IXZ-2150 2-Axis Evaluation Board User Guide
Revision 1.0

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1. Revision History

Date	Revision	Description
09/20/2011	1.0	Initial release

2. Purpose

This document describes the hardware and circuitry on the IXZ-2150™ 2-Axis Evaluation (EV) Board. It covers applying the EV board to a larger system, understanding key signals and circuit functions, hardware jumper settings, and port connectors.

2.1 Usage

This evaluation board provides two axes of motion sensing, comprised of:

- X- and Z-Axis gyros with ±250°/sec, ±500°/sec, ±1000°/sec, ±2000°/sec selectable full-scale range.
- Digital data measured using on-chip ADCs, is transmitted over an I²C interface.

The Evaluation board may be used by itself using an I²C serial communications interface. Alternatively, it may be connected to InvenSense's ARM Evaluation Board (INVARMEVB) for connectivity to a host computer using USB interface.

2.2 Related Documents

The following documents are recommended for additional information regarding the products and systems described in this Application Note.

- IXZ-2150 Product Specification
- IXZ-2150 Register Map and Register Descriptions

3. IXZ-2150 2-Axis EV Board Overview

The IXZ-2150 2-Axis EV Board contains the IXZ-2150 dual axis gyroscope. It contains a number of 'solder-across' jumper points that permit several circuit configurations.

Refer to Figure 1. The EV Board is populated on its top side only for ease of measurement access. The 10x2 User Header is designed to connect with the InvenSense ARM Evaluation Board (INVARMEVB), which is a host microcontroller board useful for adapting the IXZ-2150 2-Axis EV Board to a personal computer via its USB port.

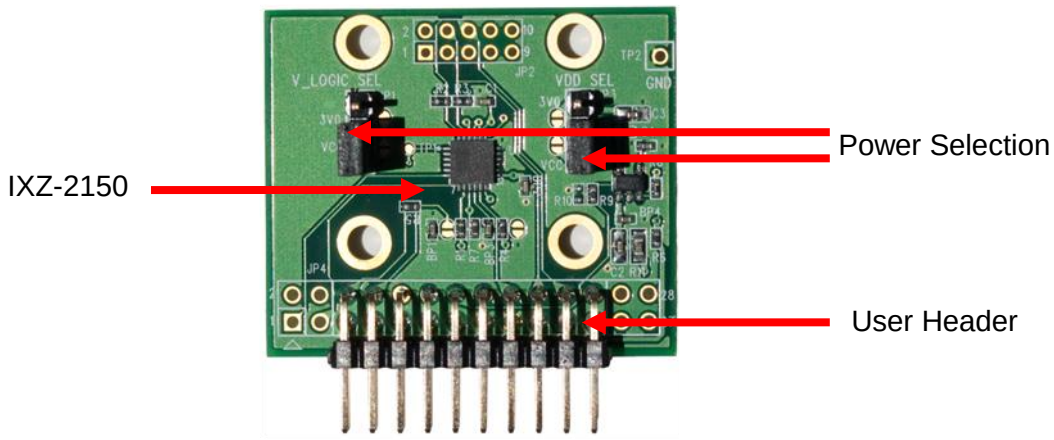

Figure 1. Top side of the IXZ-2150 2-Axis EV Board

The 3-pin power selection headers are used to select which voltage supply is fed to the IXZ-2150.

3.1 IXZ-2150 Key Function and Pin-outs

The IXZ-2150 EVB is a fully-tested evaluation board, providing for quick evaluation of the IXZ-2150's X- and Z-axis angular rate gyroscope. The IXZ-2150 uses InvenSense's proprietary MEMS technology with vertically driven vibrating masses to produce a functionally complete, low-cost motion sensor. All required conditioning electronics are integrated into a single chip measuring 4 x 4 x 0.9mm. It incorporates X- and Z-axis low-pass filters and an EEPROM for on-chip factory calibration of the sensor. Factory trimmed scale factors eliminate the need for external active components and end-user calibration. A built-in Proportional-To-Absolute-Temperature (PTAT) sensor provides temperature compensation information. The product is lead-free and Green Compliant.

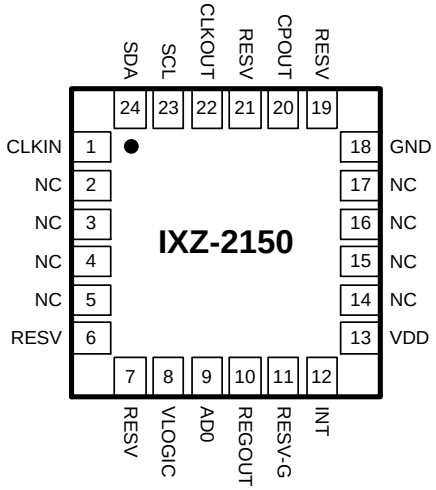

Figure 2. IXZ-2150 QFN Package (Top View) 24-pin 4mm x 4mm x 0.9mm

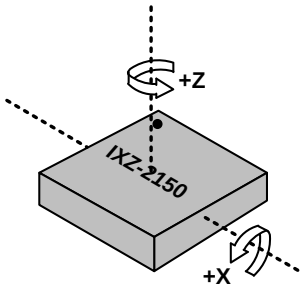

Figure 3. Orientation of Axes of Sensitivity and Polarity of Rotation

3.2 IXZ-2150 Bus Connection

The IXZ-2150 communicates to a system processor using an I^2C serial interface. The device always acts as a slave when communicating to the system processor.

4. IXZ-2150 2-Axis EVB Schematic

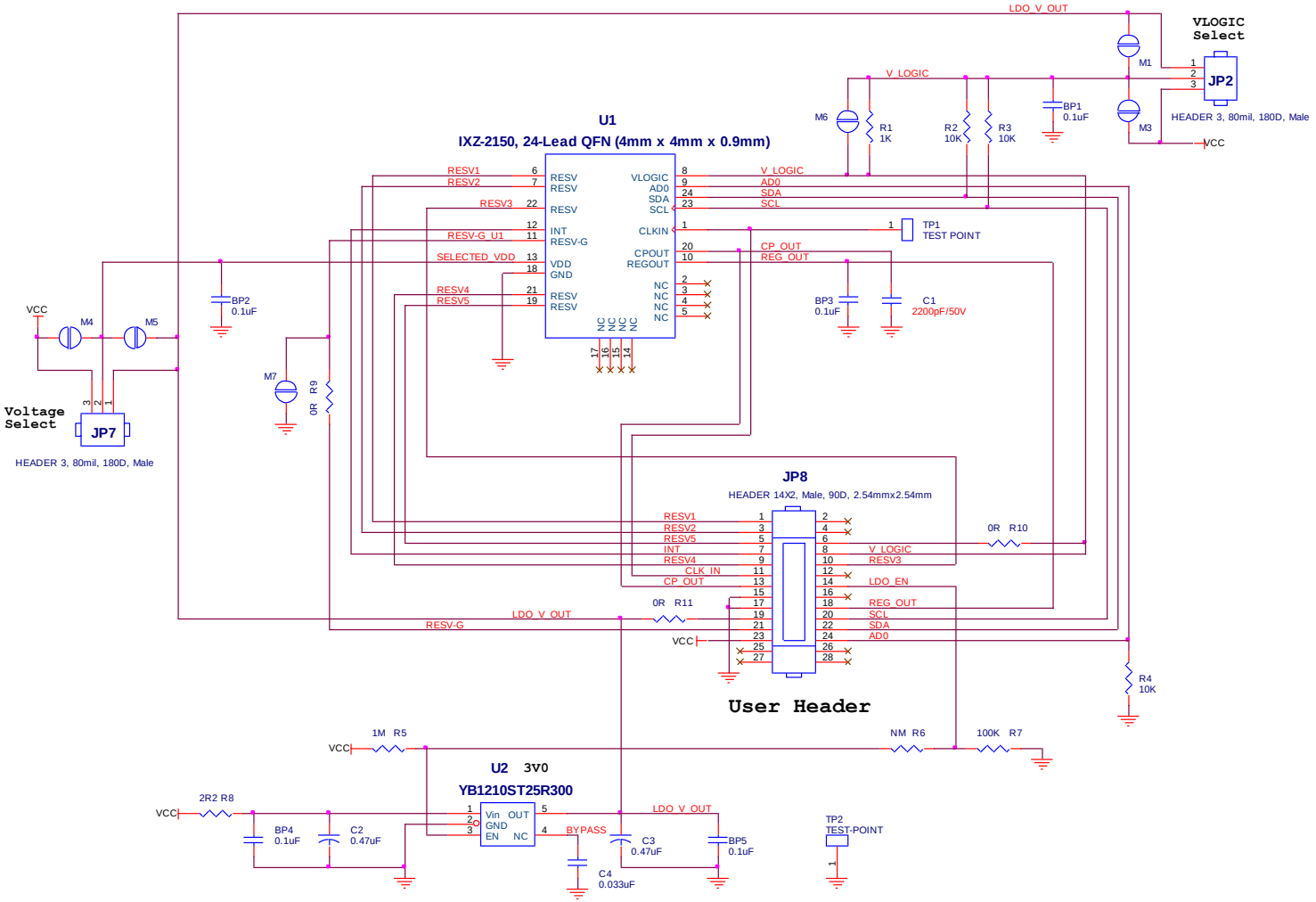

Figure 4. Schematic

5. Bill of Materials

Table 1. Bill of Materials

Item	Quantity	Reference	Part	PCB Footprint
1	5	BP1,BP2,BP3,BP4,BP5	0.1uF	C0402
2	1	C1	2200pF/50V	C0402
3	2	C2,C3	0.47uF	C0603
4	1	C4	0.033uF	C0402
5	2	JP2,JP7	HEADER 3, 80mil, 180D, Male	J79\3S
6	1	JP8	HEADER 14X2, Male, 90D, 2.54mmx2.54mm	HDB2X14NRA
8	1	R1	1K	R0402
9	3	R2,R3,R4	10K	R0402
10	1	R5	1M	R0402
11	1	R6	Not Mount	R0402
12	1	R7	100K	R0402
13	1	R8	2R2	R0603
14	3	R9,R10,R11	0R	R0402
17	1	U1	IXZ-2150, 24-Lead QFN (4mm x 4mm x 0.9mm)	QFN5_5S24P0_5T
18	1	U2	YB1210ST25R300	SOT235

5.1 Power Supply Connections

JP2 and JP7 are 3 header-pin plug-in jumpers which allow users to select between on-board LDO and external DC supply to the IXZ-2150. For details, please refer Table 2. Power Selection Jumpers.

The on-board 3.0V LDO (Low-dropout voltage regulator) is a low-noise version with stable enable-disable profile. Its output is called 3V0 on the schematic, and using it will assure that the gyroscope performance will meet intended specifications.

Selecting the raw Vcc line to power the chip is generally done while designing and evaluating an embedded platform, where the host processor and related electronics needs full control over the motion processing chipset's power supply.

When user intends to use on board LDO 3V0 power, external Vcc must be provided with higher than 3.7V to ensure that the LDO works properly.

If user provides Vcc with 5V, JP2 and JP7 must be set as "1-2 short". IXZ-2150 VDD and VLOGIC operation range is 2.1V to 3.6V.

5.2 IXZ-2150 EVB connector signals description

Table 2. Power Selection Jumpers

JP2 Pin Number	Signal description
1-2 short	VLOGIC = 3V
2-3 short	VLOGIC = Vcc (from external)
JP7 Pin Number	**Signal description**
1-2 short	VDD = 3V
2-3 short	VDD = Vcc (from external)

Table 3. User Interface Connector Signals

JP8 Pin Number	Signal description
1	Reserved
3	Reserved
5	Reserved
7	INT, INT output to controller
9	Reserved
11	CLK_I
13	CPOUT
15	GND
17	GND
19	3V
21	FSYNC
23	Receive power from ARM-7 Controller Board or external. It should be 5V, with >200mA
25	NC
27	NC
2	NC
4	NC
6	NC
8	VLOGIC
10	Reserved
12	NC
14	EVB on board LDO enable
16	NC
18	REGOUT
20	I²C SCL

JP8 Pin Number	Signal description
22	I²C SDA
24	I²C Addr
26	NC
28	NC

6. Serial bus Levels, Speeds and Terminations

The IXZ-2150 supports I²C up to 400kHz serial clock rate. The I²C bus open drain pull up resisters are connected to either 3.0V or external provided Vcc (3V or 5V depend on user). The pull up level is selected by JP2. Please refer to Table 2. Power Selection Jumpers.

7. Data Gathering Options

The IXZ-2150's Digital Sensor Data is available at the User Header. Alternatively, for connectivity with a host PC, an InvenSense ARM Processor Board may be used.

7.1 Connection to ARM EVB

For communications via USB to a host computer, the IXZ-2150 EVB can be connected to InvenSense's ARM processor board, the INV-ARMEVB.

The photo below shows the connection of IXZ-2150 to INV-ARMEVB. Connection between the two boards is made via the user header.

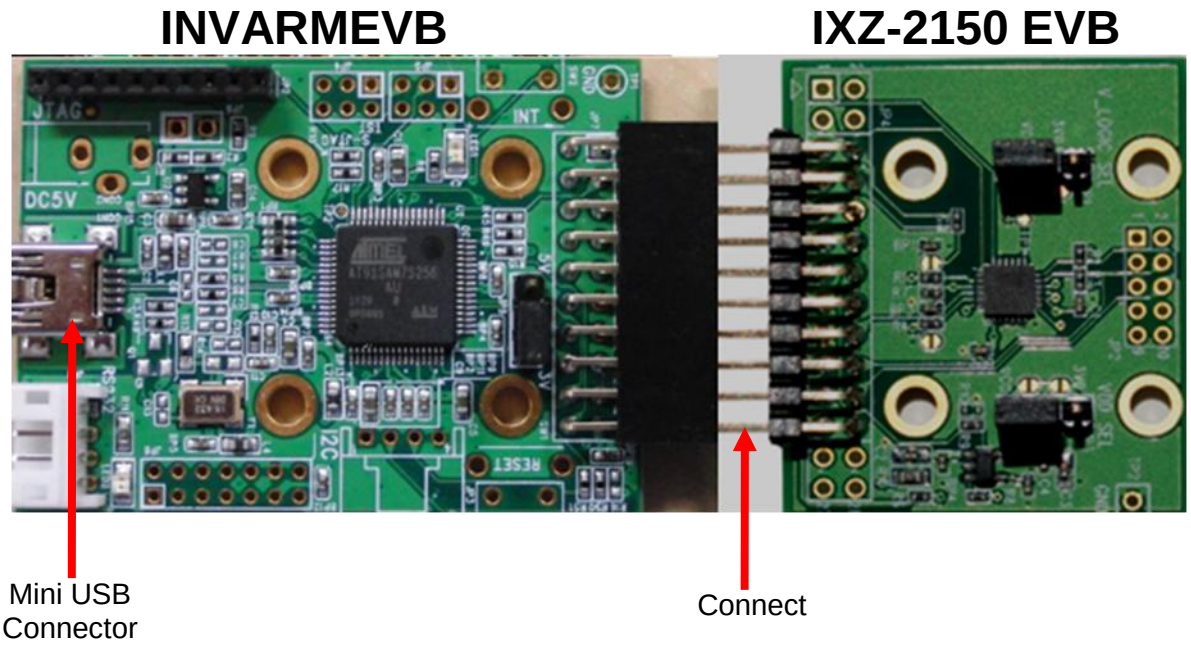

Figure 5. Connect IXZ-2150 EVB to ARM Board

7.2 Use of IXZ-2150 without ARM EVB board

I²C signals are available on JP8. User can develop tools to communicate with the IXZ-2150. There is no bus mode selection setting needed.

8. Special Instructions

8.1 Electrostatic Discharge Sensitivity

The IXZ-2150 gyro can be permanently damaged by an electrostatic discharge. ESD precautions for handling and storage are recommended.

9. Dimension Drawing

The IXZ-2150 EV board is a 4 layer PCB with 32mm x 38mm dimension.

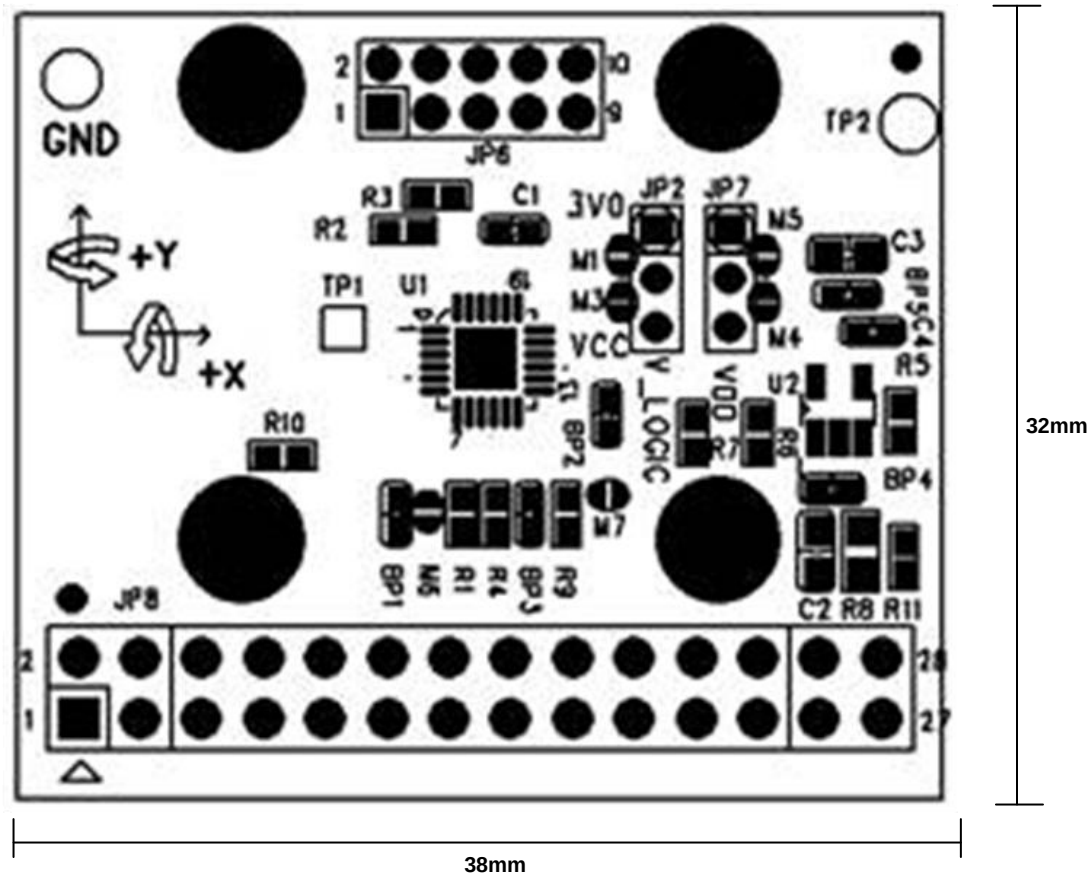

Figure 6. IXZ-2150 EVB.

Dimensions: 32mm x 38mm