	2.38
A1	0.90	1.01	1.10
A2	0.00		0.10
b	0.72		0.85
b4	5.13	5.33	5.46
c	0.47		0.60
c2	0.47		0.60
D	6.00	6.10	6.20
D1	5.15	5.40	5.65
E	6.50	6.60	6.70
E1	4.70	4.85	5.00
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	0.90		1.25
L3	0.51 BSC		
L4	0.60	0.80	1.00
L6	1.80 BSC		
θ1	5°	7°	9°
θ2	5°	7°	9°
V2	0°		8°

4.4 DPAK (TO-252) type E package information

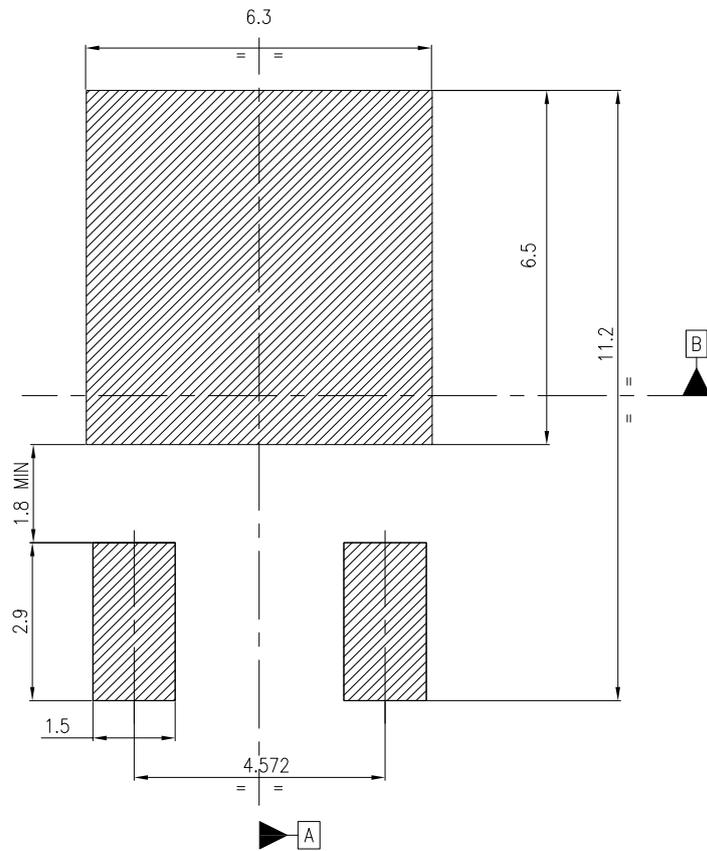**Figure 25. DPAK (TO-252) type E package outline**
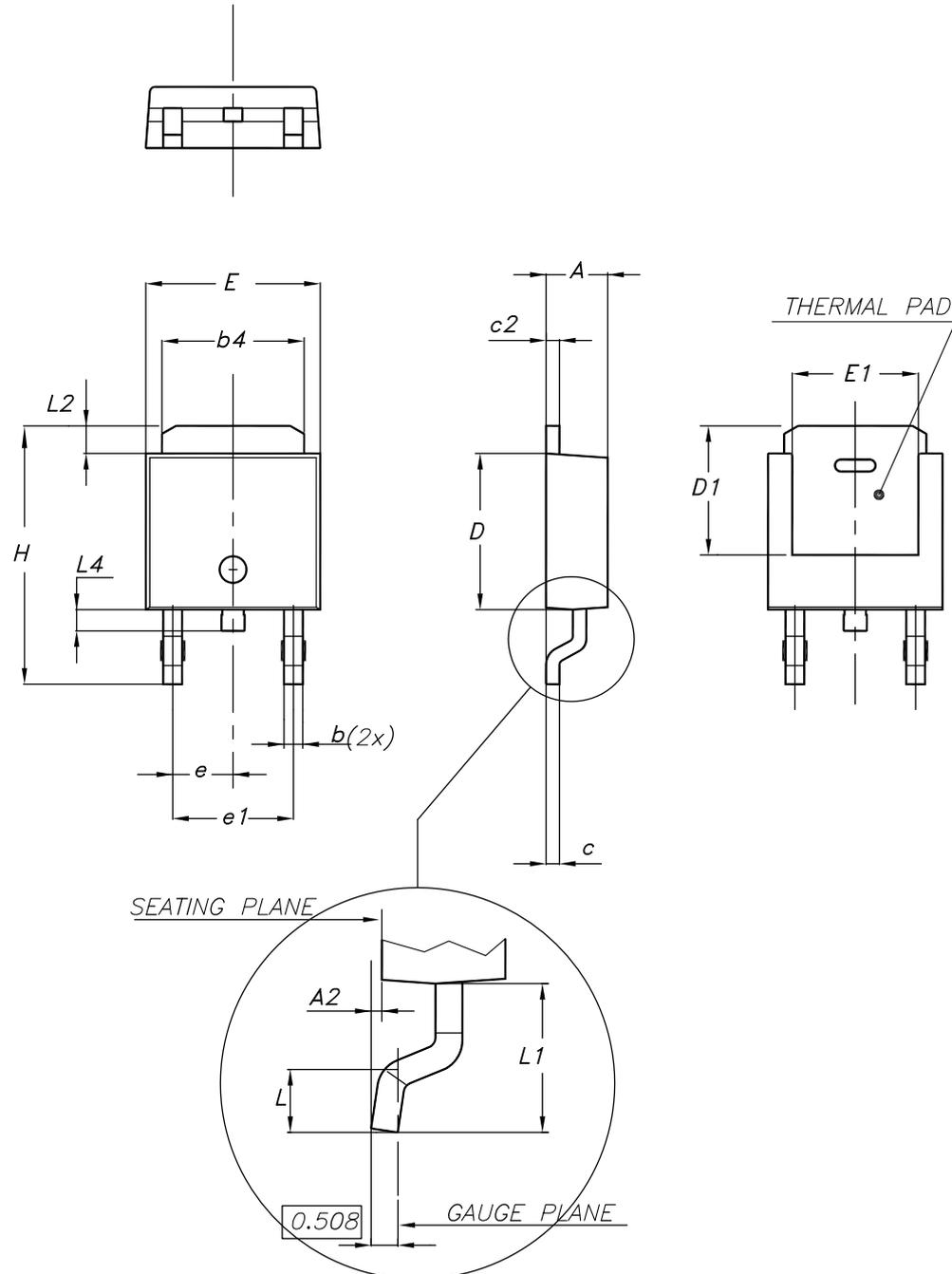
0068772_typeE_rev.36

Table 11. **DPAK (TO-252) type E mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	2.18		2.39
A2			0.13
b	0.65		0.884
b4	4.95		5.46
c	0.46		0.61
c2	0.46		0.60
D	5.97		6.22
D1	5.21		
E	6.35		6.73
E1	4.32		
e		2.286	
e1		4.572	
H	9.94		10.34
L	1.50		1.78
L1		2.74	
L2	0.89		1.27
L4			1.02

Figure 26. DPAK (TO-252) recommended footprint (dimensions are in mm)

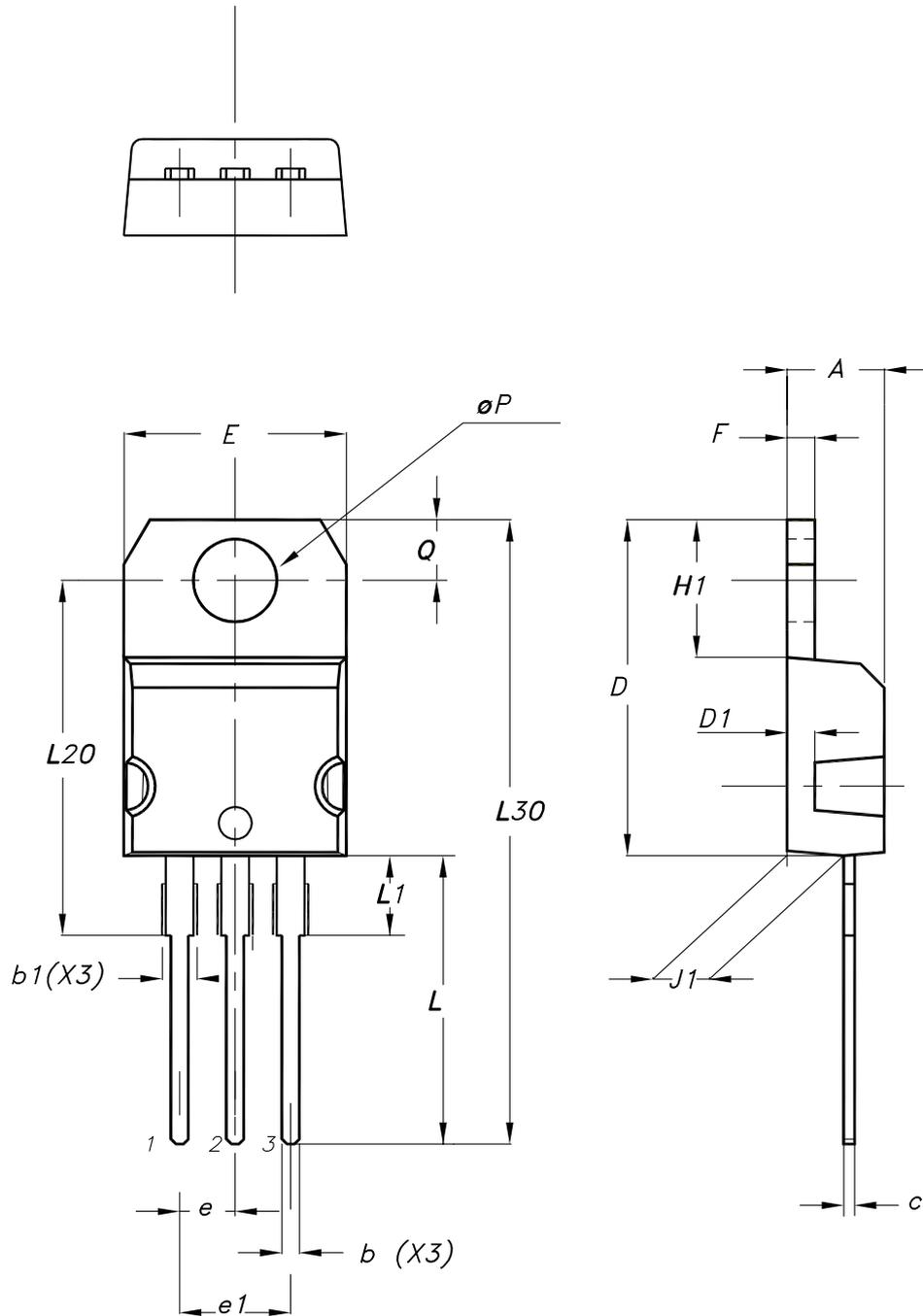Notes:

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 ⌖ 0.05 A B

FP_0068772_36

4.5 TO-220 type A package information

Figure 27. TO-220 type A package outline

0015988_typeA_Rev_24
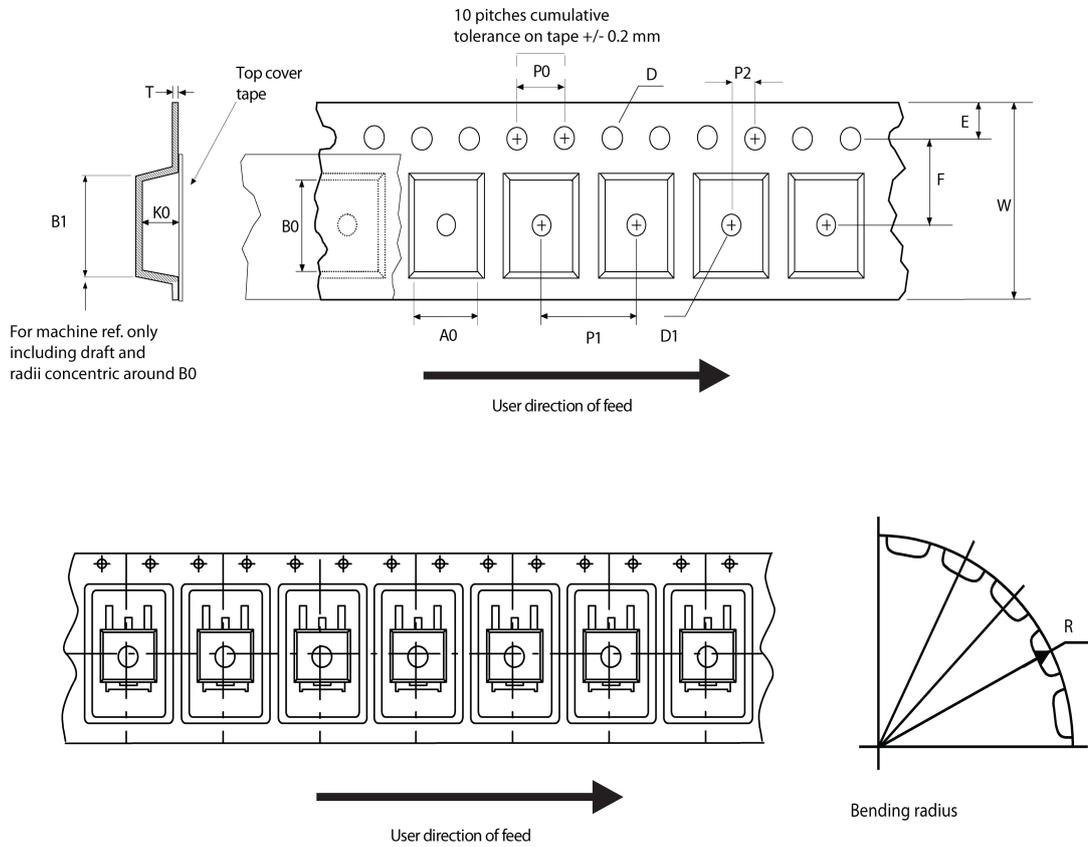
Table 12. TO-220 type A package mechanical data

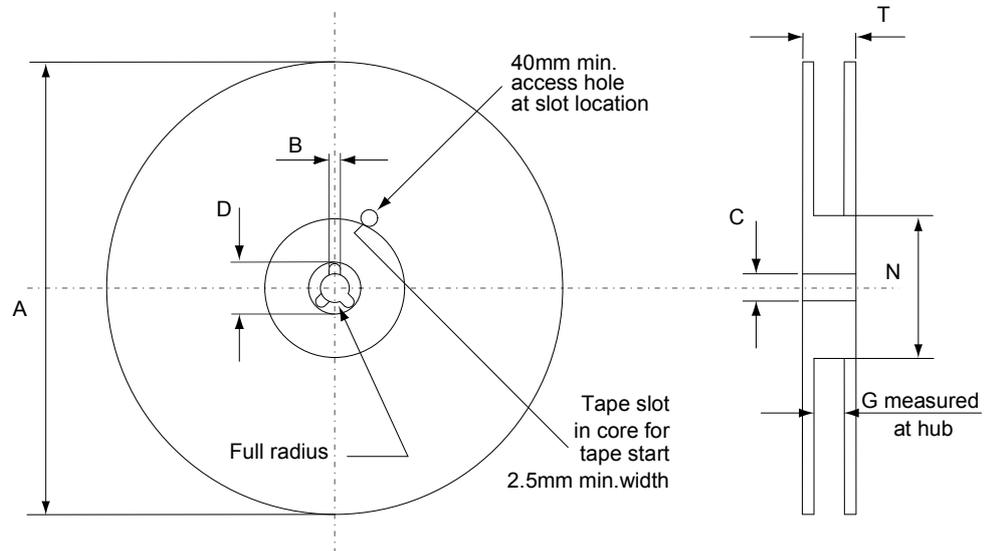| Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.55
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10.00		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13.00		14.00
L1	3.50		3.93
L20		16.40	
L30		28.90	
øP	3.75		3.85
Q	2.65		2.95
Slug flatness		0.03	0.10

4.6 D²PAK packing information

Figure 28. D²PAK tape drawing (dimensions are in mm)

0079900_14

4.7   DPAK packing information

Figure 29. DPAK tape outline

AM08852v1

Figure 30. DPAK reel outline

40mm min. access hole at slot location

Tape slot in core for tape start 2.5mm min.width

Full radius

G measured at hub

AM06038v1

Table 13. DPAK 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			

5   Order codes

Table 14. Device summary

Order code	Marking	Package	Packing
STB10N60M2	10N60M2	D²PAK	Tape and reel
STD10N60M2		DPAK	
STP10N60M2		TO-220	Tube

Revision history

Table 15. Document revision history

Date	Version	Changes
29-May-2013	1	First release.
06-Dec-2013	2	– Added: D²PAK package – Modified: title and $R_{DS(on)}$ values in cover page – Modified: $R_{DS(on)}$ values in *Table 5* – Modified: R_G value in *Table 6* – Modified: *Figure 9* and I_D value in *Figure 12* – Added: *Table 9*, *13*, *Figure 22* and *23* – Updated: *Table 10*, *11*, *Figure 24*, *25* and *26* Minor text changes.
08-Mar-2017	3	Updated the title and the description in cover page. Updated *Table 4: "Avalanche characteristics"*. Updated *Section 4.2: "DPAK (TO-252) type A package information"*. Added *Section 4.4: "DPAK (TO-252) type E package information"*, and *Section 4.7: "IPAK (TO-251) type C package information"*. Minor text changes.
19-Jan-2021	4	The part number STU10N60M2 have been removed and the document has been updated accordingly. Updated *Figure 1. Safe operating area for D²PAK and TO-220, Figure 2. Maximum transient thermal impedance for D²PAK and TO-220, Figure 3. Safe operating area for DPAK and Figure 4. Maximum transient thermal impedance for DPAK*. Minor text changes.
08-Jul-2025	5	Updated Section 4: Package information. Minor text changes.

Contents

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