# Diode

Fast Switching Emitter Controlled Diode

# IDW30E60

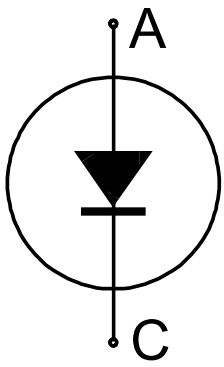
Emitter Controlled Diode series

Data sheet

Industrial & Multimarket

# Fast Switching Emitter Controlled Diode

**Features:**



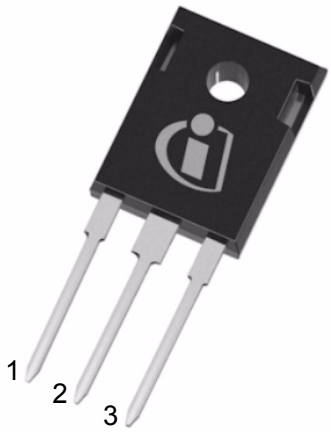

- Qualified according to JEDEC for target applications
- 600 V Emitter Controlled technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- 175 °C junction operating temperature
- Easy paralleling
- Pb-free lead plating; RoHS compliant

**Applications:**

- Switching diode for PFC applications with operating range up to 30kHz

**Package pin definition:**

- Pin 1 - not connected
- Pin 2 - cathode
- Pin 3 - anode




**Key Performance and Package Parameters**

| Type | $V_{rrm}$ | $I_f$ | $V_f$, $T_{vj}$=25°C | $T_{vjmax}$ | Marking | Package |
|---|---|---|---|---|---|---|
| IDW30E60 | 600V | 30A | 1.65V | 175°C | D30E60 | PG-TO247-3 |

**Table of Contents**

**Maximum ratings**

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | 600 | V |
| Diode forward current, limited by $T_{vjmax}$<br>$T_C$ = 25°C<br>$T_C$ = 115°C | $I_F$ | <br>60.0<br>30.0 | A |
| Diode pulsed current, $t_p$ limited by $T_{vjmax}$ | $I_{Fpuls}$ | 90.0 | A |
| Diode surge non repetitive forward current<br>$T_C$ = 25°C, $t_p$ = 10.0ms, sine halfwave | $I_{FSM}$ | <br>150.0 | A |
| Power dissipation $T_C$ = 25°C | $P_{tot}$ | 143.0 | W |
| Operating junction temperature | $T_{vj}$ | -40...+175 | °C |
| Storage temperature | $T_{stg}$ | -55...+150 | °C |
| Soldering temperature,<br>wave soldering 1.6 mm (0.063 in.) from case for 10s | | <br>260 | °C |
| Mounting torque, M3 screw<br>Maximum of mounting processes: 3 | $M$ | 0.6 | Nm |

**Thermal Resistance**

| Parameter | Symbol | Conditions | Max. Value | Unit |
|---|---|---|---|---|
| **Characteristic** | | | | |
| Diode thermal resistance,<br>junction - case | $R_{th(j-c)}$ | | 1.05 | K/W |
| Thermal resistance<br>junction - ambient | $R_{th(j-a)}$ | | 40 | K/W |

**Electrical Characteristic, at $T_{vj}$ = 25°C, unless otherwise specified**

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Static Characteristic** | | | | | | |
| Diode forward voltage | $V_F$ | $I_F$ = 30.0A<br>$T_{vj}$ = 25°C<br>$T_{vj}$ = 175°C | <br>-<br>- | <br>1.65<br>1.60 | <br>2.00 | V |
| Reverse leakage current | $I_R$ | $V_R$ = 600V<br>$T_{vj}$ = 25°C<br>$T_{vj}$ = 175°C | <br>-<br>- | <br>-<br>- | <br>40.0<br>1000.0 | µA |

**Electrical Characteristic, at $T_{vj}$ = 25°C, unless otherwise specified**

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| **Dynamic Characteristic** | | | | | | |
| Internal emitter inductance<br>measured 5mm (0.197 in.) from case | $L_E$ | | - | 13.0 | - | nH |

**Switching Characteristic, Inductive Load, at $T_{vj}$ = 25°C**

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |

**Diode Characteristic, at $T_{vj}$ = 25°C**

| | | | | | | |
|---|---|---|---|---|---|---|
| Diode reverse recovery time | $t_{rr}$ | $T_{vj}$ = 25°C, $V_R$ = 400V, $I_F$ = 30.0A, $di_F/dt$ = 1000A/µs | - | 143 | - | ns |
| Diode reverse recovery charge | $Q_{rr}$ | | - | 1.20 | - | µC |
| Diode peak reverse recovery current | $I_{rrm}$ | | - | 13.0 | - | A |
| Diode peak rate of fall of reverse recovery current during $t_b$ | $di_{rr}/dt$ | | - | -108 | - | A/µs |

**Switching Characteristic, Inductive Load, at $T_{vj}$ = 175°C**

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |

**Diode Characteristic, at $T_{vj}$ = 175°C**

| | | | | | | |
|---|---|---|---|---|---|---|
| Diode reverse recovery time | $t_{rr}$ | $T_{vj}$ = 175°C, $V_R$ = 400V, $I_F$ = 30.0A, $di_F/dt$ = 1000A/µs | - | 255 | - | ns |
| Diode reverse recovery charge | $Q_{rr}$ | | - | 2.80 | - | µC |
| Diode peak reverse recovery current | $I_{rrm}$ | | - | 23.0 | - | A |
| Diode peak rate of fall of reverse recovery current during $t_b$ | $di_{rr}/dt$ | | - | -108 | - | A/µs |

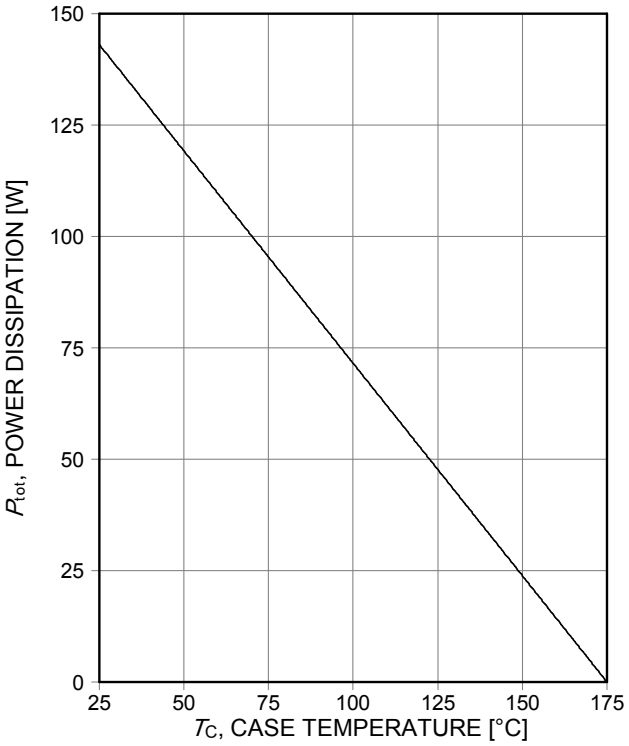



**Figure 1. Power dissipation as a function of case temperature**
($T_j$≤175°C)

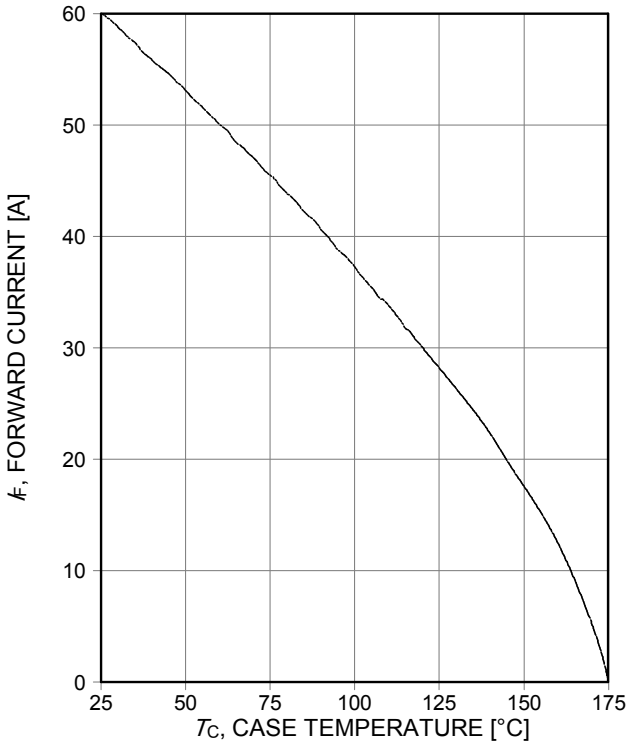



**Figure 2. Diode forward current as a function of case temperature**
($T_j$≤175°C)

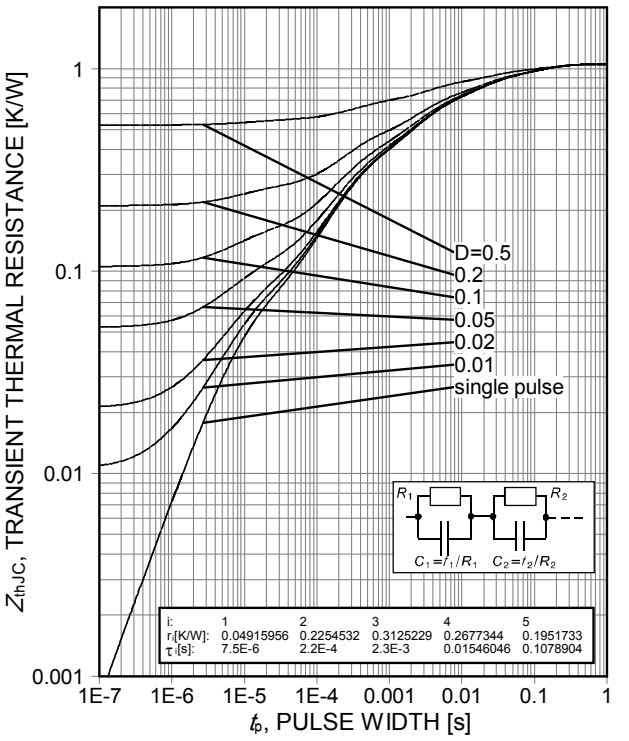



**Figure 3. Diode transient thermal impedance as a function of pulse width**
($D=t_p/T$)

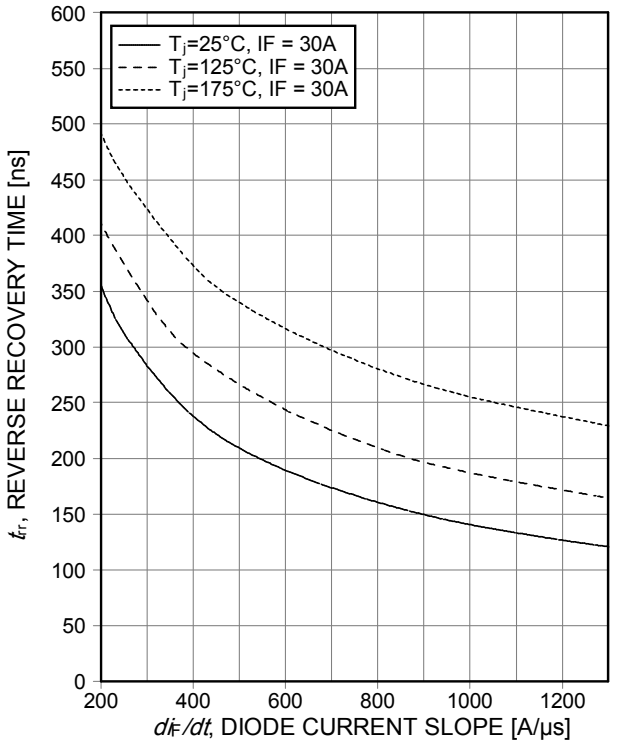



**Figure 4. Typical reverse recovery time as a function of diode current slope**
($V_R$=400V, $I_F$=30A, Dynamic test circuit in Figure E)

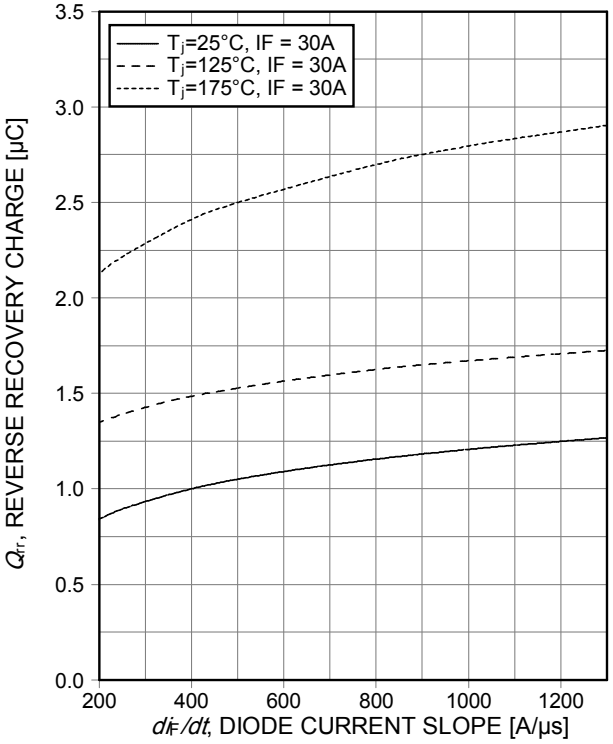



**Figure 5. Typical reverse recovery charge as a function of diode current slope**
($V_R$=400V, $I_F$=30A, Dynamic test circuit in Figure E)

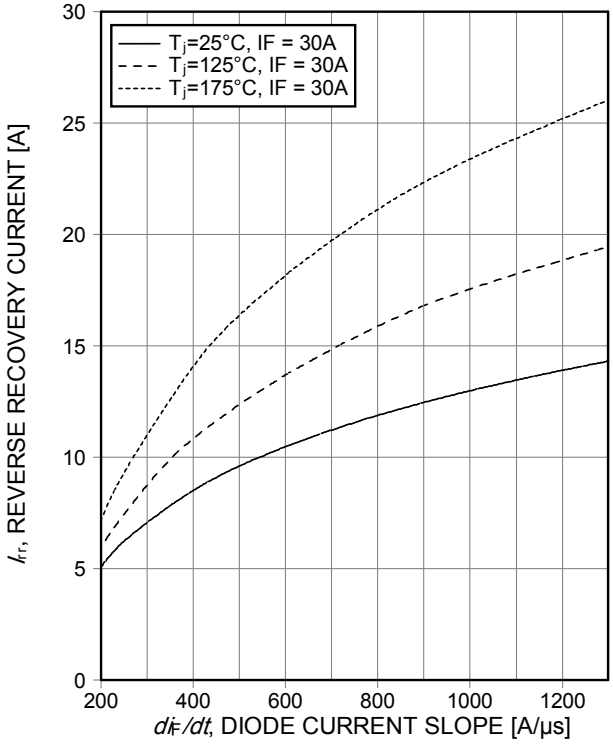



**Figure 6. Typical reverse recovery current as a function of diode current slope**
($V_R$=400V, $I_F$=30A, Dynamic test circuit in Figure E)

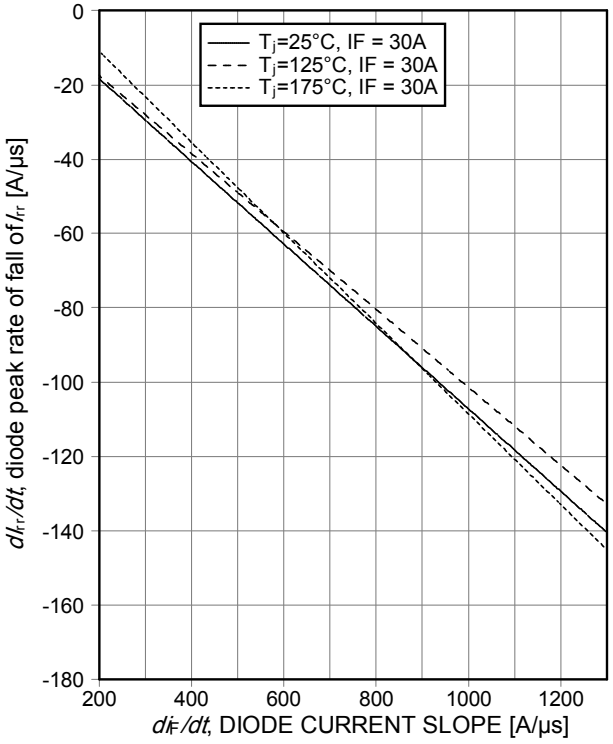



**Figure 7. Typical diode peak rate of fall of reverse recovery current as a function of diode current slope**
($V_R$=400V, $I_F$=30A, Dynamic test circuit in Figure E)

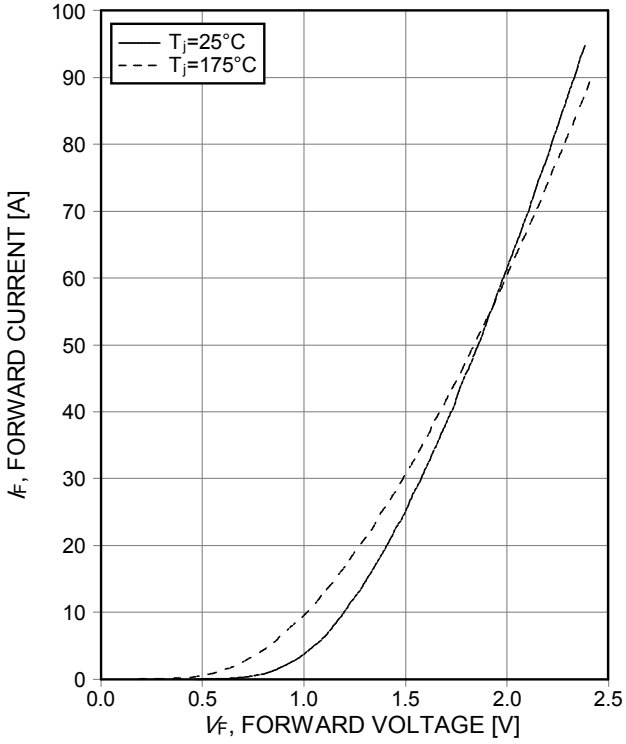



**Figure 8. Typical diode forward current as a function of forward voltage**

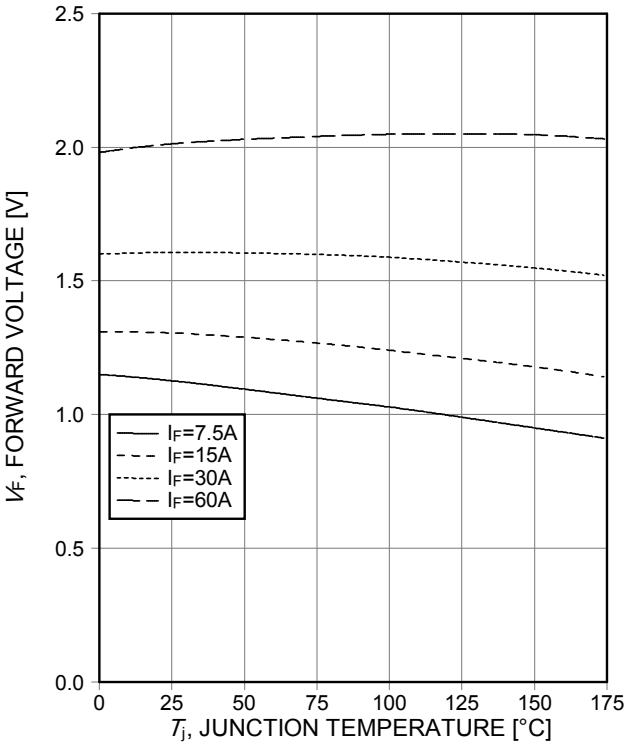
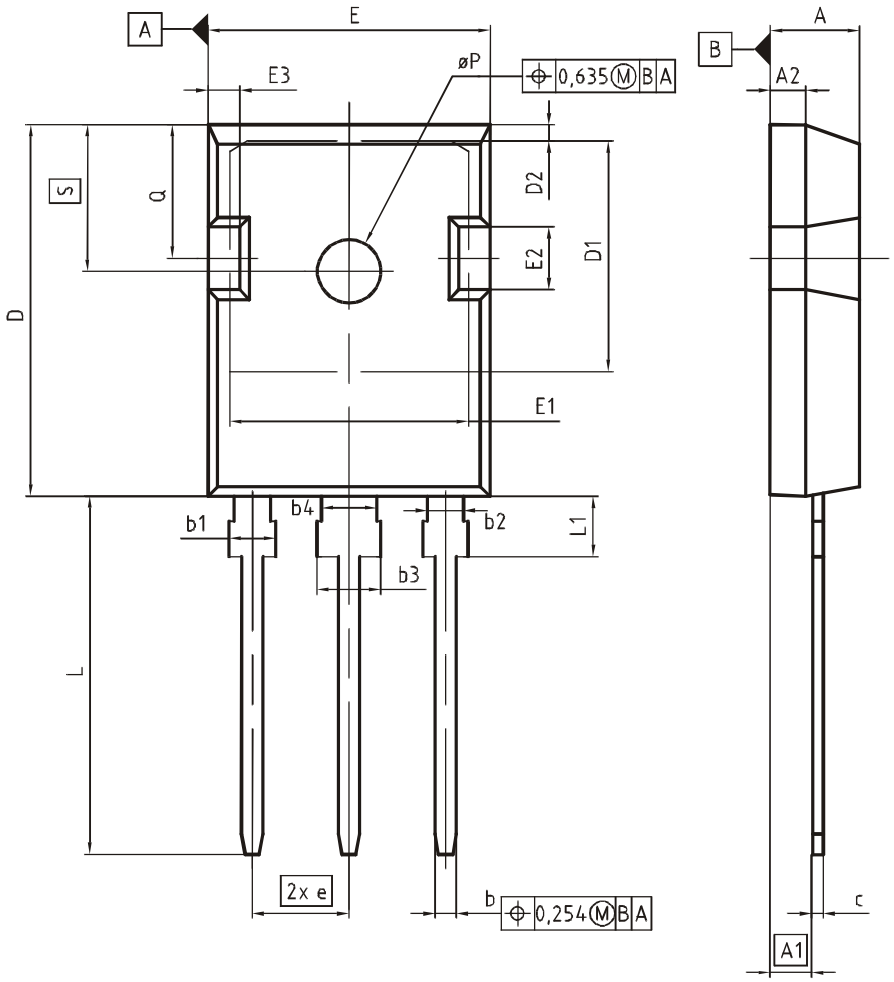



**Figure 9. Typical diode forward voltage as a function of junction temperature**

# PG-TO247-3




| DIM | MILLIMETERS | | INCHES | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 4.83 | 5.21 | 0.190 | 0.205 |
| A1 | 2.27 | 2.54 | 0.089 | 0.100 |
| A2 | 1.85 | 2.16 | 0.073 | 0.085 |
| b | 1.07 | 1.33 | 0.042 | 0.052 |
| b1 | 1.90 | 2.41 | 0.075 | 0.095 |
| b2 | 1.90 | 2.16 | 0.075 | 0.085 |
| b3 | 2.87 | 3.38 | 0.113 | 0.133 |
| b4 | 2.87 | 3.13 | 0.113 | 0.123 |
| c | 0.55 | 0.68 | 0.022 | 0.027 |
| D | 20.80 | 21.10 | 0.819 | 0.831 |
| D1 | 16.25 | 17.65 | 0.640 | 0.695 |
| D2 | 0.95 | 1.35 | 0.037 | 0.053 |
| E | 15.70 | 16.13 | 0.618 | 0.635 |
| E1 | 13.10 | 14.15 | 0.516 | 0.557 |
| E2 | 3.68 | 5.10 | 0.145 | 0.201 |
| E3 | 1.00 | 2.60 | 0.039 | 0.102 |
| e | 5.44 (BSC) | | 0.214 (BSC) | |
| N | 3 | | 3 | |
| L | 19.80 | 20.32 | 0.780 | 0.800 |
| L1 | 4.10 | 4.47 | 0.161 | 0.176 |
| øP | 3.50 | 3.70 | 0.138 | 0.146 |
| Q | 5.49 | 6.00 | 0.216 | 0.236 |
| S | 6.04 | 6.30 | 0.238 | 0.248 |

| | |
|---|---|
| DOCUMENT NO. | Z8B00003327 |
| SCALE | 0 5 5 7.5mm |
| EUROPEAN PROJECTION | |
| ISSUE DATE | 09-07-2010 |
| REVISION | 05 |

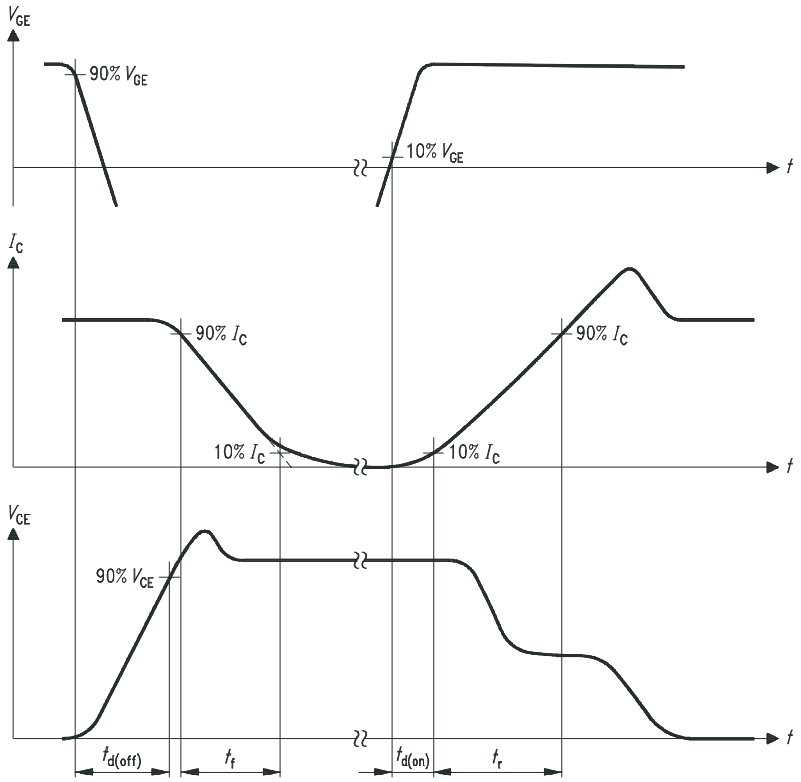



**Figure A. Definition of switching times**

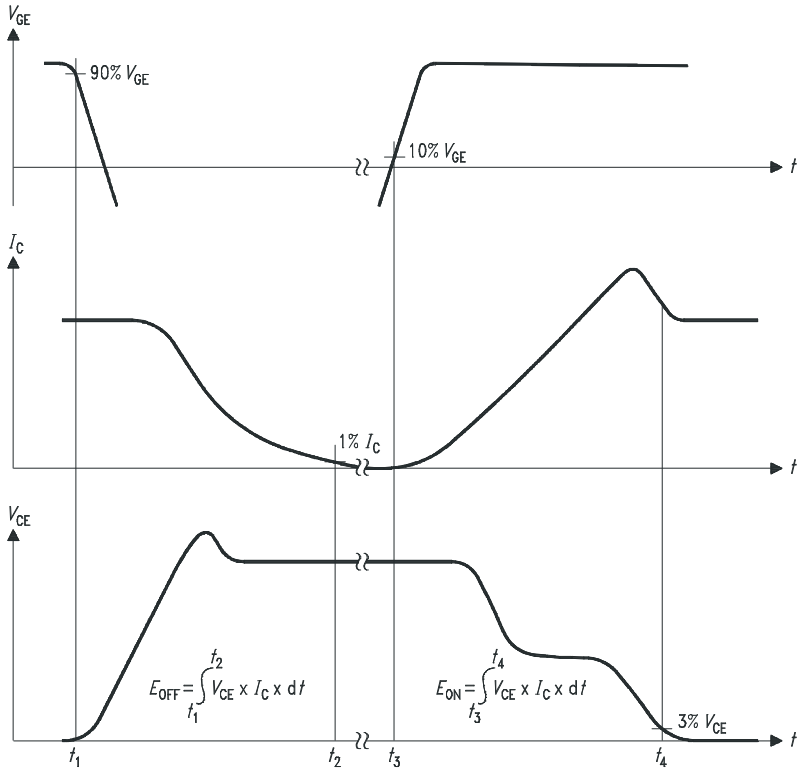



**Figure B. Definition of switching losses**

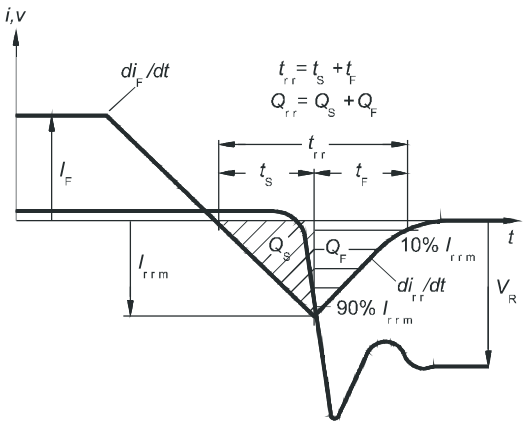



**Figure C. Definition of diodes switching characteristics**

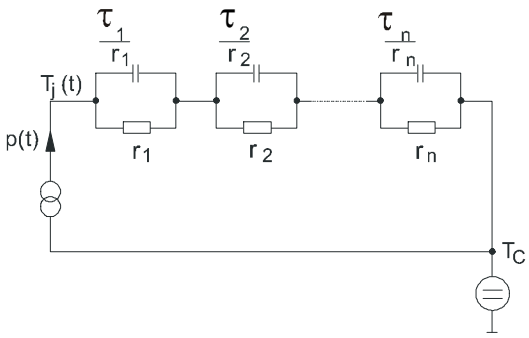



**Figure D. Thermal equivalent circuit**

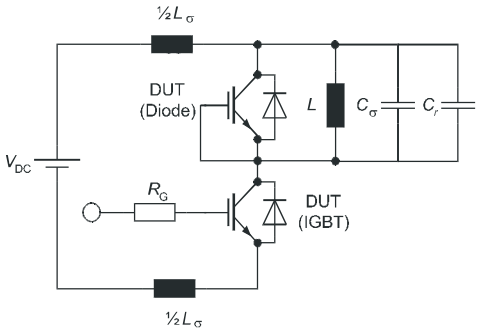



**Figure E. Dynamic test circuit**
Parasitic inductance $L_\sigma$,
Parasitic capacitor $C_\sigma$,
Relief capacitor $C_r$
(only for ZVT switching)

## Revision History

IDW30E60

**Revision: 2011-11-10, Rev. 1.1**

Previous Revision

| Revision | Date | Subjects (major changes since last revision) |
|---|---|---|
| 1.1 | 2011-11-10 | Preliminary data sheet |

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