

RS232-RS423-Compatible Keyboard & Optical Knob Encoder SeriCoder™ S25C8

Description

The S25C8 KeyCoder™ is an easy-to-use single-chip serial keyboard encoder equipped with an optical knob interface. This versatile microcontroller IC will directly communicate with any standard asynchronous RS232 or RS423 serial communications interface.

On a 12 X 14 matrix, the S25C8 will scan, debounce and encode up to 144 keys, which can be defined to work in either typematic or single action mode. Matrix scanning is performed in two-key inhibit mode. This mode is suitable for single finger-operated panels and prevents accidental multi-key presses.

For every key press, the S25C8 sends one byte comprising of the matrix coordinates of the specific key: the high nibble of the byte sent contains the column number, while the low-nibble contains the row number. The host system can prevent data transmission at any time, using the Clear-To-Send Line.

In addition to the keyboard matrix, the S25C8 offers an interface to an optical knob, such as the US Digital SP16. A unique code is assigned for each direction of the rotation of the knob. The send rate is proportional to the rate at which the user is turning the control knob.

The S25C8 is ideal for simple embedded applications where the use of complicated keyboard protocols is not required and where asynchronous serial communications interface hardware is available.

Features

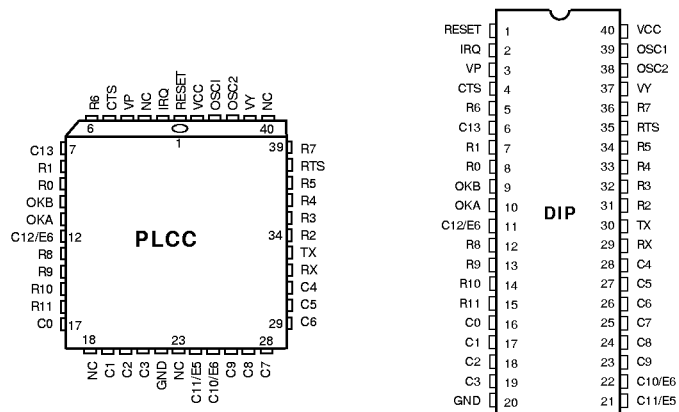
- RS232 or RS423-compatible keyboard encoder
- Optical knob interface
- Baud rate selectable to 9600 bps
- Available in DIP, PLCC, QFP and wide temperature range packages
- Custom versions available

Applications

The S25C8 will interface both a keyboard and an optical encoder switch to any host system with an RS232 interface. In combination with a display, the S25C8 will provide the user with the means to move the cursor or icon on the screen, make selections from pull-down menus, or perform simple keyboard entry. Software can be written to facilitate more elaborate data entry functions.

- Embedded control systems
- Industrial panels
- Radio tuning and selection panel
- Volume setting
- Robot position and command panel
- Motor control

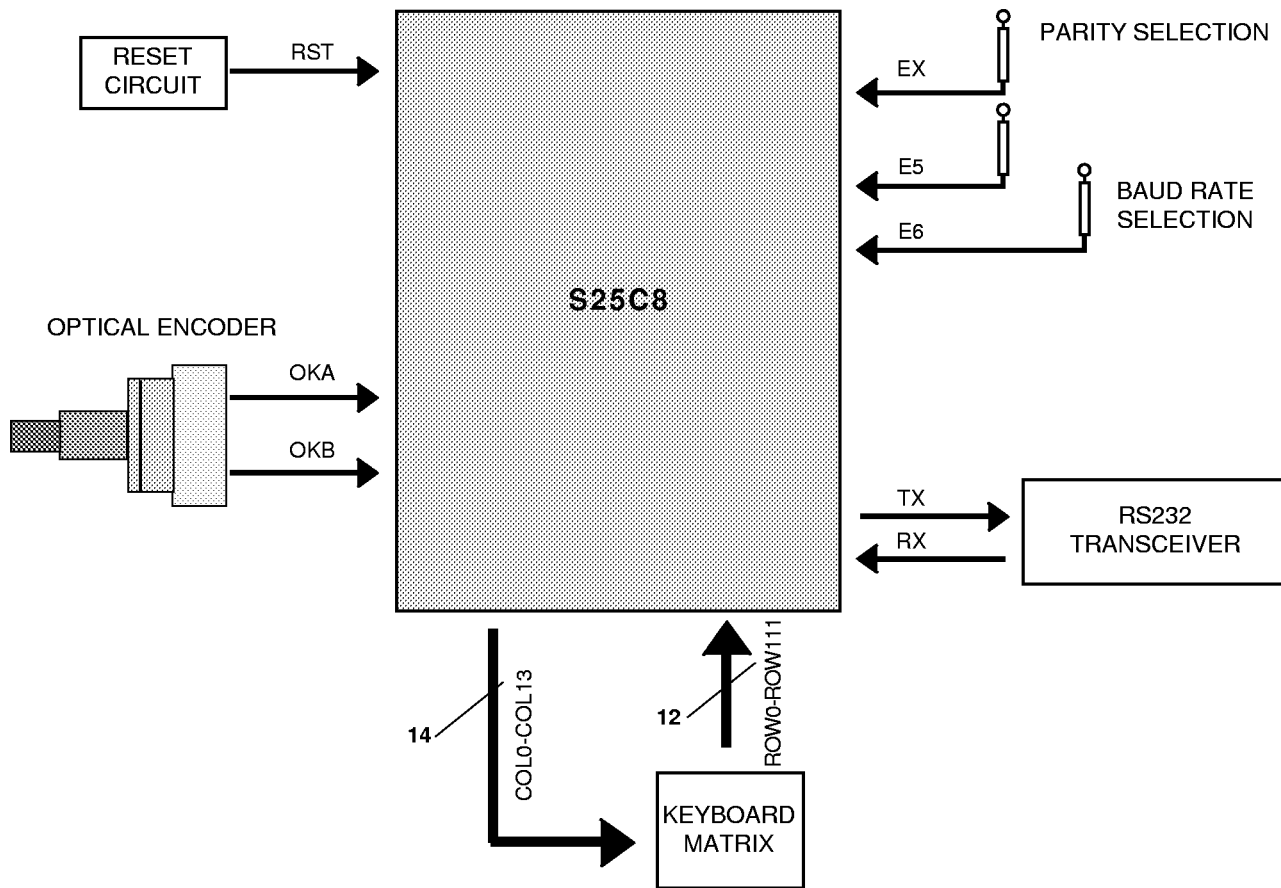
Pin Configurations



Ordering Code

PACKAGES	TA = 0 C TO +70 C	TA = -40 C TO +85 C
40 pin, Plastic DIP	S25C8-P	S25C8-CP
44 pin, PLCC	S25C8-FN	S25C8-CFN

Functional Diagram



Functional Description

The S25C8 interfaces a 12X14 switch matrix to an RS232 port. Each key press generates a unique byte sent to the RS232 port of the computer. Baud rate is jumper selectable up to 9600. The host computer can suspend data transmission from the controller board by setting the CTS line of the interface connector low. The controller board, powered by a single +5 Volt source, can directly interface an optical knob, with a quadrature output. A unique code is assigned for each rotation direction of the knob. The send rate is proportional to the rate at which the user is turning the control knob. Data format is eight data bits, one stop bit, with parity selectable either to no parity or odd parity.

Transmission Codes

The S25C8 Sends the following codes:

Optical Knob

F0 Hex for clockwise rotation of the knob

F1 Hex for counter-clockwise rotation

Switch Matrix Encoding

For every key press, the KeyCoder sends one byte representing the coordinates on the matrix of the key being pressed. The high-nibble of the byte sent contains the column number, while the low-nibble contains the row number. For example, if the coordinates of the key corresponding to column 11, row 8 is pressed, the KeyCoder will send B8 Hex.

Jumpers

E6 and E5 Baud Rate selection jumpers where position 2,3 is Low and position 1,2 is High:

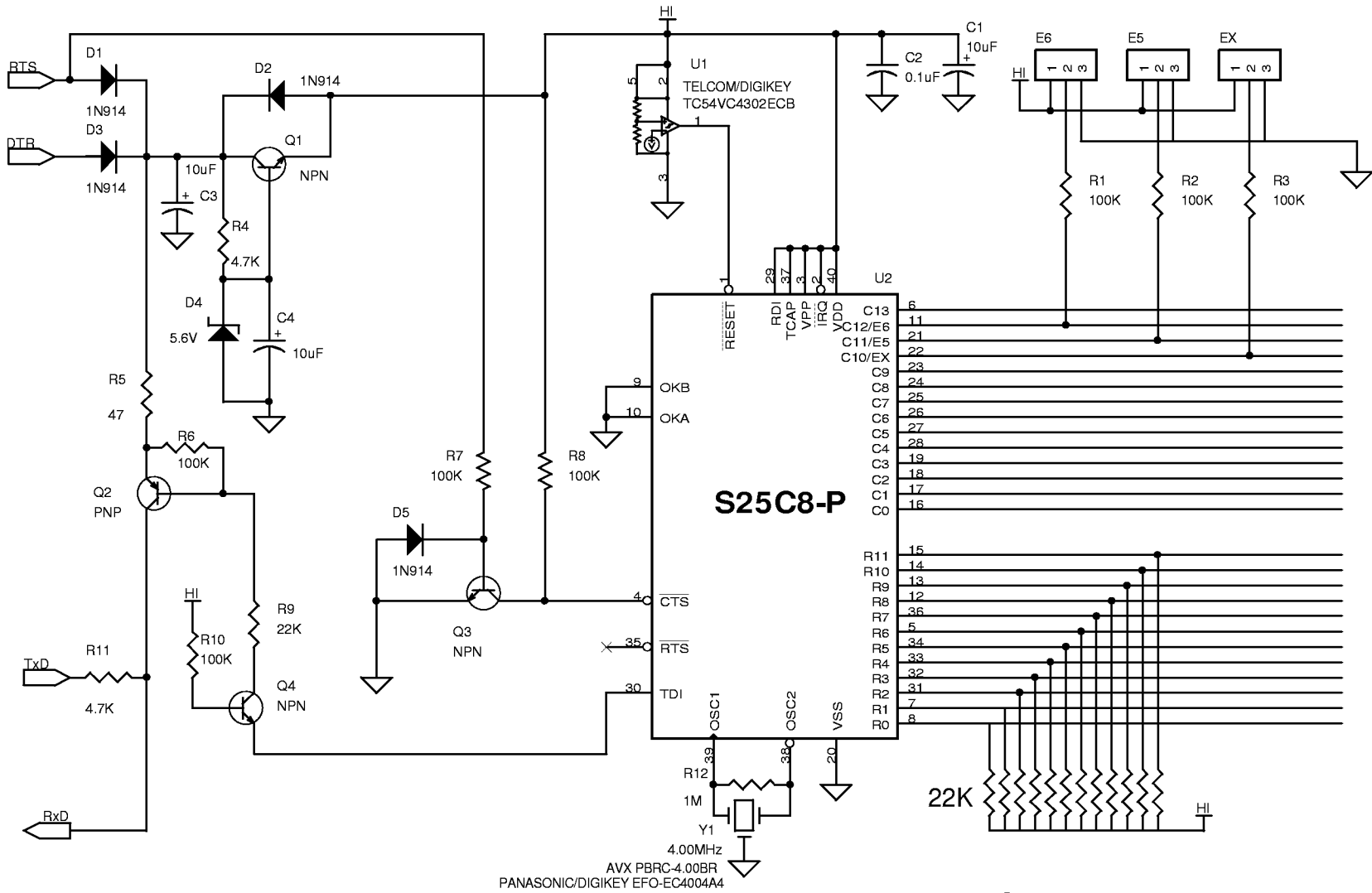
E6	E5	Baud Rate
2,3	2,3	1200
2,3	1,2	2400
1,2	2,3	4800
1,2	1,2	9600

Ex Parity Selection Jumper:

EX	Parity
2,3	No Parity
1,2	Odd Parity

Pin Description

Mnemonic	Pin Numbers		TYPE	NAME AND FUNCTION
	DIP	PLCC		
Vcc	40	44	I	Power Supply: +5V.
Vss	20	22	I	Ground
OSCI	39	43	I	Oscillator Input
OSCO	38	42	O	Oscillator Output: 4 mhz
RST	1	1	I/O	Reset: apply 0 V for orderly start up.
VY	37	41	I	Must be tied to VCC
VX	3	4	I	Must be tied to Vcc
C0	16	17	O	Column Outputs: for matrix selection
C1	17	19	O	
C2	18	20	O	Pin C10 is multiplexed for parity selection
C3	19	21	O	
C4	28	31	O	Low = no parity; High = tied to Vcc 100K
C6	26	29	O	
C7	25	28	O	Pins C11 and C12 are multiplexed for Baud Rate.
C8	24	27	O	
C9	23	26	O	C11/E5 C12/E6
C10/EX 22	22	25	O	L L 1200 Baud Rate
C11/E5	21	24	O	L H 2400 Baud Rate
C12/E6	11	12	O	H L 4800 Baud Rate
C13	6	7	O	H H 9600 Baud Rate
R0	8	9	I	Row Inputs: for reading of the matrix rows
R1	7	8	I	
R2	31	34	I	
R3	32	35	I	
R4	33	36	I	[All unused pins should be tied to Vcc or
R5	34	37	I	Ground. Pins 3, 18, 28 and 40 of the
R6	5	6	I	PLCC part are not connected.]
R7	36	39	I	
R8	12	13	I	
R9	13	14	I	
R10	14	15	I	
R11	15	16	I	
RDI	29	32	I	Recieve Serial Data
TDI	30	33	O	Transmit Serial Data
RTS	35	38	O	Not Request-to-send
CTS	4	5	I	Not Clear-to-send
OKA	10	11	I	Optical Encoder Input
OKB	9	10	I	Optical Encoder Input
IRQ	Connect to Vcc			



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Suggested Interfacing

Electrical Specifications

Absolute Maximum Ratings

Ratings	Symbol	Value	Unit
Supply Voltage	V _{DD}	-0.3 to +7.0	V
Input Voltage	V _{IN}	V _{SS} -0.3 to V _{DD} +0.3	V
Current Drain per Pin (not including V _{SS} or V _{DD})	I	25	mA
Operating Temperature S25C8-xx S25C8-Cxx	T _A	T _{LOW} to T _{HIGH} 0 to +70 -40 to +85	°C
Storage Temperature Range	T _{STG}	-65 to +150	°C

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Thermal Resistance ■ Plastic ■ Cerdip ■ PLCC	T _{JA}	60 60 70	°C per W

DC Electrical Characteristics (V_{DD}=5.0 Vdc +/-10%, V_{SS}=0 Vdc, Temperature range=T low to T high unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Output Voltage (I _{LOAD} <10uA)	V _{OL} V _{OH}			0.1	V
Output High Voltage (I _{LOAD} =0.8mA)	V _{OH}	V _{DD} -0.1			V
Output Low Voltage (I _{LOAD} =1.6mA)	V _{OL}			0.4	V
Input High Voltage	V _{IH}	0.7xV _{DD}		V _{DD}	V
Input Low Voltage	V _{IL}	V _{SS}		0.2xV _{DD}	V
User Mode Current	I _{PP}		5	10	mA
Data Retention Mode (0 to 70°C)	V _{RM}	2.0			V
Supply Current (Run)	I _{DD}		4.7	7.0	mA
I/O Ports Hi-Z Leakage Current	I _{IL}			+/-10	uA
Input Current	I _{IN}			+/- 1	uA
I/O Port Capacitance	C _{IO}		8	12	pF

Control Timing (V_{DD}=5.0 Vdc +/-10%, V_{SS}=0 Vdc, Temperature range=T low to T high unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
Frequency of Operation ■ Crystal Option ■ External Clock Option	f _{osc}		4.0 4.0	MHz
Internal Operating Frequency ■ Crystal (f _{osc} / 2) ■ External Clock (f _{osc} / 2)	f _{OP}	dc	2.0 2.0	MHz
Cycle Time	t _{cyC}	500		ns
Crystal Oscillator Startup Time	t _{oxov}		100	ms
Stop Recovery Startup Time	t _{ILCH}		100	ms
RESET Pulse Width	t _{RL}	8		t _{cyC}
Interrupt Pulse Width Low	t _{LIH}	125		ns
Interrupt Pulse Period	t _{LIL}	*		t _{cyC}
OSC1 Pulse Width	t _{OH} , t _{OL}	90		ns

*The minimum period t_{LIL} should not be less than the number of cycle times it takes to execute the interrupt service routine plus 21 t_{cyC}.