P-SRAM™ Parallel Evaluation Kit

User Guide

AK3xx316xxxxxxxx

Revision History

Revision No.	Date	History
1.0	09/01/2020	Initial Release
1.1	09/15/2021	Cosmetic Changes

Contents

1. Overview

The Avalanche P-SRAM™ parallel evaluation kit enables the users to evaluate Avalanche P-SRAM parallel product using a STMicro Nucleo motherboard connected to Avalanche daughterboard via a standard Asynchronous SRAM interface. The STMicro Nucleo motherboard communicates with the computer using two USB 2.0 cables type A/B and Avalanche proprietary software application. This evaluation kit is designed to work with the STMicro NUCLEO-F746ZG with an UNO R3 compatible header.

Avalanche P-SRAM Product Support

The Avalanche P-SRAM daughterboard can be populated with one of the following P-SRAM Parallel devices:

Table 1: Avalanche P-SRAM Parallel Product Support

Part #	Density	Voltage	Access Time	Organization	Package
AS3032316-035nX0IBCY	32Mb	2.7 V to 3.6V	35ns	x16	48-Pin FBGA
AS3032316-035nX0ITAY	32Mb	2.7 V to 3.6V	35ns	x16	44-Pin TSOP
AS3032316-035nX0ITBY	32Mb	2.7 V to 3.6V	35ns	x16	54-Pin TSOP
AS3016316-035nX0IBCY	16Mb	2.7 V to 3.6V	35ns	x16	48-Pin FBGA
AS3016316-035nX0ITAY	16Mb	2.7 V to 3.6V	35ns	x16	44-Pin TSOP
AS3016316-035nX0ITBY	16Mb	2.7 V to 3.6V	35ns	x16	54-Pin TSOP
AS3008316-035nX0IBCY	8Mb	2.7 V to 3.6V	35ns	x16	48-Pin FBGA
AS3008316-035nX0ITAY	8Mb	2.7 V to 3.6V	35ns	x16	44-Pin TSOP
AS3008316-035nX0ITBY	8Mb	2.7 V to 3.6V	35ns	x16	54-Pin TSOP
AS3004316-035nX0IBCY	4Mb	2.7 V to 3.6V	35ns	x16	48-Pin FBGA
AS3004316-035nX0ITAY	4Mb	2.7 V to 3.6V	35ns	x16	44-Pin TSOP
AS3004316-035nX0ITBY	4Mb	2.7 V to 3.6V	35ns	x16	54-Pin TSOP
AS3001316-035nX0IBCY	1Mb	2.7 V to 3.6V	35ns	x16	48-Pin FBGA
AS3001316-035nX0ITAY	1Mb	2.7 V to 3.6V	35ns	x16	44-Pin TSOP
AS3001316-035nX0ITBY	1Mb	2.7 V to 3.6V	35ns	x16	54-Pin TSOP
AS3032316-045nX0IBCY	32Mb	2.7 V to 3.6V	45ns	x16	48-Pin FBGA
AS3032316-045nX0ITAY	32Mb	2.7 V to 3.6V	45ns	x16	44-Pin TSOP
AS3032316-045nX0ITBY	32Mb	2.7 V to 3.6V	45ns	x16	54-Pin TSOP
AS3016316-045nX0IBCY	16Mb	2.7 V to 3.6V	45ns	x16	48-Pin FBGA

Part #	Density	Voltage	Access Time	Organization	Package
AS3016316-045nX0ITAY	16Mb	2.7 V to 3.6V	45ns	x16	44-Pin TSOP
AS3016316-045nX0ITBY	16Mb	2.7 V to 3.6V	45ns	x16	54-Pin TSOP
AS3008316-045nX0IBCY	8Mb	2.7 V to 3.6V	45ns	x16	48-Pin FBGA
AS3008316-045nX0ITAY	8Mb	2.7 V to 3.6V	45ns	x16	44-Pin TSOP
AS3008316-045nX0ITBY	8Mb	2.7 V to 3.6V	45ns	x16	54-Pin TSOP
AS3004316-045nX0IBCY	4Mb	2.7 V to 3.6V	45ns	x16	48-Pin FBGA
AS3004316-045nX0ITAY	4Mb	2.7 V to 3.6V	45ns	x16	44-Pin TSOP
AS3004316-045nX0ITBY	4Mb	2.7 V to 3.6V	45ns	x16	54-Pin TSOP
AS3001316-045nX0IBCY	1Mb	2.7 V to 3.6V	45ns	x16	48-Pin FBGA
AS3001316-045nX0ITAY	1Mb	2.7 V to 3.6V	45ns	x16	44-Pin TSOP
AS3001316-045nX0ITBY	1Mb	2.7 V to 3.6V	45ns	x16	54-Pin TSOP

Ordering Options

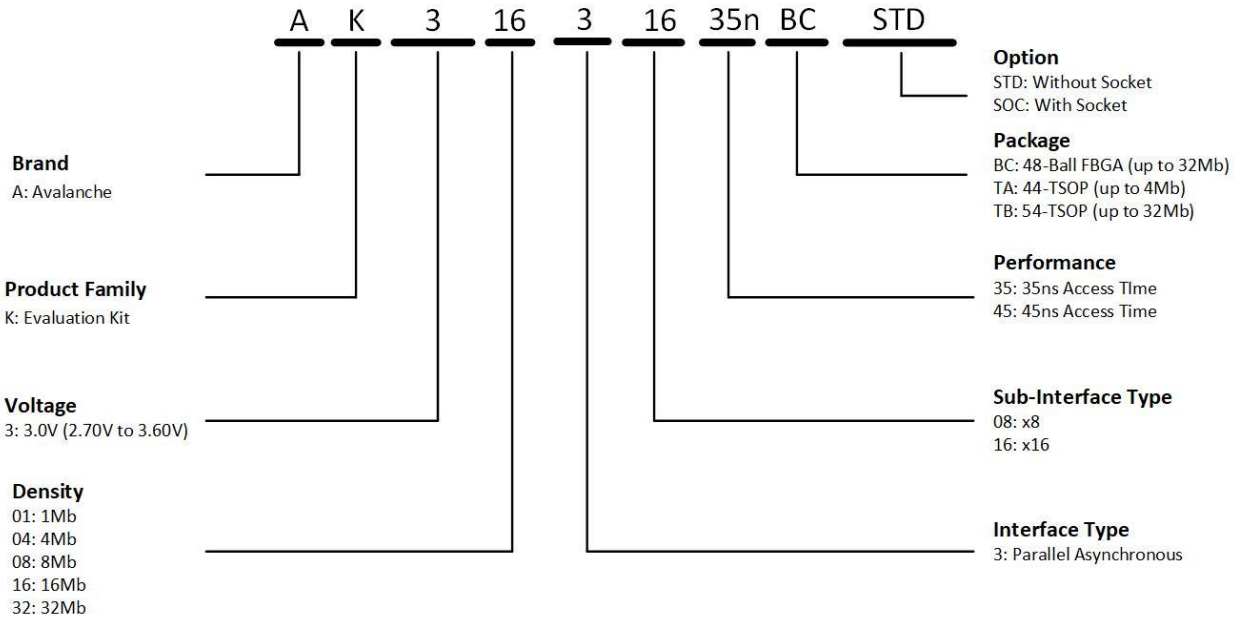


Figure 1: Ordering Option

2. Package Content

The Avalanche P-SRAM™ parallel evaluation kit contains the following items.

1. STMicro NUCLEO-F746ZG board
2. Avalanche daughterboard populated with an Avalanche P-SRAM parallel memory device
3. Two USB cable type A/B

3. STMicro Nucleo Motherboard Support

The Avalanche P-SRAM daughterboard is compatible with the following host:

- STMicro Nucleo Series with UNO R3 compatible header

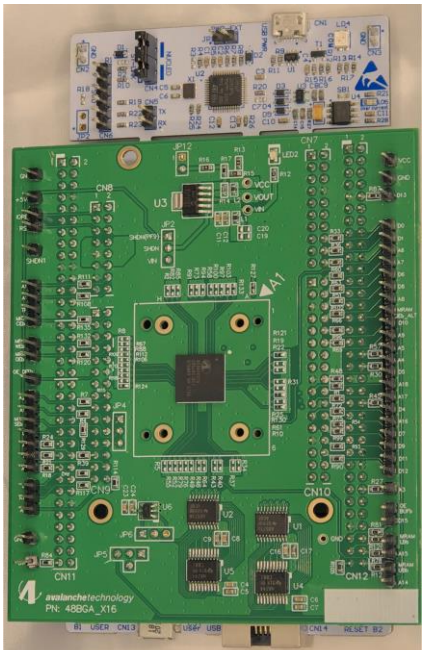


Figure 2: Avalanche P-SRAM Parallel 16Mb BGA-48 Eval Kit

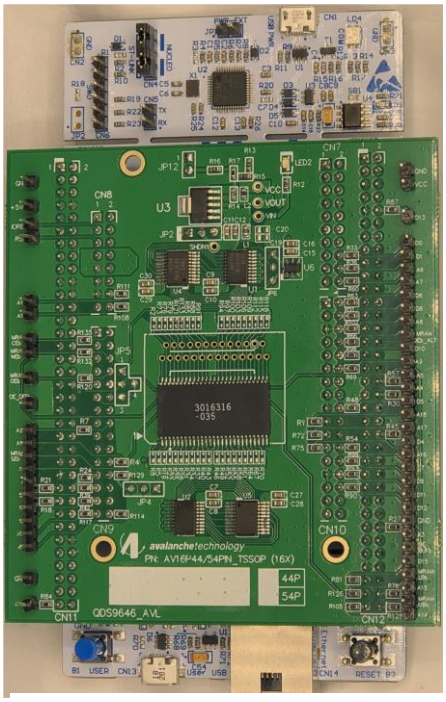


Figure 3: Avalanche P-SRAM Parallel 16Mb TSOP-54 Eval Kit

4. Getting Started

4.1 Requirements

- A PC system with two available USB 2.0/3.0 ports
- Windows 7/8/10 with 32/64-bit Operation System
- A STMicro NUCLEO-F746ZG motherboard
- Two USB 2.0 cables Type A/B

4.2 STMicro Application Software and Driver Installations

1. Download the STMicro's STM32 ST-LINK utility (STM32 ST-LINK Utility vxxx setup.exe). This software is a full-featured software interface for programming STM32 microcontroller required to program the STMicro Nucleo motherboard with Avalanche firmware. This software also installs the USB driver on the computer to allow the connection between the eval kit and the PC
    - Use the following link:

      https://www.st.com/en/development-tools/stsw-link004.html
    - After installation, an icon (see Figure 4: STM32 ST Link Desktop Icon) will appear on your desktop

Figure 4: STM32 ST Link Desktop Icon

5. Connecting the Eval Kit to PC

Perform the step-by-step instructions in the following order to configure and connect the eval kit to your computer:

1. Connect the eval kit to your computer's USB ports using two universal USB 2.0 cable (see *Figure 5: Nucleo Board with 2 USB Connections*). The RED power LEDs on both the STMicro

Nucleo motherboard and the Avalanche P-SRAM daughterboard should go on.

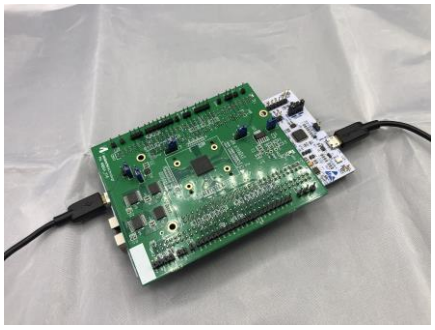


Figure 5: Nucleo Board with 2 USB Connections

2. For first time installation, users should install the USB driver on the computer by installing the STMicro Link Utility. You can check to ensure the USB drivers have been properly installed by opening Windows Device Manager, and looking under "Ports (COM & LPT)". (see *Figure 6: Device Manager*) Windows should assign two COM ports # to the STMicro Nucleo motherboard. The first COM port is called "STMicroelectronics STLink Virtual COM Port" and the second COM port is called "USB Serial Device (COMxx).

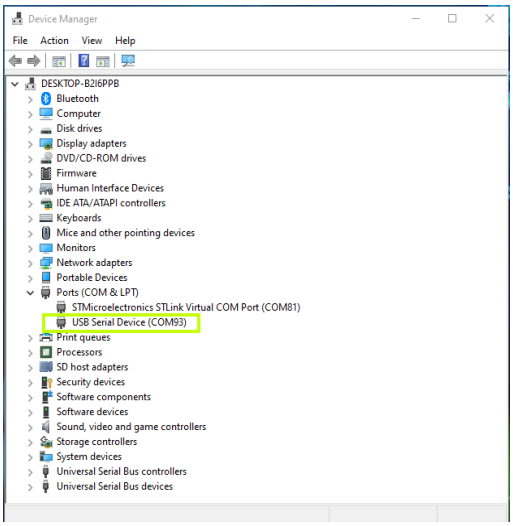


Figure 6: Device Manager

3. If there are no COMxx ports assigned to the STMicro Nucleo motherboard, then remove both cables and re-insert the two USB connectors from/into PC's USB ports for Windows to re-enumerate USB ports. If that doesn't solve the problem, you may need to re-install the USB drivers.

5.1 Programming Avalanche Firmware to the STMicro Nucleo motherboard (*Optional)*

Ready to go straight out of the box, the STMicro Nucleo motherboard includes all the software tools necessary to test basis functionality of the Avalanche P-SRAM device.

To update the STMicro Nucleo motherboard with Avalanche latest firmware revision, follow the step-by-step instructions below:

1. Download latest version of the Avalanche test program (hex files) from https://www.avalanche-technology.com/support/development-kits/
    - Click on link “Download the Avalanche test program for STMicro Nucleo”
    - Save and un-zip the zip file on your computer
2. Double-click the STM32 ST-Link icon on your desktop (*Figure 4: STM32 ST Link Desktop Icon*) to launch the STM32 ST-Link Utility program.
3. Select “Target” → “Program & Verify…”. See Figure 7: STM Utility Window.

   NOTE: Make sure only one (1) Nucleo board is connected to the computer when programming the Nucleo board, otherwise the intended board may not be programmed.

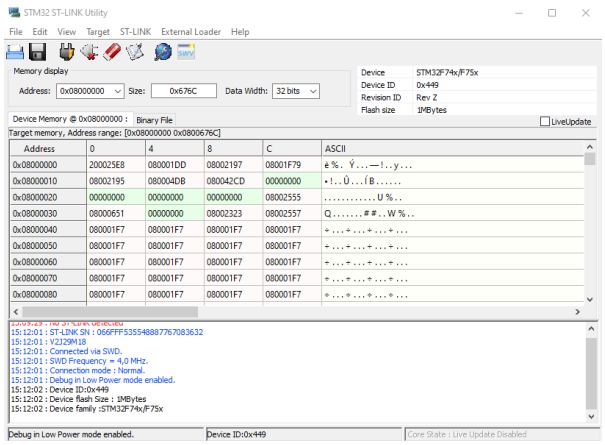


Figure 7: STM Utility Window

4. Choose “Browse” button to go to the directory that you’ve downloaded the Nucleo Hex file from Avalanche Technology website.
5. Select an appropriate file with *.hex extension.

- For 35ns part, select "STM32N_x16ParallelMemTest_FMC-Diag-V.x_35ns_0-26.5-9.hex"
- For 45ns part, select "STM32N_x16ParallelMemTest_FMC-Diag-V.x_W45R45.hex"

6. Select "Open" and then select "Start" to start uploading the appropriate firmware file into Nucleo board
7. Select "Target" → "Disconnect" to disconnect the Nucleo board from STM32 ST-Link Utility

6.0 Running Avalanche Test Program

The Avalanche Technology software suite is needed to run the test program on the STMicro Nucleo motherboard.

7.1 Avalanche Software Suite

The eval kit will be pre-loaded with either the 35ns or 45ns firmware upon customer request. Avalanche also will provide the Avalanche Software Suite which is required for running the board. The Avalanche Software Suite consists of 3 files as follows:

For 35ns Eval Kit:

1. Config.txt
2. Ava35ns.exe
3. STM32N_x16ParallelMemTest_FMC-Diag-V.x_35ns_0-26.5-9.hex

For 45ns Eval Kit:

1. Config.txt
2. Ava45ns.exe
3. STM32N_x16ParallelMemTest_FMC-Diag-V.x_W45R45.hex

The above 3 files are in the Avalanche Software Suite folder and can be downloaded from Avalanche Technology website (https://www.avalanche-technology.com/support/development-kits/). The users can place this folder on their PC's desktop or any other locations for easy access.

The configuration file consists of 6 user-defined lines. Below is an example of a config.txt file:

- Def_com_port = COM4

  - COMx: where x is the COM port assigned by Windows OS (refer to Figure 6 – Device Manager)

- Run_test = y
  - y: automated test
  - n: user selected option test
- Test_selection = c
  - a: x16 Write
  - b: x16 Read
  - c: x16 Write-Read Compare
  - d: x16 Read Compare
  - x: Exit
- Start_Address = 0x0
  - 0x0: starting address in hexadecimal (hex) format (0x)
- Num_Words =0x100
  - 0x100: number of words (16-bit) tested. Format is in hexadecimal (hex)
  - For 16Mb: maximum number of words = 0x100000
  - For 32Mb: maximum number of words = 0x200000
- Def_Pattern = 7
  - Test Data Pattern: 7 = Incrementing Data Patter

The STMicro Nucleo motherboard and the Avalanche P-SRAM evaluation board are now up-and-running. The Terminal Monitor window will display the main menu for tests available on the Avalanche P-SRAM device as indicated below:

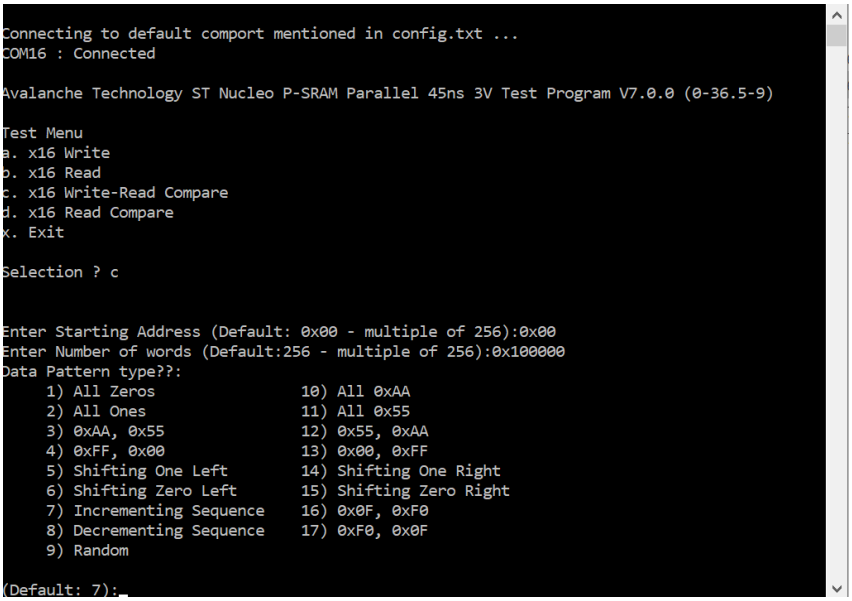
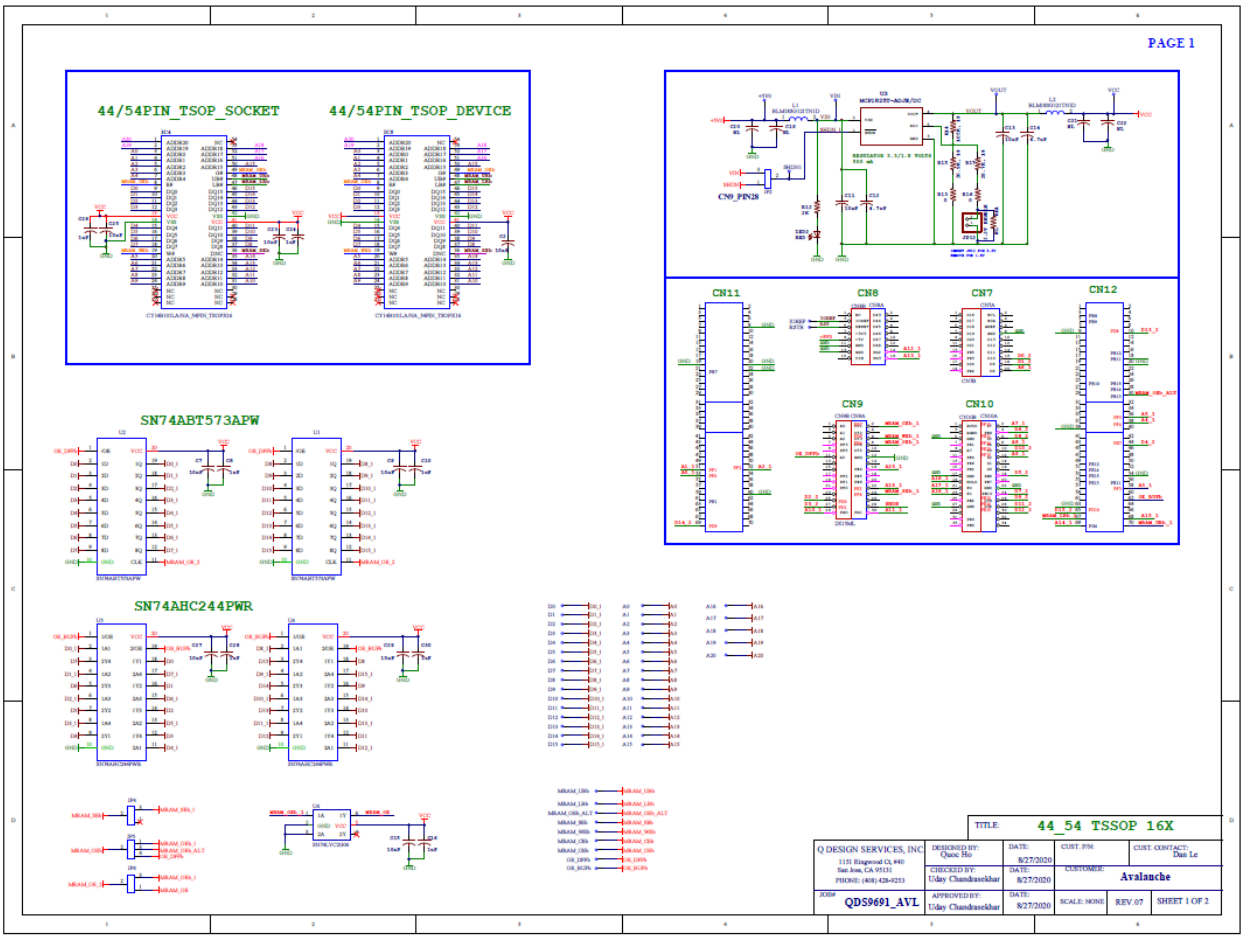
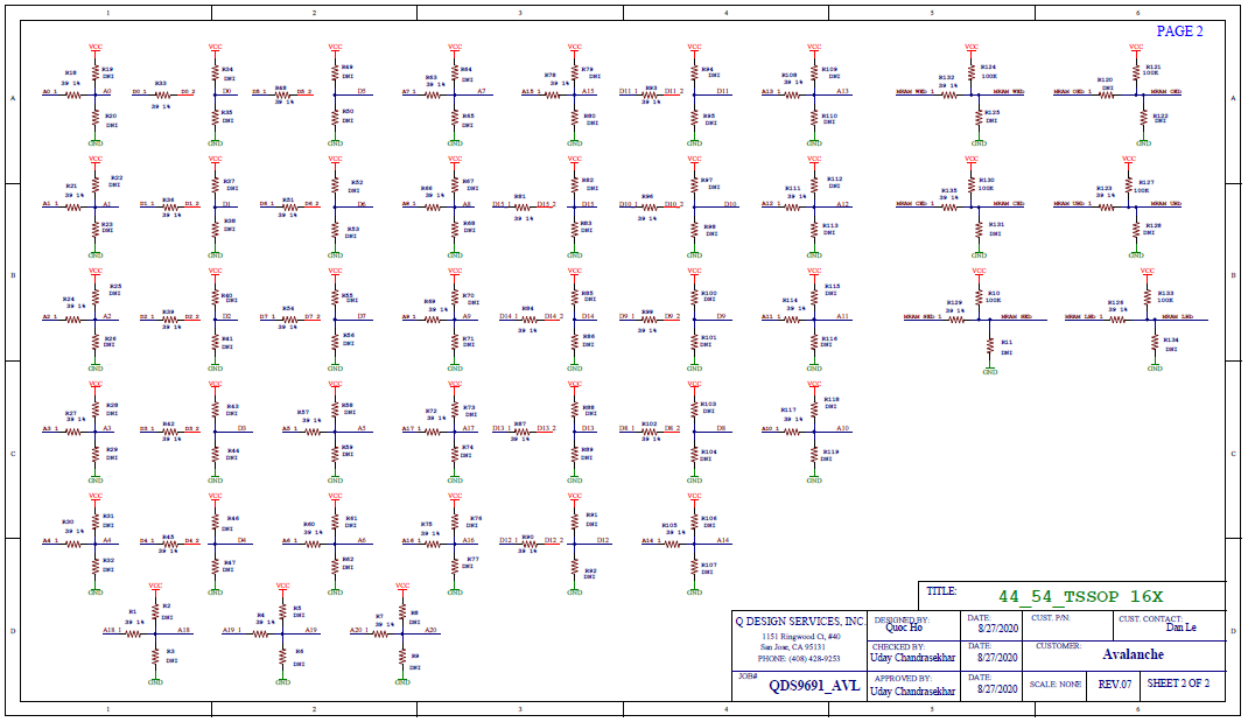


Figure 8: Test Menu

Appendix A

AS3xx31635nxxEVAL - Schematic




PAGE 2
TITLE: 44_54_TSSOP_16X
Q DESIGN SERVICES, INC.
1151 Ringwood Ct, #40
San Jose, CA 95131
PHONE: (408) 428-9253
DESIGNED BY: Quoc Ho
DATE: 8/27/2020
CUST. P/N:
CUST. CONTACT: Dan Le
CHECKED BY: Uday Chandrasekhar
DATE: 8/27/2020
CUSTOMER: Avalanche
JOB#: QDS9691_AVL
APPROVED BY: Uday Chandrasekhar
DATE: 8/27/2020
SCALE: NONE
REV.07
SHEET 2 OF 2

Appendix B

AS3xx31635nxxEVAL – BOM

Qty	Value	Part
7	TP	+5V0, IOREF, RSTB, VCAP, VCC, VIN, VOUT
1		BR1
5	10nF	C2, C11, C13, C23, C25
2	4.7uF	C12, C14
4	NL	C19, C20, C21, C22
2	1uF	C24, C26
1	2X10_ML	CN7
1	2X8_ML	CN8
1	2X15ML	CN9
1	2X17ML	CN10
2	HDR2X35	CN11, CN12
1	CY14B101LA/NA_54PIN_TSOPX16	IC4
1	CY14B101LA/NA_54PIN_TSOPX16	IC5
2	3PIN_JUMPER	JP3, JP4
1	3.3V ENABLE	JP12
2	BLM18SG121TN1D	L1, L2
1	RED	LED2
43	39 1%	R1, R4, R7, R18, R21, R24, R27, R30, R33, R36, R39, R42, R45, R48, R51, R54, R57, R60, R63, R66, R69, R72, R75,

Qty	Value	Part
		R78, R81, R84, R87, R90, R93, R96, R99, R102, R105, R108, R111, R114, R117, R120, R123, R126, R129, R132, R135
80	DNI	R2, R3, R5, R6, R8, R9, R11, R19, R20, R22, R23, R25, R26, R28, R29, R31, R32, R34, R35, R37, R38, R40, R41, R43, R44, R46, R47, R49, R50, R52, R53, R55, R56, R58, R59, R61, R62, R64, R65, R67, R68, R70, R71, R73, R74, R76, R77, R79, R80, R82, R83, R85, R86, R88, R89, R91, R92, R94, R95, R97, R98, R100, R101, R103, R104, R106, R107, R109, R110, R112, R113, R115, R116, R118, R119, R122, R125, R128, R131, R134
6	120	R10, R121, R124, R127, R130, R133
1	2K	R12
2	0	R13, R16
1	105K, 1%	R14
1	30.9K, 1%	R15
1	28.7K, 1%	R17
1	MCP1825T-ADJE/DC	U3
43	39 1%	R1, R4, R7, R18, R21, R24, R27, R30, R33, R36, R39, R42, R45, R48, R51, R54, R57, R60, R63, R66, R69, R72, R75, R78, R81, R84, R87, R90, R93, R96, R99, R102, R105, R108, R111, R114, R117, R120, R123, R126, R129, R132, R135
80	DNI	R2, R3, R5, R6, R8, R9, R11, R19, R20, R22, R23, R25, R26, R28, R29, R31, R32, R34, R35, R37, R38, R40, R41, R43, R44, R46, R47, R49, R50, R52, R53, R55, R56, R58, R59, R61, R62, R64, R65, R67, R68, R70, R71, R73, R74, R76, R77, R79, R80, R82, R83, R85, R86, R88, R89, R91, R92, R94, R95, R97, R98, R100, R101, R103, R104, R106, R107, R109, R110, R112, R113, R115, R116, R118, R119, R122, R125, R128, R131, R134

Qty	Value	Part
6	120	R10, R121, R124, R127, R130, R133
1	2K	R12
2	0	R13, R16
1	105K, 1%	R14