

1500V N-Channel Power MOSFET



General Features

- RoHS Compliant
- $R_{DS(ON),typ.}=5.4\ \Omega @ V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

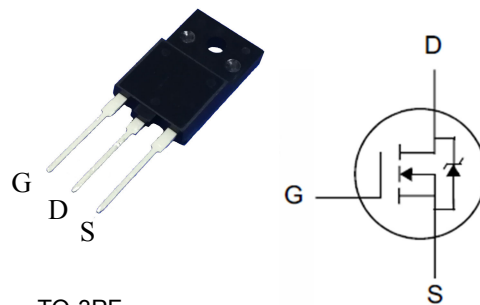
V_{DSS}	$R_{DS(ON),typ.}$	I_D
1500V	5.4 Ω	3A

Applications

- Adaptor
- Charger
- SMPS Standby Power

Ordering Information

Part Number	Package
SK03N150-T3F	TO-3PF



TO-3PF

Package No to Scale

Absolute Maximum Ratings

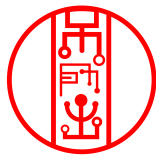
$T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter			Unit
V_{DSS}	Drain-to-Source Voltage	1500		V
V_{GSS}	Gate-to-Source Voltage	± 30		
I_D	Continuous Drain Current	3		A
I_{DM}	Pulsed Drain Current at $V_{GS}=10V$	12		
E_{AS}	Single Pulse Avalanche Energy, $L=30mH$	500		mJ
P_D	Power Dissipation	90	35	W
	Derating Factor above 25°C	0.72	0.28	W/ $^\circ\text{C}$
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300		$^\circ\text{C}$
$T_J \& T_{STG}$	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			Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.38	3.57	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	50	100	



Electrical Characteristics

OFF Characteristics

$T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	1500	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=1500V, V_{GS}=0V$
		--	--	500		$V_{DS}=1200V, V_{GS}=0V, T_J=125^\circ\text{C}$
I_{GSS}	Gate-to-Source Leakage Current	--	--	+100	nA	$V_{GS}=+30V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-30V, V_{DS}=0V$

ON Characteristics

$T_J = 25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	5.4	8.2	Ω	$V_{GS}=10V, I_D=2.0A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	--	4.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
gfs	Forward Transconductance	--	3.0	--	S	$V_{DS}=15V, I_D=3A$

Dynamic Characteristics

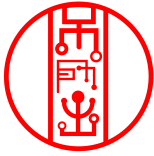
Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance	--	1600	--	pF	$V_{GS}=0V, V_{DS}=25V, f=1.0MHz$
C_{rss}	Reverse Transfer Capacitance	--	33	--		
C_{oss}	Output Capacitance	--	100	--		
Rg	Gate input resistance	--	4.5	--	Ω	f=1 MHz Gate DC Bias=0 Test signal level=20mV open drain
Q_g	Total Gate Charge	--	36	--	nC	$V_{DD}=750V, I_D=3A, V_{GS}=0 \text{ to } 10V$
Q_{gs}	Gate-to-Source Charge	--	9.5	--		
Q_{gd}	Gate-to-Drain (Miller) Charge	--	12	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	25	--	nS	$V_{DD}=750V, I_D=3A, V_{GS}=10V, R_g=4.7\Omega$
t_{rise}	Rise Time	--	48	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	57	--		
t_{fall}	Fall Time	--	52	--		



SK03N150-T3F

Source-Drain Body Diode Characteristics

$T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
I_{SD}	Continuous Source Current ^[2]	--	--	3	A	Integral pn-diode in MOSFET
I_{SM}	Pulsed Source Current ^[2]	--	--	12		
V_{SD}	Diode Forward Voltage	--	--	1.5	V	$I_S=3\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	255	--	ns	$V_{GS}=0\text{V}$ $I_F=3\text{A}$, $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	1.1	--	uC	

Typical Characteristics

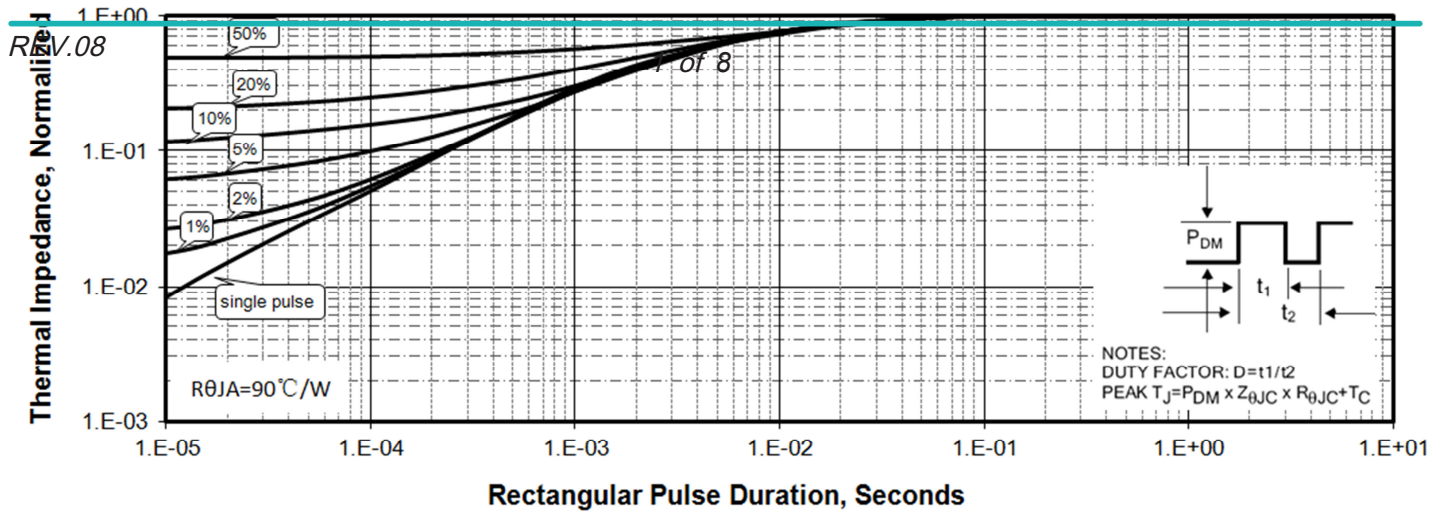


Figure 2 . Max. Power Dissipation vs Case Temperature

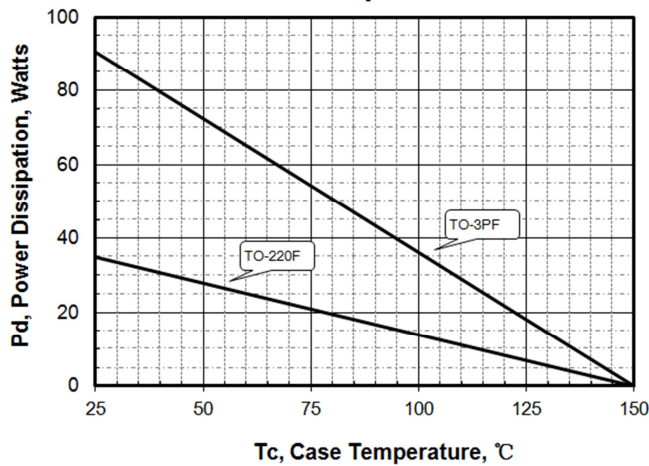


Figure 3 .Maximum Continuous Drain Current vs T_c

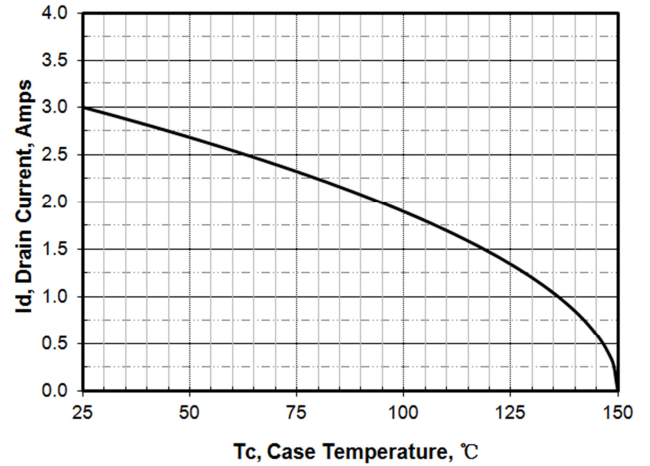


Figure 4. Output Characteristics

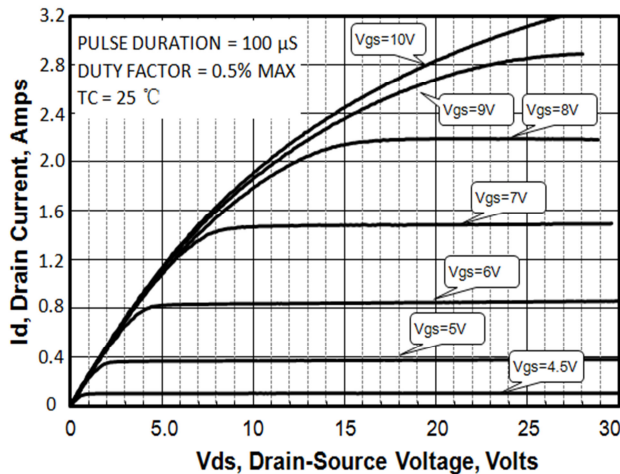
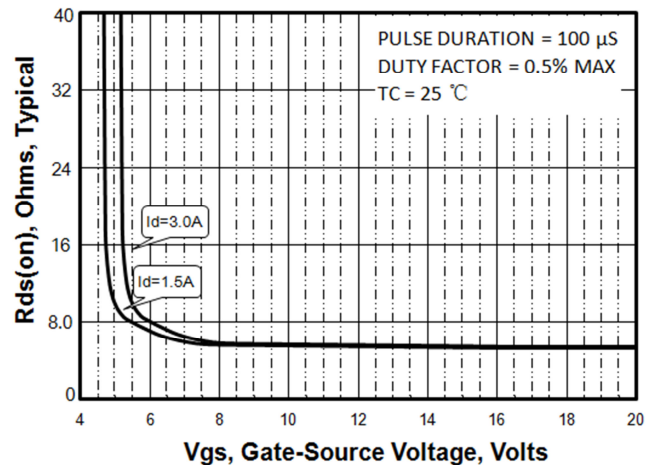


Figure 5. $R_{ds(on)}$ vs Gate Voltage



Typical Characteristics(Cont.)

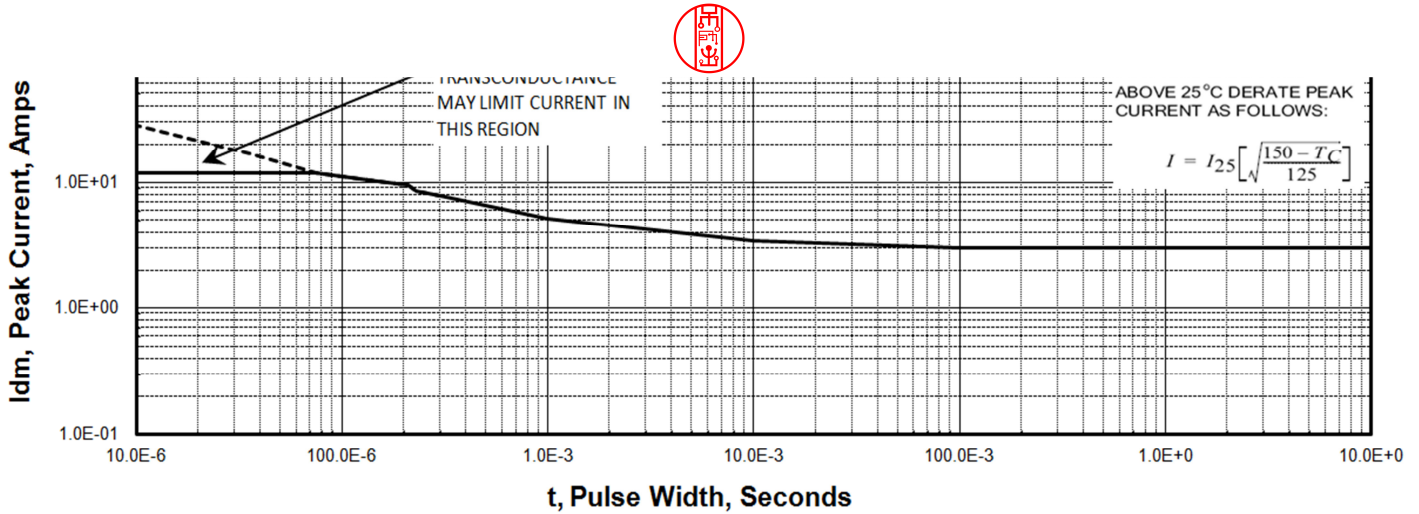


Figure 7. Transfer Characteristics

Figure 8. Unclamped Inductive Switching Capability

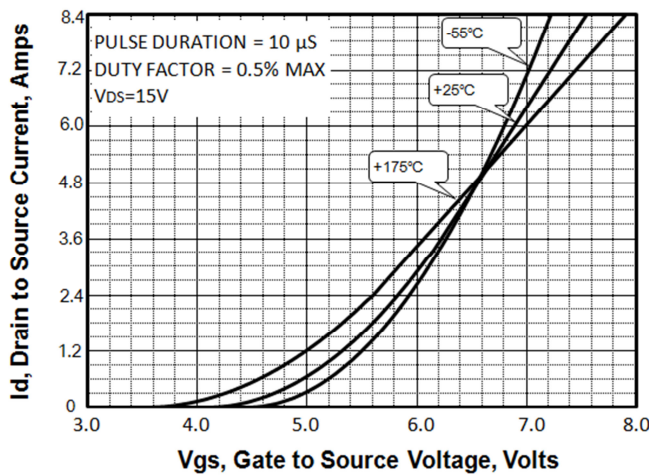


Figure 9. Drain to Source ON Resistance vs Drain Current

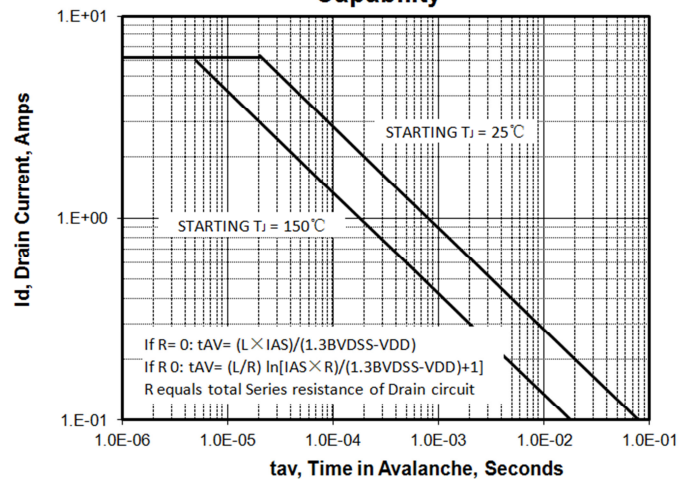
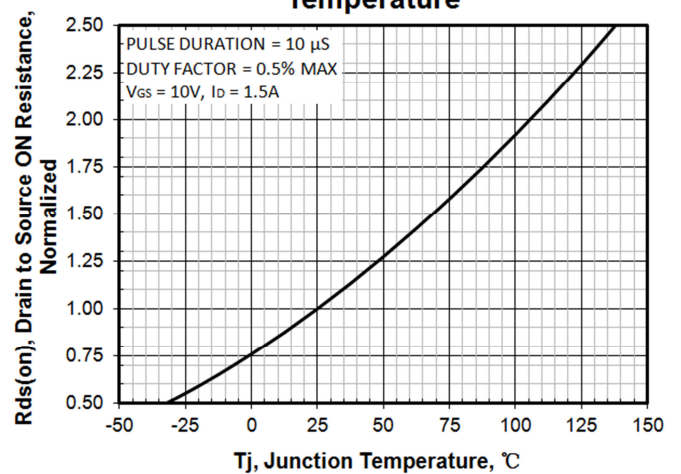
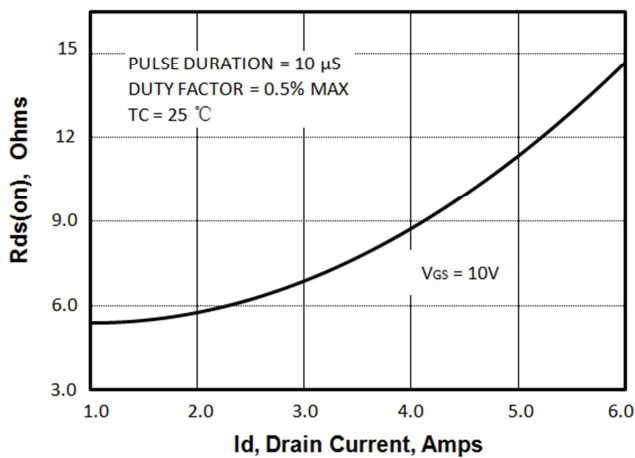


Figure 10. Rdson vs Junction Temperature



Typical Characteristics (Cont.)

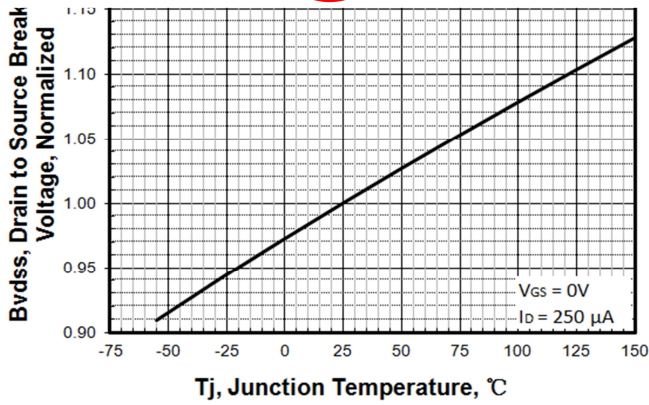


Figure 12. Threshold Voltage vs Temperature

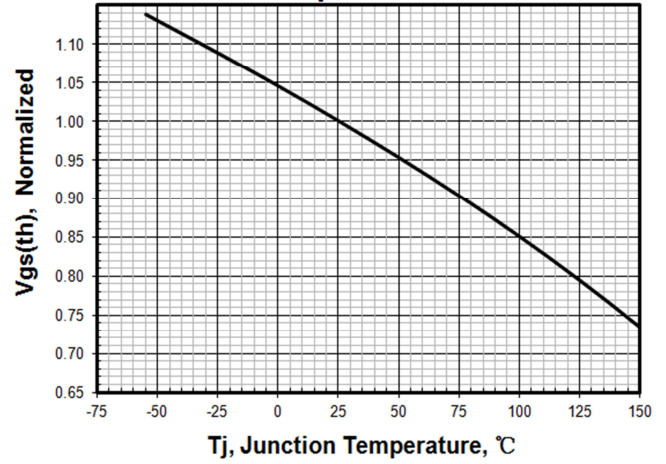


Figure 13 . Maximum Safe Operating Area(TO-3PF)

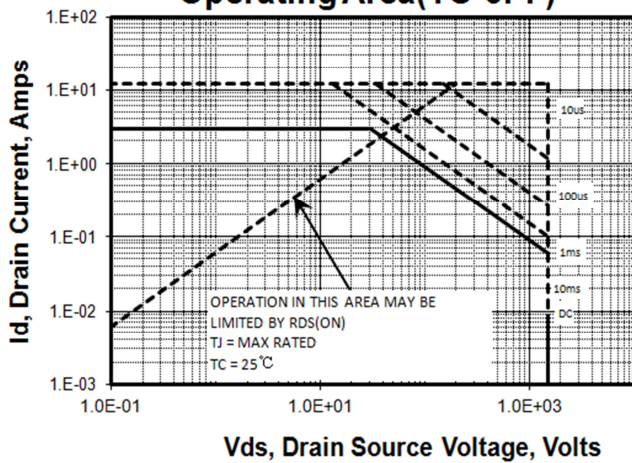


Figure 14 . Maximum Safe Operating Area(TO-220F)

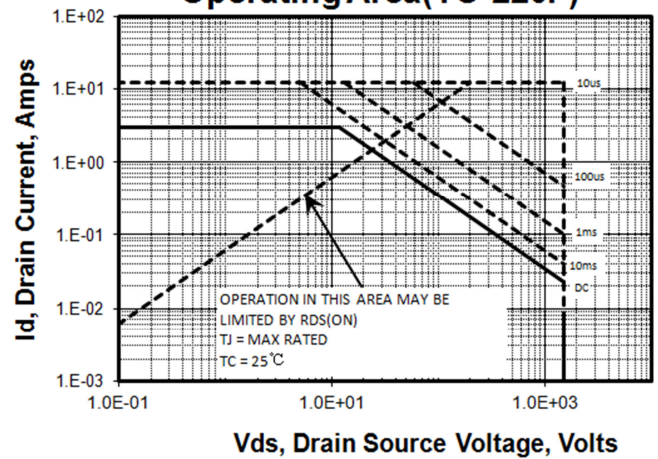


Figure 15. Capacitance vs Vds

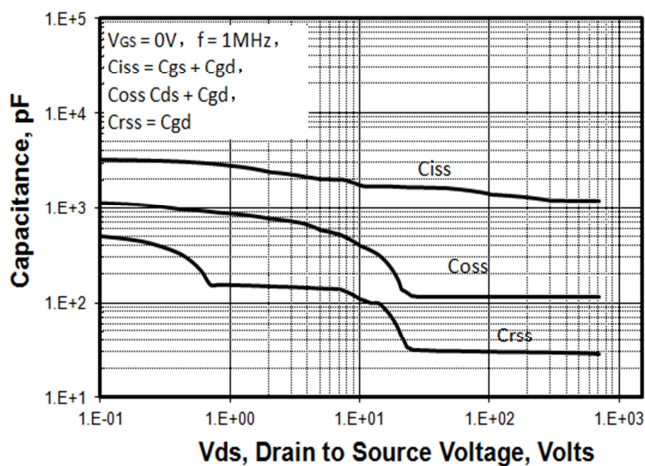
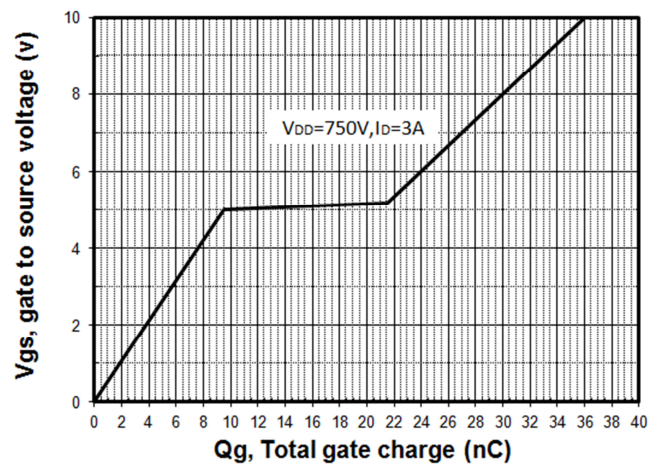


Figure 16 . Typical Gate Charge



Test Circuits and Waveforms

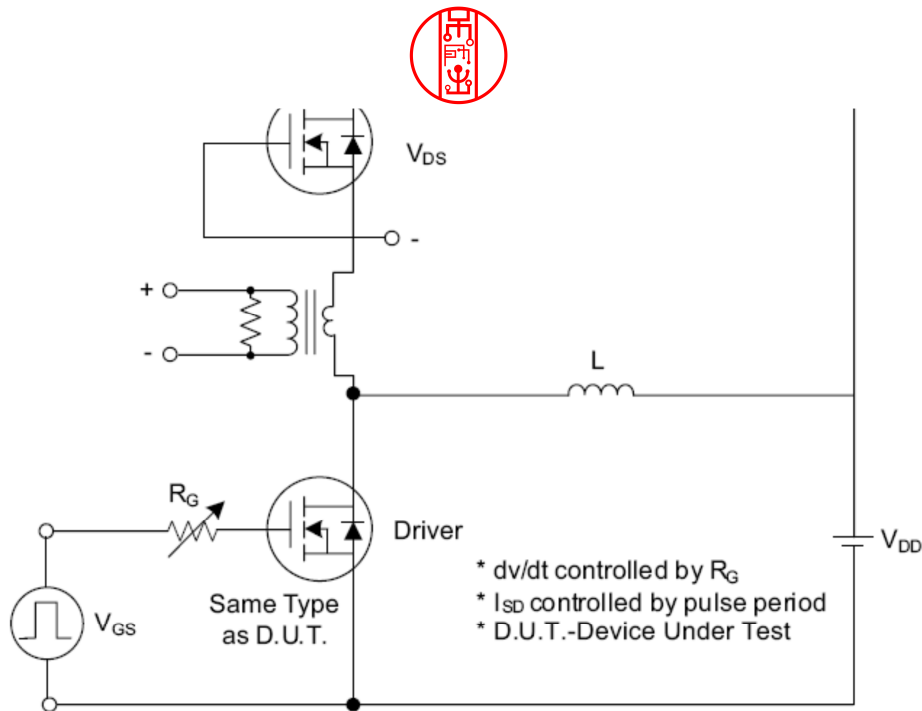


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

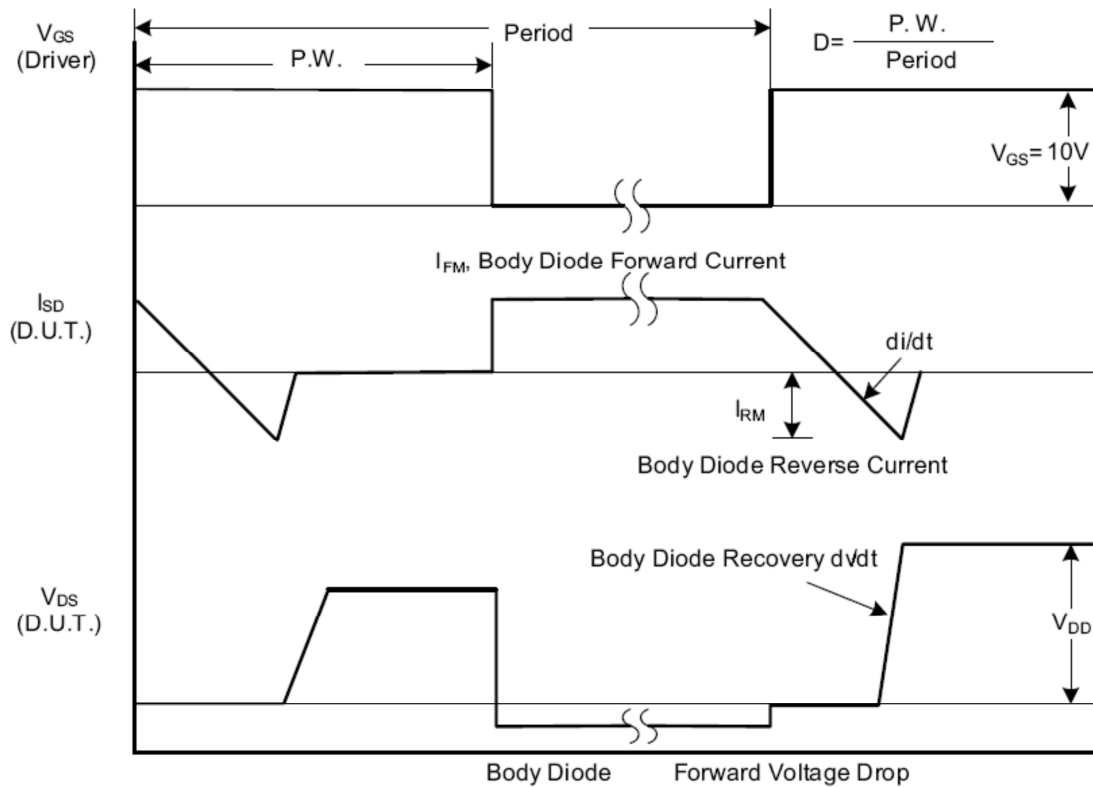


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

Test Circuits and Waveforms (Cont.)

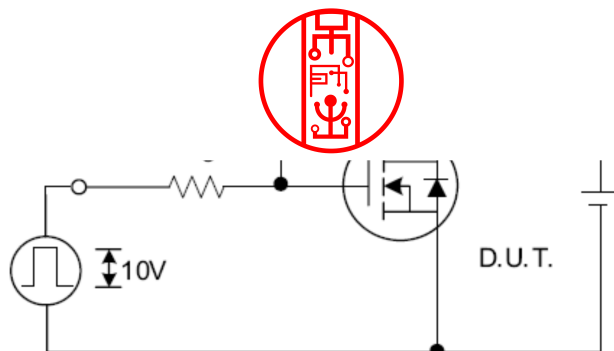


Fig. 2.1 Switching Test Circuit

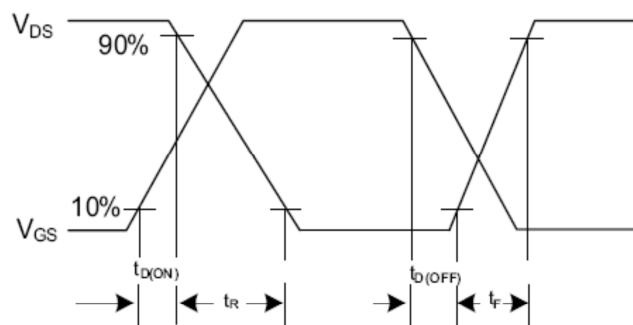


Fig. 2.2 Switching Waveforms

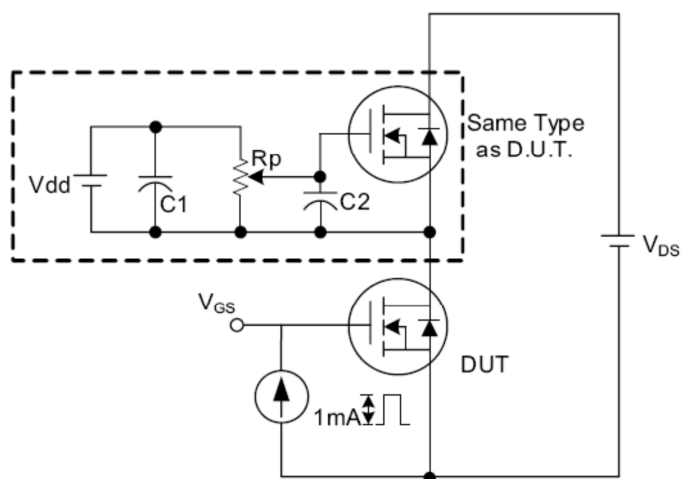


Fig. 3.1 Gate Charge Test Circuit

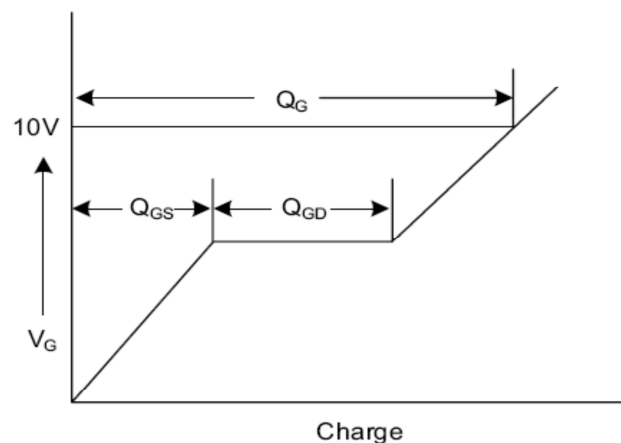


Fig. 3.2 Gate Charge Waveform

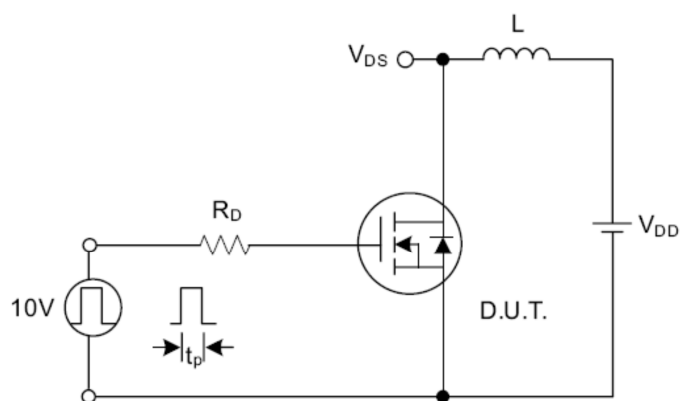


Fig. 4.1 Unclamped Inductive Switching Test Circuit

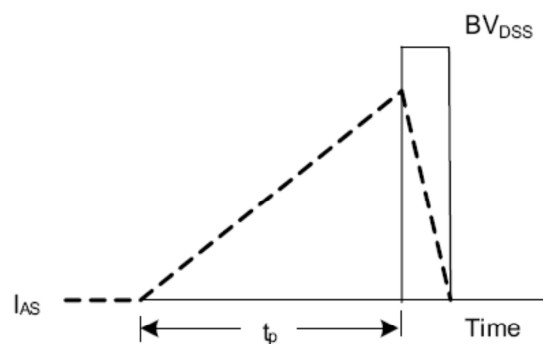


Fig. 4.2 Unclamped Inductive Switching Waveforms