18A 200V N-Channel Enhancement Mode Power MOSFET

Description:

These N-channel enhanced vdmosfets, is obtained by the self-aligned planar technology which reduce the conduction loss, improve switching performance and enhance the avalanche energy. Which accords with the RoHS standard.

Product Summary			
V_{DS}	$R_{DS(on)}$ (Ω) Typ	I_D (A)	Qg (Typ)
200V	0.12 @ 10V	18	20.4nc

Features:

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

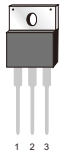
Mechanical Data

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

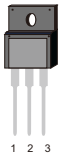
Application

- Switching applications

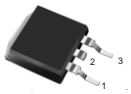
TO-220 KW18N20



ITO-220 KW18N20F

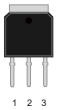


TO-263 KW18N20D

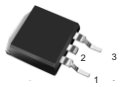


TO-262 KW18N20E

TO-251 KW18N20N



TO-252 KW18N20M



Ordering Information

Part No.	Package Type	Package	Quality(box)
KW18N20	TO-220	Tube	1000
KW18N20F	ITO-220	Tube	1000
KW18N20D	TO-263	Tape & Reel	800
KW18N20E	TO-262	Tube	1000
KW18N20N	TO-251	Tube	1000
KW18N20M	TO-252	Tape & Reel	3000

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

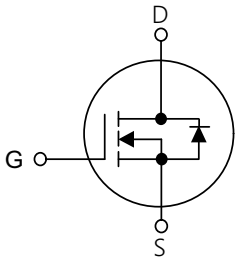


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	KW18N20/KW18N20D/ KW18N20E/KW18N20M/ KW18N20N	KW18N20F	Unit
Drain-Source Voltage		V_{DS}	200		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C=25°C	I_D	18		A
	T_C=100°C		11.3		
Pulsed Drain Current (Note 1)		I_{DM}	72		A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	500		mJ
Peak Diode Recovery dv/dt(Note 3)		dv/dt	5		V/ns
Isolation Voltage		V_{ISO}	/	2500	
Power Dissipation	Ta=25°C	P_D	2	2	W
	T_C=25°C		100	35	
Operating Junction and Storage Temperature		T_J/T_{STG}	-55~+150		°C

Table 2.Thermal Characteristics

Parameter	Symbol	KW18N20/KW18N20D/ KW18N20E/KW18N20M/ KW18N20N	KW18N20F	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	62.5	62.5	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	1.25	3.57	°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	200	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=200V,V_{GS}=0V	-	-	10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V	-	-	100	nA
	Reverse		V_{GS}=-30V,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=9A	-	0.12	0.18	Ω
Dynamic Characteristics(Note 5)							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V,f=1MHz	-	1136	-	pF
Output Capacitance		C_{OSS}		-	183	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	16.4	-	pF
Switching Characteristics (Note 5)							
Turn-On Delay Time		td(on)	V_{DD}=100V,I_D=18A, R_G=10Ω	-	19	-	ns
Turn-On Rise Time		t_R		-	33	-	ns
Turn-Off Delay Time		td(off)		-	35	-	ns
Turn-Off Fall Time		tf		-	8	-	ns
Total Gate Charge		Q_G	V_{DD}=160V,I_D=18A, V_{GS}=10V	-	20.4	-	nC
Gate-Source Charge		Q_{GS}		-	6.9	-	nC
Gate-Drain Charge		Q_{GD}		-	7.3	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=18A	-	-	1.5	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		-	-	18	A
Reverse Recovery Time		trr	V_{GS}=0V, I_F=18A dI$_F$/dt=100A/μs (Note 1)	-	187	-	ns
Reverse Recovery Charge		Q_{RR}		-	925	-	nC

Notes : 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=10mH, I_D=10A,V_{DD}=50V,Starting T_J=25°C
3 I_{SD}=18A,di/dt≤100A/μs,V_{DD}≤BV_{DSS},Start T_J=25°C
4 Pulse Test: Pulse width ≤300μS, Duty cycle≤2%
5 Guaranteed by design,not subject to production

Typical Characteristics Diagrams

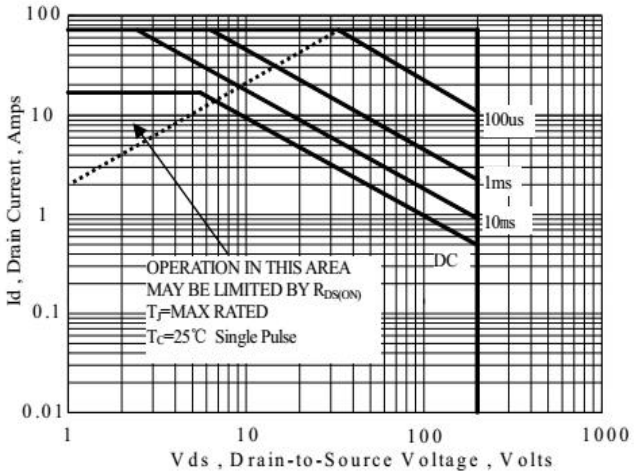


Figure 1 Maximum Forward Bias Safe Operating Area

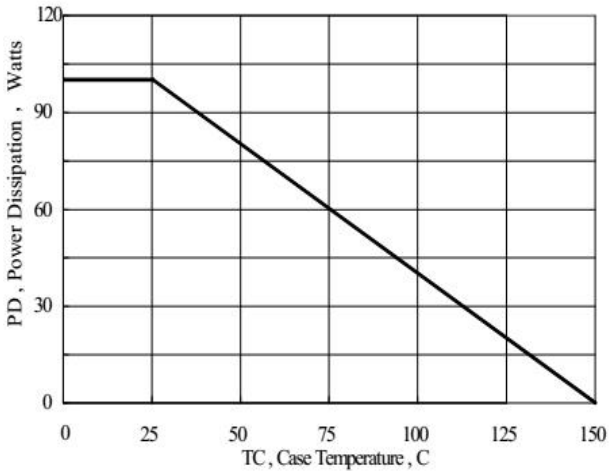


Figure 2 Maximum Power Dissipation vs Case Temperature

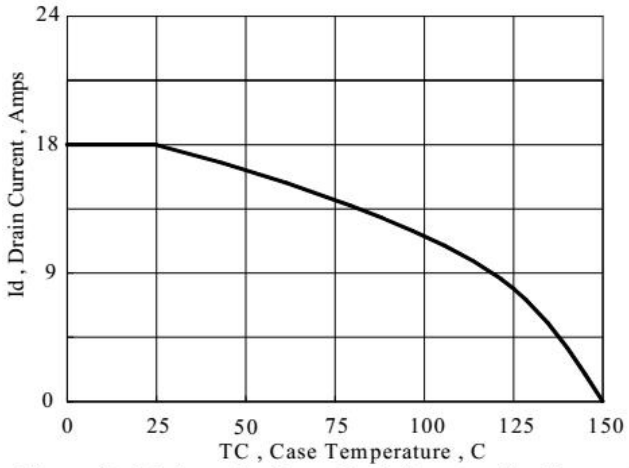


Figure 3 Maximum Continuous Drain Current vs Case Temperature

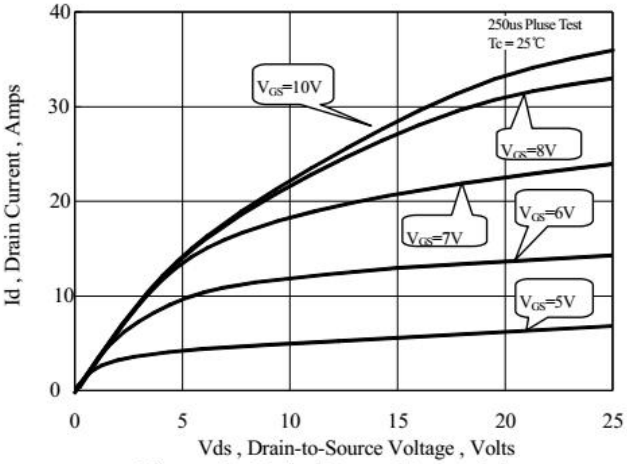


Figure 4 Typical Output Characteristics

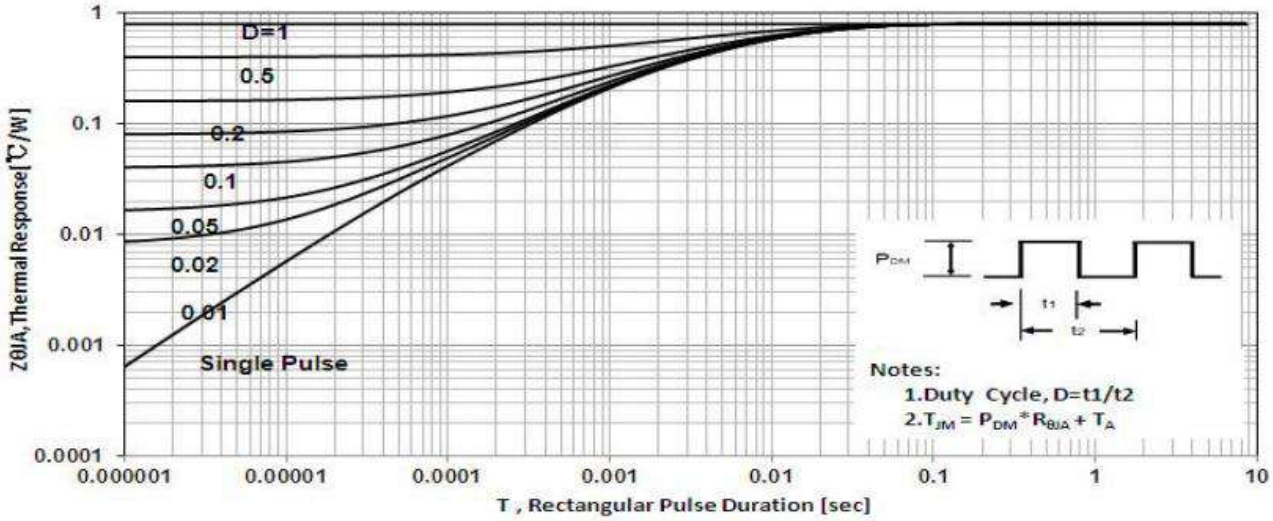


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

Typical Characteristics Diagrams

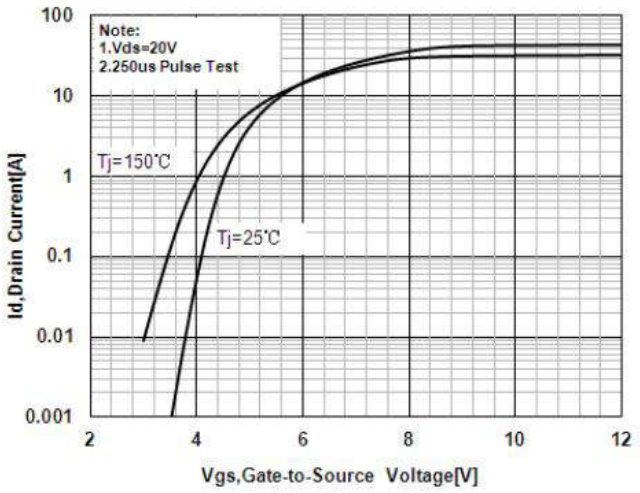


Figure 6 Typical Transfer Characteristics

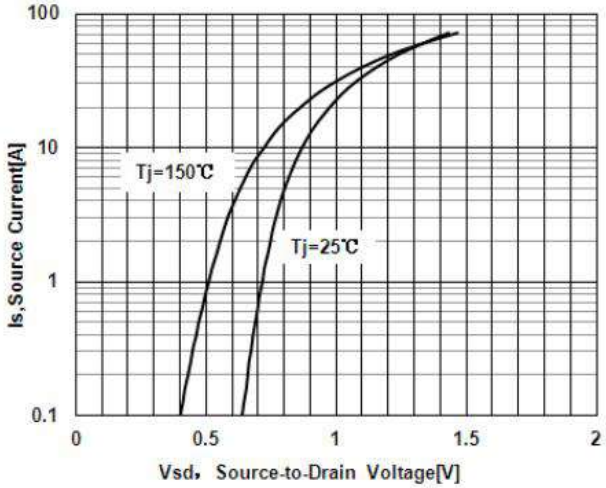


Figure 7 Typical Body Diode Transfer Characteristics

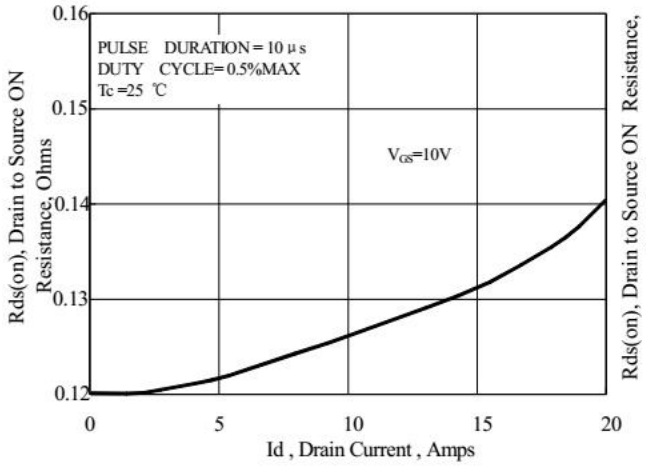


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

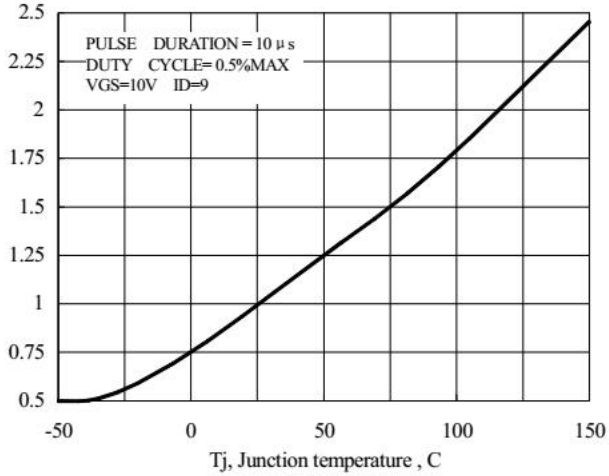


Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

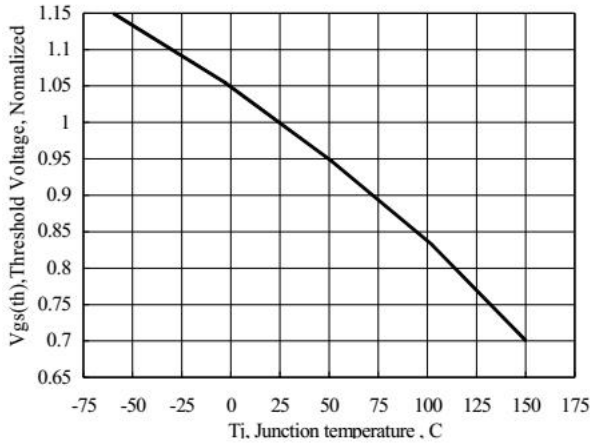


Figure 10 Typical Theshold Voltage vs Junction Temperature

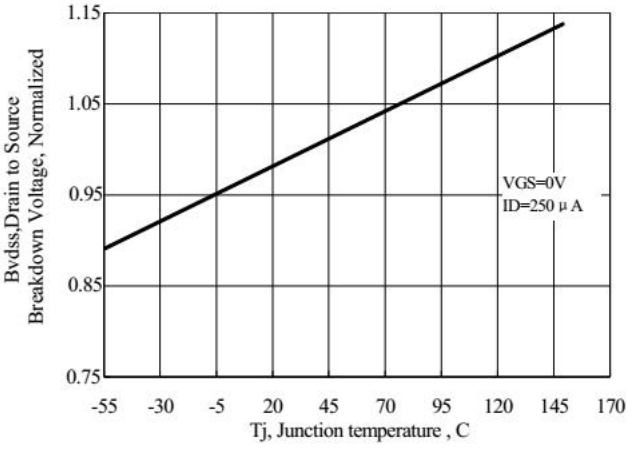


Figure 11 Typical Breakdown Voltage vs Junction Temperature

Typical Characteristics Diagrams

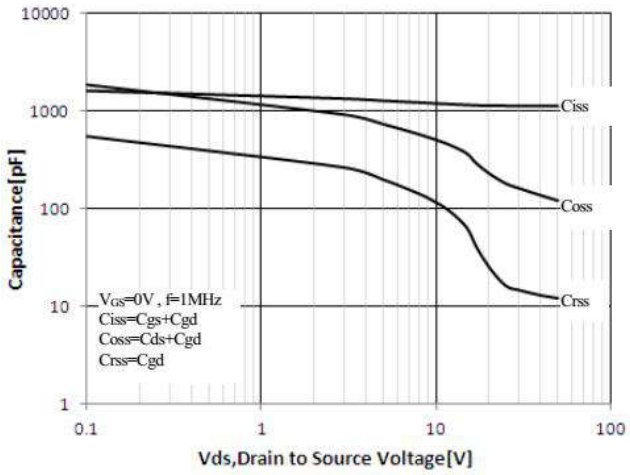


Figure 12 Typical Capacitance vs Drain to Source Voltage

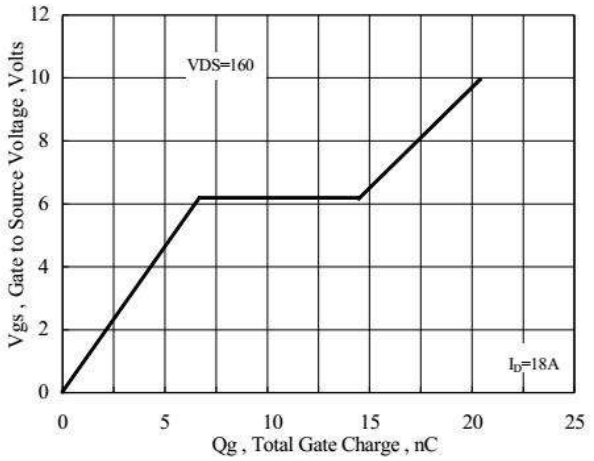


Figure 13 Typical Gate Charge vs Gate to Source Voltage

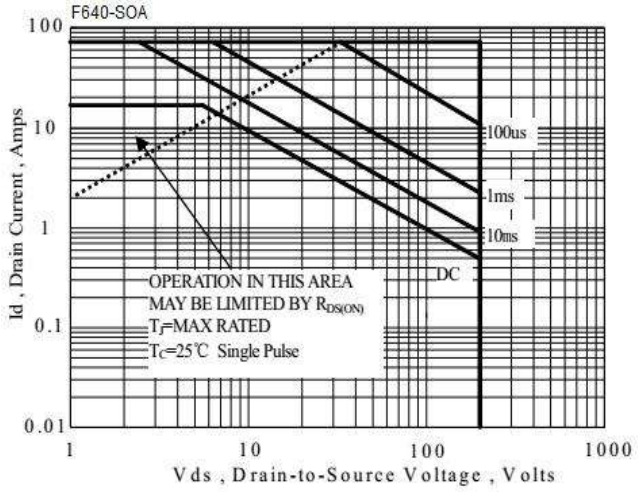


Figure 14 Maximum Forward Bias Safe Operating Area

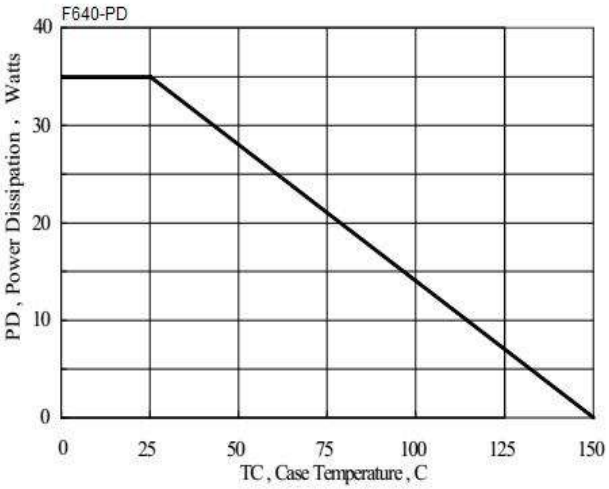
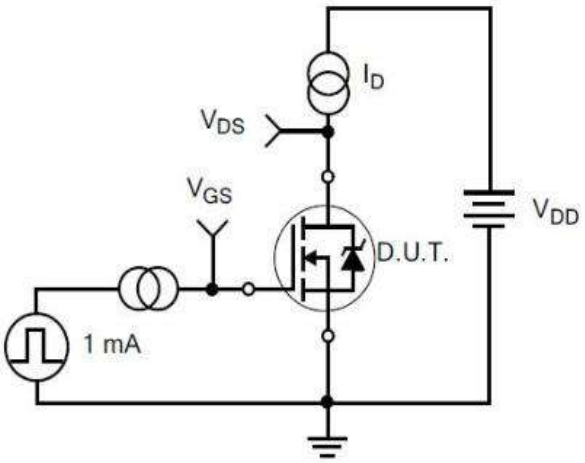
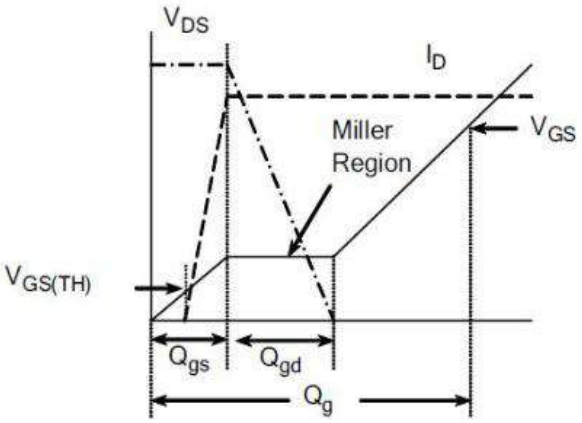


Figure 15 Maximum Power Dissipation vs Case Temperature

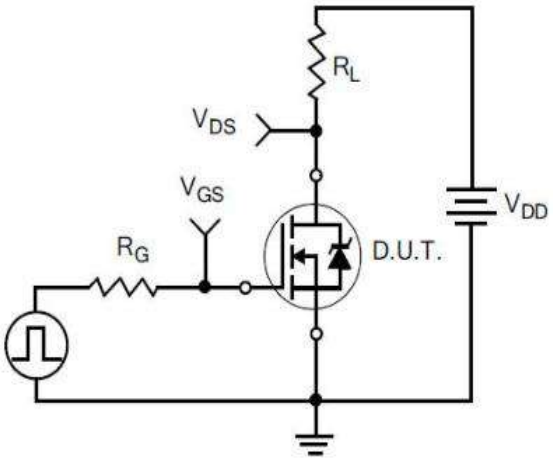
Typical Test Circuit



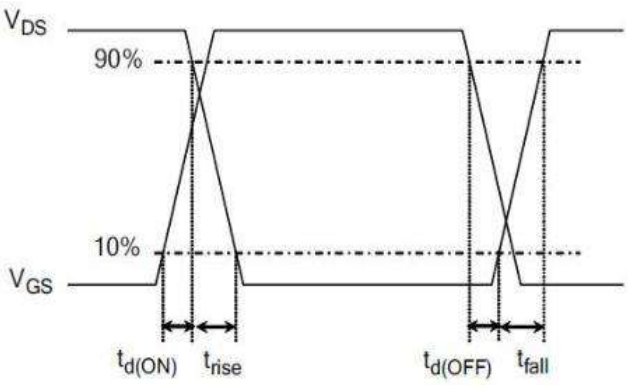
1) Gate Charge Test Circuit



2) . Gate Charge Waveform

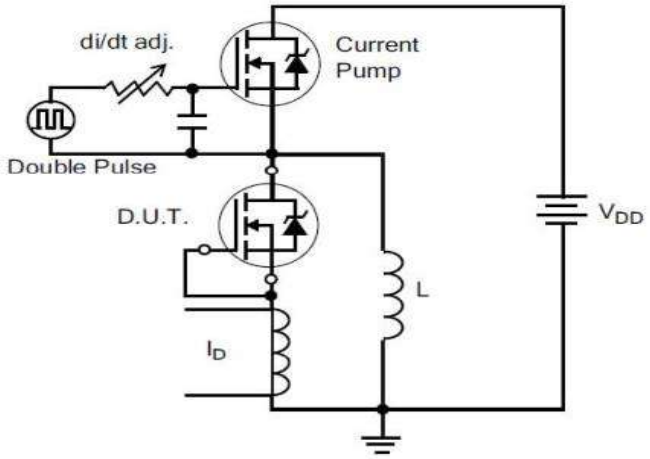


3) Resistive Switching Test Circuit

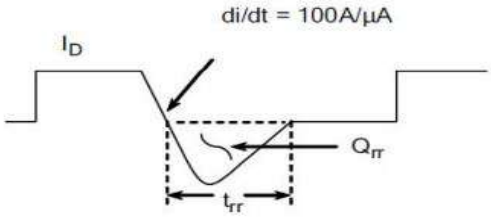


4) Resistive Switching Waveforms

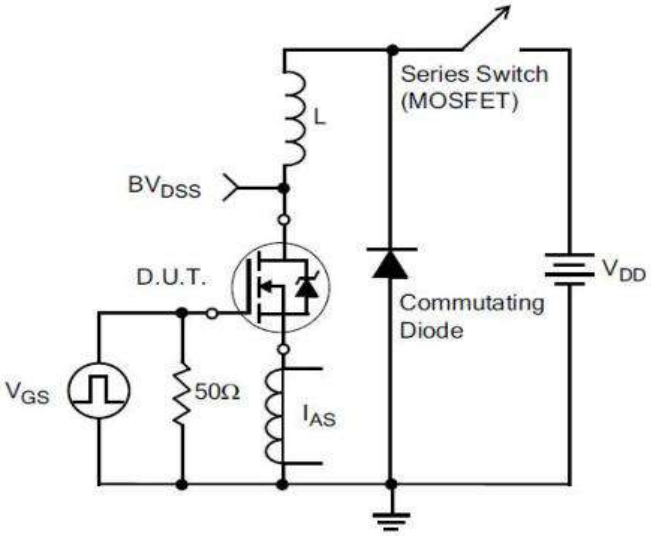
Typical Test Circuit



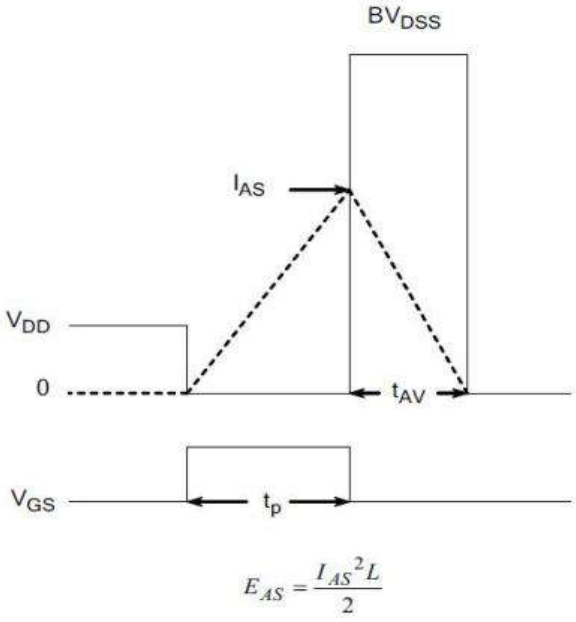
5) Diode Reverse Recovery Test Circuit



6) Diode Reverse Recovery Waveform



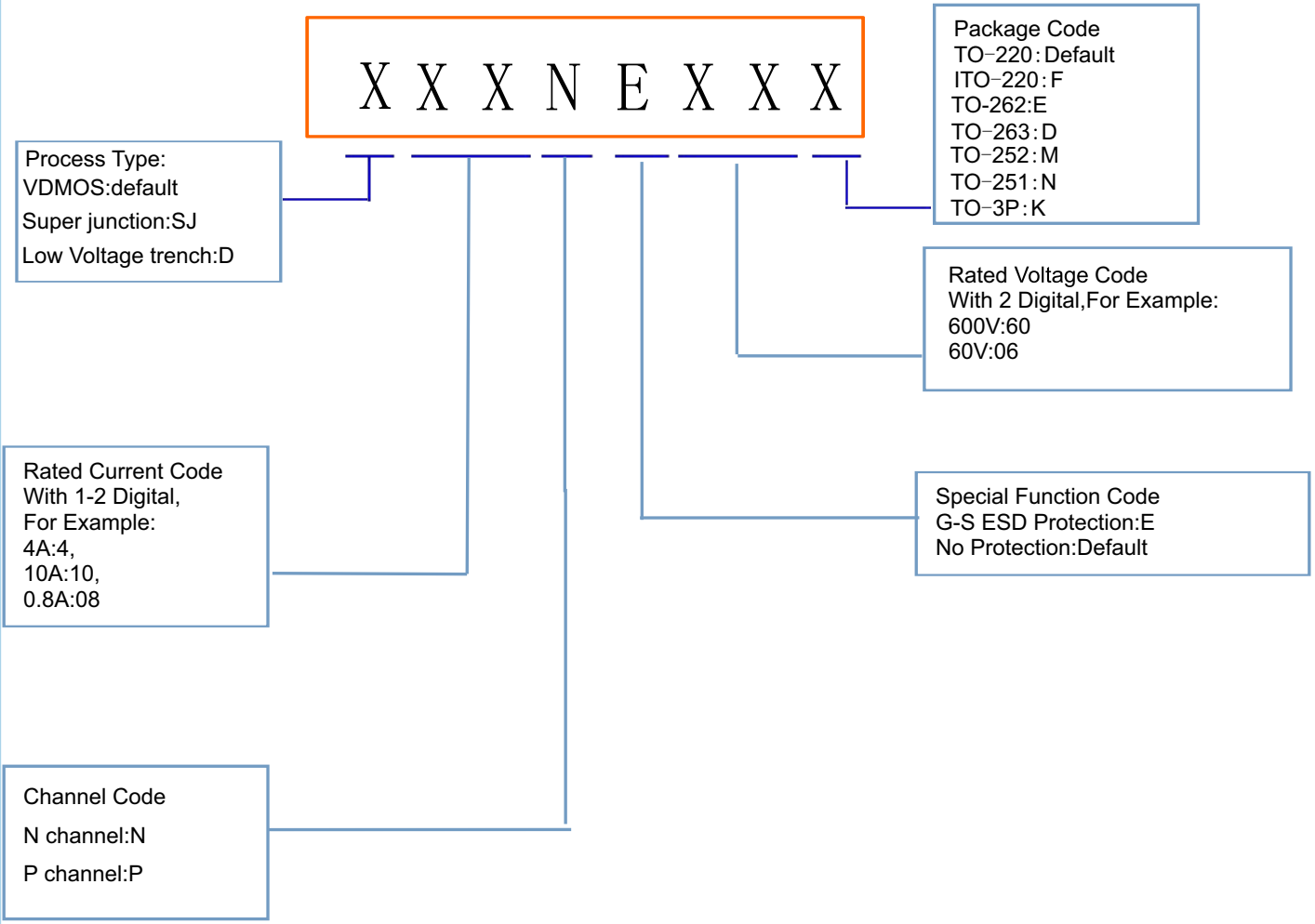
7) . Unclamped Inductive Switching Test Circuit



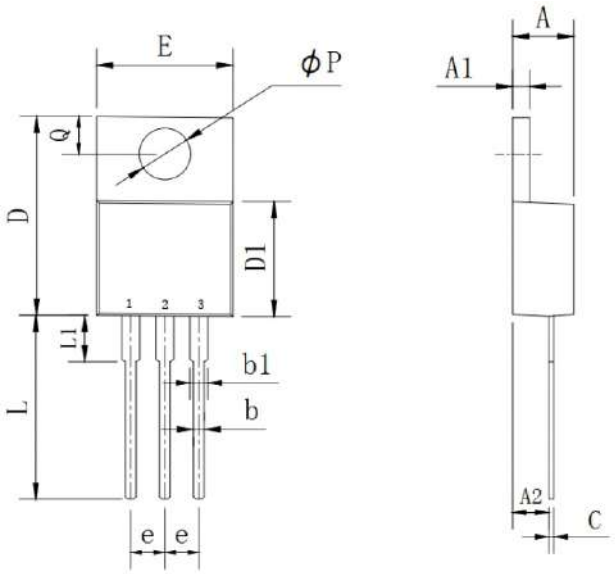
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

8) Unclamped Inductive Switching Waveforms

Product Names Rules

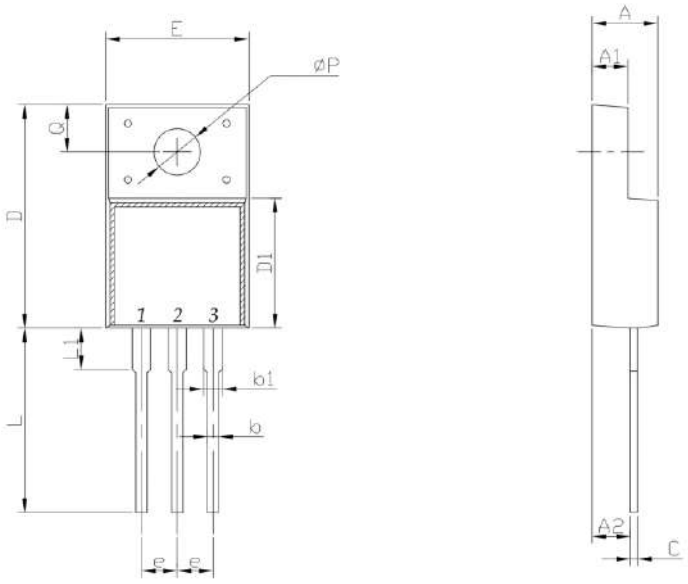


TO-220 PACKAGE OUTLINE DIMENSIONS



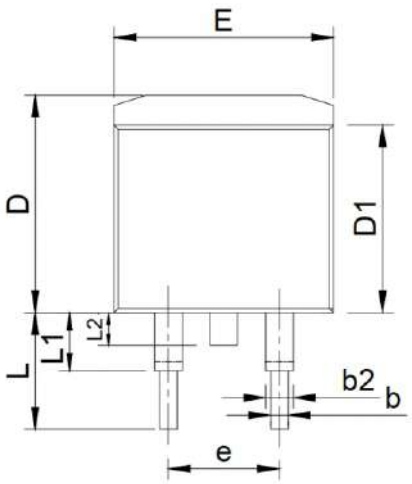
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	2.03	2.92	0.080	0.115
b	0.51	1.11	0.020	0.044
b1	0.97	1.6	0.038	0.063
C	0.3	0.7	0.012	0.028
D	14.6	15.9	0.575	0.626
D1	8.04	9.3	0.317	0.366
E	9.57	10.57	0.377	0.416
e	2.34	2.74	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

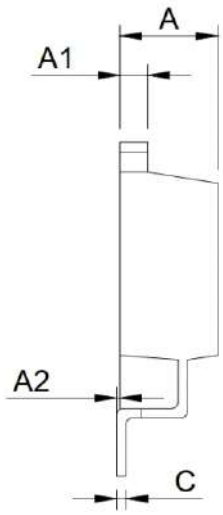
ITO-220 PACKAGE OUTLINE DIMENSIONS



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

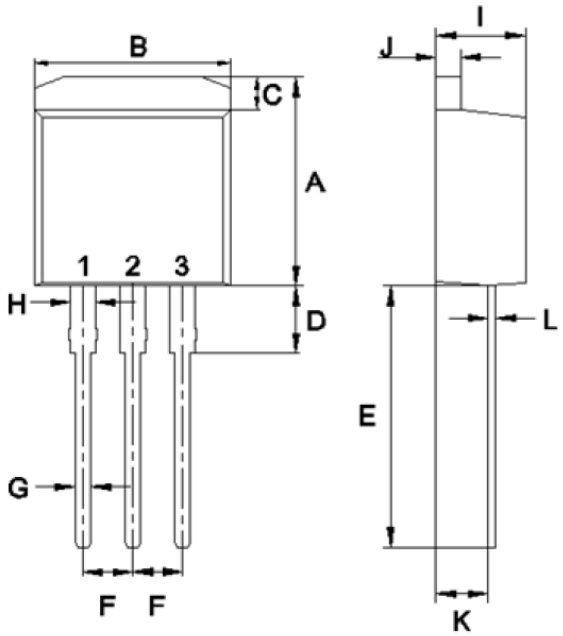
TO-263 PACKAGE OUTLINE DIMENSIONS





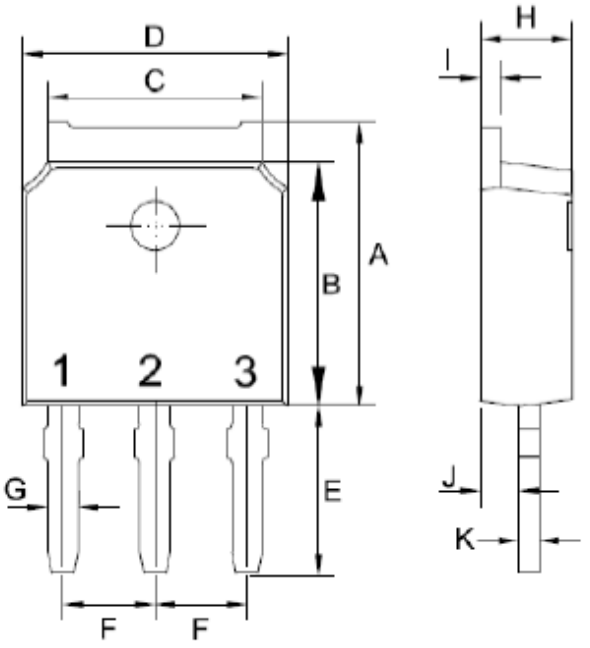
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192	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



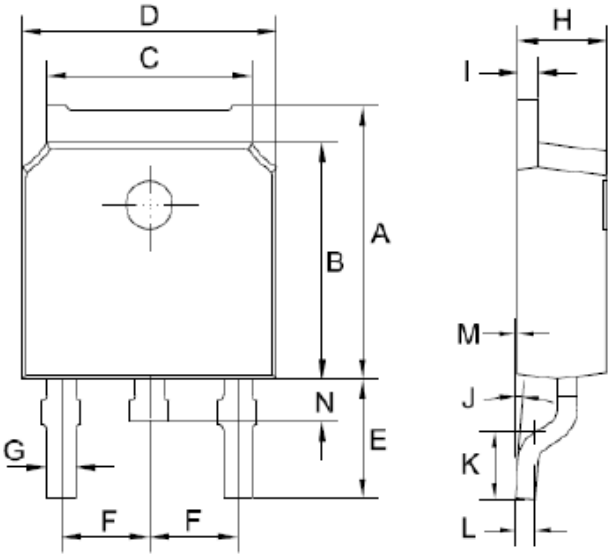
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	10.14	11.14	0.399	0.439
B	9.57	10.57	0.377	0.416
C	1.15	1.84	0.045	0.072
D	2.95	3.95	0.116	0.156
E	12.25	13.75	0.482	0.541
F	2.34	2.74	0.092	0.108
G	0.51	1.11	0.020	0.044
H	0.97	1.57	0.038	0.062
I	4.25	4.87	0.167	0.192
J	1.07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

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