



# AUTOMOTIVE

## LED INTERIOR LIGHTING

MAP READING AND  
VANITY LIGHTS

DOME LIGHTS

INSTRUMENT CLUSTER  
BACKLIGHTING

EV CHARGE  
INDICATOR

FOOTWELL/  
AMBIENT LIGHTING

ACCESSORY LIGHTING

CUPHOLDERS,  
DOOR HANDLES,  
POWER PORTS

PUDDLE LIGHTS

SILL PLATE  
ILLUMINATION

# AUTOMOTIVE

## LED INTERIOR LIGHTING

AS AUTOMOBILES STRIVE TO BECOME EVER MORE EFFICIENT, INCANDESCENT BULBS ARE RAPIDLY BEING REPLACED BY LEDs FOR BOTH EXTERIOR AND INTERIOR LIGHTING.

### SIMPLICITY

In many cases, an interior light is a simple bulb on a switch, fed by a battery or alternator voltage. As these simple lighting solutions are replaced with LEDs however, products like the AL5809Q constant current regulator are required to maintain the simplicity of installation and wiring with which designers are familiar.

### CONTROL

There are more demands for lighting in vehicles now than in the past, with ambient mood lighting, illuminated sill plates, and puddle lighting being relatively recent additions. When effects like dimming and fade-in/fade-out are required, a dimmable device like the BCR4xxUQ series gives designers a simple way to achieve elegant lighting design.

### EFFICIENCY

LEDs immediately offer efficiency improvements over incandescent bulbs, but this will not be fully realized with a linear driver. Switching regulators offer the maximum overall efficiency with the highest degree of control and accuracy.

### CONSTANT CURRENT VERSUS RESISTOR

Whilst LEDs can be implemented with a series resistor, this has numerous disadvantages in an automotive environment: LED output will vary with voltage during stop/start events, VF matched LEDs may be required for visual matching, and LED lifetimes may be reduced due to uncontrolled current spikes. Diodes' LED drivers overcome these issues in cost-effective and simple solutions with a small footprint.



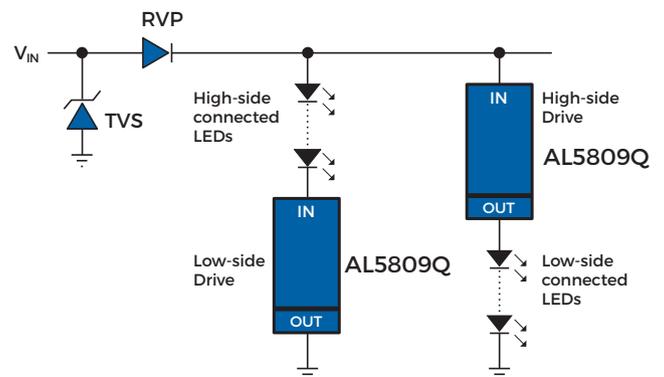
## AL5809Q SIMPLE TWO-TERMINAL CONSTANT CURRENT LINEAR LED DRIVER

The AL5809Q is ideal for simple fixed-output current lighting applications. It requires no external resistors for current setting, and is available in 11 current options from 15mA to 150mA.

The device can be used either high-side or low-side. With a 60V rating and a power dissipation of up to 1.5W, it is extremely flexible and can be used in a wide variety of applications such as sill plates, accessory lighting, reading and vanity lights, and button backlighting.

### THE DIODES ADVANTAGE

- High power dissipation in a small footprint
- $\pm 5\%$  accuracy across whole temperature range
- Wide operating voltage range for a variety of LED chain lengths
- Low temperature drift and high power supply rejection ratio maintain accuracy over wide range of conditions



# LIGHTING APPLICATIONS



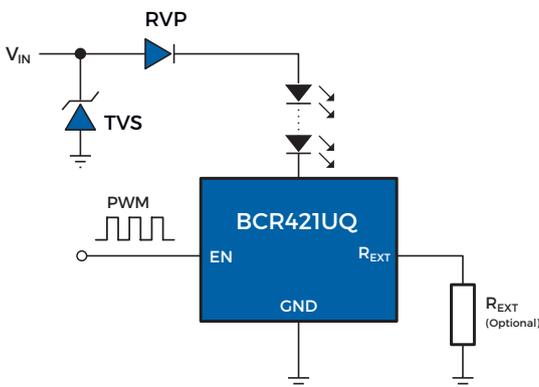
## BCR4xxUQ ADJUSTABLE AND DIMMABLE LINEAR LED DRIVERS

The BCR4xxUQ series are constant current regulators, adjustable from 10mA to 350mA with PWM capability for fade-in, fade-out, and dimming effects where required.

With a minimum 1.4V output, the number of LEDs in the string can be maximized to improve efficiency. It is ideal for strip lighting and ambient mood lighting, as well as backlighting of instruments, infotainment displays, and controls.

### THE DIODES ADVANTAGE

- Preset 10, 20, and 50mA options with no need for external components
- Output can be adjusted up to 350mA (BCR421UQ) using external resistor
- BCR421UQ can be directly PWM-dimmed from 3.3V MCU
- DFN2020 package option < 0.6mm height for side-emitting LED strips



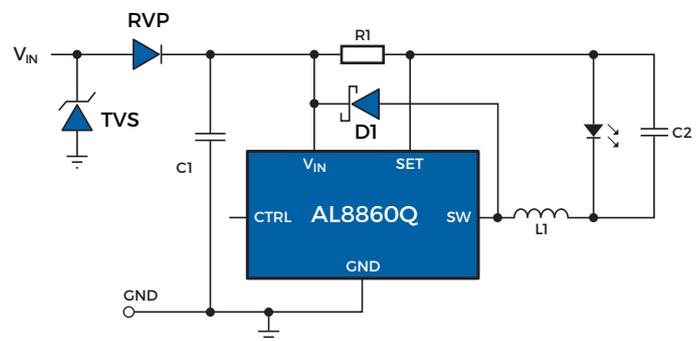
## AL88xxQ SWITCHING LED DRIVERS

Switching LED drivers provide enhanced maximum power efficiency, control, and accuracy.

Switching LED drivers are ideal where higher power outputs are needed, such as dome or puddle lighting. In addition, they are the optimum choice for applications which require higher efficiency and control, such as ambient lighting.

### THE DIODES ADVANTAGE

- Highest efficiency
- High accuracy
- Choice of PWM and DC dimming
- Different topologies: Buck, Boost, Buck/Boost/Buck-Boost



## AUTOMOTIVE LED DRIVER PRODUCTS

Part Number	Buck	Buck-boost	Boost	Linear	Driver/Controller	Input Voltage		Maximum LED Current	Maximum Output Voltage	Operating Temperature Range	Sense Voltage	Switching Frequency Maximum	Dimming		LED Current Accuracy	Packages
						Max	Min						PWM	Analog		
						V	V						Y	N		
AL5801Q	-	-	-	Y	D	100	5	0.35	100	-40 to 125	560	No	Yes	No	N/A	SOT26
AL5809Q	-	-	-	Y	D	60	2.5	0.15	60	-40 to 125	No	No	Ext.	No	5	PowerDI123 (Type B)
AL5810Q	-	-	-	Y	D	60	2.5	0.2	60	-40 to 105	No	No	Ext.	No	5	W-DFN2020-3 (SWP) (Type A)
AL5814Q	-	-	-	Y	C	60	4.5	Ext.	Ext.	-40 to 125	400	No	Yes	No	5	MSOP-8EP
AL5816Q	-	-	-	Y	C	60	4.5	Ext.	Ext.	-40 to 125	200	No	Yes	Yes	5	SOT25
AL5873Q	-	-	-	Y	D	55	5	0.25	55	-40 to 125	-	No	Yes	Yes	5	TSSOP-16EP (Type DX)
AL8400Q	-	-	-	Y	C	18	2	Ext.	Ext.	-40 to 125	200	No	Ext.	No	3	SOT353
AL8843Q	Y	-	-	-	D	40	4.5	3	36	-40 to 125	100	1000	Yes	Yes	4	SO-8EP
AL8860Q	Y	-	-	-	D	40	4.5	1.5	36	-40 to 125	100	1000	Yes	Yes	5	MSOP-8EP
AL8861Q	Y	-	-	-	D	40	4.5	1.5	36	-40 to 125	100	1000	Yes	Yes	5	MSOP-8EP
AL8862Q	Y	-	-	-	D	55	5	1	50	-40 to 125	100	1000	Yes	Yes	4	SO-8EP
AL8871Q	-	Y	-	-	C	60	5	Ext.	Ext.	-40 to 125	225	1000	Yes	Yes	2	TSSOP-16EP
BCR401UW6Q	-	-	-	Y	D	40	1.2	0.1	40	-55 to 150	700	No	Ext.	No	10	SOT26
BCR402UW6Q	-	-	-	Y	D	40	1.4	0.1	40	-55 to 150	700	No	Ext.	No	10	SOT26
BCR405UW6Q	-	-	-	Y	D	40	1.4	0.1	40	-55 to 150	700	No	Ext.	No	10	SOT26
BCR420UFDQ	-	-	-	Y	D	40	1.4	0.35	40	-55 to 150	700	No	Ext.	No	10	U-DFN2020-6
BCR420UW6Q	-	-	-	Y	D	40	1.4	0.35	40	-55 to 150	700	No	Ext.	No	10	SOT26
BCR421UFDQ	-	-	-	Y	D	40	1.4	0.35	40	-55 to 150	700	No	Yes	No	10	U-DFN2020-6
BCR421UW6Q	-	-	-	Y	D	40	1.4	0.35	40	-55 to 150	700	No	Ext.	No	10	SOT26
BCR430UW6Q	-	-	-	Y	D	42	5	100	40	-40 to 125	892	No	Ext.	No	5	SOT26
ZXLD1350Q	Y	-	-	-	D	30	7	0.38	30	-40 to 105	100	600	Yes	Yes	5	TSOT25
ZXLD1356Q	Y	-	-	-	D	60	6	0.55	60	-40 to 125	200	600	Yes	Yes	3	TSOT25
ZXLD1360Q	Y	-	-	-	D	30	7	1	30	-40 to 125	100	600	Yes	Yes	5	TSOT25
ZXLD1362Q	Y	-	-	-	D	60	6	1	60	-40 to 125	100	600	Yes	Yes	5	TSOT25
ZXLD1366Q	Y	-	-	-	D	60	6	1	60	-40 to 125	200	600	Yes	Yes	2.5	SO-8EP, TSOT25, V-DFN3030-6
ZXLD1370Q	Y	Y	Y	-	C	60	6.5	Ext.	Ext.	-40 to 125	218	1000	Yes	Yes	2	TSSOP-16EP
ZXLD1371Q	Y	Y	Y	-	C	60	5	Ext.	Ext.	-40 to 125	218	1000	Yes	Yes	2	TSSOP-16EP

\*Ext. = External transistor

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