

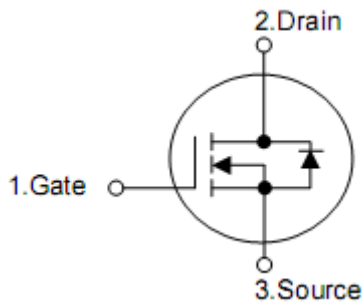
## 1. Features

- Proprietary New Planar Technology
- $R_{DS(ON)}=80m\Omega(\text{typ.})@V_{GS}=10V$
- Low Gate Charge Minimize Switching Loss
- Fast Recovery Body Diode

## 2. Applications

- DC-DC Converters
- DC-AC Inverters for UPS
- SMPS and Motor controls

## 3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source

## 4. Ordering Information

Part Number	Package	Brand
KNP9125A	TO-220	KIA

## 5. Absolute maximum ratings

(Tc= 25 °C , unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Drain-to-Source Voltage <sup>1)</sup>	V <sub>DSS</sub>	250	V
Gate-to-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current	Tc=25 °C	I <sub>D</sub>	40
	Tc=100 °C	I <sub>D</sub>	Figure 3
Pulsed Drain Current at V <sub>GS</sub> =10V <sup>2)</sup>	I <sub>DM</sub>	Figure 6	A
Single Pulse Avalanche Energy	EAS	1250	mJ
Peak Diode Recovery dv/dt <sup>3)</sup>	dv/dt	5.0	V/ns
Power Dissipation	P <sub>D</sub>	125	W
Derating Factor above 25°C	P <sub>D</sub>	1.0	W/°C
Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10 seconds, Package Body for 10 seconds	T <sub>L</sub> T <sub>PAK</sub>	300 260	°C
Operating and Storage Temperature Range	T <sub>J</sub> &T <sub>STG</sub>	-55 to 150	°C

Caution: Stresses greater than those listed in the “Absolute Maximum Ratings” may cause permanent damage to the device.

## 6. Thermal characteristics

Parameter	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case	R <sub>θJC</sub>	1.0	°C/W
Thermal Resistance, Junction-to-Ambient	R <sub>θJA</sub>	62	°C/W

## 7. Electrical characteristics

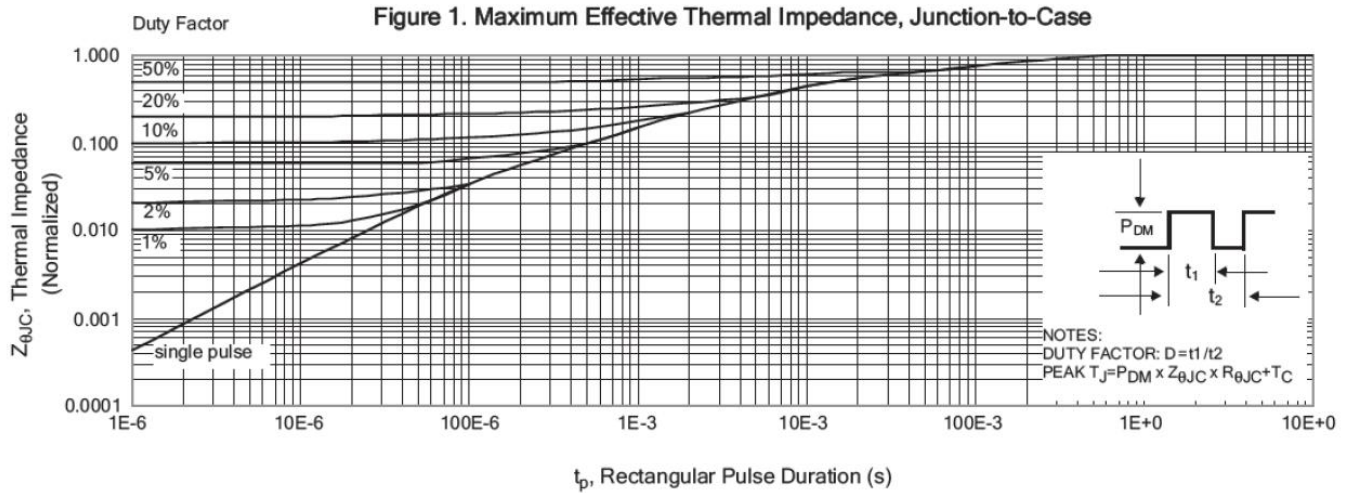
 (T<sub>J</sub>=25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-to-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	250	-	-	V
Drain-to-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =250V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =200V, T <sub>J</sub> =125°C	-	-	100	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
Drain-to-Source ON Resistance <sup>4)</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	80	100	mΩ
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.0	-	4.0	V
Forward Transconductance <sup>4)</sup>	g <sub>fs</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =20A	-	65	-	S
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHZ	-	2450	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	80	-	
Output Capacitance	C <sub>oss</sub>		-	240	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DD</sub> =100V, I <sub>D</sub> =20A, V <sub>GS</sub> =0~10V	-	94	-	nC
Gate-to-Source Charge	Q <sub>gs</sub>		-	16	-	
Gate-to-Drain (Miller) Charge	Q <sub>gd</sub>		-	36	-	
Turn-on Delay Time	t <sub>d(ON)</sub>	V <sub>DD</sub> =100V, I <sub>D</sub> =20A, R <sub>G</sub> =3.9Ω, V <sub>GS</sub> = 10V	-	18	-	nS
Rise Time	t <sub>rise</sub>		-	31	-	
Turn-Off Delay Time	t <sub>d(OFF)</sub>		-	68	-	
Fall Time	t <sub>fall</sub>		-	26	-	
Continuous Source Current <sup>4)</sup>	I <sub>SD</sub>	Integral PN-diode in MOSFET	-	-	40	A
Pulsed Source Current <sup>4)</sup>	I <sub>SM</sub>		-	-	160	A
Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =40A, V <sub>GS</sub> =0V	-	-	1.5	V
Reverse recovery time	t <sub>rr</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =20A, diF/dt=100A/μs	-	260	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	400	-	μC

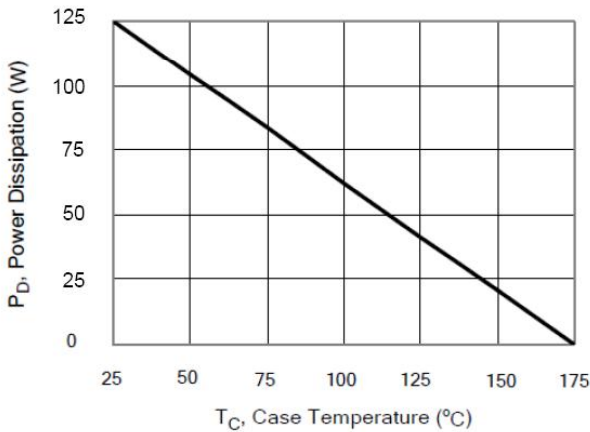
Note:

- 1) T<sub>J</sub>=+25°C to +150°C
- 2) Repetitive rating; pulse width limited by maximum junction temperature.
- 3) I<sub>SD</sub>=20A, di/dt<100 A/μs, V<sub>DD</sub><BV<sub>DSS</sub>, T<sub>J</sub>=+150°C.
- 4) Pulse width≤380μs; duty cycle≤2%.

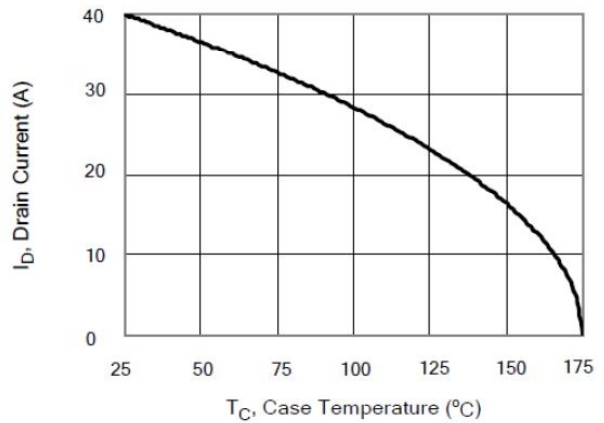
**8. Test circuits and waveforms**



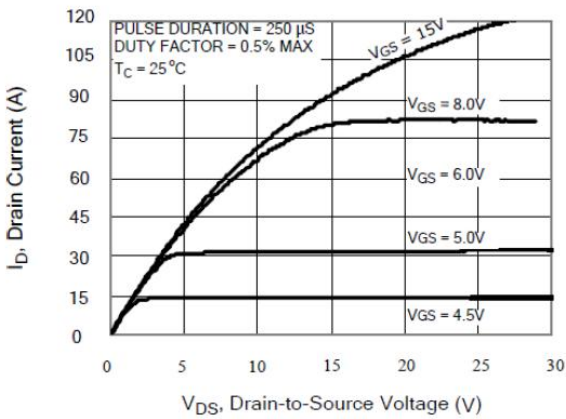
**Figure 2. Maximum Power Dissipation vs Case Temperature**



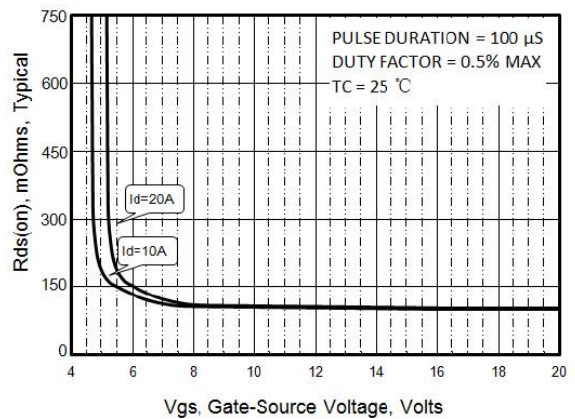
**Figure 3. Maximum Continuous Drain Current vs Case Temperature**



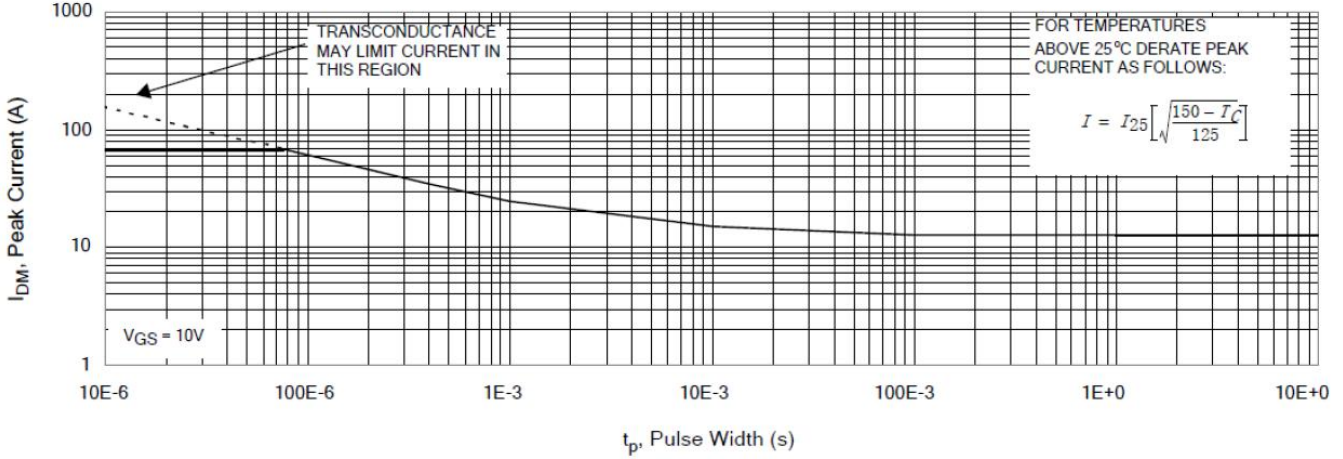
**Figure 4. Typical Output Characteristics**



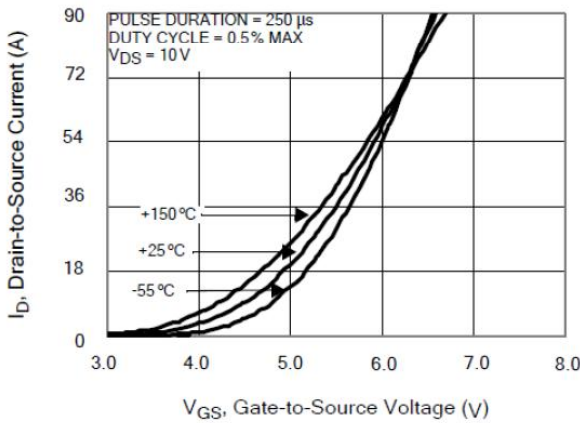
**Figure 5. Rdson vs Gate Voltage**



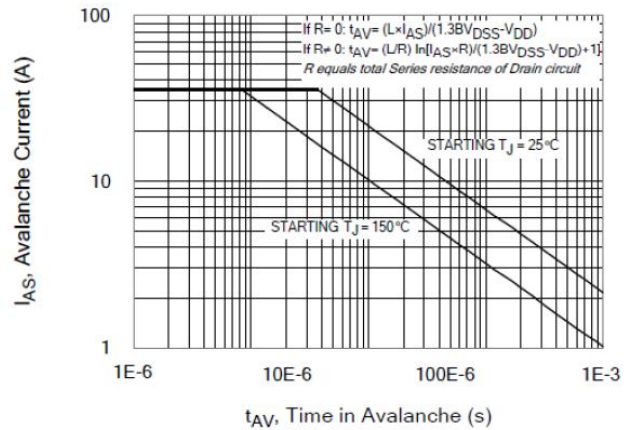
**Figure 6. Maximum Peak Current Capability**



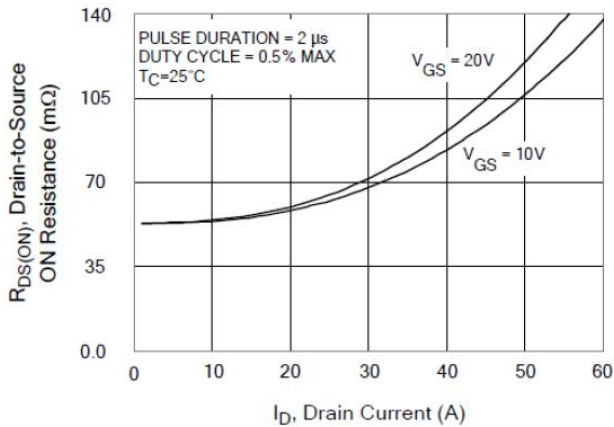
**Figure 7. Typical Transfer Characteristics**



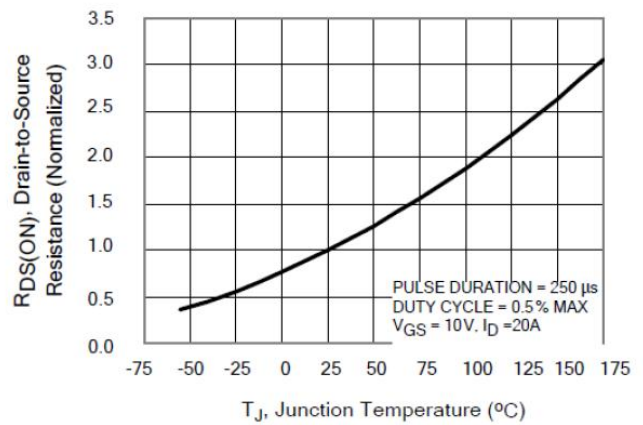
**Figure 8. Unclamped Inductive Switching Capability**



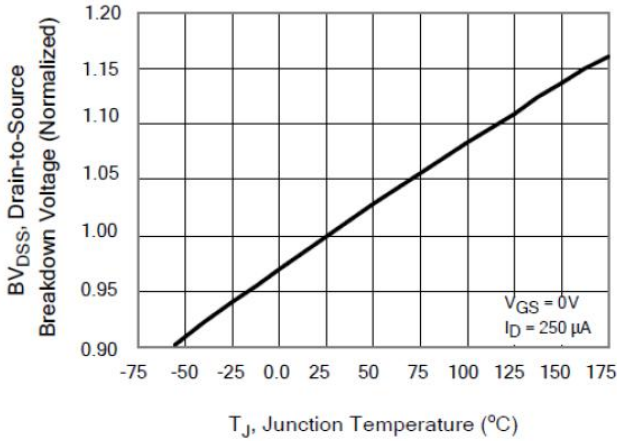
**Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current**



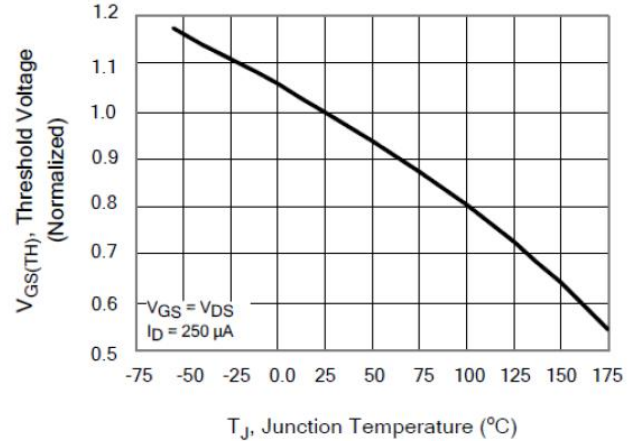
**Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature**



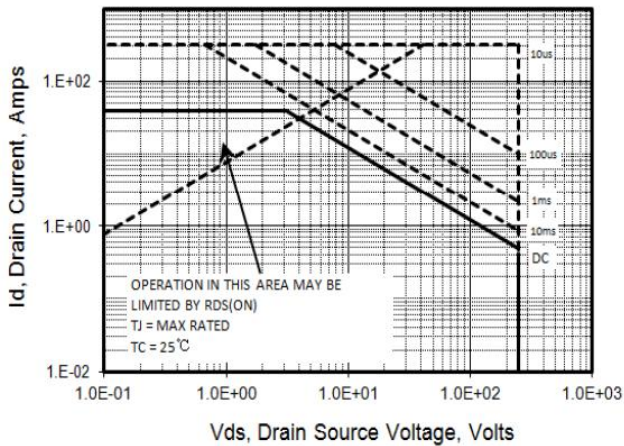
**Figure 11. Typical Breakdown Voltage vs Junction Temperature**



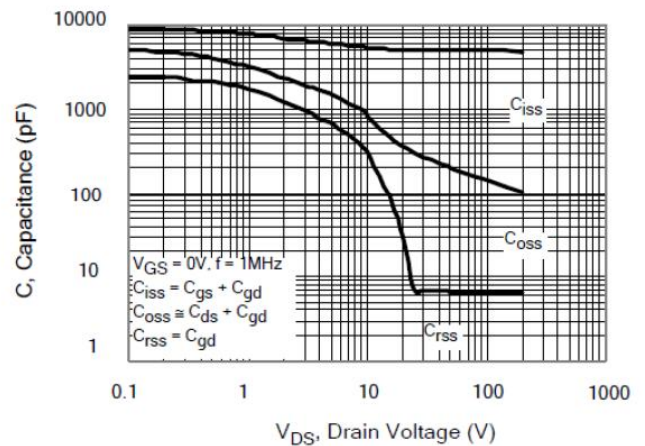
**Figure 12. Typical Threshold Voltage vs Junction Temperature**



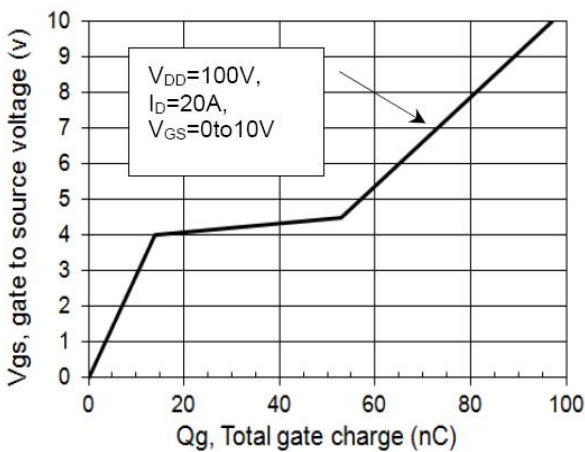
**Figure 13. Maximum Safe Operating Area**



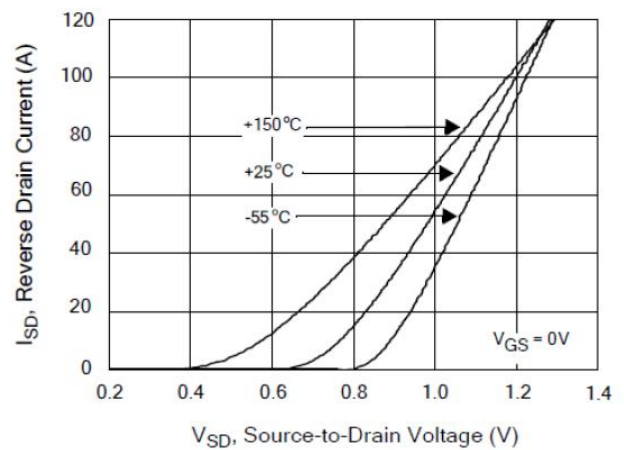
**Figure 14. Typical Capacitance vs Drain-to-Source Voltage**



**Figure 15. Typical Gate Charge**



**Figure 16. Typical Body Diode Transfer Characteristics**



**9. Test Circuits and Waveforms**

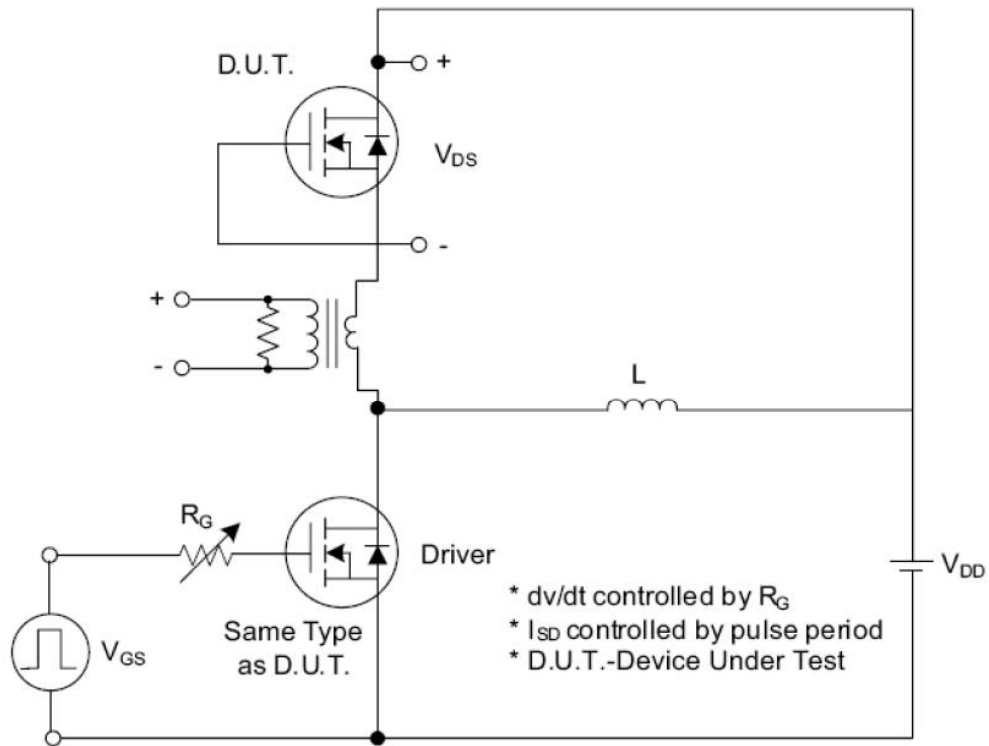


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

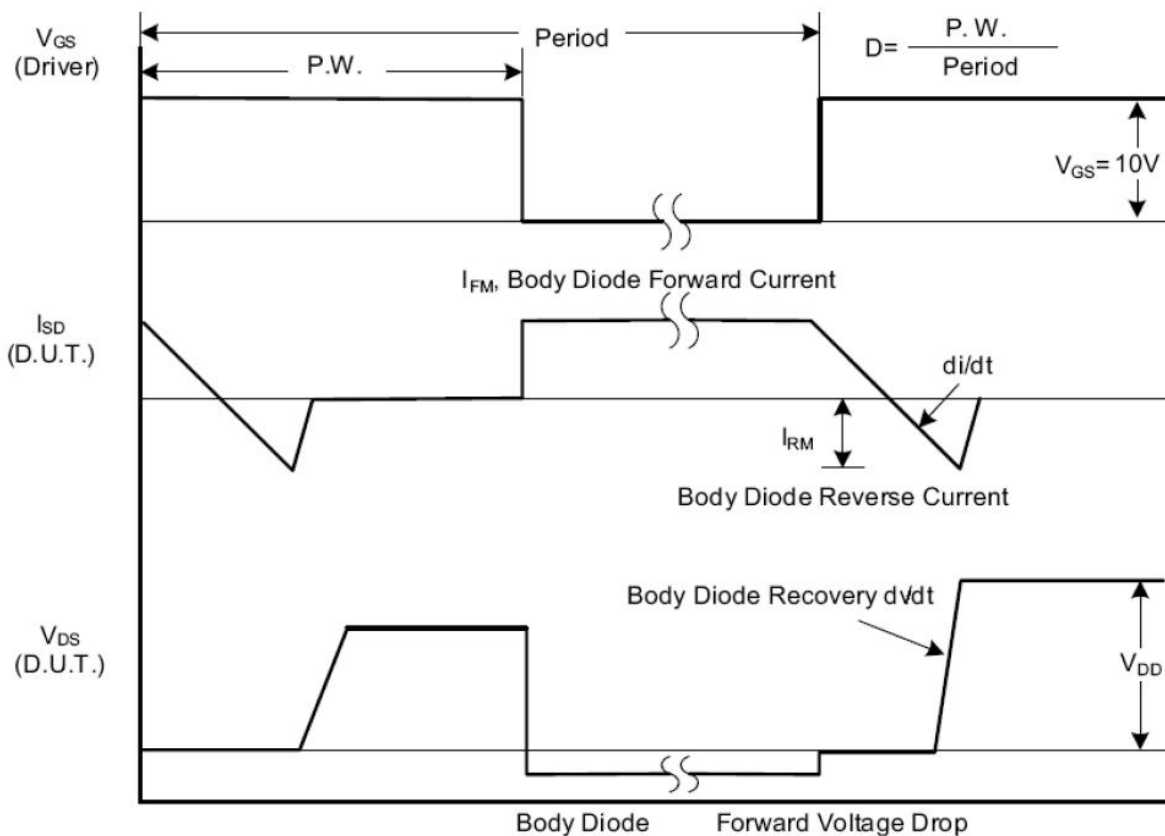


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms

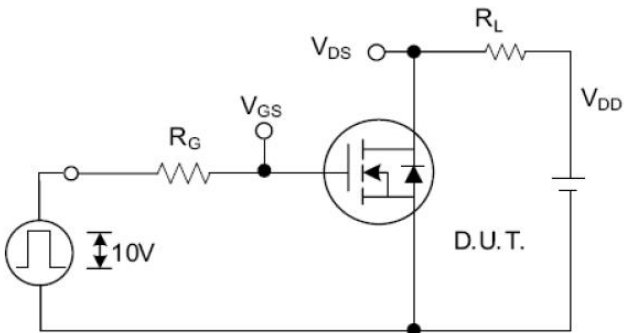


Fig. 2.1 Switching Test Circuit

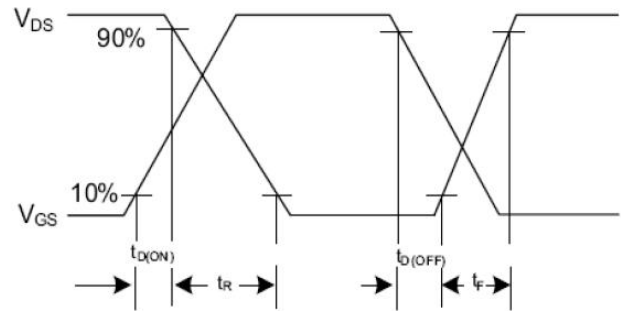


Fig. 2.2 Switching Waveforms

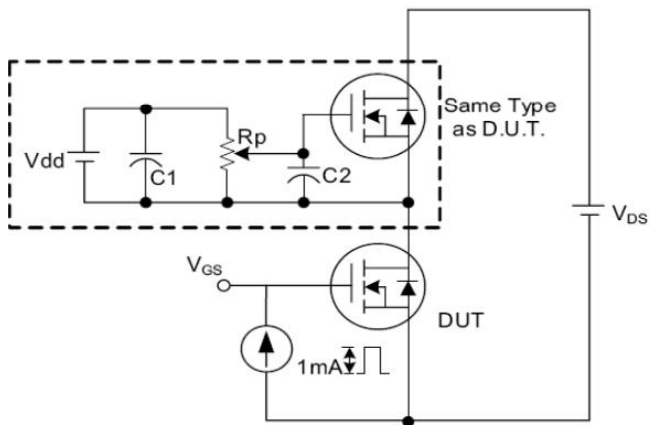


Fig. 3.1 Gate Charge Test Circuit

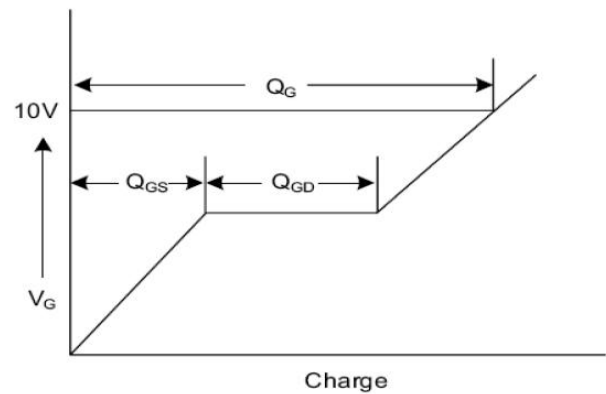


Fig. 3.2 Gate Charge Waveform

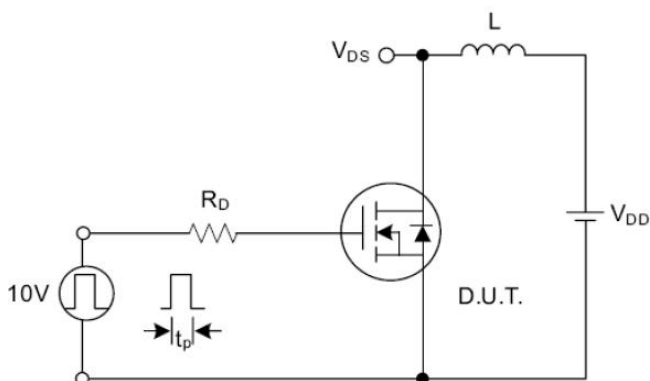


Fig. 4.1 Unclamped Inductive Switching Test Circuit

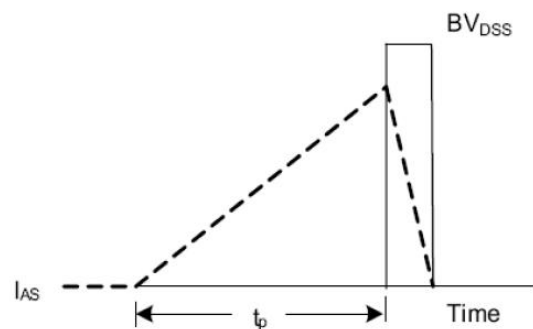


Fig. 4.2 Unclamped Inductive Switching Waveforms