

## General Description

This MOSFETs uses advanced technology to achieve extremely low Static Drain-to-Source on-Resistance  $R_{DS(on)}$  and fast switch. For this reason, This MOSFETs has low energy consumption during application which also enhances reliability and durability.

## Features

- Fast switching
- Extended Safe Operating Area
- 100% avalanche tested
- Rohs compliant

## Mechanical Data

- Case:TO-220,TO-220C Package

## Application

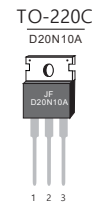
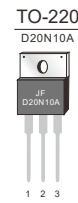
- Power switching applications
- DC Motor Control
- UPS

## Ordering Information

Part No.	Package Type	Package	Quality(box)
D20N10A	TO-220	Tube	1000
D20N10A	TO-220C	Tube	1000



Product Summary			
$V_{DS}$	$R_{DS(on)}$ (m $\Omega$ )Typ	$I_D$ (A)	$Q_g$ (Typ)
100V	60 @ 10V,10A	20	28.5nc



## Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

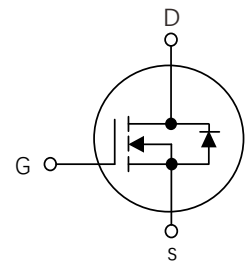


Table1 Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

Parameters	Symbol	D20N10A D20N10A	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 25$	V
Contionous Drain Current	$I_D$	$T_c=25^\circ\text{C}$	20
		$T_c=100^\circ\text{C}$	16
Pulsed Drain Current (Note 1)	$I_{DM}$	65	A
Single Pulse Avalanche Energy	EAS	150	mJ
Power Dissipation $T_c=25^\circ\text{C}$	$P_D$	80	W
Operating Junction and Storage Temperature	$T_J/T_{STG}$	-55 ~ +175	$^\circ\text{C}$

Table 2. Thermal Characteristics

Parameters	Symbol	D20N10A D20N10A	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	80.0	$^{\circ}\text{C}/\text{W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	2.10	$^{\circ}\text{C}/\text{W}$

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

Parameters	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	100			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=100V, V_{GS}=0V$			3	$\mu A$
Gate-Source Leakage Current	Forward	$I_{GSS}$			100	nA
	Reverse				-100	nA
On Characteristics(Note 2)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.0	4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=10A$		60	85	m $\Omega$
Dynamic Characteristics(Note 3)						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1\text{MHz}$		1269		pF
Output Capacitance	$C_{OSS}$			208		pF
Reverse Transfer Capacitance	$C_{RSS}$			49		pF
Switching Characteristics (Note 3)						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=50V, I_D=9A,$ $V_{GS}=10V, R_G=12\Omega$		10.8		ns
Turn-On Rise Time	$t_r$			16.3		ns
Turn-Off Delay Time	$t_{d(off)}$			41.3		ns
Turn-Off Fall Time	$t_f$			13.5		ns
Total Gate Charge	$Q_G$	$V_{DS}=80V, I_D=9A,$ $V_{GS}=10V$		28.5		nC
Gate-Source Charge	$Q_{GS}$			5.15		nC
Gate-Drain Charge	$Q_{GD}$			10.3		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=10A$			1.2	V
Maximum Continuous Drain-Source Diode Forward Current(Note 2)	$I_S$				20	A
Reverse Recovery Time	$t_{rr}$	$I_F=9A$ $dI_F/dt=100A/\mu s$ (Note 4)		61		ns
Reverse Recovery Charge	$Q_{RR}$			162		nC

Notes: 1 Repetitive Rating:Pulse width limited by maximum junction temperature  
 2 Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$   
 3 Guaranteed by design, not subject to production

Typical Characteristics Diagrams

Figure 1. Output Characteristics

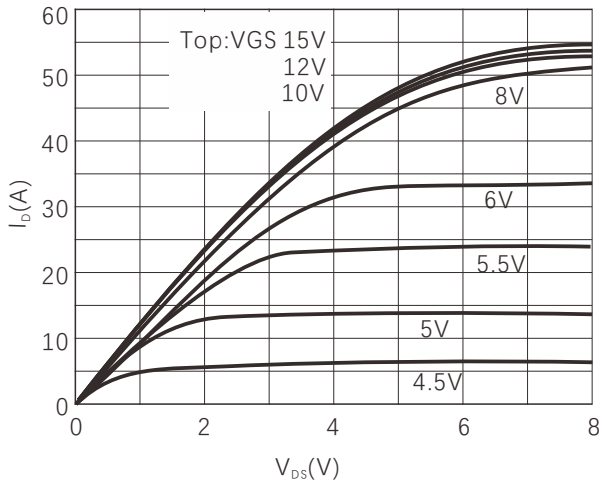


Figure 2. Normalized  $R_{DS(ON)}$  vs Temperature

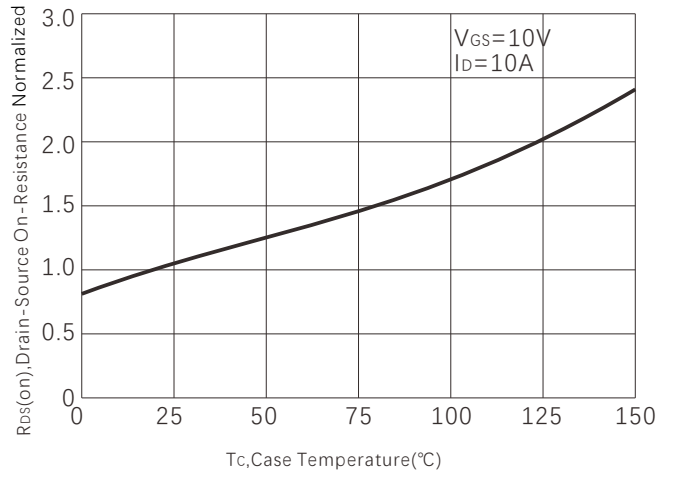


Figure 3. On-Resistance vs. Drain Current

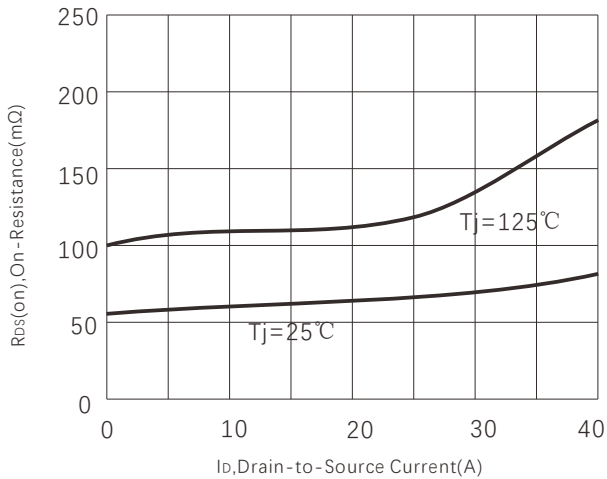


Figure 4. Capacitance

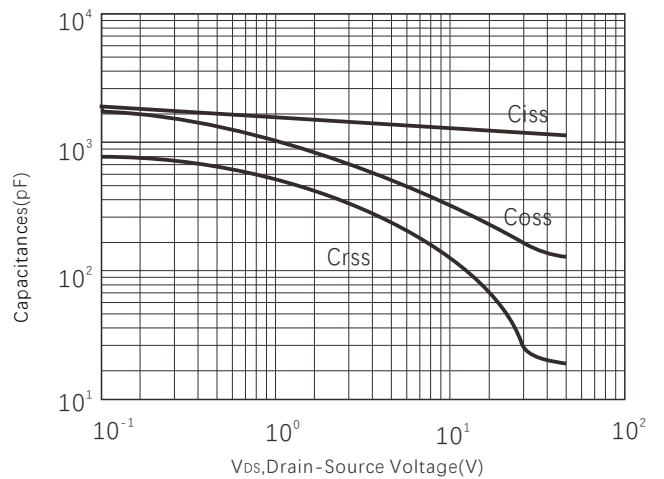


Figure 5. Gate charge

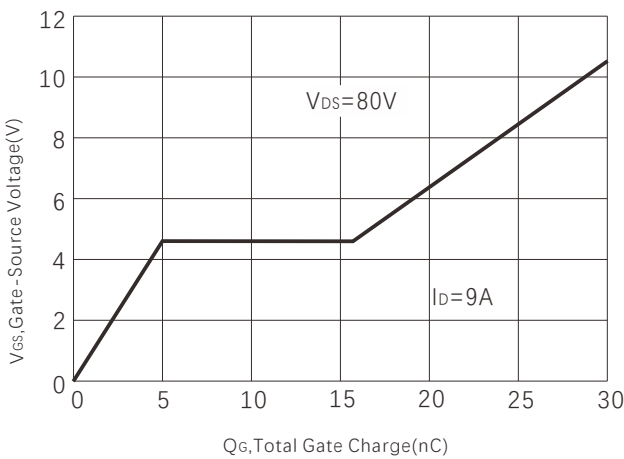


Figure 6. Source-Drain Diode Forward Voltage

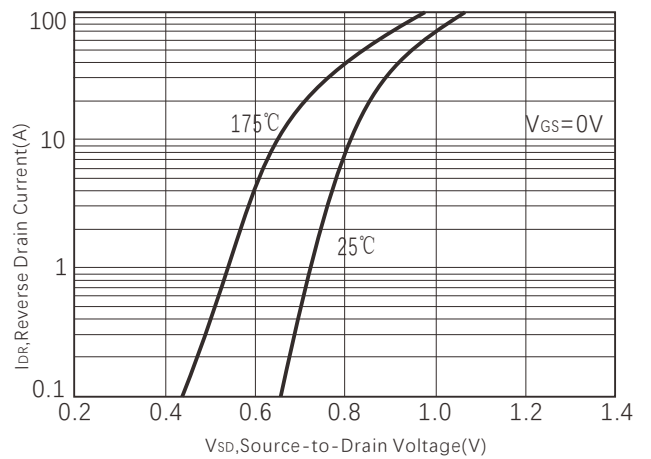


Figure 7. Maximum Drain Current vs Temperature

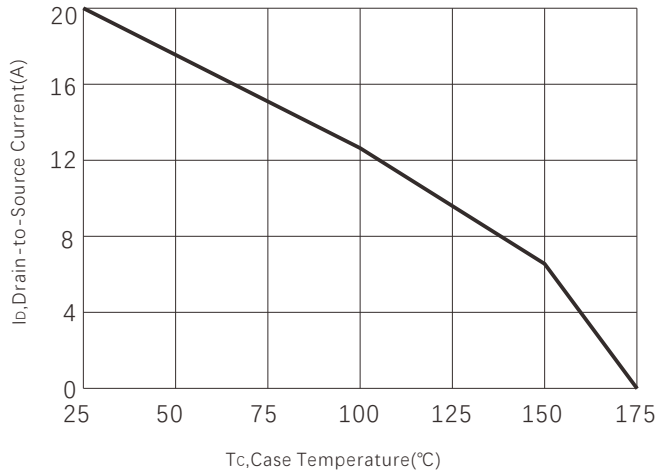


Figure 8. Normalized Drain-Source Voltage vs Temperature

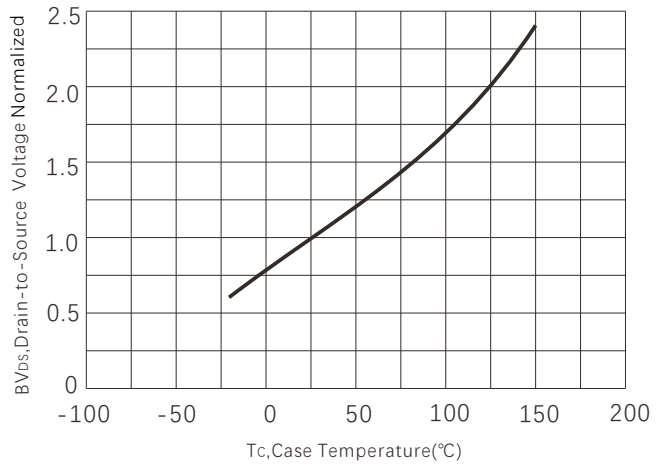
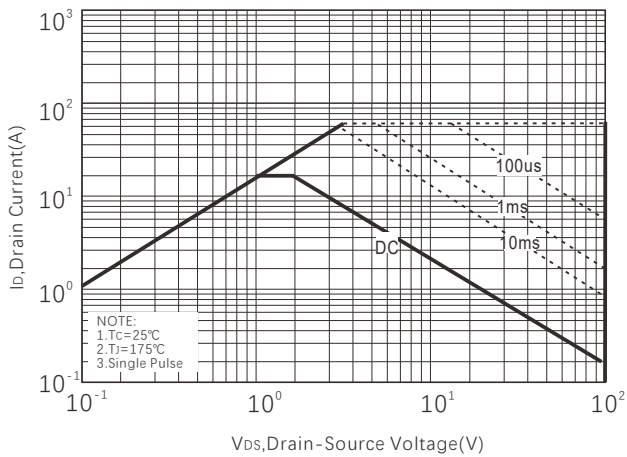
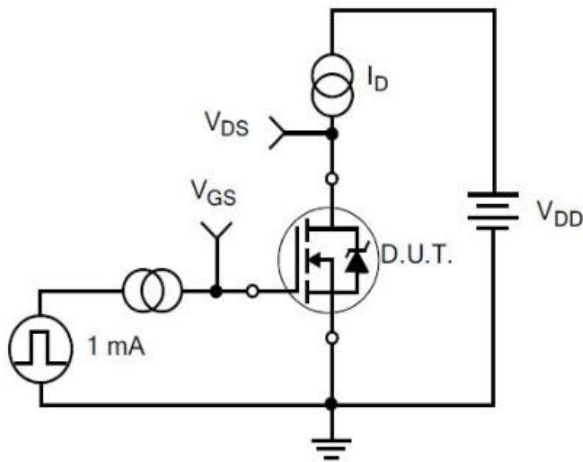


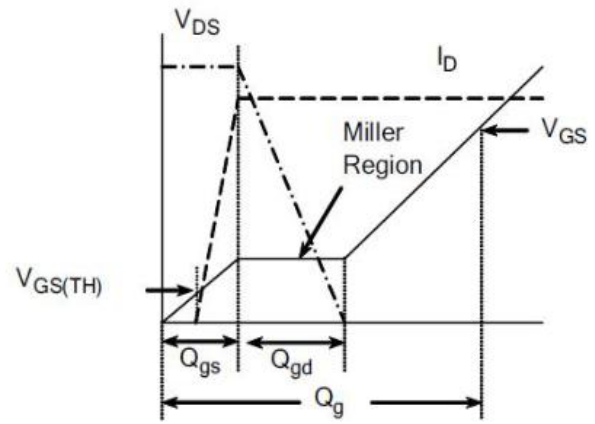
Figure 9. Safe operating area



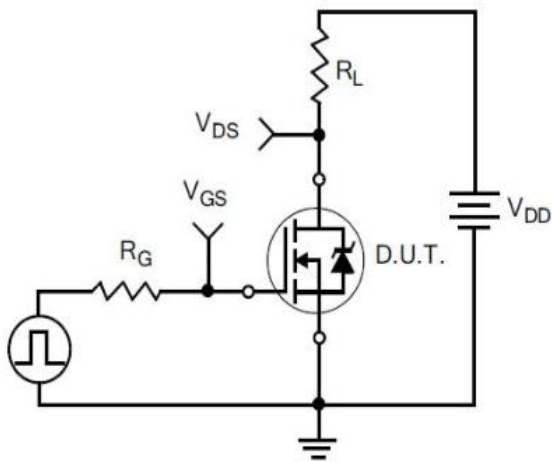
Typical Test Circuit



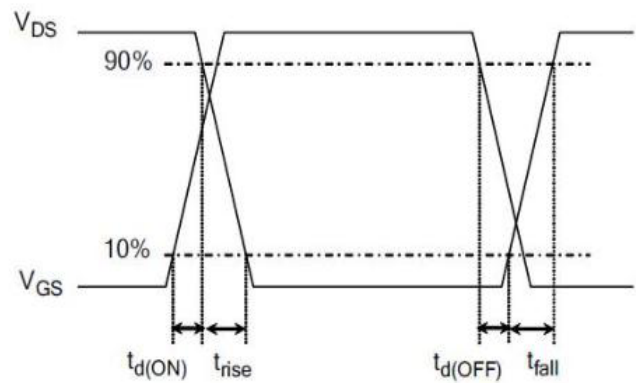
1) Gate Charge Test Circuit



2) Gate Charge Waveform

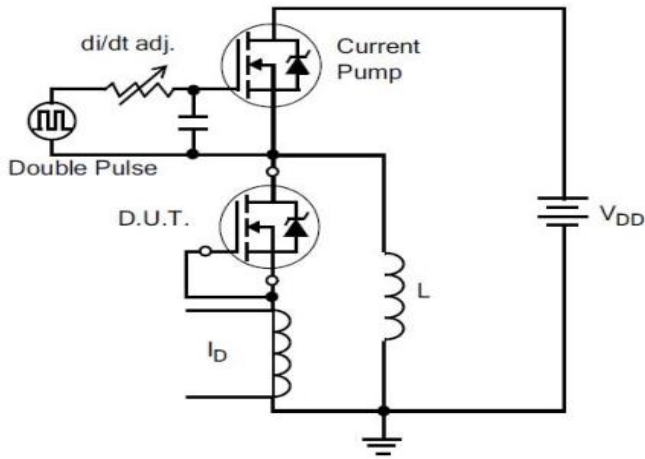


3) Resistive Switching Test Circuit

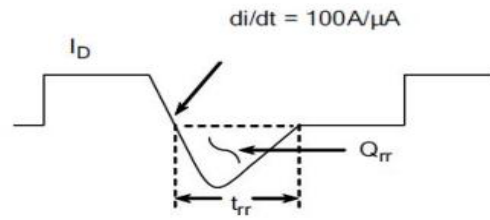


4) Resistive Switching Waveforms

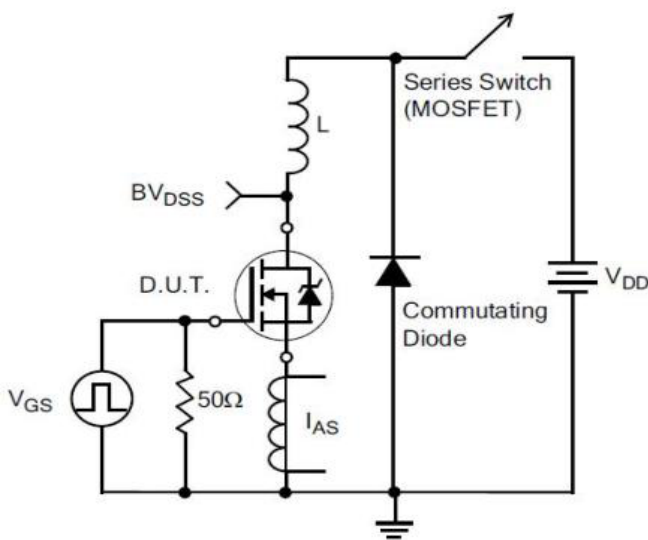
Typical Test Circuit



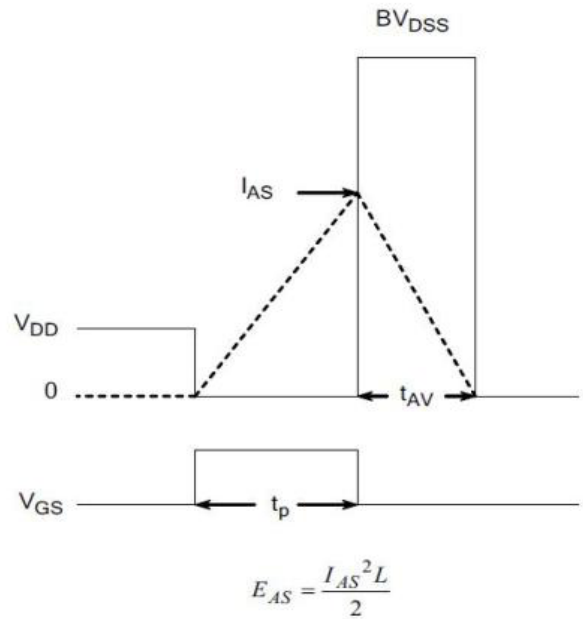
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

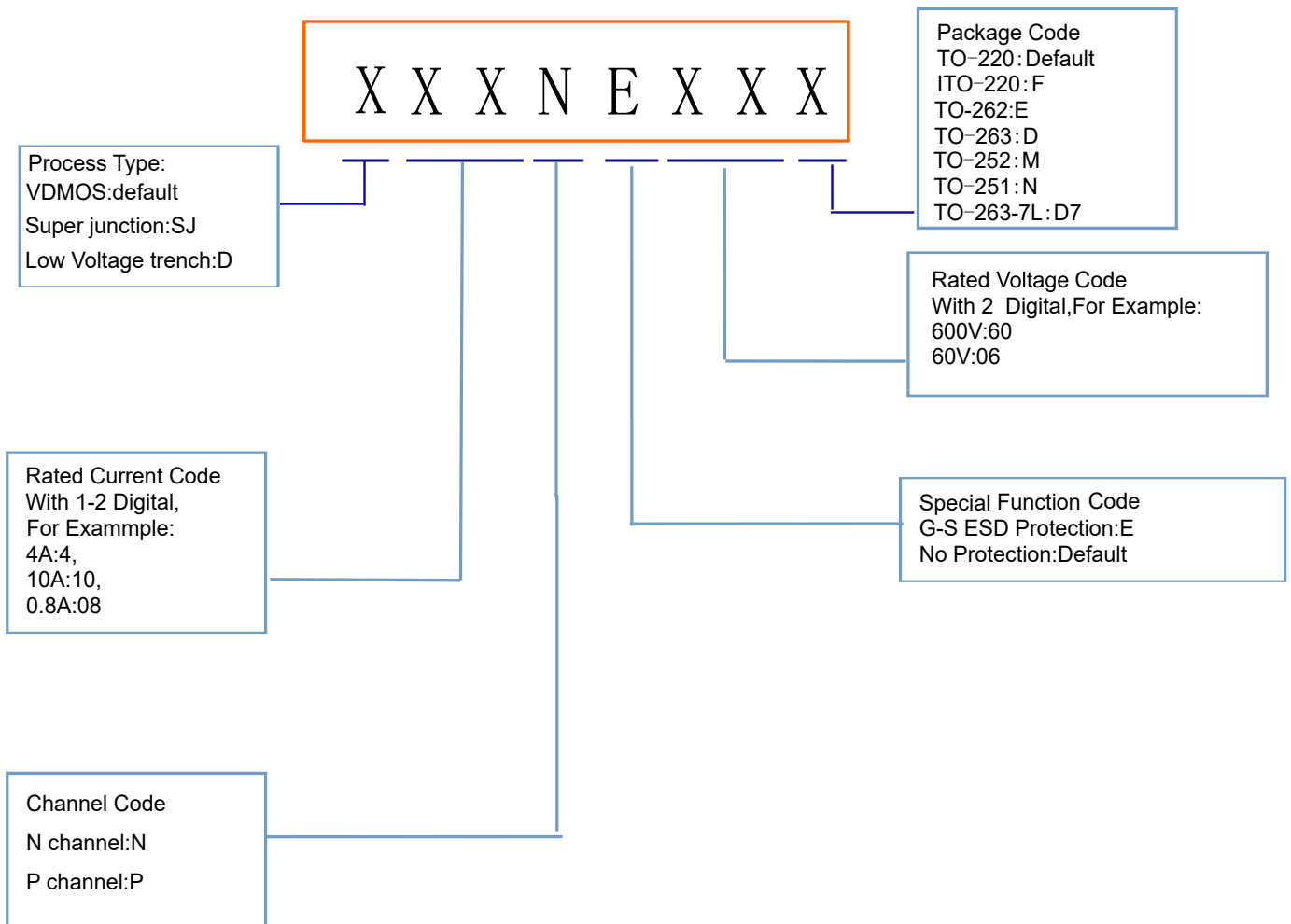


7) . Unclamped Inductive Switching Test Circuit



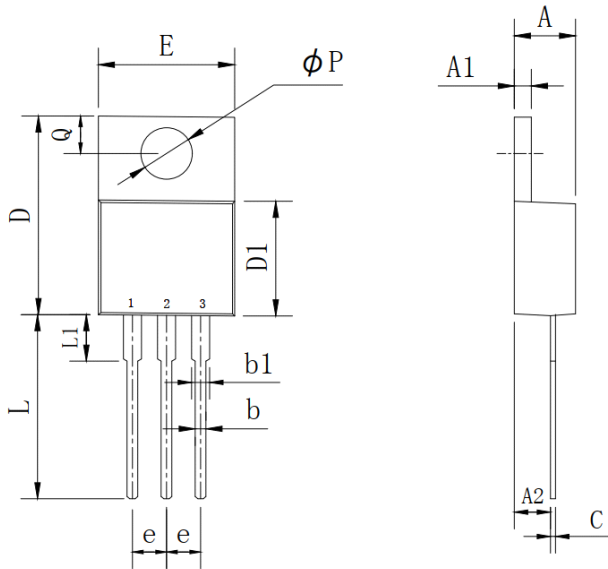
8) Unclamped Inductive Switching Waveforms

Product Names Rules



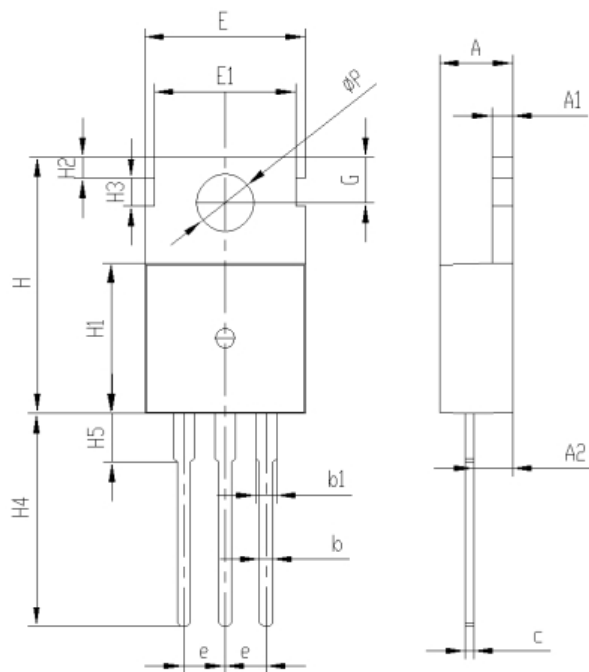
Dimensions

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
DI	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

TO-220C PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions (millimeters)	
	Min.	Max.
A	4.30	4.70
A1	1.17	1.37
A2	2.20	2.60
b	0.60	1.00
b1	1.17	1.37
b2	1.90	2.30
c	0.30	0.70
e	2.34	2.74
E	9.70	10.1
E1	8.50	8.90
H	15.5	15.9
H1	9.00	9.40
H2	1.10	1.50
H3	1.50	1.90
H4	12.58	13.58
H5	2.80	3.20
G	2.60	3.00
ΦP	3.40	3.80



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