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BRIEF DESCRIPTION

These instructions are aimed to help users define a BiSS XML file.

The function of the XML file is to automatically allocate device characteristics using the BiSS identifier.

The XML file for BiSS encoders can be used for BiSS B and BiSS C protocols. It can also be applied for all BiSS slaves. It can be used independently and also as a supplement to the BiSS profiles. The XML file can include EDS information which the BiSS device itself cannot contain (e.g. BiSS B devices, BiSS devices that have no EEPROM/FLASH memory).

BiSS Identifier
The BiSS identifier is divided into two sections:

- Device ID(address 0x78. . . 0x7D)
- Manufacturer ID(address 0x7E. . . 0x7F)

The XML file specific to the manufacturer is selected using the manufacturer ID (2 bytes). Each manufacturer ID is assigned to one manufacturer. Each BiSS device manufacturer thus only generates one single XML file for all BiSS products that use the BiSS identifier. This file should thus be suitably structured so that the size of the file is compact yet has enough capacity for future products. Manufacturer IDs are supplied by iC-Haus free of charge to BiSS device manufacturers.

The Device ID (6 bytes) acts as a key with which information is extracted from the XML file. A completely individual key could be created for each individual product configuration in the XML file. The disadvantage of this type of data generation is, however, that the amount of data or number of entries grows in line with the variety of products.

The manufacturer and device IDs are stored in non-volatile memories, such as PROMs or EEPROMs, by the device manufacturer. BiSS slave devices use the manufacturer and device IDs generated by the semiconductor manufacturer as long as the device is not programmed.

The BiSS identifier differentiates between a product type that is both physically and parametrically distinguishable. The BiSS identifier does not replace a serial number.

A more beneficial approach would be to split the device ID into the various distinctive features of the BiSS products:

Product-specific features

- Device class
- Device subclass
- Device revision
- . . .

BiSS interface-specific features

- BiSS protocol sensor data
- BiSS protocol register data
- Encoder data length
- Check sum length
- Timeout configuration
- . . .

XML file structure
The structure of the XML file is specific to the customer and can be freely selected; this document thus only includes suggestions. The contents of the XML file are also customized and can be selected at will. The layout of a manufacturer XML file should take the following attributes into account:

- Maintenance of the DTD (Data Type Definition)
- Depiction of all products with the BiSS interface by one manufacturer
- No repetition of identical features
- Grouping of products
- Compact file size
- Reproduction of information important for the BiSS interface

iC-BLS DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-BLS BiSS identifier (BiSS Line, content is managed by the sensor sided host)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 1: Register layout

The sensor sided host manages the complete content of any register access to this BiSS Line slave including BiSS ID.

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-BLS BiSS identifier (BiSS Line, content is managed by the sensor sided BiSS C device)								
0x78	See BiSS C Device ID							
0x79	See BiSS C Device ID							
0x7A	See BiSS C Device ID							
0x7B	See BiSS C Device ID							
0x7C	See BiSS C Device ID							
0x7D	See BiSS C Device ID							
0x7E	See BiSS C Manufacturer ID							
0x7F	See BiSS C Manufacturer ID							

Table 2: Register layout

The sensor sided BiSS C slave manages the complete content of any register access to this BiSS Line slave including BiSS ID.

iC-LG DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-LG BiSS Identifier (BiSS B)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 3: Register layout

iC-LGC DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-LGC BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7A	Device ID							
0x7C	Refers to RAM address 0x15 bit(2) = TIMO(2)							
	Device ID			TIMO(2)	Device ID	TIMO(2)	Device ID	
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 4: Register layout

Just one of the two bits (bit 4 or bit 2) in address 0x7C must be set to 1 to change the TIMO value.

iC-MCB DETAILS

1st BiSS data channel based on single iC-MCB

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MCB BiSS identifier (BiSS C, content is managed by the sensor sided host)								
0x78	Device ID of data channel 1							
0x79	Device ID of data channel 1							
0x7A	Device ID of data channel 1							
0x7B	Device ID of data channel 1							
0x7C	Device ID of data channel 1							
0x7D	Device ID of data channel 1							
0x7E	Manufacturer ID of data channel 1							
0x7F	Manufacturer ID of data channel 1							

Table 5: Register layout

2nd BiSS data channel based on single iC-MCB
iC-MCB is capable to provide a second data channel with an own BiSS ID. In this case the iC-MCB does provide an additional BiSS ID by the sensor sided host.

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MCB BiSS identifier (BiSS C, content is managed by the sensor sided host)								
0x78	Device ID of data channel 2							
0x79	Device ID of data channel 2							
0x7A	Device ID of data channel 2							
0x7B	Device ID of data channel 2							
0x7C	Device ID of data channel 2							
0x7D	Device ID of data channel 2							
0x7E	Manufacturer ID of data channel 2							
0x7F	Manufacturer ID of data channel 2							

Table 6: Register layout

In case of a single device a matching Manufacturer ID of both data channels 1 and 2 is expected.

iC-MH DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MH BiSS identifier (BiSS C)								
0x78	Device ID 0x4D = ASCII(M) *							
0x79	Device ID 0x48 = ASCII(H) *							
0x7A	Device ID 0x5A = ASCII(Z) *							
0x7B	Device ID 0x00 = iC-Haus device revisions id *							
0x7C	Reserved *							CFGTOS **
0x7D	Device ID ***							
0x7E	Manufacturer ID ***							
0x7F	Manufacturer ID ***							

Table 7: Register layout

* : Not changeable or programmable (ZAP)
** : Configurable during runtime
*** : Programmable (ZAP)

As data storage is implemented in an internal ZAP PROM structure in iC-MH, this chip has only a limited identification range. When using iC-MH the fixed contents of addresses 0x78-0x7B must be taken into account and/or reserved in both the product portfolio and also in the layout of the XML file. Contents in address 0x7C (bits 7:3) can be temporarily written to the RAM but are no longer available after a drop in voltage. Using address 0x7C for device ID is not recommended for iC-MH. The contents of addresses 0x7A and 0x7B can vary with product revisions.

iC-MH8 DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MH8 BiSS identifier (BiSS C)								
0x78	Device ID 0x4D = ASCII(M) *							
0x79	Device ID 0x48 = ASCII(H) *							
0x7A	Device ID 0x38 = ASCII(8) *							
0x7B	Device ID 0x00 = iC-Haus device revisions id *							
0x7C	Reserved *							CFGTOS **
0x7D	Device ID ***							
0x7E	Manufacturer ID ***							
0x7F	Manufacturer ID ***							

Table 8: Register layout

* : Not changeable or programmable (ZAP)
** : Configurable during runtime
*** : Programmable (ZAP)
As data storage is implemented in an internal ZAP PROM structure in iC-MH8, this chip has only a limited identification range. When using iC-MH8 the fixed contents of addresses 0x78-0x7B must be taken into account and/or reserved in both the product portfolio and also in the layout of the XML file. Contents in address 0x7C (bits 7:3) can be temporarily written to the RAM but are no longer available after a drop in voltage. Using address 0x7C for device ID is not recommended for iC-MH8. The contents of addresses 0x7A and 0x7B can vary with product revisions.

iC-MH16 DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MH16 BiSS identifier (BiSS C)								
0x78	Device ID 0x4D = ASCII(M) *							
0x79	Device ID 0x48 = ASCII(H) *							
0x7A	Device ID 0x67 = ASCII(g) *							
0x7B	Device ID 0x32 = ASCII(2) *							
0x7C	Reserved *							CFGTOS **
0x7D	Device ID ***							
0x7E	Manufacturer ID ***							
0x7F	Manufacturer ID ***							

Table 9: Register layout

* : Not changeable or programmable (ZAP)
** : Configurable during runtime
*** : Programmable (ZAP)
As data storage is implemented in an internal ZAP PROM structure in iC-MH16, this chip has only a limited identification range. When using iC-MH16 the fixed contents of addresses 0x78-0x7B must be taken into account and/or reserved in both the product portfolio and also in the layout of the XML file. Contents in address 0x7C (bits 7:3) can be temporarily written to the RAM but are no longer available after a drop in voltage. Using address 0x7C for device ID is not recommended for iC-MH16. The contents of addresses 0x7A and 0x7B can vary with product revisions.

iC-MHL100 DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MHL100 BiSS identifier (BiSS C)								
0x78	Device ID 0x4D = ASCII(M) *							
0x79	Device ID 0x48 = ASCII(H) *							
0x7A	Device ID 0x5A = ASCII(L) *							
0x7B	Device ID 0x30 = ASCII(0) = iC-Haus device revisions id *							
0x7C	Reserved *							CFGTOS **
0x7D	Device ID ***							
0x7E	Manufacturer ID ***							
0x7F	Manufacturer ID ***							

Table 10: Register layout

* : Not changeable or programmable (ZAP)
** : Configurable during runtime
*** : Programmable (ZAP)
As data storage is implemented in an internal ZAP PROM structure in iC-MHL100, this chip has only a limited identification range. When using iC-MHL100 the fixed contents of addresses 0x78-0x7B must be taken into account and/or reserved in both the product portfolio and also in the layout of the XML file. Contents in address 0x7C (bits 7:3) can be temporarily written to the RAM but are no longer available after a drop in voltage. Using address 0x7C for device ID is not recommended for iC-MHL100. The contents of addresses 0x7A and 0x7B can vary with product revisions.

iC-MHL200 DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MHL200 BiSS identifier (BiSS C)								
0x78	Device ID 0x4D = ASCII(M) *							
0x79	Device ID 0x48 = ASCII(H) *							
0x7A	Device ID 0x5A = ASCII(L) *							
0x7B	Device ID 0x31 = ASCII(3) = iC-Haus device revisions id *							
0x7C	Reserved *							CFGTOS **
0x7D	Device ID ***							
0x7E	Manufacturer ID ***							
0x7F	Manufacturer ID ***							

Table 11: Register layout

* : Not changeable or programmable (ZAP)
** : Configurable during runtime
*** : Programmable (ZAP)
As data storage is implemented in an internal ZAP PROM structure in iC-MHL200, this chip has only a limited identification range. When using iC-MHL200 the fixed contents of addresses 0x78-0x7B must be taken into account and/or reserved in both the product portfolio and also in the layout of the XML file. Contents in address 0x7C (bits 7:3) can be temporarily written to the RAM but are no longer available after a drop in voltage. Using address 0x7C for device ID is not recommended for iC-MHL200. The contents of addresses 0x7A and 0x7B can vary with product revisions.

iC-MHM DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MHM BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 12: Register layout

iC-MU DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MU BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 13: Register layout

iC-MU is considerable as an iC-MU with a 1.28 mm pole width (master track).

iC-MU150 DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MU150 BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 14: Register layout

iC-MU is considerable as an iC-MU150 with a 1.50 mm pole width (master track).

iC-MU200 DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MU200 BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 15: Register layout

iC-MU is considerable as an iC-MU with a 2.00 mm pole width (master track).

iC-MR DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MR BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 16: Register layout

iC-MR3 DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MR3 BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 17: Register layout

iC-MN DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MN BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Refers to RAM address 0x4C with full R/W access							
	CID_SCD(3:0)				-	-	TOS(1:0)	
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 18: Register layout

If TOS timeout sensor data times are shortened with systems based on iC-MN, only the enabled bits of address 0x7C should be changed. It is, however, necessary to read out address 0x7C and mask the set/reset TOS(1:0) bits in address 0x7C before doing so.

iC-MNF DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MNF BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Refers to RAM address 0x4C with full R/W access							
	CID_SCD(3:0)				-	-	TOS(1:0)	
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 19: Register layout

If TOS timeout sensor data times are shortened with systems based on iC-MNF, only the enabled bits of address 0x7C should be changed. It is, however, necessary to read out address 0x7C and mask the set/reset TOS(1:0) bits in address 0x7C before doing so.

iC-MD DETAILS

iC-MD based BiSS ID

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MD BiSS identifier (BiSS C)								
0x78	Device ID 0x4D = ASCII(M) *							
0x79	Device ID 0x44 = ASCII(D) *							
0x7A	Device ID 0x5A = ASCII(Z) *							
0x7B	Device ID 0x31 = iC-Haus device revision **							
0x7C	Device ID 0x00 = Revision *							
0x7D	Device ID 0x00 = Revision *							
0x7E	Manufacturer ID *							
0x7F	Manufacturer ID *							

Table 20: Register layout

* : Only configurable during runtime (e.g. via the microcontroller used). ** : iC-Haus device iC-MD revision ID is the ASCII value of ”1” or ”2” .

Host based BiSS ID through iC-MD
As iC-MD is not capable to read out an own EEPROM independently. BiSS identifier defaults are visible until update. An additional controller can, however, write a completely individual BiSS identifier to the RAM addresses 0x78-0x7F of iC-MD.

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-MD BiSS identifier (BiSS C, content is managed by the sensor sided host)								
0x78	Device ID defined by the host ***							
0x79	Device ID defined by the host ***							
0x7A	Device ID defined by the host ***							
0x7B	Device ID defined by the host ***							
0x7C	Device ID defined by the host ***							
0x7D	Device ID defined by the host ***							
0x7E	Manufacturer ID defined by the host **							
0x7F	Manufacturer ID defined by the host **							

Table 21: Register layout

*** : Only configurable during runtime (e.g. via the microcontroller used).

iC-NQ DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-NQ BiSS identifier (BiSS B)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 22: Register layout

iC-NQC DETAILS

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-NQC BiSS identifier (BiSS C)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7A	Device ID							
0x7C	TOS affects TIMO							
	Reserved *					TOS(2:0)		
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 23: Register layout

* With a non-blocking register protection level, when the timeout is switched the contents of address 0x7C (bits 7:3) could be permanently altered. It would then be possible that the BiSS identifier is incorrectly assigned. It is recommended that this area remain reserved and not be used for device identification. When TOS(2:0) = 0b000 the configured TIMO value is used; when TOS(2:0) = 0b001 . . . 0b111 the shortened TIMO value is used. The contents of address 0x7C depend on the register protection level of the device configuration.

iC-RZ2648 DETAILS

Data channel for Control Position Word (BiSS Safety)
iC-RZ2648 does not provide an own BiSS identifier for the CPW data channel, just for the SPW data channel.

Data channel for Safety Position Word (BiSS Safety)

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-RZ2648 BiSS identifier of the SPW data channel (BiSS C, content is managed by the iC-RZ2648								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 24: Register layout

Data channel for Control Position Word based on iC-RZ2648 and iC-MR3 (BiSS Safety)
A combination of iC-RZ2548 and iC-MR3 replaces the data channel for Control Position Word and such BiSS ID by iC-MR3. In this case the iC-MR3 does define the BiSS ID by it´s configuration for this data channel. iC-RZ2648 does also provide an own BiSS identifier but just for the SPW data channel.

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-RZ2648 + iC-MR3 BiSS identifier of the CPW data channel (BiSS C, content is managed by the iC-MR3)								
iC-RZ2648 + iC-MR3								
0x78	Device ID of iC-MR3							
0x79	Device ID of iC-MR3							
0x7A	Device ID of iC-MR3							
0x7B	Device ID of iC-MR3							
0x7C	Device ID of iC-MR3							
0x7D	Device ID of iC-MR3							
0x7E	Manufacturer ID of iC-MR3							
0x7F	Manufacturer ID of iC-MR3							

Table 25: Register layout

iC-TW29 DETAILS

iC-TW29 manages the BiSS C content directly

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-TW29 BiSS identifier (BiSS C, content is managed by the iC-TW29 and it´s on chip EEPROM and non volatile configuration)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 26: Register layout

A host manages the BiSS C content of iC-TW29

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
iC-TW29 BiSS identifier (BiSS C, content is managed by the sensor sided host)								
0x78	Device ID							
0x79	Device ID							
0x7A	Device ID							
0x7B	Device ID							
0x7C	Device ID							
0x7D	Device ID							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 27: Register layout

XML RECOMMENDED FILE LAYOUT FOR BiSS B and BiSS C ENCODERS

Requirements:

1. Through attempted access* the BiSS master recognizes whether the chip is a BiSS B or BiSS C device.
2. Through attempted access the BiSS master recognizes whether the device enables register access in the relevant protocol (BiSS B or BiSS C).
3. The BiSS master identifies the device by the BiSS profile ID, BiSS identifier, and/or BiSS EDS.

* Attempted access on the basis of the minimum electrical characteristics required (maximum timeouts, minimum frequencies) according to BiSS Application Note 2.

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Example BiSS identifier system layout (with BiSS B and BiSS C taken into account)								
0x78	Device class XX							
0x79	Device subclass YY							
0x7A	BiSSMOD	RegC	RegB	MT(4:0)				
0x7B	Reserved			ST(4:0)				
0x7C	Reserved				Timeout			
0x7D	Device revision ZZ							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 28: Register layout

Device class XX Addr. 0x78; bit 7...0	
0	Recommended to reserve ‡
1	Device 1
2	Device 2
...	...
0xFE	Device 254
0xFF	Not recommended to use*

Table 29: Device class definition

Device sub class YY Addr. 0x79; bit 7...0	
0	Recommended to reserve ‡
1	Sub class 1
2	Sub class 2
...	...
0xFE	Sub class 254
0xFF	Not recommended to use *

Table 30: Device sub class definition

* Reserved number for unconfigured devices or unprogrammed BiSS ID.
† Not recommended for new designs/new XML file definitions.
‡ Reserved number.

Device revision Addr. 0x7D; bit 7...0 **ZZ**	
0	Recommended to reserve ‡
1	Revision 1
2	Revision 2
...	...
0xFE	Revision 254
0xFF	Not recommended to use *

Table 31: Device revision definition

BiSSMOD Addr. 0x7A; bit 7	
0	BiSS B mode †
1	BiSS C mode

Table 32: BiSS SCD protocol definition

RegC Addr. 0x7A; bit 6	
0	Register access via BiSS C not supported
1	Register access via BiSS C supported

Table 33: BiSS C register access protocol definition

RegB Addr. 0x7A; bit 6	
0	Register access via BiSS B not supported
1	Register access via BiSS B supported †

Table 34: BiSS B register access protocol definition

MT Addr. 0x7A; bit 4:0	
00000	0 bit
00001	1 bit
00010	2 bit
00011	3 bit
00100	4 bit
00101	5 bit
00110	6 bit
00111	7 bit
01000	8 bit
01001	9 bit
01010	10 bit
01011	11 bit
01100	12 bit
01101	13 bit
01110	14 bit
01111	15 bit
10000	16 bit
10001	17 bit
10010	18 bit
10011	19 bit
10100	20 bit
10101	21 bit
10110	22 bit
10111	23 bit
11000	24 bit
11001	25 bit
11010	26 bit
11011	27 bit
11100	28 bit
11101	29 bit
11110	30 bit
11111	31 bit

ST Addr. 0x7B; bit 4:0	
00000	0 bit
00001	1 bit
00010	2 bit
00011	3 bit
00100	4 bit
00101	5 bit
00110	6 bit
00111	7 bit
01000	8 bit
01001	9 bit
01010	10 bit
01011	11 bit
01100	12 bit
01101	13 bit
01110	14 bit
01111	15 bit
10000	16 bit
10001	17 bit
10010	18 bit
10011	19 bit
10100	20 bit
10101	21 bit
10110	22 bit
10111	23 bit
11000	24 bit
11001	25 bit
11010	26 bit
11011	27 bit
11100	28 bit
11101	29 bit
11110	30 bit
11111	31 bit

Table 36: Single turn data length definition

Timeout Addr. 0x7C; bit 2:0	
000	typ. 26 µs (12.5 µs ... 40 µs)
001	typ. 1.2 µs (0.5 µs ... 3 µs)
...	typ. 1.2 µs (0.5 µs ... 3 µs)
111	typ. 1.2 µs (0.5 µs ... 3 µs)

Table 37: BiSS SCD timeout definition

XML RECOMMENDED FILE LAYOUT FOR BiSS C and BiSS Line ENCODERS

Requirements:

1. The BiSS master knows that the encoder is a BiSS C or BiSS Line device due to different interface channels.
2. The BiSS master identifies the device by the BiSS profile ID, BiSS identifier, and/or BiSS EDS.

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Example BiSS identifier system layout (only BiSS C taken into account)								
0x78	Device class XX							
0x79	Device subclass YY							
0x7A	Reserved			MT(4:0)				
0x7B	Status(2:0)			ST(4:0)				
0x7C	Reserved				Timeout			
0x7D	Device revision ZZ							
0x7E	Manufacturer ID							
0x7F	Manufacturer ID							

Table 38: Register layout

Device class XX Addr. 0x78; bit 7...0	
0	Recommended to reserve †
1	Device 1
2	Device 2
...	...
0xFE	Device 254
0xFF	Not recommended to use*

Table 39: Device class definition

The device class defines all devices.

Device sub class YY Addr. 0x79; bit 7...0	
0	Recommended to reserve †
1	Sub class 1
2	Sub class 2
...	...
0xFE	Sub class 254
0xFF	Not recommended to use *

Table 40: Device sub class definition

The device sub class defines all devices sub classes.

Device revision ZZ Addr. 0x7D; bit 7...0	
0	Recommended to reserve †
1	Revision 1
2	Revision 2
...	...
0xFE	Revision 254
0xFF	Not recommended to use *

Table 41: Device revision definition

The device revision definition follows a standard revision system for all devices.

* Reserved number for unconfigured devices or unprogrammed BiSS ID.
† Reserved number.

MT	Addr. 0x7A; bit 4:0
00000	0 bit
00001	1 bit
00010	2 bit
00011	3 bit
00100	4 bit
00101	5 bit
00110	6 bit
00111	7 bit
01000	8 bit
01001	9 bit
01010	10 bit
01011	11 bit
01100	12 bit
01101	13 bit
01110	14 bit
01111	15 bit
10000	16 bit
10001	17 bit
10010	18 bit
10011	19 bit
10100	20 bit
10101	21 bit
10110	22 bit
10111	23 bit
11000	24 bit
11001	25 bit
11010	26 bit
11011	27 bit
11100	28 bit
11101	29 bit
11110	30 bit
11111	31 bit

Table 42: Multi turn data length definition

The multi turn data length definition considers all MT related bits.

ST	Addr. 0x7B; bit 4:0
00000	0 bit
00001	1 bit
00010	2 bit
00011	3 bit
00100	4 bit
00101	5 bit
00110	6 bit
00111	7 bit
01000	8 bit
01001	9 bit
01010	10 bit
01011	11 bit
01100	12 bit
01101	13 bit
01110	14 bit
01111	15 bit
10000	16 bit
10001	17 bit
10010	18 bit
10011	19 bit
10100	20 bit
10101	21 bit
10110	22 bit
10111	23 bit
11000	24 bit
11001	25 bit
11010	26 bit
11011	27 bit
11100	28 bit
11101	29 bit
11110	30 bit
11111	31 bit

Table 43: Single turn data length definition

ST	Addr. 0x7B; bit 7:5
000	0 bit
001	1 bit
010	2 bit
011	3 bit
100	4 bit
101	5 bit
110	6 bit
111	7 bit

Table 44: Status data length definition

The default status is a 2 bit status with low active Error(nE) and low active Warning(nW).

The single turn data length definition considers all ST related bits including fill bits. For linear devices the total bit length of position bits can be a combination of MT and ST.

OTP DEVICE CONSIDERATIONS

BiSS OTP devices (OTP: One Time Programmable) like e.g. iC-MH, iC-MH8, iC-MH16, iC-MHL100 and iC-MHL200 are OTP based and use a ZAP PROM structure for configuration. These devices do not support a full programmable BiSS ID and provide a not changeable section of the BiSS ID by mask set definition. In this case those parts of the BiSS ID need to be defined in the XML file too using the manufacturers structure.

OVERVIEW								
Addr	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
OTP iC BiSS identifier (BiSS C)								
0x78	Constant device ID *							
0x79	Constant device ID *							
0x7A	Constant device ID *							
0x7B	Constant device ID (device revisions id) *							
0x7C	Reserved *							CFGTOS **
0x7D	One Time Programmable Device ID ***							
0x7E	One Time Programmable Manufacturer ID ***							
0x7F	One Time Programmable Manufacturer ID ***							

Table 45: Register layout

* : Not changeable or programmable (ZAP)
** : RAM: configurable during runtime
*** : Programmable OTP (ZAP)

As data storage is implemented in an internal ZAP PROM structure in OTP iCs, there is only a limited identification range that can be programmed individually. When using such OTP iCs the fixed contents of addresses 0x78-0x7B must be taken into account and/or reserved in both the product portfolio and also in the layout of the XML file. Also the restrictions for customized contents of address 0x7C must be taken into account and/or reserved in both the product portfolio and also in the layout of the XML file. Custom content in address 0x7C (bits 7:3) can be temporarily written to the RAM but are no longer available after a drop in voltage. For custom content to identify devices the address 0x7D can be used and may vary with product revisions.

Due to limited data additional content may not be stored in such OPT devices as are:

- Serial Number
- EDS
- USER DATA

XML FILE TEMPLATE FOR BiSS C ONLY ENCODERS

Structural definition

The device structure may be flat and linear and integrate all products and single entries. In case of derivates and revision a tree-like structure might make sense. Device specific versions can be placed with each single device definition or such can be defined once and for all devices. In case of data lengths the MT and ST this definitions are once in the XML file but cover all devices with their data lengths.

File name

The file name is standardized and contains the BiSS Device Manufacturer ID code (hexadecimal): **idbiss-WXYZ.xml**

Header

The header contains the document type the version the BiSS Device Manufacturer ID code and the clear name of the BiSS Device Manufacturer.

```
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE BiSS-Identifier SYSTEM "idbiss.dtd">
<BiSS-Identifier Version="1.3">
 <Manufacturer Id="WXYZ">
  <Label>BiSS Device Manufacturer WXYZ Ltd. / AG / GmbH /S.A. </Label>
```

Device class XX structure

Device sub class YY structure

Device revision ZZ structure

Multi turn data length

The Multi turn data length definition is a generic definition and all standard devices use this length definition.

Single turn data length

The Single turn data length definition is a generic definition and all standard devices use this length definition.

Status data length

The status data length definition is a generic definition and all standard devices use this length definition.

BiSS register locations

```
<Reg>
<IdUsed>1</IdUsed>
<Bissmod>1</Bissmod>
<Label Adr="66:67" Range="">PROFILE</Label>
<Label Adr="68:71">SERIAL_NUMBER(31:0)</Label>
<Label Adr="120:127">IDENTIFIER</Label>
</Reg>
```

Foother
The footer contains the end of the XML structure

```
</Device>
</Manufacturer>
</BiSS-Identifier>
```

Comments
The XML text may contain comments for a better understanding and editing. The comments may not interfere any structure or incorporate any keywords.

```
<!-- iC-LGC -->
```

DTD FILE

```
<!-- DTD for BiSS Idenitfier XML Files Version 1.1 -->

<!ELEMENT BiSS-Identifier (Manufacturer | Profile)+>
<!ATTLIST BiSS-Identifier
    Version CDATA #IMPLIED
>

<!ELEMENT Manufacturer (Label | Device)+>
<!ATTLIST Manufacturer
    Id CDATA #REQUIRED
>

<!ELEMENT Profile (Label | Device)+>

<!ELEMENT Device (Id+, (Device | Label | FreqSens | TimeOutSens | TMA | TO_MIN | TO_MAX | TOS_MIN | TOS_MAX | TCLK_MIN | TCLK_MAX | TCYC |
        TBUSY_S | BUSY_S | PON_DLY | TimeOutReg | Sens | SCDS | SCDA | Reg)+)>

<!ELEMENT Id (#PCDATA)>
<!ATTLIST Id
    Range CDATA #IMPLIED
    type (include | exclude) "include"
>

<!ELEMENT FreqSens (#PCDATA)>
<!ATTLIST FreqSens
    Unit (MHz | KHz) #REQUIRED
>

<!ELEMENT TimeOutSens (#PCDATA)>
<!ATTLIST TimeOutSens
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TMA (#PCDATA)>
<!ATTLIST TMA
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TO_MIN (#PCDATA)>
<!ATTLIST TO_MIN
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TO_MAX (#PCDATA)>
<!ATTLIST TO_MAX
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TOS_MIN (#PCDATA)>
<!ATTLIST TOS_MIN
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TOS_MAX (#PCDATA)>
<!ATTLIST TOS_MAX
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TCLK_MIN (#PCDATA)>
<!ATTLIST TCLK_MIN
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TCLK_MAX (#PCDATA)>
<!ATTLIST TCLK_MAX
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TCYC (#PCDATA)>
<!ATTLIST TCYC
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TBUSY_S (#PCDATA)>
<!ATTLIST TBUSY_S
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT BUSY_S (#PCDATA)>
```

```
<!ELEMENT PON_DLY (#PCDATA)>
<!ATTLIST PON_DLY
    Unit (s | ms | us | ns) #REQUIRED
>

<!ELEMENT TimeOutRegMin (#PCDATA)>
<!ATTLIST TimeOutRegMax
    Unit (s | ms | us | us) #REQUIRED
>

<!ELEMENT TimeOutReg (#PCDATA)>
<!ATTLIST TimeOutReg
    Unit (s | ms | us | us) #REQUIRED
>

<!ELEMENT TimeOutRegMax (#PCDATA)>
<!ATTLIST TimeOutRegMax
    Unit (s | ms | us | us) #REQUIRED
>

<!ELEMENT Sens (Length | CrcPoly | InvCrc | Label | Bissmod )>
<!ATTLIST Sens
    Pos CDATA #IMPLIED
>

<!ELEMENT SCDS (Length | CrcPoly | InvCrc | Label | Bissmod )>
<!ATTLIST SCDS
    Pos CDATA #IMPLIED
>

<!ELEMENT SCDA (Length | CrcPoly | InvCrc | Label | Bissmod )>
<!ATTLIST SCDA
    Pos CDATA #IMPLIED
>

<!ELEMENT Reg (IdUsed | Label | Bissmod)>

<!ELEMENT Label (#PCDATA)>
<!ATTLIST Label
    Pos CDATA #IMPLIED
    Adr CDATA #IMPLIED
    Range CDATA #IMPLIED
    type (data | error | warning| unused | zero) "data"
    source (append_id) "append_id"
    unit CDATA #IMPLIED
    offset CDATA #IMPLIED
>

<!ELEMENT Length (#PCDATA)>
<!ATTLIST Length
    type (absolut | incremental | decremental) "absolut"
    source (id) "id"
>

<!ELEMENT CrcPoly (#PCDATA)>

<!ELEMENT CrcStart (#PCDATA)>

<!ELEMENT InvCrc (#PCDATA)>

<!ELEMENT IdUsed (#PCDATA)>

<!ELEMENT Bissmod (#PCDATA)>
```

DTD DATA TYPE DEFINITION

The DTD file defines all tags, keys and rules for the automatic parsing of the BiSS XML files. The DTD file uses the XML specification 1.0.

The DTD defines:

- Permissible TAGs
- Possible units
- Required information
- Possible information

The DTD version is included in the first line as a comment.

<!––DTD for BiSS Idenitfier XML Files Version 1.1 ––>

The following element attributes are possible:

- REQUIRED (the attribute must be stated)
- IMPLIED (the attribute is optional)
- "..." (default/standard if the attribute is missing)
- FIXED "..." (the attribute always has a fixed standard value)

Repeated elements
Elements that appear more than once are marked with a '+'.

ELEMENT Manufacturer
Several manufacturers are permitted within one XML file. The name of the XML file, e.g. idBiSS4C69.xml, can be used to help the user distinguish between manufacturers. Several XML files from various manufacturers can also be compiled to create one large file. The ELEMENT Manufacturer is distinguished by the manufacturer attribute "ID" and is required.

The manufacturer is denoted by a label ("Label"). Only one manufacturer label is permitted. The devices belonging to this manufacturer are referred to as "Device". Several devices are permitted within one manufacturer.

ELEMENT Profile
BiSS profiles are also described by their own XML file but defined via the same DTD file. Several profiles can be described in one XML file. The profile description is defined by "Label". Only one profile label is permitted for one profile. "Device" denotes the devices of this profile. Several devices are permitted within one profile.

ELEMENT Device
A device is identified by IDs. A device can be described by one or more device elements.

- Id+
- (Device | Label . . .)>

The following element(s) of a device are described by the ID, also elements that are repeated:

- Device
- Label
- FreqSens
- TimeOutSens
- TMA
- TO_MIN
- TO_MAX
- TOS_MIN
- TOS_MAX
- TCLK_MIN
- TCLK_MAX
- TCYC
- TBUSY_S
- BUSY_S
- PON_DLY
- TimeOutRegMin
- TimeOutReg
- TimeOutRegMax
- Sens
- SCDS
- SCDA
- Reg
- Label
- Length
- CrcPoly
- CrcStart
- InvCrc
- Label
- Bissmod

ELEMENT Id
An ID is assigned via a range of values ("Range"). As an option the user can decide whether this range is to be included ("Include") or excluded ("Exclude"). The default value for the given range is "Include".

ELEMENT TMA
"TMA" denotes the minimum permissible clock cycle at MA.

ELEMENT TO_MIN
"TO_MIN" describes the minimum BiSS timeout. At TO_MIN = 0 the slave operates adaptively and requires a timeout of at least 1.5 * TMA.

ELEMENT TO_MAX
"TO_MAX" describes the maximum BiSS timeout. At TO_MAX = 0 the slave operates adaptively and requires a timeout of at least 1.5 * TMA + 3 * TCLK.

ELEMENT TOS_MIN
”TOS_MIN” describes the minimum shortened BiSS timeout. At TOS_MIN = 0 the shortened timeout is not supported.

ELEMENT TOS_MAX
”TOS_MAX” describes the maximum shortened BiSS timeout. At TOS_MAX = 0 the shortened timeout is not supported.

ELEMENT TCLK_MIN
Minimum sampling cycle for an adaptive timeout (0 = adaptive timeout not available).

ELEMENT TCLK_MAX
Maximum sampling cycle for an adaptive timeout (0 = adaptive timeout not available).

ELEMENT TCYC
”TCYC” describes the minimum permissible cycle time (0 = no cycle time restrictions).

ELEMENT TBUSY_S
”TBUSY_S” describes the maximum processing time during the sensor data readout as a time. The total maximum processing time is calculated from the sum of TBUSY_S + (TMA * BUSY_S).

ELEMENT BUSY_S
”BUSY_S” describes the maximum processing time during the sensor data readout in TMA clock units. The total maximum processing time is calculated from the sum of TBUSY_S + (TMA * BUSY_S).

ELEMENT PON_DLY
”PON_DEL” describes the maximum power-on delay of the sensor until a controller communication is available (”Power On Delay”).

ELEMENT FreqSens
”FreqSens” describes the typical BiSS MA clock frequency for sensor data communication with BiSS B.

ELEMENT TimeOutSens
”TimeOutSens” describes the typical BiSS timeout for sensor data communication with BiSS B.

ELEMENT TimeOutRegMin
”TOR_MIN” describes the minimum BiSS timeout for register communication with BiSS B.

ELEMENT TimeOutReg
”TimeOutReg” describes the typical BiSS timeout for register communication with BiSS B.

ELEMENT TimeOutRegMax
”TOR_MAX” describes the maximum BiSS timeout for register communication with BiSS B.

ELEMENT Sens = ELEMENT SCDS
”Sens” or ”SCDS” describes the single-cycle sensor data. The position of the sensor data can be optionally defined by the attribute ”Pos”.

- Length
- CrcPoly
- InvCrc
- Label
- BiSSmod

ELEMENT SCDA
”SCDA” describes the single-cycle actuator data. The position of the actuator data can be optionally defined by the attribute ”Pos”.

ELEMENT Reg
”ELEMENT Reg” describes one or more sets of register contents of a BiSS device. ELEMENT Reg has the following sub-elements:

- IdUsed (at which BiSS slave ID the register is accessible)
- Label (which register is selected here)
- BiSSmod (in which BiSS mode the register is accessible)

ELEMENT Label
ELEMENT Label has the following sub-elements:

- Pos (position in a list; ”data” is the default type)
- Adr(address in a range)
- Range(number range)

The following Label types are permitted:

- data (data in general; ”data” is the default type)
- error (error in general)
- warning (warnings in general)
- unused (unused or no type)

ELEMENT Length
The following Length types are permitted:

- data (data bit length; ”data” is the default type)
- error (error bit length)
- warning (warning bit length)
- unused (unused bit length)

ELEMENT CrcPoly
The CRC polynomial can be given as a hexadecimal, decimal, or binary number. The leading most significant bit in the CRC polynomial must be included in the CRC polynomial. A polynomial can be expressed in various number systems:

- <CrcPoly>0x25</CrcPoly>

- <CrcPoly>0b101001</CrcPoly>
- <CrcPoly>0x43</CrcPoly>
- <CrcPoly>0b10000011</CrcPoly>
- . . .

ELEMENT CrcStart
The CRC start value can be given as a hexadecimal, decimal, or binary number. A CRC start value can be expressed in various number systems:

- <CrcStart>0b0</CrcStart>
- <CrcStart>0b0101</CrcStart>
- <CrcStart>0xF0</CrcStart>
- . . .

ELEMENT InvCrc
This element defines whether the CRC check sum is transmitted in its inverted state or not. In BiSS C the CRC check sum is always subjected to inverted transmission (InvCrc = 1).

- 0 (non-inverted CRC check sum transmission)
- 1 (inverted CRC check sum transmission)

ELEMENT IdUsed
This defines how many IDs a device uses. One device, e.g. a BiSS sensor, can occupy several BiSS IDs on the BiSS interface.

- 0 (device does not use a BiSS ID)
- 1 (device uses one BiSS ID)
- 2 (device uses two BiSS IDs)
- . . .

ELEMENT Bissmod

- 0 (BiSS B)
- 1 (BiSS C)

ELEMENT Bissmod Permissible units for times:

- s (seconds)
- ms (milliseconds)
- µs (microseconds)
- us (microseconds)
- ns (nanoseconds)

XML EXAMPLE FOR BiSS IDENTIFIER

This example XML file illustrates a possible file structure.

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<!DOCTYPE BiSS-Identifier SYSTEM "idbiss.dtd">
<BiSS-Identifier Version="1.3">
 <Manufacturer Id="6943">
  <Label>iC-Haus GmbH</Label>
  <Device> <!-- iC-LG -->
   <Id Range="47:32">0x4C47</Id>
   <Id Range="47:24" type="exclude">0x4C4743</Id>
   <Label Pos="1">iC-LG </Label>
   <Label Pos="2">(unknown revision)</Label>
   <Device> <!-- iC-LGW4 -->
    <Id Range="31:16">0x5734</Id>
    <Label Pos="2">W4</Label>
    <Sens>
     <Length>1</Length>
     <CrcPoly>0x43</CrcPoly>
     <InvCrc>1</InvCrc>
     <Label Pos="3" type="error">Warning</Label>
    </Sens>
    <Sens>
     <Length type="incremental">1</Length>
     <Label Pos="2" type="error">Error</Label>
    </Sens>
    <Device>
     <Id Range="10:8">0b000</Id>
     <Label Pos="3">, ST=9bit</Label>
     <Sens>
      <Length type="incremental">9</Length>
      <Label Pos="1">ST(8:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="10:8">0b001</Id>
     <Label Pos="3">, ST=10bit</Label>
     <Sens>
      <Length type="incremental">10</Length>
      <Label Pos="1">ST(9:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="10:8">0b010</Id>
     <Label Pos="3">, ST=11bit</Label>
     <Sens>
      <Length type="incremental">11</Length>
      <Label Pos="1">ST(10:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="10:8">0b011</Id>
     <Label Pos="3">, ST=12bit</Label>
     <Sens>
      <Length type="incremental">12</Length>
      <Label Pos="1">ST(11:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="10:8">0b100</Id>
     <Label Pos="3">, ST=13bit</Label>
     <Sens>
      <Length type="incremental">13</Length>
      <Label Pos="1">ST(12:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="10:8">0b101</Id>
     <Label Pos="3">, ST=14bit</Label>
     <Sens>
      <Length type="incremental">14</Length>
      <Label Pos="1">ST(13:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="10:8">0b110</Id>
     <Label Pos="3">, ST=17bit</Label>
     <Sens>
      <Length type="incremental">17</Length>
      <Label Pos="1">ST(16:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="10:8">0b111</Id>
     <Label Pos="3">, ST=21bit</Label>
     <Sens>
      <Length type="incremental">21</Length>
      <Label Pos="1">ST(20:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="13:11">0b100</Id>
     <Label Pos="4">, MT=24bit</Label>
     <Sens>
      <Length type="incremental">24</Length>
      <Label Pos="0">MT(23:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="13:11">0b101</Id>
     <Label Pos="4">, MT=20bit</Label>
     <Sens>
      <Length type="incremental">20</Length>
      <Label Pos="0">MT(19:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="13:11">0b110</Id>
     <Label Pos="4">, MT=16bit</Label>
     <Sens>
      <Length type="incremental">16</Length>
      <Label Pos="0">MT(15:0)</Label>
     </Sens>
    </Device>
    <Device>
     <Id Range="13:11">0b111</Id>
     <Label Pos="4">, MT=12bit</Label>
     <Sens>
      <Length type="incremental">12</Length>
      <Label Pos="0">MT(11:0)</Label>
     </Sens>
    </Device>
   </Device>
   <Reg>
    <IdUsed>2</IdUsed>
    <Label Adr="0">DAC_NSIN(7:0)</Label>
    <Label Adr="1">DAC_PSIN(7:0)</Label>
    <Label Adr="2">DAC_NCOS(7:0)</Label>
    <Label Adr="3">DAC_PCOS(7:0)</Label>
    <Label Adr="4:9">OFFSET</Label>
    <Label Adr="10:15">PRESET</Label>
    <Label Adr="16" Range="7">NSYNC_INT</Label>
    <Label Adr="16" Range="6:3">INTA(3:0)</Label>
    <Label Adr="16" Range="2">NSV</Label>
    <Label Adr="16" Range="1:0">CNFG(3:2)</Label>
    <Label Adr="17" Range="7:6">CNFG(1:0)</Label>
    <Label Adr="17" Range="5:0">MPX(5:0)</Label>
    <Label Adr="18" Range="7">NQUAD</Label>
    <Label Adr="18" Range="6">DIR</Label>
    <Label Adr="18" Range="5">NGRAY</Label>
    <Label Adr="18" Range="4">NSER</Label>
    <Label Adr="18" Range="3:2">STA(1:0)</Label>
    <Label Adr="18" Range="1">PGMODE</Label>
    <Label Adr="18" Range="0">VNN</Label>
    <Label Adr="19" Range="7:6">MTCNFG(7:6)</Label>
    <Label Adr="19" Range="5">MTCNFG(5)</Label>
    <Label Adr="19" Range="4">MTCNFG(4)</Label>
    <Label Adr="19" Range="3">MTCNFG(3)</Label>
    <Label Adr="19" Range="2">MTCNFG(2)</Label>
    <Label Adr="19" Range="1:0">MTCNFG(1:0)</Label>
    <Label Adr="20" Range="7">ODD</Label>
    <Label Adr="20" Range="6:4">ST_DL(2:0)</Label>
    <Label Adr="20" Range="3">DISPRES</Label>
    <Label Adr="20" Range="2">NSSI</Label>
    <Label Adr="20" Range="1">SSI_X</Label>
    <Label Adr="20" Range="0">SSI_A</Label>
    <Label Adr="21" Range="7">E_PAR</Label>
    <Label Adr="21" Range="6">E_ALARM</Label>
    <Label Adr="21" Range="5:2">CFGTOS(3:0)</Label>
    <Label Adr="21" Range="1:0">CFGTOS(1:0)</Label>
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  <Label Adr="23">TMX(7:0)</Label>
  <Label Adr="24">TMN(7:0)</Label>
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  <Label Adr="25" Range="6">NDISA</Label>
  <Label Adr="25" Range="5">IDDQ</Label>
  <Label Adr="25" Range="4">SNCOS</Label>
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  <Label Adr="25" Range="2">SNSIN</Label>
  <Label Adr="25" Range="1">NSA</Label>
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  <Label Adr="26" Range="6">ETC</Label>
  <Label Adr="26" Range="5">EKOMP</Label>
  <Label Adr="26" Range="4">EJD</Label>
  <Label Adr="26" Range="3:0">TEST(3:0)</Label>
  <Label Adr="27" Range="5">NENF</Label>
  <Label Adr="27" Range="4">ZWK</Label>
  <Label Adr="27" Range="3">DIS_ERR</Label>
  <Label Adr="27" Range="2">RES_ERR</Label>
  <Label Adr="27" Range="1:0">SEL_BP(1:0)</Label>
  <Label Adr="46" Range="7">SEC_HI(7)</Label>
  <Label Adr="46" Range="6:0">SEC_HI(6:0)</Label>
  <Label Adr="47" Range="7:0">SEC_LO(7:0)</Label>
  <Label Adr="48" Range="7:0">EMSK(7:0)</Label>
  <Label Adr="49" Range="7:0">WMSK(7:0)</Label>
  <Label Adr="50" Range="7:0">CHECK(7:0)</Label>
  <Label Adr="51:98">EEPROM</Label>
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  <Label Adr="104" Range="1">ERR_LV</Label>
  <Label Adr="104" Range="0">ERR_S</Label>
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 <Label Adr="2">INCOSA(7:0)</Label>
 <Label Adr="3">ICOSA(7:0)</Label>
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 <Label Adr="5">OFFS_MT(15:8)</Label>
 <Label Adr="6">OFFS_MT(7:0)</Label>
 <Label Adr="7">OFFS_ST(12:5)</Label>
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 <Label Adr="8" Range="2:0">OFFS_INT(7:5)</Label>
 <Label Adr="9" Range="7:3">OFFS_INT(4:0)</Label>
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 <Label Adr="0xB">PRES_MT(15:8)</Label>
 <Label Adr="0xC">PRES_MT(7:0)</Label>
 <Label Adr="0xD">PRES_ST(12:5)</Label>
 <Label Adr="0xE" Range="7:3">RRES_ST(4:0)</Label>
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 <Label Adr="0xF" Range="7:3">PRES_INT(4:0)</Label>
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 <Label Adr="0x10" Range="6:3">RES_INT(3:0)</Label>
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 <Label Adr="0x11" Range="7:6">UTRACKS(1:0)</Label>
 <Label Adr="0x11" Range="5:0">MPX(5:0)</Label>
 <Label Adr="0x12" Range="7">NQUAD</Label>
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 <Label Adr="0x1C" Range="3">OUTF_UC</Label>
 <Label Adr="0x1C" Range="2">ENLC</Label>
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 <Label Adr="0x2F" Range="7:0">SEC_OEM(7:0)</Label>
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 <Label Adr="0x16" Range="5:4">ORC_S(1:0)</Label>
 <Label Adr="0x16" Range="7:6">OFC_S(1:0)</Label>
 <Label Adr="0x17" Range="7:0">OFC_S(9:2)</Label>
 <Label Adr="0x18" Range="0">OFC_S_MSB</Label>
 <Label Adr="0x18" Range="7:1">PH_S(6:0)</Label>
 <Label Adr="0x19" Range="1:0">PH_S(8:7)</Label>
 <Label Adr="0x19" Range="2">PH_S_MSB</Label>
 <Label Adr="0x1C" Range="4:0">ACOC_S(4:0)</Label>
 <Label Adr="0x1C" Range="5">ACOR_S</Label>
 <Label Adr="0x1C" Range="7">ACOT_S(0)</Label>
 <Label Adr="0x1D" Range="0">ACOT_S(1)</Label>
 <Label Adr="0x20" Range="2:0">GR_N(2:0)</Label>
 <Label Adr="0x20" Range="7:3">GFC_N(4:0)</Label>
```

```
<Label Adr="0x21" Range="7:0">GFS_N(7:0)</Label>
<Label Adr="0x22" Range="2:0">GFS_N(10:8)</Label>
<Label Adr="0x22" Range="7:3">MPS_N(4:0)</Label>
<Label Adr="0x23" Range="4:0">MPS_N(9:5)</Label>
<Label Adr="0x23" Range="7:5">MPC_N(2:0)</Label>
<Label Adr="0x24" Range="6:0">MPC_N(9:3)</Label>
<Label Adr="0x24" Range="7">OSR_N(0)</Label>
<Label Adr="0x25" Range="0">OSR_N(1)</Label>
<Label Adr="0x25" Range="7:1">OFS_N(6:0)</Label>
<Label Adr="0x26" Range="2:0">OFS_N(9:7)</Label>
<Label Adr="0x26" Range="3">OFS_N_MSB</Label>
<Label Adr="0x26" Range="5:4">ORC_N(1:0)</Label>
<Label Adr="0x26" Range="7:6">OFC_N(1:0)</Label>
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<Label Adr="0x28" Range="0">OFC_N_MSB</Label>
<Label Adr="0x28" Range="7:1">PH_N(6:0)</Label>
<Label Adr="0x29" Range="1:0">PH_N(8:7)</Label>
<Label Adr="0x29" Range="2">PH_N_MSB</Label>
<Label Adr="0x2C" Range="4:0">ACOC_N(4:0)</Label>
<Label Adr="0x2C" Range="5">ACOR_N</Label>
<Label Adr="0x2C" Range="7">ACOT_N(0)</Label>
<Label Adr="0x2D" Range="0">ACOT_N(1)</Label>
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<Label Adr="0x32" Range="7:0">OFFS_ST(23:16)</Label>
<Label Adr="0x33" Range="7:0">OFFS_ST(31:24)</Label>
<Label Adr="0x34" Range="6:0">OFFS_ST(38:32)</Label>
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<Label Adr="0x36" Range="7:0">OFFS_MT(15:8)</Label>
<Label Adr="0x37" Range="7:0">OFFS_MT(23:16)</Label>
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<Label Adr="0x3A" Range="7:0">SPO_N(10:3)</Label>
<Label Adr="0x3B" Range="1:0">SPO_N(12:11)</Label>
<Label Adr="0x3B" Range="4:2">UBL_M(3:0)</Label>
<Label Adr="0x3B" Range="7:6">UBL_S(1:0)</Label>
<Label Adr="0x3C" Range="1:0">UBL_S(3:2)</Label>
<Label Adr="0x3C" Range="4:2">SBL_S(2:0)</Label>
<Label Adr="0x3C" Range="7:5">UBL_N(2:0)</Label>
<Label Adr="0x3D" Range="0">UBL_N(3)</Label>
<Label Adr="0x3D" Range="3:1">SBL_N(2:0)</Label>
<Label Adr="0x3D" Range="7:4">MODE_ST(3:0)</Label>
<Label Adr="0x3E" Range="4:0">DL_ST(4:0)</Label>
<Label Adr="0x3E" Range="7:5">DL_MT(2:0)</Label>
<Label Adr="0x3F" Range="0">DL_MT(3)</Label>
<Label Adr="0x3F" Range="2:1">M2S(1:0)</Label>
<Label Adr="0x3F" Range="3">NBISS</Label>
<Label Adr="0x3F" Range="4">RSSI</Label>
<Label Adr="0x3F" Range="5">ESSI</Label>
<Label Adr="0x3F" Range="6">ELC</Label>
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<Label Adr="0x41" Range="5">REG_MT</Label>
<Label Adr="0x41" Range="6">SWC_MT</Label>
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<Label Adr="0x43" Range="1:0">PROT_E2P(1:0)</Label>
<Label Adr="0x43" Range="2">S2WRN</Label>
<Label Adr="0x43" Range="3">S2ERR</Label>
<Label Adr="0x43" Range="4">reserved</Label>
<Label Adr="0x43" Range="5">NC_BISS</Label>
<Label Adr="0x43" Range="7:6">FRQ_TH(1:0)</Label>
<Label Adr="0x44" Range="1:0">AUTORES(1:0)</Label>
<Label Adr="0x47" Range="2:0">CALMODE(2:0)</Label>
<Label Adr="0x47" Range="4:3">TRACMODE(1:0)</Label>
<Label Adr="0x48" Range="1:0">DSC(1:0)</Label>
<Label Adr="0x48" Range="3:2">DTRI(1:0)</Label>
<Label Adr="0x48" Range="5:4">DSR(1:0)</Label>
<Label Adr="0x4C" Range="1:0">TOS(1:0)</Label>
<Label Adr="0x4C" Range="7:4">CID_SCD(3:0)</Label>
<Label Adr="0x4D" Range="0">reserved</Label>
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<Label Adr="0x4D" Range="2">reserved</Label>
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<Label Adr="0x4D" Range="5">reserved</Label>
<Label Adr="0x4D" Range="6">reserved</Label>
<Label Adr="0x4E" Range="7:0">CRC_E2P(9:2)</Label>
<Label Adr="0x4F" Range="7:6">CRC_E2P(1:0)</Label>
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<Label Adr="0x51" Range="7:0">PRES_ST(15:8)</Label>
<Label Adr="0x52" Range="7:0">PRES_ST(23:16)</Label>
<Label Adr="0x53" Range="7:0">PRES_ST(31:24)</Label>
<Label Adr="0x54" Range="6:0">PRES_ST(38:32)</Label>
<Label Adr="0x55" Range="7:0">PRES_MT(7:0)</Label>
<Label Adr="0x56" Range="7:0">PRES_MT(15:8)</Label>
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<Label Adr="0x75" Range="2">MT_CTR</Label>
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<Label Adr="0x75" Range="4">FRQ_STUP</Label>
<Label Adr="0x75" Range="5">FRQ_WDR</Label>
<Label Adr="0x75" Range="6">EPR_ERR</Label>
<Label Adr="0x75" Range="7">TH_WRN</Label>
<Label Adr="0x76" Range="0">TH_ERR</Label>
<Label Adr="0x76" Range="1">RF_ERR</Label>
<Label Adr="0x76" Range="2">CT_ERR</Label>
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<Label Adr="0x76" Range="4">ACM_MIN</Label>
<Label Adr="0x76" Range="5">AM_MAX</Label>
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<Label Adr="0x77" Range="0">ACS_MIN</Label>
<Label Adr="0x77" Range="1">AS_MAX</Label>
<Label Adr="0x77" Range="2">AS_MIN</Label>
<Label Adr="0x77" Range="3">ACN_MAX</Label>
<Label Adr="0x77" Range="4">ACN_MIN</Label>
<Label Adr="0x77" Range="5">AN_MAX</Label>
<Label Adr="0x77" Range="6">AN_MIN</Label>
<Label Adr="0x77" Range="7">CMD_EXE</Label>
<Label Adr="0x78:0x7F">IDENTIFIER</Label>
</Reg>
</Device>
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<Label Pos="1">iC-MH </Label>
<Label Pos="2">(unknown revision)</Label>
<Device> <!-- iC-MHY -->
<Id Range="31:16">0x5920</Id>
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</Sens>
<Sens>
<Length type="incremental">1</Length>
<Label Pos="2" type="error">nERR</Label>
</Sens>
<Sens>
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<Label Pos="1">ST(11:0)</Label>
</Sens>
<Reg>
<IdUsed>1</IdUsed>
<Bissmod>1</Bissmod>
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<Label Adr="0" Range="7:6">GAING(1:0)</Label>
<Label Adr="1" Range="6:0">GCC(6:0)</Label>
<Label Adr="1" Range="7">ENAC</Label>
<Label Adr="2" Range="6:0">VOSS(6:0)</Label>
<Label Adr="3" Range="6:0">VOSC(6:0)</Label>
<Label Adr="3" Range="7">PRM</Label>
<Label Adr="4" Range="3:0">CIBM(3:0)</Label>
<Label Adr="4" Range="4">CFGTOB</Label>
<Label Adr="4" Range="6">DPU</Label>
<Label Adr="4" Range="7">HCLH</Label>
<Label Adr="5" Range="1:0">CFGDR(1:0)</Label>
<Label Adr="5" Range="3:2">TRIHL(1:0)</Label>
<Label Adr="5" Range="5:4">CFGO(1:0)</Label>
<Label Adr="5" Range="6">CFGPROT</Label>
<Label Adr="5" Range="7">ENSSI</Label>
<Label Adr="6" Range="7:0">CFGRES(7:0)</Label>
<Label Adr="7" Range="7:0">CFGZPOS(7:0)</Label>
<Label Adr="8" Range="1:0">CFGAB(1:0)</Label>
<Label Adr="8" Range="2">CFGPOLE</Label>
<Label Adr="8" Range="3">CFGSU</Label>
<Label Adr="8" Range="4">CFGMTD</Label>
```

```
   <Label Adr="8" Range="5">CFGDIR</Label>
   <Label Adr="8" Range="7:6">CFGHYS(1:0)</Label>
   <Label Adr="9" Range="7:0">CfgCOM(7:0)</Label>
   <Label Adr="10" Range="0">CFGMTD2</Label>
   <Label Adr="14" Range="7:0">TEST(7:0)</Label>
   <Label Adr="15" Range="0">PROGZAP</Label>
   <Label Adr="66:67" Range="">PROFILE</Label>
   <Label Adr="118" Range="7:0">GAIN(7:0</Label>
   <Label Adr="119" Range="0">PROGOK</Label>
   <Label Adr="119" Range="3">ERREXT</Label>
   <Label Adr="119" Range="4">ERRAMAX</Label>
   <Label Adr="119" Range="5">ERRAMIN</Label>
   <Label Adr="119" Range="6">ERRSDATA</Label>
   <Label Adr="119" Range="7">PROGERR</Label>
   <Label Adr="120:127">IDENTIFIER</Label>
  </Reg>
 </Device>
</Manufacturer>
<Manufacturer Id="0000">
 <Label>iC-Haus GmbH</Label>
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  <Id Range="47:32">0x4D48</Id>
  <Label Pos="1">iC-MH </Label>
  <Label Pos="2">(unknown revision)</Label>
  <Device> <!-- iC-MHY -->
   <Id Range="31:16">0x5920</Id>
   <Label Pos="2">Y</Label>
  </Device>
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   <Bissmod>1</Bissmod>
   <CrcPoly>0x43</CrcPoly>
   <InvCrc>1</InvCrc>
   <Label Pos="3" type="error">nWARN</Label>
  </Sens>
  <Sens>
   <Length type="incremental">1</Length>
   <Label Pos="2" type="error">nERR</Label>
  </Sens>
  <Sens>
   <Length type="incremental">12</Length>
   <Label Pos="1">ST(11:0)</Label>
  </Sens>
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   <IdUsed>1</IdUsed>
   <Bissmod>1</Bissmod>
   <Label Adr="0" Range="5:0">GAINF(5:0)</Label>
   <Label Adr="0" Range="7:6">GAING(1:0)</Label>
   <Label Adr="1" Range="6:0">GCC(6:0)</Label>
   <Label Adr="1" Range="7">ENAC</Label>
   <Label Adr="2" Range="6:0">VOSS(6:0)</Label>
   <Label Adr="3" Range="6:0">VOSC(6:0)</Label>
   <Label Adr="3" Range="7">PRM</Label>
   <Label Adr="4" Range="3:0">CIBM(3:0)</Label>
   <Label Adr="4" Range="4">CFGTOB</Label>
   <Label Adr="4" Range="6">DPU</Label>
   <Label Adr="4" Range="7">HCLH</Label>
   <Label Adr="5" Range="1:0">CFGDR(1:0)</Label>
   <Label Adr="5" Range="3:2">TRIHL(1:0)</Label>
   <Label Adr="5" Range="5:4">CFGO(1:0)</Label>
   <Label Adr="5" Range="6">CFGPROT</Label>
   <Label Adr="5" Range="7">ENSSI</Label>
   <Label Adr="6" Range="7:0">CFGRES(7:0)</Label>
   <Label Adr="7" Range="7:0">CFGZPOS(7:0)</Label>
   <Label Adr="8" Range="1:0">CFGAB(1:0)</Label>
   <Label Adr="8" Range="2">CFGPOLE</Label>
   <Label Adr="8" Range="3">CFGSU</Label>
   <Label Adr="8" Range="4">CFGMTD</Label>
   <Label Adr="8" Range="5">CFGDIR</Label>
   <Label Adr="8" Range="7:6">CFGHYS(1:0)</Label>
   <Label Adr="9" Range="7:0">CfgCOM(7:0)</Label>
   <Label Adr="10" Range="0">CFGMTD2</Label>
   <Label Adr="14" Range="7:0">TEST(7:0)</Label>
   <Label Adr="15" Range="0">PROGZAP</Label>
   <Label Adr="66:67" Range="">PROFILE</Label>
   <Label Adr="118" Range="7:0">GAIN(7:0</Label>
   <Label Adr="119" Range="0">PROGOK</Label>
   <Label Adr="119" Range="3">ERREXT</Label>
   <Label Adr="119" Range="4">ERRAMAX</Label>
   <Label Adr="119" Range="5">ERRAMIN</Label>
   <Label Adr="119" Range="6">ERRSDATA</Label>
   <Label Adr="119" Range="7">PROGERR</Label>
   <Label Adr="120:127">IDENTIFIER</Label>
  </Reg>
 </Device>
</Manufacturer>
</BiSS-Identifier>
```

XML FILE FOR BiSS PROFILE IDENTIFIER

This XML file illustrates the structure and contents of the BiSS profile XML file. With this, communication settings from the BiSS profile identifier and the BiSS profile XML file can be generated.

All defined BiSS profiles are covered by this XML file. BiSS profile based configuration identification is independant to the manufacturer.

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<!DOCTYPE BiSS-Identifier SYSTEM "idbiss.dtd">
<BiSS-Identifier Version="1.0">
 <Profile>
  <Device> <!--BP0 -->
   <Id Range="15:13">0b000</Id>
   <Label Pos="0">BP0: Universal Profile</Label>
   <Device>
    <Id Range="12:8">0b00000</Id>
    <Label Pos="1">, Zero Length Data Channel</Label>
   </Device>
   <Device>
    <Id Range="7:7">0b0</Id> <!-- Sensor -->
    <Id Range="12:8" type="exclude">0b00000</Id>
    <Label Pos="1">, Sensor</Label>
    <SCDS>
     <CrcPoly>0x25</CrcPoly>
    </SCDS>
    <Device>
     <Id Range="12:8">0b00001</Id> <!-- 1 Bit -->
     <SCDS>
      <Length>1</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b00010</Id> <!-- 2 Bit -->
     <SCDS>
      <Length>2</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b00011</Id> <!-- 3 Bit -->
     <SCDS>
      <Length>3</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b00100</Id> <!-- 4 Bit -->
     <SCDS>
      <Length>4</Length>
      <Label Pos="1">Data</Label>
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    </Device>
    <Device>
     <Id Range="12:8">0b00101</Id> <!-- 5 Bit -->
     <SCDS>
      <Length>5</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b00110</Id> <!-- 6 Bit -->
     <SCDS>
      <Length>6</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b00111</Id> <!-- 7 Bit -->
     <SCDS>
      <Length>7</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b01000</Id> <!-- 8 Bit -->
     <SCDS>
      <Length>8</Length>
      <Label Pos="1">Data</Label>
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    </Device>
    <Device>
     <Id Range="12:8">0b01001</Id> <!-- 9 Bit -->
     <SCDS>
      <Length>9</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b01010</Id> <!-- 10 Bit -->
     <SCDS>
      <Length>10</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b01011</Id> <!-- 11 Bit -->
     <SCDS>
      <Length>11</Length>
      <Label Pos="1">Data</Label>
     </SCDS>
    </Device>
    <Device>
     <Id Range="12:8">0b01100</Id> <!-- 12 Bit -->
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    <Device>
     <Id Range="12:8">0b01110</Id> <!-- 14 Bit -->
     <SCDS>
      <Length>14</Length>
      <Label Pos="1">Data</Label>
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    <Device>
     <Id Range="12:8">0b01111</Id> <!-- 15 Bit -->
     <SCDS>
      <Length>15</Length>
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    </Device>
    <Device>
     <Id Range="12:8">0b10000</Id> <!-- 16 Bit -->
     <SCDS>
      <Length>16</Length>
      <Label Pos="1">Data</Label>
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    </Device>
    <Device>
     <Id Range="12:8">0b10001</Id> <!-- 17 Bit -->
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    <Device>
     <Id Range="12:8">0b10010</Id> <!-- 18 Bit -->
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<Device>
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 <Id Range="12:8" type="exclude">0b00000</Id>
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  <CrcPoly>0x25</CrcPoly>
 </SCDA>
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  <SCDA>
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   <Label Pos="1">Data</Label>
  </SCDA>
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 <Device>
  <Id Range="12:8">0b00010</Id> <!-- 2 Bit -->
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  <Id Range="12:8">0b00011</Id> <!-- 3 Bit -->
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   <Length>3</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b00100</Id> <!-- 4 Bit -->
  <SCDA>
   <Length>4</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b00101</Id> <!-- 5 Bit -->
  <SCDA>
   <Length>5</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b00110</Id> <!-- 6 Bit -->
  <SCDA>
   <Length>6</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b00111</Id> <!-- 7 Bit -->
  <SCDA>
   <Length>7</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01000</Id> <!-- 8 Bit -->
  <SCDA>
   <Length>8</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01001</Id> <!-- 9 Bit -->
  <SCDA>
   <Length>9</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01010</Id> <!-- 10 Bit -->
  <SCDA>
   <Length>10</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01011</Id> <!-- 11 Bit -->
  <SCDA>
   <Length>11</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01100</Id> <!-- 12 Bit -->
  <SCDA>
   <Length>12</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01101</Id> <!-- 13 Bit -->
  <SCDA>
   <Length>13</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01110</Id> <!-- 14 Bit -->
  <SCDA>
   <Length>14</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b01111</Id> <!-- 15 Bit -->
  <SCDA>
   <Length>15</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10000</Id> <!-- 16 Bit -->
  <SCDA>
   <Length>16</Length>
   <Label Pos="1">Data</Label>
```

```
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10001</Id> <!-- 17 Bit -->
  <SCDA>
   <Length>17</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10010</Id> <!-- 18 Bit -->
  <SCDA>
   <Length>18</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10011</Id> <!-- 19 Bit -->
  <SCDA>
   <Length>19</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10100</Id> <!-- 20 Bit -->
  <SCDA>
   <Length>20</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10101</Id> <!-- 21 Bit -->
  <SCDA>
   <Length>21</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10110</Id> <!-- 22 Bit -->
  <SCDA>
   <Length>22</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b10111</Id> <!-- 23 Bit -->
  <SCDA>
   <Length>23</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b11000</Id> <!-- 24 Bit -->
  <SCDA>
   <Length>24</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b11001</Id> <!-- 25 Bit -->
  <SCDA>
   <Length>25</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
 <Device>
  <Id Range="12:8">0b11010</Id> <!-- 26 Bit -->
  <SCDA>
   <Length>26</Length>
   <Label Pos="1">Data</Label>
  </SCDA>
 </Device>
</Device>
</Device>
<Device> <!--BP1 -->
 <Id Range="15:12">0b0010</Id>
 <Label Pos="0">BP1: Standard Rotary Encoder Profile</
     Label>
 <SCDS>
  <Length>1</Length>
  <CrcPoly>0x43</CrcPoly>
  <Label Pos="2" type="error">nE</Label>
 </SCDS>
 <SCDS>
  <Length type="incremental">1</Length>
  <Label Pos="3" type="error">nW</Label>
 </SCDS>
 <Device> <!-- DL:48 -->
  <Id Range="11:10">0b00</Id>
  <SCDS>
   <Length type="incremental">48</Length>
  </SCDS>
 </Device>
 <Device> <!-- DL:36 -->
  <Id Range="11:10">0b01</Id>
  <SCDS>
   <Length type="incremental">36</Length>
  </SCDS>
 </Device>
 <Device> <!-- DL:24 -->
  <Id Range="11:10">0b10</Id>
  <SCDS>
   <Length type="incremental">24</Length>
  </SCDS>
 </Device>
 <Device> <!-- DL:12 -->
  <Id Range="11:10">0b11</Id>
  <SCDS>
   <Length type="incremental">12</Length>
  </SCDS>
 </Device>
 <Device> <!-- extended single turn -->
  <Id Range="4:3">0b11</Id>
  <Id Range="2:0" type="exclude">0b000</Id> <!-- 24 Bit
      -->
  <SCDS>
   <Length type="incremental" source="id"></Length>
  </SCDS>
 </Device>
 <Device> <!-- Multi Turn -->
  <Id Range="9:5">0b-----</Id>
  <Id Range="9:5" type="exclude">0b00000</Id> <!-- no
      Multiturn -->
  <Label Pos="2" source="append_id">, R_MT=</Label>
  <Device> <!-- 1..12 Bit -->
   <Id Range="9:7">0b000</Id>
   <Id Range="9:7">0b001</Id>
   <Id Range="9:7">0b010</Id>
   <Id Range="9:5">0b01100</Id>
   <SCDS>
    <Label Pos="0">MT(11:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 13..24 Bit -->
   <Id Range="9:5">0b11000</Id>
   <Id Range="9:7">0b011</Id>
   <Id Range="9:5" type="exclude">0b01100</Id>
   <SCDS>
    <Label Pos="0">MT(23:0)</Label>
   </SCDS>
  </Device>
 </Device>
 <Device> <!-- Single Turn -->
  <Id Range="4:0">0b-----</Id>
  <Id Range="4:0" type="exclude">0b00000</Id> <!-- no
      Singleturn -->
  <Label Pos="1" source="append_id">, R_ST=</Label>
  <Device> <!-- 1..12 Bit -->
   <Id Range="4:2">0b000</Id>
   <Id Range="4:2">0b001</Id>
   <Id Range="4:2">0b010</Id>
   <Id Range="4:0">0b01100</Id>
   <SCDS>
    <Label Pos="1">ST(11:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 13..24 Bit -->
   <Id Range="4:9">0b11000</Id>
   <Id Range="4:2">0b011</Id>
   <Id Range="4:0" type="exclude">0b01100</Id>
   <SCDS>
    <Label Pos="1">ST(23:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 25 Bit -->
   <Id Range="4:9">0b11001</Id>
   <SCDS>
    <Label Pos="1">ST(24:0)</Label>
   </SCDS>
  </Device>
```

```
  <Device> <!-- 26 Bit -->
   <Id Range="4:9">0b11010</Id>
   <SCDS>
    <Label Pos="1">ST(25:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 27 Bit -->
   <Id Range="4:9">0b11011</Id>
   <SCDS>
    <Label Pos="1">ST(26:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 28 Bit -->
   <Id Range="4:9">0b11100</Id>
   <SCDS>
    <Label Pos="1">ST(27:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 29 Bit -->
   <Id Range="4:9">0b11101</Id>
   <SCDS>
    <Label Pos="1">ST(28:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 30 Bit -->
   <Id Range="4:9">0b11110</Id>
   <SCDS>
    <Label Pos="1">ST(29:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 31 Bit -->
   <Id Range="4:9">0b11111</Id>
   <SCDS>
    <Label Pos="1">ST(30:0)</Label>
   </SCDS>
  </Device>
 </Device>
</Device>
<Device> <!--BP2 -->
 <Id Range="15:12">0b0100</Id>
 <Label Pos="0">BP2: Safety Rotary Encoder Profile</
      Label>
 <SCDS>
  <Length>1</Length>
  <CrcPoly>0x43</CrcPoly>
  <Label Pos="2" type="error">nE</Label>
 </SCDS>
 <SCDS>
  <Length type="incremental">1</Length>
  <Label Pos="3" type="error">nW</Label>
 </SCDS>
 <SCDS>
  <Length type="incremental">6</Length>
  <Label Pos="4" type="error">LC</Label>
 </SCDS>
 <Device> <!-- DL:48 -->
  <Id Range="11:10">0b00</Id>
  <SCDS>
   <Length type="incremental">48</Length>
  </SCDS>
 </Device>
 <Device> <!-- DL:36 -->
  <Id Range="11:10">0b01</Id>
  <SCDS>
   <Length type="incremental">36</Length>
  </SCDS>
 </Device>
 <Device> <!-- DL:24 -->
  <Id Range="11:10">0b10</Id>
  <SCDS>
   <Length type="incremental">24</Length>
  </SCDS>
 </Device>
 <Device> <!-- DL:12 -->
  <Id Range="11:10">0b11</Id>
  <SCDS>
   <Length type="incremental">12</Length>
  </SCDS>
 </Device>
 <Device> <!-- extended single turn -->
  <Id Range="4:3">0b11</Id>
  <Id Range="2:0" type="exclude">0b000</Id> <!-- 24 Bit
       -->
  <SCDS>
   <Length type="incremental" source="id"></Length>
  </SCDS>
 </Device>
 <Device> <!-- Multi Turn -->
  <Id Range="9:5">0b-----</Id>
  <Id Range="9:5" type="exclude">0b00000</Id> <!-- no
       Multiturn -->
  <Label Pos="1" source="append_id">, R_MT=</Label>
  <Device> <!-- 1..12 Bit -->
   <Id Range="9:7">0b000</Id>
   <Id Range="9:7">0b001</Id>
   <Id Range="9:7">0b010</Id>
   <Id Range="9:5">0b01100</Id>
   <SCDS>
    <Label Pos="0">MT(11:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 13..24 Bit -->
   <Id Range="9:5">0b11000</Id>
   <Id Range="9:7">0b011</Id>
   <Id Range="9:5" type="exclude">0b01100</Id>
   <SCDS>
    <Label Pos="0">MT(23:0)</Label>
   </SCDS>
  </Device>
 </Device>
 <Device> <!-- Single Turn -->
  <Id Range="4:0">0b-----</Id>
  <Id Range="4:0" type="exclude">0b00000</Id> <!-- no
       Singleturn -->
  <Label Pos="1" source="append_id">, R_ST=</Label>
  <Device> <!-- 1..12 Bit -->
   <Id Range="4:2">0b000</Id>
   <Id Range="4:2">0b001</Id>
   <Id Range="4:2">0b010</Id>
   <Id Range="4:0">0b01100</Id>
   <SCDS>
    <Label Pos="1">ST(11:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 13..24 Bit -->
   <Id Range="4:9">0b11000</Id>
   <Id Range="4:2">0b011</Id>
   <Id Range="4:0" type="exclude">0b01100</Id>
   <SCDS>
    <Label Pos="1">ST(23:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 25 Bit -->
   <Id Range="4:9">0b11001</Id>
   <SCDS>
    <Label Pos="1">ST(24:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 26 Bit -->
   <Id Range="4:9">0b11010</Id>
   <SCDS>
    <Label Pos="1">ST(25:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 27 Bit -->
   <Id Range="4:9">0b11011</Id>
   <SCDS>
    <Label Pos="1">ST(26:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 28 Bit -->
   <Id Range="4:9">0b11100</Id>
   <SCDS>
    <Label Pos="1">ST(27:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 29 Bit -->
   <Id Range="4:9">0b11101</Id>
   <SCDS>
    <Label Pos="1">ST(28:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 30 Bit -->
   <Id Range="4:9">0b11110</Id>
   <SCDS>
    <Label Pos="1">ST(29:0)</Label>
   </SCDS>
  </Device>
  <Device> <!-- 31 Bit -->
   <Id Range="4:9">0b11111</Id>
```

```
  <SCDS>
   <Label Pos="1">ST(30:0)</Label>
  </SCDS>
 </Device>
</Device>
 </Device>
 </Profile>
</BiSS-Identifier>
```

HTML FILE FOR XML VALIDATION

The XML file can be tested with an HTML file and an XML capable browser e.g. Internet Explorer™and Edge™.

The test folder needs to carry:

- XML file
- DTD file
- HTML file

The used HTML code is:

```
<html>
<body>
<script language="JavaScript">

var xmlDoc = new ActiveXObject("Microsoft.XMLDOM")
xmlDoc.async="false"
xmlDoc.validateOnParse="true"
xmlDoc.load("idBiSS6943.xml")

document.write("<br>Error Code: ")
document.write(xmlDoc.parseError.errorCode)
document.write("<br>Error Reason: ")
document.write(xmlDoc.parseError.reason)
document.write("<br>Error Line: ")
document.write(xmlDoc.parseError.line)
document.write("<br>Src-Text: ")
document.write(xmlDoc.parseError.srcText)

</script>
</body>
</html>
```

An example result on a positive validation with the Internet Explorer™:
Error Code: 0
Error Reason:
Error Line: 0
Src-Text:

XML FILE WITH BiSS Line ENCODERS

BiSS Line uses the BiSS C content definitions. An XML file for BiSS Line does identify the BiSS Line components on the same structure and XML file as BiSS C devices. BiSS Line devices are considered as BiSS C devices.

A manufacturer of BiSS devices needs to incorporate both BiSS C and BiSS devices in a single XML file. We recommend to separate those two types of BiSS products by e.g. device classes or sub classes.

As BiSS Line permits a 2wire and 4wire structure we recommend to separate those two types of BiSS Line products by e.g. device classes or sub classes.

A BiSS manufacturer does only provide a single BiSS XML file for all BiSS products including BiSS B, BiSS C and BiSS Line.

REVISION HISTORY

Rel.	Rel. Date*	Chapter	Modification	Page
A1	2010-07-29		Initial release	

Rel.	Rel. Date*	Chapter	Modification	Page
A2	2012-08-16		Minor updates	

Rel.	Rel. Date*	Chapter	Modification	Page
A3	2019-01-14		BiSS C and BiSS Line products added	
			Simplified BiSS C XML structure example	
			BiSS Line applications added	

* Release Date format: *YYYY-MM-DD*