



SANYO Semiconductors

DATA SHEET

LA79200V — Monolithic Linear IC For extension of I²C-BUS compatible microcomputer I/O port

Overview

This LA79200V is a for extension of I²C-BUS compatible microcomputer I/O port.

Functions

- 8 bit Expanded I/O port with LED Driver
- 2 bit DAC×2

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V ₁ max		7.0	V
Allowable power dissipation	Pd max	Ta ≤ 65°C *	300	mW
Operating temperature	Topr		-10 to +65	°C
Storage temperature	Tstg		-55 to +150	°C

* Mounted on a board : 114.3×76.1×1.6mm³, glass epoxy.

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V ₁		5.0	V
Operating supply voltage range	V ₁ op		4.5 to 5.5	V

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LA79200V

Electrical Characteristics at Ta = 25°C, V₁ = 5V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[Circuit voltage, current]						
Supply current	I ₁	V ₁ =5V	7.2	8.0	8.8	mA
Supply voltage	V ₁		4.5	5.0	5.5	V
[SCL input/SDA input output]						
LOW level input voltage	ViL		0		0.8	V
HIGH level input voltage	ViH		3.5		5.0	V
DATA saturation voltage	VDA _{sat}				0.35	V
[I/O s]						
LOW level input voltage	VIOiL		0		0.8	V
HIGH level input voltage	VIOiH		3.5		5.0	V
LOW level saturation voltage	VIO _{sat}				0.35	V
[Slave address select]						
LOW level input voltage	VAiL		0		0.8	V
[D/A output]						
D/A LOW level output voltage	VDAL		0		0.3	V
D/A MID1 level output voltage	VDAM1		1.7	2	2.3	V
D/A MID2 level output voltage	VDAM2		2.7	3	3.3	V
D/A HIGH level output voltage	VDAH		3.8	4.1	4.4	V

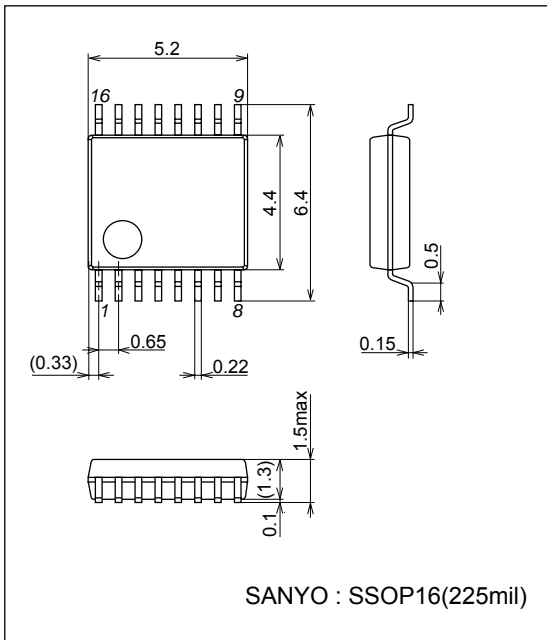
Notes

- (1) Write "Hi" in the register of each port with IIC Bus when using each port as an input.
- (2) Clock rate of IIC Bus can be used at 400kHz or less.

Package Dimensions

unit : mm

3178B



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Test Conditions at $T_a = 25^\circ\text{C}$, $V_{CC} = V_1 = 5.0\text{V}$

Parameter	Symbol	Test point	Input signal	Test method	Bus conditions
[Circuit voltage, current]					
Supply current (pin 1)	I_1	1	IC Add: 0111 1100 Sub Add: 0000 0000 Data Add: 0000 0000	Apply a voltage of 5.0V to pin 1 and measure the incoming DC current (mA).	Initial
[SCL input/SDA input output]					
LOW level input voltage	V_{IL}	15 16	IC Add: 0111 1100 Sub Add: 0000 0000 Data Add: 0000 0000	Measure the DC voltage at LOW level of the signal entered in pins 15 and 16.	Initial
HIGH level input voltage	V_{IH}	15 16	IC Add: 0111 1100 Sub Add: 0000 0000 Data Add: 0000 0000	Measure the DC voltage at HIGH level of the signal entered in pins 15 and 16.	Initial
DATA pin saturation voltage	V_{DAsat}	16	IC Add: 0111 1101	Allow 3.3mA to flow through DATA pin and measure the DC voltage when ACK is returned.	Initial
[I/O s]					
LOW level input voltage	V_{IOL}	5 to 8 10 to 13	IC Add: 0111 1100 Sub Add: 0000 0000 Data Add: 0000 0000	Measure the DC voltage of pins 5 to 8 and 10 to 13.	Initial
HIGH level input voltage	V_{IOH}	5 to 8 10 to 13	IC Add: 0111 1100 Sub Add: 0000 0000 Data Add: 1111 1111	Measure the DC voltage of pins 5 to 8 and 10 to 13.	PEX0:1 PEX1:1 PEX2:1 PEX3:1 PEX4:1 PEX5:1 PEX6:1 PEX7:1

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Parameter	Symbol	Test point	Input signal	Test method	Bus conditions
LOW level saturation voltage	VIOsat	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">5</div> <p style="text-align: center;">to</p> <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">8</div> <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">10</div> <p style="text-align: center;">to</p> <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">13</div>	IC Add: 0111 1100 Sub Add: 0000 0000 Data Add: 0000 0000	Measure the DC voltage when 3.3mA is allowed to flow through pin 13.	Initial
[D/A output]					
D/A output voltage H	VDAH	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">2</div> <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">3</div>	IC Add: 0111 1100 Sub Add: 0000 0001 Data Add: 0000 0000	Measure the DC voltage of pins 5 to 8 and 10 to 13.	Initial
D/A output voltage MID2	VDAM2	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">2</div> <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">3</div>	IC Add: 0111 1100 Sub Add: 0000 0001 Data Add: 0100 0100	Measure the DC voltage of pins 5 to 8 and 10 to 13.	DA.OUTPUT_1:1 DA.OUTPUT_2:1
D/A output voltage MID1	VDAM1	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">2</div> <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">3</div>	IC Add: 0111 1100 Sub Add: 0000 0001 Data Add: 1000 1000	Measure the DC voltage of pins 5 to 8 and 10 to 13.	DA.OUTPUT_1:2 DA.OUTPUT_2:2
D/A output voltage L	VDAL	<div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">2</div> <div style="border: 1px solid black; width: 20px; height: 20px; text-align: center; margin: 2px;">3</div>	IC Add: 0111 1100 Sub Add: 0000 0001 Data Add: 1100 1100	Measure the DC voltage of pins 5 to 8 and 10 to 13.	DA.OUTPUT_1:3 DA.OUTPUT_2:3

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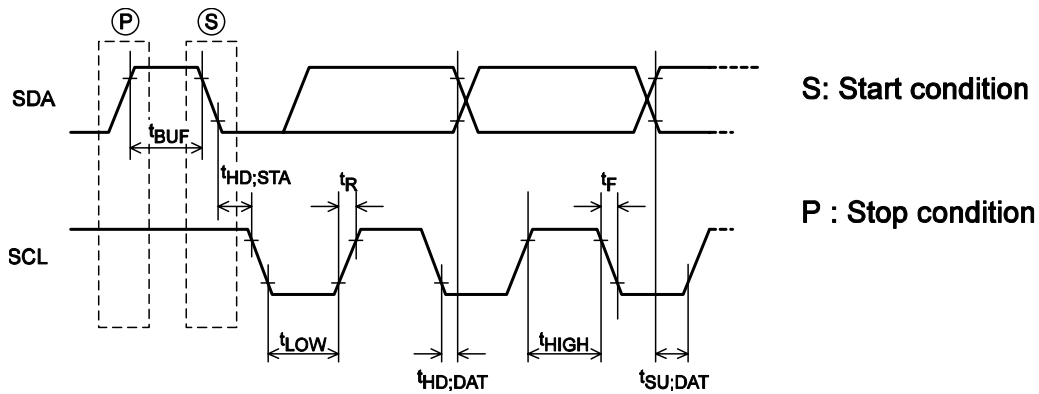
IIC input/output conditions at Ta = 25°C, VCC = 5V

Parameter	Symbol	Standard		High speed		Unit
		min	max	min	max	
SCL Frequency	FSCL	0	100	0	400	kHz
BUS free time between stop - start	t _{BUF}	4.7		1.3		μs
HOLD time of start, restart condition	t _{HD;STA}	4.0		0.6		μs
L time of SCL	t _{LOW}	4.7		1.3		μs
H time of SCL	t _{high}	4.0		0.6		μs
Set-up time of restart condition	t _{SU;STA}	4.7		0.6		μs
HOLD time of SDA	t _{HD;DAT}	0		0	0.9	μs
Set-up time of SDA	t _{SU;DAT}	250		100		ns
Rising time of SDA, SCL	t _R		1000	20+0.1Cb	300	ns
Falling time of SDA, SCL	t _F		300	20+0.1Cb	300	ns

Refer to figure 1

(Note) Cb : Total capacitance of all BUS (Unit : pF)

IIC BUS INPUT Timing



OMT06006

IIC timing

Pin Assignment

PIN	FUNCTION	PIN	FUNCTION
1	V _{CC} 5V	16	SDA
2	DA Output 0	15	CLK
3	DA Output 1	14	ADDRESS
4	N.C.	13	I/O 0
5	I/O 7	12	I/O 1
6	I/O 6	11	I/O 2
7	I/O 5	10	I/O 3
8	I/O 4	9	GND

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BUS Control Register Bit Allocation

IC Address (WRITE) : 011111A0

BUS Control Register Bit Allocation Map

2002.12.27

Control Register Bit Allocations								
Sub Address	MSB	DATA BITS						LSB
	DA0 Bit7	DA1 Bit6	DA2 Bit5	DA3 Bit4	DA4 Bit3	DA5 Bit2	DA6 Bit1	DA7 Bit0
0000 0000	PEX7 0	PEX6 0	PEX5 0	PEX4 0	PEX3 0	PEX2 0	PEX1 0	PEX0 0
0000 0001	DA Output 0 0		*		DA Output 0 0		*	
			*				*	

(Bits are transmitted in this order.)

BUS Control Register Bit Allocation Map

IC Address (READ) : 011111A1

Status Register Bit Allocations								
Sub Address	MSB	DATA BITS						LSB
	DA0 Bit7	DA1 Bit6	DA2 Bit5	DA3 Bit4	DA4 Bit3	DA5 Bit2	DA6 Bit1	DA7 Bit0
Status 1	PEX7 *	PEX6 *	PEX5 *	PEX4 *	PEX3 *	PEX2 *	PEX1 *	PEX0 *
Status 2	(PEX7) *	(PEX6) *	(PEX5) *	(PEX4) *	(PEX3) *	(PEX2) *	(PEX1) *	(PEX0) *

Note

- (1) "A" in the IC address is set by PIN14, Address.
- (2) For the Read Status, the first 1 byte of two bytes that have been read is used.
(Attempt to read only the first 1 byte may cause failure of occurrence of the STOP condition.)

Bus Control Register Truth Table

Control Register Truth Table				
Register Name	0 HEX	1 HEX	2 HEX	3 HEX
PEX 0	Low	High		
PEX 1	Low	High		
PEX 2	Low	High		
PEX 3	Low	High		
PEX 4	Low	High		
PEX 5	Low	High		
PEX 6	Low	High		
PEX 7	Low	High		
DA OUTPUT_1	High	Mid 2	Mid 1	Low
DA OUTPUT_2	High	Mid 2	Mid 1	Low

Bus Control Register Truth Table

Status Byte Truth Table				
Register Name	0 HEX	1 HEX	2 HEX	3 HEX
PEX 0	Low	High		
PEX 1	Low	High		
PEX 2	Low	High		
PEX 3	Low	High		
PEX 4	Low	High		
PEX 5	Low	High		
PEX 6	Low	High		
PEX 7	Low	High		

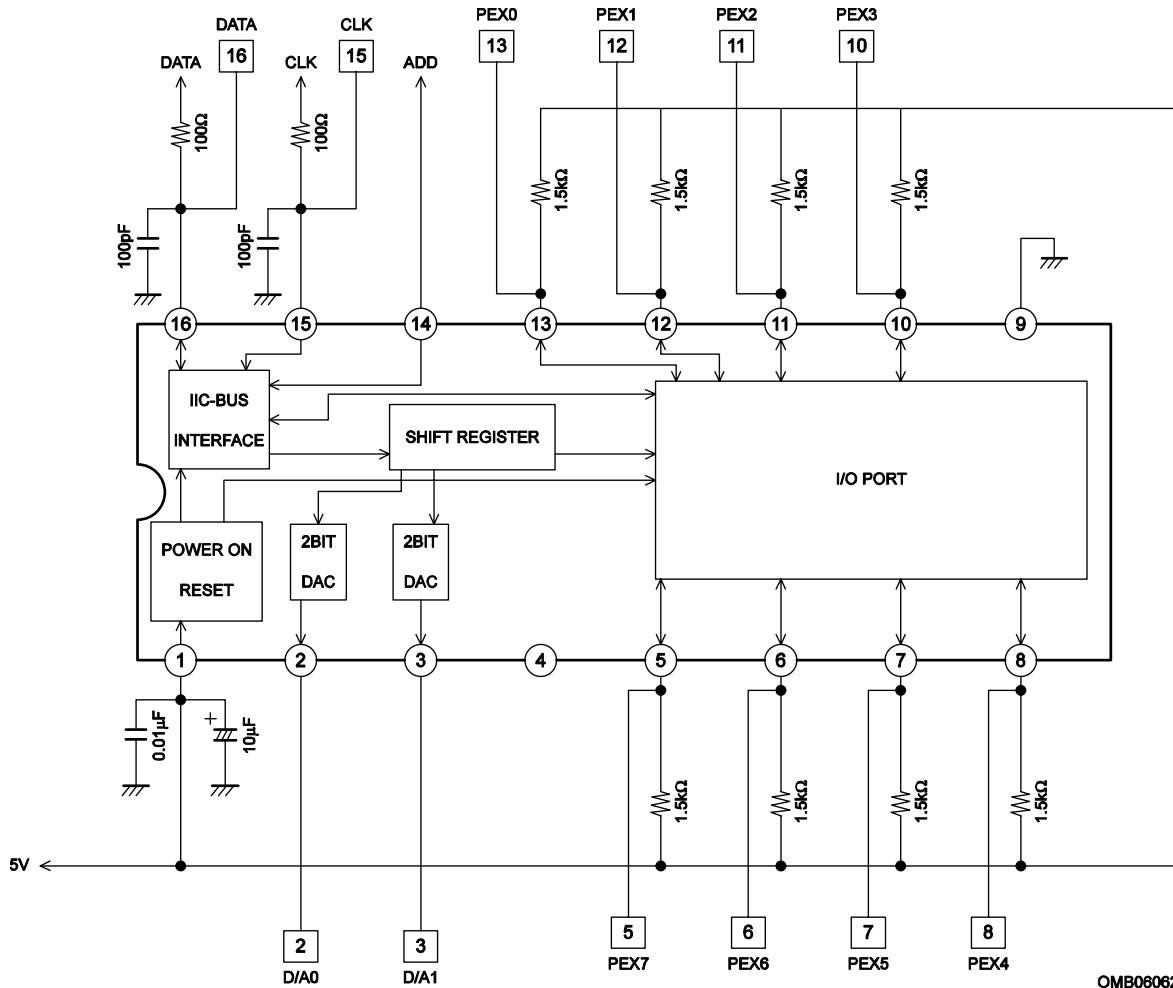
BUS Initial Conditions

Initial Test Conditions	
Register	
PEX 0	0 HEX
PEX 1	0 HEX
PEX 2	0 HEX
PEX 3	0 HEX
PEX 4	0 HEX
PEX 5	0 HEX
PEX 6	0 HEX
PEX 7	0 HEX
DA OUTPUT_1	0 HEX
DA OUTPUT_2	0 HEX

BUS Control Register Descriptions

Control Register Descriptions		
Register Name	Bits	General Description
PEX 0	1	I/O PORT SW
PEX 1	1	I/O PORT SW
PEX 2	1	I/O PORT SW
PEX 3	1	I/O PORT SW
PEX 4	1	I/O PORT SW
PEX 5	1	I/O PORT SW
PEX 6	1	I/O PORT SW
PEX 7	1	I/O PORT SW
DA OUTPUT_1	2	D/A OUTPUT SW
DA OUTPUT_2	2	D/A OUTPUT SW

Test Circuit



OMB06062

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