

Photo Modules for PCM Remote Control Systems

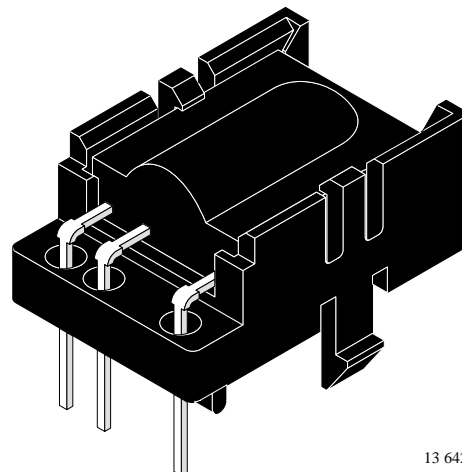
Available types for different carrier frequencies

Type	fo	Type	fo
TSOP1730UU1	30 kHz	TSOP1733UU1	33 kHz
TSOP1736UU1	36 kHz	TSOP1737UU1	36.7 kHz
TSOP1738UU1	38 kHz	TSOP1740UU1	40 kHz
TSOP1756UU1	56 kHz		

Description

The TSOP17..UU1 – series are miniaturized receivers for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter.

The demodulated output signal can directly be decoded by a microprocessor. TSOP17.. is the standard IR remote control receiver series, supporting all major transmission codes.

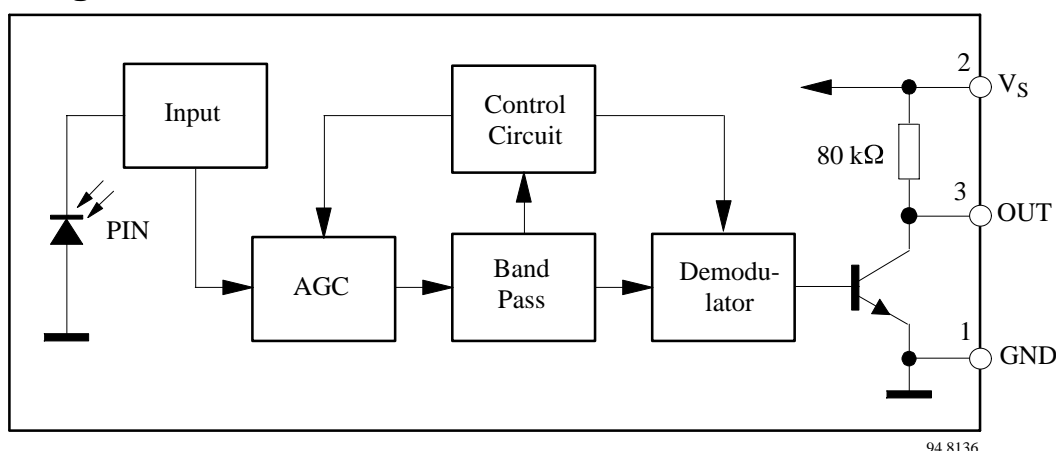


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Features

- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against electrical field disturbance
- TTL and CMOS compatibility
- Output active low
- Low power consumption
- High immunity against ambient light
- Continuous data transmission possible (up to 2400 bps)
- Suitable burst length ≥ 10 cycles/burst

Block Diagram



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Absolute Maximum Ratings

 $T_{amb} = 25^{\circ}\text{C}$

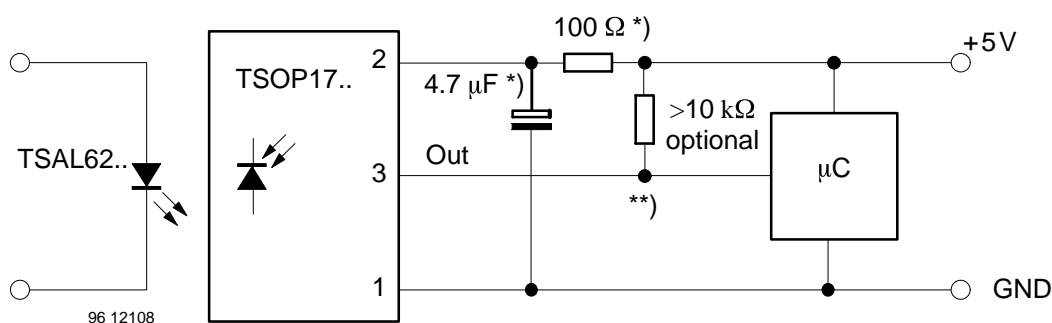
Parameter	Test Conditions	Symbol	Value	Unit
Supply Voltage	(Pin 2)	V_S	-0.3...6.0	V
Supply Current	(Pin 2)	I_S	5	mA
Output Voltage	(Pin 3)	V_O	-0.3...6.0	V
Output Current	(Pin 3)	I_O	5	mA
Junction Temperature		T_j	100	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	-25...+85	$^{\circ}\text{C}$
Operating Temperature Range		T_{amb}	-25...+85	$^{\circ}\text{C}$
Power Consumption	($T_{amb} \leq 85^{\circ}\text{C}$)	P_{tot}	50	mW
Soldering Temperature	$t \leq 5\text{ s}$	T_{sd}	260	$^{\circ}\text{C}$

Basic Characteristics

 $T_{amb} = 25^{\circ}\text{C}$

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Supply Current (Pin 2)	$V_S = 5\text{ V}, E_v = 0$	I_{SD}	0.4	0.6	1.5	mA
	$V_S = 5\text{ V}, E_v = 40\text{ klx, sunlight}$	I_{SH}		1.0		mA
Supply Voltage (Pin 2)		V_S	4.5		5.5	V
Transmission Distance	$E_v = 0$, test signal see fig.7, IR diode TSAL6200, $I_F = 400\text{ mA}$	d		35		m
Output Voltage Low (Pin 3)	$I_{OSL} = 0.5\text{ mA}, E_e = 0.7\text{ mW/m}^2$, $f = f_o, t_p/T = 0.4$	V_{OSL}			250	mV
Irradiance (30 – 40 kHz)	Pulse width tolerance: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal (see fig.7)	$E_{e\text{ min}}$		0.35	0.5	mW/m^2
Irradiance (56 kHz)	Pulse width tolerance: $t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal (see fig.7)	$E_{e\text{ min}}$		0.4	0.6	mW/m^2
Irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$	$E_{e\text{ max}}$	30			W/m^2
Directivity	Angle of half transmission distance	$\phi_{1/2}$		± 45		deg

Application Circuit



*) recommended to suppress power supply disturbances

**) The output voltage should not be hold continuously at a voltage below 3.3V by the external circuit.

Suitable Data Format

The circuit of the TSOP17..UU1 is designed in that way that unexpected output pulses due to noise or disturbance signals are avoided. A bandpassfilter, an integrator stage and an automatic gain control are used to suppress such disturbances.

The distinguishing mark between data signal and disturbance signal are carrier frequency, burst length and duty cycle.

The data signal should fullfill the following condition:

- Carrier frequency should be close to center frequency of the bandpass (e.g. 38kHz).
- Burst length should be 10 cycles/burst or longer.
- After each burst which is between 10 cycles and 70 cycles a gap time of at least 14 cycles is necessary.
- For each burst which is longer than 1.8ms a corresponding gap time is necessary at some time in the data stream. This gap time should have at least same length as the burst.
- Up to 1400 short bursts per second can be received continuously.

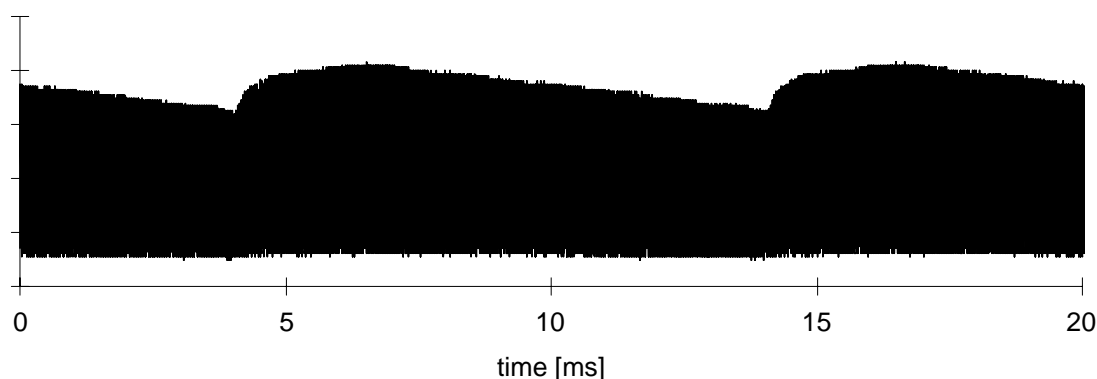
Some examples for suitable data format are:

NEC Code, Toshiba Micom Format, Sharp Code, RC5 Code, RC6 Code, R-2000 Code, Sony Format (SIRCS).

When a disturbance signal is applied to the TSOP17..UU1 it can still receive the data signal. However the sensitivity is reduced to that level that no unexpected pulses will occur.

Some examples for such disturbance signals which are suppressed by the TSOP17..UU1 are:

- DC light (e.g. from tungsten bulb or sunlight)
- Continuous signal at 38kHz or at any other frequency
- Signals from fluorescent lamps with electronic ballast (an example of the signal modulation is in the figure below).



IR Signal from Fluorescent Lamp with low Modulation

Typical Characteristics ($T_{amb} = 25^{\circ}\text{C}$ unless otherwise specified)



Figure 1. Frequency Dependence of Responsivity



Figure 4. Sensitivity vs. Electric Field Disturbances



Figure 2. Sensitivity in Dark Ambient

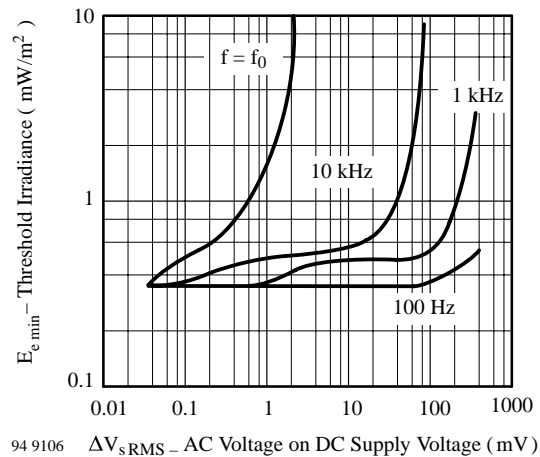


Figure 5. Sensitivity vs. Supply Voltage Disturbances

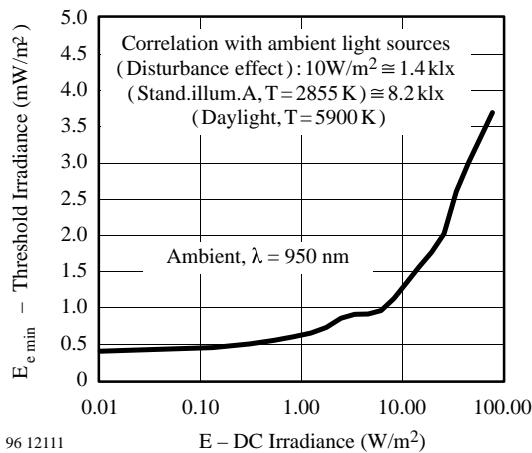


Figure 3. Sensitivity in Bright Ambient

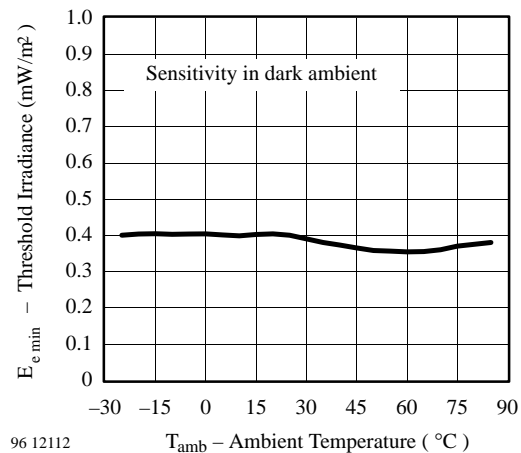


Figure 6. Sensitivity vs. Ambient Temperature

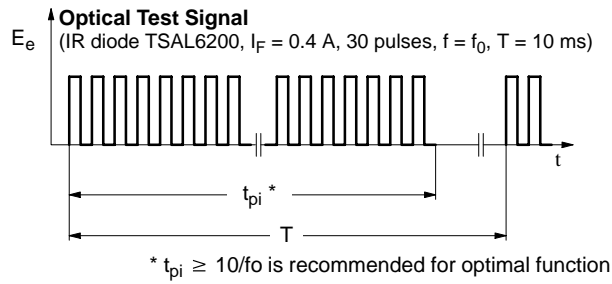


Figure 7. Output Function

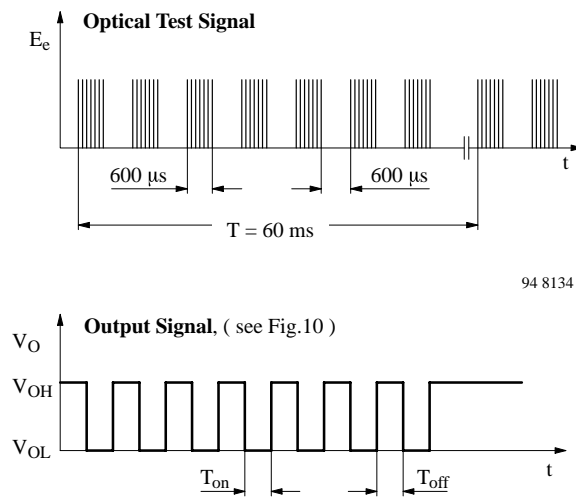


Figure 8. Output Function

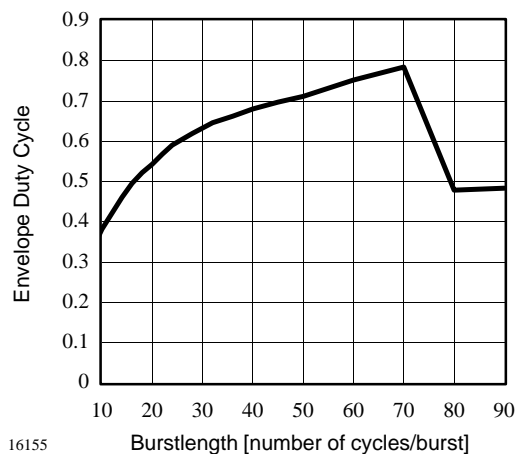


Figure 9. Max. Envelope Duty Cycle vs. Burstlength

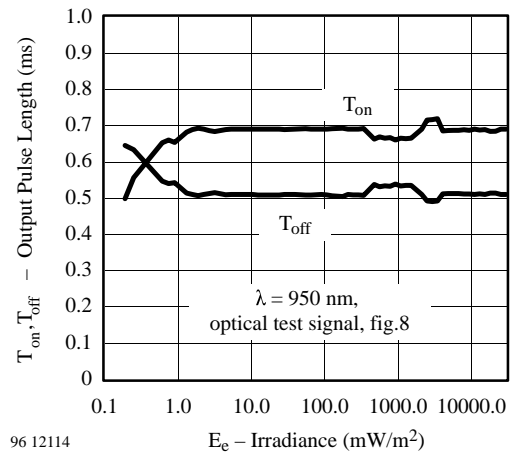


Figure 10. Output Pulse Diagram

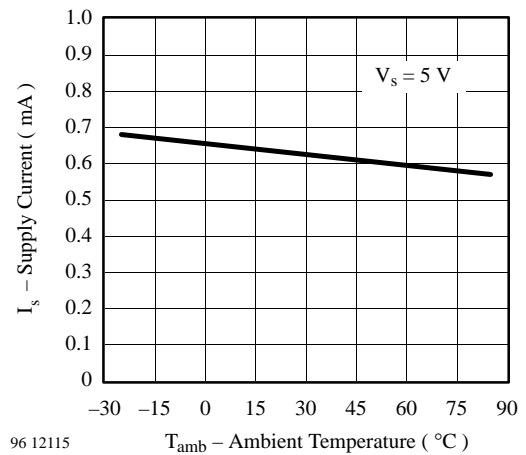


Figure 11. Supply Current vs. Ambient Temperature

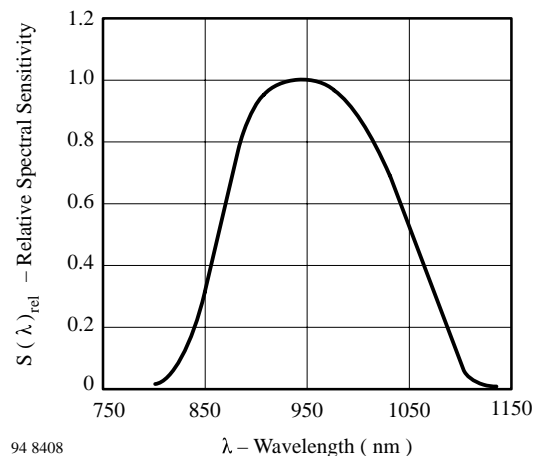


Figure 12. Relative Spectral Sensitivity vs. Wavelength

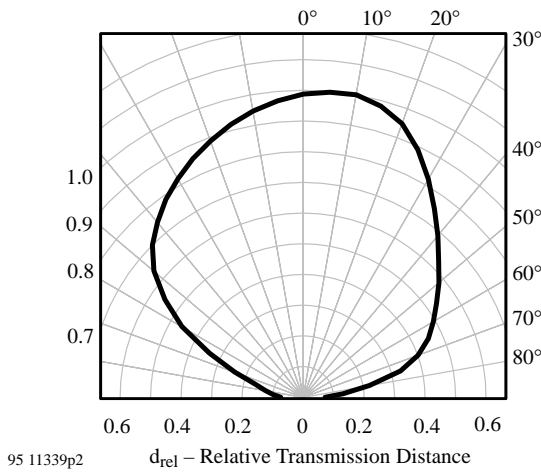


Figure 13. Vertical Directivity ϕ_y

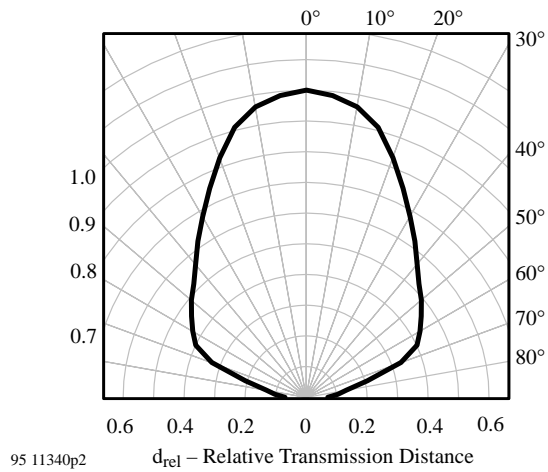


Figure 14. Horizontal Directivity ϕ_x

Technical drawing of the D12827 sensor, showing three views: top, side, and footprint.

Top View Dimensions:

- Overall width: 20 ± 0.5 mm
- Overall height: 15.4 ± 0.3 mm
- Pin pitch: 2.54 mm (nominal)
- Pin 1 to Pin 4 distance: $3 \times 2.54 = 7.62$ mm (nominal)
- Pin 5 to Pin 8 distance: 7.05 ± 0.15 mm
- Pin 9 to Pin 12 distance: 8.55 ± 0.15 mm
- Pin 13 to Pin 16 distance: 2.6 ± 0.5 mm
- Pin 17 to Pin 20 distance: 0.4 ± 0.05 mm
- Pin 21 to Pin 24 distance: 1 ± 0.1 mm
- Pin 25 to Pin 28 distance: 8.5 ± 0.5 mm
- Pin 29 to Pin 32 distance: 12 ± 0.5 mm
- Pin 33 to Pin 36 distance: 12.8 ± 0.5 mm
- Pin 37 to Pin 40 distance: 2 ± 0.2 mm
- Pin 41 to Pin 44 distance: 3.25 ± 0.15 mm
- Pin 45 to Pin 48 distance: 3.05 ± 0.15 mm
- Pin 49 to Pin 52 distance: 3.25 ± 0.15 mm
- Pin 53 to Pin 56 distance: 2 ± 0.2 mm
- Pin 57 to Pin 60 distance: 3.25 ± 0.15 mm
- Pin 61 to Pin 64 distance: 3.05 ± 0.15 mm
- Pin 65 to Pin 68 distance: 3.25 ± 0.15 mm
- Pin 69 to Pin 72 distance: 2 ± 0.2 mm
- Pin 73 to Pin 76 distance: 3.25 ± 0.15 mm
- Pin 77 to Pin 80 distance: 3.05 ± 0.15 mm
- Pin 81 to Pin 84 distance: 3.25 ± 0.15 mm
- Pin 85 to Pin 88 distance: 2 ± 0.2 mm
- Pin 89 to Pin 92 distance: 3.25 ± 0.15 mm
- Pin 93 to Pin 96 distance: 3.05 ± 0.15 mm
- Pin 97 to Pin 100 distance: 3.25 ± 0.15 mm
- Pin 101 to Pin 104 distance: 2 ± 0.2 mm
- Pin 105 to Pin 108 distance: 3.25 ± 0.15 mm
- Pin 109 to Pin 112 distance: 3.05 ± 0.15 mm
- Pin 113 to Pin 116 distance: 3.25 ± 0.15 mm
- Pin 117 to Pin 120 distance: 2 ± 0.2 mm
- Pin 121 to Pin 124 distance: 3.25 ± 0.15 mm
- Pin 125 to Pin 128 distance: 3.05 ± 0.15 mm
- Pin 129 to Pin 132 distance: 3.25 ± 0.15 mm
- Pin 133 to Pin 136 distance: 2 ± 0.2 mm
- Pin 137 to Pin 140 distance: 3.25 ± 0.15 mm
- Pin 141 to Pin 144 distance: 3.05 ± 0.15 mm
- Pin 145 to Pin 148 distance: 3.25 ± 0.15 mm
- Pin 149 to Pin 152 distance: 2 ± 0.2 mm
- Pin 153 to Pin 156 distance: 3.25 ± 0.15 mm
- Pin 157 to Pin 160 distance: 3.05 ± 0.15 mm
- Pin 161 to Pin 164 distance: 3.25 ± 0.15 mm
- Pin 165 to Pin 168 distance: 2 ± 0.2 mm
- Pin 169 to Pin 172 distance: 3.25 ± 0.15 mm
- Pin 173 to Pin 176 distance: 3.05 ± 0.15 mm
- Pin 177 to Pin 180 distance: 3.25 ± 0.15 mm
- Pin 181 to Pin 184 distance: 2 ± 0.2 mm
- Pin 185 to Pin 188 distance: 3.25 ± 0.15 mm
- Pin 189 to Pin 192 distance: 3.05 ± 0.15 mm
- Pin 193 to Pin 196 distance: 3.25 ± 0.15 mm
- Pin 197 to Pin 200 distance: 2 ± 0.2 mm
- Pin 201 to Pin 204 distance: 3.25 ± 0.15 mm
- Pin 205 to Pin 208 distance: 3.05 ± 0.15 mm
- Pin 209 to Pin 212 distance: 3.25 ± 0.15 mm
- Pin 213 to Pin 216 distance: 2 ± 0.2 mm
- Pin 217 to Pin 220 distance: 3.25 ± 0.15 mm
- Pin 221 to Pin 224 distance: 3.05 ± 0.15 mm
- Pin 225 to Pin 228 distance: 3.25 ± 0.15 mm
- Pin 229 to Pin 232 distance: 2 ± 0.2 mm
- Pin 233 to Pin 236 distance: 3.25 ± 0.15 mm
- Pin 237 to Pin 240 distance: 3.05 ± 0.15 mm
- Pin 241 to Pin 244 distance: 3.25 ± 0.15 mm
- Pin 245 to Pin 248 distance: 2 ± 0.2 mm
- Pin 249 to Pin 252 distance: 3.25 ± 0.15 mm
- Pin 253 to Pin 256 distance: 3.05 ± 0.15 mm
- Pin 257 to Pin 260 distance: 3.25 ± 0.15 mm
- Pin 261 to Pin 264 distance: 2 ± 0.2 mm
- Pin 265 to Pin 268 distance: 3.25 ± 0.15 mm
- Pin 269 to Pin 272 distance: 3.05 ± 0.15 mm
- Pin 273 to Pin 276 distance: 3.25 ± 0.15 mm
- Pin 277 to Pin 280 distance: 2 ± 0.2 mm
- Pin 281 to Pin 284 distance: 3.25 ± 0.15 mm
- Pin 285 to Pin 288 distance: 3.05 ± 0.15 mm
- Pin 289 to Pin 292 distance: 3.25 ± 0.15 mm
- Pin 293 to Pin 296 distance: 2 ± 0.2 mm
- Pin 297 to Pin 300 distance: 3.25 ± 0.15 mm
- Pin 301 to Pin 304 distance: 3.05 ± 0.15 mm
- Pin 305 to Pin 308 distance: 3.25 ± 0.15 mm
- Pin 309 to Pin 312 distance: 2 ± 0.2 mm
- Pin 313 to Pin 316 distance: 3.25 ± 0.15 mm
- Pin 317 to Pin 320 distance: 3.05 ± 0.15 mm
- Pin 321 to Pin 324 distance: 3.25 ± 0.15 mm
- Pin 325 to Pin 328 distance: 2 ± 0.2 mm
- Pin 329 to Pin 332 distance: 3.25 ± 0.15 mm
- Pin 333 to Pin 336 distance: 3.05 ± 0.15 mm
- Pin 337 to Pin 340 distance: 3.25 ± 0.15 mm
- Pin 341 to Pin 344 distance: 2 ± 0.2 mm
- Pin 345 to Pin 348 distance: 3.25 ± 0.15 mm
- Pin 349 to Pin 352 distance: 3.05 ± 0.15 mm
- Pin 353 to Pin 356 distance: 3.25 ± 0.15 mm
- Pin 357 to Pin 360 distance: 2 ± 0.2 mm
- Pin 361 to Pin 364 distance: 3.25 ± 0.15 mm
- Pin 365 to Pin 368 distance: 3.05 ± 0.15 mm
- Pin 369 to Pin 372 distance: 3.25 ± 0.15 mm
- Pin 373 to Pin 376 distance: 2 ± 0.2 mm
- Pin 377 to Pin 380 distance: 3.25 ± 0.15 mm
- Pin 381 to Pin 384 distance: 3.05 ± 0.15 mm
- Pin 385 to Pin 388 distance: 3.25 ± 0.15 mm
- Pin 389 to Pin 392 distance: 2 ± 0.2 mm
- Pin 393 to Pin 396 distance: 3.25 ± 0.15 mm
- Pin 397 to Pin 400 distance: 3.05 ± 0.15 mm
- Pin 401 to Pin 404 distance: 3.25 ± 0.15 mm
- Pin 405 to Pin 408 distance: 2 ± 0.2 mm
- Pin 409 to Pin 412 distance: 3.25 ± 0.15 mm
- Pin 413 to Pin 416 distance: 3.05 ± 0.15 mm
- Pin 417 to Pin 420 distance: 3.25 ± 0.15 mm
- Pin 421 to Pin 424 distance: 2 ± 0.2 mm
- Pin 425 to Pin 428 distance: 3.25 ± 0.15 mm
- Pin 429 to Pin 432 distance: 3.05 ± 0.15 mm
- Pin 433 to Pin 436 distance: $3.25 \pm$

Ozone Depleting Substances Policy Statement

It is the policy of **Vishay Semiconductor GmbH** to

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.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay-Telefunken products for any unintended or unauthorized application, the buyer shall indemnify Vishay-Telefunken against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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