

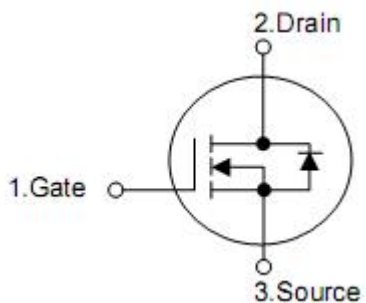
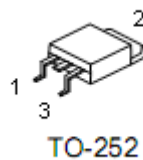
## 1. Features

- n  $R_{DS(ON),typ.}=0.8\Omega$  @  $V_{GS}=10V, I_D=4A$
- n Fast Switching
- n 100% avalanche tested
- n Improved dv/dt capability

## 2. Application

- n DC Motor Control and Class D Amplifier
- n Uninterruptible Power Supply(UPS)
- n Automotive

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

#### 4. Ordering Information

Part Number	Package	Brand
KND840U	TO-252	KIA

#### 5. Absolute maximum ratings

(T<sub>C</sub>= 25°C , unless otherwise specified)

Parameter	Symbol	Rating	Units
		TO252	
Drain-source voltage	V <sub>DSS</sub>	500	V
Gate-source voltage	V <sub>GSS</sub>	±30	V
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> =25 °C	8*
		T <sub>C</sub> =100 °C	4.61*
Pulsed Drain Current <sup>note1</sup>	I <sub>DM</sub>	28*	A
Single Pulse Avalanche Energy <sup>note2</sup>	E <sub>AS</sub>	180	mJ
Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25 °C	84
Linear Derating Factor		T <sub>C</sub> > 25 °C	0.66
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	1.5	°C/W
Operating and Storage Temperature Range	T <sub>L</sub> , T <sub>STG</sub>	-55~+150	°C

\*Drain current limited by maximum junction temperature

## 6. Electrical characteristics

(T<sub>J</sub>=25°C, unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	500	-	-	V
Breakdown voltage temperature coefficient	ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =250μA, referenced to 25°C	-	0.5	-	V/°C
Zero Gage Voltage Drain Source	I <sub>DSS</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =400V, T <sub>C</sub> =125°C	-	-	10	μA
Gate to Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V	-	-	100	nA
		V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	-	-	-100	nA
On characteristics						
Gate threshold voltage <sup>note4</sup>	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2	-	4	V
Static drain-source on-resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =4.0A	-	0.8	0.9	Ω
Forward Transconductance	G <sub>FS</sub>	V <sub>DS</sub> =30V, I <sub>D</sub> =3.5A	-	3.0	-	S
Dynamic characteristics						
Input capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1.0 MHz	-	831	-	pF
Output capacitance	C <sub>OSS</sub>		-	80.7	-	pF
Reverse transfer capacitance	C <sub>RSS</sub>		-	3.81	-	pF
Total gate charge	Q <sub>G</sub>	V <sub>DD</sub> =400V, I <sub>D</sub> =7A, V <sub>GS</sub> =10V	-	17.8	-	nC
Gate-source charge	Q <sub>GS</sub>		-	3.9	-	nC
Gate-drain charge	Q <sub>GD</sub>		-	5.5	-	nC
Switching characteristics						
Turn-on delay time	t <sub>D(ON)</sub>	V <sub>DD</sub> =250V, I <sub>D</sub> =7A, R <sub>G</sub> =10Ω, V <sub>GS</sub> =10V	-	13.1	-	ns
Rise time	t <sub>R</sub>		-	21.0	-	ns
Turn-off delay time	t <sub>D(OFF)</sub>		-	23.7	-	ns
Fall time	t <sub>F</sub>		-	10.3	-	ns
Switching characteristics						
Continuous drain-source current	I <sub>S</sub>		-	-	8	A
Pulsed drain-source current	I <sub>SM</sub>		-	-	28	A
Drain-source diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =7A	-	-	1.4	V
Reverse recovery time	t <sub>RR</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =4A, di/dt=100A/μs	-	283	-	ns
Reverse recovery charge	Q <sub>RR</sub>		-	1.2	-	μC

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. L=10mH, I<sub>AS</sub>=6A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.

3. I<sub>SD</sub>≤8A, di/dt≤200A/μs, V<sub>DD</sub>≤B<sub>V</sub>DSS, Starting T<sub>J</sub>=25°C.

4. Pulse width≤300μs; duty cycle≤2%

## 7. Typical Characteristics

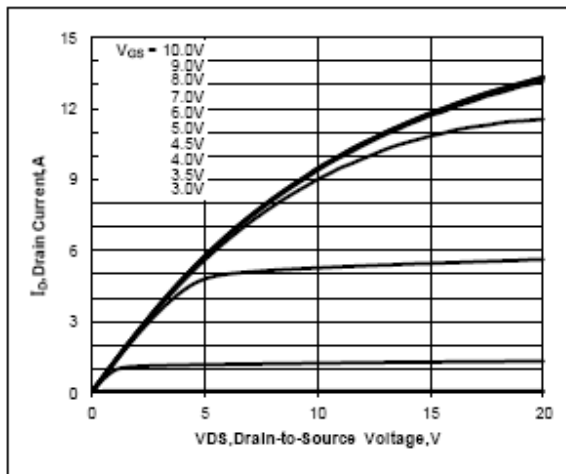


Figure 1. Output Characteristics

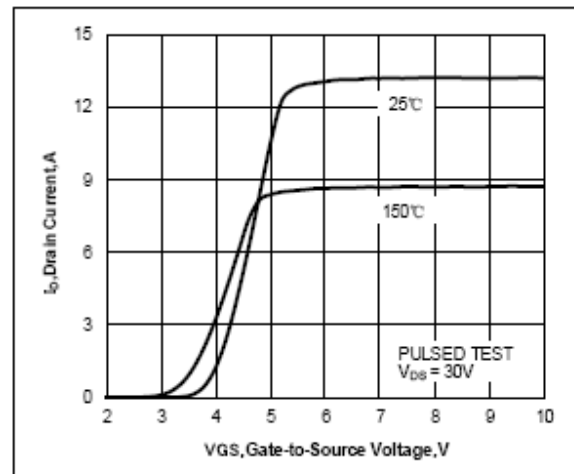


Figure 2. Transfer Characteristics

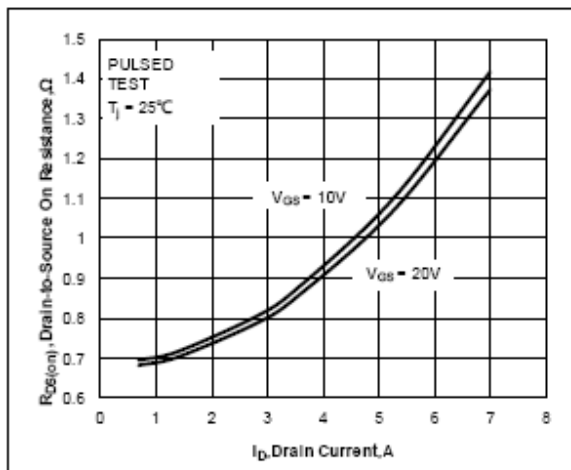


Figure 3. Drain-to-Source On Resistance vs. Drain Current and Gate Voltage

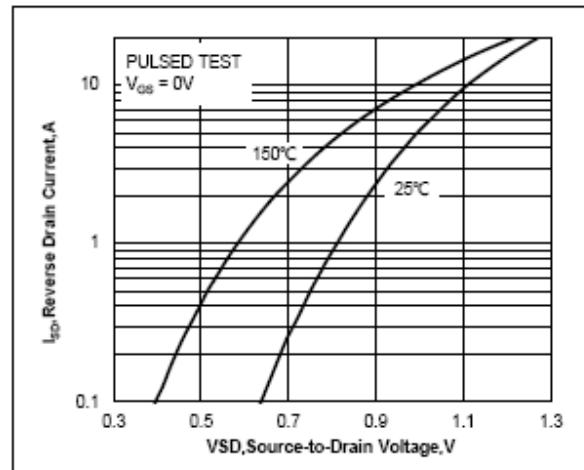


Figure 4. Body Diode Forward Voltage vs. Source Current and Temperature

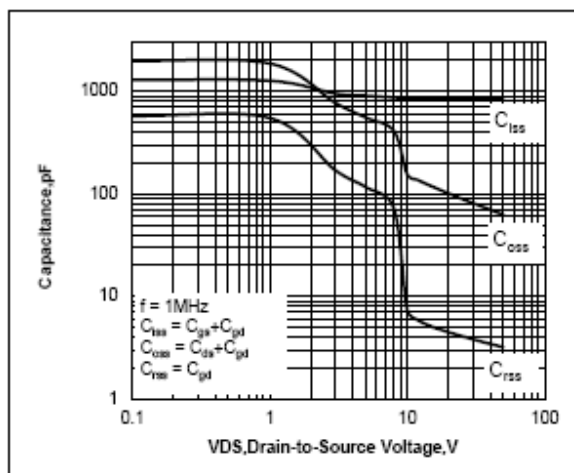


Figure 5. Capacitance Characteristics

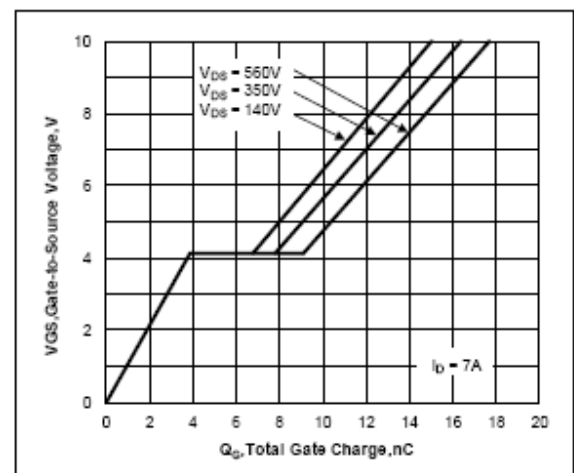
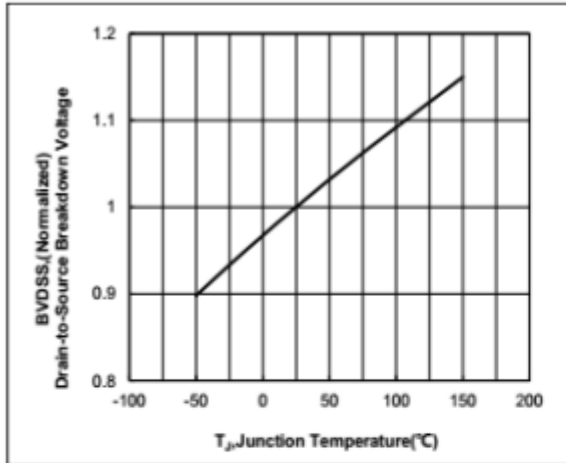
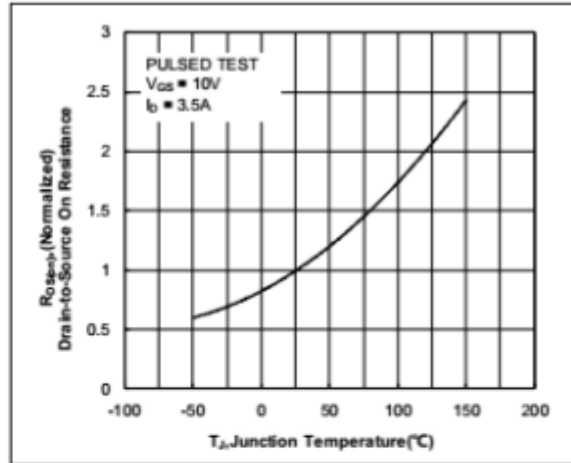


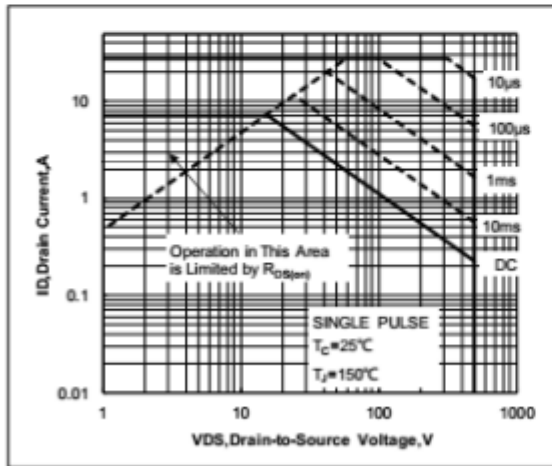
Figure 6. Gate Charge Characteristics



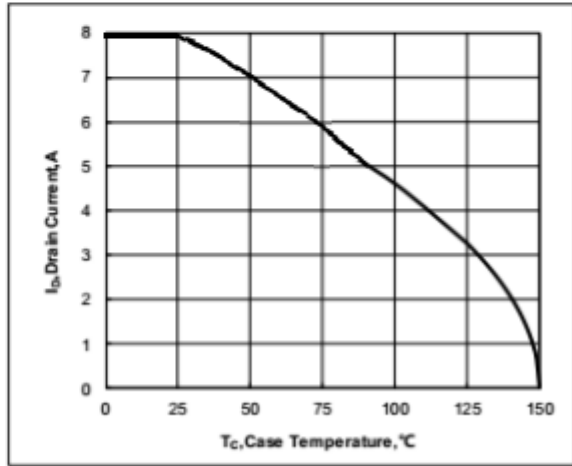
**Figure 7. Normalized Breakdown Voltage vs. Junction Temperature**



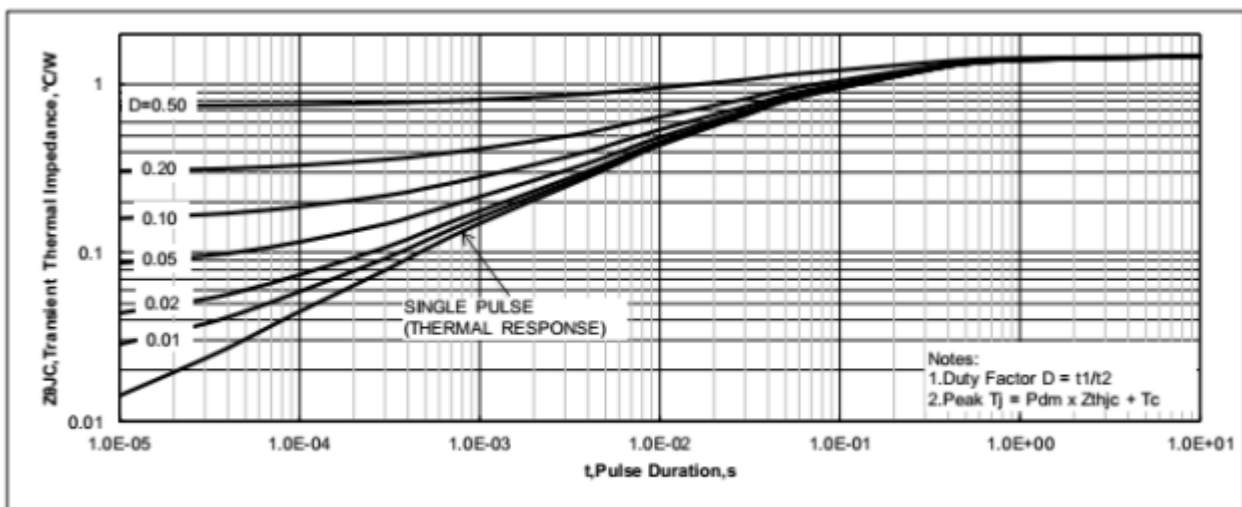
**Figure 8. Normalized On Resistance vs. Junction Temperature**



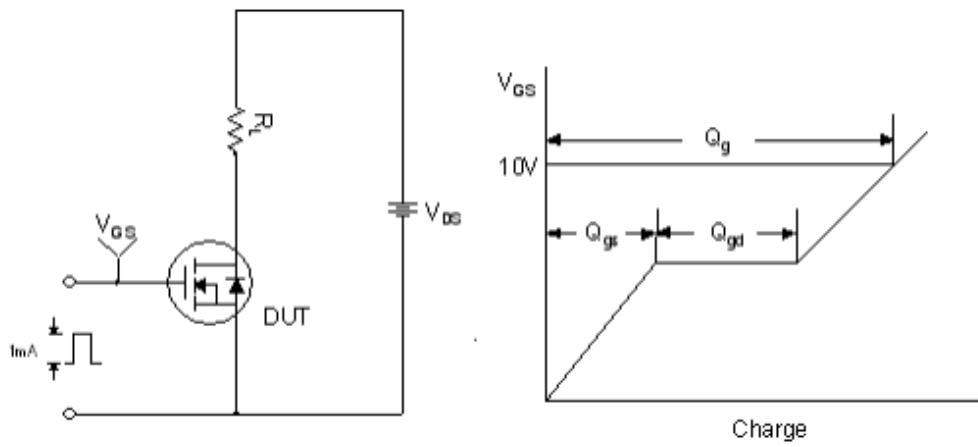
**Figure 9. Maximum Safe Operating Area**



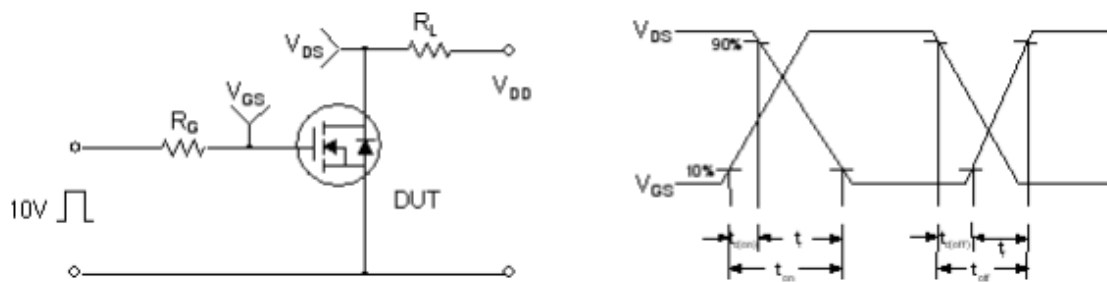
**Figure 10. Maximum Continuous Drain Current vs. Case Temperature**



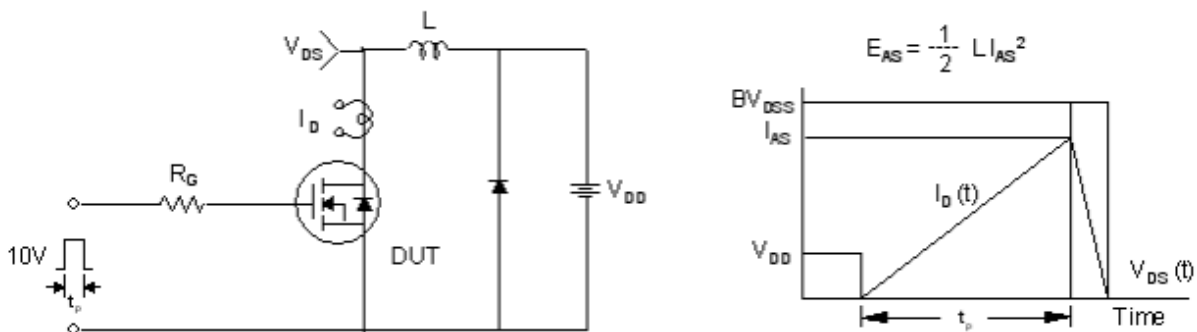
**Figure 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case**



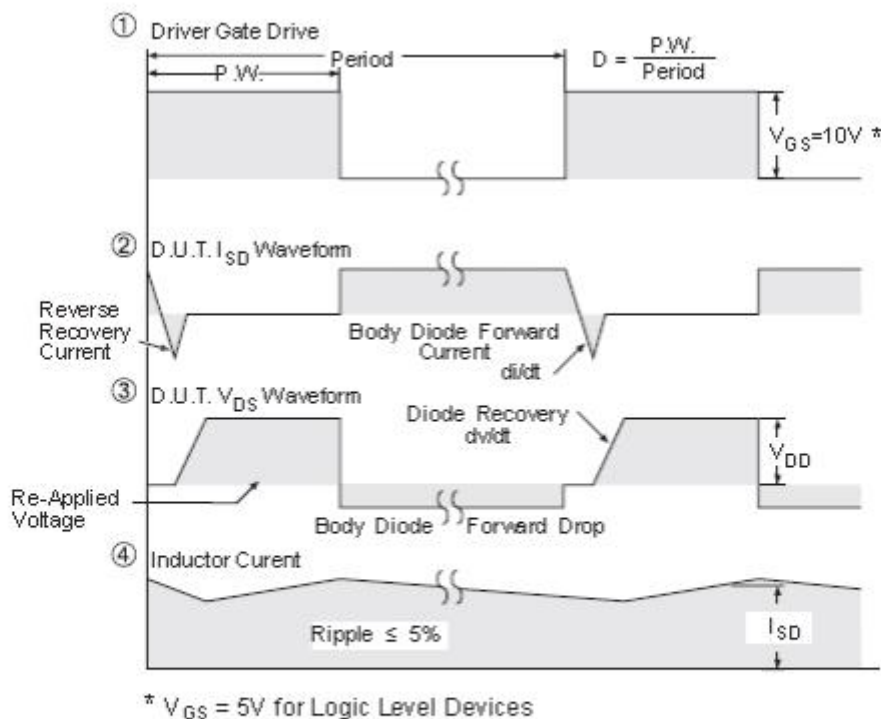
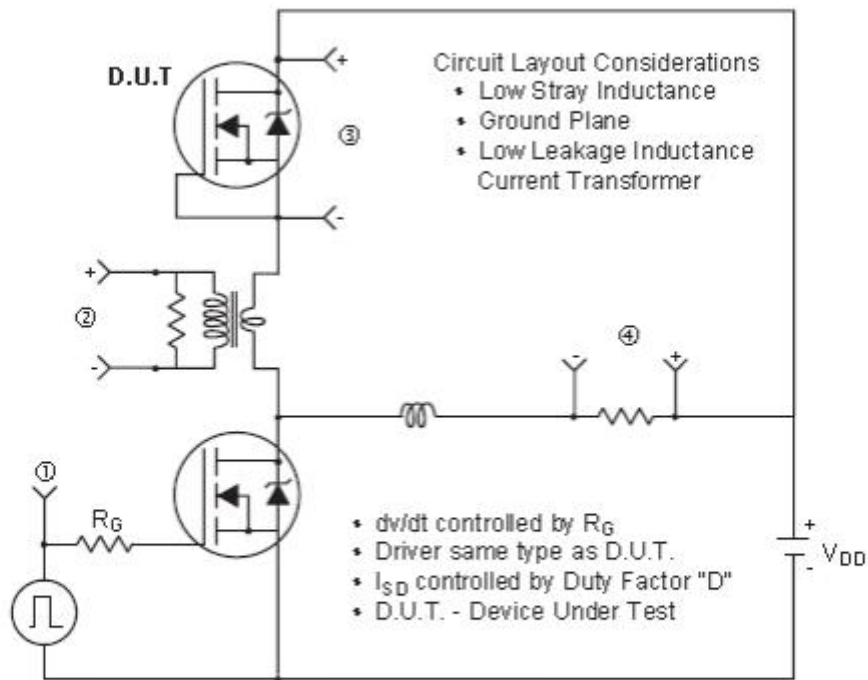
**Figure 12. Gate Charge Test Circuit & Waveform**



**Figure 13. Resistive Switching Test Circuit & Waveforms**



**Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms**



**Figure 15. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms (For N-channel)**