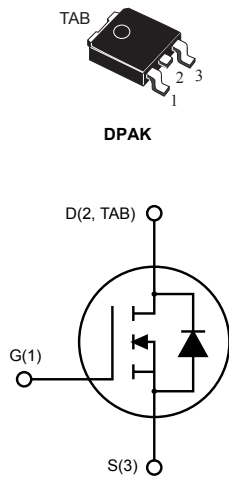



Automotive-grade N-channel 250 V, 318 mΩ, 8 A, STripFET™ II Power MOSFET in a DPAK package



AM01475v1_noZen

Features

Order code	V_{DS}	$R_{DS(on)max.}$	I_D
STD8NF25	250 V	420 mΩ	8 A

- AEC-Q101 qualified 
- 100% avalanche tested
- 175 °C maximum junction temperature

Applications

- Switching applications

Description

This Power MOSFET series 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

[STD8NF25](#)

Product summary

Order code	STD8NF25
Marking	8NF25
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 $T_C = 25\text{ }^\circ\text{C}$	8	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	6	A
$I_{DM}^{(1)}$	Drain current (pulsed)	32	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	72	W
T_J	Operating junction temperature range	-55 to 175	$^\circ\text{C}$
T_{stg}	Storage temperature range		

1. Pulse width is limited by safe operating area.

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	2.08	$^\circ\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	50	$^\circ\text{C/W}$

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

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or non-repetitive (pulse width limited by T_{Jmax})	8	A
E_{AS}	Single pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$)	110	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	$I_D = 1\text{ mA}$, $V_{GS} = 0\text{ V}$	250			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 250\text{ V}$			1	μA
		$V_{GS} = 0\text{ V}$, $V_{DS} = 250\text{ V}$, $T_C = 125\text{ °C}$ ⁽¹⁾			50	μA
I_{GSS}	Gate body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 20\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2		4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 8\text{ A}$		318	420	m Ω

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

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	500	-	pF
C_{oss}	Output capacitance			90		
C_{rss}	Reverse transfer capacitance			15		
Q_g	Total gate charge	$V_{DD} = 200\text{ V}$, $I_D = 8\text{ A}$, $V_{GS} = 0\text{ to }10\text{ V}$ (see Figure 13. Test circuit for gate charge behavior)	-	16	-	nC
Q_{gs}	Gate-source charge			3.5		
Q_{gd}	Gate-drain charge			8		

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 125\text{ V}$, $I_D = 4\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$	-	13	-	ns
t_r	Rise time			10		
$t_{d(off)}$	Turn-off delay time	(see Figure 12. Test circuit for resistive load switching times and Figure 17. Switching time waveform)	-	26	-	ns
t_f	Fall time			6		

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		8	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				32	
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 8\text{ A}$, $V_{GS} = 0\text{ V}$	-		1.5	V

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
t_{rr}	Reverse recovery time	$I_{SD} = 8 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$, $V_{DD} = 50 \text{ V}$ (see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	115		ns
Q_{rr}	Reverse recovery charge			0.47		μC
I_{RRM}	Reverse recovery current			8.5		A
t_{rr}	Reverse recovery time	$I_{SD} = 8 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$, $V_{DD} = 50 \text{ V}$, $T_j = 150 \text{ }^\circ\text{C}$ (see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	130		ns
Q_{rr}	Reverse recovery charge			0.58		μC
I_{RRM}	Reverse recovery current			9.5		A

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

2.1 Electrical characteristics (curves)

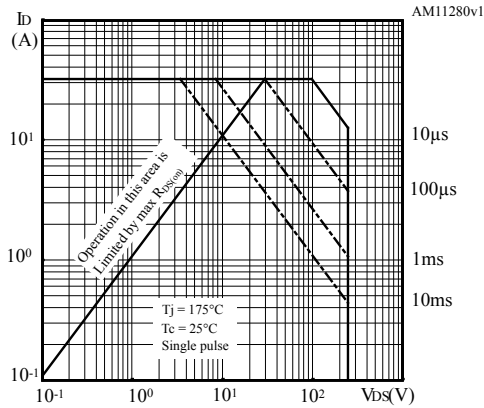
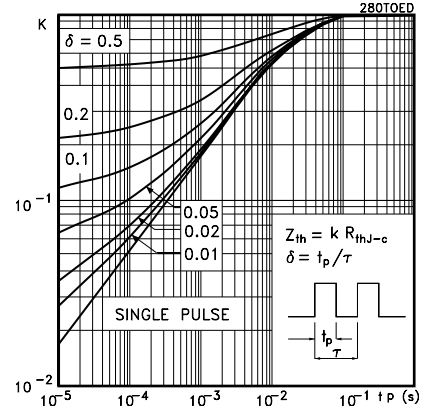
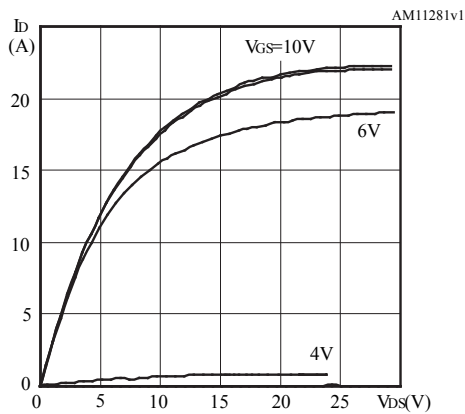
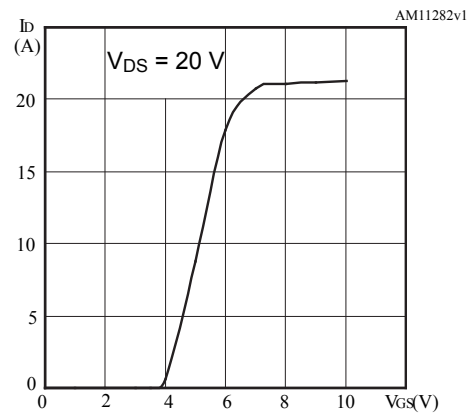
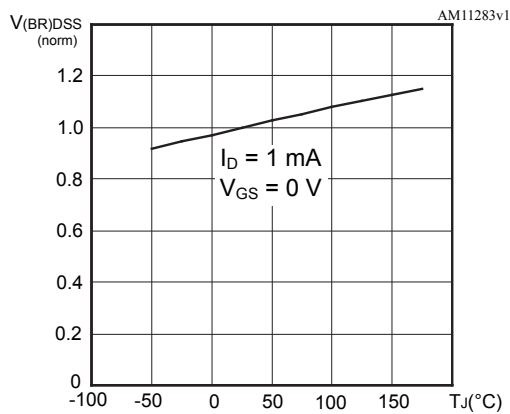
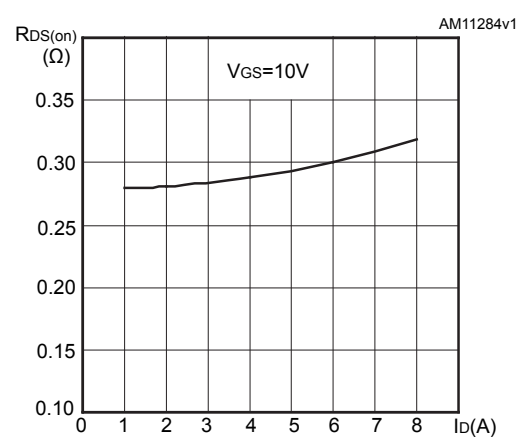
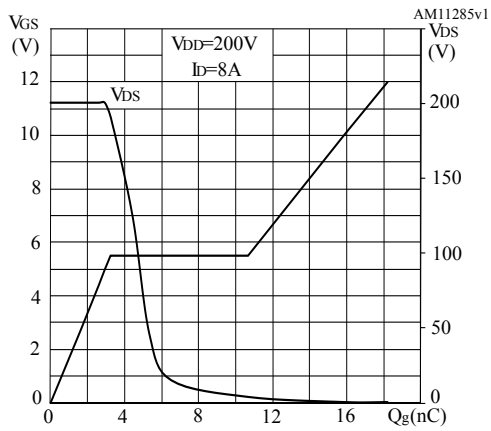
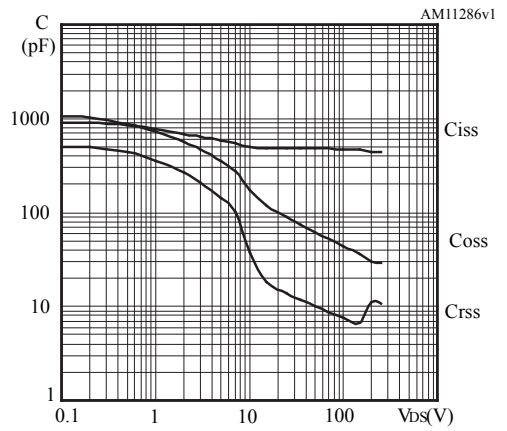
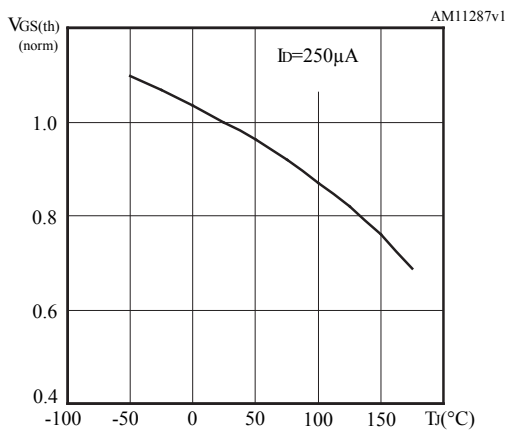
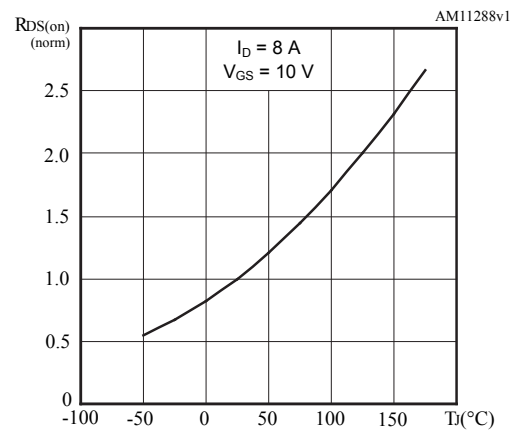
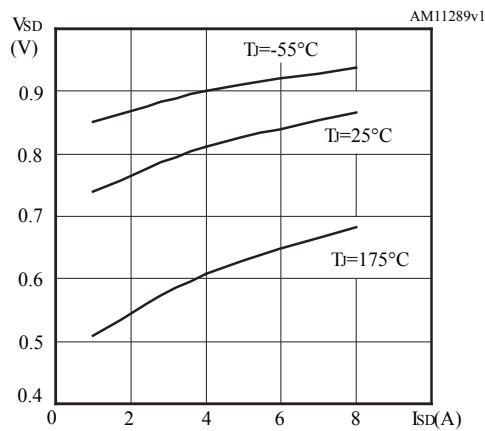
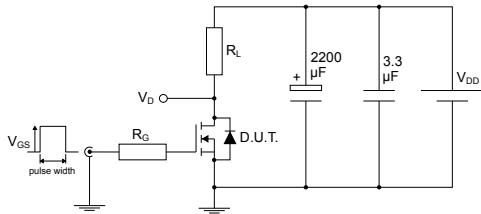
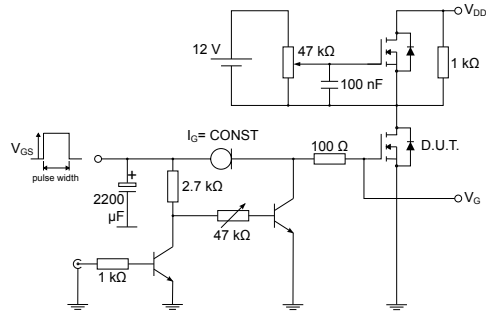
Figure 1. Safe operating area

Figure 2. Thermal impedance

Figure 3. Output characteristics

Figure 4. Transfer characteristics

Figure 5. Normalized $V_{(BR)DSS}$ vs temperature

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


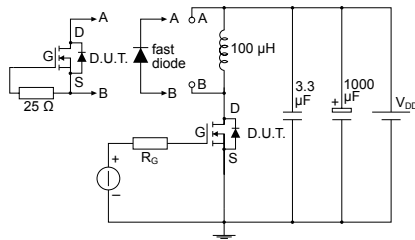
3 Test circuits

Figure 12. Test circuit for resistive load switching times


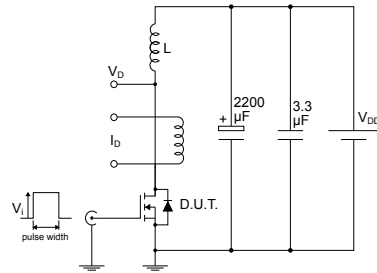
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Figure 13. Test circuit for gate charge behavior


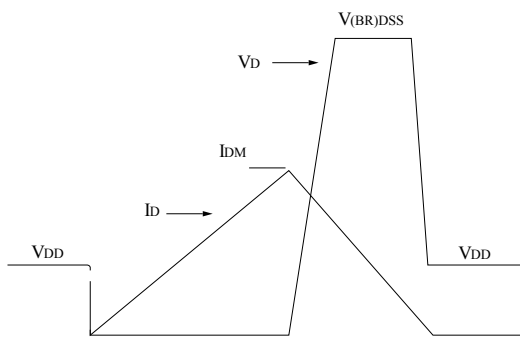
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Figure 14. Test circuit for inductive load switching and diode recovery times


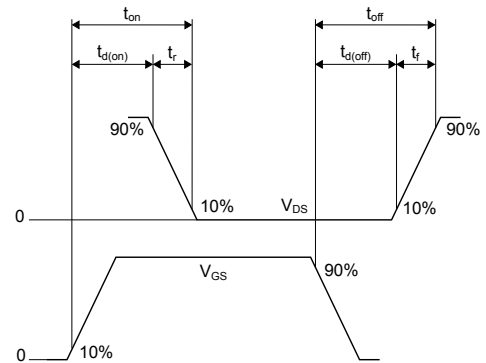
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Figure 15. Unclamped inductive load test circuit


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Figure 16. Unclamped inductive waveform


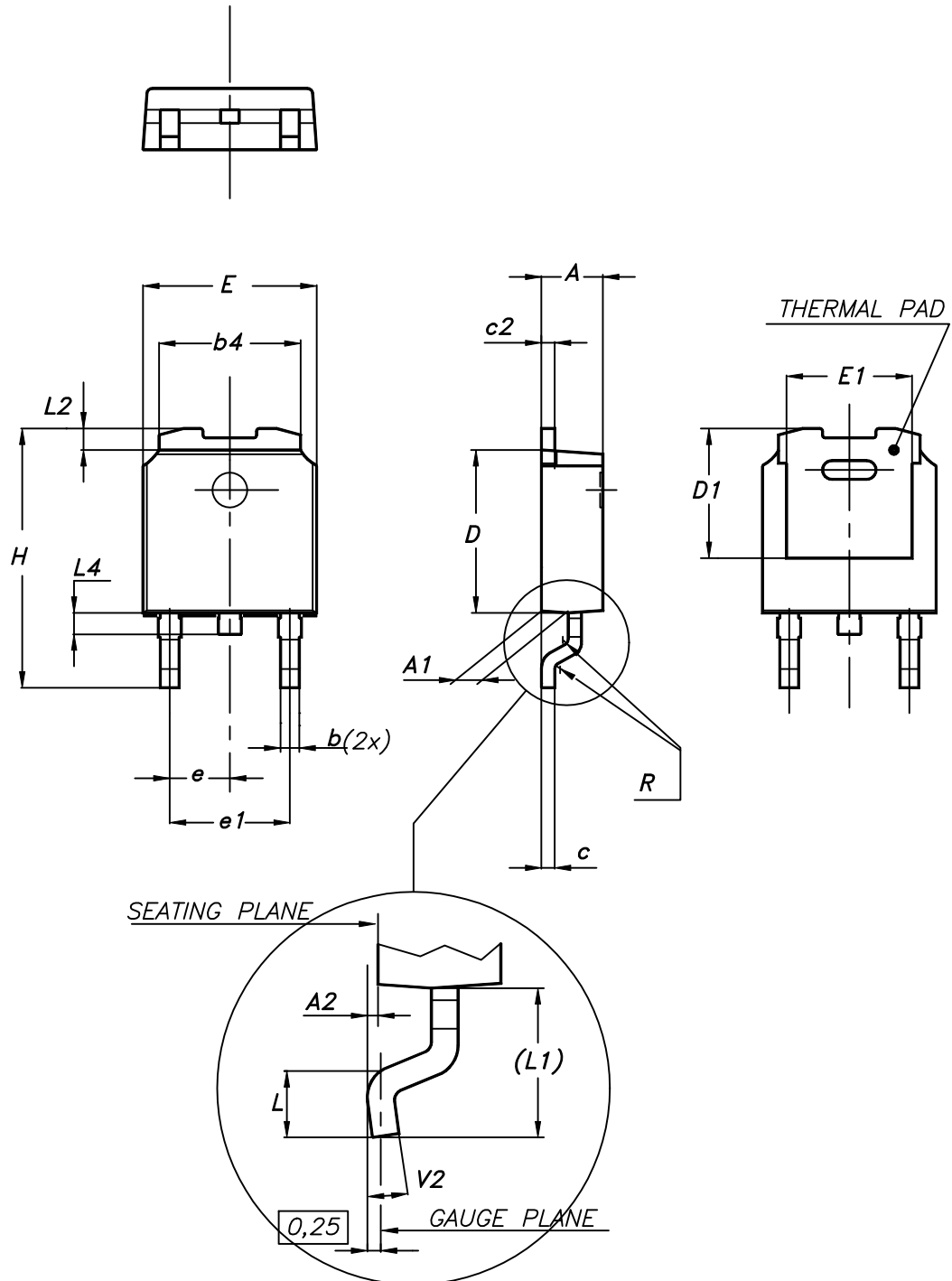
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Figure 17. Switching time waveform


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4 Package information

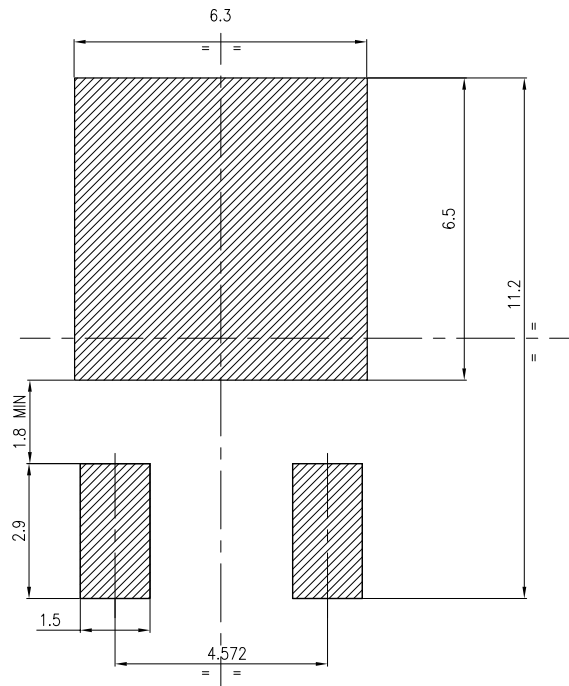
In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

4.1 DPAK (TO-252) type A2 package information
Figure 18. DPAK (TO-252) type A2 package outline


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

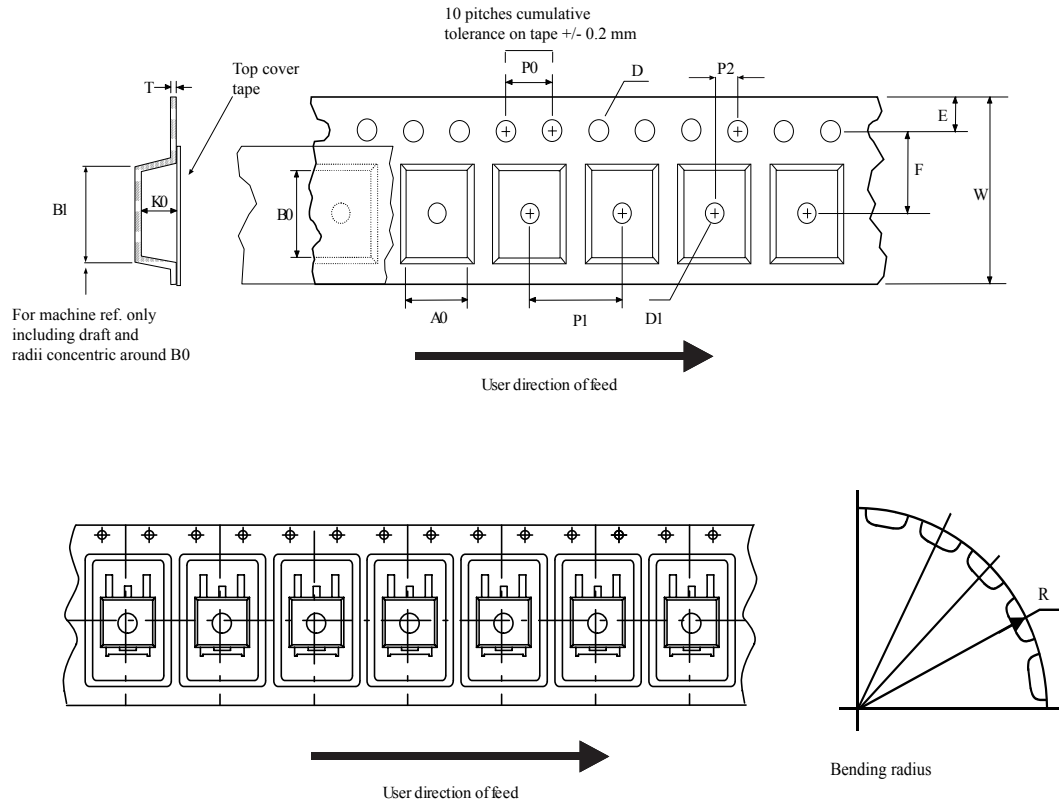
Dim.	mm		
	Min.	Typ.	Max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1	4.95	5.10	5.25
E	6.40		6.60
E1	5.10	5.20	5.30
e	2.159	2.286	2.413
e1	4.445	4.572	4.699
H	9.35		10.10
L	1.00		1.50
L1	2.60	2.80	3.00
L2	0.65	0.80	0.95
L4	0.60		1.00
R		0.20	
V2	0°		8°

Figure 19. DPAK (TO-252) recommended footprint (dimensions are in mm)


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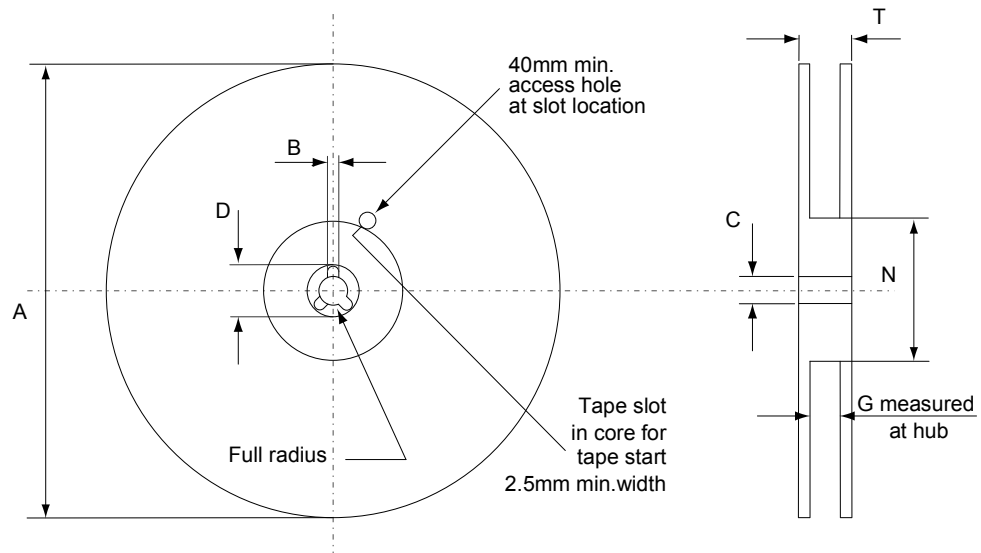
4.2 DPAK (TO-252) packing information

Figure 20. DPAK (TO-252) tape outline



AM08852v1

Figure 21. 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
26-Apr-2012	1	First release.
03-Jul-2018	2	Removed maturity status indication from cover page. Updated title, features and description on cover page. Updated Section 4.1 DPAK (TO-252) type A2 package information . Minor text changes

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