

SLD3090T

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.

Application

- PWM Application
- Load Switch
- Power Management

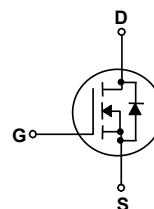
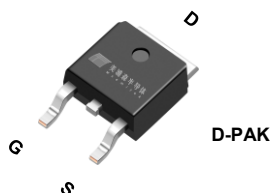
Features

- N-Channel:30V 80A

$$R_{DS(on)Typ} = 4.0m\Omega @ V_{GS} = 10V$$

$$R_{DS(on)Typ} = 7.0m\Omega @ V_{GS} = 4.5V$$

- Very Low On-resistance $R_{DS(on)}$
- Low C_{rss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

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

Symbol	Parameter	SLD3090T	Units
V_{DSS}	Drain-Source Voltage	30	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$)	80	A
	- Continuous ($T_C = 100^\circ\text{C}$)	45	A
I_{DM}	Drain Current - Pulsed (Note 1)	320	A
V_{GSS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	81	mJ
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	83	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.5	$^\circ\text{C/W}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	260	$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Package Marking

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
SLD3090T	SLD3090T	D-Pak	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	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.0	1.6	2.2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$	--	4.0	5.0	$\text{m}\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 20\text{ A}$	-	7.0	9.0	

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1970	-	pF
C_{oss}	Output Capacitance		--	215	-	pF
C_{rss}	Reverse Transfer Capacitance		--	178	-	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V},$ $R_G = 2.7\Omega, I_D = 30\text{ A}$ (Note 3)	--	20	--	ns
t_r	Turn-On Rise Time		--	15	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	60	--	ns
t_f	Turn-Off Fall Time		--	10	--	ns
Q_g	Total Gate Charge	$V_{DS} = 15\text{ V}, I_D = 30\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 3)	--	37.3	--	nC
Q_{gs}	Gate-Source Charge		--	5.8	--	nC
Q_{gd}	Gate-Drain Charge		--	7.7	--	nC

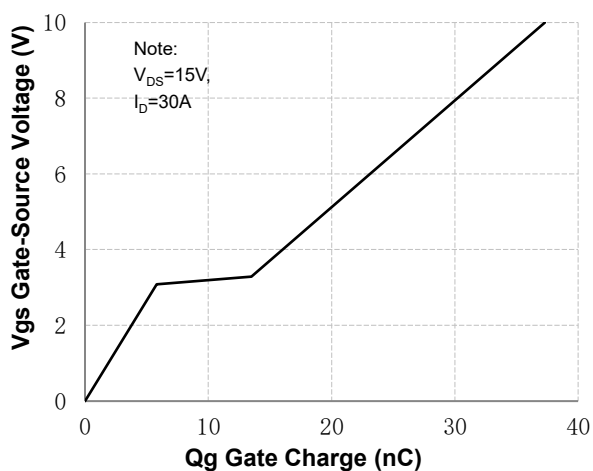
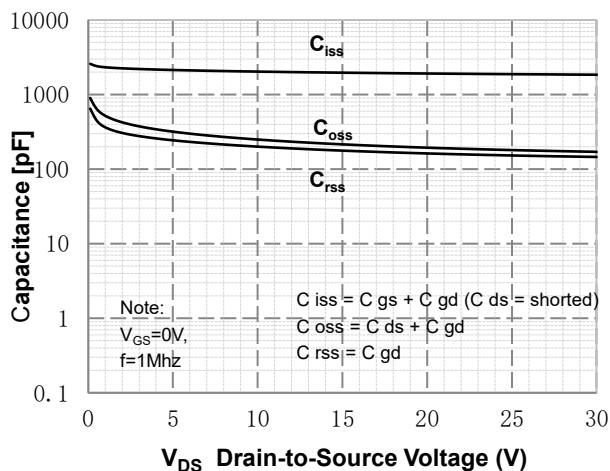
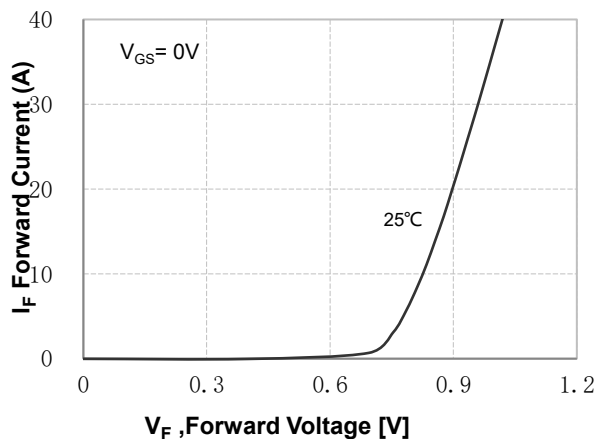
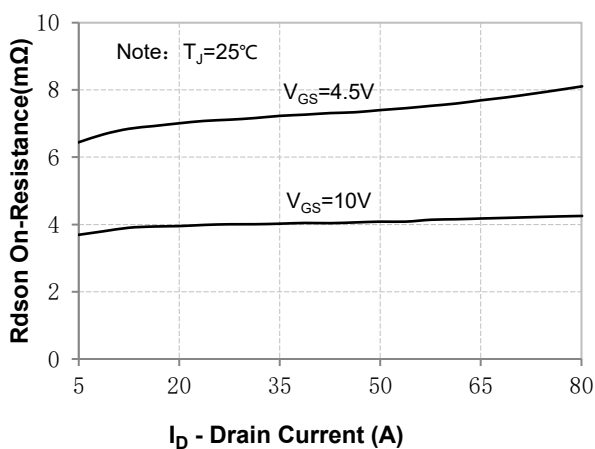
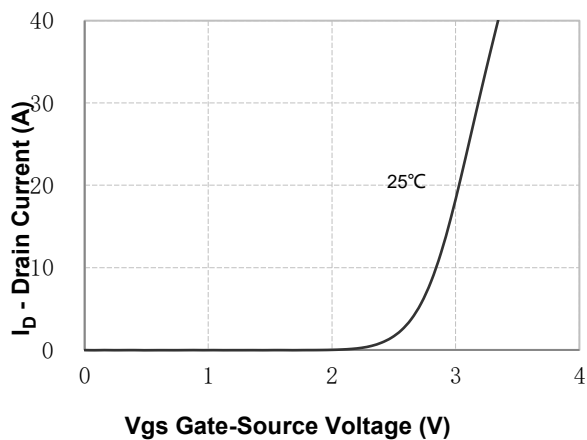
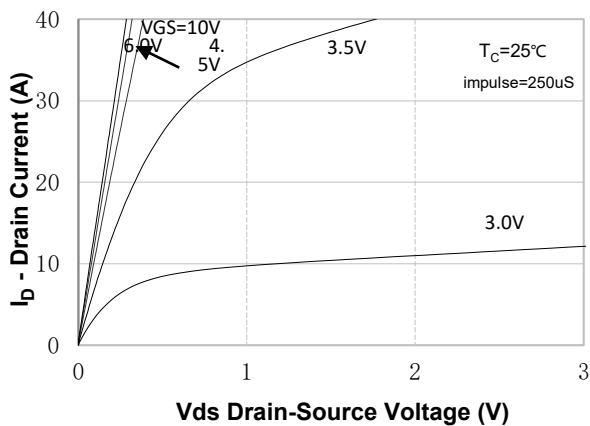
Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current	--	--	80	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	--	--	320	A
V_{SD}	Drain to Source Diode Forward Voltage, $V_{GS} = 0\text{ V}, I_{SD} = 30\text{ A}, T_J = 25^\circ\text{C}$	--	--	1.2	V
t_{rr}	Reverse Recovery Time & $T_J = 25^\circ\text{C}, I_F = 80\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	--	32	--	nS
Q_{rr}	Reverse Recovery Charge & $T_J = 25^\circ\text{C}, I_F = 80\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$	--	12	--	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J = 25^\circ\text{C}, V_{DD} = 15\text{ V}, V_G = 10\text{ V}, R_G = 25\Omega, L = 0.5\text{ mH}$,
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$

N- Channel Typical Characteristics



N- Channel Typical Characteristics (Continued)

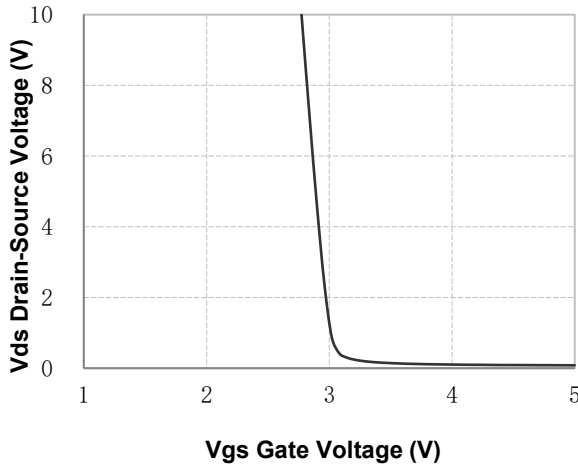


Figure 7. V_{ds} Drain-Source Voltage vs Gate Voltage

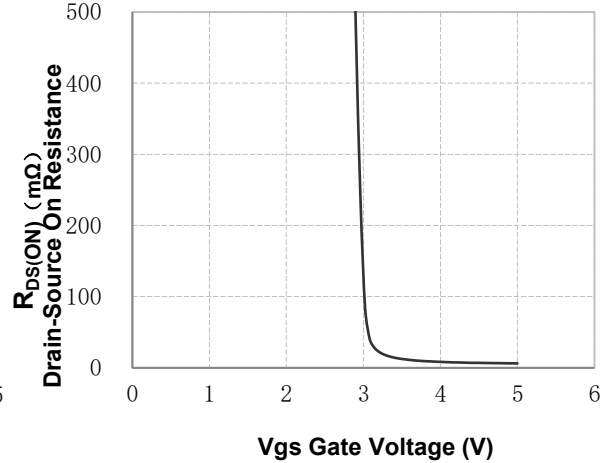


Figure 8. On-Resistance vs Gate Voltage

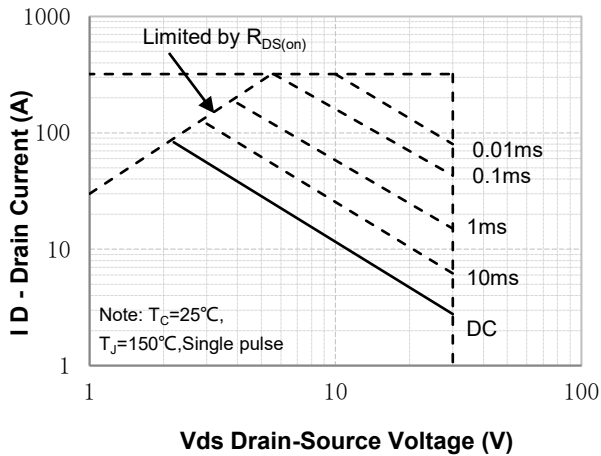


Figure 9. Maximum Safe Operating Area

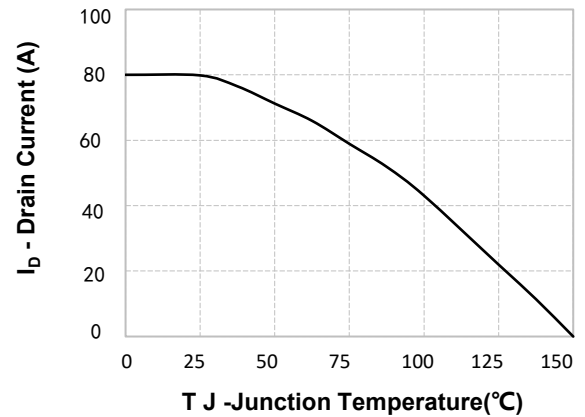


Figure 10. Maximum Continuous Drain Current vs Temperature

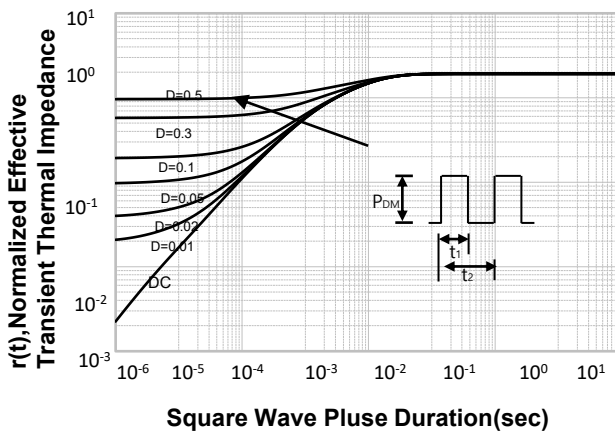
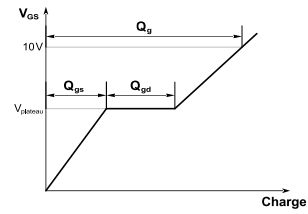
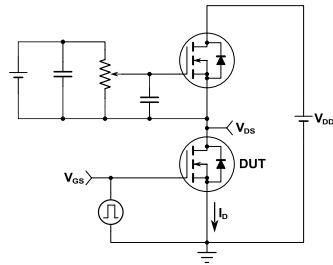
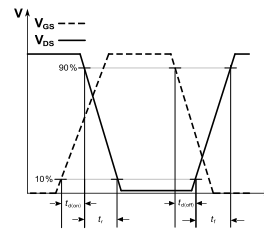
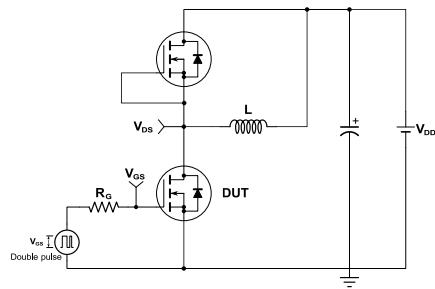


Figure 11. Transient Thermal Response Curve

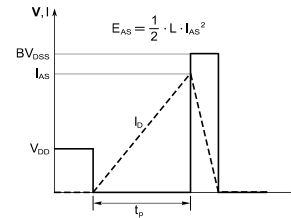
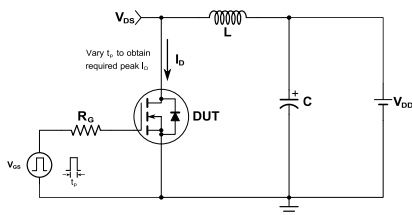
Test Circuits and waveforms



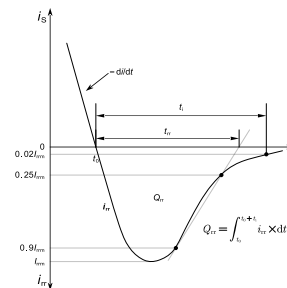
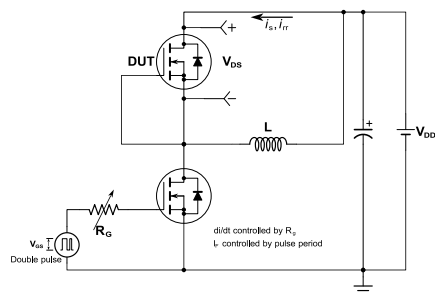
Gate charge test circuit & waveform



Switching times for inductive load test circuit & waveform



Unclamped inductive load test circuit & waveform



Diode characteristics test circuit & waveform

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