IR Receiver Modules for Remote Control Systems

FEATURES
- Improved immunity against HF and RF 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
- Improved immunity against optical noise
- Insensitive to supply voltage ripple and noise
- Taping available for top view and side view assembly
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

DESCRIPTION
The TSOP6... series are miniaturized SMD IR receiver modules for infrared remote control systems. A PIN diode and a preamplifier are assembled on a leadframe, the epoxy package contains an IR filter.

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

The TSOP64.. series devices are optimized to suppress almost all spurious pulses from Wi-Fi and CFL sources. They may suppress some data signals if continuously transmitted.

The TSOP62.. series devices are provided primarily for compatibility with old AGC2 designs. New designs should prefer the TSOP64.. series containing the newer AGC4.

These components have not been qualified according to automotive specifications.

PARTS TABLE

<table>
<thead>
<tr>
<th>AGC</th>
<th>LEGACY, FOR LONG BURST REMOTE CONTROLS (AGC2)</th>
<th>RECOMMENDED FOR LONG BURST CODES (AGC4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 kHz</td>
<td>TSOP6230</td>
<td>TSOP6430</td>
</tr>
<tr>
<td>33 kHz</td>
<td>TSOP6233</td>
<td>TSOP6433</td>
</tr>
<tr>
<td>36 kHz</td>
<td>TSOP6236</td>
<td>TSOP6436 (1)(2)(3)</td>
</tr>
<tr>
<td>38 kHz</td>
<td>TSOP6238</td>
<td>TSOP6438 (4)(5)</td>
</tr>
<tr>
<td>40 kHz</td>
<td>TSOP6240</td>
<td>TSOP6440</td>
</tr>
<tr>
<td>56 kHz</td>
<td>TSOP6256</td>
<td>TSOP6456 (6)(7)</td>
</tr>
</tbody>
</table>

Package: Panhead
Pinning: 1 = GND, 2 = N.C., 3 = V$_S$, 4 = OUT
Dimensions (mm): 7.5 W x 5.3 H x 4.0 D
Mounting: SMD
Application: Remote control
Best choice for: (1) RC-5 (2) RC-6 (3) Panasonic (4) NEC (5) Sharp (6) r-step (7) Thomson RCA

167971 2 3 4

Rev. 1.5, 13-Sep-17

Document Number: 82463
**BLOCK DIAGRAM**

**APPLICATION CIRCUIT**

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.

### ABSOLUTE MAXIMUM RATINGS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Vs</td>
<td>-0.3 to +6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Supply current</td>
<td>Is</td>
<td>5</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Output voltage</td>
<td>Vout</td>
<td>-0.3 to (Vs + 0.3)</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>Io</td>
<td>5</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Junction temperature</td>
<td>Tj</td>
<td>100</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-25 to +85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td>Tamb</td>
<td>-25 to +85</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>Tamb ≤ 85 °C</td>
<td>Ptot</td>
<td>10 mW</td>
<td></td>
</tr>
</tbody>
</table>

### ELECTRICAL AND OPTICAL CHARACTERISTICS (Tamb = 25 °C, unless otherwise specified)

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>Vs = 5 V, Ee = 0</td>
<td>VSD</td>
<td>2.5</td>
<td>-</td>
<td>5.5</td>
<td>V</td>
</tr>
<tr>
<td>Supply current</td>
<td>Ee = 40 klx, sunlight</td>
<td>ISD</td>
<td>0.55</td>
<td>0.7</td>
<td>0.9</td>
<td>mA</td>
</tr>
<tr>
<td>Transmission distance</td>
<td>Ee = 0, IR diode TSAL6200, If = 250 mA, test signal see Fig. 1</td>
<td>d</td>
<td>-</td>
<td>40</td>
<td>-</td>
<td>m</td>
</tr>
<tr>
<td>Output voltage low</td>
<td>Ios = 0.5 mA, Ee = 0.7 mW/m², test signal see Fig. 1</td>
<td>Vosl</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>mV</td>
</tr>
<tr>
<td>Minimum irradiance</td>
<td>Pulse width tolerance: tpi - 5/fo &lt; tpo &lt; tpi + 6/fo, test signal see Fig. 1</td>
<td>Eemin</td>
<td>-</td>
<td>0.2</td>
<td>0.4</td>
<td>mW/m²</td>
</tr>
<tr>
<td>Maximum irradiance</td>
<td>tpi - 5/fo &lt; tpo &lt; tpi + 6/fo, test signal see Fig. 1</td>
<td>Eemax</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>W/m²</td>
</tr>
<tr>
<td>Directivity</td>
<td>Angle of half transmission distance</td>
<td>φ1/2</td>
<td>-</td>
<td>± 50</td>
<td>-</td>
<td>deg</td>
</tr>
</tbody>
</table>
**TYPICAL CHARACTERISTICS** (T<sub>amb</sub> = 25 °C, unless otherwise specified)

**Fig. 1 - Output Active Low**

*tp ≥ 10/f₀ is recommended for optimal function

**Fig. 2 - Pulse Length and Sensitivity in Dark Ambient**

**Fig. 3 - Output Function**

**Fig. 4 - Output Pulse Diagram**

**Fig. 5 - Frequency Dependence of Responsivity**

**Fig. 6 - Sensitivity in Bright Ambient**
Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

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

Fig. 9 - Sensitivity vs. Ambient Temperature

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 is applied to the product 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 noise from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14)
- 2.4 GHz and 5 GHz Wi-Fi

### Minimum burst length

<table>
<thead>
<tr>
<th></th>
<th>TSOP62..</th>
<th>TSOP64..</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 cycles/burst</td>
<td>10 cycles/burst</td>
</tr>
</tbody>
</table>

### After each burst of length

<table>
<thead>
<tr>
<th></th>
<th>10 to 70 cycles</th>
<th>10 to 35 cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>a minimum gap time is required of</td>
<td>≥ 12 cycles</td>
<td>≥ 12 cycles</td>
</tr>
</tbody>
</table>

### For bursts greater than

<table>
<thead>
<tr>
<th></th>
<th>70 cycles</th>
<th>35 cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>a minimum gap time in the data stream is needed of</td>
<td>&gt; 4 x burst length</td>
<td>&gt; 10 x burst length</td>
</tr>
</tbody>
</table>

### Maximum number of continuous short bursts/second

<table>
<thead>
<tr>
<th></th>
<th>800</th>
<th>1300</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEC code</td>
<td>Yes</td>
<td>Preferred</td>
</tr>
<tr>
<td>RC5 / RC6 code</td>
<td>Yes</td>
<td>Preferred</td>
</tr>
<tr>
<td>Thomson 56 kHz code</td>
<td>Yes</td>
<td>Preferred</td>
</tr>
<tr>
<td>Sharp code</td>
<td>Yes</td>
<td>Preferred</td>
</tr>
<tr>
<td>Suppression of interference from fluorescent lamps</td>
<td>Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13)</td>
<td>Complex and critical disturbance patterns are suppressed (example: signal pattern of Fig. 14 or highly dimmed LCDs)</td>
</tr>
</tbody>
</table>

**Note**

- For data formats with short bursts please see the datasheet of TSOP61.., TSOP63.., TSOP65..
**PACKAGE DIMENSIONS** in millimeters

![Package Dimensions Diagram](image)

**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

TAPING VERSION TSOP..TT DIMENSIONS in millimeters
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

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)

<table>
<thead>
<tr>
<th>PLAIN WRITING</th>
<th>ABBREVIATION</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item-description</td>
<td>-</td>
<td>18</td>
</tr>
<tr>
<td>Item-number</td>
<td>INO</td>
<td>8</td>
</tr>
<tr>
<td>Selection-code</td>
<td>SEL</td>
<td>3</td>
</tr>
<tr>
<td>LOT-/serial-number</td>
<td>BATCH</td>
<td>10</td>
</tr>
<tr>
<td>Data-code</td>
<td>COD</td>
<td>3 (YWW)</td>
</tr>
<tr>
<td>Plant-code</td>
<td>PTC</td>
<td>2</td>
</tr>
<tr>
<td>Quantity</td>
<td>QTY</td>
<td>8</td>
</tr>
<tr>
<td>Accepted by</td>
<td>ACC</td>
<td>-</td>
</tr>
<tr>
<td>Packed by</td>
<td>PCK</td>
<td>-</td>
</tr>
<tr>
<td>Mixed code indicator</td>
<td>MIXED CODE</td>
<td>-</td>
</tr>
<tr>
<td>Origin</td>
<td>xxxxxxxx+</td>
<td>Company logo</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LONG BAR CODE TOP</th>
<th>TYPE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item-number</td>
<td>N</td>
<td>8</td>
</tr>
<tr>
<td>Plant-code</td>
<td>N</td>
<td>2</td>
</tr>
<tr>
<td>Sequence-number</td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Quantity</td>
<td>N</td>
<td>8</td>
</tr>
<tr>
<td>Total length</td>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SHORT BAR CODE BOTTOM</th>
<th>TYPE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection-code</td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Data-code</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>Batch-number</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>Filter</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Total length</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

**DRY PACKING**

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

![Aluminum bag and Label](image)

**FINAL PACKING**

The sealed reel is packed into a cardboard box.

**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.
Tape and Reel Standards for Surface-Mount IR Receiver Modules

Vishay Semiconductor surface-mount IR receivers are packaged on tape and reel. The following specification is based on IEC publication 286, which takes the industrial requirements for automatic insertion into account.

Absolute maximum ratings, mechanical dimensions, optical and electrical characteristics for taped devices are identical to the basic catalog types and can be found in the specifications for untaped devices.

PACKAGING
The tapes of components are available on reels. Each reel is marked with labels which contain the following information:
- Vishay
- Type
- Group
- Tape code, normally part of type name
- Production code
- Quantity

MISSING COMPONENTS
Up to 3 consecutive components may be missing if the gap is followed by at least 6 components. A maximum of 0.5 % of the components per reel quantity may be missing. At least 5 empty positions are present at the start and the end of the tape to enable tape insertion.

Tensile strength of the tape: > 15 N

NUMBER OF COMPONENTS
A. Panhead: quantity per reel:
   TT, top view package, 1190 pcs
   TR, side view package, 1120 pcs
B. Heimdall: quantity per reel:
   TT, top view package, 2200 pcs
   TR, side view package, 2300 pcs
C. Heimdall without lens: quantity per reel:
   WTT, top view package, 2200 pcs
   WTR, side view package, 2300 pcs
D. Belobog: quantity per reel:
   TT1, top view package, 1800 pcs
   TT2, top view package, 7000 pcs
E. Belobog with shield: quantity per reel:
   TT1, top view package, 1500 pcs
   TT2, top view package, 5000 pcs
F. Minimold DF1P: quantity per reel:
   DF1P, 1100 pcs
G. TVCastSMD TR1: quantity per reel:
   TR1, side view package, 2000 pcs

ORDER DESIGNATION
The type designation of the device is extended by TT or TT1 for top view or TR for side view.

Example:
- TSOP6238TR (reel packing)
- TSOP75238TR (reel packing)
- TSOP75338WTT (reel packing)
- TSOP57438TT1 (reel packing)
- TSOP57238HTT1 (reel packing)
- TSOP39438TR1 (reel packing)
REEL DIMENSIONS FOR PANHEAD, HEIMDALL, AND TVCASTSMD TR in millimeters

Note
- The body structure of the reel can vary

Form of the leave open of the wheel is supplier specific.

Dimension acc. to IEC EN 60 286-3

Tape width 15

Technical drawings according to DIN specifications

Drawing-No.: 9.800-5052.V2-4
Issue: 1; 07.05.02

16734
TAPING VERSION TSOP..TT (TOP VIEW) DIMENSIONS in millimeters

A. Panhead (TSOP36..TT, TSSP....TT, TSOP6...TT, TSOP16...TT, TSOP96...TT)
TAPPING VERSION TSOP..TT (TOP VIEW) DIMENSIONS in millimeters

B. Heimdall (TSOP75...TT, TSOP77...TT, TSSP77...TT, TSOP15...TT, TSOP95...TT)

Drawing-No.: 9.700-5338.01-4
Issue: 4; 12.06.13

Direction of feed

technical drawings according to DIN specifications
**Taping Version TSOP..TT (Top View) Dimensions** in millimeters

C. Heimdall without lens (TSOP75...WTT, TSOP77...WTT, TSSP77...WTT, TSOP15...WTT, TSOP95...WTT)

![Diagram of taping version TSOP..TT](image)

Drawing-No.: 9.700-5341.01-4
Issue: 3; 06.10.15

Technical drawings according to DIN specifications
Taping Version TSOP..TT1, TSOP..TT2 (Top View) Dimensions in millimeters

D. Belobog (TSOP37...TT1, TSOP37...TT2, TSOP57...TT1, TSOP57...TT2, TSOP17...TT1, TSOP17...TT2, TSOP97...TT1, TSOP97...TT2)

Tape and reel dimensions:

Reel size “Y”
TT1 Ø 180 ± 2 = 1800 pcs.
TT2 Ø 330 ± 2 = 7000 pcs.

Parts mounted
Empty leader 400 mm min.

100 mm min. with cover tape

Empty trailer 200 mm min.

Leader and trailer tape:

Technical drawings according to DIN specifications

Drawing-No.: 9.700-5347.01-4

Issue: 1; 14.11.11

Not indicated tolerances ± 0.1
Taping Version TSOP..TT1, TSOP..TT2 (Top View) Dimensions in millimeters

E. Belobog with shield (TSOP37...HTT1, TSOP37...HTT2, TSOP57...HTT1, TSOP57...HTT2, TSOP17...HTT1, TSOP17...HTT2, TSOP97...HTT1, TSOP97...HTT2)

Tape and Reel dimensions:

Reel size "Y"
GS 08 Ø 180 ± 2 = 1500 pcs.
GS 18 Ø 330 ± 2 = 5000 pcs.

Unreel direction

Not indicated tolerances ± 0.1

Ø 13 ± 0.2
Label posted here

Ø 21 ± 0.8

Parts mounted
Empty leader 400 mm min.
100 mm min. with cover tape
Direction of pulling out

Leader and trailer tape:
Empty trailer 200 mm min.

Reel dimensions and tape

Drawing-No.: 9.700-5380.01-4
Issue: 1; 28.10.13

Technical drawings according to DIN specifications

X 2 : 1
**Taping Version TSOP..DF1P (Side View) Dimensions** in millimeters

F. Minimold DF1P (TSOP33...DF1P, TSOP53...DF1P, TSOP13...DF1P, TSOP93...DF1P)

---

**Technical Drawing**

Form of the leave open of the wheel is supplier specific.
Dimensions according to IEC EN 60 286-3
Tape width: 24
TAPPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

G. TVCastSMD TR1 (TSOP59...TR1, TSOP39...TR1, TSOP19...TR1, TSOP99...TR1)

Drawing-No.: GO-100220.10_Z
Issue B: 08.02.17
TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

A. Panhead (TSOP36...TR, TSSP6...TR, TSOP6...TR, TSOP16...TR, TSOP96...TR)

Drawing-No.: 9 700-5260 01-4
Issue: 2; 25.09.01

16585
TAPPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters
B. Heimdall (TSSP7..., TSOP75...TR, TSOP77...TR, TSSP7....TR, TSOP15...TR, TSOP95...TR)

Direction of feed

technical drawings according to DIN specifications

Drawing-No.: 9.700-5337.01-4
Issue: 2; 06.10.15
TAPING VERSION TSOP..TR (SIDE VIEW) DIMENSIONS in millimeters

C. Heimdall without lens (TSOP75...WTR, TSOP77...WTR, TSSP...WTR, TSOP15...WTR, TSOP95...WTR)

Drawing-No.: 9.700-5342.01-4
Issue: 2; 12.06.13

technical drawings according to DIN specifications
LEADER AND TRAILER DIMENSIONS in millimeters

<table>
<thead>
<tr>
<th>Trailer</th>
<th>Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>no devices</td>
<td>no devices</td>
</tr>
<tr>
<td>devices</td>
<td>devices</td>
</tr>
<tr>
<td>Start</td>
<td>Start</td>
</tr>
<tr>
<td>min. 200</td>
<td>min. 400</td>
</tr>
<tr>
<td>96 11B18</td>
<td></td>
</tr>
</tbody>
</table>

COVER TAPE REEL 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

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 |

<table>
<thead>
<tr>
<th><strong>LONG BAR CODE TOP</strong></th>
<th><strong>TYPE</strong></th>
<th><strong>LENGTH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Item-number</td>
<td>N</td>
<td>8</td>
</tr>
<tr>
<td>Plant-code</td>
<td>N</td>
<td>2</td>
</tr>
<tr>
<td>Sequence-number</td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Quantity</td>
<td>N</td>
<td>8</td>
</tr>
<tr>
<td>Total length</td>
<td>-</td>
<td>21</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SHORT BAR CODE TOP</strong></th>
<th><strong>TYPE</strong></th>
<th><strong>LENGTH</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Selection-code</td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Data-code</td>
<td>N</td>
<td>3</td>
</tr>
<tr>
<td>Batch-number</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>Filter</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total length</td>
<td>-</td>
<td>17</td>
</tr>
</tbody>
</table>
DRY PACKAGING
The reel is packed in an anti-humidity bag to protect the devices from absorbing moisture during transportation and storage.

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 JSTD-020 level 4 label is included on all dry bags.

OUTER PACKAGING
The sealed reel is packed into a pizza box.

EIA JEDEC standard JSTD-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.
Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.