

## GENERAL DESCRIPTION

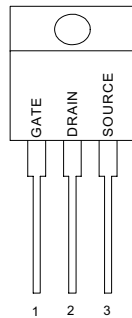
This advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

## FEATURES

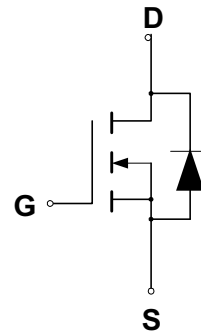
- ◆ Avalanche Energy Specified
- ◆ Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- ◆ Diode is Characterized for Use in Bridge Circuits
- ◆  $I_{DSS}$  and  $V_{DS(on)}$  Specified at Elevated Temperature

## PIN CONFIGURATION

TO-220  
Top View



## SYMBOL



## ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	$I_D$	7.0	A
— Pulsed	$I_{DM}$	21	
Gate-to-Source Voltage — Continue	$V_{GS}$	$\pm 20$	V
— Non-repetitive	$V_{GSM}$	$\pm 40$	V
Total Power Dissipation	$P_D$	50	W
Derate above 25°C		0.4	W/°C
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy — $T_J = 25^\circ\text{C}$ ( $V_{DD} = 100\text{V}$ , $V_{GS} = 10\text{V}$ , $I_L = 20\text{A}$ , $L = 10\text{mH}$ , $R_G = 25\Omega$ )	$E_{AS}$	74	mJ
Thermal Resistance — Junction to Case	$\theta_{JC}$	2.50	°C/W
— Junction to Ambient	$\theta_{JA}$	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	$T_L$	260	°C

### ELECTRICAL CHARACTERISTICS

Unless otherwise specified,  $T_J = 25^\circ\text{C}$ .

Characteristic		Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA)		V <sub>(BR)DSS</sub>	200			V
Drain-Source Leakage Current (V <sub>DS</sub> = 200 V, V <sub>GS</sub> = 0 V) (V <sub>DS</sub> = 200 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125°C)		I <sub>DSS</sub>			10 100	μA
Gate-Source Leakage Current-Forward (V <sub>gsf</sub> = 20 V, V <sub>DS</sub> = 0 V)		I <sub>GSSF</sub>			100	nA
Gate-Source Leakage Current-Reverse (V <sub>gsr</sub> = 20 V, V <sub>DS</sub> = 0 V)		I <sub>GSSR</sub>			100	nA
Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA)		V <sub>GS(th)</sub>	2.0	3.1	4.0	V
Static Drain-Source On-Resistance (V <sub>GS</sub> = 10 V, I <sub>D</sub> = 3.5A) *		R <sub>DS(on)</sub>		0.46	0.7	Ω
Drain-Source On-Voltage (V <sub>GS</sub> = 10 V) (I <sub>D</sub> = 7.0 A)		V <sub>DS(on)</sub>		3.4	5.9	V
Forward Transconductance (V <sub>DS</sub> = 14 V, I <sub>D</sub> = 3.5A) *		g <sub>FS</sub>	1.5			S
Input Capacitance	(V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1.0 MHz)	C <sub>iss</sub>		342	480	pF
Output Capacitance		C <sub>oss</sub>		92	130	pF
Reverse Transfer Capacitance		C <sub>rss</sub>		27	55	pF
Turn-On Delay Time	(V <sub>DD</sub> = 100 V, I <sub>D</sub> = 7.0 A, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 9.1Ω) *	t <sub>d(on)</sub>		8.8	17.6	ns
Rise Time		t <sub>r</sub>		29	58	ns
Turn-Off Delay Time		t <sub>d(off)</sub>		22	44	ns
Fall Time		t <sub>f</sub>		20	40.8	ns
Total Gate Charge	(V <sub>DS</sub> = 160 V, I <sub>D</sub> = 7.0 A, V <sub>GS</sub> = 10 V)*	Q <sub>g</sub>		13.7	21	nC
Gate-Source Charge		Q <sub>gs</sub>		3.3		nC
Gate-Drain Charge		Q <sub>gd</sub>		6.6		nC
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)		L <sub>D</sub>		4.5		nH
Internal Drain Inductance (Measured from the source lead 0.25" from package to source bond pad)		L <sub>S</sub>		7.5		nH
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I <sub>S</sub> = 7.0 A, d <sub>IS</sub> /d <sub>t</sub> = 100A/μs)	V <sub>SD</sub>		1.02	1.2	V
Forward Turn-On Time		t <sub>on</sub>		**		ns
Reverse Recovery Time		t <sub>rr</sub>		138		ns

\* Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

\*\* Negligible, Dominated by circuit inductance

## TYPICAL ELECTRICAL CHARACTERISTICS

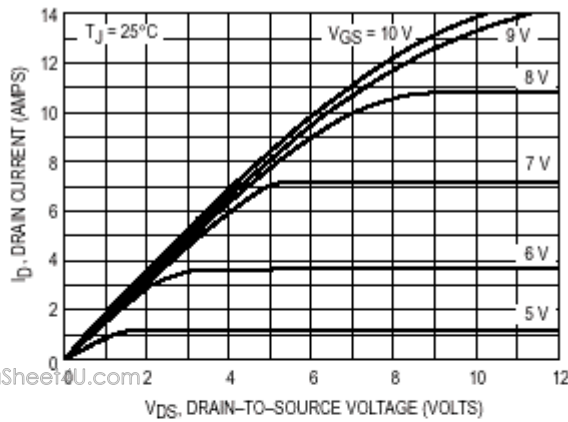


Figure 1. On-Region Characteristics

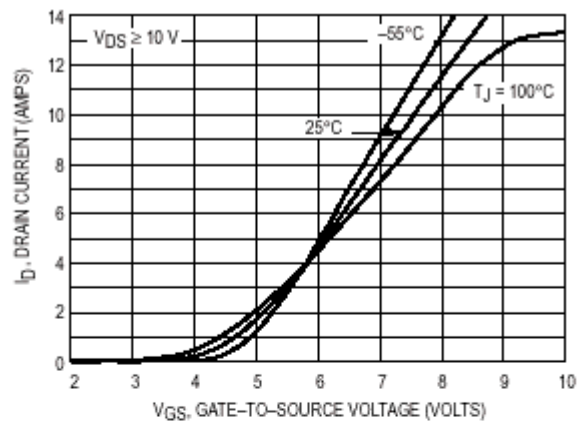


Figure 2. Transfer Characteristics

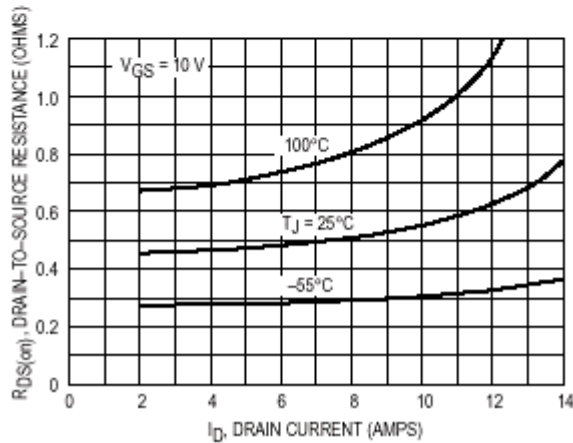


Figure 3. On-Resistance versus Drain Current and Temperature

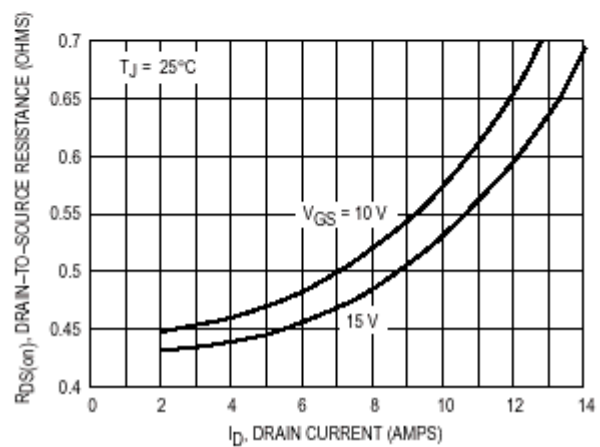


Figure 4. On-Resistance versus Drain Current and Gate Voltage

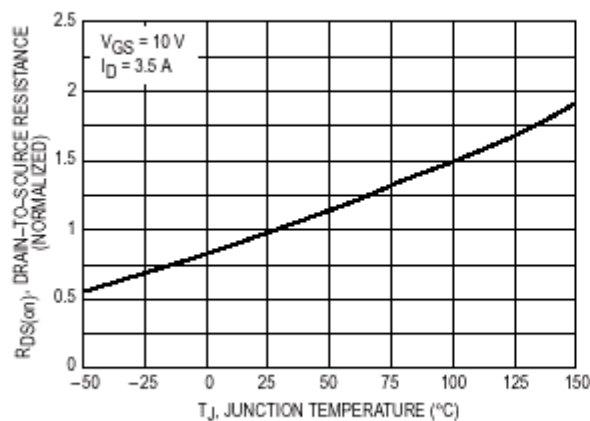


Figure 5. On-Resistance Variation with Temperature

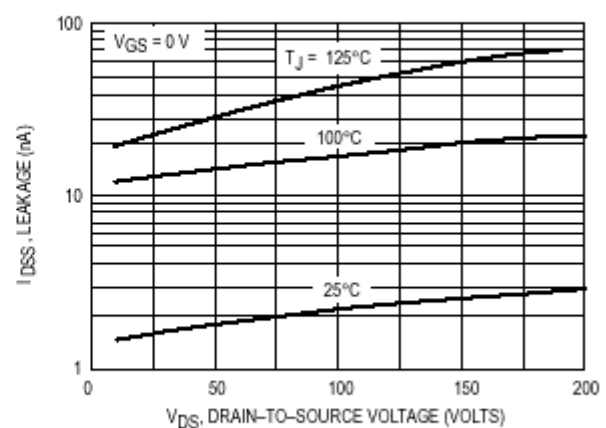
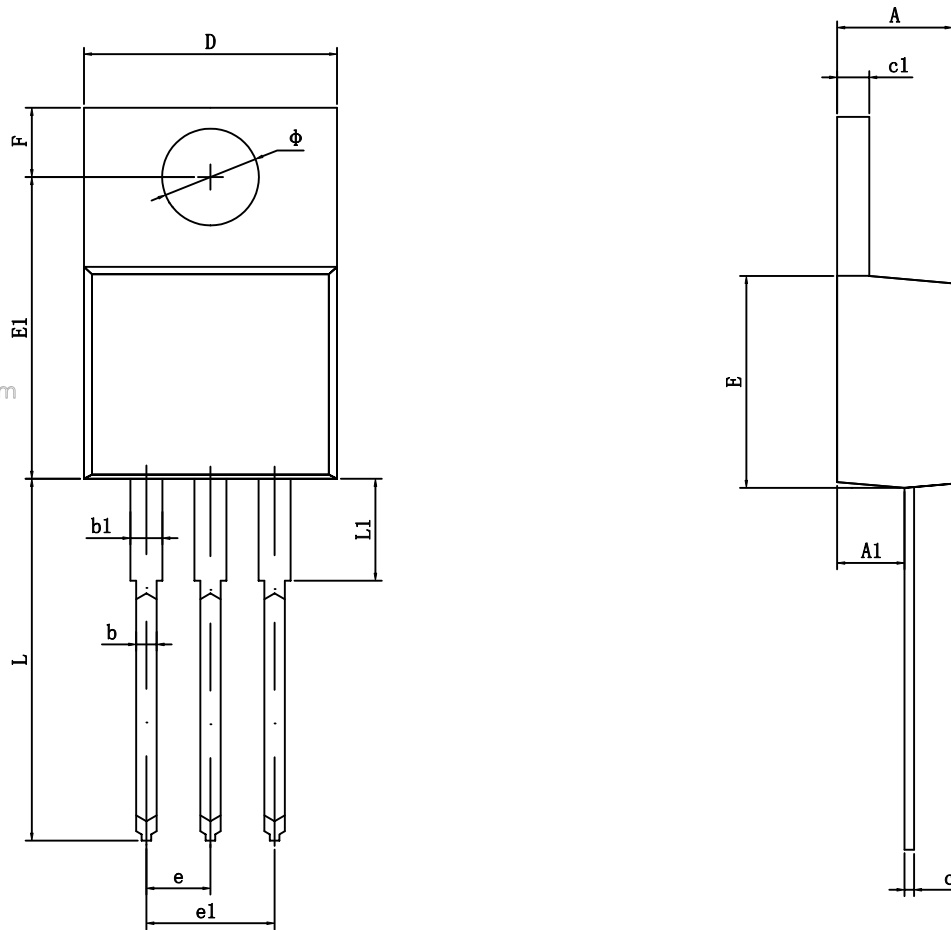


Figure 6. Drain-to-Source Leakage Current versus Voltage

**TO-220 PACKAGE OUTLINE DIMENSIONS**

www.DataSheet4U.com



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	2.520	2.820	0.099	0.111
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
E1	12.060	12.460	0.475	0.491
e	2.540TYP		0.100TYP	
e1	4.980	5.180	0.196	0.204
F	2.590	2.890	0.102	0.114
L	13.400	13.800	0.528	0.543
L1	3.560	3.960	0.140	0.156
$\phi$	3.790	3.890	0.149	0.153