

### General Description

These N-channel enhanced VDMOSFETS Used advanced trench technology design, provided excellent R<sub>ds(on)</sub> and low gate charge. Which accords with the RoHS standard.

Product Summary			
V <sub>DS</sub>	R <sub>DS(on)</sub> (mΩ) Typ	I <sub>D</sub> (A)	Q <sub>g</sub> (Typ)
150V	18 @ 10V	50	63nc

### Features

- Fast switching
- Low on-resistance
- Low gate charge and input capacitance
- 100% avalanche tested

### Mechanical Data

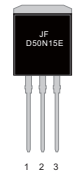
- Case: TO-220, ITO-220, TO-263, TO-262 Package

### Application

- Switching applications

### Ordering Information

Part No.	Package Type	Package	Quality(box)
D50N15	TO-220	Tube	1000
D50N15F	ITO-220	Tube	1000
D50N15D	TO-263	Tape & Reel	800
D50N15E	TO-262	Tube	1000



### Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

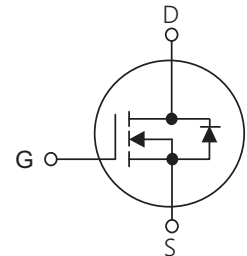


Table1 Absolute Maximum Ratings (T<sub>C</sub>=25°C, unless otherwise specified)

Parameter	Symbol	D50N15/D50N15D/D50N15E	D50N15F	Unit
Drain-Source Voltage	V <sub>DS</sub>	150		V
Gate-Source Voltage	V <sub>GS</sub>	±20		V
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> =25°C	50	A
		T <sub>C</sub> =100°C	36	
Pulsed Drain Current (Note 1)	I <sub>DM</sub>	180		A
Single Pulse Avalanche Energy(Note 2)	E <sub>AS</sub>	670		mJ
Avalanche Current(Note 1)	I <sub>AR</sub>	52		A
Power Dissipation T <sub>C</sub> =25°C	P <sub>D</sub>	180	54	W
Operating Junction and Storage Temperature	T <sub>J</sub> /T <sub>STG</sub>	-55 ~ +175		°C

Table 2. Thermal Characteristics

Parameter	Symbol	D50N15/D50N15D/D50N15E	D50N15F	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	75	$^{\circ}C/W$
Thermal resistance Junction to Case	$R_{\theta JC}$	1.7	3.57	$^{\circ}C/W$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	150			V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=150V, V_{GS}=0V$			1	$\mu A$
Gate- Source Leakage Current	Forward	$V_{GS}=20V, V_{DS}=0V$			100	nA
	Reverse	$V_{GS}=-20V, V_{DS}=0V$			-100	nA
On Characteristics(Note 4)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	3.1	4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=50A$		18	28	$m\Omega$
Dynamic Characteristics(Note 5)						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		2772		pF
Output Capacitance	$C_{OSS}$			349		pF
Reverse Transfer Capacitance	$C_{RSS}$			153		pF
Switching Characteristics (Note 5)						
Turn-On Delay Time	$t_d(on)$	$V_{DS}=100V, I_D=30A,$ $V_{GS}=10V, R_G=2.5\Omega$		16.1		ns
Turn-On Rise Time	$t_r$			55.7		ns
Turn-Off Delay Time	$t_d(off)$			38.4		ns
Turn-Off Fall Time	$t_f$			67.1		ns
Total Gate Charge	$Q_G$	$V_{DS}=100V, I_D=30A,$ $V_{GS}=10V$		63		nC
Gate-Source Charge	$Q_{GS}$			15		nC
Gate-Drain Charge	$Q_{GD}$			24		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=30A$		0.86	1.3	V
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				50	A
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_F=30A$		53		ns
Reverse Recovery Charge	$Q_{RR}$	$di_F/dt=100A/\mu s$ (Note 1)		103		nC

Notes : 1 Repetitive Rating: Pulse width limited by maximum junction temperature

2  $L=0.5mH, I_D=52A, V_{DD}=50V$ , Starting  $T_J=25^{\circ}C$

4 Pulse Test: Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$

5 Guaranteed by design, not subject to production

Typical Characteristics Diagrams

Figure 1: Power Dissipation

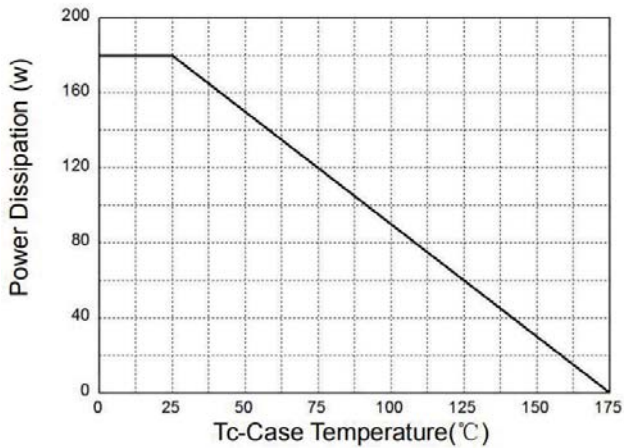


Figure 2: Drain Current

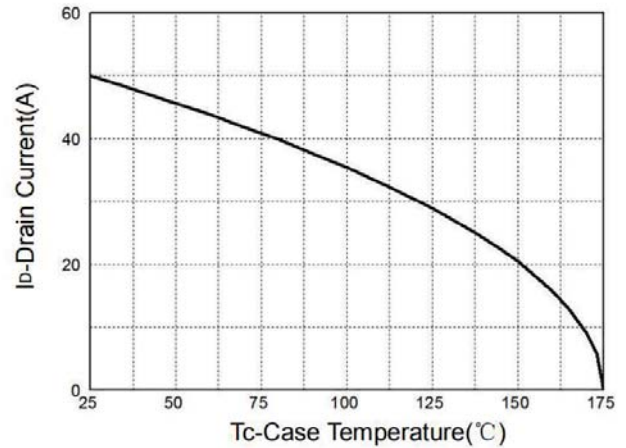


Figure 3: Safe Operation Area

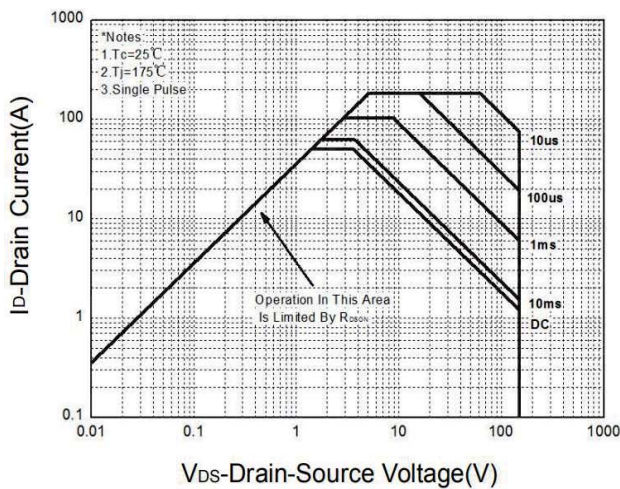
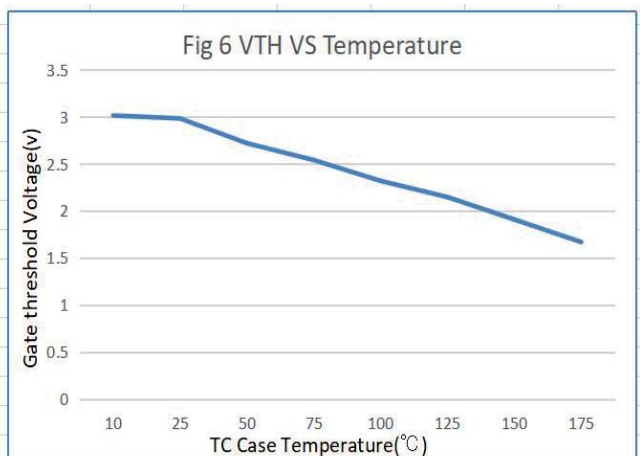
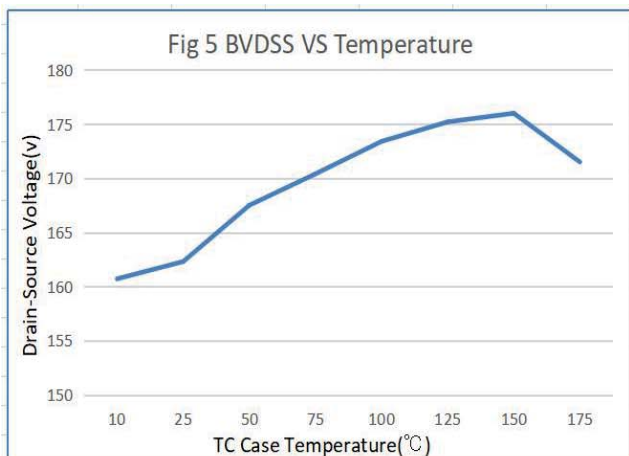
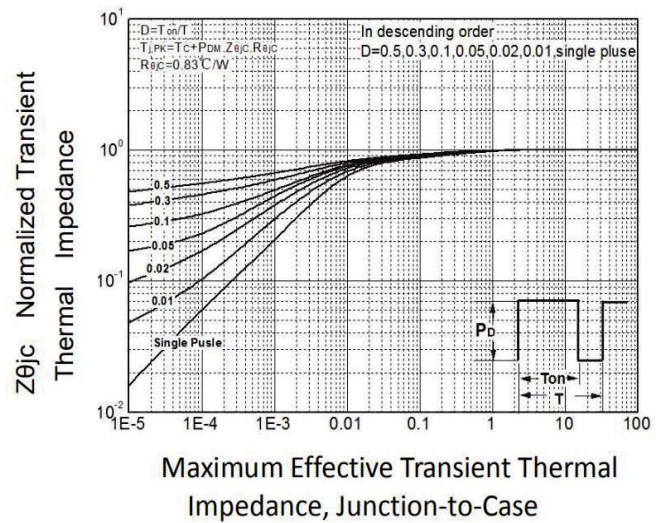
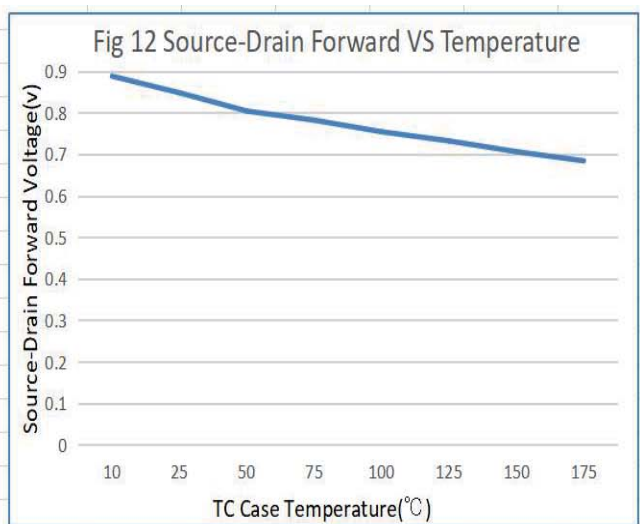
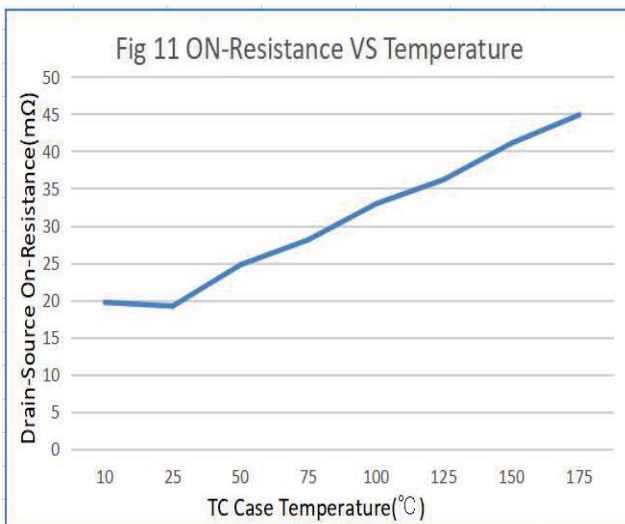
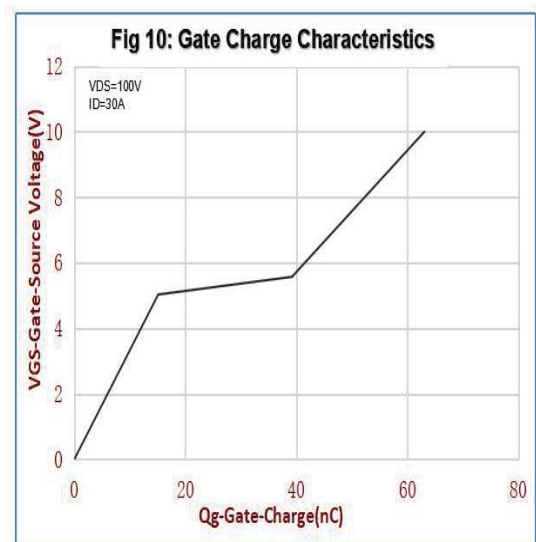
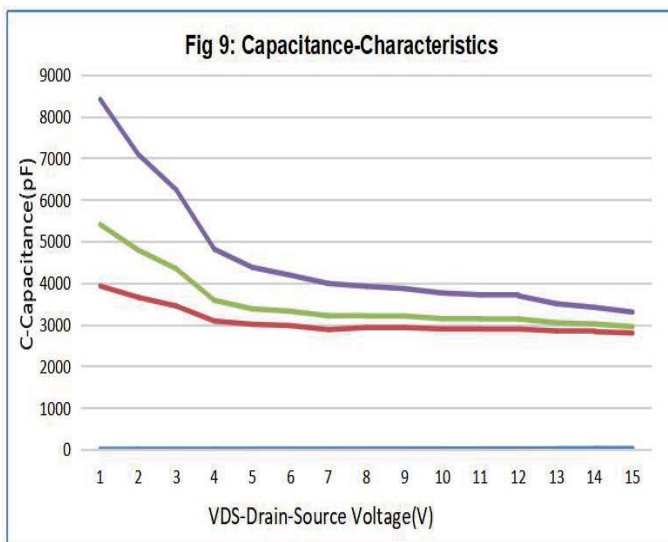
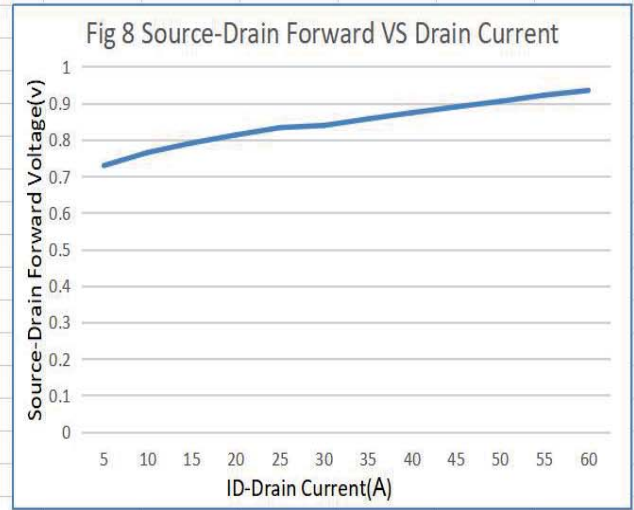
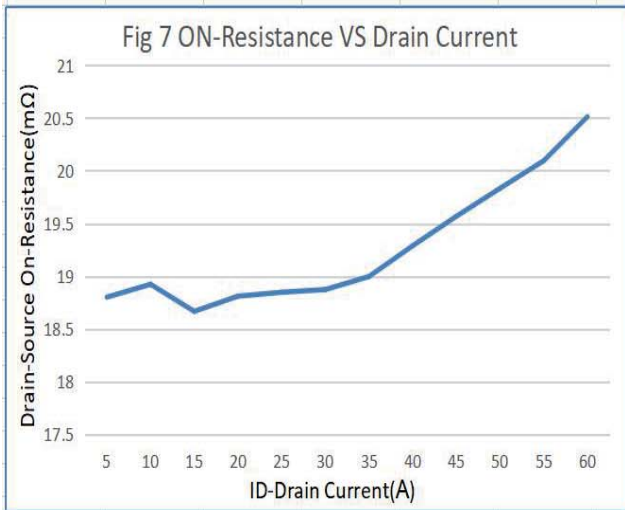


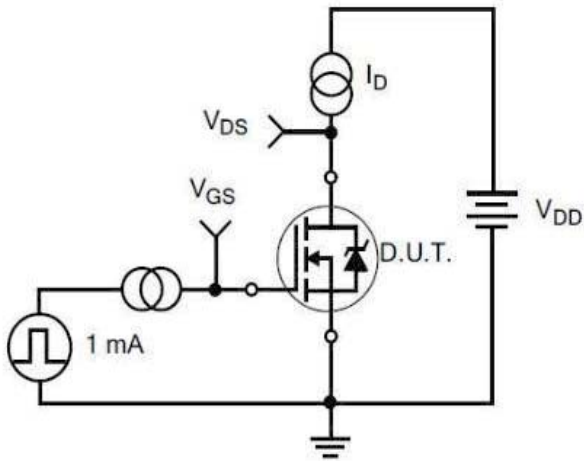
Figure 4: Thermal Transient Impedance



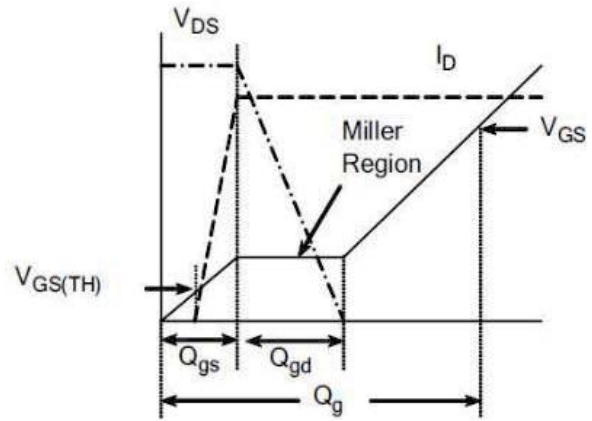
Typical Characteristics Diagrams



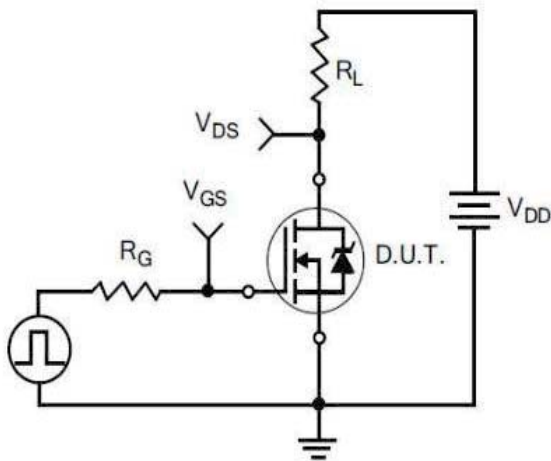
Typical Characteristics Diagrams



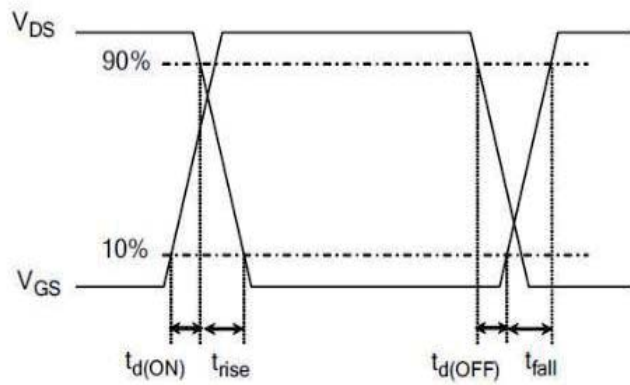
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

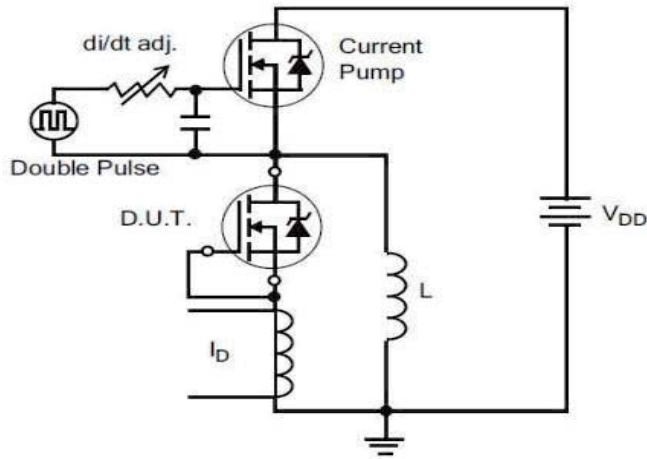


3) Resistive Switching Test Circuit

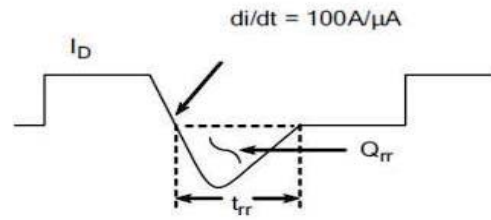


4) Resistive Switching Waveforms

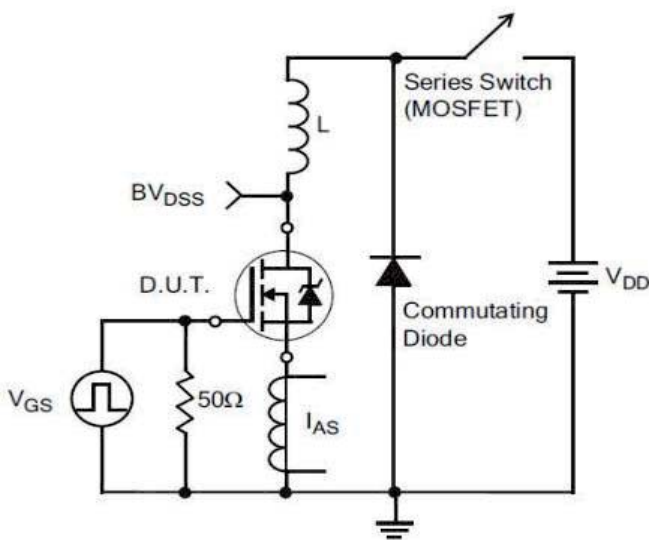
Typical Test Circuit



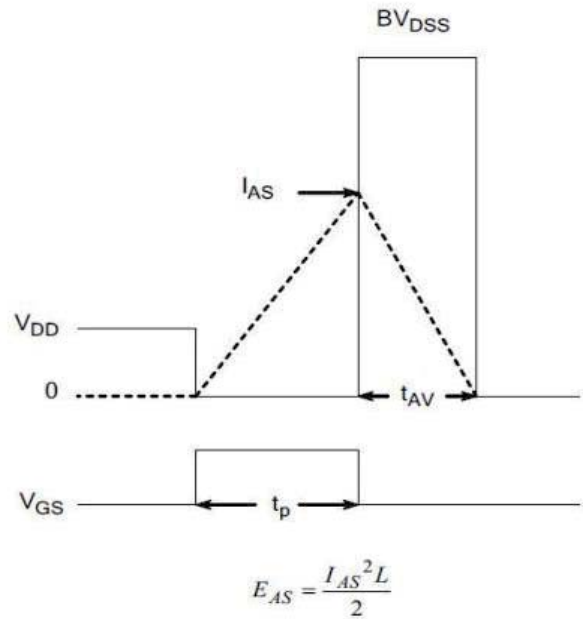
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

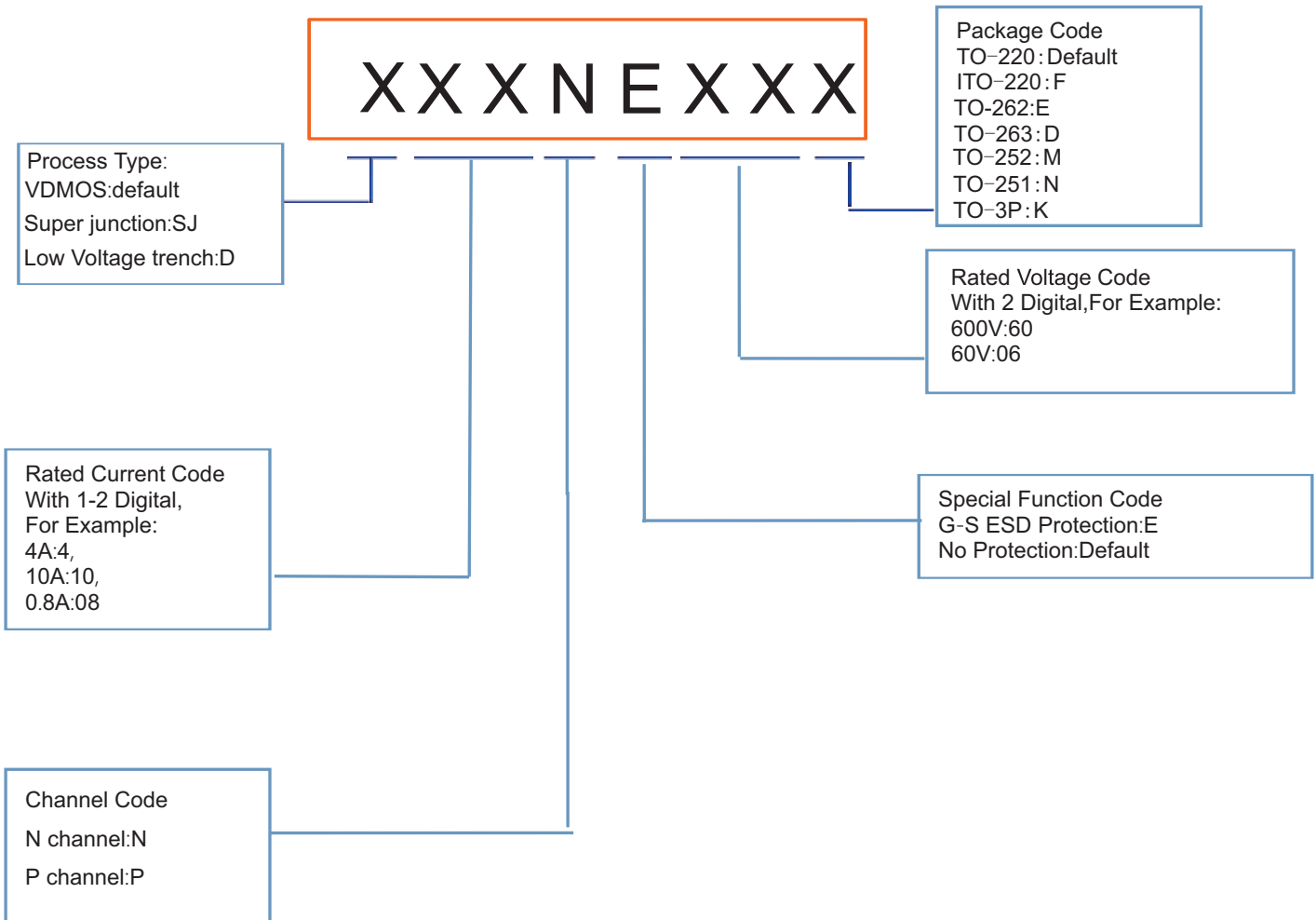


7) . Unclamped Inductive Switching Test Circuit



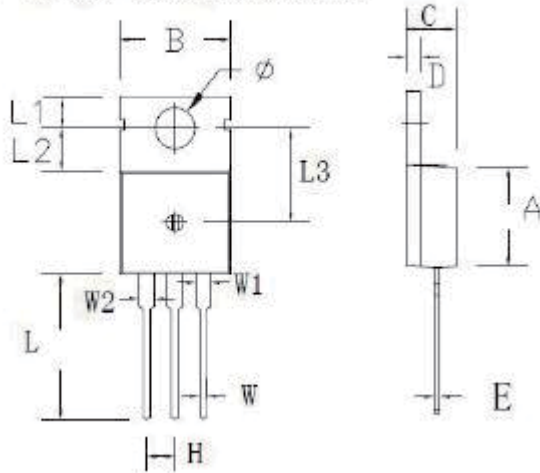
8) Unclamped Inductive Switching Waveforms

Product Names Rules



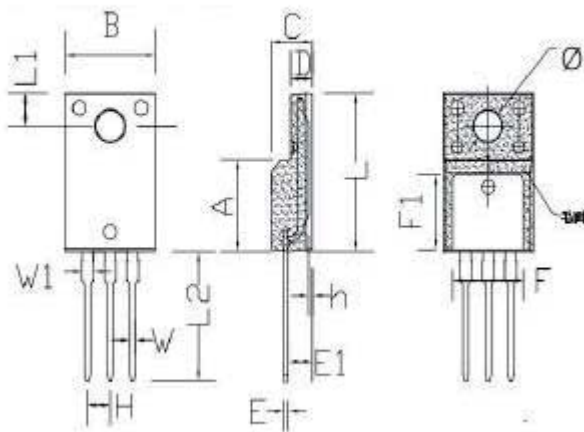
Dimensions

TO-220 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	9.70	10.30	0.382	0.406
C	4.25	4.75	0.167	0.187
D	1.20	1.45	0.047	0.057
E	0.40	0.60	0.016	0.024
H	2.54 TYP		0.100 TYP	
W	0.60	0.95	0.024	0.037
W1	1.05	1.45	0.041	0.057
W2	1.20	1.60	0.047	0.063
L	12.60	13.40	0.496	0.528
L1	2.45	2.95	0.096	0.116
L2	3.45	3.95	0.136	0.156
L3	8.15	8.65	0.321	0.341
$\phi$	3.50	3.90	0.138	0.154

ITO-220 PACKAGE OUTLINE DIMENSIONS

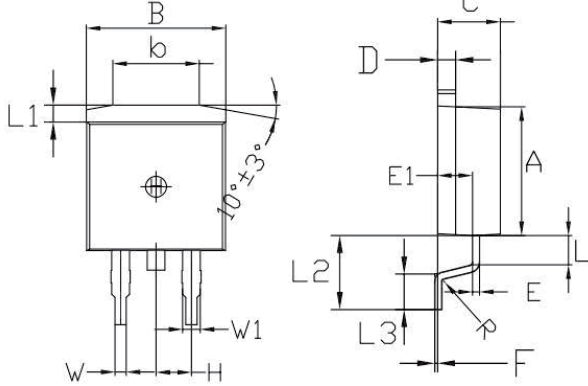


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	10.00	10.50	0.394	0.413
C	4.30	4.90	0.169	0.193
D	2.30	2.70	0.091	0.106
L	15.55	16.15	0.612	0.636
h	0.40	0.60	0.016	0.024
L1	3.15	3.55	0.124	0.140
L2	12.65	13.35	0.498	0.526
W	0.70	0.90	0.028	0.035
W1	1.15	1.55	0.045	0.061
H	2.54 TYP		0.100 TYP	
E	0.48	0.53	0.019	0.021
$\phi$	2.90	3.40	0.114	0.134
E1	2.40	2.90	0.094	0.114
F	7.75	8.25	0.305	0.325
F1	7.35	7.85	0.289	0.309



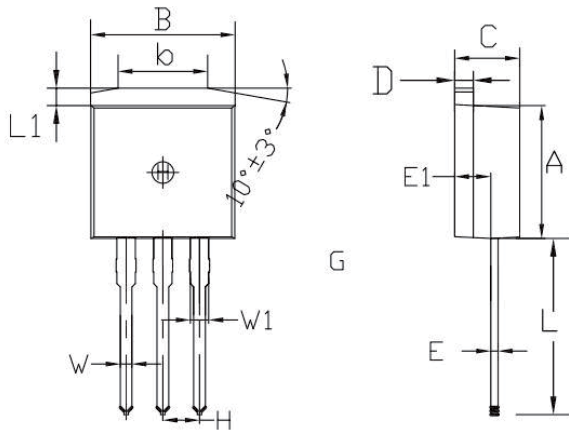
Dimensions

TO-263 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	9.70	10.30	0.382	0.406
C	4.25	4.75	0.167	0.187
D	1.20	1.45	0.047	0.057
E	0.40	0.60	0.016	0.024
L	1.90	2.30	0.075	0.091
L1	1.15	1.45	0.045	0.057
R	0.24	0.26	0.0095	0.0102
W	0.80	0.82	0.0315	0.0323
W1	1.20	1.30	0.047	0.051
H	2.54 TYP		0.200 TYP	
b	5.50	6.50	0.216	0.256
E1	2.4	2.6	0.0946	0.1024
L2	5.20	5.80	0.205	0.228
L3	2.20	3.20	0.087	0.126
F	0.03	0.23	0.0012	0.0091

TO-262 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	min.	max.	min.	max.
A	8.80	9.30	0.346	0.366
B	9.70	10.30	0.382	0.406
C	4.25	4.75	0.167	0.187
D	1.20	1.45	0.047	0.057
E	0.40	0.60	0.016	0.024
L	12.25	13.75	0.482	0.541
L1	1.15	1.45	0.045	0.057
E1	2.4	2.6	0.0945	0.1024
W	0.80	0.82	0.0315	0.034
W1	1.20	1.30	0.047	0.051
H	2.54 TYP		0.200 TYP	
b	5.50	6.50	0.216	0.256

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