SEMICONDUCTOR

D031N03G

110A 30V N-Channel Enhancement Mode Power MOSFET

Features

- Fast switching
- Extremely low on-resistance RDS(on)
- 100% single pulse avalanche energy test

Product Summary			
V_{DS}	$R_{DS(on)}$ (mΩ) Typ	I_D (A)	Qg (Typ)
30V	3.1 @ 10V 60A	110	61nc

Mechanical Data

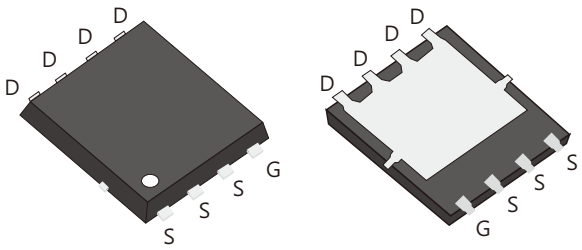
- Case:DFN5×6 Package

DFN5×6

D031N03G

Application

- Power switching applications
- Inverter management system
- Electric tools
- Automotive electronics



Ordering Information

Part No.	Package Type	Package	Quality(box)
D031N03G	DFN5×6	Tape & Reel	5000

Block Diagram

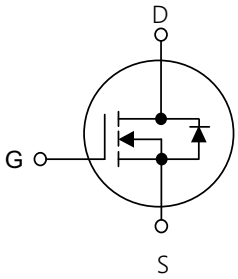


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Note 5)	T_C=25°C	I_D	110	A
	T_C=100°C		71	
Pulsed Drain Current (Note 1)		I_{DM}	380	A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	215	mJ
Power Dissipation	T_C=25°C	P_D	80	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55~+150	°C

Table 2.Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance Junction to Ambient,,Max	$R_{\theta JA}$	50	°C/W
Thermal resistance Junction to Case,Max	$R_{\theta JC}$	1. 56	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	30	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=30V,V_{GS}=0V	-	-	1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=20V,V_{DS}=0V	-	-	100	nA
	Reverse		V_{GS}=-20V,V_{DS}=0V	-	-	-100	nA
On Characteristics(Note 3)							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250μA	1.0	1.5	2.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=60A	-	3.1	3.7	mΩ
			V_{GS}=4.5V,I_D=30A	-	4.9	6.1	
Dynamic Characteristics(Note 4)							
Input Capacitance		C_{ISS}	V_{DS}=15V,V_{GS}=0V,f=1MHz	-	2531	-	pF
Output Capacitance		C_{OSS}		-	392	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	293	-	pF
Gate Resisitance		R_G	f=1MHz	-	2.7	-	Ω
Switching Characteristics (Note 4)							
Turn-On Delay Time		td(on)	V_{DS}=15V,R_{GEN}=2Ω V_{GS}=4.5V,I_D=60A,	-	17	-	ns
Turn-On Rise Time		t_R		-	115	-	ns
Turn-Off Delay Time		td(off)		-	42	-	ns
Turn-Off Fall Time		tf		-	114	-	ns
Total Gate Charge		Q_G	V_{DS}=20V,I_D=45A, V_{GS}=10V	-	61	-	nC
Gate-Source Charge		Q_{GS}		-	11	-	nC
Gate-Drain Charge		Q_{GD}		-	17	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=30A	-	-	1.3	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		-	-	96	A
Reverse Recovery Time		trr	V_{GS}=0V, I_F=30A dI_F/dt=100A/μs	-	13	-	ns
Reverse Recovery Charge		Q_{RR}		-	2.5	-	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=0.5mH, I_D=29.4A,V_{DD}=24V,V_{GATE}=10V,,Starting T_J=25°C
3 Pulse Test: Pulse width ≤300μS, Duty cycle≤2%
4 Guaranteed by design,not subject to production
5 The maximum current is limited by the package.

Typical Characteristics Diagrams

Figure 1.Output Characteristics

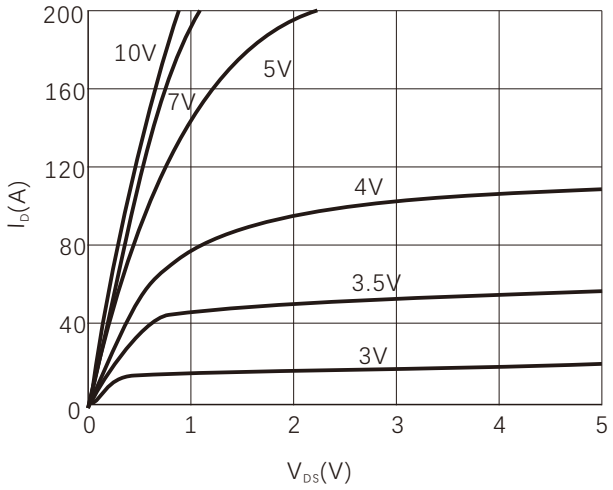


Figure2.Normalized $R_{DS(ON)}$ vs Temperature

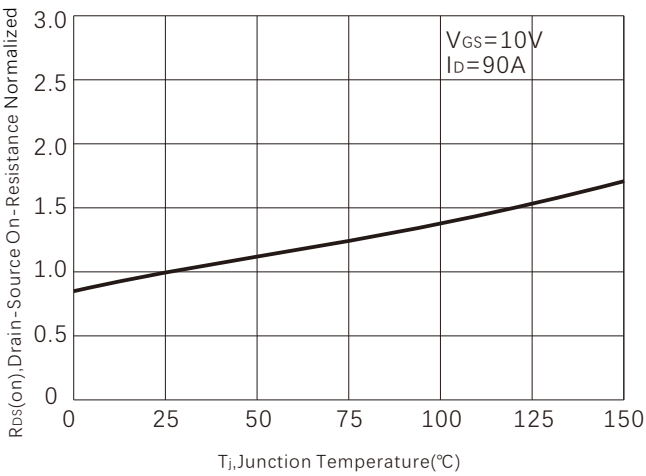


Figure 3.On-Resistance vs.Drain Current

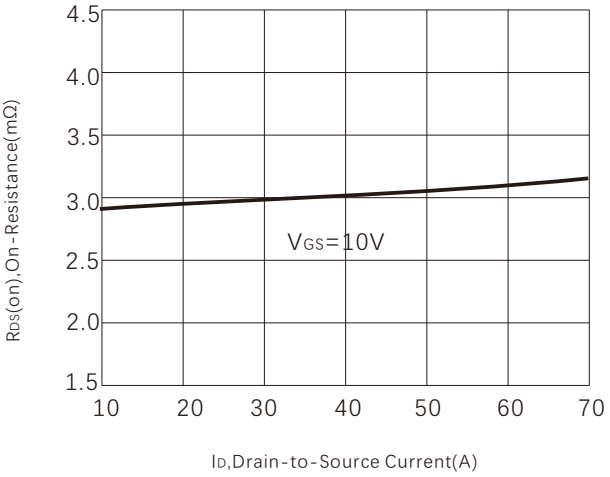


Figure 4. Capacitance

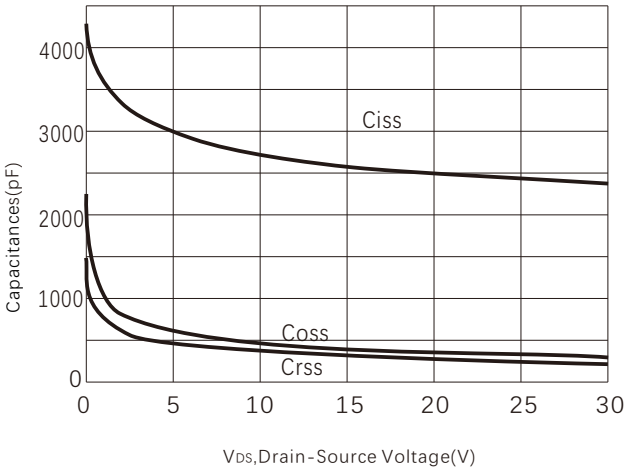


Figure 5.Gate charge

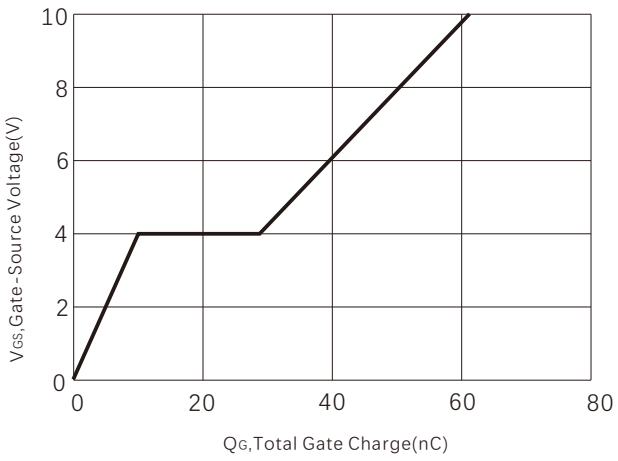


Figure 6. Transfer Characteristics

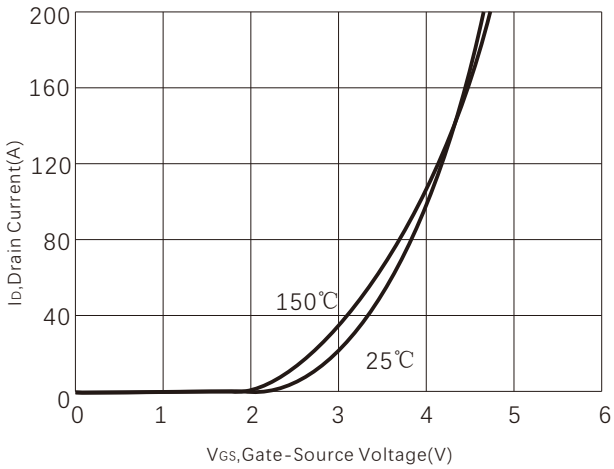


Figure7.Maximum Drain Current vs Temperature

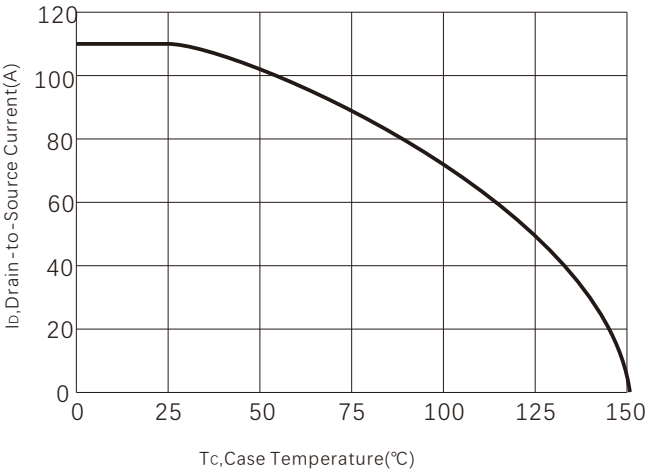


Figure 8. Power dissipation

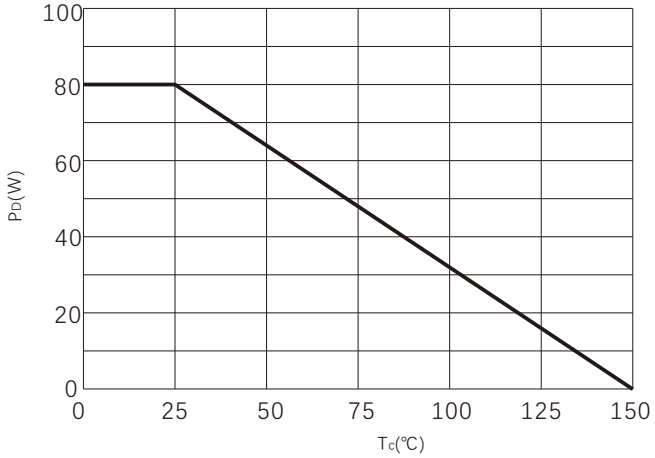


Figure 9. Safe operating area

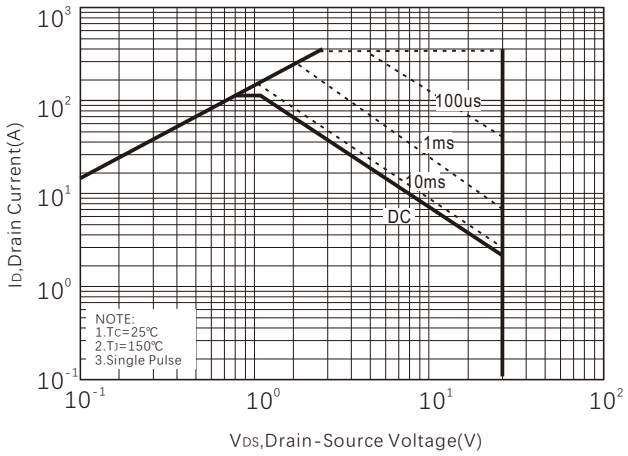
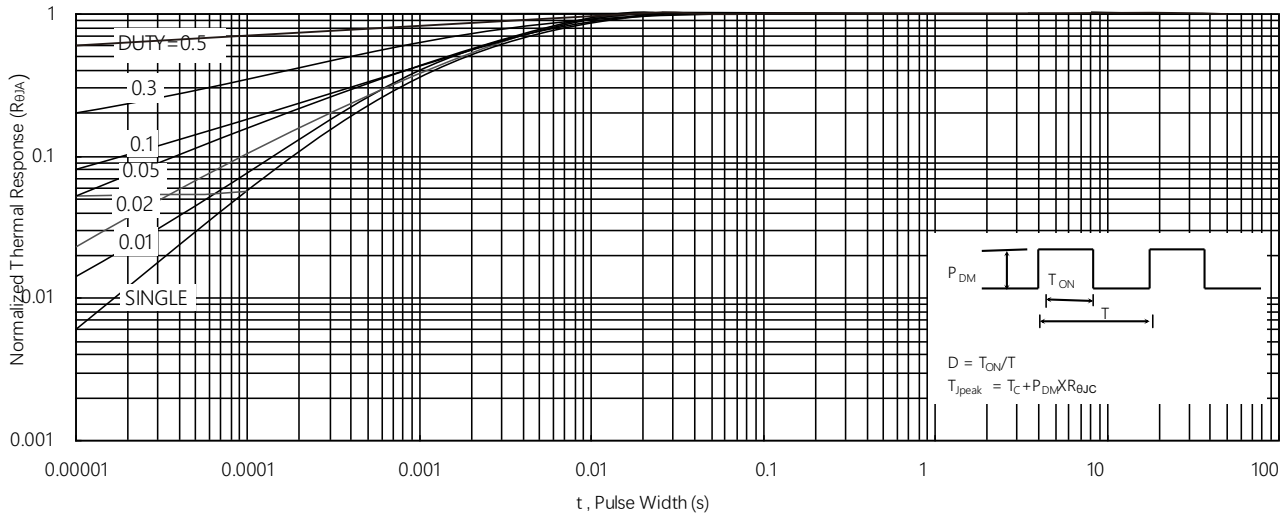
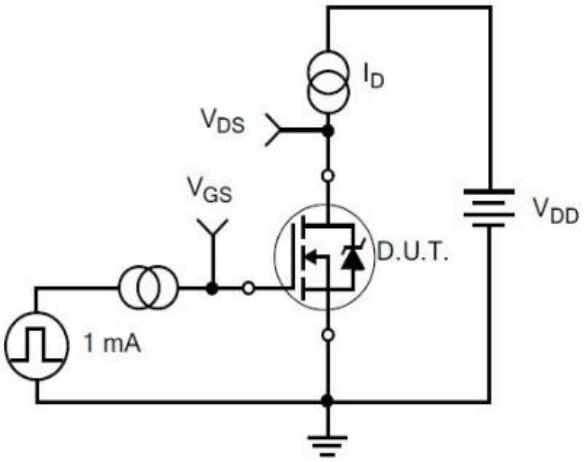


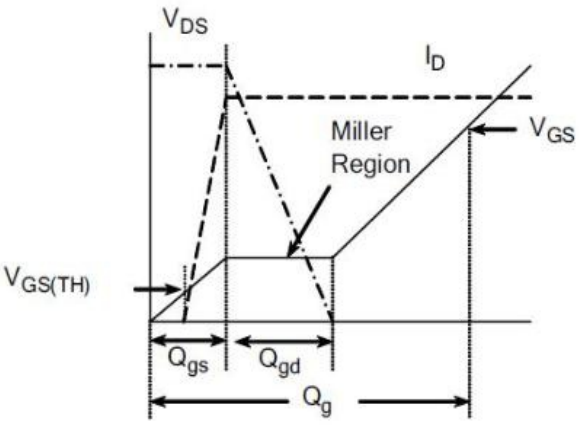
Figure 10.Normalized Maximum Transient Thermal Impedance



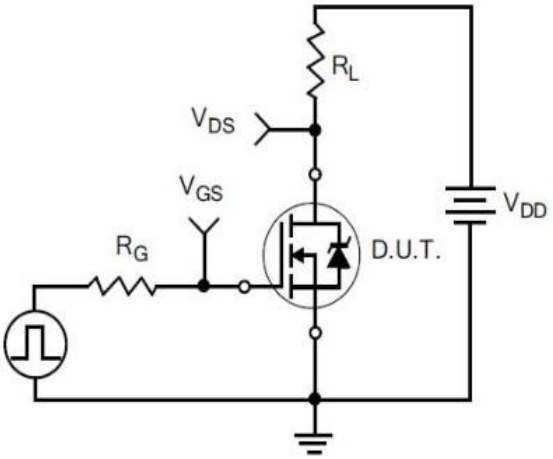
Typical Test Circuit



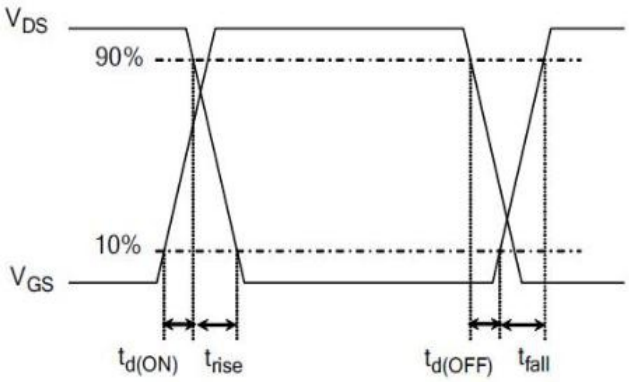
1) Gate Charge Test Circuit



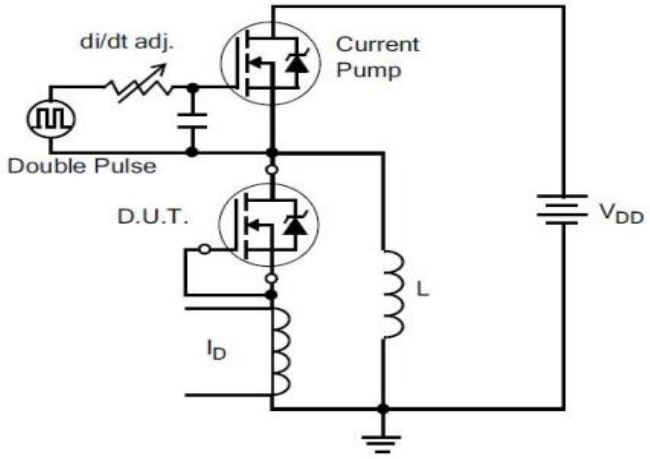
2) . Gate Charge Waveform



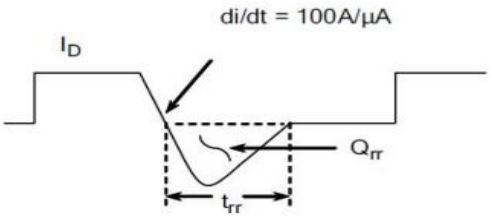
3) Resistive Switching Test Circuit



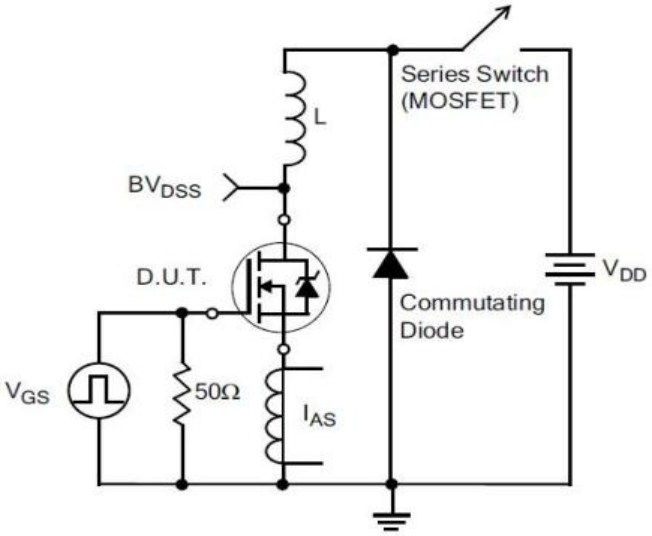
4) Resistive Switching Waveforms



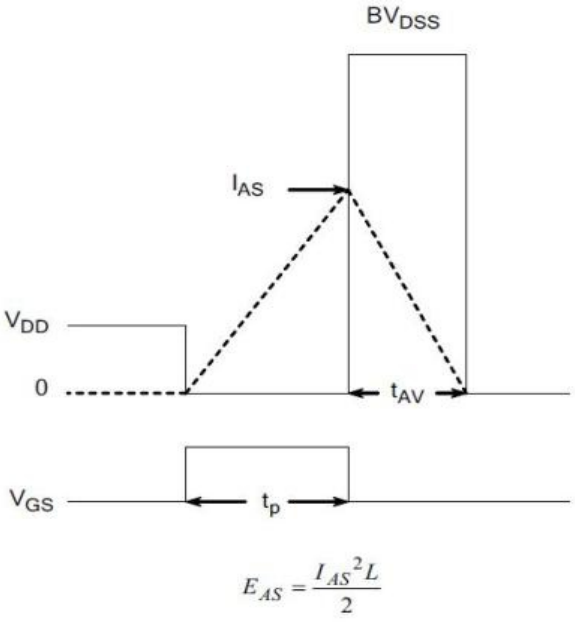
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



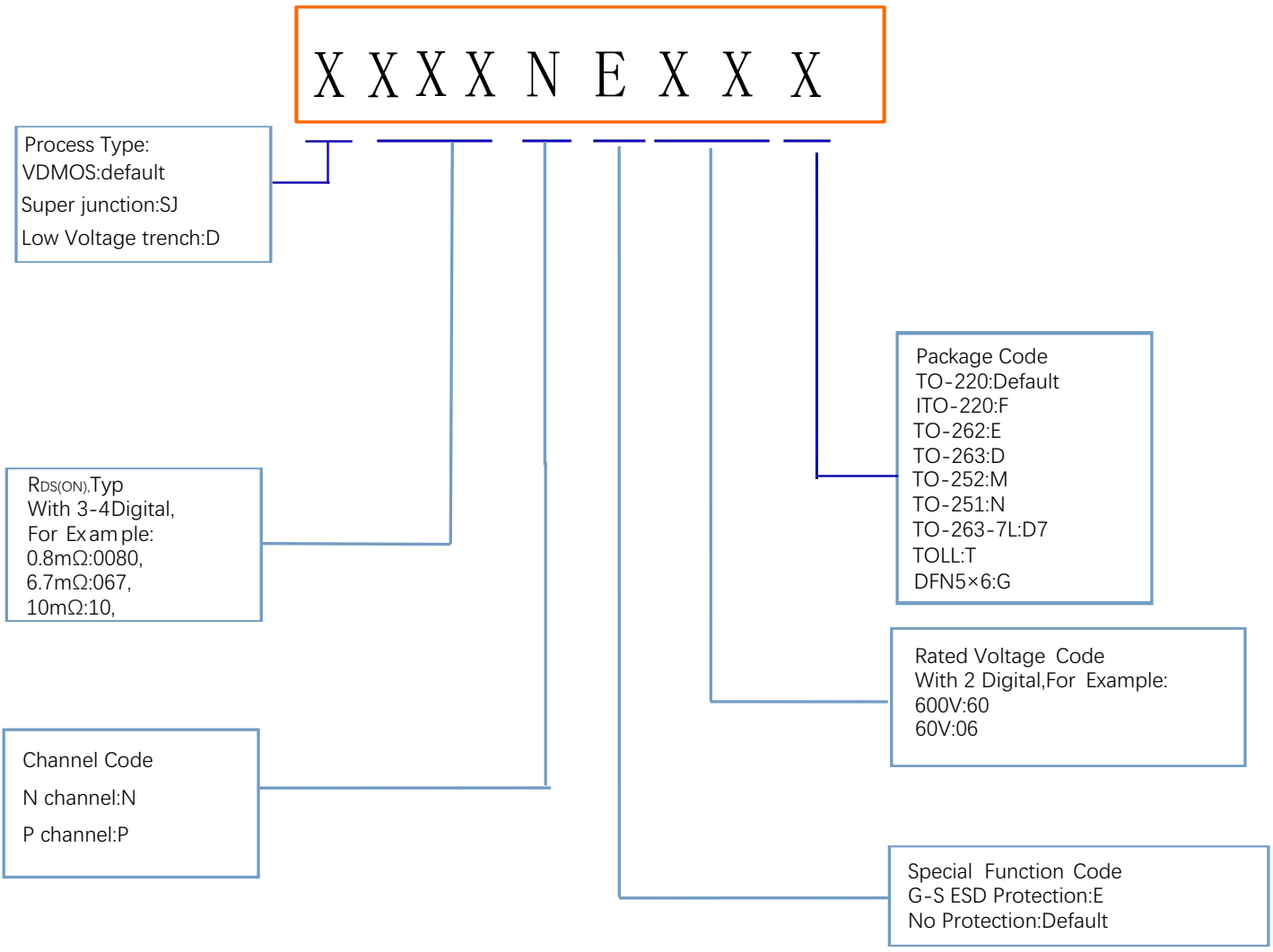
7) . Unclamped Inductive Switching Test Circuit



$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

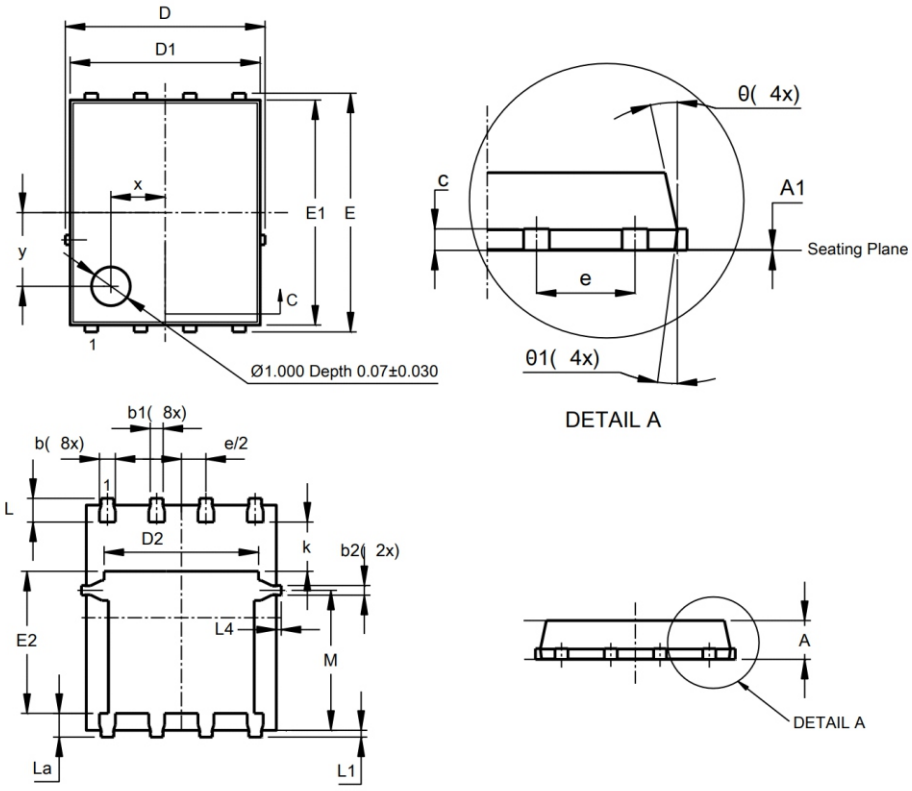
8) Unclamped Inductive Switching Waveforms

Product Names Rules



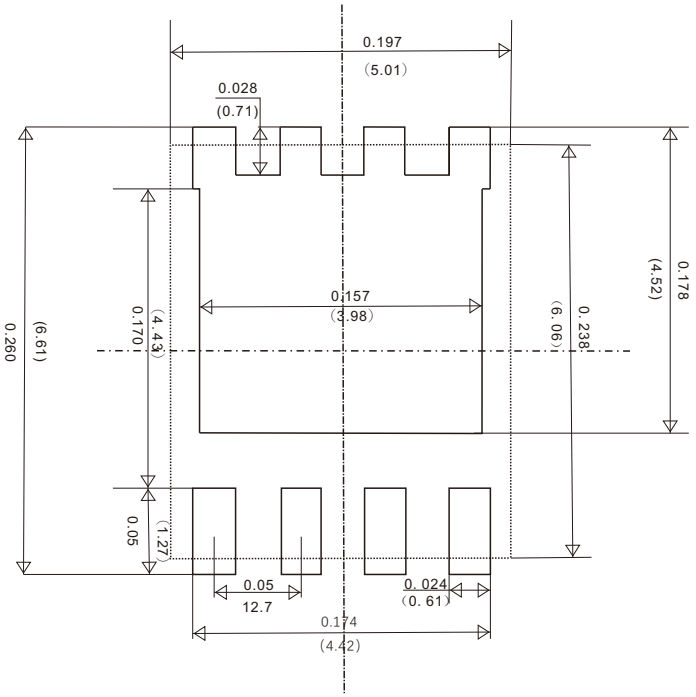
Dimensions

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



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