



CB-FET

SLP60R280SJ / SLF60R280SJ

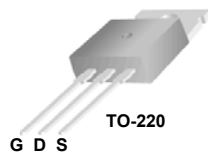
SLP60R280SJ / SLF60R280SJ 600V N-Channel MOSFET

General Description

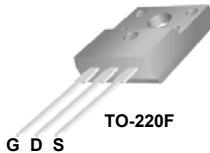
This Power MOSFET is produced using Maple semi's Advanced Super-Junction technology. This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for AC/DC power conversion in switching mode operation for higher efficiency.

Features

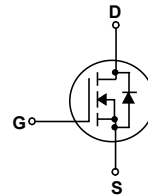
- 15A, 600V, $R_{DS(on) typ.} = 0.25\Omega @ V_{GS} = 10V$
- Low gate charge (typical 43nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-220



TO-220F



Absolute Maximum Ratings

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

Symbol	Parameter	SLP60R280SJ	SLF60R280SJ	Units
V_{DSS}	Drain-Source Voltage	600		V
I_D	Drain Current - Continuous ($T_C = 25^\circ\text{C}$) - Continuous ($T_C = 100^\circ\text{C}$)	15	15 *	A
		9.4	9.4 *	A
I_{DM}	Drain Current - Pulsed (Note 1)	45	45 *	A
V_{GSS}	Gate-Source Voltage	± 30		V
EAS	Single Pulsed Avalanche Energy (Note 2)	110		mJ
I_{AR}	Avalanche Current (Note 1)	2.1		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	0.32		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.0		V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	156	34	W
		1.67	0.3	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	SLP60R280SJ	SLF60R280SJ	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.6	3.6	$^\circ\text{C}/\text{W}$
$R_{\theta JS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	80	$^\circ\text{C}/\text{W}$

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	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	600	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	0.6	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 480\text{ V}, T_C = 125^\circ\text{C}$	--	--	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	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5	--	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 7.5\text{ A}$	--	0.25	0.28	Ω
g_{FS}	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 7.5\text{ A}$ (Note 4)	--	16	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	800	--	pF
C_{oss}	Output Capacitance		--	180	--	pF
C_{riss}	Reverse Transfer Capacitance		--	8	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 400\text{ V}, I_D = 6.5\text{ A},$ $R_G = 20\text{ }\Omega$ (Note 4, 5)	--	13	--	ns
t_r	Turn-On Rise Time		--	11	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	100	--	ns
t_f	Turn-Off Fall Time		--	12	--	ns
Q_g	Total Gate Charge	$V_{DS} = 480\text{ V}, I_D = 6.5\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 4, 5)	--	43	--	nC
Q_{gs}	Gate-Source Charge		--	5	--	nC
Q_{gd}	Gate-Drain Charge		--	22	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	12	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	40	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 6.5\text{ A}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = 6.5\text{ A},$	--	345	--	ns
Q_{rr}	Reverse Recovery Charge	$dI_F / dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	4.5	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L=50\text{mL}, I_{AS} = 2.1\text{ A}, V_{DD} = 150\text{ V}, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq 15\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
5. Essentially independent of operating temperature

Typical Characteristics

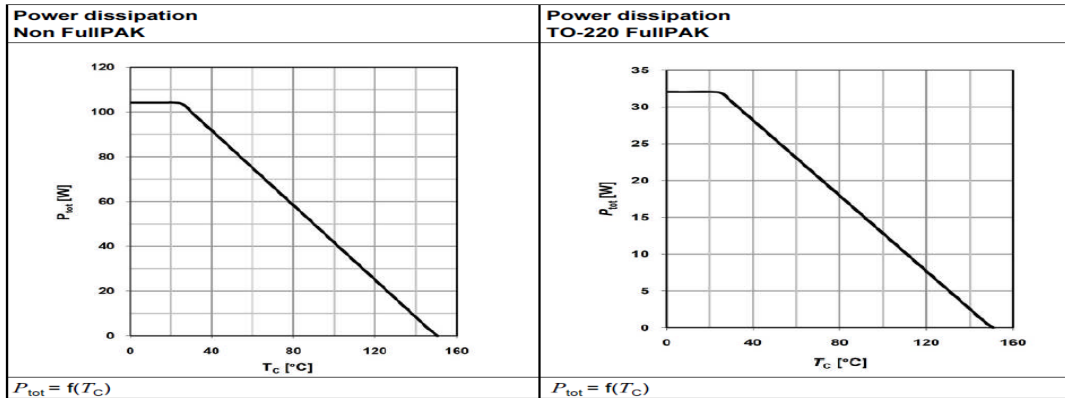


Figure 1. Power Dissipation for SLP60R280SJ

Figure 2. Power Dissipation for SLF60R280SJ

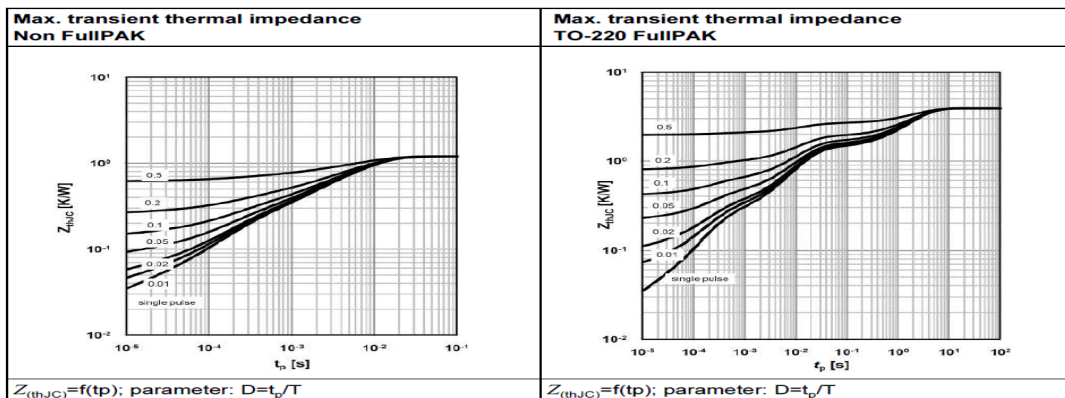


Figure 3. Transient Thermal Response Curve for SLP60R280SJ

Figure 4. Transient Thermal Response Curve for SLF60R280SJ

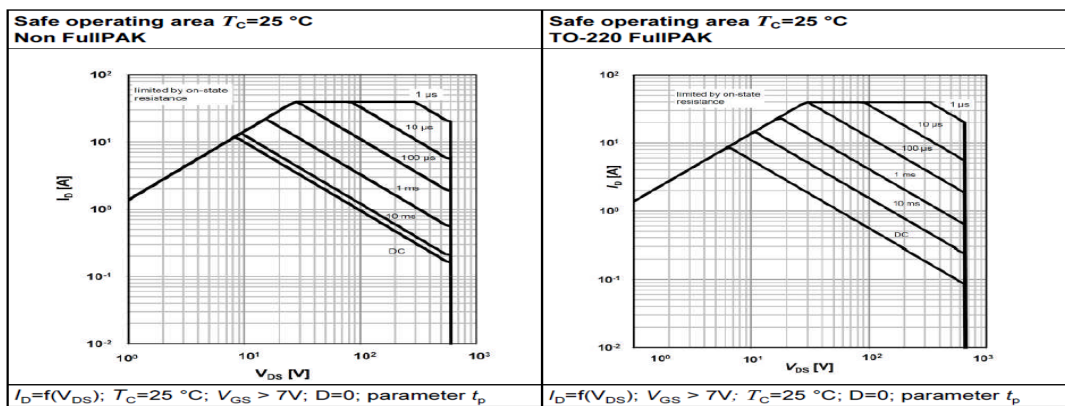


Figure 5. Maximum Safe Operating Area for SLP60R280SJ@25°C

Figure 6. Maximum Safe Operating Area for SLF60R280SJ@25°C

Typical Characteristics (Continued)

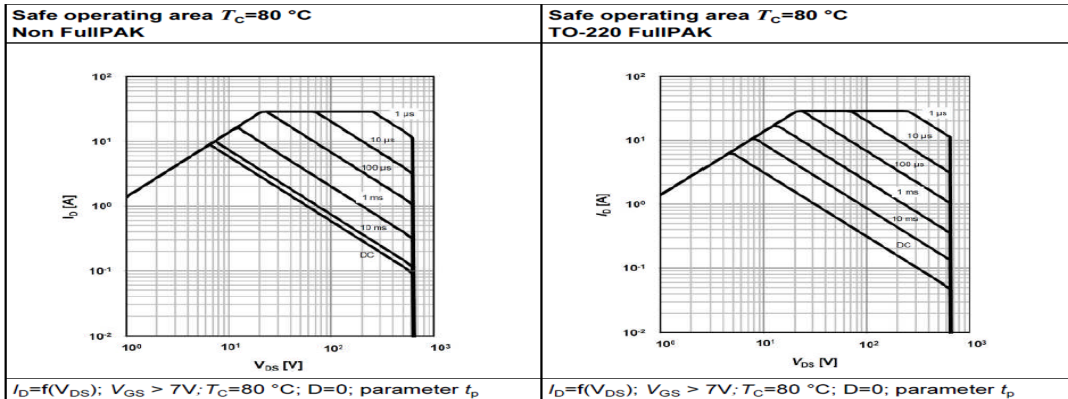


Figure 7. Maximum Safe Operating Area for SLP60R280SJ@80°C

Figure 8. Maximum Safe Operating Area for SLP60R280SJ@80°C

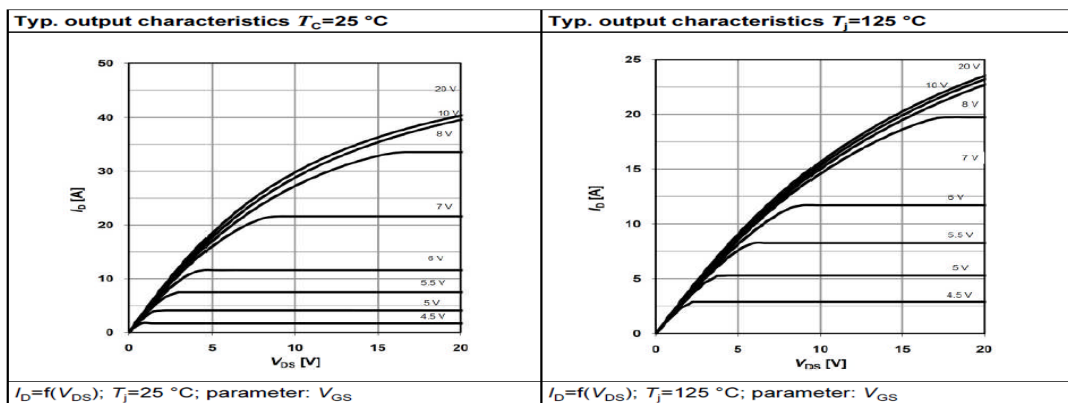


Figure 9. Output Characteristics@25°C

Figure 10. Output Characteristics@125°C

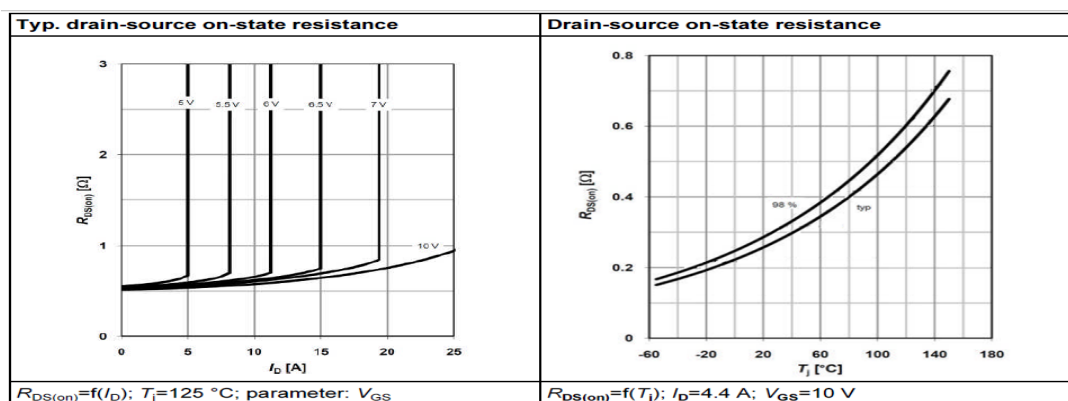


Figure 11. On-Resistance Variation vs Drain Current and Gate Voltage@125°C

Figure 12. On-Resistance Variation vs Temperature

Typical Characteristics (Continued)

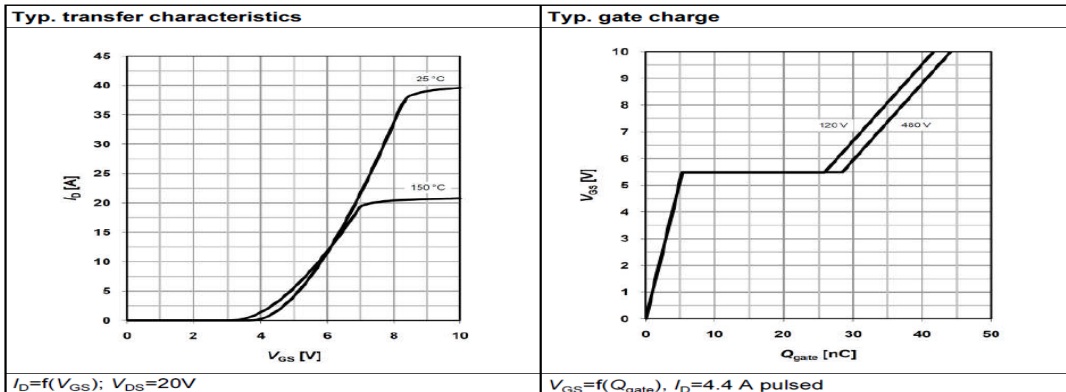


Figure 13. Transfer Characteristics

Figure 14. Gate Charge Characteristics

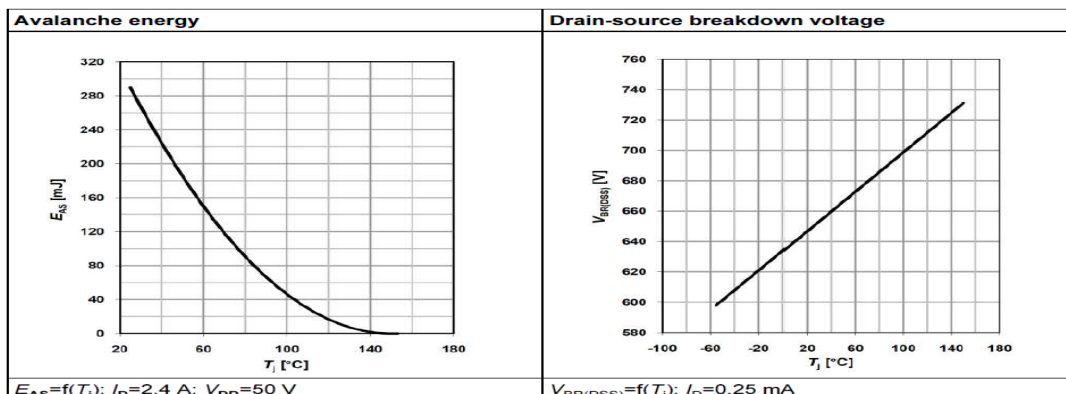


Figure 15. Avalanche Energy Characteristics

Figure 16. Breakdown Voltage Variation vs Temperature

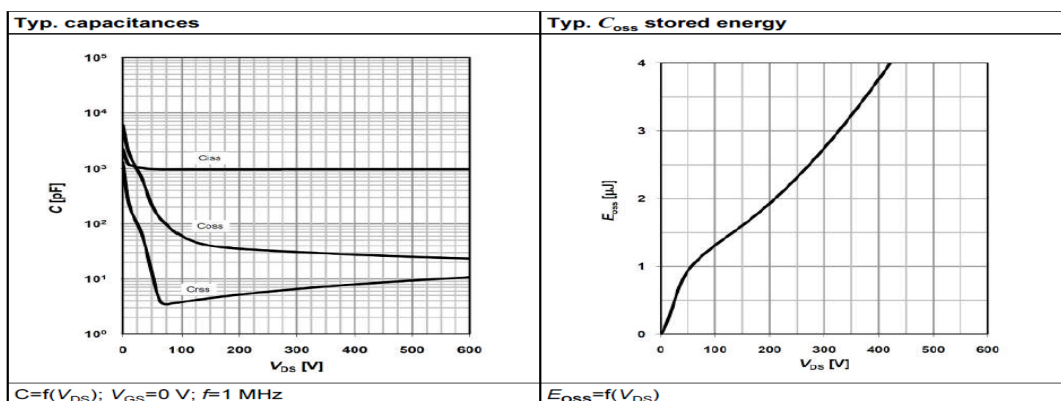


Figure 17. Capacitance Characteristics

Figure 18. On-Resistance Variation vs Temperature

Typical Characteristics (Continued)

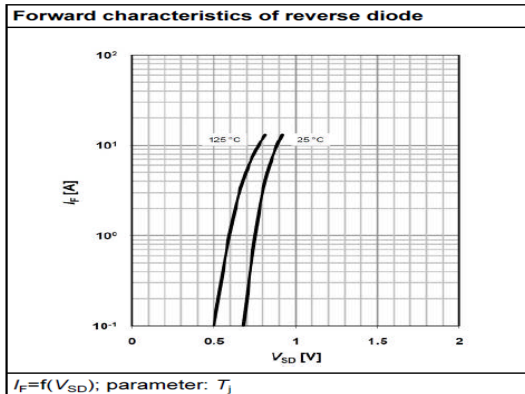
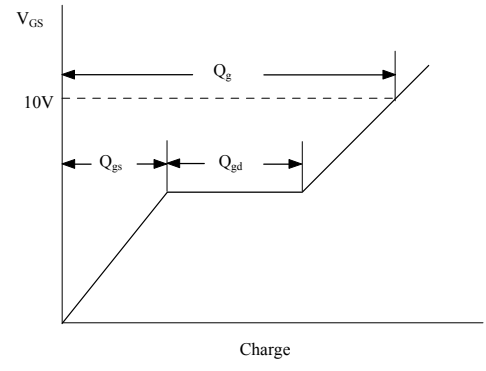
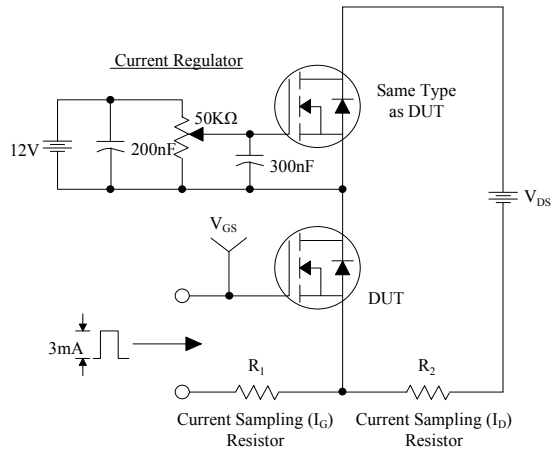
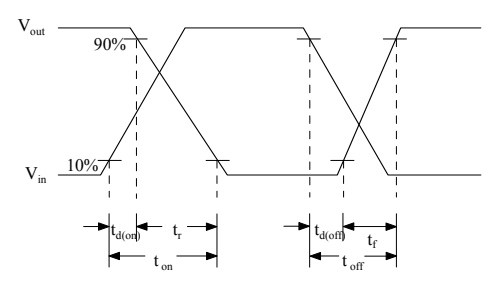
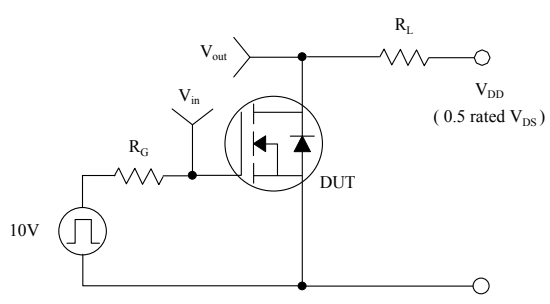


Figure 19. Body Diode Forward Voltage Variation with Source Current and Temperature

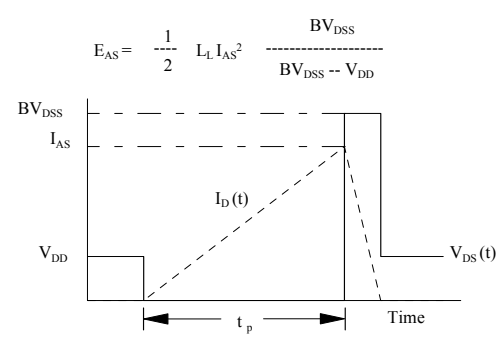
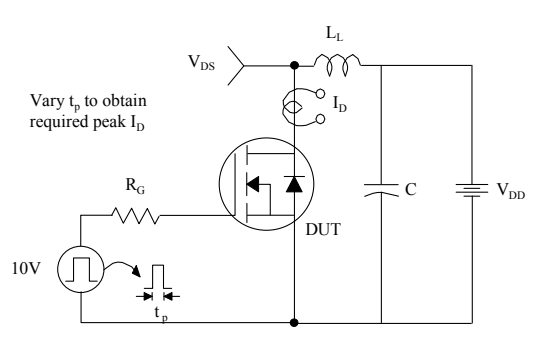
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

