

SPECIFICATION

MX8731/31A

USB/PS2 Single Chip Optical Mouse Sensor

VERSION 1.1

TABLE OF CONTENTS

1. General Description.....	3
2. Features.....	3
3. Pin Assignment.....	4
3.1 MX8731 Pin Assignment.....	4
3.2 MX8731A Pin Assignment.....	5
3.3 Option for sensor rotation table.....	5
4. Absolute Maximum Rating.....	9
5. Electrical Characteristic.....	9
6. DC Electrical Characteristic.....	10
7. Application Circuit.....	11
7.1 MX8731 application circuit.....	11
7.2 MX8731A application circuit.....	12
8. Part Number Information.....	13
9. Package (Dimension In mm).....	13
10. Revision History.....	14

1. General Description

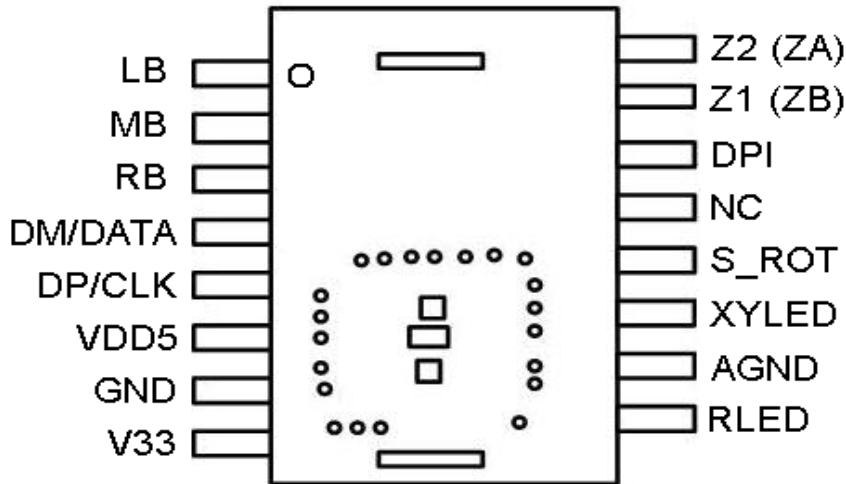
The MX8731/31A chip is a low cost single chip optical mouse solution used to implement a non-mechanical tracking engine for computer mice. It is based on optical navigation technology with USB/PS2 combo MCU bundled. Which measures changes in position by optically acquiring sequential surface images(frames) 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. It is a true crystal-less and ultra low cost solution.

2. Features

- Optical Navigation Technology
- Low-cost and powerful solution for PS/2 and low-speed USB combo mouse
- Microsoft 3D Intellimouse and IBM PS/2 mouse compatible
- Internal switch for USB DP/DM and PS2 CLK/Data I/O
- Universal Serial Bus Specification, version 2.0
- USB HID Specification, version 1.1
- Compatible whit Windows7, Windows Vista, WindowsXP, Windows2000, Windows ME, Windows98, MAC OS,Cent OS and Linux
- USB-IF and WHQL compliable
- 5V Power Supply
- Power Saving During No Motion
- On Chip LED Drive with Regulated Current
- Crystal-less
- Low EMI radiation
- Resolution is default by manufacturer (800 or 1200 CPI)
- Supports 3D (X, Y, Z) input
- Supports 3 buttons and mechanical wheel encoding
- 4 axis sensor rotation (0 degree, 90degrees,180 degrees or 270 degrees)

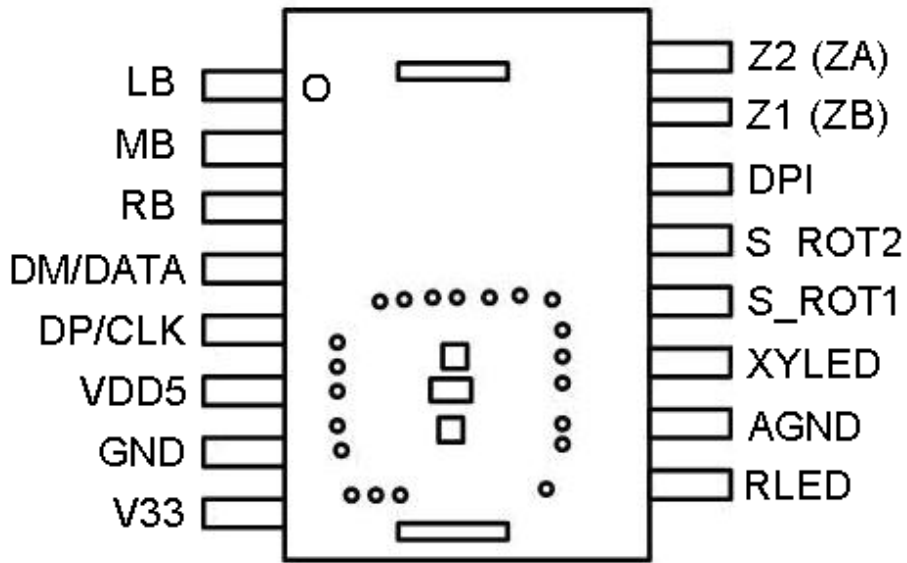
3. Pin Assignment

3.1 MX8731 Pin Assignment



Pin No.	Symbol	I/O	Function
1	LB	I	Left button input
2	MB	I	Middle button input
3	RB	I	Right button input
4	DM/DATA	I/O	USB D- / PS2 DATA
5	DP/CLK	I/O	USB D+ / PS2 CLK
6	VDD5	P	5V Power Input
7	GND	P	GND
8	V33	P	3.3V DC voltage output from internal regulator, This pin need to be tied to a 104 capacitor.
9	RLED	-	LED current resistor
10	AGND	P	Analog GND
11	XYLED	O	LED control (sink current)
12	S_ROT	I	Option for sensor clockwise rotation angle.
13	NC	-	
14	DPI	I	CPI select pin(0:800 or 1:1200)
15	Z1	I	Z axis Input 1
16	Z2	I	Z axis Input 2

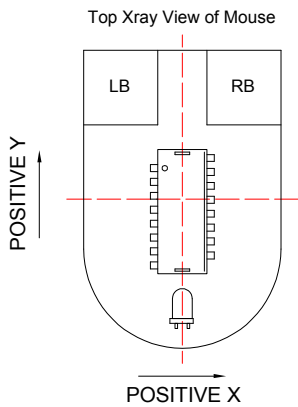
3.2 MX8731A Pin Assignment



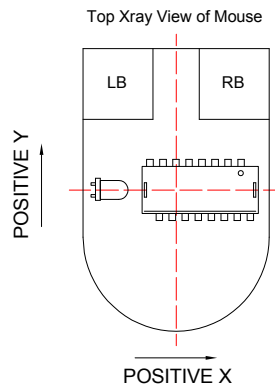
Pin No.	Symbol	I/O	Function
1	LB	I	Left button input
2	MB	I	Middle button input
3	RB	I	Right button input
4	DM/DATA	I/O	USB D- / PS2 DATA
5	DP/CLK	I/O	USB D+ / PS2 CLK
6	VDD5	P	5V Power Input
7	GND	P	GND
8	V33	P	3.3V DC voltage output from internal regulator, This pin need to be tied to a 104 capacitor.
9	RLED	-	LED current resistor
10	AGND	P	Analog GND
11	XYLED	O	LED control (sink current)
12	S_ROT1	I	Option for sensor clockwise rotation angle.
13	S_ROT2	I	Option for sensor clockwise rotation angle.
14	DPI	I	CPI select pin(0:800 or 1:1200)
15	Z1	I	Z axis Input 1
16	Z2	I	Z axis Input 2

3.3 Option for sensor rotation table

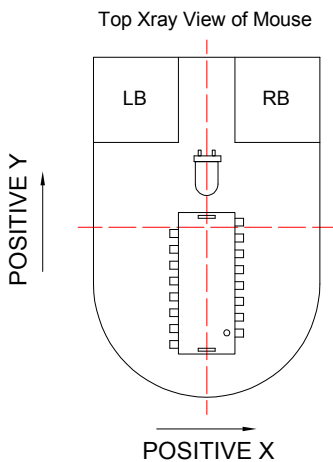
Part number	S_ROT2	S_ROT1	Sensor rotation angle
MX8731	Null	0	0 degree
		1	270 degrees
		Input Floating	180 degrees
MX8731A	1	X	90 degrees
	0	0	0 degree
		1	270 degrees
		Input Floating	180 degrees



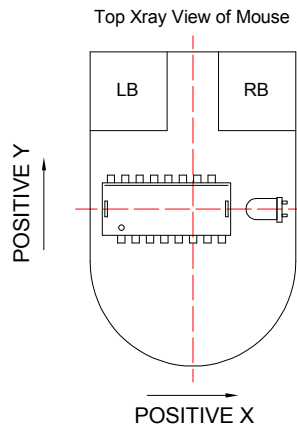
Package pinout at 0°



Package pinout at 90°



Package pinout at 180°



Package pinout at 270°

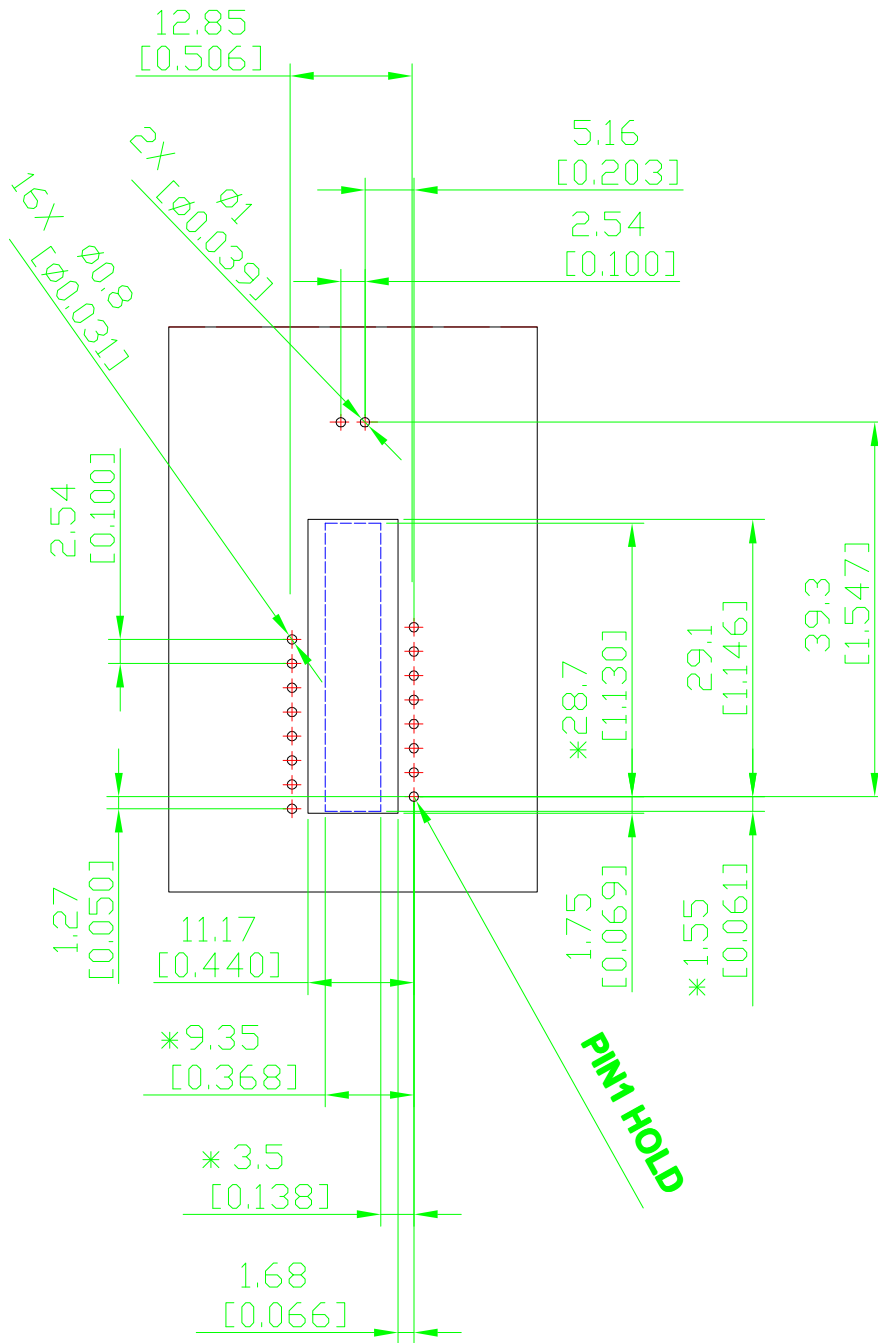
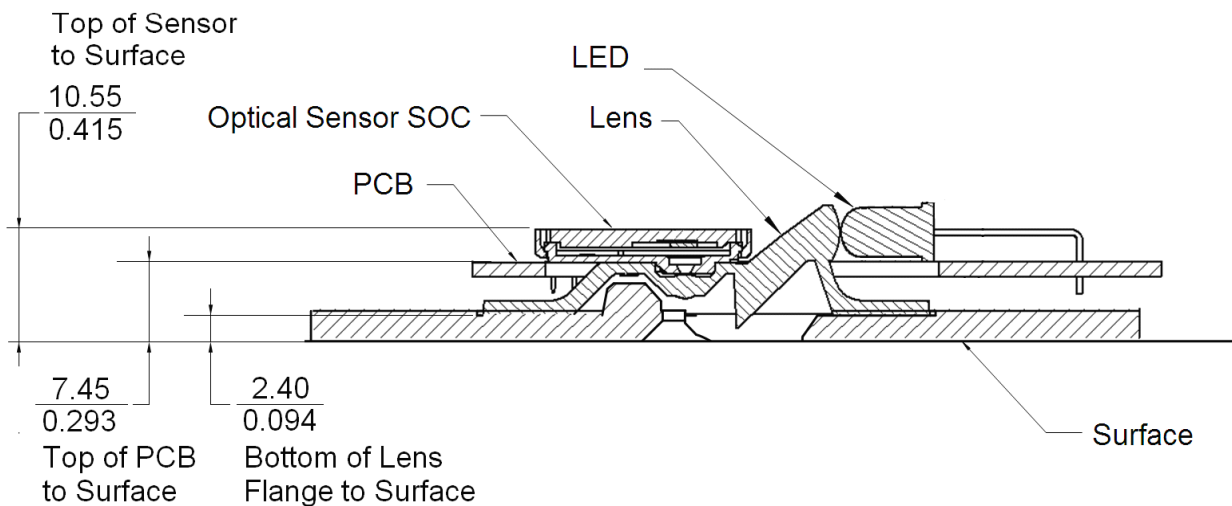


Chart 7

Notes:

- (1) Dimensions in mm/inchs
- (2) * indicates dimension for minimum cut-out

Recommended PCB mechanical cutouts and spacing (Top view)



Notes:

- (1) Dimensions in mm/inchs
- (2) All tolerance $\pm 0.1\text{mm}$

Assembly drawing of MX8731

4. Absolute Maximum Rating

Symbol	Min.	Max.	Unit
Temperature under bias	0	70	°C
Storage temperature	-65	150	°C
Input voltage	-0.5	6.0	V
Output voltage	-0.5	6.0	V

5. Electrical Characteristic

Test Condition: T = 25°C, VDD=5.0V, VSS=0V

Parameters	Sym.	Min.	Typ.	Max.	Unit
Operating voltage	VDD	4.5	5.0	5.5	V
Operating Current (normal operation)	IOP	-	-	10	mA
Operating Current (Sleep mode)	Isleep	-	-	320	μA
Output voltage of 3.3V regulator	Vreg	3.0	3.3	3.6	V
L, M, R, debounce time	Tb	17	-	-	ms
Z-axis debounce time	Tz	700	-	-	μs

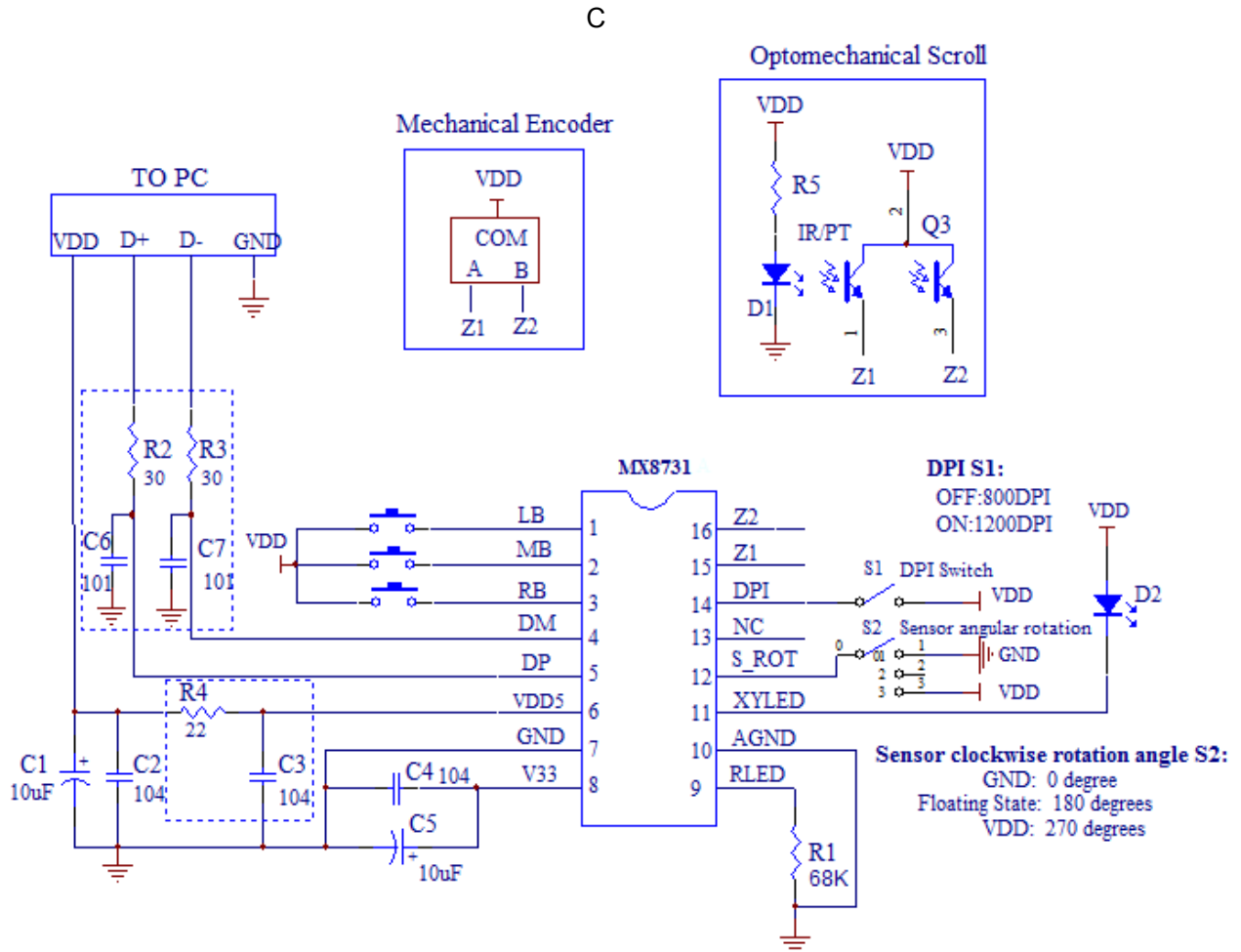
6. DC Electrical Characteristic

(T=25°C, Vdd=5V, Vss=0V)

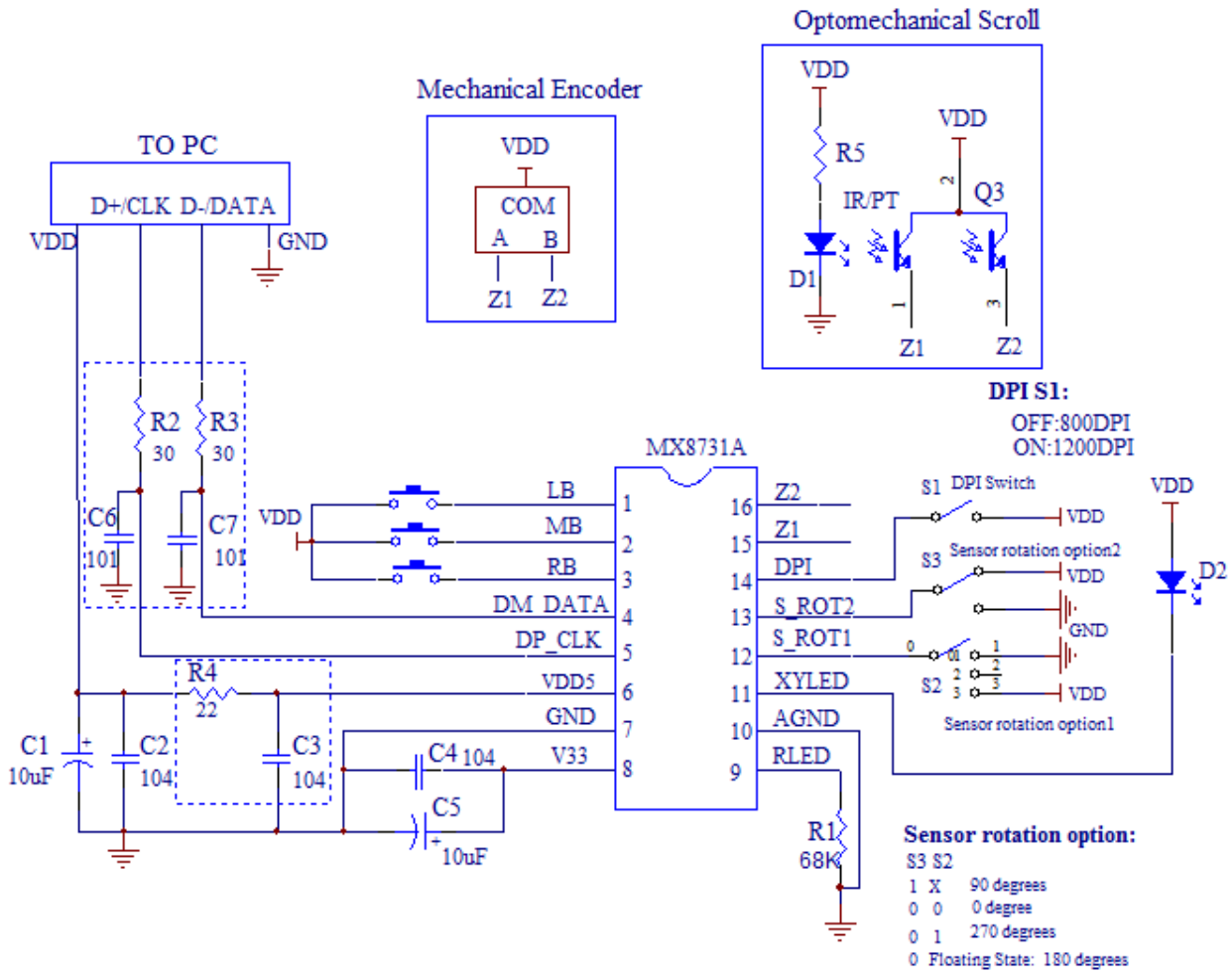
Symbol	Parameter	Condition	Min	Type	Max	Unit
3.3V Regulator						
Vreg	Output voltage of 3.3v Regulator	Vdd=4.4V~5.25V	3.0	3.3	3.6	V
VresetL	Low Power Reset detecting low Voltage				3.3	V
VresetH	Low Power Reset detecting high Voltage		3.6			V
MCU operation						
Iil	Input Leakage Current for input pins	VIN=VDD, VSS			±1	uA
Icc	VDD operating supply current Normal frequency operation mode	Output pins floating			10	mA
USB Interface						
Voh	Static Output High	USB operation Mode	2.8		3.6	V
Vol	Static Output Low				0.3	V
Vdi	Differential Input Sensitivity		0.2			V
Vcm	Differential Input Command Mode Range		0.8		2.5	V
Vse	Single Ended Receiver Threshold		0.8		2.0	V
Cin	Transceiver Capacitance				20	PF
Vrg	Output Voltage of internal Regulator		3.0		3.6	V

7. Application Circuit

7.1 MX8731 application circuit



7.2 MX8731A application circuit



Note:

1. C1, C2, R4 as close USB/PS2 line solder pad on PCB as possible, PCB layout should be designed in such a way as to ensure that the VDD is stable and pass through RC filter.
2. The capacitance C3, C4 & C5 have to close to IC.
3. D+/CLK and D-/DATA signal line have the short trace to IC.
4. Recommend to have ground grid on the PCB periphery.
5. Components in dotted line are used for EMC issue.

8. Part Number Information

Part Number: **MX8731** **X**

1 2

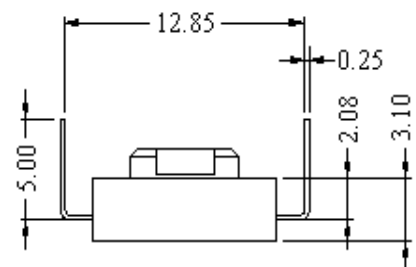
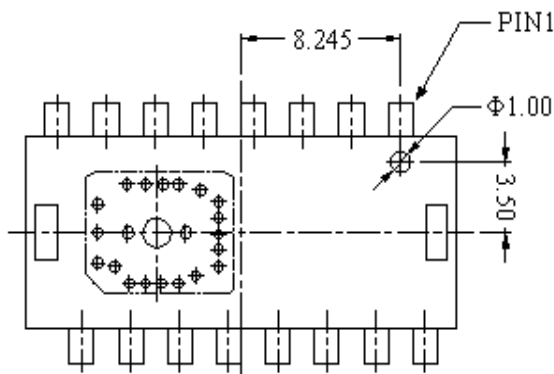
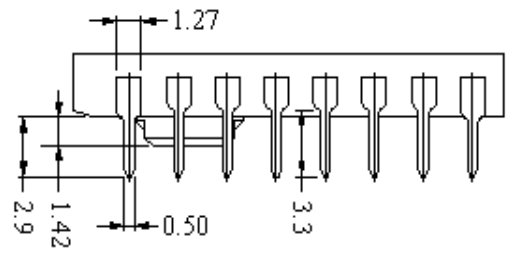
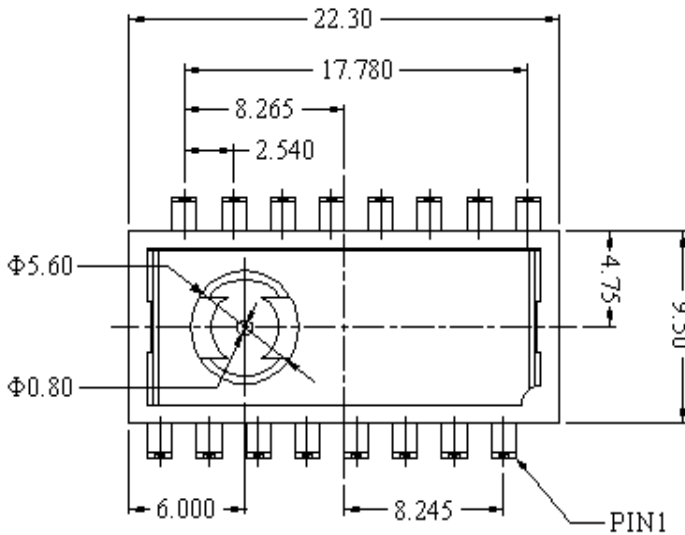
1. Prefix for product series name

2. Postfix for part number

MX8731 -- 3 axis sensor rotation (0 degree, 180 degree, or 270 degree)

MX8731A -- 4 axis sensor rotation (0 degree, 90 degree, 180 degree, or 270 degree)

9. Package (Dimension In mm)



Notes: Dimensions in mm.



10. Revision History

Version	Update date	Revised Content	Revised by	Confirmed by
V1.0	2009-10-28	Original	LiuXing	Alan
V1.1	2010-1-18	Add MX8731A information	LiuXing	Alan