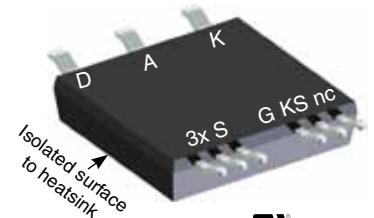
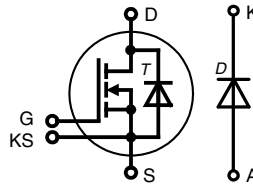


# CoolMOS™<sup>1)</sup> Power MOSFET

**ISOPLUS™** - electrically isolated surface to heatsink  
**Surface Mount Power Device**

$$\begin{aligned} V_{DSS} &= 600 \text{ V} \\ I_{D25} &= 50 \text{ A} \\ R_{DS(on) \text{ max}} &= 45 \text{ m}\Omega \end{aligned}$$

Preliminary data



E72873

| MOSFET T                                                                                                                                 |                                                                                                                                                   |                                                           |                                                                                                  |             |                                        |            |                |
|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------|----------------------------------------|------------|----------------|
| Symbol                                                                                                                                   | Conditions                                                                                                                                        | Maximum Ratings                                           |                                                                                                  |             |                                        |            |                |
| V <sub>DSS</sub>                                                                                                                         | T <sub>VJ</sub> = 25°C to 150°C                                                                                                                   | 600                                                       |                                                                                                  | V           |                                        |            |                |
| V <sub>GS</sub>                                                                                                                          |                                                                                                                                                   | ±20                                                       |                                                                                                  | V           |                                        |            |                |
| I <sub>D25</sub>                                                                                                                         | T <sub>C</sub> = 25°C                                                                                                                             | 50                                                        |                                                                                                  | A           |                                        |            |                |
| I <sub>D80</sub>                                                                                                                         | T <sub>C</sub> = 80°C                                                                                                                             | 38                                                        |                                                                                                  | A           |                                        |            |                |
| E <sub>AS</sub><br>E <sub>AR</sub>                                                                                                       | single pulse<br>repetitive                                                                                                                        | 1950<br>3                                                 | mJ<br>mJ                                                                                         |             |                                        |            |                |
| } I <sub>D</sub> = 11 A; T <sub>C</sub> = 25°C                                                                                           |                                                                                                                                                   |                                                           |                                                                                                  |             |                                        |            |                |
| dV/dt                                                                                                                                    | MOSFET dV/dt ruggedness V <sub>DS</sub> = 0...480 V                                                                                               | 50                                                        |                                                                                                  | V/ns        |                                        |            |                |
| Symbol                                                                                                                                   | Conditions                                                                                                                                        | Characteristic Values                                     |                                                                                                  |             |                                        |            |                |
| (T <sub>VJ</sub> = 25°C, unless otherwise specified)                                                                                     |                                                                                                                                                   |                                                           |                                                                                                  |             |                                        |            |                |
|                                                                                                                                          |                                                                                                                                                   | min.                                                      | typ.                                                                                             | max.        |                                        |            |                |
| R <sub>DSon</sub>                                                                                                                        | I <sub>D</sub> = 44 A; V <sub>GS</sub> = 10 V                                                                                                     |                                                           | 40                                                                                               | 45          | mΩ                                     |            |                |
| V <sub>GS(th)</sub>                                                                                                                      | I <sub>D</sub> = 3 mA; V <sub>DS</sub> = V <sub>GS</sub>                                                                                          | 2.5                                                       | 3                                                                                                | 3.5         | V                                      |            |                |
| I <sub>DSS</sub>                                                                                                                         | V <sub>DS</sub> = V <sub>DSS</sub> ; V <sub>GS</sub> = 0 V; T <sub>VJ</sub> = 25°C<br>T <sub>VJ</sub> = 125°C                                     |                                                           | 50                                                                                               | 10          | μA<br>μA                               |            |                |
| I <sub>GSS</sub>                                                                                                                         | V <sub>DS</sub> = 0 V; V <sub>GS</sub> = ± 20 V                                                                                                   |                                                           |                                                                                                  | 100         | nA                                     |            |                |
| t <sub>d(on)</sub><br>t <sub>r</sub><br>t <sub>d(off)</sub><br>t <sub>f</sub><br>E <sub>on</sub><br>E <sub>off</sub><br>E <sub>rec</sub> | Inductive switching<br>boost mode with diode D<br>V <sub>DS</sub> = 380 V; I <sub>D</sub> = 30 A<br>V <sub>GS</sub> = 10 V; R <sub>G</sub> = 33 Ω |                                                           | 80<br>40<br>750<br>40<br>1.3<br>0.45<br>0.35                                                     |             | ns<br>ns<br>ns<br>ns<br>mJ<br>mJ<br>mJ |            |                |
| C <sub>iss</sub><br>C <sub>oss</sub>                                                                                                     |                                                                                                                                                   | V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 100 V; f = 1 MHz |                                                                                                  | 6800<br>320 |                                        | pF<br>pF   |                |
| Q <sub>g</sub><br>Q <sub>gs</sub><br>Q <sub>gd</sub>                                                                                     |                                                                                                                                                   |                                                           | V <sub>DS</sub> = 400 V; I <sub>D</sub> = 44 A<br>V <sub>GS</sub> = 10 V; R <sub>G</sub> = 3.3 Ω |             | 150<br>35<br>50                        | 190        | nC<br>nC<br>nC |
| R <sub>thJC</sub><br>R <sub>thJH</sub>                                                                                                   |                                                                                                                                                   | with heatsink compound (IXYS test setup)                  |                                                                                                  |             | tbd                                    | 0.4<br>tbd | K/W<br>K/W     |
|                                                                                                                                          |                                                                                                                                                   |                                                           |                                                                                                  |             |                                        |            |                |
|                                                                                                                                          |                                                                                                                                                   |                                                           |                                                                                                  |             |                                        |            |                |
|                                                                                                                                          |                                                                                                                                                   |                                                           |                                                                                                  |             |                                        |            |                |

## Features

- **Fast CoolMOS™<sup>1)</sup>** power MOSFET 4<sup>th</sup> generation
  - high blocking capability
  - lowest resistance
  - avalanche rated for unclamped inductive switching (UIS)
  - low thermal resistance due to reduced chip thickness
- **Package**
  - isolated surface to heatsink
  - low coupling capacity between pins and heatsink
  - PCB space saving
  - enlarged creepage towards heatsink
  - application friendly pinout
  - low inductive current path
  - high reliability

## Applications

- Buck / boost chopper
- Optimized for boost configuration
- PFC stage

<sup>1)</sup> CoolMOS™ is a trademark of Infineon Technologies AG.

**Source-Drain Diode of MOSFET T**

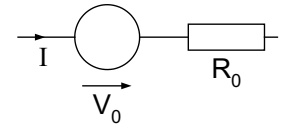
| Symbol                                               | Conditions                                                                     | Maximum Ratings       |      |      |    |
|------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------|------|------|----|
| I <sub>S25</sub>                                     | T <sub>C</sub> = 25°C                                                          | 50                    | A    |      |    |
| I <sub>S80</sub>                                     | T <sub>C</sub> = 80°C                                                          | 38                    | A    |      |    |
| Symbol                                               | Conditions                                                                     | Characteristic Values |      |      |    |
| (T <sub>VJ</sub> = 25°C, unless otherwise specified) |                                                                                |                       |      |      |    |
|                                                      |                                                                                | min.                  | typ. | max. |    |
| V <sub>SD</sub>                                      | I <sub>F</sub> = 44 A; V <sub>GS</sub> = 0 V                                   |                       | 0.9  | 1.0  | V  |
| t <sub>rr</sub>                                      | I <sub>F</sub> = 44 A; -di <sub>F</sub> /dt = 100 A/μs; V <sub>R</sub> = 400 V |                       | 600  |      | ns |
| Q <sub>RM</sub>                                      |                                                                                |                       | 17   |      | μC |
| I <sub>RM</sub>                                      |                                                                                |                       | 60   |      | A  |

**Diode D**

| Symbol                                               | Conditions                                                                        | Maximum Ratings                                                 |            |      |                     |
|------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------|------------|------|---------------------|
| $I_{F25}$                                            | $T_C = 25^{\circ}\text{C}; \text{DC}$                                             | 96                                                              | A          |      |                     |
| $I_{F80}$                                            | $T_C = 80^{\circ}\text{C}; \text{DC}$                                             | 61                                                              | A          |      |                     |
| Symbol                                               | Conditions                                                                        | Characteristic Values                                           |            |      |                     |
| (T <sub>VJ</sub> = 25°C, unless otherwise specified) |                                                                                   |                                                                 |            |      |                     |
|                                                      |                                                                                   | min.                                                            | typ.       | max. |                     |
| $V_{RRM}$                                            | $T_{VJ} = 25^{\circ}\text{C}$                                                     |                                                                 |            | 600  | V                   |
| $V_F$                                                | $I_F = 25 \text{ A}$                                                              | $T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$ | 1.2<br>1.3 | 1.4  | V                   |
| $I_R$                                                | $V_R = V_{RRM}$                                                                   | $T_{VJ} = 25^{\circ}\text{C}$<br>$T_{VJ} = 125^{\circ}\text{C}$ | tbd        | 150  | $\mu\text{A}$<br>mA |
| $I_{RM}$                                             | $I_F = 30 \text{ A}; V_R = 350 \text{ V}$<br>$-di/dt = 240 \text{ A}/\mu\text{s}$ | $T_{VJ} = 100^{\circ}\text{C}$                                  | 10         |      | A                   |
| $t_{rr}$                                             | $I_F = 1 \text{ A}; V_R = 30 \text{ V}$<br>$-di/dt = 100 \text{ A}/\mu\text{s}$   | $T_{VJ} = 100^{\circ}\text{C}$                                  | 35         | 50   | ns                  |
| $R_{thJC}$<br>$R_{thJH}$                             | per diode<br>with heatsink compound (IXYS test setup)                             |                                                                 | tbd        | 0.7  | K/W<br>k/W          |

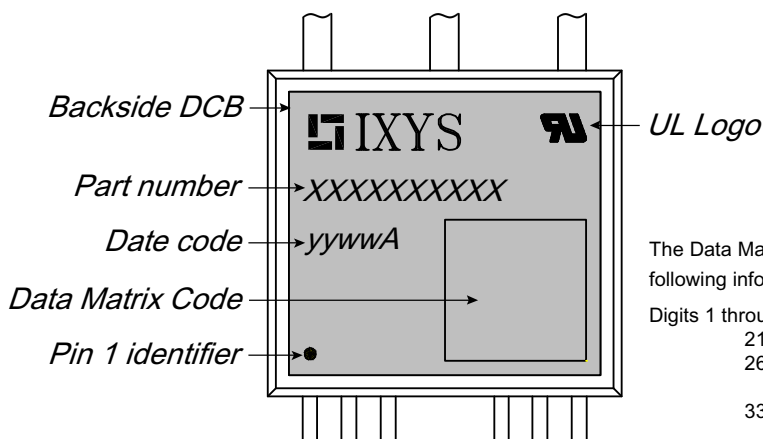
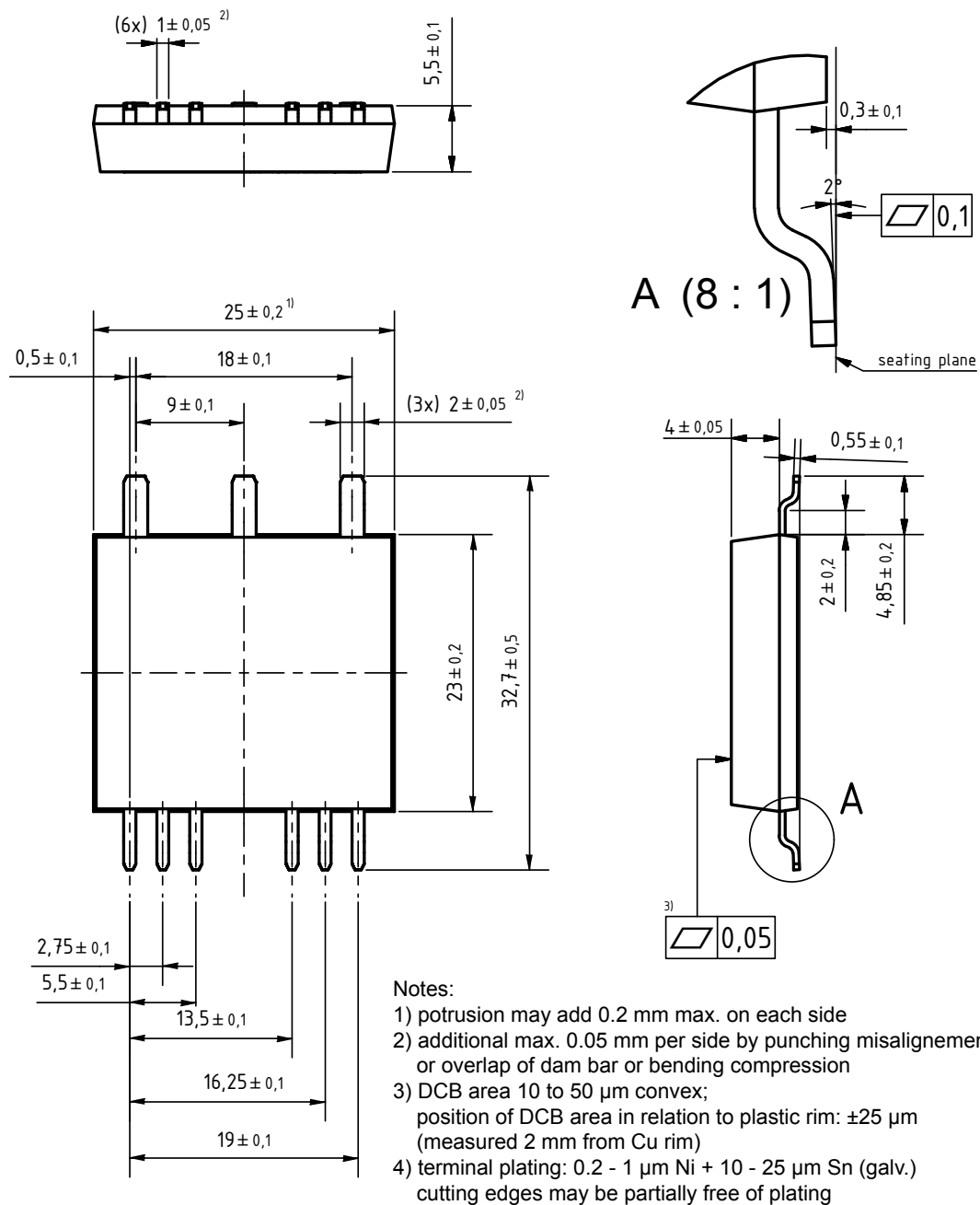
**Component**

| Symbol     | Conditions                                                | Maximum Ratings       |      |      |    |
|------------|-----------------------------------------------------------|-----------------------|------|------|----|
| $T_{VJ}$   |                                                           | -55...+150            |      |      | °C |
| $T_{stg}$  |                                                           | -55...+125            |      |      | °C |
| $V_{ISOL}$ | $I_{ISOL} \leq 1\text{ mA}; 50/60\text{ Hz}$              | 2500                  |      |      | V~ |
| $F_C$      | mounting force                                            | 40 ... 130            |      |      | N  |
| Symbol     | Conditions                                                | Characteristic Values |      |      |    |
|            |                                                           | min.                  | typ. | max. |    |
| $C_P$      | coupling capacity between shorted pins and backside metal |                       | 90   |      | pF |
| $d_S, d_A$ | pin - pin                                                 | 1.65                  |      |      | mm |
| $d_S, d_A$ | pin - backside metal                                      | 4                     |      |      | mm |
| CTI        |                                                           | 400                   |      |      |    |
| Weight     |                                                           |                       | 8    |      | g  |

**Equivalent Circuits for Simulation**
**Conduction**


Boost Diode (typ. at  $T_J = 125^\circ\text{C}$ )  
 $V_0 = \text{tbd V}; R_0 = \text{tbd m}\Omega$

| Ordering | Part Number         | Marking on Product | Delivering Mode | Base Qty | Ordering Code |
|----------|---------------------|--------------------|-----------------|----------|---------------|
| Standard | MKE38RK600DFELB-TRR | MKE38RK600DFELB    | Tape & Reel     | 200      | 510479        |
|          | MKE38RK600DFELB     | MKE38RK600DFELB    | Blister         | 45       | 510231        |



The Data Matrix Code contains the following information in 36 digits:

Digits 1 through 20: part number  
 21 to 25: date code (YYWWA)  
 26 to 31: assembly lot code  
 32: reserved for special information  
 33 to 36: may be used for subsequent module numbering within the assembly lot

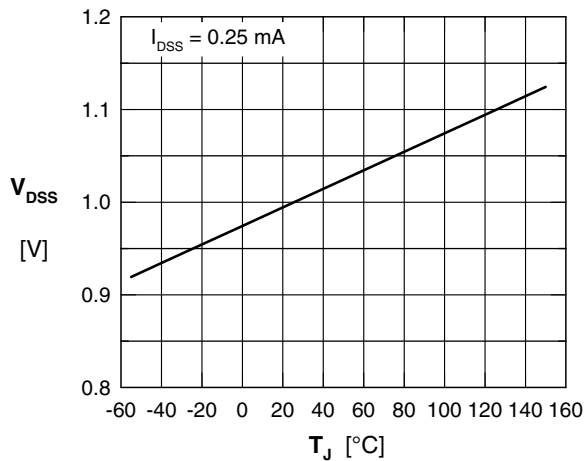


Fig.1 Drain source breakdown voltage versus temperature  $T_{VJ}$

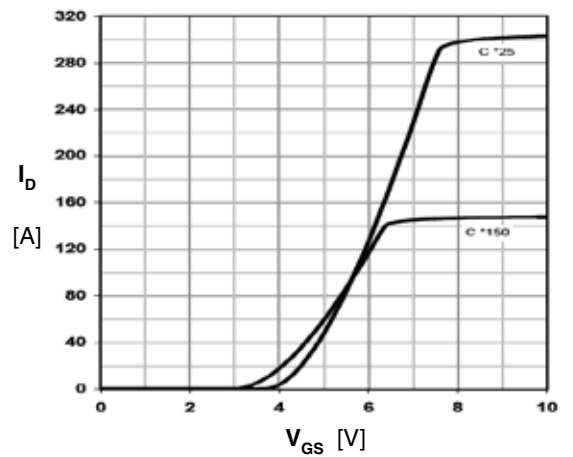


Fig. 2 Typ. transfer characteristics

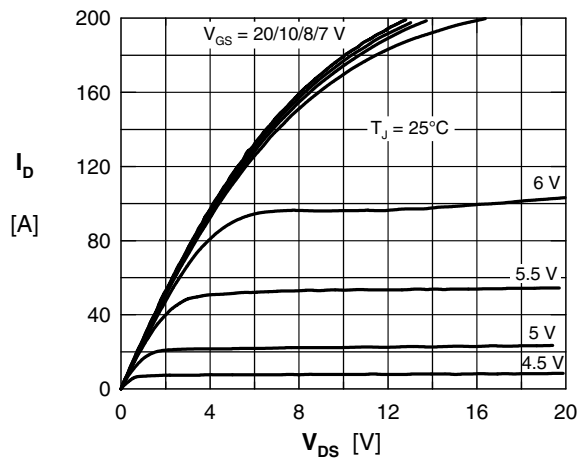


Fig. 3 Typical output characteristics

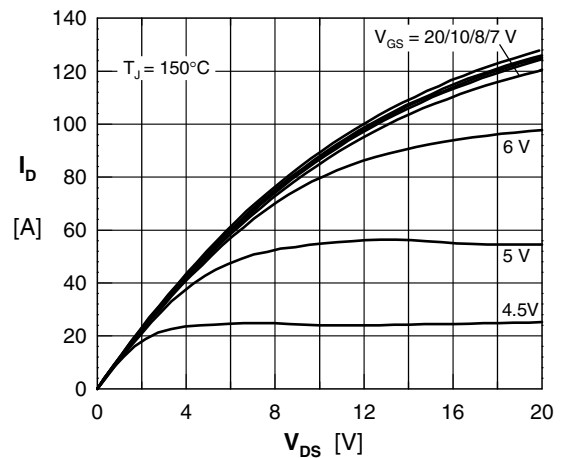


Fig. 4 Typical output characteristics

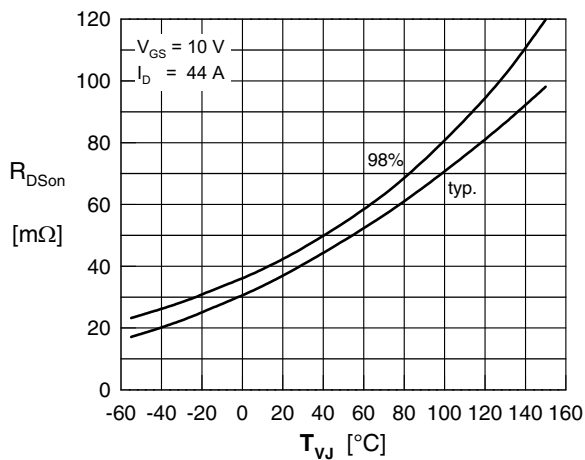


Fig.5 Drain source on-state resistance  $R_{DS(on)}$  vs. junction temperature  $T_{VJ}$

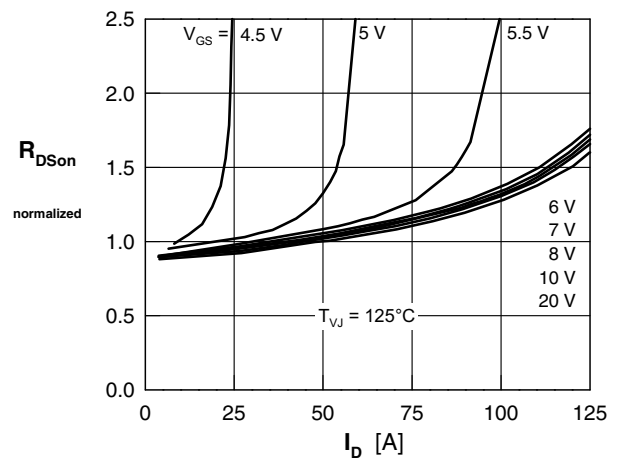
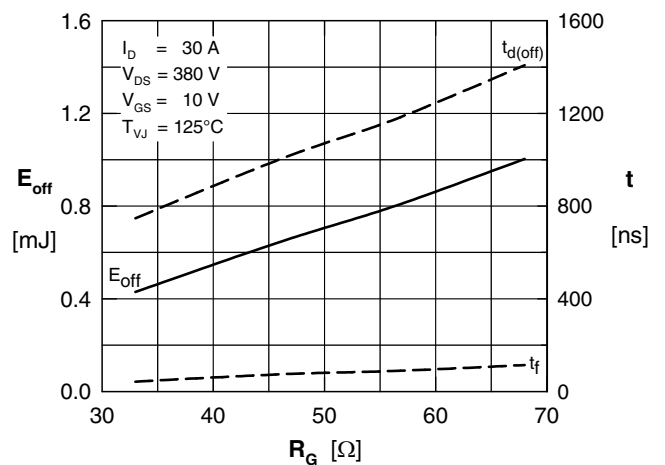
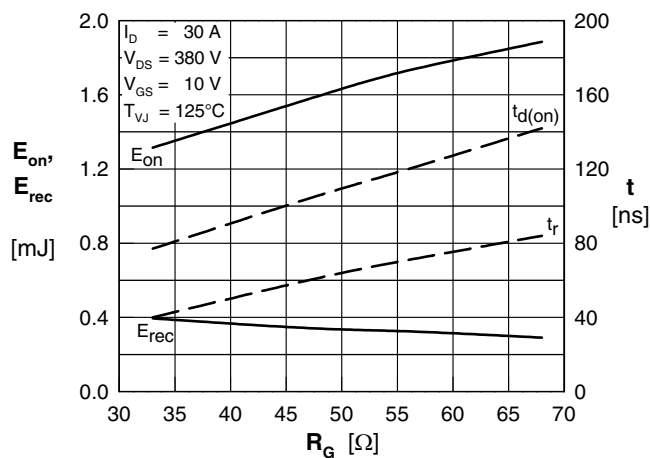
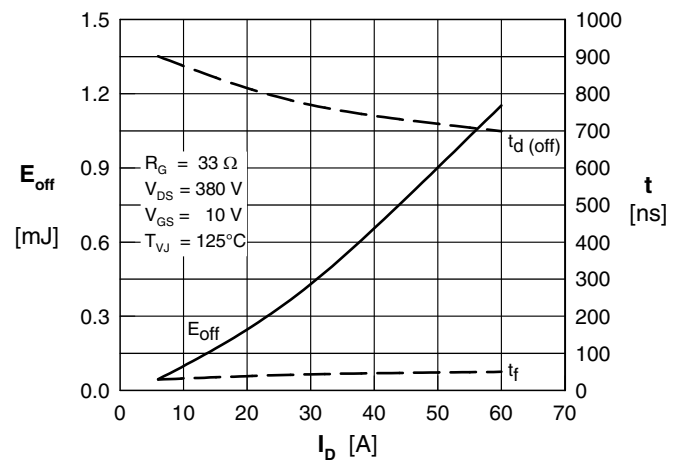
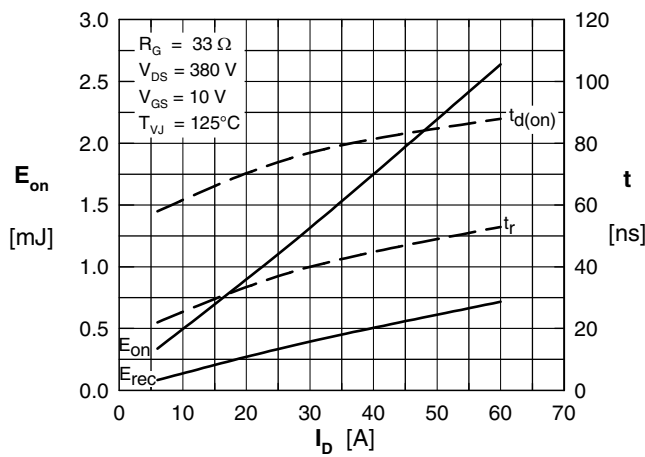
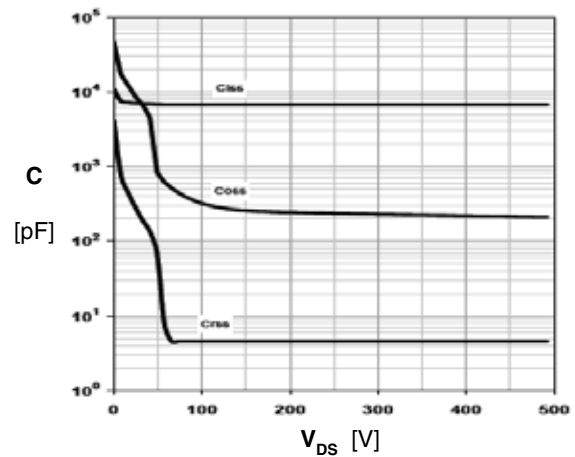
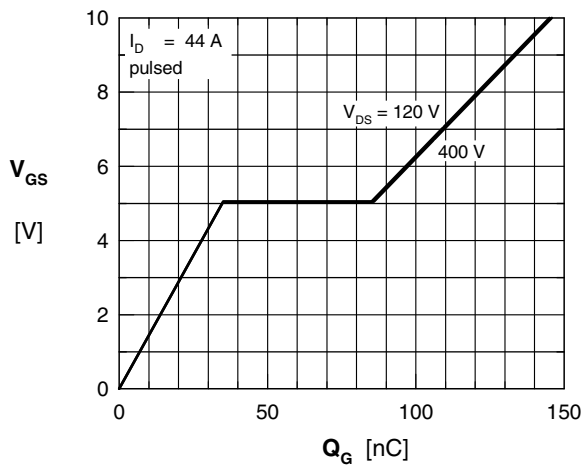
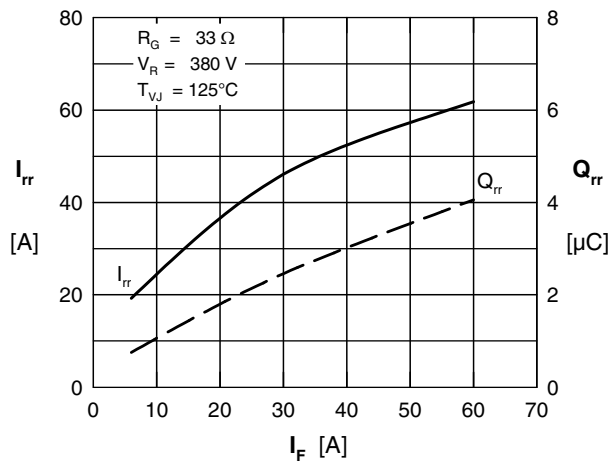
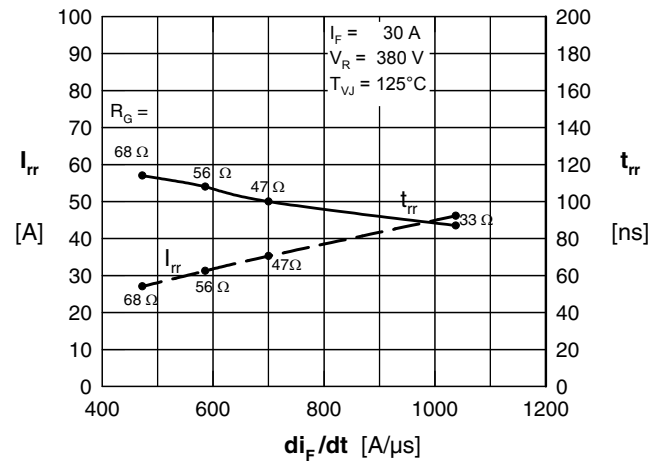
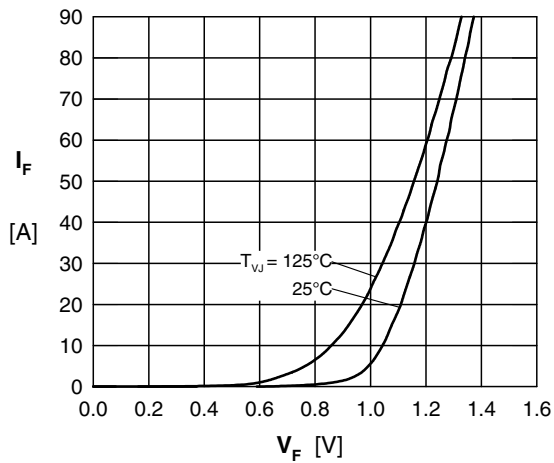


Fig. 6 Drain source on-state resistance,  $R_{DS(on)}$  versus  $I_D$







---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).