

CoolMOS™¹⁾ Power MOSFET

ISOPLUS™ - electrically isolated surface to heatsink

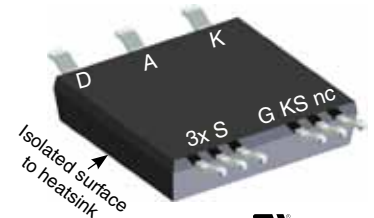
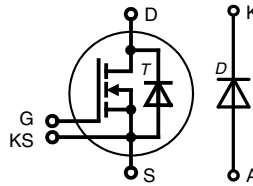
Surface Mount Power Device

$$V_{DSS} = 600 \text{ V}$$

$$I_{D25} = 50 \text{ A}$$

$$R_{DS(on) \text{ max}} = 45 \text{ m}\Omega$$

Preliminary data



E72873

| MOSFET T | | Maximum Ratings | |
|----------------------|---|-----------------|----------|
| Symbol | Conditions | | |
| V_{DSS} | $T_{VJ} = 25^\circ\text{C}$ to 150°C | 600 | V |
| V_{GS} | | ± 20 | V |
| I_{D25} | $T_C = 25^\circ\text{C}$ | 50 | A |
| I_{D80} | $T_C = 80^\circ\text{C}$ | 38 | A |
| E_{AS} E_{AR} | single pulse repetitive } $I_D = 11 \text{ A}; T_C = 25^\circ\text{C}$ | 1950 3 | mJ mJ |
| dV/dt | MOSFET dV/dt ruggedness $V_{DS} = 0 \dots 480 \text{ V}$ | 50 | V/ns |

| Symbol | Conditions | Characteristic Values | | | | |
|---|--|-----------------------|------|------|--------------------------------|-----|
| | | min. | typ. | max. | | |
| ($T_{VJ} = 25^\circ\text{C}$, unless otherwise specified) | | | | | | |
| $R_{DS(on)}$ | $I_D = 44 \text{ A}; V_{GS} = 10 \text{ V}$ | | 40 | 45 | m Ω | |
| $V_{GS(th)}$ | $I_D = 3 \text{ mA}; V_{DS} = V_{GS}$ | 2.5 | 3 | 3.5 | V | |
| I_{DSS} | $V_{DS} = V_{DSS}; V_{GS} = 0 \text{ V}; T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$ | | 50 | 10 | μA μA | |
| I_{GSS} | $V_{DS} = 0 \text{ V}; V_{GS} = \pm 20 \text{ V}$ | | | 100 | nA | |
| $t_{d(on)}$ t_r $t_{d(off)}$ t_f | Inductive switching boost mode with diode D $V_{DS} = 380 \text{ V}; I_D = 30 \text{ A}$ $V_{GS} = 10 \text{ V}; R_G = 33 \Omega$ | | 80 | | ns | |
| E_{on} | | | 40 | | ns | |
| E_{off} | | | 750 | | ns | |
| E_{rec} | | | 40 | | ns | |
| C_{iss} C_{oss} | $V_{GS} = 0 \text{ V}; V_{DS} = 100 \text{ V}; f = 1 \text{ MHz}$ | | 6800 | | pF | |
| | | | | 320 | | pF |
| Q_g Q_{gs} Q_{gd} | $V_{DS} = 400 \text{ V}; I_D = 44 \text{ A}$ $V_{GS} = 10 \text{ V}; R_G = 3.3 \Omega$ | | 150 | 190 | nC | |
| | | | | 35 | | nC |
| | | | | 50 | | nC |
| R_{thJC} R_{thJH} | with heatsink compound (IXYS test setup) | | 0.4 | | K/W | |
| | | | tbd | tbd | | K/W |

Features

- **Fast CoolMOS™¹⁾** power MOSFET 4th 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

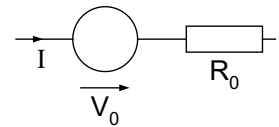
- Buck / boost chopper
- Optimized for boost configuration
- PFC stage

¹⁾ CoolMOS™ is a trademark of Infineon Technologies AG.

| Source-Drain Diode of MOSFET T | | | | | |
|---|--|-----------------------|-----|-----|---------------|
| Symbol | Conditions | Maximum Ratings | | | |
| I_{S25} | $T_C = 25^\circ\text{C}$ | 50 | A | | |
| I_{S80} | $T_C = 80^\circ\text{C}$ | 38 | A | | |
| Symbol | Conditions | Characteristic Values | | | |
| ($T_{VJ} = 25^\circ\text{C}$, unless otherwise specified) | | | | | |
| V_{SD} | $I_F = 44\text{ A}; V_{GS} = 0\text{ V}$ | | 0.9 | 1.0 | V |
| t_{rr} | $I_F = 44\text{ A}; -di_F/dt = 100\text{ A}/\mu\text{s}; V_R = 400\text{ V}$ | | 600 | | ns |
| Q_{RM} | | | 17 | | μC |
| I_{RM} | | | 60 | | A |

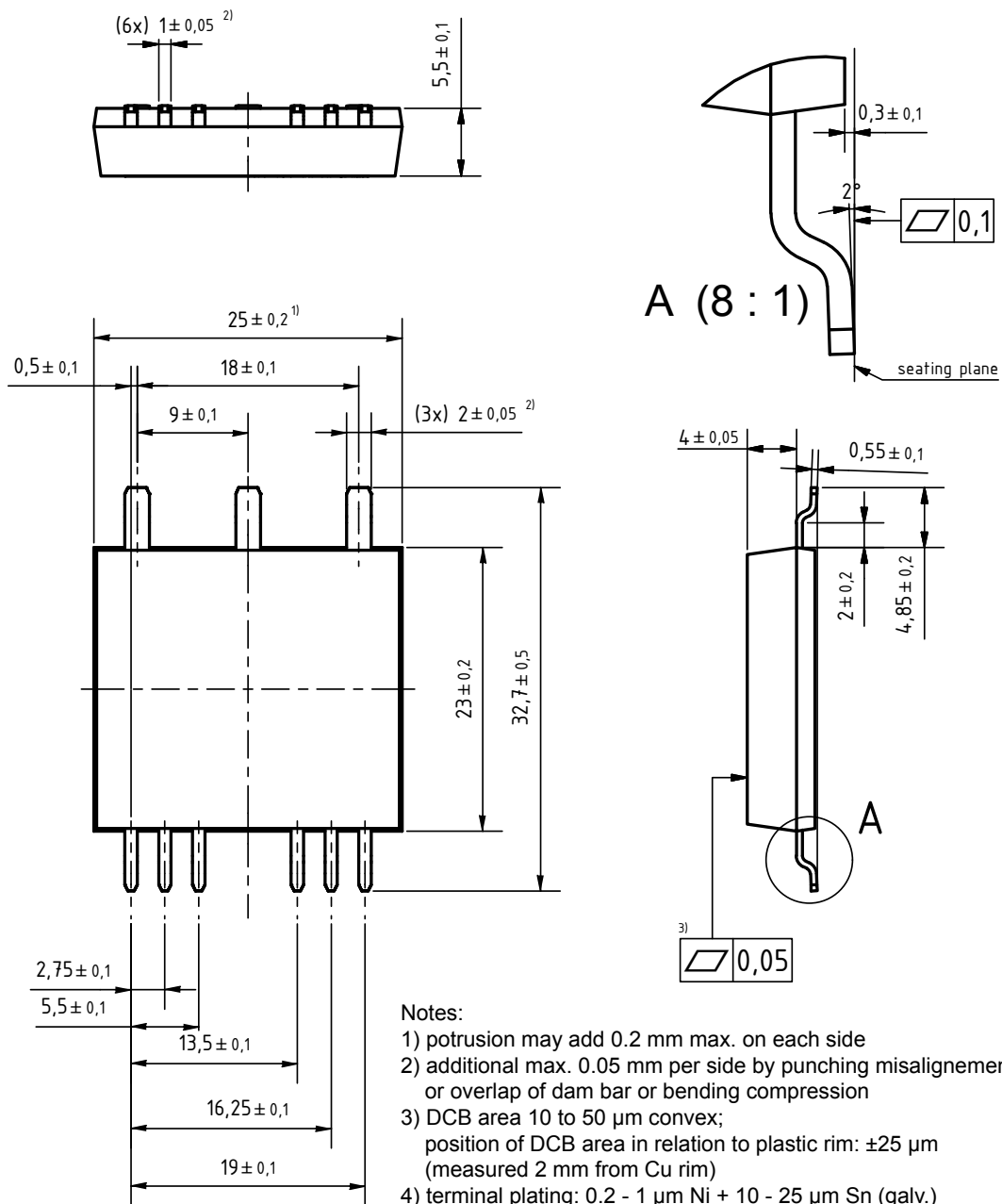
| Diode D | | | | | |
|---|--|------------------------------|-----|-----|---------------|
| Symbol | Conditions | Maximum Ratings | | | |
| I_{F25} | $T_C = 25^\circ\text{C}; \text{DC}$ | 96 | A | | |
| I_{F80} | $T_C = 80^\circ\text{C}; \text{DC}$ | 61 | A | | |
| Symbol | Conditions | Characteristic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

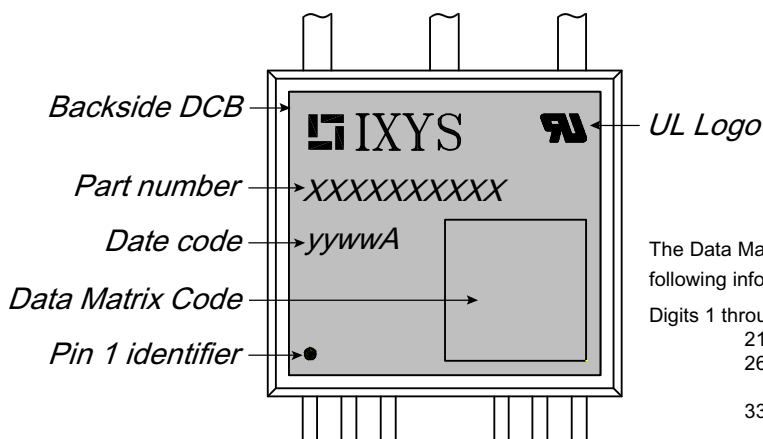
Equivalent Circuits for Simulation
Conduction


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 |



- Notes:
- 1) potrusion may add 0.2 mm max. on each side
 - 2) additional max. 0.05 mm per side by punching misalignement or overlap of dam bar or bending compression
 - 3) DCB area 10 to 50 μ m convex; position of DCB area in relation to plastic rim: $\pm 25 \mu$ m (measured 2 mm from Cu rim)
 - 4) terminal plating: 0.2 - 1 μ m Ni + 10 - 25 μ m Sn (galv.) cutting edges may be partially free of plating



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

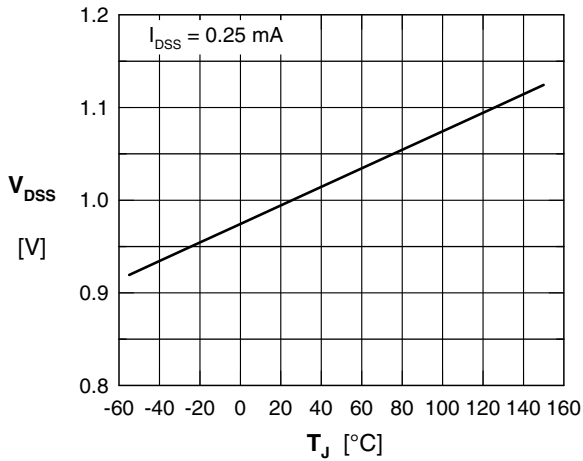


Fig. 1 Drain source breakdown voltage versus temperature T_{VJ}

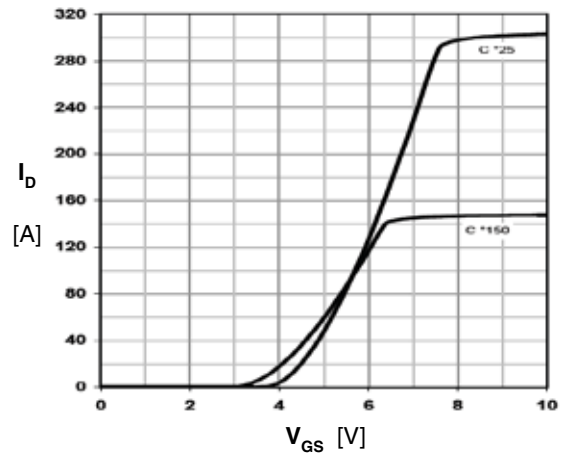


Fig. 2 Typ. transfer characteristics

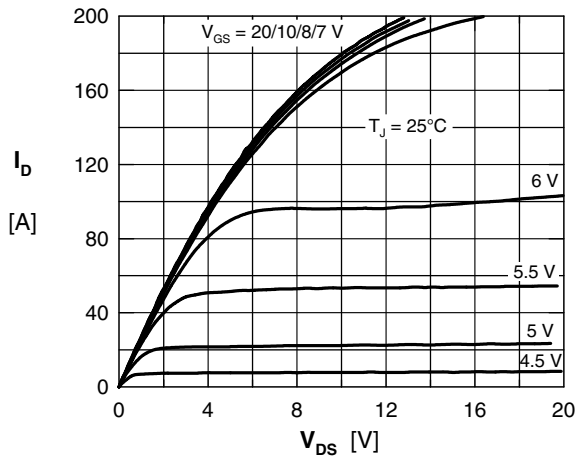


Fig. 3 Typical output characteristics

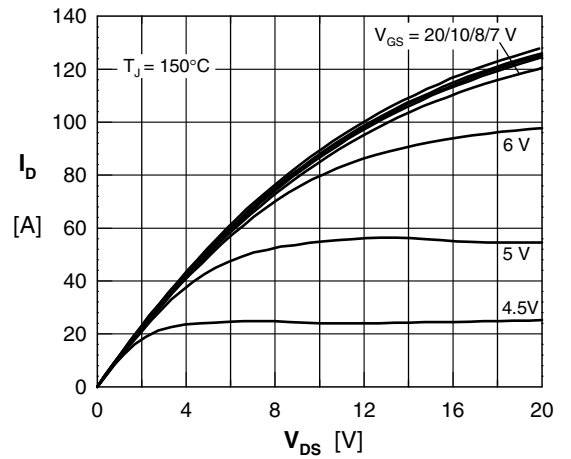


Fig. 4 Typical output characteristics

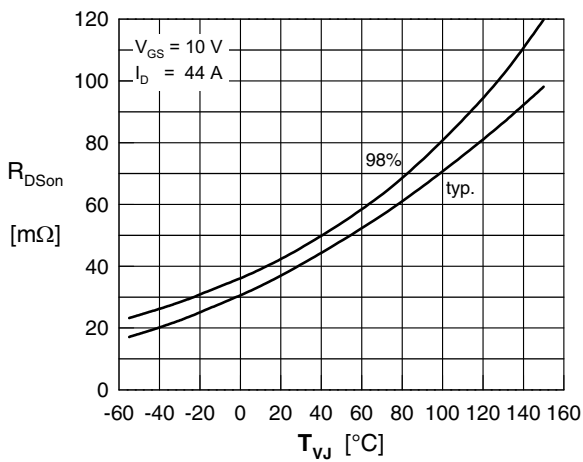


Fig. 5 Drain source on-state resistance $R_{DS(on)}$ vs. junction temperature T_{VJ}

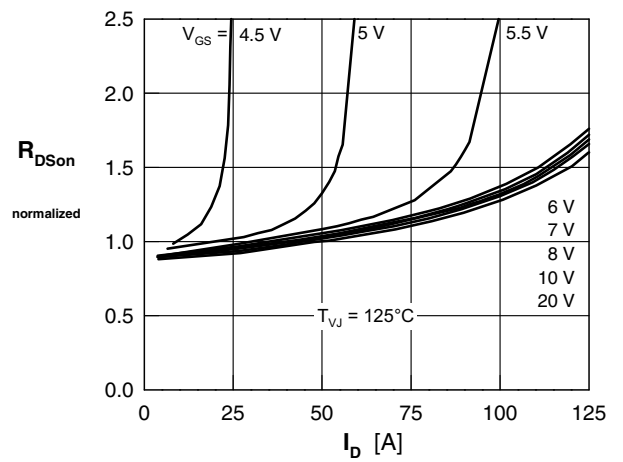


Fig. 6 Drain source on-state resistance, $R_{DS(on)}$ versus I_D

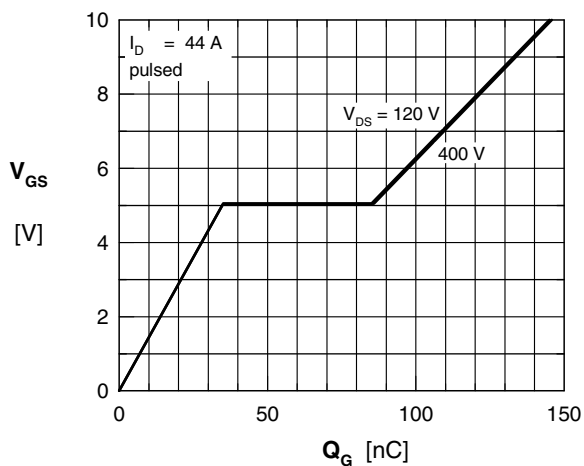


Fig. 7 Typ. turn-on gate charge

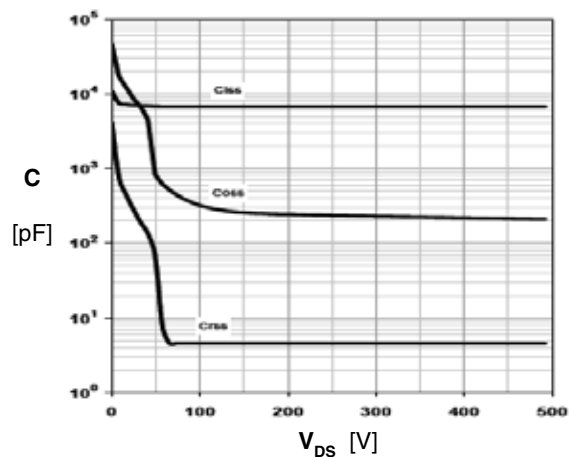


Fig. 8 Typ. capacities, MOSFET only

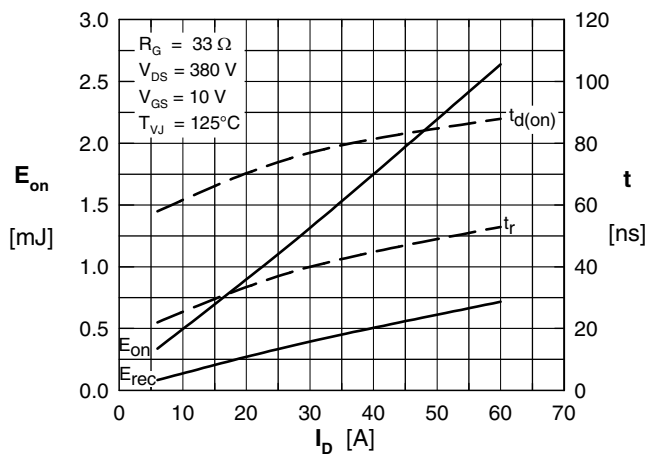


Fig. 9 Typ. turn-on energy and switching times vs. collector current, inductive switching

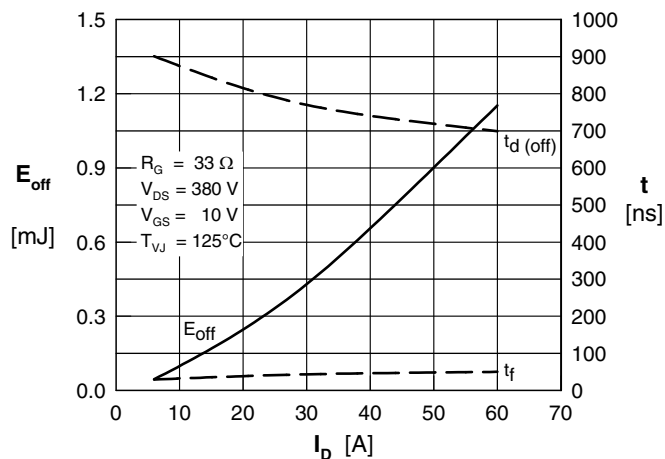


Fig. 10 Typ. turn-off energy and switching times vs. collector-current, inductive switching

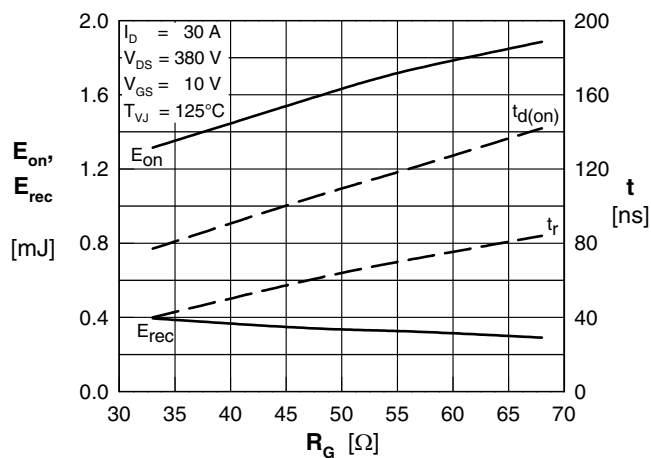


Fig. 11 Typ. turn-on energy and switching times vs. gate resistor, inductive switching

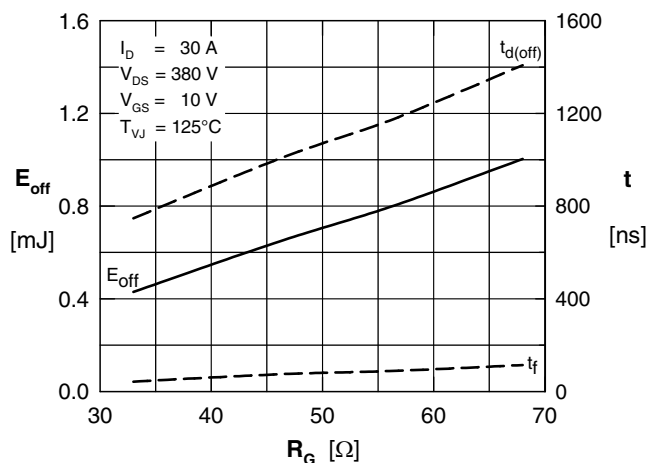


Fig. 12 Typ. turn-off energy and switching times vs. gate resistor, inductive switching

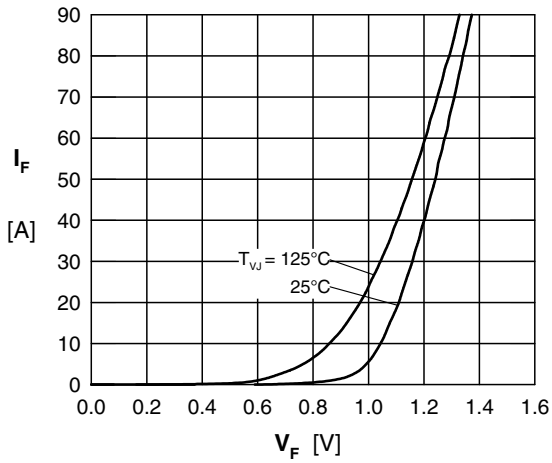


Fig. 13 Typ. forward characteristics of diode D

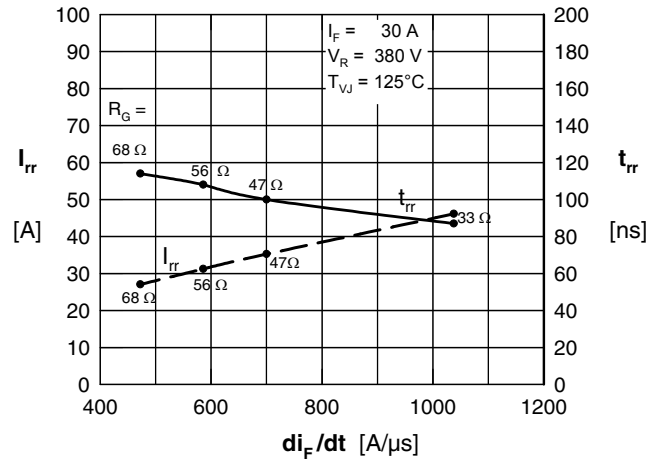


Fig. 14 Typ. reverse recovery characteristics of diode D

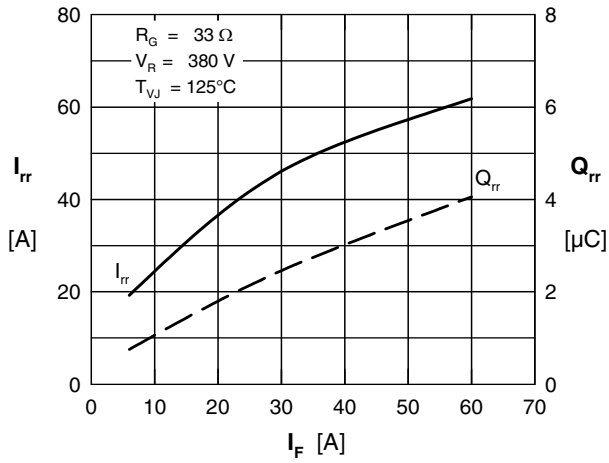


Fig. 15 Typ. reverse recovery characteristics of diode D



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