

MSB120N08G/MSI120N08G

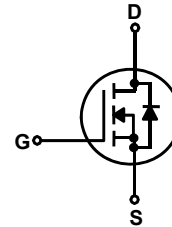
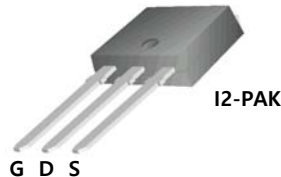
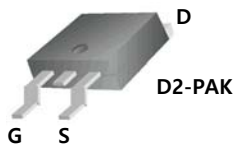
80V N-Channel MOSFET

General Description

This Power MOSFET is produced using Maple semi's advanced technology, which provides high performance in on-state resistance, fast switching performance and excellent quality. MSP120N08G suitable device for Synchronous Rectification For Server and general purpose applications.

Features

- 120A, 80V, $R_{DS(TYP)} = 5.5m\Omega @ V_{GS} = 10V$
- Low gate charge (typical 59 nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	MSB120N08G	MSI120N08G	Units
V_{DSS}	Drain-Source Voltage	80		V
I_D	Drain Current	- Continuous ($T_C = 25^\circ C$)	120	A
		- Continuous ($T_C = 100^\circ C$)	67	A
I_{DM}	Drain Current - Pulsed (Note 1)	420		A
V_{GSS}	Gate-Source Voltage	± 20		V
EAS	Single Pulsed Avalanche Energy (Note 2)	144.5		mJ
I_{AR}	Avalanche Current (Note 1)	120		A
P_D	Power Dissipation ($T_C = 25^\circ C$) - Derate above $25^\circ C$	157		W
		1.26		W/ $^\circ C$
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		$^\circ C$

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	MSB120N08G	MSI120N08G	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.8		$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5		$^\circ C/W$

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	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	80	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	0.1	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 64\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 64\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	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	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 60\text{ A}$	--	5.5	7.0	$\text{m}\Omega$
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 60\text{ A}$ (Note 3)	--	47	--	S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	3841	--	pF
C_{oss}	Output Capacitance		--	652	--	
C_{rss}	Reverse Transfer Capacitance		--	34	--	

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 40\text{ V}, I_D = 60\text{ A},$ $R_G = 3.0\text{ }\Omega$ (Note 3, 4)	--	15.6	--	ns
t_r	Turn-On Rise Time		--	32.7	--	
$t_{d(off)}$	Turn-Off Delay Time		--	24.2	--	
t_f	Turn-Off Fall Time		--	15.1	--	
Q_g	Total Gate Charge	$V_{DS} = 40\text{ V}, I_D = 60\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 3, 4)	--	59.4	--	nC
Q_{gs}	Gate-Source Charge		--	16.5	--	
Q_{gd}	Gate-Drain Charge		--	12.3	--	

Drain-Source Diode Characteristics and Maximum Ratings

V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 60\text{ A}$	--	0.9	1.2	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 60\text{ A},$	--	64.3	--	ns
Q_{rr}	Reverse Recovery Charge	$di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 3)	--	152.7	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS} = 17\text{ A}, L = 1.0\text{ mH}, V_{GS} = 10\text{ V}$, Starting $T_J = 25^\circ\text{C}$
3. Pulse Test : Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Characteristics

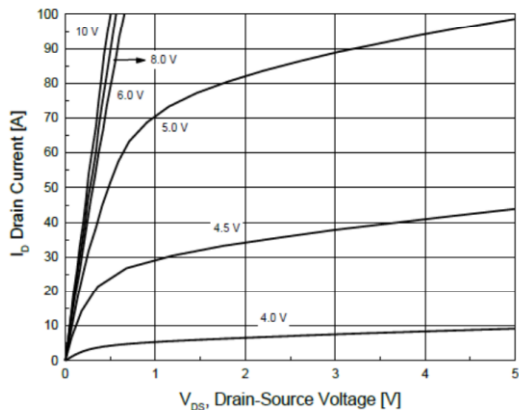


Figure 1. On-Region Characteristics

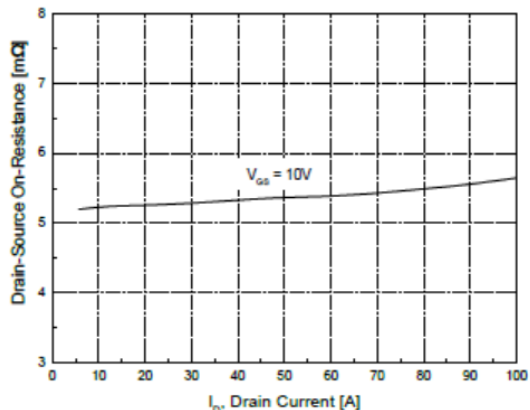


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

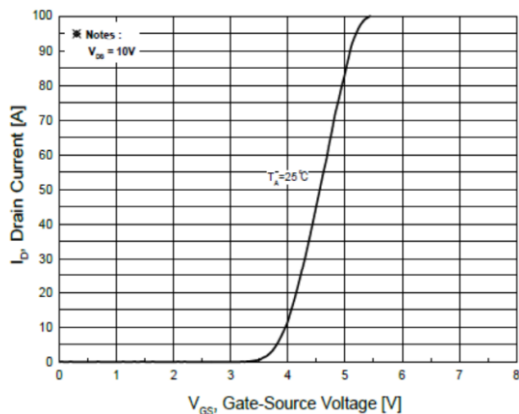


Figure 3. Transfer Characteristics

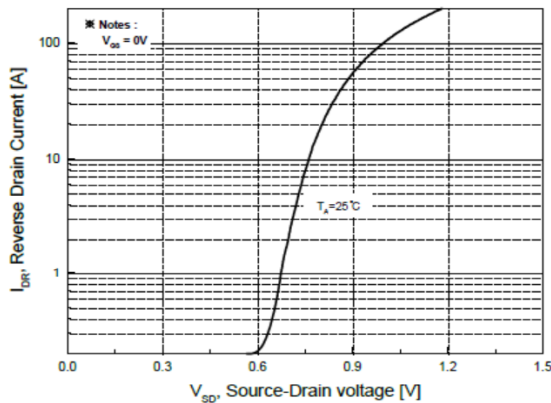


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

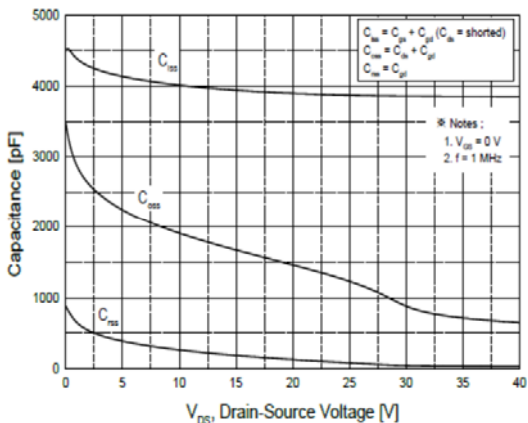


Figure 5. Capacitance Characteristics

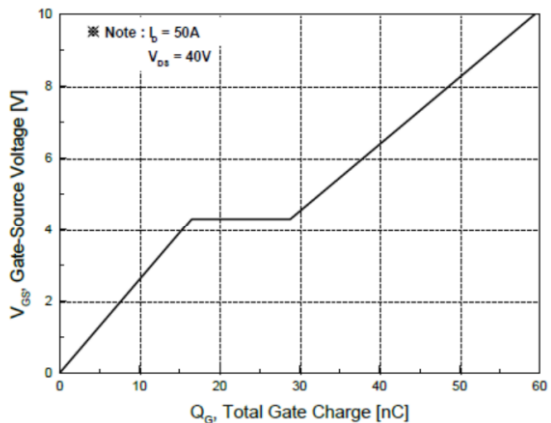


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

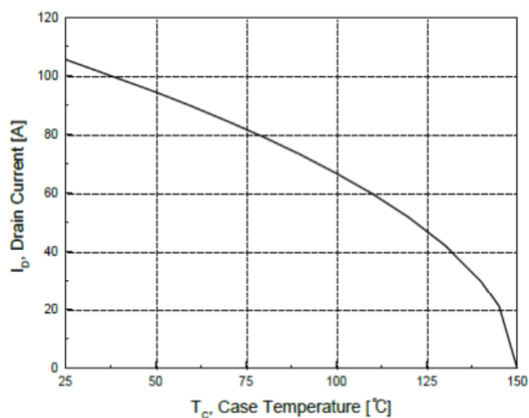


Figure 7. Maximum Drain Current VS Case Temperature

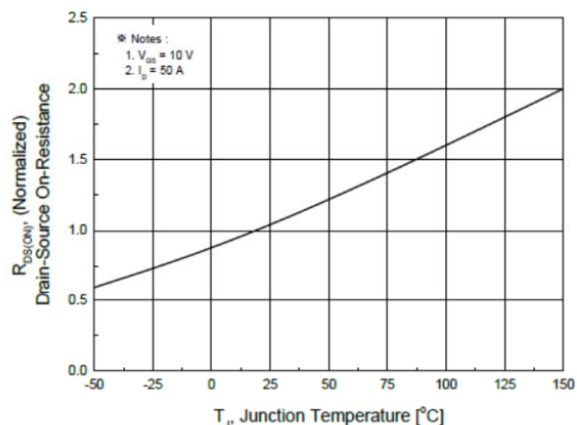


Figure 8. On-Resistance Variation vs Temperature

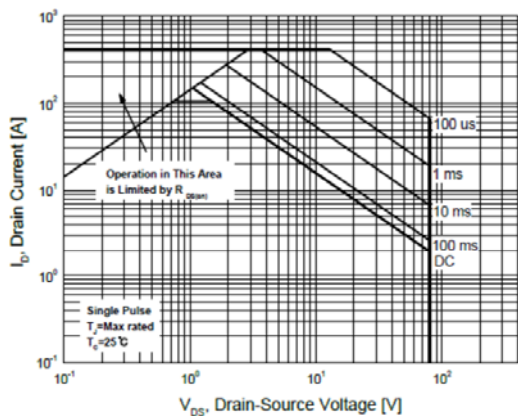


Figure 9. Maximum Safe Operating Area

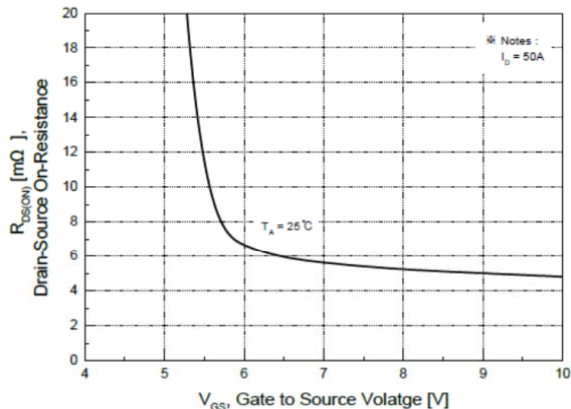


Figure 10. On-Resistance Variation with Gate to Source Voltage

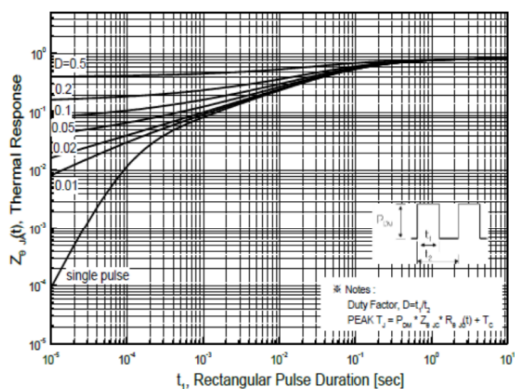
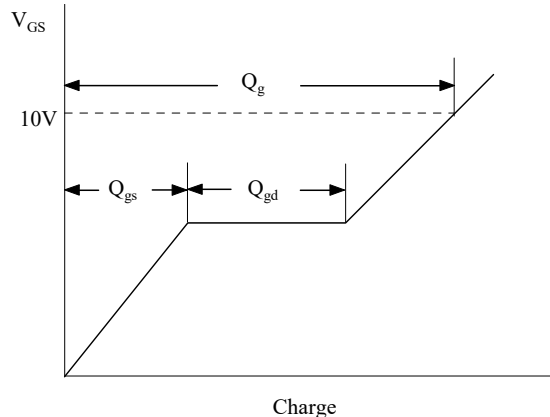
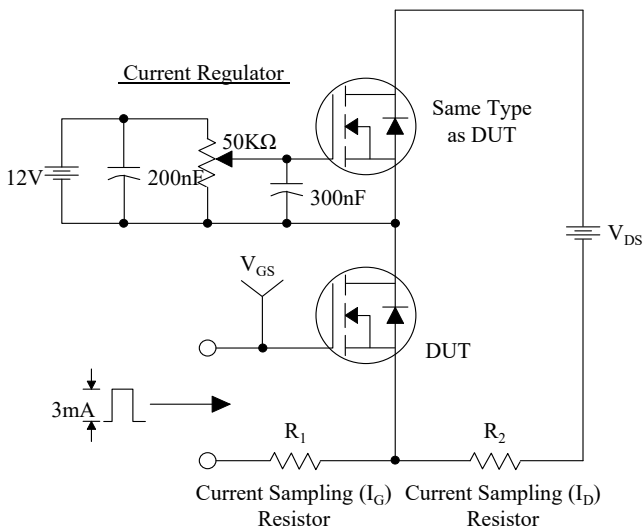
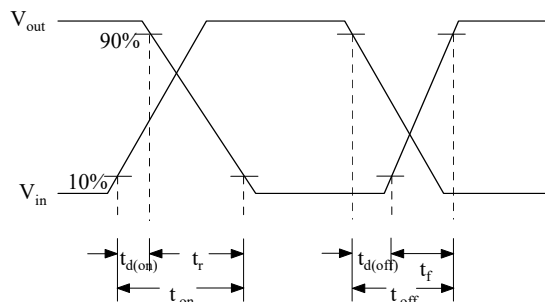
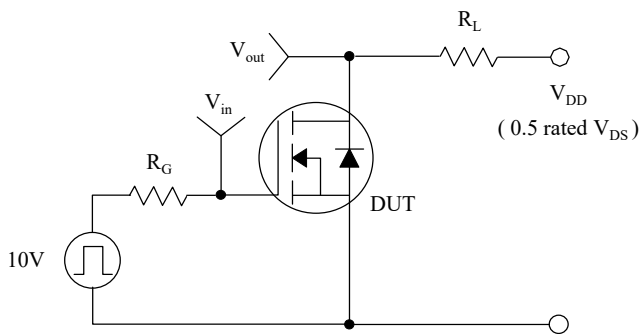


Figure 11. Transient Thermal Response Curve

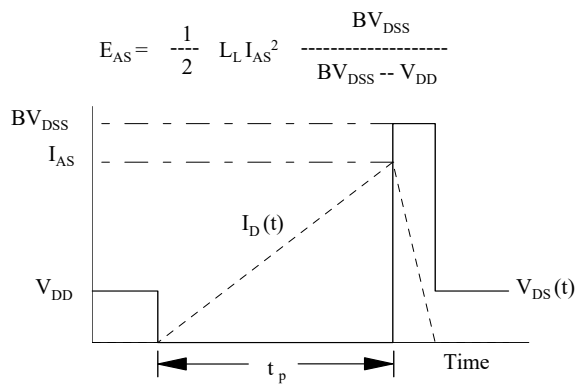
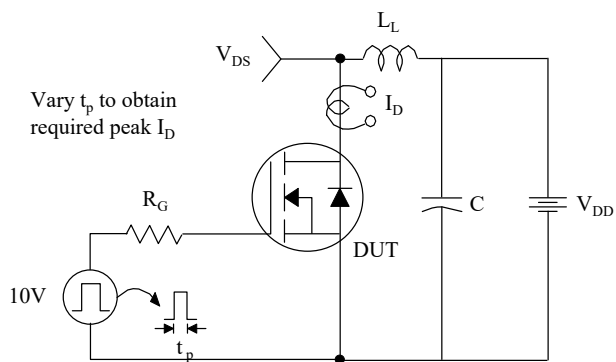
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

