

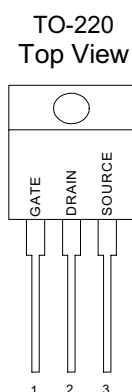
## GENERAL DESCRIPTION

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.

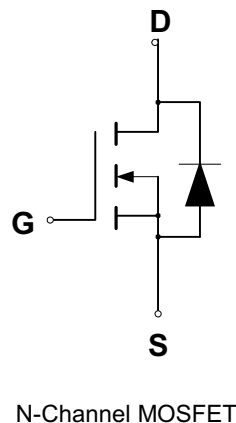
## FEATURES

- ◆ 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



## SYMBOL



## 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	$V_{GS}$	$\pm 20$	V
– Non-repetitive	$V_{GSM}$	$\pm 40$	V
Total Power Dissipation	$P_D$	75	W
Derate above 25°C		0.6	W/°C
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy – $T_J = 25^\circ\text{C}$	$W_{DSR(1)}$	290	mJ
– $T_J = 100^\circ\text{C}$		46	
Repetitive Pulse Drain-to-Source Avalanche Energy	$W_{DSR(2)}$	7.5	
Thermal Resistance – Junction to Case	$\theta_{JC}$	1.67	°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

(1)  $V_{DD} = 50\text{V}, I_D = 3.0\text{A}$

(2) Pulse Width and frequency is limited by  $T_J(\text{max})$  and thermal response

## ELECTRICAL CHARACTERISTICS

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

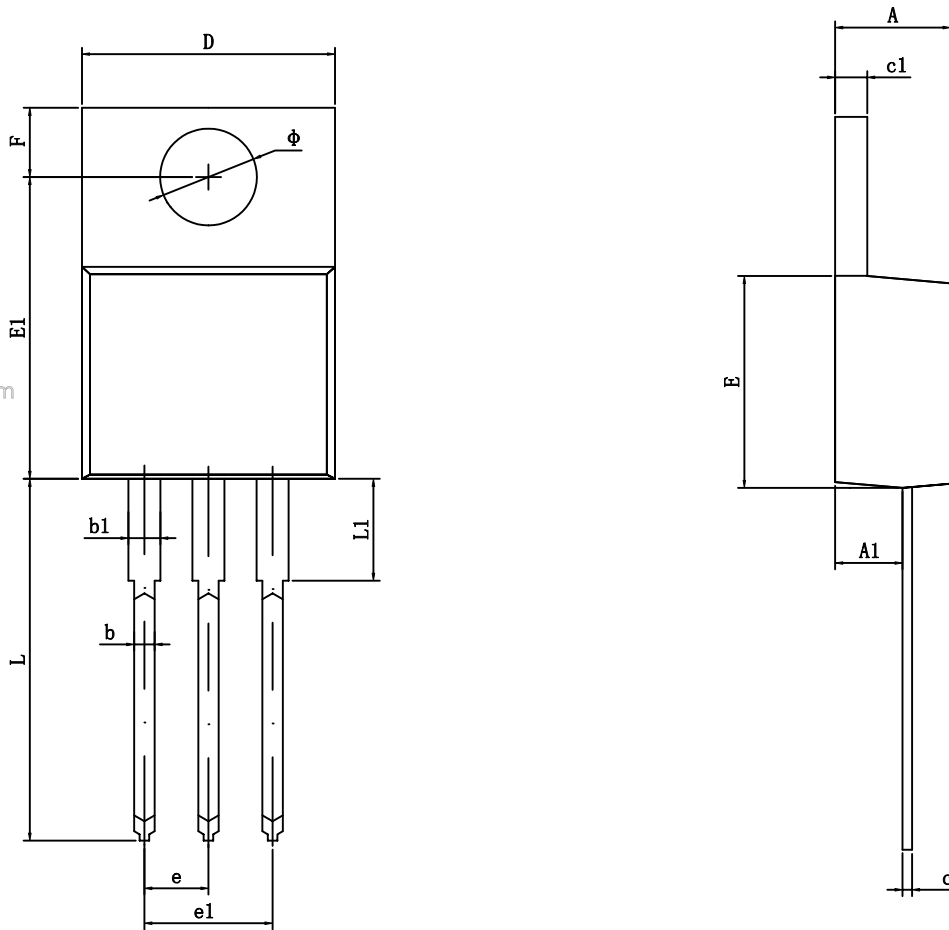
Characteristic	Symbol	Min	Typ	Max	Units	
Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$ )	$V_{(BR)DSS}$	600			V	
Drain-Source Leakage Current ( $V_{DS} = 600\text{ V}$ , $V_{GS} = 0\text{ V}$ ) ( $V_{DS} = 480\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$ )	$I_{DSS}$			10 100	$\mu\text{A}$	
Gate-Source Leakage Current-Forward ( $V_{gsf} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$ )	$I_{GSSF}$			100	nA	
Gate-Source Leakage Current-Reverse ( $V_{gsr} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$ )	$I_{GSSR}$			100	nA	
Gate Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$ )	$V_{GS(th)}$	2.0		4.0	V	
Static Drain-Source On-Resistance ( $V_{GS} = 10\text{ V}$ , $I_D = 1.5\text{A}$ ) *	$R_{DS(on)}$		2.1	2.2	$\Omega$	
Drain-Source On-Voltage ( $V_{GS} = 10\text{ V}$ ) ( $I_D = 3.0\text{ A}$ )	$V_{DS(on)}$			9.0	V	
Forward Transconductance ( $V_{DS} = 15\text{ V}$ , $I_D = 1.5\text{ A}$ ) *	$g_{FS}$	1.5			S	
Input Capacitance	$(V_{DS} = 25\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$		770	pF	
Output Capacitance		$C_{oss}$		105	pF	
Reverse Transfer Capacitance		$C_{rss}$		19	pF	
Turn-On Delay Time	$(V_{DD} = 300\text{ V}$ , $I_D = 3.0\text{ A}$ , $V_{GS} = 10\text{ V}$ , $R_G = 12\Omega$ , $R_L = 100\Omega$ ) *	$t_{d(on)}$		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	$(V_{DS} = 420\text{ V}$ , $I_D = 3.0\text{ A}$ , $V_{GS} = 10\text{ V}$ )*	$Q_g$		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	
<b>SOURCE-DRAIN DIODE CHARACTERISTICS</b>						
Forward On-Voltage(1)	$(I_S = 3.0\text{ A}$ , $d_{IS}/d_t = 100\text{A}/\mu\text{s}$ )	$V_{SD}$			1.4	V
Forward Turn-On Time		$t_{on}$		**		ns
Reverse Recovery Time		$t_{rr}$		400		ns

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

\*\* Negligible, Dominated by circuit inductance

**TO-220 PACKAGE OUTLINE DIMENSIONS**

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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