

12-BIT SERIAL TO PARALLEL CONVERTER

GENERAL DESCRIPTION

The NJU3714 is a 12-bit serial to parallel converter especially apply to MPU output expander.

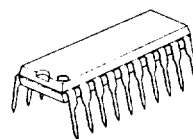
The effective output assignment of MPU is available as the connection between NJU3714 and MPU is required only 4 lines.

Up to 5MHz signal can be input to the serial data input terminal and the data is output from parallel output buffer through serial in parallel out shift register and parallel data latches.

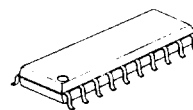
Furthermore, the NJU3714 output the serial data from SO terminal through the shift register, therefore output bit number can increase by cascade connection.

The hysteresis input circuit realized wide noise margin and high drivability output buffer (25mA) can drive LED directly.

PACKAGE OUTLINE



NJU3714D



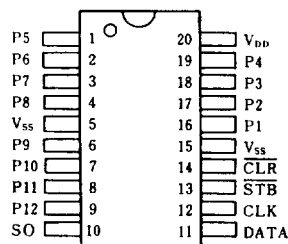
NJU3714G

FEATURES

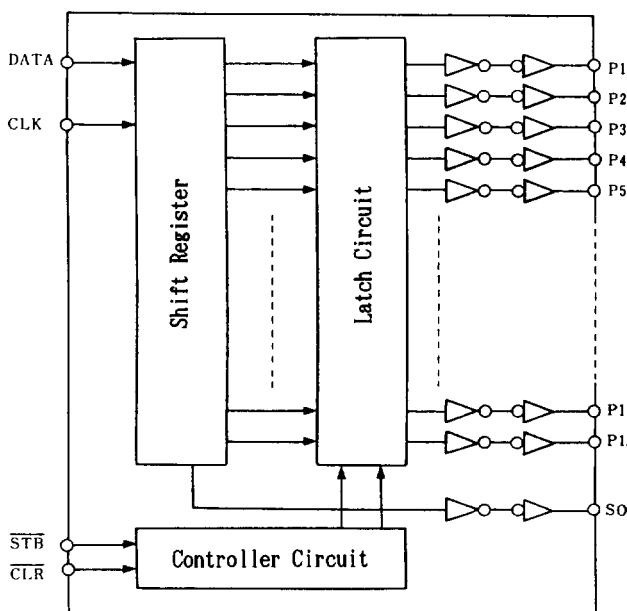
- 12-Bit Serial In Parallel Out
- Cascade Connection
- Hysteresis Input
- Operating Voltage
- Operating Frequency
- Output Current
- C-MOS Technology
- Package Outline

----- 0.5V typ
----- $5V \pm 10\%$
----- 5MHz or more
----- 25mA
----- DIP/SOP 20

PIN CONFIGURATION



BLOCK DIAGRAM





■ TERMINAL DESCRIPTION

NO.	SYMBOL	F U N C T I O N	NO.	SYMBOL	F U N C T I O N
1	P5	Parallel Converts Data Output Terminals	11	DATA	Serial Data Input Terminal
2	P6		12	CLK	Clock Signal Input Terminal
3	P7		13	STB	Strobe Signal Input Terminal
4	P8		14	CLR	Clear Signal Input Terminal
5	V _{SS}	GND	15	V _{SS}	GND
6	P9	Parallel Converts Data Output Terminals	16	P1	Parallel Converts Data Output Terminals
7	P10		17	P2	
8	P11		18	P3	
9	P12		19	P4	
10	S0	Serial Data Output Terminal	20	V _{DD}	Power Supply Terminal

■ FUNCTIONAL DESCRIPTION

(1) Reset

When the "L" level is input to the $\overline{\text{CLR}}$ terminal, all latches are reset and all parallel conversion output are "L" level.

Normally, the $\overline{\text{CLR}}$ terminal should be "H" level.

(2) Data Transmission

In the STB terminal is "H" level and input the clock signal to the CLK terminal, the serial data input from DATA terminal shift in the shift register by synchronizing at rising edge of the clock signal.

When the STB terminal change to "L" level, the data in the shift register transfer to the latch.

Even if the STB terminal is "L" level, the input clock signal shift the data in the shift register, therefore, the clock signal control is needed.

(3) Cascade Connection

The serial data input from DATA terminal output from the S0 terminal through internal shift register unrelated the $\overline{\text{CLR}}$ and STB status.

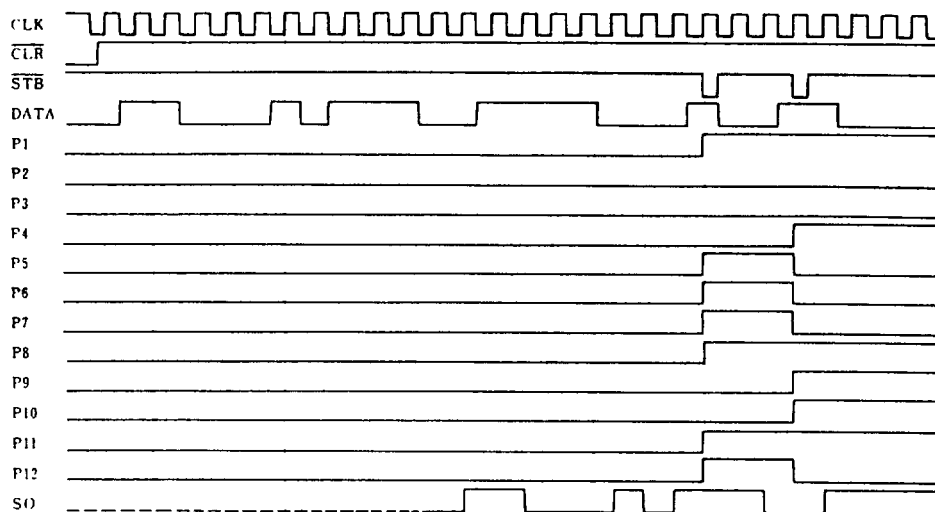
Furthermore, the 4 input terminals have a hysteresis characteristics by using the schmitt trigger structure to protect the noise.

CLK	STB	$\overline{\text{CLR}}$	O P E R A T I O N
X	X	L	All latch are reset (the data in the shift register is no change). All of Parallel convert output are "L".
	H	H	The serial data input from DATA terminal input to the shift register. In this stage, the data in the latch is no change.
L	L	H	The data in the shift register transfer to the latch. And the data in the latch output from parallel output.
H			
	L	H	The CLK input in the STB="L" and $\overline{\text{CLR}}$ ="H" state, the data shift in the shift register and latched data also change in accordance with the shift register.

Note) X: Don't care



TIMING CHART



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ABSOLUTE MAXIMUM RATINGS

(Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage Range	V _{DD}	-0.5 ~ +7.0	V
Input Voltage Range	V _I	V _{SS} -0.5 ~ V _{DD} +0.5	V
Output Voltage Range	V _O	V _{SS} -0.5 ~ V _{DD} +0.5	V
Output Current	I _O	±25	mA
Power Dissipation	P _D	700 (DIP) 400 (SOP)	mW
Operating Temperature Range	Topr	-25 ~ +85	°C
Storage Temperature Range	Tstg	-65 ~ +150	°C



DC ELECTRICAL CHARACTERISTICS

 $(V_{DD}=4.5\sim 5.5V, V_{SS}=0V, T_a=25^{\circ}C)$

P A R A M E T E R		SYMBOL	C O N D I T I O N		MIN	TYP	MAX	UNIT
Operating Current		I _{DD5}	V _{IH} =V _{DD} , V _{IL} =V _{SS}				0.1	mA
Output Voltage	High-Level	V _{OH}	I _{OH} =-0.4mA	SD Terminal	4.0		V _{DD}	V
	Low-Level	V _{OL}	I _{OL} =+3.2mA		V _{SS}		0.4	
Input Voltage	High-Level	V _{IH}			0.7V _{DD}		V _{DD}	V
	Low-Level	V _{IL}			V _{SS}		0.3V _{DD}	
Input Leakage Current		I _{LI}	V _I =0~V _{DD}		-10		10	μA
High-Level Output Voltage		V _{OHD}	I _{OH} =-25mA	P1~P12 Terminals (Note 1)	V _{DD} -1.5		V _{DD}	V
			I _{OH} =-15mA		V _{DD} -1.0		V _{DD}	
			I _{OH} =-10mA		V _{DD} -0.5		V _{DD}	
Low-Level Output Voltage		V _{OLD}	I _{OL} =+25mA		V _{SS}		1.5	V
			I _{OL} =+15mA		V _{SS}		0.8	
			I _{OL} =+10mA		V _{SS}		0.4	
Output Short Current		I _{OS}	V _O =7V, V _I =0V	SD Terminal (Note 2)			10	mA
			V _O =0V, V _I =7V				-10	
		I _{OSD}	V _O =7V, V _I =0V	P1~P12 Terminals (Note 2)			20	mA
			V _O =0V, V _I =7V				-20	

Note 1) Specified value represent output current per pin. When use, total current consideration and less than power dissipation rating operation should be required.

Note 2) $V_{DD}=7V, V_{SS}=0V, 1$ second per pin.

SWITCHING CHARACTERISTICS

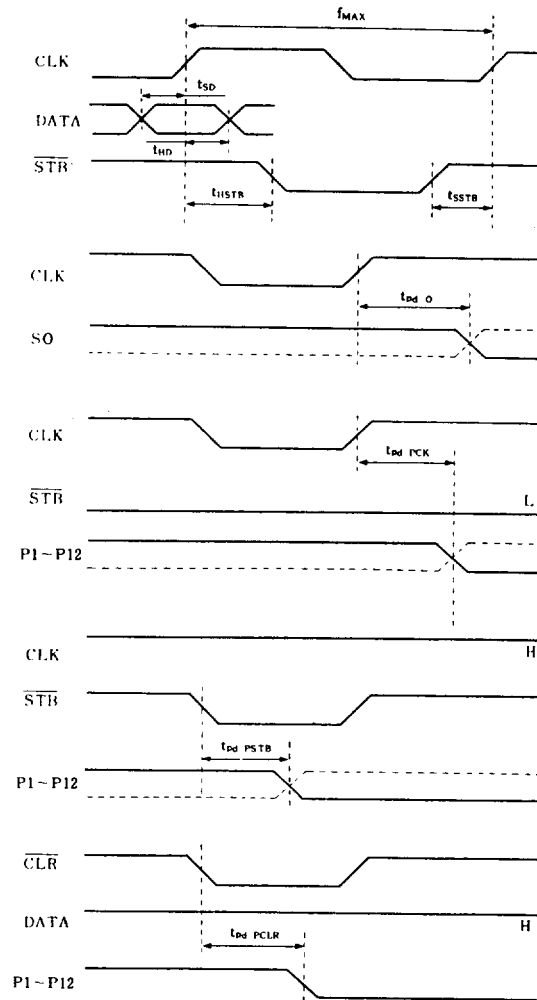
 $(V_{DD}=4.5V\sim 5.5V, V_{SS}=0V, T_a=-20\sim 75^{\circ}C)$

PARAMETER	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Set-Up Time	t_{SD}	DATA - CLK	20			ns
Hold Time	t_{HD}	CLK - DATA	20			ns
Set-Up Time	t_{SSTB}	STB - CLK	30			ns
Hold Time	t_{HSTB}	CLK - STB	30			ns
Output Delay Time	t_{dO}	CLK - SO			70	ns
	t_{dPCK}	CLK - P1~P12			100	ns
	t_{dPSTB}	STB - P1~P12			80	ns
	t_{dPCLR}	CLR - P1~P12			80	ns
Max. Operating Frequency	f_{MAX}		5			MHz

*) $C_{OUT}=50pF$

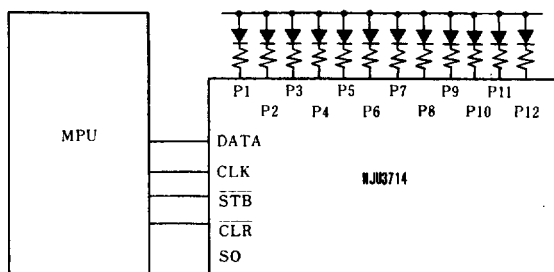


SWITCHING CHARACTERISTICS TEST WAVEFORM

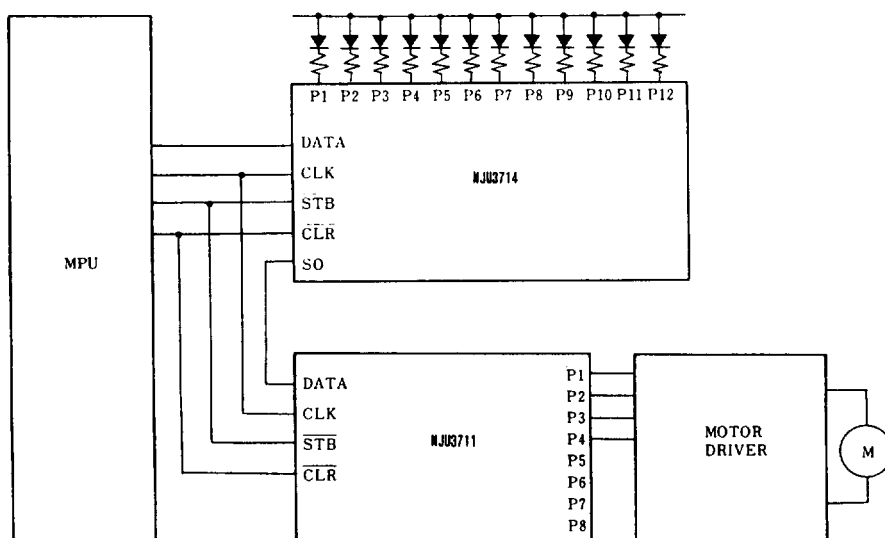




■ APPLICATION CIRCUIT (1)



■ APPLICATION CIRCUIT (2) (Combined with NJU3711)



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