TOSHIBA PHOTO-IC Si MONOLITHIC PHOTO-IC

TPS830

HIGH-SPEED OPTICAL REMOTE CONTROLLERS

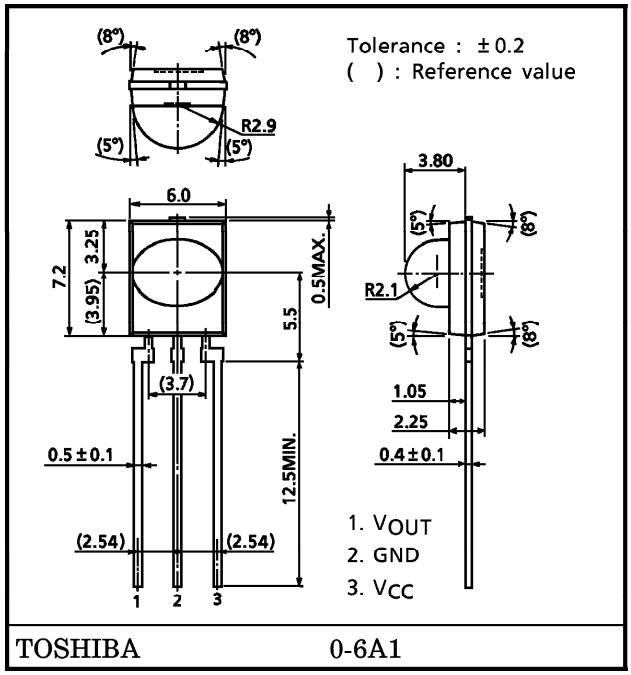
CORDLESS CONTROLLERS FOR VIDEOGAMES

ELECTRONIC ORGANIZERS AND OTHER NEW PORTABLE INFORMATION DEVICES

IR DATA COMMUNICATIONS

- Photodiode, I-V converter, band-pass filter and AGC amplifier all incorporated in a single chip
- Carrier frequency : f_0 = 455 kHz (typ.)
- Supply voltage : V_{CC} = 5 V
- Visible light cut-off frequency : $\lambda > 700$ nm
- TLN105B and TLN231 available as infrared LEDs for remote controllers

Unit : mm



TOSHIBA 0-6A1

Weight : 0.3 g (typ.)

MAXIMUM RATINGS (Ta = 25°C)

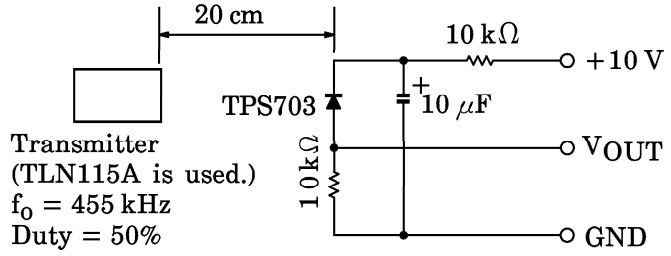
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	7	V
Output Current	I_O	±10	μA
Operating Temperature Range	T_{opr}	−20~60	°C
Storage Temperature Range	T_{stg}	−30~100	°C
Soldering Temperature Range (5 s)	T_{sol}	260	°C

OPTICAL AND ELECTRICAL CHARACTERISTICS (V_{CC} = 5 V, Ta = 25°C, C = 1000 pF : Note 1)

CHARACTERISTIC	SYMBOL	TEST CONDITION	Min	Typ.	Max	UNIT
Supply Voltage	V_{CC}	—	3	5	7	V
Supply Current	I_{CC}	E = 0	—	1.2	3.0	mA
Electromagnetic Sensitivity	E_S	(Note 5)	—	250	—	V_{p-p} / m
Transmission Range	L (Note 3)	The burst wave shown in Note 4 is transmitted by a standard transmitter (Note 2). External light intensity < 500 ℓx Output current < 10 μA	3	6	—	m
High-Level Output Voltage	V_{OH}		4.0	—	—	V
Low-Level Output Voltage	V_{OL}		—	—	0.5	V
ON Pulse Width	T_{ON}		16	25	40	μs
OFF Pulse Width	T_{OFF}		—	63	—	μs
Carrier Frequency	f_o	—	—	455	—	kHz
Peak Sensitivity Wavelength	λ_P	—	—	900	—	nm
Radiation Angle	θ_H	Horizontal angle, L / 2 (Note 6)	±55	±63	—	°
	θ_V	Vertical angle, L / 2 (Note 6)	±25	±30	—	°

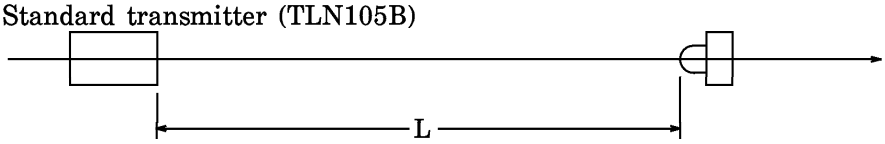
(Note 1) : Measurements for the TPS830 are based on a standard circuit which includes a 1000-pF capacitor between V_O and GND to prevent oscillation.

(Note 2) : Standard transmitter



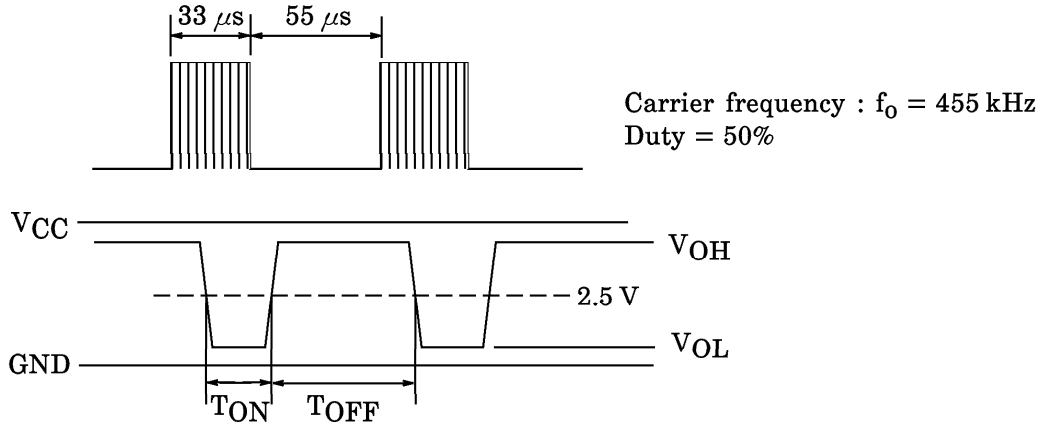
In the figure above, the transmitter output V_{OUT} is 80 mVpp.
The TPS703 in this application has a short-circuit current of I_{sc} = 1.24 μA when measured at E = 0.1 mW / cm^2. (E is the radiant incidence when a CIE standard light source A is used.)

(Note 3) : Transmission range L

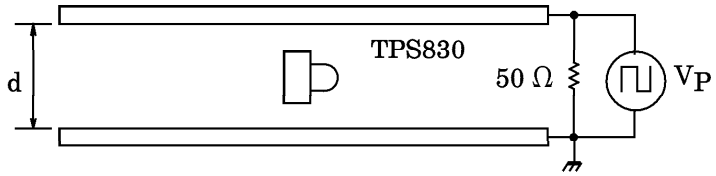


L is the maximum distance at which burst waves can be received from the transmitter unit, and at which data can be processed by the receiver unit.
Note that when signals other than the recommended burst wave are transmitted, the transmission range may be reduced or a malfunction may occur.
(*) The TLN105B is used as the standard LED transmitter.
If the TLN231 is used instead, the transmission range is 1.2 times that of the TLN105B.
Example : 6 m (with TLN105B) ⇒ 10.1 m (with TLN231)

(Note 4) : Burst wave



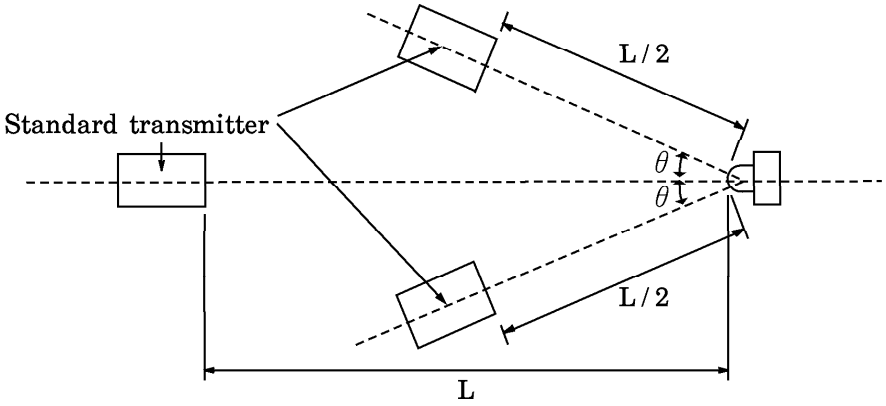
(Note 5) : Electromagnetic sensitivity



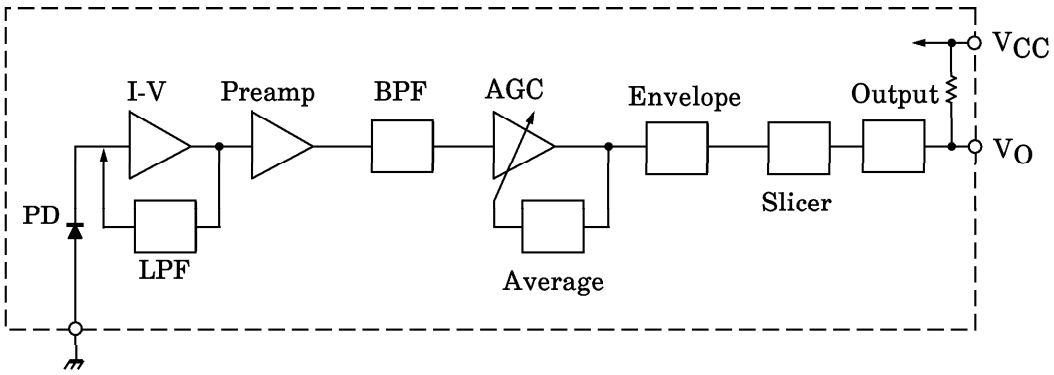
$E_S = V_P / d\ (V_{p\text{-}p} / m)$

Mount the device between two parallel boards separated by a distance of d.
Apply voltages modulated using frequencies ranging from 10 kHz to 50 MHz across the boards and read off the voltage at which noise is generated in the output from the device.
(*) Usage in strong electromagnetic fields may affect the device.
Please evaluate product in this type of environment before releasing them for actual use.

(Note 6) : Radiation angle



Circuit Block Diagram



Bit pattern designing example (reference)

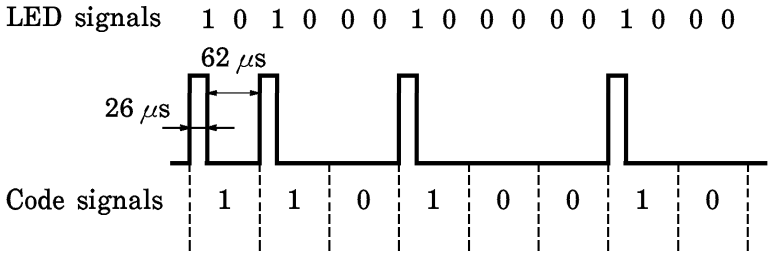
- Example of code signal = 11010010

Sequence of LED signals = 1 must be avoided. If LED signals of 1 sequence, TPS830 may not receive LED signals properly. After an LED signal of 1, 0 must be sent (55 μ or longer interval necessary). Please take this into account when designing a bit pattern.
The following shows the bit pattern t example that is converted at first code signals to LED signals as shown on the right diagram.

<Conversion example>

Code signal		LED signal
0	→	00
1	→	10

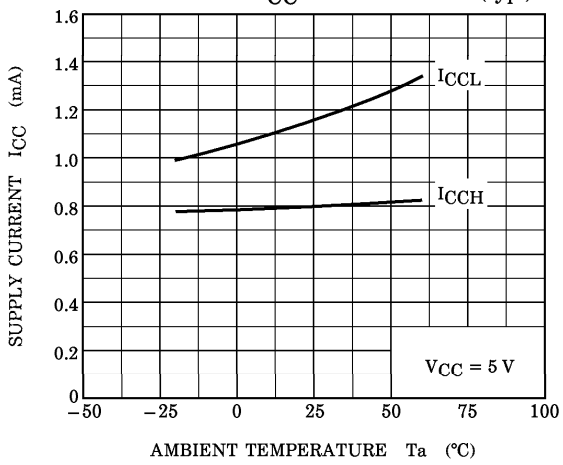
<Pattern example>



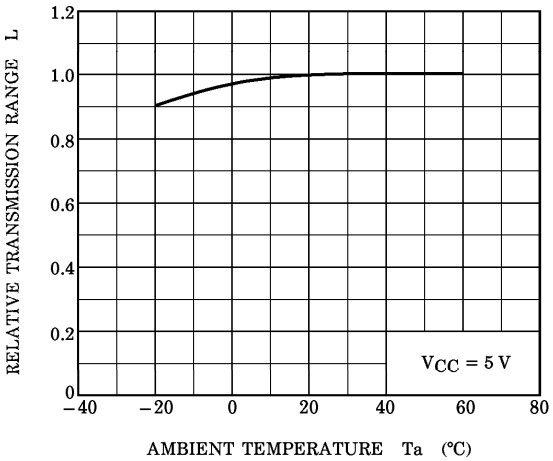
PRECAUTIONS

1. To stabilize the power line, insert a bypass capacitor of up to 0.01 μF between V_{CC} and GND, close to the device.
2. At power-on the internal circuit takes about 100 μs to stabilize. During this period the output signal is unstable and may change.
3. To avoid unnecessary oscillation, insert a bypass capacitor of 1000 pF between V_{CC} and GND.
4. When using the device, please take the device's characteristics, the operating environment and the characteristics of pairing LED device into considerations.
5. Soldering temperature : $\leqq$260℃, Soldering time : $\leqq$ 5 s (Soldering must be performed under the 2 mm from the body of the device.)
6. When forming the leads, bend each lead under the 2 mm from the body of the device. Soldering must be performed after the leads have been formed.

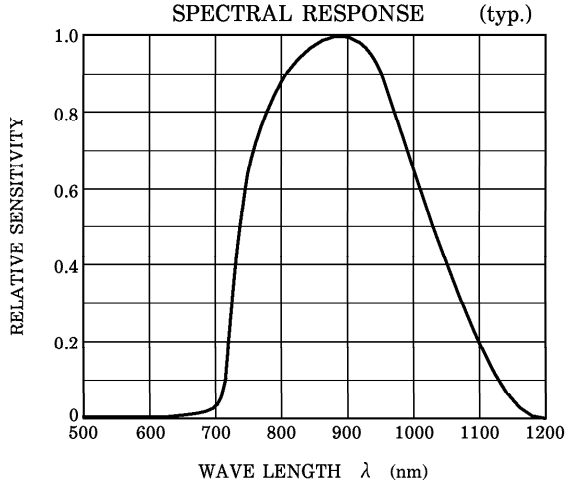
I_{CC} – Ta (typ.)



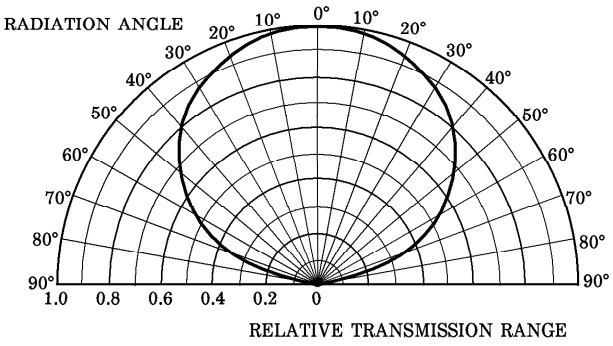
RELATIVE L – Ta (typ.)



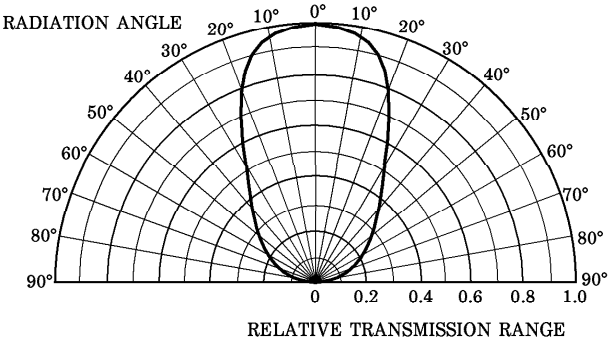
SPECTRAL RESPONSE (typ.)



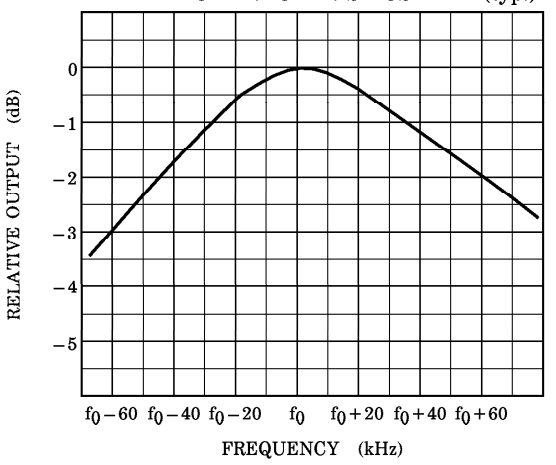
RADIATION PATTERN CHARACTERISTICS (typ.)
(Ta = 25°C)
HORIZONTAL



RADIATION PATTERN CHARACTERISTICS (typ.)
(Ta = 25°C)
VERTICAL



CARRIER FREQUENCY CHARACTERISTICS (typ.)



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