Electro Magnetic Compatibility Test Report

Regarding the CE Mark Compliance of the

EVAL-ADICUP360

In Accordance with the Information Technology Standards

EN 55022:2010 for Emissions

And

EN 55024:2010 for Immunity

Revision History

Release	Date	Description
1.0	17 November 2015	Initial release

Description of Equipment Under Test (EUT)

Test Item	:	Design Evaluation Board
Model number	:	EVAL-ADICUP360
Manufacturer	:	Analog Devices

Manufacturer's information

Manufacturers Representative	:	Robin Getz – Brandon Bushey
Company	:	Analog Devices
Address	:	804 Woburn St. Wilmington, MA 01887 U.S.A.
Website	:	http://www.analog.com/en/index.html

Tests Performed at

Address	:	EMI Test Lab LLC 1822 Skyway Drive Unit J Longmont, Colorado 80504 U.S.A
Website	:	http://www.emitestlab.com/

Test Specifications	:	EN 55022:2010 and EN 55024:2010
Tests completed	:	13 November 2015
Result of Testing	:	**The EUT is in Compliance with EN 55022:2010 and EN 55024:2010**
Senior EMC Engineer	:	Dennis King
Report written by	:	Dennis King – EMI Test Lab
Report date	:	17 November 2015

These test results relate only to the specific unit that was tested. A periodic production audit to verify continued compliance is recommended.

Table of Contents

1 General

1.1 Applied Standards

Analog Devices EVAL-ADICUP360 was evaluated for emissions using EN 55022:2010 and for immunity using EN 55024:2010.

EN 55022:2010 is the European Union's version of the international CISPR standard CISPR 22:2008.

EN 55024:2010 is the European Union's version of the international CISPR standard CISPR 24:2010.

1.2 Detailed description of the test configuration, input and output ports

Test Configuration Definition:

The EVAL-ADICUP360 is being tested per the Test Instructions provided by Analog Devices.

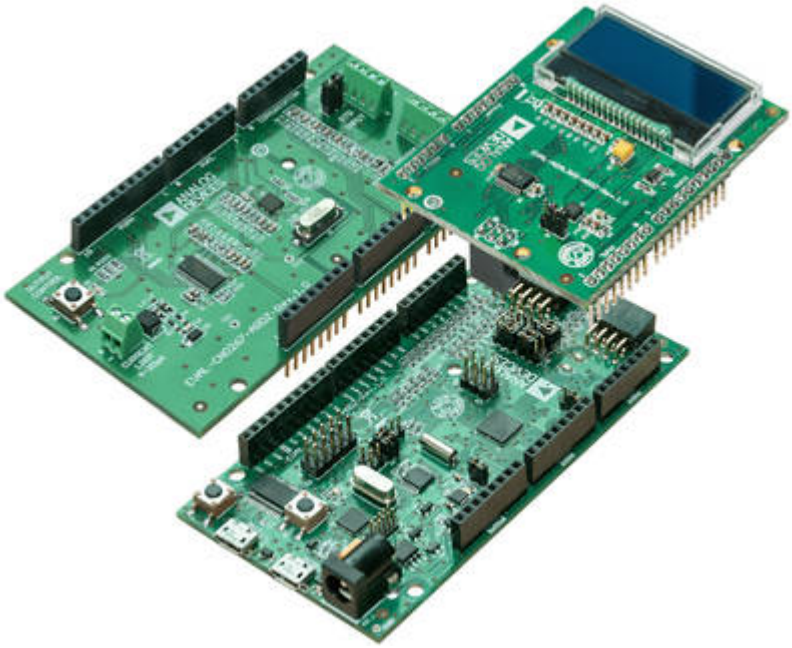
The following reference designs were tested representing typical use modes for the software and hardware. USB cables with ferrites at the circuit board end were used for all the testing. These cables are shipped with the kit.

The following reference designs are currently available and were tested:

- **Case 1: Blinking LEDs Demo** - Shows the basic steps of creating a new project for the EVAL-ADICUP360 base board, running and debugging the software.
- **Case 2: Command Line Interpreter Demo** - A Command Line Interpreter (CLI) demo project for the EVAL-ADICUP360 base board.
- **Case 3: Accelerometer Demo** - Illustrates the functionality of the ADXL362 3-axes accelerometer. It works with EVAL-ADXL362-ARDZ Shield.

About the EVAL-ADICUP360

The **EVAL-ADICUP360** is an Arduino-like platform based on the **ADUCM360** fully integrated, 3.9 kSPS, 24-bit data acquisition system that incorporates dual high performance, multichannel sigma-delta (Σ-Δ) analog-to-digital converters (ADCs), a 32-bit ARM Cortex™-M3 processor, and Flash/EE memory on a single chip. The platform has an Arduino-Due form factor and has two additional PMOD connectors. It is accompanied by an Eclipse based development environment.



CE Test Software:

The software used during testing is typical of what the end user would use. The ADuCM360-IDE program was pre-loaded on an ACER Aspire One notebook computer provided by Analog Devices. Case 1,2 and 3 were tested according to the Test Plan in section 7 of this report.

1.2.1 Description of test configuration

EUT	:	Design Evaluation Board
Manufacturer	:	Analog Devices
Part Number	:	EVAL-ADICUP360
Serial Number	:	3715-02 10
Test Voltage (host laptop)	:	230 VAC 50 Hz
Host Laptop	:	ACER Aspire One
Host Power Supply	:	Delta Electronics
Conductors	:	Line and Neutral
Power Supply P/N	:	AP0400100214904B7AP105
Shield Circuit Board for Case 3	:	EVAL-ADXL362-ARDZ rev 1.0

Note: the EVAL-ADICUP360 board gets its power through the connected usb cable, no other power connected to the EVAL-ADICUP360.

1.2.2. Description of tested input and output ports

Note: all cables are less than 3 meters in length.

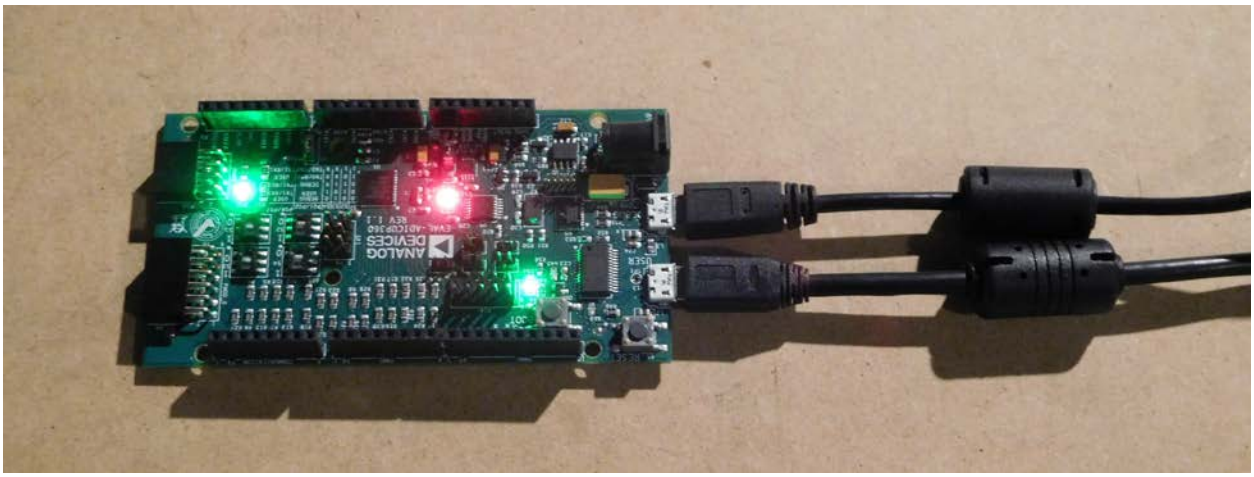
USB cables are from Monoprice.
Part Number: 5457

Number of cable type	Type of Cable	From	To	Shielded?	Remarks - length
2	USB Type A to Micro-B	Laptop USB ports	Eval board – user and debug ports	yes	3 ft. – Ferrite on the Micro-B end

1.2.3 Operation modes

The Equipment Under Test (EUT) was set up per Analog Device's test Instructions.

- **Case 1: Blinking LEDs Demo** - Shows the basic steps of creating a new project for the EVAL-ADICUP360 base board, running and debugging the software.
- **Case 2 :Command Line Interpreter Demo** - A Command Line Interpreter (CLI) demo project for the EVAL-ADICUP360 base board.
- **Case 3: Accelerometer Demo** - Illustrates the functionality of the ADXL362 3-axes accelerometer. It works with EVAL-ADXL362-ARDZ Shield.



Analog Devices EVAL-ADICUP260

2 Emissions

The EUT has been tested to determine conformity with the relevant emissions parts of the EN 55022:2010 standard.

AC Power line conducted and radiated field strength measurements concerning the emission of radiated and conducted electromagnetic disturbances were made.

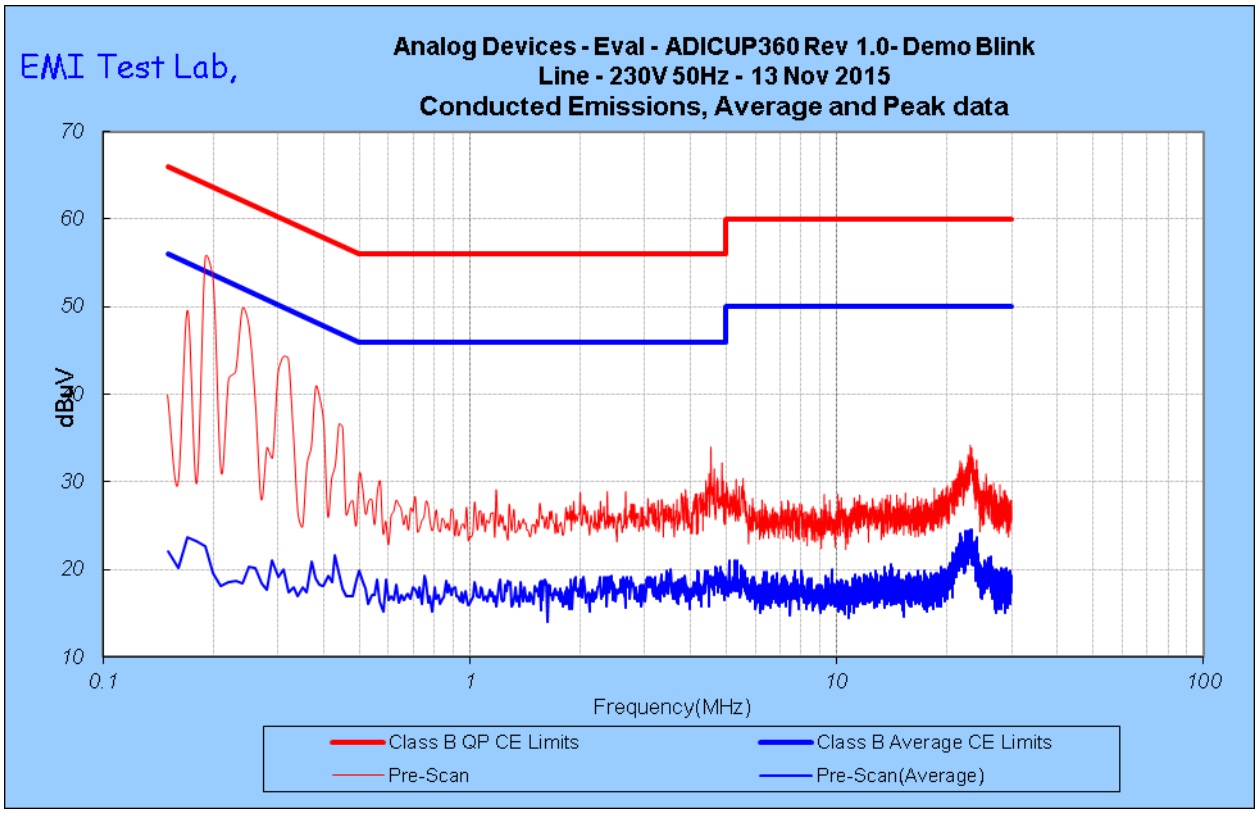
The EUT was not tested for AC harmonics and Flicker since there are no testing requirements for equipment with a power draw <75 watts.

2.1 AC Mains Power Input Ports

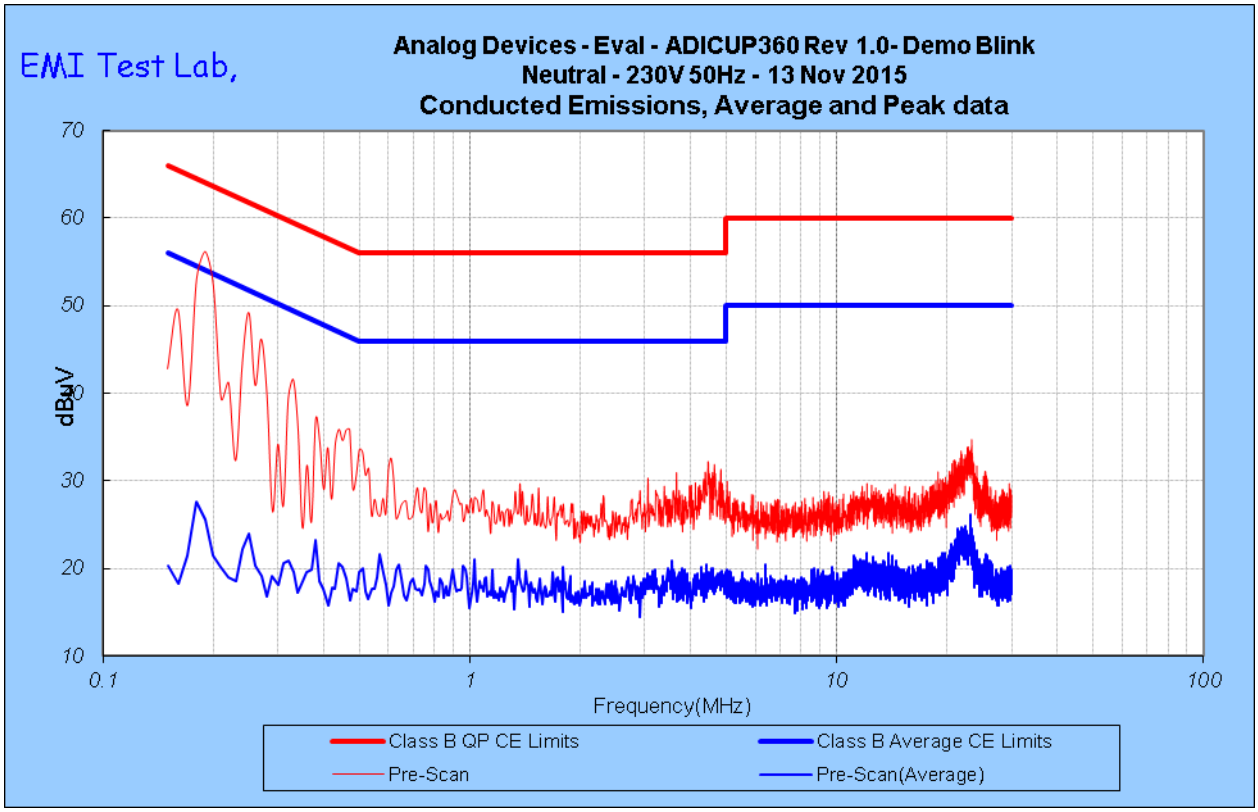
The disturbance voltage emissions levels at the AC mains power port of the EUT were measured in conformity with and according to the criteria as stated below.

Basic standard	:	CISPR 22:2008
Test setup	:	EN 55022:2010
Frequency range 1	:	0.15 – 0.5 MHz
Limit	:	66 dBuV quasi peak, 56 dBuV average
		Decreasing with the log of frequency to range 2
Frequency range 2	:	0.5 – 5 MHz
Limit	:	56 dBuV quasi peak, 46 dBuV average
Frequency range 3	:	5 – 30 MHz
Limit	:	60 dBuV quasi peak, 50 dBuV average

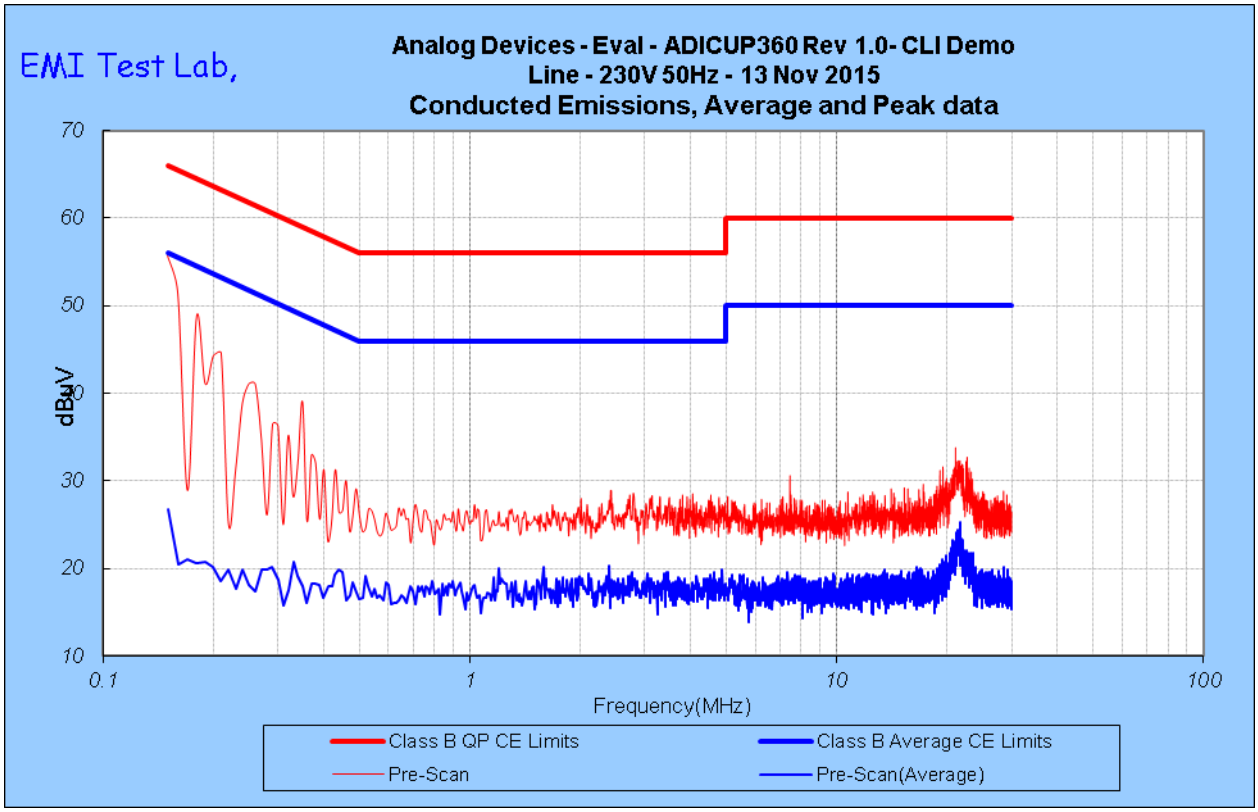
Results of the measurements concerning the emissions of voltage levels at the AC mains input port of the EUT.	**PASS Class B – home use**
Name of Test Engineer: Signature: Date:	Dennis King  13 November 2015
Remarks: Case 1, 2 and 3 all pass class b conducted emissions.	



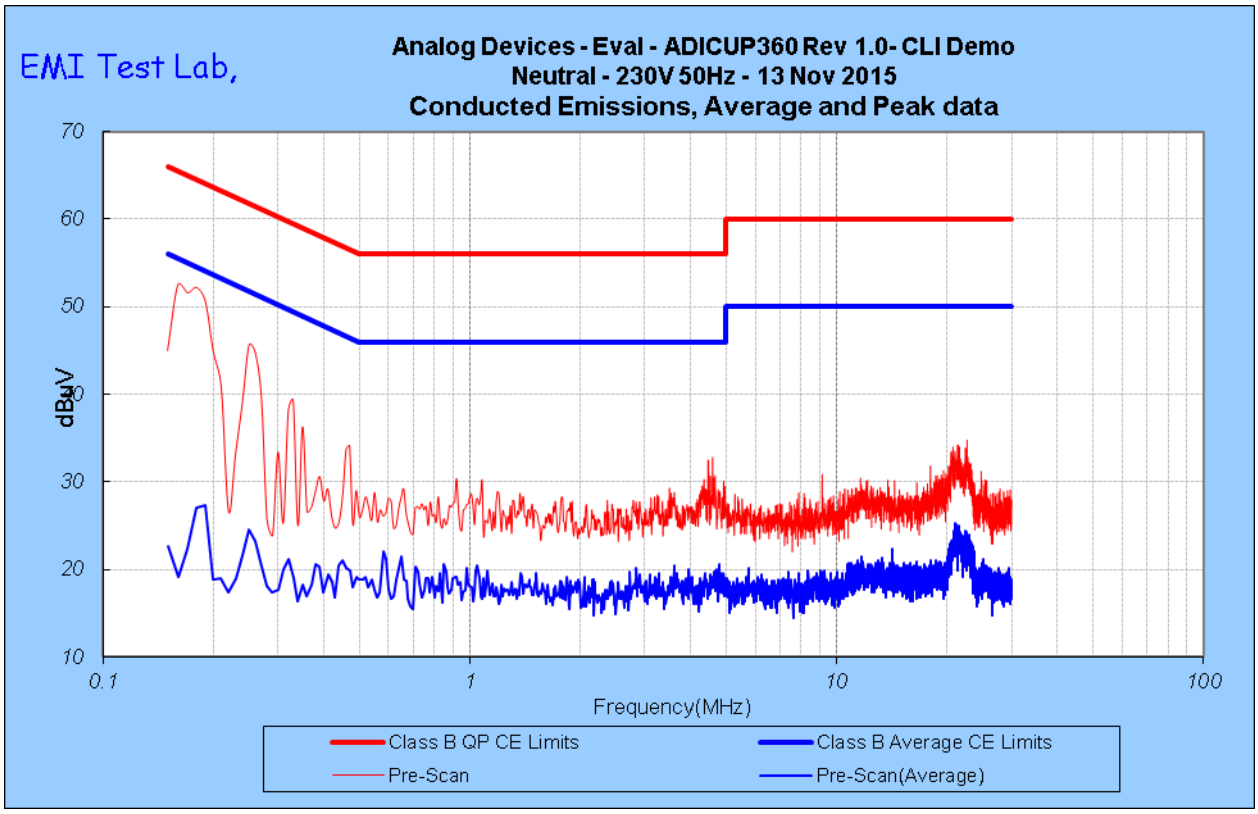
Case 1, Line - Peak data passing the Quasi Peak limit, Average data passing the Average limit



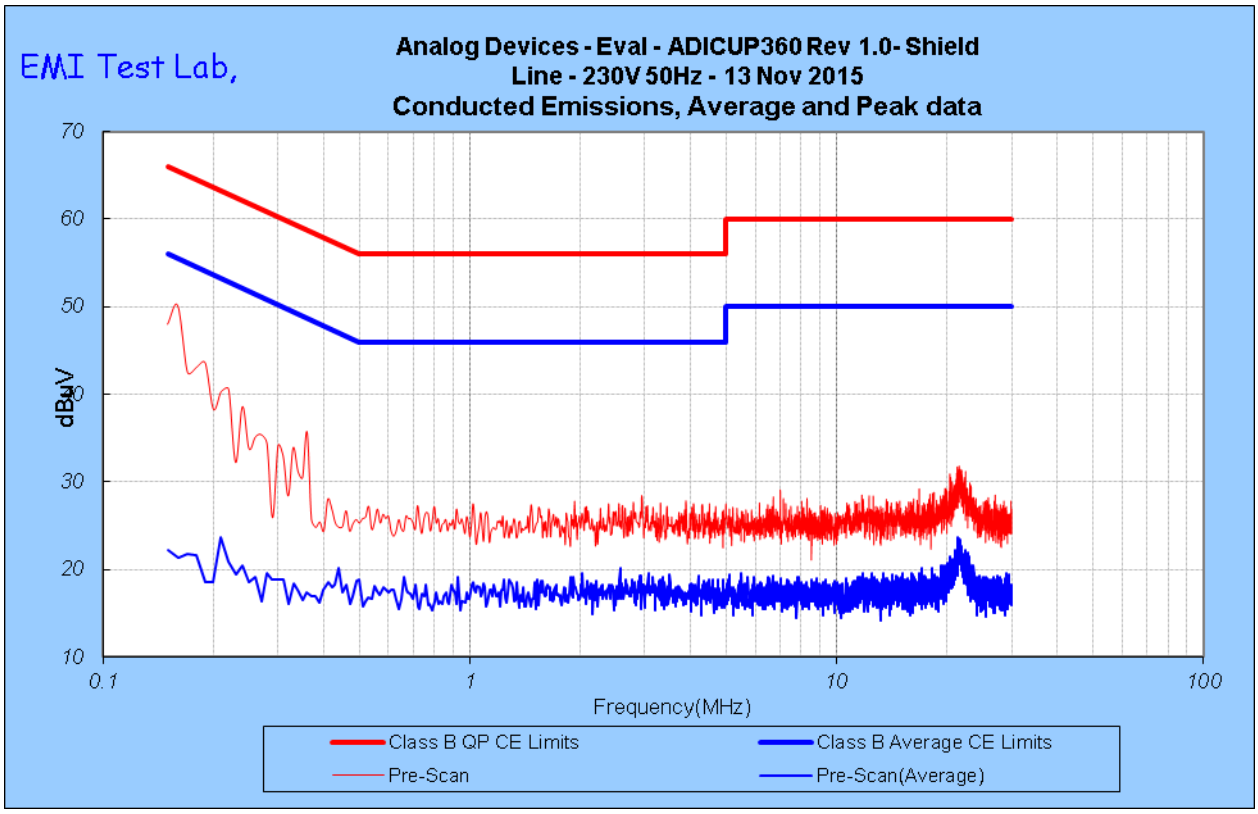
Case 1, Neutral - Peak data passing the Quasi Peak limit, Average data passing the Average limit



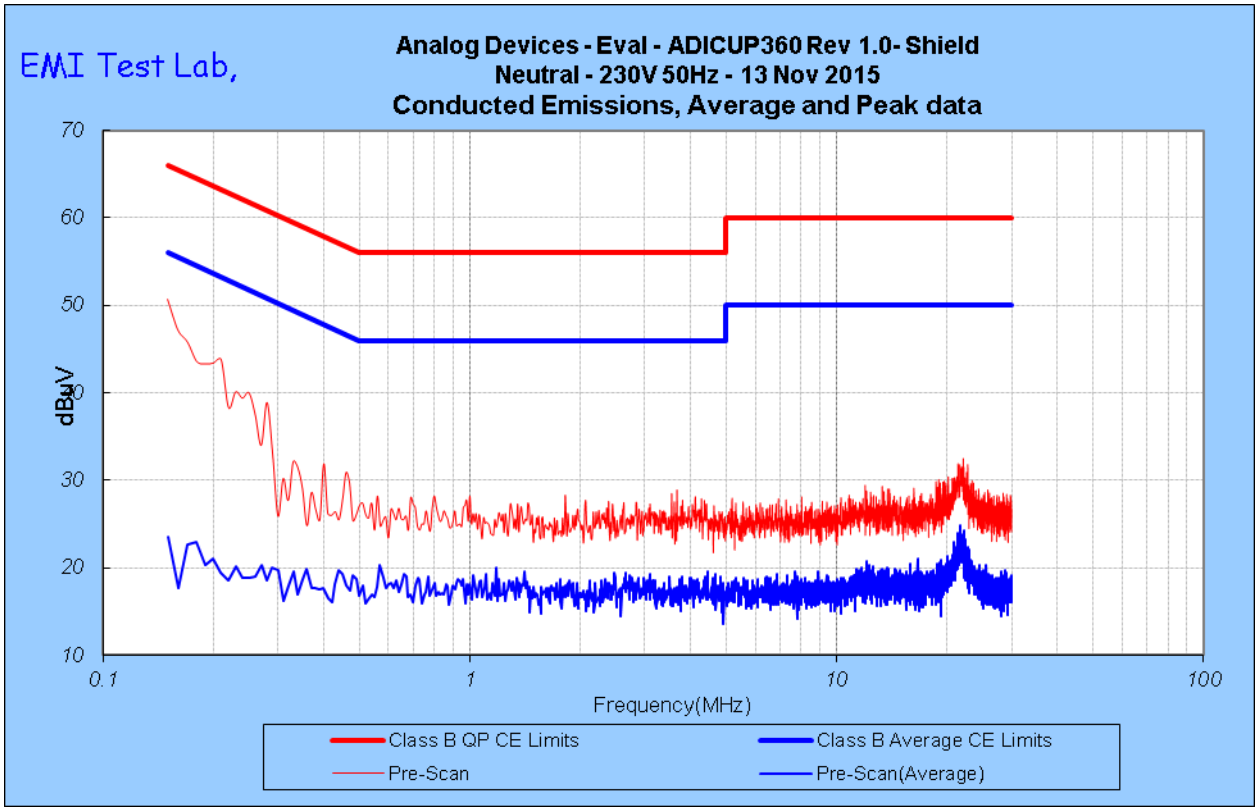
Case 2, Line - Peak data passing the Quasi Peak limit, Average data passing the Average limit



Case 2, Neutral - Peak data passing the Quasi Peak limit, Average data passing the Average limit



Case 3, Line - Peak data passing the Quasi Peak limit, Average data passing the Average limit



Case 3, Neutral - Peak data passing the Quasi Peak limit, Average data passing the Average limit

Conducted emissions test setup – Case 1, 2 and 3 setup is the same except 1 and 2 do not have the top circuit board "shield"

Conducted emissions test setup – Case 1, 2 and 3 setup is the same except 1 and 2 do not have the top circuit board "shield"

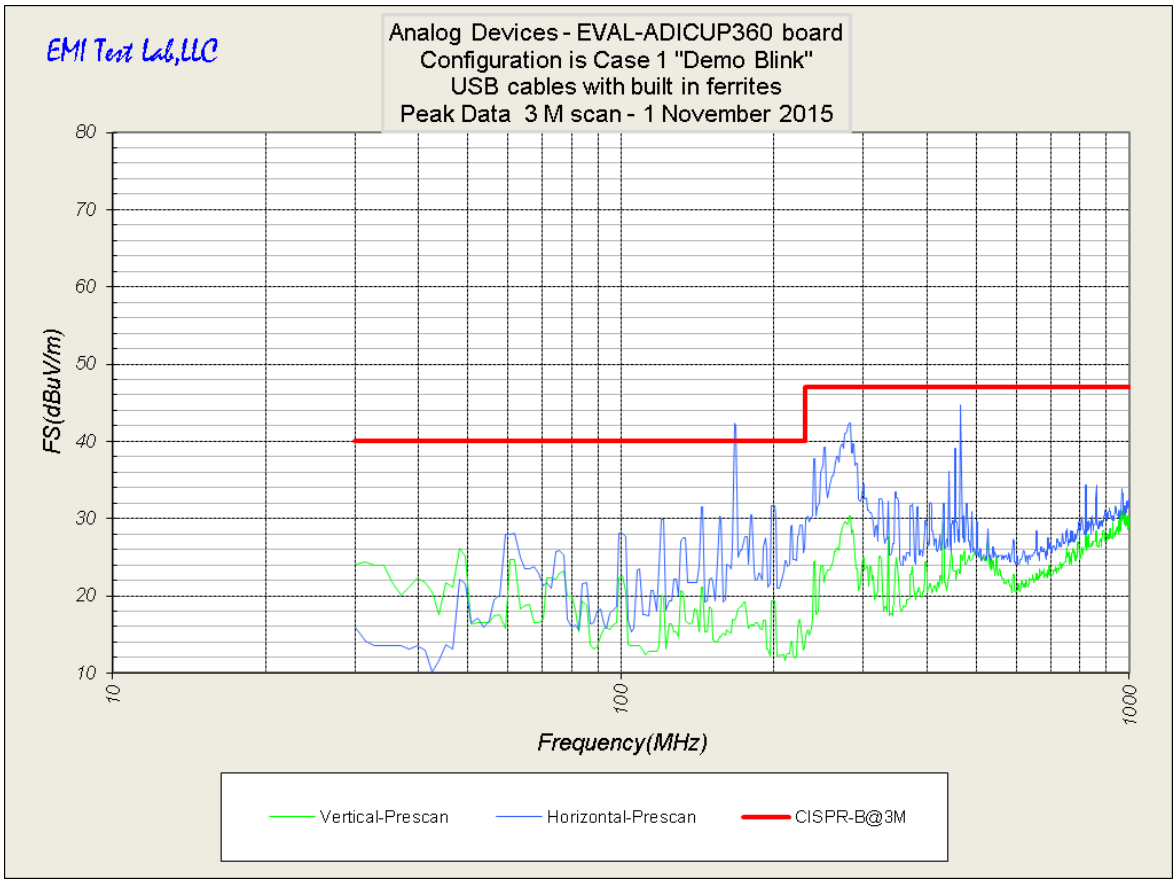
2.2 Enclosure

2.2.1 30-1,000 MHz

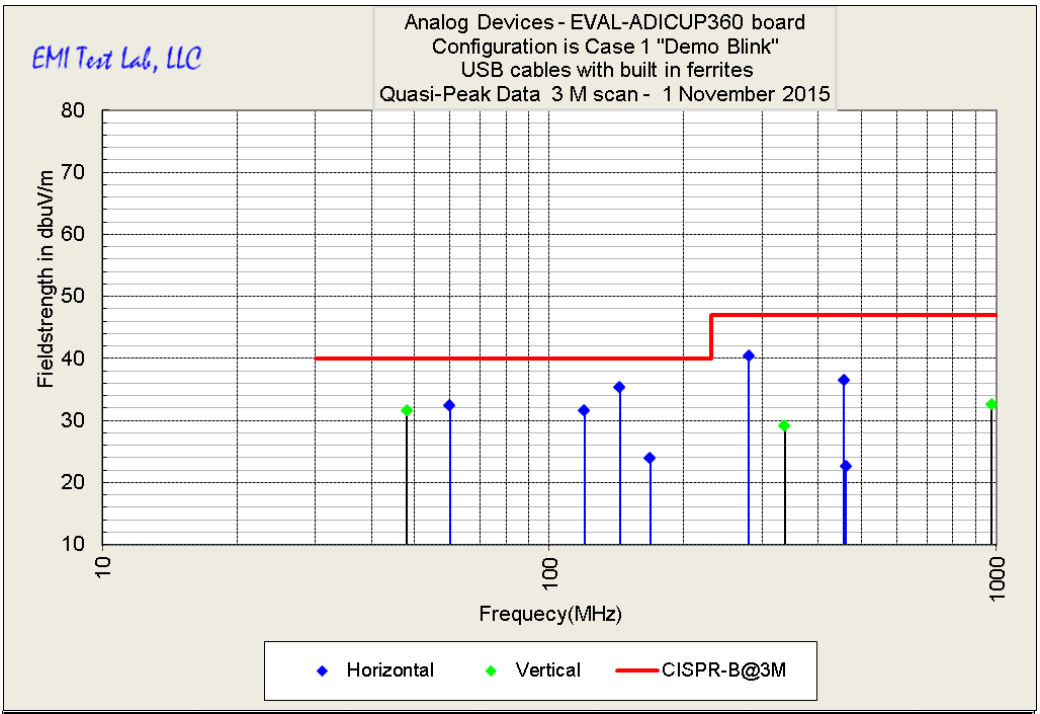
The radiated field strength levels (electric component) have been measured in conformity with and according to the criteria as stated below.

Basic standard	:	CISPR 22:2008
Test setup	:	EN 55022:2010
Limit distance	:	3 meters
Frequency range 1	:	30 -230 MHz
Limits	:	40 dBuV/m
Frequency range 2	:	230 – 1,000 MHz
Limits	:	47 dBuV/m

Results of the measurements concerning radiated electromagnetic fields (electric component) emitted by the EUT, enclosure, as a tested system	**PASS Class B – home use**
Name of Test Engineer: Signature: Date:	Dennis King  1,2 November 2015
Remarks: **Radiated Emission Summary : 30MHz-1GHz (3 meter test distance)** **Case 1, 2 and 3 all pass Class B radiated emissions for home use.**	



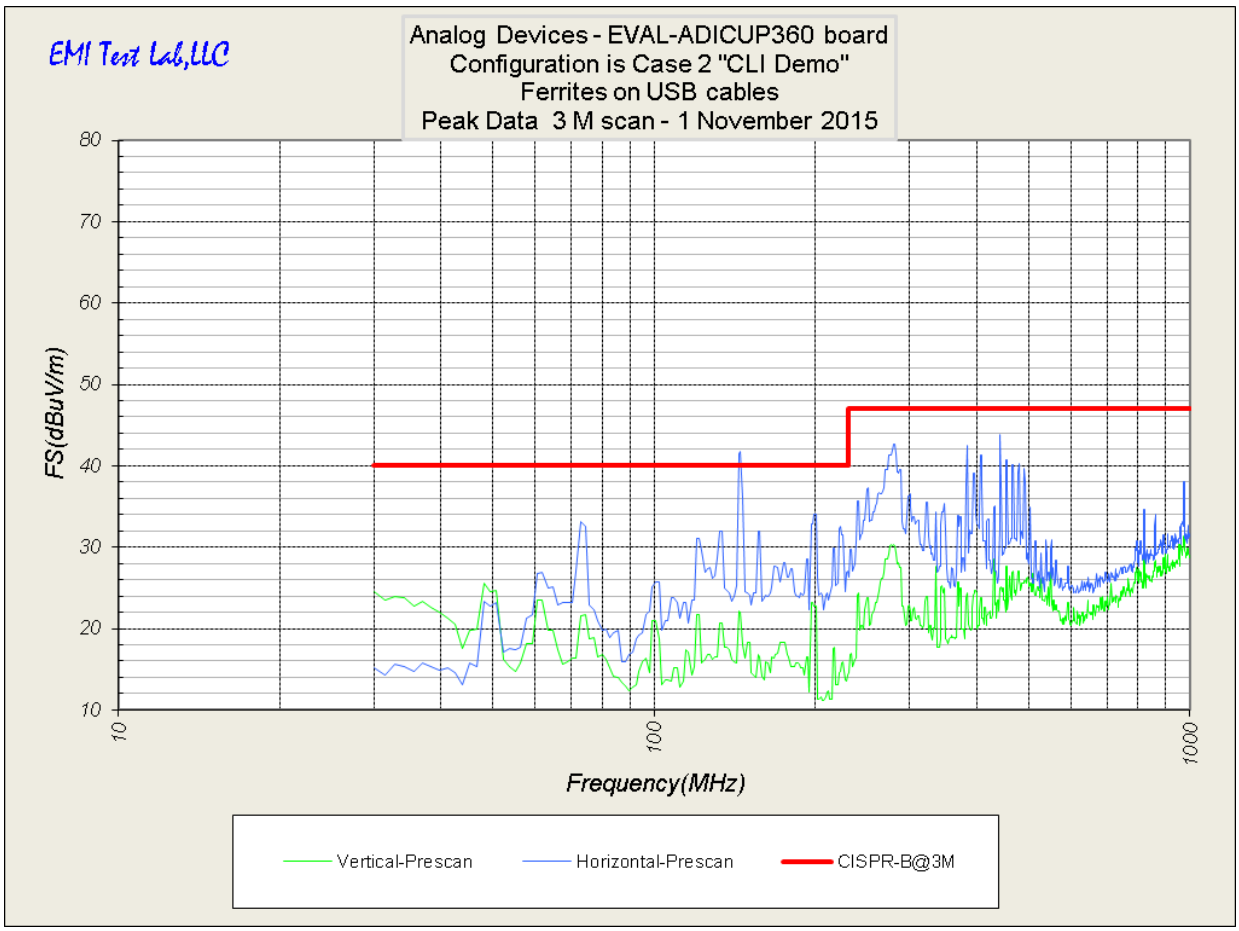
Case 1 Peak data pre-scan – the quasi peak limit is shown in red
See the next chart for final quasi peak data to compare against the quasi peak limit



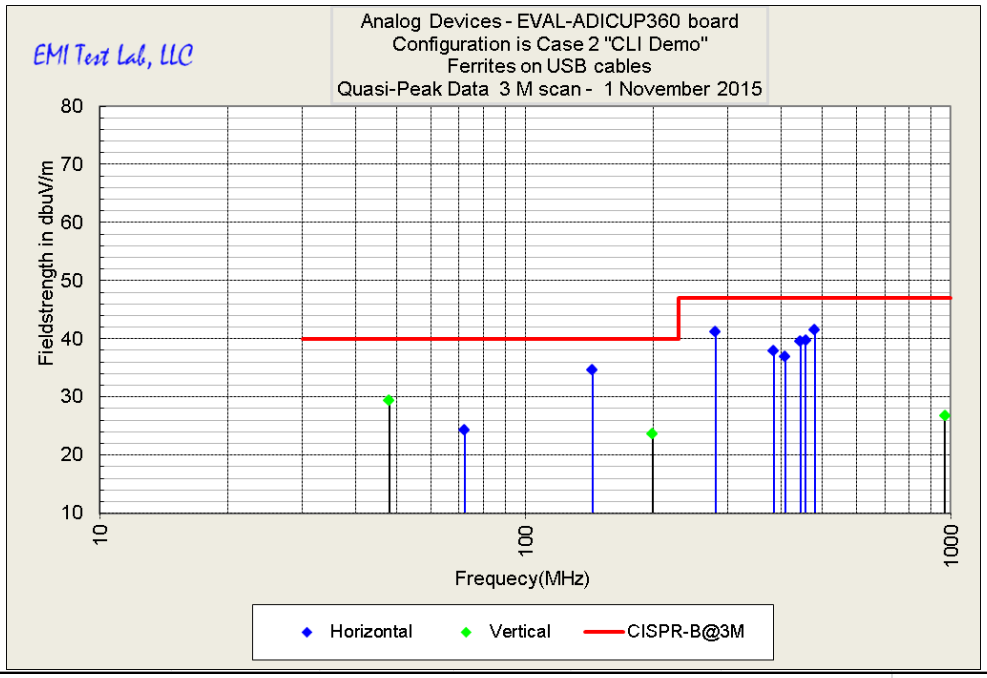
EMI Test Lab — Sheet4

1822 Skyway Drive, Unit J, Longmont Co
Dennis King dennis@emitestlab.com , Cell 303-746-0611

Frequency	F.S. EUT	Limit	Azimuth	Height	Antenna Polarization	Limit delta
(MHz)	*(dBuV/m)*	*(dBuV/m)*	*Degrees*	*Meters*	*H or V*	*dBuV*
336.01	29.15	47	32.0	1	V	-17.9
48.00	31.52	40	72.0	1	V	-8.5
976.35	32.6	47	168.0	1	V	-14.4
168.21	23.97	40	56.0	1	H	-16.0
456.02	36.52	47	64.0	1	H	-10.5
119.97	31.65	40	76.0	1	H	-8.4
60.01	32.45	40	176.0	1	H	-7.6
143.99	35.37	40	228.0	1	H	-4.6
461.12	22.60	47	232.0	1	H	-24.4
279.96	40.42	47	244.0	1	H	-6.6



Case 2 Peak data pre-scan – the quasi peak limit is shown in red
See the next chart for final quasi peak data to compare against the quasi peak limit



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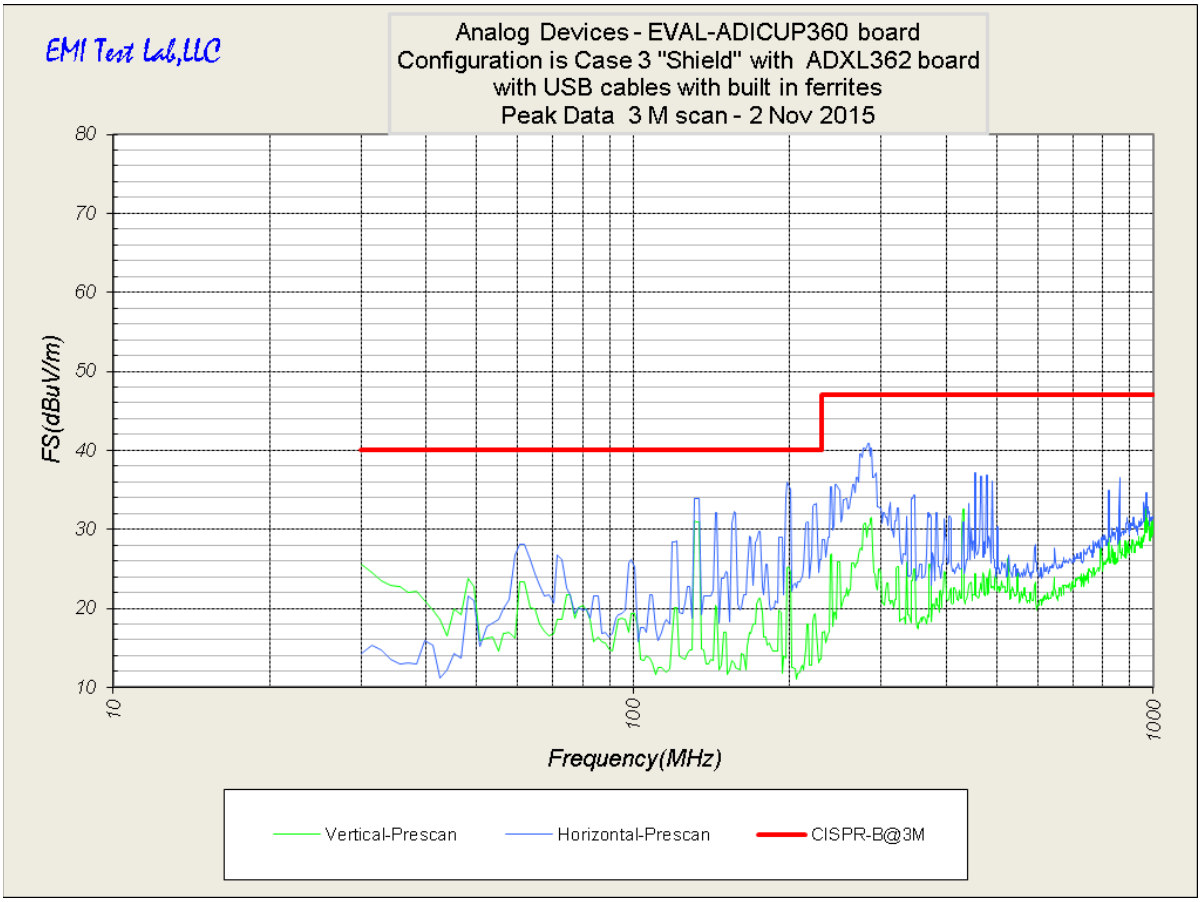
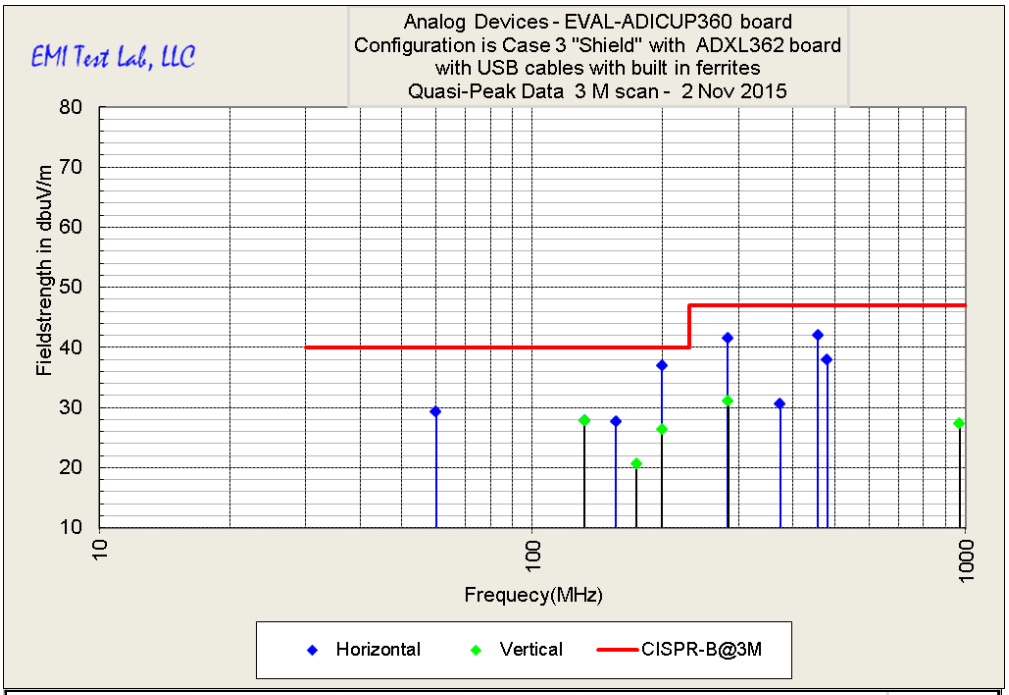
Frequency	F.S. EUT	Limit	Azimuth	Height	Antenna Polarization	Limit delta
(MHz)	*(dBuV/m)*	*(dBuV/m)*	*Degrees*	*Meters*	*H or V*	*dBuV*
47.98	29.42	40	20.0	1	V	-10.6
969.14	26.72	47	140.0	1	V	-20.3
199.13	23.57	40	240.0	1	V	-16.4
144.00	34.55	40	140.0	1	H	-5.5
72.09	24.27	40	200.0	1	H	-15.7
408.67	36.90	47	216.0	1	H	-10.1
384.43	37.95	47	216.0	1	H	-9.1
280.36	41.12	47	236.0	1	H	-5.9
480.01	41.60	47	268.0	1	H	-5.4
456.07	39.65	47	272.0	1	H	-7.4
444.00	39.57	47	288.0	1	H	-7.4



Case 3 Peak data pre-scan – the quasi peak limit is shown in red
See the next chart for final quasi peak data to compare against the quasi peak limit



EMI Test Lab Sheet4

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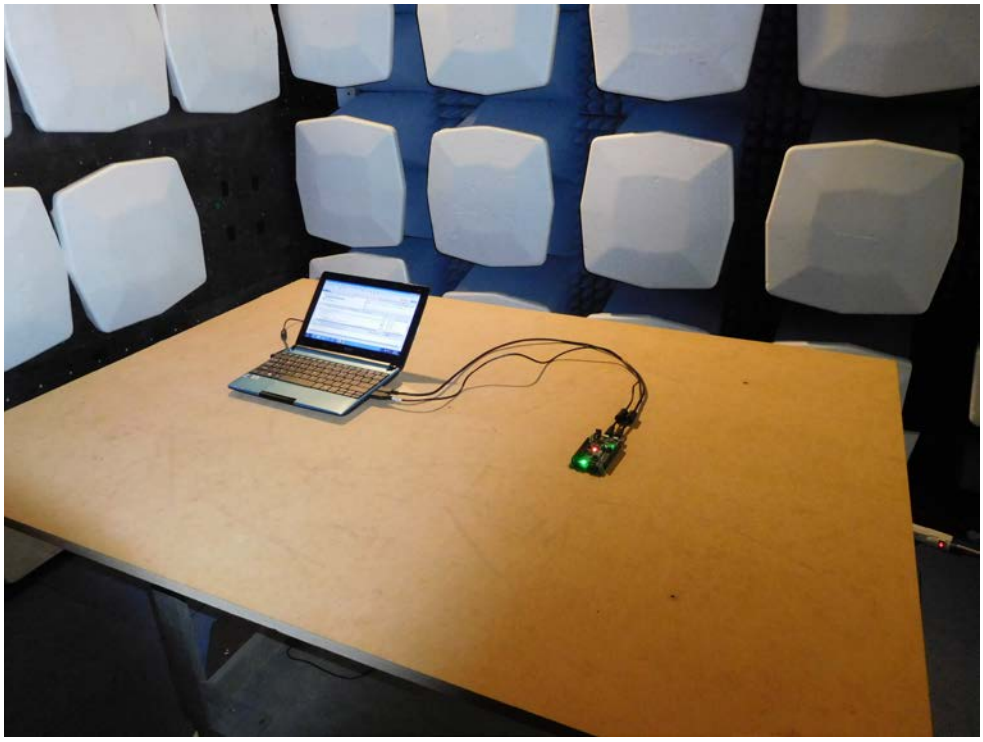
Frequency	F.S. EUT	Limit	Azimuth	Height	Antenna Polarization	Limit delta
(MHz)	*(dBuV/m)*	*(dBuV/m)*	*Degrees*	*Meters*	*H or V*	*dBuV*
283.58	31.02	47	4.0	1	V	-16.0
199.19	26.3	40	44.0	1	V	-13.7
969.37	27.27	47	152.0	1	V	-19.7
132.02	27.82	40	188.0	1	V	-12.2
174.26	20.55	40	292.0	1	V	-19.5
155.94	27.70	40	4.0	1	H	-12.3
132.04	27.75	40	148.0	1	H	-12.3
480.02	37.87	47	152.0	1	H	-9.1
59.95	29.27	40	204.0	1	H	-10.7
282.46	41.47	47	228.0	1	H	-5.5
199.17	36.95	40	240.0	1	H	-3.1
373.32	30.65	47	256.0	1	H	-16.4
456.00	42.05	47	268.0	1	H	-5.0

2.2.2 1-6 GHz

The radiated field strength levels (electric component) have been measured in conformity with and according to the criteria as stated below.

Basic standard	:	CISPR 22:2008
Test setup	:	EN 55022:2010
Limit distance	:	3 meters
Frequency range 1	:	1-3 GHz
Limits	:	Average 50 dBuV/m, Peak 70 dBuV/m
Frequency range 2	:	3-6 GHz
Limits	:	Average 54 dBuV/m, Peak 74 dBuV/m

Results of the measurements concerning radiated electromagnetic fields (electric component) emitted by the EUT, enclosure, as a tested system	**Not Applicable** **Highest clock frequency is 8 MHz**
Name of Test Engineer: Signature: Date:	Dennis King  17 November 2015
Remarks: **Radiated Emission Summary : 1GHz-6GHz (3 meter test distance)** Not required if the highest clock frequency is 8 MHz.	



Radiated Emissions Setup Picture – Case 1 and 2 only have the bottom pcb, Case 3 has an additional circuit board EVAL-ADXL362-ARDZ rev 1.0 Both usb cables have ferrites at the EUT end in order to pass Class B

2.3 Harmonic current emissions

The emissions of harmonic currents at the AC mains connection terminals of the EUT were measured in conformance with and according to the criteria as stated below.

Basic standard : EN 61000-3-2
Test setup : EN 61000-3-2
Frequency range : 100 Hz – 2000 Hz

Results of the measurements concerning the emission of harmonic currents at the AC mains connection terminals of the EUT	**PASS per Laptop Manufacturer, also no requirement below 75 watts**
Name of Test Engineer: Signature: Date:	Dennis King  17 November 2015
Remarks: The power supply was tested at 230VAC 50Hz by Acer, the laptop manufacturer. The Declaration of Conformity and the full test report are available upon request.	

2.4 Voltage fluctuations and flicker

Voltage fluctuations and flicker at the AC mains connection terminals of the EUT were measured in conformance with and according to the criteria as stated below.

Basic standard : EN 61000-3-3
Test setup : EN 61000-3-3

Results of the measurements concerning voltage fluctuations and flicker at the AC mains connection terminals of the EUT	**PASS per Laptop Manufacturer**
Name of Test Engineer:	Dennis King
Signature:	
Date:	17 November 2015
Remarks: The power supply was tested at 230VAC 50Hz by Acer. The Declaration of Conformity and the full test report are available upon request.	

3 Immunity

The EUT has been tested in conformity with parts of the standard EN 55024:2010 (immunity) concerning susceptibility and transient, conducted and radiated disturbances including electrostatic discharges.

3.1 Performance criteria

The general principles (performance criteria) for the evaluation of the immunity test results are given below. The details are in EN 55024:2010

Performance Criterion A: The apparatus shall continue to operate as intended during the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of performance) specified by the manufacturer, when the apparatus is used as intended.

Performance Criterion B: The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level (or permissible loss of function) specified by the manufacturer, when the apparatus is used as intended. During the test, degradation of performance is allowed, however, no change of actual operating state or stored data is allowed.

Performance Criterion C: Temporary loss of function is allowed, provided the function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

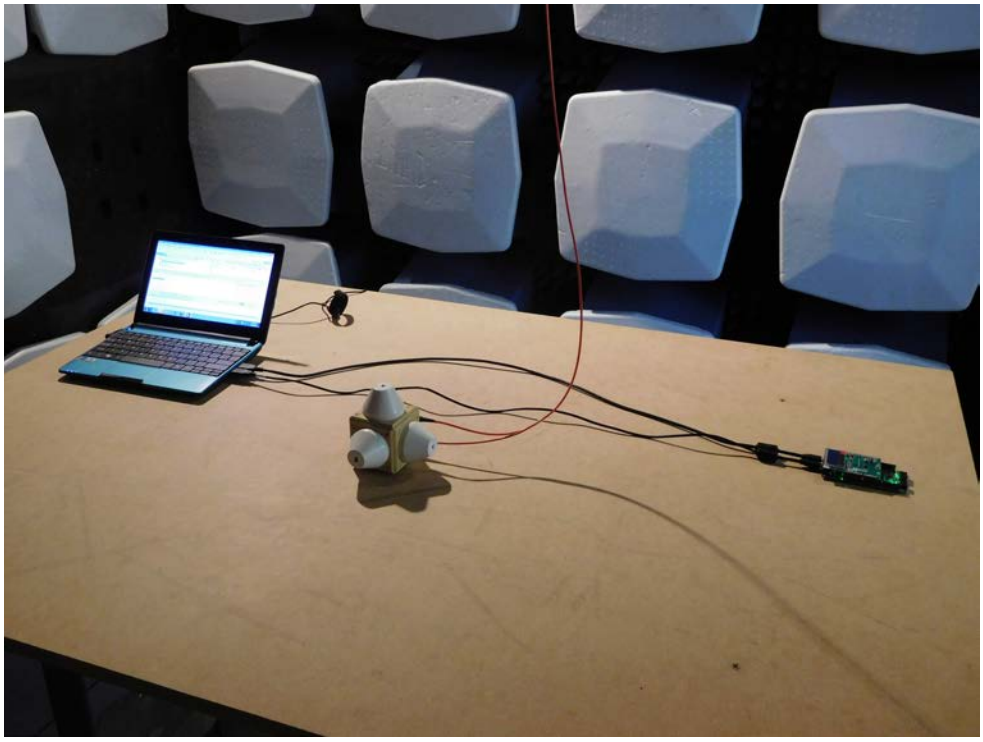
3.2 Enclosure Port

3.2.1 Radio-frequency electromagnetic field. Amplitude modulated.

The susceptibility of the EUT to radio-frequency electromagnetic fields has been tested in conformity with and according to the criteria as stated below.

Basic standard	:	EN 55024:2010
Test setup	:	EN 61000-4-3
Frequency range	:	80 MHz to 1000 MHz
Field strength level	:	3 V/m (selected w/o modulation, applied w/mod.)
Modulation	:	1 kHz AM modulation, 80% depth
Performance Criteria A	:	The unit must continue to operate as intended without loss of data or function.

Results of the measurements concerning the susceptibility of the EUT to radio-frequency electromagnetic fields	**PASS Criteria A**
Name of Test Engineer:	Dennis King
Signature:	
Date:	2,6 and 7 November 2015
Remarks: **Radiated Immunity Summary:** **Configurations: Case 1,2 and 3 - PASS 3 V/Meter**	



Radiated immunity test setup – 80-1,000 MHz, 3 V/m

Case 1 and 2 only have the bottom pcb,
Case 3 has an additional circuit board EVAL-ADXL362-ARDZ rev 1.0
Both usb cables have ferrites at the EUT end in order to pass Class B emissions

The unit continued to run during and after the Immunity testing –
Passing Criteria A.
All 4 sides, Vertical and Horizontal were checked at 3V/M
No errors were detected

3.2.2 Electrostatic discharge

The susceptibility of the EUT to electrostatic discharge was not tested. See notes below.

Basic standard	:	EN 55024:2010
Test setup	:	EN 61000-4-2
Test levels	:	+- 4kV and +- 8 kV air discharge
		+- 2kV and +- 4 kV contact discharge
		+- 2kV and +- 4 kV horizontal and vertical planes
Performance criteria	:	B

Results of the test concerning the susceptibility of the EUT to electrostatic discharges (enclosure port)	**Not tested**
Name of Test Engineer:	Dennis King
Signature:	
Date:	17 November 2015
Remarks: **Due to the open nature of the circuit board, ESD testing is not applicable to this product. Advice will be given to the Users to exercise proper ESD precautions when handling the circuit board.**	

Signal ports including telecommunication ports

3.2.3 Radio-frequency (common mode). Amplitude modulated

The susceptibility of the EUT to radio-frequency (common mode, amplitude modulated) signals to be tested in conformity with and according to the criteria as stated below

Basic Standard	:	EN 55024:2010
Test setup	:	EN 61000-4-6
Frequency range	:	0.15 – 80 MHz
Test level	:	3 Vrms
Modulation	:	1 kHz AM to a depth of 80%
Source impedance	:	150 Ohms
Performance criteria	:	Criteria A

Note: Conducted only on ports interfacing with cables whose total length, according to the manufacturer's functional specification, may exceed 3 meters.

Results of the test concerning the susceptibility of the EUT to radio-frequency signals (common mode, AM modulated applied to signal and telecom ports)	**N/A – no cables 3 meters or longer**
Name of Test Engineer: Signature: Date:	Dennis King  17 November 2015
Remarks: There are no cables 3 meters or longer connected to the EUT.	

3.2.4 Fast Transients

The susceptibility of the EUT to fast transients has been tested in conformity with and according to the criteria as stated below.

Basic standard	:	EN 55024:2010
Test setup	:	EN 61000-4-4
Test level	:	+- 0.5 KV
Tr/Th	:	5/50 nSec
Repetition frequency	:	5 kHz
Performance criteria	:	Criteria B

Note: Conducted only on ports interfacing with cables whose total length, according to the manufacturer's functional specification, may exceed 3 meters.

Results of the test concerning the susceptibility of the EUT to fast transients	**N/A – no cables 3 meters or longer**
Name of Test Engineer:	Dennis King
Signature:	
Date:	17 November 2015
Remarks: N/A	

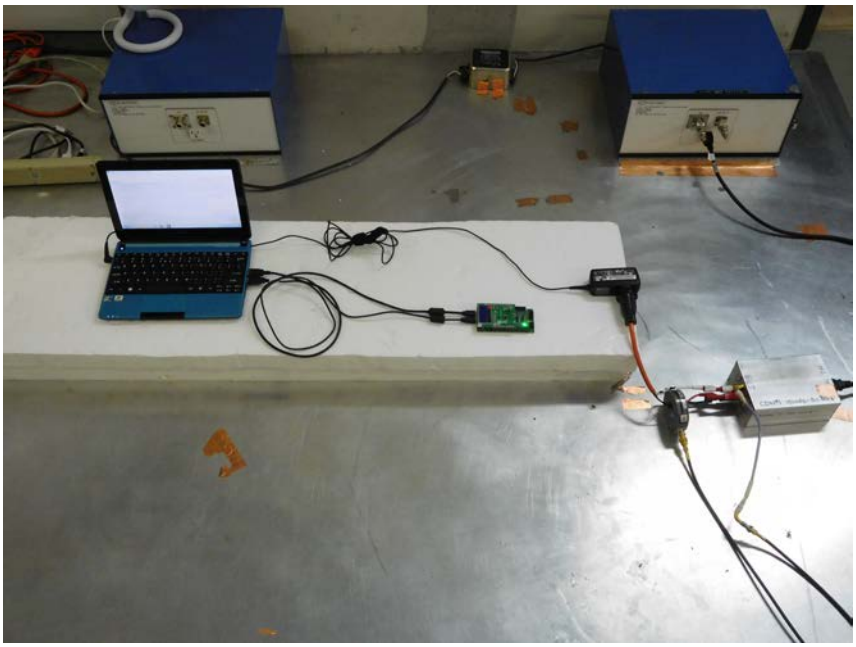
3.3 AC input and AC output power ports

3.3.1 Radio-frequency (common mode, amplitude modulated)

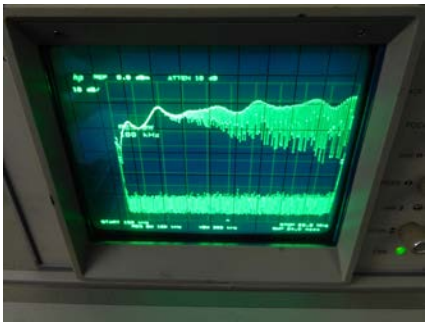
The susceptibility of the EUT to radio-frequency signals (common mode, amplitude modulated, has been tested in conformity with and according to the criteria as stated below.

Basic standard	:	EN 55024:2010
Test setup	:	EN 61000-4-6
Frequency range	:	0.15 – 80 MHz
Test level	:	3 Vrms
Modulation	:	1 kHz AM modulation, 80% depth
Source impedance	:	150 Ohms
Performance criteria	:	Criteria A

Results of the test concerning the susceptibility of the EUT to radio-frequency signals (common mode, amplitude modulated) – AC input and AC output power ports	**PASS Criteria A**
Name of Test Engineer:	Dennis King
Signature:	
Date:	6 January 2015
Remarks: **Configurations : Case 1, 2 and 3 PASS 3 Vrms**	



Test Setup per EN 61000-4-6 Conducted Immunity



The current clamp is used to monitor the injected signal during the test

3.3.2 Surges

The susceptibility of the EUT to surges has been tested in conformity with and according to the criteria as stated below

Basic Standard	:	EN 55024:2010
Test setup	:	EN 61000-4-5
Test level 1	:	+-0.5 kV, +- 1.0 kV Differential Mode
Test level 2	:	+- 2 kV common Mode
Tr/Th	:	1.2/50(8/20) micro Seconds
Number of pulses		
Per phase angle/voltage	:	5
Performance criteria	:	Criteria B
Note	:	***Applicable only to input AC ports***

Results of the test concerning the susceptibility of the EUT to surges (AC input and AC output power ports	**PASS per ACER**
Name of Test Engineer:	Dennis King
Signature:	
Date:	17 November 2015

Remarks:
Configuration **:** The EUT has no AC connection, it gets power through the usb cable. The ACER host laptop has been tested and passes.
Declaration of Conformity and Test report for the ACER laptop and power supply available upon request.

3.3.3 Fast Transients

The susceptibility of the EUT to fast transients (common mode) has been tested in conformity with and according to the criteria as stated below.

Basic standard	:	EN 55024:2010
Test setup	:	EN 61000-4-4
Test level	:	+- 1 KV
Tr/Th	:	5/50 nSec
Repetition frequency	:	5 kHz
Performance criteria	:	Criteria B
Note	:	***Conducted on the AC input.***

Results of the test concerning the susceptibility of the EUT to fast transients (common mode, AC input and AC output ports)	**PASS per ACER**
Name of Test Engineer:	Dennis King
Signature:	
Date:	17 November 2015

Remarks:
Configuration **:** The EUT has no AC connection, it gets power through the usb cable. The ACER host laptop has been tested and passes.
Declaration of Conformity and Test report for the ACER laptop and power supply available upon request.

3.3.4 Voltage Dips and Interruptions

The susceptibility of the EUT to voltage dips and interruptions has been tested in conformity with and according to the criteria as stated below.

Basic Standard	:	EN 55024:2010
Test setup	:	EN 61000-4-11
Test level (a)	:	Line at 0% of nominal for 0 .5 cycles
Test level (b)	:	Line at 40% of nominal for 5 cycles
Test level (c)	:	Line at 70% of nominal for 25 cycles
Test level (d)	:	Line at 0% of nominal for 250 cycles

Results of the test concerning the susceptibility of the EUT to voltage dips and interruptions – AC input and AC output ports	**PASS per ACER**
Name of Test Engineer: Signature: Date:	Dennis King  17 November 2015
Remarks: ***Configuration*** **:** The EUT has no AC connection, it gets power through the usb cable. The ACER host laptop has been tested and passes. Declaration of Conformity and Test report for the ACER laptop and power supply available upon request.	

3.3.5 Power Frequency Magnetic Fields

The susceptibility of the EUT to power frequency magnetic fields has been tested in conformity with and according to the criteria as stated below.

Basic Standard	:	EN 55024:2010
Test setup	:	EN 61000-4-8
Test level	:	1 Amp per meter, X,Y and Z axis

Results of the test concerning the susceptibility of the EUT to	**Not Applicable**
Name of Test Engineer:	Dennis King
Signature:	
Date:	17 November 2015
Remarks: There are no magnetically sensitive components in this product.	

4.0 Modifications

The usb cables that were originally used for testing had no ferrites, the unit would pass Class A radiated emissions but not Class B.

The usb cables were switched to cables that had ferrites at the pcb end and the unit would pass Class B for home use.

The cables used were from Monoprice, part number 5457.

5.0 Test equipment
Table of Test Equipment

Equipment	Description and Test	Model number	Serial number	Next cal due
HP Spectrum Analyzer	Used for Radiated and Conducted Emissions	8566B	2607A02760	3 June 2016
HP Quasi-Peak Adapter	Used for Radiated and Conducted Emissions	85650A	8574A00233	3 June 2016

Advantest Spectrum Analyzer	Used for Radiated and Conducted Emissions	R3361A	01730556	20 October 2016
Com-Power transient Limiter	Conducted Emissions	HZ560	001	3 June 2016
RF Bay Pre-Amp	Radiated emissions – 100kHz to 10 GHz	LPA-10-20	0643	2 Dec 2015
GTEM	Radiated Emissions and Radiated Immunity	5317	9703-1209	8 Nov 2016 – Field Uniformity Cal per IEC 61000-4-20
3 Meter FAR – Fully Anechoic Room	Radiated Immunity and Emissions	N/A	FAR #1	15 October 2016 Field Uniformity per IEC/EN 61000-4-3 and Correlation data to GTEM
ComPower Horn Antenna	1-18 GHz – Radiated Immunity and Emissions	AH 118	071040	20 March 2016
Chase BiLog Antenna	Radiated Emissions and Immunity	CBL6111	1121	20 March 2016
Marconi Instruments – Signal Generator 10kHz – 2.7 GHz	Radiated Immunity	2031	1196061031	20 October 2016
HP Signal Generator	Radiated Immunity	8657A	STD0578	3 May 2016
HP Synthesized Sweep Generator .01-20 GHz	Radiated Immunity 1 GHz to 2.7 GHz	83752B	34462	3 May 2016
Amplifier Research .800 – 4.2 GHz Amp	Radiated Immunity – 1 GHz to 2.7 GHz	10S1G4	34516	4 May 2016
Antenna Research Associates – 100 Watt amplifier w/controller	Radiated Immunity – 80-1000 MHz in the FAR	ARAPS/PC757LC ARA757LC-CE	587V7 587V7	20 October 2016
Kalmus Power Amplifier	Radiated Immunity 150kHz – 1 GHz – in the GTEM	747LC-CE	7894-1	12 May 2016
Amplifier Research	Radiated Immunity	FP 2000	12845	12 May 2016

E- Field Probe				
Com-Power LISN	Conducted emissions	LI-115	241010	17 May 2016
Com-Power LISN	Conducted emissions	LI-115	241011	17 May 2016
California Instruments 1000 VA Power Source	Emissions and Immunity - used as a 100/120/230/240-VAC 50/60 Hz AC source	1001WP	L04788	4 June 2016
EMI Labs CDN	Conducted Immunity	EMICDN	001	9 Dec 2015
Schaffner ESD Gun	Electro Static Discharge	NSG435	54711	11 Dec 2015
KeyTek ECAT	Fast transients / Burst	E412	32612	5 June 2016
FCC Inc. RF Current Probe	Monitor Conducted Immunity signal	F-33-1	423	9 Dec 2015
EMI Labs Mag Loop	Magnetic Loop Antenna	Mag100	80162	12 Dec 2015
Thermo Keytek CE Master	Surge/ AC Dips and Interrupts	CE Master	0405277	15 Dec 2015

All equipment used for testing has been calibrated or verified for cal using NIST traceable standards. Each piece of test equipment has a cal verification procedure that is conducted before and after each test.

6.0 Measurement Uncertainty – Radiated Emissions

Table of Uncertainty Calculation					
√	Contribution	Designation	Probability Distribution	k	Uncertainty (dB)
	Equipment Under Test Uncertainties	U_{EUT}			Note 1
√	Measuring Receiver Amplitude Accuracy	$U_{RXaccuracy}$	rectangular	$\sqrt{3}$	± 0.9
√	GTEM Uniformity	$U_{Uniformity}$	rectangular	$\sqrt{3}$	± 4.0
√	Secondary Field Components	$U_{Secondary}$			Excluded by Test Method
√	Mismatch Uncertainty-GTEM to Pre-Amplifier	$U_{Mismatch}$	U-shaped	$\sqrt{2}$	+0.63 and -0.65
√	Mismatch Uncertainty-Pre-Amplifier to Spectrum Analyzer	$U_{Mismatch}$	U-shaped	$\sqrt{2}$	+0.92 and -1.03
√	System Sensitivity Error	$U_{Sensitivity}$	rectangular	$\sqrt{3}$	0.28
√	GTEM Electric-Field Frequency Response	$U_{E-Field}$	rectangular	$\sqrt{3}$	± 1.6
	Ambient Signal Uncertainty	U_{Abient}			Not Significant
√	GTEM to OATS Correlation	U_{Corr}	rectangular	$\sqrt{3}$	±1.2
√	Septum Height Variation	U_{Septum}	normal	2	+0.72 and -0.82
	Coaxial Cable Temperature Variations	$U_{CableTemperature}$			Not Significant
√	Coaxial Cable Calibration	$U_{CableCalibration}$	rectangular	$\sqrt{3}$	±0.05
√	Pre-amplifier Calibration Uncertainty	$U_{Pre-Amp}$	rectangular	$\sqrt{3}$	±0.05
	Combined Uncertainty(dB) Positive Terms				2.77
	Combined Uncertainty(dB) Negative Terms				-2.75
	Expanded Uncertainty Positive Terms		Normal	2	5.54
	Expanded Uncertainty Negative Terms		Normal	2	-5.50

Typical Measurement Uncertainty for the following Tests:

The estimated combined standard uncertainty for ESD testing, EN 61000-4-2 is ± 4%
The estimated combined standard uncertainty for Radiated Immunity, EN 61000-4-3 is ± 2.7dB
The estimated combined standard uncertainty for EFT/Burst, EN 61000-4-4 is ± 5.8%
The estimated combined standard uncertainty for Surge, EN 61000-4-5 is ± 8%
The estimated combined standard uncertainty for Conducted Immunity, EN 61000-4-6 is ± 1.5 dB
The estimated combined standard uncertainty for Magnetic Fields, EN 61000-4-8 is ± 0.6%
The estimated combined standard uncertainty for Voltage Dips and Interrupts, EN 61000-4-11 is ± 4.3%
The estimated combined standard uncertainty for Conducted Emissions, CISPR 11 is ± 1.2dB
The estimated combined standard uncertainty for Harmonic current and flicker is ± 11.6%

7.0 Test Plan

Objective:

The EVAL-ADICUP360 is to be tested for EMC CE Mark Compliance and shall pass Class B Radiated and Conducted Emissions.

The Kit shall also pass all immunity tests that apply.

- RF Immunity
- EFT/Burst
- Surge
- Conducted Immunity
- AC Dips and Interrupts
- Power Frequency Magnetic Field
- ESD will not be tested due to the open nature of the product.

Reliance upon CE MARK Compliance of the power supply shall be utilized for the power supply tests, as applicable, some re-testing is required due to system level testing.

CE Class B Emissions Test:

- **Radiated Emissions – Frequency Range <30MHz-1GHz > (3 meter test distance)**
  - Class B Spec: EN 55022:2010
  - Test Method: CISPR 22:2008
- **Radiated Emissions – Frequency Range <1GHz-6GHz > (3 meter test distance)**
  - Class A Spec: EN 55022:2010
  - Test Method: CISPR 22:2008

- **Conducted Emissions – Frequency Range <150kHz-30MHz > Hot line & Neutral line, Peak and Quasi-Peak measurements**
  - Class A Spec: EN 55022:2010
  - Test Method: CISPR 22:2008

CE Immunity Tests:

- **Radiated Immunity – at 3V/m – EN 61000-4-3**
  4 Sides Vertical and 4 Sides Horizontal polarization (directional antenna orientation)
  Frequency Range <80MHz-1GHz w/ 1KHz 80% AM modulation>
  - Spec: EN 55024:2010
  - Test Method: EN 61000-4-3
- **Conducted Immunity – at 3 Vrms – EN 61000-4-6**
  Frequency Range <0.15 – 80 MHz w/ 1KHz 80% AM modulation>
  - Spec: EN 55024:2010
  - Test Method: EN 61000-4-6

- EN 61000-4-2 Electro Static Discharge (not to be tested)
- EN 61000-4-4 EFT / Burst
- EN 61000-4-5 Surge
- EN 61000-4-8 Mag Fields
- EN 61000-4-11 AC Dips and Interrupts

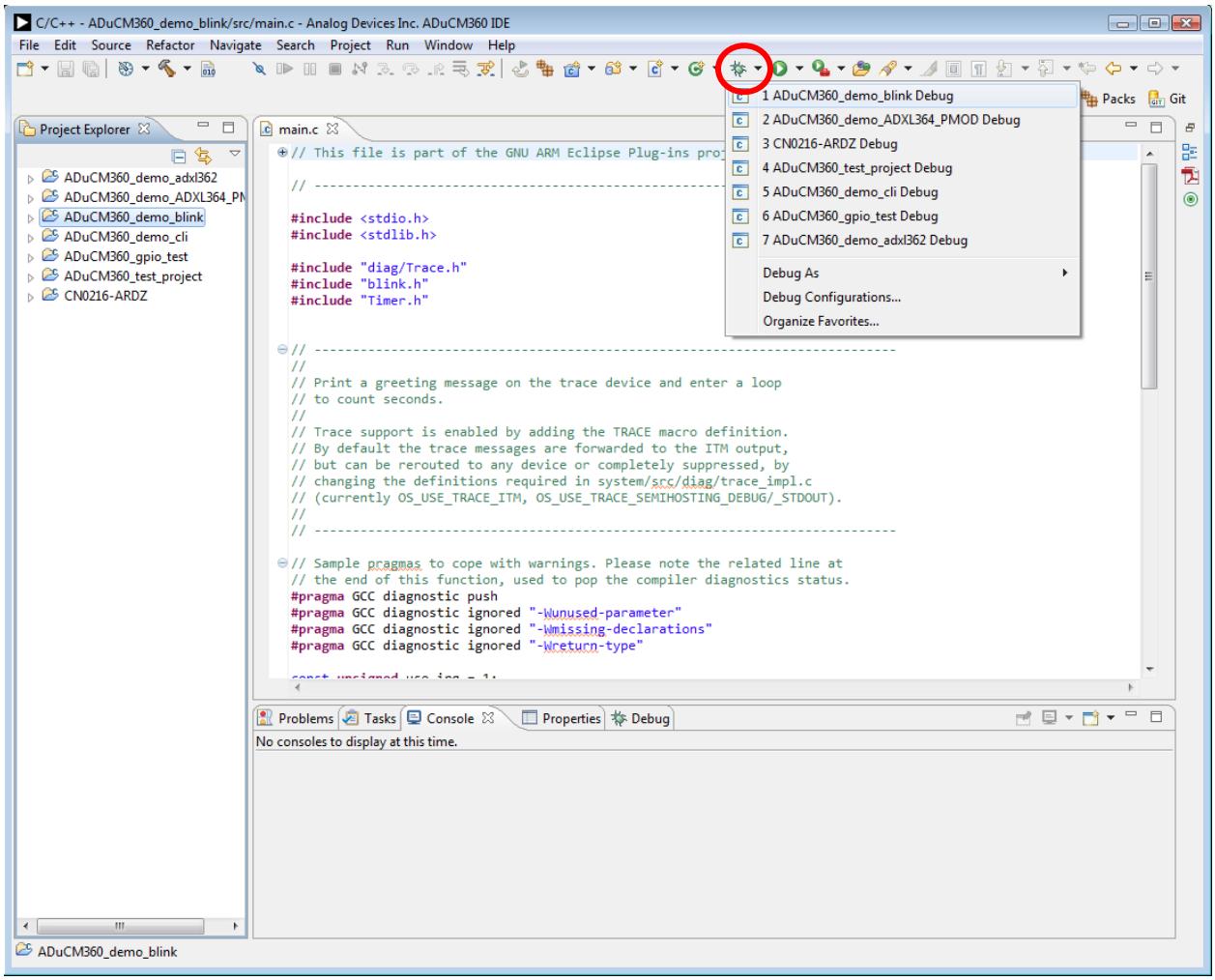
Test Instructions

Testing the ADUCM360 Board

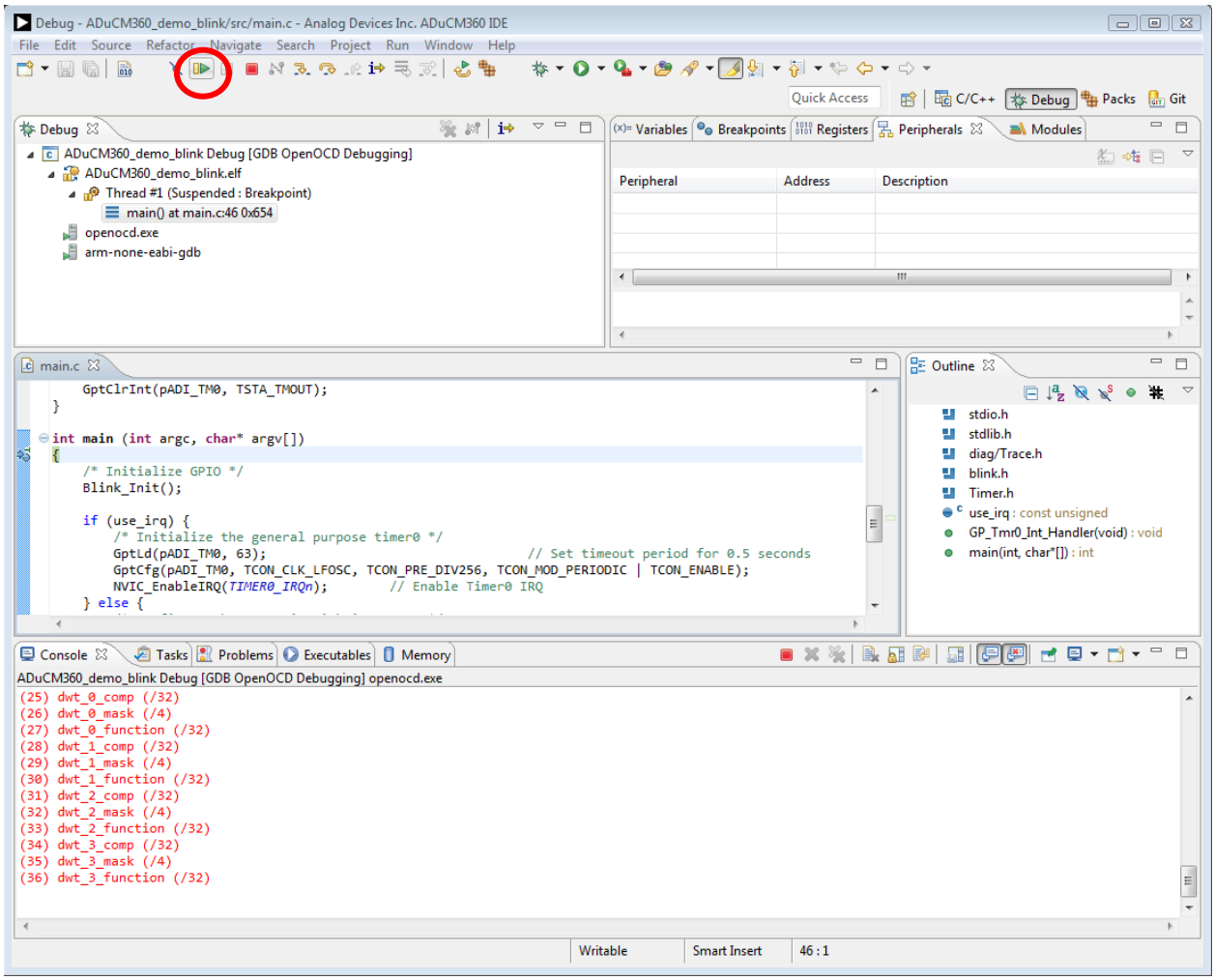
1. Open the ADuCM360-IDE program
2. Plug in microUSB cable into USB port of computer
3. Plug the other end into the DEBUG port of the EVAL-ADICUP360

Case 1: Demo Blink

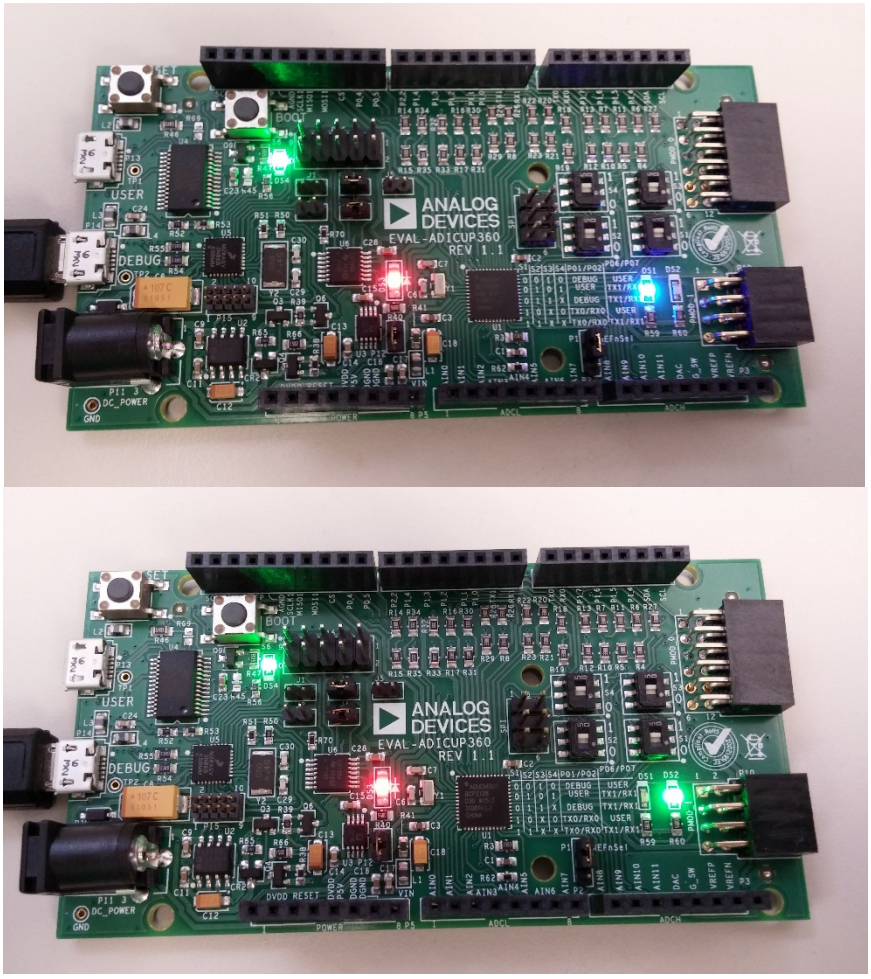
1. In the toolbar, look for the “bug” icon, click the down arrow, and look for the “ADuCM360_demo_blink Debug” and click it.



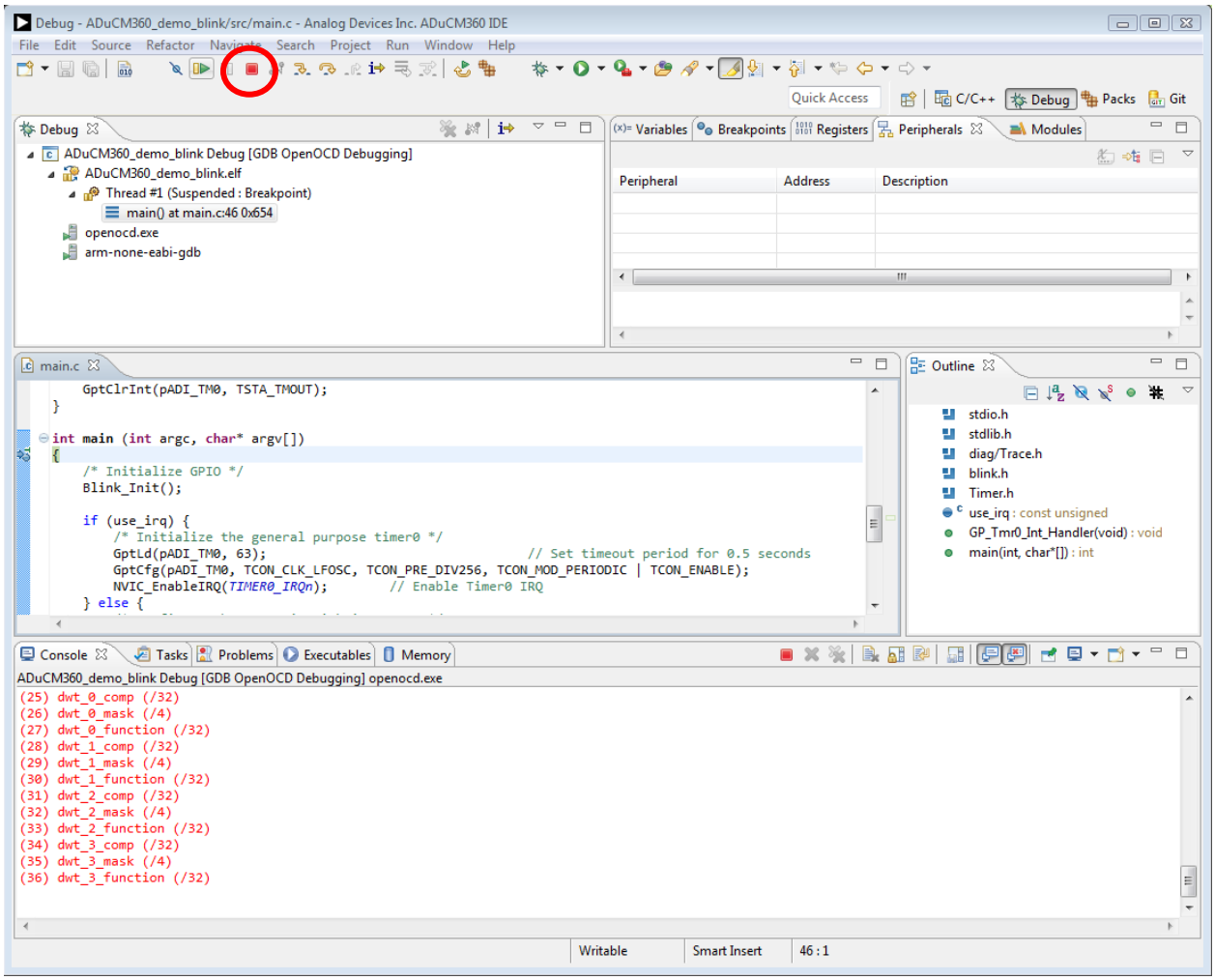
2. In the toolbar, look for the Play/Pause button, and click it.



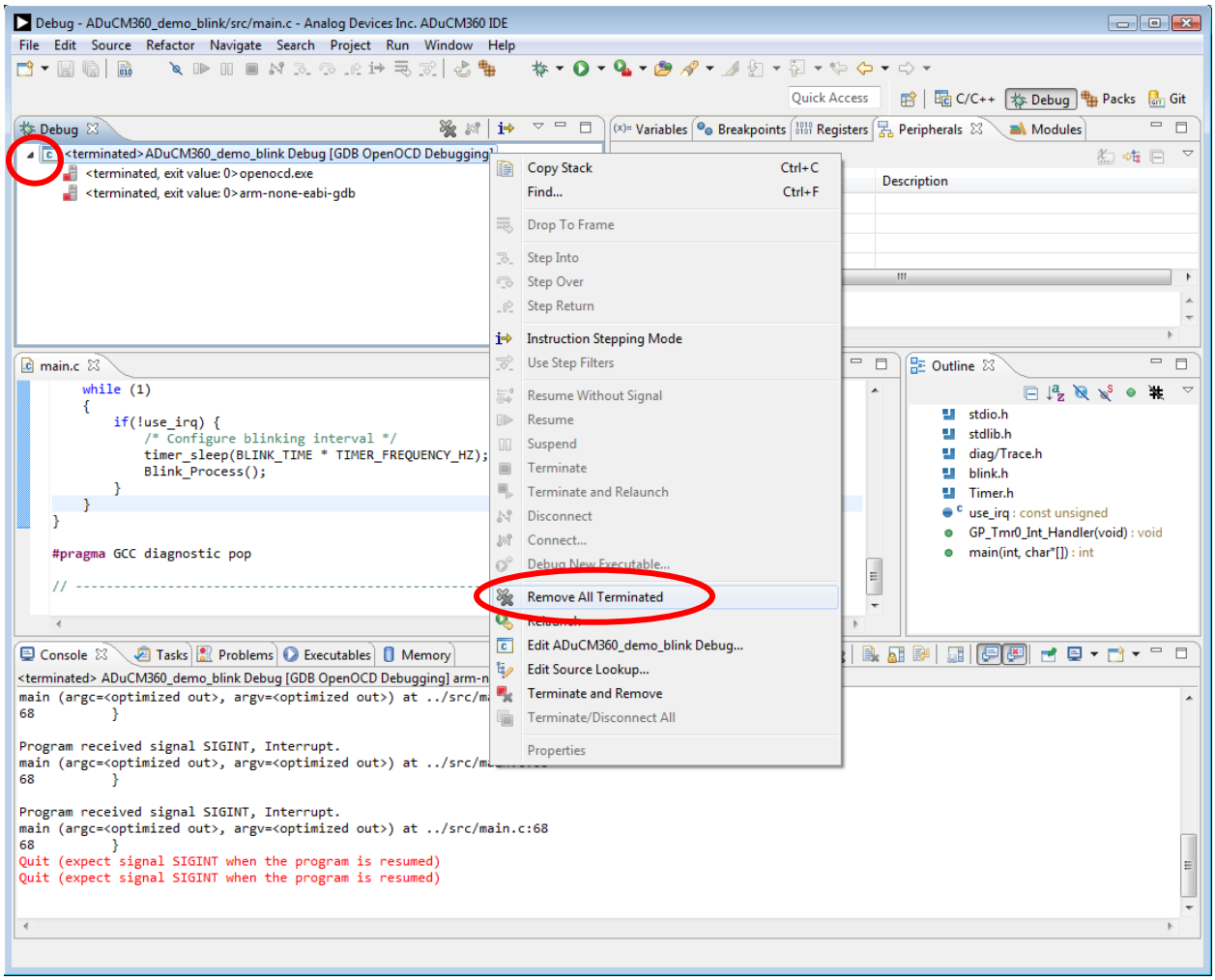
3. Make sure to see that the blue and green LEDs are flashing.



4. In the toolbar, look for the stop button, and click it.

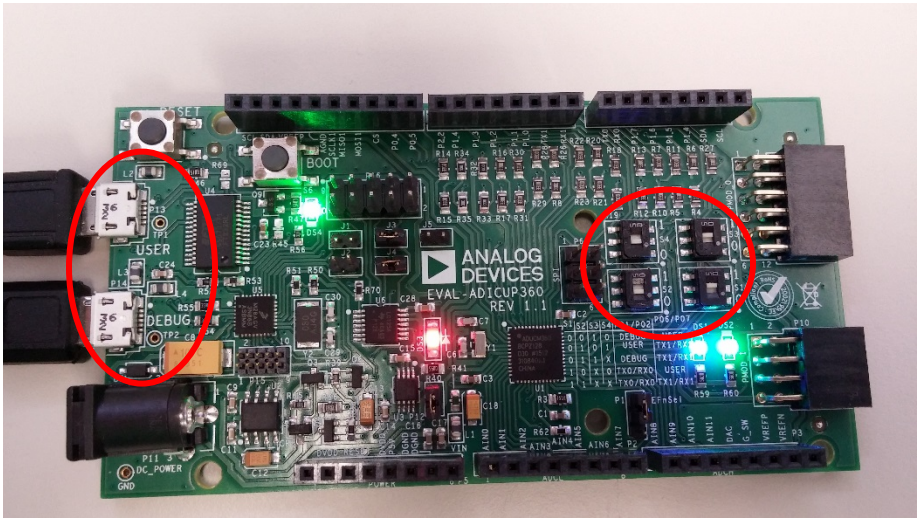


5. Go to the “Debug tab” and right click on the terminated debug session. Click on the “Remove Terminated” option

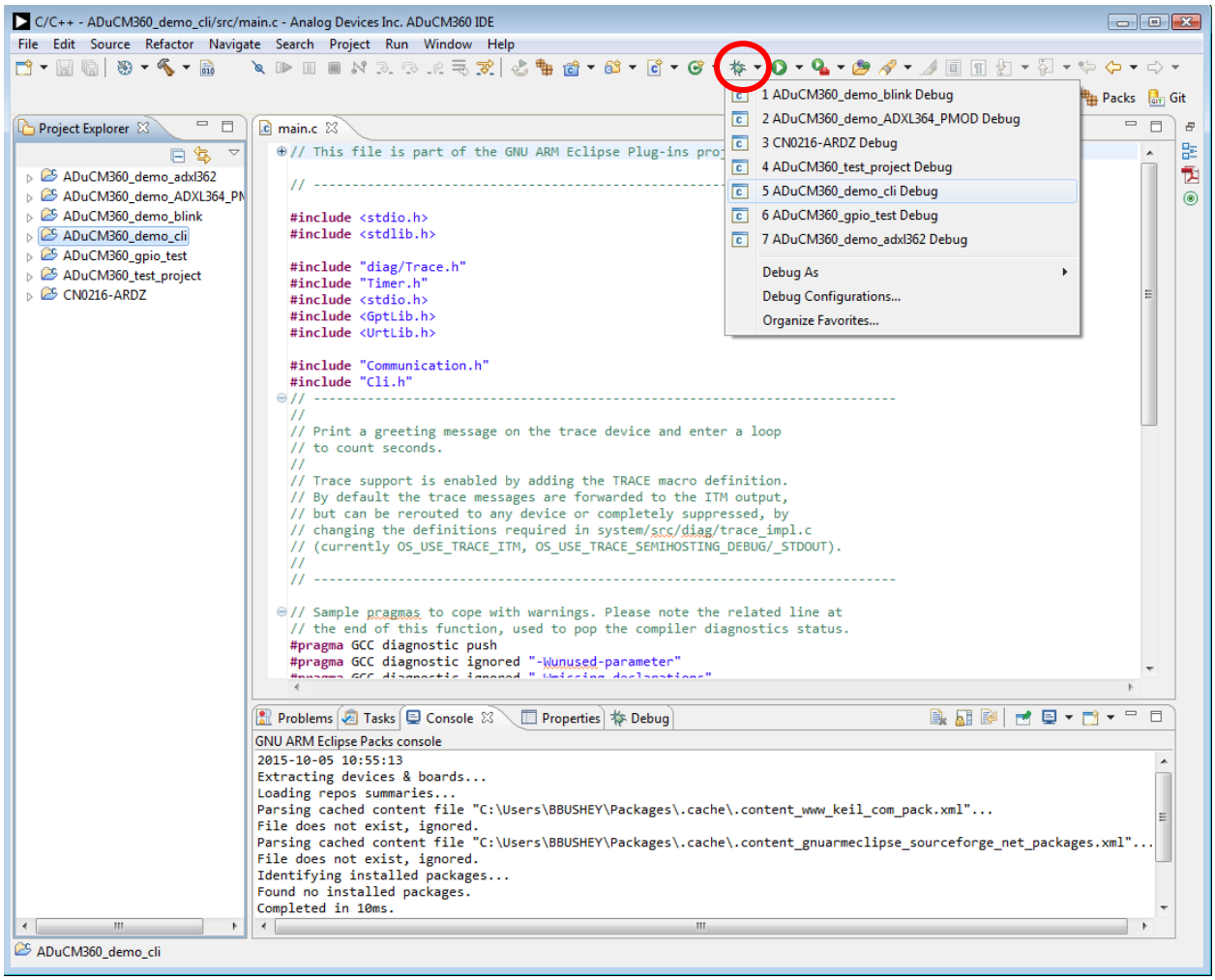


Case 2: CLI Demo

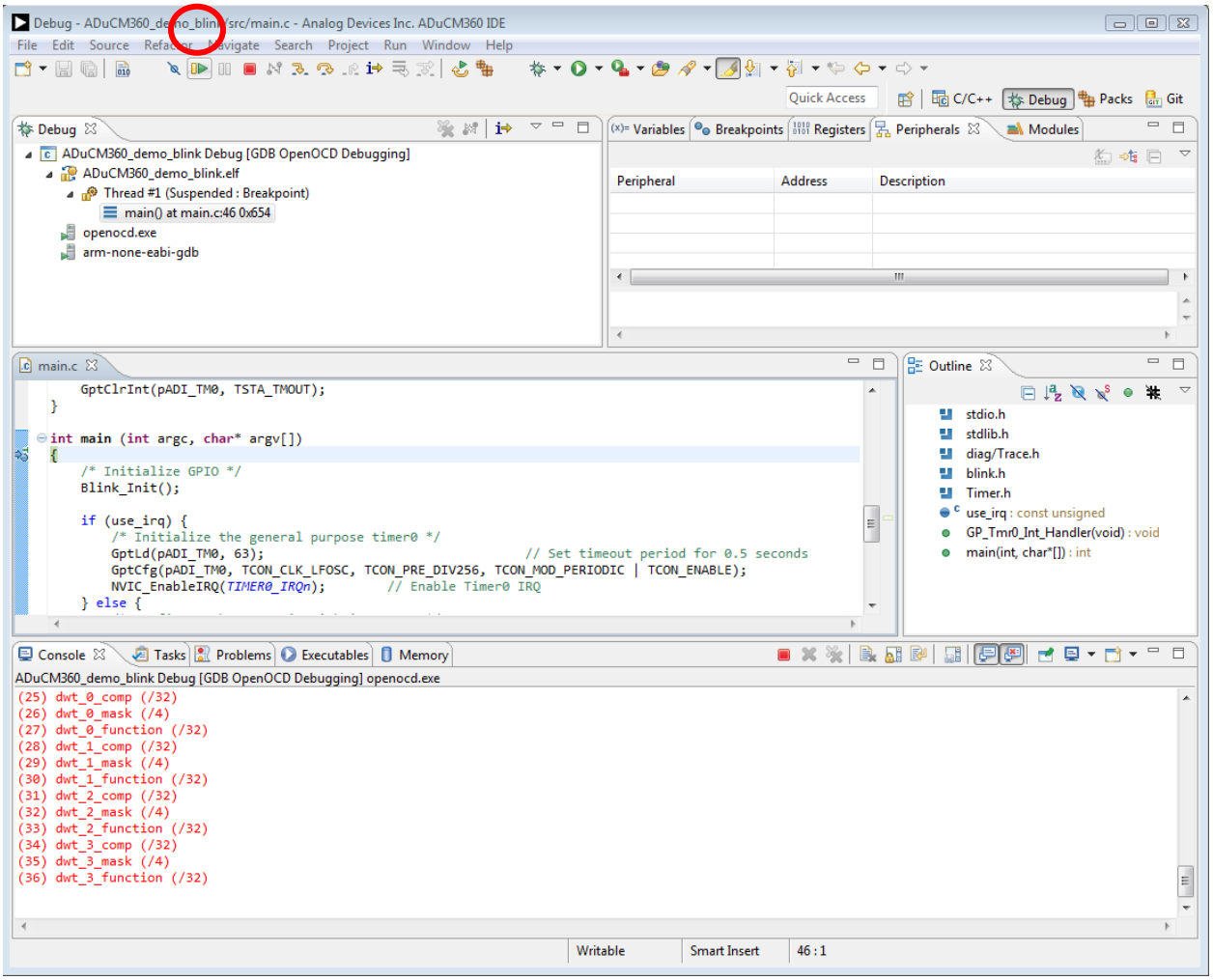
6. Unplug the microUSB cable from the DEBUG port
7. Set up hardware switches in the following positions. S1 = 1, S2 = 0, S3 = 1, S4 = 0
8. Plug in microUSB cable back into DEBUG port, and Plug second microUSB cable into USER port, and the other end into the computer.



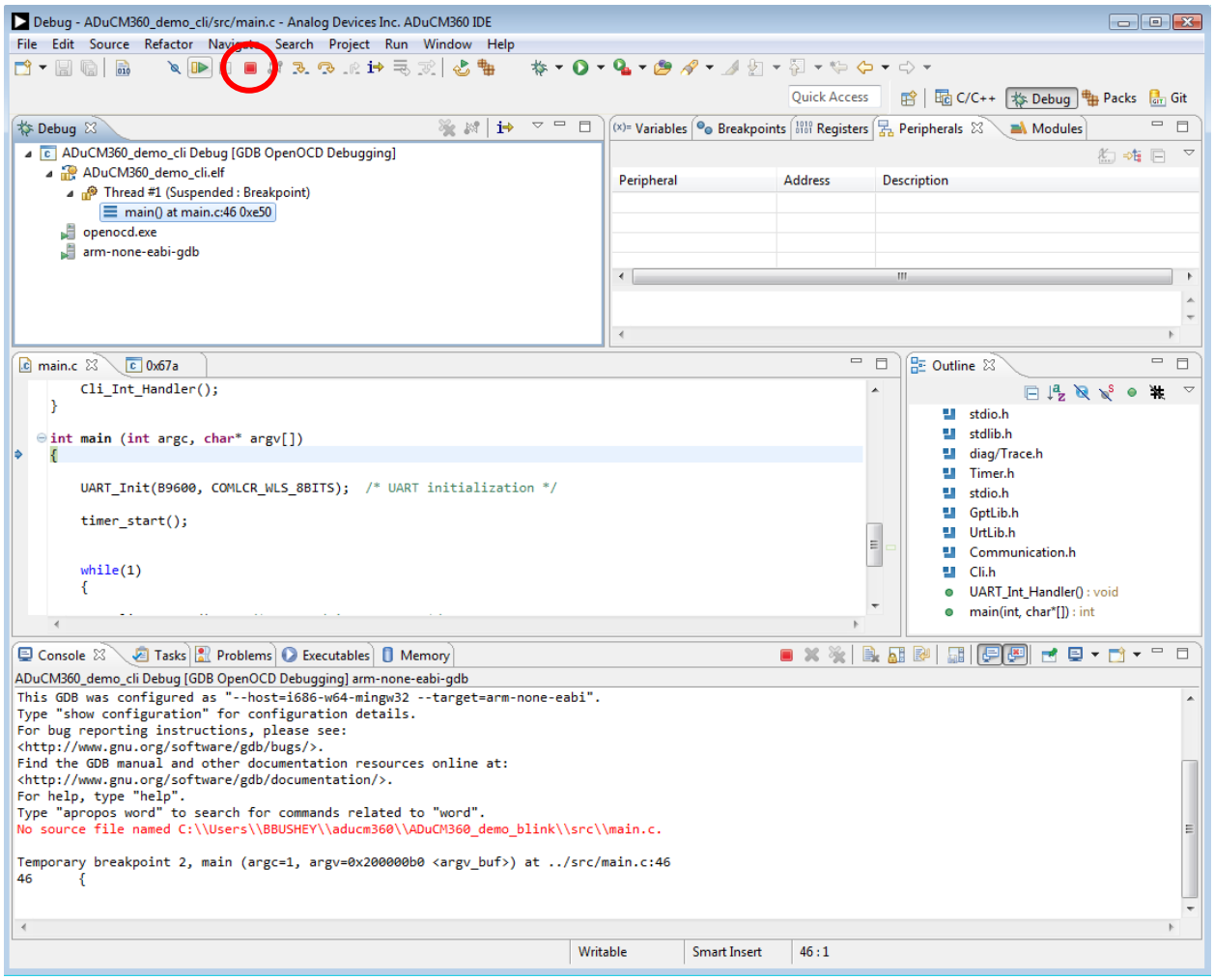
9. In the toolbar, look for the “bug” icon, click the down arrow, and look for the “ADuCM360_demo_cli Debug” and click it.


C/C++ - ADuCM360_demo_cli/src/main.c - Analog Devices Inc. ADuCM360 IDE
File Edit Source Refactor Navigate Search Project Run Window Help
1 ADuCM360_demo_blink Debug
2 ADuCM360_demo_ADXL364_PMOD Debug
3 CN0216-ARDZ Debug
4 ADuCM360_test_project Debug
5 ADuCM360_demo_cli Debug
6 ADuCM360_gpio_test Debug
7 ADuCM360_demo_adxl362 Debug
Debug As
Debug Configurations...
Organize Favorites...
Project Explorer
ADuCM360_demo_adxl362
ADuCM360_demo_ADXL364_PM
ADuCM360_demo_blink
ADuCM360_demo_cli
ADuCM360_gpio_test
ADuCM360_test_project
CN0216-ARDZ
main.c
Problems Tasks Console Properties Debug
GNU ARM Eclipse Packs console
2015-10-05 10:55:13
Extracting devices & boards...
Loading repos summaries...
Parsing cached content file "C:\Users\BBUSHEY\Packages\.cache\.content_www_keil_com_pack.xml"...
File does not exist, ignored.
Parsing cached content file "C:\Users\BBUSHEY\Packages\.cache\.content_gnuarmeclipse_sourceforge_net_packages.xml"...
File does not exist, ignored.
Identifying installed packages...
Found no installed packages.
Completed in 10ms.
ADuCM360_demo_cli

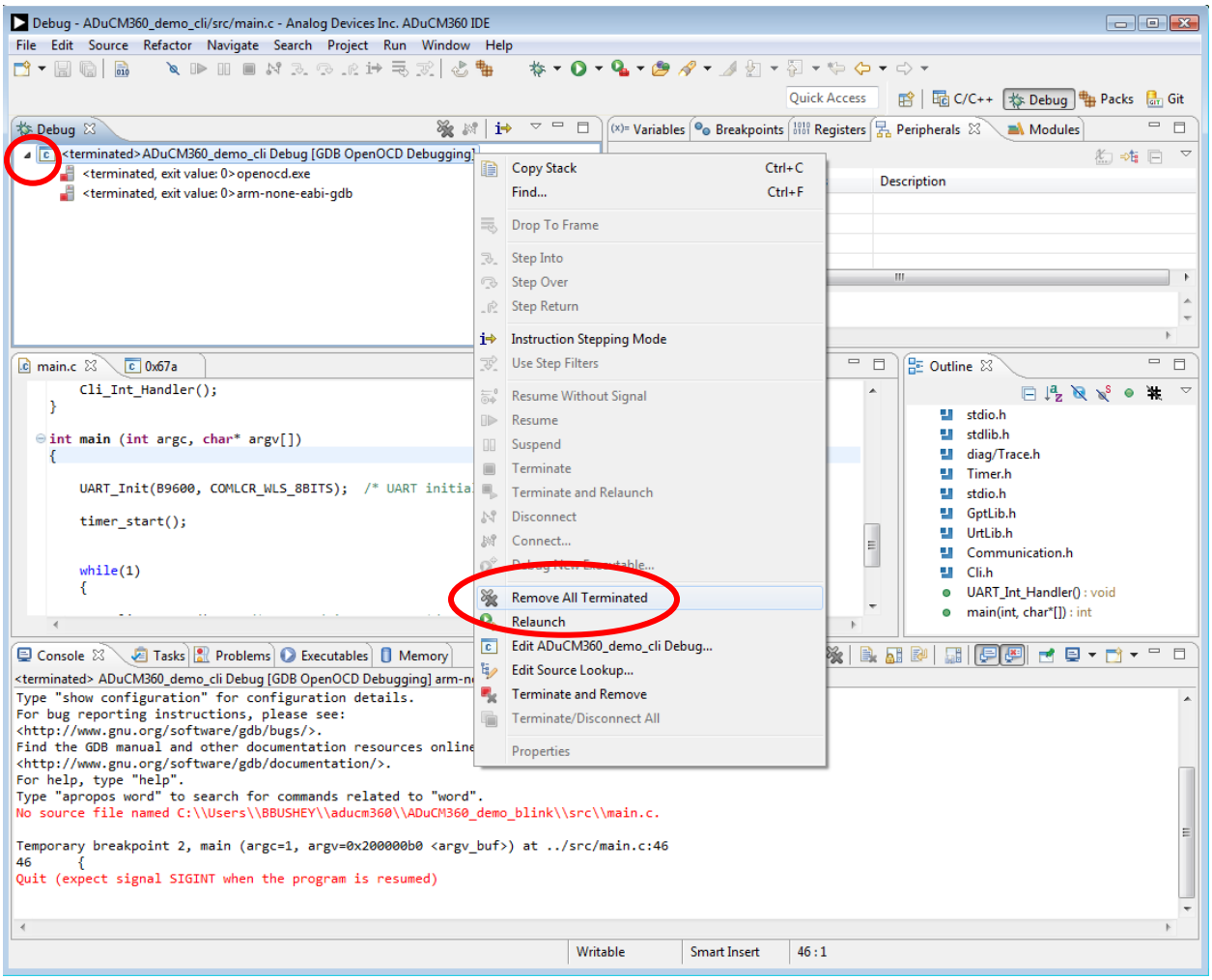
10. In the toolbar, look for the Play/Pause button, and click it.



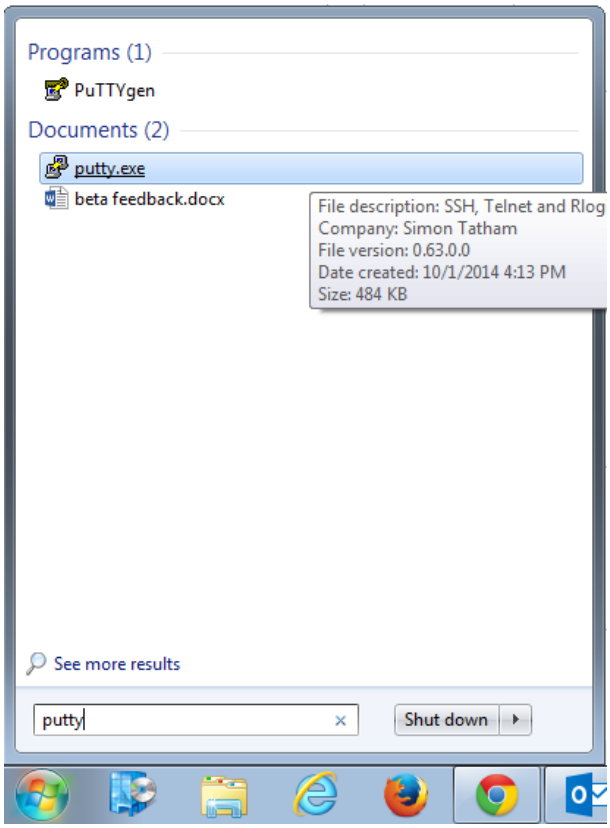
11. In the toolbar, look for the stop button, and click it.



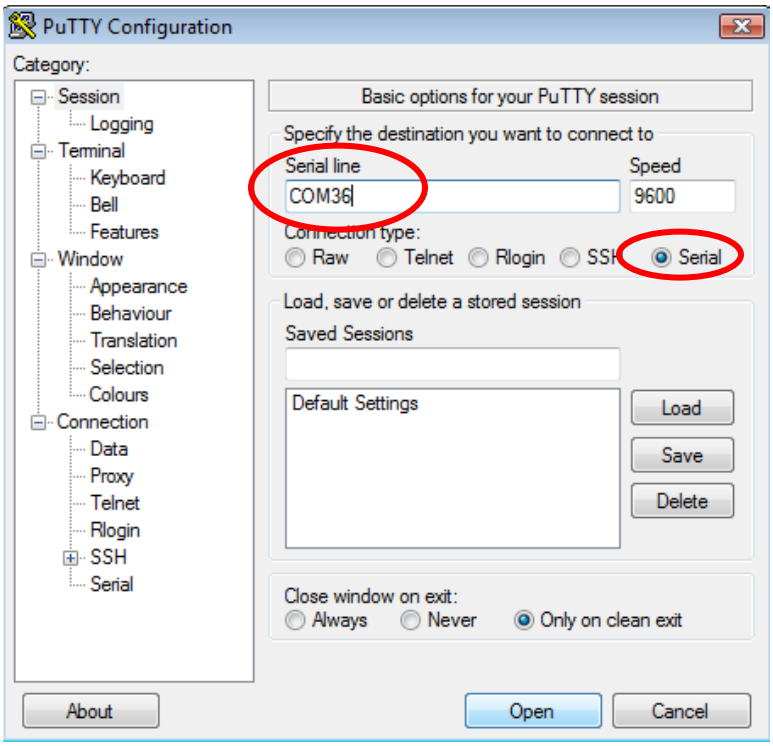
12. Go to the “Debug tab” and right click on the terminated debug session. Click on the “Remove Terminated” option



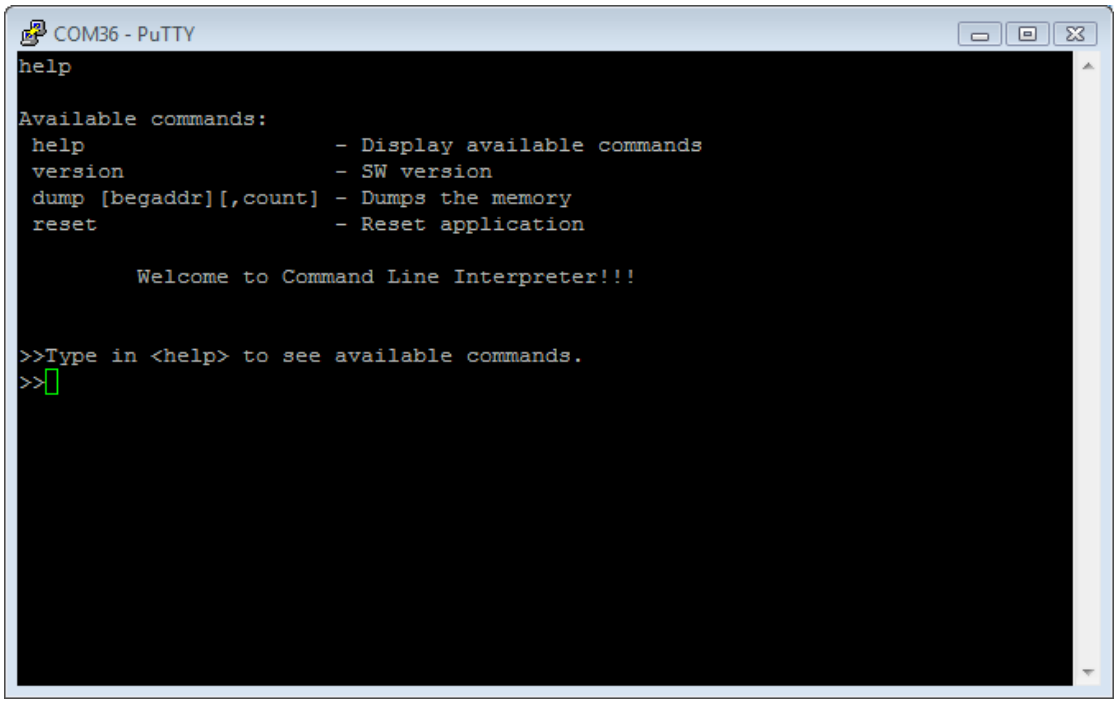
13. Go to the start menu and type in “putty”. Look for the putty.exe program and click it



14. Configure Putty, by clicking on the "Serial" radio button, and then type in "**COM6**" on the Serial Line. Click OK.



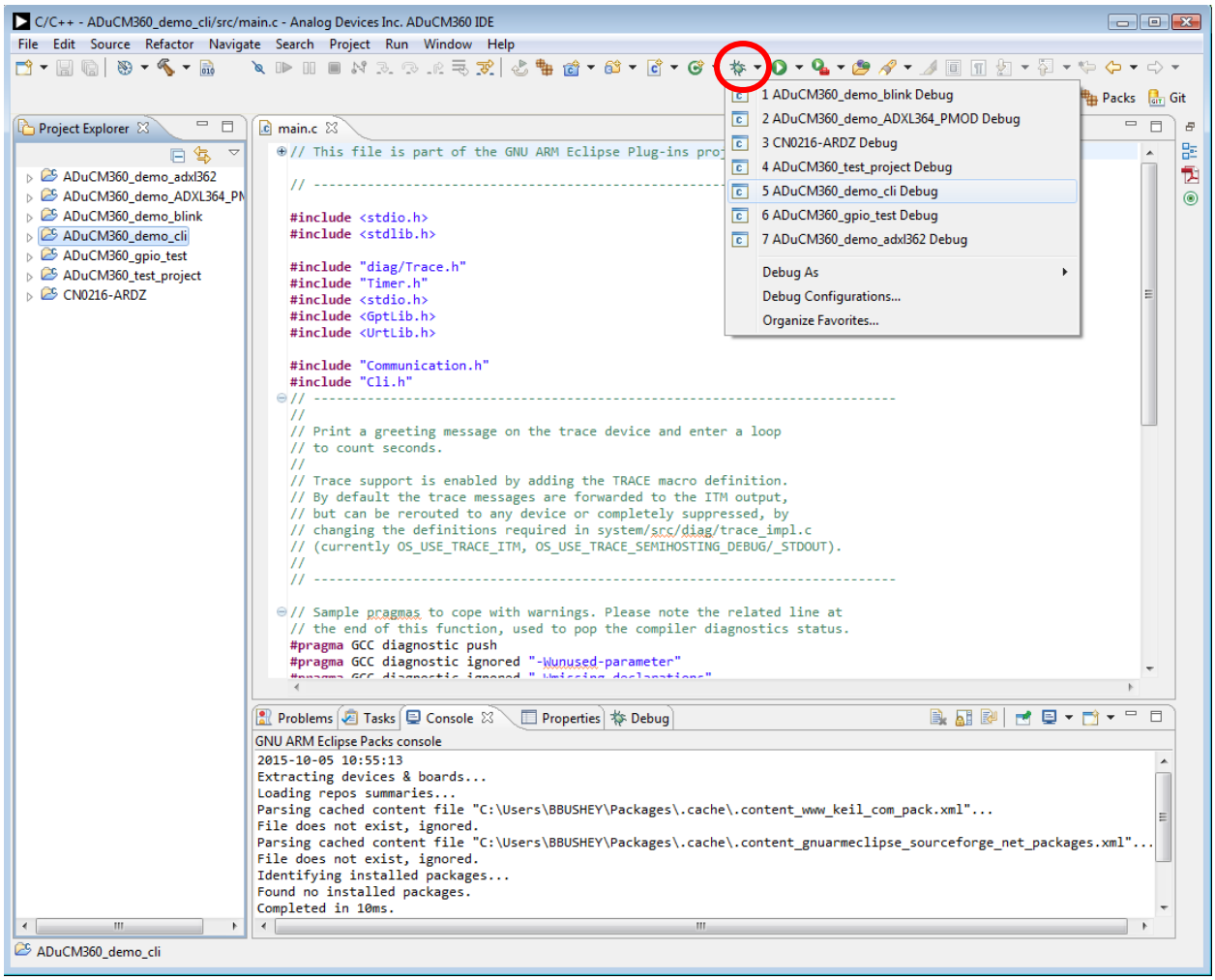
15. Type in the word “help” into the putty program prompt. You should see a help menu display.



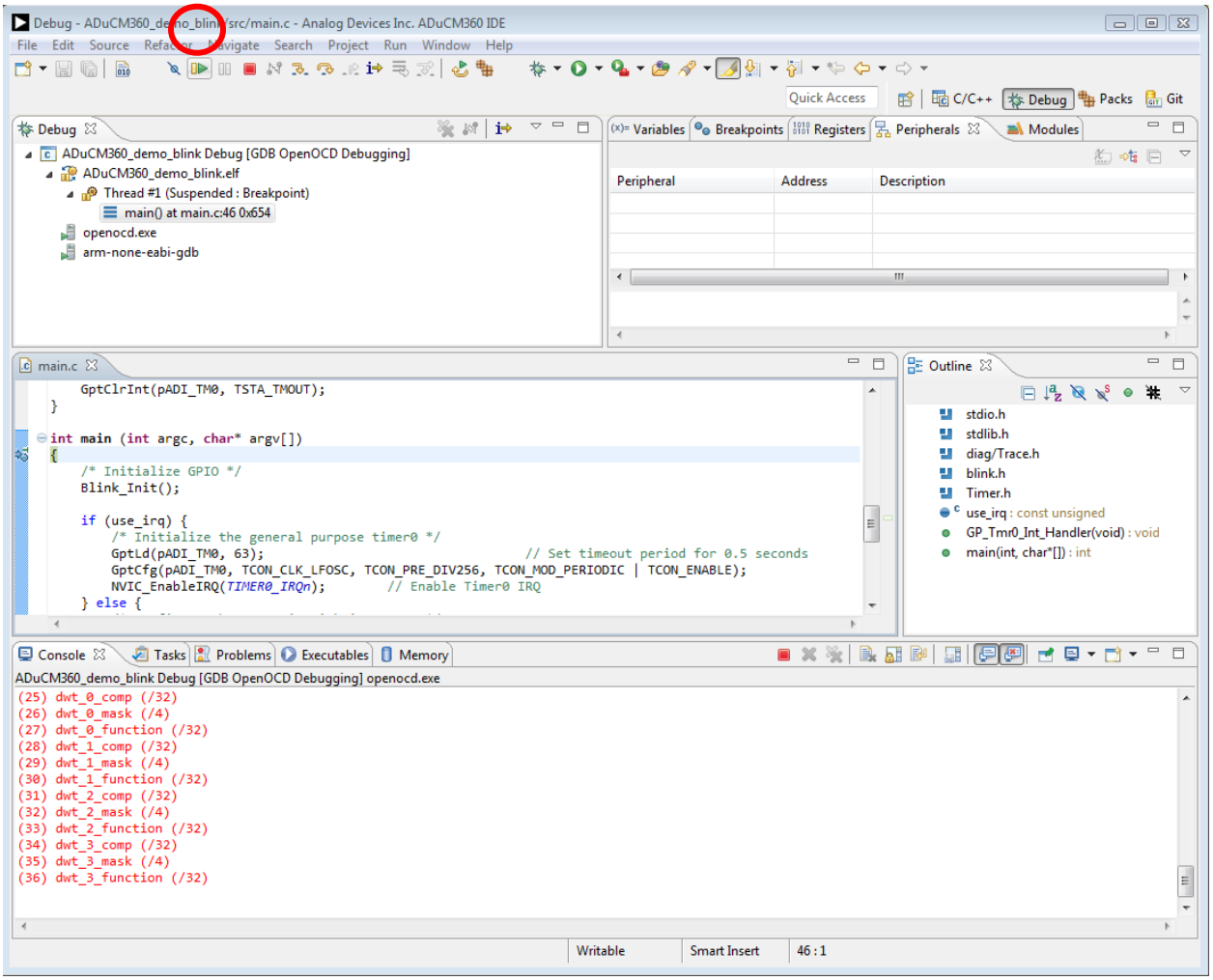
16. If you see the above menu, than everything worked successfully

Case 3: Shield

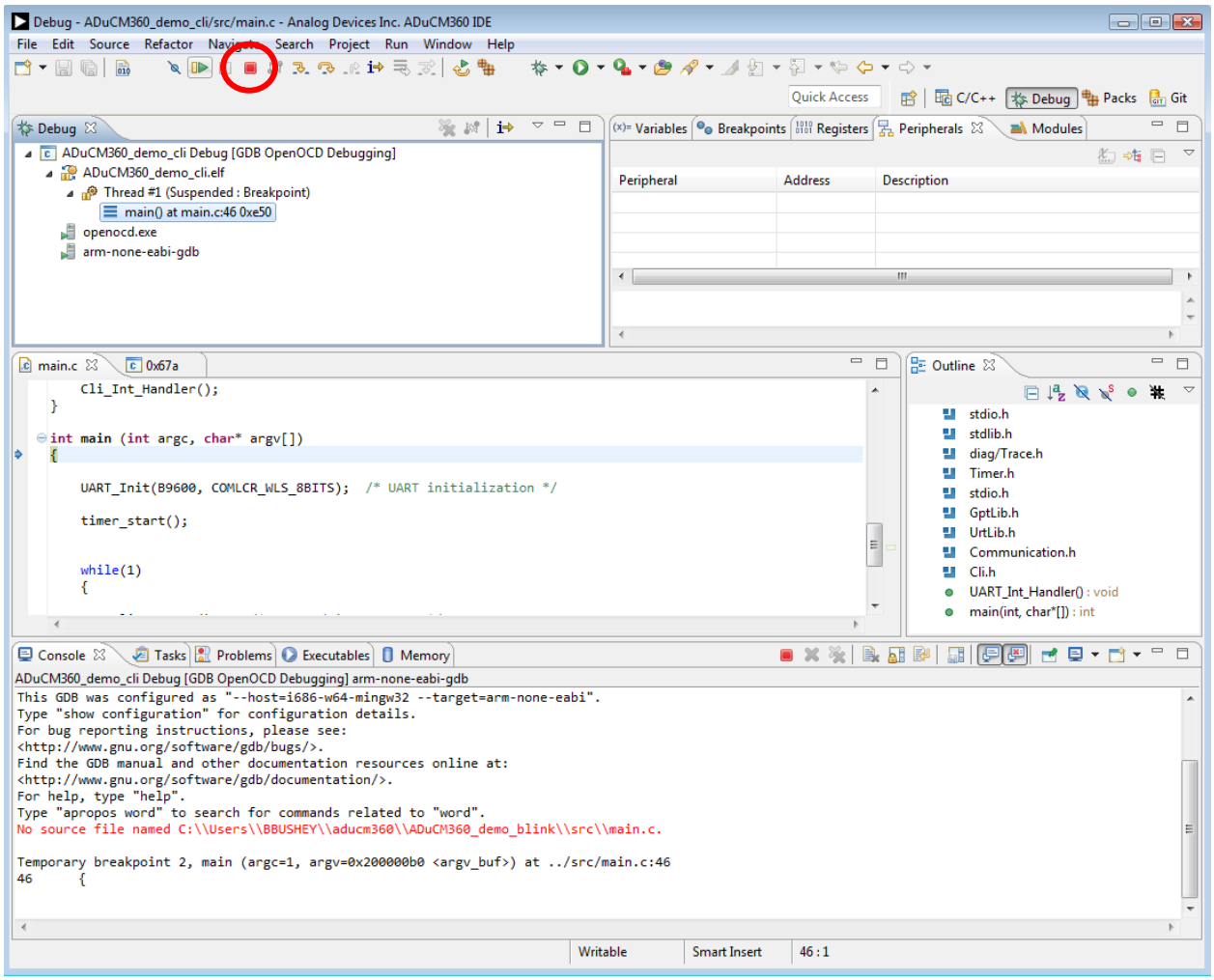
1. Unplug the microUSB cable from the DEBUG port
2. Set up hardware switches in the following positions. S1 = 1, S2 = 0, S3 = 1, S4 = 0
3. Plug in microUSB cable back into DEBUG port, and Plug second microUSB cable into USER port
4. In the toolbar, look for the “bug” icon, click the down arrow, and look for the “ADuCM360_demo_adxl362 Debug” and click it.


C/C++ - ADuCM360_demo_cli/src/main.c - Analog Devices Inc. ADuCM360 IDE
File Edit Source Refactor Navigate Search Project Run Window Help
1 ADuCM360_demo_blink Debug
2 ADuCM360_demo_ADXL364_PMOD Debug
3 CN0216-ARDZ Debug
4 ADuCM360_test_project Debug
5 ADuCM360_demo_cli Debug
6 ADuCM360_gpio_test Debug
7 ADuCM360_demo_adxl362 Debug
Debug As
Debug Configurations...
Organize Favorites...
Project Explorer
ADuCM360_demo_adxl362
ADuCM360_demo_ADXL364_PM
ADuCM360_demo_blink
ADuCM360_demo_cli
ADuCM360_gpio_test
ADuCM360_test_project
CN0216-ARDZ
main.c
Problems Tasks Console Properties Debug
GNU ARM Eclipse Packs console
2015-10-05 10:55:13
Extracting devices & boards...
Loading repos summaries...
Parsing cached content file "C:\Users\BBUSHEY\Packages\.cache\.content_www_keil_com_pack.xml"...
File does not exist, ignored.
Parsing cached content file "C:\Users\BBUSHEY\Packages\.cache\.content_gnuarmeclipse_sourceforge_net_packages.xml"...
File does not exist, ignored.
Identifying installed packages...
Found no installed packages.
Completed in 10ms.
ADuCM360_demo_cli

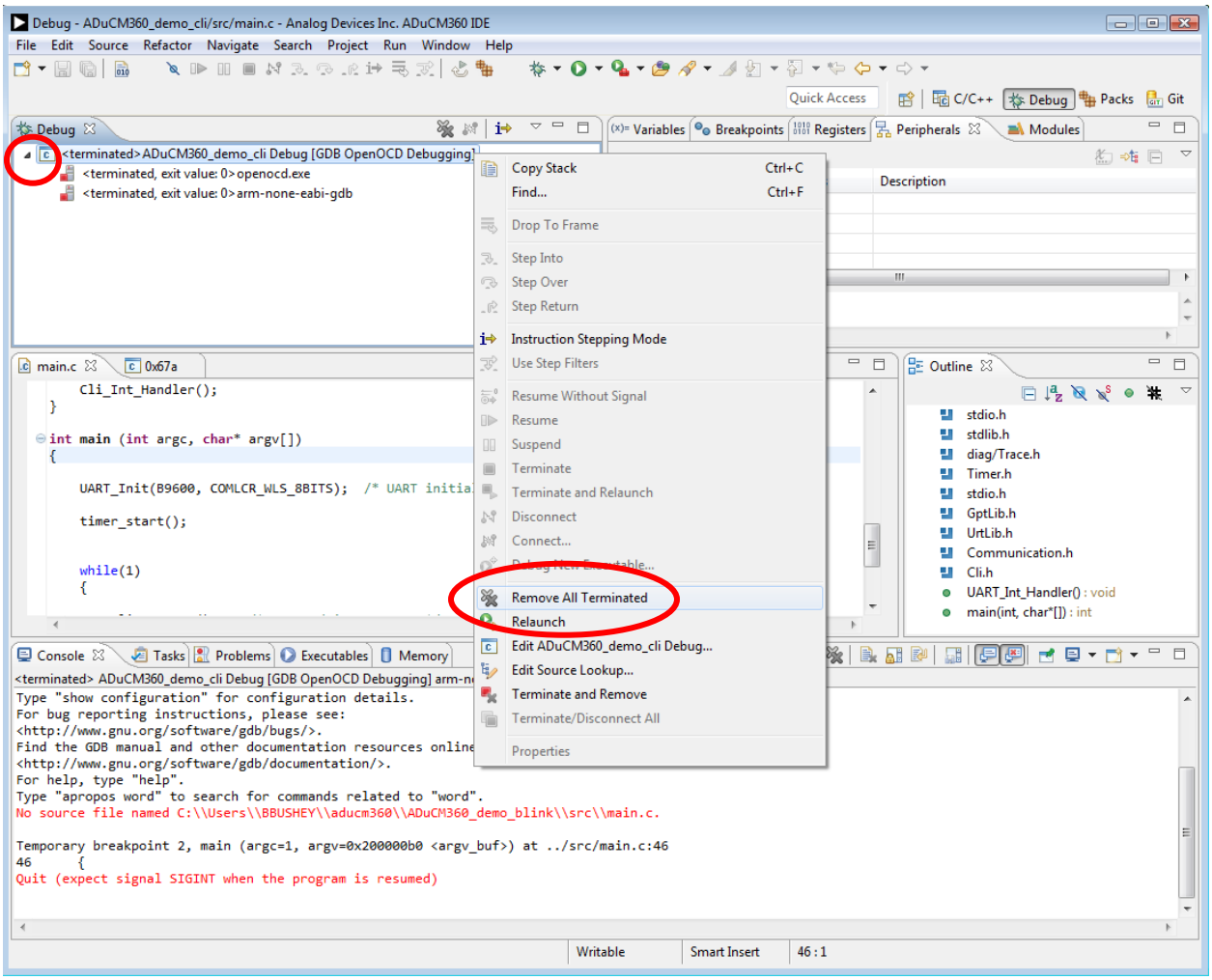
5. In the toolbar, look for the Play/Pause button, and click it.



6. In the toolbar, look for the stop button, and click it.

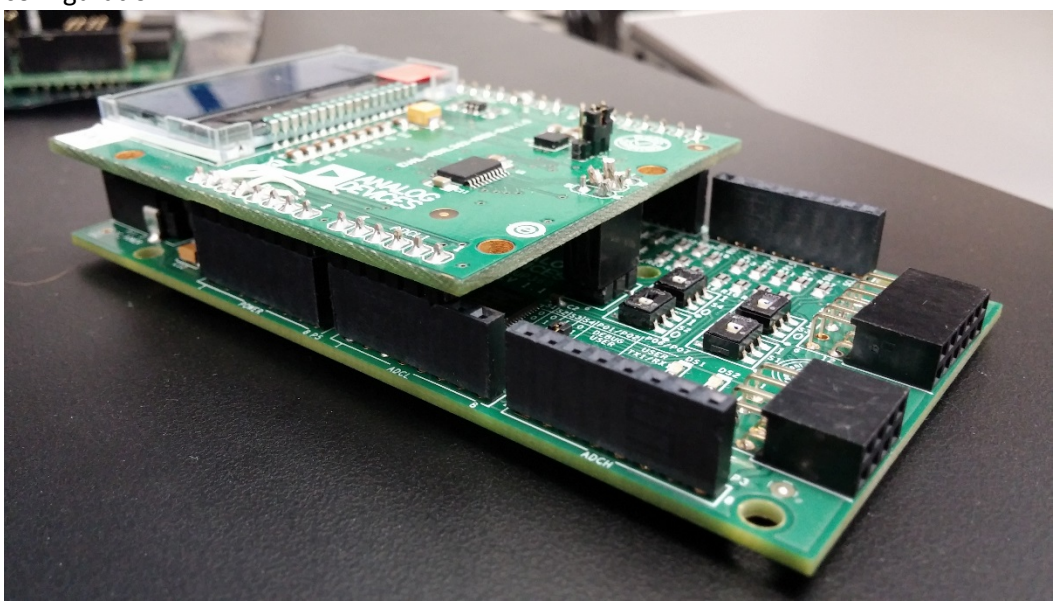


7. Go to the “Debug tab” and right click on the terminated debug session. Click on the “Remove Terminated” option



8. Unplug the micro USB cable from the DEBUG port of the EVAL-ADICUP360

9. Stack the EVAL-ADXL362-ARDZ board on top of the EVAL-ADICUP360.
    a. Make sure you align the pins of the ADXL362 with the Power/ADCL/PWML/PWMH/SPI headers. It will only fit in one configuration.



10. Plug in the microUSB connector back into the DEBUG port of the EVAL-ADICUP360
11. The LCD screen should show a bunch of data and a small grid to the right. That is completed operation.

8.0 Conclusion

Analog Devices EVAL-ADICUP360 complies with;

the emissions standard EN 55022:2010

and the immunity standard EN 55024:2010

in the configurations and operating modes as stated in this test report.

End of Report