

2nd Generation thinQ!TM SiC Schottky Diode

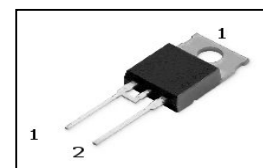
Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery / No forward recovery
- No temperature influence on the switching behavior
- High surge current capability
- Pb-free lead plating; RoHs compliant
- Qualified according to JEDEC⁽¹⁾ for target applications
- Breakdown voltage tested at 5mA⁽²⁾

Product Summary

| | | |
|----------|-----|----|
| V_{DC} | 600 | V |
| Q_c | 12 | nC |
| I_F | 5 | A |

PG-TO220-2-2



thinQ! 2G Diode specially designed for fast switching applications like:

- CCM PFC
- Motor Drives

| Type | Package | Marking | Pin 1 | Pin 2 |
|-----------|--------------|---------|-------|-------|
| IDT05S60C | PG-TO220-2-2 | D05S60C | C | A |

Maximum ratings, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

| Parameter | Symbol | Conditions | Value | Unit |
|---|-------------------|--|-------------|------------------|
| Continuous forward current | I_F | $T_C < 140\text{ }^\circ\text{C}$ | 5 | A |
| RMS forward current | $I_{F,RMS}$ | $f=50\text{ Hz}$ | 7.5 | |
| Surge non-repetitive forward current, sine halfwave | $I_{F,SM}$ | $T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ ms}$ | 42 | |
| Repetitive peak forward current | $I_{F,RM}$ | $T_j=150\text{ }^\circ\text{C}$, $T_C=100\text{ }^\circ\text{C}$, $D=0.1$ | 21 | |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ }\mu\text{s}$ | 180 | |
| i^2t value | $\int i^2 dt$ | $T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ ms}$ | 9 | A ² s |
| Repetitive peak reverse voltage | V_{RRM} | | 600 | V |
| Diode ruggedness dv/dt | dv/dt | $V_R = 0 \dots 480\text{V}$ | 50 | V/ns |
| Power dissipation | P_{tot} | $T_C=25\text{ }^\circ\text{C}$ | 55 | W |
| Operating and storage temperature | T_j , T_{stg} | | -55 ... 175 | $^\circ\text{C}$ |
| Mounting torque | | M3 and M3.5 screws | 60 | Ncm |

| Parameter | Symbol | Conditions | Values | | | Unit |
|--|------------|-------------------------------------|--------|------|------|------|
| | | | min. | typ. | max. | |
| Thermal characteristics | | | | | | |
| Thermal resistance, junction - case | R_{thJC} | | - | - | 2.7 | K/W |
| Thermal resistance, junction - ambient | R_{thJA} | leaded | - | - | 62 | |
| Soldering temperature, wavesoldering only allowed at leads | T_{sold} | 1.6mm (0.063in.) from case for 10s | - | - | 260 | °C |

Electrical characteristics, at $T_j=25\text{ }^\circ\text{C}$, unless otherwise specified

Static characteristics

| | | | | | | |
|-----------------------|----------|---|-----|-----|-----|---------------|
| DC blocking voltage | V_{DC} | $I_R=0.07\text{ mA}$ | 600 | - | - | V |
| Diode forward voltage | V_F | $I_F=5\text{ A}, T_j=25\text{ }^\circ\text{C}$ | - | 1.5 | 1.7 | |
| | | $I_F=5\text{ A}, T_j=150\text{ }^\circ\text{C}$ | - | 1.7 | 2.1 | |
| Reverse current | I_R | $V_R=600\text{ V}, T_j=25\text{ }^\circ\text{C}$ | - | 0.6 | 70 | μA |
| | | $V_R=600\text{ V}, T_j=150\text{ }^\circ\text{C}$ | - | 2.5 | 700 | |

AC characteristics

| | | | | | | |
|------------------------------|-------|---|---|-----|-----|-------------|
| Total capacitive charge | Q_c | $V_R=400\text{ V}, I_F \leq I_{F,max}, di_F/dt=200\text{ A}/\mu\text{s}, T_j=150\text{ }^\circ\text{C}$ | - | 12 | - | nC |
| Switching time ³⁾ | t_c | $T_j=150\text{ }^\circ\text{C}$ | - | - | <10 | ns |
| Total capacitance | C | $V_R=1\text{ V}, f=1\text{ MHz}$ | - | 240 | - | pF |
| | | $V_R=300\text{ V}, f=1\text{ MHz}$ | - | 30 | - | |
| | | $V_R=600\text{ V}, f=1\text{ MHz}$ | - | 30 | - | |

¹⁾ J-STD20 and JESD22

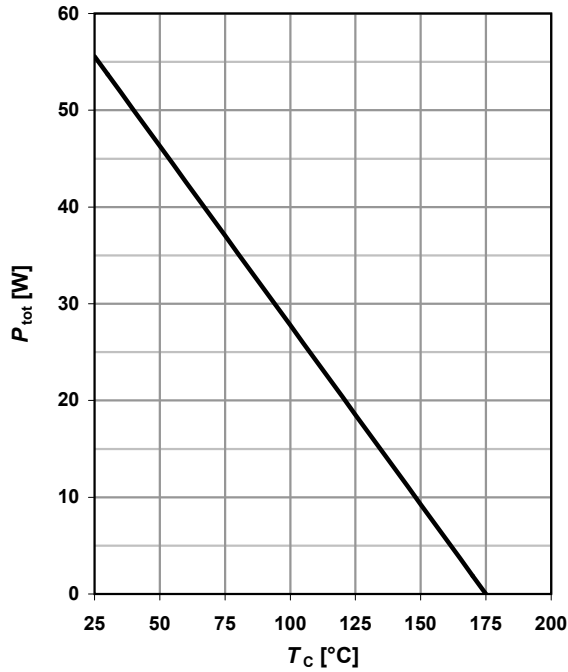
²⁾ All devices tested under avalanche conditions, for a time periode of 5ms, at 5mA.

³⁾ t_c is the time constant for the capacitive displacement current waveform (independent from T_j, I_{LOAD} and di/dt), different from t_{rr} , which is dependent on $T_j, I_{LOAD}, di/dt$. No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

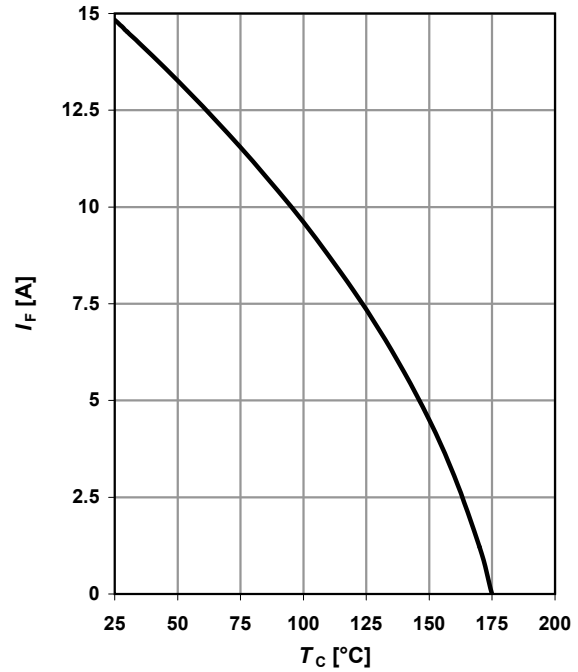
⁴⁾ Only capacitive charge occuring, guaranteed by design.

1 Power dissipation

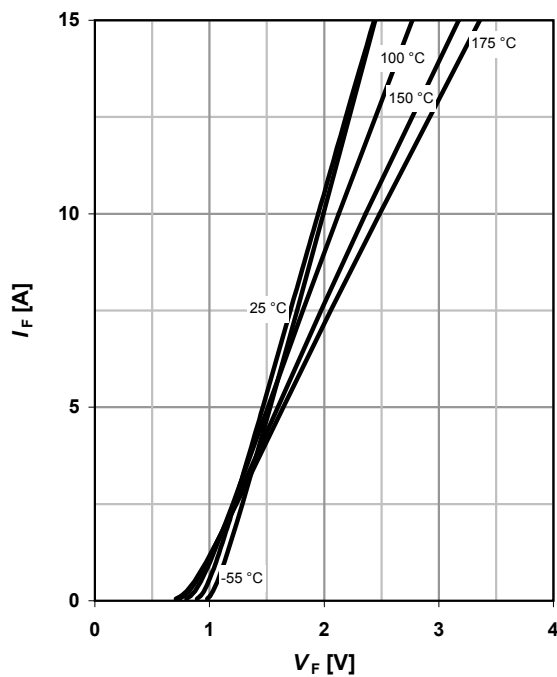
$$P_{\text{tot}} = f(T_C)$$

 parameter: $R_{\text{thJC(max)}}$

2 Diode forward current

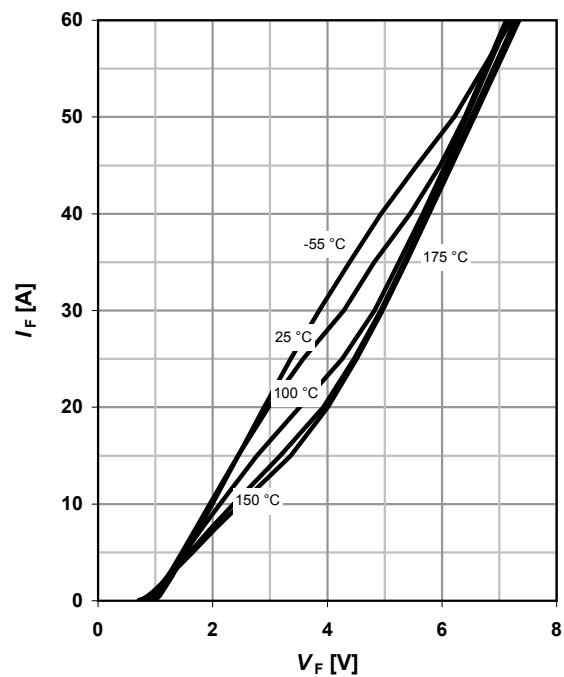
$$I_F = f(T_C); T_j \leq 175 \text{ } ^\circ\text{C}$$

 parameter: $R_{\text{thJC(max)}}$; $V_{F(\text{max})}$

3 Typ. forward characteristic

$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}$$

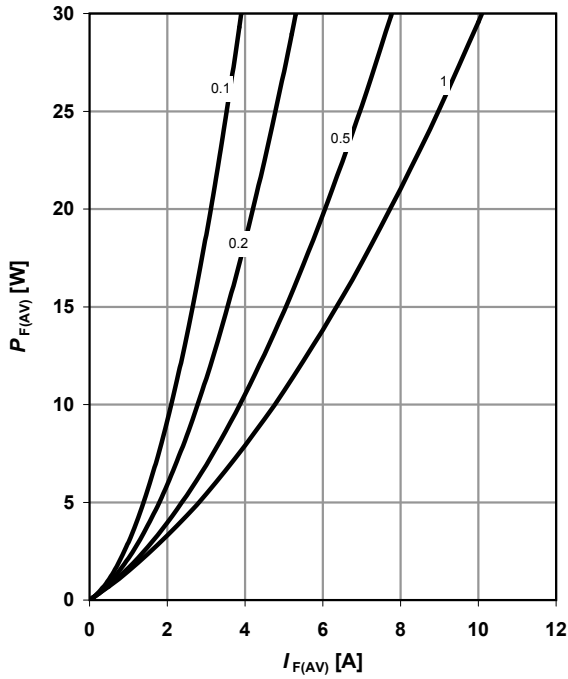
 parameter: T_j

4 Typ. forward characteristic in surge current mode

$$I_F = f(V_F); t_p = 400 \text{ } \mu\text{s}; \text{ parameter: } T_j$$



5 Typ. forward power dissipation vs. average forward current

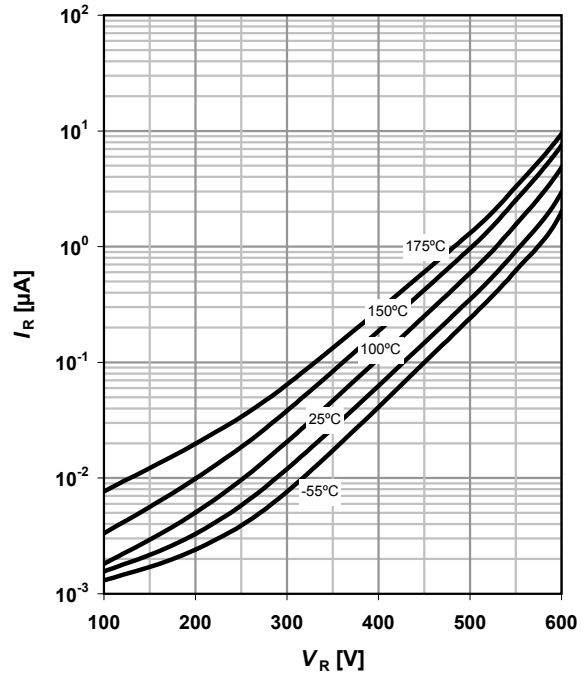
$P_{F,AV}=f(I_F)$, $T_C=100\text{ }^\circ\text{C}$, parameter: $D=t_p/T$



6 Typ. reverse current vs. reverse voltage

$I_R=f(V_R)$

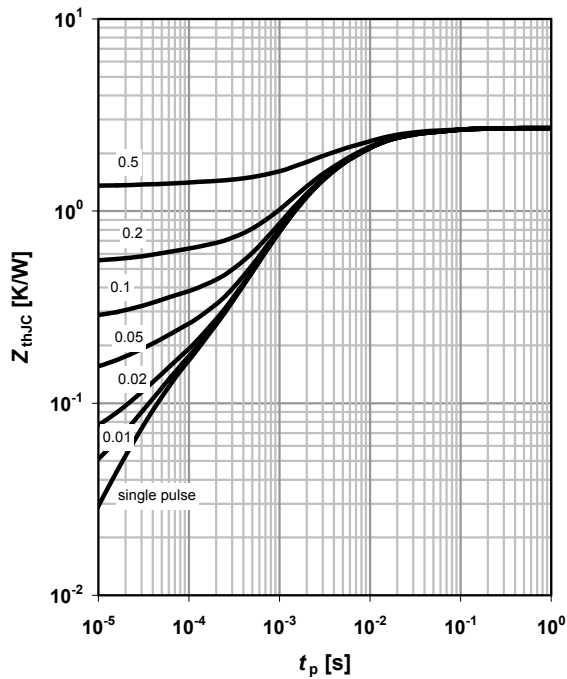
parameter: T_j



7 Transient thermal impedance

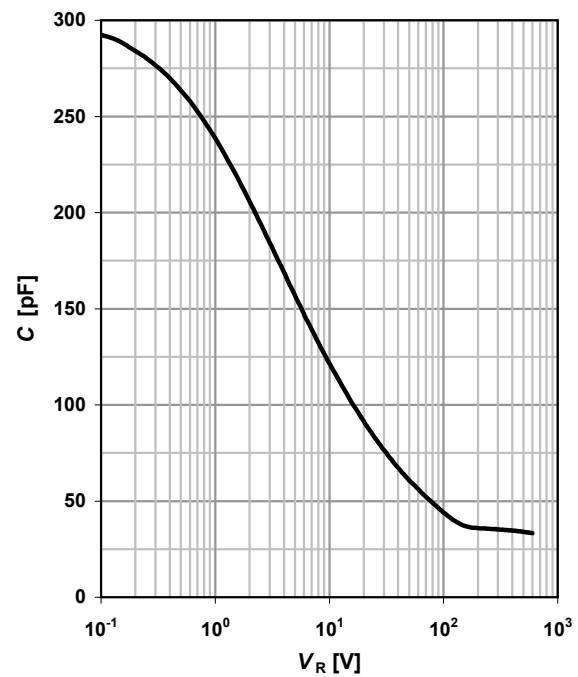
$Z_{thJC}=f(t_p)$

parameter: $D=t_p/T$



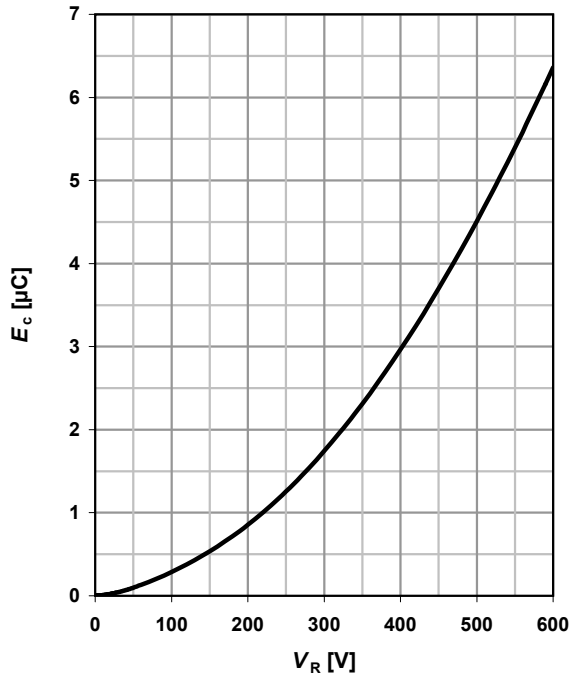
8 Typ. capacitance vs. reverse voltage

$C=f(V_R)$; $T_C=25\text{ }^\circ\text{C}$, $f=1\text{ MHz}$



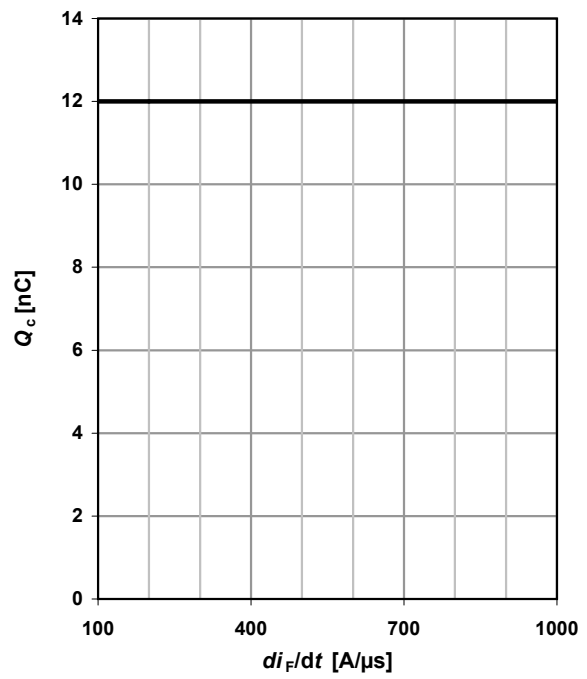
9 Typ. C stored energy

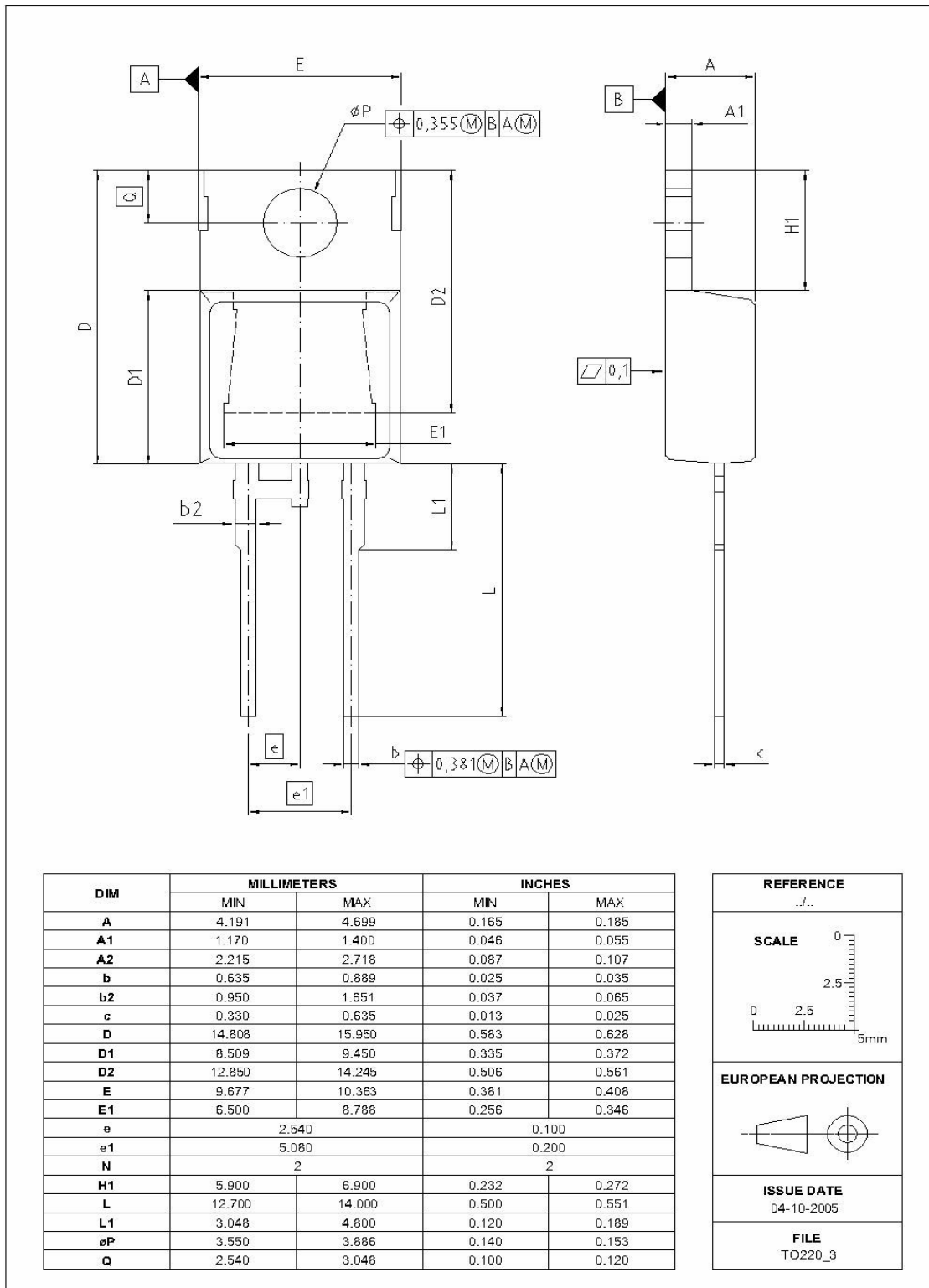
$$E_C = f(V_R)$$



10 Typ. capacitance charge vs. current slope

$$Q_C = f(di_F/dt)^4; T_J = 150\text{ }^\circ\text{C}; I_F \leq I_{F,max}$$



PG-TO220-2-2: Outline


Dimensions in mm/inches

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