DIODES INCORPORATED

LED LIGHTING AND IoT POWER SOLUTIONS

Automotive-Compliant LED Lighting

IoT and LED Power Supply

LED LIGHTING AND IoT POWER APPLICATIONS

Infotainment Display

Connected Lighting

Industrial LED Lighting

diodes.com

LED LIGHTING AND IoT POWER OVERVIEW

Diodes Incorporated products are well recognized for their simplicity, cost effectiveness, high efficiency, and incredible versatility to cover a wide range of LED lighting and IoT power applications and solutions:

- Automotive-Compliant LED Drivers
- Connected LED Lighting and IoT Power Drivers
- Industrial LED Lighting and Power Drivers
- Infotainment Display Drivers
- Triac Dimmable and Offline LED Drivers

Diodes automotive-compliant LED drivers help customers build innovative, reliable and cost-effective lighting systems that meet today's stringent automotive LED Lighting requirements. Our highly efficient LED solutions extend the life of the automotive lighting system, enable greater driver and pedestrian safety, and enhance the driving experience.

Diodes connected lighting and IoT power drivers provide low standby power, increased efficiency, and high integration with buck, boost, buck-boost, and flyback. Its wide operating voltage range operates from 30Vac up to 277Vac. In addition, its optimized transient response supports the requirement of MCU, BLE, ZIGBEE and Wi-Fi communications.

Diodes industrial LED lighting and power drivers combine robust low thermal packages with high power density for industrial dimmable lighting and power applications. Integrated switching MOSFET LED drivers are capable of delivering LED currents up to 3A with operating DC voltage up to 400V. Controllers can deliver higher voltage and power using external MOSFET. Topologies include buck, boost, buck-boost, linear and multi-channels.

Diodes infotainment display drivers enhance user interface display experience with best-in-class features for backlight, AMOLED bias supply and camera flash solutions in personal electronic and automotive applications. Combined with high efficiency, wide input/output voltage range, high dimming ratios, selectable switching frequency, fault protection notification, digital interface and compact solutions, these drivers can extend battery life, reduce board space and BOM cost.

Triac dimmable and offline LED drivers provide the most cost-effective and quality solutions for retrofit bulbs and commercial LED lighting system. The triac dimmable LED Drivers are capable of being smoothly dimmed through triac dimmers. offline LED driver topologies include AC linear, buck, buck-boost, boost and flyback with main input voltages: 120Vac and 230Vac.

To help customers build innovative, reliable, and cost-effective products, Diodes offers design tools and solutions that will calculate and optimize systems performance.

diodes.com/applications/lighting

AUTOMOTIVE-COMPLIANT LED LIGHTING

Part	AEC-Q Grade	Buck	Boost	Buck-Boost	Linear	Input Voltage Min	Input Voltage Max	Max Output Voltage	Current Sense Voltage	Typ Peak LED Current	LED Current Accuracy	Max Switching Frequency	Efficiency	Temp Range	Package
						V	V	V	mV	A	%	kHz	%	°C	
AL5809Q	1/3	–	–	–	Y	2.5	60	55	–	multi	5	–	–	-40~+125/ -40~+85	POWERDI123
AL8400Q	1	–	–	–	Y	2	18	–	200	Ext.	3	–	–	-40~+125	SOT353
AL5814Q/6Q*	1	–	–	–	Y	4.5	60	55	–	–	3	–	–	-40~+125	MSOP-8EP
AL1783Q*	1	–	–	–	Y	6.5	60	60	1500	750	4	–	–	-40~+125	TSSOP-16EP
AL8860Q/1Q*	1	Y	–	–	–	4.5	40	36	100	1	5	1000	95	-40~+125	MSOP-8EP
AL8843Q*	1	Y	–	–	–	4.5	40	36	100	3	5	1000	95	-40~+125	SO-8EP
AL8862Q/3Q*	1	Y	–	–	–	4.5	60	55	100	1/Ext	5	1000	95	-40~+125	SO-8EP
AL8806Q/7Q	1	Y	–	–	–	6	30	26	100	1.5/1.3	5	1000	95	-40~+125	MSOP-8EP
ZXLD1356Q	1	Y	–	–	–	6	60	55	200	0.55	3	1000	97	-40~+125	V-DFN3030-6, TSOT25
ZXLD1360Q	1	Y	–	–	–	7	30	27	100	1	5	1000	95	-40~+125	TSOT25
ZXLD1362Q	1	Y	–	–	–	6	60	55	100	1	5	1000	95	-40~+125	TSOT25
ZXLD1366Q	1	Y	–	–	–	6	60	55	200	1	2.5	500	95	-40~+125	V-DFN3030-6, SO-8EP, TSOT25
ZXLD1370Q/71Q	1	Y	Y	Y	–	6.5/ 5.0	60	Ext. MOS	218	Ext. MOSFET	2	1000	95	-40~+125	TSSOP-16EP
ZXLD1374Q	1	Y	Y	Y	–	6.5	60	60	218	1.5	2	1000	95	-40~+125	TSSOP-20EP

* Engineering samples available upon request

THE **DIODES** ADVANTAGE

High-performance, high-temperature LED drivers in low thermal impedance packages qualified to AEC-Q100

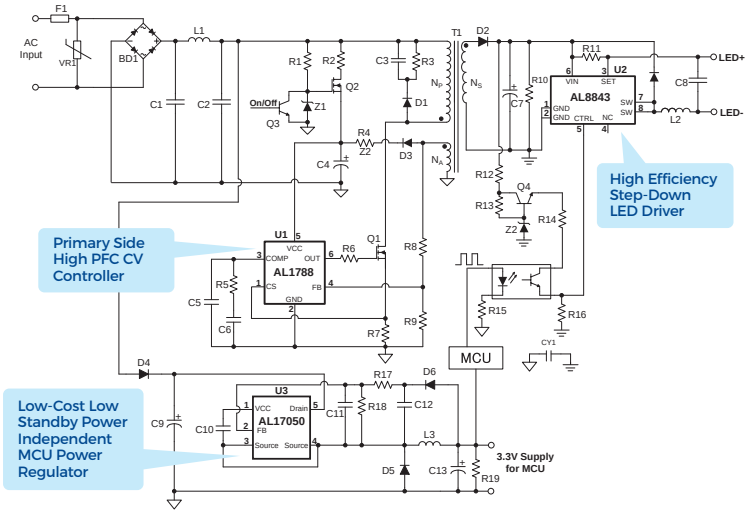
- **High-accuracy LED control:**
  1% reference tolerance
  Better brightness control and matching between lamps
- **Multi-topology device using one sense resistor**
  Suitable for buck, boost, and buck-boost lighting
- **LED current thermal management**
  Reduces ILED at high temp
  -> improves reliability
- **Diagnostic feedback pins**
  Provide fault status for MCU on-board

CONNECTED LIGHTING AND IoT POWER

Part	Topology	Power (Watt)	Magnetic Component	MOSFET Options	PF	Output Voltage	Dimmable	Mains Voltage	Package
AL17050	Buck	≤=0.2W	Single Winding Inductor	500V/0.5A	–	Adj	–	30~277	SOT23-5
AL6562A	Boost, Flyback	≤=100W	Transformer with Auxiliary Winding	PFC Controller	>0.9	Adj	–	85~277	SO-8
AL1788	Flyback/Buck	≤=100W	Transformer with Auxiliary Winding	PFC Controller	>0.9	Adj	–	85~277	SOT23-6
AL1771/2	PFC Controller + one or two channel Linear LED Driver	≤=40W	Transformer with Auxiliary Winding	PFC Controller 30V/1A	>0.9	Adj	PWM	85~277	TSSOP-16EP
AL1673/2	Buck-Boost/ Buck	≤=15W	Single Winding Inductor	600V@2A /@4A	>0.9	Adj	PWM+ Analog	85~277	SO8-EP
AL1665*	Flyback Buck-Boost	≤=100W	Transformer with Auxiliary Winding	PFC Controller	>0.9	Adj	PWM+ Analog	85~277	SO-8
AL5822*	Linear	≤=100W	–	Ripple Suppress Controller	–	–	–	85~277	SOT23-5

* Engineering samples available upon request

CONNECTED AND IOT POWER
AL1788 + AL8843 + AL17050



AL1788 is a high-performance AC/DC power factor corrected AC input and CV mode output regulator for LED lighting applications.

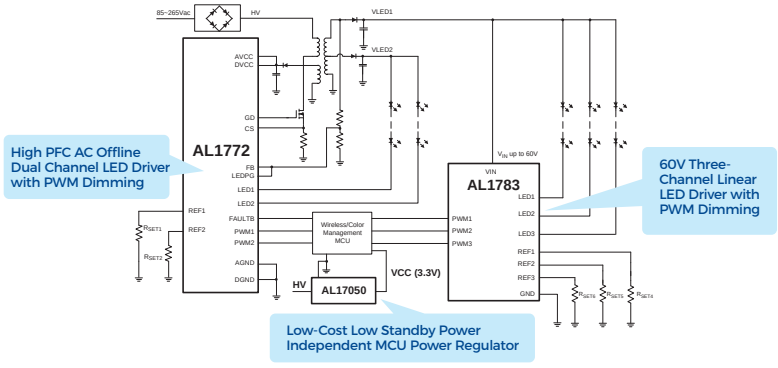
AL8843 is a hysteresis mode step-down DC/DC converter designed to drive LEDs with a constant current. It operates from an input supply between 4.5V and provides an externally adjustable output current up to 3A.

AL17050 is a universal AC high-voltage input step-down regulator that provides accurate constant voltage for IoT applications.

THE **DIODES** ADVANTAGE

- Primary Side Control for CV Stage
- High Power Factor and Low THD
- <200mW Standby Power for System
- Output Current up to 3A for Step-Down LED Driver
- Accurate LED Current Regulation
- Support PWM Dimming in CC Stage
- Multiple Protections: UVLO, OVP, OCP, OTP
- Low-Cost Independent Power for MCU

CONNECTED LIGHTING
AL1772 + AL17050 + AL1783



AL1772 is an integrated AC-DC PFC controller and dual-channel LED driver with PWM dimming control. AL1772 is targeted for dimmable and tunable white connected lighting applications.

AL1783 is a three-channel linear LED driver with PWM dimming control designed to target for three-channel smart connected lighting applications.

AL17050 is a universal AC high-voltage input step-down regulator that provides accurate constant voltage for IoT applications.

THE **DIODES** ADVANTAGE

AL1772 for Main Dual-LED Channel CCT Tunable White Functions

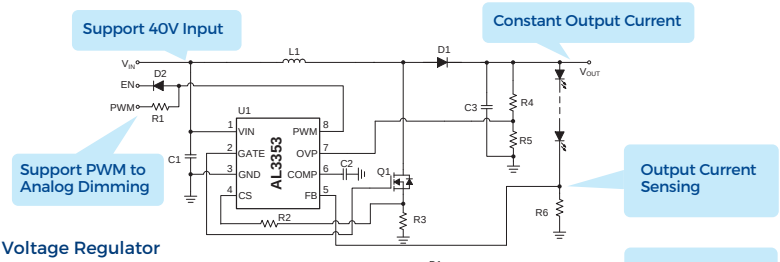
- Integrates High Power Factor Offline AC power PWM Controller and LED Driver in Single Chip
- Supports two independent PWM dimming for each channel with two different maximum channel current settings
- Integrates Adaptive Thermal Management (ATM) scheme to minimize non-productive power dissipation

AL1783 for 3-Channel Connected Lighting Applications

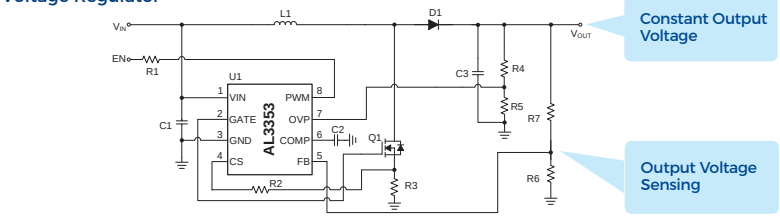
- Wide Input Voltage Range from 6.5V to 60V
- PWM Dimming Control for Each Channel
- Integrates Adaptive Thermal Management (ATM) scheme to minimize non-productive power dissipation

AL3353 HIGH PERFORMANCE BOOST LED CONTROLLER OR BOOST VOLTAGE REGULATOR

LED Controller



Voltage Regulator



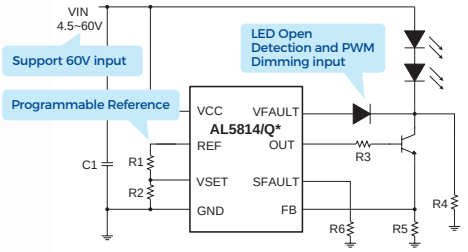
The AL3353 is a highly integrated and cost-effective LED controller optimized for LCD monitor and TV backlighting application.

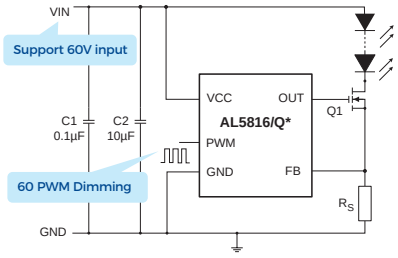
The AL3353 offers PWM-to-analog dimming method for a wide range of dimming control. The AL3353 offers comprehensive protection features to protect the system in various fault conditions.

THE **DIODES** ADVANTAGE

- Wide Input Voltage Range: 9V to 40V
- Constant current output or constant voltage output with low BOM cost
- Current mode PWM controller with good dynamic response
- Support PWM-to-Analog Dimming with 100:1
- Built-in multiple protections: over-voltage protection, over-current protection, LED open protection, output short protection, diode & inductor short protection, LED cathode short to GND protection, OTP

AL5814/6Q* 60V LINEAR DIMMABLE LED CONTROLLER





The AL5814/Q* is an 8-terminal and AL5816/Q* is an 5-terminal adjustable linear LED driver-controller offering excellent temperature stability and output current capability. It works with a wide input voltage range from 4.5V to 60V.

With an external LED driving power device, its internal power dissipation is minimized compared with traditional linear LED drivers. This makes it ideal for medium to high current LED circuits.

THE **DIODES** ADVANTAGE

- 15mA Output Drive Capability for MOSFET or Bipolar Transistor
- Programmable Reference
- Low Temperature Drift
- Compatible for PWM Dimming
- LED Open Protection Detected by VFAULT Pin
- Built-in multiple protection: UVLO, OTP, and thermal foldback protection

* Engineering samples available upon request

INDUSTRIAL LED LIGHTING

Part	Buck	Boost	Buck-Boost	Linear	Input Voltage Min	Input Voltage Max	Max Output Voltage	Current Sense Voltage	Typical Peak LED Current	LED Current Accuracy	Max Switching Frequency	Efficiency	Temp Range	Package
					V	V	V	mV	A	%	kHz	%	°C	
AL5809	–	–	–	Y	2.5	60	–	–	15/20/25/30/40/50/60/90/120/150	5	–	85	-40 to +125	POWERDI123
AL5811/12	–	–	–	Y	3.5	60	–	–	75/150	3	–	85	-40 to +125	U-DFN3030-6; MSOP-8EP
AL5890	–	–	–	Y	7	400	–	–	10/15/20/30/40	5	–	–	-40 to +125	PowerDI123 SOT89-E TO252
AL5896*	–	–	–	Y	7	500	–	–	Adj	2.5	–	–	-40 to +125	SO-8EP
AL1791/2/3/4	–	–	–	Y	6.5	30	–	–	1000/500/500/500	4	–	85	-40 to +125	U-DFN4030-14
AL5814/5/6/7	–	–	–	Y	4.5	60	–	–	Ext. BJT/MOSFET	4.5	–	85	-40 to +125	SOT25/MSOP-8EP
AL1781/2	–	–	–	Y	6.5	30	–	–	150/300	4.5	–	85	-40 to +125	TSSOP-16EP
AL1783*	–	–	–	Y	6.5	60	–	–	750	5	–	85	-40 to +125	TSSOP-16EP
PAM2804	Y	–	–	–	2.5	6	5	100	1	5	1500	93	-40 to +85	TSOT25
PAM2863	Y	–	–	–	4.5	40	36	100	2	5	1000	95	-40 to +85	SO-8EP
AL8860/1	Y	–	–	–	4.5	40	36	100	1	5	1000	95	-40~+125	TSOT25 SOT89-5 MSOP-8EP
AL8843	Y	–	–	–	4.5	40	36	100	3	5	1000	95	-40~+125	SO-8EP
AL8862/3*	Y	–	–	–	4.5	60	55	100	1/Ext. MOSFET	5	1000	95	-40~+125	SO-8EP
AL8822/3	Y	Y	–	–	5	36	60	100	1/Ext. MOSFET	5	1000	90	-40~+105	SO-8EP/SO-8
PAM2803	–	Y	–	–	0.9	V_F-0.2	5	100	1	5	1000	90	-40~+85	TSOT26
ZXLD1370/1/4	Y	Y	Y	–	5/6.5	60	60	218	Ext. MOSFET/1.5	2	1000	95	-40~+125	TSSOP-16EP/TSSOP-20EP

* Engineering samples available upon request

TRIAC DIMMABLE AND OFFLINE LED DRIVERS

Part	Topology	Power (Watt)	Magnetic Component	MOSFET Options	PF	Dimmable	Mains Voltage	Package
AL5892*	Linear	<=10W	No Inductor	350V@75mA	>0.7	Triac	120	SO8-EP
AL1698*	Buck-Boost Flyback	<=15W	Single Winding Inductor	600V@2A	>0.9	Triac	110/230	SO-7
AL1692/7	Buck-Boost	<=125W	Single Winding Inductor	400V@3A 500V@3A 600V@2A 700V@1A Controller	>0.9	Triac	120/230	SO-7 SO-8
AL1676/AP1688	Buck	<=150W	Single Winding Inductor	300V@2A, 300V@3A, 500V@1A, 500V@2A, 600V@2A, 650V@4A, Controller	>0.9	No	85~277	SO-7 SO-8

* Engineering samples available upon request

INFOTAINMENT DISPLAY

Part	Topology	Input Voltage		Max Output Voltage	Current Sense Voltage	Max Output Current Per Channel	LED Current Accuracy	Max Switching Frequency	Efficiency	Temp Range	Quiescent Current	Package
		Min	Max									
		V	V	V	mV	mA	%	kHz	%	°C	mA	
AL3022	Boost	4	18	Ext MOSFET	200	Ext MOSFET	3	140	93	-40~+85	5	SO-8
AL3050	Boost	2.7	5.5	60	540	40	3	750	88	-40~+85	0.3	DFN2020-6
AL3065/6	Boost	4.5	33	60	540	400	3	1000	90	-40~+85	3	SO-16
AP3041	Boost	5	27	60	540	Ext MOSFET	2	1000	90	-40~+85	1.5	SO-16
AP3064	Boost	4.5	33	60	540	220	8	1000	90	-40~+85	3	SO-16, DIP-16
AL3065A	Boost	4.5	33	60	540	400	3	1000	90	-40~+85	3	SO-16
AL3353*	Boost	9	40	Ext MOSFET	400	Ext MOSFET	3	120	93	-40~+85	2	SO-8
AL3644*	Boost + Linear	2.5	5	4.85	–	1500	7	4000	85	-40~+85	0.3	U-WLB1713-12

* Engineering samples available upon request

THE **DIODES** ADVANTAGE

High-Efficiency, Cost-Effective Infotainment Display LED Drivers for Smartphone, Notebooks, TVs and Monitors

- **High Precision Current Source**
  The LED current accuracy is ≤ ±3%. The current matching between any channel is ±0.5% (typical for AL3065A).
- **Versatile Protection Features**
  Meet strict safety requirements with built-in multiple protections: OVP, OCP, LED open, Output short circuit. Diodes and Inductor short circuit, LED cathod short to GND, and OTP.
- **Drive 4 LED strings at 250mA per string, 400mA pulse current max**
  High LED current precision and channel matching meets the latest requirements for medium to large LCD panels including 3D TVs
- **Adjustable operating frequency from 0.1MHz to 1MHz**
  Supports flexible operating frequency for better selection on inductor size and EMI solution
- **High efficiency, high switching boost solutions cover all screen sizes**
  Smaller inductor values and overall footprint
- **Analog, Direct (10,000:1) and Fast PWM Dimming Controls**
  Versatile and wide dimming range for large brightness variations

DIODES
INCORPORATED

ANALOG | DISCRETE
LOGIC | MIXED-SIGNAL

Diodes Incorporated is a leading global manufacturer and supplier of high-quality application specific standard products within the broad discrete, logic, analog and mixed-signal semiconductor markets. Diodes serves the consumer electronics, computing, communications, industrial, and automotive markets.

Diodes' corporate headquarters and Americas' sales office are located in Plano, Texas and Milpitas, California. Design, marketing, and engineering centers are located in Plano; Milpitas; Taipei, Taiwan; Taoyuan City, Taiwan; Zhubei City, Taiwan; Manchester, England; and Neuhaus, Germany.

Diodes' wafer fabrication facilities are located in Manchester and Shanghai. Diodes has assembly and test facilities located in Shanghai, Jinan, Chengdu, and Yangzhou, China, as well as in Hong Kong, Neuhaus and Taipei.

Additional engineering, sales, warehouse, and logistics offices are located in Taipei; Hong Kong; Manchester; Shanghai; Shenzhen, China; Seongnam-si, South Korea; and Munich, Germany, with support offices throughout the world.

diodes.com

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