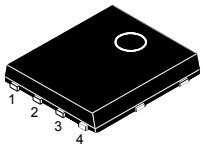
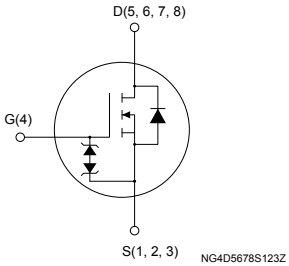
ST6L5N60DM2

Datasheet

N-channel 600 V, 1.32 Ω typ., 3.5 A MDmesh DM2 Power MOSFET in a PowerFLAT 5x6 HV package



PowerFLAT 5x6 HV



Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
ST6L5N60DM2	600 V	1.7 Ω	3.5 A

- Fast-recovery body diode
- Extremely low gate charge and input capacitance
- Low on-resistance
- 100% avalanche tested
- Extremely high dv/dt ruggedness
- Zener-protected

Applications

- Switching applications

Description

This high-voltage N-channel Power MOSFET is part of the MDmesh DM2 fast-recovery diode series. It offers very low recovery charge (Q_{rr}) and time (t_{rr}) combined with low $R_{DS(on)}$, rendering it suitable for the most demanding high-efficiency converters and ideal for bridge topologies and ZVS phase-shift converters.

Product status link
ST6L5N60DM2

Product summary	
Order code	ST6L5N60DM2
Marking	5N60DM2
Package	PowerFLAT 5x6 HV
Packing	Tape and reel

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	600	V
V_{GS}	Gate-source voltage	±25	V
I_D	Drain current (continuous) at T_C = 25 °C	3.5	A
	Drain current (continuous) at T_C = 100 °C	2	
I_{DM}(1)	Drain current (pulsed)	6.7	A
P_{TOT}	Total power dissipation at T_C = 25 °C	139	W
dv/dt(2)	Peak diode recovery voltage slope	50	V/ns
dv/dt(3)	MOSFET dv/dt ruggedness	50	V/ns
T_{stg}	Storage temperature range	-55 to 150	°C
T_J	Operating junction temperature range		°C

1. *Pulse width limited by safe operating area.*
2. *I_{SD} ≤ 3.5 A, di/dt ≤ 900 A/µs; V_{DS} (peak) ≤ $V_{(BR)DSS}$*
3. *V_{DD} = 400 V.*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	0.9	°C/W
R_{thJA}(1)	Thermal resistance, junction-to-ambient	50	°C/W

1. *When mounted on a standard 1 inch² area of FR-4 PCB with 2-oz copper.*

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or non-repetitive (pulse width limited by T_J max.)	1	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	179	mJ

2 Electrical characteristics

T_C = 25 °C unless otherwise specified.

Table 4. On/off-states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	V_{GS} = 0 V, I_D = 1 mA	600			V
I_{DSS}	Zero gate voltage drain current	V_{GS} = 0 V, V_{DS} = 600 V			1	µA
		V_{GS} = 0 V, V_{DS} = 600 V, T_C = 125 °C(1)			100	
I_{GSS}	Gate-body leakage current	V_{DS} = 0 V, V_{GS} = ±25 V			±5	µA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	3	4	5	V
$R_{DS(on)}$	Static drain-source on- resistance	V_{GS} = 10 V, I_D = 1.75 A		1.32	1.7	Ω

1. *Specified by design, not tested in production.*

Table 5. Dynamic characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 400 V, f = 250 kHz, V_{GS} = 0 V	-	198	-	pF
C_{oss}	Output capacitance		-	10	-	pF
C_{rss}.	Reverse transfer capacitance		-	1.7	-	pF
$C_{oss\ eq.}$(1)	Equivalent output capacitance	V_{DS} = 0 to 400 V, V_{GS} = 0 V	-	27	-	pF
R_g	Intrinsic gate resistance	f = 250 kHz, open drain	-	5.6	-	Ω
Q_g	Total gate charge	V_{DD} = 480 V, I_D = 3.5 A, V_{GS} = 0 to 10 V (see the Figure 14. Test circuit for gate charge behavior)	-	8.5	-	nC
Q_{gs}	Gate-source charge		-	2.1	-	nC
Q_{gd}	Gate-drain charge		-	5.1	-	nC

1. *$C_{oss\ eq.}$ is defined as a constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DSS}.*

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	V_{DD}= 300 V, I_D = 1.75 A, R_G = 4.7 Ω, V_{GS} = 10 V (see the Figure 13. Test circuit for resistive load switching times and Figure 18. Switching time waveform)	-	6.5	-	ns
t_r	Rise time		-	4.1	-	ns
$t_{d(off)}$	Turn-off delay time		-	12.3	-	ns
t_f	Fall time		-	19	-	ns

Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		3.5	A
I_{SDM}(1)	Source-drain current (pulsed)		-		6.7	A
V_{SD}(2)	Forward on voltage	V_{GS} = 0 V, I_{SD} = 3.5 A	-		1.6	V
t_{rr}	Reverse recovery time	I_{SD} = 3.5 A, di/dt = 100 A/µs, V_{DD} = 60 V (see the Figure 15. Test circuit for inductive load switching and diode recovery times)	-	57		ns
Q_{rr}	Reverse recovery charge		-	0.1		µC
I_{RRM}	Reverse recovery current		-	3.5		A
t_{rr}	Reverse recovery time	I_{SD} = 3.5 A, di/dt = 100 A/µs, V_{DD} = 60 V, T_J = 150 °C (see the Figure 15. Test circuit for inductive load switching and diode recovery times)	-	115		ns
Q_{rr}	Reverse recovery charge		-	0.26		µC
I_{RRM}	Reverse recovery current		-	4.5		A

1. *Pulse width is 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

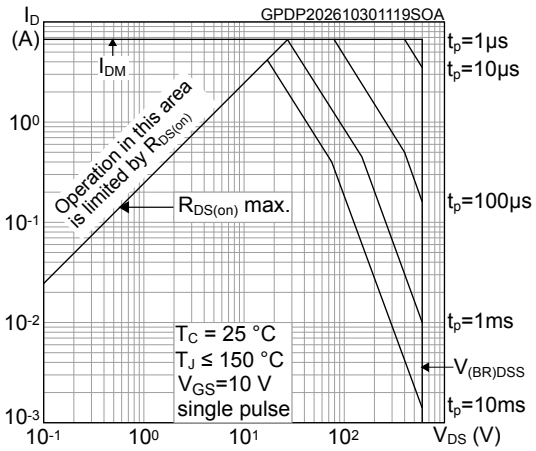


Figure 2. Normalized transient thermal impedance

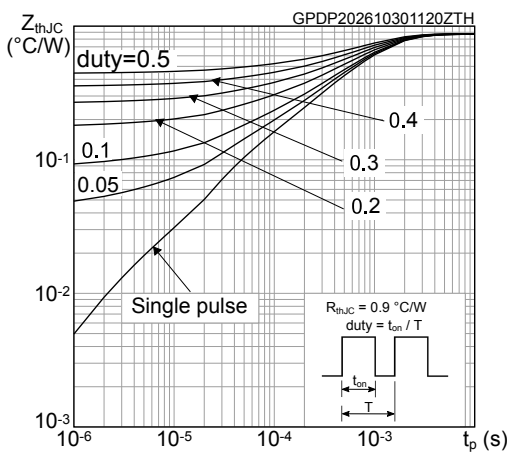


Figure 3. Typical output characteristics

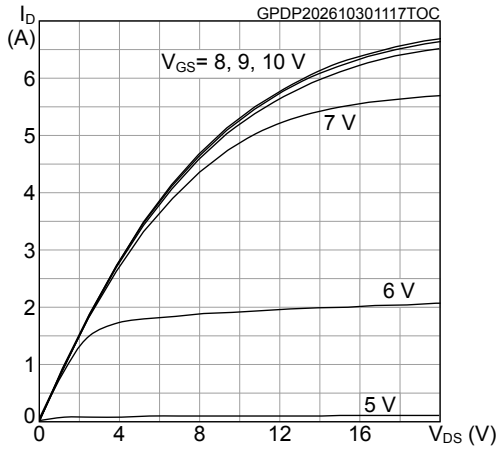


Figure 4. Typical transfer characteristics

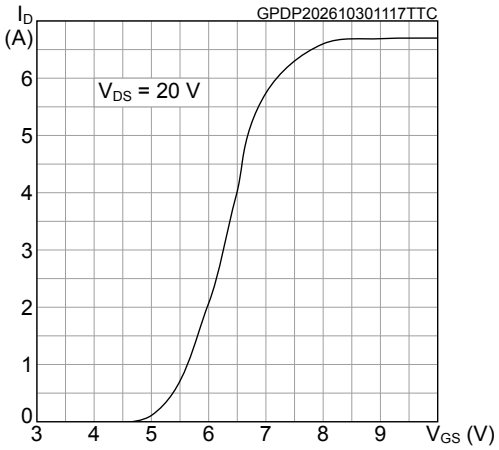


Figure 5. Typical gate charge characteristics

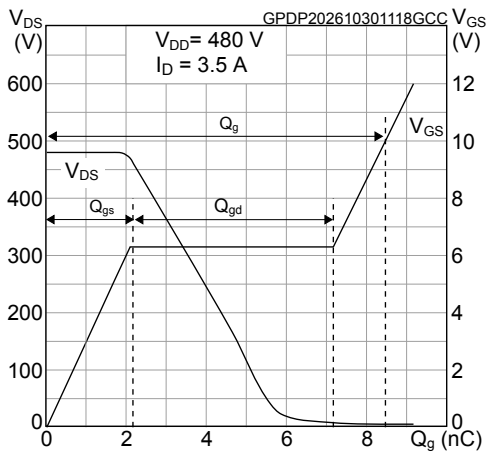


Figure 6. Typical drain-source on-resistance

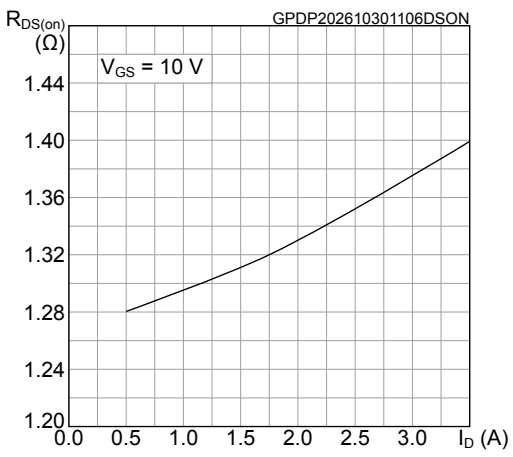


Figure 7. Typical capacitance characteristics

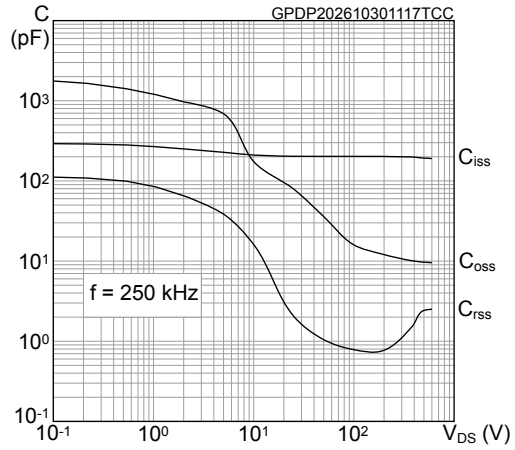


Figure 8. Typical output capacitance stored energy

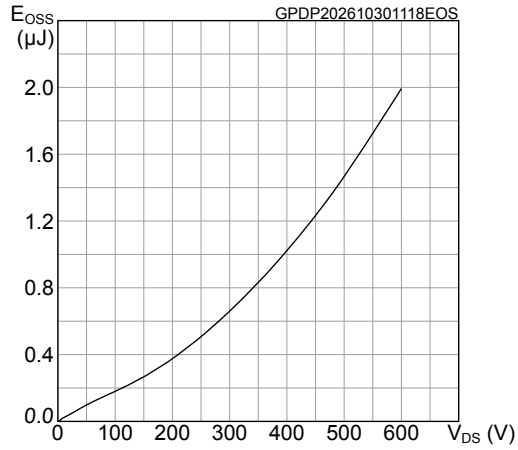


Figure 9. Normalized gate threshold vs temperature

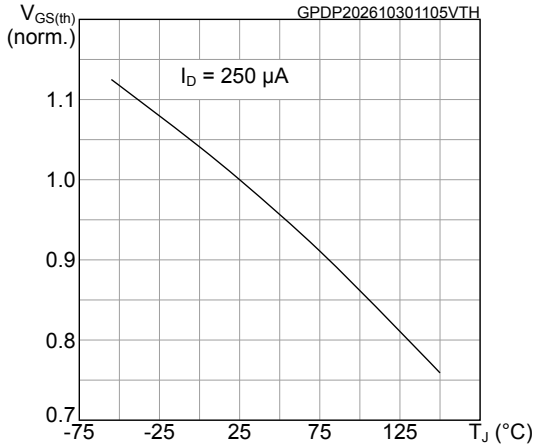


Figure 10. Normalized on-resistance vs temperature

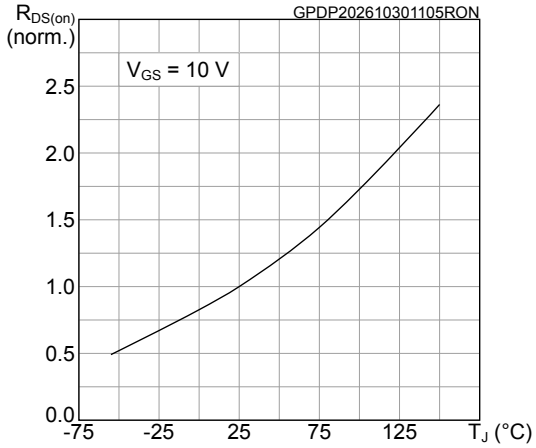


Figure 11. Typical reverse diode forward characteristics

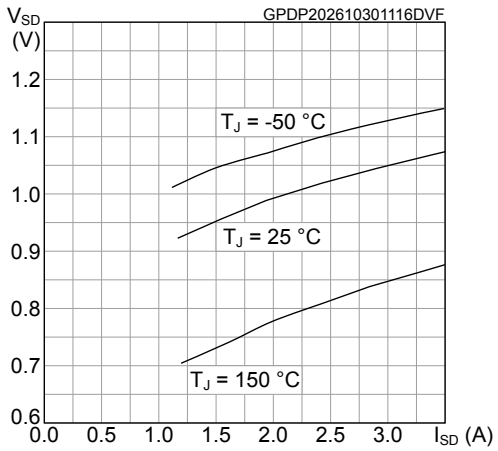
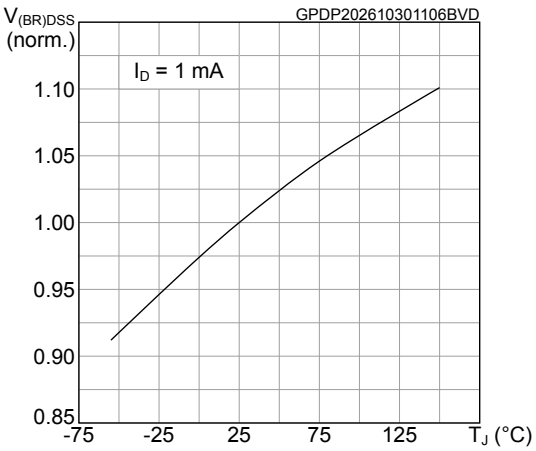


Figure 12. Normalized breakdown voltage vs temperature



3 Test circuits

Figure 13. Test circuit for resistive load switching times

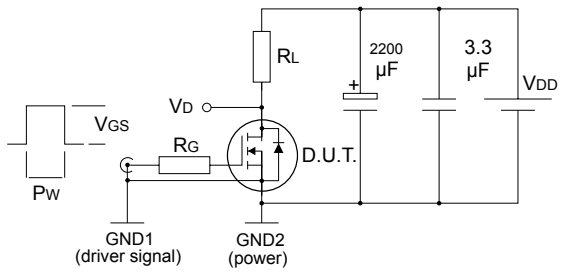


Figure 14. Test circuit for gate charge behavior

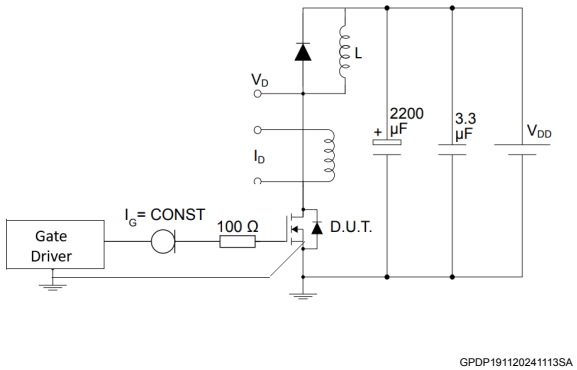


Figure 15. Test circuit for inductive load switching and diode recovery times

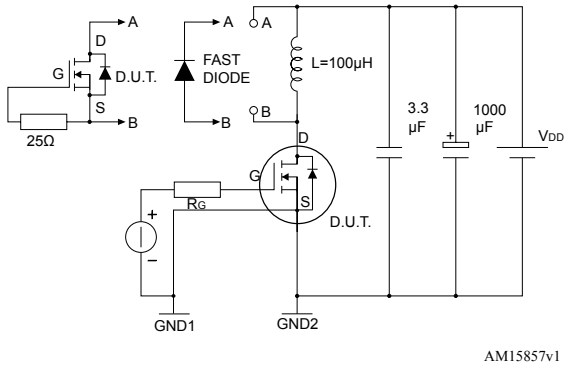


Figure 16. Unclamped inductive load test circuit

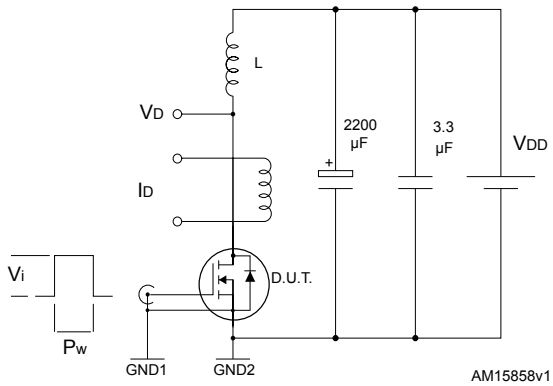


Figure 17. Unclamped inductive waveform

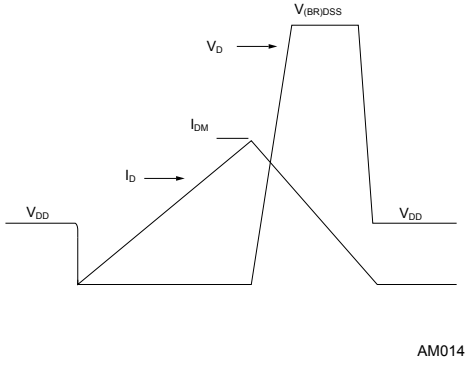
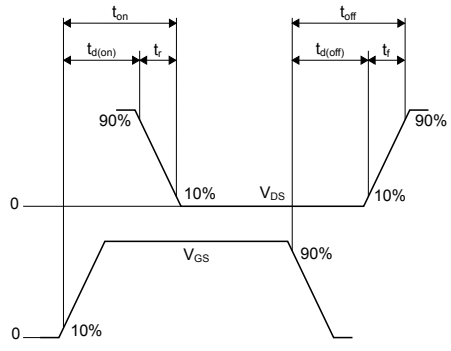


Figure 18. Switching time waveform

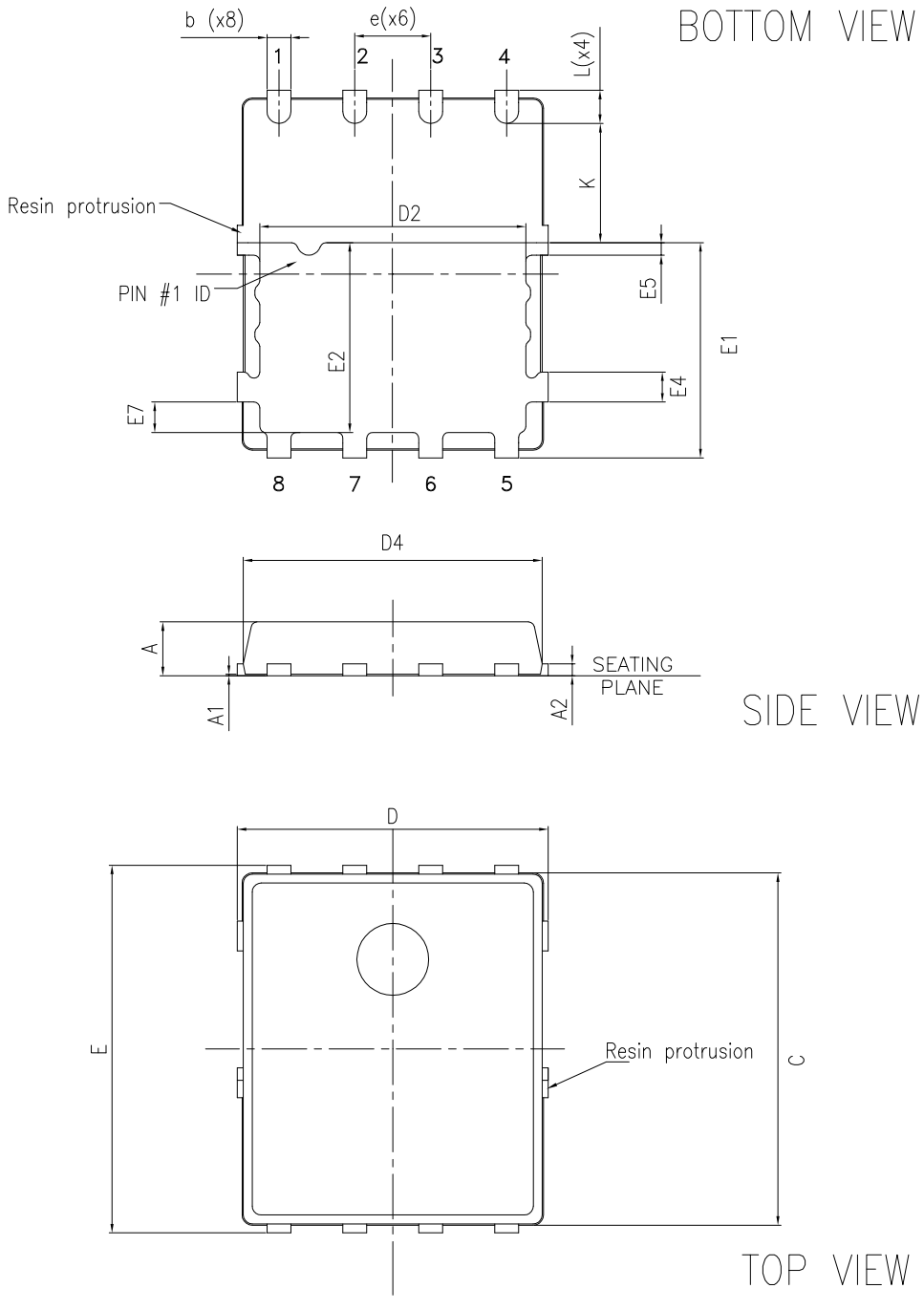


4 Package information

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 PowerFLAT 5x6 HV package information

Figure 19. PowerFLAT 5x6 HV package outline

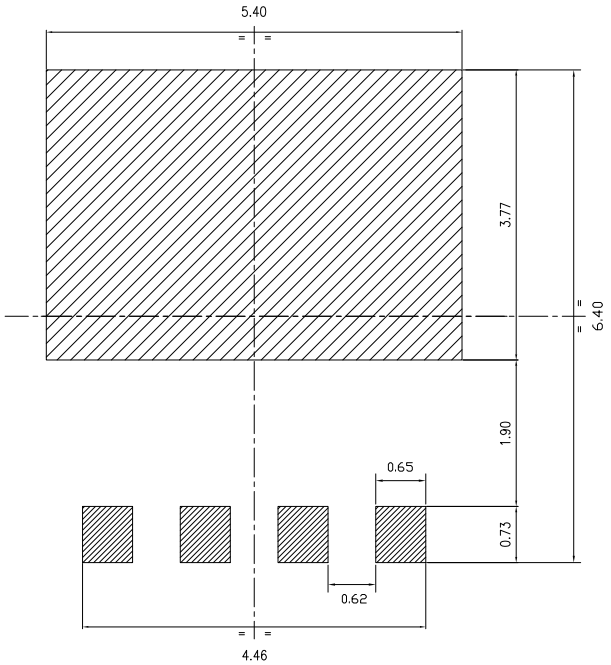


8368143_Rev_4

Table 8. **PowerFLAT 5x6 HV mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	0.80		1.00
A1	0.02		0.05
A2		0.25	
b	0.30		0.50
C	5.60	5.80	6.00
D	5.10	5.20	5.30
D2	4.30	4.40	4.50
D4	4.60	4.80	5.00
E	6.05	6.15	6.25
E1	3.50	3.60	3.70
E2	3.10	3.20	3.30
E4	0.40	0.50	0.60
E5	0.10	0.20	0.30
E7	0.40	0.50	0.60
e		1.27	
L	0.50	0.55	0.60
K	1.90	2.00	2.10

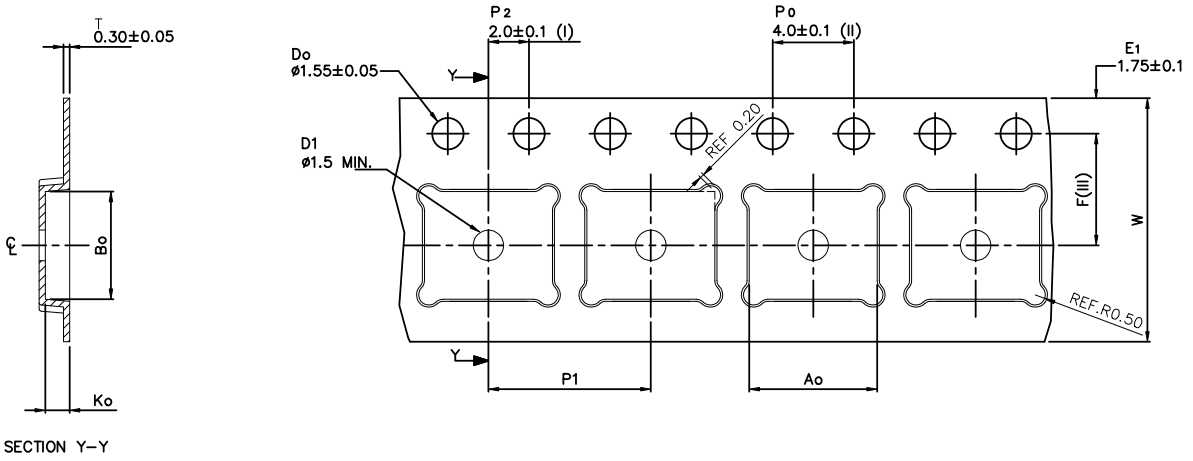
Figure 20. **PowerFLAT 5x6 HV recommended footprint (dimensions are in mm)**



8368143_Rev_4_footprint

4.2 PowerFLAT 5x6 packing information

Figure 21. **PowerFLAT 5x6 tape (dimensions are in mm)**



Ao	6.30 +/– 0.1
Bo	5.30 +/– 0.1
Ko	1.20 +/– 0.1
F	5.50 +/– 0.1
P1	8.00 +/– 0.1
W	12.00 +/– 0.3

(I) Measured from centreline of sprocket hole to centreline of pocket.

(II) Cumulative tolerance of 10 sprocket holes is ±0.20.

(III) Measured from centreline of sprocket hole to centreline of pocket

Base and bulk quantity 3000 pcs
All dimensions are in millimeters

8234350_Tape_rev_C

Figure 22. **PowerFLAT 5x6 package orientation in carrier tape**

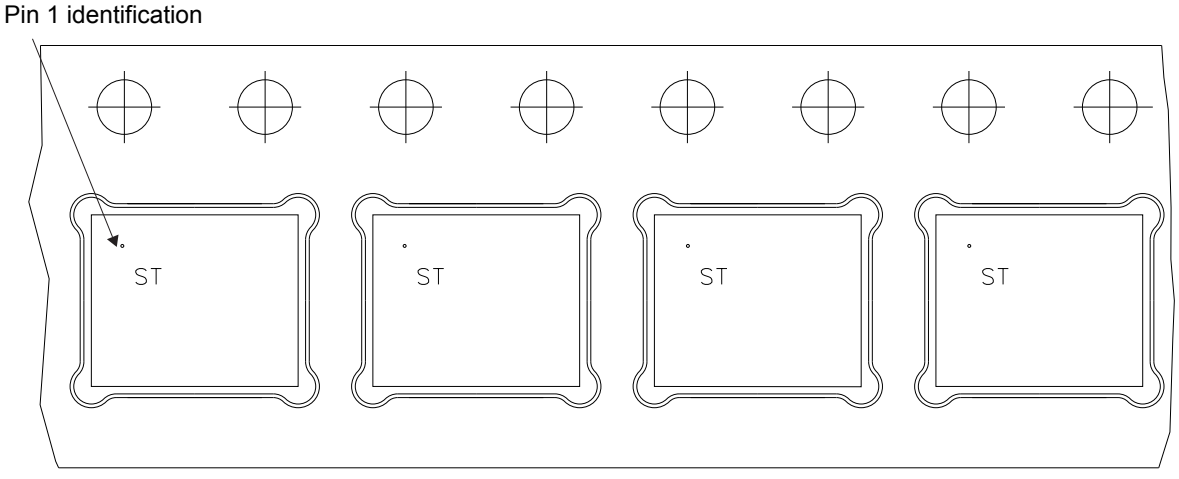
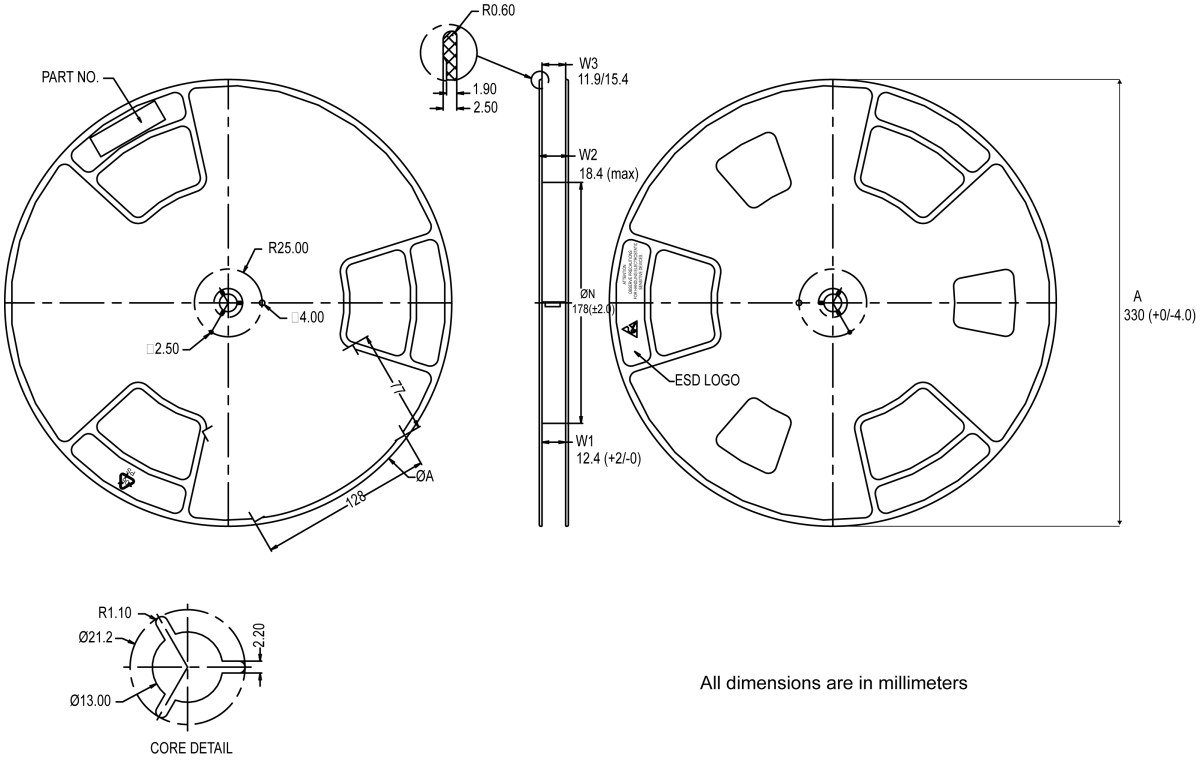


Figure 23. **PowerFLAT 5x6 reel**



All dimensions are in millimeters

8234350_Reel_rev_C

Revision history

Table 9. **Document revision history**

Date	Revision	Changes
02-Nov-2026	1	First release.

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