LV5239TA

Bi-CMOS LSI

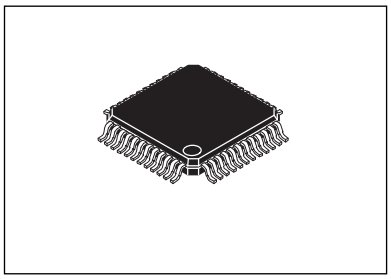
24-channel LED Driver

ON Semiconductor®

www.onsemi.com

Overview

The LV5239TA is a 24-channel LED driver IC that is capable of switching between constant-current output and open drain output. It enables 2-wire/3-wire serial bus control (address designation) to be set arbitrarily using an external pin. Also possible are 24-channel LED ON/OFF control and the setting of the PWM luminance in 256 steps.
Up to 32 driver ICs can be connected using the slave address setting pins.



TQFP48 EP 7x7, 0.5P

Function

- 24-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 (3 bits) for switching current level … 6.40mA to 32.40mA (RGB drive).
  Constant current (I_O max=50mA) for full-color LEDs × 24 channels.
- In the open drain mode (OUTSCT: H), high current drive
  (I_O max=100mA) × 24 channels
- In the constant-current mode (OUTSCT: M)
  Only RGB7, RGB8 is open drain (I_O max=100mA)
- Luminance adjustment using internal PWM control (256 steps), It copes with independent PWM control for each LED output.
  - 8-bit PWM luminance dimming (0% to 99.6%)
  - 8-phase PWM
- Selection of 2-wire/ 3-wire serial bus control signals enabled (switching using an external pin).
  - Schmitt trigger input (3.3V/5V)
- Slave addressing (5 bits, connection of up to 32 driver ICs possible)
- Input Power supply supports 12V
  - Internal reference output terminal (5V)
- Low current consumption
- Output malfunction protection circuits
  (thermal protection function, UVLO detection protection function, Power on RESET)

ORDERING INFORMATION

See detailed ordering and shipping information on page 28 of this data sheet.

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Publication Order Number :
LV5239TA/D

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V_{CC} max		13.6	V
	VLED	VLED	42	V
	VREF	VREF	5.8	V
Output voltage	V_O max	LED off	42	V
Output current	I_O max	Open drain	100	mA
Allowable power dissipation	Pd max	Ta ≤ 25°C *	1.25	W
Operating temperature	Topr		−25 to +85	°C
Storage temperature	Tstg		−40 to +150	°C

* Specified board: 114.3mm × 76.1mm × 1.6mm, glass epoxy board. Exposed Die-pad area is not a substrate mounting.
[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.

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Operating supply voltage range	V_{CC} op	SV_{CC}	3.0 to 12.8	V
	V_{LED} op	V_{LED}	3.0 to 42	V
	V_{REF} op	V_{REF}	3.0 to 5.5	V

[Warning] : The VLED terminal becomes the terminal for protection of the LED drive output. Please be connected to the power supply same as LED drive. When IC power supply (SVCC) and power supply of the LED or two kinds of power supply is more than it, please connect VLED to the highest potential and the power supply that it is.

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

Electrical Characteristics at Ta = 25°C, V_{CC} = 5V (=VREF)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Consumption current	$I_{CC}1$	LED off	1.8	2.3	2.9	mA
Reference current pin voltage	VRT	RT1=30kΩ	1.14	1.22	1.30	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=32.40mA (Between bits pairing characteristics)			5	%
Maximum LED driver output current 1	IMAX1	RT1=30kΩ LED OUTSCT= L	30.0	32.4	34.8	mA
LED output on resistance 1	Ron1	I_O = 10mA		10	20	Ω
OFF leak current	Ileak	LED OFF			10	μA
Power on RESET voltage	VPOR	The voltage that is canceled		2.5		V
Reset voltage	VRST	UVLO voltage		2.3		V
VREF voltage	VREF	VREF=open		4.9		V
VREF voltage	VREF1	V_{CC} = 6.0V, I_O = 10mA	4.7	5.1	5.4	V
Oscillator frequency	Fosc			1000		kHz

* Power on RESET
Reset all the data in the IC at the time of power activation. And it becomes the default setting.

* UVLO detection protection function
When SVCC decreases, it turns off LED output terminal.

* Thermal protection function
When a temperature in the IC rises, it turns off output terminal. When temperature falls, it returns by oneself.

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
H level 1	VH1	Input H level OUTSCT	4.5		5.0	V
M level 1	VM1	Input M level OUTSCT	1.8		3.0	V
L level 1	VL1	Input L level OUTSCT	−0.2		0.5	V
H level 2	VH2	Input H level CTLSCT	3.5		5.0	V
L level 2	VL2	Input L level CTLSCT	−0.2		0.5	V
H level 3	VH3	Input H level RESET	4.0		5.0	V
L level 3	VL3	Input L level RESET	−0.2		1.0	V
H level 4	VH4	Input H level SCLK, SDATA, SDEN	4.0		5.0	V
L level 4	VL4	Input L level SCLK, SDATA, SDEN	−0.2		1.0	V
H level 5	VH5	Input H level A0 to A4	3.5		5.0	V
L level 5	VL5	Input L level A0 to A4	−0.2		0.5	V

Electrical Characteristics at Ta = 25°C, V_{CC} = 3.3V (=VREF)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Consumption current	$I_{CC}1$	LED off		2.1		mA
Reference current pin voltage	VRT	RT1=30kΩ	1.14	1.22	1.30	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=32.40mA (Between bits pairing characteristics)			5	%
Maximum LED driver output current 1	IMAX1	RT1=30kΩ LED OUTSCT= L		32.4		mA
LED output on resistance 1	Ron1	I_O = 10mA		10	20	Ω
OFF leak current	Ileak	LED OFF			10	μA
Power on RESET voltage	VPOR	The voltage that is canceled		2.5		V
Reset voltage	VRST	UVLO voltage		2.3		V
VREF voltage	VREF	VREF=open		3.2		V
Oscillator frequency	Fosc			1000		kHz

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

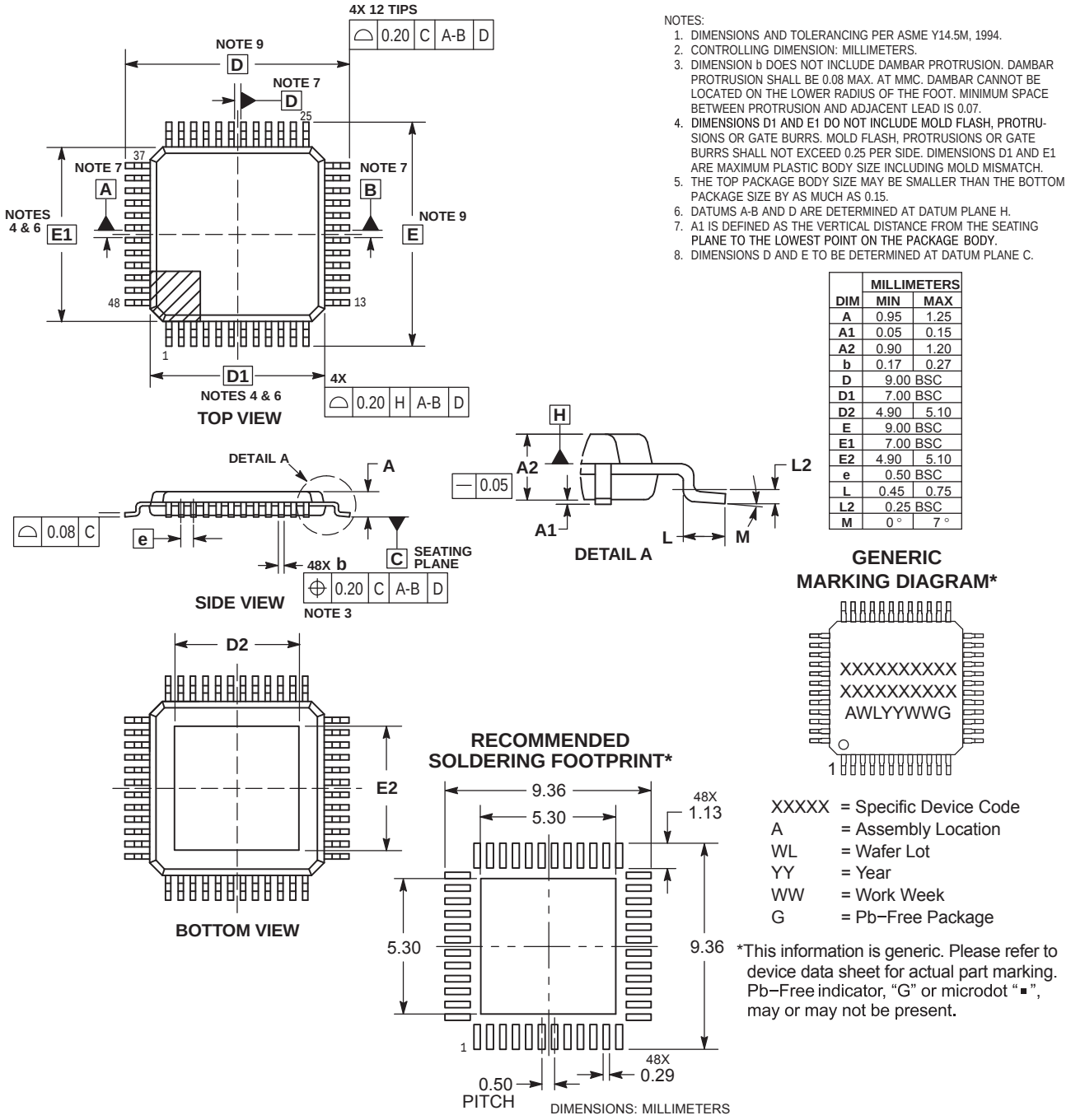
Control circuit at Ta = 25°C, V_{CC} = 3.3V (=VREF)

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
H level 1	VH1	Input H level OUTSCT	2.8		3.3	V
M level 1	VM1	Input M level OUTSCT	1.2		1.7	V
L level 1	VL1	Input L level OUTSCT	−0.2		0.5	V
H level 2	VH2	Input H level CTLSCT	2.3		3.3	V
L level 2	VL2	Input L level CTLSCT	−0.2		0.5	V
H level 3	VH3	Input H level RESET	2.7		3.3	V
L level 3	VL3	Input L level RESET	−0.2		0.6	V
H level 4	VH4	Input H level SCLK, SDATA, SDEN	2.7		3.3	V
L level 4	VL4	Input L level SCLK, SDATA, SDEN	−0.2		0.6	V
H level 5	VH5	Input H level A0 to A4	2.3		3.3	V
L level 5	VL5	Input L level A0 to A4	−0.2		0.5	V

Package Dimensions

unit : mm

TQFP48 EP 7x7, 0.5P
CASE 932F
ISSUE C



NOTES:
1. DIMENSIONS AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR PROTRUSION SHALL BE 0.08 MAX. AT MMC. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND ADJACENT LEAD IS 0.07.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.25 PER SIDE. DIMENSIONS D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE INCLUDING MOLD MISMATCH.
5. THE TOP PACKAGE BODY SIZE MAY BE SMALLER THAN THE BOTTOM PACKAGE SIZE BY AS MUCH AS 0.15.
6. DATUMS A-B AND D ARE DETERMINED AT DATUM PLANE H.
7. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
8. DIMENSIONS D AND E TO BE DETERMINED AT DATUM PLANE C.

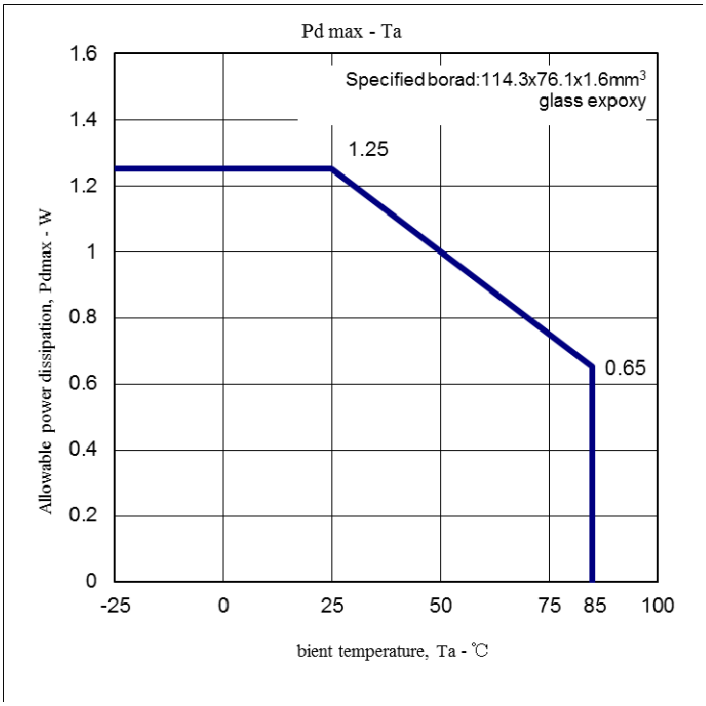
	MILLIMETERS	
DIM	MIN	MAX
A	0.95	1.25
A1	0.05	0.15
A2	0.90	1.20
b	0.17	0.27
D	9.00 BSC	
D1	7.00 BSC	
D2	4.90	5.10
E	9.00 BSC	
E1	7.00 BSC	
E2	4.90	5.10
e	0.50 BSC	
L	0.45	0.75
L2	0.25 BSC	
M	0 °	7 °

GENERIC MARKING DIAGRAM*

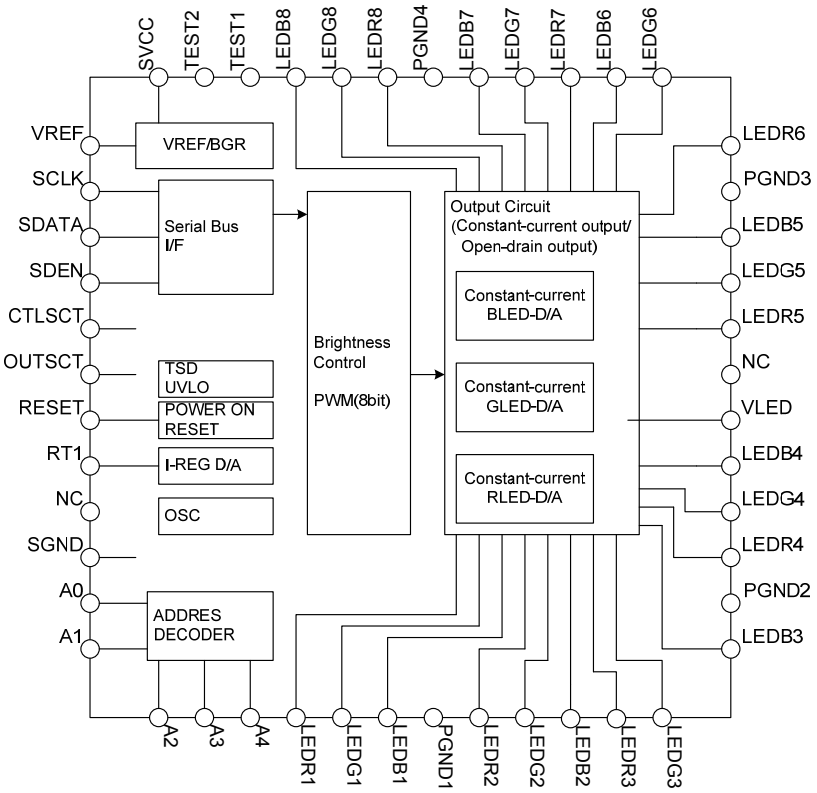
XXXXX = Specific Device Code
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

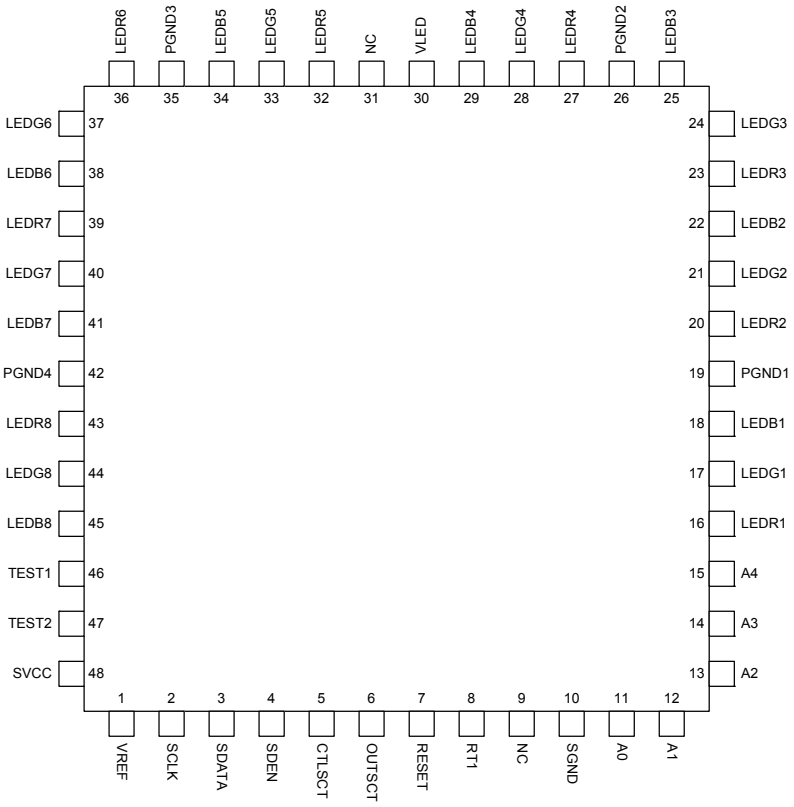


Block Diagram



[Warning] : The VLED terminal becomes the terminal for protection of the LED drive output. Please be connected to the power supply same as LED drive. When IC power supply (SVCC) and power supply of the LED or two kinds of power supply is more than it, please connect VLED to the highest potential and the power supply that it is.

Pin Assignment



Pin Descriptions

Pin No.	Pin name	I/O	Description
1	VREF	O	5V reference output 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	CTLSCT	I	2-wire serial bus/3-wire serial bus selecting control pin (L: 3-wire serial, H: 2-wire serial)
6	OUTSCT	I	Output type switching control pin L: Constant-current output M:Constant output, only RGB7,RGB8 is open drain output H: Open drain output
7	RESET	I	Reset signal input pin
8	RT1	O	LED current setting resistor connection pin
9	NC		No connection
10	SGND	-	Analog circuit GND pin
11	A0	I	Slave address input pin A0
12	A1	I	Slave address input pin A1
13	A2	I	Slave address input pin A2
14	A3	I	Slave address input pin A3
15	A4	I	Slave address input pin A4
16	LEDR1	O	LEDR1 output pin
17	LEDG1	O	LEDG1 output pin
18	LEDB1	O	LEDB1 output pin
19	PGND1	-	GND pin dedicated for LED driver
20	LEDR2	O	LEDR2 output pin
21	LEDG2	O	LEDG2 output pin
22	LEDB2	O	LEDB2 output pin
23	LEDR3	O	LEDR3 output pin
24	LEDG3	O	LEDG3 output pin
25	LEDB3	O	LEDB3 output pin

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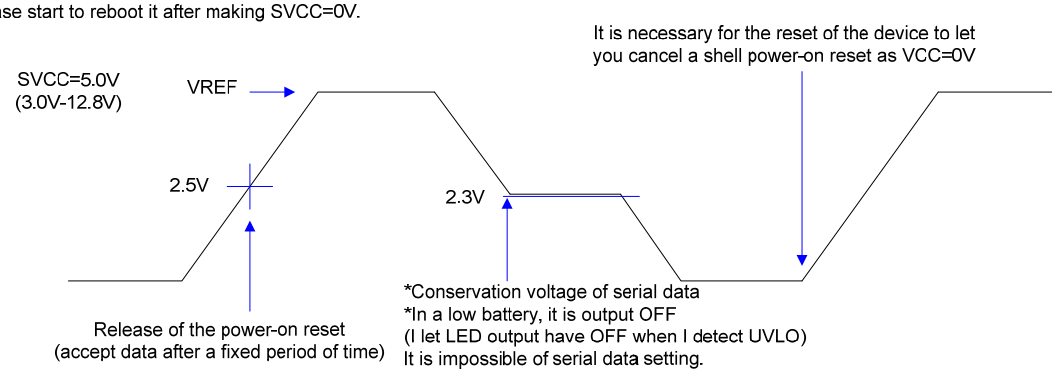
Pin No.	Pin name	I/O	Description
26	PGND2	-	GND pin dedicated for LED driver
27	LEDR4	O	LEDR4 output pin
28	LEDG4	O	LEDG4 output pin
29	LEDB4	O	LEDB4 output pin
30	VLED		Output protection pin
31	NC		No connection
32	LEDR5	O	LEDR5 output pin
33	LEDG5	O	LEDG5 output pin
34	LEDB5	O	LEDB5 output pin
35	PGND3	-	GND pin dedicated for LED driver
36	LEDR6	O	LEDR6 output pin
37	LEDG6	O	LEDG6 output pin
38	LEDB6	O	LEDB6 output pin
39	LEDR7	O	LEDR7 output pin
40	LEDG7	O	LEDG7 output pin
41	LEDB7	O	LEDB7 output pin
42	PGND4	-	GND pin dedicated for LED driver
43	LEDR8	O	LEDR8 output pin
44	LEDG8	O	LEDG8 output pin
45	LEDB8	O	LEDB8 output pin
46	TEST1	I	Test1 pin (connected to GND)
47	TEST2	I	Test2 pin (connected to GND)
48	SV_{CC}	-	Power supply pin

OUTSCT Settings

	LED Driver Output Pin	
OUTSCT pin	LED1, LED2, LED3, LED4, LED5, LED6	LED7,LED8
L=-0.2 to 0.3V	Constant current output Built-in current value switching D/A (3 bits) 6.40mA to 32.40mA, RT1=30kΩ (f=1MHz)	Constant current output Built-in current value switching D/A (3 bits) 6.40mA to 32.40mA, RT1=30kΩ (f=1MHz)
H=4.7 to 5.0V	Open drain output Current value is determined by external limiting resistor. R_{ON}=10Ω	Open drain output Current value is determined by external limiting resistor. R_{ON}=10Ω
M=1.8 to 3.0V	Constant current output Built-in current value switching D/A (3 bits) 6.40mA to 32.40mA, RT1=30kΩ (f=1MHz)	Open drain output Current value is determined by external limiting resistor. R_{ON}=10Ω

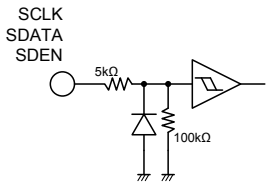
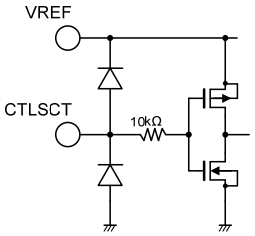
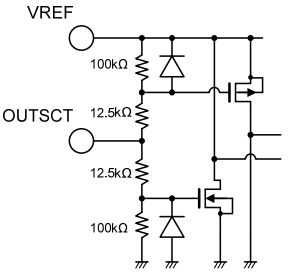
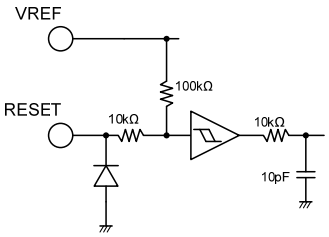
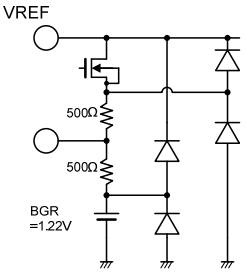
Power on RESET Settings

It has power-on reset circuit built-in, and, at the time of power activation, the air resister data of the IC is reset.
It prevents malfunction of the LED lighting by letting you reset it.
When voltage rises from state of SVCC=0V, the power-on reset becomes effective.
Please start to reboot it after making SVCC=0V.



When you transmit data after a release of the power-on reset,
please transmit it after being able to open interval more than 100usec.

Pin Functions

Pin No.	Pin Name	Pin function	Equivalent Circuit
48	SV_{CC}	Power supply pin	
1	VREF	Reference output pin(5V)	
2 3 4	SCLK SDATA SDEN	Serial clock signal input pin Serial data signal input pin Serial enable signal input pin	
5	CTLSCT	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 2-wire serial bus signals are set as the input signals.	
6	OUTSCT	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. When set to middle: Constant-current output is set for the LED driver. However, open drain output is set for the only LED7 driver and LED8 driver.	
7	RESET	Reset signal input pin Reset status when set to low.	
8	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 1.22V. By changing the current level, it is possible to change the oscillator frequency and LED driver current value (in the constant-current mode).	
9	NC	No connection	
10	SGND	GND pin	

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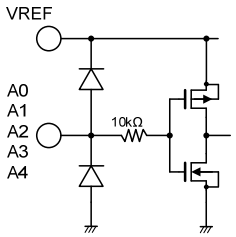
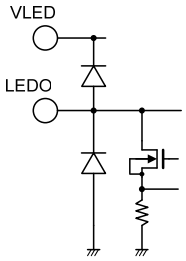
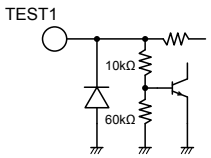
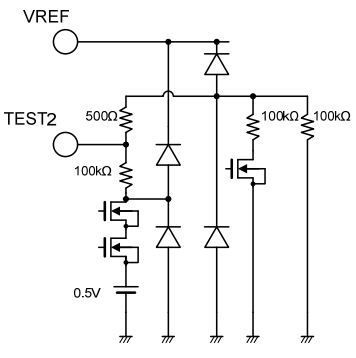
Pin No.	Pin Name	Pin function	Equivalent Circuit
11 12 13 14 15	A0 A1 A2 A3 A4	Slave address setting pin A0 Slave address setting pin A1 Slave address setting pin A2 Slave address setting pin A3 Slave address setting pin A4	
16 17 18 20 21 22 23 24 25 27 28 29 32 33 34 36 37 38 39 40 41 43 44 45	LEDR1 LEDG1 LEDB1 LEDR2 LEDG2 LEDB2 LEDR3 LEDG3 LEDB3 LEDR4 LEDG4 LEDB4 LEDR5 LEDG5 LEDB5 LEDR6 LEDG6 LEDB6 LEDR7 LEDG7 LEDB7 LEDR8 LEDG8 LEDB8	LEDR1 output pin LEDG1 output pin LEDB1 output pin LEDR2 output pin LEDG2 output pin LEDB2 output pin LEDR3 output pin LEDG3 output pin LEDB3 output pin LEDR4 output pin LEDG4 output pin LEDB4 output pin LEDR5 output pin LEDG5 output pin LEDB5 output pin LEDR6 output pin LEDG6 output pin LEDB6 output pin LEDR7 output pin LEDG7 output pin LEDB7 output pin LEDR8 output pin LEDG8 output pin LEDB8 output pin If these pins are not going to be used, they must always be connected to GND.	
30	VLED	Output protection pin	
31	NC	No connection	
19 26 35 42	PGND1 PGND2 PGND3 PGND4	GND pin dedicate for LED output GND pin dedicate for LED output GND pin dedicate for LED output GND pin dedicate for LED output	
46	TEST1	Test1 pin This pin must always be connected to GND.	
47	TEST2	Test2 pin This pin must always be connected to GND.	

Serial Bus Communication Specifications

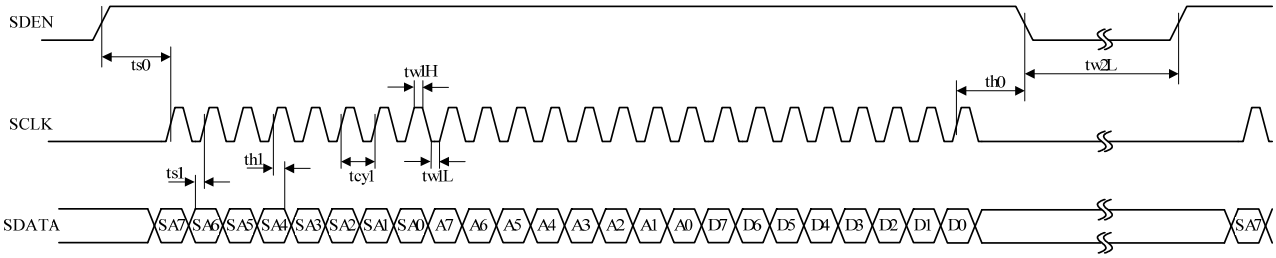
1) Serial bus transfer timing conditions

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

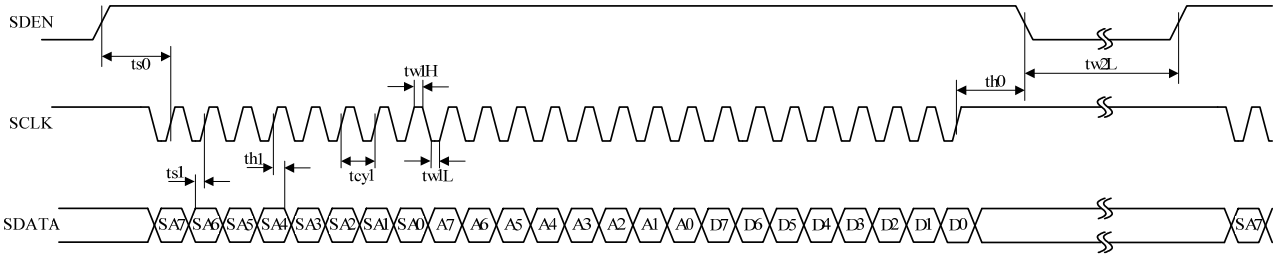
2) 3-wire serial bus transfer formats

LV5239TA receives the command by communication format by 3 line type serial communication of SCLK, SDATA, and SDEN.

When SCLK stops in “L” level



When SCLK stops in “H” level



Data length : 24bits

Clock frequency : 5MHz 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.

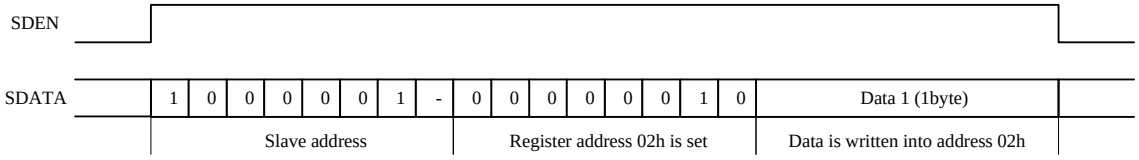
Note: If the number of SCLK clock signals during the high period of SDEN is 23 or less, SDATA is not taken in. If it is 25 or more, the register address is automatically incremented every time 1byte is taken in.

Data organization

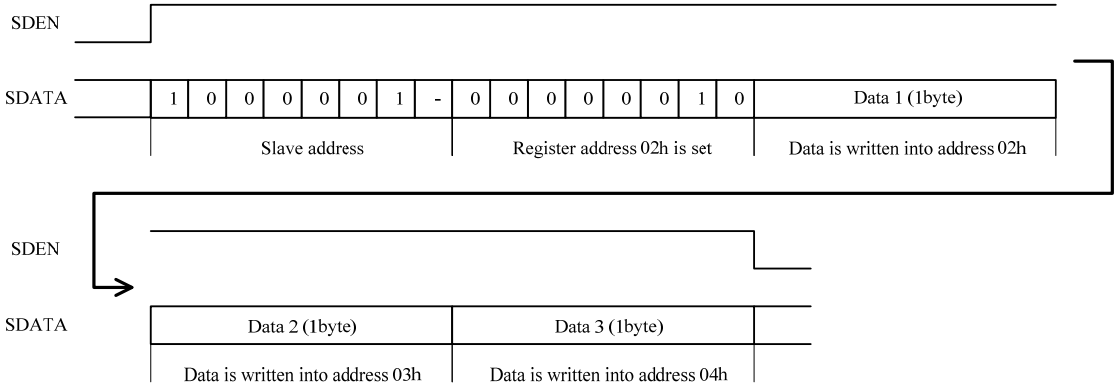
The slave address is assigned by the first byte, and the register address on the serial map is specified by the next byte. The third byte transfers the data to the address specified by the register address that was written by the second byte and if the data subsequently continues even after this, the 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 1fh, the next byte to be transferred becomes 00h.

Serial data transfer example (slave address=1000 001-)

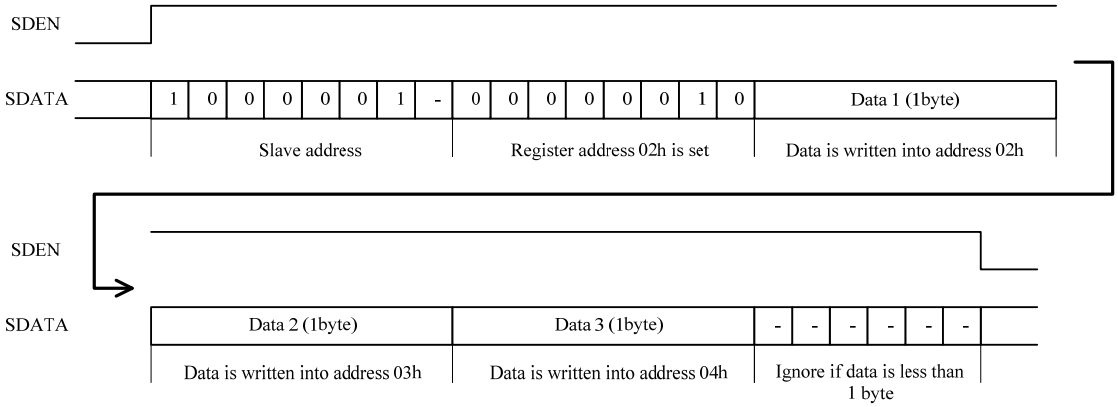
When I set register address 02h and write in data (the smallest data length)



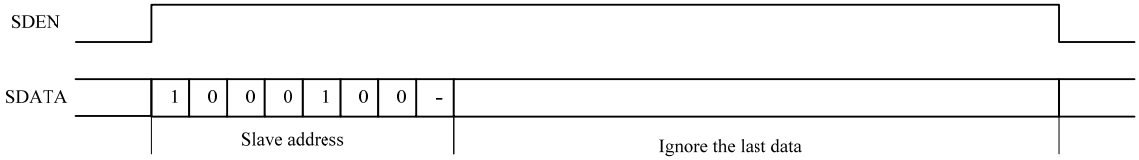
When I set register address 02h and write in data for 3 bytes



When I set register address 02h and write in data for 3 byte, and following data is less than a signal byte



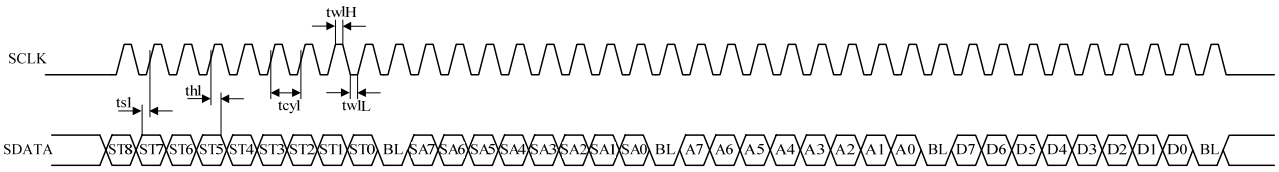
When slave address does not accord



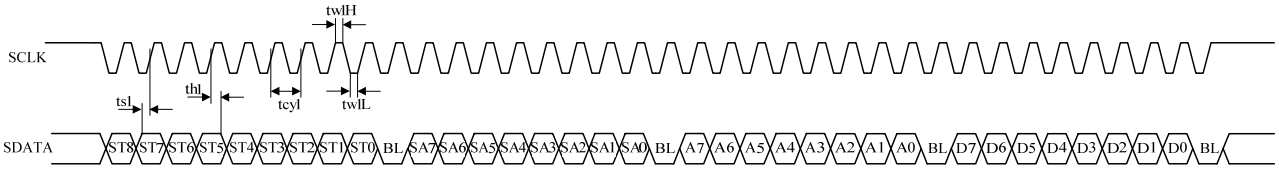
3) 2-wire serial bus transfer formats

LV5239TA receives the command by communication format by 2 line type serial communication of SCLK, SDATA.

When SCLK stops in “L” level



When SCLK stops in “H” level



Data length : 37bits

Start condition (“111111111”) + BLANK (“0”) + Slave address (8bit) + BLANK + (“0”) + Resister address (8bit) + BLANK (“0”) + Data (8bit) + BLANK (“0”)

Clock frequency : 5MHz or less

After start detection, it takes SDATA in the timing when the 27th clock track of SCLK stands up when sign according to communication format is input into SCLK and SDATA.

Note: When SCLK is less than 27th clock track, and BLANK is different from communication format such as “1”, after start detection, do not take in SDATA.

When SCLK is higher than 28th clock track, start detection is confirmed, or it is automatic, and register address is incremented every 1byte (8bit) + BLANK (“0”) unless BLANL is “1”.

Data organization

bit	ST8	ST7	ST6	ST5	ST4	ST3	ST2	ST1	ST0	BL	SA7	SA6	SA5	SA4	SA3	SA2	SA1	SA0	BL	A7	A6	A5	A4	A3	A2	A1	A0	BL	D7	D6	D5	D4	D3	D2	D1	D0	BL
SDATA	1	1	1	1	1	1	1	1	1	0	1	0						-	0									0									0
Parameter	Start condition									BLANK	Slave address								BLANK	Register address								BLANK	Data									BLANK

Even if SCLK and SDATA are state such as among standby or serial data inward correspondences, “111111111” start assumption and BLANK”0” start the uptake atomic act of new serial data after detection (start detection) was considered to be it.

After start detection, the first single byte (8bit) is assigned to slave address, and a write store of the slave address completes it in BLANK”0”.

The next single byte appoints register address in the serial manufacturing auto protocol, and a write of the register address is completed in BLANK”0”.

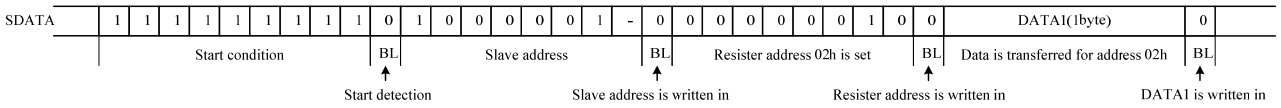
The third byte performs a data transfer to the address which it appointed in the register address which it wrote in at the second byte and it complete data transfer in BLANK”0” and write in it. When data continues after this, register address is automatically incremented after the fourth byte and a data transfer is completed each time and, in BLANK”0”, writes in it.

Data Forward continuous from designated register address is enabled, but, as for the redirecting address of the next byte, it is in this way with for “00h” when register address becomes “1Fh”.

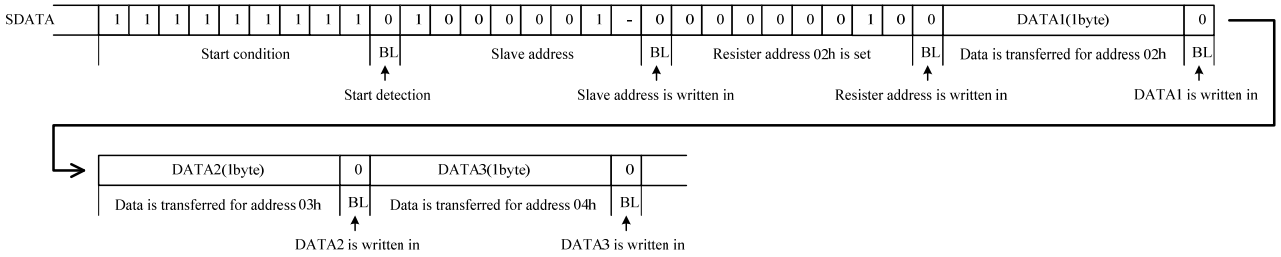
In addition, when serial data uptake BLANK is “1”, including slave address selection and register address assignment, the single byte data just before it is ignored without being written in, and the subsequent data is ignored until it is detected a start.

Serial data transfer example (slave address=1000 001-)

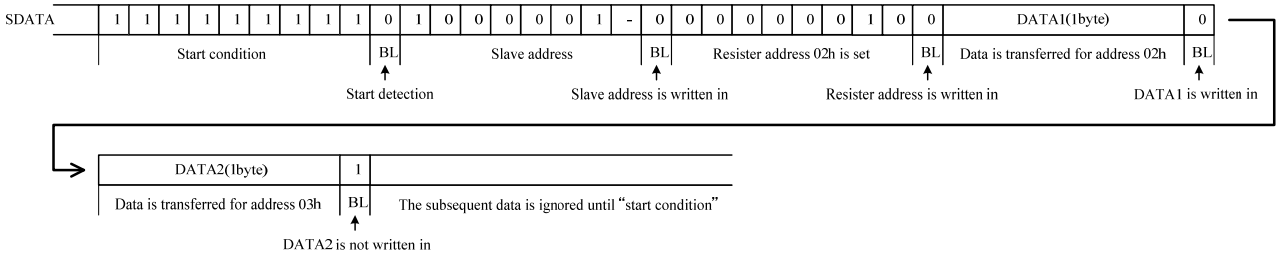
When I set register address 02h and write in data (the smallest data length)



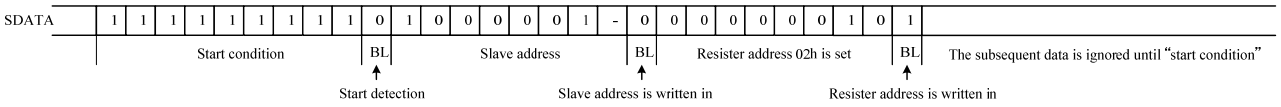
When I set register address 02h and write in data for 3 bytes



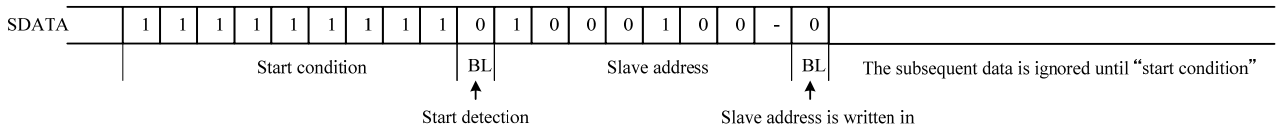
When I set register address 02h and write in data for 1 byte, and BLANK after the following byte in the case of “1”



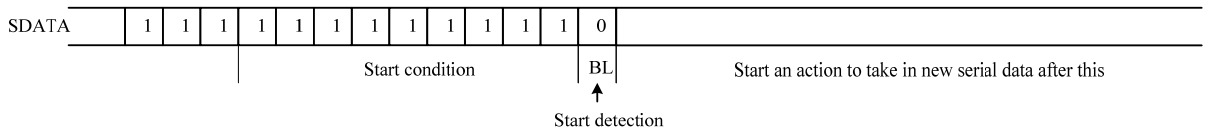
When I set register address 02h, but BLANK after the byte in the case of “1”



When slave address does not accord



SDATA continues more than 10bit; and in the case of 1 "" (start detection of this case)



Slave address condition

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

:LV5239

Terminal PIN					SA7	SA6	SA5	SA4	SA3	SA2	SA1	SA0
A4	A3	A2	A1	A0								
L	L	L	L	L	1	0	0	0	0	0	0	-
L	L	L	L	H	1	0	0	0	0	0	1	-
L	L	L	H	L	1	0	0	0	0	1	0	-
L	L	L	H	H	1	0	0	0	0	1	1	-
L	L	H	L	L	1	0	0	0	1	0	0	-
L	L	H	L	H	1	0	0	0	1	0	1	-
L	L	H	H	L	1	0	0	0	1	1	0	-
L	L	H	H	H	1	0	0	0	1	1	1	-
L	H	L	L	L	1	0	0	1	0	0	0	-
L	H	L	L	H	1	0	0	1	0	0	1	-
L	H	L	H	L	1	0	0	1	0	1	0	-
L	H	L	H	H	1	0	0	1	0	1	1	-
L	H	H	L	L	1	0	0	1	1	0	0	-
L	H	H	L	H	1	0	0	1	1	0	1	-
L	H	H	H	L	1	0	0	1	1	1	0	-
L	H	H	H	H	1	0	0	1	1	1	1	-
H	L	L	L	L	1	0	1	0	0	0	0	-
H	L	L	L	H	1	0	1	0	0	0	1	-
H	L	L	H	L	1	0	1	0	0	1	0	-
H	L	L	H	H	1	0	1	0	0	1	1	-
H	L	H	L	L	1	0	1	0	1	0	0	-
H	L	H	L	H	1	0	1	0	1	0	1	-
H	L	H	H	L	1	0	1	0	1	1	0	-
H	L	H	H	H	1	0	1	0	1	1	1	-
H	H	L	L	L	1	0	1	1	0	0	0	-
H	H	L	L	H	1	0	1	1	0	0	1	-
H	H	L	H	L	1	0	1	1	0	1	0	-
H	H	L	H	H	1	0	1	1	0	1	1	-
H	H	H	L	L	1	0	1	1	1	0	0	-
H	H	H	L	H	1	0	1	1	1	0	1	-
H	H	H	H	L	1	0	1	1	1	1	0	-
H	H	H	H	H	1	0	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]	-	-	RLED[2]	RLED[1]	RLED[0]
default	0	0	0	0	0	0	0	0

D7	D6	D5	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

D2	D1	D0	Current value (mA)
0	0	0	6.40
0	0	1	10.15
0	1	0	13.90
0	1	1	17.65
1	0	0	21.15
1	0	1	24.90
1	1	0	28.65
1	1	1	32.40

RLED current value setting

* Default

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

D2	D1	D0	Current value (mA)
0	0	0	6.40
0	0	1	10.15
0	1	0	13.90
0	1	1	17.65
1	0	0	21.15
1	0	1	24.90
1	1	0	28.65
1	1	1	32.40

GLED current value setting

* Default

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

D2	D1	D0	Current value (mA)
0	0	0	6.40
0	0	1	10.15
0	1	0	13.90
0	1	1	17.65
1	0	0	21.15
1	0	1	24.90
1	1	0	28.65
1	1	1	32.40

BLED current value setting

* Default

	ADDRESS : 03h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R8OUT	R7OUT	R6OUT	R5OUT	R4OUT	R3OUT	R2OUT	R1OUT
default	0	0	0	0	0	0	0	0

D7	R8OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR8 output duty setting

* Default

D6	R7OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR7 output duty setting

* Default

D5	R6OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR6 output duty setting

* Default

D4	R5OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR5 output duty setting

* Default

D3	R4OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR4 output duty setting

* Default

D2	R3OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR3 output duty setting

* Default

D1	R2OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR2 output duty setting

* Default

D0	R1OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDR1 output duty setting

* Default

	ADDRESS : 04h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G8OUT	G7OUT	G6OUT	G5OUT	G4OUT	G3OUT	G2OUT	G1OUT
default	0	0	0	0	0	0	0	0

D7	G8OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG8 output duty setting

* Default

D6	G7OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG7 output duty setting

* Default

D5	G6OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG6 output duty setting

* Default

D4	G5OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG5 output duty setting

* Default

D3	G4OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG4 output duty setting

* Default

D2	G3OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG3 output duty setting

* Default

D1	G2OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG2 output duty setting

* Default

D0	G1OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDG1 output duty setting

* Default

	ADDRESS : 05h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B8OUT	B7OUT	B6OUT	B5OUT	B4OUT	B3OUT	B2OUT	B1OUT
default	0	0	0	0	0	0	0	0

D7	B8OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB8 output duty setting

* Default

D6	B7OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB7 output duty setting

* Default

D5	B6OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB6 output duty setting

* Default

D4	B5OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB5 output duty setting

* Default

D3	B4OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB4 output duty setting

* Default

D2	B3OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB3 output duty setting

* Default

D1	B2OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB2 output duty setting

* Default

D0	B1OUT
0	PWM mode-Duty setting
1	100%-Duty setting

LEDB1 output duty setting

* Default

	ADDRESS : 06h							
	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 : 07h							
	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 : 08h							
	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 : 09h							
	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 : 0ah							
	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 : 0bh							
	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 : 0ch							
	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 : 0dh							
	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 : 0eh							
	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

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

	ADDRESS : 0fh							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R4PWM[7]	R4PWM[6]	R4PWM[5]	R4PWM[4]	R4PWM[3]	R4PWM[2]	R4PWM[1]	R4PWM[0]
default	0	0	0	0	0	0	0	0

LEDR4 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R4PWM[7:0]}}{256}$$

	ADDRESS : 10h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G4PWM[7]	G4PWM[6]	G4PWM[5]	G4PWM[4]	G4PWM[3]	G4PWM[2]	G4PWM[1]	G4PWM[0]
default	0	0	0	0	0	0	0	0

LEDG4 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G4PWM[7:0]}}{256}$$

	ADDRESS : 11h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B4PWM[7]	B4PWM[6]	B4PWM[5]	B4PWM[4]	B4PWM[3]	B4PWM[2]	B4PWM[1]	B4PWM[0]
default	0	0	0	0	0	0	0	0

LEDB4 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B4PWM[7:0]}}{256}$$

	ADDRESS : 12h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R5PWM[7]	R5PWM[6]	R5PWM[5]	R5PWM[4]	R5PWM[3]	R5PWM[2]	R5PWM[1]	R5PWM[0]
default	0	0	0	0	0	0	0	0

LEDR5 PWM Duty setting (DefaultALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R5PWM[7:0]}}{256}$$

	ADDRESS : 13h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G5PWM[7]	G5PWM[6]	G5PWM[5]	G5PWM[4]	G5PWM[3]	G5PWM[2]	G5PWM[1]	G5PWM[0]
default	0	0	0	0	0	0	0	0

LEDG5 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G5PWM[7:0]}}{256}$$

	ADDRESS : 14h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B5PWM[7]	B5PWM[6]	B5PWM[5]	B5PWM[4]	B5PWM[3]	B5PWM[2]	B5PWM[1]	B5PWM[0]
default	0	0	0	0	0	0	0	0

LEDB5 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B5PWM[7:0]}}{256}$$

	ADDRESS : 15h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R6PWM[7]	R6PWM[6]	R6PWM[5]	R6PWM[4]	R6PWM[3]	R6PWM[2]	R6PWM[1]	R6PWM[0]
default	0	0	0	0	0	0	0	0

LEDR6 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R6PWM[7:0]}}{256}$$

	ADDRESS : 16h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G6PWM[7]	G6PWM[6]	G6PWM[5]	G6PWM[4]	G6PWM[3]	G6PWM[2]	G6PWM[1]	G6PWM[0]
default	0	0	0	0	0	0	0	0

LEDG6 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G6PWM[7:0]}}{256}$$

	ADDRESS : 17h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B6PWM[7]	B6PWM[6]	B6PWM[5]	B6PWM[4]	B6PWM[3]	B6PWM[2]	B6PWM[1]	B6PWM[0]
default	0	0	0	0	0	0	0	0

LEDB6 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B6PWM[7:0]}}{256}$$

	ADDRESS : 18h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R7PWM[7]	R7PWM[6]	R7PWM[5]	R7PWM[4]	R7PWM[3]	R7PWM[2]	R7PWM[1]	R7PWM[0]
default	0	0	0	0	0	0	0	0

LEDR7 PWM Duty setting (DefaultALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R7PWM[7:0]}}{256}$$

	ADDRESS : 19h							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G7PWM[7]	G7PWM[6]	G7PWM[5]	G7PWM[4]	G7PWM[3]	G7PWM[2]	G7PWM[1]	G7PWM[0]
default	0	0	0	0	0	0	0	0

LEDG7 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G7PWM[7:0]}}{256}$$

	ADDRESS : 1ah							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B7PWM[7]	B7PWM[6]	B7PWM[5]	B7PWM[4]	B7PWM[3]	B7PWM[2]	B7PWM[1]	B7PWM[0]
default	0	0	0	0	0	0	0	0

LEDB7 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B7PWM[7:0]}}{256}$$

	ADDRESS : 1bh							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	R8PWM[7]	R8PWM[6]	R8PWM[5]	R8PWM[4]	R8PWM[3]	R8PWM[2]	R8PWM[1]	R8PWM[0]
default	0	0	0	0	0	0	0	0

LEDR8 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{R8PWM[7:0]}}{256}$$

	ADDRESS : 1ch							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	G8PWM[7]	G8PWM[6]	G8PWM[5]	G8PWM[4]	G8PWM[3]	G8PWM[2]	G8PWM[1]	G8PWM[0]
default	0	0	0	0	0	0	0	0

LEDG8 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{G8PWM[7:0]}}{256}$$

	ADDRESS : 1dh							
	D7	D6	D5	D4	D3	D2	D1	D0
register name	B8PWM[7]	B8PWM[6]	B8PWM[5]	B8PWM[4]	B8PWM[3]	B8PWM[2]	B8PWM[1]	B8PWM[0]
default	0	0	0	0	0	0	0	0

LEDB8 PWM Duty setting (Default ALL0)

D	Duty (%)
00h	0.0
ffh	99.6

$$\text{Duty (\%)} = \frac{\text{B8PWM[7:0]}}{256}$$

LV5239TA 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]			×	×	RLED[2:0]		
									0	0	0	0	0	0	0	0
01h	0	0	0	0	0	0	0	1	×	×	×	×	×	GLED[2:0]		
									0	0	0	0	0	0	0	0
02h	0	0	0	0	0	0	1	0	×	×	×	×	×	BLED[2:0]		
									0	0	0	0	0	0	0	0
03h	0	0	0	0	0	0	1	1	R8OUT	R7OUT	R6OUT	R5OUT	R4OUT	R3OUT	R2OUT	R1OUT
									0	0	0	0	0	0	0	0
04h	0	0	0	0	0	1	0	0	G8OUT	G7OUT	G6OUT	G5OUT	G4OUT	G3OUT	G2OUT	G1OUT
									0	0	0	0	0	0	0	0
05h	0	0	0	0	0	1	0	1	B8OUT	B7OUT	B6OUT	B5OUT	B4OUT	B3OUT	B2OUT	B1OUT
									0	0	0	0	0	0	0	0
06h	0	0	0	0	0	1	1	0	R1PWM[7:0]							
									0	0	0	0	0	0	0	0
07h	0	0	0	0	0	1	1	1	G1PWM[7:0]							
									0	0	0	0	0	0	0	0
08h	0	0	0	0	1	0	0	0	B1PWM[7:0]							
									0	0	0	0	0	0	0	0
09h	0	0	0	0	1	0	0	1	R2PWM[7:0]							
									0	0	0	0	0	0	0	0
0ah	0	0	0	0	1	0	1	0	G2PWM[7:0]							
									0	0	0	0	0	0	0	0
0bh	0	0	0	0	1	0	1	1	B2PWM[7:0]							
									0	0	0	0	0	0	0	0
0ch	0	0	0	0	1	1	0	0	R3PWM[7:0]							
									0	0	0	0	0	0	0	0
0dh	0	0	0	0	1	1	0	1	G3PWM[7:0]							
									0	0	0	0	0	0	0	0
0eh	0	0	0	0	1	1	1	0	B3PWM[7:0]							
									0	0	0	0	0	0	0	0
0fh	0	0	0	0	1	1	1	1	R4PWM[7:0]							
									0	0	0	0	0	0	0	0
10h	0	0	0	1	0	0	0	0	G4PWM[7:0]							
									0	0	0	0	0	0	0	0
11h	0	0	0	1	0	0	0	1	B4PWM[7:0]							
									0	0	0	0	0	0	0	0
12h	0	0	0	1	0	0	1	0	R5PWM[7:0]							
									0	0	0	0	0	0	0	0
13h	0	0	0	1	0	0	1	1	G5PWM[7:0]							
									0	0	0	0	0	0	0	0
14h	0	0	0	1	0	1	0	0	B5PWM[7:0]							
									0	0	0	0	0	0	0	0
15h	0	0	0	1	0	1	0	1	R6PWM[7:0]							
									0	0	0	0	0	0	0	0
16h	0	0	0	1	0	1	1	0	G6PWM[7:0]							
									0	0	0	0	0	0	0	0
17h	0	0	0	1	0	1	1	1	B6PWM[7:0]							
									0	0	0	0	0	0	0	0
18h	0	0	0	1	1	0	0	0	R7PWM[7:0]							
									0	0	0	0	0	0	0	0
19h	0	0	0	1	1	0	0	1	G7PWM[7:0]							
									0	0	0	0	0	0	0	0
1ah	0	0	0	1	1	0	1	0	B7PWM[7:0]							
									0	0	0	0	0	0	0	0
	Register address								Data							

Continued on next page.

Continued from preceding page.

	A7	A6	A5	A4	A3	A2	A1	A0	D7	D6	D5	D4	D3	D2	D1	D0
1bh	0	0	0	1	1	0	1	1	R8PWM[7:0]							
									0	0	0	0	0	0	0	0
1ch	0	0	0	1	1	1	0	0	G8PWM[7:0]							
									0	0	0	0	0	0	0	0
1dh	0	0	0	1	1	1	0	1	B8PWM[7:0]							
									0	0	0	0	0	0	0	0
	Register address								Data							

ORDERING INFORMATION

Device	Package	Shipping (Qty / Packing)
LV5239TAZ-NH	TQFP48 EP 7x7, 0.5P (Pb-Free / Halogen Free)	1000 / Tape & Reel

† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D. http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF

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