

## **Linduino Change Log**

### **1.3.0. Mar 20, 2020**

Library Changes:

LTC681X: Removing unwanted ISOSPI reversal.

New Libraries/ Demo Programs:

LTC7841 (DC2798A)

### **1.2.9. Oct 24, 2019**

Library Changes:

LTC2944: Fixed LSB and full scale values.

### **1.2.8. Aug 29, 2019**

New Libraries/ Demo Programs:

LTC2971 (DC2875A)

### **1.2.7. March 22, 2019**

Demo Program Changes:

DC2259.ino: Bug fix in LTC6811\_run\_cell\_adc\_st(). Added all the missing commands

Library Changes:

LTC681x: Added functions for commands wrsctrl, rdsctrl, stsctrl and axow. Added LTC681x\_run\_gpio\_openwire() and LTC681x\_run\_openwire\_multi(). Changed LTC681x\_run\_cell\_adc\_st() . Changed cell\_asic structure to compatible with LTC6810.

LTC 6811: Added functions for commands wrsctrl, rdsctrl and stsctrl. Added LTC681x\_run\_openwire\_multi()

New Libraries/ Demo Programs:

LTC6810 (DC2515)

LTC6812 (DC2350AA)  
LTC6813 (DC2350AB)

### **1.2.6. Apr 13, 2018**

New Libraries/ Demo Programs:

LTC6603 (DC1304A\_B)  
LTC5556 (DC2693A)

### **1.2.5. Feb 19, 2018**

Library Changes:

LTC2348: Added family support for the entire 23XX family – LTC2344,  
LTC2348, LTC2333, LTC2353, LTC2357, LTC2358.

New Libraries/ Demo Programs:

LTC6952 (DC2609A)  
LTC6953 (DC2610A)  
LTC2972 (DC2675A)

### **1.2.4. Oct 24, 2017**

Demo Program Changes:

DC1490.ino: Bug Fix - Displayed hex values have leading FFFF for inputs above  
half-scale. Added mask to fix.

Library Changes:

LTC2970: Bug fix for an incorrect masking bit.  
LTC2460.cpp: Bug Fix - Data is read into a 32-bit word, then shifted. Values  
above half scale are wrongly interpreted as negative, added mask.

New Libraries/ Demo Programs:

LTC2662 (DC2692A)  
LTC2992 (DC2561)  
LTC3886 (DC2155A)

### **1.2.3. Sep 12, 2017**

New Libraries/ Demo Programs:

LTC2600 (DC579A)  
EasySMU:  $\pm 12\text{V}/\pm 40\text{mA}$  Programmable-Voltage/Programmable-Current Source  
Measurement Unit

### **1.2.2. July 10, 2017**

New Libraries/ Demo Programs:

LTC2508 (DC2222AB)  
LTC2512 (DC2222AC)

Library Changes:

LTC2373: Code supports LTC2372 and LTC2374 as well.

### **1.2.1. June 1, 2017**

New Libraries/ Demo Programs:

LTC6811 (DC2259)  
LTC681x : LTC681x and bms\_hardware library files to support LTC681x family.

Library Changes:

LTC68031: Bug fix for daisy chained Aux Measurement read back.  
LTC68042: Bug fix for network PEC error check for AUX and STAT commands

### **1.2.0. March 31, 2017**

New Libraries/ Demo Programs:

LTM9100 (DC2423A)  
LTC2492 (DC1009AA)

Demo Program Changes:

DC1496BB.ino (LTC2942): Added support for LTC2941.  
DC2094A (LTC2348): Added support for LTC2358, LTC2344.  
DC1096B (LTC2642): Added support for LTC2641 and to choose unipolar vs.  
bipolar.

Library Changes:

LTM2893: Documentation fix.  
LTC2640: Documentation fix. The code does not support LTC2631.

### **1.1.9. Feb 17, 2017**

Demo Program Changes:

DC590\_enhanced code: Adding functionality to 'k' command to read specifically pin 12 (MISO) when the command argument is 'C'.

Library Changes:

LTM2893: Documentation fixes.

New Libraries/ Demo Programs:

24xx\_iso\_spi in Example designs  
LTC2944 (DC1812AB)  
LTC2498 (DC1410AA)  
LTC2449 (DC1410AB)  
LTC5566 (DC2460A)

Other File Changes:

Doxygen Reference: Regrouped codes into newly defined groups.

### **1.1.8. Jan 26, 2017**

New Libraries/ Demo Programs:

LTM2893 (DC2405A)

### **1.1.7. Dec 12, 2016**

Demo Program Changes:

Fixed bugs on LTC4282, LTC4215, LTC4260, LTC4280 due to mismatch in function definition and declaration for various functions w.r.t. argument types and return variables.

Library Changes:

LT\_I2C

Bug fixed in i2c\_read\_byte\_data() and i2c\_read\_word\_data(). The I2C bus was getting stuck in a constant loop with either master or slave holding the data line low after

continuous reading for long hours. To explain the reason for this, consider the following scenario:

Suppose the slave ACKs on Address byte (write bit) and NACKs on Command byte. The ret variable in the code is set to 1. Since there is no checking for the ret value at this point, the function does not return and goes forward. When the master sends the Repeated Start, the slave sees it as a usual Start.

When the Address byte is sent again (read bit), the slave ACKs. But, since the ret variable is 1, the master tries to send a stop, while the slave tries to send over data. This causes the data line to be confused and the program to be stuck in a loop inside i2c\_stop().

### **1.1.6. Oct 17, 2016**

New Libraries/ Demo Programs:

LTC2947 (DC2334A)  
DC2574A\_KIT (LTC2947)

Library Changes:

LT\_SMBUS Library:

Moved I2C and SMBus files to LT\_SMBUS library  
Fixed memory leak in LT\_I2CBus.cpp  
Exposed i2cBus object in SMBus classes  
Added CRC block data calculation in LT\_SMBus  
Removed TWI and used standard TwoWire  
Changed to LT\_two.c so that it behaves cleanly when a master tries to communicate with a Linduino

LT\_PMBUS Library

Exposed smbus object in PMBus class  
Added Not In Transaction polling as comment in LT\_PMBus.cpp  
Removed waitForAck on managers.  
Added PMBus Temp1 Offset support

LTPSM\_PartFaultLogs Library

Removed block read code and used non block methods for fault logs  
Fixed Polling on EEData Type Fault Logs.  
Converted fault log readers for LTC3883 and LTC3887 to use MFR\_DATA.

LTPSM\_InFlightUpdate Library

Changed In Flight Update memory management to statics  
Removed In Flight Update dead code  
Changed pointer size in nvm.cpp to avoid wrap around of data on large NVM datasets  
Turned off debug printing in In Flight Update.

Demo Program Changes:

LTC2970 Sketches

Added LTC2970 support library.  
Modified sketches to use new LTC2970 library.

DC1962C Sketches

Updated some sketches to use static memory rather than allocate and free.  
Added Retention sketch  
Fixed datalogger bugs.

LTC3882 Sketches

Fixed LTC3883 Address for DC1778A.

Sketches General

Added Sandbox sketch under User Contributed / LTPowerPlay  
Removed twi includes from some sketches.

### **1.1.5. Sep 23, 2016**

New Libraries/ Demo Programs:

LTC2983  
LTC2984  
LTC2986

### **1.1.4. Sep 2, 2016**

Library Changes:

LTC3335 : Removed the use of low level I2C functions.  
LTC3676 : Removed the use of low level I2C functions.  
LTC2942 : Added code support for LTC2941.  
LT\_I2C : Bug fix in i2c\_read\_block\_data() to immediately exit from the function upon NACK after the command byte portion of the transaction.  
LTC2642: Removed unnecessary delay in SPI write function for the DAC.

LTC2943: Code support added for LTC2943-1 (DC1812AC). Code uploaded on the web pages, but LTSketchbook not released.

New Libraries/ Demo Programs:

LTC2412  
LTC2413 (family of LTC2412)  
LTC2604  
LTC2605  
LTC2480  
LTC2482  
DC2430 – in User Contributed

Demo Program Changes:

DC1096B (LTC2642) : Removed unnecessary delay in the SPI write function.

### **1.1.3. May 10, 2016**

Library Changes:

LTC2348 : Improved code and added support for LTC2358.  
LTC3589 : Removed the use of low level I2C functions.  
LT3965 : Removed the use of low level I2C functions.

New Libraries/ Demo Programs:

LTC2664 (DC2376A)  
LTC2636 (DC1466) – code supports LTC2634 (DC1488A) as well.  
LTC2637 (DC1534A) – code supports LTC2635 (DC1593A) as well.

### **1.1.2. March 24, 2016**

New Libraries/ Demo Programs:

LTC6951 (DC2248A)

### **1.1.1 Jan 29, 2016**

Library Changes:

Removed inclusion of Wire.h in LT24XX\_general library. Linduino.h covers up for Wire.h.

Linduino.h : Defined macros to differentiate Little Endian and Big Endian, Added a union to include array of two 16 bit words.

PMBUS Library: Added LT\_PMBusDevice.cpp for better compile errors when porting.

PMBUS Library : Updated fault logging to use word transactions for some devices to reduce memory usage during programming.

PMBUS Library : Added virtual destructors to reduce warnings.

PMBUS Library : Removed C++11 variable initialization in device, rail, and group classes.

PMBUS Library : Various updates to code to eliminate compiler warnings in library files.

PMBUS Library : Update DC1962C program sketch with newer hex data from most recent LT Powerplay revision.

#### Demo Program Changes:

DC1684AA.ino (LTC2758) : Removed unnecessary characters.

#### New Libraries/ Demo Programs:

LTC3335 (DC2343A)

LTC4155 (DC1674A)

LT3965 (DC2218A)

LTM4676 (DC1811B)

#### Other changes:

Added LT\_3887FaultLog class.

### **1.1.0 Dec 4, 2015**

#### Library Changes:

Improvements to PSM polling code in LT\_PMBus.cpp and LT\_SMBusBase.cpp.  
Reworked PSM device type code in LT\_PMBus.cpp so that one routine decodes MFR\_SPECIAL\_ID

#### Demo Program Changes

DC1590B.ino (LTC3880) Doxygen documentation changes, update for API changes, added ClearFaults.

DC1936A.ino (LTC3882) Doxygen documentation changes.

DC1778A.ino (LTC3883) Doxygen documentation changes.

DC1633B.ino (LTC2933) Doxygen documentation changes.

DC1605B.ino (LTC2936) Doxygen documentation changes.

DC2313A.ino (LTC2937) Doxygen documentation changes.



DC1978.ino (LTC2974)	Doxygen documentation changes.
DC2382.ino (LTC2975)	Doxygen documentation changes.
DC1989A.ino (LTM4676)	Changed rail definition to use auto detection.

New Libraries/ Demo Programs:

DC2289A.ino (LTC2380-24)  
DC2364A.ino (LTC2873)  
DC1496BB.ino (LTC2942)  
DC2217A.ino (LTC4316)  
LTC4675  
LTC4677

New Fault Log sketches and example sketches to cover the following PSM devices:

DC2022A.ino (LTC2975)  
DC2028A.ino (LTC2977)  
DC2198A.ino (LTC2980)  
DC2023A.ino (LTM2987)  
DC2263A.ino (LTC3887)

Other Changes:

User Contributed - DC1962C sketches: Added support for identification and programming of PSM devices and rails.

## 1.0.9 Sep 23, 2015

Library Changes:

Replaced LTC6602 files with updated tested code.  
Fixed Doxygen Documentation on LTC2984 and LTC2983 files.

New Libraries/ Demo Programs:

DC1011AB.ino	LTC2496
DC2024A.ino	LTC4282
DC2313A.ino	LTC2937
DC980.ino	LTC2970

Demo Program Changes

Deleting DC2023\_Init.ino  
New DC1962 (LTC2984) sketches for store and programming.

## 1.0.8 Aug 12, 2015

New Libraries/ Demo Programs:

LTC2984

## 1.0.7 July 1, 2015

Library Changes:

LT\_PMBus Library updated with support for polyphase rails and more NVM operations.

Demo Program Changes:

ultra_fix.ino (DC1926C)	Added Bricked Device Detector
faultlog.ino (DC1926C)	Fixed Time Stamp byte order, Added check for fault log existence, Added support for LTC2975

New Libraries/ Demo Programs:

DC1989A.ino (LTM4676)

Other changes:

Renamed the .ino file for LTC6903 to DC726\_A, and for LTC6904 to DC726\_B.  
Fixed documentation issues in LTC2338 files.

## 1.0.6 May 28, 2015

Library Changes:

LT_PSM	Refactored and new functions added.
LT_InFlightUpdate	Fixed "verify bug".

Demo Program Changes:

DC570A.ino (LTC2440)	Fixed a bug (could not detect EEPROM)
DC572.ino	Replaced parseFloat() with read_float()
DC1684A.ino	Replaced parseFloat() with read_float()
DC1684B.ino	Replaced parseFloat() with read_float()
DC1096B.ino	Replaced parseFloat() with read_float()

Sketches for LT\_PSM cleaned up to reflect refactoring LT\_PSM.

New Libraries/ Demo Programs:

DC1558_DC1808.ino	(LTC3589)
DC1651A.ino	(LTC6803-1)
DC1652A.ino	(LTC6803-2)
DC1684AA.ino	(LTC2758)
DC1684AB.ino	(LTC2752)
DC786A.ino	(LTC4260)
DC985A.ino	(LTC4245)
DC1704A.ino	(LTC4280)
DC2094A.ino	(LTC2348)
DC1605B.ino	(LTC2936)
DC1633B.ino	(LTC2933)
DC2382.ino	(LTC2975)
DC2023A.ino	(LTC2987)
DC2023A_Init.ino	(LTC2987)
Program.ino	(User Contributed/DC1962)
Store.ino	(User Contributed/DC1962)

Other changes:

Made the library codes and Linduino code for LTC1592 (DC572) more user friendly.  
Renamed LTC2374-18 libraries with LTC2373-18 (DC2071AA.ino)

**1.0.5 March 11, 2015**

Library Changes:

LT\_PMBus.cpp                      Added file and modified to use PAGE command.

New Libraries/ Demo Programs:

DC1096B.ino (LTC2642)  
DC572A (LTC1592)  
DC1339A (LTC2302)  
DC874A (LTC4215)  
DC998A (LTC4261)

Other changes:

Added Fault Log decoding for LTC2974, LTC2977, LTC2978, LTC3880, LTC3882, LTC3883, and LTC3886.

## 1.0.4 December 16, 2014

### Library Changes:

LTC6948.cpp	Added code to detect register bit FRAC_NUM = 0, then set to INTN mode.
LT_I2CBus.cpp	Added sketches for more PSM devices. Cleaned up PMBus stack with Group protocol.

### Demo Program Changes:

DC1444A.ino (LTC2305)	Menu and print title modifications.
DC1186A.ino (LTC2308)	Reorganized.
DC1337A.ino (LTC2309)	Some additional print functions included.
DC2025A.ino (LTC2668)	Changes made to settle channel and trigger logic.
DC1846.ino (LTC6947)	Added EEPROM Store/Restore, made menu modifications.
DC1959.ino (LTC6948)	Added EEPROM Store/Restore, made menu modifications.

### New Libraries/ Demo Programs:

DC2091A.ino (LTC5599)  
DC1649A.ino (LTC6945)  
DC1705C.ino (LTC6946)  
DC1795A.ino (LTC6950)  
DC1954A.ino (LTC6954)  
DC2071A.ino (LTC2374)  
DC2196A.ino (LTC2666)  
DC1633B.ino (LTC2933)

### Other changes:

LT_I2C.cpp	Changed I2C clock to 100 KHz to match DC590.
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Added faultlog.ino, FaultLog.h and FaultLog.cpp files to read and interpret fault log from NVM for:

LTC2974  
LTC2977  
LTC2978  
LTC3880  
LTC3882  
LTC3883

Modified the following files in User Contributed/DC1962C to add sketches for more PSM devices. Cleaned up PMBus stack with Group protocol:

- faultog.ino
- logo.ino
- svid.ino
- hello\_world.ino
- training.ino
- ultra\_fix.ino

### 1.0.3 August 1, 2014

Global Changes:

Rename "Libraries" directory to "libraries" (lower case 'l'). Arduino for Linux does not like the upper-case 'L'. Windows works with either.

Library Changes:

LT\_I2C Library: quikeval\_I2C\_connect() modified to wait 55ms if the state of the MUX pin actually changes. This accommodates the 55ms connection delay of the LTC4315 used on the DC2026 rev B board. Also change the default bus frequency to 100kHz (from 400kHz) to match DC590B.

LTC1859 Library - Modified

LTC2309 Library - Modified

LTC2378 Library - Modified

LTC2484 Library - Correct SPI function call from 24 bits to 32 bits. Change ADC code pointer to signed 32 bit.

LTC2497 Library - Correct I2C function call from 32 bits to 24 bits.

LTC2460 Library - Correct SPI function call from 32 bits to 24 bits. Remove EOC\_timeout notes from header.

LTC2473 Library - Add timeout as an argument (was a fixed constant.)

LTC24XX\_general library - Add a default check for an ADC code of all zeros that needs to be detected for EasyDrive parts

LTC2990 Library - Add additional bit masks

LTC2991 Library - Add proper check for new valid data

QuikEval\_EEPROM Library - Fix read\_quikeval\_id\_string function so that it is tolerant of a missing comma

Demo Program Changes:

DC682.ino (LTC1859 program) - Reorganized

DC1337.ino (LTC2309 program) - Reorganized

DC1925.ino (LTC2378 program) - Minor changes

DC1490.ino (LTC2460 program) - Remove EOC\_timeout call

DC1716.ino (LTC2473 program) - Add timeout to read function call  
DC939.ino (LTC2484 program) - Change a bunch of variables from unsigned to signed.  
DC1011AA.ino (LTC2498 program) - Remove extra data read when in 2X mode. LTC244x family requires this, LTC2498 family does NOT.  
DC1012AA.ino (LTC2499 program) - Remove extra data read when in 2X mode.  
DC2197.ino (LTC2645 program) - Add options to enter duty cycle as a percentage  
DC2025.ino (LTC2668 program) - Add SPI loopback test and notes on “internal use only” functions.  
DC1697.ino (LTC2945 program) - Add “will attempt to proceed” note if demo board not connected.  
DC1338.ino (LTC2990 demo program) - change some calls to use new mode masks.  
DC590B.ino (DC590 emulator) - Correct spelling of “pseudo”, add delay in reset routine to better match actual DC590 behavior.  
I2C\_Address\_Scan.ino (I2C address scanner) - Remove inclusion of SPI library, clarify what to do to start scan.

#### NEW Libraries / Demo Programs!:

LTPMBus - Functions for PMBus and Power System Management products

LTC1856  
LTC2305  
LTC2315  
LTC2338  
LTC2366  
LTC2370  
LTC2380  
LTC2383  
LTC2946  
LTC2983  
LTC6602  
LTC6947  
LTC6948

DC1962C Sketch  
LTC3880 Sketch  
LTC3882 Sketch  
LTC3883 Sketch  
LTC2974 Sketch  
LTC2977 Sketch

Example Designs / User Contributed:

LTC2449\_Datalogger.ino - Simple channel scanning routine. Demonstrates how to scan channels in multiplexed ADCs.  
DC1962.ino - Power System Management demonstrations (LTC3880, LTC2974, LTC2977)

### **1.0.2.1 – March 31<sup>st</sup>, 2014**

LTC2484 Library

Fix for 2x multiple zero issue

### **1.0.2 – March 21<sup>st</sup>, 2014**

LTC6904 Library

DC726A.ino added

LTC6904.cpp added

LTC6904.h added

LTC6903 Library

DC762B.ino added

LTC6903.cpp added

LTC6903.h added

LTC3676 Library

LTC3676.cpp Added

LTC3676.h Added

DC1976.ino Added

LTC2498 Library\*

LTC2498.cpp Added

LTC2498.h Added

DC1011AA.ino Added

LTC2499 Library\*

LTC2499.cpp Added

LTC2499.h Added

DC1012AA.ino Added

LTC2460 Library\*

LTC2460.cpp Added

LTC2460.h Added

DC1490.ino Added

LTC2473 Library\*

LTC2473.cpp Added

LTC2473.h Added

DC1716.ino Added

LTC2497 Library\*

LTC2497.cpp Added

LTC2497.h Added

DC1012AB.ino Added

LTC2990 Library

- LTC2990.cpp Added
- LTC2990.h Added
- DC1338.ino Added
- LTC2440 Library\*
  - LTC2440.cpp Added
  - LTC2440.h Added
  - DC570.ino Added
- LT24XX unified library
  - LTC24XX\_general.cpp Added
  - LTC24XX\_general.h Added
  - LTC24XX\_general\_test Added
- LTC2991 Library
  - Spelling correction in comments on LTC2991.h
- LTC2484 Library \*
  - LTC2484.cpp Modified to use General Library
- LTC237X Library
  - Revision to cover more parts

\* indicates that the library requires the General Library and needs LTC24XX\_general.cpp and LTC24XX\_general.h

### **1.0.1 – January 15<sup>th</sup>, 2014**

- LTC2668 Library
  - DC2025A.ino Added
  - LTC2668\_backpage\_app.ino Added
  - LTC2668.cpp Added
  - LTC2668.h Added
- LTC2943 Library
  - DC1812A.ino Added
  - LTC2943.cpp Added
  - LTC2943.h Added
- LTC2874 Library
  - DC1880A.ino Added
  - LTC2874.cpp Added
  - LTC2874.h Added
- LTC6804 Library
  - DC1894.ino Added
  - DC1942.ino Added
  - LTC68041.cpp Added
  - LTC68041.h Added
  - LTC68042.cpp Added
  - LTC68042.h Added
- LT\_I2C.cpp
  - Fixed bug in i2c\_read\_word



Linduino.html

Doxygen rerun to update for new parts

**1.0**

Initial Release