SEMICONDUCTOR

D120N10-6M5

120A 100V N-Channel Enhancement Mode Power MOSFET

Features

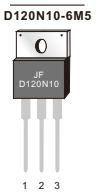
- Uses advanced SGT technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- 100% avalanche tested

Product Summary			
V_{DS}	$R_{DS(on)}$ (mΩ) Typ	I_D (A)	Qg (Typ)
100V	6.5 @ 10V,50A	120	56.6nc

Mechanical Data

- Case:TO-220 Package

TO-220



Application

- Motor Drives
- SR (Synchronous rectification)
- DC/DC converter
- General purpose applications

Ordering Information

Part No.	Package Type	Package	Quality(box)
D120N10-6M5	TO-220	Tube	1000

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

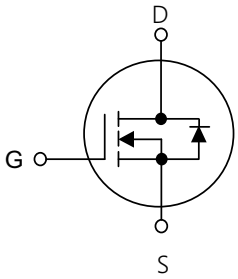


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C=25°C	I_D	120	A
	T_C=100°C		75	
Pulsed Drain Current (Note 1)		I_{DM}	470	A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	473	mJ
Power Dissipation	T_C=25°C	P_D	178	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	$R_{\theta JA}$	60	°C/W
Thermal resistance Junction to Case.Max	$R_{\theta JC}$	0.7	°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	100	-	-	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=50A	-	6.5	7.5	mΩ
Dynamic Characteristics(Note 4)							
Input Capacitance		C_{ISS}	V_{DS}=40V,V_{GS}=0V,f=1MHz	-	3649	-	pF
Output Capacitance		C_{OSS}		-	389	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	20	-	pF
Gate Resisitance		R_G	V_{DD}=0V,V_{GS}=0V,f=1MHz	-	2.7	-	Ω
Switching Characteristics (Note 4)							
Turn-On Delay Time		td(on)	V_{DD}=47.5V, V_{GS}=10V,R_L=3Ω,	-	17.3	-	ns
Turn-On Rise Time		t_R		-	33	-	ns
Turn-Off Delay Time		td(off)		-	38.9	-	ns
Turn-Off Fall Time		tf		-	18.1	-	ns
Total Gate Charge		Q_G	V_{DD}=47.5V,I_D=50A, V_{GS}=10V	-	56.6	-	nC
Gate-Source Charge		Q_{GS}		-	21.4	-	nC
Gate-Drain Charge		Q_{GD}		-	12.5	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=50A	-	-	1.2	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		-	-	120	A
Reverse Recovery Time		trr	V_{GS}=0V, I_F=20A dI$_F$/dt=500A/μs (Note 1)	-	68	-	ns
Reverse Recovery Charge		Q_{RR}		-	66	-	nC

Notes: 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2The EAS data shows Max. rating . The test condition is R_g=25Ω,L=0.5mH.
3 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%
4 Guaranteed by design,not subject to production

Typical Characteristics Diagrams

Figure 1.Output Characteristics

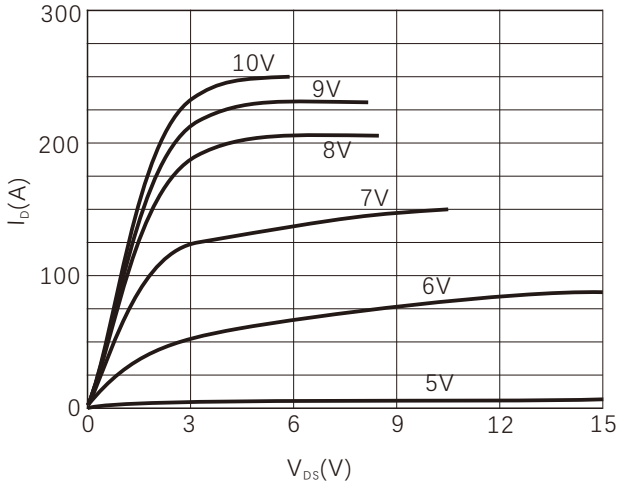


Figure2.Normalized $R_{DS(ON)}$ vs Temperature

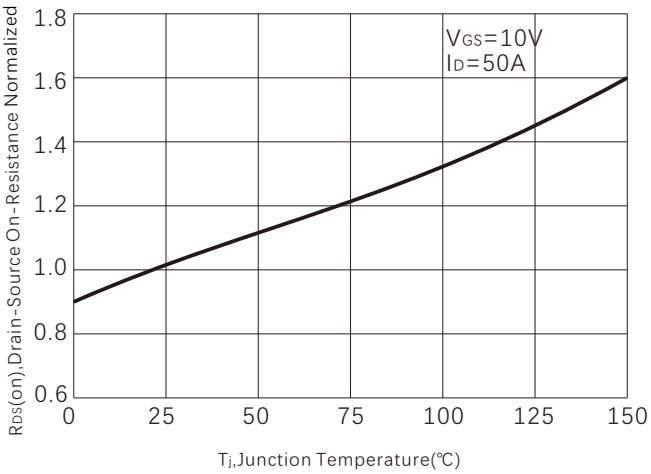


Figure 3.On-Resistance vs.Drain Current

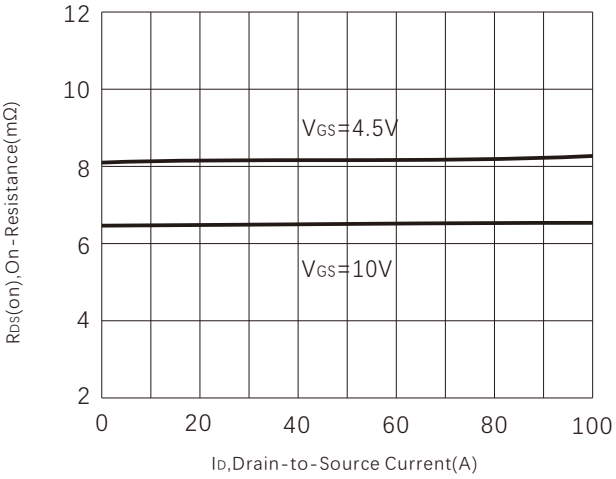


Figure 4. Capacitance

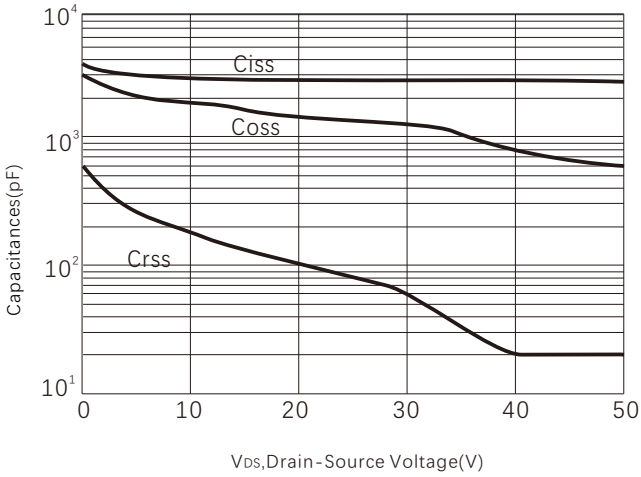


Figure 5.Gate charge

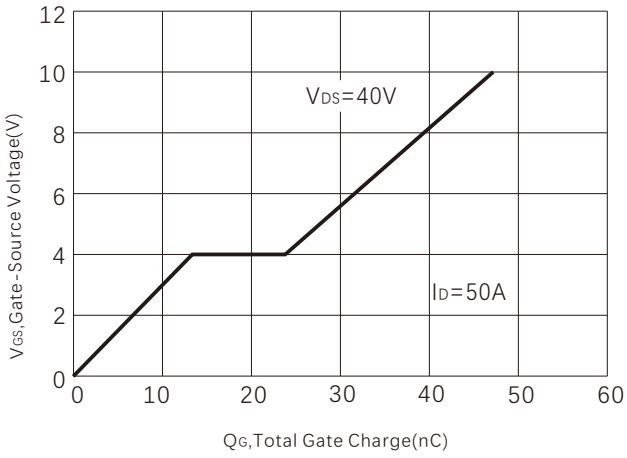


Figure 6.Source-Drain Diode Forward Voltage

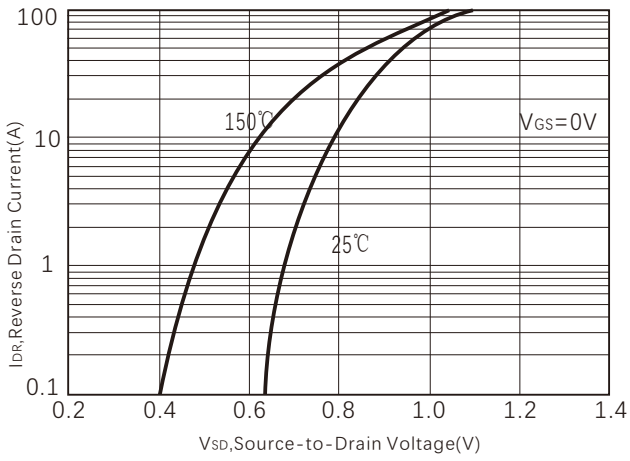


Figure7.Drain Current vs Temperature

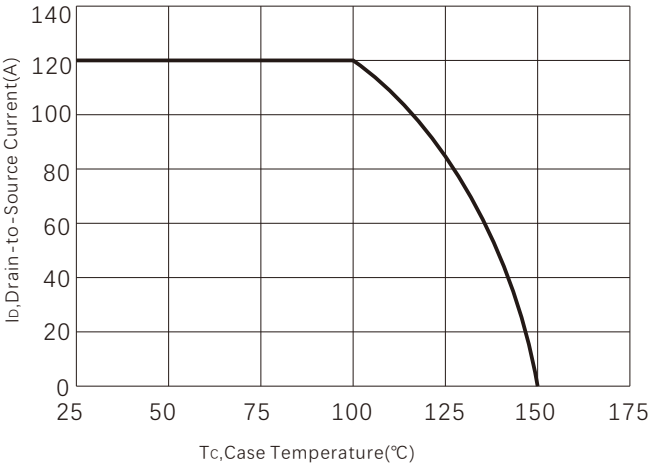


Figure 8. Transfer Characteristics

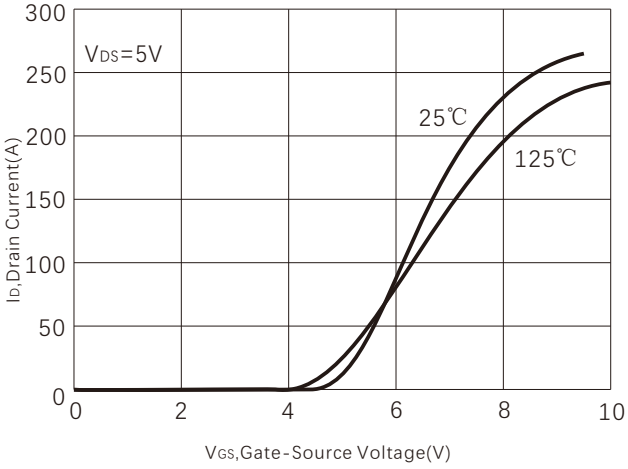


Figure 9. Safe operating area

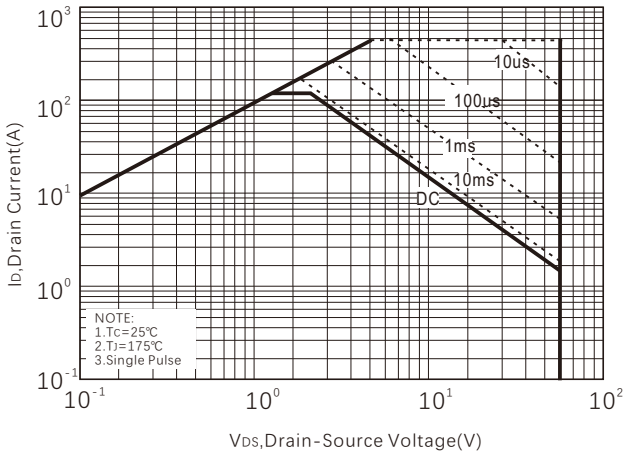


Figure 10. Power dissipation

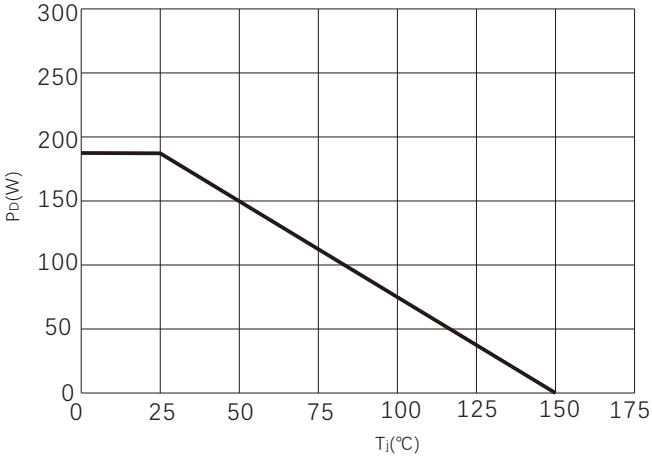
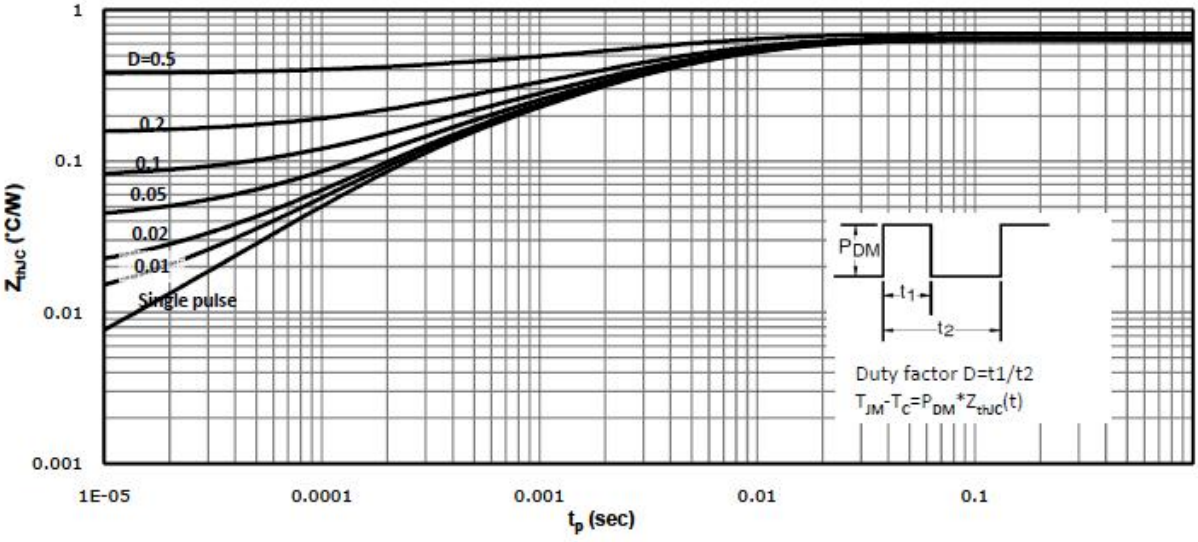
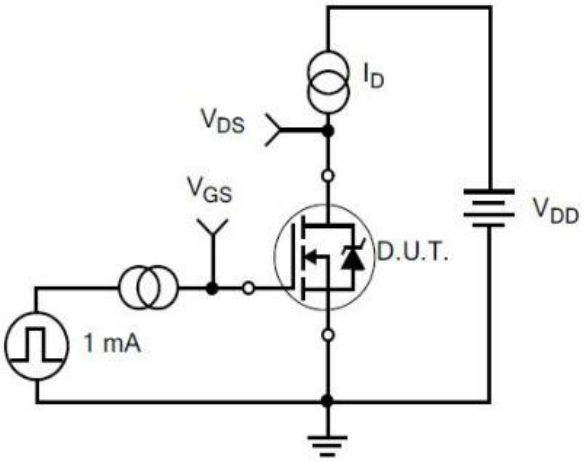


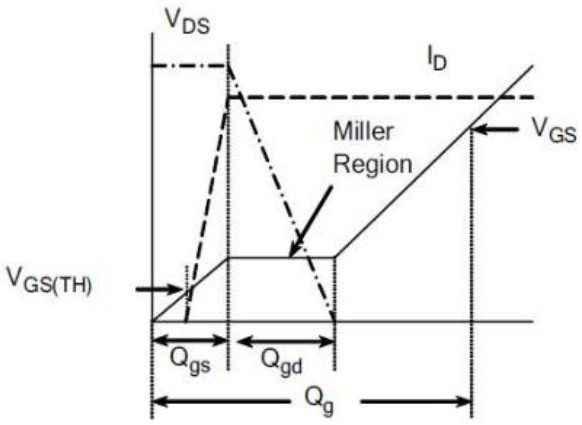
Figure 11. Maximum Transient Thermal Impedance



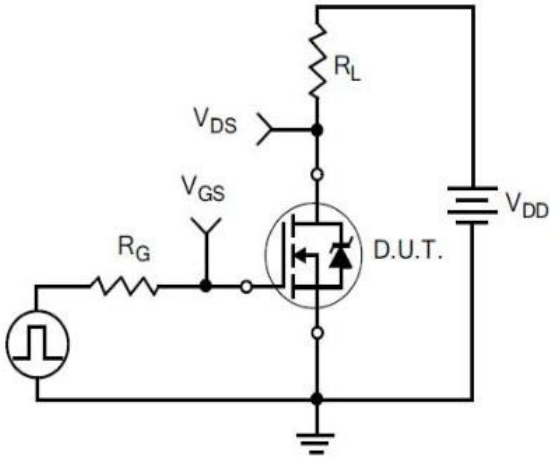
Typical Test Circuit



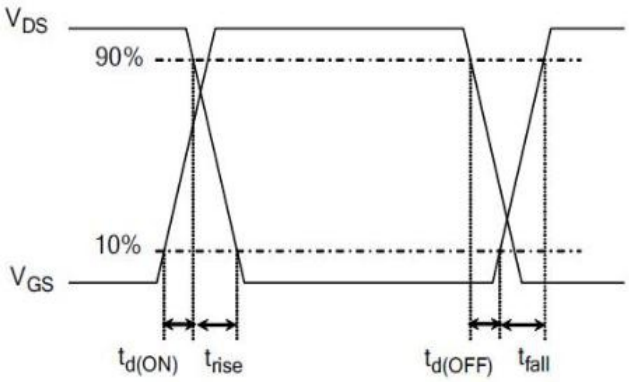
1) Gate Charge Test Circuit



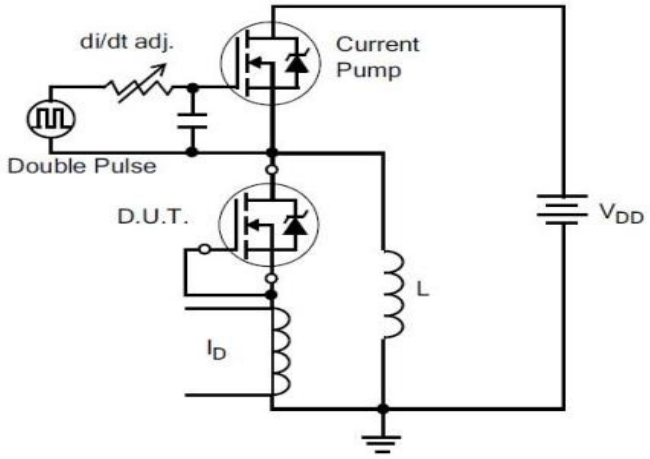
2) . Gate Charge Waveform



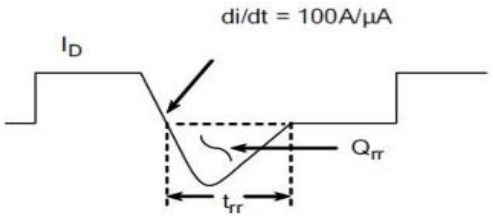
3) Resistive Switching Test Circuit



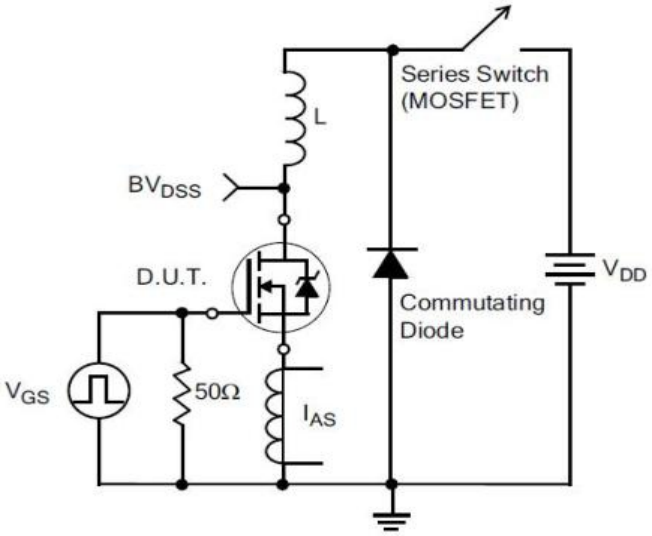
4) Resistive Switching Waveforms



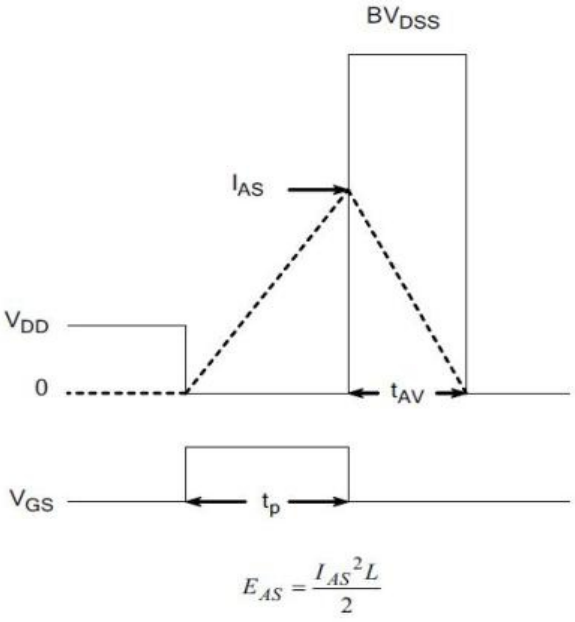
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



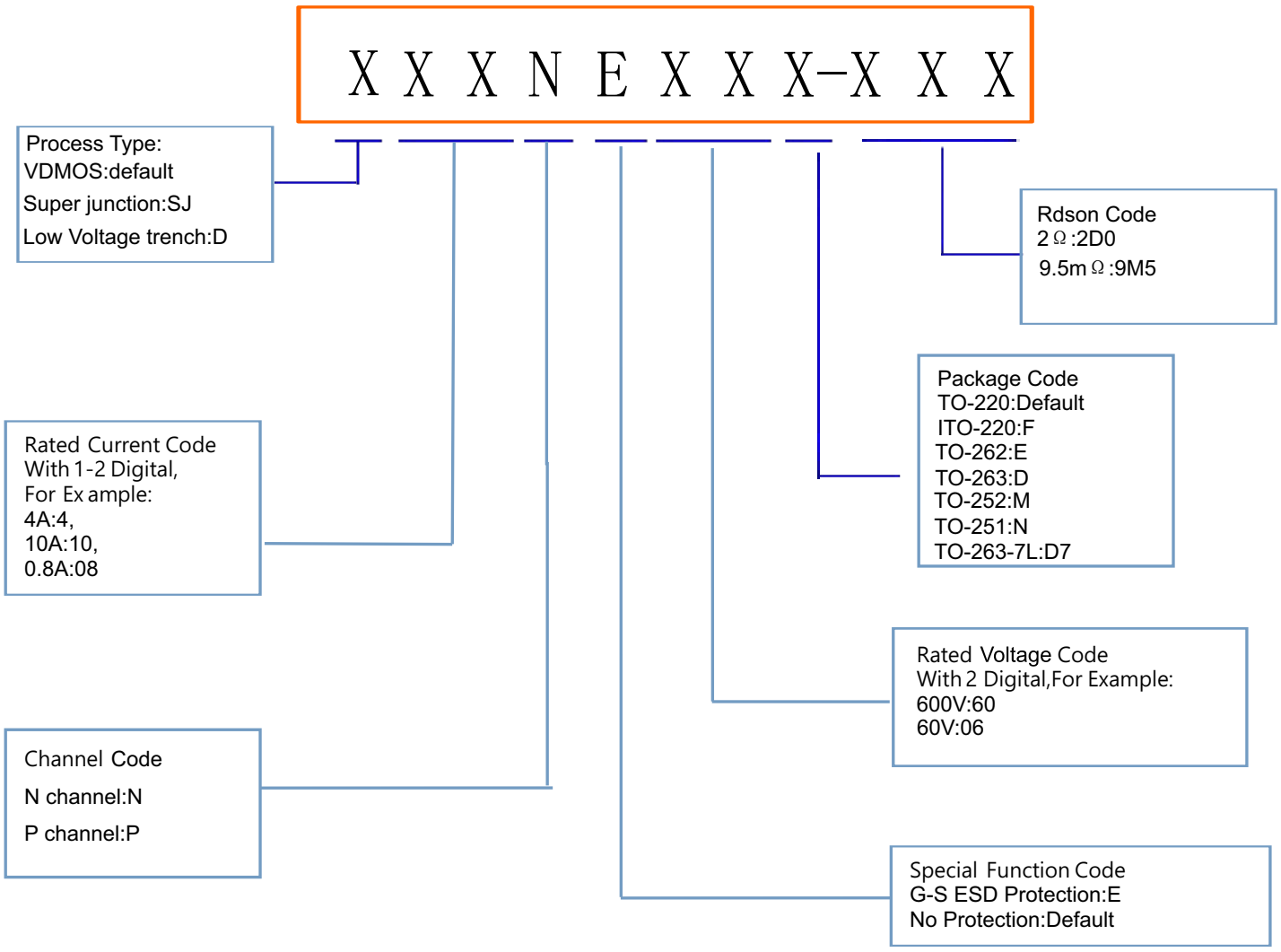
7) . Unclamped Inductive Switching Test Circuit



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

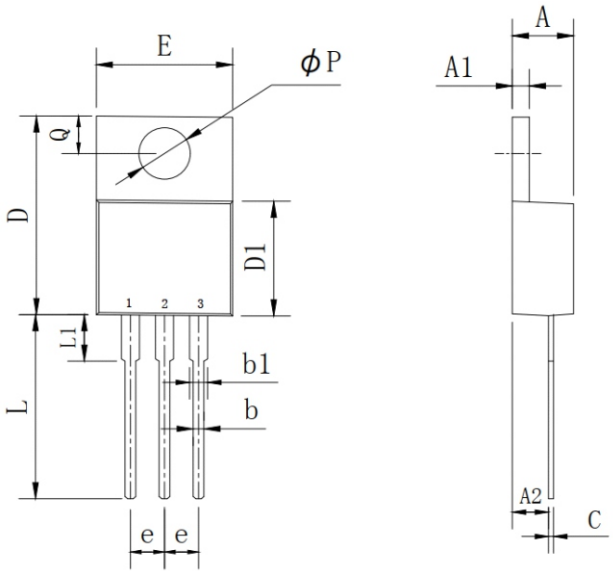
8) Unclamped Inductive Switching Waveforms

Product Names Rules



Dimensions

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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