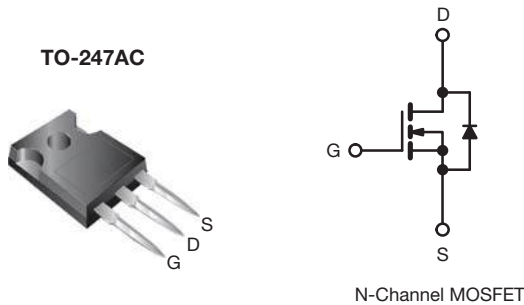


E Series Power MOSFET with Fast Body Diode and Low Gate Charge

| PRODUCT SUMMARY | |
|---|-------------------------|
| V_{DS} (V) at T_J max. | 650 |
| $R_{DS(on)}$ typ. (Ω) at 25 °C | $V_{GS} = 10$ V 0.127 |
| Q_g (Max.) (nC) | 75 |
| Q_{gs} (nC) | 17 |
| Q_{gd} (nC) | 19 |
| Configuration | Single |



FEATURES

- Reduced figure-of-merit (FOM): $R_{on} \times Q_g$
- Fast body diode MOSFET using E series technology
- Reduced t_{rr} , Q_{rr} , and I_{RRM}
- Increased robustness due to low Q_{rr}
- Low input capacitance (C_{iss})
- Reduced switching and conduction losses
- Avalanche energy rated (UIS)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Telecommunications
 - Server and telecom power supplies
- Computing
 - ATX power supplies
- Industrial
 - Welding
 - Induction heating
 - Battery chargers
 - Uninterruptible power supplies (UPS)
- Renewable energy
 - String PV inverters

| ORDERING INFORMATION | |
|---------------------------------|------------------|
| Package | TO-247AC |
| Lead (Pb)-free and Halogen-free | SiHG25N60EFL-GE3 |


| ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted) | | | | |
|---|---------------------------------|----------------|-------------|------|
| PARAMETER | SYMBOL | LIMIT | UNIT | |
| Drain-Source Voltage | V_{DS} | 600 | V | |
| Gate-Source Voltage | V_{GS} | ± 30 | | |
| Continuous Drain Current ($T_J = 150$ °C) | V_{GS} at 10 V | $T_C = 25$ °C | 25 | A |
| | | $T_C = 100$ °C | 16 | |
| Pulsed Drain Current ^a | | I_{DM} | 61 | |
| Linear Derating Factor | | | 2 | W/°C |
| Single Pulse Avalanche Energy ^b | | E_{AS} | 353 | mJ |
| Maximum Power Dissipation | | P_D | 250 | W |
| Operating Junction and Storage Temperature Range | | T_J, T_{stg} | -55 to +150 | °C |
| Drain-Source Voltage Slope | $V_{DS} = 0$ V to 80 % V_{DS} | dV/dt | 70 | V/ns |
| Reverse Diode dV/dt ^d | | | 15 | |
| Soldering Recommendations (Peak temperature) ^c | for 10 s | | 300 | °C |

Notes

- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD} = 140$ V, starting $T_J = 25$ °C, $L = 28.2$ mH, $R_g = 25$ Ω , $I_{AS} = 5$ A.
- 1.6 mm from case.
- $I_{SD} \leq I_D$, $dI/dt = 100$ A/ μ s, starting $T_J = 25$ °C.



| THERMAL RESISTANCE RATINGS | | | | |
|----------------------------------|------------|------|------|------|
| PARAMETER | SYMBOL | TYP. | MAX. | UNIT |
| Maximum Junction-to-Ambient | R_{thJA} | - | 62 | °C/W |
| Maximum Junction-to-Case (Drain) | R_{thJC} | - | 0.5 | |

| SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted) | | | | | | |
|---|---------------------|---|--|-------|-----------|---------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN. | TYP. | MAX. | UNIT |
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V_{DS} | $V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$ | 600 | - | - | V |
| V_{DS} Temperature Coefficient | $\Delta V_{DS}/T_J$ | Reference to $25\text{ }^\circ\text{C}, I_D = 10\text{ mA}$ | - | 0.69 | - | V/°C |
| Gate-Source Threshold Voltage (N) | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$ | 3.0 | - | 5.0 | V |
| Gate-Source Leakage | I_{GSS} | $V_{GS} = \pm 20\text{ V}$ | - | - | ± 100 | nA |
| | | $V_{GS} = \pm 30\text{ V}$ | - | - | ± 1 | μA |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}$ | - | - | 1 | μA |
| | | $V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$ | - | - | 500 | |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 12.5\text{ A}$ | - | 0.127 | 0.146 | Ω |
| Forward Transconductance | g_{fs} | $V_{DS} = 30\text{ V}, I_D = 12.5\text{ A}$ | - | 11.3 | - | S |
| Dynamic | | | | | | |
| Input Capacitance | C_{iss} | $V_{GS} = 0\text{ V},$ $V_{DS} = 100\text{ V},$ $f = 1\text{ MHz}$ | - | 2274 | - | pF |
| Output Capacitance | C_{oss} | | - | 137 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 4 | - | |
| Effective Output Capacitance, Energy Related ^a | $C_{o(er)}$ | $V_{DS} = 0\text{ V to } 480\text{ V}, V_{GS} = 0\text{ V}$ | - | 79 | - | |
| Effective Output Capacitance, Time Related ^b | $C_{o(tr)}$ | | - | 330 | - | |
| Total Gate Charge | Q_g | $V_{GS} = 10\text{ V}, I_D = 12.5\text{ A}, V_{DS} = 480\text{ V}$ | - | 50 | 75 | nC |
| Gate-Source Charge | Q_{gs} | | - | 17 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 19 | - | |
| Turn-On Delay Time | $t_{d(on)}$ | $V_{DD} = 480\text{ V}, I_D = 12.5\text{ A},$ $R_g = 9.1\text{ }\Omega, V_{GS} = 10\text{ V}$ | - | 25 | 50 | ns |
| Rise Time | t_r | | - | 39 | 68 | |
| Turn-Off Delay Time | $t_{d(off)}$ | | - | 47 | 94 | |
| Fall Time | t_f | | - | 21 | 42 | |
| Gate Input Resistance | R_g | | $f = 1\text{ MHz}, \text{ open drain}$ | 0.4 | 0.7 | |
| Drain-Source Body Diode Characteristics | | | | | | |
| Continuous Source-Drain Diode Current | I_S | MOSFET symbol showing the integral reverse p-n junction diode  | - | - | 25 | A |
| Pulsed Diode Forward Current | I_{SM} | | - | - | 61 | |
| Diode Forward Voltage | V_{SD} | $T_J = 25\text{ }^\circ\text{C}, I_S = 12.5\text{ A}, V_{GS} = 0\text{ V}$ | - | 0.9 | 1.2 | V |
| Reverse Recovery Time | t_{rr} | $T_J = 25\text{ }^\circ\text{C}, I_F = I_S = 12.5\text{ A},$ $dI/dt = 100\text{ A}/\mu\text{s}, V_R = 25\text{ V}$ | - | 138 | 276 | ns |
| Reverse Recovery Charge | Q_{rr} | | - | 0.8 | 1.6 | μC |
| Reverse Recovery Current | I_{RRM} | | - | 11 | - | A |

Notes

- a. $C_{oss(er)}$ is a fixed capacitance that gives the same energy as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .
- b. $C_{oss(tr)}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DSS} .

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

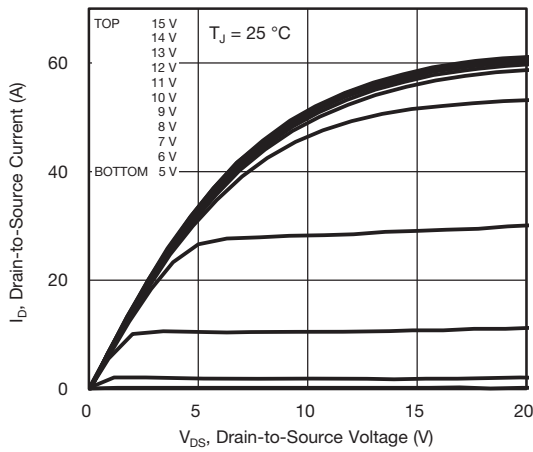


Fig. 1 - Typical Output Characteristics

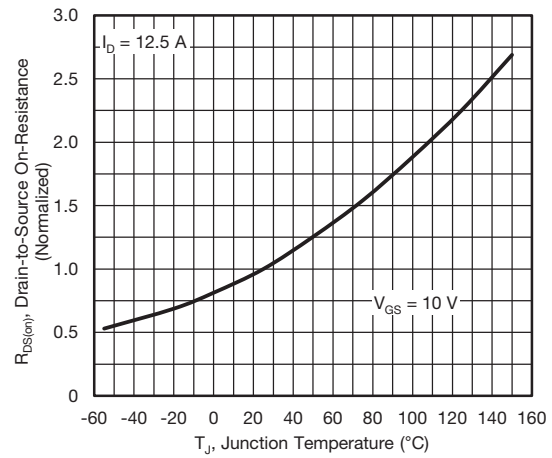


Fig. 4 - Normalized On-Resistance vs. Temperature

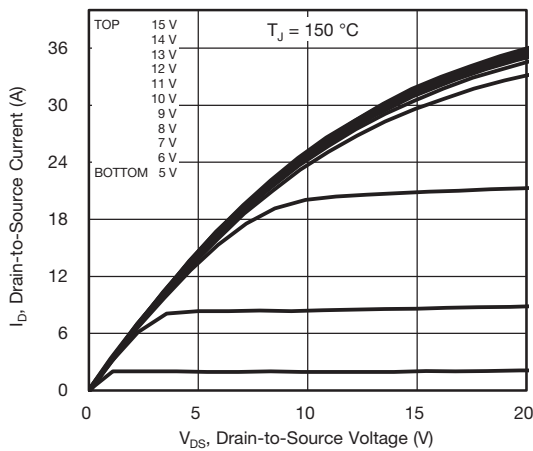


Fig. 2 - Typical Output Characteristics

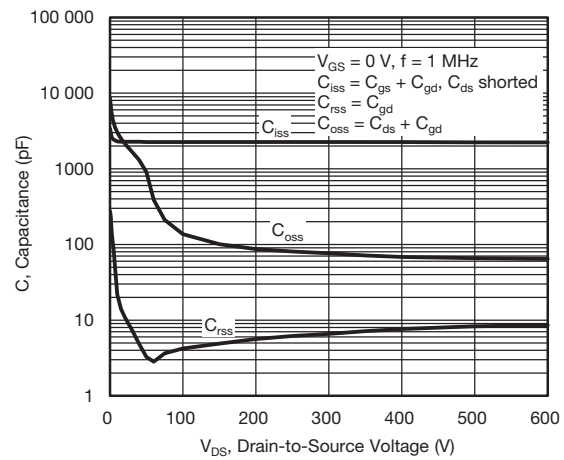


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

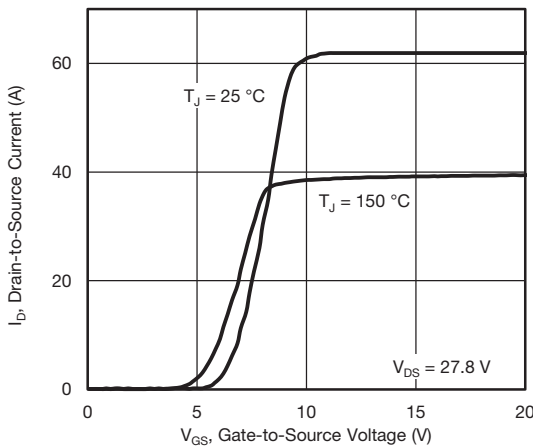


Fig. 3 - Typical Transfer Characteristics

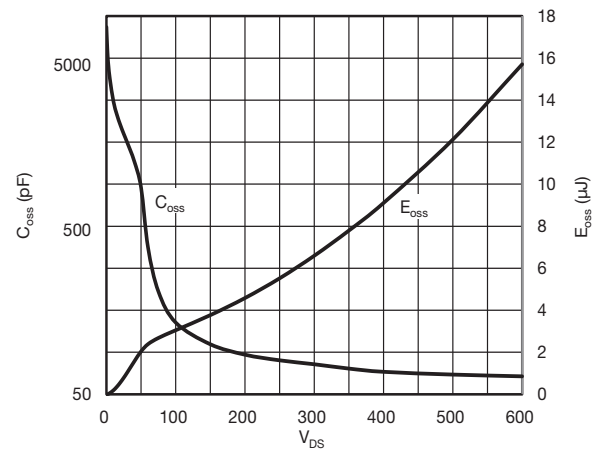


Fig. 6 - Coss and Eoss vs. Vds

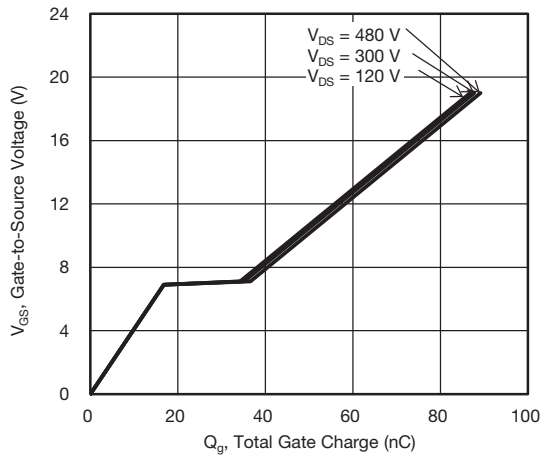


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

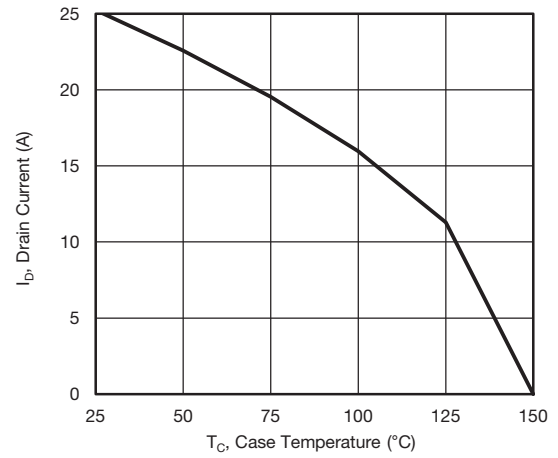


Fig. 10 - Maximum Drain Current vs. Case Temperature

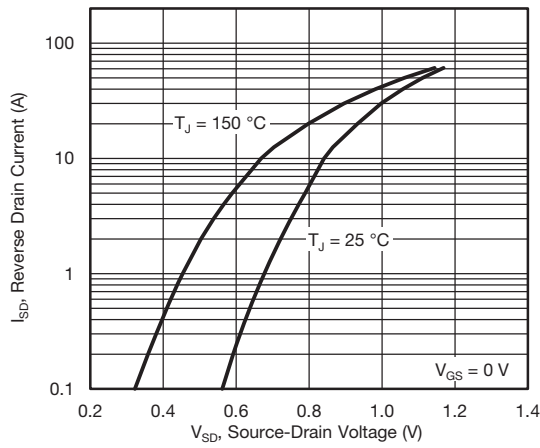


Fig. 8 - Typical Source-Drain Diode Forward Voltage

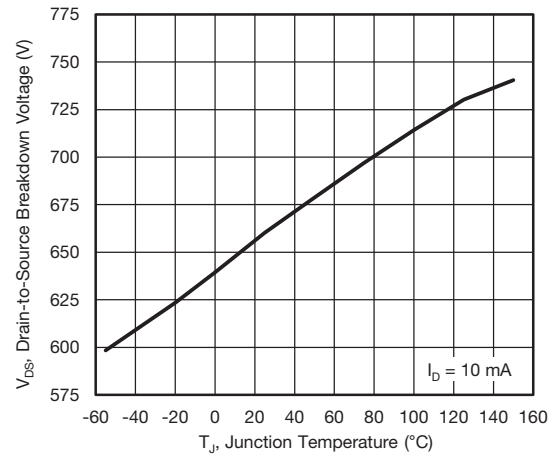


Fig. 11 - Typical Drain-to-Source Voltage vs. Temperature

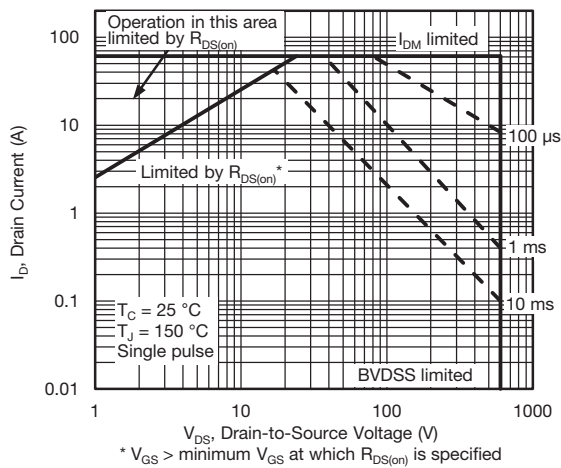


Fig. 9 - Maximum Safe Operating Area

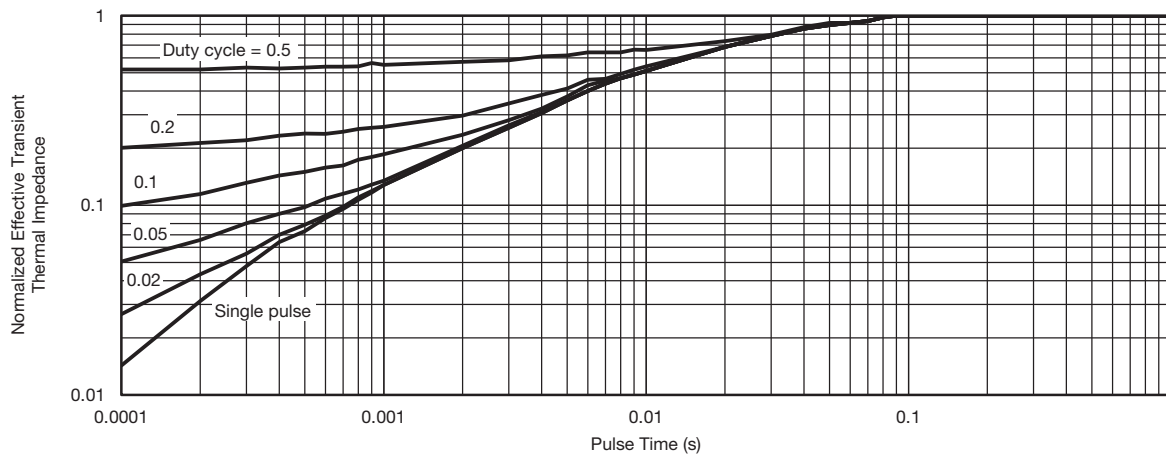


Fig. 12 - Normalized Thermal Transient Impedance, Junction-to-Case

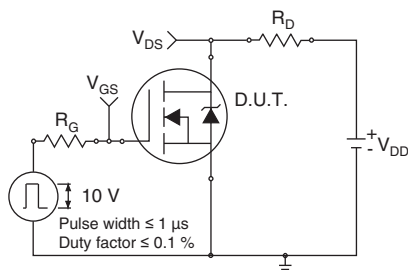


Fig. 13 - Switching Time Test Circuit

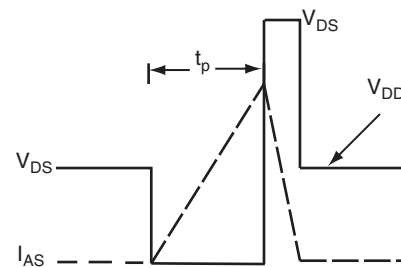


Fig. 16 - Unclamped Inductive Waveforms

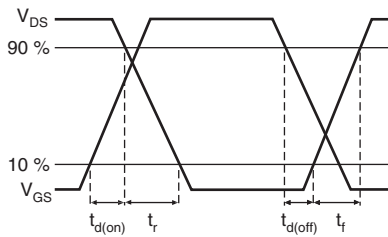


Fig. 14 - Switching Time Waveforms

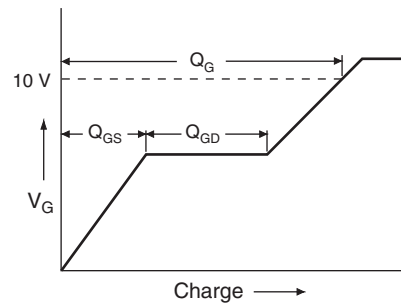


Fig. 17 - Basic Gate Charge Waveform

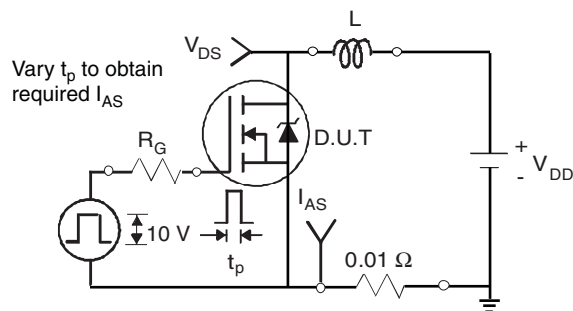


Fig. 15 - Unclamped Inductive Test Circuit

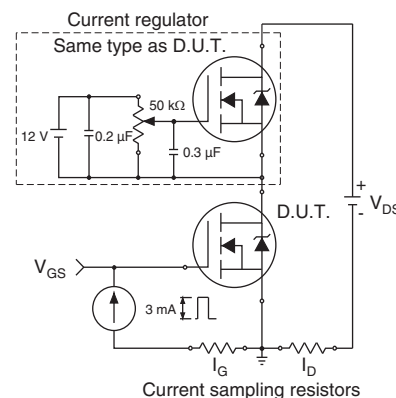
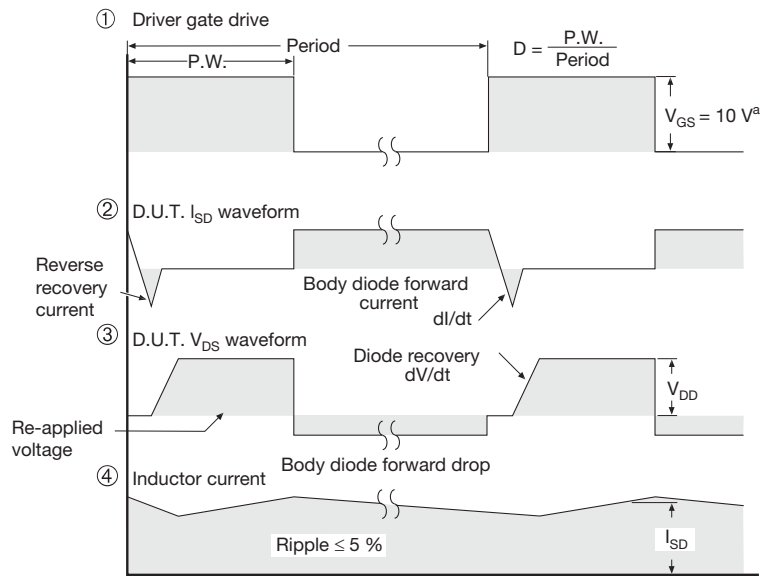
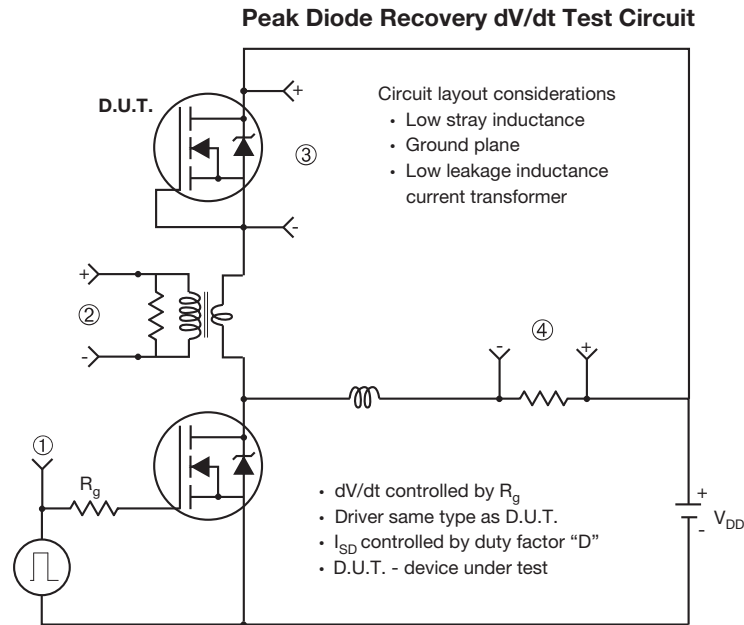


Fig. 18 - Gate Charge Test Circuit



Note

a. $V_{GS} = 5 V$ for logic level devices

Fig. 19 - For N-Channel

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