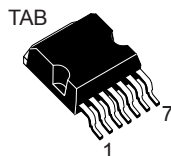
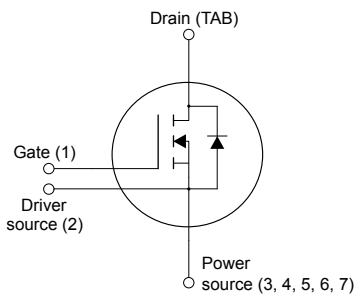


Automotive-grade silicon carbide Power MOSFET, 1200 V, 75 A, 30 mΩ (typ., $T_J = 25\text{ }^\circ\text{C}$) in an H²PAK-7 package



H²PAK-7


N-chG1DS2PS34567DTAB



Features

Order code	V_{DS}	$R_{DS(on)typ.}$	I_D
SCTH100N120G2-AG	1200 V	30 mΩ	75 A

- AEC-Q101 qualified 
- High speed switching performance
- Very fast and robust intrinsic body diode
- Low capacitance

Applications

- Traction inverters
- DC-DC converters
- Solar inverters
- OBC

Description

This silicon carbide Power MOSFET device has been developed using ST's advanced and innovative 2nd generation SiC MOSFET technology. The device features remarkably low on-resistance per unit area and very good switching performance. The variation of switching loss is almost independent of junction temperature.

Product status link

[SCTH100N120G2-AG](#)

Product summary

Order code	SCTH100N120G2-AG
Marking	100N120AG
Package	H ² PAK-7
Packing	Tape and reel

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	1200	V
V_{GS}	Gate-source voltage	-10 to 22	V
	Gate-source voltage (recommended operational values)	-5 to 18	
I_D	Drain current (continuous) at $T_C = 25\text{ °C}$	75	A
	Drain current (continuous) at $T_C = 100\text{ °C}$	53	
$I_D^{(1)}$	Drain current (pulsed)	212	A
P_{TOT}	Total power dissipation at $T_C = 25\text{ °C}$	484	W
T_{stg}	Storage temperature range	-55 to 175	°C
T_J	Operating junction temperature range		°C

1. Pulse width is limited by safe operating area.

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	0.31	°C/W
$R_{thj-amb}$	Thermal resistance junction-ambient	50	°C/W

2 Electrical characteristics

($T_{CASE} = 25\text{ °C}$ unless otherwise specified).

Table 3. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	1200			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}, V_{DS} = 1200\text{ V}$			10	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0\text{ V}, V_{GS} = 22\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	1.9	3.1	5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 18\text{ V}, I_D = 50\text{ A}$		30	39	m Ω
		$V_{GS} = 18\text{ V}, I_D = 50\text{ A}, T_J = 175\text{ °C}$		69		

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 800\text{ V}, f = 1\text{ MHz}, V_{GS} = 0\text{ V}$	-	3400	-	pF
C_{oss}	Output capacitance		-	140	-	pF
C_{rss}	Reverse transfer capacitance		-	30	-	pF
Q_g	Total gate charge	$V_{DS} = 800\text{ V}, V_{GS} = -5\text{ to }18\text{ V}, I_D = 50\text{ A}$	-	163	-	nC
Q_{gs}	Gate-source charge		-	50	-	nC
Q_{gd}	Gate-drain charge		-	41	-	nC
R_g	Gate input resistance	$f=1\text{ MHz}, I_D = 0\text{ A}$	-	1	-	Ω

Table 5. Switching energy

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
E_{on}	Turn-on switching energy	$V_{DD} = 800\text{ V}, I_D = 50\text{ A}$	-	1.6	-	mJ
E_{off}	Turn-off switching energy	$R_G = 2.2\text{ }\Omega, V_{GS} = -5\text{ to }20\text{ V}$	-	0.46	-	mJ

Table 6. Reverse SiC diode characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode forward voltage	$I_{SD} = 50\text{ A}, V_{GS} = 0\text{ V}$	-	3.2	-	V
t_{rr}	Reverse recovery time	$I_{SD} = 50\text{ A}, V_{GS} = 0\text{ V}, di/dt = 2000\text{ A}/\mu\text{s}, V_{DD} = 800\text{ V}$	-	31	-	ns
Q_{rr}	Reverse recovery charge		-	467	-	nC
I_{RRM}	Reverse recovery current		-	23	-	A

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

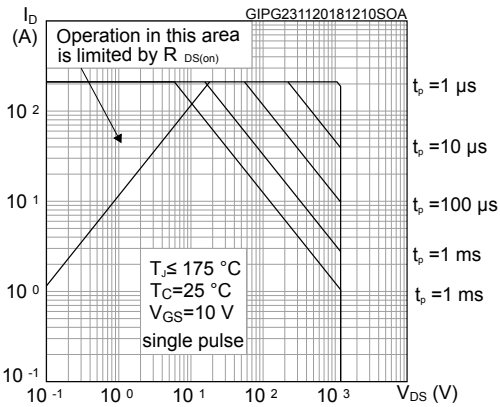


Figure 2. Thermal impedance

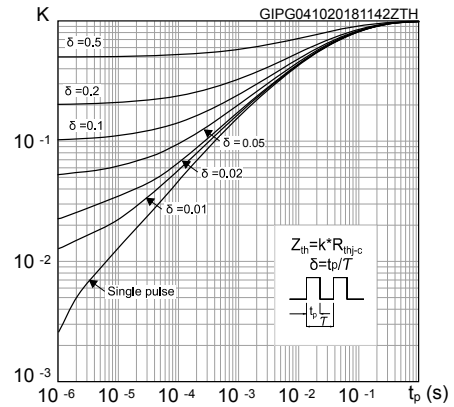


Figure 3. Output characteristics ($T_J = 25^\circ C$)

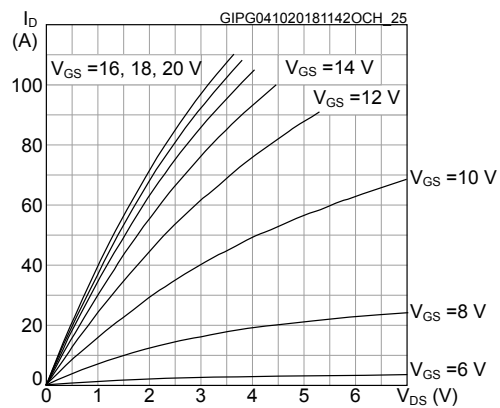


Figure 4. Output characteristics ($T_J = 175^\circ C$)

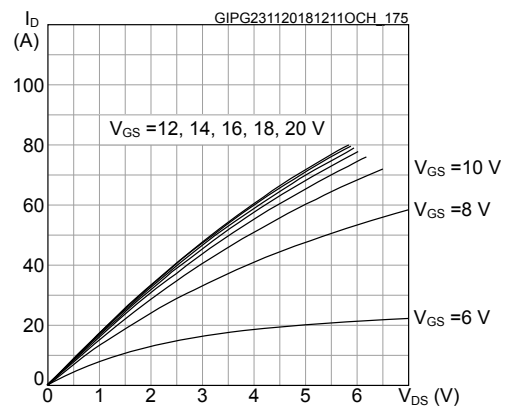


Figure 5. Transfer characteristics

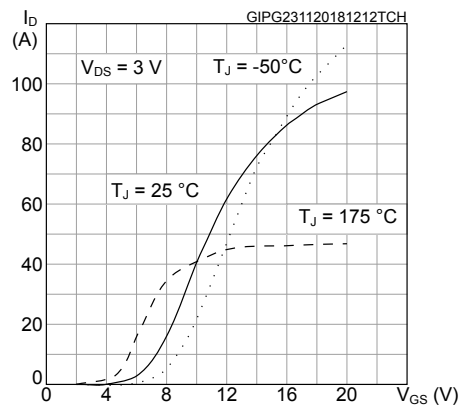


Figure 6. Total power dissipation

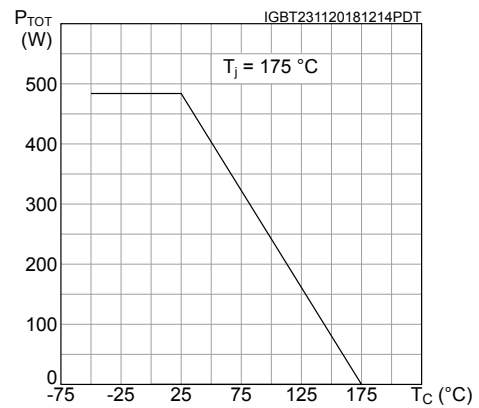


Figure 7. Gate charge vs gate-source voltage

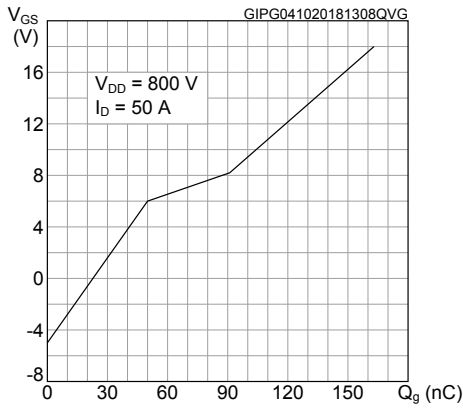


Figure 8. Capacitance variations

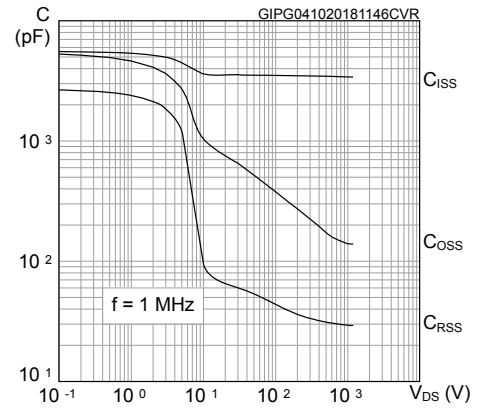


Figure 9. Switching energy vs current

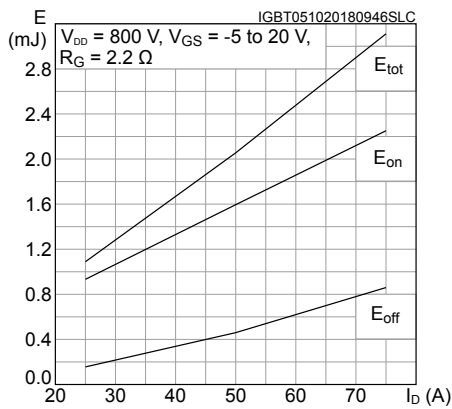


Figure 10. Switching energy vs temperature

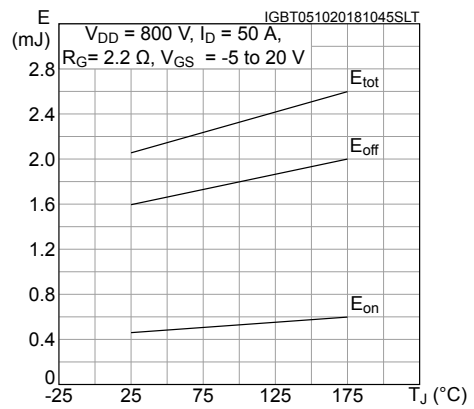


Figure 11. Normalized $V_{(BR)DSS}$ vs. temperature

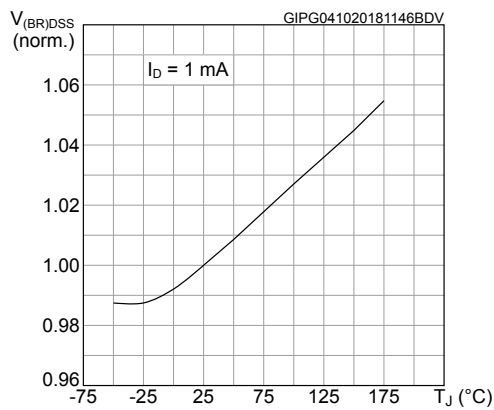


Figure 12. Normalized gate threshold voltage vs. temperature

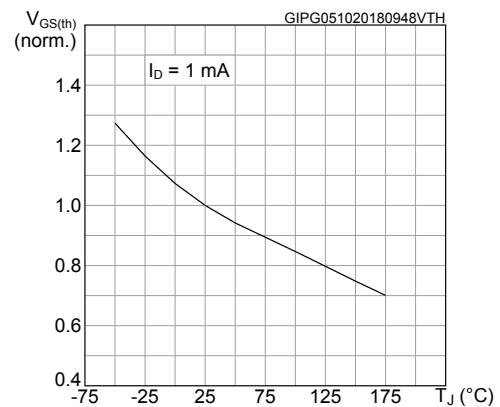


Figure 13. Normalized on-resistance vs. temperature

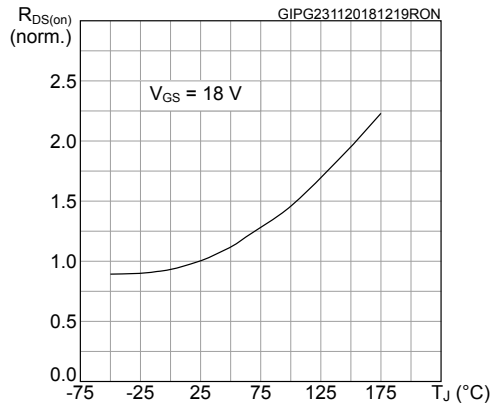


Figure 14. Static drain-source on-resistance

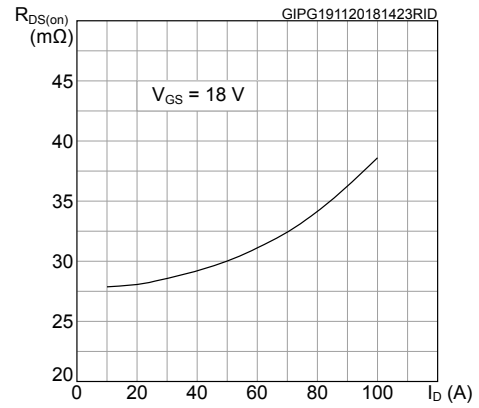


Figure 15. Reverse conduction characteristics ($T_J = -50$ °C)

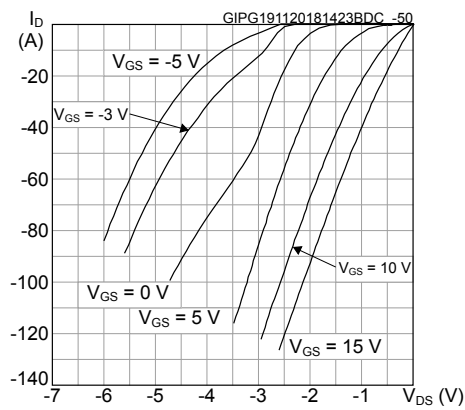


Figure 16. Reverse conduction characteristics ($T_J = 25$ °C)

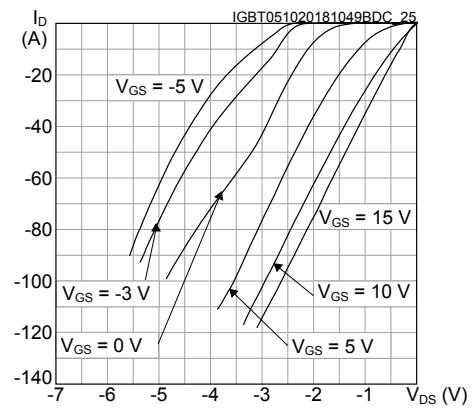
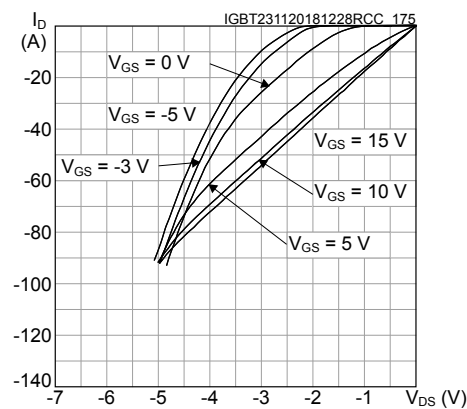
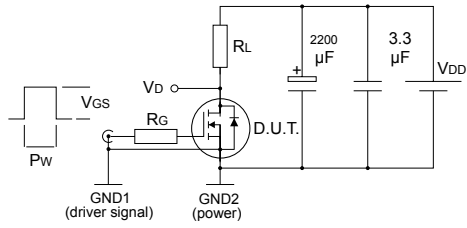


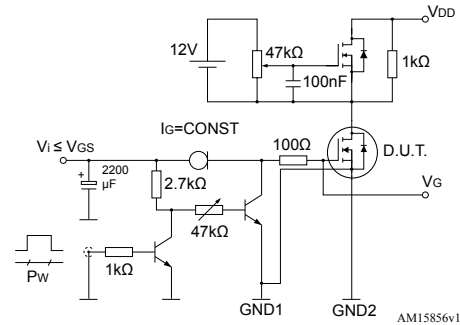
Figure 17. Reverse conduction characteristics ($T_J = 175$ °C)



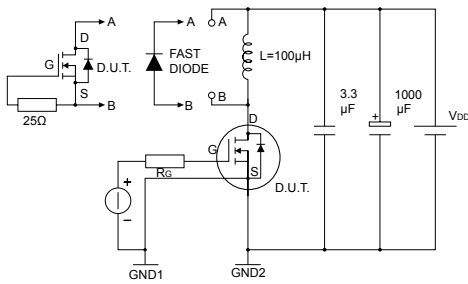
3 Test circuits

Figure 18. Switching times test circuit for resistive load


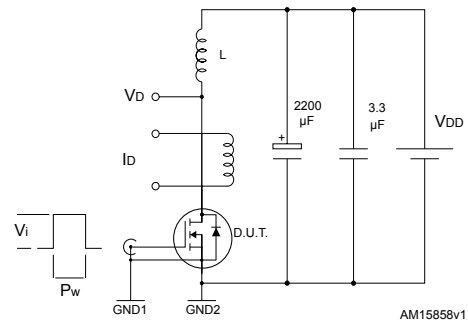
AM15855v1

Figure 19. Test circuit for gate charge behavior


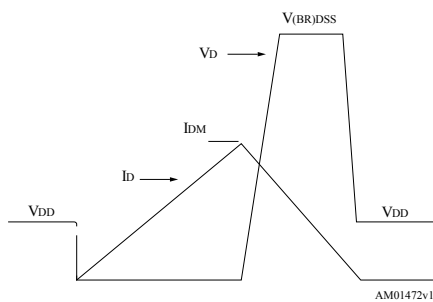
AM15856v1

Figure 20. Test circuit for inductive load switching and diode recovery times


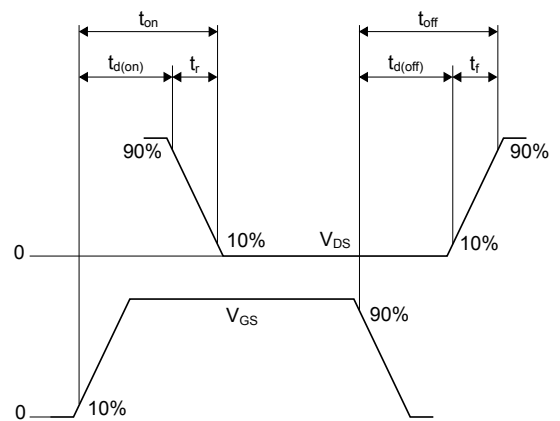
AM15857v1

Figure 21. Unclamped inductive load test circuit


AM15858v1

Figure 22. Unclamped inductive waveform


AM01472v1

Figure 23. Switching time waveform


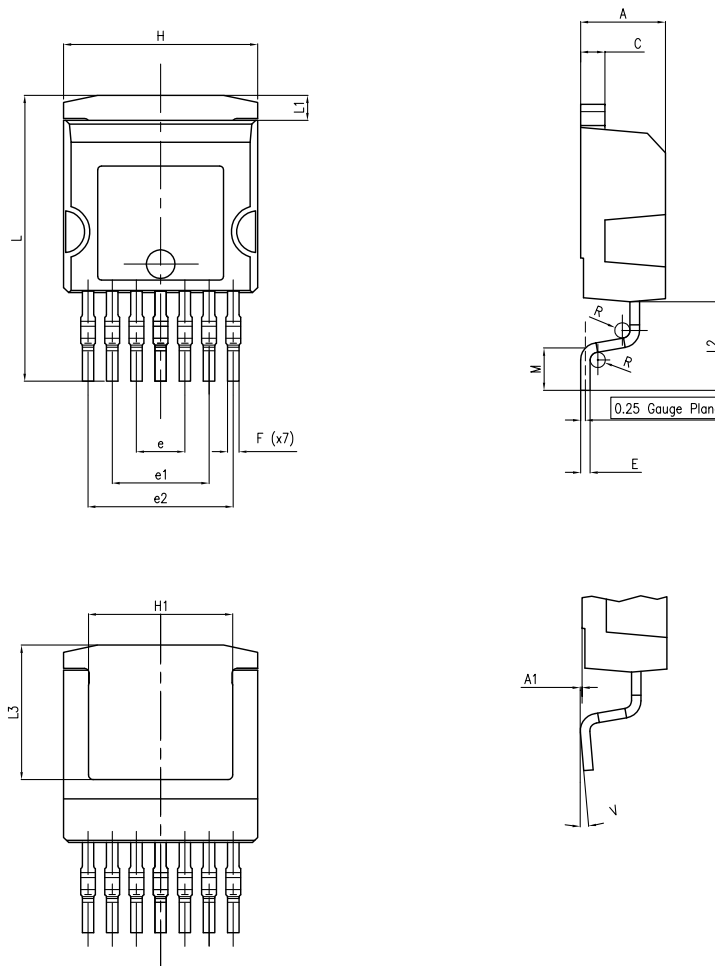
AM01473v1

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-7 package information

Figure 24. H²PAK-7 package outline

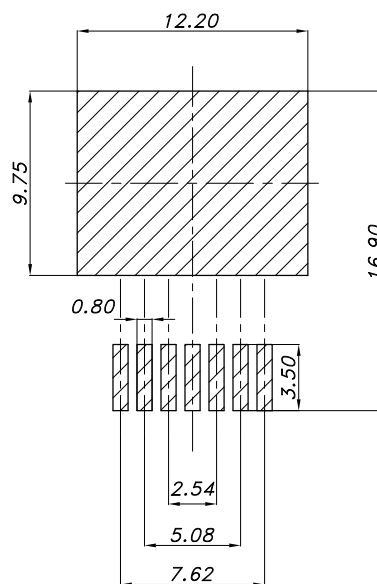


DM00249216_4

Table 7. H²PAK-7 package mechanical data

Dim.	mm	
	Min.	Max.
A	4.30	4.80
A1	0.03	0.20
C	1.17	1.37
e	2.34	2.74
e1	4.88	5.28
e2	7.42	7.82
E	0.45	0.60
F	0.50	0.70
H	10.00	10.40
H1	7.40	7.60
L	14.75	15.25
L1	1.27	1.40
L2	4.35	4.95
L3	6.85	7.25
M	1.90	2.50
R	0.20	0.60
V	0°	8°

Figure 25. H²PAK-7 recommended footprint

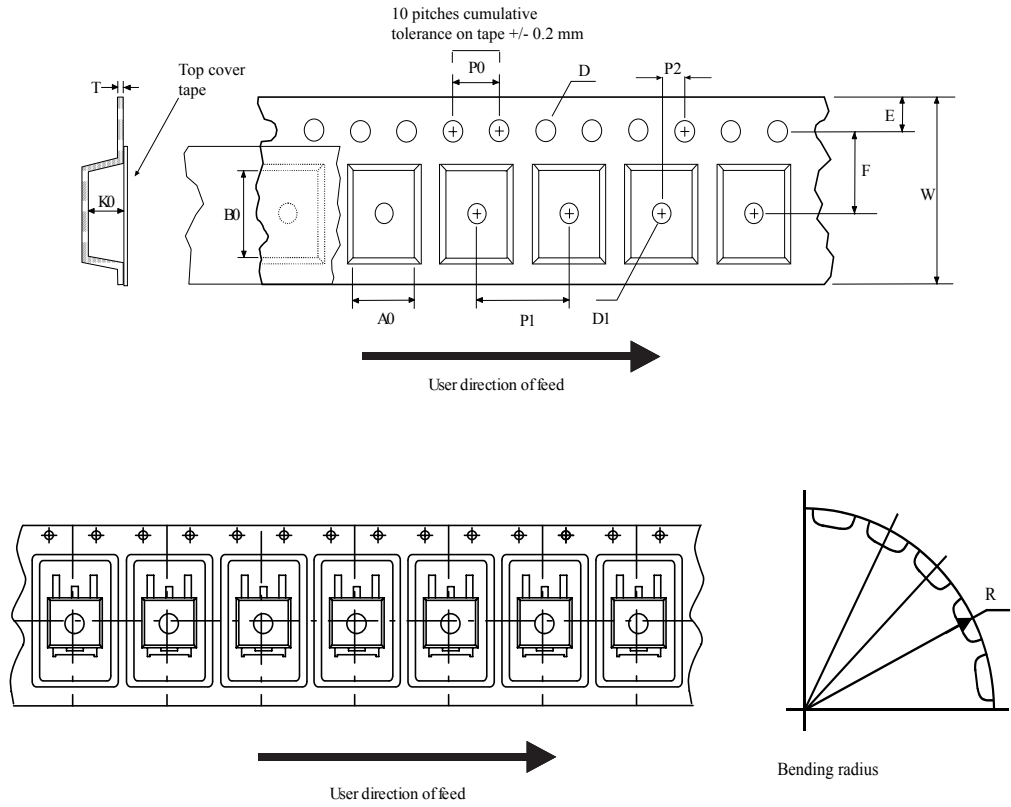


footprint_DM00249216_4

Note: Dimensions are in mm.

4.2 Packing information

Figure 26. Tape outline



AM08852v2

Figure 27. Reel outline

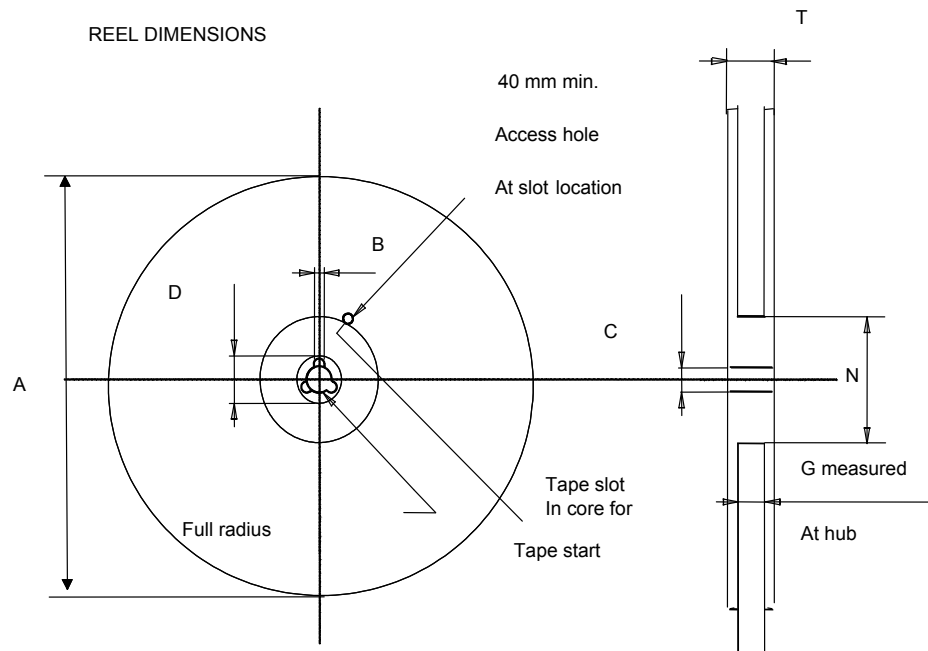


Table 8. Tape and reel mechanical data

Dim.	Tape		Dim.	Reel	
	mm			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
03-Dec-2018	1	First release.
23-Jul-2020	2	Modified Table 3. On/off states and Table 6. Reverse SiC diode characteristics.

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