

General 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.

Features

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

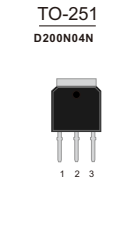
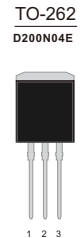
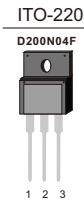
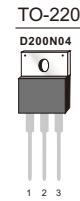
Mechanical Data

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

Ordering Information

Part No.	Package Type	Package	Quality(box)
D200N04	TO-220	Tube	1000
D200N04F	ITO-220	Tube	1000
D200N04D	TO-263	Tape & Reel	800
D200N04E	TO-262	Tube	1000
D200N04M	TO-252	Tape & Reel	2500
D200N04N	TO-251	Tube	3000

Product Summary			
V _{DS}	R _{DS(on)} (mΩ) Typ	I _D (A)	Q _g (Typ)
40V	1.9@10V	200	155nc



Block Diagram

Pin Definition:

1. Gate
2. Drain
3. Source

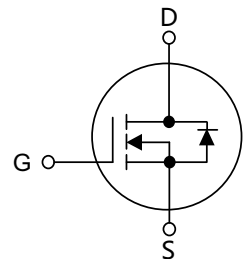


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter	Symbol	TO-220/TO-263/TO-262 TO-252/TO-251	ITO-220	Unit
Drain-Source Voltage	V _{DS}	40		V
Gate-Source Voltage	V _{GS}	±20		V
Continuous Drain Current	I _D	200		A
		135		
Pulsed Drain Current (Note 1)	I _{DM}	750		A
Single Pulse Avalanche Energy(Note 2)	E _{AS}	121		mJ
Power Dissipation T _C =25°C	P _D	215	85	W
Isolation Voltage	V _{ISO}	/	2500	V
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175		°C

Table 2. Thermal Characteristics

Parameter	Symbol	TO-220/TO-263/TO-262 TO-252/TO-251	ITO-220	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	75	$^{\circ}\text{C/W}$
Thermal resistance Junction to Case	$R_{\theta JC}$	0.7	1.76	$^{\circ}\text{C/W}$

Table 3. Electrical Characteristics($T_J=25^{\circ}\text{C}$, 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	40	50	--	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =40V,V _{GS} =0V	--	--	10	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	--	4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V,I _D =100A	--	1.9	2.5	mΩ
Dynamic Characteristics(Note 5)							
Input Capacitance		C _{ISS}	V _{DS} =25V,V _{GS} =0V,f= 1MHz	--	5700	--	pF
Output Capacitance		C _{OSS}		--	1450	--	pF
Reverse Transfer Capacitance		C _{RSS}		--	590	--	pF
Switching Characteristics (Note 5)							
Turn-On Delay Time		t _{d (on)}	V _{DD} =30V,I _D =60A, V _{GS} =10V,R _{GEN} =6Ω	--	35	--	ns
Turn-On Rise Time		t _r		--	20	--	ns
Turn-Off Delay Time		t _{d (off)}		--	45	--	ns
Turn-Off Fall Time		t _f		--	62	--	ns
Total Gate Charge		Q _G	V _{DD} =32V,I _D =60A, V _{GS} =10V	--	155	--	nC
Gate-Source Charge		Q _{GS}		--	30	--	nC
Gate-Drain Charge		Q _{GD}		--	66	--	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V, I _S =60A	--	--	1.3	V
Maximum Continuous Drain-Source Diode Forward Current		I _S		--	--	200	A
Reverse Recovery Time		t _{rr}	V _{GS} =0V, I _F =60A	--	36	--	ns
Reverse Recovery Charge		Q _{RR}	dI _F /dt=100A/μs (Note 1)	--	60	--	nC

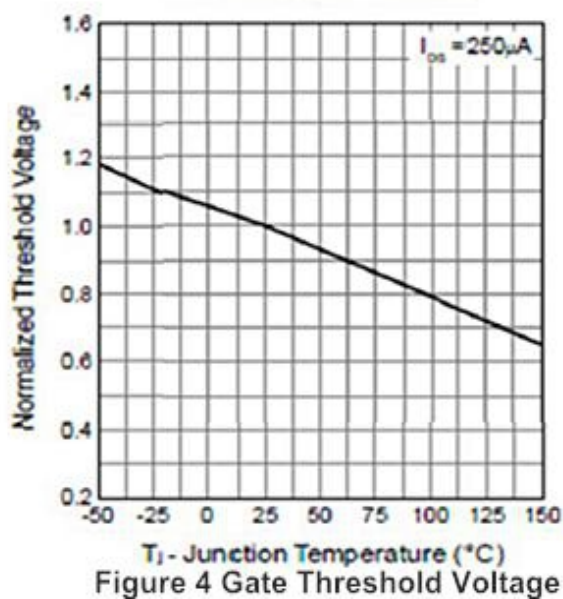
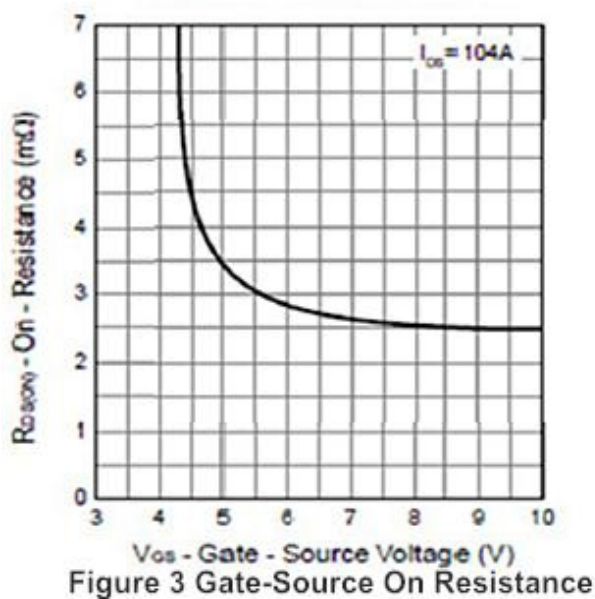
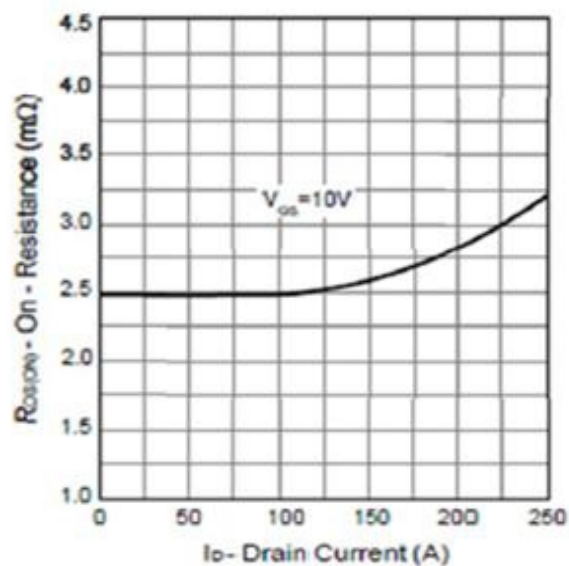
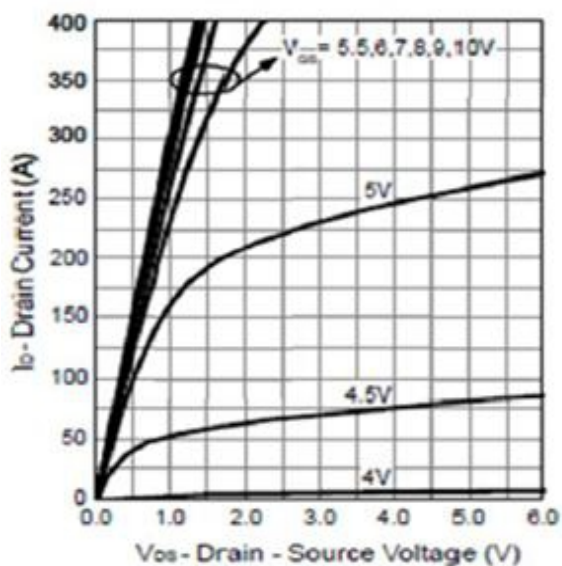
Notes: 1 Repetitive Rating:Pulse width limited by maximum junction temperature

2 $L=0.5\text{mH}$, $I_D=90A, V_{DD}=50V$, Starting $T_J=25^{\circ}\text{C}$

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

5 Guaranteed by design,not subject to production

Typical characteristics diagrams



Typical characteristics diagrams

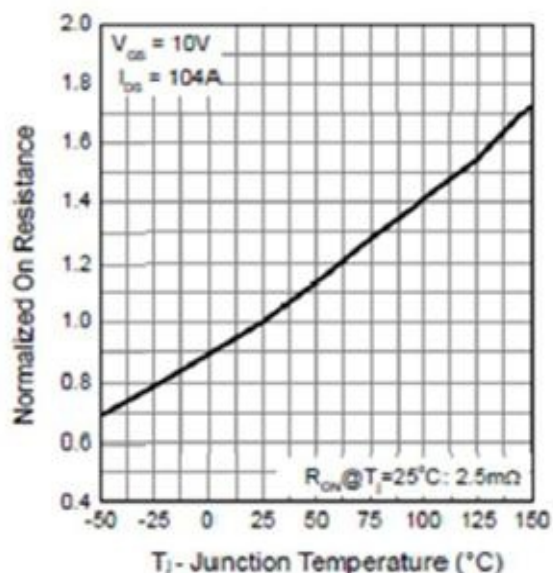


Figure 5 Drain-Source On Resistance

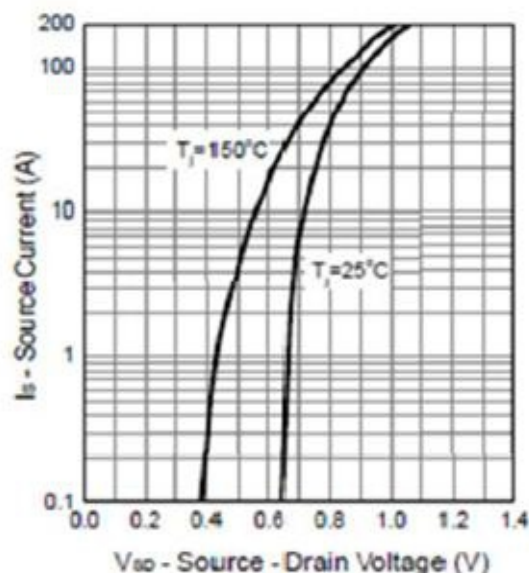


Figure 6 Source-Drain Diode Forward

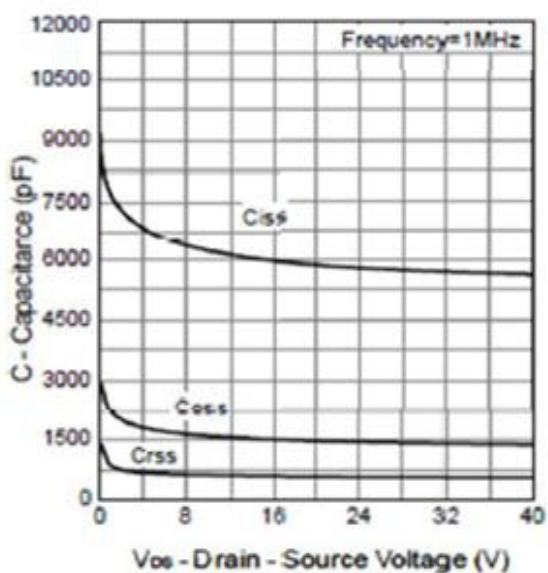


Figure 7 Capacitance

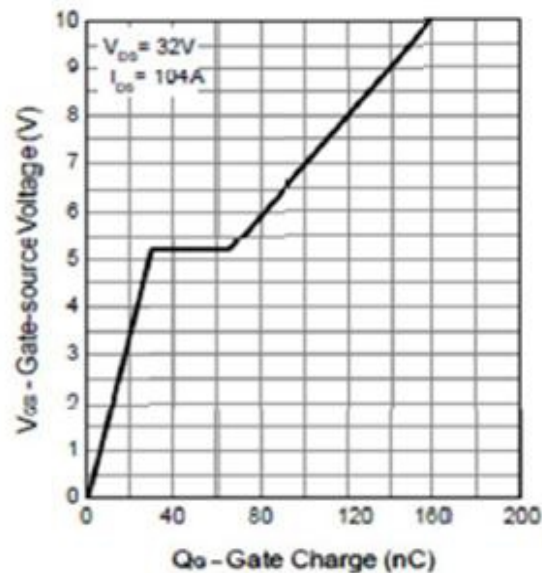


Figure 8 Gate Charge

Typical characteristics diagrams

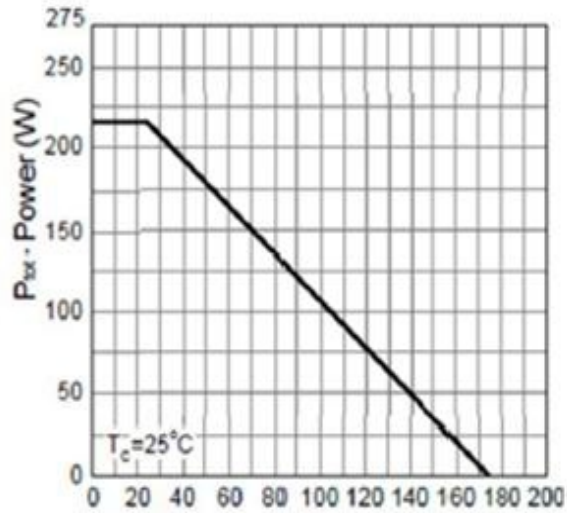


Figure 9 Power Dissipation

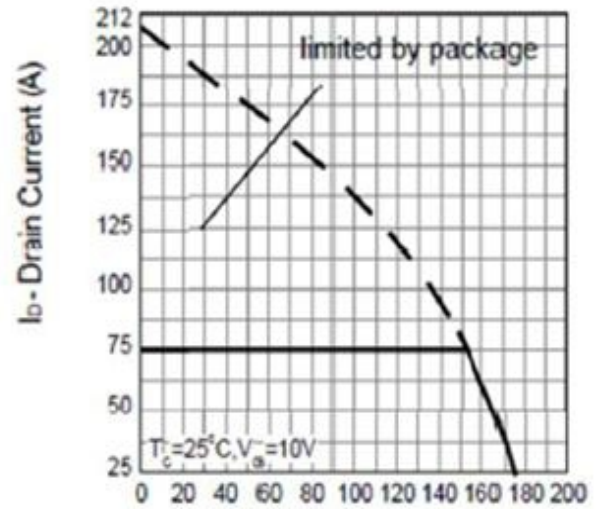


Figure 10 Drain Current

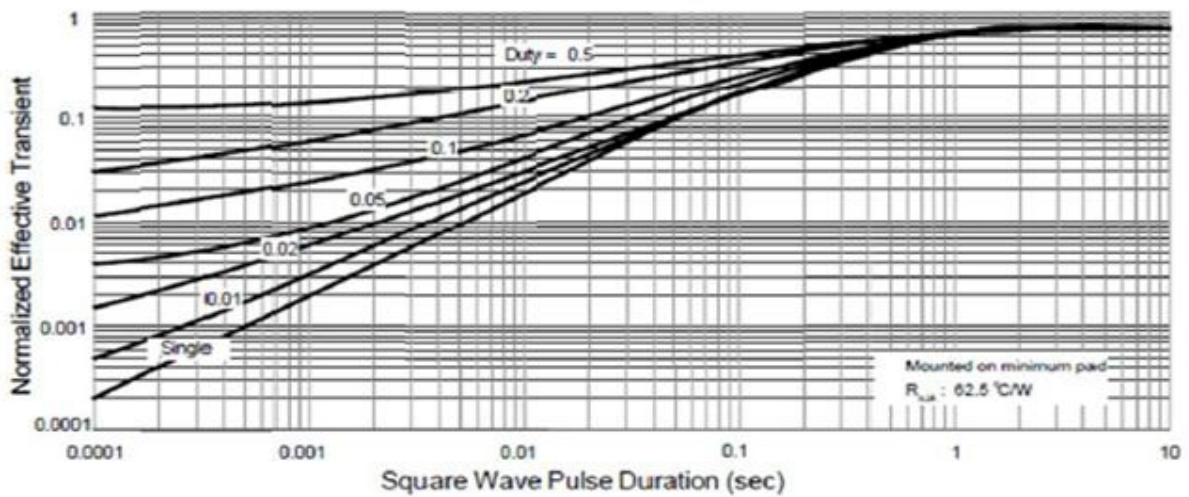
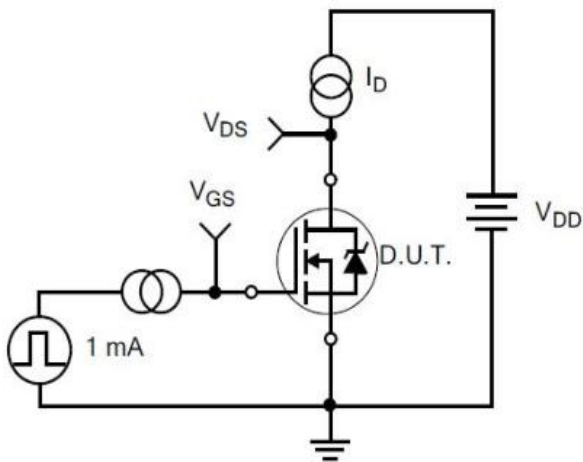
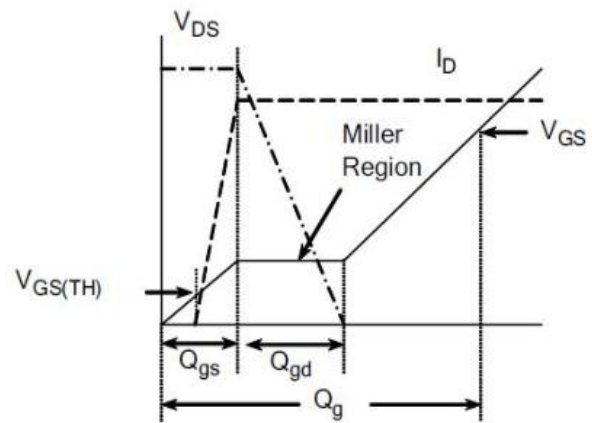


Figure 11 Thermal Transient Impedance

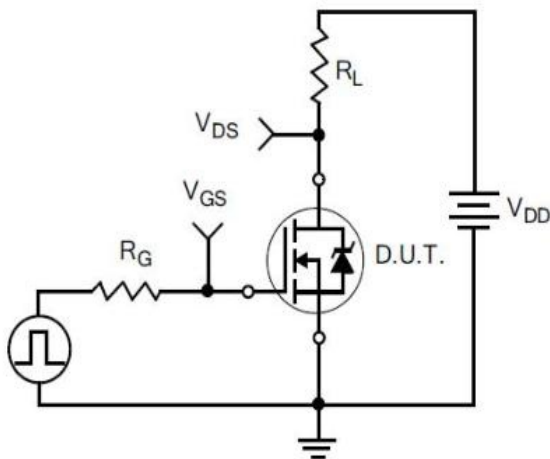
Typical Test Circuit



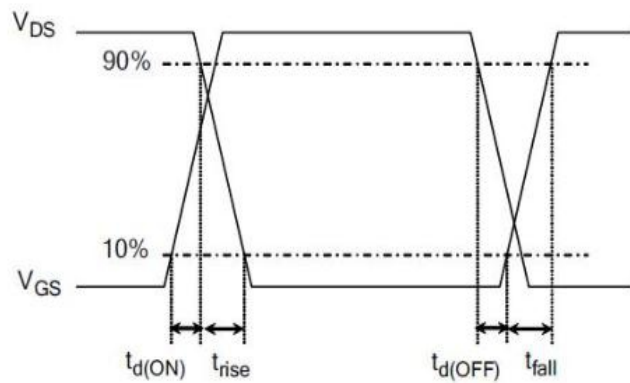
1) Gate Charge Test Circuit



2) . Gate Charge Waveform



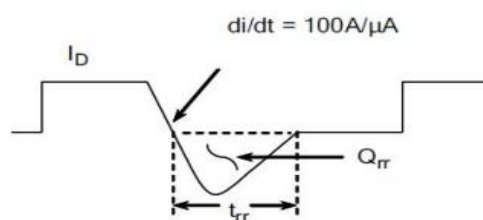
3) Resistive Switching Test Circuit



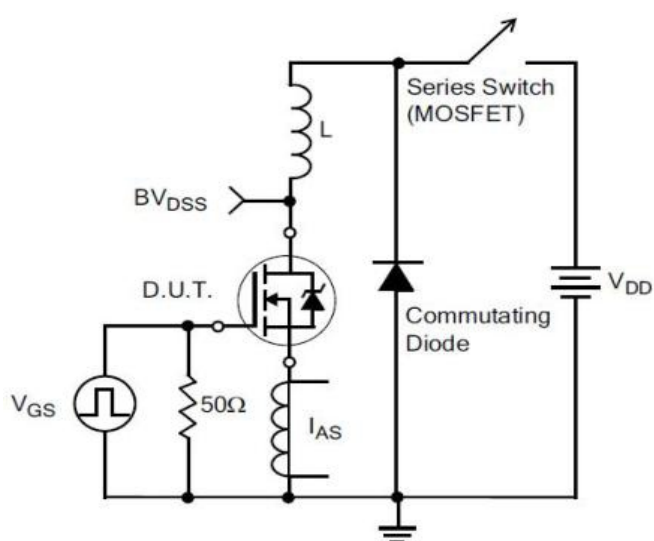
4) Resistive Switching Waveforms

The diagram shows a current pump circuit. A MOSFET and diode are connected in series to a V_{DD} supply. The MOSFET gate is driven by a 'di/dt adj.' source and a 'Double Pulse' source. The diode's cathode is connected to the D.U.T. (Device Under Test), which is another MOSFET and diode. The D.U.T. MOSFET gate is driven by a 'Double Pulse' source. The D.U.T. diode's cathode is connected to an inductor L, which is then connected to ground. The D.U.T. MOSFET drain is connected to the inductor L. The D.U.T. MOSFET is biased with a drain current I_D .

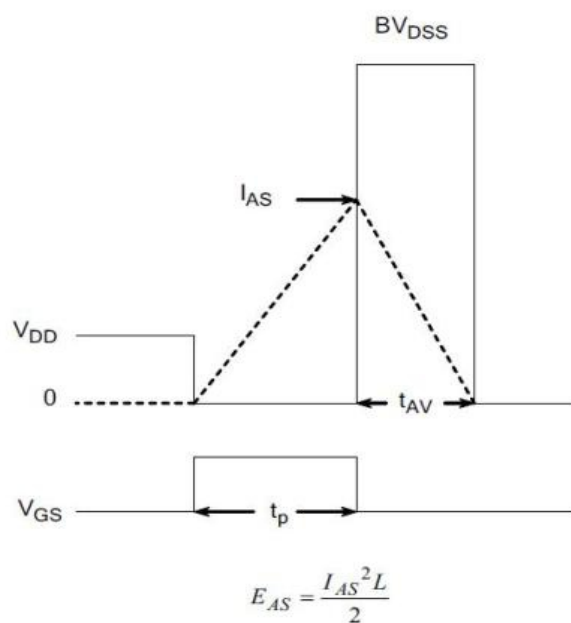
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform

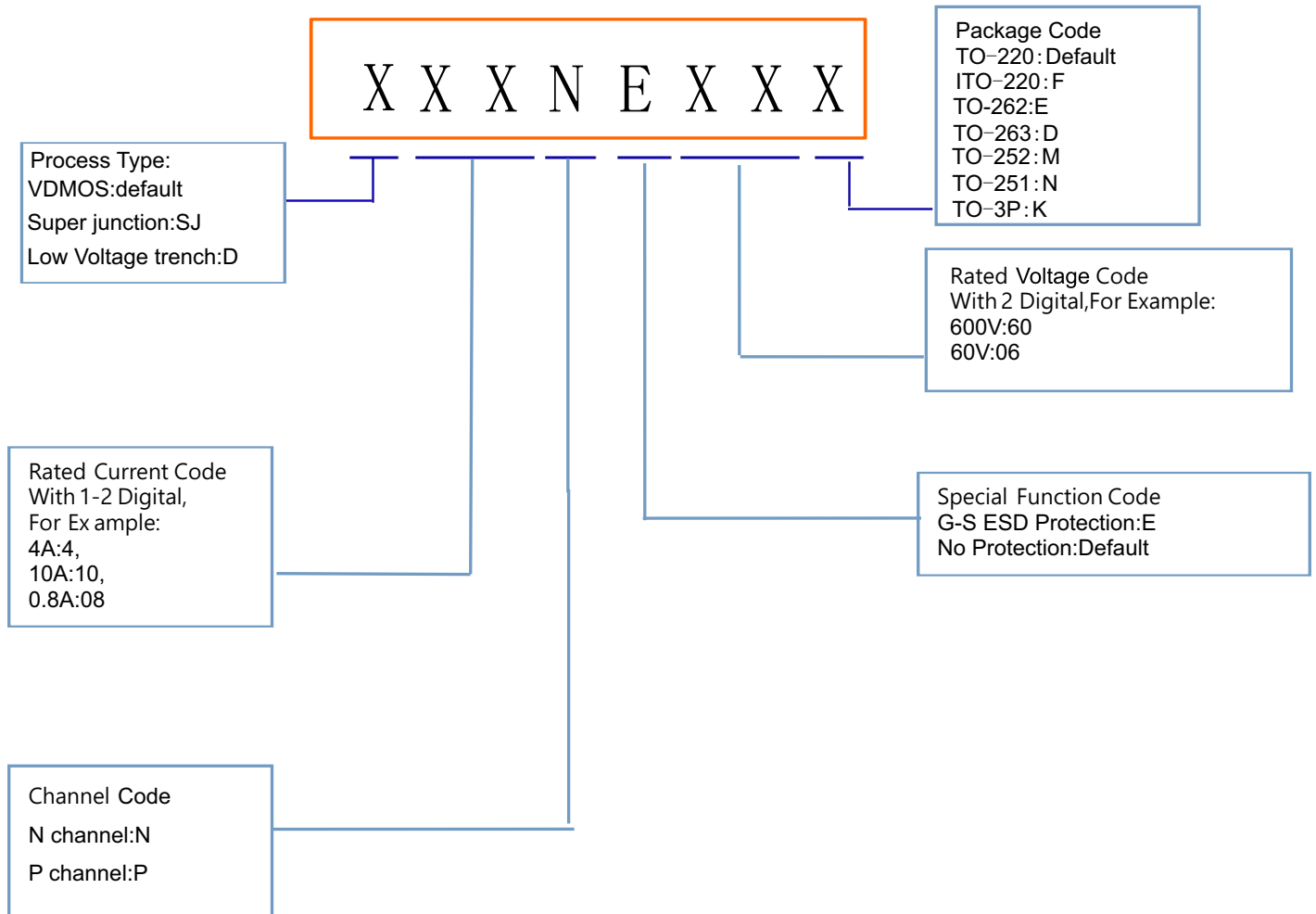


7) . Unclamped Inductive Switching Test Circuit



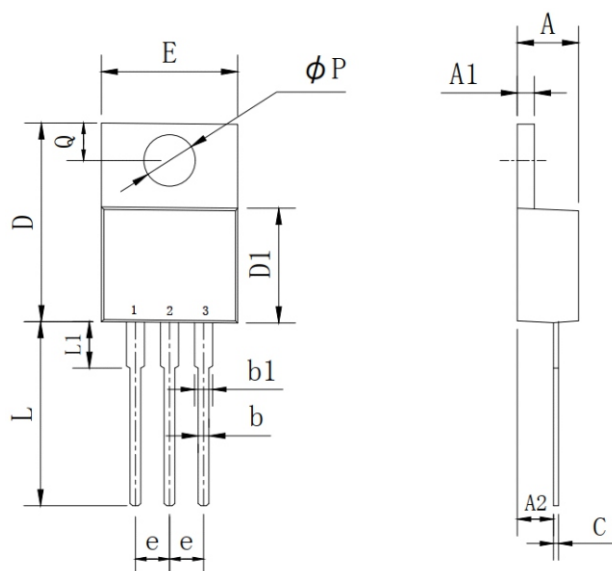
8) Unclamped Inductive Switching Waveforms

Product Names Rules



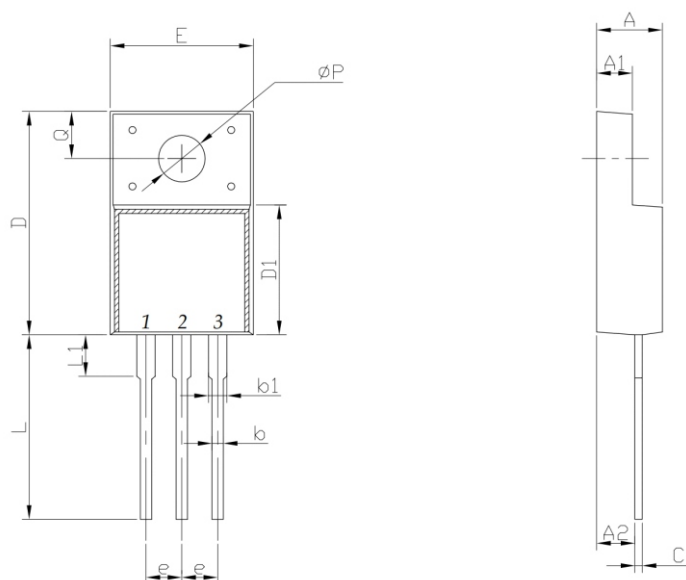
Dimensions

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
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

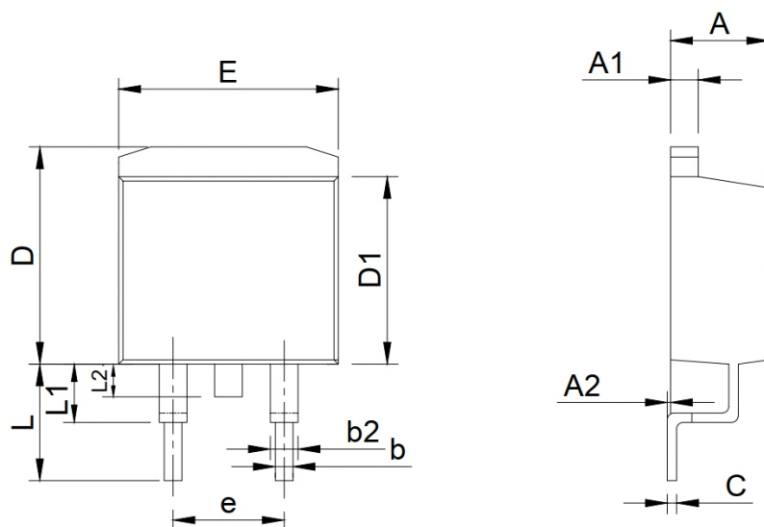
ITO-220 PACKAGE OUTLINE DIMENSIONS



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

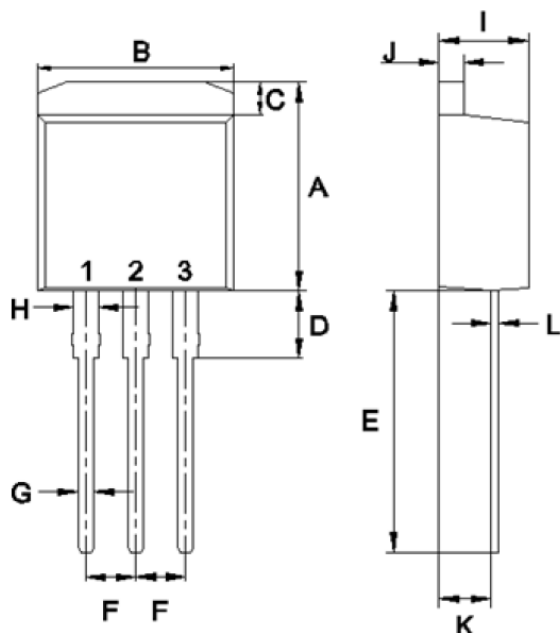
Dimensions

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

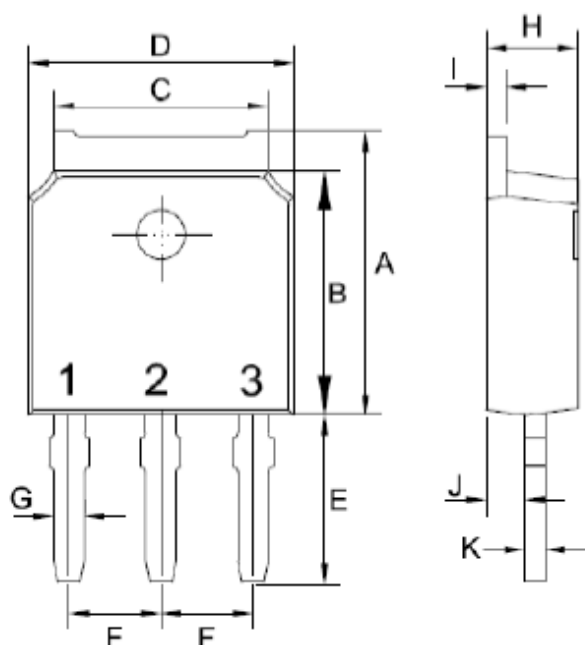
TO-262 PACKAGE OUTLINE DIMENSIONS



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

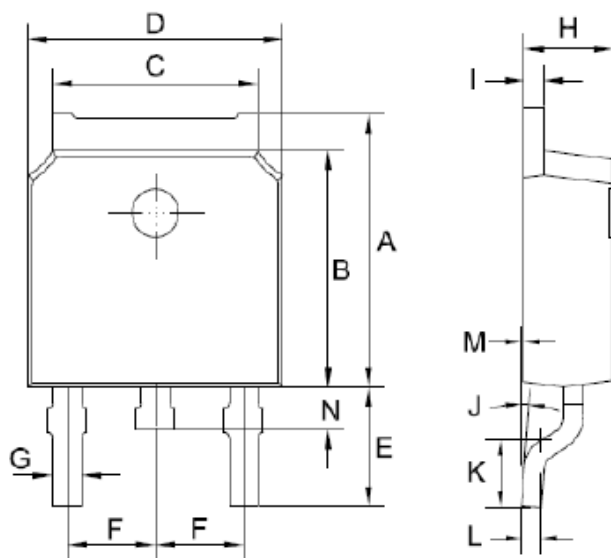
Dimensions

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	0.71	1.31	0.028	0.052
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

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