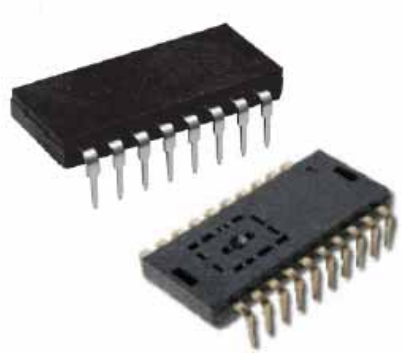
1. Features:



- Optical Navigation Technology
- No Mechanical Parts
- Accurate Motion Up to 14''/sec
- Accurate navigation over a wide variety on surfaces
- 5V Power Supply
- Power Saving During No Motion
- On Chip LED Drive with Regulated Current
- IEC 60825-1 eye safe under single fault conditions
- 6MHz Resonator used for low EMI radiation concern.
- Compliant USB Rev2.0 Specification
- Compliant USB HID Rev1.1 Specification
- Compliant with IBM® mouse specification
- Auto detection protocol interface (USB or PS/2)
- Support 3 buttons and mechanical wheel encoding with 16Pin Package (**C1165**)
- Additional keys (4^{th} and 5^{th} buttons) with 20Pin Package (**C1205**)

The C1165/C1205 chip is a low cost single chip optical mouse solution used to implement a non-mechanical tracking engine for computer mice. It is based on N1165 optical navigation technology with USB MCU bundled. Which measures changes in position by optically acquiring sequential surface images (frames) and mathematically determining the direction and magnitude of movement. The single chip optical mouse sensor provides a complete and compact mouse solution, There are no moving parts, and precision optical alignment is not required, few outside components use and facilitate high volume assembly.

The C1165/C1205 is an real single chip optical mouse sensor with one die internal package and it supports output format USB or PS/2 protocol while port plug in auto detection. This device meets USB 2.0 specification and Compliants with IBM® PS/2 mouse specification.

A complete mouse can be builtin with the addition of PC board; switches and mechanical wheel; plastic case and cable. Few external electrical components are needed for Optical Mouse function both USB and PS/2 mode.

There are 2 major Mouse function to provide by pinout package selectable as listing:

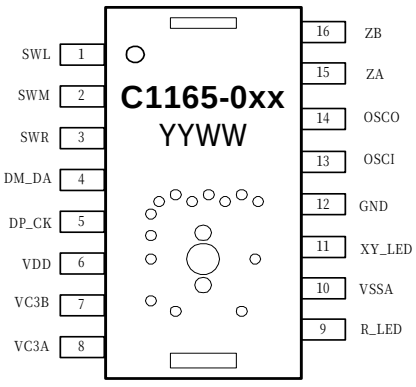
- 16pin package (**C1165**): Three buttons and one Z wheel for Microsoft® IntelliMouse® mode.
  Resolution is default by manufacture (400 or 800 CPI)

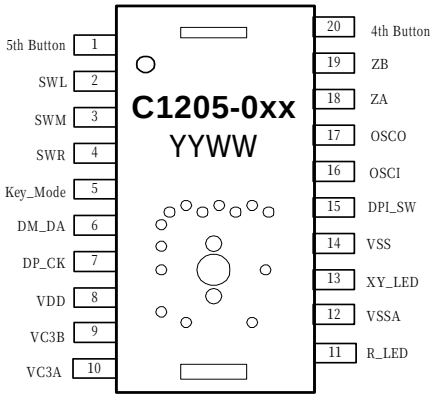
- 20pin package (**C1205**): Five buttons (with additional keys; 4^{th} and 5^{th} button) available and one Z wheel for Microsoft® IntelliEye® protocol.
  Resolution is default by manufacture (400 / 600 / 800 CPI) or strap pin selectable. See Figure 15

2. Pin Description:

16 Pin C1165	20 Pin C1205	Pin Name	Type	Description
1	2	SWL	I	Left button input
2	3	SWM	I	Middle button input
3	4	SWR	I	Right button input
4	8	DM_DA	I/O	USB D- or PS/2 data
5	7	DP_CK	I/O	USB D+ or PS/2 clock
6	8	VDD	P	+5 volt power supply
7	9	VC3B	P	Internal 3.3 voltage regulator power output
8	10	VC3A	P	USB 3.3 voltage power input
9	11	R_LED	-	LED current resistor
10	12	VSSA	P	Analog Ground
11	13	XY_LED	O	LED control (sink current)
12	14	GND	P	System ground
13	16	OSCI	I	Oscillator intput
14	17	OSCO	O	Oscillator output
15	18	ZA	I	Z axis input A
16	19	ZB	I	Z axis input B
	20	4th button	I	4th Key while IntelliEye® mode.
	1	5th button	I	5th Key while IntelliEye® mode.
	5	Key_Mode	I	Buttons support for IntelliMouse® or IntelliEye® mode. 3 buttons (IntelliMouse®) = GND 5 buttons (IntelliEye®) = VCC
	15	DPI_SW	I	Motion Resolution strap 800CPI = NC 600CPI = VCC 400CPI = GND

3. Pin Assignment:





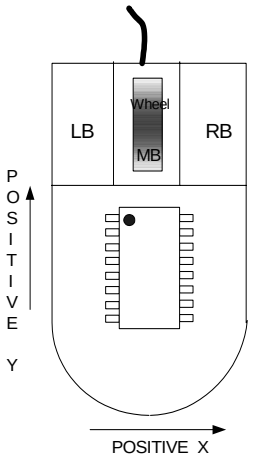


Figure 1: C1165 Top View Pinout **Figure 2: C1205 Top View Pinout** **Figure 3: Top View of Mouse**

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Parameter	*Symbol*	*Minimum*	*Maximum*	*Units*	*Notes*
Supply Voltage	VDD	-0.5	5.5	V	
Operating Temperature	T_A	-15	55	℃	
Storage temperature	T_S	-40	85	℃	
Lead Solder temp			260	℃	
ESD			2	KV	All pins, human body model
Input Voltage	V_{IN}	-0.5	5.5	V	

4.2 Recommend Operating Conditions

Parameter	*Symbol*	*Minimum*	*Typical*	*Maximum*	*Units*	*Notes*
Supply Voltage	VDD	4.5	5.0	5.5	V	PS/2 interface
		4.25	5.0	5.25	V	USB interface
Operating Temperature	T_A	0		40	℃	
Clock Source Frequency	f_{CLK}		6.0		MHz	VDD=5V
Power Cousumption	IDD		30		mA	VDD=5.5V
USB Mode Suspend Current	ISUSP			400	uA	VDD=5.25V
Low Voltage Detect	VLVDZ		3.6		V	
Low Voltage Reset	VLVRZ		3.0		V	

4.3 Optical Navigation Operating Conditions

Parameter	*Symbol*	*Minimum*	*Typical*	*Maximum*	*Units*	*Notes*
Distance From lens reference plane to surface	Z	2.3	2.4	2.5	mm	
Speed	S	0		14	In/sec	
Acceleration	A			0.15	G	
Light level onto IC	IRR_{INC}	40		20000	MW/m^2	λ =639 nm
Frame Rate	FR		1800		Frames/s	
XY_LED Current	I_{LED}	Typ-15%	560/R_LED	Typ+15%	mA	

4.4 DC Electrical Specifications (VDD = 5.0V, Temperature = 25ºC)

Mnemonic	*Description*	*Item*	*Min.*	*Typ.*	*Max.*	*Unit*	*Condition*
XI, XO	Oscillation Cell	F	-	6	-	MHz	
VC	3.3 V regulator output	V_O	3.0	3.3	3.6	V	VDD=5V
DP_CK	Input Voltage High	V_{IH}	2.0			V	
	Input Voltage Low	V_{IL}			0.8	V	
	Output Voltage High	V_{OH}	2.8		3.6	V	
	Output Voltage Low	V_{OL}	0		0.3	V	
	PS/2 mode Pull-up	R_{PPU}	3.5	5.0	6.5	KΩ	V_{IN} = VSS
DM_DA	Input Voltage High	V_{IH}	2.0			V	
	Input Voltage Low	V_{IL}			0.8	V	
	Output Voltage High	V_{OH}	2.8		3.6	V	
	Output Voltage Low	V_{OL}	0		0.3	V	
	USB mode Pull-up	R_{PU}	1.20	1.50	1.80	KΩ	
	PS/2 mode Pull-up	R_{MPU}	3.5	5.0	6.5	KΩ	
PA5:0	Input Voltage High	V_{IH}	2.0			V	
PB1:0	Input Voltage Low	V_{IL}			0.8	V	
PC0	Output Voltage High	V_{OH}	2.4			V	Source current = 8 mA
	Output Voltage Low	V_{OL}			0.5	V	Sink current is 20mA for PB[1:0]; 8 mA for others
	Pull down Resistor	R_{PD}	35	50	65	KΩ	V_{IN} = VDD
	Pull up Resistor	R_{PU}	10.5	15	19.5	KΩ	V_{IN} = VSS
All	I/O Port Hi-Z Leakage	I_Z	-	-	10	μA	R_P inactive

* The frequency defined in this item is based on the CPU frequency. It is one-half of the oscillation frequency.

4.5 AC Electrical Specifications (VDD = 5.0V, Temperature = 25ºC)

Characteristics	*Item*	*Min.*	*Typ.*	*Max.*	*Unit*	*Condition*
Internal Ring oscillator frequency	F_{ROSC}	1.75	3.5	5.25	KHz	
Sleep mode delay from no motion to low power	T_{SLEEP}		1000		ms	
Wakeup delay from sleep mode due to motion	T_{WUPP}		50	100	ms	
Power up delay	T_{PUP}			50	ms	From VDD reach 4.25V until spec's met
Flashing frequency of LED	F_{LED}		125		Hz	
Debounce delay on button input	T_{DBB}	5	9	15	ms	
Z Wheel sampling period	T_{ZW}	120	200	300	us	
Input Capacitance (OSC pins)	T_{ZON}		15		pF	OSCI, OSCO to GND

4.6 USB Electrical Specifications (VDD = 5.0V, Temperature = 25ºC)

Characteristics	*Item*	*Min.*	*Max.*	*Unit*	*Condition*
Output Signal Crossover Voltage	V_{CRS}	1.3	2.0	V	C_L = 200pF ~ 600pF
Input Signal Crossover Voltage	V_{ICRS}	1.2	2.1	V	C_L = 200pF ~ 600pF
Differential Input Sensitivity	V_{DI}	0.2		V	|(D+) – (D-)| See Figure 6
Differential Input Common Mode Range	V_{CM}	0.8	2.5	V	Include V_{DI}, See Figure 6
Single Ended Receiver Threshold	V_{SE}	0.8	2.0	V	
Transceiver Input Capacitance	C_{IN}		20	pF	D+ to V_{BUS}, D- to V_{BUS}
Output High	C_{OH}	2.8	3.6	V	with 15kΩ to GND and 3.3V internal regulator through 1.5KΩ to D-, See Figure 5
Output Low	C_{OH}	0	0.3	V	with 15kΩ to GND and 3.3V internal regulator through 1.5KΩ to D-, See Figure 5
Single Ended Output	V_{SED}		0.8	V	
Input High (Driven)	V_{IH}		2.0	V	
Input High (Folting)	V_{IHZ}	2.7	3.6	V	
Input Low	V_{IL}		0.5	V	

4.7 USB Timing Specifications (VDD = 5.0V, Temperature = 25ºC)

Characteristics	*Item*	*Min.*	*Max.*	*Unit*	*Condition*
USB Low-Speed Rise Time / Fall Time	T_{LR}/T_{LF}	75	300	ns	C_L = 200pF ~ 600pF, See Figure 4
Rise and Fall time matching	V_{LRFM}	80	125	%	T_R/T_F; C_L = 200pF; Excluding the first transition from the idle time
USB reset time	T_{RESET}	8.6	10	us	
Data Rate	t_{LDRATE}	1.4775	1.5225	Mb/s	Average bit rate, 1.5Mb/s +/-1/5%
Receiver Jitter Tolerance	t_{DJR1}	-75	75	ns	To next transition, see Figure 7
Receiver Jitter Tolerance	t_{DJR2}	-45	45	ns	For paired transition, see Figure 7
Differential to EOP Transition Skew	t_{LDEOP}	-40	100	ns	See Figure 8
EOP Width at Receiver	t_{LEOPR}	670		ns	Accepts EOP, see Figure 8
Source EOP Width	t_{LEOPT}	1.25	1.5	us	
Width of SE0 interval during differential Transition	t_{LST}		210	ns	
Differential Output Jitter	t_{UDJ1}	-95	95	ns	To next transition, see Figure 9
Differential Output Jitter	t_{UDJ2}	-150	150	ns	For paired transition, see Figure 9

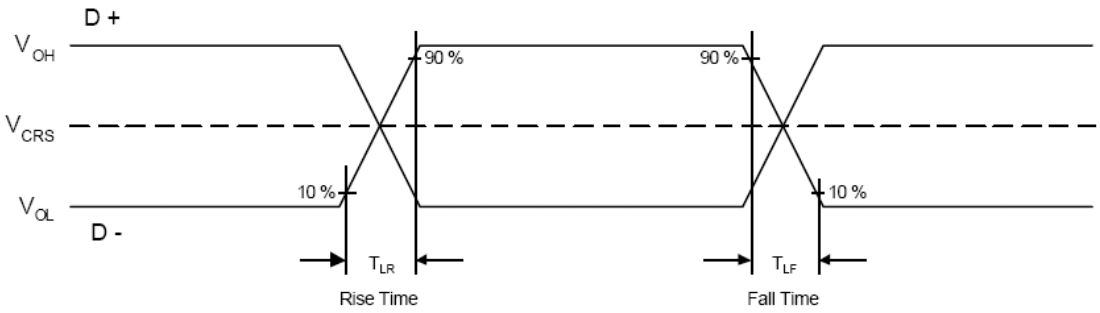


Figure 4: Data Signal Rise and Fall Times

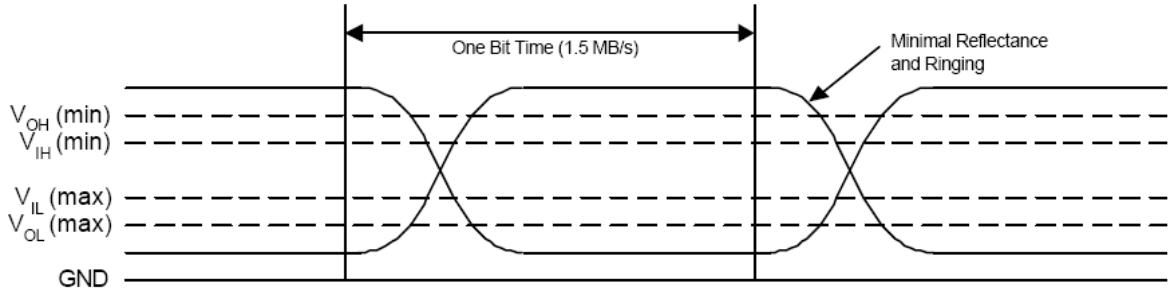


Figure 5: Data Signal Voltage Levels

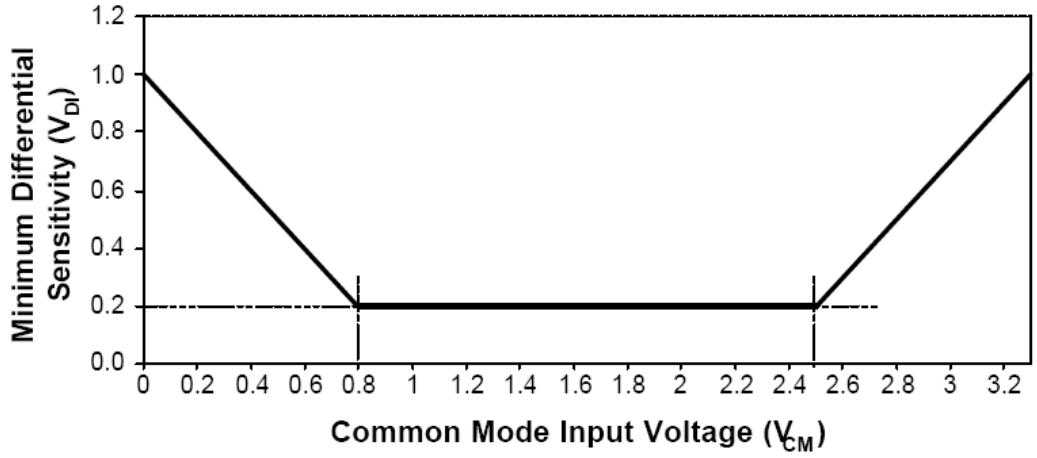


Figure 6: Differential Receiver Input Sensitivity vs. Common Mode Input Range

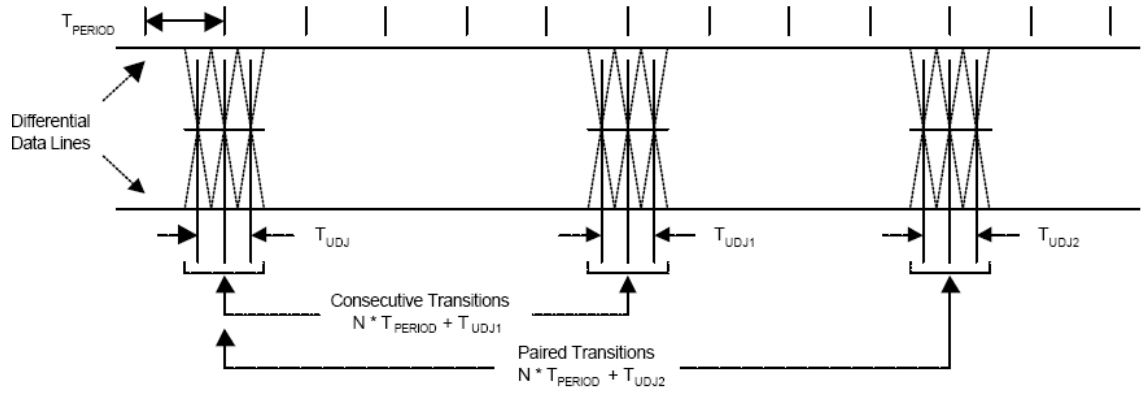


Figure 7: Receiver Jitter Tolerance

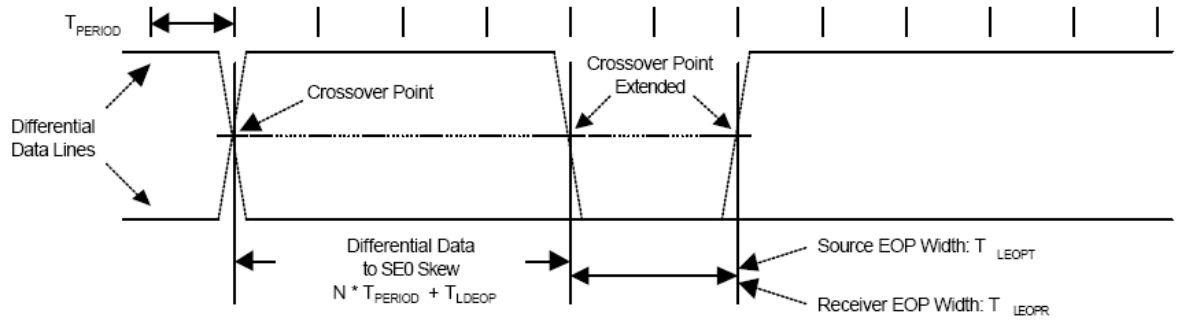


Figure 8: Differential to EOP Transition Skew and EOP Width

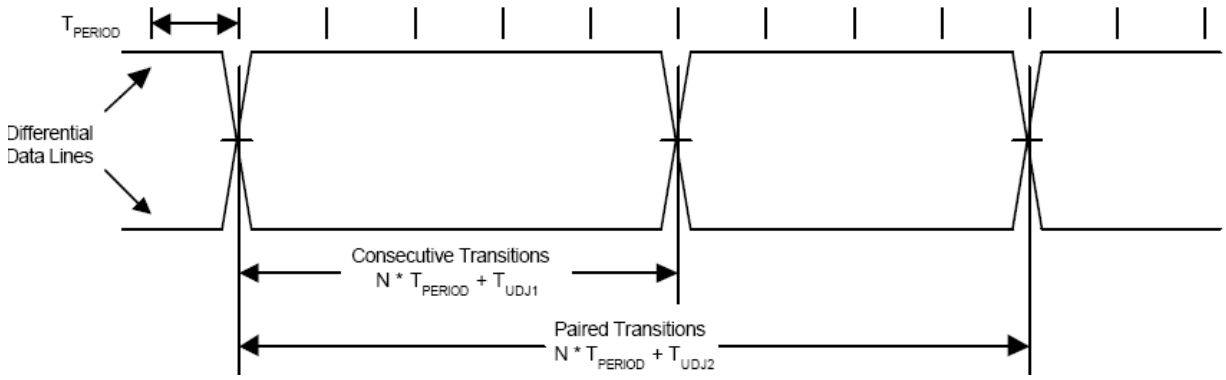


Figure 9: Differential Output Jitter

5. PS/2 Output WaveForms

5.1 Timing Charts (Host Sending Data)

The following describes the typical sequence of events when the Host is sending data to the (C1165/C1205) Mouse Device.

1. The Host checks for a (C1165/C1205) Mouse Device transmission in process. If a transmission is in process and beyond the 10th clock, the Host must receive the data.
2. The (C1165/C1205) Mouse Device checks the DATA line. If the line is inactive (low). an I/O operation is not allowed.
3. The (C1165/C1205) Mouse Device checks the DATA line. If the line is inactive (low). the Host has data to transmit. The DATA line is set inactive (low) when the start bit (always 0) is placed on the DATA line.
4. The (C1165/C1205) Mouse Device sets the CLK line inactive (low). The Host then places the first bit on the DATA line. Each time the (C1165/C1205) Mouse Device sets the CLK line inactive (after falling edge), the Host places the next bit on the DATA line until all bits are transmitted.
5. The (C1165/1205) Mouse Device samples the DATA line for each bit while the CLK line is active (high). Data must be stable within 1 micosecond after the rising edge of the CLK line.
6. The (C1165/C1205) Mouse Device checks for a positive-level stop bit after the 10th clock. If the DATA line is inactive (low), the (C1165/C1205) Mouse Device continues to clock until the DATA line become active (high). Then the (C1165/C1205) Mouse Device clocks the line-control bit and, at the next opportunity, sends a Resend command to the Host.
7. The (C1165/C1205) Mouse Device pulls the DATA line inactive (low), producing the line-control bit.
8. The Host can pull the CLK line inactive (low), inhibiting the (C1165/C1205) Mouse Device.

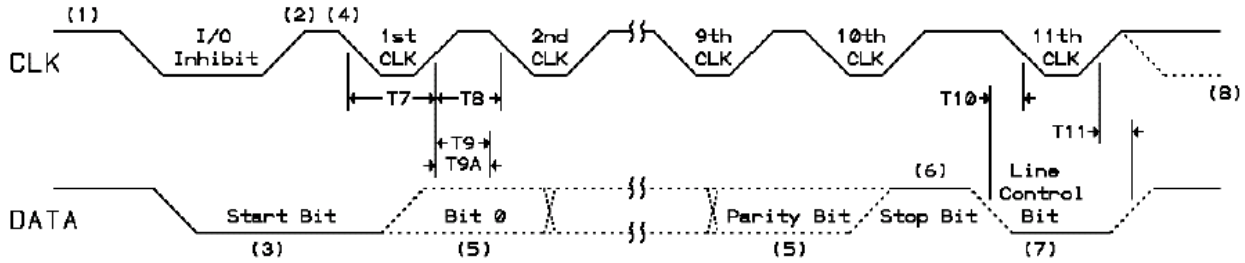


Figure 10: (C1165/C1205) Receiving Data Timings

Receiving Data Timings

Description	Timing	Value	Units	Specification
End of mouse inhibit to 1st CLK low	T6	200 ~ 600	us	30us ~ 1ms
Duration of CLK low (PC -> Mouse)	T7	35 ~ 46	us	33 ~ 50us
Duration of CLK high (PC -> Mouse)	T8	35 ~ 42	us	33 ~ 50us
From CLK high to DATA sample	T9	20 +/-5%	us	IBM Spec: 5 ~ 25us
From Line control falling edge to 11 CLK Falling edge	T10	5	us	
From Line control rising edge to 11 CLK rising edge	T11	5 ~ 25	us	

5.2 Timing Charts (Host Receiving Data)

The following describes the typical sequence of events when the Host is receiving data from the (C1165/C1205) Mouse Device.

1. The (C1165/C1205) Mouse Device checks the CLK line. If the line is inactive (low), output from (C1165/C1205) Mouse Device is not allowed.
2. The (C1165/C1205) Mouse Device checks the DATA line, If the line is inactive (low), the (C1165/1205) Mouse Device receives data from the Host.
3. The (C1165/C1205) Mouse Device checks the CLK line periodically during the transmission at intervals not exceeding 100 microseconds. If the (C1165/C1205) Mouse Device finds that the Host is holding the CLK line inactive (low), the byte transmission is terminated. The Host can terminated transmission anytime suring the first 10 clock cycles.
4. A final check for terminated transmission is performed at least 5 microseconds after clock ten.
5. The Host can hold the CLK line inactive (low) to inhibit the next transmission.
6. The Host can set the DATA line inactive (low) if it has a byte to transmit to the The (C1165/C1205) Mouse Device. The DATA line is set inactive (low) when the start bit (always 0) is placed on the DATA line.
7. The Host raises the CLK line to allow the next transmission.

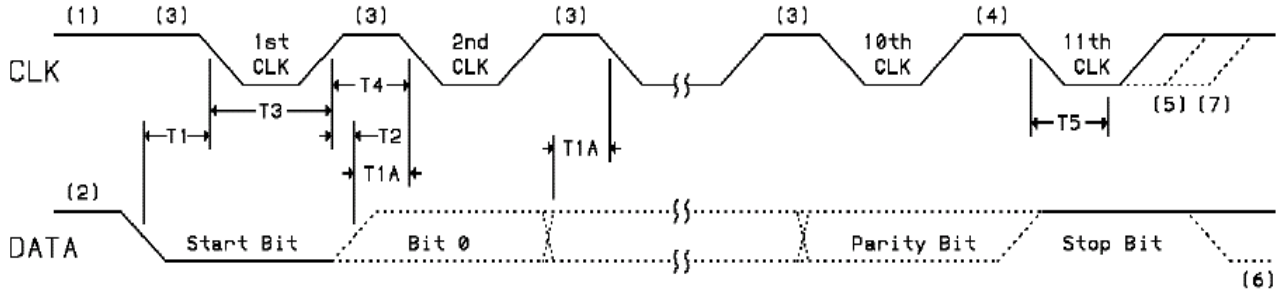


Figure 11: (C1165/C1205) Sending Data Timings

Sending Data Timings

Description	Timing	Value	Units	Specification
DATA transition to CLK low	T1	14 +/-10%	us	5 ~ 25us
Time from DATA transition to falling edge of CLK2-11	T1A	5 ~ 25	us	5 ~ 25us
CLK high to DATA transition	T2	19 +/-10%	us	5 ~ (T4-5us)
Duration of CLK low (Mouse -> PC)	T3	35-46	us	33 – 50us
Duration of CLK high (Mouse -> PC)	T4	40 +/- 5%	us	33 – 50us
Time to Mouse inhibit after 11 to ensure the Mouse does not start another transmission	T5	0 ~ 50	us	0 ~ 50us

6. PS/2 Mouse Standard Commands

NOTE 1: The 4th ,5th buttons both are no function when not in IntelliEye mode.

NOTE 2: The F4 (Enable) command is effective (i.e. sending XY reports) only after 50ms.

PS/2 Mouse Standard Commands (in grey: not implemented commands)				
Host Command	Format	Meaning	Mouse answer (in case of multiple bytes cmd, answer FA for each)	Remark
FF		Reset	FA AA 00	
FE		Resend	resend last packet (not FA)	
F6		Set Default	FA	
F5		Disable	FA	
F4		Enable (after 20ms)	FA	
F3 *RR*	*RR* = report rate (0A, 14, 28, 3C, 50, 64, C8)	Set Sampling Rate	FA	
F2		Read Device Type	FA ID	C1165/C1205 not support
F0		Set Remote Mode	FA	
EE		Set Wrap Mode	EE	
EC		Reset Wrap Mode	FA	
EB		Read Data	FA HD XX YY (this is also the standard mouse report format, without the FA "ACK" byte)	HD: b7=Yovf, b6=Xovf, b5=Ysign, b4=Xsign, b3=SrcTag=1, b2=Mstat, b1=Rstat, b0=Lstat XX = X data, YY = Y data
EA		Set Stream Mode	FA	
E9		Status Request	FA *S1 S2 S3*	*S1*: b7=rsv=0, b6=remote, b5=enable, b4=scale2, b3=rsv=0, b2=Lpress, b1=Mpress, b0=Rpress *S2*: same format as for E8 cmd *S3*: same format as for F3 cmd
E8 *RS*	*RS* = resolution = 0,1,2,3 Reported motion = Motion * (1 SHL RS) / 8	Set Resolution (1)	FA (parameter is ignored, effective resolution is set to maximum, that is to say 3)	
E7		Set Scaling to 2:1	FA (cmd has no effect)	
E6		Reset Scaling to 1:1	FA	

7. USB - PS/2 Detection

7.1 detection Features

At power-on, C1165/C1205 is able to detect the correct protocol when connected to either PS/2 or USB. This also includes hot plug in both PS/2 and USB port.

7.2 PS/2 and USB wire connection

As the same 4-wire cable will be used for USB and PS/2 (with passive adapter for PS/2), the mapping between USB and PS/2 is the following:

USB	**PS/2**
Vbus	Vcc
GND	GND
D+	CLOCK
D-	DATA

7.3 PS/2 connection

With a PS/2 connection, the lines state is not well defined. C1165/C1205 ends its protocol detection algorithm in PS/2 mode when the following states are found on the lines:

- request to send (CLOCK =1, DATA=0)
- PS/2 idle (CLOCK =1, DATA=1)

7.4 USB connection

C1165/C1205 ends its protocol detection algorithm in USB mode when the following state is found on the lines:

- Both lines pulled-down by USB 15K ohm resistor.

If lines are forced low, floating or generally speaking do not match one of the cases defined in §7.3 or §7.4.3, the detection algorithm waits until one of the defined cases is found.

8. Function Block Description:

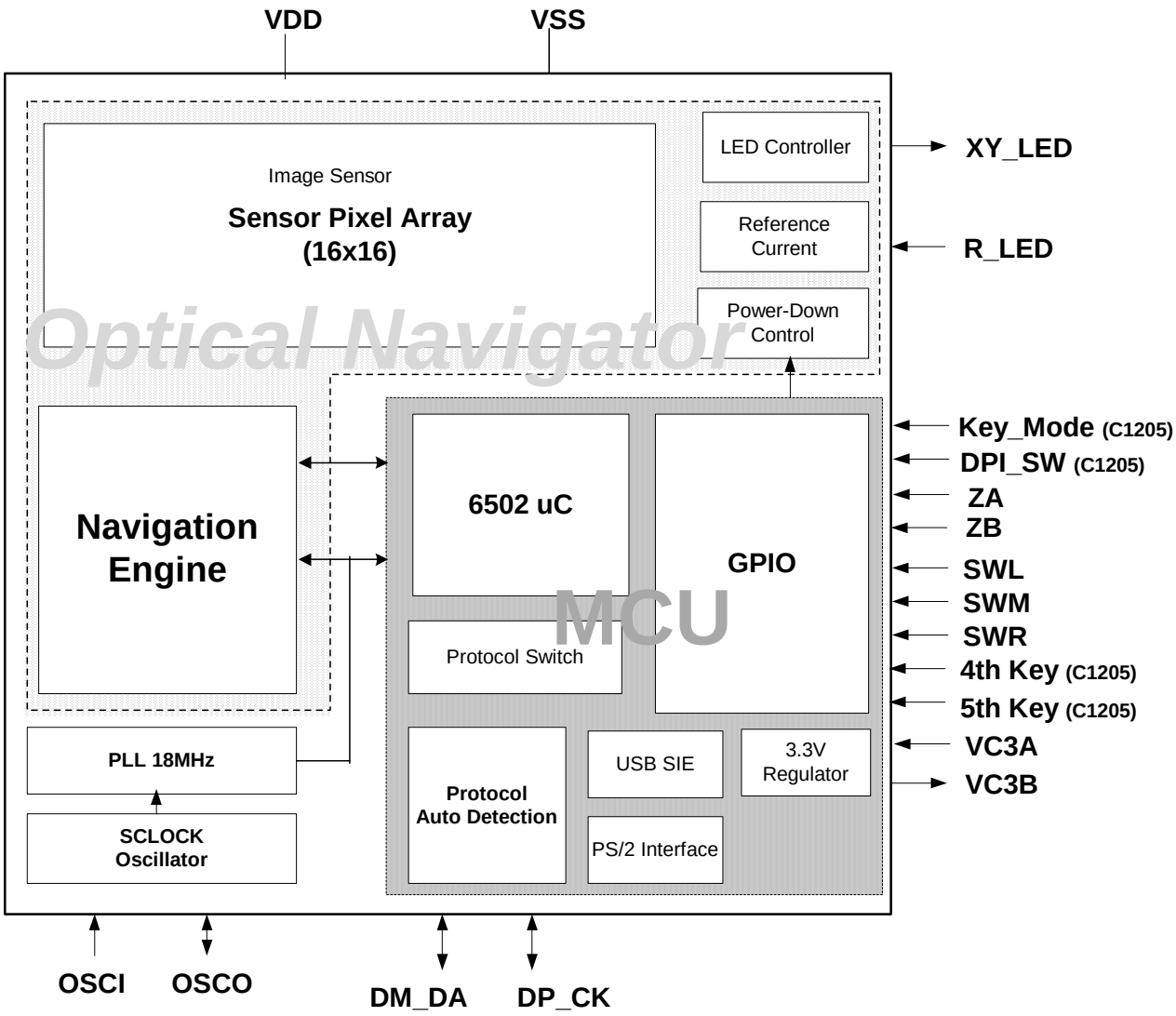


Figure 12: Block Diagram

9. Function Description Register

Address	Register	RW	Reset value	Functional Description
0x00	Product ID	RO	0x02	Product ID, it can be used to verify that the serial communication link is ok
0x01	Revision ID	RO	0x00	Revision ID
0x02	Motion	RO	0x00	Detail is described in following table.
0x03	Delta_X	RO	0x00	X movement is counts since last report. Reading clears the register. Eight bit 2's complement number.
0x04	Delta_Y	RO	0x00	Y movement is counts since last report. Reading clears the register. Eight bit 2's complement number.
0x05	Quality	RO	0x00	Quality is a measure of the number of features visible by the sensor in the current frame. To obtain an accurate value, the LED needs to be turned on by changing the sleep mode of the configuration register 0x0a to always awake.
0x06	Average_Pixel	RO	0x00	Average pixel value in current frame.
0x07	Maximum_Pixel	RO	0x00	Maximum pixel value in current frame.
0x08	Sleep_Delay	R/W	0x70	Time delay from no motion until IC enters sleep mode. Units are frame cycles.
0x09	Sleep_Time	R/W	0x0B	Time delay from entering sleep mode until wakeup to check for motion. . Units are frame cycles.
0x0a	Configuration_bits	R/W	0x00	Detail is described in following table.
0x0c	Pixel_ Data	RO	0x00	To obtain an accurate value, the LED needs to be turned on. Detail method is described in dump pixels algorithm. Detail is described in the section of the CMOS sensor pixels dumping flow.
0x0d	Pixel_Address	R/W	0x00	
0x0e	Shutter	RO	0x10	The shutter is adjusted to keep the average and maximum pixel values within normal operating ranges. The shutter value can be adjusted to a new value on every frame. Unit is 5.64uSec.
0x0f	Gain	RO	0x0f	The gain is adjusted to keep the average and maximum pixel values within normal operating ranges. The gain value can be adjusted to a new value on every frame.

0x02 Motion				
Bit Name	**Bit**	**RW**	**Dft**	**Function Description**
MOT	7	RO	0	Motion since last report or PD 0 = No motion 1 = Motion occurred, data ready fo reading in Delta_X and Delta_Y registers
Reserved	6		0	Reserved for future
Reserved	5		0	Reserved for future
OVFY	4	RO	0	Motion overflow Y, delta Y buffer has overflowed since last report 0 = No overflow 1 = Overflow has occurred
OVFX	3	RO	0	Motion overflow X, delta X buffer has overflowed since last report 0 = No overflow 1 = Overflow has occurred
Reserved	2		0	Reserved for future
Reserved	1		0	Reserved for future
RES	0	RO	0	Resolution in counts per inch 0 = 400 1 = 800

0x0A Configuration_bits				
Bit Name	**Bit**	**RW**	**Dft**	**Function Description**
RESET	7	R/W	0	Power up defaults (bit always reads 0) 0 = No effect 1 = Reset registers and bits to power up default settings
LED_MODE	6	R/W	0	LED Shutter Mode 0 = Shutter mode off (LED always on) 1 = Shutter mode on (LED only on when the electronic shutter is open)
Reserved	5		0	Reserved for future
RES	4	R/W	0	Resolution in counts per inch (CPI) 0 = 400 1 = 800
PIX_DUMP	3	R/W	0	Dump the pixel array through Pixel_Data according Pixel_address 0 = disabled 1 = dump pixel array
600 CPI	2		0	Resolution 600 CPI 1 = Enable 0 = Disable
Reserved	1		0	Reserved for future
SLEEP	0	R/W	0	Sleep Mode 0 = Normal, fall asleep after one second of no movement 1 = Always awake

0x1C Navigation XY Direction Control				
Bit Name	**Bit**	**RW**	**Dft**	**Function Description**
X_Y change	7	R/W	0	Change X, Y axis
SIGN_X_REV	6	R/W	0	Reverse X axis
SIGN_Y_REV	5	R/W	0	Reverse Y axis
Reserved	4	RO	0	Reserved for future
Reserved	3	RO	0	Reserved for future
Reserved	2	RO	0	Reserved for future
Reserved	1	RO	0	Reserved for future
Reserved	0	RO	0	Reserved for future

10. The Sensor Array Pixels Mapping:

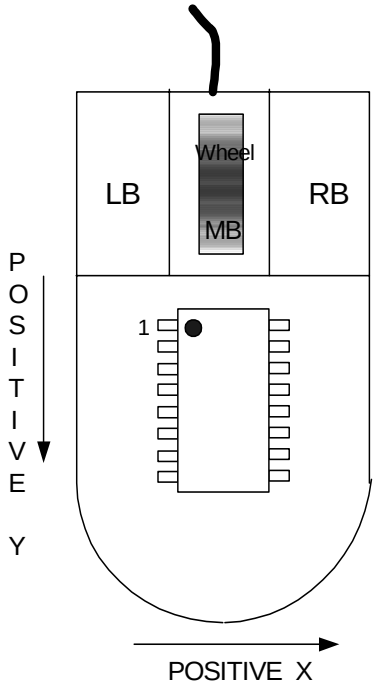
PIXEL ADDRESS MAP

(Looking through the lens)

LAST PIXEL

FF	FE	FD	FC	FB	FA	F9	F8	F7	F6	F5	F4	F3	F2	F1	F0
EF	EE	ED	EC	EB	EA	E9	E8	E7	E6	E5	E4	E3	E2	E1	E0
DF	DE	DD	DC	DB	DA	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
CF	CE	CD	CC	CB	CA	C9	C8	C7	C6	C5	C4	C3	C2	C1	C0
BF	BE	BD	BC	BB	BA	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
AF	AE	AD	AC	AB	AA	A9	A8	A7	A6	A5	A4	A3	A2	A1	A0
9F	9E	9D	9C	9B	9A	99	98	97	96	95	94	93	92	91	90
8F	8E	8D	8C	8B	8A	89	88	87	86	85	84	83	82	81	80
7F	7E	7D	7C	7B	7A	79	78	77	76	75	74	73	72	71	70
6F	6E	6D	6C	6B	6A	69	68	67	66	65	64	63	62	61	60
5F	5E	5D	5C	5B	5A	59	58	57	56	55	54	53	52	51	50
4F	4E	4D	4C	4B	4A	49	48	47	46	45	44	43	42	41	40
3F	3E	3D	3C	3B	3A	39	38	37	36	35	34	33	32	31	30
2F	2E	2D	2C	2B	2A	29	28	27	26	25	24	23	22	21	20
1F	1E	1D	1C	1B	1A	19	18	17	16	15	14	13	12	11	10
0F	0E	0D	0C	0B	0A	09	08	07	06	05	04	03	02	01	00

FIRST PIXEL



Directions are for a complete mouse, with the Lens.

Figure 13: Sensor Pixels Array and XY Direction Mapping

11. Application Circuit Example for C1165 / C1205 :

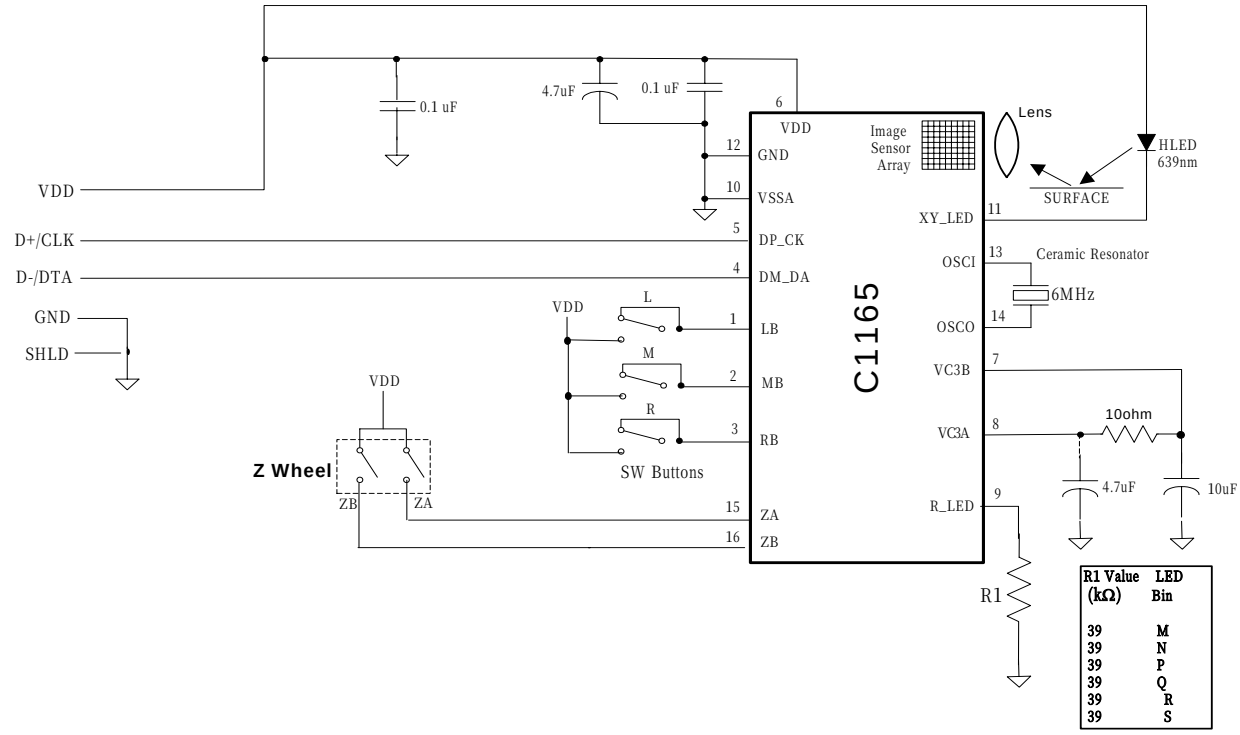


Figure 14: Application Schematic with C1165 16pins (3 buttons Optical Mouse with Z-Wheel)

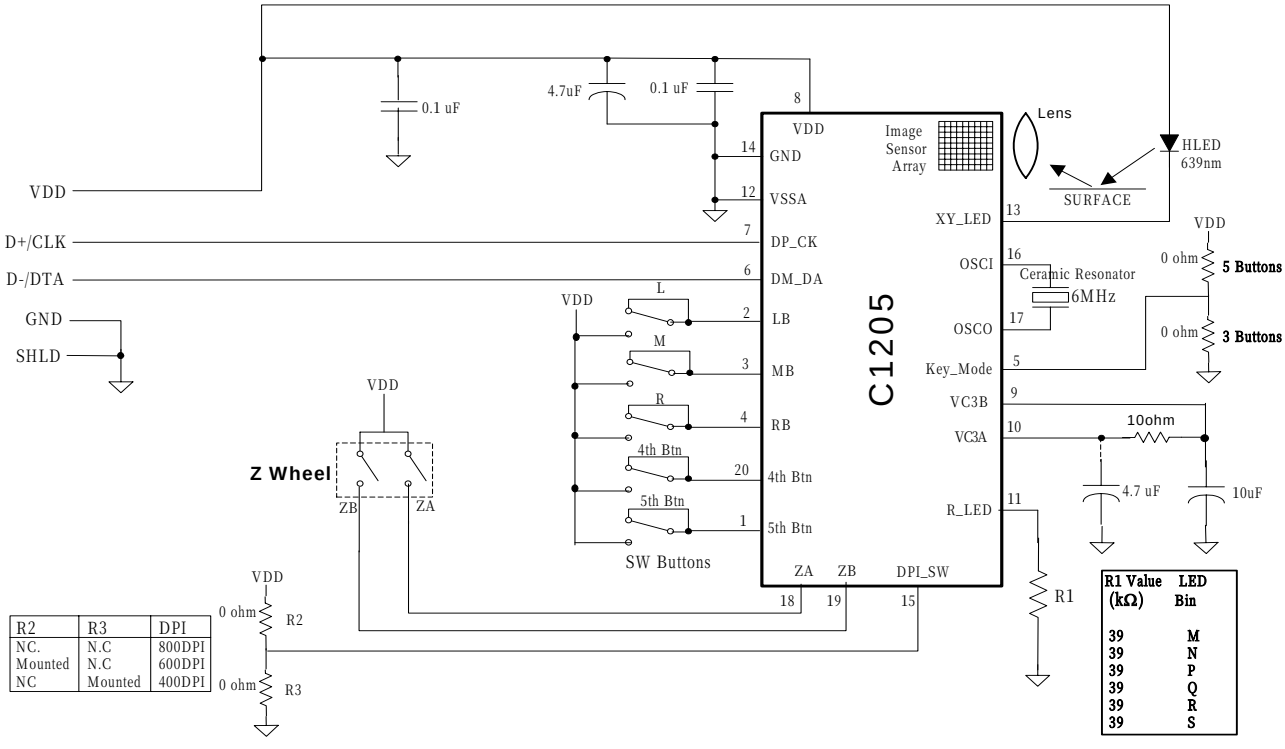
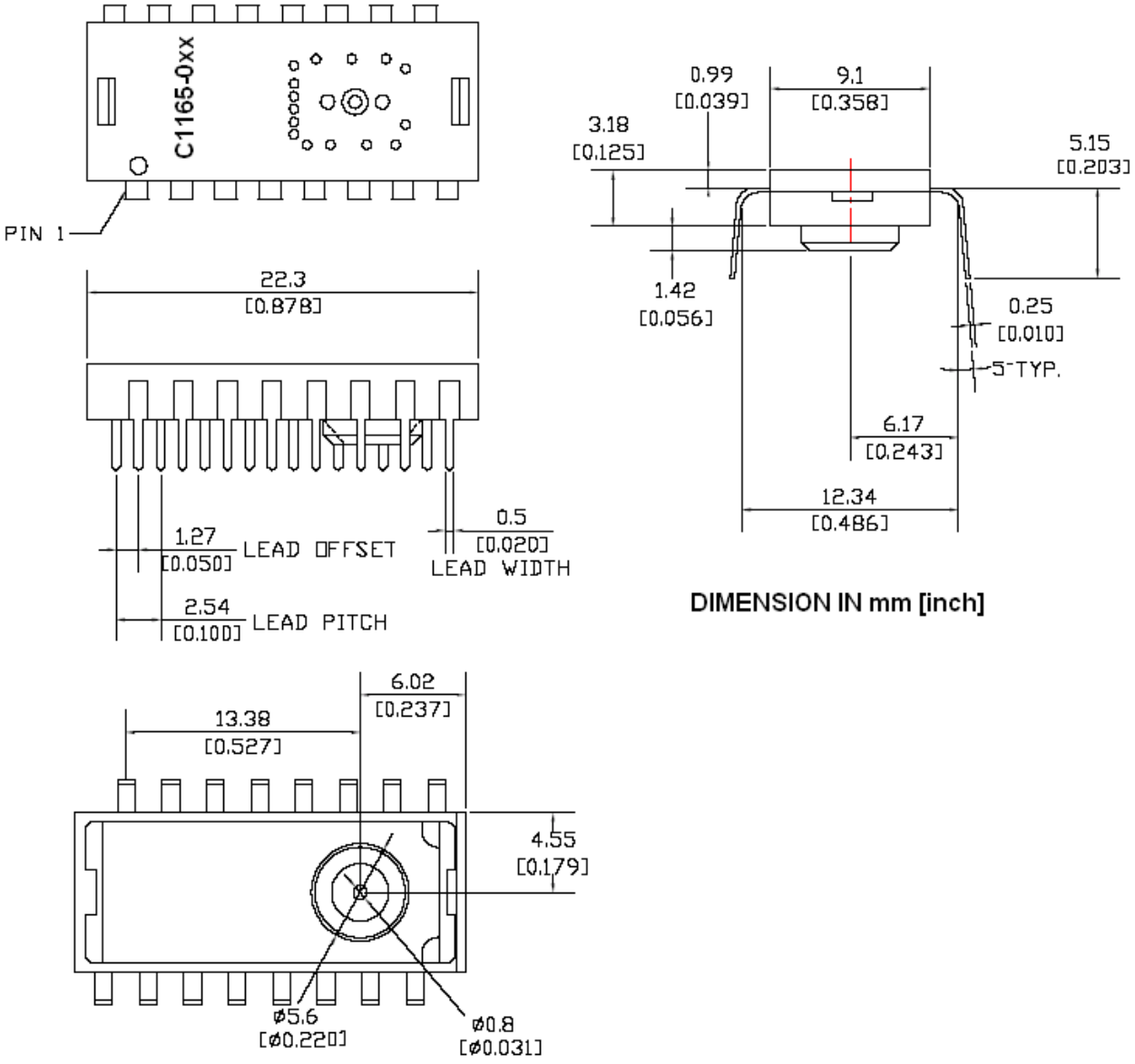


Figure 15: Application Schematic with C1205 20pins (5 buttons Optical Mouse with Z-Wheel)

12. Package Dimension:

12.1 C1165 16Pin Package



DIMENSION IN mm [inch]

12.2 C1205 20Pin Package