

## N-Channel MOSFET

**Lead Free Package and Finish**

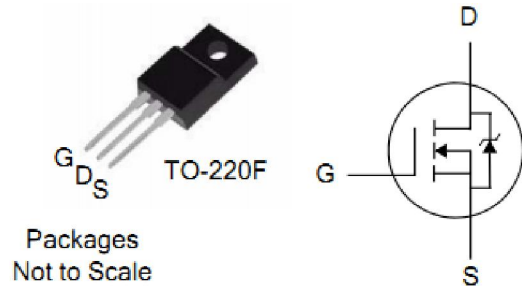
### Applications:

- Adaptor
- Charger
- SMPS

$V_{DSS}$	$R_{DS(ON)}(Typ.)$	$I_D$
650V	0.66Ω	12A

### Features:

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



### Ordering Information

PART NUMBER	PACKAGE	BRAND
ITA12N65R	TO-220F	<b>IPS</b>

### Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	ITA12N65R	Units
$V_{DSS}$	Drain-to-Source Voltage	650	V
$I_D$	Continuous Drain Current	12	A
$I_{DM}$	Pulsed Drain Current, $V_{GS}@10\text{V}$ (NOTE *2)	48	A
$P_D$	Power Dissipation	42	W
	Derating Factor above $25^\circ\text{C}$	0.34	W/ $^\circ\text{C}$
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy (L=10mH)	550	mJ
$T_L$	Maximum Temperature for Soldering	300	$^\circ\text{C}$
$T_J$ and $T_{STG}$	Operating Junction and Storage Temperature Range (NOTE *1)	150, -55 to 150	

### Thermal Resistance

Symbol	Parameter	Typ.	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	2.98	$^\circ\text{C}/\text{W}$	Water cooled heatsink, $P_D$ adjusted for a peak junction temperature of $+150^\circ\text{C}$ .
$R_{\theta JA}$	Junction-to-Ambient	62.5		1 cubic foot chamber, free air.



# ITA12N65R

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	650	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	1	$\mu A$	$V_{DS}=650V, V_{GS}=0V$ $T_J=25^\circ\text{C}$
		--	--	100		$V_{DS}=520V, V_{GS}=0V$ $T_J=125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	--	--	+100	$nA$	$V_{GS}=+30V$
	Gate-to-Source Reverse Leakage	--	--	-100		$V_{GS}=-30V$

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance (NOTE *3)	--	0.66	0.8	$\Omega$	$V_{GS}=10V, I_D=6A$
$V_{GS(TH)}$	Gate Threshold Voltage	2	--	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$g_{fs}$	Forward Transconductance (NOTE *3)	--	12	--	S	$V_{DS}=15V, I_D=6A$

## Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$C_{iss}$	Input Capacitance	--	1993	--	$pF$	$V_{GS}=0V, V_{DS}=25V$ $f=1.0MHz$
$C_{oss}$	Output Capacitance	--	160	--		
$C_{rss}$	Reverse Transfer Capacitance	--	9.5	--		
$Q_g$	Total Gate Charge	--	40	--	$nC$	$I_D=12A, V_{DD}=520V$ $V_{GS}=10V$
$Q_{gs}$	Gate-to-Source Charge	--	10	--		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	--	14	--		

## Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	28		$ns$	$V_{DD}=325V, I_D=12A,$ $V_G=10V, R_G=10\Omega$
$t_{rise}$	Rise Time	--	26			
$t_{d(OFF)}$	Turn-Off Delay Time	--	64			
$t_{fall}$	Fall Time	--	45			



# ITA12N65R

## Source-Drain Diode Characteristics

T<sub>c</sub>=25°C unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	--	--	12	A	T <sub>C</sub> =25°C
I <sub>SM</sub>	Maximum Pulsed Current (Body Diode)	--	--	48	A	
V <sub>SD</sub>	Diode Forward Voltage	--	--	1.5	V	I <sub>SD</sub> =12A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	--	651	--	ns	I <sub>F</sub> = I <sub>S</sub> di/dt=100A/us
Q <sub>rr</sub>	Reverse Recovery Charge	--	4297	--	nC	

### Notes:

- \*1. T<sub>J</sub> = +25°C to +150°C.
- \*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

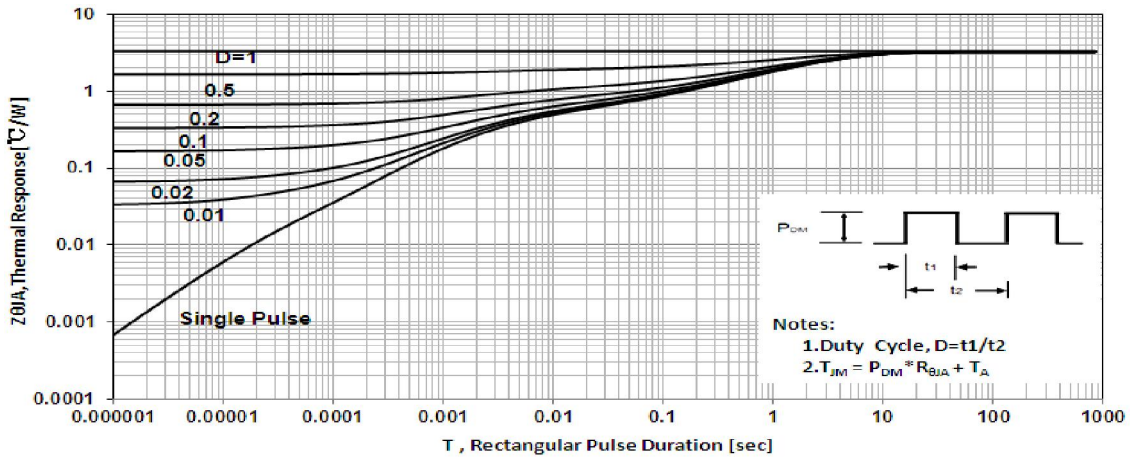


Figure 2. Typical Output Characteristics

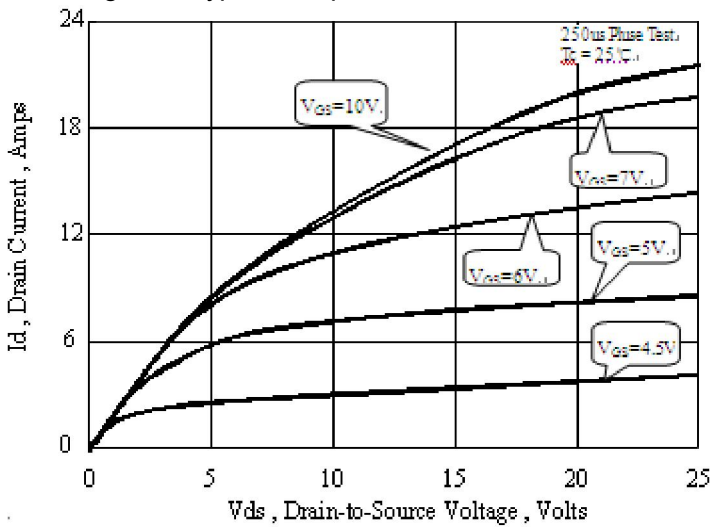


Figure 3. Typical Transfer Characteristics

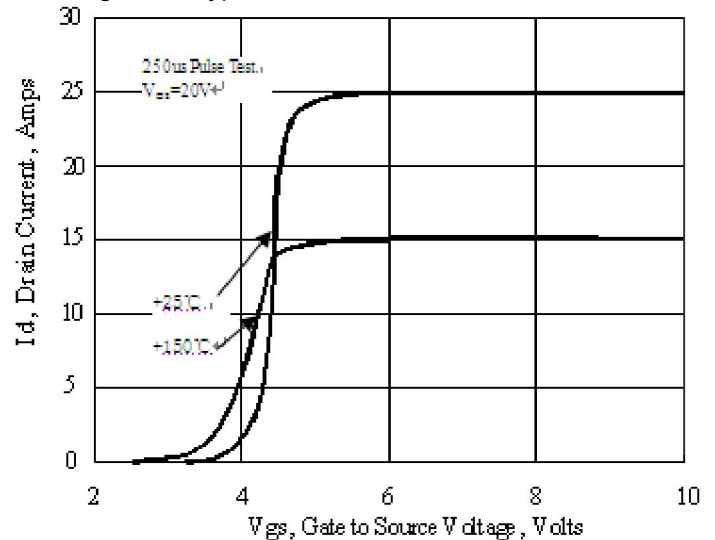


Figure 4. Typical Body Diode Transfer Characteristics

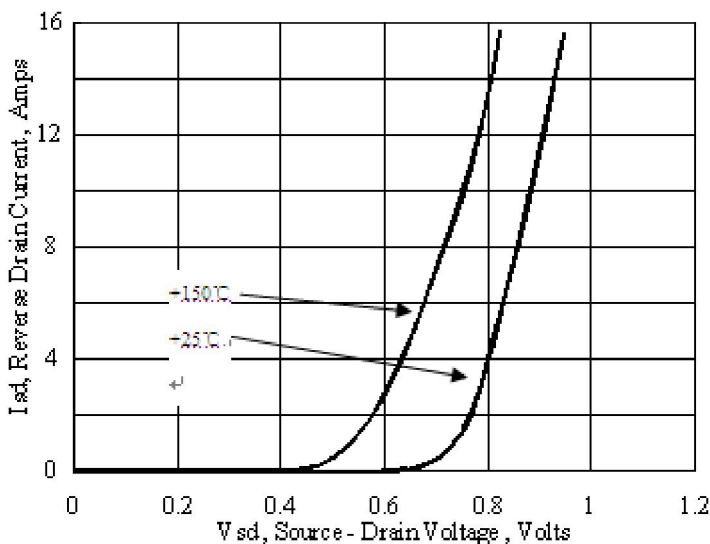


Figure 5. Typical Drain-to-source on Resistance VS Drain Current

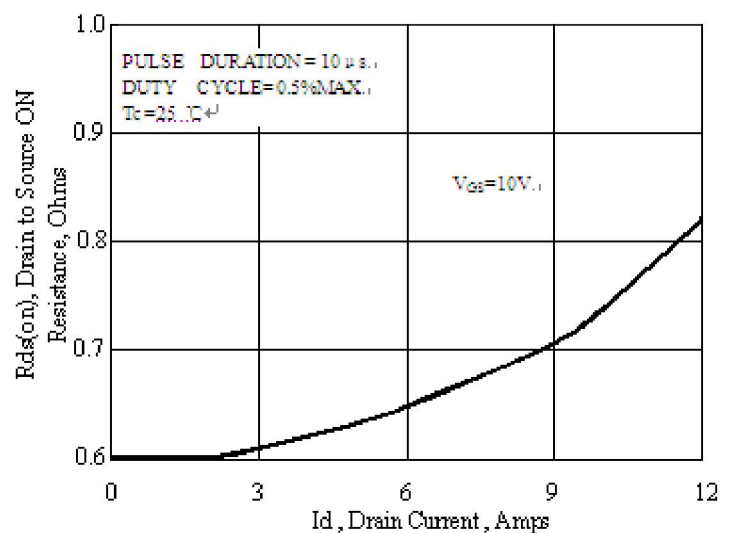


Figure 6. Capacitance VS Drain-to-Source Voltage

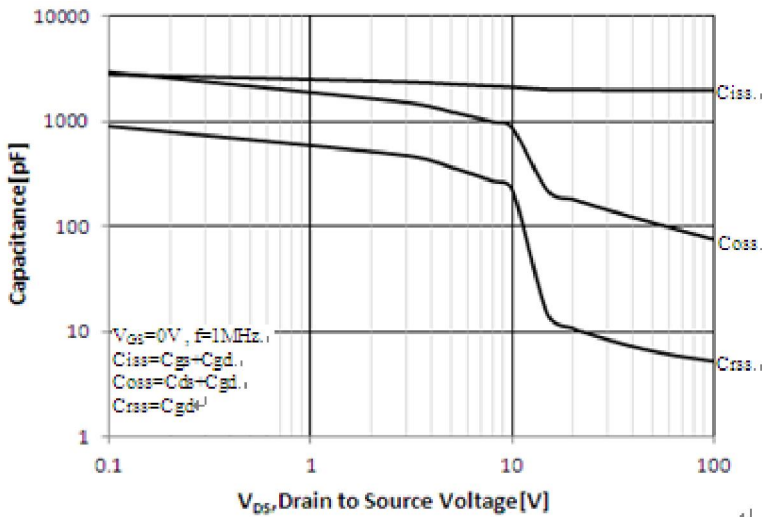


Figure 7. Gate Charge VS Gate-to-Source Voltage

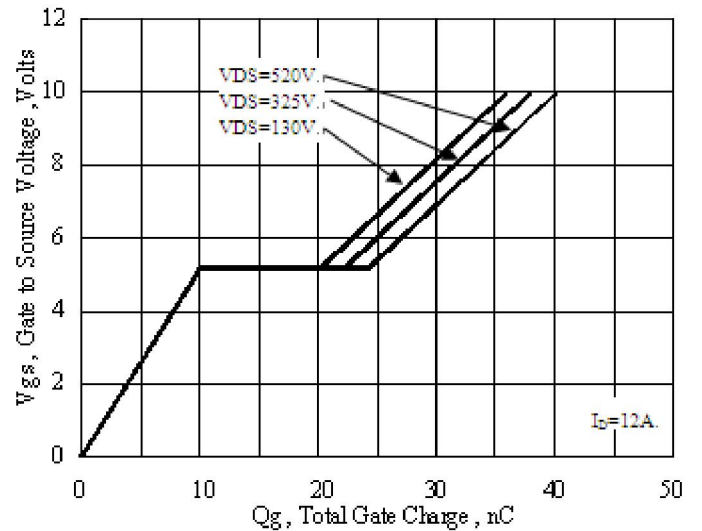


Figure 8. Breakdown Voltage VS Temperature

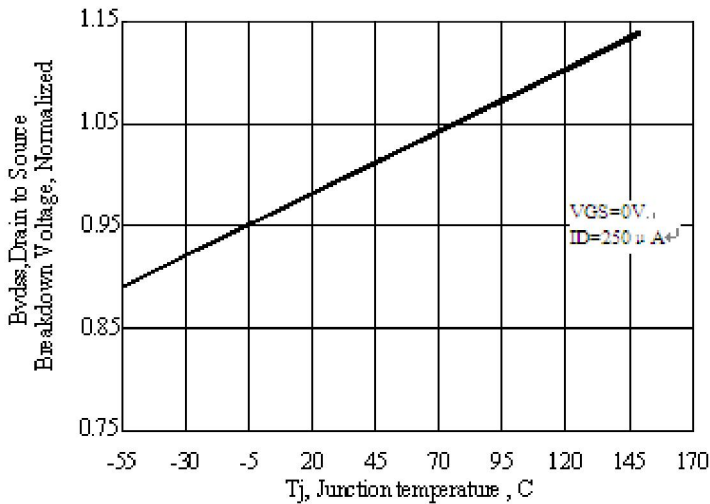


Figure 9. on-Resistance VS Temperature

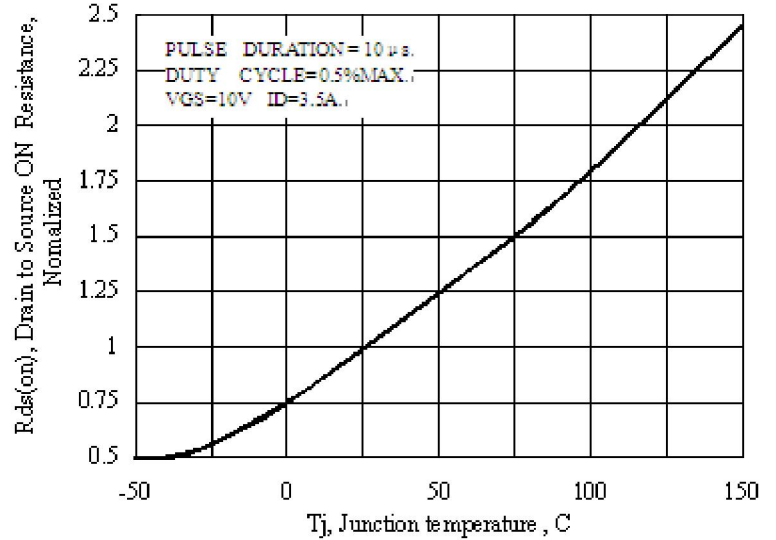
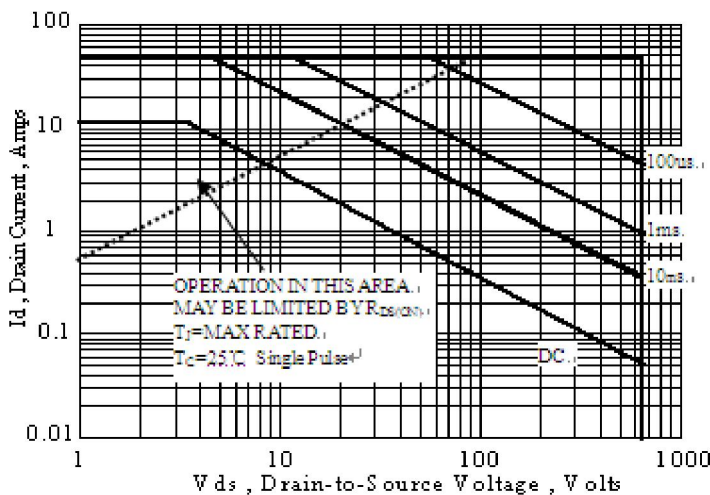


Figure 10. Safe Operating Area



## Test Circuits and Waveforms

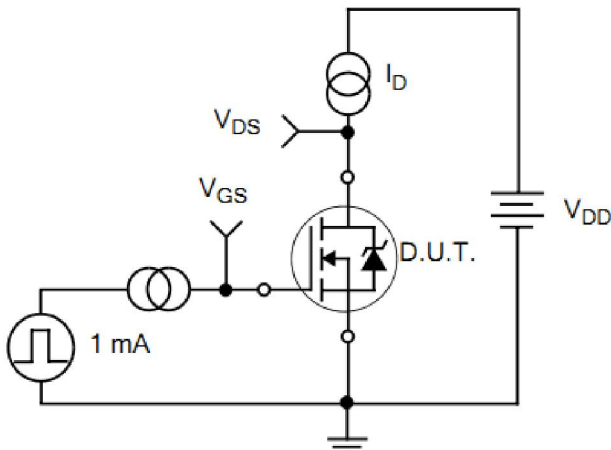


Figure 11. Gate Charge Test Circuit

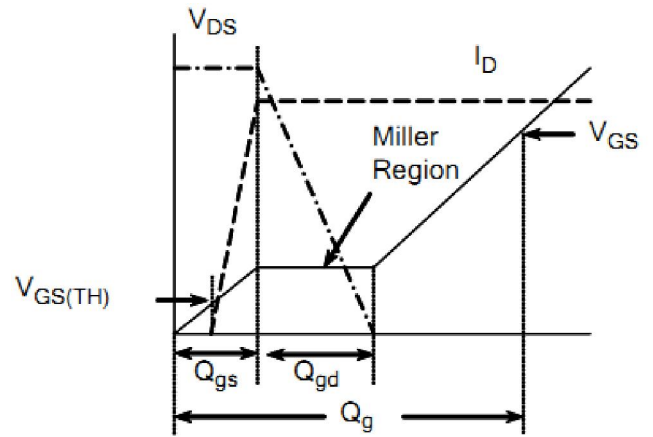


Figure 12. Gate Charge Waveforms

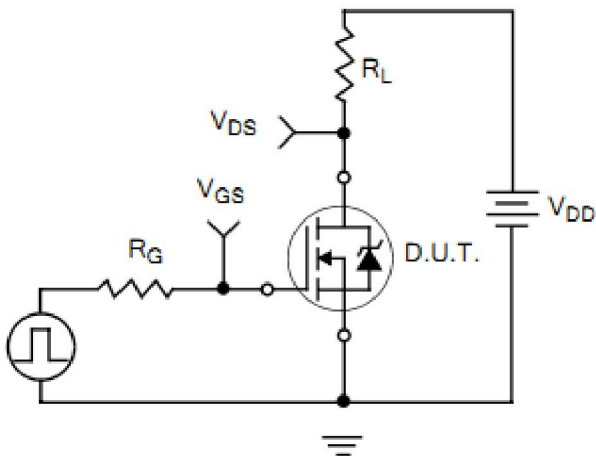


Figure 13. Resistive Switching Test Circuit

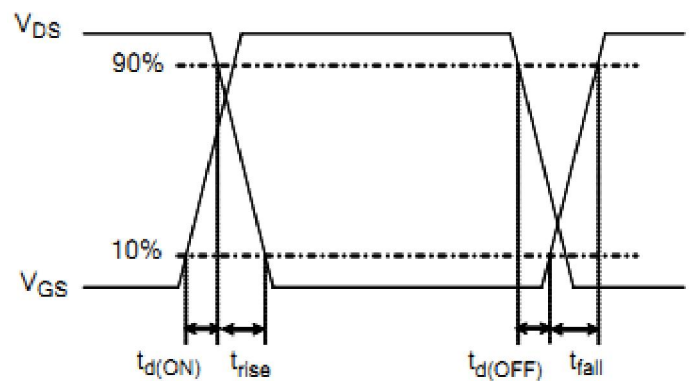


Figure 14. Resistive Switching Waveforms

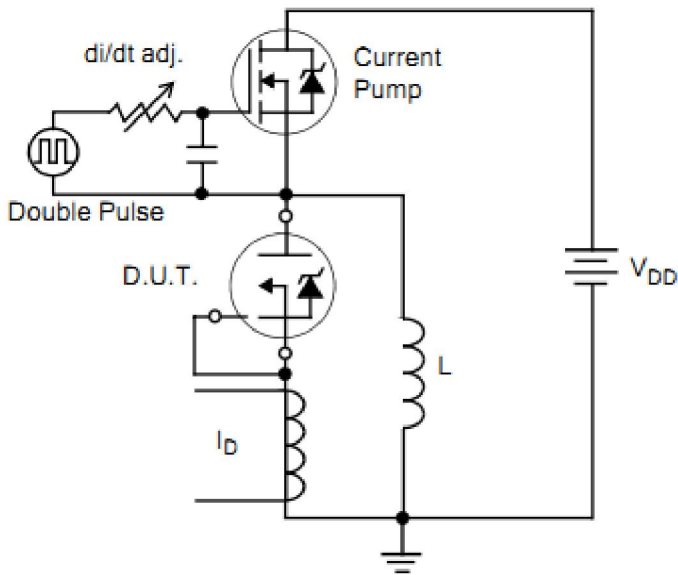


Figure 15. Diode Reverse Recovery Test Circuit

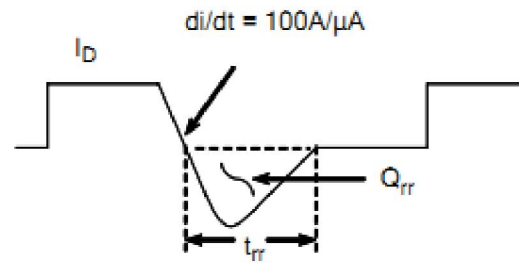


Figure 16. Diode Reverse Recovery Waveform

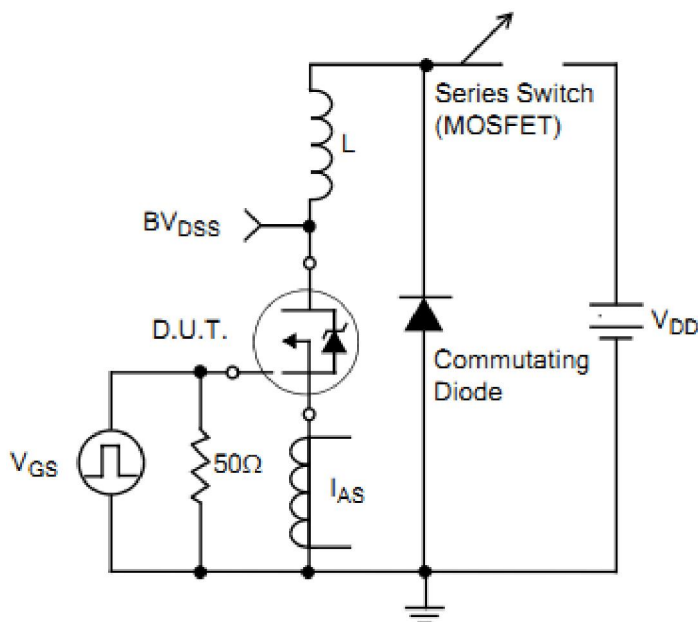


Figure 17. Unclamped Inductive Switching Test Circuit

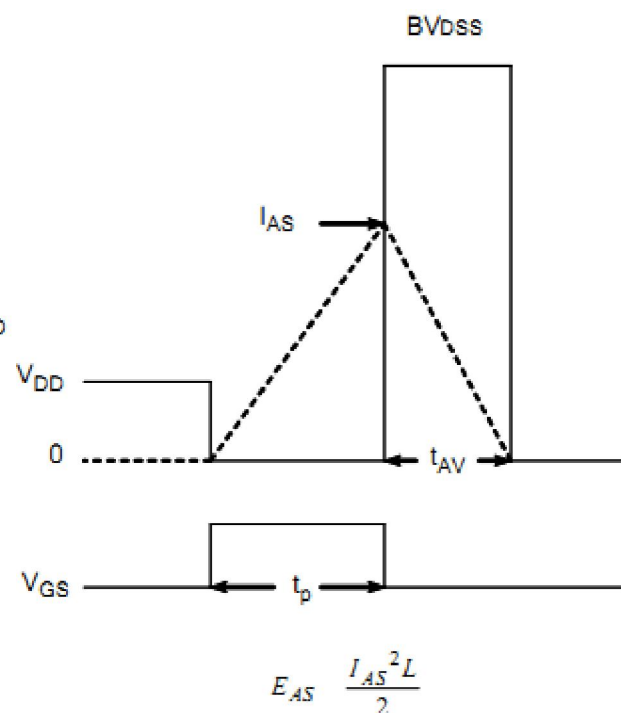


Figure 18. Unclamped Inductive Switching Waveform



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