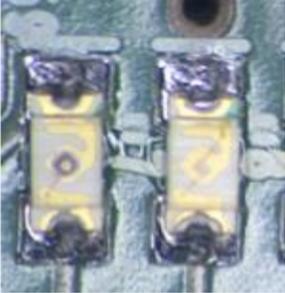# Visual Inspection

Please perform a brief visual inspection of every PCB to ensure adequate PCB fabrication and assembly quality. The tests are generic and intended to catch "big-ticket" manufacturing errors that could indicate electrical performance issues and the existence of obscure issues. Return to the manufacturer if any of these issues are present:

Test	Instructions		Pass Condition
All Board Tests	**Tests must be done for every board.**		

Component Orientation	1) Ensure proper orientation of all major connectors/mechanical components:
	   a) Mini USB receptacle
	   b) Input/output banana jacks
	   c) JLink debug connector
	   d) Standoffs
	2) Check orientation of polarized component against the assembly layer according to the "Layout" gerber document in Strata's Platform Content tab. DO NOT use silkscreen as a reference for polarity.
	   a) ICs: U1, U2, U3, U4, U5, U8, U10, U11, U13, U14, U19, U21, U22, U23, U24, U26
	   b) Caps: C18
	   c) Diodes: D1, D2, D3, D4, D5, D6, D7, D8, D9, D12, D21, D24, D26, D28, D32, D34, D35, D36, D37, D40, D42, D43, D44
		Proper connector/standoff orientation:
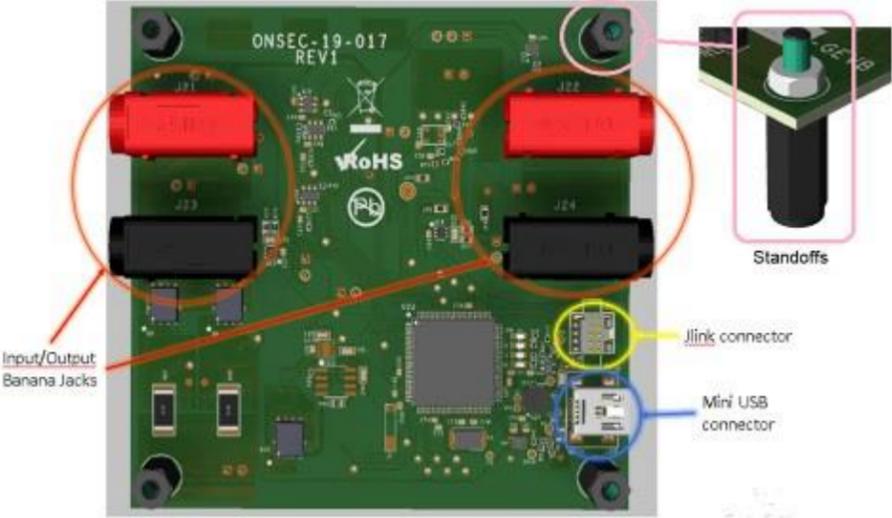		
		Example of correct IC orientation:
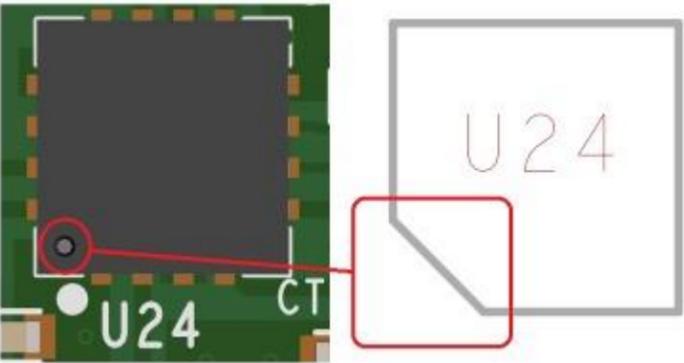		
			☐ All components installed with proper orientation

Component Solder Attach/ Seating	1) Check for noticeable errors in component installation:
	   a) Tombstoned/misaligned components
	   b) Ripped pads
	   c) Cold solder joints
		Example of improper component placement/seating:
		  Example of resistor rotated on its side:
		
			☐ No obvious solder attachment and seating issues for any components

		Example of ripped pads:	Example of questionably cold/hand-soldered joints:	

Silkscreen Quality	1) Check for major silkscreen errors. At a minimum, ensure the following are legible:
	  a) OPN marking
	  b) ON logo
	  c) Strata logo
	2) Ensure no silk on pads
		Example of poor silkscreen quality:
		
		PORTLAND SEC
		ONSEC 18-017
		BU ENABLE 15A
		REV1
			☐ No major silkscreen errors

Electrical Tests

The following are electrical tests to ensure basic hardware functionality and do not require opening the Strata application. The following lab equipment is required to perform the tests:
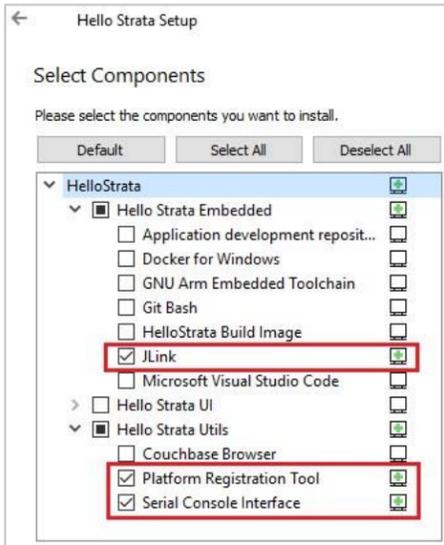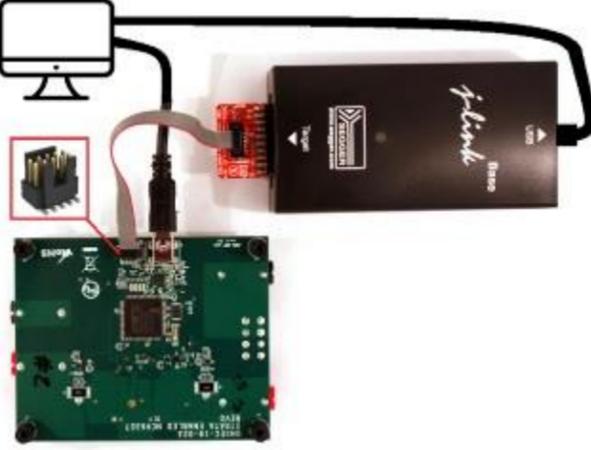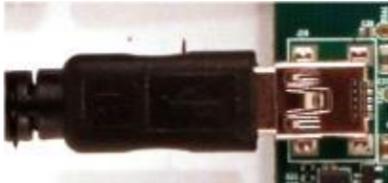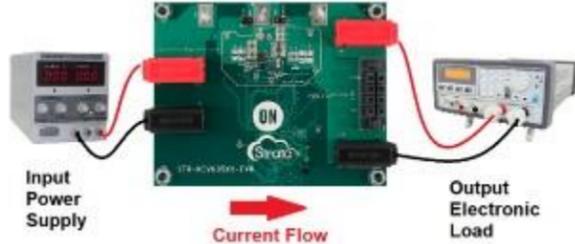
    1.) Digital Multimeter

Test	Instructions	Pass Condition
All Board Tests	**Tests must be done for every board.**	

Power Rail Shorts	1) With a multimeter, check for greater than 1kΩ from the following main power rails to ground:
	  a) VIN
	  b) 3V3
	  c) VOUT
	  d) 5V_REG
	  e) NEG_5V
	2) Check no shorts between the following rails:
	  a) VIN <-> VOUT
		☐ No undesired shorts to ground or other rails for all main power rails

Pullups/Pulldowns	1) Confirm 10kΩ to ground for the following signals:
	  a) EN_210, EN_211, EN_213, EN_214, EN_333
	  b) HIGH_LOAD_EN
	2) Confirm approx. 10kΩ to 3V3 for the following signals:
	  a) LOW_LOAD_EN#, MID_LOAD_EN#
	  b) LOAD_FAULT#
	  c) VS_INT#, CS_INT, I_IN_INT
		☐ Signals have appropriate pullup/pulldown resistances with no undesired shorts to ground or a power rail

USB 5V/MCU 3V3	1) Plug in the mini USB connector to to board. 2) With a multimeter, probe the following voltages to GND: 　a) 5V 　b) 3V3		☐ 5V voltage reads from 4.5V-5.25V ☐ 3V3 rail voltage reads 3.3V ± 5%

Strata Functionality

The following tests are used to verify basic Strata connectivity and proper functionality of the UI/firmware for receiving telemetry and controlling the platform. Some tests only need to be completed once, while others must be completed for every board.

Test	Instructions		Pass Condition
One Time Tests	**These tests only need to be done one time per OPN.**		
Strata Version Confirmation	1) Ensure Strata version is appropriate for validation by asking product owner. 2) Open Strata and login. Create a login if you don't already have one. 3) Click the profile letter (first letter of the first name used for login registration step), in the top right corner of the screen, then select "About". 4) Check the Strata version in the dialog box that comes up. 　a) If version is out of date, install the newest Strata release. 　b) If the newest official release version is not new enough, contact SEC for a Beta release.		☐ The appropriate Strata Developer Studio version is installed.
Strata Platform Selector	1) On "Platform Selection" tab find the STR OPN in this list. There is one possible OPN that is listed below: 　a) STR-CURRENT-SENSE-GEVB 2) Select "Browse Documentation"		☐ Ensure the OPN is in the "Platform Selection" list ☐ At least one document is shown on "Platform Content" tab under "Platform Documents" and optionally documents displayed on "Part Datasheets" and "Downloads"
Setup	1) Install "Hello Strata Utils" using the newest Hello Strata installer here 　a) \\usbserv1\deployment\hello_strata 2) ONLY REQUIRED TO INSTALL THE FOLLOWING!! See picture to right. 　a) JLink 　b) Platform Registration Tool 　c) Serial Console Interface		☐ One-time installation completed
All Board Tests	**Tests below this line must be done on every board.**		

Platform Registration Tool	1) Ensure "Setup" section was completed. Those instructions only need to be repeated if the "Hello Strata Utils" are not installed.
	2) Connect the EVB as shown in the picture to the right
	3) Open the "Platform Registration Tool" application
	   a) Per OPN, download the .bin file from Strata's "Platform Documents" > "Downloads" section
	   b) Browse to the downloaded .bin file in the "Firmware data file" browse "Select" dialog
	4) Click "Begin"
	5) Ensure programming was successful
	   a) Repeat steps 1) through 5) for the remaining boards before continuing to next step. Note: simply unplug JLink and platform and plug into another and the flash will start automatically.
			☐ Flash was successful
			
			Programming successful
			
			✓
			
			To program another device, simply plug it in and new process will start automatically
			
			or press End.

Serial Console Interface	1) Open the "Serial Console Interface" application and execute the following command {"cmd":"set_platform_id","payload":{"platform_id":"0570d932-6a3f-4a34-8442-cd9914518241","class_id":"0570d932-6a3f-4a34-8442-cd9914518241","board_count":0}} a) Repeat steps 1) through 5) for the remaining boards before continuing to next step		☐ Command status is "OK"
Strata Detection	1) Unplug mini USB cable from previous steps (see picture to right for reference to which USB cable). 2) Open Strata and Login, you should see Platform Selection list 3) Plug in board to computer using mini USB cable		☐ Strata detects board and opens user interface automatically.
Input Voltage	1) Using lab power supply and banana plugs, provide evaluation board with 12V DC with at least 2A current limit (see image to right for polarity).		☐ "VIN" reads 12V within 5%.
Enable Switches	1) Connect a digital multimeter to VOUT and GND to read a DC voltage. 2) Enable "NCS213R" switch. Check pass conditions. Disable "NCS213R" switch. 3) Enable "NCS214R" switch. Check pass conditions. Disable "NCS214R" switch. 4) Enable "NCS210R" switch. Check pass conditions. Disable "NCS210R" switch. 5) Enable "NCS211R" switch. Check pass conditions. Disable "NCS211R" switch. 6) Set input voltage to 5V. Enable "NCS333A" switch. Check pass conditions. Disable "NCS333A" switch.		☐ The multimeter voltage reading is the same as "VIN" within 5% when each of the 5 "Settings" switches are enabled. ☐ Green LED next to the respective switch on the board lights up. To know which switch is on, look at the silkscreen labels at the bottom right corner of each of the 5 boxes down the center of the board.

On Board Loads	1) Set Input voltage to 1.5V. 2) Turn on "NCS333A" switch. Click "Recalibrate". Turn on the "Low Current" switch and the set the slider to the right of the switch to 50uA. Check pass condition 1). 3) Turn on "NCS210R" switch. Click "Recalibrate". Turn on the "Mid Current" switch and the set the slider to the right of the switch to 50mA. Check pass condition 2). 4) Turn on "NCS213R" switch. Click "Recalibrate". Turn on the "High Current" switch and the set the slider to the right of the switch to 1A. Check pass condition 3).	1) The current reading found next to the "NCS333A" switch is within 10% of 50uA. 2) The current reading found next to the "NCS210R" switch is within 10% of 50mA. 3) The current reading found next to the "NCS213R" switch is within 10% of 1A.
Interrupts	1) Set the "Mode" switch to "Manual". 2) Set the "Max Input Voltage" slider to be 10V. Set input voltage to 12V. Check pass condition 1). 3) Set the "Max Input Voltage" slider to be 26.5V. Click the "Reset" button. 4) Set the "Max Input Current" slider to be 1A. Set input voltage to 2V. Turn on the "NCS213R" switch followed by the "High Current" switch. Set the "High Current" slider to 2A. Check pass condition 2).	1) UI greys out all 5 switches in the "Settings" section and gives an error message in the "Status List". "Input Voltage Status" LED and "Fault" LED are both red. 2) UI greys out all 5 switches in the "Settings" section and gives an error message in the "Status List". "Input Current Status" LED and "Fault" LED are both red.