

SLD3091T

30V N-Channel MOSFET

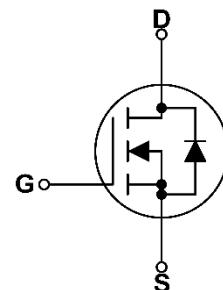
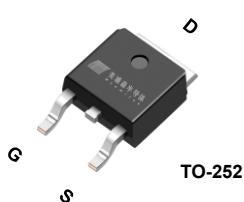
General Description

This Power MOSFET is produced using Msemitek's advanced TRENCH technology.

This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

Features

- 89A, 30V, $R_{DS(on)typ} = 3.5m\Omega @ V_{GS} = 10V$
 $R_{DS(on)typ} = 5.5m\Omega @ V_{GS} = 4.5V$
- Low gate charge
- Low Crss
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

$T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	SLD3091T	Units
V_{DSS}	Drain-Source Voltage	30	V
I_D	Drain Current ¹⁾ - Continuous ($T_C = 25^\circ C$)	89	A
	- Continuous ($T_C = 100^\circ C$)	56	A
I_{DM}	Drain Current ¹⁾ - Pulsed	356	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy ²⁾	110	mJ
P_D	Power Dissipation ($T_C = 25^\circ C$)	60	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	260	$^\circ C$

Thermal Characteristics

R_{thJC}	Thermal Resistance, Junction to Case	2.1	$^\circ C/W$
R_{thJA}	Thermal Resistance, Junction to ambient	62.5	$^\circ C/W$

Package Marking

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
SLD3091T	SLD3091T	TO-252	Tape & Reel	2500	25000

Electrical Characteristics

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{\text{GS}} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{\text{DS}} = 30 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$	--	--	1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{\text{GS}} = 20 \text{ V}$, $V_{\text{DS}} = 0 \text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{\text{GS}} = -20 \text{ V}$, $V_{\text{DS}} = 0 \text{ V}$	--	--	-100	nA

On Characteristics

$V_{\text{GS}(\text{th})}$	Gate Threshold Voltage	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 250 \mu\text{A}$	1.0	1.5	2.2	V
$R_{\text{DS}(\text{on})}$	Static Drain-Source On-Resistance	$V_{\text{GS}} = 10 \text{ V}$, $I_D = 20 \text{ A}$	--	3.45	4.5	$\text{m}\Omega$
		$V_{\text{GS}} = 4.5 \text{ V}$, $I_D = 15 \text{ A}$	--	5.45	7.5	

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{\text{DS}} = 15 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$, $f = 1 \text{ MHz}$	--	2858	-	pF
C_{oss}	Output Capacitance		--	290	-	pF
C_{rss}	Reverse Transfer Capacitance		--	282	-	pF
R_g	Internal Gate Resistance	$f = 1 \text{ MHz}$, open drain	--	2.8	--	Ω

Switching Characteristics

$t_{\text{d}(\text{on})}$	Turn-On Delay Time	$V_{\text{DS}} = 24 \text{ V}$, $V_{\text{GS}} = 10 \text{ V}$ $R_G = 5 \Omega$, $I_D = 24 \text{ A}$	--	11	--	ns
t_r	Turn-On Rise Time		--	50	--	ns
$t_{\text{d}(\text{off})}$	Turn-Off Delay Time		--	62	--	ns
t_f	Turn-Off Fall Time		--	45	--	ns
Q_g	Total Gate Charge	$V_{\text{DS}} = 24 \text{ V}$, $I_D = 40 \text{ A}$, $V_{\text{GS}} = 10 \text{ V}$	--	62	--	nC
Q_{gs}	Gate-Source Charge		--	9	--	nC
Q_{gd}	Gate-Drain Charge		--	18	--	nC

Drain-Source Diode Characteristics

I_s	Maximum Continuous Drain-Source Diode Forward Current	--	--	89	A	
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	356	A	
V_{SD}	Drain to Source Diode Forward Voltage, $V_{\text{GS}} = 0 \text{ V}$, $I_{\text{SD}} = 20 \text{ A}$, $T_J = 25^\circ\text{C}$	--	0.85	1.1	V	
t_{rr}	Reverse Recovery Time	$V_{\text{DD}} = 24 \text{ V}$, $\text{IF} = 24 \text{ A}$, $dI/dt = 100 \text{ A}/\mu\text{s}$	--	19	--	nS
Q_{rr}	Reverse Recovery Charge		--	0.01	--	uC
I_{rrm}	Peak Reverse Recovery Current		--	1.25	--	A

Notes:

- Repetitive Rating : Drain current limited by maximum junction temperature.
- EAS condition: $T_J = 25^\circ\text{C}$, $V_{\text{DD}} = 50 \text{ V}$, $V_{\text{GS}} = 10 \text{ V}$, $L = 0.5 \text{ mH}$, $I_{\text{AS}} = 21 \text{ A}$.
- These curves are based on the junction-to-case thermal impedance R_{thjc} , assuming maximum junction temperature is 150°C . These curves provide a single pulse rating.

Typical Characteristics

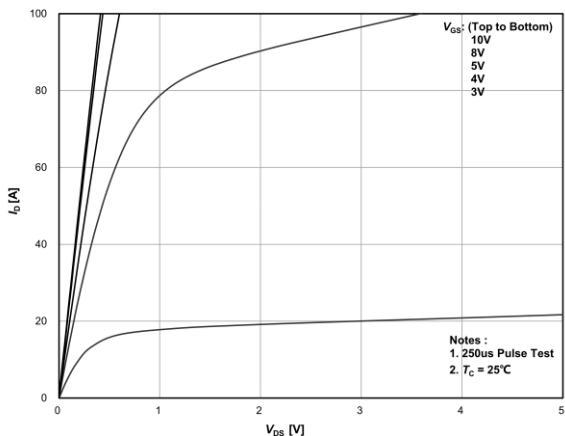


Figure 1. On-Region Characteristics

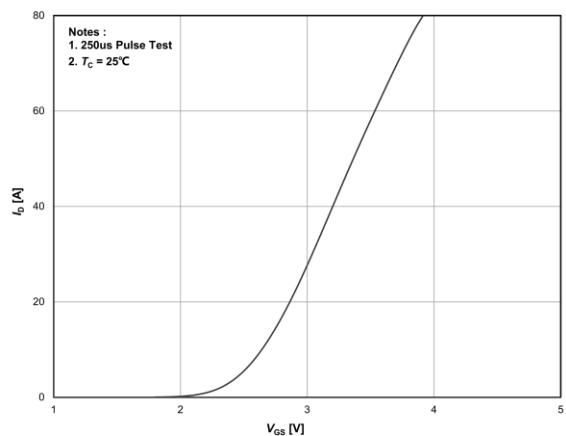


Figure 2. Transfer Characteristics

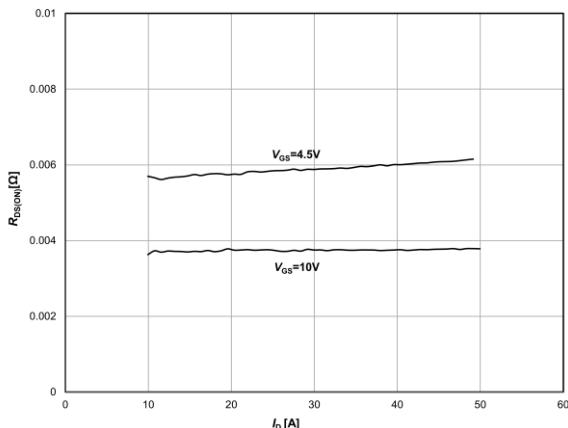


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

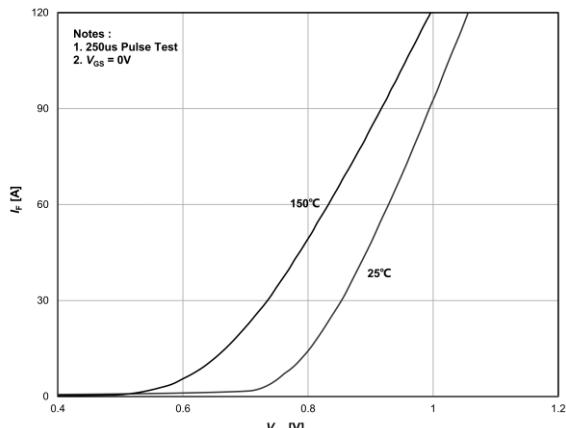


Figure 4. Body Diode Forward Voltage Variation with Current

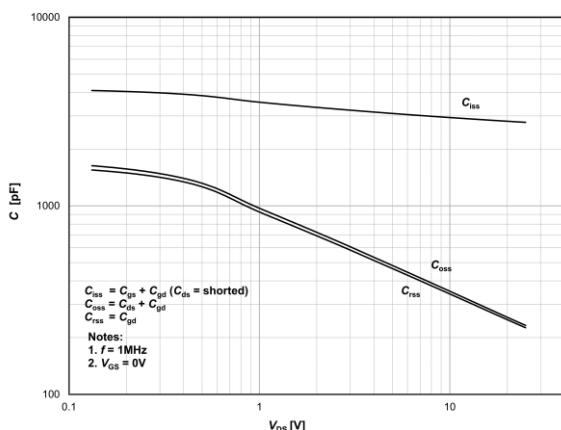


Figure 5. Capacitance Characteristics

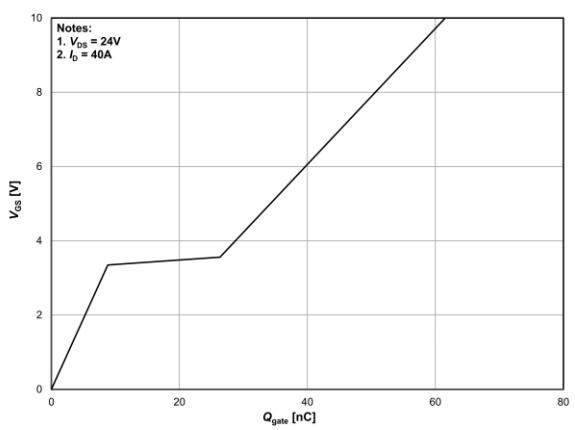


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

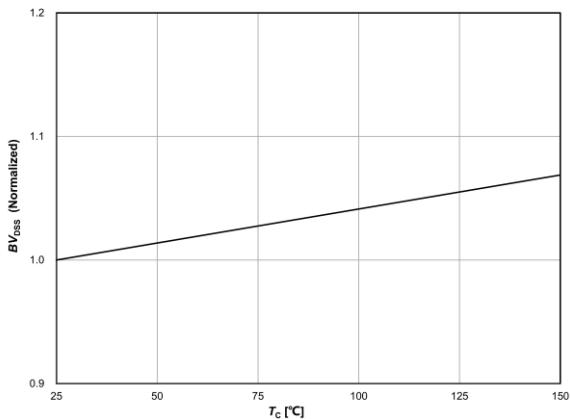


Figure 7. Breakdown Voltage Variation vs Temperature

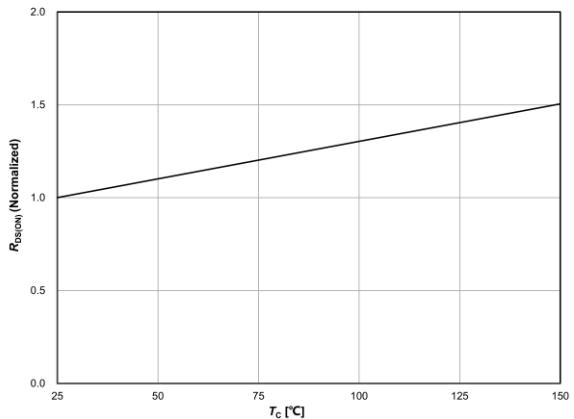


Figure 8. On-Resistance Variation vs Temperature

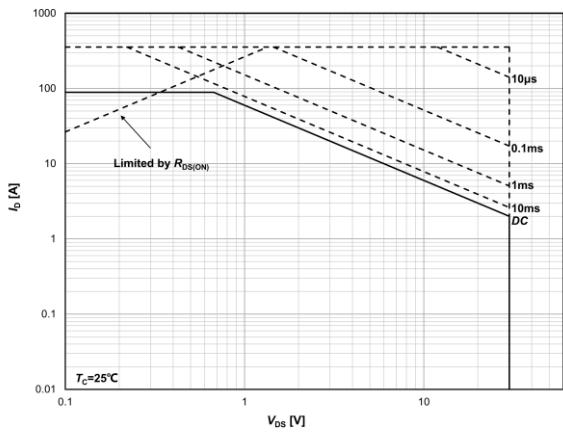


Figure 9. Maximum Safe Operating Area³⁾

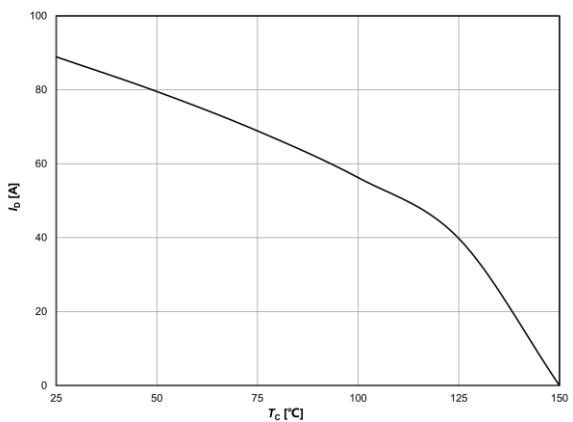


Figure 10. Maximum Drain Current vs Case Temperature

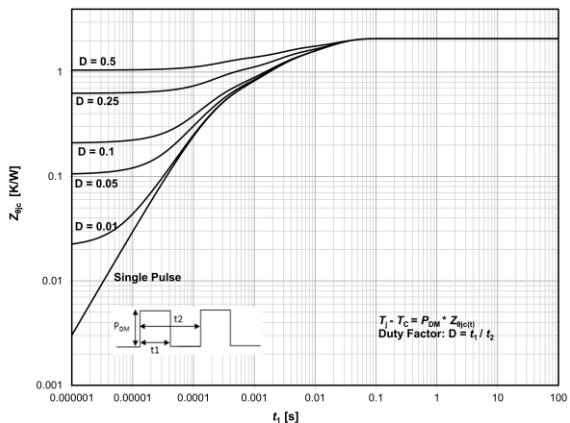
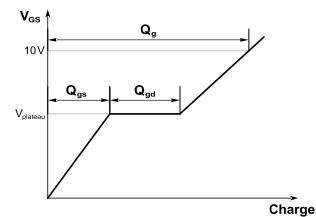
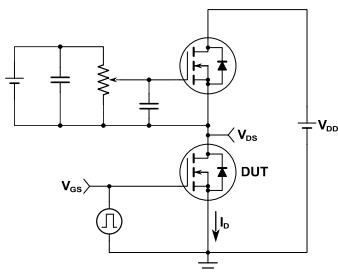
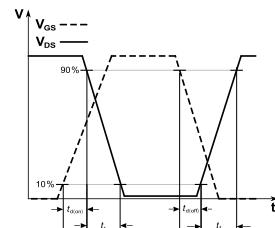
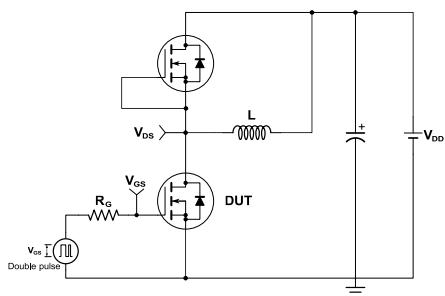


Figure 11. Transient Thermal Response Curve

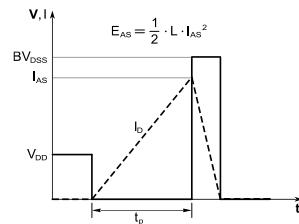
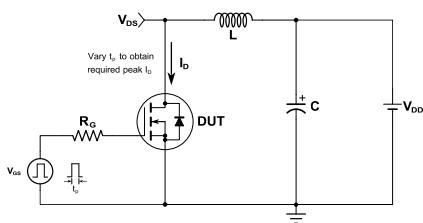
Test Circuits and waveforms



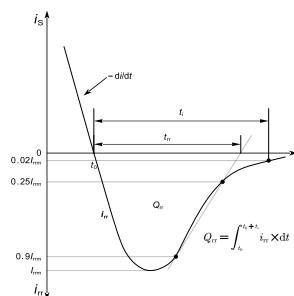
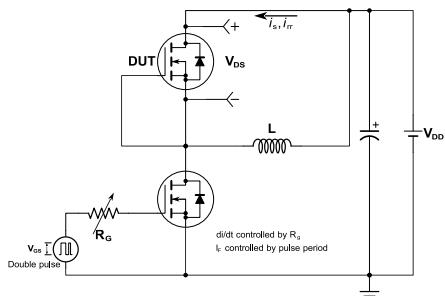
Gate charge test circuit & waveform



Switching times for inductive load test circuit & waveform

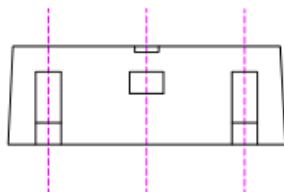
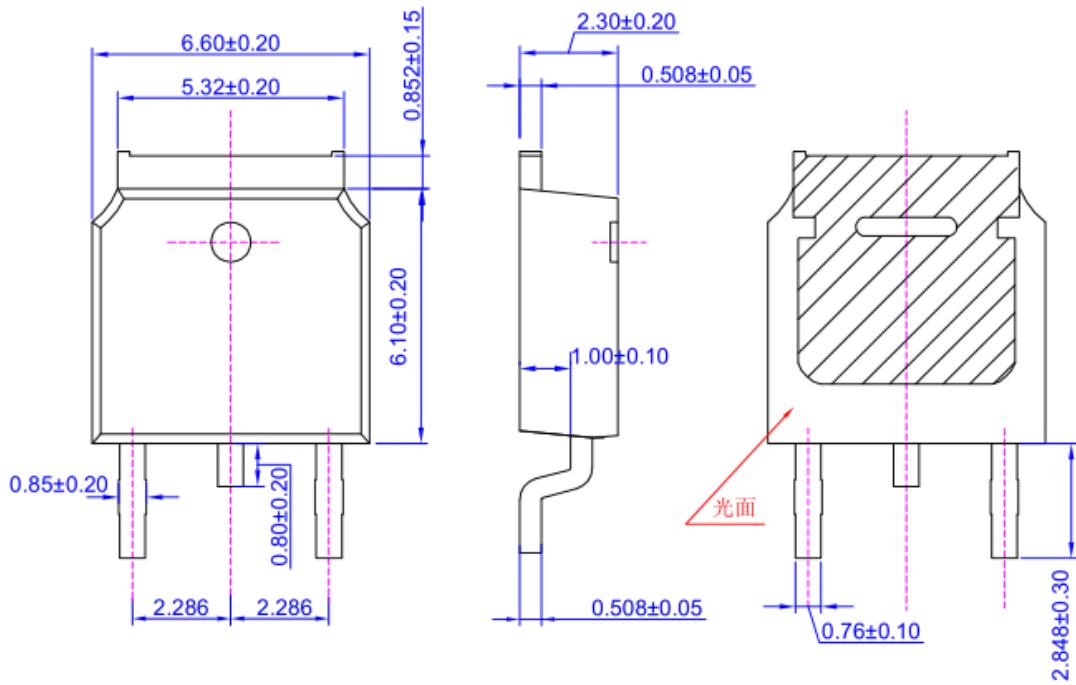


Unclamped inductive load test circuit & waveform



Diode characteristics test circuit & waveform

TO-252 OUTLINE



NOTE:

- 1The plastic package is not marked as smooth surfaceRa=0.1;Subglossy surfaceRa=0.8
- 2.Undeclared tolerance±0.25,Unmarked filletRmax=0.25

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