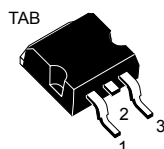
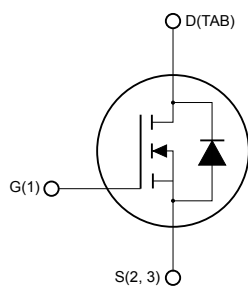


N-channel 100 V, 3.2 mΩ typ., 180 A, STripFET F7 Power MOSFET in an H²PAK-2 package



H²PAK-2



DTG1S23NZ



Features

Order code	V _{DS}	R _{DS(on)} max.	I _D	P _{TOT}
STH200N10WF7-2	100 V	4.0 mΩ	180 A	340 W

- Best-in-class SOA capability
- High current surge capability
- Extremely low on-resistance

Applications

- Hot-swap
- Electronic fuse
- Load switch
- In-rush current limiter

Description

This N-channel Power MOSFET utilizes the STripFET F7 technology with an enhanced trench gate structure boosting linear mode withstanding capability and providing a wider SOA combined with a very low on-state resistance. The resulting MOSFET ensures the best trade-off between linear mode and switching operations.

Product status link

[STH200N10WF7-2](#)

Product summary

Order code	STH200N10WF7-2
Marking	200N10WF7
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 $T_C = 25\text{ }^{\circ}\text{C}$ ⁽¹⁾	180	A
	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	150	A
I_{DM} ⁽²⁾	Drain current (pulsed)	720	A
P_{TOT}	Total power dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	340	W
I_{AV}	Avalanche current, repetitive or not repetitive (pulse width limited by maximum junction temperature)	65	A
E_{AS}	Single pulse avalanche energy ($T_J = 25\text{ }^{\circ}\text{C}$, $I_D = I_{AV}$, $V_{DD} = 25\text{ V}$)	840	mJ
T_J	Operating junction temperature range	-55 to 175	$^{\circ}\text{C}$
T_{stg}	Storage temperature range		

1. Current limited by package.
2. Pulse width limited by safe operating area.

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	0.44	$^{\circ}\text{C/W}$
R_{thJB} ⁽¹⁾	Thermal resistance, junction-to-board	35	$^{\circ}\text{C/W}$

1. When mounted on an 1 inch² FR-4 board, 2 oz of Cu, $t < 10\text{ s}$.

2 Electrical characteristics

($T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Table 3. On /off-states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	100			V
I_{DSS}	Zero-gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 100\text{ V}$			1	μA
		$V_{GS} = 0\text{ V}$, $V_{DS} = 100\text{ V}$, $T_C = 125\text{ }^{\circ}\text{C}$ ⁽¹⁾			100	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = 20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 90\text{ A}$		3.2	4.0	m Ω

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

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	4430	-	pF
C_{oss}	Output capacitance		-	3770	-	pF
C_{rss}	Reverse transfer capacitance		-	88	-	pF
Q_g	Total gate charge	$V_{DD} = 50\text{ V}$, $I_D = 180\text{ A}$,	-	93	-	nC
Q_{gs}	Gate-source charge	$V_{GS} = 0$ to 10 V	-	52	-	nC
Q_{gd}	Gate-drain charge	(see Figure 13. Test circuit for gate charge behavior)	-	23	-	nC

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50\text{ V}$, $I_D = 90\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$ (see Figure 12. Test circuit for resistive load switching times and Figure 17. Switching time waveform)	-	40	-	ns
t_r	Rise time		-	230	-	ns
$t_{d(off)}$	Turn-off delay time		-	430	-	ns
t_f	Fall time		-	730	-	ns

Table 6. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 180\text{ A}$, $V_{GS} = 0\text{ V}$	-		1.2	V
t_{rr}	Reverse recovery time	(see Figure 14. Test circuit for inductive load switching and diode recovery times) $I_{SD} = 180\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 80\text{ V}$	-	85		ns
Q_{rr}	Reverse recovery charge		-	125		nC
I_{rr}	Reverse recovery current		-	2.9		A

1. Pulsed: pulse duration = 300 μs , duty cycle 1.5%.

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

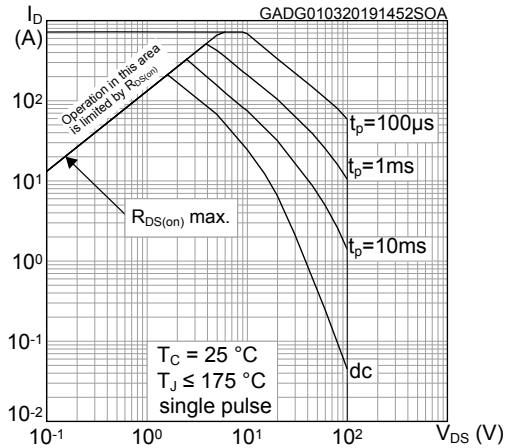


Figure 2. Normalized transient thermal impedance

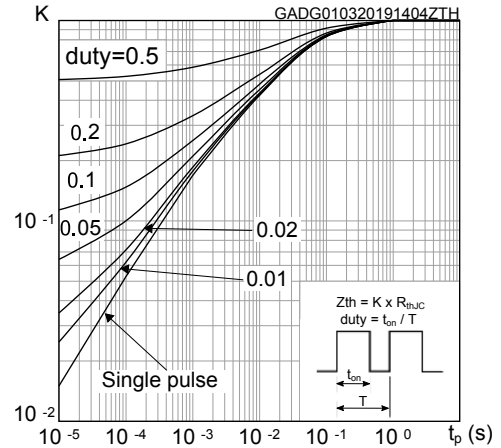


Figure 3. Typical output characteristics

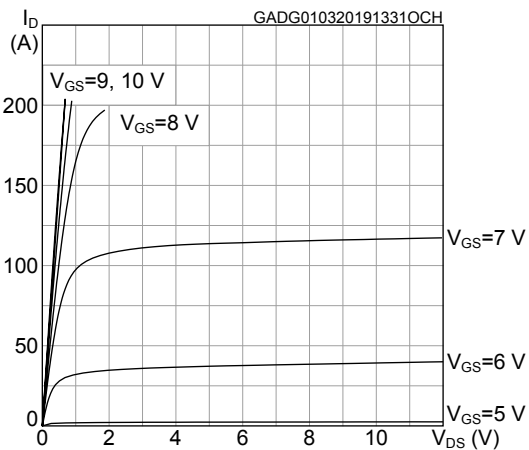


Figure 4. Typical transfer characteristics

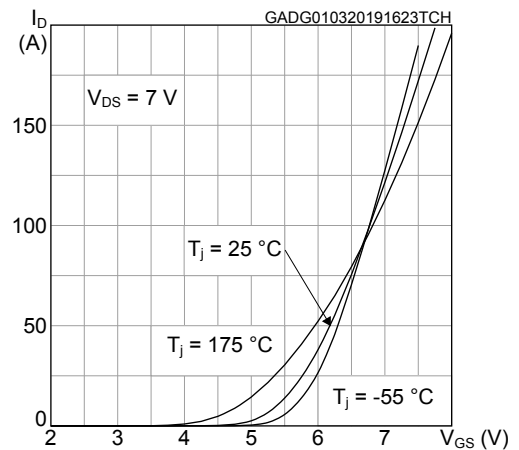


Figure 5. Typical gate charge characteristics

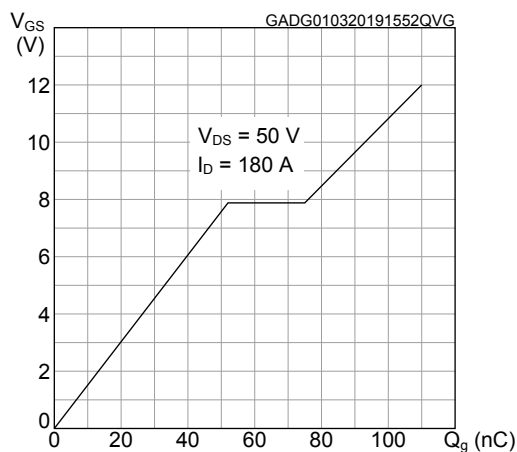


Figure 6. Typical drain-source on-resistance

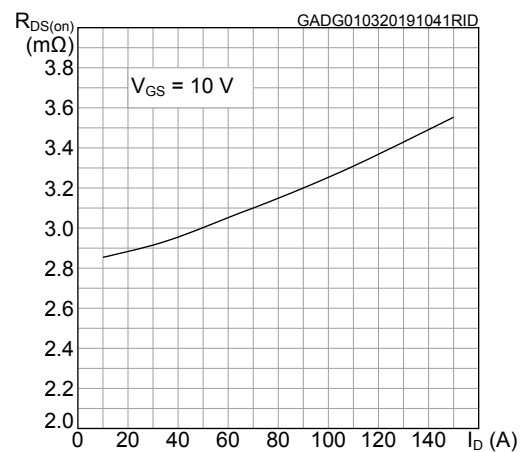


Figure 7. Typical capacitance characteristics

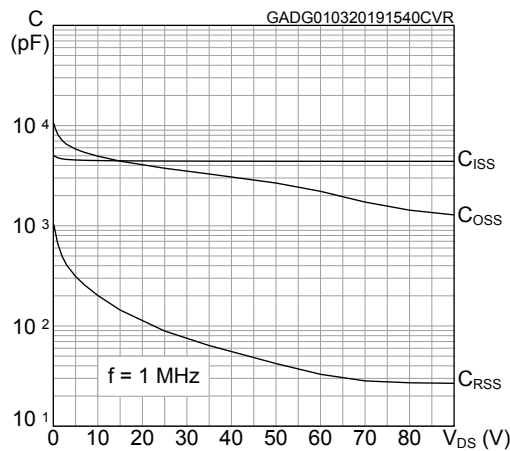


Figure 8. Normalized gate threshold vs temperature

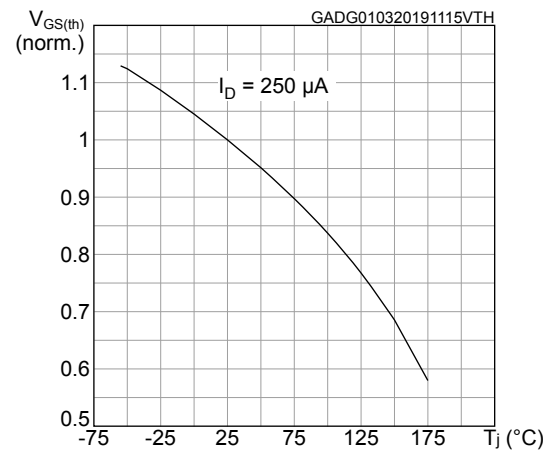


Figure 9. Normalized on-resistance vs temperature

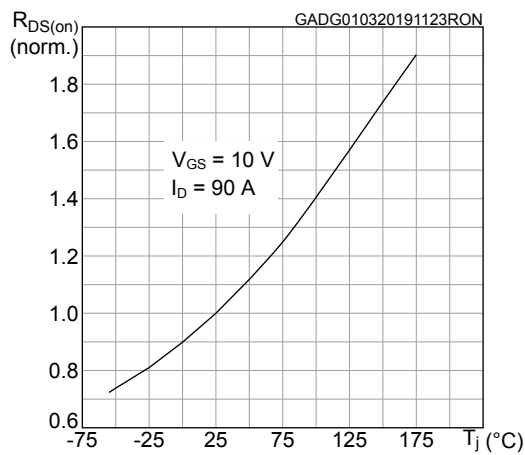


Figure 10. Normalized breakdown voltage vs temperature

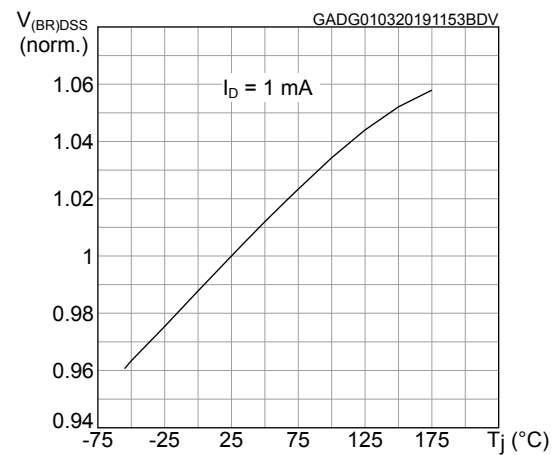
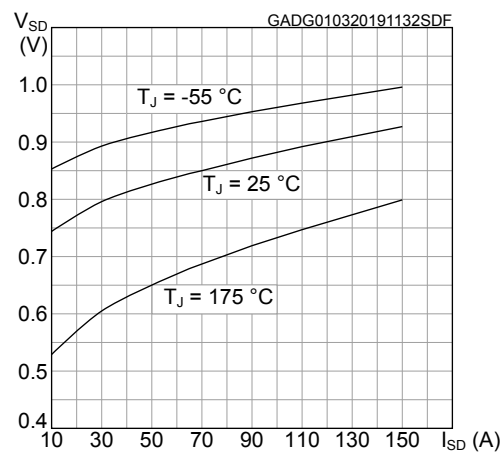
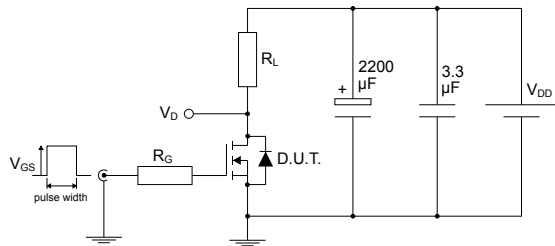


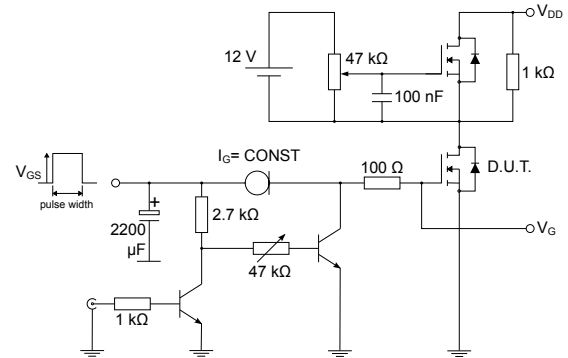
Figure 11. Typical reverse diode forward characteristics



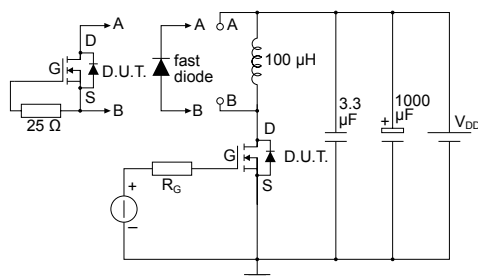
3 Test circuits

Figure 12. Test circuit for resistive load switching times


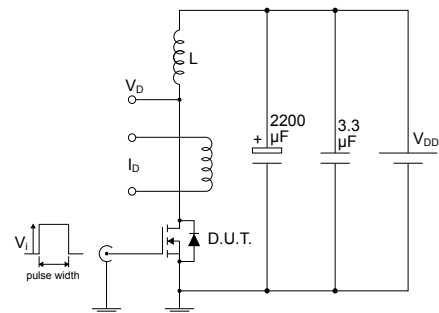
AM01468v1

Figure 13. Test circuit for gate charge behavior


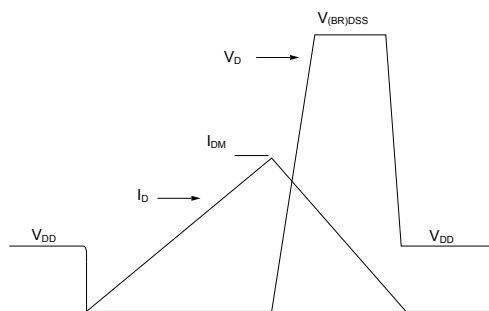
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Figure 14. Test circuit for inductive load switching and diode recovery times


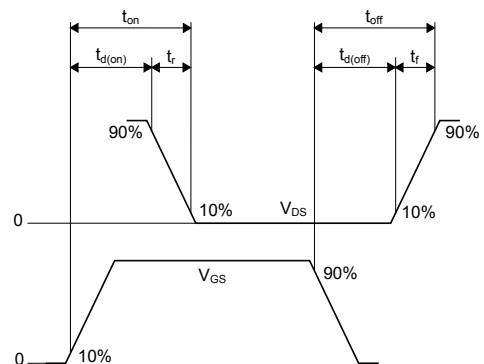
AM01470v1

Figure 15. Unclamped inductive load test circuit


AM01471v1

Figure 16. Unclamped inductive waveform


AM01472v1

Figure 17. Switching time waveform


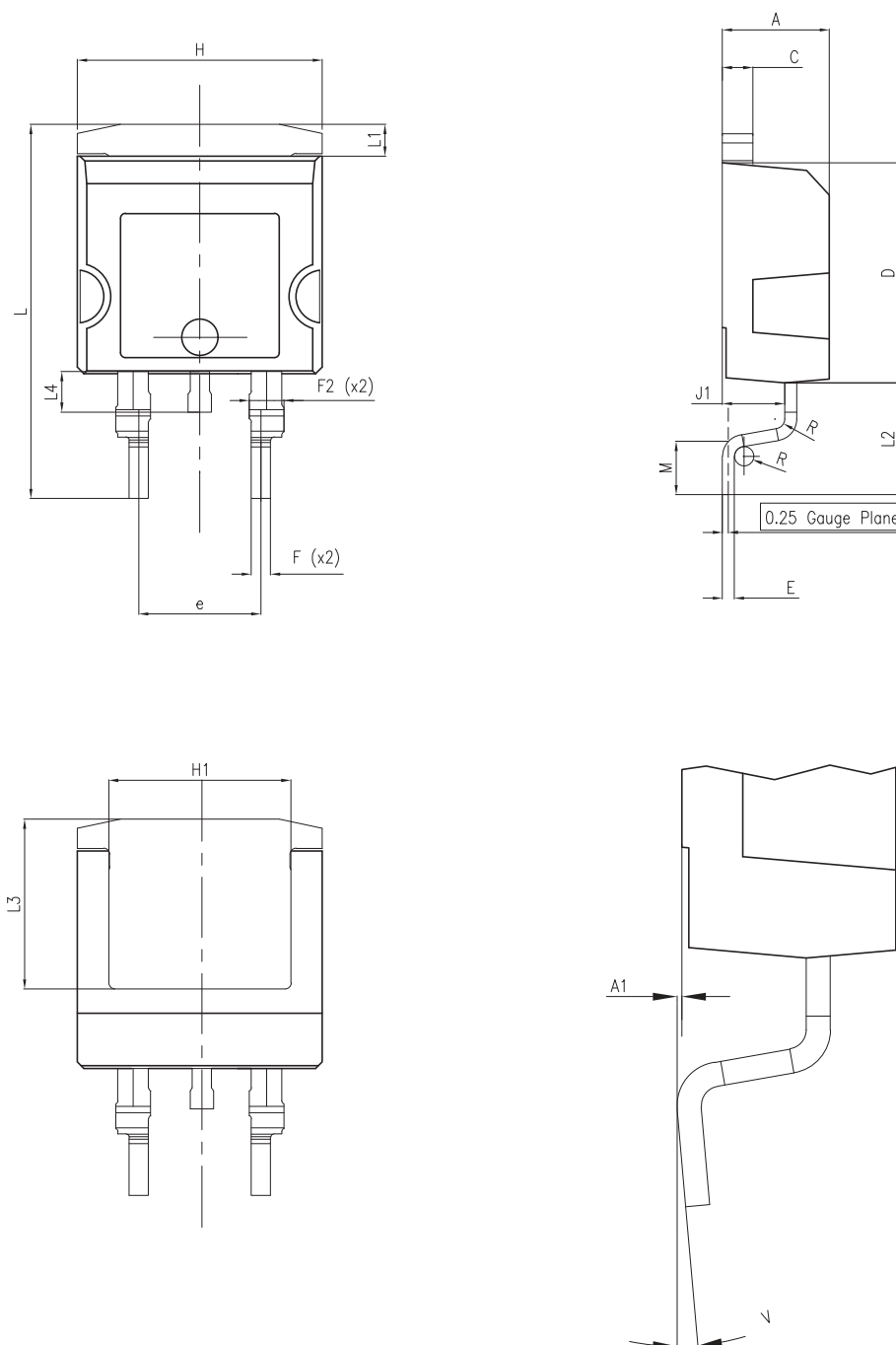
AM01473v1

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 package information

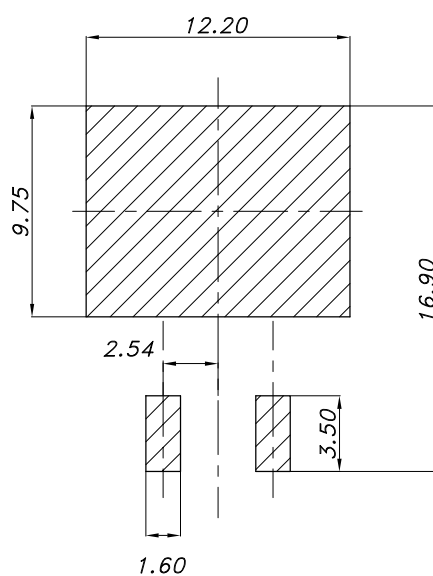
Figure 18. H²PAK-2 package outline



8159712_10

Table 7. H²PAK-2 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.30	-	4.70
A1	0.03		0.20
C	1.17		1.37
D	8.95		9.35
e	4.98		5.18
E	0.50		0.90
F	0.78		0.85
F2	1.14		1.70
H	10.00		10.40
H1	7.40		7.80
J1	2.49		2.69
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


8159712_10

Note: Dimensions are in mm.

4.2 Packing information

Figure 20. Tape outline

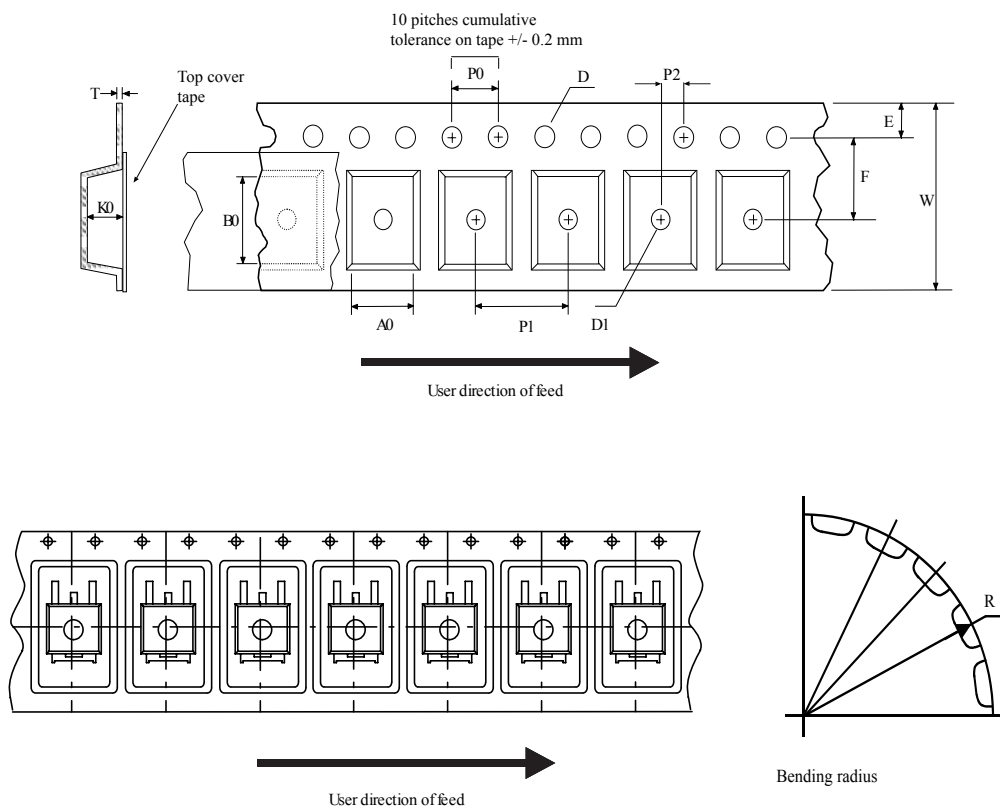


Table 8. Tape and reel mechanical data

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	Revision	Changes
22-Sep-2016	1	First release
07-Mar-2019	2	Updated <i>Table 4. Dynamic</i> , <i>Table 5. Switching times</i> and <i>Table 6. Sourcedrain diode</i> .
09-Jul-2021	3	Modified <i>Table 1. Absolute maximum ratings</i> , <i>Table 3. On /off-states</i> , <i>Table 4. Dynamic</i> , <i>Table 5. Switching times</i> and <i>Table 6. Source-drain diode</i> . Modified <i>Figure 1. Safe operating area</i> , <i>Figure 3. Typical output characteristics</i> , <i>Figure 4. Typical transfer characteristics</i> , <i>Figure 6. Typical drain-source on-resistance</i> , <i>Figure 7. Typical capacitance characteristics</i> , <i>Figure 9. Normalized on-resistance vs temperature</i> and <i>Figure 11. Typical reverse diode forward characteristics</i> . Minor text changes.
13-Jul-2022	3	Updated <i>Section Description</i> .

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