

SLM50N06G

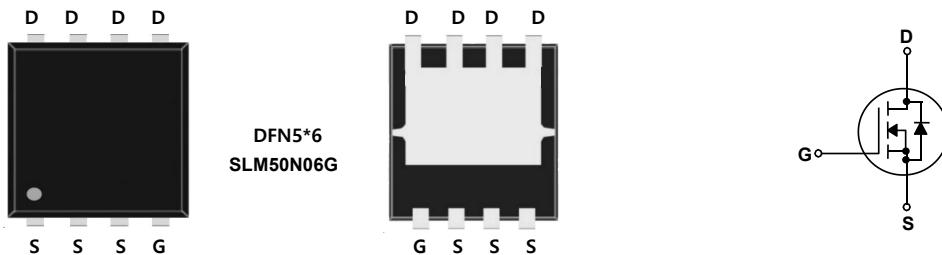
60V N-Channel MOSFET

General Description

This Power MOSFET is produced using Msemitek's advanced Shielding Gate MOSFET technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for low voltage applications such as DC/DC converters and high efficiency switching for power management in portable and battery operated products.

Features

- 50A, 60V, $R_{DS(on)Typ} = 8.5m\Omega @ V_{GS} = 10V$
- Very Low On-resistance $R_{DS(ON)}$
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

$T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	SLM50N06G	Units
V_{DSS}	Drain-Source Voltage	60	V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$) - Continuous ($T_C = 100^\circ C$)	50	A
		33	A
I_{DM}	Drain Current - Pulsed (Note 1)	200	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	60	mJ
P_D	Power Dissipation ($T_C = 25^\circ C$)	52	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.4	$^\circ C/W$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ C$

* Drain current limited by maximum junction temperature.

Package Marking

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
SLM50N06G	SLM50N06G	DFN5*6	Tape & Reel	5000	50000

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
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	0.06	--	V°C
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	--	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	--	8.5	12.5	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	--	11.4	15.5	

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 500\text{ kHz}$	--	1138	--	pF
C_{oss}	Output Capacitance		--	280	--	pF
C_{riss}	Reverse Transfer Capacitance		--	11	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}, I_D = 30\text{ A},$ $R_G = 4.7\text{ }\Omega, V_{GS} = 10\text{ V}$ (Note 4, 5)	--	9.6	--	ns
t_r	Turn-On Rise Time		--	4.6	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	26	--	ns
t_f	Turn-Off Fall Time		--	7	--	ns
Q_g	Total Gate Charge	$V_{DS} = 30\text{ V}, I_D = 30\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 4, 5)	--	18.7	--	nC
Q_{gs}	Gate-Source Charge		--	4.1	--	nC
Q_{gd}	Gate-Drain Charge		--	3.6	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	50	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	200	A	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 30\text{ A}$	--	--	1.2	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 30\text{ A},$	--	27	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F / dt = 80\text{ A}/\mu\text{s}$ (Note 4)	--	22	--	nC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $V_{DD} = 20\text{ V}, L = 0.5\text{ mH}$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq I_D, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

N- Channel Typical Characteristics

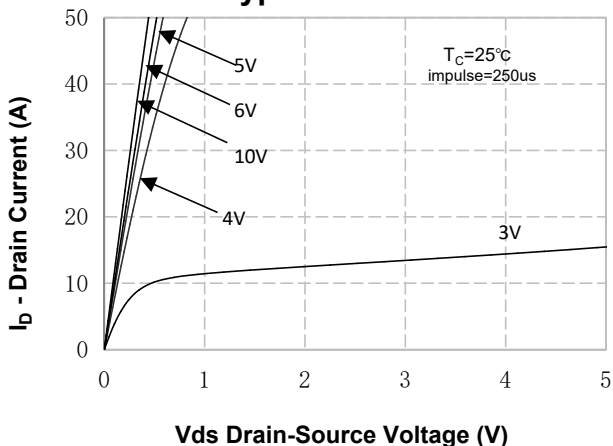


Figure 1. On-Region Characteristics

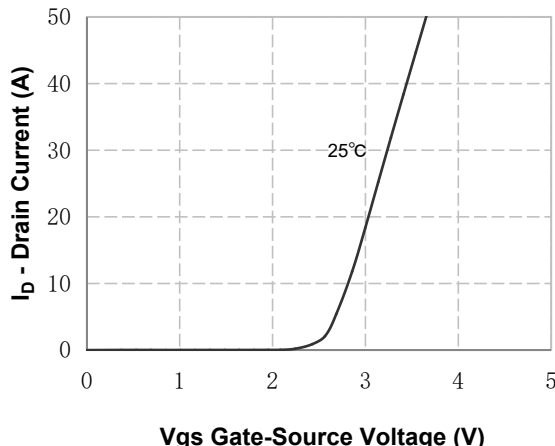


Figure 2. Transfer Characteristics

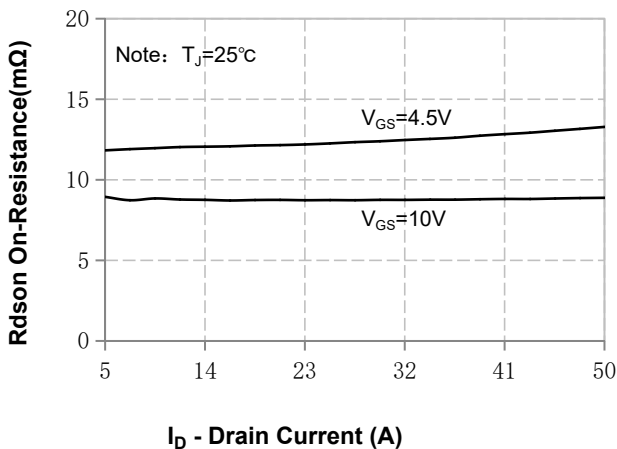


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

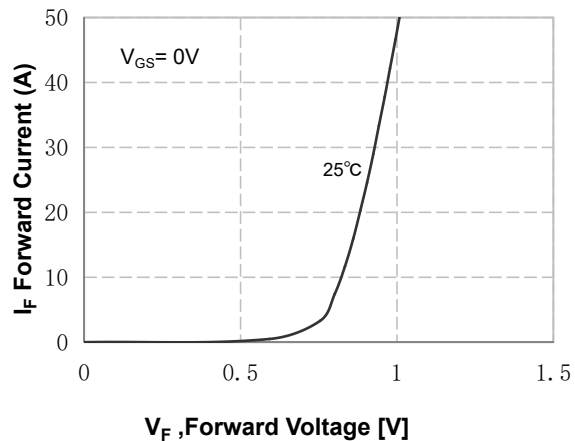


Figure 4. Body Diode Forward Voltage Variation vs Source Current

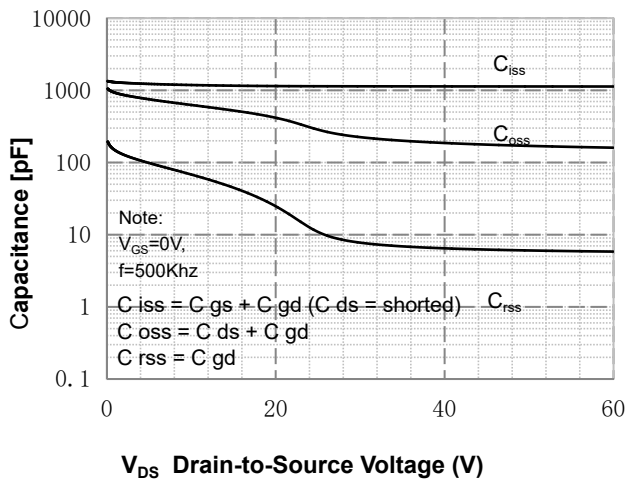


Figure 5. Capacitance Characteristics

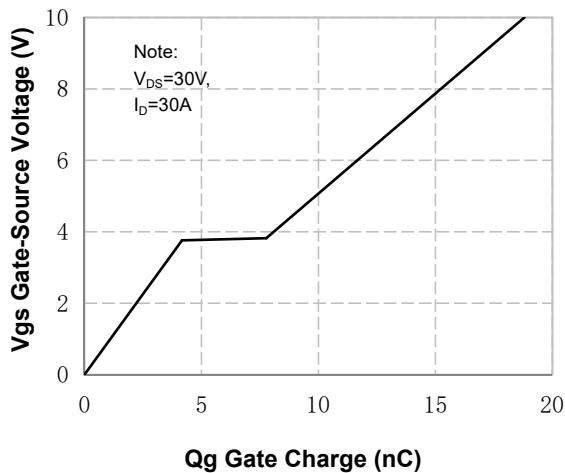


Figure 6. Gate Charge Characteristics

N- Channel Typical Characteristics (Continued)

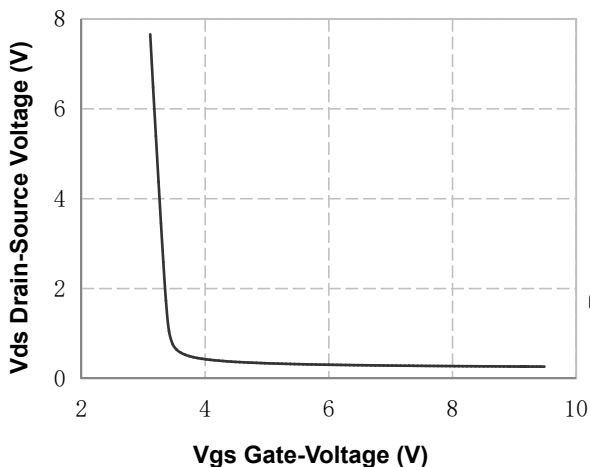


Figure 7. Vds Drain-Source Voltage vs Gate Voltage

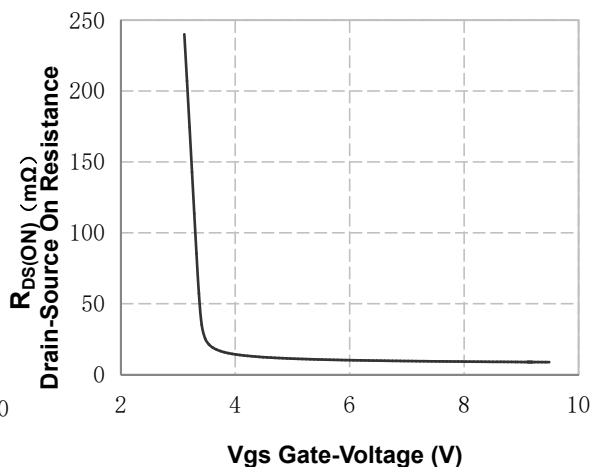


Figure 8. On-Resistance vs Gate Voltage

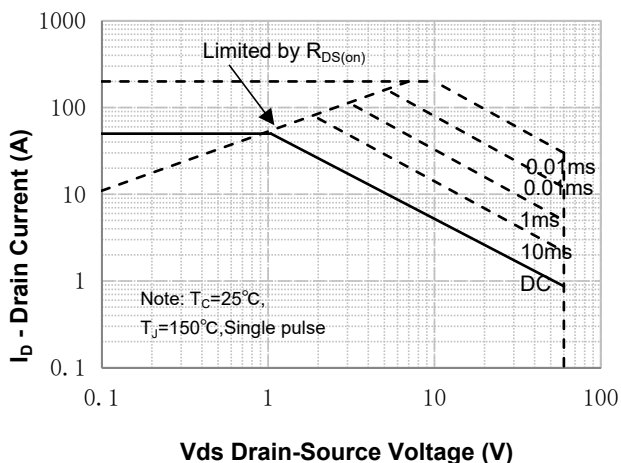


Figure 9. Maximum Safe Operating Area

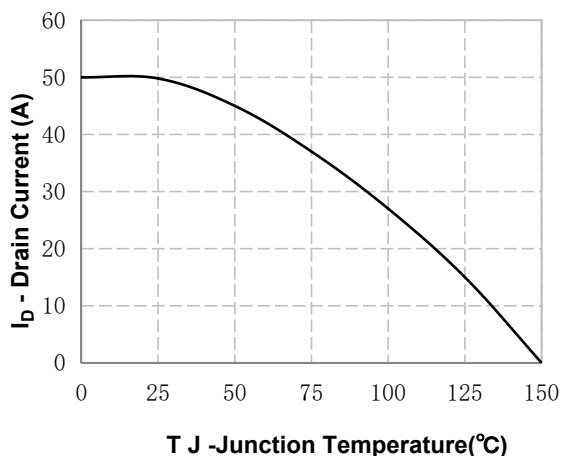


Figure 10. Maximum Continuous Drain Current vs Temperature

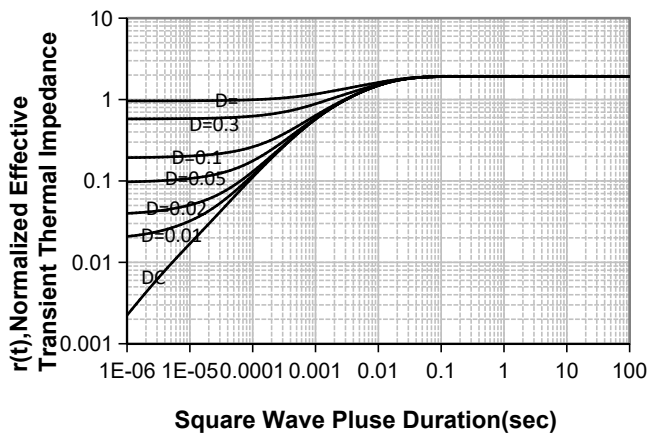
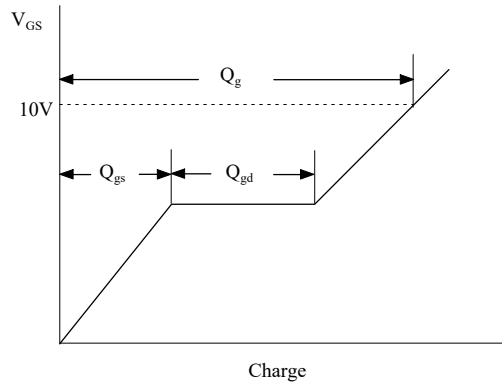
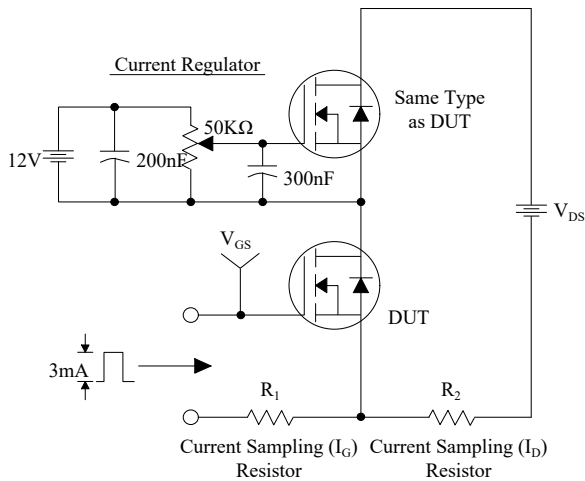
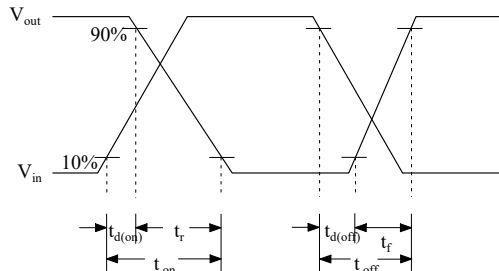
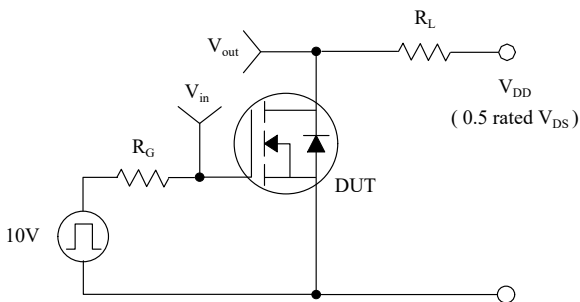


Figure 11. Transient Thermal Response Curve

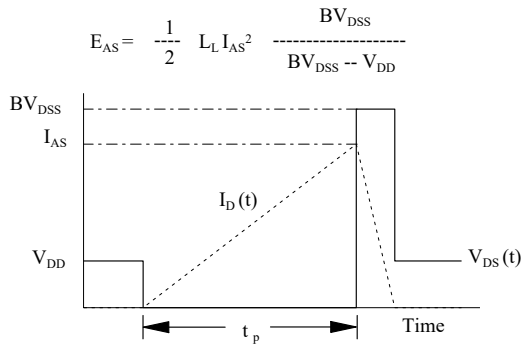
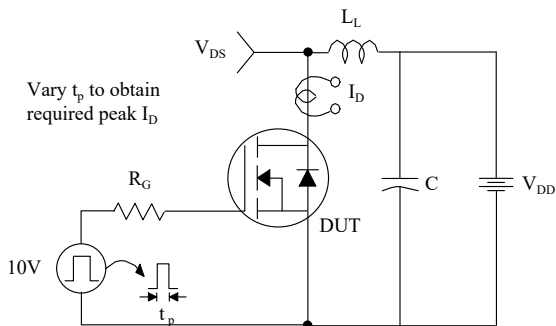
Gate Charge Test Circuit & Waveform



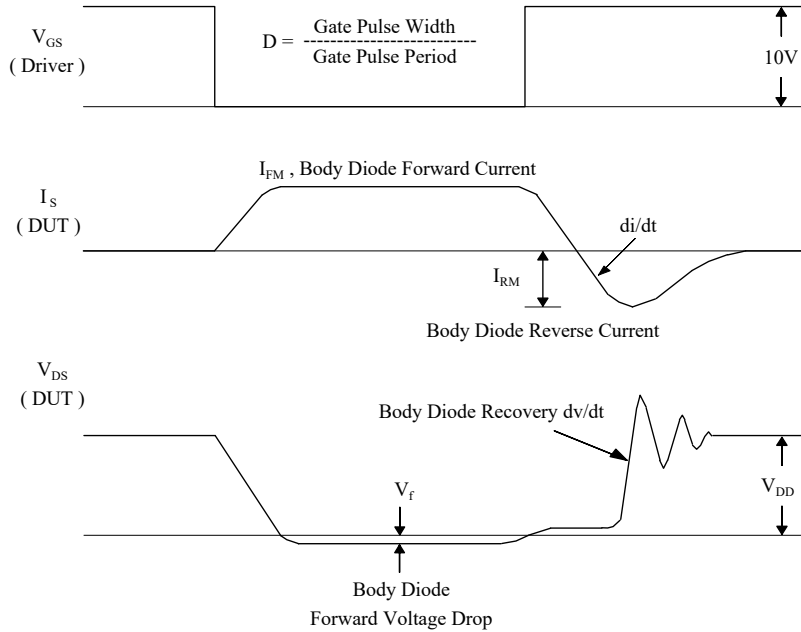
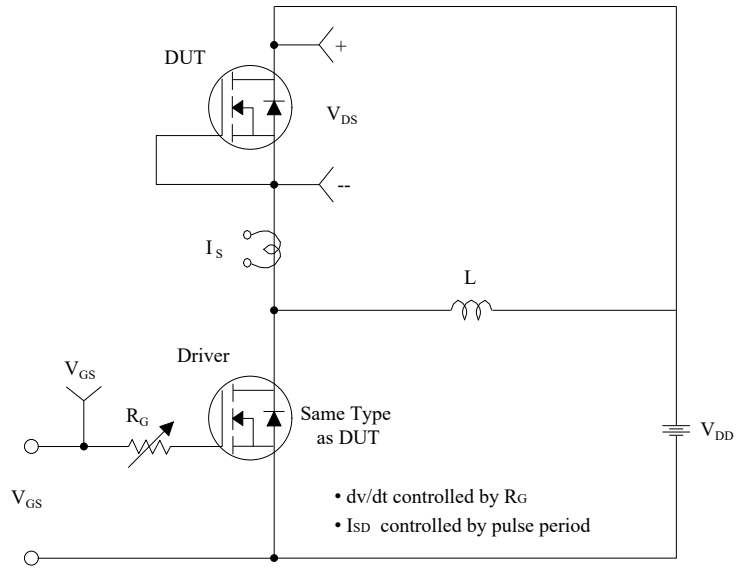
Resistive Switching Test Circuit & Waveforms



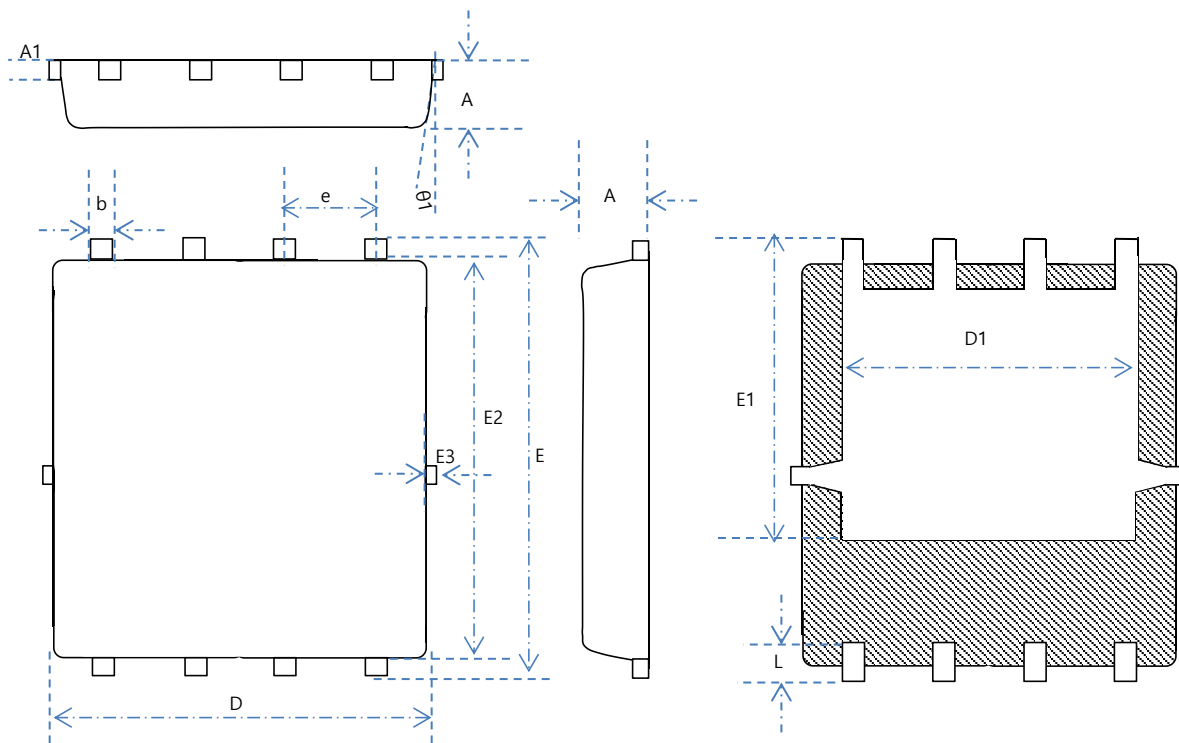
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



DFN 5*6 OUTLINE



SYMBO L	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.85	0.95	1.05	D	4.90	5.20	5.35
A1	0.254 REF			e	1.270 TYPE		
b	-	0.30	-	D1	3.90	4.0	4.10
E	5.85	6.05	6.25	L	0.54	0.64	0.74
E1	3.90	4.10	4.30				
E2	5.45	5.55	5.65	θ1	8°	10°	12°
E3	-	-	0.15				

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