

±30V N+P-Channel Enhancement Mode MOSFET

General Description

This N Channel + P Channel MOSFET has been designed using advanced power trench process to optimize the $R_{DS(ON)}$.

Features

N-Ch

$V_{DS} = 30V$ $I_D = 4A$

$R_{DS(ON)} < 40 m\Omega$ @ $V_{GS} = 10V$

P-Ch

$V_{DS} = -30V$ $I_D = -4A$

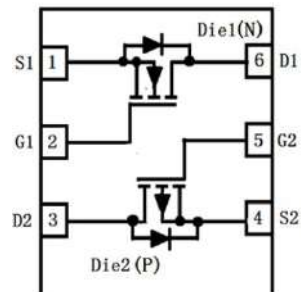
$R_{DS(ON)} < 80 m\Omega$ @ $V_{GS} = -10V$

- High-Side Switching
- Low Threshold
- Fast Switching Speed

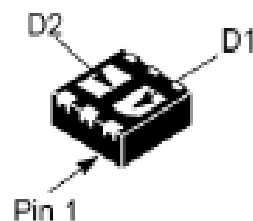
Applications

- Drivers: Relays, Solenoids, Memories
- Battery Operated Systems
- Power Supply Converter Circuits
- Load/Power Switching Cell Phones, Pagers

Inner Equivalent Principium Chart



Pin Assignment



Package Marking and Ordering Information

Marking	Part Number	Package	Packing	Qty.
	KLM2D4NP03L	DFN2020-6	Reel	3000 Pcs

Absolute Maximum Ratings

Symbol	Parameter	Value		Units
		N-Ch	P-Ch	
V_{DSS}	Drain-to-Source Voltage	30	-30	V
I_D	Continuous Drain Current $T_C = 25^\circ C$	4	-4	A
I_{DM}	Drain Current - Pulsed (Note1)	16	-15	A
V_{GS}	Gate-Source Voltage	± 12	± 12	V
P_D	Power Dissipation	1.4	1.4	W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient (Note2)	190		$^\circ C/W$
T_J, T_{STG}	Operating Junction and Storage Temperature Range	150, -55 to 150		$^\circ C$
T_L	Maximum Temperature for Soldering	260		$^\circ C$

N-Channel Electrical Characteristic ($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-source breakdown voltage	V _{(BR) DSS}	V _{GS} = 0V, I _D =250μA	30			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =24V,V _{GS} = 0V			1	μA
Gate-body leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} = 0V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.5	1.0	1.5	V
Drain-source on-resistance (note 2)	R _{DS(on)}	V _{GS} =10V, I _D =4A		30	40	mΩ
		V _{GS} =4.5V, I _D =3A		35	45	mΩ
Forward tranconductance (note 2)	g _{FS}	V _{DS} =5V, I _D =4A	3			S
Diode forward voltage	V _{SD}	I _S =1A			1	V
DYNAMIC PARAMETERS (note 3)						
Input capacitance	C _{iss}	V _{DS} =15V,V _{GS} =0V,f =1MHz			375	pF
Output capacitance	C _{oss}			57		pF
Reverse transfer capacitance	C _{rss}			39		pF
SWITCHING PARAMETERS (note 3)						
Turn-on delay time	t _{d(on)}	V _{GS} =10V,V _{DS} =15V, R _L =2.2Ω,R _{GEN} =3Ω		4.6		ns
Turn-on rise time	t _r			1.9		ns
Turn-off delay time	t _{d(off)}			20.1		ns
Turn-off fall time	t _f			2.6		ns

Notes :

1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. Pulse Test : Pulse width $\leq 300\mu s$, duty cycle $\leq 0.5\%$.
3. These parameters have no way to verify.

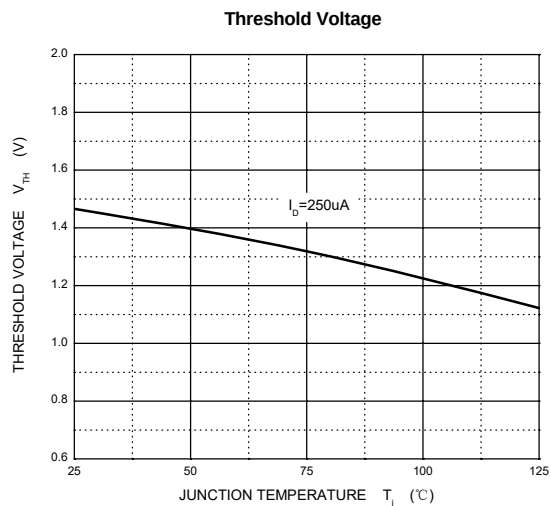
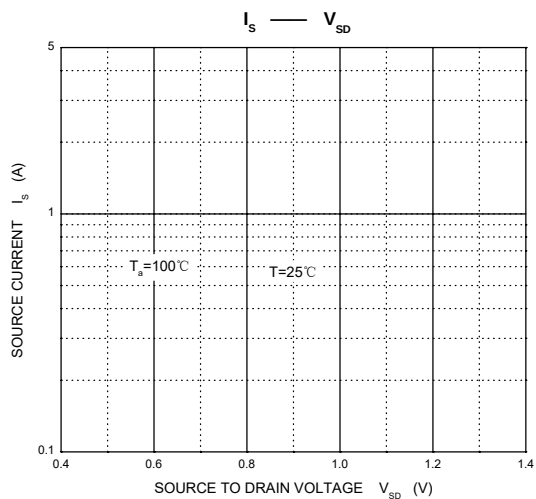
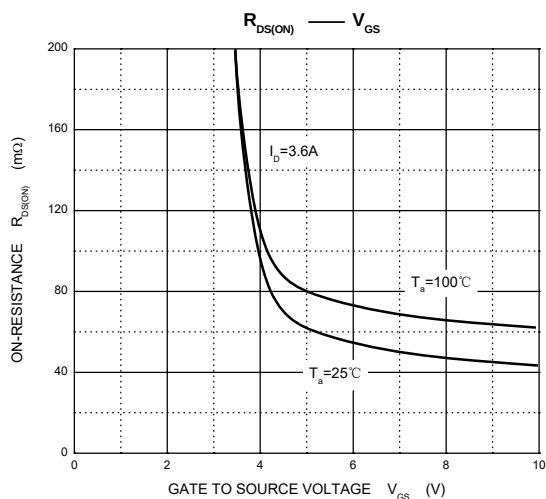
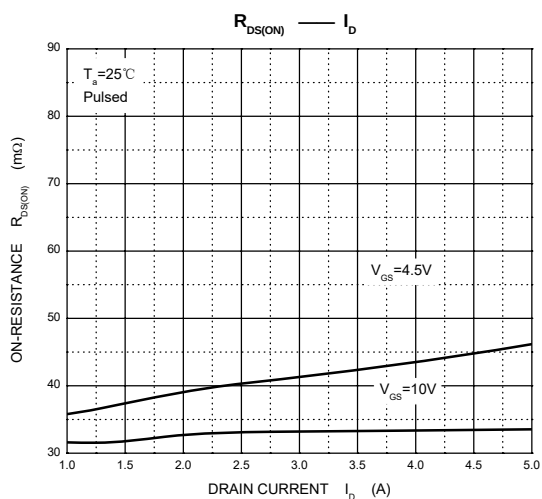
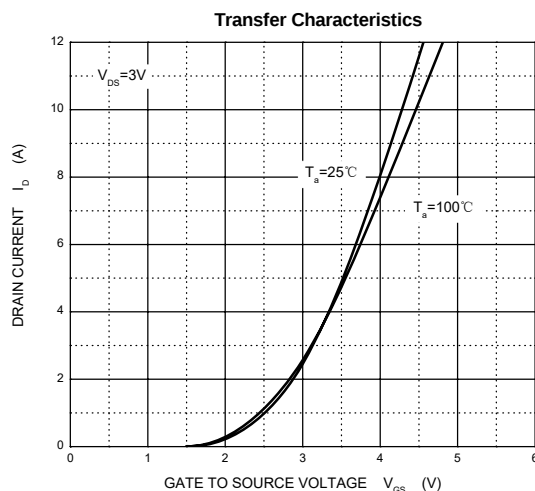
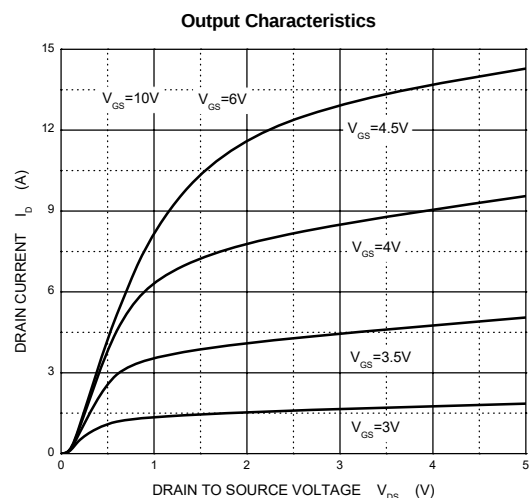
P-Channel Electrical Characteristic ($T_C = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Static characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} = 0V, I _D =-250μA	-30			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-24V,V _{GS} = 0V			-1	μA
Gate-source leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} = 0V			±100	nA
Drain-source on-resistance (note 1)	R _{DS(on)}	V _{GS} =-10V, I _D =-3A		60	80	mΩ
		V _{GS} =-4.5V, I _D =-2A		69	90	mΩ
Forward tranconductance (note 1)	g _{FS}	V _{DS} =-5V, I _D =-4A	5.5			S
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.5	-1.0	-1.5	V
Diode forward voltage (note 1)	V _{SD}	I _S =-1A,V _{GS} =0V			-1	V
Dynamic characteristics (note 2)						
Input capacitance	C _{iss}	V _{DS} =-15V,V _{GS} =0V,f =1MHz		700		pF
Output capacitance	C _{oss}			120		pF
Reverse transfer capacitance	C _{rss}			75		pF
Switching Characteristics (note 2)						
Turn-on delay time	t _{d(on)}	V _{GS} =-10V,V _{DS} =-15V, R _L =3.6Ω,R _{GEN} =3Ω		8.6		ns
Turn-on rise time	t _r			5.0		ns
Turn-off delay time	t _{d(off)}			28.2		ns
Turn-off fall time	t _f			13.5		ns

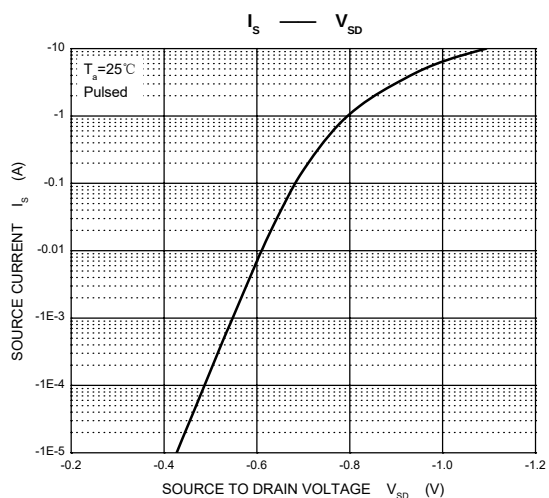
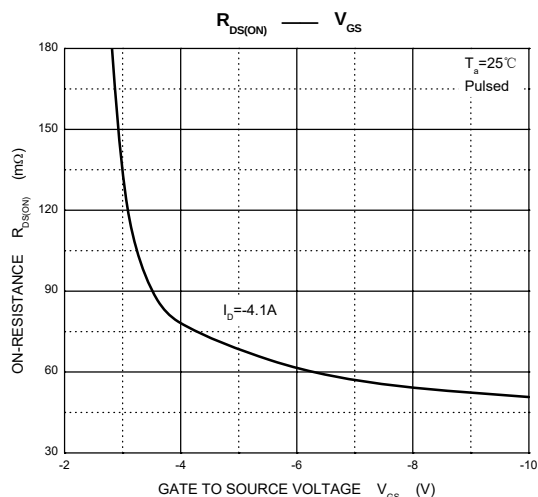
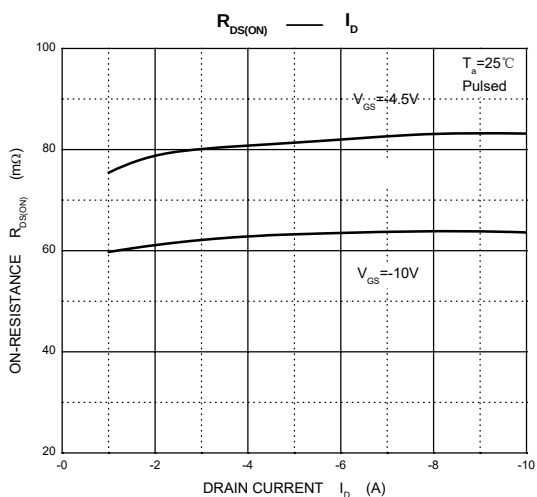
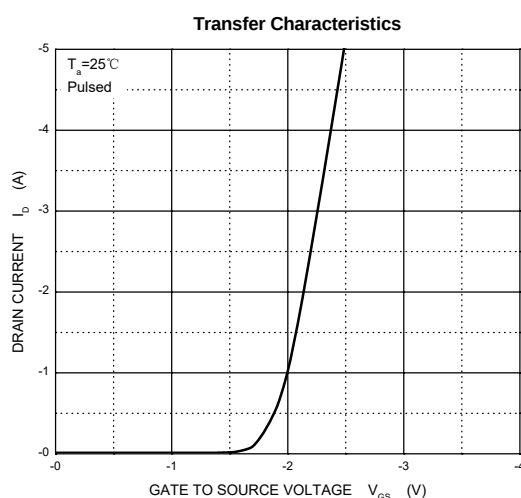
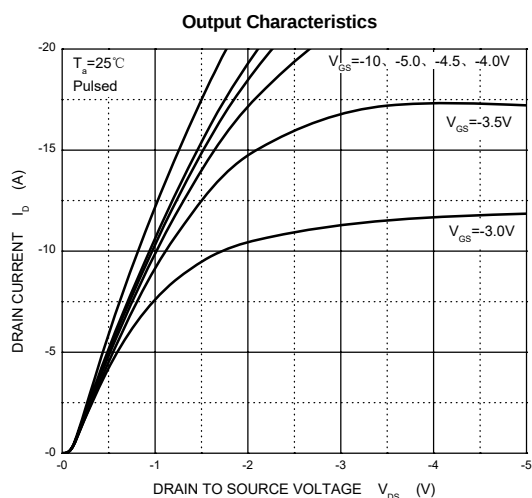
Notes:

1. Pulse test: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
2. These parameters have no way to verify.
3. $PW \leq 10\mu s$, Duty cycle $\leq 1\%$.
4. Device mounted on 1"×1" FR-4 PCB with high coverage 2oz Copper ,double sided. Copper, $t \leq 10s$.

N-Channel Characteristics Curve



P-Channel Characteristics Curve



N-Channel Test Circuit & Waveform

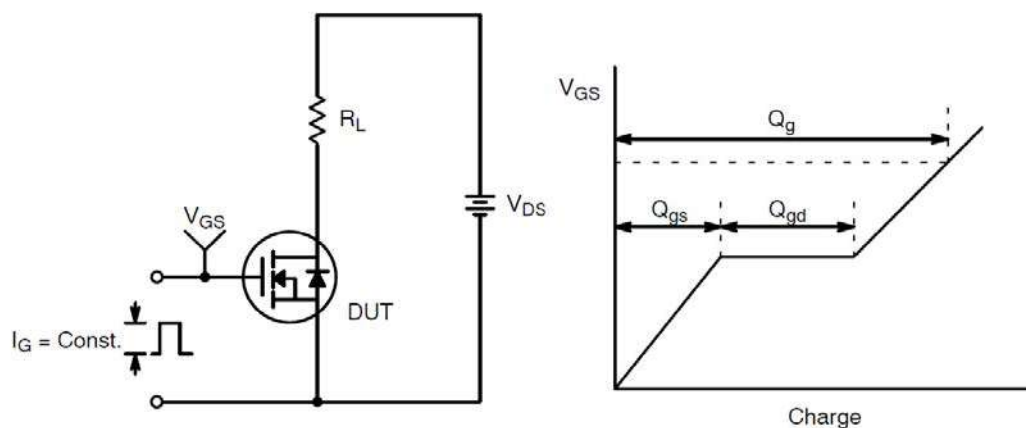


Figure 14: Gate Charge Test Circuit & Waveform

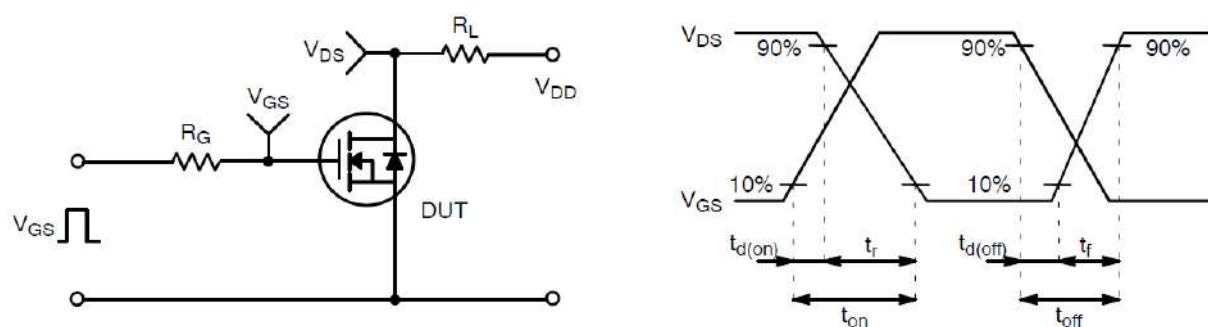


Figure 15: Resistive Switching Test Circuit & Waveforms

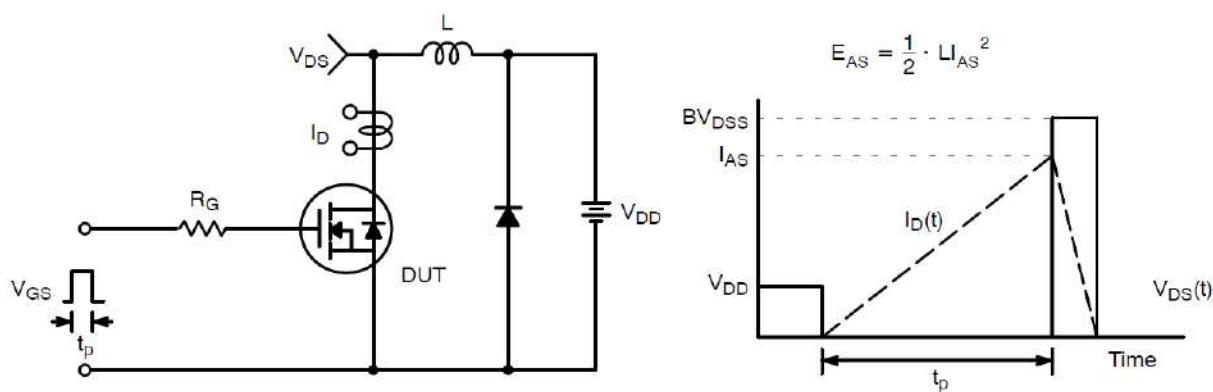


Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms

P-Channel Test Circuit & Waveform

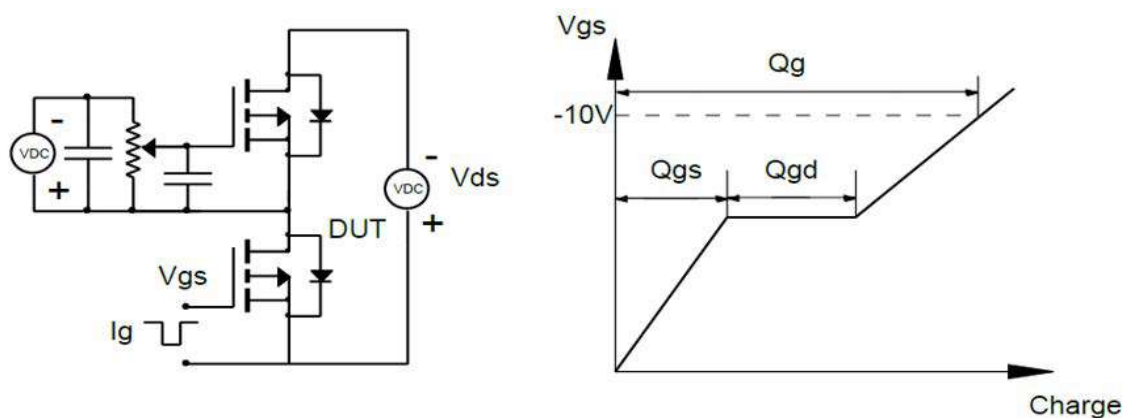


Figure 14: Gate Charge Test Circuit & Waveform

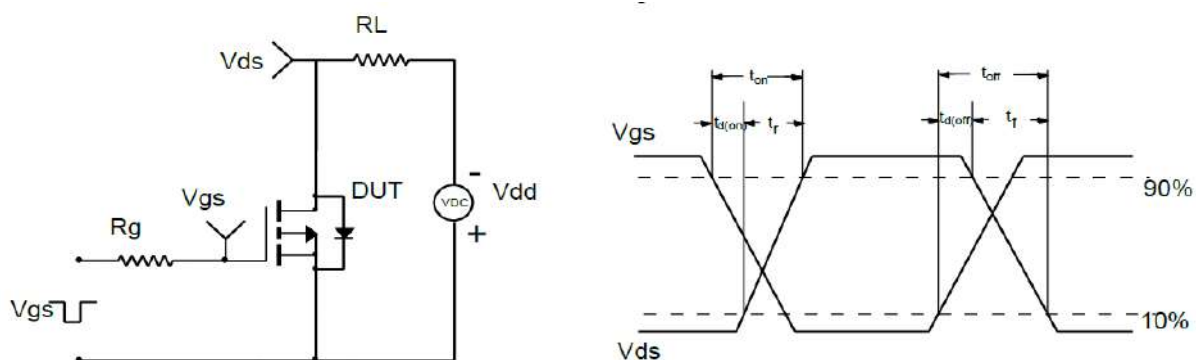


Figure 15: Resistive Switching Test Circuit & Waveforms

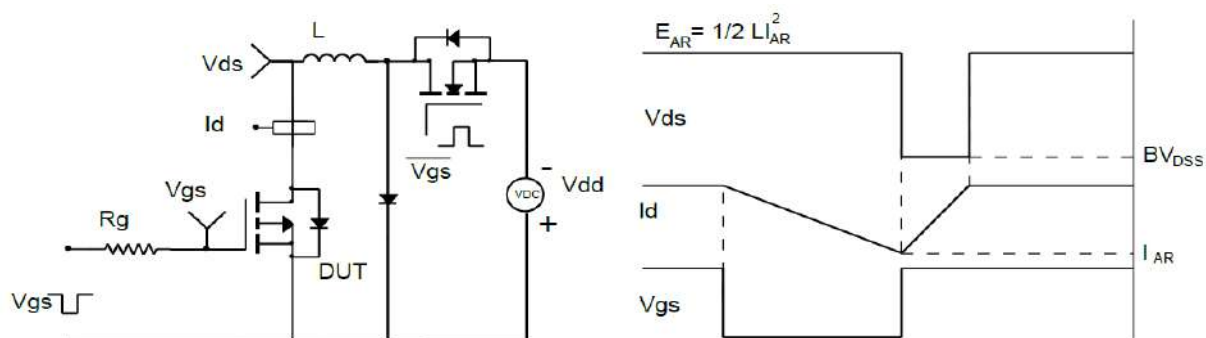
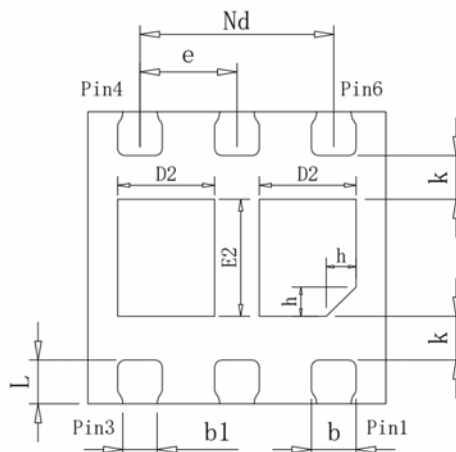
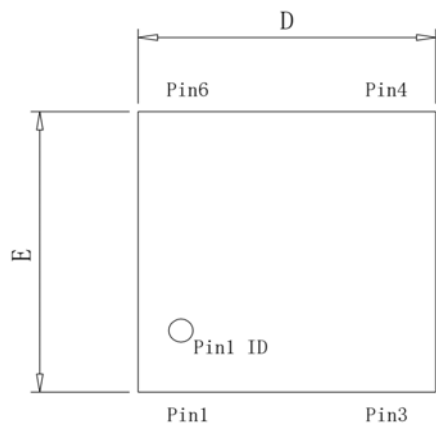
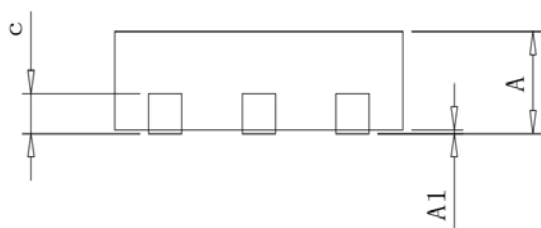


Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms

Package Outline



Bottom View



Side View

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	—	0.02	0.05
b	0.25	0.30	0.35
b1	0.18	0.23	0.28
c	0.203 REF		
D	1.90	2.00	2.10
D2	0.55	0.65	0.75
Nd	1.30 BSC		
e	0.65 BSC		
E	1.90	2.00	2.10
E2	0.70	0.80	0.90
h	0.15	0.20	0.25
k	0.25	0.30	0.35
L	0.25	0.30	0.35