ITD04N65R

N-Channel MOSFET

Lead Free Package and Finish

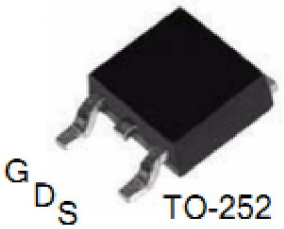
Applications:

- Adaptor
- Charger
- SMPS

V_{DSS}	$R_{DS(ON)}$(Typ.)	I_D
650V	2.4Ω	4A

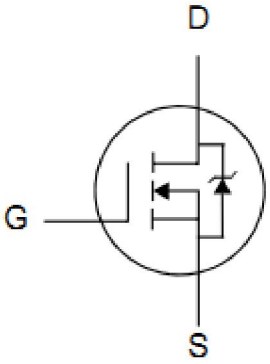
Features:

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



TO-252

Packages
Not to Scale



Ordering Information

PART NUMBER	PACKAGE	BRAND
ITD04N65R	TO-252	***IPS***

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	ITD04N65R	Units
V_{DSS}	Drain-to-Source Voltage	650	V
I_D	Continuous Drain Current	4	A
I_{DM}	Pulsed Drain Current, V_{GS}@10V (NOTE *1)	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（NOTE *2）	200	mJ
T_L	Maximum Temperature for Soldering	300	℃
T_J and T_{STG}	Operating Junction and Storage Temperature Range	150，-55 to150	

Thermal Resistance

Symbol	Parameter	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	650	--	--	V	V_{GS}=0V, I_D=250μA
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	V_{DS}=650V, V_{GS}=0V T_J=25℃
		--	--	100		V_{DS}=520V, 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	--	2.4	2.8	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	--	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	--	610	--	pF	V_{GS}= 0V,V_{DS} = 25V f =1.0MHz
C_{oss}	Output Capacitance	--	53	--		
C_{rss}	Reverse Transfer Capacitance	--	3.5	--		
Q_g	Total Gate Charge	--	14.5	--	nC	I_D=4A,V_{DD}=520V V_{GS} = 10V
Q_{gs}	Gate-to-Source Charge	--	3	--		
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}=325V, I_D=4A, V_G=10V R_G=10Ω
t_{rise}	Rise Time	--	16			
$t_{d(OFF)}$	Turn-Off Delay Time	--	32			
t_{fall}	Fall Time	--	11			

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	--	256	--	ns	I_F= I_S di/dt=100A/us
Q_{rr}	Reverse Recovery Charge	--	1200	--	nC	

Notes:

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

*2. L=10mH, ID=6.3A, Start TJ=25℃

Characteristics Curve：

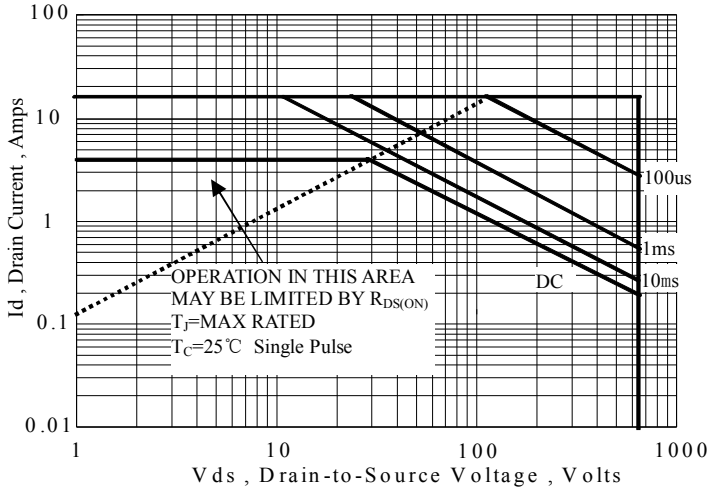


Figure 1 Maximum Forward Bias Safe Operating Area

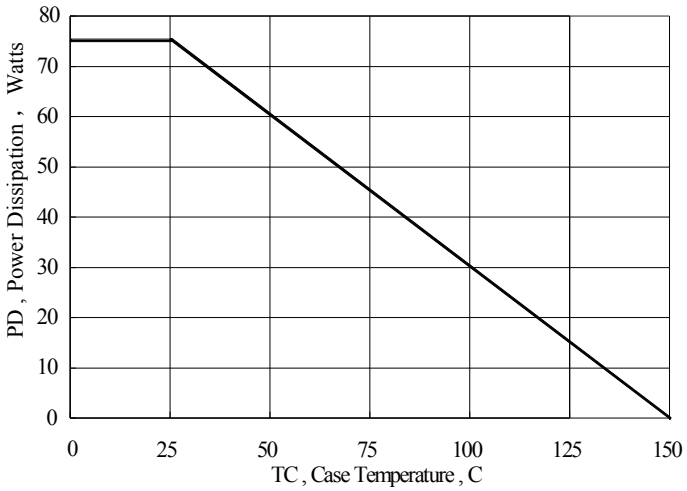


Figure2 Maximum Power Dissipation vs Case Temperature

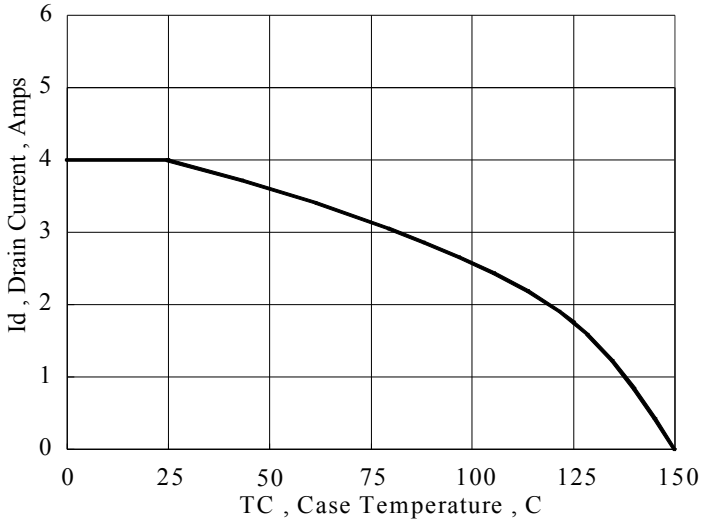


Figure3 Maximum Continuous Drain Current vs Case Temperature

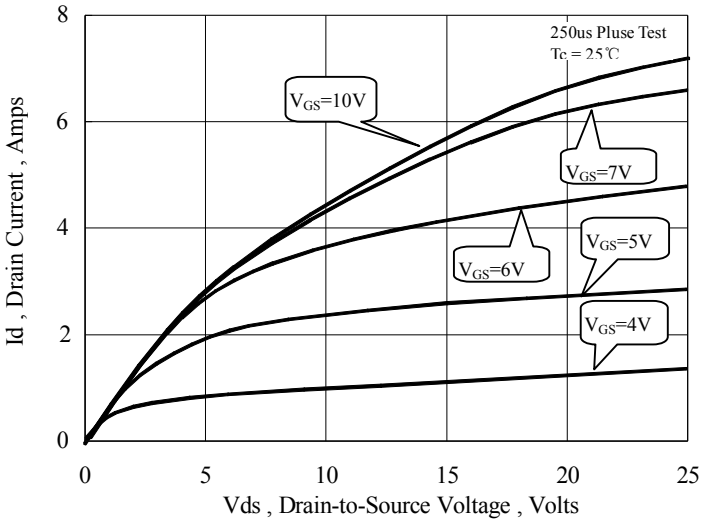


Figure 4 Typical Output Characteristics

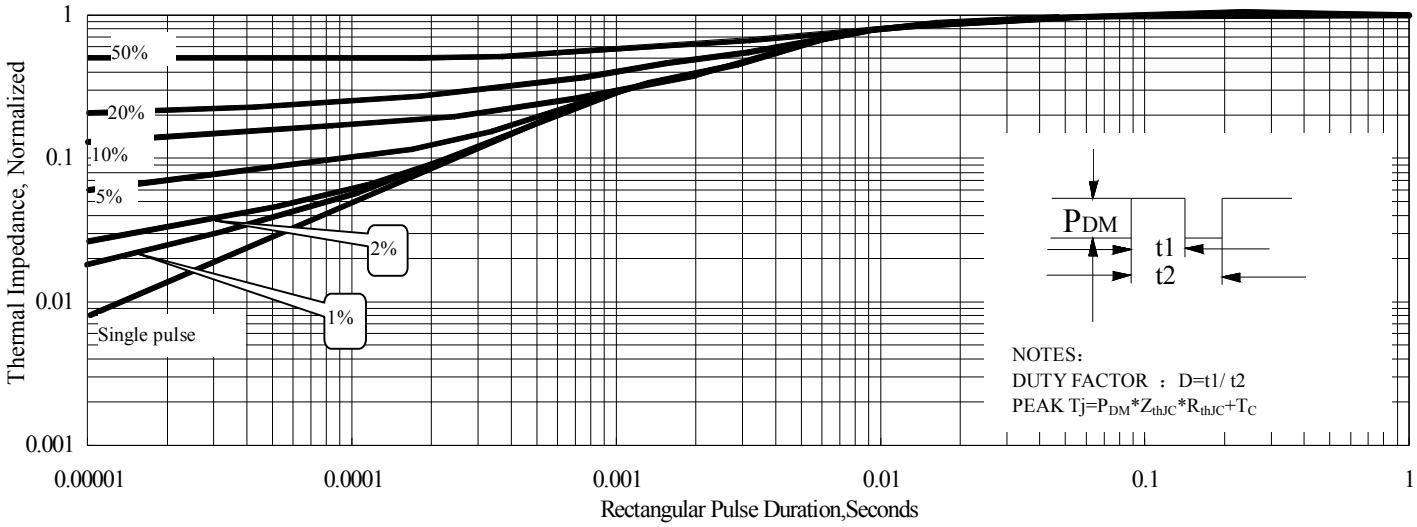


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

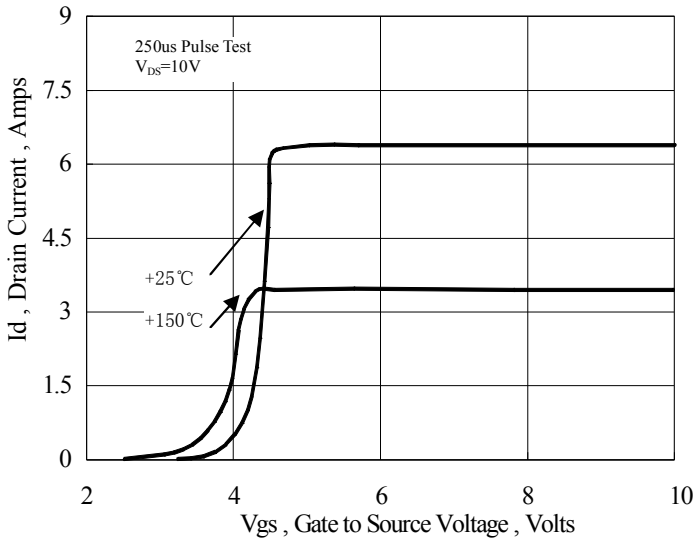


Figure 6 Typical Transfer Characteristics

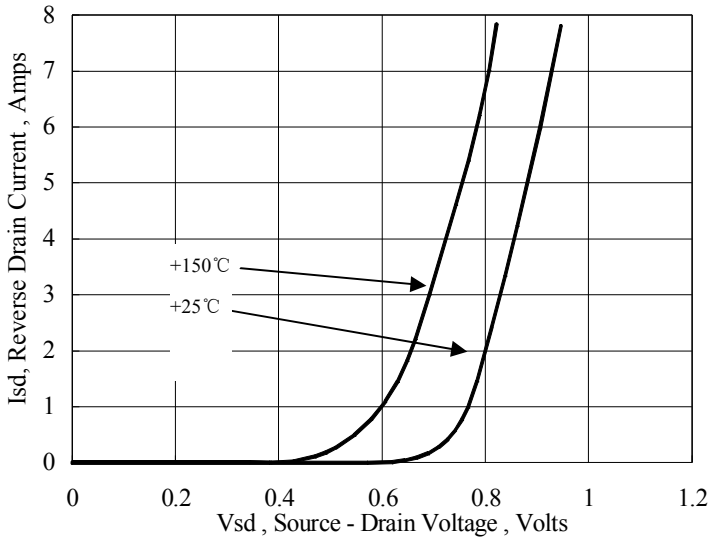


Figure 7 Typical Body Diode Transfer Characteristics

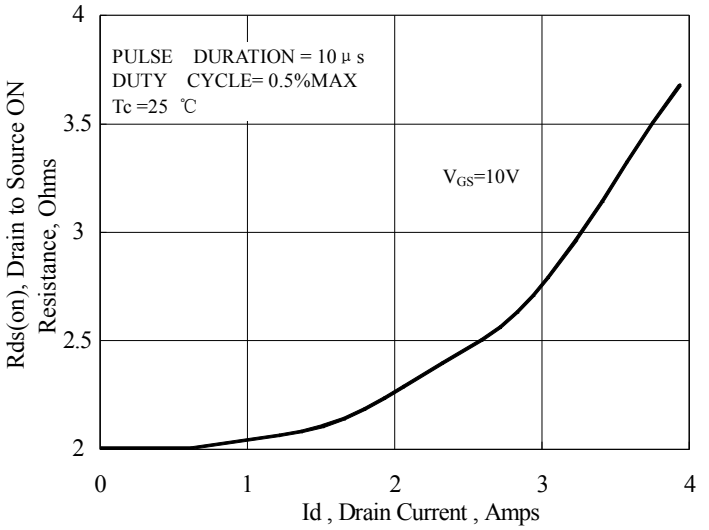


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

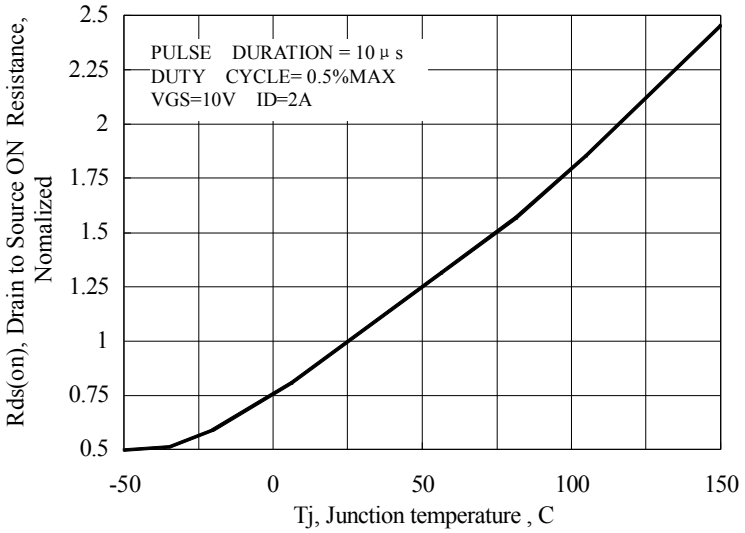


Figure 9 Typical Drian to Source on Resistance vs Junction Temperature

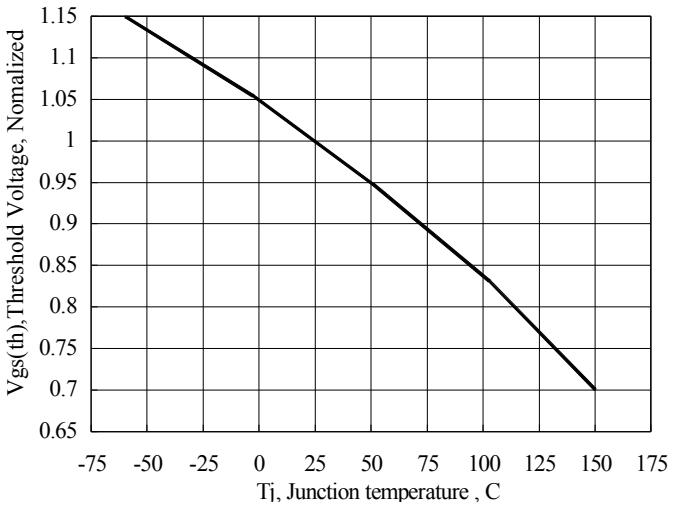


Figure 10 Typical Theshold Voltage vs Junction Temperature

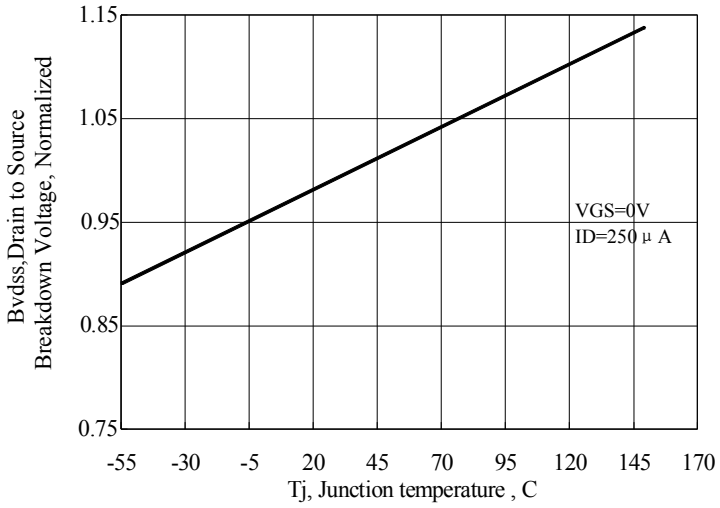


Figure 11 Typical Breakdown Voltage vs Junction Temperature

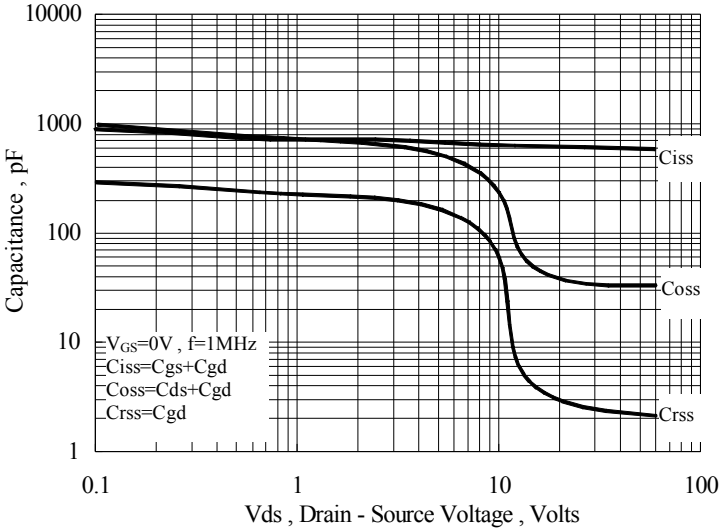


Figure 12 Typical Capacitance vs Drain to Source Voltage

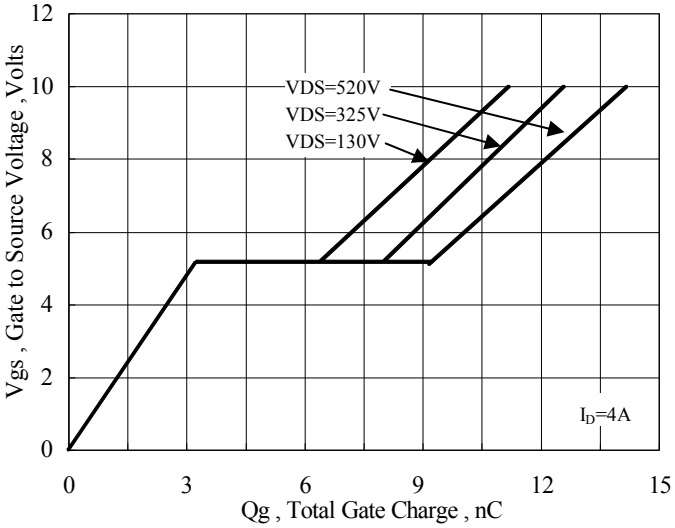


Figure 13 Typical Gate Charge vs Gate to Source Voltage

Test Circuits and Waveforms

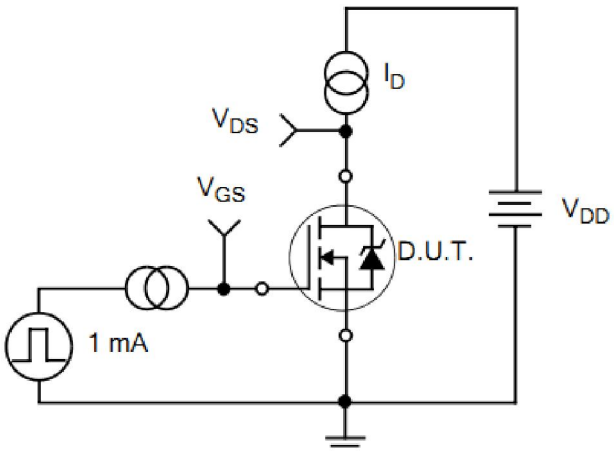


Figure 14. Gate Charge Test Circuit

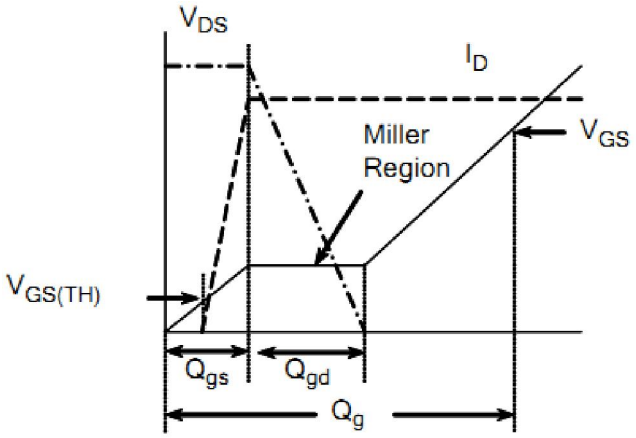


Figure 15. Gate Charge Waveforms

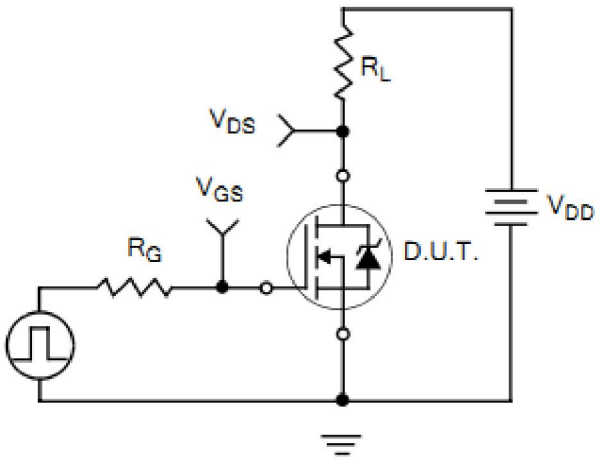


Figure 16. Resistive Switching Test Circuit

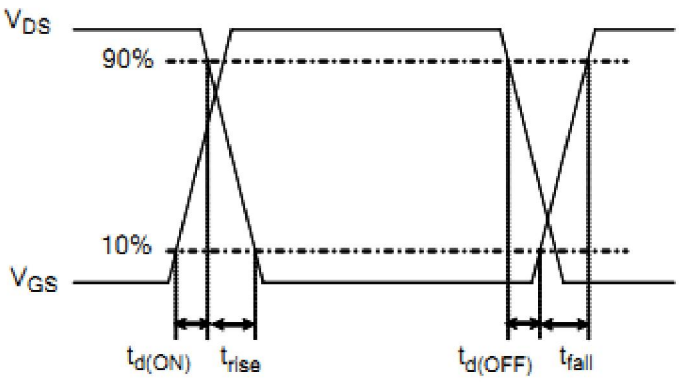


Figure 17. Resistive Switching Waveforms

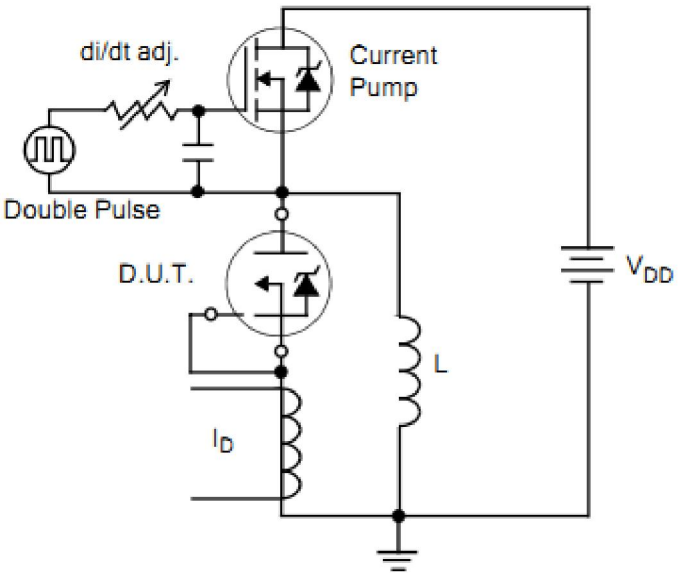


Figure 18. Diode Reverse Recovery Test Circuit

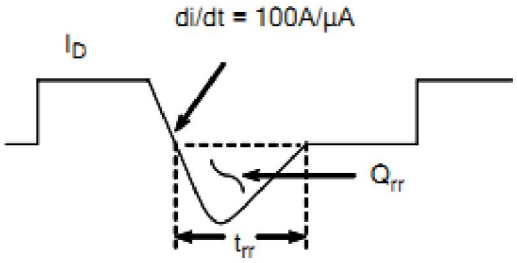


Figure 19. Diode Reverse Recovery Waveform

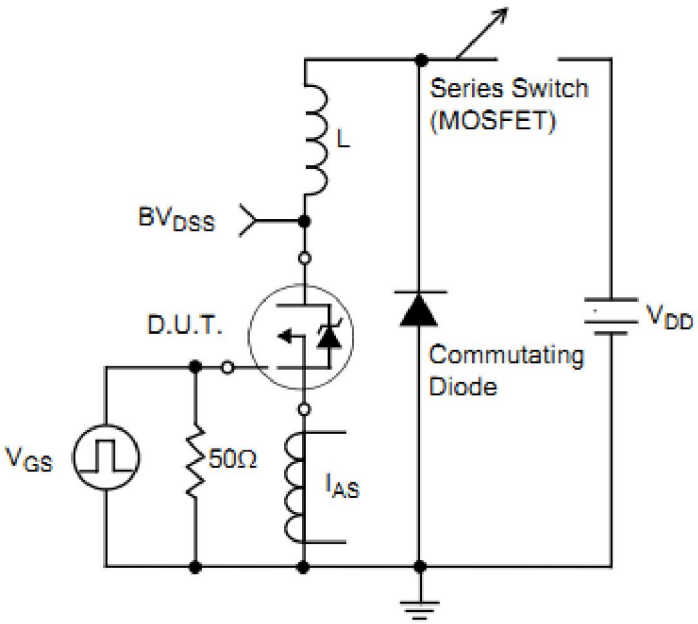
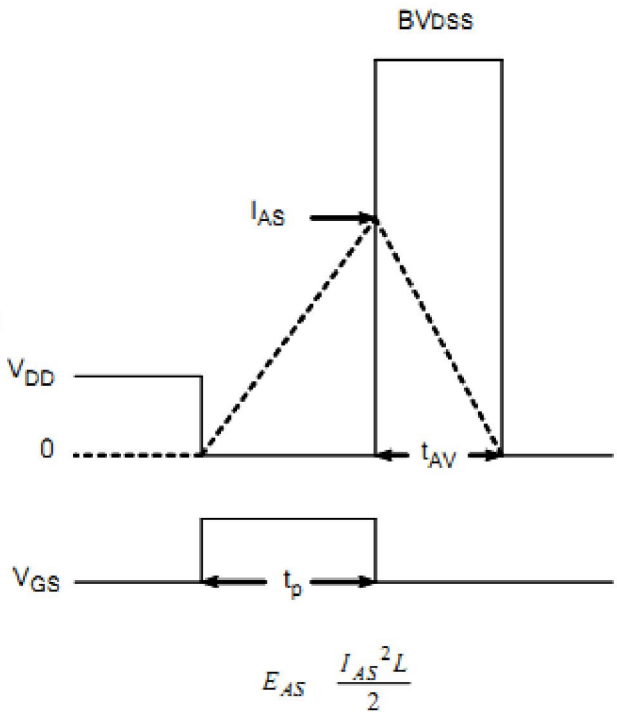


Figure20.Unclamped Inductive Switching Test Circuit



$$E_{AS} \quad \frac{I_{AS}{}^2 L}{2}$$

Figure21.Unclamped Inductive Switching Waveform

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