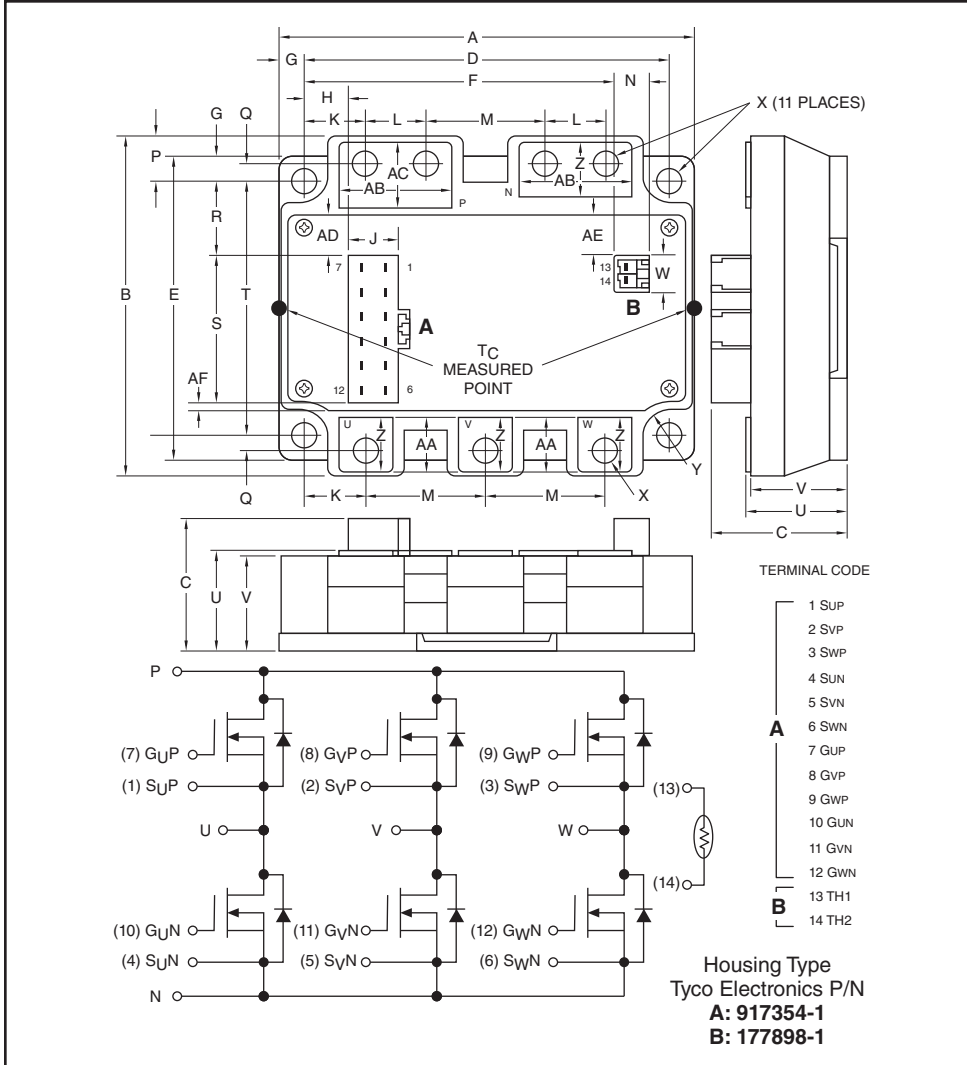


6-PACK High Power MOSFET Module
300 Amperes/75 Volts



Description:

Powerex MOSFET Modules are designed for use in low voltage switching applications. Each module consists of 6 MOSFET switches with low $R_{ds(on)}$ and a fast recovery body diode to yield low loss. All components and interconnects are isolated from the heat sink baseplate. This offers simplified system assembly and thermal management.

Features:

- Low $E_{SW(off)}$ and Low $R_{ds(on)}$
- Super-Fast Recovery Free-Wheel Diode
- Thermistor for T_C Sensing
- Parallel Legs to make a Dual Module at 3X the Rating
- Positive Locking Connectors
- Easy Bus Bar Layout Due to Flow Through Power Design

Applications:

- Forklift
- Off road Electric Vehicle
- Welder
- UPS
- Chopper

Ordering Information:

Example: Select the complete part module number you desire from the table below -i.e. FM600TU-07A is a 75V (V_{DSS}), 300 Ampere 6-Pack High Power MOSFET Module.

| Type | Current Rating Amperes | V_{DSS} Volts |
|------|---------------------------|--------------------|
| FM | 300 | 75 |

Outline Drawing and Circuit Diagram

| Dimensions | Inches | Millimeters |
|------------|--------|-------------|
| A | 4.33 | 110.0 |
| B | 3.54 | 90.0 |
| C | 1.38 | 35.0 |
| D | 3.82 | 97.0 |
| E | 3.15 | 80.0 |
| F | 3.27 | 83.0 |
| G | 0.26 | 6.5 |
| H | 0.48 | 12.0 |
| J | 0.51 | 12.9 |
| K | 0.65 | 16.5 |
| L | 0.63 | 16.0 |
| M | 1.26 | 32.0 |
| N | 0.35 | 8.8 |
| P | 0.45 | 11.5 |
| Q | 0.16 | 4.0 |

| Dimensions | Inches | Millimeters |
|------------|-----------|-------------|
| R | 0.79 | 20.0 |
| S | 1.50 | 38.0 |
| T | 2.64 | 67.0 |
| U | 1.02 | 26.0 |
| V | 0.98 | 25.0 |
| W | 0.36 | 9.1 |
| X | Dia. 0.25 | Dia. 6.5 |
| Y | Rad. 0.25 | Rad. 6.5 |
| Z | 0.57 | 14.5 |
| AA | 0.55 | 14.0 |
| AB | 1.18 | 30.0 |
| AC | 0.69 | 17.5 |
| AD | 0.47 | 12.0 |
| AE | 0.61 | 15.5 |
| AF | 0.18 | 4.5 |



Powerex, Inc., 173 Pavilion Lane, Youngwood, Pennsylvania 15697 (724) 925-7272 www.pwr.com

FM600TU-07A

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Absolute Maximum Ratings, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Ratings | Symbol | FM600TU-07A | Units |
|--|---------------------|-------------|------------------|
| Channel Temperature | T_j | -40 to 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -40 to 125 | $^\circ\text{C}$ |
| Drain-Source Voltage (G-S Short) | V_{DSS} | 75 | Volts |
| Gate-Source Voltage (D-E Short) | V_{GSS} | ± 20 | Volts |
| Drain Current ($T_C = 25^\circ\text{C}$) | $I_{\text{D(rms)}}$ | 300 | A_{rms} |
| Peak Drain Current (Pulse) | I_{DM} | 600* | Amperes |
| Avalanche Current (L = 10 μH , Pulse) | I_{DA} | 300* | Amperes |
| Source Current ($T_C = 25^\circ\text{C}$)** | $I_{\text{S(rms)}}$ | 300 | A_{rms} |
| Peak Source Current (Pulse)** | I_{SM} | 600* | Amperes |
| Maximum Power Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*** | P_{D} | 960 | Watts |
| Maximum Peak Power Dissipation ($T_C = 25^\circ\text{C}$, $T_j < 150^\circ\text{C}$)*** | P_{D} | 1300 | Watts |
| Mounting Torque, M6 Main Terminal | — | 40 | in-lb |
| Mounting Torque, M6 Mounting | — | 40 | in-lb |
| Weight | — | 600 | Grams |
| Isolation Voltage (Main Terminal to Baseplate, AC 1 min.) | V_{ISO} | 2500 | Volts |

* Pulse width and repetition rate should be such that device channel temperature (T_j) does not exceed $T_{j(\text{max})}$ rating.

**Represents characteristics of the anti-parallel, source-to-drain free-wheel diode (FWDi).

*** T_C measured point is just under the chips. If you use this value, $R_{\text{th(f-a)}}$ should be measured just under the chips.

FM600TU-07A
6-Pack High Power MOSFET Module
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Electrical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|---|--------------|---|------|------|------|-----------|
| Drain-Cutoff Current | I_{DSS} | $V_{DS} = V_{DSS}, V_{GS} = 0V$ | — | — | 1.0 | mA |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | $I_D = 30mA, V_{DS} = 10V$ | 4.7 | 6.0 | 7.3 | Volts |
| Gate Leakage Current | I_{GSS} | $V_{GS} = V_{GSS}, V_{DS} = 0V$ | — | — | 1.5 | μA |
| Static Drain-Source On-State Resistance (Chip) | $r_{DS(on)}$ | $I_D = 300A, V_{GS} = 15V, T_j = 25^\circ\text{C}$ | — | 0.53 | 0.73 | $m\Omega$ |
| | | $I_D = 300A, V_{GS} = 15V, T_j = 125^\circ\text{C}$ | — | 0.87 | — | $m\Omega$ |
| Static Drain-Source On-State Voltage (Chip) | $V_{DS(on)}$ | $I_D = 300A, V_{GS} = 15V, T_j = 25^\circ\text{C}$ | — | 0.16 | 0.22 | Volts |
| | | $I_D = 300A, V_{GS} = 15V, T_j = 125^\circ\text{C}$ | — | 0.26 | — | Volts |
| Lead Resistance | R_{lead} | $I_D = 300A, \text{Terminal-Chip}, T_j = 25^\circ\text{C}$ | — | 0.7 | — | $m\Omega$ |
| | | $I_D = 300A, \text{Terminal-Chip}, T_j = 125^\circ\text{C}$ | — | 1.0 | — | $m\Omega$ |
| Input Capacitance | C_{iss} | | — | — | 110 | nF |
| Output Capacitance | C_{oss} | $V_{DS} = 10V, V_{GS} = 0V$ | — | — | 15 | nF |
| Reverse Transfer Capacitance | C_{rss} | | — | — | 10 | nF |
| Total Gate Charge | Q_G | $V_{DD} = 48V, I_D = 300A, V_{GS} = 15V$ | — | 1650 | — | nC |
| Turn-on Delay Time | $t_{d(on)}$ | | — | — | 450 | ns |
| Rise Time | t_r | $V_{DD} = 48V, I_D = 300A,$ | — | — | 600 | ns |
| Turn-off Delay Time | $t_{d(off)}$ | $V_{GS1} = V_{GS2} = 15V, R_G = 4.2\Omega,$ | — | — | 600 | ns |
| Fall Time | t_f | Inductive Load Switching Operation, | — | — | 400 | ns |
| Diode Reverse Recovery Time** | t_{rr} | $I_S = 300A$ | — | — | 200 | ns |
| Diode Reverse Recovery Charge** | Q_{rr} | | — | 4.8 | — | μC |
| Source-Drain Voltage | V_{SD} | $I_S = 300A, V_{GS} = 0V$ | — | — | 1.3 | Volts |

**Represents characteristics of the anti-parallel, source-to-drain free-wheel diode (FWDi).



FM600TU-07A

6-Pack High Power MOSFET Module

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Thermal and Mechanical Characteristics, $T_j = 25^\circ\text{C}$ unless otherwise specified

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|-------------------------------------|----------------|---|------|------|-------|--------------------|
| Thermal Resistance, Channel to Case | $R_{th(j-c)}$ | MOSFET part (1/6 Module) T_C Reference Point per Outline Drawing | — | — | 0.13 | $^\circ\text{C/W}$ |
| Thermal Resistance, Channel to Case | $R_{th(j-c')}$ | MOSFET part (1/6 Module) Measured Point is Just Under the Chips. | — | — | 0.096 | $^\circ\text{C/W}$ |
| Contact Thermal Resistance | $R_{th(c-f)}$ | Per 1/6 Module, Thermal Grease Applied | — | 0.1 | — | $^\circ\text{C/W}$ |

Thermistors Part

| Characteristics | Symbol | Test Conditions | Min. | Typ. | Max. | Units |
|-----------------|----------|---|------|------|------|------------------|
| Resistance* | R_{th} | $T_C = 25^\circ\text{C}$ | — | 100 | — | $\text{k}\Omega$ |
| B Constant* | B | Resistance at 25°C , 50°C | — | 4000 | — | K |

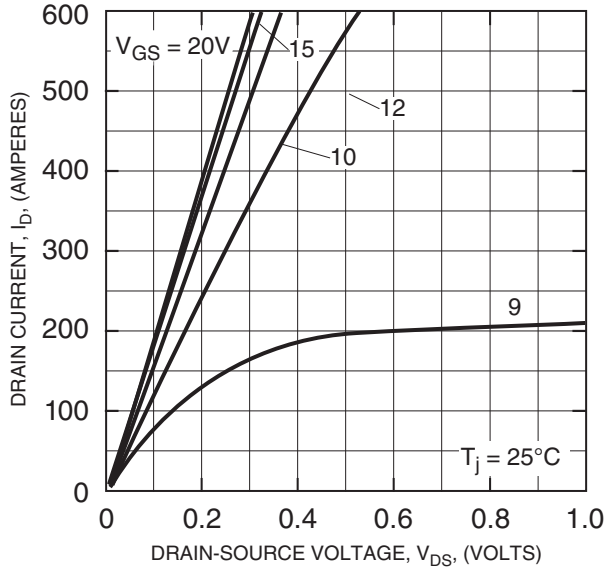
* $B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)$

R_1 : Resistance at $T_1(\text{K})$,

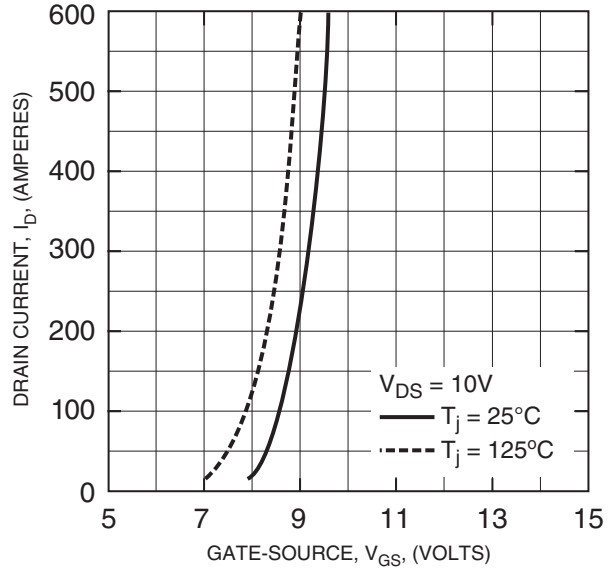
R_2 : Resistance at $T_2(\text{K})$

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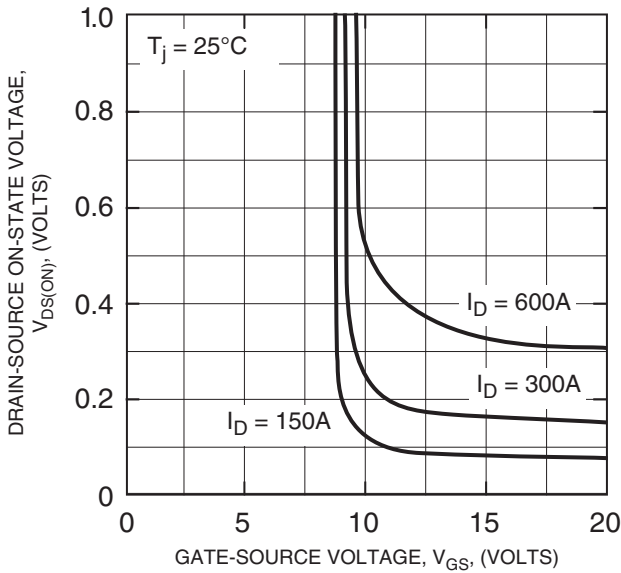
OUTPUT CHARACTERISTICS (TYPICAL)



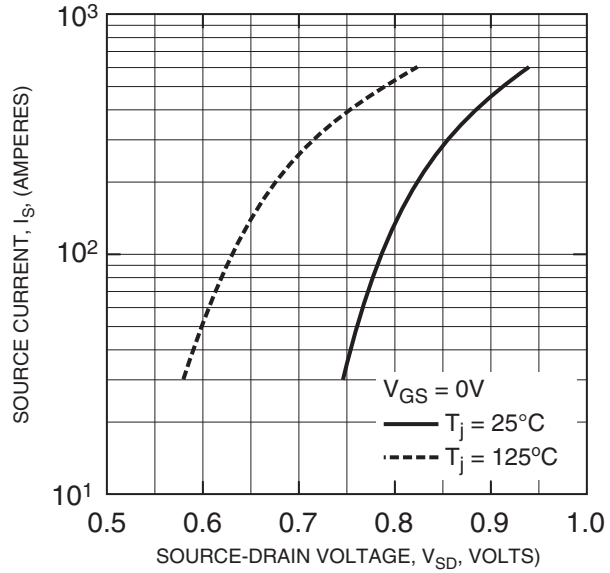
TRANSFER CHARACTERISTICS (TYPICAL)



DRAIN-SOURCE ON-STATE VOLTAGE VS. GATE BIAS CHARACTERISTICS (TYPICAL)

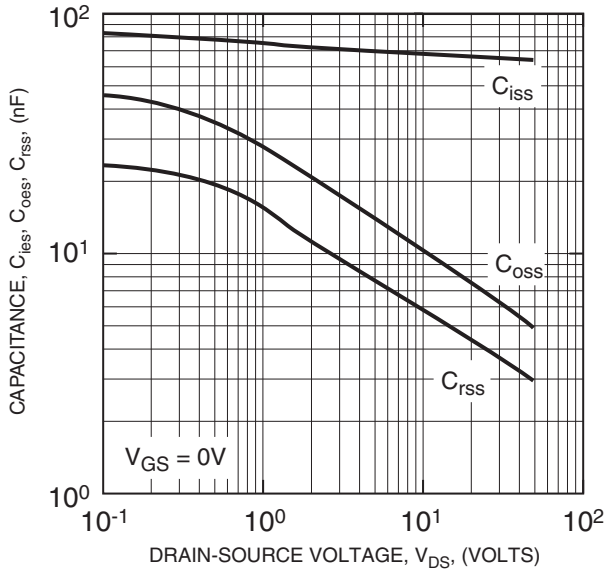


FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL - INVERTER PART)

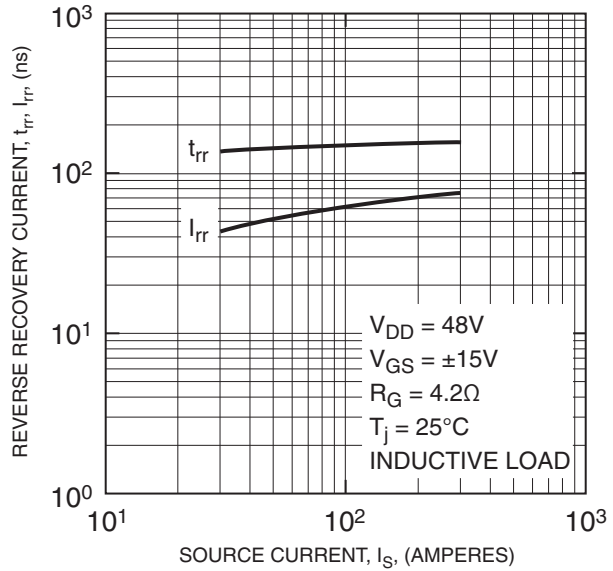


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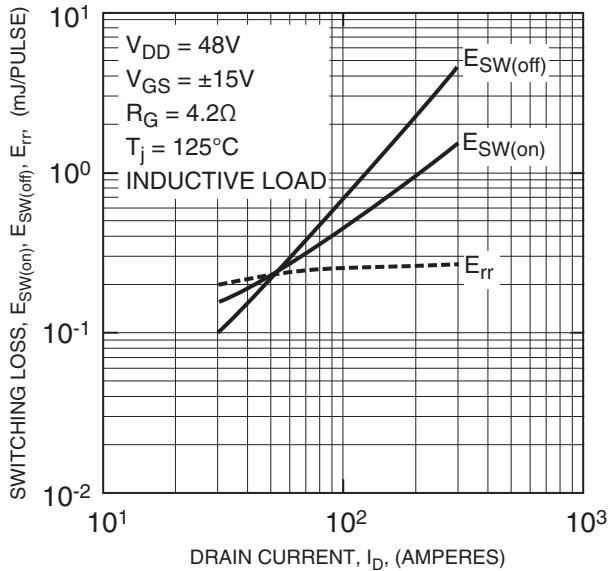
CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)



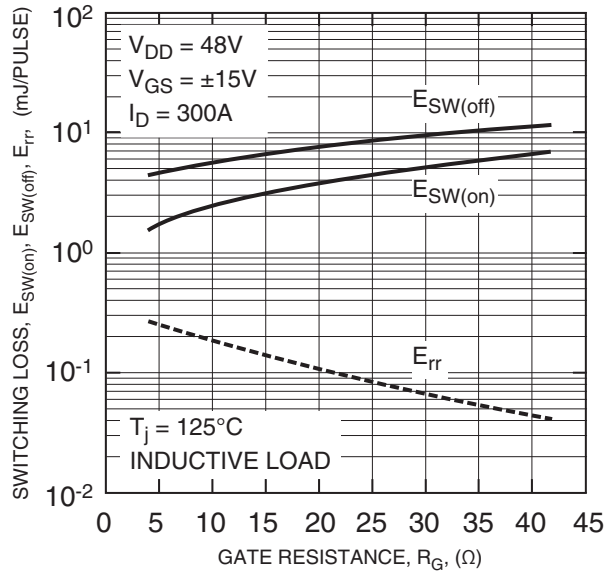
REVERSE RECOVERY CHARACTERISTICS (TYPICAL)



SWITCHING LOSS VS. DRAIN CURRENT (TYPICAL)

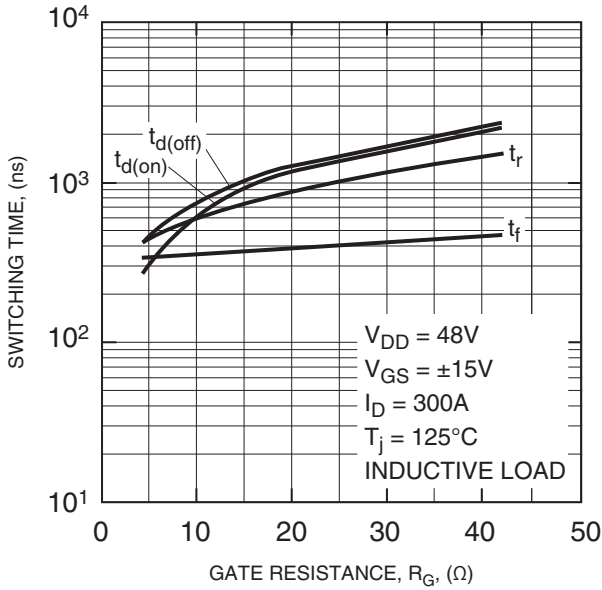


SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)

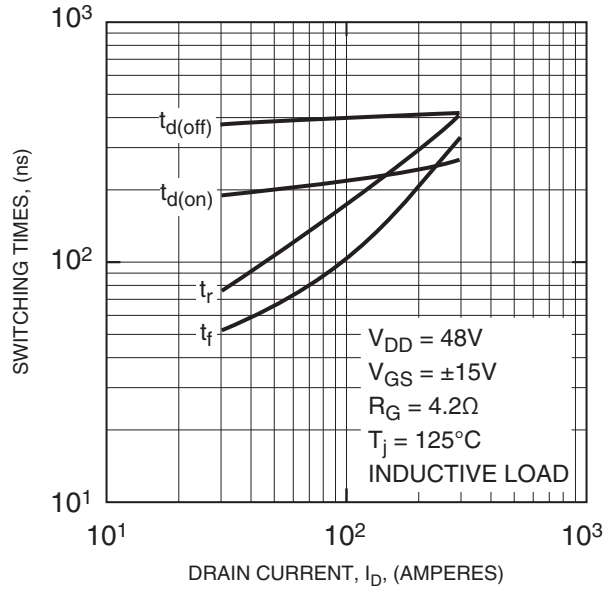


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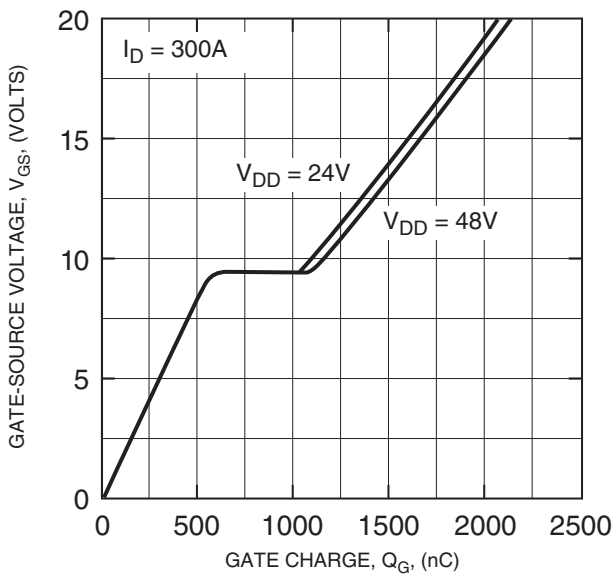
SWITCHING TIME VS. GATE RESISTANCE (TYPICAL)



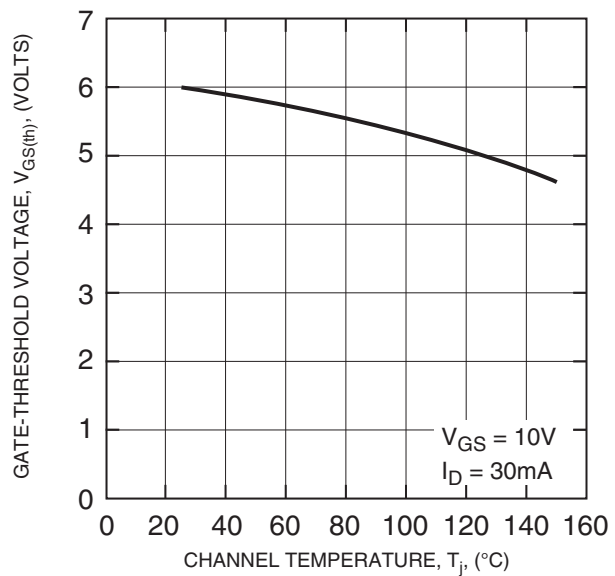
SWITCHING TIME VS. DRAIN CURRENT (TYPICAL)



GATE CHARGE CHARACTERISTICS (TYPICAL)



GATE THRESHOLD VOLTAGE VS. TEMPERATURE (TYPICAL)



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