FSU04N60A

N-Channel MOSFET

Lead Free Package and Finish

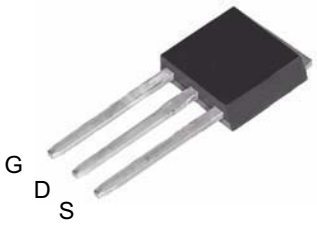
Applications:

- Adaptor
- TV Main Power
- SMPS Power Supply
- LCD Panel Power

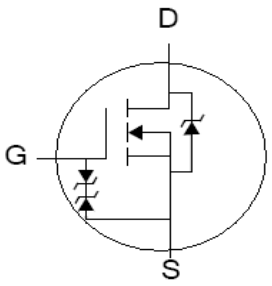
V_{DSS}	$R_{DS(ON)}$ (Typ.)	I_D
600 V	1.9 Ω	4 A

Features:

- RoHS Compliant
- Low ON Resistance
- Low Gate Charge
- ESD improved Capability



TO-251
Not to Scale



Ordering Information

PART NUMBER	PACKAGE	BRAND
FSU04N60A	TO-251	FSU04N60A

Absolute Maximum Ratings T_C=25 °C unless otherwise specified

Symbol	Parameter		FSU04N60A	Units
V_{DSS}	Drain-to-Source Voltage	(NOTE *1)	600	V
I_D	Continuous Drain Current		4*	A
I_D@ 100 °C	Continuous Drain Current		2.9	
I_{DM}	Pulsed Drain Current, V_{GS}@ 10V	(NOTE *2)	16	
P_D	Power Dissipation		86	W
	Derating Factor above 25°C		0.69	W/°C
V_{GS}	Gate-to-Source Voltage		± 20	V
E_{AS}	Single Pulse Avalanche Engergy L=10 mH		300	mJ
I_{AS}	Pulsed Avalanche Rating		Figure 16	A
dv/dt	Peak Diode Recovery dv/dt	(NOTE *3)	5.0	V/ns
$V_{ESD(G-S)}$	Gate to Source ESD (HBM-C=100pF, R=1.5KΩ)		3000	V
T_L T_{PKG}	Maximum Temperature for Soldering Leads at 0.063 in (1.6 mm) from Case for 10 seconds Package Body for 10 seconds		300 260	°C
T_J and T_{STG}	Operating Junction and Storage Temperature Range		-55 to 150	

** Drain Current Limited by Maximum Junction Temperature*

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

Thermal Resistance

Symbol	Parameter	FSU04N60A	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	1.45	°C/W	Drain lead soldered to water cooled heatsink, P_D adjusted for a peak junction temperature of +150 °C.
$R_{\theta JA}$	Junction-to-Ambient	62.5		1 cubic foot chamber, free air.

OFF Characteristics T_J=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	600	--	--	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta T_J$	BreakdownVoltage Temperature Coefficient, Figure 11.	--	0.67	--	V/°C	Reference to 25°C, I_D=250μA
I_{DSS}	Drain-to-Source Leakage Current	--	--	25	μA	V_{DS}=600V, V_{GS}=0V
		--	--	250		V_{DS}=480V, V_{GS}=0V T_J=125°C
I_{GSS}	Gate-to-Source Forward Leakage	--	--	10	uA	V_{GS}=+20V
	Gate-to-Source Reverse Leakage	--	--	-10		V_{GS}= -20V

ON Characteristics T_J=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance Figure 9 and 10.	--	1.9	2.3	Ω	V_{GS}=10V, I_D=2.0A (NOTE *4)
$V_{GS(TH)}$	Gate Threshold Voltage, Figure 12.	2.0	--	4.0	V	V_{DS}=V_{GS}, I_D=250μA
gfs	Forward Transconductance	--	5.0	--	S	V_{DS}=15V, I_D=2.0A (NOTE *4)

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C_{iss}	Input Capacitance	--	470	--	pF	V_{GS}=0V V_{DS}=25V f=1.0MHz
C_{oss}	Output Capacitance	--	58	--		
C_{rss}	Reverse Transfer Capacitance	--	15	--		
Q_g	Total Gate Charge	--	18	--	nC	V_{DD}=300V I_D=4A, Vgs=10V
Q_{gs}	Gate-to-Source Charge	--	2.2	--		
Q_{gd}	Gate-to-Drain (“Miller”) Charge	--	10	--		

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	12	--	ns	V_{DD}=300V I_D=4A V_{GS}=10V R_G=4.7Ω
t_{rise}	Rise Time	--	46	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	50	--		
t_{fall}	Fall Time	--	48	--		

Source-Drain Diode Characteristics T_C=25 °C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	--	--	4	A	Integral pn-diode in MOSFET
I_{SM}	Maximum Pulsed Current (Body Diode)	--	--	16	A	
V_{SD}	Diode Forward Voltage	--	--	1.5	V	I_S=4A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	328	--	ns	V_{GS}=0V
Q_{rr}	Reverse Recovery Charge	--	1.07	--	uC	I_F=4A, di/dt=100 A/μs

Notes:

*1. T_J = +25 °C to +150 °C.

*2. Repetitive rating; pulse width limited by maximum junction temperature.

*3. I_{SD}= 4 A, di/dt <_100 A/μs, V_{DD} <_BV_{DSS}, T_J=+150 °C.

*4. Pulse width ≤ 380μs; duty cycle ≤ 2%.

Characteristics Curve:

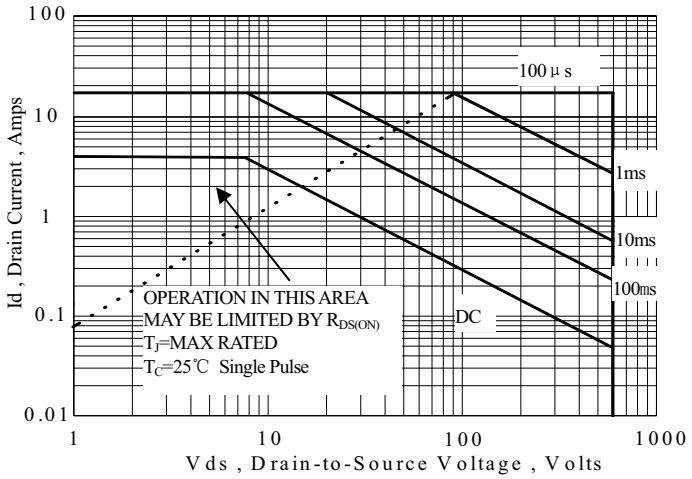


Figure 1 Maximun Forward Bias Safe Operating Area

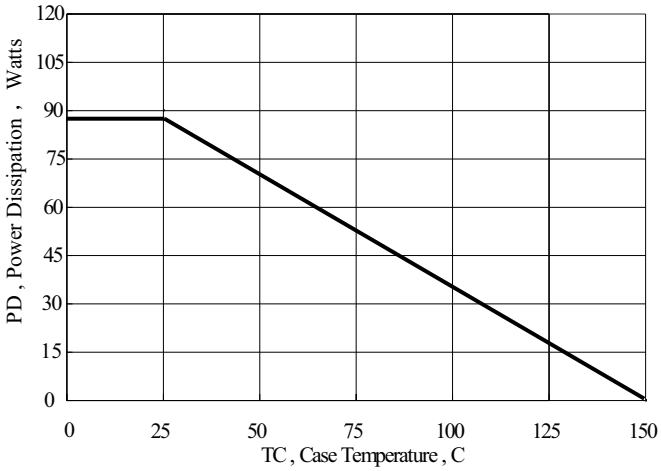


Figure 2 Maximun Power Dissipation vs Case Temperature

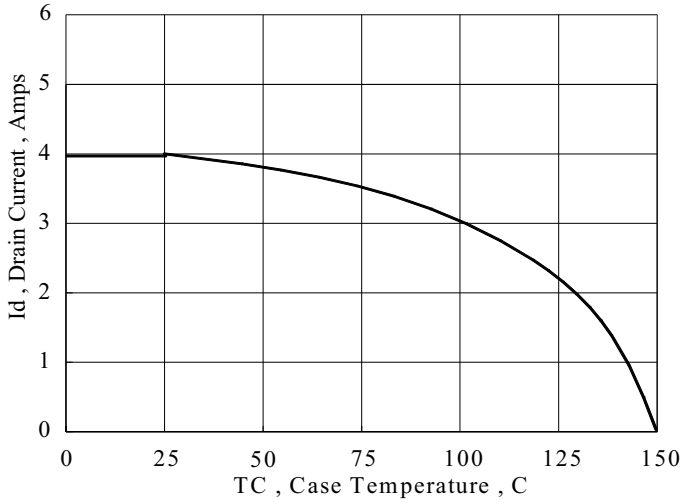


Figure 3 Maximum Continuous Drain Current vs Case Temperature

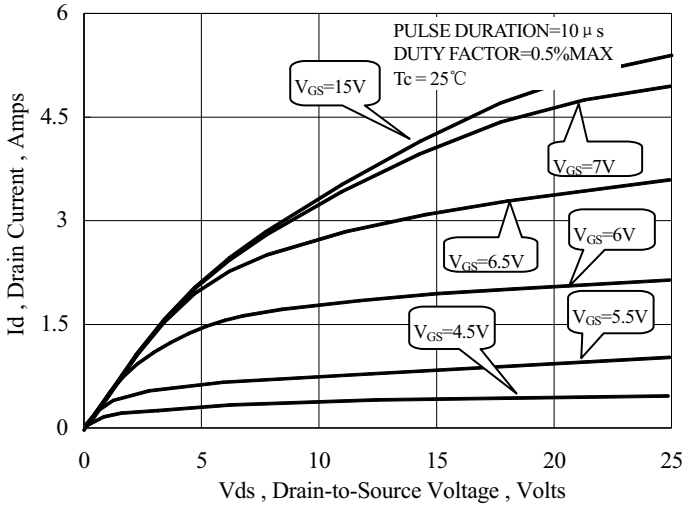


Figure 4 Typical Output Characteristics

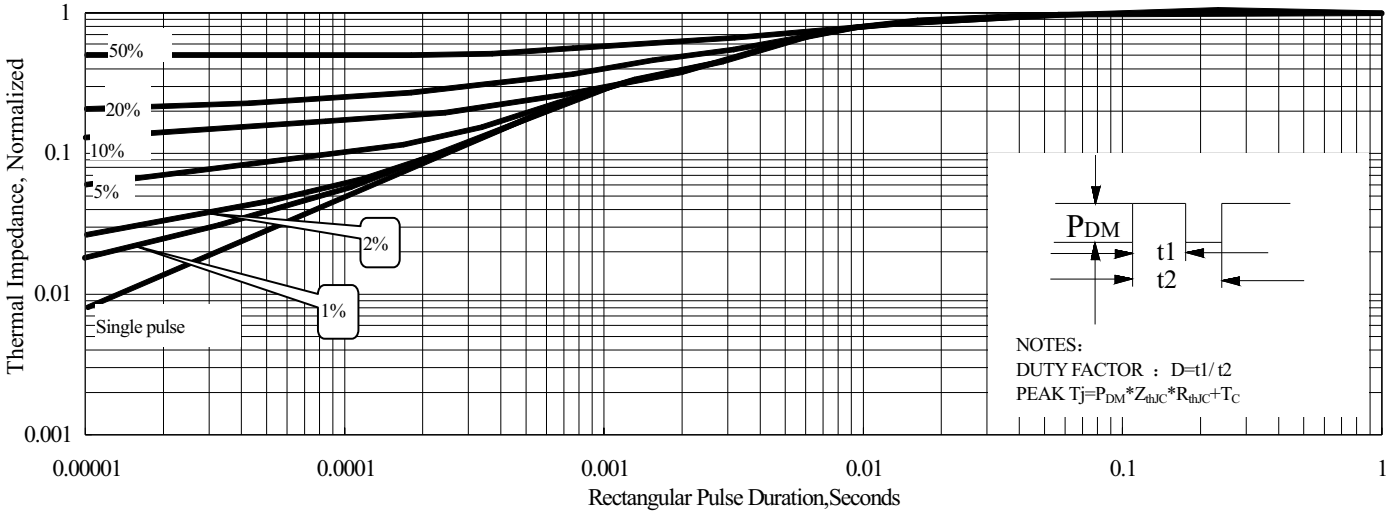


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

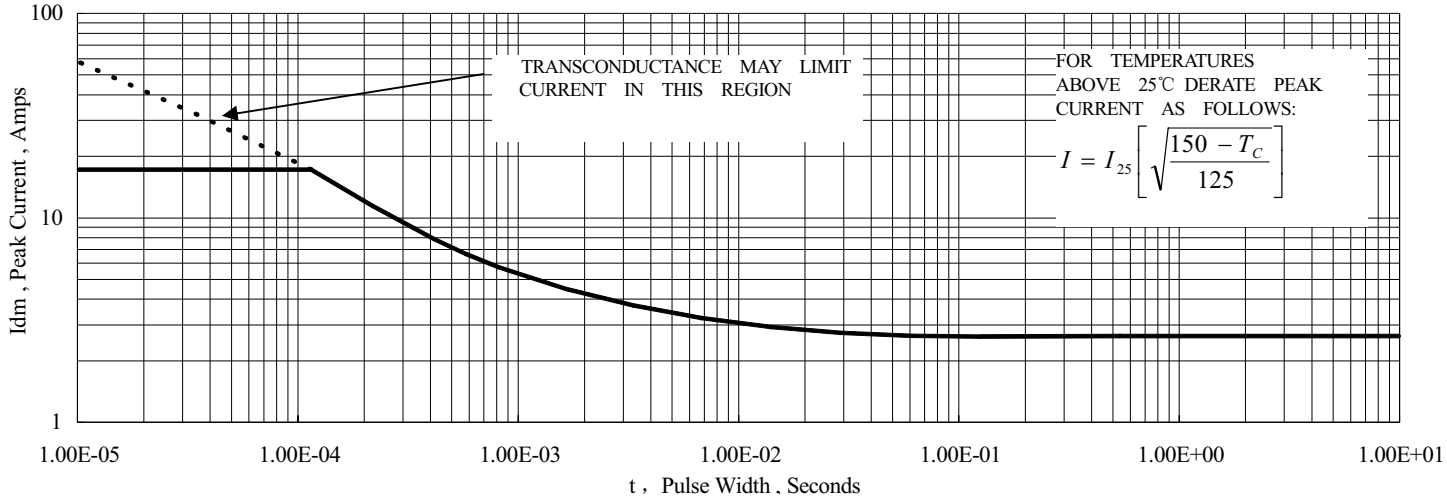


Figure 6 Maximun Peak Current Capability

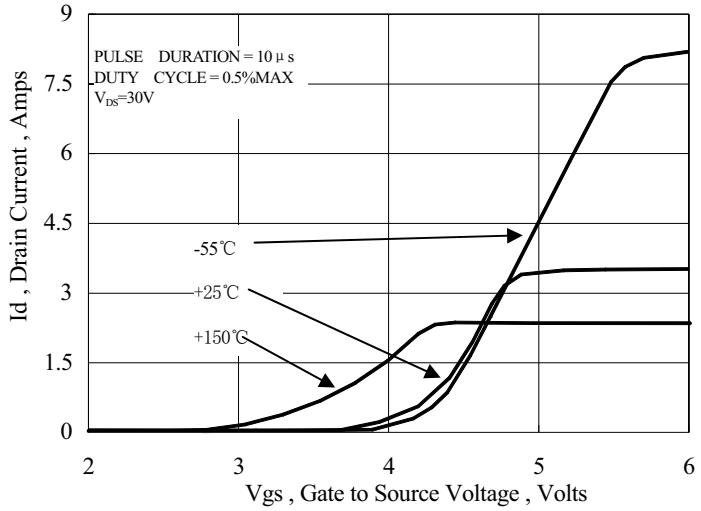


Figure 7 Typical Transfer Characteristics

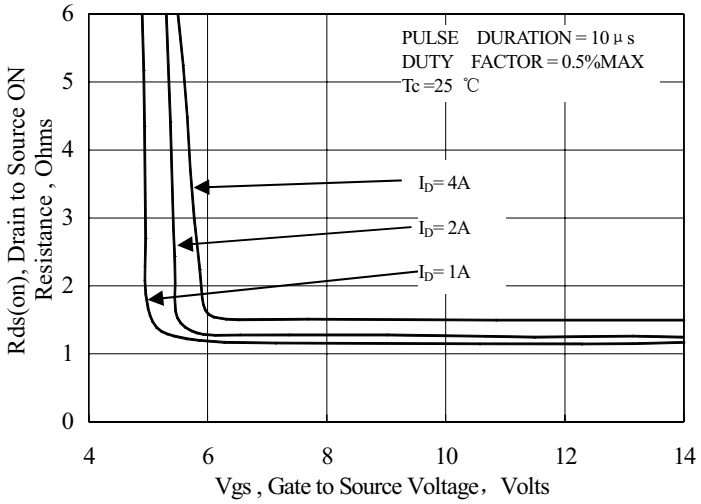


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

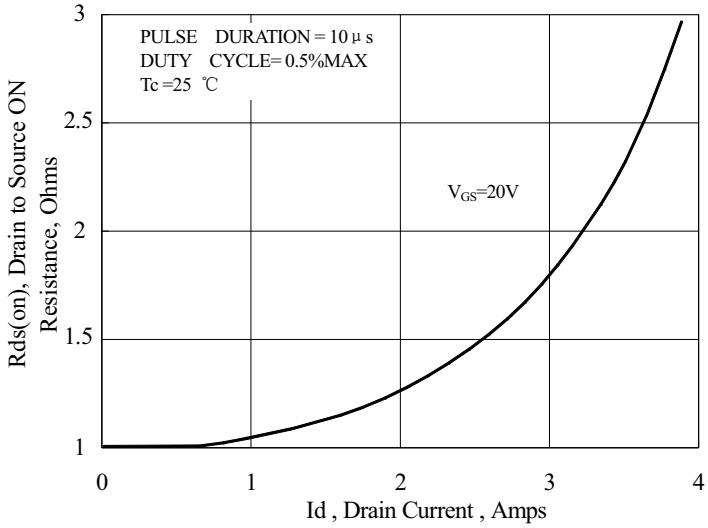


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

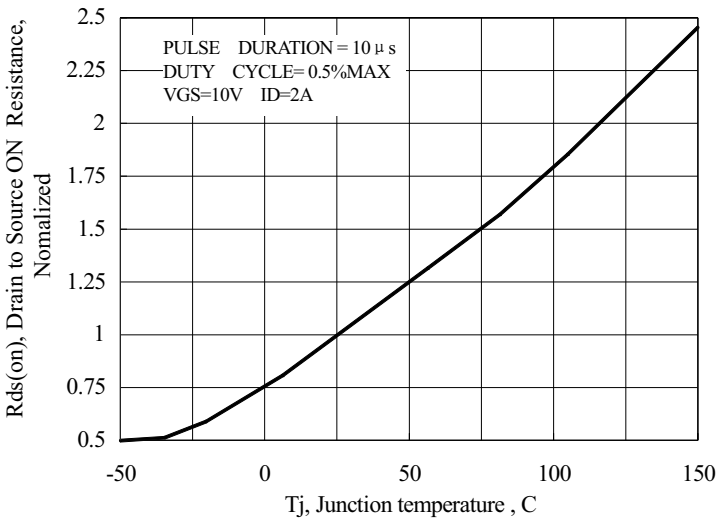


Figure 10 Typical Drian to Source on Resistance vs Junction Temperature

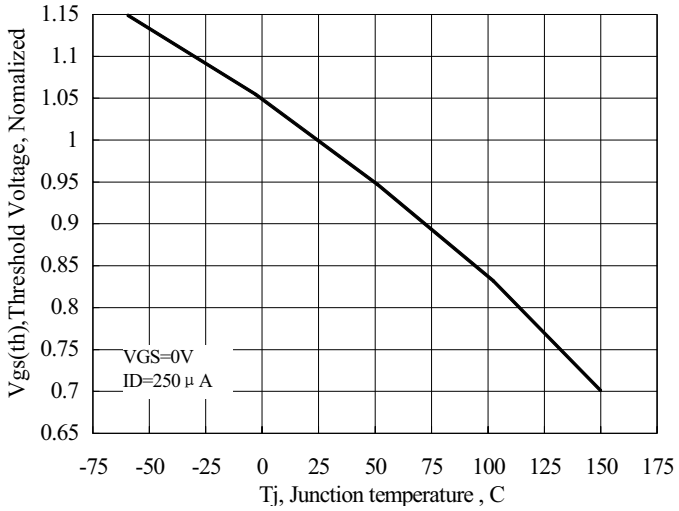


Figure 11 Typical Theshold Voltage vs Junction Temperature

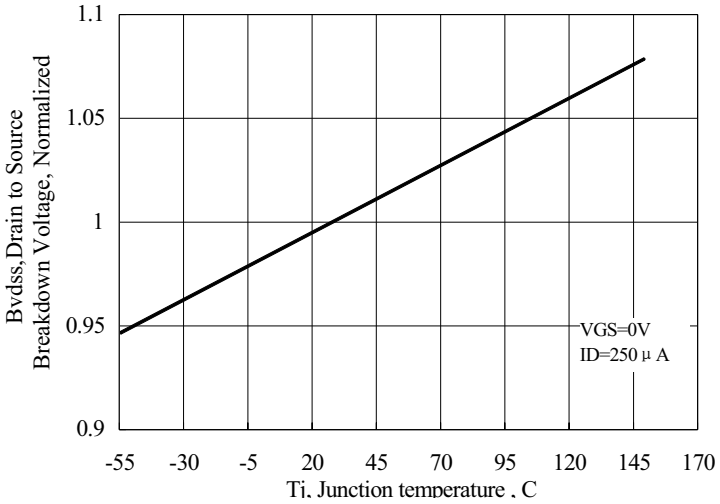


Figure 12 Typical Breakdown Voltage vs Junction Temperature

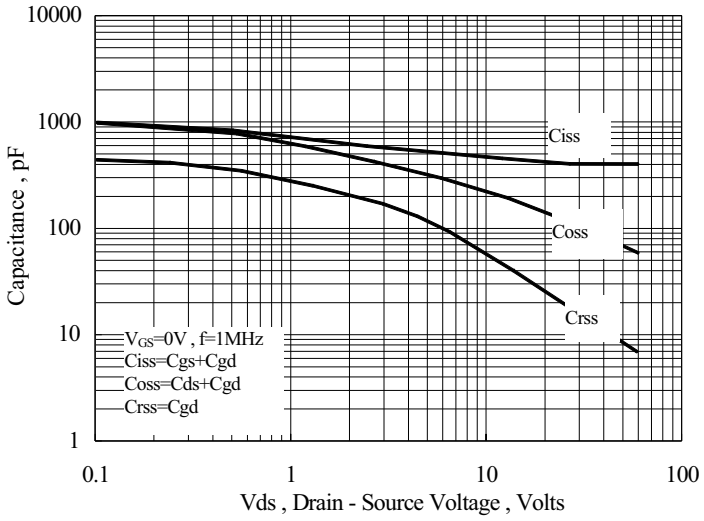


Figure 13 Typical Capacitance vs Drain to Source Voltage

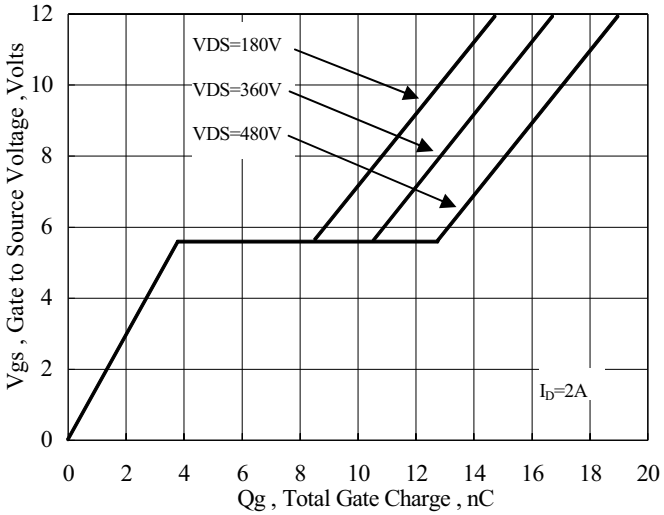


Figure 14 Typical Gate Charge vs Gate to Source Voltage

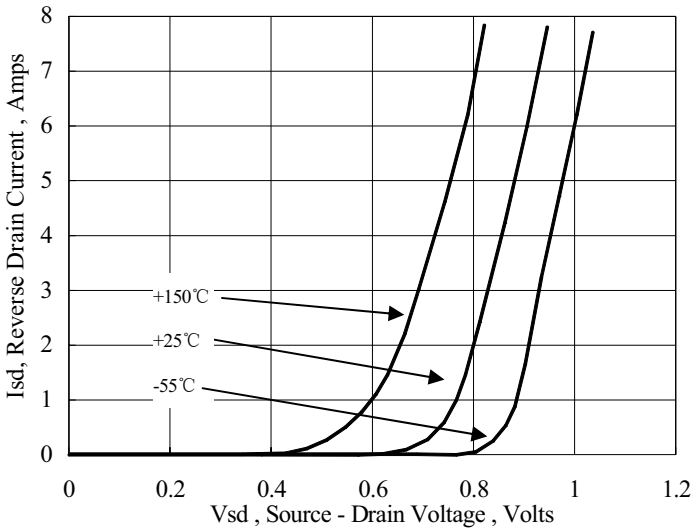


Figure 15 Typical Body Diode Transfer Characteristics

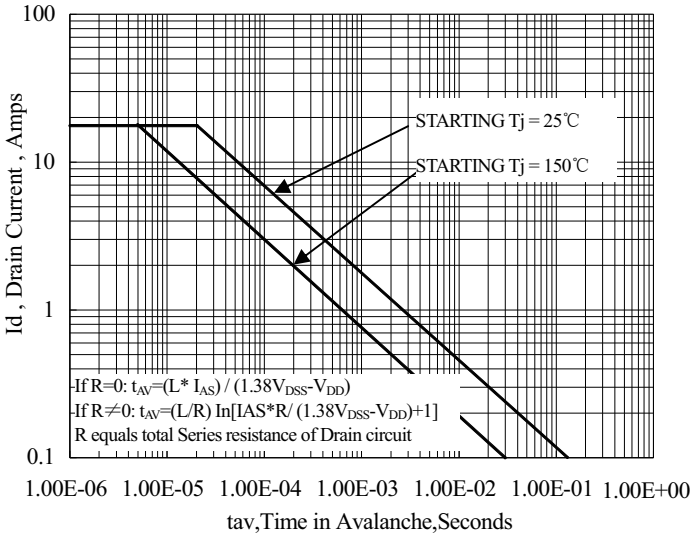


Figure 16 Unclamped Inductive Switching Capability

TEST CIRCUITS AND WAVEFORMS

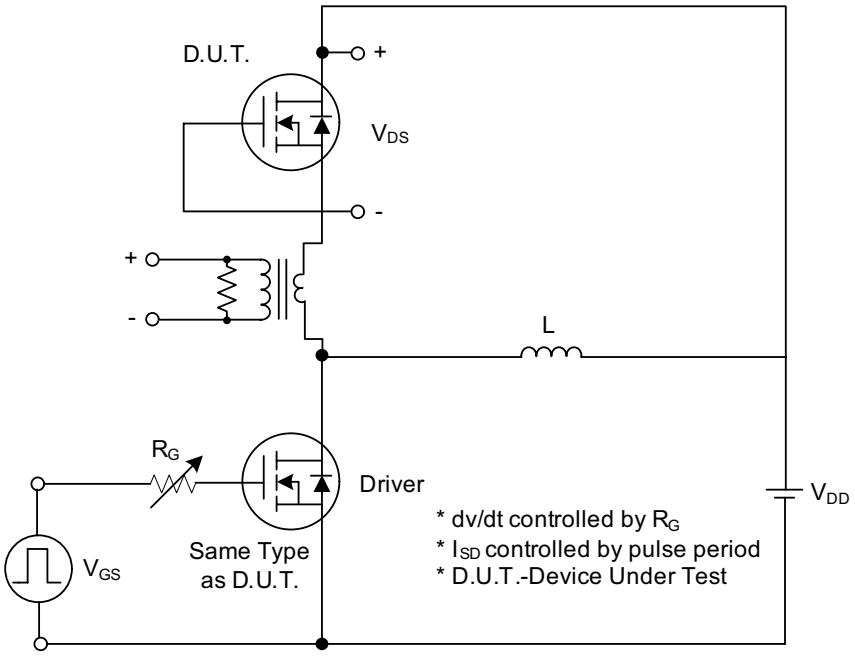


Fig. 1.1 Peak Diode Recovery dv/dt Test Circuit

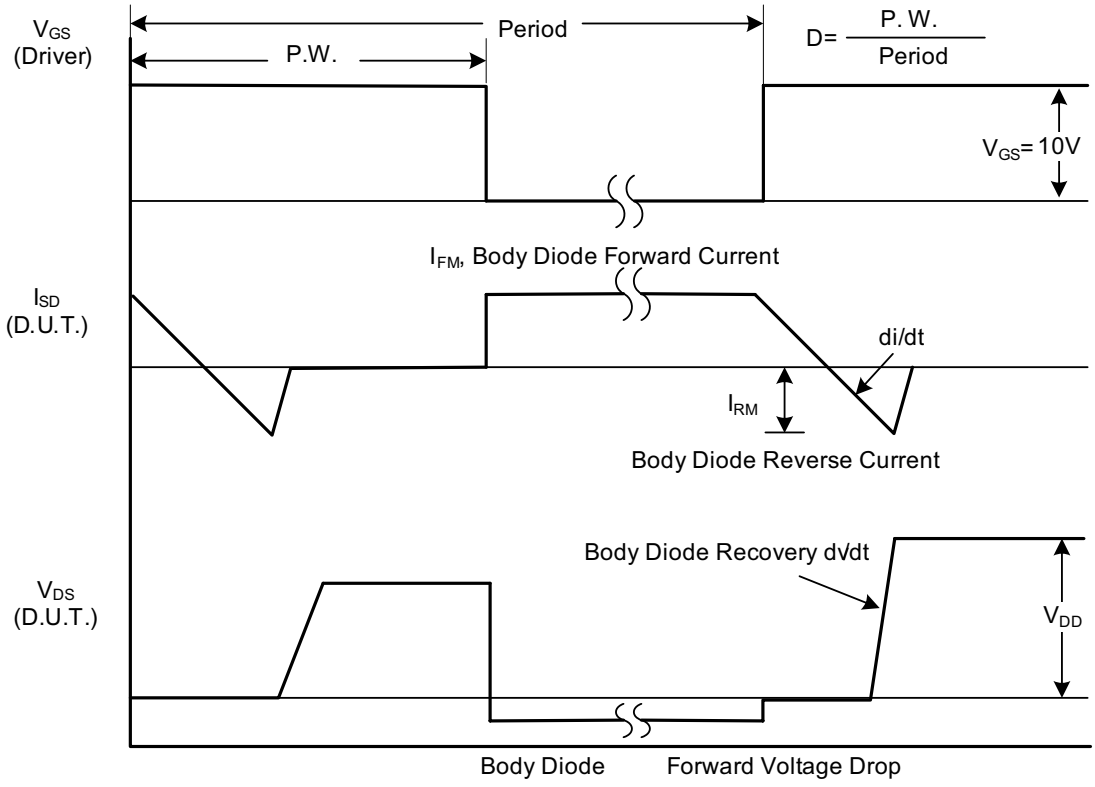


Fig. 1.2 Peak Diode Recovery dv/dt Waveforms

TEST CIRCUITS AND WAVEFORMS (Cont.)

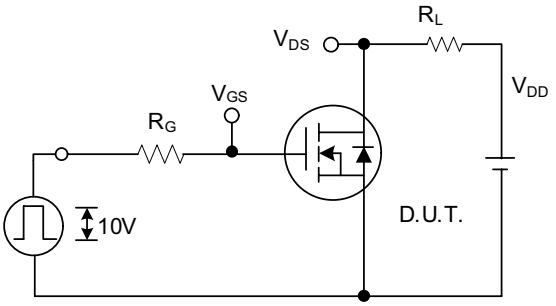


Fig. 2.1 Switching Test Circuit

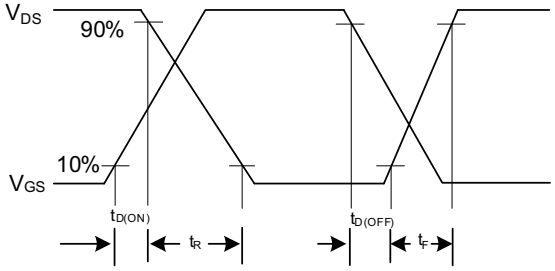


Fig. 2.2 Switching Waveforms

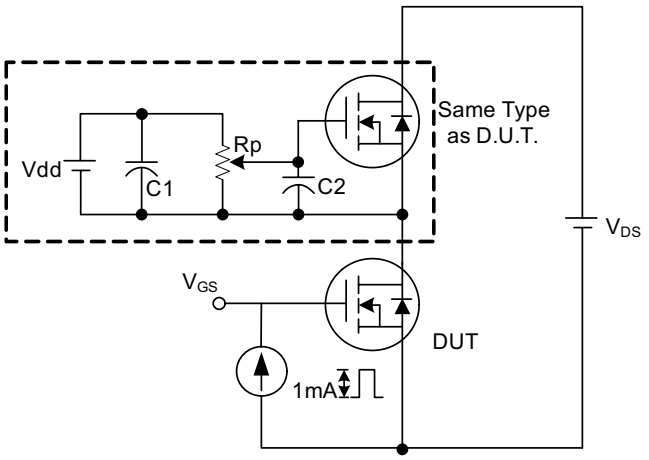


Fig. 3 . 1 Gate Charge Test Circuit

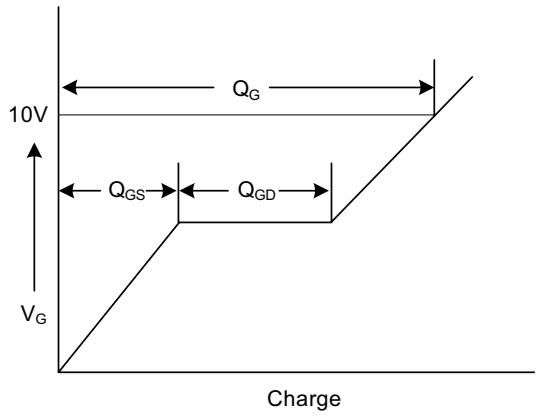


Fig. 3 . 2 Gate Charge Waveform

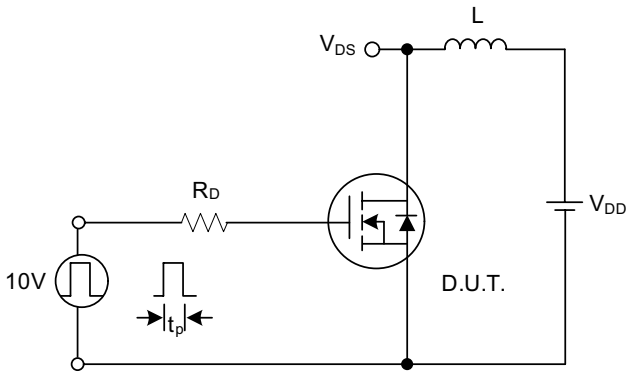


Fig. 4.1 Unclamped Inductive Switching Test Circuit

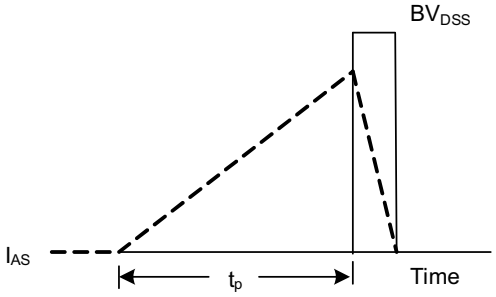


Fig. 4.2 Unclamped Inductive Switching Waveforms

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