



## IR Receiver Modules for Remote Control Systems



23051

### 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



Product Page



Marking



Packages



Holders



Bends and Cuts

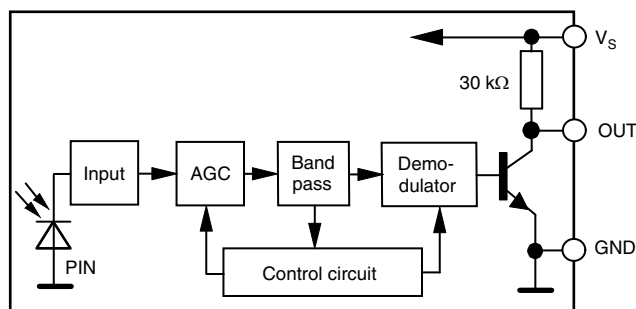
### APPLICATIONS

- Infrared remote control systems

### DESIGN SUPPORT TOOLS

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

### BLOCK DIAGRAM



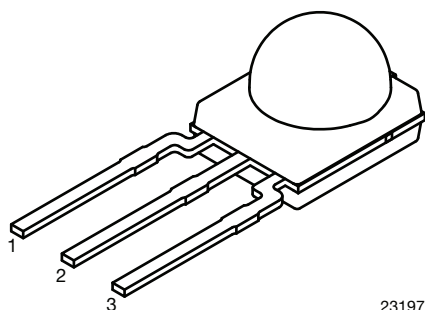
16833-22



## MECHANICAL DATA

### Pinning for TSOP53...:

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



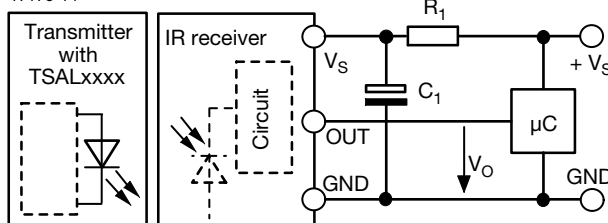
23197

## ORDERING CODE

TSOP53... - 1800 pieces in bags

## 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 BURST REMOTE CONTROLS (AGC2)	RECOMMENDED FOR LONG BURST CODES (AGC4)
Carrier frequency	30 kHz	TSOP53230	TSOP53430
	33 kHz	TSOP53233	TSOP53433
	36 kHz	TSOP53236	TSOP53436 (1)(2)(3)
	38 kHz	TSOP53238	TSOP53438 (4)(5)(6)(9)(10)
	40 kHz	TSOP53240 (8)	TSOP53440
	56 kHz	TSOP53256 (11)	TSOP53456 (6)(7)
Package		Minimold	
Pinning		1 = OUT, 2 = GND, 3 = $V_S$	
Dimensions (mm)		5.4 W x 6.35 H x 4.9 D	
Mounting		Leaded	
Application		Remote control	
Best choice for		(1) RC-5 (2) RC-6 (3) Panasonic (4) NEC (5) Sharp (6) r-step (7) Thomson RCA (8) Sony (9) Mitsubishi (10) Sejin 4PPM (11) Cisco	
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		$I_S$	5	mA
Output voltage		$V_O$	-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		$I_O$	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 ( $T_{amb} = 25^{\circ}\text{C}$ , 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, $I_F = 50\text{ mA}$	$d$	-	24	-	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	$E_e\text{ min.}$	-	0.12	0.25	$\text{mW/m}^2$
	Test signal: NEC code	$E_e\text{ min.}$	-	0.16	0.35	$\text{mW/m}^2$
Maximum irradiance	$t_{pi} - 4/f_0 < t_{po} < t_{pi} + 4/f_0$ , test signal see Fig. 1	$E_e\text{ max.}$	30	-	-	$\text{W/m}^2$
Directivity	Angle of half transmission distance	$\phi_{1/2}$	-	$\pm 45$	-	deg

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

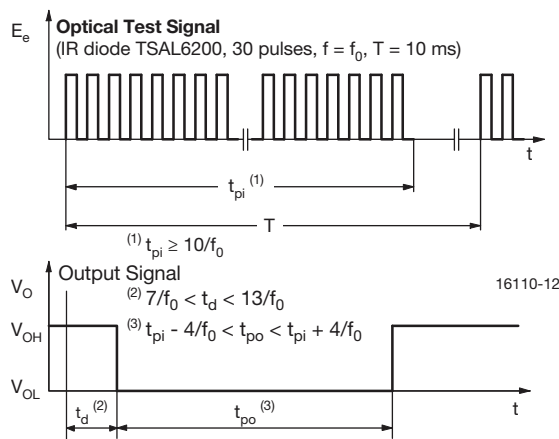


Fig. 1 - Output Active Low

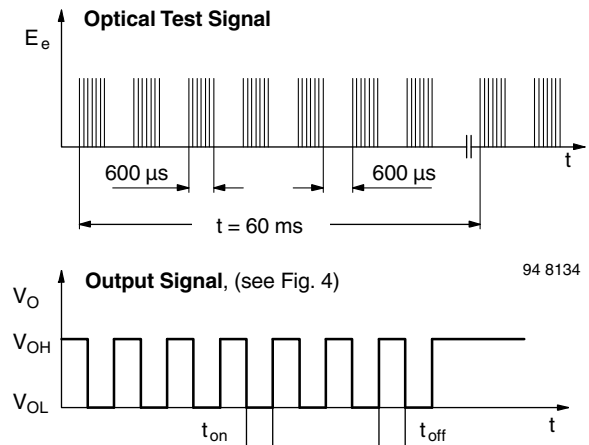


Fig. 3 - Output Function

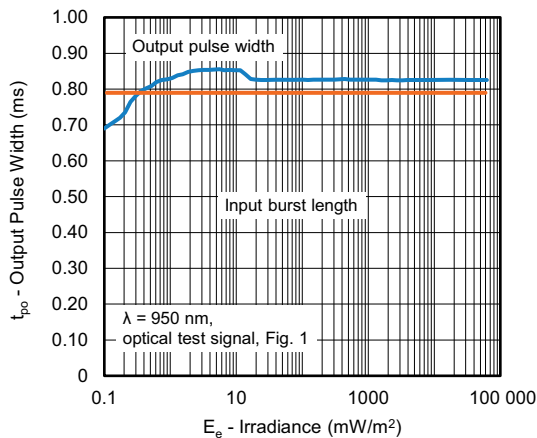


Fig. 2 - Pulse Length and Sensitivity in Dark Ambient

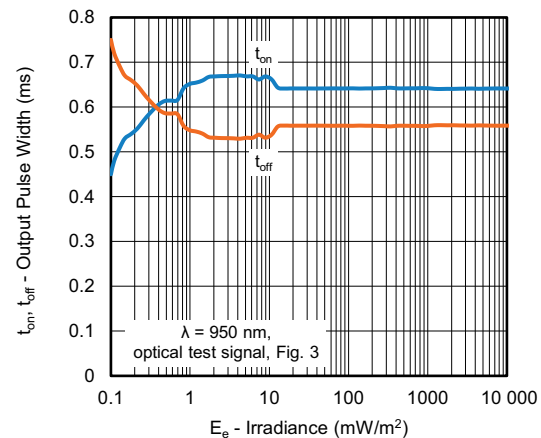


Fig. 4 - Output Pulse Diagram

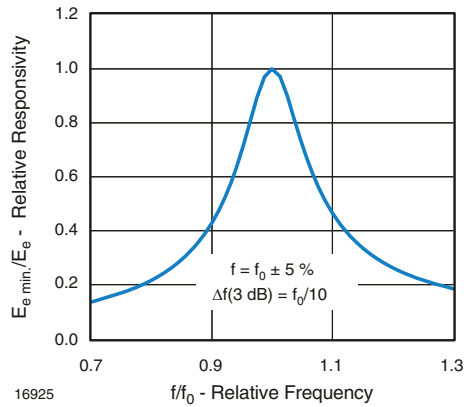


Fig. 5 - Frequency Dependence of Responsivity

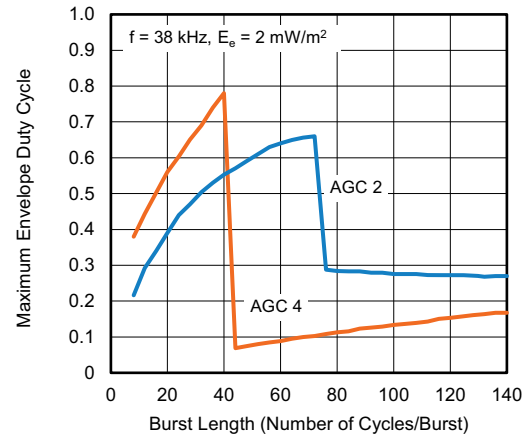


Fig. 8 - Max. Envelope Duty Cycle vs. Burst Length

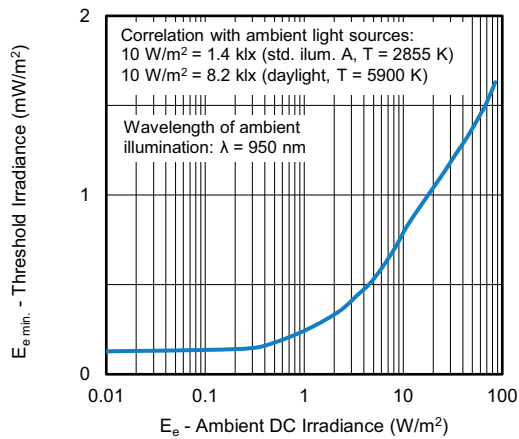


Fig. 6 - Sensitivity in Bright Ambient

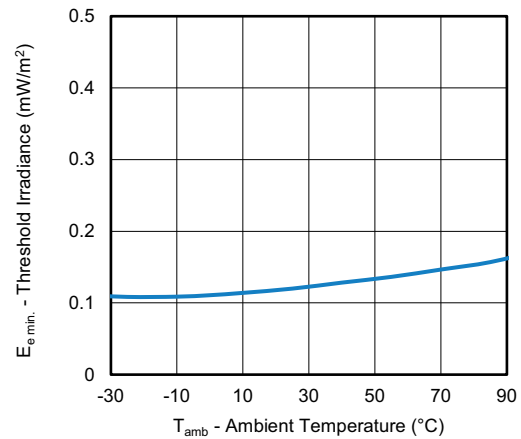


Fig. 9 - Sensitivity vs. Ambient Temperature

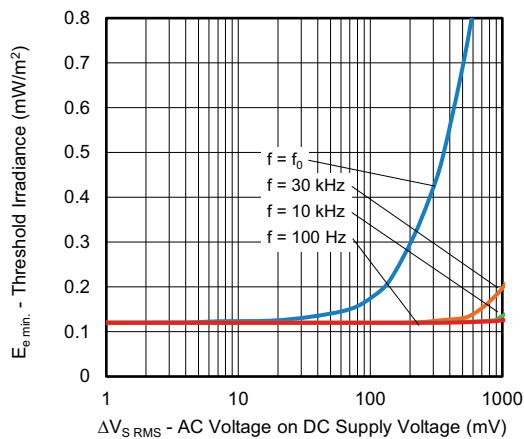


Fig. 7 - Sensitivity vs. Supply Voltage Disturbances

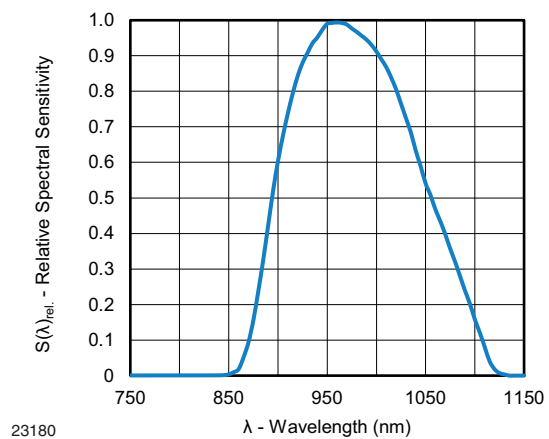


Fig. 10 - Relative Spectral Sensitivity vs. Wavelength



TSOP532.., TSOP534..

Vishay Semiconductors

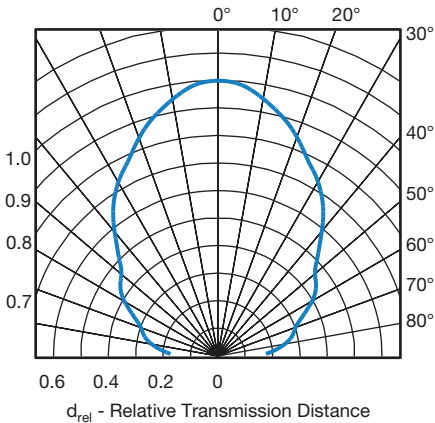


Fig. 11 - Horizontal Directivity

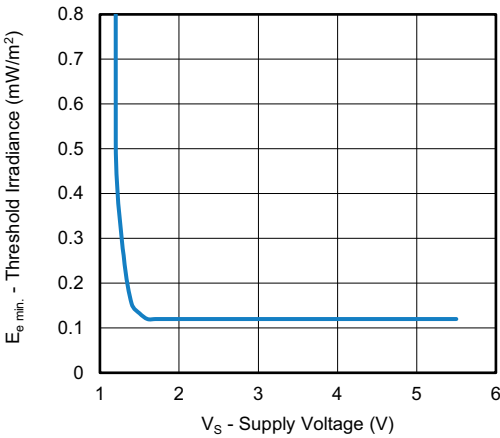


Fig. 12 - Sensitivity vs. Supply Voltage



### 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 patterns from fluorescent lamps with electronic ballasts (see Fig. 13 or Fig. 14).
- 2.4 GHz and 5 GHz Wi-Fi

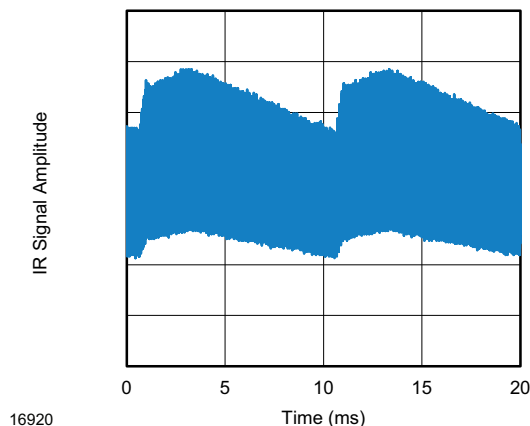


Fig. 13 - IR Disturbance from Fluorescent Lamp With Low Modulation

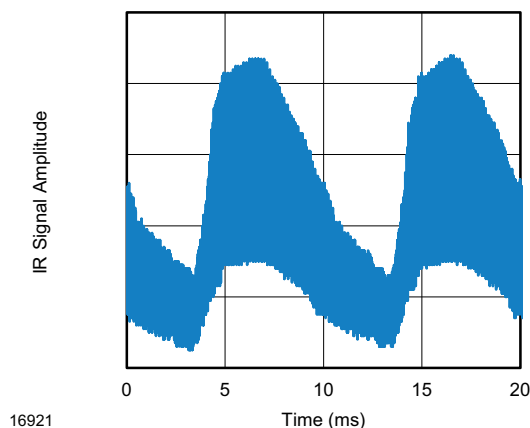
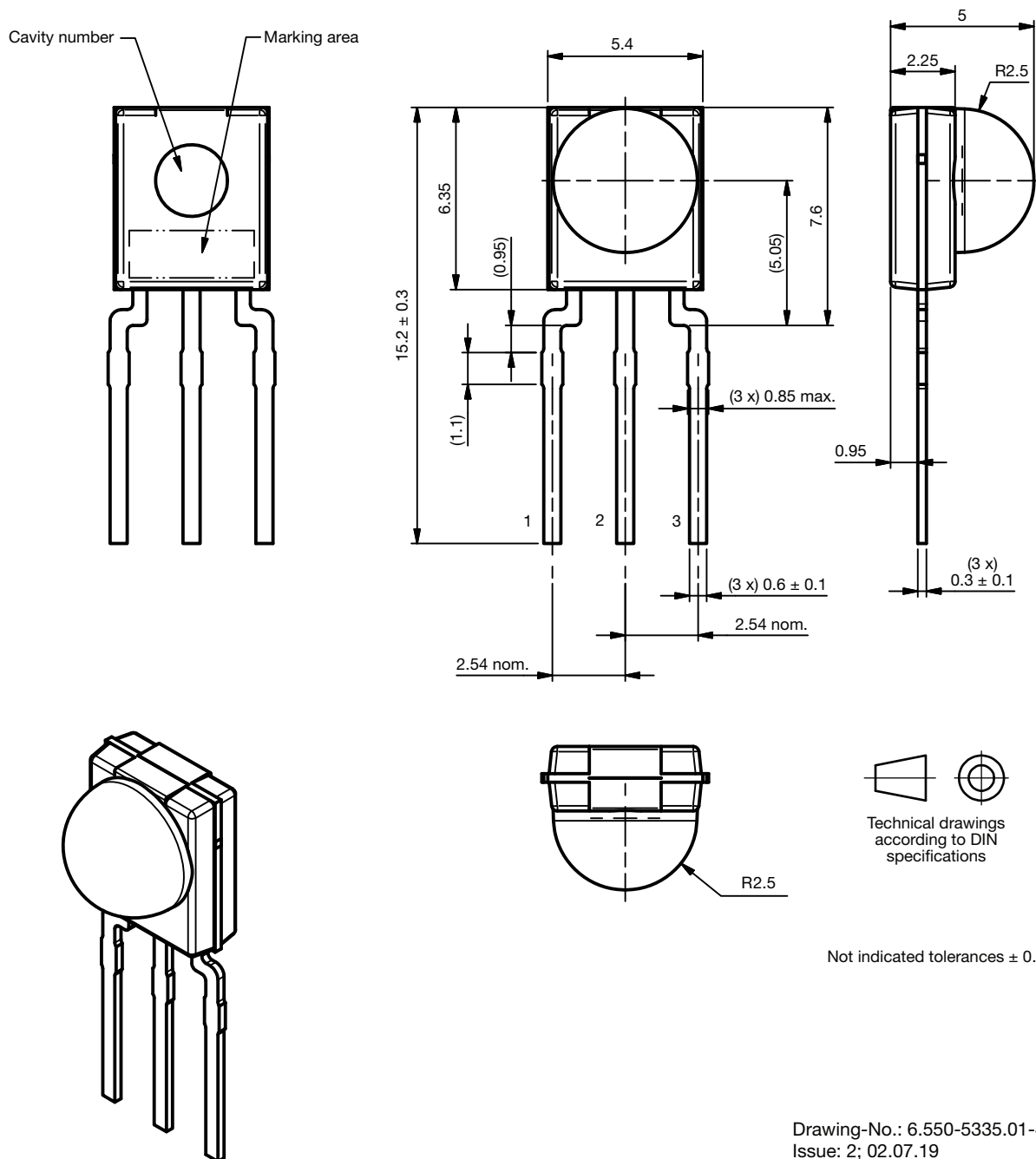


Fig. 14 - IR Disturbance from Fluorescent Lamp With High Modulation

	TSOP532..	TSOP534..
Minimum burst length	10 cycles/burst	10 cycles/burst
After each burst of length a minimum gap time is required of	10 to 72 cycles ≥ 10 cycles	10 to 40 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	72 cycles > 3 x burst length	40 cycles > 10 x burst length
Maximum number of continuous short bursts/second	950	1500
NEC code	Yes	Preferred
RC5/RC6 code	Yes	Preferred
Thomson RCA 56 kHz code	Yes	Preferred
Sharp code	Yes	Preferred
Sony code	Preferred	No
r-step code	Yes	Preferred
Suppression of interference from fluorescent lamps	Mild disturbance patterns are suppressed (example: signal pattern of Fig. 13)	Complex and critical disturbance patterns are suppressed (example: signal pattern of Fig. 14 or highly dimmed LCDs)

#### Note

- For data formats with short bursts please see the datasheet of TSOP531.., TSOP533.., TSOP535..



Technical drawings  
according to DIN  
specifications

Not indicated tolerances  $\pm 0.2$

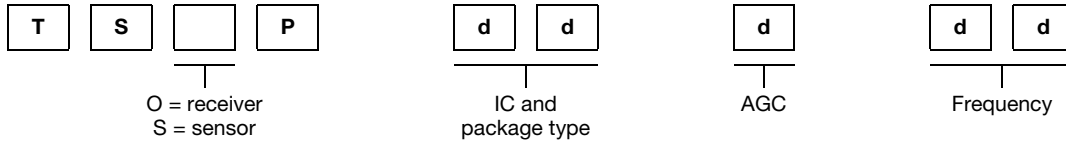
Drawing-No.: 6.550-5335.01-4  
Issue: 2; 02.07.19



## BULK PACKAGING

Standard shipping for minimold is in conductive plastic bags. The packing quantity is determined by weight and a maximum of 0.3 % of the components per carton may be missing.

## ORDERING INFORMATION



### Note

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

Examples: TSOP53438  
 TSOP53456VI1  
 TSOP53438SS1F

## PACKAGING QUANTITY

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





## 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.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

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.