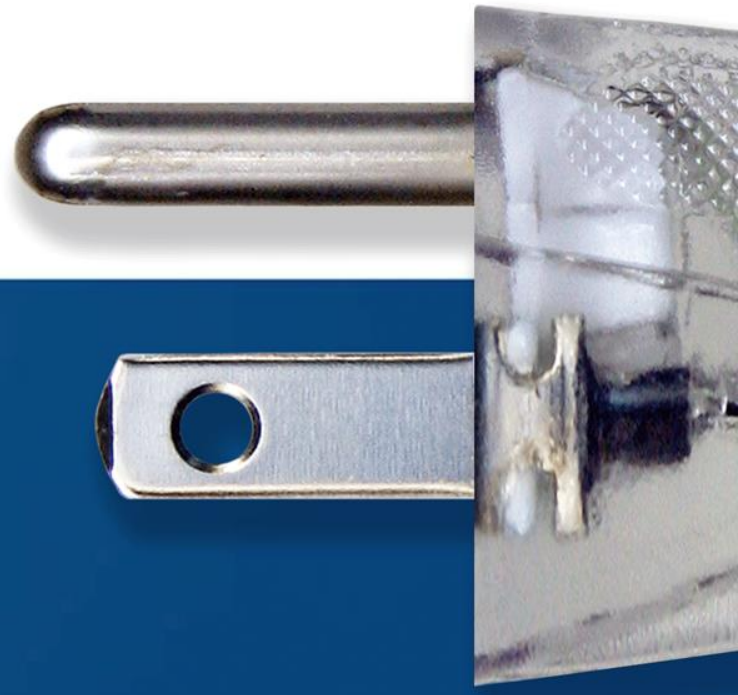
CHY100

First IC in The Market to Implement QC 2.0 Spec

April 2014

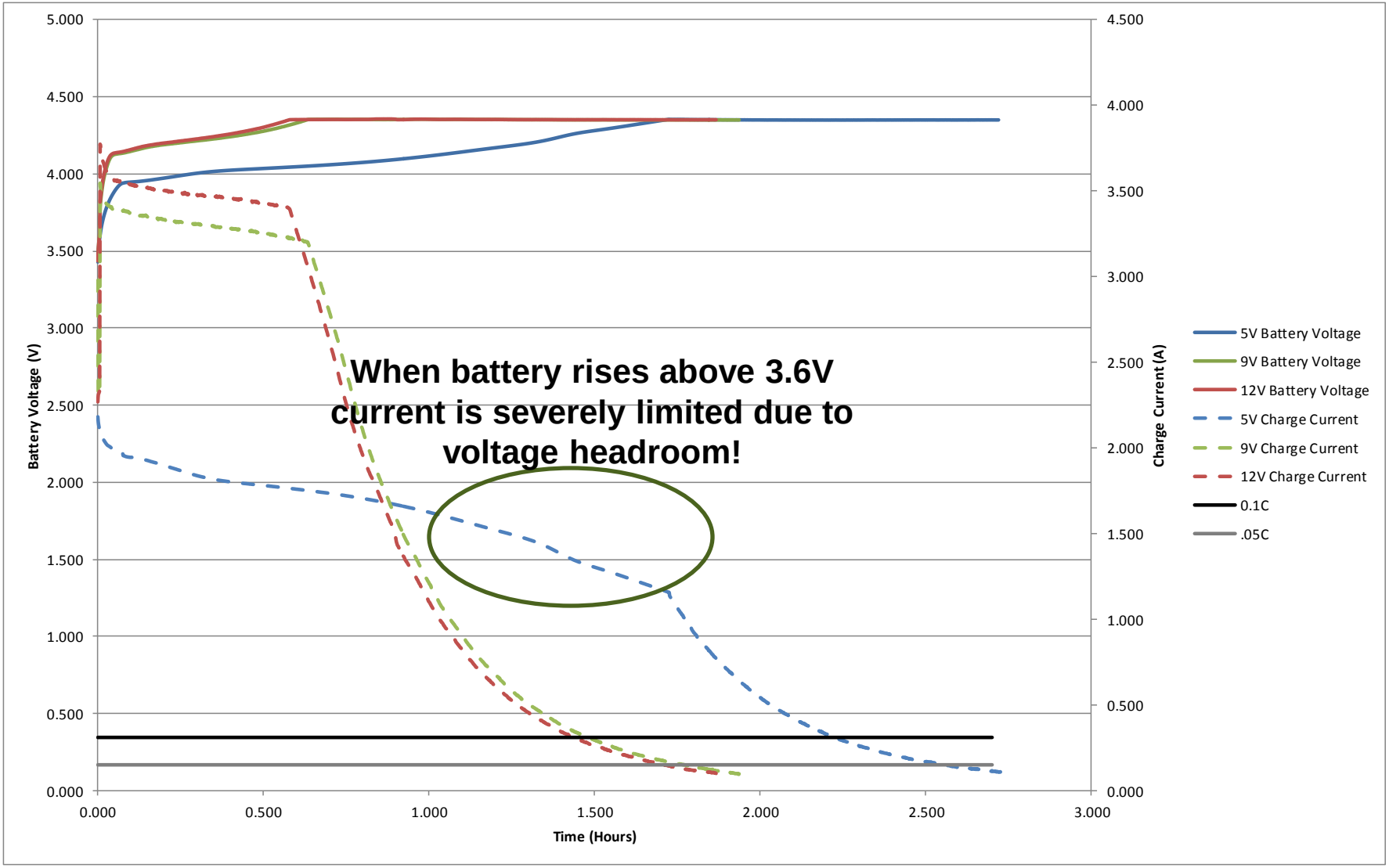


Confidential

Smart Phone/Tablet Requires Faster Time to Charge the Battery

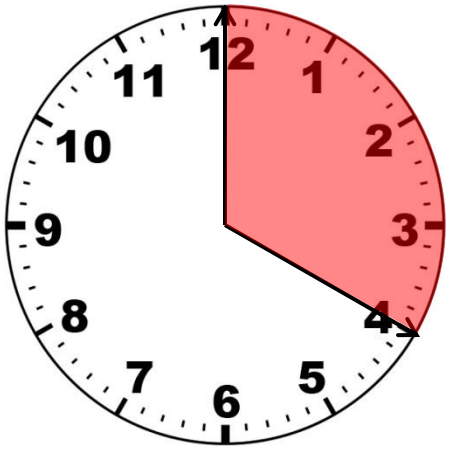
- Today most popular charger is 5V 2A
- Increase current up to 3-4 A is not an option
  - 5V 3A charger is very expensive, more than 25 RMB vs 15 RMB 5V 2A
  - There are reliability and safety issues related to output cable and connector
  - Charger size increases due to low efficiency of 5V output
- You can address all of these issue changing the output voltage
  - But must be compatible with the USB spec

Fast Charging Smartphone Batteries

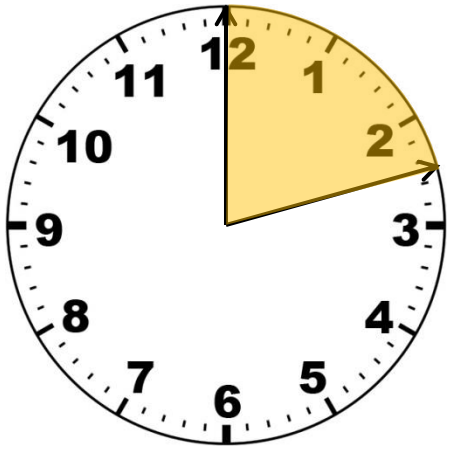


Time to 90% with Qualcomm's Quick Charge

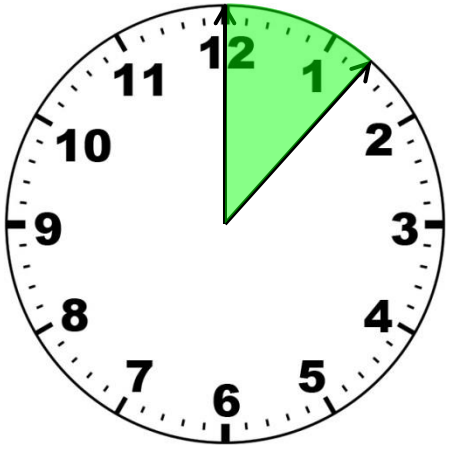
Full Charge (0%~90%) Comparison
3300mAH Smartphone Battery



Conventional Charging



Quick Charge 1.0



Quick Charge 2.0

Time Limited Charge – 60% in 30 Minutes

30-Minute Charge Comparison
3300mAH Smartphone Battery

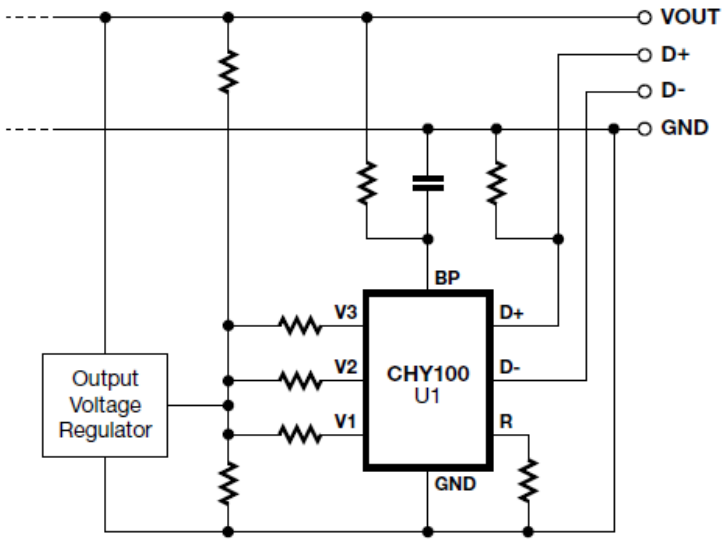
Conventional Charging

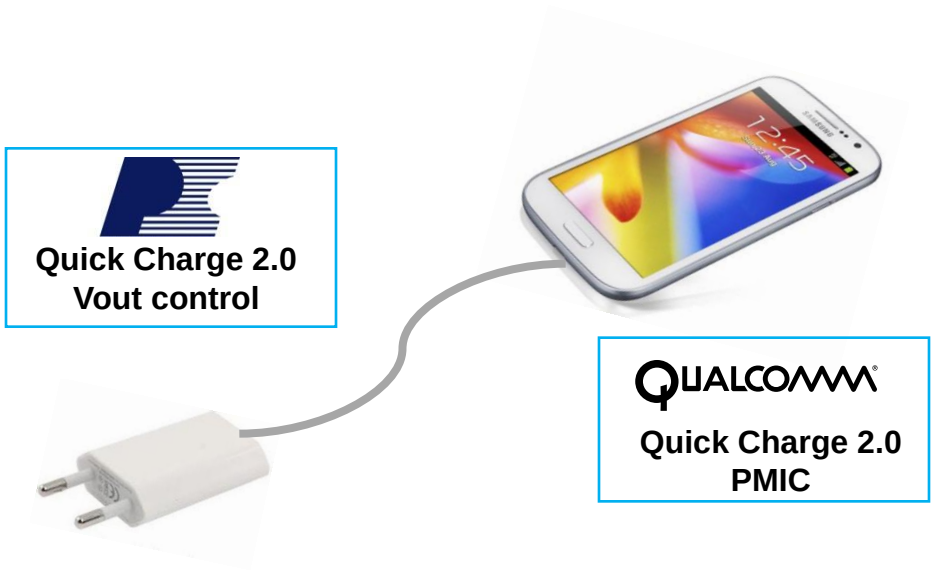
Quick Charge 1.0

Quick Charge 2.0

CHY100 Implements Quick Charger 2.0 is Available Now

- Backward-compatible with USB 5V charger
- Changes output voltage when asked by the phone
- Returns to normal USB 5V charger in 20 ms
- Works with present PI products like TopSwitch and TinySwitch



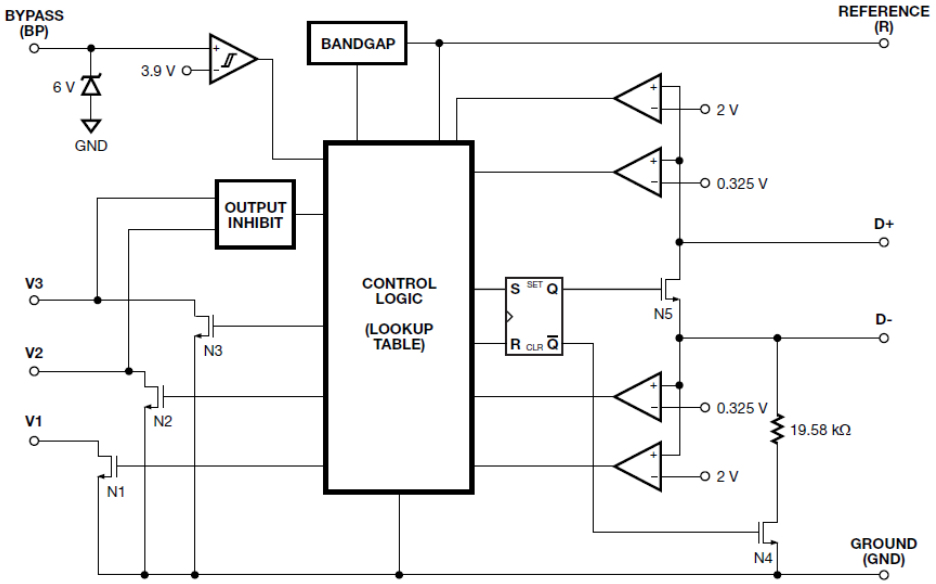


High Level QuickCharger2.0 Specification

Start

At Power up CHY100 turn-on N5 in 20 ms D+/D- Shorted

Portable Device Performs Detections according to USB BC1.2 Spec



CHY100 Start Monitor D+. If stays ON for at least 1.25s above 0.325 V it enters in QC2.0 Mode

N5 is Turned OFF and N4 turned ON connecting 19.53 Kohm pull-down Resistor to D-

Portable Device then recognizes the DCP as a valid HVDCP and ACKs by forcing DC voltages on D+/D- to request a voltage from the HVDCP

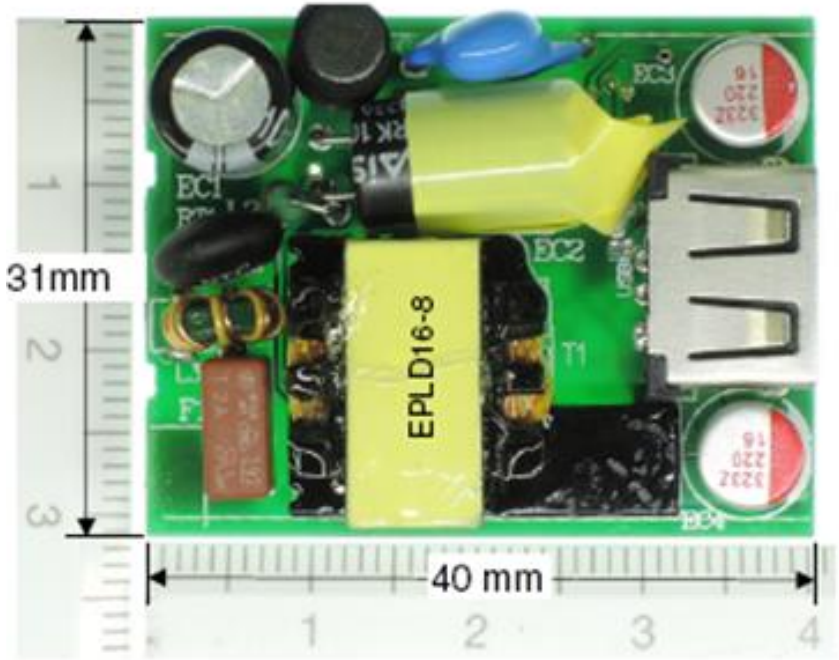
HVDCP outputs 5V,9V,12V, or 20 V until D+ goes low, below Vdat_ref

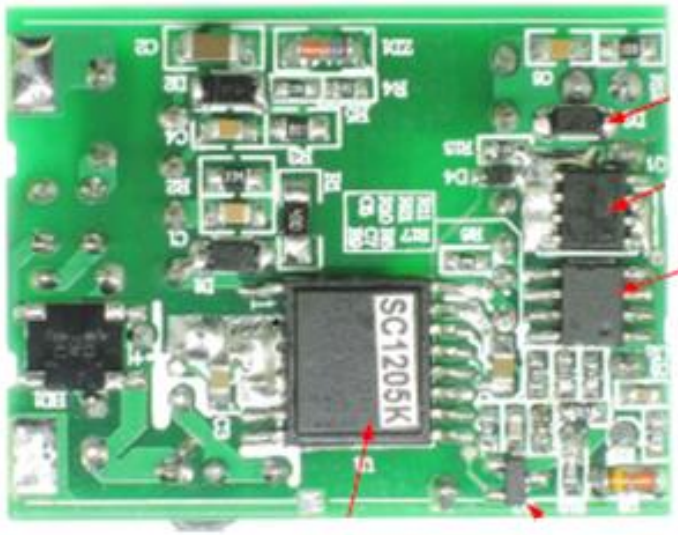
D+/D+ Voltages Set by Portable Device

Portable Device		HVDCP
D+	D-	Adapter Voltage
0.6 V	0.6 V	12 V
3.3 V	0.6 V	9 V
3.3. V	3.3 V	20 V
0.6 V	3.3 V	Reserved
0.6 V	GND	5 V

- 12 V output request is inhibited if V2 is connected to BYPASS Pin
- 20 V output request is inhibited if V3 is connected to BYPASS Pin

A 12 W Design Example

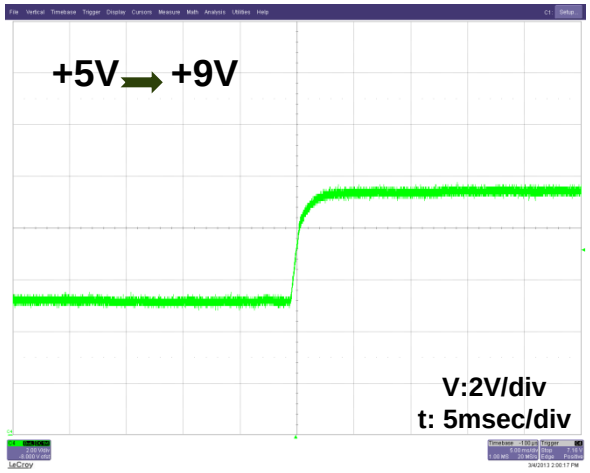


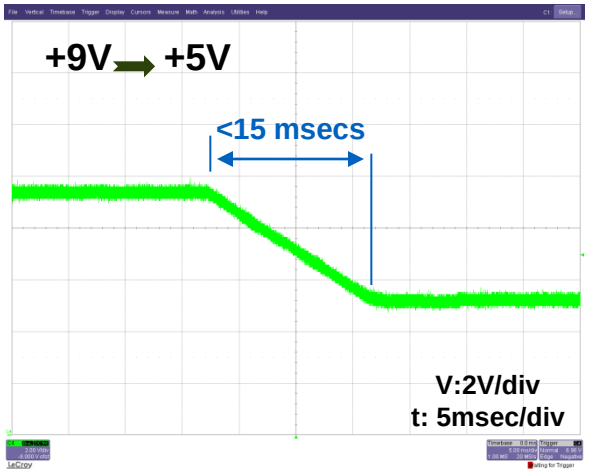


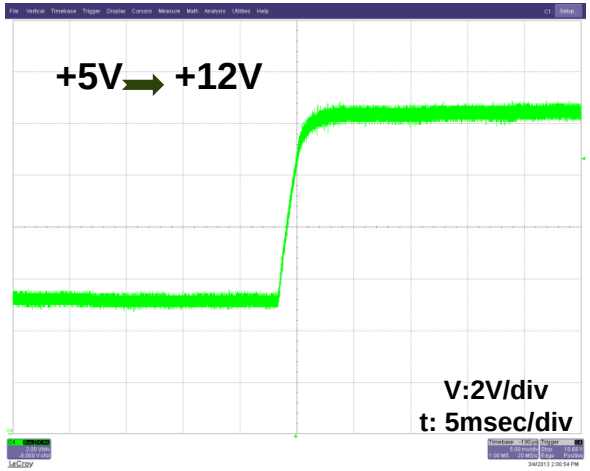
- Greater 85% Efficiency at 12 V output

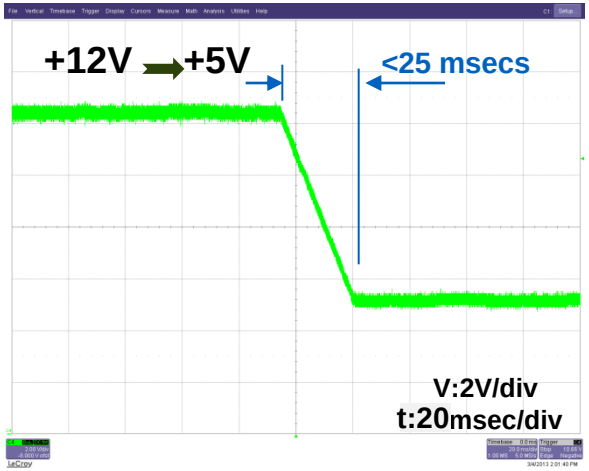
Voltage Transitions

- Smooth transitions in both directions - No under or overshoot
- Rapid discharge to 5V



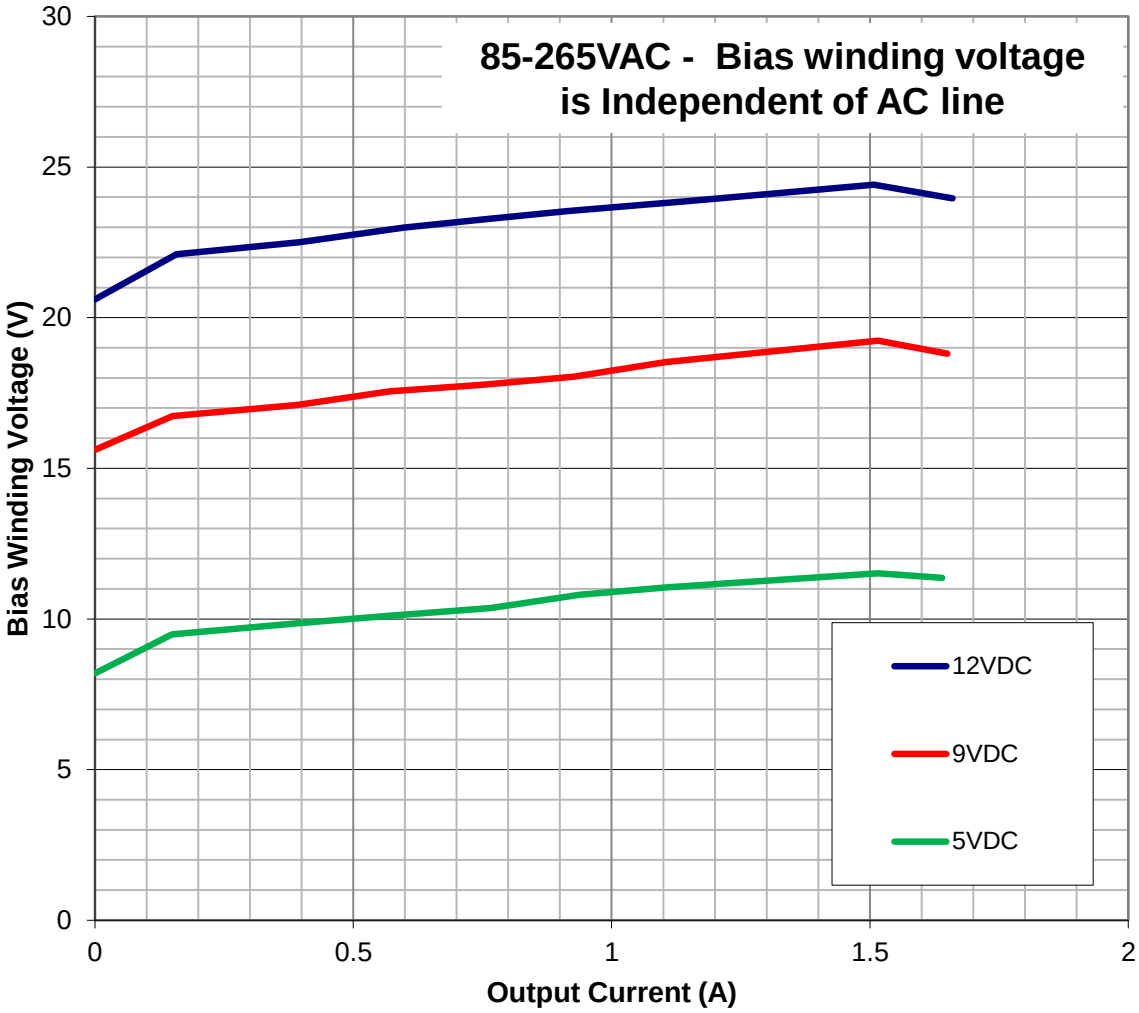






Test conditions:
Light Load - worst case overshoot and discharge test condition.
Independent of AC Line

Primary Bias Winding Voltage



- All PI Products are designed to withstand >60V on bias winding

Conclusion

- CHY100 is the first IC to implement in simple way QC2.0 spec
- It works with present PI family products like TinySwitch and TopSwitch
- Released in 2013
- http://www.powerint.com/en/products/chiphy-family/chiphy

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ChiPhy

Charger Physical Interface IC for Quick Charge 2.0

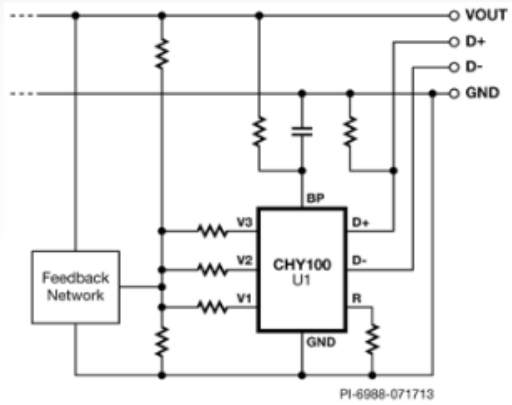
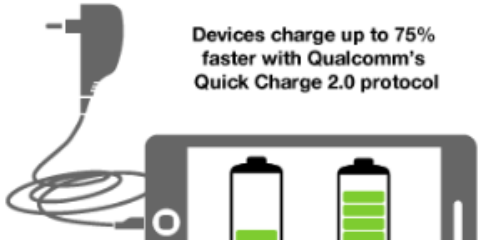
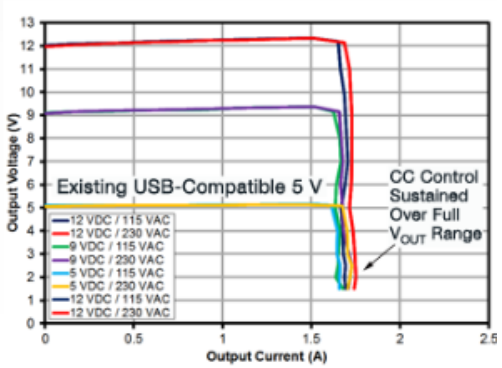


Figure 1. Typical Application Schematic

Adaptive rapid charging is the latest in USB battery charging technology that can charge devices 75% faster than conventional chargers. At the forefront of this technology is Qualcomm's Quick Charge 2.0 protocol. Quick Charge 2.0 works by detecting commands from Quick Charge 2.0 enabled devices, such as a cellphones and tablets, and adjusting the output voltage of the AC -DC charger to increase power delivery to the device's battery.



Output Characteristics



The performance curve shows CHY100 output characteristics measured at three different voltage output levels.

Output Voltage

D+ (V)	D- (V)	V(out)*
0.6	0.6	12
3.3	0.6	9
3.3	3.3	20
0.6	GND	5 V (default)

*Connecting pin V3 to the BYPASS pin (directly or through a resistor up to 100 kΩ) will limit output voltage to 12 V.

Product Documents

DATA SHEET

Design Examples

Back Up