



**CB-FET**

SLP65R300SJ / SLF65R300SJ

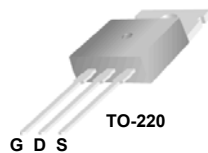
## SLP65R300SJ / SLF65R300SJ 650V N-Channel MOSFET

### General Description

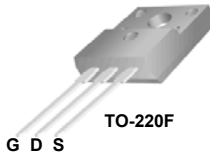
This Power MOSFET is produced using Maple semi's Advanced Super-Junction technology. This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well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

### Features

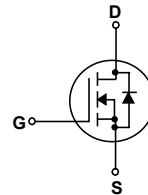
- 15A, 650V,  $R_{DS(on) typ.} = 0.27\Omega @ V_{GS} = 10V$
- Low gate charge ( typical 43nC)
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-220



TO-220F



### Absolute Maximum Ratings

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

Symbol	Parameter	SLP65R300SJ	SLF65R300SJ	Units
$V_{DSS}$	Drain-Source Voltage	650		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	$\pm 30$		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 $25^\circ\text{C}$	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	SLP65R300SJ	SLF65R300SJ	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
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	650	--	--	V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$ , Referenced to $25^\circ\text{C}$	--	0.6	--	$\text{V}/^\circ\text{C}$
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
		$V_{DS} = 480\text{ V}, T_C = 125^\circ\text{C}$	--	--	10	$\mu\text{A}$
$I_{GSSF}$	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
<b>On Characteristics</b>						
$V_{GS(th)}$	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	$V_{GS} = 10\text{ V}, I_D = 7.5\text{ A}$	--	0.27	0.30	$\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 40\text{ V}, I_D = 7.5\text{ A}$ (Note 4)	--	16	--	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	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
<b>Switching Characteristics</b>						
$t_{d(on)}$	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
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	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	--	$\mu\text{C}$

**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.  $I_{SD} \leq 10\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$ , 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

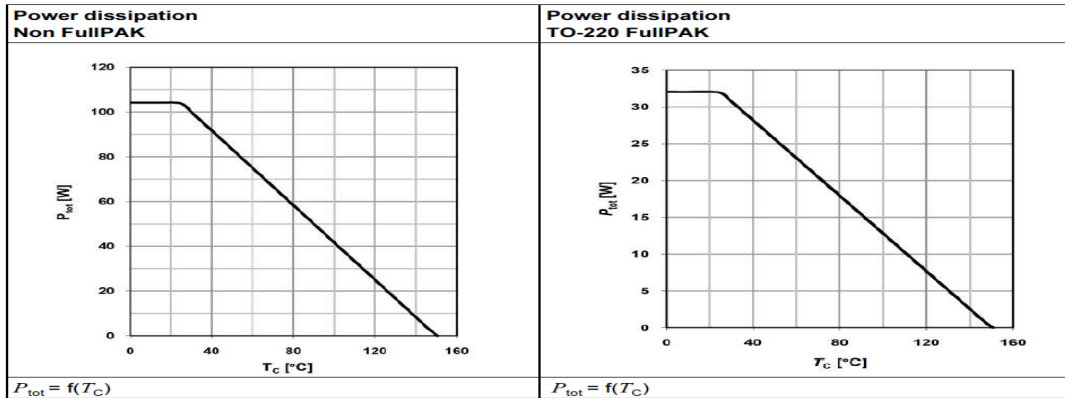


Figure 1. Power Dissipation for SLP65R300SJ

Figure 2. Power Dissipation for SLF65R300SJ

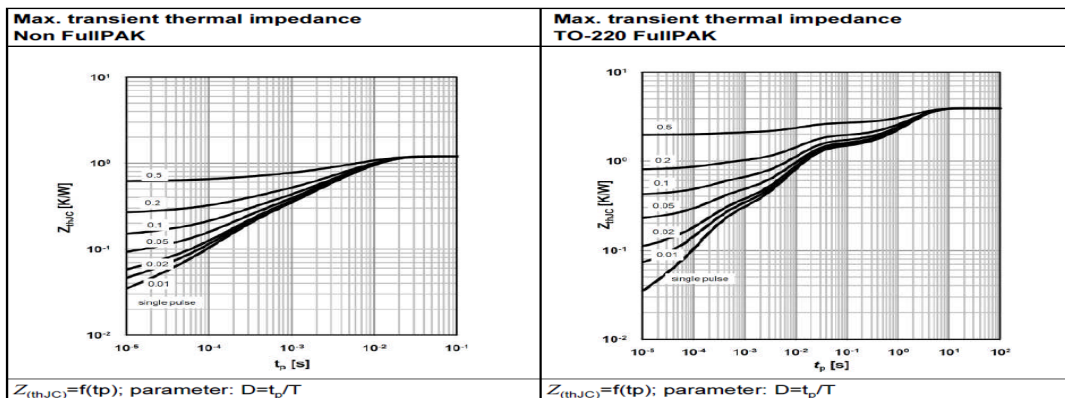


Figure 3. Transient Thermal Response Curve for SLP65R300SJ

Figure 4. Transient Thermal Response Curve for SLF65R300SJ

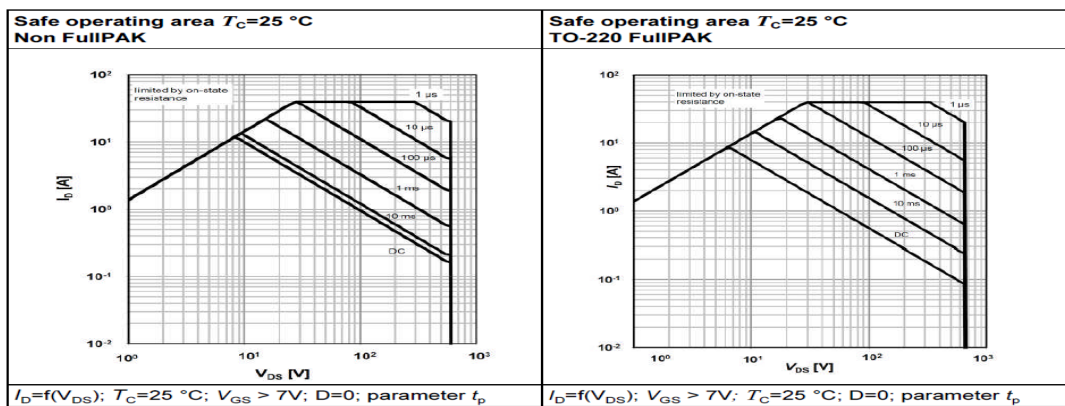
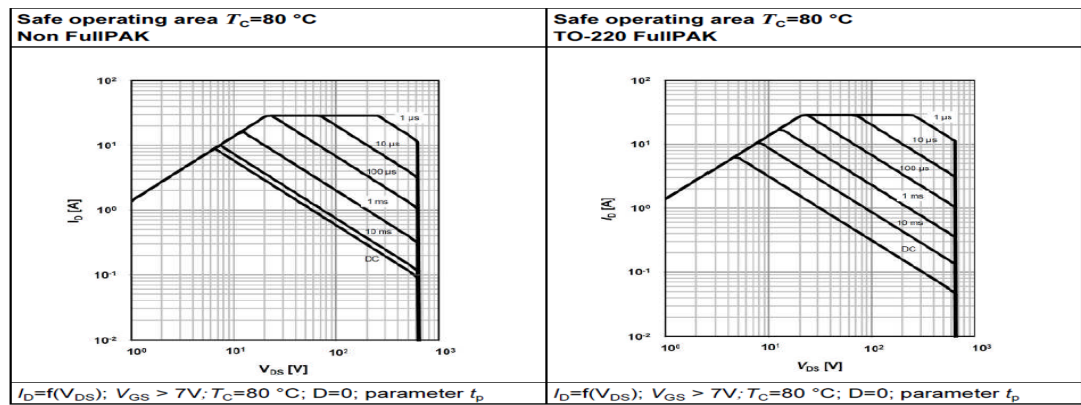


Figure 5. Maximum Safe Operating Area for SLP65R300SJ@25°C

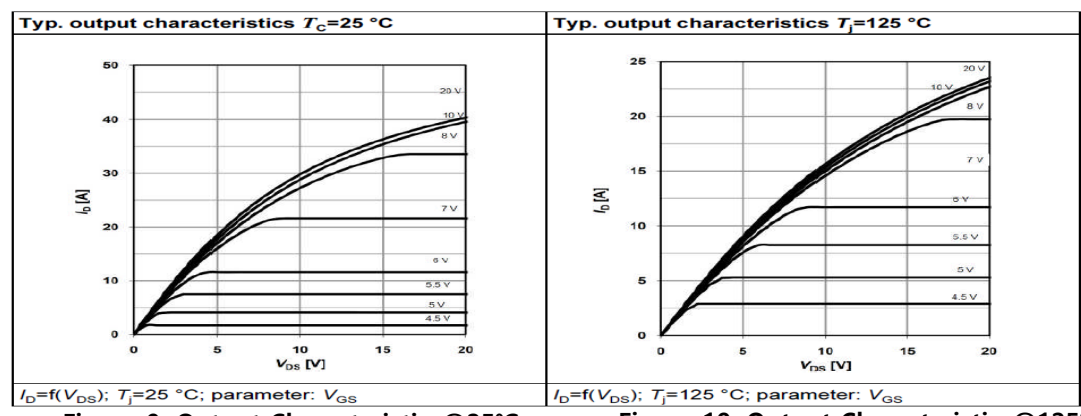
Figure 6. Maximum Safe Operating Area for SLF65R300SJ@25°C

**Typical Characteristics** (Continued)



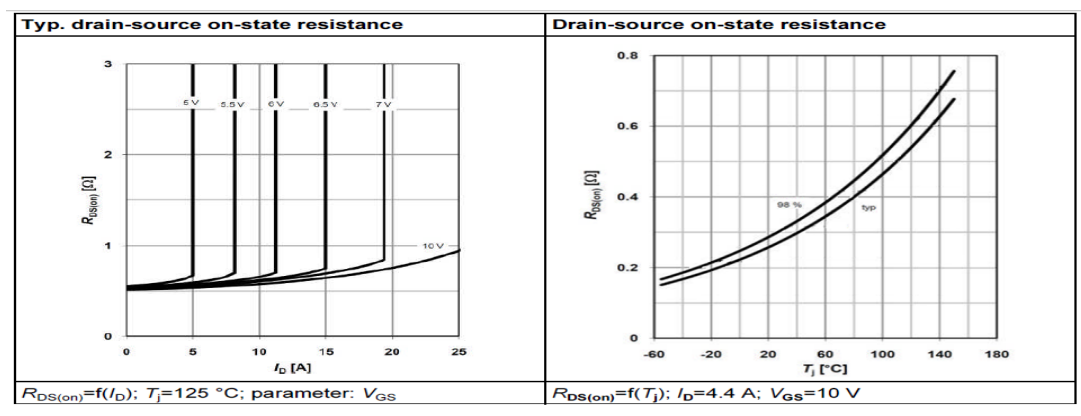
**Figure 7. Maximum Safe Operating Area for SLP65R300SJ@80°C**

**Figure 8. Maximum Safe Operating Area for SLP65R300SJ@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)

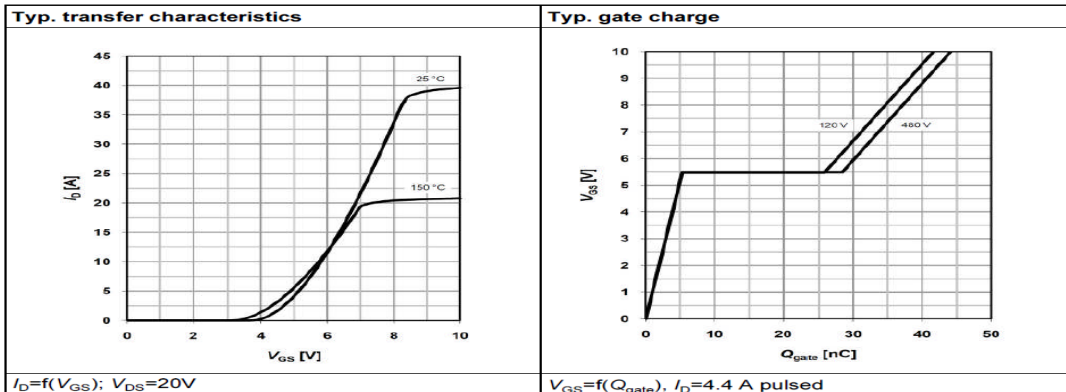


Figure 13. Transfer Characteristics

Figure 14. Gate Charge Characteristics

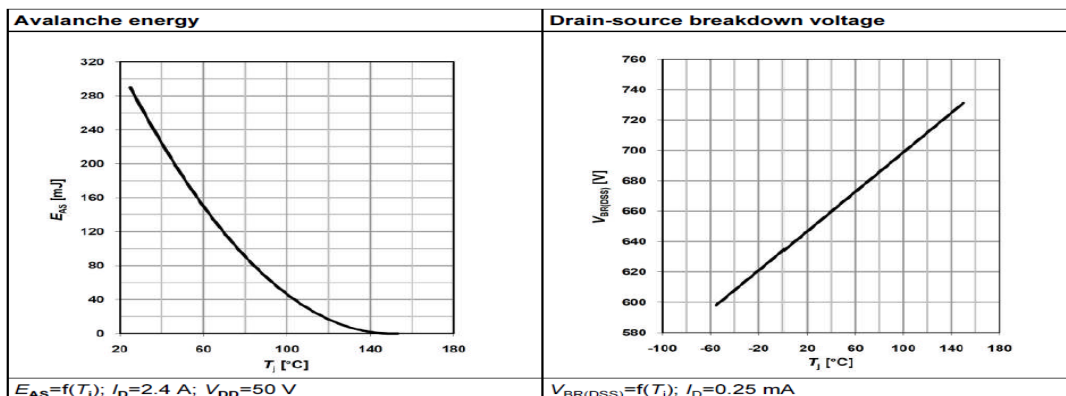


Figure 15. Avalanche Energy Characteristics

Figure 16. Breakdown Voltage Variation vs Temperature

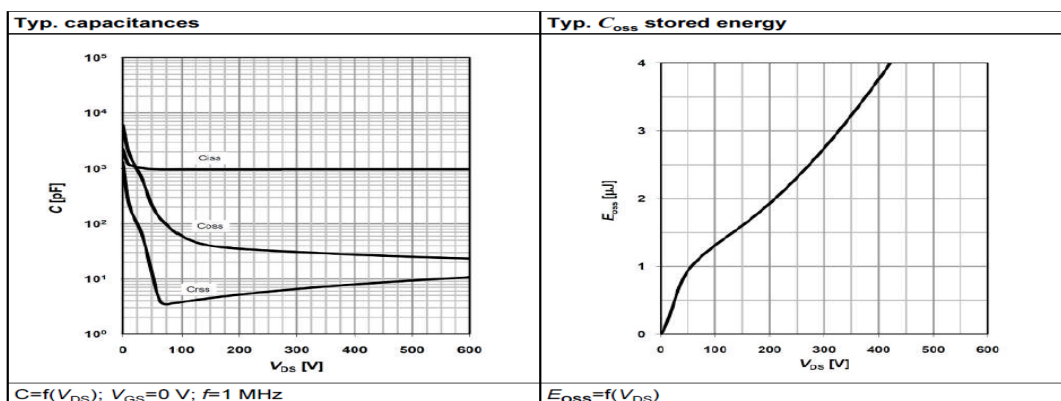
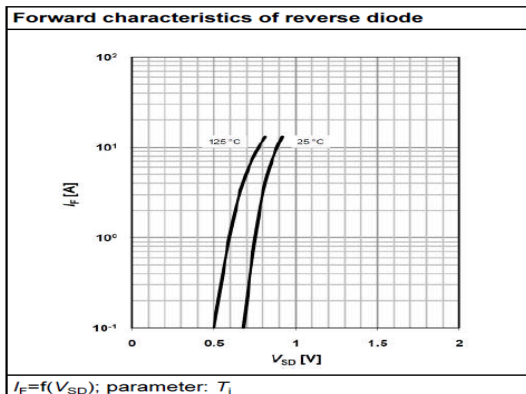


Figure 17. Capacitance Characteristics

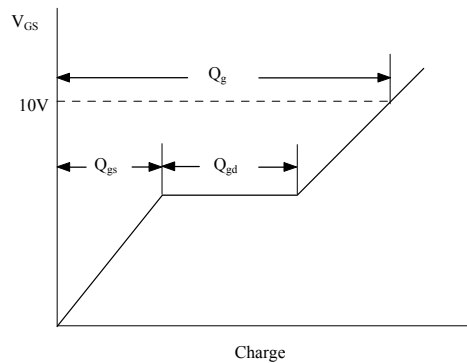
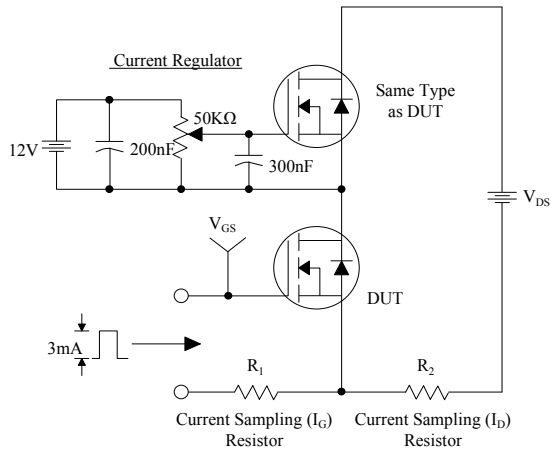
Figure 18. On-Resistance Variation vs Temperature

**Typical Characteristics** (Continued)

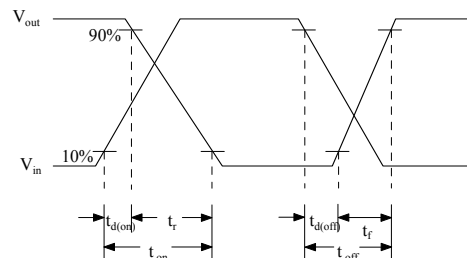
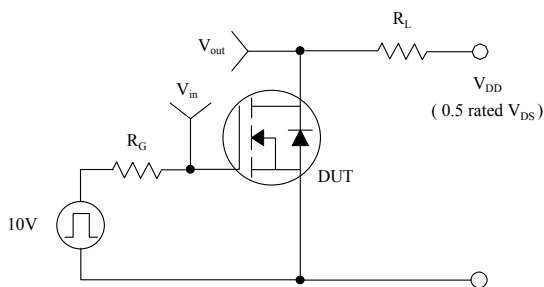


**Figure 19. Body Diode Forward Voltage Variation with Source Current and Temperature**

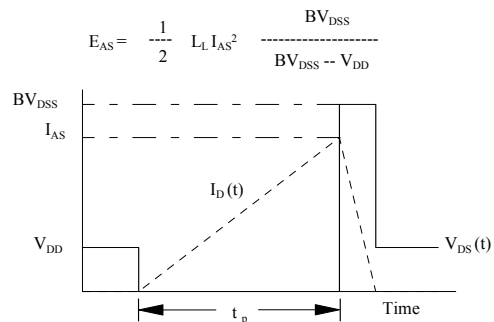
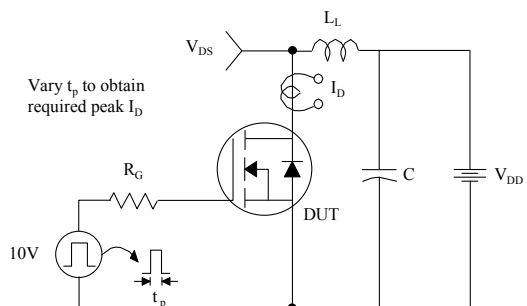
### Gate Charge Test Circuit & Waveform



### Resistive Switching Test Circuit & Waveforms



### Unclamped Inductive Switching Test Circuit & Waveforms



### Peak Diode Recovery dv/dt Test Circuit & Waveforms

