

- 4 wires PS/II interface built-in.
- CMOS technology for lower power consumption.
- Fully compatible with IBM PS/II series PC.
- Supports four working modes: Reset, Stream, Remote and Wrap.
- 16 commands plus acknowledgment code.
- 7 different sample rates from 10/sec to 200/sec.
- 4 different resolutions: 1, 2, 4 and 8 count/mm.
- Scaling can be set to 2:1 as specified by IBM spec.
- Reduced external component counts by chip integration.
- RC oscillation.
- Built-in X/Y independent Auto-Ref function (E-CMOS Patented) : X/Y threshold voltage level track with input signal dynamically and independently.
- High standard ESD and EFT immunity.

EC3592R is a single chip PS/II Mouse Controller, designed and fabricated in CMOS Technology. The EC3592R is available in 14-pin or 16-pin P-DIP package.

The block diagram illustrates the control system for the X-Y plotter. It shows the following components and their interconnections:

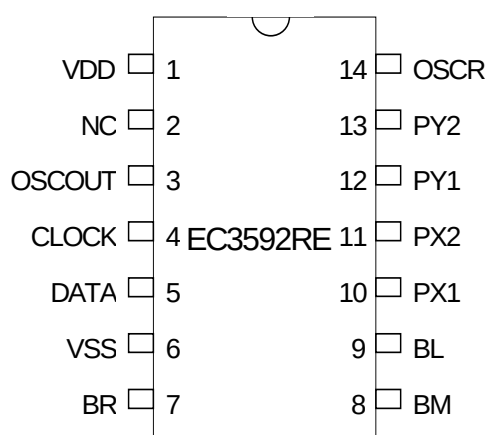
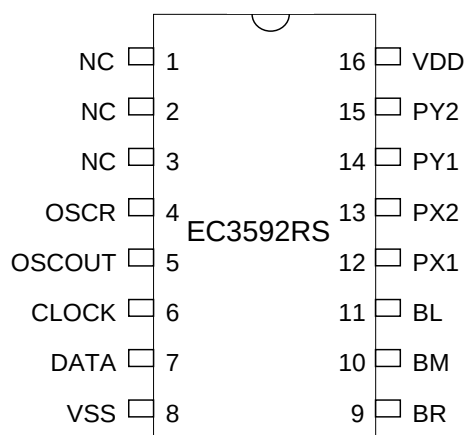
- Inputs:** BL, BM, BR, PX1, PX2, PY1, PY2, TEST, OSCR, and OSCOUT.
- Process Blocks:**
 - AUTO REF / X/Y MOVEMENT PROCESS:** Receives PX1 and PX2. It is connected to the X/Y MOVEMENT PROCESS and the X/Y RESOLUTION block.
 - AUTO REF / Y MOVEMENT PROCESS:** Receives PY1 and PY2. It is connected to the Y MOVEMENT PROCESS and the X/Y RESOLUTION block.
 - BUTTON PROCESS:** Receives BL, BM, and BR. It is connected to the SELECTION block and the INFORMATION PROCESS.
 - SELECTION:** Receives TEST. It is connected to the BUTTON PROCESS and the INFORMATION PROCESS.
 - COMMAND PROCESS:** Connected to the INFORMATION PROCESS.
 - ERROR PROCESS:** Connected to the INFORMATION PROCESS.
 - X/Y RESOLUTION:** Receives signals from the X/Y MOVEMENT PROCESS and the Y MOVEMENT PROCESS. It is connected to the X/Y SCALE block.
 - X/Y SCALE:** Connected to the INFORMATION PROCESS.
 - INFORMATION PROCESS:** The central hub, connected to the COMMAND PROCESS, ERROR PROCESS, X/Y SCALE, and X/Y SAMPLING. It has bidirectional connections for CLOCK and DATA.
 - OSCILLATOR:** Receives OSCR and outputs OSCOUT. It is connected to the TIMING GENERATOR.
 - TIMING GENERATOR:** Connected to the INFORMATION PROCESS and the X/Y SAMPLING block.
 - X/Y SAMPLING:** Connected to the INFORMATION PROCESS.



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PIN CONFIGURATIONS



PIN DESCRIPTIONS

PIN NAME	I/O	FUNCTION
OSCR	I	Crystal or RC oscillation input.
OSCOUT	O	Crystal or RC oscillation output.
CLOCK	I/O	Bi-directional signal line between EC3592R and PC system. Whenever the mouse is ready to send data to the system or the system wants to send command to the mouse, it will clock in 11 bits of CLOCK on this line.
DATA	I/O	Bi-directional signal line to transfer data. This is an open-drain output with internal pull-up resistor. All mouse data and system commands are transmitted through this line.
VSS	P	Ground pin.



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PIN NAME	I/O	FUNCTION
BR	I	Right button selection. Built-in pull-down resistor of 50K Ω . BR pin is HIGH when right button is pressed and becomes LOW when it is released. EC3592R has edge-triggered button operation. It will only report through DATA line on a rising edge or falling edge of the input signal.
BM	I	Middle button selection. Built-in pull-down resistor of 50K Ω . It is also edge-triggered button operation as "BR".
BL	I	Left button selection. Built-in pull-down resistor of 50K Ω . It is also edge-triggered button operation as "BR".
PX1	I	Input from the first X-axis photo-encoder.
PX2	I	Input from the second X-axis photo- encoder. PX1 and PX2 constitute positive (negative) counts for rightward (leftward) movement on the screen.
PY1	I	Input from the first Y-axis photo-encoder.
PY2	I	Input from the second Y-axis photo-encoder. PY1 and PY2 constitute positive (negative) counts for downward (upward) movement on the screen.
VDD	P	+5V power supply.

ABSOLUTE MAXIMUM RATINGS

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

Note: This is a stress rating only and functional operation of the device at these or at any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute



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maximum rating may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

(NOTE: $V_{DD} = 5V$, UNLESS OTHERWISE SPECIFIED)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Operating Voltage	Vdd	4.5	5	5.5	V
Operating current (No load)	Iop		1.0	2.5	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 Internal Resistor	Rpxy		12		K Ω
BL/BM/BR Input High Voltage	Vih	3.2			V
BL/BM/BR Input Low Voltage	Vil			1.3	V
BL/BM/BR Internal Pull-down Resistor	Rbut		50		K Ω
CLOCK/DATA Output Current (Vol. =0.5V)	Iol	8			mA
CLOCK/DATA Internal Pull-up Resistor	Rcd		5		K Ω
PX1/PX2/PY1/PY2/BL/BM/BR Input Leakage Current (Vih = 5V)	Iih			2	μA

AC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Oscillator Frequency R=270 K Ω	Foscr	62	75	90	KHz
BL/BM/BR Button Debounce Time	Tbd		43		ms

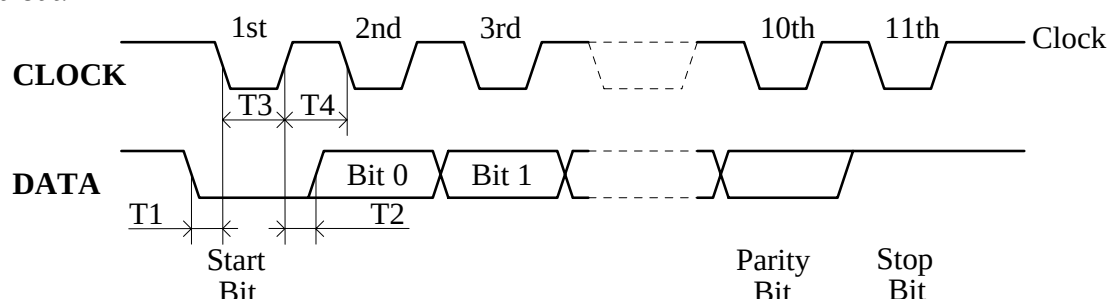


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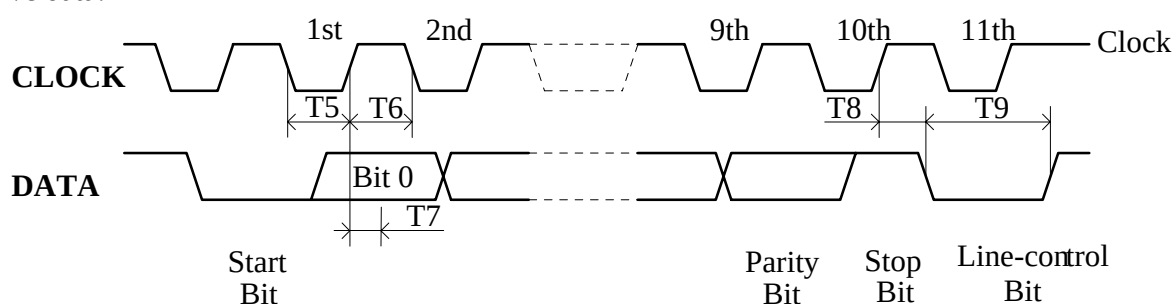
EC3592R

TIMING DIAGRAM

Mouse sends data out:



Mouse receive data:



		IBM SPEC	E-CMOS SPEC
T1	Time from DATA transition to the falling edge of CLOCK.	5~25	13.3
T2	Time from the rising edge of CLOCK to DATA transition.	5~(T4-5)	26.7
T3	Duration of CLOCK Low.	30~50	40
T4	Duration of CLOCK High.	30~50	40
T5	Duration of CLOCK Low.	30~50	40
T6	Duration of CLOCK High.	30~50	40
T7	Time from the rising edge of CLOCK to DATA sampled point.	5~25	13.3
T8	Time from the rising edge of the 10th CLOCK to starting point of line-control bit.		13.3
T9	The pulse width of line-control bit.		80

(Base on oscillator frequency=70KHz)

(Unit in μs)



PS/2 COMMAND LIST

HEX CODE	COMMAND	EC3592's RESPONSE
FF	Reset	FA, AA, 00
FE	Resend	XX, (XX, XX)
F6	Set Default	FA
F5	Disable	FA
F4	Enable	FA
F3, XX	Set Sampling Rate	FA, FA
F2	Read Device Type	FA, 00
F0	Set Remote Mode	FA
EE	Set Wrap Mode	FA
EC	Reset Wrap Mode	FA
EB	Read Data	FA, XX, XX, XX
EA	Set Stream Mode	FA
E9	Status Request	FA, XX, XX, XX
E8, XX	Set Resolution	FA, FA
E7	Set Scaling 2:1	FA
E6	Reset Scaling	FA

A. F3, XX SET SAMPLING RATE

SECOND BYTE XX	SAMPLING RATE
0A	10/sec.
14	20/sec.
28	40/sec.
3C	60/sec.
50	80/sec.
64	100/sec.
C8	200/sec.



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B. **E9 STATUS REQUEST**

BYTE	BIT	DESCRIPTION
3	0-7	Current Sampling Rate (Bit 0=LSB)
2	0-7	Current Sampling Setting (Bit 0=LSB)
1	7	Reserved
	6	0 = Stream Mode, 1 = Remote Mode
	5	0 = Disabled, 1 = Enabled
	4	0 = Scaling 1:1, 1 = Scaling 2:1
	3	Reserved
	2	1 = Left Button Pressed
	1	Reserved
	0	1 = Right Button Pressed

C. **E8, XX SET RESOLUTION**

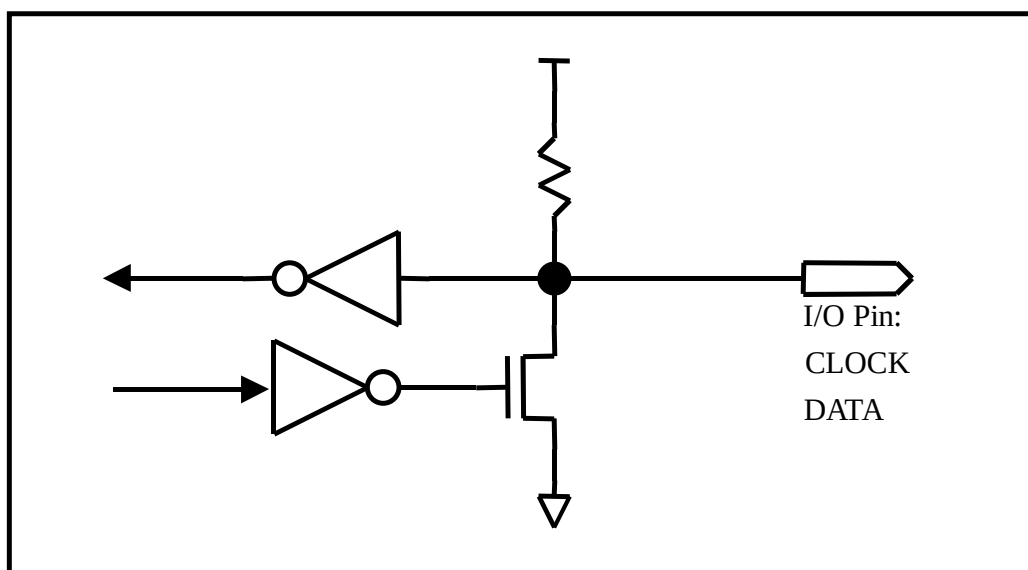
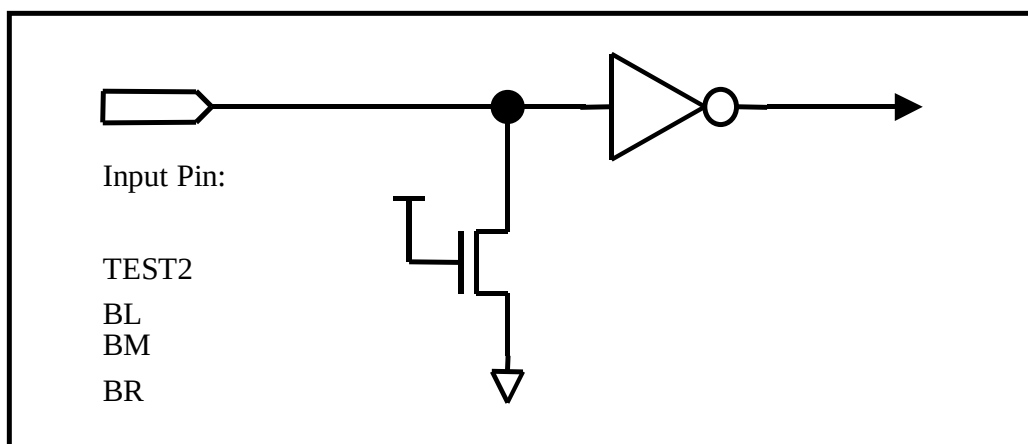
SECOND BYTE XX	RESOLUTION (COUNTS PER MM)
00	1
01	2
02	4
03	8

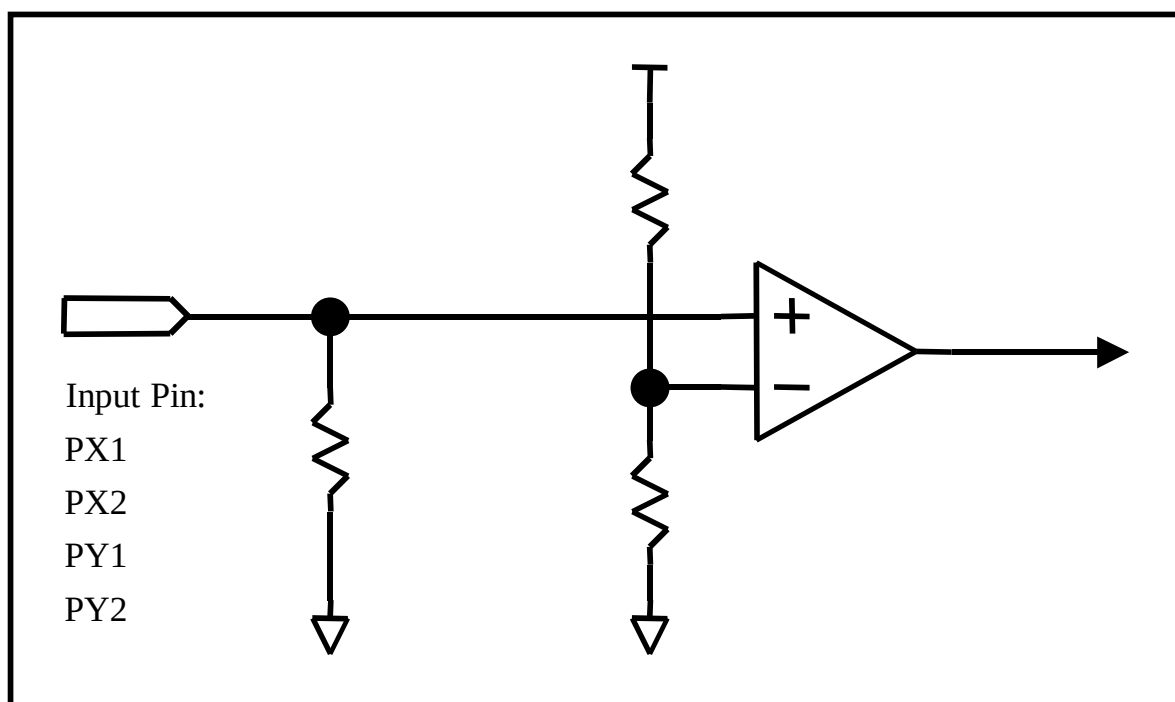
D. **E7 SET SCALING 2:1**

INPUT	OUTPUT
0	0
1	1
2	1
3	3
4	6
5	9
N (≥ 6)	2.0×N



INPUT/OUTPUT EQUIVALENT CIRCUIT





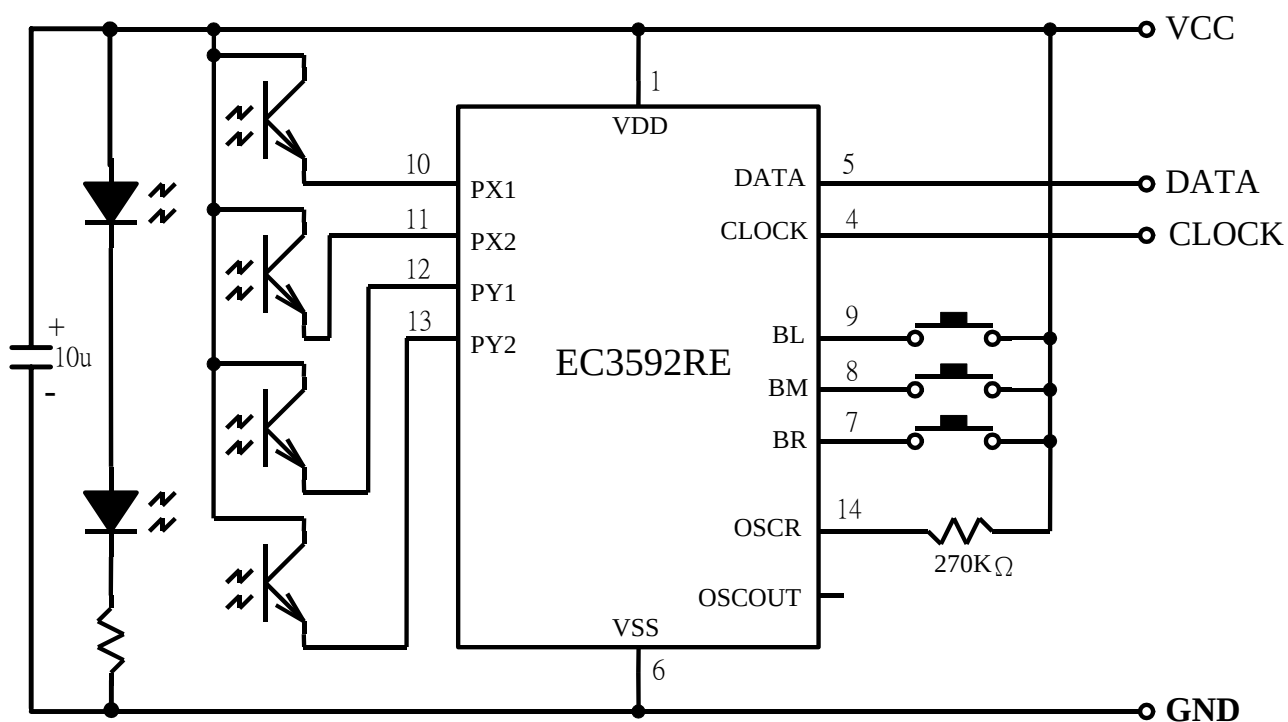


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APPLICATION CIRCUITS

(Note: This application circuit is for reference only)

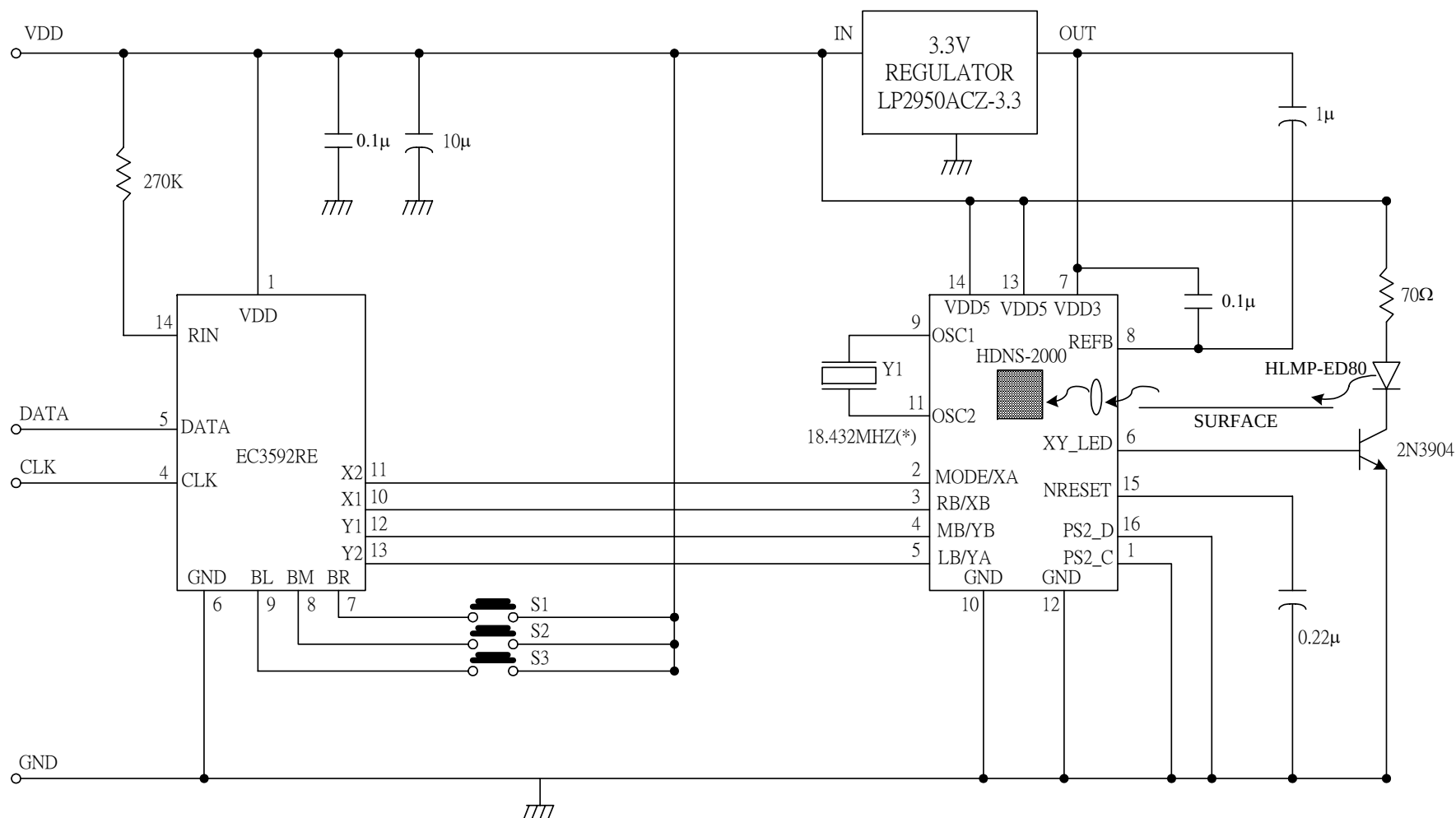




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Typical Application Circuit For HDNS-2000 Optical Input (For Reference Only)



(*)Y1 IS A CERAMIC RESONATOR SUCH AS CSA18.43MXZ040
(FROM MURATA) OR KBR-18.43-MSA(FROM AVX).