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## DS28C16 Evaluation Kit

Evaluates: DS28C16 and DS2477

### General Description

The DS28C16 evaluation kit (EV kit) provides the hardware and software necessary to exercise the features of the DS28C16. The EV system consists of five DS28C16 and DS2477 devices in an 8- and 6-pin TDFN package, respectively, a DS9121DQ+ and DS9121BQ+ evaluation TDFN socket board, and a DS9481P-300# USB-to-I<sup>2</sup>C/1-Wire® adapter. The evaluation software runs under Windows® 10, Windows 8, and Windows 7 operating systems, both 64-bit and 32-bit versions. It provides a handy user interface to exercise the features of the DS28C16.

### Features

- Demonstrates the Features of the DS28C16 DeepCover® SHA-3 I<sup>2</sup>C Authenticator
- Logs I<sup>2</sup>C Communication to Aid Firmware Designer's Understanding of the DS28C16
- 1-Wire/I<sup>2</sup>C USB Adapter Creates a Virtual COM Port on Any PC
- Fully Compliant with USB Specification v2.0
- Software Runs on Windows 10, Windows 8, and Windows 7
- Convenient On-Board Test Points and TDFN Socket

### EV Kit Contents

QTY	DESCRIPTION
5	DS28C16 DeepCover SHA-3 I <sup>2</sup> C Authenticator (8-pin TDFN)
5	DS2477Q+ DeepCover SHA-3 Coprocessor (6-pin TDFN)
1	DS9121BQ+ Socket Board (6-pin TDFN)
1	DS9121DQ+ Socket Board (8-pin TDFN)
1	DS9481P-300# USB to 1-Wire/I <sup>2</sup> C Adapter
1	USB Type-A to Micro-USB Type-B Cable

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1-Wire and DeepCover are registered trademarks of Maxim Integrated Products, Inc.

### Quick Start

#### Required Equipment

This section includes a list of recommended equipment and instructions on how to set up the Windows-based PC for the evaluation software.

- DS9481P-300# USB to 1-Wire/I<sup>2</sup>C adapter (included)
- DS9121BQ+ TDFN socket board (included)
- DS9121DQ+ TDFN socket board (included)
- DS28C16Q+ (five included)
- DS2477Q+ (five included)
- USB Type A to Micro-USB Type B cable (included)
- PC with a Windows 10, Windows 8, or Windows 7 operating system (64 bit or 32 bit) and a spare USB 2.0 or higher port
- Download DS28C16 Evaluation Kit Light Version software or request full DS28C16 Evaluation Kit software.

Ordering Information appears at end of data sheet.

## Procedure

The following steps were performed on a Windows 10 PC to set up the DS28C16 EV kit hardware/software:

- 1) Obtain the [DS28C16 Evaluation Kit Setup V1.0.exe](#) file or the latest version.
- 2) In a file viewer double click on [DS28C16 Evaluation Kit Setup V1.0.exe](#) to begin the installation.
- 3) Complete all steps of the interactive installation wizard. The software opens by default when the installation is complete.
- 4) Open the DS9121DQ+ socket, insert a DS28C16 into the cavity per the same orientation shown in [Figure 1](#), and close the burn-in socket.
- 5) Connect the DS9121DQ+ to the DS9481P-300# per [Figure 2](#).
- 6) Open the DS9121BQ+ socket, insert a DS2477 into the cavity per the same orientation shown in [Figure 1](#), and close the burn-in socket.
- 7) Configure the second DS9121BQ+ socket board for DS2477 by setting jumpers JB1, JB3, and JB4 per [Figure 3](#).
- 8) For select flows in the software that use the DS2477 coprocessor, connect both DS9121DQ+ and DS9121BQ+ boards to the DS9481P-300# as shown in [Figure 3](#). For all other flow, connect only the DS9121DQ+ board containing a DS28C16 to the DS9481P-300# as shown in [Figure 2](#).
- 9) Connect the DS9481P-300# to the PC using a USB Type-A to Micro-USB Type-B cable.
- 10) Select a flow from the top-left panel in the program and click on the **Run** button to start the demo as shown in [Figure 4](#). More information about the available flows is available in [Table 1](#).

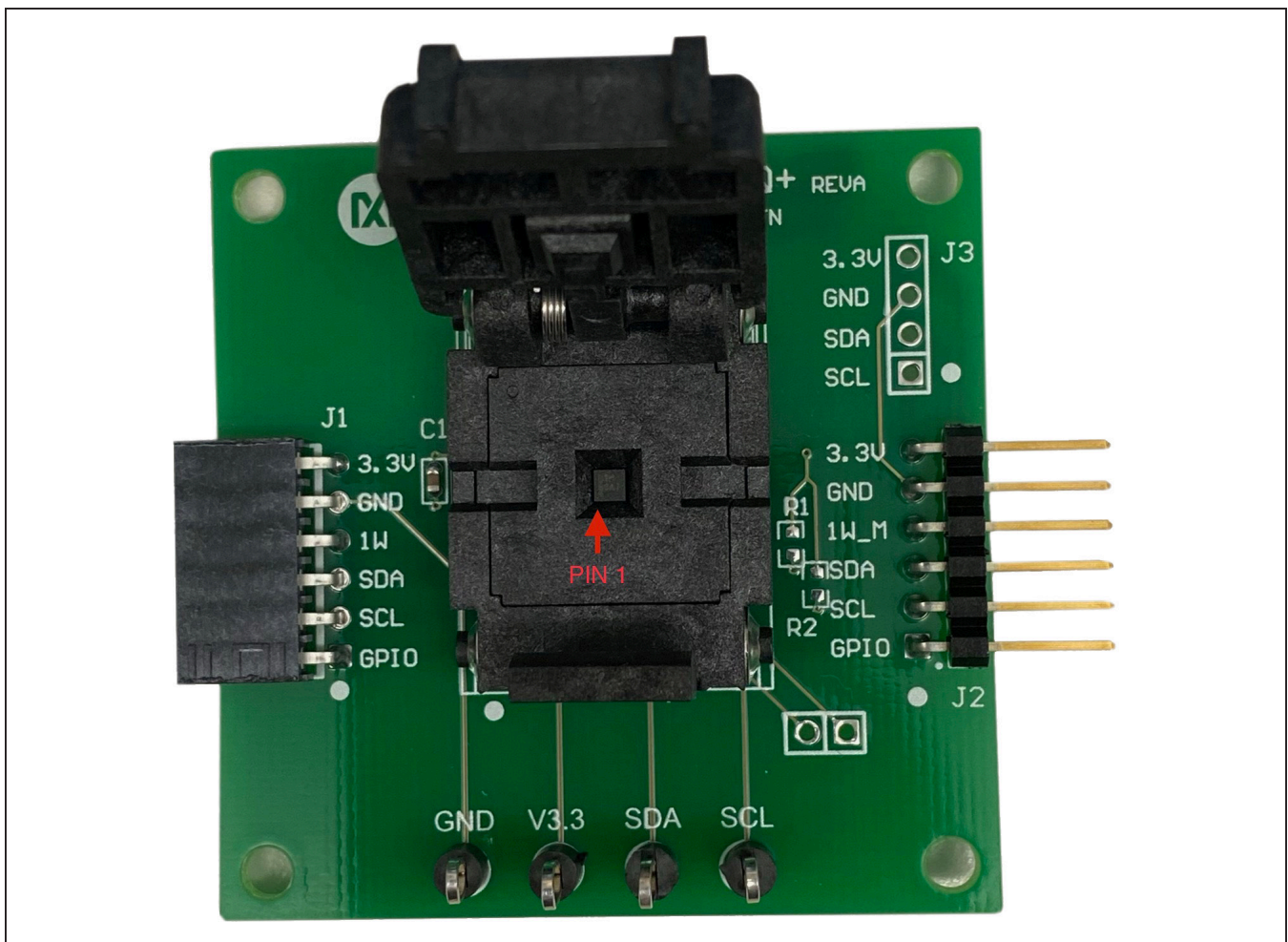


Figure 1. Orientation in Burn-In Socket

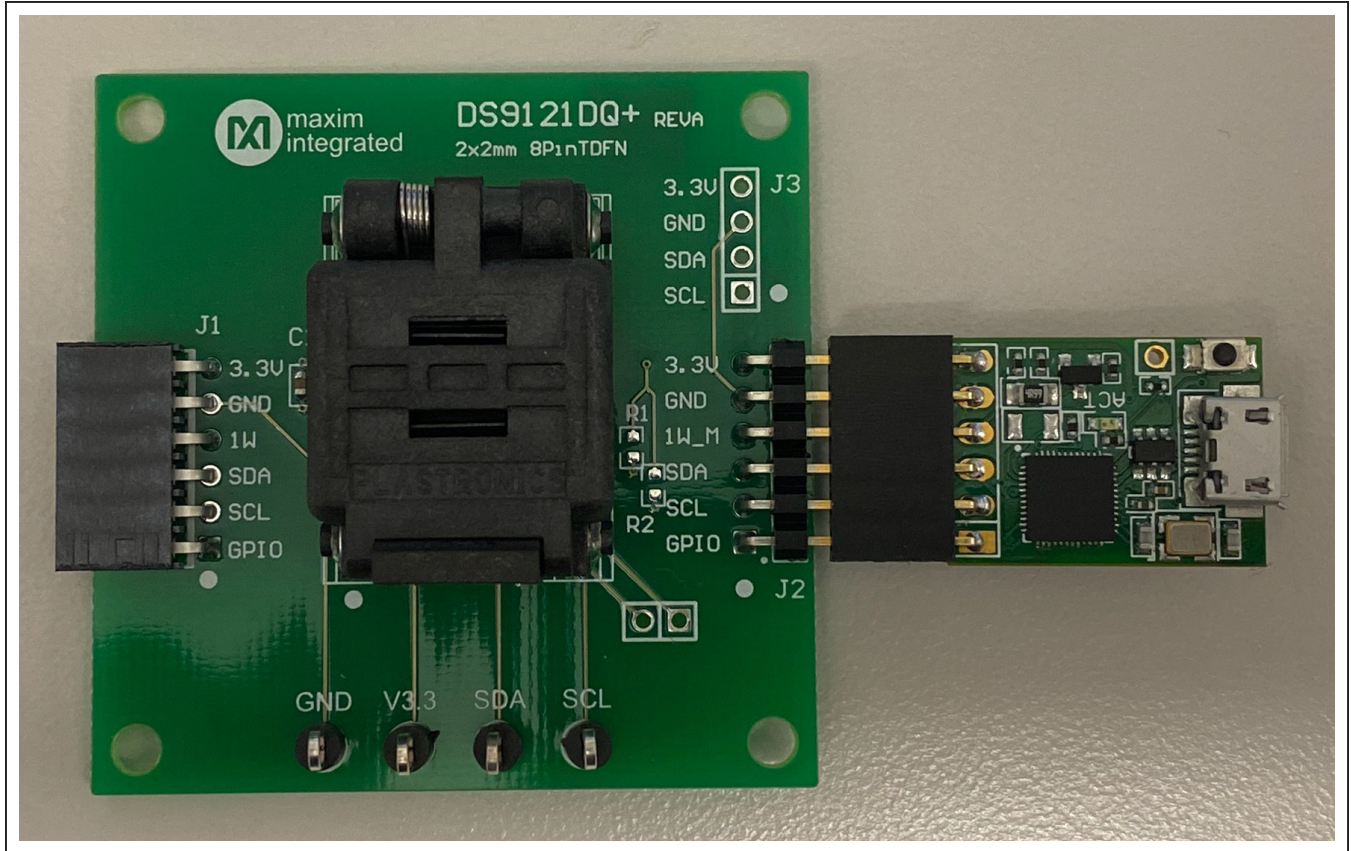


Figure 2. DS28C16 Connected to DS9481P-300#

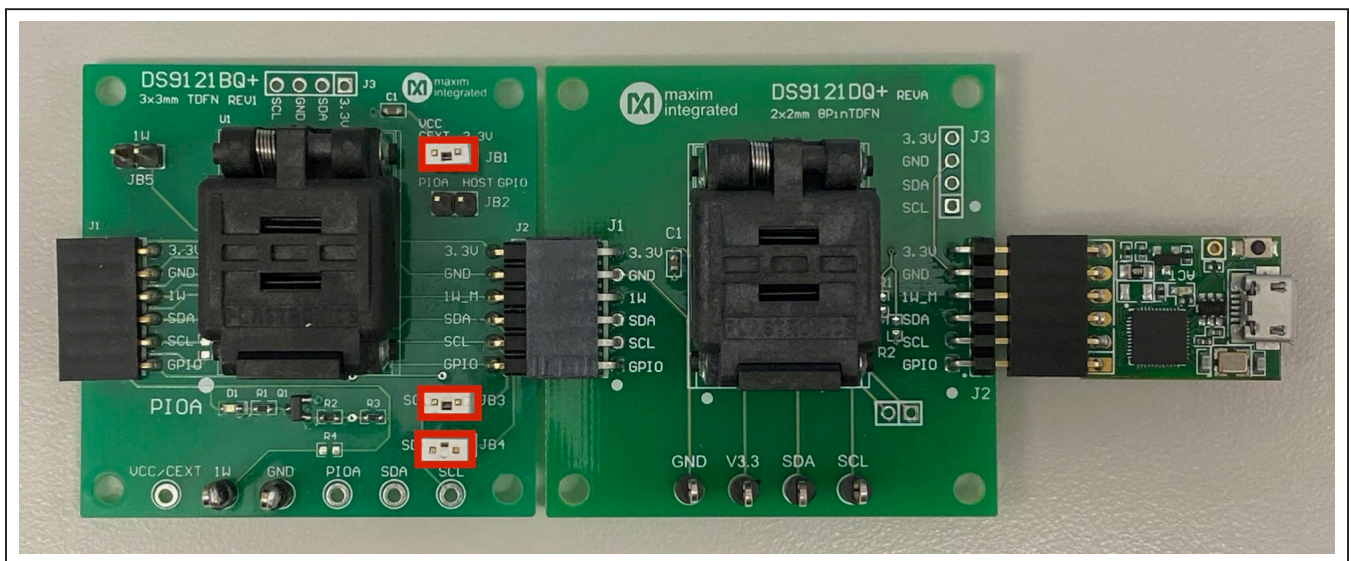


Figure 3. DS2477 Connected to DS9481P-300# and DS28C16

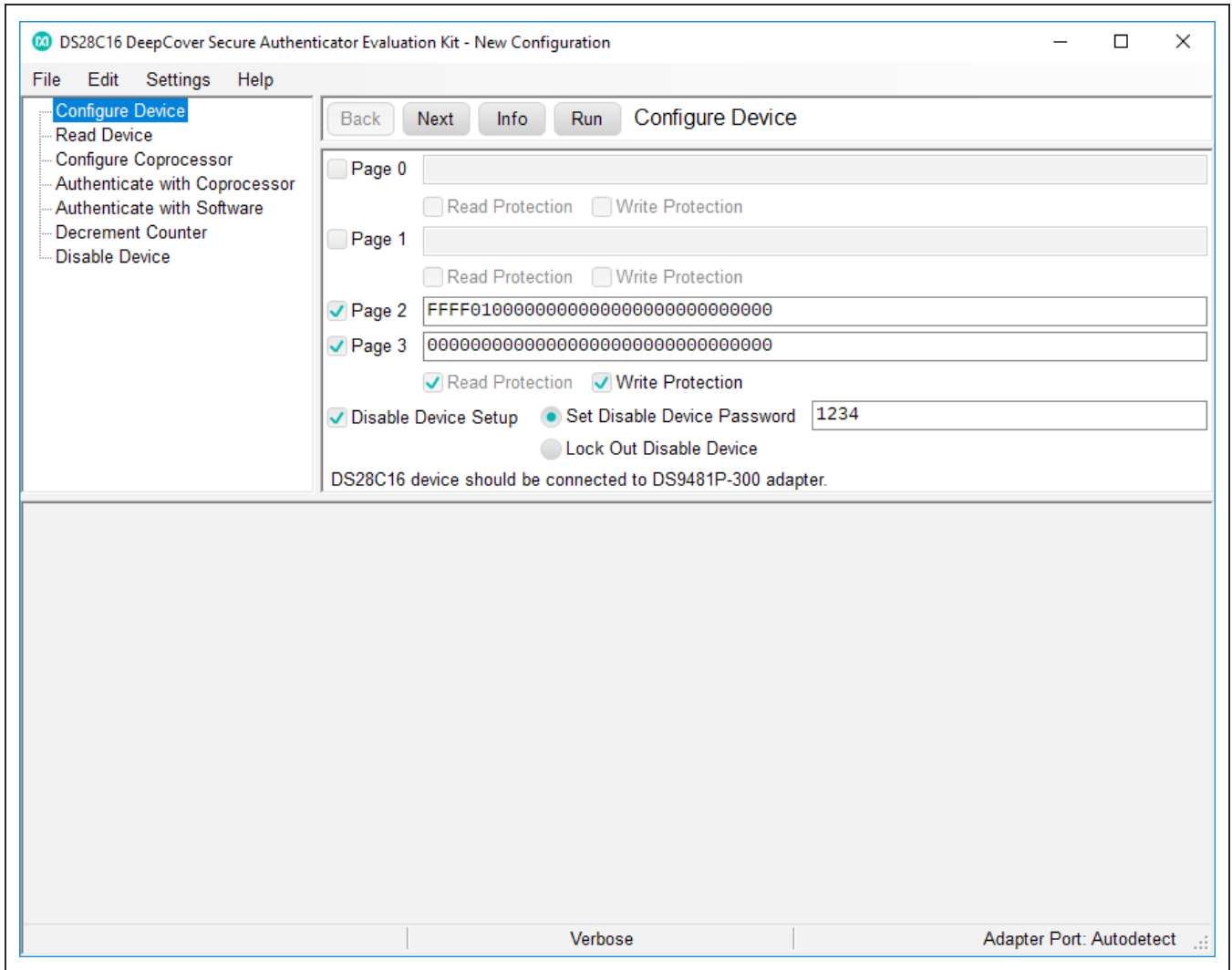


Figure 4. Main Program Screen

**Table 1. Program Flows**

FLOW	DESCRIPTION
Configure Device	Configure DS28C16 memory page data, memory page protections, and disable device setup.
Read Device	Read all available information from the device including memory page data, memory page protections, MAN ID, and device version.
Configure Coprocessor	Configure DS2477 coprocessor with Master Secret for the <b>Authenticate with Coprocessor</b> flow.
Authenticate with Coprocessor	Authenticate DS28C16 with DS2477 coprocessor used for cryptographic and I <sup>2</sup> C operations.
Authenticate with Software	Authenticate DS28C16 with software used for cryptographic operations.
Decrement Counter	Decrement the DS28C16 counter. Page 2 must have been set in the <b>Configure Device</b> flow.
Disable Device	Permanently disable DS28C16 device. The disable device password must have been set in the <b>Configure Device</b> flow.

**Table 2. I<sup>2</sup>C Communication Legend**

NOTATION	DETAILS
HH	Written byte
[HH]	Read byte
S	Start condition
P	Stop condition
<DELAYn>	Delay for n milliseconds

**Ordering Information**

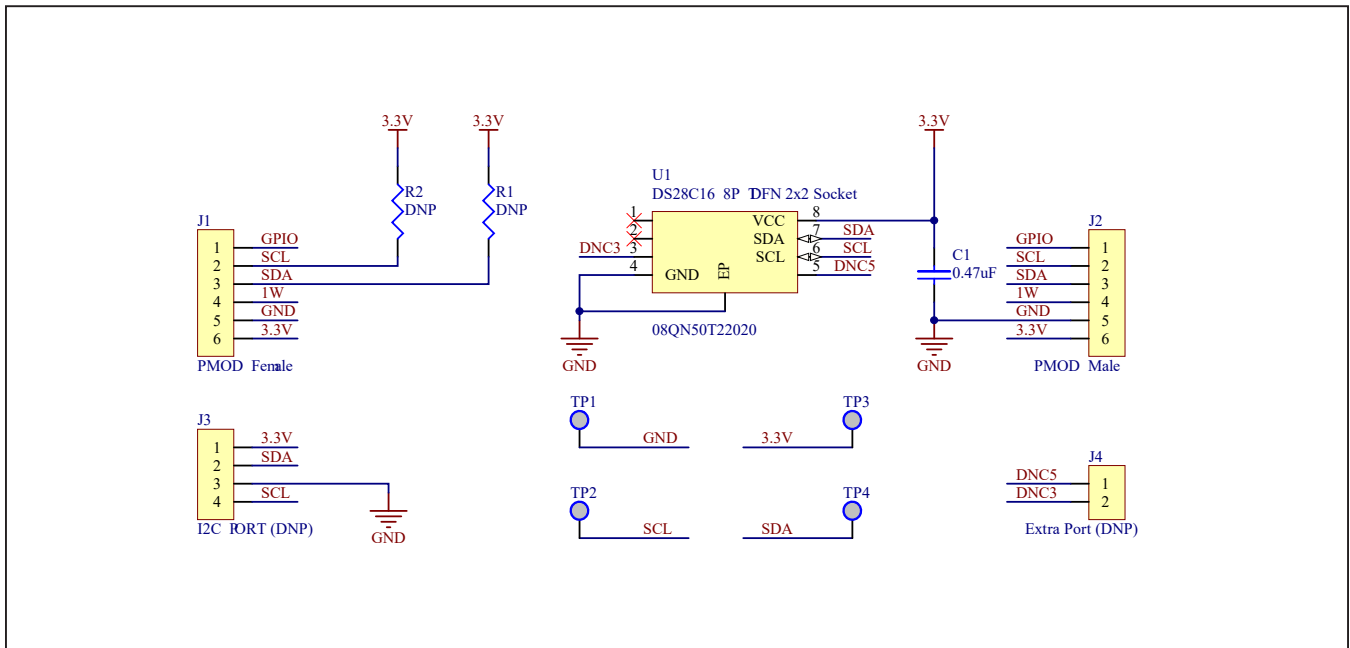
PART	TYPE
DS28C16EVKIT#	EV Kit

#Denotes RoHS compliance.

### DS28C16 EV Kit Bill of Materials

COMMENT	DESCRIPTION	DESIGNATOR	PART NUMBER	QUANTITY	MANUFACTURE NAME
DS28C16 8P TDFN 2x2 Socket	DS28C16 8P TDFN 2x2 Socket	U1	08QN50T22020	1	Plastronics
0.47uF	CAP+,0.47uF,10%,16V,X7R,0603	C1	C0603C474K4RACTU	1	KEMET CORPORATION
PMOD Input	CONN RCPT .100" 6POS R/A SGL SN	J1	SSW-106-02-T-S-RA	1	Samtec Inc.
PMOD Output	CONN HEADER 6POS .1" GOLD	J2	TSW-150-08-G-S-RA	1	Samtec
I2C PORT (DNP)	CONN RCPT 4POS 0.1 TIN PCB R/A	J3	SSQ-104-02-T-S-RA	1	Samtec
Extra Port (DNP)	CONN HEADER VERT 2POS 2.54MM	J4	PEC02SAAN	1	Sullins Connector Solutions
DNP	RES SMD 10K OHM 1% 1/10W 0603	R1, R2	ERJ-3EKF1002V	2	Panasonic Electronic Components

### DS28C16 EV Kit Schematic



## Revision History

REVISION NUMBER	REVISION DATE	DESCRIPTION	PAGES CHANGED
0	4/20	Initial release	—

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