

# P-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	$R_{DS(on)}\left(\Omega\right)$	I <sub>D</sub> (A) <sup>c</sup>		
- 60	0.0074 at $V_{GS} = -10 \text{ V}$	- 90		
	$0.0094 \text{ at V}_{GS} = -4.5 \text{ V}$	- 90		

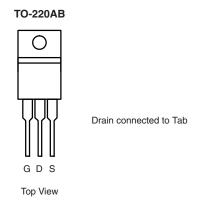
### **FEATURES**

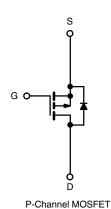
- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



#### **APPLICATIONS**

• DC/DC Primary Switch





ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> = 25 °C, unless otherwise noted)					
Parameter	Symbol	Limit	Unit		
Drain-Source Voltage		V <sub>DS</sub>	- 60	V	
Gate-Source Voltage		V <sub>GS</sub>	± 20	v	
Continuous Drain Current /T 175 °C\C	T <sub>C</sub> = 25 °C	I <sub>D</sub>	- 90	А	
Continuous Drain Current (T <sub>J</sub> = 175 °C) <sup>c</sup>	T <sub>C</sub> = 125 °C	'D	- 67		
Pulsed Drain Current	I <sub>DM</sub>	- 200	A		
Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	- 65		
Single Pulse Avalanche Energy <sup>a</sup>	L=0.1 IIII	E <sub>AS</sub>	211	mJ	
Power Dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	250 <sup>b</sup>	W	
i ower Dissipation	T <sub>A</sub> = 25 °C	, D	2.4	•	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Limit	Unit		
Junction-to-Ambient Free Air	R <sub>thJA</sub>	62	°C/W		
Junction-to-Case	R <sub>thJC</sub>	0.6	C/VV		

#### Notes:

- a. Duty cycle  $\leq$  1 %.
- b. See SOA curve for voltage derating.
- c. Limited by package.

服务热线:400-655-8788

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Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	$V_{GS} = 0 \text{ V}, I_{D} = -250 \mu\text{A}$	- 60			V	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	- 1		- 3		
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA	
		V <sub>DS</sub> = - 60 V, V <sub>GS</sub> = 0 V			- 1		
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = - 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			- 50	μΑ	
		$V_{DS} = -60 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 175 ^{\circ}\text{C}$			- 250		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = - 5 V, V <sub>GS</sub> = - 10 V	- 120			Α	
		V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 30 A		0.0074			
	<sub>D</sub>	V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 30 A, T <sub>J</sub> = 125 °C		0.0150		1	
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 30 A, T <sub>J</sub> = 175 °C		0.0190		Ω	
		V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 20 A		0.0094			
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 30 A	20			S	
Dynamic <sup>b</sup>							
Input Capacitance	C <sub>iss</sub>			9200		pF	
Output Capacitance	C <sub>oss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = - 25 V, f = 1 MHz		975			
Reverse Transfer Capacitance	C <sub>rss</sub>	1		760			
Total Gate Charge <sup>c</sup>	$Q_g$			160	240		
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 90 A		40		nC	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>	1		36			
Gate Resistance	$R_{g}$	f = 1.0 MHz		3		Ω	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>			20	30		
Rise Time <sup>c</sup>	t <sub>r</sub>	$V_{DD} = -30 \text{ V}, R_{L} = 0.33 \Omega$		190	285		
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>	$I_D \cong$ - 90 A, $V_{GEN}$ = - 10 V, $R_g$ = 2.5 $\Omega$		140	210	ns	
Fall Time <sup>c</sup>	t <sub>f</sub>	1		300	450		
Source-Drain Diode Ratings and Cha	racteristics	(T <sub>C</sub> = 25 °C) <sup>b</sup>		<u>.                                      </u>			
Continuous Current	Is				- 90	^	
Pulsed Current	I <sub>SM</sub>				- 200	A	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = - 50 A, V <sub>GS</sub> = 0 V		- 1.0	- 1.5	V	
Reverse Recovery Time	t <sub>rr</sub>			60	90	ns	
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>	I <sub>F</sub> = - 50 A, dI/dt = 100 A/μs		- 3	- 4.5	Α	
Reverse Recovery Charge	Q <sub>rr</sub>	†		0.09	0.2	μC	

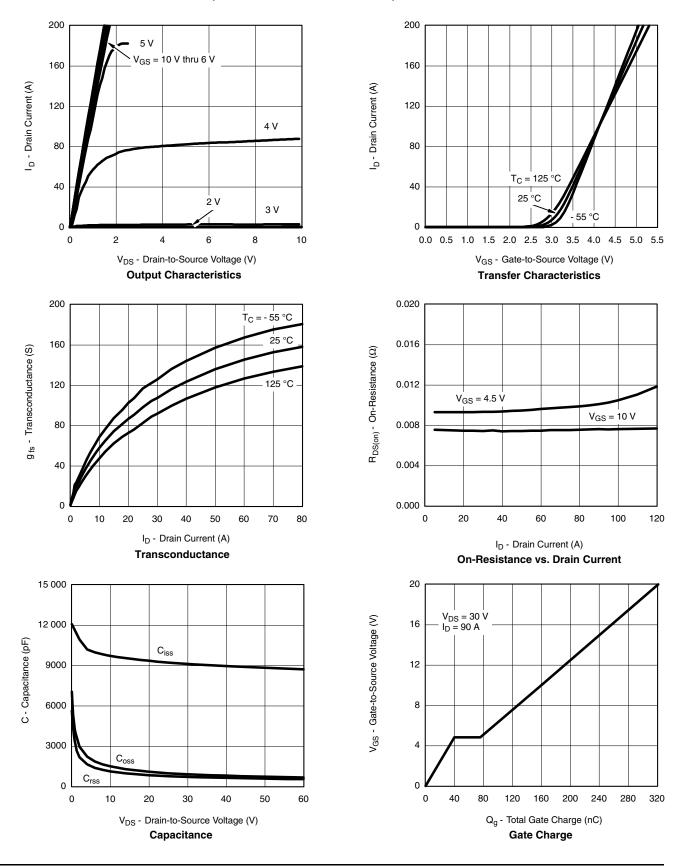
#### Notes:

- a. Pulse test; pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



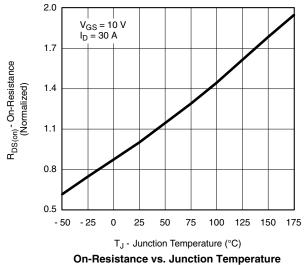
### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



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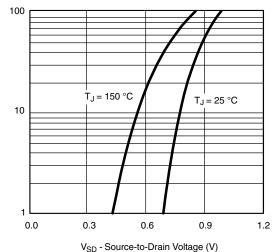


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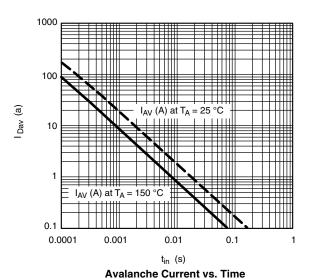




Is - Source Current (A)



Source-Drain Diode Forward Voltage

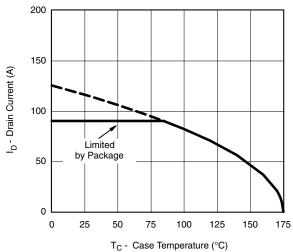


76
72
| I<sub>D</sub> = 10 mA
72
| 68
| 64
| 60
| 56
| -50 -25 0 25 50 75 100 125 150 175

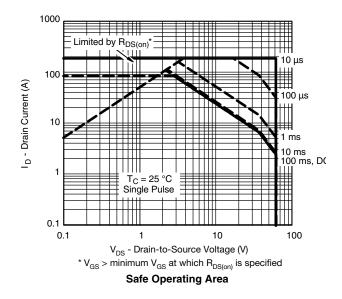
T<sub>J</sub> - Junction Temperature (°C) **Drain Source Breakdown vs. Junction Temperature** 

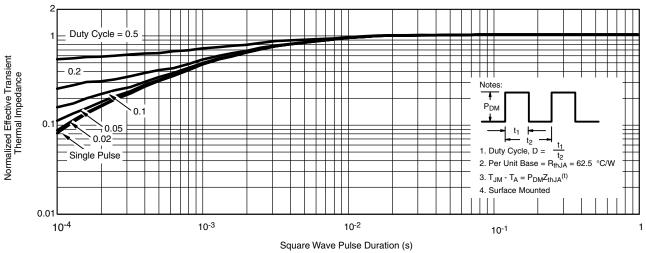


#### THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature

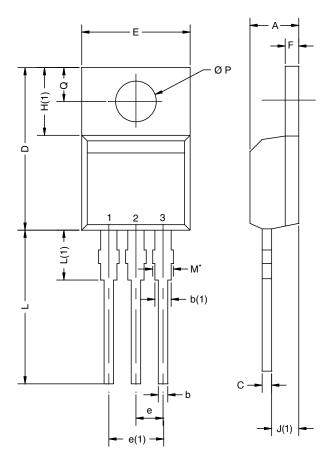




Normalized Thermal Transient Impedance, Junction-to-Case



## **TO-220AB**



	D2

	MILLIMETERS		INC	HES
DIM.	MIN.	MAX.	MIN.	MAX.
А	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
С	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
е	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
ØΡ	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118
ECN: T14-0413-Rev. P, 16-Jun-14 DWG: 5471				

#### Note

 $<sup>^{\</sup>star}$  M = 1.32 mm to 1.62 mm (dimension including protrusion) Heatsink hole for HVM



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