TOSHIBA Photo−IC Si Monolithic Photo−IC

TPS830(F)

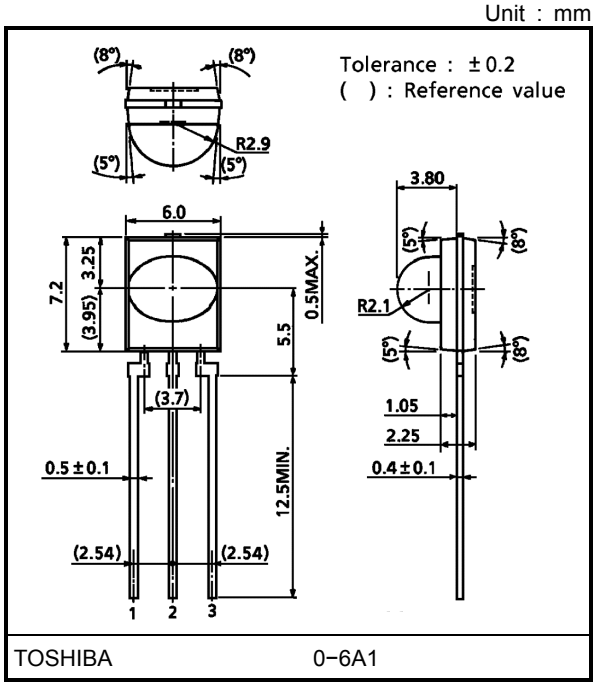
Unit : mm

Lead(Pb)-Free

High−Speed Optical Remote Controllers

Wireless Mouse, Wireless keyboard

IR Data Communications



TOSHIBA 0−6A1

Weight: 0.3 g (typ.)

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

Absolute 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

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

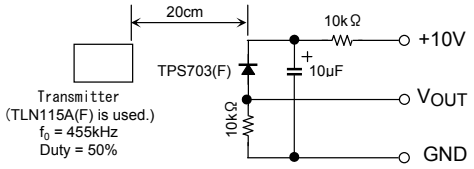
Optical And Electrical Characteristics (V_{CC} = 5V, Ta = 25°C, C = 1000pF: Note 1)

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	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 < 10μA	3	6	—	m
High−level output voltage	V_{OH}		4	—	—	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	—	°

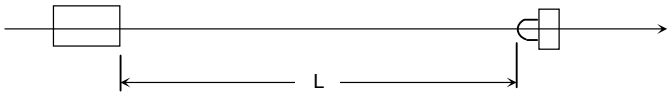
Note 1: Measurements for the TPS830(F) are based on a standard circuit which includes a 1000−pF capacitor between VO and GND to prevent oscillation.

Note 2: Standard transmitter

In the figure above, the transmitter output V_{OUT} is 80m Vpp.
The TPS703(F) in this application has a short−circuit current of I_{sc} = 1.24μA when measured at E = 0.1mW/cm². (E is the radiant incidence when a CIE standard light source A is used.)

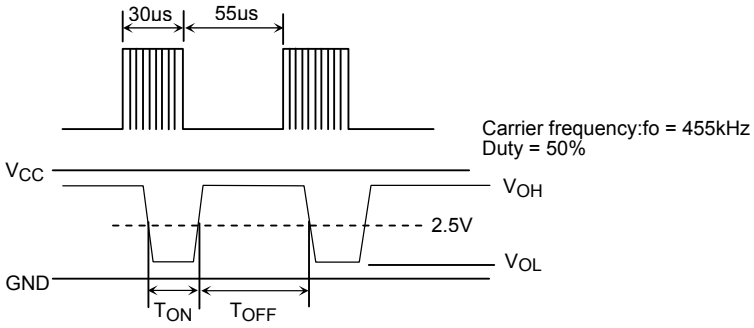


Note 3: Transmission range L
Standard transmitter (TLN105B(F))

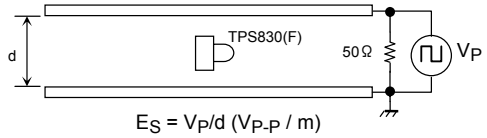


L is the maximum distance at which burst waves can be received from the transmitter unit, and at which data can be processed by the receiver unit.
Note that when signals other than the recommended burst wave are transmitted, the transmission range may be reduced or a malfunction may occur.
(*) The TLN105B(F)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

Note 4: Burst wave

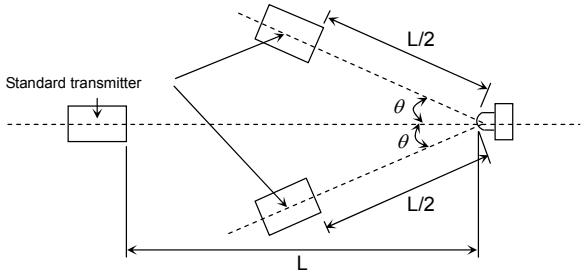


Note 5: Electromagnetic sensitivity

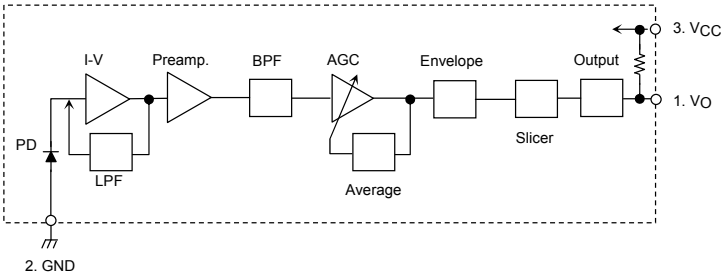


Mount the device between two parallel boards separated by a distance of d.
Apply voltages modulated using frequencies ranging from 10kHz to 50MHz across the boards and read off the voltage at which noise is generated in the output from the device.
(*) Usage in strong electromagnetic fields may affect 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)

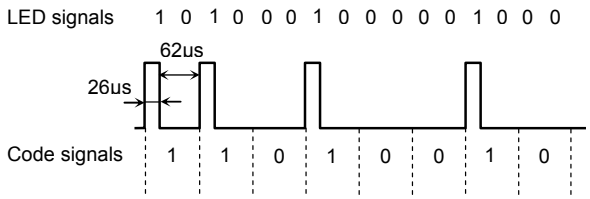
- Example of code signal = 11010010

  Sequence of LED signals = 1 must be avoided. If LED signals of 1 sequence, TPS830(F) may not receive LED signals properly. After an LED signal of 1, 0 must be sent (55μ 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

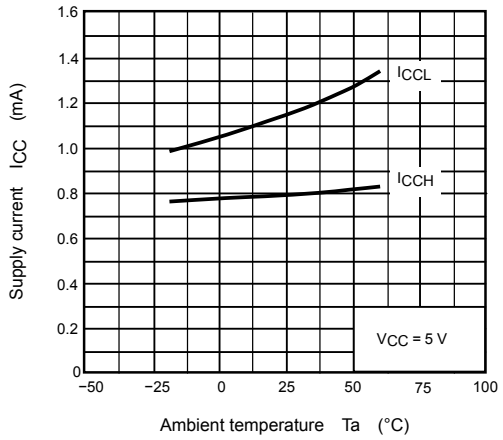
<Pattern example>



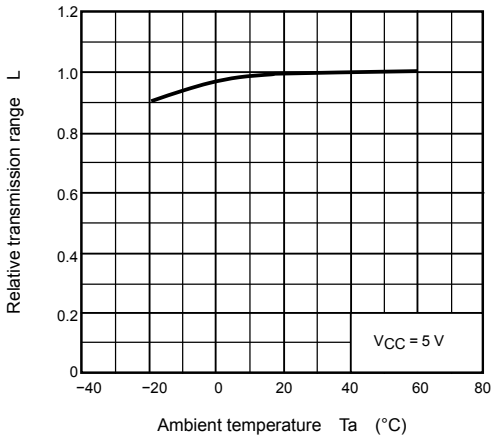
Precautions

1. To stabilize the power line, insert a bypass capacitor of up to 0.01μF between V_{CC} and GND, close to the device.
2. At power–on the internal circuit takes about 100μs to stabilize. During this period the output signal is unstable and may change.
3. To avoid unnecessary oscillation, insert a bypass capacitor of 1000pF 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: ≦ 260°C, soldering time : ≦ 5s (Soldering must be performed under the 2mm from the body of the device.)
6. When forming the leads, bend each lead under the 2mm from the body of the device. Soldering must be performed after the leads have been formed.

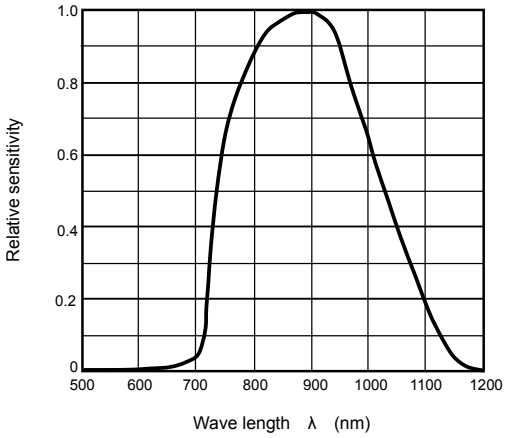
I_{CC} – Ta (typ.)



Relative L – Ta (typ.)



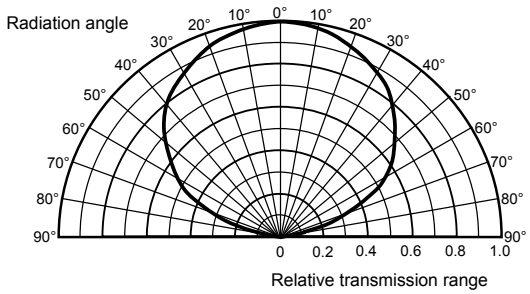
Spectral Response (typ.)



Radiation Pattern Characteristics (typ.)

(Ta = 25°C)

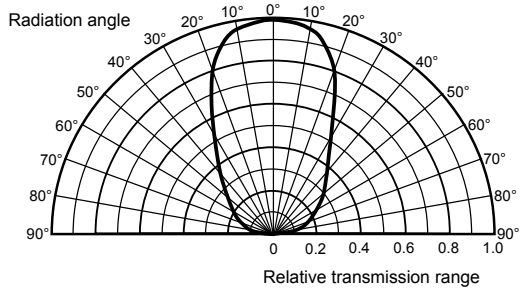
Horizontal



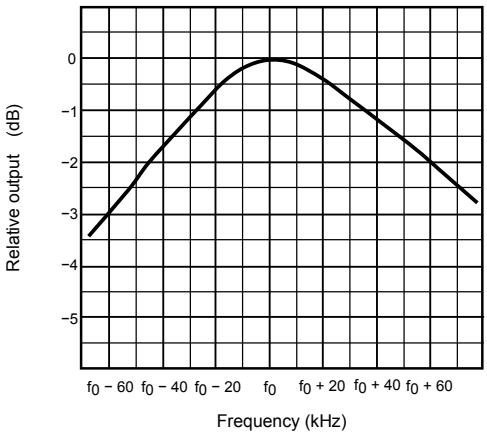
Radiation Pattern Characteristics (typ.)

(Ta = 25°C)

Vertical



Carrier Frequency Characteristics (typ.)



RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc.
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.).These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in his document shall be made at the customer’s own risk.
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patents or other rights of TOSHIBA or the third parties.
- Please contact your sales representative for product-by-product details in this document regarding RoHS compatibility. Please use these products in this document in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances. Toshiba assumes no liability for damage or losses occurring as a result of noncompliance with applicable laws and regulations.