

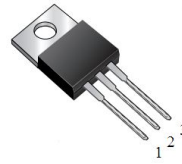
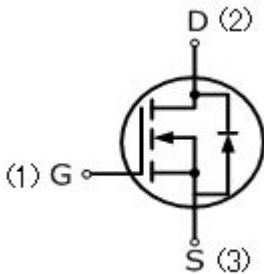


# MIC-IRF630

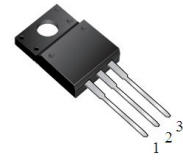
## 9 Amps, 200 Volts N-CHANNEL MOSFET

### Features

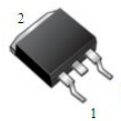
- 9A, 200V,  $R_{DS(ON)MAX} = 0.3 \Omega @ V_{GS} = 10V/4.5A$
- Low gate charge
- Low  $C_{iss}$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-220AB



ITO-220AB



TO-263



TO-262

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

Parameter	Symbol	MIC-IRF630	UNIT
Drain-Source Voltage	$V_{DSS}$	200	V
Gate-Source Voltage	$V_{GSS}$	$\pm 30$	
Continuous Drain Current	$I_D$	9	A
Pulsed Drain Current (Note 1)	$I_{DM}$	36	
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	460	mJ
Avalanche Current (Note 1)	$I_{AR}$	9	A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	23	mJ
Maximum Power Dissipation	$P_D$	83	W
$T_C = 25^\circ C$			
Reverse Diode dV/dt (Note 3)	dv/dt	5.5	V/ns
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ C$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	$T_L$	260	$^\circ C$
Mounting Torque	6-32 or M3 screw	10	lbf • in
		1.1	N • m

### Thermal Characteristics

Parameter	Symbol	MIC-IRF630	Units
Maximum Junction-to-Case	$R_{thJC}$	1.5	$^\circ C/W$

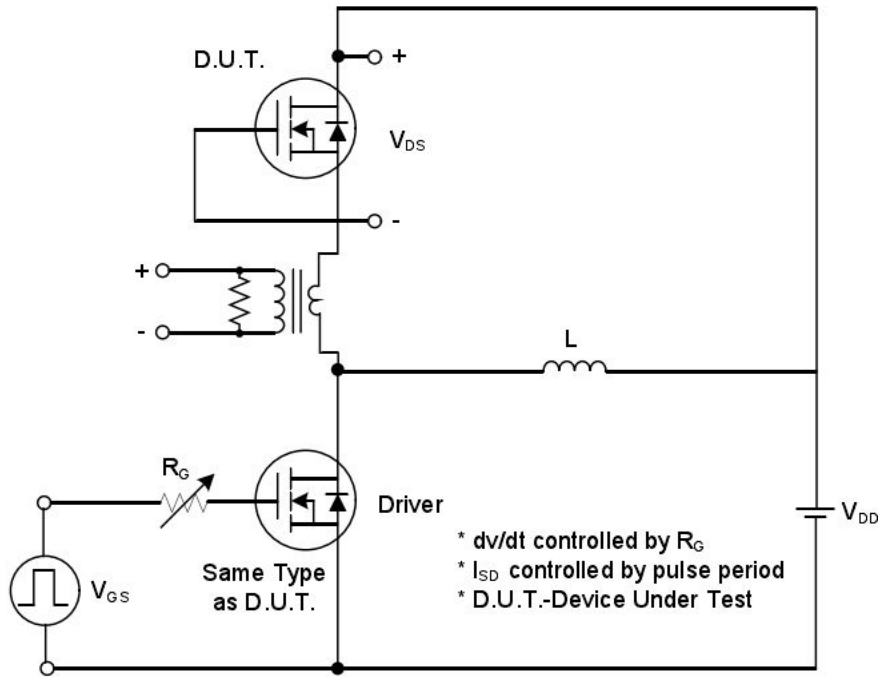


Electrical Characteristics ( $T_c=25^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	200	—	—	V
Breakdown Temperature Coefficient	$\Delta BV_{DSS} / \Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=250\mu A$	—	0.6	—	$V/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=200V, V_{GS}=0V$	—	—	25	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSSF}$	$V_{GS}=30V, V_{DS}=0V$	—	—	0.1	$\mu A$
Gate-Body Leakage Current, Reverse	$I_{GSSR}$	$V_{GS}=-30V, V_{DS}=0V$	—	—	-0.1	$\mu A$
<b>On Characteristics</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=10V, I_D=250\mu A$	2	—	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=4.5A$	—	—	0.3	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$	—	—	860	pF
Output Capacitance	$C_{oss}$		—	—	160	pF
Reverse Transfer Capacitance	$C_{rss}$		—	—	100	pF
<b>Switching Characteristics</b>						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=100V, I_D=9A,$ $R_g=25\Omega$ (Note4,5)	—	30	—	ns
Turn-On Rise Time	$t_r$		—	65	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	26	—	ns
Turn-Off Fall Time	$t_f$		—	8	—	ns
Total Gate Charge	$Q_g$	$V_{DS}=160V, I_D=9A,$ $V_{GS}=10V,$ (Note4,5)	—	17	—	nC
Gate-Source Charge	$Q_{gs}$		—	10	—	nC
Gate-Drain Charge	$Q_{gd}$		—	7	—	nC
<b>Drain-Source Body Diode Characteristics and Maximum Ratings</b>						
Continuous Diode Forward Current	$I_S$		—	—	9	A
Pulsed Diode Forward Current	$I_{SM}$		—	—	36	A
Diode Forward Voltage	$V_{SD}$	$I_S=9A, V_{GS}=0V$	—	—	1.0	V
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_S=8A,$ $dI_F/dt=100A/\mu s,$ (Note4)	—	380	—	ns
Reverse Recovery Charge	$Q_{rr}$		—	7.0	—	$\mu C$

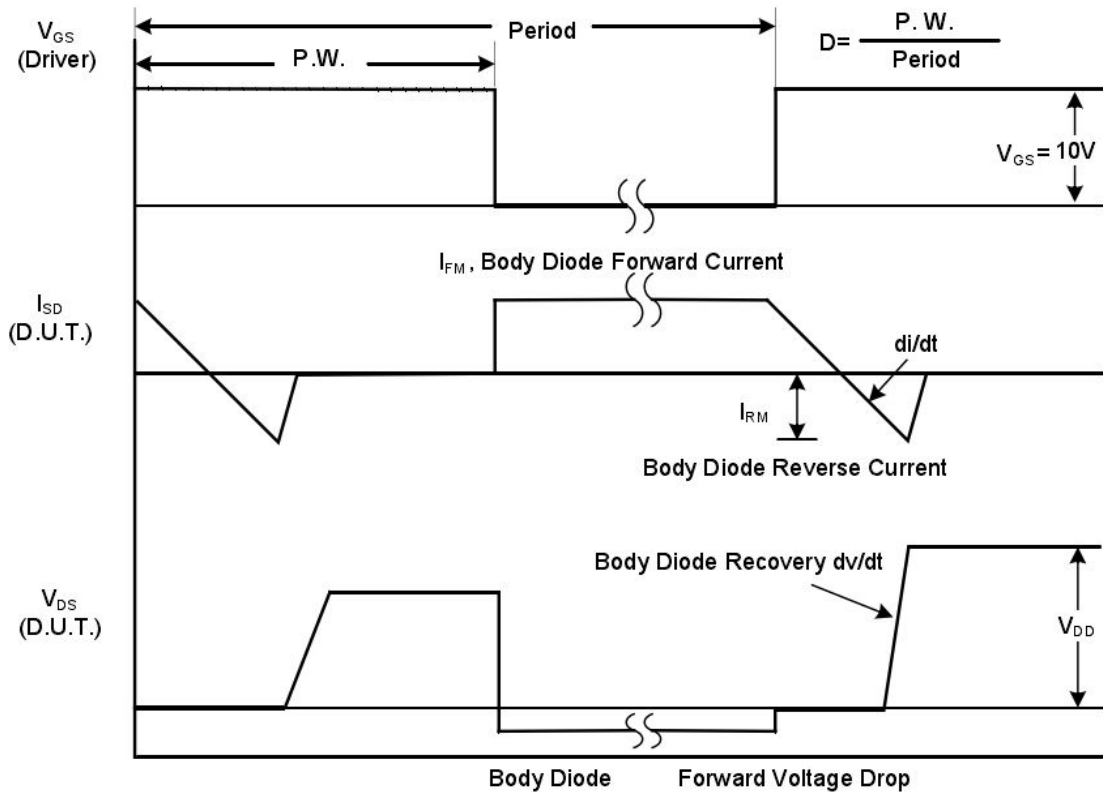
#### Notes

1. Repetitive Rating; pulse width limited by maximum junction temperature.
2.  $V_{DD}=50V, L=8.5\text{mH}, R_g=25\Omega, I_{AS}=9A$ , starting  $T_J=25^\circ\text{C}$ .
3.  $I_{SD} \leq I_D, dI/dt=200A/\mu s, V_{DD} \leq BV_{DSS}$ , 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.

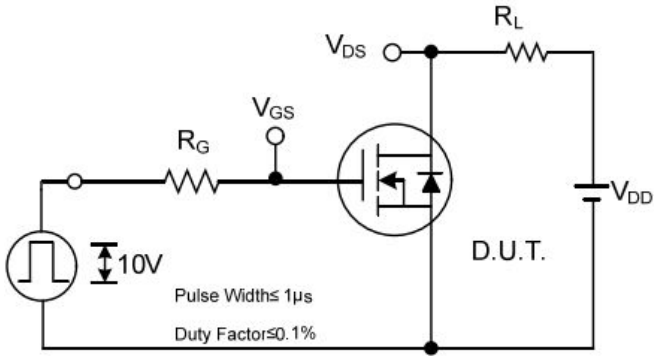
## TEST CIRCUIT AND WAVEFORM



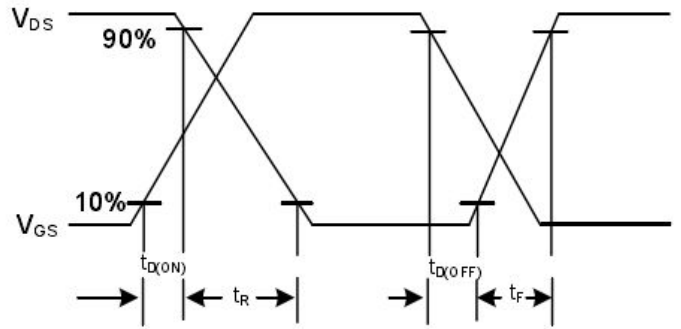
**Peak Diode Recovery  $dv/dt$  Test Circuit**



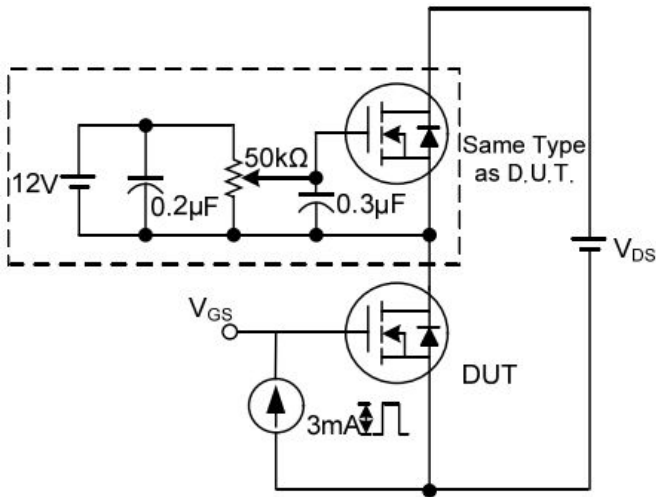
**Peak Diode Recovery  $dv/dt$  Waveforms**



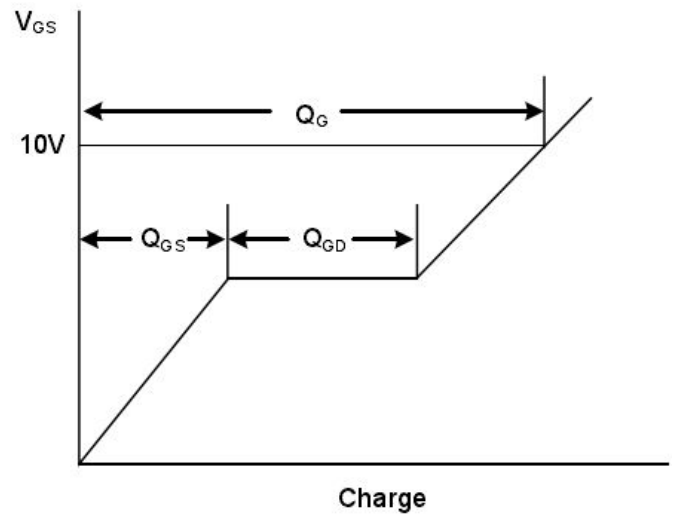
**Switching Test Circuit**



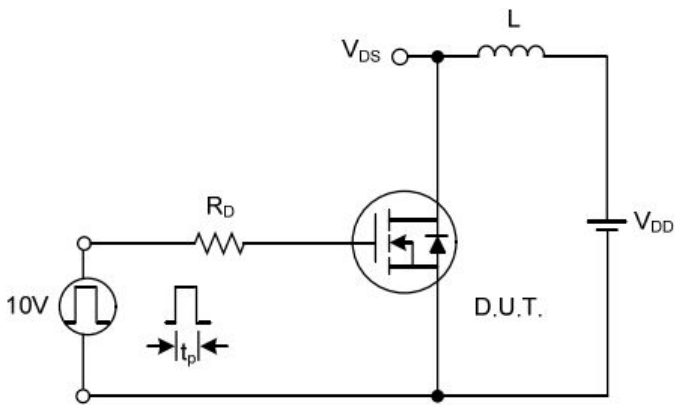
**Switching Waveforms**



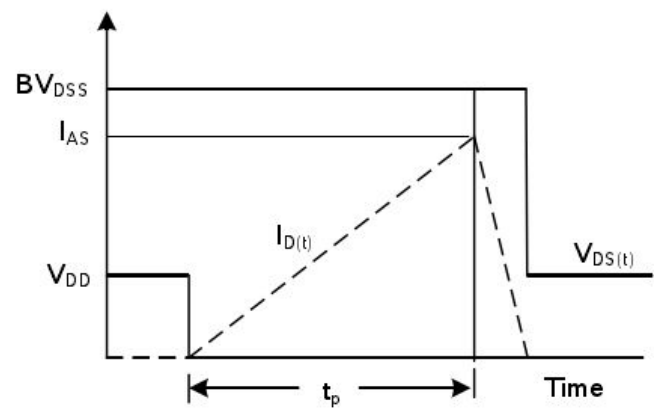
**Gate Charge Test Circuit**



**Gate Charge Waveform**



**Unclamped Inductive Switching Test Circuit**

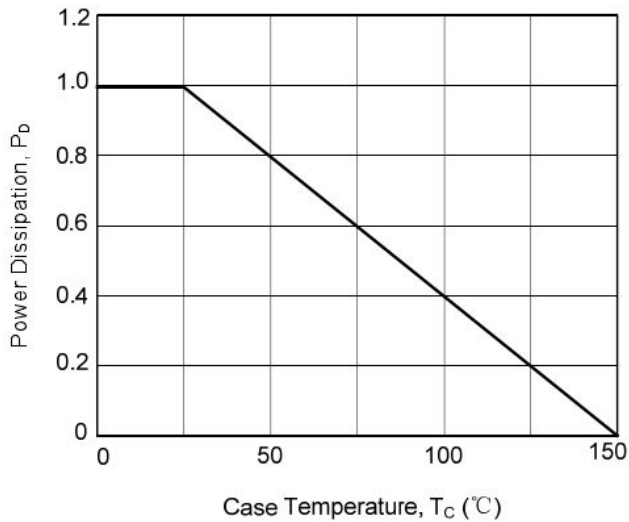


**Unclamped Inductive Switching Waveforms**

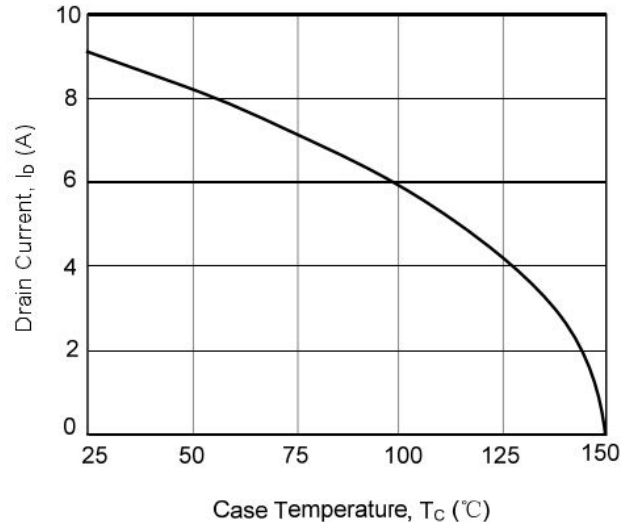


## RATING AND CHARACTERISTIC CURVES

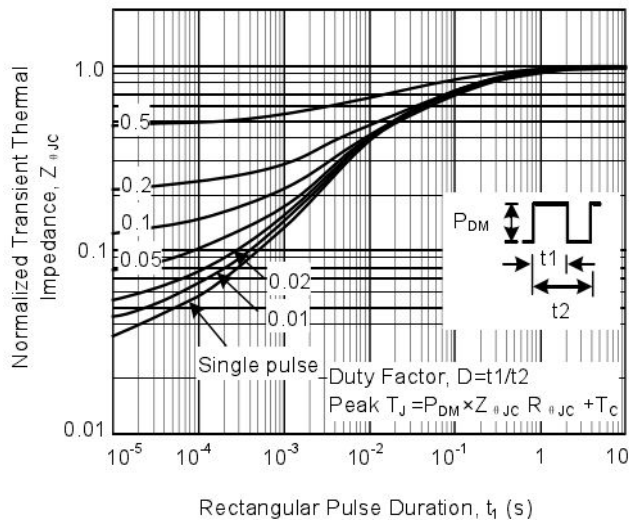
Normalized Power Dissipation vs. Case Temperature



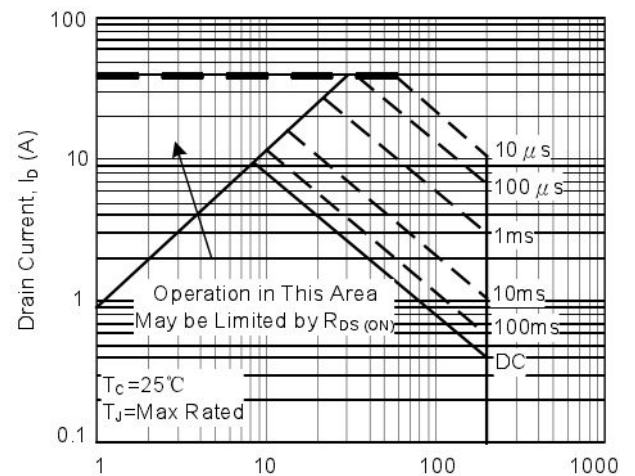
Maximum Continuous Drain Current vs. Case Temperature



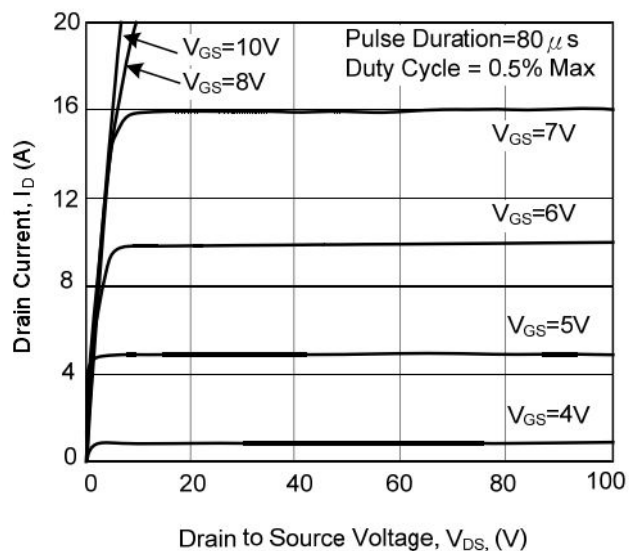
Normalized Transient Thermal Impedance



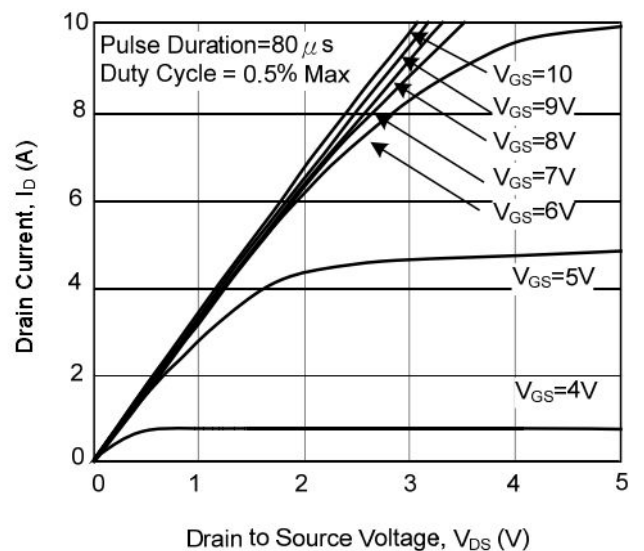
Forward Bias Safe Operating Area



Output Characteristics

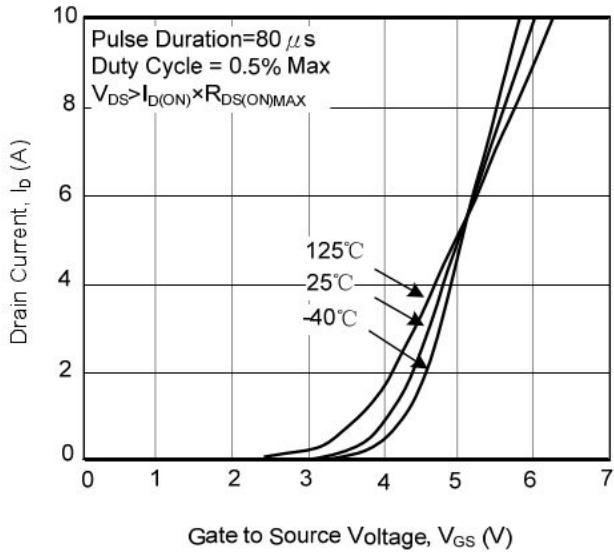


Saturation Characteristics

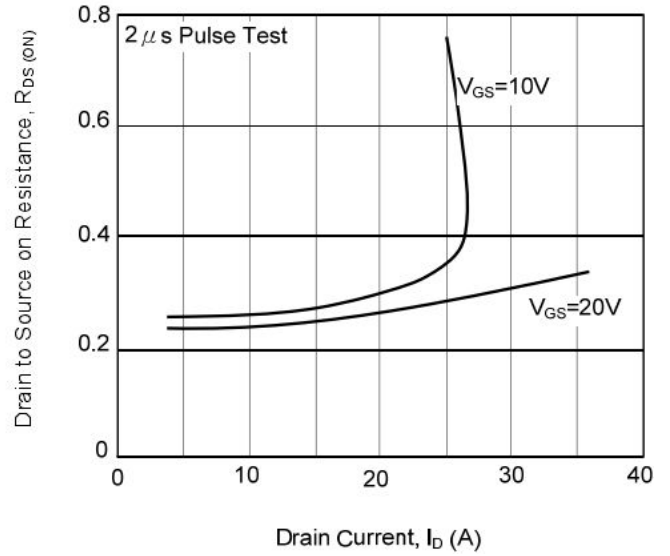




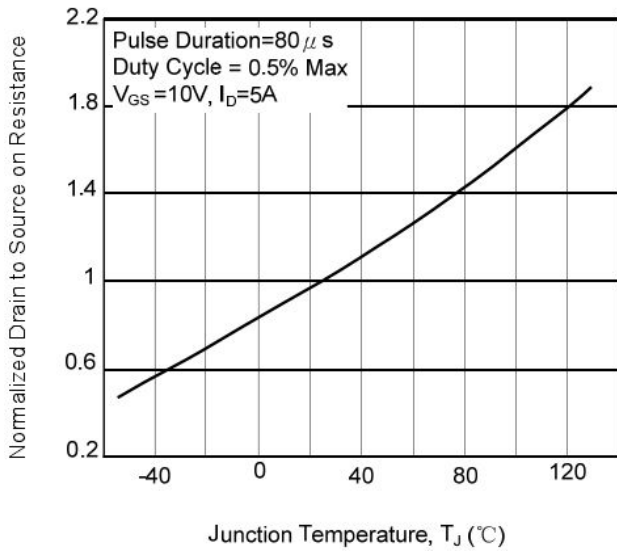
Transfer Characteristics



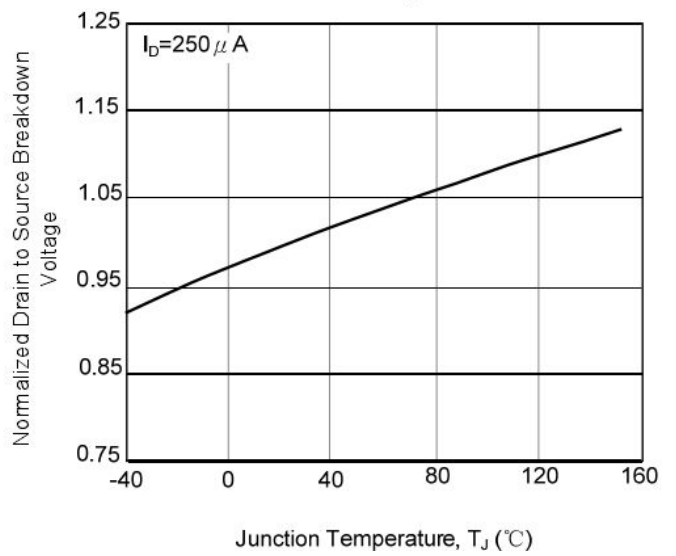
Drain to Source on Resistance vs. Gate Voltage and Drain Current



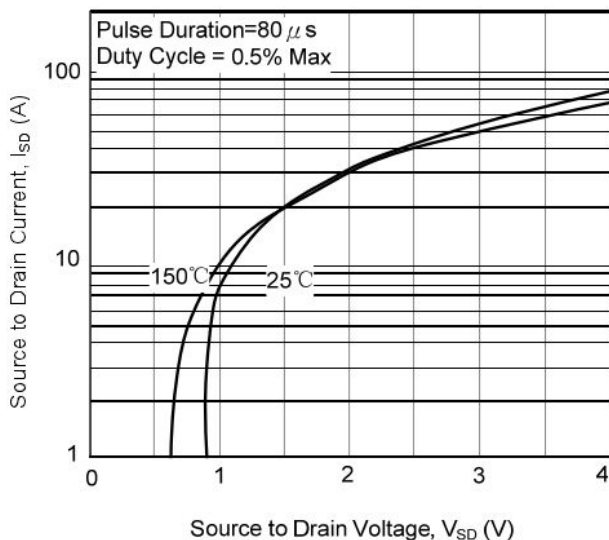
Normalized Drain to Source on Resistance vs. Junction Temperature



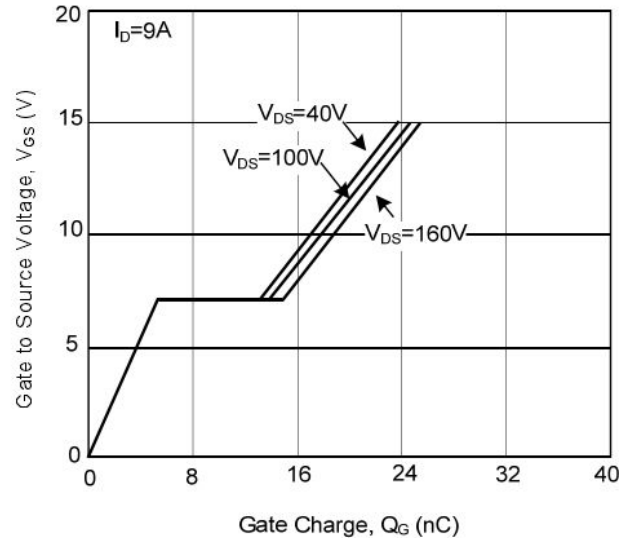
Normalized Drain to Source Breakdown Voltage vs. Junction Temperature



Source to Drain Diode Voltage



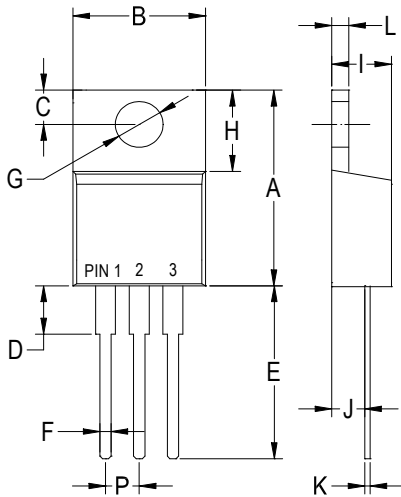
Gate to Source Voltage vs. Gate Charge





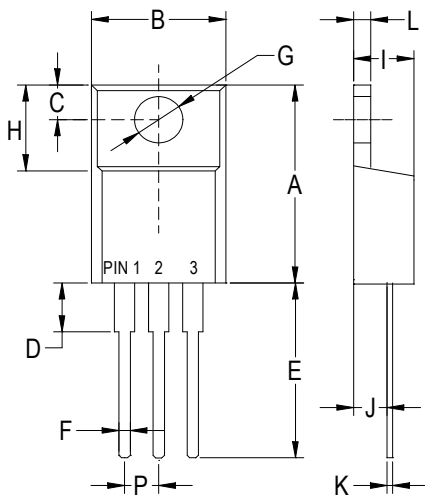
**PACKAGE OUTLINE DIMENSIONS**

**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**

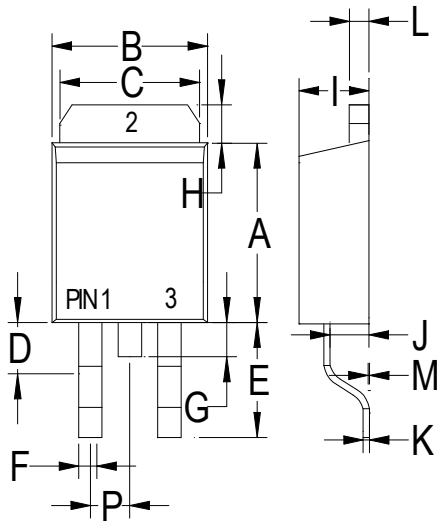


ITO-220AB		
Dim	Min	Max
A	.571 (14.5)	.610 (15.5)
B	.383 (9.72)	.406 (10.3)
C	.110 (2.80)	.126 (3.20)
D	.133 (3.38)	.162 (4.10)
E	.512 (13.0)	.551 (14.0)
F	.028 (0.70)	.035 (0.90)
G	.114 (2.90)	.138 (3.50)
H	.268 (6.80)	.291 (7.40)
I	.162 (4.10)	.185 (4.70)
J	.102 (2.60)	.110 (2.80)
K	.018 (0.45)	.026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





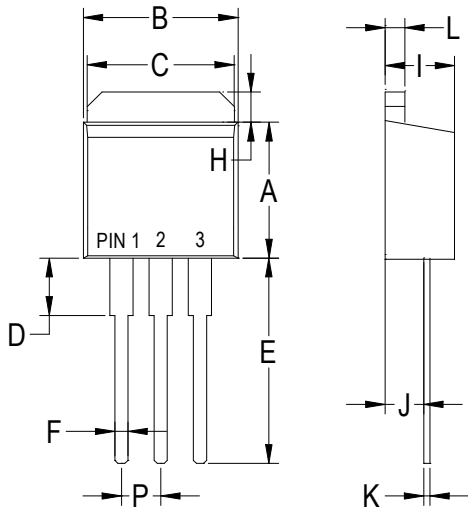
### TO-263



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)