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RTL8380M/ RTL8382M/ RTL8382L

LED Application Note

Rev. 1.0
22 Feb 2013
Track ID:

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USING THIS DOCUMENT

This document is intended for the hardware and software engineer’s general LED information on the Realtek RTL8380M/ RTL8382M/ RTL8382L chip.

Though every effort has been made to ensure that this document is current and accurate, more information may have become available subsequent to the production of this guide. In that event, please contact your Realtek representative for additional information that may help in the development process.

REVISION HISTORY

Revision	Release Date	Summary
1.0	2013/02/22	First release.

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1. General Description

RTL8380M/ RTL8382M/ RTL8382L provide flexible LED display to show speed, link status and other information of the port status. RTL8380M/ RTL8382M/ RTL8382L support three LED modes: serial mode, single color scan mode and bi-color scan mode.

LED mode is decided by strapping pin after power on or reset. Table 1 is the list of strapping pin for LED mode and table 2 is the list of register that reflects current configuration.

Table 1 LED_MODE[1:0] strapping pin

Pin Name	Pin No.	Description
LED_MODE[1]	156	Select LED mode, Strapping pin. LED_MODE[1:0] = 2'b00: Enable LED, and display LED through Serial interface; LED_MODE[1:0] = 2'b01: Enable LED, and display LED through Single color scan LED interface; LED_MODE[1:0] = 2'b10: Enable LED, and display LED through Bicolor scan LED interface; LED_MODE[1:0] = 2'b11: Disable LED.
LED_MODE[0]	157	

Table 2 LED_MODE_SEL register

Register Name	Description
LED_MODE_SEL[1:0]	Select LED mode, Strapping pin. 0x0: Enable LED, and display LED through Serial interface; 0x1: Enable LED, and display LED through Single color scan LED interface; 0x2: Enable LED, and display LED through Bicolor scan LED interface; 0x3: Disable LED.

1.1. LED definition setting

In each mode, RTL8380M/ RTL8382M/ RTL8382L support at most 3 LED per port and each LED status can be defined individually, as listed in table 3. However, in bi-color LED mode, LED0 and LED1 can not light simultaneously, so the definition of LED0 and LED1 should avoid this restriction. Furthermore, RTL8382M/ RTL8382L support two sets of LED definition setting, one for port 0~ 23 and the other for port 24~ 27, and RTL8380M also supports two sets of LED definition setting, one for port 0~ 15 and the other for port 16~ 19, as listed in table 4.

Table 3 LED Status Definition

LED[*n*]_Mode_SEL[4:0]	Code	Description
Link/Act	5'b00000	Link, Activity Indicator. ON for link established. Blink when the corresponding port is transmitting or receiving.
Link	5'b00001	Link Indicator ON for link established.
Act	5'b00010	Activity Indicator. Blink for port transmitting or receiving.
RX	5'b00011	Receive Status Indicator. Blink for receiving activity.
TX	5'b00100	Transmit Status Indicator. Blink for transmission activity
Col/Full Duplex	5'b00101	Full duplex and Collision Indicator. ON for full duplex, and OFF for half duplex mode. Blink when the corresponding port is half duplex and collision.
Full Duplex	5'b00110	Duplex Status Indicator.

		ON for indicating full duplex No Blink even in half duplex and collision.
1000M Link	5'b00111	1000Mb/s Link Indicator. ON for 1000Mb/s link established.
100M Link	5'b01000	100Mb/s Link Indicator. ON for 100Mb/s link established.
10M Link	5'b01001	10Mb/s Link Indicator. ON for 10Mb/s link established.
1000M Link /Act	5'b01010	1000Mb/s Link, Activity Indicator. ON for 1000Mb/s link established. Blink when the corresponding port is 1000Mb/s transmitting or receiving.
100M Link/Act	5'b01011	100Mb/s Link, Activity Indicator. ON for100Mb/s link established. Blink when the corresponding port is 100Mb/s transmitting or receiving.
10M Link/Act	5'b01100	10Mb/s Link, Activity Indicator. ON for10Mb/s link established. Blink when the corresponding port is 10Mb/s transmitting or receiving.
1000M/100M Link/Act	5'b01101	ON to indicated 1000/100Mb/s Link, Activity. Blink when the corresponding port is 1000/100Mb/s transmitting or receiving. If the port is in 10Mb/s, this signal should keep OFF.
1000M/10M Link/Act	5'b01110	ON to indicated 1000/10Mb/s Link, Activity. Blink when the corresponding port is 1000/10Mb/s transmitting or receiving. If the port is in 100Mb/s, this signal should keep OFF.
100M/10M Link/Act	5'b01111	ON to indicate 100/10Mb/s Link, Activity. Blink when the corresponding port is 100/10Mb/s transmitting or receiving. If the port is in 1000Mb/s, this signal should keep OFF.
10M Link Flashing	5'b10000	10Mb/s link Indicator. Blink for port link in 10Mb/s.
100M Link Flashing	5'b10001	100Mb/s link Indicator. Blink for port link in 100Mb/s.
1000M Link Flashing	5'b10010	1000Mb/s link Indicator. Blink for port link in 1000Mb/s.

Table 4 LED Mode Setting

Register Name	Description
P23_0_LED0_MODE_SEL[4:0]	RTL8382M/ RTL8382L: select LED0's mode configuration for port 0 to port 23. RTL8380M: select LED0's mode configuration for port 0 to port 15. The led mode definition is listed in table 1.
P23_0_LED1_MODE_SEL[4:0]	RTL8382M/ RTL8382L: select LED0's mode configuration for port 0 to port 23. RTL8380M: select LED1's mode configuration for port 0 to port 15.
P23_0_LED2_MODE_SEL[4:0]	RTL8382M/ RTL8382L: select LED0's mode configuration for port 0 to port 23. RTL8380M: select LED2's mode configuration for port 0 to port 15.
P27_24_LED0_MODE_SEL[4:0]	RTL8382M/ RTL8382L: select LED0's mode configuration for port 24 to port 27. RTL8380M: select LED0's mode configuration for port 16 to port 19.
P27_24_LED1_MODE_SEL[4:0]	RTL8382M/ RTL8382L: select LED0's mode configuration for port 24 to port 27. RTL8380M: select LED1's mode configuration for port 16 to port 19.
P27_24_LED2_MODE_SEL[4:0]	RTL8382M/ RTL8382L: select LED0's mode configuration for port 24 to port 27. RTL8380M: select LED2's mode configuration for port 16 to port 19.

1.2. Power on blinking

In addition to normal LED display to show link status, RTL8380M/ RTL8382M/ RTL8382L also support power on blinking after every power on or reset. In order to support bi-color LED display, three steps are

designed. Table 5 is the list of register that control the LED on/off in step1 and step2, and in step3 all LED are off.

Table 5 power on blinking step control register

Register Name	Description
STEP2_PWR_ON_LED_2_0	Select power on blinking LED[2:0] in step 2 power on duration. "0" is LED off, "1" is LED on.
STEP1_PWR_ON_LED_2_0	Select power on blinking LED[2:0] in step 1 power on duration. "0" is LED off, "1" is LED on

This is a global setting for all ports. A typical setting for bi-color LED mode is that set *STEP1_PWR_ON_LED_2_0* to 3'b101 and set *STEP1_PWR_ON_LED_2_0* to 3'b110 so that LED0 and LED1 can turn on respectively. LED on/off time in each step can also be set by strapping pin, as listed in table 6.

Table 6 LED power on blinking time strapping pin

Pin Name	Pin No.	Description
PWRBLINK[1]	152	Select power on blinking time for each step, Strapping Pin. PWRBLINK[1:0] = 2'b00: disable; PWRBLINK[1:0] = 2'b01: 800ms; PWRBLINK[1:0] = 2'b10: 1.6ms; PWRBLINK[1:0] = 2'b11: 3.2s.
PWRBLINK[0]	151	

For RTL8380M/ RTL8382M, since default LED setting maybe different from customer needs, PWRBLINK[1:0] are suggest to be strapped to 2'b00 and let CPU configure it. For RTL8382L, customer can strap PWRBLINK[1:0] as needs.

1.3. Combo Port LED Setting

RTL8380M/ RTL8382M/ RTL8382L support combo port LED to distinguish from UTP port and Fiber port, when the PHY can work either on UTP mode or fiber mode. The register setting is listed in table 7.

Table 7 Combo Port LED Setting

Register Name	Description
COMBO_PORT_MODE	Indicate which sets of LED is in combo port LED mode; 0x0: neither LED is in combo port LED mode; 0x1: for RTL8382M/ RTL8382L, port 20~23 are in combo port LED mode; for RTL8380M, port 12~15 are in combo port LED mode; 0x2 or 0x3: for RTL8382M/ RTL8382L, port 24~27 are in combo port LED mode; for RTL8380M, port 16~19 are in combo port LED mode;

1.4. Pin Assignments for LED

RTL8380M/ RTL8382M/ RTL8382L provide 2 LED pins to connect with shift register in serial mode or RTL8231 in scan mode. The description of these two pins is listed in table 8.

Table 8 LED pin description

Pin Name	Pin No.	Type	Drive (mA)	Description
LED_CLK	122	O	12	(1) In Serial LED mode: Reference output clock for serial LED interface and Data is latched on the rising of LED_CLK. (2) In single color scan LED mode and bi-color scan LED mode: Reference output clock for MDC/MDIO interface.
LED_DAT	123	O	12	(1) In Serial LED mode: Serial bit stream of link status information. (2) In single color scan LED mode and bi-color scan LED mode: The data written to LED IC.

2. Serial LED Application

2.1. Serial LED Mode Setting

The serial LED interface, *LED_CLK* and *LED_DAT* provide clock and data to enable/disable the external shift registers.

In serial led mode, RTL8382M/ RTL8382L can support 28 ports and per-port 3 LED. And the sequence that RTL8382M/ RTL8382L output is P0_LED0→P0_LED1→P0_LED2→P1_LED0→P1_LED1→P1_LED2→P2_LED0→…→P27_LED2. For combo port application, RTL8382M/ RTL8382L can support extra 4 ports and per-port at most 3 LED to distinguish between UTP port and Fiber port .

RTL8380M can support 20 ports and per-port 3 LED, the sequence is same to RTL8382M/ RTL8382L except that the last LED is P19_LED2. Also, RTL8380M supports extra 4 ports and per-port 3 LED for combo port application.

Additionally, RTL8380M/ RTL8382M/ RTL8382L supports port mask and led mask if you need less led. *LED_P_EN_CTRL* is used to enable/ disable each port LED, each bit mapping to each port. For example, in 16G+ 2 Fiber Mode, set *LED_P_EN_CTRL* to 0x5FFFF00 so that only 18 ports LED are needed which can save shift registers.

LED_MASK_SEL and *P27_24_LED_MASK_SEL* are used to select how many LED are displayed for each port. *LED_MASK_SEL* is used to set port 0~23 while *P27_24_LED_MASK_SEL* is used to set port 24~27. Set *LED_MASK_SEL* to 1 means each port display 1 LED, set *LED_MASK_SEL* to 3 means 2 LED and 7 means 3 LED, other values are reserved. For example, in 24G+ 2* Fiber mode, all ports need 2 LED, set *LED_MASK_SEL* and *P27_24_LED_MASK_SEL* to 3 so that totally 52 shift registers are enough. In combo port mode, fiber LED mask is the same as UTP LED mask. That is, in 24G+ 4G combo port, port 24~27 are work in combo port mode, so the fiber LED mask is set by *P27_24_LED_MASK_SEL*; but in 20G+ 4G Combo mode, in which port 20~23 are work in combo port mode, so the fiber LED mask is set by *LED_MASK_SEL*.

The default value of *LED_P_EN_CTRL* is 0x5FFFFFF for RTL8382M/ RTL8382L and 0x5FFFF00 for RTL8380M, and the default value of *LED_MASK_SEL* and *P27_24_LED_MASK_SEL* is 0x7 for RTL8380M/ RTL8382M/ RTL8382L.

What should be take care is that these *LED settings should be configured properly before power on blinking*. For RTL8380M/ RTL8382M, if customer LED specification is different from default setting, CPU must configure it before power on blinking, in this case, PWRBLINK[1:0] should be set to 2'b00 and CPU can write it to other values after configuration. For RTL8382L, if customer LED specification is different from default setting, EEPROM can configure it before power on blinking.

Some typical settings are listed in table 9 as below.

Table 9 Serial LED application mode

Application mode			*LED_P_EN_CTRL*	*LED_MASK_SEL*	*P27_24_LED_MASK_SEL*	*Total LED*
RTL8382M/ RTL8382L	24G+ 2* Fiber	Per-port 3 LED	0x5FFFFFF	7	7	78
		Per-port 2 LED	0x5FFFFFF	3	3	52
	24G+ 4G UTP (or 4G Fiber)	Per-port 2 LED	0xFFFFFFF	3	3	56
	24G+ 4G Combo	Per-port 2 LED	0xFFFFFFF	3	3	56+ 8
	24G	Per-port 2 LED	0x0FFFFFF	3	3	48

	20G+ 4G Combo	Per-port 2 LED	0xFFFFFFF	3	3	48+ 8
RTL8380M	16G+ 2* Fiber	Per-port 3 LED	0x5FFFF00	7	7	54
		Per-port 2 LED	0x5FFFF00	3	3	36
	16G+ 4G UTP (or 4G Fiber)	Per-port 2 LED	0xFFFFF00	3	3	40
	16G+ 4G Combo	Per-port 2 LED	0xFFFFF00	3	3	40+ 8
	16G	Per-port 2 LED	0x0FFFF00	3	3	32
	12G+ 4G Combo	Per-port 2 LED	0xFFFFF00	3	3	32+ 8

2.2. Referenced circuits

2.2.1. Serial LED with 74HC164

A 74HC164 8-bit serial-in, parallel-out shift register captures per-port link status and diagnostic information. The related circuit design for 16G+ 4G Combo mode with per-port 2 LED, as shown in figure 1. In non-combo port mode, those fiber LED and related 74HC164(U29 in figure 1) can be removed. In 16G+ 2* Fiber mode, P17LED and P19LED can also be removed.

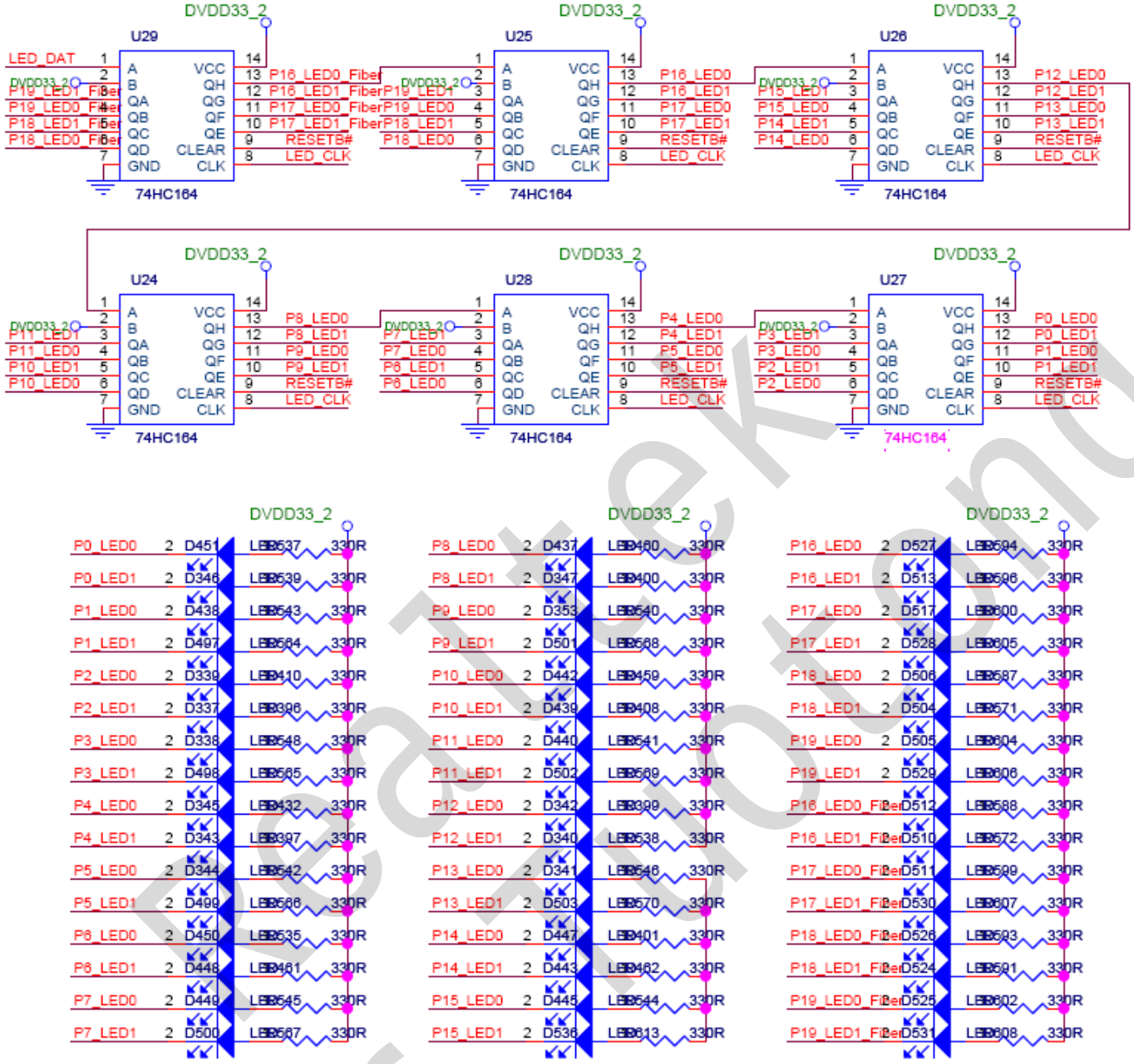

Figure 1 RTL8380M 16G+ 4G Combo Serial LED Connection with 74HC164 Diagram

2.2.2. Serial LED with RTL8231

The RTL8231 shift register mode could reserve the serial data, and output parallel data in order. There are 36 shift registers in one RTL8231. The output data sequence is shown below in figure 2:

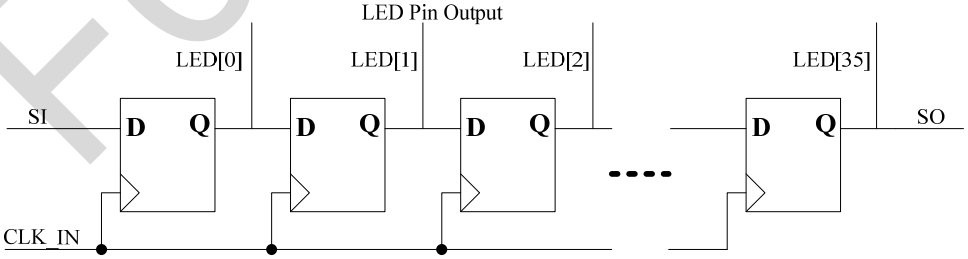

Figure 2 RTL8231 Shift Register Mode Logic Diagram

RTL8231 latches the current serial data which received at the SI pin and shift the preceding data to the next stage at the each rising edge of the serial clock. At the first serial data input, RTL8231 output from pin 15 LED[0]. At the last shift register, the serial data output from LED[35] pin and SO pin at the same time.

Strapping pins configuration of RTL8231 in shift register mode is depicted in table 10.

Table 10 RTL8231 Shift Register Mode Strapping Pins Configuration

Pin Name	Pin Number	Type	Description	Configuration for serial LED mode
LED[0]/Dis_SMI	15	I/O_{PD}	Select RTL8231 in the SMI mode or Shift Register mode. 0: SMI mode.(default) **1: Shift register mode.**	Pull high
SO/MOD[1]	16	I/O	MOD[1] defines that application circuit is active high or low. 0: Low active 1: High active **Note**: internal floating. Must be pulled high or low to select the active high or active low application.	Pull low
LED[15]/MOD[0]	42	I/O_{PU}	MOD[0] defines the initial value is output high or low. 0: Output low after power on or hardware pin reset. 1: Output high after power on or hardware pin reset. (default)	Pull high

The related circuit design is shown in figure 3.

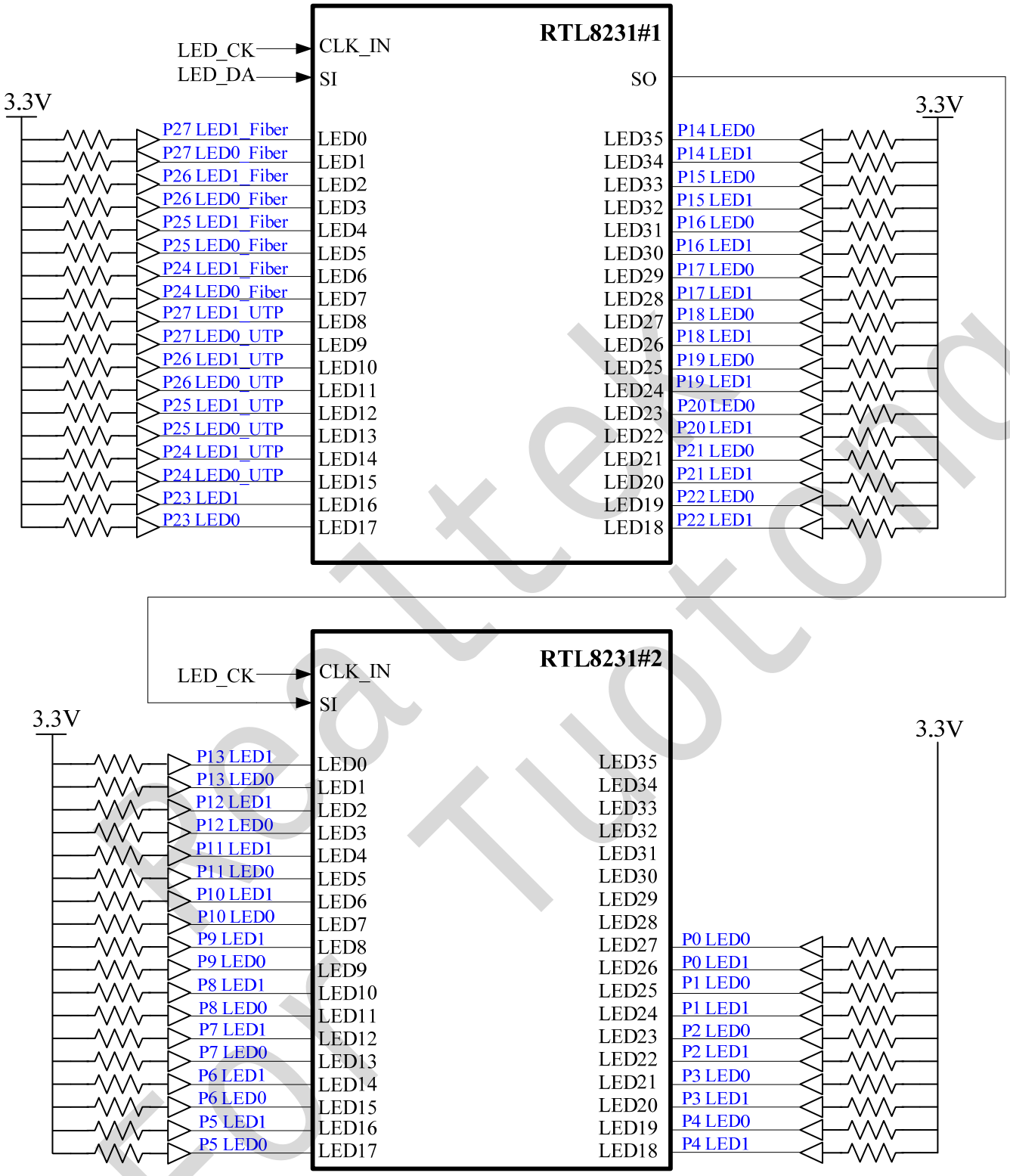

Figure 3 RTL8382M/ RTL8382L 24G+ 4G Combo Serial LED Connection with RTL8231 Diagram

Figure 3 is an example of RTL8231 shift register mode for 24G+ 4G Combo with per-port 2 LED, totally 64 LED are used. In this case, two RTL8231 are needed, connect LED_CLK to both RTL8231 and connect the first RTL8231's SO to the second RTL8231's SI so that two RTL8231 can be combined together to form a 72 bits shift register, which is enough for 64 LED application. Same to more RTL8231 applications. In 24G+ 4G(UTP or Fiber) mode, port 24~ 27 fiber LED can be removed, remember that the first RTL8231 LED0 must be the last LED pin, so all other LED should shift 8 pins ahead.

3. Scan LED Application

3.1. Scan LED Mode Setting

The RTL8380M/ RTL8382M/ RTL8382L support scan LED by connecting with an LED IC of the RTL8231, which provides single color and bi-color scan LED. The *LED_CLK/ LED_DAT* change to MDC/ MDIO interface mode and transmit MDC/ MDIO data to LED IC.

After power on or hardware reset, RTL8380M/ RTL8382M/ RTL8382L initialize the RTL8231, and then write LED status to it to turn on/ off LED.

The strapping pins configuration of RTL8231 in SMI Mode is depicted in table 11.

Table 11 RTL8231 SMI Mode Strapping Pins Configuration

Pin Name	Pin Number	Type	Description	Configuration for I2C-like mode
GPIO[35]/Dis_SMI	15	I/O_{PD}	Select RTL8231 in the SMI mode or Shift Register mode. **0: SMI mode.(default)** 1: Shift register mode.	Pull low
SCAN_STAB0/Addr[0]	37	I/O_{PU}	Addr[4:0] is Device ID. The first LED IC device address should be 0, and others are incrementally addressed;	Pull low
SCAN_STAB1/Addr[1]	38	I/O_{PU}		Pull low
SCAN_STAB2/Addr[2]	39	I/O_{PU}		Pull low
SCAN_STAB3/Addr[3]	40	I/O_{PU}		Pull low
SCAN_STAB4/Addr[4]	41	I/O_{PU}		Pull low
SCAN_STAB5/MOD[0]	42	I/O_{PU}	When SMI mode is enable, **1: MDC/MDIO interface(default)** 0: I2C interface	Pull high

RTL8231 can support at most 72 single color LED in single color mode or 24 bi-color LED plus 24 single color LED in bi-color mode.

In the scan mode, RTL8380M/ RTL8382M/ RTL8382L support 3 single color LED or 1 bi-color plus 1 single color LED for each port. RTL8382M/ RTL8382L support 28 ports in non-combo port mode with additional 4 ports in combo port mode, and RTL8380M supports 20 ports in non-combo port mode with additional 4 ports in combo port mode.

Different from serial LED mode, RTL8380M/ RTL8382M/ RTL8382L can not set *LED_P_EN_CTRL* to enable/ disable each port independently in scan mode. If some port's LED are not need to display, circuit designers can remove the LED from PCB. For example, in 24G+ 2* Fiber mode, P25 and P27 are not used, but we need to reserve their LED pin and not connect to any LED so that P25 and P27 will not display.

In the case that each port displays 3 LED, totally RTL8382M/ RTL8382L need 28*3 LED in non-combo port mode and 28*3+ 4*3 LED in combo port mode, while RTL8380M need 20*3 LED in non-combo port mode and 20*3+ 4*3 LED in combo port mode. As mentioned before each RTL8231 can support 72 single color LED, so 2 RTL8231 are needed for RTL8382M/ RTL8382L when per-port 3 LED, the device address should be from 0 to 1, while 1 RTL8231 is enough for RTL8380M.

In order to save LED pins and LED IC when less led for each port are needed, RTL8380M/ RTL8382M/ RTL8382L can set *LED_MASK_SEL* to 1 or 3 so that each port will display only 1 or 2 LED. So only 1 RTL8231 is enough in single color LED mode but 2 LED are still needed in bi-color LED mode.

The difference between scan LED mode and serial LED mode is that in scan LED mode, *LED_MASK_SEL* is the global setting for all ports while in serial LED mode port 24~ 27 must be set independently through *P27_24_LED_MASK_SEL*. So in scan mode if port 0~ 23 needs less LED than port 24~ 27, *LED_MASK_SEL* should be set the value that port 24~ 27 needs and port 0~ 23 should also reserve the LED pins but not connect to any LED.

The default value of *LED_MASK_SEL* is 0x7 for RTL8380M/ RTL8382M/ RTL8382L. What should be take care is that these *LED settings should be configured before power on blinking*. For RTL8380M/ RTL8382M, if customer LED specification is different from default setting, CPU must configure it before power on blinking, in this case, PWRBLINK[1:0] should be set to 2'b00. For RTL8382L, if customer LED specification is different from default setting, EEPROM can configure it before power on blinking, so PWRBLINKG[1:0] can be set as needs.

3.2. Single color Scan LED application

Table 12 is a brief list for some typical application in single color LED mode.

Table 12 Scan single color LED application mode

Application mode			*LED_MASK_SEL*	*Total LED RTL8380M/ RTL8382M/ RTL8382L supports*	*Total LED Actually used*	*RTL8231 needed*
RTL8382M/ RTL8382L	24G+ 2* Fiber	Per-port 3 LED	7	28*3	26*3	2
		Per-port 2 LED	3	28*2	26*2	1
	24G+ 4G UTP (or 4G Fiber)	Per-port 2 LED	3	28*2	28*2	1
	24G+ 4G Combo	Per-port 2 LED	3	28*2+ 4*2	28*2+ 4*2	1
		Per-port 3 LED	7	28*3+ 4*3	28*3+ 4*3	2
	20G+ 4G Combo	Per-port 2 LED	3	24*2+4*2	24*2+ 4*2	1
		Per-port 3 LED	7	24*3+4*3	24*3+ 4*3	2
	24G	Per-port 2 LED	3	28*2	24*2	1
		Per-port 3 LED	7	28*3	24*3	1
RTL8380M	16G+ 2* Fiber	Per-port 3 LED	7	20*3	18*3	1
		Per-port 2 LED	3	20*2	18*2	1
	16G+ 4G UTP (or 4G Fiber)	Per-port 2 LED	3	20*2	20*2	1
	16G+ 4G Combo	Per-port 2 LED	3	20*2+ 4*2	20*2+ 4*2	1
		Per-port 3 LED	7	20*3+ 4*3	20*3+ 4*3	1
	12G+ 4G Combo	Per-port 2 LED	3	16*2+ 4*2	16*2+ 4*2	1
		Per-port 3 LED	7	16*3+ 4*3	16*3+ 4*3	1
	16G	Per-port 2 LED	3	20*2	16*2	1

Some related circuit design is shown in figure 4~7 as below:

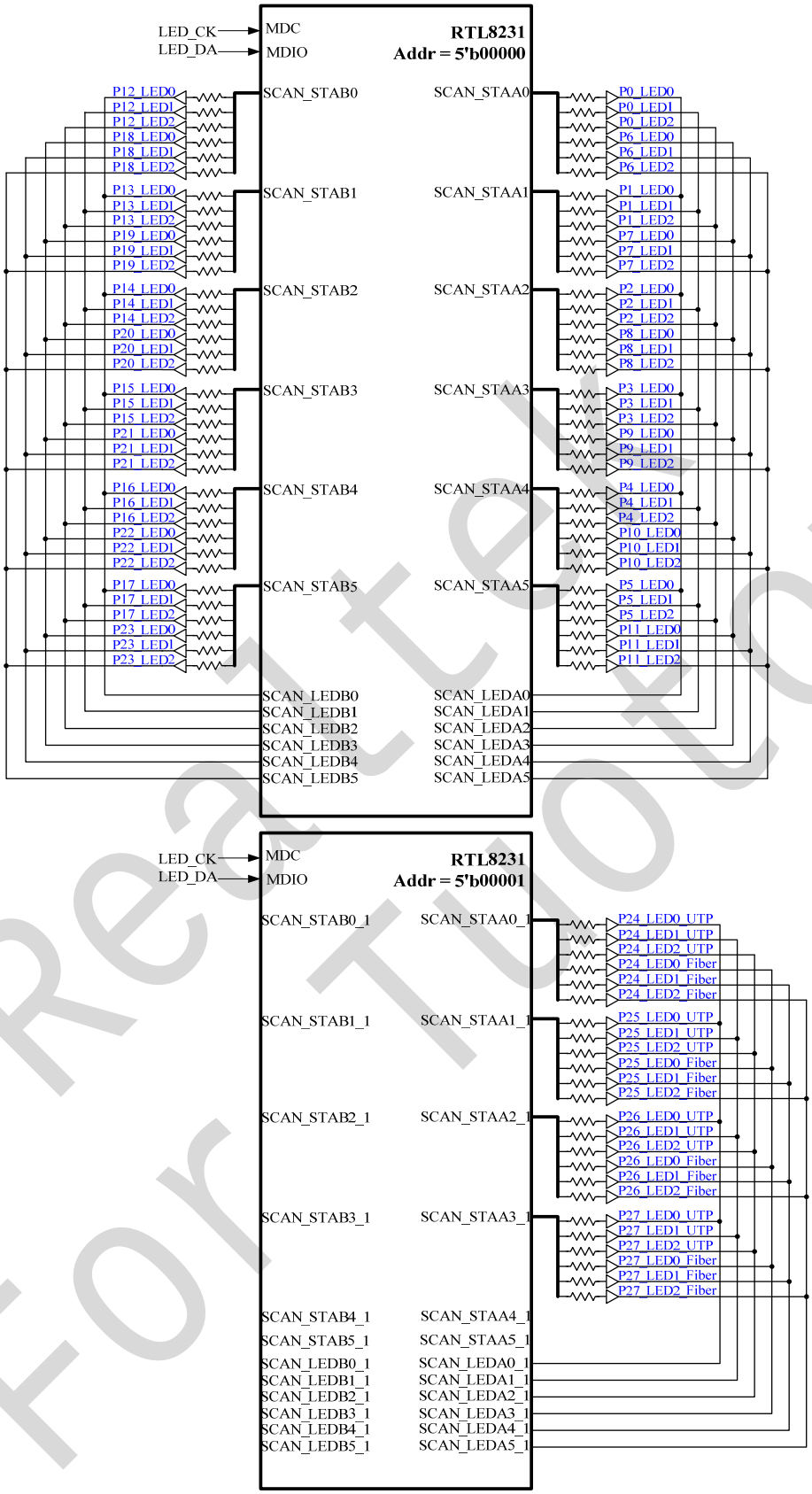

Figure 4 RTL8382M/ RTL8382L 24G+ 4G Combo and per-port 3 single color LED circuit

Figure 4 is an example for single color 24G+ 4G Combo LED circuit with per port 3 LED; In 24G+ 4G (UTP or Fiber) mode, SCAN_LEDA3_1, SCAN_LEDA4_1 and SCAN_LEDA5_1 are not need to

connect to LED. In 24G+ 2* Fiber mode, SCAN_STAA1_1 and SCAN_STAA3_1 are not need to connect to LED; In 24G mode, only the upper RTL8231 is enough and the lower RTL8231 can be deleted. Furthermore, if Port 0~23 need less LED, for example 2 LED, SCAN_LEDA2, SCAN_LEDA5, SCAN_LEDB2 and SCAN_LEDB5 can be left floating.

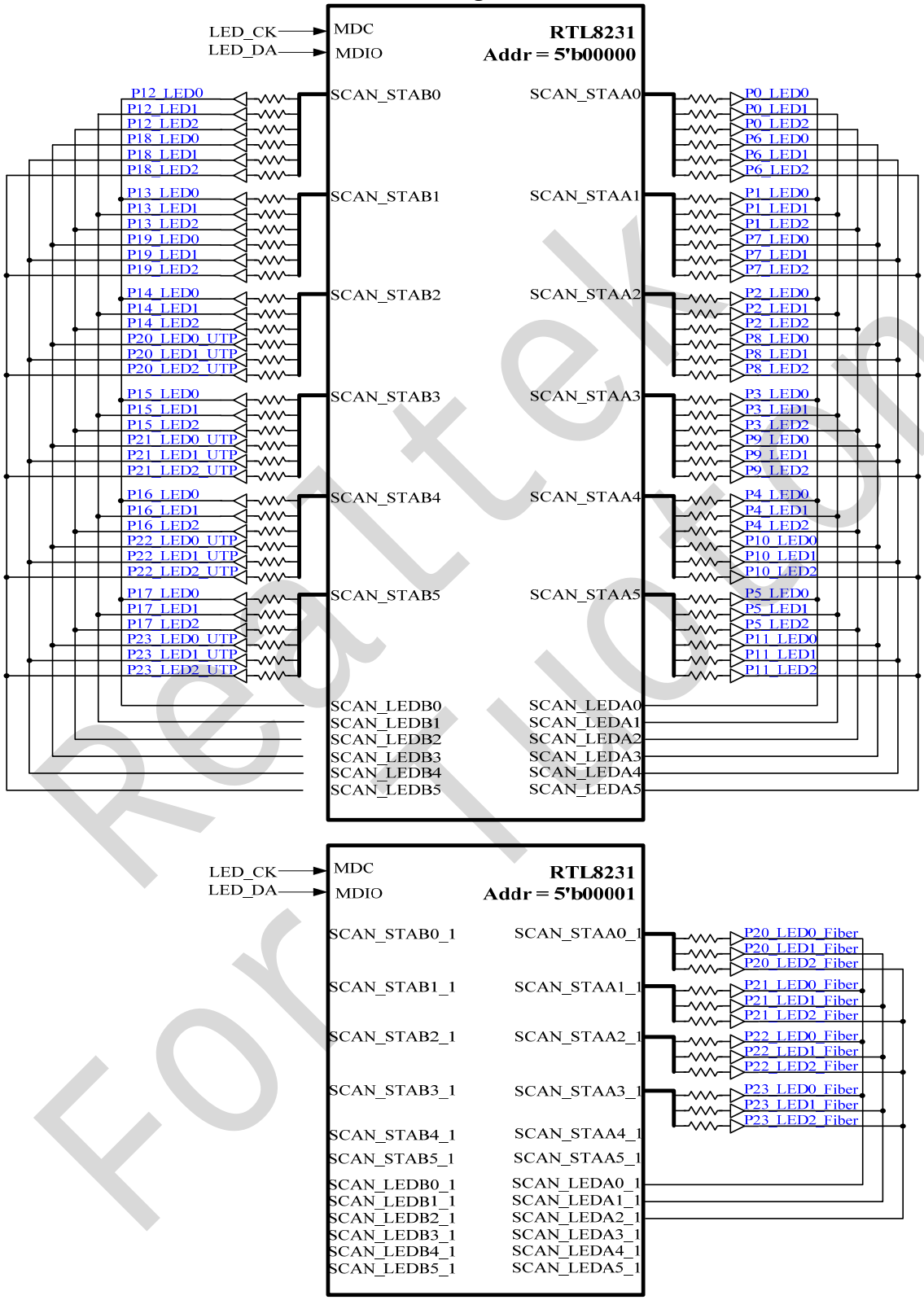

Figure 5 RTL8382M/ RTL8382L 20G+ 4G Combo and per-port 3 single color LED circuit

Figure 5 is an example for single color 20G+ 4G Combo LED circuit with per port 3 LED; In this case, port 24~27 LED as listed in figure 4 are used for port 20~23 fiber LED, that is, port 24~27 will have no LED in 20G+ 4G Combo mode. In 20G+ 4G (UTP or Fiber) mode, the second RTL8231 can be removed.

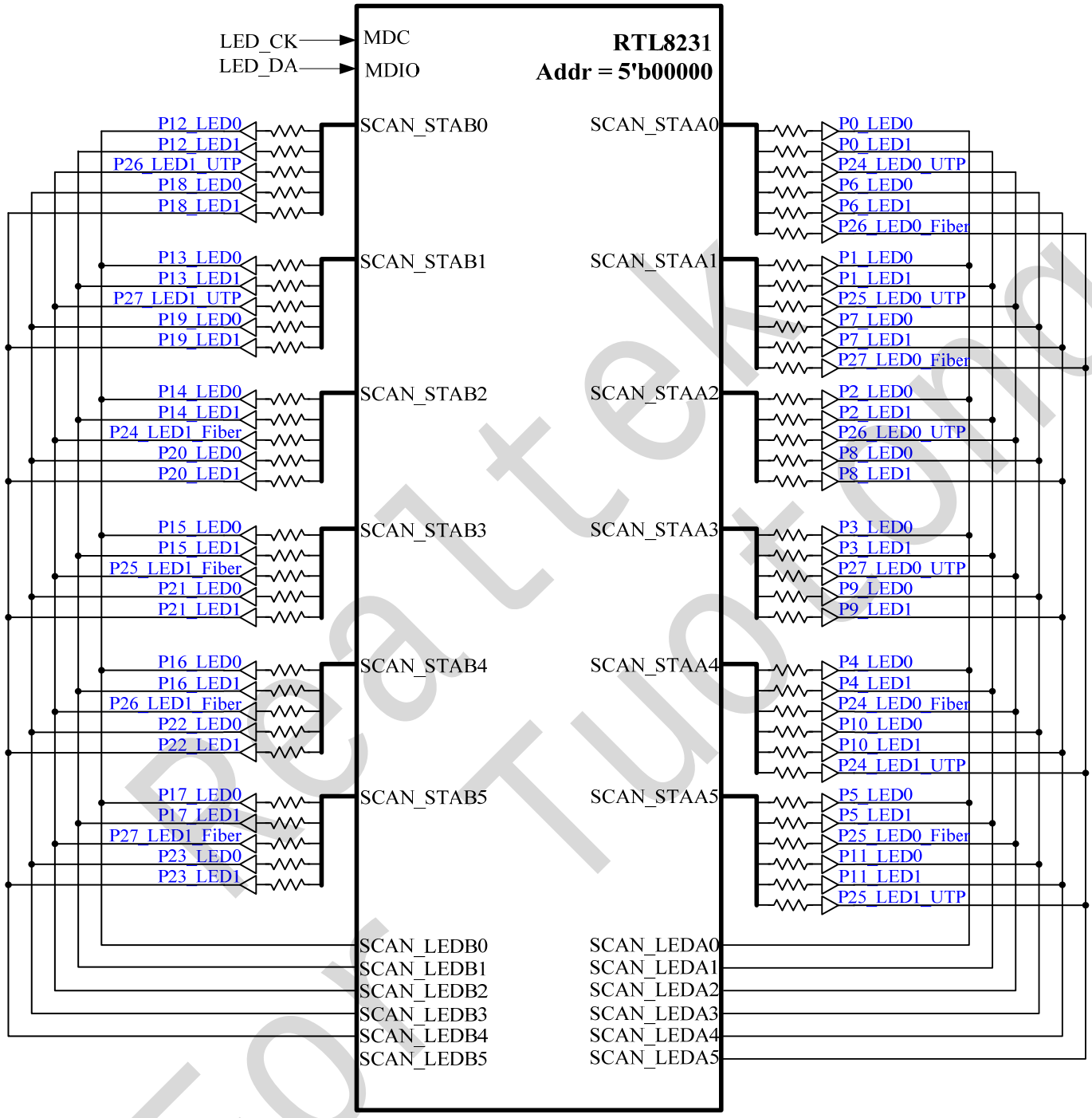

Figure 6 RTL8382M/ RTL8382L 24G+ 4G Combo and per-port 2 single color LED circuit

Figure 6 is an example for single color 24G+ 4G Combo LED circuit with per port 2 LED. Since port 0~ 23 LED2 are not needed, they can be used for port 24~ 27 in both combo port mode and non-combo port mode. In combo port mode, port 24~ 27 UTP LED0 will connect between SCAN_STA0 ~SCAN_STA3 and SCAN_LED2, which were originally port 0~3 LED2, while port 24~ 27 Fiber LED0 can be connected between SCAN_STA4 ~SCAN_STA5 and SCAN_LED2, and between SCAN_STA0~ SCAN_STA1 and SCAN_LED5, which were originally port 4~7 LED2. Similar to port 24~ 27 UTP and fiber mode LED1,

which were originally port 10~ 17 LED2. In 24G+ 4G (UTP or Fiber) mode, port 24~ 27 Fiber LED0 and LED1 should be left floating and port 24~ 27 UTP LED0 and LED1 are still at the position as in figure 5. In 24G+ 2* Fiber mode, P25 and P27 LED0 and LED1 should left floating. In 24G mode, port 24~ 27 LED can be removed. Furthermore, if port 0~ 23 need less, for example 1 LED, SCAN_LEDA1, SCAN_LEDA4, SCAN_LEDB1 and SCAN_LEDB4 can be left floating.

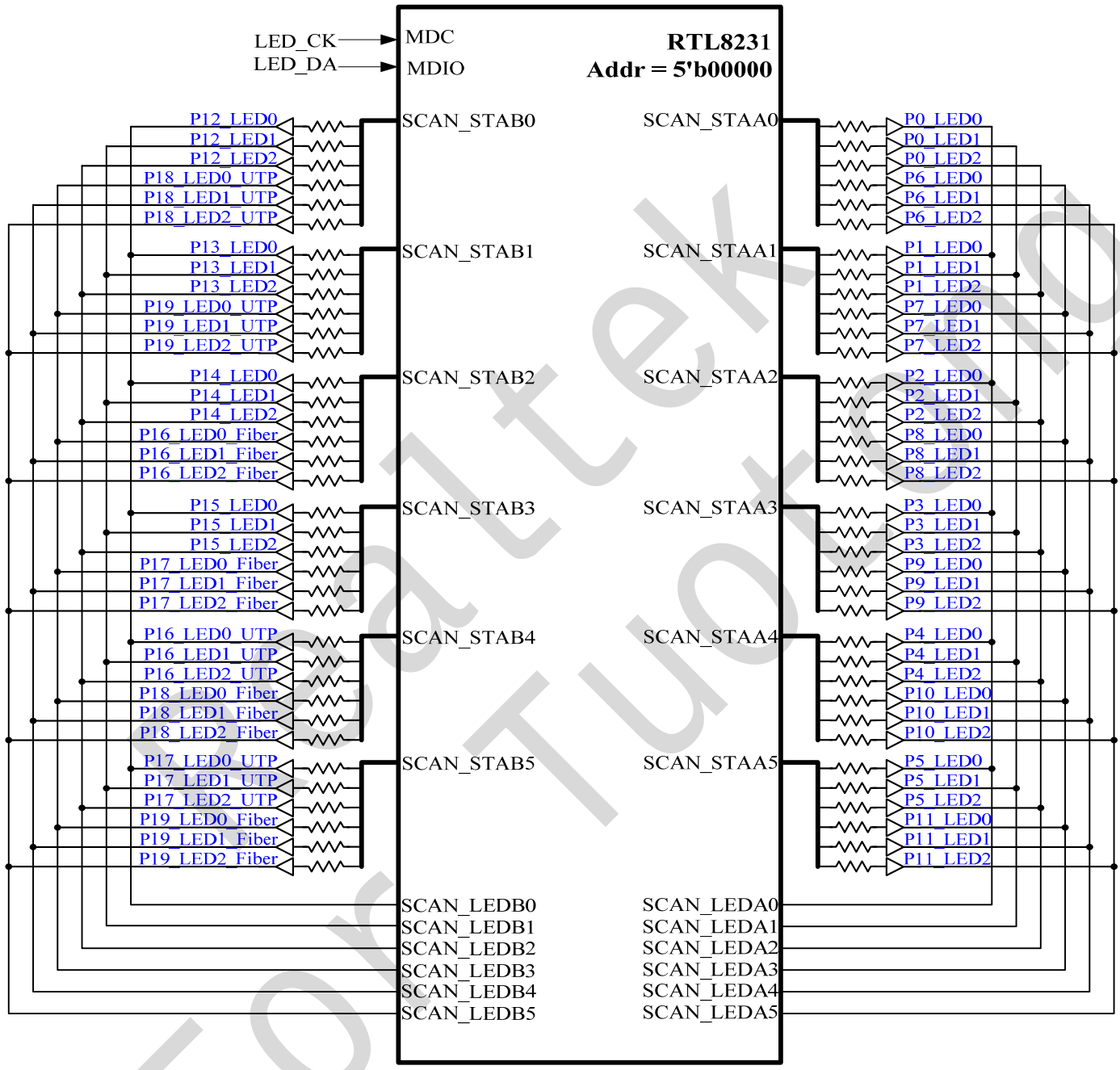

Figure 7 RTL8380M 16G+ 4G Combo and per-port 3 single color LED circuit

Figure 7 is an example for 16G+ 4G Combo LED circuit with per port 3 LED. In 16G+ 4G (UTP or Fiber) mode, the LED between SCAN_STAB2 ~ SCAN_STAB5 and SCAN_LEDB3 ~ SCAN_LEDB5 can be removed. In 16G+ 2* Fiber mode, P17LED and P19LED can be removed. In 16G mode, P16LED and P18LED can also be floating. Furthermore, if port 0~ 15 need less LED, SCAN_LEDA2, SCAN_LEDA5, SCAN_LEDB2 and SCAN_LEDB5 can be left floating.

3.3. Bi-color Scan LED Application

In bi-color LED mode, a little difference from single color LED is that in per-port 2 LED mode, 2 RTL8231 are still needed for more than 24 ports application, since that 1 RTL8231 can only support 24 ports bi-color LED.

Table 13 is a brief list for some typical application in bi-color LED mode.

Table 13 Scan bi-color LED application mode

Application mode			*LED_MASK_SEL*	*Total LED RTL8380M/ RTL8382M/ RTL8382L support*	*Total LED Actually used*	*RTL8231 needed*
RTL8382M/ RTL8382L	24G+ 2* Fiber	Per-port 3 LED	7	28*3	26*3	2
		Per-port 2 LED	3	28*2	26*2	2
	24G+ 4G UTP (or 4G Fiber)	Per-port 2 LED	3	28*2	28*2	2
	24G+ 4G Combo	Per-port 2 LED	3	28*2+ 4*2	28*2+ 4*2	2
		Per-port 3 LED	7	28*3+ 4*3	28*3+ 4*3	2
	20G+ 4G Combo	Per-port 2 LED	3	24*2+ 4*2	24*2+ 4*2	2
		Per-port 3 LED	7	24*3+ 4*3	24*3+ 4*3	2
	24G	Per-port 2 LED	3	28*2	24*2	1
		Per-port 3 LED	7	28*3	24*3	1
RTL8380M	16G+ 2* Fiber	Per-port 3 LED	7	20*3	18*3	1
		Per-port 2 LED	3	20*2	18*2	1
	16G+ 4G UTP (or 4G Fiber)	Per-port 2 LED	3	20*2	20*2	1
	16G+ 4G Combo	Per-port 2 LED	3	20*2+ 4*2	20*2+ 4*2	1
		Per-port 3 LED	7	20*3+ 4*3	20*3+ 4*3	1
	12G+ 4G Combo	Per-port 2 LED	3	16*2+ 4*2	16*2+ 4*2	1
		Per-port 3 LED	7	16*3+ 4*3	16*3+ 4*3	1
	16G	Per-port 2 LED	3	20*2	20*2	1
		Per-port 3 LED	7	20*3	20*3	1

Some related circuit design is shown in figure 8~9 as below:

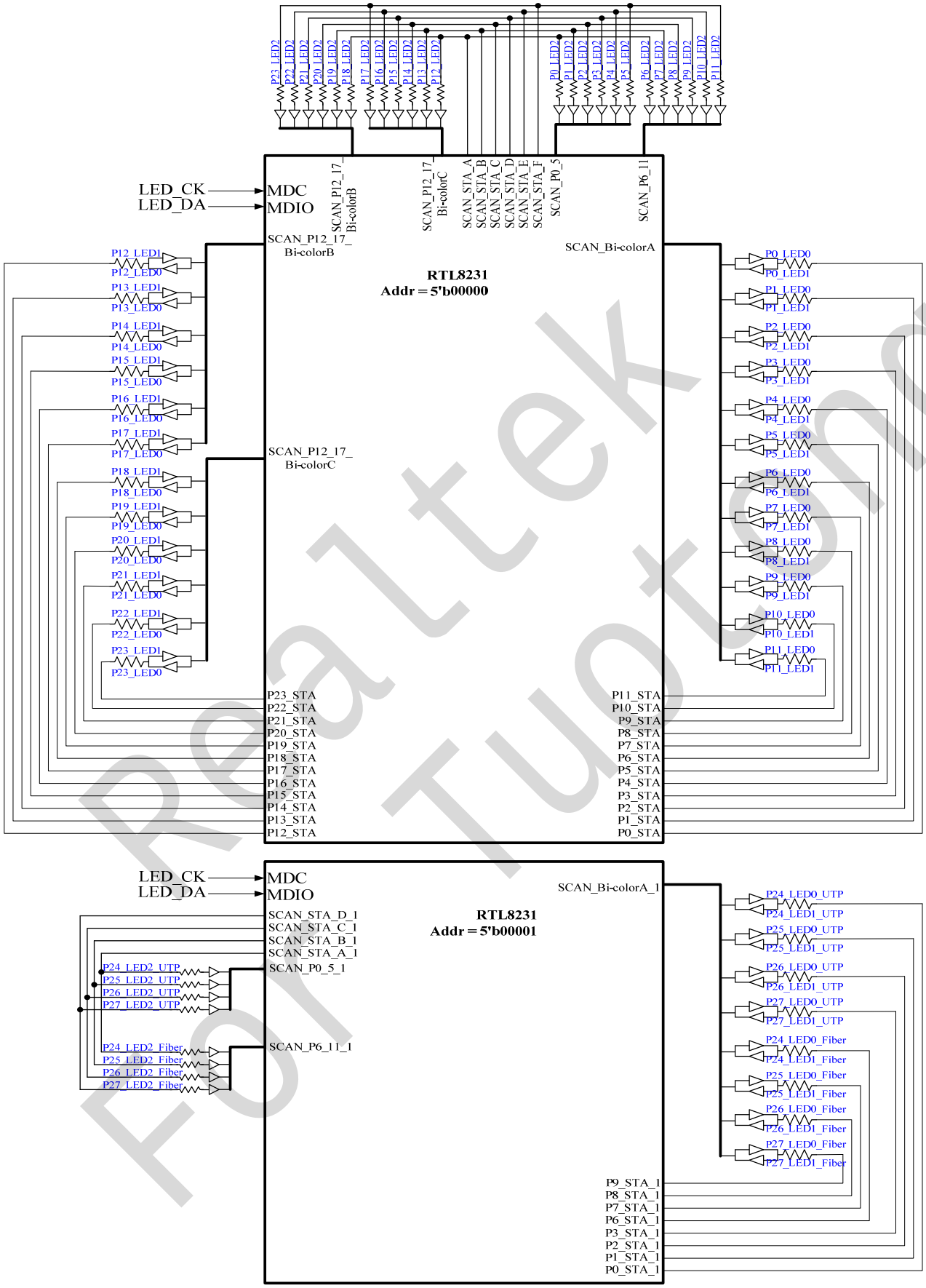

Figure 8 RTL8382M/ RTL8382L 24G+ 4G Combo and per-port 3 LED circuit

Figure 8 is an example for 24G+ 4G Combo LED circuit with per port 3 LED; In 24G+ 4G (UTP or Fiber) mode, P6_STA_1, P7_STA_1, P8_STA_1, P9_STA_1 and SCAN_P6_11_1 are not need to connect to LED. Also, as in single color LED mode, port 24~27 LED will be used for port 20~ 23 fiber LED in 20G+ 4G Combo mode. In 24G+ 2* Fiber mode, P1_STA_1, P3_STA_1, SCAN_STA_B_1 and SCAN_STA_D_1 are not need to connect to LED; In 24G mode, only the upper RTL8231 is enough and the lower RTL8231 can be deleted. Furthermore, if port 0~ 23 need less, for example 2 LED, SCAN_P0-5, SCAN_P6-11, SCAN_STA_A, SCAN_STA_B, SCAN_STA_C, SCAN_STA_D, SCAN_STA_E and SCAN_STA_F can be left floating.

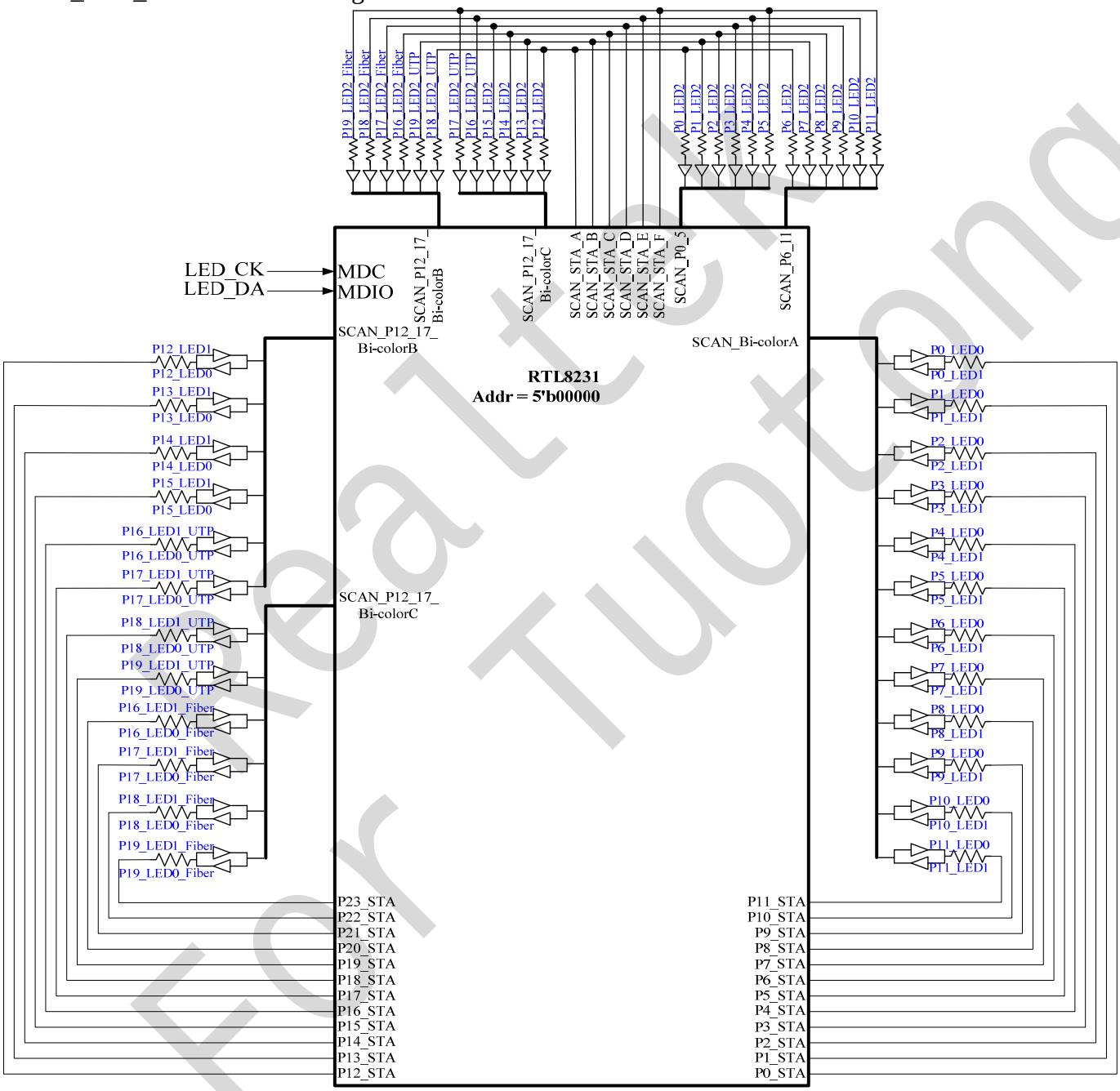

Figure 9 RTL8380M 16G+ 4G Combo and per-port 3 LED circuit

Figure 9 is an example for 16G+ 4G Combo LED circuit with per port 3 LED; In 16G+ 4G (UTP or Fiber) mode, P20_STA, P21_STA, P22_STA and P23_STA are not need to connect to LED. In 16G+ 2* Fiber mode, P17_STA, P19_STA are not need to connect to LED. In 16G mode, P16_STA, P18_STA can also be floating. Furthermore, if port 0~15 need less LED, the LED connected between SCAN_P0-5 and

SCAN_STA_A, SCAN_STA_B, SCAN_STA_C, SCAN_STA_D, SCAN_STA_E and SCAN_STA_F can be removed, same to other single color LED.

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