

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 $T_C = 25\text{ }^{\circ}\text{C}$	16	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^{\circ}\text{C}$	10	A
$I_{DM}^{(1)}$	Drain current (pulsed)	64	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^{\circ}\text{C}$	125	W
$dv/dt^{(2)}$	Peak diode recovery voltage slope	15	V/ns
$dv/dt^{(3)}$	MOSFET dv/dt ruggedness	50	V/ns
T_{stg}	Storage temperature range	- 55 to 150	$^{\circ}\text{C}$
T_j	Operating junction temperature range		

1. Pulse width limited by safe operating area.
2. $I_{SD} \leq 16\text{ A}$, $di/dt \leq 400\text{ A}/\mu\text{s}$; $V_{DS(peak)} < V_{(BR)DSS}$, $V_{DD} = 400\text{ V}$.
3. $V_{DS} \leq 480\text{ V}$

Table 2. Thermal data

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

1. When mounted on FR-4 board of inch^2 , 2oz Cu.

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width limited by T_{jmax})	3.5	A
E_{AS}	Single pulse avalanche energy (starting $T_j = 25\text{ }^{\circ}\text{C}$, $I_D = I_{AR}$; $V_{DD} = 50\text{ V}$)	180	mJ

2 Electrical characteristics

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

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$, $I_D = 1\text{ mA}$	600			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 600\text{ V}$			1	μA
		$V_{GS} = 0\text{ V}$, $V_{DS} = 600\text{ V}$, $T_C = 125\text{ }^{\circ}\text{C}$ ⁽¹⁾			100	μA
I_{GSS}	Gate-body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = \pm 25\text{ V}$			± 10	μA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	3.25	4	4.75	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 8\text{ A}$		0.184	0.205	Ω

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

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 100\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	1090	-	pF
C_{oss}	Output capacitance		-	56	-	pF
C_{rss}	Reverse transfer capacitance		-	1.6	-	pF
$C_{oss\text{ eq.}}^{(1)}$	Equivalent output capacitance	$V_{DS} = 0\text{ to }480\text{ V}$, $V_{GS} = 0\text{ V}$	-	255	-	pF
R_G	Intrinsic gate resistance	$f = 1\text{ MHz}$, $I_D = 0\text{ A}$	-	7	-	Ω
Q_g	Total gate charge	$V_{DD} = 480\text{ V}$, $I_D = 18\text{ A}$, $V_{GS} = 0\text{ to }10\text{ V}$ (see Figure 15. Gate charge test circuit)	-	29	-	nC
Q_{gs}	Gate-source charge		-	6	-	nC
Q_{gd}	Gate-drain charge		-	12	-	nC

1. $C_{oss\text{ eq.}}$ 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 Energy

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$E_{(off)}$	Turn-off energy (from 90% V_{GS} to 0% I_D)	$V_{DD} = 400\text{ V}$, $I_D = 2\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$	-	7	-	μJ
		$V_{DD} = 400\text{ V}$, $I_D = 4\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$	-	8	-	μJ

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 300\text{ V}$, $I_D = 9\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (see Figure 14. Switching times test circuit for resistive load and Figure 19. Switching time waveform)	-	15	-	ns
t_r	Rise time		-	10	-	ns
$t_{d(off)}$	Turn-off-delay time		-	61	-	ns
t_f	Fall time		-	16	-	ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		16	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		64	A
$V_{SD}^{(2)}$	Forward on voltage	$V_{GS} = 0\text{ V}$, $I_{SD} = 16\text{ A}$	-		1.6	V
t_{rr}	Reverse recovery time	$I_{SD} = 18\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 100\text{ V}$ (see Figure 16. Test circuit for inductive load switching and diode recovery times)	-	360		ns
Q_{rr}	Reverse recovery charge		-	5		μC
I_{RRM}	Reverse recovery current		-	28		A
t_{rr}	Reverse recovery time	$I_{SD} = 18\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 100\text{ V}$, $T_j = 150\text{ }^\circ\text{C}$ (see Figure 16. Test circuit for inductive load switching and diode recovery times)	-	445		ns
Q_{rr}	Reverse recovery charge		-	6.5		μC
I_{RRM}	Reverse recovery current		-	29		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

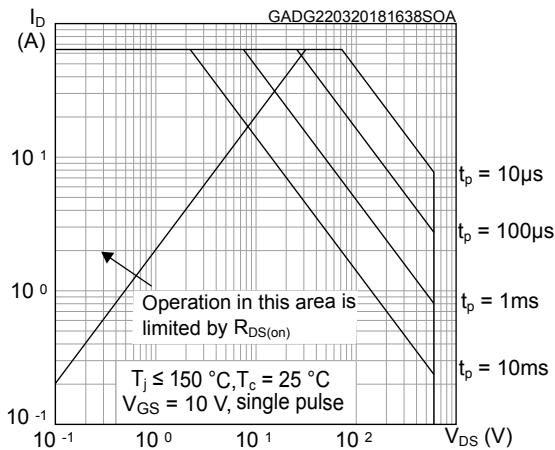


Figure 2. Thermal impedance

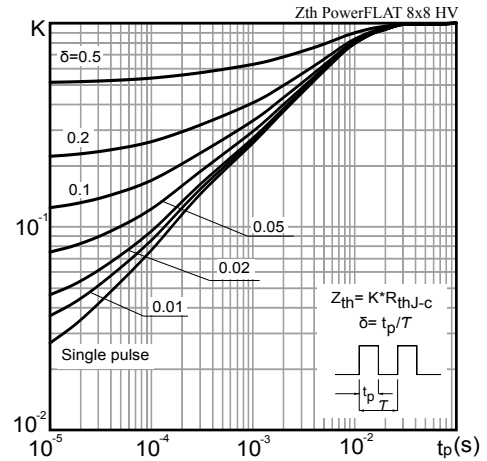


Figure 3. Output characteristics

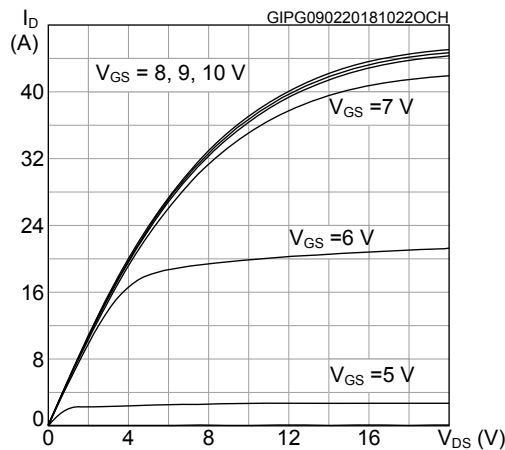


Figure 4. Transfer characteristics

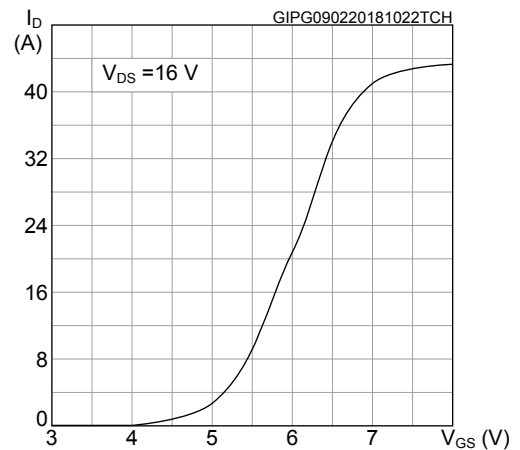


Figure 5. Gate charge vs gate-source voltage

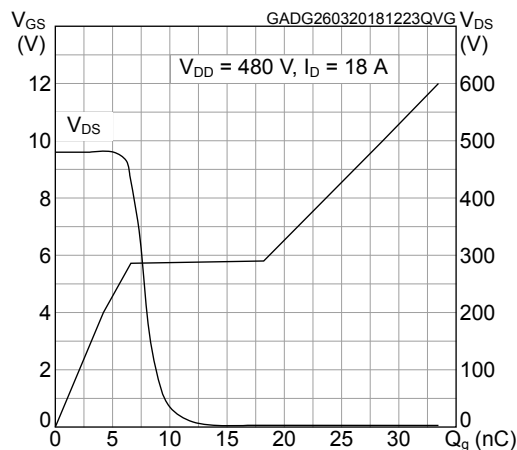


Figure 6. Static drain-source on-resistance

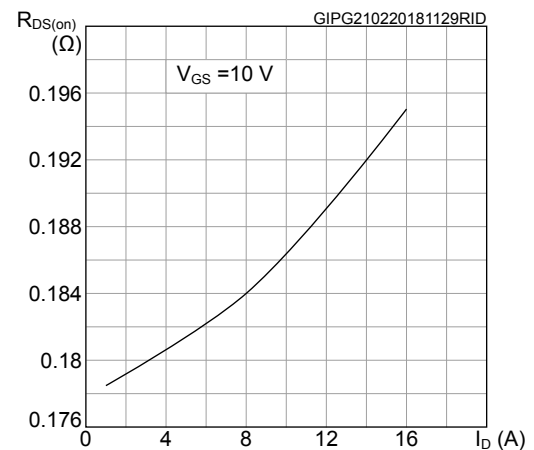


Figure 7. Capacitance variations

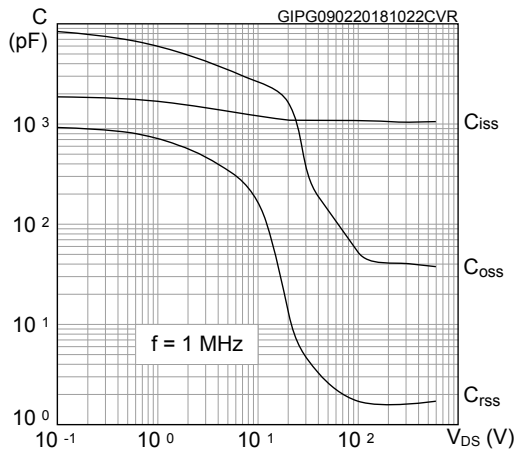


Figure 8. Output capacitance stored energy

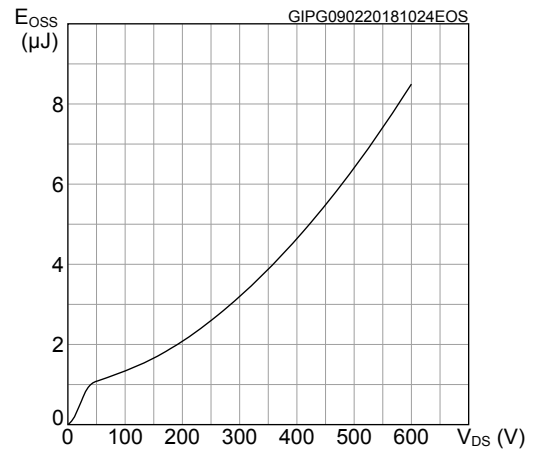


Figure 9. Turn-off switching energy vs drain current

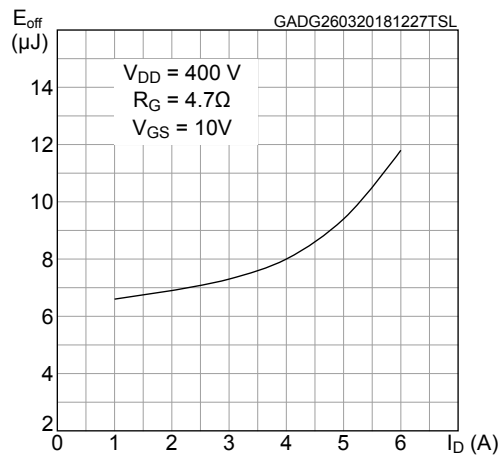


Figure 10. Normalized gate threshold voltage vs temperature

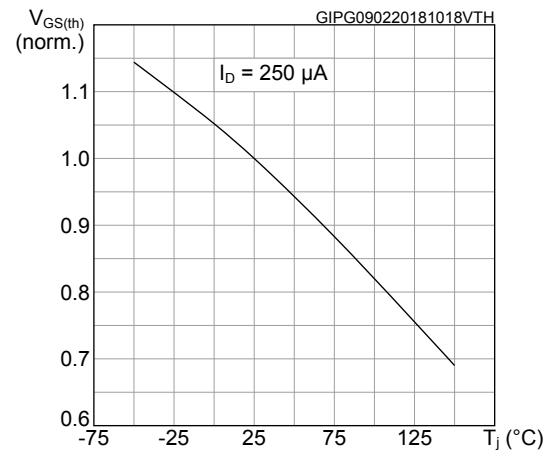


Figure 11. Normalized on-resistance vs temperature

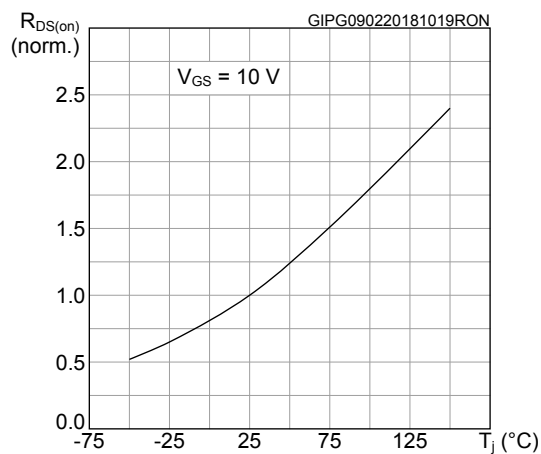


Figure 12. Normalized $V_{(BR)DSS}$ vs temperature

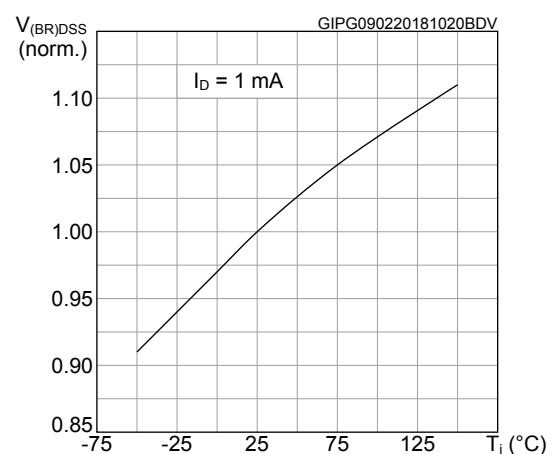
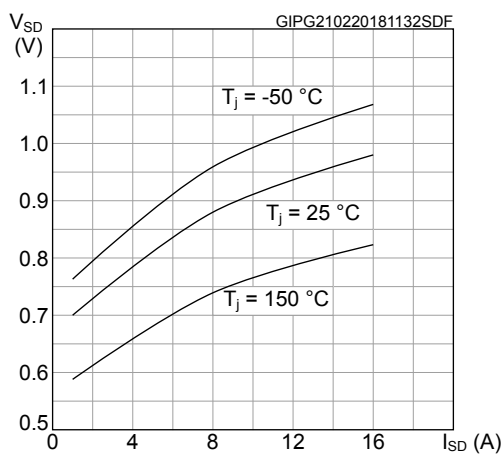


Figure 13. Source-drain diode forward characteristics



AM15855v1

AM01469v2

AM15857v1

AM15858v1

AM01472v1

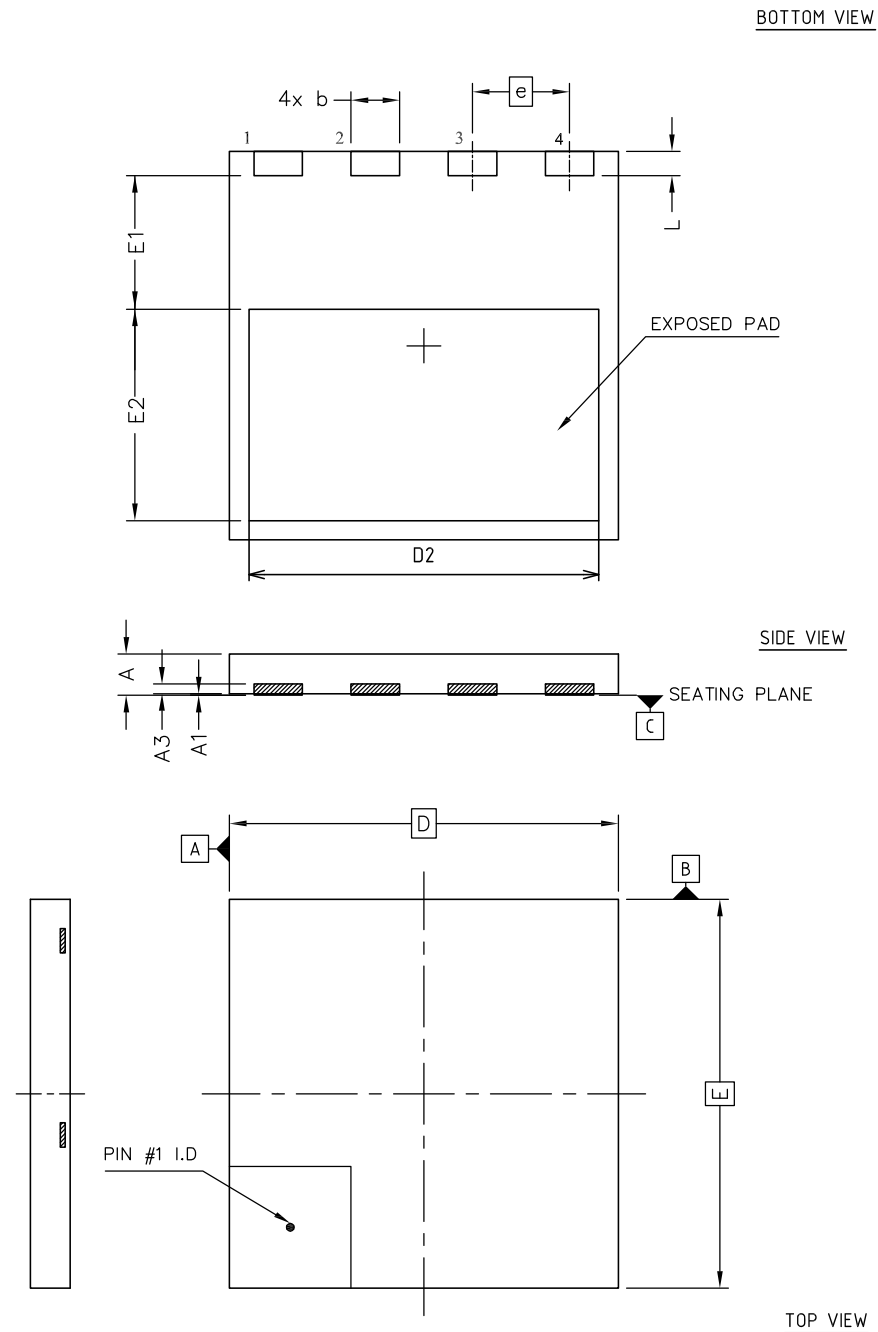
AM01473v1

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 PowerFLAT™ 8x8 HV package information

Figure 20. PowerFLAT™ 8x8 HV package outline

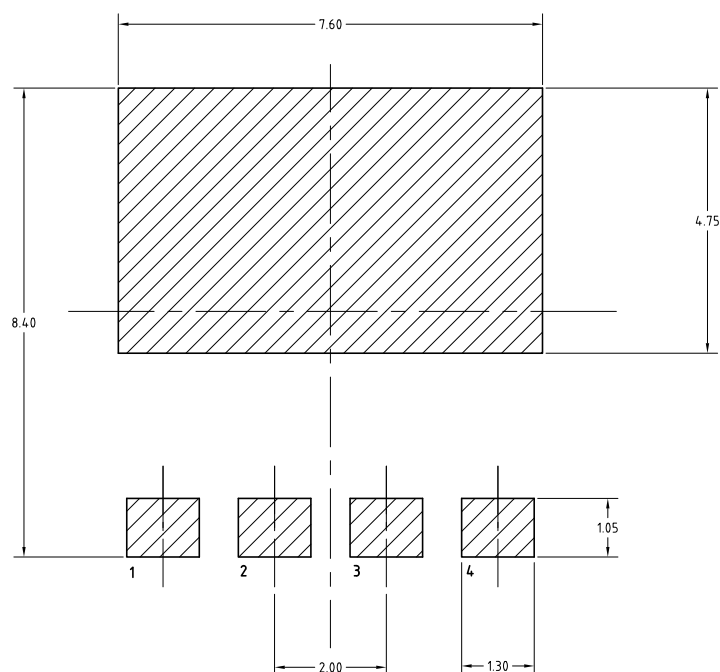


8222871_Rev_4

Table 9. PowerFLAT™ 8x8 HV mechanical data

Dim.	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 21. PowerFLAT™ 8x8 HV footprint

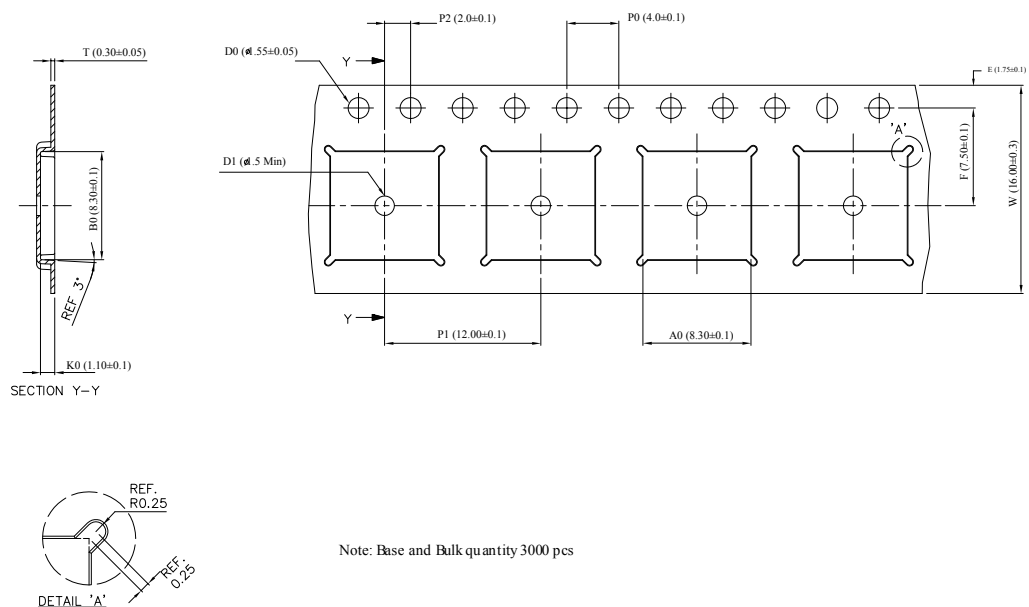


8222871_REV_4_footprint

Note: All dimensions are in millimeters.

5 PowerFLAT™ 8x8 HV packing information

Figure 22. PowerFLAT™ 8x8 HV tape



8229819_Tape_revA

Note: All dimensions are in millimeters.

Figure 23. PowerFLAT™ 8x8 HV package orientation in carrier tape

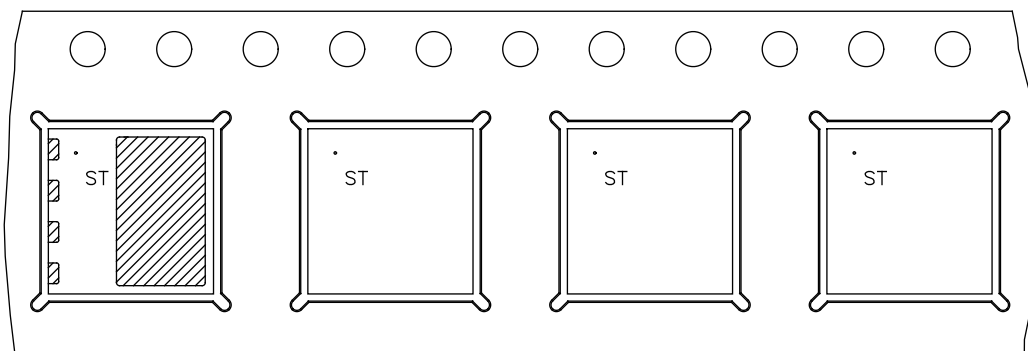
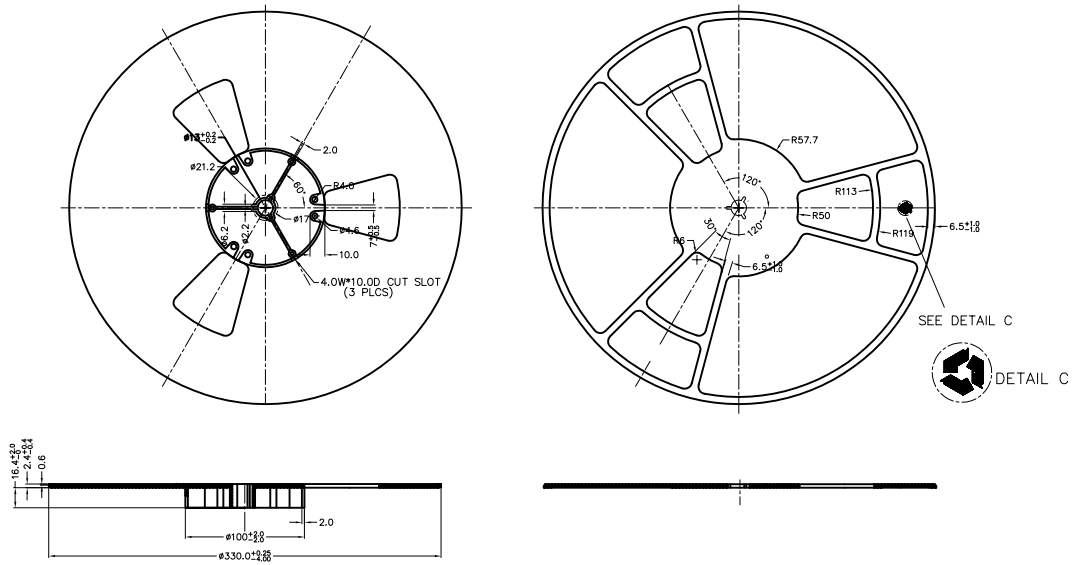


Figure 24. PowerFLAT™ 8x8 HV reel



8229819_Reel_revA

Note: All dimensions are in millimeters.

Revision history

Table 10. Document revision history

Date	Revision	Changes
02-Dec-2014	1	First release.
12-Jan-2015	2	Updated product status from "preliminary data" to "production data".
20-Nov-2015	3	Updated: cover image and <i>Figure 1: "Internal schematic diagram"</i> Updated: <i>Section 3: "Test circuits"</i> Modified: <i>Section 4.1: "PowerFLAT 8x8 HV package information"</i> Minor text changes
21-Feb-2018	4	Removed maturity status indication from cover page. The document status is production data. Modified <i>Table 1. Absolute maximum ratings</i> , <i>Table 4. On/off states</i> , <i>Table 5. Dynamic</i> , <i>Table 6. Switching Energy</i> , <i>Table 7. Switching times</i> and <i>Table 8. Source drain diode</i> . Modified the entire <i>Section 2.1 Electrical characteristics (curves)</i> . Minor text changes.
26-Mar-2018	5	Modified <i>Table 1. Absolute maximum ratings</i> , <i>Table 4. On/off states</i> , <i>Table 5. Dynamic</i> , <i>Table 6. Switching Energy</i> , <i>Table 7. Switching times</i> , <i>Table 8. Source drain diode</i> and <i>Section 2.1 Electrical characteristics (curves)</i> . Minor text changes.

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