

# Evaluation Board User Manual



# EvalAg7010 Evaluation Board User Manual

Version 2.0 – September 2022

#### High Efficiency Buck Converter Evaluation Board

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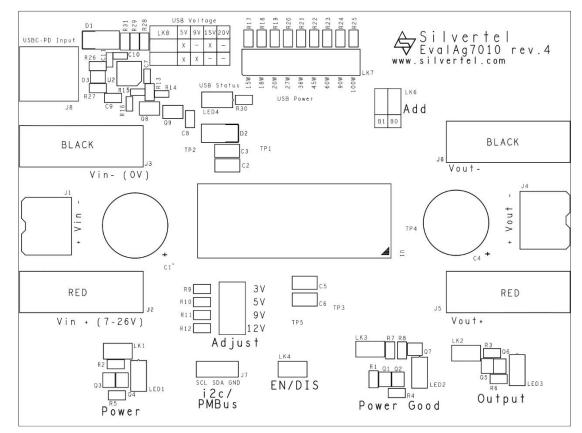
#### 1 Kit Contents

- EvalAg7010 Evaluation Board
- > Ag7010 Soldered to Evaluation Board

### 2 Additional Components

- I<sup>2</sup>C controller
- USB-C Source

## 3 Board Layout





#### 3.1 Link Settings

- LK1 Input Power LED Enable
- LK2 Output Power LED Enable
- LK3 PWR good LED Enable
- LK4 CONTROL Set
- LK5 Output voltage Select
- LK6 I<sup>2</sup>C Address Set
- LK7 USB Power Request Set
- LK8 USB Voltage Request Set

### 3.2 Input Output Connections

- J1 Input Power DC jack
- J2 & J3 Input Power Banana Connectors
- J4 Load Output Dc Jack
- J5 & J6 Load Output Banana Connectors
- J7 I<sup>2</sup>C Interface
- J8 USB-C Connector

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## 4 Introduction

This Manual is a guide to using the EvalAg7010 revision 3 or greater evaluation board fitted with a Silvertel Ag7010 High Efficiency Buck Converter module for use in a wide variety of point of load (PoL) and DC-DC converter applications, including USB Power Delivery (USB-PD), Apple Lightning and Intel Thunderbolt enabled devices

## 5 Input

#### 5.1 Supply

The EvalAg7010 evaluation board can be powered using a DC Power supply connected to either J2 and J3 via banana connectors, J1 with bare wire or J8 via USB-C.

This supply should deliver between 8-24V, a lower voltage will not cause damage to the module. The DCDC converter will be enabled when its supply exceeds the configured VIN\_ON setting, by default this is 6.75V.

The Ag7010 can output up to 10A of continuous output current for a maximum power output of 120W.

At this output current the Ag7010 will dissipate up to 5.1W. Any power source should be suitably rated for the desired output power, the power dissipation of the Ag7010 and any transmission power losses.

#### 5.2 Output Voltage Adjust

The output voltage of the Ag7010 module can be adjusted by changing the location of the jumper LK5. There are four jumper locations on LK5 that can be used to set the Ag7010 to one of the pre-configured the output voltage of 3V, 5V, 9V, or 12V.

To set the output voltage to a custom value, fit a resistor to location R9 to overriding the 3V output setting with the custom voltage output, please refer to the Ag7010 datasheet for details on resistor value calculation.

With no jumper present on LK5, the module will default to 3V output.

#### 5.3 EN/DIS

The Ag7010 DCDC converter can be enabled or disabled by pulling the CONTROL pin LOW, which can be performed by connecting a jumper link to LK4, EN/DIS.

The default action is a jumper link placed on LK4 will disable the output. This pin function can be inverted or negated using the PMBus configuration.

## 6 l<sup>2</sup>C

The Ag7010's I<sup>2</sup>C interface supports PMBus commands and is designed to the PMBus rev 1.3 specification.

This allows for the configuration, control, and monitoring of the DC/DC converter by a system controller. For the full command list of the I<sup>2</sup>C interface, see the Ag7010 Datasheet

The Pin arrangement for the I2C interface on J7 is as below:

Serial Clock - Serial Data Analogue - Ground

#### 6.1 I<sup>2</sup>C Address

Up to four Ag7010 modules can operate on the same I<sup>2</sup>C bus by configuring them to operate on different addresses. Bits 0 and 1 of the I<sup>2</sup>C address can be pulled LOW from their default HIGH state by connecting one or two jumpers vertically to LK6. Bit 0 is set by the right column of LK6, bit 1 is set by the left column of LK6.

## 7 USB

The EvalAg7010 rev 3 is fitted with a Diodes Inc AP33771 USB PD Sink Controller, this controller performs the role of requesting voltage and power levels from a USB-PD source.

The AP33771 uses resistor links to configure the voltage and power level request, as opposed to the AP33772, which is configured via  $I^2C$ .

#### 7.1 USB Voltage Request Select

The requested voltage from the USB-PD source is set using two jumper links on LK8. With both links present 20V will be requested from the source. With only the lower link present 15V will be requested.

If neither jumper link is present, the USB volage will be 5V, with this voltage the I<sup>2</sup>C interface on the Ag7010 will be active, but the voltage will be too low for the DCDC converter to be enabled.

#### 7.2 USB Power Level Request Select

The power level requested from the USB-PD source is set by placing a jumper link on the appropriate setting on LK7. If the USB-PD source device has a power contract that allows this power level at the requested voltage, power will be supplied, otherwise a mismatch will be flagged.

#### $7.3\,\textbf{USB LED}$

The EvalAg7010 features an LED to indicate the status of the power request from the USB connection. The behaviour of the LED will be as per the Table 1 when connected to a USB-PD source.

| LED action                   | Status                            |
|------------------------------|-----------------------------------|
| Full Light                   | powered with <500mA draw          |
| 4-sec Breathing              | Powered and Drawing Currernt      |
| Flashing - 2 second period   | Voltage or Power request Mismatch |
| Flashing - 0.6 second period | Over Voltage Protection           |

Table 1: USB LED States

#### 7.4 Data

The EvalAg7010 contains a USB-PD sink controller negotiating power delivery from a USB PSE for the purpose of evaluating the module for USB powered applications. There is no data Throughput for the USB-C connection.

## 8 Output

The Ag7010 will output 3V-12.7V and can deliver a continuous output current of 10A, for up to 120W of continuous power, the peak output power may be reduced as a result of the power source or operating conditions the module is operating in.

#### 8.1 PWR good LED

The power good LED will illuminate when the output voltage has reached a regulated output.

## 9 Test Setup

Figure 2 shows a typical test set up using the EvalAg7010 evaluation board.

The equipment required: -

- Up to 130W USB-PD source or 24V bench power supply
- Application Device
- USB-C cable

Optional equipment: -

Data source e.g. PC

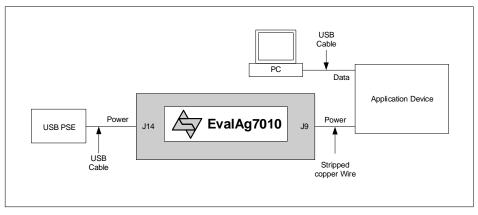
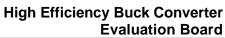


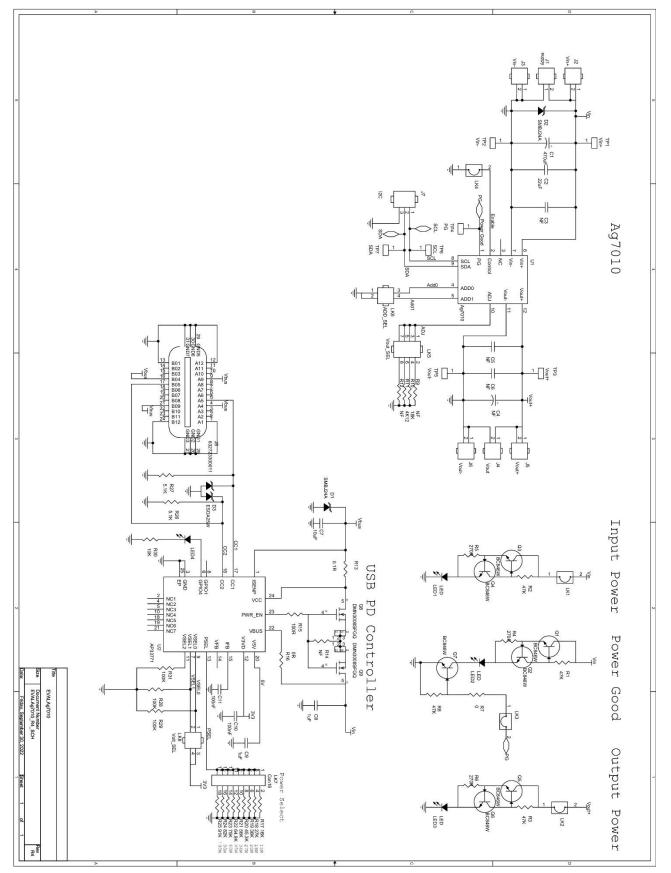
Figure 2: Basic Test Setup

## **10 Additional information**

Full operating conditions and feature set can be found in the Ag7010 product datasheet, available from www.silvertel.com.

#### **11 Schematic**





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| Description         Yale         Leaders         Op         Support Previous   |          |   |             | ,       |               | · 5  | LK1 - LK8   | LINKS                | Jumper Links              |                    |
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| Description         Yalue         Location:         Ot:         Package:         Rating:         Tot:         Supplier PINC:           PD Module         Ag7010         U1         1         Custom         1         Supplier PINC:         Supplier PINC:           PD Module         Ag7010         U1         1         Custom         -         Silver Telecom Part           PD Module         Ag7010         U1         1         Custom         -         -         Silver Telecom Part           Protection Diode         BS002SFG         01:07         1         WGFHA00234         -         -         Diodes Inc.           Protection Diode         ES0A23W         01:07         1         SMA1         -         Silver Telecom Part           Caranto: multi-layer         Protection Diode         ES0A23W         03:07         -         Silver Telecom Part           Caranto: multi-layer         Protection Diode         ES0A23W         03:07         -         Silver Telecom Part           Caranto: multi-layer         Protection Diode         ES0A23W         03:07         -         Silver Diodes Inc.           Caranto: multi-layer         NF         C3:05:05         0         Through Hole         Silver Diodes Inc.         Silver Diodes Inc.<   |          | Royal Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          | 1    | R17         | 16K                  | Resistor - 0805           |                    |
| Description         Value         Location:         Oxt:         Package:         Rains:         Tot:         Supplier PLNC:           PD Module         Ag7010         U1         1         Custom         -         -         Silver Telecom Part           PD Module         Ag7010         U1         1         Custom         -         -         Silver Telecom Part           Transistor NPN 60x Single         DBGA6BW         01-02         2         Power Part         -         -         Diodes Inc.           Protection Diode         ESDA5SW         D3         01-02         2         Power Part         -         Diodes Inc.           Gapator Electop/Icc         BSDA5SW         D3         D3         -         -         Diodes Inc.           Carante mult-layer         NF         C3         SUT323         -         -         Diodes Inc.           Carante mult-layer         NF         C3         SUT323         -         -         Diodes Inc.           Carante mult-layer         NF         C3         SUT323         -         -         Diodes Inc.           Carante mult-layer         NF         C3         SUT323         -         -         Unthth 8245002411Mahay. ST Micro. Diodes Inc. <td></td> <td>Royal Ohm, Eurohm &amp; Yageo</td> <td>1%</td> <td>125mW</td> <td>0805</td> <td>-</td> <td>R13</td> <td>0R01</td> <td>Resistor - 0805</td> <td></td>  |          | Royal Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          | -    | R13         | 0R01                 | Resistor - 0805           |                    |
| Description         Value         Location:         Otype         Pakage:         Raing:         Tot         Supplier PLNC:           PD Module         Ag7010         U1         1         Custom         1         Supplier PLNC:         Supplier PLNC:           PD Module         Ag7010         U1         1         Custom         1         Supplier PLNC:         Supplier PLNC:           USB PD Sink Controller         Ag7010         U1         1         V-GEN4040-24         -         Diodes Inc.           Protection Diode         BOM24A         D1/D2         2         Protection Diode         Supplier PLNC:         Diodes Inc.           Capaditor Electolytic         DIMC00069FG         08/02         2         Protection Diode         Supplier PLNC:         Number Addition Concersion           Capaditor Electolytic         RED LED         LED1-LED         1         Through Hole         35V         20%         Panasonic. Sansung. NC. TDK. Kemet, AVX. Wurth: 880072075014         Inflaeon or NXP Only           Caranic multi-layer         NF         C3. C5. C6         0         100/6         35V         20%         Sansung. NC. TDK. Kemet, AVX. Wurth: 880072107015         Incord Hole 35V         20%         Sansung. NC. TDK. Kemet, AVX. Wurth: 880072107015         Incord Hole 35V         20%   |          | Royal Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          | -    | R12         | 4K12                 | Resistor - 0805           |                    |
| Description         Yalve         Location:         Ory:         Package:         Rating:         Tot         Supplier PLNO:           PD Module         Ag7010         U1         1         Custom         -         Silver Telecom Part           PD Module         Ag7010         U1         1         Custom         -         Silver Telecom Part           USB PD Sink Controller         Ag7010         U1         1         Custom         -         Diodes Inc.           Protection Diode         BG2466W         Q1-Q7         2         SOT323         -         -         Diodes Inc.           Protection Diode         BG2466W         Q1-Q7         2         SNA         -         -         Diodes Inc.           Capacitar Electohylic         DMN27A         D1-D2         2         SNA         -         -         Diodes Inc.           Caramic multi-layer         NF         C3.05.05         D1         Trough Hole         35V         20%         Parasonic. Samsung. NC. TDK. Kurata. Kemet. AVX. Wurth: 8601210714           Caramic multi-layer         100F         C7         Q         0050         25V         20%         Samsung. NC. TDK. Murata. Kemet. AVX. Wurth: 8601210715           Caramic multi-layer         100F         C7 <td></td> <td>Royal Ohm, Eurohm &amp; Yageo</td> <td>1%</td> <td>125mW</td> <td>0805</td> <td>-</td> <td>R11</td> <td>6K2</td> <td>Resistor - 0805</td> <td></td>  |          | Royal Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          | -    | R11         | 6K2                  | Resistor - 0805           |                    |
| Description         Value         Location:         Oty         Package:         Rating:         Tol:         Supplier PLNO:           PD Modia         Ag7010         U1         1         Custom         1         Supplier PLNO:         Supplier PLNO:           PD Modia         Ag7010         U1         1         Custom         1         Supplier PLNO:         Supplier PLNO:           USB PD Sink Controller         Ag7010         U1         1         V-DFMA00-24         1         Silver Telecom Part.         Infineon or NXP Only         In   |          | Royal Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          |      | R10         | 19K1                 | Resistor - 0805           |                    |
| Description         Yalue         Location:         Qtr.         Package:         Rating:         Infl.         Supplier Pt NO:           PD Module         Ag7010         U1         1         Custom         -         -         Sliver Telecon Part           USB PD Sink Comoler         Ag7010         U1         1         Custom         -         -         Diver Telecon Part           Transitor Nielov Single         BC44680X         Q1-Q7         7         SO1323         -         -         Diver Telecon Part           Protection Diode         BC50A23W         Q1-Q7         7         SO1323         -         -         Diver Telecon Part           Protection Diode         BS0A23W         Q1-Q7         7         SO1323         -         -         Diver Telecon Part           Capactor Telecolytic         ATOUF         C1         Transut Ntono         SML         -         -         Diver Sinco         A           Capactor Telecolytic         NF         C2         Q         2         NF         -         -         SMLoco         A         SMLoco         A         Smrung, NC, TDK, Kernet, AVX, Wurth:8600220575014           Caramic mult-layer         NF         C2         Q         2         OX   |          |   | 1%          | 125mW   | 0805          | 0    | R9, R12     | NF                   | Resistor - 0805           |                    |
| Description.         Value         Location:         QIX:         Package:         Rating:         Tot:         Supplier PLNC:           PD Module         Ag7010         U1         1         Custom         1         Supplier PLNC:         Supplier PLNC:           PD Module         Ag7010         U1         1         Custom         -         Sliver Telecom Part         Dicko Control         Ag73711         U12         1         Sliver Telecom Part         Dicko Single         BC44689X         01-02         7         SOT333         -         -         Dicko Single         Sliver Telecom Part         Dickos Inc.         Dickos  |          | Royal Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          | 1    | R7          | OR                   | Resistor - 0805           |                    |
| Description         Yalue         Location:         QV:         Package:         Rating:         Tot:         Supplier PLNC:           PD Module         Ag7010         U1         1         Custom         -         Sliver Telecom Part           USB EP Sink Controller         Ag37171         U1         1         V-Custom         -         -         Sliver Telecom Part           Transitor NetOox Single         BC3468WV         Q1-Q7         7         SOT323         -         -         Inflineon NAVD ONY           WOSFET N Channel         DMM3008FG         Q3.Q9         2         Powerd/3333-8         -         -         Inflineon NAVD ONY           WOSFET N Channel         DMM3008FG         Q3.Q9         2         Powerd/3333-8         -         -         Inflineon NAVD ONY           Gapactor ElectoNtic         EstoAcXW         D3         2         Powerd/3333-8         -         -         Strinco, Diodes Inc.           SM LED         RED LED         LED1-LED4         1         Strinco         Strinco, Diodes Inc.         Strinco, Diodes Inc.           Ceramic multi-layer         NF         C4         0         Strinco         Strinco, Diodes Inc.         Strinco, Diodes Inc.           Ceramic multi-layer         NF   |          | Royal Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          | ω    | R4,R5,R6    | 270R                 | Resistor - 0805           |                    |
| Description         Value         Location:         Qt/<br>Value         Package:         Rating:         Iol:         Supplier PLNC:           PD Module         Ag7010         U1         1         Custom         -         Sliver Telecom Part           VBB PD Sink Controller         Ag3771         U2         1         Custom         -         Sliver Telecom Part           MOSFET N Channel         DMM3008SFG         08.09         2         PowG103333         -         -         Diodes Inc.           Protection Diode         SMA_2AA         D1, D2         2         SMA         -         Diodes Inc.         Number Stringer Number, 2020         -         Diodes Inc.         -         North - 824500241/Vishay, ST Micro, Diodes Inc.         -         Stringer 1/4         -         Wurth- 824500241/Vishay, ST Micro, Diodes Inc.         -         Stringer 1/4         -         -         Wurth- 82450241/Vishay, ST Micro, Diodes Inc.         -         -         Wurth- 82450241/Vishay, ST Micro, Diodes Inc.         -         -  |          | Roval Ohm, Eurohm & Yageo   | 1%          | 125mW   | 0805          | 4    | R1.R2.R3.R8 | 47K                  | Resistor - 0805           |                    |
| Description.       Value       Location:       function:       function: <thfunction:< th="">       function:</thfunction:<>   |          | Samsung, NIC, TDK, Murata, Kemet, AVX, Wurth: 885012206120  | 20%         | 25V     | 0603          | N    | C10, C11    | 100nF                | Ceramic multi-layer       |                    |
| Description.         Value         Location:         Oty:         Package:         Rating:         Total:         Supplier PLNO:           PD Module         Aq7010         U1         1         Custom         -         -         Sliver Telecom Part           USB PD Sink Controller         Aq7010         U1         1         Custom         -         -         Sliver Telecom Part           USB PD Sink Controller         AP33771         U2         1         W-GEN4040-24         -         -         Diodes Inc.           MOSFET N Chanel         DMN026         0302         2         Power0333-8         -         -         Diodes Inc.           Protection Diode         ESDA25W         D3         2         Power0333-8         -         -         Infineon or NXP Only           SM LED         EB046BW         D3         1         SOT323         -         -         Wurth- 150 141 RS7 3100         -         -         St Micro         -         -         St Micro         -         -         St Micro         -         -         St Micro         -         St Micro         -         -         S  |          | Samsung, NIC, TDK, Murata, Kemet, AVX, Wurth: 885012106031  | 20%         | 25V     | 0603          | -    | C7          | 10uF                 | Ceramic multi-layer       |                    |
| Description.         Yalue         Location:         Atr:         Package:         Rating:         Iol:         Supplier Pt NO:           PD Module         Ag7010         U1         1         Custom         -         Sliver Telecom Part           USB PD Sink Controller         Ag7010         U1         1         Custom         -         Sliver Telecom Part           VISB PD Sink Controller         Ag73771         U2         1         W-QFN4040-24         -         -         Diodes Inc.           Protection Diode         BC946BW         Q1-Q7         7         SOT323         -         -         Diodes Inc.           Protection Diode         SMAJ24A         D1,D2         2         Powerd13333-8         -         Diodes Inc.         Diodes Inc.           SMLED         SML2D         DI,D2         2         SMAT         -         SIVer Telecom Part         -         SIVer Telecom Part           Capacitor Eleciolytic         RED LED         LED1-LED4         1         W-QFN4040-24         -         -         Diodes Inc.           Ceramic multi-laver         NF         C1         1         SIVE         -         SIVerto, Diodes Inc.         -           Ceramic multi-laver         NF         C1  |          | Samsung, NIC, TDK, Murata, Kemet, AVX, Wurth:885012107015   | 20%         | 25V     | 0805          | 2    |             | 1uF                  | Ceramic multi-layer       |                    |
| Description       Yalue       Location:       Atr.       Package:       Rating:       Iol:       Suppler PLNC:         PD Module       Ag7010       U1       1       Custom       -       -       Silver Telecom Part         USB PD Sink Controller       Ag7010       U1       1       Custom       -       -       Silver Telecom Part         VIGS PD Sink Controller       Ag7010       U1       1       V-Grustom       -       -       Silver Telecom Part         VIGS PD Sink Controller       Ag7010       U1       1       W-GRU4040-24       -       -       Silver Telecom Part         VIGS PD Sink Controller       Ag7010       U1       1       W-GRU4040-24       -       -       Diodes Inc.         Protection Diode       BC8468W       Q1-Q7       7       SOT323       -       -       Diodes Inc.         SM LED       DMN30085FG       Q8.Q9       2       Powerd1333-8       -       -       Wurth- 150 141 RS7 310.0       -         Gapacitor Electolytic       RED LED       LED1-LED4       4       SMT       -       Wurth- 150 141 RS7 310.0       -         Gapacitor Electolytic       NF       C2       1       Through Hole       35V       20%  |          | a contract of the state of the | 10.00       | 357     | 1206          | 0.   |             | NF                   | Ceramic multi-laver       |                    |
| Description       Yalue       Location:       Otype       Package:       Rating:       Tol:       Supplier PLOC:         PD Module       Ag7010       U1       1       Custom       -       -       Supplier PLOC:       Supplier PLOC:         USB PD Sink Controller       Ag7010       U1       1       Custom       -       -       Silver Telecom Part         Transistor NPN 60v Single       BC846BW       Q1-Q7       1       W-OFN4040-24       -       -       Diodes Inc.         MOSFET N Channel       DMN3008SFG       Q1-Q7       7       S0T323       -       -       Diodes Inc.         Protection Diode       SMA224A       D1, D2       1       SMT       -       -       Diodes Inc.         SM ED       RED LED       LED1-LED4       1       SMT       -       -       STrassonic, Samsung, NIC, TDK, Kernet, AVX, Wurth:860020575014       -         Gapaciter Electivity       Aproperiode       C1       C1       - <td></td> <td>Samsung NIC TDK Murata Kemet AV/X Wurth</td> <td>200%</td> <td>357</td> <td>1206</td> <td>-</td> <td>3 5</td> <td>2211E</td> <td>Ceramic multi-laver</td> <td></td>  |          | Samsung NIC TDK Murata Kemet AV/X Wurth   | 200%        | 357     | 1206          | -    | 3 5         | 2211E                | Ceramic multi-laver       |                    |
| Description       Value       Location:       dty:       Package:       Rating:       Tol:       Supplier Pt NO:         PD Module       Ag7010       U1       1       Custom       -       -       Silver Telecom Part         USB PD Sink Controller       Ag3771       U1       1       Custom       -       -       Diodes Inc.         MOSFET N Channel       BRX424A       01-02       7       SOT323       -       -       Infineon INP Only         Protection Diode       SMA24A       01, D2       2       SMA3       -       -       Diodes Inc.       -       Nutrit- 824500241, Vishay, ST Micro, Diodes Inc.       -       -       -       Infineon INP Only       -   | Ditoh: 5 | Failasofile, saliisuliy, NIC, TDA, Reffer, AVA, wurth.cooovzos/3014   | 2002        | 251     | Through Hole  | - c  | 2 9         | 4700F                | Capacitor Electolytic     |                    |
| Description       Value       Location:       dtv:       Package:       Rating:       Tol:       Supplier Pt NO:         PD Module       Ag7010       U1       1       Custom       -       -       Sliver Telecom Part         USB PD Sink Controller       Ag7010       U1       1       V-QEN4040-24       -       -       Diodes Inc.         VUSB PD Sink Controller       Ag7010       U1       1       V-QEN4040-24       -       -       Diodes Inc.         VUSB PD Sink Controller       Ag7010       U1       1       V-QEN4040-24       -       -       Diodes Inc.         VUSB PD Sink Controller       Ag7010       U1       1       V-QEN4040-24       -       Diodes Inc.       -         MOSFET N PN 60v Single       BC346BW       Q1-Q7       7       SOT323       -       -       Infineon INCP Only         Protection Diode       SMAJ24A       D1,D2       2       Powerli333-8       -       -       Nurth-824500241.Vishay, ST Micro, Diodes Inc.         Protection Diode       SEXA25W       D3       2       SOT323       -       -       Wurth-824500241.Vishay, ST Micro, Diodes Inc.         Protection Diode       ESDA25W       D3       1       SOT323       -  | Ditop: n |   |             |         | Through Holo  | 4 4  |             | 170E                 | SM LED                    |                    |
| Description       Value       Location:       Oty:       Package:       Rating:       Iol:       Supplier Pt NO:         PD Module       Ag7010       U1       Custom       -       -       Sliver Telecom Part         USB PD Sink Controller       Ag7010       U1       1       Custom       -       -       Sliver Telecom Part         USB PD Sink Controller       Ag7010       U1       1       Value       -       Sliver Telecom Part         VOSFET N Channel       BC8446BW       Q1-Q7       7       SOT323       -       -       Diodes Inc.         Protection Diode       DMN3008FG       Q8.Q9       2       Powerdi333-8       -       -       Diodes Inc.         Protection Diode       SMA/224       D1, D2       2       SMA       -       Diodes Inc.       Diodes Inc.         Protection Diode       SMA/24A       D1, D2       2       SMA       -       -       Diodes Inc.       Diodes Inc.         Protection Diode       SMA/24A       D1, D2       4       STAN       -       -       Otherset Inc.       -   |          |   |             |         | 001020        | -    |             |                      |                           |                    |
| Description.       Value       Location:       Oty:       Package:       Rating:       Iol:       Suppler Pt NO:         PD Module       Ag7010       U1       1       Custom       -       -       Silver Telecom Part         USB PD Sink Controller       Ag7010       U1       1       Custom       -       -       Silver Telecom Part         Transistor NPN 60v Single       BC846BW       Q1-Q7       7       SOT323       -       -       Diodes Inc.         MOSFET N Chamel       DMN30085FG       Q8.Q9       2       Powerdi333-8       -       -       Diodes Inc.   |          | CT Micro, Diodes Inc  |             |         | SMA           | 4 N  | D1, D2      | SMAJ24A              | Protection Diode          |                    |
| Description       Value       Location:       ftp:       Package:       Rating:       Tol:       Supplier Pt NO:         PD Module       Ag7010       U1       Custom       -       Silver Telecom Part       Supplier Pt NO:         USB PD Sink Controller       AP33771       U2       1       W-QFN4040-24       -       Silver Telecom Part         Transistor NPN 60v Single       BC846BW       Q1-Q7       7       SOT323       -       -       Infineon or NXP Only   |          | Diodes Inc.   | Ŧ           | x       | Powerdi3333-8 | 2    | Q8,Q9       | DMN3008SFG           | MOSFET N Channel          |                    |
| Description       Value       Location:       Qty:       Package:       Rating:       Tol:       Supplier Pt NO:         PD Module       Ag7010       U1       1       Custom        Silver Telecom Part         USB PD Sink Controller       AP33771       U2       1       W-OFW04040-24        Oides Inc.   |          | Infineon or NXP Only  |             | ,       | SOT323        | 7    | Q1-Q7       | BC846BW              | Transistor NPN 60v Single |                    |
| Description     Value     Location:     Qty:     Package:     Rating:     Tol:     Supplier Pt NO:       PD Module     Ag7010     U1     1     Custom     -     Silver Telecom Part  |          | Diodes Inc.   | Ŧ           | ı       | W-QFN4040-24  | -    | U2          | AP33771              | USB PD Sink Controller    |                    |
| Description     Yalue     Location:     Qty:     Package:     Rating:     Tol:     Supplier Pt NO:   |          | Silver Telecom Part   | r           | i       | Custom        | _    | U1          | Ag7010               | PD Module                 |                    |
| Description     Value     Location:     Qty:     Package:     Rating:     Tol:     Supplier Pt NO:   |          |   |             |         |               |      |             |                      |                           |                    |
|  | Comme    | Supplier Pt NO:   | <u>Tol:</u> | Rating: | Package:      | Qty: | Location:   | Value                |                           | Silver<br>Part No. |
|  |          |   |             |         |               |      |             |                      |                           |                    |
|  |          | Date: 30th September, 2022  |             |         |               |      |             |                      |                           |                    |
|  |          |   |             |         |               |      |             |                      |                           |                    |

### 12 Bill of Materials

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#### High Efficiency Buck Converter Evaluation Board