Ordering number : ENA1936A

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

Bi-CMOS IC

LV5234V — 9-channel LED Driver

Overview

The LV5234V is a 9-channel LED driver IC that is capable of switching between constant-current output and open drain output. It enables 3-wire serial bus control (address designation)/I^2C serial bus control to be set arbitrarily using an external pin. Also possible are 9-channel LED ON/OFF control and the setting of the PWM luminance in 256 steps. The device also has a built-in fade-in/fade-out function. Up to 32 driver ICs can be connected using the slave address setting pins.

Features

- 9-channel output constant-current LED driver/open drain output LED driver (selected by using an external pin)
  Supports separate ON/OFF setting for each LED output, high withstand voltage (VOUT<42V)
  - In the constant-current mode (OUTSCT: L), the reference current is set by the value of resistor connected to the external pin (RT1).
    Built-in D/A (5 bits) for switching current level … 0.96mA to 30.7mA (RGB drive)
    Constant current (I_O max=50mA) for full-color LEDs × 9 channels
  - In the open drain mode (OUTSCT: H), high current drive (I_O max=100mA) × 9 channels
- Luminance adjustment using internal PWM control (256 steps)
  - 8-bit PWM luminance dimming (0% to 99.6%)
  - 3-phase PWM
- Fade-in/fade-out function (PWM control priority), supporting synchronous connection
  - Supports separate fade ON/OFF for each LED output (fade time common for all channels)
  - Interrupt control possible for fade function
- Selection of 3-wire/I^2C serial bus control signals enabled (switching using an external pin)
  Slave addressing (5 bits, connection of up to 32 driver ICs possible)
- Low current consumption
- Output malfunction protection circuits (thermal protection function, UVLO detection protection function)

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		6	V
Output voltage	V_O max	LED off	42	V
Output current	I_O max		100	mA
Allowable power dissipation	Pd max	Ta ≤ 25°C *	0.84	W
Operating temperature	Topr		-25 to +75	°C
Storage temperature	Tstg		-40 to +125	°C

* Specified board : 114.3mm × 76.1mm × 1.6mm, glass epoxy board.

[Warning]: If you should intend to use this IC continuously under high temperature, high current, high voltage, or drastic temperature change, even if it is used within the range of absolute maximum ratings or operating conditions, there is a possibility of decrease reliability. Please contact us for a confirmation.

Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	V_{CC}	SV_{CC}	5.0	V
Operating supply voltage range	V_{CC} op	SV_{CC}	4.5 to 5.5	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 5.0V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Consumption current	$I_{CC}2$	LED off		3.5	5.5	mA
Oscillator frequency	Fosc		900	1000	1100	kHz
Reference current pin voltage	VRT	RT1=22kΩ	0.92	0.98	1.04	V
MAX output current	ΔIL	V_O=0.7 to 4.0V(Same channel line regulation)	-10			%
Between bits output current	$\Delta I_O L$	I_O=30.7mA (Between bits pairing characteristics)			5	%
Maximum LED driver output current 1	IMAX1	LED OUTSCT= L	28.8	30.7	32.6	mA
LEDO output on resistance	Ron1	LED1, LED2, LED3 (I_O = 100mA)		4	10	Ω
OFF leak current	Ileak	LED off			10	μA
Driver output malfunction protection voltage	Vt	SV_{CC}	2.58	2.70	2.82	V

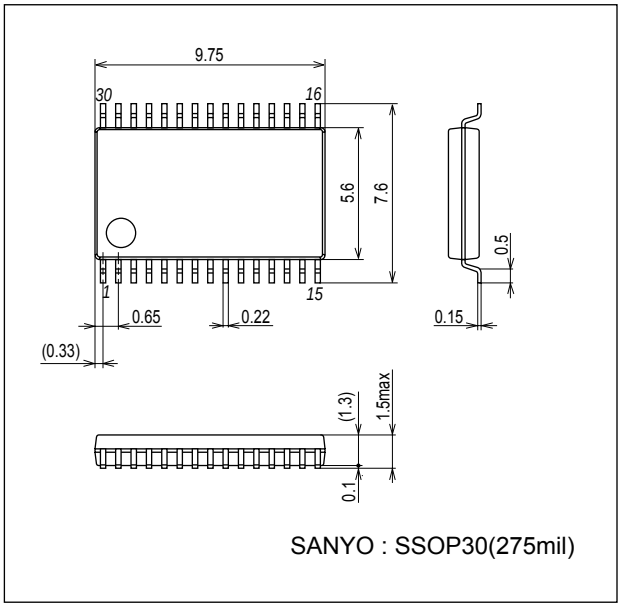
Control circuit at Ta = 25°C, V_{CC} = 5.0V

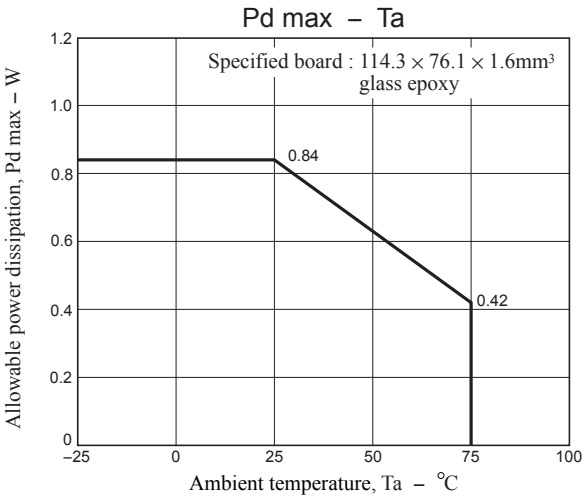
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
H level 1	VH1	Input H level OUTSCT	4.7		5	V
L level 1	VL1	Input L level OUTSCT	-0.2		0.3	V
H level 2	VH2	Input H level CTLSCT	0.7× V_{CC}		V_{CC}	V
L level 2	VL2	Input L level CTLSCT	-0.2		0.3	V
H level 3	VH3	Input H level RESET	0.8× V_{CC}		V_{CC}	V
L level 3	VL3	Input L level RESET	-0.2		0.2× V_{CC}	V
H level 4	VH4	Input H level SCLK, SDATA, SDEN	0.8× V_{CC}		V_{CC}	V
L level 4	VL4	Input L level SCLK, SDATA, SDEN	-0.2		0.2× V_{CC}	V
H level 5	VH7	Input H level A0 to A4	0.7× V_{CC}		V_{CC}	V
L level 5	VL7	Input L level A0 to A4	-0.2		0.3	V

Package Dimensions

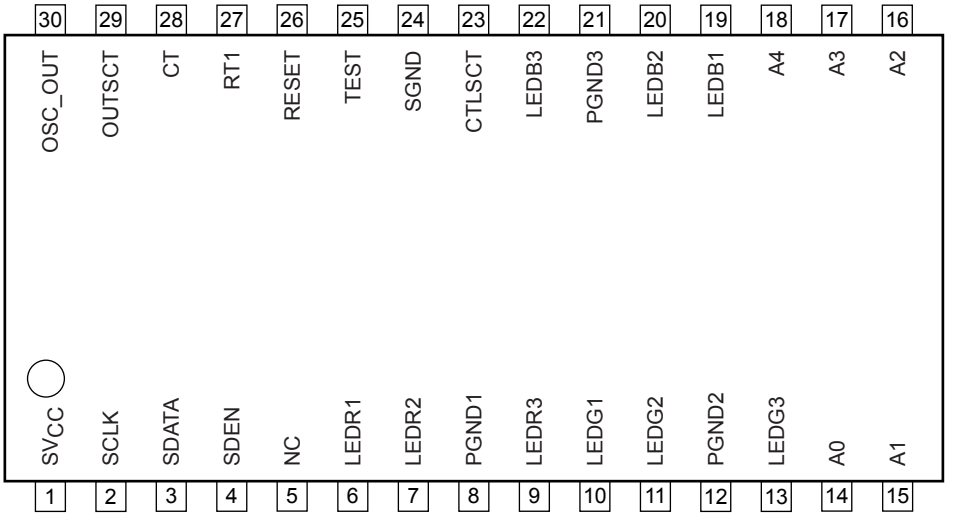
unit : mm (typ)

3191B





Pin Assignment



Top view

Pin Descriptions

Pin No.	Pin name	I/O	Description
1	SV_{CC}	-	Power supply pin
2	SCLK	I	Serial clock signal input pin
3	SDATA	I	Serial data signal input pin
4	SDEN	I	Serial enable signal input pin
5	NC	-	No connection
6	LEDR1	O	LEDR1 output pin
7	LEDR2	O	LEDR2 output pin
8	PGND1	-	GND pin dedicated for LED driver
9	LEDR3	O	LEDR3 output pin
10	LEDG1	O	LEDG1 output pin

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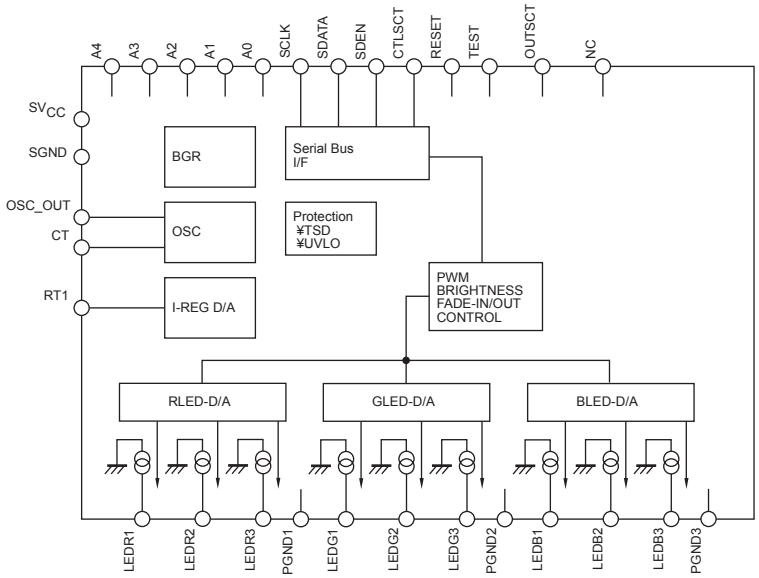
Pin No.	Pin name	I/O	Description
11	LEDG2	O	LEDG2 output pin
12	PGND2	-	GND pin dedicated for LED driver
13	LEDG3	O	LEDG3 output pin
14	A0	I	Slave address input pin A0
15	A1	I	Slave address input pin A1
16	A2	I	Slave address input pin A2
17	A3	I	Slave address input pin A3
18	A4	I	Slave address input pin A4
19	LEDB1	O	LEDB1 output pin
20	LEDB2	O	LEDB2 output pin
21	PGND3	-	GND pin dedicated for LED driver
22	LEDB3	O	LEDB3 output pin
23	CTLSCT	I	3-wire serial bus/I^2C serial bus selecting control pin (L: 3-wire serial, H: I^2C)
24	SGND	-	Analog circuit GND pin
25	TEST	I	Test pin (connected to GND)
26	RESET	I	Reset signal input pin
27	RT1	O	LED current setting resistor connection pin 1
28	CT	O	Oscillation frequency setting capacitor connection pin
29	OUTSCT	I	Output type switching control pin L: Constant-current output H: Open drain output
30	OSC_OUT	O	Oscillator output pin (synchronous connection)

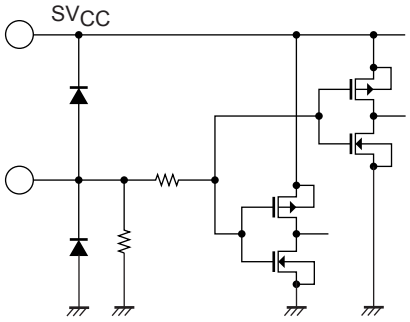
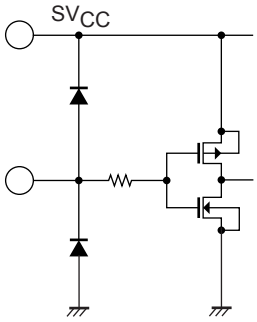
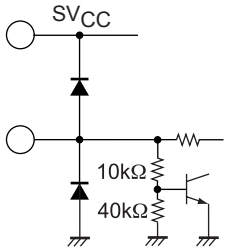
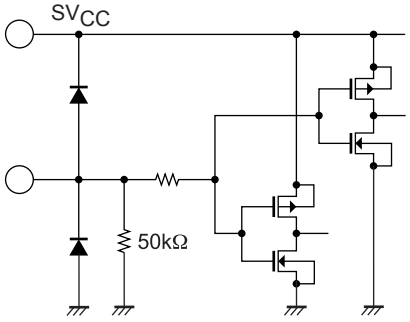
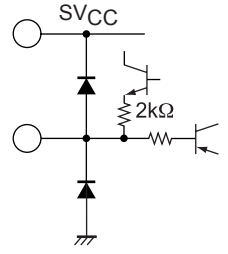
OUTSCT Settings at SV_{CC}=5.0V

	LED Driver Output Pin
OUTSCT pin	LED1, LED2, LED3
L=-0.2 to 0.3V	Constant current output Built-in current value switching D/A (5 bits) 0.96mA to 30.7mA, RT1=22kΩ (f=1MHz)
H=4.7 to 5.0V	Open drain output Current value is determined by external limiting resistor. RON=4Ω

Block Diagram



Pin Functions

Pin No.	Pin Name	Pin function	Equivalent Circuit
1	SV_{CC}	Power supply pin	
2 3 4	SCLK SDATA SDEN	Serial clock signal input pin Serial data signal input pin Serial enable signal input pin	
14 15 16 17 18 23 29	A0 A1 A2 A3 A4 CTLSCT OUTSCT	Slave address setting pin A0 Slave address setting pin A1 Slave address setting pin A2 Slave address setting pin A3 Slave address setting pin A4 Serial bus communication setting pin When set to low: The 3-wire serial bus signals are set as the input signals. When set to high: The I^2C serial bus signals are set as the input signals. LED driver output type setting pin When set to low: Constant-current output is set for the LED driver. When set to high: Open drain output is set for the LED driver.	
24	SGND	GND pin	
25	TEST	Test pin This pin must always be connected to GND.	
26	RESET	Reset signal input pin Reset status when set to low.	
27	RT1	Reference current setting resistor connection pin. By connecting the external register between this pin and GND, the reference current is generated. The pin voltage is approximately 0.98V. By changing the current level, it is possible to change the oscillator frequency and LED driver current value (in the constant-current mode).	

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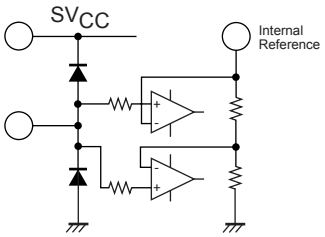
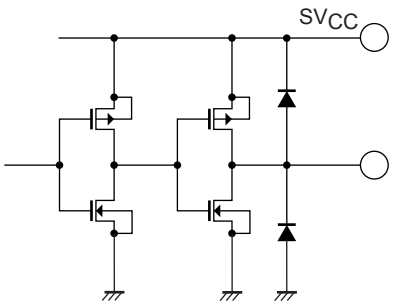
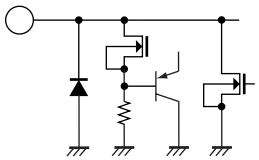
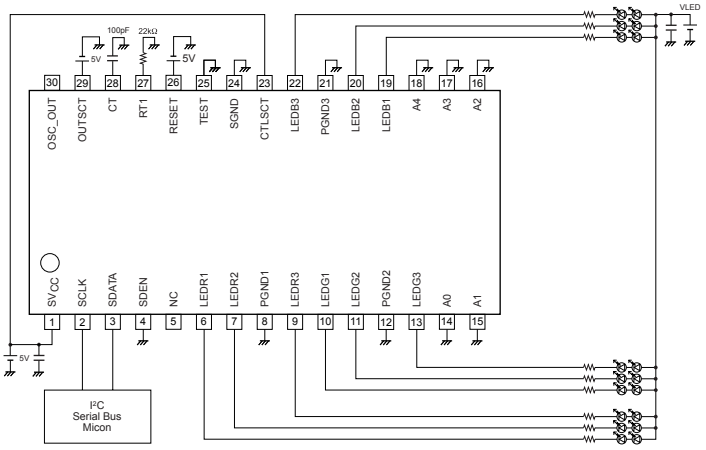
Pin No.	Pin Name	Pin function	Equivalent Circuit
28	CT	Oscillator frequency setting capacitor connection pin/oscillator input pin. By changing the value of capacitance, it is possible to change the oscillator frequency. The capacitor must be connected to this pin of the master-side IC. The CT pin of the slave-side IC must be connected as the oscillator input pin.	
30	OSC_OUT	Oscillator output pin When a multiple number of driver ICs are connected for use, the oscillators can be connected in synchronization by connecting the OSC_OUT output to the CT pin of the ICs to be connected.	
6 7 9 10 11 13 19 20 22	LEDR1 LEDR2 LEDR3 LEDG1 LEDG2 LEDG3 LEDB1 LEDB2 LEDB3	LEDR1 output pin LEDR2 output pin LEDR3 output pin LEDG1 output pin LEDG2 output pin LEDG3 output pin LEDB1 output pin LEDB2 output pin LEDB3 output pin If these pins are not going to be used, they must always be connected to GND.	
8 12 21	PGND1 PGND2 PGND3	GND pin dedicate for LEDR GND pin dedicate for LEDG GND pin dedicate for LEDB	
5	NC	No connection	

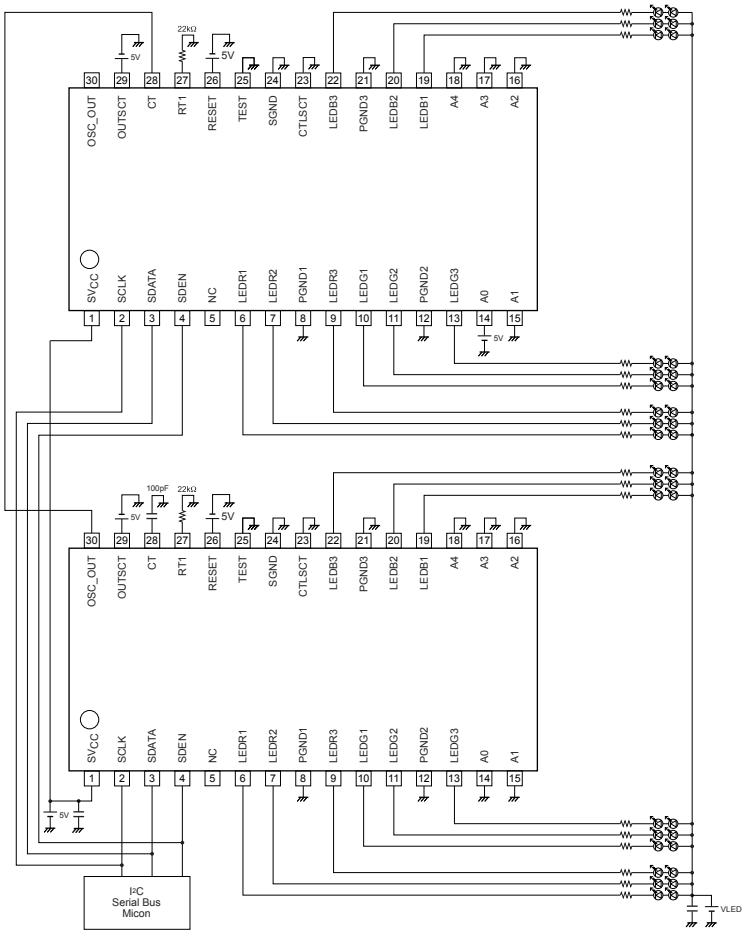
Application Circuit Diagrams

●Specifications when one driver IC is used



Use as a master-side IC
Slave selection: A0-A4: low
Address setting: Master (010-0000)
Nothing must be connected to the NC pins

●Specifications when more than one driver IC is used



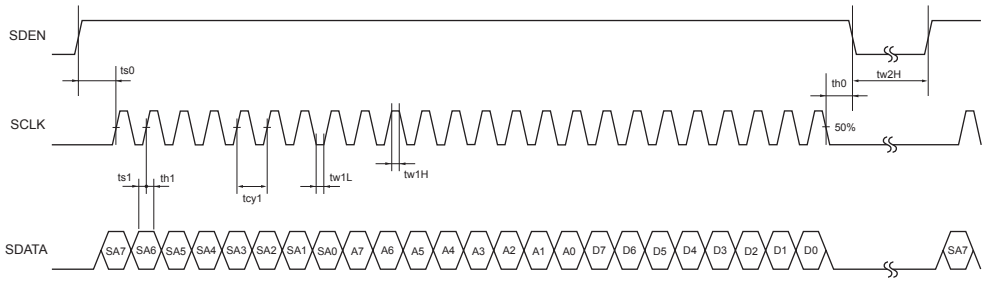
Use as a master-side IC
Slave selection: A0 : high
A1-A4: low
Address setting: Master (010-0000)

Use as a slave-side IC
Slave selection: A0 high: A1-A4 low
Address setting: Slave (010-0001)

The oscillator frequency is determined by the master IC.
The synchronous connection of the oscillator can be established by connecting the oscillator output (OSC_OUT) to the CT pins of the slave-side ICs.
Nothing must be connected to the NC pins.

Serial Bus Communication Specifications

1) 3-wire serial bus transfer timing conditions



Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Cycle time	tcy1	SCLK clock period	200	-	-	ns
Data setup time	ts0	SDEN setup time relative to the rise of SCLK	90	-	-	ns
	ts1	SDATA setup time relative to the rise of SCLK	60	-	-	ns
Data hold time	th0	SDEN hold time relative to the fall of SCLK	200	-	-	ns
	th1	SDATA hold time relative to the fall of SCLK	60	-	-	ns
Pulse width	tw1L	Low period pulse width of SCLK	90	-	-	ns
	tw1H	High period pulse width of SCLK	90	-	-	ns
	tw2L	Low period pulse width of SDEN	1	-	-	μs

Data length: 24 bits

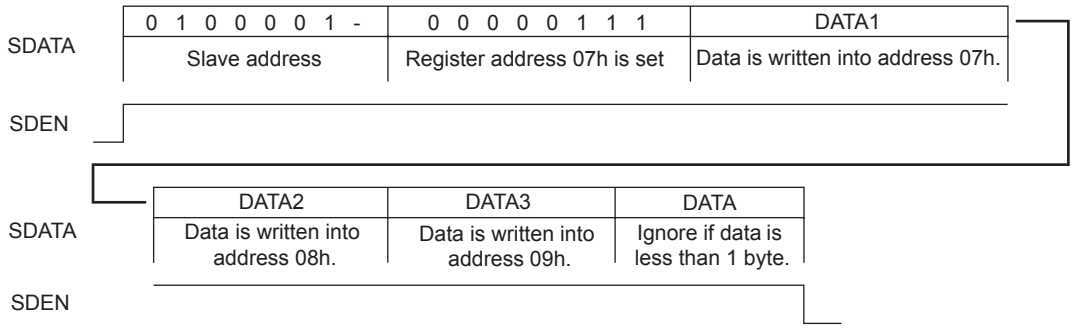
Clock frequency: 5 MHz or less

When 24 SCLK clock signals have been input during the high period of SDEN, the SDATA is taken in at the rising edge of SCLK.

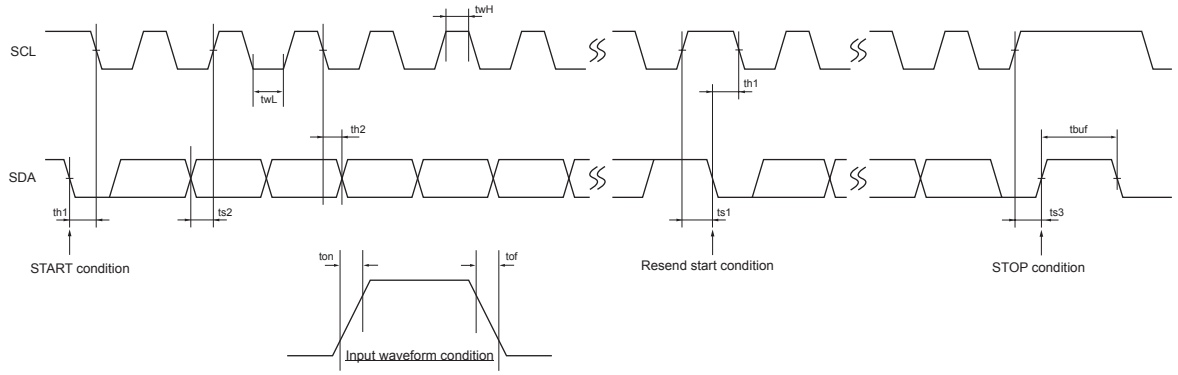
Note: If the number of SCLK clock signals during the high period of SDEN is 23 or less, SDATA is not taken in. If it is 25 or more, the register address is automatically incremented every time 1 byte is taken in.

The slave address is assigned by the first byte, and the register address on the serial map is specified by the next byte.
The third byte transfers the data to the address specified by the register address that was written by the second byte and if the data subsequently continues even after this, the register address is automatically incremented for the fourth and subsequent bytes. As a result, it is possible to send the data continuously from the specified addresses. Data of less than one byte is ignored. However, when the address reaches 15h, in the next byte to be transferred becomes 00h.

Example of a write operation:



2) I^2C serial transfer timing conditions



Standard mode

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
SCL clock frequency	fsc1	SCL clock frequency	0	-	100	kHz
Data setup time	ts1	SCL setup time relative to the fall of SDA	4.7	-	-	μs
	ts2	SDA setup time relative to the rise of SCL	250	-	-	ns
	ts3	SCL setup time relative to the rise of SDA	4.0	-	-	μs
Data hold time	th1	SCL hold time relative to the fall of SDA	4.0	-	-	μs
	th2	SDA hold time relative to the fall of SCL	0	-	-	μs
Pulse width	twL	SCL pulse width for the L period	4.7	-	-	μs
	twH	SCL pulse width for the H period	4.0	-	-	μs
Input waveform conditions	ton	SCL and SDA (input) rise time	-	-	1000	ns
	tof	SCL and SDA (input) fall time	-	-	300	ns
Bus free time	tbuf	Time between STOP condition and START condition	4.7	-	-	μs

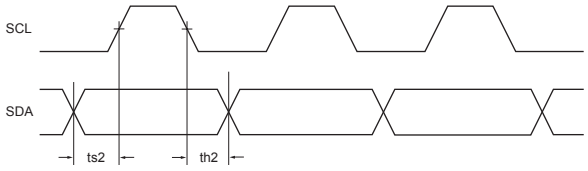
High-speed mode

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
SCL clock frequency	fsc1	SCL clock frequency	0	-	400	kHz
Data setup time	ts1	SCL setup time relative to the fall of SDA	0.6	-	-	μs
	ts2	SDA setup time relative to the rise of SCL	100	-	-	ns
	ts3	SCL setup time relative to the rise of SDA	0.6	-	-	μs
Data hold time	th1	SCL hold time relative to the fall of SDA	0.6	-	-	μs
	th2	SDA hold time relative to the fall of SCL	0	-	-	μs
Pulse width	twL	SCL pulse width for the L period	1.3	-	-	μs
	twH	SCL pulse width for the H period	0.6	-	-	μs
Input waveform conditions	ton	SCL and SDA (input) rise time	-	-	300	ns
	tof	SCL and SDA (input) fall time	-	-	300	ns
Bus free time	tbuf	Time between STOP and START conditions	1.3	-	-	μs

I^{2}C bus transfer method

Start and stop conditions

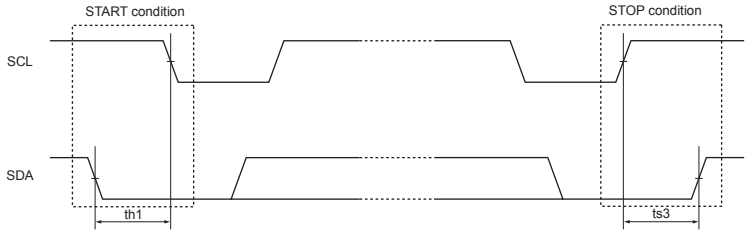
During data transfer operation using the I^{2}C bus, SDA must basically be kept in constant state while SCL is “H” as shown below.



When data is not being transferred, both SCL and SDA are set in the “H” state.

When SCL=SDA is “H,” the start condition is established when SDA is changed from “H” to “L,” and access is started.

When SCL is “H,” the stop condition is established when SDA is changed from “L” to “H,” and access is ended.



Data transfer and acknowledgement response

After the start condition has been established, the data is transferred one byte (8 bits) at a time.

Any number of bytes of data can be transferred continuously.

Each time the 8-bit data is transferred, the ACK signal is sent from the receive side to the send side. The ACK signal is issued when SDA on the send side is released and SDA on the receive side is set to “L” immediately after fall of the clock pulse at the SCL eighth bit of data transfer to “L.”

When the next 1-byte transfer is left in the receive state after sending the ACK signal from the receive side, the receive side releases SDA at the fall of the SCL ninth clock.

In the I^{2}C bus, there is no CE signal. In its place, a 7-bit slave address is assigned to each device, and the first byte of transfer is assigned to the command (R/W) representing the 7-bit address and subsequent transfer direction. Note that only write is valid in this IC. The 7-bit address is transferred sequentially starting with MSB, and the eighth bit is set to “L” which indicates a write.

Slave address condition

	SLAVE ADDRESS							
	SA7	SA6	SA5	SA4	SA3	SA2	SA1	SA0
resister name	-	-	A4	A3	A2	A1	A0	-
default	0	1	0	0	0	0	0	-

Terminal PIN				
A4	A3	A2	A1	A0
L	L	L	L	L
L	L	L	L	H
L	L	L	H	L
L	L	L	H	H
L	L	H	L	L
L	L	H	L	H
L	L	H	H	L
L	L	H	H	H
L	H	L	L	L
L	H	L	L	H
L	H	L	H	L
L	H	L	H	H
L	H	H	L	L
L	H	H	L	H
L	H	H	H	L
L	H	H	H	H
H	L	L	L	L
H	L	L	L	H
H	L	L	H	L
H	L	L	H	H
H	L	H	L	L
H	L	H	L	H
H	L	H	H	L
H	L	H	H	H
H	H	L	L	L
H	H	L	L	H
H	H	L	H	L
H	H	L	H	H
H	H	H	L	L
H	H	H	L	H
H	H	H	H	L
H	H	H	H	H

:LV5234

SA7	SA6	SA5	SA4	SA3	SA2	SA1	SA0
0	1	0	0	0	0	0	-
0	1	0	0	0	0	1	-
0	1	0	0	0	1	0	-
0	1	0	0	0	1	1	-
0	1	0	0	1	0	0	-
0	1	0	0	1	0	1	-
0	1	0	0	1	1	0	-
0	1	0	0	1	1	1	-
0	1	0	1	0	0	0	-
0	1	0	1	0	0	1	-
0	1	0	1	0	1	0	-
0	1	0	1	0	1	1	-
0	1	0	1	1	0	0	-
0	1	0	1	1	0	1	-
0	1	0	1	1	1	0	-
0	1	0	1	1	1	1	-
0	1	1	0	0	0	0	-
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0	1	1	0	0	1	1	-
0	1	1	0	1	0	0	-
0	1	1	0	1	0	1	-
0	1	1	0	1	1	0	-
0	1	1	0	1	1	1	-
0	1	1	1	0	0	0	-
0	1	1	1	0	0	1	-
0	1	1	1	0	1	0	-
0	1	1	1	0	1	1	-
0	1	1	1	1	0	0	-
0	1	1	1	1	0	1	-
0	1	1	1	1	1	0	-
0	1	1	1	1	1	1	-

Serial each mode setting

	ADDRESS : 00h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	PWM[2]	PWM[1]	PWM[0]	-	-	MAS	-
default	0	0	0	0	0	0	0	0

D6	D5	D4	time(ms)
0	0	0	0.5
0	0	1	1.0
0	1	0	2.0
0	1	1	4.0
1	0	0	8.0
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

PWM cycle setting
*Default

D1	MAS
0	Master
1	Slave

Master/Slave setting
*Default

	ADDRESS : 01h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	FOUT[2]	FOUT[1]	FOUT[0]	-	FIN[2]	FIN[1]	FIN[0]
default	0	0	0	0	0	0	0	0

D6	D5	D4	time(ms)
0	0	0	No slope
0	0	1	0.5
0	1	0	1.0
0	1	1	2.0
1	0	0	4.0
1	0	1	8.0
1	1	0	16.0
1	1	1	32.0

Fout slope setting
*Default

Speed of fade a step
(It takes 256 above-mentioned, set value × seconds until the fade is completed.)

D2	D1	D0	time(ms)
0	0	0	No slope
0	0	1	0.5
0	1	0	1.0
0	1	1	2.0
1	0	0	4.0
1	0	1	8.0
1	1	0	16.0
1	1	1	32.0

Fin slope setting
*Default

Speed of fade a step
(It takes 256 above-mentioned, set value × seconds until the fade is completed.)

	ADDRESS : 02h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	-	-	RLED[4]	RLED[3]	RLED[2]	RLED[1]	RLED[0]
default	0	0	0	0	0	0	0	0

D4	D3	D2	D1	D0	Current value (mA)
0	0	0	0	0	0.96
0	0	0	0	1	1.92
0	0	0	1	0	2.88
0	0	0	1	1	3.84
0	0	1	0	0	4.80
0	0	1	0	1	5.76
0	0	1	1	0	6.72
0	0	1	1	1	7.68
0	1	0	0	0	8.64
0	1	0	0	1	9.60
0	1	0	1	0	10.56
0	1	0	1	1	11.52
0	1	1	0	0	12.48
0	1	1	0	1	13.44
0	1	1	1	0	14.40
0	1	1	1	1	15.36
1	0	0	0	0	16.32
1	0	0	0	1	17.28
1	0	0	1	0	18.24
1	0	0	1	1	19.20
1	0	1	0	0	20.16
1	0	1	0	1	21.12
1	0	1	1	0	22.08
1	0	1	1	1	23.04
1	1	0	0	0	24.00
1	1	0	0	1	24.96
1	1	0	1	0	25.92
1	1	0	1	1	26.88
1	1	1	0	0	27.84
1	1	1	0	1	28.80
1	1	1	1	0	29.76
1	1	1	1	1	30.72

RLED current value setting

* Default

	ADDRESS : 03h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	-	-	GLED[4]	GLED[3]	GLED[2]	GLED[1]	GLED[0]
default	0	0	0	0	0	0	0	0

D4	D3	D2	D1	D0	Current value (mA)
0	0	0	0	0	0.96
0	0	0	0	1	1.92
0	0	0	1	0	2.88
0	0	0	1	1	3.84
0	0	1	0	0	4.80
0	0	1	0	1	5.76
0	0	1	1	0	6.72
0	0	1	1	1	7.68
0	1	0	0	0	8.64
0	1	0	0	1	9.60
0	1	0	1	0	10.56
0	1	0	1	1	11.52
0	1	1	0	0	12.48
0	1	1	0	1	13.44
0	1	1	1	0	14.40
0	1	1	1	1	15.36
1	0	0	0	0	16.32
1	0	0	0	1	17.28
1	0	0	1	0	18.24
1	0	0	1	1	19.20
1	0	1	0	0	20.16
1	0	1	0	1	21.12
1	0	1	1	0	22.08
1	0	1	1	1	23.04
1	1	0	0	0	24.00
1	1	0	0	1	24.96
1	1	0	1	0	25.92
1	1	0	1	1	26.88
1	1	1	0	0	27.84
1	1	1	0	1	28.80
1	1	1	1	0	29.76
1	1	1	1	1	30.72

GLED current value setting

* Default

	ADDRESS : 04h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	-	-	BLED[4]	BLED[3]	BLED[2]	BLED[1]	BLED[0]
default	0	0	0	0	0	0	0	0

D4	D3	D2	D1	D0	Current value (mA)
0	0	0	0	0	0.96
0	0	0	0	1	1.92
0	0	0	1	0	2.88
0	0	0	1	1	3.84
0	0	1	0	0	4.80
0	0	1	0	1	5.76
0	0	1	1	0	6.72
0	0	1	1	1	7.68
0	1	0	0	0	8.64
0	1	0	0	1	9.60
0	1	0	1	0	10.56
0	1	0	1	1	11.52
0	1	1	0	0	12.48
0	1	1	0	1	13.44
0	1	1	1	0	14.40
0	1	1	1	1	15.36
1	0	0	0	0	16.32
1	0	0	0	1	17.28
1	0	0	1	0	18.24
1	0	0	1	1	19.20
1	0	1	0	0	20.16
1	0	1	0	1	21.12
1	0	1	1	0	22.08
1	0	1	1	1	23.04
1	1	0	0	0	24.00
1	1	0	0	1	24.96
1	1	0	1	0	25.92
1	1	0	1	1	26.88
1	1	1	0	0	27.84
1	1	1	0	1	28.80
1	1	1	1	0	29.76
1	1	1	1	1	30.72

BLED current value setting

* Default

	ADDRESS : 05h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	B2ON	G2ON	R2ON	-	B1ON	G1ON	R1ON
default	0	0	0	0	0	0	0	0

D6	B2ON
0	OFF
1	ON

LEDB2 ON/OFF setting
* Default

D5	G2ON
0	OFF
1	ON

LEDG2 ON/OFF setting
* Default

D4	R2ON
0	OFF
1	ON

LEDR2 ON/OFF setting
* Default

D2	B1ON
0	OFF
1	ON

LEDB1 ON/OFF setting
* Default

D1	G1ON
0	OFF
1	ON

LEDG1ON/OFF setting
* Default

D0	R1ON
0	OFF
1	ON

LEDR1 ON/OFF setting
* Default

	ADDRESS : 06h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	-	-	-	-	B3ON	G3ON	R3ON
default	0	0	0	0	0	0	0	0

D2	B3ON
0	OFF
1	ON

LEDB3 ON/OFF setting
* Default

D1	G3ON
0	OFF
1	ON

LEDG3 ON/OFF setting
* Default

D0	R3ON
0	OFF
1	ON

LEDR3 ON/OFF setting
* Default

	ADDRESS : 07h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	-	R3PON[1]	R3PON[0]	R2PON[1]	R2PON[0]	R1PON[1]	R1PON[0]
default	0	0	0	0	0	0	0	0

D5	D4	R3PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDR3 output setting
* Default

D3	D2	R2PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDR2 output setting
* Default

D1	D0	R1PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDR1 output setting
* Default

	ADDRESS : 08h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	-	G3PON[1]	G3PON[0]	G2PON[1]	G2PON[0]	G1PON[1]	G1PON[0]
default	0	0	0	0	0	0	0	0

D5	D4	G3PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDG3 output setting
* Default

D3	D2	G2PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDG2 output setting
* Default

D1	D0	G1PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDG1 output setting
* Default

	ADDRESS : 09h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	-	B3PON[1]	B3PON[0]	B2PON[1]	B2PON[0]	B1PON[1]	B1PON[0]
default	0	0	0	0	0	0	0	0

D5	D4	B3PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDB3 output setting

* Default

D3	D2	B2PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDB2 output setting

* Default

D1	D0	B1PON
0	0	PMW output priority
0	1	Fade output priority
1	0	Compulsion ON/OFF output priority
-	-	-

LEDB1 output setting

* Default

	ADDRESS : 0ah							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	R3CM	R2CM	R1CM	-	R3FD	R2FD	R1FD
default	0	0	0	0	0	0	0	0

D6	R3CM
0	Compulsion OFF
1	Compulsion ON

LEDR3 compulsion ON/OFF setting
* Default

D5	R2CM
0	Compulsion OFF
1	Compulsion ON

LEDR2 compulsion ON/OFF setting
* Default

D4	R1CM
0	Compulsion OFF
1	Compulsion ON

LEDR1 compulsion ON/OFF setting
* Default

D2	R3FD
0	Fade invalidity
1	Fade effective

LEDR3 fade function ON/OFF setting
* Default

D1	R2FD
0	Fade invalidity
1	Fade effective

LEDR2 fade function ON/OFF setting
* Default

D0	R1FD
0	Fade invalidity
1	Fade effective

LEDR1 fade function ON/OFF setting
* Default

	ADDRESS : 0bh							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	G3CM	G2CM	G1CM	-	G3FD	G2FD	G1FD
default	0	0	0	0	0	0	0	0

D6	G3CM
0	Compulsion OFF
1	Compulsion ON

LEDG3 compulsion ON/OFF setting
* Default

D5	G2CM
0	Compulsion OFF
1	Compulsion ON

LEDG2 compulsion ON/OFF setting
* Default

D4	G1CM
0	Compulsion OFF
1	Compulsion ON

LEDG1 compulsion ON/OFF setting
* Default

D2	G3FD
0	Fade invalidity
1	Fade effective

LEDG3 fade function ON/OFF setting
* Default

D1	G2FD
0	Fade invalidity
1	Fade effective

LEDG2 fade function ON/OFF setting
* Default

D0	G1FD
0	Fade invalidity
1	Fade effective

LEDG1 fade function ON/OFF setting
* Default

	ADDRESS : 0ch							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	-	B3CM	B2CM	B1CM	-	B3FD	B2FD	B1FD
default	0	0	0	0	0	0	0	0

D6	B3CM
0	Compulsion OFF
1	Compulsion ON

LEDB3 compulsion ON/OFF setting
* Default

D5	B2CM
0	Compulsion OFF
1	Compulsion ON

LEDB2 compulsion ON/OFF setting
* Default

D4	B1CM
0	Compulsion OFF
1	Compulsion ON

LEDB1 compulsion ON/OFF setting
* Default

D2	B3FD
0	Fade invalidity
1	Fade effective

LEDB3 fade function ON/OFF setting
* Default

D1	B2FD
0	Fade invalidity
1	Fade effective

LEDB2 fade function ON/OFF setting
* Default

D0	B1FD
0	Fade invalidity
1	Fade effective

LEDB1 fade function ON/OFF setting
* Default

	ADDRESS : 0dh							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R1PWM[7]	R1PWM[6]	R1PWM[5]	R1PWM[4]	R1PWM[3]	R1PWM[2]	R1PWM[1]	R1PWM[0]
default	0	0	0	0	0	0	0	0

LEDR1 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R1PWM[7:0]}}{256}$$

	ADDRESS : 0eh							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G1PWM[7]	G1PWM[6]	G1PWM[5]	G1PWM[4]	G1PWM[3]	G1PWM[2]	G1PWM[1]	G1PWM[0]
default	0	0	0	0	0	0	0	0

LEDG1 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G1PWM[7:0]}}{256}$$

	ADDRESS : 0fh							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B1PWM[7]	B1PWM[6]	B1PWM[5]	B1PWM[4]	B1PWM[3]	B1PWM[2]	B1PWM[1]	B1PWM[0]
default	0	0	0	0	0	0	0	0

LEDB1 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B1PWM[7:0]}}{256}$$

	ADDRESS : 10h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R2PWM[7]	R2PWM[6]	R2PWM[5]	R2PWM[4]	R2PWM[3]	R2PWM[2]	R2PWM[1]	R2PWM[0]
default	0	0	0	0	0	0	0	0

LEDR2 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R2PWM[7:0]}}{256}$$

	ADDRESS : 11h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G2PWM[7]	G2PWM[6]	G2PWM[5]	G2PWM[4]	G2PWM[3]	G2PWM[2]	G2PWM[1]	G2PWM[0]
default	0	0	0	0	0	0	0	0

LEDG2 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G2PWM[7:0]}}{256}$$

	ADDRESS : 12h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B2PWM[7]	B2PWM[6]	B2PWM[5]	B2PWM[4]	B2PWM[3]	B2PWM[2]	B2PWM[1]	B2PWM[0]
default	0	0	0	0	0	0	0	0

LEDB2 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B2PWM[7:0]}}{256}$$

	ADDRESS : 13h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R3PWM[7]	R3PWM[6]	R3PWM[5]	R3PWM[4]	R3PWM[3]	R3PWM[2]	R3PWM[1]	R3PWM[0]
default	0	0	0	0	0	0	0	0

LEDR3 PWM Duty setting (DefaultALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R3PWM[7:0]}}{256}$$

	ADDRESS : 14h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G3PWM[7]	G3PWM[6]	G3PWM[5]	G3PWM[4]	G3PWM[3]	G3PWM[2]	G3PWM[1]	G3PWM[0]
default	0	0	0	0	0	0	0	0

LEDG3 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G3PWM[7:0]}}{256}$$

	ADDRESS : 15h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B3PWM[7]	B3PWM[6]	B3PWM[5]	B3PWM[4]	B3PWM[3]	B3PWM[2]	B3PWM[1]	B3PWM[0]
default	0	0	0	0	0	0	0	0

LEDB3 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B3PWM[7:0]}}{256}$$

LV5234V serial map

• Table upper row: Register name Table the lower: Default value

	A7	A6	A5	A4	A3	A2	A1	A0	D7	D6	D5	D4	D3	D2	D1	D0
00h	0	0	0	0	0	0	0	0	×	PWM[2:0]			×	×	MAS	×
									0	0	0	0	0	0	0	0
01h	0	0	0	0	0	0	0	1	×	FOUT[2:0]			×	FIN[2:0]		
									0	0	0	0	0	0	0	0
02h	0	0	0	0	0	0	1	0	×	×	×	RLED[4:0]				
									0	0	0	0	0	0	0	0
03h	0	0	0	0	0	0	1	1	×	×	×	GLED[4:0]				
									0	0	0	0	0	0	0	0
04h	0	0	0	0	0	1	0	0	×	×	×	BLED[4:0]				
									0	0	0	0	0	0	0	0
05h	0	0	0	0	0	1	0	1	×	B2ON	G2ON	R2ON	×	B1ON	G1ON	R1ON
									0	0	0	0	0	0	0	0
06h	0	0	0	0	0	1	1	0	×	×	×	×	×	B3ON	G3ON	R3ON
									0	0	0	0	0	0	0	0
07h	0	0	0	0	0	1	1	1	×	×	R3PON[1:0]		R2PON[1:0]		R1PON[1:0]	
									0	0	0	0	0	0	0	0
08h	0	0	0	0	1	0	0	0	×	×	G3PON[1:0]		G2PON[1:0]		G1PON[1:0]	
									0	0	0	0	0	0	0	0
09h	0	0	0	0	1	0	0	1	×	×	B3PON[1:0]		B2PON[1:0]		B1PON[2:0]	
									0	0	0	0	0	0	0	0
0ah	0	0	0	0	1	0	1	0	×	R3CM	R2CM	R1CM	×	R3FD	R2FD	R1FD
									0	0	0	0	0	0	0	0
0bh	0	0	0	0	1	0	1	1	×	G3CM	G2CM	G1CM	×	G3FD	G2FD	G1FD
									0	0	0	0	0	0	0	0
0ch	0	0	0	0	1	1	0	0	×	B3CM	B2CM	B1CM	×	B3FD	B2FD	B1FD
									0	0	0	0	0	0	0	0
0dh	0	0	0	0	1	1	0	1	R1PWM[7:0]							
									0	0	0	0	0	0	0	0
0eh	0	0	0	0	1	1	1	0	G1PWM[7:0]							
									0	0	0	0	0	0	0	0
0fh	0	0	0	0	1	1	1	1	B1PWM[7:0]							
									0	0	0	0	0	0	0	0
10h	0	0	0	1	0	0	0	0	R2PWM[7:0]							
									0	0	0	0	0	0	0	0
11h	0	0	0	1	0	0	0	1	G2PWM[7:0]							
									0	0	0	0	0	0	0	0
12h	0	0	0	1	0	0	1	0	B2PWM[7:0]							
									0	0	0	0	0	0	0	0
13h	0	0	0	1	0	0	1	1	R3PWM[7:0]							
									0	0	0	0	0	0	0	0
14h	0	0	0	1	0	1	0	0	G3PWM[7:0]							
									0	0	0	0	0	0	0	0
15h	0	0	0	1	0	1	0	1	B3PWM[7:0]							
									0	0	0	0	0	0	0	0
	Register address								Data							