

## N-Channel MOSFET

**Lead Free Package and Finish**

### Applications:

- Adaptor
- Charger
- SMPS

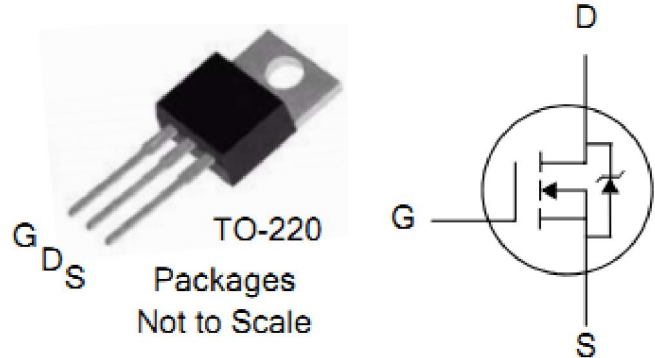
$V_{DSS}$	$R_{DS(ON)}(Typ.)$	$I_D$ (Silicon limited current)
40V	3.6m $\Omega$	130A

### Features:

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

### Ordering Information

PART NUMBER	PACKAGE	BRAND
FTP05N04N	TO-220	<b>IPS</b>



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

Symbol	Parameter	FTP05N04N	Units
$V_{DSS}$	Drain-to-Source Voltage	40	V
$I_D$	Continuous Drain Current	130	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	83	A
$I_{DM}$	Pulsed Drain Current, $V_{GS}@10\text{V}$ (NOTE *1)	520	A
$P_D$	Power Dissipation	125	W
	Derating Factor above $25^\circ\text{C}$	1	W/ $^\circ\text{C}$
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulse Avalanche Energy(NOTE *2)	221.1	mJ
$T_L$	Maximum Temperature for Soldering	300	$^\circ\text{C}$
$T_J$ and $T_{STG}$	Operating Junction and Storage Temperature Range	150, -55 to 150	

### Thermal Resistance

Symbol	Parameter	Max.	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	1	$^\circ\text{C}/\text{W}$	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.



# FTP05N04N

## 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	40	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	1	$\mu A$	$V_{DS}=40V, V_{GS}=0V$ $T_J=25^\circ\text{C}$
		--	--	500		$V_{DS}=32V, V_{GS}=0V$ $T_J=125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	--	--	+100	nA	$V_{GS}=+20V$
	Gate-to-Source Reverse Leakage	--	--	-100		$V_{GS}=-20V$

## 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	--	3.6	5	m $\Omega$	$V_{GS}=10V, I_D=75A$
$V_{GS(TH)}$	Gate Threshold Voltage	2	--	4	V	$V_{DS}=V_{GS}, I_D=250\mu A$

## Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$R_g$	Gate resistance		1		$\Omega$	$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$
$C_{iss}$	Input Capacitance	--	8900	--	$\mu F$	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$
$C_{oss}$	Output Capacitance	--	550	--		
$C_{rss}$	Reverse Transfer Capacitance	--	480	--		
$Q_g$	Total Gate Charge	--	160	--	nC	$I_D=20A, V_{DD}=32V$ $V_{GS}=10V$
$Q_{gs}$	Gate-to-Source Charge	--	42	--		
$Q_{gd}$	Gate-to-Drain ("Miller") Charge	--	33	--		

## Resistive Switching Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	48		ns	$V_{DD}=30V, I_D=75A,$ $V_G=10V, R_G=10\Omega$
$t_{rise}$	Rise Time	--	88			
$t_{d(OFF)}$	Turn-Off Delay Time	--	170			
$t_{fall}$	Fall Time	--	62			



## Source-Drain Diode Characteristics $T_c=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current (Body Diode)	--	--	130	A	$T_c=25^\circ\text{C}$
$I_{SM}$	Maximum Pulsed Current (Body Diode)	--	--	520	A	
$V_{SD}$	Diode Forward Voltage	--	--	1.5	V	$I_S=75\text{A}, V_{GS}=0\text{V}$
$t_{rr}$	Reverse Recovery Time	--	84	--	ns	$I_F=20\text{A}$ $di/dt=100\text{A}/\mu\text{s}$
$Q_{rr}$	Reverse Recovery Charge	--	75	--	nC	

### Notes:

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

\*2.  $L=0.1\text{mH}$ ,  $I_D=66.5\text{A}$ , Start  $T_J=25^\circ\text{C}$

## Characteristics Curve:

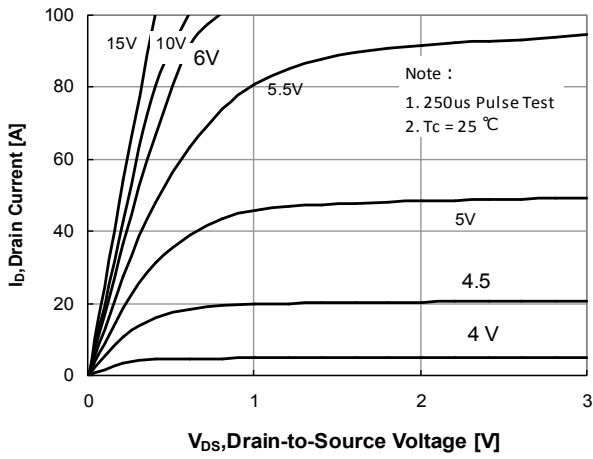


Figure 1. Output Characteristics

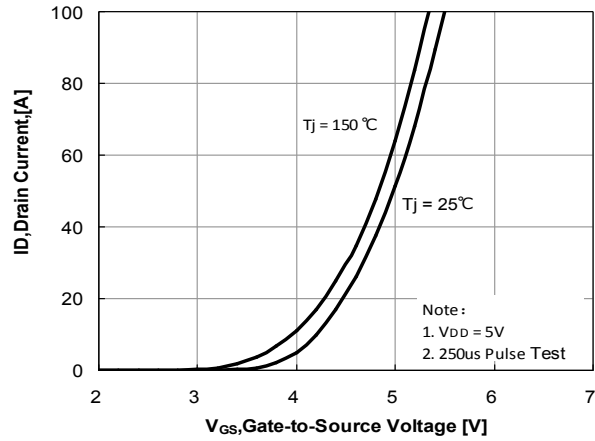


Figure 2. Transfer Characteristics

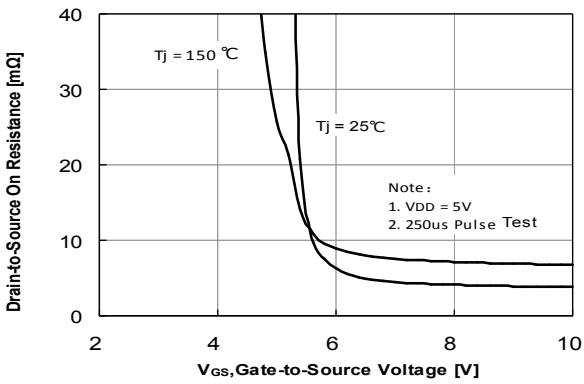


Figure 3. Drain-to-Source On Resistance vs Gate Voltage

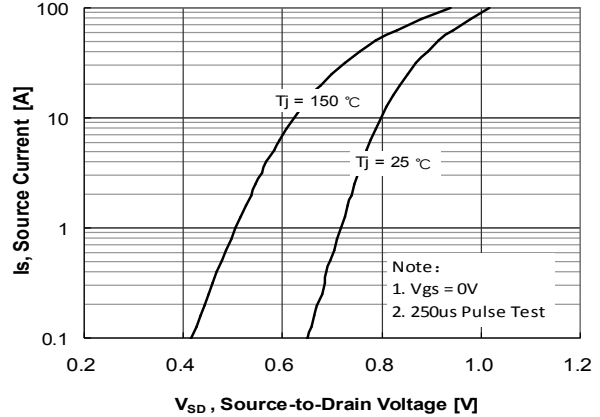


Figure 4. Typical Body Diode Transfer Characteristics

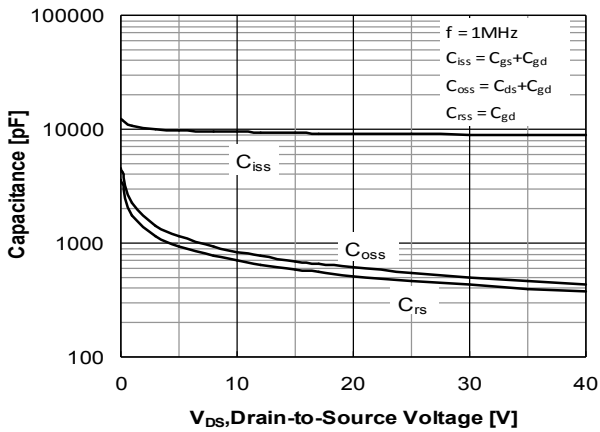


Figure 5. Capacitance Characteristics

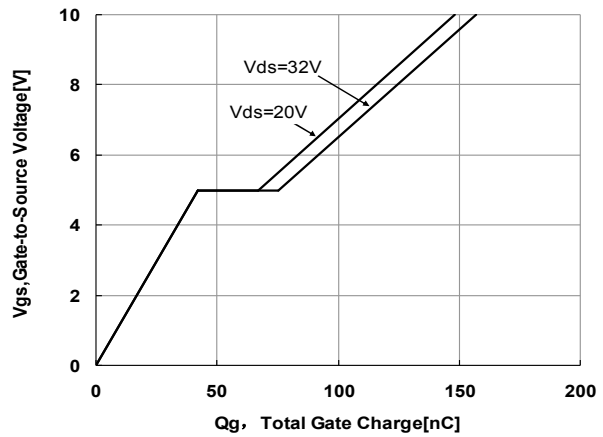


Figure 6. Gate Charge Characteristics

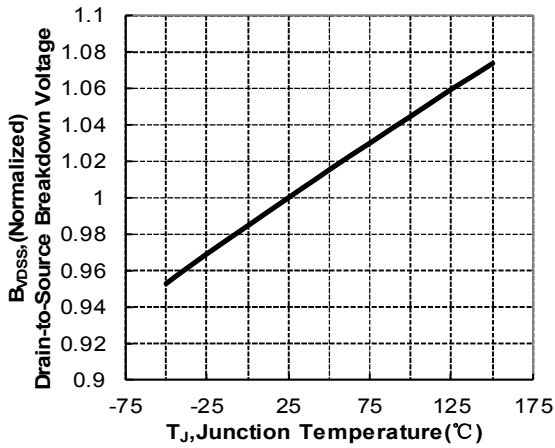


Figure 7. Normalized Breakdown Voltage vs Junction Temperature

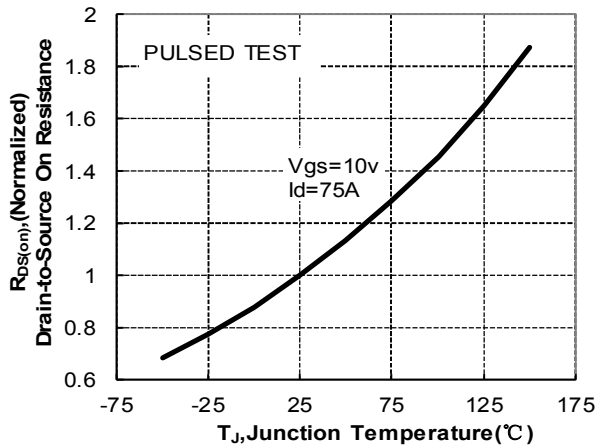


Figure 8. Normalized On Resistance vs Junction Temperature

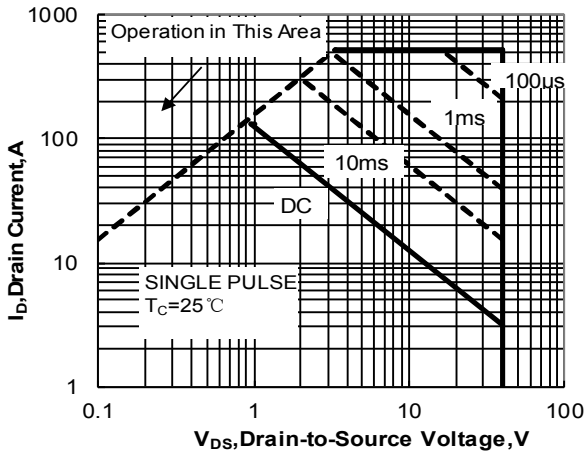


Figure 9. Maximum Safe Operating

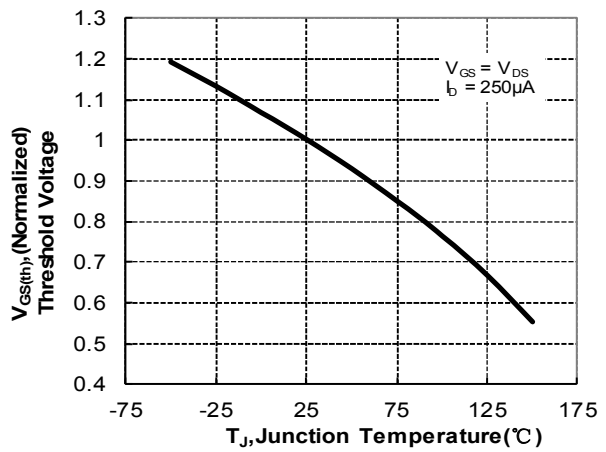


Figure 10. Normalized Threshold Voltage vs Junction Temperature

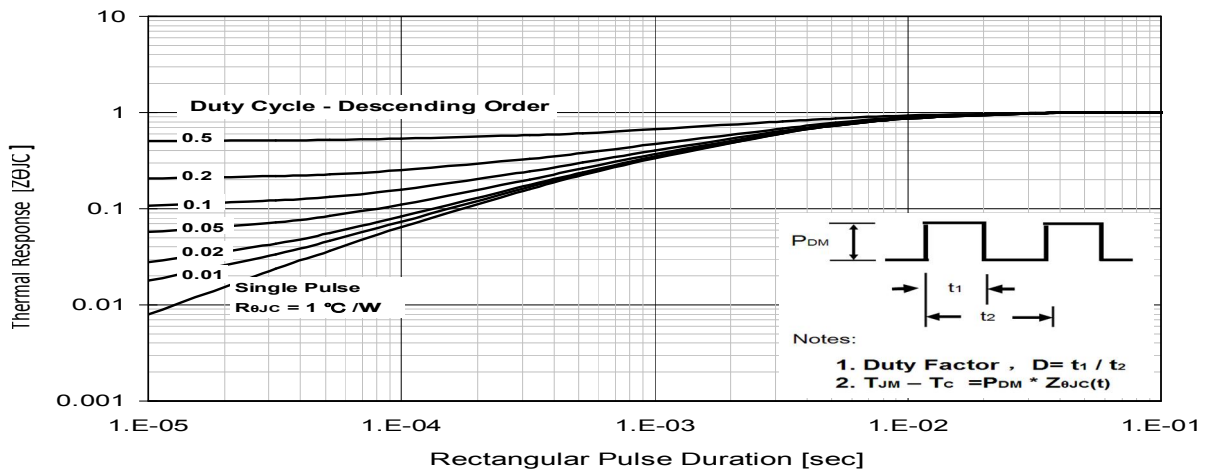


Figure 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

## Test Circuits and Waveforms

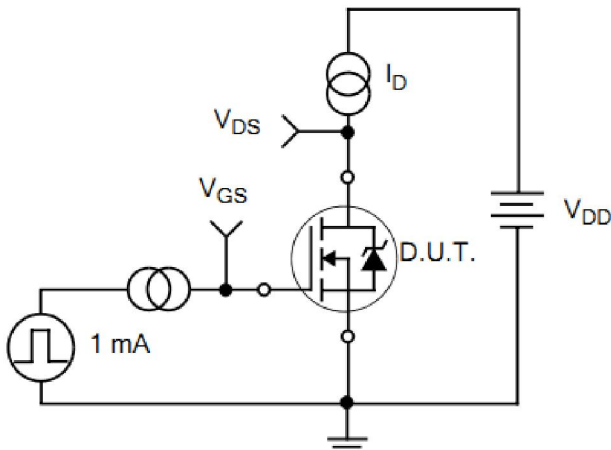


Figure 12. Gate Charge Test Circuit

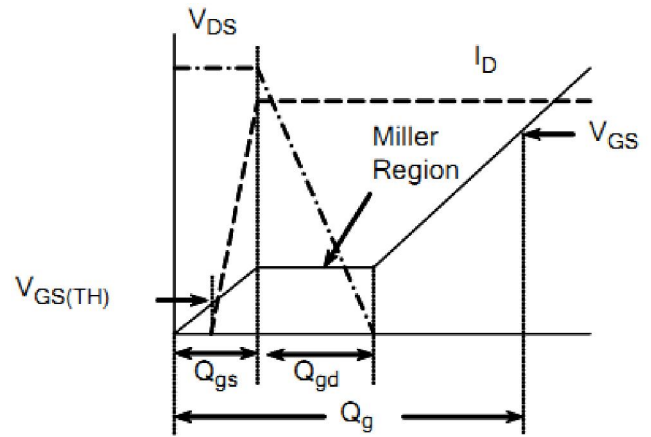


Figure 13. Gate Charge Waveforms

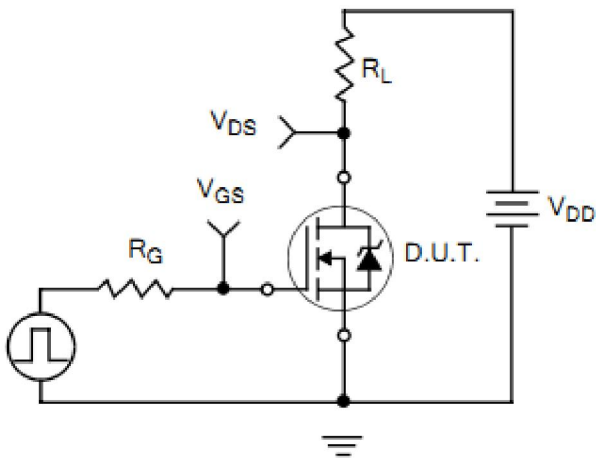


Figure 14. Resistive Switching Test Circuit

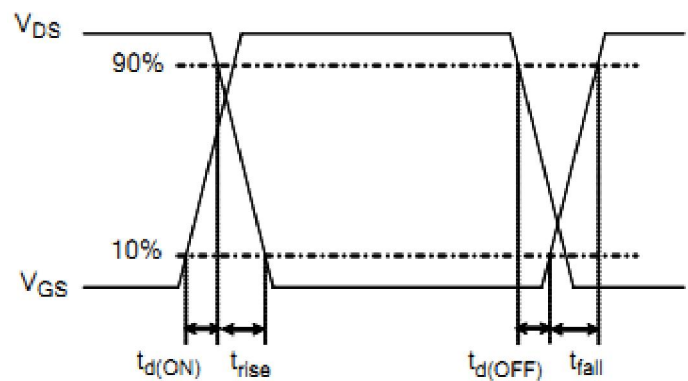


Figure 15. Resistive Switching Waveforms

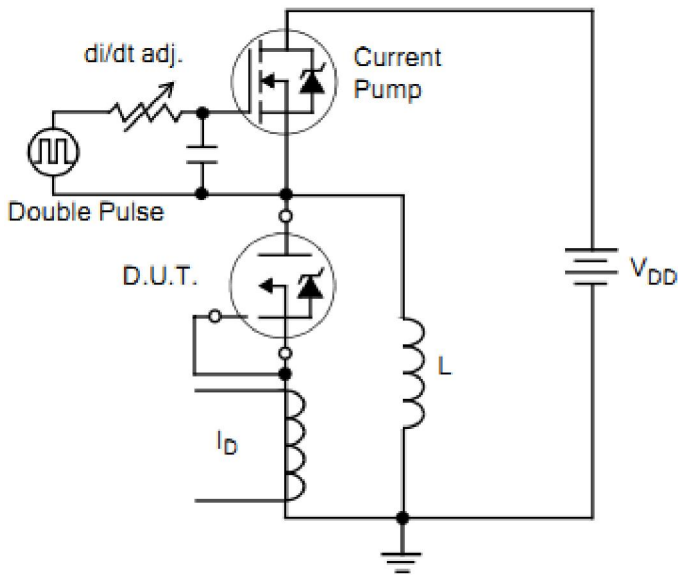


Figure 16. Diode Reverse Recovery Test Circuit

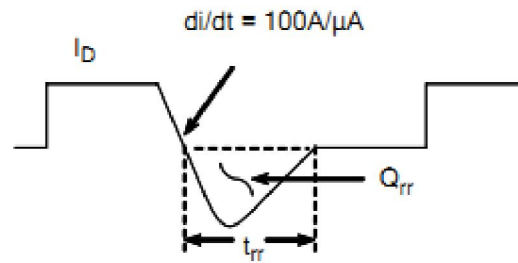


Figure 17. Diode Reverse Recovery Waveform

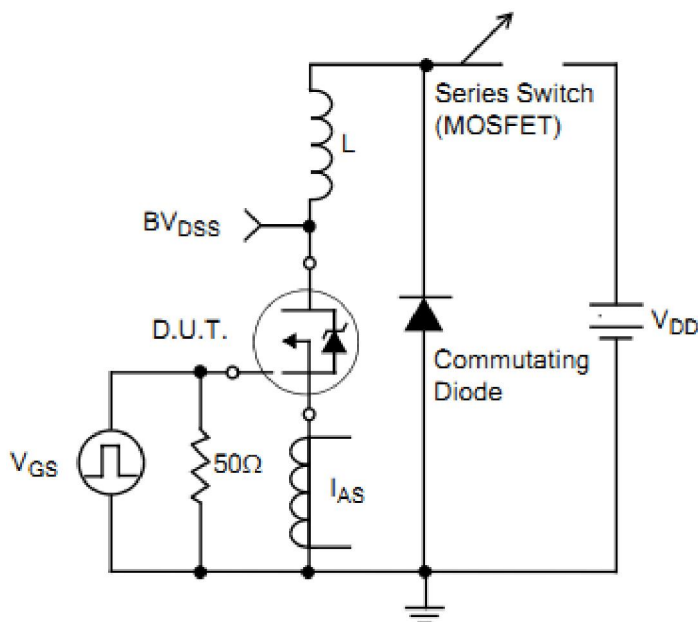


Figure 18. Unclamped Inductive Switching Test Circuit

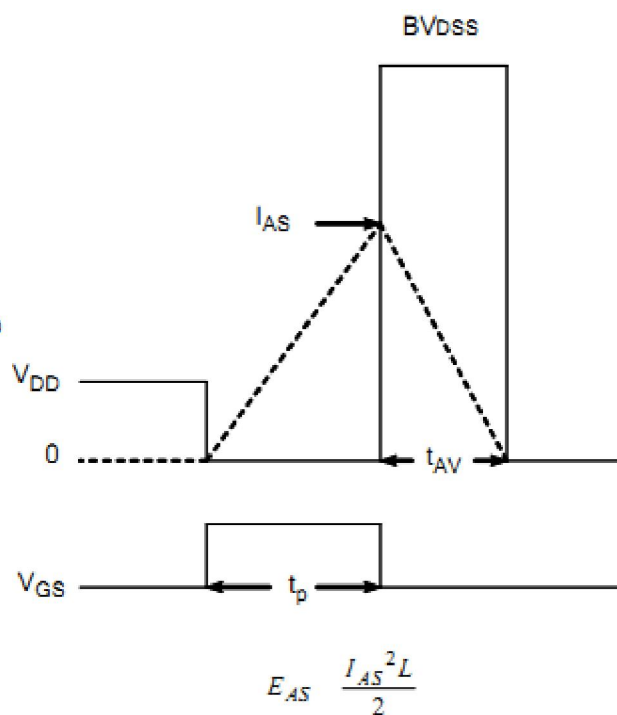


Figure 19. Unclamped Inductive Switching Waveform



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