Cevelon systems

Technology

A212CU, A213CU
32-bit ALU

Features

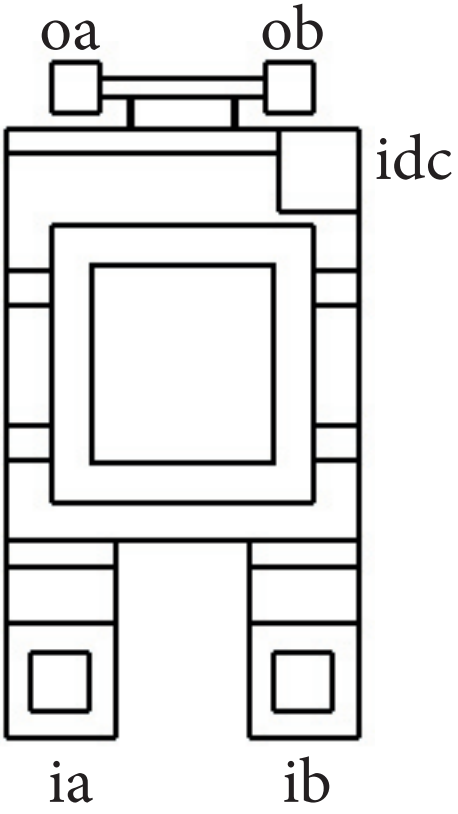
- Support for up to 2^{16} connected channels
- Capability to perform operations across busses
- High reliability even during undervoltage
- 16 ms switching speed

Technical description

The A21xxx series consists of several ALU units. These units are capable of simple integer operations. Operations can be performed on values provided by the input bus or internal constants. The units have two bus inputs that allow operations to be performed across busses without the need of merging the buses. If several buses are provided, duplicate channels will be merged by summation.

The A212CU can perform addition, subtraction, division and multiplication. These operations can be performed on singular values or on all channels.

A213CU performs operations based on the value in the status register. This allows the unit to be used to determine if a value is smaller, greater or equal to another. The unit can operate based on the channel sum or if a single channel fulfills the criteria.



ia	Bus input A
ib	Bus input B
oa	Bus output A
ob	Bus output C
idc	Operation indicator light

General specifications

Power supply

Symbol	Description	typ	min	max	Unit
Pw	Power consumtion	997	997	998	W
Vr	Working voltage range	-	10	100	%
Ci	Internal backup capacitor(note 1)	1	-	-	kJ

(note 1) The capacitor can power the unit very briefly during power cut, but should not be relied upon.

Controller

Symbol	Description	Value	Unit
Mi	Bus channel value range	± 4294967296	-
Sw	Time per operation	16.66	ms

STA12 bus specifications

Bus channels & merging

The STA12 serial i/o bus is used for communication between units of the A2xxxx series. The bus protocol allows for a maximum of 65536 independent values to be used at one time. Each indepentent value is assigned a unique id and is refered to as a channel.

Bus merging occurs when several buses connected to a single bus or unit. The resulting, merged bus will have each channel contain the sum of the duplicate channels of the same id.

Note that if the value of a channel is not set, the value of the channel will be treated as zero.

Name	Description
Everything	The sum of all channels.
Anything	Will result in true if any channel fulfills the criteria given.
Each	Performs the same operation on all channels individually, the results vill be stored in the channel they where performed respectively. Setting Each as output allows the full bus to be outputted.

Bus A		Bus B		Merged b.	
A	B	A	B	A	B
-	12	10	-	10	12
-9	9	10	-10	1	-1
2^{32}	-	100	-	2^{32}	-
-2^{32}	-	-100	-	-2^{32}	-

Meta channels

Meta channels are not transfered over the bus, but are instead calculated based upon the bus inputs of a unit.

These channels allow units to perform operations on all channels, such as using the sum of all values or performing the same operation on all channels.

Available meta channels include Everyting, Anything and Each.

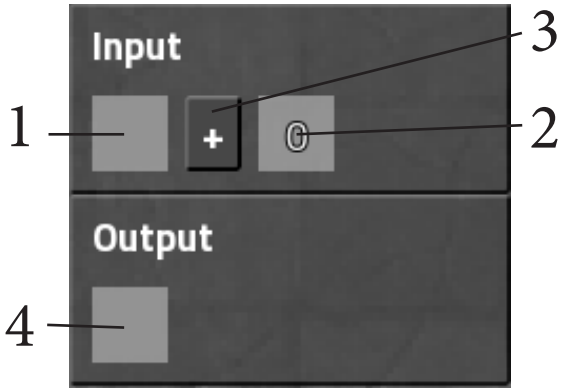
A212CU unit

Capabilities

The A212CU is capeable of performing signed integer addition, subtraction, multiplication and division. The unit also has access to the meta channel Each.

The unit does not accept numbers greater than 2^{32} or less than -2^{32}. If a number outside of this range is produced, it will be rounded nearest available number.

In case a invalid operation is performed, such as division by zero, the unit will simply give the result as zero.



#	Description
1	Input channel A
2	Input channel B
3	Operation
4	Output channel

Interface & usage

The user interface of the A212CU consists of two channels used as inputs and a single channel used as a output. The input is connected to the two bus ports on the slanted side of the unit.

Be aware that these inputs may carry several values and that the sum of each channel pair will be used in the unit.

What operation to be performed can be set using the associated button (#3). The operation will be performed in the order shown on the panel. For instance, if the leftmost channel (#1) is set to A and the remaining input (#2) is set to 2. The operation will be performed as
A [operation] 2 .

If the leftmost input channel (#1) is set to Each, the operations will be performed individually on each channel. The operations are run on all channels, where Each is replaced with the value of the given channel and the result is outputted as the associated channel.

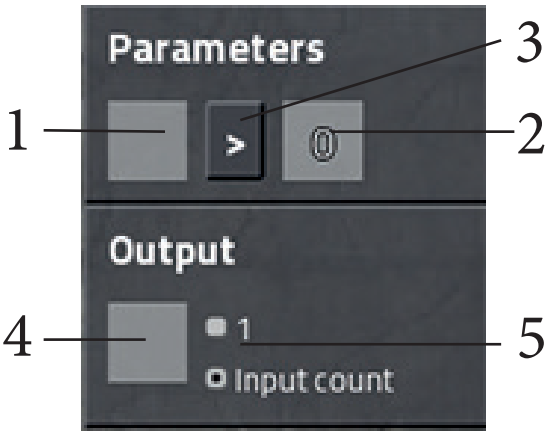
Note that the output must be set to Each in order to output multiple channels. Otherwise the channel sum will be used.

A213CU unit

Capabilities

The A213CU performs comparisons on its input and outputs based on if the condtion is true. Comparisons the unit is capable of performing are more than, less than and equals.

Available meta channels are Everything , Anything and Each



#	Description
1	Input channel A
2	Input channel B
3	Comparison operation
4	Output channel
5	Value to output

Interface & usage

The unit takes two values provided by the bus inputs on the slanted side and compares them. If the given condition is true, the unit will then emit a value based on what is provided by the radio buttons (#5). Available output modes are either output 1 (”1”) or the value of the rightmost (#1) input. (”Input count”)

The values that are used as inputs can be sected by the the light gray fields located at the top of the panel (#1,#2). Available values are based upon a channel (henceforth refered to channels) that is created by taking the sum of channels with the same id.

Along with channel values and constants, the unit is capeable of performing operations on meta channels. These channels have the ids Everything , Anything and Each and allows operations on all channels.

The Everything channel represents the sum of all channels in the inputted buses. This channel can not be used as output.

If a operation is run with Anything in as a operator, the operation will be run on each channel with the value of the channel being in place of the Anything operator. The condtion will result as true if any of the provided channels fulfill this condition. Not usable as output.

The Each operator acts on all channels, simlilar to Anything . The operator will merge all the results into a internal result bus, that may be outputted if the output is given as Each. If the output is not set to Each, it will be given as the sum of all channels of the result bus.