

## CANopen\_NXP\_SDK\_CiA401

### Electronic Datasheet Information

Version 1, revision 3

CANopen Library for NXP SDK - CiA 401 generic IO Example

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Provided by Embedded Systems Academy

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### Product Information

Property	Value
Vendor Name	NXP Semiconductors BV
Vendor ID	0xAF0002DC
Product Name	CANopen NXP CiA 401
Product Code	0xCODE0010
Revision Number	0x20201014
Order Code	CODE0010

### Commissioning Information

Property	Value
Node ID	0x03
Name	GenIO
Bitrate	500 kbps
Network Number	0
Network Name	
LSS Serial Number	0x00000000
CANopen Manager	No

### PDO Configuration

#### Communication Parameters

PDO	COBID	Tx Type	Inhibit Time	Event Time	Sync Start
RPDO1	\$NODEID+0x200	255			
RPDO2	\$NODEID+0x300	255			
TPDO1	\$NODEID+0x40000180	255	100.0 ms	250 ms	0
TPDO2	\$NODEID+0x40000280	255	200.0 ms	500 ms	0

### Mappings

PDO	Mappings
RPDO1	[0x6200,0x01] Write State 8 Output Lines - DigOutput8_1 (Unsigned8) [0x6200,0x02] Write State 8 Output Lines - DigOutput8_2 (Unsigned8) [0x6200,0x03] Write State 8 Output Lines - DigOutput8_3 (Unsigned8) [0x6200,0x04] Write State 8 Output Lines - DigOutput8_4 (Unsigned8)

RPDO2	[0x6411,0x01]	Write Analog Output 16-bit - AnalogOutput16_1 (Integer16)
	[0x6411,0x02]	Write Analog Output 16-bit - AnalogOutput16_2 (Integer16)
TPDO1	[0x6000,0x01]	Read State 8 Input Lines - DigInput8_1 (Unsigned8)
	[0x6000,0x02]	Read State 8 Input Lines - DigInput8_2 (Unsigned8)
	[0x6000,0x03]	Read State 8 Input Lines - DigInput8_3 (Unsigned8)
	[0x6000,0x04]	Read State 8 Input Lines - DigInput8_4 (Unsigned8)
TPDO2	[0x6401,0x01]	Read Analog Input 16-bit - AnalogInput16_1 (Integer16)
	[0x6401,0x02]	Read Analog Input 16-bit - AnalogInput16_2 (Integer16)

## Object Dictionary

### Overview

Index	Subindex	Name	Type	Access	Default Value
0x0002	0x00	INTEGER8	I8	CO	
0x0003	0x00	INTEGER16	I16	CO	
0x0004	0x00	INTEGER32	I32	CO	
0x0005	0x00	UNSIGNED8	U8	CO	
0x0006	0x00	UNSIGNED16	U16	CO	
0x0007	0x00	UNSIGNED32	U32	CO	
0x1000	0x00	Device Type	U32	CO	0x000F0191
0x1001	0x00	Error Register	U8	CO	
0x1002	0x00	Manufacturer Status Register	U32	RO	
0x1003	0x00	Pre-Defined Error Field	U8	RW	0x00
	0x01	Pre-Defined Error Field 1	U32	RO	
	0x02	Pre-Defined Error Field 2	U32	RO	
	0x03	Pre-Defined Error Field 3	U32	RO	
	0x04	Pre-Defined Error Field 4	U32	RO	
0x1005	0x00	COB-ID SYNC	U32	CO	0x00000080
0x1008	0x00	Manufacturer Device Name	VisStr	RO	See description
0x1009	0x00	Manufacturer Hardware Version	VisStr	RO	See description
0x100A	0x00	Manufacturer Software Version	VisStr	RO	See description
0x1010	0x00	Store Parameters	U8	CO	0x04
	0x01	Save All Parameters	U32	RW	
	0x02	Save Communication Parameters	U32	RW	
	0x03	Save Application Parameters	U32	RW	
	0x04	Save Manufacturer Parameters	U32	RW	
0x1011	0x00	Restore Parameters	U8	CO	0x04
	0x01	Save All Parameters	U32	RW	
	0x02	Restore Communication Parameters	U32	RW	
	0x03	Restore Application Parameters	U32	RW	

	0x04	Restore Manufacturer Parameters	U32	RW	
0x1014	0x00	COB-ID EMCY	U32	CO	\$NODEID+0x80
0x1015	0x00	Inhibit Time Emergency	U16	CO	100
0x1016	0x00	Consumer Heartbeat Time	U8	CO	0x03
	0x01	Consumer Heartbeat Time 1	U32	RW	0x000103E8
	0x02	Consumer Heartbeat Time 2	U32	RW	0x000203E8
	0x03	Consumer Heartbeat Time 3	U32	RW	0x000303E8
0x1017	0x00	Producer Heartbeat Time	U16	RW	1000
0x1018	0x00	Identity Object	U8	CO	4
	0x01	Vendor ID	U32	CO	0xAF0002DC
	0x02	Product Code	U32	CO	0xCODE0010
	0x03	Revision number	U32	CO	0x20201014
	0x04	Serial number	U32	CO	
0x1019	0x00	SYNC counter overflow value	U8	RW	0
0x1400	0x00	Receive PDO Communication Parameter	U8	CO	2
	0x01	COB-ID	U32	RW	\$NODEID+0x200
	0x02	Transmission Type	U8	RW	255
0x1401	0x00	Receive PDO Communication Parameter	U8	CO	2
	0x01	COB-ID	U32	RW	\$NODEID+0x300
	0x02	Transmission Type	U8	RW	255
0x1600	0x00	Receive PDO Mapping Parameter	U8	CO	4
	0x01	PDO Mapping Entry	U32	CO	0x62000108
	0x02	PDO Mapping Entry	U32	CO	0x62000208
	0x03	PDO Mapping Entry	U32	CO	0x62000308
	0x04	PDO Mapping Entry	U32	CO	0x62000408
0x1601	0x00	Receive PDO Mapping Parameter	U8	CO	2
	0x01	PDO Mapping Entry	U32	CO	0x64110110
	0x02	PDO Mapping Entry	U32	CO	0x64110210
0x1800	0x00	Transmit PDO Communication Parameter	U8	CO	6
	0x01	COB-ID	U32	RW	\$NODEID+0x40000180
	0x02	Transmission Type	U8	RW	255
	0x03	Inhibit Time	U16	RW	1000
	0x05	Event Timer	U16	RW	250
	0x06	Sync Start Value	U8	RW	0
0x1801	0x00	Transmit PDO Communication Parameter	U8	CO	6
	0x01	COB-ID	U32	RW	\$NODEID+0x40000280
	0x02	Transmission Type	U8	RW	255

	0x03	Inhibit Time	U16	RW	2000
	0x05	Event Timer	U16	RW	500
	0x06	Sync Start Value	U8	RW	0
0x1A00	0x00	Transmit PDO Mapping Parameter	U8	CO	4
	0x01	PDO Mapping Entry	U32	CO	0x60000108
	0x02	PDO Mapping Entry	U32	CO	0x60000208
	0x03	PDO Mapping Entry	U32	CO	0x60000308
	0x04	PDO Mapping Entry	U32	CO	0x60000408
0x1A01	0x00	Transmit PDO Mapping Parameter	U8	CO	2
	0x01	PDO Mapping Entry	U32	CO	0x64010110
	0x02	PDO Mapping Entry	U32	CO	0x64010210
0x5FFF	0x00	EmSA	VisStr	RO	See description
0x6000	0x00	Read State 8 Input Lines	U8	CO	4
	0x01	DigInput8_1	U8	RO	0x12
	0x02	DigInput8_2	U8	RO	0x23
	0x03	DigInput8_3	U8	RO	0x34
	0x04	DigInput8_4	U8	RO	0x45
0x6200	0x00	Write State 8 Output Lines	U8	CO	4
	0x01	DigOutput8_1	U8	RWW	
	0x02	DigOutput8_2	U8	RWW	
	0x03	DigOutput8_3	U8	RWW	
	0x04	DigOutput8_4	U8	RWW	
0x6401	0x00	Read Analog Input 16-bit	U8	CO	2
	0x01	AnalogInput16_1	I16	RO	0xFEDC
	0x02	AnalogInput16_2	I16	RO	0xEDCB
0x6411	0x00	Write Analog Output 16-bit	U8	CO	2
	0x01	AnalogOutput16_1	I16	RWW	
	0x02	AnalogOutput16_2	I16	RWW	

#### Device Type (0x1000)

Subindex	0x00
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x000F0191

#### Error Register (0x1001)

Subindex	0x00
Data Type	Unsigned8
Access	Const
Can be mapped	No

#### Manufacturer Status Register (0x1002)

Subindex	0x00
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No

#### Pre-Defined Error Field (0x1003)

Subindex	0x00
Name	Number of Errors
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0x00
Low Limit	0x00
High Limit	0x04

Subindex	0x01
Name	Pre-Defined Error Field 1
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No

Subindex	0x02
Name	Pre-Defined Error Field 2
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No

Subindex	0x03
Name	Pre-Defined Error Field 3
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No

Subindex	0x04
Name	Pre-Defined Error Field 4
Data Type	Unsigned32
Access	ReadOnly
Can be mapped	No

#### COB-ID SYNC (0x1005)

Subindex	0x00
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x00000080

#### Manufacturer Device Name (0x1008)

Subindex	0x00
Data Type	Visible String
Access	ReadOnly
Can be mapped	No
Default Value	CANopenLibNXPSDK CiA401 Example

#### Manufacturer Hardware Version (0x1009)

Subindex	0x00
Data Type	Visible String
Access	ReadOnly
Can be mapped	No
Default Value	Some NXP Evalboard

#### Manufacturer Software Version (0x100A)

Subindex	0x00
Data Type	Visible String
Access	ReadOnly
Can be mapped	No
Default Value	EmSA MCOP 7.10 2020-10-14

#### Store Parameters (0x1010)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	0x04

Subindex	0x01
Name	Save All Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

Subindex	0x02
Name	Save Communication Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

Subindex	0x03
Name	Save Application Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

Subindex	0x04
Name	Save Manufacturer Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

#### Restore Parameters (0x1011)

Subindex	0x00
Name	Highest Subindex

Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	0x04

Subindex	0x01
Name	Save All Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

Subindex	0x02
Name	Restore Communication Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

Subindex	0x03
Name	Restore Application Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

Subindex	0x04
Name	Restore Manufacturer Parameters
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No

#### COB-ID EMCY (0x1014)

Subindex	0x00
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	\$NODEID+0x80

#### Inhibit Time Emergency (0x1015)

Subindex	0x00
Data Type	Unsigned16
Access	Const
Can be mapped	No
Default Value	100

#### Consumer Heartbeat Time (0x1016)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No

Default Value	0x03
Subindex	0x01
Name	Consumer Heartbeat Time 1
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x000103E8

Subindex	0x02
Name	Consumer Heartbeat Time 2
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x000203E8

Subindex	0x03
Name	Consumer Heartbeat Time 3
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	0x000303E8

#### Producer Heartbeat Time (0x1017)

Subindex	0x00
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	1000

Note that CiA 401 sets the default to 0 and thereby disables heartbeat. In order to have a periodic transmission from the node right after initialization, this is changed to 1000 ms. This allows an easy verification that CAN is working and the stack is running, even before any interaction with a CANopen manager.

#### Identity Object (0x1018)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	4
Low Limit	1
High Limit	4

Subindex	0x01
Name	Vendor ID
Data Type	Unsigned32



Access	Const
Can be mapped	No
Default Value	0xAF0002DC

Subindex	0x02
Name	Product Code
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0xC0DE0010

Subindex	0x03
Name	Revision number
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x20201014

Subindex	0x04
Name	Serial number
Data Type	Unsigned32
Access	Const
Can be mapped	No

#### SYNC counter overflow value (0x1019)

Subindex	0x00
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

#### Receive PDO Communication Parameter (0x1400)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	0x01
Name	COB-ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	\$NODEID+0x200
High Limit	0xFFFFFFFF

Subindex	0x02
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Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

#### Receive PDO Communication Parameter (0x1401)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	0x01
Name	COB-ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	\$NODEID+0x300
High Limit	0xFFFFFFFF

Subindex	0x02
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255

#### Receive PDO Mapping Parameter (0x1600)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	4
Low Limit	0
High Limit	64

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x62000108 [0x6200,0x01] Write State 8 Output Lines - DigOutput8_1 (Unsigned8)

Subindex	0x02
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Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x62000208 [0x6200,0x02] Write State 8 Output Lines - DigOutput8_2 (Unsigned8)

Subindex	0x03
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x62000308 [0x6200,0x03] Write State 8 Output Lines - DigOutput8_3 (Unsigned8)

Subindex	0x04
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x62000408 [0x6200,0x04] Write State 8 Output Lines - DigOutput8_4 (Unsigned8)

#### Receive PDO Mapping Parameter (0x1601)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2
Low Limit	0
High Limit	64

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x64110110 [0x6411,0x01] Write Analog Output 16-bit - AnalogOutput16_1 (Integer16)

Subindex	0x02
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x64110210 [0x6411,0x02] Write Analog Output 16-bit - AnalogOutput16_2 (Integer16)

#### Transmit PDO Communication Parameter (0x1800)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	6
Subindex	0x01
Name	COB-ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	\$NODEID+0x40000180
High Limit	0xFFFFFFFF
Subindex	0x02
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255
Subindex	0x03
Name	Inhibit Time
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	1000
Subindex	0x05
Name	Event Timer
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	250
Subindex	0x06
Name	Sync Start Value
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

#### Transmit PDO Communication Parameter (0x1801)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8

Access	Const
Can be mapped	No
Default Value	6
Subindex	0x01
Name	COB-ID
Data Type	Unsigned32
Access	ReadWrite
Can be mapped	No
Default Value	\$NODEID+0x40000280
High Limit	0xFFFFFFFF
Subindex	0x02
Name	Transmission Type
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	255
Subindex	0x03
Name	Inhibit Time
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	2000
Subindex	0x05
Name	Event Timer
Data Type	Unsigned16
Access	ReadWrite
Can be mapped	No
Default Value	500
Subindex	0x06
Name	Sync Start Value
Data Type	Unsigned8
Access	ReadWrite
Can be mapped	No
Default Value	0

#### Transmit PDO Mapping Parameter (0x1A00)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	4
Low Limit	0

High Limit	64
Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x60000108 [0x6000,0x01] Read State 8 Input Lines - DigInput8_1 (Unsigned8)

Subindex	0x02
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x60000208 [0x6000,0x02] Read State 8 Input Lines - DigInput8_2 (Unsigned8)

Subindex	0x03
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x60000308 [0x6000,0x03] Read State 8 Input Lines - DigInput8_3 (Unsigned8)

Subindex	0x04
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x60000408 [0x6000,0x04] Read State 8 Input Lines - DigInput8_4 (Unsigned8)

#### Transmit PDO Mapping Parameter (0x1A01)

Subindex	0x00
Name	Highest Subindex
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2
Low Limit	0
High Limit	64

Subindex	0x01
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const

Can be mapped	No
Default Value	0x64010110 [0x6401,0x01] Read Analog Input 16-bit - AnalogInput16_1 (Integer16)

Subindex	0x02
Name	PDO Mapping Entry
Data Type	Unsigned32
Access	Const
Can be mapped	No
Default Value	0x64010210 [0x6401,0x02] Read Analog Input 16-bit - AnalogInput16_2 (Integer16)

#### EmSA (0x5FFF)

Subindex	0x00
Data Type	Visible String
Access	ReadOnly
Can be mapped	No
Default Value	EmSA <a href="http://www.em-sa.com">www.em-sa.com</a> , CANopen Architect Mini

#### Read State 8 Input Lines (0x6000)

Subindex	0x00
Name	Number of Elements
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	4

Subindex	0x01
Name	DigInput8_1
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	Yes
Default Value	0x12

Subindex	0x02
Name	DigInput8_2
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	Yes
Default Value	0x23

Subindex	0x03
Name	DigInput8_3
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	Yes
Default Value	0x34

Subindex	0x04
Name	DigInput8_4
Data Type	Unsigned8
Access	ReadOnly
Can be mapped	Yes
Default Value	0x45

#### Write State 8 Output Lines (0x6200)

Subindex	0x00
Name	Number of Elements
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	4

Subindex	0x01
Name	DigOutput8_1
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes

Subindex	0x02
Name	DigOutput8_2
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes

Subindex	0x03
Name	DigOutput8_3
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes

Subindex	0x04
Name	DigOutput8_4
Data Type	Unsigned8
Access	ReadWriteWrite
Can be mapped	Yes

#### Read Analog Input 16-bit (0x6401)

Subindex	0x00
Name	Number of Elements
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	0x01
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Name	AnalogInput16_1
Data Type	Integer16
Access	ReadOnly
Can be mapped	Yes
Default Value	0xFEDC

Subindex	0x02
Name	AnalogInput16_2
Data Type	Integer16
Access	ReadOnly
Can be mapped	Yes
Default Value	0xEDCB

#### Write Analog Output 16-bit (0x6411)

Subindex	0x00
Name	Number of Elements
Data Type	Unsigned8
Access	Const
Can be mapped	No
Default Value	2

Subindex	0x01
Name	AnalogOutput16_1
Data Type	Integer16
Access	ReadWriteWrite
Can be mapped	Yes

Subindex	0x02
Name	AnalogOutput16_2
Data Type	Integer16
Access	ReadWriteWrite
Can be mapped	Yes