美浦森半导体
Msemitek

RoHS
LEAD FREE

SLS20N03T
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 20A
  $R_{DS(on)Typ}$= 10mΩ@VGS = 10 V
  $R_{DS(on)Typ}$= 14.8mΩ@VGS =4.5 V
- Very Low On-resistance $R_{DS(ON)}$
- Low Crss
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

SOP-8

S	1		8	D
S	2		7	D
S	3		6	D
G	4		5	D

D
G
S
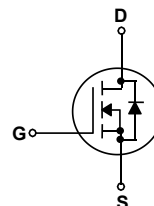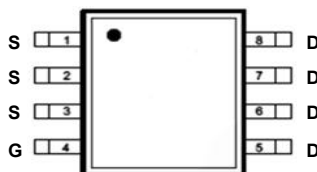
Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter		SLS20N03T	Units
V_{DSS}	Drain-Source Voltage		30	V
I_D	Drain Current - Continuous (T_C = 25℃)		20	A
	- Continuous (T_C = 100℃)		13	A
I_{DM}	Drain Current - Pulsed (Note 1)		80	A
V_{GSS}	Gate-Source Voltage		±20	V
E_{AS}	Single Pulsed Avalanche Energy		52	mJ
P_D	Power Dissipation (T_C = 25℃)		3	W
$R_{θJC}$	Thermal Resistance, Junction to Case		42	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300	℃

* Drain current limited by maximum junction temperature.

Package Marking

Part Number	Top Marking	Package	Packing Method	MOQ	QTY
SLS20N03T	SLS20N03T	SOP-8	Tape & Reel	3000	60000

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =30 V, V_{GS} = 0 V	--	--	1	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20 V, V_{DS} = 0 V	--	--	-100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 uA	1.0	1.6	2.2	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} =10 V, I_D = 20A	--	10	14	mΩ
		V_{GS} =4.5 V, I_D = 10A	--	14.8	19	

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_{iss}	Input Capacitance	V_{DS} = 15 V, V_{GS} = 0 V, f = 1.0 MHz	--	865	-	pF
C_{oss}	Output Capacitance		--	105	-	pF
C_{rss}	Reverse Transfer Capacitance		--	86	-	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$t_{d(on)5}$	Turn-On Delay Time	V_{GS}=10V, V_{DS}=15V, R_L = 3Ω ,I_D=10A Tj=25℃	--	5	--	ns
t_r	Turn-On Rise Time		--	4	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	22	--	ns
t_f	Turn-Off Fall Time		--	6	--	ns
Q_g	Total Gate Charge	V_{DS}=15V, I_D =10A, V_{GS} = 10V	--	17.2	--	nC
Q_{gs}	Gate-Source Charge		--	2.7	--	nC
Q_{gd}	Gate-Drain Charge		--	4.0	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter		Min	Typ	Max	Units
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	20	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	80	A
V_{SD}	Drain to Source Diode Forward Voltage,V_{GS} = 0V, I_{SD} =10A,T_J = 25℃		--	--	1.2	V

Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T_J =25℃, V_{DD} =15V, V_G =5V, R_G =25Ω, L=0.5mH, I_{AS}=34A
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

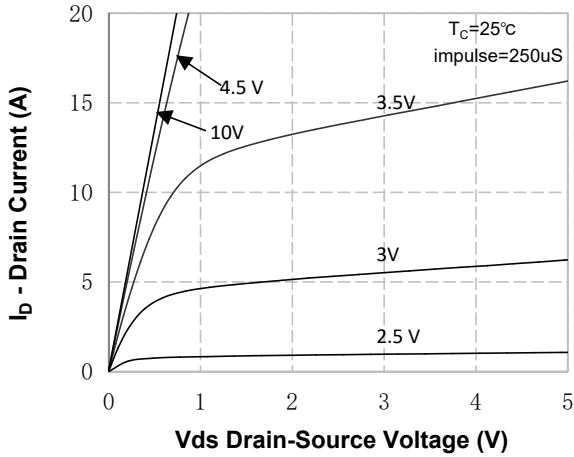# N- Channel Typical Characteristics
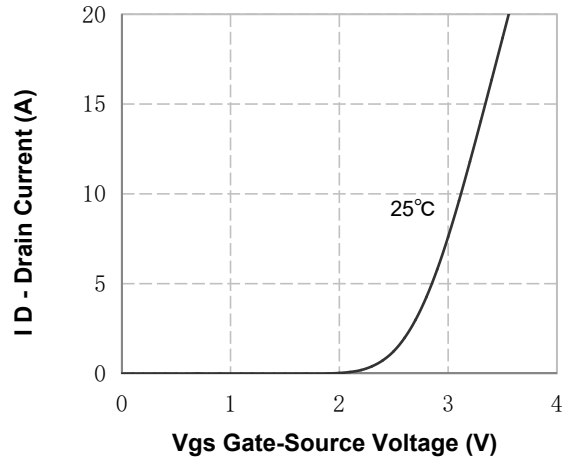

Figure 1. On-Region Characteristics
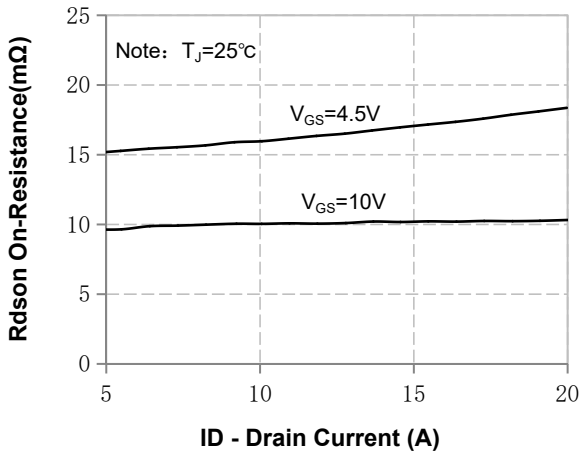

Figure 2. Transfer Characteristics

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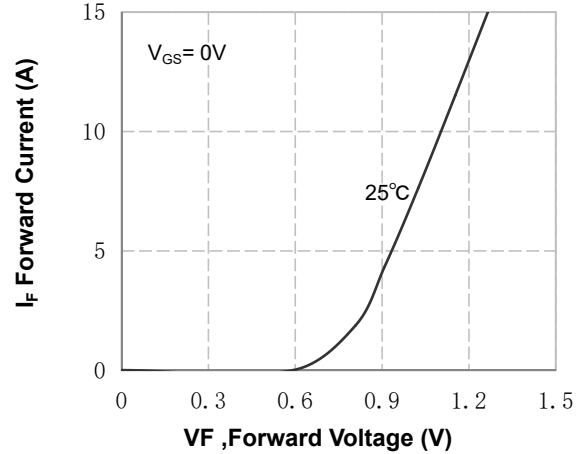Drain Current and Gate Voltage

Figure 4. Body Diode Forward Voltage
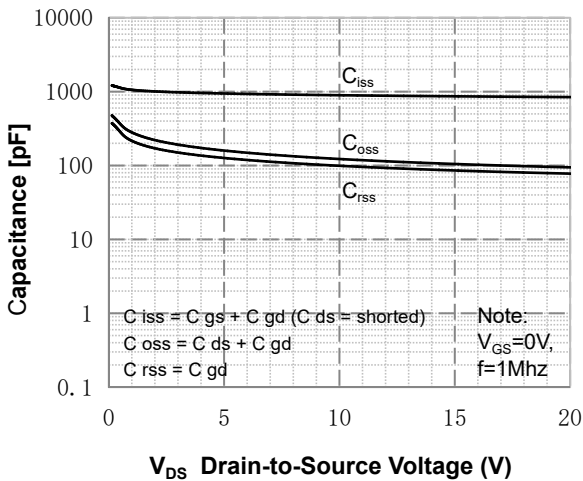Variation with Source Current
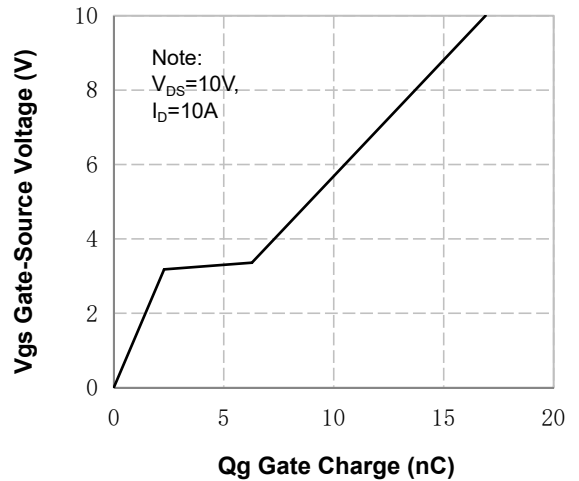

Figure 5. Capacitance Characteristics

Figure 6. Gate Charge Characteristics

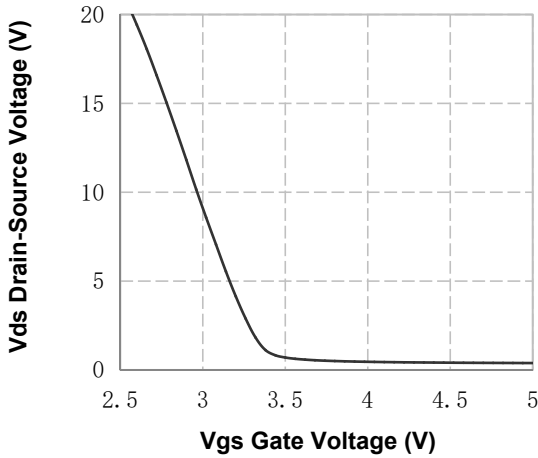# N- Channel Typical Characteristics (Continued)

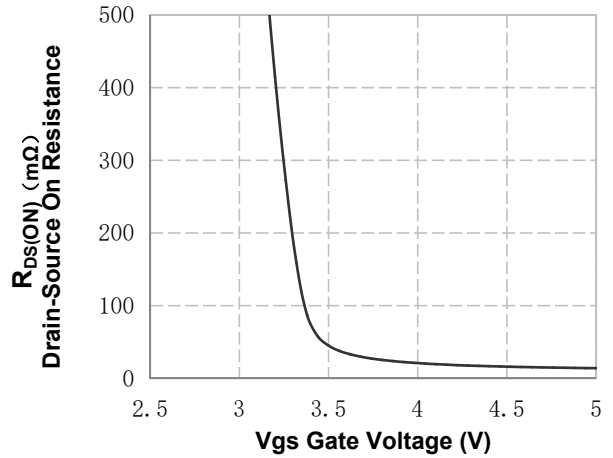
Figure 7.   Vds Drain-Source Voltage vs Gate Voltage

Figure 8. On-Resistance vs Gate Voltage

Limited by $R_{DS(on)}$

0.01ms
0.1ms
1ms
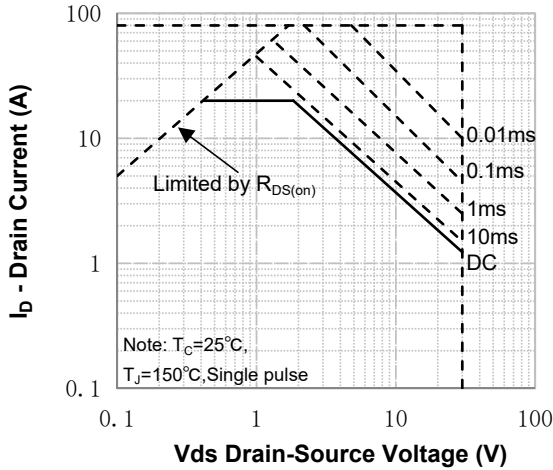10ms
DC

Note: T_C=25℃,
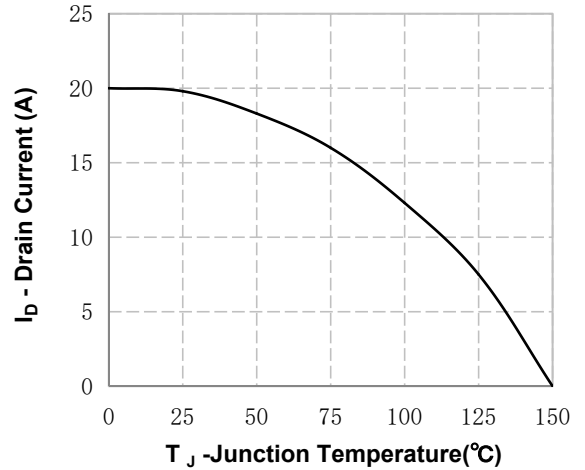T_J=150℃,Single pulse

Figure 9. Maximum Safe Operating Area

Figure 10. Maximum Continuous Drain Current vs Temperature

T_j-T_C=P_{DM}*$Z_{\theta jc(t)}$
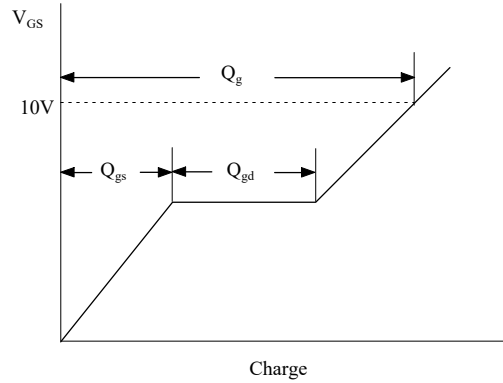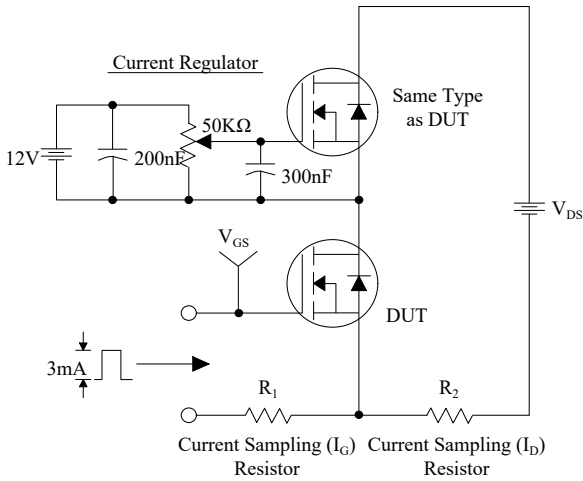Duty Factor: D=t1/t2

In descending order
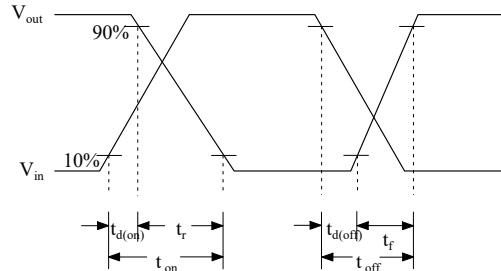D=0.5，0.2，0.1，0.05，0.02，0.01，Single Pulse
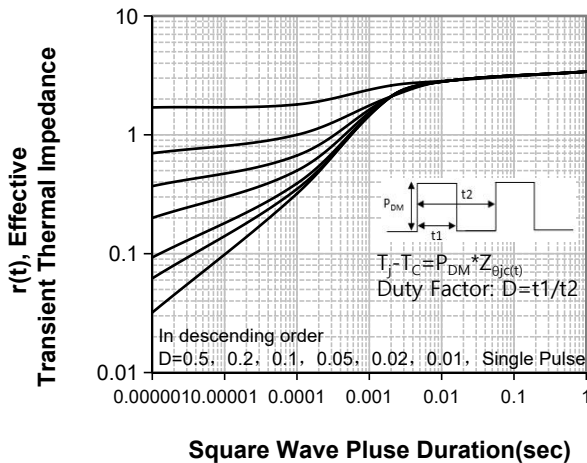
Figure 11. Transient Thermal Response Curve

Gate Charge Test Circuit & Waveform

Current Regulator

12V   200nF   50KΩ   300nF

Same Type
as DUT

V_{DS}

V_{GS}

DUT

3mA

R_1 R_2

Current Sampling (I_G)   Current Sampling (I_D)
Resistor   Resistor

V_{GS}

10V

Q_g

Q_{gs} Q_{gd}

Charge

Resistive Switching Test Circuit & Waveforms

V_{out} R_L

V_{in}

V_{DD}
(0.5 rated V_{DS})

R_G

DUT

10V

V_{out} 90%

V_{in} 10%

$t_{d(on)}$ t_r $t_{d(off)}$ t_f
t_{on} t_{off}
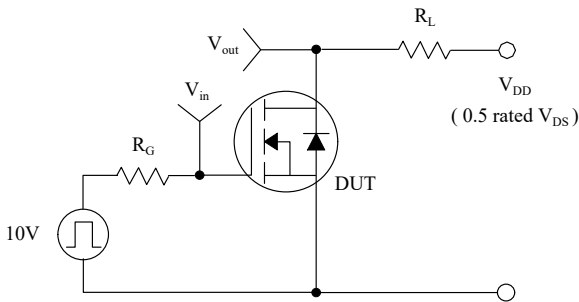
Unclamped Inductive Switching Test Circuit & Waveforms

L_L

V_{DS}

Vary t_p to obtain
required peak I_D

I_D

R_G

C V_{DD}

DUT

10V

t_p

$$E_{AS} = \frac{1}{2} L_L I_{AS}^2$$

BV_{DSS}
I_{AS}

$I_D(t)$

V_{DD}

$V_{DS}(t)$

t_p Time
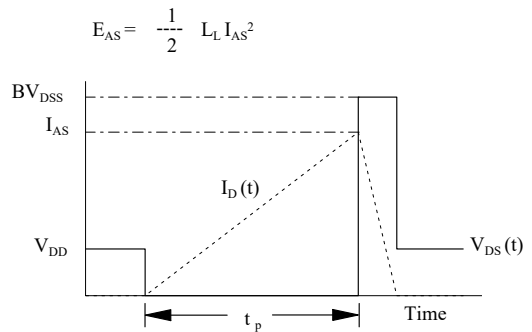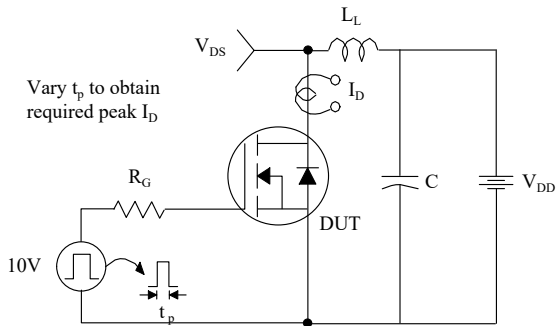
Peak Diode Recovery dv/dt Test Circuit & Waveforms

DUT

V_{DS}

I_S

L

V_{GS}

Driver

R_G

Same Type
as DUT

V_{DD}

V_{GS}

• dv/dt controlled by R_G
• I_{SD} controlled by pulse period

V_{GS}
(Driver)

$$D = \frac{\text{Gate Pulse Width}}{\text{Gate Pulse Period}}$$

10V

I_S
(DUT)

I_{FM} , Body Diode Forward Current

di/dt

I_{RM}

Body Diode Reverse Current

V_{DS}
(DUT)

Body Diode Recovery dv/dt

V_f

V_{DD}

Body Diode
Forward Voltage Drop
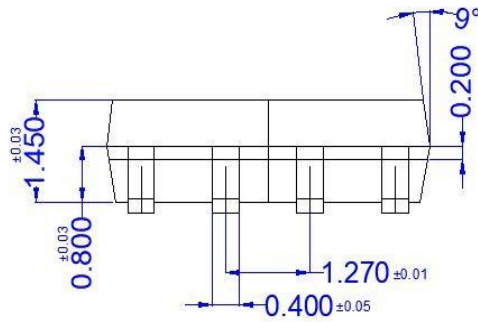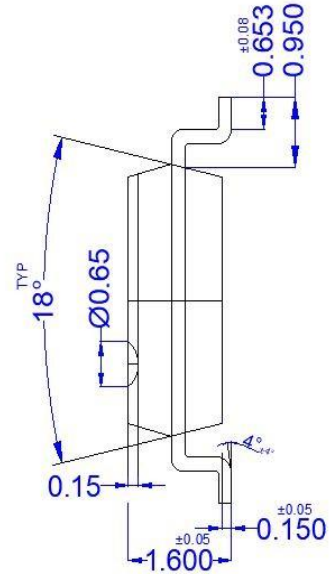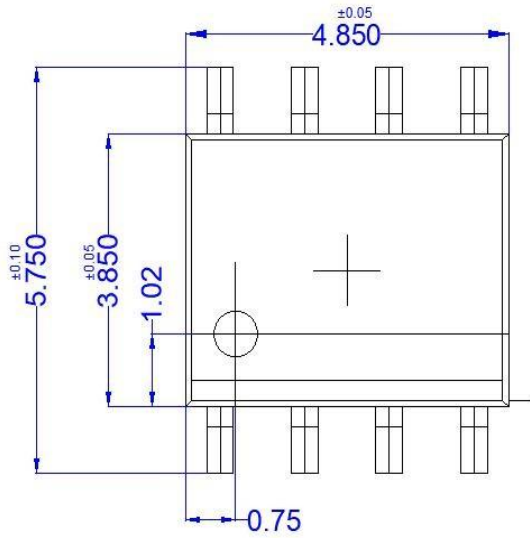
SOP-8 OUTLINE

NAME	SOP-8 OUTLINE	UNIT	mm	DESIGNED	Shawn	THIRD ANGLE SYSTEM
DWGNO		PAGE	1 OF 1	CHECKED		
VERSION	Ver1.0	ISSUE DATE		APPROVED		

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