XBee Grove Development Board

User Guide

Revision history—90001457-13

Revision	Date	Description
A	June 2016	Converted files to new format and completed minor updates to screens and content.
B	October 2017	Updated USB VBUS line graphic.

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- Description of issue
- Steps to reproduce

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Contents

Overview

Schematic and Gerber files

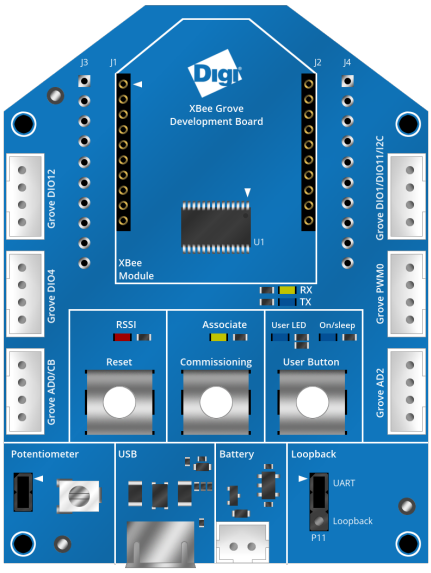
Overview

This section provides an overview of the XBee Grove Development Board.

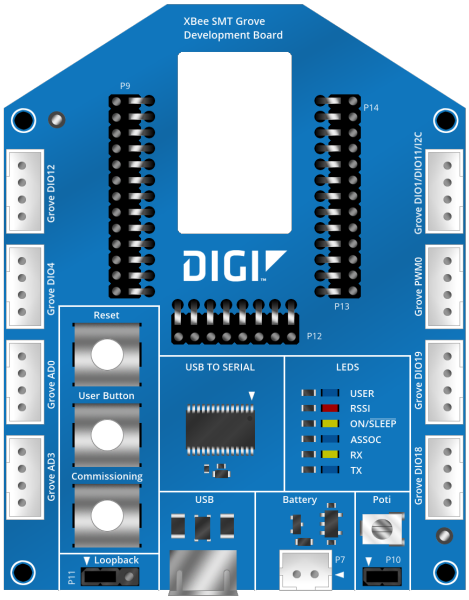
Development board variants

The THT and SMT are the two variants of the board.

XBee THT Grove Development Board

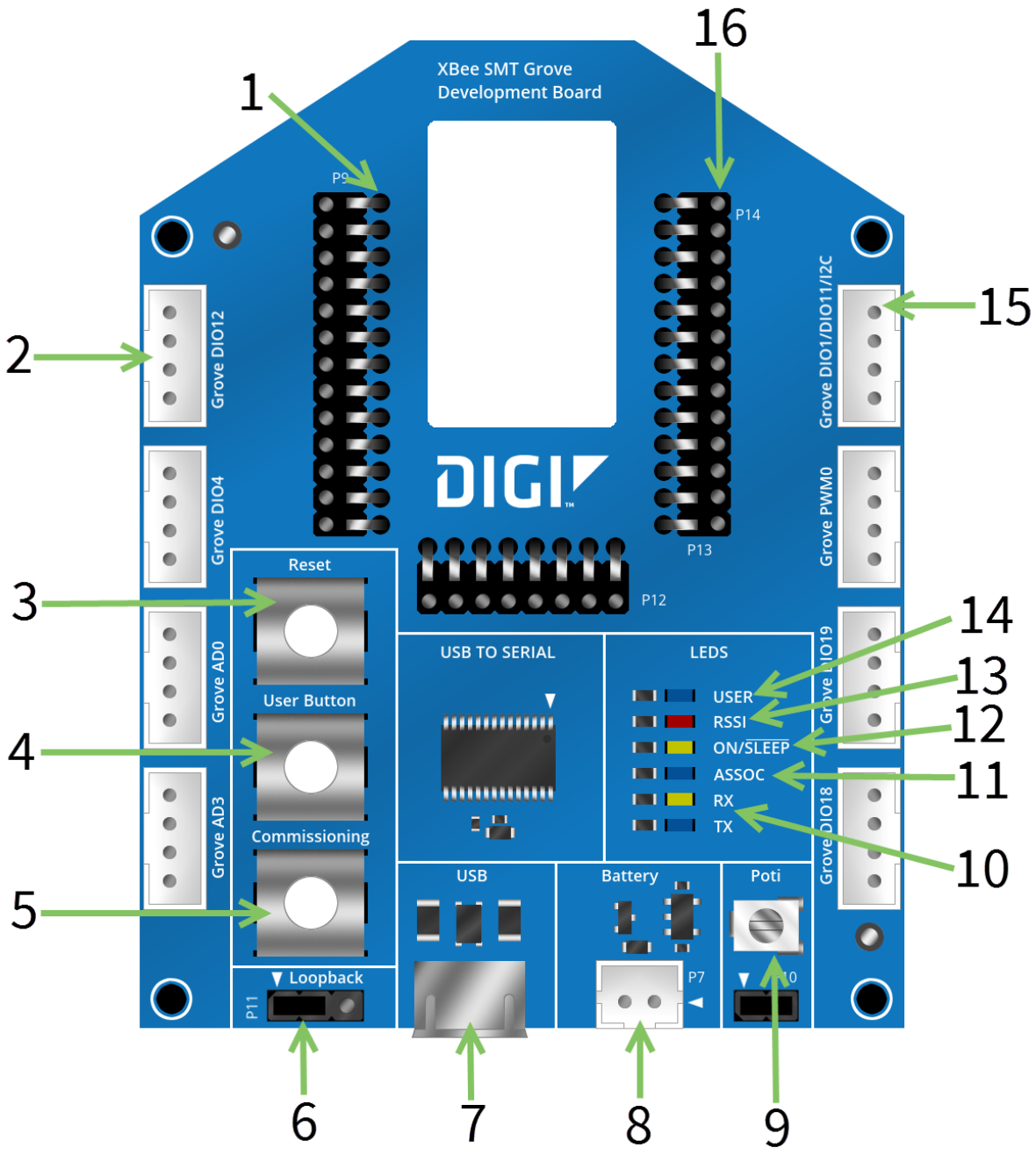


XBee SMT Grove Development Board



XBee surface-mount (SMT) Grove development board

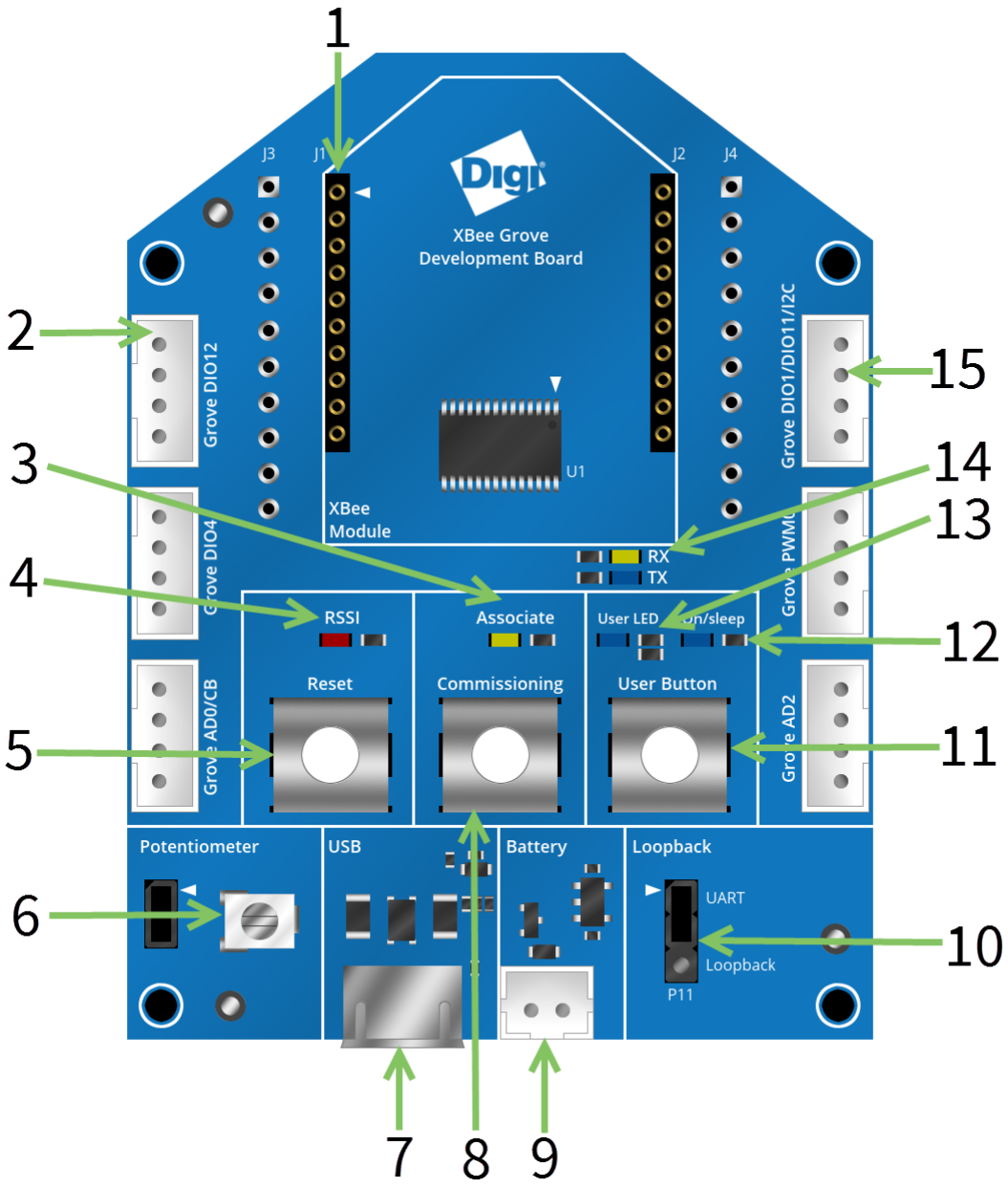
This picture shows the XBee SMT Grove development board and the table that follows explains the callouts in the picture.



Number	Item	Description
1	SMT XBee socket	
2	Grove connectors	The board provides eight vertical Grove connectors connected to XBee DIO lines.
3	Reset button	Button connected to the XBee reset pin.
4	User button	Button connected to the XBee DIO4 line. The button shares the same DIO line with one user LED.
5	Commissioning button	Button connected to the XBee commissioning pin.
6	Loopback jumper	Three-pin jumper to connect the UART to the USB (normal mode) or to make a loopback connection between the Rx and Tx signals of the UART.
7	Micro USB	The XBee serial port is connected through a USB to RS-232 converter to a micro USB connector provided on the board.
8	Battery connector	Two-pin, 2 mm pitch, PH type connector from JST to power the board from an external battery.
9	Potentiometer	10 K potentiometer connected to the XBee AD3 line. One jumper is available to save power when it is not used.
10	RX and TX indicators	Yellow: UART Rx / RF Tx Blue: UART Tx / RF Rx
11	Association indicator	LED connected to the XBee association pin.
12	ON/SLEEP LED	LED connected to the ON/SLEEP pin (DIO9). On: XBee is awake Off: XBee is asleep
13	RSSI indicator	LED connected to the XBee RSSI pin.
14	I2C bus	Bus connected to XBee DIO1/DIO19, to be used with several Grove sensors.
15	User LED	Shares DIO4 with the user button.
16	Test points	

XBee through-hole (TH) Grove development board

This picture shows the XBee TH Grove development board and the table that follows explains the callouts in the picture.



Number	Item	Description
1	Through-hole XBee sockets	Two 10-pin, 2 mm pitch.
2	Grove connectors	The board provides six vertical Grove connectors, connected to XBee DIO lines.
3	Association indicator	LED connected to the XBee association pin.
4	RSSI indicator	LED connected to the XBee RSSI pin.
5	Reset button	Button connected to the XBee reset pin.
6	Potentiometer	10 K potentiometer connected to the XBee AD3 line. One jumper is available to save power when it is not used.
7	Micro USB	The XBee serial port is connected through a USB to RS-232 converter to a micro USB connector provided on the board.
8	Commissioning button	Button connected to the XBee commissioning pin.
9	Battery connector	Two-pin, 2 mm pitch, PH type connector from JST to power the board from an external battery.
10	Loopback jumper	Three-pin jumper to connect the UART to the USB (normal mode) or to make a loopback connection between the Rx and Tx signals of the UART.
11	User button	Button connected to XBee DIO4 line. The button shares the same DIO line with one user LED.
12	ON/SLEEP LED	LED connected to the ON/SLEEP pin (DIO9). On: XBee is awake Off: XBee is asleep
13	User LED	A user LED that shares the DIO4 with the user button.
14	RX and TX indicator	Yellow: UART Rx / RF Tx
15	I2C bus	Bus connected to XBee DIO1/DIO11 to be used with several Grove sensors.

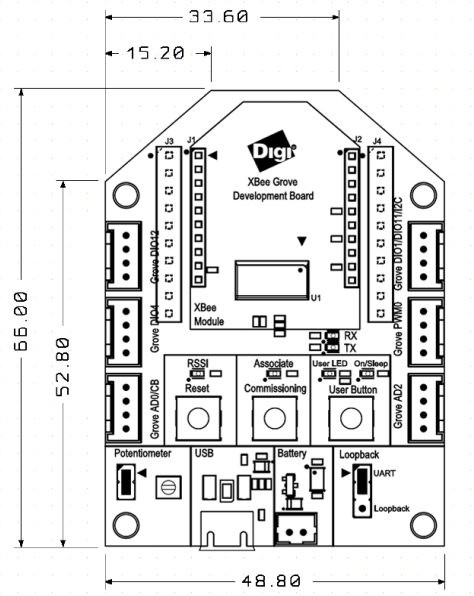
Mechanical

There are two variants of the XBee Grove Development Board:

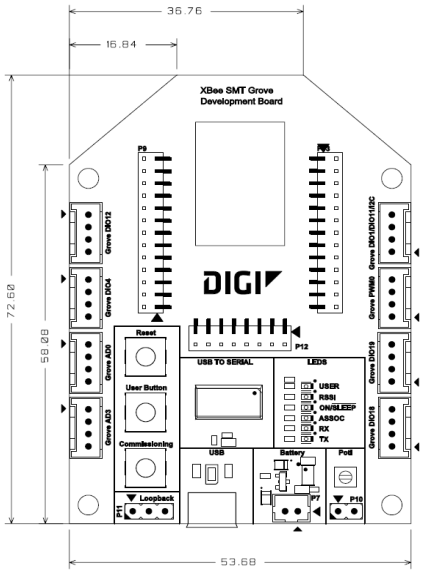
- THT variant is 48.8 mm x 66 mm
- SMT variant is 53.68 mm x 72.60 mm with a shape similar to a regular XBee module.

The board provides four 3.2 mm assembly drills.

XBee THT Grove Development Board variant



XBee SMT Grove Development Board variant



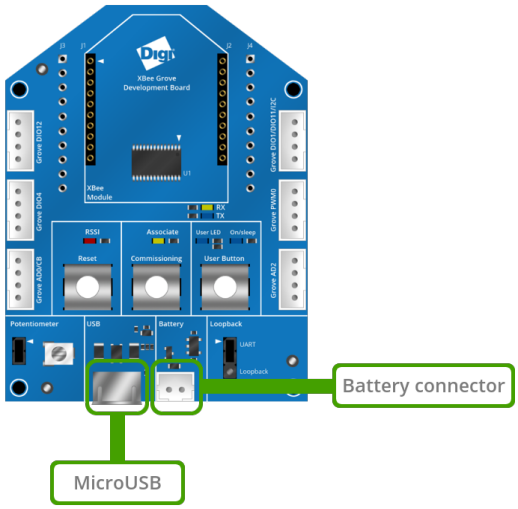
Power supply

You can power the XBee Grove Development Board from the 5 V supply available on the USB connector or from an external battery connected to a 2-pin, 2 mm pitch, PH-type connector from JST. When you power the board from both supplies, it uses the USB.

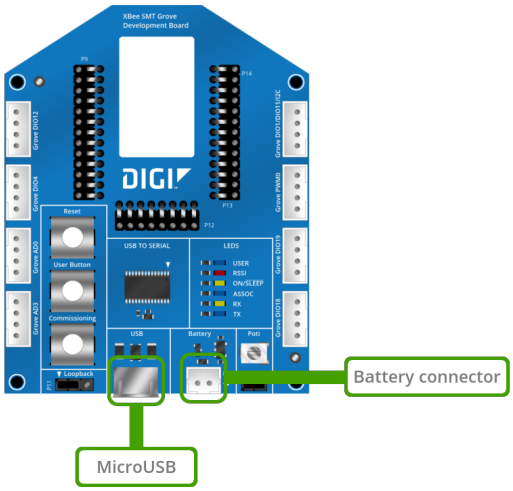
The board has a 3.3 V regulator that generates 500 mA supply.

Note The power supply battery connector is not mounted in the board.

XBee THT Grove Development Board power supply



XBee SMT Grove Development Board power supply



Power supply battery connector

The following table shows the pinout of the battery connector:

Battery connector	Signal	Comments
2	GND	
1	VBAT	Battery supply input

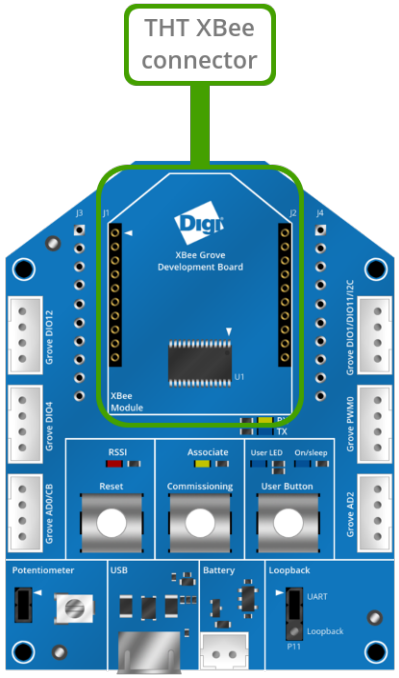
Note The power supply battery connector is not mounted in the board.

XBee connector

The XBee THT Grove Development Board provides two 10-pin, THT, 2 mm pitch sockets to connect a THT XBee module. It is compatible with the XBee/XBee-PRO and the programmable XBee.

XBee THT Grove Development Board XBee connector

The board provides footprints for two 10-pin, THT, 2.54 mm pitch connectors. You can use these footprints to solder a pin header on the top or bottom to access the XBee signals or to connect the XBee Grove Development Board to a bread board.

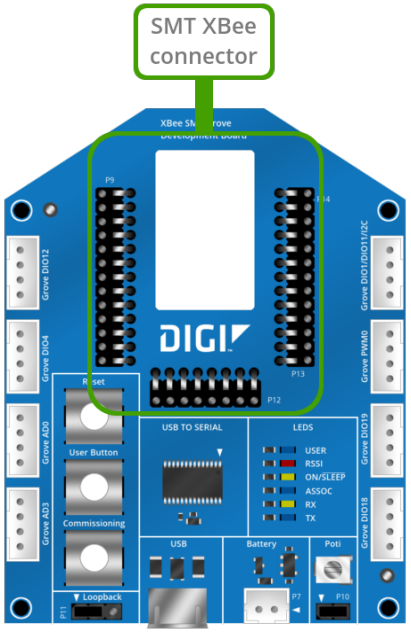


Left			Right		
Pin	**Signal**	**Comments**	**Pin**	**Signal**	**Comments**
1	3.3V	XBee supply	1	DIO4	To GROVE_DIO4 and user LED/button
2	XBEE_TX	To serial to USB device	2	XBEE_CTS_N	To serial to USB device

Left			Right		
3	XBEE_RX	To serial to USB device	3	DIO9	To On/Sleep LED
4	DIO12	To GROVE_DIO12	4	VREF	
5	RESET_N	To reset button	5	ASSOC_LED	To association LED
6	RSSI/PWM0	To RSSI LED and GROVE_PWM	6	XBEE_RTS_N	To serial to USB device
7	DIO11/I2C_SDA	To GROVE_I2C	7	AD3	To potentiometer
8	XBEE_PIN8	Connected to breadboard header	8	AD2	To GROVE_AD2
9	XBEE_DTR_N	To serial to USB device	9	DIO1/ISC_SCL	To GROVE_I2C
10	GND		10	AD0/CB	To commissioning button and GROVE_AD0

XBee SMT Grove Development Board XBee connector

The XBee SMT Grove Development Board provides three spring sockets. A spring header is a custom Digi header that provides a reliable connection to SMT XBee modules without soldering the module in place.



Left			Bottom			Right		
Pin	**Signal**	**Comments**	**Pin**	**Signal**	**Comments**	**Pin**	**Signal**	**Comments**
1	GND		1	DIO18	To GROVE_ DIO18	1		
2	3.3V	XBee supply	2			2	AD0/CB	To commissioning button and GROVE_ AD0

Left			Bottom			Right		
3	XBEE_TX	To serial to USB device	3			3	DIO1/I2C_SCL	To GROVE_I2C
4	XBEE_RX	To serial to USB device	4			4	AD2	To potentiometer
5	DIO12	To GROVE_DIO12	5			5	AD3	To GROVE_AD3
6	RESET_N	To reset button	6			6	XBEE_RTS_N	To serial to USB device
7	RSSI/PWM0	To RSSI LED and GROVE_ PWM0	7			7	ASSOC_LED	To association LED
8	DIO11/I2C_ SDA	To GROVE_I2C	8			8	VREF	
9	-		9			9	DIO9	To On/Sleep LED
10	XBEE_DTR_N	To serial to USB device	10			10	XBEE_CTS_N	To serial to USB device
11	GND		11			11	DIO4	To GROVE_DIO4 and user LED/button
12	DIO19	To GROVE_DIO19	12			12		
13	GND		13			13		

USB

The XBee Grove Development Board includes a micro USB connector and an FT232RL USB to RS-232 converter to communicate with the serial port of the XBee.

A green LED and a yellow LED show the status of the TX and RX lines.

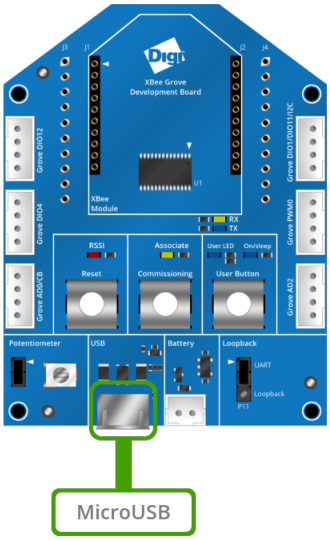
The hardware flow control signals of the XBee (XBee_RTS and XBee_CTS) connect to the FT232RL device. Two serial or resistors disconnect the flow control of the chip if this functionality is not needed.

The XBEE_DTR_N signal is also connected to the FT232 chip. XCTU uses this signal to enter in the boot loader and recover the module from incorrect firmware. A configurable OR resistor disconnects this signal if the functionality is not needed.

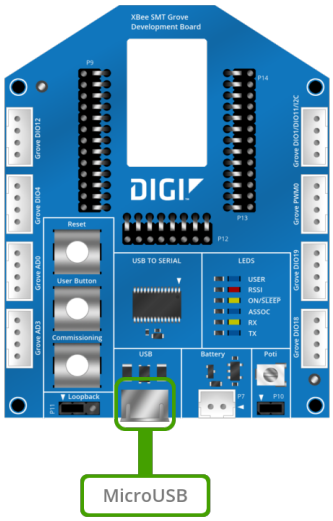
A three-pin jumper configures the serial port in a loopback mode, connecting the RX and TX lines together. When you close positions 1 and 2, the serial port is configured in normal mode and the serial port of the XBee is connected to the micro USB connector. If you close positions 2 and 3, the serial port works in loopback mode and the data transmitted by the XBee connects to the RX pin.

The USB connector also powers the board through the VBUS line.

XBee THT Grove Development Board USB

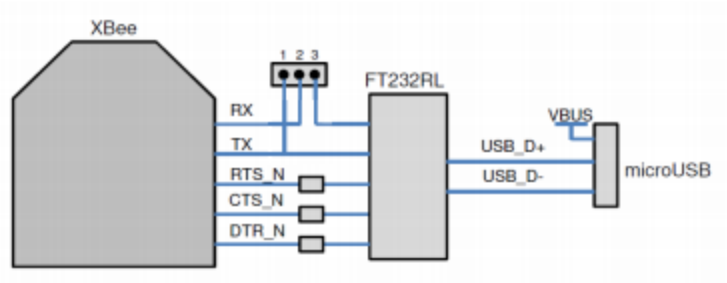


XBee SMT Grove Development Board USB



USB VBUS line

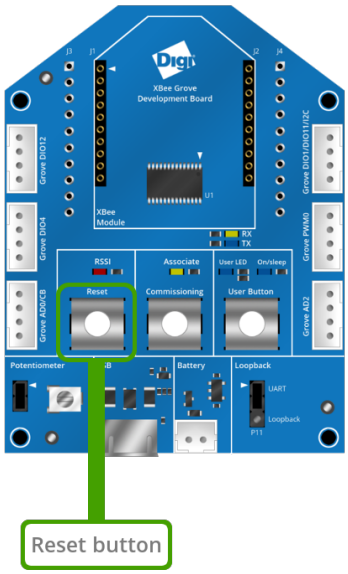
The following graphic illustrates how the USB powers the board through the VBUS line.



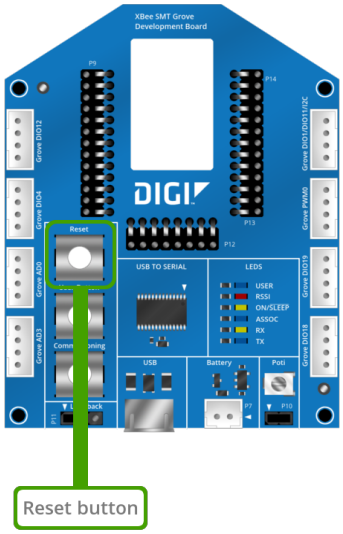
Reset button

The XBee Grove Development Board has a reset button to reboot the XBee module.

XBee THT Grove Development Board Reset button



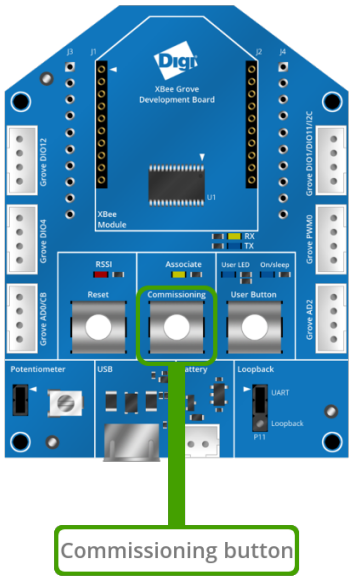
XBee SMT Grove Development Board Reset button



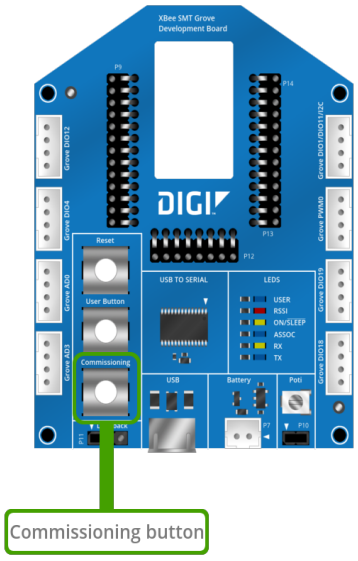
Commissioning button

The XBee Grove Development Board has a push button connected to the commissioning pin of the XBee module. The commissioning pin of the XBee is also connected to the Grove AD0 connector. You can use the commissioning push button in Zigbee or DigiMesh to help deploy devices in a network.

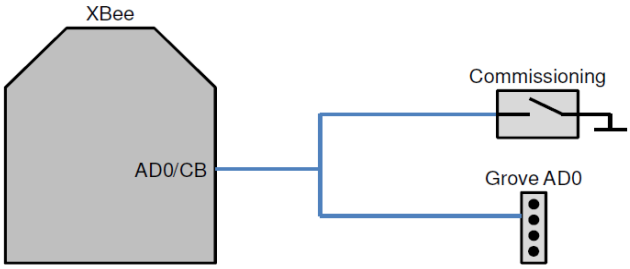
XBee THT Grove Development Board Commissioning button



XBee SMT Grove Development Board Commissioning button



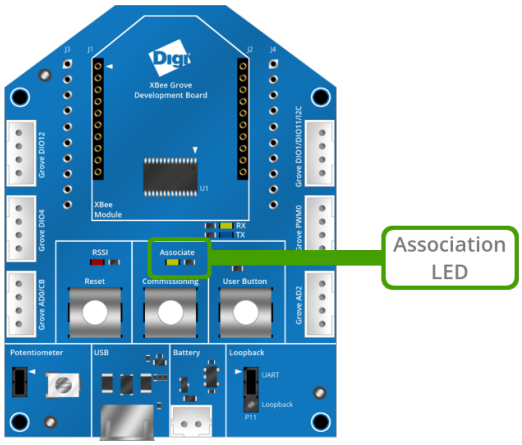
Commissioning pin and Grove AD0 connection



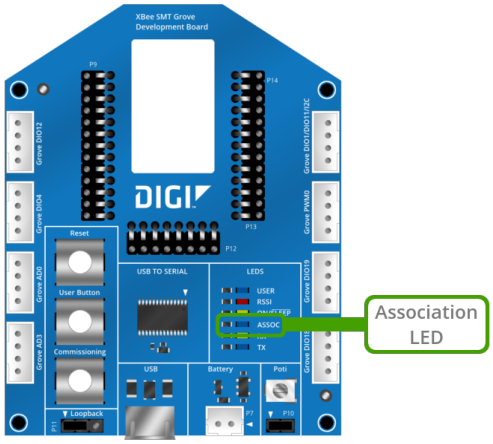
Association led

The XBee Grove Development Board provides an LED connected to the association pin of the XBee module.

XBee THT Grove Development Board Association LED



XBee SMT Grove Development Board Association LED

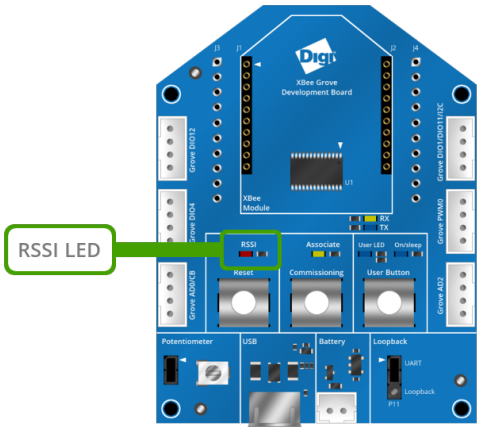


RSSI led

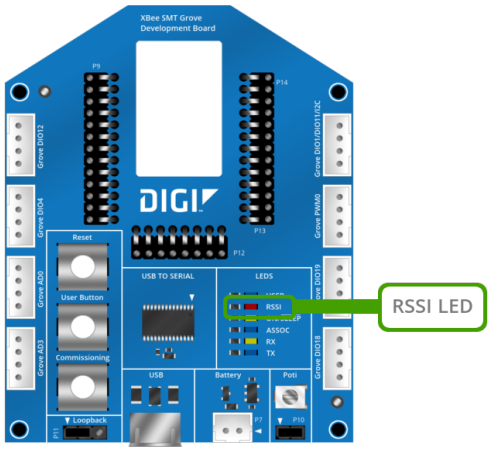
The XBee Grove Development Board provides an LED connected to the RSSI/PWM0 pin of the XBee module. The RSSI/PWM signal is also connected to the PWM Grove connector.

If the PWM0 pin (**P0**) is configured as RSSI, the brightness of this LED displays the signal strength of the last packet received.

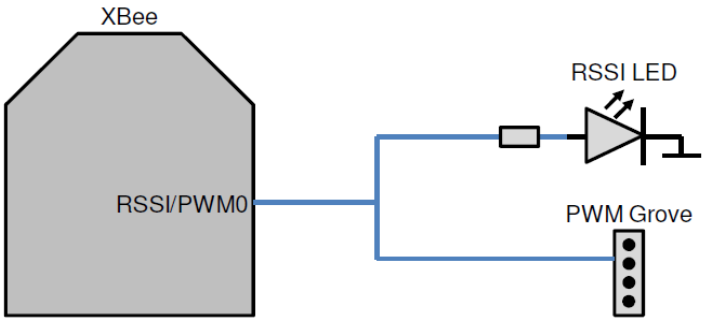
XBee THT Grove Development Board RSSI LED



XBee SMT Grove Development Board RSSI LED



PWM0 RSSI configuration

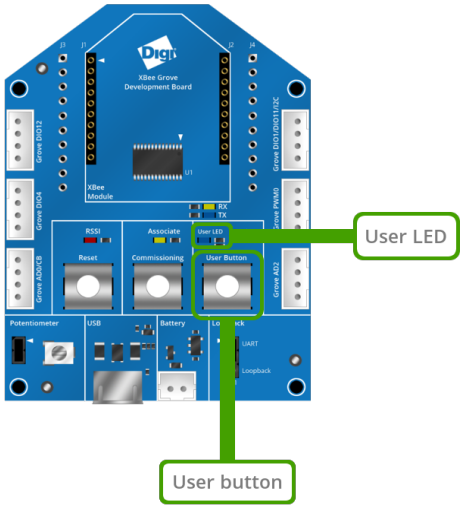


User LED and User button

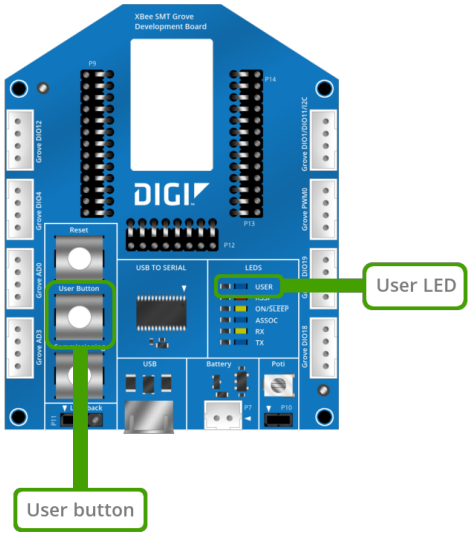
The XBee Grove Development Board provides a user LED and a user button. Both share the same XBee I/O pin, DIO4.

Although the user LED and user button share the same pin, you can use only one at a time.

XBee THT Grove Development Board User LED and User button

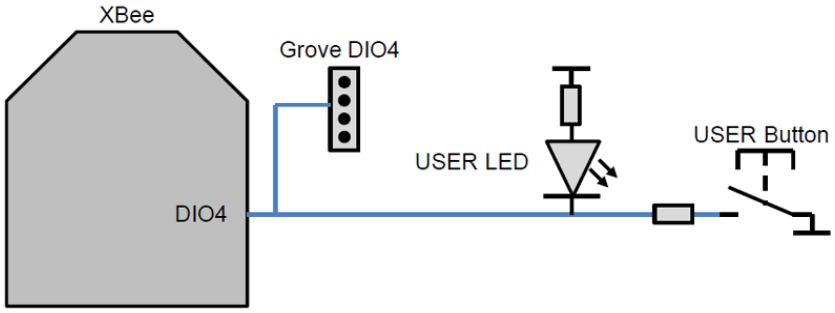


XBee SMT Grove Development Board User LED and User button



User LED and User Button connection to DIO4

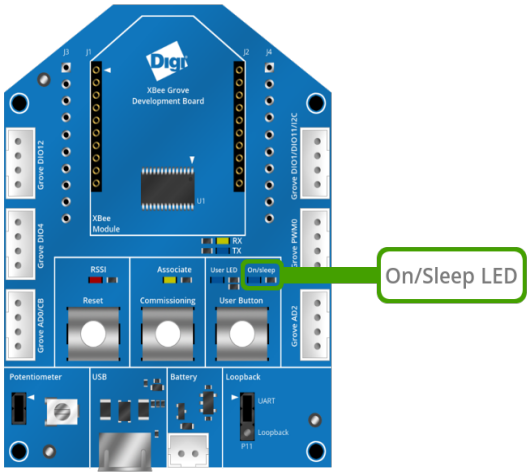
The following graphic illustrates the connection between the User LED and User button to the I/O pin, DIO4.


XBee
Grove DIO4
USER LED
USER Button
DIO4

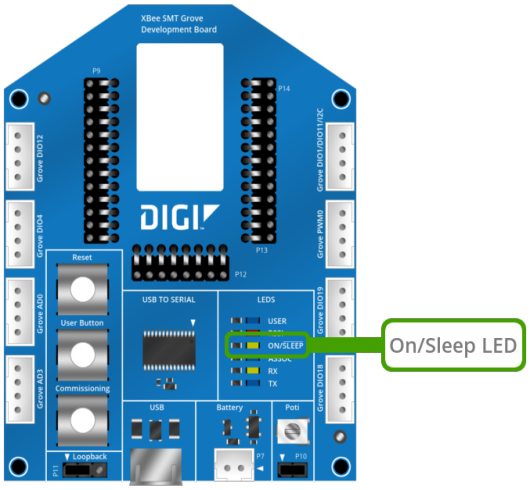
On/sleep LED

The XBee Grove Development Board provides an LED connected to the On/Sleep pin (DIO9). This LED is on when the XBee module is awake, and off when it is asleep.

XBee THT Grove Development Board On/Sleep LED

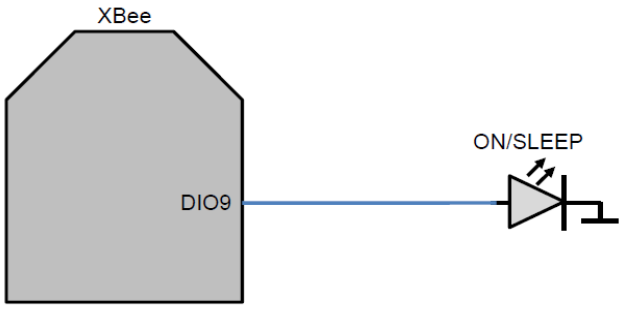


XBee SMT Grove Development Board On/Sleep LED



On/sleep LED connection to DIO9

The following graphic illustrates the connection between the on/sleep LED and the On/sleep pin, DIO9.



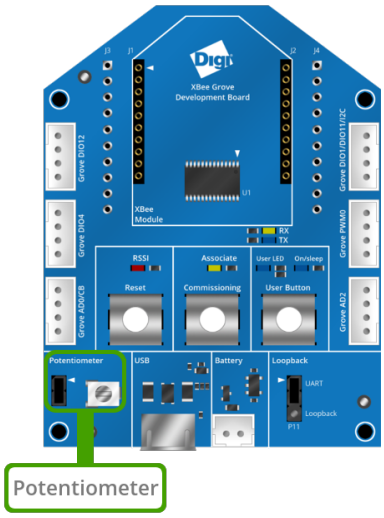
Potentiometer

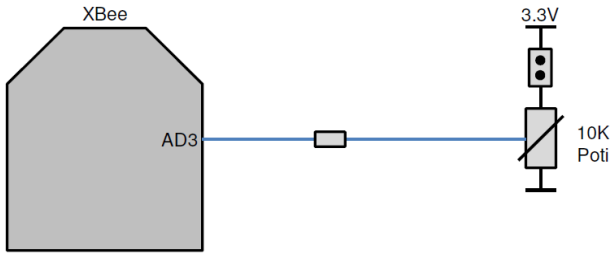
The XBee Grove Development Board provides a 10K potentiometer to generate analog signal between 3.3V and 0V.

You can use the jumper to disconnect the 3.3V supply from the potentiometer to save power when not in use.

XBee THT Grove Development Board Potentiometer

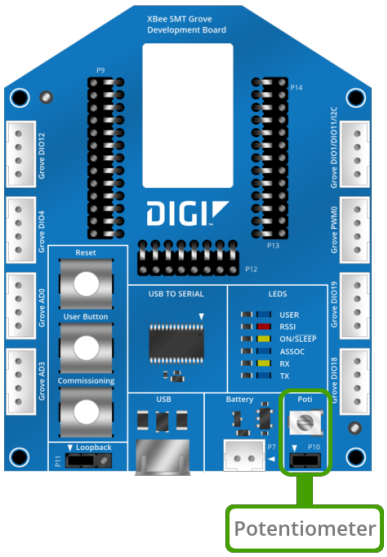
The output of the potentiometer is connected to the AD3 pin (D3) of the XBee in the THT board.

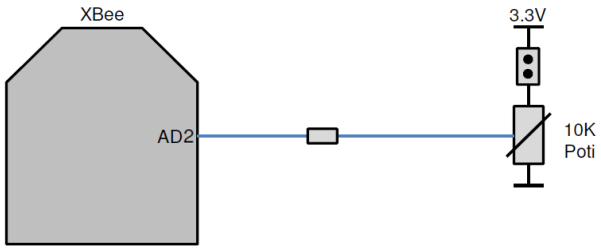




XBee SMT Grove Development Board Potentiometer

The output of the potentiometer is connected to AD2 pin (D2) of the XBee in the SMT board.

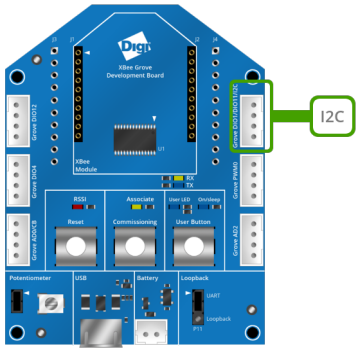




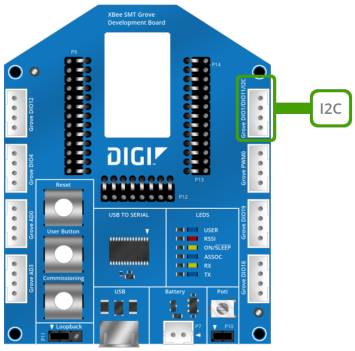
I2C

The XBee Grove Development Board provides an I2C bus that you can use with XBee programmable modules.

XBee THT Grove Development Board I2C bus

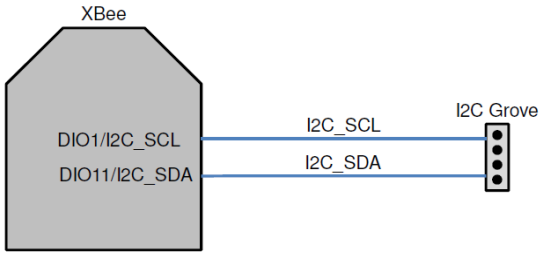


XBee SMT Grove Development Board I2C bus



XBee/XBee-PRO connection to Grove sensor

Regular XBee/XBee-PRO modules do not provide an I2C bus, but you can connect a digital Grove sensor.



Grove I2C connector pinout

The following table shows the pinout of the Grove I2C connector:

Grove I2C	Signal
1	DIO1/I2C_SCL
2	DIO11/I2C_SDA
3	3.3V
4	GND

Grove Connectors

The XBee Grove Development Board provides several Grove connectors connected to the XBee pins:

- THT boards include six Grove connectors:
  - Two connectors to digital I/O pins
  - Two connectors to two digital/analog I/O pins
  - One connector to the RSSI/PWM0 pin
  - One connector to the I2C bus of the microcontroller placed in the socket (programmable XBee)
- SMT boards include eight Grove connectors:
  - Four connectors to digital I/O pins
  - Two connectors to two digital/analog I/O pins
  - One connector to the RSSI/PWM0 pin
  - One connector to the I2C bus of the microcontroller placed in the socket (programmable XBee)

For more information about Grove sensors and actuators for use with these connectors see the Seed Studio wiki.

THT board Grove connectors pinout

The following tables show the pinout for the THT board Grove connectors:

Grove DIO12	Signal	Comments
1	DIO12	
2	-	
3	3.3V	
4	GND	

Grove DIO4	Signal	Comments
1	DIO4	Signal connected to the user LED/button
2	-	
3	3.3V	
4	GND	

Grove AD0	Signal	Comments
1	AD0/CB	Signal connected to the commissioning button
2	-	
3	3.3V	
4	GND	

Grove I2C	Signal	Comments
1	DIO1/I2C_SCL	
2	DIO11/I2C_SDA	
3	3.3V	
4	GND	

Grove PWM0	Signal	Comments
1	RSSI/PWM0	Signal connected to the RSSI LED
2	-	
3	3.3V	
4	GND	

Grove AD2	Signal	Comments
1	AD2	
2	-	
3	3.3V	
4	GND	

SMT board Grove connectors pinout

The following tables show the pinout for the SMT board Grove connectors:

Grove DIO12	Signal	Comments
1	DIO12	
2	-	
3	3.3V	
4	GND	

Grove DIO4	Signal	Comments
1	DIO4	Signal connected to the LED/button
2	-	
3	3.3V	
4	GND	

Grove AD0	Signal	Comments
1	AD0/CB	Signal connected to the commissioning button
2	-	
3	3.3V	
4	GND	

Grove AD3	Signal	Comments
1	AD3	
2	-	
3	3.3V	
4	GND	

Grove I2C	Signal	Comments
1	DIO1/I2C_SCL	
2	DIO11/I2C_SDA	
3	3.3V	
4	GND	

Grove PWM0	Signal	Comments
1	RSSI/PWM0	Signal connected to the RSSI LED
2	-	
3	3.3V	
4	GND	

Grove DIO19	Signal	Comments
1	DIO19	
2	-	
3	3.3V	
4	GND	

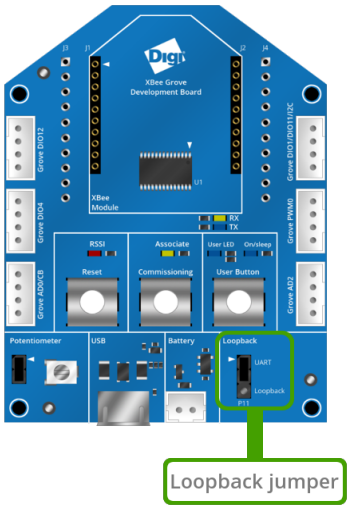
Grove DIO18	Signal	Comments
1	DIO18	
2	-	
3	3.3V	
4	GND	

Loopback jumper

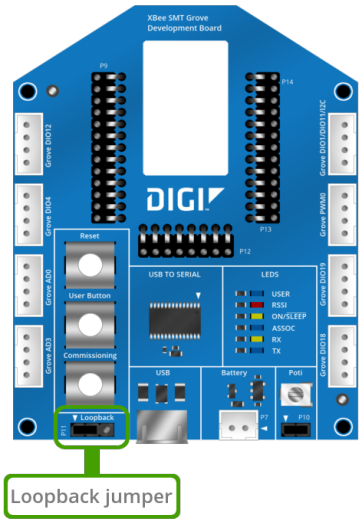
The XBee Grove Development Board provides a three-pin jumper to connect the UART to the USB (normal mode) or to make a loopback connection between the RX and TX signals of the UART.

In loopback mode, connect the RX line to the TX line, which transmits back any data received. You can use loopback in transparent mode to check the signal strength and perform a range test.

XBee THT Grove Development Board Loopback jumper



XBee SMT Grove Development Board Loopback jumper

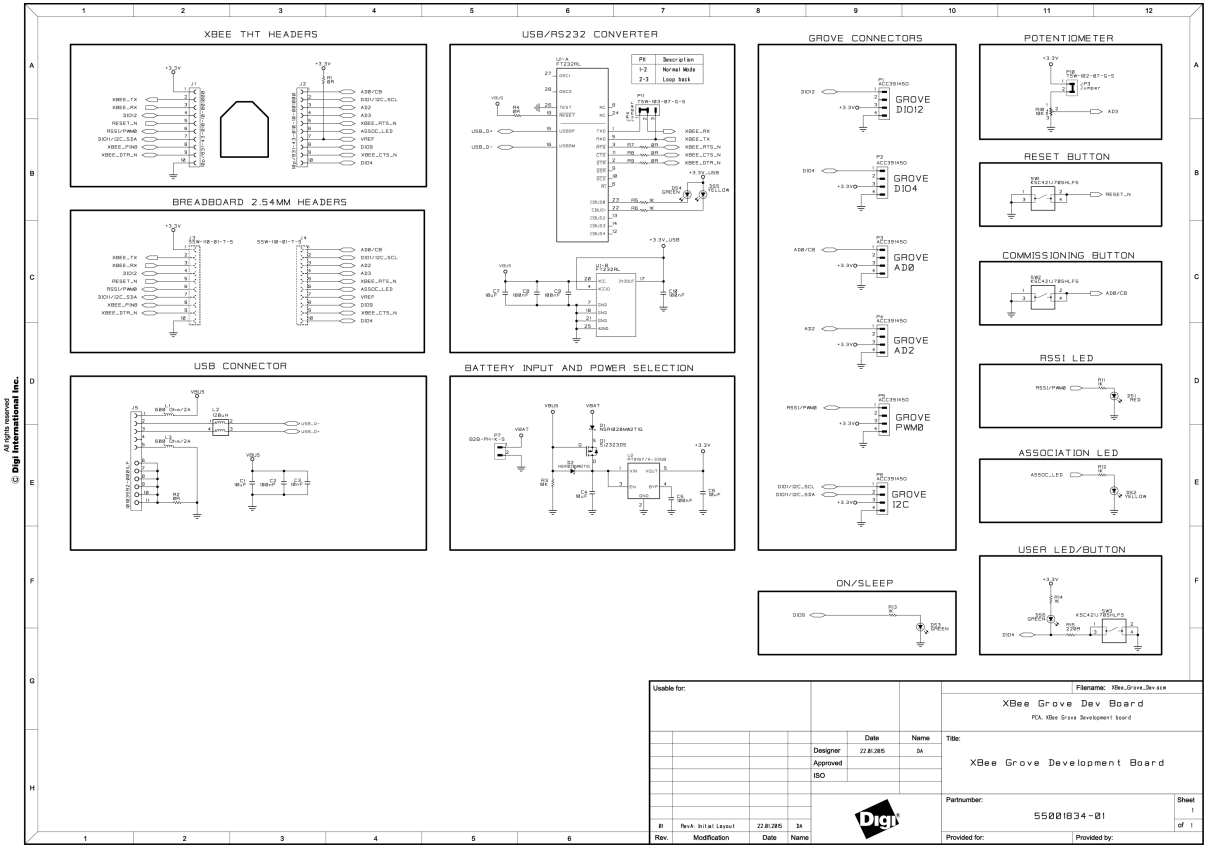


Schematic and Gerber files

This section shows the schematics for the THT Grove Development Board and the SMT Grove Development board and provides links to download the Gerber files.

- XBee THT Grove Development Board
- XBee SMT Grove Development Board

XBee THT Grove Development Board schematic

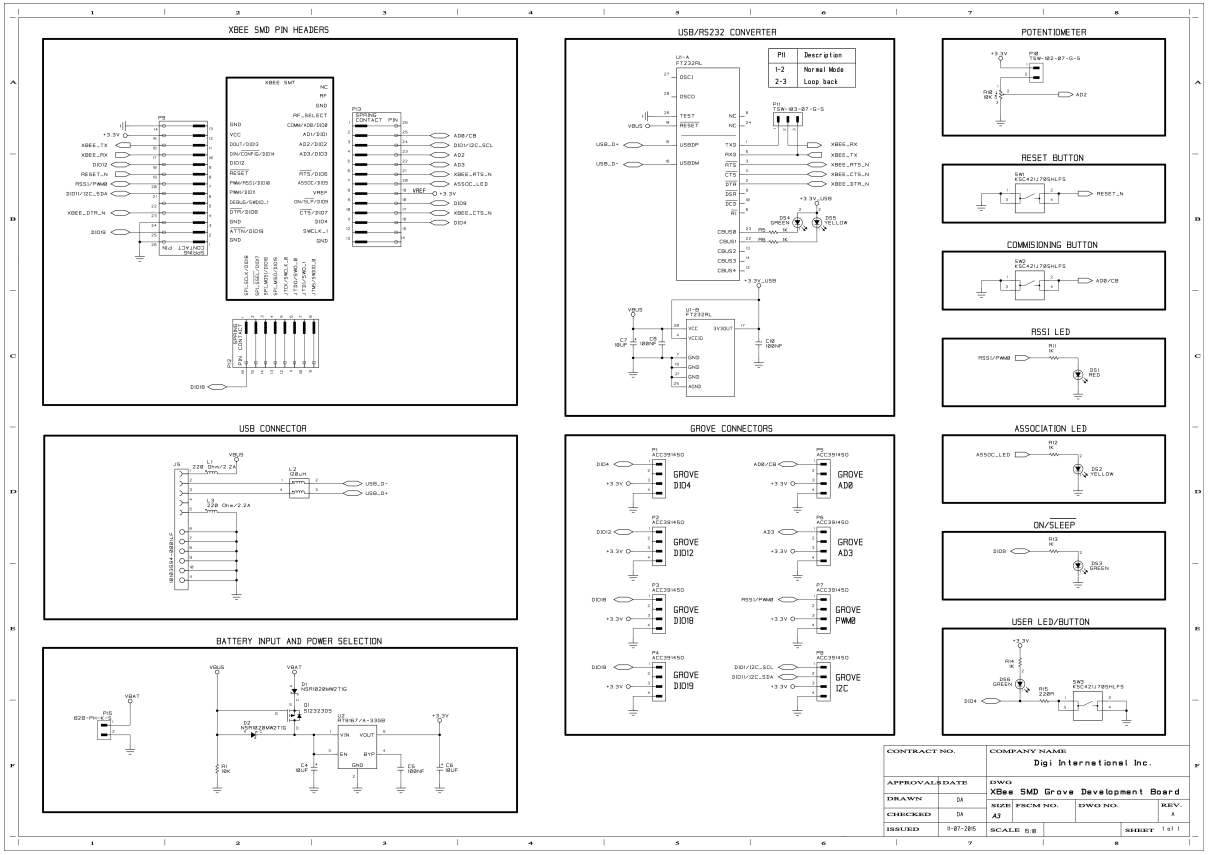


You can dowload a copy of the schematic for the XBee THT Grove Development Board.

Gerber files

You can download the Gerber files for the XBee THT Grove Development Board.

XBee SMT Grove Development Board schematic



You can download a copy of the schematic for the XBee SMT Development Board.

Gerber files

You can download the Gerber files for the XBee SMT Grove Development Board.