

iJA Evaluation Kit Operators Guide



This Guide shows you how to Get Started and use your IJA Evaluation System.

Please contact to TDK-Lambda if you have any questions or need further product details.

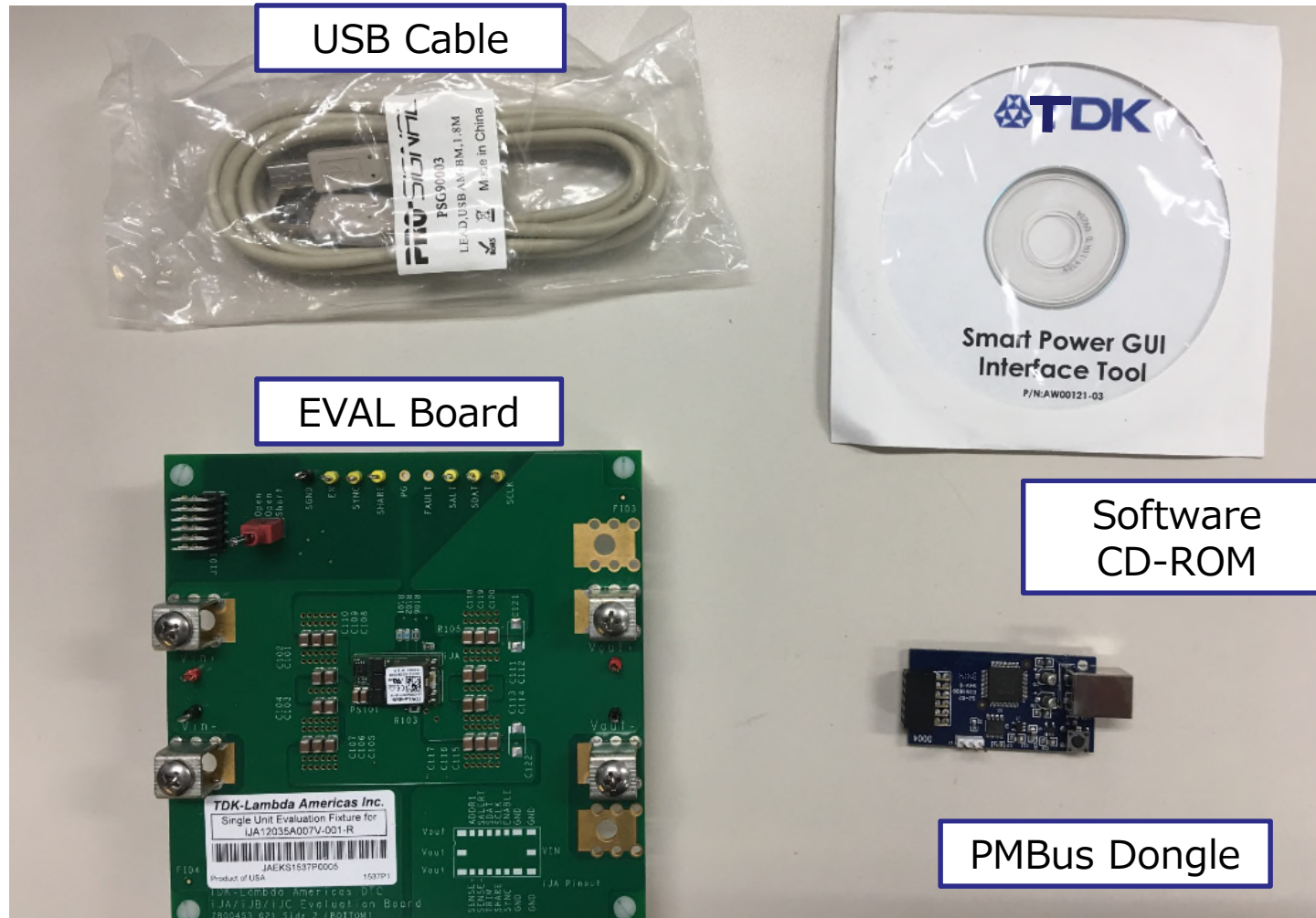
Note: The GUI software is provided on a CD-ROM and is also available at <http://www.us.tdk-lambda.com/lp/contacts/gui-download-page/>. If downloading from the web, registration is required.

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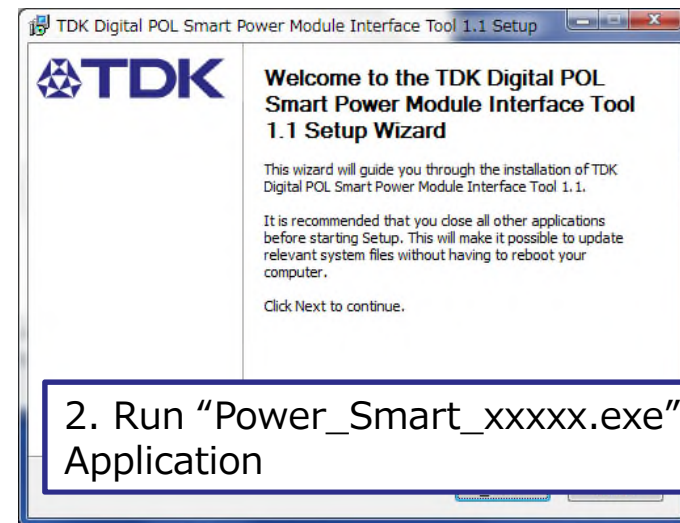
iJA Evaluation Kit Contents



Install Smart Power GUI Interface Tool



The Interface tool allows the user to configure and operate the iJA device via the PMBus. Install as shown.



*Require Windows XP or later



A icon will appear on your desktop after install.

Please check latest version on our website

<http://www.us.tdk-lambda.com/lp/contacts/gui-download-page/>

iJA Eval Board Installation



- **System requirements**
 - **Windows XP, Windows 7 (32bit or 64bit)**
 - **Java**
 - **Free USB port**
- **GUI installation**
 - **Do not connect USB cable !**
 - **Install “SmartPower_1.1_20130926_win32-setup.exe”**
 - **Follow the instruction by the installer**
 - **Close GUI**
- **Evaluation board set-up**
 - **Apply 12V source to the Vin terminal (see picture 1)**
 - **Connect USB cable to board and PC**
 - **Driver will be installed**

About the iJA



TDK-Lambda

iJA Series

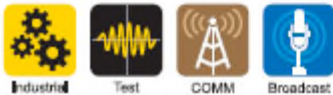
100W, 35A Non-isolated SMT Point of Load with PMBus

Features

- ◆ Only 0.45 in² Board Space
- ◆ PMBus Compliant (Read & Write)
- ◆ Surface Mountable
- ◆ Digital Adaptive Control
- ◆ Parallel Operation with Current Sharing
- ◆ Configurable Sequence & Fault Management



Key Market Segments & Applications



Vo: 0.6 to 3.3 Volts

100 Watts

35 Amps

About the EVAL Board

PMBus Connector Pinout

1	SALT	2	5V(USB)
3	SDAT	4	SGND
5	SCLK	6	SGND
7	-	8	SGND
9	-	10	SGND
11	-	12	SGND

ON/OFF Switch

TEST Pins

Input Terminals

Output Terminals

This Eval kit does NOT have input fuse.
Please verify polarity of electrical connection before power up. Permanent Damage will occur if polarity is reversed.

Switch in
"OPEN"
Position

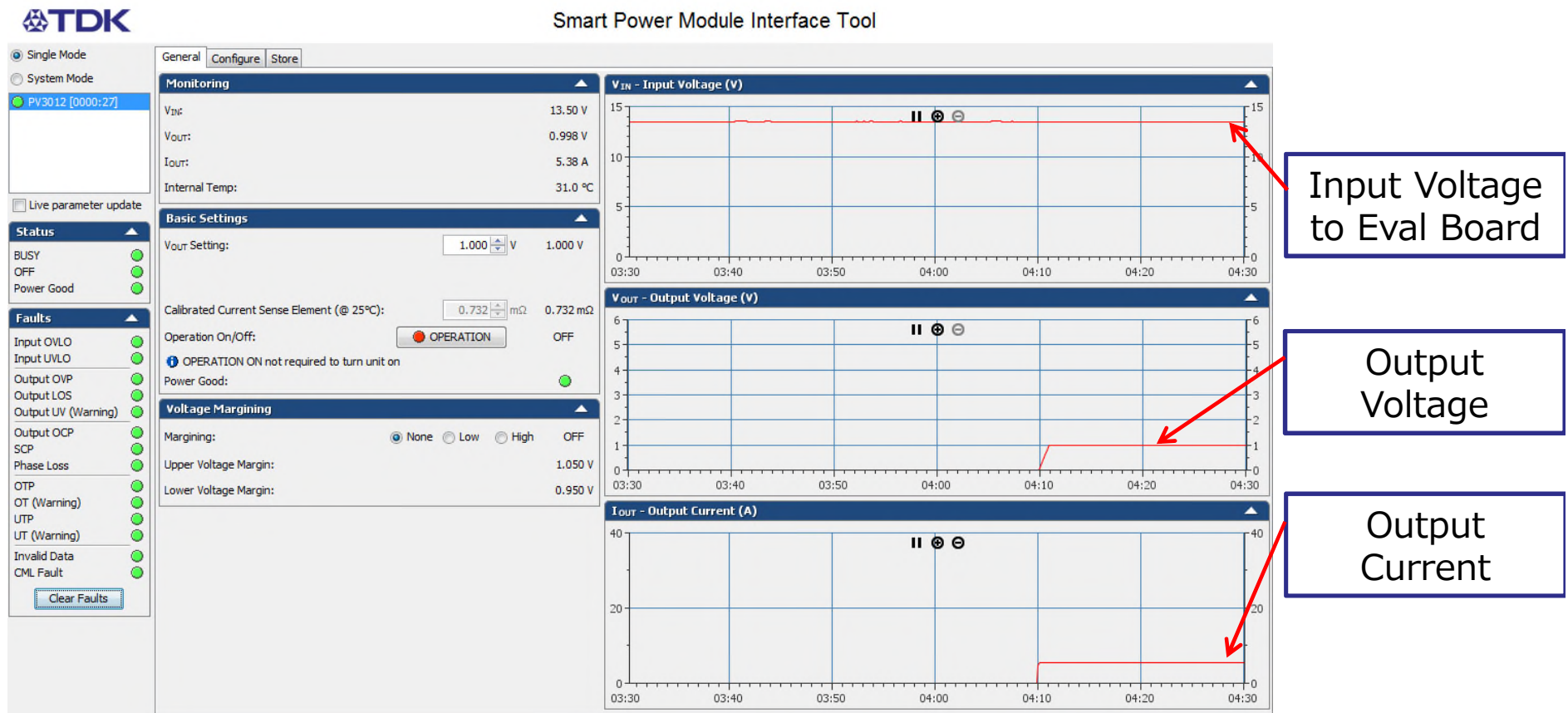


Connect Resistive Load

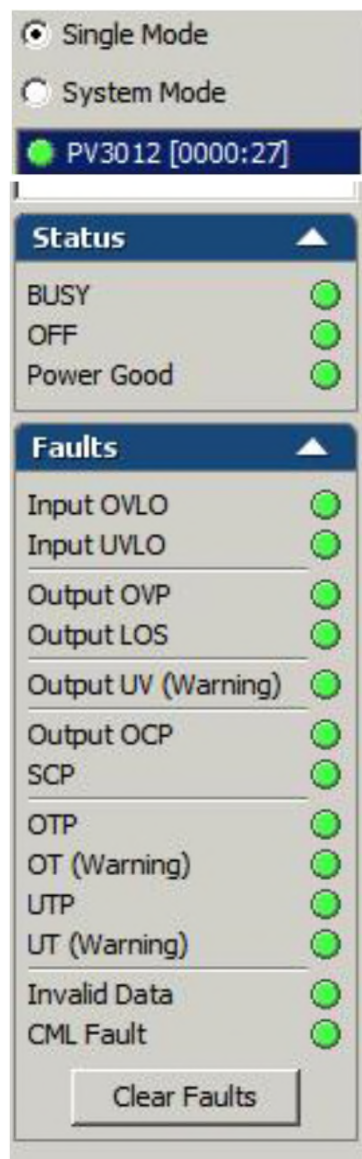
Power It Up / Run the GUI - Basic



- Energize the Eval Board
- Open the GUI
- Cycle Power Switch to “Short” Position



GUI Features



Status and Fault Indicators

green except during NVM storage operation

shows if the module is ON or OFF

indicates if V_{out} is within the limits

green when V_{in} is lower than set limit in the fault section

green when V_{in} is higher than set limit in the fault section

green when V_{out} is lower than set limit in the fault section

loss of sense, when V_{sense} is lost module will be set OFF

green when V_{out} is higher than set limit in the fault section

green when I_{out} is lower than set limit in the fault section

green when short circuit protection has not been active

green when Temp. is lower than set limit in the fault section

green when Temp. is lower than set limit in the fault section

green when Temp. is higher than set limit in the fault section

green when Temp. is higher than set limit in the fault section

indicates invalid or unsupported data

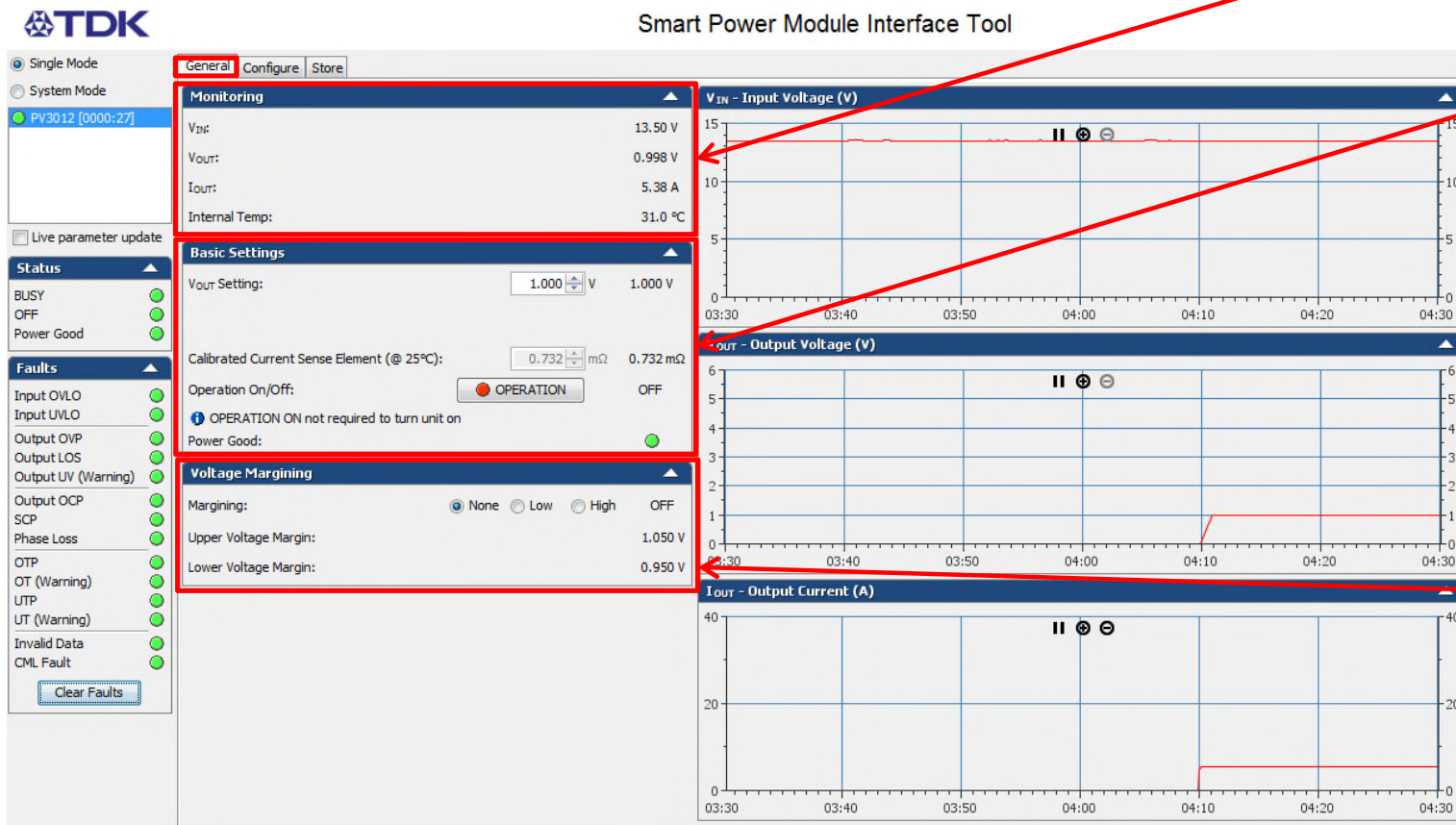
indicates communication / memory / logic status

Clear Faults can be used to clear any previous fault flags that were raised

GUI Features (cont.)



The General Tab



Monitoring:

Shows:

- V_{IN}
- V_{OUT}
- I_{OUT}
- Internal Temperature

Basic Settings

- Sets V_{OUT}
- Controls Output ON/Off with Operation button
- Displays value of internal calibrated shunt

Voltage Margining

- Enable Hi and Low output margins.
- Values for margins set on Configure Tab
- Useful for device load testing.

GUI Features (cont.)



The Configure Tab - Basic

Single Mode (Selected)
System Mode

PV3012 [0000:10]
PV3012 [0000:11]

Status

- BUSY (Green)
- OFF (Red)
- Power Good (Red)

Faults

- Input OVLO (Green)
- Input UVLO (Green)
- Output OVP (Green)
- Output LOS (Green)
- Output UV (Warning) (Green)
- Output OCP (Green)
- SCP (Green)
- OTP (Green)
- OT (Warning) (Green)
- UTP (Green)
- UT (Warning) (Green)
- Invalid Data (Green)
- CML Fault (Green)

Clear Faults

General **Configure** **Store** **Demo**

Basic **Fault**

Configuration

V _{OUT} Trim:	0.000 V	0.000 V
V _{OUT} Max:	1.600 V	1.600 V
V _{OUT} Scale Loop:	Internal Rdiv On/Off	1.0000
V _{OUT} Tracking:	☒ Off ☐ 50% ☐ 100%	OFF
Slew Rate:	1.042 mV/μs	1.042 mV/μs
ON Rise Time:	2.9 ms	2.9 ms
ON Time Delay:	2.0 ms	2.0 ms
OFF Time Delay:	0.0 ms	0.0 ms
Upper Voltage Margin:	5.0 %	1.050 V
Lower Voltage Margin:	-5.0 %	0.950 V

On/Off Configuration

Requires OPERATION ON:	☐ Yes ☒ No	NO
Requires CTRL Pin Asserted:	☒ Yes ☐ No	YES
CTRL Pin Polarity:	☒ Active High ☐ Active Low	HIGH
CTRL Pin Off Action:	☐ Immediate Off ☒ Turn Off Delay	DELAY

Power Stage

Calibrated Current Sense Element (@ 25°C):	0.770 mΩ	0.770 mΩ
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Configuration

Controls Output voltage Trim values, allowable maximum output voltages and scaling selection (internal or external).

Controls Ratiometric output voltages for non-parallel multiple device operation.

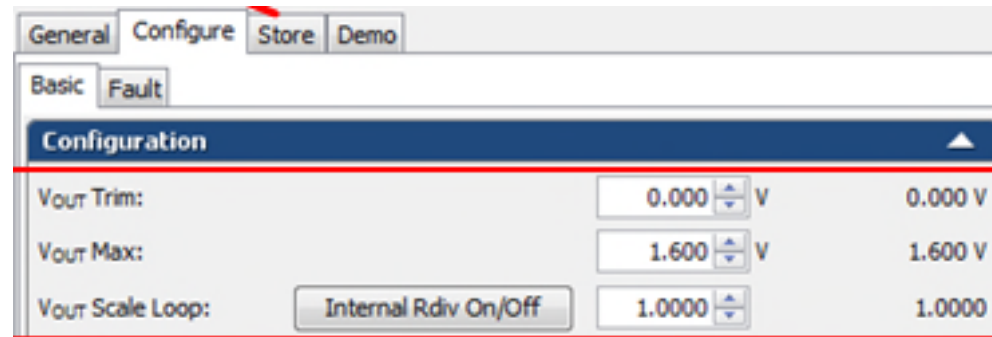
Controls Output voltage timing on power up and power down.

Sets incremental voltage margin control in percent.

On/Off Configuration

Establishes on/off hardware control features.

GUI Features (cont.)



- The Power Modules feature an internal voltage divider which can be disabled to enhance voltage setpoint accuracy when no attenuation is required. (output voltage 1.500 volts or lower). During startup the module will turn the divider on or off depending on the VOUT_OV_FAULT_LIMIT that was determined based on Rset value. With voltage attenuation off, VOUT_MAX = 1.6 V. With voltage attenuation on, VOUT_MAX = 3.5 V.
- If you want to change to higher voltage then you must turn voltage divider on (select 0.2857). This will happen automatically if resistor on Vset pin is changed so generally a user does not need to worry about this item, but in case of EV-kit they may need to turn on or off.

GUI Features (cont.)



The Configure Tab - Fault

Single Mode
System Mode
PV30 12 [0000:27]
Live parameter update

Status
BUSY
OFF
Power Good

Faults
Input OVLO
Input UVLO
Output OVP
Output LOS
Output UV (Warning)
Output OCP
SCP
Phase Loss
OTP
OT (Warning)
UTP
UT (Warning)
Invalid Data
CML Fault
Clear Faults

General Configure Store
Basic Fault

Fault Limits

Input OVLO Limit:	15.00 V	15.00 V
Input UVLO Turn-On Threshold:	7.60 V	7.60 V
Input UVLO Turn-Off Threshold:	7.00 V	7.00 V
Output OVP Limit:	3.500 V	3.500 V
Output OVP Response Delay:	40.00 µs	40.00 µs
Output OVP Retry/Latch:	Retry	Retry
Output OCP Limit:	40 A	40 A
Output OCP Response Delay:	1500.0 µs	1500.0 µs
Output OCP Retry/Latch:	Retry	Retry
Output OCP Retry Delay:	500 ms	500 ms
OTP Limit:	120 °C	120 °C
UTP Limit:	-50 °C	-50 °C

Warning Limits

Output UV Limit:	0.801 V	0.801 V
OT Limit:	110 °C	110 °C
UT Limit:	-30 °C	-30 °C

Fault Limits

- Sets Values for Input Over Voltage Lock Out (OVLO), Output Over Voltage Protection, Output Overcurrent Protection (OCP) and Over/Under Temperature Protection (OTP and UTP).
- Once Fault limits are exceeded, device shuts down.

Warning Limits

- Sets Warning Limits for Output Under Voltage (UV), device Overtemperature (OT) and Undertemperature (UT).
- Warning thresholds do not cause shutdown of supply.

The NVM capacity on the iJX devices is limited; using the Store function is not advised.

Values can be changed in working memory without using the “store” command.

Exercise the Module



Exercise:

Change output voltage to 3.3 volts, Change Margin to 10%, Adjust On/Off Configuration.

General Configure Store

Basic Fault

Configuration

Vout Trim: -0.001 V -0.001 V

Vout Max: 3.400 V 3.400 V

Vout Scale Loop: Internal Rdiv On/Off 0.2857 0.2857

Vout Tracking: ☒ Off ☐ 50% ☐ 100% OFF

Slew Rate: 1.094 mV/us 1.094 mV/us

ON Rise Time: 3.8 ms 3.8 ms

ON Time Delay: 2.0 ms 2.0 ms

OFF Time Delay: 0.0 ms 0.0 ms

Upper Voltage Margin: 10.0 % 1.100 V

Lower Voltage Margin: -10.0 % 0.900 V

On/Off Configuration

Requires OPERATION ON: ☒ Yes ☐ No YES

Requires CTRL Pin Asserted: ☒ Yes ☐ No YES

CTRL Pin Polarity: ☐ Active High ☒ Active Low LOW

CTRL Pin Off Action: ☐ Immediate Off ☒ Turn Off Delay DELAY

Power Stage

Calibrated Current Sense Element (@ 25°C): 0.732 mΩ 0.732 mΩ

Vout max: 3.400

Click Internal
Rdiv On/Off

Output OVP
Limit: 3.600

Set Margins to
+10% and -10%.

Requires Operation
ON: YES

General Configure Store

Basic Fault

Fault Limits

Input OVLO Limit: 15.00 V 15.00 V

Input UVLO Turn-On Threshold: 7.60 V 7.60 V

Input UVLO Turn-Off Threshold: 7.00 V 7.00 V

Output OVP Limit: 3.600 V 3.600 V

Output OVP Response Delay: 40.00 μs 40.00 μs

Output OVP Retry/Latch: Retry Retry

Output OCP Limit: 40 A 40 A

Output OCP Response Delay: 1500.0 μs 1500.0 μs

Output OCP Retry/Latch: Retry Retry

Output OCP Retry Delay: 500 ms 500 ms

OTP Limit: 120 °C 120 °C

UTP Limit: -50 °C -50 °C

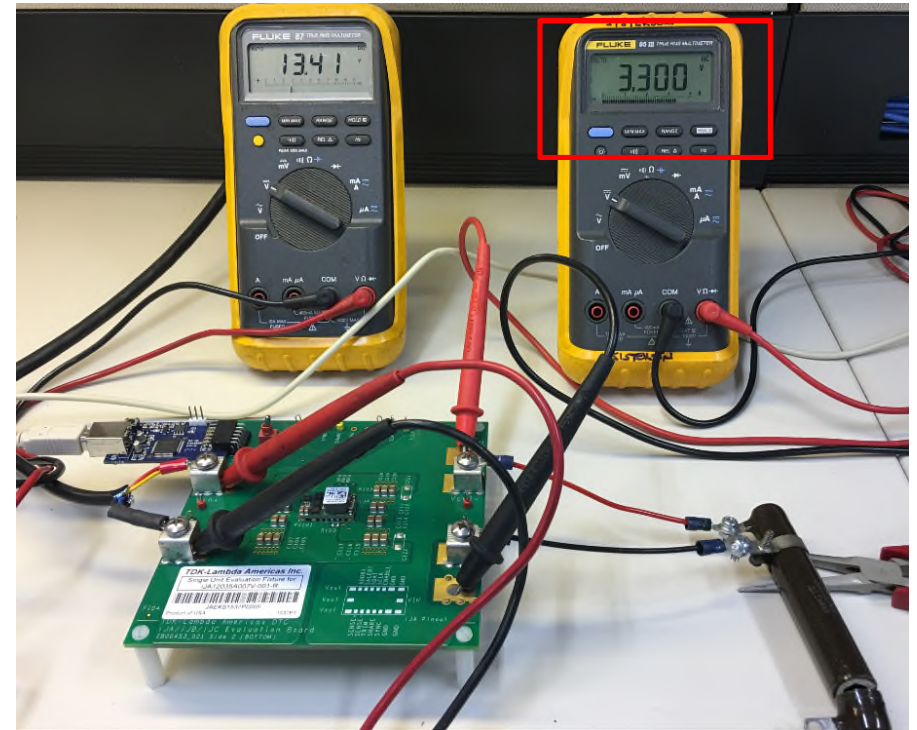
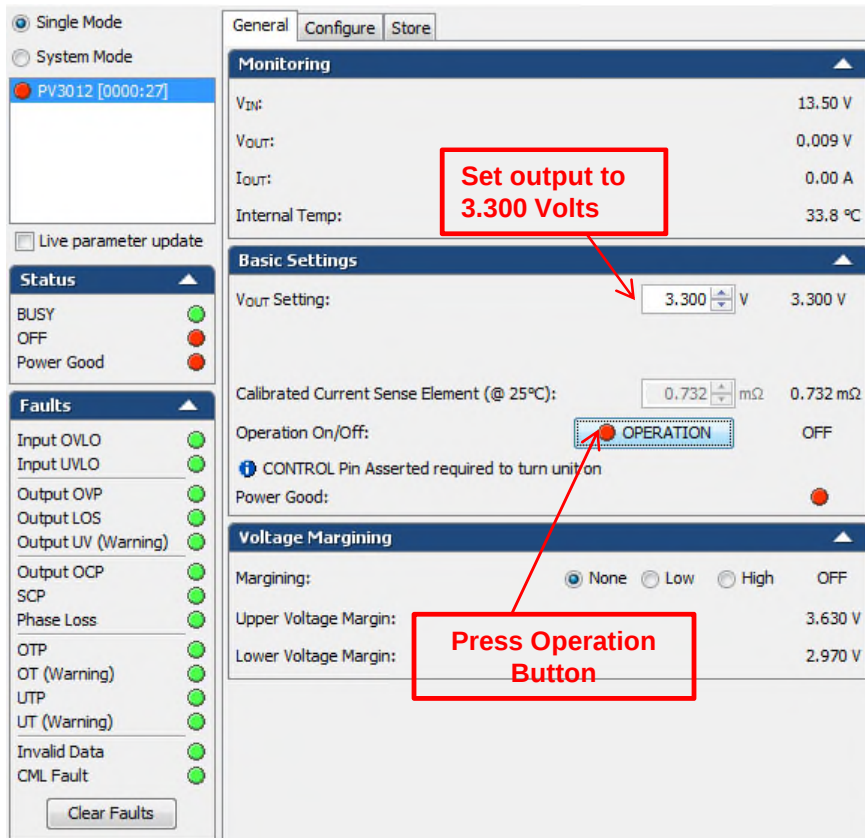
Warning Limits

Output UV Limit: 0.801 V 0.801 V

OT Limit: 110 °C 110 °C

UT Limit: -30 °C -30 °C

Exercise the Module (cont.)



Exercise the Module (cont.)



From the General Tab:

Adjust the Margin from 1.00 Volt +10% and –10%

Voltage Margining	
Margining:	☒ None ☐ Low ☐ High OFF
Upper Voltage Margin:	1.100 V
Lower Voltage Margin:	0.900 V

Monitoring	
V _{IN} :	13.49 V
V _{OUT} :	1.005 V
I _{OUT} :	3.32 A
Internal Temp:	32.0 °C

Voltage Margining	
Margining:	☐ None ☒ Low ☐ High LOW
Upper Voltage Margin:	1.100 V
Lower Voltage Margin:	0.900 V

Monitoring	
V _{IN} :	13.50 V
V _{OUT} :	0.905 V
I _{OUT} :	2.99 A
Internal Temp:	31.7 °C

Voltage Margining	
Margining:	☐ None ☐ Low ☒ High HIGH
Upper Voltage Margin:	1.100 V
Lower Voltage Margin:	0.900 V

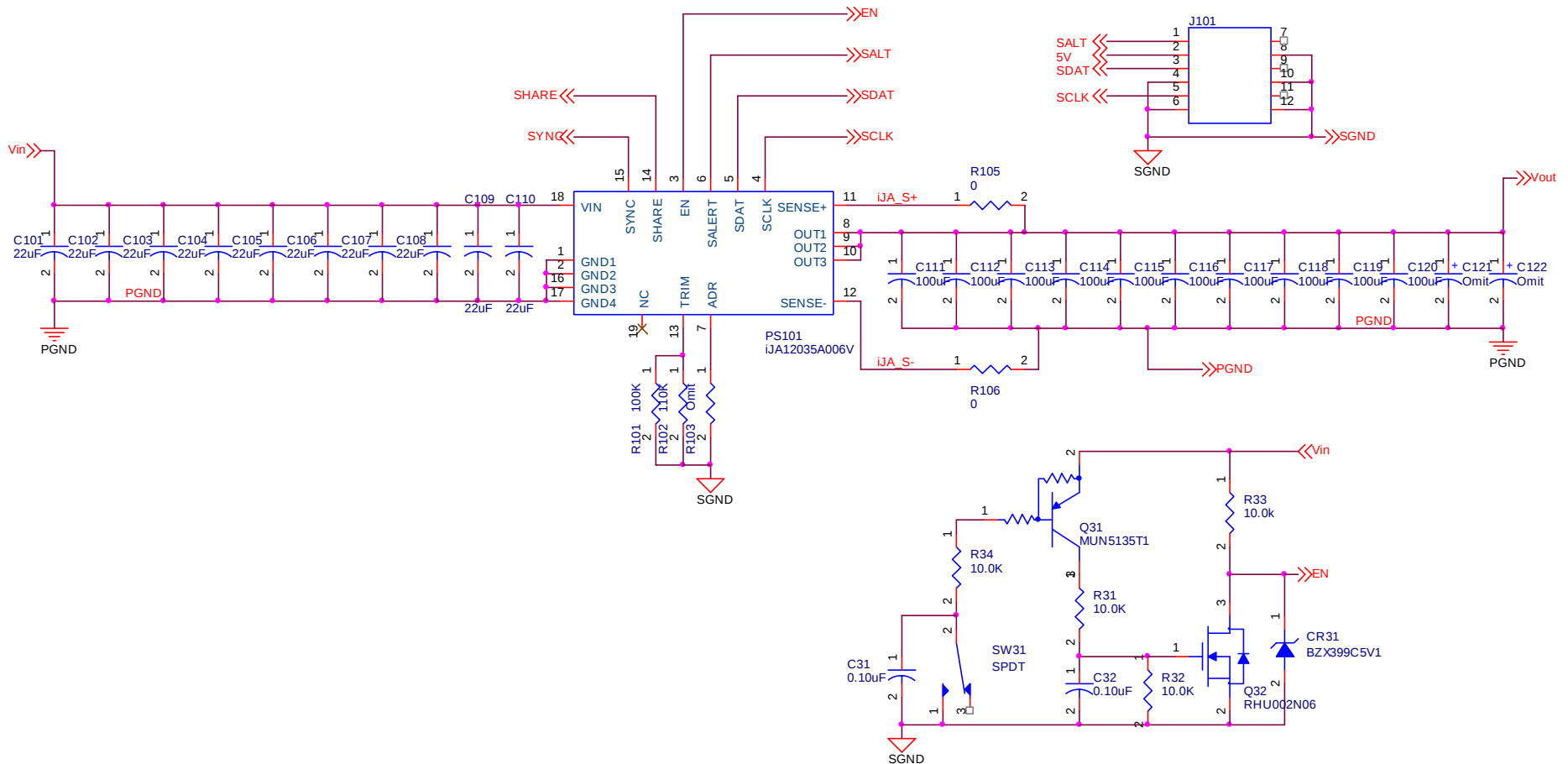
Monitoring	
V _{IN} :	13.49 V
V _{OUT} :	1.103 V
I _{OUT} :	3.67 A
Internal Temp:	31.6 °C

Appendix

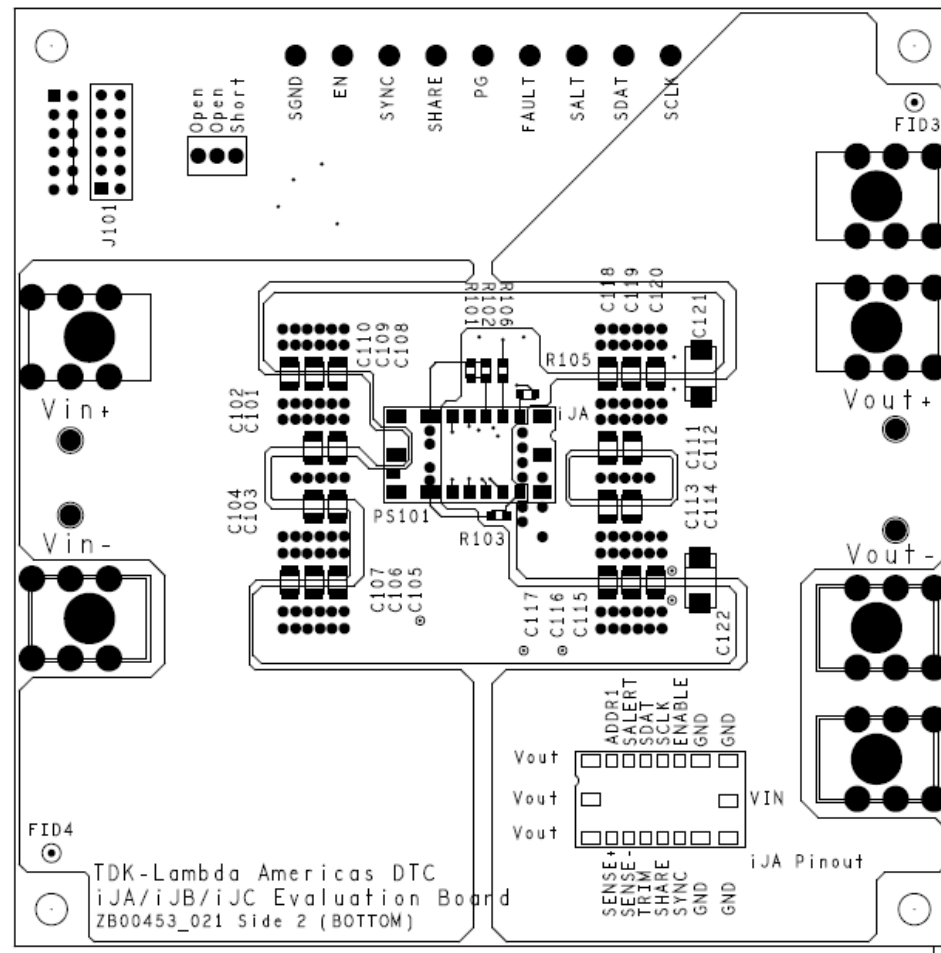


- iJA Eval Board Schematic
- iJA Eval Board Silkscreen
- iJA Eval Board BOM

Eval Board Schematic (iJA series)



Board Layout (iJA Series)



BOM (iJA Series)



BOM Ref Des	Description	Manufacturers,Mfr. Part Number	Manufacturer
C101	Capacitor	C3225X7R1C226MT	TDK
C102	Capacitor	C3225X7R1C226MT	TDK
C103	Capacitor	C3225X7R1C226MT	TDK
C104	Capacitor	C3225X7R1C226MT	TDK
C105	Capacitor	C3225X7R1C226MT	TDK
C106	Capacitor	C3225X7R1C226MT	TDK
C107	Capacitor	C3225X7R1C226MT	TDK
C108	Capacitor	C3225X7R1C226MT	TDK
C109	Capacitor	C3225X7R1C226MT	TDK
C110	Capacitor	C3225X7R1C226MT	TDK
C111	Capacitor	C3225X5R0J107MT	TDK
C112	Capacitor	C3225X5R0J107MT	TDK
C113	Capacitor	C3225X5R0J107MT	TDK
C114	Capacitor	C3225X5R0J107MT	TDK
C115	Capacitor	C3225X5R0J107MT	TDK
C116	Capacitor	C3225X5R0J107MT	TDK
C117	Capacitor	C3225X5R0J107MT	TDK
C118	Capacitor	C3225X5R0J107MT	TDK
C119	Capacitor	C3225X5R0J107MT	TDK
C120	Capacitor	C3225X5R0J107MT	TDK
C32	Capacitor	C1608X7R1H104KT	TDK
CONN1	Connector	8196	Keystone
CONN2	Connector	8196	Keystone
CONN5	Connector	8196	Keystone
CONN6	Connector	8196	Keystone
CR31	Zener diode SOD323	BZX384-B5V1	NXP semiconductor
J1	12 pin header	MC34771	Multi comp
PS1	Digital POL Module		TDK Lambda Americas Inc
PWB1	PWB		TDK Lambda Americas Inc
Q31	Transistor SOT323	MUN5135T1G	On semiconductor
Q32	Mosfet SOT323	RHU002N06	Rohm
R101	Resistor 0805	RK73H2ATTE1003F	KOA
R102	Resistor 0805	RK73H2ATTE1103F	KOA
R105	Resistor 0805	RK73Z2ATTE	KOA
R106	Resistor 0805	RK73Z2ATTE	KOA
R7	Resistor 0805	RK73Z2ATTE	KOA
R31	Resistor 0805	RK73H2ATTE1002F	KOA
R32	Resistor 0805	RK73H2ATTE1002F	KOA
R33	Resistor 0805	RK73H2ATTE1002F	KOA
R34	Resistor 0805	RK73H2ATTE1002F	KOA
SW31	Toggle switch	2AS3T2A1M2RE	Multi comp
TP1	Test pin	5014	Keystone
TP2	Test pin	5014	Keystone
TP3	Test pin	5014	Keystone
TP4	Test pin	5014	Keystone
TP5	Test pin	5011	Keystone
TP6	Test pin	5014	Keystone
TP7	Test pin	5014	Keystone
TP10	Test pin	5010	Keystone
TP11	Test pin	5011	Keystone
TP12	Test pin	5010	Keystone
TP13	Test pin	5011	Keystone

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