Raffar Technology Corp.

RT5967

16 channel PWM Constant Current LED Driver IC built-in SRAM for maximum 128 Time-Multiplexing LED Display

2021/11

Version: 0.2

Description

RT5967 is a PWM constant current LED driver IC with built-in 64K-bit SRAM to support time-multiplexing up to 128 scans in high refresh rate program. The 16 constant current outputs of RT5967 are kept from influence of loading effect. The output current can be optimized by setting an external resistor and adjusted by 6-bit current gain.

By sending the complete frame data for the 64K-bit SRAM of RT5967, the display can be running on an efficiency of data transmission without increasing DCK clock frequency. Through the scrambled PWM technology and high refresh rate mode, RT5967 is easy to raise the display visual refresh rate without increasing the clock frequency of GCK. In addition, RT5967 also builds in innovative functions of eliminating ghost issue and relieving LED cross bright line caused by LED defected. A built-in smart power saving technology is helpful to reduce the power consumption of LED display.

Features

- Supply voltage : 3.3V~ 5.0V
- Support time-multiplexing from 1~128 scans with built-in 64K-bit SRAM
- 16 constant current outputs
- Constant current output range : 1.0~15mA @ VDD=5.0V
- Selectable PWM control with spreading PWM pulse output mode to support HDR:
  - 16~11 bits grayscale level, support gray first or visual refresh rate first
- 64 steps current gain adjustment (40%~160%)
- High refresh rate mode to raise the visual refresh rate
- Anti-ghost circuit
- First scan dim line elimination
- Eliminating bright line caused by defected LEDs
- LED open/short detection
- Smart power saving technology
- Low grayscale and brightness improvement
- Accurate constant output current driving:
  -Channel to Channel: ±1% (Typ.)
  -Chip to Chip: ±1% (Typ.)

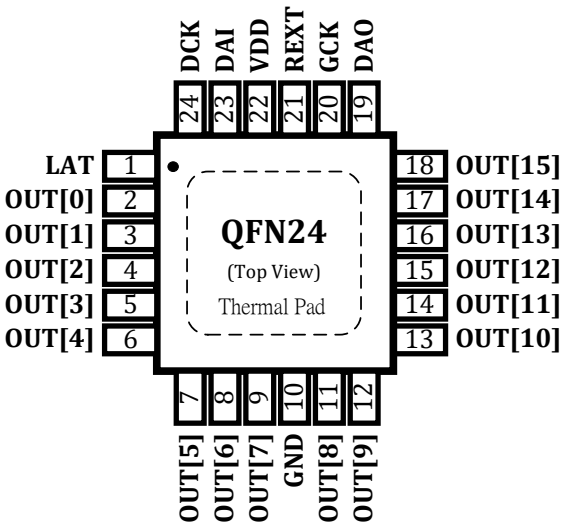
Applications

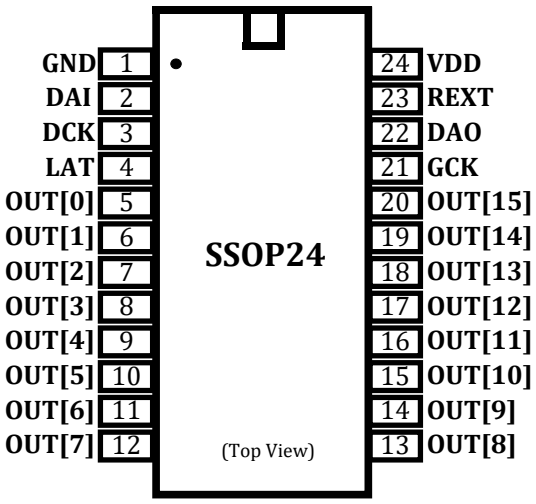
Indoor and outdoor full color LED display
Mini LED fine pitch full color LED display

Package Information

No.	Part No.	Package
1	RT5967SS	SSOP24-150mil-0.635mm
2	RT5967QN	QFN24-4*4mm

Pin Assignment





Pin Name	Description
GND	Ground terminal
DAI	Serial data input
DCK	Clock signal input for serial data
LAT	Input data strobe signal
OUT[0-15]	Constant current outputs
GCK	Clock signal input for gray scale
DAO	Serial data output
REXT	External resistor terminal , to set the output current
VDD	Supply voltage terminal
Thermal pad	QFN24: Floating or connect to GND

Maximum Rating

Parameters	Symbol	Rating	Unit
Supply Voltage	V_{DD}	0 ~ 5.5	V
Input Voltage (all pins)	V_{IN}	−0.4 ~ V_{DD}+0.4	V
Output Current (OUT[0-15])	I_{OUT}	15	mA
Output Voltage (OUT[0-15])	V_{OUT}	10	V
GND Terminal Current	I_{GND}	240	mA
Data Clock Frequency	f_{DCK}	30	MHz
Power Dissipation (on 4-layer PCB, T_a = 25 °C)	P_D	1.67 (SSOP24)	W
		2.50 (QFN24)	
Thermal Resistance (on 4-layer PCB, T_a = 25 °C)	$R_{th(j-a)}$	75 (SSOP24)	°C/W
		50 (QFN24)	
Operating Temperature	T_{opr}	−40 ~ 85	°C
Storage Temperature	T_{stg}	−55 ~ 150	°C

*The IC reliability may be reduced when operating with the maximum rating for long periods. The suggested junction temperature of the device is less than 125°C.
*All voltage values are with respect to ground terminal.
*The capability of thermal dissipation is related to the dimension of thermal pad and layer numbers of the PCB.

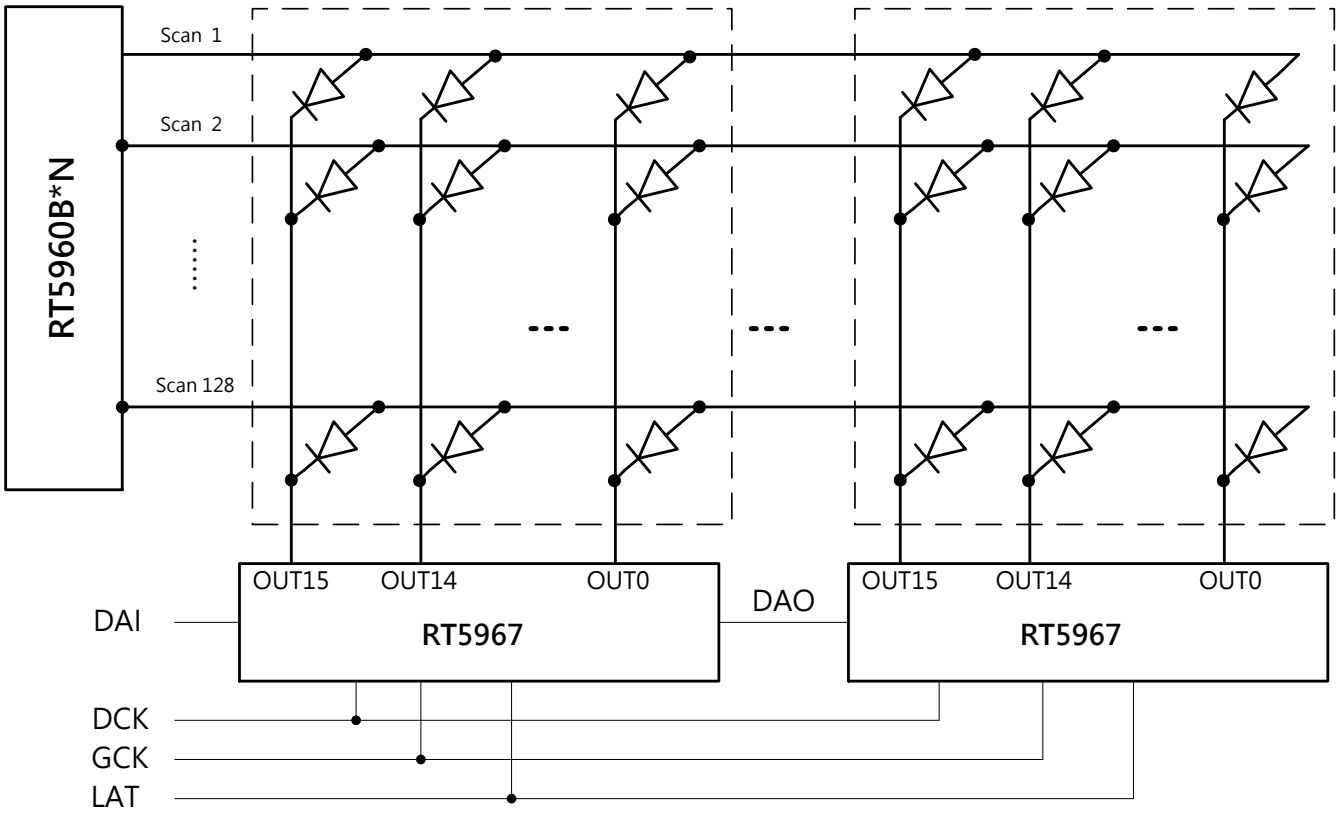
Recommended Operating Condition

Parameters	Symbol	Rating	Unit
Supply Voltage	V_{DD}	3.3~5.0	V
Input Voltage (all pins)	V_{IN}	−0.4 ~ V_{DD}+0.4	V
Output Current (OUT[0-15])	I_{OUT}	1.0~15 (VDD=4.2V~5.0V,incl. current gain adjustment)	mA

The Typical Design Structure of scan type LED Display

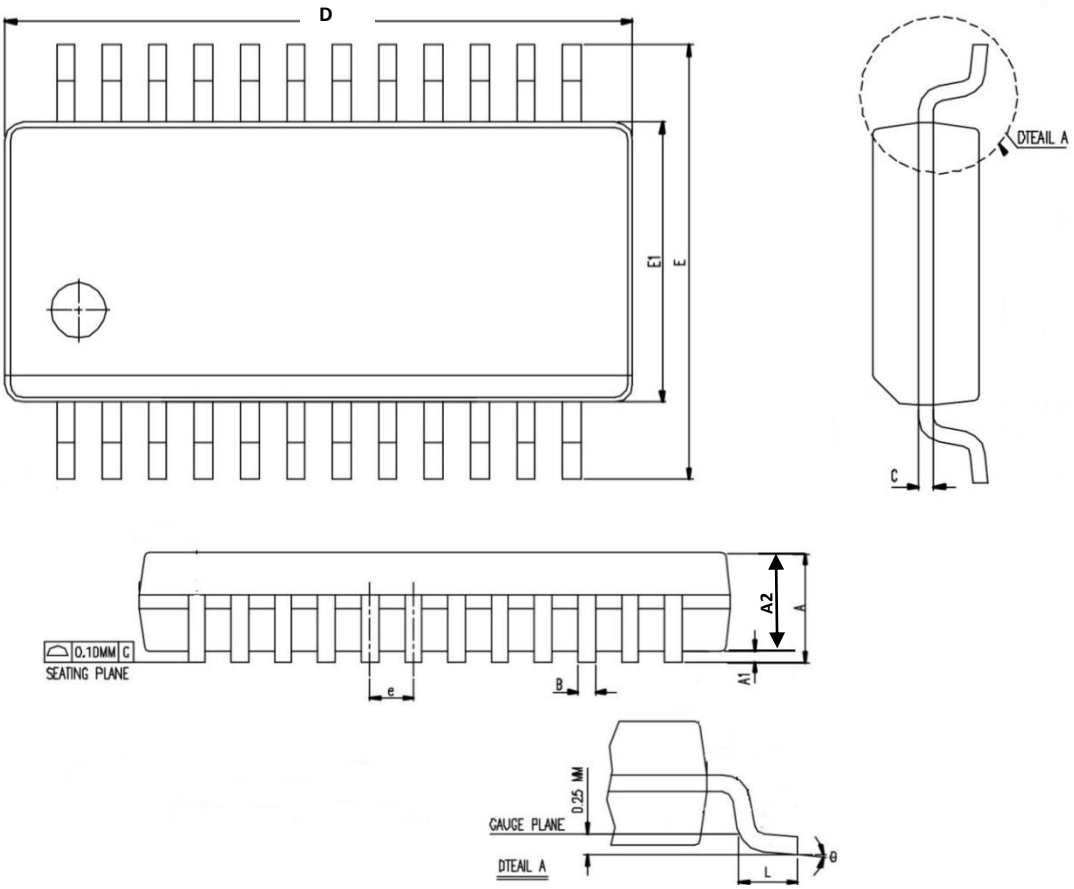
The structure below shows the N-row multiplexing LED display application with RT5967.
RT5967 is controlled by the command data composing of DCK and LAT as well as DAI and DAO for PWM data. In the meanwhile, OUT0~OUT15 switch to different scan by RT5960B, Scan1~Scan128 (max.), for displaying the image data.

Note: The external resistor of REXT pin has to be pulled low to GND.



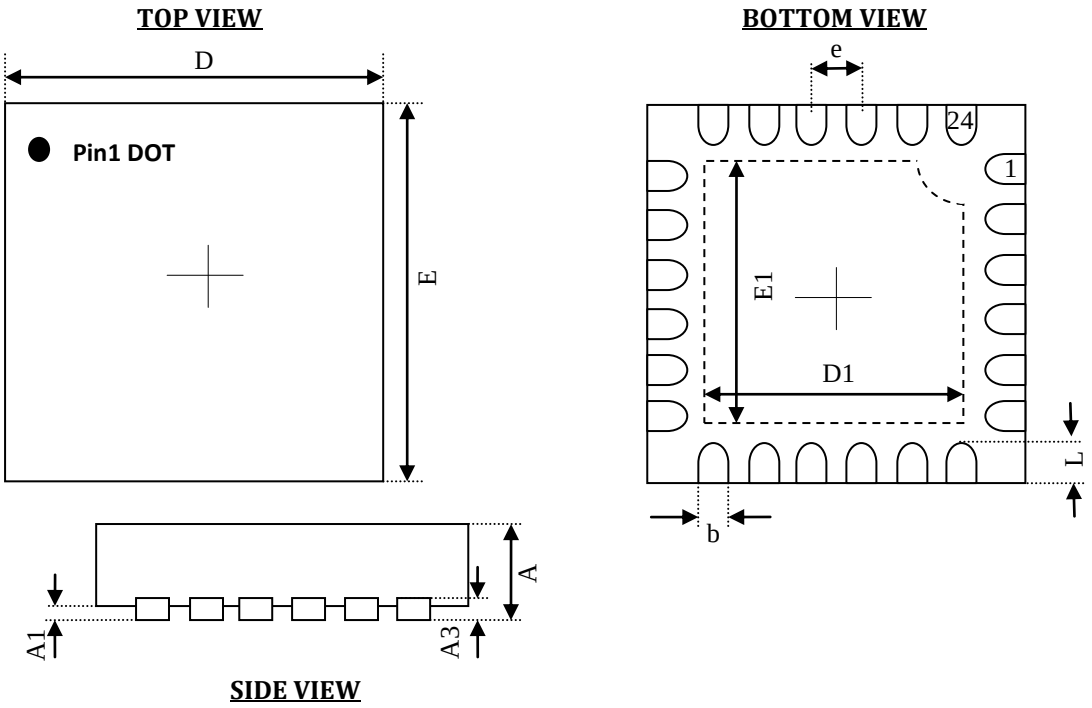
Package Outline Drawing

SSOP24 Dimension (150 mil-0.635 mm)



Symbol	Millimeters (mm)	
	Min.	Max.
A	1.35	1.75
A1	0.10	0.25
A2	---	1.50
B	0.20	0.30
C	0.18	0.25
D	8.56	8.74
E	5.79	6.20
E1	3.81	3.99
e	0.635 (BSC)	
L	0.41	1.27
θ°	0	8

QFN24 Dimension (4*4mm)



Symbol	Millimeters (mm)		
	Min.	Nom.	Max.
A	0.70	0.75	0.80
A1	0	----	0.05
A3	0.203 Ref.		
b	0.18	0.25	0.30
D	3.90	4.00	4.10
E	3.90	4.00	4.10
D1	2.55	2.65	2.75
E1	2.55	2.65	2.75
e	0.50 BSC		
L	0.30	0.40	0.50

Note

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