

EZ-PD™ PAG2: Power Adapter Generation 2

ZVS flyback converter chipset with USB-PD, SR, and PWM for USB-C PD adapters and chargers

EZ-PD™ PAG2 is a secondary-side controlled ZVS flyback converter chipset (combining EZ-PD™ PAG2P and EZ-PD™ PAG2S) with integrated USB power delivery, synchronous rectifier (SR), and PWM controller. The communication and isolation between primary and secondary are via a pulse edge transformer (CYPET121). The product family supports non-complementary active clamp flyback (NCP-ACF) and quasi-resonant flyback with zero voltage switching (QR-ZVS) topologies, enabling highly efficient USB-C adapters and chargers.

EZ-PD™ PAG2S-AC is a secondary-side ACF controller. It enables leakage energy recycling and ZVS operation to reach highly-efficient flyback converter.

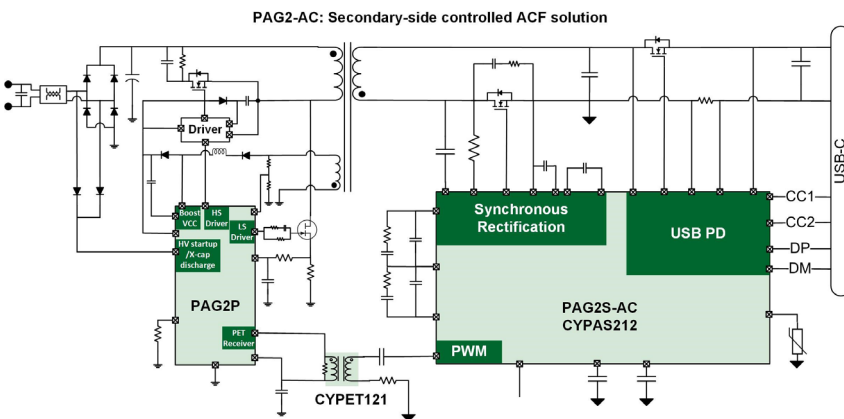
EZ-PD™ PAG2S-QZ is a secondary-side QR-ZVS controller. It achieves ZVS using SR control scheme and eliminates additional winding and switch.

EZ-PD™ PAG2P is a primary HV startup controller which integrates HV start-up function, pulse edge transformer (PET) receiver, low-side NFET gate driver, high-side logical level driver, fault protection, x-cap discharge, and Vcc boost converter to reduce the bill of materials and enable better system performance.

The EZ-PD™ PAG2 secondary-side controlled solution offers better regulation accuracy and lower standby power consumption than primary-side controlled PWM controller. Its programmable parameters such as digital valley table, ZVS/ACF pulse width, burst/skip frequency, and SR turn-on/off delay enable better system performance than fixed function controllers.

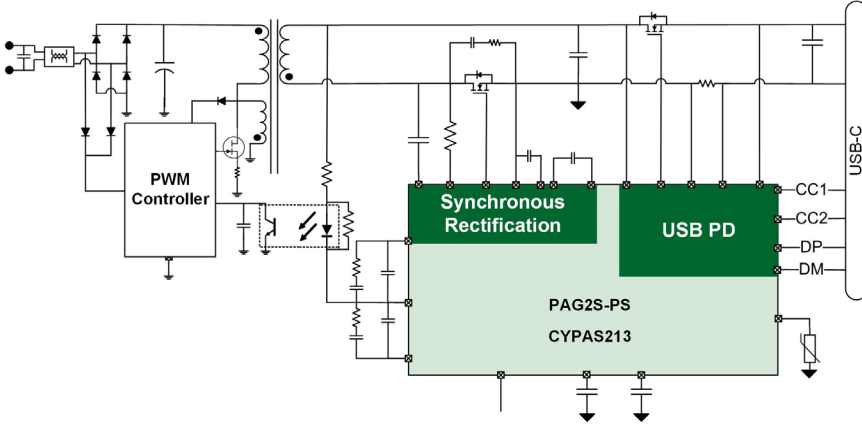
EZ-PD™ PAG2 family key features

- Support PD 3.1 SPR with PPS and 28 V EPR
- Legacy charging protocols:
 - BC v1.2, AFC, Apple charging, and QC5
- Universal AC line input: 90 V_{AC} – 265 V_{AC}
- Programmable soft-start with external capacitor
- Support DCM, CrCM, CCM, burst, and skip mode
- f_{sw} range: 20 kHz – 300 kHz
- Programmable digital valley table across line and load
- Support logical and non-logical SR switch
- Support fault protections:
 - brown in/out, line UV/OV, VBUS OCP/SCP/OVP/UVP, OTP



EZ-PD™ PAG2S-PS is a secondary-side controller with integrated USB PD controller and synchronous rectification

EZ-PD™ PAG2S-PS acts as USB PD and SR integrated secondary-side controller by pairing with 3rd party primary-side PWM controllers via an optocoupler. It has built-in shunt voltage regulator for constant voltage and current mode control and the volt-second integration feature to avoid SR false turn-on conditions.



**EZ-PD™ PAG2S-PS
Key features**

USB PD:

- PD 3.1 SPR with PPS and 28 V EPR
- Legacy charging protocols
- Fault protection: VBUS OCP, SCP, OVP, UVP, OTP
- CC-VBUS short protection
- Integrate shunt regulator

Synchronous rectification:

- Volt-second integration
- Short SR turn on and off delay time
- Supports DCM/CCM converter
- Supports 300 kHz max switching frequency

Ordering information

Product family name	Part number	Application	Package
PAG2S-QZ	CYPAS211A1-32LQXQ/T	USB-PD secondary-side controlled QR-ZVS	32 pin-QFN
PAG2S-AC	CYPAS212A1-32LQXQ/T	USB-PD secondary-side controlled ACF	32 pin-QFN
PAG2S-PS	CYPAS213A1-32LQXQ/T	USB-PD and synchronous rectification	32 pin-QFN
PAG2S-PS	CYPAS213A1-24SXQ/T	USB-PD and synchronous rectification	24 pin-SOIC

Product family name	Part number	Mode	Package
PAG2P	CYPAP211A1-14SXI/T	Non-x-cap	14 pin-SOIC
PAG2P	CYPAP212A1-14SXI/T	X-cap	14 pin-SOIC



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