Z1 Starter Platform Datasheet

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Contents

The Z1 Starter Platform contains everything needed to develop applications for the Z1 easily. Development time can be reduced by leaving the best features of the Z1 with dedicated connectors, improving existing and adding new ones.

Product Summary

Z1 Starter Platform is designed for an intense use of its features during development, but can also be used as a final product thanks to its friendly form-factor. If the enclosure is open, it behaves like a perfect development platform for the Z1 with access to all connectors and components. If closed, it behaves like an enhanced mote, keeping the most important peripherals accessible from outside.

The power management for the Z1 and sensors is one of the most prominent issues in the Z1SP. The Z1SP has two built-in power supplies of +3V and +5V. This features allows for an extension of the range of sensors that can be plugged to the Z1. At the same time, powering the Z1SP is simpler and more versatile than ever.

Another improvement to encourage the use of all types of sensors in the Z1 is a dedicated connector for Ziglets. The Ziglets are a new standard proposed by Zolertia to standardize the connection of digital sensors. See Ziglet connector.

Applications

- Longer distance WSN
- Accurate consumption control
- Cascade sensors
- Versatile sensor management (3V digital or 3V/5V analog)

Product Features

- RP-SMA connector for external antenna
- Enclosure with battery-holder (2xAA) accessible from the outside
- Three power supply modes
- Two Phidget ports
- One cascadable Ziglet port
- Wheel potentiometer
- Buzzer
- JTAG connector (direct compatibility with TI debuggers tools)
- Big User Button and Reset Button
- System switch (REAL on/off)
- Tri-color led
- 12-pin expansion connector (1xSPI, 2xADC, 1xUART, Interrupt)
- microUSB connector for power and serial port communication

Electrical Characteristics

Absolute Maximum Ratings

Power Supply Voltage Vcc	–0.3V to +3.6V
Voltage on any digital Pin	–0.3 to Vcc+0.3V
Max. RF Input Power	10dBm
Storage Temperature Range	–30°C to +80°C
Operating Temperature Range	–10°C to +60°C

Table 1 — Absolute Maximum Ratings

Mechanical Characteristics

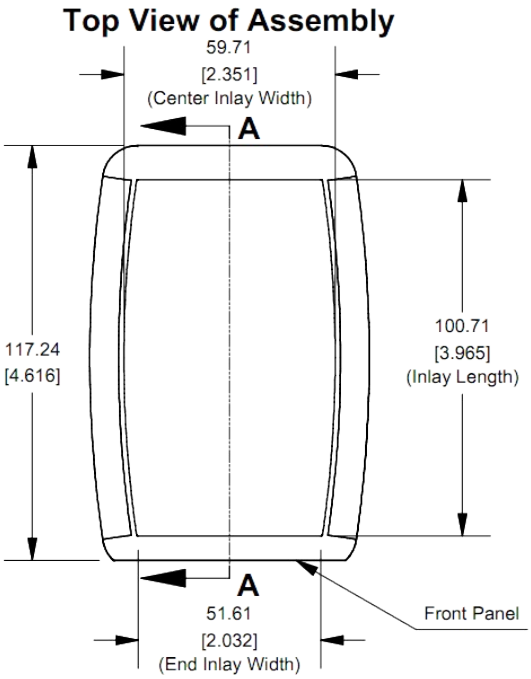

Figure 1– Box top view

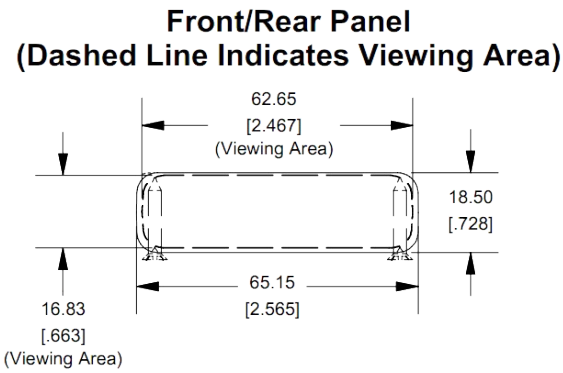

Figure 2– Box front/rear view

Box Contents

Depending on the kit you have ordered, you may have obtained Z1SP modules in different option packages. However, any of the kits will come with the following basic parts:

- 1 or more Z1SP
- 1 or more USB A to Micro-B cables
- 1 battery pack per ordered module (2xAA)

Powering the Z1SP

The Z1SP accept three power sources. Each mode is different and requires special attention:

Battery mode

Z1SP is designed to be used with 2xAA batteries. For this reason, alkaline batteries provide greater lifetime. Rechargeable batteries can be used too, but usually lifetime before recharging will be shorter than in the alkaline case.

With two AA batteries the Z1SP is able to power the Z1 and all peripherals thanks to two built-in power-supplies of +3V and +5V. Both power-supplies are fixed and regulated. See PS+3V and PS+5V for detailed information.

USB mode

Z1SP can be powered from microUSB connector (USB1). Power-wise, USB has priority over the batteries, which means that when you plug the microUSB cable, automatically the system is powered by the USB regardless of batteries. However, to avoid damaging the batteries, it is recommended to remove the batteries while the microUSB cable is connected for a long time or when "Only USB power the board" mode is configured.

In this mode, the internal PS+3V and PS+5V power supply regulators stop working.

JTAG mode

While using the MSP-FETU430IF JTAG adapter for development, the Z1SP can be powered directly from the JTAG connector. In this mode, only the Z1 is powered to a fixed voltage of 3V provided by the FET. The built-in power supplies do not work and there is no guarantee that the Z1SP peripherals work, due to a possible lack of current provided by the FET.

To configure this mode, simply place the jumper in the connector **BRD_PWR** (JP2), on the side named as **JTAG** and plug the Debug-Interface to the Z1SP. See Figure 3 for JTAG jumper closeup . **Do not use this mode with batteries or USB simultaneously since a risk of damaging the board exists** .

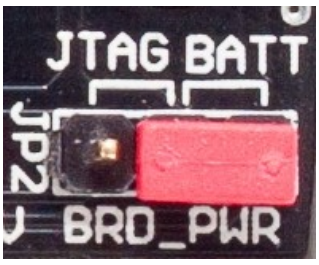

Figure 3– JTAG jumper

If you need debug an application with USB cable connected and powered by JTAG, see JP13 jumper configuration.

Connectors

The most important peripherals are available to the user at the front window.

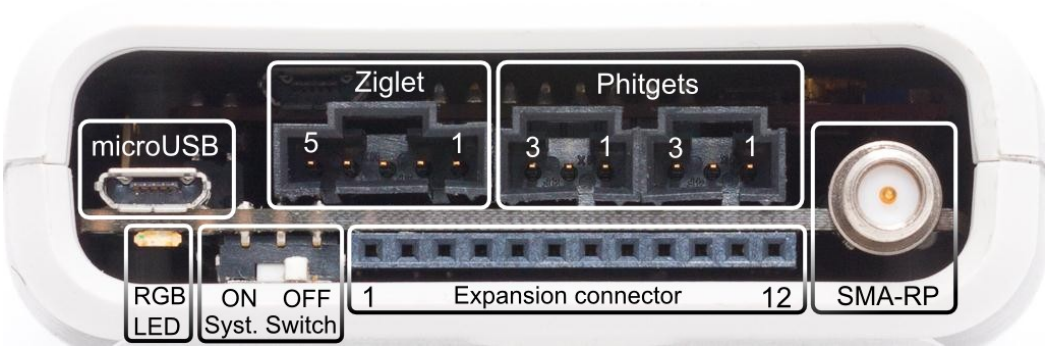

Figure 4– Z1SP window

Phidgets (JP3 and JP7)

Two standards connectors for Phidgets are available in the Z1SP. These connectors support 5V analog sensors by default. This 5V are fixed and regulated, regardless of battery level. The pinout for connecting the Z1SP and Phidgets is shown in Figure 4 and Figure 5.

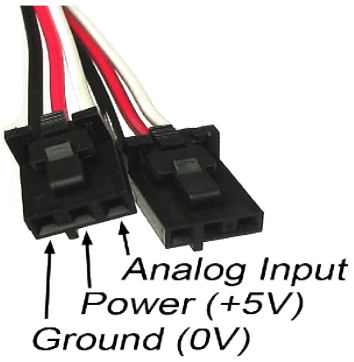

Figure 5– Phidget cable connector (plug)

Pin#	Pin Name	MSP430 Port#	Features
1	**BATGND**		*Phidget powered @5V, ADC input has resistor divider to allow 5V inputs*
2	**PS+5V**		
3	**ADC3***	P6.3	

Table 2– JP3 Pinout description

Pin#	Pin Name	MSP430 Port#	Features
1	**BATGND**		*Phidget powered @5V, ADC input has resistor divider to allow 5V inputs*
2	**PS+5V**		
3	**ADC0***	P6.0	

Table 3– JP7 Pinout description

If you need to use power supplies different than +5V, see Bypass PS+3V and PS+5V.

Ziglet (JP5)

A standard connector for Ziglets is available in the Z1SP. This connector is designed for use with external digital sensors or other complaint devices. The pinout for connecting the Z1SP and devices is shown in Figure 4 and Figure 6. For more information see the Ziglets Specification document.

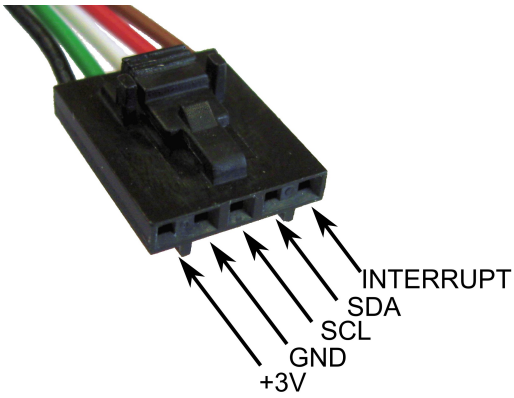

Figure 6– Ziglet connector (plug)

Pin#	Pin Name	MSP430 Port#	Features
1	**PS+3V**		*Ziglet powered @3V, Interrupt input has 0ohm resistor for hardware switch*
2	**DGND**		
3	**I2CSCL**	P5.2	
4	**I2CSDA**	P5.1	
5	**INTERRUPT**	JP.P2.0/ACLK/CA2	

Table 4– JP7 Pinout description

Expansion Connector (JP8)

In addition to dedicated sensor connectors, the Z1SP has a generic Expansion Connector with some interesting pins available for accessories or custom prototypes. This socket connector has a pitch of 2.54mm and is accessible from Z1SP window. See Figure 4 and Table 5 for pinout.

Pin#	Pin Name	MSP430 Port#	Features
1	**D+3V**		
2	**DGND**		
3	**SPI.SOMI**	P3.2	*SPI port*
4	**SPI.SIMO**	P3.1	
5	**SPI.CLK**	P3.3	
6	**P2.4/CAI/TA2**	P2.4	
7	**JP.P2.3/CA0/TAI**	P2.3	
8	**EXT_INTERRUPT**		*Can be configured as external interrupt. See Interrupt Jumper for configure this feature*
9	**UARTI.TX**	P3.6	*UARTI port*
10	**UARTI.RX**	P3.7	
11	**AD_5/DACI**	P6.5	
12	**AD_6/DAC0**	P6.6	

Table 5– JP8 Pinout description

JTAG (JP1)

A standard JTAG connector (12 pins) is added to Z1SP board and it is ready to use out of the box with the MSP-FETU430IF Debug-Interface by Texas Instruments.

Features	MSP430 Port#	Pin Name	Pin#	Pin Name	MSP430 Port#	Features
JTAG	TDO/TDI	**TDO**	1 2	**Vcc**	DVCC1	
	TDI/TDCLK	**TDI**	3 4	**NC**		
	TMS	**TMS**	5 6	**NC**		
	TCK	**TCK**	7 8	**NC**		
		GND	9 10	**NC**		
With low level resets the msp430. Used together with JTAG	\RST/NMI	**\RESET**	11 12	**NC**		
		NC	13 14	**NC**		

Table 6– JP1 Pinout description

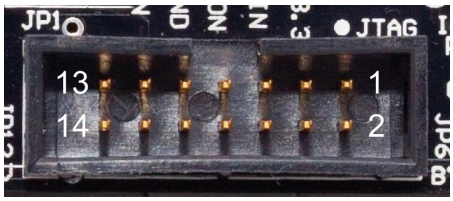

Figure 7– JP1 PCB Closeup

SMA-RP (JP10)

A standard RF SMA-RP connector is added to Z1SP board. This connector allows the Z1 to have a higher gain external antenna to extend the communication range. The box includes a 5dBi antenna and a pigtail (U.FL to U.FL) to connect the Z1 with the Z1SP. In case you are plugging another Z1 in the Z1SP different from the one that came with it, note that the external antenna can **only be used with if the Z1 is also prepared to use the connector U.FL**. See *West port* section in the Z1 datasheet for more details. By default, all Z1 sold together with a Z1SP are prepared to be used with the mentioned external antenna.

ICSP (JP4)

A generic 2.54mm pitch connector is added to Z1SP board for program and debug the PIC firmware, if necessary. PIC is used as BootStrap Detector and its program protocol is ICSP. Note that reprogramming the PIC is not necessary under any normal circumstance. However, if you do need to reprogram the PIC, **please, do never attempt to program the PIC while the Z1 is powered, and do use an ICD3 programmer set to power the board at no more than +3.5V**.

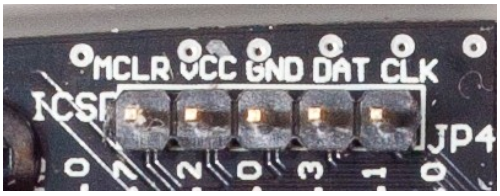

Figure 8– JP10 PCB Closeup

PS+3V and PS+5V

Two built-in Power-Supplies are implemented in the Z1SP. These two power sources can power the system with two regulated voltages of +3V and +5V when Battery Mode is active. When USB is connected, the system automatically is powered by the USB and the PS+3V and PS+5V stop working.

These power-supplies are designed to extend the battery life, but also to keep all peripherals alive under any battery voltage. Otherwise, certain peripherals like the external flash, or external sensors, would not respond below a threshold voltage that however may be enough for the MSP430 to keep on working. This feature allows the system to continue working after the batteries are discharged significantly. See Figure 9 for maximum currents vs battery voltage.

PS+3V always work if the USB is connected to the system. In contrast, PS+5V can be enabled or disabled by the user at any time. To activate PS+5V it is only needed to set a **high level** on **JP.P5.3** port. To disable, a **low level** is expected**.**

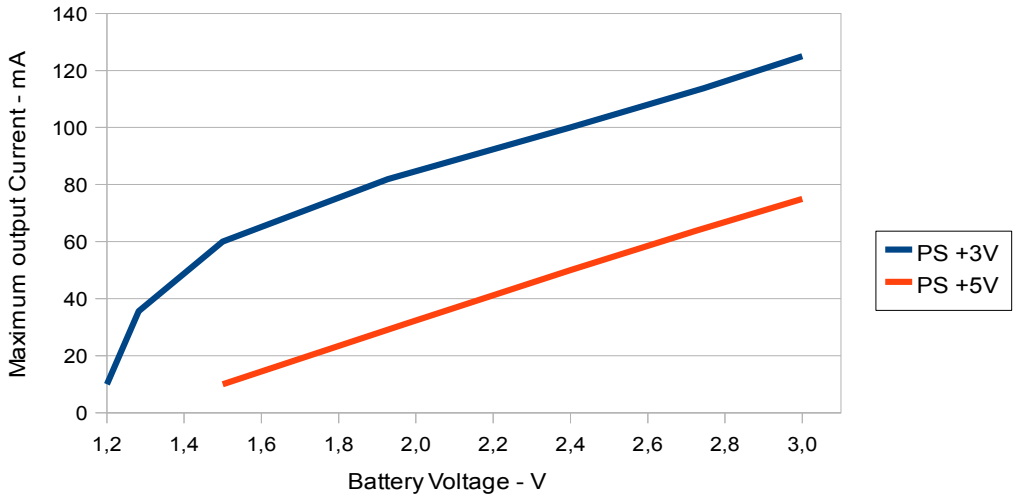

Figure 9– Maximum output current vs battery voltage

Bypass PS+3V and PS+5V

In order to extend even more the battery life when it is not important to have regulated voltages, you can bypass the two power-supplies and power the Z1SP directly from the battery. This feature can be used independently or together for the two power-supplies. See Figure 10 and Figure 11 for a closeup. **Note that if PS+5V is bypassed, the Phitgets will be powered with the battery voltage**.

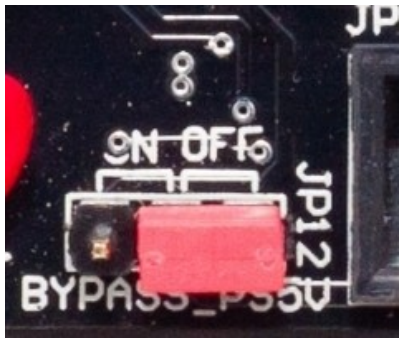

Figure 10– PS+5V bypass jumper

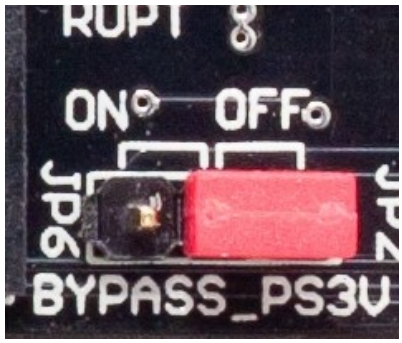

Figure 11– PS+3V bypass jumper

JP13 jumper

Specials modes can be configured with JP13 jumpers:

Desired function	CPD+3.3	VBATIN	VBATON	BATGND	D2_ON
Default	x	x	x	x	x
Use USB serial port with battery power (1)	-	x	x	x	-
Only USB power the board	x	-	-	x	x

(1) When diode D1 is not soldered in the ZI
"x" = connected "-" = not connected

Table 7– JP8 Pinout description

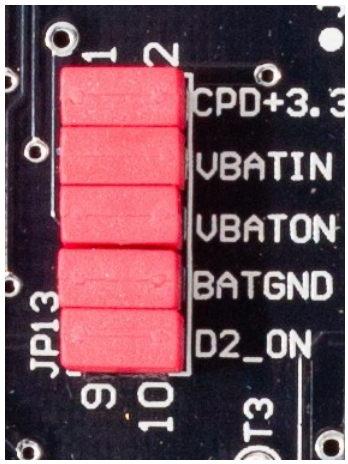

Figure 12– JP13 closeup

Tri-color RGB led

The Z1SP includes a Tri-color RGB led visible from the window Figure 4. To turn each color on it is necessary to set a **low level** on the corresponding port. It is also possible to combine RGB colors to create other colors. See Table 8 for details.

Color	MSP 430 Port	Current consumption
Red	\JP.P4.2/TB2	~14mA
Green	\JP.P4.0/TB0	~6mA
Blue	\JP.P4.7/TBCLK	~30mA

Table 8– Tri-color led ports and current consumption

Buzzer

The buzzer is located under the Z1SP board. This buzzer has not an internal resonator, therefore it can emit different tones depending on the frequency excitation applied to **JP.P4.3/TB3** port. See Figure 13 for frequency range.

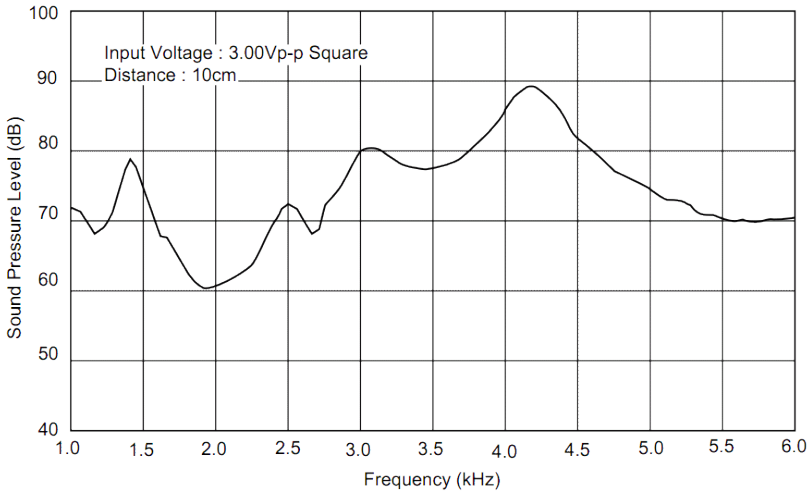

Figure 13– Sound Pressure Level vs Frequency

System Switch

The Z1SP includes a power on/off switch for the entire system, **including USB power**. See Figure 4 for details.

Wheel potentiometer

With the idea of being able to develop applications, the Z1SP includes 1Megaohm wheel potentiometer with easy access to manipulation. The wiper is connected to the **AD4 port**.

Figure 14– Closeup 1MEG potentiometer

Accessories

Most of the available accessories you can think of for the Z1SP are available at [ZSTORE].

However, being the Z1SP an open system it means that you can buy from third-parties all kinds of accessories (phidgets, sensors, etc.) and plug them in your Z1SP.

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References

[PHIDGETS]	www.phidgets.com
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[ZOLERTIA]	www.zolertia.com
[ZSTORE]	shop.zolertia.com

Glossary

ICSP	In-Circuit Serial Programming
SMA-RP	SubMiniature type A Reverse Polarity
JTAG	Join Test Action Group (program-debug interface)
PS	Power Supply

Versions

Date	Version	Release Notes
2011-04-26	v1.0	First Revision
2011-05-03	v1.1	Added license
2011-05-13	v1.2	Corrected Figures & Typos