ITU04N60R

N-Channel MOSFET

Lead Free Package and Finish

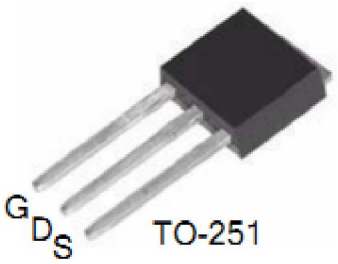
Applications:

- Adaptor
- Charger
- SMPS

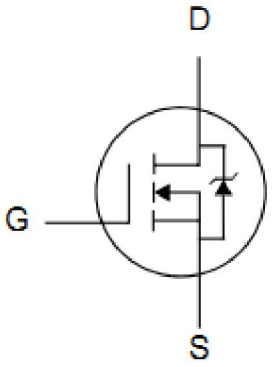
V_{DSS}	$R_{DS(ON)}$(Typ.)	I_D
600V	2.1Ω	4A

Features:

- RoHS Compliant
- Low ON Resistance
- Low Gate Charge
- Peak Current vs Pulse Width Curve
- Inductive Switching Curves



Packages
Not to Scale



Ordering Information

PART NUMBER	PACKAGE	BRAND
ITU04N60R	TO-251	***IPS***

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	ITU04N60R	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	4	A
I_{DM}	Pulsed Drain Current, V_{GS}@10V (NOTE *2)	16	A
P_D	Power Dissipation	75	W
	Derating Factor above 25℃	0.6	W/℃
V_{GS}	Gate-to-Source Voltage	±30	V
E_{AS}	Single Pulse Avalanche Energy（L=10mH）	250	mJ
T_L	Maximum Temperature for Soldering	300	℃
T_J and T_{STG}	Operating Junction and Storage Temperature Range (NOTE *1)	150，-55 to150	

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	1.67		℃/W	Water cooled heatsink, P_D adjusted for a peak junction temperature of +150℃.
$R_{\theta JA}$	Junction-to-Ambient	100			1 cubic foot chamber, free air.

OFF Characteristics T_C=25℃ 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
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	V_{DS}=600V, V_{GS}=0V T_J=25℃
		--	--	100		V_{DS}=480V, V_{GS}=0V T_J=125℃
I_{GSS}	Gate-to-Source Forward Leakage	--	--	+100	nA	V_{GS}=+30V
	Gate-to-Source Reverse Leakage	--	--	-100		V_{GS}= -30V

ON Characteristics T_J=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(ON)}$	StaticDrain-to-Source On-Resistance(NOTE *3)	--	2.1	2.5	Ω	V_{GS}=10V, I_D=2A
$V_{GS(TH)}$	Gate Threshold Voltage	2	--	4	V	V_{DS}=V_{GS},I_D=250μA
g_{fs}	Forward Transconductance(NOTE *3)	--	3.5	--	S	V_{DS}=15V, I_D=2A

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C_{iss}	Input Capacitance	--	590	--	pF	V_{GS}= 0V,V_{DS} = 25V f =1.0MHz
C_{oss}	Output Capacitance	--	55	--		
C_{rss}	Reverse Transfer Capacitance	--	4	--		
Q_g	Total Gate Charge	--	14.5	--	nC	I_D=4A,V_{DD}=480V V_{GS} = 10V
Q_{gs}	Gate-to-Source Charge	--	2.6	--		
Q_{gd}	Gate-to-Drain (“Miller”) Charge	--	6.5	--		

Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	14		ns	V_{DD}=300V, I_D=4A, V_G=10V R_G=10Ω
t_{rise}	Rise Time	--	15			
$t_{d(OFF)}$	Turn-Off Delay Time	--	34			
t_{fall}	Fall Time	--	13			

Source-Drain Diode Characteristics Tc=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	--	--	4	A	T_C=25℃
I_{SM}	Maximum Pulsed Current (Body Diode)	--	--	16	A	
V_{SD}	Diode Forward Voltage	--	--	1.5	V	I_{SD}=4A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	250	--	ns	I_F= I_S di/dt=100A/us
Q_{rr}	Reverse Recovery Charge	--	1	--	uC	

Notes:

*1. T_J = +25℃ to +150℃.

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

*3. Pulse width < 380μs; duty cycle < 2%.

Characteristics Curve：

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

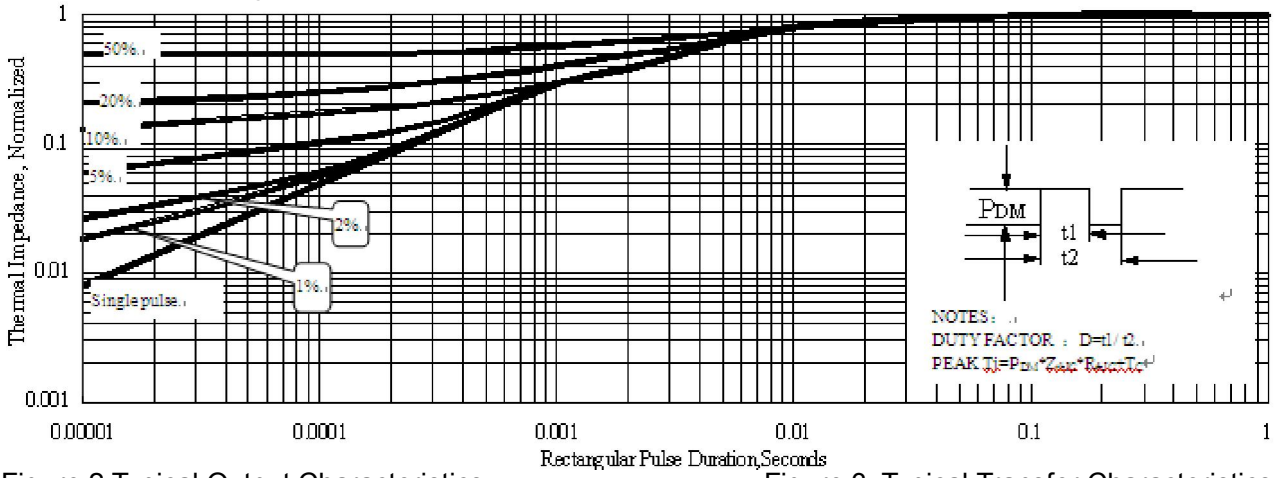


Figure 2.Typical Output Characteristics

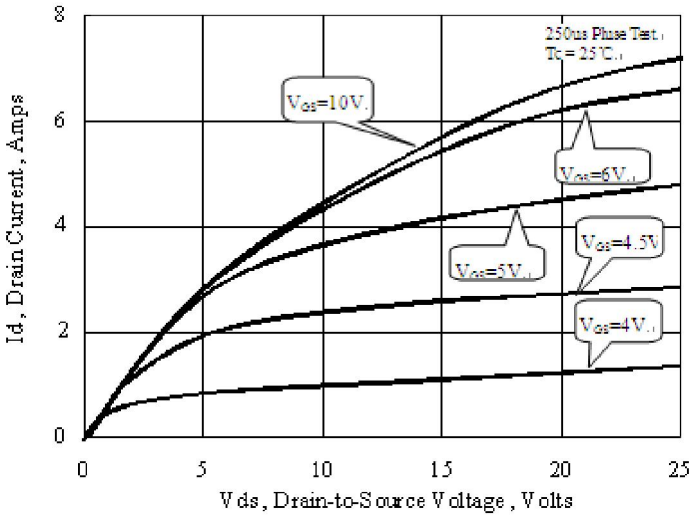


Figure 3. Typical Transfer Characteristics

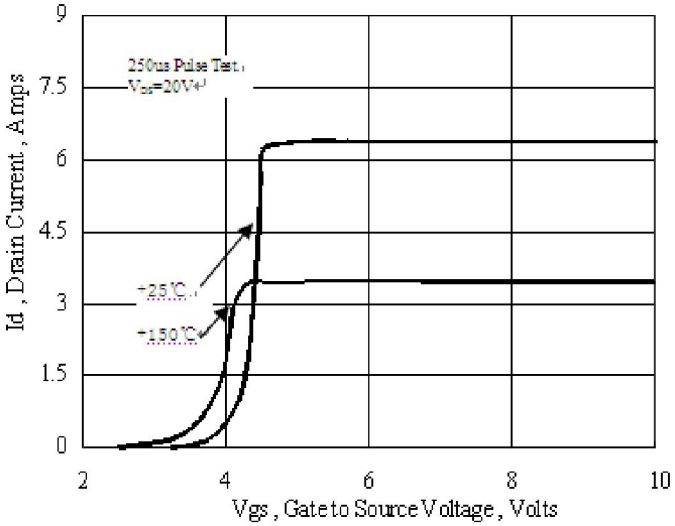


Figure 4. Typical Body Diode Transfer Characteristics

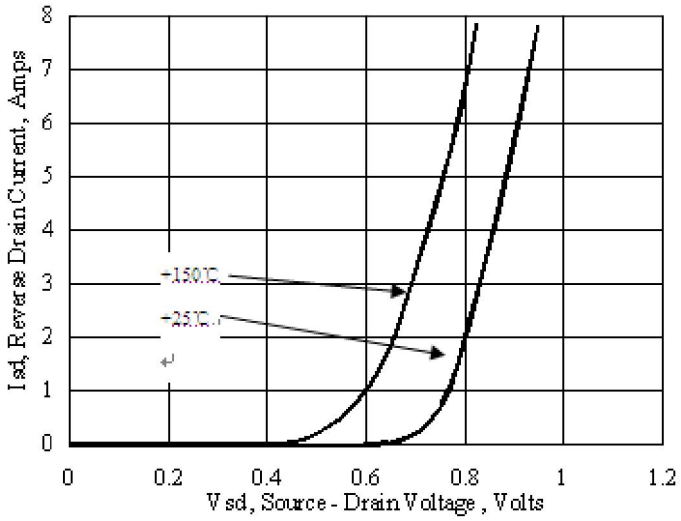


Figure 5. Typical Drain-to-source on ResistanceVS Drain Current

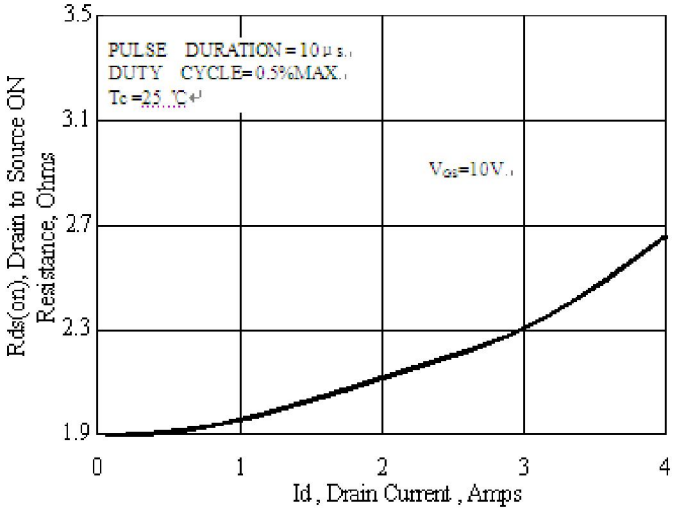


Figure 6. Capacitance VS Drain-to-Source Voltage

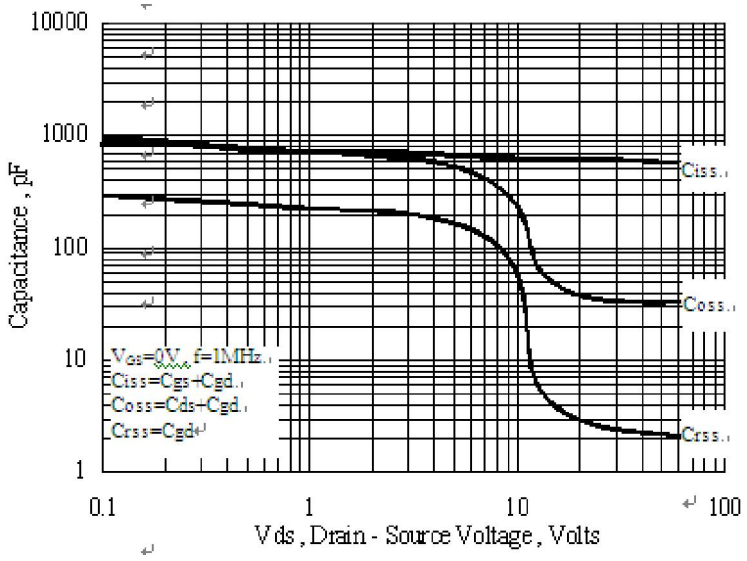


Figure 7. Gate Charge VS Gate-to-Source Voltage

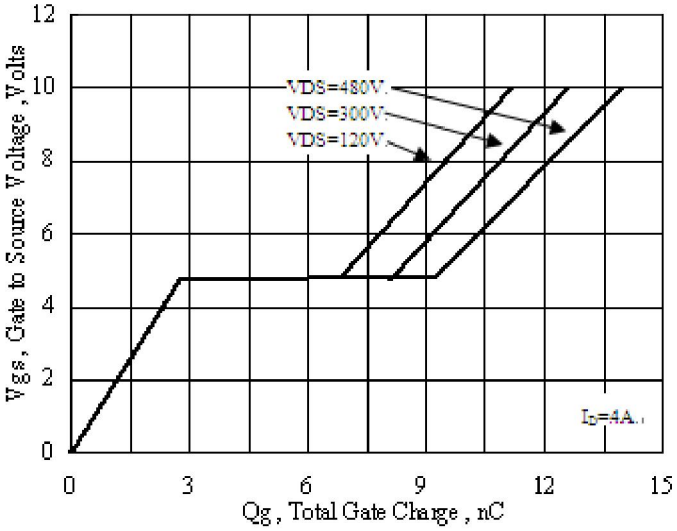


Figure 8. Breakdown Voltage VS Temperature

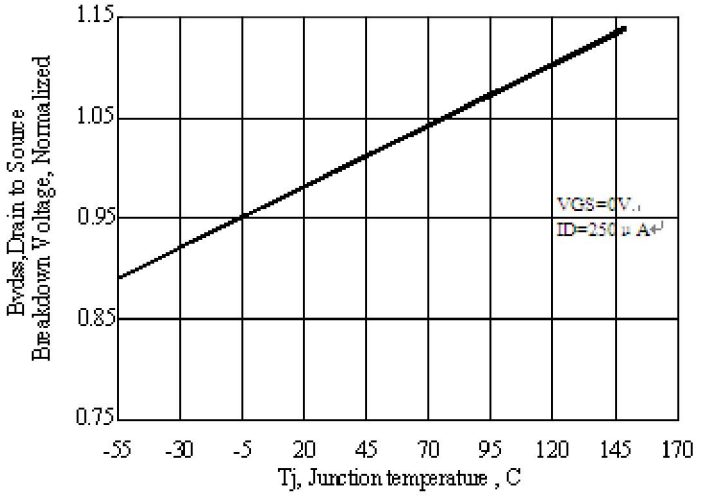


Figure 9. on-Resistance VS Temperature

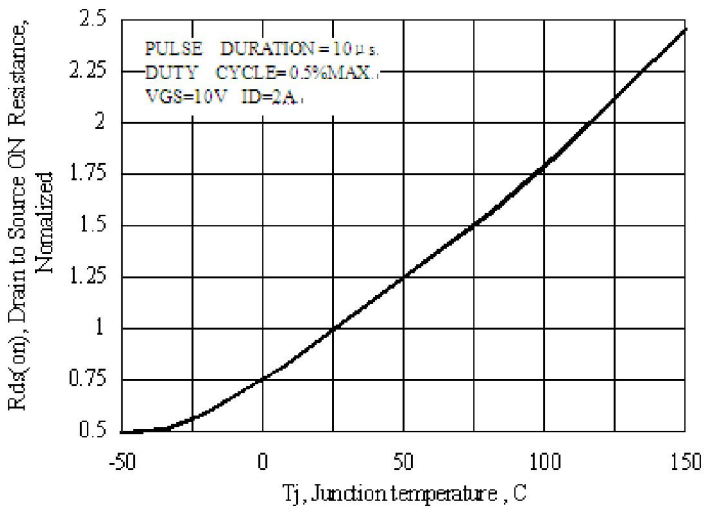
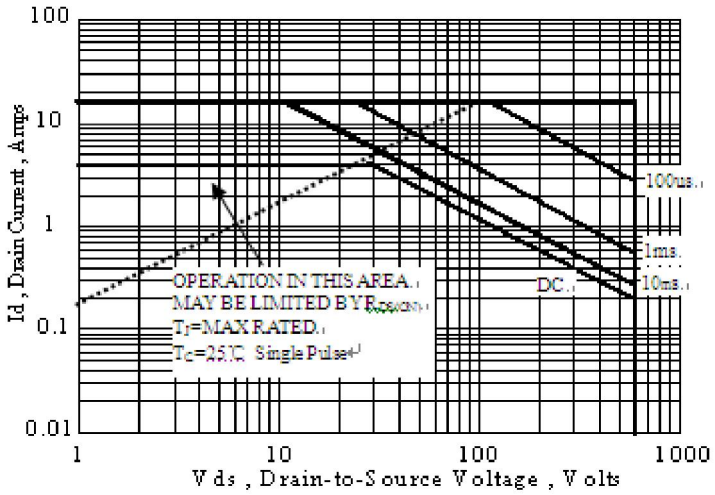


Figure 10. Safe Operating Area



Test Circuits and Waveforms

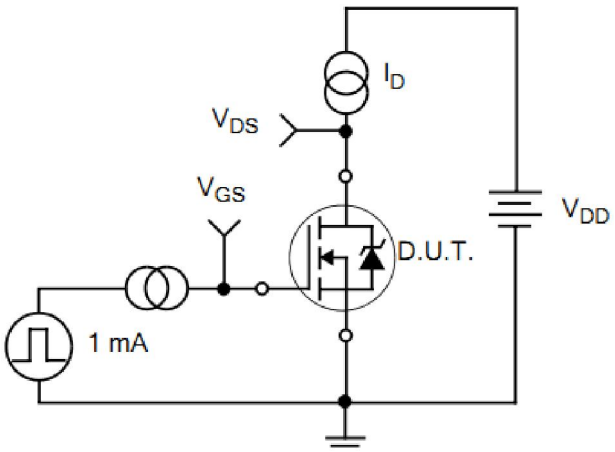


Figure 11. Gate Charge Test Circuit

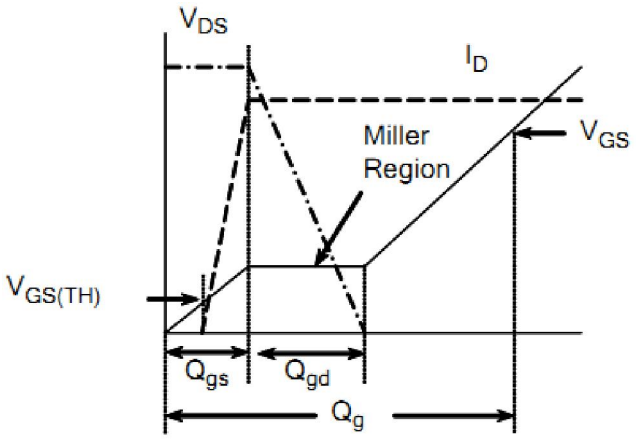


Figure 12. Gate Charge Waveforms

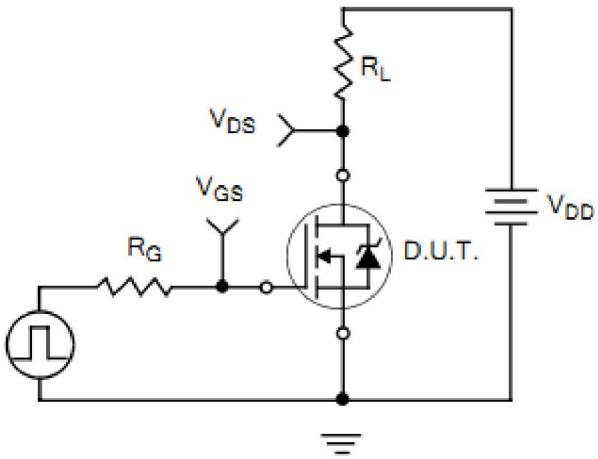


Figure 13. Resistive Switching Test Circuit

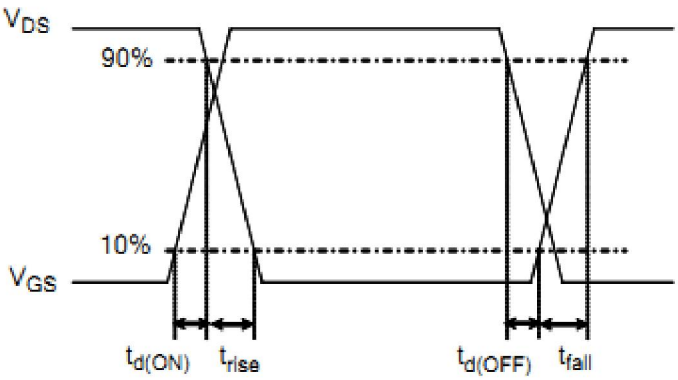


Figure 14. Resistive Switching Waveforms

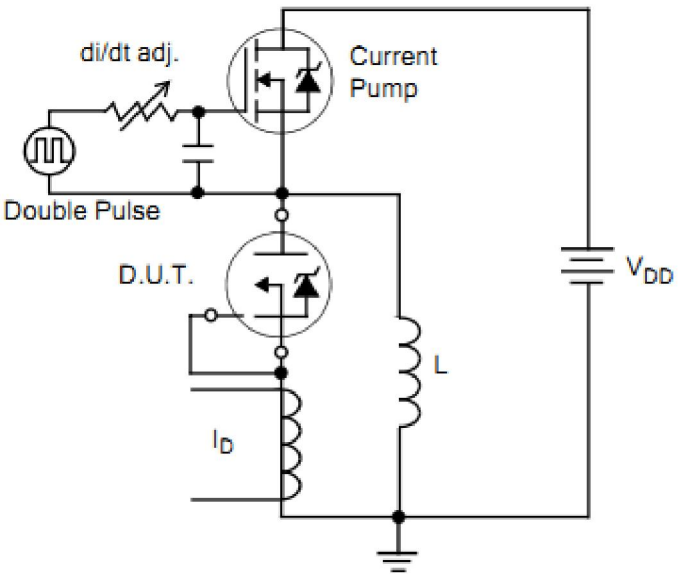


Figure 15. Diode Reverse Recovery Test Circuit

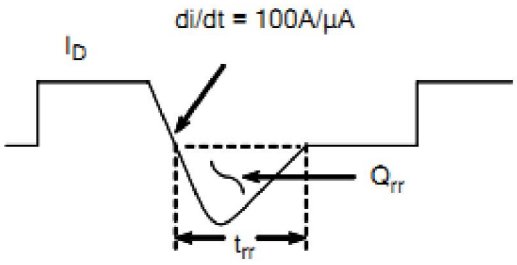


Figure 16. Diode Reverse Recovery Waveform

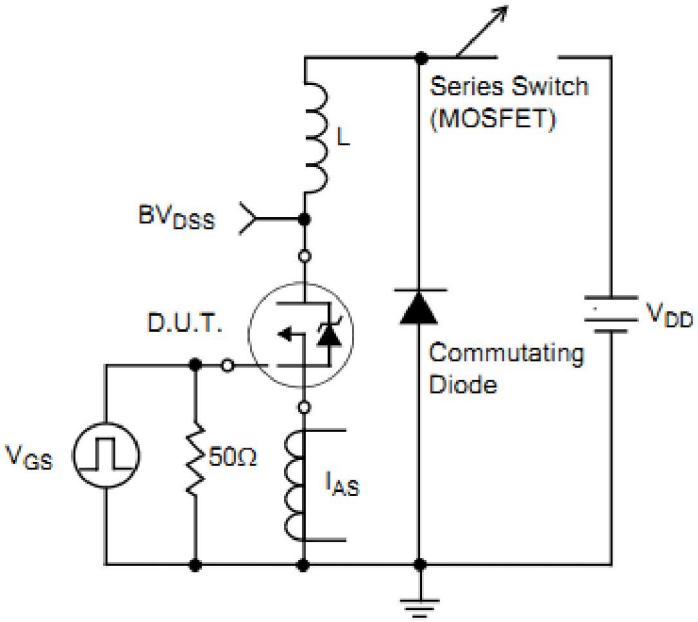


Figure17.Unclamped Inductive Switching Test Circuit

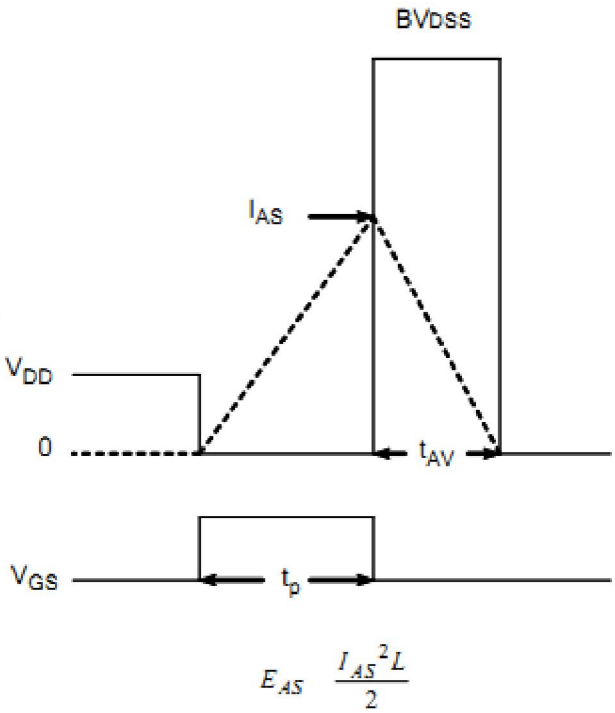


Figure18.Unclamped Inductive Switching Waveform

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