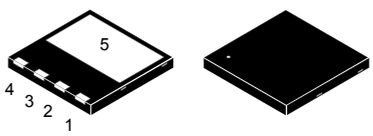
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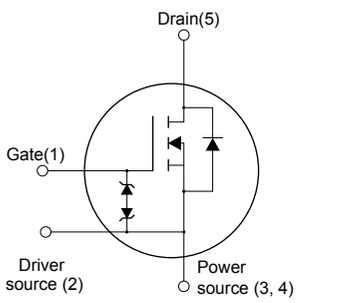
STL19N60M6

Datasheet

N-channel 600 V, 255 mΩ typ., 11 A MDmesh M6 Power MOSFET in a PowerFLAT 8x8 HV package



PowerFLAT 8x8 HV



STPOWER

Product status link
STL19N60M6

Product summary	
Order code	STL19N60M6
Marking	19N60M6
Package	PowerFLAT 8x8 HV
Packing	Tape and reel

Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
STL19N60M6	600 V	308 mΩ	11 A

- Reduced switching losses
- Lower $R_{DS(on)}$ per area vs previous generation
- Low gate input resistance
- 100% avalanche tested
- Zener-protected

Applications

- Switching applications
- LLC converters
- Boost PFC converters

Description

The new MDmesh M6 technology incorporates the most recent advancements to the well-known and consolidated MDmesh family of SJ MOSFETs. STMicroelectronics builds on the previous generation of MDmesh devices through its new M6 technology, which combines excellent $R_{DS(on)}$ per area improvement with one of the most effective switching behaviors available, as well as a user-friendly experience for maximum end-application efficiency.

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1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{GS}	Gate-source voltage	±25	V
I_D	Drain current (continuous) at T_C = 25 °C	11	A
	Drain current (continuous) at T_C = 100 °C	6.9	A
I_{DM} (1)	Drain current (pulsed)	38	A
P_{TOT}	Total power dissipation at T_C = 25 °C	90	W
dv/dt (2)	Peak diode recovery voltage slope	15	V/ns
dv/dt (3)	MOSFET dv/dt ruggedness	100	V/ns
T_{stg}	Storage temperature range	-55 to 150	°C
T_J	Operating junction temperature range		

1. *Pulse width limited by safe operating area.*
2. *I_{SD} ≤ 11 A, di/dt ≤ 400 A/µs; V_{DS} (peak) < $V_{(BR)DSS}$, V_{DD} = 400 V.*
3. *V_{DS} ≤ 480 V.*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}case}$	Thermal resistance junction-case	1.39	°C/W
$R_{thj\text{-}pcb}$ (1)	Thermal resistance junction-pcb	45	°C/W

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

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width limited by T_J max)	2.7	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AR}; V_{DD} = 50 V)	210	mJ

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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	µA
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	3.25	4	4.75	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS} = 10 V, I_D = 6.5 A		255	308	mΩ

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

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 100 V, f = 1 MHz, V_{GS} = 0 V	-	650	-	pF
C_{oss}	Output capacitance		-	45	-	pF
C_{rss}	Reverse transfer capacitance		-	2	-	pF
$C_{oss\ eq.}$(1)	Equivalent output capacitance	V_{DS} = 0 to 480 V, V_{GS} = 0 V	-	123	-	pF
R_G	Intrinsic gate resistance	f = 1 MHz, I_D = 0 A	-	4.6	-	Ω
Q_g	Total gate charge	V_{DD} = 480 V, I_D = 13 A, V_{GS} = 0 to 10 V (see Figure 14. Test circuit for gate charge behavior)	-	16.8	-	nC
Q_{gs}	Gate-source charge		-	4.5	-	nC
Q_{gd}	Gate-drain charge		-	8.4	-	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 = 6.5 A, R_G = 4.7 Ω, V_{GS} = 10 V (see Figure 13. Switching times test circuit for resistive load and Figure 18. Switching time waveform)	-	16	-	ns
t_r	Rise time		-	7	-	ns
$t_{d(off)}$	Turn-off delay time		-	28	-	ns
t_f	Fall time		-	9	-	ns

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Table 7. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		11	A
I_{SDM} (1)	Source-drain current (pulsed)		-		38	A
V_{SD} (2)	Forward on voltage	V_{GS} = 0 V, I_{SD} = 11 A	-		1.6	V
t_{rr}	Reverse recovery time	I_{SD} = 13 A, di/dt = 100 A/µs, V_{DD} = 60 V (see Figure 15. Test circuit for inductive load switching and diode recovery times)	-	208		ns
Q_{rr}	Reverse recovery charge		-	1.9		µC
I_{RRM}	Reverse recovery current		-	18		A
t_{rr}	Reverse recovery time	I_{SD} = 13 A, di/dt = 100 A/µs, V_{DD} = 60 V, T_J = 150 °C (see Figure 15. Test circuit for inductive load switching and diode recovery times)	-	290		ns
Q_{rr}	Reverse recovery charge		-	2.9		µC
I_{RRM}	Reverse recovery current		-	20		A

1. *Pulse width is limited by safe operating area.*
2. *Pulsed: pulse duration = 300 µs, duty cycle 1.5%.*

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2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

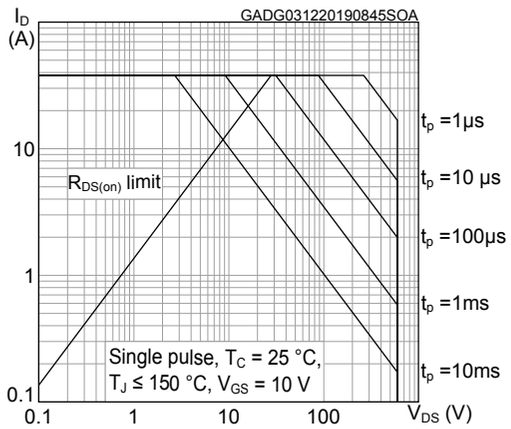


Figure 2. Thermal impedance

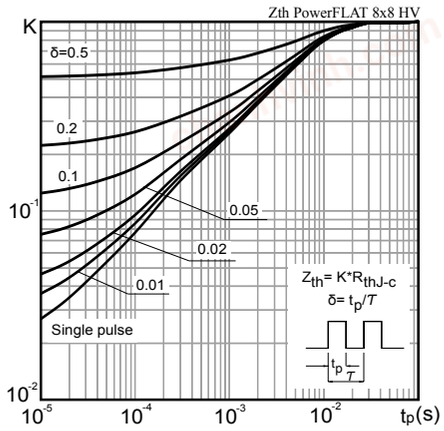


Figure 3. Output characteristics

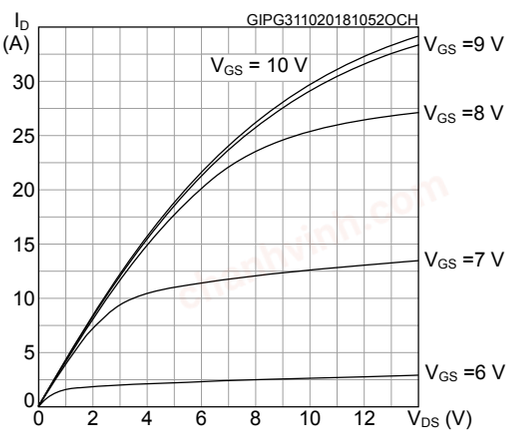


Figure 4. Transfer characteristics

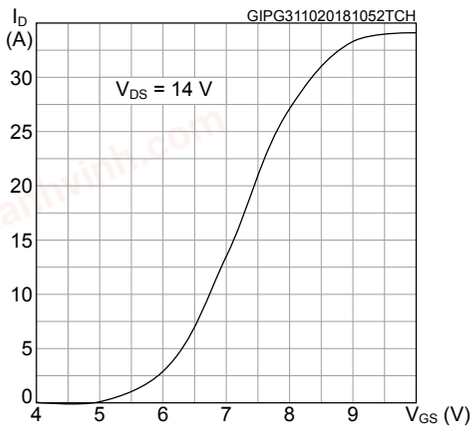


Figure 5. Gate charge vs gate-source voltage

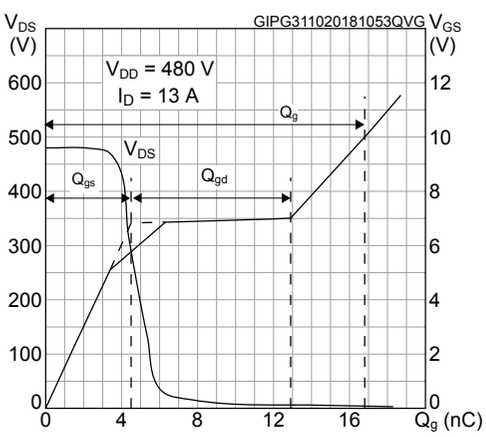
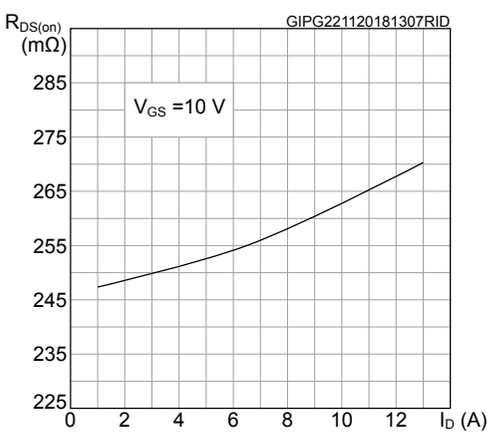


Figure 6. Static drain-source on-resistance



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Figure 7. Capacitance variations

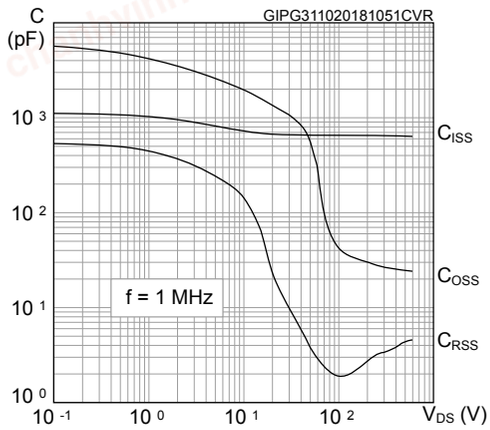


Figure 8. Output capacitance stored energy

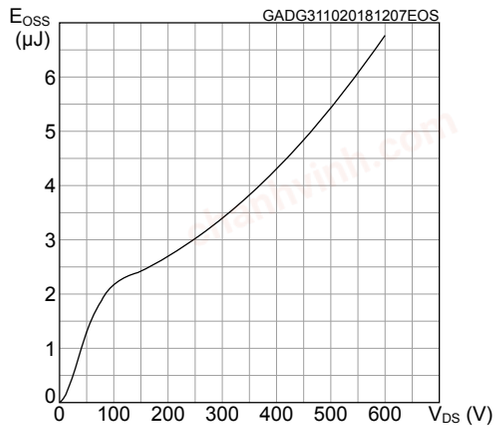


Figure 9. Normalized gate threshold voltage vs temperature

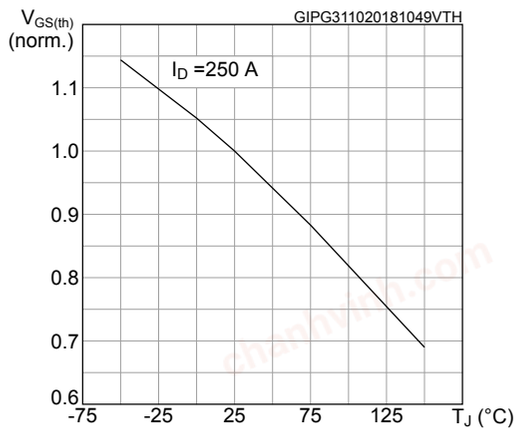


Figure 10. Normalized on-resistance vs temperature

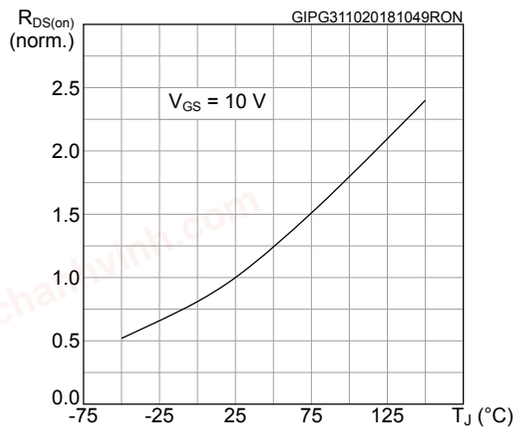


Figure 11. Normalized $V_{(BR)DSS}$ vs temperature

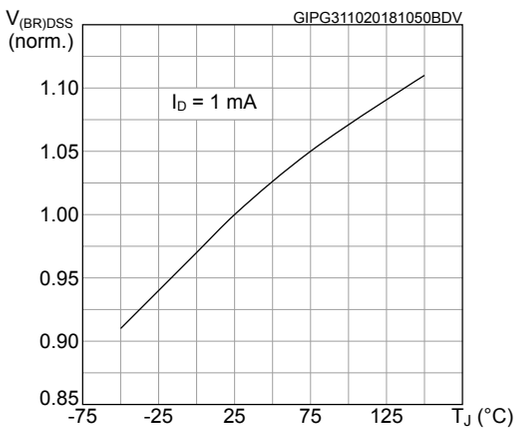
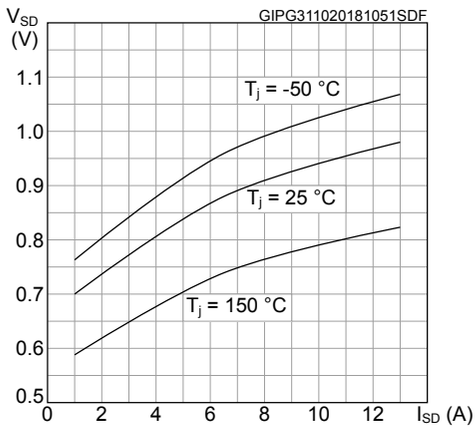


Figure 12. Source-drain diode forward characteristics



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3 Test circuits

Figure 13. Switching times test circuit for resistive load

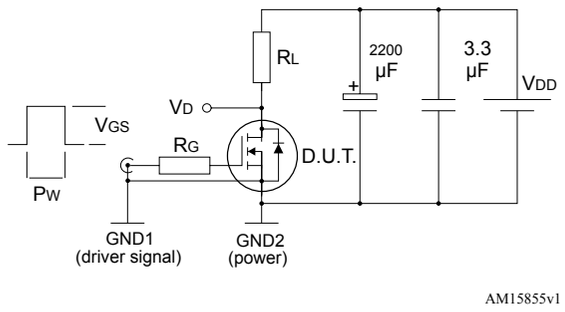


Figure 14. Test circuit for gate charge behavior

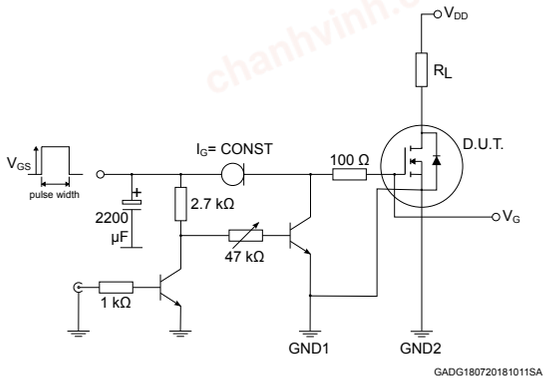


Figure 15. Test circuit for inductive load switching and diode recovery times

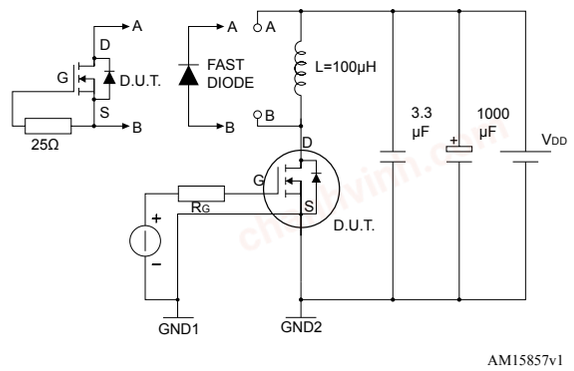


Figure 16. Unclamped inductive load test circuit

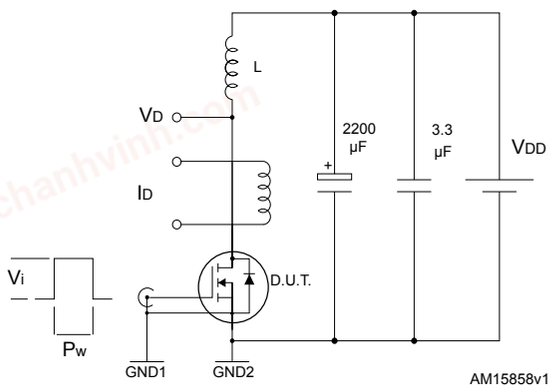


Figure 17. Unclamped inductive waveform

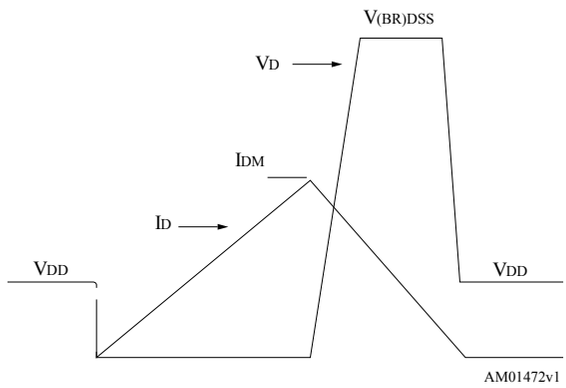
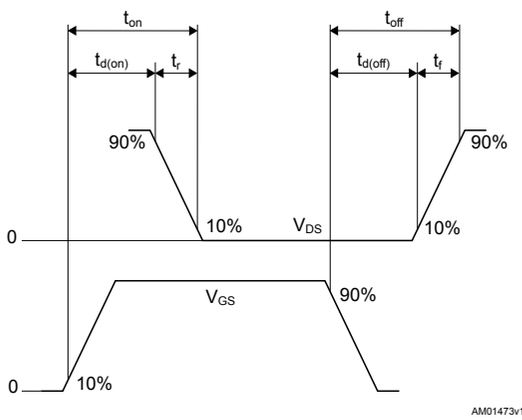


Figure 18. Switching time waveform



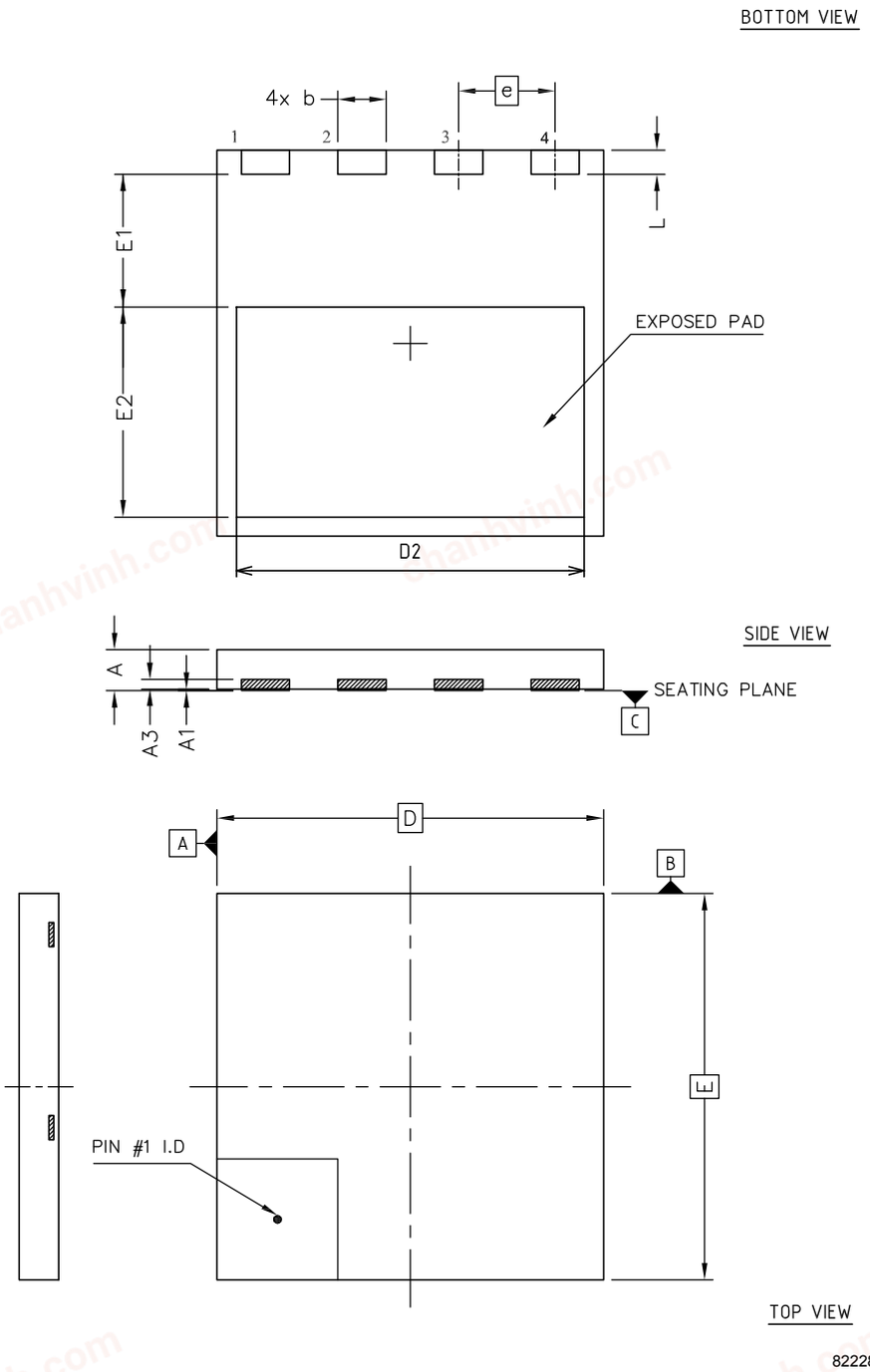
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4 Package information

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 PowerFLAT 8x8 HV package information

Figure 19. PowerFLAT 8x8 HV package outline

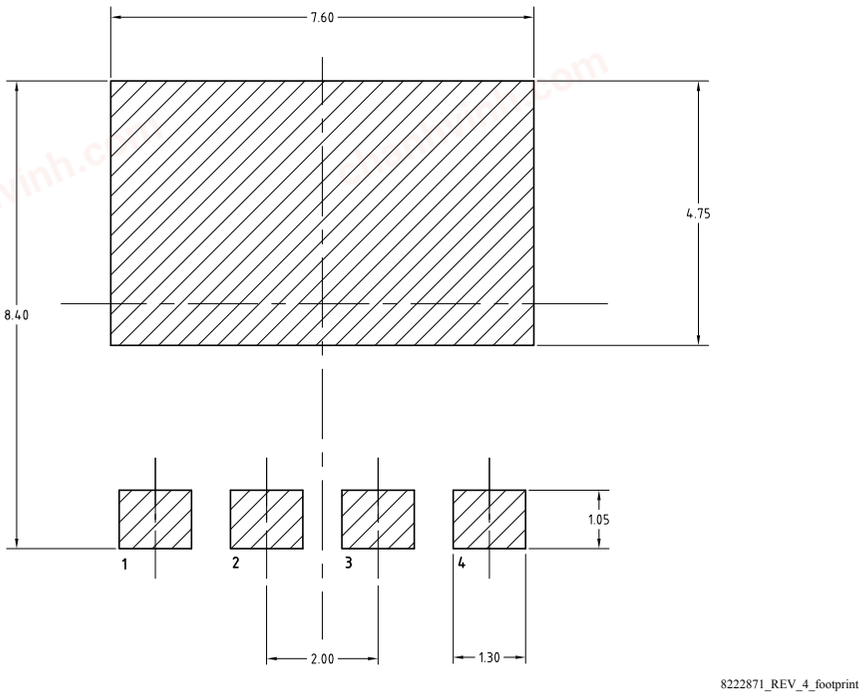


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Table 8. **PowerFLAT 8x8 HV mechanical data**

Ref.	Dimensions (in mm)		
	Min.	Typ.	Max.
A	0.75	0.85	0.95
A1	0.00		0.05
A3	0.10	0.20	0.30
b	0.90	1.00	1.10
D	7.90	8.00	8.10
E	7.90	8.00	8.10
D2	7.10	7.20	7.30
E1	2.65	2.75	2.85
E2	4.25	4.35	4.45
e		2.00 BSC	
L	0.40	0.50	0.60

Figure 20. **PowerFLAT 8x8 HV footprint**

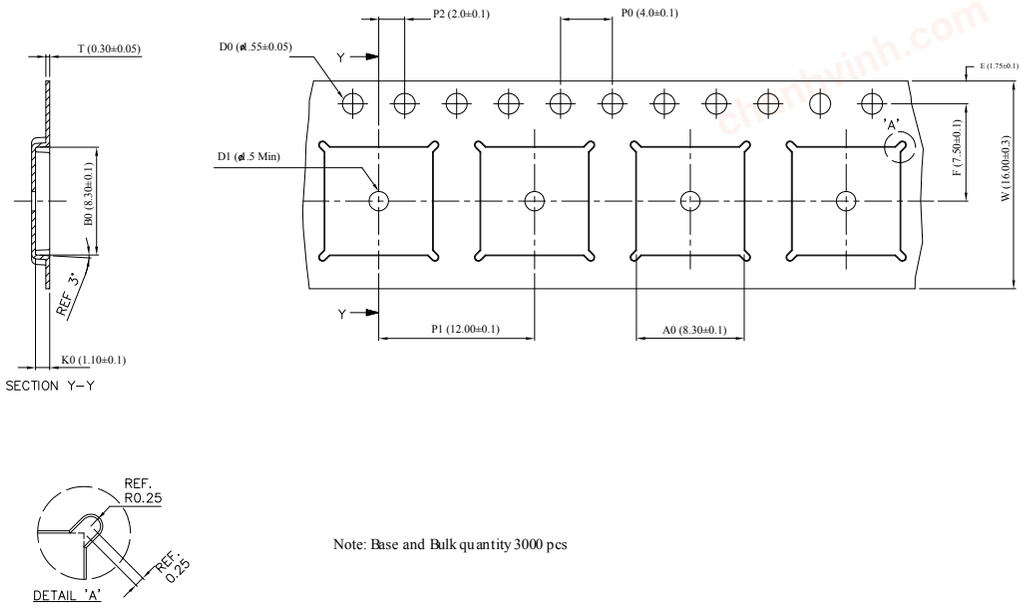


Note: All dimensions are in millimeters.

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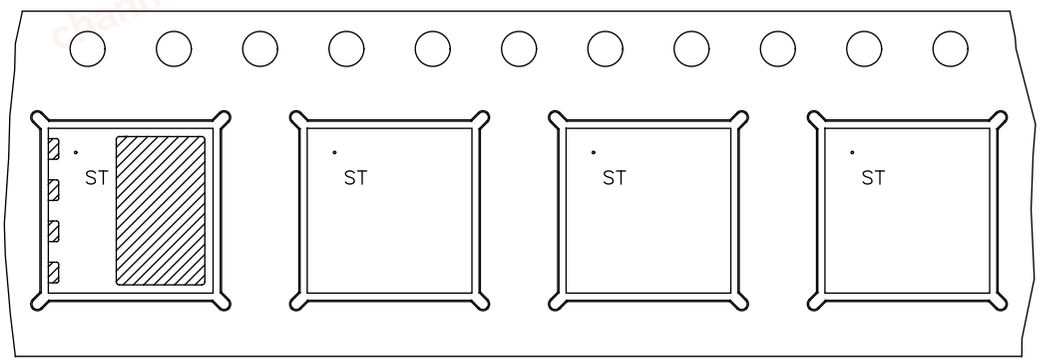
4.2 PowerFLAT 8x8 HV packing information

Figure 21. **PowerFLAT 8x8 HV tape**



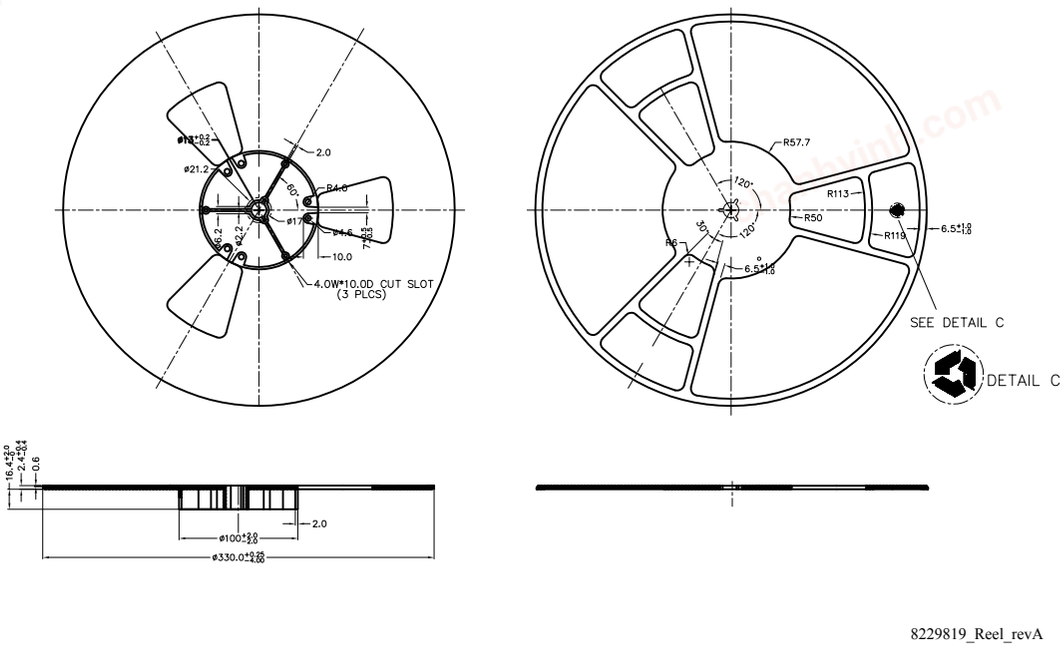
Note: All dimensions are in millimeters.

Figure 22. **PowerFLAT 8x8 HV package orientation in carrier tape**



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Figure 23. **PowerFLAT 8x8 HV reel**



8229819_Reel_revA

Note: All dimensions are in millimeters.

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Revision history

Table 9. **Document revision history**

Date	Revision	Changes
13-Dec-2019	1	First release.

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