



**TM15N04S**

**N-Channel Enhancement Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = 40V</math> <math>I_D = 15A</math></p> <p><math>R_{DS(ON)} = 7.8m\Omega</math> (typ.) @ <math>V_{GS} = 10V</math></p> <p>100% UIS Tested                  100% <math>R_g</math> Tested</p>
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PIN1

Marking: 15N04

S:SOP-8L

**Absolute Maximum Ratings ( $T_A=25^\circ C$  unless otherwise noted)**

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	40	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current- $T_C=25^\circ C$	15	A
	Continuous Drain Current- $T_C=100^\circ C$	9.7	
$I_{DM}$	Drain Current-Pulsed <sup>1</sup>	55	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>2</sup>	81	mJ
$P_D$	Power Dissipation	4	W
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

**Thermal Characteristic**

Symbol	Parameter	Max	Units
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	31.7	$^\circ C/W$



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Electrical Characteristics: ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250 \mu A$	40	---	---	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=40V,$	---	---	1	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250 \mu A$	1.1	1.5	2.5	V
$R_{DS(on)}$	Drain-Source On Resistance <sup>3</sup>	$V_{GS}=10V, I_D=15A$	---	7.8	10	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	---	9.8	14	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1MHz$	---	999	---	pF
$C_{oss}$	Output Capacitance		---	191	---	
$C_{rss}$	Reverse Transfer Capacitance		---	164	---	
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=20V, I_D=10A$ $R_G=3 \Omega, V_{GS}=10V$	---	11	---	ns
$t_r$	Rise Time		---	11	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	37	---	ns
$t_f$	Fall Time		---	8	---	ns
$Q_g$	Total Gate Charge	$V_{GS}=10V, V_{DS}=20V,$ $I_D=15A$	---	36	---	nC
$Q_{gs}$	Gate-Source Charge		---	5	---	nC
$Q_{gd}$	Gate-Drain "Miller" Charge		---	6	---	nC
<b>Drain-Source Diode Characteristics</b>						
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=15A$	---	---	1.2	V
$I_S$	Source drain current(Body Diode)	$V_D=V_G=0V$	---	---	15	A
$I_{SM}$	Pulsed Drain to Source Diode	$V_D=V_G=0V$	---	---	55	A
$T_{rr}$	Reverse Recovery Time	$I_F=15A, di_F/dt=100A/\mu s$	---	22	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	11	---	nC

**Notes:**

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition:  $T_J=25^\circ\text{C}, V_{DD}=20V, V_G=10V, R_G=25\Omega, L=0.5mH, I_{AS}=18A$
3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$



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Typical Characteristics: ( $T_c=25^\circ\text{C}$  unless otherwise noted)

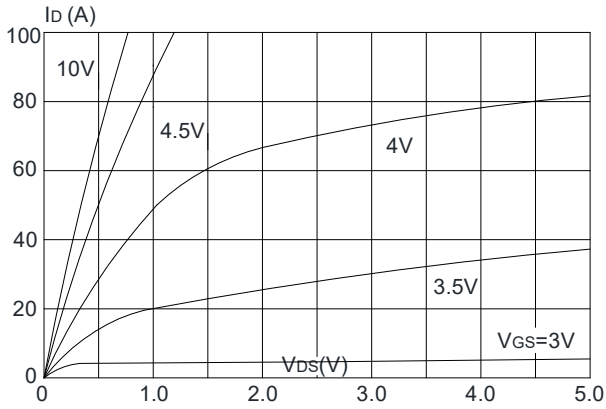


Figure 1: Output Characteristics

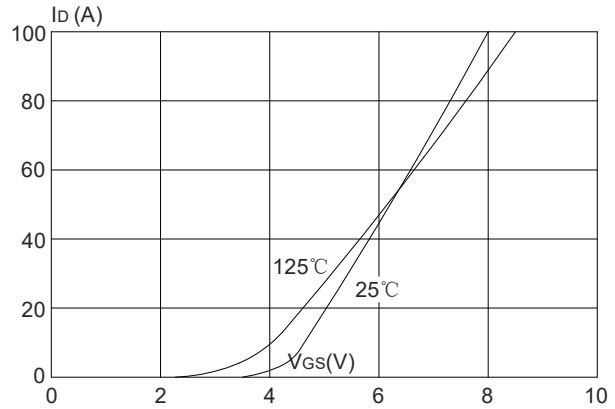


Figure 2: Typical Transfer Characteristics

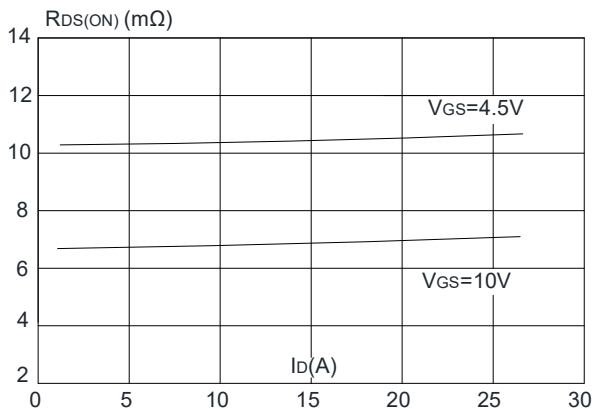


Figure 3: On-resistance vs. Drain Current

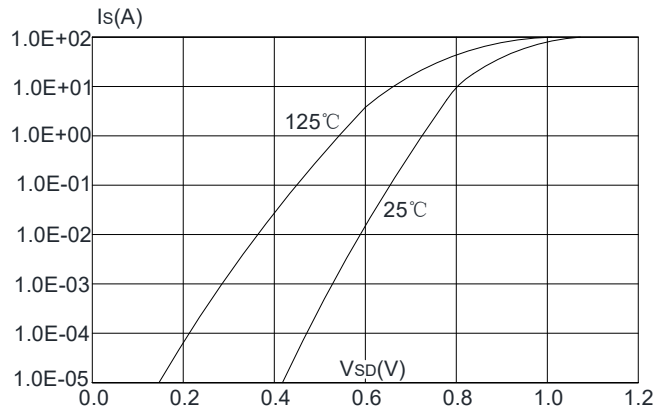


Figure 4: Body Diode Characteristics

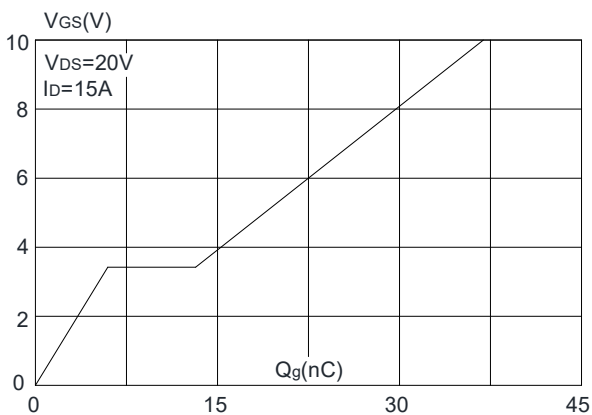


Figure 5: Gate Charge Characteristics

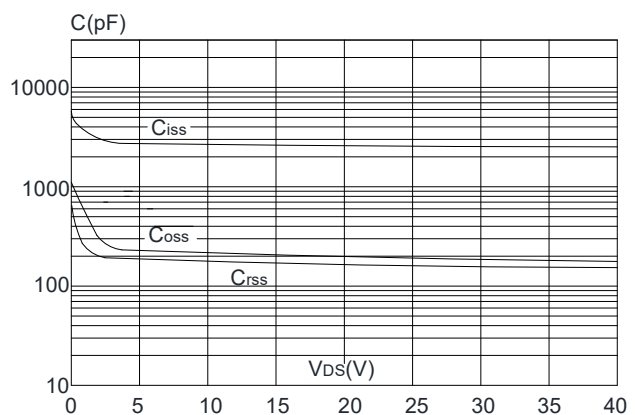


Figure 6: Capacitance Characteristics

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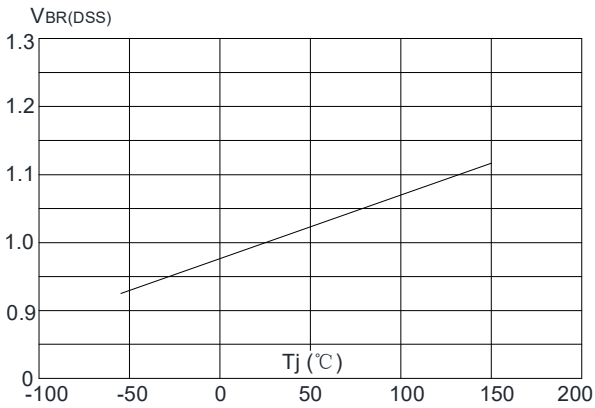


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

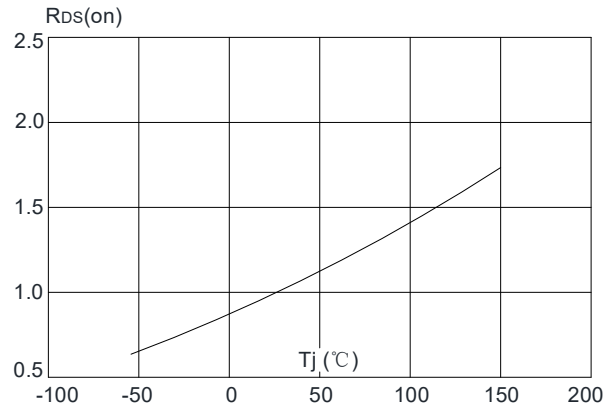


Figure 8: Normalized on Resistance vs. Junction Temperature

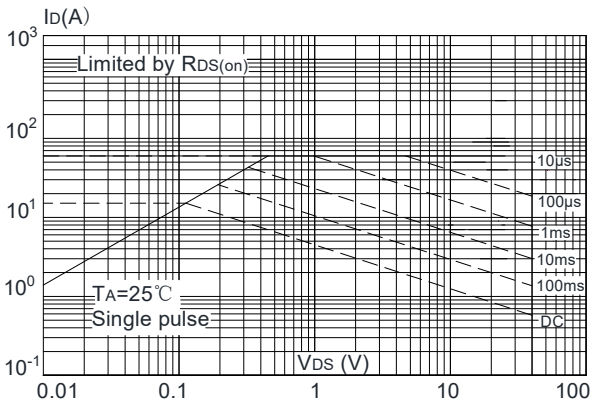


Figure 9: Maximum Safe Operating Area

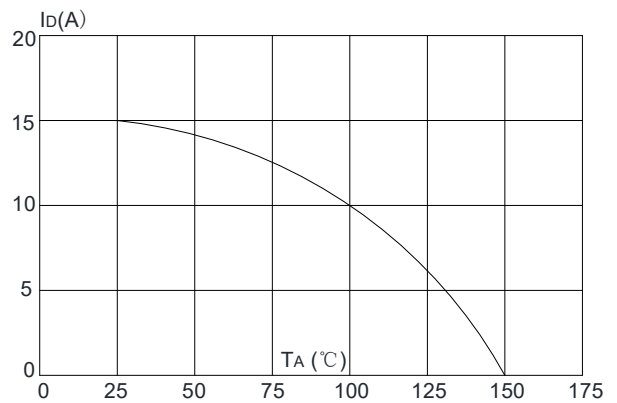


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

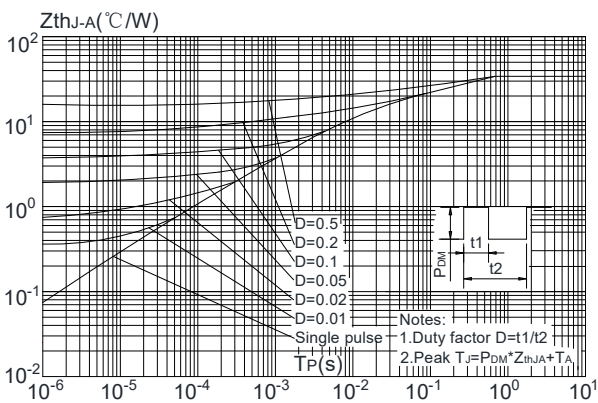
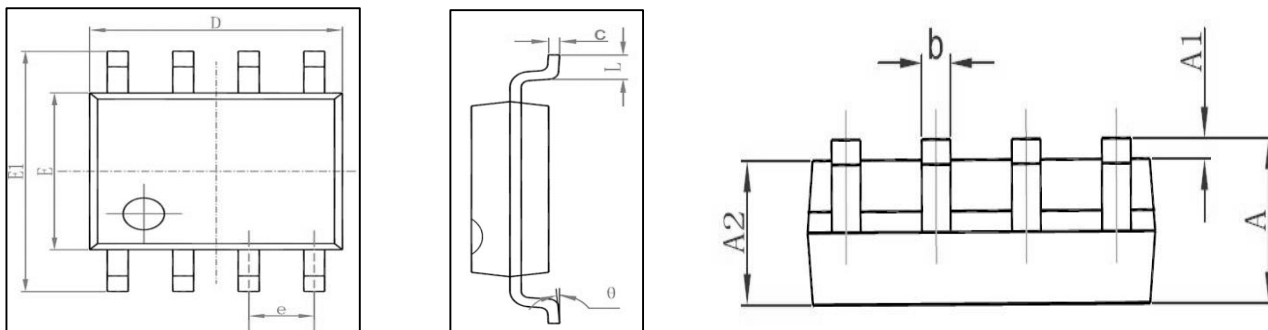
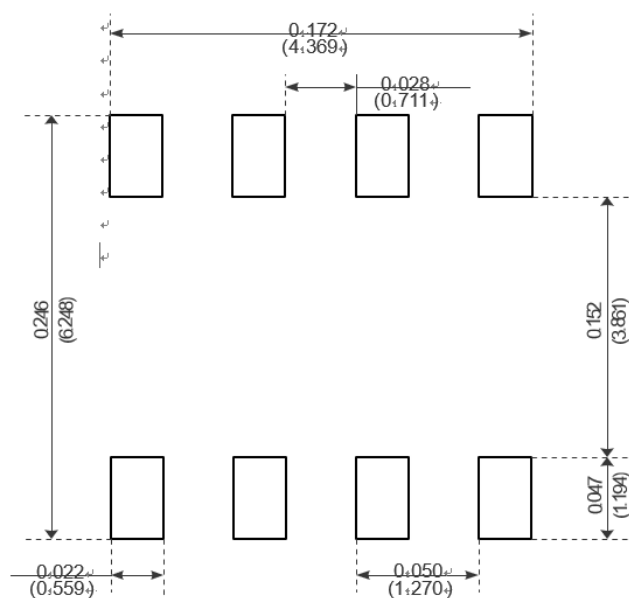


Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

# Package Mechanical Data:SOP-8L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Recommended Minimum Pads