



SANYO Semiconductors

DATA SHEET

An ON Semiconductor Company

LV5231CS — Bi-CMOS IC LED Driver

Overview

The LV5231CS is 16ch LED driver IC for the cell phones with built-in charge pump circuit.

Features

- LED driver ×16 (3-color ×2, MAIN, Flash) and on-chip switching regulator control circuit.
- Each LED driver current level can be adjusted independently over the serial bus.
- Support strobe mode of LED for flash.
- Ring tone signal and 3-color LEDs synchronization function.
- Gradation function (3-color LEDs)
- Miniature package

Function

- PWM switching regulator control circuit
Built-in Triangular wave oscillator, Standard voltage, PWM comparator, Driver, DTC and short-circuit protection circuit.
The output interception circuit at the overload is a timer latch method.
- LED driver
LED driver for the main liquid crystal backlight ×6
LED current can be switched indecently in 6-bit units (0.4 to 25.6mA)
External current value control pin is provided.
As for MLED6, a possible independent control (0.6 to 19.2mA)
3-colorLEDs driver ×2
LED current can be switched indecently in 5-bit units (0.5 to 16mA)
Ring tone synchronization function (forced activation with SCTL: High)
It corresponds to the information mode. RGBLED1 only, Built-in low current consumption internal oscillator
Gradation function
Twice current mode (1 to 32mA) RGBLED2 only
LED driver for flash ×4
LED current can be switched indecently in 4-bit units (2 to 32mA)
At the strobe mode (6 to 96mA) (FCTL: High)
Flash mode 1sec limiter (It is an automatic migration in a normal mode after about 1sec at continuousness High of FCTL).
As for FLED3 and FLED4, a possible independent control.

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Specifications

Maximum Ratings at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|------------------------------|-------------|------|
| Maximum supply voltage | V _{CC} max | | 6 | V |
| Allowable power dissipation | Pd max | * Mounted on a circuit board | 850 | mW |
| Operating temperature | T _{opr} | | -30 to +75 | °C |
| Storage temperature | T _{stg} | | -40 to +125 | °C |

* Specified board: 40mm × 50mm × 0.8mm, glass epoxy board. (2S2P (4-layer board))

Operating Conditions at Ta = 25°C

| Parameter | Symbol | Conditions | Ratings | Unit |
|------------------|------------------|------------|--------------------------|------|
| Supply voltage 1 | V _{BAT} | | 3.0 to 4.5 | V |
| Supply voltage 2 | V _{DD} | | 1.65 to V _{BAT} | V |

Electrical Characteristics at Ta = 25°C, V_{BAT} = 3.7V, V_{DD} = 2.6V unless otherwise specified.

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---|--|---|-----------------------|-----------------------|------|------|
| | | | min | typ | max | |
| Consumption current | | | | | | |
| Consumption current | I _{CC1} | V _{BAT} +V _{DD} consumption current RESET: Low (when reset) | | 0 | 5 | μA |
| | I _{CC2} | V _{BAT} +V _{DD} consumption current RESET: High in serial default | | 0.5 | 5 | μA |
| | I _{CC3} | V _{BAT} +V _{DD} consumption current RESET: High, STBY=1, When clock operates | | 1.2 | | mA |
| | I _{CC4} | V _{BAT} +V _{DD} consumption current When switching regulator operates | | 3.6 | 5 | mA |
| | I _{CC5} | V _{BAT} +V _{DD} consumption current Information LED lighting mode Current consumption when turning it off | | 5 | 8 | μA |
| Switching regulator control blocks Error Amp. | | | | | | |
| IN pin internal voltage | V01 | I _O =100mA, At 4.9V setting of output | 4.7 | 4.9 | 5.1 | V |
| LED pin voltage | V02 | Voltage of LED pin at MLED current setting 20mA time. Load MLED current | 0.25 | 0.40 | 0.55 | V |
| Dormant period Coordination block | | | | | | |
| Threshold voltage | V _{D1} | Duty cycle=100% | 0.25 | 0.30 | 0.35 | V |
| | V _{D2} | Duty cycle=Min | 0.75 | 0.80 | 0.85 | V |
| Output block | | | | | | |
| Output LOW voltage | V _L | V _{IN} =0V, I _O =10mA | | 0.1 | 0.3 | V |
| Output High voltage | V _H | V _{IN} =0V, I _O =10mA | V _{BAT} -0.3 | V _{BAT} -0.1 | | V |
| Triangular wave oscillator block | | | | | | |
| Oscillatory frequency | f _{OSC} | | 900 | 1000 | 1100 | kHz |
| LED driver block | | | | | | |
| Minimum output current value | I _{MIN1} | 3-color 1, 2 LED driver, Current value setting Min., V _O =0.5V | 0.2 | 0.5 | 1.0 | mA |
| | | 3-color 2 LED driver, Current value setting Min. V _O =0.5V, Twice current mode | 0.2 | 1.0 | 2.0 | mA |
| | I _{MIN2} | MAIN LED driver, Current value setting Min. V _O =0.5V | 0.1 | 0.4 | 1.0 | mA |
| | I _{MIN3} | Flash LED driver, Current value setting Min., V _O =0.5V | 0.5 | 2.0 | 4.0 | mA |
| | I _{MIN4} | Flash LED driver, Current value setting Min., V _O =0.5V, FCTL=High | 1 | 6 | 12 | mA |
| | I _{MIN5} | LED driver(MLED6 a possible independent mode), Current value setting Min., V _O =0.5V | 0.2 | 0.6 | 1.2 | mA |
| I _{MIN6} | LED driver(FLED3 and FLED4, a possible independent mode), Current value setting Min., V _O =0.5V | 0.2 | 1.0 | 2.0 | mA | |

Continued on next page.

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Continued from preceding page.

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---------------------------------|-------------------|--|----------------------|------|----------------------|------|
| | | | min | typ | max | |
| Maximum output current value | I _{MAX1} | 3-color 1, 2 LED driver, Current value setting Max., V _O =0.5V | 14.5 | 16.0 | 17.5 | mA |
| | | 3-color 2 LED driver, Current value setting Max. V _O =0.5V, Twice current mode | 29 | 32 | 35 | mA |
| | I _{MAX2} | MAIN LED driver, Current value setting Max., V _O =0.5V | 23.0 | 25.6 | 28.2 | mA |
| | I _{MAX3} | Flash LED driver, Current value setting Max. V _O =0.55V | 29 | 32 | 35 | mA |
| | I _{MAX4} | Flash LED driver, Current value setting Max., V _O =0.6V, FCTL=High | 87 | 96 | 105 | mA |
| | I _{MAX5} | LED driver(MLED6 a possible independent mode), Current value setting Max., V _O =0.5V | 17.4 | 19.2 | 21.0 | mA |
| | I _{MAX6} | LED driver(FLED3 and FLED4, a possible independent mode), Current value setting Max., V _O =0.5V | 29 | 32 | 35 | mA |
| Maximum output current | ΔI _{L1} | 3-color LED driver, Maximum current setting, Voltage of PIN that becomes -10% of current value of V _O =2V time | | | 0.3 | V |
| | ΔI _{L2} | MAIN LED driver, Maximum current setting, Voltage of PIN that becomes -10% of current value of V _O =2V time | | | 0.25 | V |
| | ΔI _{L3} | Flash LED driver, Maximum current setting, Voltage of PIN that becomes -10% of current value of V _O =2V time | | | 0.55 | V |
| | ΔI _{L4} | Flash LED driver, FCTL=High, Maximum current setting, Voltage of PIN that becomes -10% of current value of V _O =2V time | | | 0.6 | V |
| Leakage current | I _{L1} | 3-color LED driver, LED driver: OFF, V _O =0.5V | | | 1 | μA |
| | I _{L2} | MAIN LED driver, LED driver: OFF, V _O =0.5V | | | 1 | μA |
| | I _{L3} | Flash LED driver, LED driver: OFF, V _O =0.5V | | | 1 | μA |
| Non-linearity error *1 | LE1 | All LED driver, Current value: to 3mA | -1 | | 1 | LSB |
| | LE2 | All LED driver, Current value: 3 to 8mA | -1.5 | | 1.5 | LSB |
| | LE3 | All LED driver, Current value: 8mA over | -10 | | 10 | % |
| Differential linearity error *2 | DLE1 | 3-color 1, 2 LED driver, Flash LED driver, MLED6 a possible independent mode, FLED3 and FLED4 a possible independent mode | -1 | | 1 | LSB |
| | DLE1 | MAIN LED driver | -1 | | 2 | LSB |
| Control circuit block | | | | | | |
| High level 1 | V _{INH1} | Input High level, FCTL, SCTL | 1.5 | | V _{BAT} | V |
| Low level 1 | V _{INL1} | Input Low level, FCTL, SCTL | 0 | | 0.3 | V |
| High level 2 | V _{INH2} | Input High level, Serial signal input PIN | V _{DD} ×0.8 | | | V |
| Low level 2 | V _{INL2} | Input Low level, Serial signal input PIN | 0 | | V _{DD} ×0.2 | V |
| High level 3 | V _{INH3} | Input High level, RESET | 1.5 | | | V |
| Low level 3 | V _{INL3} | Input Low level, RESET | 0 | | 0.3 | V |
| High output level 1 | V _{H01} | Output High level, INTO, I _L =1mA | V _{DD} -0.3 | | | V |
| Low output level 1 | V _{L01} | Output Low level, INTO, I _L =-1mA | 0 | | 0.3 | V |
| High input current 4 | I _{HIN4} | IN/OUT Current when V _{DD} voltage is charged to SCTL pin and FCTL pin | 15 | 47 | 75 | μA |
| Low input current 4 | I _{LIN4} | IN/OUT Current when 0V is charged to SCTL pin and FCTL pin | -1 | 0 | 1 | μA |

*1. Non-linearity error: The difference between the actual and ideal current values.

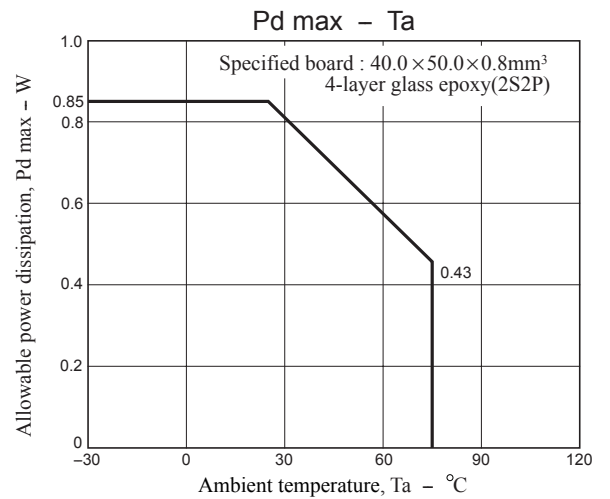
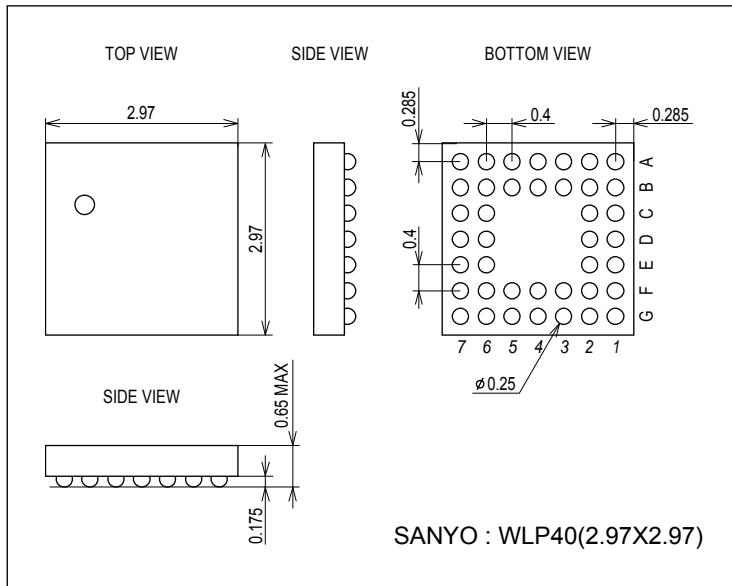
*2. Differential linearity error: The difference between the actual and ideal increment when one low-order bit value is added.

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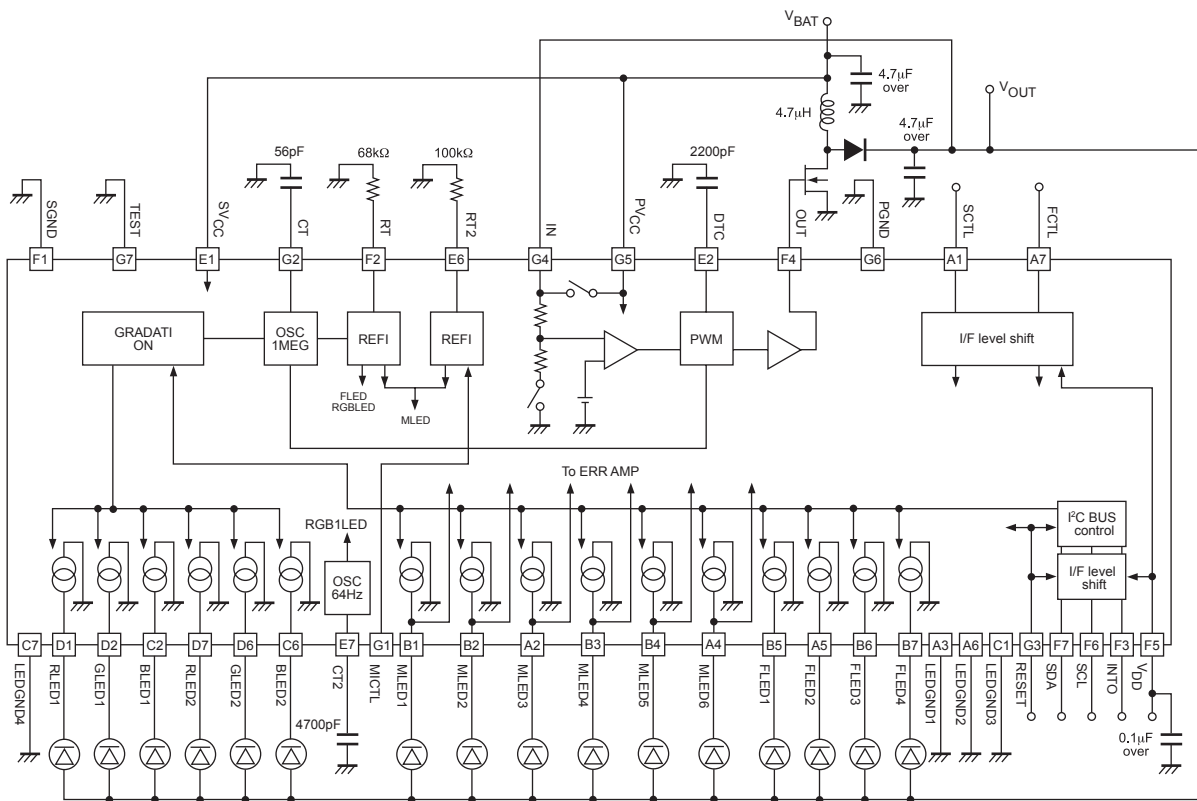
Package Dimensions

unit : mm (typ)

3413



Block Diagram



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Pin Descriptions

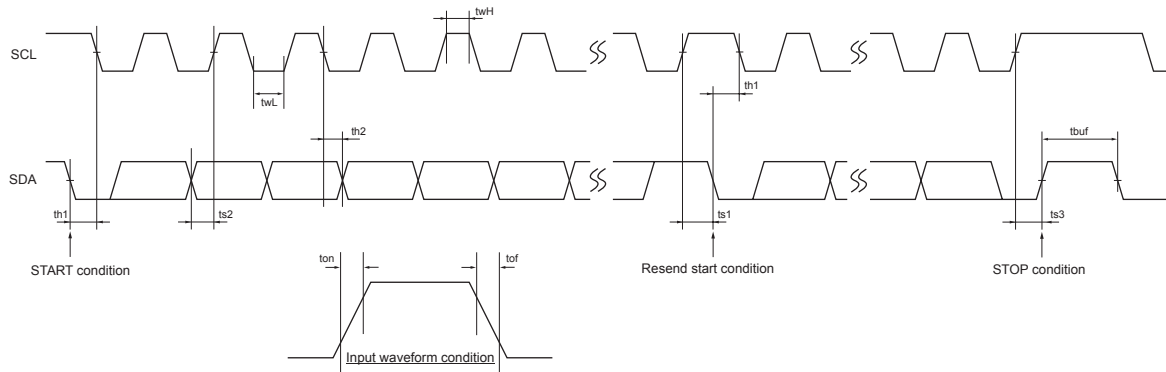
| | G | F | E | D | C | B | A | |
|---|------------------|-----------------|------------------|-------|---------------------|-------|---------------------|---|
| 1 | MICTL | SGND | SV _{CC} | RLED1 | LEDGN _{D3} | MLED1 | SCTL | 1 |
| 2 | CT | RT | DTC | GLED1 | BLED1 | MLED2 | MLED3 | 2 |
| 3 | RESET | INTO | | | | MLED4 | LEDGN _{D1} | 3 |
| 4 | IN | OUT | | | | MLED5 | MLED6 | 4 |
| 5 | PV _{CC} | V _{DD} | | | | FLED1 | FLED2 | 5 |
| 6 | PGND | SCL | RT2 | GLED2 | BLED2 | FLED3 | LEDGN _{D2} | 6 |
| 7 | TEST | SDA | CT2 | RLED2 | LEDGN _{D4} | FLED4 | FCTL | 7 |
| | G | F | E | D | C | B | A | |

| Pin No. | Pin name | Description | Protection diode vs. V _{BAT} | Protection diode vs. GND | Pin No. | Pin name | Description | Protection diode vs. V _{BAT} | Protection diode vs. GND |
|---------|----------|--|---------------------------------------|--------------------------|---------|------------------|---|---------------------------------------|--------------------------|
| A1 | SCTL | Ring tone synchronization signal input pin | | ○ | D6 | GLED2 | GLED2 driver output pin | | ○ |
| A2 | MLED3 | MLED3 driver output pin | | ○ | D7 | RLED2 | RLED2 driver output pin | | ○ |
| A3 | LEDGND1 | GND for LED driver | | | E1 | SV _{CC} | Power supply pin for signal processing circuit | | ○ |
| A4 | MLED6 | MLED6 driver output pin | | ○ | E2 | DTC | DTC setting pin | ○ | ○ |
| A5 | FLED2 | FLED2 driver output pin | | ○ | E6 | RT2 | External control MLED current setting resistance connection pin | ○ | ○ |
| A6 | LEDGND2 | GND for LED driver | | | E7 | CT2 | Information mode frequency setting capacity connection pin | ○ | ○ |
| A7 | FCTL | | | ○ | F1 | SGND | GND for signal processing circuit | | ○ |
| B1 | MLED1 | MLED1 driver output pin | | ○ | F2 | RT | Standard current setting resistance connection pin | ○ | ○ |
| B2 | MLED2 | MLED2 driver output pin | | ○ | F3 | INTO | INTO output pin | ○ | ○ |
| B3 | MLED4 | MLED4 driver output pin | | ○ | F4 | OUT | Switching regulator PWM signal output pin | ○ | ○ |
| B4 | MLED5 | MLED5 driver output pin | | ○ | F5 | V _{DD} | Power supply input pin for Serial signal I/F | ○ | ○ |
| B5 | FLED1 | FLED1 driver output pin | | ○ | F6 | SCL | I ² C clock signal input pin | | ○ |
| B6 | FLED3 | FLED3 driver output pin | | ○ | F7 | SDA | I ² C data signal input pin | | ○ |
| B7 | FLED4 | FLED4 driver output pin | | ○ | G1 | MICTL | External control MLED current control pin | ○ | ○ |
| C1 | LEDGND3 | GND for LED driver | | | G2 | CT | Setting of frequency of oscillator capacity connection pin | ○ | ○ |
| C2 | BLED1 | BLED1 driver output pin | | ○ | G3 | RESET | RESET signal input pin | | ○ |
| C6 | BLED2 | BLED2 driver output pin | | ○ | G4 | IN | Switching regulator output voltage input pin | | ○ |
| C7 | LEDGND4 | GND for LED driver | | | G5 | PV _{CC} | Power supply only for OUT pin internal driver | | ○ |
| D1 | RLED1 | RLED1 driver output pin | | ○ | G6 | PGND | GND only for OUT pin internal driver | | ○ |
| D2 | GLED1 | GLED1 driver output pin | | ○ | G7 | TEST | TEST pin | ○ | ○ |

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Serial Bus Communication Specifications

1) I²C 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 |

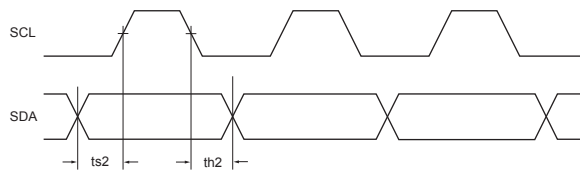
High-speed mode

| 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 |

2) I²C bus transfer method

Start and stop conditions

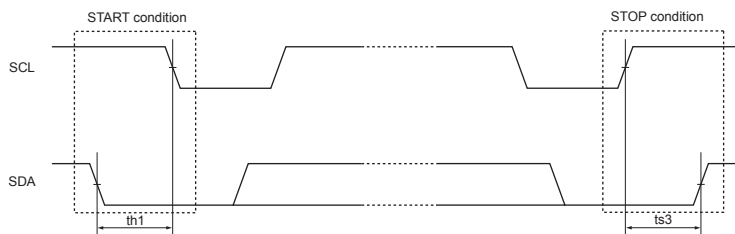
During data transfer operation using the I²C bus, SDA must basically be kept in constant state while SCL is "H" as shown below.



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.

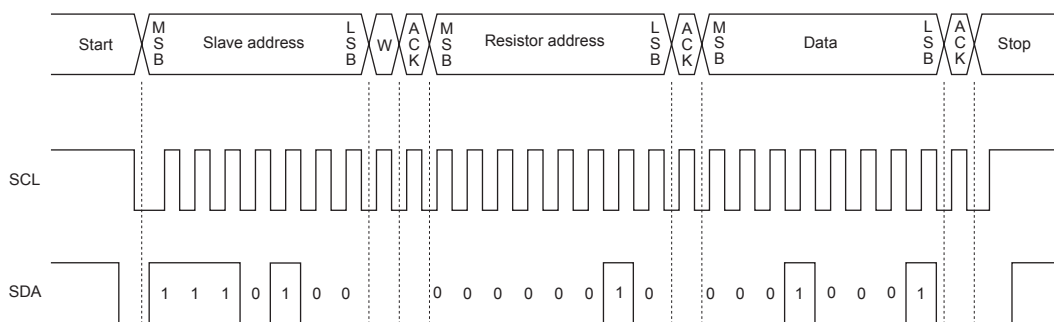
Any number of bytes of data can be transferred continuously.

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 I²C 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.

In the LV5231CS the slave address is specified as "1110100"



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Serial mode setting

| | | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| 00h | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|

| | |
|----|------|
| D0 | STBY |
| 0 | OFF |
| 1 | ON |

Standby mode setting

*Default

| | |
|----|------|
| D1 | RGSW |
| 0 | OFF |
| 1 | ON |

SW regulator setting

*Default

| | |
|----|-------|
| D2 | FXSW |
| 0 | OFF |
| 1 | Fixed |

Output voltage mode setting

*Default

(Fixed: It fixes to the voltage set with serial VD.)

| | |
|----|-----|
| D3 | MSW |
| 0 | OFF |
| 1 | ON |

MAIN LED output setting

*Default

| | |
|----|-------|
| D4 | MLED6 |
| 0 | OFF |
| 1 | ON |

MLED6 output setting

*Default

MLED6: Turn on MSW when you turn it on.

| | |
|----|-------|
| D5 | MLED5 |
| 0 | OFF |
| 1 | ON |

MLED5 output setting

*Default

MLED5: Turn on MSW when you turn it on.

| | |
|----|-------|
| D6 | MLED4 |
| 0 | OFF |
| 1 | ON |

MLED4 output setting

*Default

MLED4: Turn on MSW when you turn it on.

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| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 01h | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|

| | |
|----|------|
| D0 | R1SW |
| 0 | OFF |
| 1 | ON |

RLED1 output setting
*Default

| | |
|----|------|
| D1 | G1SW |
| 0 | OFF |
| 1 | ON |

GLED1 output setting
*Default

| | |
|----|------|
| D2 | B1SW |
| 0 | OFF |
| 1 | ON |

BLED1 output setting
*Default

| | |
|----|------|
| D3 | R2SW |
| 0 | OFF |
| 1 | ON |

RLED2 output setting
*Default

| | |
|----|------|
| D4 | G2SW |
| 0 | OFF |
| 1 | ON |

GLED2 output setting
*Default

| | |
|----|------|
| D5 | B2SW |
| 0 | OFF |
| 1 | ON |

BLED2 output setting
*Default

| | |
|----|-------|
| D6 | EXTSW |
| 0 | OFF |
| 1 | ON |

Information mode setting
*Default Normal
 For SLEEP at information

| | |
|----|--------|
| D7 | RGB2X2 |
| 0 | OFF |
| 1 | ON |

RGBLED Twice current mode
*Default One time mode
 Twice mode

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| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|----|---|---|----|----|----|----|
| 02h | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | D7 | D6 | 0 | 0 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|----|---|---|----|----|----|----|

| | |
|----|------|
| D0 | F1SW |
| 0 | OFF |
| 1 | ON |

Flash LED1 output setting
*Default

| | |
|----|------|
| D1 | F2SW |
| 0 | OFF |
| 1 | ON |

Flash LED2 output setting
*Default

| | |
|----|------|
| D2 | F3SW |
| 0 | OFF |
| 1 | ON |

Flash LED3 output setting
*Default

| | |
|----|------|
| D3 | F4SW |
| 0 | OFF |
| 1 | ON |

Flash LED4 output setting
*Default

| | |
|----|--------|
| D6 | SCTEN2 |
| 0 | OFF |
| 1 | ON |

SCTL signal enable RLED2, GLED2 and BLED2 setting
*Default

| | |
|----|--------|
| D7 | SCTEN1 |
| 0 | OFF |
| 1 | ON |

SCTL signal enable RLED1, GLED1 and BLED1 setting
*Default

*SCTL turns three colors LED on and off by the external synchronous pin input because of the sound synchronization from sound source LSI etc.

* Effective/invalidity of the SCTL signal can be specified by SCTL signal enable setting.

The relation among SCTEN, SCTL, RLED, GLED, and BLED: as shown in the following table.

| SCTEN1 | SCTL pin | RLED1, BLED1, GLED1 state |
|--------|----------|---------------------------|
| 0 | Low | Turning off |
| 0 | High | Possible to light |
| 1 | Low | Possible to light |
| 1 | High | Possible to light |

When turning it off, it compulsion turns it off regardless of the serial command.

Lighting by R1SW, G1SW and B1SW of the serial command, or automatic ON/OFF lighting in the gradation mode.

| SCTEN2 | SCTL pin | RLED2, BLED2, GLED2 state |
|--------|----------|---------------------------|
| 0 | Low | Turning off |
| 0 | High | Possible to light |
| 1 | Low | Possible to light |
| 1 | High | Possible to light |

When turning it off, it compulsion turns it off regardless of the serial command.

Lighting by R1SW, G1SW and B1SW of the serial command, or automatic ON/OFF lighting in the gradation mode.

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| | | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|----|---|----|----|----|----|----|----|
| 03h | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | D7 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|----|---|----|----|----|----|----|----|

| | | | | | | MLED current value(mA) |
|----|----|----|----|----|----|------------------------|
| D5 | D4 | D3 | D2 | D1 | D0 | MAIN[5:0] |
| 0 | 0 | 0 | 0 | 0 | 0 | 0.4 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0.8 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1.2 |
| 0 | 0 | 0 | 0 | 1 | 1 | 1.6 |
| 0 | 0 | 0 | 1 | 0 | 0 | 2.0 |
| 0 | 0 | 0 | 1 | 0 | 1 | 2.4 |
| 0 | 0 | 0 | 1 | 1 | 0 | 2.8 |
| 0 | 0 | 0 | 1 | 1 | 1 | 3.2 |
| 0 | 0 | 1 | 0 | 0 | 0 | 3.6 |
| 0 | 0 | 1 | 0 | 0 | 1 | 4.0 |
| 0 | 0 | 1 | 0 | 1 | 0 | 4.4 |
| 0 | 0 | 1 | 0 | 1 | 1 | 4.8 |
| 0 | 0 | 1 | 1 | 0 | 0 | 5.2 |
| 0 | 0 | 1 | 1 | 0 | 1 | 5.6 |
| 0 | 0 | 1 | 1 | 1 | 0 | 6.0 |
| 0 | 0 | 1 | 1 | 1 | 1 | 6.4 |
| 0 | 1 | 0 | 0 | 0 | 0 | 6.8 |
| 0 | 1 | 0 | 0 | 0 | 1 | 7.2 |
| 0 | 1 | 0 | 0 | 1 | 0 | 7.6 |
| 0 | 1 | 0 | 0 | 1 | 1 | 8.0 |
| 0 | 1 | 0 | 1 | 0 | 0 | 8.4 |
| 0 | 1 | 0 | 1 | 0 | 1 | 8.8 |
| 0 | 1 | 0 | 1 | 1 | 0 | 9.2 |
| 0 | 1 | 0 | 1 | 1 | 1 | 9.6 |
| 0 | 1 | 1 | 0 | 0 | 0 | 10.0 |
| 0 | 1 | 1 | 0 | 0 | 1 | 10.4 |
| 0 | 1 | 1 | 0 | 1 | 0 | 10.8 |
| 0 | 1 | 1 | 0 | 1 | 1 | 11.2 |
| 0 | 1 | 1 | 1 | 0 | 0 | 11.6 |
| 0 | 1 | 1 | 1 | 0 | 1 | 12.0 |
| 0 | 1 | 1 | 1 | 1 | 0 | 12.4 |
| 0 | 1 | 1 | 1 | 1 | 1 | 12.8 |
| 1 | 0 | 0 | 0 | 0 | 0 | 13.2 |
| 1 | 0 | 0 | 0 | 0 | 1 | 13.6 |
| 1 | 0 | 0 | 0 | 1 | 0 | 14.0 |
| 1 | 0 | 0 | 0 | 1 | 1 | 14.4 |
| 1 | 0 | 0 | 1 | 0 | 0 | 14.8 |
| 1 | 0 | 0 | 1 | 0 | 1 | 15.2 |
| 1 | 0 | 0 | 1 | 1 | 0 | 15.6 |
| 1 | 0 | 0 | 1 | 1 | 1 | 16.0 |
| 1 | 0 | 1 | 0 | 0 | 0 | 16.4 |
| 1 | 0 | 1 | 0 | 0 | 1 | 16.8 |
| 1 | 0 | 1 | 0 | 1 | 0 | 17.2 |
| 1 | 0 | 1 | 0 | 1 | 1 | 17.6 |
| 1 | 0 | 1 | 1 | 0 | 0 | 18.0 |
| 1 | 0 | 1 | 1 | 0 | 1 | 18.4 |
| 1 | 0 | 1 | 1 | 1 | 0 | 18.8 |
| 1 | 0 | 1 | 1 | 1 | 1 | 19.2 |
| 1 | 1 | 0 | 0 | 0 | 0 | 19.6 |
| 1 | 1 | 0 | 0 | 0 | 1 | 20.0 |
| 1 | 1 | 0 | 0 | 1 | 0 | 20.4 |
| 1 | 1 | 0 | 0 | 1 | 1 | 20.8 |
| 1 | 1 | 0 | 1 | 0 | 0 | 21.2 |

MAIN current value setting

*Default

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Continued from preceding page.

| | | | | | | MLED current value(mA) |
|----|----|----|----|----|----|------------------------|
| D5 | D4 | D3 | D2 | D1 | D0 | MAIN[5:0] |
| 1 | 1 | 0 | 1 | 0 | 1 | 21.6 |
| 1 | 1 | 0 | 1 | 1 | 0 | 22.0 |
| 1 | 1 | 0 | 1 | 1 | 1 | 22.4 |
| 1 | 1 | 1 | 0 | 0 | 0 | 22.8 |
| 1 | 1 | 1 | 0 | 0 | 1 | 23.2 |
| 1 | 1 | 1 | 0 | 1 | 0 | 23.6 |
| 1 | 1 | 1 | 0 | 1 | 1 | 24.0 |
| 1 | 1 | 1 | 1 | 0 | 0 | 24.4 |
| 1 | 1 | 1 | 1 | 0 | 1 | 24.8 |
| 1 | 1 | 1 | 1 | 1 | 0 | 25.2 |
| 1 | 1 | 1 | 1 | 1 | 1 | 25.6 |

| D7 | VODET |
|----|--------------|
| 0 | - |
| 1 | Re-detection |

Mode setting that judges automatic pressure again

*Default

It becomes "0" and it enters the state of the acceptance after it detects it again.

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| 04h | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|

| D0 | RGB1VO |
|----|------------|
| 0 | No boost |
| 1 | Auto boost |

RLED1, GLED1 and BLED1 ON time boost setting

*Default

Automatic boost after LED pin LOW is detected. Boost is fixed voltage boost.

| D1 | RGB2VO |
|----|------------|
| 0 | No boost |
| 1 | Auto boost |

RLED2, GLED2, BLED2 ON time boost setting

*Default

Automatic boost after LED pin LOW is detected. Boost is fixed voltage boost.

| D2 | FLVO |
|----|------------|
| 0 | No boost |
| 1 | Auto boost |

FLED1, FLED2, FLED3, FLED4 ON time boost setting. FCTL=L

*Default

Automatic boost after LED pin LOW is detected. Boost is fixed voltage boost.

*It excludes it at an independent mode of FLED3 and FLED4.

It doesn't boost it automatically at an independent mode. Set the manual operation with FXSW.

| D3 | FHVO |
|----|----------------------------|
| 0 | Boost(Fixed voltage) |
| 1 | Boost(Auto output voltage) |

FLED1, FLED2, FLED3, FLED4 ON time boost setting. FCTL=H

*Default

LED pin LOW is detected and the pressure voltage is changeable.

*It excludes it at an independent mode of FLED3 and FLED4.

It doesn't boost it automatically at an independent mode. Set the manual operation with FXSW.

| D4 | FXVO |
|----|-----------------------------|
| 0 | LED pin fixed voltage boost |
| 1 | Fixed voltage boost |

MLED auto booster setting.

*Default

*It excludes it at an independent mode of MLED6.

It doesn't boost it automatically at an independent mode. Set the manual operation with FXSW.

Continued on next page.

LV5231CS

Continued from preceding page.

| | | | DC/DC output voltage(V) |
|----|----|----|-------------------------|
| D7 | D6 | D5 | VD[2:0] |
| 0 | 0 | 0 | 4.3 |
| 0 | 0 | 1 | 4.5 |
| 0 | 1 | 0 | 4.7 |
| 0 | 1 | 1 | 4.9 |
| 1 | 0 | 0 | 5.1 |
| 1 | 0 | 1 | 5.3 |
| 1 | 1 | 0 | 5.5 |
| 1 | 1 | 1 | Not possible to use |

Output DC setting
*Default

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|----|----|---|----|----|----|----|
| 05h | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | D7 | D6 | D5 | 0 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|----|----|---|----|----|----|----|

| | | | | MICTL voltage at 50% in MLED current time |
|----|----|----|----|---|
| D3 | D2 | D1 | D0 | MICTLC[3:0] |
| 0 | 0 | 0 | 0 | 1.10V |
| 0 | 0 | 0 | 1 | 0.98V |
| 0 | 0 | 1 | 0 | 0.86V |
| 0 | 0 | 1 | 1 | 0.74V |
| 0 | 1 | 0 | 0 | 0.62V |
| 0 | 1 | 0 | 1 | 0.50V |
| 0 | 1 | 1 | 0 | 0.38V |
| 0 | 1 | 1 | 1 | 1.24V |
| 1 | 0 | 0 | 0 | 1.38V |
| 1 | 0 | 0 | 1 | 1.51V |
| 1 | 0 | 1 | 0 | 1.64V |
| 1 | 0 | 1 | 1 | 1.77V |
| 1 | 1 | 0 | 0 | 1.90v |
| 1 | 1 | 0 | 1 | 2.04V |
| 1 | 1 | 1 | 0 | 2.16V |
| 1 | 1 | 1 | 1 | Not possible to use |

MICTL adjustment
*Default

MICTL input voltage value to which MLED current attenuates by 50%

RT2=100kΩ

| D5 | MISW |
|----|------|
| 0 | OFF |
| 1 | ON |

MICTL control
*Default MICTL pin input invalidity
MICTL pin input effective

| D6 | ICKSW |
|----|-------|
| 0 | OFF |
| 1 | ON |

Information modal frequency switch
*Default One cycle 2sec.
One cycle 4sec.

| D7 | CHSW |
|----|-------------|
| 0 | Normal |
| 1 | Charge time |

Information mode control when being charging it
*Default

LV5231CS

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| 06h | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|

| | | | | FLED current value(mA) |
|----|----|----|----|------------------------|
| D3 | D2 | D1 | D0 | FLC[3:0] |
| 0 | 0 | 0 | 0 | 2.0 |
| 0 | 0 | 0 | 1 | 4.0 |
| 0 | 0 | 1 | 0 | 6.0 |
| 0 | 0 | 1 | 1 | 8.0 |
| 0 | 1 | 0 | 0 | 10.0 |
| 0 | 1 | 0 | 1 | 12.0 |
| 0 | 1 | 1 | 0 | 14.0 |
| 0 | 1 | 1 | 1 | 16.0 |
| 1 | 0 | 0 | 0 | 18.0 |
| 1 | 0 | 0 | 1 | 20.0 |
| 1 | 0 | 1 | 0 | 22.0 |
| 1 | 0 | 1 | 1 | 24.0 |
| 1 | 1 | 0 | 0 | 26.0 |
| 1 | 1 | 0 | 1 | 28.0 |
| 1 | 1 | 1 | 0 | 30.0 |
| 1 | 1 | 1 | 1 | 32.0 |

Flash LED ordinary mode current setting

*Default

| | | | | FLED current value(mA) |
|----|----|----|----|------------------------|
| D7 | D6 | D5 | D4 | FHC[3:0] |
| 0 | 0 | 0 | 0 | 6.0 |
| 0 | 0 | 0 | 1 | 12.0 |
| 0 | 0 | 1 | 0 | 18.0 |
| 0 | 0 | 1 | 1 | 24.0 |
| 0 | 1 | 0 | 0 | 30.0 |
| 0 | 1 | 0 | 1 | 36.0 |
| 0 | 1 | 1 | 0 | 42.0 |
| 0 | 1 | 1 | 1 | 48.0 |
| 1 | 0 | 0 | 0 | 54.0 |
| 1 | 0 | 0 | 1 | 60.0 |
| 1 | 0 | 1 | 0 | 66.0 |
| 1 | 0 | 1 | 1 | 72.0 |
| 1 | 1 | 0 | 0 | 78.0 |
| 1 | 1 | 0 | 1 | 84.0 |
| 1 | 1 | 1 | 0 | 90.0 |
| 1 | 1 | 1 | 1 | 96.0 |

Flash LED strobe mode current value setting(SCTL=H is effective)

*Default

LV5231CS

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|
| 07h | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | D7 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|

| | | | | | RLED1 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | R1C[4:0] |
| 0 | 0 | 0 | 0 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 1 | 1.0 |
| 0 | 0 | 0 | 1 | 0 | 1.5 |
| 0 | 0 | 0 | 1 | 1 | 2.0 |
| 0 | 0 | 1 | 0 | 0 | 2.5 |
| 0 | 0 | 1 | 0 | 1 | 3.0 |
| 0 | 0 | 1 | 1 | 0 | 3.5 |
| 0 | 0 | 1 | 1 | 1 | 4.0 |
| 0 | 1 | 0 | 0 | 0 | 4.5 |
| 0 | 1 | 0 | 0 | 1 | 5.0 |
| 0 | 1 | 0 | 1 | 0 | 5.5 |
| 0 | 1 | 0 | 1 | 1 | 6.0 |
| 0 | 1 | 1 | 0 | 0 | 6.5 |
| 0 | 1 | 1 | 0 | 1 | 7.0 |
| 0 | 1 | 1 | 1 | 0 | 7.5 |
| 0 | 1 | 1 | 1 | 1 | 8.0 |
| 1 | 0 | 0 | 0 | 0 | 8.5 |
| 1 | 0 | 0 | 0 | 1 | 9.0 |
| 1 | 0 | 0 | 1 | 0 | 9.5 |
| 1 | 0 | 0 | 1 | 1 | 10.0 |
| 1 | 0 | 1 | 0 | 0 | 10.5 |
| 1 | 0 | 1 | 0 | 1 | 11.0 |
| 1 | 0 | 1 | 1 | 0 | 11.5 |
| 1 | 0 | 1 | 1 | 1 | 12.0 |
| 1 | 1 | 0 | 0 | 0 | 12.5 |
| 1 | 1 | 0 | 0 | 1 | 13.0 |
| 1 | 1 | 0 | 1 | 0 | 13.5 |
| 1 | 1 | 0 | 1 | 1 | 14.0 |
| 1 | 1 | 1 | 0 | 0 | 14.5 |
| 1 | 1 | 1 | 0 | 1 | 15.0 |
| 1 | 1 | 1 | 1 | 0 | 15.5 |
| 1 | 1 | 1 | 1 | 1 | 16.0 |

RLED1 current value setting

*Default

| | |
|----|------|
| D7 | R3SW |
| 0 | OFF |
| 1 | ON |

Information RLED1 point light

*Default

LV5231CS

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|
| 08h | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | D7 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|

| | | | | | GLED1 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | G1C[4:0] |
| 0 | 0 | 0 | 0 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 1 | 1.0 |
| 0 | 0 | 0 | 1 | 0 | 1.5 |
| 0 | 0 | 0 | 1 | 1 | 2.0 |
| 0 | 0 | 1 | 0 | 0 | 2.5 |
| 0 | 0 | 1 | 0 | 1 | 3.0 |
| 0 | 0 | 1 | 1 | 0 | 3.5 |
| 0 | 0 | 1 | 1 | 1 | 4.0 |
| 0 | 1 | 0 | 0 | 0 | 4.5 |
| 0 | 1 | 0 | 0 | 1 | 5.0 |
| 0 | 1 | 0 | 1 | 0 | 5.5 |
| 0 | 1 | 0 | 1 | 1 | 6.0 |
| 0 | 1 | 1 | 0 | 0 | 6.5 |
| 0 | 1 | 1 | 0 | 1 | 7.0 |
| 0 | 1 | 1 | 1 | 0 | 7.5 |
| 0 | 1 | 1 | 1 | 1 | 8.0 |
| 1 | 0 | 0 | 0 | 0 | 8.5 |
| 1 | 0 | 0 | 0 | 1 | 9.0 |
| 1 | 0 | 0 | 1 | 0 | 9.5 |
| 1 | 0 | 0 | 1 | 1 | 10.0 |
| 1 | 0 | 1 | 0 | 0 | 10.5 |
| 1 | 0 | 1 | 0 | 1 | 11.0 |
| 1 | 0 | 1 | 1 | 0 | 11.5 |
| 1 | 0 | 1 | 1 | 1 | 12.0 |
| 1 | 1 | 0 | 0 | 0 | 12.5 |
| 1 | 1 | 0 | 0 | 1 | 13.0 |
| 1 | 1 | 0 | 1 | 0 | 13.5 |
| 1 | 1 | 0 | 1 | 1 | 14.0 |
| 1 | 1 | 1 | 0 | 0 | 14.5 |
| 1 | 1 | 1 | 0 | 1 | 15.0 |
| 1 | 1 | 1 | 1 | 0 | 15.5 |
| 1 | 1 | 1 | 1 | 1 | 16.0 |

GLED1 current value setting

*Default

| D7 | G3SW |
|----|------|
| 0 | OFF |
| 1 | ON |

Information GLED1 point light

*Default

LV5231CS

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|
| 09h | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | D7 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|

| | | | | | BLED1 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | B1C[4:0] |
| 0 | 0 | 0 | 0 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 1 | 1.0 |
| 0 | 0 | 0 | 1 | 0 | 1.5 |
| 0 | 0 | 0 | 1 | 1 | 2.0 |
| 0 | 0 | 1 | 0 | 0 | 2.5 |
| 0 | 0 | 1 | 0 | 1 | 3.0 |
| 0 | 0 | 1 | 1 | 0 | 3.5 |
| 0 | 0 | 1 | 1 | 1 | 4.0 |
| 0 | 1 | 0 | 0 | 0 | 4.5 |
| 0 | 1 | 0 | 0 | 1 | 5.0 |
| 0 | 1 | 0 | 1 | 0 | 5.5 |
| 0 | 1 | 0 | 1 | 1 | 6.0 |
| 0 | 1 | 1 | 0 | 0 | 6.5 |
| 0 | 1 | 1 | 0 | 1 | 7.0 |
| 0 | 1 | 1 | 1 | 0 | 7.5 |
| 0 | 1 | 1 | 1 | 1 | 8.0 |
| 1 | 0 | 0 | 0 | 0 | 8.5 |
| 1 | 0 | 0 | 0 | 1 | 9.0 |
| 1 | 0 | 0 | 1 | 0 | 9.5 |
| 1 | 0 | 0 | 1 | 1 | 10.0 |
| 1 | 0 | 1 | 0 | 0 | 10.5 |
| 1 | 0 | 1 | 0 | 1 | 11.0 |
| 1 | 0 | 1 | 1 | 0 | 11.5 |
| 1 | 0 | 1 | 1 | 1 | 12.0 |
| 1 | 1 | 0 | 0 | 0 | 12.5 |
| 1 | 1 | 0 | 0 | 1 | 13.0 |
| 1 | 1 | 0 | 1 | 0 | 13.5 |
| 1 | 1 | 0 | 1 | 1 | 14.0 |
| 1 | 1 | 1 | 0 | 0 | 14.5 |
| 1 | 1 | 1 | 0 | 1 | 15.0 |
| 1 | 1 | 1 | 1 | 0 | 15.5 |
| 1 | 1 | 1 | 1 | 1 | 16.0 |

BLED1 current value setting

*Default

| D7 | B3SW |
|----|------|
| 0 | OFF |
| 1 | ON |

Information BLED1 point light

*Default

LV5231CS

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| 0ah | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|

| | | | | | RLED2 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | R2C[4:0] |
| 0 | 0 | 0 | 0 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 1 | 1.0 |
| 0 | 0 | 0 | 1 | 0 | 1.5 |
| 0 | 0 | 0 | 1 | 1 | 2.0 |
| 0 | 0 | 1 | 0 | 0 | 2.5 |
| 0 | 0 | 1 | 0 | 1 | 3.0 |
| 0 | 0 | 1 | 1 | 0 | 3.5 |
| 0 | 0 | 1 | 1 | 1 | 4.0 |
| 0 | 1 | 0 | 0 | 0 | 4.5 |
| 0 | 1 | 0 | 0 | 1 | 5.0 |
| 0 | 1 | 0 | 1 | 0 | 5.5 |
| 0 | 1 | 0 | 1 | 1 | 6.0 |
| 0 | 1 | 1 | 0 | 0 | 6.5 |
| 0 | 1 | 1 | 0 | 1 | 7.0 |
| 0 | 1 | 1 | 1 | 0 | 7.5 |
| 0 | 1 | 1 | 1 | 1 | 8.0 |
| 1 | 0 | 0 | 0 | 0 | 8.5 |
| 1 | 0 | 0 | 0 | 1 | 9.0 |
| 1 | 0 | 0 | 1 | 0 | 9.5 |
| 1 | 0 | 0 | 1 | 1 | 10.0 |
| 1 | 0 | 1 | 0 | 0 | 10.5 |
| 1 | 0 | 1 | 0 | 1 | 11.0 |
| 1 | 0 | 1 | 1 | 0 | 11.5 |
| 1 | 0 | 1 | 1 | 1 | 12.0 |
| 1 | 1 | 0 | 0 | 0 | 12.5 |
| 1 | 1 | 0 | 0 | 1 | 13.0 |
| 1 | 1 | 0 | 1 | 0 | 13.5 |
| 1 | 1 | 0 | 1 | 1 | 14.0 |
| 1 | 1 | 1 | 0 | 0 | 14.5 |
| 1 | 1 | 1 | 0 | 1 | 15.0 |
| 1 | 1 | 1 | 1 | 0 | 15.5 |
| 1 | 1 | 1 | 1 | 1 | 16.0 |

RLED2 current value setting

*Default

LV5231CS

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|

| | | | | | GLEDD2 current value(mA) |
|----|----|----|----|----|--------------------------|
| D4 | D3 | D2 | D1 | D0 | G2C[4:0] |
| 0 | 0 | 0 | 0 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 1 | 1.0 |
| 0 | 0 | 0 | 1 | 0 | 1.5 |
| 0 | 0 | 0 | 1 | 1 | 2.0 |
| 0 | 0 | 1 | 0 | 0 | 2.5 |
| 0 | 0 | 1 | 0 | 1 | 3.0 |
| 0 | 0 | 1 | 1 | 0 | 3.5 |
| 0 | 0 | 1 | 1 | 1 | 4.0 |
| 0 | 1 | 0 | 0 | 0 | 4.5 |
| 0 | 1 | 0 | 0 | 1 | 5.0 |
| 0 | 1 | 0 | 1 | 0 | 5.5 |
| 0 | 1 | 0 | 1 | 1 | 6.0 |
| 0 | 1 | 1 | 0 | 0 | 6.5 |
| 0 | 1 | 1 | 0 | 1 | 7.0 |
| 0 | 1 | 1 | 1 | 0 | 7.5 |
| 0 | 1 | 1 | 1 | 1 | 8.0 |
| 1 | 0 | 0 | 0 | 0 | 8.5 |
| 1 | 0 | 0 | 0 | 1 | 9.0 |
| 1 | 0 | 0 | 1 | 0 | 9.5 |
| 1 | 0 | 0 | 1 | 1 | 10.0 |
| 1 | 0 | 1 | 0 | 0 | 10.5 |
| 1 | 0 | 1 | 0 | 1 | 11.0 |
| 1 | 0 | 1 | 1 | 0 | 11.5 |
| 1 | 0 | 1 | 1 | 1 | 12.0 |
| 1 | 1 | 0 | 0 | 0 | 12.5 |
| 1 | 1 | 0 | 0 | 1 | 13.0 |
| 1 | 1 | 0 | 1 | 0 | 13.5 |
| 1 | 1 | 0 | 1 | 1 | 14.0 |
| 1 | 1 | 1 | 0 | 0 | 14.5 |
| 1 | 1 | 1 | 0 | 1 | 15.0 |
| 1 | 1 | 1 | 1 | 0 | 15.5 |
| 1 | 1 | 1 | 1 | 1 | 16.0 |

GLEDD2 current value setting

*Default

LV5231CS

| | | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| Och | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|

| | | | | | BLED2 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | B2C[4:0] |
| 0 | 0 | 0 | 0 | 0 | 0.5 |
| 0 | 0 | 0 | 0 | 1 | 1.0 |
| 0 | 0 | 0 | 1 | 0 | 1.5 |
| 0 | 0 | 0 | 1 | 1 | 2.0 |
| 0 | 0 | 1 | 0 | 0 | 2.5 |
| 0 | 0 | 1 | 0 | 1 | 3.0 |
| 0 | 0 | 1 | 1 | 0 | 3.5 |
| 0 | 0 | 1 | 1 | 1 | 4.0 |
| 0 | 1 | 0 | 0 | 0 | 4.5 |
| 0 | 1 | 0 | 0 | 1 | 5.0 |
| 0 | 1 | 0 | 1 | 0 | 5.5 |
| 0 | 1 | 0 | 1 | 1 | 6.0 |
| 0 | 1 | 1 | 0 | 0 | 6.5 |
| 0 | 1 | 1 | 0 | 1 | 7.0 |
| 0 | 1 | 1 | 1 | 0 | 7.5 |
| 0 | 1 | 1 | 1 | 1 | 8.0 |
| 1 | 0 | 0 | 0 | 0 | 8.5 |
| 1 | 0 | 0 | 0 | 1 | 9.0 |
| 1 | 0 | 0 | 1 | 0 | 9.5 |
| 1 | 0 | 0 | 1 | 1 | 10.0 |
| 1 | 0 | 1 | 0 | 0 | 10.5 |
| 1 | 0 | 1 | 0 | 1 | 11.0 |
| 1 | 0 | 1 | 1 | 0 | 11.5 |
| 1 | 0 | 1 | 1 | 1 | 12.0 |
| 1 | 1 | 0 | 0 | 0 | 12.5 |
| 1 | 1 | 0 | 0 | 1 | 13.0 |
| 1 | 1 | 0 | 1 | 0 | 13.5 |
| 1 | 1 | 0 | 1 | 1 | 14.0 |
| 1 | 1 | 1 | 0 | 0 | 14.5 |
| 1 | 1 | 1 | 0 | 1 | 15.0 |
| 1 | 1 | 1 | 1 | 0 | 15.5 |
| 1 | 1 | 1 | 1 | 1 | 16.0 |

BLED2 current value setting

*Default

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| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|
| 0dh | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | D7 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|

| | | | | | MLED6 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | M6SPC[4:0] |
| 0 | 0 | 0 | 0 | 0 | 0.6 |
| 0 | 0 | 0 | 0 | 1 | 1.2 |
| 0 | 0 | 0 | 1 | 0 | 1.8 |
| 0 | 0 | 0 | 1 | 1 | 2.4 |
| 0 | 0 | 1 | 0 | 0 | 3.0 |
| 0 | 0 | 1 | 0 | 1 | 3.6 |
| 0 | 0 | 1 | 1 | 0 | 4.2 |
| 0 | 0 | 1 | 1 | 1 | 4.8 |
| 0 | 1 | 0 | 0 | 0 | 5.4 |
| 0 | 1 | 0 | 0 | 1 | 6.0 |
| 0 | 1 | 0 | 1 | 0 | 6.6 |
| 0 | 1 | 0 | 1 | 1 | 7.2 |
| 0 | 1 | 1 | 0 | 0 | 7.8 |
| 0 | 1 | 1 | 0 | 1 | 8.4 |
| 0 | 1 | 1 | 1 | 0 | 9.0 |
| 0 | 1 | 1 | 1 | 1 | 9.6 |
| 1 | 0 | 0 | 0 | 0 | 10.2 |
| 1 | 0 | 0 | 0 | 1 | 10.8 |
| 1 | 0 | 0 | 1 | 0 | 11.4 |
| 1 | 0 | 0 | 1 | 1 | 12.0 |
| 1 | 0 | 1 | 0 | 0 | 12.6 |
| 1 | 0 | 1 | 0 | 1 | 13.2 |
| 1 | 0 | 1 | 1 | 0 | 13.8 |
| 1 | 0 | 1 | 1 | 1 | 14.4 |
| 1 | 1 | 0 | 0 | 0 | 15.0 |
| 1 | 1 | 0 | 0 | 1 | 15.6 |
| 1 | 1 | 0 | 1 | 0 | 16.2 |
| 1 | 1 | 0 | 1 | 1 | 16.8 |
| 1 | 1 | 1 | 0 | 0 | 17.4 |
| 1 | 1 | 1 | 0 | 1 | 18.0 |
| 1 | 1 | 1 | 1 | 0 | 18.6 |
| 1 | 1 | 1 | 1 | 1 | 19.2 |

MLED6 Independent mode current value setting

*Default

| D7 | M6SP |
|----|------|
| 0 | OFF |
| 1 | ON |

MLED6 Independent mode setting

*Default

*M6SW: 1, M6SP: 1 is MLED6 independent mode lighting

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| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|
| 0eh | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | D7 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|

| | | | | | FLED3 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | F3SPC[4:0] |
| 0 | 0 | 0 | 0 | 0 | 1.0 |
| 0 | 0 | 0 | 0 | 1 | 2.0 |
| 0 | 0 | 0 | 1 | 0 | 3.0 |
| 0 | 0 | 0 | 1 | 1 | 4.0 |
| 0 | 0 | 1 | 0 | 0 | 5.0 |
| 0 | 0 | 1 | 0 | 1 | 6.0 |
| 0 | 0 | 1 | 1 | 0 | 7.0 |
| 0 | 0 | 1 | 1 | 1 | 8.0 |
| 0 | 1 | 0 | 0 | 0 | 9.0 |
| 0 | 1 | 0 | 0 | 1 | 10.0 |
| 0 | 1 | 0 | 1 | 0 | 11.0 |
| 0 | 1 | 0 | 1 | 1 | 12.0 |
| 0 | 1 | 1 | 0 | 0 | 13.0 |
| 0 | 1 | 1 | 0 | 1 | 14.0 |
| 0 | 1 | 1 | 1 | 0 | 15.0 |
| 0 | 1 | 1 | 1 | 1 | 16.0 |
| 1 | 0 | 0 | 0 | 0 | 17.0 |
| 1 | 0 | 0 | 0 | 1 | 18.0 |
| 1 | 0 | 0 | 1 | 0 | 19.0 |
| 1 | 0 | 0 | 1 | 1 | 20.0 |
| 1 | 0 | 1 | 0 | 0 | 21.0 |
| 1 | 0 | 1 | 0 | 1 | 22.0 |
| 1 | 0 | 1 | 1 | 0 | 23.0 |
| 1 | 0 | 1 | 1 | 1 | 24.0 |
| 1 | 1 | 0 | 0 | 0 | 25.0 |
| 1 | 1 | 0 | 0 | 1 | 26.0 |
| 1 | 1 | 0 | 1 | 0 | 27.0 |
| 1 | 1 | 0 | 1 | 1 | 28.0 |
| 1 | 1 | 1 | 0 | 0 | 29.0 |
| 1 | 1 | 1 | 0 | 1 | 30.0 |
| 1 | 1 | 1 | 1 | 0 | 31.0 |
| 1 | 1 | 1 | 1 | 1 | 32.0 |

FLED3 Independent mode current value setting

*Default

| D7 | F3SP |
|----|------|
| 0 | OFF |
| 1 | ON |

FLED3 Independent mode setting

*Default

*F3SW: 1, F3SP: 1 is FLED3 independent mode lighting

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| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|
| 0fn | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | D7 | 0 | 0 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|---|----|----|----|----|----|

| | | | | | FLED4 current value(mA) |
|----|----|----|----|----|-------------------------|
| D4 | D3 | D2 | D1 | D0 | F4SPC[4:0] |
| 0 | 0 | 0 | 0 | 0 | 1.0 |
| 0 | 0 | 0 | 0 | 1 | 2.0 |
| 0 | 0 | 0 | 1 | 0 | 3.0 |
| 0 | 0 | 0 | 1 | 1 | 4.0 |
| 0 | 0 | 1 | 0 | 0 | 5.0 |
| 0 | 0 | 1 | 0 | 1 | 6.0 |
| 0 | 0 | 1 | 1 | 0 | 7.0 |
| 0 | 0 | 1 | 1 | 1 | 8.0 |
| 0 | 1 | 0 | 0 | 0 | 9.0 |
| 0 | 1 | 0 | 0 | 1 | 10.0 |
| 0 | 1 | 0 | 1 | 0 | 11.0 |
| 0 | 1 | 0 | 1 | 1 | 12.0 |
| 0 | 1 | 1 | 0 | 0 | 13.0 |
| 0 | 1 | 1 | 0 | 1 | 14.0 |
| 0 | 1 | 1 | 1 | 0 | 15.0 |
| 0 | 1 | 1 | 1 | 1 | 16.0 |
| 1 | 0 | 0 | 0 | 0 | 17.0 |
| 1 | 0 | 0 | 0 | 1 | 18.0 |
| 1 | 0 | 0 | 1 | 0 | 19.0 |
| 1 | 0 | 0 | 1 | 1 | 20.0 |
| 1 | 0 | 1 | 0 | 0 | 21.0 |
| 1 | 0 | 1 | 0 | 1 | 22.0 |
| 1 | 0 | 1 | 1 | 0 | 23.0 |
| 1 | 0 | 1 | 1 | 1 | 24.0 |
| 1 | 1 | 0 | 0 | 0 | 25.0 |
| 1 | 1 | 0 | 0 | 1 | 26.0 |
| 1 | 1 | 0 | 1 | 0 | 27.0 |
| 1 | 1 | 0 | 1 | 1 | 28.0 |
| 1 | 1 | 1 | 0 | 0 | 29.0 |
| 1 | 1 | 1 | 0 | 1 | 30.0 |
| 1 | 1 | 1 | 1 | 0 | 31.0 |
| 1 | 1 | 1 | 1 | 1 | 32.0 |

FLED4 Independent mode current value setting

*Default

| D7 | F4SP |
|----|------|
| 0 | OFF |
| 1 | ON |

FLED4 Independent mode setting

*Default

*F4SW: 1, F4SP: 1 is FLED4 independent mode lighting

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| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|----|----|----|----|----|----|
| 10h | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | D7 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|----|----|----|----|----|----|

| | | | Fade IN time |
|----|----|----|--------------|
| D2 | D1 | D0 | FIN1[2:0] |
| 0 | 0 | 0 | No slope |
| 0 | 0 | 1 | Slope 1/32 |
| 0 | 1 | 0 | 1/16 |
| 0 | 1 | 1 | 1/8 |
| 1 | 0 | 0 | 1/4 |
| 1 | 0 | 1 | 1/2 |
| 1 | 1 | 0 | 3/4 |
| 1 | 1 | 1 | Max slope |

RLED1, GLED1 and BLED1 is lighting slope setting

*Default

Slope time MAX is 1/2 of the settings during the AT1 time.

| | | | Fade out time |
|----|----|----|---------------|
| D5 | D4 | D3 | FOUT1[2:0] |
| 0 | 0 | 0 | No slope |
| 0 | 0 | 1 | Slope 1/32 |
| 0 | 1 | 0 | 1/16 |
| 0 | 1 | 1 | 1/8 |
| 1 | 0 | 0 | 1/4 |
| 1 | 0 | 1 | 1/2 |
| 1 | 1 | 0 | 3/4 |
| 1 | 1 | 1 | Max slope |

RLED1, GLED1 and BLED1 is light off slope setting

*Default

Slope time MAX is 1/2 of the settings during the AT1 time.

| D7 | SYNC |
|----|------|
| 0 | OFF |
| 1 | ON |

Setting of synchronous mode of RLED1, GLED1, BLED1 and RLED2, GLED2, BLED2

*Default

The operation of RLED2, GLED2, BLED2, becomes it as well as RLED1, GLED1, BLED1.

As for the setting of the fade setting, the setting at the gradation time, the turning on position, and the turning off position, RLED1, GLED1 and BLED1 is used.

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| 11h | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|

| | | | Gradation cycle |
|----|----|----|-----------------|
| D2 | D1 | D0 | AT1[2:0] |
| 0 | 0 | 0 | 0.25s |
| 0 | 0 | 1 | 0.5s |
| 0 | 1 | 0 | 1s |
| 0 | 1 | 1 | 2s |
| 1 | 0 | 0 | 4s |
| 1 | 0 | 1 | 8s |
| 1 | 1 | x | - |

RLED1, GLED1 and BLED1 automatic ON/OFF cycle setting

*Default

| D3 | GRON1 |
|----|-------|
| 0 | OFF |
| 1 | ON |

RLED1, GLED1 and BLED1 automatic ON/OFF function setting

*Default

| D4 | GR1M1 |
|----|-------|
| 0 | OFF |
| 1 | ON |

One time of RLED1, GLED1 and BLED1 gradation execution

*Default

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| | |
|----|-------|
| D5 | GRON2 |
| 0 | OFF |
| 1 | ON |

RLED2, GLED2 and BLED2 automatic ON/OFF function setting

*Default

| | |
|----|-------|
| D6 | GR1M2 |
| 0 | OFF |
| 1 | ON |

One time of RLED2, GLED2 and BLED2 gradation execution

*Default

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 12h | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R1Aoff [5:0] D5-0 RLED1 automatic operation OFF position setting (Default All0)

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 13h | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R1Aon [5:0] D5-0 RLED1 automatic operation ON position setting (Default All0)

R1Aoff=R1Aon all cycle turning off

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 14h | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R1Aoff [5:0] D5-0 GLED1 automatic operation OFF position setting (Default All0)

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 15h | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R1Aon [5:0] D5-0 GLED1 automatic operation ON position setting (Default All0)

R1Aoff=R1Aon all cycle turning off

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 16h | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R1Aoff [5:0] D5-0 BLED1 automatic operation OFF position setting (Default All0)

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 17h | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R1Aon [5:0] D5-0 BLED1 automatic operation ON position setting (Default All0)

R1Aoff=R1Aon all cycle turning off

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 18h | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

| | | | Fade IN time |
|----|----|----|--------------|
| D2 | D1 | D0 | FIN2[2:0] |
| 0 | 0 | 0 | No slope |
| 0 | 0 | 1 | Slope 1/32 |
| 0 | 1 | 0 | 1/16 |
| 0 | 1 | 1 | 1/8 |
| 1 | 0 | 0 | 1/4 |
| 1 | 0 | 1 | 1/2 |
| 1 | 1 | 0 | 3/4 |
| 1 | 1 | 1 | Max slope |

RLED2, GLED2 and BLED2 is lighting slope setting

*Default

Slope time MAX is 1/2 of the settings during the AT2 time.

| | | | Fade out time |
|----|----|----|---------------|
| D5 | D4 | D3 | FOUT2[2:0] |
| 0 | 0 | 0 | No slope |
| 0 | 0 | 1 | Slope 1/32 |
| 0 | 1 | 0 | 1/16 |
| 0 | 1 | 1 | 1/8 |
| 1 | 0 | 0 | 1/4 |
| 1 | 0 | 1 | 1/2 |
| 1 | 1 | 0 | 3/4 |
| 1 | 1 | 1 | Max slope |

RLED2, GLED2 and BLED2 is light off slope setting

*Default

Slope time MAX is 1/2 of the settings during the AT2 time.

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| | | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|
| 19h | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|

| | | | Gradation cycle |
|----|----|----|-----------------|
| D2 | D1 | D0 | AT2[2:0] |
| 0 | 0 | 0 | 0.25s |
| 0 | 0 | 1 | 0.5s |
| 0 | 1 | 0 | 1s |
| 0 | 1 | 1 | 2s |
| 1 | 0 | 0 | 4s |
| 1 | 0 | 1 | 8s |
| 1 | 1 | x | - |

RLED2, GLED2 and BLED2 automatic ON/OFF cycle setting

*Default

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1ah | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R2Aoff [5:0] D5-0 RLED2 automatic operation OFF position setting (Default All0)

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1bh | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R2Aon [5:0] D5-0 RLED2 automatic operation ON position setting (Default All0)
R2Aoff=R1Aon all cycle turning off

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1ch | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R2Aoff [5:0] D5-0 GLED2 automatic operation OFF position setting (Default All0)

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1dh | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R2Aon [5:0] D5-0 GLED2 automatic operation ON position setting (Default All0)
R2Aoff=R1Aon all cycle turning off

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1eh | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R2Aoff [5:0] D5-0 BLED2 automatic operation OFF position setting (Default All0)

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 1fh | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | D5 | D4 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

R2Aon [5:0] D5-0 BLED2 automatic operation ON position setting (Default All0)
R2Aoff=R1Aon all cycle turning off

| | | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|----|---|---|---|----|----|----|----|
| 20h | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | D7 | 0 | 0 | 0 | D3 | D2 | D1 | D0 |
|-----|---|---|---|---|---|---|---|---|----|---|---|---|----|----|----|----|

| | |
|----|-------|
| D0 | INTM1 |
| 0 | OFF |
| 1 | ON |

INT mask setting. Mask of interrupt factor 1(RGBLED1 fade end)

*Default

| | |
|----|-------|
| D1 | INTM2 |
| 0 | OFF |
| 1 | ON |

INT mask setting. Mask of interrupt factor 2(RGBLED1 gradation end)

*Default

| | |
|----|-------|
| D2 | INTM3 |
| 0 | OFF |
| 1 | ON |

INT mask setting. Mask of interrupt factor 3(RGBLED2 fade end)

*Default

| | |
|----|-------|
| D3 | INTM4 |
| 0 | OFF |
| 1 | ON |

INT mask setting. Mask of interrupt factor 4(RGBLED2 gradation end)

*Default

| | |
|----|----------------|
| D7 | INTCR |
| 0 | INT acceptance |
| 1 | INT clear |

INTCR (INT clear)

*Default

*It becomes "0" and it enters the state of the INT acceptance after INT is cleared.

Precautions for serial transmission and usage note

- * The switching regulator must start when it is LED driver OFF.
- * Set the setting of the gradation in the state of gradation OFF.
- * Set the setting of the MLED4, MLED5 and MLED6 in the state of MSW ON.
- When LED pin unused
 - Connect the LED driver pin with V_{BAT} or GND when you do not connect LED with the LED pin.
- Information LED lighting
 - Impress the V_{DD} voltage when information LED lights because the oscillator for information LED lighting is operated by the V_{DD} voltage.
- FLED use time
 - Using FLED (An independent mode is excluded) must use FLED1.
 - The use of FLED2, 3, and 4 is prohibited by FLED1:OFF.

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LV5231CS serial map

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

| | | Register address | | | | | | | | data | | | | | | | |
|-----|--|------------------|----|----|----|----|----|----|----|----------|--------|-------------|------------|-------------|-----------|--------|------|
| | | 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 | × | MLED4 | MLED5 | MLED6 | MSW | FXSW | RGSW | STBY |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 01h | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | RGB2x2 | EXTSW | B2SW | G2SW | R2SW | B1SW | G1SW | R1SW |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 02h | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | SCTEN1 | SCTEN2 | × | × | F4SW | F3SW | F2SW | D1SW |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 03h | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | VODET | × | MAIN[5:0] | | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 04h | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | VD[2:0] | | FXVO | FHVO | FLVO | RGB2VO | RGB1VO | |
| | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 05h | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | CHSW | ICKSW | MISW | × | MICTLC[3:0] | | | |
| | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 06h | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | FHC[3:0] | | | FLC[3:0] | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 07h | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | R3SW | × | × | R1C[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 08h | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | G3SW | × | × | G1C[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 09h | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | B3SW | × | × | B1C[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0ah | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | × | × | × | R2C[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0bh | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | × | × | × | G2C[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0ch | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | × | × | × | B2C[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0dh | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | M6SP | × | × | M6SPC[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0eh | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | F3SP | × | × | F3SPC[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0fh | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | F4SP | × | × | F4SPC[4:0] | | | | |
| | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10h | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | SYNC | × | FOUT1[2:0] | | | FIN1[2:0] | | |
| | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11h | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | × | GR1M2 | GRON2 | GR1M1 | GRON1 | AT1[2:0] | | |
| | | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12h | | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | × | × | R1Aoff[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13h | | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | × | × | R1Aon[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14h | | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | × | × | G1Aoff[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15h | | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | × | × | G1Aon[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Register address | | | | | | | | data | | | | | | | |

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| | | Register address | | | | | | | | data | | | | | | | |
|-----|--|------------------|----|----|----|----|----|----|----|-------|----|-------------|----|-------|-----------|-------|-------|
| | | A7 | A6 | A5 | A4 | A3 | A2 | A1 | A0 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 16h | | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | × | × | B1Aoff[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17h | | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | × | × | B1Aon[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 18h | | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | × | × | FOUT2[2:0] | | | FIN2[2:0] | | |
| | | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 19h | | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | × | × | × | × | × | AT2[2:0] | | |
| | | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1ah | | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | × | × | R2Aoff[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1bh | | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | × | × | R2Aon[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1ch | | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | × | × | G2Aoff[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1dh | | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | × | × | G2Aon[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1eh | | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | × | × | B2Aoff[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1fh | | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | × | × | B2Aon[5:0] | | | | | |
| | | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 20h | | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | INTCR | × | × | × | INTM4 | INTM3 | INTM2 | INTM1 |
| | | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Register address | | | | | | | | Data | | | | | | | |

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