iW629 Product Summary

AC/DC Secondary-Side Controller for Qualcomm® Quick Charge™ 2.0 USB Interface with Soft-Short Protection

1.0 Features

- Supports Qualcomm® Quick Charge™ 2.0 (QC2.0) technology High Voltage Dedicated Charging Port (HVDCP)

- Double-layer cable protection:
  - » Secondary side (iW629): Proprietary D+/D- over-voltage protection (OVP) addresses V_{BUS} D+/D- soft shorts
  - » Primary side (iW1780): SmartDefender™ smart hiccup technology reduces average output power at fault conditions without latch

- Proprietary secondary-to-primary digital communication eliminates discrete decoders in the primary side and simplifies system designs

- Single opto-coupler transmits all information for rapid charge: output voltage requests, output current limits, output voltage undershoot, over-voltage protection, and fault and reset signals

- Backward compatible with USB Battery Charging Specification Revision 1.2 (USB BC1.2) Dedicated Charging Port (DCP)

- Pin-to-pin compatible with iW626

- Programmable active fast discharge from 9V to 5V at mobile device (MD) unplug or upon request with built-in switch or external switch

- Normally OFF state with <120μA cut-off current during 5V steady-state operation to achieve <10mW power consumption at no load

- Wide operating voltage range from 3V to 25V

- Built-in opto-coupler LED driver with minimum driving current of 2mA

- 6-lead SOT-23 package

2.0 Description

The iW629 is an AC/DC secondary-side controller compatible with the Qualcomm Quick Charge 2.0 USB interface and secondary-to-primary communication protocol, allowing rapid charging of QC2.0-enabled mobile devices. The iW629 resides on the secondary side of an AC/DC power supply and allows the adapter to be configured for multi-level output such as 5V and 9V, depending on the voltage requested by the mobile device. It can be used in Dialog's primary-side controlled AC/DC systems to achieve fast voltage transition, low no-load power consumption, and fast dynamic load response.

The iW629 implements Dialog's proprietary secondary-to-primary digital communication technique. When paired with Dialog's primary-side iW1780 controller, the iW629 eliminates the discrete decoders in the primary side, simplifying system designs. It uses one opto-coupler to transmit all necessary information for rapid charging, including output voltage requests, output current limits, output voltage undershoot, output over-voltage, and fault and reset signals. It also has a built-in opto-coupler LED driver to minimize the bill of material cost.

The iW629 and iW1780 provide double-layer cable protection. On the secondary side, the iW629 incorporates Dialog's proprietary D+/D- over-voltage protection to address V_{BUS} D+/D- soft shorts. On the primary side, the iW1780 uses Dialog's SmartDefender advanced hiccup technology to reduce the average output power during soft shorts without latch.

Dialog's innovative, proprietary technology ensures that power supplies designed with the iW629 and iW1780 can provide multi-level output voltage configuration, with user-selected various output current limit combinations. Furthermore, the chipset can achieve <10mW no-load power consumption at 5V, 2A output setting and fast dynamic load response in typical AC/DC rapid charge adapter designs.

Qualcomm® Quick Charge™ 2.0 is a product of Qualcomm Technologies, Inc.

3.0 Applications

- Rapid-charging AC/DC adapters for smart phones, tablets, and other portable devices

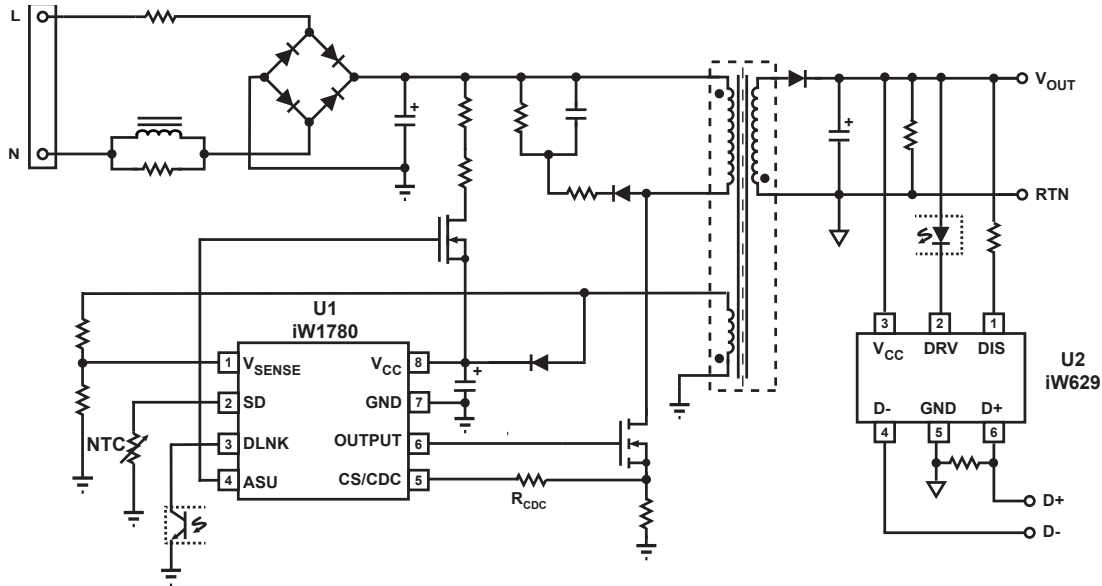## AC/DC Secondary-Side Controller for Qualcomm® Quick Charge™ 2.0 USB Interface with Soft-Short Protection

Figure 3.1: iW629 Typical Application Circuit for Multi-Level Output Voltage and Current (Using iW1780 as Primary-Side Controller. Achieving <10mW No-Load Power Consumption)
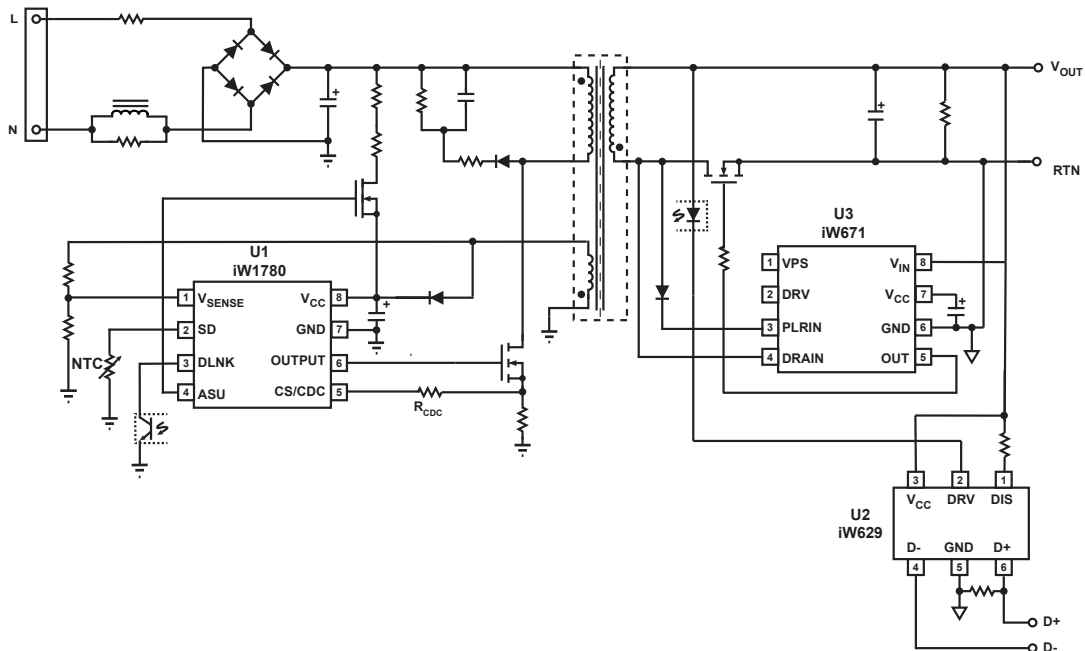

Figure 3.2: iW629 Typical Application Circuit for Multi-Level Output Voltage and Current (Using iW1780 as Primary-Side Controller and iW671 as Synchronous Rectifier Controller. Achieving < 20mW No-Load Power Consumption)

AC/DC Secondary-Side Controller for Qualcomm® Quick Charge™ 2.0 USB Interface with Soft-Short Protection
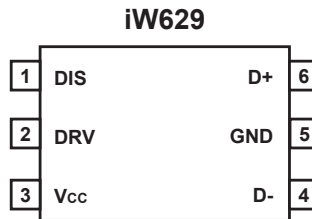
4.0 Pinout Description

iW629

Figure 4.1: 6 Lead SOT-23 Package

Pin #	Name	Type	Pin Description
1	DIS	Analog Output	Discharging circuit and external FET drive. Used for fast discharging of output capacitor. Also can be used for driving external FET.
2	DRV	Analog Output	External circuit drive. Can be used for opto-coupler LED drive with automatic current limiting for transmitting signals to primary side.
3	V_{CC}	Power Supply	IC power supply.
4	D-	Analog Input/ Output	USB D- signal.
5	GND	Ground	Ground.
6	D+	Analog Input	USB D+ signal.

AC/DC Secondary-Side Controller for Qualcomm® Quick Charge™ 2.0
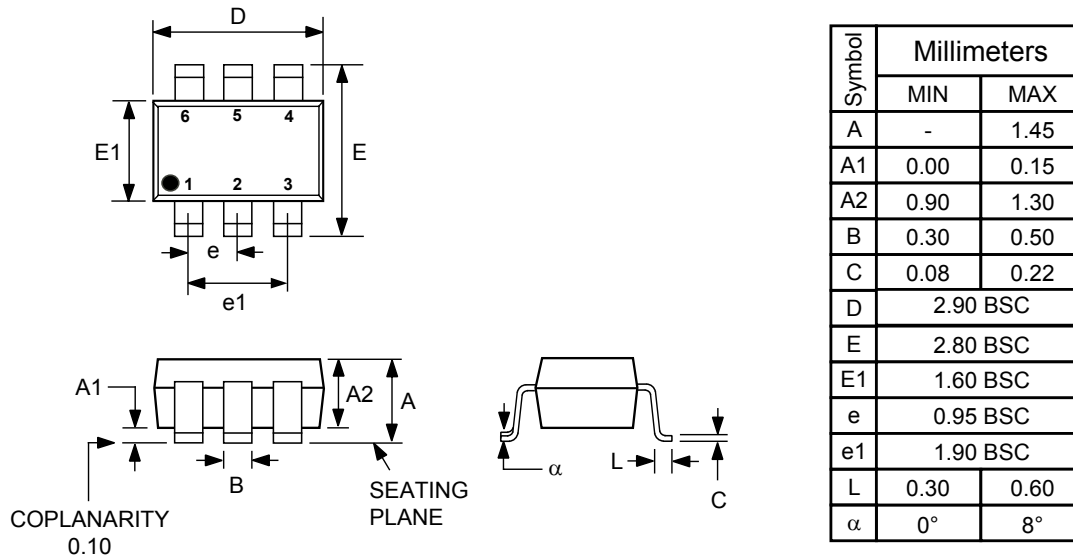## USB Interface with Soft-Short Protection

5.0 Absolute Maximum Ratings

Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded.

Parameter	Symbol	Value	Units
DIS (pin 1) voltage	V_{DIS}	30	V
DRV (pin 2) voltage	V_{DRV}	30	V
V_{CC} (pin 3) voltage	V_{CC}	30	V
D- (pin 4) voltage	V_{D-}	-0.3 to 7	V
D+ (pin 6) voltage	V_{D+}	-0.3 to 7	V
Continuous DC current at DRV pin (V_{DRV}= 11V)	I_{DRV}	25	mA
Continuous DC supply current at V_{CC} pin (V_{CC}= 12V)	I_{VCC}	25	mA
Peak current at DIS pin (V_{DIS}= 12V)	I_{DIS}	600	mA
Maximum junction temperature	T_{JMAX}	150	°C
Operating junction temperature	T_{JOPT}	-40 to 150	°C
Storage temperature	T_{STG}	-65 to 150	°C
ESD rating per JEDEC JESD22-A114 (D+ and D- pins)		4,000	V
ESD rating per JEDEC JESD22-A114 (all other pins)		2,000	V

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6.0 Physical Dimensions

6-Lead SOT Package

Symbol	Millimeters	
	MIN	MAX
A	-	1.45
A1	0.00	0.15
A2	0.90	1.30
B	0.30	0.50
C	0.08	0.22
D	2.90 BSC	
E	2.80 BSC	
E1	1.60 BSC	
e	0.95 BSC	
e1	1.90 BSC	
L	0.30	0.60
α	0°	8°

Compliant to JEDEC Standard MO-178AB

Controlling dimensions are in millimeters

This package is RoHS compliant and Halide free.

Soldering Temperature Resistance:
[a] Package is IPC/JEDEC Std 020D Moisture Sensitivity Level 1
[b] Package exceeds JEDEC Std No. 22-A111 for Solder Immersion Resistance; packages can withstand 10 s immersion < 260ºC

Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.25 mm per side.

The package top may be smaller than the package bottom. Dimensions D and E1 are are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs and interlead flash, but including any mismatch between top and bottom of the plastic body.

Part Number	Options	Package	Description
iW629-20[1]	Supports QC2.0 5V/9V, k = 0.411 for 5V/9V CC limits, 4.75V undershoot threshold for 5V, 11kΩ dynamic preload at 5V	SOT-23	Tape & Reel[2]

Note 1: The iW629-20 is a customized product option with 12V disabled. Adapters designed with this product option may not pass QC2.0 HVDCP compliancy test.

Note 2: Tape & Reel packing quantity is 3,000/reel. Minimum ordering quantity is 3,000.

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