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 (1)	Drain current (continuous) at T_C = 25 °C	180	A
I_D (1)	Drain current (continuous) at T_c = 100 °C	120	A
I_{DM} (2)	Drain current (pulsed)	720	A
P_{TOT}	Total dissipation at T_C = 25 °C	300	W
E_{AS} (3)	Single pulse avalanche energy	500	mJ
T_j	Operating junction temperature range	-55 to 175	°C
T_{stg}	Storage temperature range		

1. *Current limited by package.*
2. *Pulse width limited by safe operating area.*
3. *Starting T_j=25 °C, I_D=45 A, V_{DD}=50 V*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	0.5	°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb	35	°C/W

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

2 Electrical characteristics

(T_C = 25 °C unless otherwise specified)

Table 3. On/Off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 250 µA, V_{GS} = 0 V	100			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0 V, V_{DS} = 100 V			1	µA
		V_{GS} = 0 V, V_{DS} = 100 V, T_C=125 °C (1)			100	µA
I_{GSS}	Gate-body leakage current	V_{GS} = ±20 V, V_{DS} = 0 V			100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS} , I_D = 250 µA	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D= 60 A		2	2.5	mΩ

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 V, f = 1 MHz, V_{GS} = 0 V	-	11550	-	pF
C_{oss}	Output capacitance		-	2950	-	pF
C_{rss}	Reverse transfer capacitance		-	217	-	pF
Q_g	Total gate charge	V_{DD} = 50 V, I_D = 180 A, V_{GS} = 0 to 10 V (see Figure 15. Test circuit for gate charge behavior)	-	160	-	nC
Q_{gs}	Gate-source charge		-	48	-	nC
Q_{gd}	Gate-drain charge		-	38	-	nC

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD} = 50 V, I_D = 90 A, R_G = 4.7 Ω, V_{GS} = 10 V (see Figure 14. Test circuit for resistive load switching times and Figure 19. Switching time waveform)	-	49	-	ns
t_r	Rise time		-	139	-	ns
$t_{d(off)}$	Turn-off delay time		-	110	-	ns
t_f	Fall time		-	112	-	ns

Table 6. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		180	A
I_{SDM} (1)	Source-drain current (pulsed)		-		720	A

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V_{SD}(2)	Source-drain curren	I_{SD} = 180 A, V_{GS} = 0 V	-		1.2	V
t_{rr}	Reverse recovery time	I_{SD} = 180 A, di/dt = 100 A/µs	-	108		ns
Q_{rr}	Reverse recovery charge	V_{DD} = 64 V, T_J = 150 °C (see Figure 16. Test circuit for inductive load switching and diode recovery times)	-	315		nC
I_{RRM}	Reverse recovery current		-	5.8		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 3. Safe operating area

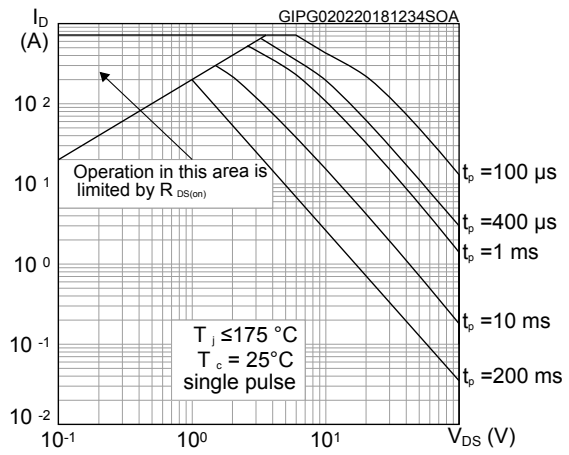


Figure 4. Thermal impedance

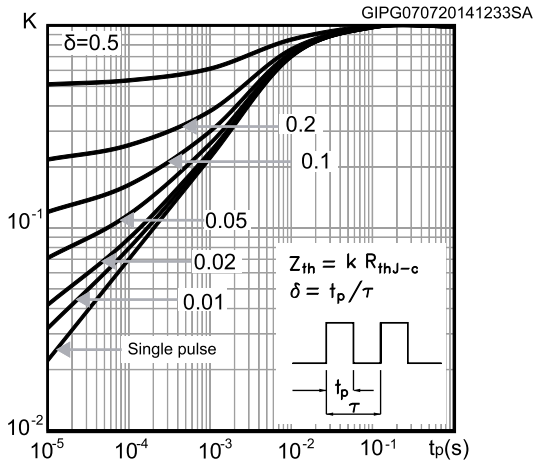


Figure 5. Output characteristics

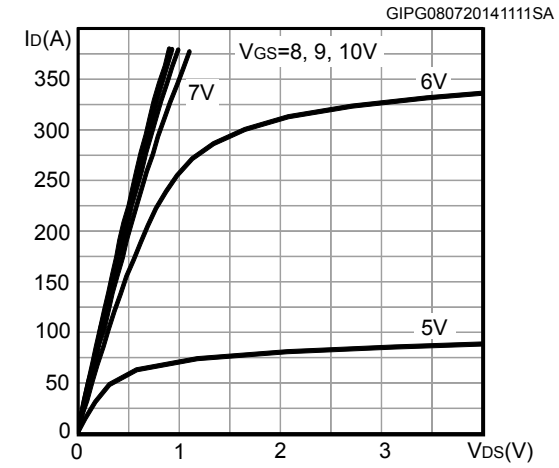


Figure 6. Transfer characteristics

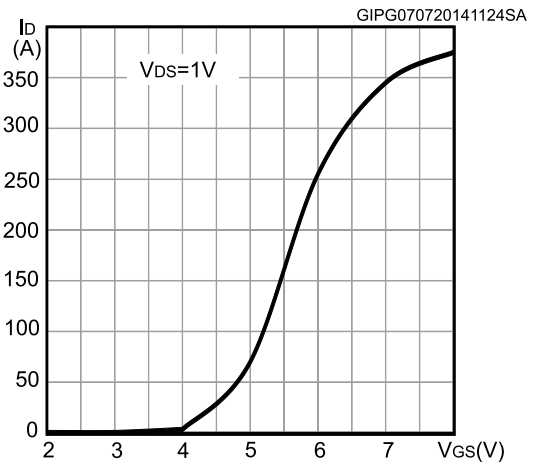


Figure 7. Gate charge vs gate-source voltage

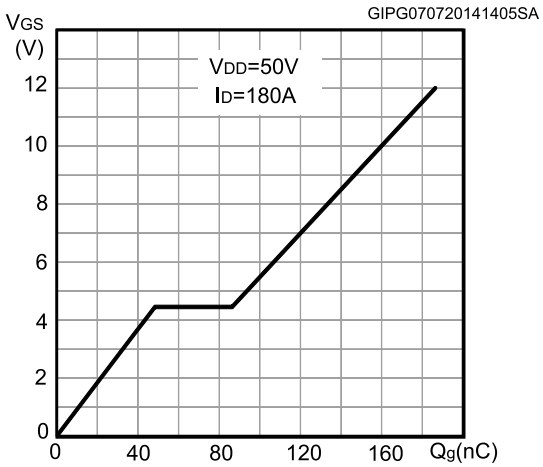


Figure 8. Static drain-source on-resistance

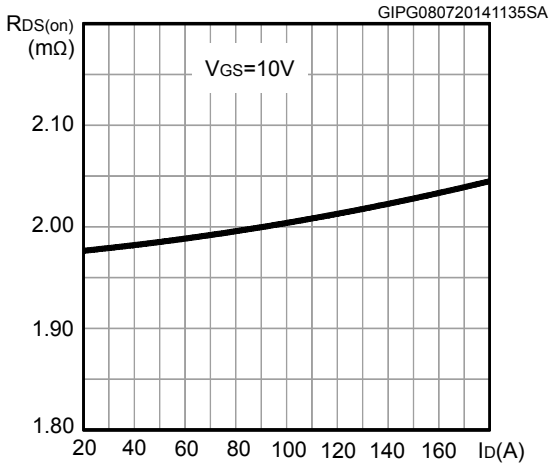


Figure 9. Capacitance variations

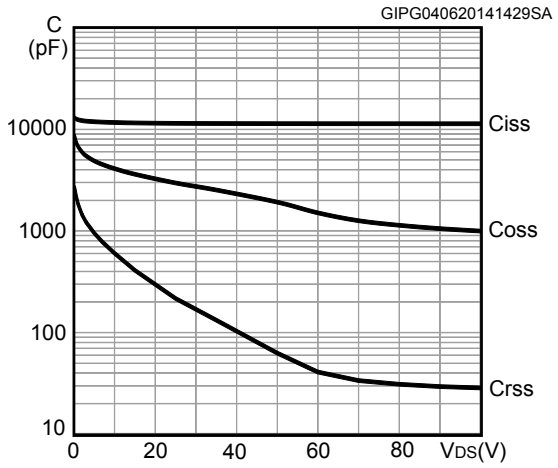


Figure 10. Normalized gate threshold voltage vs. temperature

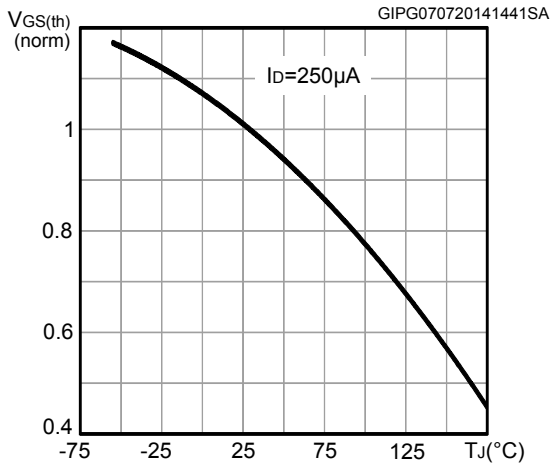


Figure 11. Normalized $V_{(BR)DSS}$ vs. temperature

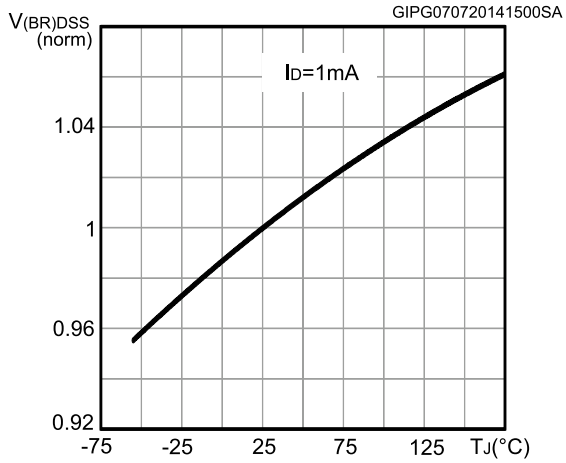


Figure 12. Normalized on-resistance vs. temperature

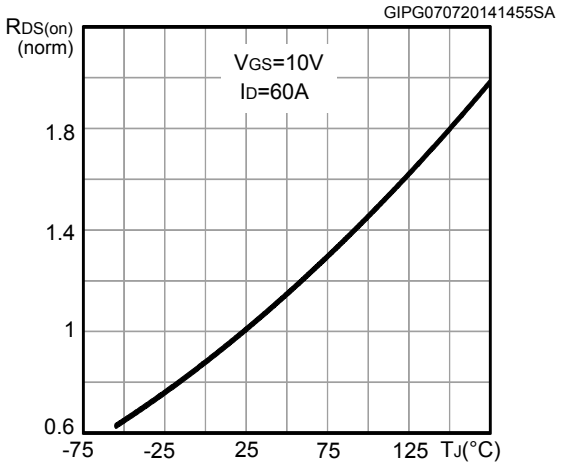
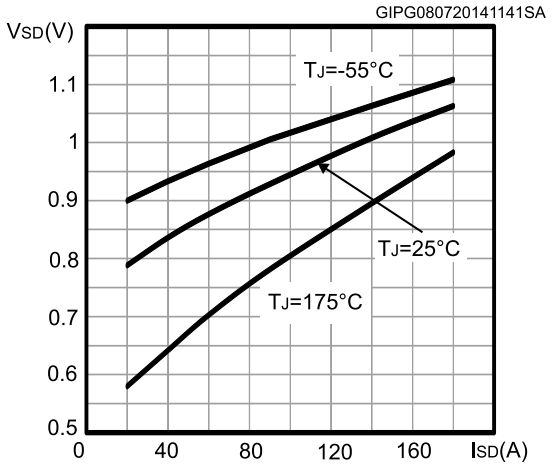


Figure 13. Source-drain diode forward characteristics



3 Test circuits

Figure 14. Test circuit for resistive load switching times

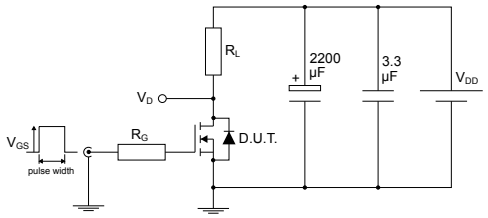


Figure 15. Test circuit for gate charge behavior

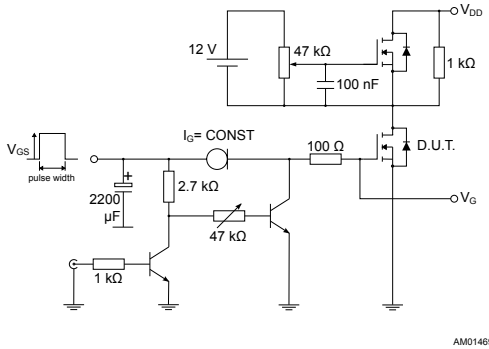


Figure 16. Test circuit for inductive load switching and diode recovery times

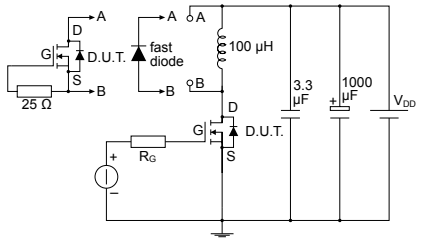


Figure 17. Unclamped inductive load test circuit

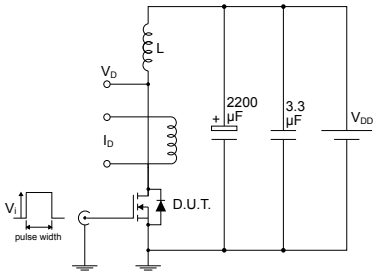


Figure 18. Unclamped inductive waveform

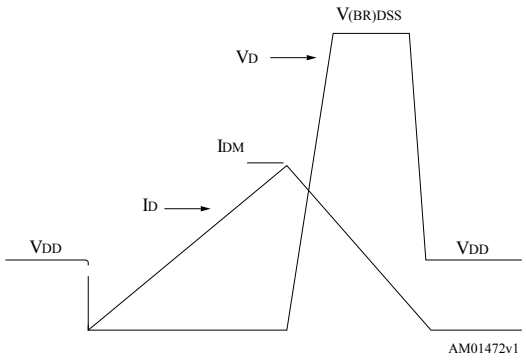
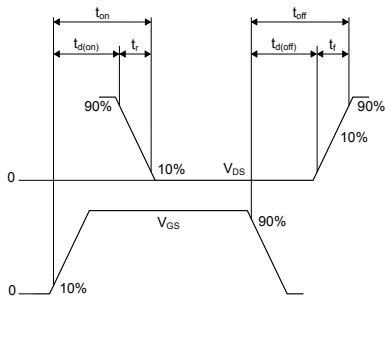


Figure 19. Switching time waveform



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 20. H²PAK-2 package outline

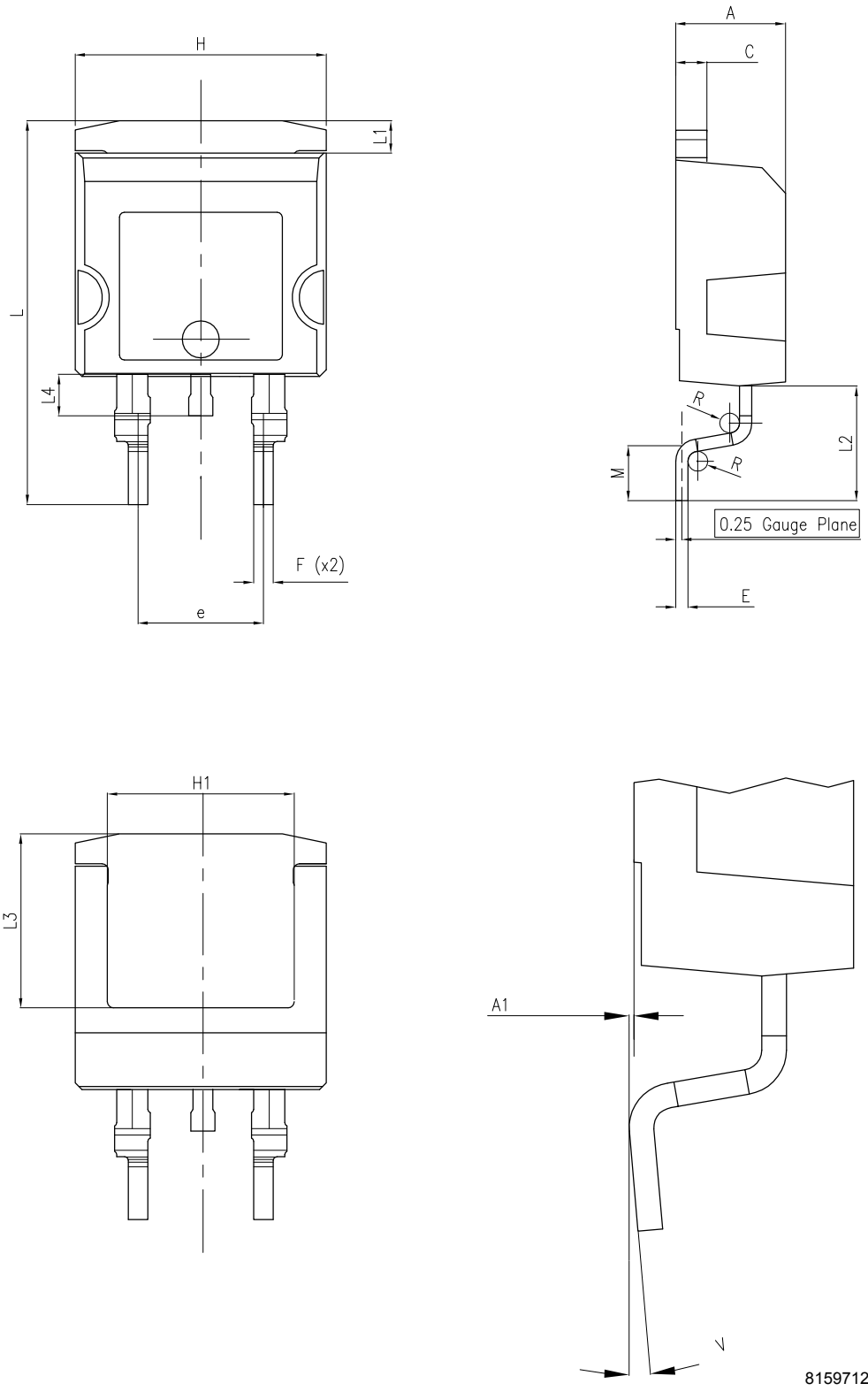
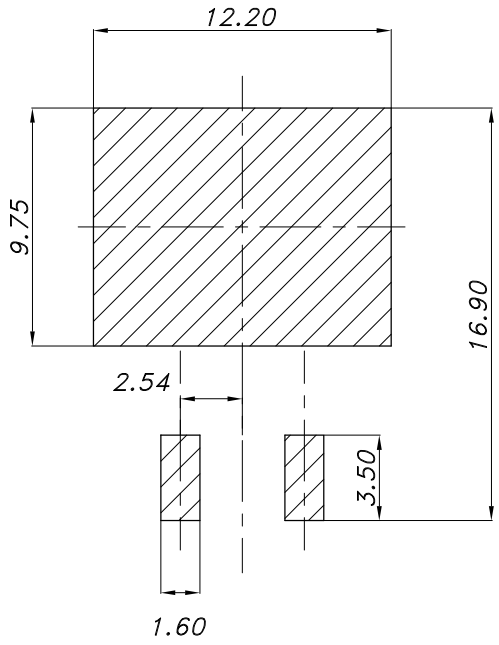


Table 7. **H²PAK-2 package mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.30		4.70
A1	0.03		0.20
C	1.17		1.37
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	1.5		1.7
M	2.6		2.9
R	0.20		0.60
V	0°		8°

Figure 21. **H²PAK-2 recommended footprint**



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Note: Dimensions are in mm.

4.2 H²PAK-6 package information

Figure 22. H²PAK-6 package outline

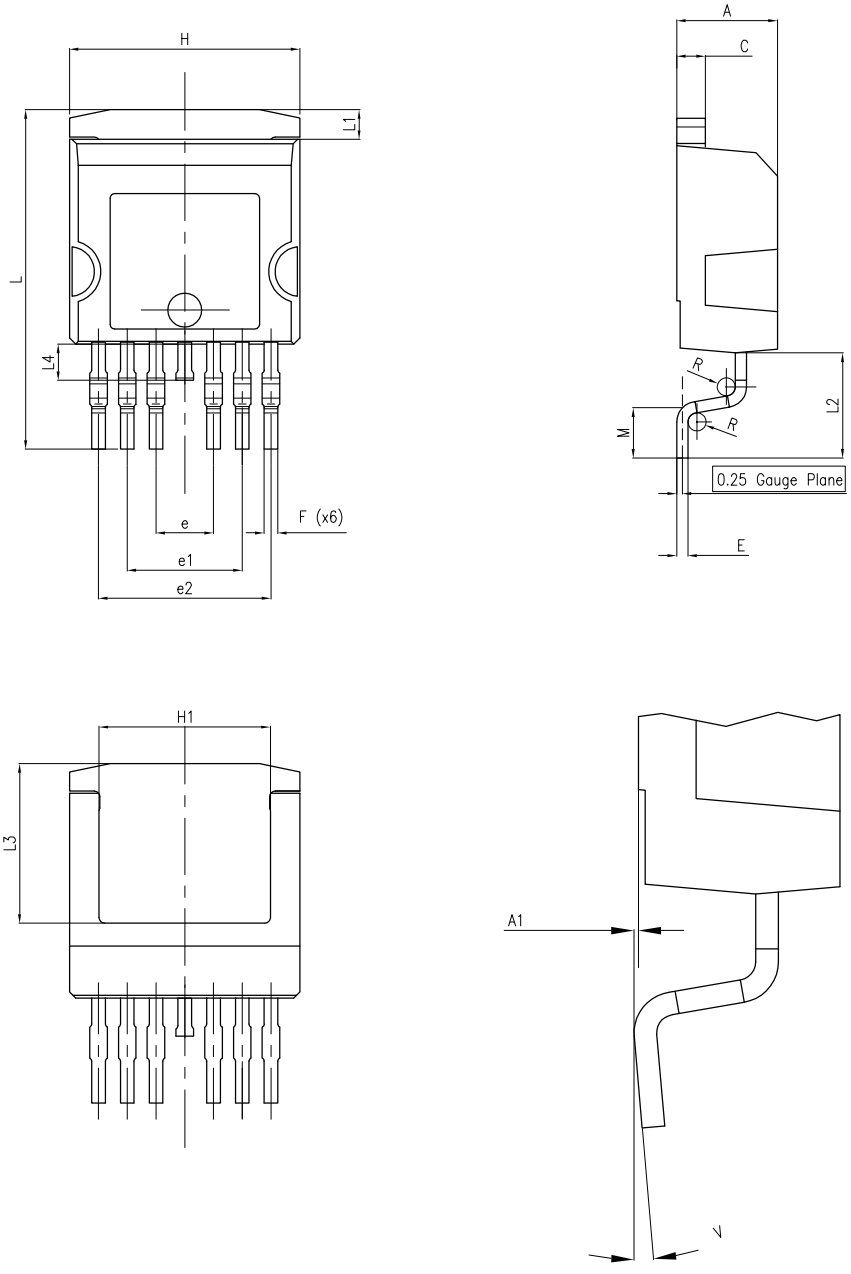

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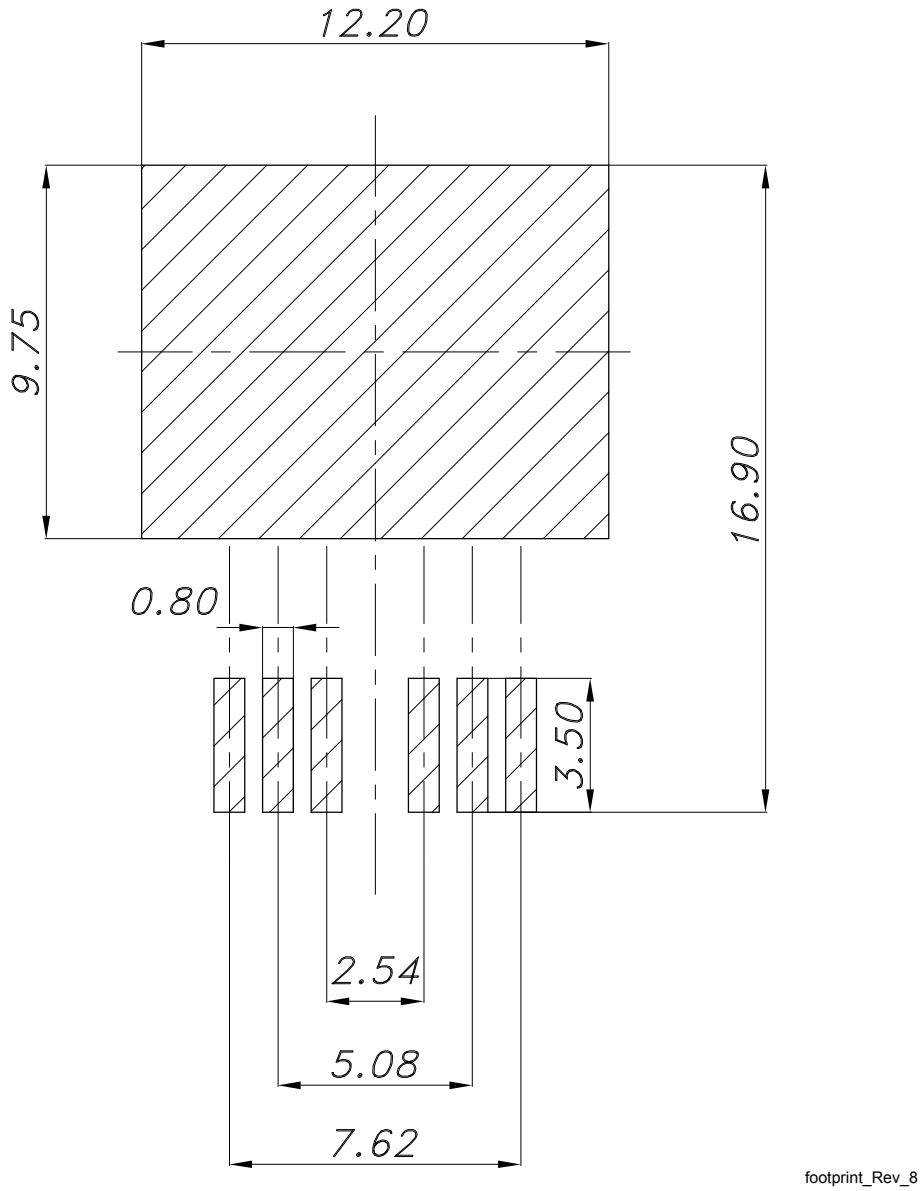
Table 8. H²PAK-6 package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.30		4.70
A1	0.03		0.20
C	1.17		1.37
e	2.34	2.54	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		7.80
L	14.75		15.25
L1	1.27		1.40
L2	4.35		4.95
L3	6.85		7.25
L4	1.50		1.75
M	1.90		2.50
R	0.20		0.60
V	0°		8°

Figure 23. **H²PAK-6 recommended footprint**



Note: Dimensions are in mm.

4.3 Packing information

Figure 24. **Tape outline**

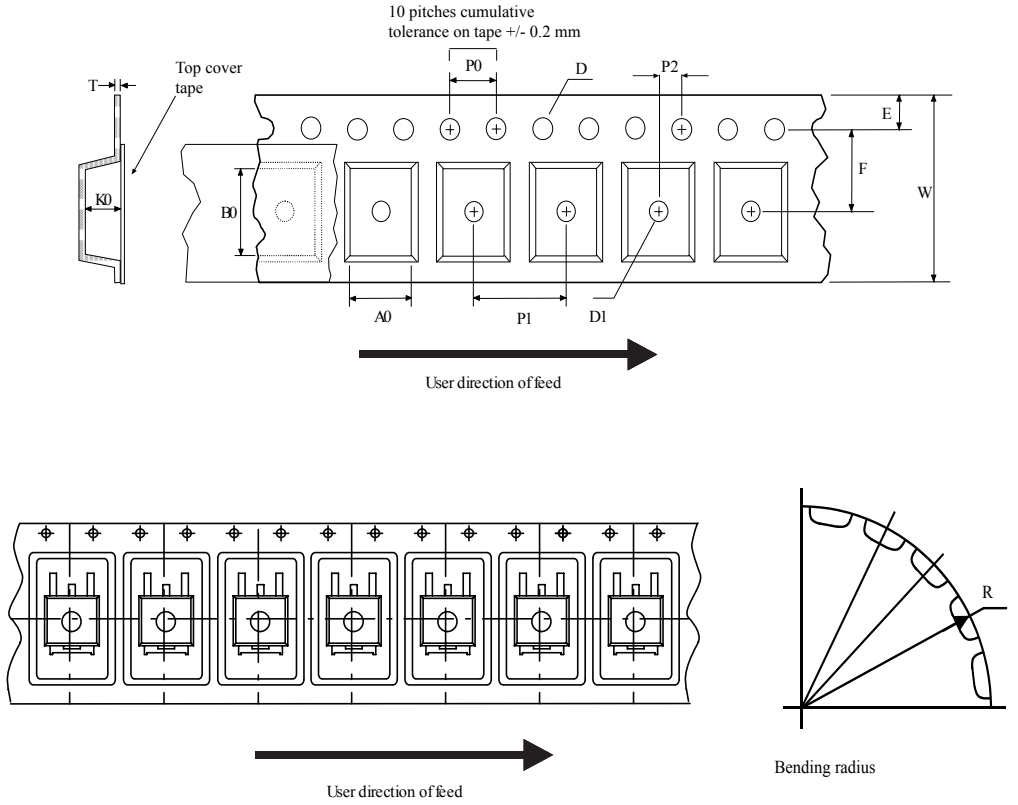


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Figure 25. **Reel outline**

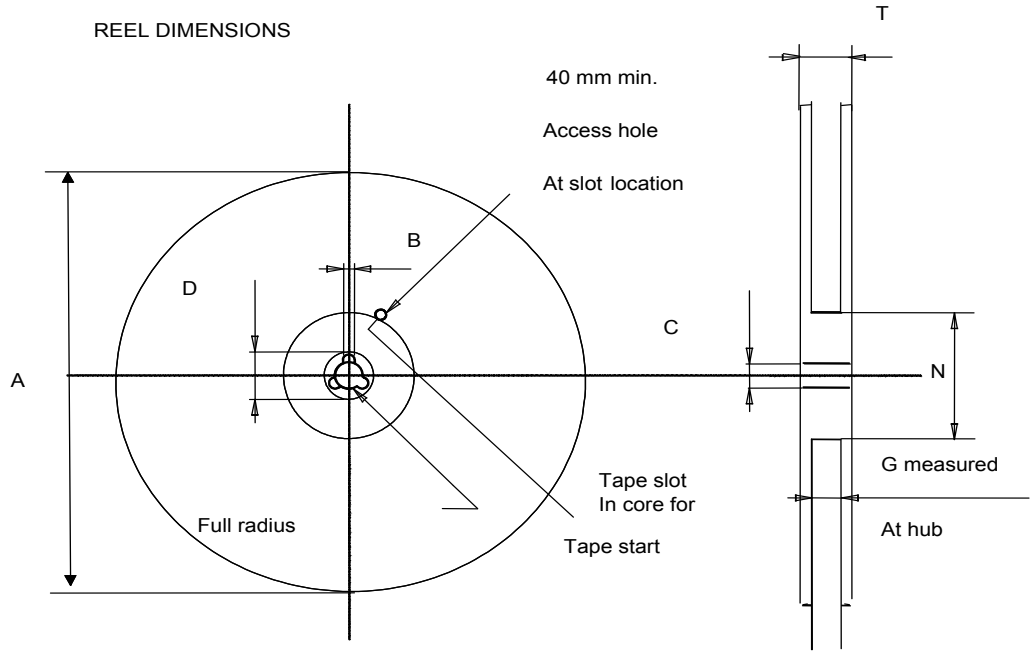

Table 9. **Tape and reel mechanical data**

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 10. **Document revision history**

Date	Version	Changes
07-May-2014	1	Initial release.
23-Jul-2014	2	– Modified: title and description – Added: *Section 2.1: Electrical characteristics (curves)* – Minor text changes
06-Feb-2018	3	Removed maturity status indication from cover page. Production data. Modified Figure 3. Safe operating area. Minor text changes.

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