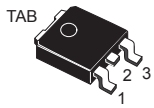
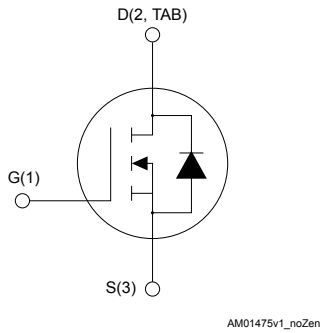
Automotive-grade N-channel 250 V, 140 mΩ typ., 17 A STripFET II Power MOSFET in a DPAK package



DPAK



Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
STD18NF25	250 V	165 mΩ	17 A

- AEC-Q101 qualified
- Exceptional dv/dt capability
- 100% avalanche tested
- Low gate charge

Applications

- Switching applications

Description

This Power MOSFET has been developed using STMicroelectronics' unique STripFET process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.

Product status link
STD18NF25

Product summary	
Order code	STD18NF25
Marking	18NF25
Package	DPAK
Packing	Tape and reel

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	250	V
V_{GS}	Gate-source voltage	±20	V
I_D	Drain current (continuous) at T_C = 25 °C	17	A
	Drain current (continuous) at T_C = 100 °C	12	
I_{DM} (1)	Drain current (pulsed)	68	A
P_{TOT}	Total power dissipation at T_C = 25 °C	110	W
dv/dt (2)	Peak diode recovery voltage slope	10	V/ns
T_J	Operating junction temperature range	-55 to 175	°C
T_{stg}	Storage temperature range		

1. *Pulse width limited by safe operating area.*
2. *I_{SD} ≤ 17 A, di/dt ≤ 200 A/µs, V_{DS} (peak) ≤ $V_{(BR)DSS}$, V_{DD} = 80% $V_{(BR)DSS}$.*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	1.36	°C/W
R_{thJA} (1)	Thermal resistance, junction-to-ambient	50	°C/W

1. *When mounted on 1 inch² FR-4, 2 Oz copper board.*

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_J max)	17	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	170	mJ

2 Electrical characteristics

T_C = 25 °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 = 1 mA, V_{GS} = 0 V	250			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0 V, V_{DS} = 250 V			1	µA
		V_{GS} = 0 V, V_{DS} = 250 V, T_C = 125 °C (1)			10	
I_{GSS}	Gate body leakage current	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
$V_{GS(th)}$	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 = 8.5 A		140	165	mΩ

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} = 25 V, f = 1 MHz, V_{GS} = 0 V	-	1000	-	pF
C_{oss}	Output capacitance		-	178	-	pF
C_{rss}	Reverse transfer capacitance		-	28	-	pF
$C_{o(tr)}$ (1)	Equivalent output capacitance time related	V_{DS} = 0 to 200 V, V_{GS} = 0 V	-	106	-	pF
$C_{o(er)}$ (2)	Equivalent output capacitance energy related		-	79	-	pF
R_g	Intrinsic gate resistance	f = 1 MHz, I_D = 0 A	-	2	-	Ω
Q_g	Total gate charge	V_{DD} = 200 V, I_D = 17 A, V_{GS} = 0 to 10 V (see Figure 14. Test circuit for gate charge behavior)	-	29.3	-	nC
Q_{gs}	Gate-source charge		-	4.5	-	nC
Q_{gd}	Gate-drain charge		-	14.4	-	nC

1. *$C_{o(tr)}$ is a constant capacitance value that gives the same stored energy as C_{oss} while V_{DS} is rising from 0 to 80% V_{DSS}.*
2. *$C_{o(er)}$ is a constant capacitance value that gives the same stored energy as C_{oss} while V_{DS} is rising 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} = 125 V, I_D = 8.5 A, R_G = 4.7 Ω, V_{GS} = 10 V (see Figure 13. Test circuit for resistive load switching times and Figure 18. Switching time waveform)	-	10.2	-	ns
t_r	Rise time		-	16.5	-	ns
$t_{d(off)}$	Turn-off delay time		-	31.5	-	ns
t_f	Fall time		-	9.8	-	ns

Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		17	A
I_{SDM} (1)	Source-drain current (pulsed)		-		68	A
V_{SD} (2)	Forward on voltage	I_{SD} = 17 A, V_{GS} = 0 V	-		1.5	V
t_{rr}	Reverse recovery time	I_{SD} = 17 A, di/dt = 100 A/µs, V_{DD} = 60 V (see Figure 15. Test circuit for inductive load switching and diode recovery times)	-	147		ns
Q_{rr}	Reverse recovery charge		-	0.8		µC
I_{RRM}	Reverse recovery current		-	10.6		A
t_{rr}	Reverse recovery time	I_{SD} = 17 A, di/dt = 100 A/µs, V_{DD} = 60 V, T_J = 150 °C (see Figure 15. Test circuit for inductive load switching and diode recovery times)	-	180		ns
Q_{rr}	Reverse recovery charge		-	1.1		µC
I_{RRM}	Reverse recovery current		-	12		A

1. *Pulse width limited by safe operating area.*
2. *Pulsed: pulse duration = 300 µs, duty cycle 1.5%.*

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

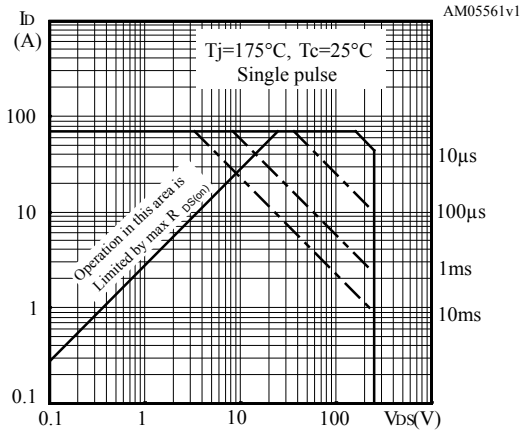


Figure 2. Normalized transient thermal impedance

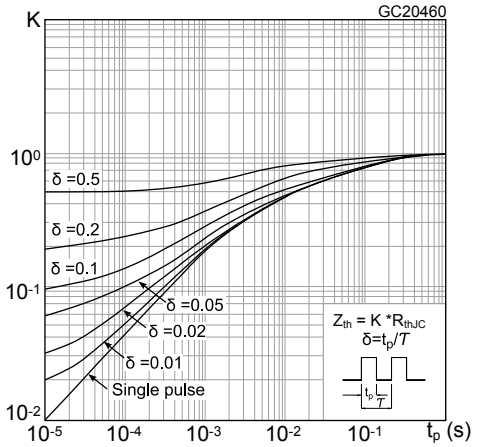


Figure 3. Typical output characteristics

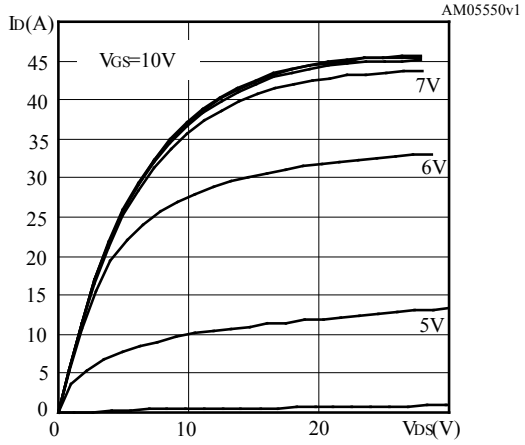


Figure 4. Typical transfer characteristics

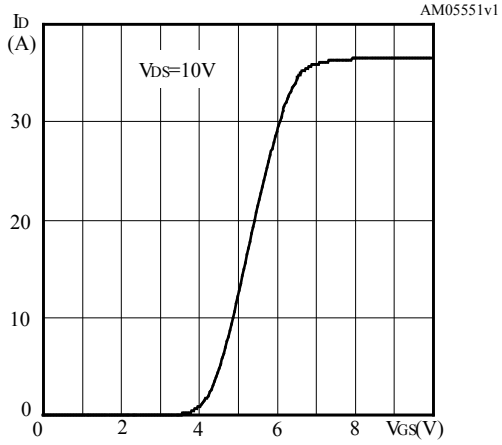


Figure 5. Typical gate charge characteristics

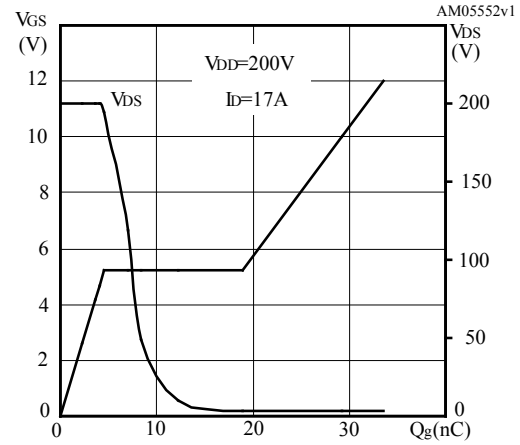


Figure 6. Typical drain-source on-resistance

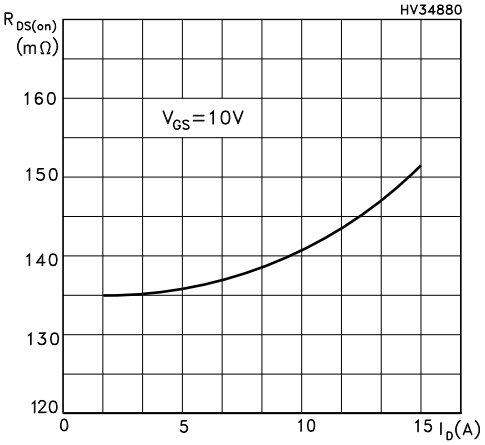


Figure 7. Typical output capacitance stored energy

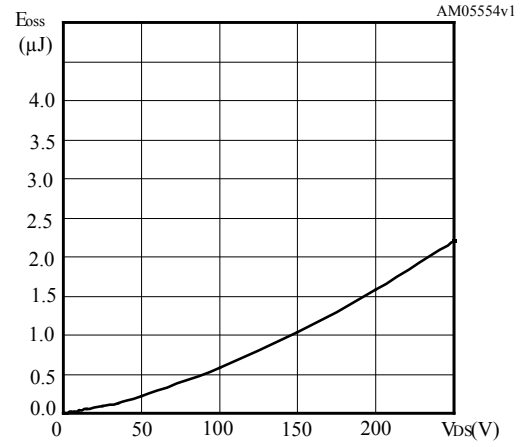


Figure 8. Typical capacitance characteristics

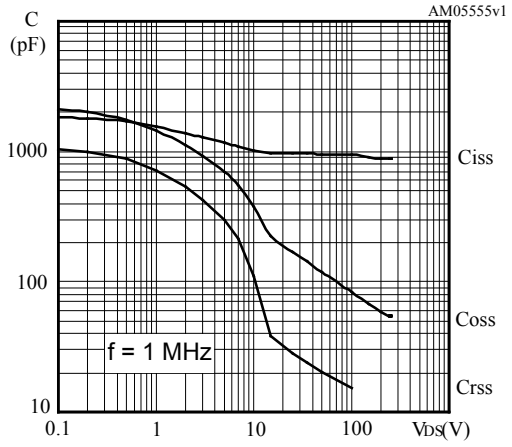


Figure 9. Normalized gate threshold vs temperature

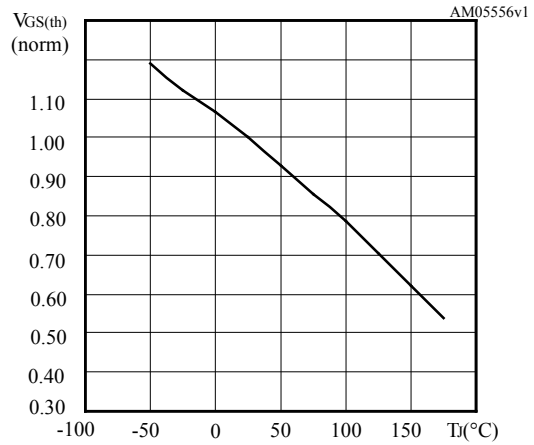


Figure 10. Normalized on-resistance vs temperature

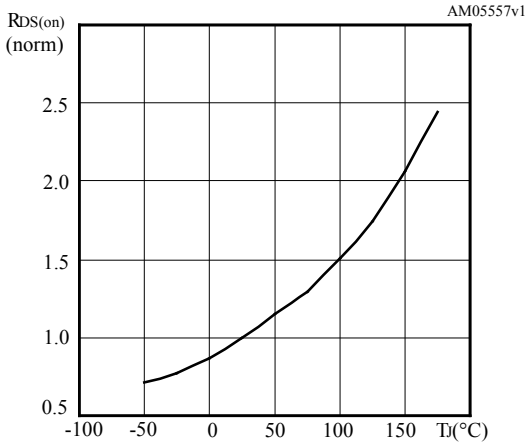


Figure 11. Typical reverse diode forward characteristics

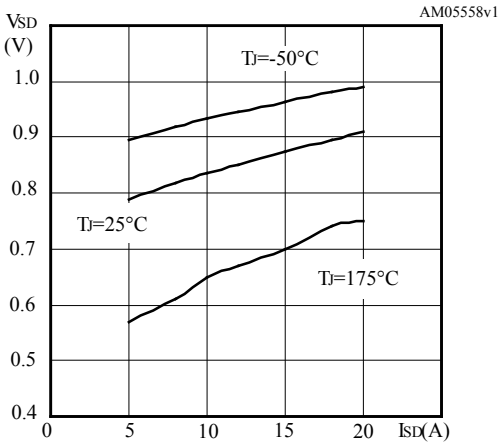
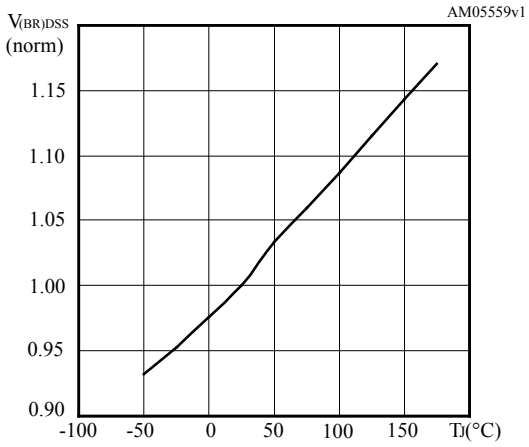
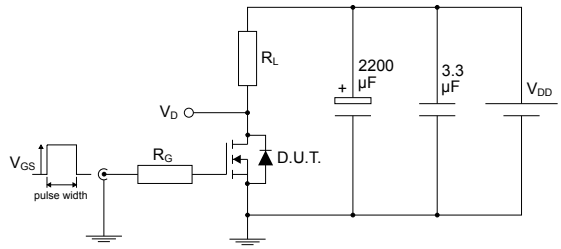


Figure 12. Normalized breakdown voltage vs temperature



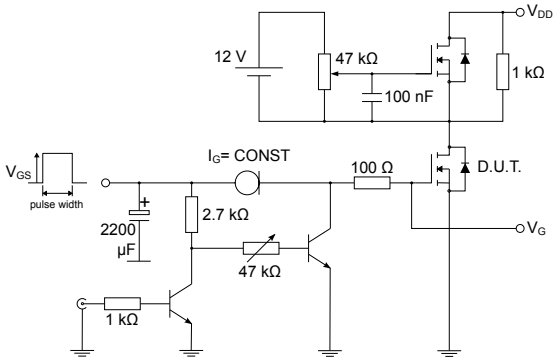
3 Test circuits

Figure 13. Test circuit for resistive load switching times



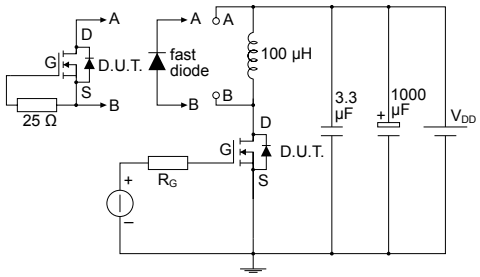
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Figure 14. Test circuit for gate charge behavior



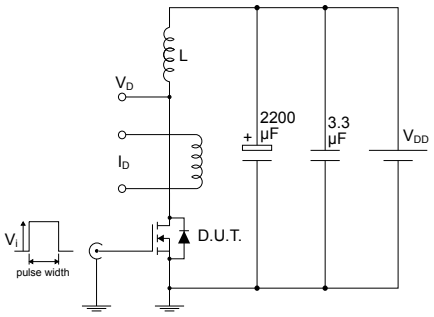
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Figure 15. Test circuit for inductive load switching and diode recovery times



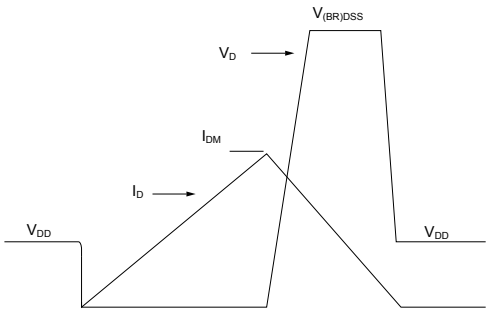
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Figure 16. Unclamped inductive load test circuit



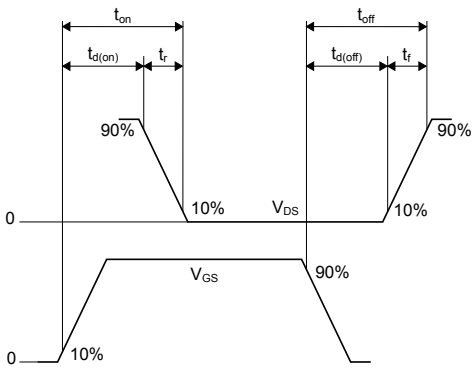
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Figure 17. Unclamped inductive waveform



AM01472v1

Figure 18. Switching time waveform



AM01473v1

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. ECOPACK is an ST trademark.

4.1 DPAK (TO-252) type A2 package information

Figure 19. DPAK (TO-252) type A2 package outline

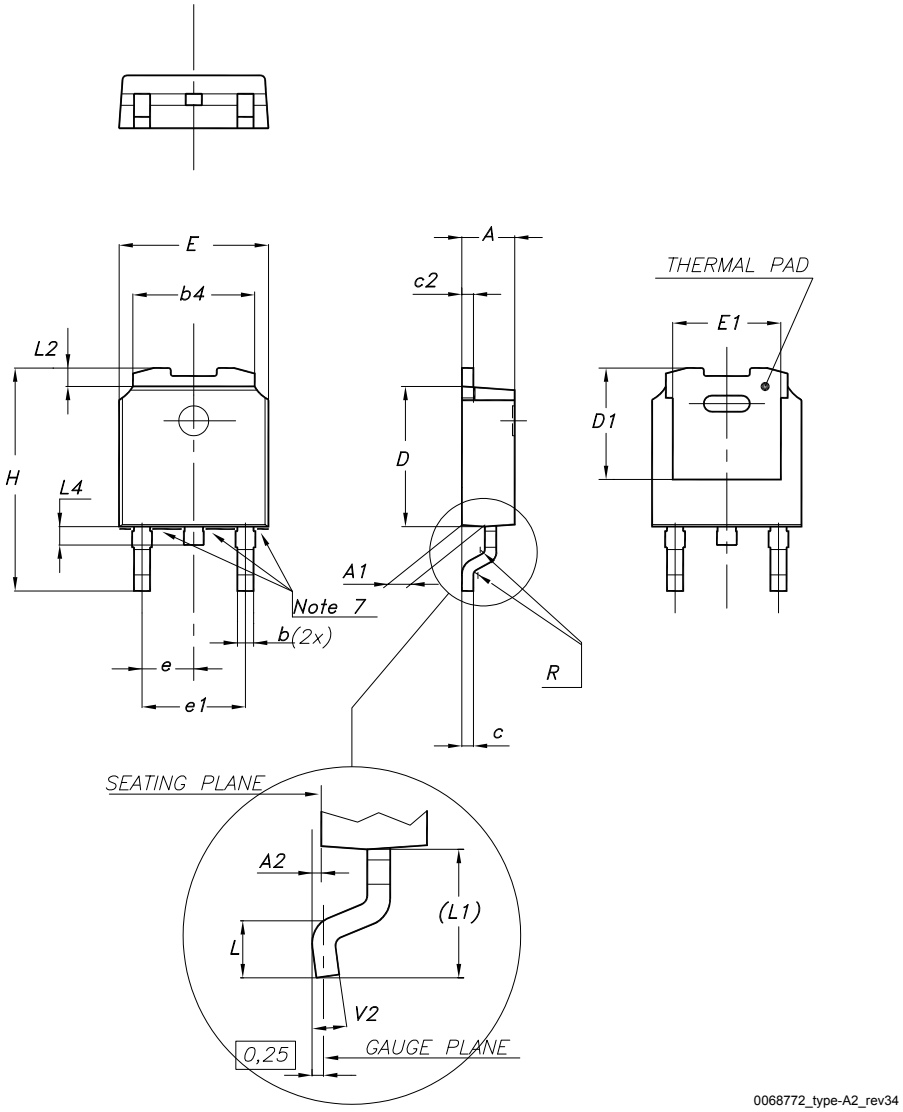
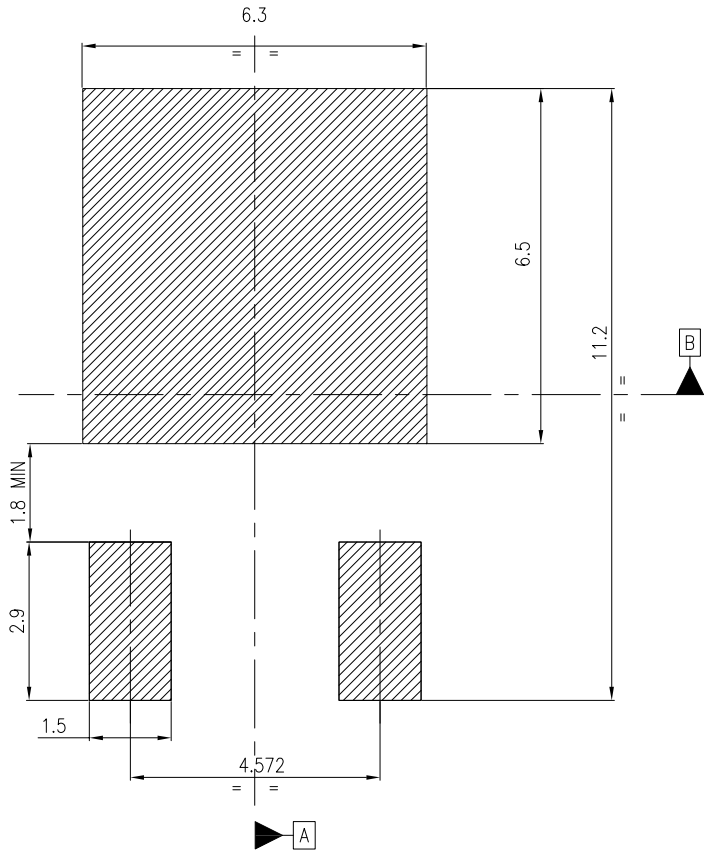


Table 8. **DPAK (TO-252) type A2 mechanical data**

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 20. 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

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4.2 DPAK (TO-252) packing information

Figure 21. **DPAK (TO-252) tape outline**

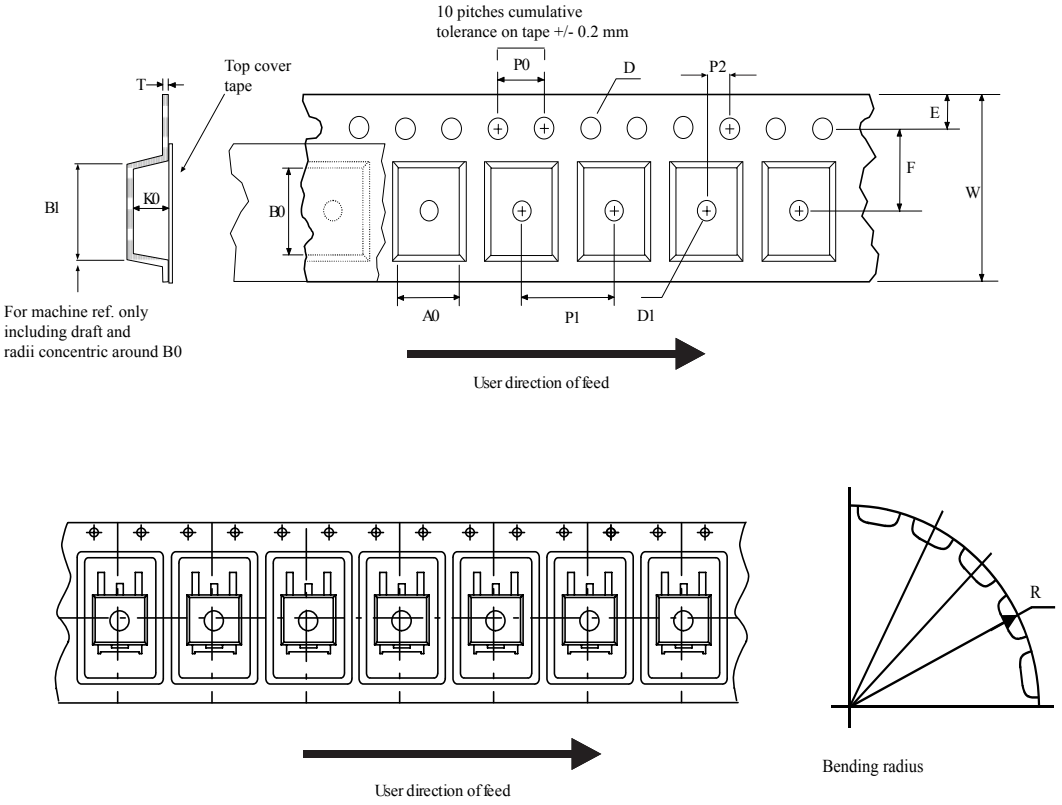
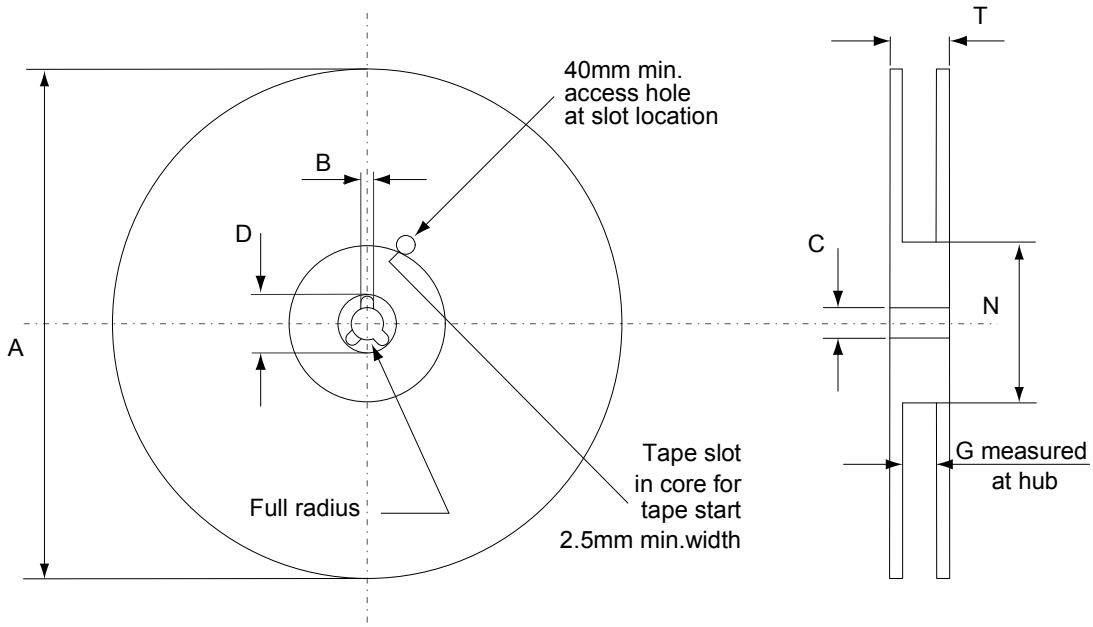


Figure 22. **DPAK (TO-252) reel outline**



AM06038v1

Table 9. **DPAK (TO-252) 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			

Revision history

Table 10. **Document revision history**

Date	Version	Changes
16-Nov-2009	1	First release.
19-Feb-2010	2	V_{DS} value in *Table 8* has been corrected.
26-Apr-2012	3	Updated E_{AS} in *Table 4: Avalanche data, Section 4: Package information* and *Section 4.3: Packing information.* Minor text changes.
10-Sep-2015	4	Updated *4.2: DPAK (TO-252) package information* Minor text changes.
07-May-2018	5	Removed maturity status indication from cover page. Modified title and features on cover page. Modified *Table 5. Dynamic*, *Table 6. Switching times* and *Table 7. Source drain diode*. Modified *Figure 8. Static drain-source on resistance*. Updated *Section 4 Package information*. Minor text changes.
05-Jul-2023	6	The part number STB18NF25 has been moved to a separate datasheet and the document has been updated accordingly. Modified the entire Section 4 Package information. Minor text changes.

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