SK07N65B

650V N-ch Planar MOSFET

| BV$_{DSS}$	R$_{DS(ON),Typ.}$	I$_D$
650V	1.2Ω	7.0A

General Features

- RoHS Compliant
- R$_{DS(ON),typ.}$=1.2 Ω@V$_{GS}$=10V
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

Applications

- Adaptor
- Charger
- SMPS Standby Power
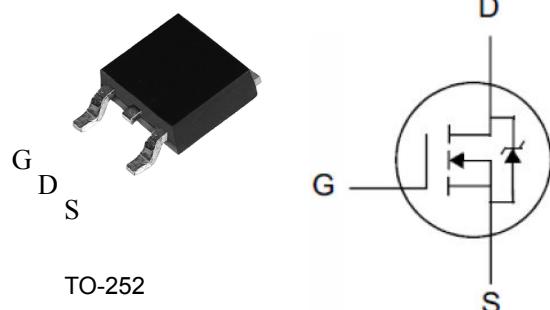
TO-252

Ordering Information

Part Number	Package
SK07N65B	TO-252

Absolute Maximum Ratings

T$_C$=25℃ unless otherwise specified

Symbol	Parameter	SK07N65B	Unit
V$_{DSS}$	Drain-to-Source Voltage	650	V
V$_{GSS}$	Gate-to-Source Voltage	±30	V
I$_D$	Continuous Drain Current	7.0	A
I$_{DM}$	Pulsed Drain Current at V$_{GS}$=10V	28	A
E$_{AS}$	Single Pulse Avalanche Energy	550	mJ
P$_D$	Power Dissipation	126	W
P$_D$	Derating Factor above 25℃	1.0	W/℃
T$_L$ T$_{PAK}$	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	300 260	℃
T$_J$& T$_{STG}$	Operating and Storage Temperature Range	-55 to 150	

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	SK07N65B	Unit
R$_{θJC}$	Thermal Resistance, Junction-to-Case	0.99	℃/W
R$_{θJA}$	Thermal Resistance, Junction-to-Ambient	75	℃/W

Electrical Characteristics

OFF Characteristics

T_J =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	650	--	--	V	V_{GS}=0V, I_D=250uA
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	uA	V_{DS}=650V, V_{GS}=0V
		--	--	100		V_{DS}=520V, V_{GS}=0V, T_J =125℃
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	V_{GS}=+30V, V_{DS}=0V
		--	--	-100		V_{GS}=-30V, V_{DS}=0V

ON Characteristics

T_J =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	1.2	1.40	Ω	V_{GS}=10V, I_D=3.5A
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	V_{DS}=V_{GS}, I_D=250uA
gfs	Forward Transconductance	--	11	--	S	VDS=30V,ID=3.5A

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	1120	--	pF	V_{GS}=0V, V_{DS}=25V, f=1.0MH$_Z$
C_{rss}	Reverse Transfer Capacitance	--	10	--		
C_{oss}	Output Capacitance	--	90	--		
Q_g	Total Gate Charge	--	20	--	nC	V_{DD}=325V, I_D=7A, V_{GS}=0 to 10V
Q_{gs}	Gate-to-Source Charge	--	5	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	5	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

| Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
td$_{(ON)}$	Turn-on Delay Time	--	12	--	ns	V_{DD}=325V, I_D=7A, V_{GS}=10V Rg=4.7Ω
t$_{rise}$	Rise Time	--	12	--		
td$_{(OFF)}$	Turn-Off Delay Time	--	18	--		
t$_{fall}$	Fall Time	--	10	--		

Source-Drain Body Diode Characteristics

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current[2]	--	--	7.0	A	Integral pn-diode in MOSFET
I_{SM}	Pulsed Source Current[2]	--	--	28		
V_{SD}	Diode Forward Voltage	--	--	1.5	V	I_S=7A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	350	--	ns	V_{GS}=0V
Q_{rr}	Reverse Recovery Charge	--	1.1	--	uC	I_F=7A, di/dt=100A/μs

Note: [1] T_J=+25℃ to +150℃
[2] Pulse width≤380μs; duty cycle≤2%.

Typical Characteristics

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

Duty Factor

$Z_{\theta JC}$, Thermal Impedance (Normalized)

50%
20%
10%
5%
2%
1%

single pulse

t_p, Rectangular Pulse Duration (s)

NOTES:
DUTY FACTOR: $D = t1/t2$
PEAK $T_J = P_{DM} \times Z_{\theta JC} \times R_{\theta JC} + T_C$
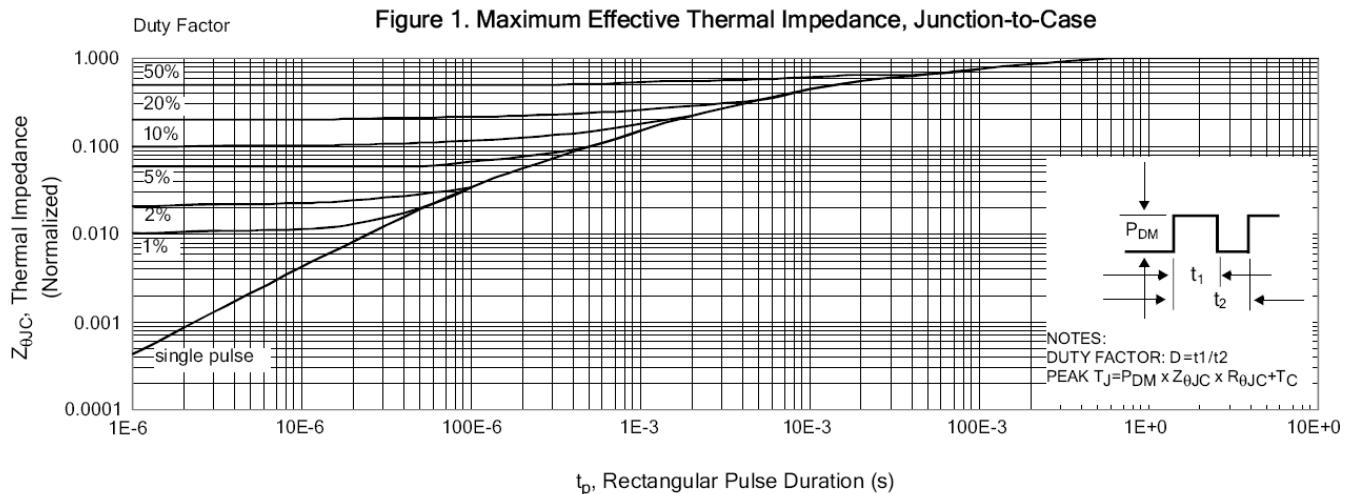
Figure 2 . Max. Power Dissipation vs Case Temperature

Pd, Power Dissipation, Watts

Tc, Case Temperature, ℃

Figure 3.   Maximum Continuous Drain Current vs Case Temperature

I_D, Drain Current (A)

T_C, Case Temperature (°C)

Figure 4. Typical Output Characteristics

PULSE DURATION = 250 µS
DUTY FACTOR = 0.5%
MAX, T_C = 25 °C

V_{GS} = 15V
V_{GS} = 7.0V
V_{GS} = 6.5V
V_{GS} = 6.0V
V_{GS} = 5.5V
V_{GS} = 5.0V

I_D, Drain Current (A)

V_{DS}, Drain-to-Source Voltage (V)
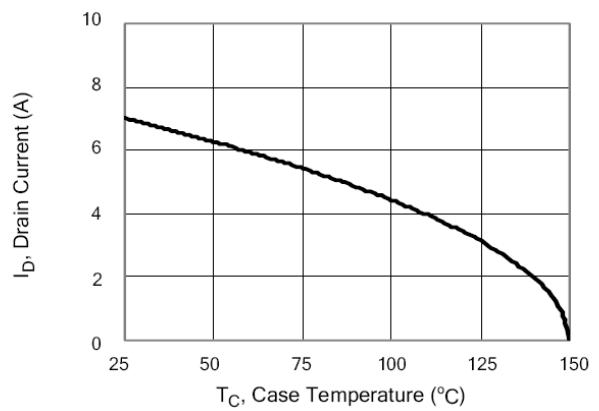
Figure 5.   Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current

PULSE DURATION = 10 µS
DUTY FACTOR = 0.5% MAX
T_C = 25 °C

I_D = 14A
I_D = 7A
I_D = 3.5A
I_D = 1.25A

RDS(ON), Drain-to-Source ON Resistance (Ω)

V_{GS}, Gate-to-Source Voltage (V)
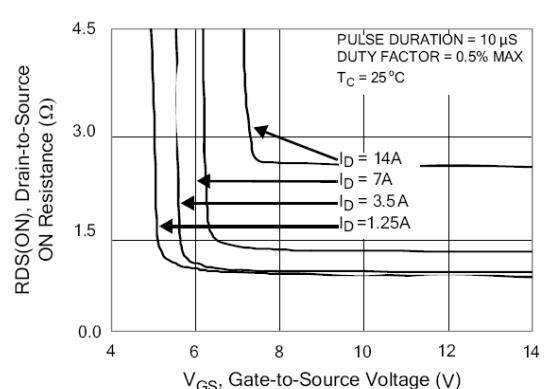
Typical Characteristics(Cont.)

Figure 6. Maximum Peak Current Capability

TRANSCONDUCTANCE MAY LIMIT CURRENT IN THIS REGION

FOR TEMPERATURES ABOVE 25°C DERATE PEAK CURRENT AS FOLLOWS:

$$I = I_{25}\left[\sqrt{\frac{150 - T_C}{125}}\right]$$

V_{GS} = 10V

t_p, Pulse Width (s)

I_{DM}, Peak Current (A)
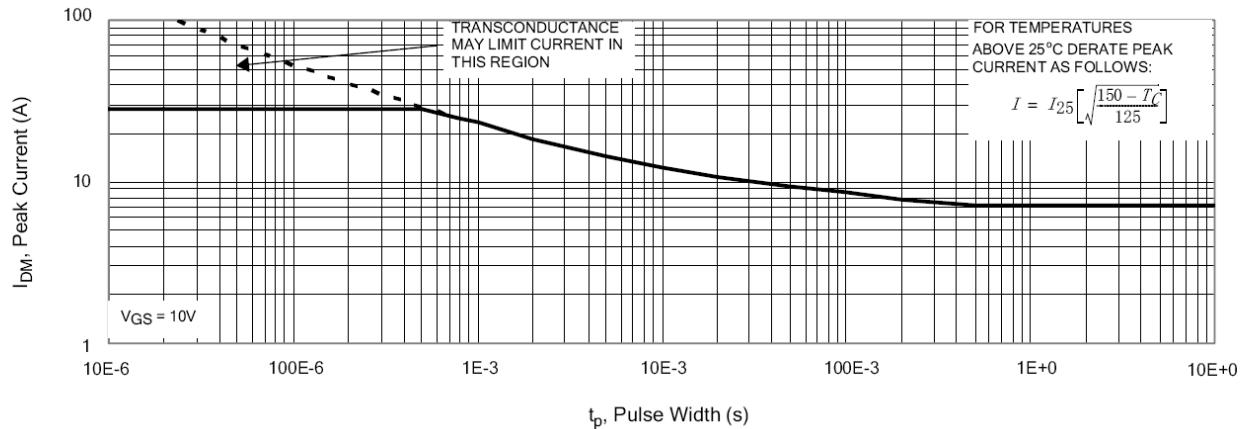
Figure 7. Typical Transfer Characteristics

PULSE DURATION = 10 μs
DUTY CYCLE = 0.5% MAX
V_{DS} = 30 V

+150 °C
+25 °C
-55 °C

I_D, Drain-to-Source Current (A)

V_{GS}, Gate-to-Source Voltage (V)
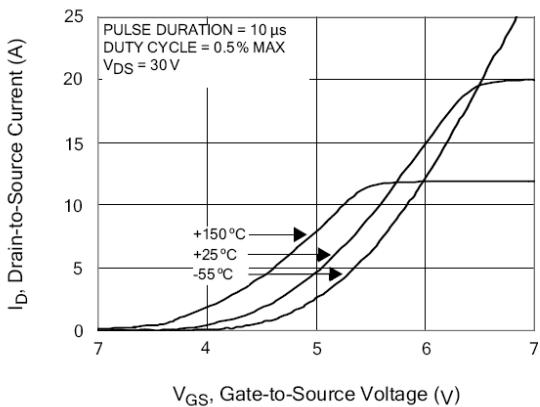
Figure 8. Unclamped Inductive Switching Capability

STARTING T_J = 25°C

STARTING T_J = 150°C

If R= 0: t_{AV}= (L×I_{AS})/(1.3BV_{DSS}-V_{DD})
If R≠ 0: t_{AV}= (L/R) ln[I_{AS}×R)/(1.3BV_{DSS}-V_{DD})+1]
R equals total Series resistance of Drain circuit

I_{AS}, Avalanche Current (A)

t_{AV}, Time in Avalanche (s)
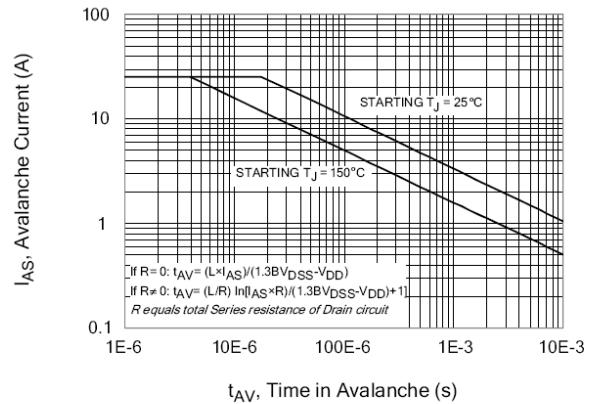
Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

PULSE DURATION = 10 μs
DUTY CYCLE = 0.5% MAX
T_C=25°C

V_{GS} = 10V

$R_{DS(ON)}$, Drain-to-Source ON Resistance (Ω)

I_D, Drain Current (A)
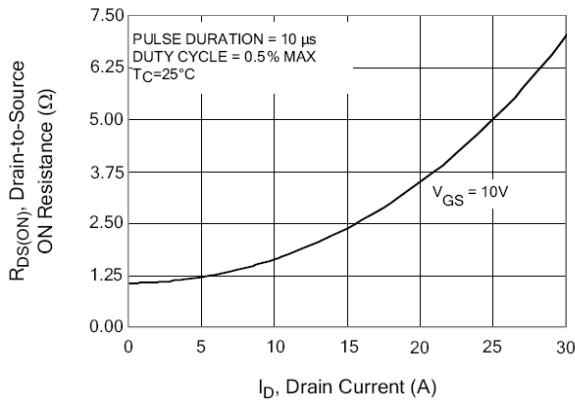
Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature

PULSE DURATION = 10 μs
DUTY CYCLE = 0.5% MAX
V_{GS} = 10V, I_D = 3.5A

$R_{DS(ON)}$, Drain-to-Source Resistance (Normalized)

T_J, Junction Temperature (°C)

5 of 8

SK07N65B
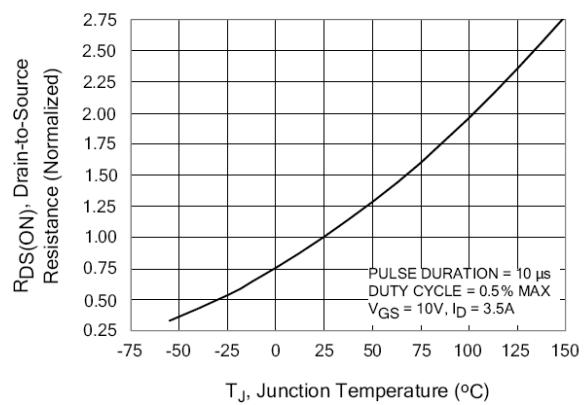
Typical Characteristics(Cont.)

Figure 11. Typical Breakdown Voltage vs Junction Temperature
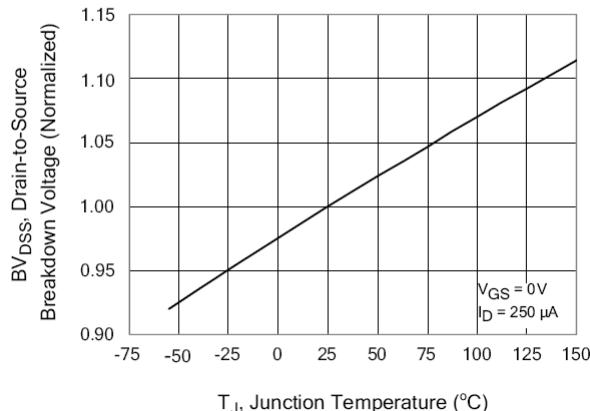
Figure 12. Typical Threshold Voltage vs Junction Temperature
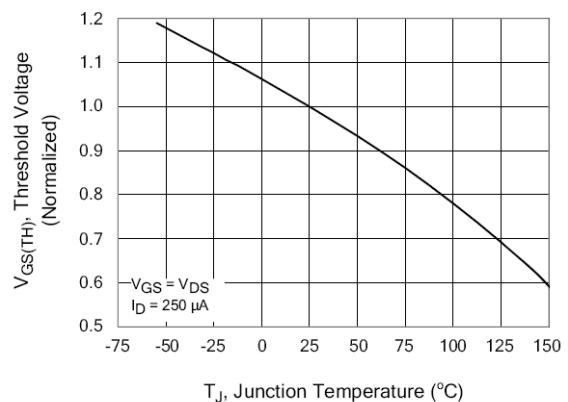
Figure 13 . Maximum Safe Operating Area
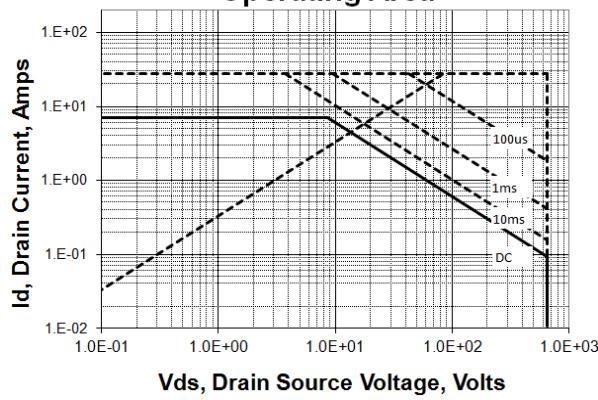
Figure 14. Capacitance vs Vds
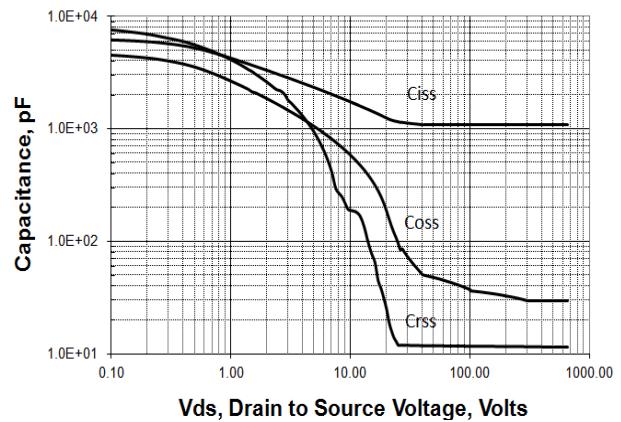

Figure 15 .Typical Gate Charge
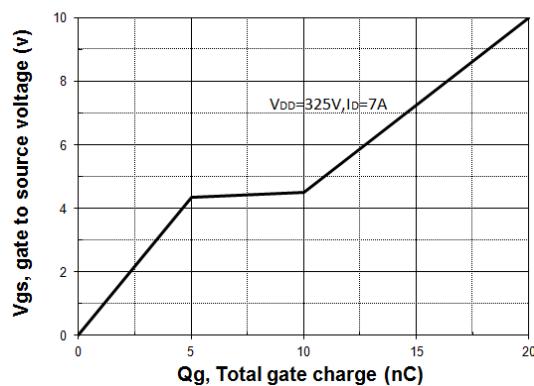
Figure 16. Typical Body Diode Transfer Characteristics
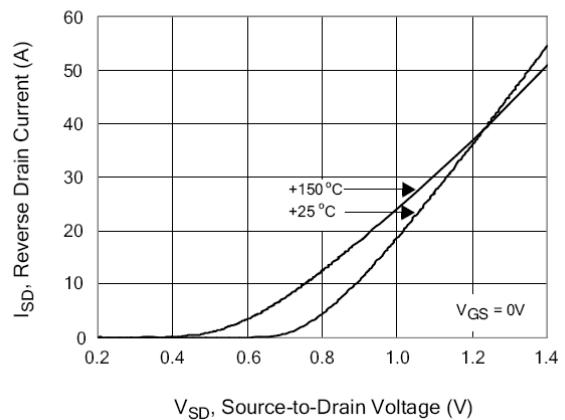
Test Circuits and Waveforms
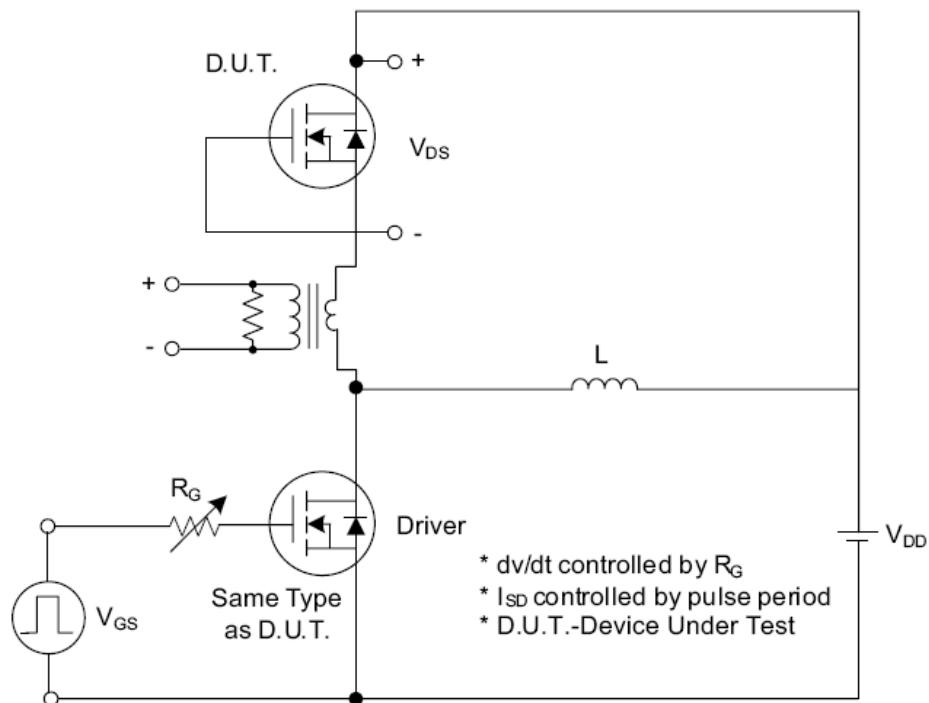
Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit
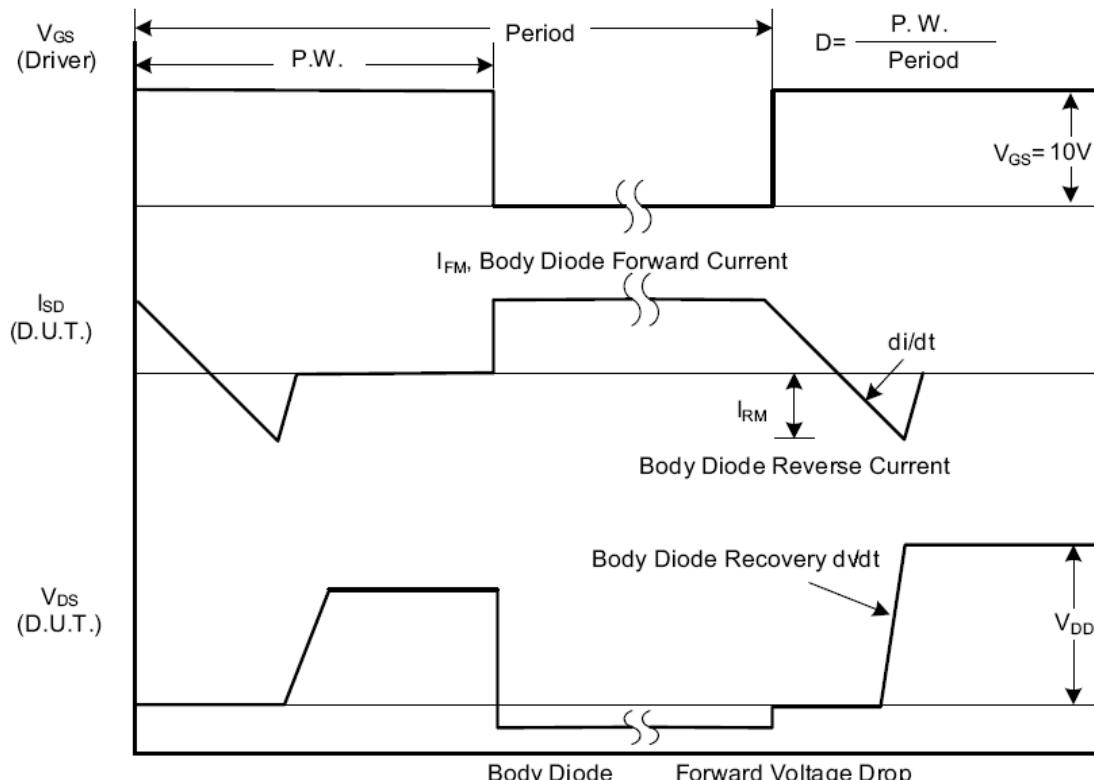
Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)
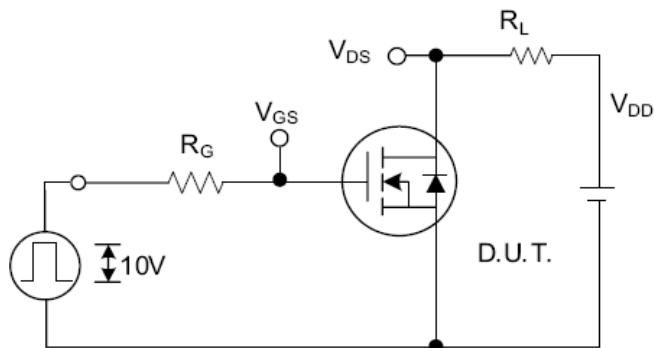
Fig. 2.1 Switching Test Circuit
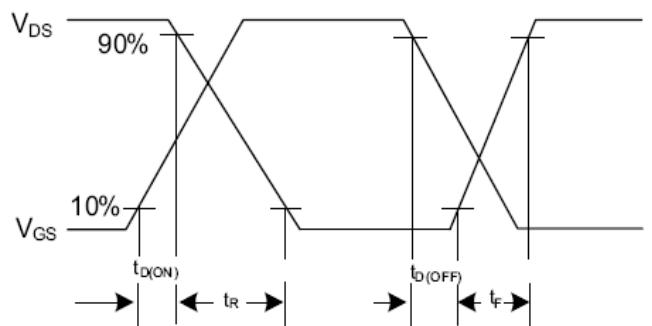
Fig. 2.2 Switching Waveforms
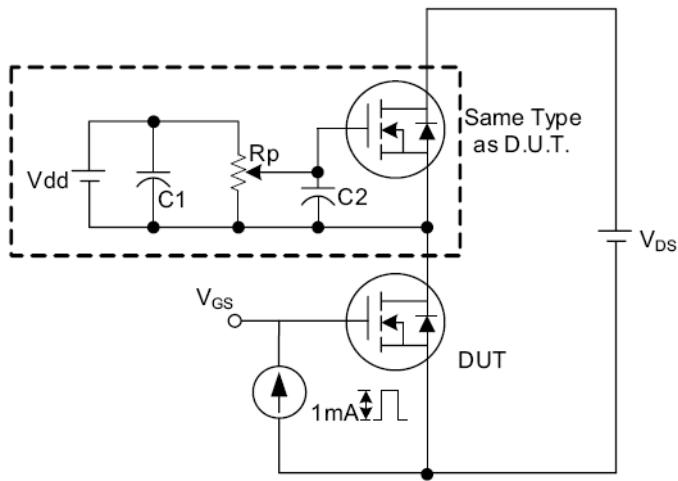
Fig. 3 . 1 Gate Charge Test Circuit
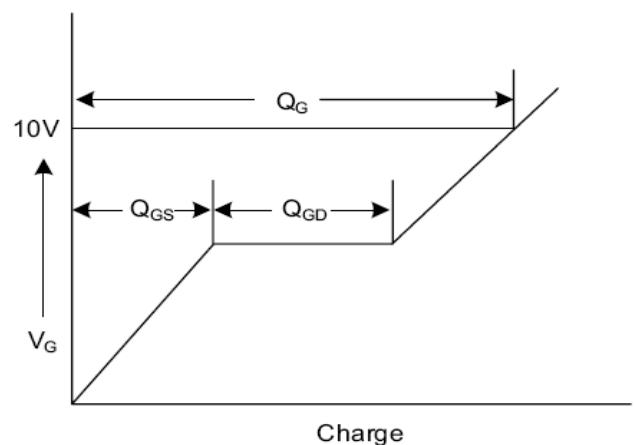

Fig. 3 . 2 Gate Charge Waveform
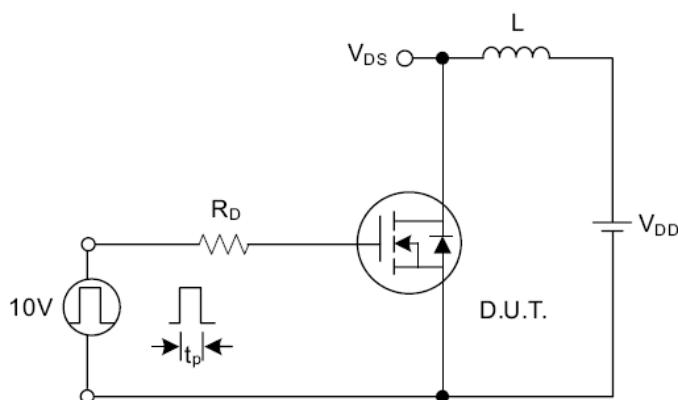

Fig. 4.1 Unclamped Inductive Switching Test Circuit
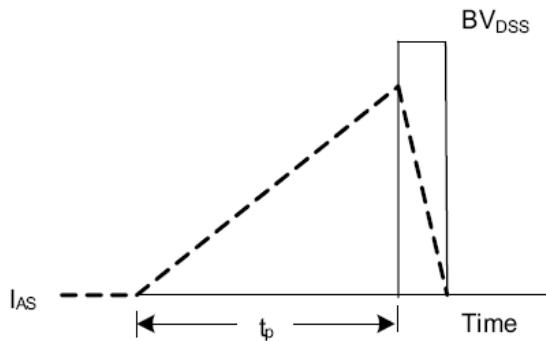
Fig. 4.2 Unclamped Inductive Switching Waveforms