TU8FA0408AA
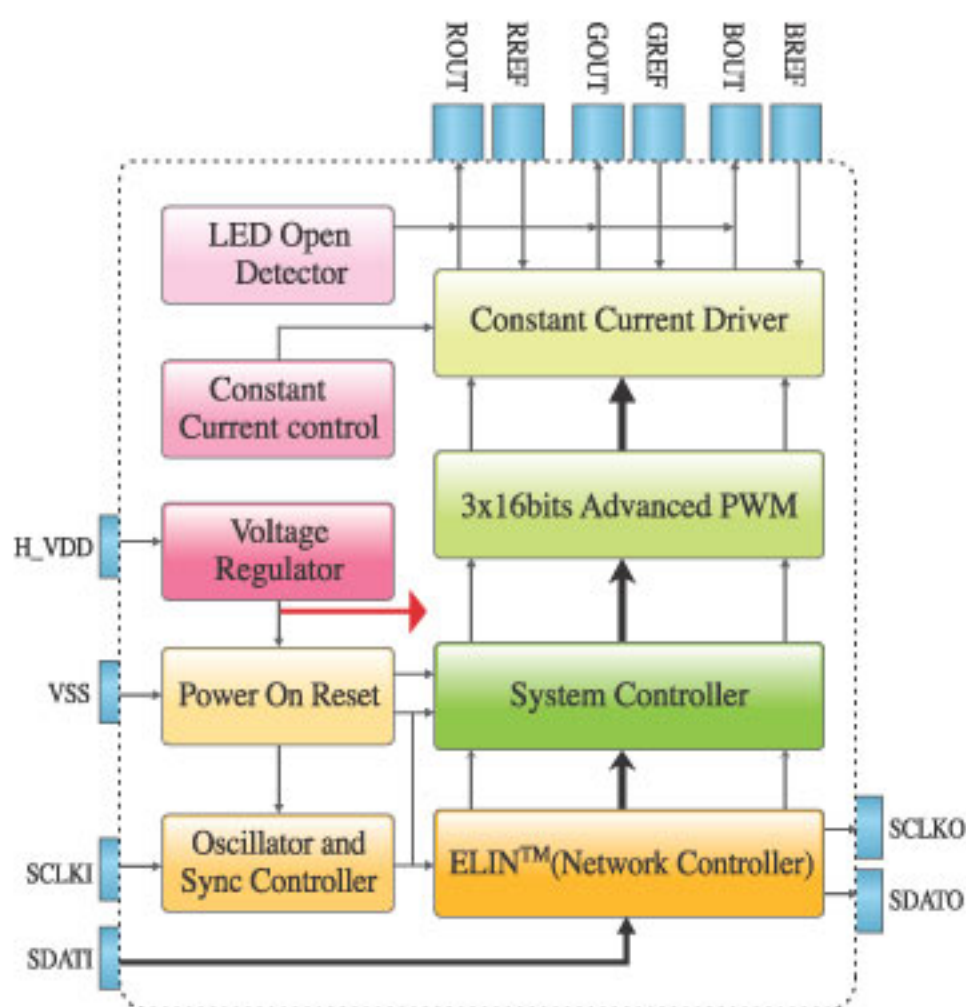## 3 Channel Output LED Driver IC with a 16Bit APWM™ a Sync/Async Mode and an Internal Regulator

The TU8FA0408AA is a networking color LED driver IC designed for a LED decorative lighting and a LED sign.

The color LED driver IC includes an internal voltage regulator and an internal RC oscillator. Therefore, only 3 lines (LED Power (LED_VDD), Ground (LED_VSS) Serial Data (SDI/SDO)) in an async transmission mode and only 4 lines (LED Power (LED_VDD), Ground (LED_VSS) Serial Data (SDI/SDO) External Clock (CLK)) in a sync transmission mode are needed to connect between a cluster and a network line. This feature can reduce the number of network line and incorporate the reliability of the LED module system.

The color LED driver IC can be connected up to 65,000 LED modules in one serial network by a cascade method via a transmission line, which transmit data as like an image or a text among clusters. So above features can reduce a network connection overhead and easy to make the connection of LED modules.
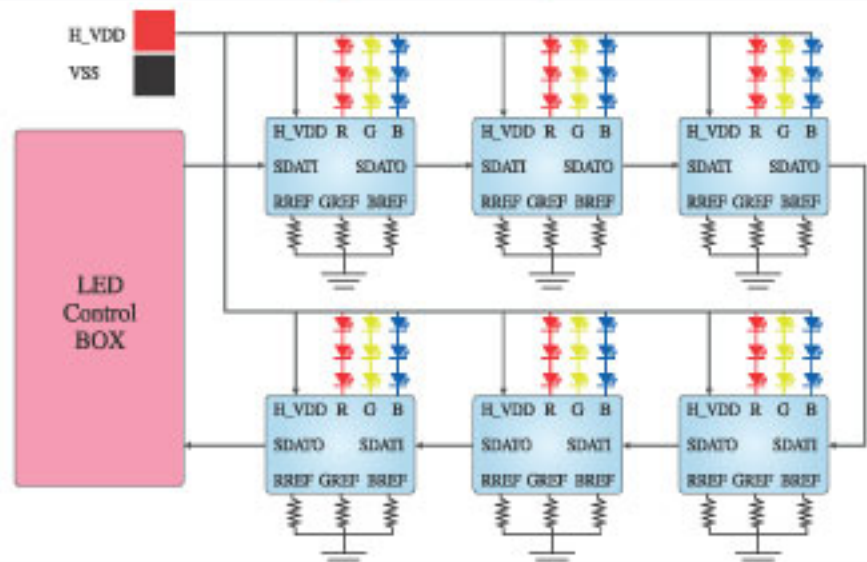
_Block Diagram

◆ Analog Part
. Built In Voltage Regulator : 4V ~ 27V Operation
. Support Up to 30V LED Power (LED Driving Port)
. Built In Oscillator
. Maximum Synchronous Clock : 25Mhz(Synchronous Mode only)
. Power On Reset
. Internal Band-gap Reference Circuit
. 60mA Constant Current Driver (REF = 18KΩ)
. Current Fine Tuning can be executed by external resistors.
. Constant Current Accuracy
    − Between Channels : ± 1.5% (typ), ± 3% (max)
    − Between Chips   : ± 6% (max)
. LED Open Detection to detect LED errors for each channel.
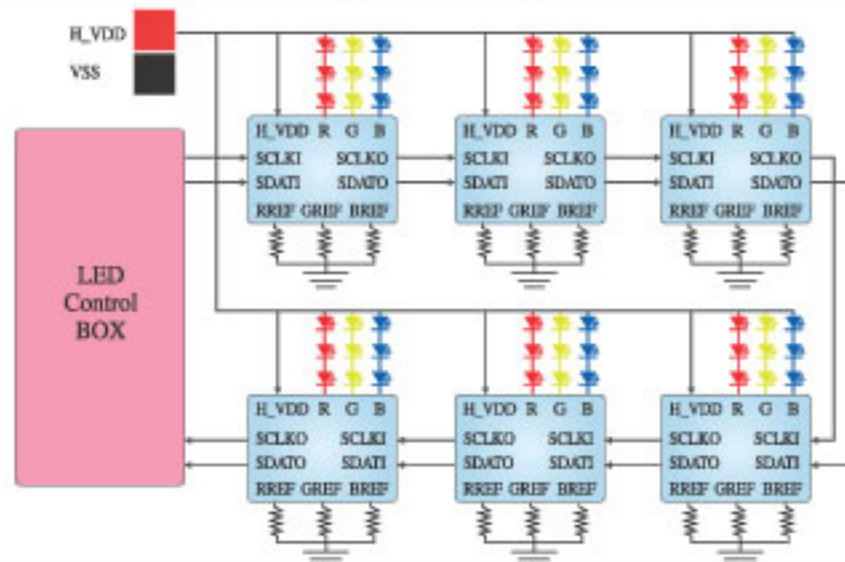
◆ Control Part
. 420 Kbps Enhanced Local Interconnect Network
    (ELIN™, Asynchronous Mode)
    − Don't need external sync clock
    − Only need 3 wires (VDD, VSS, SDATI) to form network
    − Maximum distance between two clusters is 1M
. Support Total 65536 devices for one serial network
. Max 25 Mbps Enhanced Local Interconnect Network
    (ELIN™, Synchronous Mode)
    − Need 4 wires (VDD, VSS, SCLKI, SDATI) to form network
    − Support Total 65536 devices for one serial network.
. 16bit Advanced Pulse Width Modulator (APWM™) to improve refresh rate and reduce flicker noise.
. Delayed LED output
. Can Support 8bit ~ 16bit PWM mode (S/W selectable)
. Built in buffer for data to next driver

_Application Diagram (Asynchronous Mode)

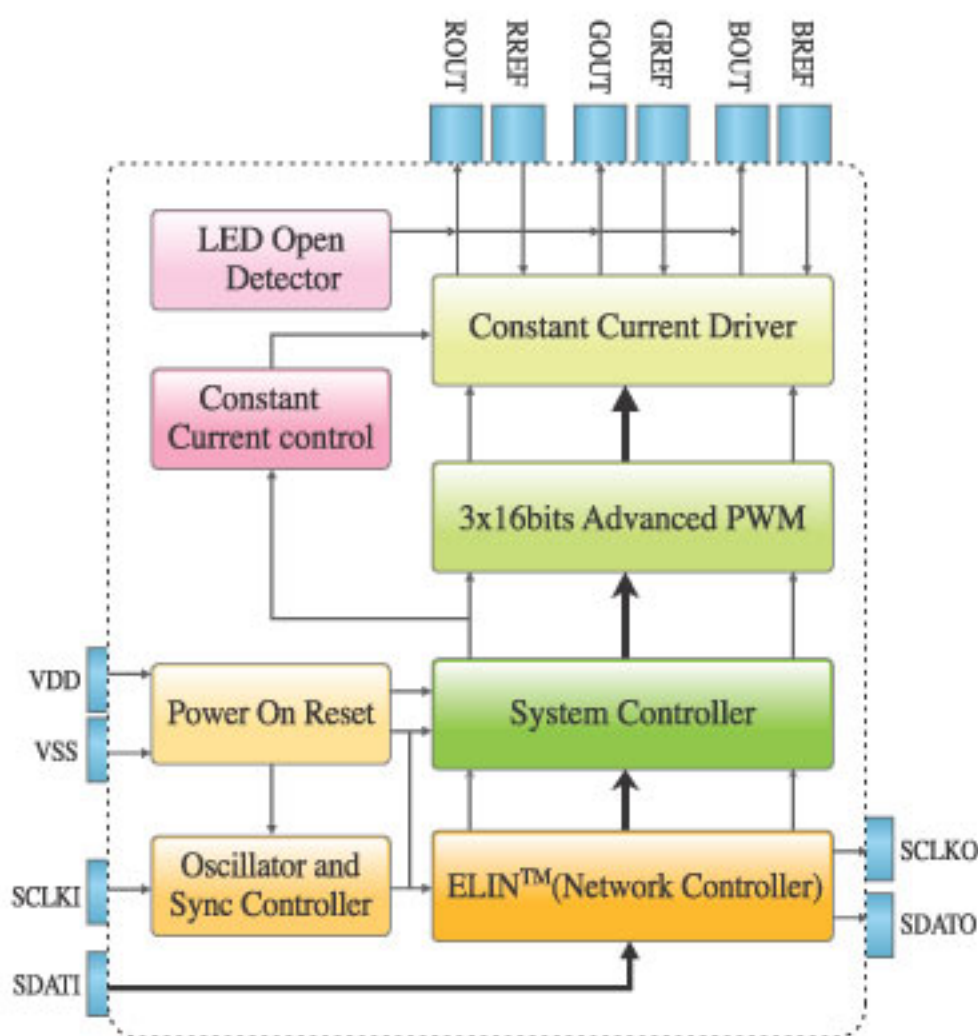# _Application Diagram (Synchronous Mode)

The TU8FA0508AA is a networking color LED driver IC designed for a LED decorative lighting and a LED sign.

The color LED driver IC includes an internal RC oscillator. Therefore, only 3 lines (LED Power (LED_VDD), Ground (LED_VSS) Serial Data (SDI/SDO)) in an async transmission mode and only 4 lines (LED Power (LED_VDD), Ground (LED_VSS) and Serial Data (SDI/SDO) External Clock (CLK)) in a sync transmission mode are needed to connect between a cluster and a network line. This feature can reduce the number of network line and incorporate the reliability of the LED module system.

The color LED driver IC can be connected up to 65,000 LED modules in one serial network by a cascade method via a transmission line, which transmit data as like an image or a text among clusters. So above features can reduce a network connection overhead and easy to make the connection of LED modules.
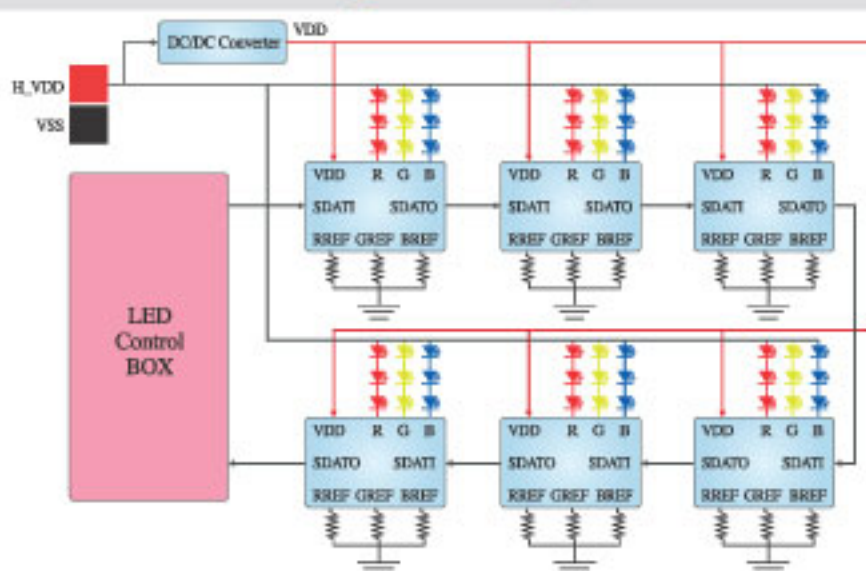
_Block Diagram

◆ Analog Part

. Supply Voltage for operation : 3.0V ~ 3.6V
. Support Up to 30V LED Power (LED Driving Port)
. Built In Oscillator
. Maximum Synchronous Clock : 25Mhz(Synchronous Mode only)
. Power On Reset
. Internal Band-gap Reference Circuit
. 60mA Constant Current Driver (REF = 18KΩ)
. Current Fine Tuning can be executed by external resistors.
. Constant Current Accuracy
    − Between Channels : $\pm$ 1.5% (typ), $\pm$ 3% (max)
    − Between Chips   : $\pm$ 6% (max)
. LED Open Detection to detect LED errors for each channel.
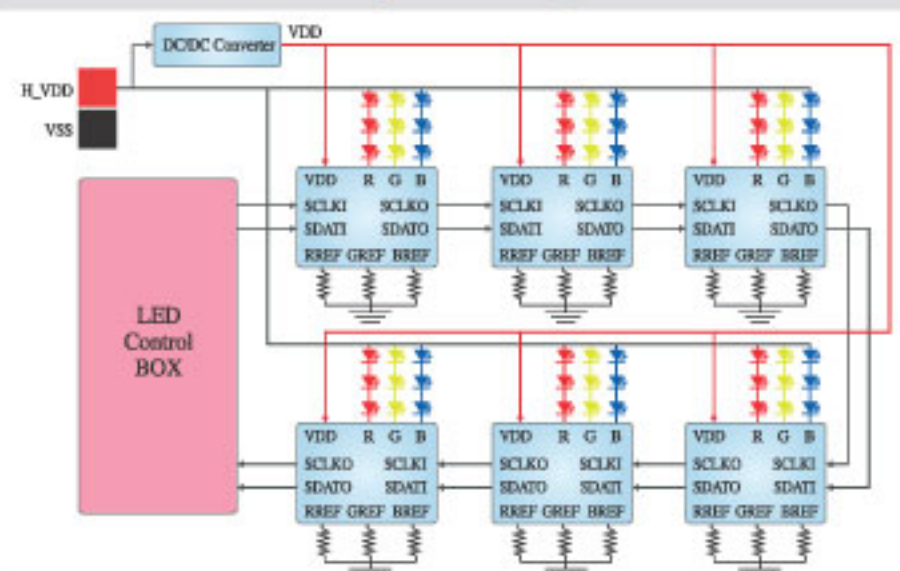
◆ Control Part

. 420 Kbps Enhanced Local Interconnect Network
  (ELIN™, Asynchronous Mode)
    − Don't need external sync clock
    − Only need 3 wires (VDD, VSS, SDATI) to form network
    − Maximum distance between two clusters is 1M
. Support Total 65536 devices for one serial network
. Max 25 Mbps Enhanced Local Interconnect Network
  (ELIN™, Synchronous Mode)
    − Need 4 wires (VDD, VSS, SCLKI, SDATI) to form network
    − Support Total 65536 devices for one serial network.
. 16bit Advanced Pulse Width Modulator (APWM™) to improve
  refresh rate and reduce flicker noise.
. Delayed LED output
. Can Support 8bit ~ 16bit PWM mode (S/W selectable)
. Built in buffer for data to next driver

_Application Diagram (Asynchronous Mode)

_Application Diagram (Synchronous Mode)

TU8FA0608AA
12 Channel Output LED Driver IC with a 16Bit APWM™
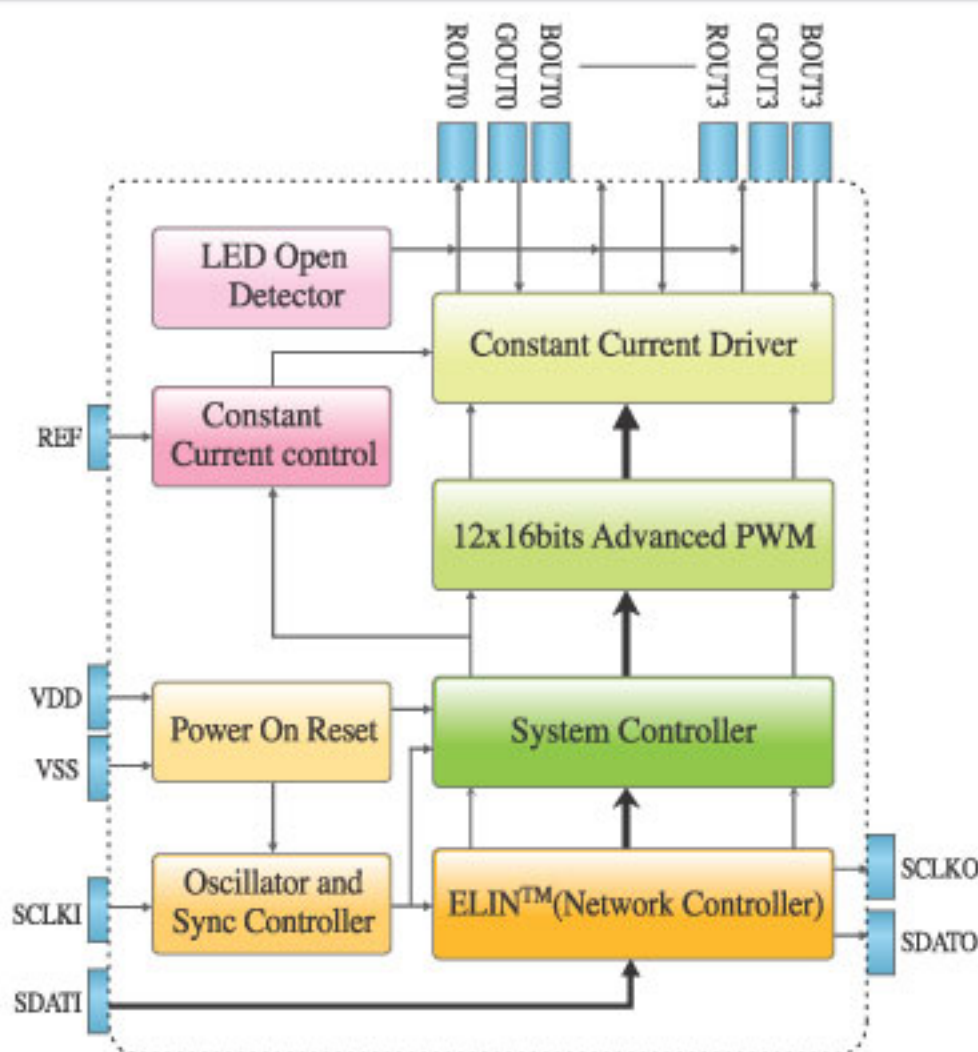### a Sync/Async Mode

The TU8FA0608AA is a networking color LED driver IC designed for a LED decorative lighting and a LED sign.

The color LED driver IC includes an internal RC oscillator. Therefore, only 3 lines (LED Power (LED_VDD), Ground (LED_VSS) Serial Data (SDI/SDO)) in an async transmission mode and only 4 lines (LED Power (LED_VDD), Ground (LED_VSS) and Serial Data (SDI/SDO) External Clock (CLK)) in a sync transmission mode are needed to connect between a cluster and a network line. This feature can reduce the number of network line and incorporate the reliability of the LED module system.

The color LED driver IC can be connected up to 65,000 LED modules in one serial network by a cascade method via a transmission line, which transmit data as like an image or a text among clusters. So above features can reduce a network connection overhead and easy to make the connection of LED modules.
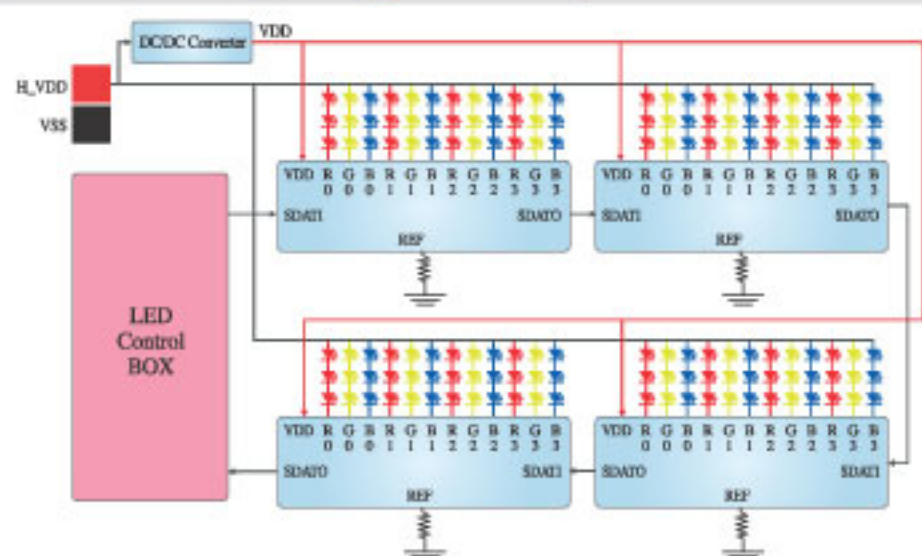
_Block Diagram

◆ Analog Part
. Supply Voltage for operation : 3.0V ~ 3.6V
. Support Up to 30V LED Power (LED Driving Port)
. Built In Oscillator
. Maximum Synchronous Clock : 25Mhz (Synchronous Mode only)
. Power On Reset
. Internal Band−gap Reference Circuit
. 60mA Constant Current Driver (REF = 18KΩ)
. Current Fine Tuning can be executed by external resistor (REF).
. Constant Current Accuracy
   − Between Channels : ± 1.5% (typ), ± 3% (max)
   − Between Chips   : ± 6% (max)
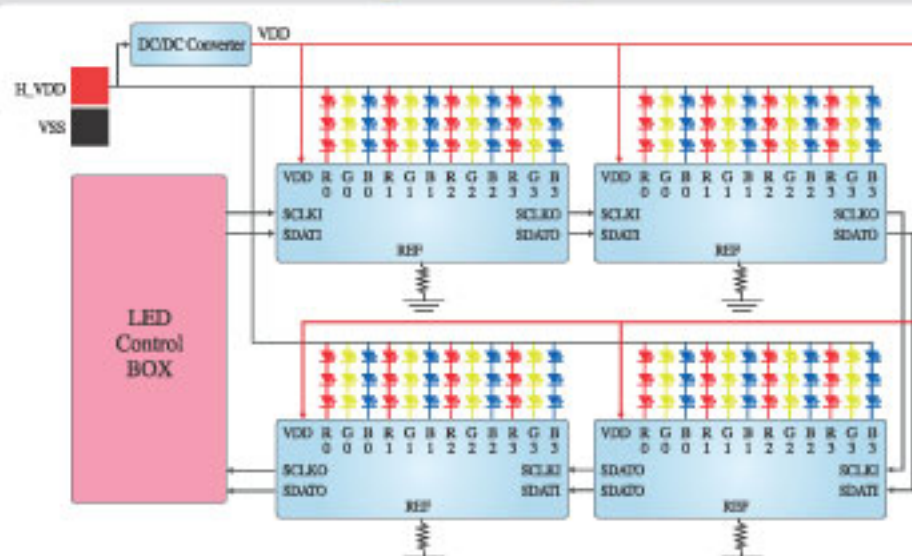. LED Open Detection to detect LED errors for each channel.

◆ Control Part
. 420 Kbps Enhanced Local Interconnect Network
  (ELIN™, Asynchronous Mode)
   − Don't need external sync clock
   − Only need 3 wires (VDD, VSS, SDATI) to form network
   − Maximum distance between two clusters is 1M
. Support Total 65536 devices for one serial network
. Max 25 Mbps Enhanced Local Interconnect Network
  (ELIN™, Synchronous Mode)
   − Need 4 wires (VDD, VSS, SCLKI, SDATI) to form network
   − Support Total 65536 devices for one serial network.
. 16bit Advanced Pulse Width Modulator (APWM™) to improve refresh rate and reduce flicker noise.
. Delayed LED output
. Can Support 8bit ~ 16bit PWM mode (S/W selectable)
. Built in buffer for data to next driver

_Application Diagram (Asynchronous Mode)

_Application Diagram (Synchronous Mode)

Terachips Inc.
www.terachips.com

8FA0109AA
TERACHIPS
0944

TU8FA0109AA is a 16 channel networking color LED driver IC for LED Video display, Sign Board and LED decorative lighting application. Customer can set constant current level, which is applicable LED intensity for their application, within 5mA ~ 60mA by connecting external resistor to the REF pin. Also this chip includes 256 step brightness controller and it can use 256 level global dimming control or Gray Scale control.

Besides this LED controller chips adopt our own network controller technology ELIN™.
This network controller is very powerful and effective method for forming LED driver serial network chain and it can handle maximum 35Mbps data transfer rate.

In addition, this network controller include various network command set and register set which are very helpful for composing serial network chain effectively and easily. Basically two signal lines (SCLKI, SDATI) are enough to make network chain and data transfer. So it s very helpful and cost saving way to make LED module and network chain. And then, we also adopt latch enable pin (LATCH). Customer can enable or disable this latch enable by network command and if customer enabling this pin, then uploading time of PWM data will be synchronized with signal which is enforced by latch enable pin. This method is very good way to remove incident image as like LED Video display application.

_Block Diagram
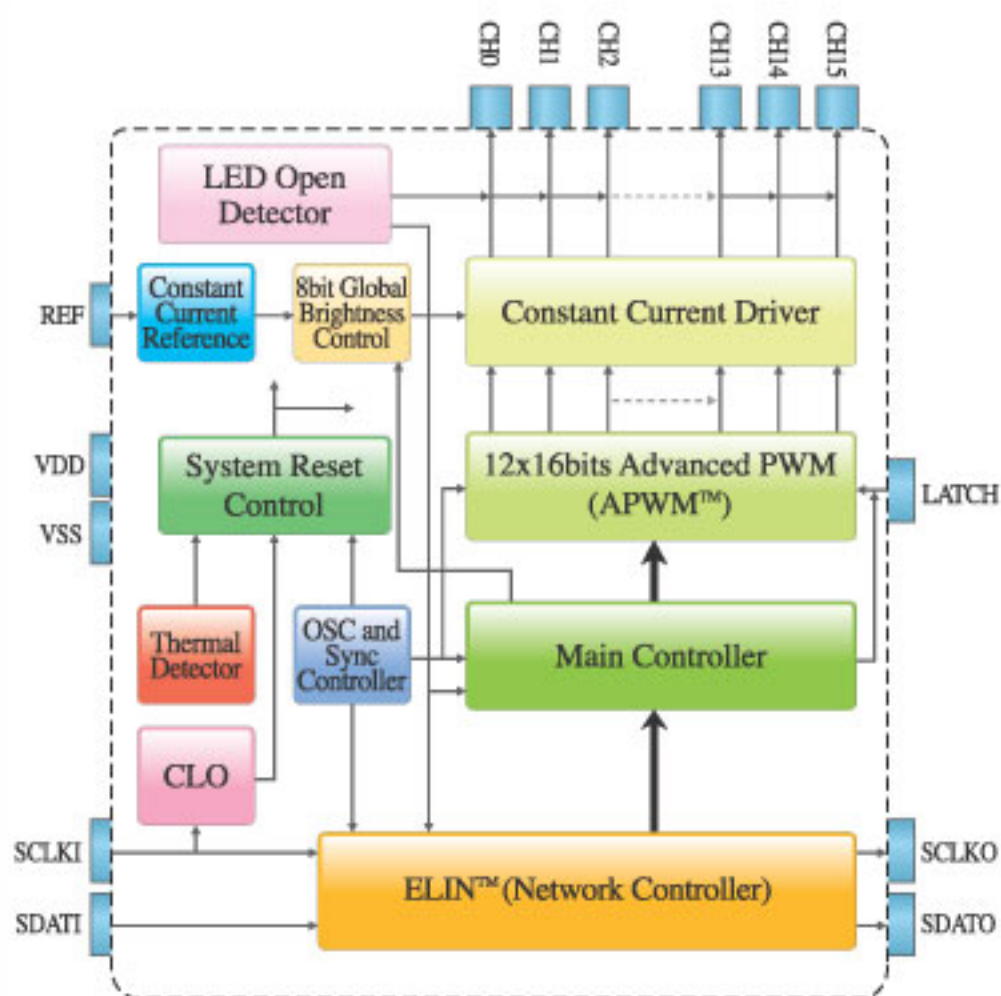
◆ Analog Part

. Supply Voltage for operation : 3.0V ~ 5.5V
. Support Up to 30V LED Power (LED Driving Port)
. Built In Oscillator and Sync controller
. Maximum Synchronous Clock : 35Mhz (Synchronous Mode only)
. Power On Reset and Thermal Detection reset
. 60mA Constant Current Driver
. Current Fine Tuning can be executed by external resistor (REF).
. Constant Current Accuracy
    − Between Channels : $\pm$ 1.5% (typ), $\pm$ 3% (max)
    − Between Chips   : $\pm$ 3% (max)
. 256 level Global Brightness Controller
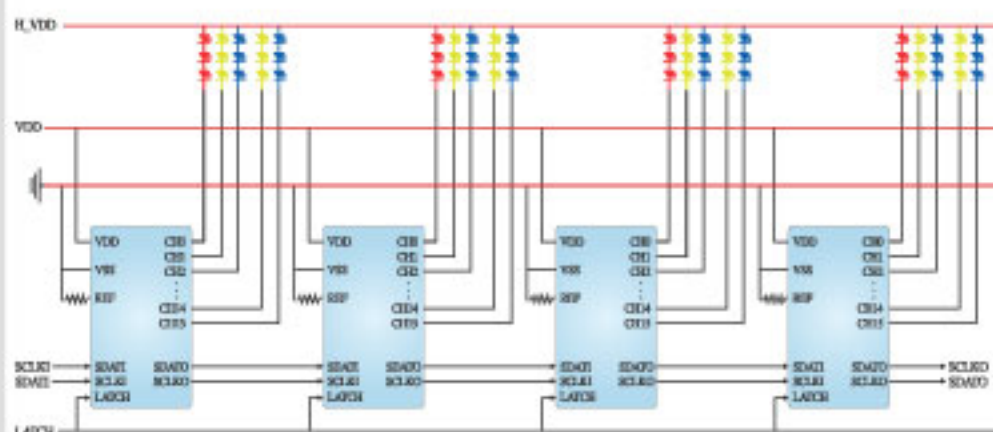. LED Open Detection to detect LED errors for each channel.

◆ Control Part

. Support Total 65536 devices for one serial network
. Max 35 Mbps Enhanced Local Interconnect Network
   (ELIN™, Asynchronous Mode)
    − Need 4 wires (VDD, VSS, SCLKI, SDATI) to form network
    − Support Total 65536 devices for one serial network.
. 12 × 16bit Advanced Pulse Width Modulator (APWM™) to improve refresh rate and reduce flicker noise.
. Can Support 8bit / 12bit PWM mode (S/W selectable)
. S/W selectable External Latch Enable (LATCH) Signal
. Delayed LED output
. Built in buffer for data to next driver
. Communication Line Observer Reset (CLO) for watch dog function

_Application Diagram (Latch Pin Disable)
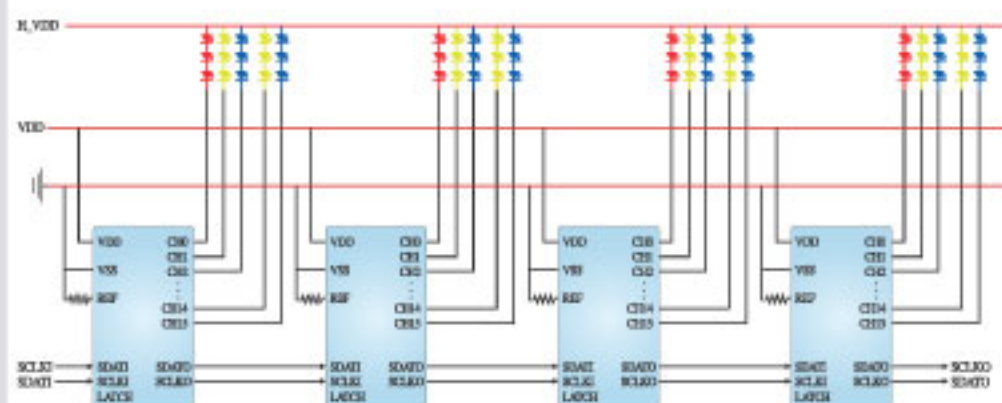
## _Application Diagram (Latch Pin Enable)

TU8FA0209AA and TU8FA0309AA is a 3 channel networking color LED driver IC designed for LED decorative lighting and LED Sign. These Color LED driver IC includes an internal voltage regulator (TU8FA0309AA) and an internal RC oscillator. Therefore only 3 lines (LED Power (LED_VDD), Ground (LED_VSS), Serial Data (SDI)) in an Async transmission mode and only 4 lines (LED Power (LED_VDD), Ground (LED_VSS), Serial Data (SDI) and External Clock (CLK)) in a Sync transmission mode are needed to connect between cluster and network line. This feature can reduce the number of network line and incorporate the reliability of the LED module system.

The color driver IC can be connected up to 512 LED modules in one serial network by a cascade method via a transmission line, which transmit data as like an image or a text among clusters. So above feature can reduce a network connection overhead and easy to make the connection of LED modules.

_Block Diagram

TU8FA0209AA
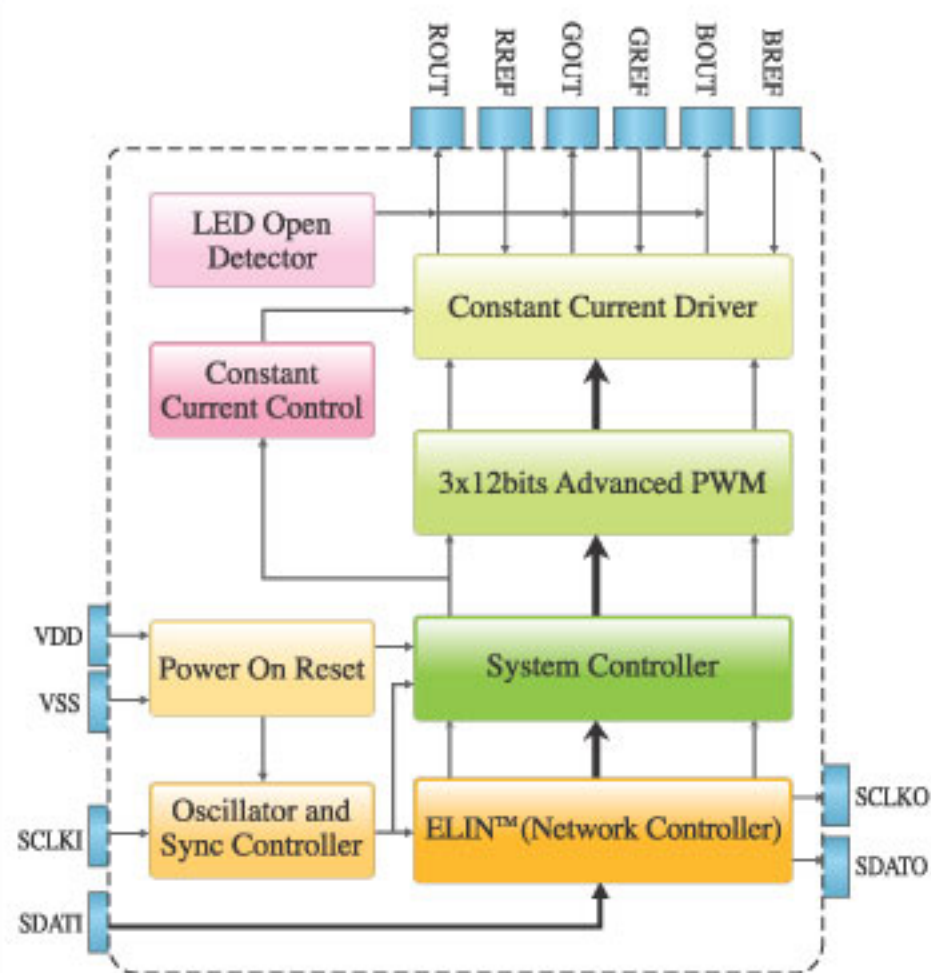
TU8FA0309AA

◆ Analog Part

. Built In Voltage Regulator (TU8FA0309AA only)
 – 4V ~ 17V Operation
. Supply Voltage for operation (TU8FA0209AA only)
 – 3.0V ~ 3.6V
. Support Up to 30V LED Power (LED Driving Port)
. Built In Oscillator
. Maximum Synchronous Clock : 25Mhz (Synchronous Mode only)
. Power On Reset
. Internal Band–gap Reference Circuit
. 60mA Constant Current Driver (REF = 18K)
. Current Fine Tuning can be executed by external resistors.
. Constant Current Accuracy
 – Between Channels : ± 1.5% (typ), ± 3% (max)
 – Between Chips   : ± 3% (max)
. LED Open Detection to detect LED errors for each channel.
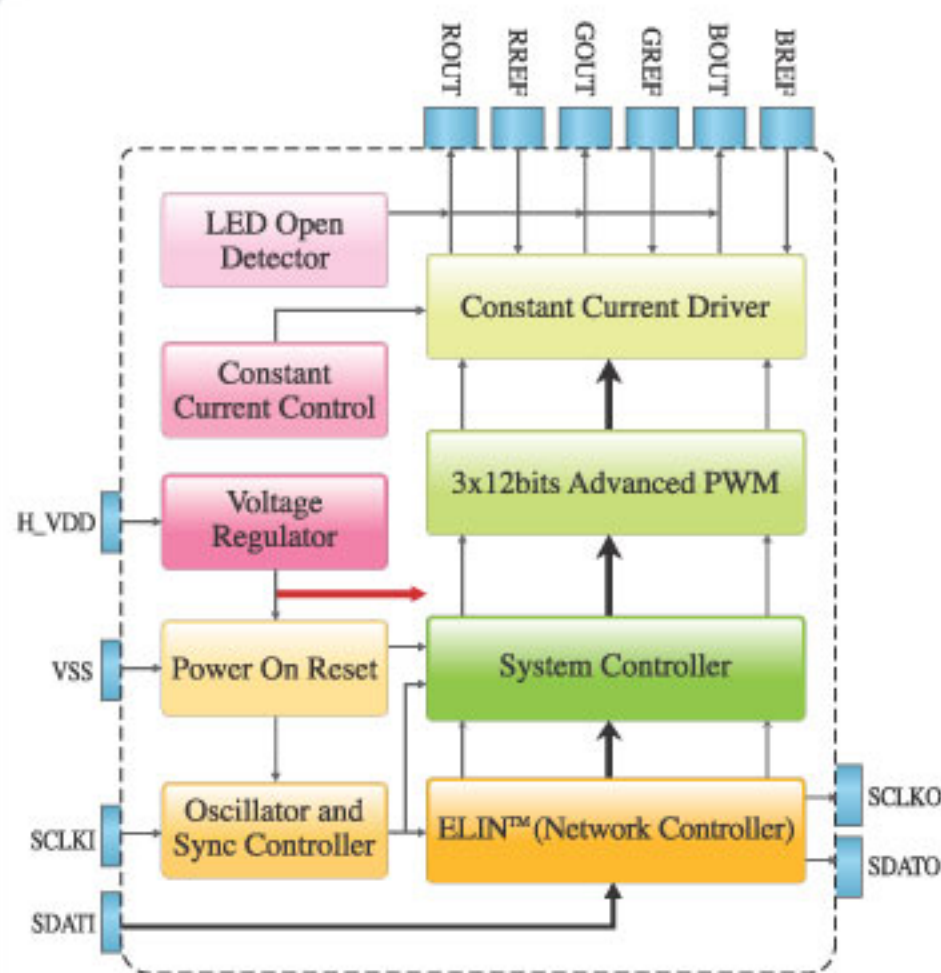
◆ Control Part

. 420 Kbps Enhanced Local Interconnect Network
 (ELIN™, Asynchronous Mode)
 – Don't need external sync clock
 – Only need 3 wires (VDD, VSS, SDATI) to form network
 – Maximum distance between two clusters is 1M
. Support 512 devices for one serial network
. Max 25 Mbps Enhanced Local Interconnect Network
 (ELIN™, Synchronous Mode)
 – Need 4 wires (VDD, VSS, SCLKI, SDATI) to form network
 – Support Total 65536 devices for one serial network.
. 12bit Advanced Pulse Width Modulator (APWM™) to improve refresh rate and reduce flicker noise.
. Delayed LED output
. Built in buffer for data to next driver

_Controller

DVI Interface Controller

- LED Display Capacity : Max. 16384 Pixels
- Video Source : ~ UXGA(1600 X 1200)
- Video Input Port : DVI
- LED Output Refresh Cycle : 60Hz/120Hz
- LED Output Format : Max. 8192 Pixels per Port
- LED Output Port : Max. 8 Ports thru RS485
- LED Data Transfer Performance : 100m (10 Mbps)
- Flexible Display Area Adjust by Key-in or from PC
- Optional Gamma Correction
- Unlimited Cascading Controller : Retiming thru Video Codec
- Power Supply : 7V ~ 12V / 1.5A DC
- Application : Sign Board, Decoration Scene Board, …

SD Card Interface Controller

- Data Transmit Performance :
    - 4000 Module, 40 Frame/sec (12 Mbps, Sync Mode)
    - 250 Module, 40 Frame/sec (Async Mode)
- Data Transmit Rate :
    - Sync Mode : 2~12 Mbps
    - Async Mode : 420 Kbps
- Transmit Distance (with receiver module) : 100m (10 Mbps)
- Communication Interface : 3.3V RS485
- SD Card Interface : FAT16, Max 2 Gbyte
- Input Voltage : DC 12V ~ 24V
- Include simple RGBW Test Mode

Ethernet Interface Controller

- Data Transmit Performance :
    - 4000 Module, 40 Frame/sec (12 Mbps, Sync Mode)
    - 250 Module, 40 Frame/sec (Async Mode)
- Data Transmit Rate :
    - Sync Mode : 2~12 Mbps
    - Async Mode : 420 Kbps
- Transmit Distance (with receiver module) : 100m (10 Mbps)
- Communication Interface : 3.3V RS485, 10/100 Base-T Ethernet
- Storage : SDRAM 64 Mbyte, NAND Flash 512 Mbyte
- SD Card Interface : FAT16, Max 2 Gbyte
- Input Voltage : DC 12V ~ 24V
- RGBW Test Mode

Pattern Embedded Controller

- Include 6 Patterns
- Data Transmit Performance :
    - 512 Module, 40 Frame/sec (1 Mbps, Sync Mode)
    - 512 Module, 20 Frame/sec (500 Kbps , Sync Mode)
    - 200 Module, 40 Frame/sec (420 Kbps , Async Mode)
- Data Transmit Rate :
    - Sync Mode : 1 Mbps or 500 Kbps
    - Async Mode : 420 Kbps
- Transmit Distance (to first LED Module) :
    - Up to 2m (or 5m in DAT/GND/CLK order)
- Communication Interface : 3.3V TTL
- Input Voltage : DC 5V ~ 12V
- Operating Current : 500mA

_Software

LEDraw

- Easy to place Modules
- Easy to allocate and edit ID
- Be able to use frame image or flash files to extract RGB value
  - Be able to check the placement by preview function
  - Supports to merge RGB files
- Generates RGB data of each module for Terachips Controller
  - Be able to select frame rates
  - Be able to change the RGB value by RGB change table of the LEDraw
- Support to print text or graphic

LEDshow
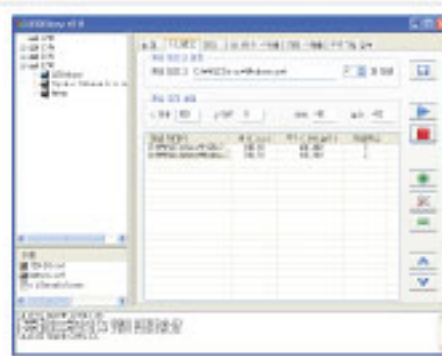
- Easy to make the scenario to play contents
  - Turn, Position, Size, Repeat count
- Easy to make a caption
  - Edit caption, Font, Color, Position , Size, Repeat count, Move speed
- Scheduling the scenario and the caption
  - Select a day
  - Play a time
  - Log display in the main window

LEDnet
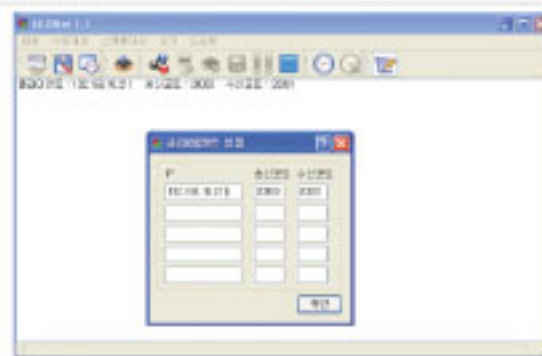
- Select the pattern to play through Ethernet
  - play the LED pattern after downloading the pattern file in PC to Ethernet Controller
  - play the LED pattern in flash memory of Ethernet Controller
  - play the LED pattern in SD card of Ethernet Controller
- Decide the number of play through Ethernet
- Download the play pattern into the flash Memory in Ethernet Controller
- Schedule the LED pattern to play

_Accessary

Receive Module

- 485 Input Channel : 2ch 3.3V RS485 Input
- Output Interface : 3.3V TTL Output
- Data Rate : 25 Mbps (MAX)
- Input Voltage : DC 12V ~ 24V
- Transmit Distance : 100m (10 Mbps)
- Operating Current : 30mA (MAX)

Transmit Module

- 485 Input Channel : 2ch 3.3V RS485 Input
- Output Interface : 3.3V TTL Output
- Data Rate : 25 Mbps (MAX)
- Input Voltage : DC 12V ~ 24V
- Transmit Distance : 100m (10 Mbps)
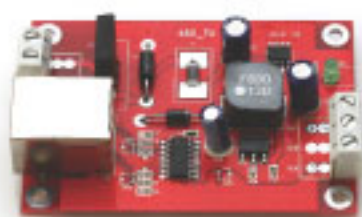- Operating Current : 100mA (MAX)

Repeater

- Input Channel : 1ch 3.3V RS485 Clock, Data Input
- Output Interface :
  - 1ch 3.3V RS485 Clock, Data Bypass
  - 1ch 3.3V RS485 Clock, Data Output
  - 1ch 3.3V TTL Clock, Data Output
- Data Rate : 20 Mbps (MAX)
- Input Voltage : DC 12V ~ 24V
- Transmit Distance : 100m (10 Mbps)
- Operating Current : 200mA (MAX)
- Available SUB ID No : 1 ~ 9999
- 4 Digit Rotary DIP Switch for ID Set

Distributor

- Input Channel : 1ch 3.3V RS485 Clock, Data Input
- Output Interface : 8ch 3.3V RS485 Clock, Data Output
- Data Rate : 20 Mbps (MAX)
- Input Voltage : DC 12V ~ 24V
- Transmit Distance : 100m (10 Mbps)
- Operating Current : 500mA (MAX)
- UART Interface for ID Set

Test Jig

- Simple LED Module operation tester for manufacturing
- Data Transmit Rate :
  - Sync Mode – 24/16/12/8 Mbps
  - Async Mode – 420 Kbps
- I/O Interface : 3.3 V I/O
- Test Mode :
  - Consecutive RGBW and off–pattern generation
  - Manual RGBW and off–pattern generation
- Input Voltage : DC 9V ~ 12V