SEMICONDUCTOR

D250N088 Series

250A 88V 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.

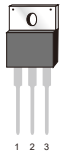
Product Summary			
V_{DS}	$R_{DS(on)}$ (mΩ) Typ	I_D (A)	Qg (Typ)
88V	2.0@ 10V	250	201nc

Features

- Fast switching
- Low on-resistance
- Low gate charge
- 100% Single Pulse Avalanche Energy Test

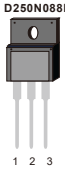
TO-220

D250N088



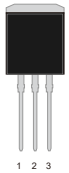
ITO-220

D250N088F



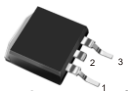
TO-262

D250N088E



TO-263

D250N088D



Mechanical Data

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

Ordering Information

Part No.	Package Type	Package	Quality(box)
D250N088	TO-220	Tube	1000
D250N088F	ITO-220	Tube	1000
D250N088D	TO-263	Tape & Reel	800
D250N088E	TO-262	Tube	1000

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

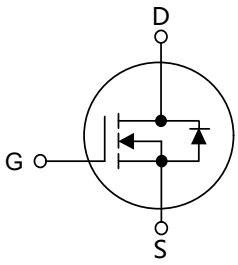


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	TO-220/TO-263/TO-262	ITO-220	Unit
Drain-Source Voltage		V_{DS}	88		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current	T_C=25°C	I_D	250		A
	T_C=100°C		175		
Pulsed Drain Current (Note 1)		I_{DM}	1000		A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	2000		mJ
Power Dissipation T_C=25°C		P_D	300	80	W
Isolation Voltage		V_{ISO}	/	2500	V
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~ +175		°C
Maximum Temperature for soldering		T_L	300		°C

Table 2.Thermal Characteristics

Parameter	Symbol	TO-220/TO-263/TO-262	ITO-220	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	75	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	0.5	1.88	°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	88	--	--	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=88V,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 4)							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250μA	2.0	3.0	4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V,I_D=80A	--	2.0	2.6	mΩ
Dynamic Characteristics(Note 5)							
Input Capacitance		C_{ISS}	V_{DS}=90V,V_{GS}=0V,f=1MHz	--	13700	--	pF
Output Capacitance		C_{OSS}		--	2200	--	pF
Reverse Transfer Capacitance		C_{RSS}		--	48	--	pF
Switching Characteristics (Note 5)							
Turn-On Delay Time		td(on)	V_{DS}=45V,I_D=125A, V_{GS}=10V,R_{GEN}=4.7Ω	--	55	--	ns
Turn-On Rise Time		t_R		--	164	--	ns
Turn-Off Delay Time		td(off)		--	159	--	ns
Turn-Off Fall Time		tf		--	145	--	ns
Total Gate Charge		Q_G	V_{DS}=45V,I_D=125A, V_{GS}=10V	--	201	--	nC
Gate-Source Charge		Q_{GS}		--	82.9	--	nC
Gate-Drain Charge		Q_{GD}		--	34.9	--	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=65A	--	--	1.46	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		--	--	487	A
Reverse Recovery Time		trr	V_{GS}=0V, I_F=90A dI$_F$/dt=100A/μs (Note 1)	--	96.5	--	ns
Reverse Recovery Charge		Q_{RR}		--	164.8	--	nC

Notes: 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=0.5mH, I_D=90A,V_{DD}=50V,V_{GATE}=100V,Starting T_J=25°C
4 Pulse Test: Pulse width ≤300μS, Duty cycle≤2%
5 Guaranteed by design,not subject to production

Typical characteristics diagrams

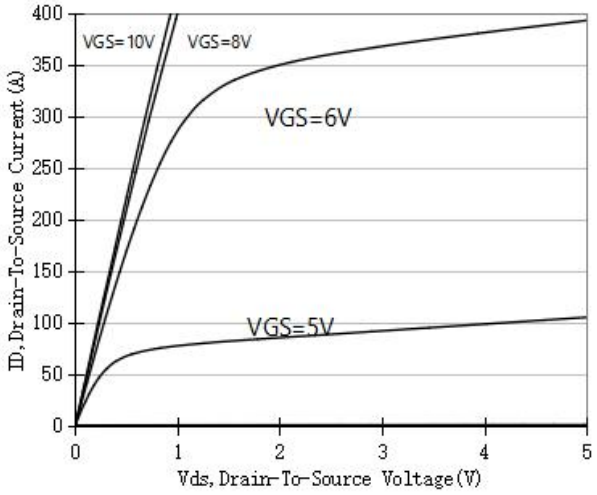


Fig 1. Output Characteristics

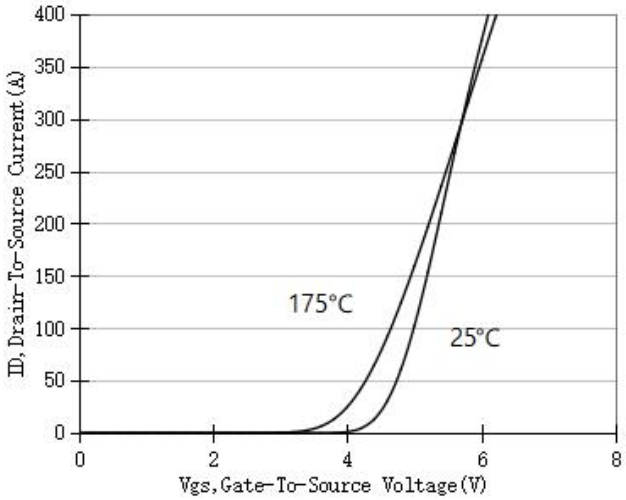


Fig 2. Transfer Characteristics

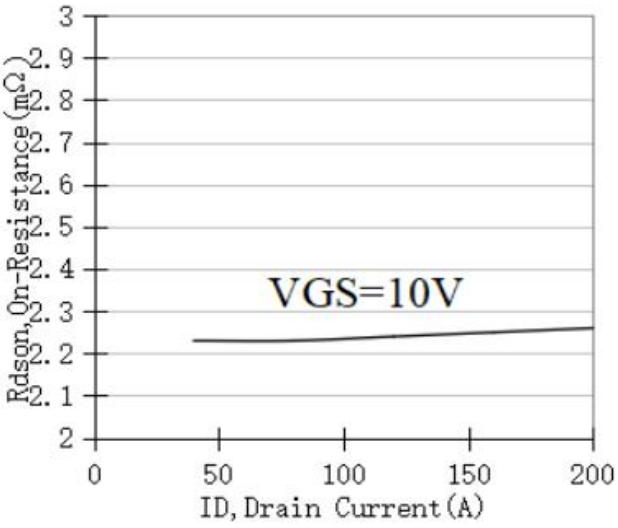


Fig 3. Rdson-Drain Current

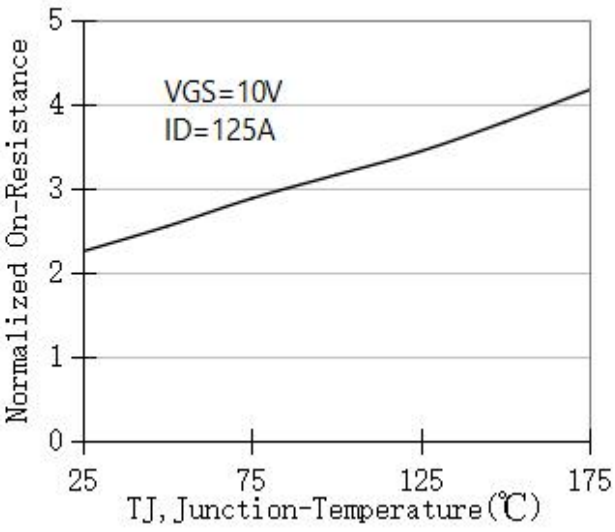


Fig 4. Rdson-Junction Temperature

Typical characteristics diagrams

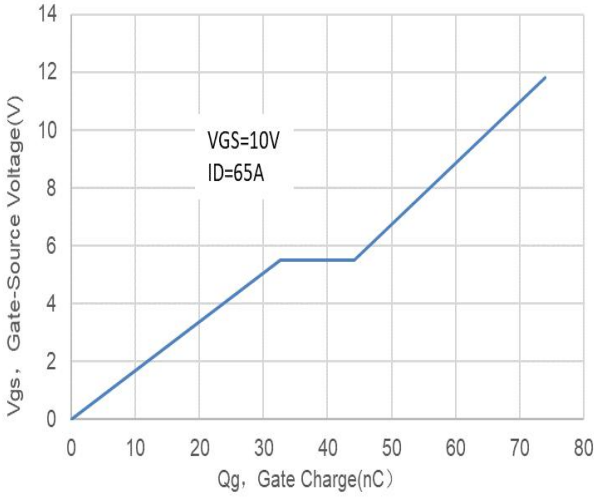


Fig 5. Gate Charge

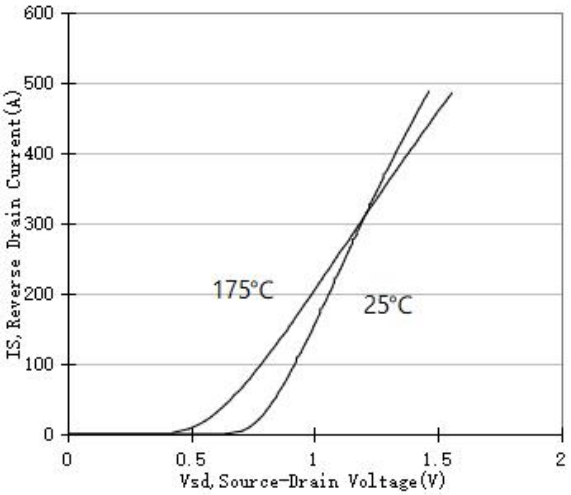


Fig 6. Source-Drain Diode Forward

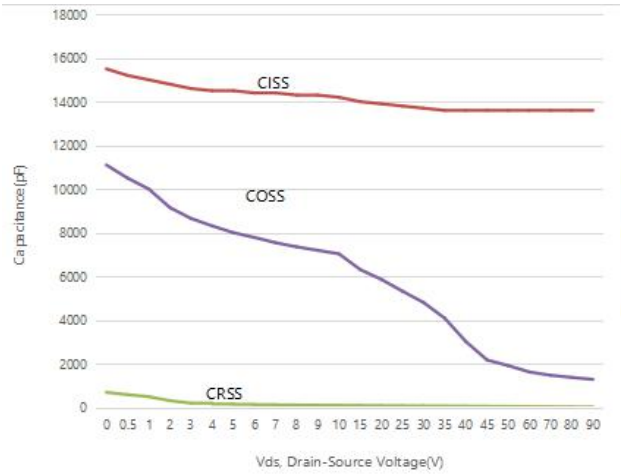


Fig 7. Capacitance vs Vds

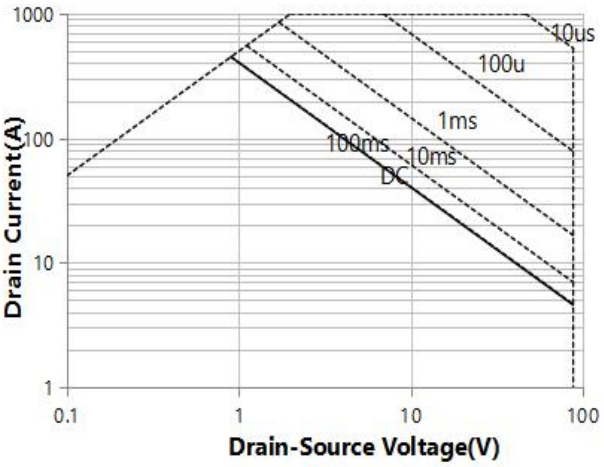


Fig 8. Safe Operation Area

Typical characteristics diagrams

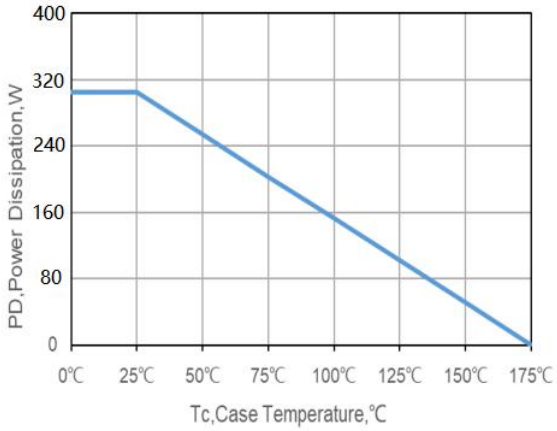


Fig 9. Power De-rating

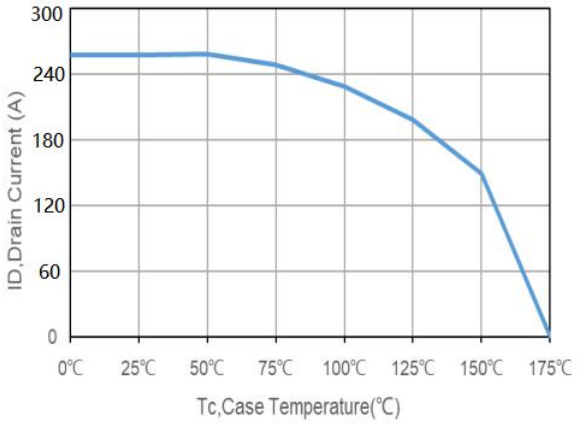


Fig 10. Current De-rating

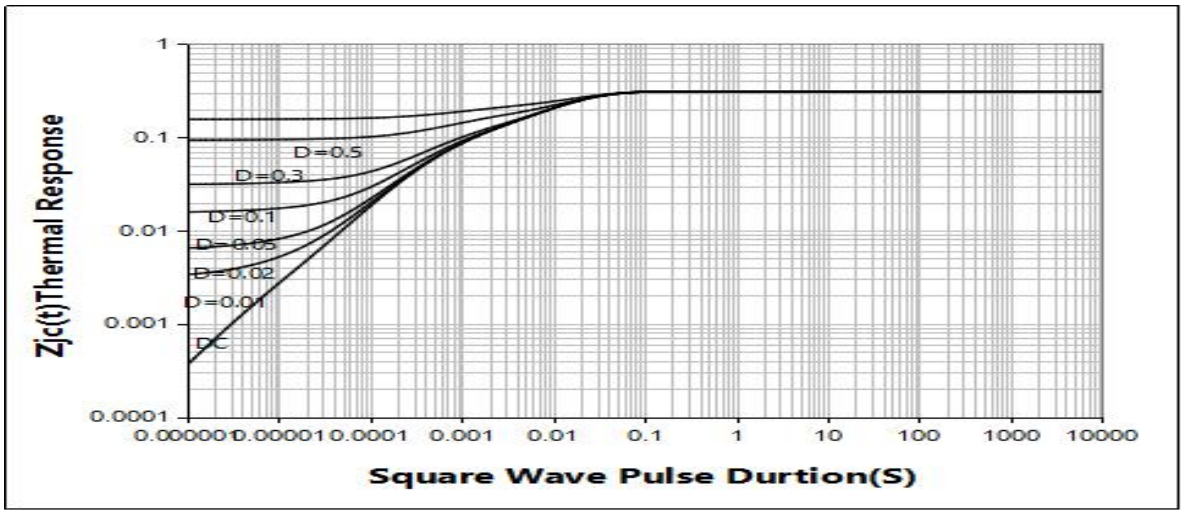
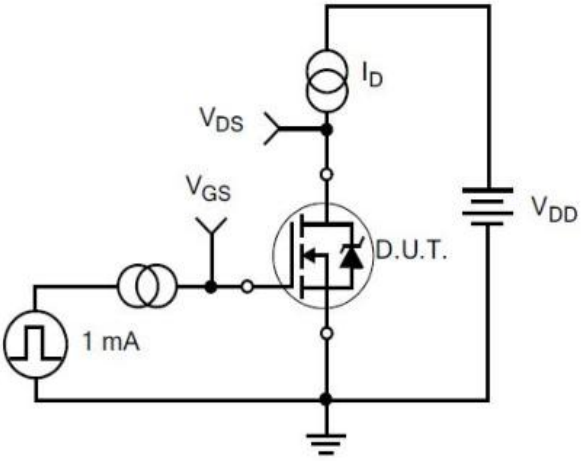
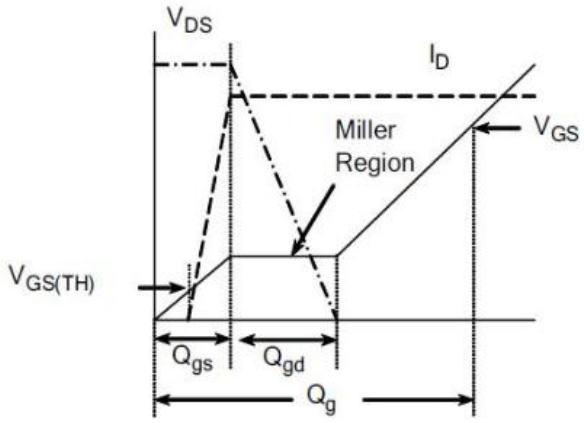


Fig 11. Normalized Maximum Transient Thermal Impedance

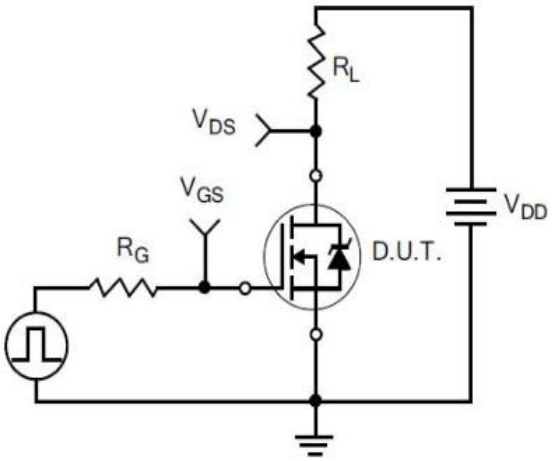
Typical Test Circuit



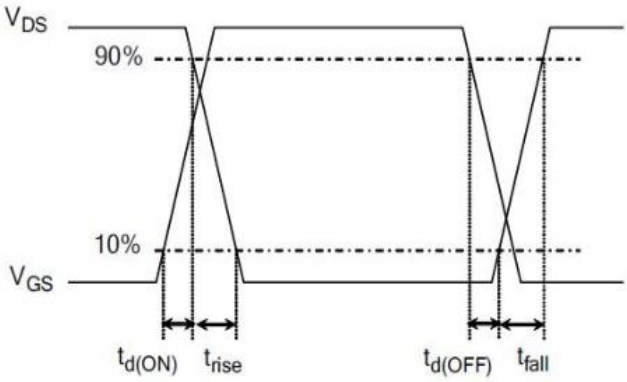
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

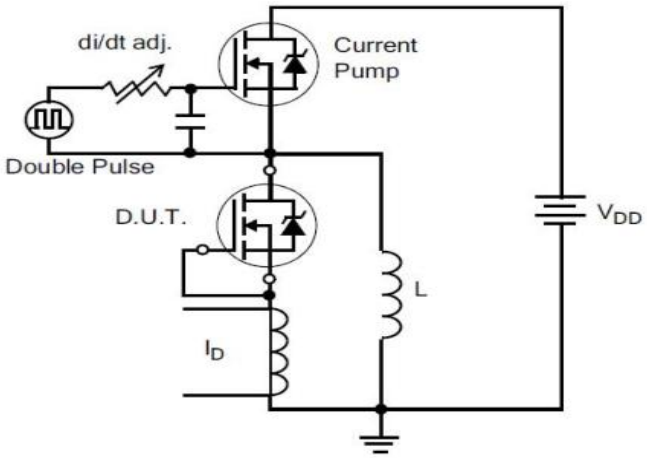


3) Resistive Switching Test Circuit

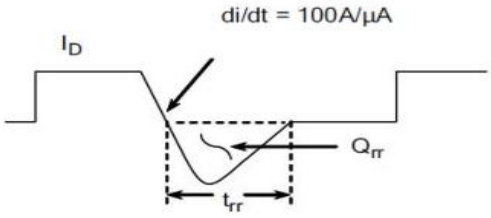


4) Resistive Switching Waveforms

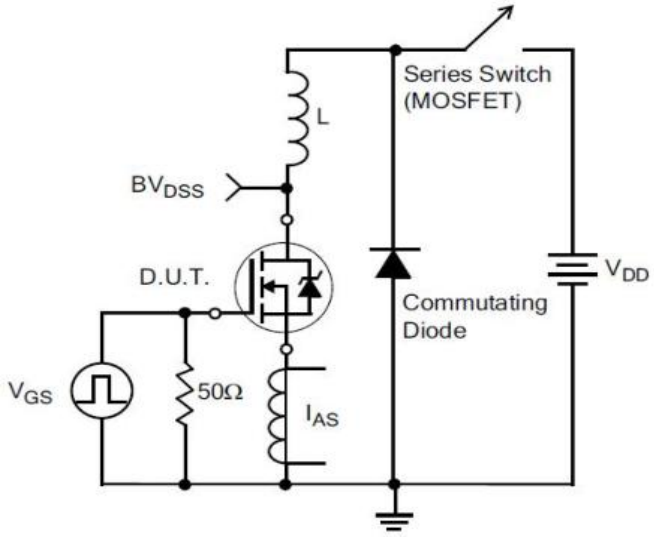
Typical Test Circuit



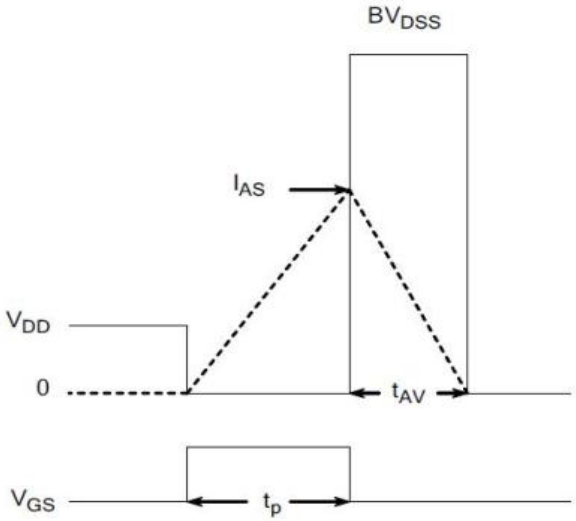
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



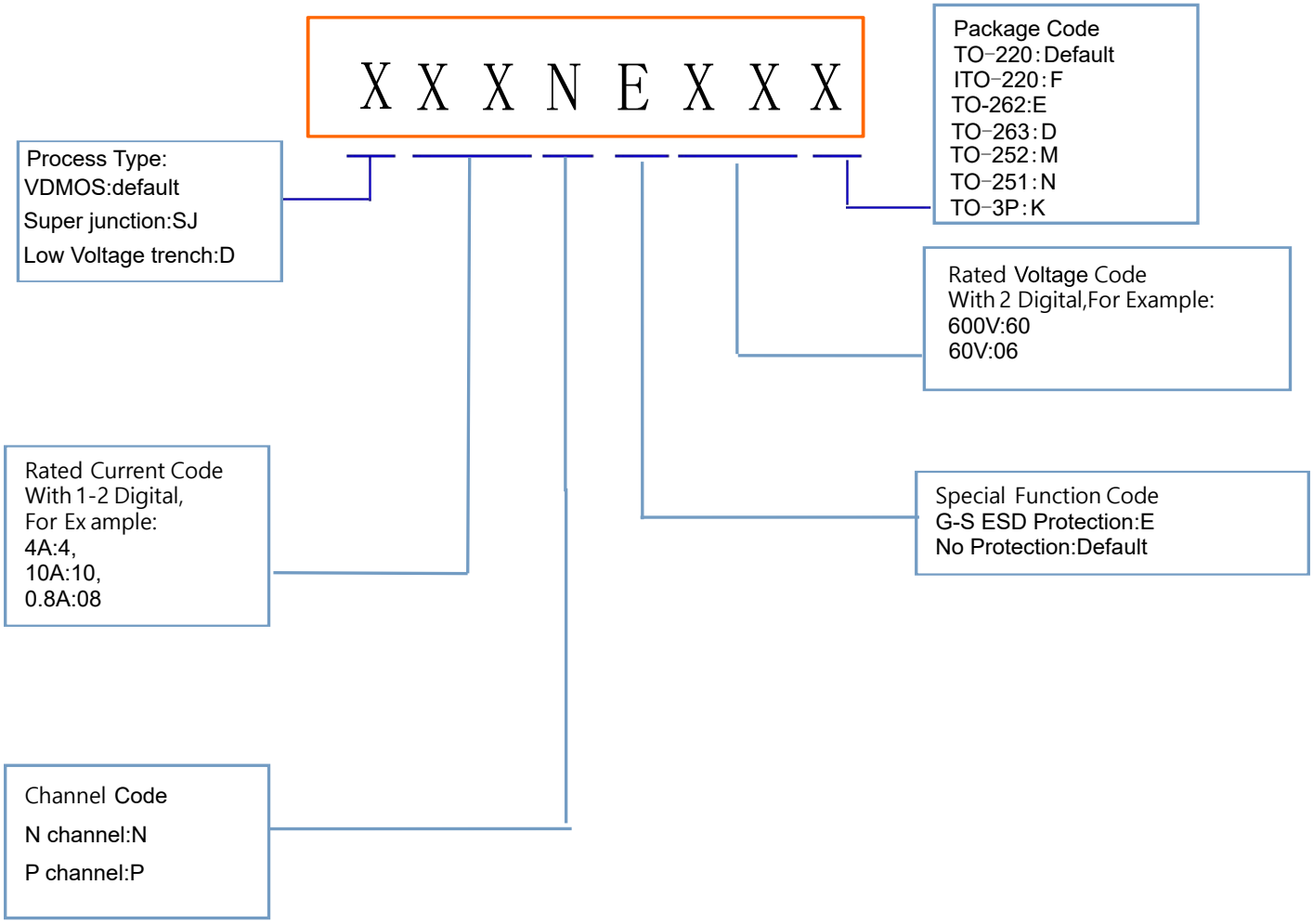
7) . Unclamped Inductive Switching Test Circuit



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

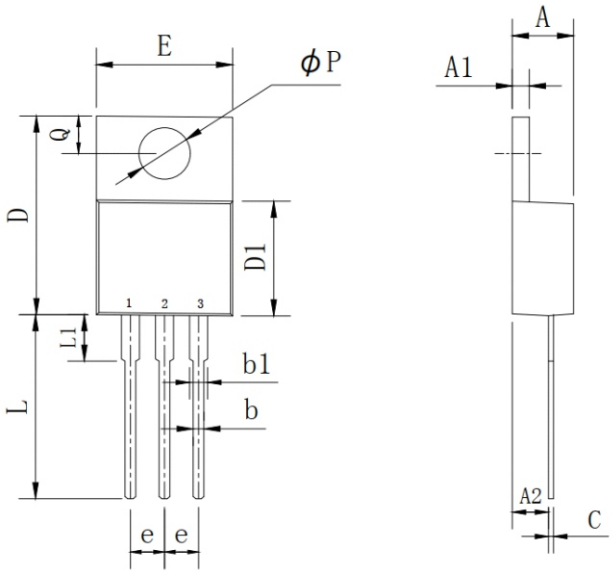
8) Unclamped Inductive Switching Waveforms

Product Names Rules



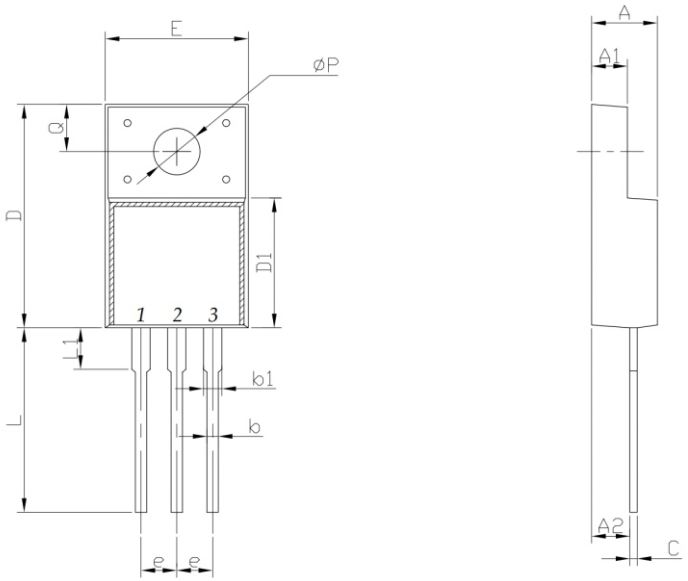
Dimensions

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

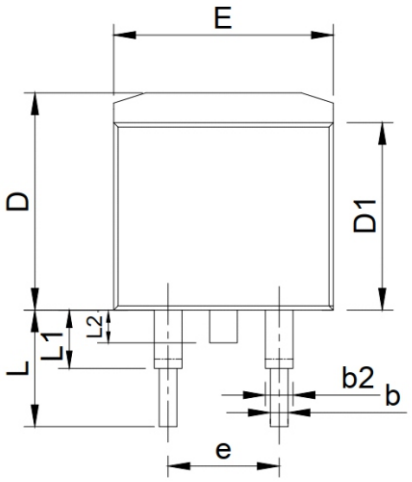
ITO-220 PACKAGE OUTLINE DIMENSIONS

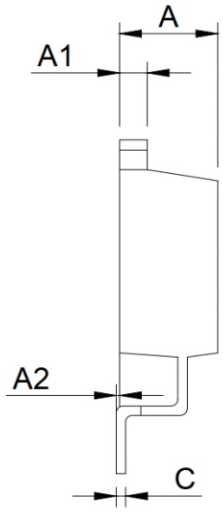


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
L	12.6	14	0.496	0.551
L1	2.45	4.3	0.096	0.169
P	2.9	3.8	0.114	0.150
Q	2.5	3.55	0.098	0.140

Dimensions

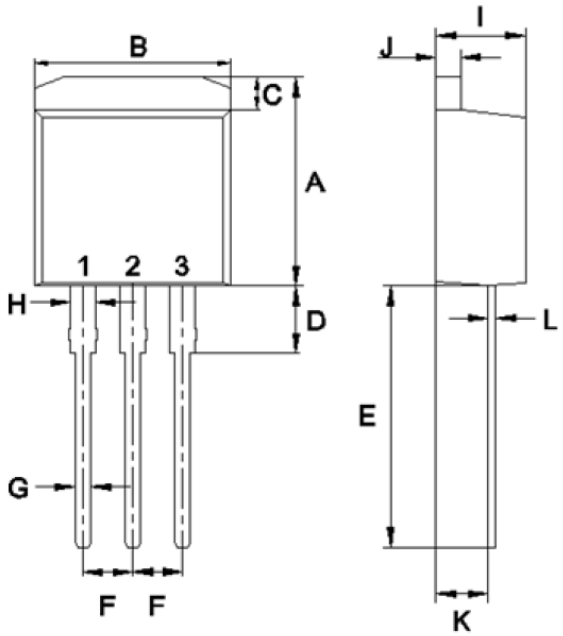
TO-263 PACKAGE OUTLINE DIMENSIONS





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	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192	0.208
L	4.46	5.85	0.176	0.230
L1	1.33	2.33	0.052	0.092
L2	0	2.2	0.000	0.087

TO-262 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	10.14	11.14	0.399	0.439
B	9.57	10.57	0.377	0.416
C	1.15	1.84	0.045	0.072
D	2.95	3.95	0.116	0.156
E	12.25	13.75	0.482	0.541
F	2.34	2.74	0.092	0.108
G	0.51	1.11	0.020	0.044
H	0.97	1.57	0.038	0.062
I	4.25	4.87	0.167	0.192
J	1.07	1.47	0.042	0.058
K	2.03	2.92	0.080	0.115
L	0.3	0.6	0.012	0.024

Friendship Reminder

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