

### Features

- High Reliability Capability
- Extremely low on-resistance  $R_{DS(on)}$
- Low reverse transfer capacitances

Product Summary			
$V_{DS}$	$R_{DS(on)}$ (m $\Omega$ ) Typ	$I_D$ (A)	$Q_g$ (Typ)
40V	1.9 @ 10V 70A	130	148nc

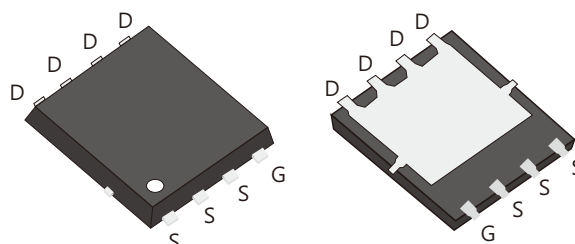
### Mechanical Data

- Case:DFN5 $\times$ 6 Package

DFN5 $\times$ 6  
D019N04G

### Application

- Motor Control and Drive
- Charge/Discharge for Battery Management System
- Synchronous Rectifier for SMPS



### Ordering Information

Part No.	Package Type	Package	Quality(box)
D019N04G	DFN5 $\times$ 6	Tape & Reel	5000

### Block Diagram

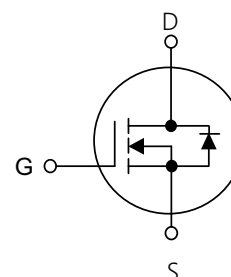


Table1 Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	130	A
		83	
Pulsed Drain Current (Note 1)	$I_{DM}$	400	A
Single Pulse Avalanche Energy(Note 2)	$E_{AS}$	729	mJ
Power Dissipation $T_c=25^\circ\text{C}$	$P_D$	74	W
Operating Junction and Storage Temperature	$T_J/T_{STG}$	-55~+150	$^\circ\text{C}$

Table 2. Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance Junction to Ambient.Max	$R_{\theta JA}$	40	$^{\circ}\text{C}/\text{W}$
Thermal resistance Junction to Case.Max	$R_{\theta JC}$	1.7	$^{\circ}\text{C}/\text{W}$

Table 3. Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV <sub>DSS</sub>	V <sub>GS</sub> =0V,I <sub>D</sub> =250μA	40	-	-	V
Drain-Source Leakage Current		I <sub>DSS</sub>	V <sub>D</sub> =40V,V <sub>GS</sub> =0V	-	-	1	μA
Gate- Source Leakage Current	Forward	I <sub>GSS</sub>	V <sub>GS</sub> =20V,V <sub>D</sub> =0V	-	-	100	nA
	Reverse		V <sub>GS</sub> =-20V,V <sub>D</sub> =0V	-	-	-100	nA
On Characteristics(Note 3)							
Gate Threshold Voltage		V <sub>GS(TH)</sub>	V <sub>D</sub> =V <sub>GS</sub> ,I <sub>D</sub> =250μA	1.3	-	2.3	V
Static Drain-Source On-State Resistance		R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V,I <sub>D</sub> =70A	-	1.9	2.4	mΩ
			V <sub>GS</sub> =4.5V,I <sub>D</sub> =70A	-	2.4	3.3	
Dynamic Characteristics(Note 4)							
Input Capacitance		C <sub>ISS</sub>	V <sub>D</sub> =20V,V <sub>GS</sub> =0V,f=1MHz	-	8399	-	pF
Output Capacitance		C <sub>OSS</sub>		-	610	-	pF
Reverse Transfer Capacitance		C <sub>RSS</sub>		-	506	-	pF
Transconductance		g <sub>fs</sub>	V <sub>D</sub> =5V,I <sub>D</sub> =70A	-	182	-	S
Switching Characteristics (Note 4)							
Turn-On Delay Time		t <sub>d(on)</sub>	V <sub>D</sub> =20V,I <sub>D</sub> =70A V <sub>GS</sub> =10V,R <sub>G</sub> =3Ω,	-	13	-	ns
Turn-On Rise Time		t <sub>r</sub>		-	37	-	ns
Turn-Off Delay Time		t <sub>d(off)</sub>		-	114	-	ns
Turn-Off Fall Time		t <sub>f</sub>		-	90	-	ns
Total Gate Charge		Q <sub>G</sub>	V <sub>D</sub> =20V,I <sub>D</sub> =70A, V <sub>GS</sub> =10V	-	148	-	nC
Gate-Source Charge		Q <sub>GS</sub>		-	27	-	nC
Gate-Drain Charge		Q <sub>GD</sub>		-	21	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =70A	-	-	1.2	V
Maximum Continuous Drain-Source Diode Forward Current		I <sub>S</sub>		-	-	130	A
Reverse Recovery Time		t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =20A dI <sub>F</sub> /dt= 100A/μs	-	34	-	ns
Reverse Recovery Charge		Q <sub>RR</sub>		-	29	-	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature

2  $L=0.5\text{mH}$ ,  $R_G=25\Omega$ ,  $V_{DS}=48V$ , Starting  $T_J=25^{\circ}\text{C}$ 

3 Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ 

4 Guaranteed by design, not subject to production

## Typical Characteristics Diagrams

Figure 1. Output Characteristics

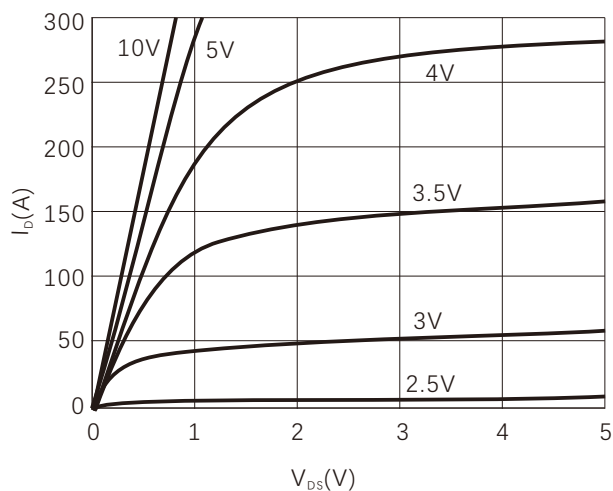


Figure 2. Normalized  $R_{DS(on)}$  vs Temperature

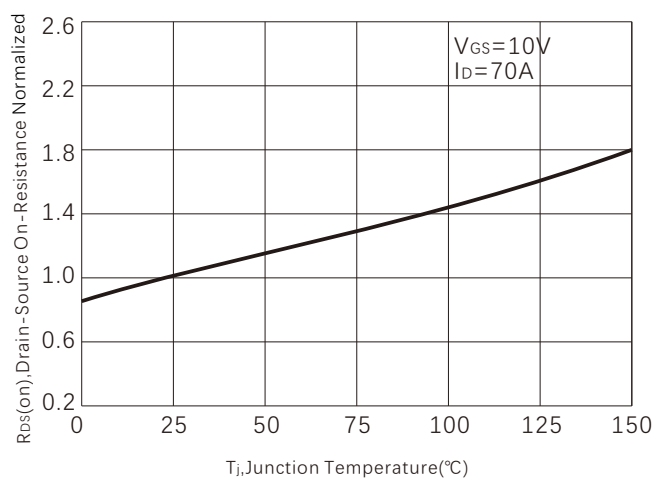


Figure 3. On-Resistance vs. Drain Current

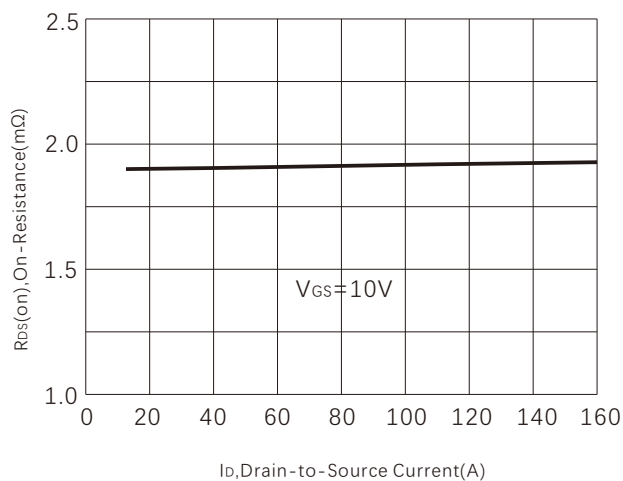


Figure 4. Capacitance

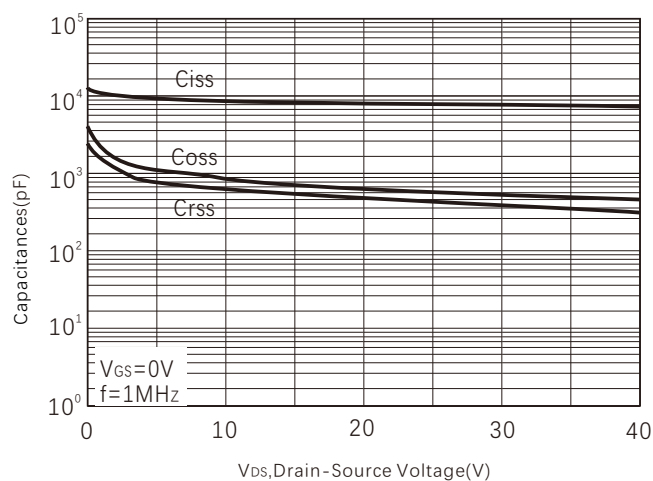


Figure 5. On-Resistance vs. Gate-Source Voltage

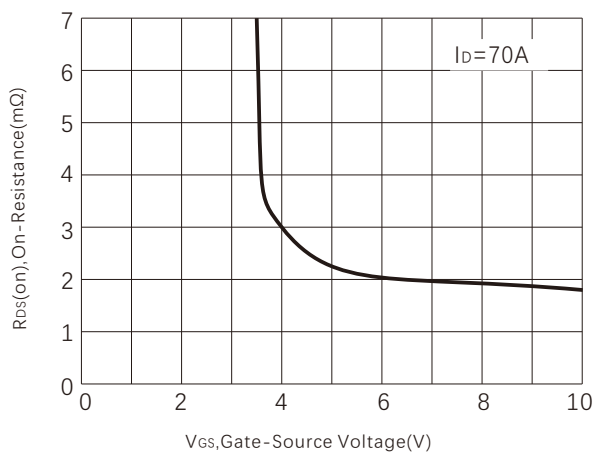


Figure 6. Source-Drain Diode Forward Voltage

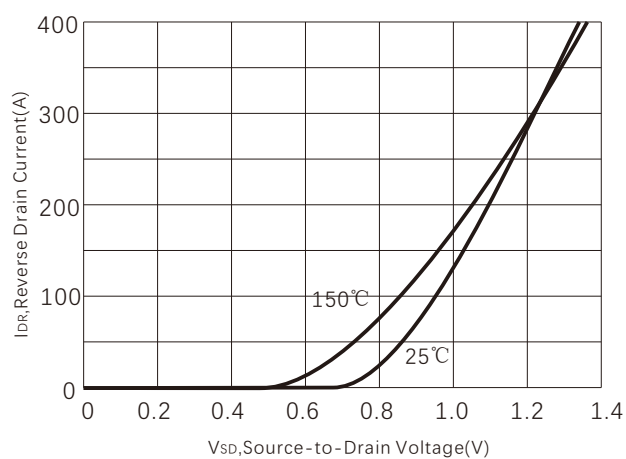


Figure7.Maximum Drain Current vs Temperature

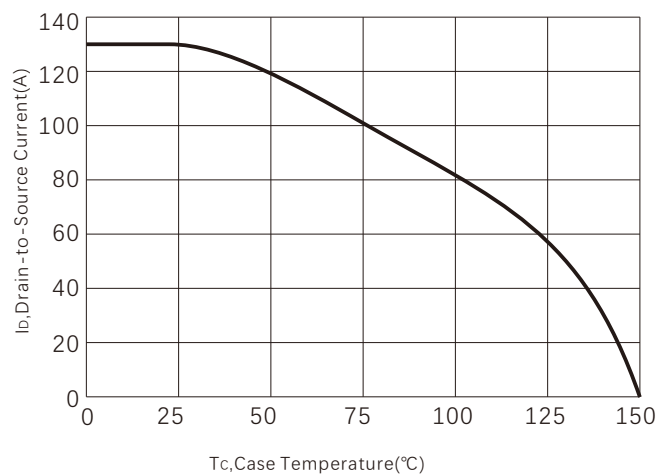


Figure 8. Power dissipation

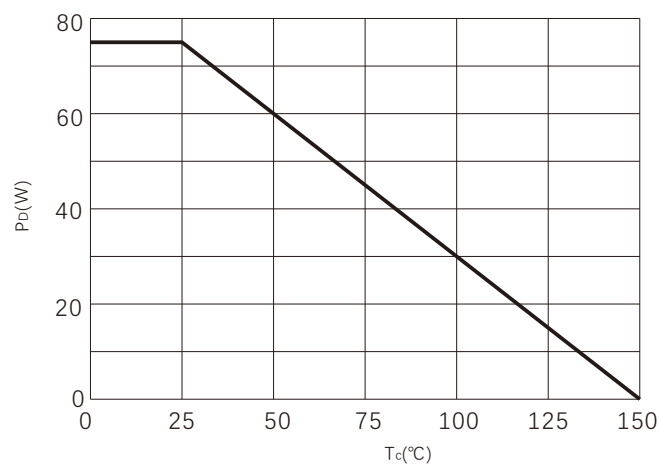


Figure 9. Safe operating area

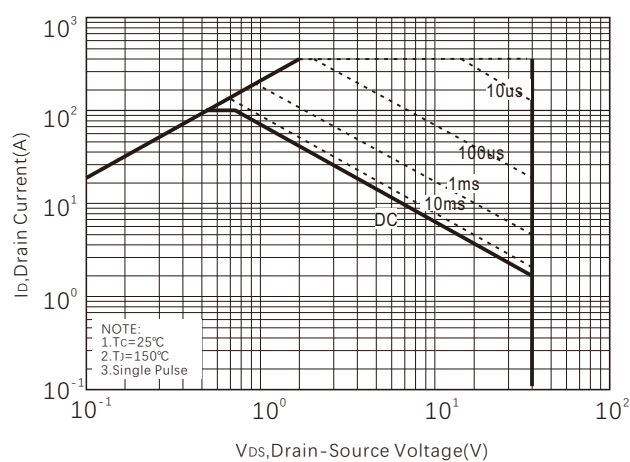
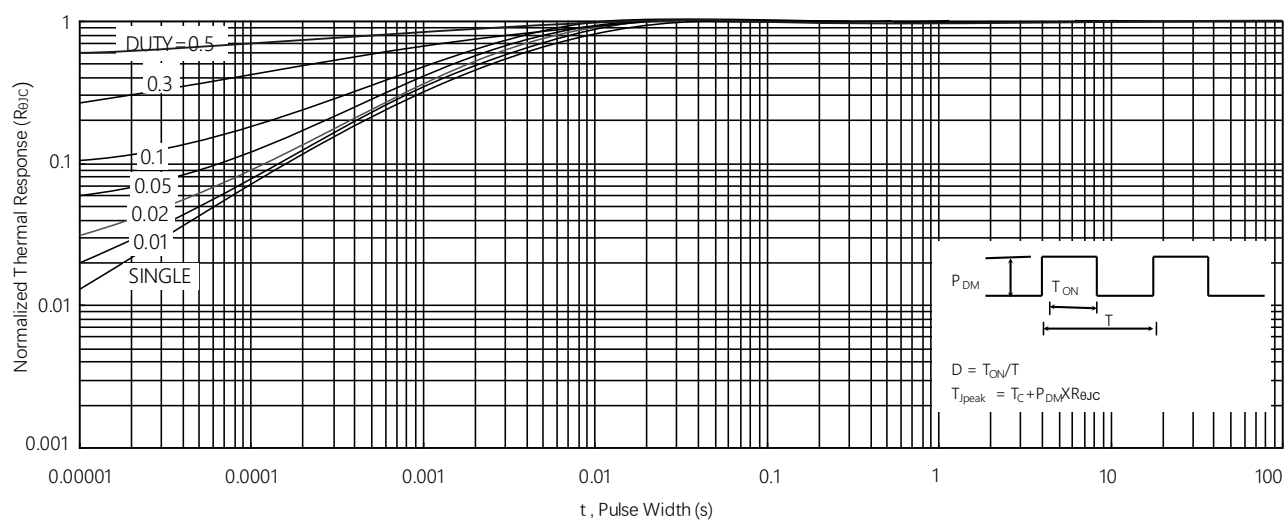
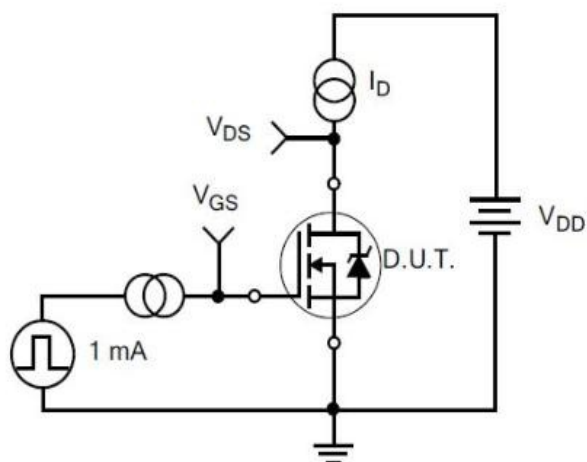


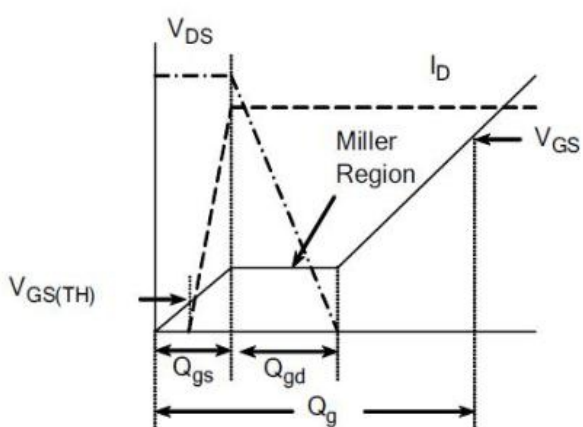
Figure 10.Normalized Maximum Transient Thermal Impedance



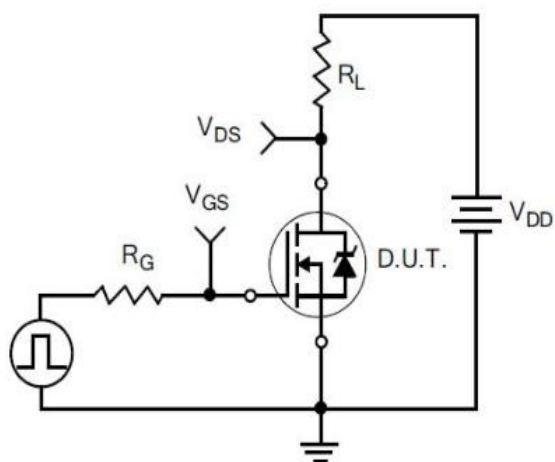
## Typical Test Circuit



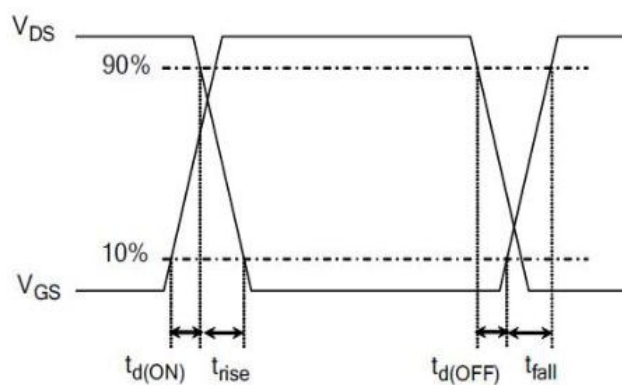
1) Gate Charge Test Circuit



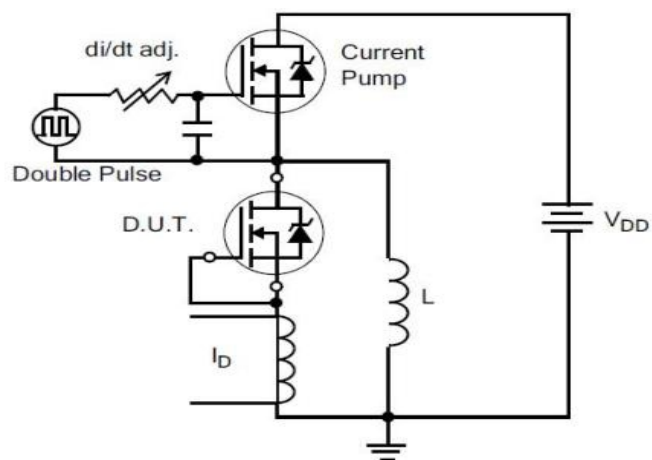
2) Gate Charge Waveform



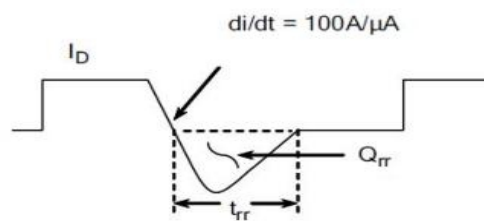
3) Resistive Switching Test Circuit



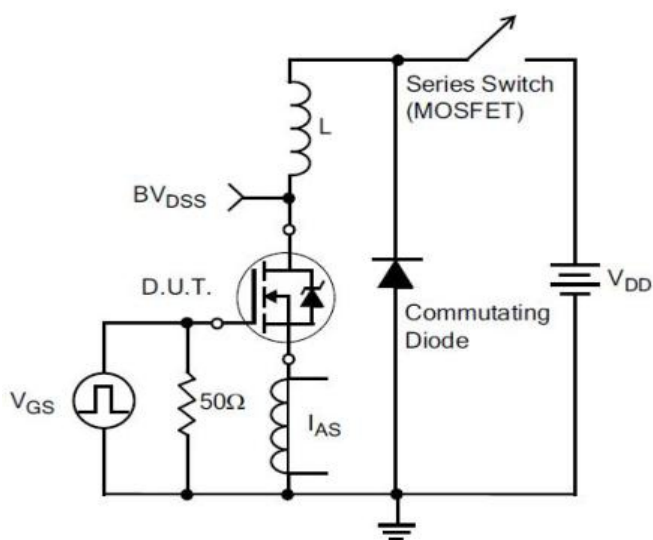
4) Resistive Switching Waveforms



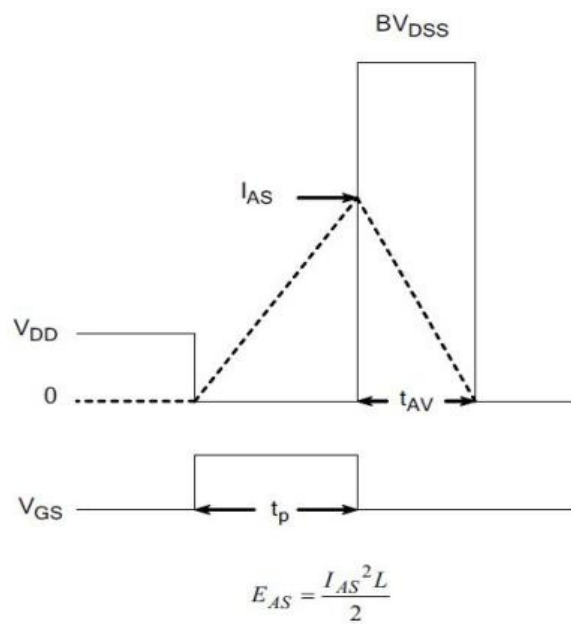
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



7) . Unclamped Inductive Switching Test Circuit



8) Unclamped Inductive Switching Waveforms

## Product Names Rules

X X X X N E X X X

Process Type:  
VDMOS:default  
Super junction:SJ  
Low Voltage trench:D  
Low Voltage SGT:DS

Rated Current Code  
With 3 Digital,  
For Example:  
6.7mΩ:067,  
10mΩ:010,

Channel Code  
N channel:N  
P channel:P

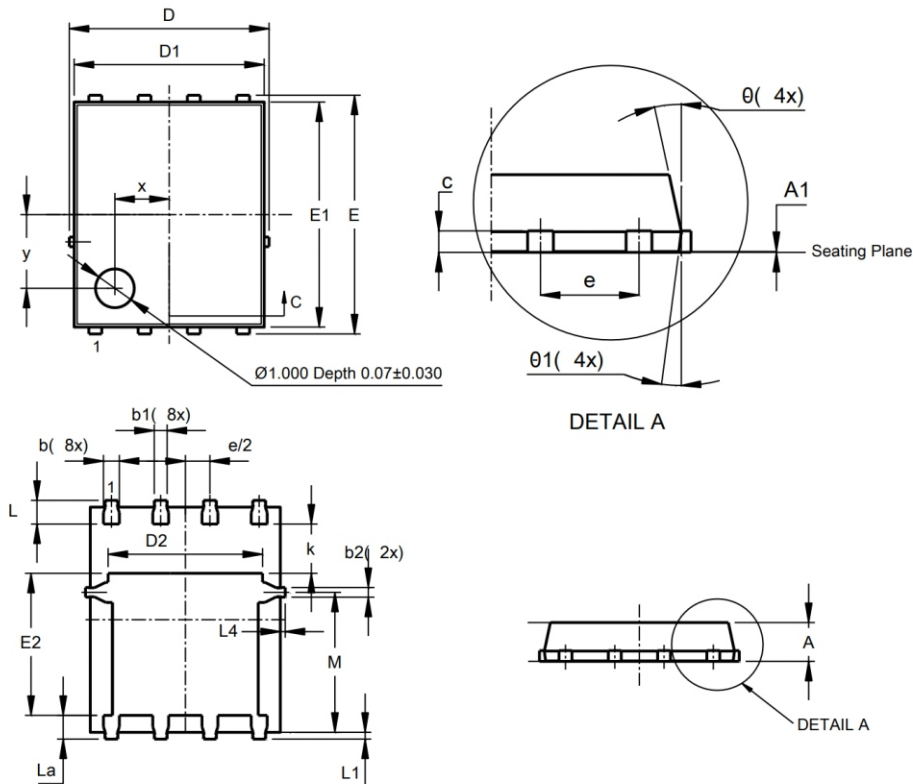
Package Code  
TO-220:Default  
ITO-220:F  
TO-262:E  
TO-263:D  
TO-252:M  
TO-251:N  
TO-263-7L:D7  
TOLL:T  
DFN5×6:G

Rated Voltage Code  
With 2 Digital,For Example:  
600V:60  
60V:06

Special Function Code  
G-S ESD Protection:E  
No Protection:Default

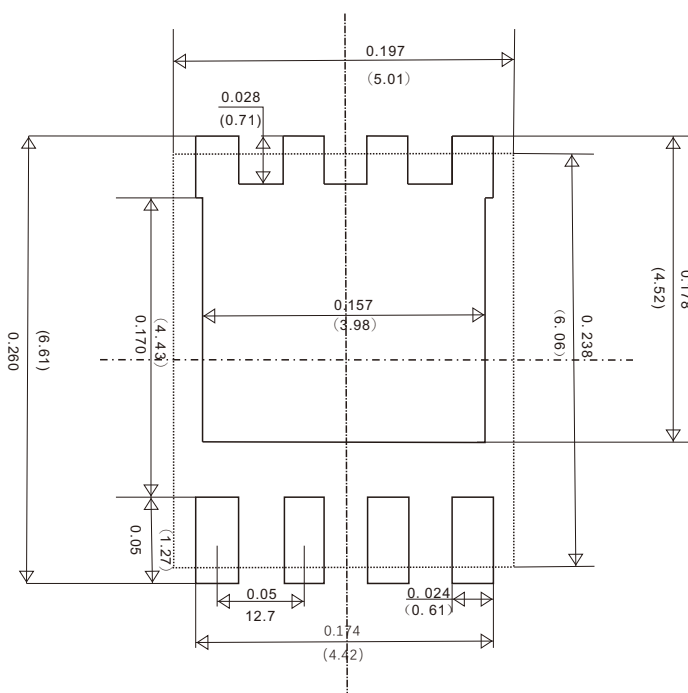
# Dimensions

## DFN5×6 PACKAGE OUTLINE DIMENSIONS



Dim	Min	Max	Type
A	0.90	1.10	1.00
b	0.23	0.41	0.32
b1	0.24	0.30	0.27
b2	0.16	0.32	0.23
c	0.17	0.27	0.22
D	-	-	5.01
D1	4.80	4.95	4.88
D2	-	-	3.98
E	-	-	6.06
E1	5.72	5.82	5.77
E2	3.42	3.52	3.47
k	-	-	1.33
L	0.56	0.66	0.61
La	0.57	0.67	0.63
L1	0.06	0.15	0.11
L4	-	-	0.06
M	3.00	3.20	3.08
φ	10	11	10.39

## Suggested Pad Layout





## Friendship Reminder

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