



SLB5N65S / SLI5N65S

650V N-Channel MOSFET



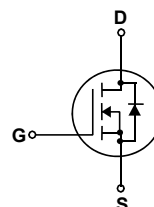
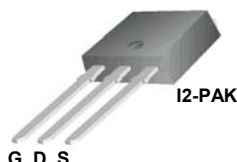
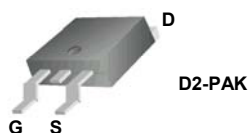
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General Description

This Power MOSFET is produced using Maple semi's advanced planar stripe DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction based on half bridge topology.

Features

- 4.5A, 650V, $R_{DS(on)} = 2.5\Omega @ V_{GS} = 10V$
- Low gate charge (typical 13.3nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings

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

Symbol	Parameter	SLB5N65S	SLI5N65S	Units
V_{DSS}	Drain-Source Voltage	650		V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$)	4.5		A
	- Continuous ($T_C = 100^\circ C$)	2.5		A
I_{DM}	Drain Current - Pulsed (Note 1)	16		A
V_{GSS}	Gate-Source Voltage	± 30		V
EAS	Single Pulsed Avalanche Energy (Note 2)	128		mJ
I_{AR}	Avalanche Current (Note 1)	4.5		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	3.5		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5		V/ns
P_D	Power Dissipation ($T_C = 25^\circ C$)	104	104	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	300		$^\circ C$

Thermal Characteristics

Symbol	Parameter	Max		Units
		SLB5N65S	SLI5N65S	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.20	1.20	$^\circ C/W$
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	62.5	62.5	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	110	110	$^\circ C/W$

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 uA	650	--	--	V
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 250 uA, Referenced to 25°C	--	0.6	--	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650 V, V _{GS} = 0 V	--	--	25	uA
		V _{DS} = 520 V, T _C = 125°C	--	--	250	uA
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 30 V, V _{DS} = 0 V	--	--	100	nA
I _{GSSR}	Gate-Body Leakage Current, Reverse	V _{GS} = -30 V, V _{DS} = 0 V	--	--	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250 uA	2.0	--	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 2.0 A	--	1.8	2.5	Ω
g _{FS}	Forward Transconductance	V _{DS} = 40 V, I _D = 2.0 A (Note 4)	--	2.5	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz	--	590	--	pF
C _{oss}	Output Capacitance		--	48	--	pF
C _{rss}	Reverse Transfer Capacitance		--	5	--	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} = 300 V, I _D = 4.5 A, R _G = 25 Ω (Note 4, 5)	--	23	--	ns
t _r	Turn-On Rise Time		--	33	--	ns
t _{d(off)}	Turn-Off Delay Time		--	61	--	ns
t _f	Turn-Off Fall Time		--	200	--	ns
Q _g	Total Gate Charge	V _{DS} = 480 V, I _D = 4.5A, V _{GS} = 10 V (Note 4, 5)	--	13.3	--	nC
Q _{gs}	Gate-Source Charge		--	3.0	--	nC
Q _{gd}	Gate-Drain Charge		--	4.8	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4.5	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	16	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 4.5 A	--	--	1.4	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = 4.5 A,	--	390	--	ns
Q _{rr}	Reverse Recovery Charge	dl _F / dt = 100 A/us (Note 4)	--	1.5	--	uC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS} = 4.5 \text{ A}, L = 25 \text{ mH}, V_{DD} = 50 \text{ V}, R_G = 25 \Omega$, Starting $T_J = 25^\circ \text{C}$
3. $I_{SD} \leq 4.5 \text{ A}, di/dt \leq 200 \text{ A/us}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ \text{C}$
4. Pulse Test : Pulse width $\leq 300 \mu \text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics

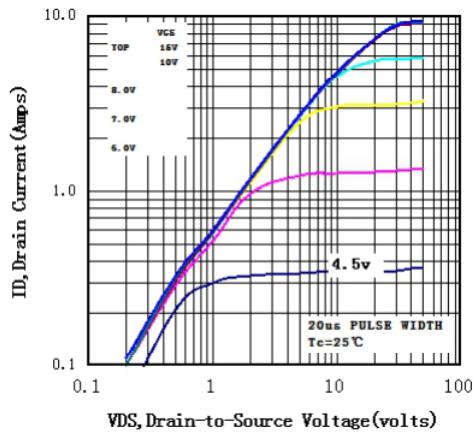


Figure 1. Typical Output Characteristics
 $T_c=25^\circ\text{C}$

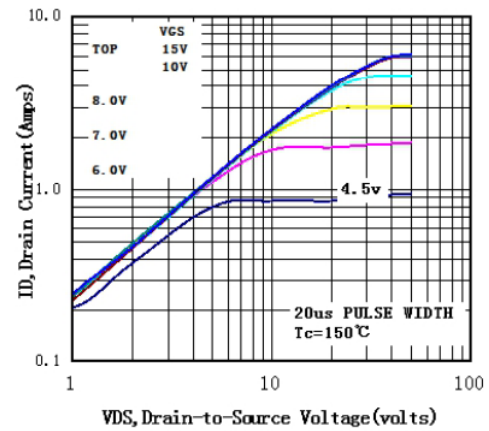


Figure 2. Typical Output Characteristics
 $T_c=150^\circ\text{C}$

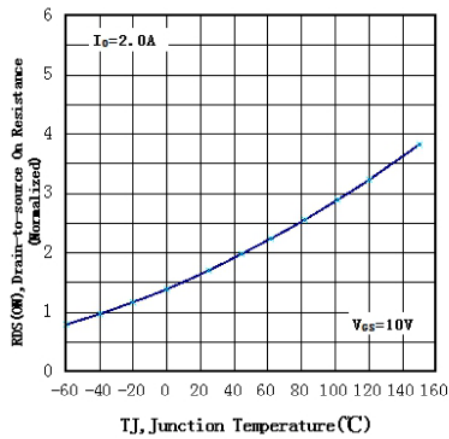


Figure 3. Normalized Resistance VS
Temperature

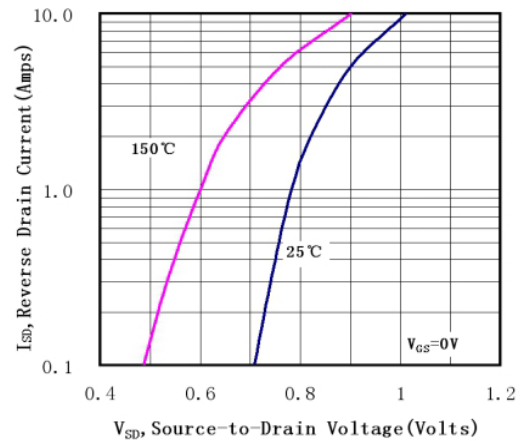


Figure 4. Typical Source-Drain Diode
Forward Voltage

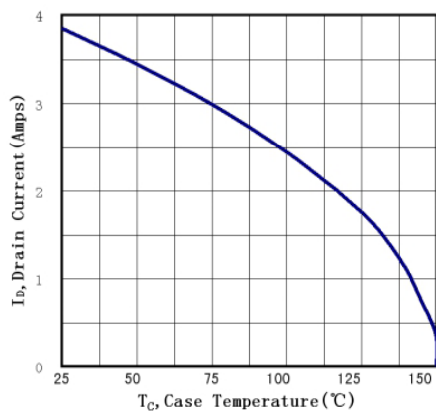


Figure 5. Maximum Current VS
Case Temperature

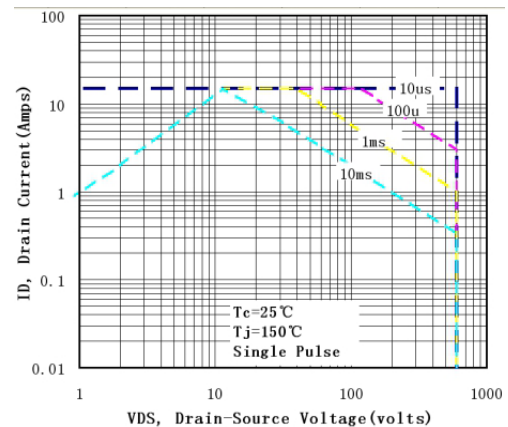
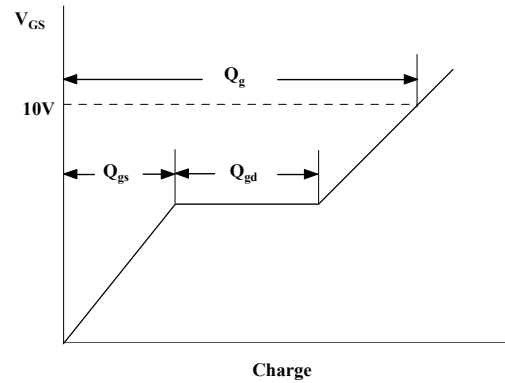
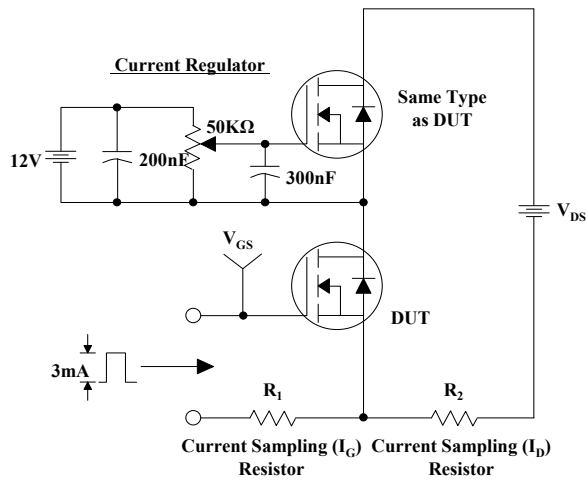
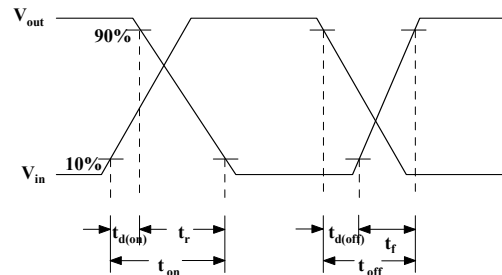
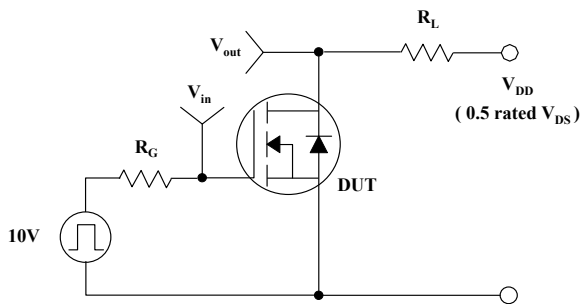


Figure 6-1. Maximum Safe Operating Area

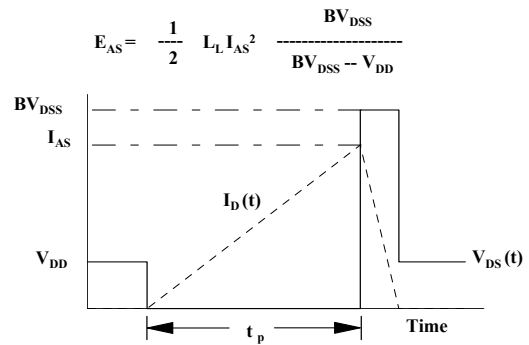
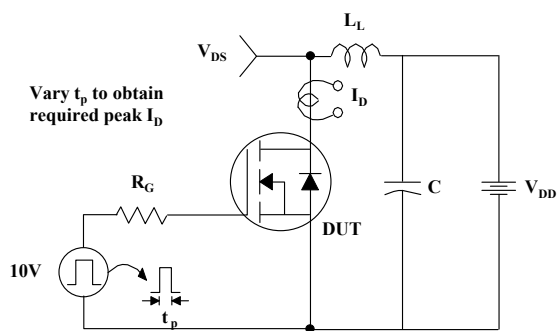
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

