

2-IN-1 PnP SERIAL MOUSE CONTROLLER WITH AUTO-REF.

FEATURES

- RS232C interface.
- 2-in-1 i.e. Microsoft System or Mouse System.
- CMOS technology.
- Low power dissipation.
- Seven button combinations.
- Wheel or Optical/Mechanical.
- Can work on optical mouse.
- Will send out PnP code after rising edge of RTS.
- Zener diode built in.
- Operating frequency: 32768Hz .
- Auto-Reference function

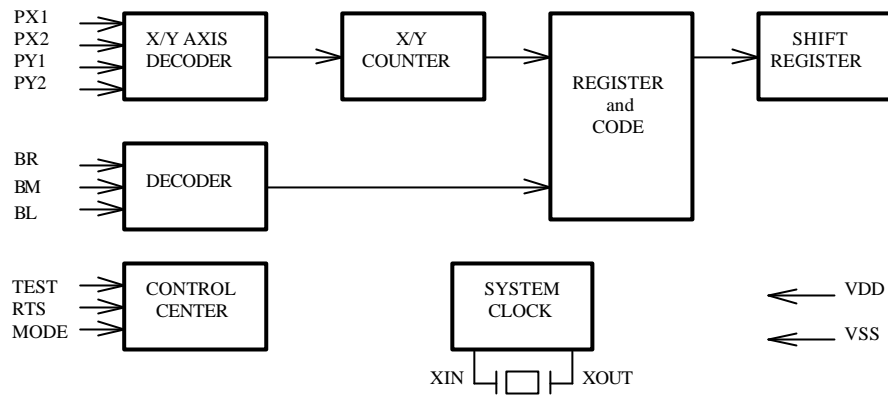
GENERAL DESCRIPTION

EC3581 is a single chip 2-IN-1 Mouse Controller, designed and fabricated in CMOS ASIC technology.

PAD DESCRIPTIONS

PAD NAME	I/O	FUNCTION
MODE	I	Mode selection input. If MODE pin is HIGH, EC3581 will operate in Microsoft System mode. If MODE pin is LOW, EC3581 will operate in Mouse System mode. If MODE pin is floating during the Power On Reset period and one of the buttons is pressed, the EC3581 will operate in Microsoft System mode. Otherwise, it will operate in Mouse System mode.
XIN	I	Crystal oscillator input.
XOUT	O	Crystal oscillator output.
RTS	I	Input from RTS (Request To Send) of RS232C. The RXD pin will send a 4D hexadecimal code in Microsoft System Mode after a LOW to HIGH transition of the RTS pin. After 4D code is received, the RTS pin will remain HIGH.
RXD	O	Serial data output to Receive Data of RS232C. Normally LOW.
VSS	P	Ground pin.
BR	I	Right button selection. BR pin is HIGH when right button is pressed and becomes LOW when it is released. EC3581 will only report through RXD on a rising edge or falling edge of the input signal. The status of BR will be LOW on a falling edge and HIGH on a rising edge.
BM	I	Middle button input.
BL	I	Left button input.
GND	I	Reference voltage for ZENER.
PX1	I	Input from the first X axis photo-encoder. In both Microsoft System and Mouse System, PX1 and PX2 constitute positive (negative) counts for rightward (leftward) movement on the screen.
PX2	I	Input from the second X axis photo-encoder.
PY1	I	Input from the first Y axis photo-encoder. In Microsoft System, PY1 and PY2 constitute positive (negative) counts for downward (upward) movement on the screen. In Mouse System, PY1 and PY2 constitute positive (negative) counts for upward (downward) movement on the screen.
PY2	I	Input from the second Y axis photo-encoder.
VDD	P	+5V power supply.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Supply Voltage	Vdd	0	6.5	V
Ambient Temperature	Tamb	0	70	
Storage Temperature	Tstg	-40	125	
Power Dissipation (Tamb = 70)	Pd	---	100	mW

Note: This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

DC ELECTRICAL CHARACTERISTICS

(Note: Vdd = 5 V, unless otherwise specified)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Operating Voltage	Vdd	4.5	5	5.5	V
Operating Current (No load)	Iop	---	---	2.0	mA
PX1/PX2/PY1/PY2 Input Range	Vir	0.1	---	3.2	V
PX1/PX2/PY1/PY2 Input Amplitude	Via	0.6	---	---	V
PX1/PX2/PY1/PY2 Input Resistance	---	---	---	---	K
BL/BM/BR/MODE/RTS	Vih	3.2	---	---	V
BL/BM/BR/MODE/RTS	Vil	---	---	1.3	V
BL/BM/BR Internal Pull-down Resistor	Rbut	125	200	270	K
RXD Output Current (sourcing) Voh=(RTS-1)V	Ioh	1.0	---	---	mA
RXD Output Current (sinking) (Vol = 0.5V)	Iol	1.0	---	---	mA
PX1/PX2/PY1/PY2/BL/BM/BR/ MODE//XIN Input Leakage Current (Vih = 5V)	Iih	---	---	2	uA
Zener Diode Voltage (Iz =4mA)	Vz	5.0	5.2	5.4	V

AC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Oscillator Frequency	Fosc	---	32.768	---	KHz
BR/BL/BM Button Debounce Time	Tbd	40	---	---	ms
Tracking Speed (200 DPI wheel; Microsoft System Mode)	Vts	---	64.5	---	CM/S
RXD Transmission Rate	Fmx	---	1213	---	Hz
Transmission Time (Mouse System)	Tms	---	41.2	---	ms
Transmission Time (Microsoft)	Tm	---	24.72 32.95	---	ms
Start Bit Time	Ts	---	0.824	---	ms
Data Bit Time	Td	---	0.824	---	ms
Stop Bit Time	Tp	---	0.824	---	ms
Mode Code Delay Time	T1	---	13.7	---	ms
Pattern In Pulse Width	Tpi	0.12	---	---	ms

Note: 1. After the power on, the mouse will send PnP code automatically.

2.The mouse will send PnP code at 15ms after RTS goes from low to high.

DATA FORMAT

Baud rate: 1200 bps asynchronous

Output data:

Microsoft System	Mouse System
3 or 4 bytes per packet	5 bytes per packet
1 Start bit	1 Start bit
7 Data bits	8 Data bits
2 Stop bits	2 Stop bits

Byte format:

MICROSOFT SYSTEM

Data Bit	6	5	4	3	2	1	0
1st byte	1	BL	BR	Y7	Y6	X7	X6
2nd byte	0	X5	X4	X3	X2	X1	X0
3rd byte	0	Y5	Y4	Y3	Y2	Y1	Y0
4th byte	0	BM	0	0	0	0	0

MOUSE SYSTEM

Data Bit	7	6	5	4	3	2	1	0
1st byte	1	0	0	0	0	BL	BM	BR
2nd byte	X7	X6	X5	X4	X3	X2	X1	X0
3rd byte	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0
4th byte	X7	X6	X5	X4	X3	X2	X1	X0
5th byte	Y7	Y6	Y5	Y4	Y3	Y2	Y1	Y0

Transmit sequence of each byte:

	Microsoft System	Mouse System
1st bit	start bit	start bit
	data bit 0	data bit 0
	data bit 6	data bit 6
	data bit 7	data bit 7
last bit	stop bit	stop bit

BR/BM/BL Data format:

Microsoft System	Mouse System
1 = Depressed	1 = Released
0 = Released	0 = Depressed

In Microsoft system:

X7 - X0 = X axis movement in 2's complement, positive for rightward.

Y7 - Y0 = Y axis movement in 2's complement, positive for downward.

In Mouse System:

X7 - X0 = X axis movement in 2's complement, positive for rightward.

Y7 - Y0 = Y axis movement in 2's complement, positive for upward.

TIMING DIAGRAM
DATE TYPE:
A. Plug and play code:

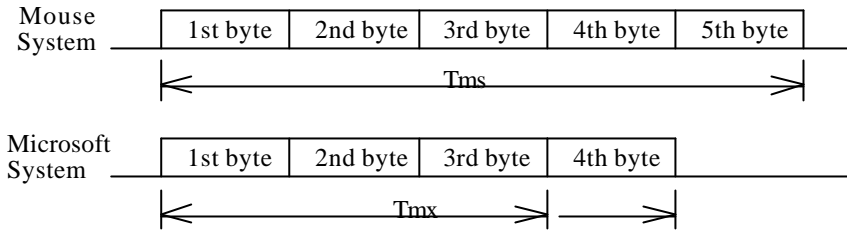
PnP code will be determined by each customer. Otherwise, this code will be E-CMOS' s code.

E-CMOS PnP code

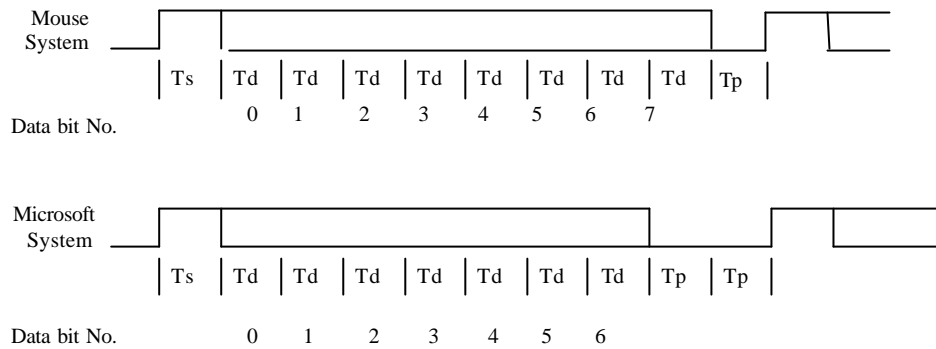
Non-PnP ID	"m", "3"	4D,33
Begin PnP	08h	08
PnP Rev	1.0	01,24
EISA ID	"ECM"	25,23,2D
Product ID	0001	10,10,10,11
Extend	"\	3C
Extend	"\	3C
Class Name	"MOUSE"	2D,2F,35,33,25
Extend	"\	3C
Driver ID	"PNPOFOC"	30,2E,30,10,26,10,23
Checksum	380	18,10
End PnP	09h	09

B. DATAOUT DIAGRAM

(1) BYTES STRUCTURE:



(2) BITS STRUCTURE :



LAYOUT DESIGN GUIDELINES

Mounting of Die and Layout for Wire Bond Pads

1. A ground potential is required for the die, area for the PCB die pad should be .010" larger than the die, on all sides.
2. For wire bonding manufacturability, the PCB pads should be placed in line with die pads.
 - A. Normal distance between die pad and PCB bond pads: .020" to .100"
 - B. Typical PCB pad size: .005" to .010" square
3. Usual Length of a wire bond: .020" to .100"

儲存環境注意事項

1. Dies 應存放於 Tray 盤內以真空包裝及置於恆溫箱中以常溫 25 儲存，以避免氧化。

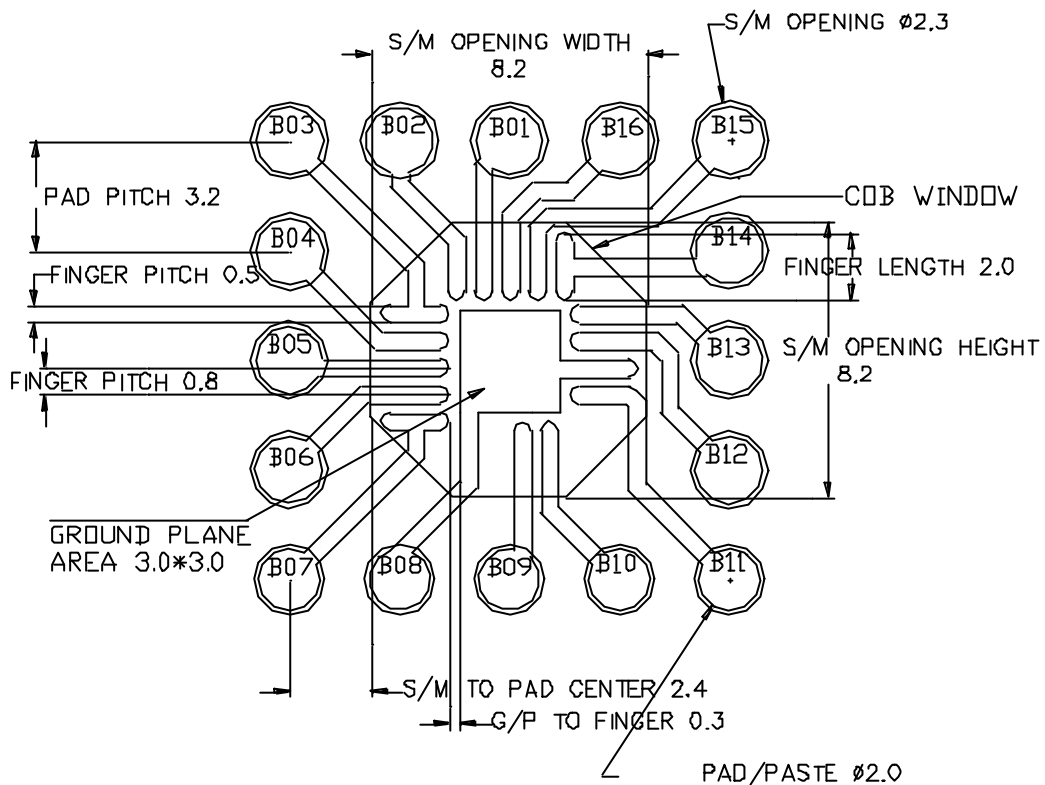
E-CMOS CORPORATION

Dev. : EC3581-D

TYPICAL COB LAYOUT DRAWING

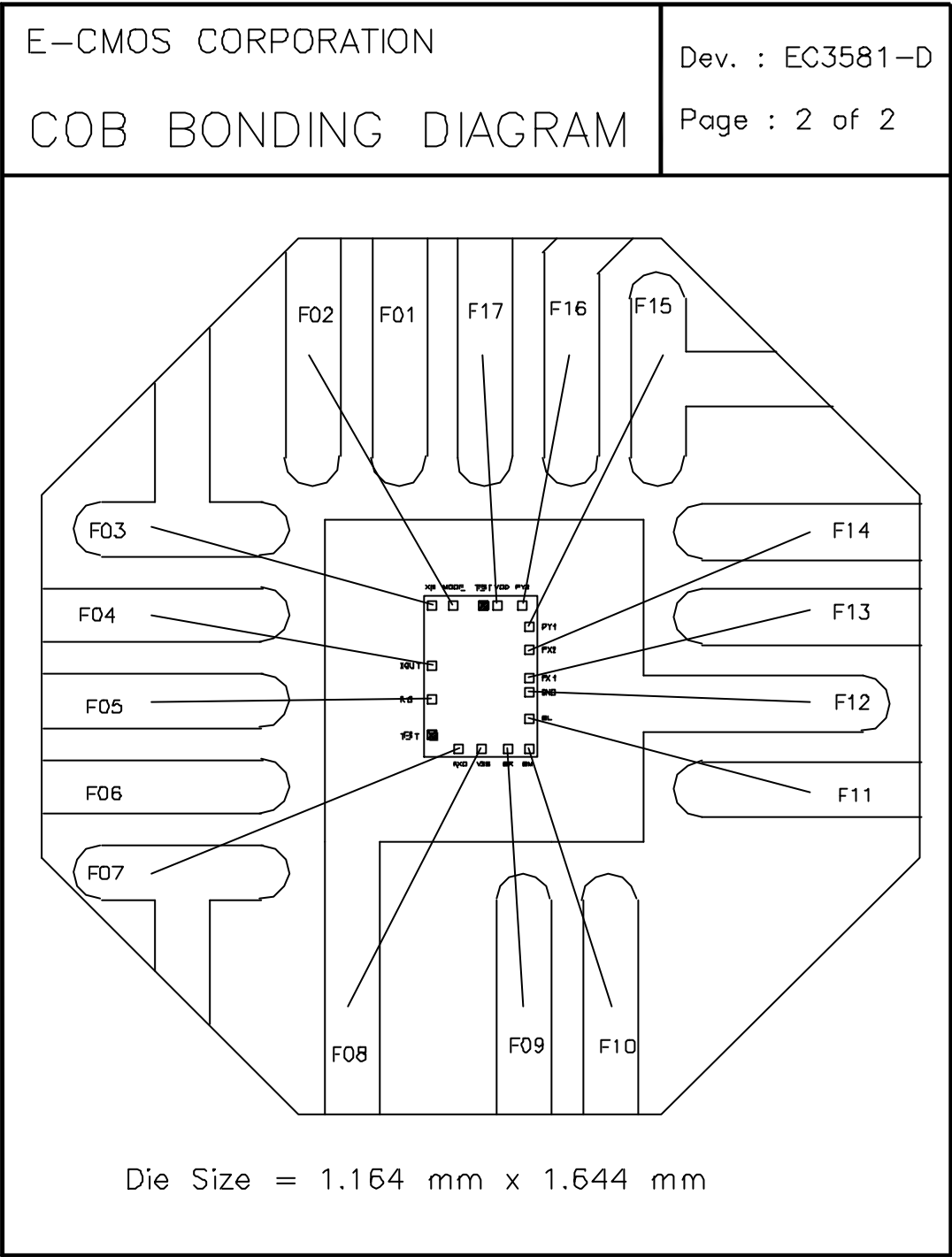
Page : 1 of 2

unit : mm

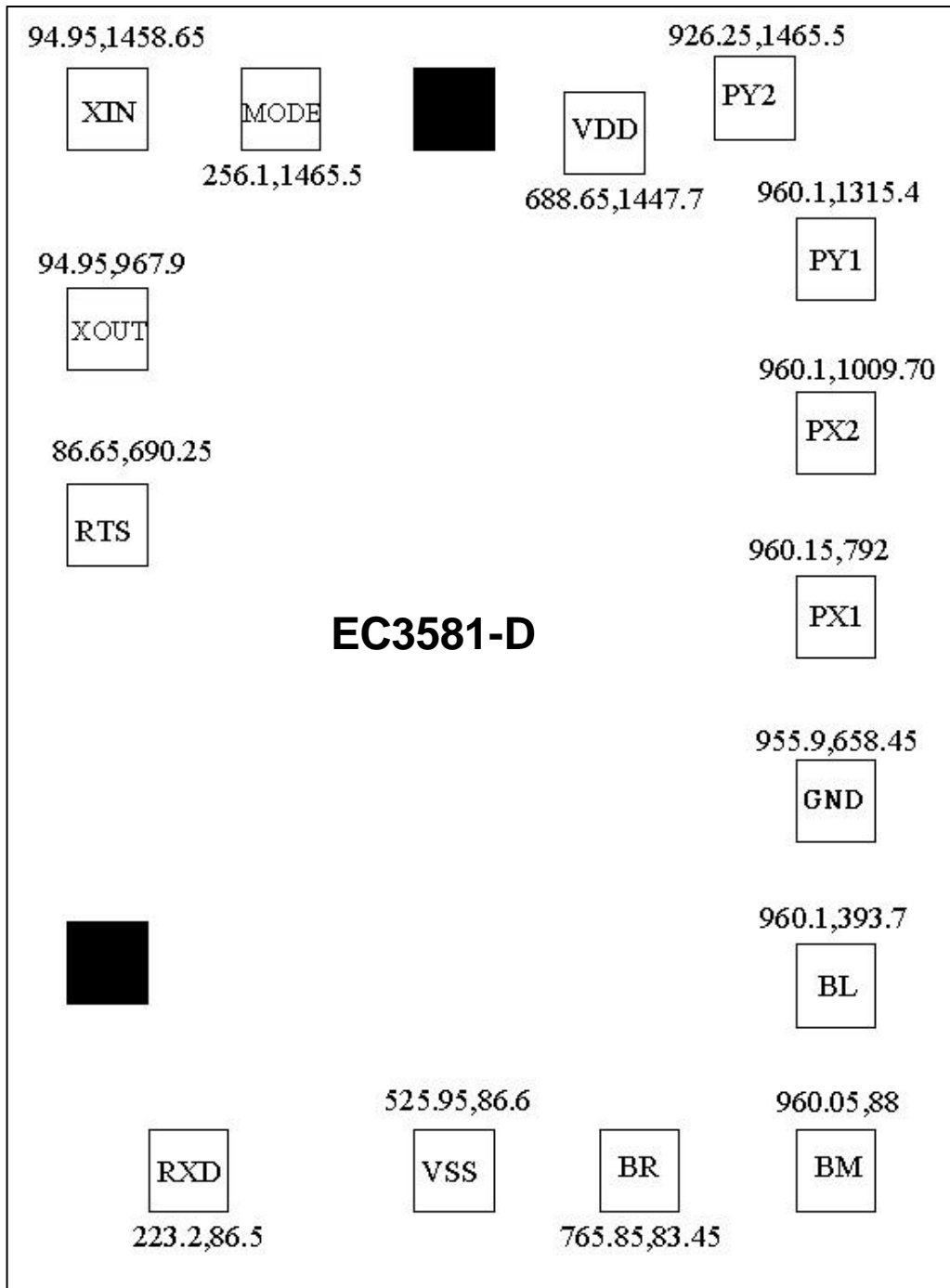


Note :

1. S/M = Solder Mask
2. G/P = Ground Plane
3. The PAD area should be fully opened up by the defined solder mask layer.
4. No.12 of pad connects to the ground plane.
5. The S/M opening area must be plated with gold for wire bonding.



CHIP LOCATION



FINGER AND PAD CONTRAST TABLE

Probe	Ball Number	Finger Number	Pad Name	Coordinate
	B01	F01	NONE	---
	B02	F02	MODE	256.1,1465.5
	B03	F03	XIN	94.95 , 1458.65
	B04	F04	XOUT	94.95,967.9
	B05	F05	RTS	86.65,690.25
	B06	F06	NONE	---
	B07	F07	RXD	223.2,86.5
	B08	F08	VSS	525.95,86.6
	B09	F09	BR	765.85,83.45
	B10	F10	BM	960.05,88
	B11	F11	BL	960.1,393.7
	NONE	F12	GND	955.9,658.45
	B12	F13	PX1	960.15,792
	B13	F14	PX2	960.1,1009.7
	B14	F15	PY1	960.1,1315.4
	B15	F16	PY2	926.25,1465.5
	B16	F17	VDD	688.65,1447.7

