

Diode

Rapid Switching Emitter Controlled Diode

IDW30C65D1

Emitter Controlled Diode Rapid 1 Common Cathode Series

Data sheet

Industrial Power Control

Rapid Switching Emitter Controlled Diode

Features:

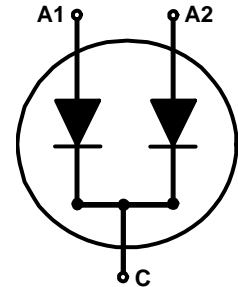
- Qualified according to JEDEC for target applications
- 650V Emitter Controlled technology
- Temperature stable behaviour of key parameters
- Low forward voltage (V_F)
- Ultra fast recovery
- Low reverse recovery charge (Q_{rr})
- Low reverse recovery current (I_{rrm})
- 175°C junction operating temperature
- Pb-free lead plating
- RoHS compliant

Applications:

- AC/DC converters
- Boost diode in PFC stages
- Free wheeling diodes in inverters and motor drives
- General purpose inverters
- Switch mode power supplies

Package pin definition:

- Pin 1 - anode (A1)
- Pin 2 and backside - cathode (C)
- Pin 3 - anode (A2)



Key Performance and Package Parameters

| Type | V_{rrm} | I_f | $V_f, T_{vj}=25^\circ\text{C}$ | T_{vjmax} | Marking | Package |
|------------|-----------|--------|--------------------------------|-------------|---------|------------|
| IDW30C65D1 | 650V | 2x 15A | 1.35V | 175°C | C30ED1 | PG-TO247-3 |

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Maximum Ratings (per leg)

For optimum lifetime and reliability, Infineon recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet.

| Parameter | Symbol | Value | Unit |
|--|-------------|--------------|--------------------|
| Repetitive peak reverse voltage, $T_{vj} \geq 25^{\circ}\text{C}$ | V_{RRM} | 650 | V |
| Diode forward current, limited by T_{vjmax} $T_C = 25^{\circ}\text{C}$ $T_C = 100^{\circ}\text{C}$ | I_F | 30.0 15.0 | A |
| Diode pulsed current, t_p limited by T_{vjmax} | I_{Fpuls} | 45.0 | A |
| Diode surge non repetitive forward current $T_C = 25^{\circ}\text{C}$, $t_p = 10.0\text{ms}$, sine halfwave | I_{FSM} | 120.0 | A |
| Power dissipation $T_C = 25^{\circ}\text{C}$ Power dissipation $T_C = 100^{\circ}\text{C}$ | P_{tot} | 92.0 46.0 | W |
| Operating junction temperature | T_{vj} | -40...+175 | $^{\circ}\text{C}$ |
| Storage temperature | T_{stg} | -55...+150 | $^{\circ}\text{C}$ |
| Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s | | 260 | $^{\circ}\text{C}$ |
| Mounting torque, M3 screw Maximum of mounting processes: 3 | M | 0.6 | Nm |

Thermal Resistances (per leg)

| Parameter | Symbol | Conditions | Max. Value | Unit |
|--|---------------|------------|------------|------|
| Characteristic | | | | |
| Diode thermal resistance, ¹⁾ junction - case | $R_{th(j-c)}$ | | 1.64 | K/W |
| Thermal resistance junction - ambient | $R_{th(j-a)}$ | | 40 | K/W |

Electrical Characteristics (per leg), at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

| Parameter | Symbol | Conditions | Value | | | Unit |
|---------------------------------------|--------|---|-------------|----------------------|----------------|---------------|
| | | | min. | typ. | max. | |
| Static Characteristic | | | | | | |
| Diode forward voltage | V_F | $I_F = 15.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$ | - - - | 1.35 1.30 1.26 | 1.70 - - | V |
| Reverse leakage current ²⁾ | I_R | $V_R = 650\text{V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$ | - - | - 600.0 | 40.0 - | μA |

Electrical Characteristic, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

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

¹⁾ Please be aware that in nonstandard load conditions, due to high $R_{th(j-c)}$, T_{vj} close to T_{vjmax} can be reached.

²⁾ Reverse leakage current per leg specified for operating conditions with zero voltage applied to the other leg.

Switching Characteristics (per leg), Inductive Load

| Parameter | Symbol | Conditions | Value | | | Unit |
|--|--------------|--|-------|------|------|------------------------|
| | | | min. | typ. | max. | |
| Diode Characteristic, at $T_{vj} = 25^{\circ}\text{C}$ | | | | | | |
| Diode reverse recovery time | t_{rr} | $T_{vj} = 25^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 15.0\text{A}$, $di_F/dt = 1000\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IKW30N65H5. | - | 71 | - | ns |
| Diode reverse recovery charge | Q_{rr} | | - | 0.37 | - | μC |
| Diode peak reverse recovery current | I_{rrm} | | - | 8.6 | - | A |
| Diode peak rate of fall of reverse recovery current during t_b | di_{rr}/dt | | - | -810 | - | $\text{A}/\mu\text{s}$ |
| Diode reverse recovery time | t_{rr} | $T_{vj} = 25^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 15.0\text{A}$, $di_F/dt = 200\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IKW30N65H5. | - | 114 | - | ns |
| Diode reverse recovery charge | Q_{rr} | | - | 0.28 | - | μC |
| Diode peak reverse recovery current | I_{rrm} | | - | 3.4 | - | A |
| Diode peak rate of fall of reverse recovery current during t_b | di_{rr}/dt | | - | -150 | - | $\text{A}/\mu\text{s}$ |

Switching Characteristics (per leg), Inductive Load

| Parameter | Symbol | Conditions | Value | | | Unit |
|---|--------------|---|-------|------|------|------------------------|
| | | | min. | typ. | max. | |
| Diode Characteristic, at $T_{vj} = 175^{\circ}\text{C}/125^{\circ}\text{C}$ | | | | | | |
| Diode reverse recovery time | t_{rr} | $T_{vj} = 175^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 15.0\text{A}$, $di_F/dt = 1000\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IKW30N65H5. | - | 95 | - | ns |
| Diode reverse recovery charge | Q_{rr} | | - | 0.91 | - | μC |
| Diode peak reverse recovery current | I_{rrm} | | - | 14.1 | - | A |
| Diode peak rate of fall of reverse recovery current during t_b | di_{rr}/dt | | - | -720 | - | $\text{A}/\mu\text{s}$ |
| Diode reverse recovery time | t_{rr} | $T_{vj} = 125^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 15.0\text{A}$, $di_F/dt = 200\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IKW30N65H5. | - | 146 | - | ns |
| Diode reverse recovery charge | Q_{rr} | | - | 0.52 | - | μC |
| Diode peak reverse recovery current | I_{rrm} | | - | 4.7 | - | A |
| Diode peak rate of fall of reverse recovery current during t_b | di_{rr}/dt | | - | -230 | - | $\text{A}/\mu\text{s}$ |

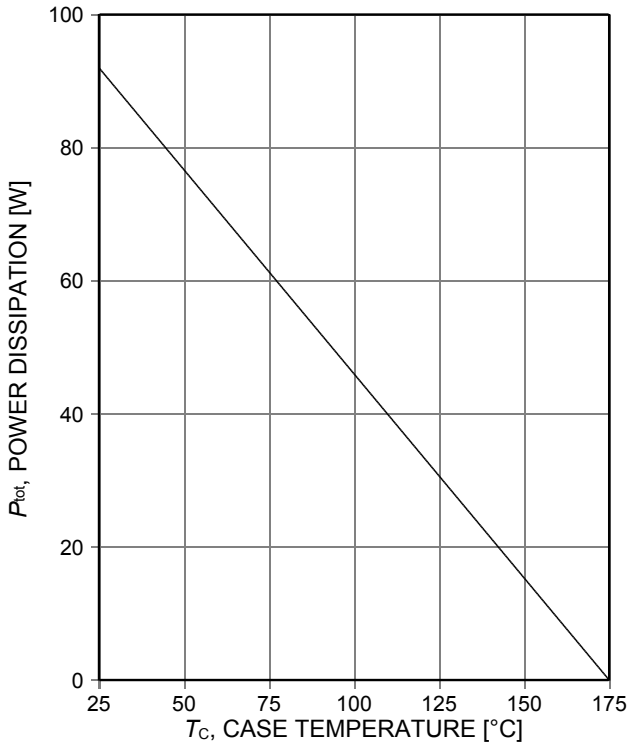


Figure 1. Power dissipation per leg as a function of case temperature ($T_{vj} \leq 175^\circ\text{C}$)

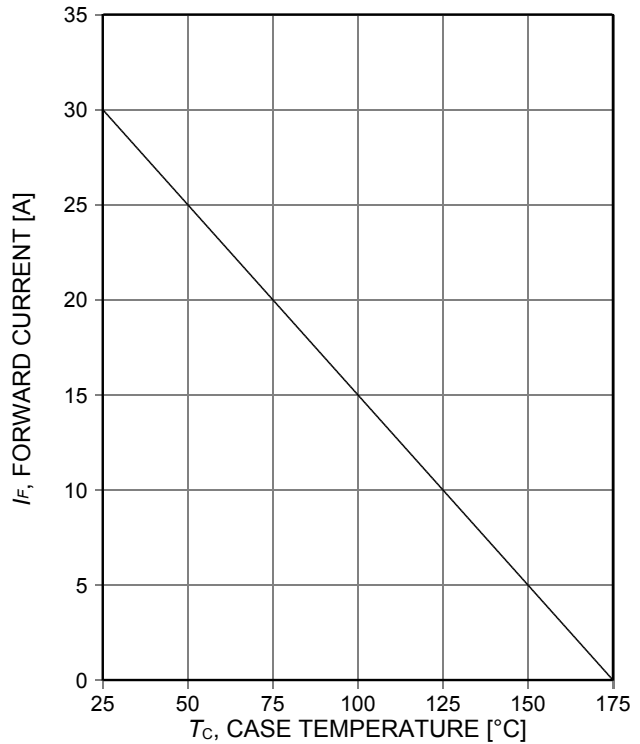


Figure 2. Diode forward current per leg as a function of case temperature ($T_{vj} \leq 175^\circ\text{C}$)

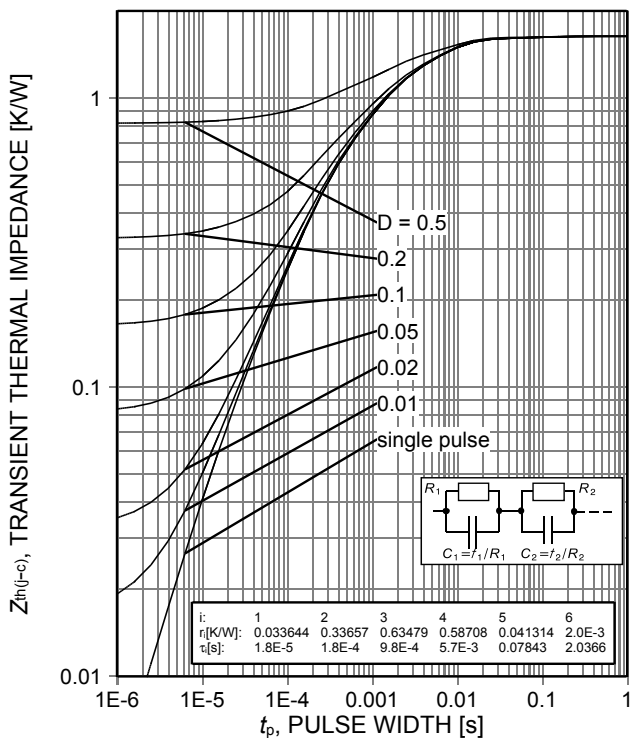


Figure 3. Diode transient thermal impedance per leg as a function of pulse width ($D = t_p/T$)

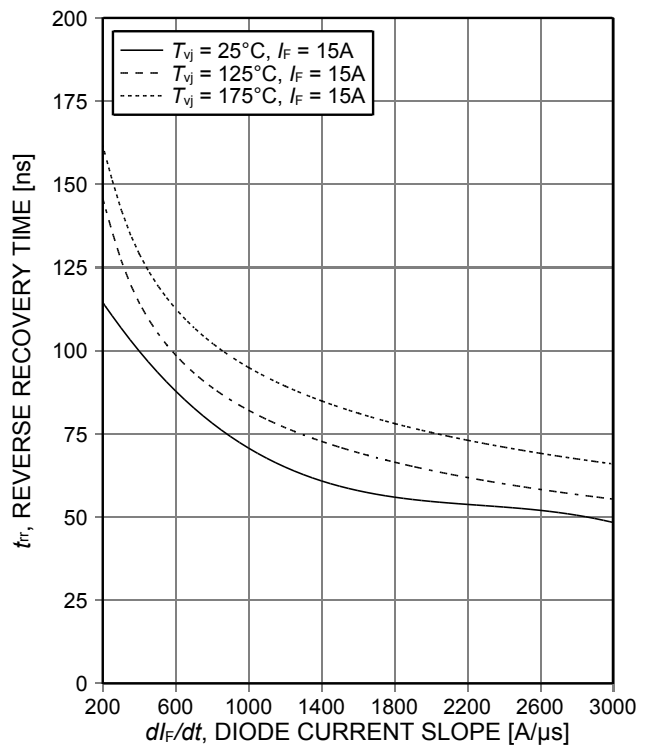


Figure 4. Typical reverse recovery time per leg as a function of diode current slope ($V_R = 400\text{V}$)

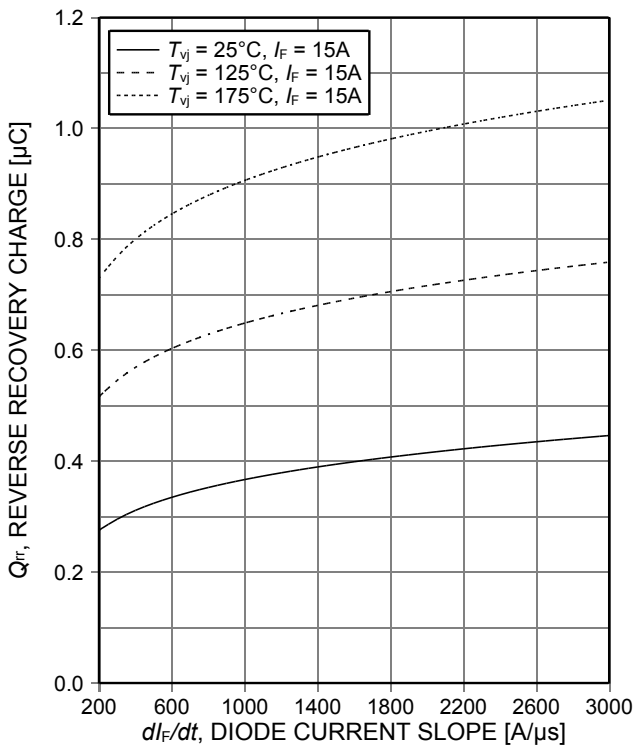


Figure 5. Typical reverse recovery charge per leg as a function of diode current slope ($V_R=400V$)

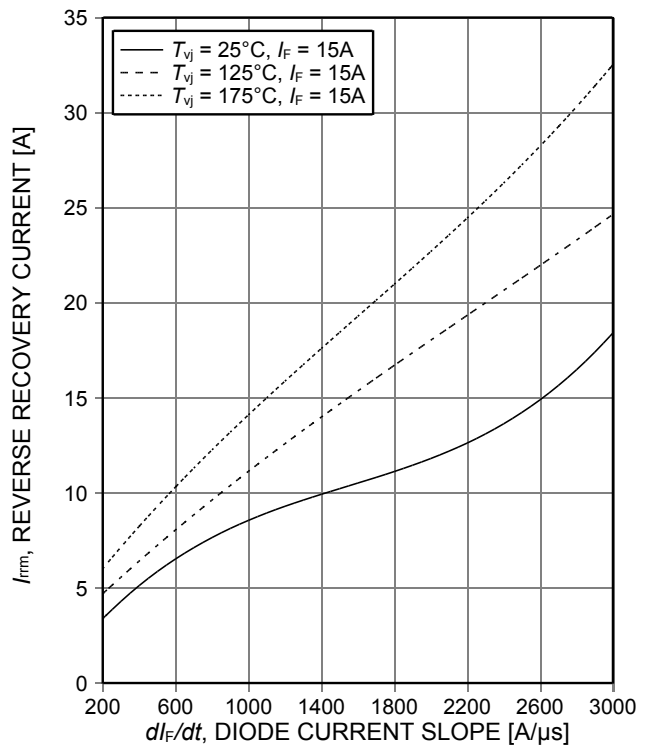


Figure 6. Typical peak reverse recovery current per leg as a function of diode current slope ($V_R=400V$)

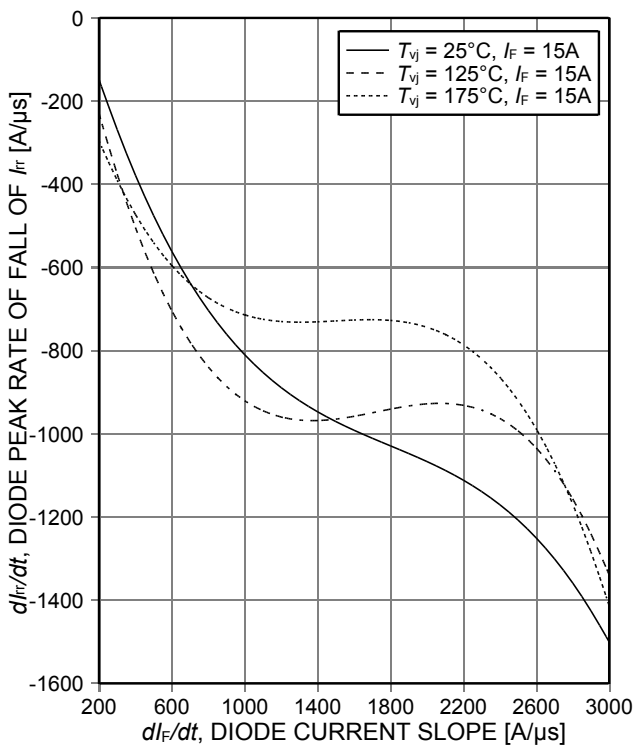


Figure 7. Typical diode peak rate of fall of rev. rec. current per leg as a function of diode current slope ($V_R=400V$)

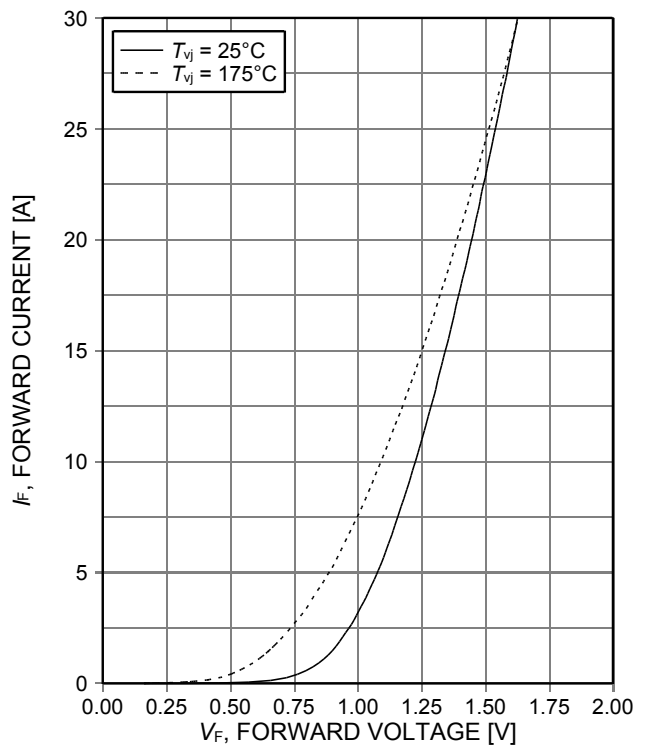


Figure 8. Typical diode forward current per leg as a function of forward voltage

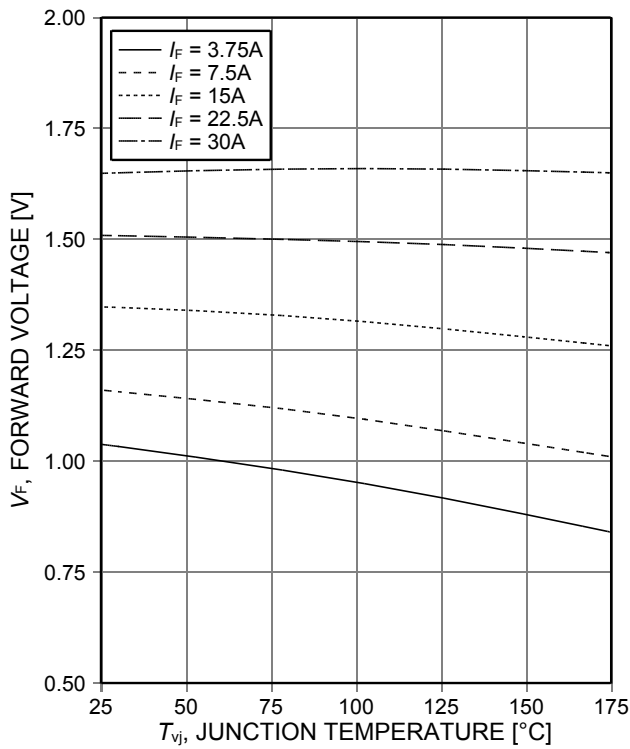
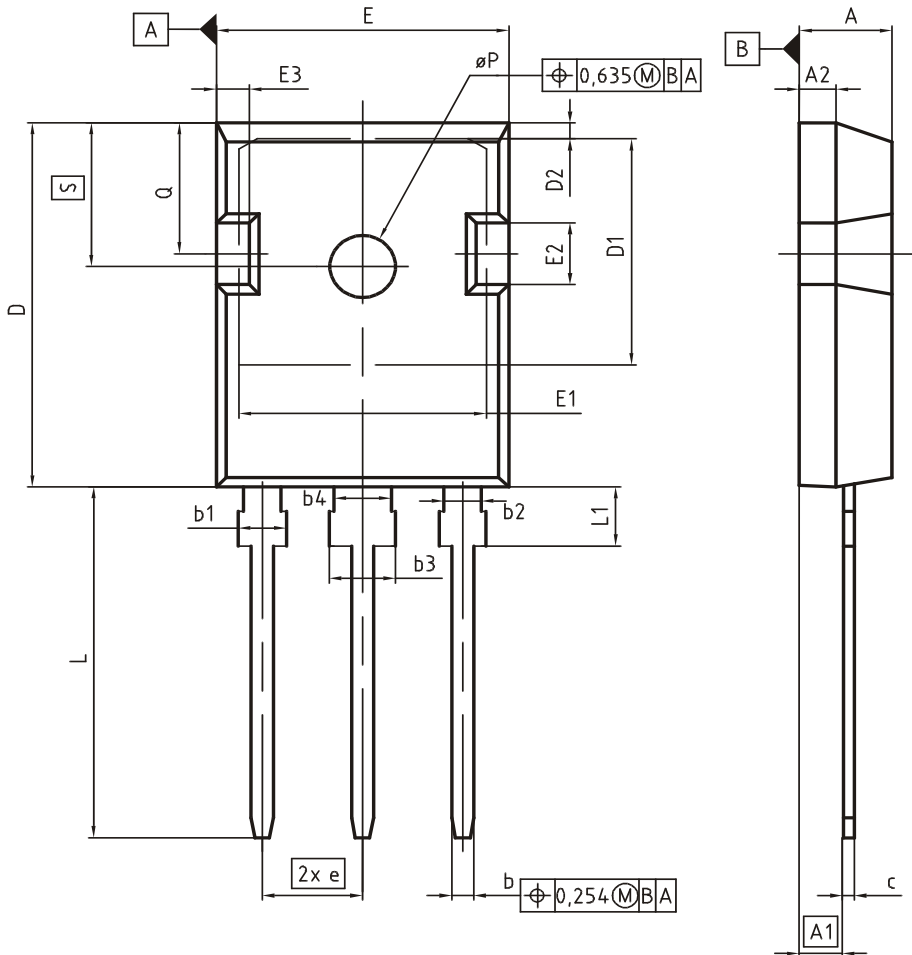


Figure 9. Typical diode forward voltage per leg as a function of junction temperature

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 |

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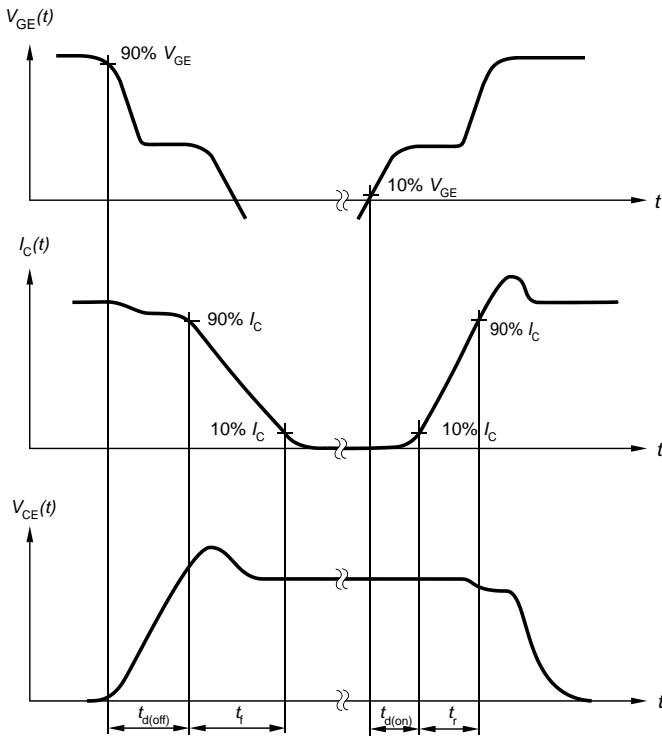


Figure A. Definition of switching times

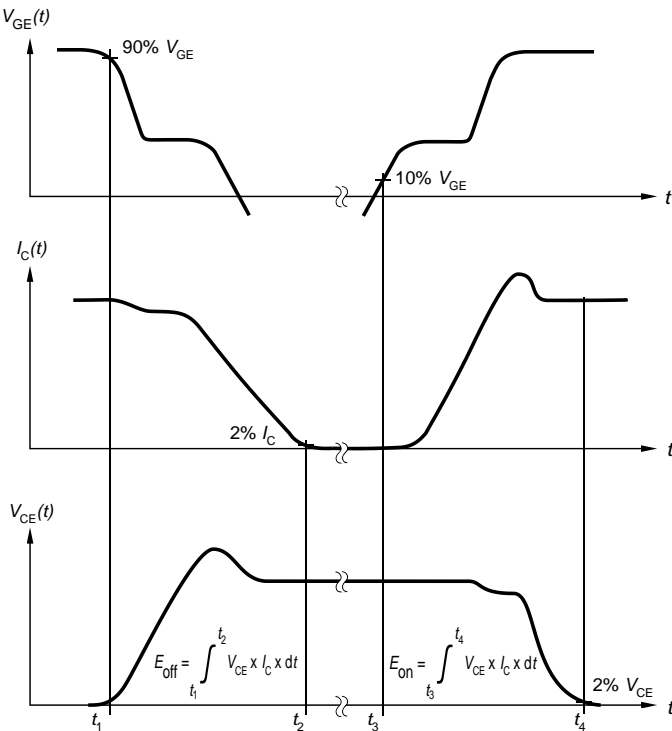


Figure B. Definition of switching losses

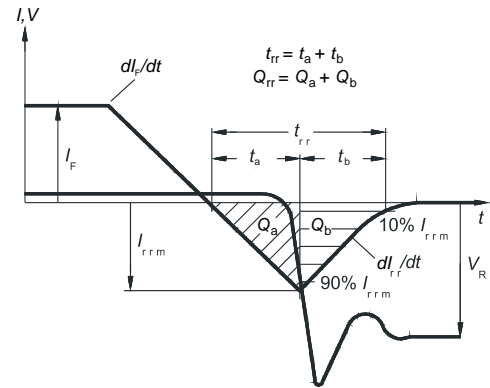


Figure C. Definition of diode switching characteristics

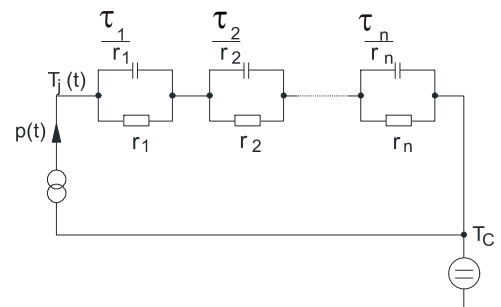


Figure D. Thermal equivalent circuit

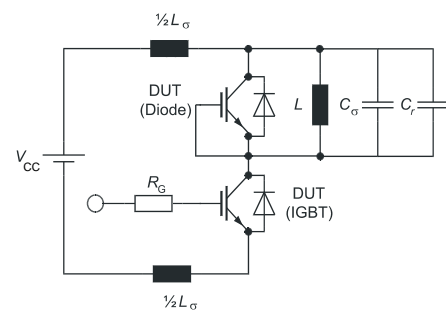


Figure E. Dynamic test circuit
Parasitic inductance L_{σ} ,
parasitic capacitor C_{σ} ,
relief capacitor C_r ,
(only for ZVT switching)

Revision History

IDW30C65D1

Revision: 2014-12-09, Rev. 2.1

Previous Revision

| Revision | Date | Subjects (major changes since last revision) |
|----------|------------|--|
| 1.1 | 2014-12-02 | Preliminary data sheet |
| 2.1 | 2014-12-09 | Final data sheet |

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