
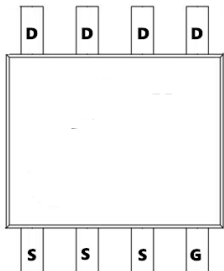
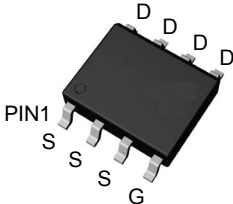
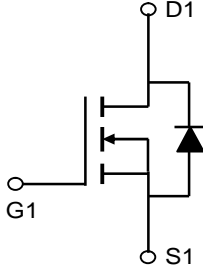


**TM12N02S**

**N-Channel Enhancement Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low R<sub>DS(ON)</sub></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>V<sub>DS</sub> = 20V I<sub>D</sub> =12A</p> <p>R<sub>DS(ON)</sub>=8mΩ (typ.) @V<sub>GS</sub> = 10V</p> <p>100% UIS Tested 100% R<sub>g</sub> Tested</p> 
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S:SOP-8L

Marking: 12N02 OR 2012

**Absolute Maximum Ratings (T<sub>A</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	20	V
V <sub>GS</sub>	Gate-Source Voltage	± 12	V
I <sub>D</sub> @T <sub>A</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 4.5V <sup>1</sup>	12.0	A
I <sub>D</sub> @T <sub>A</sub> =70°C	Continuous Drain Current, V <sub>GS</sub> @ 4.5V <sup>1</sup>	7.0	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	34	A
P <sub>D</sub> @T <sub>A</sub> =25°C	Total Power Dissipation <sup>3</sup>	3	W
P <sub>D</sub> @T <sub>A</sub> =70°C	Total Power Dissipation <sup>3</sup>	0.86	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

**Thermal Data**

Symbol	Parameter	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-ambient <sup>1</sup>	100	°C/W

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=20V, V_{GS}=0V,$	-	-	1.0	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.75	1.2	V
$R_{DS(on)}$	Static Drain-Source on-Resistance <small>note3</small>	$V_{GS}=4.5V, I_D=15A$	-	8	11.7	m $\Omega$
		$V_{GS}=2.5V, I_D=10A$	-	11.2	1.5	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS}=10V, V_{GS}=0V,$ $f=1.0MHz$	-	1000	-	pF
$C_{oss}$	Output Capacitance		-	182	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	164	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=10V, I_D=15A,$ $V_{GS}=4.5V$	-	15	-	nC
$Q_{gs}$	Gate-Source Charge		-	2	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	5.2	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DS}=10V,$ $I_D=15A, R_{GEN}=3\Omega,$ $V_{GS}=4.5V$	-	9	-	ns
$t_r$	Turn-on Rise Time		-	25	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	37	-	ns
$t_f$	Turn-off Fall Time		-	14	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	20	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	120	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS}=0V, I_S=30A$	-	-	1.2	V

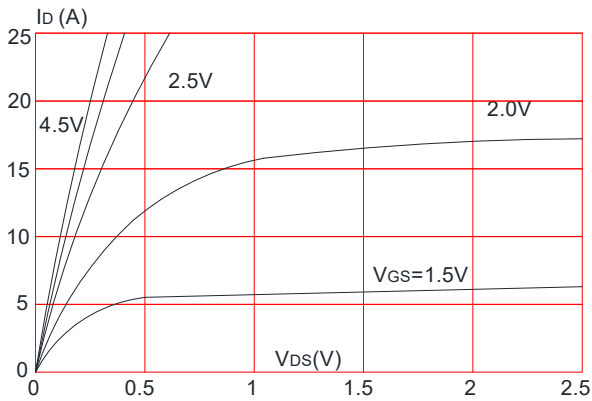
Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. EAS condition:  $T_J=25^\circ\text{C}, V_{DD}=10V, V_G=4.5V, L=0.5mH, R_G=25\Omega, I_{AS}=9.6A$ 

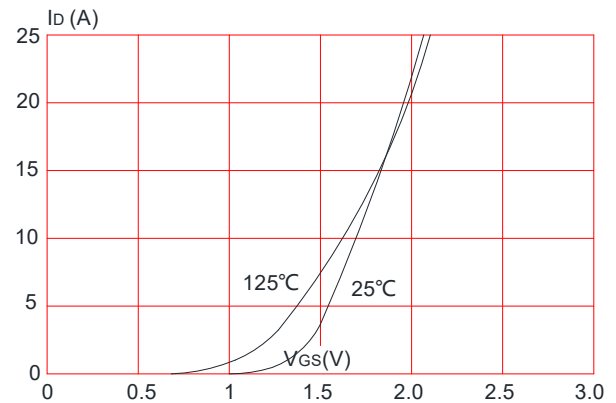
 3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

## Typical Performance Characteristics

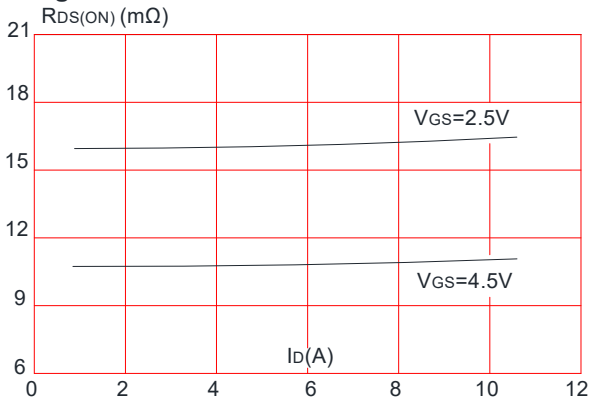
**Figure 1: Output Characteristics**



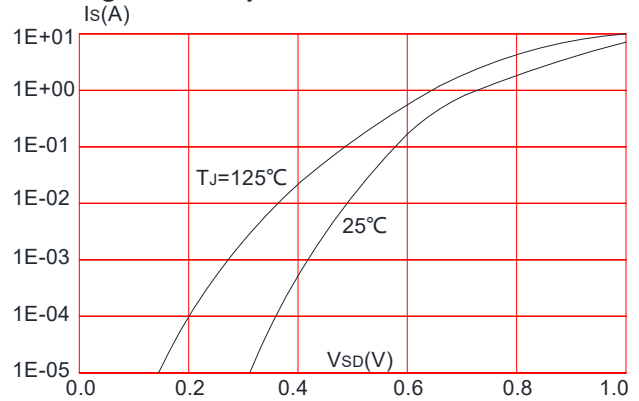
**Figure 2: Typical Transfer Characteristics**



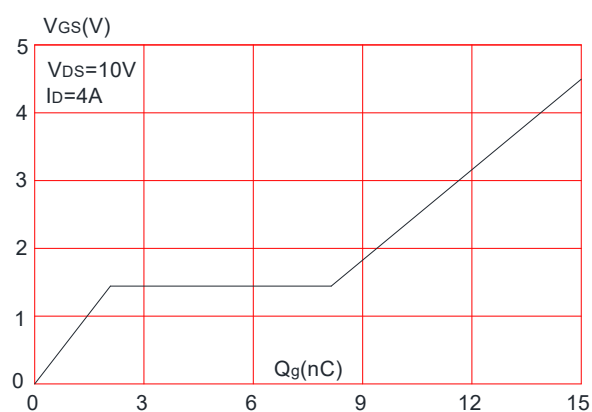
**Figure 3: On-resistance vs. Drain Current**



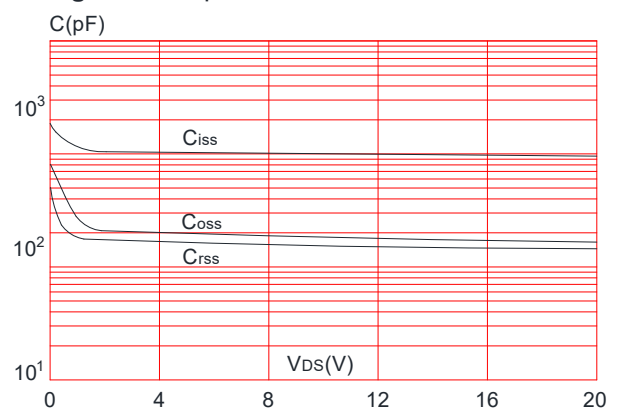
**Figure 4: Body Diode Characteristics**



**Figure 5: Gate Charge Characteristics**



**Figure 6: Capacitance Characteristics**



TM12N02S

N-Channel Enhancement Mosfet

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

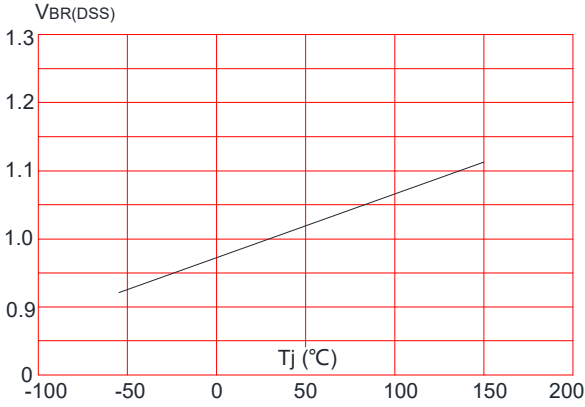


Figure 8: Normalized on Resistance vs. Junction Temperature

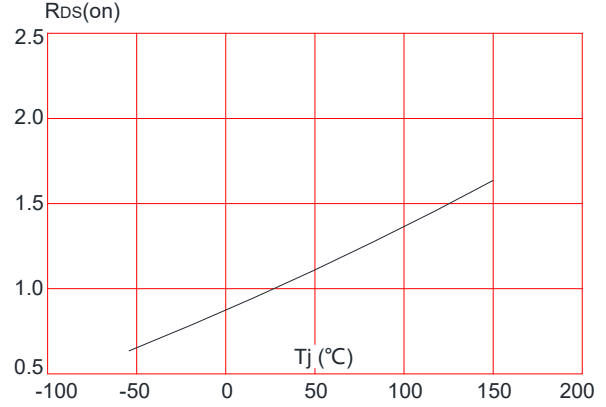


Figure 9: Maximum Safe Operating Area

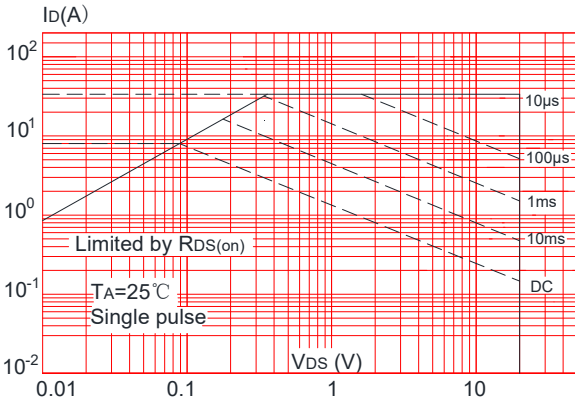


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

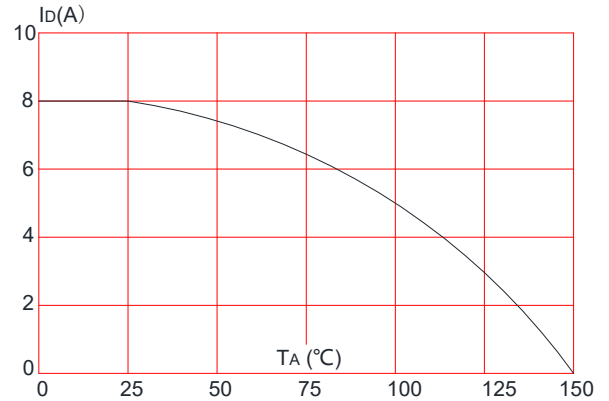
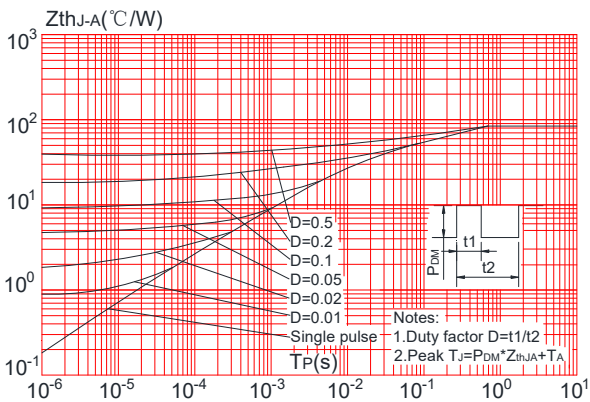
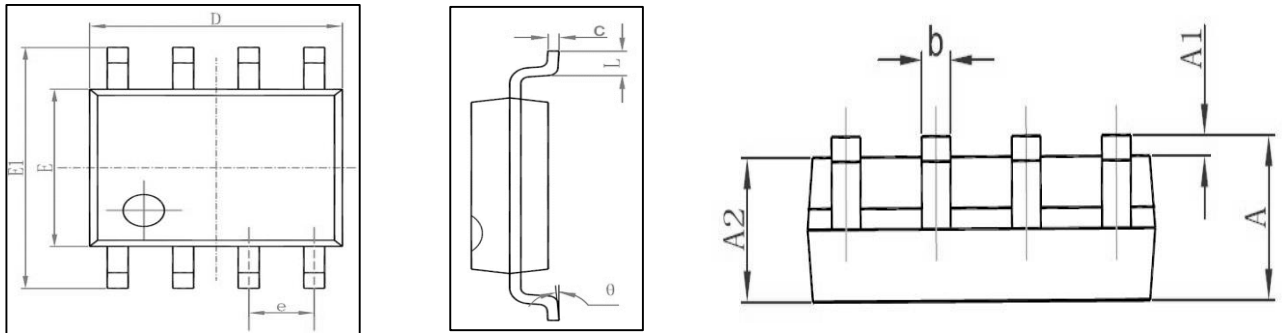


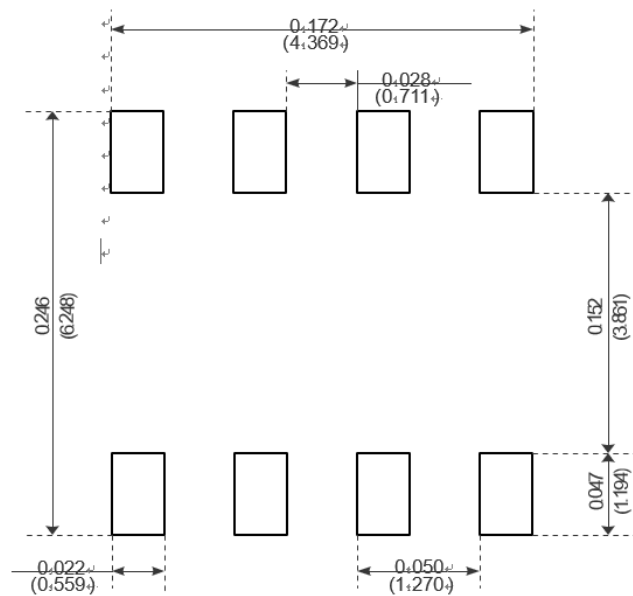
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



# 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°



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