

# SLM120N03G

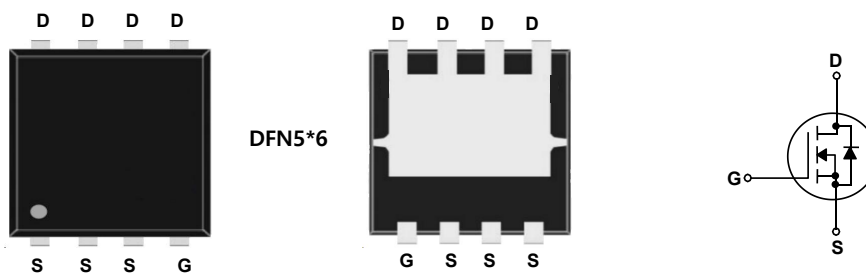
## 30V N-Channel MOSFET

### 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

- N-Channel:30V 120A
  - $R_{DS(on)Typ} = 1.2\ m\Omega @ V_{GS} = 10V$
  - $R_{DS(on)Typ} = 1.6\ m\Omega @ V_{GS} = 4.5V$
- Very Low On-resistance  $R_{DS(ON)}$
- Low  $C_{rss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



### Absolute Maximum Ratings

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

Symbol	Parameter	SLM120N03G	Units
$V_{DSS}$	Drain-Source Voltage	30	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) - Continuous ( $T_C = 100^\circ\text{C}$ )	120	A
		78	A
$I_{DM}$	Drain Current - Pulsed (Note 1)	480	A
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy (Note 2)	150	mJ
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	120	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.04	$^\circ\text{C}/\text{W}$
$T_J, T_{STG}$	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.

## Package Marking

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
SLM120N03G	SLM120N03G	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	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 24\text{ V}, T_C = 125^\circ\text{C}$	--	--	50	$\mu\text{A}$
$I_{GSSF}$	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	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.2	1.5	2.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$	--	1.2	1.8	m $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	--	1.6	2.2	

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	4050	--	pF
$C_{oss}$	Output Capacitance		--	1710	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	140	--	pF

### Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}, R_G = 1\text{ }\Omega, I_D = 50\text{ A}$ (Note 3)	--	18	--	ns
$t_r$	Turn-On Rise Time		--	11	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	64	--	ns
$t_f$	Turn-Off Fall Time		--	11	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 10\text{ V}, I_D = 30\text{ A}, V_{GS} = 10\text{ V}$ (Note 3)	--	69	--	nC
$Q_{gs}$	Gate-Source Charge		--	12	--	nC
$Q_{gd}$	Gate-Drain Charge		--	17	--	nC

### Drain-Source Diode Characteristics and Maximum Ratings

$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	120	A
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	480	A
$V_{SD}$	Drain to Source Diode Forward Voltage, $V_{GS} = 0\text{ V}, I_{SD} = 20\text{ A}, T_J = 25^\circ\text{C}$	--	--	1.2	V

#### Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition:  $T_J = 25^\circ\text{C}, V_{DD} = 15\text{ V}, V_G = 10\text{ V}, L = 0.5\text{ mH}$ ,
3. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 0.5\%$

### N- Channel Typical Characteristics

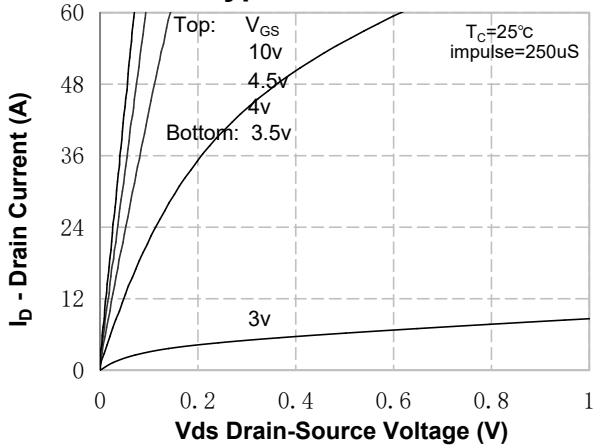


Figure 1. On-Region Characteristics

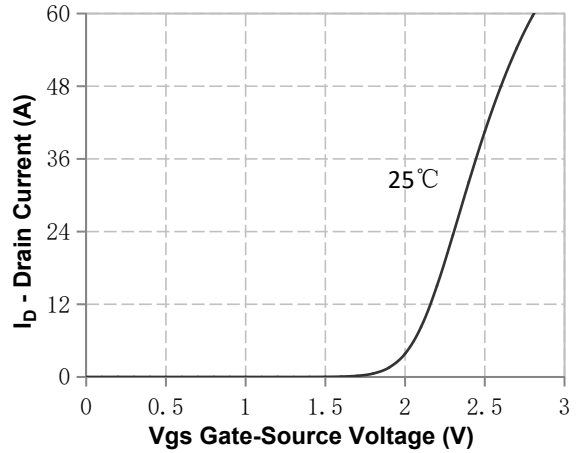


Figure 2. Transfer Characteristics

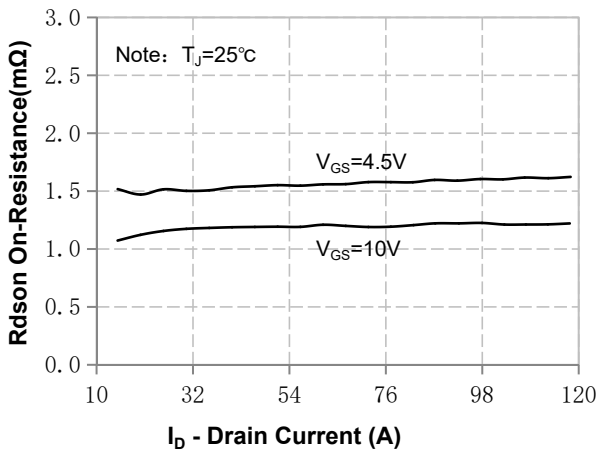


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

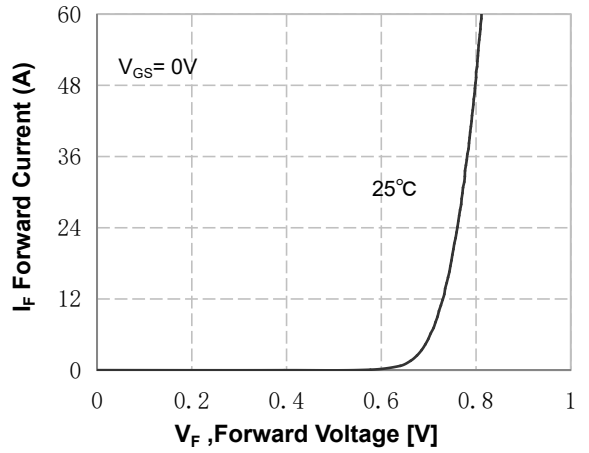


Figure 4. Body Diode Forward Voltage Variation with Source Current

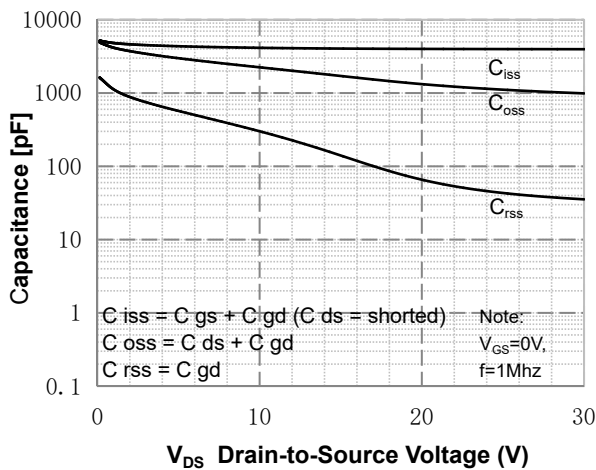


Figure 5. Capacitance Characteristics

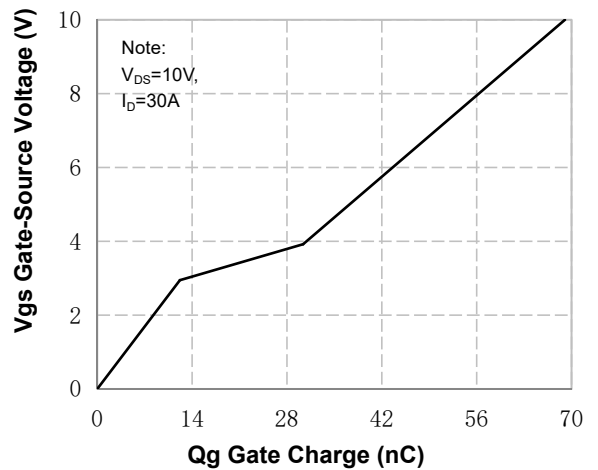
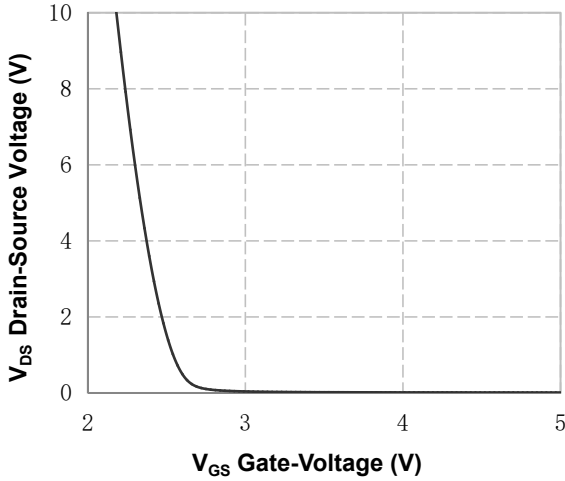
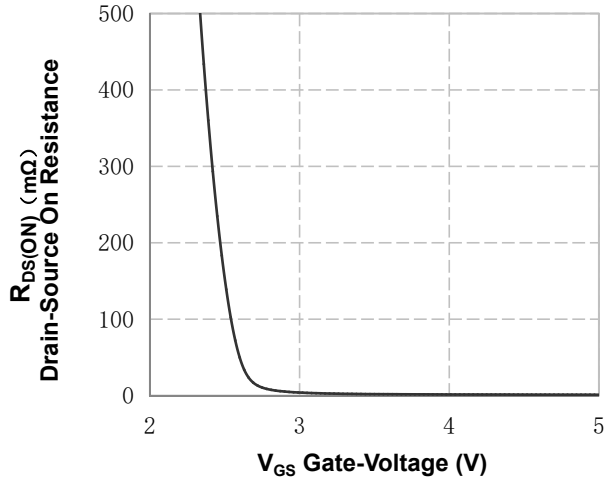


Figure 6. Gate Charge Characteristics

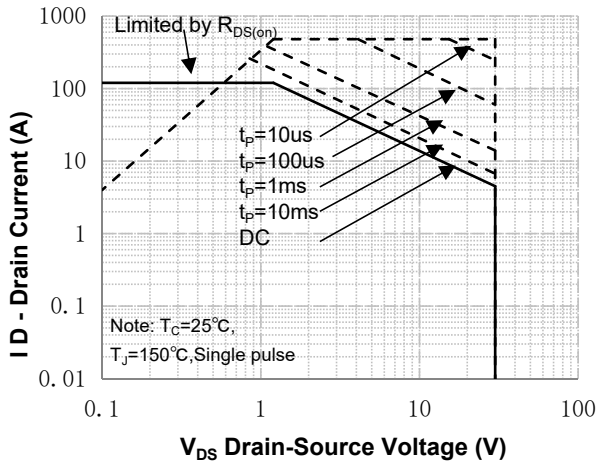
**N- Channel Typical Characteristics** (Continued)



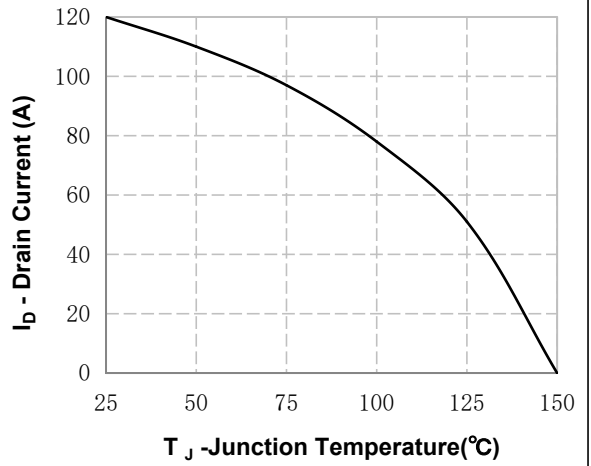
**Figure 7.  $V_{DS}$  Drain-Source Voltage vs Gate Voltage**



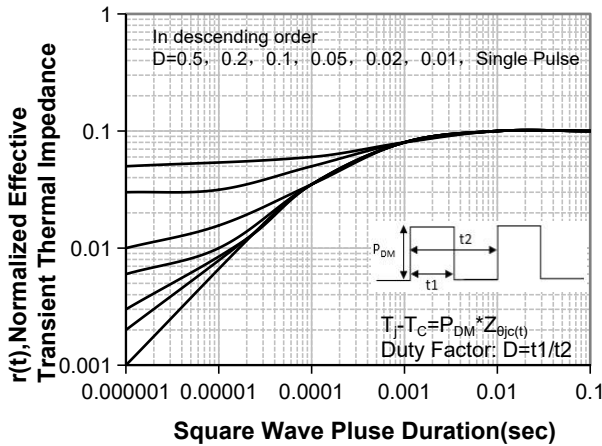
**Figure 8. On-Resistance vs Gate Voltage**



**Figure 9. Maximum Safe Operating Area**

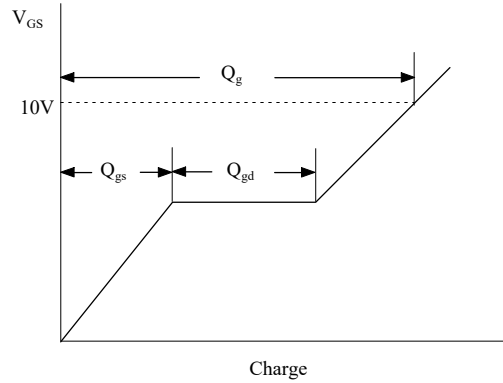
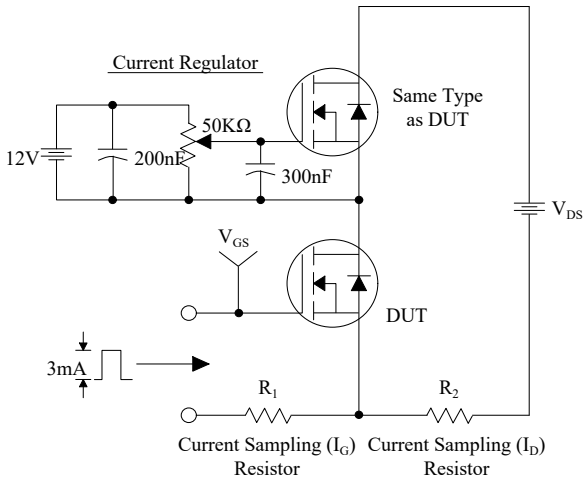


**Figure 10. Maximum Continuous Drain Current vs Temperature**

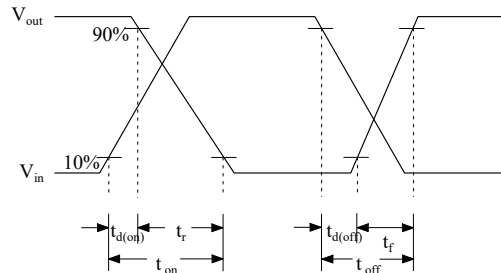
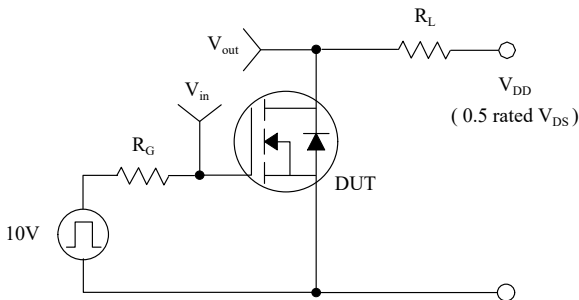


**Figure 11. Transient Thermal Response Curve**

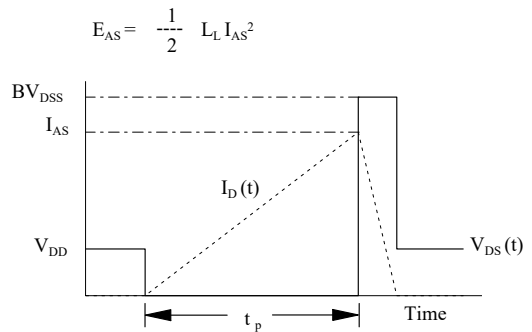
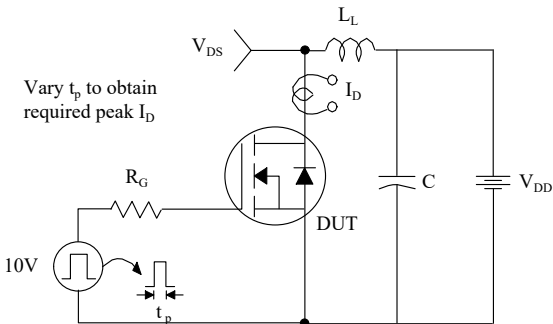
### Gate Charge Test Circuit & Waveform



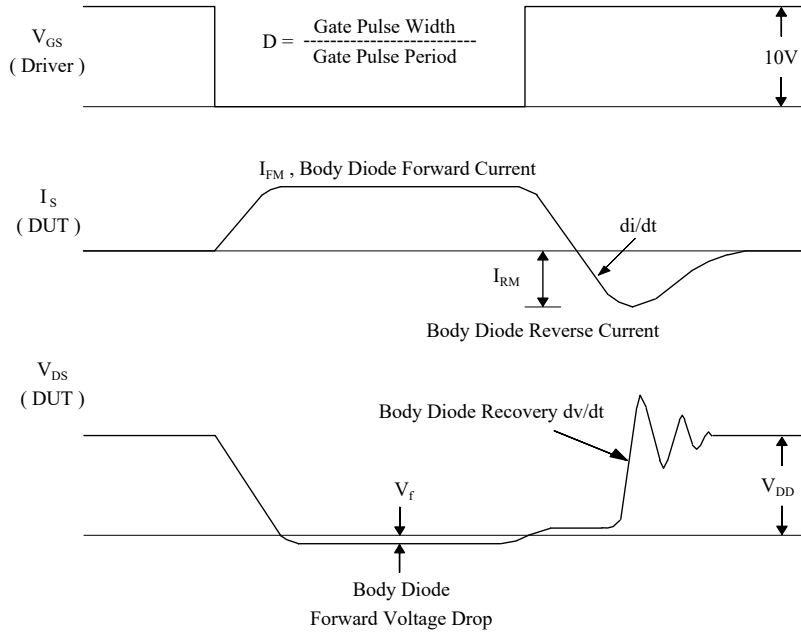
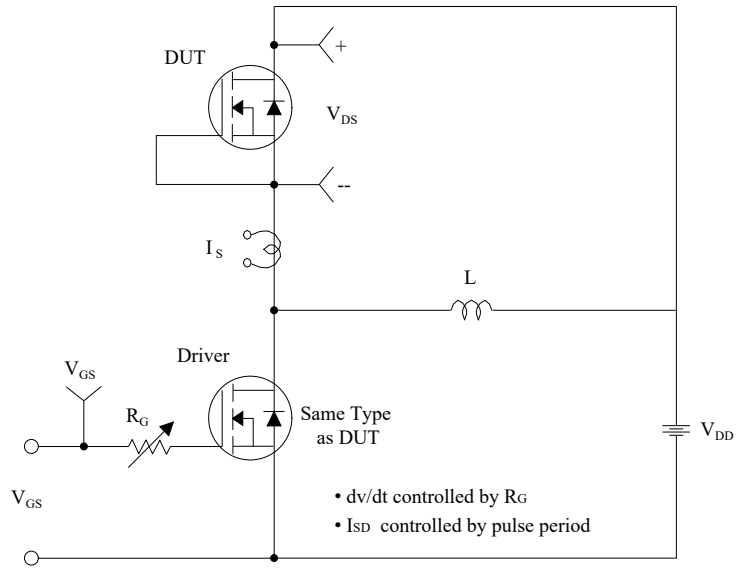
### Resistive Switching Test Circuit & Waveforms



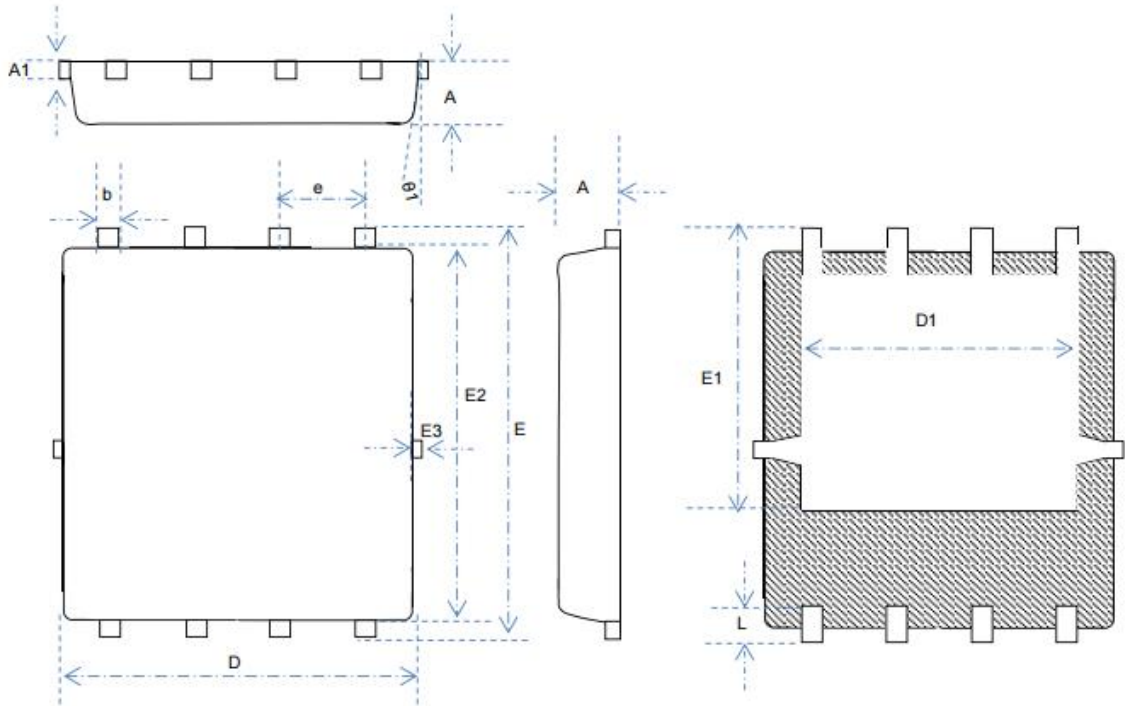
### Unclamped Inductive Switching Test Circuit & Waveforms



## Peak Diode Recovery dv/dt Test Circuit & Waveforms



# DFN 5\*6 OUTLINE



SYMBOL	Mechanical Dimensions/mm			SYMBOL	Mechanical Dimensions/mm		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.85	0.95	1.05	D	5.10	5.20	5.30
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				

NAME	DFN 5*6 OUTLINE	UNIT	mm	DESIGNED	Shawn	THIRD ANGLE SYSTEM
DWGNO		PAGE	1 OF 1	CHECKED		
VERSION	Ver1.0	ISSUE DATE		APPROVED		

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