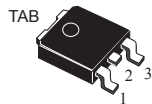
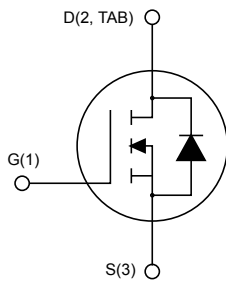


# Automotive-grade N-channel 30 V, 38 mΩ typ., 17 A STripFET II Power MOSFET in a DPAK package




DPAK



AM01475v1\_noZen

## Features

Order code	$V_{DS}$	$R_{DS(on)}$ max.	$I_D$
STD18NF03L	30 V	< 50 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

[STD18NF03L](#)

### Product summary

<b>Order code</b>	STD18NF03L
<b>Marking</b>	18NF03L
<b>Package</b>	DPAK
<b>Packing</b>	Tape and reel

# 1 Electrical ratings

**Table 1. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage ( $V_{GS} = 0\text{ V}$ )	30	V
$V_{GS}$	Gate-source voltage	$\pm 16$	V
$I_D$	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	17	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	12	A
$I_{DM}^{(1)}$	Drain current (pulsed)	68	A
$P_{TOT}$	Total power dissipation at $T_C = 25\text{ }^\circ\text{C}$	30	W
	Derating Factor	0.2	W/ $^\circ\text{C}$
$dv/dt^{(2)}$	Peak diode recovery avalanche energy	7	V/ns
$E_{AS}^{(3)}$	Single pulse avalanche energy	200	mJ
$T_{stg}$	Storage temperature range	-55 to 175	$^\circ\text{C}$
$T_J$	Operating junction temperature range		

1. Pulse width limited by safe operating area.
2.  $I_{SD} \leq 17\text{ A}$ ,  $di/dt \leq 300\text{ A}/\mu\text{s}$ ,  $V_{DD} = V_{(BR)DSS}$ ,  $T_J \leq T_J\text{ max}$ .
3. Starting  $T_J = 25\text{ }^\circ\text{C}$ ,  $I_D = 8.5\text{ A}$ ,  $V_{DD} = 15\text{ V}$ .

**Table 2. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	5.0	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-to ambient max	100	$^\circ\text{C}/\text{W}$
$T_J$	Maximum lead temperature for soldering purpose	275	$^\circ\text{C}$

## 2 Electrical characteristics

$T_C = 25\text{ °C}$  unless otherwise specified

**Table 3. On-/off-states**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$	30			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$ , $V_{DS} = \text{max rating}$			1	$\mu\text{A}$
		$V_{GS} = 0\text{ V}$ , $V_{DS} = \text{max rating}$ , $T_C = 125\text{ °C}$			10	$\mu\text{A}$
$I_{GSS}$	Gate-body leakage current	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 16\text{ V}$			$\pm 100$	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$	1.0	1.5	2.2	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$ , $I_D = 8.5\text{ A}$		38	50	m $\Omega$
		$V_{GS} = 5\text{ V}$ , $I_D = 8.5\text{ A}$		45	60	

**Table 4. Dynamic**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)}$ max., $I_D = 8.5\text{ A}$	-	12		S
$C_{iss}$	Input capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0\text{ V}$	-	320		pF
$C_{oss}$	Output capacitance		-	155		pF
$C_{riss}$	Reverse transfer capacitance		-	28		pF
$Q_g$	Total gate charge		$V_{DD} = 24\text{ V}$ , $I_D = 17\text{ A}$	-	4.8	6.5
$Q_{gs}$	Gate-source charge	$R_G = 4.7\text{ }\Omega$ , $V_{GS} = 5\text{ V}$	-	2.25		nC
$Q_{gd}$	Gate-drain charge	(see Figure 14. Test circuit for gate charge behavior)	-	1.7		nC

1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5%.

**Table 5. Switching times**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 15\text{ V}$ , $I_D = 8.5\text{ A}$ ,	-	11		ns
$t_r$	Rise time	$R_G = 4.7\text{ }\Omega$ , $V_{GS} = 5\text{ V}$	-	100		ns
$t_{d(off)}$	Turn-off delay time	(see Figure 13. Test circuit for resistive load switching times and Figure 18. Switching time waveform)	-	25		ns
$t_f$	Fall time		-	22		ns

**Table 6. Source-drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		22	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		88	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 17\text{ A}$ , $V_{GS} = 0\text{ V}$	-		1.5	V
$t_{rr}$	Reverse recovery time	$I_{SD} = 17\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ ,	-	28		ns
$Q_{rr}$	Reverse recovery charge	$V_{DD} = 15\text{ V}$ , $T_J = 150\text{ }^\circ\text{C}$	-	18		nC
$I_{RRM}$	Reverse recovery current	(see Figure 15. Test circuit for inductive load switching and diode recovery times)	-	1.3		A

1. Pulse width 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

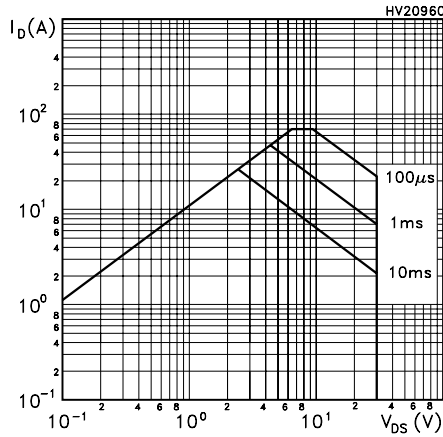


Figure 2. Thermal impedance

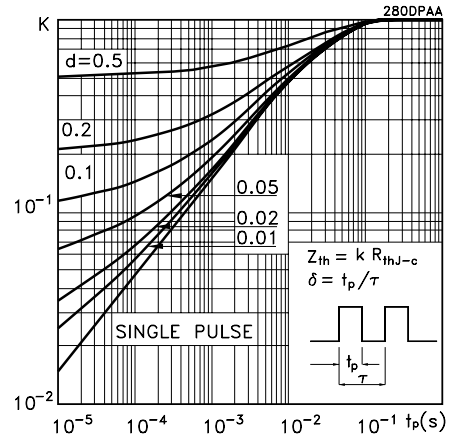


Figure 3. Output characteristics

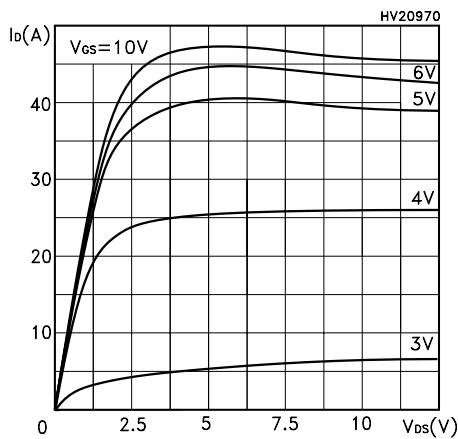


Figure 4. Transfer characteristics

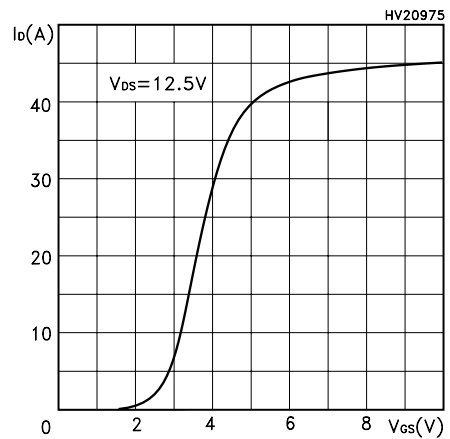


Figure 5. Transconductance

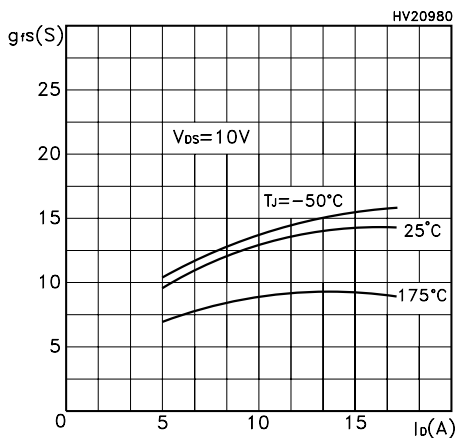


Figure 6. Static drain-source on resistance

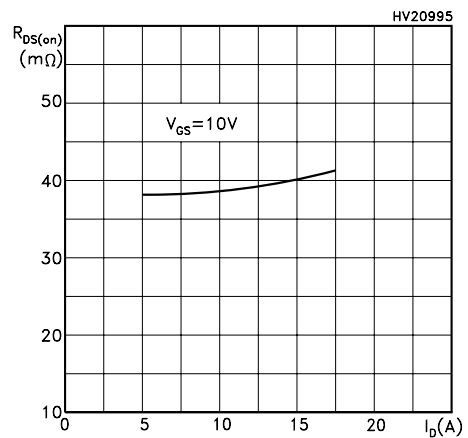


Figure 7. Gate charge vs. gate-source voltage

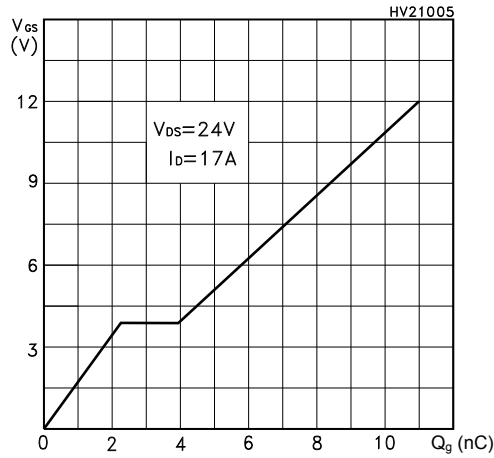


Figure 8. Capacitance variations

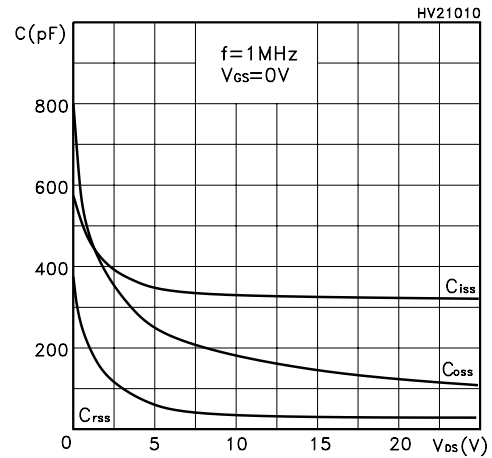


Figure 9. Normalized gate threshold voltage vs temperature

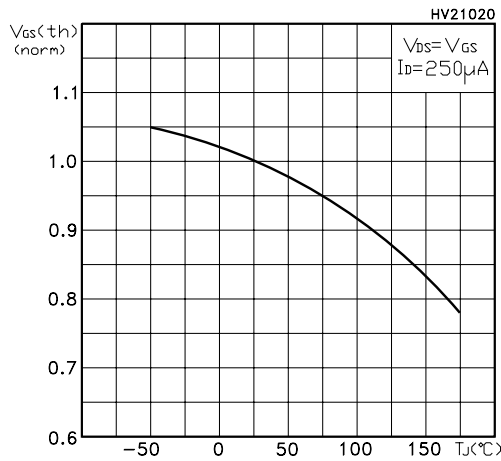


Figure 10. Normalized on resistance vs temperature

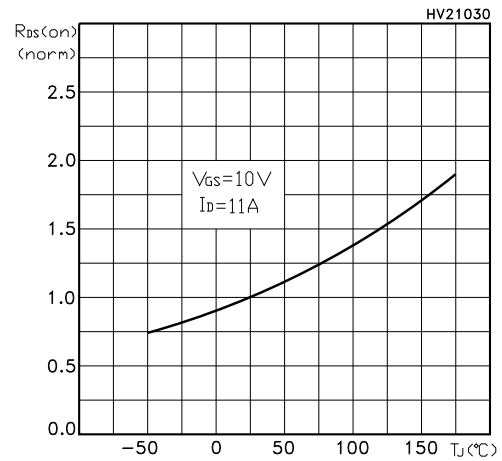


Figure 11. Source-drain diode forward characteristics

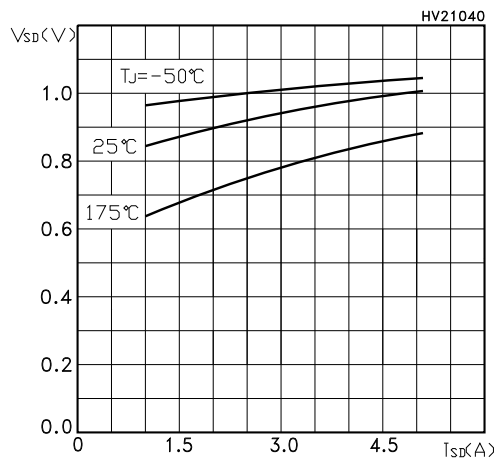
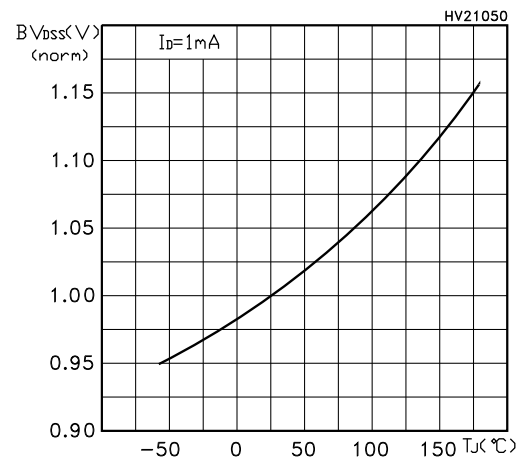
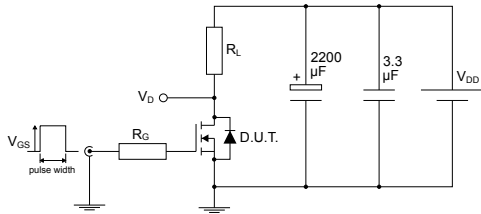


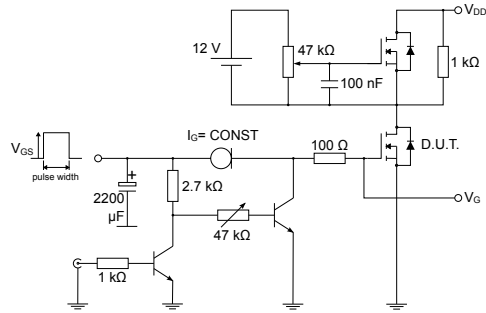
Figure 12. Normalized breakdown voltage vs temperature



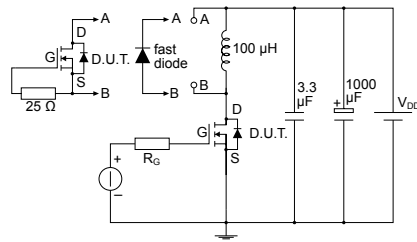
### 3 Test circuits

**Figure 13. Test circuit for resistive load switching times**


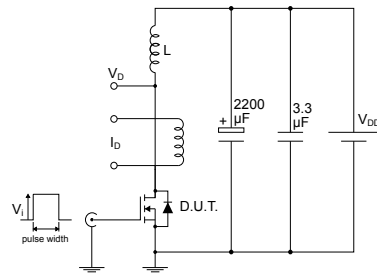
AM01468v1

**Figure 14. Test circuit for gate charge behavior**


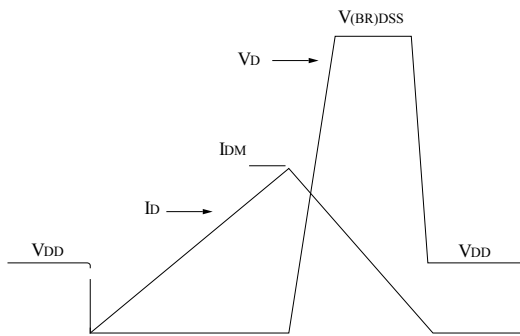
AM01469v1

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


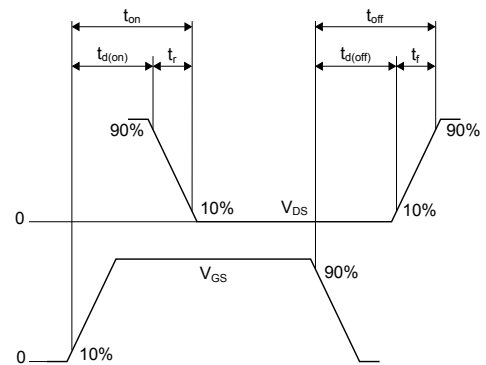
AM01470v1

**Figure 16. Unclamped inductive load test circuit**


AM01471v1

**Figure 17. Unclamped inductive waveform**


AM01472v1

**Figure 18. Switching time waveform**


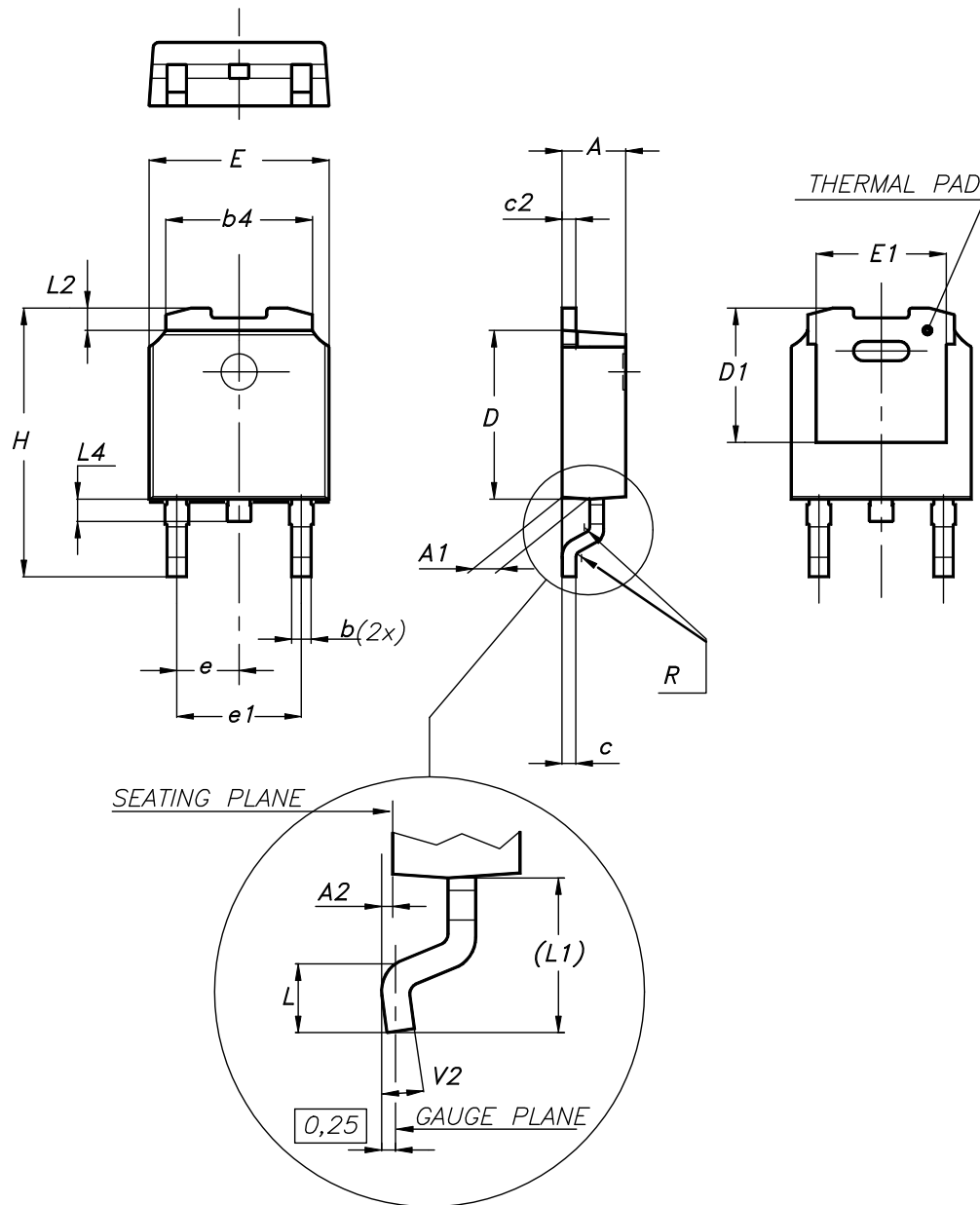
AM01473v1

## 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](http://www.st.com). ECOPACK is an ST trademark.

### 4.1 DPAK (TO-252) type A package information

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

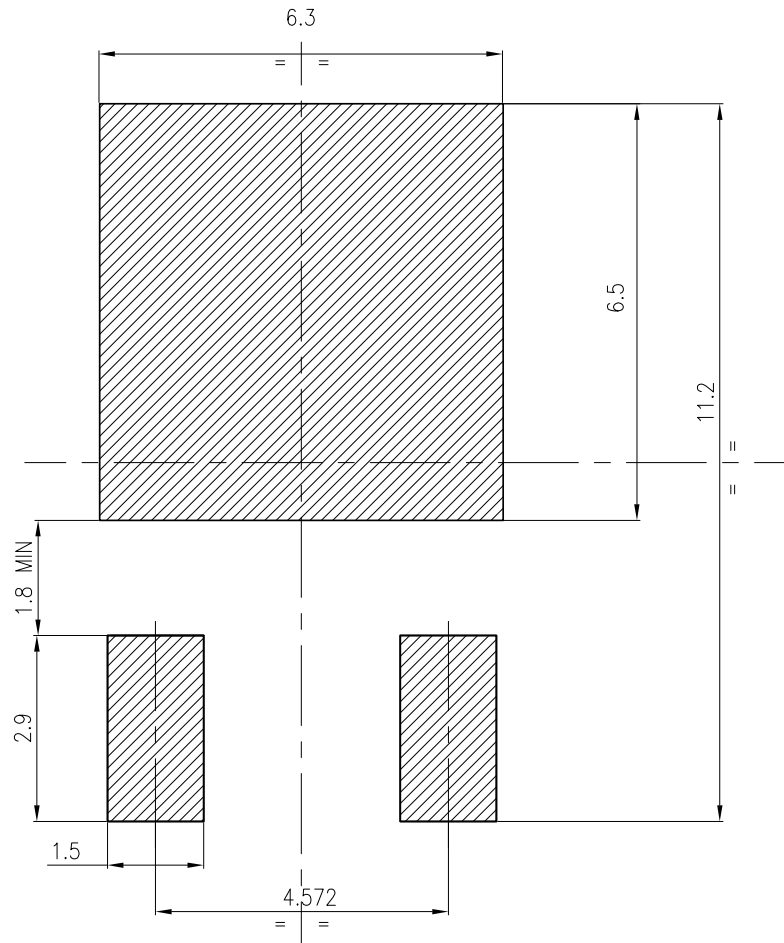


0068772\_A\_27

**Table 7. 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°

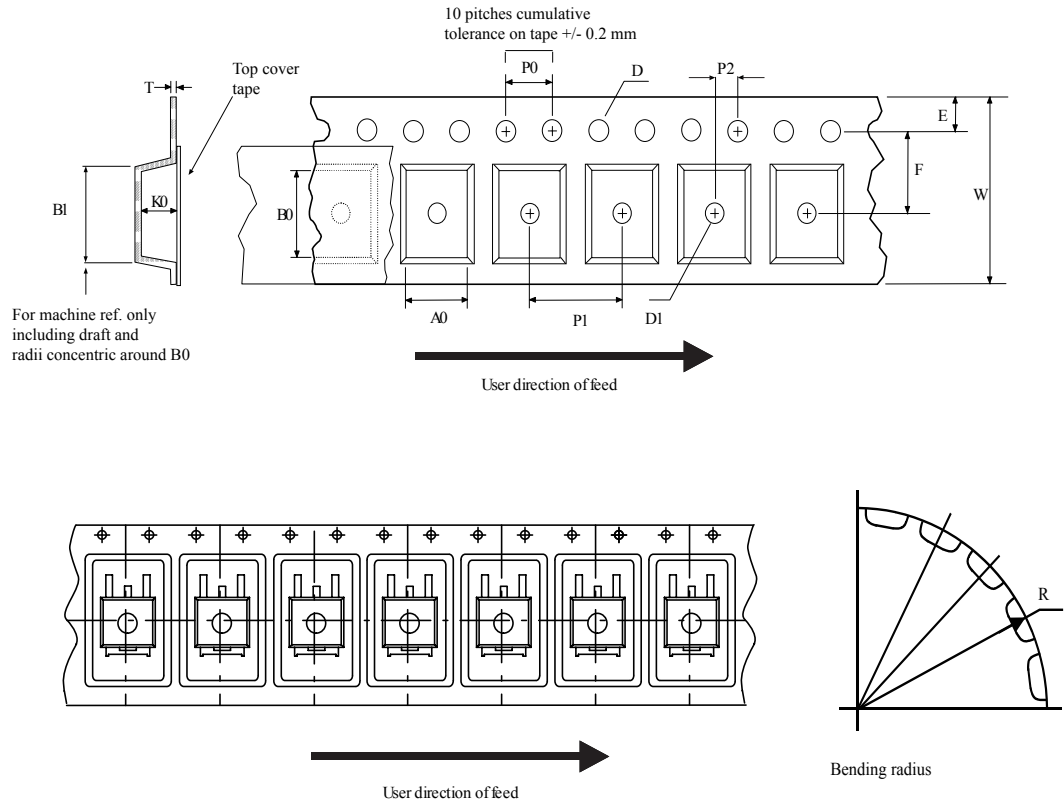
Figure 20. DPAK (TO-252) type A recommended footprint (dimensions are in mm)



FP\_0068772\_27

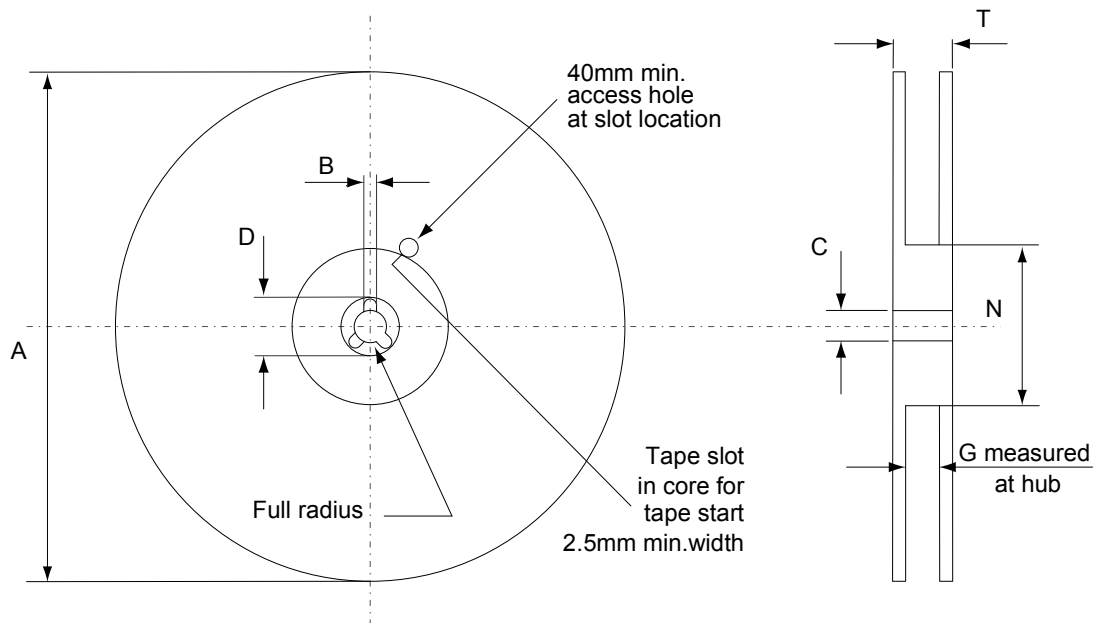
## 4.2 DPAK (TO-252) packing information

Figure 21. DPAK (TO-252) tape outline



AM08852v1

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



AM06038v1

**Table 8. 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 9. Document revision history**

Date	Version	Changes
27-Jul-2007	1	First release.
29-Apr-2020	2	Updated Title, Internal schematic, Features and Device summary in cover page. Minor text changes.

---

## Contents

<b>1</b>	<b>Electrical ratings</b> .....	<b>2</b>
<b>2</b>	<b>Electrical characteristics</b> .....	<b>3</b>
<b>2.1</b>	Electrical characteristics (curves) .....	<b>5</b>
<b>3</b>	<b>Test circuits</b> .....	<b>7</b>
<b>4</b>	<b>Package information</b> .....	<b>8</b>
<b>4.1</b>	DPAK (TO-252) type A package information .....	<b>8</b>
<b>4.2</b>	DPAK (TO-252) packing information .....	<b>11</b>
	<b>Revision history</b> .....	<b>13</b>

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries (“ST”) reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST’s terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers’ products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2020 STMicroelectronics – All rights reserved