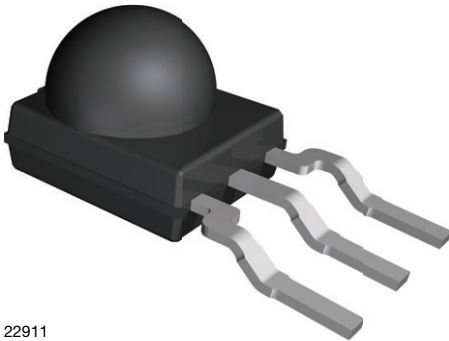


IR Receiver Modules for Remote Control Systems



22911

LINKS TO ADDITIONAL RESOURCES



DESCRIPTION

The TSOP33...DF1P series are miniaturized IR receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on lead frame, the epoxy package contains an IR filter.

The demodulated output signal can be directly connected to a microprocessor for decoding.

The TSOP333..DF1P series devices are optimized to suppress almost all spurious pulses from energy saving lamps like CFLs. AGC3 may also suppress some data signals if continuously transmitted.

The TSOP331..DF1P series are provided primarily for compatibility with old AGC1 designs. New designs should prefer the TSOP333..DF1P series containing the newer AGC3. The TSOP335..DF1P series contain a very robust AGC5. This series should only be used for critically noisy environments.

These components have not been qualified according to automotive specifications.

FEATURES

- Very low supply current
- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- 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



MECHANICAL DATA

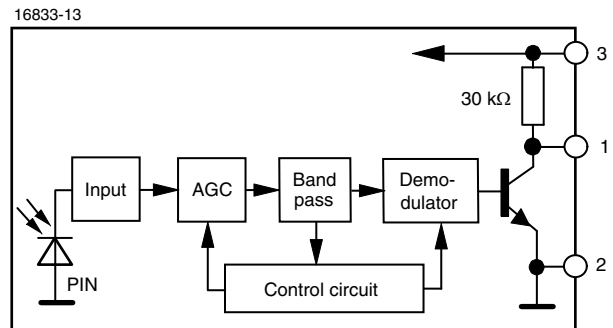
Pinning for TSOP33...DF1P:

1 = OUT, 2 = GND, 3 = V_S

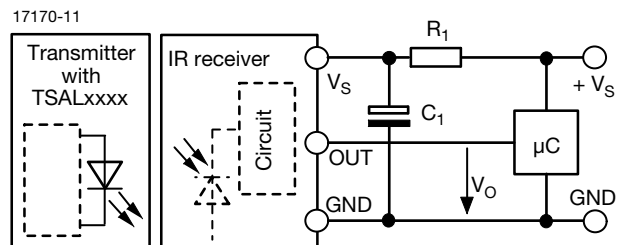
ORDERING CODE

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

BLOCK DIAGRAM



APPLICATION CIRCUIT



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



PARTS TABLE					
AGC		LEGACY, FOR SHORT BURSTS (AGC1)	FOR SHORT BURSTS, NOISY ENVIRONMENTS (AGC3)	FOR SHORT BURSTS, VERY NOISY ENVIRONMENTS (AGC5)	
Carrier frequency	30 kHz	TSOP33130DF1P	TSOP33330DF1P	TSOP33530DF1P	
	33 kHz	TSOP33133DF1P	TSOP33333DF1P	TSOP33533DF1P	
	36 kHz	TSOP33136DF1P	TSOP33336DF1P ⁽¹⁾⁽²⁾⁽⁷⁾	TSOP33536DF1P	
	38 kHz	TSOP33138DF1P	TSOP33338DF1P ⁽³⁾⁽⁴⁾⁽⁵⁾⁽⁶⁾	TSOP33538DF1P	
	40 kHz	TSOP33140DF1P	TSOP33340DF1P	TSOP33540DF1P	
	56 kHz	TSOP33156DF1P	TSOP33356DF1P	TSOP33556DF1P	
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		⁽¹⁾ MCIR ⁽²⁾ RCMM ⁽³⁾ Mitsubishi ⁽⁴⁾ RECS-80 Code ⁽⁵⁾ r-map ⁽⁶⁾ XMP-1, XMP-2 ⁽⁷⁾ RCMM			
Special options		<ul style="list-style-type: none"> Narrow optical filter: www.vishay.com/doc?81590 Wide optical filter: www.vishay.com/doc?82726 Low voltage option: www.vishay.com/doc?82382 			

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} ≤ 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}	0.27	0.35	0.45	mA
	E _v = 40 klx, sunlight	I _{SH}	-	0.45	-	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 _g = 0.7 mW/m ² , test signal see Fig. 1	V _{OSL}	-	-	100	mV
Minimum irradiance	Pulse width tolerance: t _{pi} - 5/f ₀ < t _{po} < t _{pi} + 6/f ₀ , test signal see Fig. 1	E _{e min.}	-	0.08	0.15	mW/m ²
Maximum irradiance	t _{pi} - 5/f ₀ < t _{po} < t _{pi} + 6/f ₀ , test signal see Fig. 1	E _{e max.}	30	-	-	W/m ²
Directivity	Angle of half transmission distance	φ _{1/2}	-	± 45	-	°

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

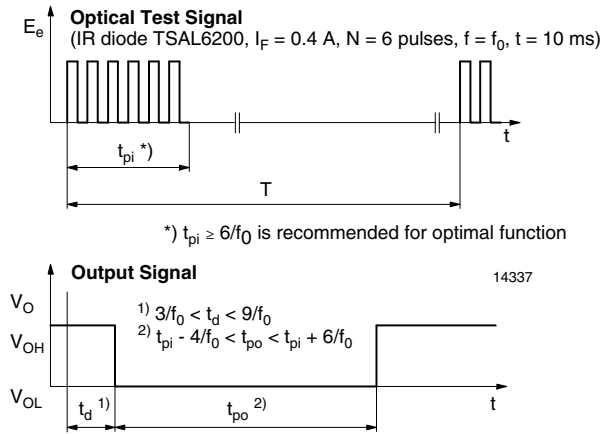


Fig. 1 - Output Active Low

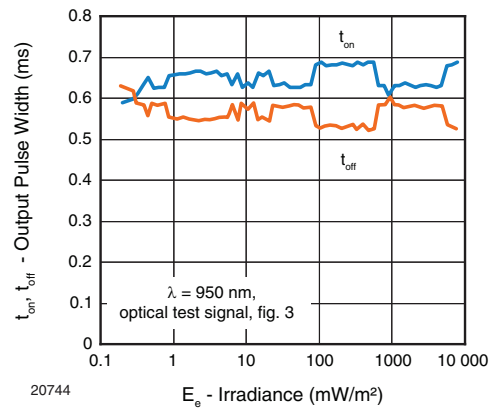


Fig. 4 - Output Pulse Diagram

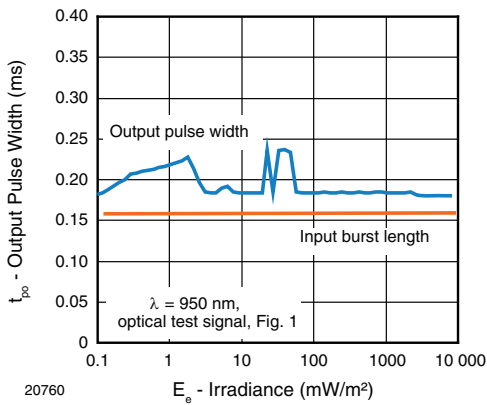


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

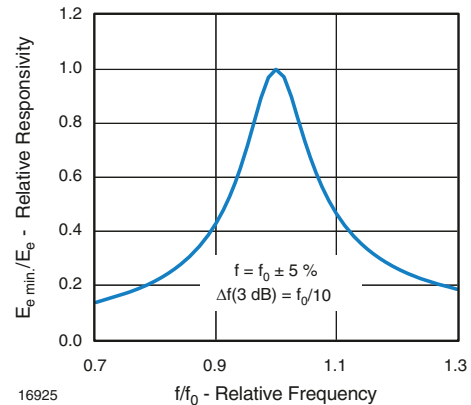


Fig. 5 - Frequency Dependence of Responsivity

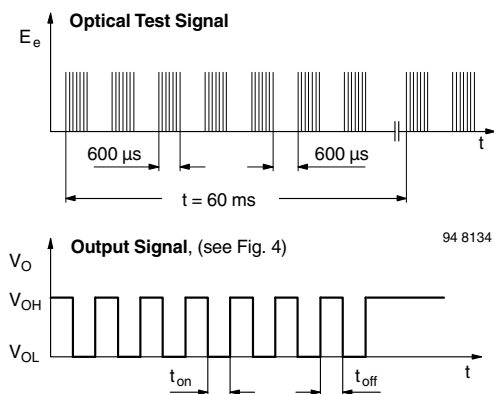


Fig. 3 - Output Function

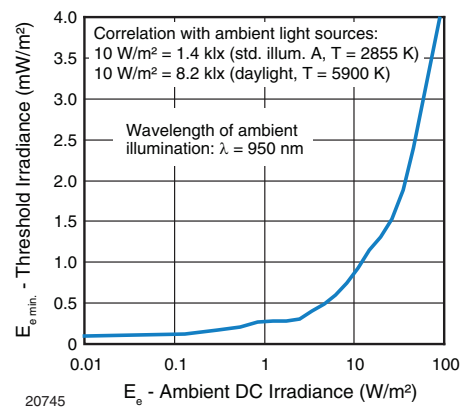


Fig. 6 - Sensitivity in Bright Ambient

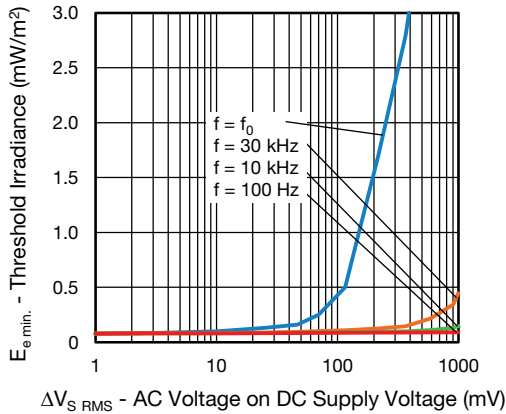


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

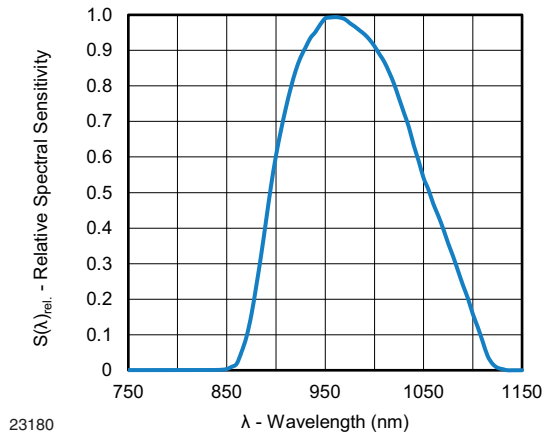


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength

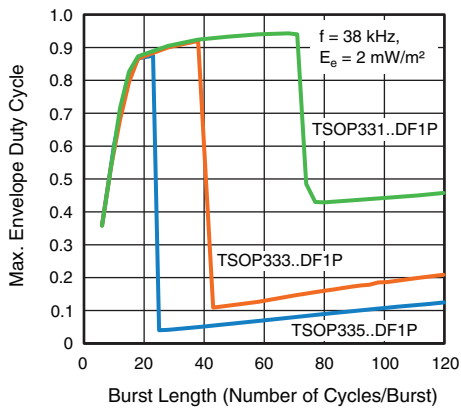


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

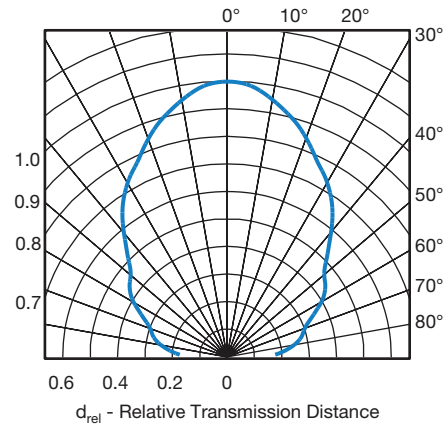


Fig. 11 - Horizontal Directivity

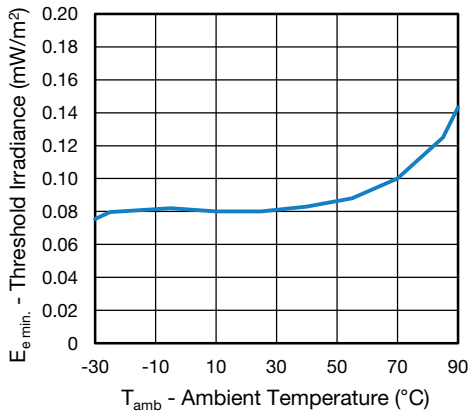


Fig. 9 - Sensitivity vs. Ambient Temperature

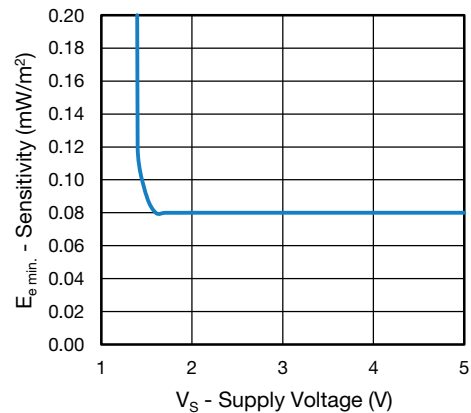


Fig. 12 - Sensitivity vs. Supply Voltage

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).



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



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

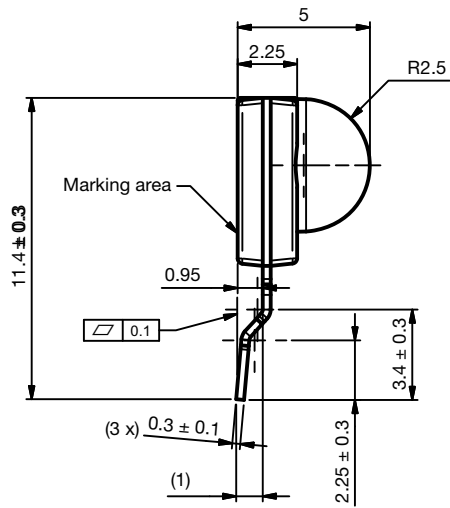
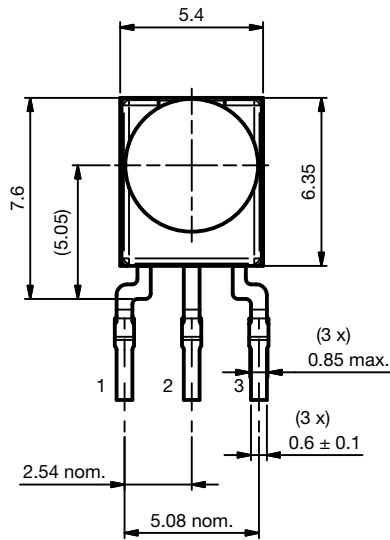
	TSOP331..DF1P	TSOP333..DF1P	TSOP335..DF1P
Minimum burst length	6 cycles/burst	6 cycles/burst	6 cycles/burst
After each burst of length A gap time is required of	6 to 70 cycles ≥ 10 cycles	6 to 35 cycles ≥ 10 cycles	6 to 24 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream 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	Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13)	Complex disturbance patterns are suppressed (example: signal pattern of Fig. 14)	Critical disturbance patterns are suppressed, e.g. highly dimmed LCDs

Note

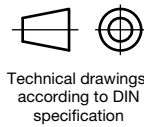
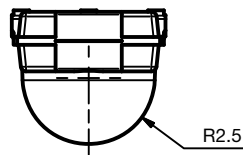
- For data formats with long bursts (more than 10 carrier cycles) please see the datasheet for TSOP332..DF1P, TSOP334..DF1P



PACKAGE DIMENSIONS in millimeters

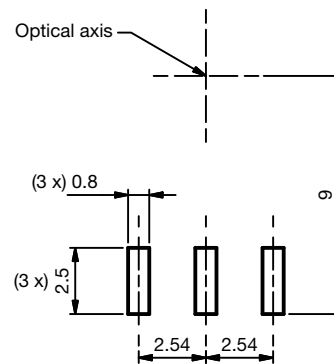


Not indicated tolerances ± 0.2



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

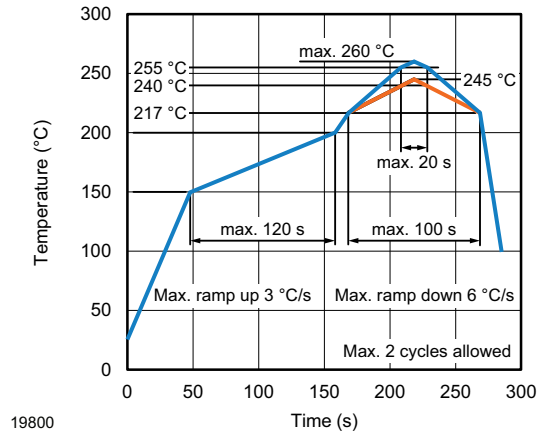
Reflow Soldering

- 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

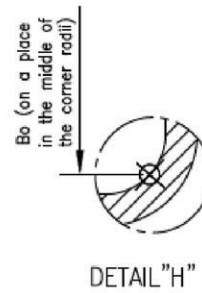
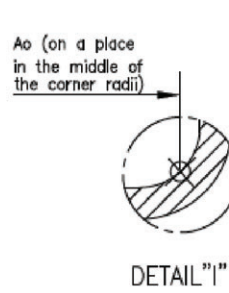
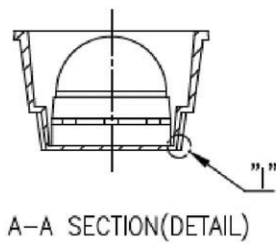
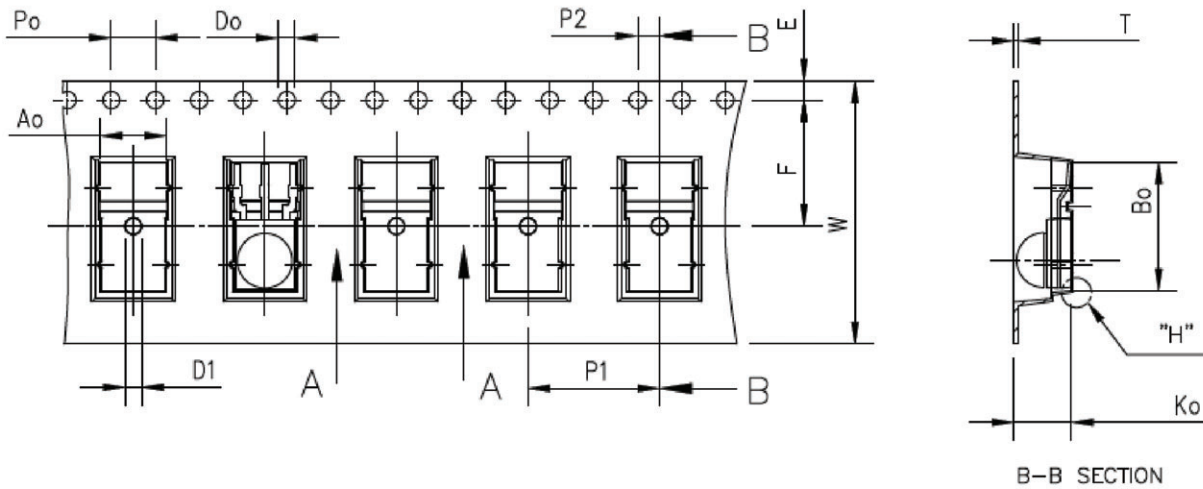
- Use a soldering iron of 25 W or less. Adjust the temperature of the soldering iron below 300 °C
- Finish soldering within 3 s
- Handle products only after the temperature has cooled off

VISHAY LEAD (Pb)-FREE REFLOW SOLDER PROFILE





PACKAGING DIMENSIONS in millimeters

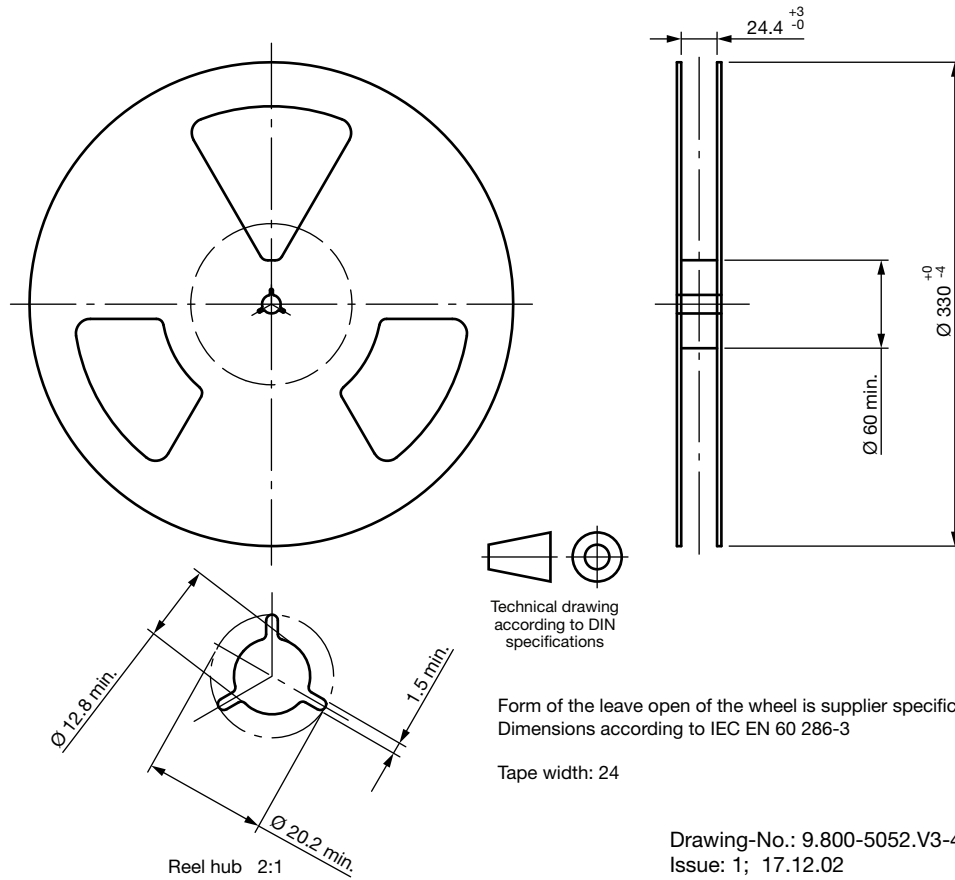


Drawing-No.: 9.700-5399.01-4
Issue: 2; 29.06.18

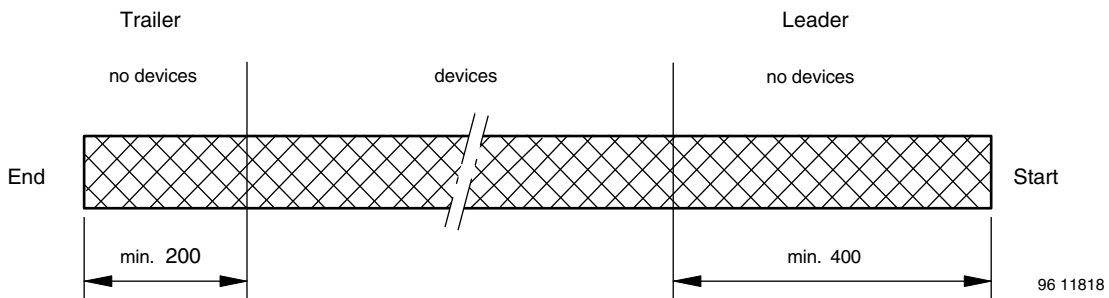
Item	A_0	B_0	K_0	P_0	P_1	P_2	T
Dimensions	6.08 ± 0.10	11.75 ± 0.10	5.25 ± 0.10	4.0 ± 0.10	12.0 ± 0.10	2.0 ± 0.10	0.40 ± 0.05
Item	E	F	D_0	D_1	W	$10P_0$	
Dimensions	1.75 ± 0.10	11.50 ± 0.10	1.55 ± 0.05	1.5 min.	$24.0 +0.30 / -0.10$	40.0 ± 0.20	



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. ± 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: TSOP33538DF1P

PACKAGING QUANTITY

- 1100 pieces per reel
- 1 reel per box

LABEL

Standard bar code labels for finished goods

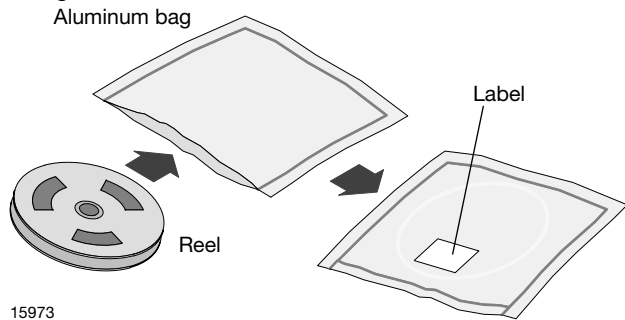
The standard bar code labels are product labels and used for identification of goods. The finished goods are packed in final packing area. The standard packing units are labeled with standard bar code labels before transported as finished goods to warehouses. The labels are on each packing unit and contain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



DRY PACKING

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



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.

ESD PRECAUTION

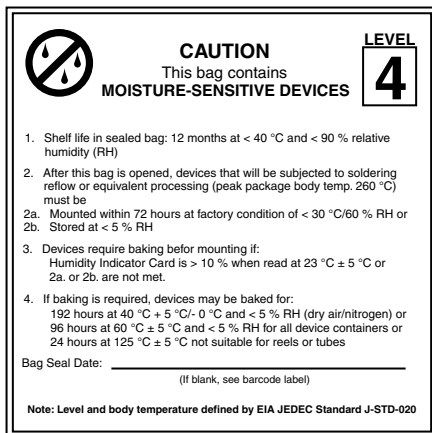
Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the antistatic shielding bag. Electrostatic sensitive devices warning labels are on the packaging.

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.



22645



22522

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



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