

# BK19 Spotlight – Rad-Hard, Low-Noise DC Voltage Regulator

## 1. Features

Metric	Performance
V <sub>IN</sub> max.	20V
V <sub>IN</sub> min. in "LDO mode"	2.3V
V <sub>DO</sub> in "LDO mode"	0.44V @ I <sub>LOAD</sub> =0.9A
I <sub>OUT</sub> max.	0.9A
V <sub>OUT</sub> range	1.2-2.0V
Temperature range	-55°C to 125°C
PSRR	75dB @ 1kHz
RMS Noise	12 μV (10Hz-100kHz)
Package	6x6x0.8 mm <sup>3</sup> QFN-28

- Up to 70% rel. higher efficiency than LDO.
- Manufactured using MIL-PRF-38535 Class V Compliant die, MIL-STD-883 up to:
  - 200 kRad(Si), per Cond. A @ 50 Rads(Si)/sec
  - 100 kRad (Si), per Cond. D, @ 10 mRads(Si)/sec
  - ELDRS Pass 100 kRad(Si)

## 2. Applications

- Low noise, efficient, radiation-hard DC power management.

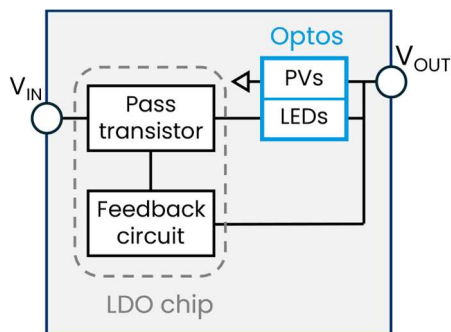


Figure 1. Schematic of an optocoupler enhanced linear regulator in a QFN package.

## 3. Description

The BK19 series consists of efficient, low-noise, and radiation-hard voltage regulators with a space-qualified LDO, good PSRR, low ground current, enable/disable functionality, over-temp protection and over-current protection. BK19 provides an adjustable voltage output set by two feedback resistors. This series is available with a 1.2-2V output.

Polaris Semiconductor’s voltage regulator technology enables much higher efficiency than a conventional linear regulator over wide voltage steps. The inductor-less, switching-free topology also offers superior electromagnetic interference performance and lower BOM than switching-based solutions. The devices employ our patented hybrid optoelectronic circuit topology, including high efficiency, GaAs-based optocouplers and a low-dropout (LDO) linear voltage regulator in a compact QFN package. High efficiency buck conversion is available in “optocoupler enhanced” mode; this engages the internal optocoupler array to recycle power normally wasted in LDOs. The input voltage required for a regulated output (V<sub>ON</sub>) is greater than an LDO and is configurable using the pin connections. Peak efficiency is achieved for V<sub>IN</sub> ≈ V<sub>ON</sub>, and therefore the optimum device configuration for a given application depends on the nominal input voltage range. The devices can also be operated as conventional LDOs in “LDO mode” for use at lower input voltages.

## 4. Selected Characteristics & Typical Applications

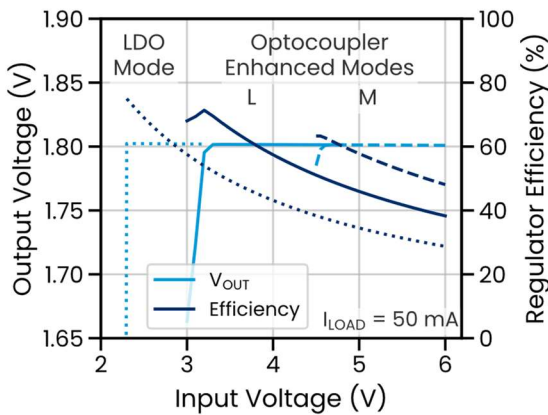


Figure 1. BK19D18V output voltage and efficiency versus input voltage with 50mA load current.

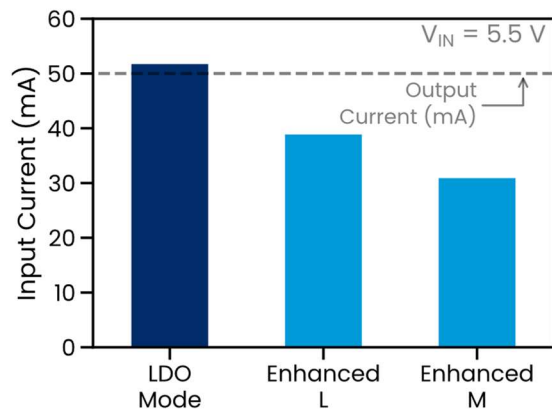


Figure 2. BK19D18V input current in the three operating modes for  $I_{load}=50mA$  and  $V_{IN}=5.5V$ .

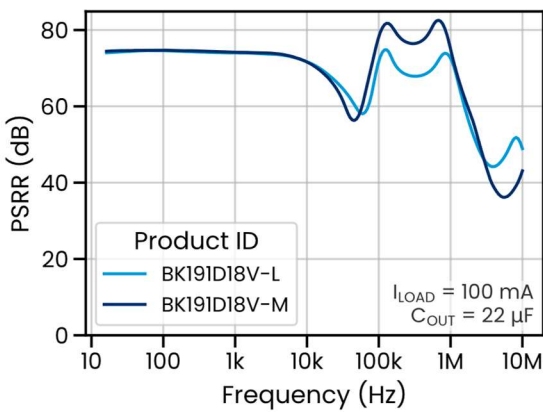


Figure 3. BK19 series PSRR at 100 mA load current.  $C_{OUT}$  is an X7R MLCC.

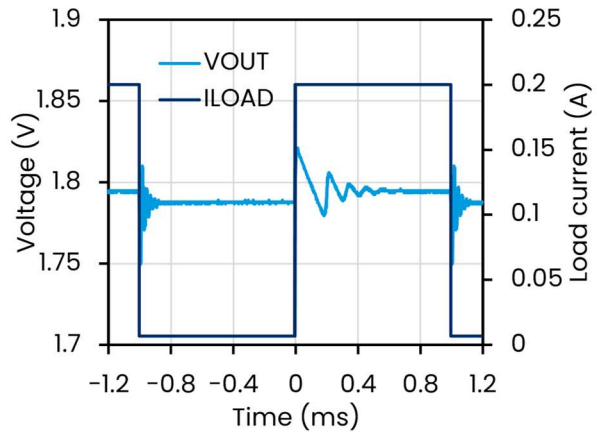


Figure 4. BK19D18V Load switching transient with  $C_{OUT}=22\mu F$  and  $V_{IN}=5.5V$ .

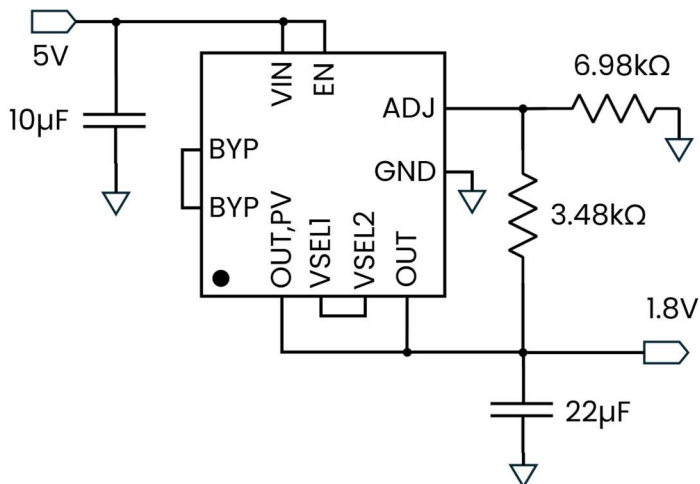


Figure 5. A 5V to 1.8V buck configuration of BK19D18V in a 6mm QFN28 package, operating in "optocoupler enhanced M" mode. Enable and bypass functionality are not used in this example.

## 5. BK19 Series Product Line Specifications

<b>Min V<sub>OUT</sub></b>	1.2 V
<b>Max V<sub>IN</sub></b>	20 V
<b>Max I<sub>OUT</sub></b>	900 mA
<b>TID</b>	RHA 200 krad(Si)

<b>Device</b>	<b>Max V<sub>OUT</sub> (V)</b>	<b>Min V<sub>IN</sub> @ I<sub>OUT</sub>=0.1A (V)<sup>1</sup></b>	<b>Peak Efficiency<sup>2</sup> @ I<sub>OUT</sub> = 0.1A (%)</b>	<b>PSRR @ 1kHz (dB)</b>	<b>V<sub>RMS</sub> noise, 10-100kHz (μV)</b>	<b>Package</b>	<b>QFN Dimensions</b>
<b>BK191D18V<sup>3</sup></b>	2	V <sub>OUT</sub> +1.4 (L) V <sub>OUT</sub> +2.8 (M)	70.5% 62.4%	75 75	~12	QFN 28	6x6x0.8 mm <sup>3</sup>

All the parts listed here are under development and device specifications provided here are subject to change.

<sup>1</sup> Minimum input voltage is provided in optocoupler enhanced mode. All devices can be operated as conventional low dropout linear regulators with lower V<sub>IN</sub>.

<sup>2</sup> Peak efficiency is provided for the following output voltages: 1.8 V (18V products)

<sup>3</sup> Uses RH1965 radiation hardness assured LDO.

Contact us at [info@polarissemiconductor.com](mailto:info@polarissemiconductor.com) for datasheets and additional information.