



*iSensor*® Demo/Evaluation Tips for the ADIS1640x



Mark Looney iSensor Application Engineer May 30, 2009



### *i***Sensor**<sup>®</sup> *The Simple Solution for Sensor Integration* Evaluation Tool Overview

#### Interface Connector for those that need to integrate this on a new PCB 1. The ADIS1640xAMLZ use the FTMH-112-03 series of connectors from Samtec. www.samtec.com/FTMH The evaluation tools use the CLM-112-02-LM-D-A connector from Samtec Acquire mating connector from Samtec, not ADI. www.samtec.com/samples Alternate mating connector: www.samtec.com/MLE 2. Evaluation/Interface Board for simpler connection to an existing processor/system PCB. These boards provide a simple connector translation from the 1mm pitch on the ADIS1640xBMLZ products to a 2mm pitch, which is easier to use in common prototyping environments such as hand-soldering and ribbon cabling. NOTE: PCB not sold separately. Part numbers for ordering: ADIS16405/PCBZ Evaluation System (ADISUSBZ) for those that prefer a simple PC interface 3. This system provides a simple USB interface, along with software for simple data collection and evaluating most of the ADIS1640x functions and performance. Supports approximately 150-200SPS sample rate. CAUTION: This system DOES NOT provide an appropriate framework for developing a system around the ADIS1640xBMLZ. NO source code or code development support is

included with this kit.
Part number for ordering: ADISUSBZ



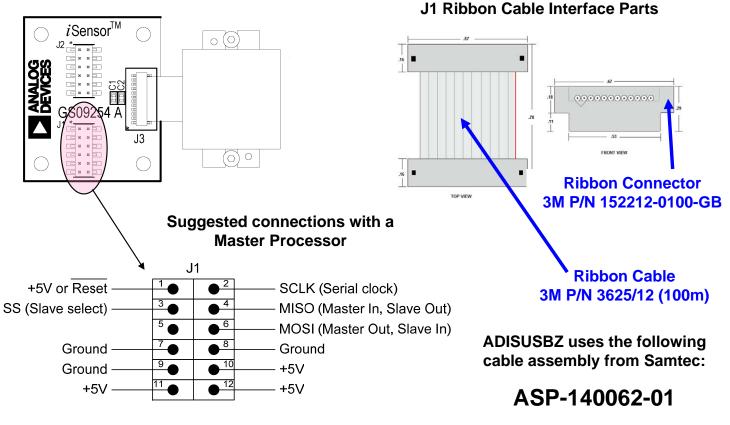




ADISUSBZ & ADIS16405BMLZ Shown Here (Sold separately)



### *i***Sensor**<sup>®</sup> *The Simple Solution for Sensor Integration* Hooking up to the ADIS1640x/PCBZ





## *i***Sensor**<sup>®</sup> *The Simple Solution for Sensor Integration* ADISUSBZ-based Evaluation

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The ADIS16405ES installation package will load the appropriate drivers and prepare a PC to use the ADIS1640x evaluation software.

1. Download 405ES.zip into a temporary directory and unpack its contents. http://www.analog.com/static/imported-files/eval\_boards/405ES.zip

OR GO TO:

#### www.analog.com/isensor-evaluation,

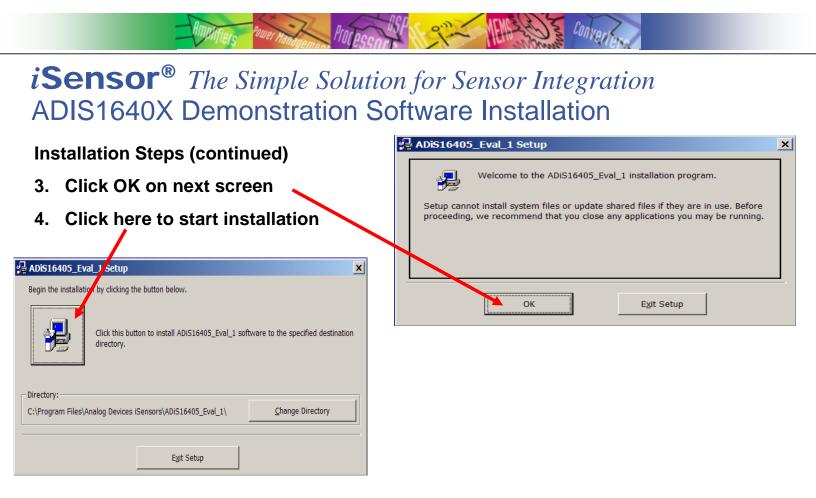
then click on EVALUATION SOFTWARE DOWNLOADS

then click on 405ES.zip option

2. Double-click on "setup.exe"

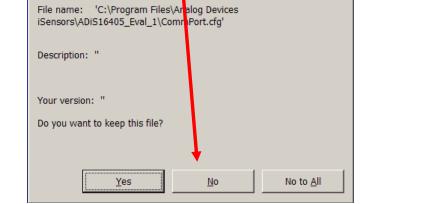
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File	Actions	Options	Help									
1	2			<b>(</b>	<b>1</b>	<b>F</b>	<b>~</b>	<u>(</u>	- St			
N	ew	Open	Favorites	Add	Extract	Encrypt	View	Instal	Wizard			
Name				Туре		Modified			Size	Ratio	Packed	
Ac	tup.lst lis16405_ tup.exe	_Eval_1.CA	ΑB	LST File WinZip Fi Install Apj		4/1/2009 4/1/2009 3/14/2001	2:13 PM		4,511 06,159 39,776		1,034 1,69 67,177	
Select	ed 0 files,	0 bytes				Total 3 files, 3	1,808KB				e	







#### Convert Amplifiers Power Manana PIOLACCON iSensor<sup>®</sup> The Simple Solution for Sensor Integration **ADIS1640X Demonstration Software Installation Installation Steps (continued)** ADiS16405\_Eval\_1 - Choose Program Group × Setup will add items to the group shown in the Program Group box. You can enter a new group name or select one from the Existing Groups list. 5. Click Continue Program Group: Analog Devices iSensors If this message comes up, Existing Groups: 6. Accessories click on "No" Analog Devices Giveio Startup Version Conflict × A file being copied is not newer t an the file currently on your system. It is recommended that you keep your existing file.



ADiS16405_Eval_1 Setup
ADiS16405_Eval_1 Setup was completed successfully.
OK

Cancel

Continue



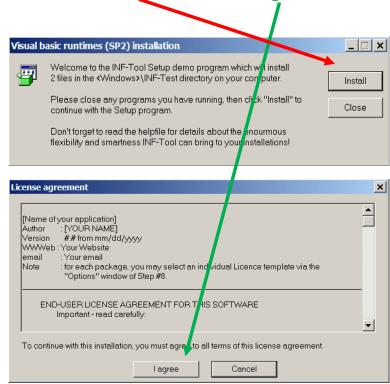
## *i***Sensor**<sup>®</sup> *The Simple Solution for Sensor Integration* ADIS1640X Demonstration Software Installation

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**Installation Steps (continued)** 

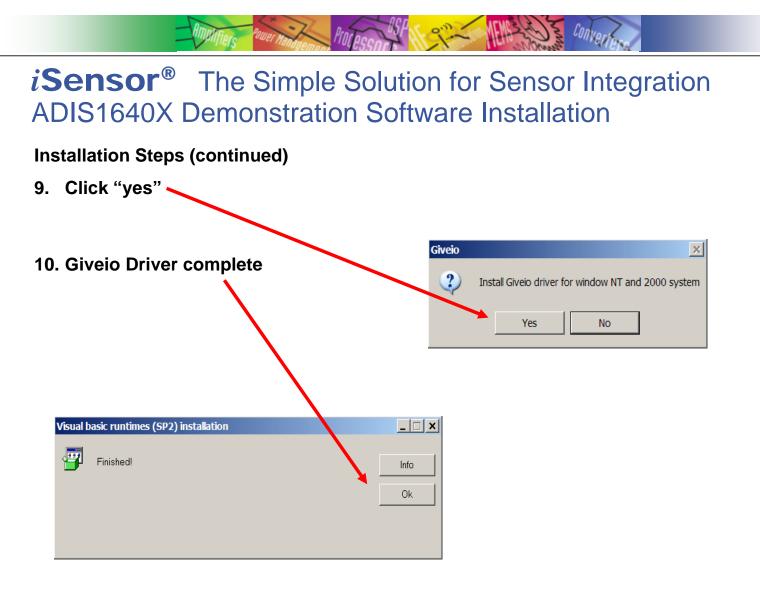
- 7. Open the newly created directory and double-click onto "giveio.exe"
- 8. Click "Install," then " I Agree"



📮 C:\Program Files\Analog	Device	s iSensors\AD <mark>b</mark> 16405_E	ival_1		
File Edit View Favorites	Tools	Help			A
🕞 Back 🔻 🕘 🔻 🤌 🔎	Search	🕞 Folders 🛄 🔻			
Address 🔁 C:\Program Files\Ar	nalog De	vices iSenso ADiS16405_	Eval_1		🔻 🄁 Go
		▲ Name 4	Size	Туре	Date Modified
File and Folder Tasks	*	Adis1 6405_Eval_1.ex	ie 320 KB	Application	4/21/2009 10:53 AM
Denene this file		Cont nPort.cfg	1 KB	Microsoft Office Outlo	5/14/2009 9:27 PM
Rename this file		GIVEIO.EXE	82 KB	Application	10/2/2001 12:46 PM
Move this file		ST6UNST.000	4 KB	000 File	5/13/2009 12:01 PM
Copy this file		ST6UNST.001	4 KB	001 File	5/14/2009 4:32 AM
Publish this file to the		ST6UNST.002	4 KB	002 File	5/14/2009 9:29 PM
Web		ST6UNST.LOG	4 KB	Text Document	5/4/2009 2:28 PM
E-mail this file					
🗙 Delete this file					
Other Places	*				
Analog Devices iSensor					
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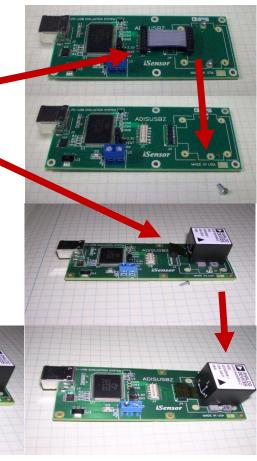
## *iSensor*<sup>®</sup> *The Simple Solution for Sensor Integration* ADIS1640x Installation on ADISUSBZ

**Installation Steps (continued)** 

### 11. Install ADIS1640xBMLZ on ADISUSBZ

- 1. Remove ribbon cable & 2mm screws
- 2. Place ADIS1640xBMLZ using silk on ADISUSBZ
- 3. Secure ADIS1640xBMLZ using 2 M2mmx0.4mm pan head screws (provided) between two tabs
- 4. Align ADIS1640xBMLZ connector over J4 on ADISUSBZ and press it down to make connection
- 5. Change JP1 from "+3.3V" option to "+5V" option

### 12. Plug in USB cable

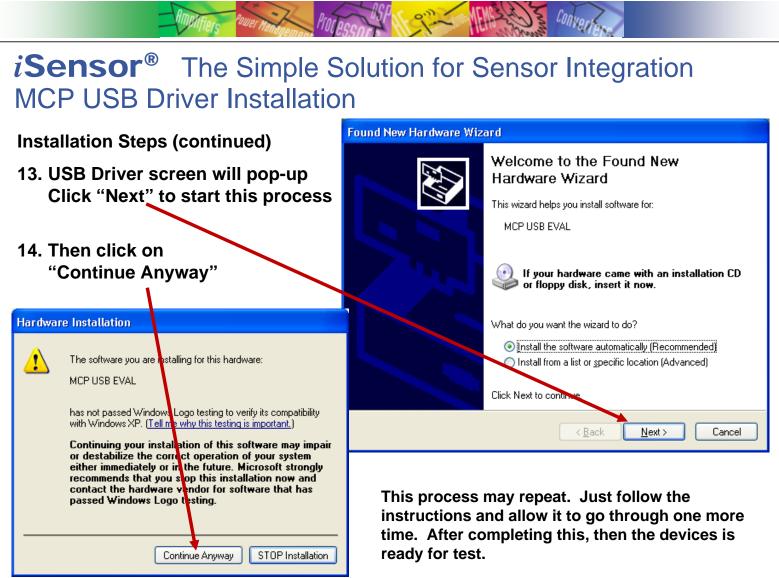




DO NOT PULL ON THE ADIS1640x BODY TO BREAK THE CONNECTION WITH THE MATING CONNECTOR. WHEN DISCONNECTING, BREAK THE CONNECTION BY USING A SMALL SLOTTED SCREWDRIVER TO PRY THE CONNECTOR UP BEFORE REMOVING SCREWS

The flex circuit can break when mishandled and in most cases, repair is impossible. ADI does not offer repair or replacement service for broken flex and encourages appropriate care when handling the flex.



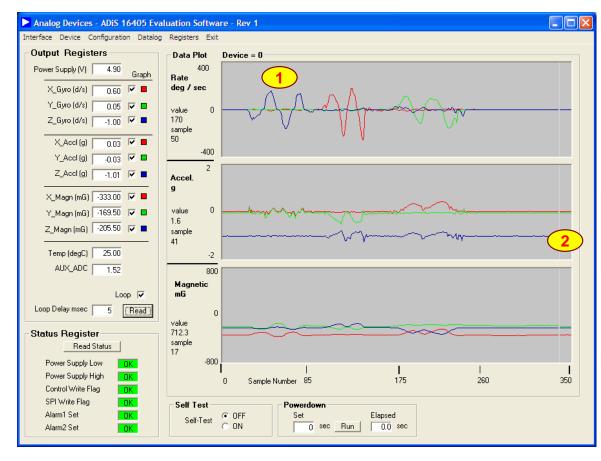




<i>iSensor</i> <sup>®</sup> <i>The Simple Solution for Sensor Integral</i> ADIS1640X Software Tips for the ADIS16405	. Locate ADIS16405_Rev1
Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Settings   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Settings   Image: Giveio   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Settings   Image: Giveio   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Settings   Image: Giveio   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Settings   Image: Giveio   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Settings   Image: Giveio   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Settings   Image: Giveio   Image: Analog Devices iSensors   Image: Analog Devices iSensors   Image: Analog Devices iSensors     Image: Setting Seting Setting Setting Setting Setting Setting	Program from the computer start menu. 2. Click on "Interface" and select USB, then OK when the pop-up window shows
Interface   Device   Configuration   Datalog   Registers   Exit     Parallel   registers   Oata Plot   0   400   400   Rate   400   Rate   100	the USB device is connected. 5. Click on device to select part number for device under test 5. Select which sensor outputs to monitor on the graph. 5. Start on-screen graphing
Temp (degC)	by selecting loop and then Read button.

# *i***Sensor**<sup>®</sup> *The Simple Solution for Sensor Integration* ADIS1640X Software Tips for the ADIS16405

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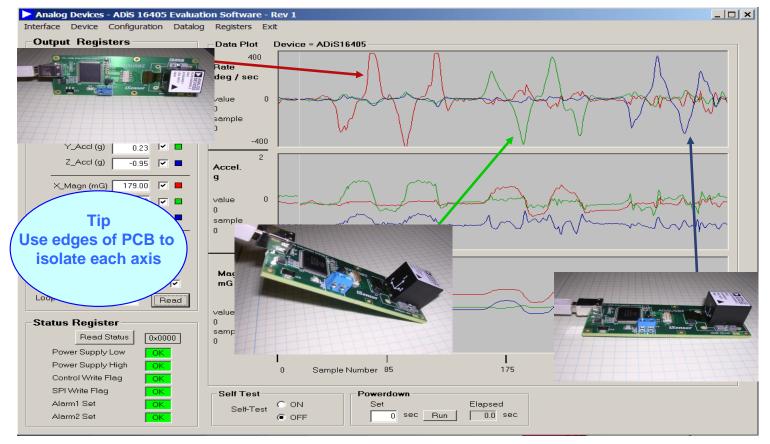
1. Use the axis markings on the device to determine rotation response with respect to the response on screen.

CONVER

2. Notice the accelerometer response to gravity.



## *i***Sensor**<sup>®</sup> *The Simple Solution for Sensor Integration* ADIS16405 Demonstration Tips – Gyro response



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### *iSensor*<sup>®</sup> *The Simple Solution for Sensor Integration* ADIS1640X Evaluation Software, Calibration Menu Features

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Calibration					×
Automatic Features	· (5	)			
Restore Factory (	Calibration	Run			
Precision Auto Nu	III	Run			
2 Auto Null		Run	1		
Manual Calibration	Adjustmer	<u>nt</u>		Register	
Gyroscopes				Contents	
X-Axis Offset	0.0000	deg / sec	Update	0×0000	
Y-Axis Offset	0.0000	deg / sec	Update	0×0000	
Z-Axis Offset	0.0000	deg / sec	Update	0×0000	
Accelerometers					
X-Axis Offset	0.000	g	Update	0×0000	
Y-Axis Offset	0.000	g	Update	0×0000	
Z-Axis Offset	0.000	g	Update	0×0000	
Magnetometers					
XMAGN_HIC	0.000	mG	Update	0×0000	
YMAGN_HIC	0.000	mG	Update	0×0000	
ZMAGN_HIC	109.500	mG	Update	0×00DB	
XMAGN SIC	2048.000	Lsb	Linder 1	0×0800	
YMAGN SIC		Lsb	Update		
_	2048.000		Update	0×0800	
ZMAGN_SIC	2048.000	Lsb	Update	0×0800	
		Close		h Memory ster Update	(4

- 1. From the main menu, click on Configuration, then on Calibration to reach this menu.
- 2. Use Auto Null Run button to do a quick offset calibration.
- 3. Use Precision Auto Null to execute this option inside the ADIS16405, which takes a 30-second average to produce these numbers. Keep the device still and away from vibration and thermal variation during this 30 second period.
- 4. Use the Flash Memory Register Update to store settings in nonvolatile flash.
- 5. Use the Restore Factory Calibration to return all of these factors to zero.



### *i***Sensor**<sup>®</sup> *The Simple Solution for Sensor Integration* ADIS1640X Evaluation Software, Operation Menu Features

	Operational Control						×
	Sample Rate	2 SMPL_F	'RD Contents	0x0001	Update		
	Measurement R	ange and C	<u>)igital Filter</u> i	ing			
	Select Gyro Range	🖲 300 de	g/sec 🔿 15	) deg/sec 🔿 75 de	eg/sec		
	3 1 Taps	SENS/A	VG Contents	0x0400	Update		
	Auxilliary Digita	I I/O Config	<u>juration</u>				
$\left( \right)$	4 <u>Configure as a gener</u>	al purpose I/O	line GPIO	CTRL Contents	0×0F00		
	Digital I/O Line 0:	Input	Output	Line 0 Level	High	O Low	
	Digital I/O Line 1:	Input	Output	Line 1 Level	High	O Low	
	Digital I/O Line 2:	Input	Output	Line 2 Level	High	O Low	
	Digital I/O Line 3	Input	Output	Line 3 Level	High	O Low	
	<u>Configure as a data re</u>	ady line	MSC_(	CTRL Contents	0×0000		
	Select I/O line	DI/00	O DI/01	Output Polarity	C High	• Low	
	Enable	O ON	<ul><li>OFF</li></ul>				
	Auxilliary D/A C	onverter O	<u>utput</u>				
	0.0 Volts	AUX_DA	C Contents	0x0000	Update		
			Close Windo	w Flash M Register		$\mathbf{b}$	

- 1. From the main menu, click on Configuration, then on Calibration to reach this menu.
- 2. Bias stability performance is typically best when using the maximum sample rate.
- 3. Use the on-board Bartlett Window Filter to reduce noise. Enter number of taps (power of 2 steps sizes), then click on update. Since the ADISUSBZ supports sample rates of 150-200SPS, start with at least 8 taps.
- 4. Digital and analog I/O channel configuration options.
- 5. Use the Flash Memory Register Update to store settings in nonvolatile flash.



# *iSensor*<sup>®</sup> *The Simple Solution for Sensor Integration* ADIS1640X Evaluation Software, Data log Menu

Procession

Datalog Control	$\bigcirc$		x
FILE SETUP	<b>2</b> DATA SE		
1 Samples per File 1000		Power Supply	
Sample Delaymsec 0	~	X Gyro	
Files per Session 1	~	Y Gyro	
FILE INFORMATION		Z Gyro	
Directory C:\Program Files\Analog Devic	~	XAccel	
File Name DATALOG		YAccel	
File 1 .csv		Z Accel	
Data Format		XMagn	
Scaled Units CLSB's		Y Magn	
3		Z Magn	
Start Datalog		Temperature	
		AUX_ADC	
	L		

1. Set the total number of samples.

CONVER

- 2. Set the inertial sensor channels to monitor.
- 3. When the data log is in process, a message (below) will appear in this location until the data collection process has completed.

DATALOG IN PROGRESS



## *iSensor®* The Simple Solution for Sensor Integration ADIS1640X Evaluation Software, Data log Menu

Processor

	Name	Addr	hexValue	decValue .	•
Base Addr (Hex)	ENDURANCE	 0x0000	0x005C	92.0	Read
	SUPPLY_OUT	0x00002	0x07F6	4.92703	
Num Bytes	XGYRO OUT	0x0004	0xFFEC	-0.99992	
Read Flag	YGYR0_OUT	0x0006	0x0008	0.39997	Print
riedd ridg	ZGYR0_OUT	0x0008	0x000A	0.49996	
Write Flag	XACCL_OUT	0x000A	0x000C	0.0396	
	YACCL_OUT	0x000C	0xFFE6	-0.0858	
Deci. Value	ZACCL_OUT	0x000E 0x0010	0xFEDA 0x01CF	-0.9702	
	XMAGN_OUT YMAGN_OUT	0x0010 0x0012	0xFF1A	231.5 -115.0	
Read (Hex)	ZMAGN OUT	0x0012	0xFFDB	-18.5	
Write (Hex)	TEMP_OUT	0x0016	0xFFF7	23.7787	
	AUX ADC	0x0018	0x0755	1.51286	
	XGYR0_0FF	0x001A	0x0000	0.0	
	YGYR0_0FF	0x001C	0x0000	0.0	
Update Flash	ZGYR0_0FF	0x001E	0x0000	0.0	
	XACCL_OFF	0x0020	0x0000	0.0	
	YACCL_OFF ZACCL OFF	0x0022 0x0024	0x0000 0x0000	0.0 0.0	
	XMAGN HIF	0x0024 0x0026	0x0000 0x0000	0.0	
	YMAGN_HIF	0x0020	0x0000	0.0	
	ZMAGN_HIF	0x002A	0x00DB	109.5	
	XMAGN_SIF	0x002C	0×0800	2048.0	
	YMAGN_SIF	0x002E	0x0800	2048.0	
	ZMAGN_SIF	0x0030	0×0800	2048.0	
	GPIO_CTRL	0x0032	0x0F00	3840.0	
	MSC_CTRL	0x0034	0x0000	0.0	
	SMPL_PRD SENS AVG	0x0036 0x0038	0x0001 0x0400	1.0 1024.0	
	SLP CNT	0x0036 0x003A	0x0400 0x0000	0.0	
	ISTATUS	0x003A	0x0000	0.0	
	COMMAND	0x003E	0x0000	0.0	
	Cont_Slp	0x003B	0x0000	0.0	

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- 1. Access Register Menu information.
- 2. Pick a register for Read/Write.

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3. Read or print user Registers.





## CONTACTS: APPLICATIONS ENGINEER:

• MARKETING:

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### MORE INFORMATION ON ISENSOR EVALATION TOOLS:

www.analog.com/isensor-evaluation

