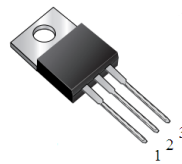
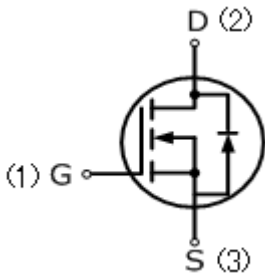


## 6N70(F,B,H,G,D)S

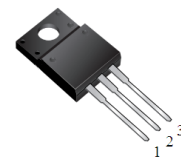
### 6 Amps, 700 Volts Super Junction N-CHANNEL MOSFET

#### FEATURE

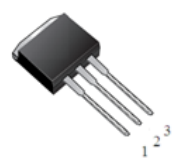
- 6A, 700V,  $R_{DS(ON)MAX}=0.95\Omega$  @  $V_{GS}=10V/3A$
- Low gate charge
- Low  $C_{iss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



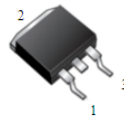
TO-220AB  
6N70S



ITO-220AB  
6N70FS



TO-262  
6N70HS



TO-263  
6N70BS



TO-252  
6N70GS



TO-251  
6N70DS

#### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	6N70(F,B,H,G,D)S	UNIT
Drain-Source Voltage	$V_{DSS}$	700	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	
Continuous Drain Current	$I_D$	6	A
Pulsed Drain Current (Note 1)	$I_{DM}$	24	
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	135	mJ
Avalanche Current (Note 1)	$I_{AR}$	2.5	A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	0.4	mJ
Reverse Diode dV/dt (Note 3)	dV/dt	48	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	$T_L$	260	$^\circ\text{C}$
Mounting Torque	6-32 or M3 screw	10	lbf • in
		1.1	N • m

#### Thermal Characteristics

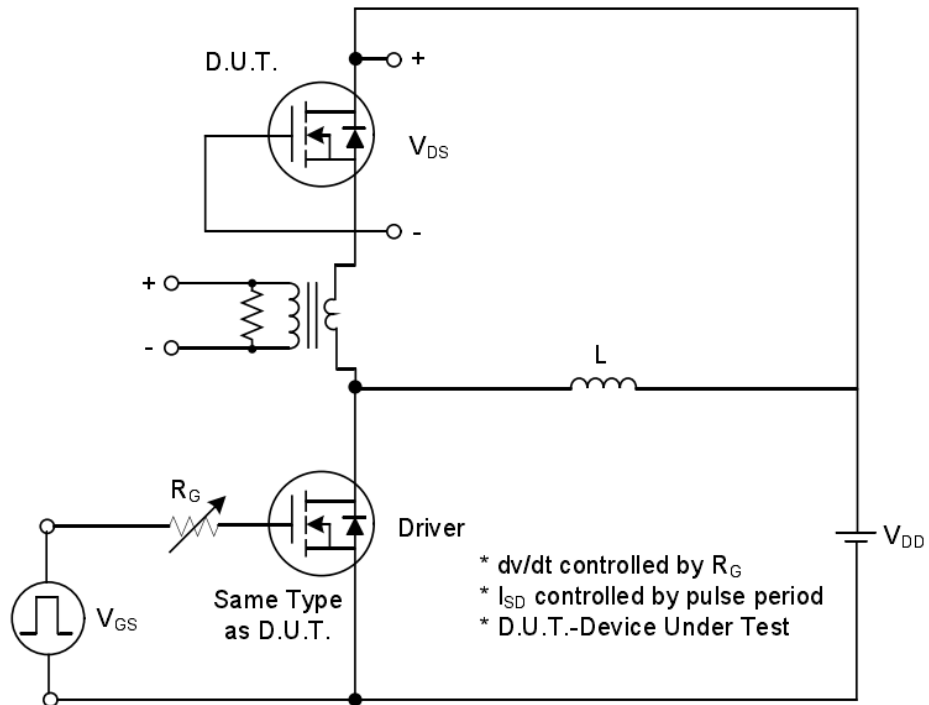
Parameter	Symbol	ITO-220	TO-220/TO-262/ TO-263	TO-251/252	Units
Thermal resistance, Junction to Case	$R_{th(J-c)}$	3.0	1.8	1.8	$^\circ\text{C}/\text{W}$
Thermal resistance, Channel to Case	$R_{th(ch-c)}$	3.0	1.8	1.8	$^\circ\text{C}/\text{W}$
Thermal resistance, Channel to Ambient	$R_{th(ch-a)}$	80	62	62	$^\circ\text{C}/\text{W}$
Maximum Power Dissipation	$T_C=25^\circ\text{C}$ $P_D$	57	70	70	W

<b>Electrical Characteristics</b> ( $T_c=25^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	700	—	—	V
Breakdown Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=250\mu A$	—	0.63	—	$V/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=700V, V_{GS}=0V$	—	—	10	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS}=30V, V_{DS}=0V$	—	—	1	$\mu A$
Gate-Body Leakage Current, Reverse	$I_{GSSR}$	$V_{GS}=-30V, V_{DS}=0V$	—	—	-1	$\mu A$
<b>On Characteristics</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	--	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=3A$	—	0.84	0.95	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=50V, V_{GS}=0V,$ $f=1.0\text{MHZ}$	—	460	—	pF
Output Capacitance	$C_{oss}$		—	45	—	pF
Reverse Transfer Capacitance	$C_{rss}$		—	3.5	—	pF
<b>Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=380V, I_D=3A,$ $R_G=18\Omega$ (Note4,5)	—	6	—	ns
Turn-On Rise Time	$t_r$		—	3	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	50	60	ns
Turn-Off Fall Time	$t_f$		—	9	15	ns
Total Gate Charge	$Q_g$	$V_{DS}=480V, I_D=6A,$ $V_{GS}=10V,$ (Note4,5)	—	10	20	nC
Gate-Source Charge	$Q_{gs}$		—	1.6	—	nC
Gate-Drain Charge	$Q_{gd}$		—	4	—	nC
<b>Drain-Source Body Diode Characteristics and Maximum Ratings</b>						
Continuous Diode Forward Current	$I_S$		—	—	6	A
Pulsed Diode Forward Current	$I_{SM}$		—	—	24	A
Diode Forward Voltage	$V_{SD}$	$I_S=6A, V_{GS}=0V$	—	—	1.3	V
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=6A,$	—	250	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_F/dt=100A/\mu s,$ (Note4)	—	2.2	—	$\mu C$

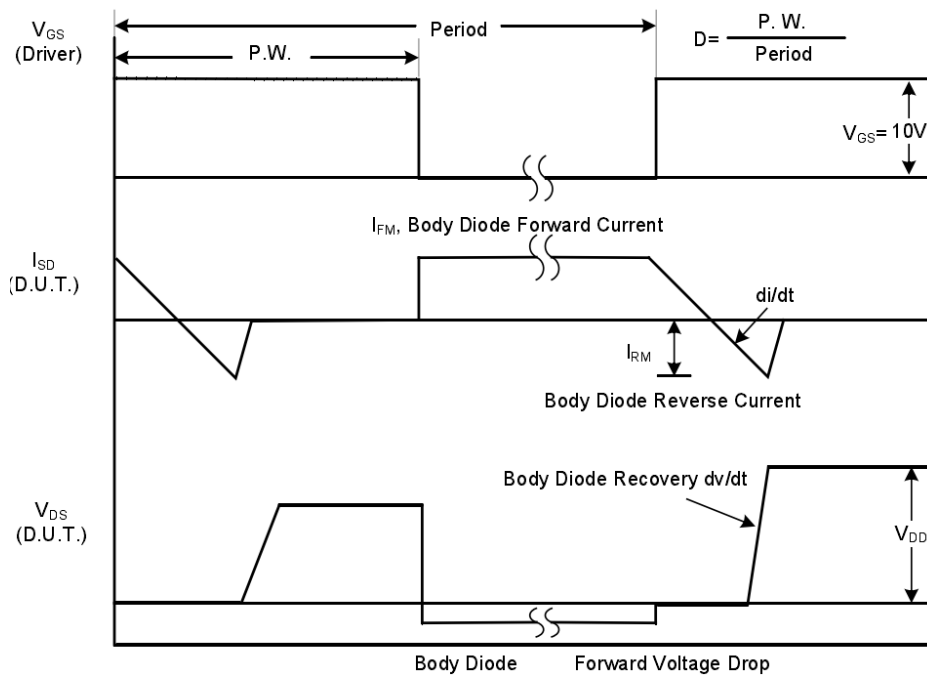
### Notes

1. Repetitive Rating: pulse width limited by maximum junction temperature .
2.  $V_{DD}=50V, L=7.5\text{mH}, R_g=25\Omega, I_{AS}=6A$ , starting,  $T_J=25^\circ\text{C}$ .
3.  $I_{SD} \leq I_D, dI/dt = \_A/\mu s, V_{DD} \leq BV_{DSS}$ , starting  $T_J=25^\circ\text{C}$ .
4. Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$ .
5. Repetitive rating; pulse width limited by maximum junction temperature.

**TEST CIRCUIT AND WAVEFORM**



**Fig. 1A Peak Diode Recovery  $dv/dt$  Test Circuit**



**Fig. 1B Peak Diode Recovery  $dv/dt$  Waveforms**

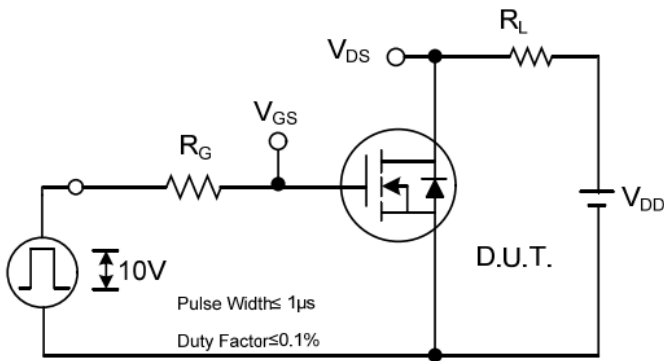


Fig. 2A Switching Test Circuit

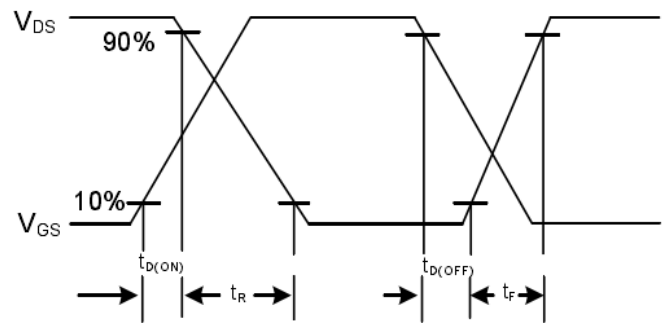


Fig. 2B Switching Waveforms

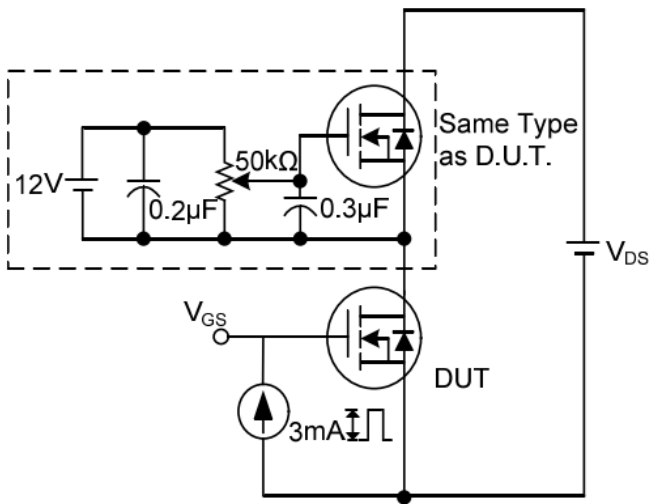


Fig. 3A Gate Charge Test Circuit

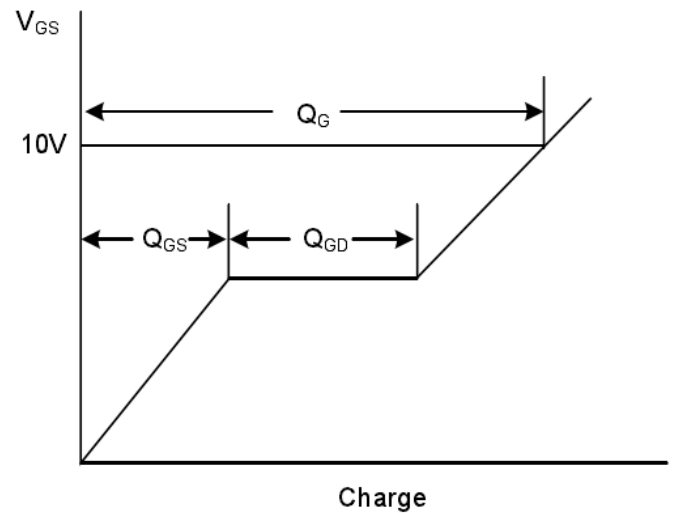


Fig. 3B Gate Charge Waveform

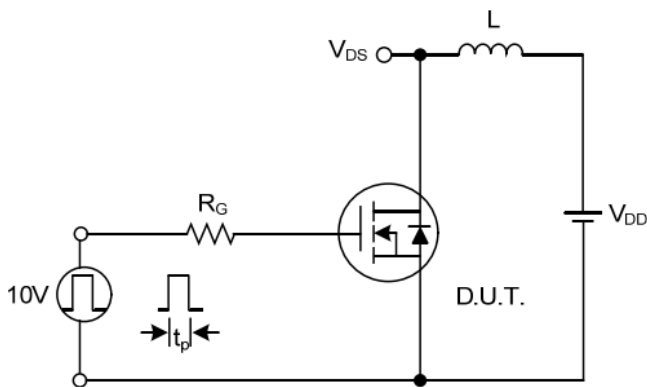


Fig. 4A Unclamped Inductive Switching Test Circuit

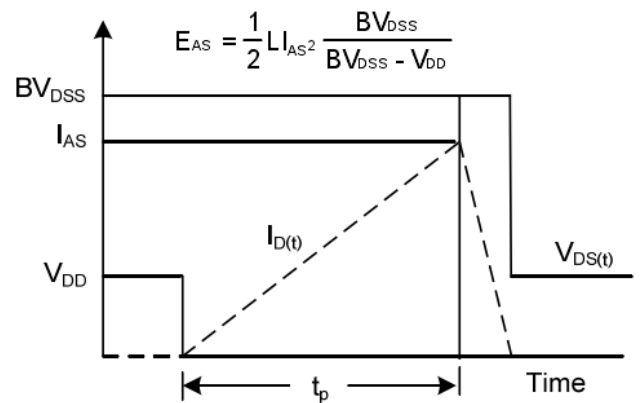
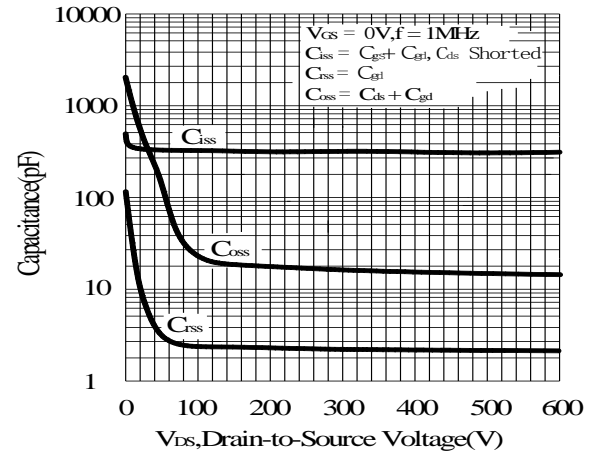
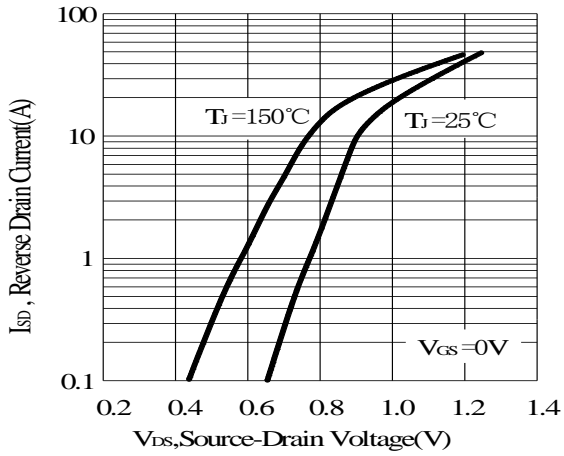
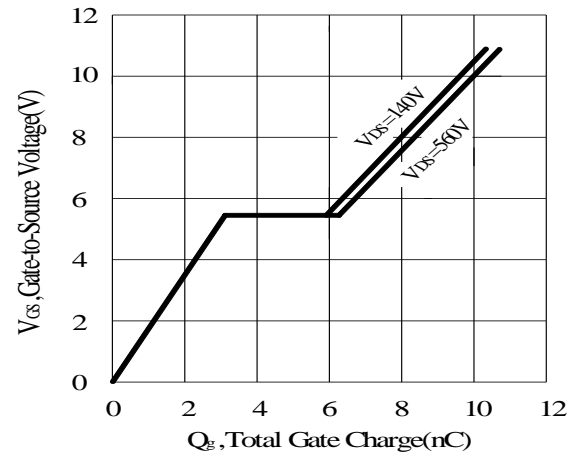
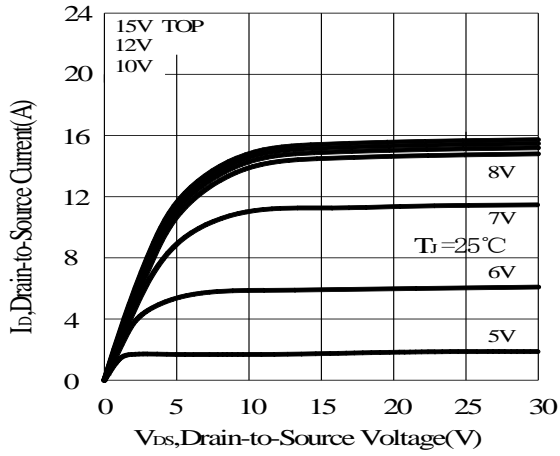
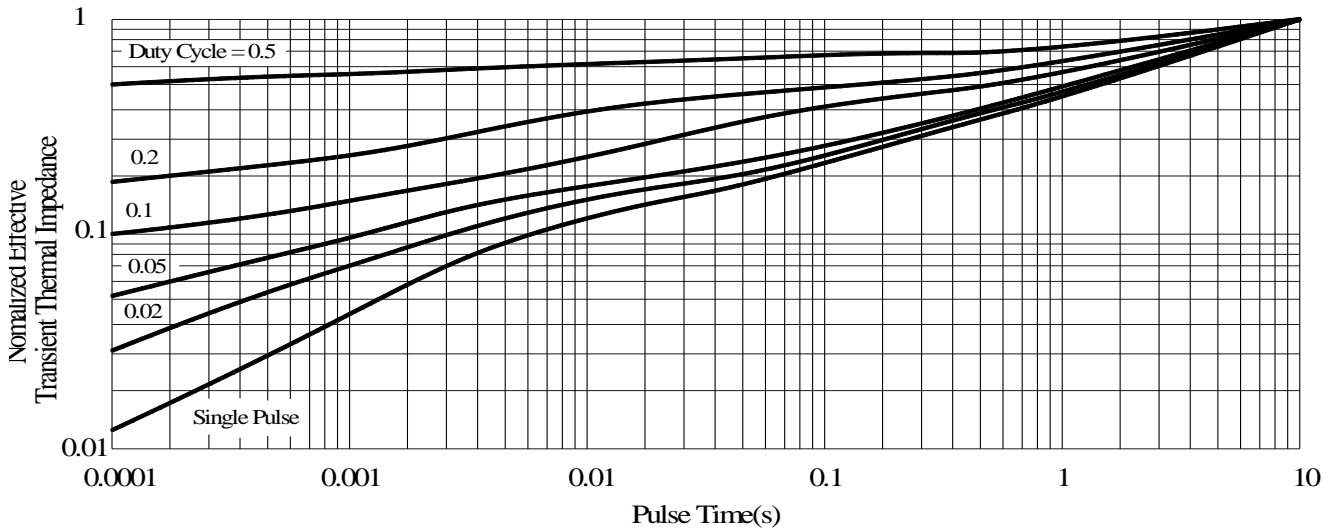
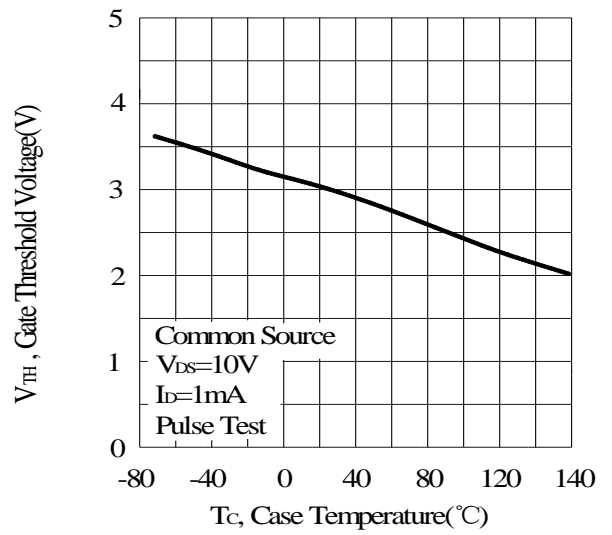
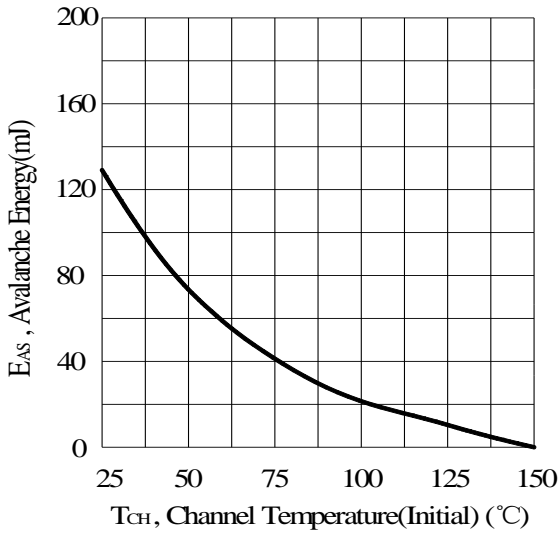
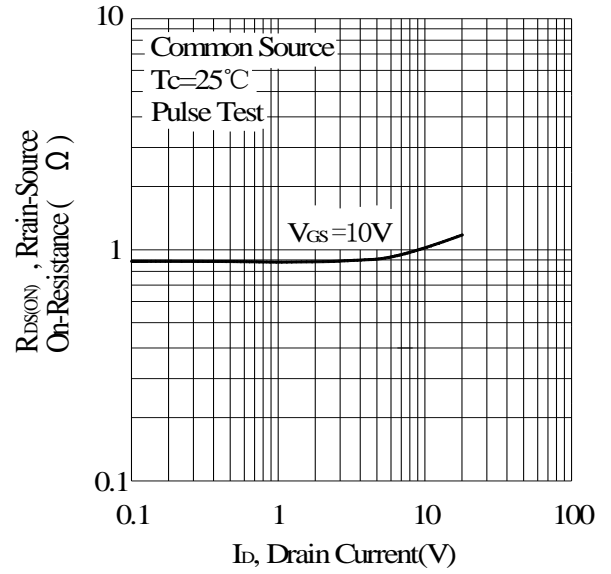
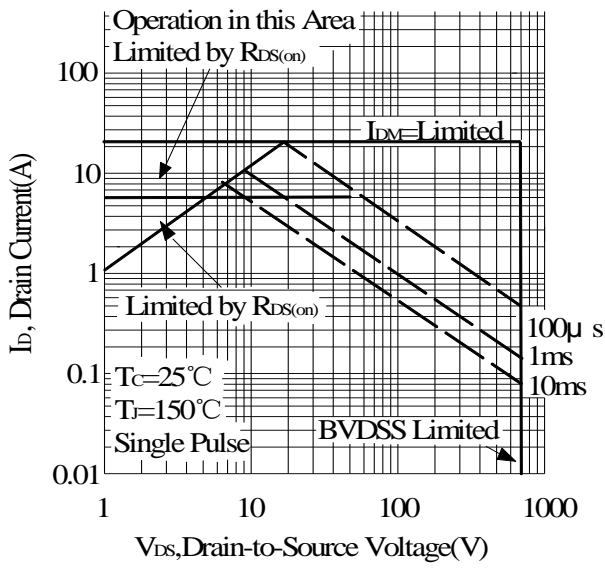


Fig. 4B Unclamped Inductive Switching Waveforms

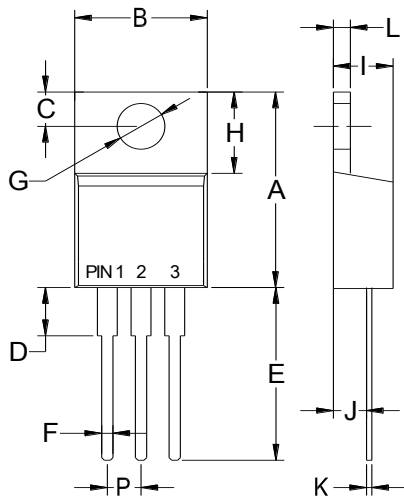
## RATING AND CHARACTERISTIC CURVES





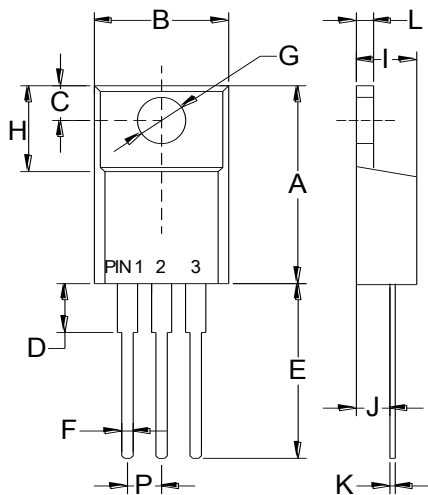
## PACKAGE OUTLINE DIMENSIONS

### TO-220AB



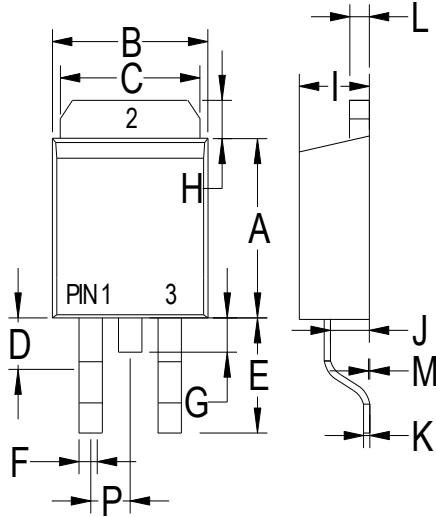
TO-220AB		
Dim	Min	Max
A	.573 (14.55)	.603 (15.32)
B	—	.412 (10.5)
C	.103 (2.62)	.113 (2.87)
D	.140 (3.56)	.160 (4.06)
E	.510 (13.0)	.560 (14.3)
F	.027 (0.68)	.037 (0.94)
G	.148 (3.74)	.154 (3.91)
H	.230 (5.84)	.270 (6.86)
I	.175 (4.44)	.185 (4.86)
J	.100 (2.54)	.110 (2.79)
K	.014 (0.35)	.025 (0.64)
L	.045 (1.14)	.055 (1.40)
P	.095 (2.41)	.105 (2.67)

### ITO-220AB



ITO-220AB		
Dim	Min	Max
A	.571 (14.5)	.610 (15.5)
B	.383 (9.72)	.406 (10.3)
C	.110 (2.80)	.126 (3.20)
D	.133 (3.38)	.162 (4.10)
E	.512 (13.0)	.551 (14.0)
F	.028 (0.70)	.035 (0.90)
G	.114 (2.90)	.138 (3.50)
H	.268 (6.80)	.291 (7.40)
I	.162 (4.10)	.185 (4.70)
J	.102 (2.60)	.110 (2.80)
K	.018 (0.45)	.026 (0.65)
L	.097 (2.46)	.113 (2.86)
P	.890 (2.25)	.113 (2.85)

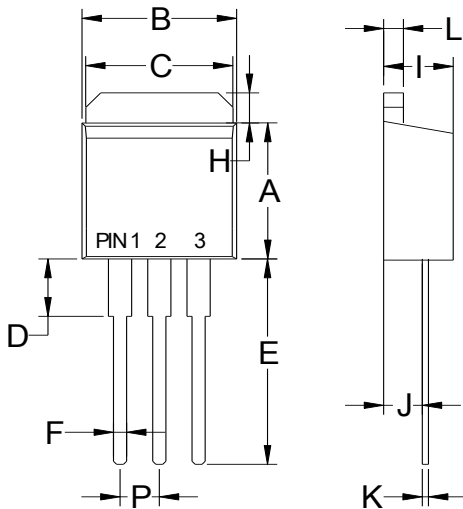
**TO-263**



TO-263		
Dim	Min	Max
A	.323 (8.20)	.348 (8.85)
B	.394 (10.0)	.413 (10.5)
C	.394 (10.0)	.402 (10.2)
D	.077 (1.95)	.100 (2.55)
E	.204 (5.17)	.227 (5.77)
F	.027 (0.68)	.037 (0.94)
G	--	.067 (1.70)
H	.046 (1.17)	.053 (1.34)
I	.175 (4.44)	.191 (4.86)
J	.100 (2.54)	.110 (2.79)
K	.014 (0.35)	.025 (0.64)
L	.047 (1.20)	.055 (1.40)
M	.000 (0.00)	.010 (0.25)
P	.095 (2.41)	.105 (2.67)

Dimensions in inches and (millimeters)

**TO-262**

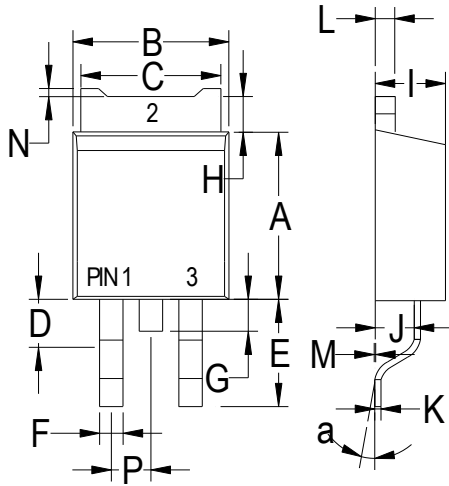


TO-262		
Dim	Min	Max
A	.323 (8.20)	.348 (8.85)
B	.394 (10.0)	.413 (10.5)
C	.394 (10.0)	.402 (10.2)
D	.140 (3.56)	.160 (4.06)
E	.510 (13.0)	.560 (14.3)
F	.027 (0.68)	.037 (0.94)
H	.046 (1.17)	.053 (1.34)
I	.175 (4.44)	.185 (4.86)
J	.100 (2.54)	.110 (2.79)
K	.014 (0.35)	.025 (0.64)
L	.045 (1.14)	.055 (1.40)
P	.095 (2.41)	.105 (2.67)

Dimensions in inches and (millimeters)



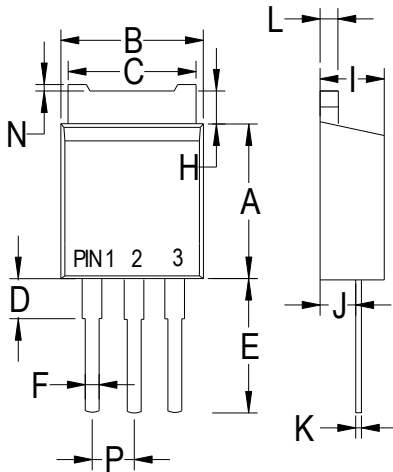
**TO-252**



TO-252		
Dim	Min	Max
A	.230 (5.85)	.246 (6.25)
B	.250 (6.35)	.264 (6.75)
C	.207 (5.27)	.218 (5.54)
D	.037 (0.93)	.045 (1.14)
E	.106 (2.70)	.138 (3.50)
F	.028 (0.72)	.033 (0.84)
G	.024 (0.60)	.041 (1.05)
H	.028 (0.72)	.043 (1.10)
I	.085 (2.15)	.096 (2.45)
J	.037 (0.95)	.047 (1.20)
K	.018 (0.45)	.026 (0.65)
L	.018 (0.45)	.024 (0.60)
P	.081 (2.05)	.094 (2.40)
M	.000 (0.00)	.006 (0.15)
N	--	.008 (0.20)
a	0°	10°

Dimensions in inches and (millimeters)

**TO-251**



TO-251		
Dim	Min	Max
A	.230 (5.85)	.246 (6.25)
B	.250 (6.35)	.266 (6.75)
C	.207 (5.27)	.218 (5.54)
D	.037 (0.93)	.045 (1.14)
E	.173 (4.40)	.205 (5.20)
F	.028 (0.72)	.033 (0.84)
H	.028 (0.70)	.043 (1.10)
I	.085 (2.15)	.096 (2.45)
J	.037 (0.95)	.047 (1.20)
K	.018 (0.45)	.026 (0.65)
L	.018 (0.45)	.024 (0.60)
N	--	.008 (0.20)
P	.081 (2.05)	.094 (2.40)

Dimensions in inches and (millimeters)