



## IR Receiver Modules for Remote Control Systems



### DESCRIPTION

This IR receiver series is optimized for long burst remote control systems in different environments. The customer can choose between different IC settings (AGC variants), to find the optimum solution for his application. The higher the AGC, the better noise is suppressed, but the lower the code compatibility.

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. These components have not been qualified to automotive specifications.

### FEATURES

- Individual IC settings to reach maximum performance
- Immunity against noise (lamps, LCD TV, Wi-Fi)
- Low supply current
- Photo detector and preamplifier in one package
- Supply voltage: 2.0 V to 5.5 V
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



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

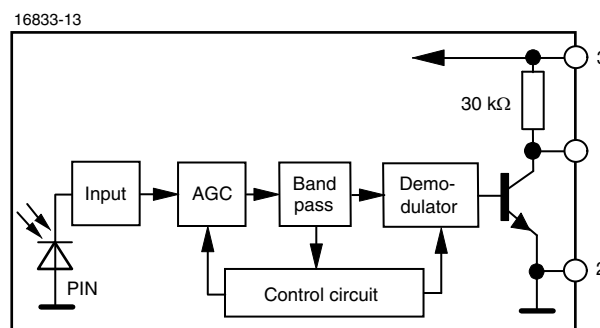
### LINKS TO ADDITIONAL RESOURCES



### DESIGN SUPPORT TOOLS

- [3D models](#)
- [Window size calculator](#)

### BLOCK DIAGRAM





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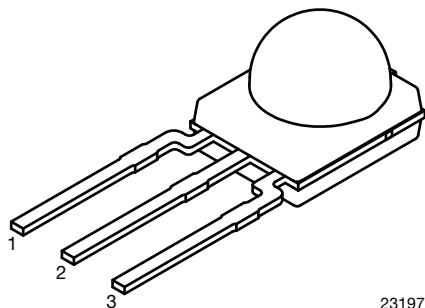
# TSOP332..DF1P, TSOP334..DF1P

Vishay Semiconductors

## MECHANICAL DATA

### Pinning for TSOP334..DF1P:

1 = OUT, 2 = GND, 3 =  $V_S$



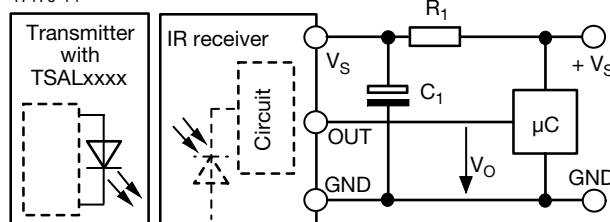
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## ORDERING CODE

TSOP33...DF1P - 1100 pieces in tape and reel

## APPLICATION CIRCUIT

17170-14



$R_1$  and  $C_1$  recommended in case there are strong ripple or spikes on the supply line.

## PARTS TABLE

AGC		LEGACY, FOR LONG BURSTS (AGC2)	FOR LONG BURSTS, VERY NOISY ENVIRONMENTS (AGC4)
Carrier frequency	30 kHz	TSOP33230DF1P	TSOP33430DF1P
	33 kHz	TSOP33233DF1P	TSOP33433DF1P
	36 kHz	TSOP33236DF1P	TSOP33436DF1P <sup>(1)(2)(3)</sup>
	38 kHz	TSOP33238DF1P	TSOP33438DF1P <sup>(4)(5)(6)</sup>
	40 kHz	TSOP33240DF1P	TSOP33440DF1P
	56 kHz	TSOP33256DF1P	TSOP33456DF1P <sup>(7)</sup>
Package		Minimold	
Pinning		1 = OUT, 2 = GND, 3 = $V_S$	
Dimensions (mm)		5.4 W x 6.35 H x 4.9 D	
Mounting		SMD	
Application		Remote control	
Best choice for		<sup>(1)</sup> RC-5 <sup>(2)</sup> RC-6 <sup>(3)</sup> Panasonic <sup>(4)</sup> NEC <sup>(5)</sup> Sharp <sup>(6)</sup> Mitsubishi <sup>(7)</sup> Thomson RCA	
Special options		<ul style="list-style-type: none"> <li>Narrow optical filter: <a href="http://www.vishay.com/doc?81590">www.vishay.com/doc?81590</a></li> <li>Wide optical filter: <a href="http://www.vishay.com/doc?82726">www.vishay.com/doc?82726</a></li> </ul>	

## 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	$T_{amb} \leq 85^\circ\text{C}$	$P_{tot}$	10	mW
Soldering temperature	$t \leq 10$ 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 ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply current	$E_v = 0$ , $V_s = 3.3\text{ V}$	$I_{SD}$	0.25	0.35	0.45	mA
	$E_v = 40\text{ klx}$ , sunlight	$I_{SH}$	-	0.45	-	mA
Supply voltage		$V_s$	2.0	-	5.5	V
Transmission distance	$E_v = 0$ , test signal see Fig. 1, IR diode TSAL6200, $I_F = 50\text{ mA}$	$d$	-	39	-	m
Output voltage low	$I_{OSL} = 0.5\text{ mA}$ , $E_e = 0.7\text{ mW/m}^2$ , test signal see Fig. 1	$V_{OSL}$	-	-	100	mV
Minimum irradiance	Test signal: RC5 code	$E_{e\text{ min.}}$	-	0.05	0.15	$\text{mW/m}^2$
	Test signal: NEC code	$E_{e\text{ min.}}$	-	0.08	0.15	$\text{mW/m}^2$
Maximum irradiance	$t_{pi} - 5/f_0 < t_{po} < t_{pi} + 5/f_0$ , test signal see Fig. 1	$E_{e\text{ max.}}$	30	-	-	$\text{W/m}^2$
Directivity	Angle of half transmission distance	$\Phi_{1/2}$	-	$\pm 45$	-	$^{\circ}$

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

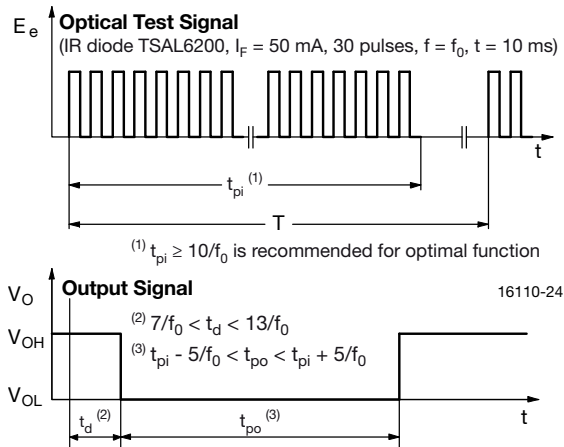


Fig. 1 - Output Active Low

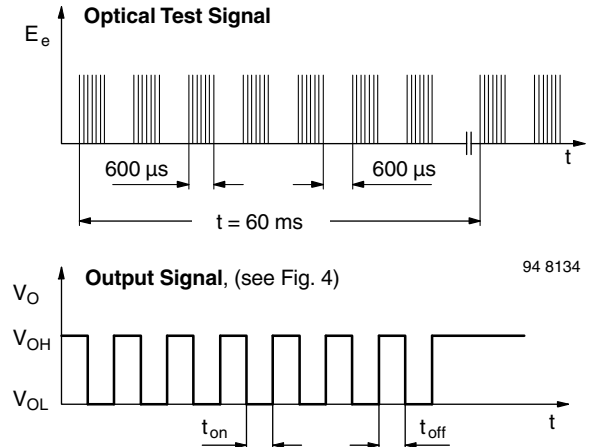


Fig. 3 - Output Function

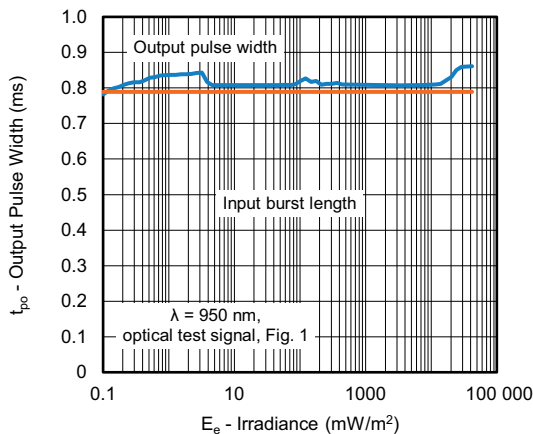


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

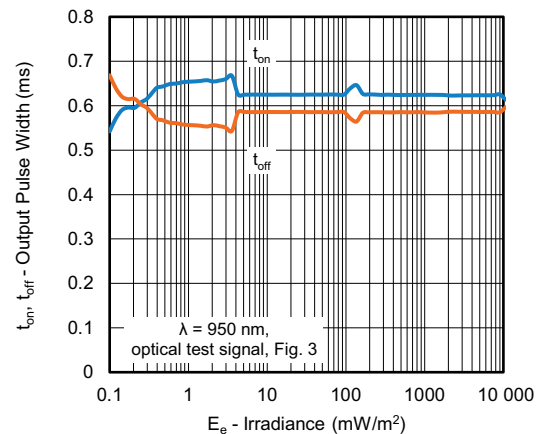


Fig. 4 - Output Pulse Diagram

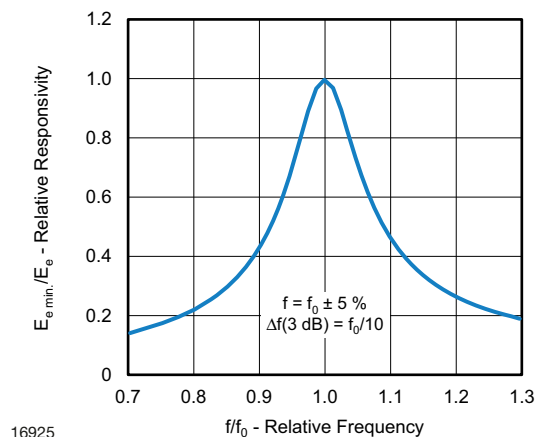


Fig. 5 - Frequency Dependence of Responsivity

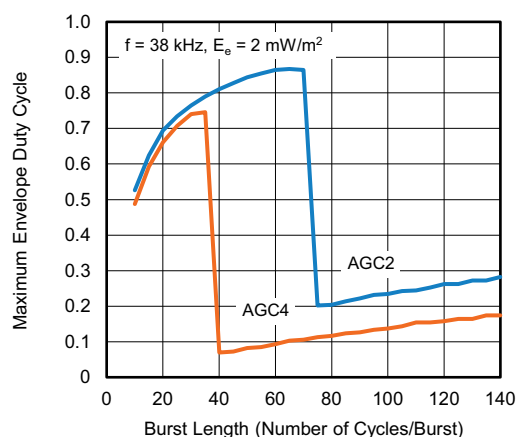


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

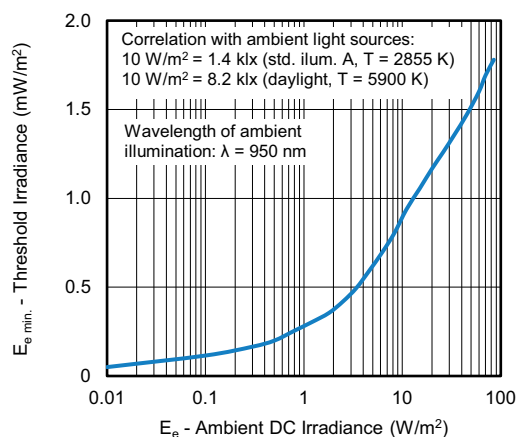


Fig. 6 - Sensitivity in Bright Ambient

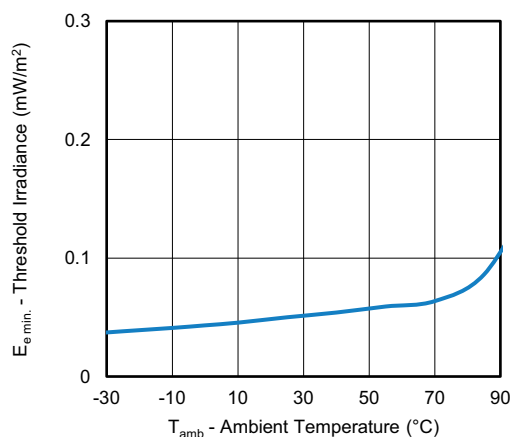


Fig. 9 - Sensitivity vs. Ambient Temperature

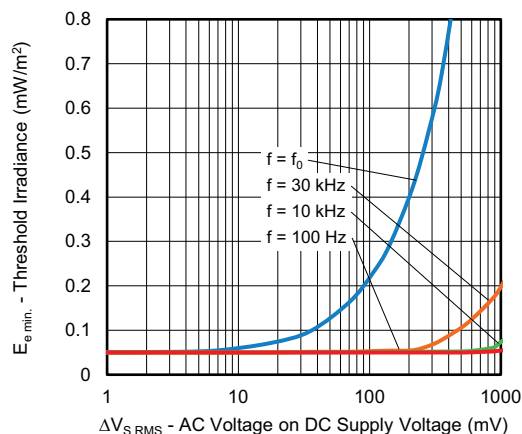


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

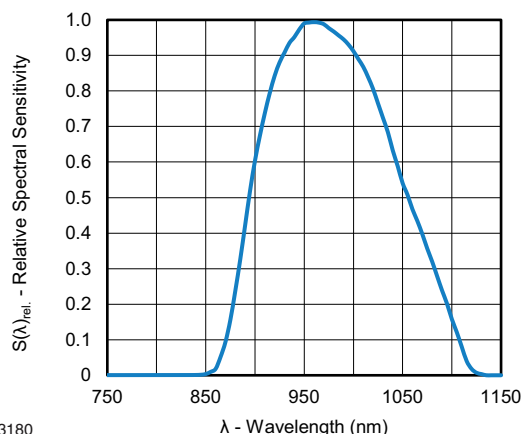


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

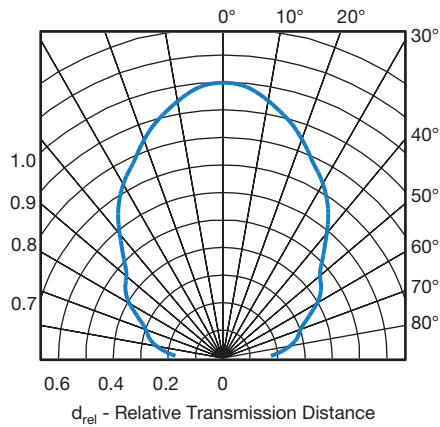


Fig. 11 - Horizontal Directivity

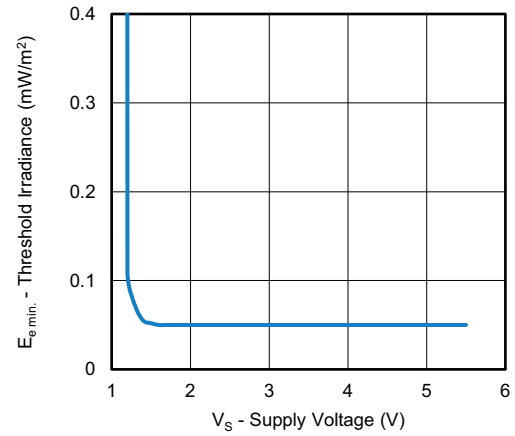


Fig. 12 - Sensitivity vs. Supply Voltage



## 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).



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



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

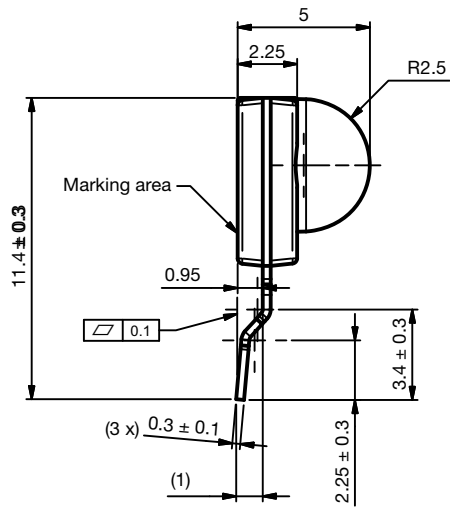
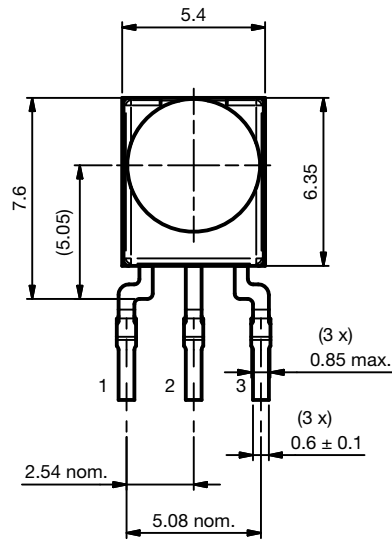
	TSOP332..DF1P	TSOP334..DF1P
Minimum burst length	10 cycles/burst	10 cycles/burst
After each burst of length a minimum gap time is required of	10 to 70 cycles ≥ 12 cycles	10 to 35 cycles ≥ 12 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 5 x burst length	35 cycles > 15 x burst length
Maximum number of continuous short bursts/second	1700	1700
NEC code	Yes	Preferred
RC5/RC6 code	Yes	Preferred
Thomson 56 kHz code	Yes	Preferred
Sharp code	Yes	Preferred
Mitsubishi code	Yes	Preferred
Sony code	Yes	No
Suppression of interference from fluorescent lamps	Fig. 13	Fig. 13 and Fig. 14

### Notes

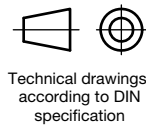
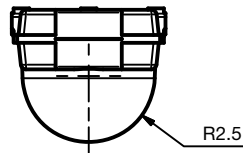
- For data formats with short bursts please see the datasheet for TSOP331..DF1P, TSOP333..DF1P, TSOP335..DF1P
- For Sony 12, 15, and 20 bit IR-codes please see the datasheet for TSOP33S40DF1P



**PACKAGE DIMENSIONS** in millimeters

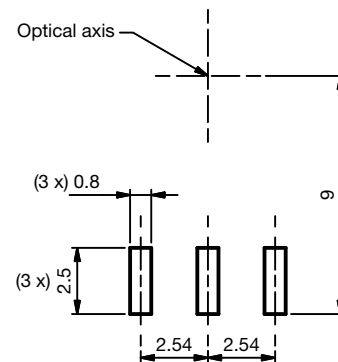


Not indicated tolerances  $\pm 0.2$



Technical drawings  
according to DIN  
specification

Proposed pad layout  
from component side  
(for reference only)



Drawing-No.: 6.550-5343.01-4  
Issue: 2; 02.07.19



## ASSEMBLY INSTRUCTIONS

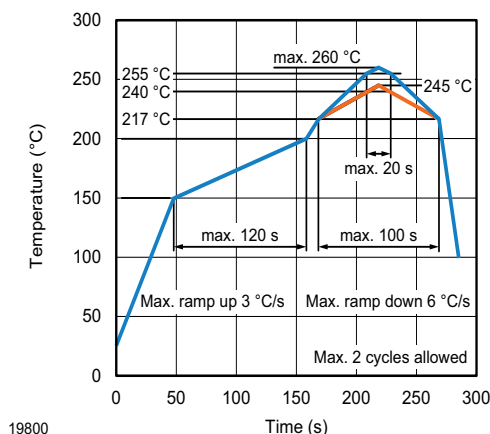
### Reflow Soldering

- Reflow soldering must be done within 72 h while stored under a max. temperature of 30 °C, 60 % RH after opening the dry pack envelope
- Set the furnace temperatures for pre-heating and heating in accordance with the reflow temperature profile as shown in the diagram. Exercise extreme care to keep the maximum temperature below 260 °C. The temperature shown in the profile means the temperature at the device surface. Since there is a temperature difference between the component and the circuit board, it should be verified that the temperature of the device is accurately being measured
- Handling after reflow should be done only after the work surface has been cooled off

### Manual Soldering

- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off

## VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE





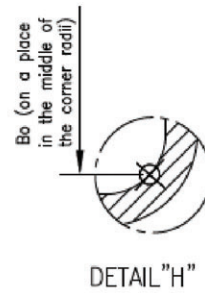
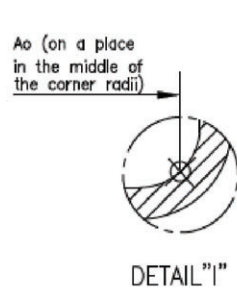
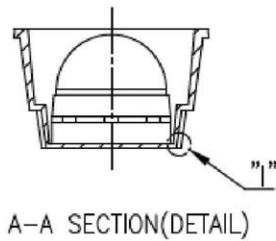
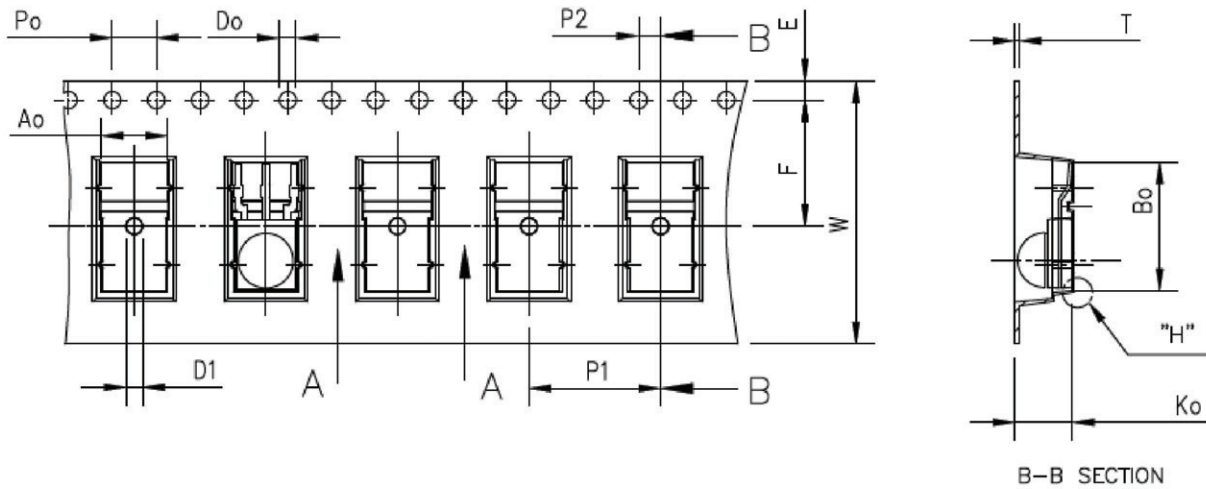


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# TSOP332..DF1P, TSOP334..DF1P

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## PACKAGING DIMENSIONS in millimeters



Drawing-No.: 9.700-5399.01-4  
Issue: 2; 29.06.18

Item	A <sub>0</sub>	B <sub>0</sub>	K <sub>0</sub>	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	T
Dimensions	6.08 ± 0.10	11.75 ± 0.10	5.25 ± 0.10	4.0 ± 0.10	12.0 ± 0.10	2.0 ± 0.10	0.40 ± 0.05
Item	E	F	D <sub>0</sub>	D <sub>1</sub>	W	10P <sub>0</sub>	
Dimensions	1.75 ± 0.10	11.50 ± 0.10	1.55 ± 0.05	1.5 min.	24.0 +0.30 / -0.10	40.0 ± 0.20	

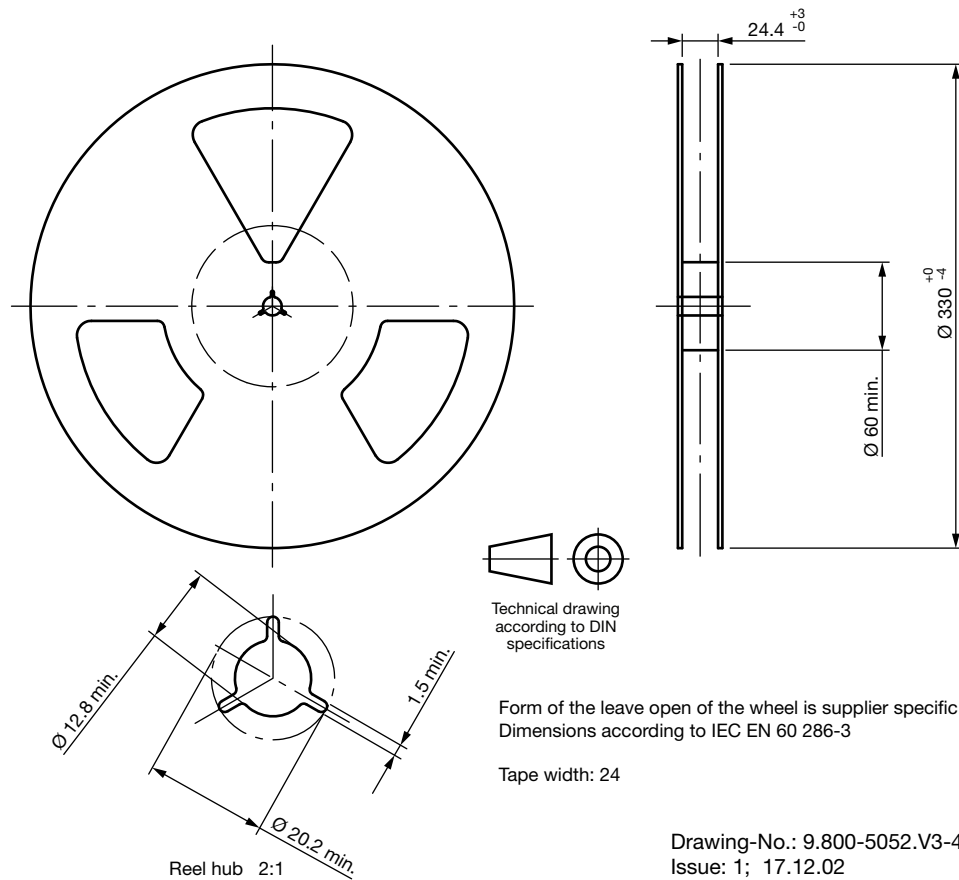


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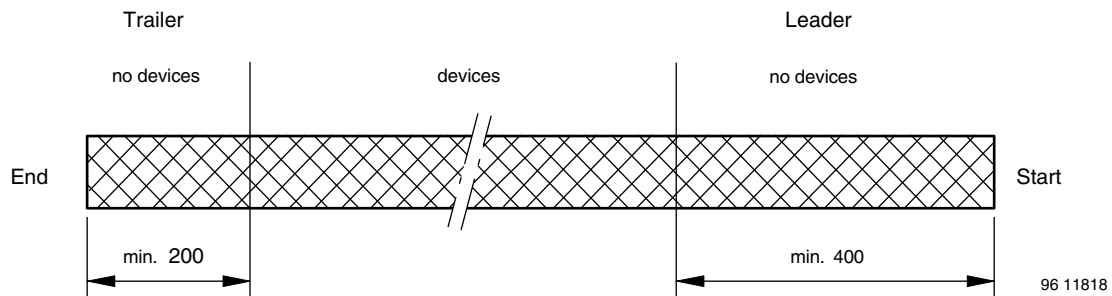
# TSOP332..DF1P, TSOP334..DF1P

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## REEL DIMENSIONS in millimeters



## LEADER AND TRAILER DIMENSIONS in millimeters



## COVER TAPE PEEL STRENGTH

According to DIN EN 60286-3

0.1 N to 1.3 N

300 mm/min.  $\pm$  10 mm/min.

165° to 180° peel angle

**ORDERING INFORMATION****Note**

- d = "digit", please consult the list of available series on the previous page to create a valid part number

**Example: TSOP33238DF1P**

**PACKAGING QUANTITY**

- 1100 pieces per reel
- 1 reel per box

**LABEL****Standard bar code labels for finished goods**

The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain Vishay Semiconductor GmbH specific data.

VISHAY SEMICONDUCTOR GmbH STANDARD BAR CODE PRODUCT LABEL (finished goods)		
PLAIN WRITING	ABBREVIATION	LENGTH
Item-description	-	18
Item-number	INO	8
Selection-code	SEL	3
LOT-/serial-number	BATCH	10
Data-code	COD	3 (YWW)
Plant-code	PTC	2
Quantity	QTY	8
Accepted by	ACC	-
Packed by	PCK	-
Mixed code indicator	MIXED CODE	-
Origin	xxxxxxx+	Company logo
LONG BAR CODE TOP	TYPE	LENGTH
Item-number	N	8
Plant-code	N	2
Sequence-number	X	3
Quantity	N	8
Total length	-	21
SHORT BAR CODE BOTTOM	TYPE	LENGTH
Selection-code	X	3
Data-code	N	3
Batch-number	X	10
Filter	-	1
Total length	-	17



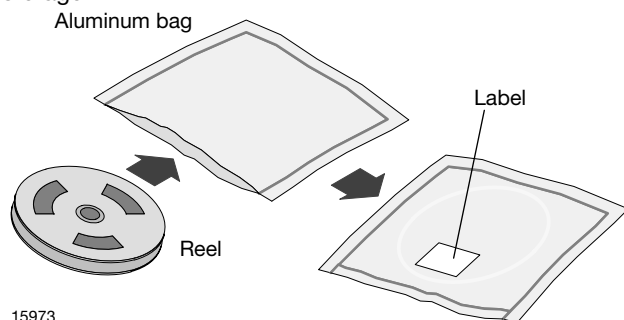
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# TSOP332..DF1P, TSOP334..DF1P

Vishay Semiconductors

## DRY PACKING

The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.



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## FINAL PACKING

The sealed reel is packed into a cardboard box. A secondary cardboard box is used for shipping purposes.

## RECOMMENDED METHOD OF STORAGE

Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- Storage temperature 10 °C to 30 °C
- Storage humidity ≤ 60 % RH max.

After more than 72 h under these conditions moisture content will be too high for reflow soldering.

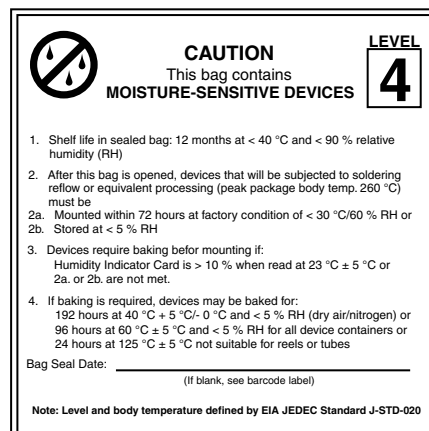
In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

192 h at 40 °C + 5 °C / - 0 °C and < 5 % RH (dry air / nitrogen) or

96 h at 60 °C + 5 °C and < 5 % RH for all device containers or

24 h at 125 °C + 5 °C not suitable for reel or tubes.

An EIA JEDEC® standard J-STD-020 level 4 label is included on all dry bags.



22522

EIA JEDEC standard J-STD-020 level 4 label is included on all dry bags

## ESD PRECAUTION

Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electrostatic sensitive devices warning labels are on the packaging.

## VISHAY SEMICONDUCTORS STANDARD BAR CODE LABELS

The Vishay Semiconductors standard bar code labels are printed at final packing areas. The labels are on each packing unit and contain Vishay Semiconductors specific data.



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