

SLB7N80C

800V N-Channel MOSFET

General Description

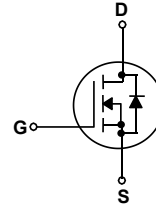
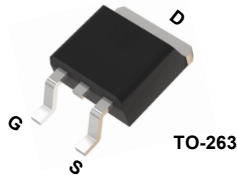
This Power MOSFET is produced using Msemitek's advanced planar stripe DMOS technology.

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

- 7.0A, 800V, $R_{DS(on)} = 1.4\Omega @ V_{GS} = 10V$
- Low gate charge (typical 40nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



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

Symbol	Parameter	SLB7N80C	Units
V_{DSS}	Drain-Source Voltage	800	V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	7.0	A
		4.2	A
I_{DM}	Drain Current - Pulsed (Note 1)	28	A
V_{GSS}	Gate-Source Voltage	± 30	V
EAS	Single Pulsed Avalanche Energy (Note 2)	650	mJ
I_{AR}	Avalanche Current (Note 1)	7.0	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	16.7	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	227	W
		1.8	W/ $^\circ\text{C}$
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	300	$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	SLB7N80C	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.55	$^\circ\text{C}/\text{W}$
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ\text{C}/\text{W}$

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	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	800	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	0.8	--	$V/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 800\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 640\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	3.0	--	5.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$	--	1.4	1.9	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 3.5\text{ A}$ (Note 4)	--	5.7	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	--	1685	--	pF
C_{oss}	Output Capacitance		--	165	--	pF
C_{rss}	Reverse Transfer Capacitance		--	17	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400\text{ V}, I_D = 7.0\text{ A}, R_G = 25\text{ }\Omega$ (Note 4, 5)	--	40	--	ns
t_r	Turn-On Rise Time		--	100	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	50	--	ns
t_f	Turn-Off Fall Time		--	60	--	ns
Q_g	Total Gate Charge	$V_{DS} = 640\text{ V}, I_D = 7.0\text{ A}, V_{GS} = 10\text{ V}$ (Note 4, 5)	--	40	--	nC
Q_{gs}	Gate-Source Charge		--	9.0	--	nC
Q_{gd}	Gate-Drain Charge		--	16.5	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	7.0	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	28	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 7.0\text{ A}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 7.0\text{ A}, di_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	765	--	ns
Q_{rr}	Reverse Recovery Charge		--	6.8	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 25\text{ mH}, I_{AS} = 7.0\text{ A}, V_{DD} = 50\text{ V}, R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 7.0\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics

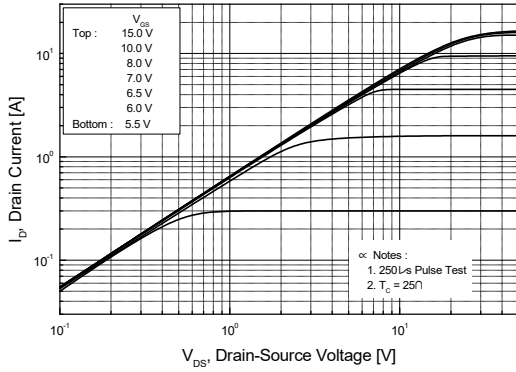


Figure 1. On-Region Characteristics

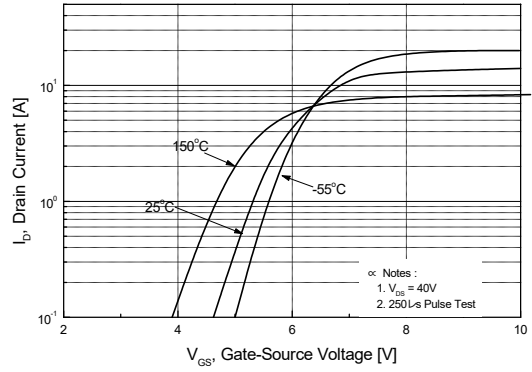


Figure 2. Transfer Characteristics

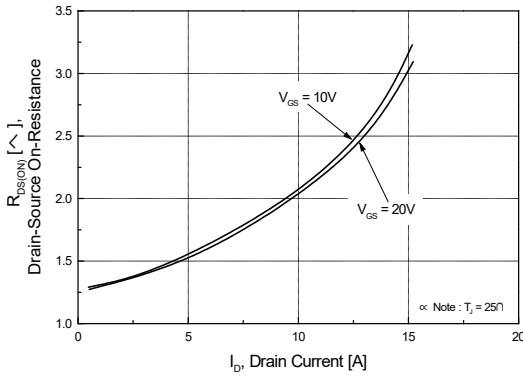


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

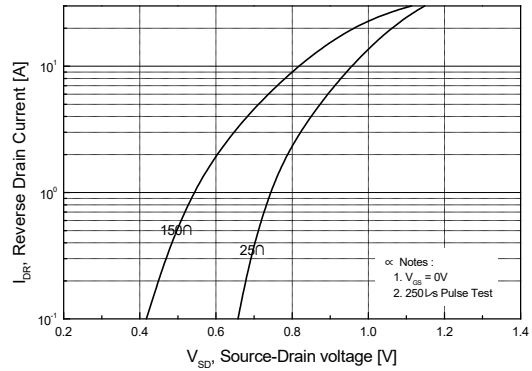


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

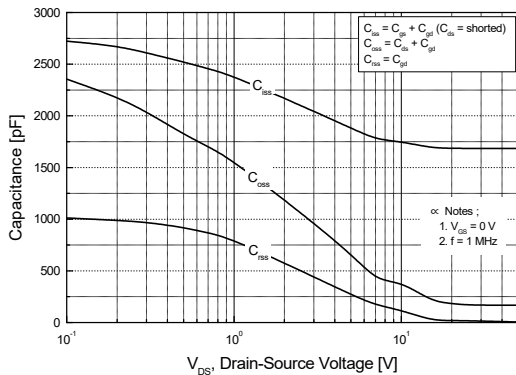


Figure 5. Capacitance Characteristics

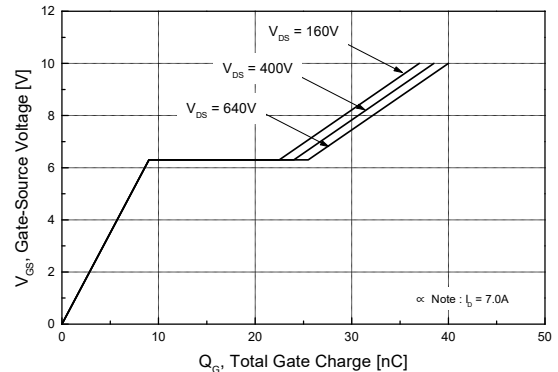


Figure 6. Gate Charge Characteristics

Typical Characteristics (Continued)

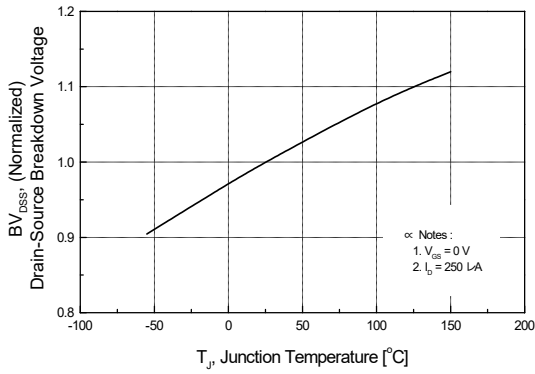


Figure 7. Breakdown Voltage Variation vs Temperature

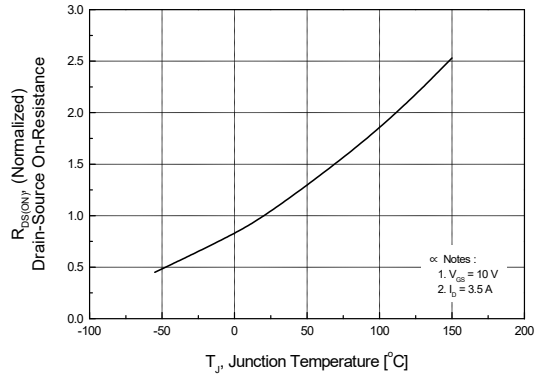


Figure 8. On-Resistance Variation vs Temperature

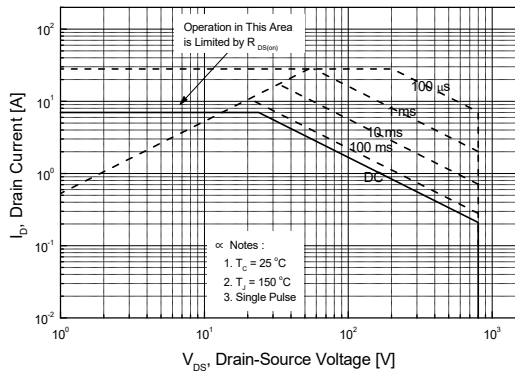


Figure 9. Maximum Safe Operating Area for SLB7N80C

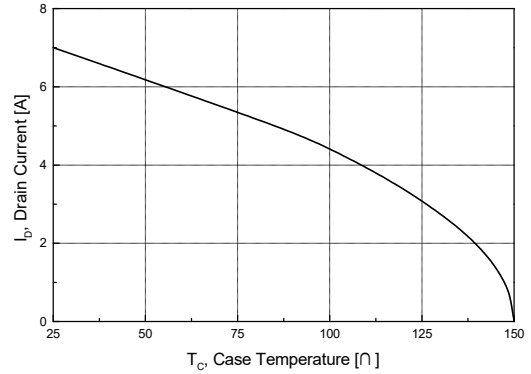


Figure 10. Maximum Drain Current vs Case Temperature

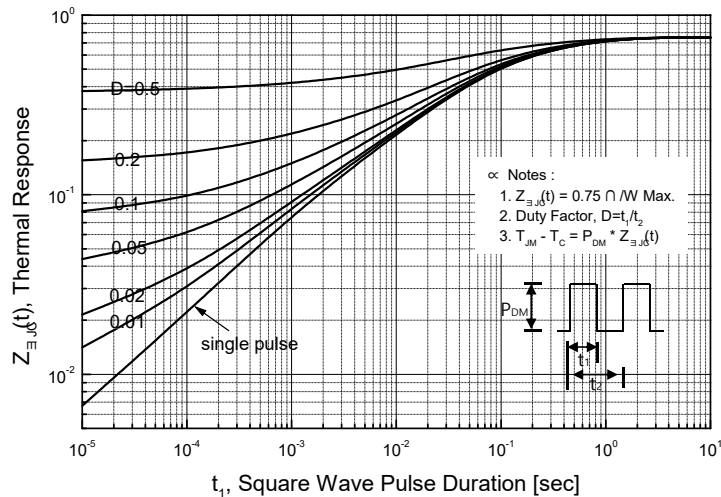
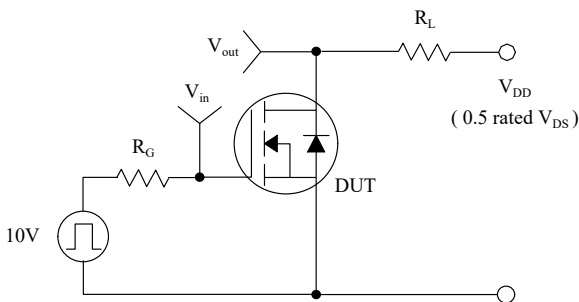


Figure 11. Transient Thermal Response Curve

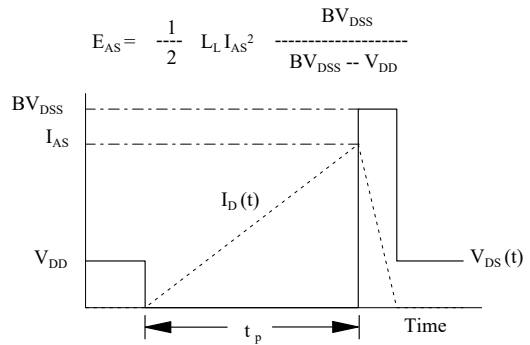
Gate Charge Test Circuit & Waveform



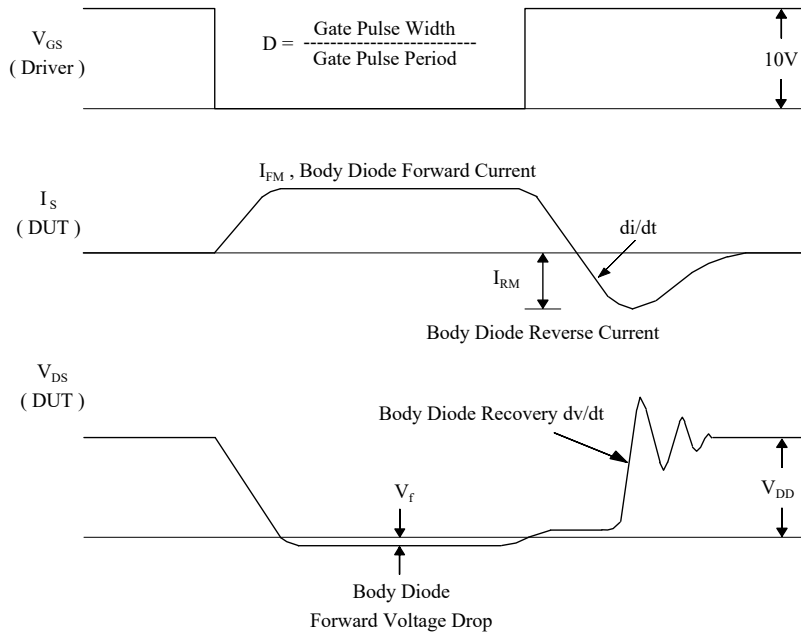
Resistive Switching Test Circuit & Waveforms



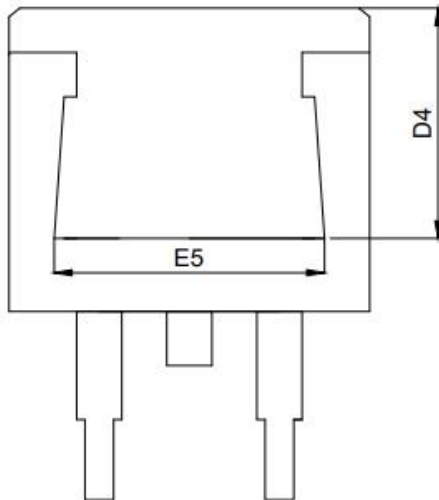
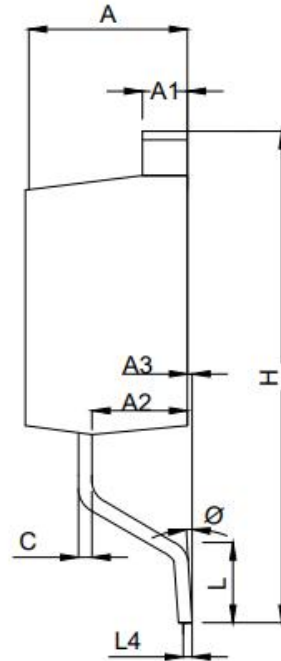
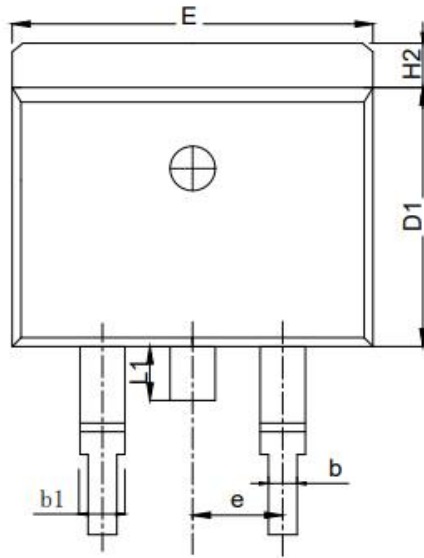
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-263 OUTLINE



Symbol	DIMENSIONS (unit:mm)		
	Min	Typ	Max
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0	0.13	0.25
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D1	8.5	8.7	8.9
D4	6.6	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.7	15.1	15.5
H2	1.07	1.27	1.47
L	2	2.3	2.6
L1	1.4	1.55	1.7
L4	0.25 BSC		
?	0°	5°	9°

NOTE:

- 1.The plastic package is not marked as smooth surfaceRa=0.1;Subglossy surfaceRa=0.8
- 2.Undeclared tolerance ± 0.25 ,Unmarked filletRmax=0.25

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