TOSHIBA PHOTO-IC Si MONOLITHIC PHOTO-IC

TPS831

HIGH-SPEED OPTICAL REMOTE CONTROLLERS

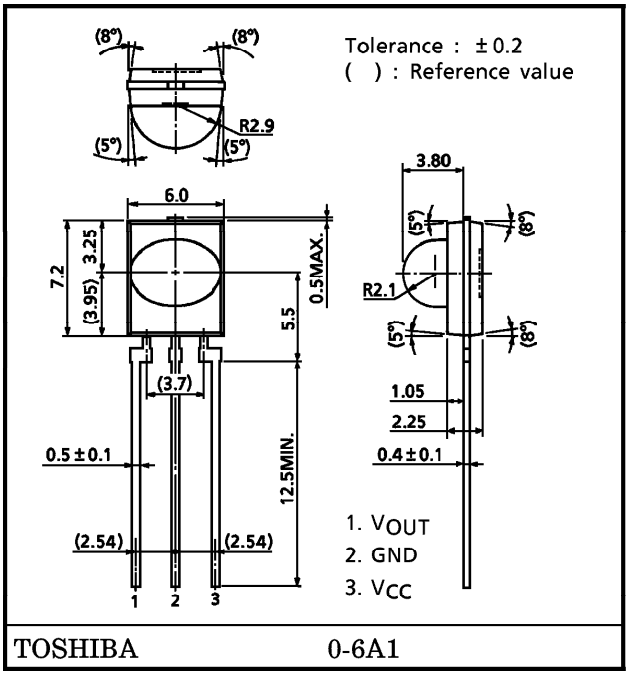
CORDLESS CONTROLLERS FOR VIDEOGAMES

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 : 800 nm
- TLN105B and TLN115A available as infrared LEDs for remote controllers

Unit : mm



TOSHIBA 0-6A1

Weight : 0.3 g (typ.)

MAXIMUM RATINGS (Ta = 25°C)

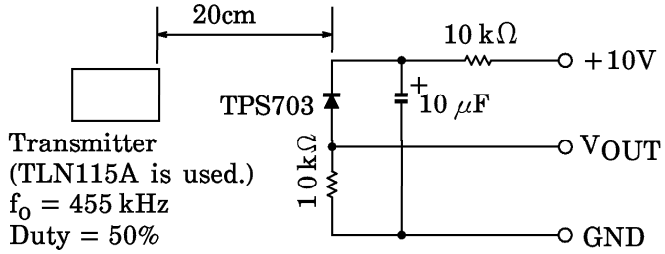
CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	7	V
Operating Temperature Range	T_{opr}	−20~60	°C
Storage Temperature Range	T_{stg}	−30~100	°C
Soldering Temperature Range (5s)	T_{sol}	260	°C

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	5	—	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
Radiation Angle	θ_H	Horizontal angle, L / 2 (Note 6)	±55	±63	—	°
	θ_V	Vertical angle, L / 2 (Note 6)	±25	±30	—	°

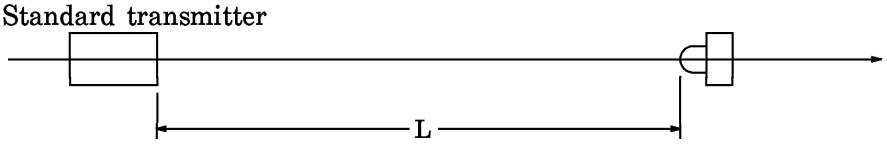
(Note 1) : Measurements for the TPS831 are based on a standard circuit which includes a 1000-pF capacitor between V_O and GND to prevent oscillation.

(Note 2) : Standard transmitter

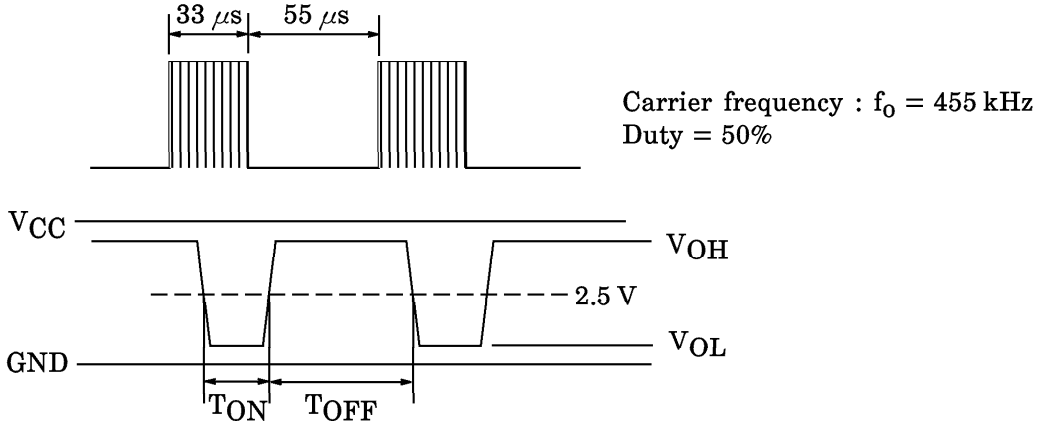


In the figure above, the transmitter output V_{OUT} is 80 mVpp.
The TPS703 in this application has a short-circuit current of I_{sc} = 1.24 μA when measured at E = 0.1 mW / cm^2. (E is the radiant incidence when a CIE standard light source A is used.)

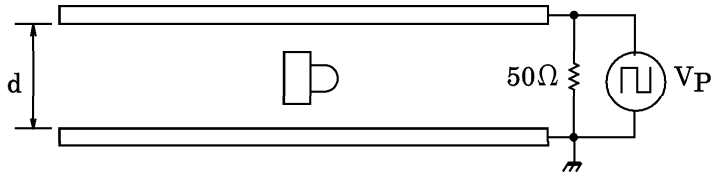
(Note 3) : Transmission range L



(Note 4) Burst wave

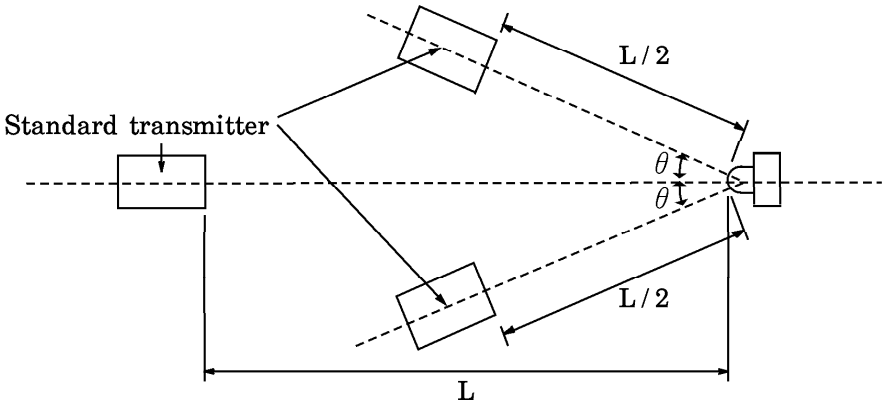


(Note 5) : Electromagnetic sensitivity

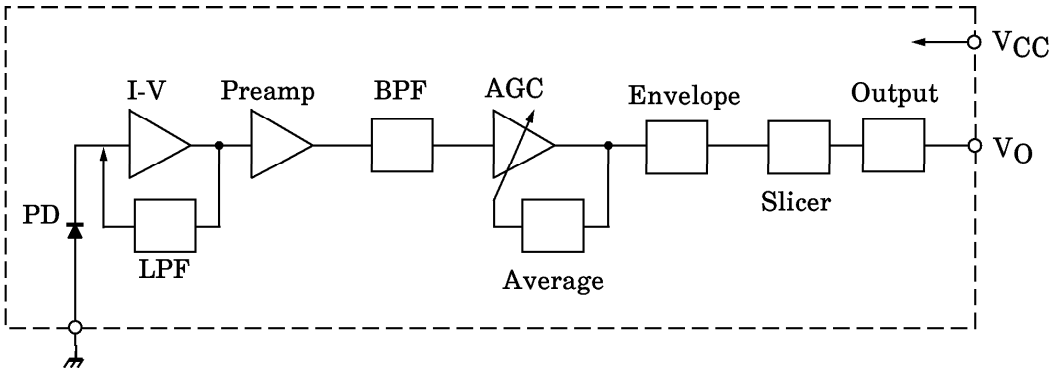


$E_S = V_P / d \ (V_{p-p} / m)$

(Note 6) : Radiation angle



Circuit block diagram



Bit pattern designing example (reference)

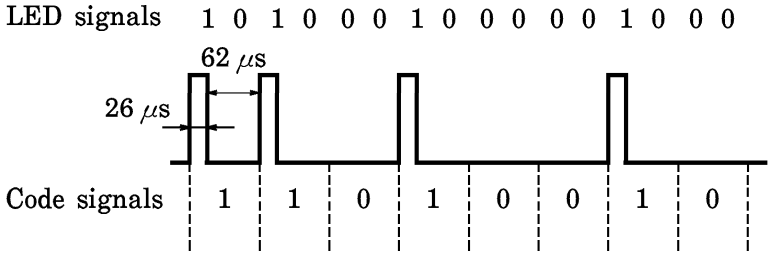
- Example of code signal = 11010010

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

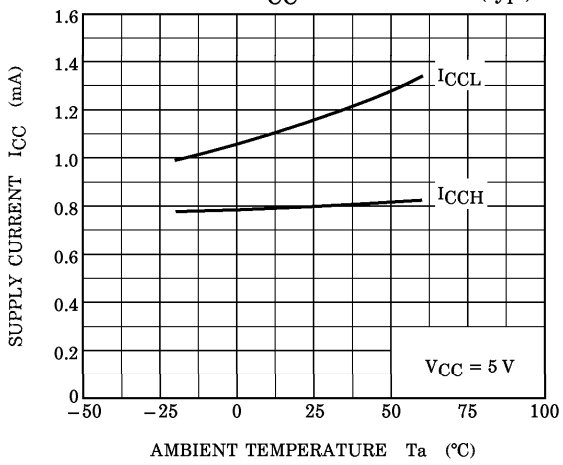
<Pattern example>



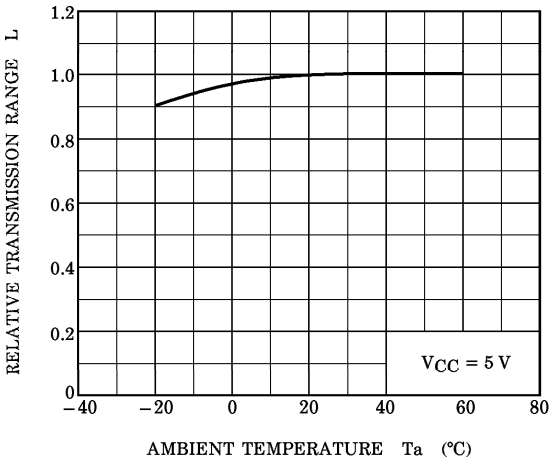
PRECAUTIONS

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.

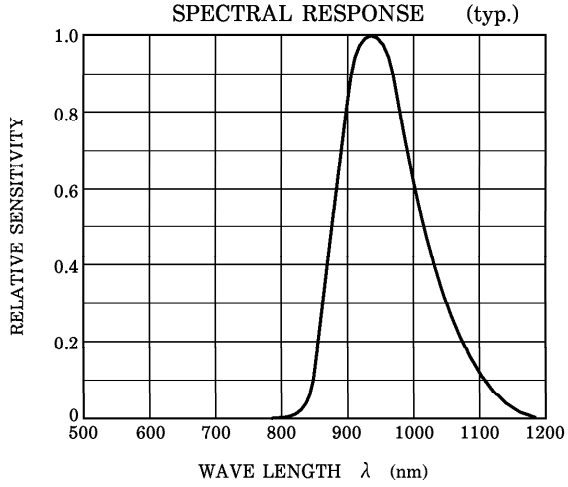
I_{CC} – Ta (typ.)



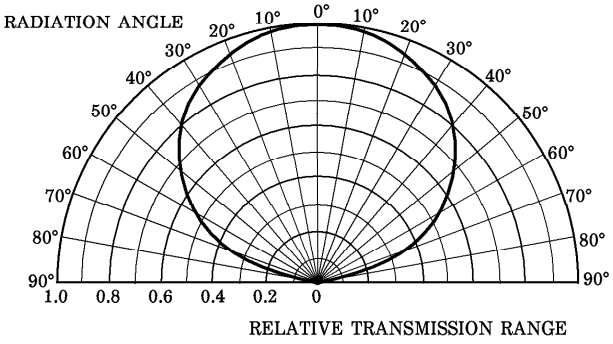
RELATIVE L – Ta (typ.)



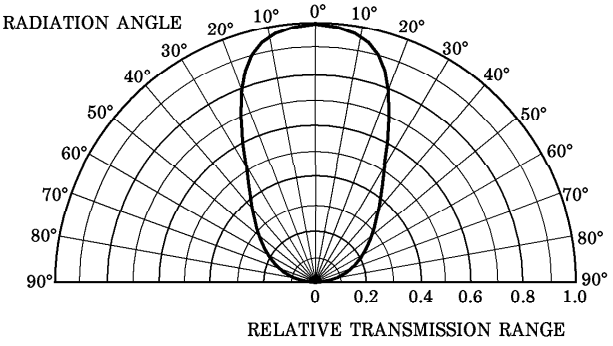
SPECTRAL RESPONSE (typ.)



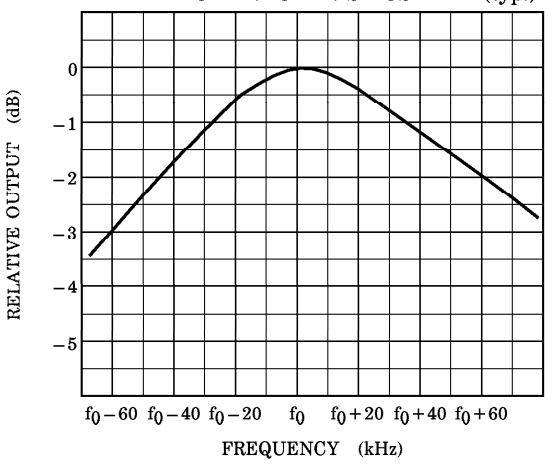
RADIATION PATTERN CHARACTERISTICS (typ.)
(Ta = 25°C)
HORIZONTAL



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



CARRIER FREQUENCY CHARACTERISTICS (typ.)



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