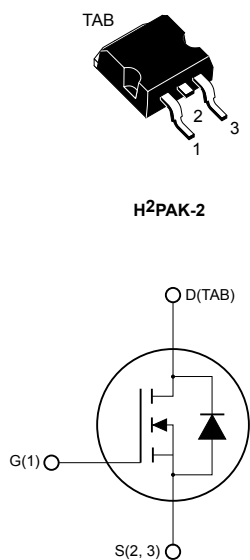


Automotive-grade N-channel 100 V, 7 mΩ typ., 80 A, STripFET™ F7 Power MOSFET in an H²PAK-2 package



DTG1S23NZ



Features

Order code	V _{DS}	R _{DS(on)} max.	I _D	P _{TOT}
STH80N10LF7-2AG	100 V	10 mΩ	80 A	110 W

- AEC-Q101 qualified 
- Among the lowest R_{DS(on)} on the market
- Excellent FoM (figure of merit)
- Low C_{rss}/C_{iss} ratio for EMI immunity
- High avalanche ruggedness

Applications

- Switching applications

Description

This N-channel Power MOSFET utilizes 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 link

[STH80N10LF7-2AG](#)

Product summary

Order code	STH80N10LF7-2AG
Marking	80N10LF7
Package	H ² PAK-2
Packing	Tape and reel

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	100	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_{case} = 25\text{ }^{\circ}\text{C}$	80	A
	Drain current (continuous) at $T_{case} = 100\text{ }^{\circ}\text{C}$	54	
$I_{DM}^{(1)}$	Drain current (pulsed)	320	A
P_{TOT}	Total dissipation at $T_{case} = 25\text{ }^{\circ}\text{C}$	110	W
$E_{AS}^{(2)}$	Single pulse avalanche energy	108	mJ
T_{stg}	Storage temperature range	-55 to 175	$^{\circ}\text{C}$
T_j	Operating junction temperature range		

1. Pulse width is limited by safe operating area.

2. $T_j \leq 25\text{ }^{\circ}\text{C}$, $I_D = 80\text{ A}$, $V_{DD} = 60\text{ V}$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	1.36	$^{\circ}\text{C/W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb	35	

1. When mounted on a 1-inch² FR-4 board, 2oz Cu.

2 Electrical characteristics

($T_{case} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified).

Table 3. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	100			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 100\text{ V}$			1	μA
		(1) $V_{GS} = 0\text{ V}$, $V_{DS} = 100\text{ V}$ $T_j = 125\text{ }^{\circ}\text{C}$			10	
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	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	1		2.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 40\text{ A}$		7	10	$\text{m}\Omega$
		$V_{GS} = 4.5\text{ V}$, $I_D = 40\text{ A}$		9	16	

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

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	2900	-	pF
C_{oss}	Output capacitance		-	1077	-	
C_{rss}	Reverse transfer capacitance		-	99	-	
Q_g	Total gate charge	$V_{DD} = 50\text{ V}$, $I_D = 80\text{ A}$, $V_{GS} = 4.5\text{ V}$ (see Figure 13. Test circuit for gate charge behavior)	-	28.3	-	nC
Q_{gs}	Gate-source charge		-	10.4	-	
Q_{gd}	Gate-drain charge		-	14.3	-	

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50\text{ V}$, $I_D = 40\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 12. Test circuit for resistive load switching times)	-	14.7	-	ns
t_r	Rise time		-	33	-	
$t_{d(off)}$	Turn-off delay time		-	69.3	-	
t_f	Fall time		-	21	-	

Table 6. 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	$V_{GS} = 0\text{ V}$, $I_{SD} = 80\text{ A}$	-		1.5	V
t_{rr}	Reverse recovery time	$I_{SD} = 80\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 80\text{ V}$ (see Figure 14. Test circuit for inductive load switching and diode recovery times)	-	55.7		ns
Q_{rr}	Reverse recovery charge		-	79.6		nC
I_{RRM}	Reverse recovery current		-	2.9		A

1. Pulse width 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

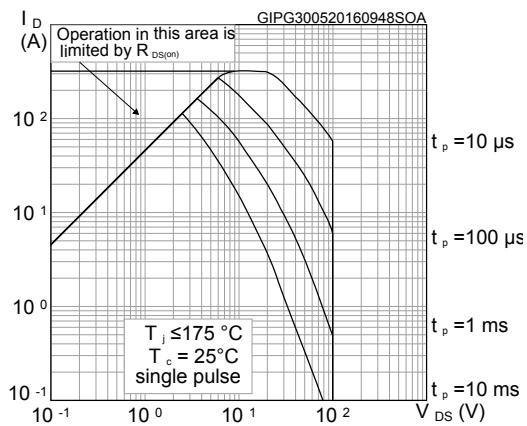


Figure 2. Thermal impedance

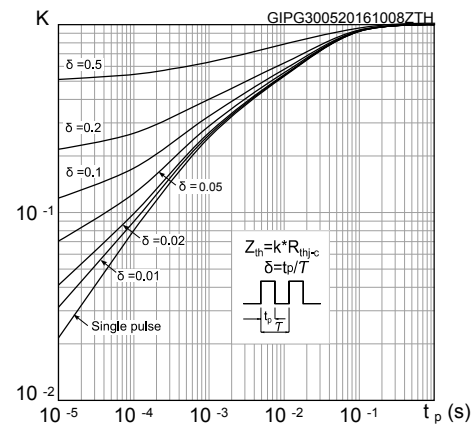


Figure 3. Output characteristics

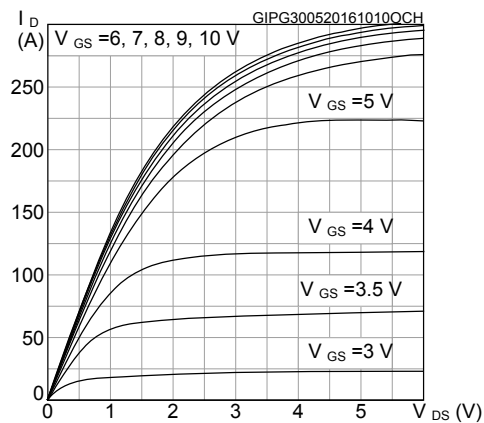


Figure 4. Transfer characteristics

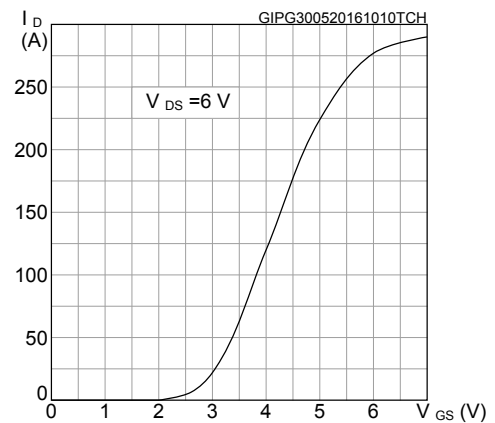


Figure 5. Gate charge vs. gate-source voltage

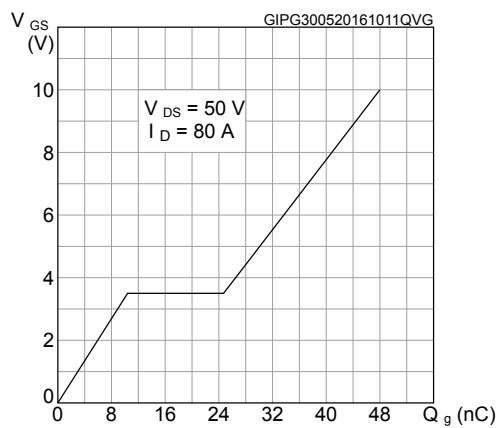


Figure 6. Static drain-source on-resistance

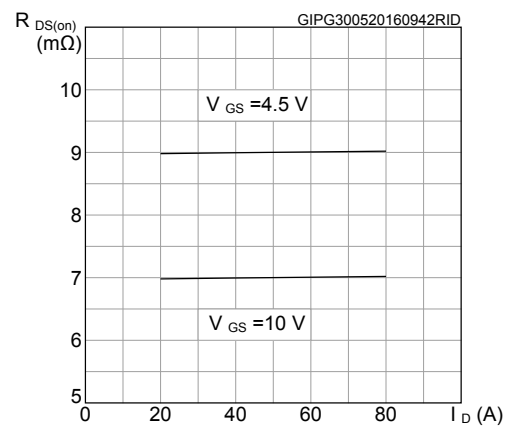


Figure 7. Capacitance variations

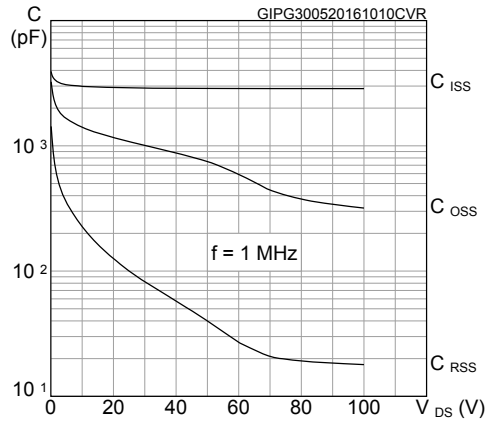


Figure 8. Normalized gate threshold voltage vs temperature

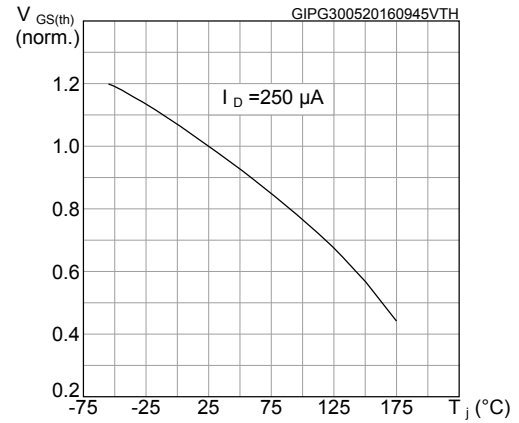


Figure 9. Normalized on-resistance vs temperature

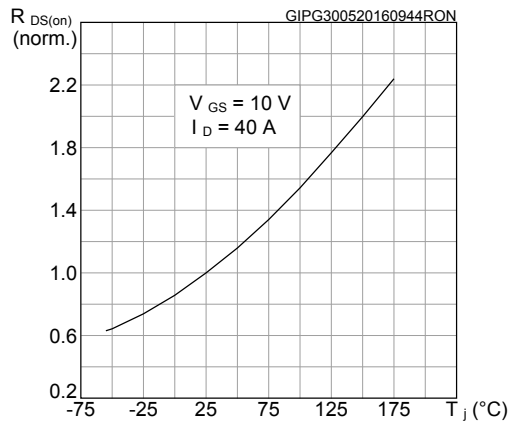


Figure 10. Normalized $V_{(BR)DSS}$ vs temperature

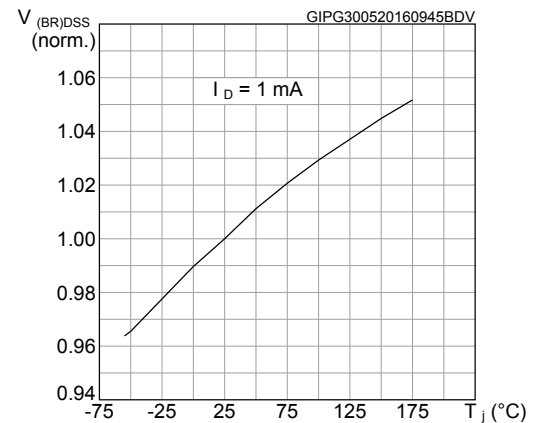
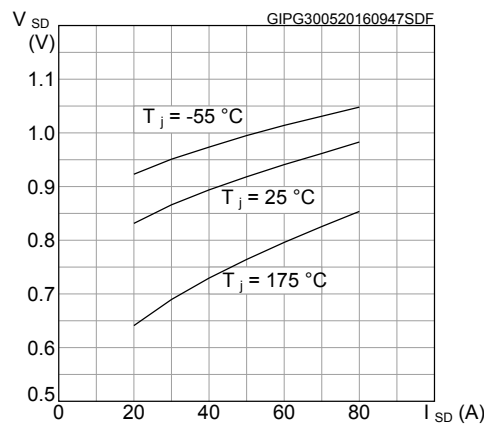
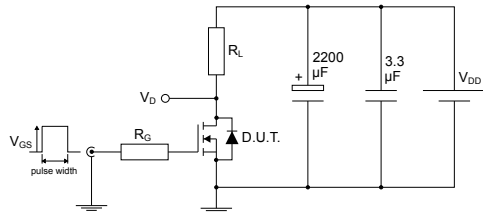


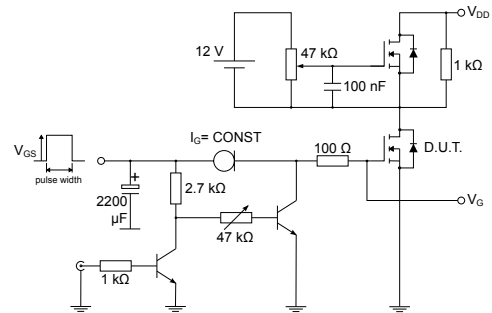
Figure 11. Source-drain diode forward characteristics



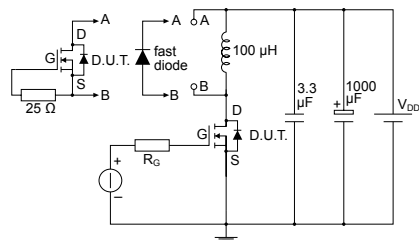
3 Test circuits

Figure 12. Test circuit for resistive load switching times


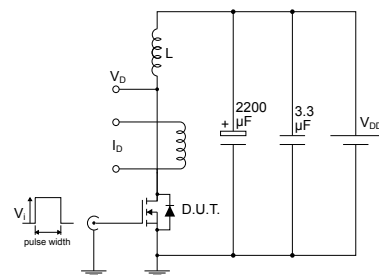
AM01468v1

Figure 13. Test circuit for gate charge behavior


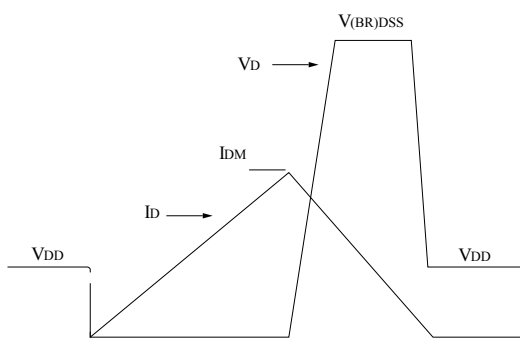
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Figure 14. Test circuit for inductive load switching and diode recovery times


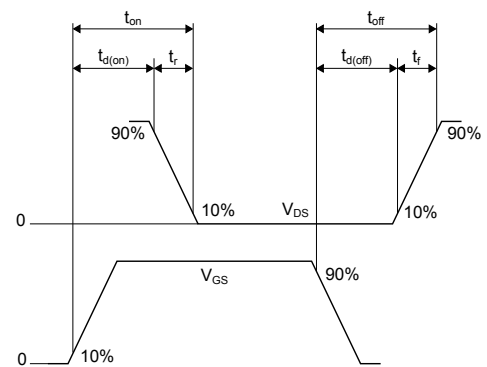
AM01470v1

Figure 15. Unclamped inductive load test circuit


AM01471v1

Figure 16. Unclamped inductive waveform


AM01472v1

Figure 17. 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 H²PAK-2 shallow gullwing package information

Figure 18. H²PAK-2 shallow gullwing package outline

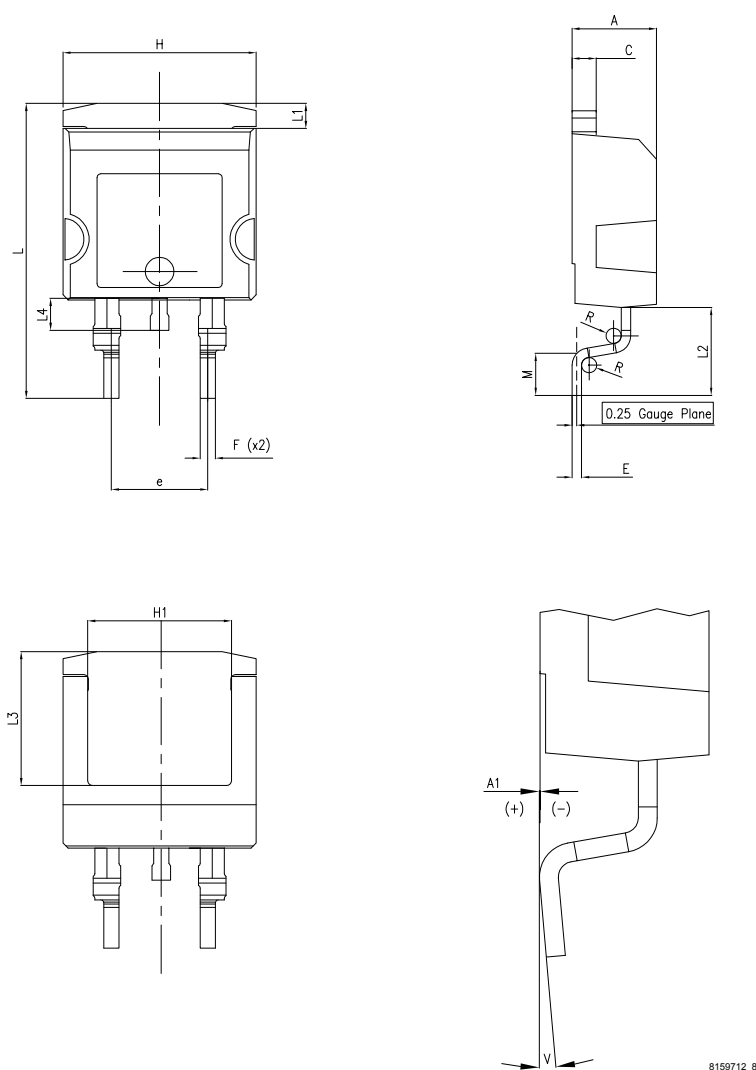
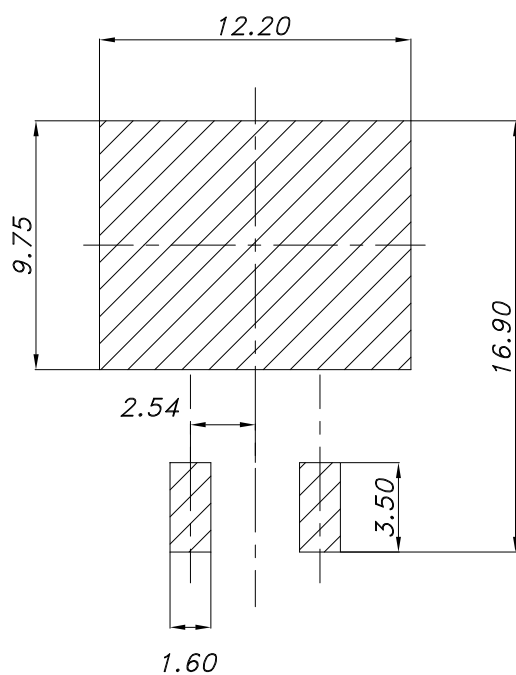


Table 7. H²PAK-2 shallow gullwing mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.30	-	4.70
A1	-0.05	-	0.08
C	1.17	-	1.37
e	4.98	-	5.18
E	0.50	-	0.90
F	0.78	-	0.85
H	10.00	-	10.40
H1	7.40	-	7.80
L	15.30	-	15.80
L1	1.27	-	1.40
L2	4.93	-	5.23
L3	6.85	-	7.25
L4	1.50	-	1.70
M	2.60	-	2.90
R	0.20	-	0.60
V	0°	-	8°

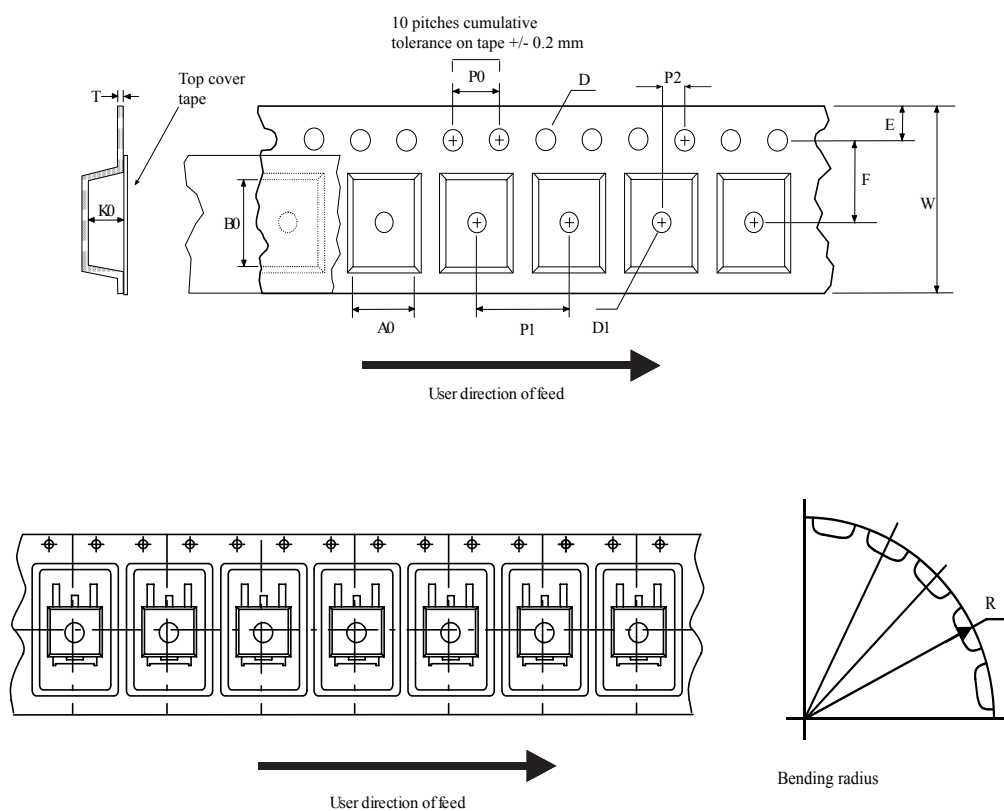
Figure 19. H²PAK-2 recommended footprint (dimensions are in mm)



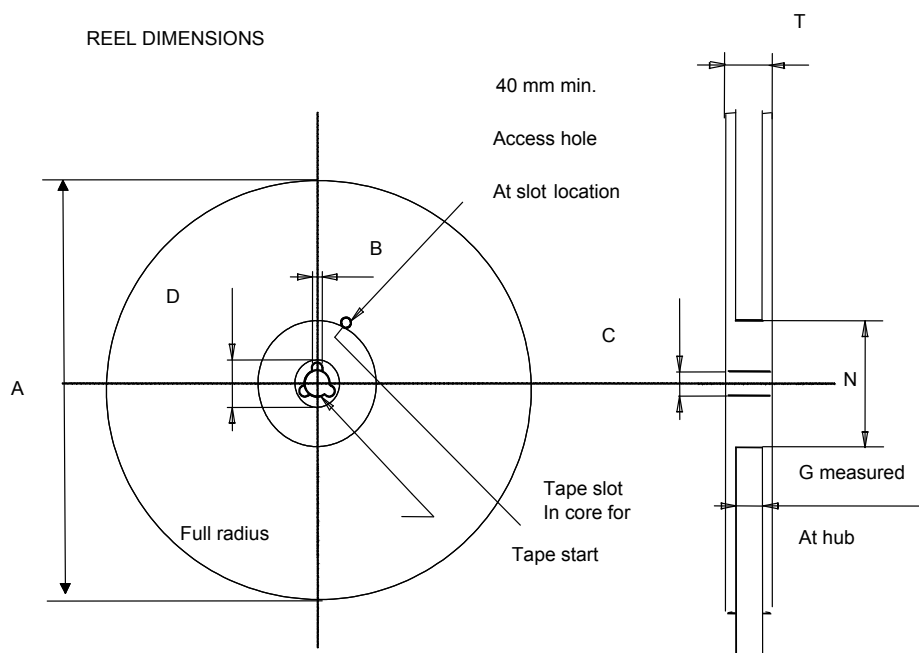
8159712_7_footprint

4.2 Packing information

Figure 20. Tape outline



AM08852v2

Figure 21. Reel outline

Table 8. 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			
P1	11.9	12.1	Base quantity		1000
P2	1.9	2.1	Bulk quantity		1000
R	50				
T	0.25	0.35			
W	23.7	24.3			

Revision history

Table 9. Document revision history

Date	Version	Changes
13-Jun-2016	1	First release
14-Jan-2019	2	Updated description title and Section Features .

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