SEMICONDUCTOR

D50N10 Series

50A 100V N-Channel Enhancement Mode Power MOSFET

Genaral Description

These N-channel enhancement mode power mosfets used advanced SGT 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)
100V	18 @ 10V 25A	50	17nc

Features

- Fast switching
- Low reverse transfer capacitances
- Low gate charge and Low on-resistance
- 100% avalanche tested

Mechanical Data

- Case:TO-220,ITO-220, TO-263, TO-263-7L，TO-262, TO-251, TO-252 Package

TO-220 D50N10

ITO-220 D50N10F

TO-263 D50N10D

Application

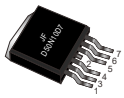
- Power switching applications
- DC-DC converters
- Full bridge control

TO-262 D50N10E

TO-251 D50N10N

TO-252 D50N10M

TO-263-7L D50N10D7



Ordering Information

Part No.	Package Type	Package	Quality(box)
D50N10	TO-220	Tube	1000
D50N10F	ITO-220	Tube	1000
D50N10D	TO-263	Tape & Reel	800
D50N10E	TO-262	Tube	1000
D50N10N	TO-251	Tube	1000
D50N10M	TO-252	Tape & Reel	2500
D50N10D7	TO-263-7L	Tape & Reel	800

Pin Definition:

1. Gate
2. Drain
3/4/5/6/7. Source

Block Diagram

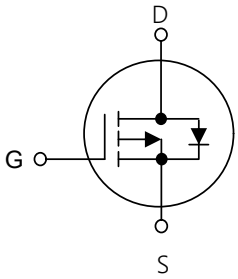


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter	Symbol	D50N10/D50N10D/D50N10E D50N10M/D50N10N D50N10D7	D50N10F	Unit
Drain-Source Voltage	V_{DS}	100		V
Gate-Source Voltage	V_{GS}	±20		V
Continuous Drain Current T_C=25°C	I_D	50	50 ※	A
Pulsed Drain Current (Note 1)	I_{DM}	188		A
Single Pulse Avalanche Energy(Note 2)	E_{AS}	150		mJ
Avalanche Current(Note 2)	I_{AR}	25		A
Power Dissipation T_C=25°C	P_D	115	35	W
Operating Junction and Storage Temperature	T_J/T_{STG}	-55~+175		°C

※ limited by maximum junction temperature

Table 2.Thermal Characteristics

Parameter	Symbol	D50N10/D50N10D/ D50N10M/D50N10N D50N10E/D50N10D7	D50N10F	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	75	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	1.3	4.29	°C/W

Table 3. Electrical Characteristics (T_C=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=25A	-	18	25	mΩ
Dynamic Characteristics(Note 4)							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V,f=1MHz	-	1322	-	pF
Output Capacitance		C_{OSS}		-	358	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	46	-	pF
Gate Resisitance		R_G	V_{DD}=0V,V_{GS}=0V,F=1MHz	-	1.5	-	Ω
Switching Characteristics (Note 4)							
Turn-On Delay Time		td(on)	V_{DD}=50V,I_D=47A V_{GS}=10V,R_{GEN}=25Ω,	-	24	-	ns
Turn-On Rise Time		t_R		-	13	-	ns
Turn-Off Delay Time		td(off)		-	27	-	ns
Turn-Off Fall Time		tf		-	10	-	ns
Total Gate Charge		Q_G	V_{DD}=80V,I_D=47A, V_{GS}=10V	-	17	-	nC
Gate-Source Charge		Q_{GS}		-	8.1	-	nC
Gate-Drain Charge		Q_{GD}		-	2.3	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=30A	-	-	1.3	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		-	-	47	A
Reverse Recovery Time		trr	V_{GS}=0V, I_F=47A dI$_F$/dt=100A/μs (Note 1)	-	62	-	ns
Reverse Recovery Charge		Q_{RR}		-	84	-	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=0.5mH, I_D=25A,V_{DD}=80V,,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

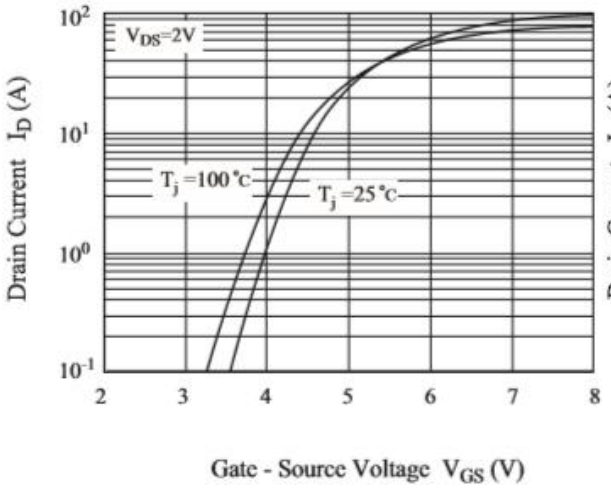


Figure 1.ID vs VGS

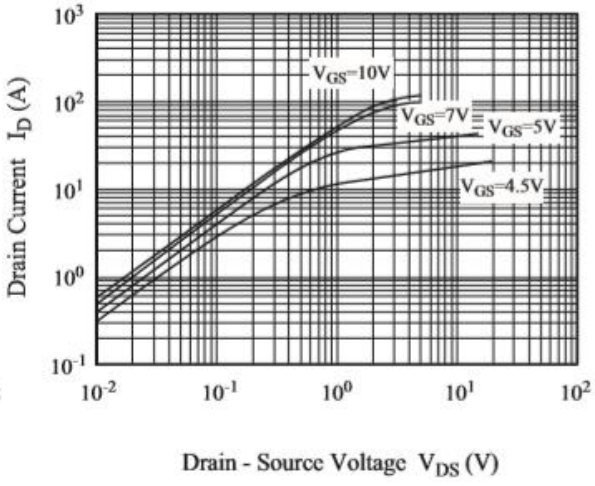


Figure 2.Output Characteristics

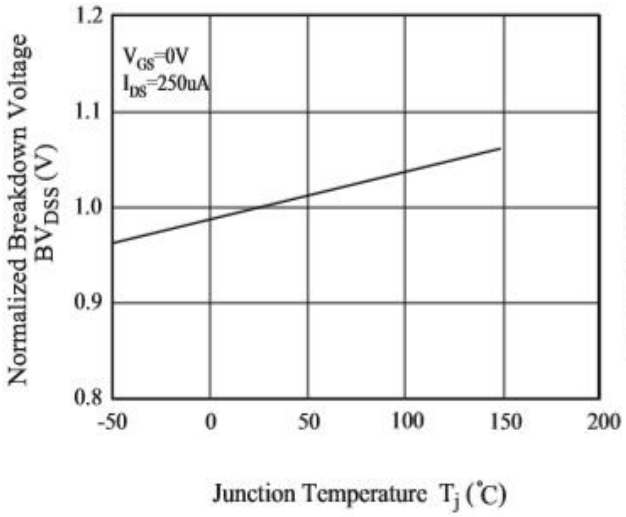


Figure 3.BVDSS vs Temperature

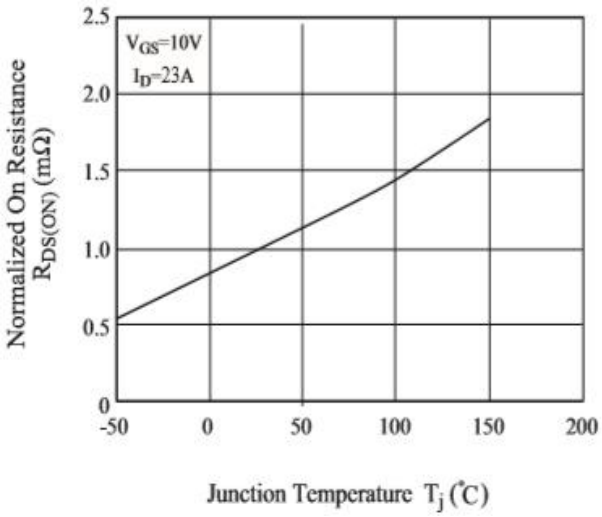


Figure 4. RDSON vs Temperature

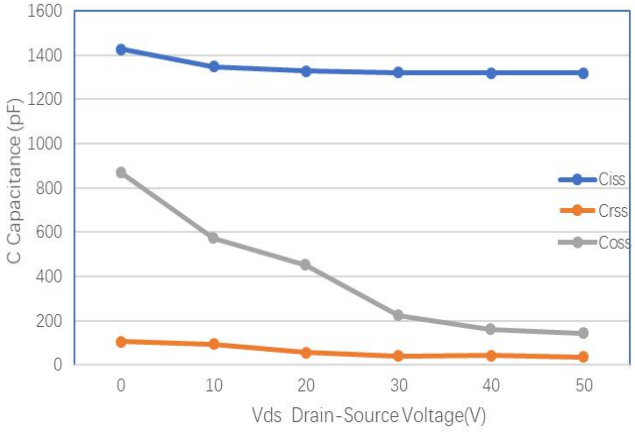


Figure 5. Capacitance Characteristics

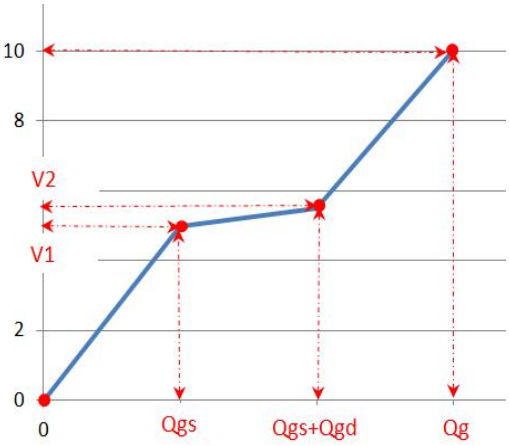


Figure 6. Gate Charge

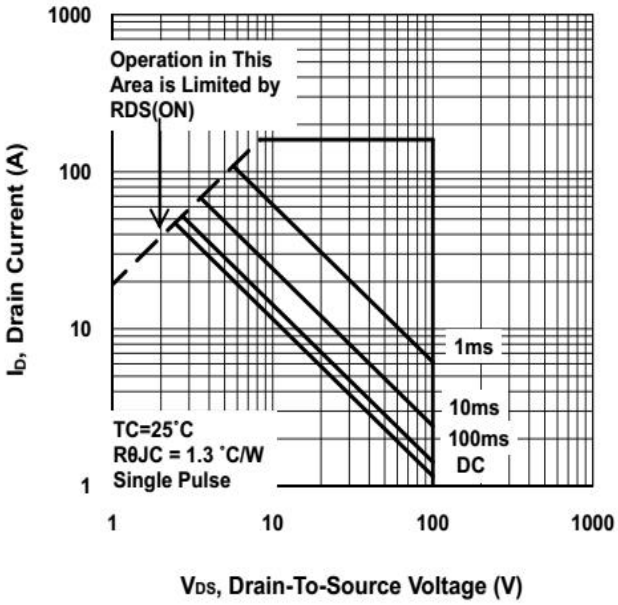


Fig 7. Safe Operating Area

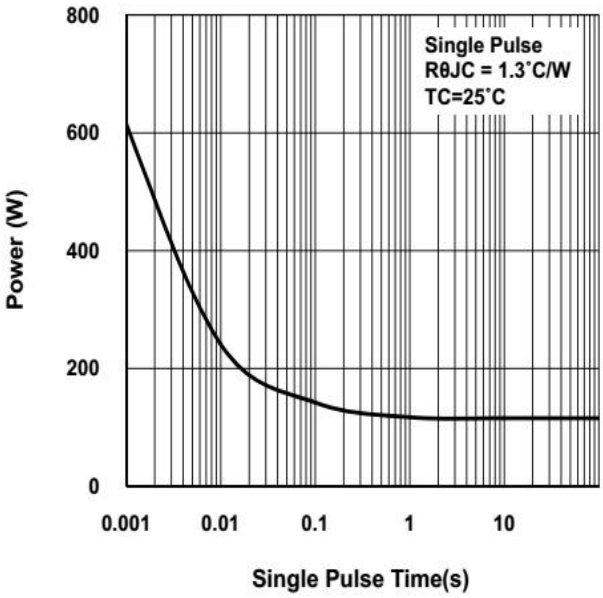


Fig 8. Single Pulse Maximum Power Dissipation

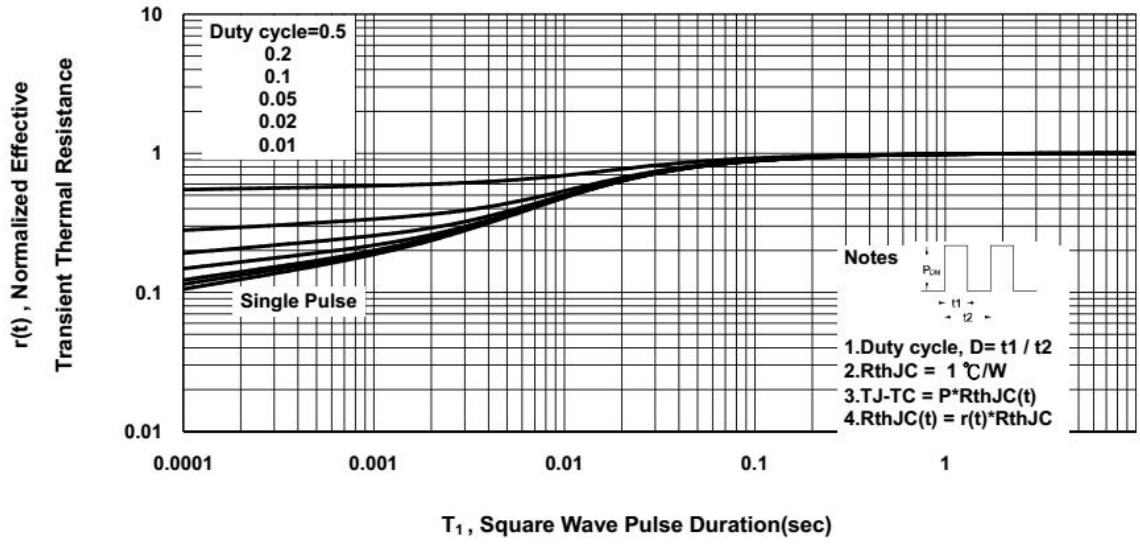
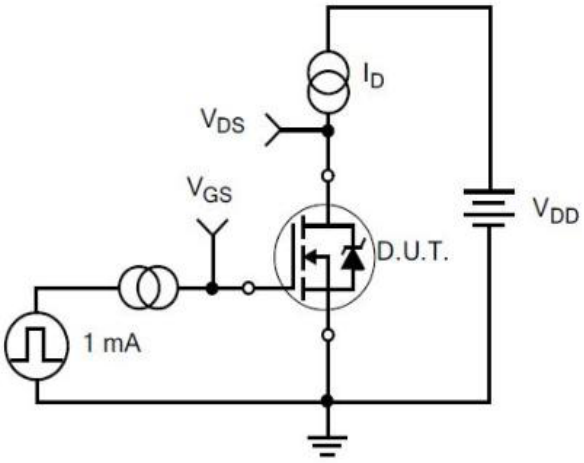
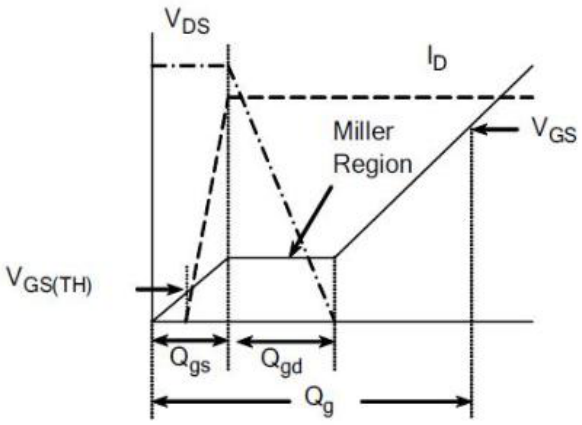


Fig 9. T1 , Transient Thermal Response Curve

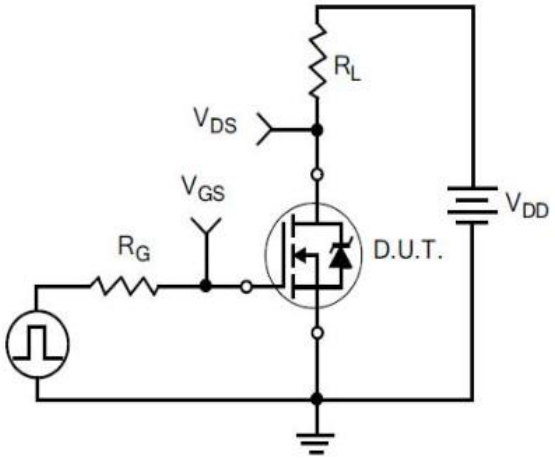
Typical Test Circuit



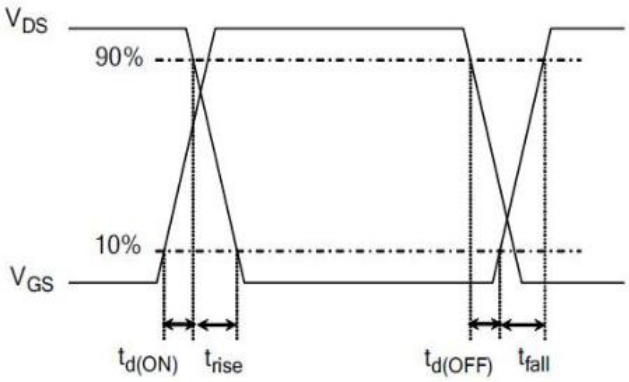
1) Gate Charge Test Circuit



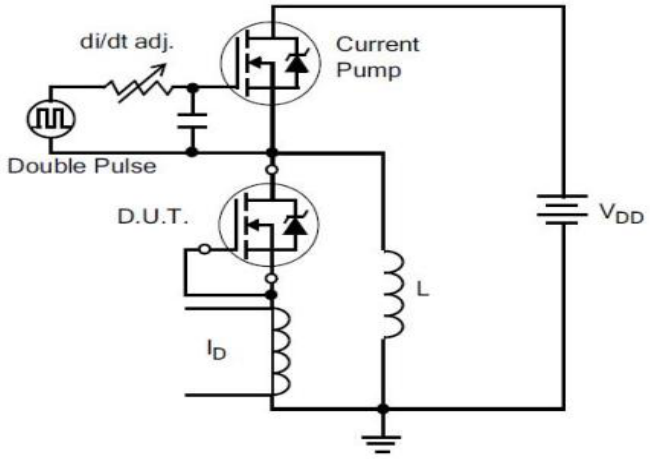
2) . Gate Charge Waveform



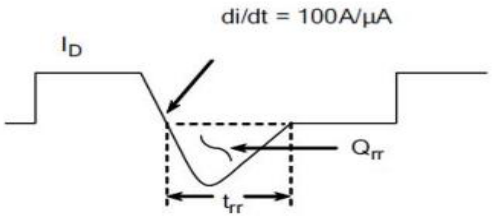
3) Resistive Switching Test Circuit



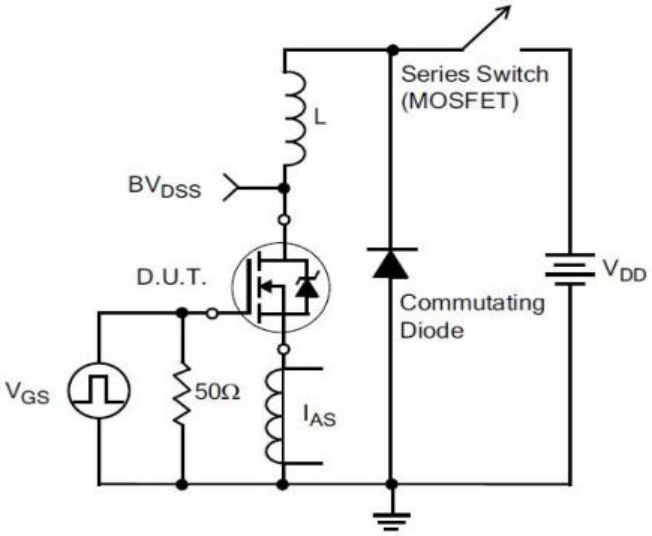
4) Resistive Switching Waveforms



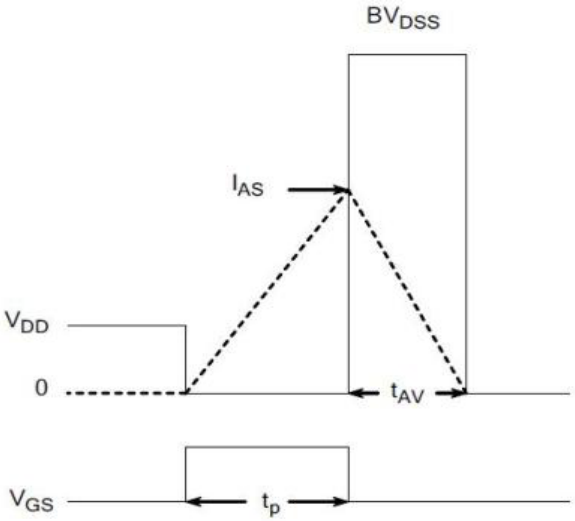
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



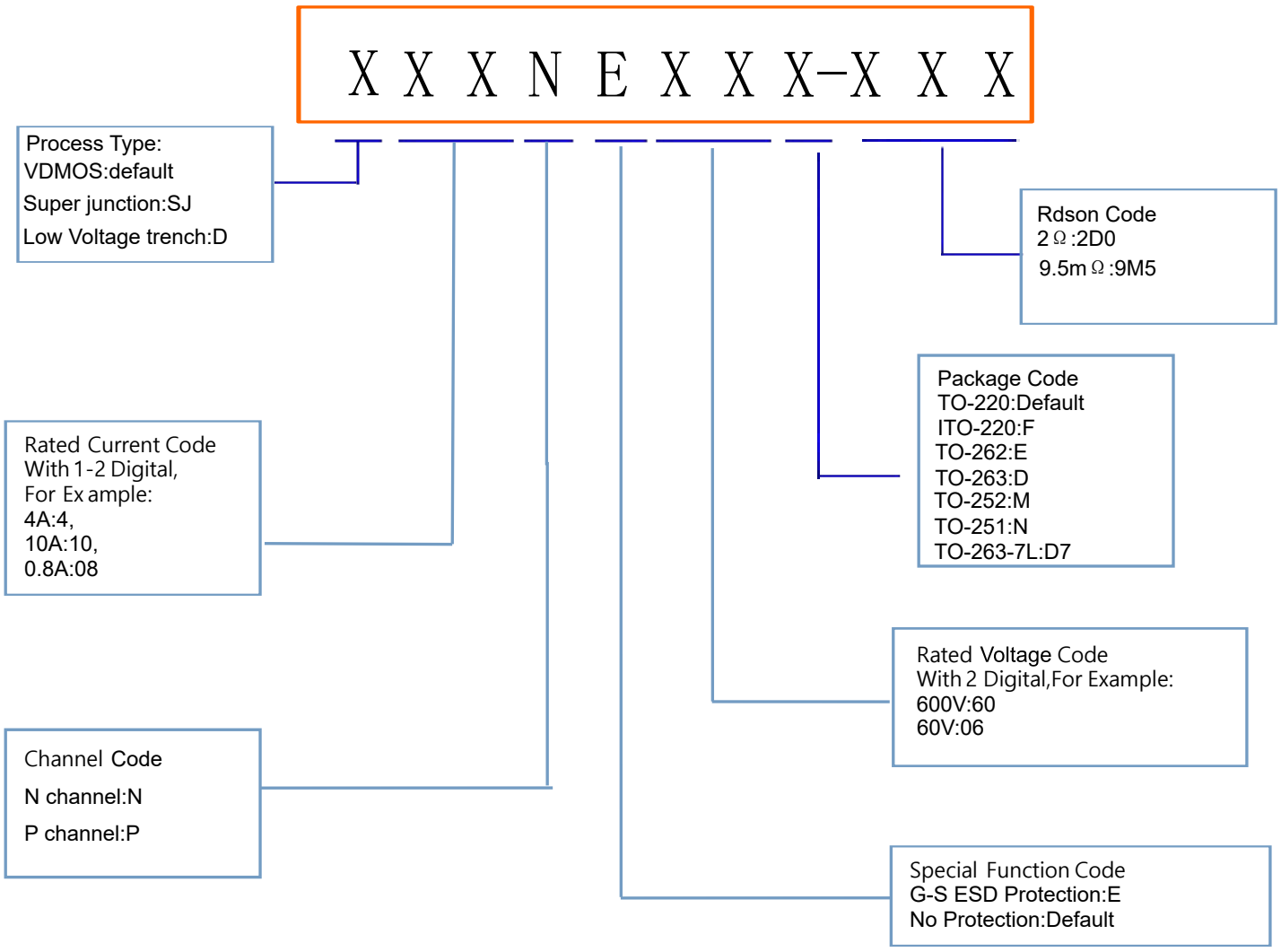
7) . Unclamped Inductive Switching Test Circuit



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

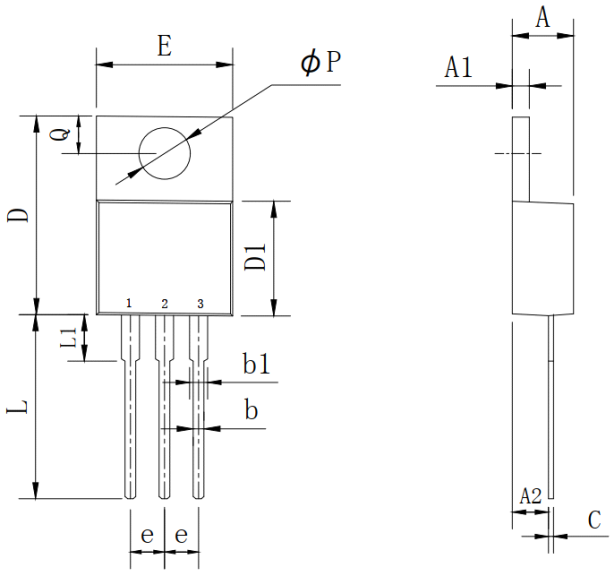
8) Unclamped Inductive Switching Waveforms

Product Names Rules



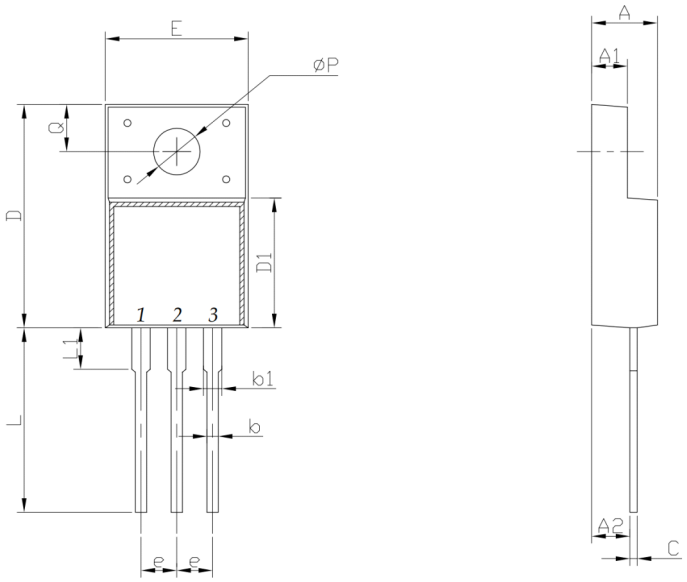
Dimensions

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

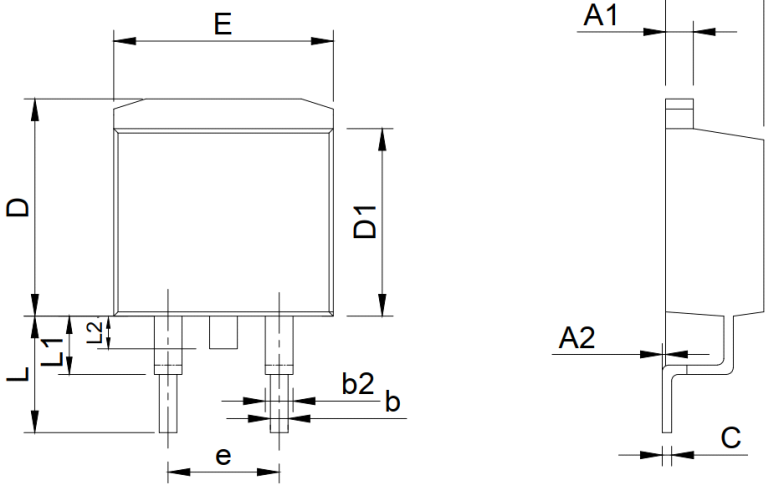
ITO-220 PACKAGE OUTLINE DIMENSIONS



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

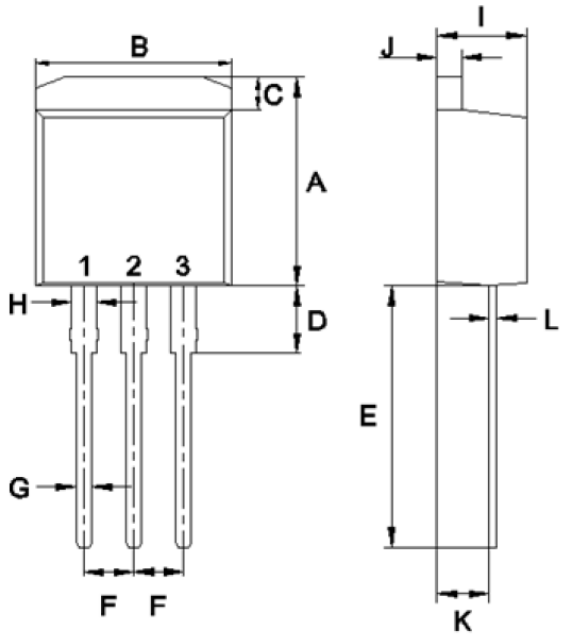
Dimensions

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

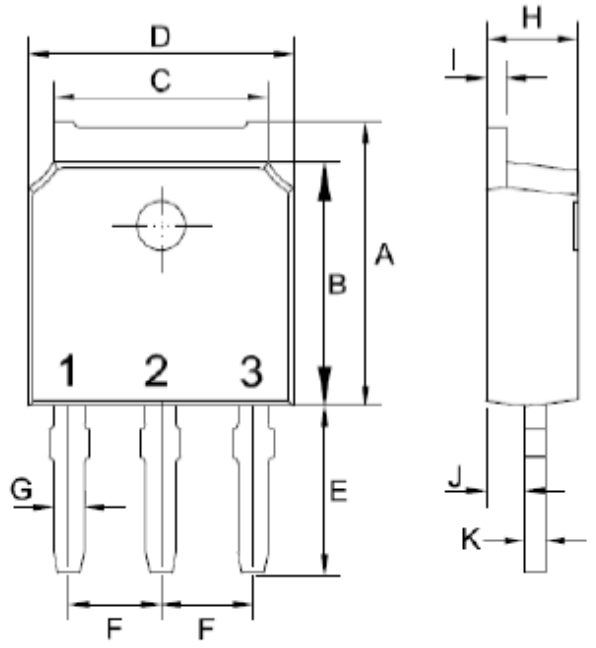
TO-262 PACKAGE OUTLINE DIMENSIONS



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

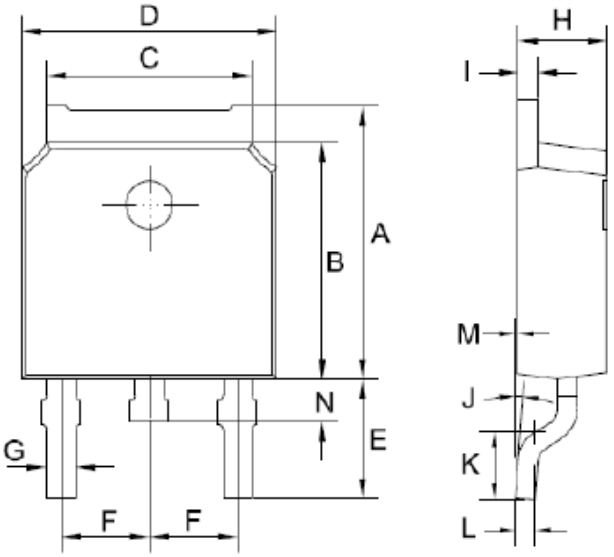
Dimensions

TO-251 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	6.85	7.25	0.270	0.285
B	5.8	6.3	0.228	0.248
C	5	5.53	0.197	0.218
D	6.3	6.8	0.248	0.268
E	3.5	4.35	0.138	0.171
F	2.19	2.39	0.086	0.094
G	0.45	0.85	0.018	0.033
H	2.2	2.4	0.087	0.094
I	0.41	0.61	0.016	0.024
J	0.71	1.31	0.028	0.052
K	0.41	0.61	0.016	0.024

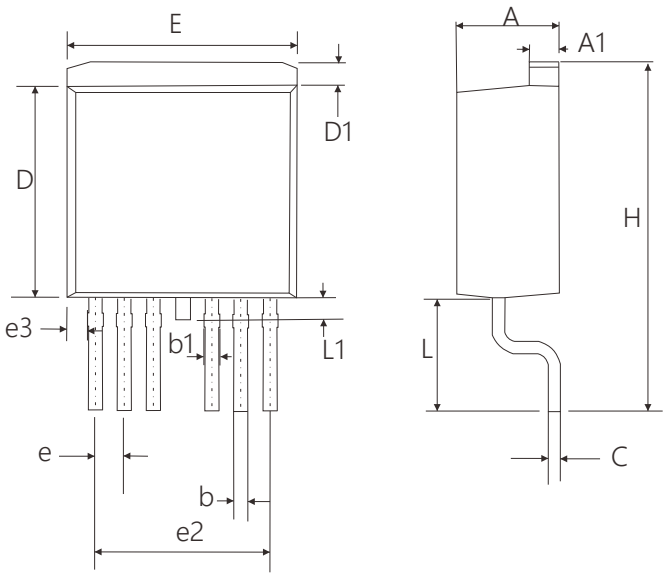
TO-252 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	6.85	7.25	0.270	0.285
B	5.8	6.3	0.228	0.248
C	5	5.53	0.197	0.218
D	6.3	6.8	0.248	0.268
E	2.6	3.3	0.102	0.130
F	2.19	2.39	0.086	0.094
G	0.45	0.85	0.018	0.033
H	2.2	2.4	0.087	0.094
I	0.41	0.61	0.016	0.024
J	0	8	0	8
K	1.45	1.85	0.057	0.073
L	0.41	0.61	0.016	0.024
M	0	0.12	0.000	0.005
P	0.6	1	0.024	0.039

Dimensions

TO-263-7L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.75	0.167	0.187
A1	1.2	1.4	0.047	0.055
b	0.5	0.7	0.020	0.028
b1	0.5	0.9	0.020	0.035
C	0.4	0.6	0.016	0.024
D	9.05	9.45	0.356	0.372
D1	0.7	1.3	0.028	0.051
E	9.8	10.2	0.386	0.402
e	1.07	1.47	0.042	0.058
e2	7.32	7.92	0.288	0.312
e3	0.64	1.04	0.025	0.041
H	14.65	15.65	0.577	0.616
L	4.47	5.47	0.176	0.215
L1	0.90	1.50	0.035	0.059

Friendship Reminder

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