

# Series 2600B System SourceMeter® Instruments

## Version 3.2.2 Firmware Release Notes

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## General Information

### Supported models

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**CAUTION** Do not install this firmware on Series 2600 (Models 2601, 2602, 2611, 2612, 2635, 2636), Series 2600A (Models 2601A, 2602A, 2611A, 2612A, 2635A, 2636A), or Series 2650A (Models 2651A, 2657A) instruments.

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This firmware is intended for use on the following Keithley Instruments product models:

2601B, 2602B, 2604B,  
 2611B, 2612B, 2614B,  
 2634B, 2635B, 2636B

### Installation instructions

For detailed firmware installation instructions, refer to the “Upgrading the firmware” topic in the “Maintenance” section of the *Series 2600B System SourceMeter® Instruments Reference Manual* (document number: 2600BS-901-01). This manual is available online at <http://www.keithley.com/support>. If you decide to upgrade the firmware in your instrument, follow the instructions in the manual. Alternatively, you can arrange to have Keithley Instruments upgrade your firmware at the factory by calling your local Keithley Instruments support office.

### Upgrade considerations for all Series 2600B models

The following table lists the considerations that should be made when deciding whether to upgrade your Series 2600B instrument firmware to version 3.2.2.

Consideration for upgrade	From version 3.0.0	From version 3.0.1 3.0.3 3.0.4	From version 3.1.0	From version 3.2.1
Recalibration required?	No	No	No	No
Backward compatibility concerns?	No	No	No	No
Requalification recommended?	No	No	No	No
Should you upgrade?	Yes	Review <sup>1</sup>	Review <sup>1</sup>	Review <sup>1</sup>

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<sup>1</sup> Review the entire list of changes made in all firmware versions between your current version and version 3.2.2. Upgrade if any of the fixes or enhancements are needed.

## Version 3.2.2 Release

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### Overview

Version 3.2.2 is a maintenance release of the Series 2600B firmware. This release resolves one noncritical issue.

### Noncritical fixes

PR49204 **Models affected:**

PR57201

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Symptom:

With open leads, rapidly executed contact check measurements erroneously return a reading of 0 ohms, instead of the expected reading of 9.91E+37.

#### Resolution:

This issue has been corrected.

### Known issues

PR46967 **Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Symptom:

When the source is off and `smuX.source.offmode` is set to `smuX.OUTPUT_ZERO`, contact check operations will result in an inappropriate error code 5066, "source.offlimiti too low for contact check" if the effective current limit is less than 1 mA. In this off mode, `smuX.source.offlimiti` is ignored; instead, the effective current limit is initially determined by either:

- The value of `smuX.source.limiti`, if the channel is sourcing voltage when it is turned off
- The greater of `smuX.source.leveli` or 10% of `smuX.source.rangei`, if the channel is sourcing current when it is turned off

In either case, `smuX.source.limiti`, not `smuX.source.offlimiti`, is used to change the effective current limit when the output is off in `smuX.OUTPUT_ZERO` mode. As such, a more appropriate error code would be 5050, "I limit too low for contact check."

PR47029 **Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Symptom:

The source lowrange attributes should have no effect when sourcing the opposite function. However, when sourcing current, if the combination of `smuX.source.lowrangev` and `smuX.source.rangei` describe a point outside the SMU channel's safe operating area, attempts to change the source configuration erroneously result in error code 5007, "Operation would exceed safe operating area of the instrument." Similarly, when sourcing voltage, if the combination of `smuX.source.lowrangei` and `smuX.source.rangev` describe a point outside the SMU channel's safe operating area, attempts to change the source configuration also erroneously result in error code 5007.

**Workaround:**

The issue can be avoided by lowering the lowrange attribute.

**PR47455 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

The `tspnet.tsp.rhtablecopy()` function may return erratic results or make the instrument unresponsive.

**PR47459 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

The instrument may fail to operate correctly after an “Out of memory” error. The instrument may ignore commands sent over the command interfaces and may ignore front panel operations.

**Workaround:**

To avoid out-of-memory issues, you should leave 1 MB of dynamic memory available for instrument use. The `meminfo()` function can be used to monitor the actual free memory remaining. When the free memory drops below 1000 KB, the instrument may encounter an “Out of memory” error. The Series 2600B System SourceMeter Instruments Reference Manual explains how to determine the amount of memory needed for reading buffers and sweeps.

**PR47460 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

In prompting mode, if a `tsplink.reset()` command initiated from another command interface is executing when the instrument receives an abort message, a prompt for the abort message may not be generated. The instrument will abort properly even though the prompt is not generated.

**PR47461 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

Aborting a `tsplink.reset()` command or aborting a script executing a `tsplink.reset()` command may take a long time because the `tsplink.reset()` command is allowed to complete before execution is aborted. The `tsplink.reset()` command may take several seconds when a large number of nodes are connected together.

**PR47463 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

The instrument may incorrectly generate an “Out of memory” error when allocating a reading buffer. When there is insufficient memory to allocate the reading buffer, the garbage collector should automatically run to reclaim any unused memory before generating the “Out of memory” error. The garbage collector often fails to run, and the instrument issues an “Out of memory” error.

**Workaround:**

To work around this issue, call the `collectgarbage()` function prior to creating a new reading buffer.

**PR47478 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

Pressing the Recall Buffer button in the virtual front panel when TSP® Express is active will cause the virtual front panel to generate a "Cannot open window:java.lang.Exception: Cannot read from instrument" error.

**PR47479 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

TSB Embedded does not generate any errors or warnings when TSP® Express is active. The tool appears to work but will not show any saved scripts, nor will it run new scripts.

**PR47482 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

Executing a `tsplink.reset()` while overlapped measurements are in progress causes the instrument to become unresponsive.

**PR47487 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

When using TSP-Net, timeouts may occur earlier than programmed. For example, with `tsynet.timeout` set to 5 seconds, the `tsynet.read()` function may actually time out after only 4.7 seconds.

**PR47490 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

When loading a script using an invalid script name, the instrument loads the script as the anonymous script and does not generate an error.

**PR47494 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

When nonprintable control codes are embedded in the text passed as parameters to display functions such as `display.settext()`, the control codes cause the display to malfunction. Some of the possible effects are:

- The displayed text is corrupted.
- The instrument beeps or buzzes.
- The display shuts down and displays a "NO COMM LINK" message.

**PR53798 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

The front-panel USB host port becomes non-operational after inserting a flash drive and removing it within a span of approximately 2 seconds. The host port functionality is restored upon rebooting the instrument.

## **Version 3.2.1 Release**

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### **Overview**

Version 3.2.1 is a release for internal purposes only. This version provides the same functionality as version 3.1.0.

## **Version 3.2.0 Release**

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### **Overview**

Version 3.2.0 was never released.



## Version 3.1.0 Release

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### Overview

Version 3.1.0 is an enhancement release of the Series 2600B firmware. This release provides two enhancements and one noncritical fix.

### Critical fixes

There were no critical fixes included in this release. See the “Enhancements” and “Noncritical fixes” sections for more information about release content.

### Enhancements

**PR47031 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Enhancement:**

The QYE, DDE, EXE, and CME bits in the Standard Event Status register of the status model are now set on the master node in addition to the remote node when a remote node generates an error that is logged to the error queue of the master node.

**PR54004 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Enhancement:**

The front-panel USB port now supports interfacing to mobile devices running the Android platform.

### Noncritical fixes

**PR47032 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

When certain errors are generated, the bit set in the Standard Event Status register of the status model does not match the bit dictated by the SCPI standard. For example, some errors cause the EXE bit to be set but the SCPI standard dictates that the DDE bit be set for that error.

**Resolution:**

This issue has been corrected.

## Version 3.0.4 Release

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### Overview

Version 3.0.4 is a maintenance release of the Series 2600B firmware.

### Critical fixes

**PR51387 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

A voltage measurement triggered within 85  $\mu$ s of a voltage measurement range change operation may not meet the accuracy specifications of the instrument.

**Resolution:**

This issue has been corrected.

### Enhancements

There were no enhancements included in this release. See the “Critical fixes” and “Noncritical fixes” sections for more information about release content.

### Noncritical fixes

**PR50614 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

In the `KIPulse` factory script, the step size ratio `b` is calculated incorrectly in functions `ConfigPulseIMeasureVSweepLog` and `ConfigPulseVMeasureISweepLog`.

**Resolution:**

This issue has been corrected.

**PR50743 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

When sourcing voltage and measuring current with measure autoranging enabled, if the current flowing through the SMU terminals momentarily exceeds a setpoint of approximately 100 mA, the next reading will occur on the 1 A range or greater, even if a smaller range would be more appropriate for the signal. The autoranging routine resumes its expected behavior on the following reading.

**Resolution:**

This issue has been corrected.

**PR51312 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

Series 2600B web applications do not work in Internet Explorer 11. Running any of these web applications brings users to a Keithley support login website.

**Resolution:**

This issue has been corrected.

**PR51313 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

When running a Series 2600B web application, a Java security prompt may ask for your confirmation for running the application. An incorrect application name is shown on the security dialog box.

**Resolution:**

This issue has been corrected.

**PR51314 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

Series 2600B web applications (Flash Upgrade, TSB Embedded, Virtual Front Panel, and TSP Express) are blocked from running in Java version 7 update 51 because the JAR file manifest does not contain the Permissions attribute.

**Resolution:**

This issue has been corrected.

**PR51328 Models affected:**

2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

The links to download Java plugin on Series 2600B web applications is broken.

**Resolution:**

This issue has been corrected.

PR51349 **Models affected:**

2601B, 2602B, 2604B

**Symptom:**

Attempting to sweep current using the `smuX.trigger.initiate()` command erroneously fails with error 802, "OUTPUT blocked by interlock", if and only if the voltage limit exceeds 20 V.

**Resolution:**

This issue has been corrected.

## Version 3.0.3 Release

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### Overview

Version 3.0.3 is a maintenance release of the Series 2600B firmware. This release provides two minor enhancements and resolves a few noncritical issues.

### Critical fixes

There were no critical fixes included in this release. See the “Enhancements” and “Noncritical fixes” sections for more information about release content.

### Enhancements

PR46007 **Models affected:**  
PR49024 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Enhancement:

Bit 10 of the `status.questionable` register now functions as the HIGHV\_NOT\_READY bit. When this bit is set, it indicates that either the interlock is not engaged, or that the interlock was engaged recently and the high voltage supply is still stabilizing. If the interlock is engaged and this bit is set, attempting to turn on the output on the 200 V range will result in error code 5052, "Interlock engaged; system stabilizing."

PR48808 **Models affected:**  
PR48812 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Enhancement:

Keithley has updated its digital signature on all of its Series 2600B Java web applications (TSP Express, TSB Embedded, Flash Upgrade, and Virtual Front Panel) to a stronger 2048-bit certificate.

### Noncritical fixes

PR48755 **Models affected:**  
PR48911 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Symptom:

Rarely, when running a sweep with the `smuX.trigger.source.stimulus` attribute set to a value other than zero, the sweep may halt unexpectedly before executing the source action.

#### Resolution:

This issue has been corrected.

PR49406 **Models affected:**  
PR50283 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

If `smuX.trigger.measure.stimulus` is nonzero, and `smuX.trigger.measure.action` is set to `smuX.ENABLED`, then measurement overruns are not reported.

**Resolution:**

This issue has been corrected.

PR49413 **Models affected:**  
PR50284 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

If `smuX.source.autorangev` is set to 1 and the interlock is not engaged, voltage sweeps that cause the SMU to change to the 200 V source range improperly execute without error. Instead, the execution attempt should fail with error code 802, "OUTPUT blocked by interlock." Note that the SMU output does not actually exceed safe voltage levels when this issue occurs.

**Resolution:**

This issue has been corrected.

PR50402 **Models affected:**  
PR50432 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

When communicating with the instrument over the USB interface, occasionally you will not be able to read all the generated output and will see unexpected "Query UNTERMINATED" error messages.

**Resolution:**

This issue has been corrected.

## **Version 3.0.2 Release**

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### **Overview**

Version 3.0.2 was never released.

## Version 3.0.1 Release

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### Overview

Version 3.0.1 is a maintenance release of the Series 2600B firmware. This release resolves one critical issue and two noncritical issues.

### Critical fixes

PR47324 **Models affected:**

PR47349 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Symptom:

When `smuX.source.offmode = smuX.OUTPUT_ZERO` and `smuX.source.offfunc = smuX.OUTPUT_DCAMPS`, turning the SMU off leaves the hardware in an invalid state. The effective voltage in this state is:

- The value of `smuX.source.levelv` if `smuX.source.func` is set to `smuX.OUTPUT_DCVOLTS`
- The value of `smuX.source.limitv` if `smuX.source.func` is set to `smuX.OUTPUT_DCAMPS`

The effective current limit in this state is unpredictable, but can exceed the standard operating area of the SMU.

#### Resolution:

This issue has been corrected.

### Enhancements

There were no enhancements included in this release. See the “Critical fixes” and “Noncritical fixes” sections for more information about release content.

### Noncritical fixes

PR47316 **Models affected:**

PR47375 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

#### Symptom:

When setting `smuX.sense` to `smuX.SENSE_CALA`, the effective source range is determined by the `smuX.measure.rangeY` setting instead of the `smuX.source.rangeY` setting. To properly calibrate range R, `smuX.measure.rangeY` must be set to R before setting `smuX.sense` to `smuX.SENSE_CALA`.

#### Resolution:

This issue has been corrected.



PR47411 **Models affected:**

PR47412 2601B, 2602B, 2604B, 2611B, 2612B, 2614B, 2634B, 2635B, 2636B

**Symptom:**

In TSP® Express, running tests with high capacitance mode enabled generates error code 5069, "Autorange locked for HighC mode," for the following configurations:

- Source voltage, measure voltage
- Source current, measure current
- Source current, measure current and voltage

**Resolution:**

This issue has been corrected.