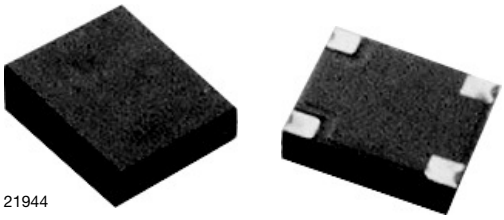
IR Receiver Modules for Remote Control Systems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FEATURES

- 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
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC
- Insensitive to supply voltage ripple and noise
- Halogen-free according to IEC 61249-2-21 definition

Pb-free

e4

RoHS COMPLIANT

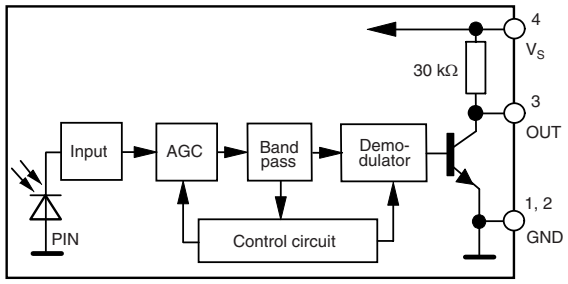
HALOGEN FREE

DESCRIPTION

The TSOP852..AP5, TSOP854..AP5 series are miniaturized receiver modules for infrared remote control systems. A PIN diode 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 TSOP852..AP5 is compatible with all common IR remote control data formats. The TSOP854..AP5 is optimized to suppress almost all spurious pulses from energy saving fluorescent lamps but will also suppress some data signals.
This component has not been qualified according to automotive specifications.

PARTS TABLE		
CARRIER FREQUENCY	STANDARD APPLICATIONS (AGC2/AGC8)	VERY NOISY ENVIRONMENTS (AGC4)
30 kHz	TSOP85230AP5	TSOP85430AP5
33 kHz	TSOP85233AP5	TSOP85433AP5
36 kHz	TSOP85236AP5	TSOP85436AP5
38 kHz	TSOP85238AP5	TSOP85438AP5
40 kHz	TSOP85240AP5	TSOP85440AP5
56 kHz	TSOP85256AP5	TSOP85456AP5

BLOCK DIAGRAM



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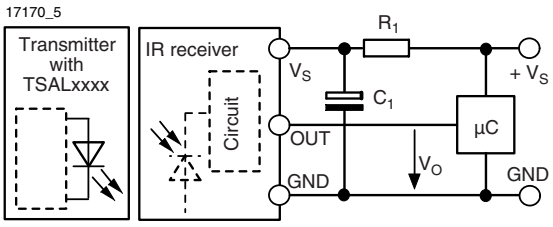
APPLICATION CIRCUIT



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 (1)				
PARAMETER	**TEST CONDITION**	**SYMBOL**	**VALUE**	**UNIT**
Supply voltage (pin 4)		V_S	- 0.3 to + 6	V
Supply current (pin 4)		I_S	3	mA
Output voltage (pin 3)		V_O	- 0.3 to (V_S + 0.3)	V
Output current (pin 3)		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

Note

(1) 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 (1)						
PARAMETER	**TEST CONDITION**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Supply voltage		V_S	2.5		5.5	V
Supply current (pin 4)	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		35		m
Output voltage low (pin 3)	I_{OSL} = 0.5 mA, E_e = 0.7 mW/m², 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	$E_{e\ min.}$		0.15	0.35	mW/m²
Maximum irradiance	$t_{pi} - 5/f_o < t_{po} < t_{pi} + 6/f_o$, test signal see fig. 1	$E_{e\ max.}$	30			W/m²
Directivity	Angle of half transmission distance	$\varphi_{1/2}$		± 75		deg

Note

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

TYPICAL CHARACTERISTICS

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

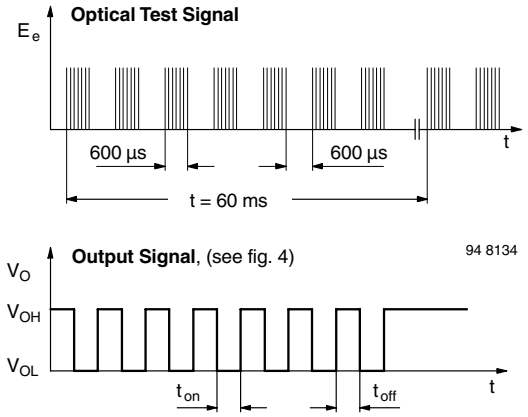


Fig. 1 - Output Function

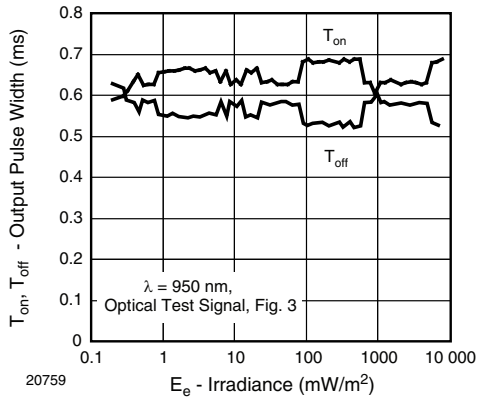


Fig. 2 - Output Pulse Diagram

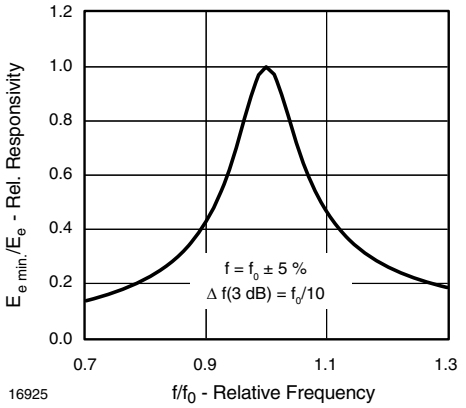


Fig. 3 - Frequency Dependance of Responsivity

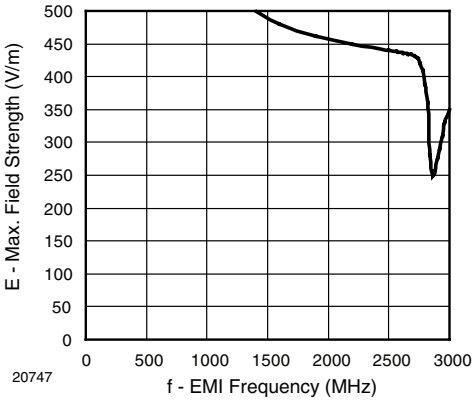


Fig. 6 - Sensitivity vs. Electric Field Disturbances

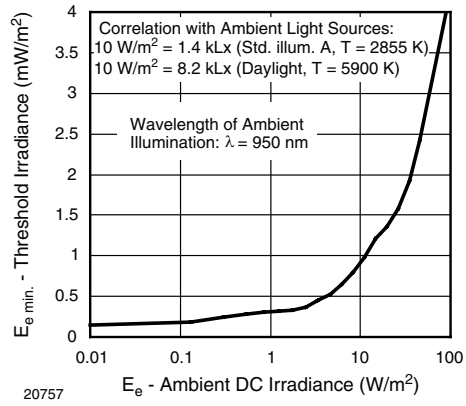


Fig. 4 - Sensitivity in Bright Ambient

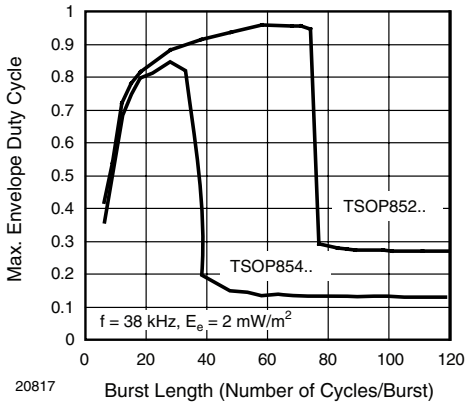


Fig. 7 - Max. Envelope Duty Cycle vs. Burst Length

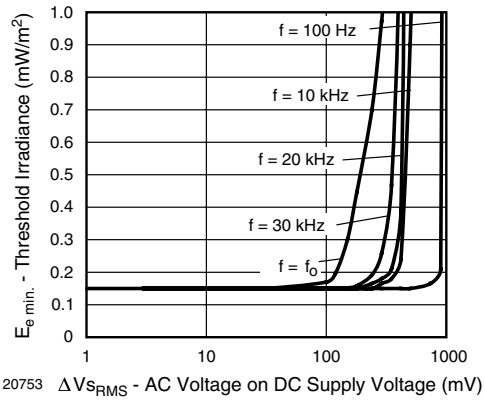


Fig. 5 - Sensitivity vs. Supply Voltage Disturbances

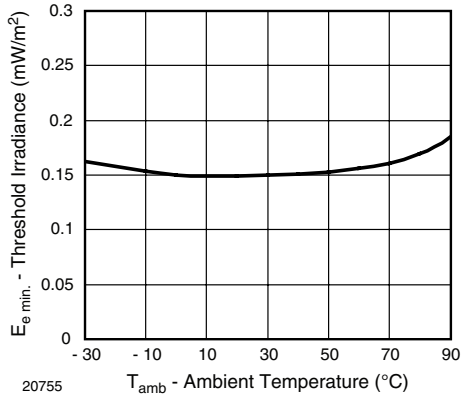


Fig. 8 - Sensitivity vs. Ambient Temperature

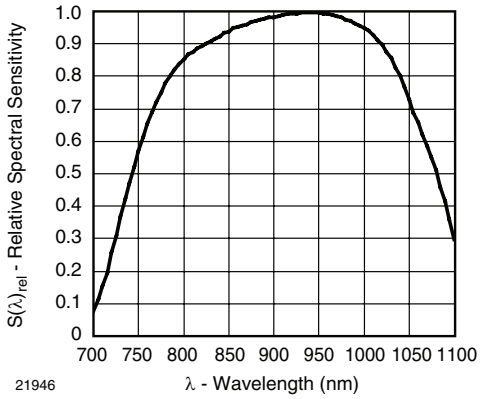


Fig. 9 - Relative Spectral Sensitivity vs. Wavelength

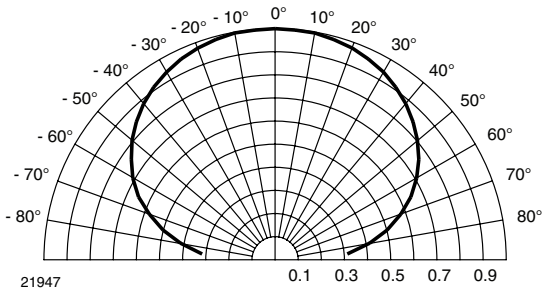


Fig. 10 - Directivity

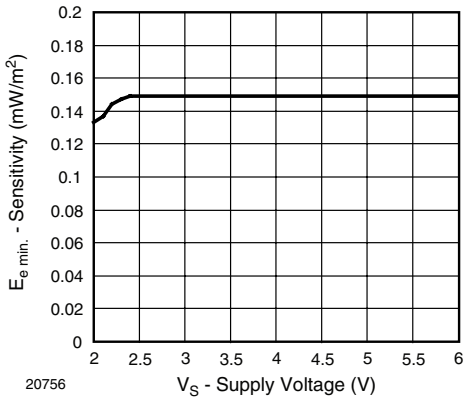


Fig. 11 - Sensitivity vs. Supply Voltage

SUITABLE DATA FORMAT

The TSOP852..AP5, TSOP854..AP5 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 TSOP852..AP5, TSOP854..AP5 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
- Strongly or weakly modulated noise from fluorescent lamps with electronic ballasts (see figure 12 or figure 13)

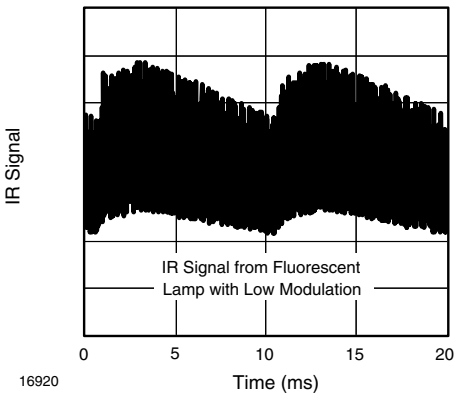


Fig. 12 - IR Signal from Fluorescent Lamp with Low Modulation

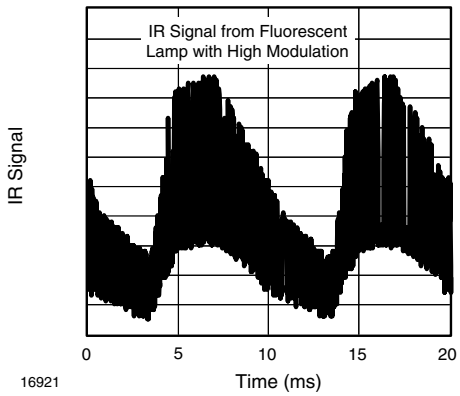


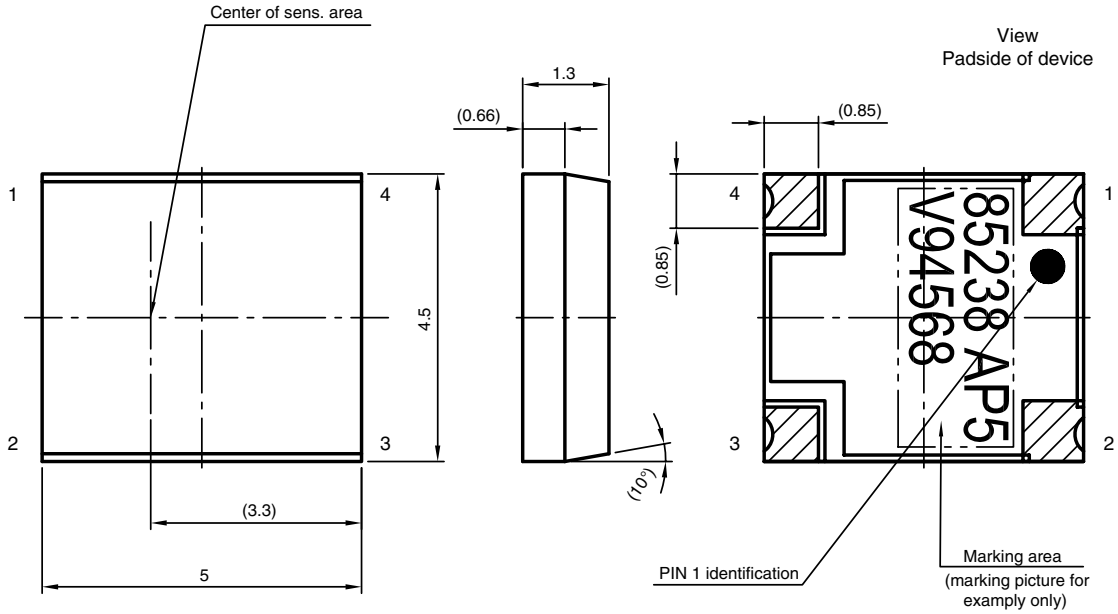
Fig. 13 - IR Signal from Fluorescent Lamp with High Modulation

	TSOP852..AP5	TSOP854..AP5
Minimum burst length	10 cycles/burst	10 cycles/burst
After each burst of length a minimum gap time is required of	10 to 70 cycles ≥ 10 cycles	10 to 35 cycles ≥ 10 cycles
For bursts greater than a minimum gap time in the data stream is needed of	70 cycles > 4 x burst length	35 cycles > 10 x burst length
Maximum number of continuous short bursts/second	1800	1500
Recommended for NEC code	Yes	Yes
Recommended for RC5/RC6 code	Yes	Yes
Recommended for Sony code	Yes	No
Recommended for Thomson 56 kHz code	Yes	Yes
Recommended for Mitsubishi code (38 kHz, preburst 8 ms, 16 bit)	Yes	No
Recommended for Sharp code	Yes	Yes
Suppression of interference from fluorescent lamps	Most common disturbance signals are suppressed	Even extreme disturbance signals are suppressed

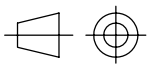
Note

For data formats with short bursts please see the datasheet for TSOP853..

PACKAGE DIMENSIONS in millimeters



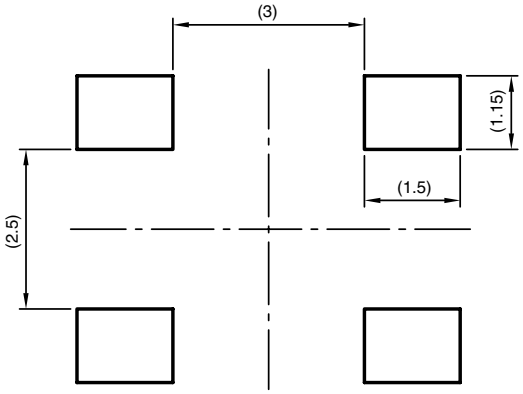
1: GND
2: GND
3: V_{OUT}
4: V_{CC}



technical drawings
according to DIN
specifications

Not indicated tolerances ± 0.2

Proposed pad layout from component side
(dim. for reference only)



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Issue: 2; 24.11.09
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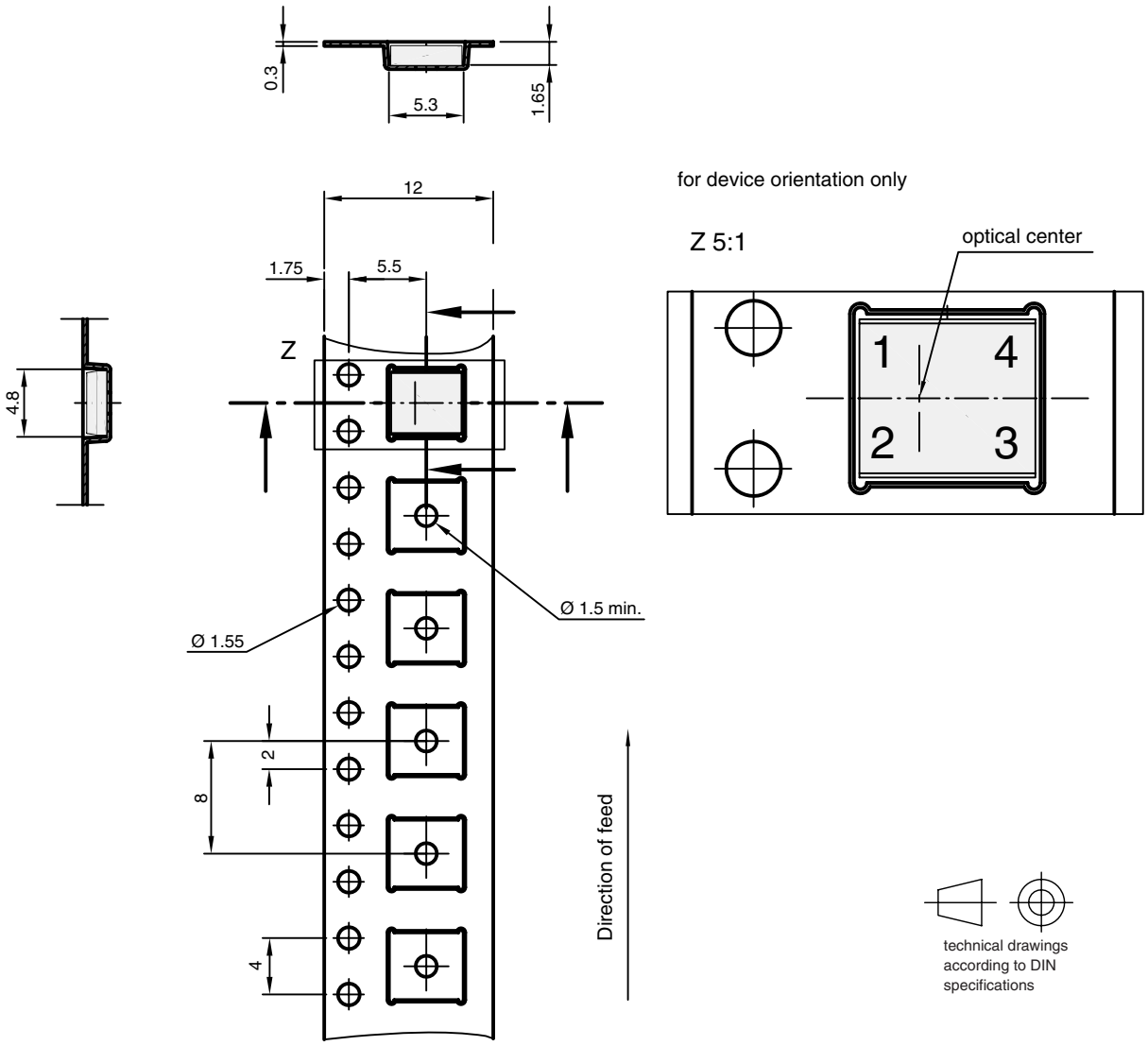
TAPING VERSION TSOP85...AP5TT

Dimensions in millimeters



Drawing-No.: 9.700-5346.01-4
Issue: 2, 24.11.09
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