

## Dual 1 Form A Solid State Relay

### Features

- Dual Channel (LH1540)
- Current Limit Protection
- Isolation Test Voltage 5300 V<sub>RMS</sub>
- Typical R<sub>ON</sub> 20 Ω
- Load Voltage 350 V
- High Surge Capability
- Clean Bounce Free Switching
- Low Power Consumption
- SMD Lead Available on Tape and Reel
- Lead-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC

### Agency Approvals

- UL1577, File No. E52744 System Code H or J, Double Protection
- CSA - Certification 093751
- BSI/BABT Cert. No. 7980
- DIN EN 60747-5-2 (VDE0884)  
DIN EN 60747-5-5 pending
- FIMKO Approval

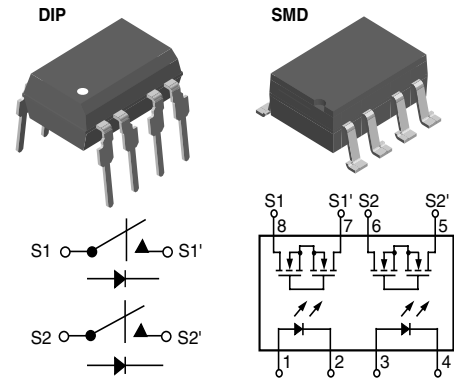
### Applications

General Telecom Switching

- On/off Hook Control
- Ring Delay
- Dial Pulse
- Ground Start
- Ground Fault Protection

Instrumentation

Industrial Controls



1179034



### Description

The LH1532 dual 1 Form A relays are SPST normally open switches that can replace electromechanical relays in many applications. They are constructed using a GaAlAs LED for actuation control and an integrated monolithic die for the switch output. The die, fabricated

in a high-voltage dielectrically isolated technology is comprised of a photodiode array, switch control circuitry, and MOSFET switches. In addition, the LH1532 SSRs employ current-limiting circuitry, enabling them to pass FCC 68.302 and other regulatory surge requirements when overvoltage protection is provided.

### Order Information

Part	Remarks
LH1532AAC	Tubes, SMD-8
LH1532AACTR	Tape and Reel, SMD-8
LH1532AB	Tubes, DIP-8

### Absolute Maximum Ratings, $T_{amb} = 25\text{ }^{\circ}\text{C}$

Stresses in excess of the absolute Maximum Ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute Maximum Ratings for extended periods of time can adversely affect reliability.

### SSR

Parameter	Test condition	Symbol	Value	Unit
LED continuous forward current		$I_F$	50	mA
LED reverse voltage	$I_R \leq 10\text{ }\mu\text{A}$	$V_R$	8.0	V
DC or peak AC load voltage	$I_L \leq 50\text{ }\mu\text{A}$	$V_L$	350	V
Continuous DC load current , one pole operating		$I_L$	120	mA
Continuous DC load current , two poles operating		$I_L$	110	mA
Peak load current (single shot)	$t = 100\text{ ms}$	$I_P$	2)	
Ambient temperature range		$T_{amb}$	- 40 to + 85	$^{\circ}\text{C}$
Storage temperature range		$T_{stg}$	- 40 to + 150	$^{\circ}\text{C}$
Pin soldering temperature	$t = 10\text{ s max}$	$T_{sld}$	260	$^{\circ}\text{C}$
Input/output isolation test voltage	$t = 1.0\text{ s}$	$V_{ISO}$	5300	$V_{RMS}$
Pole-to-pole isolation voltage (S1 to S2) <sup>1)</sup> , (dry air, dust free, at sea level)			1600	V
Output power dissipation (continuous)		$P_{diss}$	600	mW

<sup>1)</sup> Breakdown occurs between the output pins external to the package.

<sup>2)</sup> Refer to Current Limit Performance Application Note for a discussion relay operation during transient currents.

### Electrical Characteristics, $T_{amb} = 25\text{ }^{\circ}\text{C}$

Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.

### Input

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
LED forward current, switch turn-on	$I_L = 100\text{ mA}$ , $t = 10\text{ ms}$	$I_{Fon}$		1.0	2.0	mA
LED forward current, switch turn-off	$V_L = \pm 300\text{ V}$	$I_{Foff}$	0.2	0.9		mA
LED forward voltage	$I_F = 10\text{ mA}$	$V_F$	1.15	1.26	1.45	V

### Output

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
ON-resistance	$I_F = 5.0\text{ mA}$ , $I_L = 50\text{ mA}$	$R_{ON}$	12	20	25	$\Omega$
OFF-resistance	$I_F = 0\text{ mA}$ , $V_L = \pm 100\text{ V}$	$R_{OFF}$	0.5	5000		$G\Omega$
Current limit	$I_F = 5.0\text{ mA}$ , $t = 5.0\text{ ms}$ , $V_L = \pm 6.0\text{ V}$	$I_{LMT}$	170	210	250	mA
Off-state leakage current	$I_F = 0\text{ mA}$ , $V_L = \pm 100\text{ V}$	$I_O$		0.02	200	nA
	$I_F = 0\text{ mA}$ , $V_L = \pm 350\text{ V}$	$I_O$			1.0	$\mu\text{A}$

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Output capacitance	$I_F = 0 \text{ mA}, V_L = 1.0 \text{ V}$	$C_O$		55		pF
	$I_F = 0 \text{ mA}, V_L = 50 \text{ V}$	$C_O$		10		pF
Pole-to-pole capacitance (S1 to S2)	$I_F = 5.0 \text{ mA}$			0.5		pF
Switch offset	$I_F = 5.0 \text{ mA}$	$V_{OS}$		0.15		V

## Transfer

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Capacitance (input-output)	$V_{ISO} = 1.0 \text{ V}$	$C_{IO}$		1.1		pF
Turn-on time	$I_F = 5.0 \text{ mA}, I_L = 50 \text{ mA}$	$t_{on}$		1.4	2.5	ms
Turn-off time	$I_F = 5.0 \text{ mA}, I_L = 50 \text{ mA}$	$t_{off}$		0.7	2.5	ms

## Typical Characteristics ( $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified)

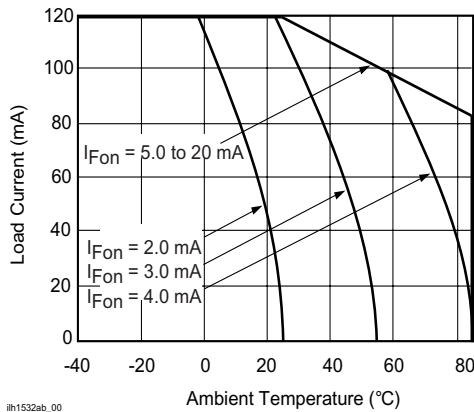


Figure 1. Recommended Operating Conditions

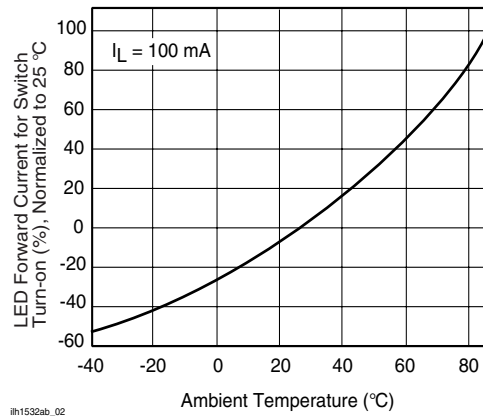


Figure 3. LED Current for Switch Turn-on vs. Temperature

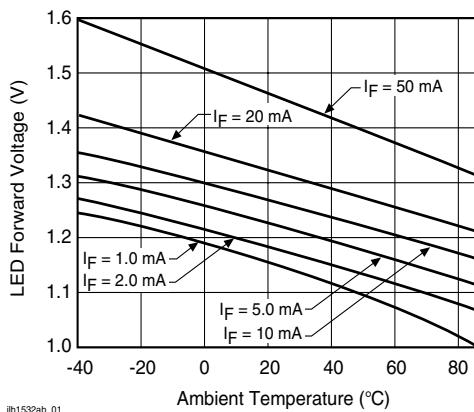


Figure 2. LED Voltage vs. Temperature

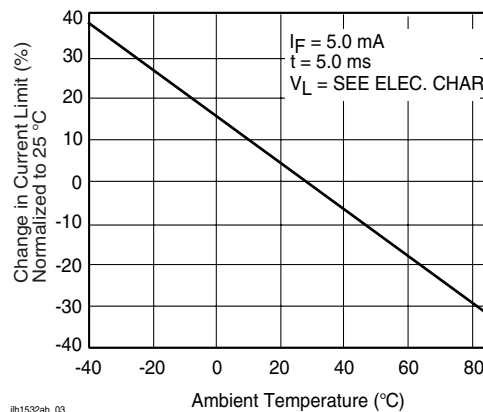


Figure 4. Current Limit vs. Temperature

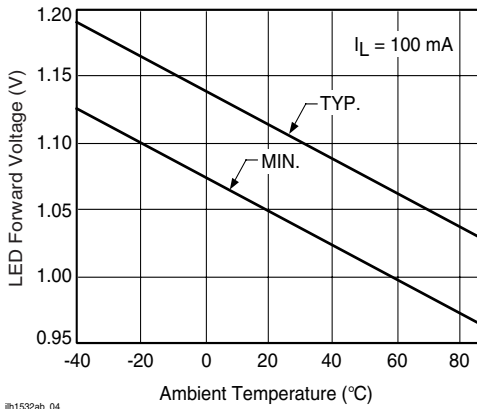


Figure 5. LED Dropout Voltage vs. Temperature

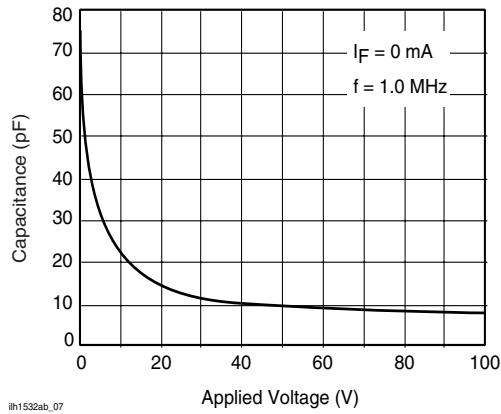


Figure 8. Switch Capacitance vs. Applied Voltage

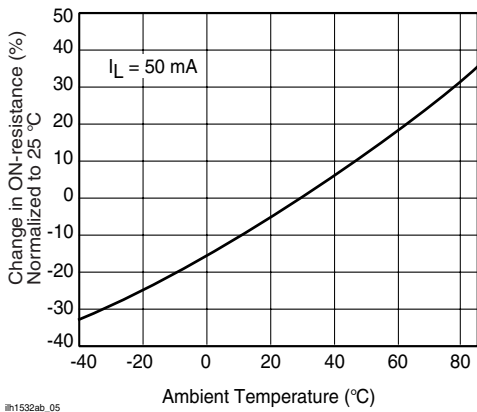


Figure 6. ON-Resistance vs. Temperature

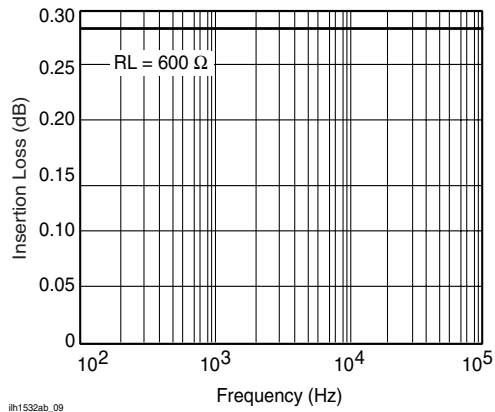


Figure 9. Insertion Loss vs. Frequency

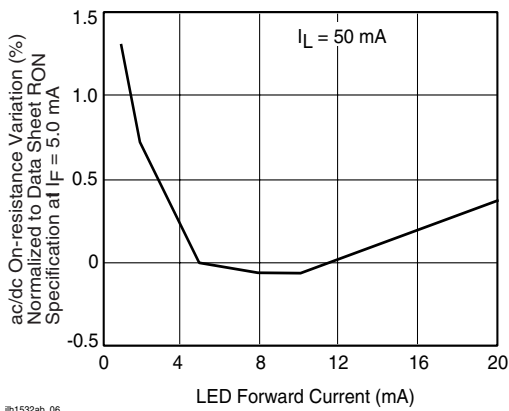


Figure 7. Variation in ON-Resistance vs. LED Current

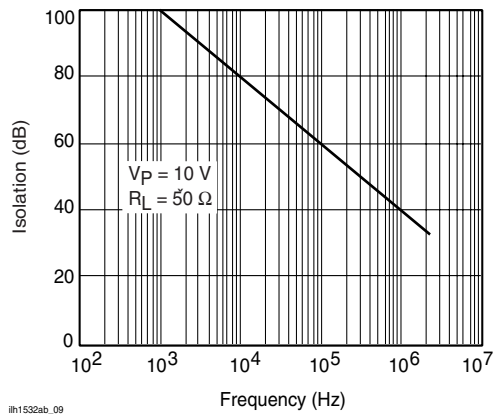


Figure 10. Output Isolation

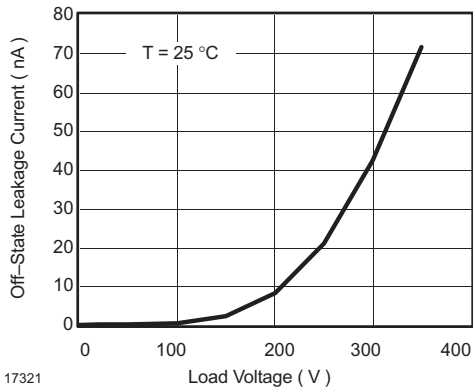


Figure 11. Leakage Current vs. Applied Voltage

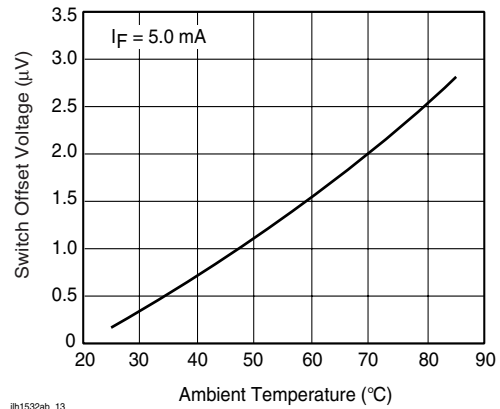


Figure 14. Switch Offset Voltage vs. Temperature

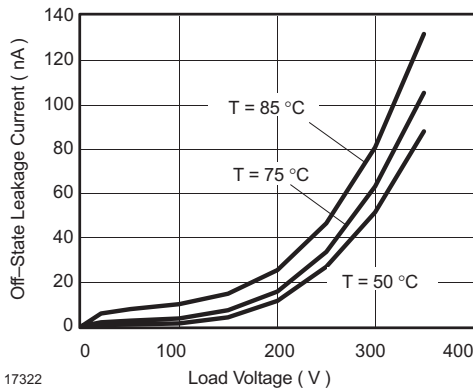


Figure 12. Leakage Current vs. Applied Voltage at Elevated Temperatures

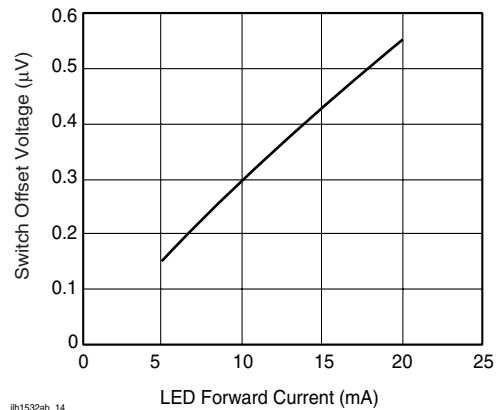


Figure 15. Switch Offset Voltage vs. LED Current

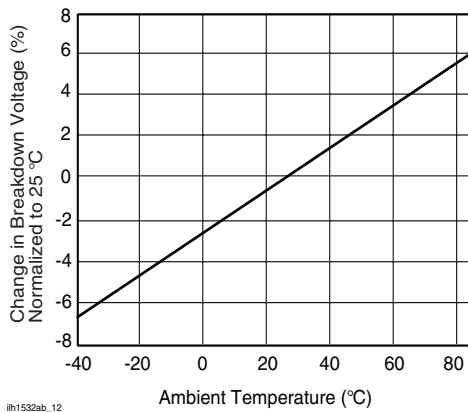


Figure 13. Switch Breakdown Voltage vs. Temperature

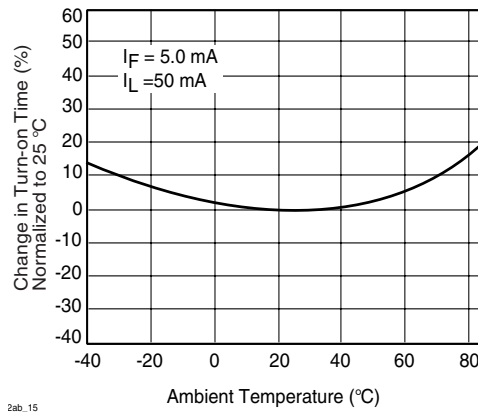
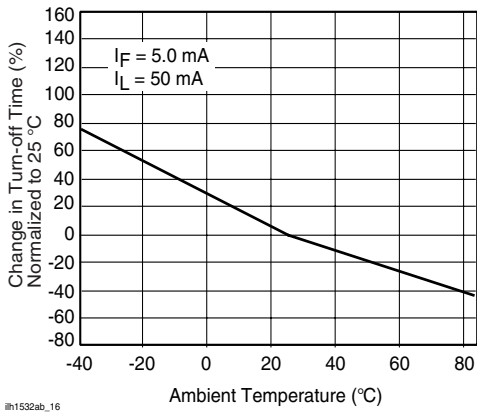
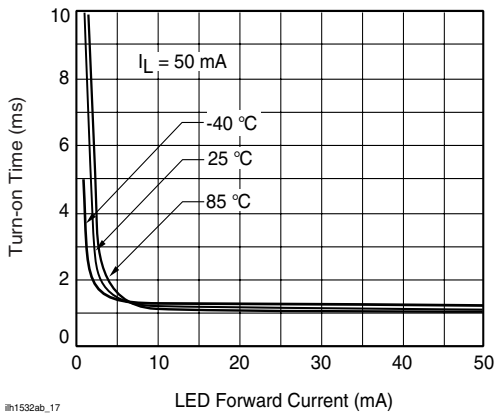


Figure 16. Turn-on Time vs. Temperature



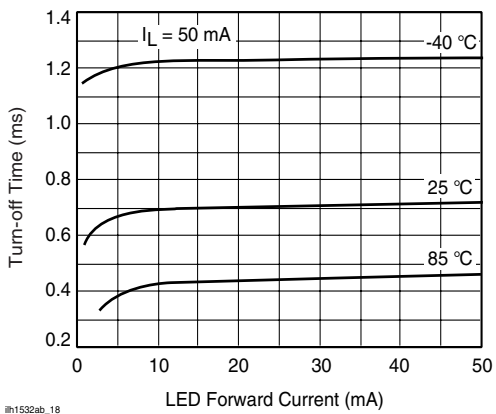
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Figure 17. Turn-off Time vs. Temperature



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Figure 18. Turn-on Time vs. LED Current

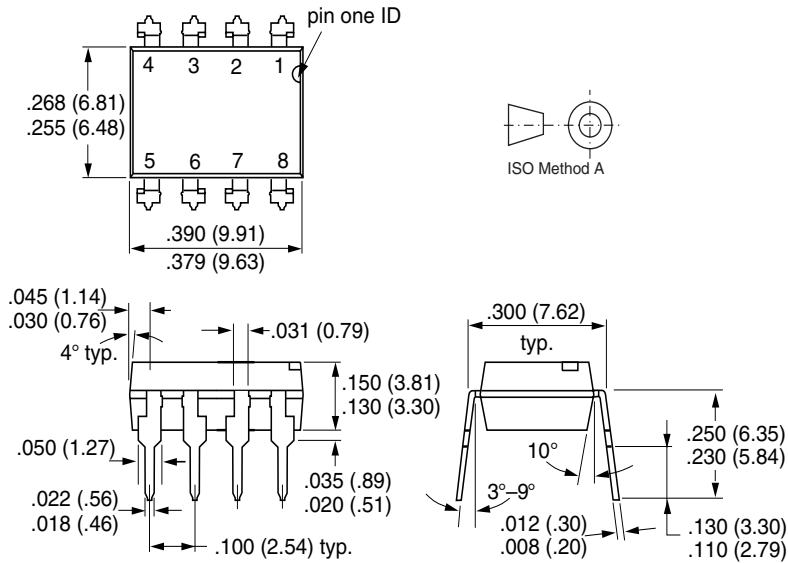


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Figure 19. Turn-off Time vs. LED Current

## Package Dimensions in Inches (mm)

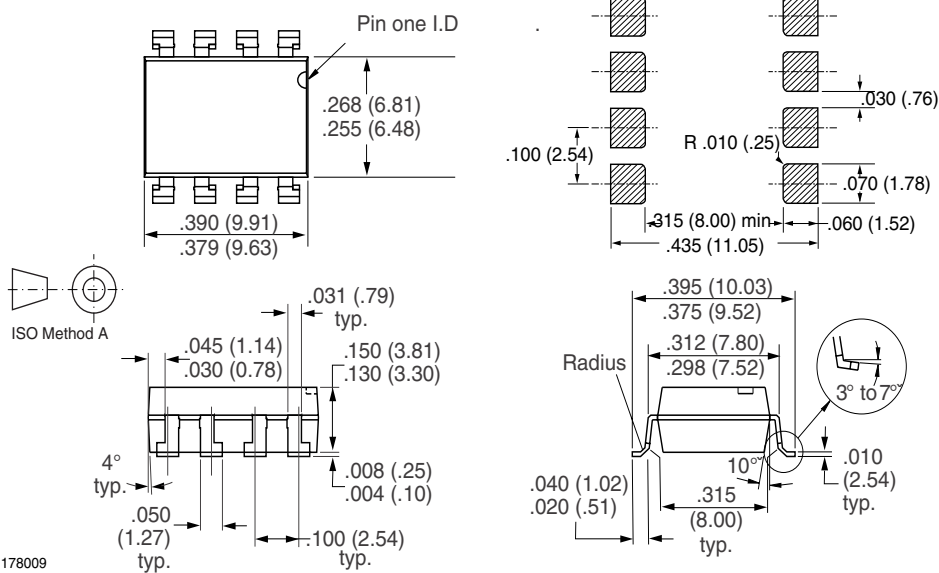
### DIP



i178008

## Package Dimensions in Inches (mm)

### SMD



i178009

## Ozone Depleting Substances Policy Statement

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1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

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The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

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1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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