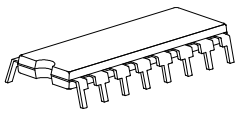
8-bit Constant Current LED Sink Driver with Gain Control

Features

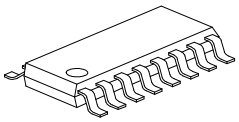
- Compatible with MBI5168 in package and electrical characteristics
- Exploit **Share-I-O™** technique to provide two operation modes:
  Normal Mode with the same functionality as MB5168,
  Current Adjust Mode to program output current gain
- 8 constant-current output channels
- Output current adjustable through an external resistor
- Constant output current range: 5 -120 mA
- Excellent output current accuracy,
  between channels < ±3% (max.), and
  between ICs < ±6% (max.).
- Constant output current invariant to load voltage change
- Fast response of output current,
  $\overline{OE}$ (min.): 200 ns @I_{out} < 60mA
  $\overline{OE}$ (min.): 400 ns @I_{out} = 60~100mA
- 25MHz clock frequency
- Schmitt trigger input
- 3.3V~ 5V supply voltage
- 256-step run-time programmable output current gain
  suitable for white balance application
- Optional for “Pb-free & Green” Package

Dual In-Line Package



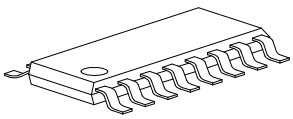
P-DIP16-300-2.54 Weight : 1.02g

Small Outline Package



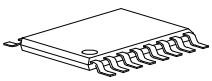
SOP16-150-1.27 Weight : 0.13g

Wide-body SOP



SOP16-300-1.27 Weight : 0.37g

Shrink SOP



SSOP16-150-0.64 Weight : 0.07g

Current Accuracy		Conditions
Between Channels	Between ICs	
< ±3%	< ±6%	I_{OUT} = 10 ~ 100 mA, V_{DS} = 0.8V, V_{DD} = 5.0V

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Product Description

MBI5170 succeeds MBI5168 and also exploits **PrecisionDrive™** technology to enhance its output characteristics. Furthermore, MBI5170 uses the idea of **Share-I-O™** technique to make MBI5170 backward compatible with MBI5168 in both package and electrical characteristics and extend its functionality for run-time LED current gain control in LED display systems.

MBI5170 contains an 8-bit Shift Register and an 8-bit Output Latch, which convert serial input data into parallel output format. At MBI5170 output stages, eight regulated current ports are designed to provide uniform and constant current sinks with small skew between ports for driving LED's with a wide range of forward voltage (Vf) variations. Users may adjust the output current from 5 mA to 120 mA with an external resistor R_{ext}, which gives users flexibility in controlling the light intensity of LED's. MBI5170 guarantees to endure maximum 17V at the output ports. Besides, the high clock frequency up to 25 MHz also satisfies the system requirements of high volume data transmission.

By means of the **Share-I-O™** technique, MBI5170 adds new functionality on the pins LE and $\overline{OE}$ of MBI5168 to provide an additional function, Current Gain Control, without any extra pins. Thus, MBI5170 could be a drop-in replacement of MBI5168. The printed circuit board originally designed for MBI5168 may be also applied to MBI5170. In MBI5170 there are two operation modes and three phases: Normal Mode phase, Mode Switching transition phase, and Current Adjust Mode phase. The signal on the multi-function pin $\overline{OE}$/SW would be monitored. Once a one-clock-wide short pulse appears on the pin $\overline{OE}$/SW, MBI5170 would enter the Mode Switching phase. At this moment, the voltage level on the pin LE/MOD/CA is used for determining the next mode to which MBI5170 is going to switch.

In the Normal Mode phase, MBI5170 has similar functionality to MBI5168. The serial data could be transferred into MBI5170 via the pin SDI, shifted in the Shift Register, and go out via the pin SDO. The LE/MOD/CA can latch the serial data in the Shift Register to the Output Latch. $\overline{OE}$/SW would enable the output drivers to sink current.

On the other hand, the Current Adjust Mode phase allows users to adjust the output current level by setting a run-time programmable Configuration Code. The code is sent into MBI5170 via the pin SDI. The positive pulse of LE/MOD/CA would latch the code in the Shift Register into a built-in 8-bit Configuration Latch, instead of the Output Latch. The code would affect the voltage at the terminal R-EXT and control the output current regulator. The output current could be adjusted finely by a current gain ranging from (1/12) to (127/128) in 256 steps. Hence, the current skew between IC's can be compensated within less than 1% and this feature is suitable for white balancing in LED color display panels.