Analog Power AM4394N

# N-Channel 150-V (D-S) MOSFET

### **Key Features:**

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

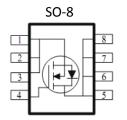
## **Typical Applications:**

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

PRODUCT SUMMARY			
V <sub>DS</sub> (V)	$r_{DS(on)}(m\Omega)$	I⊳(A)	
150	50 @ V <sub>GS</sub> = 10V	6.5	
	60 @ V <sub>GS</sub> = 5.5V	5.9	







ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C UNLESS OTHERWISE NOTED)					
Parameter		Symbol	Limit	Units	
Drain-Source Voltage	Drain-Source Voltage			V	
Gate-Source Voltage	V <sub>GS</sub>	±20	V		
Continuous Proin Current <sup>a</sup>	T <sub>A</sub> =25°C		6.5		
Continuous Drain Current <sup>a</sup>	T <sub>A</sub> =70°C	<b>−</b> I <sub>D</sub>	5.5	Α	
Pulsed Drain Current <sup>b</sup>	I <sub>DM</sub>	50			
Continuous Source Current (Diode Conduction) <sup>a</sup>	I <sub>S</sub>	4.6	Α		
Dower Dissination a	$T_A=25^{\circ}C$ $T_A=70^{\circ}C$	P <sub>D</sub>	3.1	W	
Power Dissipation <sup>a</sup>	T <sub>A</sub> =70°C		2.2	VV	
Operating Junction and Storage Temperature Range		$T_J, T_{sta}$	-55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Maximum	Units	
Maximum Junction-to-Ambient <sup>a</sup>	t <= 10 sec	$R_{\theta JA}$	40	°C/W	
Maximum Junction-to-Ambient	Steady State	IXOJA	80		

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#### Notes

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

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#### **Electrical Characteristics**

Parameter	Symbol	Test Conditions	Min	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>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			±100	nA	
Zero Gate Voltage Drain Current	lane	$V_{DS} = 120 \text{ V}, V_{GS} = 0 \text{ V}$			1	uA	
Zero Gate Voltage Brain Gurrent	I <sub>DSS</sub>	$V_{DS} = 120 \text{ V}, V_{GS} = 0 \text{ V}, T_{J} = 55^{\circ}\text{C}$			25	uA	
On-State Drain Current	I <sub>D(on)</sub>	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	13			Α	
Drain-Source On-Resistance	r	$V_{GS} = 10 \text{ V}, I_D = 5.2 \text{ A}$			50	mΩ	
Dialii-30dice Oil-Resistance	r <sub>DS(on)</sub>	$V_{GS} = 5.5 \text{ V}, I_D = 4.8 \text{ A}$			60	11152	
Forward Transconductance	g <sub>fs</sub>	$V_{DS} = 15 \text{ V}, I_D = 5.2 \text{ A}$		20		S	
Diode Forward Voltage	$V_{SD}$	$I_S = 2.3 \text{ A}, V_{GS} = 0 \text{ V}$		0.72		V	
		Dynamic					
Total Gate Charge	$Q_g$	$V_{DS} = 75 \text{ V}, V_{GS} = 5.5 \text{ V},$ $I_{D} = 5.2 \text{ A}$		58		nC	
Gate-Source Charge	$Q_{gs}$			16			
Gate-Drain Charge	$Q_{gd}$	1D = 3.2 A		34			
Turn-On Delay Time	t <sub>d(on)</sub>	$V_{DS} = 75 \text{ V}, R_1 = 14.5 \Omega,$		20			
Rise Time	t <sub>r</sub>	$V_{DS} = 75 \text{ V}, K_L - 14.5 \Omega,$ $I_D = 5.2 \text{ A},$		27		no	
Turn-Off Delay Time	$t_{d(off)}$	$V_{GEN} = 10 \text{ V}, R_{GEN} = 6 \Omega$		129		ns	
Fall Time	t <sub>f</sub>	v <sub>GEN</sub> = 10 v, n <sub>GEN</sub> - 0 Ω		37			
Input Capacitance	C <sub>iss</sub>			4388			
Output Capacitance	C <sub>oss</sub>	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		260		pF	
Reverse Transfer Capacitance	$C_{rss}$			239			

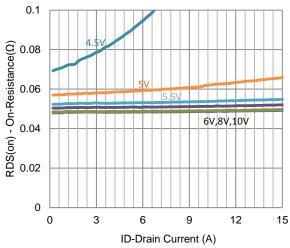
#### Notes

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

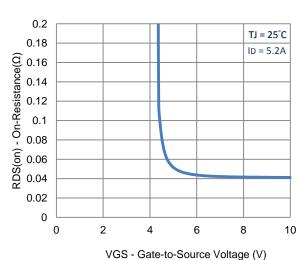
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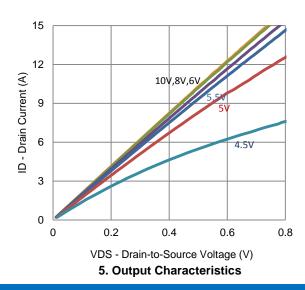
### **Typical Electrical Characteristics**



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



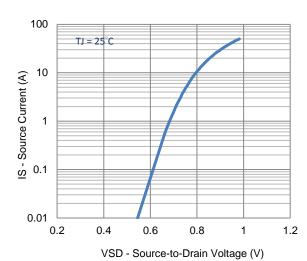
3. On-Resistance vs. Gate-to-Source Voltage



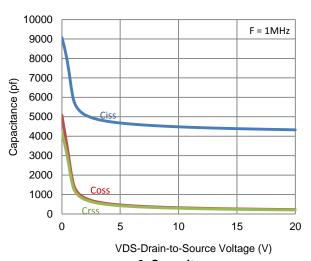
20
TJ = 25°C

16
(Y)
tuesun 12
4
0
0
2
4
6
8
VGS - Gate-to-Source Voltage (V)

2. Transfer Characteristics

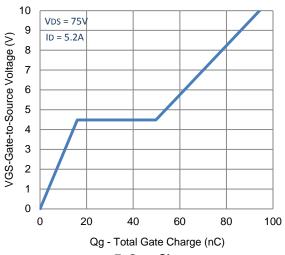


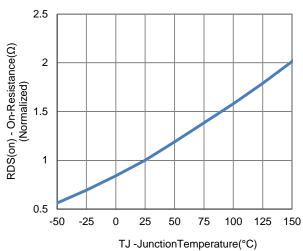
4. Drain-to-Source Forward Voltage



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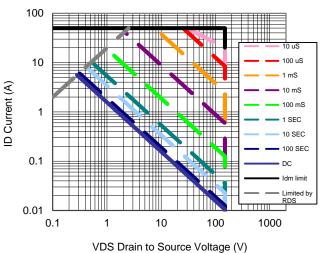
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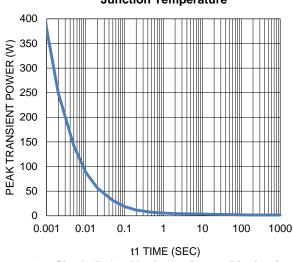




7. Gate Charge

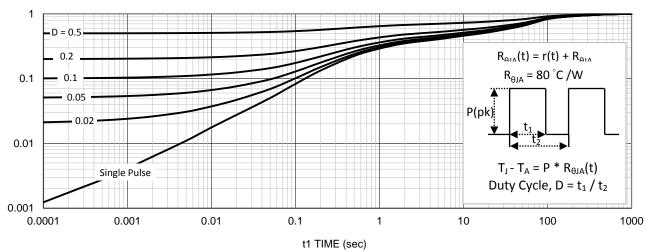






9. Safe Operating Area

10. Single Pulse Maximum Power Dissipation

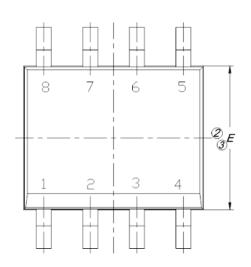


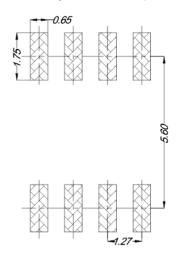
11. Normalized Thermal Transient Junction to Ambient

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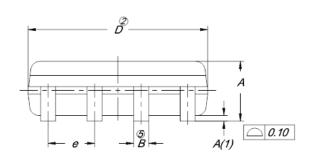
### **Package Information**

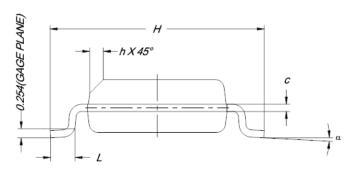
Land Pattern (Only for Reference)





	MILLIMETERS					
DIM.	MIN.	NOM.	MAX.			
Α	1.35	1.55	1.75			
A(1)	0.10	0.18	0.25			
В	0.38	0.45	0.51			
С	0.19	0.22	0.25			
D	4.80	4.90	5.00			
Е	3.80	3.90	4.00			
е	1.27 BSC					
Н	5.80	6.00	6.20			
L	0.50	0.72	0.93			
α	0°	4°	8°			
h	0.25	0.38	0.50			





#### Note:

- All Dimension Are In mm.
- Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs. Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
- 3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
- 4. The Package Top May Be Smaller Than The Package Bottom.
- 5. Dimension "B" Does Not Include Dambar Protrusion. Allowable Dambar Protrusion Shall Be 0.08 mm Total In Excess Of "B" Dimension At Maximum Material Condition. The Dambar Cannot Be Located On The Lower Radius Of The Foot.