



**THE DATASHEET OF
ZXMN10A25K**



100V N-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ | Package | Max I_D $T_A = +25^\circ C$ |
|---------------|--------------------------------|-----------------|----------------------------------|
| 100V | 125m Ω @ $V_{GS} = 10V$ | TO252 (DPAK) | 6.4A |
| | 150m Ω @ $V_{GS} = 6V$ | | 5.8A |

Description

This MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

Applications

- DC-DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

Features

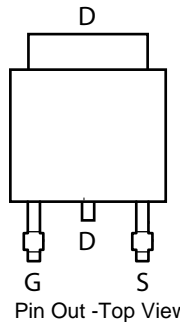
- Low On-Resistance
- Fast Switching Speed
- Low Gate Drive
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

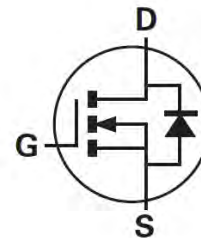
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)



Top View



Pin Out -Top View



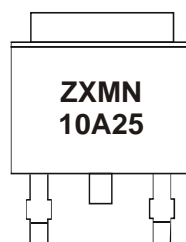
Equivalent Circuit

Ordering Information (4 & 5)

| Part Number | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|-----------|--------------------|-----------------|-------------------|
| ZXMN10A25KTC | ZXMN10A25 | 13 | 16 | 2,500 |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 2. See <http://www.diodes.com> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For Packaging Details, go to our website at <http://www.diodes.com>.
 5. Products with Q-suffix are automotive grade. Automotive products are electrical and thermal the same as the commercial, except where specified.

Marking Information



ZXMN10A25 = Product Type Marking Code

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

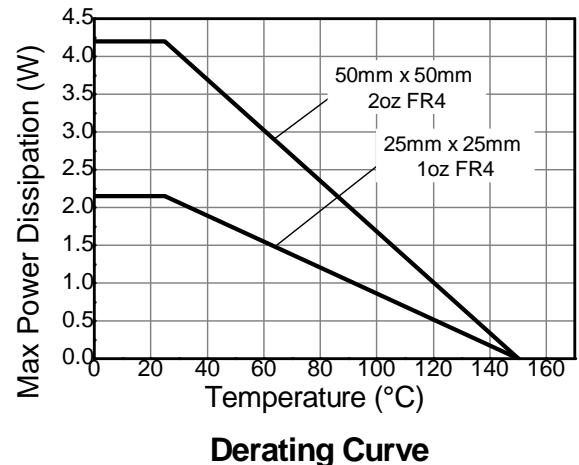
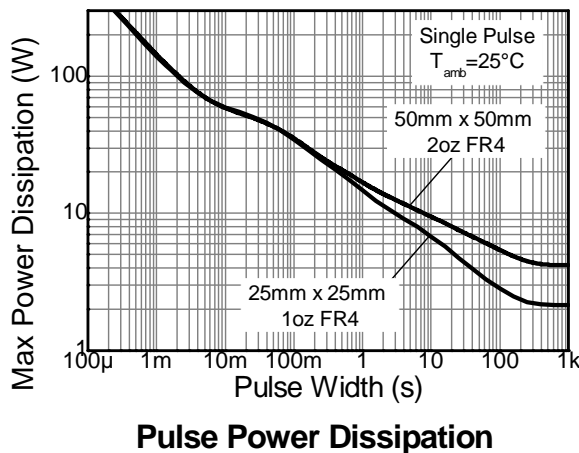
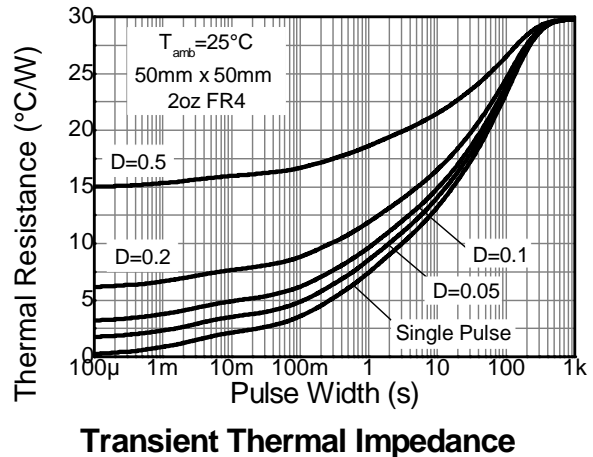
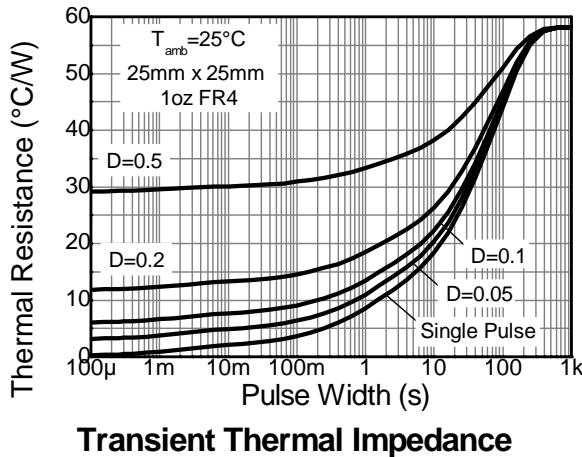
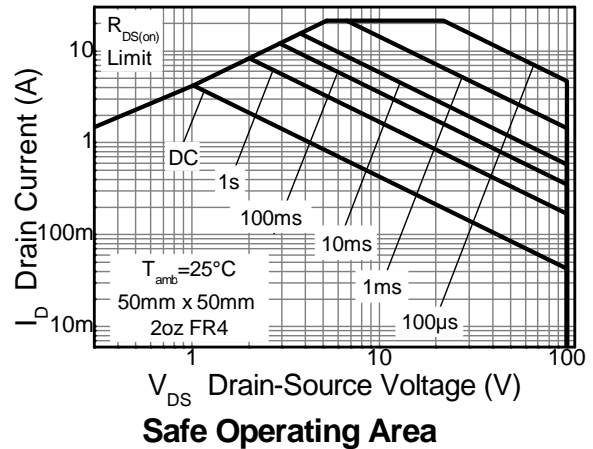
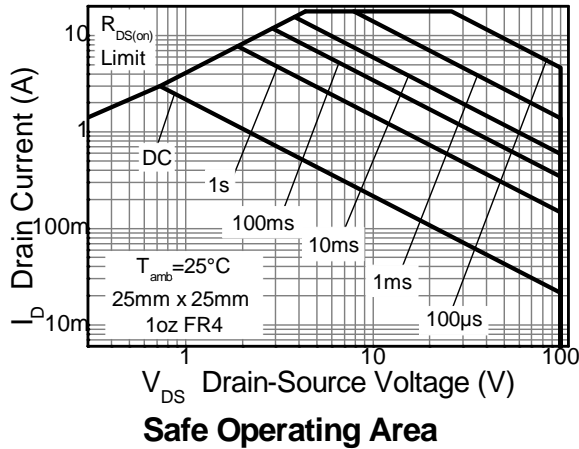
| Characteristic | | Symbol | Value | Unit |
|--|-----------------------|------------------------------------|----------|------|
| Drain-Source voltage | | V_{DSS} | 100 | V |
| Gate-Source voltage | | V_{GS} | ± 20 | V |
| Continuous Drain current | $V_{GS} = 10\text{V}$ | (Note 7) | 6.4 | A |
| | | $T_A = +70^\circ\text{C}$ (Note 7) | 5 | |
| | | (Note 6) | 4.2 | |
| Pulsed Drain current | | I_{DM} | 21 | A |
| Continuous Source current (Body diode) | | I_S | 10 | A |
| Pulsed Source current (Body diode) | | I_{SM} | 21 | A |

Thermal Characteristics

| Characteristic | | Symbol | Value | Unit |
|---|----------|-----------------|------------|---------------------------|
| Power dissipation Linear derating factor | (Note 6) | P_D | 4.25 | W mW/ $^\circ\text{C}$ |
| | | | 34 | |
| | (Note 7) | | 9.85 | |
| | | | 78.7 | |
| Thermal Resistance, Junction to Ambient | (Note 9) | $R_{\theta JA}$ | 2.11 | $^\circ\text{C/W}$ |
| | | | 16.8 | |
| | (Note 6) | | 29.4 | |
| | (Note 7) | | 12.7 | |
| | (Note 9) | | 59.1 | |
| Thermal Resistance, Junction to Lead | | $R_{\theta JL}$ | 1.43 | |
| Operating and storage temperature range | | T_J, T_{STG} | -55 to 150 | $^\circ\text{C}$ |

- Notes:
- For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 - For a device surface mounted on FR4 PCB measured at $t \leq 10$ sec.
 - Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, $D = 0.02$ and pulse width 300 μs . The pulse current is limited by the maximum junction temperature.
 - For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 - Thermal resistance from junction to solder-point (at the end of the drain lead).

Thermal Characteristics

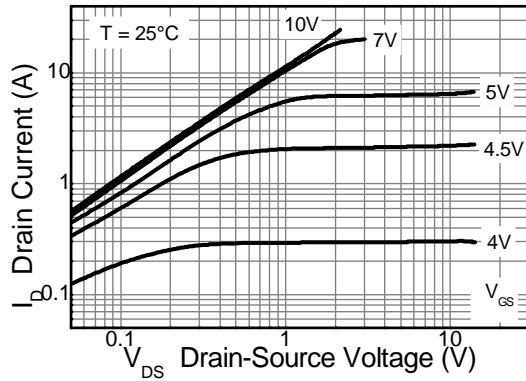


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

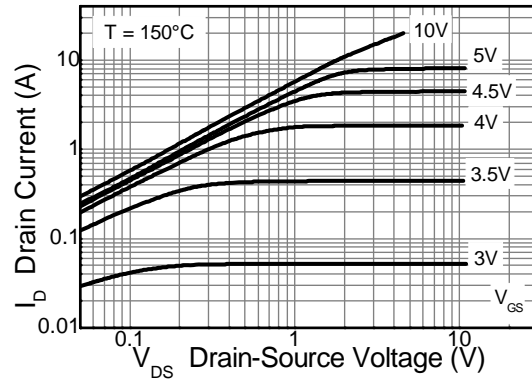
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition | |
|---|---------------------|-----|-------|------|------|--|--|
| OFF CHARACTERISTICS | | | | | | | |
| Drain-Source Breakdown Voltage | BV _{DSS} | 100 | — | — | V | I _D = 250μA, V _{GS} = 0V | |
| Zero Gate Voltage Drain Current | I _{DSS} | — | — | 0.5 | μA | V _{DS} = 100V, V _{GS} = 0V | |
| Gate-Source Leakage | I _{GSS} | — | — | ±100 | nA | V _{GS} = ±20V, V _{DS} = 0V | |
| ON CHARACTERISTICS | | | | | | | |
| Gate Threshold Voltage | V _{GS(th)} | 2.0 | — | 4.0 | V | I _D = 250μA, V _{DS} = V _{GS} | |
| Static Drain-Source On-Resistance (Note 11) | R _{DS(on)} | — | — | 125 | mΩ | V _{GS} = 10V, I _D = 3.2A | |
| | | | | 150 | | V _{GS} = 6V, I _D = 2.6A | |
| Forward Transconductance (Notes 11 & 12) | g _{fs} | — | 7.3 | — | S | V _{DS} = 15V, I _D = 2.9A | |
| Diode Forward Voltage (Note 11) | V _{SD} | — | 0.85 | 0.95 | V | I _S = 3.2A, V _{GS} = 0V, T _J = +25°C | |
| Reverse recovery time (Note 12) | t _{rr} | — | 40.5 | — | ns | I _S = 2.9A, di/dt = 100A/μs | |
| Reverse recovery charge (Note 12) | Q _{rr} | — | 62 | — | nC | T _J = +25°C | |
| DYNAMIC CHARACTERISTICS (Note 12) | | | | | | | |
| Input Capacitance | C _{iss} | — | 859 | — | pF | V _{DS} = 50V, V _{GS} = 0V f = 1MHz | |
| Output Capacitance | C _{oss} | — | 57.3 | — | pF | | |
| Reverse Transfer Capacitance | C _{rss} | — | 33 | — | pF | | |
| Total Gate Charge (Note 13) | Q _g | — | 9.6 | — | nC | V _{GS} = 5V | V _{DS} = 50V I _D = 2.9A |
| Total Gate Charge (Note 13) | Q _g | — | 17.16 | — | nC | V _{GS} = 10V | |
| Gate-Source Charge (Note 13) | Q _{gs} | — | 3.77 | — | nC | | |
| Gate-Drain Charge (Note 13) | Q _{gd} | — | 5.36 | — | nC | | |
| Turn-On Delay Time (Note 13) | t _{D(on)} | — | 4.9 | — | ns | V _{DD} = 50V, V _{GS} = 10V I _D = 1A, R _G ≅ 6.0Ω | |
| Turn-On Rise Time (Note 13) | t _r | — | 3.7 | — | ns | | |
| Turn-Off Delay Time (Note 13) | t _{D(off)} | — | 17.7 | — | ns | | |
| Turn-Off Fall Time (Note 13) | t _f | — | 9.4 | — | ns | | |

- Notes:
11. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
 12. For design aid only, not subject to production testing.
 13. Switching characteristics are independent of operating junction temperatures.

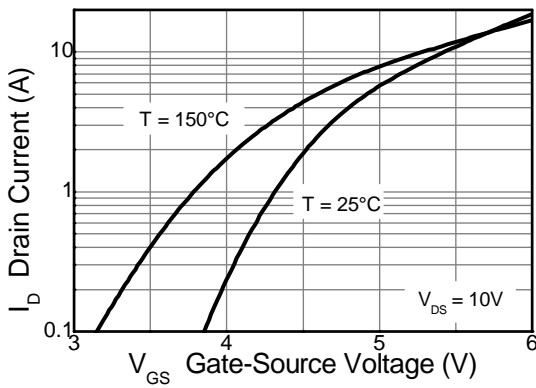
Typical Characteristics



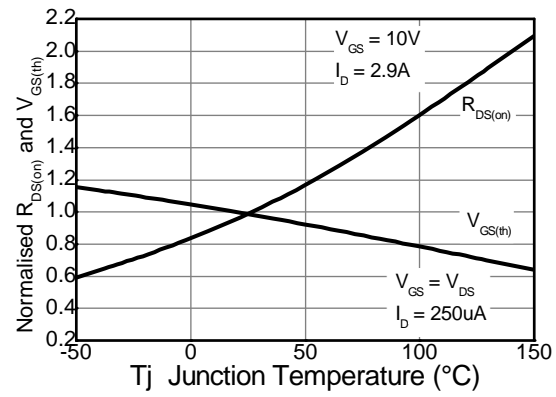
Output Characteristics



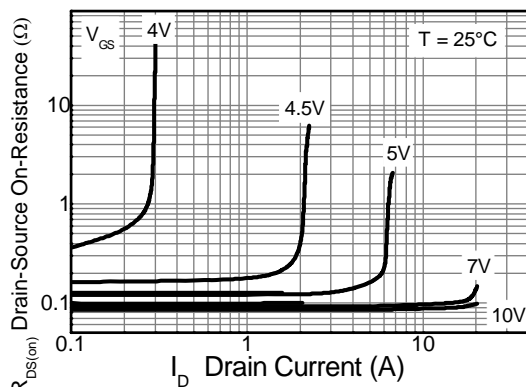
Output Characteristics



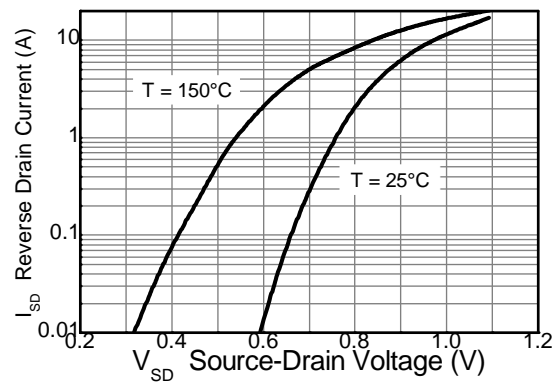
Typical Transfer Characteristics



Normalised Curves v Temperature

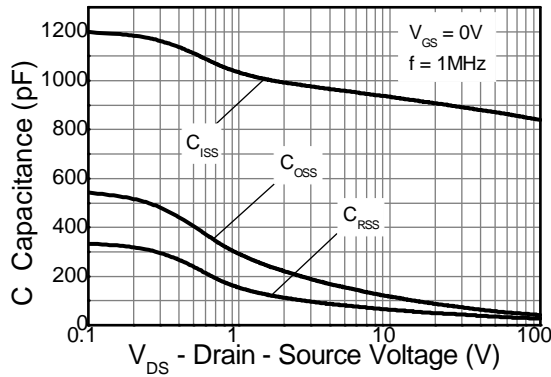


On-Resistance v Drain Current

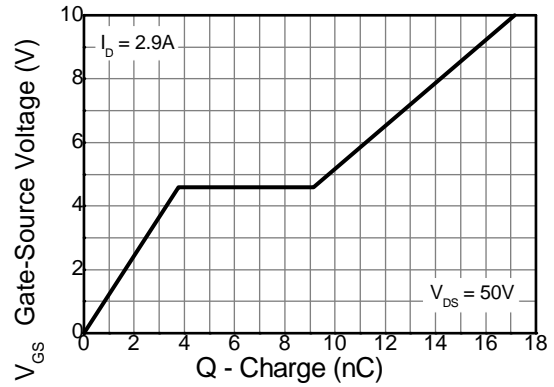


Source-Drain Diode Forward Voltage

Typical Characteristics (cont.)

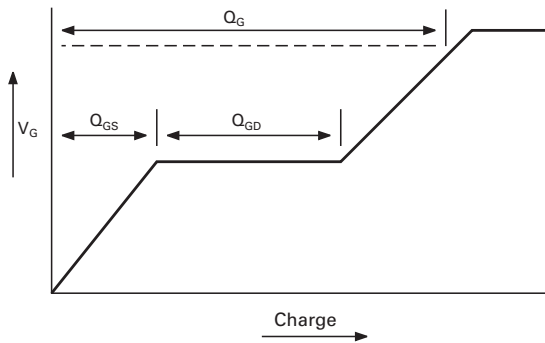


Capacitance v Drain-Source Voltage

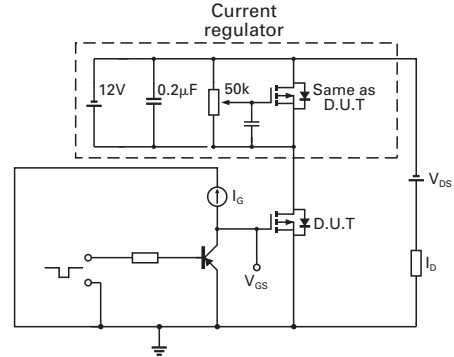


Gate-Source Voltage v Gate Charge

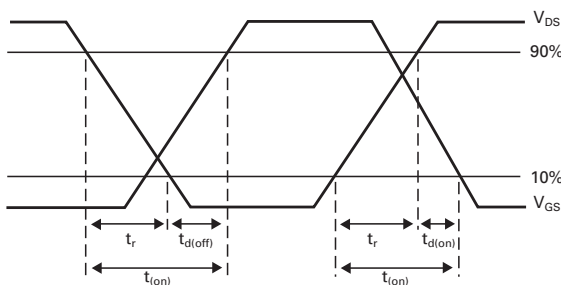
Test Circuits



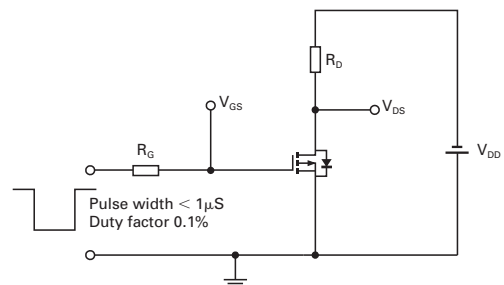
Basic gate charge waveform



Gate charge test circuit

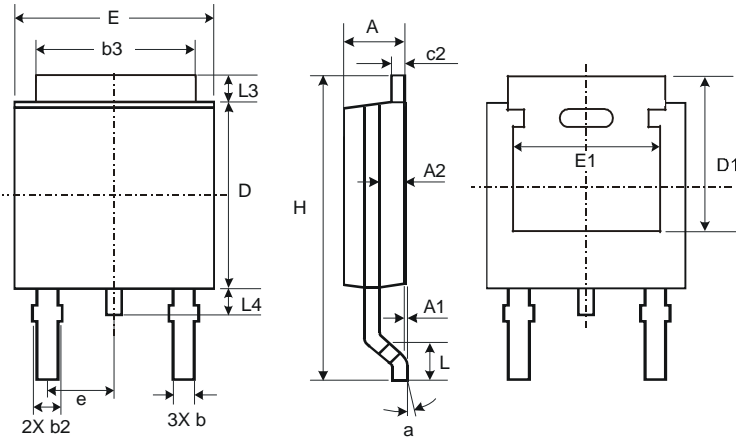


Switching time waveforms



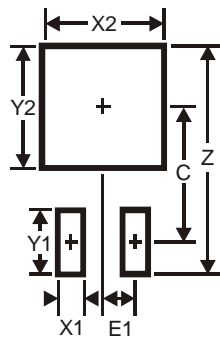
Switching time test circuit

Package Outline Dimensions



| TO252 | | | |
|----------------------|------|-------|-------|
| Dim | Min | Max | Typ |
| A | 2.19 | 2.39 | 2.29 |
| A1 | 0.00 | 0.13 | 0.08 |
| A2 | 0.97 | 1.17 | 1.07 |
| b | 0.64 | 0.88 | 0.783 |
| b2 | 0.76 | 1.14 | 0.95 |
| b3 | 5.21 | 5.46 | 5.33 |
| c2 | 0.45 | 0.58 | 0.531 |
| D | 6.00 | 6.20 | 6.10 |
| D1 | 5.21 | – | – |
| e | – | – | 2.286 |
| E | 6.45 | 6.70 | 6.58 |
| E1 | 4.32 | – | – |
| H | 9.40 | 10.41 | 9.91 |
| L | 1.40 | 1.78 | 1.59 |
| L3 | 0.88 | 1.27 | 1.08 |
| L4 | 0.64 | 1.02 | 0.83 |
| a | 0° | 10° | – |
| All Dimensions in mm | | | |

Suggested Pad Layout



| Dimensions | Value (in mm) |
|------------|---------------|
| Z | 11.6 |
| X1 | 1.5 |
| X2 | 7.0 |
| Y1 | 2.5 |
| Y2 | 7.0 |
| C | 6.9 |
| E1 | 2.3 |

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