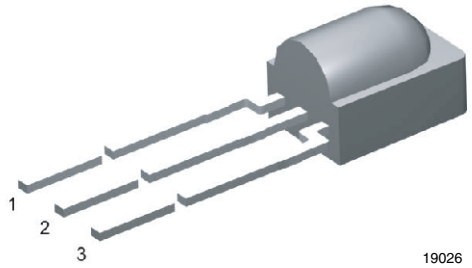
IR Receiver Modules for Remote Control Systems



FEATURES

- Low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against EMI
- Supply voltage: 2.5 V to 5.5 V
- Suitable for short bursts: Burst length ≥ 6 carrier cycles
- Improved immunity against ambient light
- 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)

MECHANICAL DATA

Pinning for TSOP581.., TSOP583.., TSOP585:

1 = OUT, 2 = GND, 3 = V_S

Pinning for TSOP591.., TSOP593.., TSOP595:

1 = OUT, 2 = V_S, 3 = GND

DESCRIPTION

These products are miniaturized receivers for infrared remote control systems. A PIN diode and a preamplifier are assembled on a lead frame, the epoxy package acts as an IR filter.

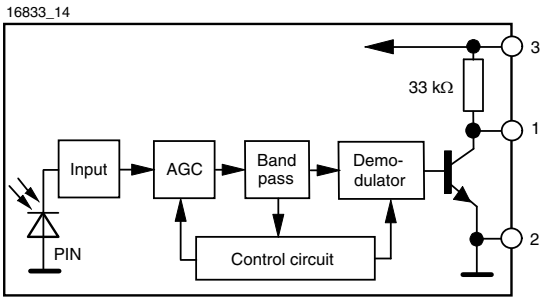
The demodulated output signal can be directly connected to a microprocessor for decoding. The TSOP581.., TSOP591.. are legacy products compatible with all common IR remote control data formats. The TSOP583.., TSOP593 are optimized to better suppress spurious pulses from energy saving fluorescent lamps. The TSOP585.., TSOP595.. have an excellent noise suppression. They are immune to dimmed LCD backlighting and any fluorescent lamps. AGC3 and AGC5 may also suppress some data signals in case of continuous transmission. Between these three receiver types, the TSOP583.. is preferred. Customers should initially try the TSOP583.. in their design.

This component has not been qualified according to automotive specifications.

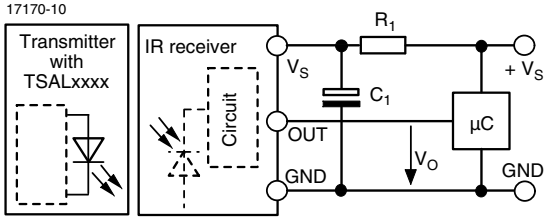
PARTS TABLE

AGC		LEGACY PRODUCT FOR SHORT BURST REMOTE CONTROLS (AGC1)		NOISY ENVIRONMENTS AND SHORT BURSTS (AGC3)		VERY NOISY ENVIRONMENTS AND SHORT BURSTS (AGC5)	
Carrier frequency	30 kHz	TSOP58130	TSOP59130	TSOP58330	TSOP59330	TSOP58530	TSOP59530
	33 kHz	TSOP58133	TSOP59133	TSOP58333	TSOP59333	TSOP58533	TSOP59533
	36 kHz	TSOP58136	TSOP59136	TSOP58336	TSOP59336 (1)(2)	TSOP58536	TSOP59536 (1)(2)
	38 kHz	TSOP58138	TSOP59138	TSOP58338	TSOP59338 (3)(4)(5)(6)	TSOP58538	TSOP59538 (3)(4)(5)
	40 kHz	TSOP58140	TSOP59140	TSOP58340	TSOP59340	TSOP58540	TSOP59540
	56 kHz	TSOP58156	TSOP59156	TSOP58356	TSOP59356	TSOP58556	TSOP59556
Package		Minicast					
Pinning		1= OUT, 2 = GND, 3 = V_S	1 = OUT, 2 = V_S, 3 = GND	1= OUT, 2 = GND, 3 = V_S	1 = OUT, 2 = V_S, 3 = GND	1= OUT, 2 = GND, 3 = V_S	1 = OUT, 2 = V_S, 3 = GND
Dimensions (mm)		5.0 W x 6.95 H x 4.8 D					
Mounting		Leaded					
Application		Remote control					
Best remote control code		(1) MCIR (2) RCMM (3) Mitsubishi (4) RECS-80 Code (5) r-map (6) XMP-1, XMP-2					

BLOCK DIAGRAM



APPLICATION CIRCUIT



The external components R_1 and C_1 are optional to improve the robustness against electrical overstress (typical values are R_1 = 100 Ω, C_1 = 0.1 µF).

ABSOLUTE MAXIMUM RATINGS

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Supply voltage		V_S	-0.3 to +6	V
Supply current		I_S	5	mA
Output voltage		V_O	-0.3 to 5.5	V
Voltage at output to supply		$V_S - V_O$	-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 voltage		V_S	2.5		5.5	V
Supply current	V_S = 5 V, E_v = 0	I_{SD}	0.55	0.7	0.9	mA
	E_v = 40 klx, sunlight	I_{SH}		0.8		mA
Transmission distance	E_v = 0, IR diode TSAL6200, I_F = 250 mA, test signal see fig. 1	d		40		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: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1	$E_{e\ min.}$		0.2	0.4	mW/m²
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1	$E_{e\ max.}$	50			W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		± 45		deg

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

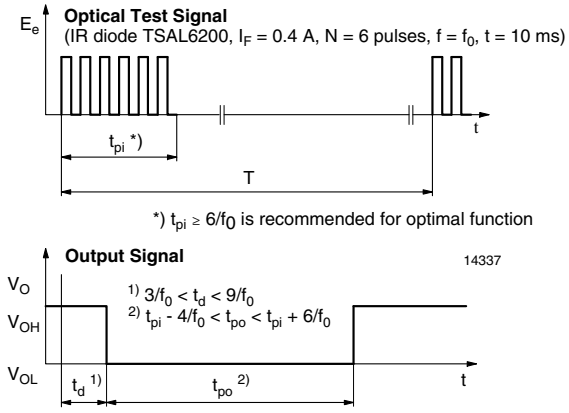


Fig. 1 - Output Active Low

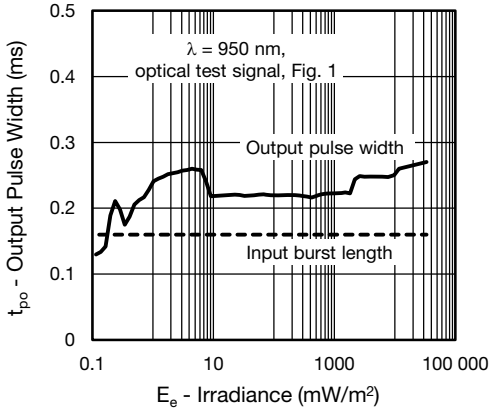


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

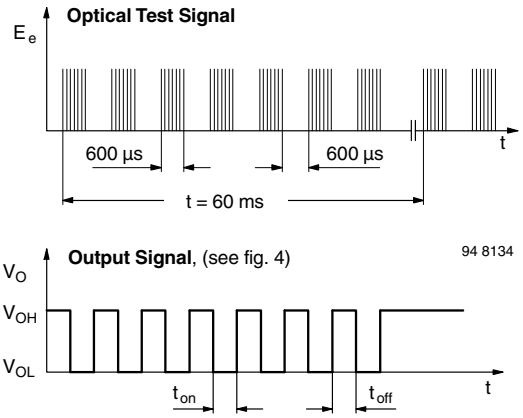


Fig. 3 - Output Function

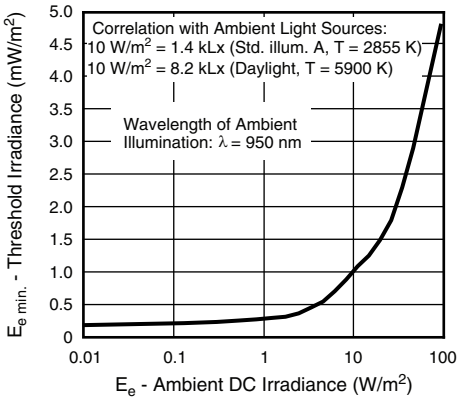


Fig. 6 - Sensitivity in Bright Ambient

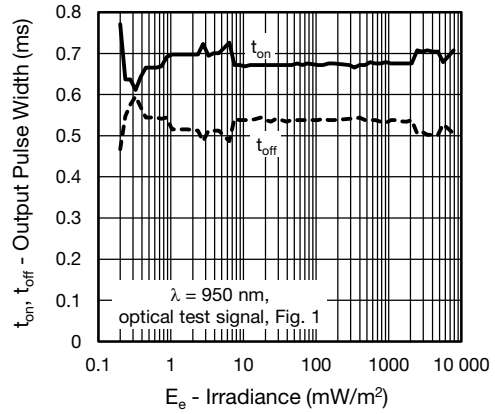


Fig. 4 - Output Pulse Diagram

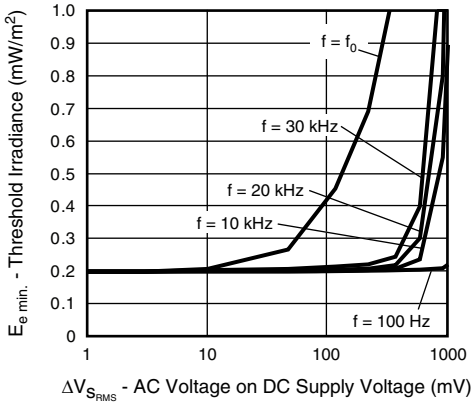


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

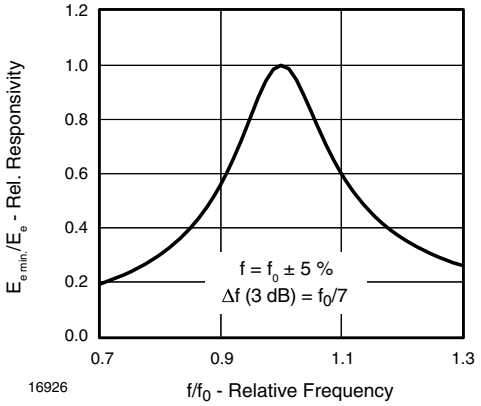


Fig. 5 - Frequency Dependence of Responsivity

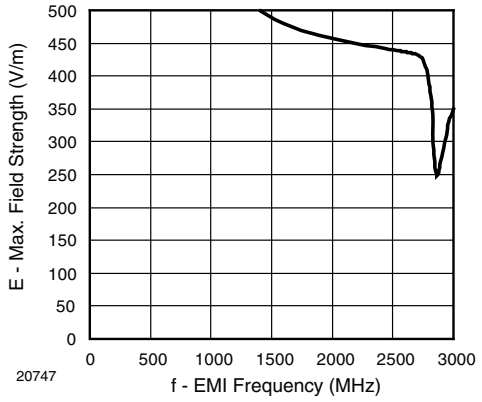


Fig. 8 - Sensitivity vs. Electric Field Disturbances

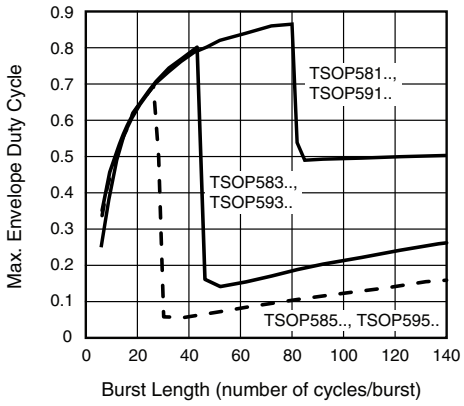


Fig. 9 - Max. Envelope Duty Cycle vs. Burst Length

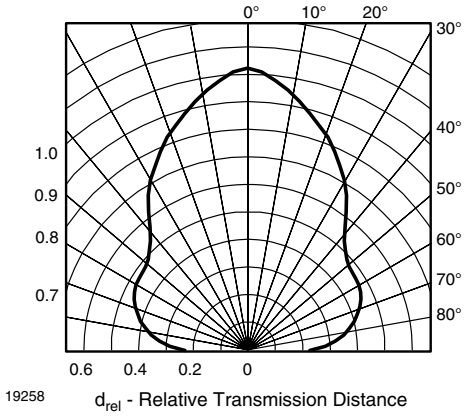


Fig. 12 - Horizontal Directivity

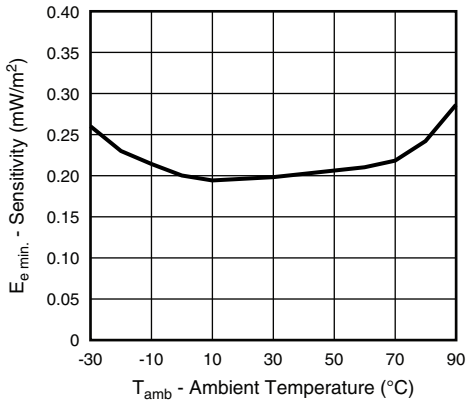


Fig. 10 - Sensitivity vs. Ambient Temperature

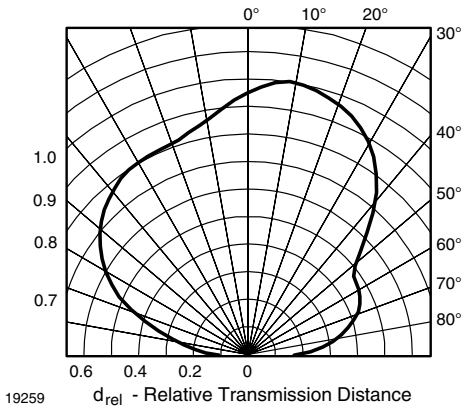


Fig. 13 - Vertical Directivity

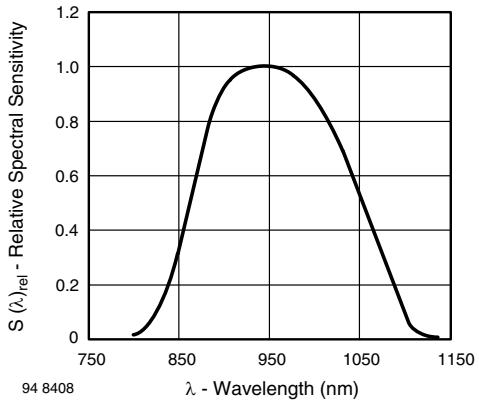


Fig. 11 - Relative Spectral Sensitivity vs. Wavelength

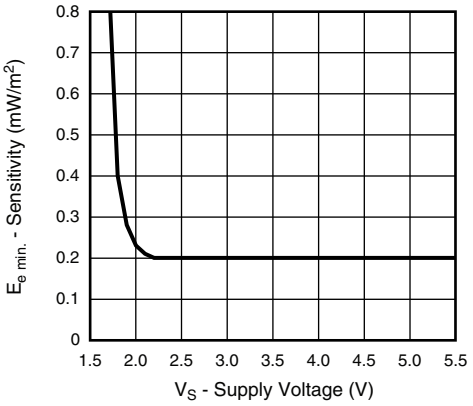


Fig. 14 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

These products are designed to suppress spurious output pulses due to noise or disturbance signals. Data and disturbance signals can be distinguished by the devices according to carrier frequency, burst length and envelope duty cycle. The data signal should be close to the band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the IR receiver in the presence of a disturbance signal, the sensitivity of the receiver is reduced to insure that no spurious pulses are present at the output. Some examples of disturbance signals which are suppressed are:

- DC light (e.g. from tungsten bulb or sunlight)
- Continuous signals at any frequency
- Modulated IR signals from common fluorescent lamps (example of noise pattern is shown in fig. 15 or fig. 16)

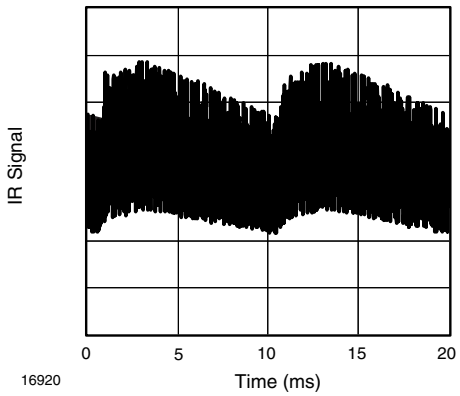


Fig. 15 - IR Disturbance from Fluorescent Lamp with Low Modulation

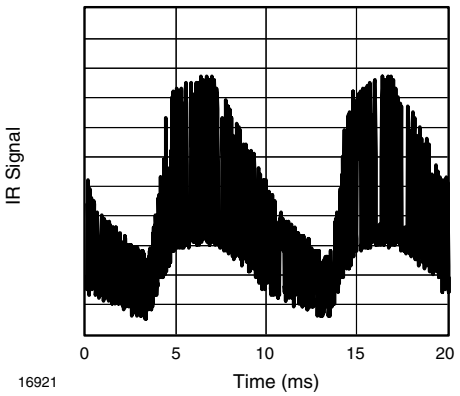


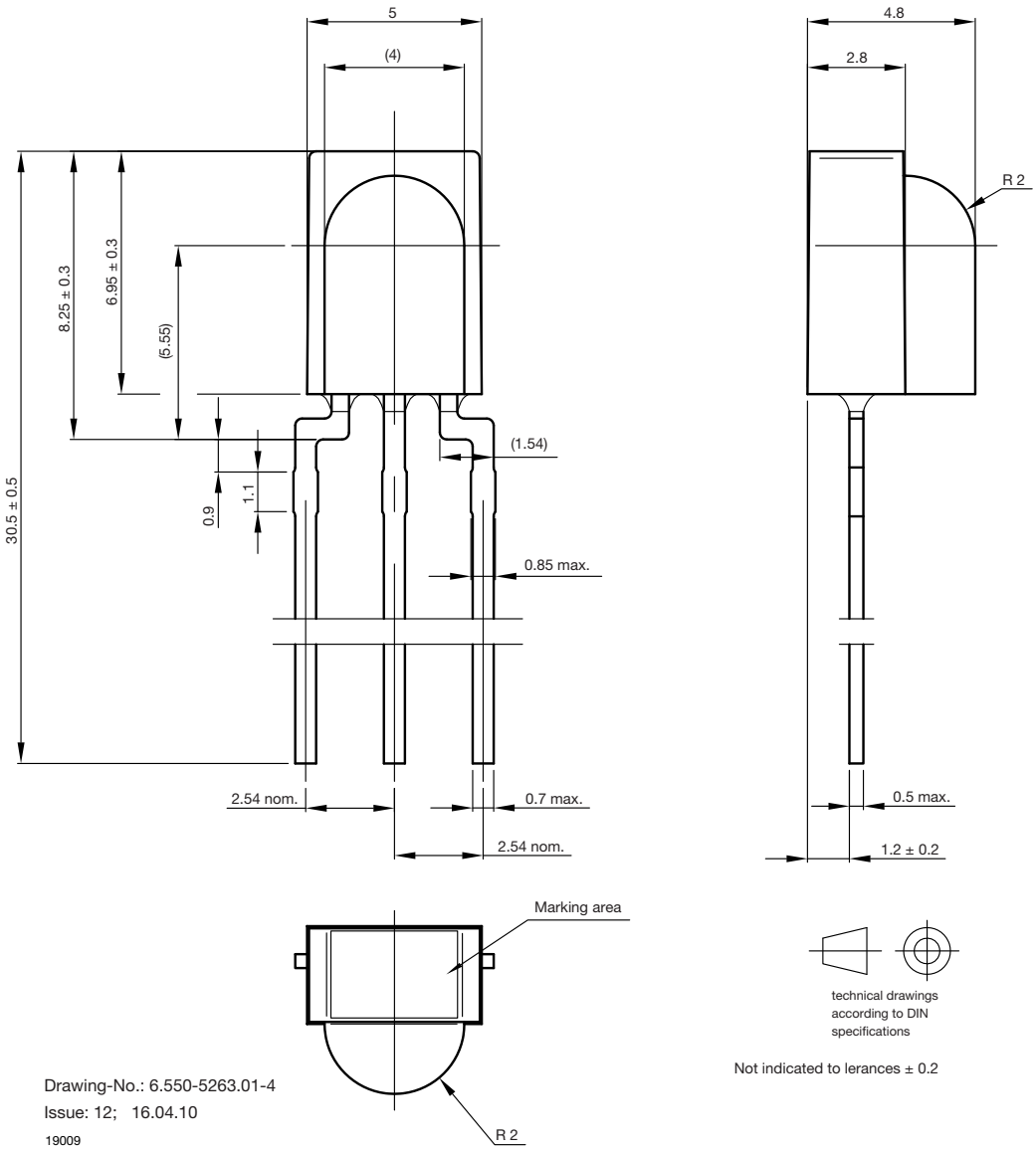
Fig. 16 - IR Disturbance from Fluorescent Lamp with High Modulation

	TSOP581.., TSOP591..	TSOP583.., TSOP593..	TSOP585.., TSOP595..
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length A gap time is required of	6 to 70 cycles ≥ 10 cycles	6 to 35 cycles ≥ 10 cycles	6 to 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 1.2 x burst length	35 cycles > 6 x burst length	24 cycles > 25 ms
Maximum number of continuous short bursts/second	2000	2000	2000
MCIR code	yes	preferred	yes
RCMM code	yes	preferred	yes
XMP-1, XMP-2 code	yes	preferred	yes
Suppression of interference from fluorescent lamps	Common disturbance patterns are supressed (example: signal pattern of fig. 14)	Even critical disturbance patterns are suppressed (examples: signal pattern of fig. 14 and fig. 15)	Even critical disturbance patterns are suppressed (examples: signal pattern of fig. 14 and fig. 15)

Notes

- For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP582.., TSOP584..
- Best choice of AGC for some popular IR-codes:
  - TSOP58336: MCIR, RCMM
  - TSOP58538: Mitsubishi, RECS-80 Code
  - TSOP58338: XMP-1, XMP-2, r-map
- For SIRCS 15 and 20 bit, Sony 12 bit IR-codes, please see the datasheet for TSOP4S40, TSOP2S40

PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5263.01-4
Issue: 12; 16.04.10
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