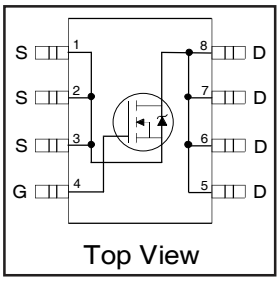
International
IOR Rectifier

PD- 95022

# IRF7201PbF

HEXFET® Power MOSFET

- Generation V Technology
- Ultra Low On-Resistance
- N-Channel MOSFET
- Surface Mount
- Available in Tape & Reel
- Dynamic dv/dt Rating
- Fast Switching
- Lead-Free



Top View

$V_{DSS}$ = 30V

$R_{DS(on)}$ = 0.030Ω


SO-8

## Description

Fifth Generation HEXFET® power MOSFETs from International Rectifier utilize advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and ruggedized device design that HEXFET MOSFETs are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, infra red, or wave soldering techniques. Power dissipation of greater than 0.8W is possible in a typical PCB mount application.

## Absolute Maximum Ratings

| | Parameter | Max. | Units |
|---|---|---|---|
| $V_{DS}$ | Drain- Source Voltage | 30 | V |
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V | 7.3 | A |
| $I_D$ @ $T_C$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V | 5.8 | |
| $I_{DM}$ | Pulsed Drain Current ① | 58 | |
| $P_D$ @$T_C$ = 25°C | Power Dissipation | 2.5 | W |
| $P_D$ @$T_C$ = 70°C | Power Dissipation | 1.6 | |
| | Linear Derating Factor | 0.02 | W/°C |
| $V_{GS}$ | Gate-to-Source Voltage | ± 20 | V |
| $V_{GSM}$ | Gate-to-Source Voltage Single Pulse tp<10µs | 30 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy② | 70 | mJ |
| dv/dt | Peak Diode Recovery dv/dt ③ | 5.0 | V/ns |
| $T_J$, $T_{STG}$ | Junction and Storage Temperature Range | -55 to + 150 | °C |

## Thermal Resistance

| | Parameter | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JA}$ | Maximum Junction-to-Ambient⑤ | —— | 50 | °C/W |



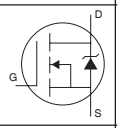
9/30/04

## Electrical Characteristics @ $T_J$ = 25°C (unless otherwise specified)

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source Breakdown Voltage | 30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = 250µA |
| $\Delta V_{(BR)DSS}/\Delta T_J$ | Breakdown Voltage Temp. Coefficient | — | 0.024 | — | V/°C | Reference to 25°C, $I_D$ = 1mA |
| $R_{DS(on)}$ | Static Drain-to-Source On-Resistance | — | — | 0.030 | Ω | $V_{GS}$ = 10V, $I_D$ = 7.3A ④ |
| | | — | — | 0.050 | | $V_{GS}$ = 4.5V, $I_D$ = 3.7A ④ |
| $V_{GS(th)}$ | Gate Threshold Voltage | 1.0 | — | — | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA |
| $g_{fs}$ | Forward Transconductance | 5.8 | — | — | S | $V_{DS}$ = 15V, $I_D$ = 2.3A |
| $I_{DSS}$ | Drain-to-Source Leakage Current | — | — | 1.0 | µA | $V_{DS}$ = 24V, $V_{GS}$ = 0V |
| | | — | — | 25 | | $V_{DS}$ = 24V, $V_{GS}$ = 0V, $T_J$ = 125°C |
| $I_{GSS}$ | Gate-to-Source Forward Leakage | — | — | -100 | nA | $V_{GS}$ = -20V |
| | Gate-to-Source Reverse Leakage | — | — | 100 | | $V_{GS}$ = 20V |
| $Q_g$ | Total Gate Charge | — | 19 | 28 | nC | $I_D$ = 4.6A |
| $Q_{gs}$ | Gate-to-Source Charge | — | 2.3 | 3.5 | | $V_{DS}$ = 24V |
| $Q_{gd}$ | Gate-to-Drain ("Miller") Charge | — | 6.3 | 9.5 | | $V_{GS}$ = 10V, See Fig. 10 ④ |
| $t_{d(on)}$ | Turn-On Delay Time | — | 7.0 | — | ns | $V_{DD}$ = 15V |
| $t_r$ | Rise Time | — | 35 | — | | $I_D$ = 4.6A |
| $t_{d(off)}$ | Turn-Off Delay Time | — | 21 | — | | $R_G$ = 6.2Ω |
| $t_f$ | Fall Time | — | 19 | — | | $R_D$ = 3.2Ω, ④ |
| $C_{iss}$ | Input Capacitance | — | 550 | — | pF | $V_{GS}$ = 0V |
| $C_{oss}$ | Output Capacitance | — | 260 | — | | $V_{DS}$ = 25V |
| $C_{rss}$ | Reverse Transfer Capacitance | — | 100 | — | | $f$ = 1.0MHz, See Fig. 9 |

## Source-Drain Ratings and Characteristics

| | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) | — | — | 2.5 | A | MOSFET symbol showing the integral reverse p-n junction diode. |
| $I_{SM}$ | Pulsed Source Current (Body Diode) ① | — | — | 58 | | |
| $V_{SD}$ | Diode Forward Voltage | — | — | 1.2 | V | $T_J$ = 25°C, $I_S$ = 4.6A, $V_{GS}$ = 0V ③ |
| $t_{rr}$ | Reverse Recovery Time | — | 48 | 73 | ns | $T_J$ = 25°C, $I_F$ = 4.6A |
| $Q_{rr}$ | Reverse RecoveryCharge | — | 73 | 110 | nC | di/dt = 100A/µs ③ |




**Notes:**

① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11)

② $V_{DD}$ = 15V, starting $T_J$ = 25°C, L = 6.6mH $R_G$ = 25Ω, $I_{AS}$ = 4.6A. (See Figure 8)

③ $I_{SD} \leq$ 4.6A, di/dt ≤ 120A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq$ 150°C

④ Pulse width ≤ 300µs; duty cycle ≤ 2%.

⑤ When mounted on 1 inch square copper board, t<10 sec

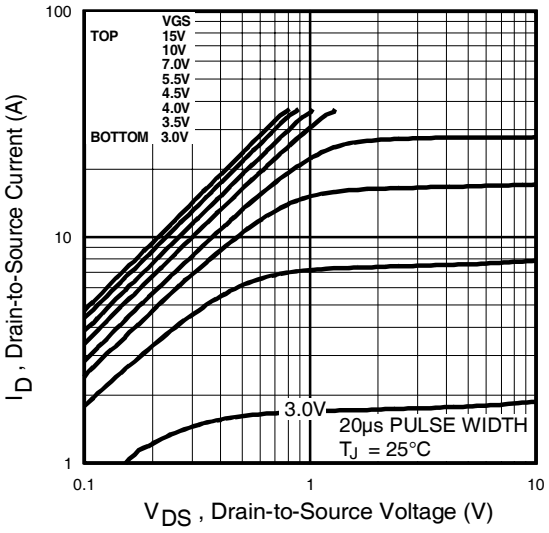



**Fig 1.** Typical Output Characteristics

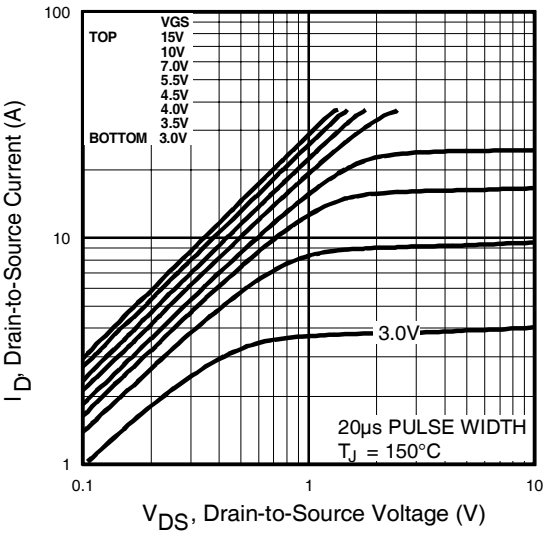



**Fig 2.** Typical Output Characteristics

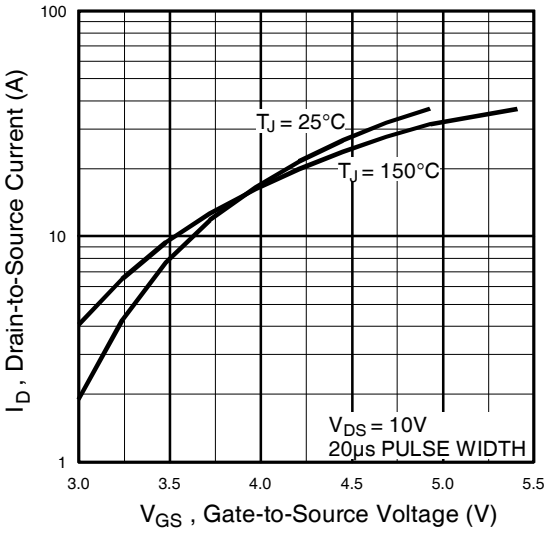



**Fig 3.** Typical Transfer Characteristics

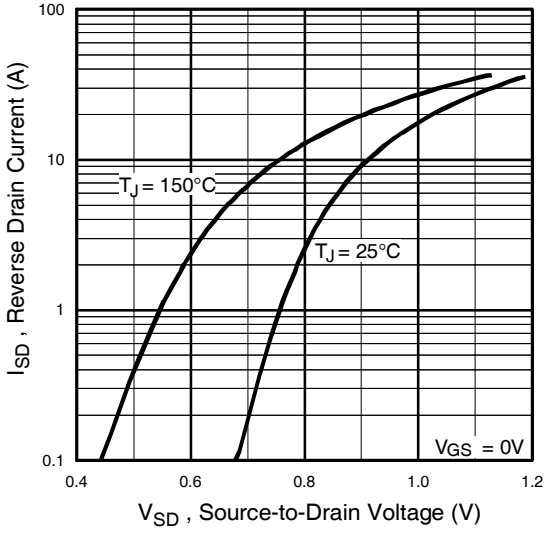



**Fig 4.** Typical Source-Drain Diode Forward Voltage

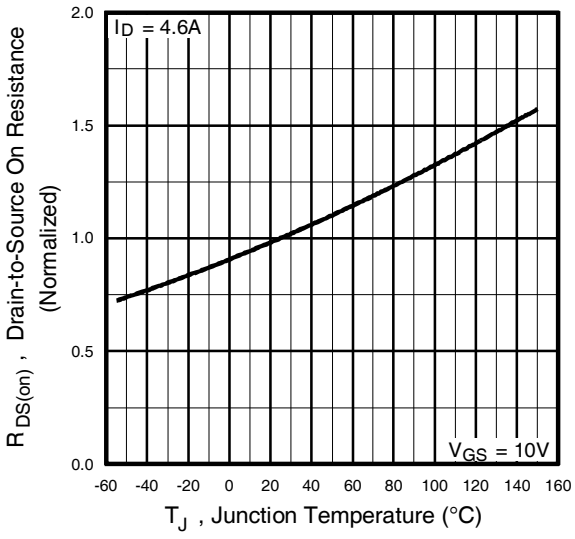



**Fig 5.** Normalized On-Resistance Vs. Temperature

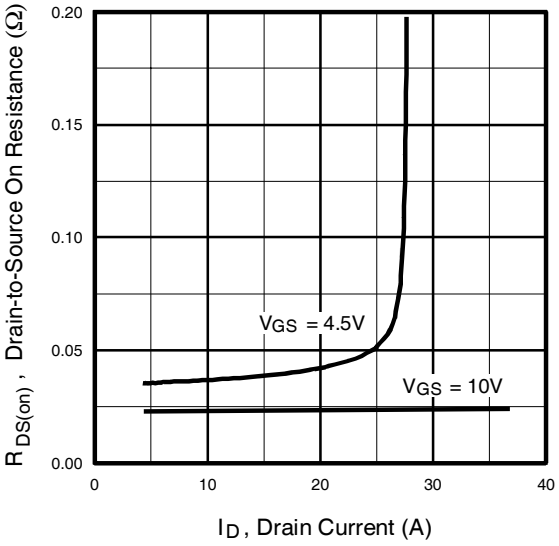



**Fig 6.** On-Resistance Vs. Drain Current

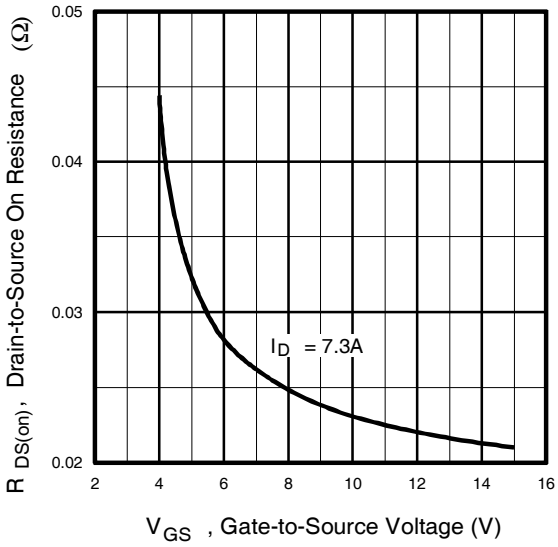



**Fig 7.** On-Resistance Vs. Gate Voltage

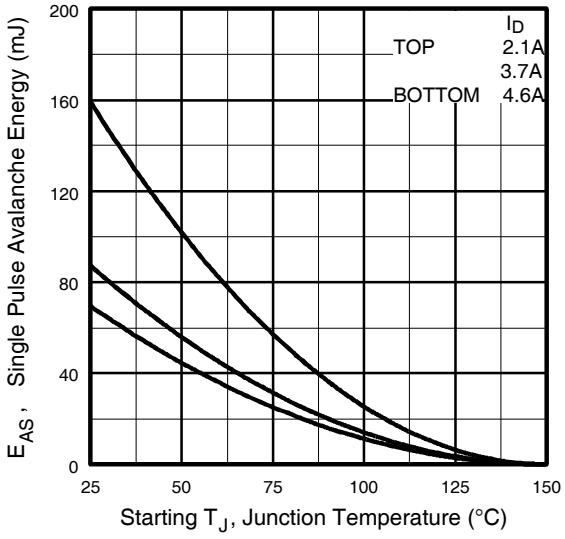



**Fig 8.** Maximum Avalanche Energy Vs. Drain Current

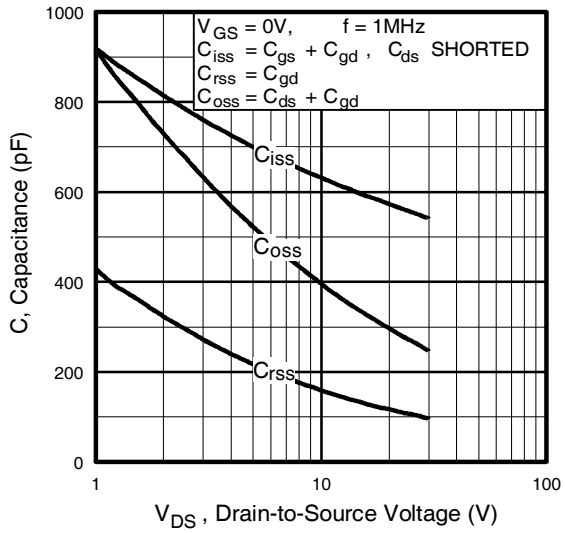



**Fig 9.** Typical Capacitance Vs. Drain-to-Source Voltage

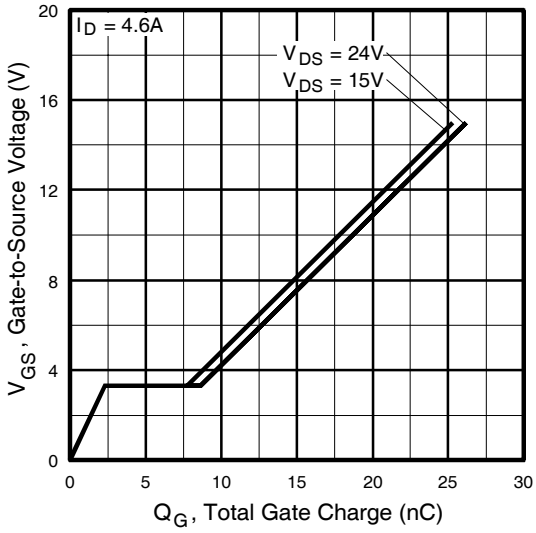



**Fig 10.** Typical Gate Charge Vs. Gate-to-Source Voltage

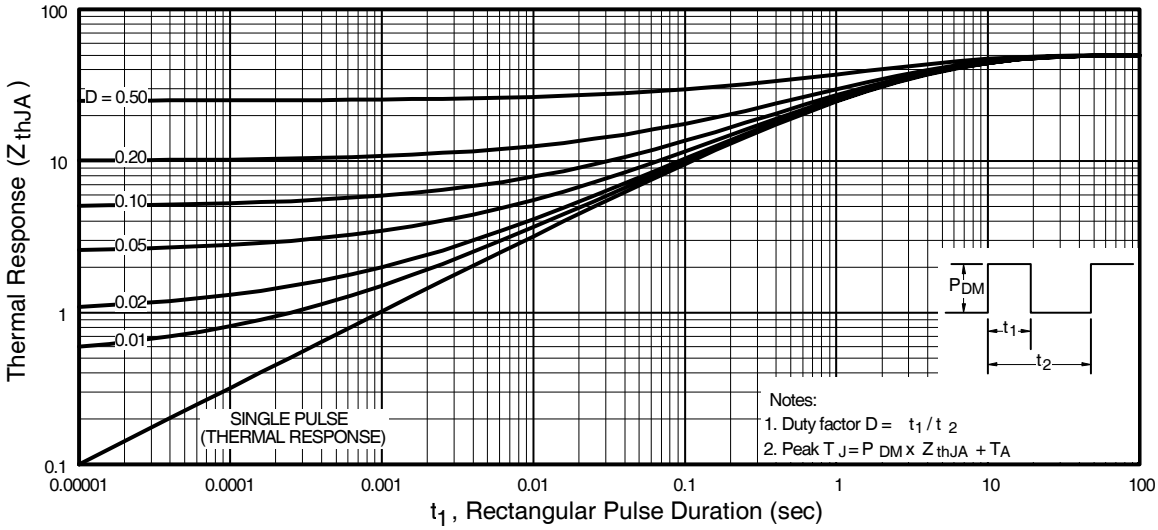
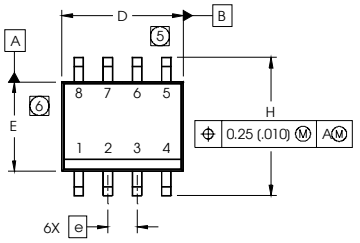
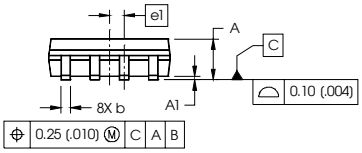


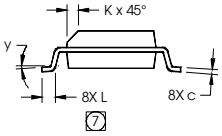

**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

## SO-8 Package Outline

Dimensions are shown in milimeters (inches)




| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | .0532 | .0688 | 1.35 | 1.75 |
| A1 | .0040 | .0098 | 0.10 | 0.25 |
| b | .013 | .020 | 0.33 | 0.51 |
| c | .0075 | .0098 | 0.19 | 0.25 |
| D | .189 | .1968 | 4.80 | 5.00 |
| E | .1497 | .1574 | 3.80 | 4.00 |
| e | .050 BASIC | | 1.27 BASIC | |
| e1 | .025 BASIC | | 0.635 BASIC | |
| H | .2284 | .2440 | 5.80 | 6.20 |
| K | .0099 | .0196 | 0.25 | 0.50 |
| L | .016 | .050 | 0.40 | 1.27 |
| y | 0° | 8° | 0° | 8° |

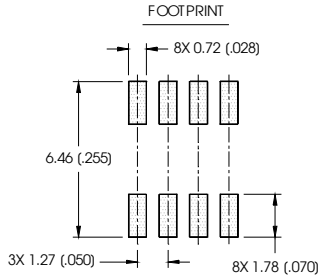
NOTES:

1. DIMENSIONING & TOLERANCING PER ASME Y14.5M-1994.
2. CONTROLLING DIMENSION: MILLIMETER
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.

5 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.15 (.006).

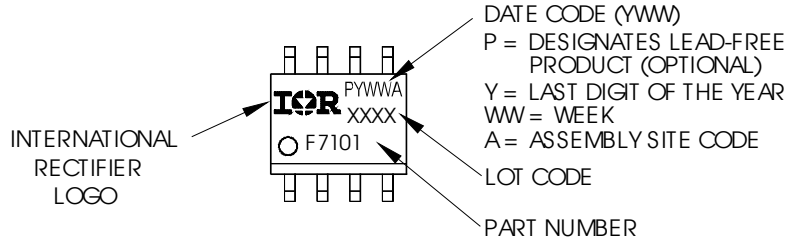
6 DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS. MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.010).

7 DIMENSION IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE.



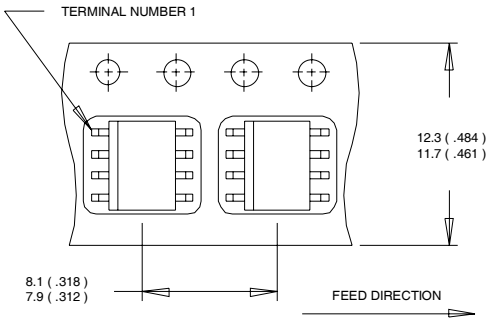

## SO-8 Part Marking Information (Lead-Free)

EXAMPLE: THIS IS AN IRF7101 (MOSFET)

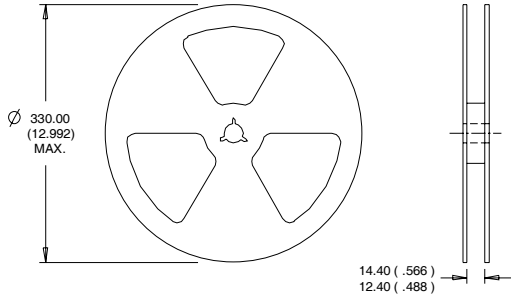


## SO-8 Tape and Reel

Dimensions are shown in milimeters (inches)




NOTES:
1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.




NOTES :
1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualifications Standards can be found on IR's Web site.

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