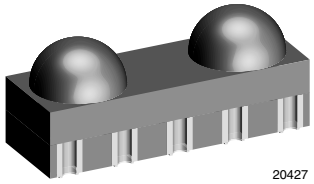
IR Receiver Modules for Remote Control Systems

Description

The TSOP853.. - series are two lens miniaturized receiver modules for infrared remote control systems. One PIN diode per lens and a preamplifier are assembled on a PCB, the epoxy lens cap is designed as an IR filter.

The demodulated output signal can be directly decoded by a microprocessor. The TSOP853.. is optimized to better suppress spurious pulses from energy saving fluorescent lamps but will also suppress some data signals.

This component has not been qualified according to automotive specifications.



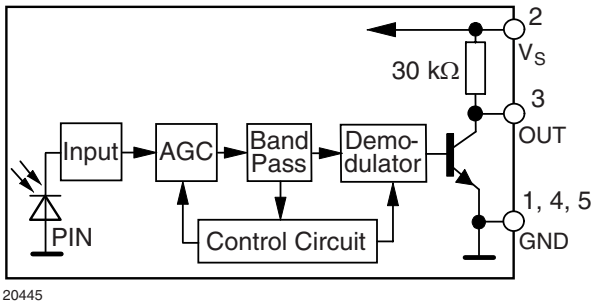
Features

- Very low supply current
- Photo detectors and preamplifier in one package
- Internal filter for PCM frequency
- Supply voltage: 2.5 V to 5.5 V
- Improved immunity against ambient light
- Capable of side or top view
- Two lenses for high sensitivity and wide receiving angle
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC
- Insensitive to supply voltage ripple and noise

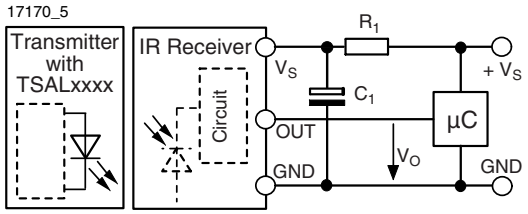
Parts Table

Part	Carrier frequency
TSOP85330	30 kHz
TSOP85333	33 kHz
TSOP85336	36 kHz
TSOP85338	38 kHz
TSOP85340	40 kHz
TSOP85356	56 kHz

Block Diagram



Application Circuit



R_1 and C_1 are recommended for protection against EOS. Components should be in the range of 33 Ω < R_1 < 1 kΩ, C_1 > 0.1 µF.

Absolute Maximum Ratings

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.

Parameter	Test condition	Symbol	Value TSOP853..	Unit
Supply voltage		V_S	- 0.3 to + 6.0	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	$T_{amb} \leq 85$ °C	P_{tot}	10	mW
Soldering temperature		T_{sd}	260	°C

Electrical and Optical Characteristics

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min.	Typ.	Max.	Unit
Supply voltage		V_S	2.5		5.5	V
Supply current	V_S = 3.3 V, E_v = 0	I_{SD}	0.27	0.35	0.45	mA
	E_v = 40 klx, sunlight	I_{SH}		0.45		mA
Transmission distance	E_v = 0 IR diode TSAL6200, I_F = 250 mA test signal see fig. 1	d		45		m
Output voltage low	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m^2, test signal see fig. 1	V_{OSL}			100	mV
Minimum irradiance	Pulse width tolerance: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$ test signal see fig. 1	$E_{e\ min}$		0.1	0.25	mW/m^2
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1	$E_{e\ max}$	30			W/m^2
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		± 50		deg

Typical Characteristics

T_{amb} = 25 °C, unless otherwise specified

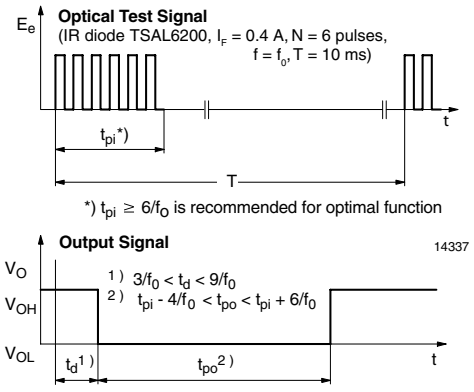


Figure 1. Output Active Low

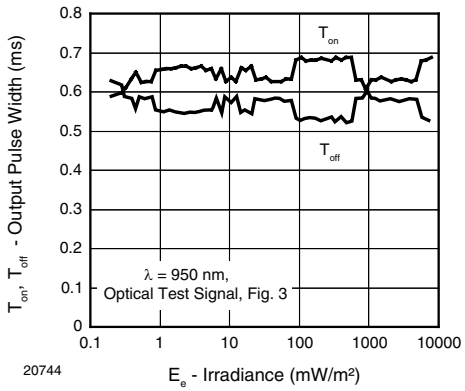


Figure 4. Output Pulse Diagram

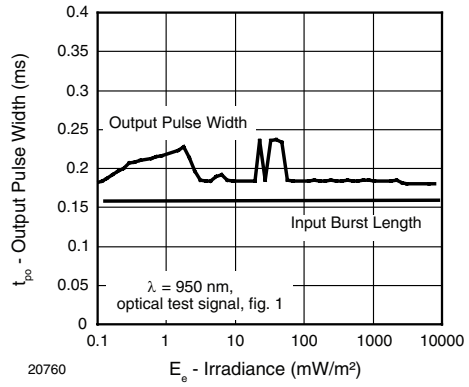


Figure 2. Pulse Length and Sensitivity in Dark Ambient

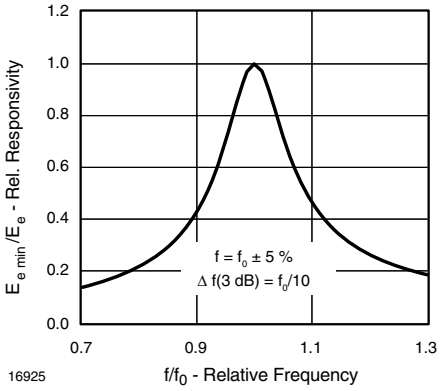


Figure 5. Frequency Dependence of Responsivity

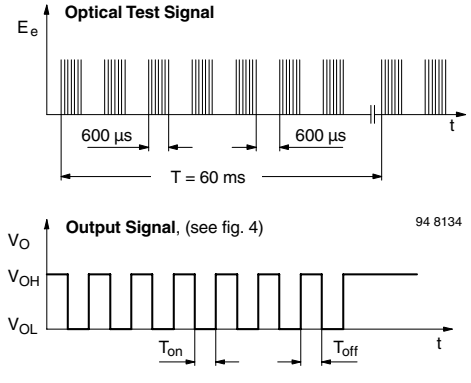


Figure 3. Output Function

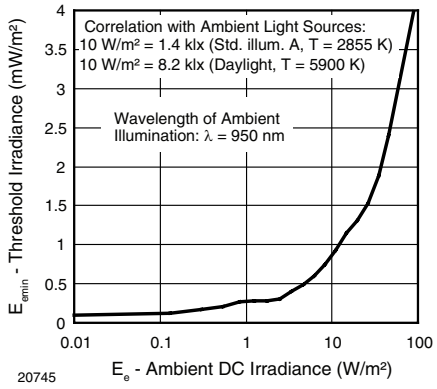


Figure 6. Sensitivity in Bright Ambient

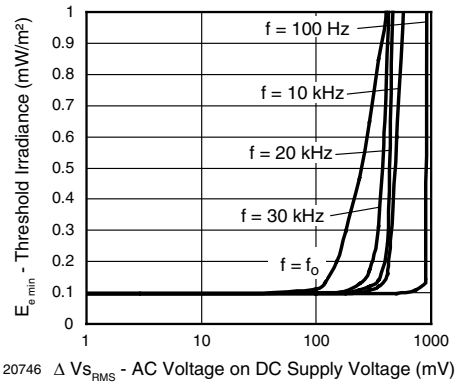


Figure 7. Sensitivity vs. Supply Voltage Disturbances

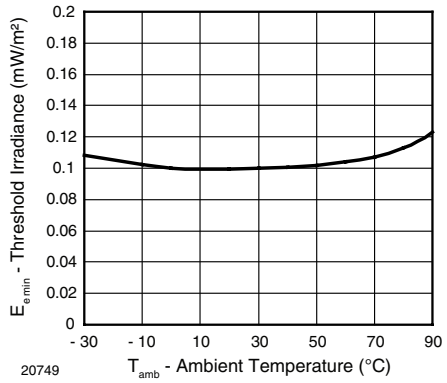


Figure 10. Sensitivity vs. Ambient Temperature

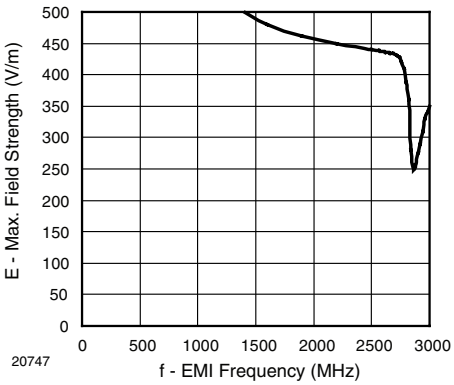


Figure 8. Sensitivity vs. Electric Field Disturbances

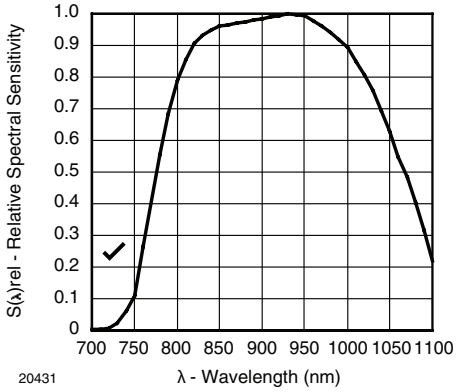


Figure 11. Relative Spectral Sensitivity vs. Wavelength

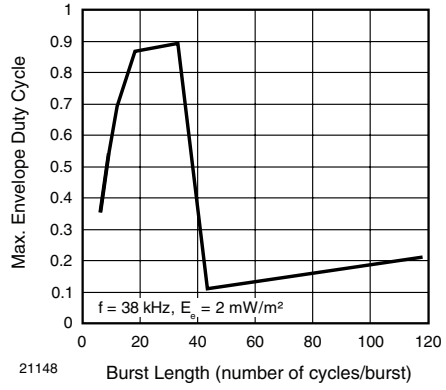


Figure 9. Max. Envelope Duty Cycle vs. Burst Length

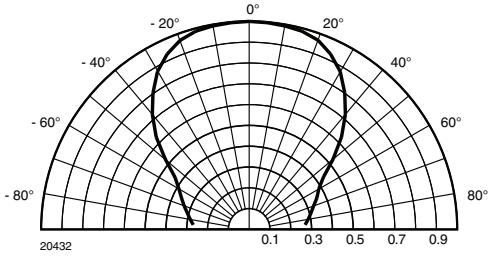


Figure 12. Directivity

Suitable Data Format

The TSOP853.. series is designed to suppress spurious output pulses due to noise or disturbance signals. Data and disturbance signals can be distinguished by the devices according to carrier frequency, burst length and envelope duty cycle. The data signal should be close to the band-pass center frequency (e.g. 38 kHz) and fulfill the conditions in the table below.

When a data signal is applied to the TSOP853.. in the presence of a disturbance signal, the sensitivity of the receiver is reduced to insure that no spurious pulses are present at the output. Some examples of disturbance signals which are suppressed are:

- DC light (e.g. from tungsten bulb or sunlight)
- Continuous signals at any frequency
- Modulated noise from fluorescent lamps with electronic ballasts

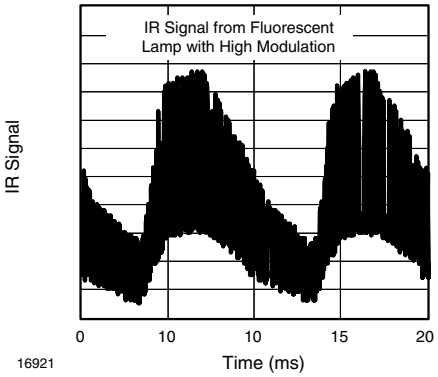


Figure 14. IR Signal from Fluorescent Lamp with High Modulation

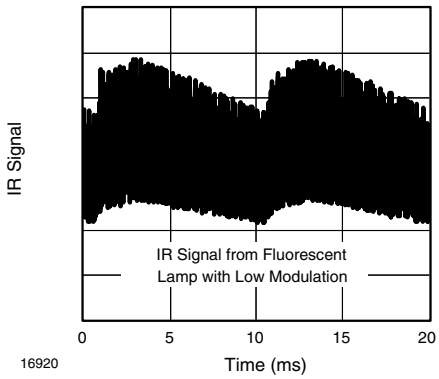
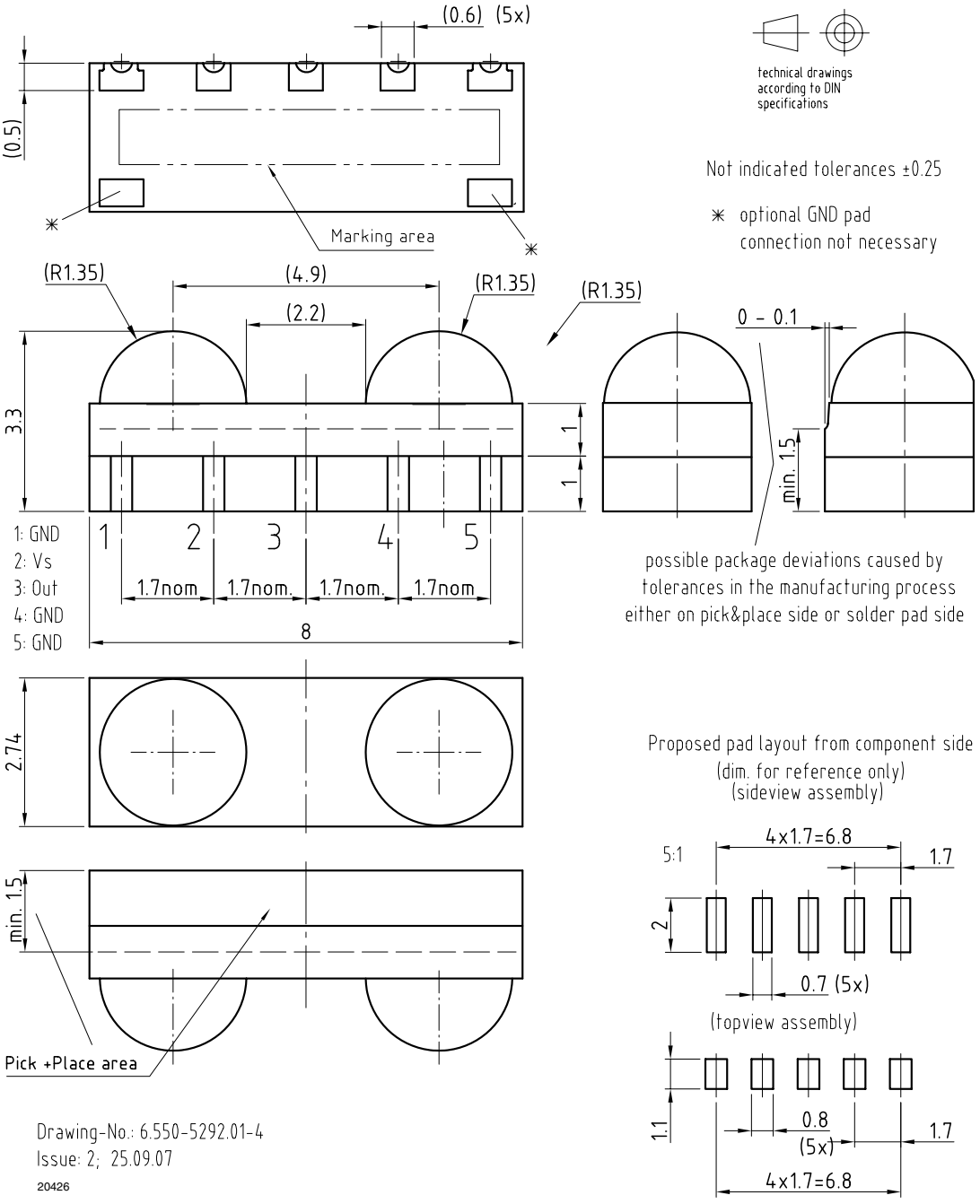


Figure 13. IR Signal from Fluorescent Lamp with Low Modulation

	TSOP853..
Minimum burst length	6 cycles/burst
After each burst of length A minimum gap time is required of	6 to 35 cycles 10 cycles
For bursts greater than A minimum gap time in the data stream is needed of	35 cycles > 6 x burst length
Maximum number of continuous short bursts/second	2000
Compatible to NEC code	yes
Compatible to RC5/RC6 code	yes
Compatible to Sony code	no
Compatible to RCMM code	yes
Compatible to r-step code	yes
Compatible to XMP code	yes
Suppression of interference from fluorescent lamps	Even critical disturbance signals are suppressed (Examples: Signal pattern of fig. 14 and fig. 15)

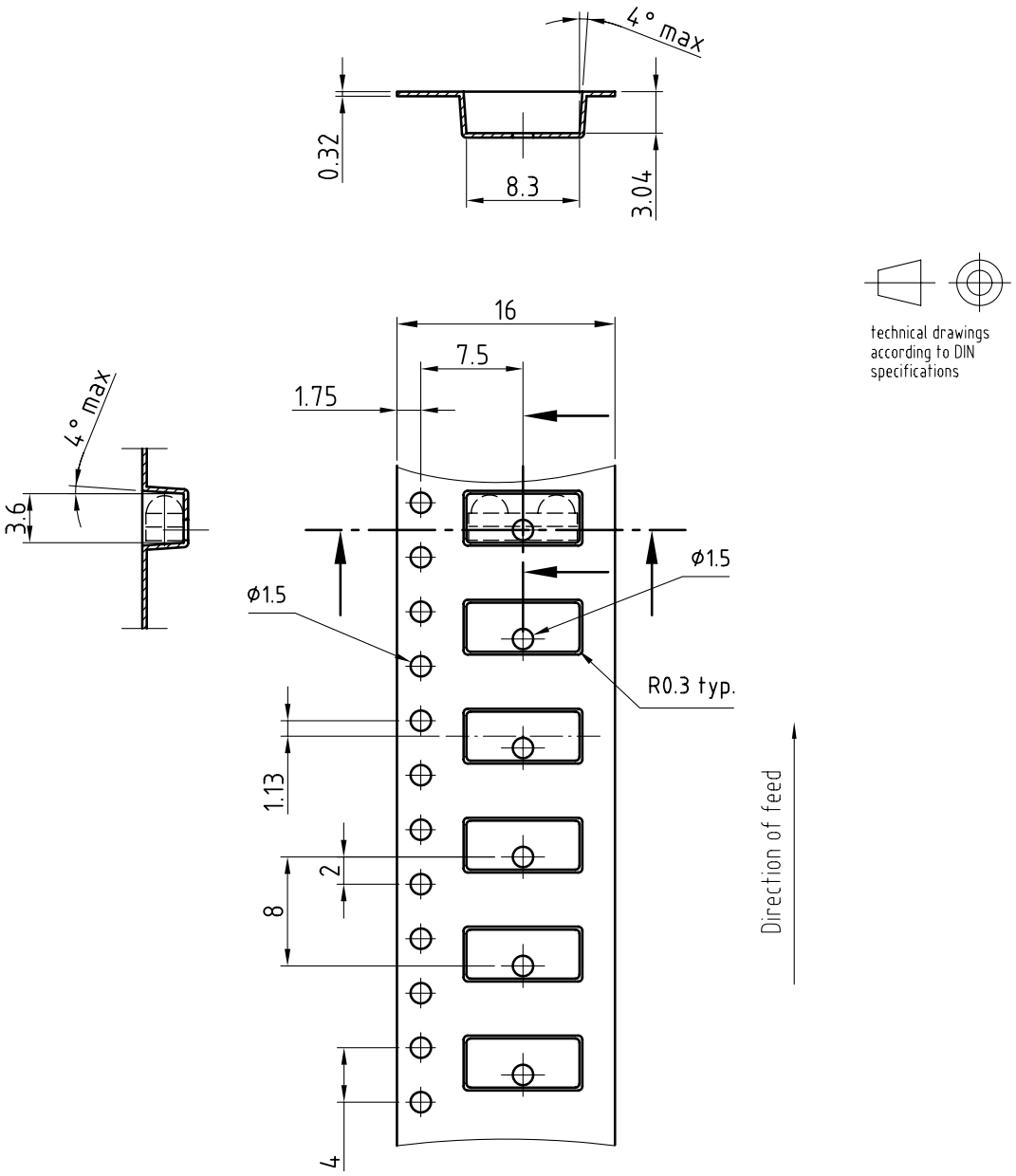
For data formats with long bursts (more than 10 carrier cycles) please see the data sheet for TSOP852../TSOP854..

Package Dimensions in millimeters



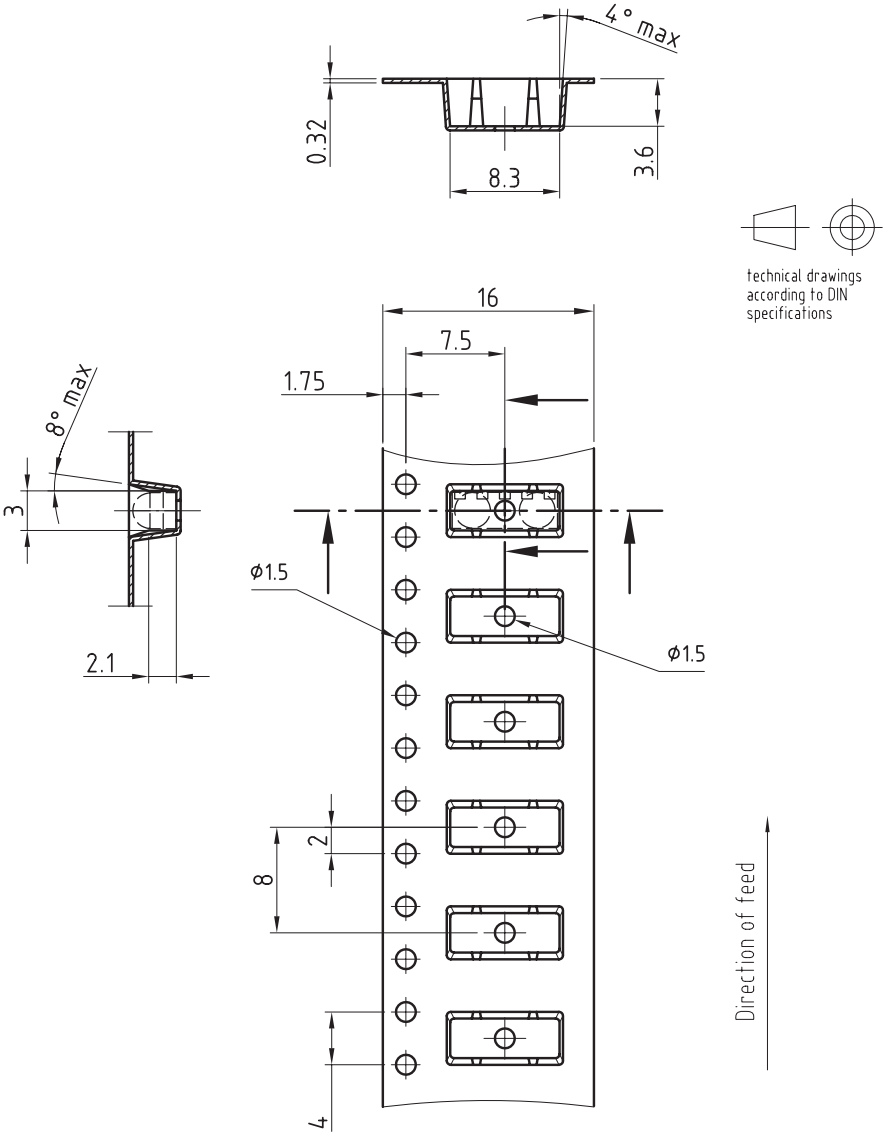
Drawing-No.: 6.550-5292.01-4
Issue: 2; 25.09.07
20426

Taping Version TSOP..TR Dimensions in millimeters



Drawing-No.: 9.700-5316.01-4
Issue: 1; 12.02.07
20628

Taping Version TSOP..TT Dimensions in millimeters



Drawing-No.: 9.700-5317.01-4
Issue: ; 12.02.08
20629

Ozone Depleting Substances Policy Statement

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1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively.
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA.
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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