

IR Receiver Modules for Remote Control Systems

Description

The CLT/CLC/CLS xxxxxx (N)-X is a Bi-CMOS IC for use in infrared remote control system.

It consist of automatic gain control amplifier, post amplifier, Oscillator, automatic gain control circuit, a band pass filter, a signal waveform detection circuit, automatic threshold control circuit, a waveform rectifier.

Features

- Supply Voltage Range: 2.7V ~ 6 V
- TTL and CMOS compatibility
- No external components Except PIN Diode
- Available for Carrier Frequencies between 32.7kHz to 56.7kHz, (Adjusted by zener-Diode Fusing, or using frequency selection PADs. (Refer to frequency selection table & bonding option.))
- Internal filter for PCM frequency
- Open collector output (built-in Pull-up resistor 42 k Ω)
- Output active low
- Enhanced Immunity against all kinds of disturbance light and power noise
- No occurrence of disturbance pulses at output pin within nominal conditions.
- Short settling time after power On (below 1msec)

Applications

- TV, VCR, AUDIO
- Home Appliances
- Remote Control Equipment

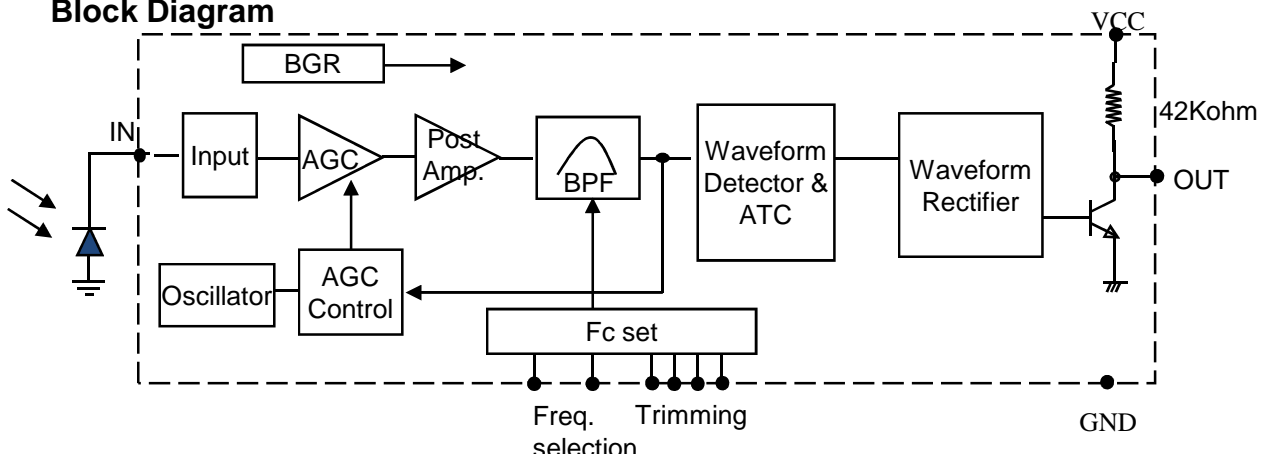
Ordering Info.(carrier frequencies)

Type	Carrier Frequency
CLT/CLC/CLS X32XX (N)-X	32.7 kHz
CLT/CLC/CLS X36XX (N)-X	36.7 kHz
CLT/CLC/CLS X38XX (N)-X	37.9 kHz
CLT/CLC/CLS X40XX (N)-X	40.0 kHz
CLT/CLC/CLS X56XX (N)-X	56.7 kHz

Suitable Data Format

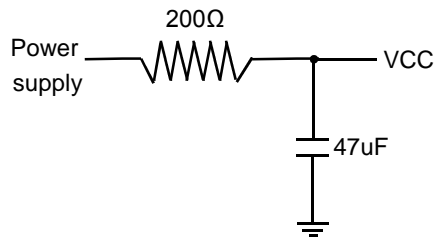
- NEC, RC5, RC6, Toshiba Micon Code, Sharp Code, Grundig Code
- Sony 12bit, Sony 15bit, Matsushita code, Mitsubishi Code, Zenith Code, JVC code

Block Diagram



Application Guide

Application for power supply ripple suppression



A further influence to the IR receiver modules may come from a supply voltage which is not stable. Such a disturbed supply voltage can be caused by switching power supply.

which is not filtered well or by other components in the circuit which produced spikes on the supply line.

This disturbed supply will reduce the sensitivity of receiver modules. This application circuit will filter the disturbed supply voltage.

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Min.	Max.	Unit
Supply Voltage	VCC	0	6.5	V
Supply Current	ICC	0	3	mA
Output Voltage	Vout	0	6.5	V
Output Current	Iout	0	2.5	mA
Operating Temperature	Tamb	-25	85	°C
Storage Temperature	Tstg	-30	85	°C
Soldering Temperature	T _{sd}	260 °C ± 5 °C, Max 5 sec		°C

Electro-optical Characteristics

(Ta = 25°C)

Parameter`	Symbol	Conditions	Vcc	Min	Typ	Max	Unit
Supply Voltage	V _{cc}			2.7	–	6.0	V
Supply Current	I _{cc}	No input signal	5	0.8	1.2	1.5	mA
			3	0.5	0.9	1.2	
B.P.F Center Frequency	f _o		5	–3	f _o	+3	%
			3	–5	f _o	+5	
Peak Wave Length	λ _P			–	940	–	nm
High Level Output Voltage	V _{OH}	Fig.1	5	V _{cc} –0.5	–	–	V
			3	V _{cc} –0.5	–	–	
Low Level Output Voltage	V _{OL}	Fig.1	5	–	0.2	0.4	V
			3		0.2	0.4	
High Level Output Pulse Width	T _{WH}	Fig.1	5	450	600	750	μs
			3	450	600	750	
Low Level Output Pulse Width	T _{WL}	Fig.1	5	450	600	750	μs
			3	450	600	750	
Minimum Data Pause Time between the data commands.(t _{Pause})	t _{Pause}	Fig. 9			23		ms
Arrival Distance	L	Fig. 1,2,3	±0°	–	20	–	m
			±30°	–	17	–	
			±45°	–	12	–	
Output Form	Active Low						

*** Note**

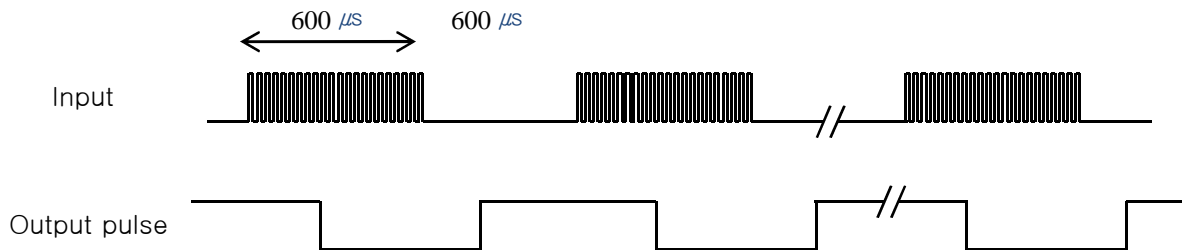
1) Arrival Distance Effected by Environment

2) While the device is operational across the temperature range, functionality will vary with temperature. Specifications are stated only at 25° C unless otherwise noted.

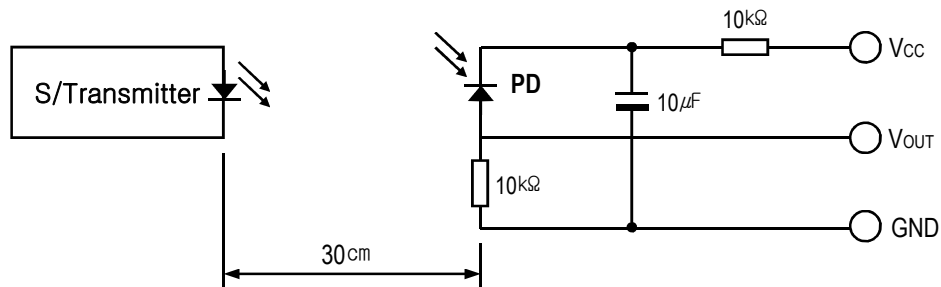
3)Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute–maximum–rated conditions for extended periods may affect device reliability.

Measurement Conditions

[Fig.1] $f=37.9\text{KHz}$, burst with 22 pulses

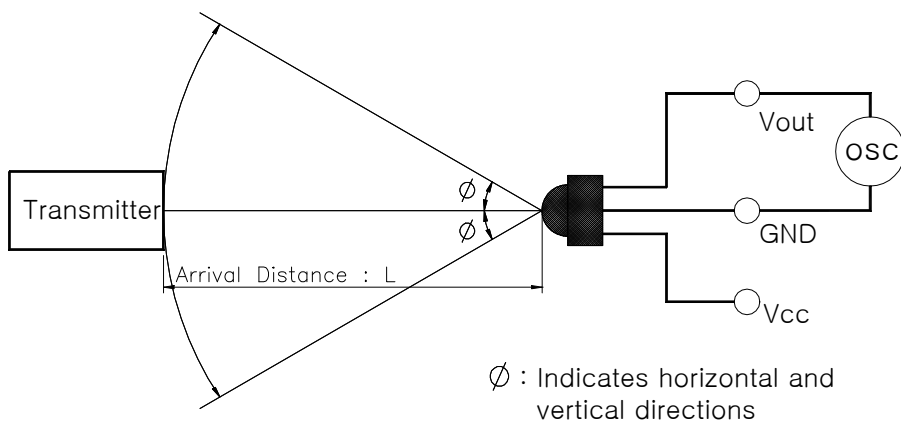


[Fig.2] Transmitter



※ The specifications shall be satisfied under the following conditions. The standard transmitter shall be specified of the burst wave form adjusted to V_{OUT} 200mVp-p upon P_o measuring circuit Standard Transmitter

[Fig.3] Test condition of arrival distance

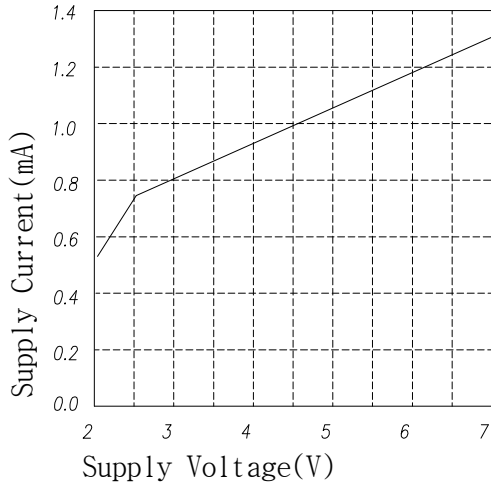


[Measurement condition for arrival distance]

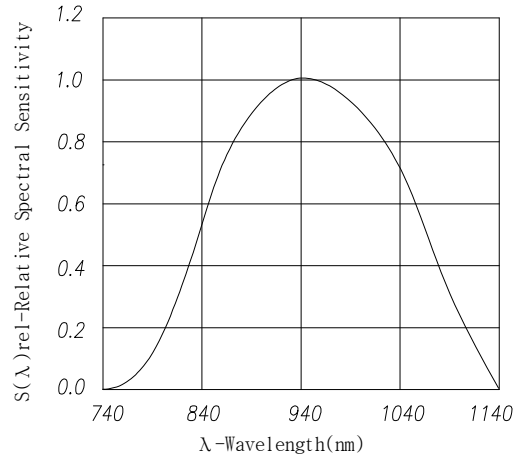
☞ Ambient light source : Detecting surface illumination shall be irradiate $200\pm 50\text{Lux}$ under ordinary white fluorescence lamp without high frequency lighting

Electrical/Optical Characteristics

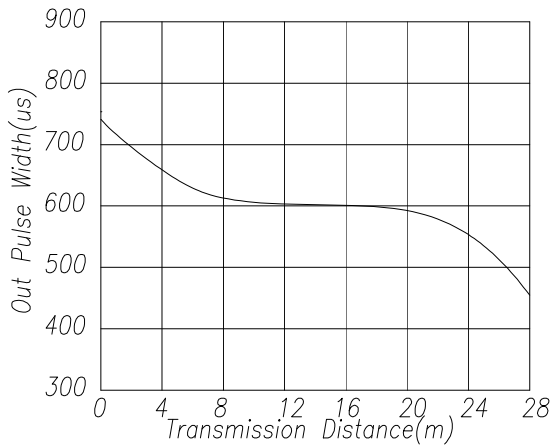
[Fig.4] Supply Current vs. Voltage



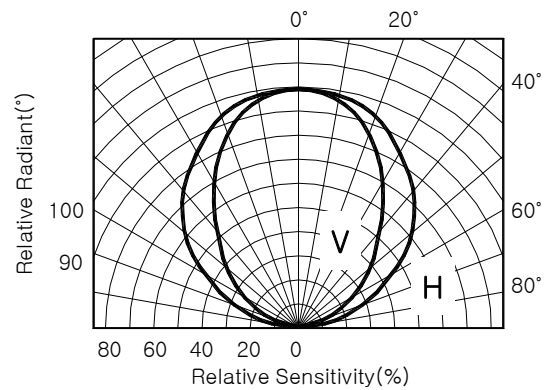
[Fig.5] Relative Spectral Sensitivity vs. Wavelength



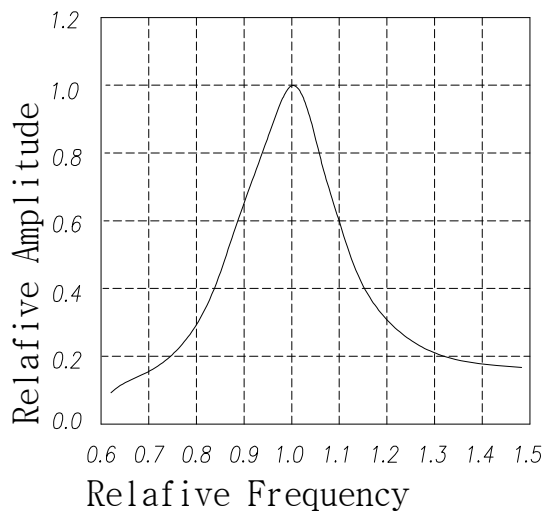
[Fig.6] Output Pulse Width vs. Distance



[Fig.7] Directivity (Horizontal/Vertical)



[Fig.8] BPF Fc Curve



ESD Test Results

Parameter	Conditions	Specification	Results
Machine Model	C=200pF, R=0Ω	Min ±200V	>±200V
Human Body Model	C=100pF, R=1.5kΩ	Min ±2000V	>±2000V
Charged Device Model	R=100MΩ, 1Ω	Min ±800V	>±800V

Suitable Data Format

The circuit of the CLT/CLC/CLS XXXXX(N)-X series is designed in that way that unexpected output pulses due to noise or disturbance signals are avoided. A band pass filter, an integrator stage and an automatic gain control are used to suppress such disturbances. The distinguishing mark between data signal (not suppressed) and disturbance signal (suppressed) are carrier frequency, burst length and Signal Gap Time (see diagram below).

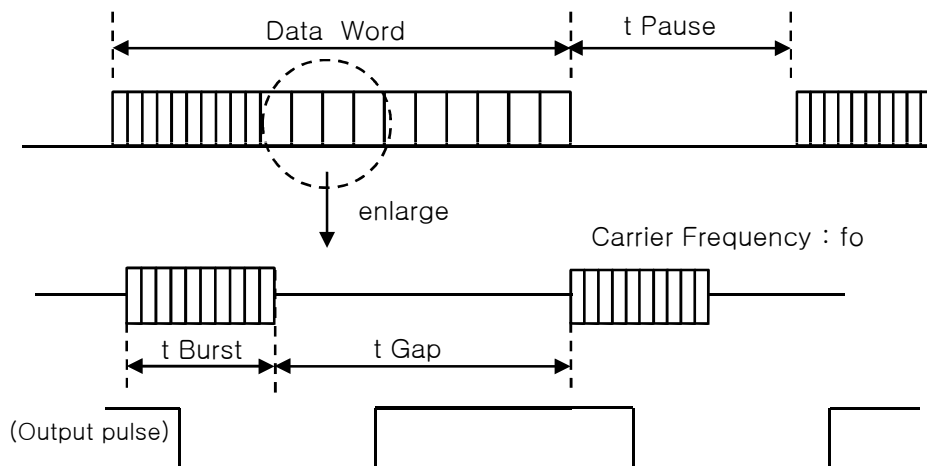
The data signal should full-fill the following condition :

- Carrier frequency should be close to center frequency of the band-pass.
- Burst length should be 300us/burst or longer.
- After each burst a gap time of at least 300us is necessary.
- The data format should not make a continuous signal transmission.
- There must be a Signal Gap Time (longer than 23 ms) at least each 100 ms, or each data command.

Some examples for suitable data format are :

NEC Code, RC5, Toshiba Code, Matsushita Code. Mitsubishi Code. Sony Code.

[Fig. 9] Data Signal diagram



- ※ t Gap : Signal gap time between two burst in pulses of carrier.
- ※ t pause : Data pause between two data words.
- ※ t Burst : Length of a burst in pulses of the carrier frequency.

Disturbance Suppression

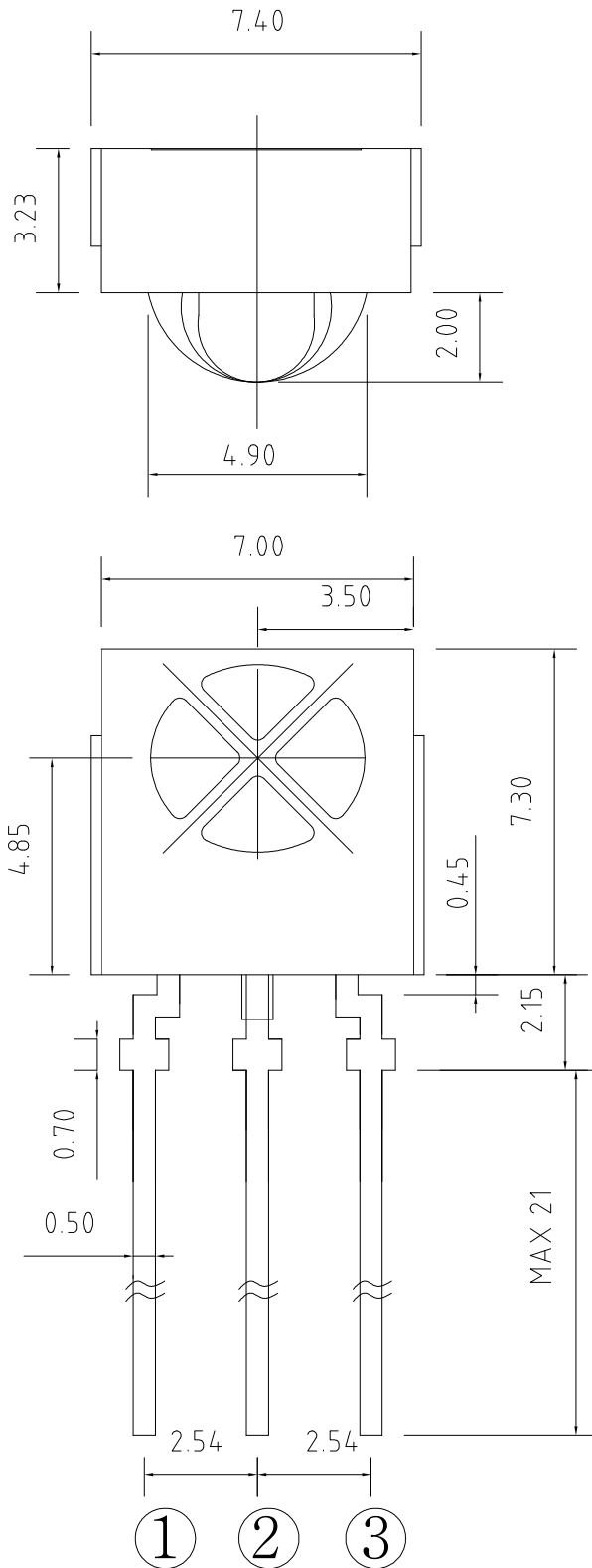
When a disturbance signal is applied to the CLT/CLC/CLS XXXXX(N)-X series, it can still receive the data signal.

However the sensitivity is reduced to that level that no unexpected pulses will occurrence.

Some examples for such disturbance signals which are suppressed by the CLT/CLC/CLS XXXXX(N)-X series are :

- Signals from fluorescent lamps with electronic ballast with high or low modulation.
- Continuous signal at 38 kHz or at any other frequency,
- DC light (from tungsten bulb or sunlight)

◆ External Dimension (Unit : mm)



NOTE:

1. PIN CONFIG.

① Vout

② GND

③ Vcc

2. G.T ± 0.3

(UNIT:mm)