

带自动呼吸功能的18x12阵列LED 驱动器

18x12 Matrix LED Driver with Auto Breathing Function

■ FEATURES

- Supply voltage range: 2.7V to 5.5V
- 18 current sinks (CS), 12 current switches (SW)
- Programmable matrix size, up to $18 \times 12 = 216$ LED matrix
- Global 256 DC current steps
- Individual 256 PWM control steps for dimming
- Individual 256-level DC current for 16.8 million color calibration
- Auto breathing or group PWM control with 3 pattern controllers
 - High-precision current sinks
 - Device-to-device error: $\pm 5\%$
 - Channel-to-channel error: $\pm 5\%$
 - EMI and audible noise reduction
 - Phase shift control
 - Spread spectrum function
 - Programmable slew rate
 - Programmable H/L logic: 1.4V/0.4V or 2.4V/0.6V
 - Clock synchronization between devices by SYNC pin
 - UVLO and over-temperature protection
 - Multiple PWM frequency selectable
 - HTR7216: 1MHz I²C-compatible interface, 16 I²C device addresses
 - HTR7216S: 10MHz SPI interface
 - Individual open and short error detect function
 - De-Ghost
 - QFN5x5-44L package
- 输入电压范围: 2.7V-5.5V
- 18路电流源(CS), 12路开关(SW)
- 可设置矩阵路数, 最高支持 $18 \times 12 = 216$ 路
- 全局256个直流设置台阶
- 独立的256阶PWM调光
- 独立的256阶CS电流用于1680万细腻调色
- 3个模式控制器, 用于自动呼吸或群组PWM控制
- 高精度电流控制: 器件间误差 $\pm 5\%$; 通道间误差 $\pm 5\%$
- EMI和可闻噪声的降低措施:
 - 相移设置
 - 扩频功能
 - 上升下降沿可设置
- 逻辑高/低电平可设置: 1.4V/0.4V 或 2.4V/0.6V
- 支持通过SYNC脚进行多个芯片的时钟同步
- 欠压和过温保护功能
- 多种PWM频率可选
- HTR7216: 支持1MHz的I²C接口, 16个I²C器件地址
 - HTR7216S: 支持10MHz SPI接口
- 独立的开路 and 短路错误检测功能
- De-Ghost
- QFN5x5-44L

■ APPLICATIONS

- Smart home appliances
- IOT device
- 智能家居设备
- IOT设备
- Consumer electronics
- Key Boards and Mouse
- 个人消费电子
- 键鼠

DESCRIPTION

HTR7216(S) is an 18x12 Matrix LED driver programmed via 1MHz I²C compatible interface (for HTR7216) or 10MHz SPI interface (for HTR7216S). Each LED can be programmed individually with 8-bit PWM data (brightness dimming), and 8-bit DC scaling data (Color Calibration). There are also global current settings via register GCCR and external resistor R_{ISSET}.

Three integrated pattern controllers provide auto breathing or group dimming control. Each pattern controller can work in auto breathing or manual control mode. All breathing parameters are configurable, including rising/falling slope, on/off time, repeat times, and minimum/maximum brightness, etc. Each LED's PWM parameter can be sourced from any one of the 3 pattern controllers optionally.

Additionally, each LED open and short state can be detected, HTR7216(S) store the open or short information in Open-Short Registers. The Open-Short Registers allowing MCU to read out via I²C compatible interface. Inform MCU whether there are LEDs open or short and the locations of open or short LEDs.

The HTR7216(S) operates from 2.7V to 5.5V and features a very low shutdown and operational current. HTR7216(S) is available in QFN5x5-44L package. It operates from 2.7V to 5.5V over the temperature range of -40°C to +125°C.

HTR7216(S)是一款通过1MHz的I²C接口(HTR7216)或10MHz SPI接口(HTR7216S)进行编程的支持18×12阵列的LED驱动芯片，每路SW_x都支持8位PWM数据进行独立调光，并且每路CS_x都有8位的直流扫描数据用来支持每个点的256阶的线性PWM调光，并且每个CS_x都支持256阶的直流电流可调节等级。

HTR7216(S)内置三个模式控制器，以提供不同的自动呼吸或群组调光控制。每个模式控制器可以工作在自动呼吸或手动控制模式。呼吸相关参数均可设置，如上升下降沿、开/关时间、重复次数、最高/最低亮度等。每个LED的PWM参数可从三个模式控制器中的任意一个得到。

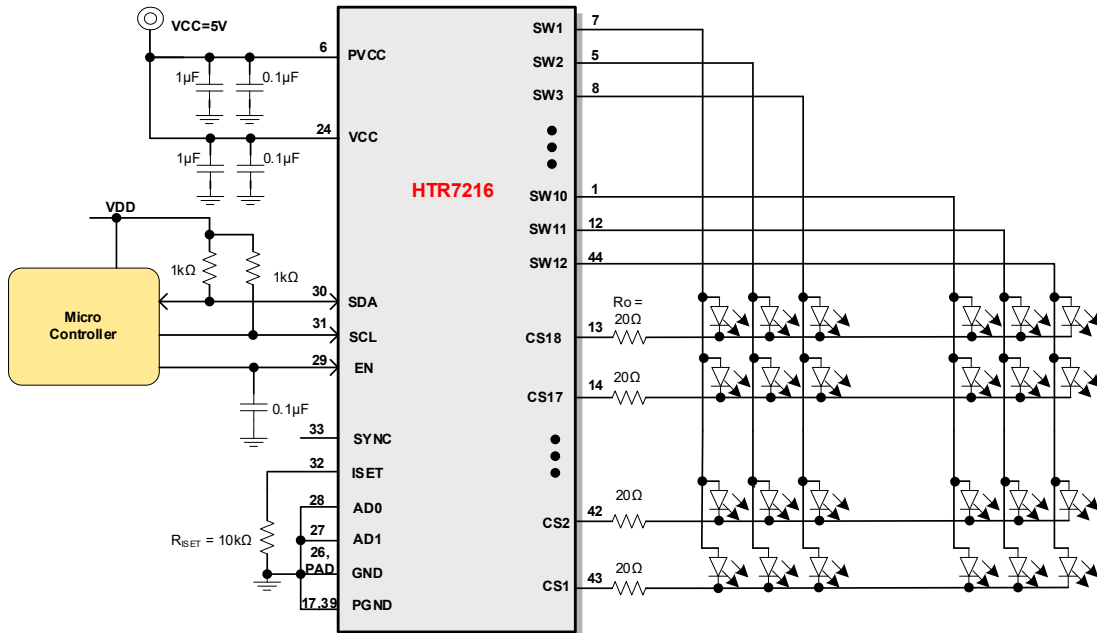
另外，每个LED的开路和短路状态都能被检测，HTR7216能够把开路和短路信息存储在Open-Short寄存器组中。

HTR7216(S)的工作电压在2.7V到5.5V之间，并且关断电流和工作电流都非常小。HTR7216支持QFN5×5-44L封装，可在2.7V到5.5V和-40°C to +125°C下工作。

EXTENDED DEVICE INFORMATION

Part Number	Channel	Interface	Package
HTR7216SQER	18*12=216	I2C	QFN5*5-44L
HTR7216SSQER	18*12=216	SPI	QFN5*5-44L
HTR7198QER	18*11=198	I2C	QFN5*5-40L
HTR7198SQER	18*11=198	SPI	QFN5*5-40L
HTR7144QER	18*8=144	I2C	QFN5*5-40L
HTR7144SQER	18*8=144	SPI	QFN5*5-40L

TYPICAL APPLICATION



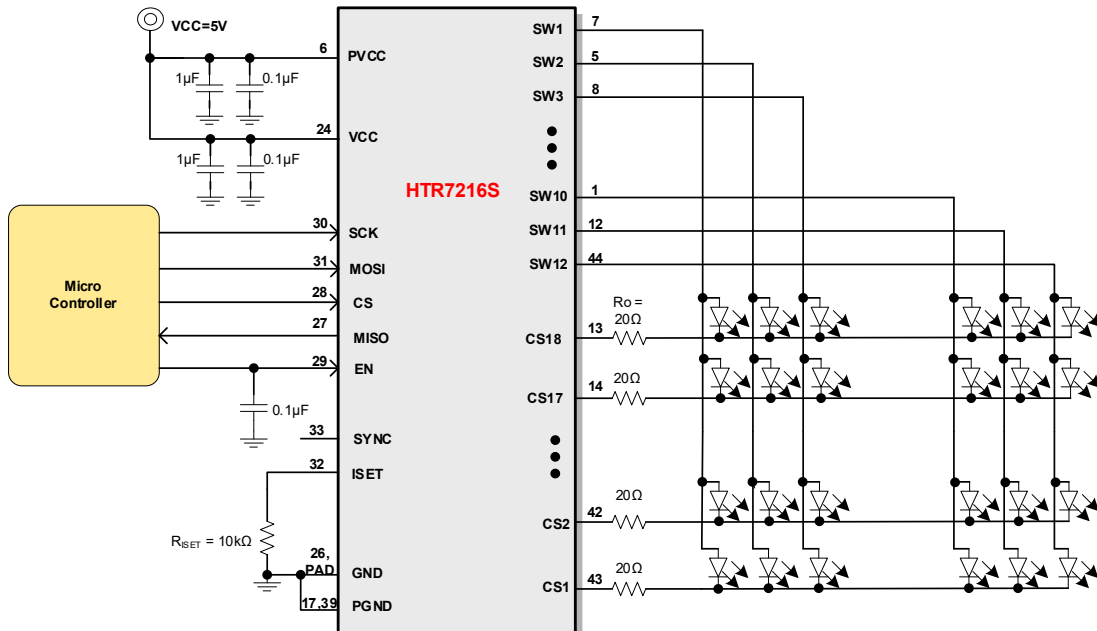
HTR7216 Driving 18×12 LEDs

The VDD should not larger than VCC.

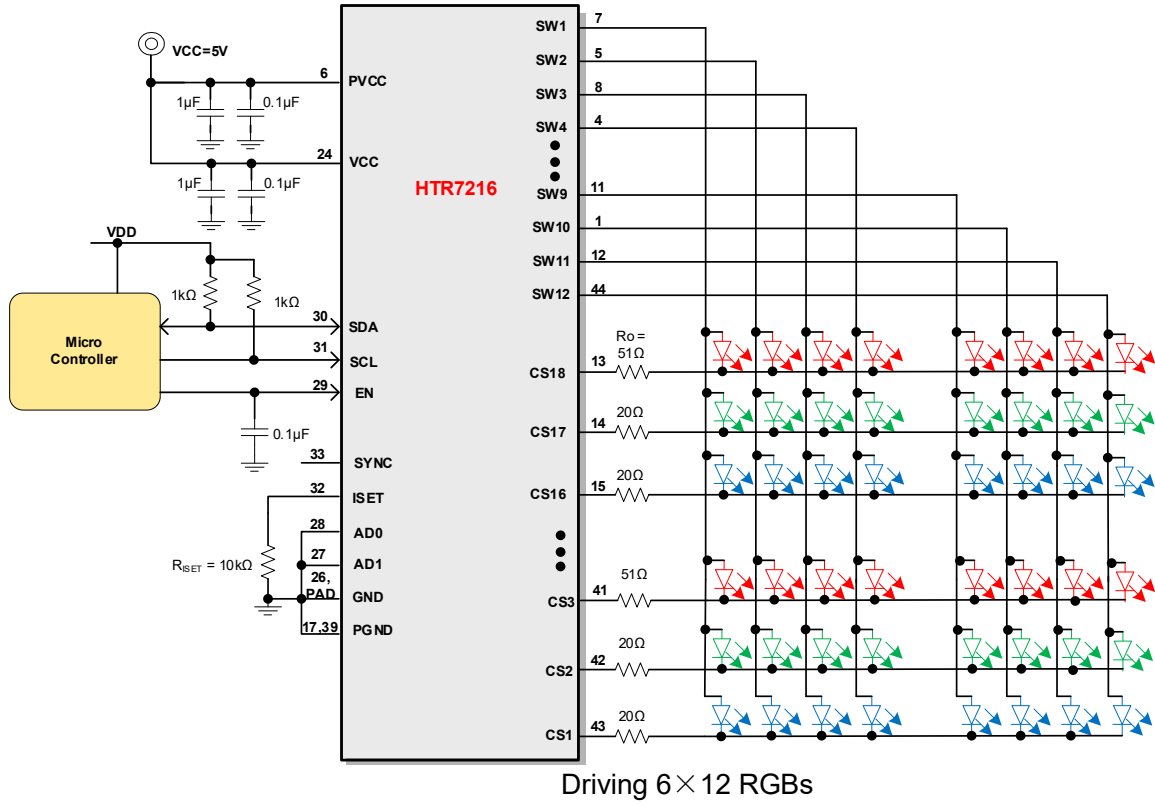
$$R_o = \frac{PVCC - V_{FLED} - V_{HCS} - V_{Hsw}}{I_{max}}$$

VDD应小于等于VCC。

$$R_o = \frac{PVCC - V_{FLED} - V_{HCS} - V_{Hsw}}{I_{max}}$$



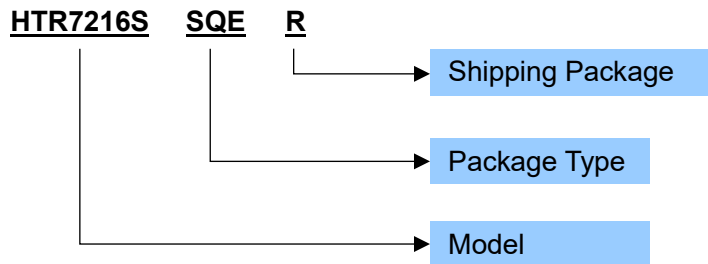
HTR7216S Driving 18×12 LEDs



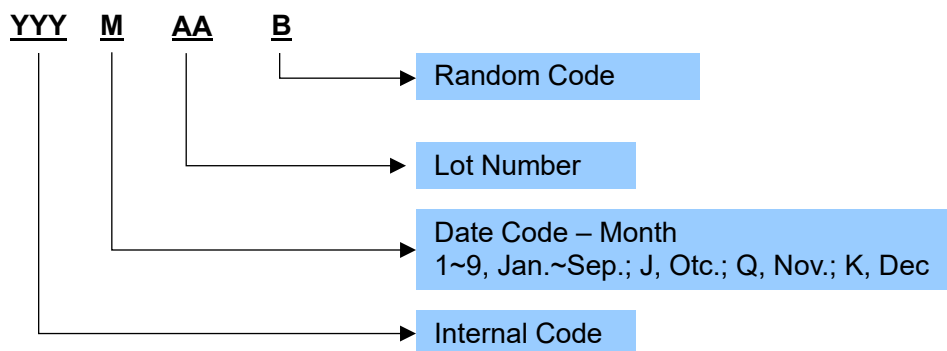
ORDERING INFORMATION

Part Number	Package Type	Package Abbr.	Eco Plan	MSL Level	Marking	Shipping Package / MOQ
HTR7216SSQE R	QFN5×5-44L (SQE)	SQE	RoHS	MSL3	HTR7216S YYYYMAAB ¹	Tape and Reel (R) / 5000pcs
HTR7216SQER	QFN5×5-44L (SQE)	SQE	RoHS	MSL3	HTR7216 YYYYMAAB	Tape and Reel (R) / 5000pcs

Part Number



Production Tracking Code



¹ YYYYMAAB is production tracking code
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