SEMICONDUCTOR

D230N06

238A 60V N-Channel Enhancement Mode Power MOSFET

Genaral Description

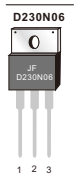
These N-channel enhancement mode power mosfets used advanced trench technology design, provided excellent Rdson and low gate charge. Which accords with the RoHS standard.

Product Summary			
V_{DS}	$R_{DS(on)}$ (mΩ) Typ	I_D (A)	Qg (Typ)
60V	2. 6 @ 10V 75A	238	155nc

Features

- Fast switching
- Low reverse transfer capacitances
- Low gate charge and Low on-resistance
- 100% avalanche tested

TO-220



Mechanical Data

- Case:TO-220 Package

Application

- Power switching applications
- Inverter management system
- Electric tools

Ordering Information

Part No.	Package Type	Package	Quality(box)
D230N06	TO-220	Tube	1000

Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

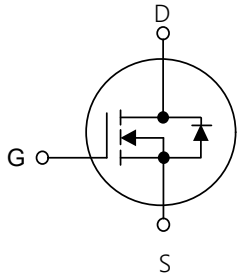


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	D230N06	Unit
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	238	A
	T_C=100°C		167	
Pulsed Drain Current (Note 1)		I_{DM}	952	A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	2025	mJ
Avalanche Current(Note 2)		I_{AR}	90	A
Power Dissipation	T_C=25°C	P_D	312	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55~+175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	D230N06	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	0.48	°C/W

Table 3. Electrical Characteristics (T_C=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	60	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=100V,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	2.0	-	4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=75A	-	2.6	3.4	mΩ
Dynamic Characteristics(Note 4)							
Input Capacitance		C_{ISS}	V_{DS}=30V,V_{GS}=0V,f=1MHz	-	7700	-	pF
Output Capacitance		C_{OSS}		-	685	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	529	-	pF
Switching Characteristics (Note 4)							
Turn-On Delay Time		td(on)	V_{DD}=30V,I_D=15A V_{GS}=10V,R_{GEN}=25Ω,	-	110	-	ns
Turn-On Rise Time		t_R		-	255	-	ns
Turn-Off Delay Time		td(off)		-	330	-	ns
Turn-Off Fall Time		tf		-	225	-	ns
Total Gate Charge		Q_G	V_{DS}=30V,I_D=45A, V_{GS}=10V	-	155	-	nC
Gate-Source Charge		Q_{GS}		-	47	-	nC
Gate-Drain Charge		Q_{GD}		-	45	-	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		-	-	160	A
Reverse Recovery Time		trr	V_{GS}=0V,I_F=90A dI$_F$/dt=100A/μs(Note 1)	-	32	-	ns
Reverse Recovery Charge		Q_{RR}		-	30	-	nC

Notes: 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=0.5mH, I_D=90A,V_{DD}=50V,V_{GATE}=60V,Starting T_J=25°C
3 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%
4 Guaranteed by design,not subject to production

Typical Characteristics Diagrams

Figure 1.Output Characteristics

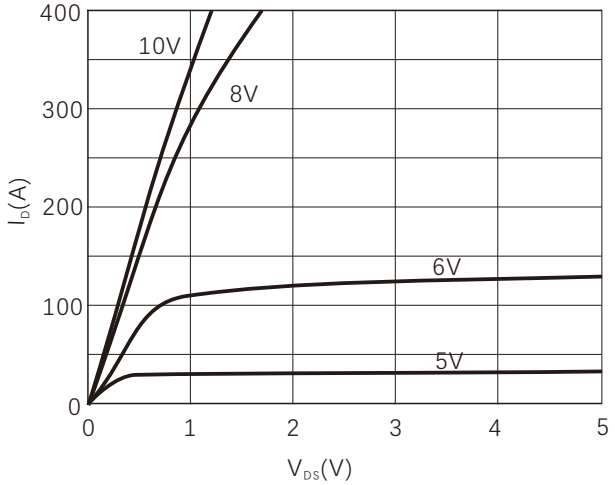


Figure 2. Transfer Characteristics

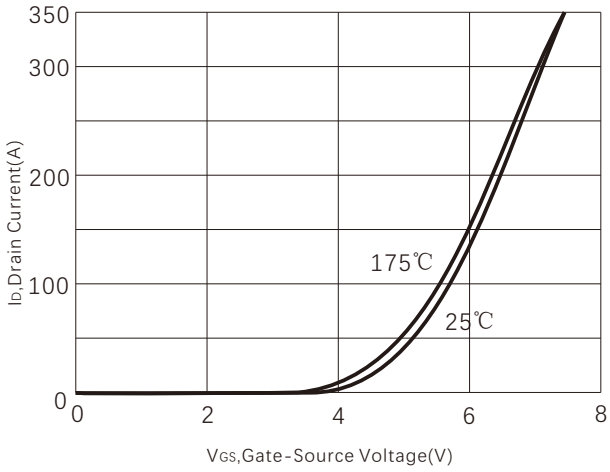


Figure10.Drain Current vs Case Temperature

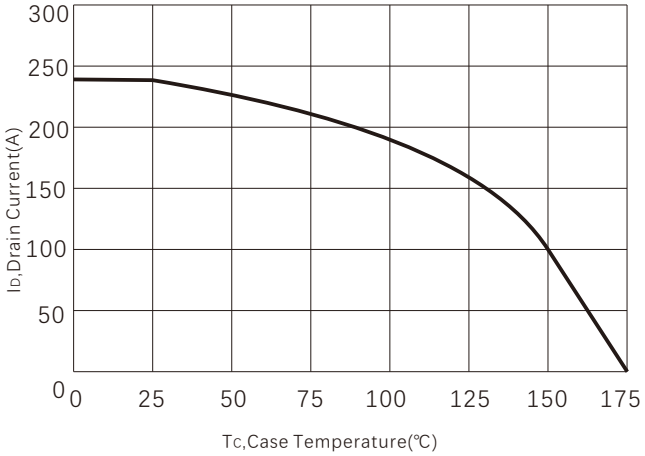


Figure 4. Capacitance

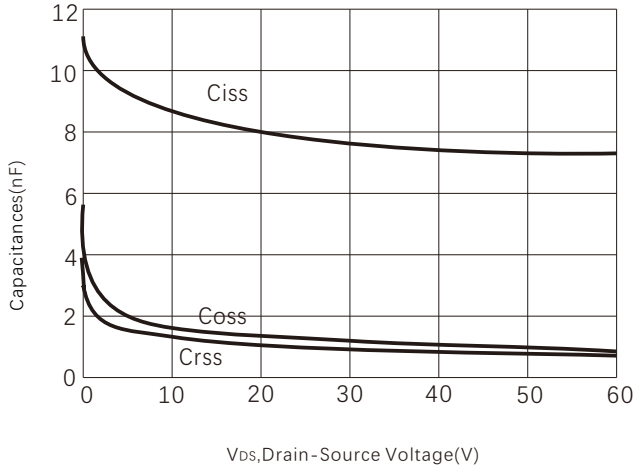


Figure 5.Gate charge

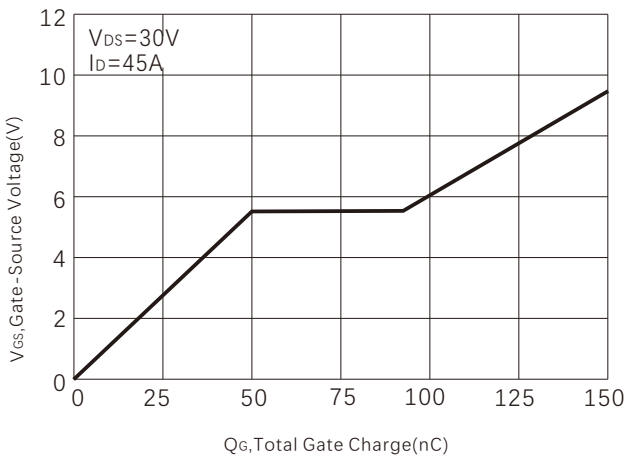


Figure 6.Source-Drain Diode Forward Voltage

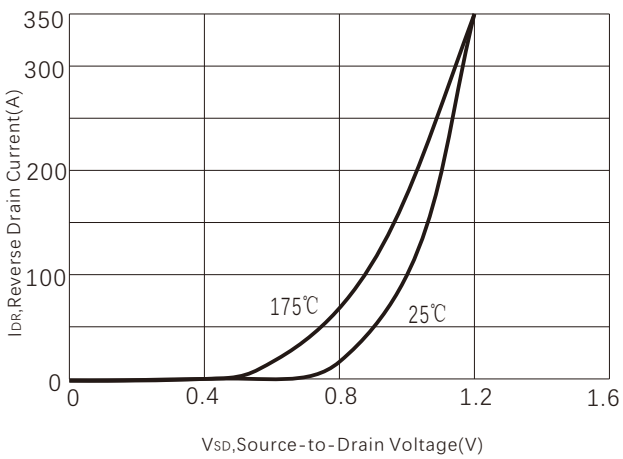


Figure7.$R_{DS(ON)}$ vs Junction Temperature

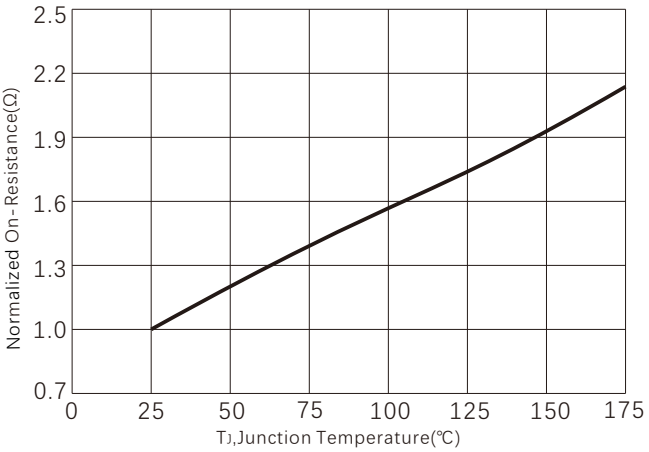


Figure 8. Power dissipation

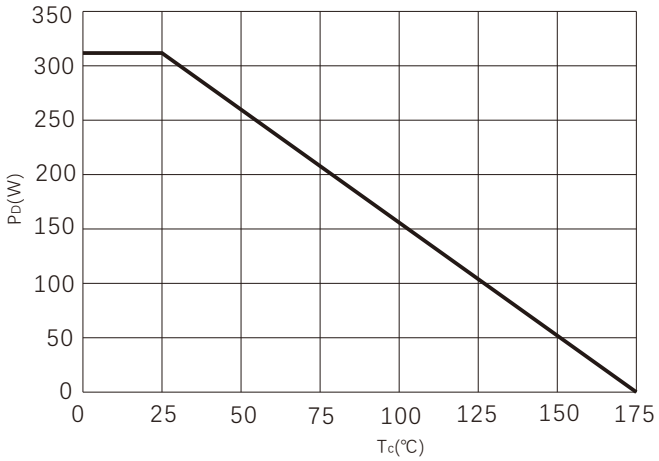


Figure 9. Safe operating area

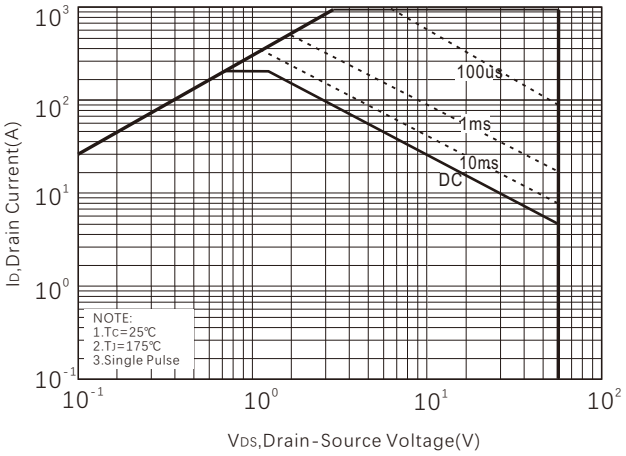
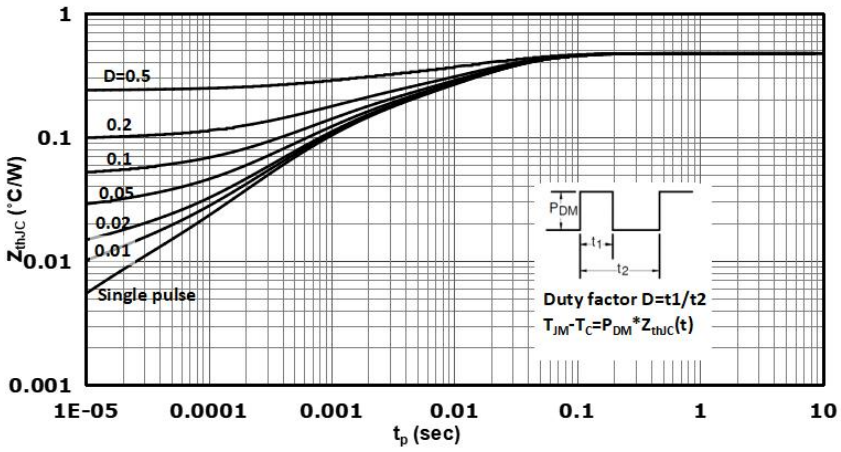
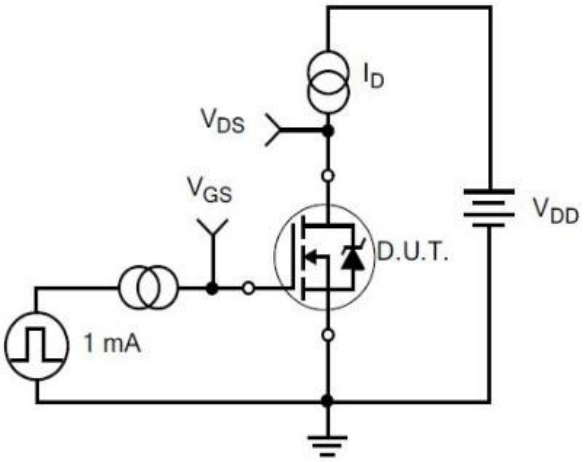


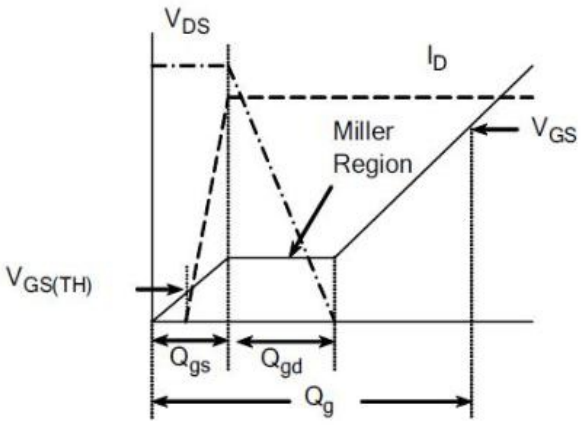
Figure 10. Maximum Transient Thermal Impedance



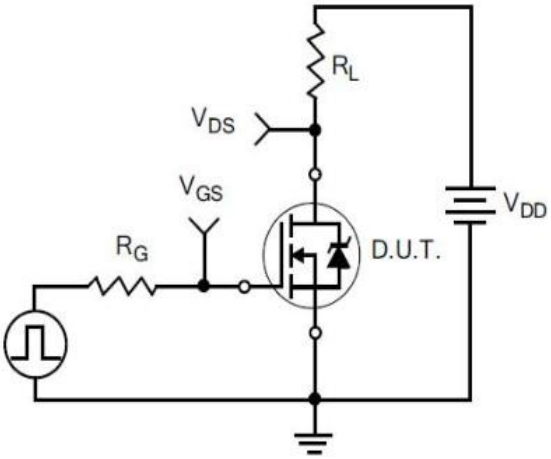
Typical Test Circuit



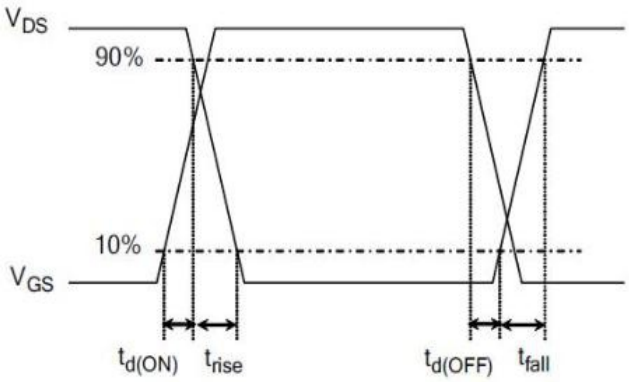
1) Gate Charge Test Circuit



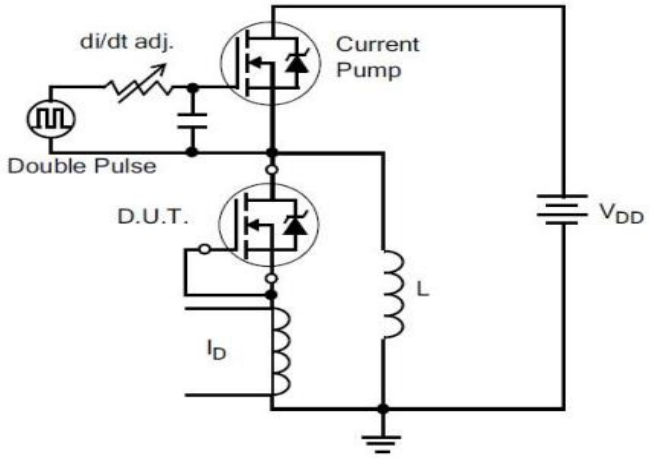
2) . Gate Charge Waveform



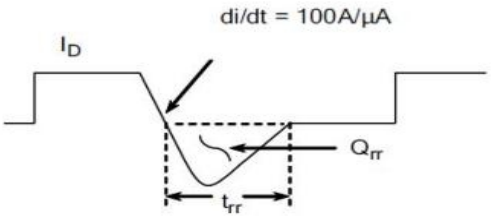
3) Resistive Switching Test Circuit



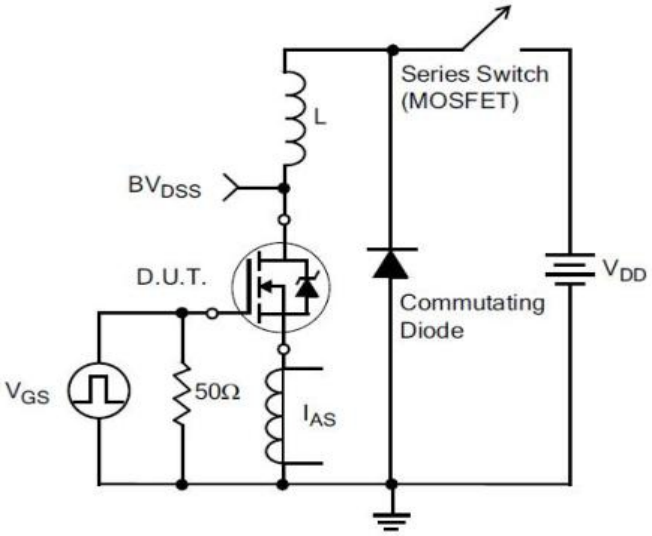
4) Resistive Switching Waveforms



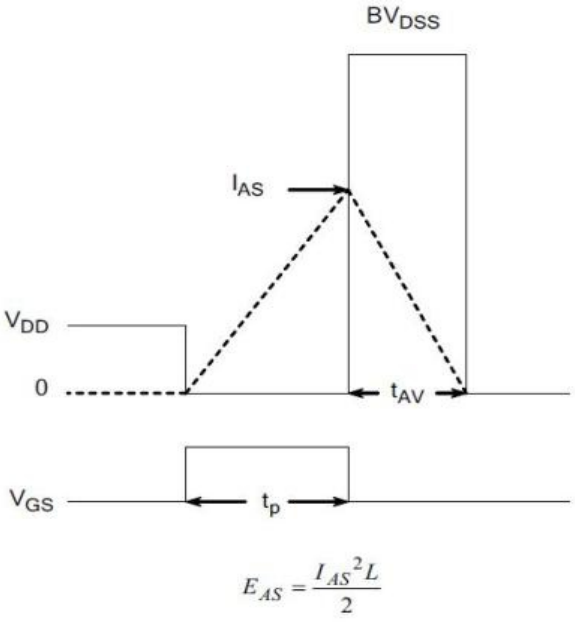
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

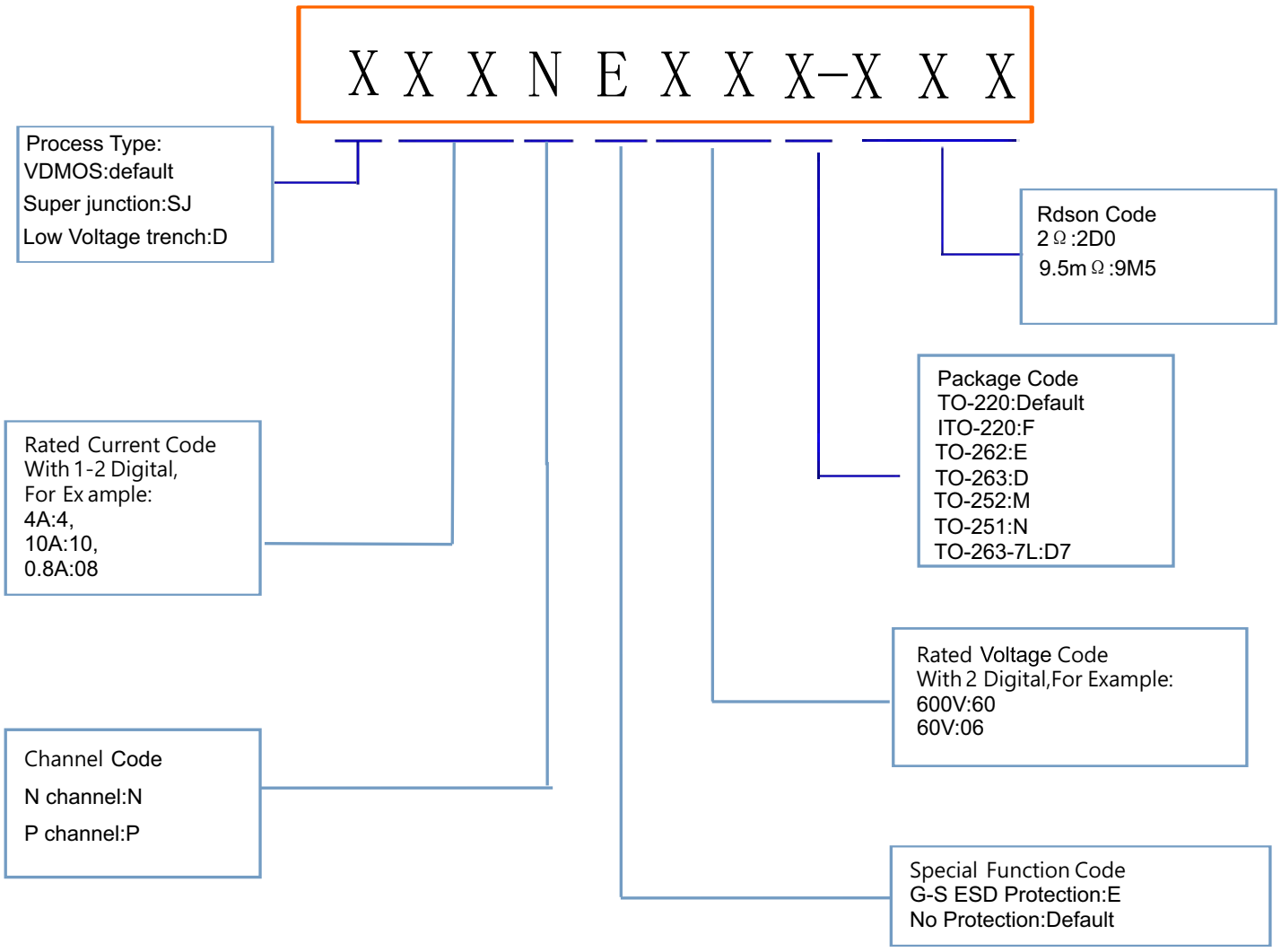


7) . Unclamped Inductive Switching Test Circuit



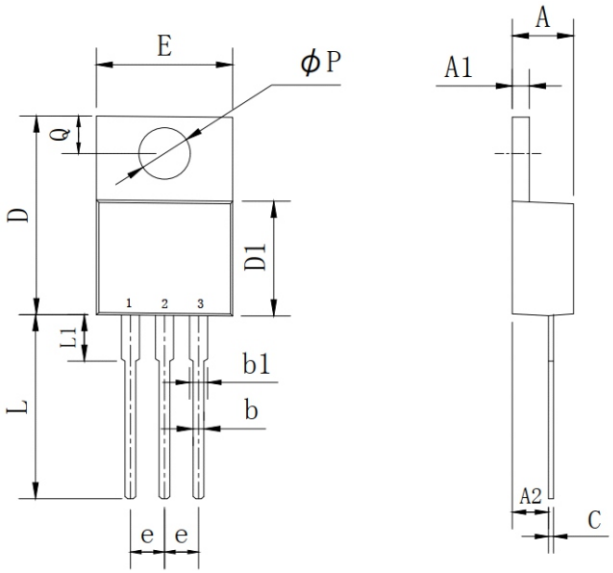
8) Unclamped Inductive Switching Waveforms

Product Names Rules



Dimensions

TO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	2.03	2.92	0.080	0.115
b	0.51	1.11	0.020	0.044
b1	0.97	1.6	0.038	0.063
C	0.3	0.7	0.012	0.028
D	14.6	15.9	0.575	0.626
D1	8.04	9.3	0.317	0.366
E	9.57	10.57	0.377	0.416
e	2.34	2.74	0.092	0.108
L	12.58	14.3	0.495	0.563
L1	2.8	4.2	0.110	0.165
P	3.4	4.14	0.134	0.163
Q	2.45	3	0.096	0.118

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