SEMICONDUCTOR

25N50K

25A 500V Silicon N-Channel Power MOSFET

Genaral Description

The 25N50K.uses advanced technology and design to provide excellent $R_{DS(ON)}$. The transistor can be used in various power switchingcircuit for system miniaturization and higher efficiency.

Product Summary			
V_{DS}	$R_{DS(on)}$ (Ω) Typ	I_D (A)	Qg (Typ)
500V	0.17@ 10V	25	81nc

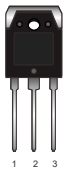
Features

- Low on-resistance
- Low reverse transfer capacitance
- 100% avalanche tested

Mechanical Data

- Case:TO-3P Package

TO-3P
25N50K



Application

- Power switching application

Ordering Information

Part No.	Package Type	Package	Quality(box)
25N50K	TO-3P	Tube	600

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

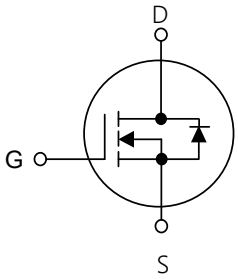


Table1 Absolute Maximum Ratings (Tc=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current Tc=25°C	I_D	25	A
Pulsed Drain Current (Note 1)	I_{DM}	100	A
Single Pulse Avalanche Energy	E_{AS}	2000	mJ
Power Dissipation Tc=25°C	P_D	250	W
Operating Junction and Storage Temperature	T_J/T_{STG}	-55~+175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	25N50K	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	0.5	°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	500	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V,V_{GS}=0V	-	-	1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V	-	-	100	nA
	Reverse		V_{GS}=-30V,V_{DS}=0V	-	-	-100	nA
On Characteristics(Note 2)							
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=12.5A	-	0.17	0.2	Ω
Dynamic Characteristics(Note 3)							
Input Capacitance		C_{iss}	V_{DS}=25V,V_{GS}=0V,f=1MHz	-	3860	-	pF
Output Capacitance		C_{oss}		-	428	-	pF
Reverse Transfer Capacitance		C_{rss}		-	38	-	pF
Switching Characteristics (Note 3)							
Turn-On Delay Time		$t_{d(on)}$	V_{DD}=250V,I_D=25A R_G=10Ω,	-	48	-	ns
Turn-On Rise Time		t_R		-	108	-	ns
Turn-Off Delay Time		$t_{d(off)}$		-	165	-	ns
Turn-Off Fall Time		t_f		-	85	-	ns
Total Gate Charge		Q_G	V_{DS}=400V,I_D=25A, V_{GS}=10V	-	81	-	nC
Gate-Source Charge		Q_{GS}		-	20	-	nC
Gate-Drain Charge		Q_{GD}		-	30	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=25A	-	-	1.5	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		-	-	25	A
Reverse Recovery Time		trr	V_{GS}=0V, I_F=25A dI$_F$/dt=100A/μs (Note 1)	-	530	-	ns
Reverse Recovery Charge		Q_{RR}		-	8.2	-	μC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 Pulse Test: Pulse width ≤300μS, Duty cycle≤2%
3 Guaranteed by design,not subject to production

Typical Characteristics Diagrams

Figure 1.Output Characteristics

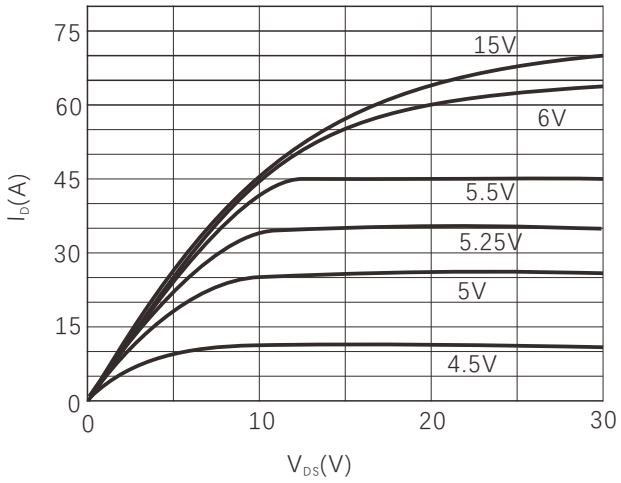


Figure2.Normalized $R_{DS(ON)}$ vs Temperature

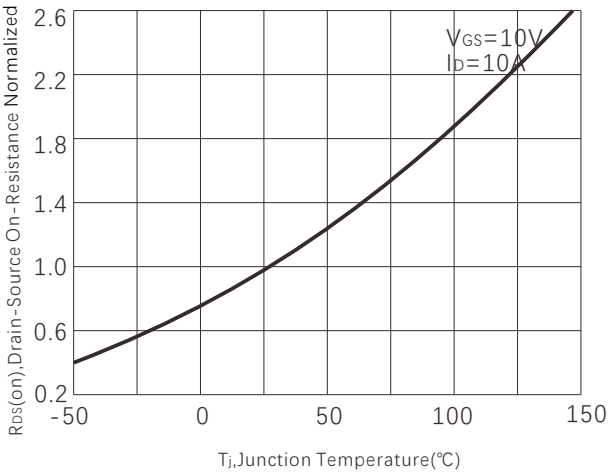


Figure 3.On-Resistance vs.Drain Current

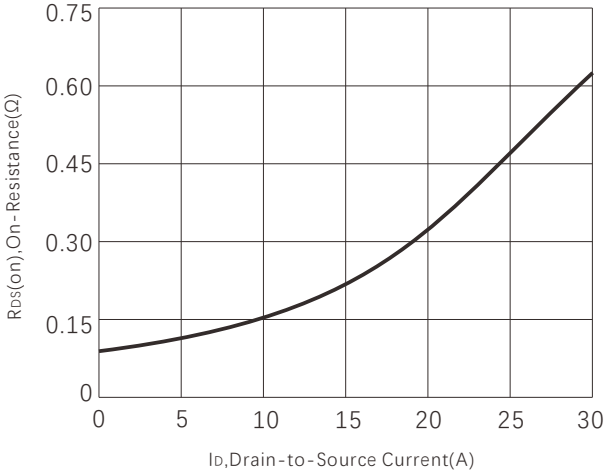


Figure 4. Capacitance

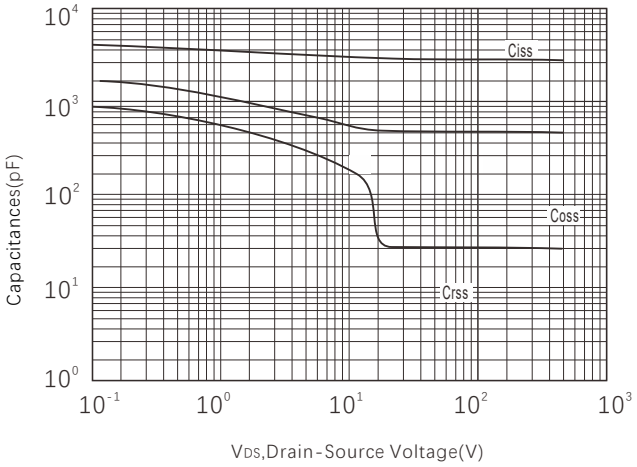


Figure 5.Gate charge

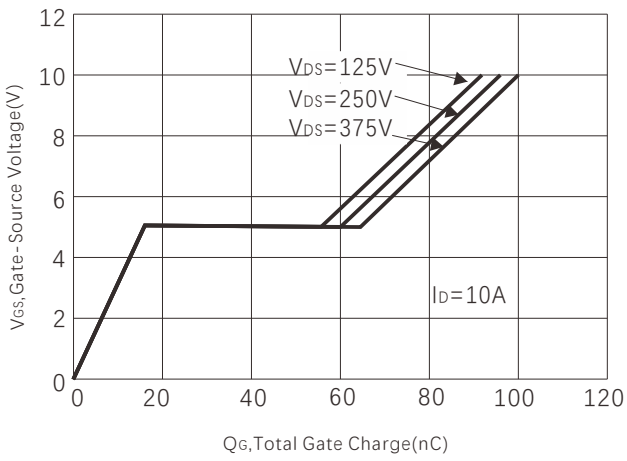


Figure 6.Source-Drain Diode Forward Voltage

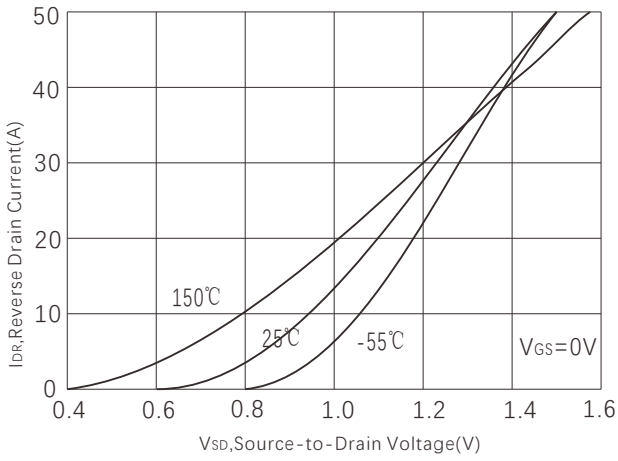


Figure7.Typical Breakdown Voltage vs Temperature

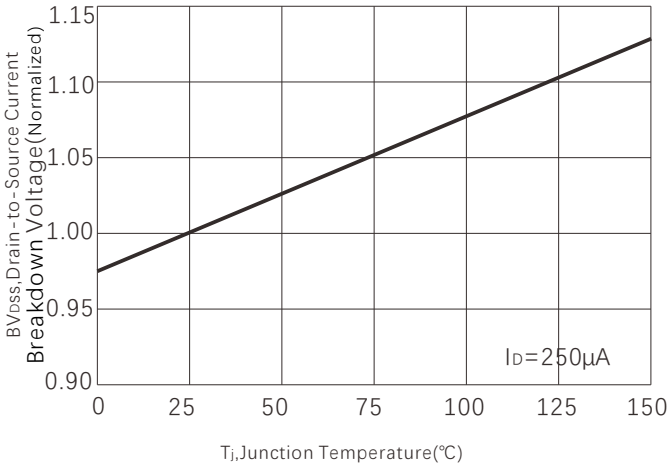


Figure 8.Gate Threshold Voltage vs Temperature

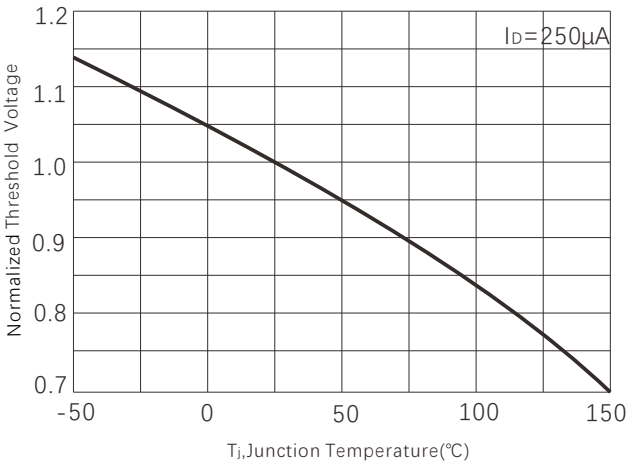


Figure 9. Safe operating area

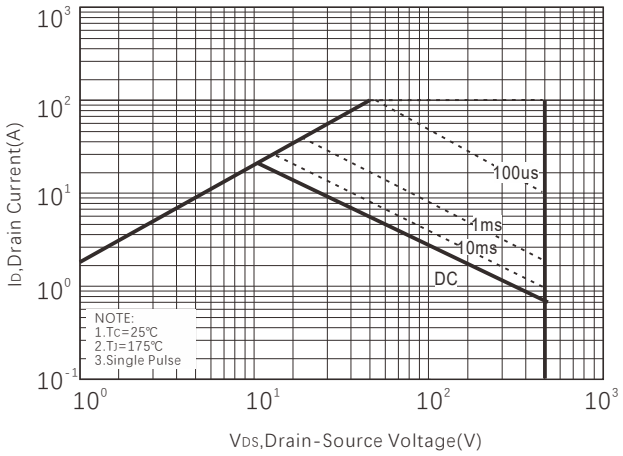


Figure 10. Power dissipation vs Case Temperature

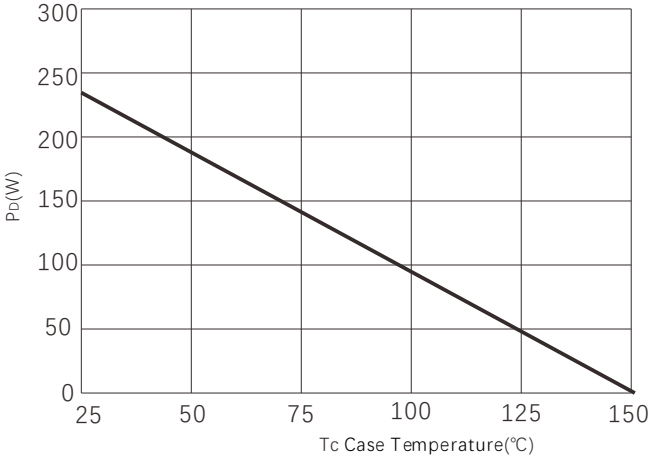
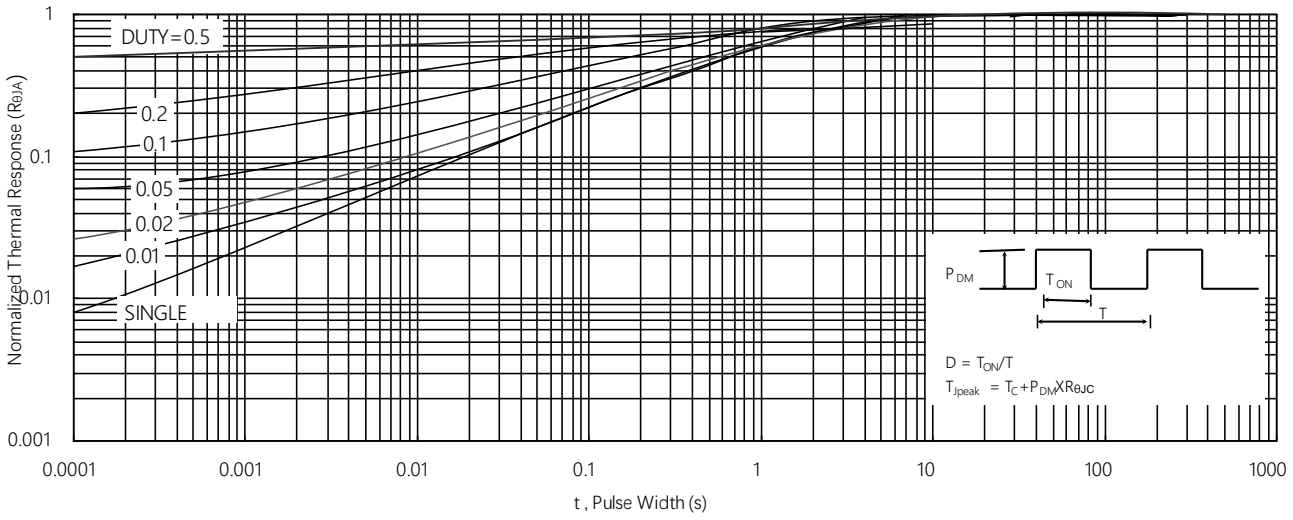
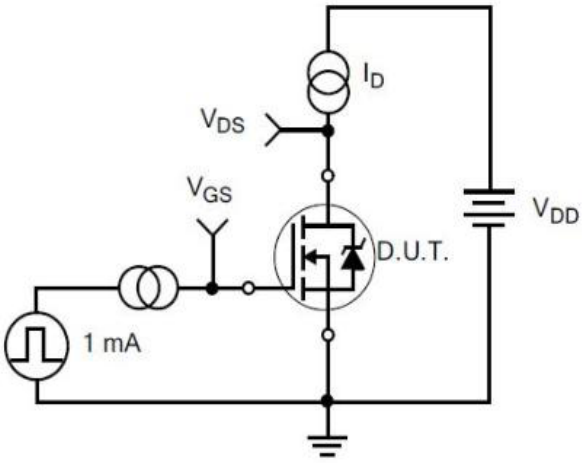


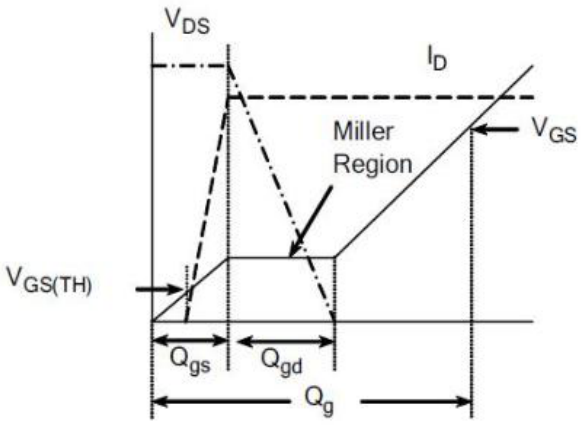
Figure 11.Normalized Maximum Transient Thermal Impedance



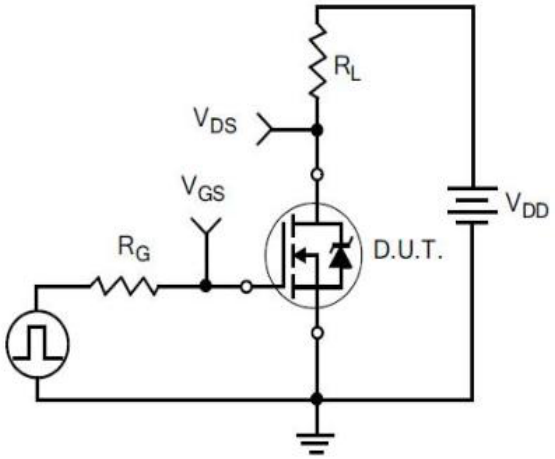
Typical Test Circuit



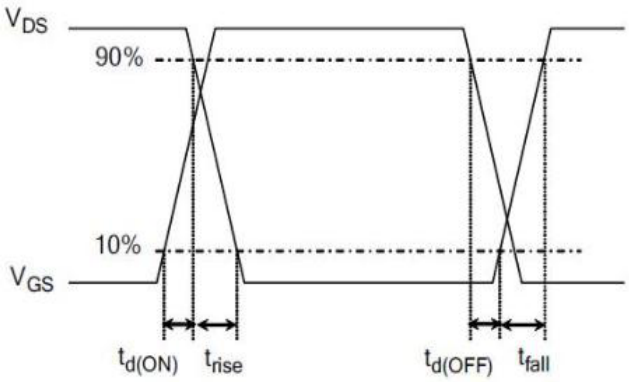
1) Gate Charge Test Circuit



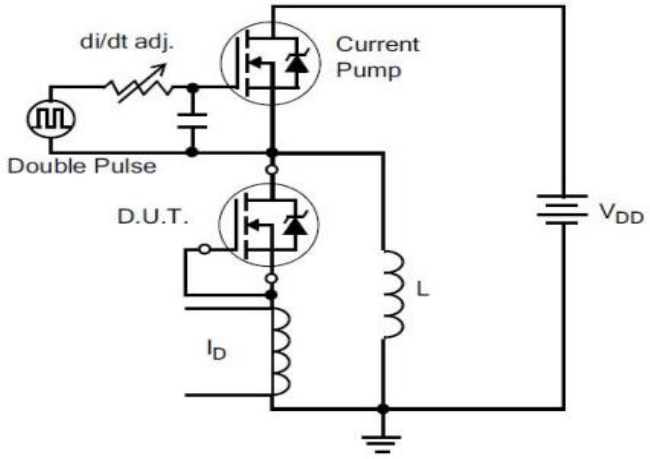
2) . Gate Charge Waveform



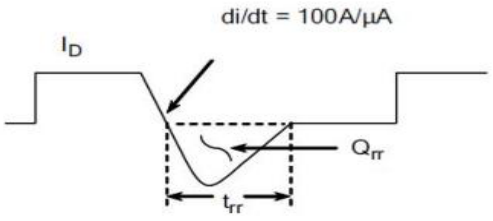
3) Resistive Switching Test Circuit



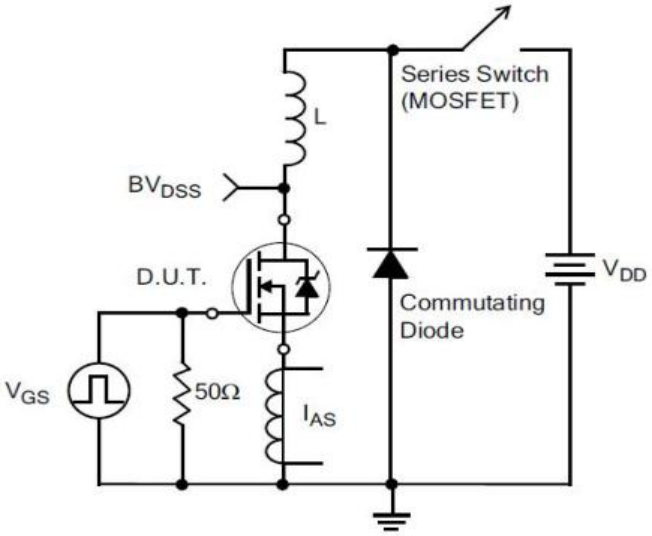
4) Resistive Switching Waveforms



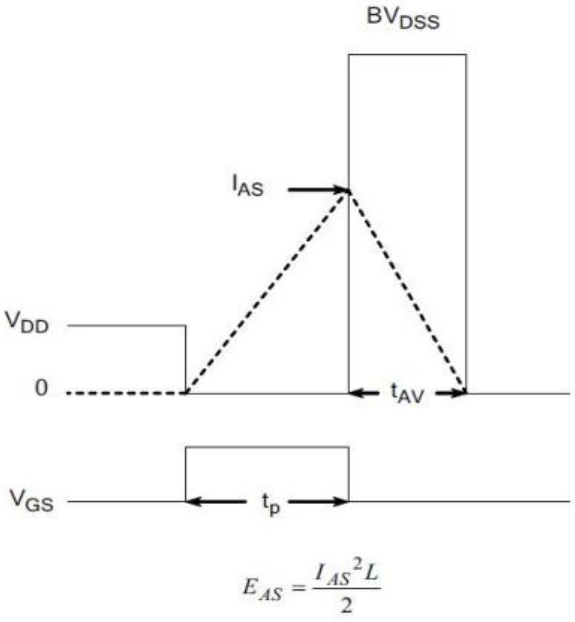
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



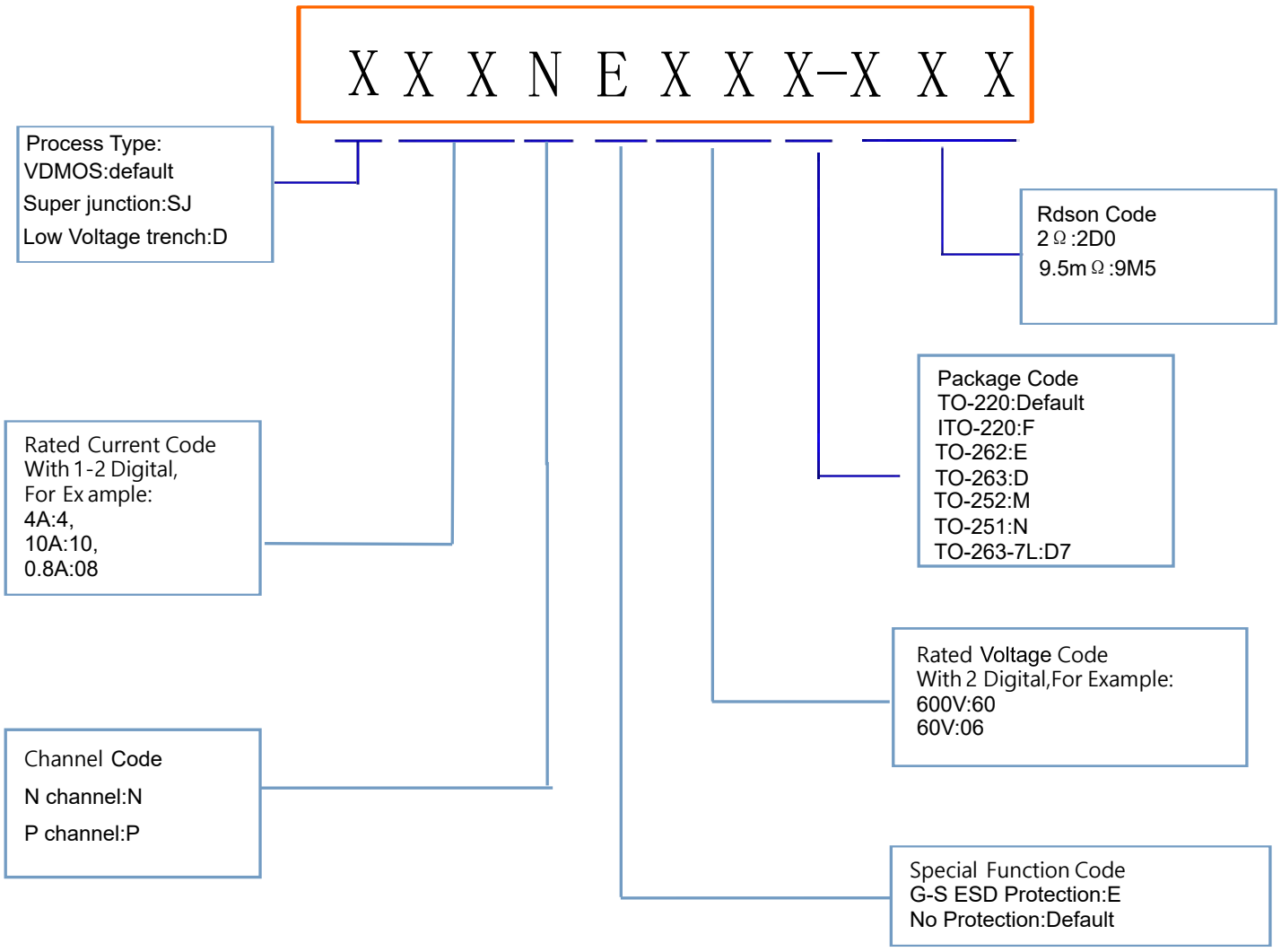
7) . Unclamped Inductive Switching Test Circuit



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

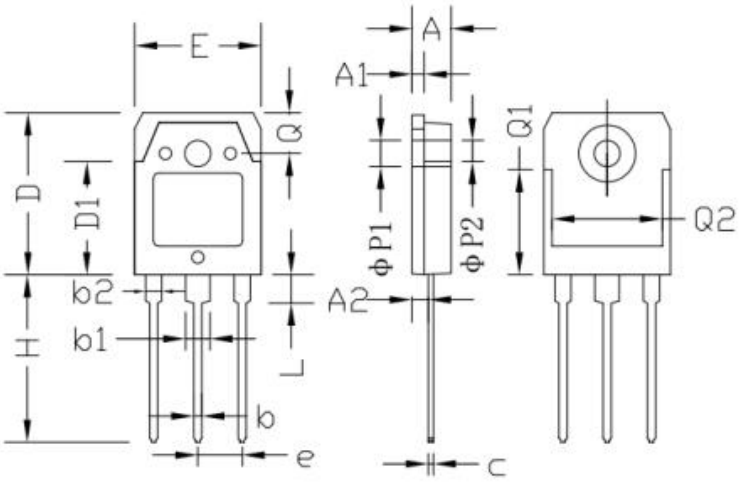
8) Unclamped Inductive Switching Waveforms

Product Names Rules



Dimensions

TO-3P PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	4.60	5.00	0.181	0.197
A1	1.45	1.65	0.057	0.065
A2	2.20	2.60	0.087	0.102
b	0.80	1.20	0.032	0.047
b1	2.80	3.20	0.110	0.126
b2	1.80	2.20	0.071	0.087
C	0.55	0.75	0.022	0.030
D	19.20	19.70	0.756	0.776
D1	13.10	14.70	0.516	0.578
E	15.40	15.80	0.607	0.623
e	5.45 TYP		0.215 TYP	
H	19.80	20.20	0.780	0.826
L	3.30	3.70	0.130	0.146
ΦP1	3.20 TYP		0.126 TYP	
ΦP2	3.50 TYP		0.138 TYP	
Q	5.00 TYP		0.197 TYP	
Q1	12.40 TYP		0.488 TYP	
Q2	12.6	-	0.496	-

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