# N-Channel 60-V (D-S) MOSFET

## **Key Features:**

- Low r<sub>DS(on)</sub> trench technology
- · Low thermal impedance
- · Fast switching speed

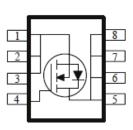
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- White LED boost converters
- · Automotive Systems
- Industrial DC/DC Conversion Circuits

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	$r_{DS(on)}(m\Omega)$	I <sub>D</sub> (A)		
60	6 @ V <sub>GS</sub> = 10V	20		
00	$7 @ V_{GS} = 4.5V$	18		







ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^{\circ}$ C UNLESS OTHERWISE NOTED)						
Parameter			Limit	Units		
Drain-Source Voltage		$V_{DS}$	60	V		
Gate-Source Voltage	$V_{GS}$	±20	V			
Continuous Drain Current <sup>a</sup> $ T_A=25^{\circ}C $ $T_A=70^{\circ}C $		I_	20			
		I <sub>D</sub>	19	Α		
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	100				
Continuous Source Current (Diode Conduction) a	I <sub>S</sub>	5	Α			
Power Dissipation a	T <sub>A</sub> =25°C	P <sub>D</sub>	3.5	l w l		
Power Dissipation	T <sub>A</sub> =70°C	ı D	3.2	V V		
Operating Junction and Storage Temperature Range	$T_J,T_stg$	-55 to 150	°C			

THERMAL RESISTANCE RATINGS						
Parameter			Maximum	Units		
Maximum Junction-to-Ambient <sup>a</sup>	t <= 10 sec	$R_{\theta JA}$	35	°C/W		
IMAXIIIUIII JUIICIIOII-IO-AIIIDIEIII	Steady State		65	C/VV		

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### Notes

- a. Surface Mounted on 1" x 1" FR4 Board.
- b. Pulse width limited by maximum junction temperature

### **Electrical Characteristics**

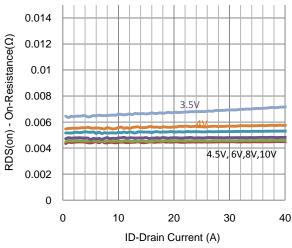
Parameter	Symbol	nbol Test Conditions		Тур	Max	Unit	
Static							
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250 \text{ uA}$	1			V	
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			±10	uA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 48 \text{ V}, V_{GS} = 0 \text{ V}$			1	uA	
	500	$V_{DS} = 48 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55^{\circ}\text{C}$			5	<b></b>	
On-State Drain Current	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	10			Α	
Drain-Source On-Resistance	r	$V_{GS} = 10 \text{ V}, I_D = 16 \text{ A}$	A 6		6	$\frac{1}{m\Omega}$	
Dialii-Source Off-Resistance	r <sub>DS(on)</sub>	$V_{GS} = 4.5 \text{ V}, I_D = 15 \text{ A}$			7	11122	
Forward Transconductance	g <sub>fs</sub>	$V_{DS} = 15 \text{ V}, I_{D} = 16 \text{ A}$		10		S	
Diode Forward Voltage	$V_{SD}$	$I_{S} = 2.5 \text{ A}, V_{GS} = 0 \text{ V}$		0.66		V	
		Dynamic					
Total Gate Charge	$Q_g$			64			
Gate-Source Charge	$Q_{gs}$	$V_{DS} = 30 \text{ V}, V_{GS} = 4.5 \text{ V}, I_{D} = 16 \text{ A}$		21		nC	
Gate-Drain Charge	$Q_{gd}$	1		30			
Turn-On Delay Time	t <sub>d(on)</sub>			17			
Rise Time	t <sub>r</sub>	$V_{DD}$ = 30 V, $R_L$ = 1.8 $\Omega$ , $I_D$ = 16 A,		53			
Turn-Off Delay Time	$t_{d(off)}$	$V_{GEN}$ = 10 V, $R_{GEN}$ = 6 $\Omega$		223		ns	
Fall Time	t <sub>f</sub>			77			
Input Capacitance	C <sub>iss</sub>			4045			
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		592		pF	
Reverse Transfer Capacitance	$C_{rss}$			513			

#### Notes

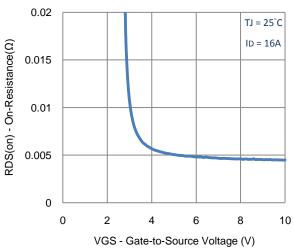
- a. Pulse test: PW <= 300us duty cycle <= 2%.
- b. Guaranteed by design, not subject to production testing.

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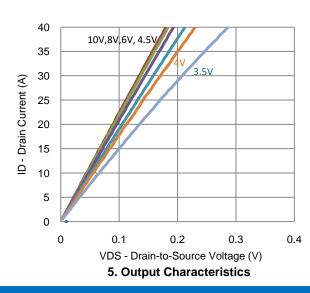
## **Typical Electrical Characteristics**

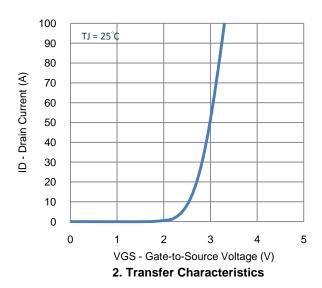


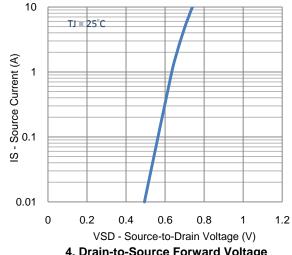
### 1. On-Resistance vs. Drain Current



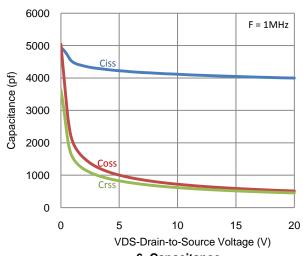
3. On-Resistance vs. Gate-to-Source Voltage



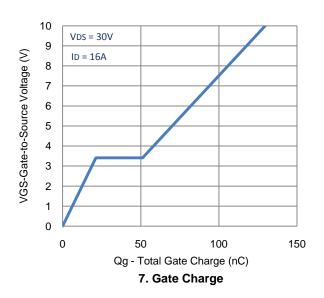


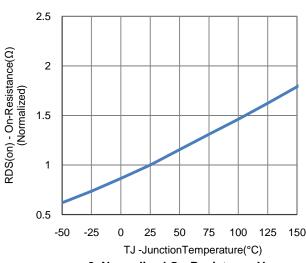


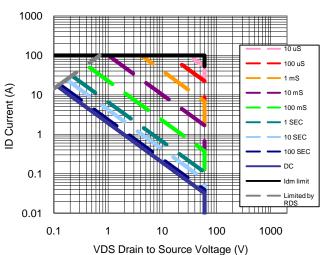
4. Drain-to-Source Forward Voltage



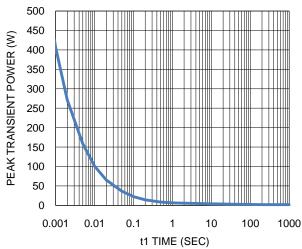
## **Typical Electrical Characteristics**





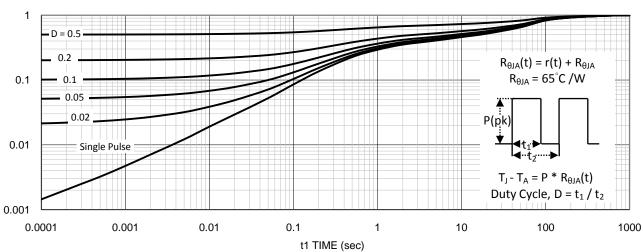






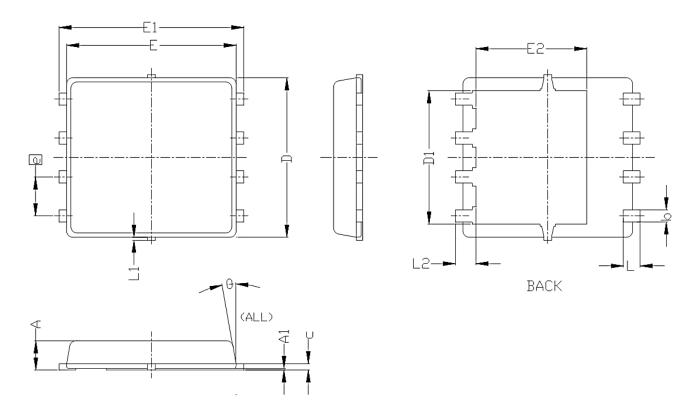
9. Safe Operating Area

10. Single Pulse Maximum Power Dissipation



11. Normalized Thermal Transient Junction to Ambient

# Package Information



	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES				
SYMBOLS	MIN	NOM MAX		MIN	NOM	MAX		
A	0.85	0. 95	1.00	0.033	0.037	0. 039		
Al	0.00		0.05	0.000		0.002		
b	0.30	0.40	0.50	0.012	0.016	0.020		
С	0. 15	0. 20	0. 25	0.006	0.008	0.010		
D		5. 20 BSC		0. 205 BSC				
D1		4. 35 BSC			0. 171 BSC			
Е		5. 55 BSC		0, 219 BSC				
E1	6. 05 BSC			0. 238 BSC				
E2	3. 62 BSC			0. 143 BSC				
e	1. 27 BSC			0. 050 BSC				
L	0.45	0.55	0.65	0.018	0.022	0.026		
L1	0		0.15	0		0.006		
L2	0.68 REF			0. 027 REF				
θ	0°		10°	0°		10°		