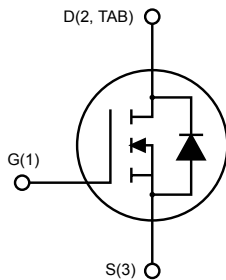
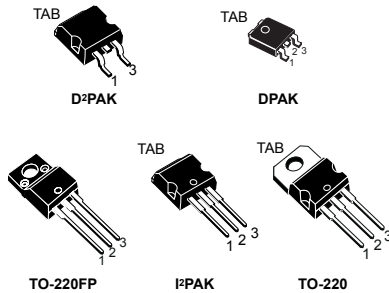


N-channel 100 V, 6.8 mΩ typ., 80 A STripFET™ F7 Power MOSFETs  
in D<sup>2</sup>PAK, DPAK, TO-220FP, I<sup>2</sup>PAK and TO-220 packages



AM01475v1\_noZen

## Features

Order codes	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>	Package
STB100N10F7	100 V	8.0 mΩ	80 A	D <sup>2</sup> PAK
STD100N10F7			80 A	DPAK
STF100N10F7			45 A	TO-220FP
STI100N10F7			80 A	I <sup>2</sup> PAK
STP100N10F7			80 A	TO-220

- Among the lowest R<sub>DS(on)</sub> on the market
- Excellent FoM (figure of merit)
- Low C<sub>rss</sub>/C<sub>iss</sub> ratio for EMI immunity
- High avalanche ruggedness

## Applications

- Switching applications

## Description

These N-channel Power MOSFETs utilize STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

### Product status links

[STB100N10F7](#)
[STD100N10F7](#)
[STF100N10F7](#)
[STI100N10F7](#)
[STP100N10F7](#)

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value			Unit
		DPAK	TO-220FP	TO-220 D <sup>2</sup> PAK I <sup>2</sup> PAK	
V <sub>DS</sub>	Drain-source voltage	100			V
V <sub>GS</sub>	Gate-source voltage	±20			V
I <sub>D</sub>	Drain current (continuous) at T <sub>C</sub> = 25 °C	80	45 <sup>(1)</sup>	80	A
	Drain current (continuous) at T <sub>C</sub> = 100 °C	62	32 <sup>(1)</sup>	70	A
I <sub>DM</sub> <sup>(2)</sup>	Drain current (pulsed)	320	180	320	A
P <sub>TOT</sub> <sup>(1)</sup>	Total dissipation at T <sub>C</sub> = 25 °C	120	30	150	W
V <sub>ISO</sub>	Insulation withstand voltage (RMS) from all three leads to external heatsink (t = 1 s, T <sub>C</sub> = 25 °C)	2.5			kV
T <sub>J</sub>	Operating junction temperature	-55 to 175			°C
T <sub>stg</sub>	Storage temperature range				°C

1. This value is limited by package.
2. Pulse width is limited by safe operating area.

**Table 2. Thermal resistance**

Symbol	Parameter	Value				Unit
		D <sup>2</sup> PAK	DPAK	TO-220FP	TO-220 I <sup>2</sup> PAK	
R <sub>thj-case</sub>	Thermal resistance junction-case	1	1.25	5	1	°C/W
R <sub>thj-amb</sub>	Thermal resistance junction-ambient	62.5				°C/W
R <sub>thj-pcb</sub> <sup>(1)</sup>	Thermal resistance junction-pcb	30	50			°C/W

1. When mounted on an 1-inch<sup>2</sup> FR-4 board, 2oz CU, t < 10 s.

**Table 3. Avalanche characteristics**

Symbol	Parameter	Value	Unit
E <sub>AS</sub>	Single pulse avalanche energy (T <sub>J</sub> = 25 °C, L = 3.5 mH, I <sub>AS</sub> = 15 A, V <sub>DD</sub> = 50 V, V <sub>GS</sub> = 10 V)	400	mJ

## 2 Electrical characteristics

( $T_{CASE} = 25\text{ °C}$  unless otherwise specified)

**Table 4. On-/off-states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$I_D = 250\ \mu\text{A}$ , $V_{GS} = 0\ \text{V}$	100			V
$I_{DSS}$	Zero gate voltage drain current	$V_{DS} = 100\ \text{V}$ , $V_{GS} = 0\ \text{V}$			1	$\mu\text{A}$
		$V_{DS} = 100\ \text{V}$ , $V_{GS} = 0\ \text{V}$ , $T_C = 125\text{ °C}^{(1)}$			100	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{GS} = 20\ \text{V}$ , $V_{DS} = 0\ \text{V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	<b>For D<sup>2</sup>PAK, DPAK, I<sup>2</sup>PAK and TO-220:</b> $V_{GS} = 10\ \text{V}$ , $I_D = 40\ \text{A}$ <b>For TO-220FP:</b> $V_{GS} = 10\ \text{V}$ , $I_D = 22.5\ \text{A}$		6.8	8.0	m $\Omega$

1. Defined by design, not subject to production test.

**Table 5. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{DS} = 50\ \text{V}$ , $f = 1\ \text{MHz}$ , $V_{GS} = 0\ \text{V}$	-	4369	-	pF
$C_{oss}$	Output capacitance		-	823	-	pF
$C_{riss}$	Reverse transfer capacitance		-	36	-	pF
$Q_g$	Total gate charge	$V_{DD} = 50\ \text{V}$ , $I_D = 80\ \text{A}$ , $V_{GS} = 0$ to $10\ \text{V}$ (see Figure 17. Test circuit for gate charge behavior)	-	61	-	nC
$Q_{gs}$	Gate-source charge		-	26	-	nC
$Q_{gd}$	Gate-drain charge		-	13	-	nC

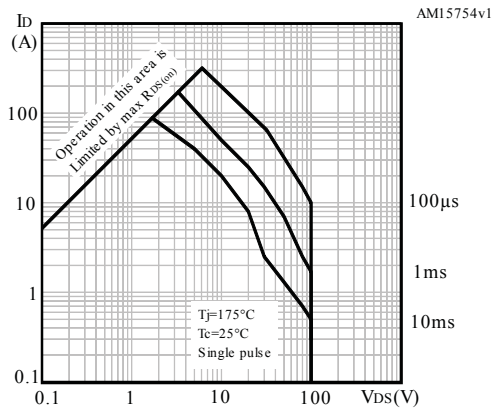
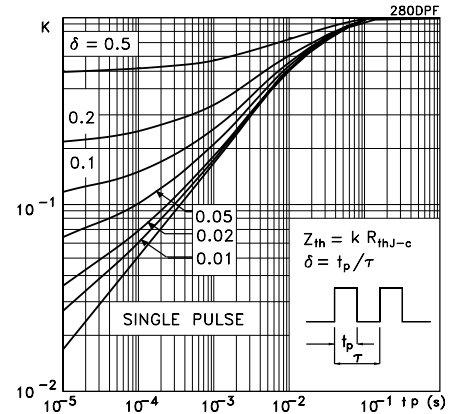
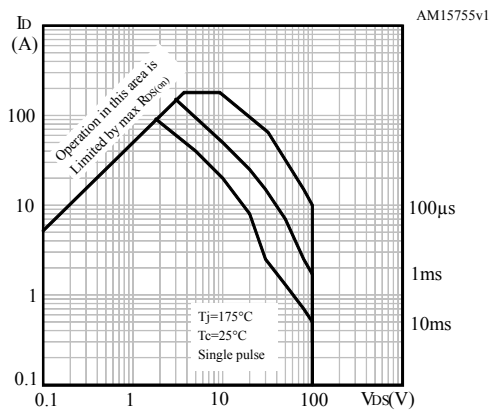
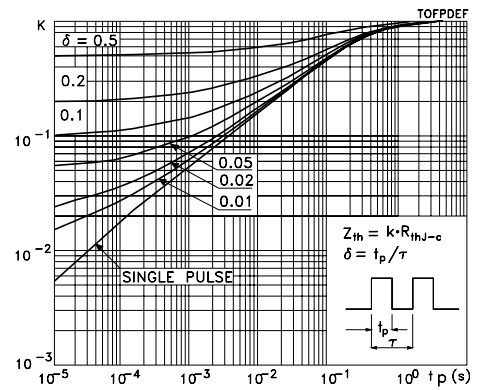
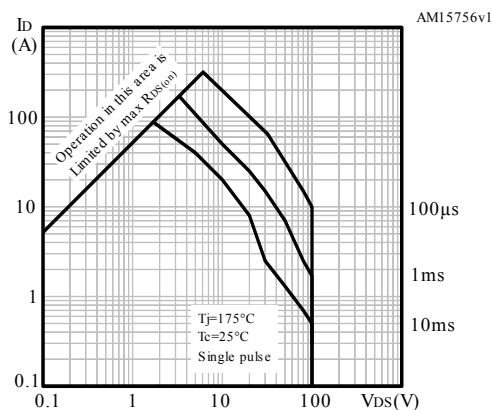
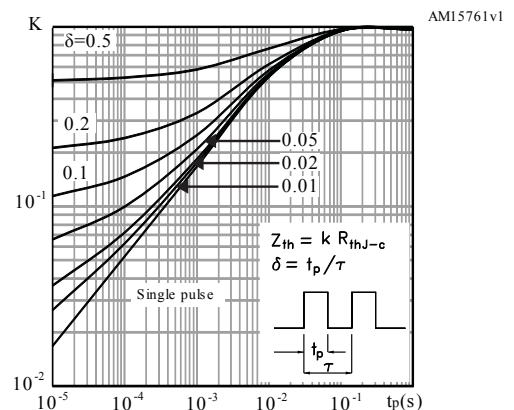
**Table 6. Switching times**

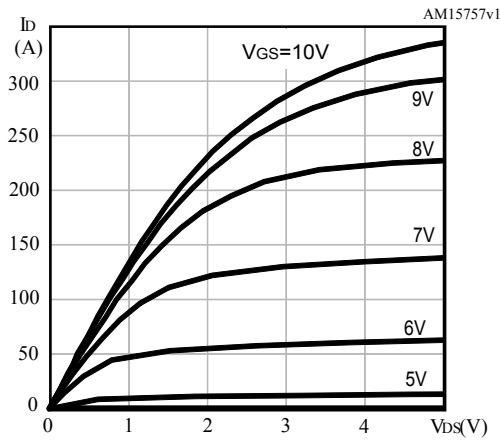
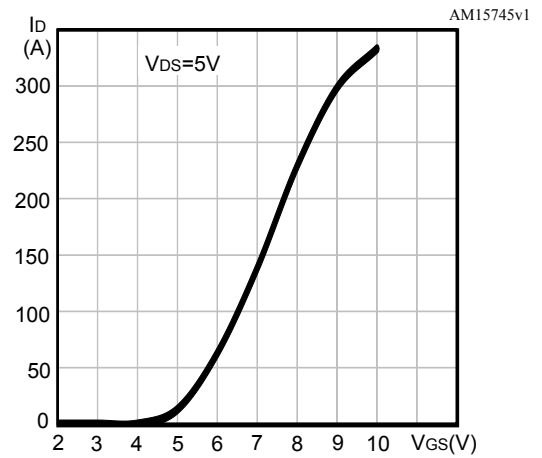
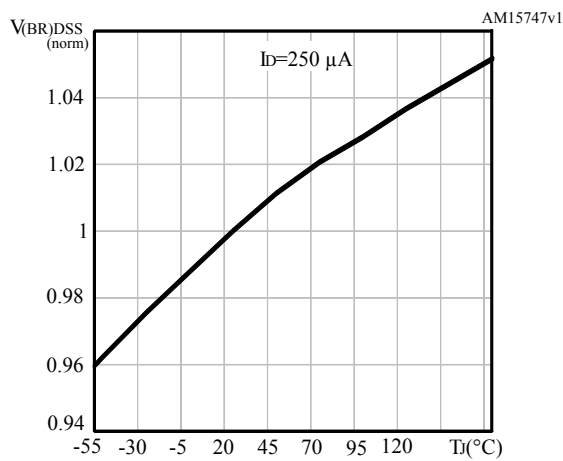
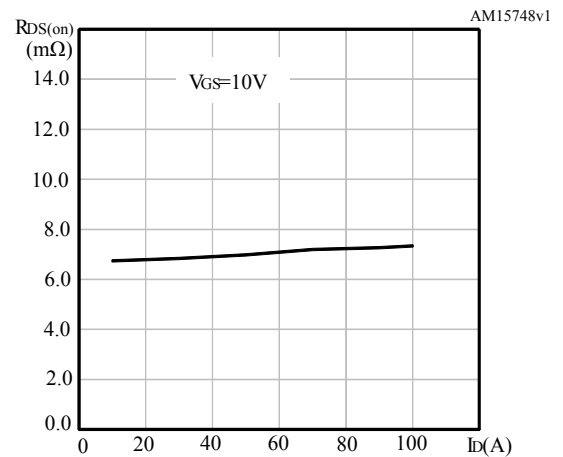
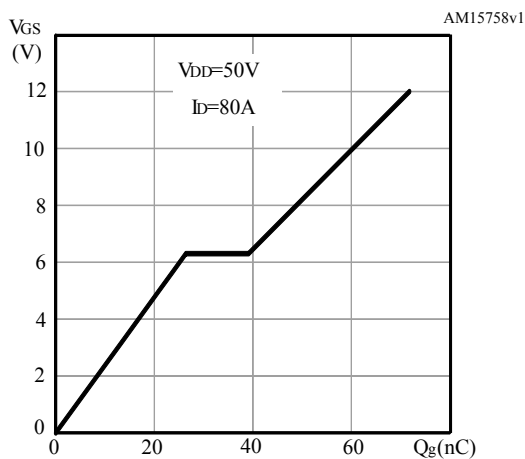
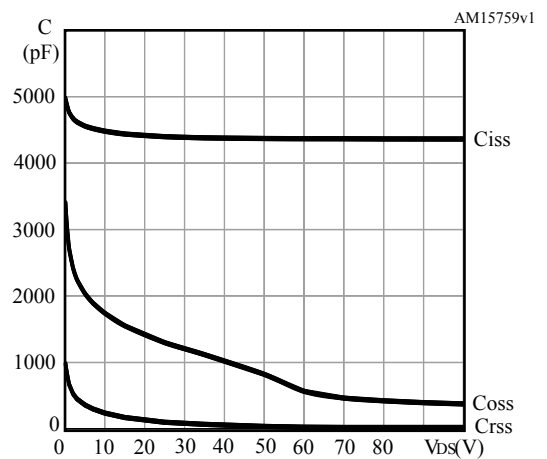
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50\ \text{V}$ , $I_D = 40\ \text{A}$ , $R_G = 4.7\ \Omega$ , $V_{GS} = 10\ \text{V}$	-	27	-	ns
$t_r$	Rise time		-	40	-	ns
$t_{d(off)}$	Turn-off delay time	(see Figure 16. Test circuit for resistive load switching times and Figure 21. Switching time waveform)	-	46	-	ns
$t_f$	Fall time		-	15	-	ns

**Table 7. Source-drain diode**

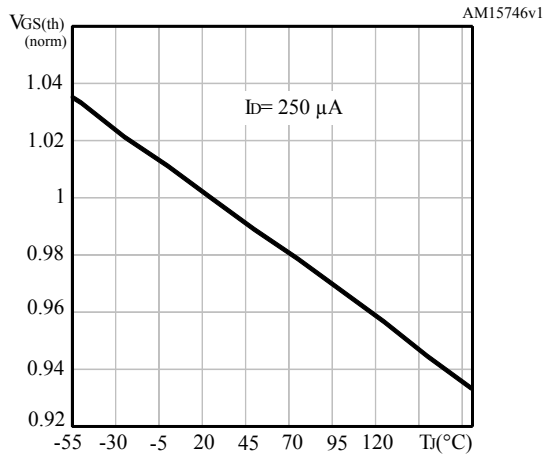
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		80	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		320	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 80 \text{ A}$ , $V_{GS} = 0 \text{ V}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 80 \text{ A}$ , $di/dt = 100 \text{ A}/\mu\text{s}$	-	77		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 80 \text{ V}$ , $T_J = 150 \text{ }^\circ\text{C}$	-	146		nC
$I_{RRM}$	Reverse recovery current	(see Figure 18. Test circuit for inductive load switching and diode recovery times)	-	4		A

1. Pulse width is limited by safe operating area.
2. Pulsed: pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%

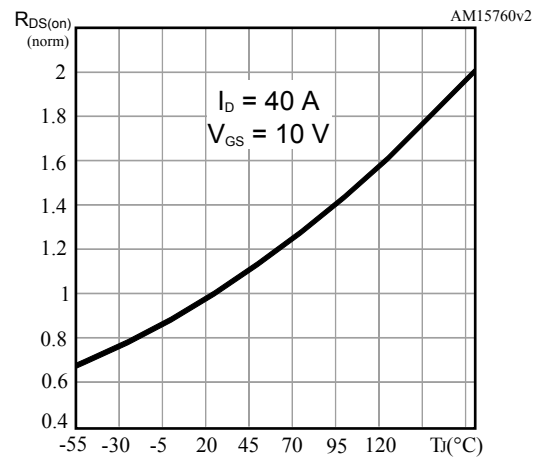
**2.1 Electrical characteristics (curves)**
**Figure 1. Safe operating area for DPAK**

**Figure 2. Thermal impedance for DPAK**

**Figure 3. Safe operating area for TO-220FP**

**Figure 4. Thermal impedance for TO-220FP**

**Figure 5. Safe operating area for D<sup>2</sup>PAK, I<sup>2</sup>PAK and TO-220**

**Figure 6. Thermal impedance for D<sup>2</sup>PAK, I<sup>2</sup>PAK and TO-220**


**Figure 7. Output characteristics**

**Figure 8. Transfer characteristics**

**Figure 9. Normalized  $V_{(BR)DSS}$  vs temperature**

**Figure 10. Static drain-source on-resistance**

**Figure 11. Gate charge vs gate-source voltage**

**Figure 12. Capacitance variations**


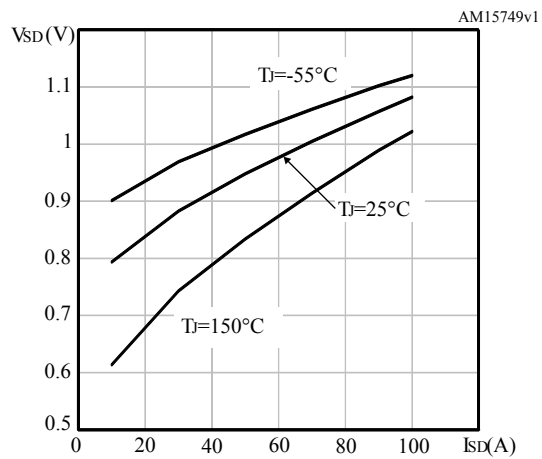
**Figure 13. Normalized gate threshold voltage vs temperature**



**Figure 14. Normalized on-resistance vs temperature**



**Figure 15. Source-drain diode forward characteristics**



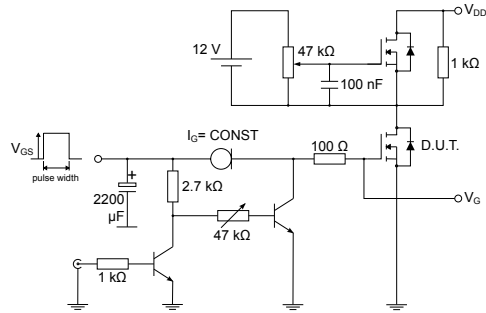
### 3 Test circuits

Figure 16. Test circuit for resistive load switching times



AM01468v1

Figure 17. Test circuit for gate charge behavior



AM01469v1

Figure 18. Test circuit for inductive load switching and diode recovery times



AM01470v1

Figure 19. Unclamped inductive load test circuit



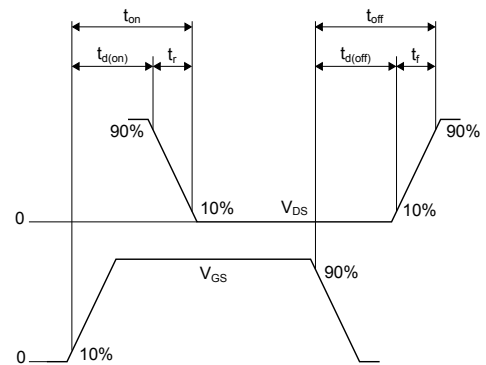
AM01471v1

Figure 20. Unclamped inductive waveform



AM01472v1

Figure 21. Switching time waveform



AM01473v1





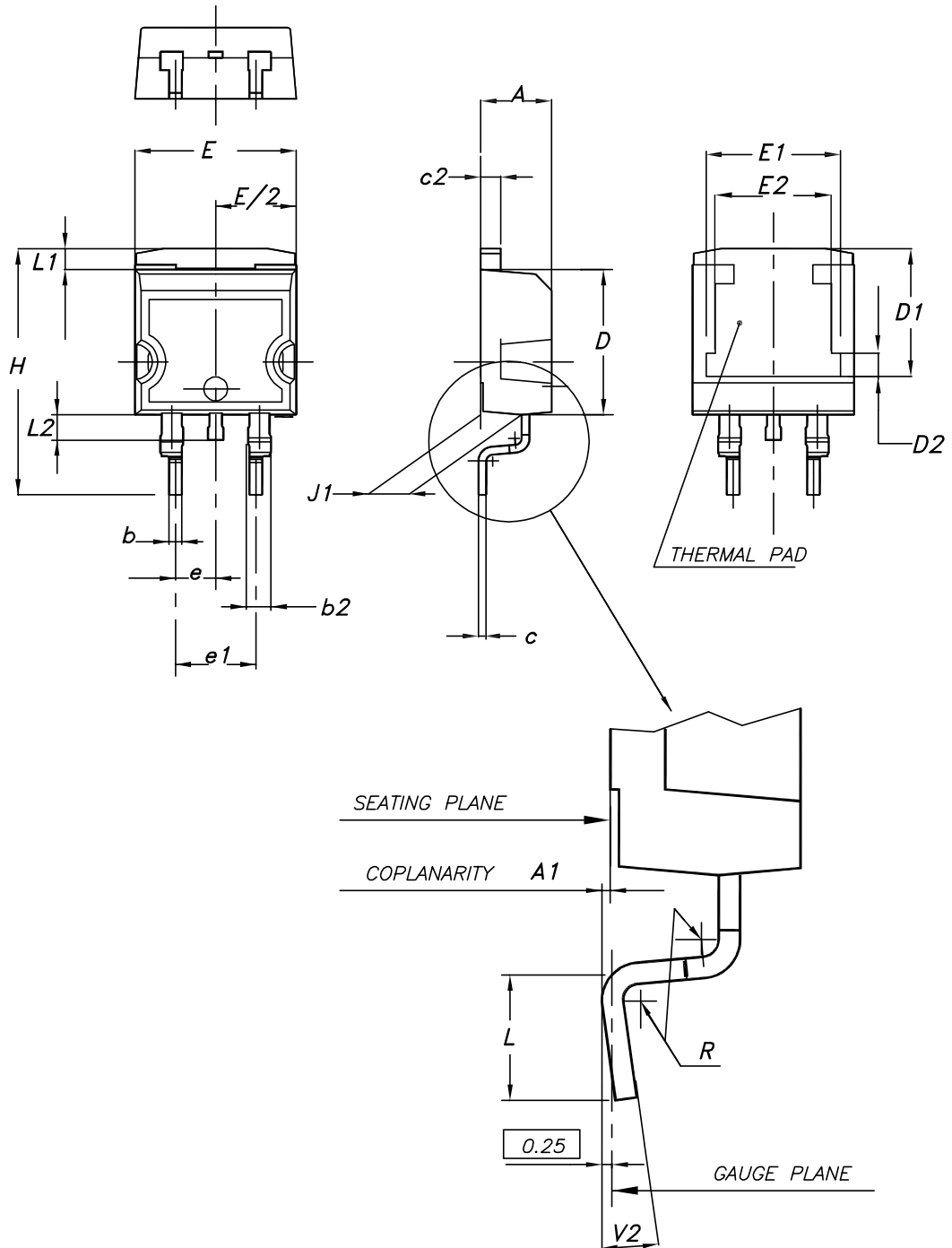
## 4 Package information

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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 D<sup>2</sup>PAK (TO-263) type A package information

Figure 22. D<sup>2</sup>PAK (TO-263) type A package outline

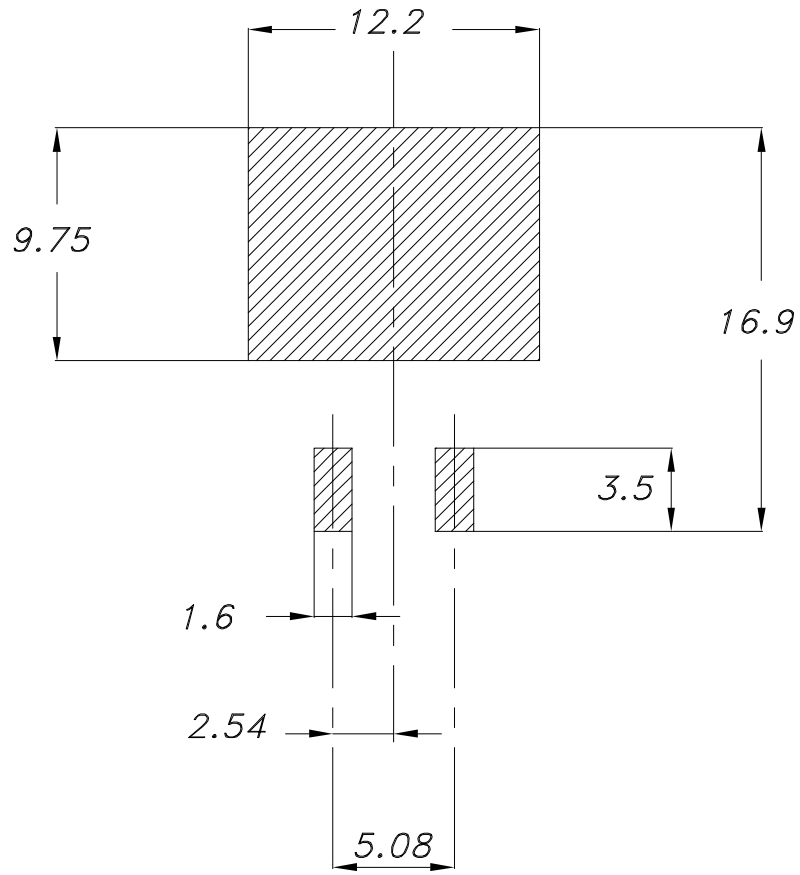


0079457\_25

**Table 8. D<sup>2</sup>PAK (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°

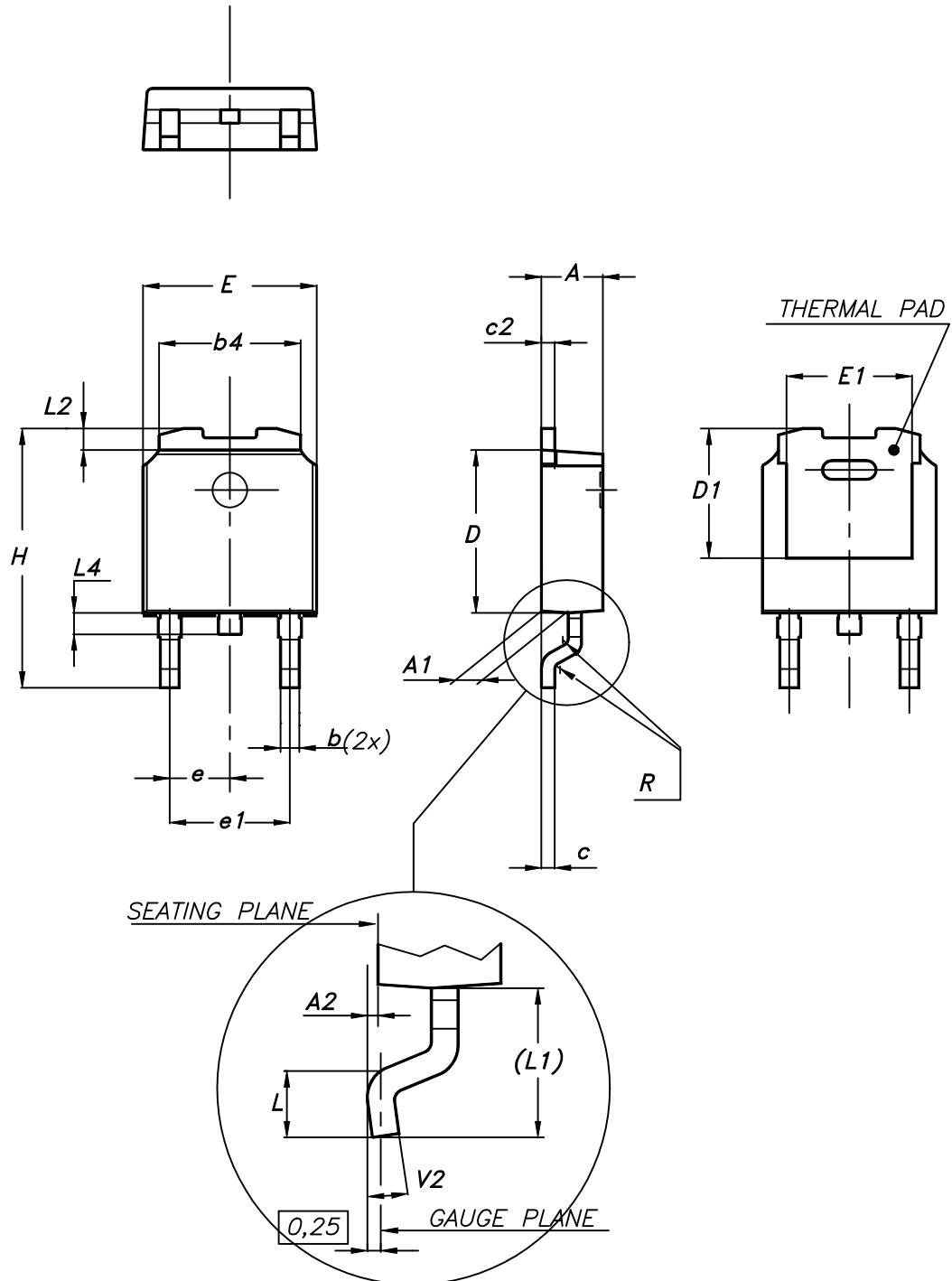
Figure 23. D<sup>2</sup>PAK (TO-263) recommended footprint (dimensions are in mm)



Footprint

## 4.2 DPAK (TO-252) type A2 package information

Figure 24. DPAK (TO-252) type A2 package outline

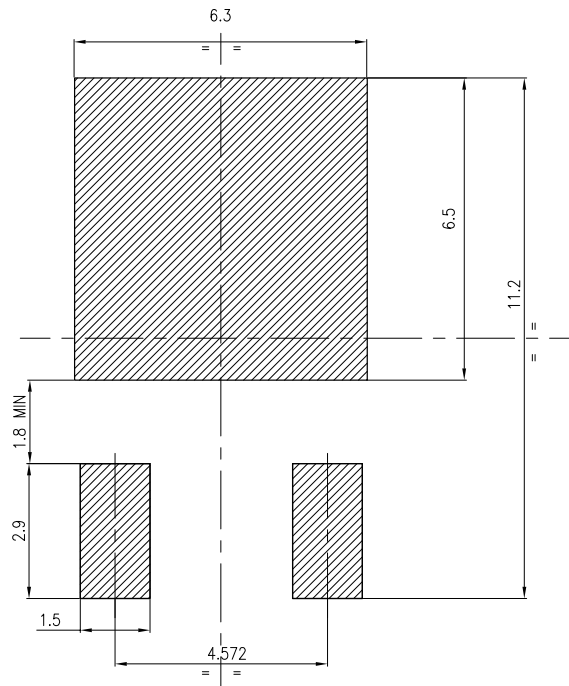


0068772\_type-A2\_rev25

**Table 9. DPAK (TO-252) type A2 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	5.10	5.20	5.30
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°

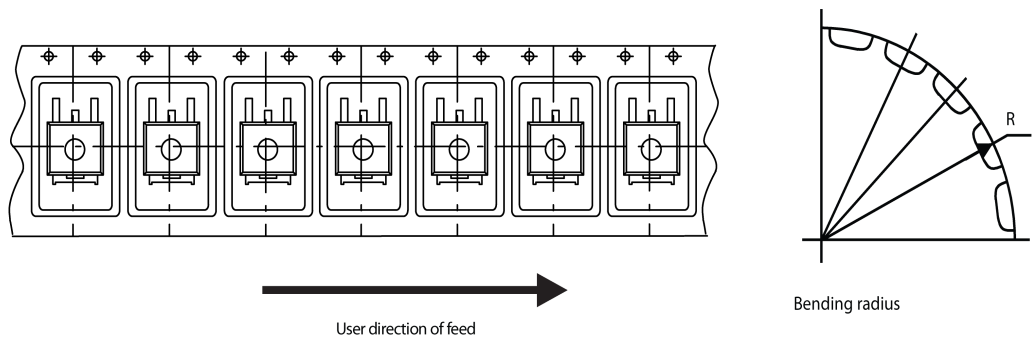
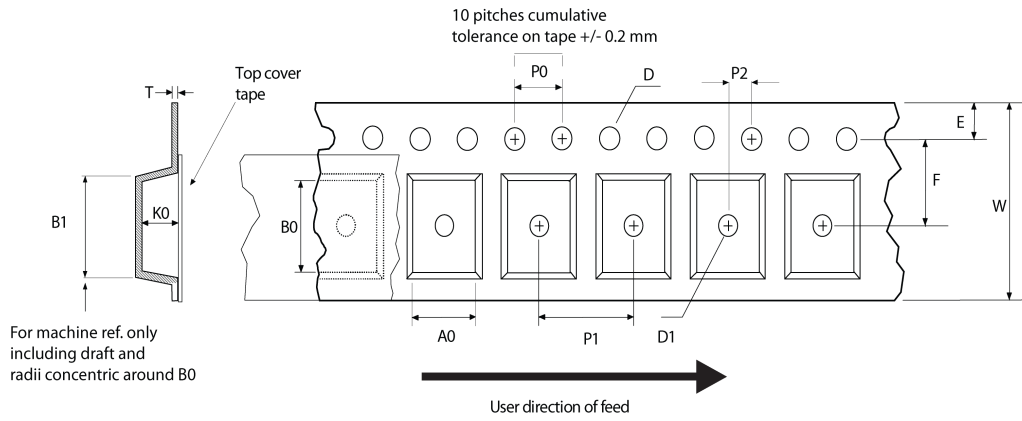
Figure 25. DPAK (TO-252) recommended footprint (dimensions are in mm)



FP\_0068772\_25

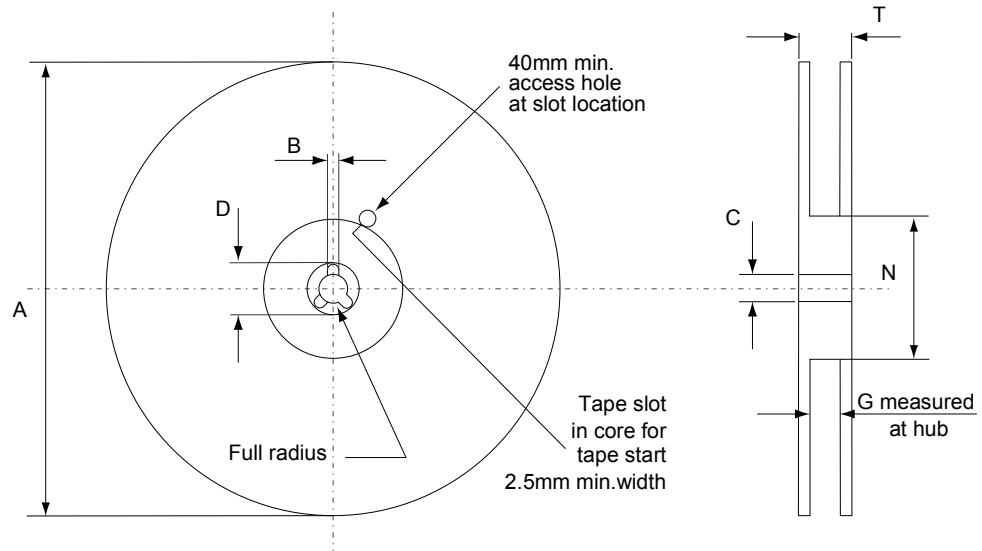
### 4.3 D<sup>2</sup>PAK and DPAK packing information

Figure 26. Tape outline



AM08852v1



**Figure 27. Reel outline**


AM06038v1

**Table 10. D<sup>2</sup>PAK tape and reel mechanical data**

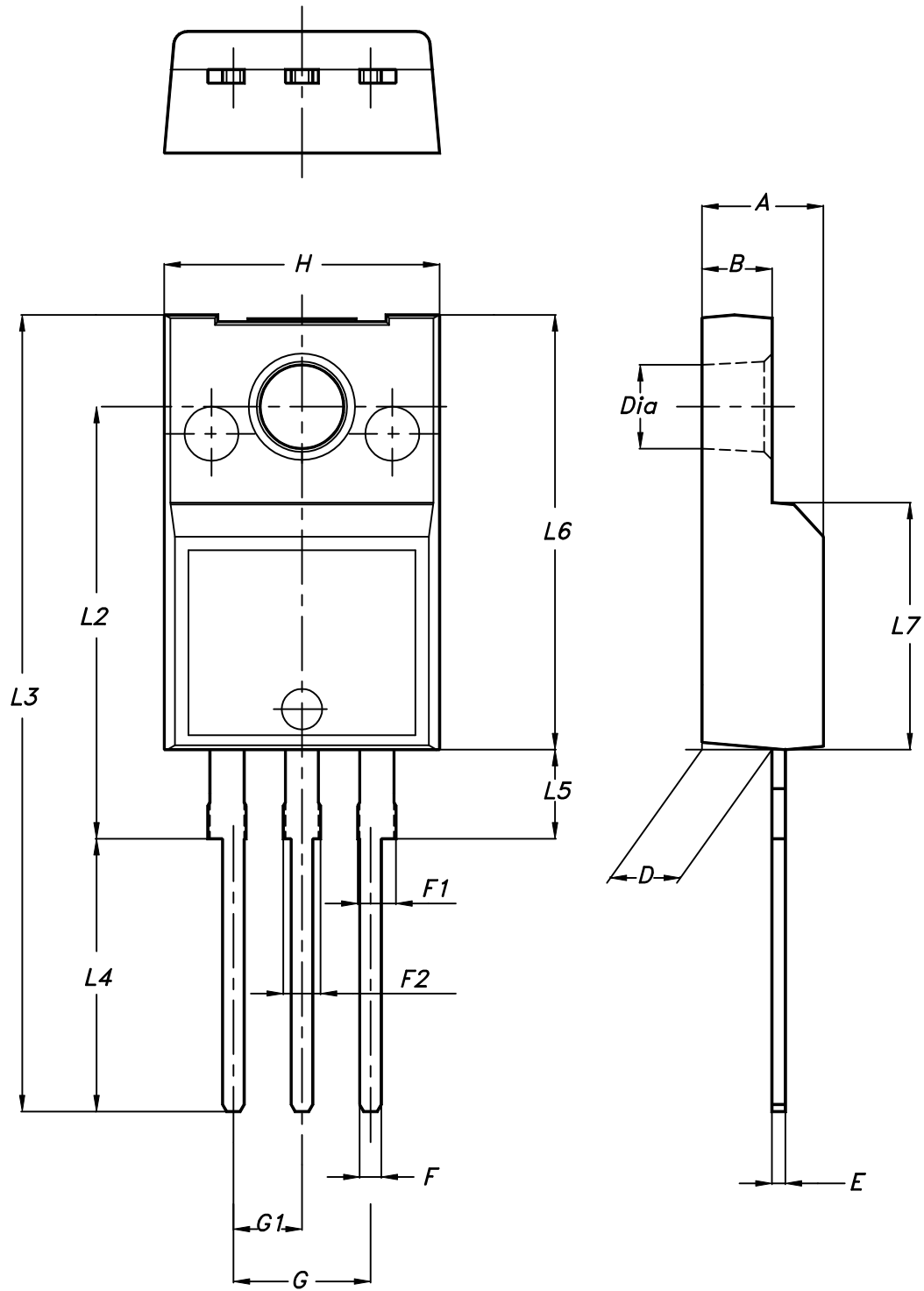
Tape			Reel			
Dim.	mm		Dim.	mm		
	Min.	Max.		Min.	Max.	
A0	10.5	10.7	A		330	
B0	15.7	15.9	B	1.5		
D	1.5	1.6	C	12.8	13.2	
D1	1.59	1.61	D	20.2		
E	1.65	1.85	G	24.4	26.4	
F	11.4	11.6	N	100		
K0	4.8	5.0	T		30.4	
P0	3.9	4.1	Base quantity Bulk quantity			
P1	11.9	12.1				1000
P2	1.9	2.1				1000
R	50					
T	0.25	0.35				
W	23.7	24.3				

**Table 11. 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			

#### 4.4 TO-220FP package information

Figure 28. TO-220FP package outline



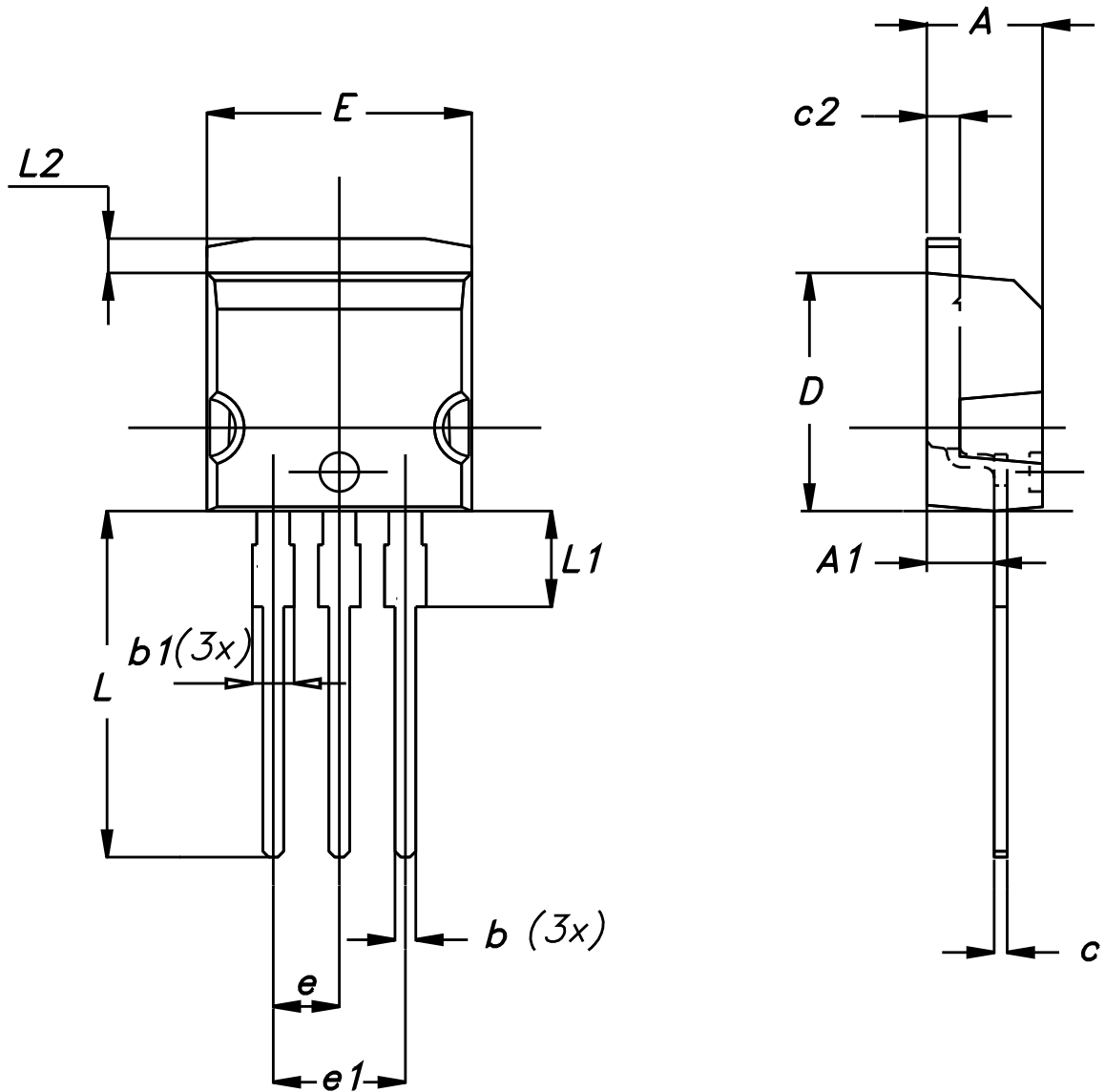
7012510\_Rev\_12\_B

**Table 12. TO-220FP package mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2

4.5 I<sup>2</sup>PAK package information

Figure 29. I<sup>2</sup>PAK package outline



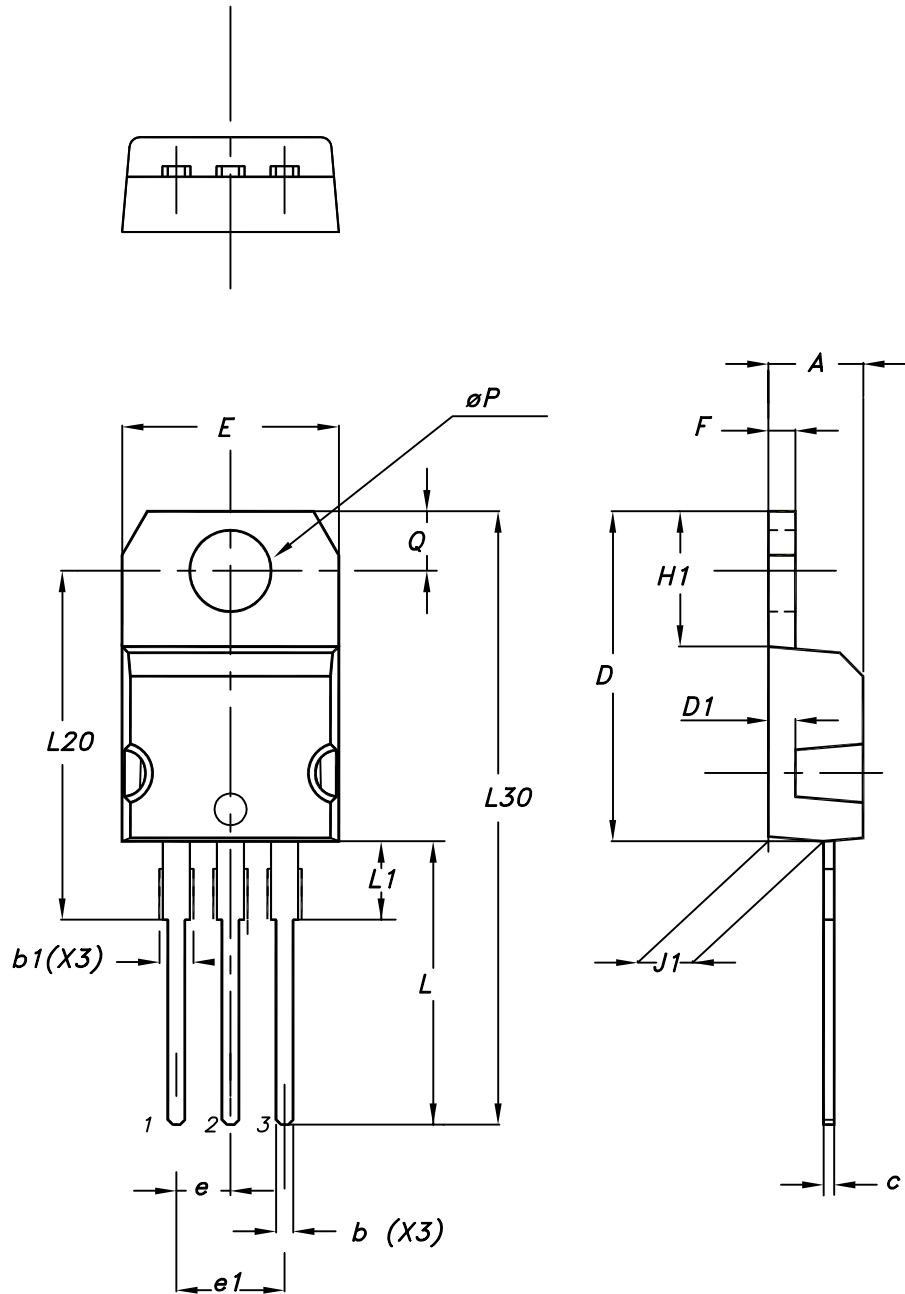
0004982\_Rev\_H

**Table 13. I<sup>2</sup>PAK package mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.40	-	4.60
A1	2.40	-	2.72
b	0.61	-	0.88
b1	1.14	-	1.70
c	0.49	-	0.70
c2	1.23	-	1.32
D	8.95	-	9.35
e	2.40	-	2.70
e1	4.95	-	5.15
E	10	-	10.40
L	13	-	14
L1	3.50	-	3.93
L2	1.27	-	1.40

## 4.6 TO-220 type A package information

Figure 30. TO-220 type A package outline



0015988\_typeA\_Rev\_21

**Table 14. 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



## 5 Ordering information

Table 15. Order codes

Order code	Marking	Package	Packing
STB100N10F7	100N10F7	D <sup>2</sup> PAK	Tape and reel
STD100N10F7		DPAK	Tape and reel
STF100N10F7		TO-220FP	Tube
STI100N10F7		I <sup>2</sup> PAK	Tube
STP100N10F7		TO-220	Tube

## Revision history

**Table 16. Document revision history**

Date	Version	Changes
05-Oct-2012	1	Initial release.
07-Feb-2013	2	<p>Inserted device in TO-220FP.</p> <p>Updated title and features on the cover page, <i>Table 1: Device summary</i>, <i>Table 2: Absolute maximum ratings</i>, <i>Table 3: Thermal resistance</i> and <i>Table 5: On/off states</i> accordingly.</p> <p>Updated <i>Table 6: Dynamic</i>, <i>Table 7: Switching times</i>, <i>Table 8: Source drain diode</i> and <i>Section 4: Package mechanical data</i>.</p> <p>Added <i>Section 5: Packaging mechanical data</i>.</p>
29-Apr-2013	3	<p>Modified: the entire typical values in <i>Table 6</i>, <i>t<sub>f</sub></i> typical value in <i>Table 7</i>, VSD and typical values for <i>t<sub>rr</sub></i>, <i>q<sub>rr</sub></i>, IRRM</p> <p>Inserted: <i>Table 4: Avalanche characteristics</i> and <i>Section 2.1: Electrical characteristics (curves)</i></p> <p>Minor text changes</p>
25-Nov-2013	4	<p>Inserted device in D<sup>2</sup>PAK.</p> <p>Updated title and features on the cover page, <i>Table 1: Device summary</i>, <i>Table 2: Absolute maximum ratings</i>, <i>Table 3: Thermal resistance</i> and <i>Table 5: On/off states</i> accordingly.</p> <p>Updated <i>Table 6: Dynamic</i>, <i>Section 4: Package mechanical data</i> and <i>Section 5: Packaging mechanical data</i>.</p>
18-Jun-2018	5	<p>Added STI100N10F7 device and updated the document accordingly.</p> <p>Removed maturity status indication, updated title, features and description on cover page.</p> <p>Updated <a href="#">Table 1. Absolute maximum ratings</a>.</p> <p>Updated <a href="#">Section 4 Package information</a>.</p> <p>Minor text changes</p>

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