



Innovate For Light



A Driver IC Like No Other

With a passion rooted in LED driver IC design and with a goal to fully maximize LED's value, Macroblock takes an innovative approach when designing LED driver ICs to ensure our ICs have the performance you want, and the reliability you need.

About Macroblock

Macroblock was founded in June 1999 in Hsinchu, Taiwan. Finding it incumbent on us to push the boundaries in the LED display industry, we have positioned ourselves as a mixed-signal driver IC design house with a special focus on power management and opto-electronic applications. In 2014, we were ranked 1st in the LED display driver IC market by IHS Research and in April 2017, we were certified by ISO 9001:2015.

Not only have our drivers been used for the 2008 Beijing Olympics and Shanghai Expo 2010, today, whether it is a display found in Times Square, NYC, USA or in Tokyo Dome, Japan, Macroblock's driver ICs have been the preferred option due to our performance and reliability. We aim to continue to bring about the ultimate LED performance for displays, backlight, automotive, and lighting applications in general.



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Macroblock

SAMSUNG Galaxy Note8
Do bigger things



Success Story : Note8 Launch Event (Courtesy of V2)



鹰眼
Hawkeye
by Macroblock

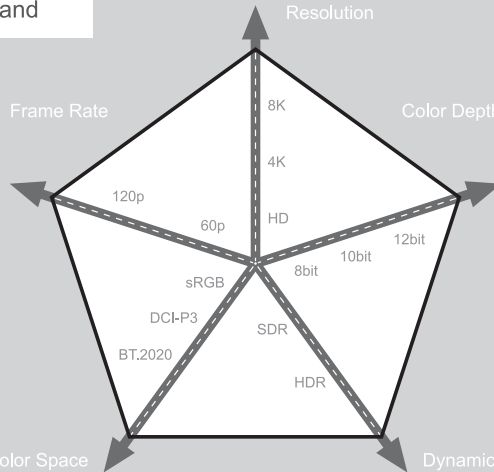
Driver ICs and peripheral ICs such as MOSFETs and logic control ICs work hand in hand to determine the overall visual effect and function of LED displays. The compatibility between these ICs are critical in determining how good an LED display is which is why Macroblock's Hawkeye solution is all about matching driver ICs with their most compatible peripheral ICs to optimize performance.

The Next Generation of LED Displays: High Quality Viewing Experience, HDR-Optimized

HDR-Optimized Driver IC
to meet HDR demand

High Integration Up to Pitch 0.6

High Refresh Rate
3,840Hz



PWM Resolution
16-bit

Current Accuracy $\pm 1.5\%$

High Contrast Ratio
25,000:1



Higher contrast ratio
More details at low grayscale
Higher color depth
in the same color space

Relationship between HDR video source input and LED driver IC's performance requirement (output)

LED Driver IC Recommendation For Time-Multiplexing LED Displays

Category	Hawkeye100		Hawkeye200		Hawkeye300					
Specification	Hawkeye100		Hawkeye200		Hawkeye300					
Solution	Fine Pitch	High Brightness	Ultra Fine Pitch							
Driver IC	MBI5153/MBI5252 MBI5253	MBI5051	MBI5353	MBI5850	MBI5759 (for common cathode LED)	MBI5359				
MOSFETs	MBI5927/MBI5947	MBI5927/MBI5947	MBI5927/MBI5947							
HDR-Optimized	—	●	—	●	—	●				
Superior Image Quality	<p>Solving the Seven Common Problems for Fine Pitch LED Display:</p>									
High refresh rate & wide grayscale depth	Refresh Rate 4KHz	Grayscale 14-bit	Refresh Rate 4KHz	Grayscale 16-bit	Refresh Rate 4KHz	Grayscale 16-bit	Refresh Rate 4KHz	Grayscale 14-bit	Refresh Rate 4KHz	Grayscale 16-bit
Brightness Adjustment Module	●	●	●	●	●	●	●	●	●	●
Intelligent Power Saving	—	—	Dynamic	Dynamic+	Dynamic+	Dynamic+	Dynamic+	Dynamic+	Dynamic+	Dynamic+
LED Failure Prediction	—	—	—	—	—	●	●	●	●	●
Board Level Circuitry	Regular	Regular	Simplified	Simplified and Modular	Simplified and Modular	Simplified and Modular	Simplified and Modular	Simplified and Modular	Simplified and Modular	Simplified and Modular
Output Current	0.5mA-20mA@V _{DD} =5V	2mA-45mA@V _{DD} =5V	0.5mA-20mA@V _{DD} =5V	0.5mA-20mA@V _{DD} =4.2V	0.5mA-15mA@V _{DD} =3.8V	0.5mA-20mA@V _{DD} =4.2V	0.5mA-20mA@V _{DD} =5V	0.5mA-20mA@V _{DD} =5V	0.5mA-20mA@V _{DD} =5V	0.5mA-20mA@V _{DD} =5V
Recommend Pixel Pitch Range	1.2mm~4mm	4mm~12mm	0.8mm~4mm	1.2mm~6mm	0.5mm~1.5mm	0.5mm~1.5mm	0.5mm~1.5mm	0.5mm~1.5mm	0.5mm~1.5mm	0.5mm~1.5mm



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Success Story : Taiwan Terminal II

Overcoming the Seven Challenges Encountered in Fine-Pitch LED Displays

When it comes to delivering fine-pitch displays with top-notch performance, no one is more committed than Macroblock in finding ways to overcome the seven most common problems namely, ghosting effect, color shift at low grayscale, non-uniformity at low grayscale, dim line at first scan line, gradient dim line, LED dead pixel, and high contrast interference.

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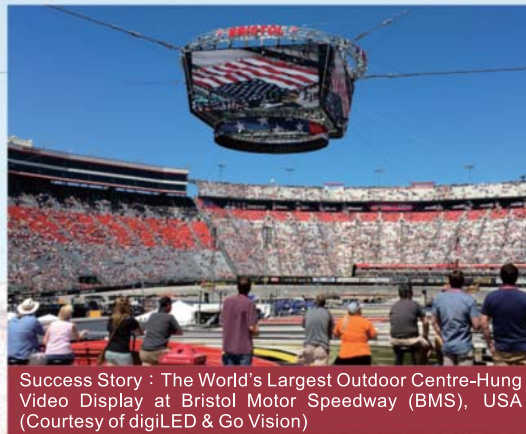
SRAM Embedded S-PWM LED Driver

MOSFET for Time-Multiplexing LED Display

		MBI5051	MBI5151	MBI5153	MBI5252	MBI5253	MBI5353	MBI5359	MBI5759	MBI5850					
No. of Output Channel		16					48			12		No. of Output Channel	2	2	4
Output Current per Channel		2~45mA	0.5~20mA			0.5~10mA	0.5~20mA		0.5~15mA	0.5~20mA		Output Current per Channel	3A		
Sustaining Output Voltage		17V									Operation Voltage	3.3V - 5V			
Excellent Output Current Accuracy	Between Channels	<±1.5% (typ.)									ON Resistance	100m ohm			
	Between ICs	<±1.5% (typ.)										High Contrast Interference Elimination	—	●	●
Embedded MOSFET		—	—	—	—	—	—	32	32	4	Upper Ghosting Effect Elimination	●	●	●	
Error Detection	LED Open	●	●	●	●	●	●	●	●	●	Short-LED Color Stripe Elimination	●	●	●	
	LED Short	—	—	—	—	—	●	●	●	●		RoHS Compliant Package	SOP8	●	●
Current Gain (12.5%~200%)		6-bit					Global/RGB			6-bit	Major Applications		Scan Type LED Display with MBI5X5X driver		
GCLK Multiplier		●	●	●	●	●	●	●	●	●					
Ghosting Elimination		●	●	●	●	●	●	●	●	●					
High Contrast Interference		—	—	—	—	●	—	●	●	●					
Color Shift Elimination		●	●	●	●	●	●	●	●	●					
Non-uniformity (IC controlled) Elimination		●	●	●	●	●	●	●	●	●					
Dim Line at the 1st Scan Line Elimination		●	●	●	●	●	●	●	●	●					
Gradient Dim Line Elimination		●	—	●	●	●	●	●	●	●					
Dead Pixel Isolated		●	—	●	●	●	●	●	●	●					
Intelligent Power Saving		—	—	—	—	—	●	●	●	—					
S-PWM		14/16-bit			13/14-bit			13/14/15/16-bit							
Scan-Type		Up to 1/8	Up to 1/8	Up to 1/32	Up to 1/16	Up to 1/32									
RoHS Compliant Package	SSOP24	●	●	●	●	●	—	—	—	●					
	mSSOP24	●	—	—	—	●	—	—	—	—					
	QFN24	—	—	●	●	●	—	—	—	—					
	QFN56	—	—	—	—	—	●	—	—	—					
	LQFP64	—	—	—	—	—	●	—	—	—					
Major Applications		—	—	—	—	—	—	●	●	—					
		Time-multiplexing LED Panel													



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Success Story : The World's Largest Outdoor Centre-Hung Video Display at Bristol Motor Speedway (BMS), USA (Courtesy of digiLED & Go Vision)

S-PWM Technology

The Scrambled Pulse Width Modulation (S-PWM) technology enhances Pulse Width Modulation (PWM) by scrambling an image into several sub-images with the same color quality. Besides increasing the image refresh rate, this feature also supports flicker-free image and improves reliability when building a 16-bit grayscale LED display.

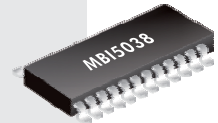
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S-PWM LED Driver

		MBI5030	MBI5031	MBI5040	MBI5043	MBI5045
No. of Output Channel		16				
Output Current per Channel		3~90mA		2~60mA	2~45mA	
Sustaining Output Voltage		17V				
Excellent Output Current Accuracy	Between Channels	<±1.5% (typ.)				<±3.0% (typ.)
	Between ICs	<±3.0% (typ.)			<±1.5% (typ.)	<±3.0% (typ.)
Error Detection	LED Open	●	●	●	—	●
	LED Short	—	—	●	—	—
	Thermal Protection	—	—	●	—	—
	Leakage	—	—	—	—	—
Current Gain (12.5%~200%)		8-bit		7-bit,0%~100%	6-bit	
GCLK Multiplier		—	—	—	●	●
Power Saving		—	—	—	—	—
Low Knee Voltage		—	—	—	—	●
Lower Ghosting Effect Elimination		—	—	—	●	●
S-PWM		12/16-bit	12-bit	12/16-bit	16-bit	
Dot Correction		—	—	8-bit, Digital	—	—
RoHS Compliant Package	SOP24	●	●	●	—	—
	SSOP24	—	—	—	●	●
	TSSOP24	●	●	●	—	—
	mSSOP24	—	—	—	●	—
	QFN24	●	●	●	—	—
Major Applications		High Refresh Rate / Grayscale LED Panel				



Multi-Function LED Driver (PrecisionDrive™ / Share-I-O™)



MBI5038

LED Driver Suitable for Traffic Signs Application



Share-I-O™ Technology

Share-I-O™ technology features pin compatibility. With Share-I-O™, additional functions can be added to LED drivers without adding extra pins and changing the printed circuit board (PCB) originally designed for conventional LED drivers.

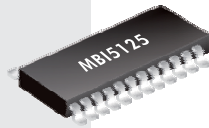
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Multi-Function LED Driver

		MBI5169	MBI5037	MBI5038	MBI5039	MBI5324
No. of Output Channel		8	16			24
Output Current per Channel		5~120mA	3~80mA	3~45mA	3~90mA	1~35mA
Sustaining Output Voltage		17V				
Excellent Output Current Accuracy	Between Channels	<±1% (typ.)	<±1.5% (typ.)			<±2% (typ.)
	Between ICs	<±1% (typ.)	<±3% (typ.)	<±1.5% (typ.)	<±3% (typ.)	<±4% (typ.)
Error Detection	LED Open	●	●	●	●	●
	LED Short	●	●	●	●	—
	Leakage	—	●	●	—	—
Current Gain		—	—	●	●	—
Power Saving		—	●	●	—	—
RoHS Compliant Package	P-DIP16	●	—	—	—	—
	SOP16	●	—	—	—	—
	SSOP16	●	—	—	—	—
	SOP24	—	●	●	●	—
	SSOP24	—	●	●	●	—
	QFN 24	—	—	—	●	—
	LQFP48	—	—	—	—	●
Major Applications		Commercial LED Panel, Message Sign, VMS Traffic Sign, Bus Sign				



Classic Constant Current (PrecisionDrive™) LED Driver



MBI5125

16 Channel Constant Current LED Driver
With Current Gain



PrecisionDrive™ Technology

The PrecisionDrive™ technology enhances the characteristics of current output and current accuracy, allowing viewers to enjoy a clear and refined image on the LED display. Driver ICs with this technology has a $\pm 1.5\%$ current accuracy between output ports within each driver IC and a $\pm 1.5\%$ deviation between driver ICs. The current varied with LED forward voltage change is no more than 0.1% per volt while the current varied with supply voltage change and ambient temperature change is restricted to 1%.

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Classic Constant Current LED Driver (PrecisionDrive™)

		MBI5167	MBI5168	MBI5025	MBI5026	MBI5035	MBI5124	MBI5125	MBI5325
No. of Output Channel		8			16				48
Output Current per Channel		3~45mA	5~120mA	1~45mA	5~90mA	3~45mA	1~25mA	2~30mA	1~25mA
Sustaining Output Voltage		17V					V _{DD} +0.4	11V	V _{DD} +0.4
Lower Ghosting Effect Elimination		—	—	—	—	—	●	—	●
Low Knee Voltage		—	—	—	—	●	—	—	—
Current Gain		—	—	—	—	—	—	●	—
Excellent Output Current Accuracy	Between Channels	<±1% (typ.)	<±1% (typ.)	<±1.5% (typ.)	<±1% (typ.)	<±3% (typ.)	<±1.5% (typ.)	<±1.5% (typ.)	<±1.5% (typ.)
	Between ICs	<±1% (typ.)	<±1% (typ.)	<±1.5% (typ.)	<±1% (typ.)	<±3% (typ.)	<±1.5% (typ.)	<±1.5% (typ.)	<±1.5% (typ.)
RoHS Compliant Packag	SOP16	●	●	—	—	—	—	—	—
	SSOP16	●	●	—	—	—	—	—	—
	SOP24	—	—	●	●	●	●	—	—
	SSOP24	—	—	●	●	●	●	●	—
	TSSOP24	—	—	●	—	—	—	—	—
	mSSOP24	—	—	—	—	—	●	—	—
	P-DIP24	—	—	—	●	—	—	—	—
	SP-DIP24	—	—	—	●	—	—	—	—
	QFN24	—	—	—	—	—	●	●	—
QFN56	—	—	—	—	—	—	—	●	
Major Applications		Commercial LED Panel, Message Sign				Power Saving LED Panel	Commercial LED Panel, Message Sign		



Automotive Lighting Driver IC



MBI6671Q

Buck 、 Boost 、 Buck-Boost and SEPIC topology
constant current high brightness LED controller



Automotive Lighting Driver IC

Switch and/or linear type drivers and controllers are targeted for LED lamps in vehicles.
The optimized technical and protection features help strengthen system reliability for automobiles.

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		Buck		Multi-topology	Linear	
		MBI6656	MBI6657Q	MBI6671Q	MBI1816	MBI1841Q
Max Channel Current		1A	1.2A	External	60mA \times 16	150mA \times 8
Max. Sustaining Voltage		45V	45V	65V	17V	48V
Supply Voltage		6~40V	6~40V	5.4~65V	5~17V	48V
Switching on Resistance		0.3 Ω	0.3 Ω	—	—	—
AEC-Q100 (SOP8/TSSOP14/QFN)		—	●	●	●	●
Dimming Method	Digital/Analog	●	●	●	●**	●
	Built-in Pattern	—	—	—	—	●
Protection	LED Open/Short	●	●	●*	—	●***
	TFB	—	●	—	—	●
	OTP	●	●	●	●	●
	Start-Up	●	●	●	—	—
	UVLO	●	—	●	—	●
	OCP	●	●	—	—	—
RoHS Compliant Package	TO252	●	—	—	—	—
	SOP8	●	●	—	—	—
	TSSOP14	—	—	●	—	—
	TSSOP20	—	—	—	●	—
	SOT89	●	—	—	—	—
	SOT23	●	—	—	—	—
	QFN	—	—	—	—	●
Application		DRL/Fog/Interior/Rear		Head Lamp/DRL/Fog	Interior/Rear	DRL/Fog/Interior/Rear

* LED short protection should be supported by external circuit

** PWM dimming can be applied using OE pin

*** Short/Open protections are only supported by certain patterns





LED Driver for General LED Lighting



MBI6658

High Efficiency, DC/DC Buck/Hysteretic PFM Converter Suitable for Stage Light



LED Drivers for General Lighting Applications

DC/DC converters and AC/DC controllers are specifically designed for LED lighting applications that require large power consumption. The constant current and high power efficiency meet the safety and reliability standards required for LED lighting applications.

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All-Ways-On™ LED Driver

		MBI1801	MBI1802	MBI1804	MBI1812	MBI1816	MBI1824	MBI1828	MBI1838	
Topology		Linear								
No. of Output Channel		1	2	4	2	16	4	8	8	
Excellent Output Current Accuracy	Between Channels (Typ.)	—	1%		3%	1%				
	Between ICs (Max.)	6%								
Output Current per Channel		0.5~1.2A	40~360mA	240mA	360mA	60mA	120mA	60mA	80mA	
Sustaining Output Voltage		17V					50V		70V	
Supply Voltage		5V			12V	5V	8~40V			
Dimming Method	Digital	●	●	●	—	●	●	●	●	
	Analog	—	—	—	●	—	—	—	—	
Protection	Thermal	●	●	●	●	●	—	—	●	
	Thermal Error Flag	—	●	—	—	—	—	●	—	
RoHS Compliant Package	SOP8	—	●	●	●	—	●	—	—	
	TSSOP16	—	—	—	—	—	—	●	—	
	TSSOP20	—	—	—	—	●	—	—	—	
	TSSOP24	—	—	—	—	—	—	—	●	
	TO265	●	—	—	—	—	—	—	—	
	QFN24	—	—	—	—	—	—	●	—	
Major Applications		LED Lighting, Automotive Lighting								

DC/DC Converter												
	MBI6651	MBI6652	MBI6653	MBI6655	MBI6656	MBI6657	MBI6658	MBI6660	MBI6661	MBI6662	MBI6663	
Topology	Buck / Hysteretic PFM		Buck	Buck / Hysteretic PFM						Buck / Adaptive PFM	Buck / Hysteretic PFM	
Max. Output Current per Channel	1A	750mA	1A			1A	2A	500mA	1A	2A	1A	
Max. Sustaining Voltage	40V	32V	65V	40V	45V	45V	36V	75V				
Supply Voltage	9~36V	6~30V	4.5~65V	6~36V	6~40V	6~40V	4.5~32V	9~60V		5~60V	6~65V	
Switch on Resistance (Typ.)	0.45Ω		0.3Ω			0.25Ω	0.12Ω	0.35Ω		0.2Ω	0.3Ω	
Dimming Method	Digital	●	●	●	●	●	●	●	●	●	●	
	Digital to Analog	—	—	●	—	—	—	—	—	—	—	
	Analog	—	—	●	—	●	—	—	—	—	●	
Protection	LED Open	●	●	●	●	●	●	●	●	●	●	
	LED Short	●	●	●	●	●	●	●	●	●	●	
	Thermal	●	●	●	●	●	●	●	●	●	●	
	Start-Up	●	●	●	●	●	—	●	●	●	●	
	UVLO	●	—	●	—	●	●	●	●	●	●	
	OCP	—	—	●	●	●	●	●	●	●	●	
	Thermal Fold-back	—	—	—	—	—	●	—	—	—	—	
	OTP Error FLAG	—	—	—	—	—	—	●	—	—	—	
OCP Error FLAG	—	—	—	—	—	—	●	—	—	—		
RoHS Compliant Package	TO252	●	—	—	—	●	—	—	●	—	●	
	SOP8	—	—	●	●	●	—	●	●	—	●	
	SOP10	—	—	—	—	—	—	—	—	●	—	
	MSOP8	●	●	●	—	—	—	—	—	—	—	
	SOT89	—	—	—	●	●	●	—	—	—	—	
	SOT23	●	●	—	—	●	●	—	—	—	—	
	DFN10	—	—	—	—	—	—	—	—	—	—	
Major Application	Mr11, MR16, Flood Light, PAR Light, Wall Wash Light, Stage Light, Panel Light, Emergency Lighting, Street Light, Tunnel Lighting, High Power LED Lighting, Automotive Lighting											

DC/DC Controller			AC/DC Controller				AC/DC Converter					
	MBI6671	MBI6672		MBI6804	MBI6812	MBI6902	MBI6912		MBI1905			
Topology	Multi-topology /PFM	Constant Off Time with Peak Current Detection	Electrical Isolation	Isolation		Non-Isolation		Topology	HV Linear			
			Topology	Flyback/DCM		Buck HPFM	Buck / BCM	Max. Output Current per Channel	120mA			
Max. Output Current per Channel	By External MOSFET		Max. Output Current per Channel	By External MOSFET				Max. Sustaining Voltage	800V			
Supply Voltage	4.5~65V	6~60V	Max. Sustaining Voltage	44V				Supply Voltage	10~400V			
Dimming Method	Digital	●	●	Supply Voltage		16~28V	9~40V	9~36V	Dimming Method	TRIAC	●	
	Analog	●	—	Dimming Method	Non-Dim	—	●	—		●	Digital	—
	Shunt Dimming	—	●		Step	●	—	—		—	Digital to Analog	—
Protection	LED Open	●*	—		Digital	—	—	●		—	Analog	—
	LED Short	●*	—	Protection	LED Open/ Short	●	●	●	●	LED Open /Short	—	
	Thermal	●	●		Thermal	●	●	●	●	Thermal Fold-back	●	
	OVP	●	—		Start-Up	●	●	●	●	Thermal Shutdown	●	
	UVLO	●	●		UVLO	●	●	●	●	Start-Up	—	
OCP	—	—	VDD_OVP		—	—	●	●	UVLO	—		
RoHS Compliant Package	TSSOP-24	●	●	RoHS Compliant Package	OVP	●	●	—	●	Power Compensation	●	
Major Applications	High Power LED Lighting, Automotive Lighting	High Power LED Lighting, Stage Light	MSOP8		—	—	●	—	RoHS Compliant Package	Bare Die	●	
			SOP8		●	●	—	—		SOP8	●	
			SOP23	—	—	—	●					
Major Applications	T8 LED Solution, LED Light Bulb											

* LED open/short status can be reported by FLT pin.





Macroblock

RGB LED Driver for Architectural Lighting

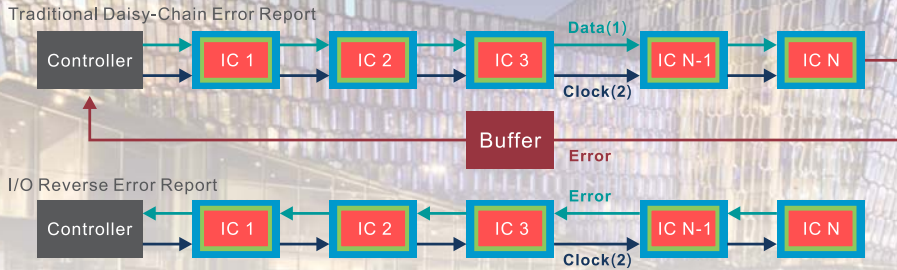


MBI6034

28V Sustaining Voltage,
Bi-Directional Transmission with I/O Reverse Report



Bi-Directional Transmission



- Data transmission mode: forward transmission
- Error report mode: reverse transmission

In traditional designs, the error report feature is achieved by connecting one additional wire from the last IC to the controller and a signal buffer. With I/O Bi-Directional Transmission, the same wire connecting the controller to the ICs is used to report information back to the control system. This not only improves communication between control systems and light fixtures but also saves wire costs.

RGB LED Driver

		MBI6023	MBI6024	MBI6033	MBI6034	MBI6020	MBI6021	MBI6027	MBI6030	MBI6120
No. of Output Channel		3x4				3x1				
Transmission Interface	Topology	2-Wire								1-Wire
	Clock Integrity	Clock Inversion							Clock Regeneration	Clock Inversion
	Bi-directional	—	—	—	●	—	—	●	—	—
Constant Output Current Range Per Channel		3~45mA			5~50mA		5~45mA	5~150mA	3~30mA	
Sustaining Output Voltage		17V		28V		17V		40V	17V	
Supply Voltage		3~5.5V		3~5.5V/ 6~24V		3~5.5V		7~30V	5~12V	
Built-in LDO		—	—	●	●	—	—	—	●	●
S-PWM		16-bit					—	12/8-bit	16-bit	12-bit
PWM		—	—	—	—	—	10-bit	—	—	—
Dot Correction		—	8/6-bit	—	—	8/6-bit	—	10/8-bit	6-bit	—
Current Gain		—	—	●	●	—	—	●	—	—
Error Detection	LED Open	—	—	●	●	—	—	—	—	—
	LED Short	—	—	—	●	—	—	●	—	—
	Leakage	—	—	—	—	—	—	●	—	—
	Wire Disconnection	—	—	—	●	—	—	●	—	—
	Thermal Protection	—	—	—	—	—	—	—	●	—
RoHS Compliant Package	SSOP16	—	—	—	—	●	●	—	●	—
	QFN16	—	—	—	—	●	—	—	—	—
	SSOP24	●	●	●	●	—	—	—	—	—
	QFN24	●	●	●	●	—	—	●	●	—
	TSSOP24	—	—	●	●	—	—	—	—	—
	SOP8	—	—	—	—	—	—	—	—	●
Major Applications		LED Strip, Mesh Display					LED Cluster			LED Strip



Contact Us

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