C2161 & C2162 flyback controllers

- Meet tough new mobile phone no-load requirements to 5 star standard (<30 mW)
- Primary Side Sensing flyback controllers eliminate the need for secondary feedback circuitry such as opto-couplers, thereby reducing BOM costs
- Meet ENERGY STAR 2.0 and EU Code of Conduct V4.0 efficiency requirements (Level V)

Overview

CamSemi C2161 and C2162 primary side sensing (PSS) quasi-resonant flyback controllers are aimed at applications up to 8 watts.

These two controllers offer very low no-load power requirements found in today's applications, such as mobile phone chargers, but also easily programmable frequency, cable compensation, quasi-resonant switching and protection features.

Applications

Typical low power applications include:

- Mobile phones
- Cordless telephones
- Digital cameras
- Bluetooth headsets
- MP3 chargers
- Portable games
- LED Lighting

Typical Application Circuit

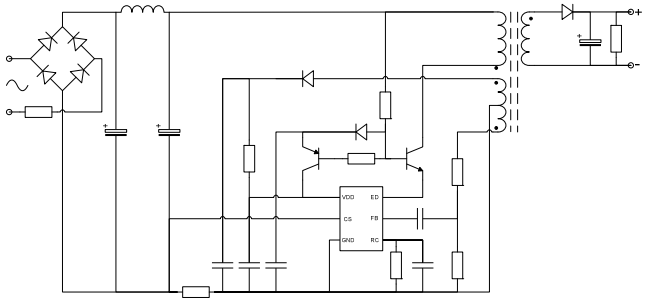


Figure 1: **Typical application circuit ≤8 W**

No Load Power

The C2161 and C2162 controllers meet the toughest new mobile phone 5 star standard of <30 mW.

No-Load consumption score chart Five stars = most energy efficient		**CamSemi controllers**
★★★★★	**≤ 0.03 W**	**C2161/C2162**

No Load Power 5 Star Requirements

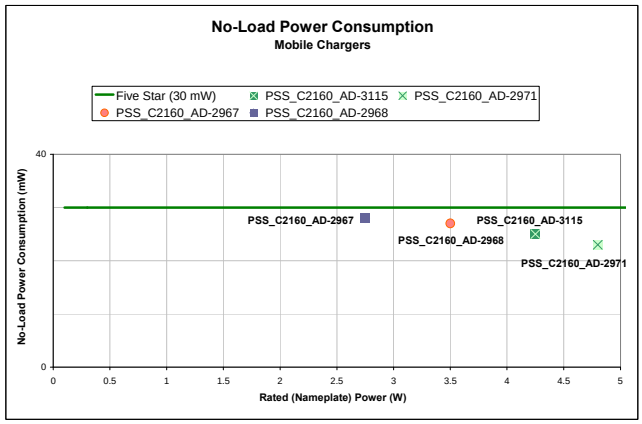


Figure 2: **CamSemi demos vs no-load star rating**

Efficiency

C2161 and C2162 controllers can help manufacturers easily achieve new requirements such as ENERGY STAR 2.0 and European Code of Conduct v4.0 (Level V).

Efficiency achieved > Energy Star 2.0

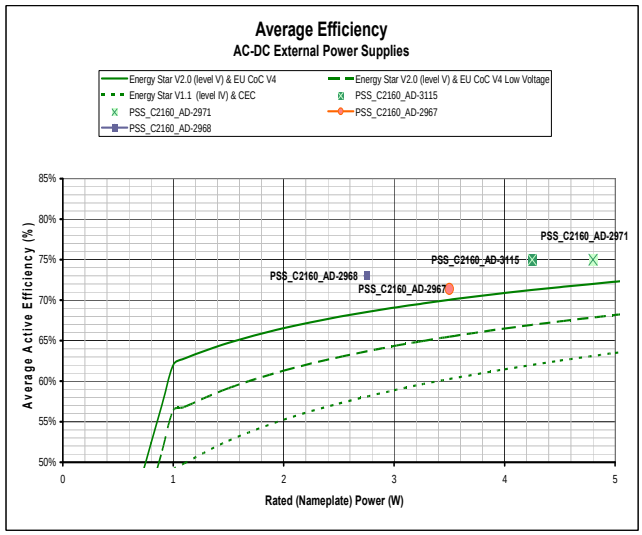


Figure 3: **CamSemi demo vs Energy Star 2.0**

Regulation

The controllers achieve constant voltage and constant current output without the need for any secondary sensing components (i.e. opto-coupler circuit) by sensing the primary side waveforms of transformer voltage and primary switch current.

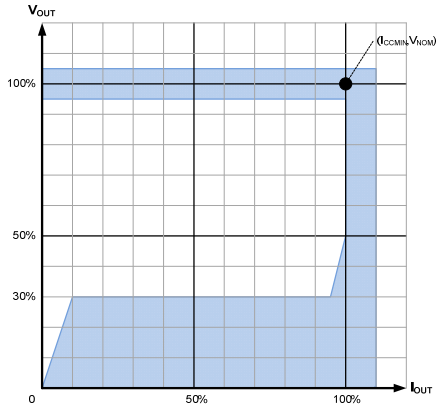


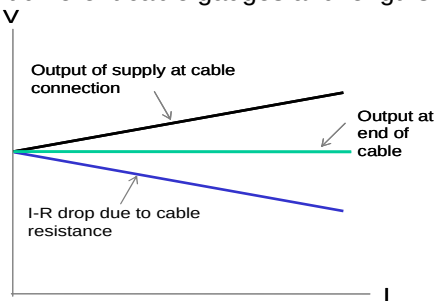
Figure 4: **Achievable charger output characteristic using C2161 or C2162 controllers**

BOM and Inventory Costs

- The removal of the opto-coupler circuits eliminates up to 10 components needed in a conventional flyback or RCC circuit.
- The use of low cost bipolar transistors also reduces cost.

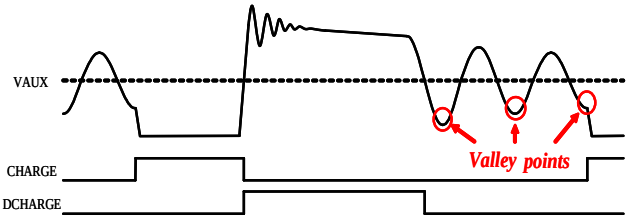
Cable Compensation

The controllers adjust the output voltage of the power supply to compensate for the voltage drop seen in the output cable. This allows the required application voltage to be seen at the output end of the cable rather than at the output of the power supply into the cable. This function is fully programmable to take into account different cable gauges and lengths.



Quasi-Resonant (Valley) Switching

CamSemi C2161 and C2162 controllers use quasi-resonant (valley) switching techniques to improve both efficiency and EMI.



- Zero current (quasi-resonant) switching is used to minimise the switching losses in the primary switch. The bipolar switch is turned on when the voltage across it is at a minimum (in a valley) to minimise the captive switching losses and improve efficiency.
- Switching the bipolar switch when the voltage is at a minimum helps reduce the hard switching effect that causes EMI.
- Switching when a valley is detected – rather than at a fixed frequency - introduces frequency jitter. This has the benefit of spreading the RF emissions spectrum and reducing EMI overall.

Protection Features

Input Over Voltage Protection - OVP

Input Under Voltage Protection - UVP

Over Temperature Protection - OTP

Transistor Over Current Protection - OCP

Controller Series

The following controller options are available:

Part Number	Output Power W	Package
C2161	1-4 W	SOT23-6
C2162	4-8 W	SOT23-6

For more Information

For details of our channel partners and information on future product, technology or corporate updates, visit www.camsemi.com

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