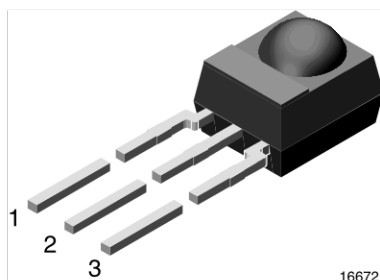


## IR Mid Range Proximity Sensors



### MECHANICAL DATA

#### Pinning

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

### DESCRIPTION

The TSSP4P38 is a compact infrared detector module for proximity sensing applications. It receives 38 kHz modulated signals and has a peak sensitivity of 940 nm.

The length of the detector's output pulse varies in proportion to the amount of light reflected from the object being detected.

### FEATURES

- Up to 2 m for proximity sensing
- Uses modulated bursts at 38 kHz
- 940 nm peak wavelength
- Photo detector and preamplifier in one package
- Low supply current
- Shielding against EMI
- Visible light is suppressed by IR filter
- Insensitive to supply voltage ripple and noise
- Supply voltage: 2.5 V to 5.5 V
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



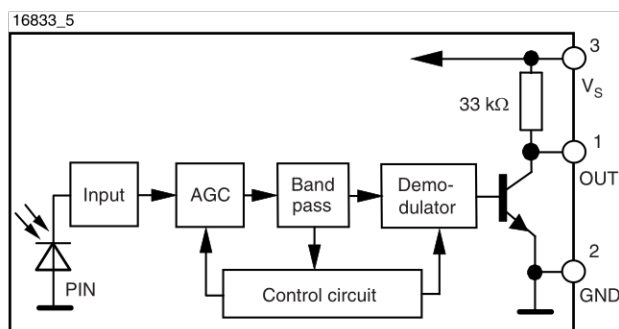
### APPLICATIONS

- Object approach detection for activation of displays and user consoles, signaling of alarms, etc.
- Simple gesture controls
- Differentiation of car arrival, static, car departure in parking lots
- Reflective sensors for toilet flush
- Navigational sensor for robotics

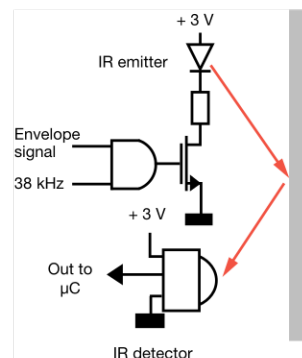
### PARTS TABLE

|                   |        |                             |
|-------------------|--------|-----------------------------|
| Carrier frequency | 38 kHz | TSSP4P38                    |
| Package           |        | Mold                        |
| Pinning           |        | 1 = OUT, 2 = GND, 3 = $V_S$ |
| Dimensions (mm)   |        | 6.0 W x 6.95 H x 5.6 D      |
| Mounting          |        | Leaded                      |
| Application       |        | Proximity sensors           |

### BLOCK DIAGRAM



### PROXIMITY SENSING



**ABSOLUTE MAXIMUM RATINGS**

| PARAMETER                   | TEST CONDITION                        | SYMBOL      | VALUE                   | UNIT |
|-----------------------------|---------------------------------------|-------------|-------------------------|------|
| Supply voltage (pin 3)      |                                       | $V_S$       | -0.3 to +6              | V    |
| Supply current (pin 3)      |                                       | $I_S$       | 5                       | mA   |
| Output voltage (pin 1)      |                                       | $V_O$       | -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 (pin 1)      |                                       | $I_O$       | 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           | $T_{amb} \leq 85\text{ °C}$           | $P_{tot}$   | 10                      | mW   |
| Soldering temperature       | $t \leq 10\text{ s}$ , 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** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)

| PARAMETER          | TEST CONDITION                                                                             | SYMBOL            | MIN. | TYP.     | MAX. | UNIT              |
|--------------------|--------------------------------------------------------------------------------------------|-------------------|------|----------|------|-------------------|
| Supply current     | $E_e = 0, V_S = 5\text{ V}$                                                                | $I_{SD}$          | 0.55 | 0.7      | 0.9  | mA                |
|                    | $E_v = 40\text{ klx}$ , sunlight                                                           | $I_{SH}$          |      | 0.8      |      | mA                |
| Supply voltage     |                                                                                            | $V_S$             | 2.5  |          | 5.5  | V                 |
| Receiving distance | Direct line of sight, test signal see fig. 1, IR diode TSAL6200, $I_F = 200\text{ mA}$     | $d$               |      | 45       |      | 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 | Pulse width tolerance: $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see fig. 1 | $E_e\text{ min.}$ |      | 0.12     | 0.25 | mW/m <sup>2</sup> |
| Maximum irradiance | $t_{pi} - 5/f_0 < t_{po} < t_{pi} + 6/f_0$ , test signal see fig. 1                        | $E_e\text{ max.}$ | 50   |          |      | W/m <sup>2</sup>  |
| Directivity        | Angle of half receiving distance                                                           | $\phi_{1/2}$      |      | $\pm 45$ |      | deg               |

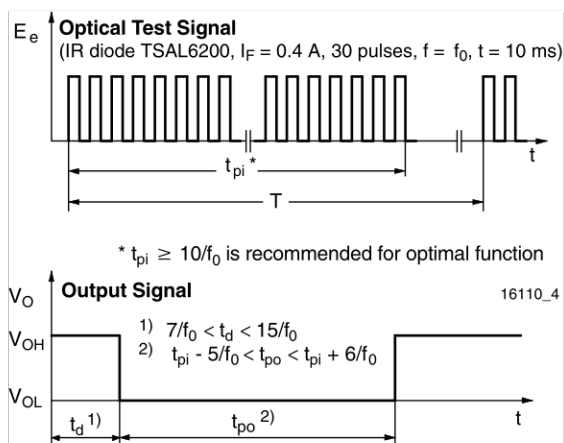
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ °C}$ , unless otherwise specified)


Fig. 1 - Output Active Low

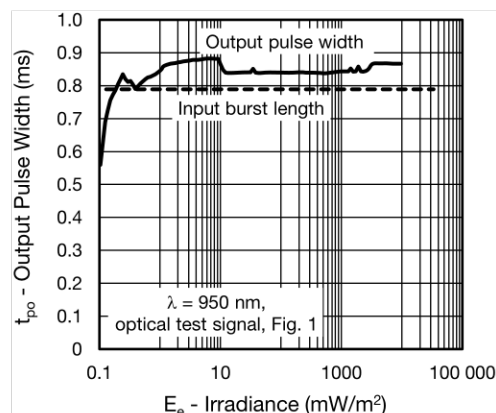


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

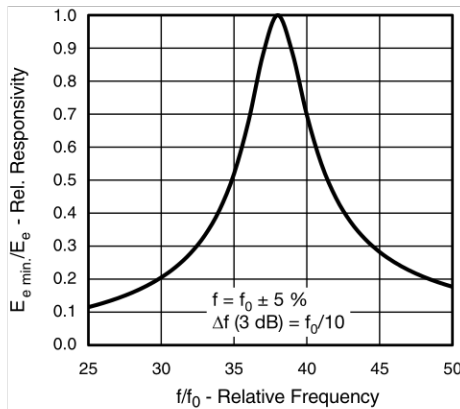


Fig. 3 - Frequency Dependence of Responsivity

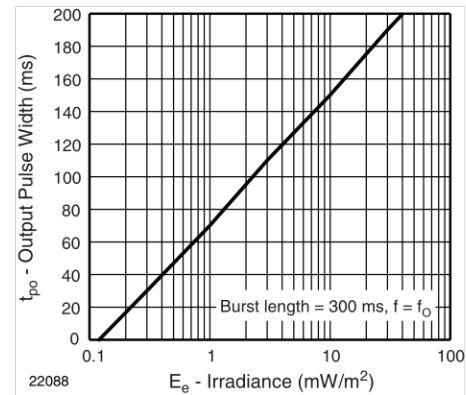


Fig. 6 - Max. Output Pulse Width vs. Irradiance

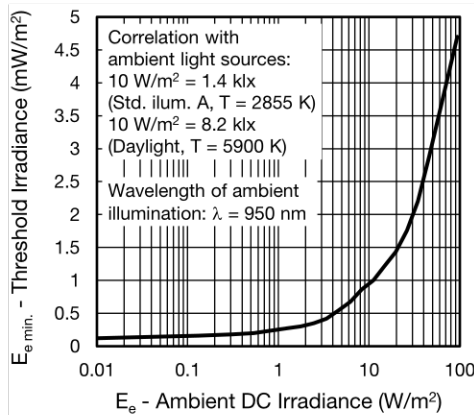


Fig. 4 - Sensitivity in Bright Ambient

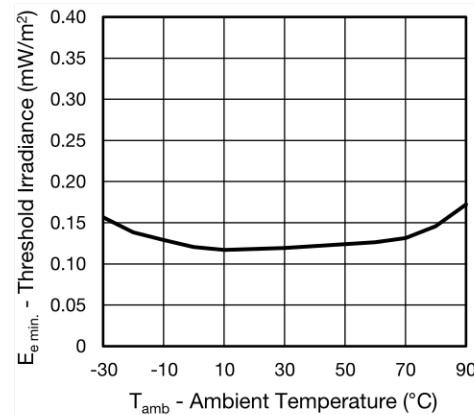


Fig. 7 - Sensitivity vs. Ambient Temperature

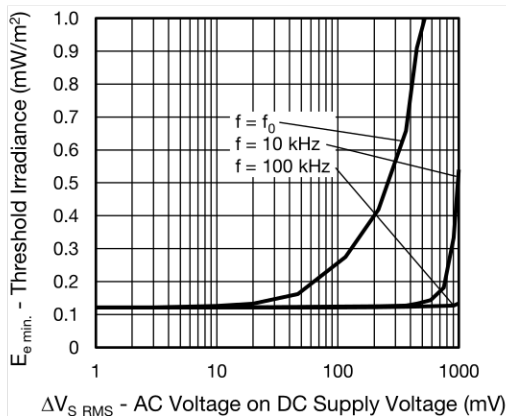


Fig. 5 - Sensitivity vs. Supply Voltage Disturbances

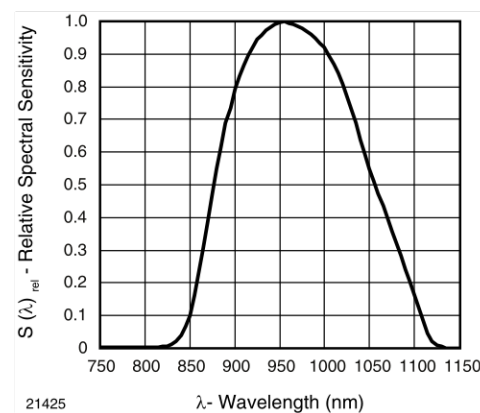


Fig. 8 - Relative Spectral Sensitivity vs. Wavelength

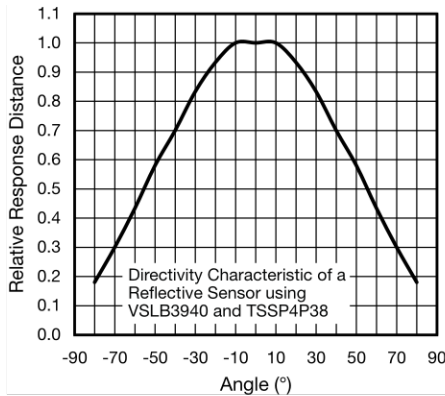


Fig. 9 - Angle Characteristic

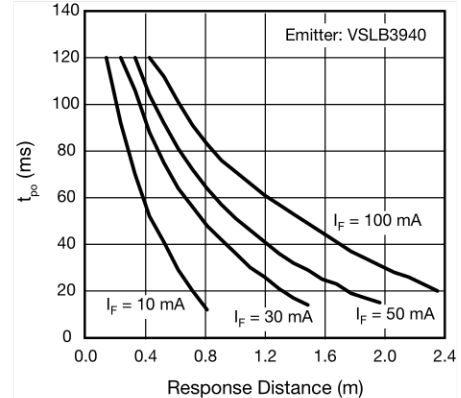
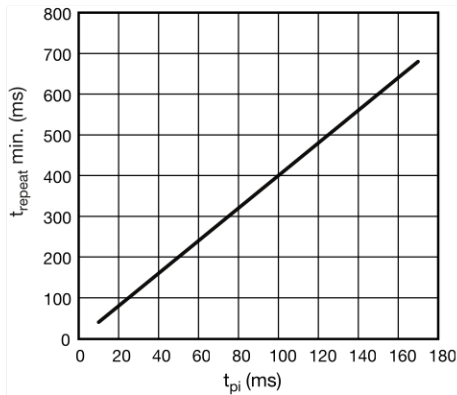
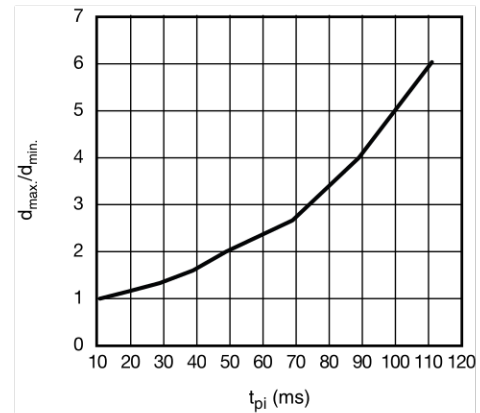
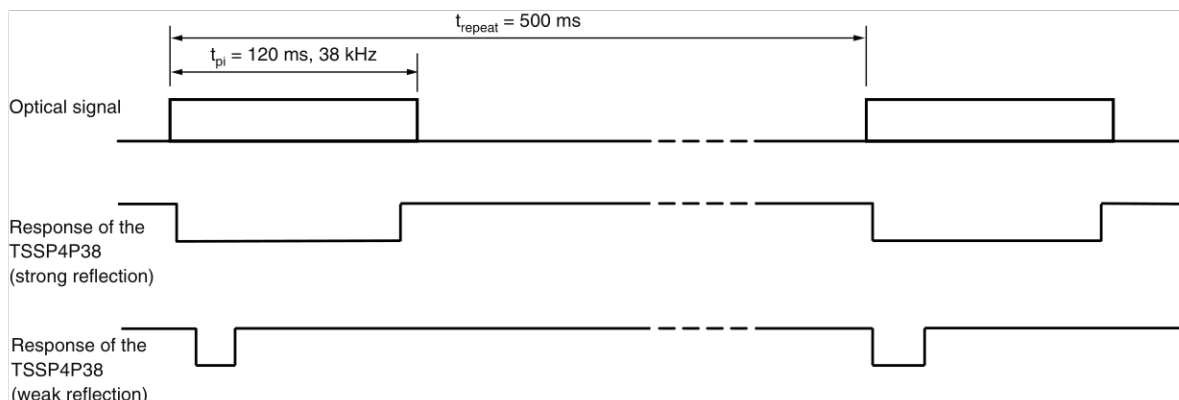

Fig. 11 -  $t_{po}$  vs. Distance Kodak Gray Card Plus 15 %


Fig. 10 - Max. Rate of Bursts

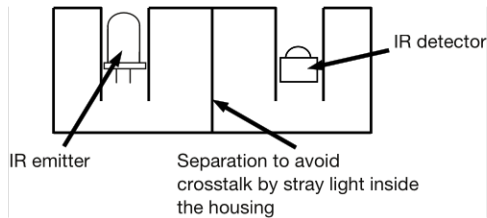

Fig. 12 - Dynamic Range of Sensor vs.  $t_{pi}$ 

The typical application of the TSSP4P38 is a reflective sensor with analog information contained in its output. The sensor evaluates the time required by the AGC to suppress a quasi continuous signal. The time required to suppress a continuous signal is longer when the signal is strong than when the signal is weak. The result is an output pulse length which corresponds to the distance of an object from the sensor. This kind of analog information can be evaluated by a microcontroller. The absolute amount of reflected light depends on the infrared reflectivity of the object and is not evaluated. Only changes in the amount of reflected light, and therefore changes in the pulse width can be evaluated with accuracy.

Example of a signal pattern:



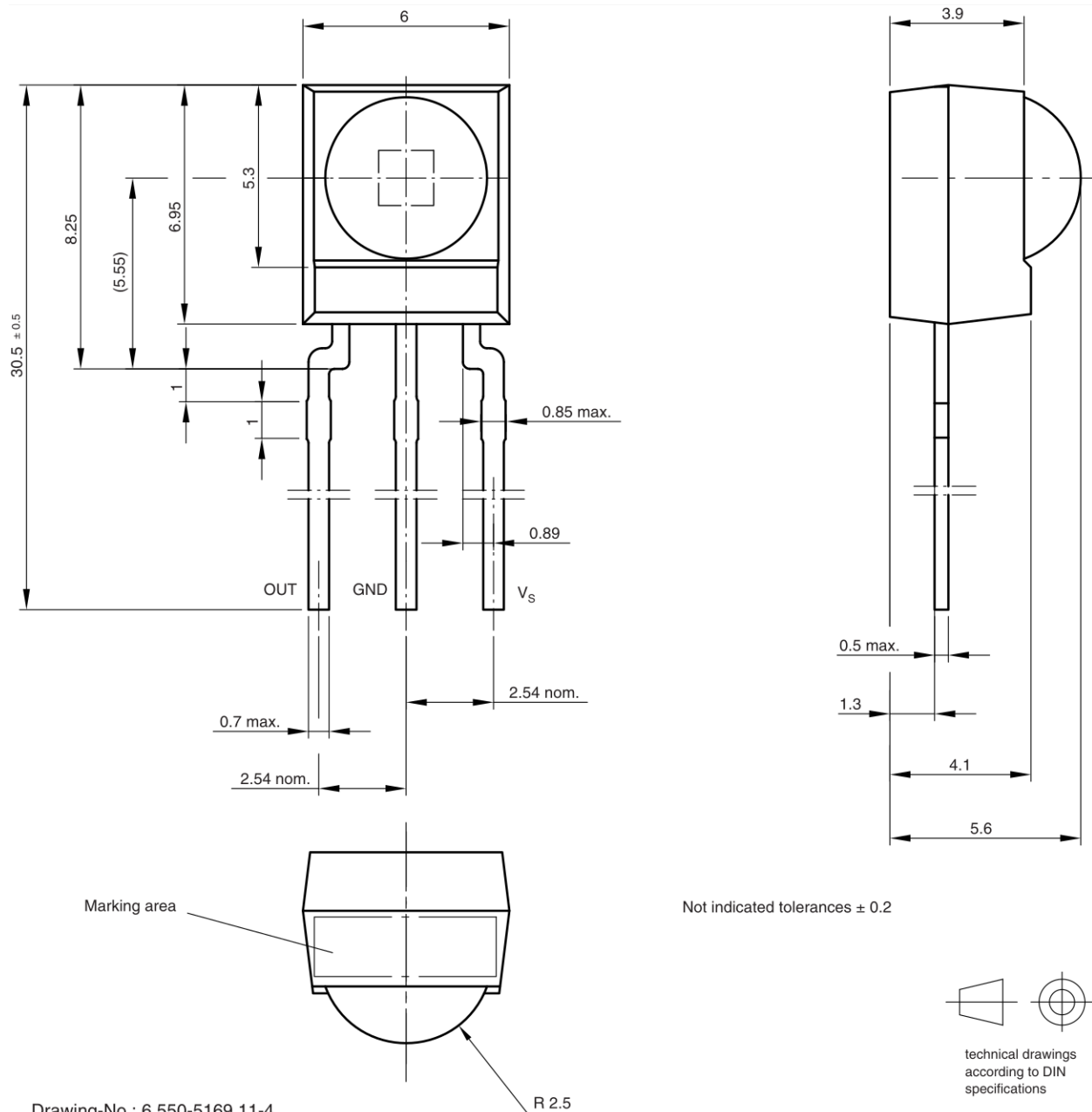
Example for a sensor hardware:



There should be no common window in front of the emitter and detector in order to avoid crosstalk by guided light through the window.

The logarithmic characteristic of the AGC in the TSSP4P38 results in an almost linear relationship between distance and pulse width. Ambient light has also some impact to the pulse width of this kind of sensor, making the pulse shorter.

## PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.550-5169.11-4

Issue: 13; 17.12.08

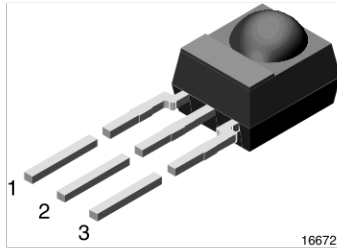
16003



## IR Receiver Modules for Remote Control Systems

Vishay offers stock molded IR receivers in four different packages:

- Loose packed in tubes, mounted on tape for reel or ammpack, or packed bulk in plastic bags.
- Vishay IR receiver with metal holders are packed in plastic trays. Vishay IR receiver with plastic holders are packed in plastic tubes.



### FEATURES

- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

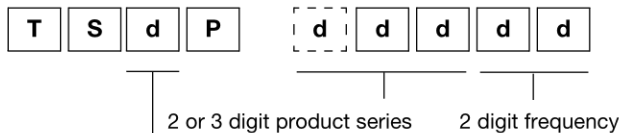
### AVAILABLE FOR

- TSOP348..
- TSOP344..
- TSOP343..
- TSOP341..
- TSOP44...
- TSOP48...
- TSOP41...
- TSOP324..
- TSOP323..
- TSOP322..
- TSOP321..
- TSOP24...
- TSOP22...
- TSOP21...
- TSOP345..
- TSOP325..
- TSOP43...
- TSOP23...
- TSSP4..
- TSMP4..



### LOOSE PACKED IN TUBE

### ORDERING INFORMATION



O = for IR receiver applications  
M = for repeater/learning applications  
S = for sensor applications

#### Note

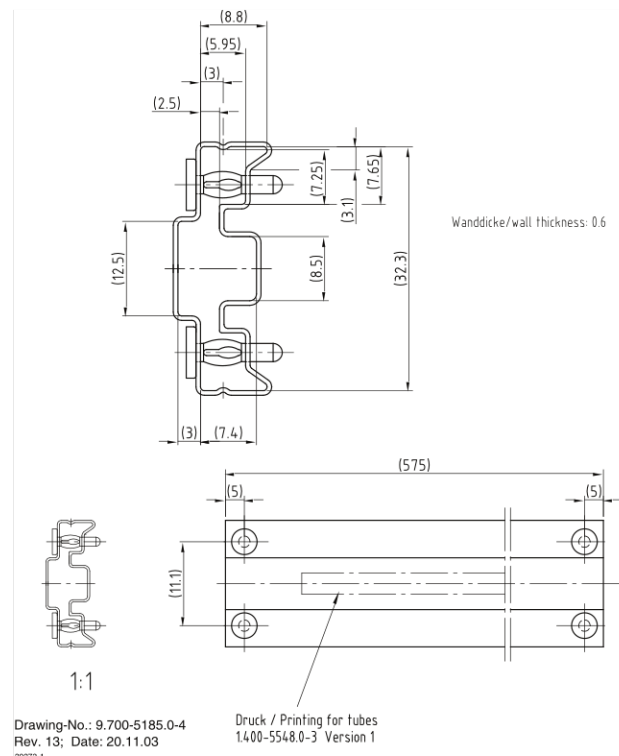
- d = "digit", please consult the list of available devices create a valid part number.

**Example: TSOP4838**

### PACKAGING QUANTITY

- 90 pieces per tube
- 24 tubes per carton

### PACKAGING DIMENSIONS in millimeters





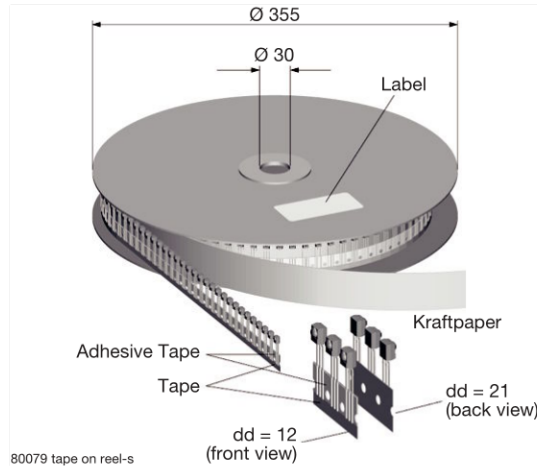


## TAPE AND REEL/AMMOPACK

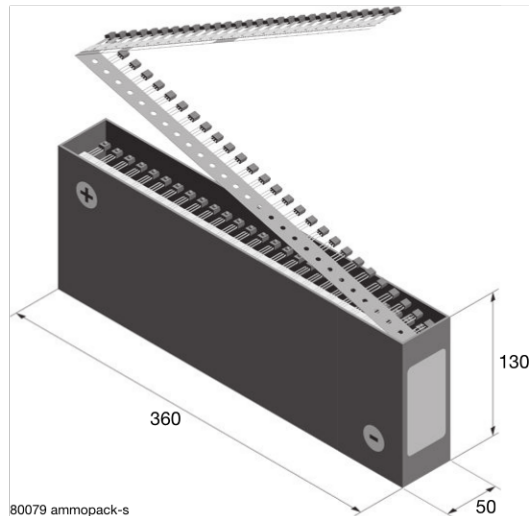
Up to 3 consecutive components may be missing if the gap is followed by at least 6 components. A maximum of 0.5 % of the components per reel quantity may be missing. At least 5 empty positions are present at the start and the end of the tape to enable insertion.

Tensile strength of the tape: > 15 N

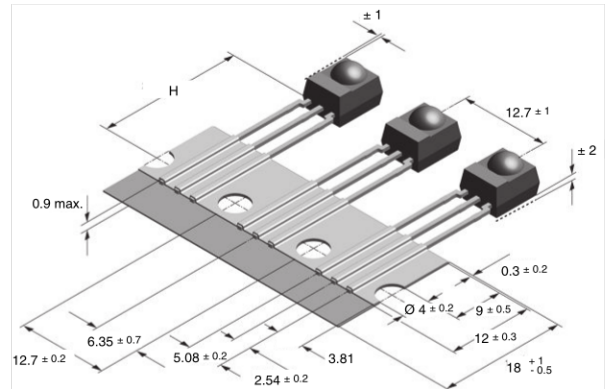
Pulling force in the plane of the tape, at right angles to the reel: > 5 N



80079 tape on reel-s



80079 ammpack-s



| VERSION | DIMENSION "H" |
|---------|---------------|
| BS      | 20 ± 0.5      |
| PS      | 23.3 ± 0.5    |
| OS      | 26 ± 0.5      |

## ORDERING INFORMATION

T S d P

O = for IR receiver applications  
M = for repeater/learning applications  
S = for sensor applications

d d d d d

2 or 3 digit product series  
2 digit frequency

S S 1

SS1 for T and R, bulk or ammpack

d d d d

dd = BS, PS or OS  
Tape and reel  
dd = 12 or 21

Z

Ammpack

### Note

- d = "digit", please consult the list of available devices create a valid part number.

Example: TSOP4838SS1BS12

TSOP2238SS1BS12Z

## PACKAGING QUANTITY

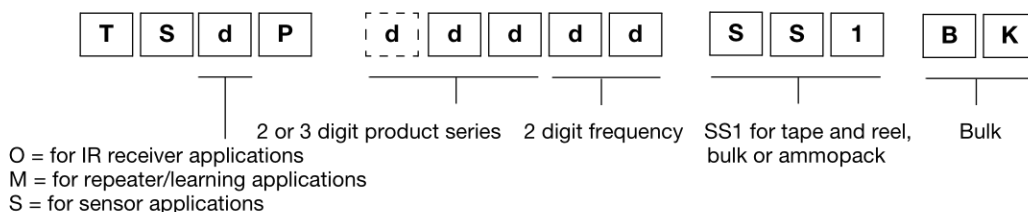
- 1000 pieces per reel
- 1000 pieces per ammpack



## BULK PACKAGING

The option "BK" signifies bulk packaging in conductive plastic bags. A maximum of 0.3 % of the components per box may be missing.

## ORDERING INFORMATION



### Note

- d = "digit", please consult the list of available devices create a valid part number.

EXAMPLE: TSOP4838SS1BK

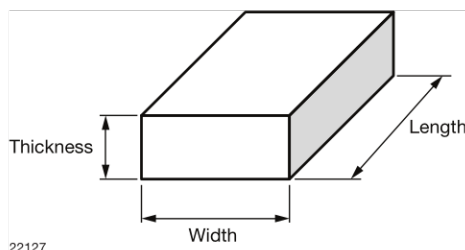
TSOP2238SS1BK

## PACKAGING QUANTITY

- 250 pieces per bag (each bag is individually boxed)
- 6 bags per carton

## OUTER PACKAGING

### CARTON BOX DIMENSIONS in millimeters



| KINDS OF CARTON BOX                                            | THICKNESS | WIDTH | LENGTH |
|----------------------------------------------------------------|-----------|-------|--------|
| <b>Packaging Plastic Tubes</b><br>(Normal/auxiliary devices)   | 80        | 150   | 600    |
| <b>Packaging Plastic Trays</b><br>(Devices with metal holders) | 120       | 290   | 490    |
| <b>Tape and Reel Box</b><br>(Taping in reels)                  | 400       | 310   | 410    |
| <b>Ammo-Box</b><br>(Zigzag taping)                             | 50        | 130   | 350    |





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