

N-Channel 60V MOSFET

E060N3P0HL1

V_{DS} (V)	$R_{DS(on),max}$ (m Ω)	I_D (A)
60V	3.0 @ $V_{GS} = 10V$	160

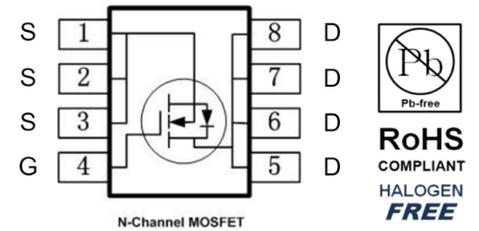
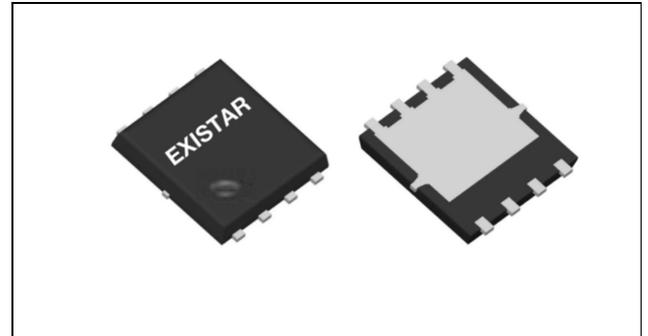
Features

- Low $R_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

Applications

- DC/DC conversion
- Power switch
- PD charger
- Moto driver

PDFN5X6



Package And Ordering Information

Ordering code	Package	Marking
E060N3P0HL1	PDFN5x6	E060N3P0HL1

Ordering Information

Package	Units/ Reel	Reels/ Inner Box	Units/ Inner Box
PDFN5x6	5000	1	5000

Key Performance Parameters

Parameter	Value	Unit
VDS, min @ Tj(max)	60	V
ID, pulse	640	A
RDS(ON), max @ VGS=10V	3	mΩ
Qg	66.1	nC

Absolute Maximum Ratings at Tj=25°C Unless Otherwise Noted

Parameter	Symbol	Limit	Unit
Drain-source voltage	V _{DS}	60	V
Gate-source voltage	V _{GS}	±20	
Continuous drain current	I _D	T _C =25°C	160
		T _C =100°C	-
Pulsed drain current	I _{D,pulse}	640	A
Avalanche energy, single pulse	E _{AS}	200	mJ
Power dissipation	P _D	T _C =25°C	140
		T _A =25°C	-
Operating junction and storage temperature range	T _J , T _{stg}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal resistance, junction-to-case	R _{θJC}	0.89	°C/W
Thermal resistance, junction-to-ambient	R _{θJA}	62	

Electrical Characteristics at Tj=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Static						
Drain to source breakdown voltage	V _{(BR)DSS}	60			V	V _{GS} = 0, I _D = 250 μA
Gate-source threshold voltage	V _{GS(th)}	1.2		2.3	V	V _{DS} = V _{GS} , I _D = 250 μA
Gate-body leakage	I _{GSS}			±100	nA	V _{DS} = 0 V, V _{GS} = ±20 V
Zero gate voltage drain current	I _{DSS}			1	μA	V _{DS} = 60 V, V _{GS} = 0 V
Drain-source on-resistance	R _{DS(on)}		2.5	3	mΩ	V _{GS} = 10 V, I _D = 20 A
Drain-source on-resistance	R _{DS(on)}		3.3	3.8	mΩ	V _{GS} = 4.5 V, I _D = 10 A

Forward transconductance	g_{fs}		-		S	$V_{DS} = 5\text{ V}, I_D = 30\text{ A}$
Gate resistance	R_g		1.3		Ω	$f = 1\text{ MHz}$
Gate Charge						
Total gate charge	Q_g		66.1		nC	$V_{DS} = 30\text{ V}, I_D = 25\text{ A}, V_{GS} = 10\text{ V}$
Gate-source charge	Q_{gs}		10.7			
Gate-drain charge	Q_{gd}		10.9			
Dynamic						
Turn-on delay time	$t_{d(on)}$		22.5		ns	$V_{DS} = 30\text{ V}, I_D = 25\text{ A}, V_{GS} = 10\text{ V}, R_{GEN} = 2\ \Omega$
Rise time	t_r		6.7			
Turn-off delay time	$t_{d(off)}$		80.3			
Fall time	t_f		26.8			
Input capacitance	C_{iss}		4370		pF	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$
Output capacitance	C_{oss}		1167			
Reverse transfer capacitance	C_{rss}		48			
Body Diode						
Diode forward voltage	V_{SD}			1.3	V	$V_{GS} = 0\text{ V}, I_F = 20\text{ A}$
Reverse recovery time	t_{rr}		68.3		ns	$V_R = 30\text{ V}, I_S = 25\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		73		nC	

Electrical Characteristics Diagrams

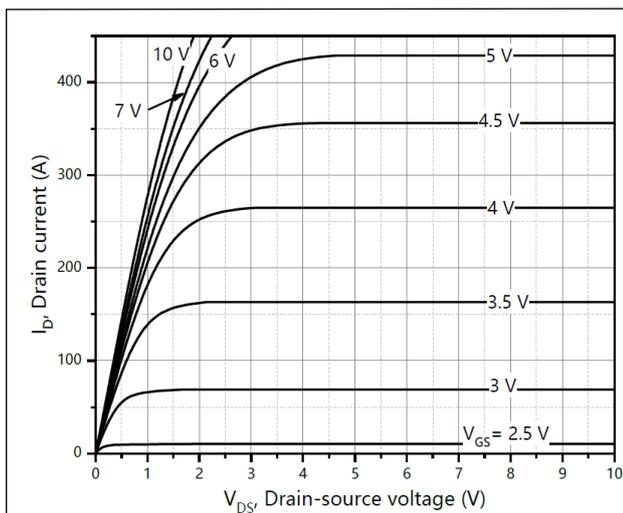


Figure 1. Typ. output characteristics

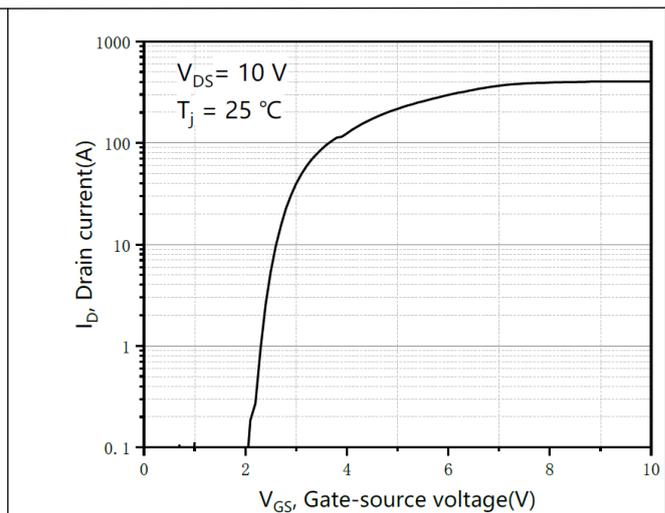


Figure 2. Typ. transfer characteristics

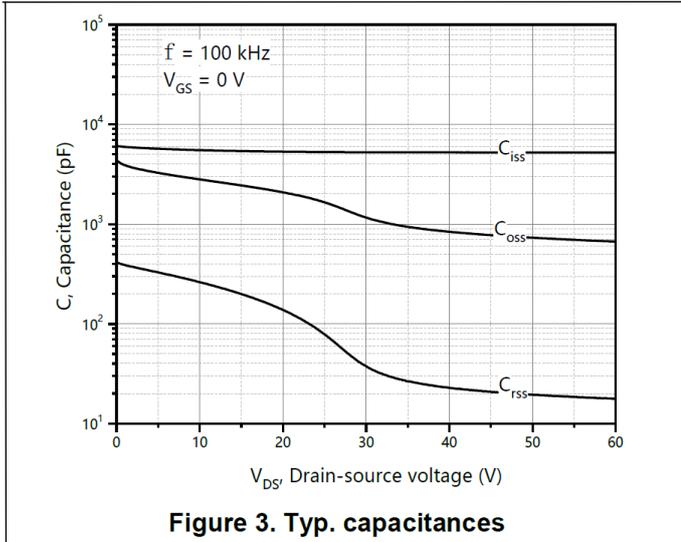


Figure 3. Typ. capacitances

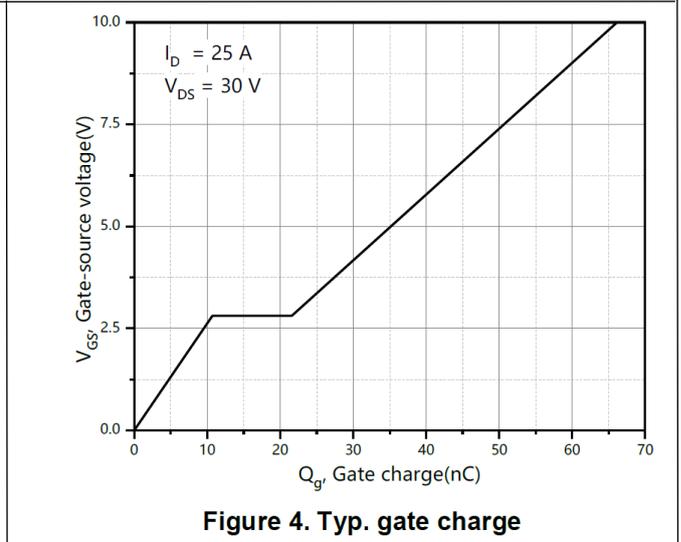


Figure 4. Typ. gate charge

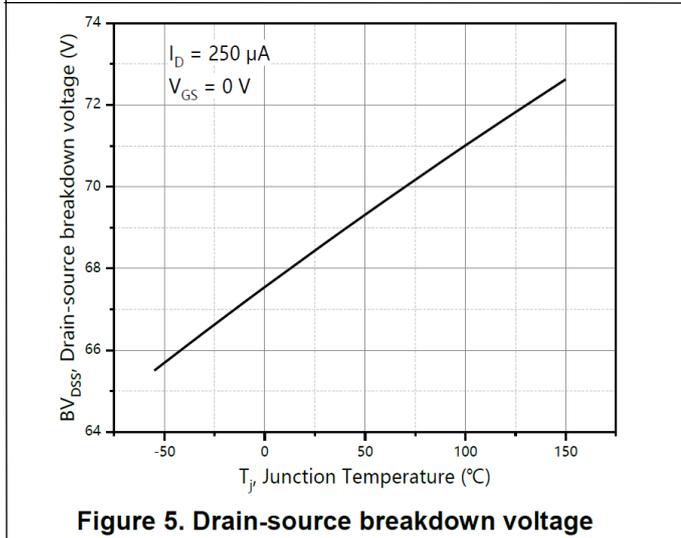


Figure 5. Drain-source breakdown voltage

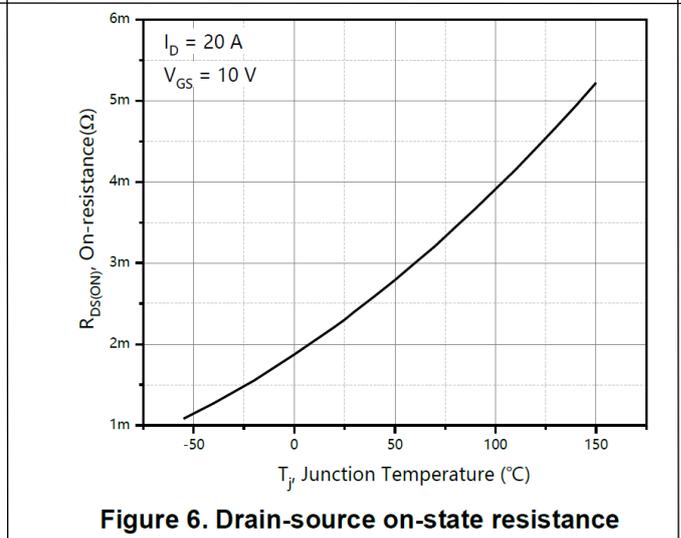


Figure 6. Drain-source on-state resistance

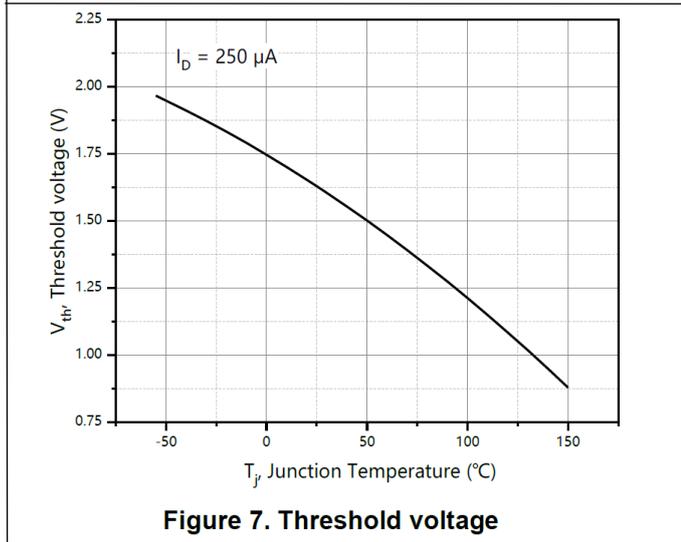


Figure 7. Threshold voltage

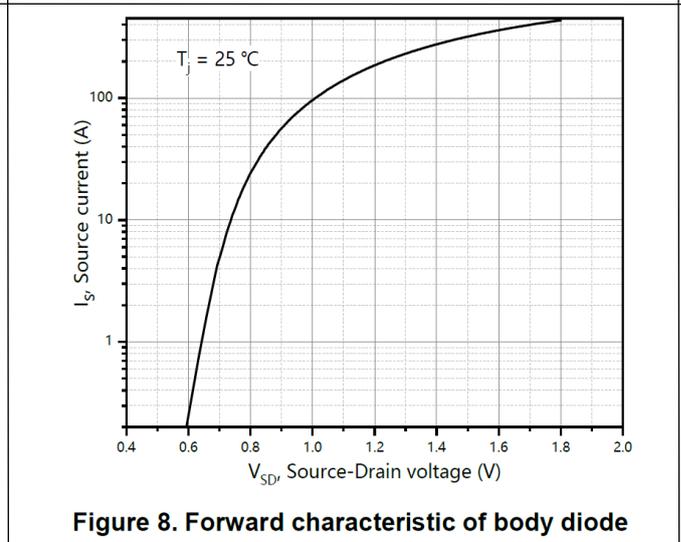


Figure 8. Forward characteristic of body diode



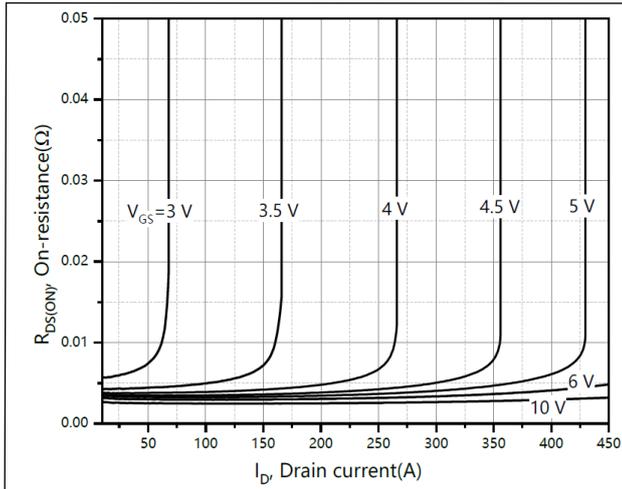


Figure 9. Drain-source on-state resistance

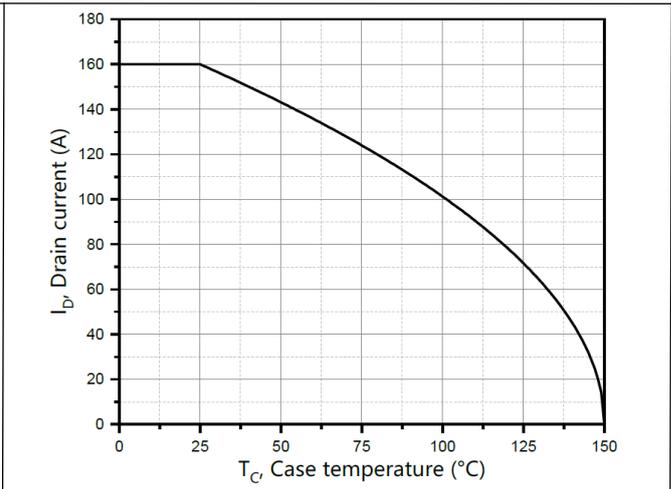


Figure 10. Drain current

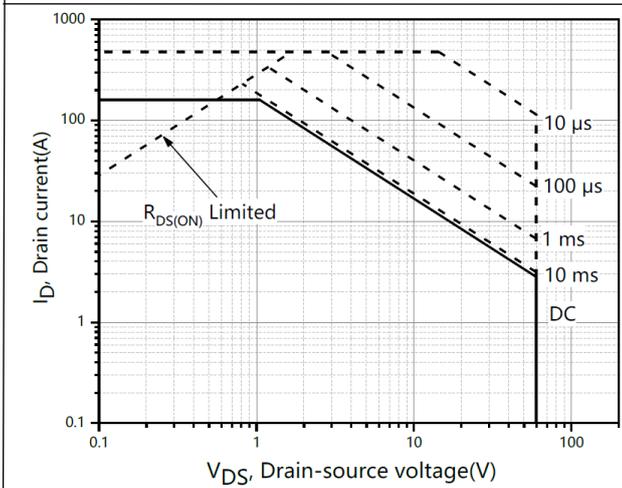


Figure 11. Safe operation area T_C=25 °C

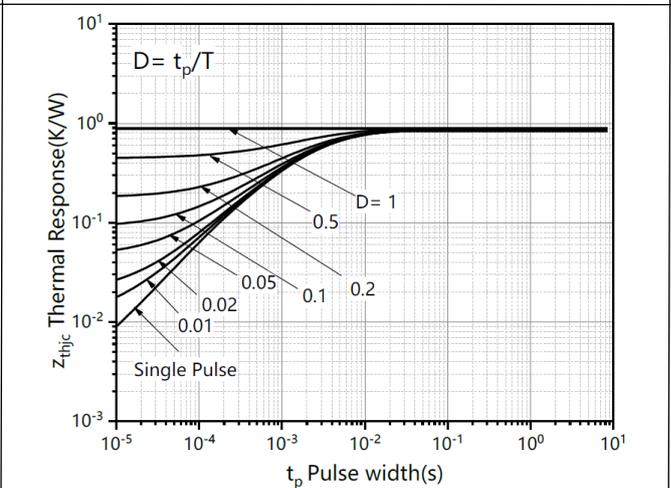


Figure 12. Max. transient thermal impedance



Test circuits and waveforms

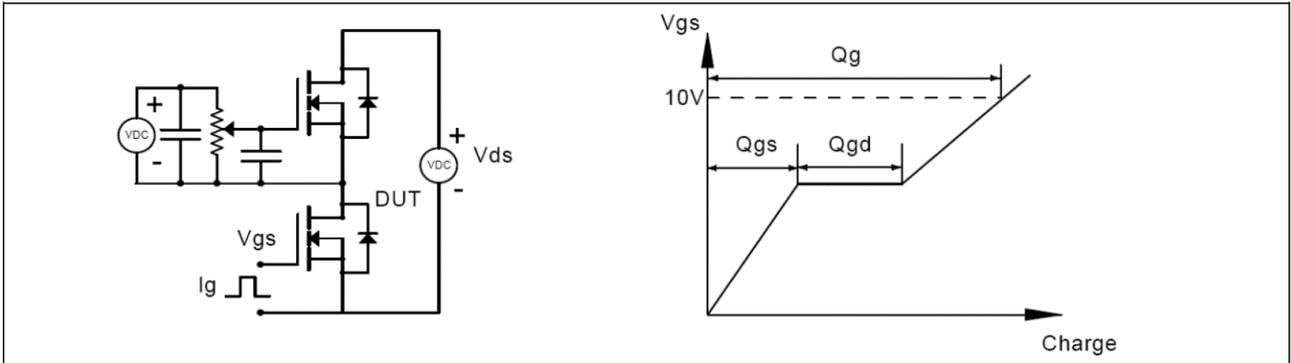


Figure 1. Gate charge test circuit & waveform

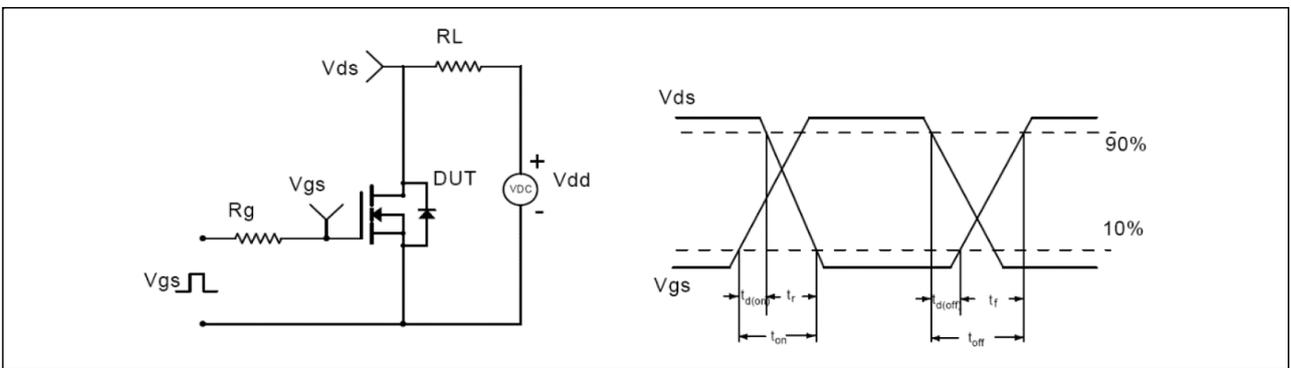


Figure 2. Switching time test circuit & waveforms

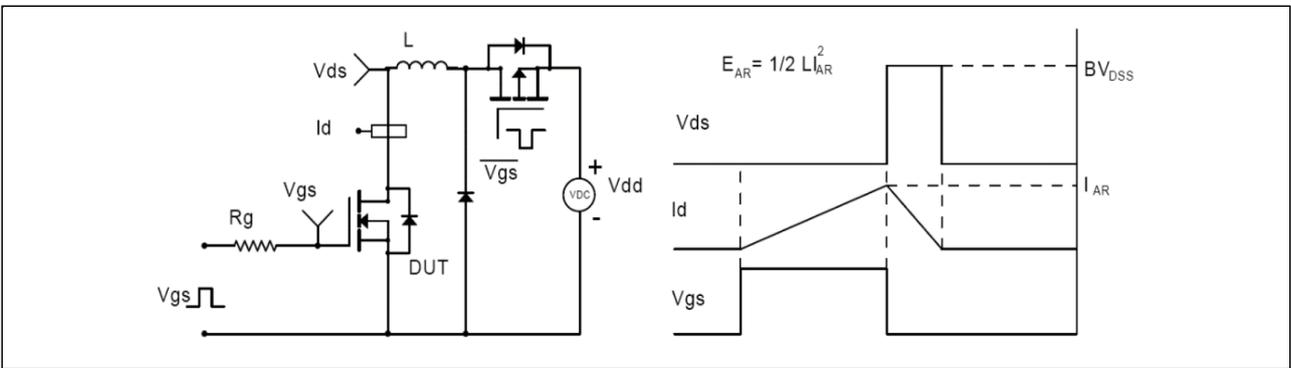


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

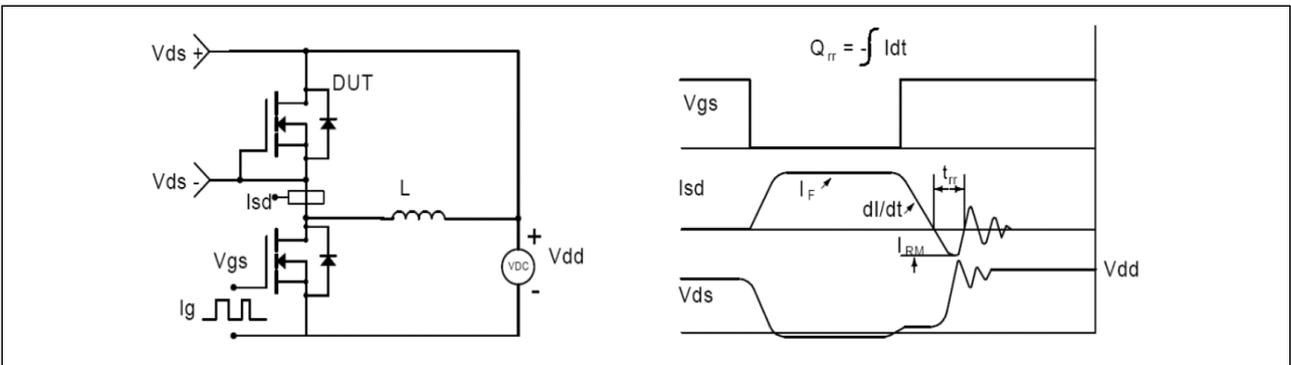
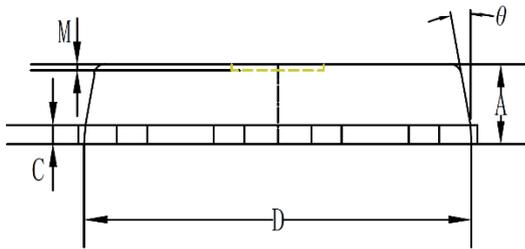
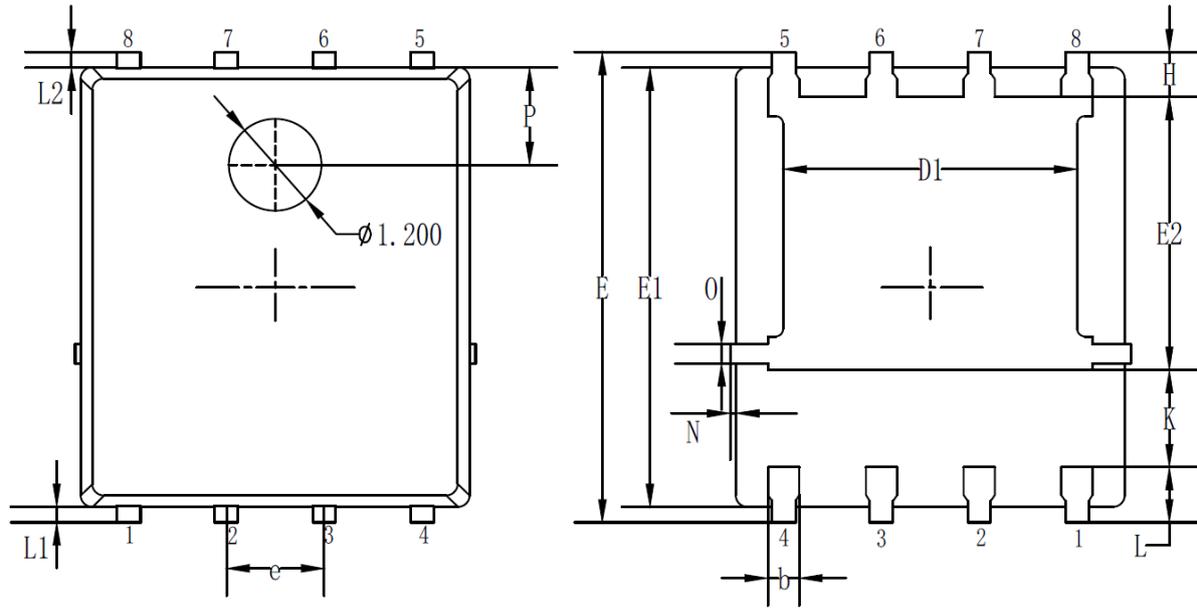


Figure 4. Diode reverse recovery test circuit & waveforms

Package Outline Dimensions



Symbols	Millimeters		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.10
D1	3.72	3.82	3.92
E	6.00	6.15	6.25
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.69	0.75
L1/L2	0.10 ~ 0.20		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

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