

P-SRAM[™] Parallel Evaluation Kit User Guide

AK3xx316xxxxxxx

No part of this document may be copied or reproduced in any form or by any means without the prior written consent of Avalanche Technology Inc.

Avalanche Technology, Inc. does not assume any liability for infringement of any intellectual property rights (including but not limited to patents, copyrights, and circuit layout licenses) of Avalanche Technology, Inc. or third parties by or arising from the use of the products or information listed in this document. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of Avalanche Technology, Inc. or others.

Avalanche Technology, Inc. reserves the right to change products or specifications without notice. For updates or additional information about Avalanche Technology products, contact the Avalanche Technology office.

All brand names trademarks and registered trademarks belong to their respective owners.

©2021 Avalanche Technology, Inc.



Revision History

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



Contents

1.	Overview	.4
2.	Package Content	.6
3.	STMicro Nucleo Motherboard Support	.7
4.	Getting Started	.8
4.1	Requirements	. 8
4.2	STMicro Application Software and Driver Installations	. 8
5.1	Programming Avalanche Firmware to the STMicro Nucleo motherboard (Optional)	10
6.0	Running Avalanche Test Program	11
	7.1 Avalanche Software Suite	11
Append	lix A	14
Append	lix B	16

6
.7
.7
. 8
.9
.9
10
13



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:

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

Table 1: Avalanche P-SRAM Parallel Product Support



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

- 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).

File Action View Help File Action View Help	🛃 Device Manager	_	\times
Image: Sector Processor	File Action View Help		
✓ DESICIOP-8216PP8 ↓ Computer ↓ Disk drives ↓ Diploy adapters ↓ Diploy adapters ↓ Diploy adapters ↓ Diff. drives ↓ Human Interface Devices ↓ Human Interface Devices ↓ Mathematic Adapters ↓ Mice and other pointing devices ↓ Monitors ↓ Portal Device (COM8) ↓ Portal Device (COM8) ↓ Portal Device (COM8) ↓ Software components ↓ Software devices ↓ Software devices ↓ Software controllers ↓ Software devices	♦ ➡ 0		
■ Bluetoch > ■ Disk drives > ■ Human Inteface Devices > ■ Human Inteface Devices > ■ Montons > ■ Montors > ■ Portable Devices ■ Staticredectronics SLink Virtual COM Port (COM81) ■ ■ Sta	V 🚦 DESKTOP-B2I6PPB	 	
> Image: Computer > Image: Computer <t< td=""><td>> (3) Bluetooth</td><td></td><td></td></t<>	> (3) Bluetooth		
> Disk drives > □ Human Interface Devices > □ Disk drives > □ Disk drives > □ Disk drives > □ Monitors > □ Pottable Devices > □ Solution deduces > □ Solution devices > □ Universal Serial Busic controllers > □ Universal Serial Busic	> 💻 Computer		
> Imply adapters > Imply Chock M drives > Imply Chock M drives <td>> 👝 Disk drives</td> <td></td> <td></td>	> 👝 Disk drives		
 > DVD/CD-ROM drives > ■ Firmware > ■ Firmware > ■ IDE ATA/ADP controllers > ■ Keyboards > ■ Keyboards > ■ Monitors > ■ Monitors > ■ Ports (COM & DP) = \$ Third codectronics STLink Virtual COM Port (COM81) = ♥ Orts (COM & DP) = \$ Third codectronics STLink Virtual COM Port (COM81) = ♥ Orts (COM & DP) = \$ Third codectronics STLink Virtual COM Port (COM81) = ♥ Orts (COM & DP) = Ports (COM & DP) = \$ Third codectronics STLink Virtual COM Port (COM81) = ♥ Orts (COM83) > > S D host adaptes > ■ Software components > ■ Software controllers > ■ Software devices 	> 🖙 Display adapters		
 iii Firmware iiii Firmware iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	> 🔐 DVD/CD-ROM drives		
 > imple Human Interface Devices > imple FAVAPPI controllers > imple Keyboards > imple Makes and other pointing devices > imple Makes Devices > imple Method Devices > imple Software Components > imple Software devices > imple Standard Device > imple Standard Devices 	> 🎬 Firmware		
 > ■ IDE ATA/ATAP/ controllers > ■ Keyboards > ■ More and other pointing devices > ■ Montors > ■ Montors > ■ Portable Evolves > ■ Software components > ■ Software devices > ■ Software components > ■ Software controllers > ■ Strange controllers > ■ Strange Evolves > ■ Viniversal Serial Bus controllers > ■ Software Serial Bus controllers 	> 🛺 Human Interface Devices		
 ↓ Keyboards ↓ Monitors ↓ Monitors ↓ Portal dotter pointing devices ↓ Portal be Devices ↓ Portal be Devices ↓ Portal be Devices ↓ Portal be Devices ↓ Strikeroelectronics STLink Virtual COM Port (COM81) ↓ Portal vice (COM93) ↓ Portal dotter (COM93) ↓ Software components ↓ Software controllers ↓ ↓ Software dovices ↓ ↓ Universal Serial Bus controllers 	> 📹 IDE ATA/ATAPI controllers		
 > Wice and other pointing devices > Monitors > Ports (COM & LPT) ⇒ Strate Devices ⇒ Ports (COM & LPT) ⇒ Strate Device (COM93) > ⇒ Print queues > Print queues > Print queues > So Dost adapters > Software components > Software devices > Software devices > Software devices 	> 🧱 Keyboards		
 Monitors Monitors Portable Devices Portable Devices Portable Devices Portable Devices Finit queues Stail Device (COM8) So hort adapters So hort adapters Software components Software devices Software devices Vinite stail Concellers Software devices Vinite stail Serial Bus controllers Software Serial Bus controllers Vinite Stail Serial Serial Bus controllers Vinite Stail Serial Serial Bus controllers Software Serial Serial Bus controllers Vinite Stail Serial Serial Bus controllers 	> Mice and other pointing devices		
 > Wetwork adapters > Ports (COM & LPT) ⇒ Ports (COM & LPT) ⇒ Witwoelectronics STlink Virtual COM Port (COM81) ⇒ Print queues > Processors > So Dost adapters > So So tadapters > Software components > Software devices > Sound, video and game controllers > Songe controllers > Software Seriel Bus controllers > Viniversal Seriel Bus controllers > Universal Seriel Bus controllers > > Universal Seriel Bus controllers > > > > > 	> 🛄 Monitors		
 Portable Devices Portable Devices Portable Devices Portable Devices StMicroelectronics STLink Virtual COM Port (COM81) Portable Serial Device (COM93) To Processors So Dott adapters Software Components Software devices Software devices Software devices Software devices Software devices Software devices Software Serial Bus controllers Software Serial Bus controllers Vinversal Serial Bus controllers Vinversal Serial Bus controllers Vinversal Serial Bus controllers 	> 🕎 Network adapters		
 ♥ Ports (COM & LPT) ♥ Striktorelectronics STLink Virtual COM Port (COM81) ♥ USB Serial Device (COM93) > ▷ Print gueues ♥ Print gueues ♥ Software components > ♥ Software components > ♥ Software devices > ♥ Software devices 	> Portable Devices		
# STMiccelectronics STLink Virtual COM Port (COM81) #U USB Serial Device (COM83) > Thrift queues Print queues So host adapters So host adapters So host adapters Software components Software devices Software devices Software devices Vinversal Serial Bus controllers Vi Universal Serial Bus controllers Vinversal Serial Bus controllers	V 💭 Ports (COM & LPT)		
	STMicroelectronics STLink Virtual COM Port (COM81)		
 > Print queues > Print cueues > Processors > So host adapters > Software components > Software controllers > Software devices > Universal Serial Bus controllers > Universal Serial Bus controllers > Universal Serial Bus controllers 	USB Serial Device (COM93)		
 > ■ Processors > ■ So host adapters > ■ So basic adapters > ■ Software components > ■ Software devices > ■ Software devices > ■ Software devices > ■ Software devices > ■ Software sontrollers > ■ Software sontrollers > ■ Software Serial Bus devices 	> 🖻 Print queues		
> ■ S0 host adapters > ■ Software components > ■ Software devices > ↓ Software devices > ↓ Sound, video and game controllers > ↓ Sound, video and game controllers > ↓ Software devices > ↓ Universal Serial Bus controllers > ↓ Universal Serial Bus controllers > ↓ Universal Serial Bus controllers	> Processors		
 ¶ Security devices ¶ Software devices Software devices Quart devices Quart devices Software devices Quart devices Software devices Software devices Quart devices System devices Viniversal Serial Bus devices	> SD host adapters		
>	Security devices		
> II Software devices > II Software devices > Seg Storage controllers > III Software devices > III Universal Serial Bus controllers > III Universal Serial Bus controllers > IIII Universal Serial Bus controllers	> Software components		
> щ Sound, video and game controllers > ∰ Songe controllers > ∰ System devices > ♥ Universal Serial Bus devices	Software devices		
> Say Storage controllers > Tim System devices > ♥ Universal Serial Bus controllers > ♥ Universal Serial Bus devices	Sound, video and game controllers		
>	> Storage controllers		
Vinversal Serial Bus controllers Vinversal Serial Bus devices	> E System devices		
> Universal Serial Bus devices	Universal Serial Bus controllers		
	> Universal Serial Bus devices		

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 <u>https://www.avalanche-technology.com/support/development-kits/</u>
 - 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" \rightarrow "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.

📕 STM32 ST-LII	NK Utility							_		×
ile Edit Viev	v Target ST-L	INK External	Loader Help							
a 🖬 👙	r 🕼 🥠 🧊	š 🙆 🔜								
Memory display						Device	STM32F74x/F75x			
Address: 0x0	8000000	0/676/	Data WA	dthu 22 hite		Device ID	0x449			
Address. Loto	3000000 - 34	0.070	Data Wi	001. 02010	<u> </u>	Revision ID	Rev Z			
Device Memory @	: 0x0800000 :	Rinary File				Flash size	1MBytes			
arget memory, A	ddress range: [0x	08000000 0x080	0676C]						Lineo	Juan
Address	0	4	8	С	ASCII					
0x08000000	200025E8	080001DD	08002197	08001F79	è%. 1	−Iy				-
0x08000010	08002195	080004DB	080042CD	00000000	•1Û	íв				
0x08000020	00000000	00000000	00000000	08002555		U %				
0x08000030	08000651	00000000	08002323	08002557	Q	##W%				
0x08000040	080001F7	080001F7	080001F7	080001F7	÷÷	++				
Dx08000050	080001F7	080001F7	080001F7	080001F7	++	++				
Dx08000060	080001F7	080001F7	080001F7	080001F7	++	++				
0x08000070	080001F7	080001F7	080001F7	080001F7	++	++				
0x0800080	080001F7	080001F7	080001F7	080001F7	· •					-
<	-									>
3.09.29 . 140 31*	LINK DELECTED									
5:12:01:51-LIN 5:12:01:V2J290	418	0400077070030	32							- 1
5:12:01 : Conne	cted via SWD.	u+								
5:12:01 : Conne	ction mode : Norm	al.								
5:12:01 : Debug 5:12:02 : Device	in Low Power mod ID:0x449	le enabled.								
5:12:02 : Device	flash Size : 1MBy	tes								
.5:12:02 : Device	ramily :STM32F74	0X/F-75X								- 1
alara in Law Daw	er mede en ekied		Davies ID:00	140			Core Sheke a Line Undake Dis	to be and		-

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" \rightarrow "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 (<u>https://www.avalanche-technology.com/support/development-kits/</u>). 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
 - o y: automated test
 - n: user selected option test
- Test_selection = c
 - o a: x16 Write
 - o b: x16 Read
 - o c: x16 Write-Read Compare
 - o d: x16 Read Compare
 - o 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-andrunning. The Terminal Monitor window will display the main menu for tests available on the Avalanche P-SRAM device as indicated below:

onnecting to default comport mentioned in config.txt DM16 : Connected					
Avalanche Technology ST Nucleo P	-SRAM Parallel 45ns 3V Test Program V7.0.0 (0-36.5-9)				
Fest Menu a. x16 Write b. x16 Read c. x16 Write-Read Compare d. x16 Read Compare <. Exit					
Selection ? c					
Enter Starting Address (Default: Enter Number of words (Default:25 Data Pattern type??: 1) All Zeros 2) All Ones 3) 0xAA, 0x55 4) 0xFF, 0x00	0x00 - multiple of 256):0x00 56 - multiple of 256):0x100000 10) All 0xAA 11) All 0x55 12) 0x55, 0xAA 13) 0x00, 0xFF				
5) Shifting One Left 6) Shifting Zero Left 7) Incrementing Sequence 8) Decrementing Sequence 9) Random	14) Shifting One Right 15) Shifting Zero Right 16) 0x0F, 0xF0 17) 0xF0, 0x0F				
(Default: 7):					

Figure 8: Test Menu



Appendix A

AS3xx31635nxxEVAL - Schematic









Appendix B

AS3xx31635nxxEVAL – BOM

Qty	Value	Part
7	ТР	+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	2К	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	2К	R12
2	0	R13, R16
1	105K, 1%	R14