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# AZD026 – Azoteq USB-dongles Overview

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## 1 Azoteq USB-dongle usage

The Azoteq USB-dongles available for commercial use are listed in Table 1.1. The dongles are connected to a computer via a mini-USB (micro-USB for CT210A) cable and are used:

**(Please Note: Use with USB data cable only)**

- As an interface to program OTP<sup>1</sup> bits which is available on certain ICs (to customize an IC for a certain design), see tables Table 2.1 and Table 2.2 for pin assignment or
- to perform serial communication between computer and IC via
  - 1-wire Communication Protocol see Table 3.1,
  - SPI see Table 3.2,
  - I<sup>2</sup>C see Table 3.3,
- Flash programming, Table 4.1
- Boot loader programming, Table 5.1

Azoteq provides software used for programming OTP bits. This software is known as USBProg and is intended for prototyping purposes. More information regarding USBProg can be found in application note AZD007.

Azoteq provides software used for the serial streaming of data to a computer utilising the Azoteq USB-dongles. Each IC has its own dedicated software and is intended for prototyping purposes and can be found on the Azoteq website under Software and Tools.

Table 1.1 Azoteq USB-dongles

Azoteq dongle	Description	Device Supported	Data Streaming	Programming	Boot loading
CT210A	4 <sup>th</sup> Generation programmer and data streamer	ALL	✓	✓	✓
CT210	3 <sup>rd</sup> Generation programmer and data streamer	ALL	✓	✓	✓
DS100	Data Streaming Dongle	ALL	✓	✗	✓

<sup>1</sup> One Time Programmable bit – Every bit is only programmable once



## Azoteq USB-dongle pin-layout

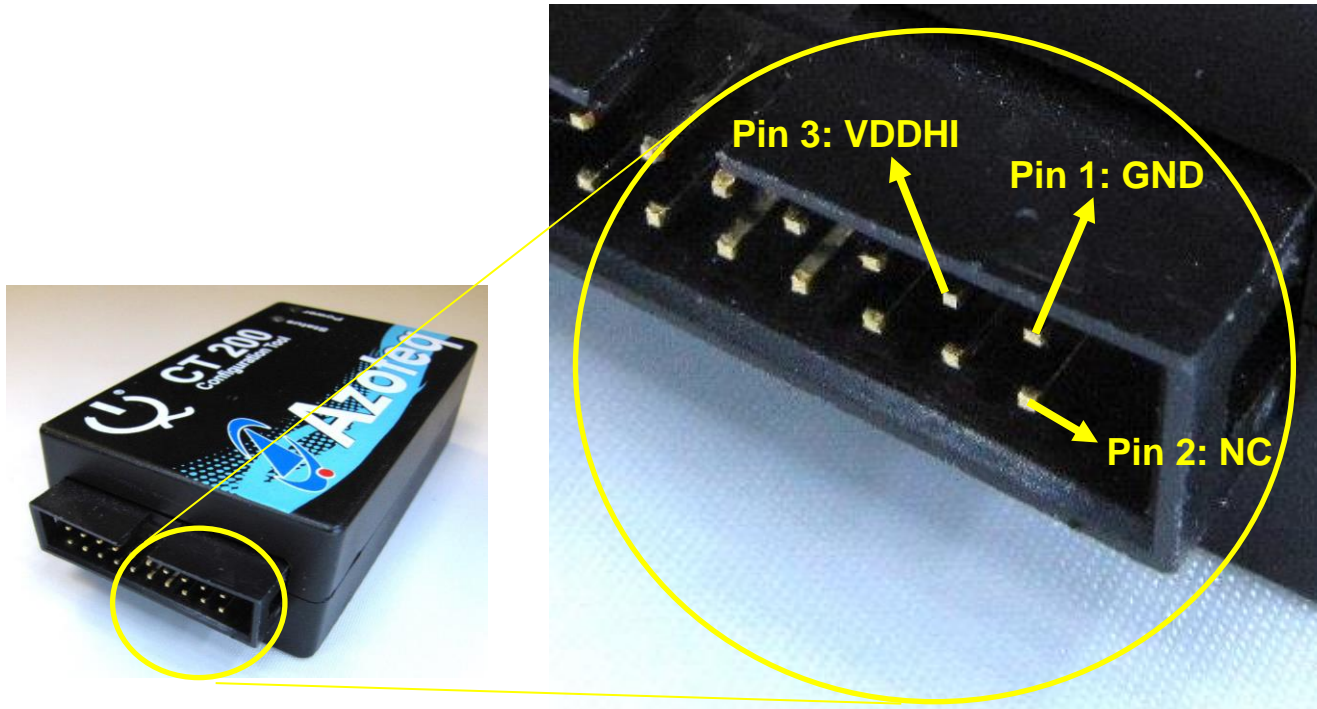


Figure 1.2 Pin layout

## 2 Connecting USB-dongle for Programming

Table 2.1 Azoteq USB-dongle pin assignment for programming IC's

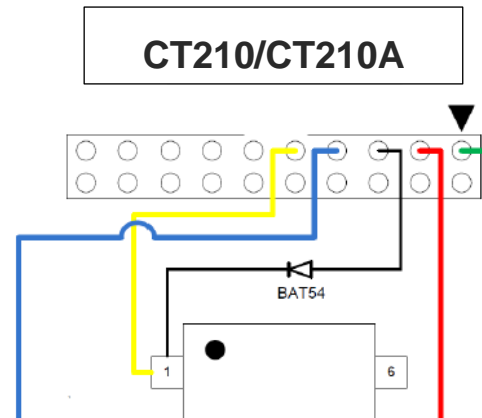
CT pin #	IQS127/ IQS128	IQS133	IQS232	IQS213A/IQS263/ IQS266	IQS333/ IQS360(A)	IQS62x/IQS680
1	V <sub>SS</sub>	V <sub>SS</sub>	V <sub>SS</sub>	V <sub>SS</sub>	V <sub>SS</sub>	V <sub>SS</sub>
2						
3	V <sub>DDHI</sub>	V <sub>DDHI</sub>	V <sub>DDHI</sub>	V <sub>DDHI</sub>	V <sub>DDHI</sub>	V <sub>DDHI</sub>
4						
5	SHLD/POUT		POUT/RF&RDY	RDY	PWM3	LTX/LED0/OUTPUT
6	CX					
7		TO0/DATA	TO0/SDA	SDA	SDA	SDA
8						
9		TO1	TO1/SCL	SCL	SCL	SCL
10						

Only devices with OTP bits are shown



**Table 2.2 Azoteq USB-dongle pin assignment for programming with special connection**

CT pin #	IQS227AS/IQS228AS IQS211(A)/IQS231(A)
1	$V_{SS}$
2	
3	$V_{DDHI}$
4	
5	IO1 / SCL (diode required – see picture)
6	
7	IO2 / SDA
8	
9	IO1 / SCL
10	



**Table 2.3 Azoteq USB-dongle pin assignment for programming IQS333 OTP using Azoteq USBProg**

CT pin #	IQS333
1	$V_{SS}$
2	
3	$V_{DDHI}$
4	
5	PWM3
6	
7	SDA
8	
9	SCL
10	RDY

Note: Insure that  $V_{DDHI}$  and  $V_{REG}$  capacitors are connected as specified by the relevant datasheet for all programming.



### 3 Connecting USB-dongle for Serial Communication

Please refer to the data sheet and communication interface of the specific device for information regarding the communication protocol supported.

#### 3.1 1-wire protocol

Table 3.1 Azoteq USB-dongle pin assignment for 1-wire protocol

USB-dongle pin #	Azoteq 1-wire device
1	$V_{SS}$
2	
3 <sup>2</sup>	$V_{DDHI}$
4	
...	
9	
10	DATA

#### 3.2 SPI

Table 3.2 Azoteq USB-dongle pin assignment for SPI

USB-dongle pin #	Azoteq SPI Device
1	$V_{SS}$
2	
3	$V_{DDHI}$
4	
5	
6	MOSI
7	SOMI
8	RDY
9	SCK
10	/SS

<sup>2</sup> VDDHI can be supplied by an external source, please ensure the same voltage levels as USB-dongle are followed



### 3.3 I<sup>2</sup>C

Table 3.3 Azoteq USB-dongle pin assignment for I<sup>2</sup>C

USB-dongle pin #	Azoteq I <sup>2</sup> C Device
1	V <sub>SS</sub>
2	
3	V <sub>DDHI</sub>
4	
5	
6	
7	I2C SDA
8	
9	I2C SCL
10	RDY



## 4 Flash Programming (CT210/CT210A)

The CT210/CT210A supports a programming protocol used to program certain flash MCUs (e.g. IQS550, IQS572, IQS525). The software used for this purpose is Azoteq Flash Programmer. The pinout to perform flash programming can be seen in Table 4.1.

Table 4.1 **Azoteq USB-dongle pin assignment for Flash Programming**

CT pin #	Flash MCU
1	V <sub>SS</sub>
2	
3	V <sub>DDHI</sub>
..	
..	
..	
17	RESET
18	DATA
19	
20	

## 5 Boot loader Programming (CT210/CT210A/DS100)

The CT210/CT210A/DS100 also support programming via a boot loader on chip for the IQS550, IQS572 and IQS525 ICs. The software used for this purpose is Azoteq Flash Programmer. The pinout to perform flash programming can be seen in Table 5.1.

Table 5.1 **Azoteq USB-dongle pin assignment for Boot loader Programming**

USB-dongle pin #	Azoteq I <sup>2</sup> C Device
1	V <sub>SS</sub>
2	
3	V <sub>DDHI</sub>
4	
5	
6	
7	I2C SDA
8	
9	I2C SCL
10	



## 6 Revision history

Version	Release date	Change Notes
0.05	March 2011	Initial release
0.06	May 2012	Updated list of supported Azoteq USB dongles Added 2-series ICs (232/233/242/252) Consolidated 1-wire protocol Added CT220/CT210 Flash Programming pin connections
0.07	November 2015	Reformatted document to the latest Azoteq template Updated to reflect the current state of the CT210 and what devices are not supported anymore.  Added programming with special connections for the IQS227AS, IQS228AS, IQS211, IQS231  Added I2C Boot loader programming pin out connections, section 5
0.08	April 2017	Added CT210A
0.09	August 2017	Added IQS333 I2C OTP
0.10	November 2017	Added: Use with USB data cable only Removed EOL items






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Please visit [www.azoteq.com](http://www.azoteq.com) for a list of distributors and worldwide representation.

The following patents relate to the device or usage of the device: US 6,249,089; US 6,952,084; US 6,984,900; US 7,084,526; US 7,084,531; US 8,395,395; US 8,531,120; US 8,659,306; US 8,823,273; US 9,209,803; US 9,360,510; EP 2,351,220; EP 2,559,164; EP 2,656,189; HK 1,156,120; HK 1,157,080; SA 2001/2151; SA 2006/05363; SA 2014/01541; SA 2015/023634

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