

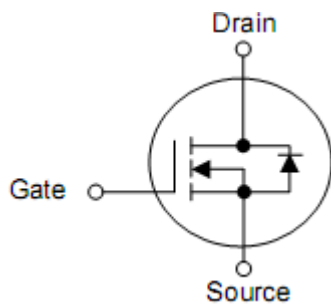
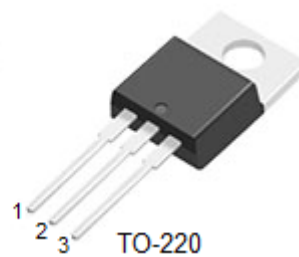
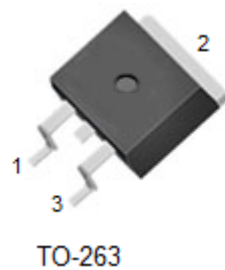
1. Features

- $R_{DS(ON)}=2.8m\Omega(\text{typ.})@V_{GS}=10V$
- Very Low On-resistance $R_{DS(ON)}$
- High ruggedness
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

2. Applications

- PWM Application
- Power Management
- Load switch

3. Symbol



Pin	Function
1	Gate
2	Drain
3	Source

4. Ordering Information

Part Number	Package	Brand
KNB2706A	TO-263	KIA
KNP2706A	TO-220	KIA

5. Absolute maximum ratings

$T_C=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Rating		Units
		TO-263	TO-220	
Drain-source voltage	V_{DSS}	60		V
Continuous drain current	I_D	150		A
	I_D	98		A
Pulsed drain current -Pulsed ¹⁾	I_{DM}	450		A
Gate-source voltage	V_{GS}	± 20		V
Single pulse avalanche energy ²⁾	E_{AS}	552		mJ
Repetitive Avalanche Energy ¹⁾	E_{AR}	240		mJ
Peak Diode Recovery dv/dt ³⁾	dv/dc	4.5		V/ns
Power dissipation	P_D	238	320	W
		-	2.56	W/ $^{\circ}\text{C}$
Operating junction and storage temperature range	T_J, T_{STG}	-55 to 150		$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300		$^{\circ}\text{C}$

*Drain current limited by maximum junction temperature.

6. Thermal characteristics

Parameter	Symbol	Rating		Unit
		TO-263	TO-220	
Thermal resistance junction-case	$R_{\theta JC}$	0.53	0.39	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	-	62.5	$^{\circ}\text{C}/\text{W}$

7. Electrical characteristics

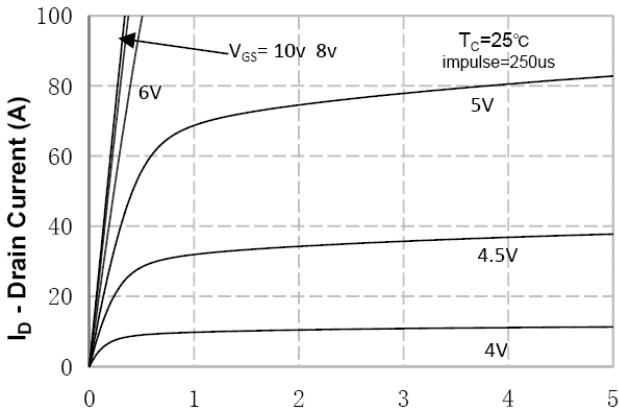
(T_C=25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0V, I _D =250uA	60	-	-	V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} / ΔT _J	I _D =250uA, Referenced to 25°C	-	0.06	-	V/°C
Drain-source leakage current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	uA
		V _{DS} =48V, T _C =150°C			10	uA
Gate-source forward leakage	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
Gate threshold voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250uA	2.2	-	3.6	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =20A	-	2.8	3.6	mΩ
Input capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V f=1MHz	-	8850	-	pF
Output capacitance	C _{oss}		-	610	-	pF
Reverse transfer capacitance	C _{rss}		-	730	-	pF
Turn-on delay time	t _{d(on)}	V _{DD} =30V, R _G =25Ω, I _D =50A ^{4),5)}		20		ns
Rise time	t _r			38		ns
Turn-off delay time	t _{d(off)}			49		ns
Fall time	t _f			30		ns
Total gate charge(10V)	Q _g	V _{DS} =30V, I _D =50A V _{GS} =10V ^{4),5)}	-	200	-	nC
Gate-source charge	Q _{gs}		-	35	-	nC
Gate-drain charge	Q _{gd}		-	72	-	nC
Maximum Continuous Drain-Source Diode Forward Current	I _S	—	-	-	150	A
Maximum Pulsed Drain-Source Diode Forward Current	I _{SM}	—	-	-	450	A
Diode forward voltage	V _{SD}	I _S =50A, V _{GS} =0V,	-	-	1.2	V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, I _S =50A, di/dt=100A/μs ⁴⁾	-	62	-	nS
Reverse Recovery Charge	Q _{rr}		-	105	-	nC

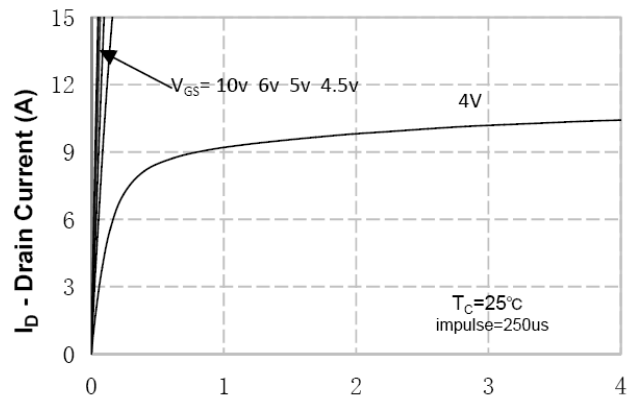
Note:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. I_{AS}=I_D, V_{DD}=20V, R_G=25Ω, Starting T_J=25°C
3. I_{SD}≤I_D, di/dt≤200A/us, V_{DD}≤BV_{DSS}, Starting T_J=25°C
4. Pulse Test : Pulse width≤300us, Duty cycle≤2%
5. Essentially independent of operating temperature

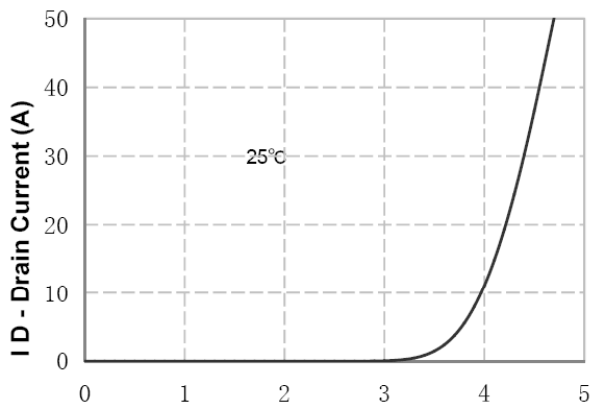
8. Typical operating characteristics



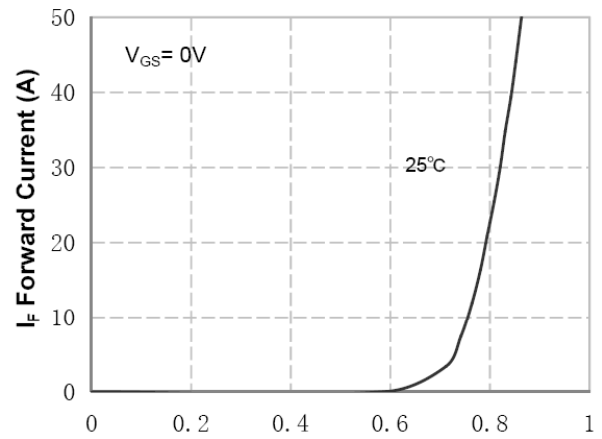
TO-263 Vds Drain-Source Voltage (V)
Figure 1. On-Region Characteristics



TO-220 Vds Drain-Source Voltage (V)
Figure 2. On-Region Characteristics



Vgs Gate-Source Voltage (V)
Figure 3. Transfer Characteristics



VF, Forward Voltage [V]
Figure 4. Body Diode Forward Voltage Variation vs Source Current

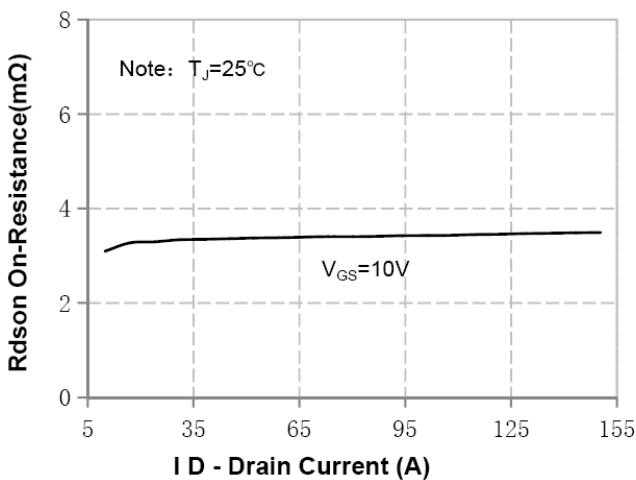


Figure 5. On-Resistance Variation vs Drain Current and Gate Voltage

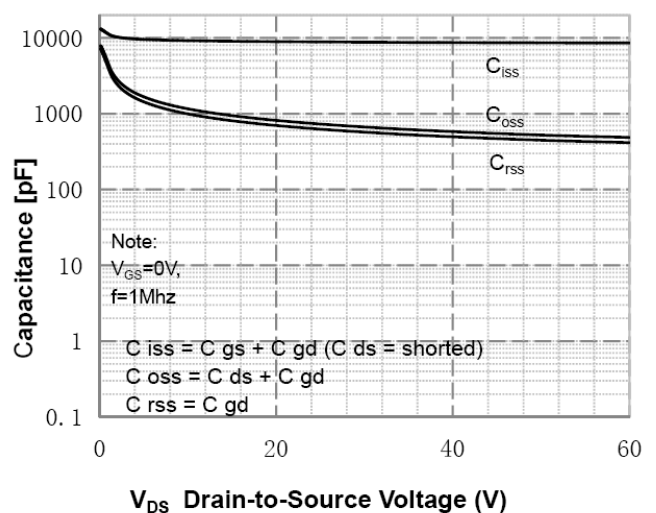


Figure 6. Capacitance Characteristics

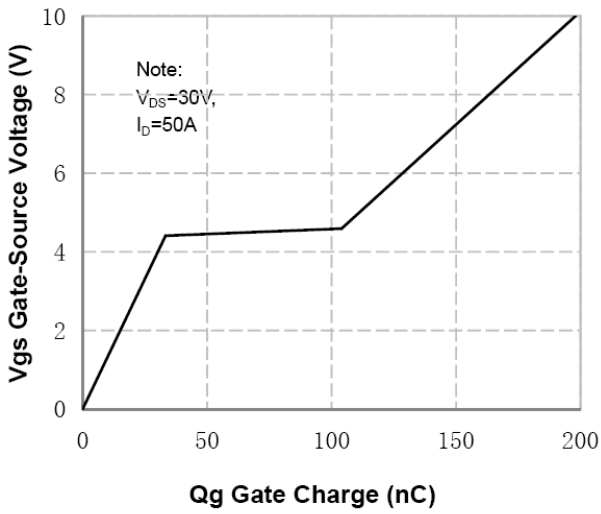


Figure 7. Gate Charge Characteristics

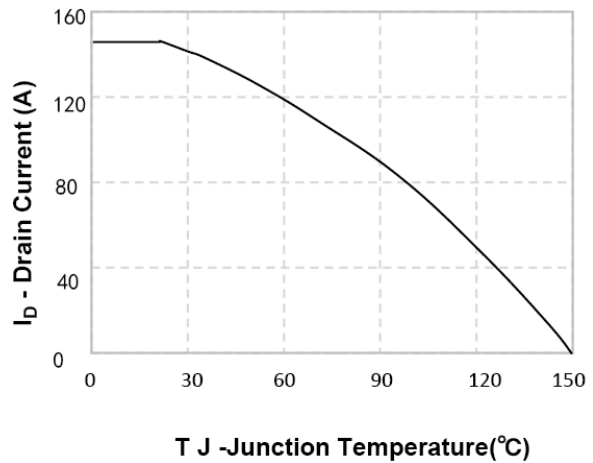


Figure 8. Maximum PContinuous Drain Current vs Case Temperature

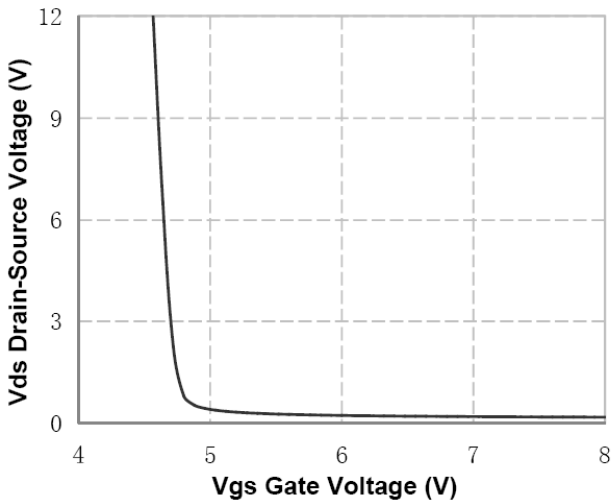


Figure 9. Vds Drain-Source Voltage vs Gate Voltage

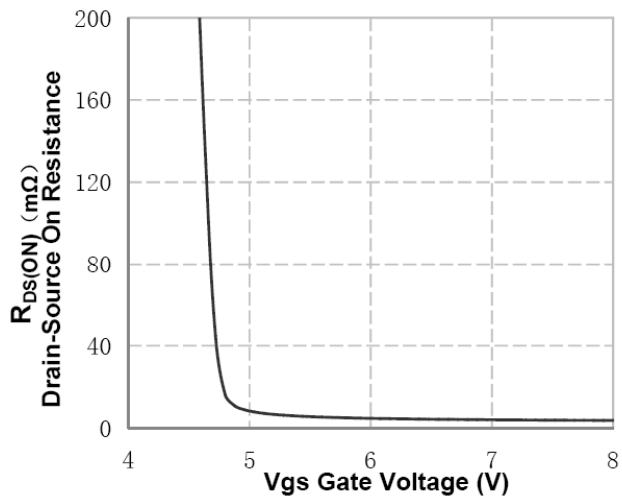
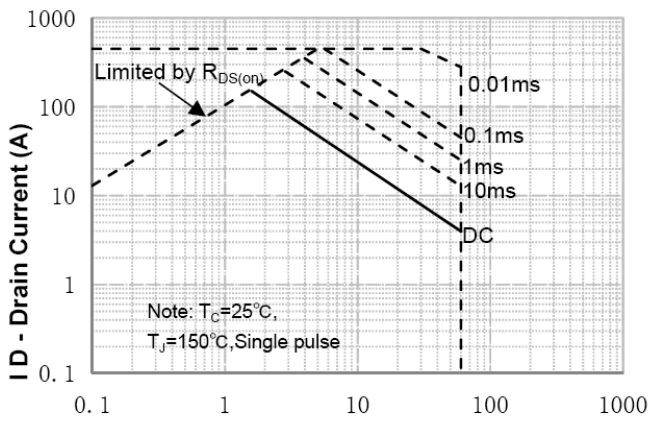
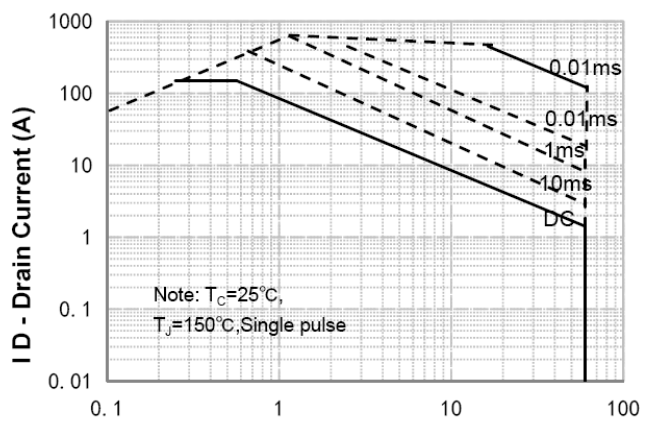


Figure 10. On-Resistance vs Gate Voltage



**TO-263 Vds Drain-Source Voltage (V)
Figure 11. Maximum Safe Operating Area**



**TO-220 Vds Drain-Source Voltage (V)
Figure 12. Maximum Safe Operating Area**

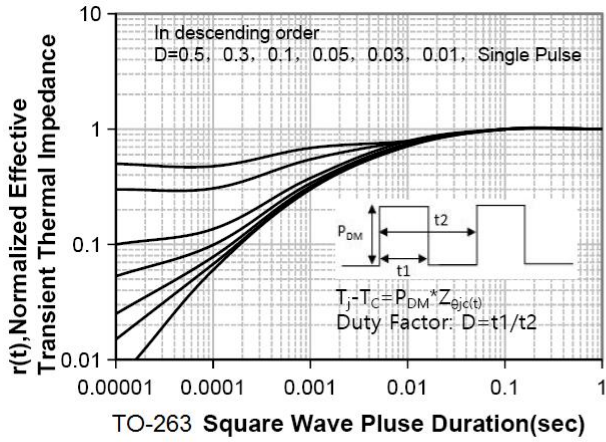


Figure 13. Transient Thermal Response Curve

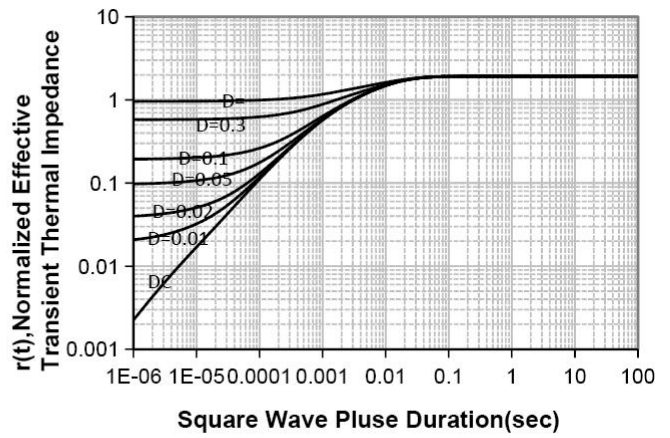
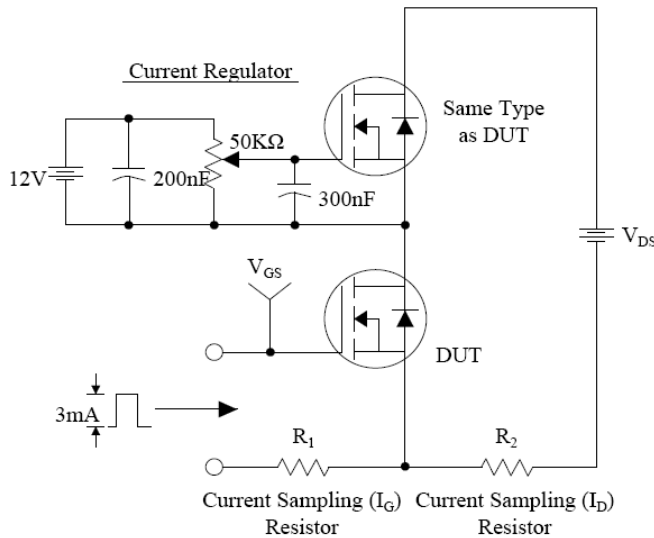


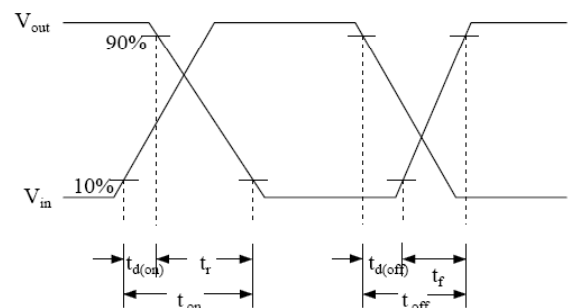
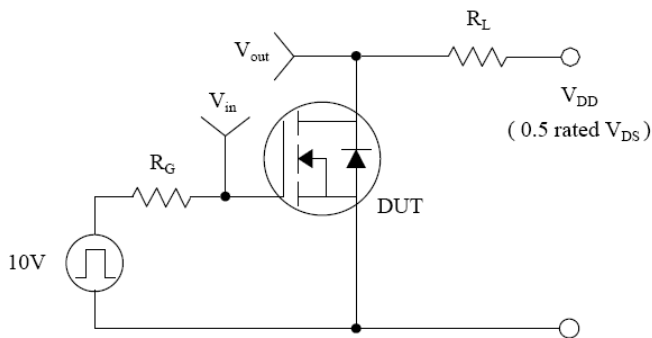
Figure 14. Transient Thermal Response Curve

9. Test Circuits and Waveforms

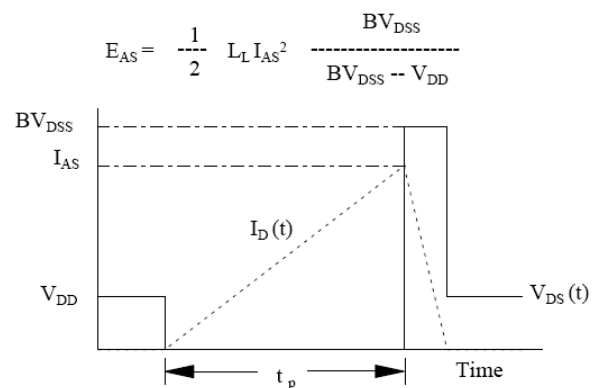
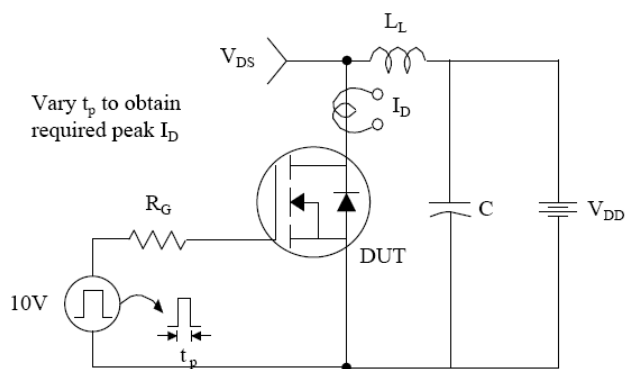
Gate Charge Test Circuit & Waveform



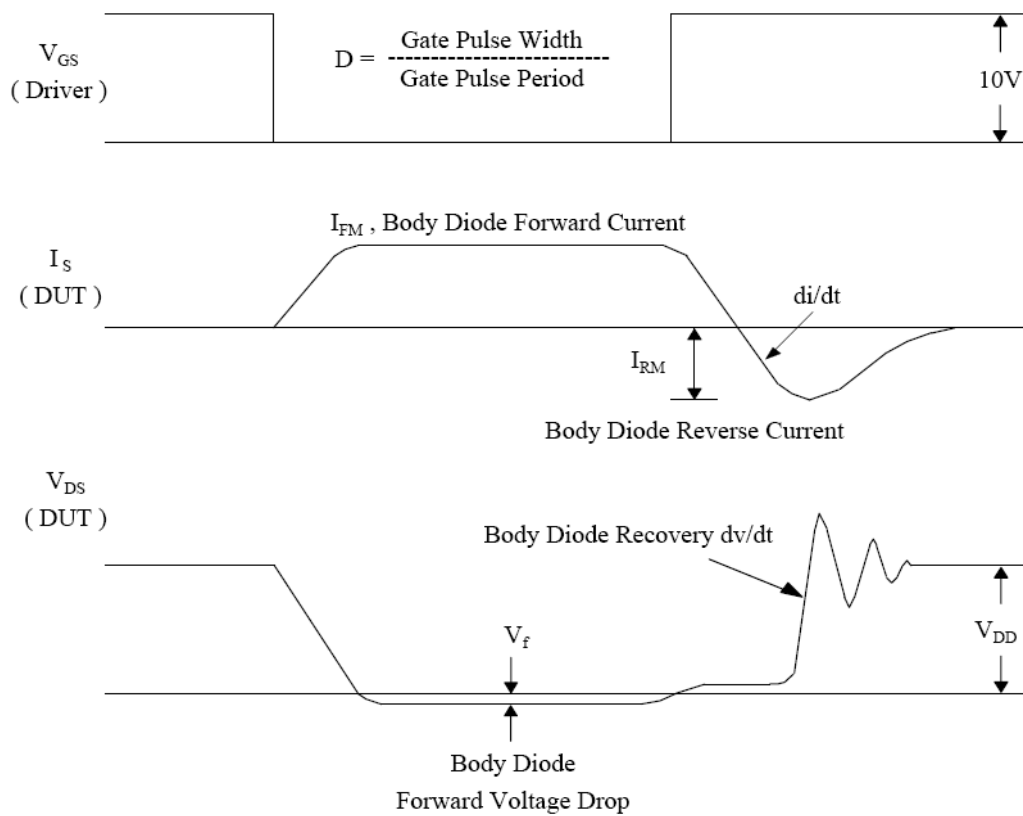
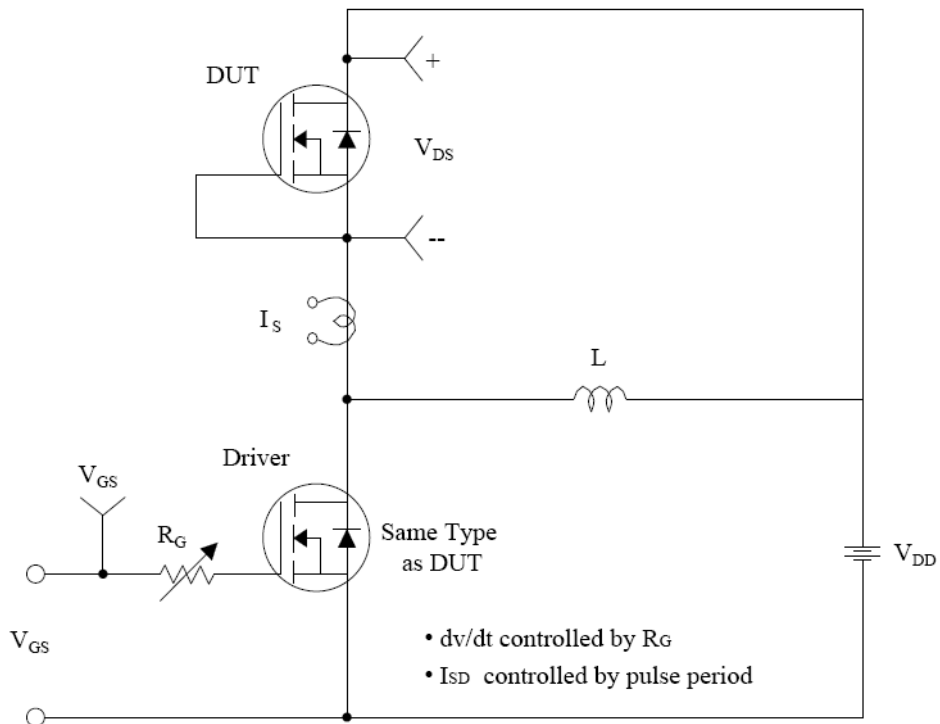
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms



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