

High Power Pump Express™ Plus-Compatible Digital PWM AC/DC Controller

1.0 Features

- Supports MediaTek Pump Express™ technology fast charge protocol
- Universal input off-line controller for applications up to 15W output power
- No-load power consumption < 30mW at 230V_{AC} along with fast dynamic load response and short turn-on delay in typical 15W adapter applications
- PrimAccurate™ primary-side feedback eliminates opto-isolators and simplifies design
- Adaptive multi-mode PWM/PFM control improves efficiency
- Proprietary optimized 79kHz maximum PWM switching frequency with quasi-resonant operation achieves best size, efficiency and common mode noise
- Active start-up scheme enables fastest possible start-up
- Tight constant-voltage regulation across line and load range
- User-configurable 5-level cable drop compensation provides design flexibility
- **EZ-EMI**® design enhances manufacturability
- No external loop compensation components required
- Built-in single-point fault protections against output short-circuit, output over-voltage, output over-current, and current-sense-resistor-short fault
- Dedicated pin for external over-temperature protection
- Tight constant current control enables output current limit and over-load protection
- No audible noise over entire operating range



2.0 Description

The iW1788 is a high performance AC/DC power supply controller which uses digital control technology to build peak current mode PWM flyback power supplies and is compatible with MediaTek's Pump Express™ Plus fast charge protocol. With PrimAccurate™ digital primary-side control technology integrated, the iW1788 enables simple, low component count power supplies for universal input off-line applications requiring low BOM cost, high performance solutions. The iW1788 removes the need for secondary feedback circuitry and loop compensation components while achieving excellent stability and line and load regulation.



The Pump Express Plus fast charge protocol enables communication between a smartphone and a wall adapter designed with the iW1788. The high power protocol allows the smartphone to send commands back to the controller to increase the output voltage of the adapter above the default 5V output, or below the default voltage to optimize charge time. The built-in power limiting function increases the output current of the adapter as the voltage output decreases and decreases the output current of the adapter as the voltage output increases. This allows the designer to minimize the size of the external transformer without sacrificing performance. See section 9.14 for more information on this function.

The iW1788 works with an external power MOSFET to allow for an output power of up to 15W. The device operates in quasi-resonant mode to provide high efficiency and integrates a number of key built-in protection features, such as EZ-EMI technology, pulse-by-pulse waveform analysis for faster dynamic load response and a full range of protection features from over-temperature, over-voltage and short-circuit.

Dialog's innovative proprietary technology ensures that power supplies built with the iW1788 can achieve both highest average active efficiency and less than 30mW no-load power consumption in 15W output power applications, and have fast yet smooth start-up with a wide range of capacitive loads at output voltages up to 12V.

3.0 Applications

- Compact AC/DC adapterchargers for cell phones, PDAs, digital still cameras
- Fast charge enabled adapters for smartphones
- Universal input AC/DC adapters (7.5W - 15W)

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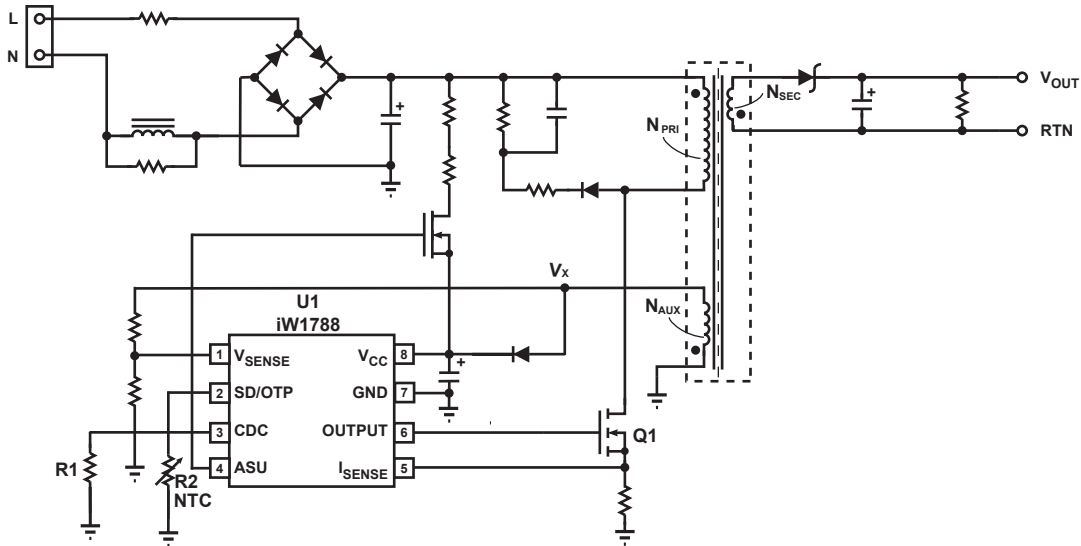


Figure 3.1 : iW1788 Typical Application Diagram

4.0 Pinout Description

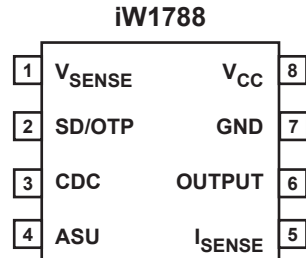


Figure 4.1 : 8-Lead SOIC-8 Package

Pin #	Name	Type	Pin Description
1	V _{SENSE}	Analog Input	Auxiliary voltage sense (used for primary regulation).
2	SD/OTP	Analog Input	External shutdown control. Used for external over-temperature protection (OTP) by connecting an NTC resistor from this pin to Ground.
3	CDC	Analog Input	Used for external cable drop compensation (CDC) configuration.
4	ASU	Output	Control signal for active start-up device (BJT or depletion mode NFET).
5	I _{SENSE}	Analog Input	Primary current sense. Used for cycle-by-cycle peak current control and limit.
6	OUTPUT	Output	Gate drive for external MOSFET switch.
7	GND	Ground	Ground.
8	V _{CC}	Power Input	Power supply for control logic.

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5.0 Absolute Maximum Ratings

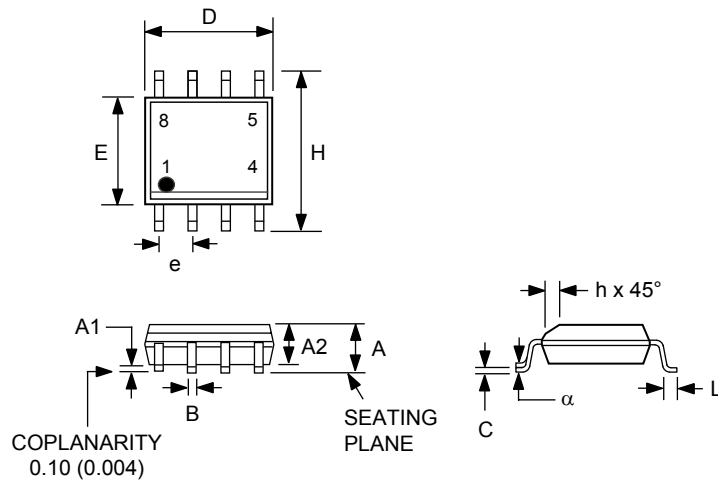
Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded. For maximum safe operating conditions, refer to Electrical Characteristics in Section 6.0.

Parameter	Symbol	Value	Units
DC supply voltage range (pin 8, $I_{CC} = 20\text{mA}$ max)	V_{CC}	-0.3 to 25.0	V
Continuous DC supply current at V_{CC} pin ($V_{CC} = 15\text{V}$)	I_{CC}	20	mA
ASU output (pin 4)		-0.3 to 19.0	V
OUTPUT (pin 6)		-0.3 to 20.0	V
V_{SENSE} input (pin 1, $I_{Vsense} \leq 10\text{mA}$)		-0.7 to 4.0	V
I_{SENSE} input (pin 5)		-0.3 to 4.0	V
SD (pin 2)		-0.3 to 4.0	V
CFG (pin 3, $I_{CFG} \leq 20\text{mA}$)		-0.8 to 4.0	V
Maximum junction temperature	T_{JMAX}	150	°C
Operating junction temperature	T_{JOPT}	-40 to 150	°C
Storage temperature	T_{STG}	-65 to 150	°C
Thermal resistance junction-to-ambient	θ_{JA}	160	°C/W
ESD rating per JEDEC JESD22-A114		$\pm 2,000$	V
Latch-up test per JESD78A		± 100	mA

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6.0 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.

7.0 Ordering Information

Part Number	Options	Package	Description
iW1788-26	15W, 12V Max Output Voltage	SOIC-8	Tape & Reel ¹

Note 1: Tape & Reel packing quantity is 2,500/reel. Minimum ordering quantity is 2,500.

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