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# GL911Tx

## Wireless Mouse Transmitter Controller

*Version 1.1*

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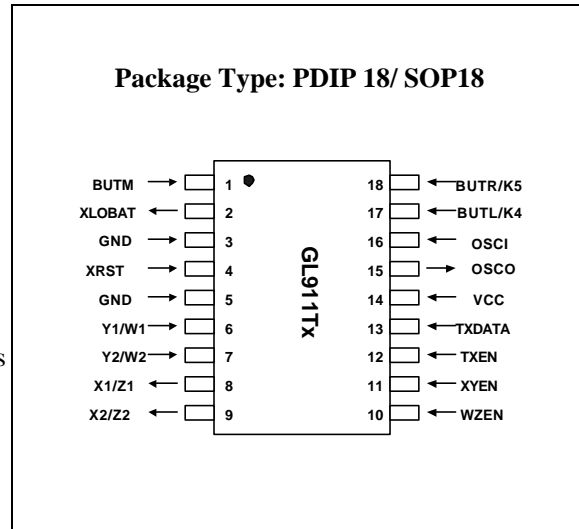
<http://www.genesyslogic.com>

## GL911Tx

### Wireless Mouse Transmitter Controller

#### Features

- Fully CMOS Static Design
- 8 Bits RISC-like Micro Controller
- 1K \*13 bits ROM / 48 Bytes RAM
- 2Mhz external clock
- Support analog or digital photo sensor
- Built in Genesys Logic's proprietary wireless link protocol
- Low-cost & Low Power solution
- Package : 18Pin PDIP / SOP 18



#### Functions

- Support up to 4Dimension/5Buttons scrolling type mouse
- High Tracking speed (12inch/sec) for 400dpi
- RF transmission rate: 4800 BPS
- Ultra High Packet Rate (Maximum 100 packet /sec)

#### Genesyslogic's proprietary wireless protocol

- Provide 8 bits Random ID to avoid co-channel interference
- Provide 2bits packet ID
- Provide 2bits user product ID
- Provide 4 bits CRC (Cyclic Redundancy Check) for packet protection

#### Power Management

- 3 step power saving stage: Full speed / Standby / Sleep
- Scroll & button sleep wake up (Response time < 30ms)
- Overall system current Sleep < 400uA (Include photo sensing)

## 1. Overview

GL901Rx/GL911Tx RF-USB is the high performance and low cost ASSP solution for wireless mouse application. Genesys Logic's RF-USB mouse series support USB and PS2 interface and provide ultra high response for wheel scrolling type mouse up to 100 packets per second. They are designed to support up to 4 Dimension and 5 buttons to cover most of the pointing device applications.

GL911Tx is the mouse controller and RF transmitter encoder for portable wireless Mouse body. This chip is a high speed RISC-Like MCU can perform high tracking speed for wheel mouse moving and encode the mouse data with Genesys Logic's proprietary protocol. GL911Tx can support 2D/3D/4D and up to 5 buttons. With 4800BPS high transmission rate it can report 2.5 times data rate than traditional tethered Rs-232 mouse and almost the same rate as general tethered PS2 or USB mouse. It means the overall excellent performance would give better mouse operation's feeling just like the tethered mouse.

GL901Rx is a bridge between RF demodulated base band signal to USB or PS/2 interface. It can adopt any RF wireless receiver easily and decode the RF Genesys Logic's proprietary protocol to host site. This chip is also a high speed RISC-Like MCU with robust low speed USB SIE transceiver. With Genesys Logic's proprietary wireless link protocol, which can distinguish up to 255 different ID code to avoid other RF interference and insure the error-free data to host.

## 2. Features

- Fully CMOS Static Design
- 8 Bits RISC-like Micro Controller
- 1K \*13 bits ROM / 48 Bytes RAM
- 2Mhz external clock
- Support analog or digital photo sensor
- Built in Genesys Logic' s proprietary wireless link protocol
- Low-cost & Low Power solution
- Support up to 4Dimention/5Buttons scrolling type mouse
- High Tracking speed (12inch/sec) for 400dpi Mechanism
- RF transmission rate: 4800 BPS
- Ultra High Packet Rate (Maximum 100 packet /sec)

### Power Management

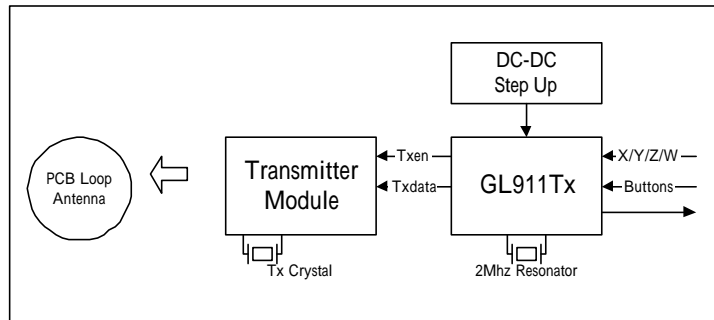
- 3 step power saving stage: Full speed / Standby / Sleep
- Scroll & button sleep wake up (Response time < 30ms)
- Overall system current Sleep < 400i A (Include photo sensing)

### GLPWP (Genesys Logic' s Proprietary Wireless Protocol)

- Provide 8 bits Random ID to avoid Co-channel interference
- Provide 2bits packet ID for 4 type packets (Broadcast packet, X/Y packet, Button+ZW packet, ..)
- Provide 2bits user product ID for other HID device expansion (Keyboard, Joystick, ..)
- Provide 4 bits CRC (Cyclic Redundancy Check) for packet protection

## 3. Function Description

### 3.1 Block Diagram



**Figure 3-1:GL911Tx Block Diagram**

### 3.2 Power supply

GL911Tx 's operation voltage is between 2.2V to 5.0V. It is recommended to use DC-DC step up converter to provide a stable 3.0V for GL911Tx MCU, IR Emitter LED and analog photo sensors. It is possible to reduce the DC-DC step up converter circuit, if using the digital photo sensors.

### 3.3 Resonator for oscillator

GL911Tx has been optimized for its firmware code. It uses only 2Mhz resonator to operate 4800 Bps encoding and mouse control sequence. Lower resonator frequency means lower power consumption and longer battery operation life.

### 3.4 Reset & Setup Button

Each mouse needs a unique Random ID to avoid co-channel interference between two or more closer device working at the same time. Press "Setup" button can change the Random ID at each time. The "Setup" button and the MCU "reset" pin is the same pin (Active Low). Pull up resistor (30K~100K ohm) is required for this pin. When the setup button is pressed (change from Low to High) GL911Tx will generate a new 8 bits ID with random number and enter "Broadcast mode" 30 seconds. If the receiver (GL901Rx) is also in the "Setup" phase (*Note1*), receiver will accept the packet and store the Random ID into EEPROM.

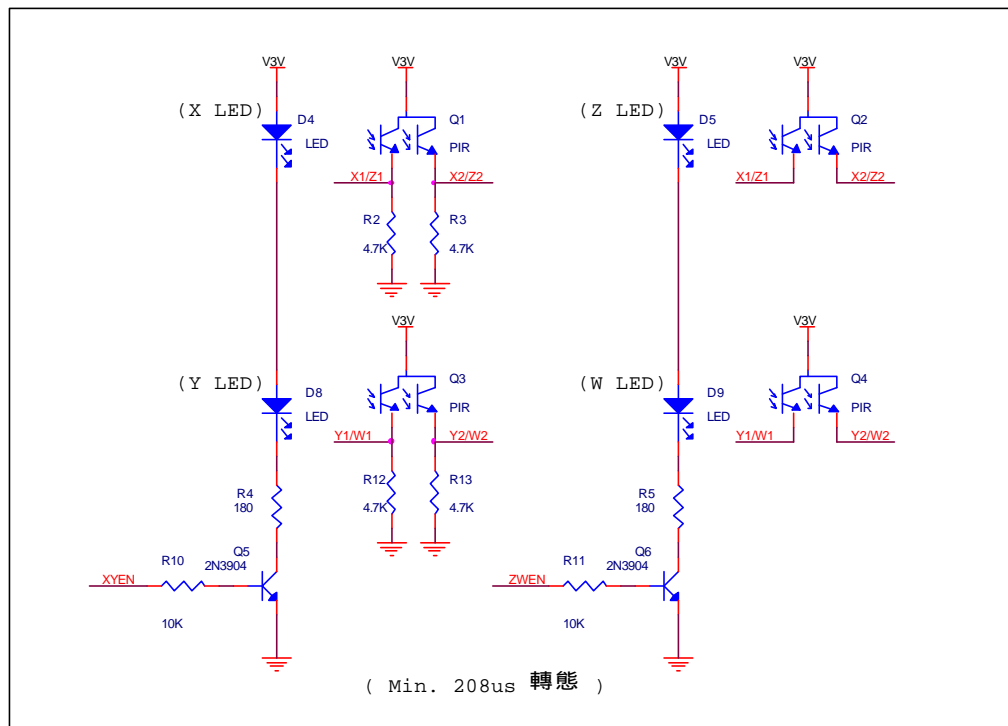
*Note1:* The receiver will keep listening the broadcast packet 30 seconds after the receiver "Setup" button is pressed or "Remote Setup" is enabled. Please refer to the GL901Rx datasheet.

### 3.5 X, Y, Z, W photo sensor

- (a) The X1, X2, Y1, Y2, Z1, Z2, W1, W2 are connected to PIR collector pins respectively. In order to reduce the pin count, X/Z axis and Y/W axis are shared with the same input pins. X,Y axis' s IR LED is controlled by XYEN pin and Z,W axis' s IR LED is controlled by ZWEN pin. Each IR control pin is turned on periodically from 20us/per 208us (Full Speed), 20us/per 1040us (standby mode) and 20us/per 10ms (Sleep mode) for power saving.
- (b) The photo sensor pin threshold voltage is around 0.8 Volt. It is necessary to adjust the current limit resistor and photo sensor' s emitter resistors for different photo sensor and roller wheel mechanical parts.

**Table 3-1: Period of Photo sensor active time**

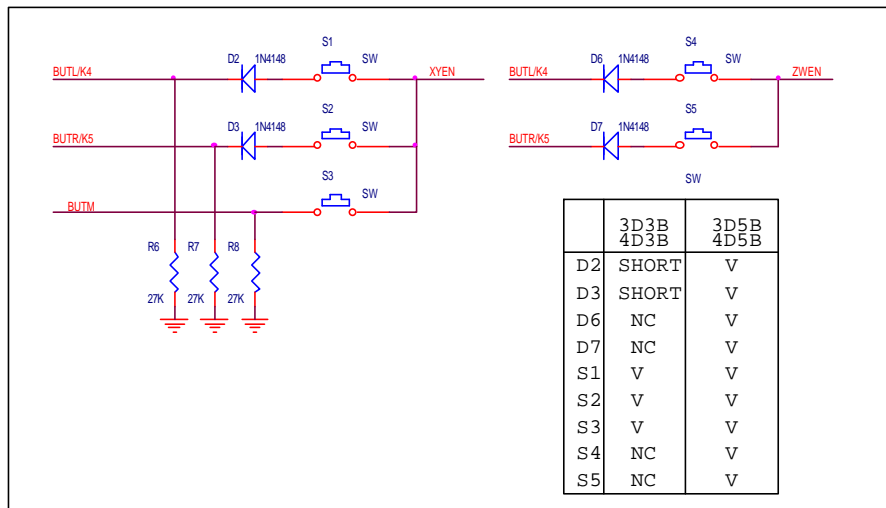
Mode	XYEN/ZWEN flush time	Period	State Change time
Full Speed	20 $\mu$ s	208 $\mu$ s	Instant
Standby	20 $\mu$ s	1040 $\mu$ s	12ms
Sleep	20 $\mu$ s	10.40ms	6sec



**Figure 3-2:GL911Tx Photo Sensor circuit example**

### 3.6 Button Switches

GL911Tx supports up to 5 buttons. But the Left button and K4 , Right button and K5 are shared with the same pins. They are read to be left/right buttons when XYEN is high and to be K4/K5 when ZWEN is high.



*Figure 3-3:GL911Tx Buttons circuit example*

### 3.7 RF Interface

- (a) **TXEN:** The TXEN is a RF transmitter enable pin (Active high). When there is a packet needs to be transmitted the TXEN will output high to enable the transmitter. The RF module must transmit stable Radio Frequency signal within 1ms after enable. The driving capability is 12ma.
- (b) **TXDATA:** The TXDATA is a serial output, which is encoded with Genesys Logic' s proprietary wireless link protocol into RF transmitter. The baud rate is 4800baud.

## 4. Pin Information

### 4.1 GL911Tx-A Pin Definition

*Table 4-1: Pin Definition of GL911TX-A 18 Pins SOC package*

No.	Pin Name	I/O	Function description	Note
<b>Power Supply</b>				
14	VDD	I	Power supply Pin. $2.2v < VDD < 5.5v$	Recommend: 3.0V
5	GND	I	Ground Pin	
3	GND1	I	NC	Connect to Ground Pin
2	Xlobat	I	Connect to GND or VCC	Reserved for future use
4	Xsetup/XRst	I	System reset pin. 0 = Reset (Setup new ID), 1 = Normal operation This pin is also function as Setup for new ID pin	External pull up resistor required.
16	OSCI	I	Oscillator input pin	2M resonator
15	OSCO	O	Oscillator output pin	2M resonator
<b>Roller Sensor Input</b>				
8	X1/Z1	I	X/Z axis photo sensor input 1	Threshold voltage around 0.8V
9	X2/Z2	I	X/Z axis photo sensor input 2	Threshold voltage around 0.8V
6	Y1/W1	I	Y/W axis photo sensor input 1	Threshold voltage around 0.8V
7	Y2/W2	I	Y/W axis photo sensor input 2	Threshold voltage around 0.8V
10	WZEN	O	W/Z axis IR LED Control : Active High	
11	XYEN	O	X/Y axis IR LED Control : Active High	
<b>Button Input</b>				
17	ButnL/K4	I	Left Key Button 1 = Pressed, 0= Released	Need pull down resistor 30K Ohm.
18	ButnR/K5	I	Right Key Button 1 = Pressed, 0= Released	Need pull down resistor 30K Ohm.
1	ButnM	I	Middle Key Button 1 = Pressed, 0= Released	Need pull down resistor 30K Ohm.
<b>Control Output</b>				
13	TXDATA	O	RF data serial out	
12	TXEN	O	RF enable. 0 = disable, 1 = Enable	When TXEN = 1 the RF transmitter is enabled. The transmitter signal must be stable within 1ms



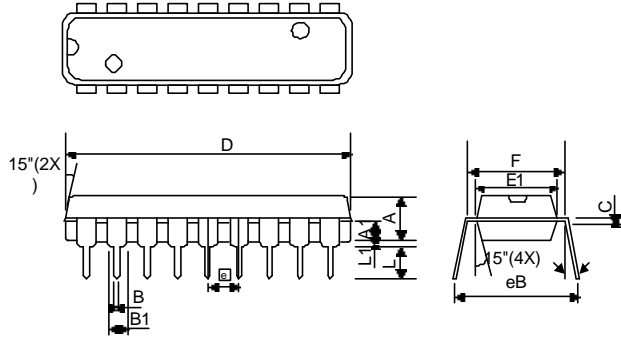
## 5. Electrical Characteristics

*Table 5-1: Electrical Characteristics*

Symbol	Operating Temperature = 0 to 85°C; F <sub>OSC</sub> = 2MHz, V <sub>CC</sub> = 3V Characteristic	Min	Max	Units	Conditions
<b>General</b>					
I <sub>CC</sub>	Operating supply current	300	700	uA	
<b>GPIO Interface</b>					
V <sub>OH1</sub>	GPIO Static output high	2.4		V	V <sub>CC</sub> = 3V; I <sub>OH</sub> = 5mA
V <sub>OL1</sub>	GPIO Static output low		0.6	V	V <sub>CC</sub> = 3V; I <sub>OL</sub> = 8mA
V <sub>IH</sub>	GPIO Static input high	0.45 V <sub>CC</sub>	V <sub>CC</sub>	V	V <sub>CC</sub> = 3V
V <sub>IL</sub>	GPIO Static input low	0	0.2 V <sub>CC</sub>	V	V <sub>CC</sub> = 3V
I <sub>SINK2</sub>	GPIO Sink current for PORT1.0-1	20		mA	V <sub>OUT</sub> = 0.4V;
I <sub>IN</sub>	Input leakage current	-1	+1	μA	V <sub>OUT</sub> = 0V or V <sub>CC</sub>
I <sub>IN</sub>	OSC1Input leakage current	-3	+3	μA	V <sub>OUT</sub> = 0V or V <sub>CC</sub>

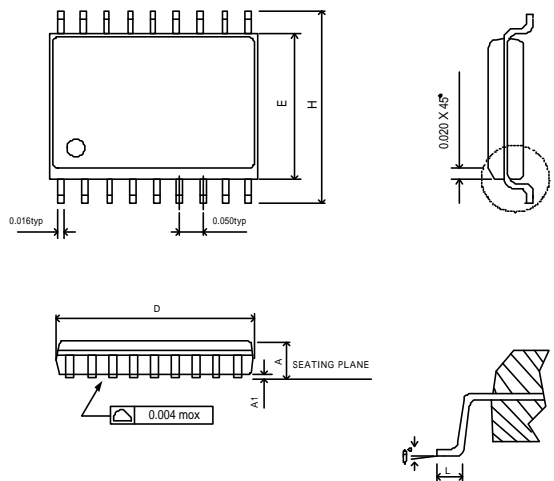
## 6. Package Dimension

### 6.1 PDIP-18



Symbol	Dimension in mil			Dimension in mm		
	Min	Nom	Max	Min	Nom	Max
A	--	130	--	--	3.302	--
A1	59	60	61	1.499	1.524	1.549
B	--	18	--	--	0.457	--
B1	--	60	--	--	1.524	--
C	--	10	--	--	0.254	--
D	890	900	910	22.606	22.860	23.114
E1	259	260	--	6.579	6.604	--
F	290	300	310	7.366	7.620	7.874
e	--	100	--	--	2.540	--
eB	345	355	365	8.763	9.017	9.271
θ	4°	5.5°	7°	4°	5.5°	7°

### 6.2 SOP-18



SYMBOLS	MIN	MAX
A	0.093	0.104
A1	0.004	0.012
D	0.447	0.463
E	0.291	0.299
H	0.394	0.419
L	0.016	0.050
e <sup>0</sup>	0	8