

Features

- Very Low On-resistance
- $R_{DS(on)}$ Low C_{rss}
- Fast switching
- Improved dv/dt capability



Application

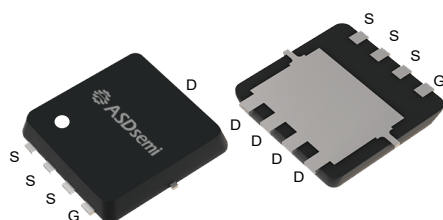
- PWM Application
- Load Switch
- Power Management

100% UIS TESTED!

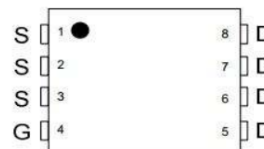
100% ΔV_{ds} TESTED!

Product Summary

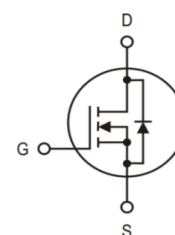
V_{DS}	60	V
$R_{DS(on), Typ @ V_{GS}=10 V}$	4.2	m Ω
I_D	109	A



PDFN5*6-8



Pin Assignment



N-Channel

Ordering and Marking Information

Ordering Device No.	Marking	Package	Packing	Quantity
ASS053N06Q1M-R	S053N06	PDFN5*6-8	Tape&Reel	4000/Reel

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Limit	Unit
V_{DSS}	Drain-Source Voltage	60	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	109	A
	- Continuous ($T_C = 100^\circ\text{C}$)	68	A
I_{DM}	Drain Current - Pulsed (Note 1)	436	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	256	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	104	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.2	$^\circ\text{C/W}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0	1.7	2.5	V
$R_{DS(on)}$	Static Drain-Source	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	--	4.2	5.3	$\text{m}\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$	--	5.5	8.0	

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1920	--	pF
C_{oss}	Output Capacitance		--	497	--	pF
C_{rss}	Reverse Transfer Capacitance		--	10	--	pF
R_g	Gate Resistance	$f = 1.0\text{ MHz}, V_{gs}=0\text{V}$	--	2.8	--	Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}, V_{DS}=48\text{V},$ $R_L = 10\Omega, I_D=20\text{A}$ (Note 3)	--	16	--	ns
t_r	Turn-On Rise Time		--	13	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	43	--	ns
t_f	Turn-Off Fall Time		--	14	--	ns
Q_g	Total Gate Charge	$V_{DS} = 30\text{V}, I_D = 20\text{A},$ $V_{GS} = 10\text{V}$ (Note 3)	--	30	--	nC
Q_{gs}	Gate-Source Charge		--	10	--	nC
Q_{gd}	Gate-Drain Charge		--	4.9	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	109	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	436	A
V_{SD}	Drain to Source Diode Forward Voltage, $V_{GS} = 0\text{V}, I_{SD} = 15\text{A}, T_J = 25^\circ\text{C}$	--	0.8	1.3	V
T_{rr}	Reverse recovery time, $I_F = 20\text{A}, dI/dt = 100\text{A}/\mu\text{s}$	--	33	--	ns
Q_{rr}	Reverse recovery charge, $I_F = 20\text{A}, dI/dt = 100\text{A}/\mu\text{s}$	--	25	--	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. EAS condition: $T_J = 25^\circ\text{C}, V_{DD} = 30\text{V}, V_G = 10\text{V}, L = 0.5\text{mH}, I_{AS} = 32\text{A}$.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

N- Channel Typical Characteristics

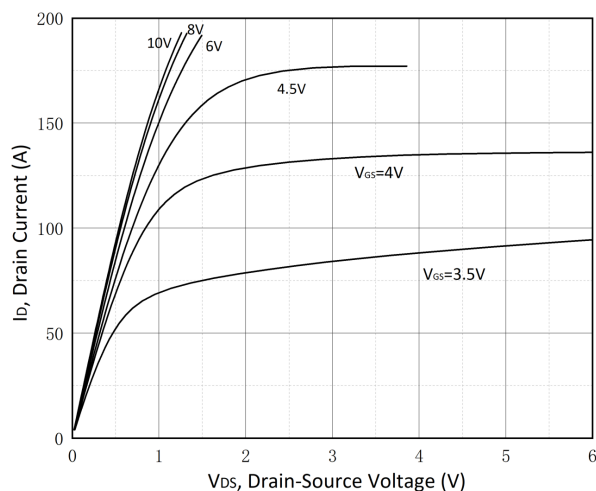


Figure1. Output Characteristics

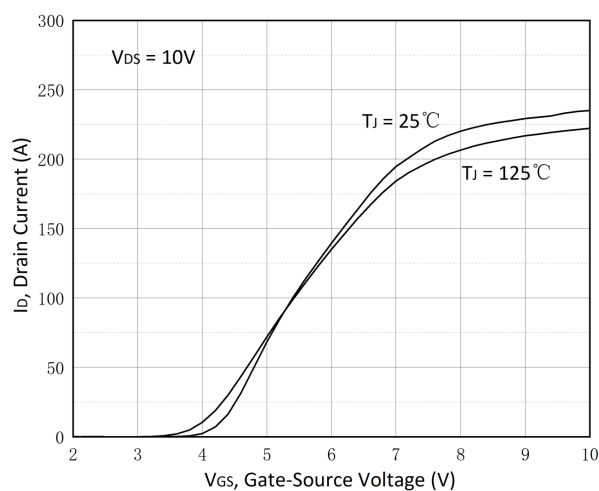


Figure2. Transfer Characteristics

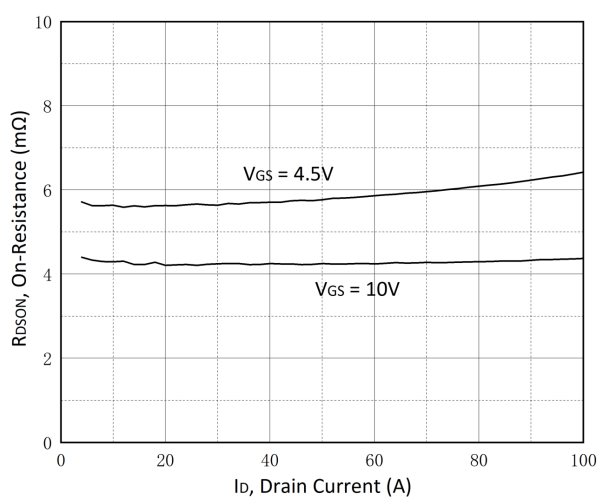


Figure3. Drain-Source on-state Resistance

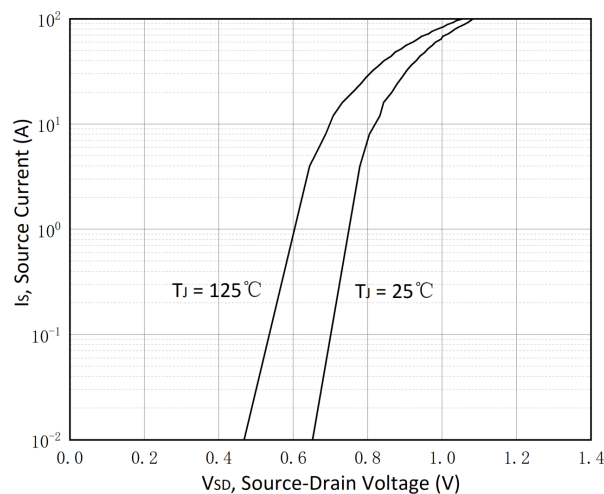


Figure4. Source-Drain Diode Forward

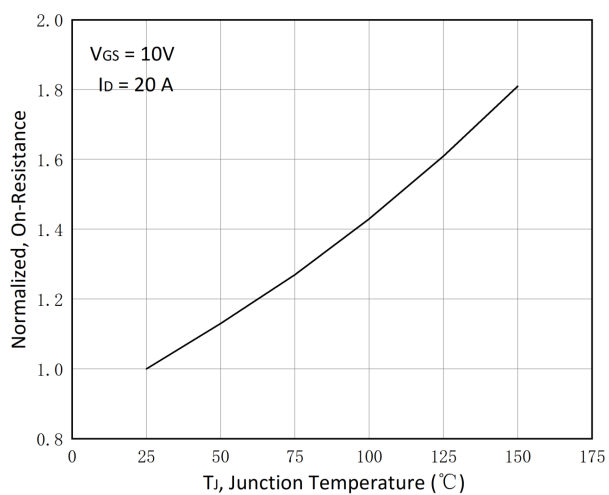


Figure5. Rds(on)-Junction Temperature

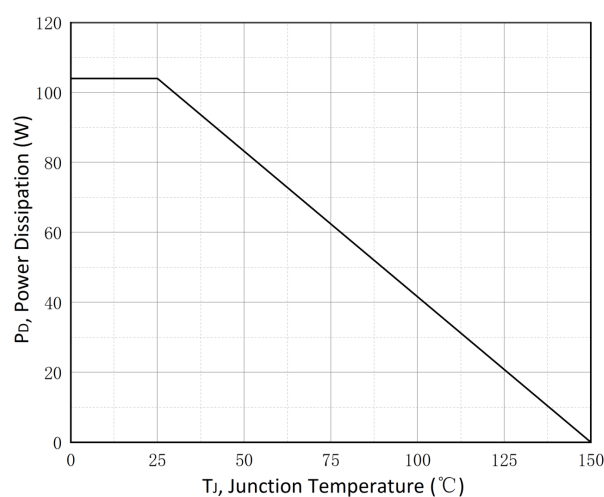


Figure 6. Power Derating

N- Channel Typical Characteristics (Continued)

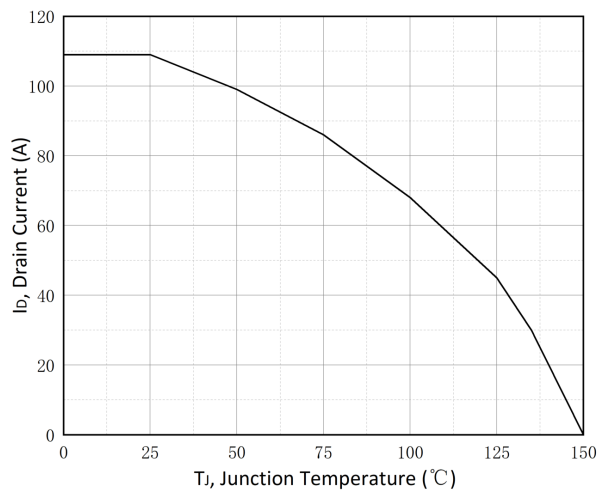


Figure7. Current Derating

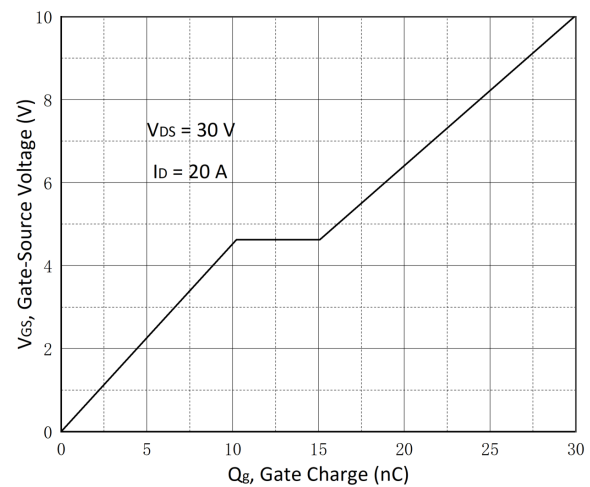


Figure 8. Gate Charge

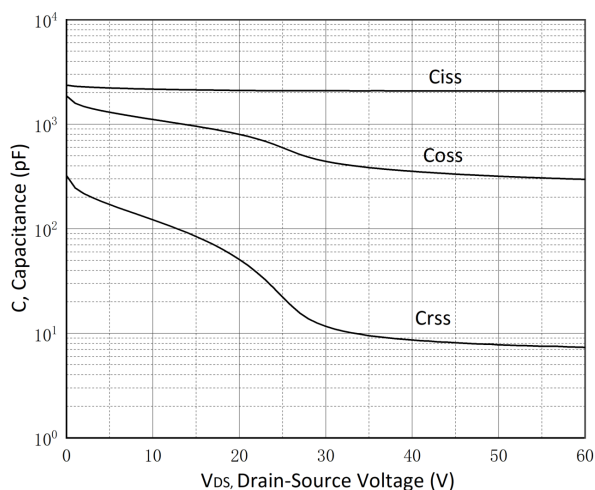


Figure 9. Capacitances

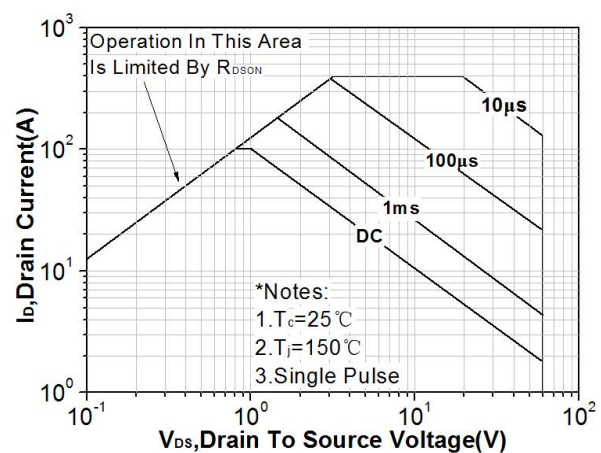


Figure 10. Safe Operation Area

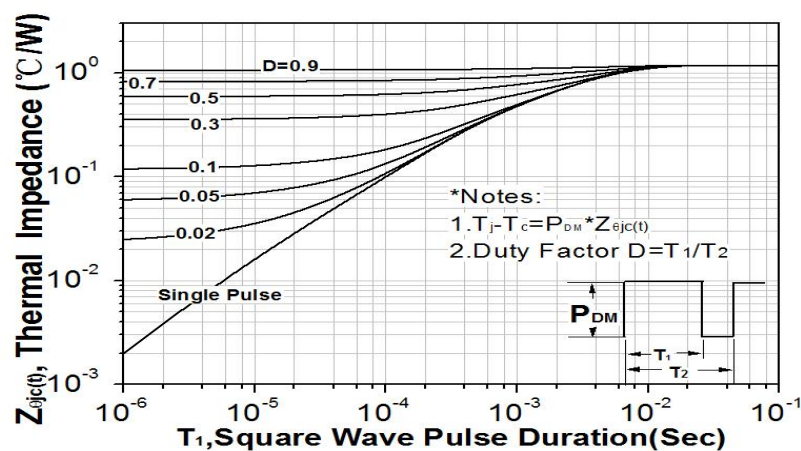
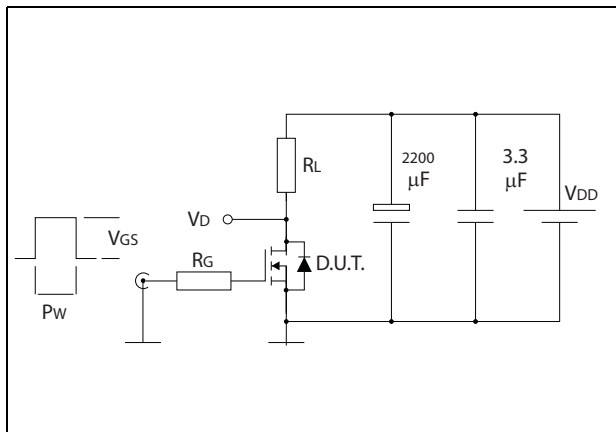


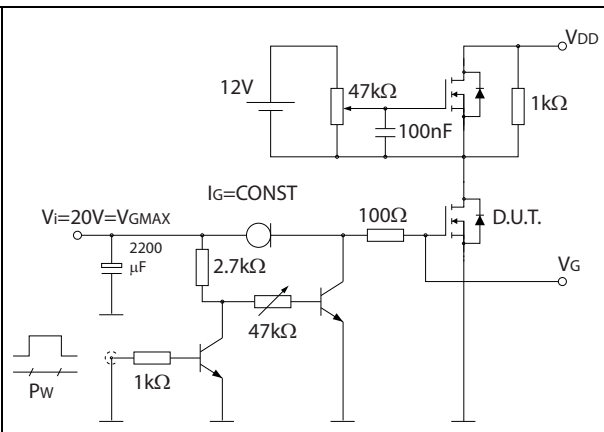
Figure 11. Normalized Maximum Transient Thermal Impedance

Test circuits

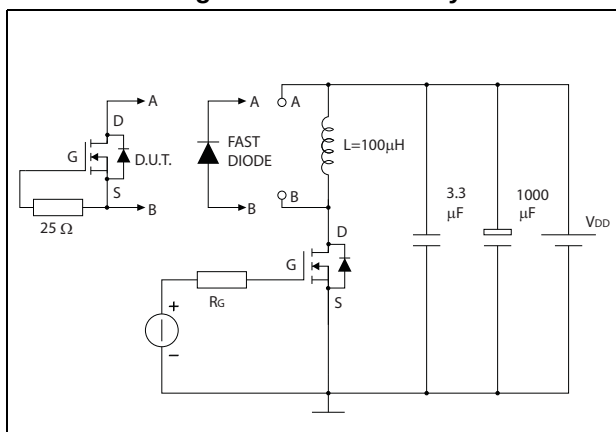
Switching times test circuit for resistive load



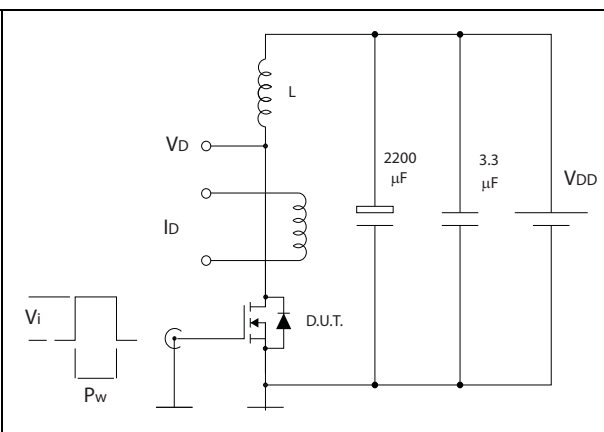
Gate charge test circuit



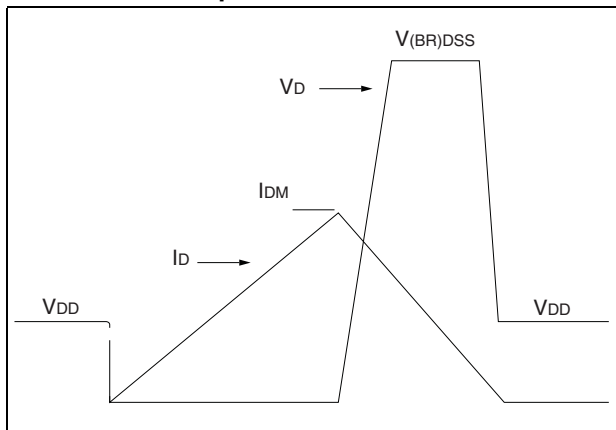
Test circuit for inductive load switching and diode recovery times



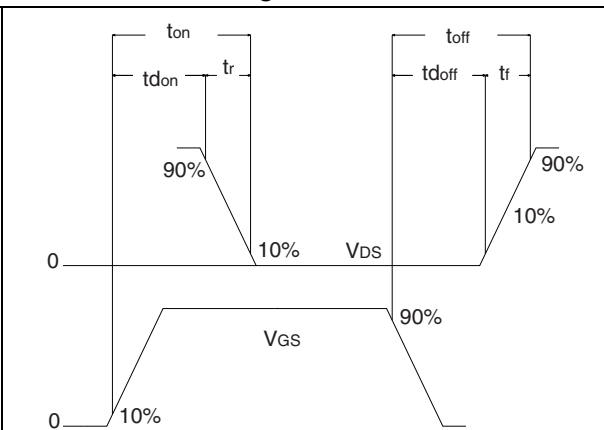
Unclamped inductive load test circuit

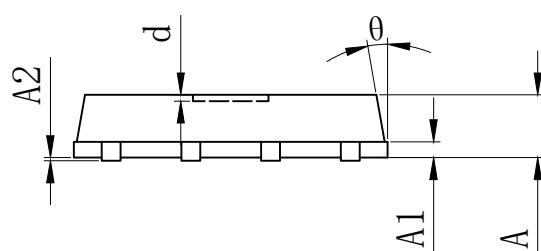
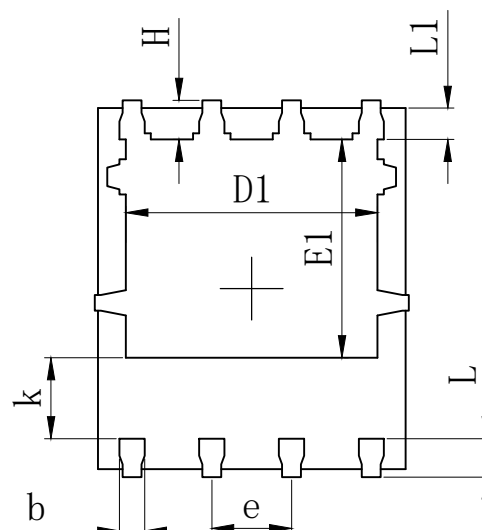
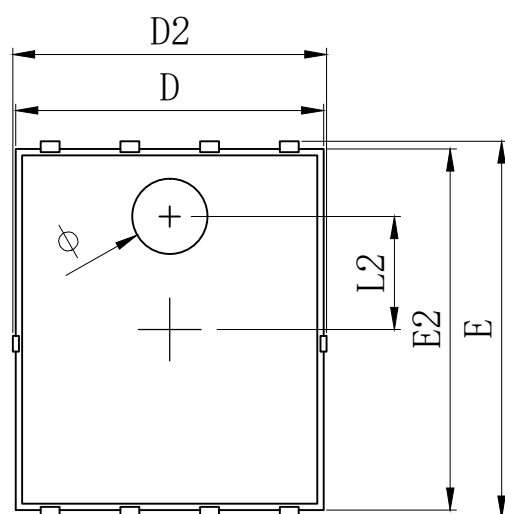


Unclamped inductive waveform



Switching time waveform



PDFN5*6-8 Package Outline Data


SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	0.900	1.000	1.100
A1	0.254 REF.		
A2	0°0.05		
D	4.824	4.900	4.976
D1	3.910	4.010	4.110
D2	4.924	5.000	5.076
E	5.924	6.000	6.076
E1	3.375	3.475	3.575
E2	5.674	5.750	5.826
b	0.350	0.400	0.450
e	1.270 TYP.		
L	0.534	0.610	0.686
L1	0.424	0.500	0.576
L2	1.800 REF.		
k	1.190	1.290	1.390
H	0.549	0.625	0.701
θ	8°	10°	12°
Φ	1.100	1.200	1.300
d			0.100

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