

Introduction

This user's manual provides instructions on using the *CondUlt software* to program and communicate with the FS140X/FS160X/FS100X/FS1412/FS1525 chip through the FaradaySemi I2C InterfaceBoard. The manual uses FS1525 as an example.

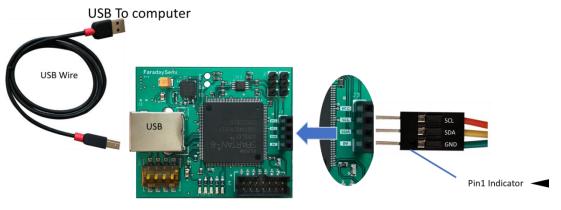
The software and complementary hardware, read and write directly to the circuit's registers using I2C.

System Requirements

- Computer installed with Windows 7 or higher.
- 2GB Of RAM
- USB Port Access
- FaradaySemi I2C interface board kit

Software and Hardware Setup

- 1. Download and install Silicon Labs CP210x USB to UART Bridge VCP Driver.
- 2. Extract the given GUI zip file xyz.zip.
- 3. Connect the I2C interface board to the evaluation board by using jumper cables as shown in Fig 1.
- 4. Connect I2C interface board to computer using USB Cable as shown in Fig 1.
- 5. Bus Voltage
 - a. The default setup uses VCC as bus voltage, jumper shorts pins 1 and 2 of J10 as shown in Fig 2.a.
 - b. If using **external bus voltage**, place shorting jumper across pins 2 and 3 of J10 and attach external Bus Voltage to test point "VEXTBUS." Show in in Fig 2.b.



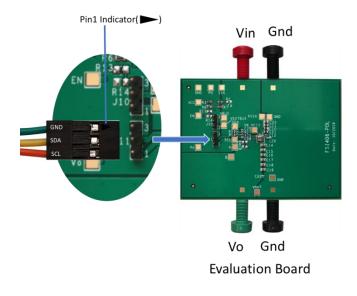
I2C Interface Board



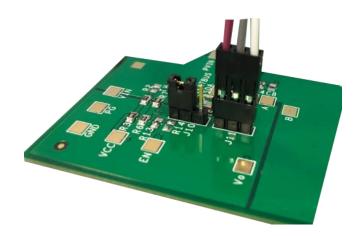








(Fig 1.) I2C interface board connections

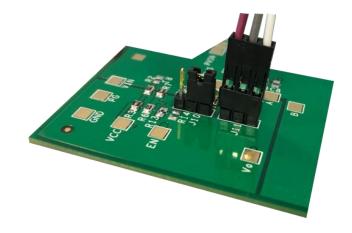


(Fig 2.a) Jumper across Pins 3 and 1 of J10. Uses VCC voltage as Bus Voltage.

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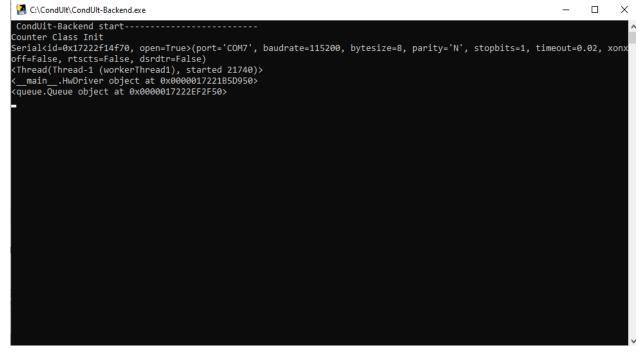




(Fig 2.b) Jumper across Pins 2 and 1 of J10. Uses VEXTBUS as Bus Voltage.

Launching the GUI

1. Go to C:\Conduit (the default installation folder) and double-click CondUIt-Backend.exe to launch the backend. Wait until the backend is ready as indicated by the highlighted line below.





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From C:\Conduit, double click the CondUIt application to launch the GUI. The GUI will launch in "offline" mode as shown in the highlighted area below, which means that it can be used without connecting the dongle to a FS1525 device/demo board. The green symbol indicates that the dongle status is good.

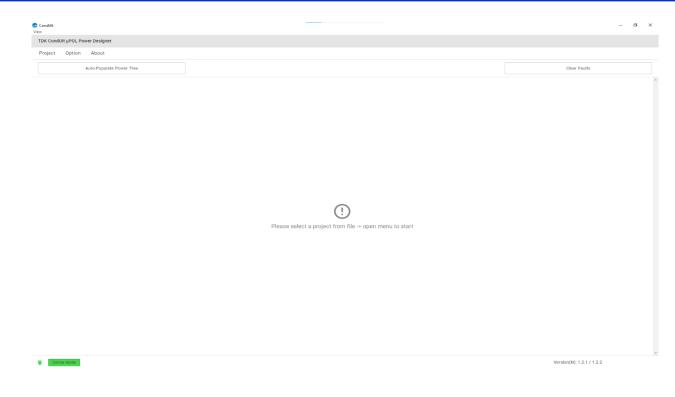
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Project Option About		
Auto-Populate Power Tree		Clear Faults
	(!)	
	0	
	Please select a project from file -> open menu to start	
Offline Mode		
Offline Mode		Version(N): 1.2.1 / 1.2.2

NOTE: A future release of CondUIT will allow launching the backend as well as front-end with a single click

3. At this stage a project can be built in "Offline" mode, but this user guide covers the operation when a demo board is connected to the dongle and powered up. This is called the "Online" mode. The steps for offline mode are identical. To switch to online mode, click on Offline mode and it will toggle to say Online mode, in green.

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Creating and working with a Project

1. Go to Project>Create to create a new project. After filling out Project Name and Description, click the SAVE button to continue.

New Project	×
Project Name	
FS1525 Test	
Description	11/50
GUI User Guide	
	14/200
CA	INCEL SAVE
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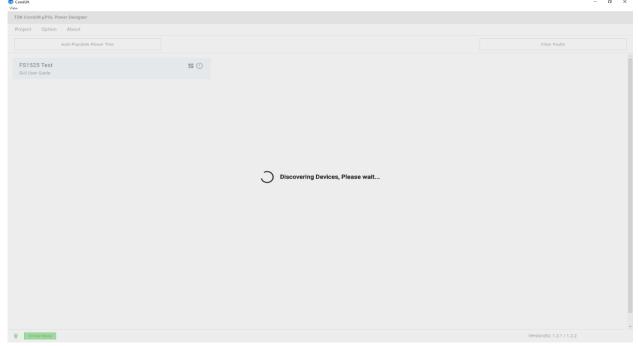
Patent Protected: US 9,729,059 B1; US 10,193,442 B2 Copyright C 2021 TDK Corporation. All rights reserved.

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Data and specifications subject to change without notice.

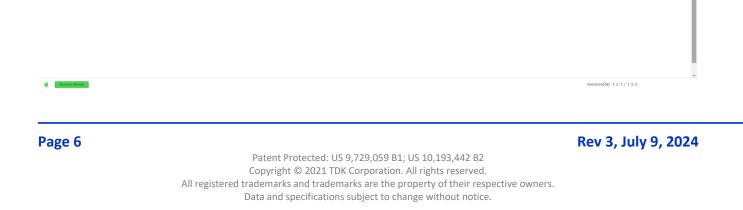


2. Click on the Auto-populate Power Tree button to scan the bus for all i2c/PMBus devices. When a device is found, it will automatically populate in the project power tree. Device discovery scans for nearly 127 addresses with some wait states, so this step can take up to 2-3 minutes.



3. After the Auto-populate process is complete, the display will show the power tree enumerated with all the devices that responded to the scan, including their i2c and PMBus addresses.

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TDK CondUlt µPOL Power Designer					
Project Option About					
Auto-Populate Power Tree					Clear Faults
FS1525 Test GUI User Guide	II ()	FS1525			0
FS1525 rail1	= ()				
12C 0x10	* = *	Input Voltage	Output Voltage	Output Current	Temperature
PMBus 0x70	٦				





At this stage, the Telemetry display dashboard is not populated and fault indicator is red. Clicking on Project Dashboard brings up the system values and clicking on Fault status gives the current status of Faults of the device.

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et Option About Project dashboard	Project fault	status		
Auto-Provide Power Tree				Clear Faults
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	Input Voltage	Output Voltage	Output Current	Temperature
Export config file	I2c workspace			
		Γ	Telemetry display on dashboar	d
Import config file	PMBus workspace	L		

4. It is recommended to provide meaningful names to the rail (s). This is particularly useful for a multi-rail project and is done simply by clicking and typing over the default Rail name.

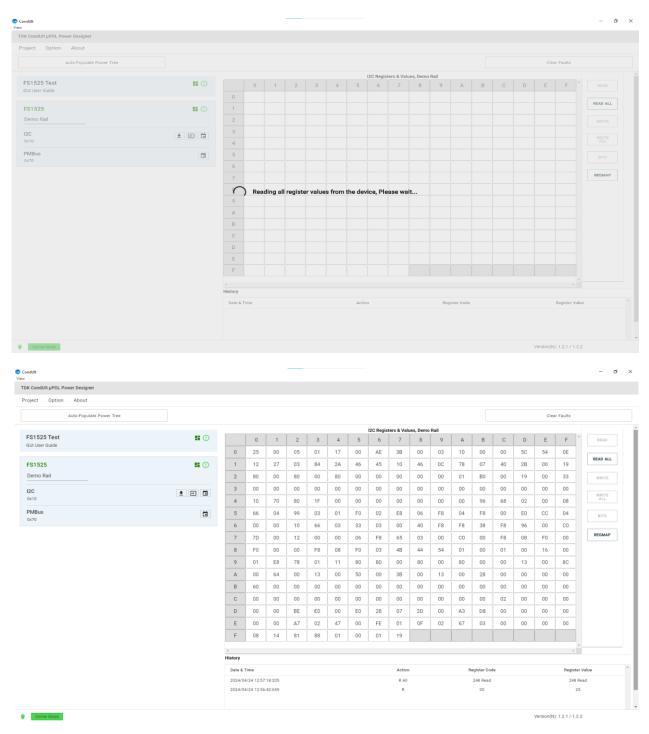
FS1525 Test GUI User Guide	II ()
FS1525 Demo Rail	II ()
I2C 0x10	
PMBus 0x70	

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5. At this stage, the user can read all the i2c registers using the Read All Registers button.



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6. Exporting a configuration file:

This step illustrates the export/save of a register configuration file in text format once any changes have been made to any of the registers. In this illustration, to keep it simple, only registers 4C and 4D are written using the WRITE ALL button. Reg 0x4D is written with a value of 0x02 and Reg 0x4C is written with a value of 0x70. Note that single registers may be written using the WRITE button. The BITs button is useful to change individual bit values within a register when different bits or groups of bits in each 8-bit register serve different functions.

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0x10		4	10	70	80	1F	00	00	00	00	00	00	00	96	70	02	00	08	WRITE
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Before clicking on Export Symbol, Go to Options/Expert Mode, enter password: expertgui. Click on Export and all the values will be saved as a configuration file.

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Auto-Populate Power	Tree																Clea	ar Faults	
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0x70	۵	5	66 00	04	99 10	03 66	01	F0 33	02	E8 00	06 40	F8 F8	04 F8	F8 38	00 F8	E0 96	00	04 C0	BITS
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7. Importing a text configuration file into the registers:

By clicking the import button, the user can browse and select the configuration file they wish to import into the design/project.

Auto-Populate Power Tree																	Clea	er Faults	
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0	* = 6		00	00	00	00 1F	00	00	00	00	00	00	00	00	00	00	00	00	WRITE
Bus	Import	4	10 66	70 04	80 99	03	00	00 F0	00	00 E8	00	00 F8	00	96 F8	68 00	02 E0	00 CC	08	
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0x10		4	10	70	80	1F	00	00	00	00	00	00	00	96	68	02	00	08	WRITE
PMBus		5	66	04	99	03	01	FO	02	E8	06	F8	04	F8	00	E0	CC	04	BITS
0x70		6	CO	00	10	66	03	33	03	00	40	F8	F8	38	F8	96	00	CO	
		7	7~					-	-	15	03	00	CO	00	F8	OC	FO	00	REGMAP
		8	FI	mport v	will era	se all e	xisting	registe	r values	в	44	54	01	00	01	00	16	00	
		9	c					c	ANCEL	DK 10	80	00	80	00	00	13	00	8C	
		A	00	13	00	13	00	50	00	ЗB	00	13	00	28	00	01	40	00	
		в	60	10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
		C	00	00	00	00	00	00	00	00	00	00	00	00	02	00	00	00	
		D	00	00	BE	EO	00	EO	38	07	30	00	A2	D8	A2	02	00	00	
		E	00	00	A8	02	81	00	03	02	14	02	01	06	A2	02	00	00	
		F	08	15	61	88	01	00	01	19									
		1											1		1				
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		Date &	Time							Action			R	legister Cod	de			Register	Value
		2024/0	5/17 13:09	20:899						w				4C				68	
			5/17 13:09							W				4C				68	
			5/17 13:08 5/17 13:07							R All R All				248 Read				248 Re	

Click OK

K CondUlt µPOL Power Designer																			
oject Option About																			
Auto-Populate Power Tree																	Clea	ar Faults	
									I2C Regis	ters & Valu	es, Demo	Rail							
FS1525 Test OU User Guide	S (1)		0	1	2	3	4	5	6	7	8	9	A	В	C	D	E	F	READ
		0	25	00	05	01	17	00	AE	3B	00	03	10	00	00	5C	54	OE	READ ALL
S1525 Demo Rall	II ()	1	12	27	03	84	2A	46	45	10	46	00	78	07	40	2B	00	19	
		2	80	00	80	00	80	00	00	00	00	00	01	01	00	19	00	33	WRITE
2C 1x10	* 🗉 🖬	3	10	70	80	00 1F	00	00	00	00	00	00	00	96	00 70	00	00	00	WRITE
MBus		4	66	04	99	03	00	F0	00	E8	00	F8	00	96 F8	00	E0	CC	08	
x70	G	6	CO	04	10	66	03	33	02	00	40	F8	F8	38	F8	96	00	C0	BITS
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			You ne	ed to V	Vrite Al	l impor	ted valu	ues to s	save in	device	44	54	01	00	01	00	16	00	
		9								OK	-	00	80	00	00	13	00	80	
		A	00	13	00	13	00	50	00	3B	00	13	00	28	00	01	40	00	
		в	60	10	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
		С	00	00	00	00	00	00	00	00	00	00	00	00	02	00	00	00	
		D	00	00	BE	EO	00	EO	38	07	30	00	A2	D8	A2	02	00	00	
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			5/17 13:09 5/17 13:09							w				4C 4C				68	
		2024/0	5/17 13:08	25.953						R All				248 Read				248 R	head

Click OK. Note that at this point the configuration values are part of the project but have not yet been written to the device registers. To do so, click WRITE ALL.

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CondUlt µPOL Power Designer																			
roject Option About																			
Auto-Populate Power Tree																	Clea	r Faults	
									I2C Regist	ters & Valu	Jes, Demo	Rail							
FS1525 Test GUI User Guide	II ()			1	2	3	4	5	6	7	8	9	A	В		D	E	F	
		0	25	00	05	01	17	00	AE	3B	00	03	10	00	00	5C	54	OE	READ ALL
FS1525	II ()	1	12	27	03	84	2A	46	45	10	46	0C	78	07	40	2B	00	19	
Demo Rail		2	80	00	80	00	80	00	00	00	00	00	01	01	00	19	00	33	
12C	* = 6	3	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0x10		4	10	70	80	1F	00	00	00	00	00	00	00	96	70	02	00	08	
PMBus		5	66	04	99	03	01	FO	02	E8	06	F8	04	F8	00	EO	CC	04	
0x70		6	CO	00	10	66	03	33	03	00	40	F8	F8	38	F8	96	00	CO	
		7	7D	00	12	00	00	06	F8	65	03	00	CO	00	F8	0C	FO	00	REGMAP
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		9	03	E8	78	01	11	80	80	00	80	00	80	00	00	13	00	8C	
		A	00	13	00	13	00	50	00	3B	00	13	00	28	00	01	40	00	
		в	60	10	00	00	00			00	00			00			00	00	
					00	00				00					02			00	
		D		00	BE	EO		EO	38	07	30		A2	D8	A2	02		00	
		E			A8		81		03		14		01	06	A2			00	
		F	08	15	61	88	01		01	19									
		History																	
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			5/17 13:09							W				4C				61	
			5/17 13:09 5/17 13:08							R All				4C 248 Read				64 240 F	

NOTE:

Note that any changes so far are still volatile and the device will revert to its default values if Vin/Vcc are cycled. To permanently store the values to the 10 times programmable OTP memory, please follow the steps in the appendix. In a future release of CondUlt this process will be made simpler by addition of a single Burn OTP button.

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8. PMBus work area: Click the PMBus workspace button to bring up the PMBus work area.

t Option About Auto-Populate Power Tree S25 Test S25 Test S25	Project Option About																			
1 1 1 1 2 3 4 5 7 1 0 1 0 1 0 1 0 1 0 1 0 0 1 0 0 1 0 0 1 0	Auto-Populate Power Tree																	Cle	ar Faults	
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See an illustration of command history below:

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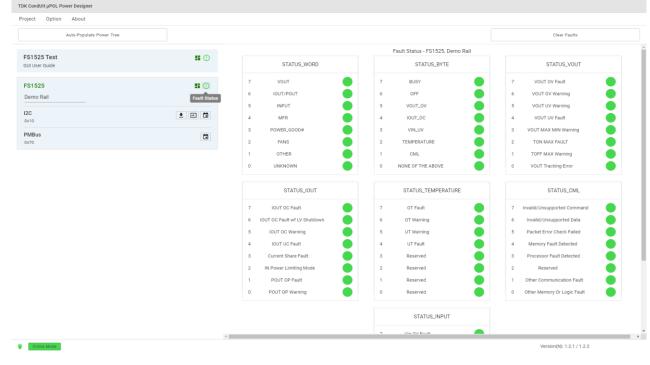
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Auto-Populate Power Tree					Clea	ar Faults
		Commands Values, Demo Rail			List Of Commands	
1525 Test User Guide	5	Real Value On 👻	<u>^</u>		SMBALERT_MASK - 1B	
		Real Value			OPERATION - 1	
1525	II ()	Hex Value 80			ON_OFF_CONFIG - 2	
no Rail		100 Mag. 00			WRITE_PROTECT - 10	
					CAPABILITY - 19	
1	1 🗉 🖬	WRITE READ SEND			VOUT_MODE - 20	
Bus		Description :			VOUT_OV_FAULT_RESPONSE -	41
					VOUT_UV_FAULT_RESPONSE -	
0			READ ALL COMM	MANDS	VUUI_UV_FAULI_KESPUNSE -	45
1			READ ALL COMM	MANDS	VUI_UV_MUL_RESPONSE	43
		History	READ ALL COMM	AANDS		43
1		Date & Time Command Code	Command	Action	Real/Register Values	Herz/Mask Values
		Date & Time Command Code 2024/04/24 13:35:24:987 1	Command	Action	Real/Register Values On	Hex/Mask Values 80
1		Date & Time Command Code 2024/04/24 13:35:24:987 1 2024/04/24 13:35:18:781 1	Command OPERATION OPERATION	Action W R	Real/Register Values On Off	Hex/Mask Values 80 00
1		Date & Time Command Code 2024/04/24 13:35:24:987 1	Command	Action	Real/Register Values On	Hex/Mask Values 80

9. Device FAULT Status : There is a dedicated area in GUI indicating any Faults that happen during the device operation. This is an example of FS1525 Fault Status without any faults - g × -



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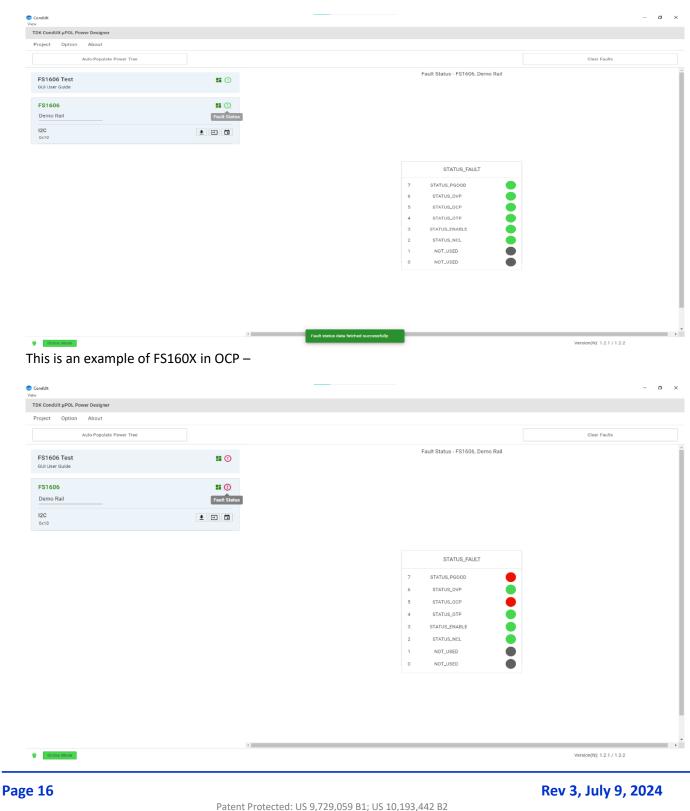
Rev 3, July 9, 2024

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For FS160X/FS100X/FS140X, there is no PMBUS functionality, and the fault status page is much simpler –



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NOTE – The fault bits for FS160X/100X/FS140X are stickied, and removing the Fault won't change the flag from Red to Green. Also, the Clear Faults tab on top right is tied to PMBUS and thus only works for FS1525/FS1412. As such, to reset the bit, En Cycling needs to be done. (NCL needs Power Cycling)

10. Opening an already created Project.

Go to Project>Open and select the project that needs to be accessed. Once selected, the following screen pops up –

IK CondUlt µPOL Power Designer					
roject Option About					
Auto-Populate Power Tree					Clear Faults
FS1525 Test GUI User Guide	II ()	FS1525 Demo Rail			
FS1525 Demo Rail	II ()	11.875	1.789	0.000	45.000
12C 0x10	± + *	Input Voltage	Output Voltage	Output Current	Temperature
PMBus 0x70					
		6			
		C Syncing	g Devices, Please wait		
		C Syncin	g Devices, Please wait		
		C Syncin	g Devices, Please wait		
		C Syncin	g Devices, Please wait		
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After Syncing is complete, the project will be ready for use.

11. Deleting a Project

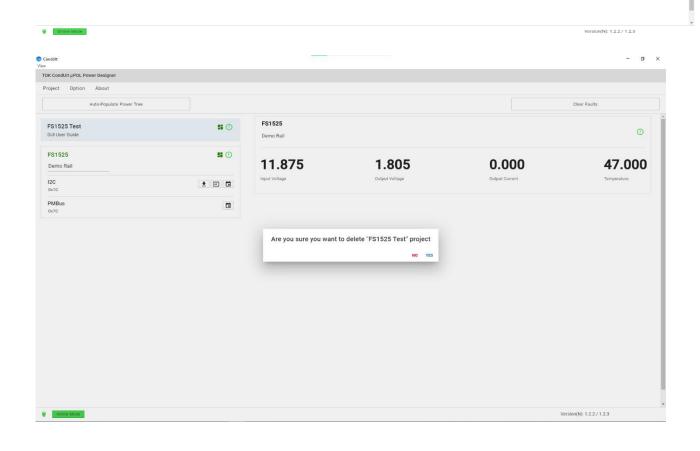
Right Click on the Dashboard Panel and Delete icon will come up.

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σ TDK Co ndUlt µPOL Power De About Tre FS1525 FS1525 Test GUI User Guide () 🗍 Delete Demo Rail FS1525 **II** () 11.875 1.805 0.000 47.000 Demo Rail 12C 0×10 ± 🗉 🛱 PMBus





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APPENDIX:

公TDK

INSTRUCTIONS to burn OTP for FS1412

- 1) Once all registers are written to desired values, read all the values into a configuration file as (register, data) pairs
- 2) Read Reg 0x92 to check number of available user banks

Reg 0x92[7:4]	Number of writes left
0001	9
0010	8
0011	7
0100	6
0101	5
0110	4
0111	3
1000	2
1001	1
1010	0

3) Apply 7.5V+/-0.25V to Vin pin

- 4) If number of writes left > 0, write 0x02 to reg 0x89
- 5) Read reg 0x93. If bit [1] is 1, the write to OTP succeeded. If this bit is 0, the write failed.
- 6) If successful, cycle Vin.
- 7) Verify step:

Read all regs, compare with the values in configuration file, and verify that they Match

- 8) If steps 5 or 7 fail, retry steps 1 to 4.
- 9) If steps 5 or 7 fail again, debug.

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INSTRUCTIONS to burn OTP for FS160X/FS100X

- 1) Once all registers are written to desired values, read all the values into a configuration file as (register, data) pairs
- 2) Read Reg 0x20 to check number of available banks

Reg 0x20[5:0]	Number of writes left
001001	3
010010	2
011011	1
100100	0

3) Apply 7.5V+/-0.25V to Vin pin

- 4) If number of writes left > 0, write 0x15 to reg 0x2B, make sure bit[1] of reg 0x1D is 1 (turn on OTP clock)
- 5) Read reg 0x21. If bit [0] is 1, the write to OTP succeeded. If this bit is 0, the write failed.
- 6) If successful, cycle Vin.
- 7) Verify step:

Read all regs, compare with the values in configuration file, and verify that they Match

- 10) If steps 5 or 7 fail, retry steps 1 to 4.
- 11) If steps 5 or 7 fail again, debug.

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INSTRUCTIONS to burn OTP for FS1525/FS1515

1) Once all registers are written to desired values, read all the values into a configuration file as (register, data) pairs

Reg 0xF2[7:4]	Number of writes left
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	A(10)

2) Read Reg 0xF2 to check number of available user banks

3) Apply 7.5V+/-0.25V to Vin pin

- 4) If number of writes left > 0, write 0x02 to reg 0xC9
- 5) Read reg 0xF3. If bit [1] is 1, the write to OTP succeeded. If this bit is 0, the write failed.
- 6) If successful, cycle Vin.
- 7) Verify step:

Read all regs, compare with the values in configuration file, and verify that they Match

- 8) If steps 5 or 7 fail, retry steps 1 to 4.
- 9) If steps 5 or 7 fail again, debug.

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INSTRUCTIONS to burn OTP for FS140X

- 1) Once all registers are written to desired values, read all the values into a configuration file as (register, data) pairs
- 2) Read Reg 0x20 to check number of available banks

Reg 0x20[5:0]	Number of writes left
001001	3
010010	2
011011	1
100100	0

3) Apply 7.5V+/-0.25V to Vin pin

- 4) If number of writes left > 0, write 0x02 to reg 0x1D, make sure bit[1] of reg 0x1D is 1 (turn on OTP clock)
- 5) Read reg 0x21. If bit [1] is 1, the write to OTP succeeded. If this bit is 0, the write failed.
- 6) If successful, cycle Vin.
- 7) Verify step:

Read all regs, compare with the values in configuration file, and verify that they Match

- 8) If steps 5 or 7 fail, retry steps 1 to 4.
- 9) If steps 5 or 7 fail again, debug.

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