

## High Speed Infrared Emitting Diodes, 940 nm, Surface Emitter Technology

VSMY2941RGX01



VSMY2941GX01



### DESCRIPTION

As part of the [SurfLight™](#) portfolio, the VSMY2941X01 series are infrared, 940 nm emitting diodes based on GaAlAs surface emitter chip technology with extreme high radiant intensities, high optical power and high speed, molded in clear, untinted plastic packages (with lens) for surface mounting (SMD).

### APPLICATIONS

- Miniature light barrier
- Photointerrupters
- Optical switch
- Emitter source for proximity sensors

### FEATURES

- Package type: surface-mount
- Package form: GW, RGW
- Dimensions (L x W x H in mm): 2.3 x 2.3 x 2.8
- Peak wavelength:  $\lambda_p = 940$  nm
- AEC-Q101 qualified
- High radiant power
- Very high radiant intensity
- Angle of half intensity:  $\phi = \pm 8^\circ$
- Terminal configurations: gullwing or reverse gullwing
- Package matches with detector VEMD2000X01 series
- Floor life: 4 weeks, MSL 2a, according to J-STD-020
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**  
**GREEN**  
(5-2008)

| PRODUCT SUMMARY |               |              |                  |            |
|-----------------|---------------|--------------|------------------|------------|
| COMPONENT       | $I_e$ (mW/sr) | $\phi$ (deg) | $\lambda_p$ (nm) | $t_r$ (ns) |
| VSMY2941RGX01   | 160           | $\pm 8$      | 940              | 5          |
| VSMY2941GX01    | 160           | $\pm 8$      | 940              | 5          |

#### Note

- Test conditions see table "Basic Characteristics"

| ORDERING INFORMATION |               |                              |                  |
|----------------------|---------------|------------------------------|------------------|
| ORDERING CODE        | PACKAGING     | REMARKS                      | PACKAGE FORM     |
| VSMY2941RGX01        | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Reverse gullwing |
| VSMY2941GX01         | Tape and reel | MOQ: 6000 pcs, 6000 pcs/reel | Gullwing         |

#### Note

- MOQ: minimum order quantity

| ABSOLUTE MAXIMUM RATINGS ( $T_{amb} = 25$ °C, unless otherwise specified) |                                  |            |             |      |
|---|----------------------------------|------------|-------------|------|
| PARAMETER   | TEST CONDITION                   | SYMBOL     | VALUE       | UNIT |
| Reverse voltage   |                                  | $V_R$      | 5           | V    |
| Forward current   |                                  | $I_F$      | 70          | mA   |
| Peak forward current  | $t_p/T = 0.5, t_p = 100$ $\mu$ s | $I_{FM}$   | 140         | mA   |
| Surge forward current   | $t_p = 100$ $\mu$ s              | $I_{FSM}$  | 500         | mA   |
| Power dissipation   |                                  | $P_V$      | 120         | mW   |
| Junction temperature  |                                  | $T_j$      | 100         | °C   |
| Operating temperature range   |                                  | $T_{amb}$  | -40 to +85  | °C   |
| Storage temperature range   |                                  | $T_{stg}$  | -40 to +100 | °C   |
| Soldering temperature   | According to Fig. 10, J-STD-020  | $T_{sd}$   | 260         | °C   |
| Thermal resistance junction-to-ambient                                    | J-STD-051, soldered on PCB       | $R_{thJA}$ | 250         | K/W  |

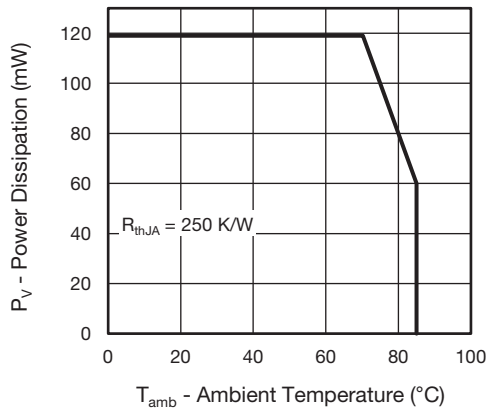


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

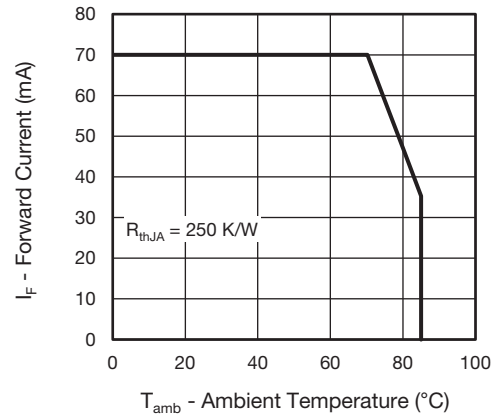


Fig. 2 - Forward Current Limit vs. Ambient Temperature

| BASIC CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |   |                             |                                    |      |      |       |
|--|---|-----------------------------|------------------------------------|------|------|-------|
| PARAMETER  | TEST CONDITION  | SYMBOL                      | MIN.                               | TYP. | MAX. | UNIT  |
| Forward voltage  | I <sub>F</sub> = 50 mA, t <sub>p</sub> = 20 ms            | V <sub>F</sub>              | -                                  | 1.4  | 1.7  | V     |
|  | I <sub>F</sub> = 70 mA, t <sub>p</sub> = 20 ms            | V <sub>F</sub>              | -                                  | 1.5  | -    | V     |
|  | I <sub>F</sub> = 500 mA, t <sub>p</sub> = 100 μs          | V <sub>F</sub>              | -                                  | 2.6  | -    | V     |
| Temperature coefficient of V <sub>F</sub>                                    | I <sub>F</sub> = 50 mA                                    | TK <sub>V<sub>F</sub></sub> | -                                  | -0.7 | -    | mV/K  |
| Reverse current  |   | I <sub>R</sub>              | Not designed for reverse operation |      |      | μA    |
| Junction capacitance   | V <sub>R</sub> = 0 V, f = 1 MHz, E = 0 mW/cm <sup>2</sup> | C <sub>J</sub>              | -                                  | 30   | -    | pF    |
| Radiant intensity  | I <sub>F</sub> = 50 mA, t <sub>p</sub> = 20 ms            | I <sub>e</sub>              | 60                                 | 115  | 170  | mW/sr |
|  | I <sub>F</sub> = 70 mA, t <sub>p</sub> = 20 ms            | I <sub>e</sub>              | -                                  | 160  | -    | mW/sr |
|  | I <sub>F</sub> = 500 mA, t <sub>p</sub> = 100 μs          | I <sub>e</sub>              | -                                  | 850  | -    | mW/sr |
| Radiant power  | I <sub>F</sub> = 70 mA, t <sub>p</sub> = 20 ms            | φ <sub>e</sub>              | -                                  | 40   | -    | mW    |
| Temperature coefficient of radiant power                                     | I <sub>F</sub> = 50 mA                                    | TKφ <sub>e</sub>            | -                                  | -0.2 | -    | %/K   |
| Angle of half intensity  |   | φ                           | -                                  | ± 8  | -    | deg   |
| Peak wavelength  | I <sub>F</sub> = 50 mA                                    | λ <sub>p</sub>              | 920                                | 940  | 960  | nm    |
| Spectral bandwidth   | I <sub>F</sub> = 70 mA                                    | Δλ                          | -                                  | 55   | -    | nm    |
| Temperature coefficient of λ <sub>p</sub>                                    | I <sub>F</sub> = 70 mA                                    | TKλ <sub>p</sub>            | -                                  | 0.28 | -    | nm/K  |
| Rise time  | I <sub>F</sub> = 70 mA, 10 % to 90 %                      | t <sub>r</sub>              | -                                  | 5    | -    | ns    |
| Fall time  | I <sub>F</sub> = 70 mA, 10 % to 90 %                      | t <sub>f</sub>              | -                                  | 6    | -    | ns    |

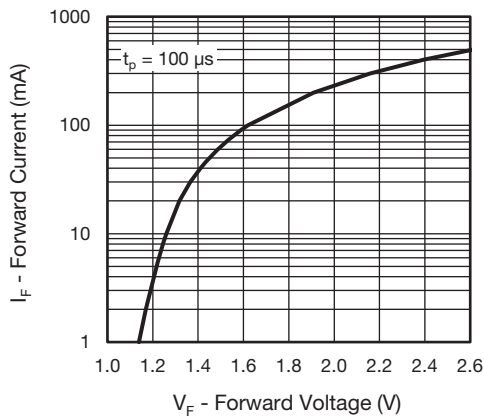
**BASIC CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 3 - Forward Current vs. Forward Voltage

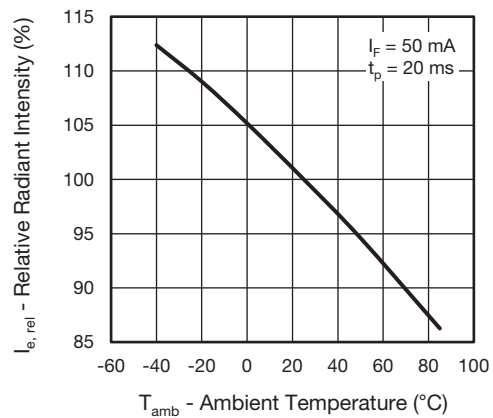


Fig. 6 - Relative Radiant Intensity vs. Ambient Temperature

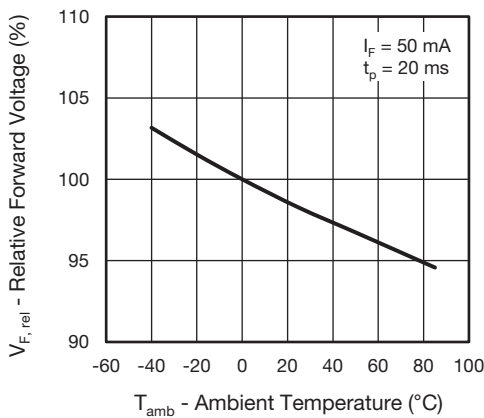


Fig. 4 - Relative Forward Voltage vs. Ambient Temperature

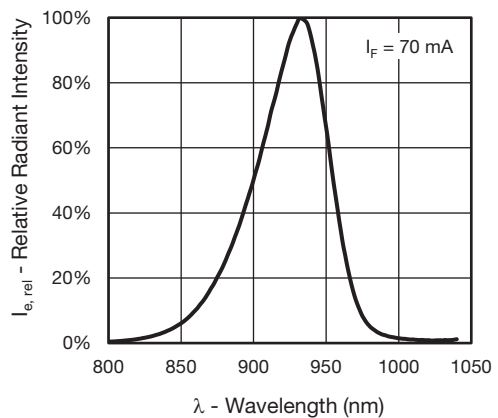


Fig. 7 - Relative Radiant Intensity vs. Wavelength

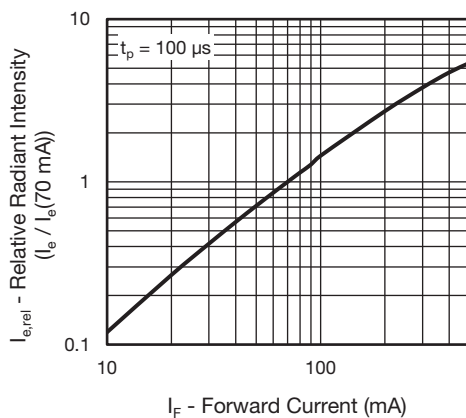


Fig. 5 - Radiant Intensity vs. Forward Current

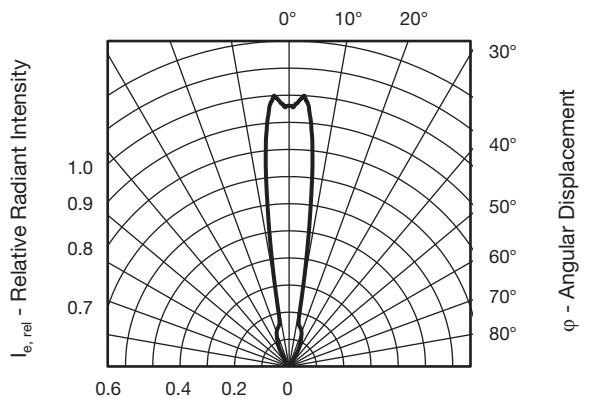


Fig. 8 - Relative Radiant Intensity vs. Angular Displacement



## SOLDER PROFILE

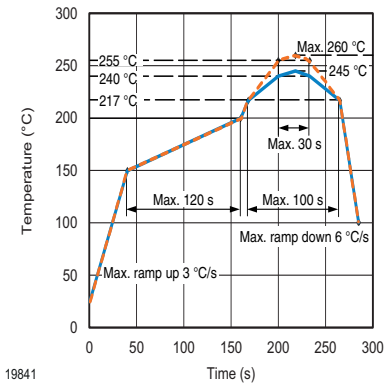


Fig. 9 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020

## DRYPACK

Devices are packed in moisture barrier bags (MBB) to prevent the products from moisture absorption during transportation and storage. Each bag contains a desiccant.

## FLOOR LIFE

Floor life (time between soldering and removing from MBB) must not exceed the time indicated on MBB label:

Floor life: 4 weeks

Conditions:  $T_{amb} < 30\text{ °C}$ ,  $RH < 60\%$

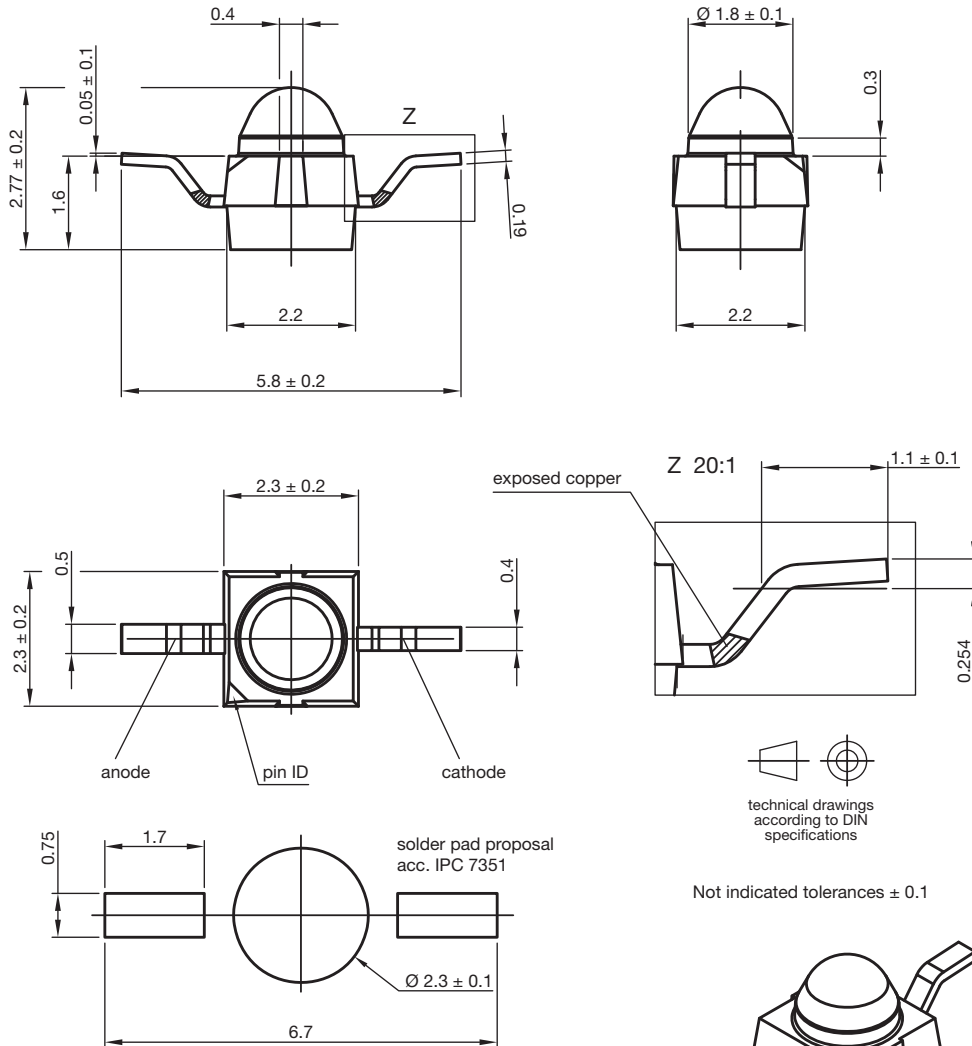
Moisture sensitivity level 2a, according to J-STD-020.

## DRYING

In case of moisture absorption devices should be baked before soldering. Conditions see J-STD-020 or label.

Devices taped on reel dry using recommended conditions 192 h at  $40\text{ °C}$  ( $+ 5\text{ °C}$ ),  $RH < 5\%$ .

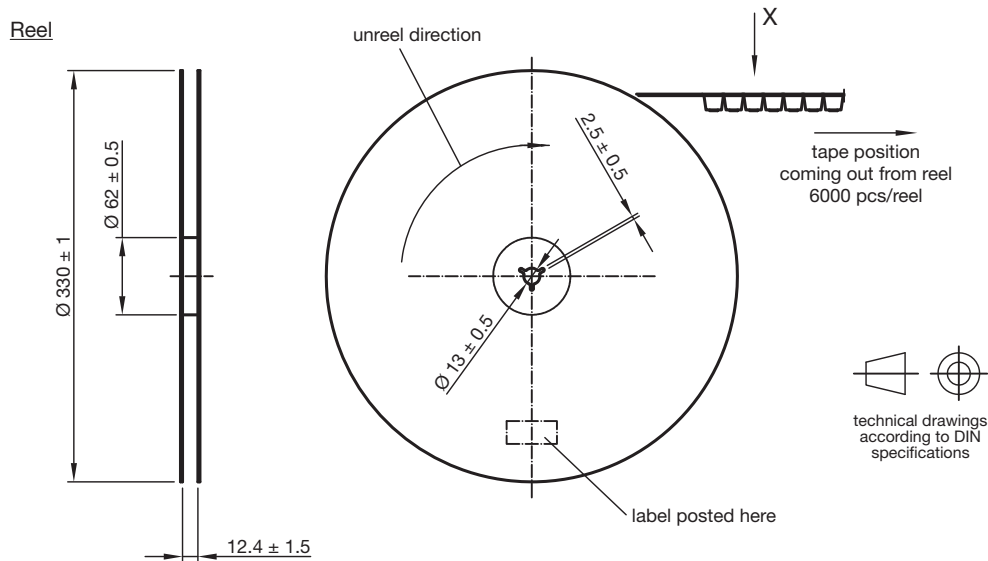
## PACKAGE DIMENSIONS in millimeters: VSMY2941RGX01



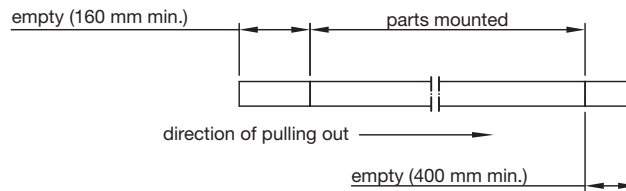
Drawing-No.: 6.544-5391.03-4  
Issue: 2; 19.09.14



## TAPING AND REEL DIMENSIONS in millimeters: VSMY2941RGX01

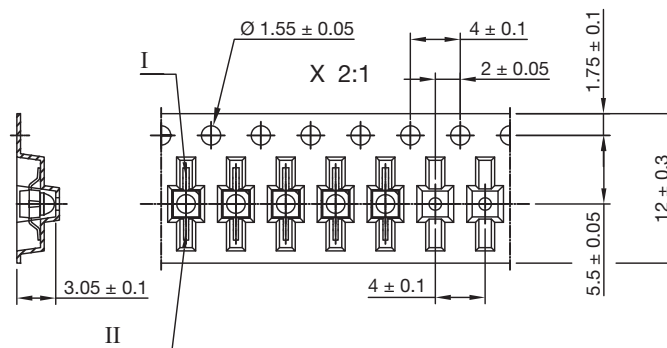


### Leader and trailer tape



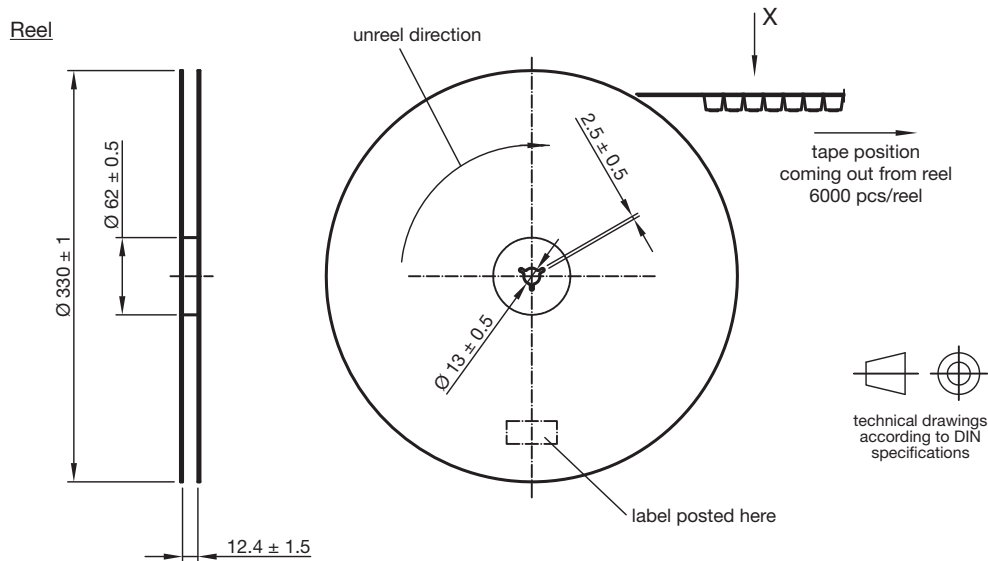
### Terminal position in tape

| Device     | Lead I    | Lead II |
|------------|-----------|---------|
| VENT2000   | Collector | Emitter |
| VENT2500   |           |         |
| VEMD2000   |           |         |
| VEMD2500   | Cathode   | Anode   |
| VSMB2000   |           |         |
| VSMG2000   |           |         |
| VSMF2890RG | Anode     | Cathode |
| VSMY2850RG |           |         |
| VSMY2940RG |           |         |

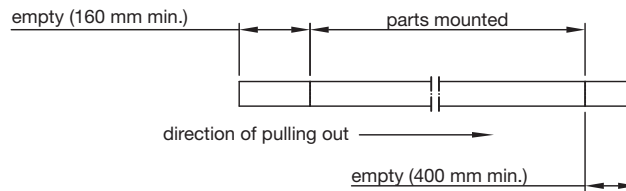


Drawing-No.: 9.800-5100.01-4  
Issue: 4; 19.09.14

## TAPING AND REEL DIMENSIONS in millimeters: VSMY2941GX01

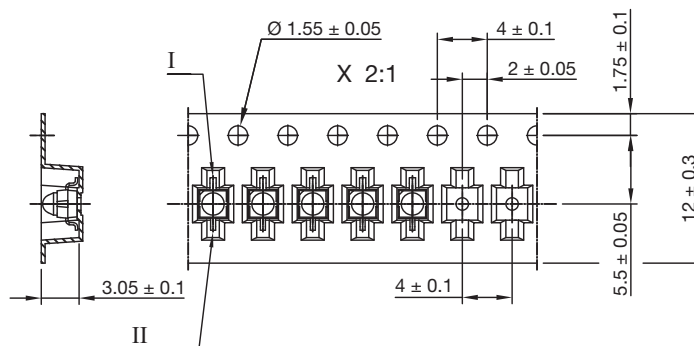


### Leader and trailer tape



### Terminal position in tape

| Device    | Lead I    | Lead II |
|-----------|-----------|---------|
| VSMB2020  | Cathode   | Anode   |
| VSMG2020  |           |         |
| VEMD2020  |           |         |
| VEMD2520  |           |         |
| VSMF2890G | Collector | Emitter |
| VEMT2020  |           |         |
| VEMT2520  |           |         |
| VSMY2850G | Anode     | Cathode |
| VSMY2940G |           |         |



Drawing-No.: 9.800-5091.01-4  
Issue: 5; 19.09.14



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