

16bit data format example for TLC6C5748-Q1

TLC6C5748-Q1 is an automotive local dimming LED driver that supports 48 channel direct drive. The TLC6C5748-Q1 has one common shift register and three data latches: the grayscale (GS) data latch, the control data latch, and the dot correction (DC) data latch. The common shift register is 769 bits long, the GS data latch is 768 bits long, the control data latch is 371 bits long, and the DC data latch is 336 bits long. If the common shift register MSB is 0, the least significant 768 bits from the common shift register are latched into the GS data latch. If the MSB is 1, and bits 767 to 760 are 96h (10010110b), the data are latched into the control data latch. Figure 1 shows the common shift register, GS data latch, control data latch, and DC data latch configurations.

TLC6C5748-Q1 protocol is similar to Serial Peripheral Interface (SPI), but not the same. An SPI port can support the data format. The following content demonstrates the standard data format for 16-bit SPI command.

First, after issuing the latch signal, the controller needs to issue 769 bits into TLC6C5748-Q1 including 9-bit identified data, 389-bit '0' data, 5-bit FC, 21-bit BC, 9-bit MC and 336-bit DC data to set the initial TLC6C5748-Q1 setting. To achieve 16-bit SPI data format, extend '1' data on MSB to a multiple of 16. And issuing the 15-bit '1' data, 9-bit '110010110b', 389-bit '0' data, 5-bit FC setting, 21-bit BC, 9-bit MC and 336-bit DC data. Total data bit count is 784-bit. For N count TLC6C5748-Q1 devices, issue $2 \times N$ times for the initial setting.

For issuing the grayscale data, same method like extend '1' data on MSB to a multiple of 16 like the initial control data setting. For N count TLC6C5748-Q1, the device needs to issue N times for all TLC6C5748-Q1 setting. And issuing the 15-bit '1' data, 1-bit '0' data for identification, 768-bit data for 48 channel grey scale data. For N count TLC6C5748-Q1 devices, issue N times for the greyscale data.

The Microsoft® Excel® file in the TLC6C5748-Q1 folder demonstrates the 16-bit example SPI command for TLC6C5748-Q1 and the Excel file provides a simple way to calculate MC and DC for the desired channel current by setting BC as 7Fh.

Figure. 1 Example of MC, BC, DC calculation

Desired Isink	10	mA	user input
IOLCMax(mA)	11.2	mA	user input-select a value > desired Isink
BC	7F	h	result
MC	2	h	
DC	6D	h	

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