

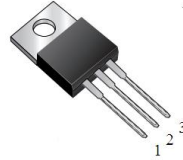
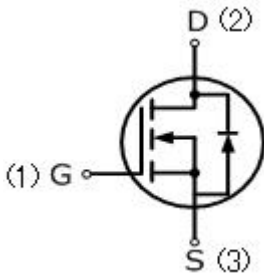


# MIC-IRF640

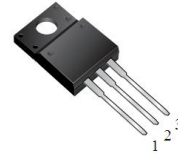
## 18 Amps, 200 Volts N-CHANNEL MOSFET

### FEATURE

- 18A, 200V,  $R_{DS(ON)MAX}=0.18 \Omega @ V_{GS}=10V/9A$
- Low gate charge
- Low  $C_{iss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



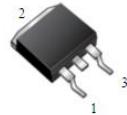
TO-220AB



ITO-220AB



TO-262



TO-263



TO-252



TO-251

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

Parameter	Symbol	MIC-IRF640	UNIT
Drain-Source Voltage	$V_{DSS}$	200	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	
Continuous Drain Current	$I_D$	18	A
Pulsed Drain Current (Note 1)	$I_{DM}$	72	
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	500	mJ
Avalanche Current (Note 1)	$I_{AR}$	4.2	A
Reverse Diode dV/dt (Note 3)	dv/dt	5	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55to+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-262/263	Units
Thermal resistance, Junction to Case	$R_{th(J-c)}$	2.80	1.25	1.25	$^\circ\text{C}/\text{W}$
Maximum Power Dissipation	$P_D$	42	100	100	W



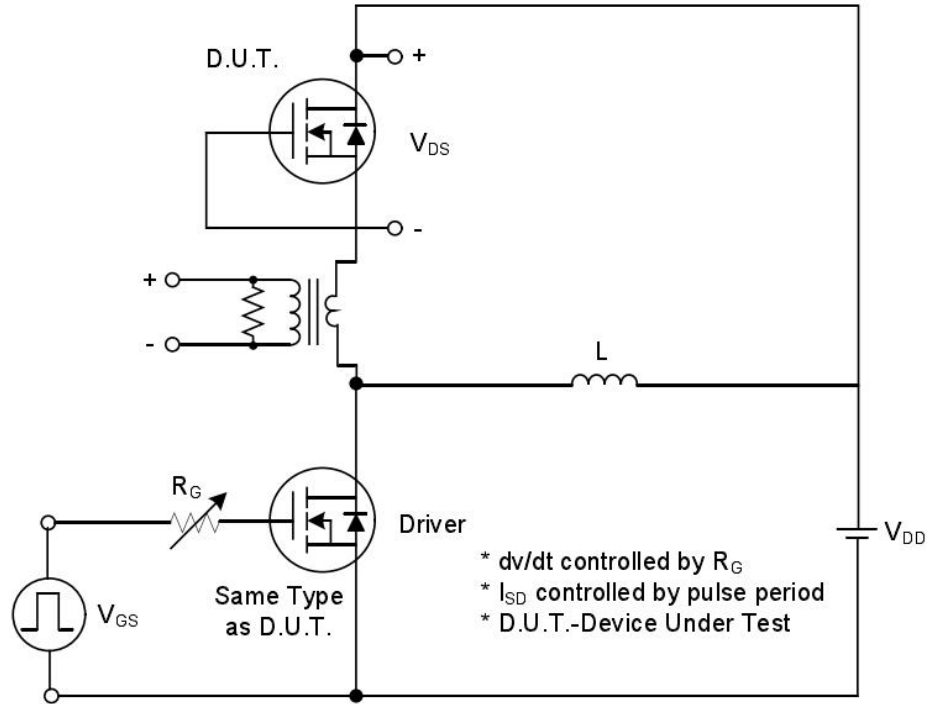
Electrical Characteristics ( $T_c=25^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Mix	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	200	—	—	V
Breakdown Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=250\mu A$	—	0.25	—	$V/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V$	—	—	1	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS}=30V, V_{DS}=0V$	—	—	100	nA
Gate-Body Leakage Current, Reverse	$I_{GSSR}$	$V_{GS}=-30V, V_{DS}=0V$	—	—	-100	nA
<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	$R_{DS(on)}$	$V_{GS}=10V, I_D=9A$	—	0.13	0.18	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$	—	1140	—	pF
Output Capacitance	$C_{oss}$		—	180	—	pF
Reverse Transfer Capacitance	$C_{rss}$		—	25	—	pF
<b>Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=100V, I_D=18A,$ $R_G=2.4\Omega, V_{GS}=10V$ (Note4,5)	—	11	—	ns
Turn-On Rise Time	$t_r$		—	33	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	25	—	ns
Turn-Off Fall Time	$t_f$		—	7	—	ns
Total Gate Charge	$Q_g$	$V_{DS}=100V, I_D=18A,$ $V_{GS}=10V,$ (Note4,5)	—	24	—	nC
Gate-Source Charge	$Q_{gs}$		—	7.5	—	nC
Gate-Drain Charge	$Q_{gd}$		—	9.5	—	nC
<b>Drain-Source Body Diode Characteristics and Maximum Ratings</b>						
Continuous Diode Forward Current	$I_S$		—	—	18	A
Pulsed Diode Forward Current	$I_{SM}$		—	—	72	A
Diode Forward Voltage	$V_{SD}$	$I_S=18A, V_{GS}=0V$	—	—	1.5	V
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=18A,$	—	160	—	ns
Reverse Recovery Charge	$Q_{rr}$	$dI_F/dt=100A/\mu s,$ (Note4)	—	888	—	nC

#### Notes

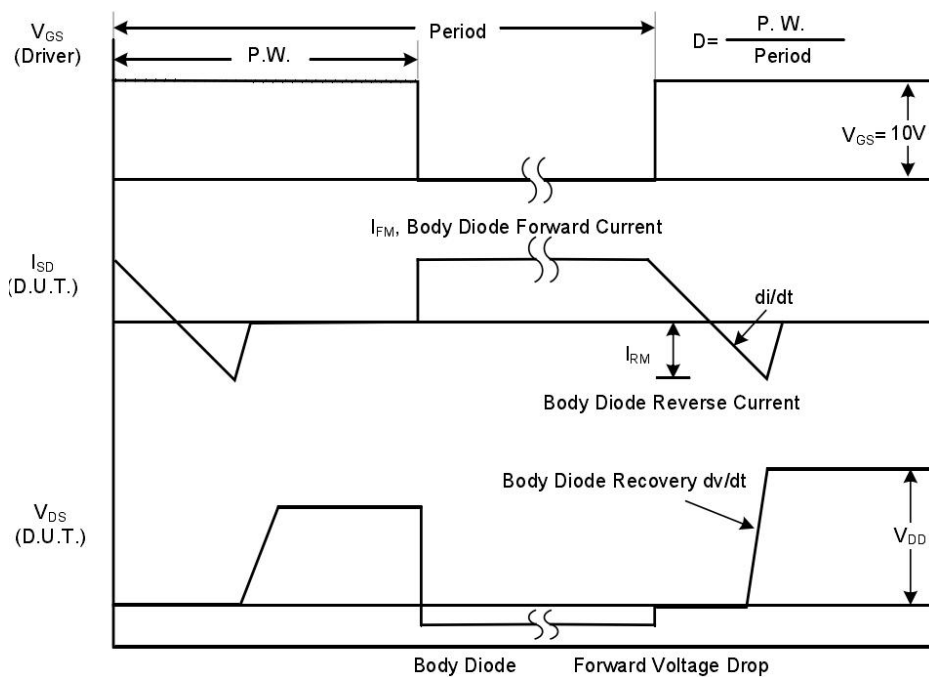
1. Repetitive Rating: pulse width limited by maximum junction temperature .
2.  $L=10\text{mH}, R_g=25\Omega, I_{AS}=10A, T_J=25^\circ\text{C}$ .
3.  $I_{SD} \leq I_D, dI/dt=100A/\mu s, V_{DD} \leq BV_{DSS},$  starting  $T_J=25^\circ\text{C}$ .
4. Pulse width  $\leq 300\mu s;$  duty cycle  $\leq 2\%$ .
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**

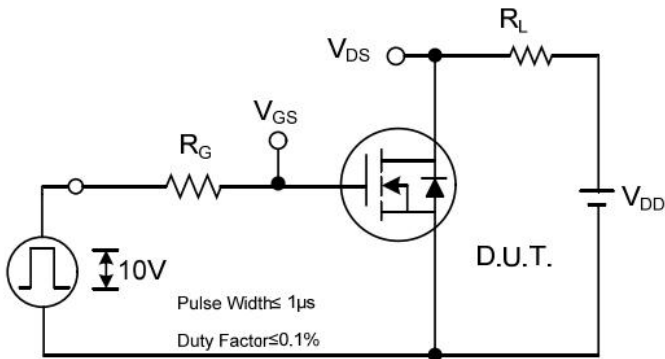


Fig. 2A Switching Test Circuit

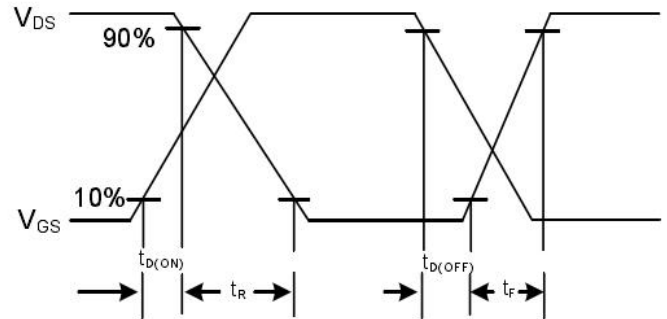


Fig. 2B Switching Waveforms

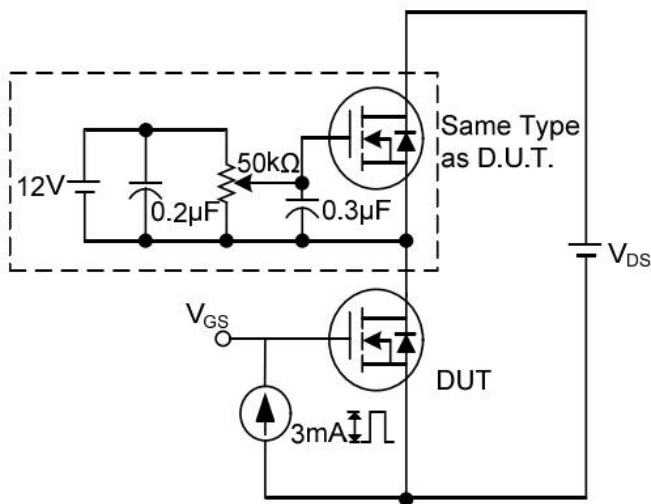


Fig. 3A Gate Charge Test Circuit

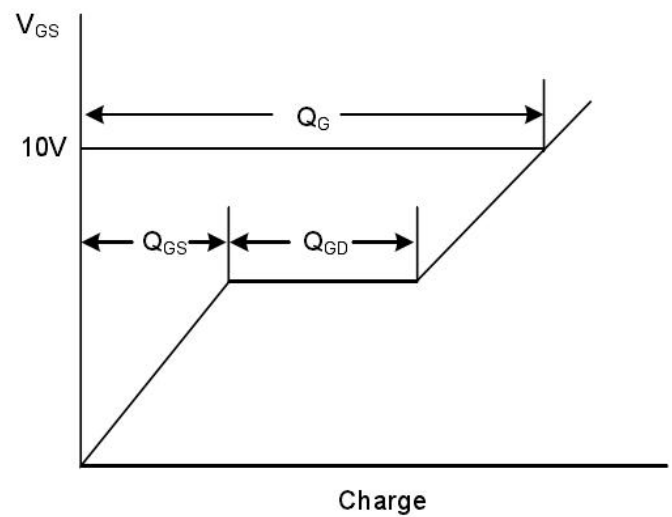


Fig. 3B Gate Charge Waveform

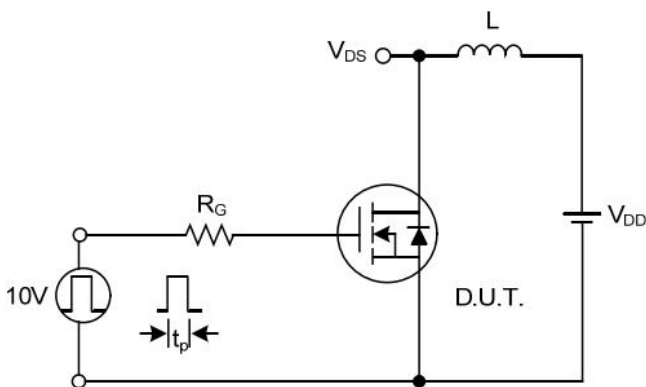


Fig. 4A Unclamped Inductive Switching Test Circuit

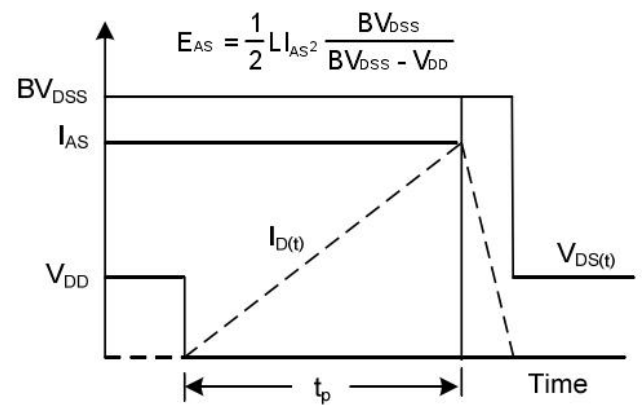
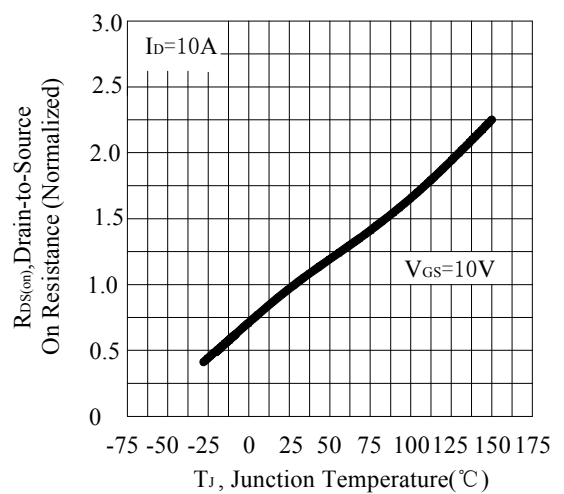
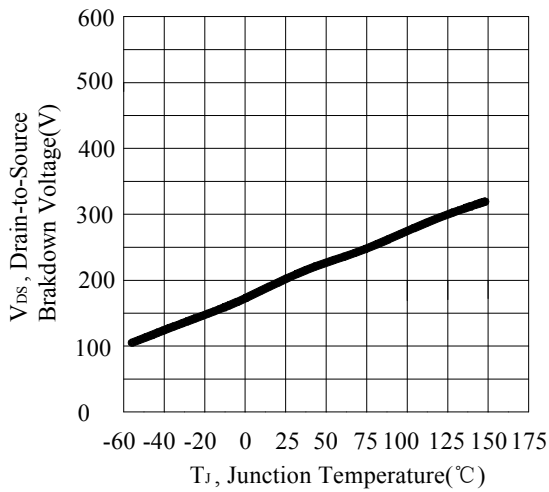
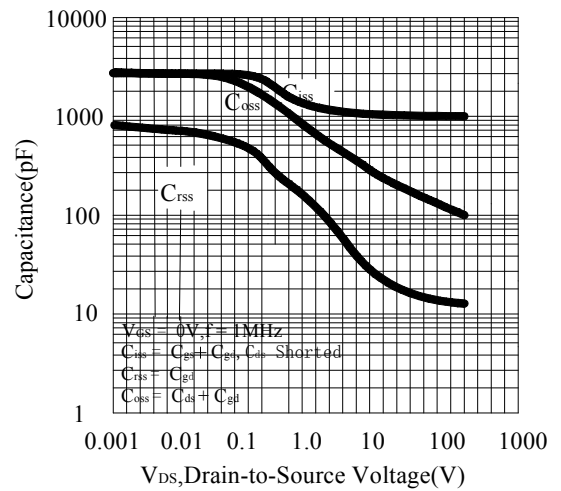
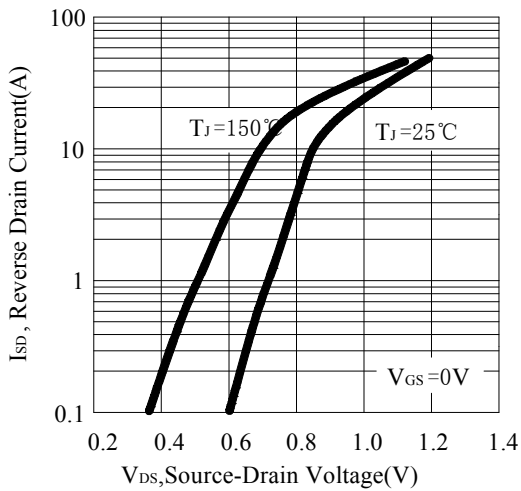
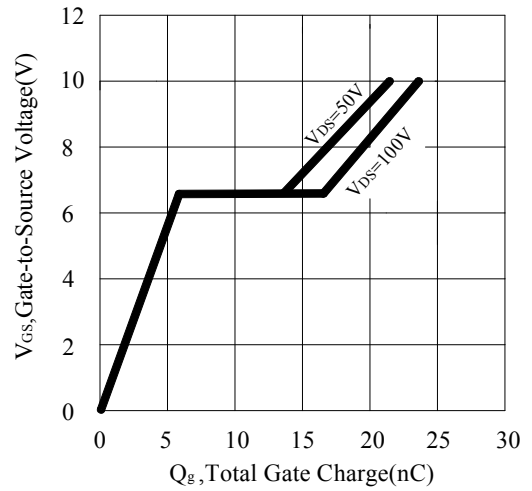
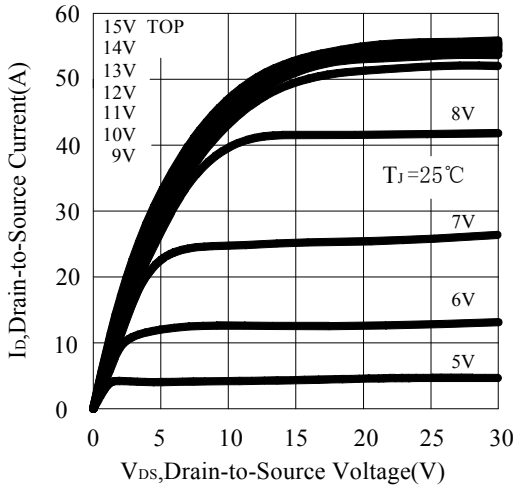
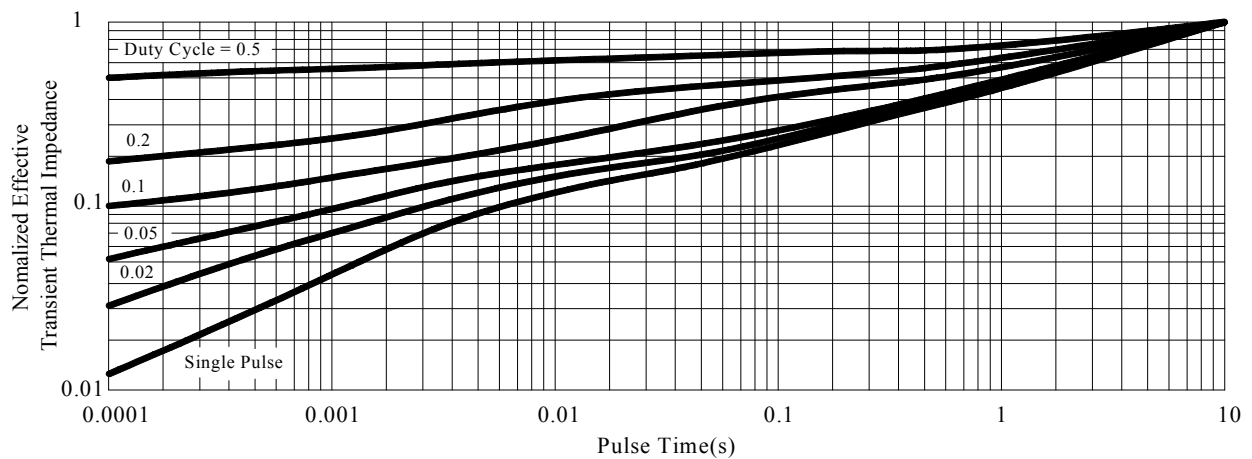
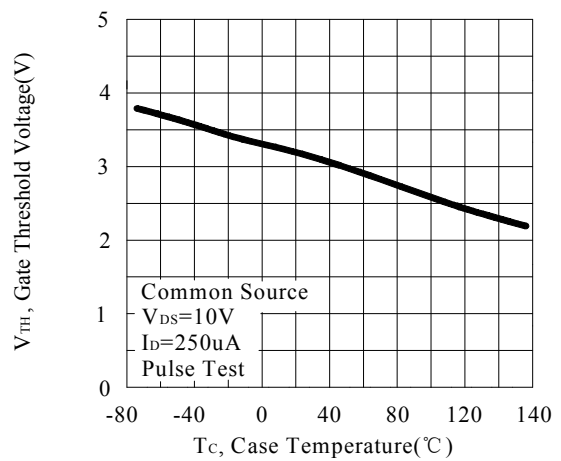
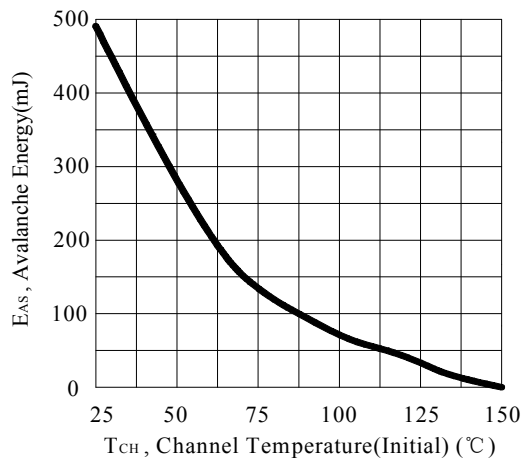
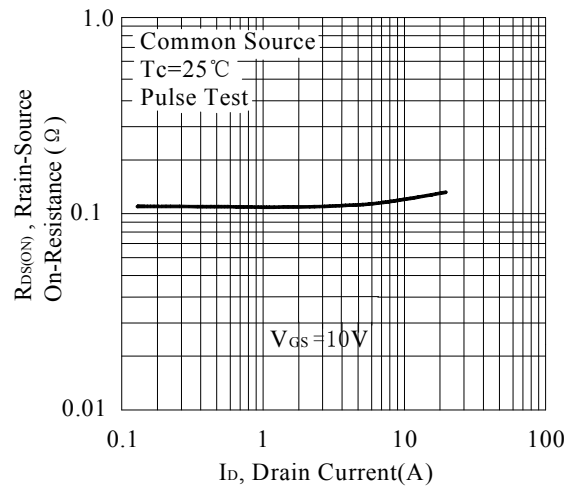
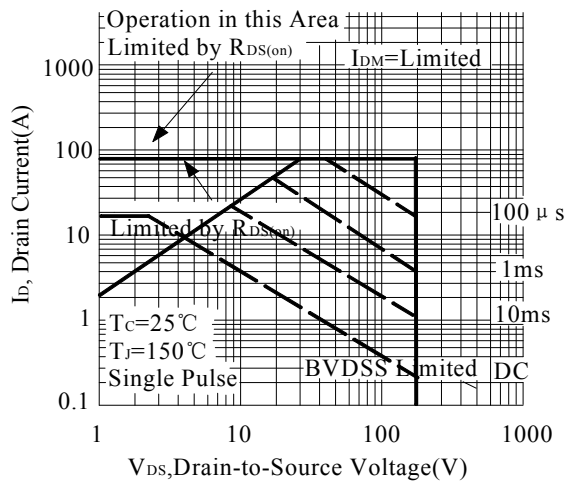


Fig. 4B Unclamped Inductive Switching Waveforms



## RATING AND CHARACTERISTIC CURVES

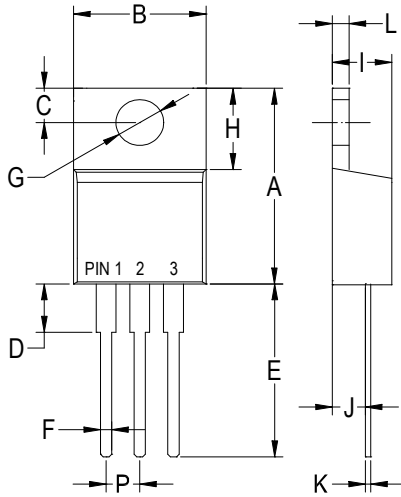






**PACKAGE OUTLINE DIMENSIONS**

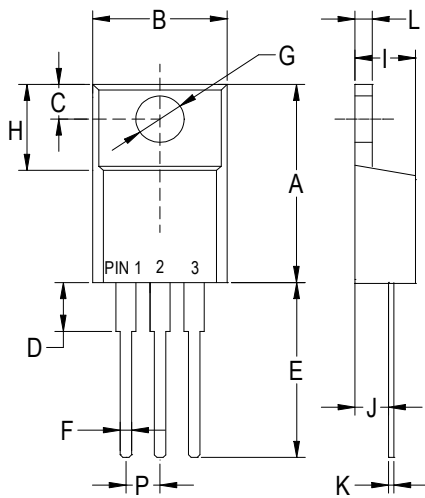
**TO-220AB**



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)

Dimensions in inches and (millimeters)

**ITO-220AB**

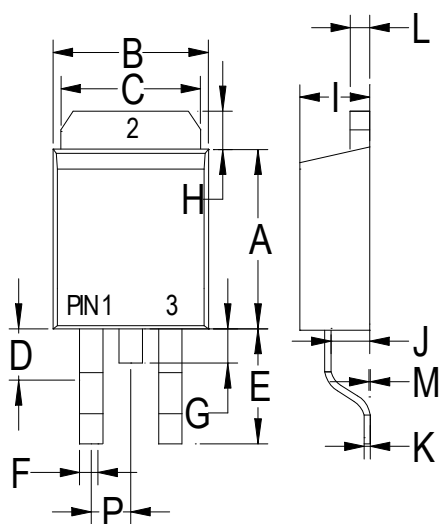


ITO-220AB		
Dim	Min	Max
A	.571 (14.5)	.610 (15.5)
B	.383 (9.72)	.406 (10.3)
C	.110 (2.80)	.126 (3.20)
D	.133 (3.38)	.162 (4.10)
E	.512 (13.0)	.551 (14.0)
F	.028 (0.70)	.035 (0.90)
G	.114 (2.90)	.138 (3.50)
H	.268 (6.80)	.291 (7.40)
I	.162 (4.10)	.185 (4.70)
J	.102 (2.60)	.110 (2.80)
K	.018 (0.45)	.026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

Dimensions in inches and (millimeters)



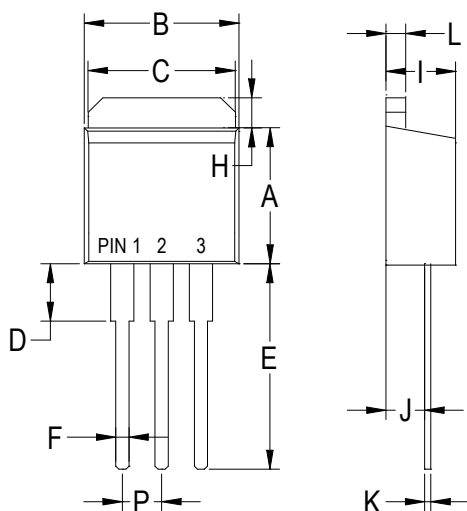
### TO-263



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



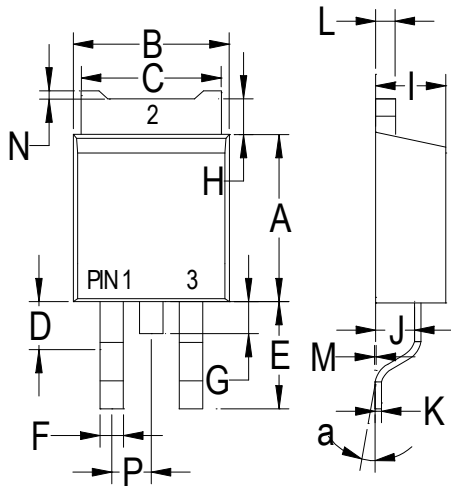
TO-262		
Dim	Min	Max
A	.323 (8.20)	.348 (8.85)
B	.394 (10.0)	.413 (10.5)
C	.394 (10.0)	.402 (10.2)
D	.140 (3.56)	.160 (4.06)
E	.510 (13.0)	.560 (14.3)
F	.027 (0.68)	.037 (0.94)
H	.046 (1.17)	.053 (1.34)
I	.175 (4.44)	.185 (4.86)
J	.100 (2.54)	.110 (2.79)
K	.014 (0.35)	.025 (0.64)
L	.045 (1.14)	.055 (1.40)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

Dimensions in inches and (millimeters)





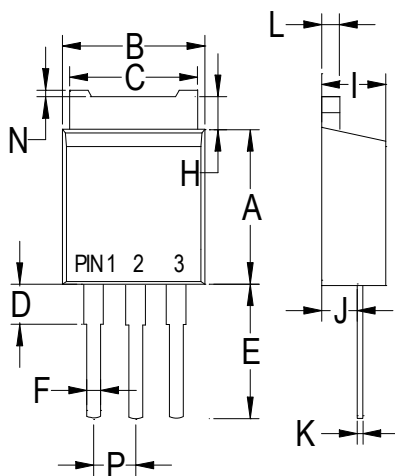
## TO-252



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)