# TECHNICAL
# DATA SHEET

AQ65A-59FKB-R AQ65E-59FKB-R AQ65K-59FKB-R

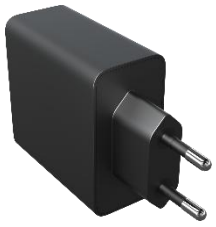
PHIHONG

## DESCRIPTION

A high-efficiency 65W wall-mount USB-C adapter featuring Power Delivery 3.0 for optimized fast charging.
Its versatile design supports PD-compliant laptops networking devices, mobile devices, USB-C hubs, docking stations, and other high-demand peripherals.

**AQ65A-59FKB-R** for US

**AQ65E-59FKB-R** for EU



**AQ65K-59FKB-R** for UK

## Features

Class B EMI
US DoE Level VI Efficiency compliance
EU CoC Ver 5 Tier 2 Compliance
Over-Voltage, Over-Current,
Short Circuit &
Over-Temperature Protection
5,000 Meters Operating Altitude
Support USB PD 3.0 & PPS protocol

## Applications

Networking Device | Monitor| Laptops

## Certifications & compliance

CB/ UL/cUL
Comply with DOE standard
IEC 62368-1

## Technical Summary

| Parameters | Value |
|---|---|
| **Input Voltage range** | 90 VAC to 264 VAC |
| **Output voltage** | 5V/ 9V / 15V / 20V (PPS : 3.3V~21V) |
| **Output power** | 65 Watt Max |
| **Efficiency** | more than 1% in COC v5 Tier 2 |
| **Dimensions** | 58mm x 56mm x 29mm |
| **Weight** | 140g±20g |



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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** | 1.5A (RMS) Max. at 100Vac |
| **In-rush current** | The I^2t shall less than 22% of the fuse, surge limiting device and bridge diode rating, Ta=25oC. |
| **Leakage current** | 25uA Max. at 240Vac / 50Hz |

## DC Output

| | |
|---|---|
| **Output voltage** | 5V/ 9V / 15V / 20V (PPS : 3.3V~21V) |
| **Output Voltage Regulation** | For 5Vdc output : 4.85V to 5.25 V at output current 0A to 3A.<br>For 9Vdc output: 8.8V to 9.42 V at output current 0A to 3A.<br>For 15Vdc output: 14.25V to 15.75 V at output current 0A to 3A.<br>For 20Vdc output: 19V to 21 V at output current 0A to 3A. With E-mark current 3.25A<br>For PPS Mode: 3.3V to 11V at output current 3A. With E-mark output current 5A.(Max.55W)<br>For PPS Mode: 3.3V to 18 V at output current 3A. With E-mark output current 3.6A.(Max.64.8W)<br>For PPS Mode: 3.3V to 21 V at output current 3A. With E-mark output current 3.25A.(Max.65W) |

| Specification | Support PD3.0 + PPS Mode | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| USB PD3.0 Mode | PDO | PDO | PDO | PDO | PDO | PDO | PDO | PDO |
| | Output Votage | 5V | 9V | 15V | 20V | 3.3~11V | 3.3~18V | 3.3~21V |
| | Output Votage Range | 4.85~ 5.25V | 8.8~ 9.42V | 14.25~ 15.75V | 19~ 21V | 3.3~11V | 3.3~18V | 3.3~21V |
| | Votage Ripple | 180mV | 200mV | 300mV | 300mV | PPS Spec | PPS Spec | PPS Spec |
| | Output Current Rating | 3A | 3A | 3A | 3A / 3.25A with E-mark | 3A / 5A with E-mark Max.55W | 3A / 3.6A with E-mark Max.64.8W | 3A / 3.25A with E-mark Max.65W |

| | |
|---|---|
| **Maximum load current** | Operating max current: should be rated current * 110%.<br>PPS mode follows USB PD Specification. It shell be supporting PD CC/CV setting on PPS mode.<br>PPS mode Operating Current Limit accuracy should be -150 ~ +150mA.<br>PPS mode Operating Current Limit setting minimum should be 500mA |
| **Ripple and noise** | 180mV (5V), 200mV (9V), 300mV (15V, 20V) at min ~ max load, 90Vac - 264Vac ( @ Amb 25°C) |

*NOTE*
*1) Measures at the cable end.*
*2) Measurements shall be made with an oscilloscope with 20MHz Bandwidth.*
*3) Outputs should be bypassed at a connector with a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor (Low ESR).*

## Overall Performance

| | |
|---|---|
| **Output Power** | 65 Watt Max |
| **Efficiency for single output**<br>*NOTE*<br>*Measured at the cable end and PCB end.*<br>*Testing at 100%, 75%, 50%, 25%, 10% of rated current output and then computing the arithmetic average of these four values.*<br>*Measure efficiency at 100%, 75%, 50%, 25%, 10% load after burn in 30min ,at 115Vac/60Hz & 230Vac/50Hz.* | The power supply shall meet DOE VI / COC v5 Tier 2 spec measuring at the cable end.<br>The power supply efficiency should be more than 1% in COC v5 Tier 2 defined the measure point is output of Type C connector (cable end)<br>5V / 3A, CoC v5 Tier2 Average Efficiency >81.835%<br>9V / 3A, CoC v5 Tier2 Average Efficiency >87.295%<br>15V / 3A, CoC v5 Tier2 Average Efficiency >88.852%<br>20V / 3.25A , CoC v5 Tier2 Average Efficiency > 89%<br>(PCB end)<br>5V / 3A, CoC v5 Tier2 Average Efficiency >82.835%<br>9V / 3A, CoC v5 Tier2 Average Efficiency >88.295%<br>15V / 3A, CoC v5 Tier2 Average Efficiency >89.852%<br>20V / 3.25A , CoC v5 Tier2 Average Efficiency > 90% |

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**Power Saving**

< 0.075 W at 115Vac/60Hz & 230Vac/50Hz
Min. Load Consumption: -Vin=115Vac/60Hz and 230Vac/50Hz (5V Only)

| Output Power (W) | Input Power(W) |
|---|---|
| 0.15W (5V/0.03A) | < 0.3W |

**AC Turn on Delay Time**

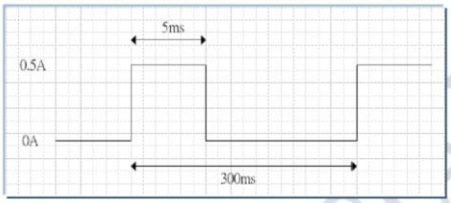
< 3 sec Max.at 100Vac & 240Vac (5V Only)

**Hold Up Time**

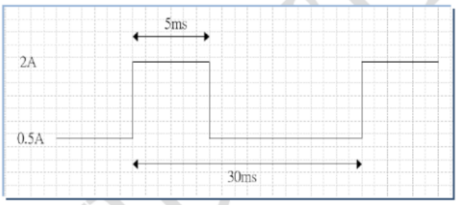
> 5 ms at 100Vac/60Hz & Max load.

**Transient Response**

5V Mode ,Output Voltage 4.6V~ 5.8V for 5V (PCB end)
If output voltage drops less than 4.6V, the during should less than 3ms at condition1
Test condition as below



Condition 1



Condition 2

PD Mode
Output voltage should within +/-5% based on the real PD CV setting. Follow USB PD Specification
PPS Mode
Follow USB PD Specification.

**Overshoot**

The output overshoot at turn on shall not exceed 10% of normal voltage value with or without the load connected.

**Output Rise Time**

At turn on the rise time of output voltage shall be less than 40ms (5V Only)
*Measured from the 10% point to the 90% point of the normal.

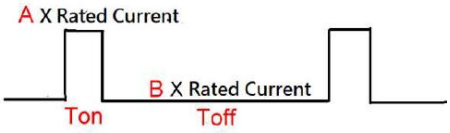
**Audible Noise**

Input Condition: @ Vin: 90Vac~264Vac , Frequency : 47Hz to 63 Hz
Load Condition: Static Load : From 0A to Full Load , 0.1A per step
Microphone at a distance of 10cm from the surface and noise level is less than 25dB

**Peak load (For 20V)**

The adapter shall support below loading condition without any damage, safety issues and protection happened. The output voltage shall be more than 17.8V (20V Mode) at input voltage 100-240V/50Hz-60Hz

| Spec | Ton | Toff | A | B |
|---|---|---|---|---|
| 1 | 2ms | 18ms | 200% | 90% |
| 2 | 1ms | 9ms | 225% | 87.5% |




**Surge load (For 20V/15V )**

The adapter should support a surge load with 120% of maximum load for 1min, maximum load for 9min and output voltage should be more than 18.5V/13.7V at 100-240Vac/50Hz-60Hz.

## Protection

**Over Current Protection (OCP)**

The adapter should be Auto recovery and no component damage.
When fault condition is removed and re plug in DC plug, the output voltage must return to normal condition

| Output Voltage | Specification |
|---|---|
| 5V & 9V | operating current (<3.4A) |
| 15V | operating current (<4A) |
| 20V | operating current (<4.3A ) |

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**Over Voltage Protection (OVP)**

The output protection is option to Auto recovery at over-voltage condition.
The output maximum value can't be over 140%
The adapter should be DC latch off and no component damage.
When fault condition is removed and re plug in DC plug, the output voltage must return to the normal condition

| Output Voltage | Specification |
|---|---|
| 5V | < 7V |
| 9V | < 12.6V |
| 15V | < 21V |
| 20V | < 28V |

**Short Circuit Protection (SCP)**

The power supply short output should be Auto recovery and no component damage.
The adapter should be DC latch off and no component damage.
When fault condition is removed and re plug in DC plug, the output voltage must return to the normal condition

**Over Temperature Protection (OTP)**

When the power supply operation in any abnormal condition, the output shall decrease to 0V (Shutdown).
No fire and no melted of the enclosure at any condition.
The adapter should be Latch off or Auto recovery and no component damage.
When fault condition is removed and re plug in DC plug, the output voltage must return to the normal condition

| | |
|---|---|
| OCP | Auto recovery |
| SCP | Auto recovery |
| OVP | Auto recovery |
| OTP | Auto recovery / Latch |

## Other Specifications

| | | |
|---|---|---|
| **Environmental Requirements** | Operating Temperature | 0℃ to 40℃ |
| | Storage Temperature | -30℃ to 80℃ |
| | Operating Relative Humidity | 5% - 90% RH |
| | Storage Relative Humidity | 5% - 90% RH |
| | Operation Altitude | 5000 M |
| | Surface Temperature rise | (Input voltage 100Vac/240Vac case temperature rise < 45℃ at 100% Loading) |
| **Reliability** | Life/Power On Hours | The power supply must be designed to operate for 13,140 power on hours. AC input voltage: 100 and 240Vrms, Ambient Temp. : 25°C |
| | MTBF | The power supply shall be designed and produced to have a MTBF of 150,000 operation hours at 90% confidence – level while operating under the following condition<br>@AC input voltage: 100 and 240Vrms<br>@Ambient Temp.: 25°C |
| | Burn-in Test Condition | More than 2 hours at 40°C, normal input voltage with 20/3.25A output. AC on/off must be tested. |
| | AC On/Off Test | Set the output at maximum load and switch AC ON/OFF at 264Vac/50Hz for 10000 cycles.<br>AC ON 4 sec and OFF 1 sec for each cycle.<br>No any component damage or fault condition during the test. |

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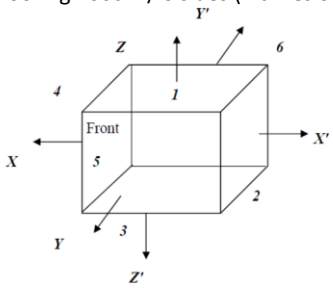
## Safety and EMC

| | |
|---|---|
| **Safety** | Common: CB<br>US type: UL/cUL<br>IEC 62368-1:2014<br>IEC 62368-1:2018<br>UL 62368-1, 3rd Ed, 2019-12-13, Revision Date: 2021-10-22 (Audio/video, information and communication technology equipment Part 1: Safety requirements) CSA C22.2 No. 62368-1:19, 3rd Ed., Issue Date: 2019-12-13 |
| **EMC** | EMI: FCC part 15, Class B.<br>CISPR32 , Class B.<br>The limits shall be meet with a margin more than 3dB with all system applicable at 10m test methods.<br>EMS EN55024<br>ESD EN 61000-4-2 (ESD)<br>Contact discharges: +-8KV Criterion A<br>Air discharge: +- 12KV Criterion A<br>Air discharge: +- 15KV Criterion B |
| **Radiated Immunity** | EN 61000-4-3 (RS)<br>80-1000MHz, 3V/m, 80% AM(1KHz), Criterion A |
| **Electrical Fast Transients** | EN 61000-4-4 (EFT)<br>2KV, 5/50Tr/Th ns, 100 kHz, Criterion B |
| **Surge** | Lighting Surge: ±2KV (L-N) ; ± 4KV (L-FG; N-FG) -Criteria A |
| **Common Mode Noise (CMN)** | According to EN61000-4-6<br>Test Equipment and Environment: Follow EN61000-4-6 Test voltage Condition: 3V<br>Test Frequency: 150KHz ~ 600KHz<br>Specification: CM N Max.: 2V @150K~600K |
| **HI-POT test** | -Primary to Secondary: 3.0KVac or 4242Vdc for 1minute<br>-Leakage current ≦ 5mA |
| **Insulation Resistance** | > 30M ohm at 500Vdc between primary Line, neutral and secondary |

## Mechanical Requirements

| | |
|---|---|
| **AC Plug Pull/Push Test** | After welding push or plug 30Kg force on AC Plug, the AC plug can't separate from the main body and case can't deformation. |
| **DC Connector Salt Spray Test** | Follow EIA Spec.<br>Salt Solution: Density 5%, PH value 6.5~7.2<br>Chamber Temp and Corrosion Time: 35°C for 48hrs<br>Without excessive corrosion or crack in appearance. |
| **Drop Test** | Cement flooring 100cm / 6 sides (1 times on each face). There must be no function damage after   testing. |
| **Tumbling Test (For EU & UK)** | Test condition: EU: Height 0.5M / 500 times; UK: Height 0.5M / 50 times<br>There must be no function damage after testing |
| **USB connector Durability** | Follow EIA 364-13<br>The initial connector insertion force shall be 5 N to 20 N<br>The initial connector extraction force shall be 8 N to 20 N<br>The extraction force shall be within the range of 6 N to 20 N after 10,000 insertion/ extraction cycle |

# TECHNICAL DATA

## Model Information

| | | |
|---|---|---|
| **Dimension** | Dimension | 58mmx56mmx29mm |
| | Weight | 140g±20g |
| **AC Socket Type** | Type | US/EU/UK/ plug |

## Test Items In Production Line

Output voltage measures at cable end, cable resistance = 100mΩ.
* At CPK > 1.33

| | | | |
|---|---|---|---|
| **5Vdc Output** | Input: 90V/60Hz | Output Voltage(5V,3A) * | 5.05V~5.55V |
| | Input: 115V/60Hz | Maximum load Efficiency (5V) | 86.38% min. |
| | Input: 264V/50Hz | Output Voltage(5V,0A) * | 4.85V~5.25V |
| | | Output Voltage(5V,3A) * | 5.05V~5.55V |
| | | Output Ripple &Noise(5V,3A) | |
| | | - Cold start | 250 mVp-p max |
| | | - After 10 minutes of warm-up | 180 mVp-p max |
| **9Vdc Output** | *Test Condition* | *Measure* | *Specification* |
| | Input: 90V/60Hz | Output Voltage(9V,3A) * | 8.8V~9.42V |
| | | Output Ripple &Noise(9V,3A) | 200 mVp-p max |
| | Input: 264V/50Hz | Output Voltage(9V,0A) * | 8.8V~9.42V |
| | | Output Voltage(9V,3A) * | 8.8V~9.42V |
| | | Output Ripple & Noise(9V,3A) | |
| | | - Cold start | 300 mVp-p max |
| | | - After 10 minutes of warm-up | 200 mVp-p max |
| **15Vdc Output** | *Test Condition* | *Measure* | *Specification* |
| | Input: 90V/60Hz | Output Voltage(15V,0A) * | 14.25V~15.75V |
| | | Output Voltage(15V,3A) * | 14.25V~15.75V |
| | | Output Ripple & Noise(15V,3A) | 300 mVp-p max |
| | | OCP(15V) | <4A |
| | Input: 264V/50Hz | Output Voltage(15V,0A) * | 14.25V~15.75V |
| | | Output Voltage(15V,3A) * | 14.25V~15.75V |
| | | Output Ripple & Noise(15V,3A) | 300 mVp-p max |
| **20Vdc Output** | *Test Condition* | *Measure* | *Specification* |
| | Input: 90V/60Hz | Output Voltage(20V,0A) * | 19V~21V |
| | | Output Voltage(20V,3.25A)* | 19V~21V |
| | | OCP(20V) | <4.3A |
| | Input: 115V/60Hz | Maximum load Efficiency (20V) | 87.00% min |
| | Input: 264V/50Hz | Output Voltage(20V, 0A) * | 19V~21V |
| | | Output Voltage(20V, 3.25A) * | 19V~21V |

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: 3300VAC/3mA/2sec.

## 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.