

Super-Junction MOSFET



Applications:

- Adaptor
- Charger
- SMPS

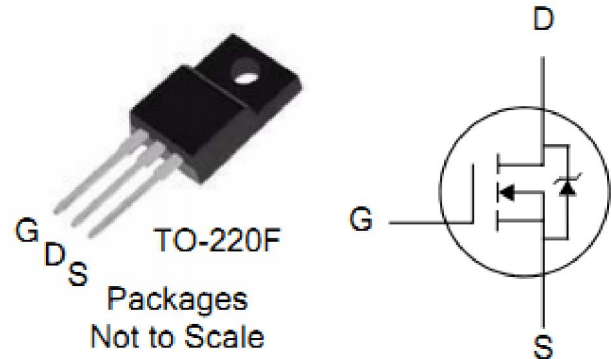
V_{DSS}	$R_{DS(ON)}(Typ.)$	I_D
600V	0.17 Ω	20A

Features:

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

Ordering Information

PART NUMBER	PACKAGE	BRAND
SJTA20N60A	TO-220F	IPS



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

Symbol	Parameter	SJTA20N60A	Units
V_{DSS}	Drain-to-Source Voltage	600	V
I_D	Continuous Drain Current	20	A
I_{DM}	Pulsed Drain Current, $V_{GS}@10V$ (NOTE *2)	60	A
P_D	Power Dissipation	34.5	W
	Derating Factor above 25°C	0.28	W/ $^\circ\text{C}$
V_{GS}	Gate-to-Source Voltage	± 30	V
E_{AS}	Single Pulse Avalanche Energy	500	mJ
E_{AR}	Avalanche Energy ,Repetitive (NOTE *2)	1	mJ
I_{AR}	Avalanche Current (NOTE *2)	20	A
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.	Max.	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case		3.6	$^\circ\text{C}/W$	Water cooled heatsink, P_D adjusted for a peak junction temperature of $+150^\circ\text{C}$.
$R_{\theta JA}$	Junction-to-Ambient		80		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	600	--	--	V	$V_{GS}=0V, I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	--	--	1	μA	$V_{DS}=600V, V_{GS}=0V$ $T_J=25^{\circ}\text{C}$
		--	--	100		$V_{DS}=600V, V_{GS}=0V$ $T_J=150^{\circ}\text{C}$
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)	--	0.17	0.19	Ω	$V_{GS}=10V, I_D=10A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.5	--	3.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
g_{fs}	Forward Transconductance(NOTE *3)	--	18.8	--	S	$V_{DS}=10V, I_D=20A$

Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C_{iss}	Input Capacitance	--	2140	--	pF	$V_{GS}=0V, V_{DS}=50V$ $f=1.0\text{MHz}$
C_{oss}	Output Capacitance	--	300	--		
C_{rss}	Reverse Transfer Capacitance	--	18	--		
Q_g	Total Gate Charge	--	54	--	nC	$I_D=20A, V_{DD}=480V$ $V_{GS}=10V$
Q_{gs}	Gate-to-Source Charge	--	10	--		
Q_{gd}	Gate-to-Drain ("Miller") Charge	--	20	--		

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	$V_{DD}=300V, I_D=20A,$ $V_G=10V, R_G=25\Omega$
t_{rise}	Rise Time	--	108			
$t_{d(OFF)}$	Turn-Off Delay Time	--	176			
t_{fall}	Fall Time	--	50			

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)	--	--	20	A	$T_c=25^{\circ}\text{C}$
I_{SM}	Maximum Pulsed Current (Body Diode)	--	--	60	A	
V_{SD}	Diode Forward Voltage	--	--	1.2	V	$I_{SD}=20\text{A}, V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	440	--	ns	$I_F=I_S$ $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	5	--	μC	

Notes:

*1. $T_J = +25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$.

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

*3. Pulse width $< 380\mu\text{s}$; duty cycle $< 2\%$.

Characteristics Curve:

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

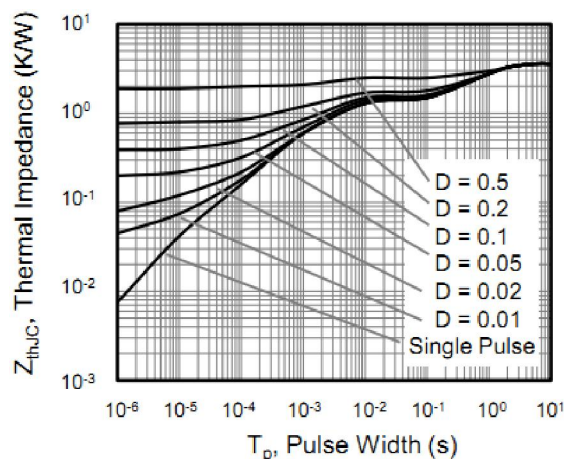


Figure 2. Typical Output Characteristics

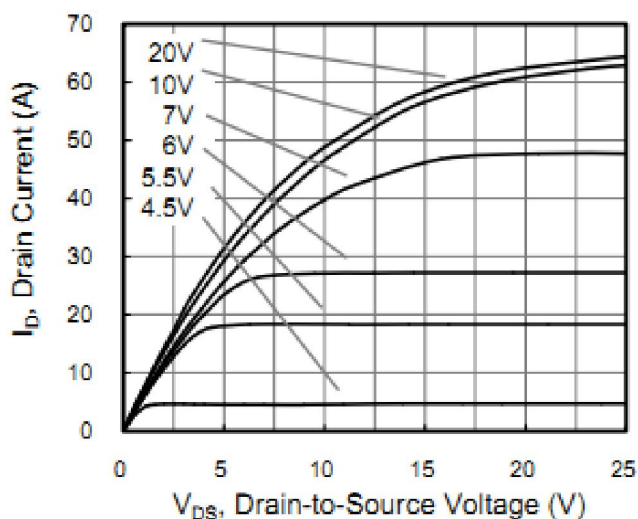


Figure 3. Typical Transfer Characteristics

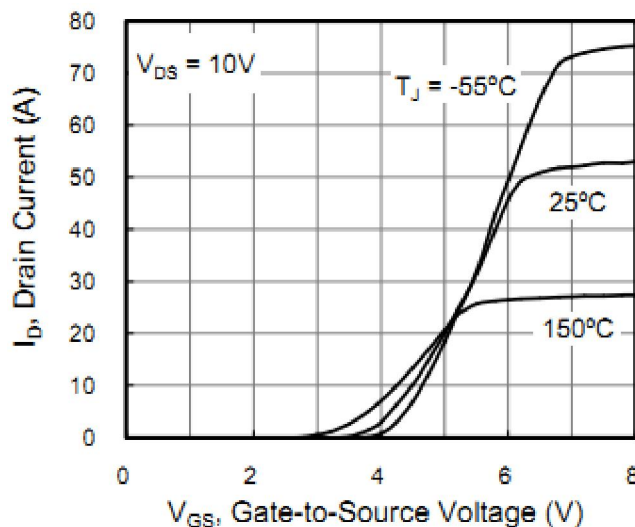


Figure 4. Typical Body Diode Transfer Characteristics

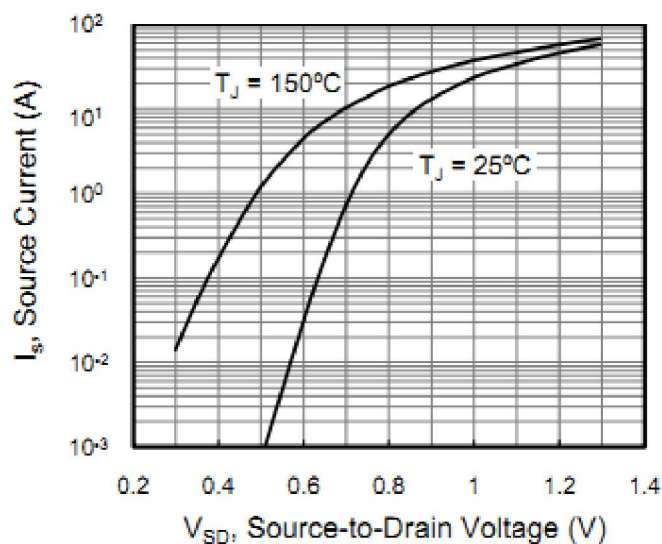


Figure 5. Typical Drain-to-source on Resistance VS Drain Current

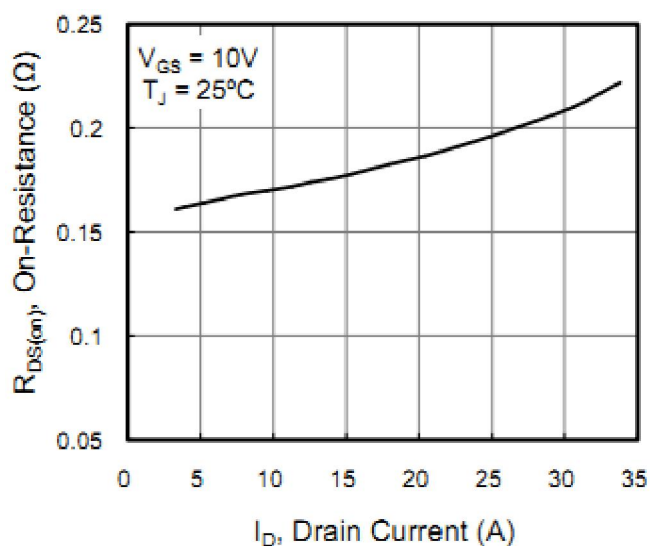


Figure 6. Capacitance VS Drain-to-Source Voltage

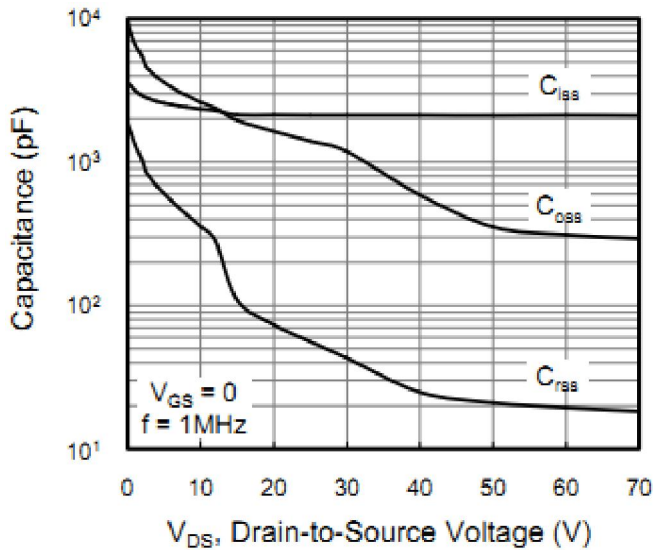


Figure 7. Gate Charge VS Gate-to-Source Voltage

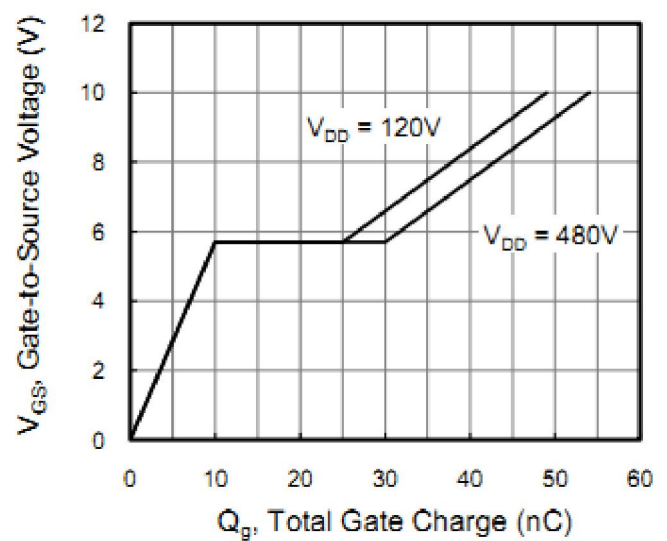


Figure 8. Threshold Voltage VS Temperature

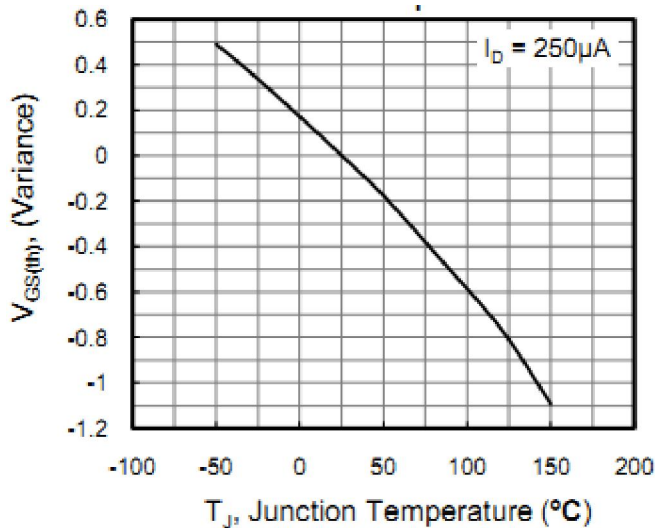


Figure 9. on-Resistance VS Temperature

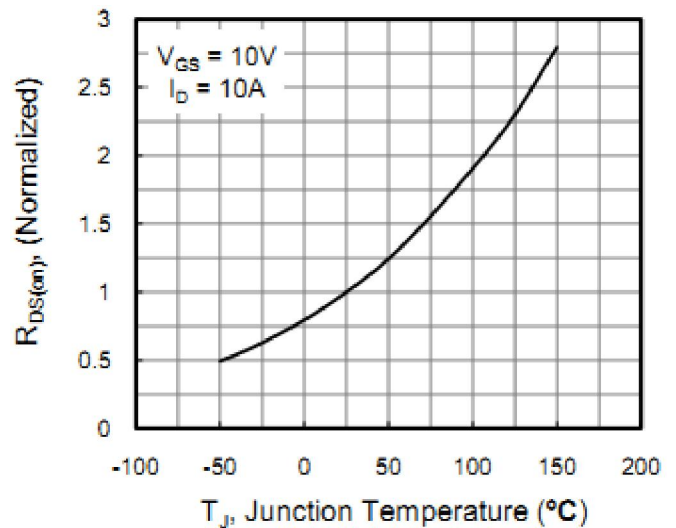
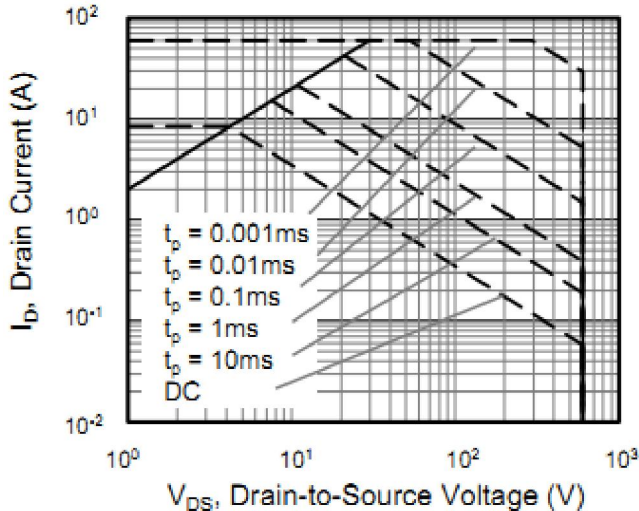


Figure 10. Safe Operating Area



Test Circuits and Waveforms

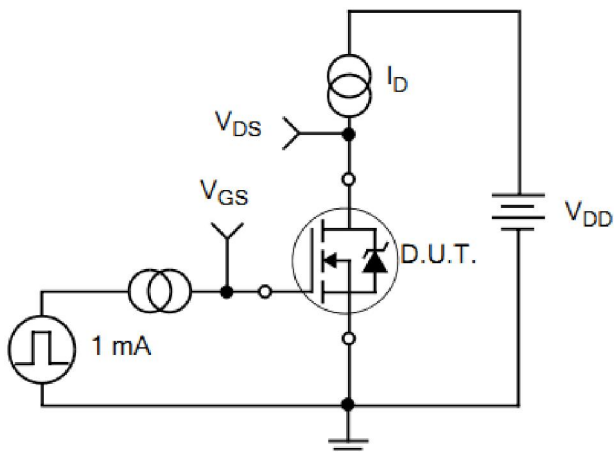


Figure 11. Gate Charge Test Circuit

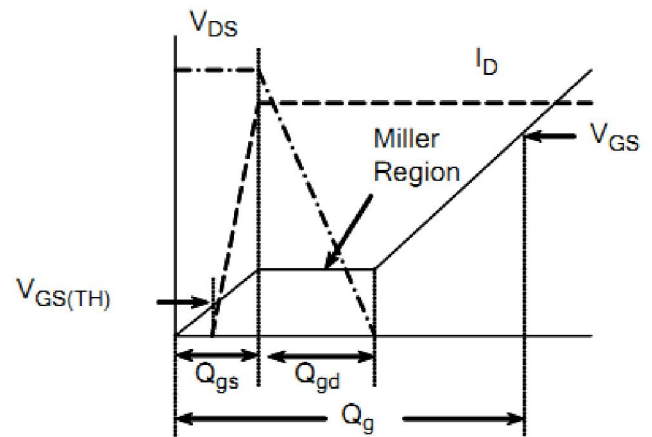


Figure 12. Gate Charge Waveforms

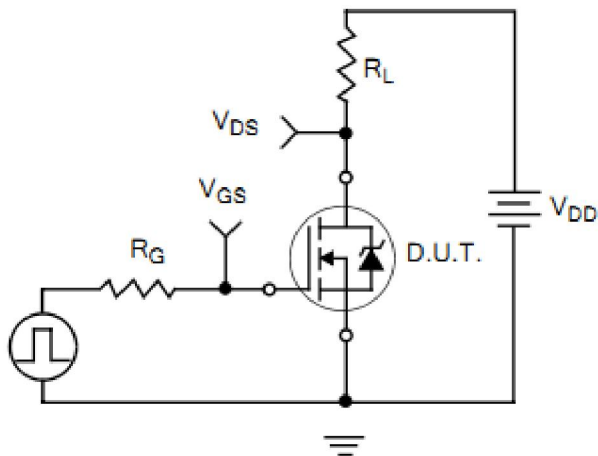


Figure 13. Resistive Switching Test Circuit

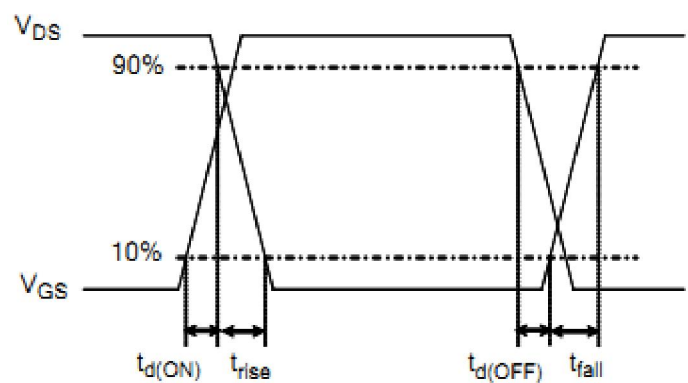


Figure 14. Resistive Switching Waveforms

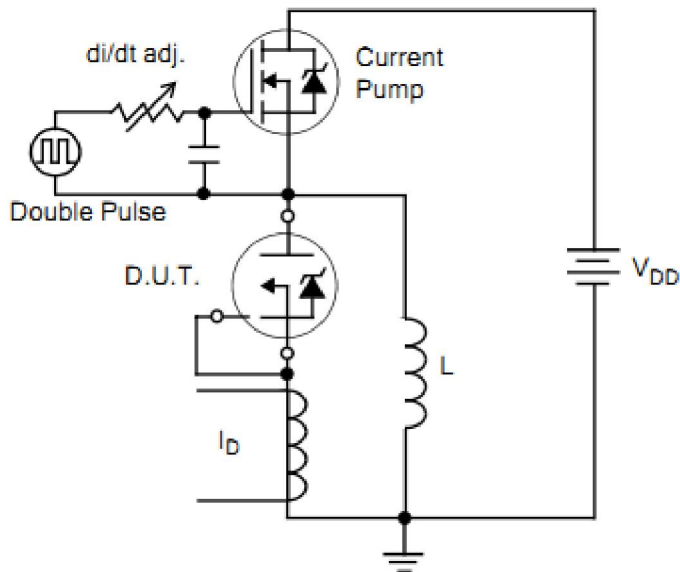


Figure 15. Diode Reverse Recovery Test Circuit

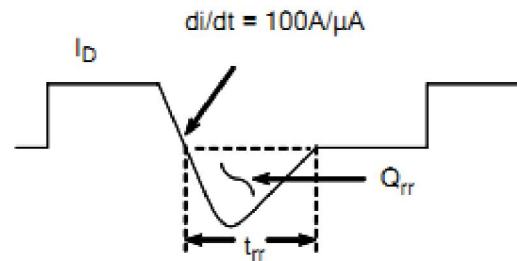


Figure 16. Diode Reverse Recovery Waveform

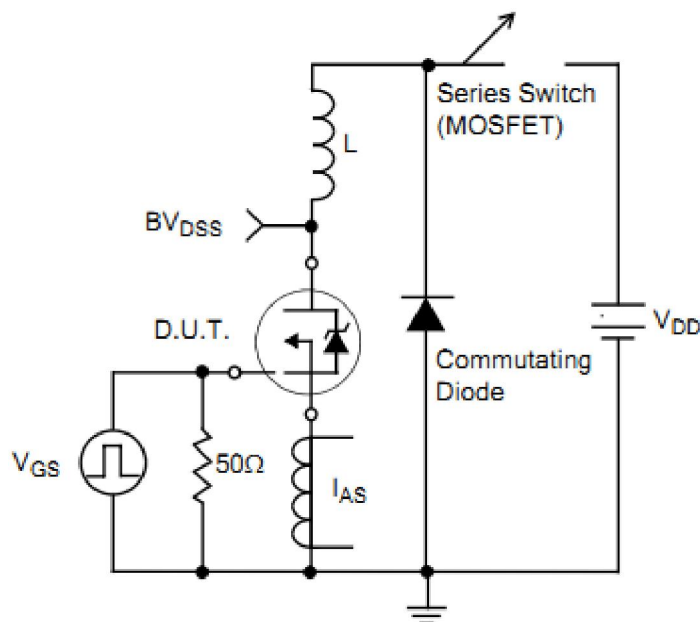


Figure17.Unclamped Inductive Switching Test Circuit

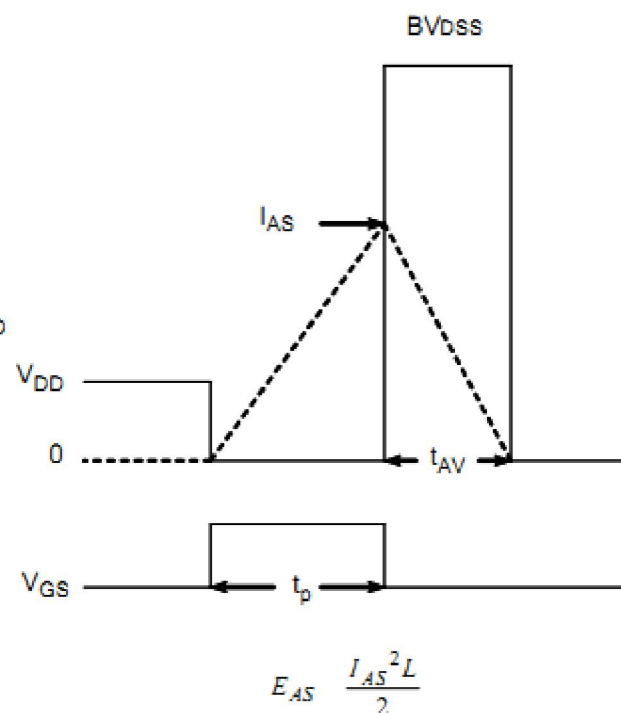


Figure18.Unclamped Inductive Switching Waveform



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