

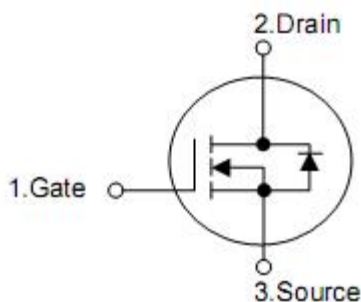
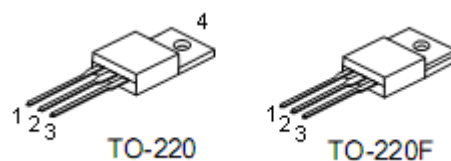
## 1. Features

- n Proprietary New Planar Technology
- n  $R_{DS(ON),typ.}=0.85\Omega@V_{GS}=10V$
- n Low Gate Charge Minimize Switching Loss
- n Fast Recovery Body Diode

## 2. Application

- n Adaptor Charger
- n SMPS Power Supply
- n LCD Panel Power

## 3. Pin configuration



| Pin | Function |
|-----|----------|
| 1   | Gate     |
| 2   | Drain    |
| 3   | Source   |
| 4   | Drain    |

## 4. Ordering Information

| Part Number | Package | Brand |
|-------------|---------|-------|
| KNP4760A    | TO-220  | KIA   |
| KNF4760A    | TO-220F | KIA   |

## 5. Absolute maximum ratings

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

| Parameter  | Symbol                             | Rating     |         | Units |
|--|------------------------------------|------------|---------|-------|
|  |                                    | TO-220     | TO-220F |       |
| Drain-source voltage <sup>[1]</sup>  | V <sub>DSS</sub>                   | 600        |         | V     |
| Gate-source voltage  | V <sub>GSS</sub>                   | ±30        |         | V     |
| Continuous Drain Current   | I <sub>D</sub>                     | 8.0        |         | A     |
| Continuous Drain Current @T <sub>c</sub> =100°C  | I <sub>D @ TC=100°C</sub>          | Figure3    |         | A     |
| Pulsed Drain Current at V <sub>GS</sub> =10V <sup>[2]</sup>  | I <sub>DM</sub>                    | Figure6    |         | A     |
| Single pulse Avalanche energy  | E <sub>AS</sub>                    | 580        |         | mJ    |
| Peak Diode Recovery dv/dt <sup>[3]</sup>   | dv/dt                              | 5.0        |         | V/ns  |
| Power Dissipation  | P <sub>D</sub>                     | 120        | 40      | W     |
| Derating Factor above 25 °C  |                                    | 0.96       | 0.32    | W/°C  |
| Maximum Temperature for Soldering Leads at 0.063in(1.6mm) form Case for 10 Seconds,Package Body for 10 seconds | T <sub>L</sub><br>T <sub>PAK</sub> | 300<br>260 |         | °C    |
| Storage temperature  | T <sub>STG</sub>                   | -55~+150   |         | °C    |

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

## 6. Thermal Characteristics

| Symbol           | Parameter                               | Max    |         | Unit  |
|------------------|---|--------|---------|-------|
|                  |   | TO-220 | TO-220F |       |
| R <sub>θJC</sub> | Thermal Resistance, Junction-to-Case    | 1.04   | 3.1     | °C /W |
| R <sub>θJA</sub> | Thermal Resistance, Junction-to-Ambient | 62     | 100     |       |

## 7. Electrical characteristics

| Parameter  | Symbol              | Conditions  | Min | Typ  | Max  | Unit |
|--|---------------------|---|-----|------|------|------|
| Off characteristics (T <sub>J</sub> =25°C, unless otherwise specified)       |                     |   |     |      |      |      |
| Drain-source breakdown voltage   | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA  | 600 | -    | -    | V    |
| Drain-to-Source Leakage Current  | I <sub>DSS</sub>    | V <sub>DS</sub> =600V, V <sub>GS</sub> =0V  | -   | -    | 1    | μA   |
|  |                     | V <sub>DS</sub> =480V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =125 °C                      | -   | -    | 100  | μA   |
| Gate-to-source 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 (T <sub>J</sub> =25°C, unless otherwise specified)        |                     |   |     |      |      |      |
| 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    |
| Static drain-source on-resistance <sup>[4]</sup>                             | R <sub>DS(ON)</sub> | V <sub>GS</sub> =10V, I <sub>D</sub> =4A  | -   | 0.85 | 1.1  | Ω    |
| Forward Transconductance <sup>[4]</sup>                                      | G <sub>FS</sub>     | V <sub>DS</sub> =20V, I <sub>D</sub> =8A  | -   | 10   | -    | S    |
| Dynamic characteristics (Essentially independent of operating temperature)   |                     |   |     |      |      |      |
| Input capacitance  | C <sub>ISS</sub>    | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1.0 MHz                                   | -   | 1250 | -    | pF   |
| Output capacitance   | C <sub>OSS</sub>    |   | -   | 110  | -    | pF   |
| Reverse transfer capacitance   | C <sub>RSS</sub>    |   | -   | 16   | -    | pF   |
| Turn-on delay time   | t <sub>D(ON)</sub>  | V <sub>DD</sub> =300V, I <sub>D</sub> =8A,<br>R <sub>G</sub> =9.1Ω, V <sub>GS</sub> =9.1V | -   | 12   | -    | ns   |
| Rise time  | t <sub>R</sub>      |   | -   | 15   | -    | ns   |
| Turn-off delay time  | t <sub>D(OFF)</sub> |   | -   | 40   | -    | ns   |
| Fall time  | t <sub>F</sub>      |   | -   | 20   | -    | ns   |
| Switching characteristics (Essentially independent of operating temperature) |                     |   |     |      |      |      |
| Total gate charge  | Q <sub>G</sub>      | V <sub>DD</sub> =300V,<br>I <sub>D</sub> =8A<br>V <sub>GS</sub> =0 to 10V                 | -   | 30   | -    | nC   |
| Gate-source charge   | Q <sub>GS</sub>     |   | -   | 6    | -    | nC   |
| Gate-drain charge  | Q <sub>GD</sub>     |   | -   | 11   | -    | nC   |
| Switching characteristics (T <sub>J</sub> =25°C, unless otherwise specified) |                     |   |     |      |      |      |
| Drain-source diode forward voltage   | V <sub>SD</sub>     | V <sub>GS</sub> =0V, I <sub>S</sub> =8A   | -   | -    | 1.5  | V    |
| Continuous drain-source current <sup>[4]</sup>                               | I <sub>SD</sub>     | Integral PN-diode in<br>MOSFET  | -   | -    | 8    | A    |
| Pulsed drain-source current <sup>[4]</sup>                                   | I <sub>SM</sub>     |   | -   | -    | 32   | A    |
| Reverse recovery time  | t <sub>RR</sub>     | V <sub>GS</sub> =0V, I <sub>F</sub> =8A   | -   | 406  | -    | ns   |
| Reverse recovery charge  | Q <sub>RR</sub>     | di <sub>F</sub> /dt=100A/μs   | -   | 1.8  | -    | μC   |

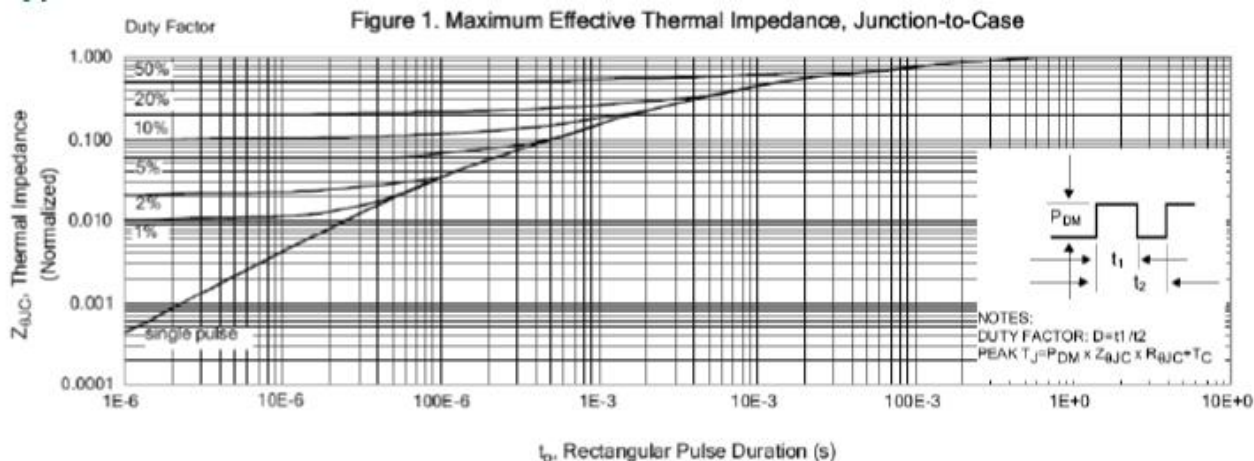
Note :[1] T<sub>J</sub>=+25 °C to +150 °C.

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

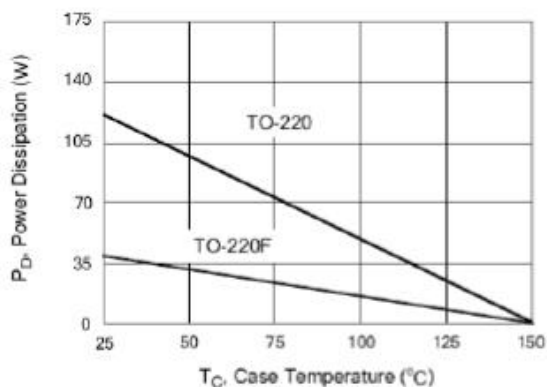
[3] I<sub>SD</sub>= 8A di/dt < 100 A/μs, V<sub>DD</sub> < BV<sub>DSS</sub>, T<sub>J</sub>=+150 °C .

[4] Pulse width ≤ 380μs; duty cycle ≤ 2%.

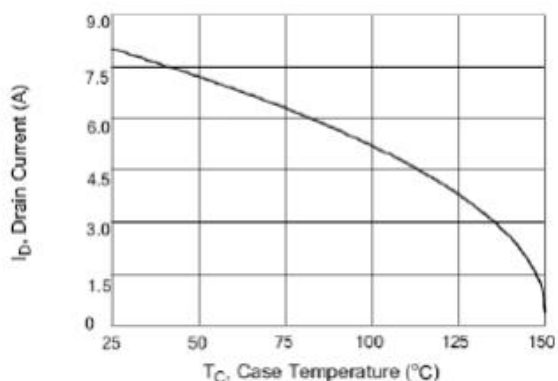
**8. Test circuits and waveforms**



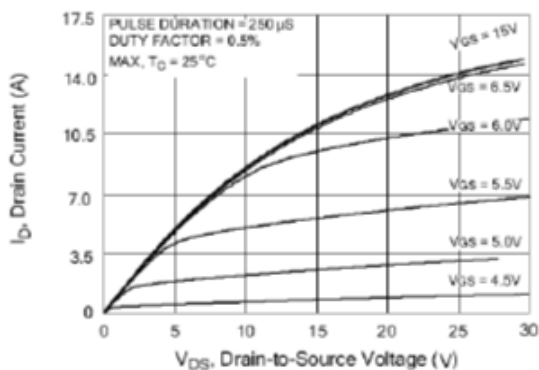
**Figure 2. Maximum Power Dissipation vs Case Temperature**



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



**Figure 4. Typical Output Characteristics**



**Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current**

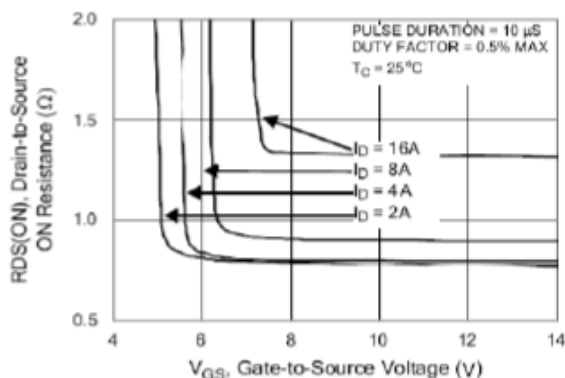


Figure 6. Maximum Peak Current Capability

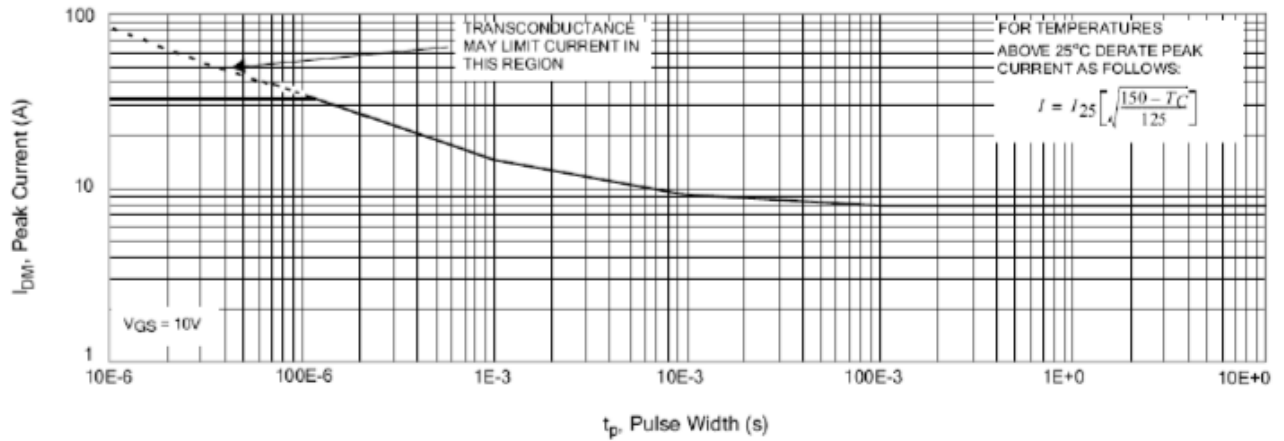


Figure 7. Typical Transfer Characteristics

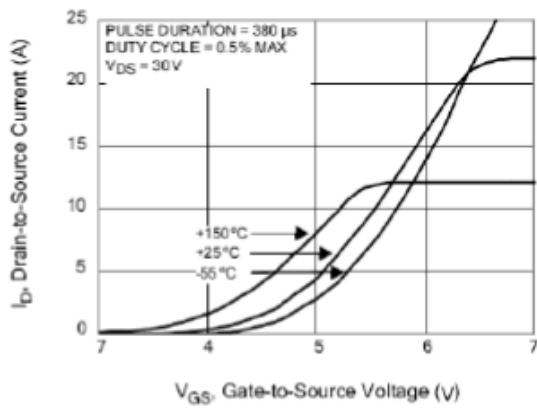


Figure 8. Unclamped Inductive Switching Capability

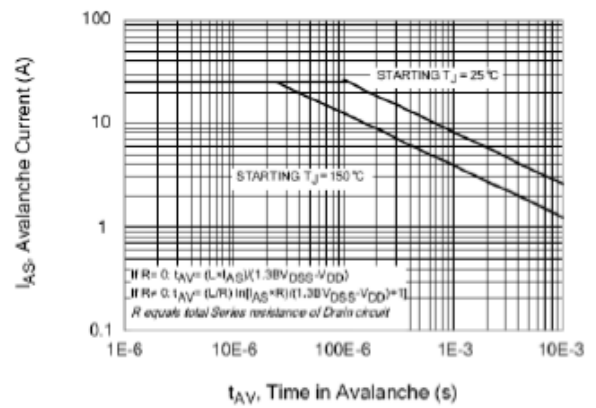


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

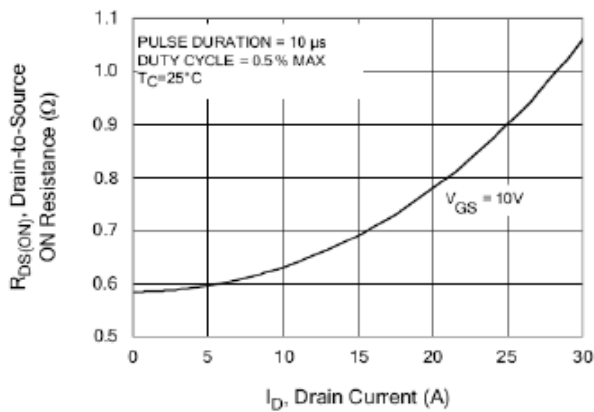
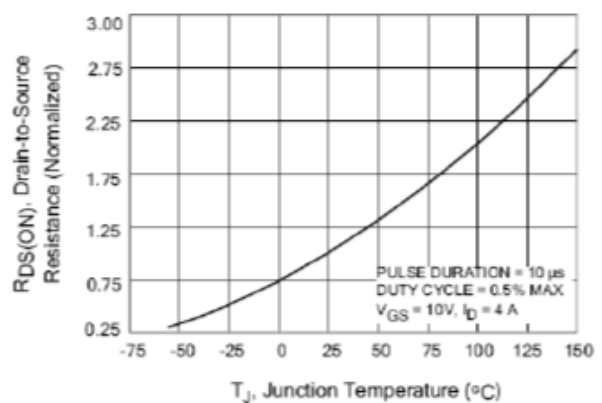
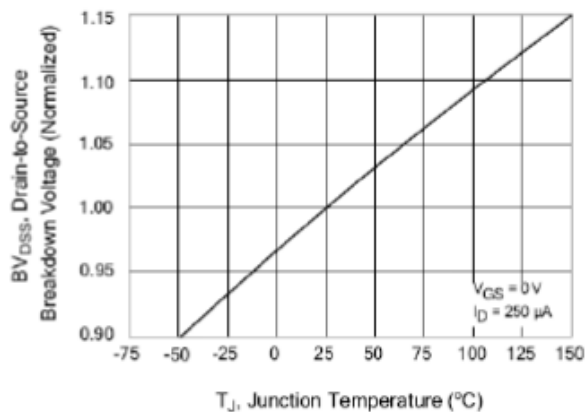


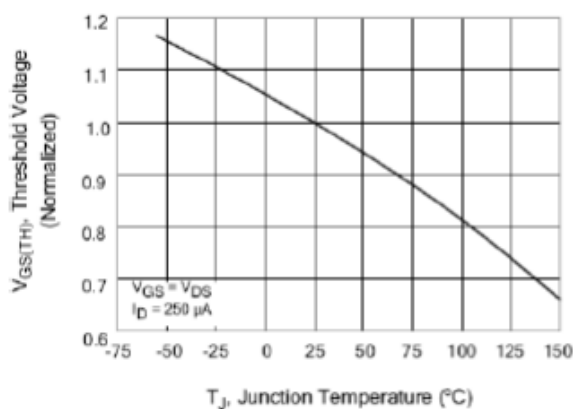
Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature



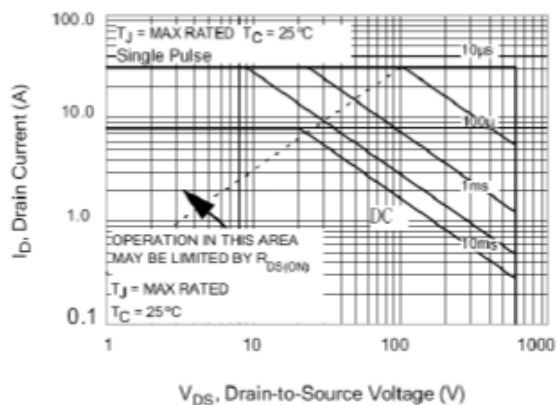
**Figure 11. Typical Breakdown Voltage vs Junction Temperature**



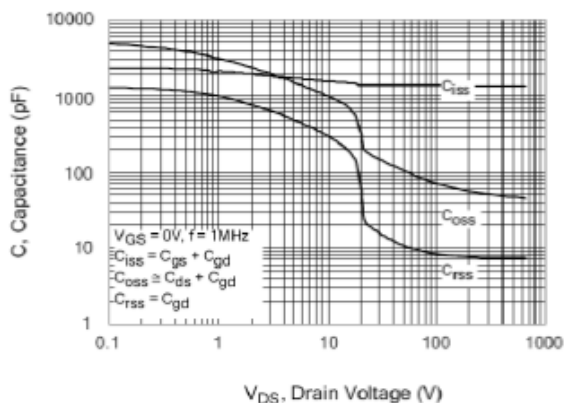
**Figure 12. Typical Threshold Voltage vs Junction Temperature**



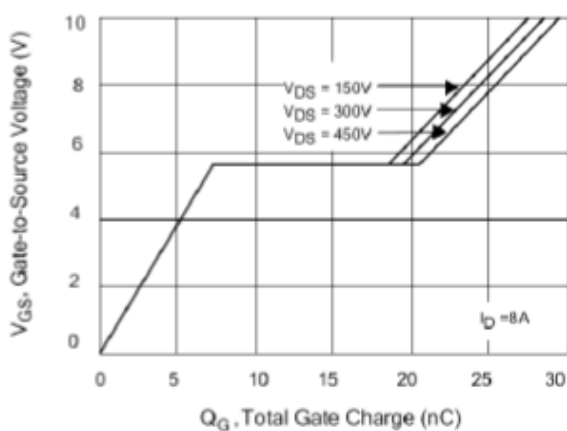
**Figure 13. Maximum Forward Bias Safe Operating Area**



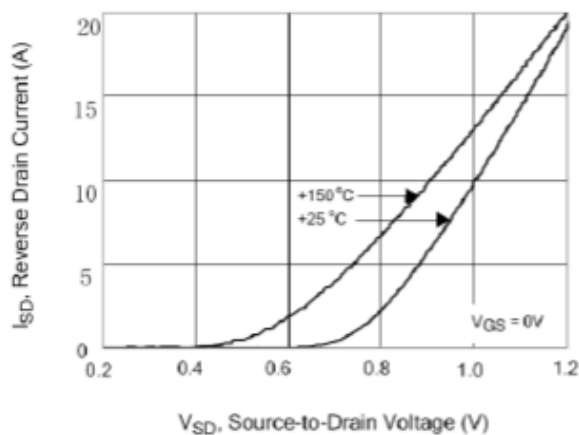
**Figure 14. Typical Capacitance vs Drain-to-Source Voltage**



**Figure 15. Typical Gate Charge vs Gate-to-Source Voltage**



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



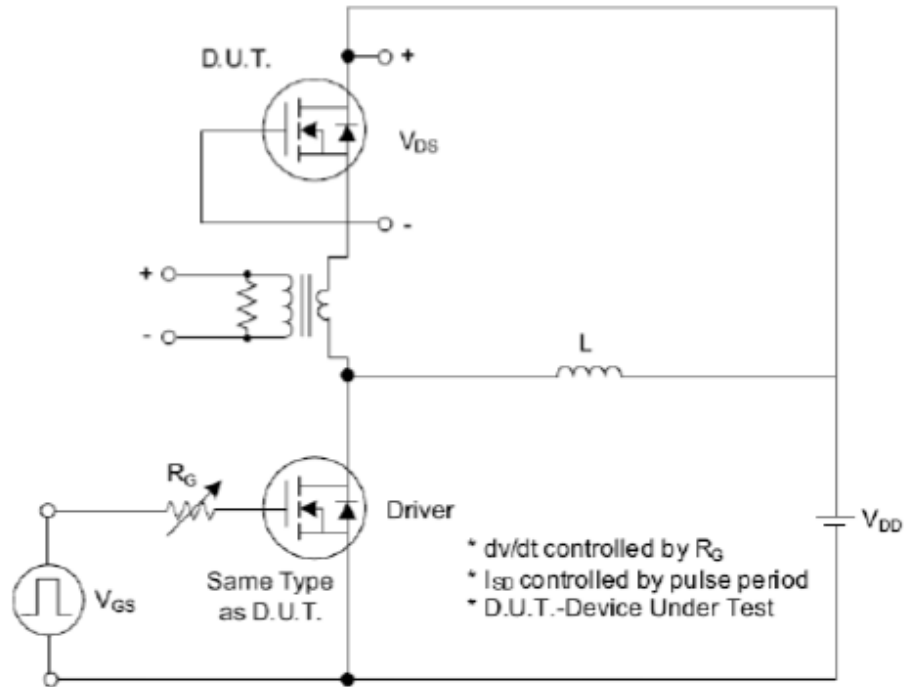


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

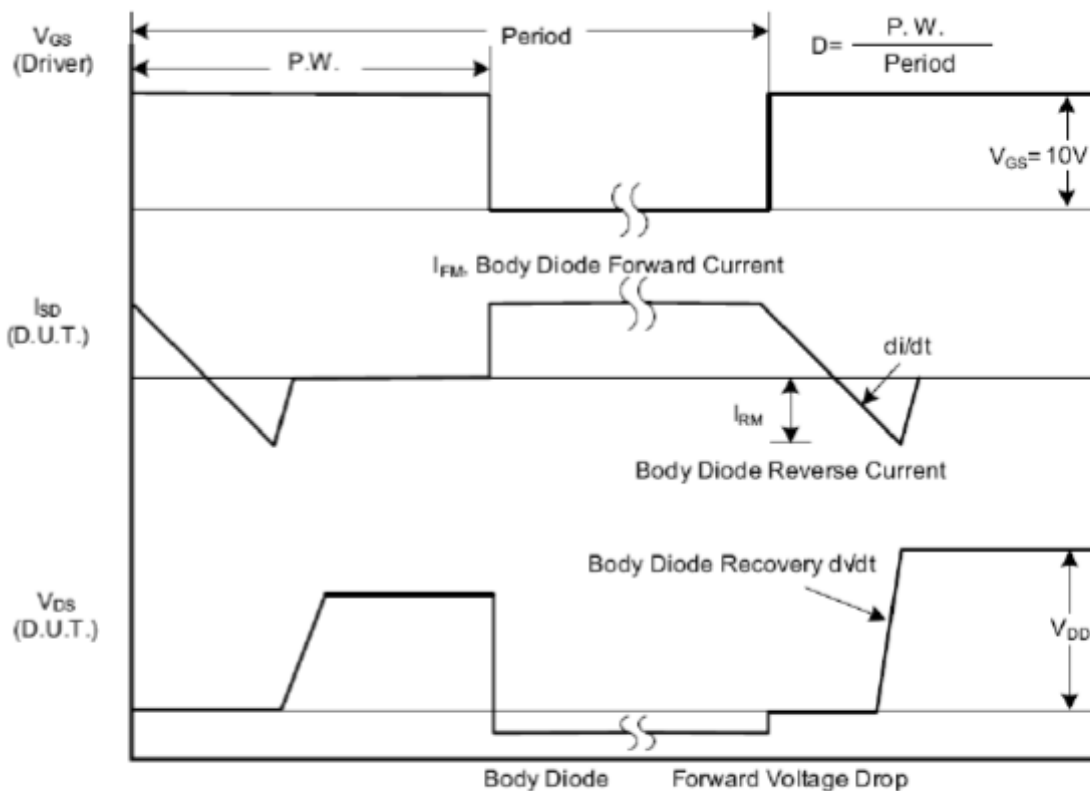


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms