

General Description

These N-channel enhancement mode power MOSFETs used advanced trench technology design, provided excellent R_{ds(on)} 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-251, TO-252, TO-263-7 Package

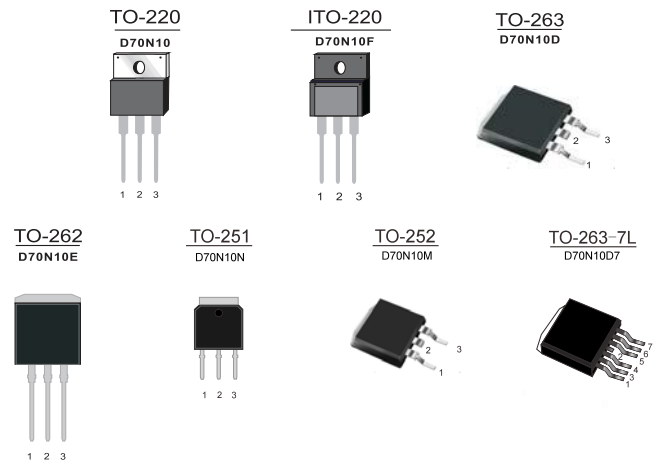
Application

- Switching applications

Ordering Information

Part No.	Package Type	Package	Quality(box)
D70N10	TO-220	Tube	1000
D70N10F	ITO-220	Tube	1000
D70N10D	TO-263	Tape & Reel	800
D70N10E	TO-262	Tube	1000
D70N10N	TO-251	Tube	1000
D70N10M	TO-252	Tape & Reel	3000
D70N10D7	TO-263-7L	Tape & Reel	800

Product Summary			
V _{DS}	R _{DS(on)} (mΩ) Typ	I _D (A)	Q _g (Typ)
100V	10@ 10V	73	60nc



Block Diagram

Pin Definition:

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

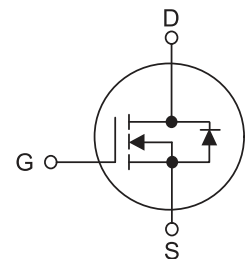


Table1 Absolute Maximum Ratings (T_c=25 C, unless otherwise specified)

Parameter	Symbol	TO-220/TO-263/TO-262 TO-252/TO-251/TO-263-7	ITO-220	Unit
Drain-Source Voltage	V _{DS}	100		V
Gate-Source Voltage	V _{GS}	±25		V
Continuous Drain Current	I _D	T _C =25°C	73	A
		T _C =100°C	51	
Pulsed Drain Current (Note 1)	I _{DM}	219		A
Single Pulse Avalanche Energy(Note 2)	E _{AS}	650		mJ
Avalanche Current(Note 2)	I _{AS}	30		A
Power Dissipation T _C =25°C	P _D	166	80	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175		C
High Temperature (tin solder)	T _L	300		C

Table 2. Thermal Characteristics

Parameter	Symbol	TO-220/TO-263/TO-262 TO-252/TO-251/TO-263-7	ITO-220	Unit
Thermal resistance Junction to Ambient	$R_{\theta JA}$	75	75	C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	0.90	1.88	C/W

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	nA
On Characteristics(Note 4)						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=35A$		10	12	m Ω
Dynamic Characteristics(Note 5)						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		2946		pF
Output Capacitance	C_{OSS}			339		pF
Reverse Transfer Capacitance	C_{RSS}			179		pF
Switching Characteristics (Note 5)						
Turn-On Delay Time	$t_d(on)$	$V_{DD}=50V, I_D=30A,$ $V_{GS}=10V, R_G=6.8\Omega$		15		ns
Turn-On Rise Time	t_R			108		ns
Turn-Off Delay Time	$t_d(off)$			51		ns
Turn-Off Fall Time	t_f			59		ns
Total Gate Charge	Q_G	$V_{DD}=50V, I_D=30A,$ $V_{GS}=10V$		60		nC
Gate-Source Charge	Q_{GS}			13.7		nC
Gate-Drain Charge	Q_{GD}			22.8		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=70A$			1.3	V
Maximum Continuous Drain-Source Diode Forward Current	I_S				70	A
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_F=50A$ $dI_F/dt=100A/\mu s$		46		ns
Reverse Recovery Charge	Q_{RR}			86		nC

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

2 $L=0.5mH, I_D=51A, V_{DD}=50V, V_{GATE}=100V, Start T_J=25\text{ }^\circ\text{C}$

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

5 Guaranteed by design, not subject to production

Typical characteristics diagrams

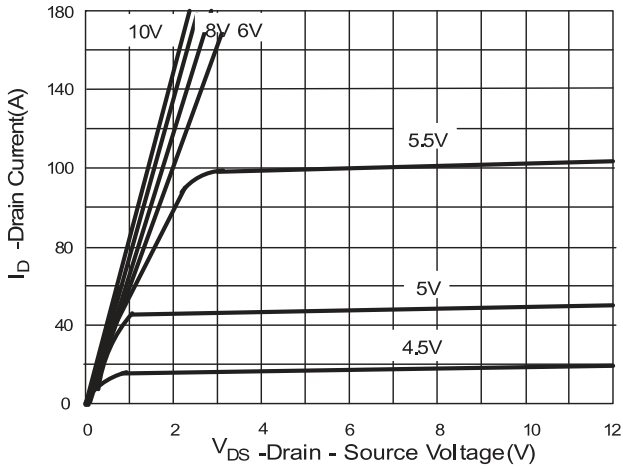


Figure.1 Output Characteristics

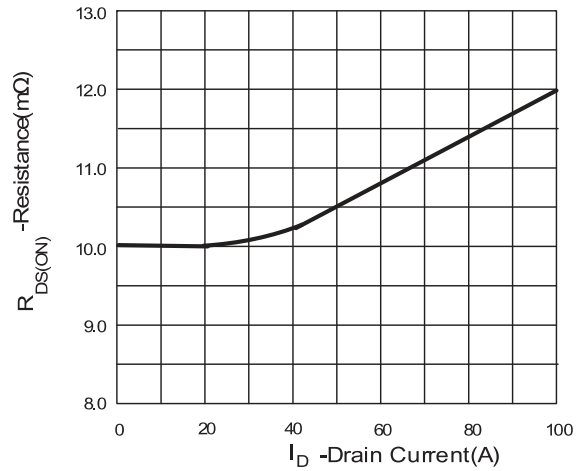


Figure.2 Drain-Source On Resistance

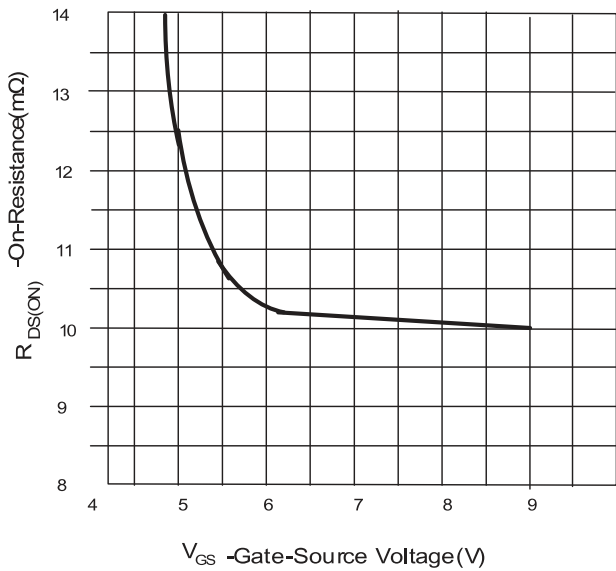


Figure.3 Drain-Source On Resistance

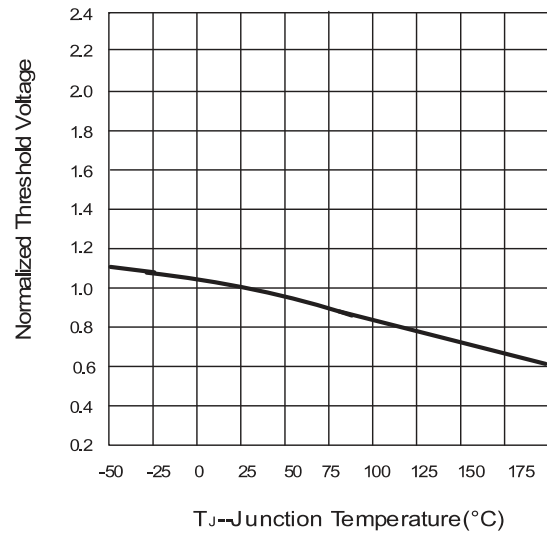


Figure.4 Gate Threshold Voltage

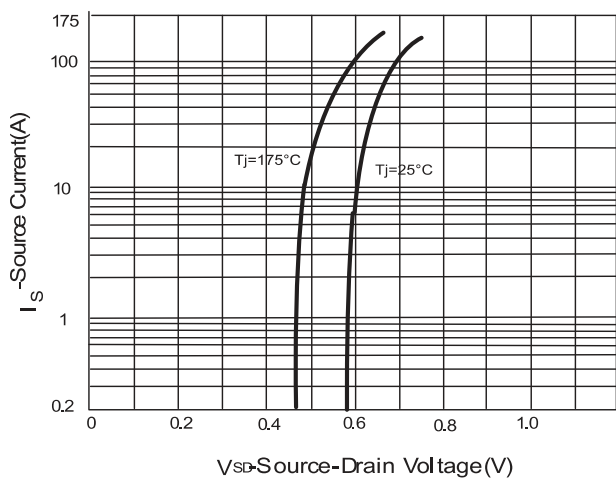


Figure.5 Source-Drain Diode Forward

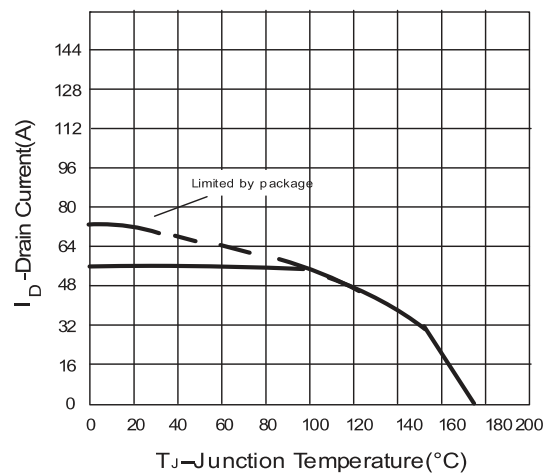


Figure.6 Drain Current

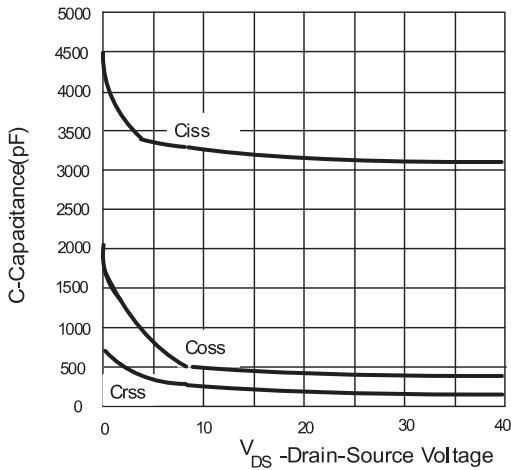


Figure.7 Capacitance

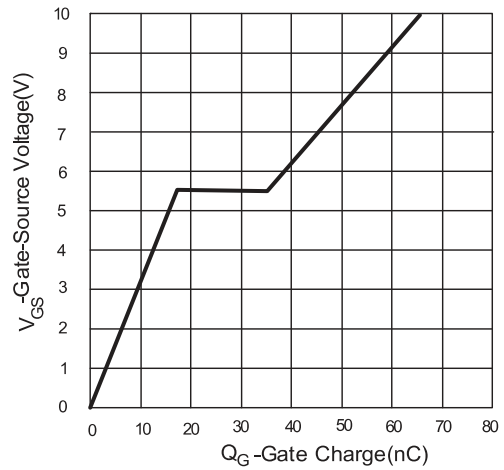


Figure.8 Gate Charge

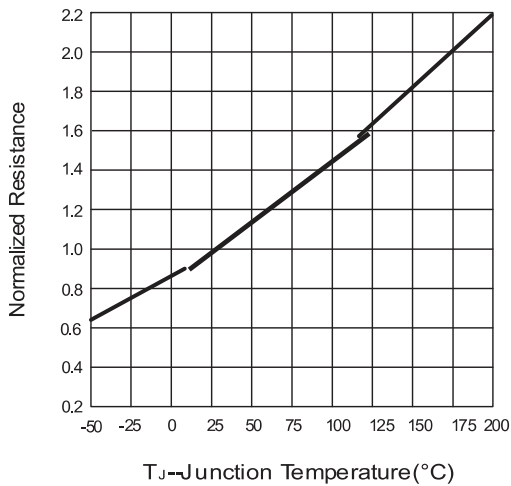


Figure.9 Drain-Source On Resistance

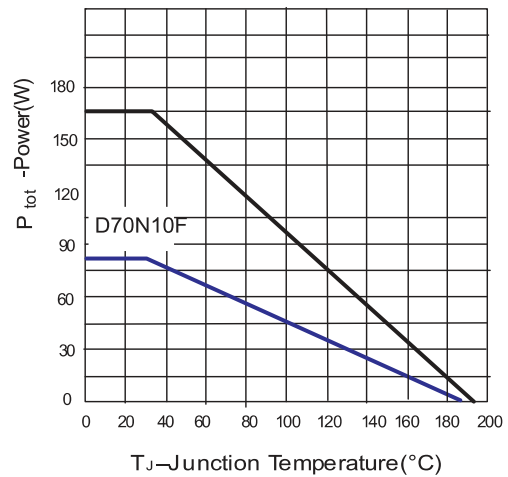


Figure.10 Power Dissipation

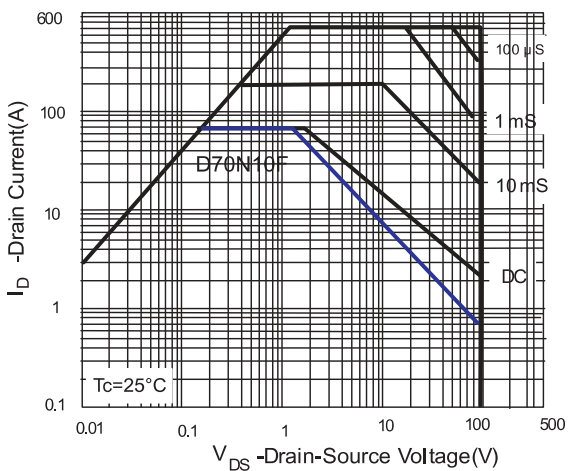


Figure.11 Safe Operation Area

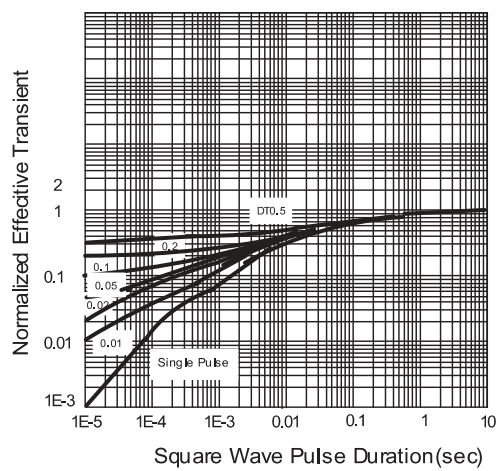
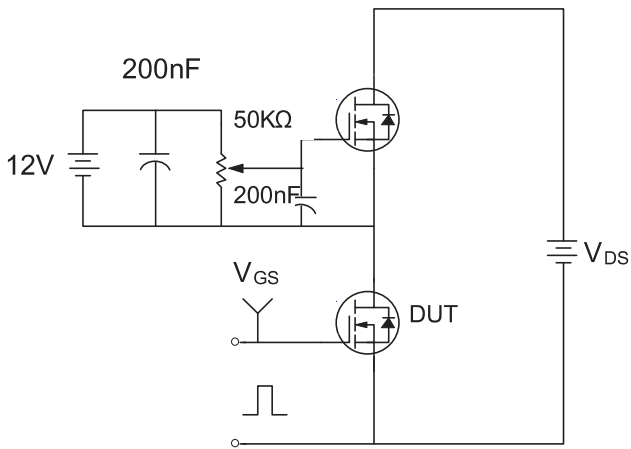
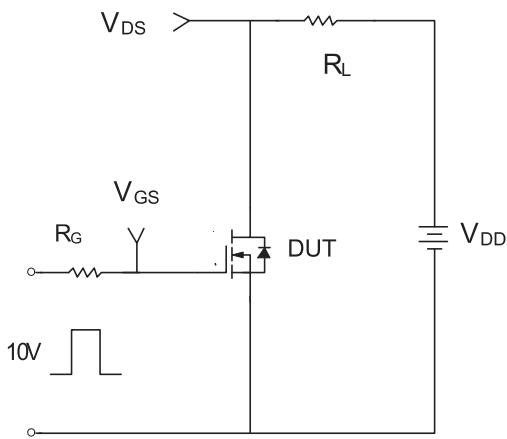


Figure.12 Thermal Transient Impedance

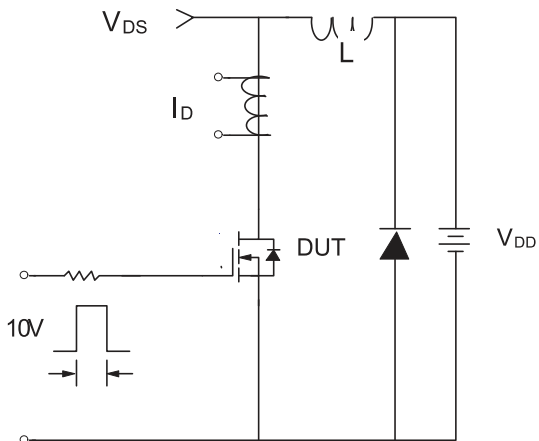
Typical Test Circuit



1) Gate Charge Test Circuit & Waveform

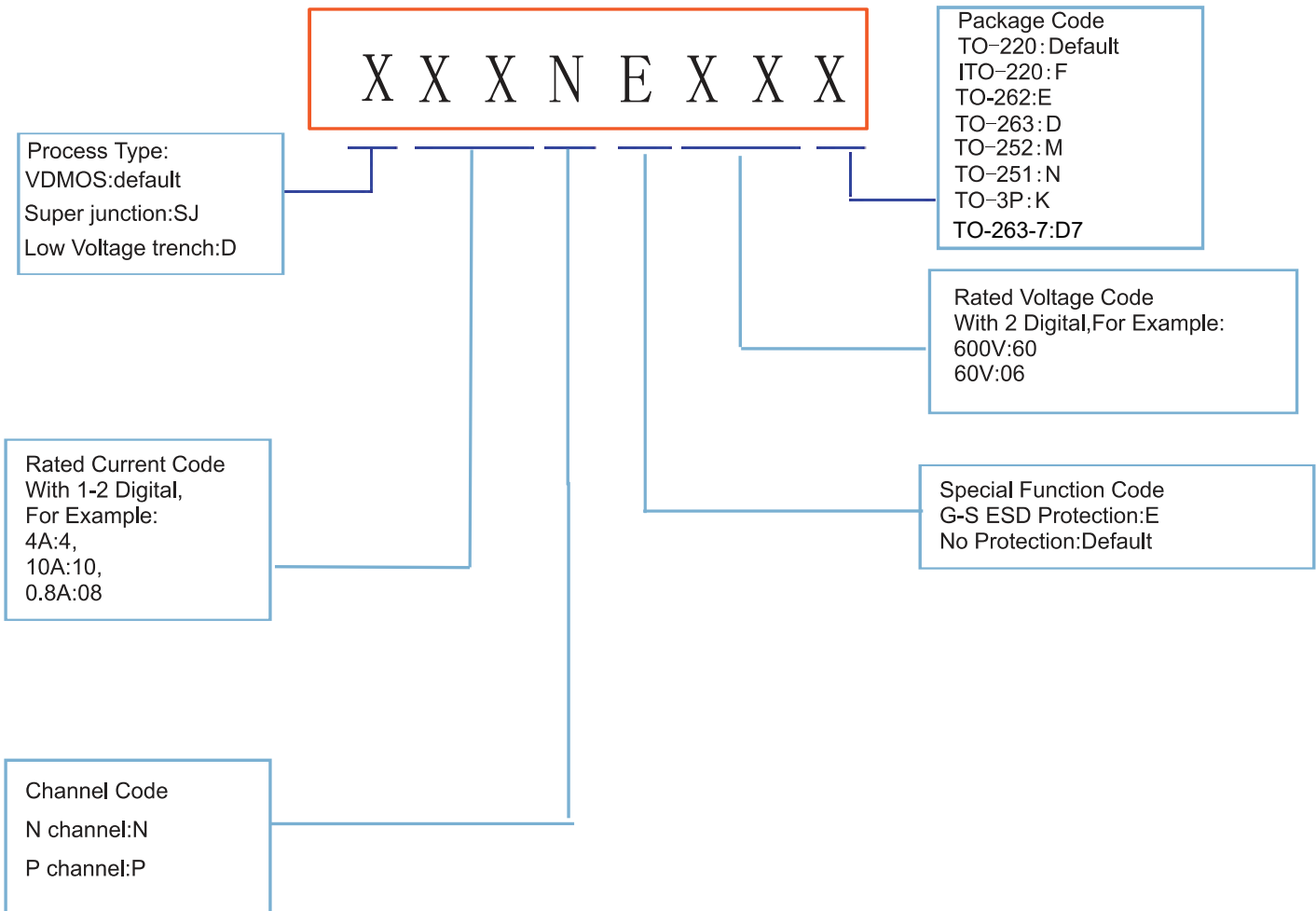


2) Switch Time Test Circuit



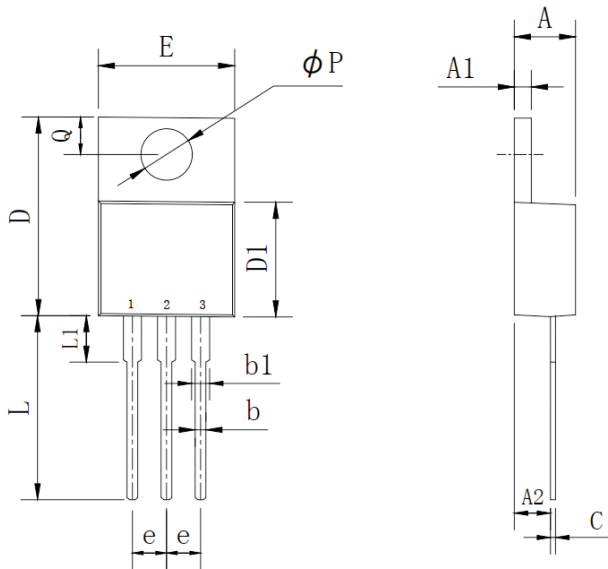
3) Unclamped Inductive Switching Test Circuit & Waveforms

Product Names Rules



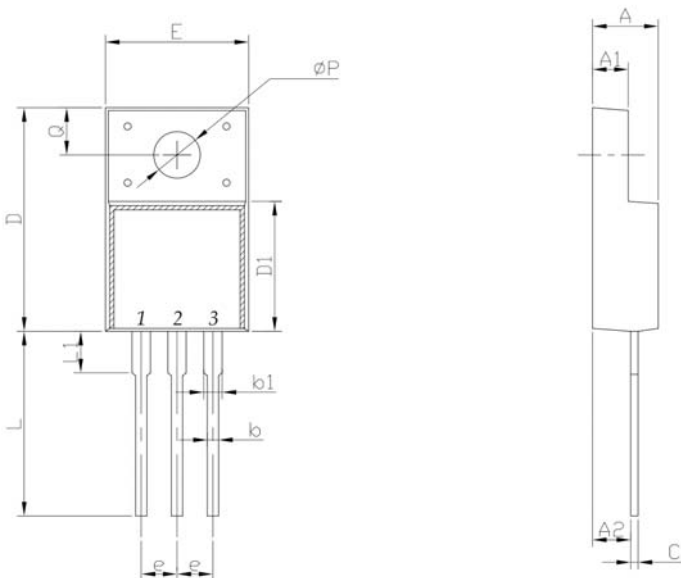
Dimensions

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

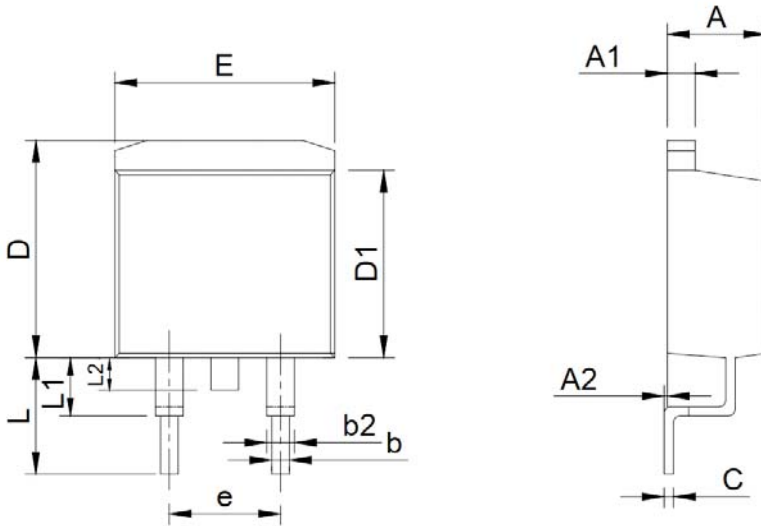
ITO-220 PACKAGE OUTLINE DIMENSIONS



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

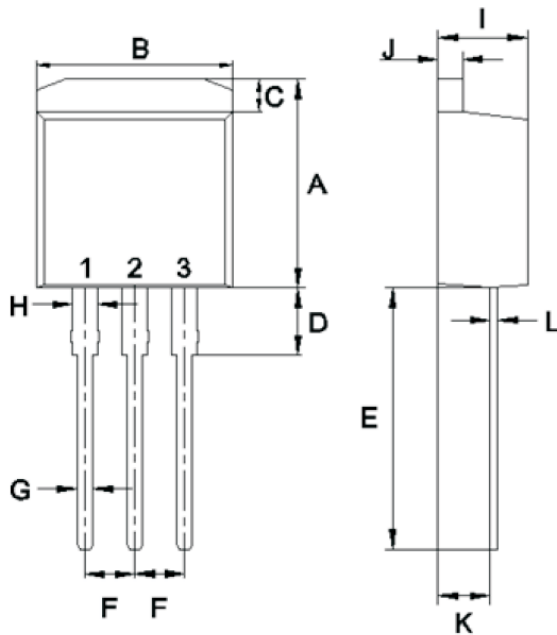
Dimensions

TO-263 PACKAGE OUTLINE DIMENSIONS



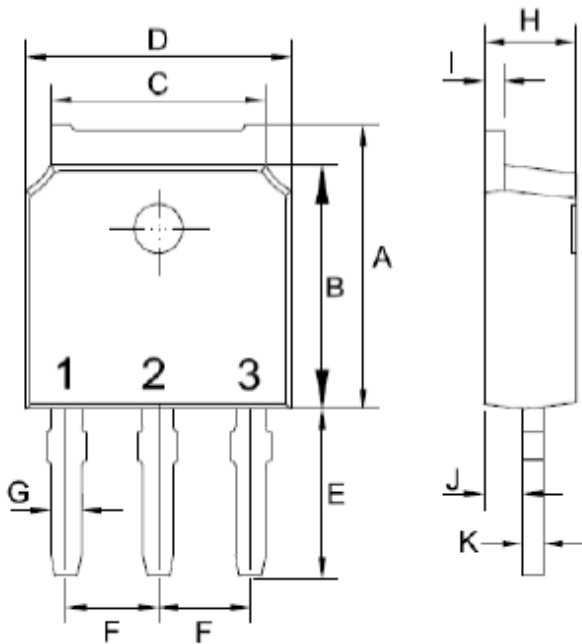
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.87	0.167	0.192
A1	1.07	1.47	0.042	0.058
A2	0	0.25	0.000	0.010
b	0.61	1.01	0.024	0.040
b1	1.2	1.34	0.047	0.053
C	0.3	0.6	0.012	0.024
D	9.48	10.84	0.373	0.427
D1	8.49	9.3	0.334	0.366
E	9.7	10.31	0.382	0.406
e	4.88	5.28	0.192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



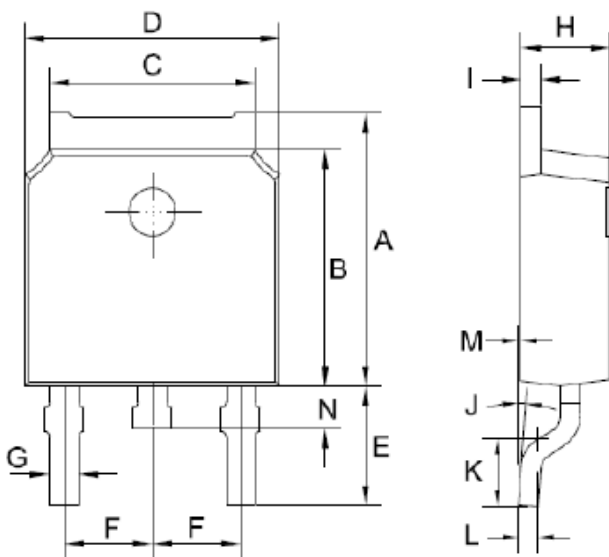
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	10.14	11.14	0.399	0.439
B	9.57	10.57	0.377	0.416
C	1.15	1.84	0.045	0.072
D	2.95	3.95	0.116	0.156
E	12.25	13.75	0.482	0.541
F	2.34	2.74	0.092	0.108
G	0.51	1.11	0.020	0.044
H	0.97	1.57	0.038	0.062
I	4.25	4.87	0.167	0.192
J	1.07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

TO-251 PACKAGE OUTLINE DIMENSIONS



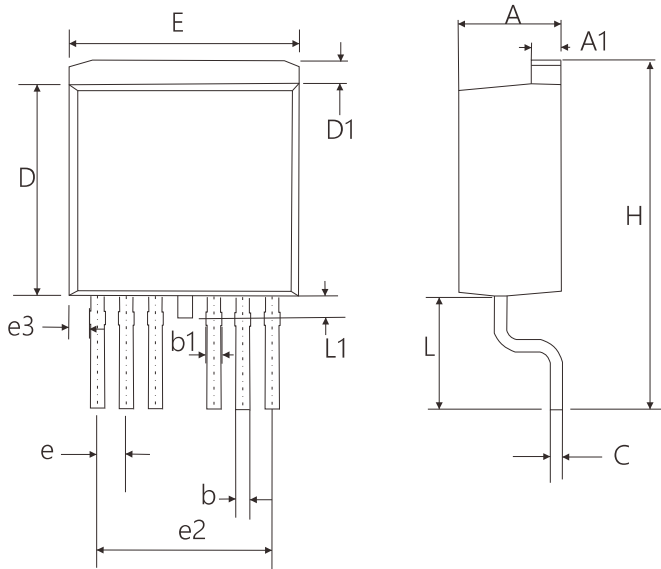
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	6.85	7.25	0.270	0.285
B	5.8	6.3	0.228	0.248
C	5	5.53	0.197	0.218
D	6.3	6.8	0.248	0.268
E	3.5	4.35	0.138	0.171
F	2.19	2.39	0.086	0.094
G	0.45	0.85	0.018	0.033
H	2.2	2.4	0.087	0.094
I	0.41	0.61	0.016	0.024
J	0.71	1.31	0.028	0.052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

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

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