

N-Channel MOSFET

Applications:

- Adaptor
- Charger
- SMPS

Features:

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

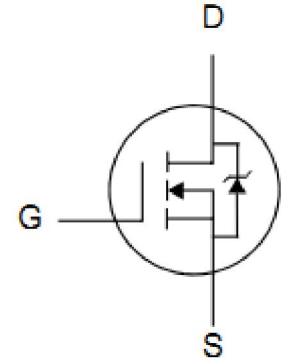
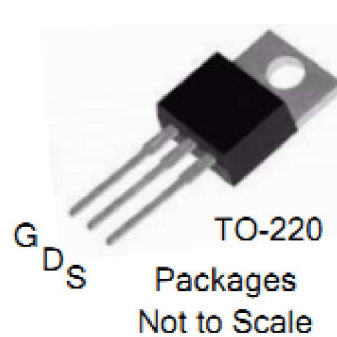
Ordering Information

PART NUMBER	PACKAGE	BRAND
FTP05N04N	TO-220	IPS



Lead Free Package and Finish

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



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

Symbol	Parameter	FTP05N04N	Units
V_{DS}	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°C	1	W/ $^\circ\text{C}$
V_{GS}	Gate-to-Source Voltage	± 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	$^\circ\text{C/W}$	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.

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	μA	$V_{DS}=40V, V_{GS}=0V$ $T_J=25^{\circ}\text{C}$
		--	--	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 Ω	$V_{GS}=10V, I_D=75A$
$V_{GS(TH)}$	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		Ω	$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$
C_{iss}	Input Capacitance	--	8900	--	pF	$V_{GS}=0V, V_{DS}=25V$ $f=1.0\text{MHz}$
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

Tc=25°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	$I_F=20\text{A}$ $di/dt=100\text{A/us}$
Q_{rr}	Reverse Recovery Charge	--	75	--	nC	

Notes:

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

*2. L=0.1mH, $I_D=66.5\text{A}$, Start TJ=25°C

Characteristics Curve:

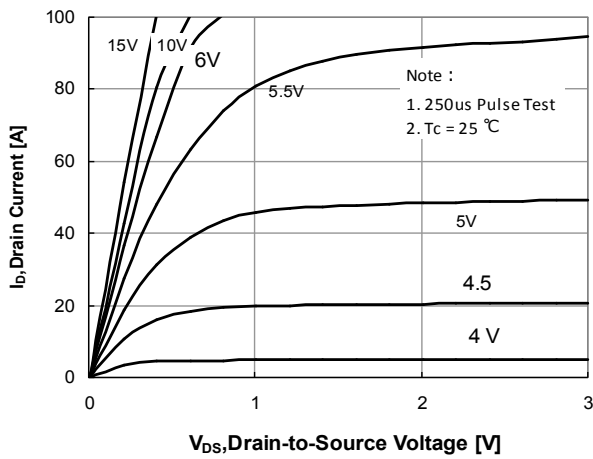


Figure 1. Output Characteristics

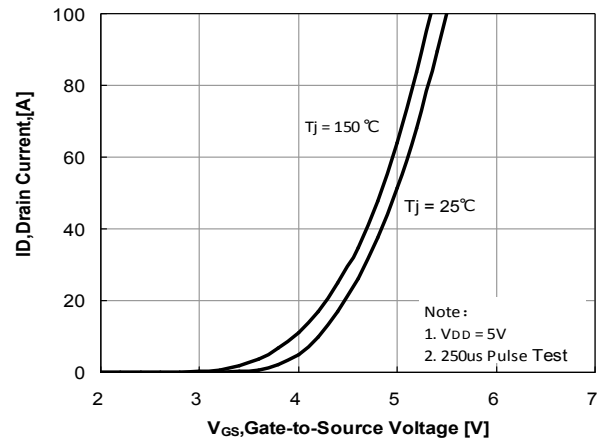


Figure 2. Transfer Characteristics

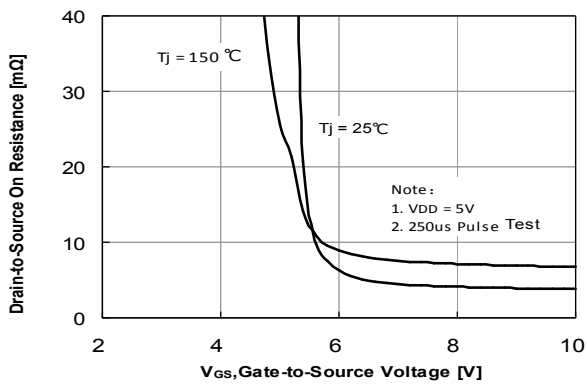


Figure 3. Drain-to-Source On Resistance vs Gate Voltage

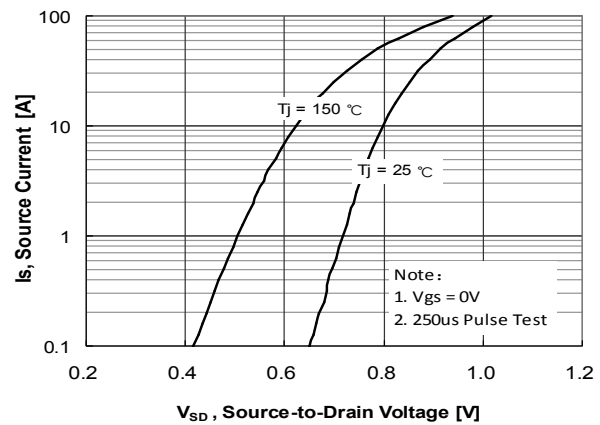


Figure 4. Typical Body Diode Transfer Characteristics

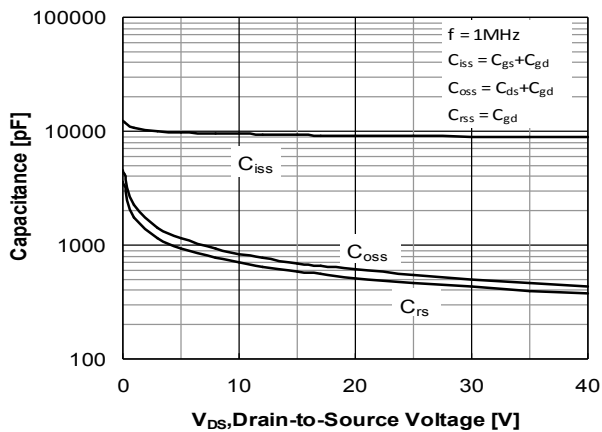


Figure 5. Capacitance Characteristics

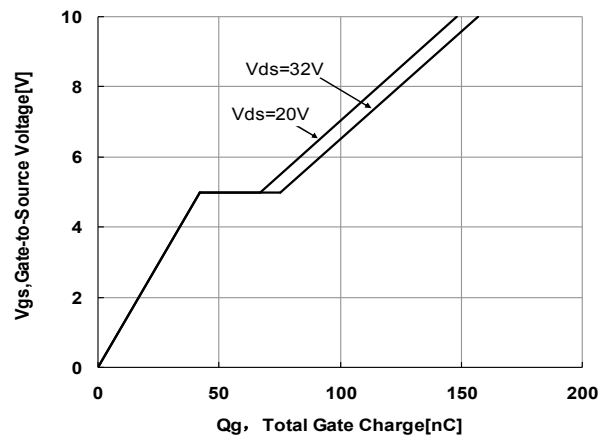


Figure 6. Gate Charge Characteristics

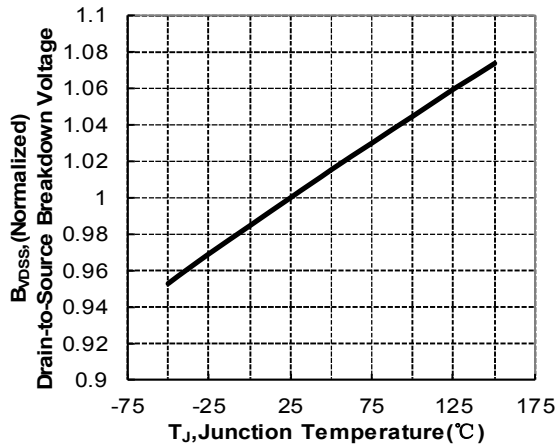


Figure 7. Normalized Breakdown Voltage vs Junction Temperature

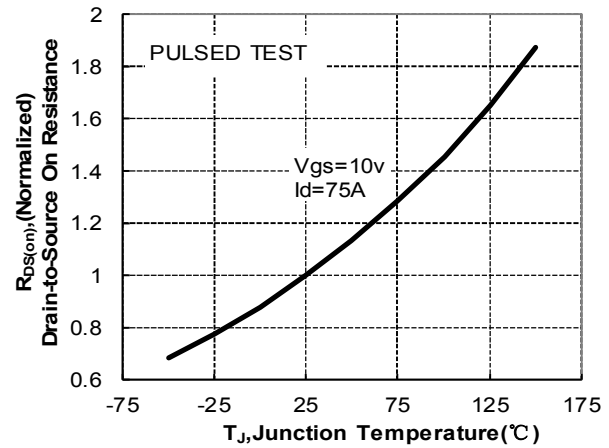


Figure 8. Normalized On Resistance vs Junction Temperature

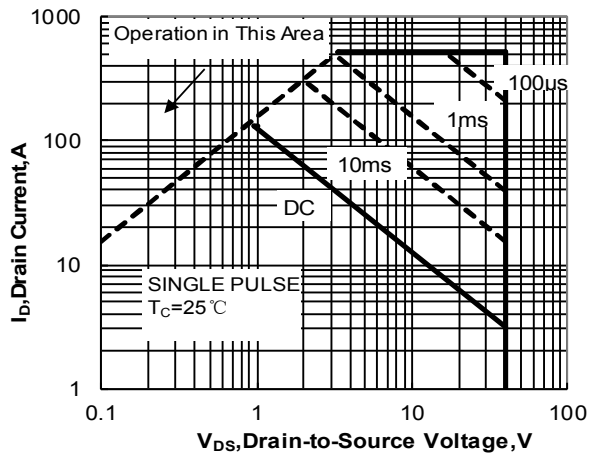


Figure 9. Maximum Safe Operating

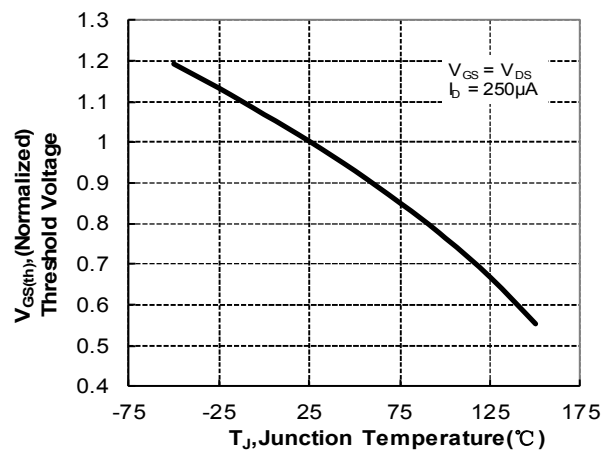


Figure 10. Normalized Threshold Voltage vs Junction Temperature

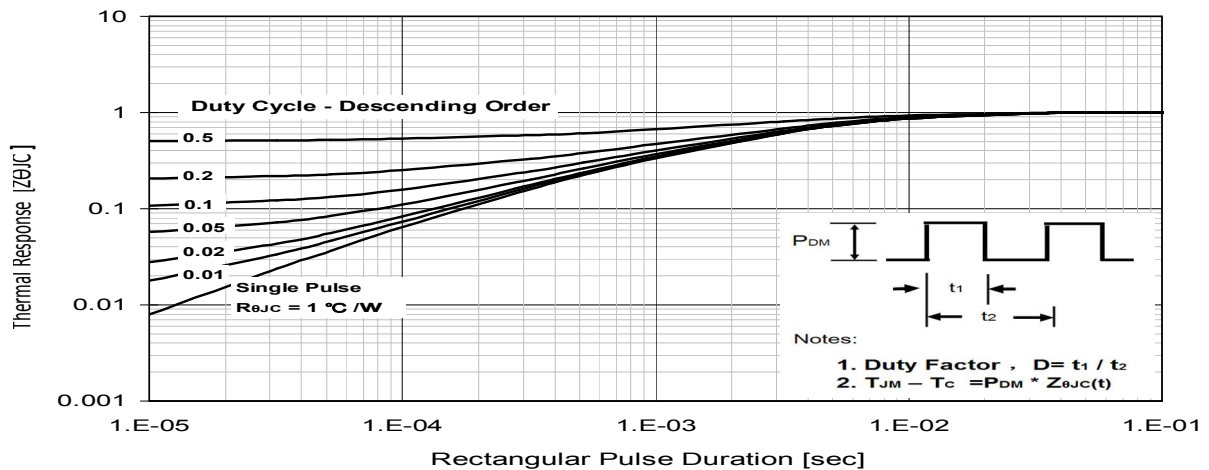


Figure 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

Test Circuits and Waveforms

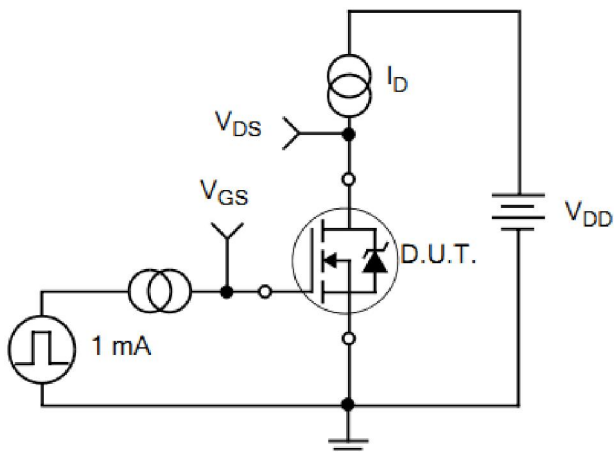


Figure 12. Gate Charge Test Circuit

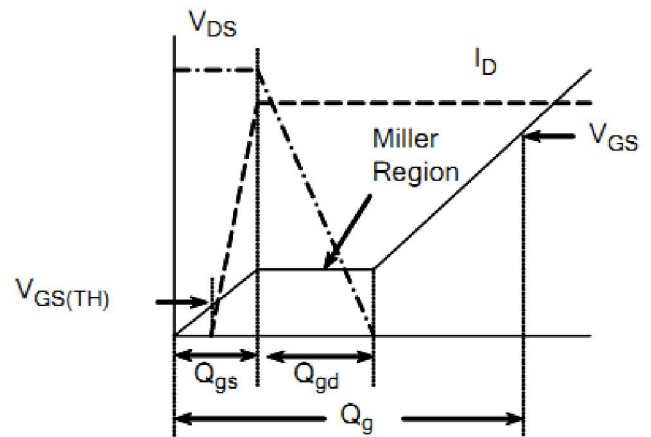


Figure 13. Gate Charge Waveforms

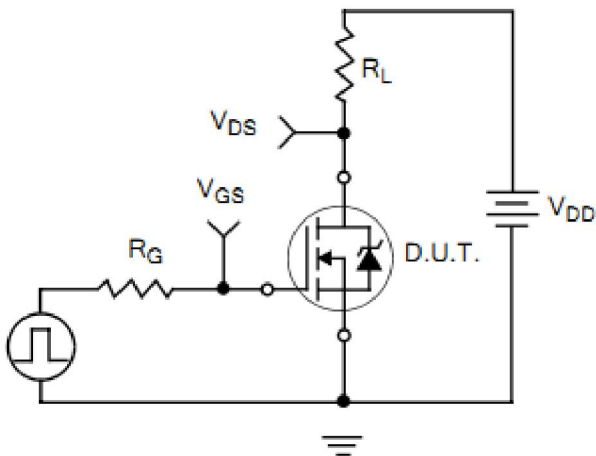


Figure 14. Resistive Switching Test Circuit

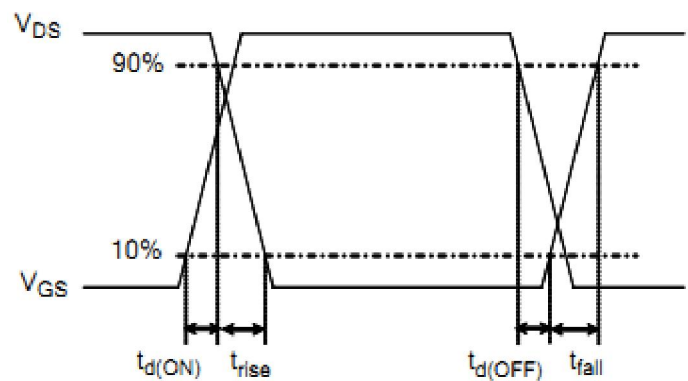


Figure 15. Resistive Switching Waveforms

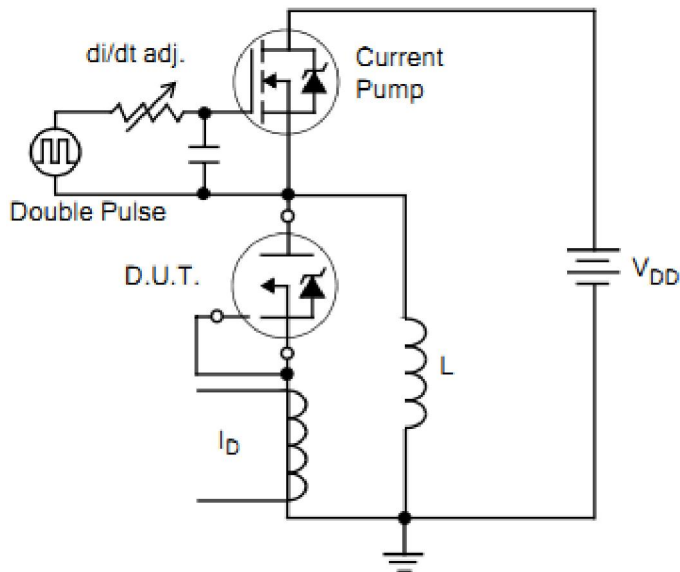


Figure 16. Diode Reverse Recovery Test Circuit

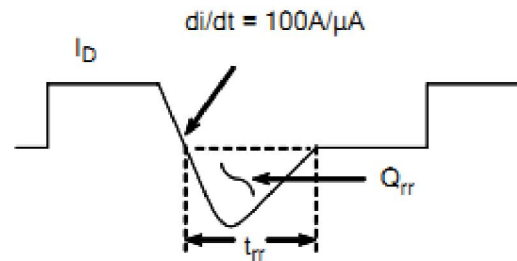


Figure 17. Diode Reverse Recovery Waveform

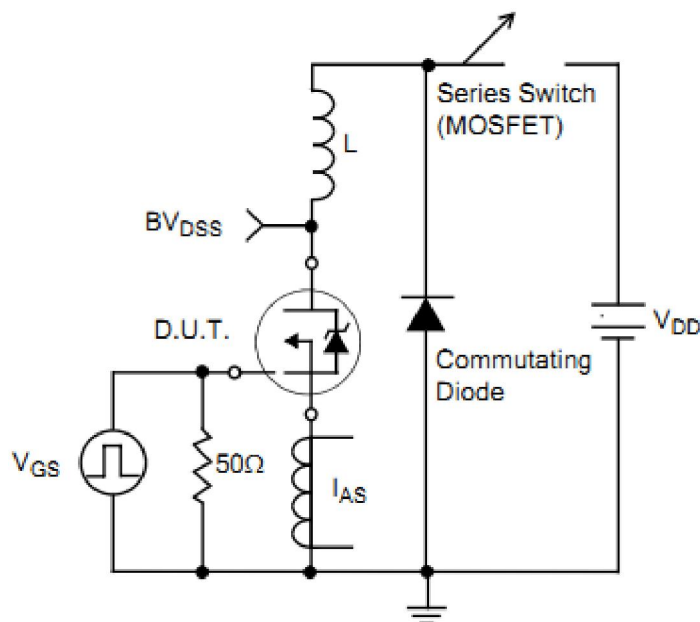


Figure18.Unclamped Inductive Switching Test Circuit

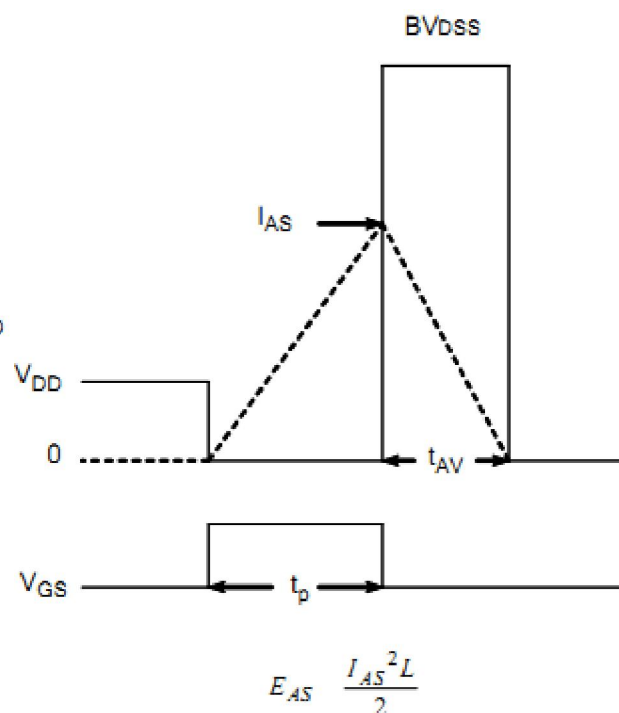


Figure19.Unclamped Inductive Switching Waveform

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