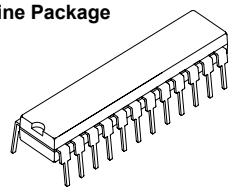
16-Bit Constant Current LED Sink Driver with Error Detection and Current Adjust

Features

- Compatible with MBI5026 in electrical characteristics and package
- Exploiting **Share-I-O™** technique to provide two operation modes:
  - Normal Mode with the same functionality as MBI5026
  - Special Mode to detect individual LED errors, like MBI5027 and program output current gain, like MBI5028
- 16 constant-current output channels
- Constant output current invariant to load voltage change
- Constant output current range: 5 -90 mA
- Excellent output current accuracy,
  between channels: < ±3% (max.), and
  between ICs: < ±6% (max.)
- Output current adjusted through an external resistor
- 128-step programmable output current gain for White Balance,
  low current band: gain = 1/9 ~ 95/288, linearly divided into 64 steps
  high current band: gain = 1/3 ~ 95/96, linearly divided into 64 steps
- Fast response of output current,
  $\overline{OE}$ (min.): 200 ns
- 25MHz clock frequency
- Schmitt trigger input
- 5V supply voltage
- Optional for “Pb-free & Green” Package

Dual In-Line Package



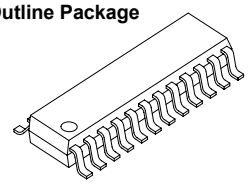
CN: P-DIP24-300-2.54

GN: P-DIP24-300-2.54

CNS: SP-DIP24-300-1.78

GNS: SP-DIP24-300-1.78

Small Outline Package



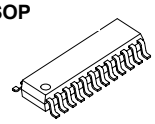
CD: SOP24-300-1.27

GD: SOP24-300-1.27

CF: SOP24-300-1.00

GF: SOP24-300-1.00

Shrink SOP



CP\CPA: SSOP24-150-0.64

GP\GPA: SSOP24-150-0.64

Current Accuracy		Conditions
Between Channels	Between ICs	
< ±3%	< ±6%	I_{OUT} = 10 ~ 60 mA

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Product Description

MBI5029 succeeds MBI5026 and also exploits **PrecisionDrive™** technology to enhance its output characteristics. Furthermore, MBI5029 uses the idea of **Share-I-O™** technology to make MBI5029 backward compatible with MBI5026 in both package and electrical characteristics and extend its functionality for LED load Error Detection and run-time LED current gain control in LED display systems, especially LED traffic sign applications.
MBI5029 contains a 16-bit Shift Register and a 16-bit Output Latch, which convert serial input data into parallel output format. At MBI5029 output stages, sixteen regulated current ports are designed to provide uniform and constant current sinks with small skew between ports for driving LED's within a wide range of forward voltage (Vf) variations. Users may adjust the output current from 5 mA to 90 mA with an external resistor R_{ext}, which gives users flexibility in controlling the light intensity of LED's. MBI5029 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.

Besides Normal Mode, MBI5029 provide another mode, Special Mode, to extend its functionality by means of the **Share-I-O™** technique on pins LE and $\overline{OE}$, without any extra pins. In Special Mode two functions are included, Error Detection and Current Gain Control. Thus, MBI5029 could be a drop-in replacement of MBI5026. The printed circuit board originally designed for MBI5026 may be also applied to MBI5029. In MBI5029 there are two operation modes and three phases: Normal Mode phase, Mode Switching transition phase, and Special Mode phase. The signal on the multiple function pin $\overline{OE}$ / SW / $\overline{ED}$ would be monitored. Once an one-clock-wide short pulse appears on the pin $\overline{OE}$ / SW / $\overline{ED}$, MBI5029 would enter the Mode Switching phase. At this moment, the voltage level on the pin LE/MOD/CA is used to determine the next mode to which MBI5029 is going to switch.

In the Normal Mode phase, MBI5029 has exactly the same functionality with MBI5026. The serial data could be transferred into MBI5029 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 / $\overline{ED}$ would enable the output drivers to sink current.

In the Special Mode phase, the low-voltage-level signal $\overline{OE}$ / SW / $\overline{ED}$ can enable output channels and detect the status of the output current to tell if the driving current level is enough or not. The detected error status would be loaded into the 16-bit Shift Register and be shifted out via the pin SDO along with the signal CLK. Then system controller could read the error status and know whether the LED's are properly lit or not.

On the other hand, in the Special Mode phase MBI5029 also allows users to adjust the output current level by setting a run-time programmable Configuration Code. The code is sent into MBI5029 via the pin SDI. The positive pulse of LE/MOD/CA would latch the code in the Shift Register into a built-in 16-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 gain ranging from 1/9 to 95/96 in 128 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.