Maplesemi

CB-FET

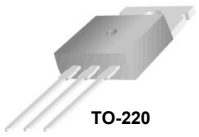
SLP65R950SJ / SLF65R950SJ
650V N-Channel MOSFET

General Description

This Power MOSFET is produced using Maple semi's Advanced Super-Junction 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.
These devices are well suited for AC/DC power conversion in switching mode operation for higher efficiency.

Features

- 5A, 650V, $R_{DS(on)\ typ.}$ = 0.85Ω@V_{GS} = 10 V
- Low gate charge (typical 15nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



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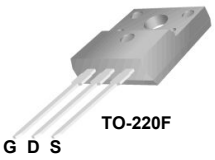

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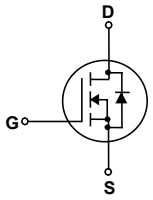


Absolute Maximum Ratings

T_C = 25°C unless otherwise noted

Symbol	Parameter		SLP65R950SJ	SLF65R950SJ	Units
V_{DSS}	Drain-Source Voltage		650		V
I_D	Drain Current - Continuous (T_C = 25℃)		5	5*	A
	- Continuous (T_C = 100℃)		4	4*	A
I_{DM}	Drain Current - Pulsed	(Note 1)	16	16*	A
V_{GSS}	Gate-Source Voltage		±30		V
EAS	Single Pulsed Avalanche Energy	(Note 2)	67.5		mJ
I_{AR}	Avalanche Current	(Note 1)	1		A
E_{AR}	Repetitive Avalanche Energy	(Note 1)	34		mJ
dv/dt	Peak Diode Recovery dv/dt	(Note 3)	4.5		V/ns
P_D	Power Dissipation (T_C = 25℃)		205	35	W
	- Derate above 25℃		1.67	0.3	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.

Thermal Characteristics

Symbol	Parameter	SLP65R950SJ	SLF65R950SJ	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.6	3.6	℃/W
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	62	℃/W

Electrical Characteristics

T_C = 25°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, T_J=25℃	650	--	--	V
		V_{GS} = 0 V, I_D = 250 uA, T_J=150℃	--	700	--	V
$\triangle BV_{DSS}$ / $\triangle T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 uA, Referenced to 25℃	--	0.6	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V	--	--	1	uA
		V_{DS} = 480 V, T_C = 125℃	--	--	10	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	2.5	--	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 2.5A	--	0.85	0.95	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40 V, I_D = 2.5 A (Note 4)	--	8	--	S
R_g	Gate resistance	f = 1.0 MHz, Open drain	--	3.5	--	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	320	--	pF
C_{oss}	Output Capacitance		--	75	--	pF
C_{rss}	Reverse Transfer Capacitance		--	4	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 400 V, I_D = 2.5 A, R_G = 20 Ω (Note 4, 5)	--	18	--	ns
t_r	Turn-On Rise Time		--	40	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	50	--	ns
t_f	Turn-Off Fall Time		--	30	--	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 5 A, V_{GS} = 10 V (Note 4, 5)	--	15	--	nC
Q_{gs}	Gate-Source Charge		--	3	--	nC
Q_{gd}	Gate-Drain Charge		--	6	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	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 = 5 A	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 5 A, dI_F / dt = 100 A/us (Note 4)	--	180	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.5	--	uC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L=60mH, I_{AS}=1.5A, VDD=150V, Starting TJ=25 ℃
3. I_{SD}≤4.5A, di/dt ≤ 200A/us, V_{DD} ≤ BV_{DSS}, Starting TJ = 25 ℃
4. Pulse Test: Pulse width ≤ 300us, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

Typical Performance Characteristics

Typical Characteristics

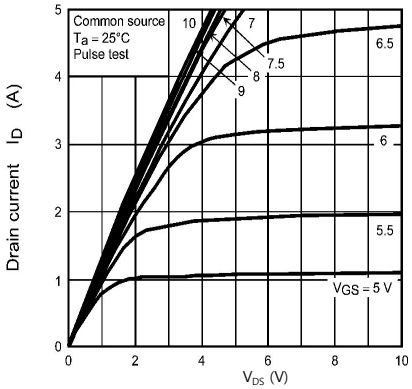


Figure 1: On-Region Characteristics@25°C

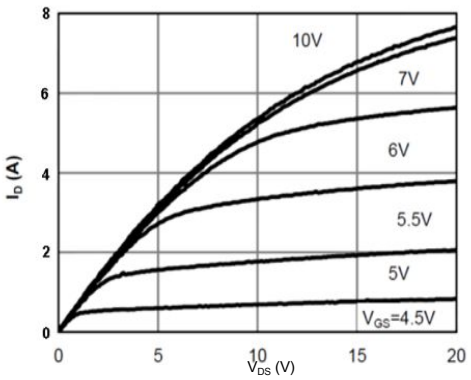


Figure 2: On-Region Characteristics@125°C

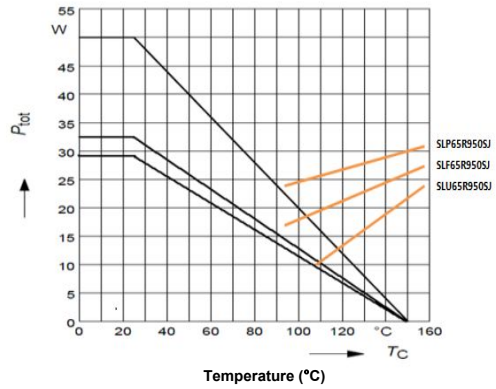


Figure 3: Power Dissipation

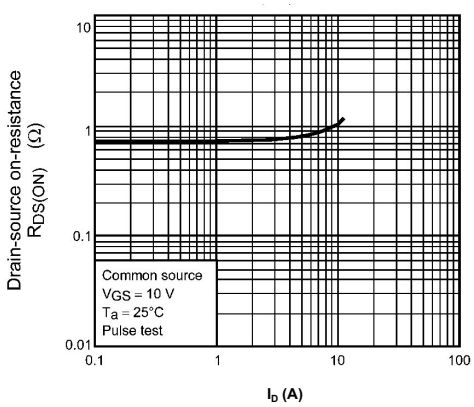


Figure 4: On-Resistance vs. Drain Current and Gate Voltage

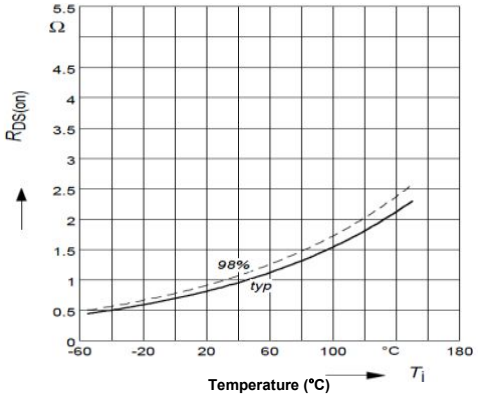


Figure 5: On-Resistance vs. Junction Temperature

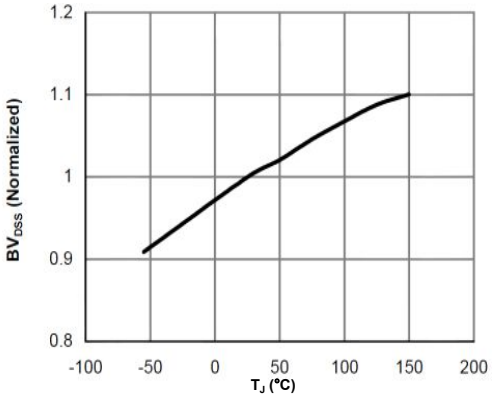


Figure 6: Break Down vs. Junction Temperature

Typical Performance Characteristics

Typical Characteristics

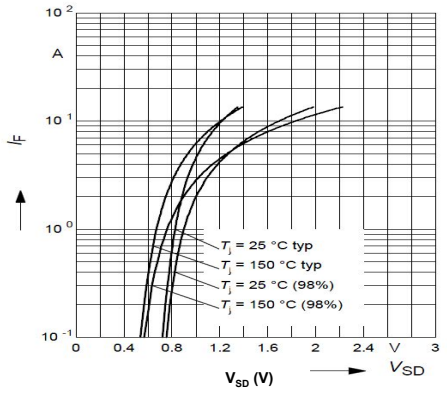


Figure 7: Body-Diode Characteristics

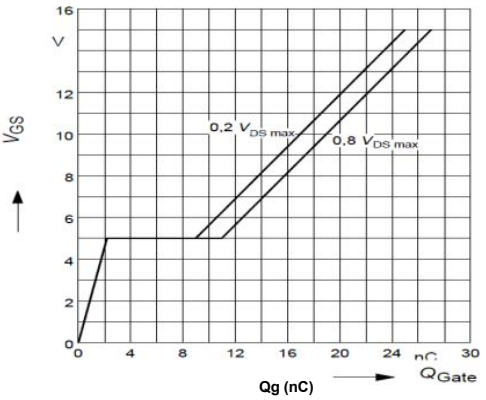


Figure 8: Gate-Charge Characteristics

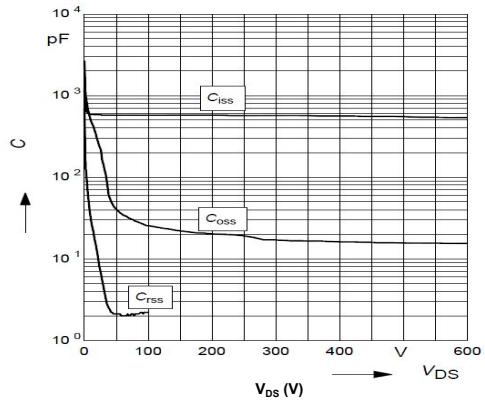


Figure 9: Capacitance Characteristics

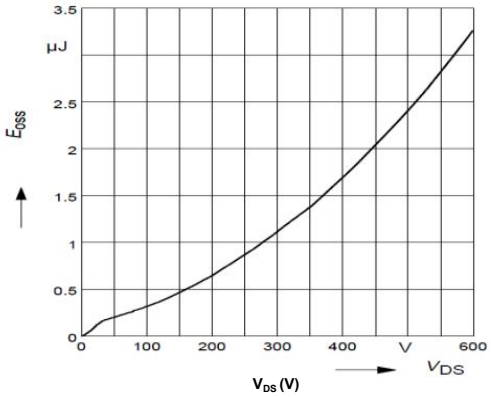


Figure 10: C_{oss} stored Energy

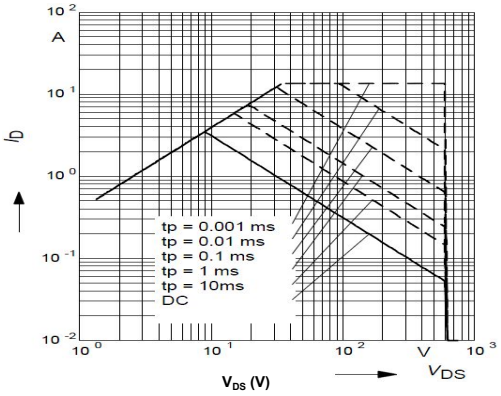


Figure 11: Maximum Forward Biased Safe Operating Area (FullPAK)

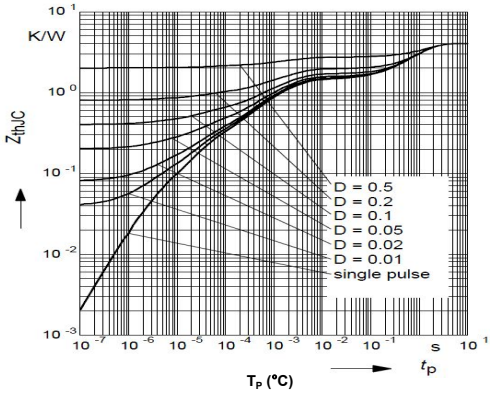


Figure 12: Sing Pulse Power Rating Junction to Case (FullPAK)

Typical Characteristics

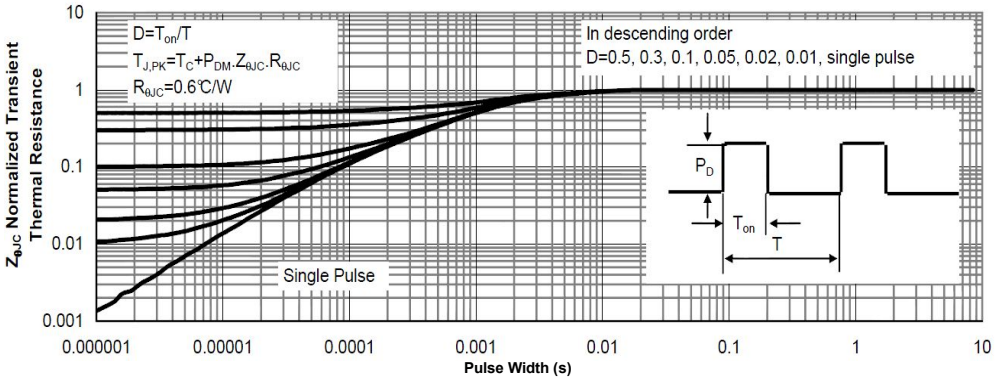


Figure 13: Normalized Maximum Transient Thermal Impedance

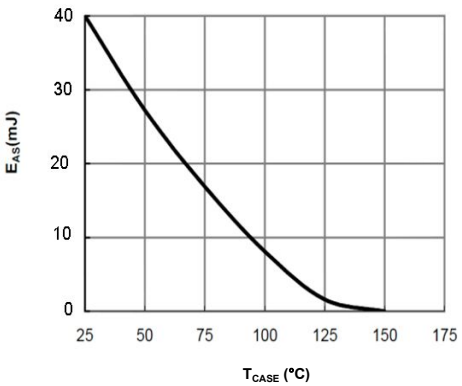


Figure 14: Avalanche energy

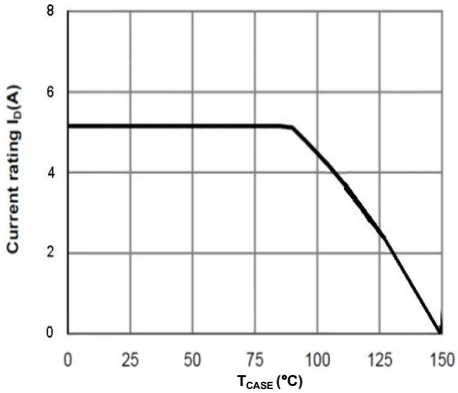


Figure 15: Current De-rating

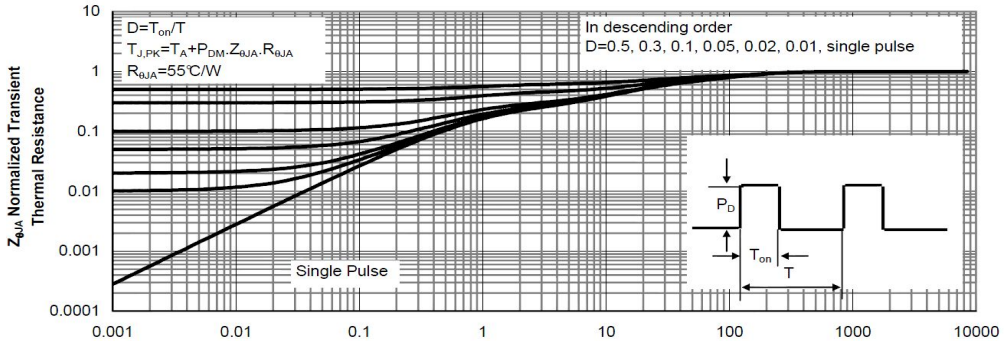
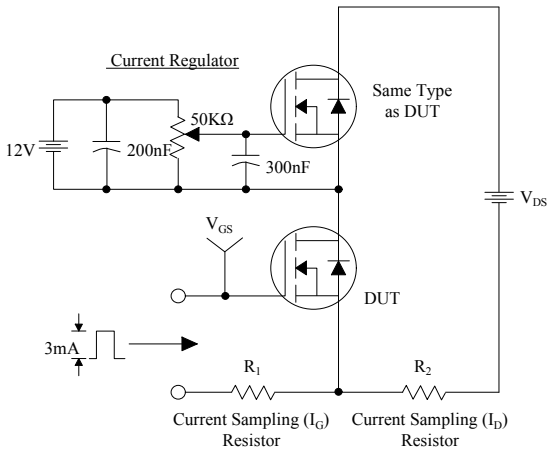
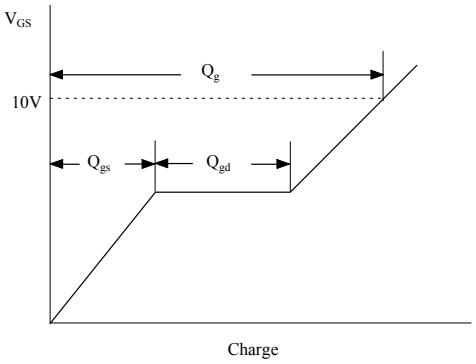


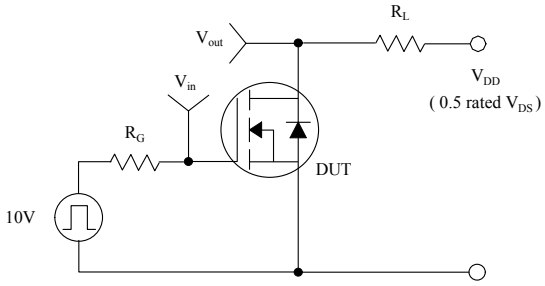
Figure 16: Normalized Maximum Transient Thermal Impedance

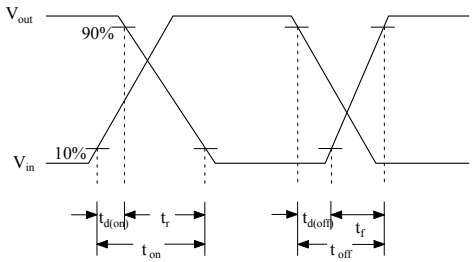
Gate Charge Test Circuit & Waveform



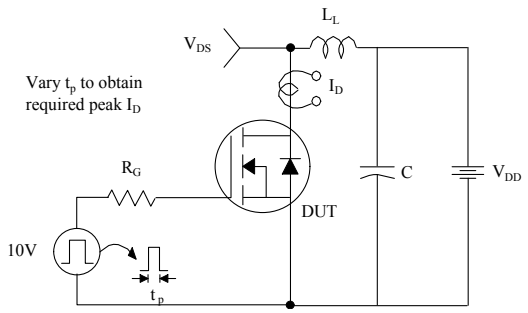


Resistive Switching Test Circuit & Waveforms

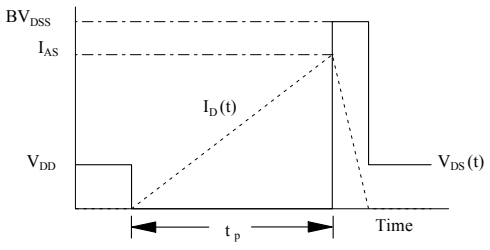




Unclamped Inductive Switching Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L_L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



Peak Diode Recovery dv/dt Test Circuit & Waveforms