GENERAL DESCRIPTION

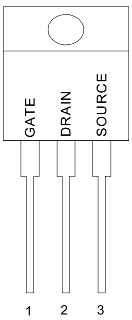
This advanced high voltage MOSFET is designed to withstand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode with fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, PWM motor controls and other inductive loads, the avalanche energy capability is specified to eliminate the guesswork in designs where inductive loads are switched and offer additional safety margin against unexpected voltage transients.

FEATURES

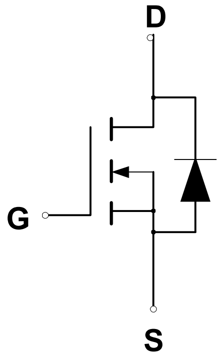
- Avalanche Energy Capability Specified at Elevated Temperature
- Low Stored Gate Charge for Efficient Switching
- Internal Source-to-Drain Diode Designed to Replace External Zener Transient Suppressor – Absorbs High Energy in the Avalanche Mode
- Source-to-Drain Diode Recovery Time Comparable to Discrete Fast Recovery Diode

PIN CONFIGURATION

TO-220
Top View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	3.0	A
— Pulsed	I_{DM}	14	
Gate-to-Source Voltage — Continue	V_{GS}	±20	V
— Non-repetitive	V_{GSM}	±40	V
Total Power Dissipation	P_D	75	W
Derate above 25℃		0.6	W/℃
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	℃
Single Pulse Drain-to-Source Avalanche Energy — T_J = 25℃	$W_{DSR(1)}$	290	mJ
— T_J = 100℃		46	
Repetitive Pulse Drain-to-Source Avalanche Energy	$W_{DSR(2)}$	7.5	
Thermal Resistance — Junction to Case	θ_{JC}	1.67	℃/W
— Junction to Ambient	θ_{JA}	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8” from case for 10 seconds	T_L	260	℃

(1) V_{DD} = 50V, I_D = 3.0AA
(2) Pulse Width and frequency is limited by TJ(max) and thermal response

ELECTRICAL CHARACTERISTICS

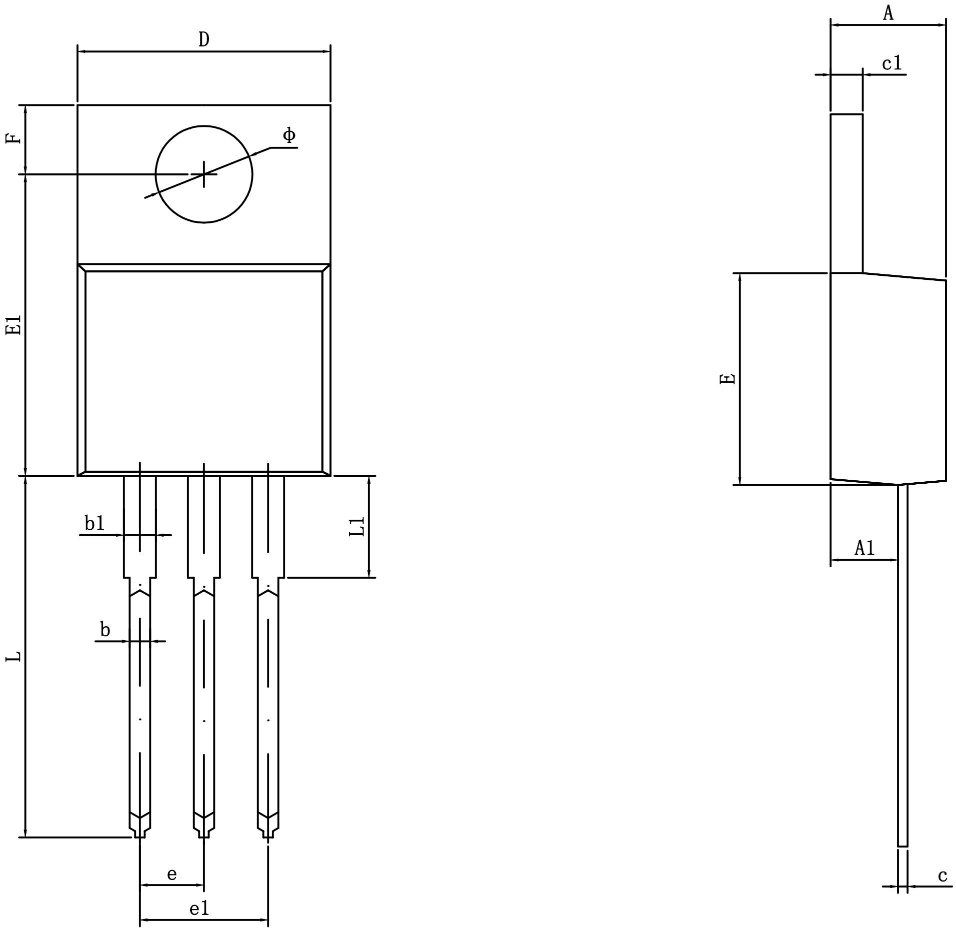
Unless otherwise specified, T_J = 25℃.

Characteristic		Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage (V_{GS} = 0 V, I_D = 250 μA)		$V_{(BR)DSS}$	600			V
Drain-Source Leakage Current (V_{DS} = 600 V, V_{GS} = 0 V) (V_{DS} = 480 V, V_{GS} = 0 V, T_J = 125℃)		I_{DSS}			10 100	μA
Gate-Source Leakage Current-Forward (V_{gsf} = 20 V, V_{DS} = 0 V)		I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse (V_{gsr} = 20 V, V_{DS} = 0 V)		I_{GSSR}			100	nA
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 250 μA)		$V_{GS(th)}$	2.0		4.0	V
Static Drain-Source On-Resistance (V_{GS} = 10 V, I_D = 1.5A) *		$R_{DS(on)}$		2.1	2.2	Ω
Drain-Source On-Voltage (V_{GS} = 10 V) (I_D = 3.0 A)		$V_{DS(on)}$			9.0	V
Forward Transconductance (V_{DS} = 15 V, I_D = 1.5 A) *		g_{FS}	1.5			S
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		770		pF
Output Capacitance		C_{oss}		105		pF
Reverse Transfer Capacitance		C_{rss}		19		pF
Turn-On Delay Time	(V_{DD} = 300 V, I_D = 3.0 A, V_{GS} = 10 V, R_G = 12Ω, R_L = 100Ω) *	$t_{d(on)}$		23		ns
Rise Time		t_r		34		ns
Turn-Off Delay Time		$t_{d(off)}$		58		ns
Fall Time		t_f		35		ns
Total Gate Charge	(V_{DS} = 420 V, I_D = 3.0 A, V_{GS} = 10 V)*	Q_g		28	31	nC
Gate-Source Charge		Q_{gs}		5.0		nC
Gate-Drain Charge		Q_{gd}		17		nC
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)		L_D		4.5		nH
Internal Drain Inductance (Measured from the source lead 0.25" from package to source bond pad)		L_S		7.5		nH
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I_S = 3.0 A, d_{IS}/d_t = 100A/μs)	V_{SD}			1.4	V
Forward Turn-On Time		t_{on}		**		ns
Reverse Recovery Time		t_{rr}		400		ns

* Pulse Test: Pulse Width ≦300μs, Duty Cycle ≦2%

** Negligible, Dominated by circuit inductance

TO-220 PACKAGE OUTLINE DIMENSIONS



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
Φ	3.790	3.890	0.149	0.153