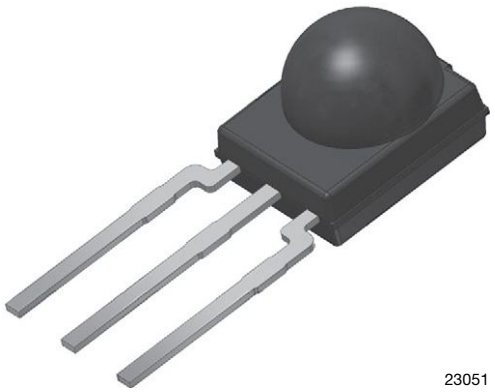
IR Receiver Modules for Remote Control Systems



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FEATURES

- Improved dark sensitivity
- Improved immunity against optical noise
- Improved immunity against Wi-Fi noise
- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- Insensitive to supply voltage ripple and noise
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE

GREEN (5-2008)

DESIGN SUPPORT TOOLS

click logo to get started

3D Models Available

MECHANICAL DATA

Pinning for TSOP13...:

1 = OUT, 2 = GND, 3 = V_S

DESCRIPTION

The TSOP13... series devices are the latest generation miniaturized IR receiver modules for infrared remote control systems. This series provides improvements in sensitivity to remote control signals in dark ambient as well as in sensitivity in the presence of optical disturbances e.g. from CFLs. The robustness against spurious pulses originating from Wi-Fi signals has been enhanced.

The devices contain a PIN diode and a preamplifier assembled on a lead frame. The epoxy package contains an IR filter. The demodulated output signal can be directly connected to a microprocessor for decoding.

The TSOP132.., TSOP134.., and TSOP136.. series devices are designed to receive long burst codes (10 or more carrier cycles per burst). The third digit designates the AGC level (AGC2, AGC4, or AGC6) and the last two digits designate the band-pass frequency (see table below). The higher the AGC, the better noise is suppressed, but the lower the code compatibility. AGC2 provides basic noise suppression, AGC4 provides enhanced noise suppression and AGC6 provides maximized noise suppression. Generally, we advise to select the highest AGC that satisfactorily receives the desired remote code.

These components have not been qualified to automotive specifications.

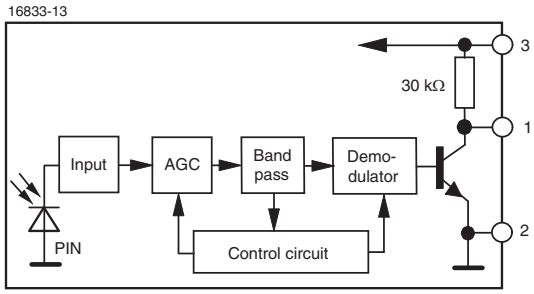
PARTS TABLE

AGC		BASIC NOISE SUPPRESSION (AGC2)	ENHANCED NOISE SUPPRESSION (AGC4)	MAXIMIZED NOISE SUPPRESSION (AGC6)
Carrier frequency	30 kHz	TSOP13230	TSOP13430	TSOP13630
	33 kHz	TSOP13233	TSOP13433	TSOP13633
	36 kHz	TSOP13236	TSOP13436 [2][5][7]	TSOP13636 [6]
	38 kHz	TSOP13238	TSOP13438 [3][10][11]	TSOP13638 [4]
	40 kHz	TSOP13240 [12]	TSOP13440	TSOP13640
	56 kHz	TSOP13256 [1]	TSOP13456 [9]	TSOP13656 [8]
Package		Minimold		
Pinning		1 = OUT, 2 = GND, 3 = V_S		
Dimensions (mm)		5.4 W x 6.35 H x 4.9 D		
Mounting		Leaded		
Application		Remote control		
Best choice for		[1] Cisco [2] MCIR [3] Mitsubishi [4] NEC [5] Panasonic [6] RC-5 [7] RC-6 [8] RCA [9] r-step [10] Sejin 4PPM [11] Sharp [12] Sony		

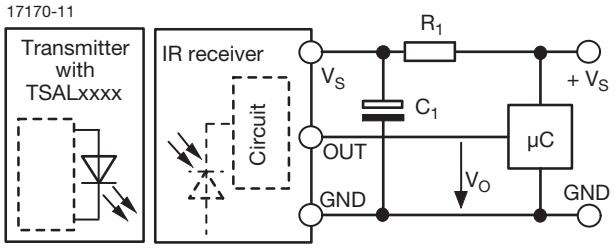
Note

- 30 kHz and 33 kHz only available on written request

BLOCK DIAGRAM



APPLICATION CIRCUIT



R_1 and C_1 recommended to reduce supply ripple for $V_S < 2.8$ V

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		V_S	-0.3 to +6	V
Supply current		I_S	3	mA
Output voltage		V_O	-0.3 to (V_S + 0.3)	V
Output current		I_O	5	mA
Junction temperature		T_j	100	°C
Storage temperature range		T_{stg}	-25 to +85	°C
Operating temperature range		T_{amb}	-25 to +85	°C
Power consumption	$T_{amb} \leq 85$ °C	P_{tot}	10	mW
Soldering temperature	t ≤ 10 s, 1 mm from case	T_{sd}	260	°C

Note

- Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect the device reliability

ELECTRICAL AND OPTICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	E_v = 0, V_S = 3.3 V	I_{SD}	0.55	0.70	0.90	mA
	E_v = 40 klx, sunlight	I_{SH}	-	0.80	-	mA
Supply voltage		V_S	2.5	-	5.5	V
Transmission distance	E_v = 0, test signal see Fig. 1, IR diode TSAL6200, I_F = 50 mA	d	-	30	-	m
Output voltage low	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m², test signal see Fig. 1	V_{OSL}	-	-	100	mV
Minimum irradiance	Pulse width tolerance: $t_{pi} - 3.5/f_0 < t_{po} < t_{pi} + 3.5/f_0$, test signal see Fig. 1	$E_{e\ min.}$	-	0.08	0.15	mW/m²
Maximum irradiance	$t_{pi} - 3.5/f_0 < t_{po} < t_{pi} + 3.5/f_0$, test signal see Fig. 1	$E_{e\ max.}$	30	-	-	W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$	-	± 45	-	deg

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

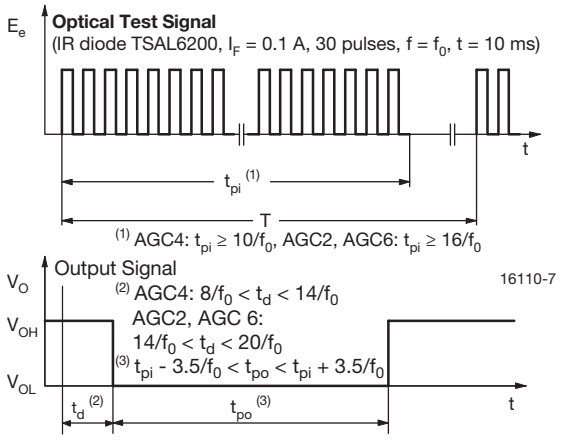


Fig. 1 - Output Delay and Pulse-Width

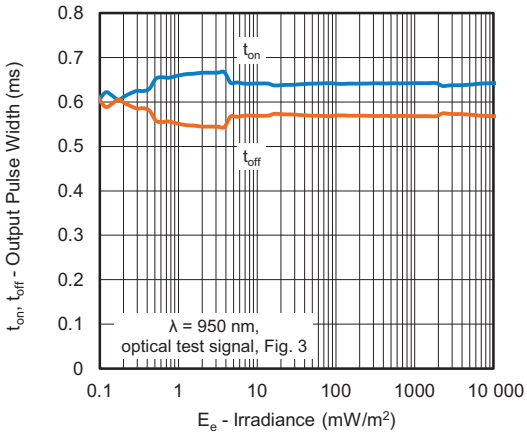


Fig. 4 - Pulse-Width vs. Irradiance in Dark Ambient

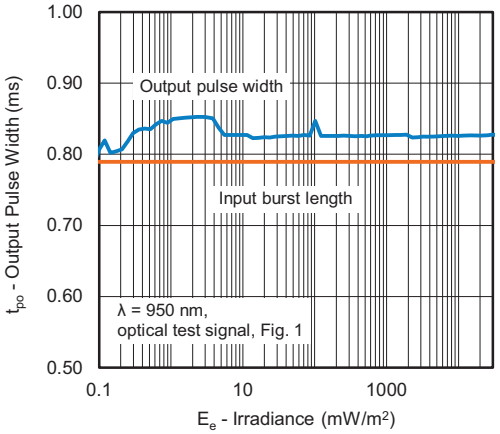


Fig. 2 - Pulse-Width vs. Irradiance in Dark Ambient

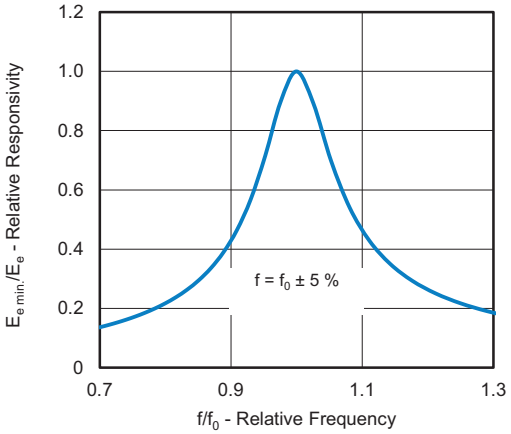


Fig. 5 - Frequency Dependence of Responsivity

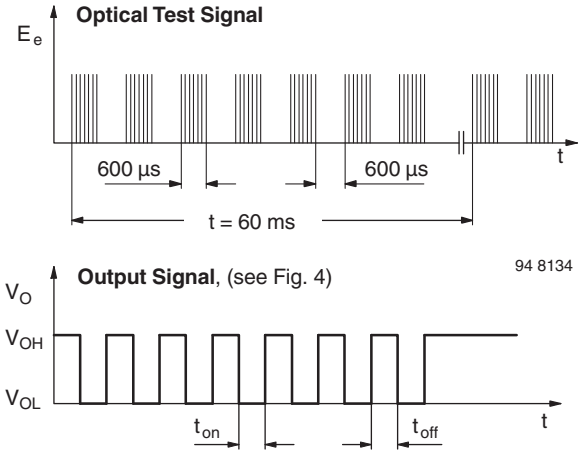


Fig. 3 - Test Signal

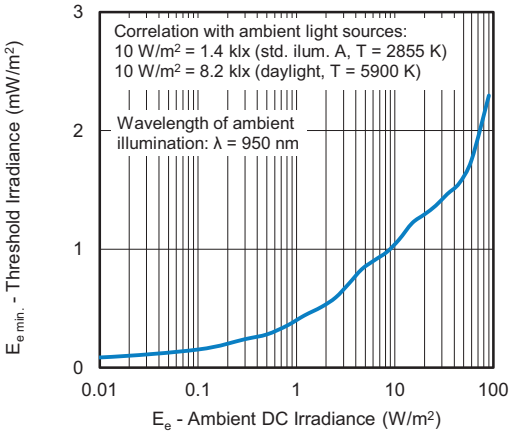


Fig. 6 - Sensitivity in Bright Ambient

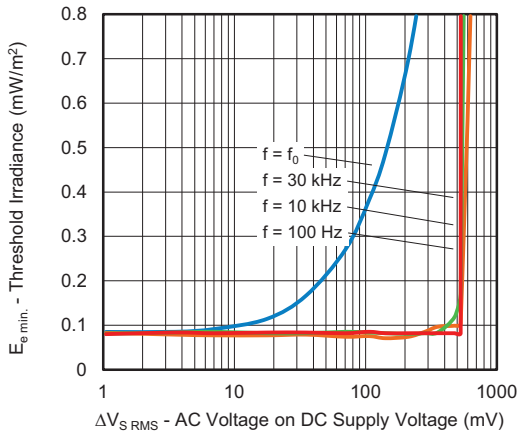


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

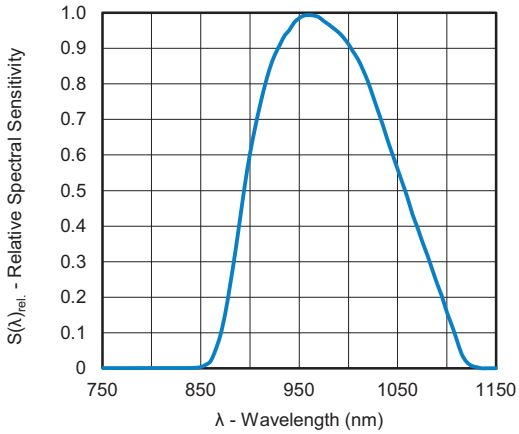


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

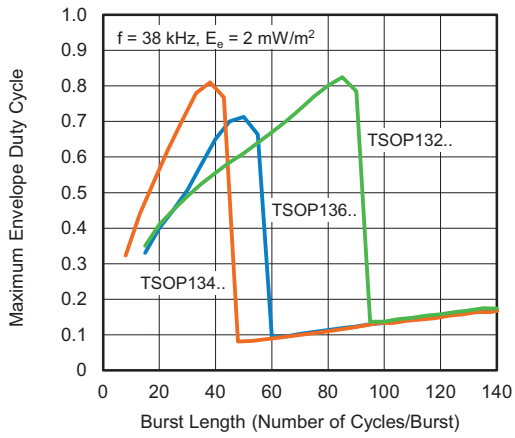


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

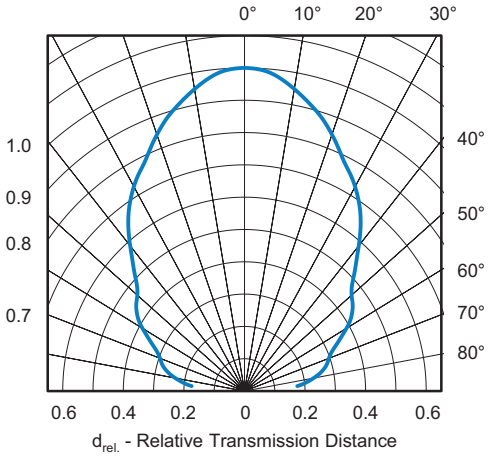


Fig. 11 - Directivity

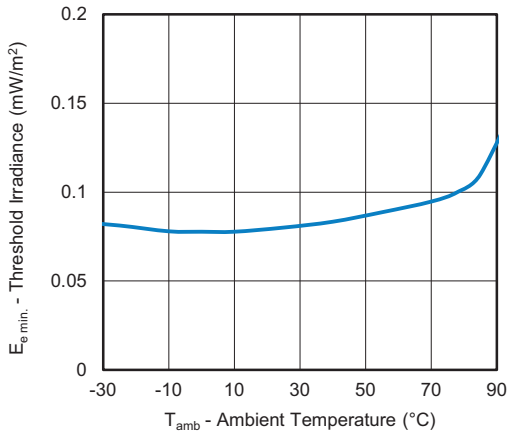


Fig. 9 - Sensitivity vs. Ambient Temperature

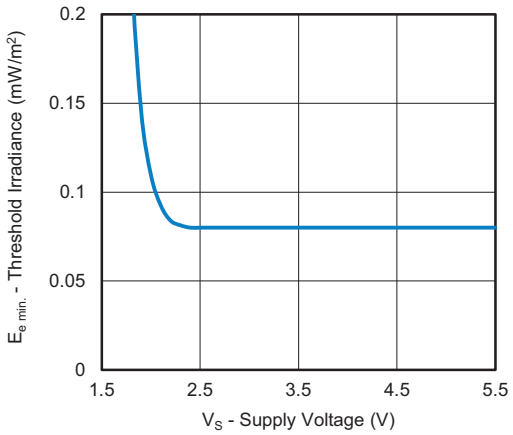


Fig. 12 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

This series is designed to suppress spurious output pulses due to noise or disturbance signals. The devices can distinguish data signals from noise due to differences in frequency, burst length, and envelope duty cycle. The data signal should be close to the device's band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal presented to the device in the presence of a disturbance, the sensitivity of the receiver is automatically reduced by the AGC to insure that no spurious pulses are present at the receiver's output. Some examples which are suppressed are:

- DC light (e.g. from tungsten bulbs sunlight)
- Continuous signals at any frequency
- Strongly or weakly modulated patterns from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14)
- 2.4 GHz and 5 GHz Wi-Fi

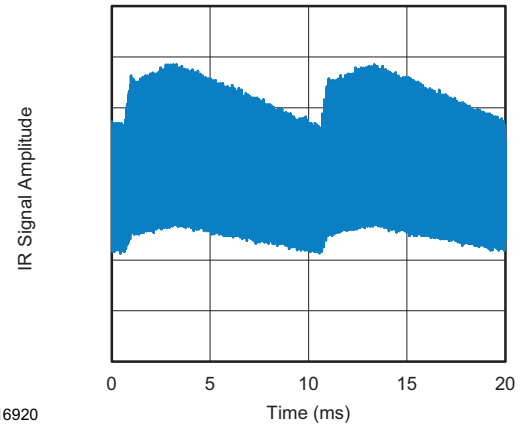


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

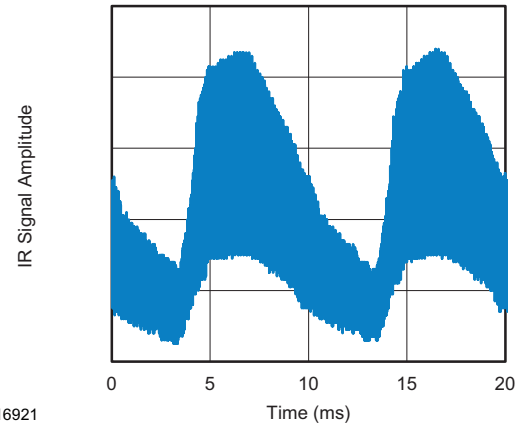


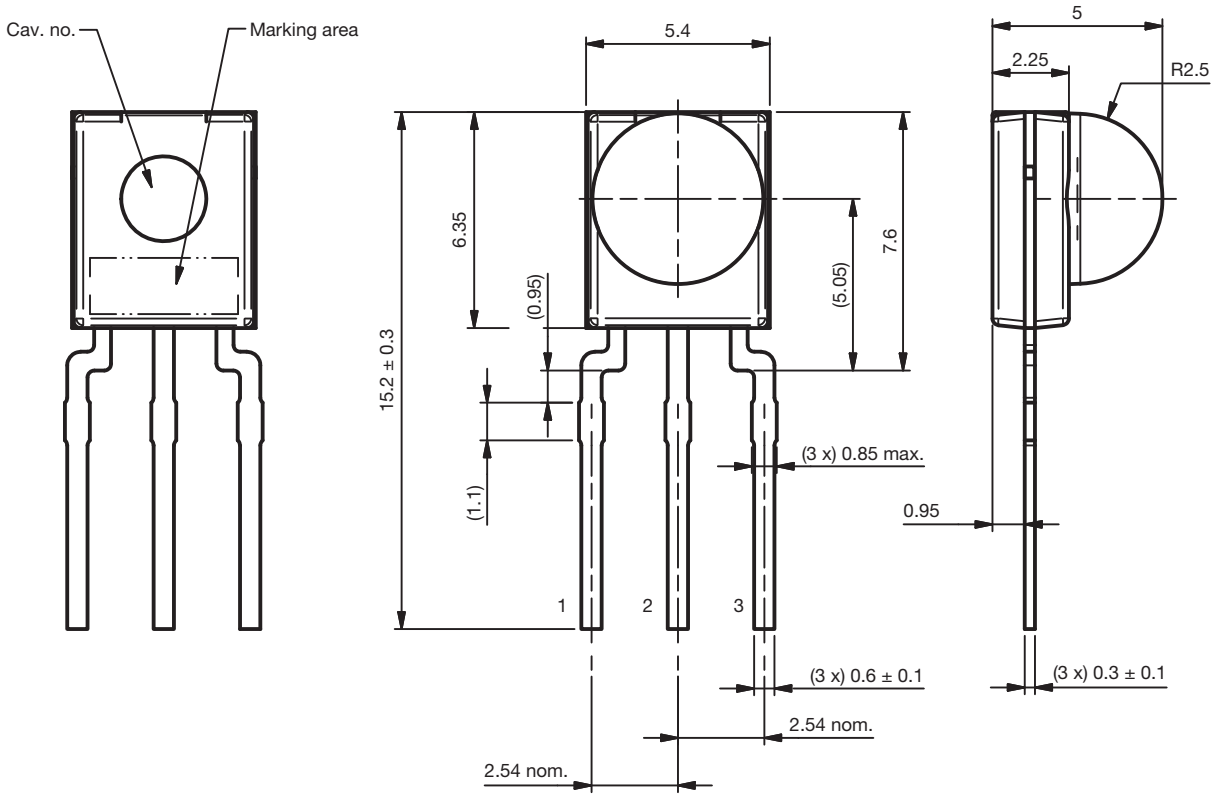
Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

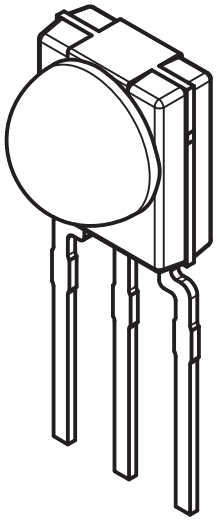
	TSOP132..	TSOP134..	TSOP136..
Minimum burst length	16 cycles/burst	10 cycles/burst	16 cycles/burst
After each burst of length a minimum gap time is required of	16 to 85 cycles ≥ 18 cycles	6 to 40 cycles ≥ 12 cycles	6 to 50 cycles ≥ 18 cycles
For bursts greater than a minimum gap time in the data stream is needed of	85 cycles > 6 x burst length	40 cycles > 10 x burst length	50 cycles > 10 x burst length
Maximum number of continuous short bursts/second	800	1300	800
RC-5 code	Yes	Preferred	Preferred
RC-6 code	Yes	Preferred	Yes
NEC code	Yes	Preferred	Yes
r-step code	Yes	Preferred	Yes
Sony code	Preferred	No	No
RCA 56 kHz code	Yes	Yes	Preferred
Suppression of interference from fluorescent lamps	Fig. 13	Fig. 13 and Fig. 14	Fig. 13 and Fig. 14

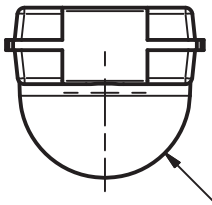
Note

- For data formats with short bursts please see the datasheet for TSOP131.., TSOP133.., TSOP135..

PACKAGE DIMENSIONS in millimeters







Not indicated tolerances ± 0.2

Technical drawings according to DIN specification.

Drawing no.: 6.550-5335.01-4
Issue: 1; 16.09.15

BULK PACKAGING

Standard shipping for minimold is in conductive plastic bags. The packing quantity is determined by weight and the number of components per carton may vary by a maximum of ± 0.3 %.

ORDERING INFORMATION

Examples: **TSOP13438**
TSOP13456VI1
TSOP13438SS1F

For more information, see: www.vishay.com/doc?80076

PACKAGING QUANTITY

- 300 pieces per bag (each bag is individually boxed)
- 6 bags per carton

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