SEMICONDUCTOR

D10P06 Series
10A 60V P-Channel Enhancement Mode Power MOSFET

Genaral Description

These P-channel enhanced VDMOSFETs, Used advanced trench technology and design, provid to 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)
-60V	78@-10V	-10	18nc

Features

- Fast switching
- Low Reverse transfer capacitances
- Low gate charge
- 100% avalanche tested

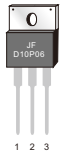
Mechanical Data

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

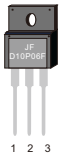
Application

- Switching applications

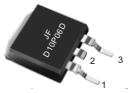
TO-220 D10P06



ITO-220 D10P06F

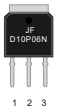


TO-263 D10P06D



TO-262 D10P06E

TO-251 D10P06N



TO-252 D10P06M

Ordering Information

Part No.	Package Type	Package	Quality(box)
D10P06	TO-220	Tube	1000
D10P06F	ITO-220	Tube	1000
D10P06D	TO-263	Tape & Reel	800
D10P06E	TO-262	Tube	1000
D10P06N	TO-251	Tube	1000
D10P06M	TO-252	Tape & Reel	3000

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

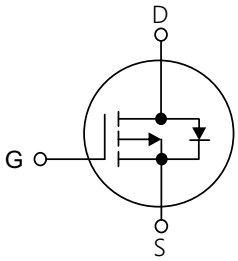


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	TO-220/TO-263/TO-262 TO-252/TO-251	ITO-220	Unit
Drain-Source Voltage		V_{DS}	-60		V
Gate-Source Voltage		V_{GS}	±20		V
Continuous Drain Current	T_C=25°C	I_D	-10		A
	T_C=100°C		-6.5		
Pulsed Drain Current (Note 1)		I_{DM}	-40		A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	25		mJ
Power Dissipation T_C=25°C		P_D	50	20	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55~+150		°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	°C/W
Thermal resistance Junction to Case	$R_{\theta JC}$	3	7.5	°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	-60	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-60V,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	-3	-	-1	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=-10V,I_D=-5A	-	78	100	mΩ
			V_{GS}=-4.5V,I_D=-5A	-	98	120	
Dynamic Characteristics(Note 5)							
Input Capacitance		C_{ISS}	V_{DS}=-25V,V_{GS}=0V,f=1MHz	-	900	-	pF
Output Capacitance		C_{OSS}		-	115	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	40	-	pF
Switching Characteristics (Note 5)							
Turn-On Delay Time		td(on)	V_{DD}=-30V,R_L=15Ω, V_{GS}=-10V,R_G=3Ω	-	8	-	ns
Turn-On Rise Time		t_R		-	6	-	ns
Turn-Off Delay Time		td(off)		-	30	-	ns
Turn-Off Fall Time		tf		-	7	-	ns
Total Gate Charge		Q_G	V_{DD}=-20V,I_D=-4A, V_{GS}=-10V	-	18	-	nC
Gate-Source Charge		Q_{GS}		-	3.2	-	nC
Gate-Drain Charge		Q_{GD}		-	3.8	-	nC
Drain-Source Diode Characteristics and Maximum Ratings							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=-10A	-	-	-1.2	V
Maximum Continuous Drain-Source Diode Forward Current		I_S		-	-	-10	A
Reverse Recovery Time		trr	V_{GS}=0V, I_S=-10A dI$_F$/dt=100A/μs (Note 1)	-	22	-	ns
Reverse Recovery Charge		Q_{RR}		-	26	-	nC

Notes：1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 L=0.5mH, I_D=-10A,V_{DD}=-50V,V_{GATE}=-60V,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

Figure1. Power Dissipation

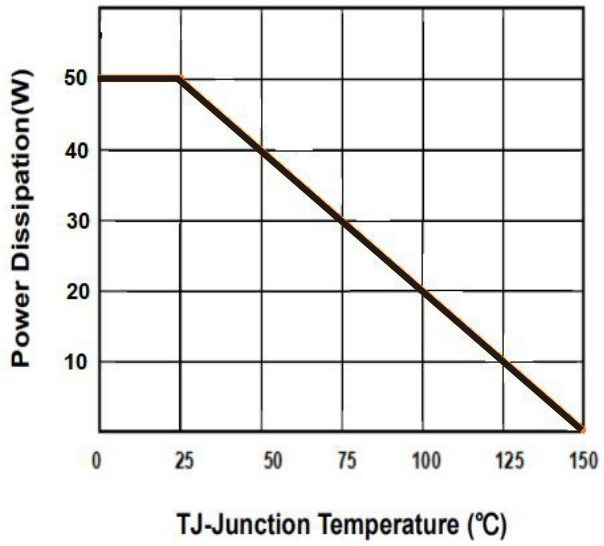


Figure2. Drain Current

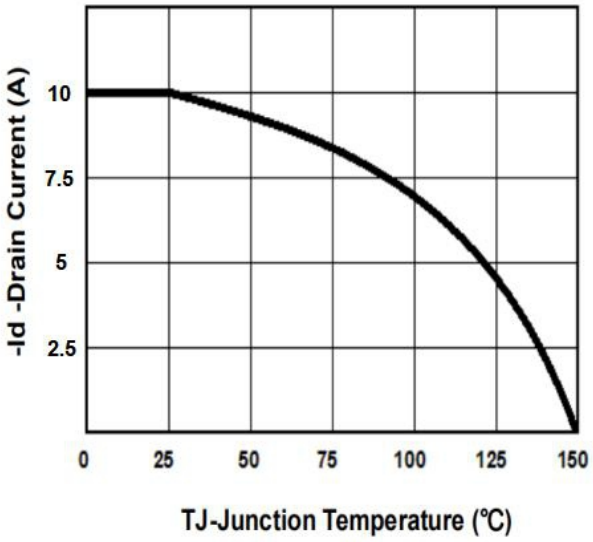


Figure3. Output Characteristics

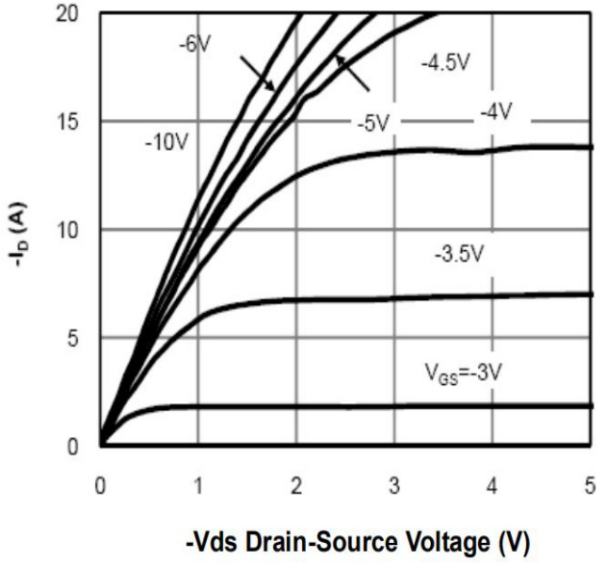
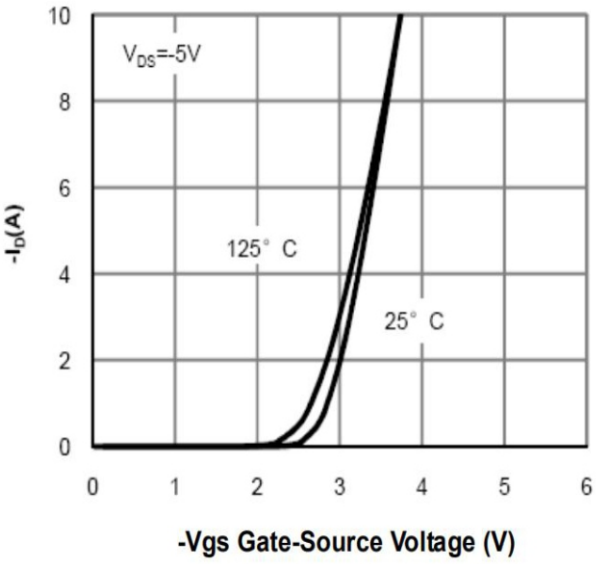


Figure4. Transfer Characteristics



Typical Characteristics Diagrams

Figure5. Capacitance

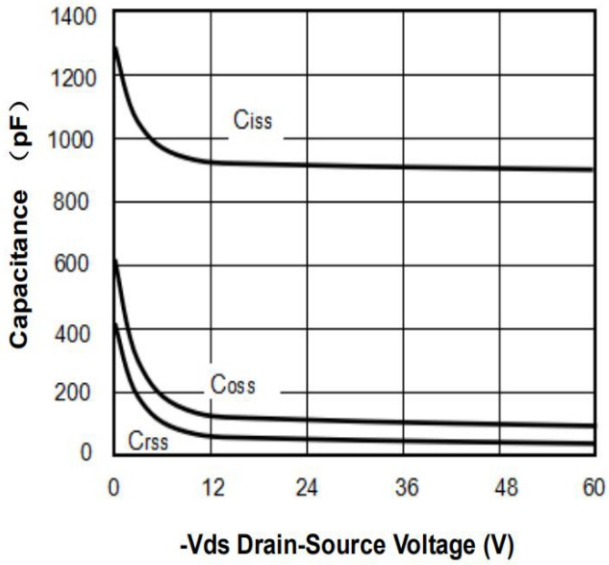


Figure6. $R_{DS(ON)}$ vs Junction Temperature

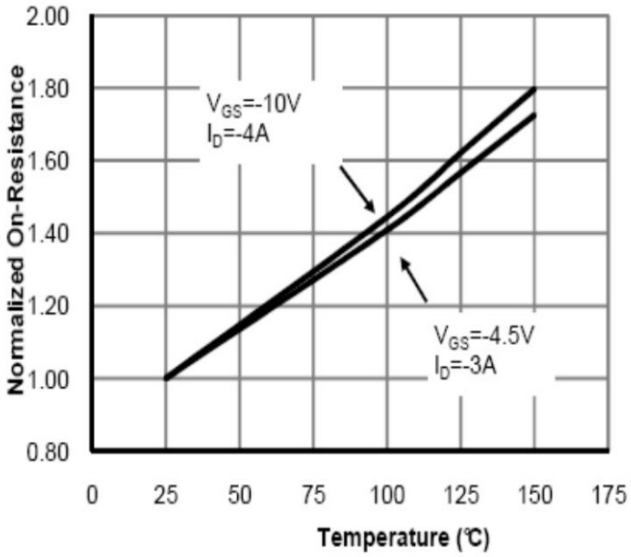


Figure7. Max BV_{DSS} vs Junction Temperature

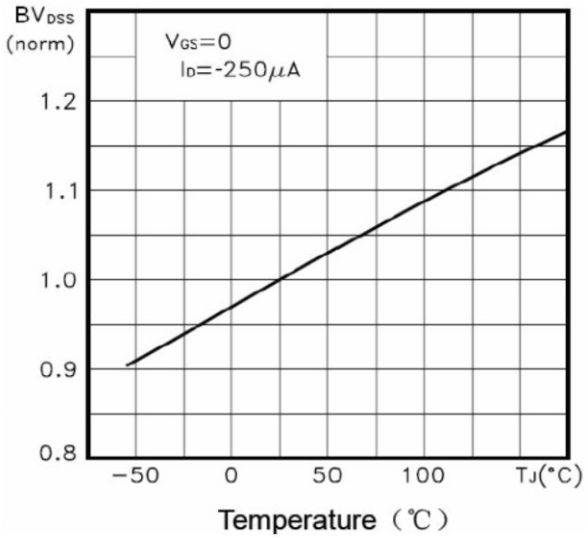


Figure8. $V_{GS(th)}$ vs Junction Temperature

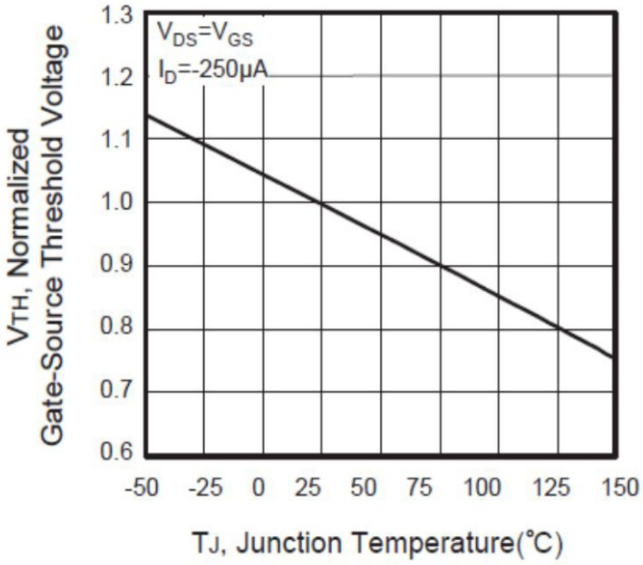
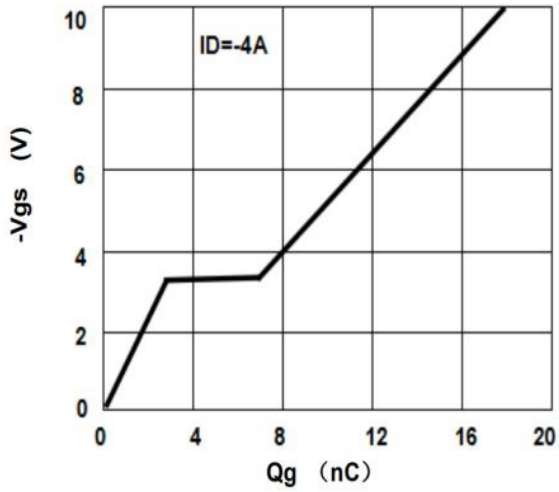
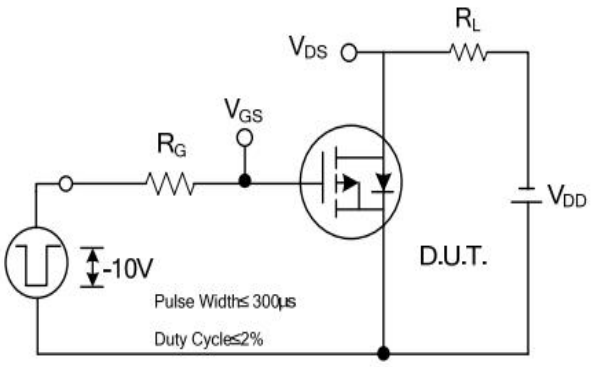


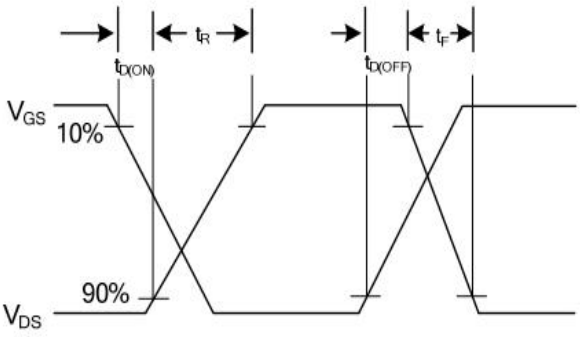
Figure9. Gate Charge Waveforms



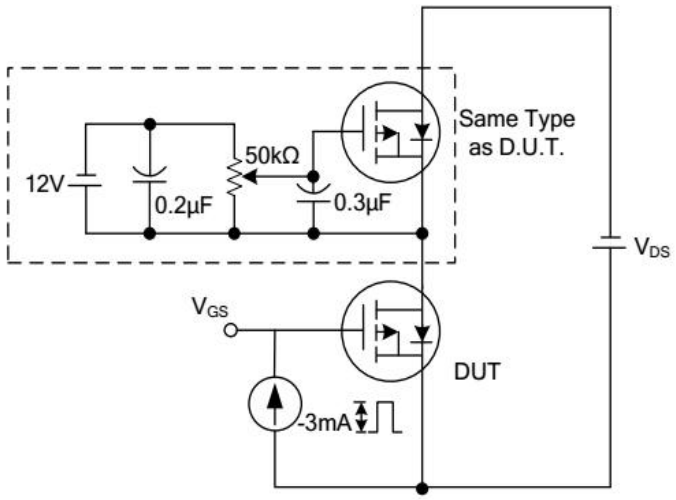
Typical Test Circuit



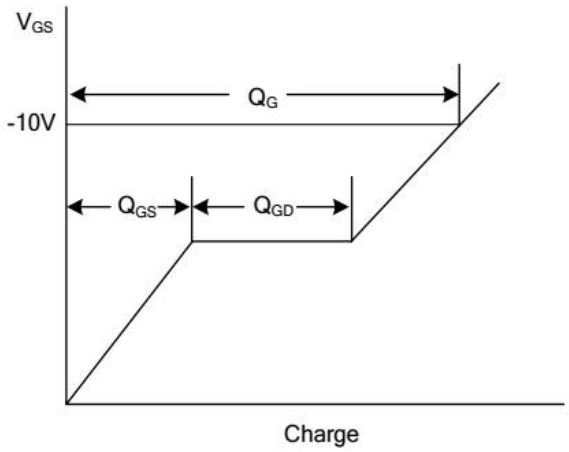
Switching Test Circuit



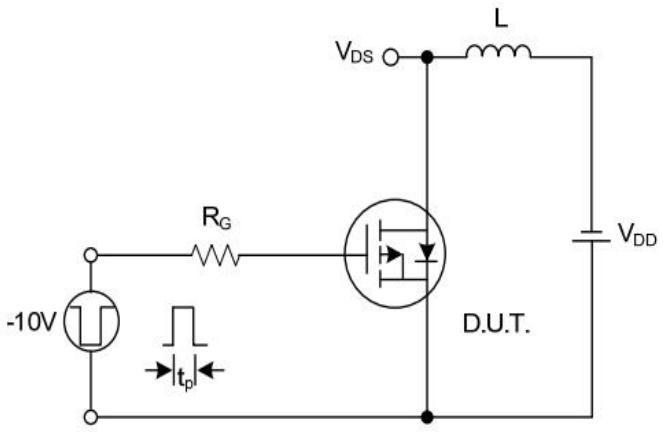
Switching Waveforms



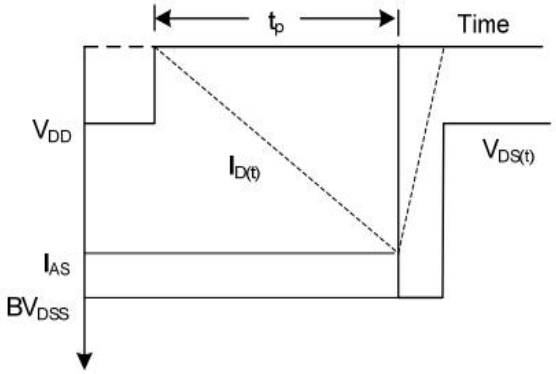
Gate Charge Test Circuit



Gate Charge Waveform

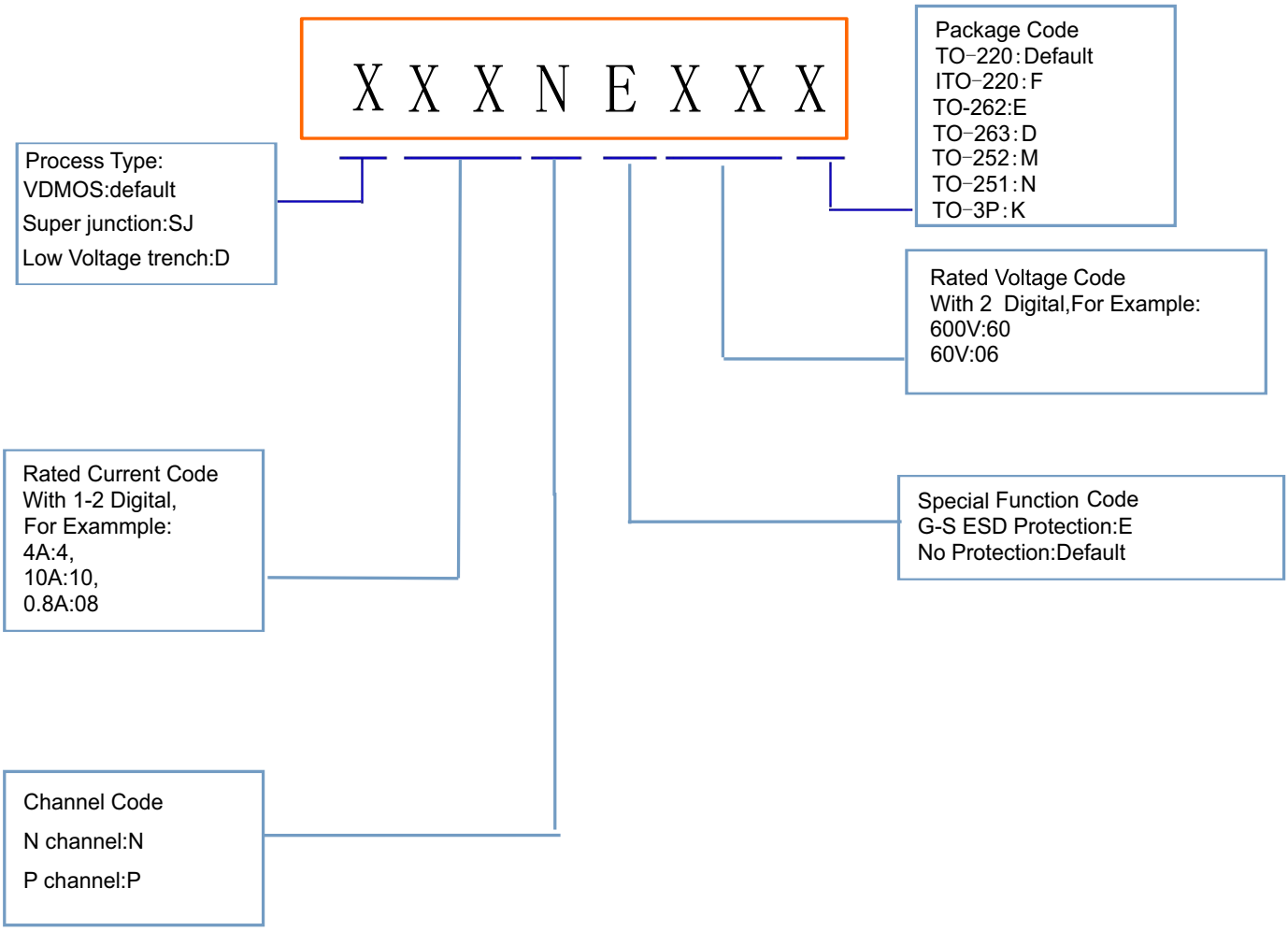


Unclamped Inductive Switching Test Circuit



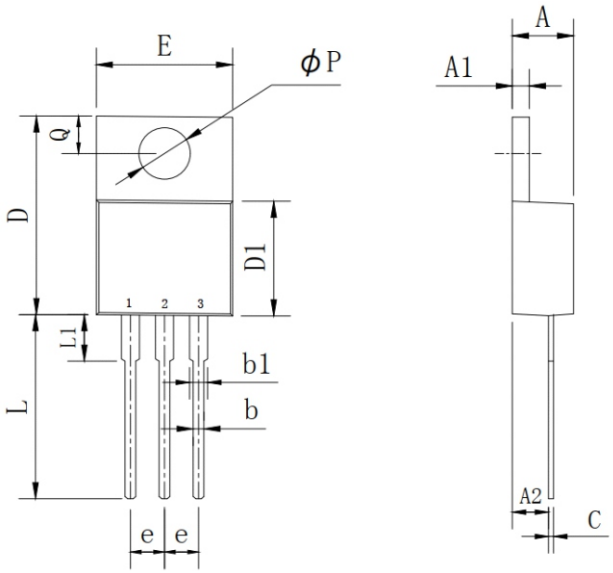
Unclamped Inductive Switching Waveforms

Product Names Rules



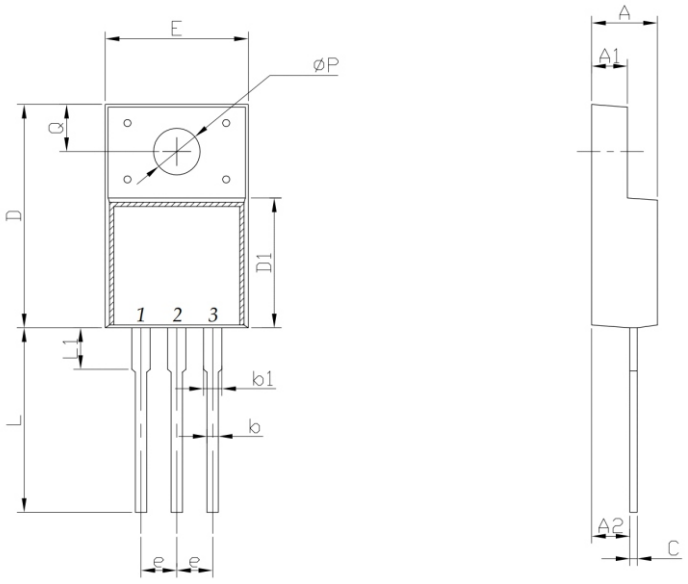
Dimensions

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

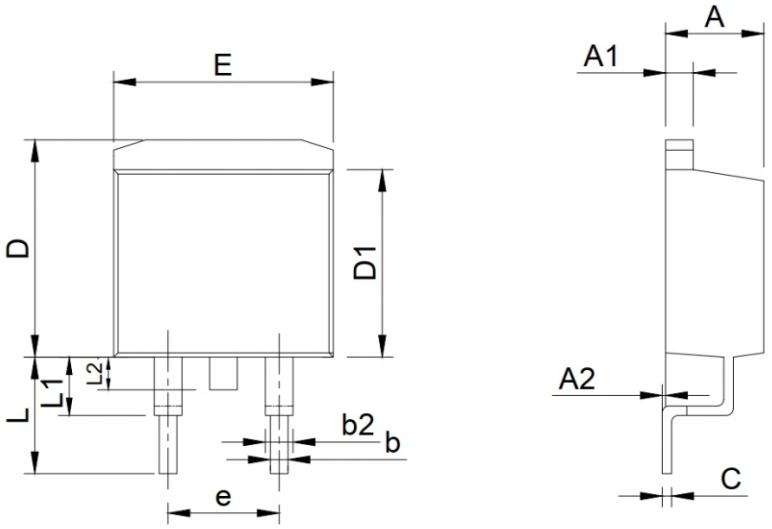
ITO-220 PACKAGE OUTLINE DIMENSIONS



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

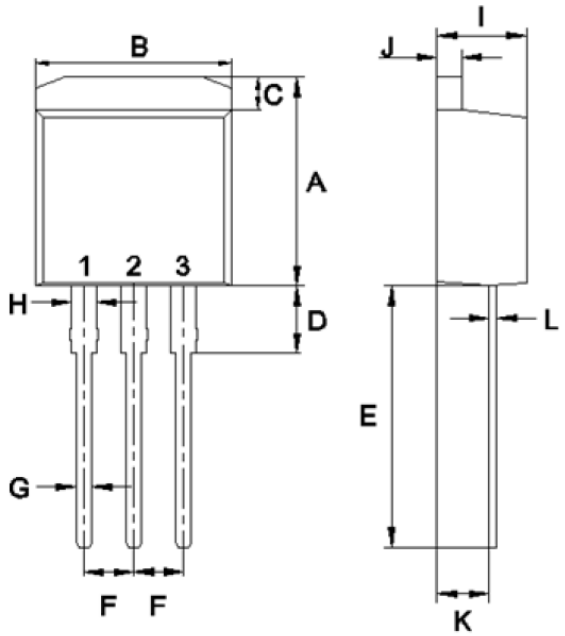
Dimensions

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

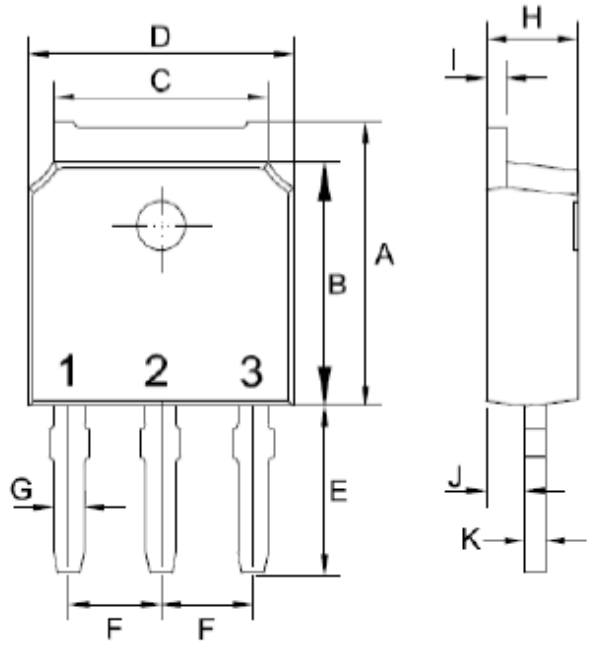
TO-262 PACKAGE OUTLINE DIMENSIONS



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

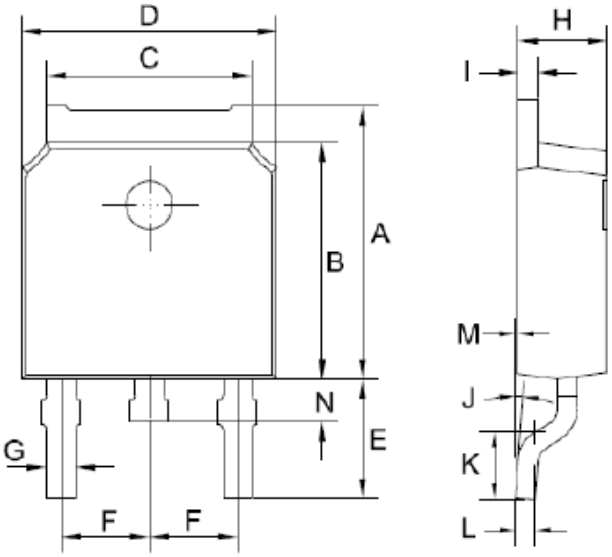
Dimensions

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



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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

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