

TECHNICAL DATA SHEET

AQ65F-59FKA-R

DESCRIPTION

A 65W wall-mount foldable adapter features a compact, foldable design engineered for optimized fast charging. It's high efficiency performance meets a travel-ready design, providing seamless power for everything from laptops and phones to docking stations and high-demand peripherals.



Features

- Class B EMI
- US DoE Level VI Efficiency compliance
- Over-Voltage, Over-Current, Short Circuit & Over-Temperature Protection
- 5,000 Meters Operating Altitude

Applications

Networking Device | Monitor | Laptops

Certifications & compliance

ULCB/UL/FCC/ICES/CE/NRCan
Comply with DOE VI+Erp

Technical Summary

Parameters	Value
Input Voltage range	90 VAC to 264 VAC
Output voltage	5Vdc/ 9Vdc/ 15Vdc/ 20Vdc
Output power	65 Watt Max
Efficiency	Avg Efficiency > 89% at 15V /3A & 20V /3.25A; > 87.30% at 9V /3A ,>81.84% at 5V /3A, DOE Level VII
Dimensions	31.5mm x 31.5mm x 60mm
Weight	95g±10g



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AC Input

AC input voltage rating	100VAC ~ 240VAC
AC input voltage range	90 VAC to 264 VAC
AC input frequency	47Hz - 63 Hz
AC input current	1.6A (RMS) Max. at 90Vac
In-rush current	Maximum inrush current, from power-on (with power on at any point on the AC sine wave), shall be limited to a 29% margin of the I _{2t} rating of the input fuse and bridge rectifier: 1) Test condition: 265Vac/50Hz @full load and +/- 90 degrees phase (with Cold/Hot start) 2) Cold Start: Cool the disconnected power supply long enough to ensure that all components are within 3°C of the minimum (ambient operating air temperature at 25C) 3) Hot Start: Operate the power supply the maximum ambient operating air temperature at 35C for 15 minutes.
Leakage current	50uA Max. at 250Vac 50Hz

DC Output

Output voltage	5Vdc/ 9Vdc/ 15Vdc/ 20Vdc
Output Voltage Regulation	Voltage

Output Voltage	Regulation	
	Min	Max
5V	4.75V	5.25V
9V	8.55V	9.45V
15V	14.25V	15.75V
20V	19.0V	21.0V

Current

Output Voltage	Load Current	
	Min	Max
5V	0A	3A
9V	0A	
15V	0A	
20V	0A	3.25A

Ripple and noise

Input Voltage	Output Voltage	Load Current		Ripple Noise
90Vac/47Hz 264Vac/63HZ	5V	0A	3A	<380m Vpk-pk
	9V			
	15V		3.25A	
	20V			

- 1) Measurements shall be made with an oscilloscope with 10KHz to 20MHz Bandwidth.
2) Output should be bypassed at a connector with a 1uF ceramic capacitor and a 10uF electrolytic capacitor (Low ESR).

Line Regulation	Must stay within specification [output voltage range] over all line conditions.
Load Regulation	Must stay within specification [output voltage range] over all line conditions.

NOTE

All output parameters will be tested at the end of a 130mΩ type-C 2M cable.



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Overall Performance

Output Power	65 Watt Max																																										
Efficiency	5V /3A, DOE Level VII Average Efficiency > 81.84%, 10% Load Efficiency > 72.48% 9V /3A, DOE Level VII Average Efficiency > 87.30%, 10% Load Efficiency > 77.30% 15V /3A, DOE Level VII Average Efficiency > 89%, 10% Load Efficiency > 79% 20V /3.25A, DOE Level VII Average Efficiency > 89%, 10% Load Efficiency > 79% <i>Note:</i> Testing at 100%, 75%, 50%, 25% of rated current output and then computing the arithmetic average of these four values. Measure efficiency at 100%, 75%, 50%, 25% load after warm up with 100% load for 30 minutes. (Efficiency will be tested at the end of a 130mΩ type-C 2M cable.)																																										
No Load/Light Load Power Consumption	<table border="1"> <thead> <tr> <th>Input Voltage</th> <th>Output Load</th> <th>Maximum Input Power</th> <th>Output Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="5">115VAC /60Hz 230VAC /50Hz</td> <td>0W</td> <td>0.075W</td> <td>5V</td> </tr> <tr> <td>0.15W</td> <td>0.3W</td> <td rowspan="4">20V</td> </tr> <tr> <td>0.5W</td> <td>1.0W</td> </tr> <tr> <td>1.0W</td> <td>1.7W</td> </tr> <tr> <td>1.5W</td> <td>2.4W</td> </tr> </tbody> </table>	Input Voltage	Output Load	Maximum Input Power	Output Voltage	115VAC /60Hz 230VAC /50Hz	0W	0.075W	5V	0.15W	0.3W	20V	0.5W	1.0W	1.0W	1.7W	1.5W	2.4W	<i>Note:</i> The 100% load warm-up test should be conducted for 15 minutes at the end of a 130 mΩ Type-C 2-meter cable.																								
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Turn on Delay Time	< 5Sec. at full load @ only test 90Vac/47Hz. (Test AC turned on to 5V regulation completed)																																										
Rise time	< 275ms. at full load and measured from 0% to 100% regulation (1) 0V to 5V (2) 5V to 9V (3) 5V to 15V (4) 5V to 20V																																										
Overshoot	10ms Max. at full load, Output voltage 105% Maximum. @90Vac/47Hz,264Vac/63Hz																																										
Hold Up Time	> 5ms at full load @ only test 115Vac/60Hz. (5V/9V/15V/20V, Phase 90 degree)																																										
Transient Load Step Response	<table border="1"> <thead> <tr> <th colspan="3">TEST CONDITION</th> <th colspan="2">REGULATION</th> </tr> <tr> <th>AC INPUT</th> <th>OUTPUT VOLTAGE</th> <th colspan="2">LOAD CURRENT</th> <th>DESIGN REQUIREMENT</th> </tr> <tr> <td></td> <td></td> <td>MIN</td> <td>MAX</td> <td>(S/R=1A/US , 1Hz & 5kHz.50% DUTY)</td> </tr> </thead> <tbody> <tr> <td rowspan="8">90 - 264Vac</td> <td rowspan="2">5V</td> <td>0A</td> <td>1.5A</td> <td rowspan="2">4.5V - 5.5V</td> </tr> <tr> <td>1.5A</td> <td>3A</td> </tr> <tr> <td rowspan="2">9V</td> <td>0A</td> <td>1.5A</td> <td rowspan="2">8.1V - 9.9V</td> </tr> <tr> <td>1.5A</td> <td>3A</td> </tr> <tr> <td rowspan="2">15V</td> <td>0A</td> <td>1.5A</td> <td rowspan="2">13.5V - 16.5V</td> </tr> <tr> <td>1.5A</td> <td>3A</td> </tr> <tr> <td rowspan="2">20V</td> <td>0A</td> <td>1.625A</td> <td rowspan="2">18V - 22V</td> </tr> <tr> <td>1.625A</td> <td>3.25A</td> </tr> </tbody> </table>			TEST CONDITION			REGULATION		AC INPUT	OUTPUT VOLTAGE	LOAD CURRENT		DESIGN REQUIREMENT			MIN	MAX	(S/R=1A/US , 1Hz & 5kHz.50% DUTY)	90 - 264Vac	5V	0A	1.5A	4.5V - 5.5V	1.5A	3A	9V	0A	1.5A	8.1V - 9.9V	1.5A	3A	15V	0A	1.5A	13.5V - 16.5V	1.5A	3A	20V	0A	1.625A	18V - 22V	1.625A	3.25A
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Audible Noise	External system capacitance 100uF/50V shall be connected to the PSU output < 25 dBA at distance of 5cm.																																										
Surge Load	Across all loading conditions, from all (5) directions. Test environment referred to ISO7779. Adapter shall output at least 16V at 90Vac/60Hz Test Condition: a. Peak current equals 200% loc for 1ms @ 5% duty cycle (low current equals 95% loc for 19ms) b. Peak current equals 175% loc for 2ms @ 10% duty cycle (low current equals 92% loc for 18ms) c. Peak current equals 150% loc for 10ms @ 50% duty cycle (low current equals 50% loc for 10ms)																																										



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Protection

Output Short Circuit Protection	No damage, Latch-function										
Over Current Protection	Latch-function 115%~125%, @90Vac/47Hz,264Vac/63Hz. for 5V/ 9V/15V (3.45A - 3.75A) for 20V (3.74A – 4.06A) (Note: Production line may verify OCP using a current close to the upper limit)										
Over Voltage Protection	Latch-function. 145% max, @90Vac/47Hz,264Vac/63Hz. The output channel volts with a maximum duration of 250milliseconds <table border="1" data-bbox="495 577 844 724"> <thead> <tr> <th>Output Voltage</th> <th>Over Voltage(Max)</th> </tr> </thead> <tbody> <tr> <td>20V</td> <td>< 29V</td> </tr> <tr> <td>15V</td> <td>< 21.75V</td> </tr> <tr> <td>9V</td> <td>< 13.05V</td> </tr> <tr> <td>5V</td> <td>< 7.25V</td> </tr> </tbody> </table>	Output Voltage	Over Voltage(Max)	20V	< 29V	15V	< 21.75V	9V	< 13.05V	5V	< 7.25V
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Over Temperature Protection	Latch-function										

Other Specifications

Environmental Requirements	<table> <tr> <td>Operating Temperature</td> <td>0°C to 35°C</td> </tr> <tr> <td>Storage Temperature</td> <td>-20°C to 85°C</td> </tr> <tr> <td>Operating Relative Humidity</td> <td>20% - 95% RH</td> </tr> <tr> <td>Storage Relative Humidity</td> <td>5% - 90% RH</td> </tr> <tr> <td>Operation Altitude</td> <td>5000 M</td> </tr> <tr> <td>E-Cap lifetime</td> <td>Usage profile 8h x 52 weeks x 3 yrs = 8,736 hours 100Vac/60Hz&230Vac/50Hz;20V@80% Load Ambient temperature = 35°C</td> </tr> <tr> <td>MTBF</td> <td>> 50K hours at 115Vac / 230Vac, Ambient=25°C/MIL-HDBK-217F</td> </tr> <tr> <td>Burn In</td> <td>Burn-in shall be at 20V/3.25A @220Vac. PP 100% burn in 24H/MP 100% burn in 2H.</td> </tr> </table>	Operating Temperature	0°C to 35°C	Storage Temperature	-20°C to 85°C	Operating Relative Humidity	20% - 95% RH	Storage Relative Humidity	5% - 90% RH	Operation Altitude	5000 M	E-Cap lifetime	Usage profile 8h x 52 weeks x 3 yrs = 8,736 hours 100Vac/60Hz&230Vac/50Hz;20V@80% Load Ambient temperature = 35°C	MTBF	> 50K hours at 115Vac / 230Vac, Ambient=25°C/MIL-HDBK-217F	Burn In	Burn-in shall be at 20V/3.25A @220Vac. PP 100% burn in 24H/MP 100% burn in 2H.
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Burn In	Burn-in shall be at 20V/3.25A @220Vac. PP 100% burn in 24H/MP 100% burn in 2H.																
Case surface temperature	0 to 35 °C maximum temperature rise of any surface shall not exceed 52C when measured at 90Vac and at maximum load.																
Drop Test	Test condition a. Height : 91cm b. Material : Concrete c. The product does not require thermal shock before testing d. Orientation : Drop the unit one time for each face (6 faces),1 cycle Acceptance criteria a. Hi-pot pass b. Allow small crack needed pass by test finger																

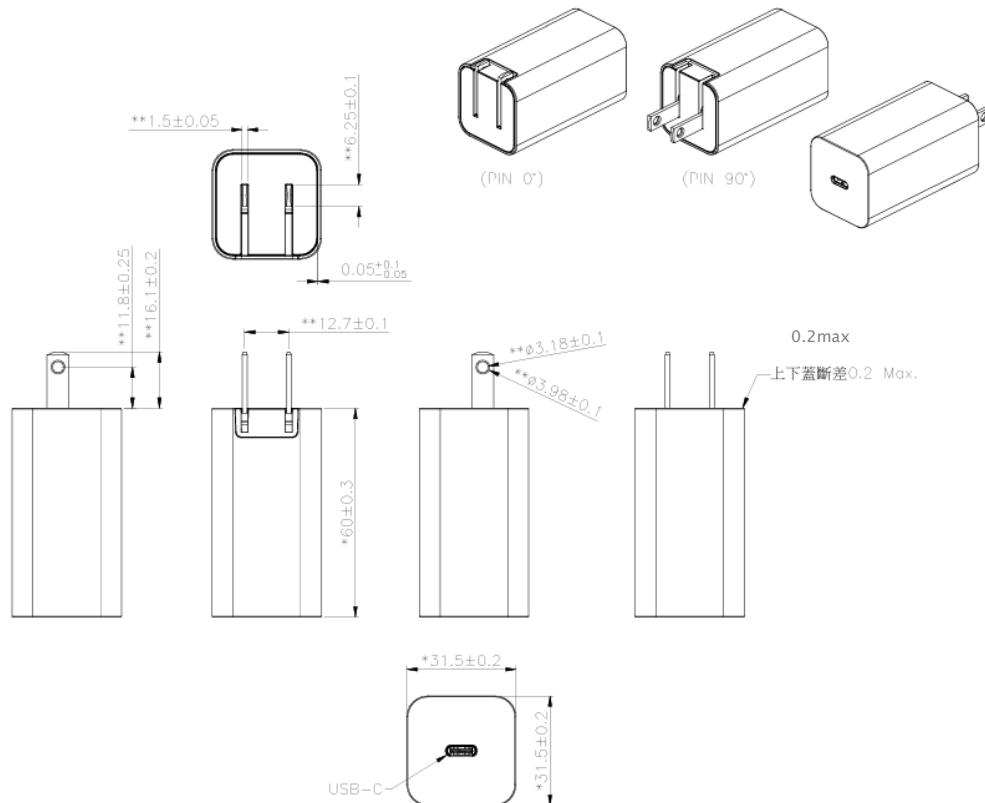


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Safety and EMC

EMC	EMI EMS:	The power supply unit shall follow the safety standard (IEC60950, IEC 62368) EN 55035 ESD : EN 61000-4-2(ESD) Contact discharges: ±2KV, ±4KV, ±8KV Criterion A. Air discharges: ±2KV, ±4KV, ±8KV, ±15KV Criterion A. Radiated Immunity: EN 61000-4-3 (RS) 80-1000MHz, 3V/m, 80% AM (1 KHz), Criterion A. Electrical Fast Transients: EN 61000-4-4 (EFT) , 2kV, Repetition Rate 5kHz, Criterion A. Surge: EN 61000-4-5 (Surge) .Line to Line 1KV, Criterion A; Line to FG 2KV, Criterion A. Conducted Disturbances: EN 61000-4-6 (CS), 0.15-80MHz, 3V, 80% AM (1 kHz), Criterion A. Magnetic Field Immunity: EN 61000-4-8 (MS), 50 or 60Hz, 1A/m (rms), Criterion A. Voltage Dips and interruptions: EN 61000-4-11 (DIP), Criterion B
Harmonics		Meet EN61000-3-2 requirement
Voltage Fluctuations and Flicker		Meet EN61000-3-3 requirement
HI-POT test		Pri. to Sec. 3000Vac ≤ 10mA for 1 Minute (Note: Production line test: 3600Vac ≤ 10mA for 3sec)
Insulation Resistance		Pri. to Sec. > 200 M ohm 1000Vdc (Note: Production line test: > 200 M ohm 1000Vdc for 3sec)
Safety		IEC/UL 62368-1 EN55032 + EN55035

Mechanical Outline Drawing





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Test Items In Production Line

* At CPK > 1.33

	TEST CONDITION	MEASURE	SPECIFICATION
5V Output	Input: 90V/60Hz	Output Voltage(5V,3A) *	4.75V~5.25V
		Output Ripple & Noise(5V,3A)	380 mVp-p max
	Input: 264V/50Hz	Output Voltage(5V,0A) *	4.75V~5.25V
		Output Ripple & Noise(5V,0A) OCP	380 mVp-p max 3.45A~3.75A max.
9V Output	Input: 90V/60Hz	Output Voltage(9V,3A) *	8.55V~9.45V
		Output Ripple & Noise(9V,3A)	380 mVp-p max
	Input: 264V/50Hz	Output Voltage(9V,0A) *	8.55V~9.45V
		Output Ripple & Noise(9V,0A) OCP	380 mVp-p max 3.45A~3.75A max.
15V Output	Input: 90V/60Hz	Output Voltage(15V,3A) *	14.25V~15.75V
		Output Ripple & Noise(15V,3A)	380 mVp-p max
	Input: 264V/50Hz	Output Voltage(15V,0A) *	14.25V~15.75V
		Output Ripple & Noise(15V,0A) OCP	380 mVp-p max 3.45A~3.75A max.
20V Output	Input: 90V/60Hz	Output Voltage(20V,3.25A) *	19V~21V
		Output Ripple & Noise(20V,3.25A)	380 mVp-p max
	Input: 115V/60Hz	Efficiency at load (20V,3.25A)	> 88%
		Input: 264V/50Hz	Output Voltage(20V,0A) *
	Output Voltage(20V,3.25A) *		19V~21V
	Output Ripple & Noise(20V,0A) OCP	380 mVp-p max 3.45A~3.75A max.	

Note: Production line efficiency measurements are performed in accordance with ISO PHG-Q3-PE04 "1.5.4.2.4 Energy Efficiency Testing".

*Hi-pot test: 3600VAC/10mA/3sec.

PHIHONG 50 YEARS OF HISTORY IN THE POWER SUPPLIES INDUSTRY

Since its founding in 1972, Phihong has emerged as a prominent power supply company, serving as a key supplier of solutions for consumer, mobile/portable, enterprise, telecom, datacom, and industrial applications.

