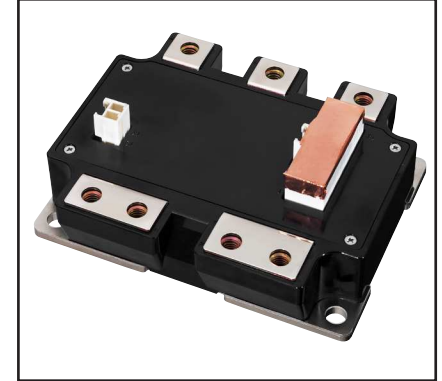
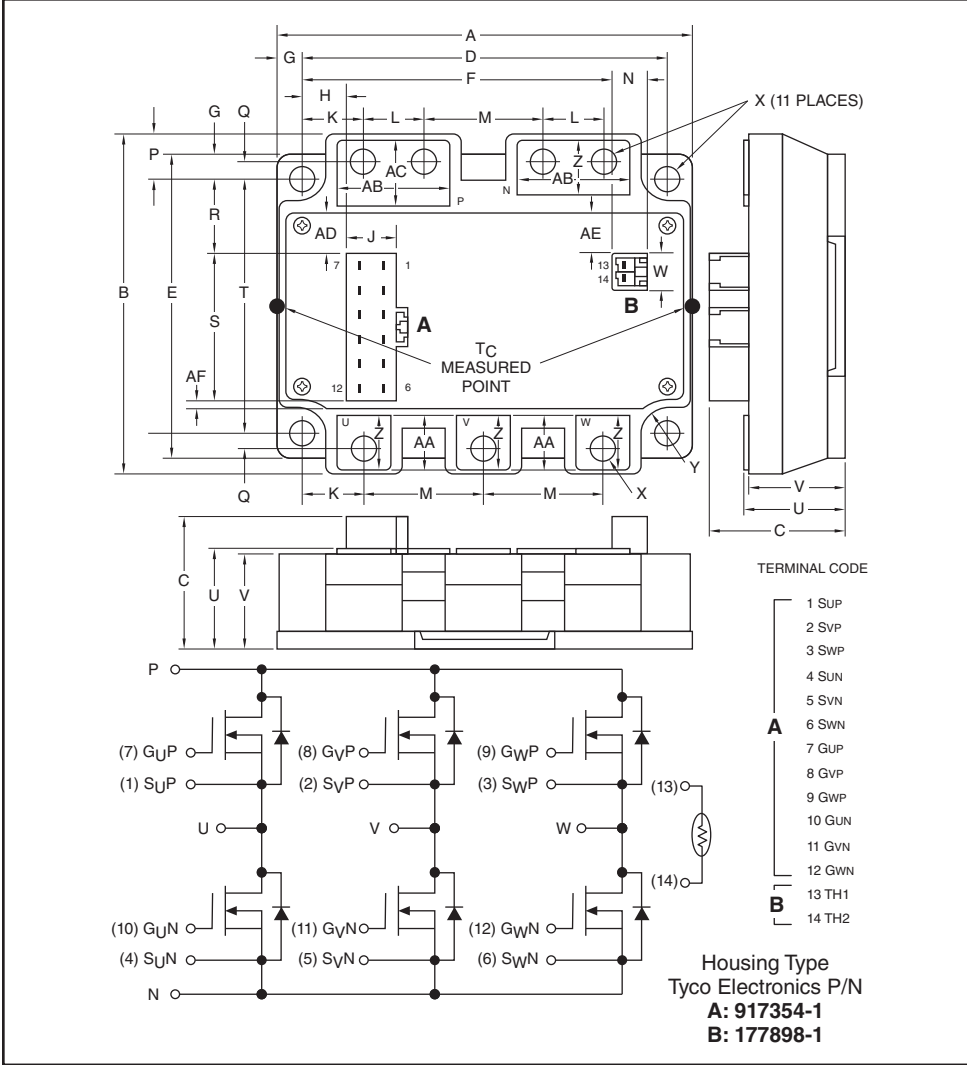


**6-PACK High Power MOSFET Module**  
**300 Amperes/150 Volts**



**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-3A is a 150V ( $V_{DSS}$ ), 300 Ampere 6-Pack High Power MOSFET Module.

| Type | Current Rating<br>Amperes | $V_{DSS}$<br>Volts |
|------|---------------------------|--------------------|
| FM   | 300                       | 150                |

**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](http://www.pwr.com)

**FM600TU-3A**  
**6-Pack High Power MOSFET Module**  
300 Amperes/150 Volts

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

| Ratings  | Symbol              | FM600TU-3A | Units            |
|--|---------------------|------------|------------------|
| Channel Temperature  | $T_j$               | -40 to 150 | $^\circ\text{C}$ |
| Storage Temperature  | $T_{\text{stg}}$    | -40 to 125 | $^\circ\text{C}$ |
| Drain-Source Voltage (G-S Short)   | $V_{\text{DSS}}$    | 150        | Volts            |
| Gate-Source Voltage (D-E Short)  | $V_{\text{GSS}}$    | $\pm 20$   | Volts            |
| Drain Current ( $T_C = 25^\circ\text{C}$ )   | $I_{\text{D(rms)}}$ | 300        | $A_{\text{rms}}$ |
| Peak Drain Current (Pulse)   | $I_{\text{DM}}$     | 600*       | Amperes          |
| Avalanche Current ( $L = 10\mu\text{H}$ , Pulse)   | $I_{\text{DA}}$     | 300*       | Amperes          |
| Source Current ( $T_C = 25^\circ\text{C}$ )**  | $I_{\text{S(rms)}}$ | 300        | $A_{\text{rms}}$ |
| Peak Source Current (Pulse)**  | $I_{\text{SM}}$     | 600*       | Amperes          |
| Maximum Power Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )***      | $P_{\text{D}}$      | 960        | Watts            |
| Maximum Peak Power Dissipation ( $T_C = 25^\circ\text{C}$ , $T_j < 150^\circ\text{C}$ )*** | $P_{\text{D}}$      | 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.)                                  | $V_{\text{ISO}}$    | 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-3A**  
**6-Pack High Power MOSFET Module**  
 300 Amperes/150 Volts

**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  | $\mu A$    |
| Static Drain-Source On-State Resistance<br>(Chip) | $r_{DS(on)}$ | $I_D = 300A, V_{GS} = 15V, T_j = 25^\circ\text{C}$  | —            | 1.6  | 2.2  | m $\Omega$ |
|   |              | $I_D = 300A, V_{GS} = 15V, T_j = 125^\circ\text{C}$   | —            | 3.0  | —    | m $\Omega$ |
| Static Drain-Source On-State Voltage<br>(Chip)    | $V_{DS(on)}$ | $I_D = 300A, V_{GS} = 15V, T_j = 25^\circ\text{C}$  | —            | 0.48 | 0.66 | Volts      |
|   |              | $I_D = 300A, V_{GS} = 15V, T_j = 125^\circ\text{C}$   | —            | 0.91 | —    | 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                                 | $C_{iss}$    | $V_{DS} = 10V, V_{GS} = 0V$   | —            | —    | 110  | nF         |
| Output Capacitance                                | $C_{oss}$    |   | —            | —    | 15   | nF         |
| Reverse Transfer Capacitance                      | $C_{rss}$    |   | —            | —    | 10   | nF         |
| Total Gate Charge                                 | $Q_G$        | $V_{DD} = 48V, I_D = 300A, V_{GS} = 15V$  | —            | 1950 | —    | nC         |
| Turn-on Delay Time                                | $t_{d(on)}$  | $V_{DD} = 48V, I_D = 300A,$<br>$V_{GS1} = V_{GS2} = 15V, R_G = 4.2\Omega,$<br>Inductive Load Switching Operation, | —            | —    | 400  | ns         |
| Rise Time   | $t_r$        |   | —            | —    | 400  | ns         |
| Turn-off Delay Time                               | $t_{d(off)}$ |   | —            | —    | 500  | ns         |
| Fall Time   | $t_f$        |   | —            | —    | 200  | ns         |
| Diode Reverse Recovery Time**                     | $t_{rr}$     |   | $I_S = 300A$ | —    | —    | 200        |
| Diode Reverse Recovery Charge**                   | $Q_{rr}$     |   | —            | 8.0  | —    | $\mu C$    |
| 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-3A**  
**6-Pack High Power MOSFET Module**  
300 Amperes/150 Volts

**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)<br>$T_C$ 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)<br>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 $25^\circ\text{C}$ , $50^\circ\text{C}$ | —    | 4000 | —    | K                |

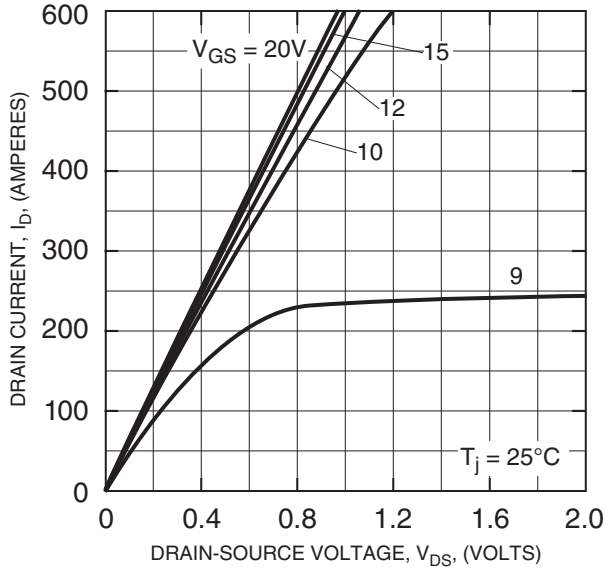
\* $B = (\ln R_1 - \ln R_2) / (1/T_1 - 1/T_2)$

$R_1$ : Resistance at  $T_1(K)$ ,

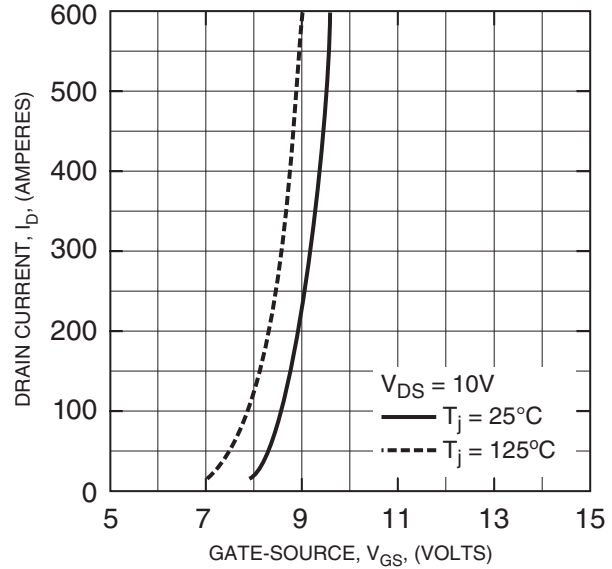
$R_2$ : Resistance at  $T_2(K)$

**FM600TU-3A**  
**6-Pack High Power MOSFET Module**  
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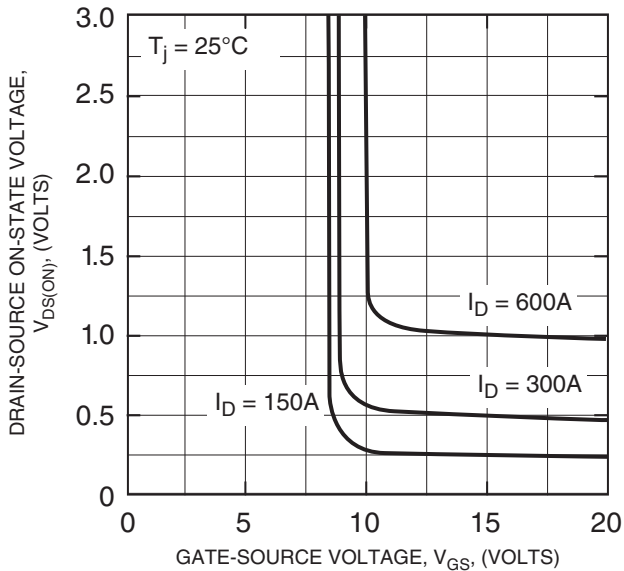
**OUTPUT CHARACTERISTICS (TYPICAL)**



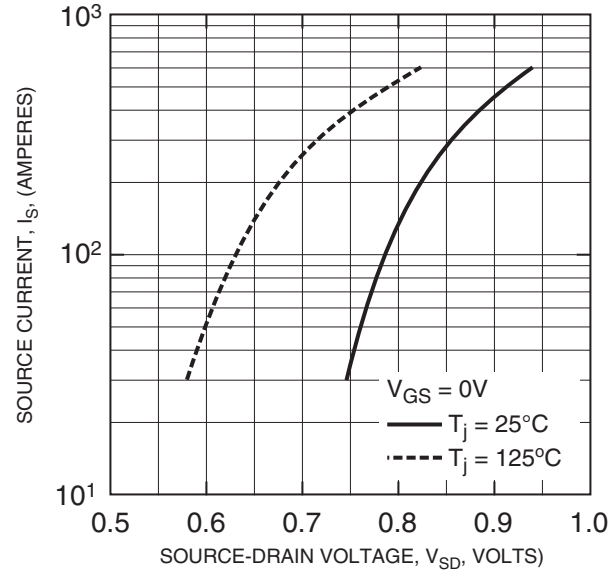
**TRANSFER CHARACTERISTICS (TYPICAL)**



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

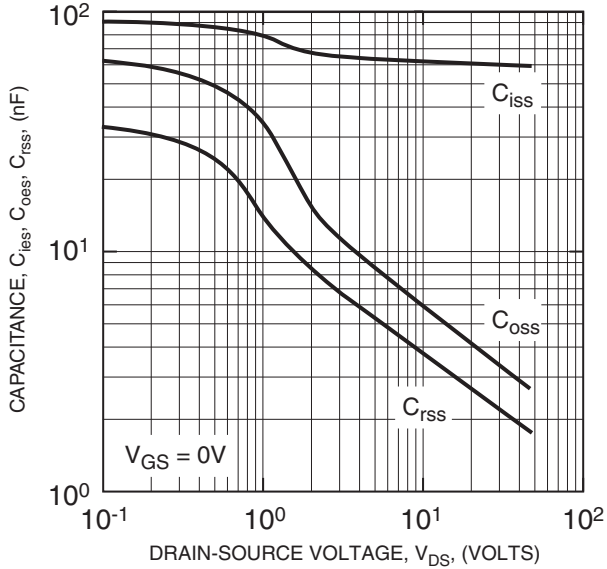


**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL - INVERTER PART)**

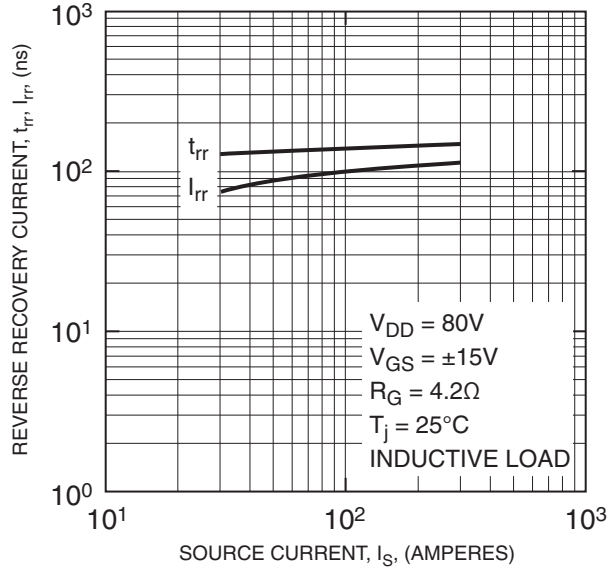


**FM600TU-3A**  
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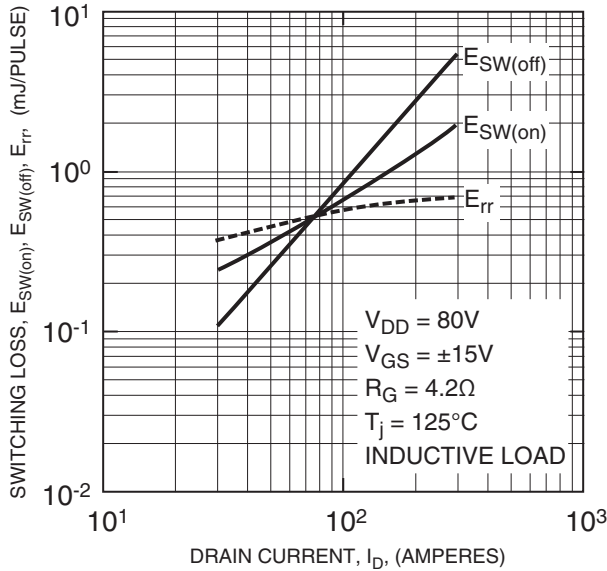
**CAPACITANCE VS. DRAIN-SOURCE VOLTAGE (TYPICAL)**



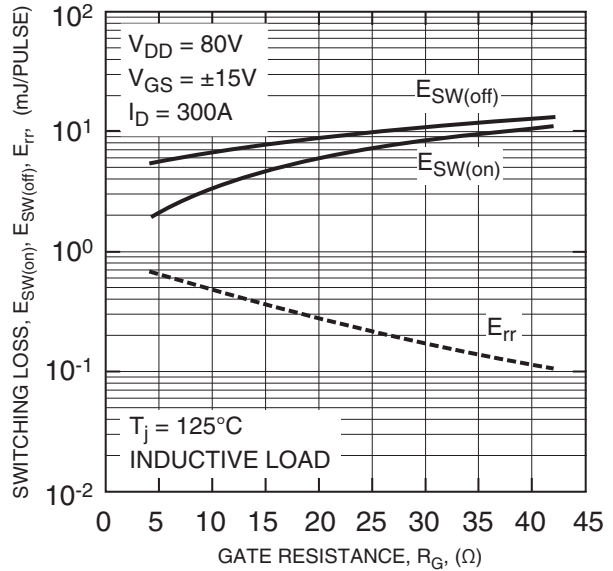
**REVERSE RECOVERY CHARACTERISTICS (TYPICAL)**



**SWITCHING LOSS VS. DRAIN CURRENT (TYPICAL)**

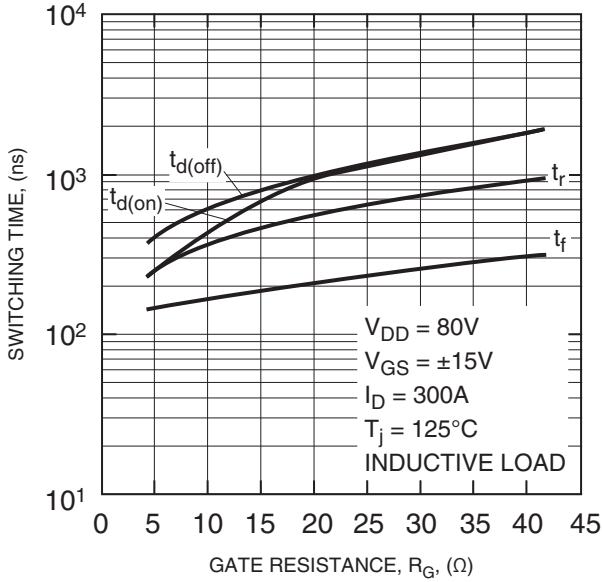


**SWITCHING LOSS VS. GATE RESISTANCE (TYPICAL)**

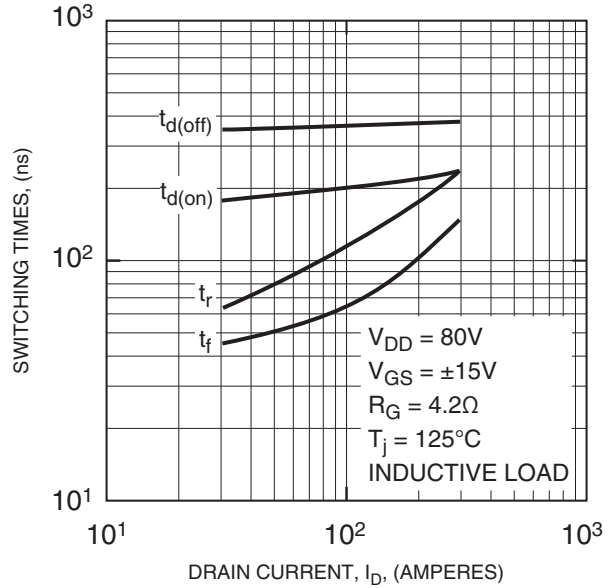


**FM600TU-3A**  
**6-Pack High Power MOSFET Module**  
 300 Amperes/150 Volts

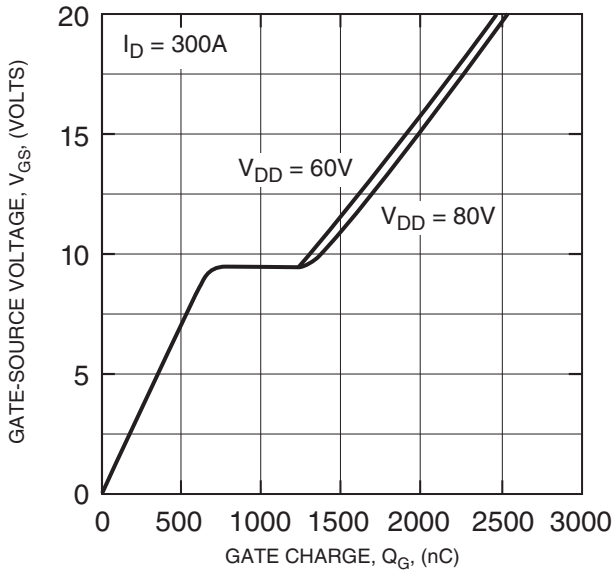
**SWITCHING TIME VS. GATE RESISTANCE (TYPICAL)**



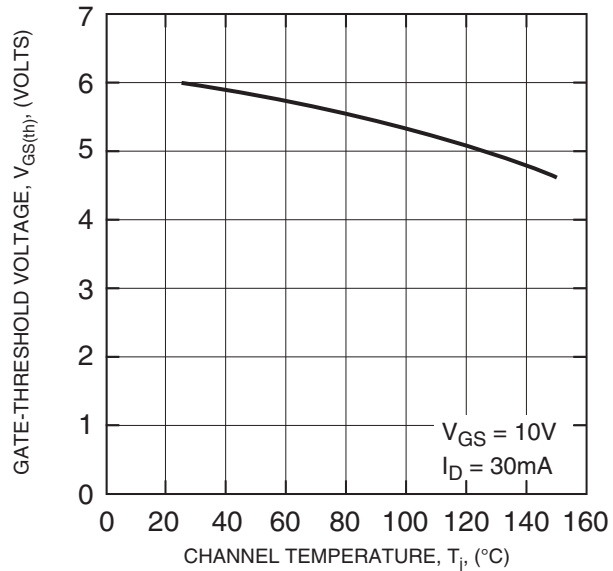
**SWITCHING TIME VS. DRAIN CURRENT (TYPICAL)**



**GATE CHARGE CHARACTERISTICS (TYPICAL)**



**GATE THRESHOLD VOLTAGE VS. TEMPERATURE (TYPICAL)**



**FM600TU-3A**  
**6-Pack High Power MOSFET Module**  
 300 Amperes/150 Volts

