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RapidCharge™ Dedicated Charging Port Controller for Qualcomm® Quick Charge™ 2.0 and Divider Mode

1 Description

The iW632 is a *RapidCharge™* Dedicated Charging Port (DCP) controller for Qualcomm® Quick Charge™ 2.0 (QC2.0) technology, optional Samsung Adaptive Fast Charging (AFC) and divider mode USB interface. It allows rapid charging of QC2.0 or divider mode enabled mobile devices (MDs), and it automatically identifies QC2.0, AFC and divider mode protocols. The iW632 resides on the USB port of the power adapter and allows the adapter to be configured for multi-level output such as 5V, 9V, or 12V depending on the voltage requested by MD. It can be used in DC/DC power converter systems to achieve smooth voltage transition and low no-load power consumption. The iW632 implements three output pins for output feedback ratio change, output over-voltage, and fault and reset signals. In addition, iW632 also implements proprietary D+/D- over-voltage protection (OVP) and proprietary D- impedance detection to address soft short issues in the output cables and connectors that can be caused by such things as a poor or loose connection between the cable connector and the socket, contamination in the USB connector, or a worn-out cable, and provides protection against the damages.

Dialog's innovative proprietary technology ensures that power supplies designed with the iW632 can provide multi-level output voltage configuration, smooth voltage transition and ultra-low no load power consumption.

2 Features

- Supports Qualcomm® QC2.0 High Voltage Dedicated Charging Port (HVDCP) Class A with voltage configuration of 5V, 9V, and 12V

- Supports divider mode with D+/D- at 2.7V/2.0V for 2.1A rapid charging

- Optionally supports Samsung Adaptive Fast Charging (AFC) for output voltage and current negotiation

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

- Backward compatible with Chinese Telecom Standard YD/T 1591-2009 Shorted Mode

- Automatically differentiates MDs and determines rapid charging protocols

- Proprietary D+/D- OVP and proprietary D- impedance detection address soft short issues in the output cables and connectors and provides protection against damages

- Programmable active fast discharge from 9V/12V to 5V at MD unplug or from a high voltage level to a lower level upon request with built-in switch or external switch

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

- Wide operating voltage range from 3V to 25V

Qualcomm®
Quick Charge™ 2.0

3 Applications

- DC/DC converters/chargers for smart phones, tablets, and other mobile devices

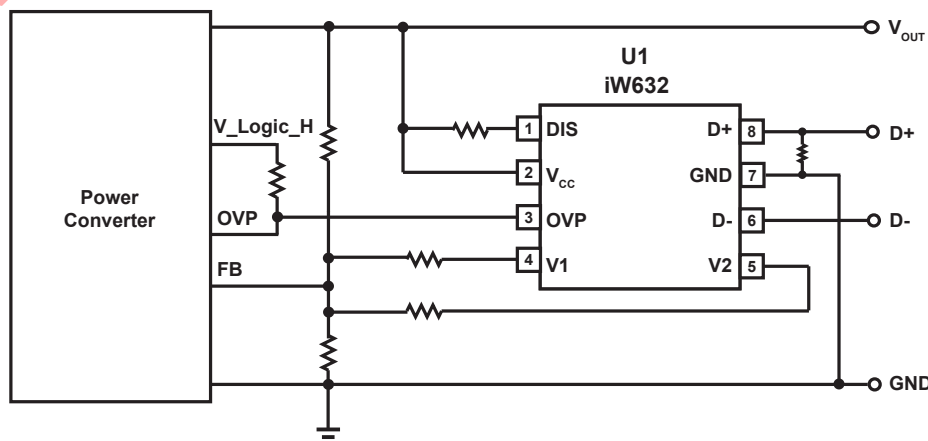Qualcomm® Quick Charge™ 2.0 is a product of Qualcomm Technologies, Inc.

Figure 3.1 : iW632 Typical Application Circuit

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4 Pinout Description

iW632

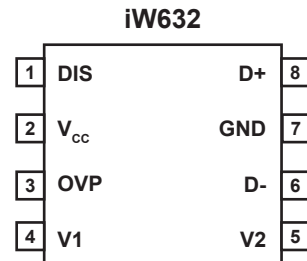| 1 | DIS | D+ | 8 |
2	V_CC	GND	7
3	OVP	D-	6
4	V1	V2	5

Figure 4.1 : 8-Lead SOIC/MSOP Package

Pin Number	Pin Name	Type	Pin Description
1	DIS	Analog Output	Discharging circuit. Used for fast discharging of output capacitor.
2	V_{CC}	Power Supply	IC power supply.
3	OVP	Analog Output	External circuit drive. It is pulled down at OVP, and can be used to change external circuit signal.
4	V1	Analog Output	External circuit drive. It is pulled down at 9V or 12V state, and can be used to change external circuit signal.
5	V2	Analog Output	External circuit drive. It is pulled down at 12V state, and can be used to change external circuit signal.
6	D-	Analog Input/ Output	USB D- signal. It is used for QC2.0/AFC signal and divider mode.
7	GND	Ground	Ground.
8	D+	Analog Input/ Output	USB D+ signal. It is used for QC2.0/AFC signal and divider mode.

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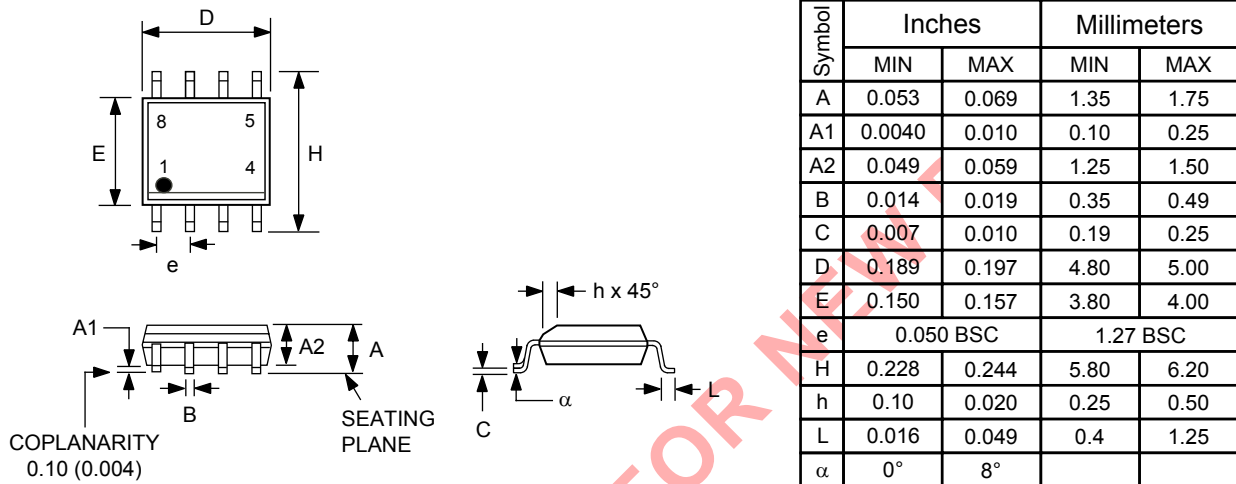
5 Absolute Maximum Ratings

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
V_{CC} (pin 2) voltage	V_{CC}	30	V
OVP (pin 3) voltage	V_{OVP}	30	V
V1 (pin 4) voltage	V_{V1}	-0.3 to 7	V
V2 (pin 5) voltage	V_{V2}	-0.3 to 7	V
D- (pin 6) voltage	V_{D-}	-0.3 to 7	V
D+ (pin 8) 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)		4000	V
ESD rating per JEDEC JESD22-A114 (all other pins)		2000	V

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6 Physical Dimensions

8-Lead Small Outline (SOIC) Package

Symbol	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.0040	0.010	0.10	0.25
A2	0.049	0.059	1.25	1.50
B	0.014	0.019	0.35	0.49
C	0.007	0.010	0.19	0.25
D	0.189	0.197	4.80	5.00
E	0.150	0.157	3.80	4.00
e	0.050 BSC		1.27 BSC	
H	0.228	0.244	5.80	6.20
h	0.10	0.020	0.25	0.50
L	0.016	0.049	0.4	1.25
α	0°	8°		

Compliant to JEDEC Standard MS12F

Controlling dimensions are in inches; millimeter dimensions are for reference only

This product 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; package can withstand
      10 s immersion < 260˚C

Dimension D does not include mold flash, protrusions or gate burrs. Mold flash, protrusions or gate burrs shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion. Interlead flash or protrusion shall not exceed 0.25 mm per side.

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

Figure 6.1 : Physical Dimensions of 8-Pin SOIC Package

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Physical Dimensions (continued)

Symbol	Min	Max
A	–	1.10
A1	0.05	0.15
A2	0.75	0.95
b	0.22	0.38
c	0.13	0.23
D	2.90	3.10
E1	2.90	3.10
E	4.80	5.00
L	0.40	0.70
L1	0.95 REF	
e	0.65 BSC	
θ	0°	8°

Notes:
1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Comply to JEDEC MO-187.
5. This package outline are for full PPF (Ni/Pd) matrix leadframe.
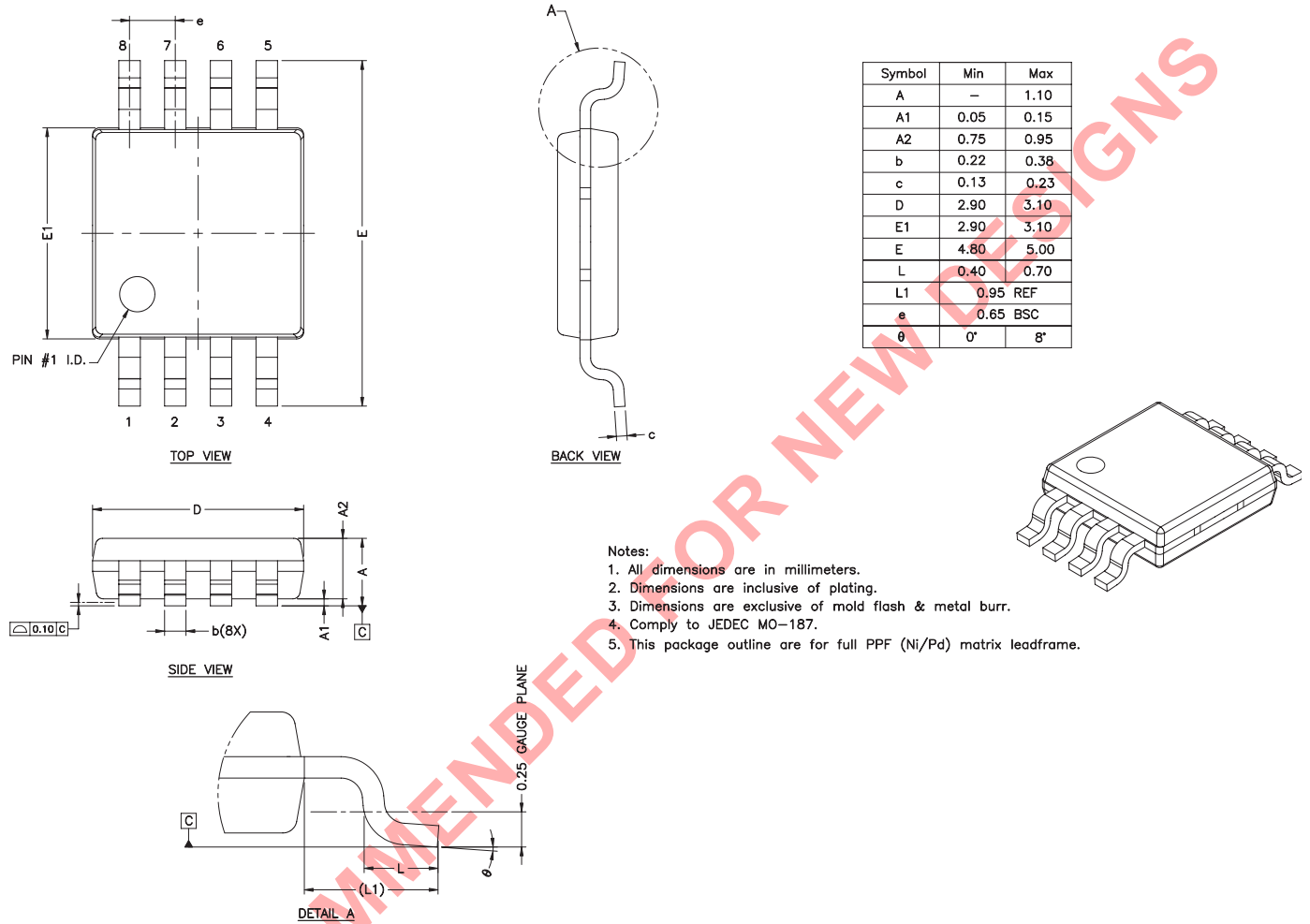
Figure 6.2 : Physical Dimensions of 8-Pin MSOP Package

7 Ordering Information

Part Number	Options	Package	Description
iW632-00-SO8	Supports QC2.0 5V/9V/12V, AFC 5V2A, 9V1.67A, 12V1.25A and divider mode 2.1A[1]	SOIC-8	Tape & Reel[2]
iW632-00-MSO8	Supports QC2.0 5V/9V/12V, AFC 5V2A, 9V1.67A, 12V1.25A and divider mode 2.1A[1]	MSOP-8	Tape & Reel[2]
iW632-01-SO8	Supports QC2.0 5V/9V/12V, and divider mode 2.1A[1]	SOIC-8	Tape & Reel[2]
iW632-01-MSO8	Supports QC2.0 5V/9V/12V, and divider mode 2.1A[1]	MSOP-8	Tape & Reel[2]

Note 1:   The current setting is only for information from iW632 to mobile devices. The actual current setting is determined by the power converter.

Note 2:   Tape and reel packing quantity is 2,500/reel. Minimum ordering quantity is 2,500.

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RoHS Compliance

Dialog Semiconductor's suppliers certify that its products are in compliance with the requirements of Directive 2011/65/EU of the European Parliament on the restriction of the use of certain hazardous substances in electrical and electronic equipment. RoHS certificates from our suppliers are available on request.

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