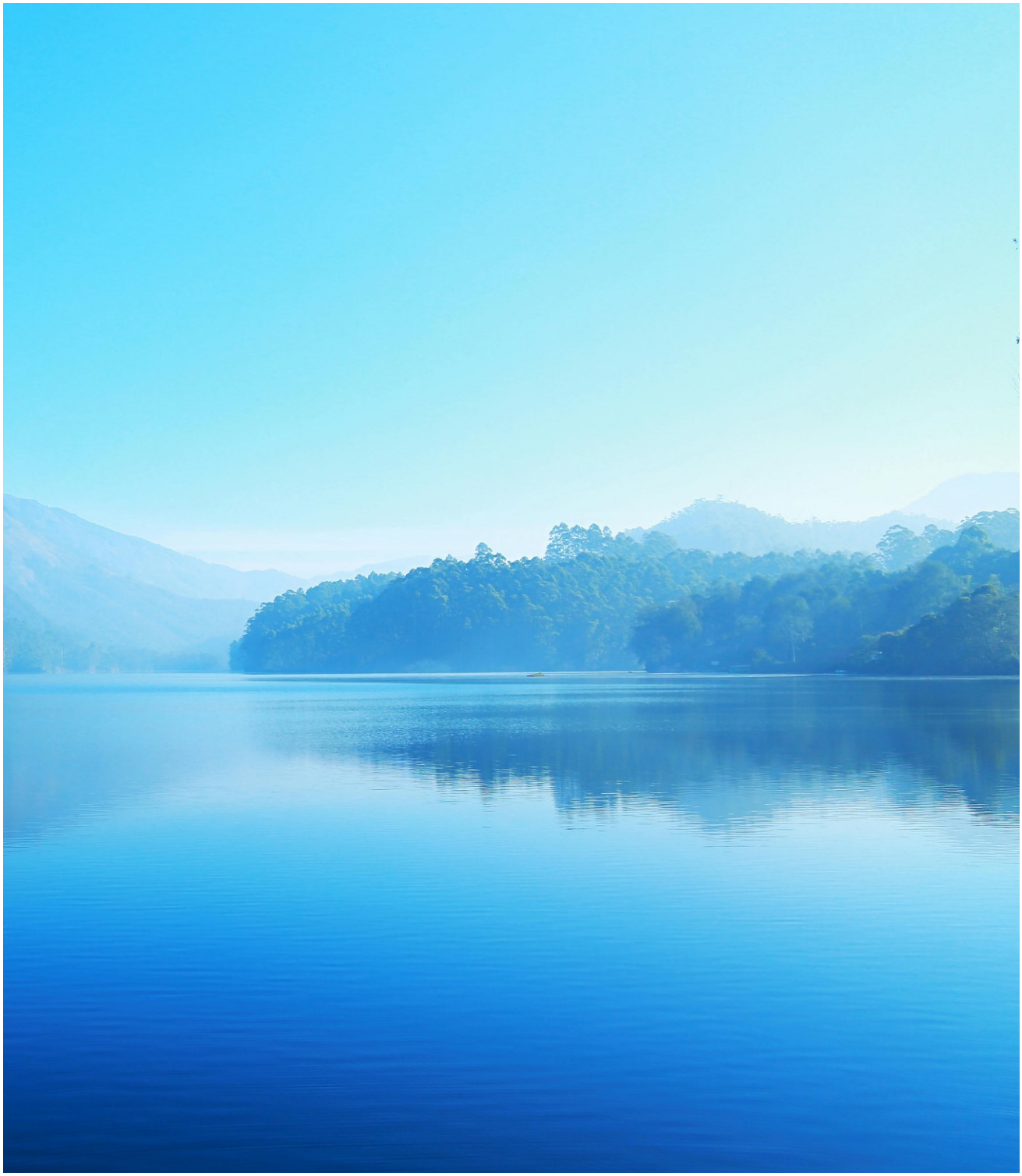
SMH Technologies®

21/10/2024

Driver v. 5.04

Moreno Ortolan

Interfacing FlashRunner 2.0 with ELMOS SWD



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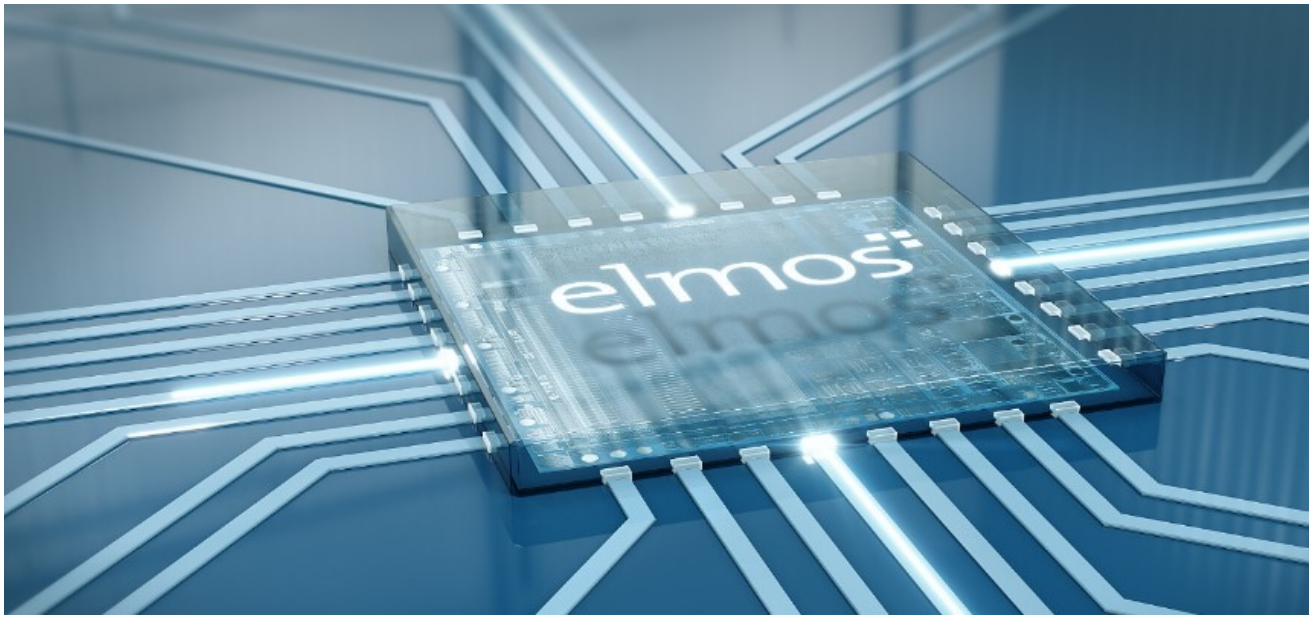
ELMOS SWD Introduction

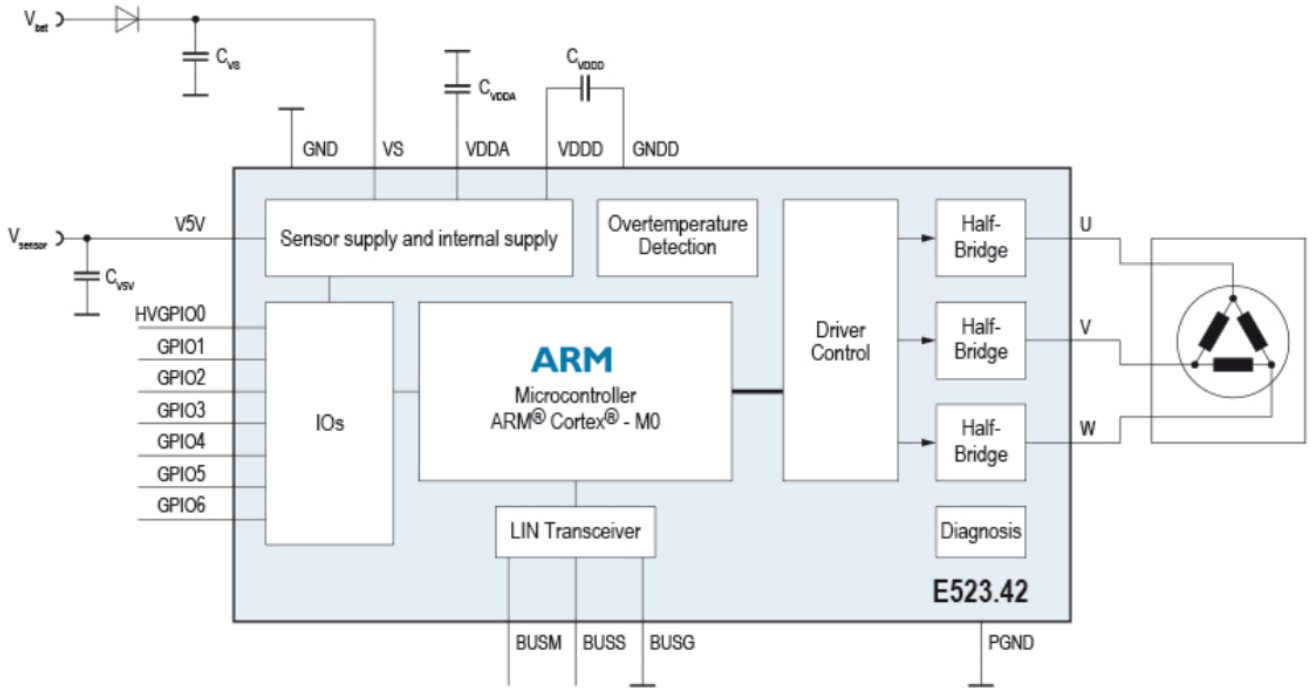


Elmos, a leading manufacturer of automotive mixed-signal semiconductors, is one of the pioneers and a figurehead for the profound structural change in Dortmund and the entire Ruhr region.

Thanks to its targeted focus on future-oriented industries such as microelectronics, nanotechnologies or IT, Dortmund is a rapidly growing technology and start-up centre.

E523.42 Introduction

E523.42 is a three Phase Motor Controller



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The E523.42 is a highly integrated motor controller for 12V automotive application.
The device combines a 32bit ARM® Cortex®-M0 microcontroller and a high-voltage analog motor driver in a small footprint leadless package.

This device drives a three-phase brush less motor (BLDC), a three-phase stepper motor or two conventional DC motors.
The combination of a microcontroller and an integrated power stage provides a cost optimized system for low to medium power actuator and fan applications.

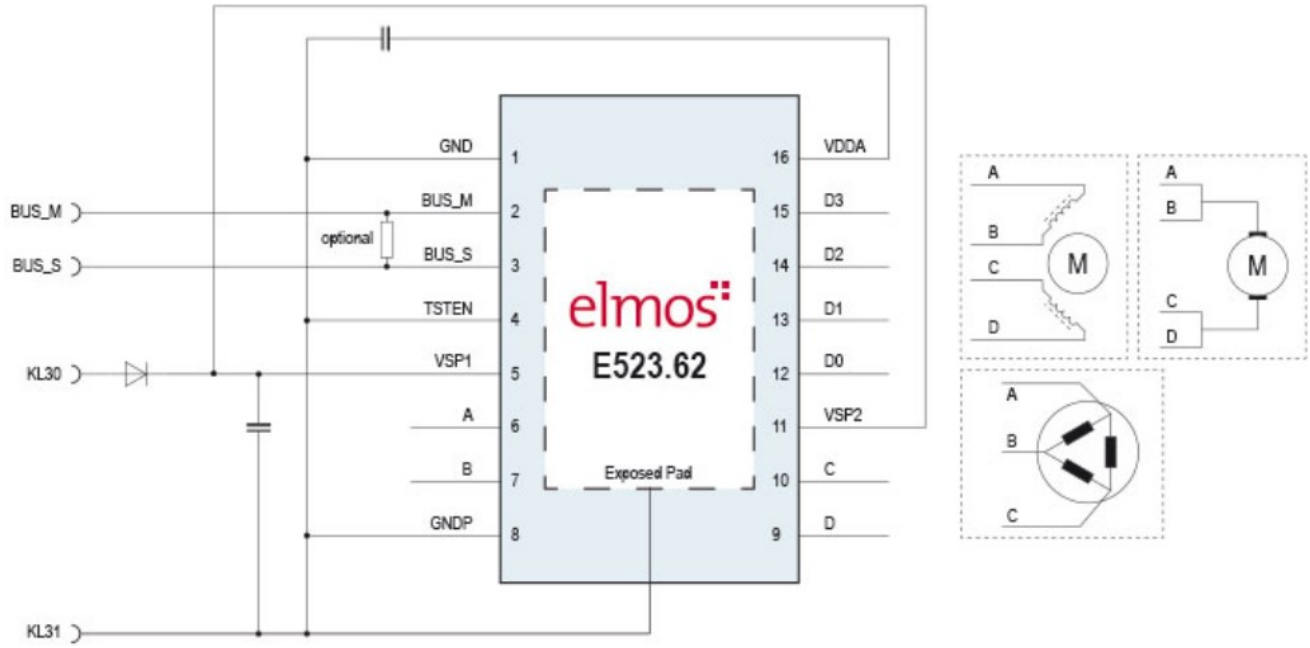
The integrated measurement system provides all input signals to realize a sensor less close loop commutation and provides a complete set of monitor and diagnosis features.

For outstanding absolute positioning requirements external sensors are supported by providing supply voltage and various data interfaces (analog/digital GPIOs, SPI).

A serial interface supports fast end-of-line OTP firmware programming.
The LIN 2.2 interface with autobaud and auto-addressing functionality enables the integration into existing LIN bus systems.

E523.62 Introduction

E523.62 is a fully Integrated Motor Controller with 4 Half Bridges SoC



E523.62 is a highly integrated motor controller for 12V automotive applications.
The device combines a 32bit ARM® Cortex®-M23 microcontroller and a high-voltage analog motor driver in a small footprint package.

This device drives a three-phase brush less motor (BLDC), a two-phase stepper motor or up to two brushed DC motors.
The combination of a microcontroller and an integrated power stage provides a cost optimized system for low to medium power actuator and fan applications.
The integrated measurement system provides all input signals to realize a sensor less close loop commutation and provides a complete set of monitoring and diagnostic features.

For outstanding absolute positioning requirements external sensors are supported by providing supply voltage and various data interfaces (analog/digital GPIOs).

A serial interface supports fast end-of-line Flash firmware programming. The LIN 2.2 interface with autobaud and auto addressing functionality enables the integration into existing LIN bus systems.

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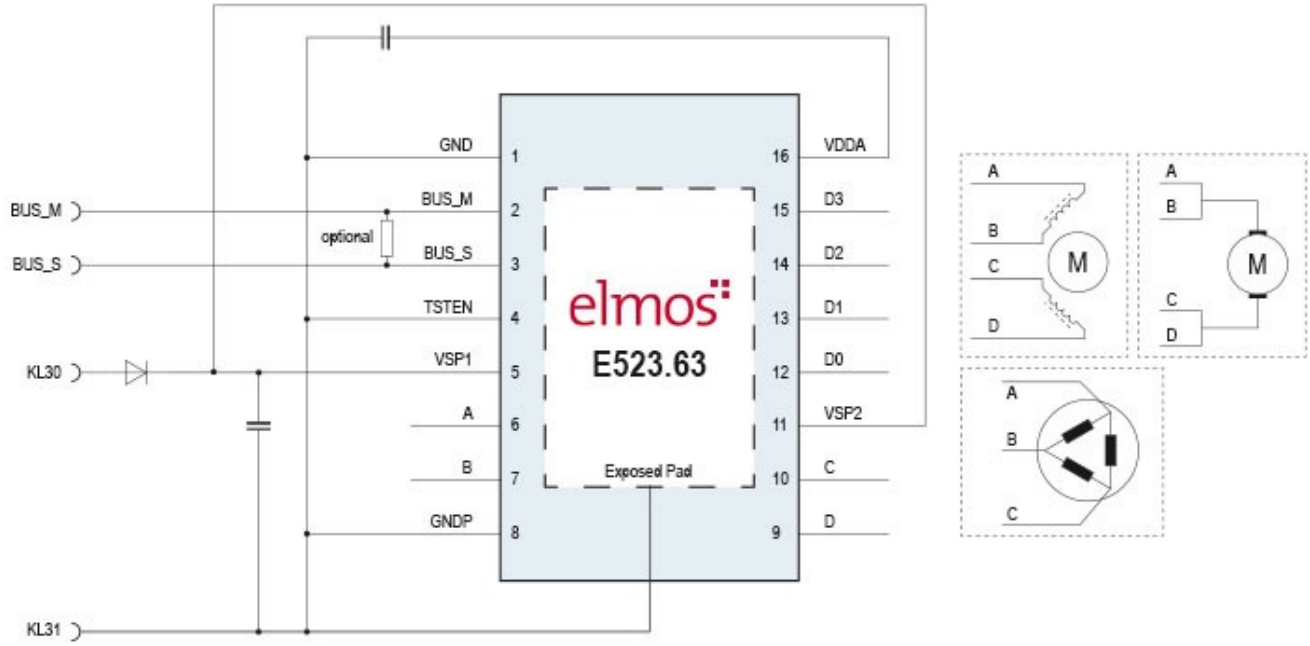
E523.63 Introduction

E523.63 is a fully Integrated Motor Controller with 4 Half Bridges SoC



E523.62 is a highly integrated motor controller for 12V automotive applications.
The device combines a 32bit ARM® Cortex®-M23 microcontroller and a high-voltage analog motor driver in a small footprint package.

This device drives a three-phase brush less motor (BLDC), a two-phase stepper motor or up to two brushed DC motors.
The combination of a microcontroller and an integrated power stage provides a cost optimized system for low to medium power actuator and fan applications.
The integrated measurement system provides all input signals to realize a sensor less close loop commutation and provides a complete set of monitoring and diagnostic features.

For outstanding absolute positioning requirements external sensors are supported by providing supply voltage and various data interfaces (analog/digital GPIOs).

A serial interface supports fast end-of-line Flash firmware programming. The LIN 2.2 interface with autobaud and auto addressing functionality enables the integration into existing LIN bus systems.

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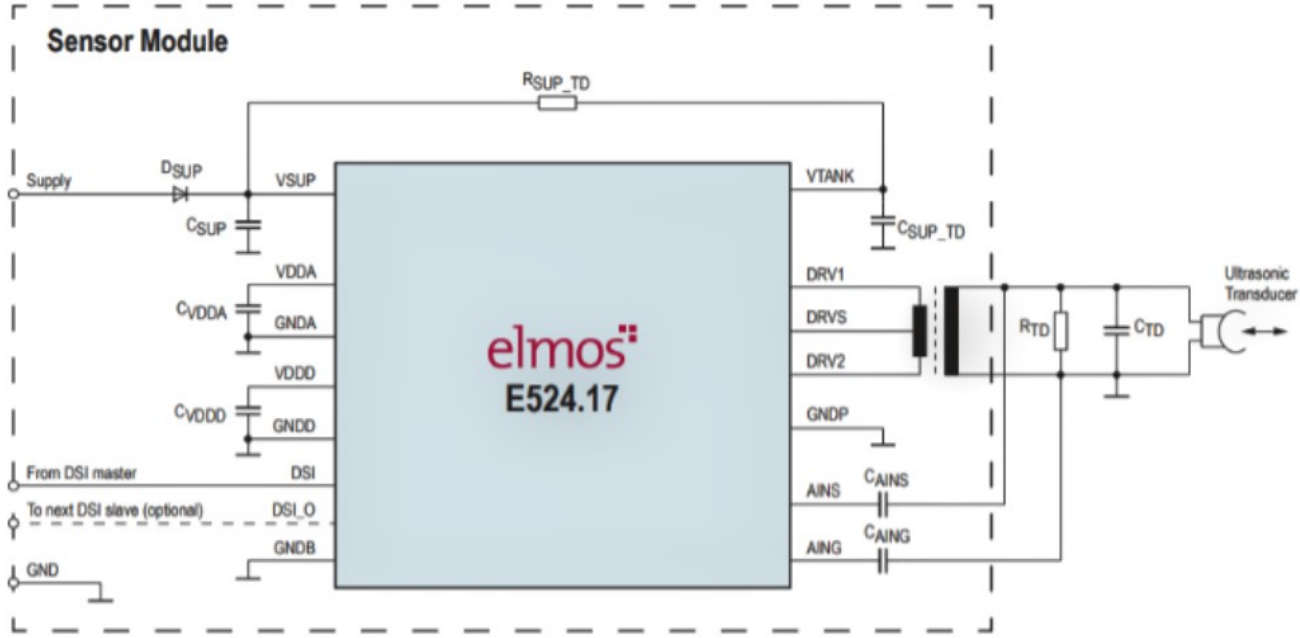
E524.17 Introduction

E524.17 is a Smart Ultrasonic Sensor IC with DSI Interface



This device provides outstanding performance in ultrasonic applications.
The embedded programmable micro controller offers maximum flexibility to adapt to various applications.

The advanced and very reliable echo detection in combination with comprehensive digital signal processing (advanced filters, automatic thresholds, echo peak detection, sensitivity time control, ...) optimizes short- and long-range detection performance. The new ultrasound signal coding realizes high robustness against noise, environmental conditions and other ultrasound sources.

DSI3 communication with up to 444 kbit/s per sensor enables a high payload data transfer to reduce system reaction times. Both point-to-point topology and bus mode are supported.

The powerful 32-bit Arm® Cortex® -M0 offers many features for special analysis, evaluation and debugging purposes (e.g., envelope and raw data output).

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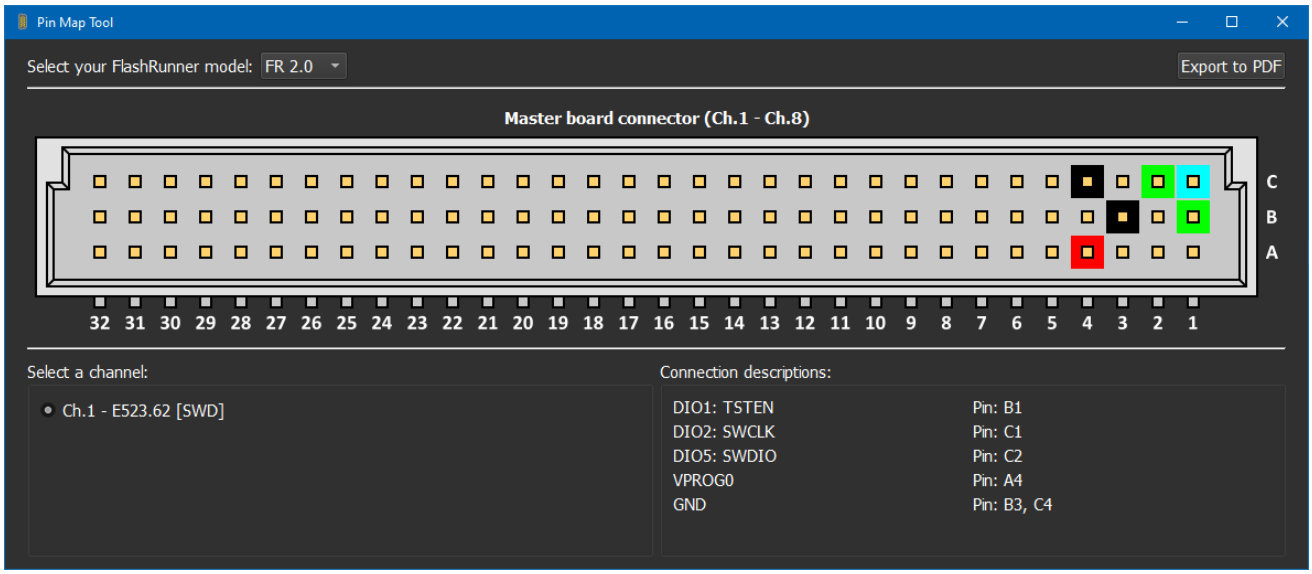
ELMOS SWD Protocol and PIN map

ELMOS SWD E52x devices support the SWD protocol.

```
#TCSETPAR CMODE <SWD>
```

ELMOS SWD PIN MAP



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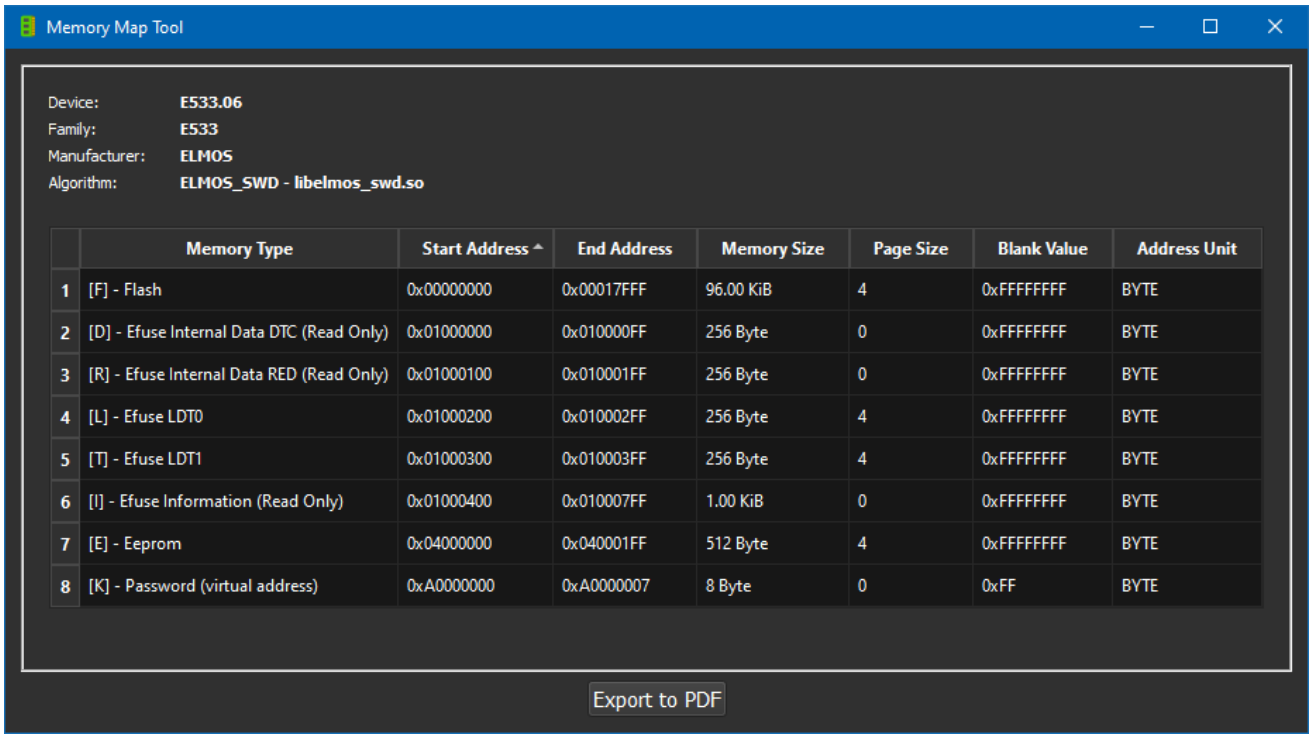
ELMOS SWD Memory Map

ELMOS E533.06 Memory Map

Memory Type	Start Address	End Address	Memory Size	Page Size	Blank Value	Address Unit
[F] - Flash	0x00000000	0x0001FFFF	96.00 KiB	4	0xFF	BYTE
[D] - Efuse Internal Data (Read Only)	0x01000000	0x010000FF	256 Byte	0	0xFF	BYTE
[R] - Efuse Internal Data (Read Only)	0x01000100	0x010001FF	256 Byte	0	0xFF	BYTE
[L] - Efuse LDT0	0x01000200	0x010002FF	256 Byte	4	0xFF	BYTE
[T] - Efuse LDT1	0x01000300	0x010003FF	256 Byte	4	0xFF	BYTE
[I] - Efuse Information (Read Only)	0x01000400	0x010007FF	1.00 KiB	0	0xFF	BYTE
[E] - Eeprom	0x04000000	0x040001FF	512 Byte	4	0xFF	BYTE
[K] - Password (virtual address)	0xA0000000	0xA000000F	8 Byte	0	0xFF	BYTE

Note: Memory listed below are “Read Only” and cannot be programmed or erased.

```
[D] - Efuse Internal Data (Read Only)
[R] - Efuse Internal Data (Read Only)
[I] - Efuse Information   (Read Only)
```



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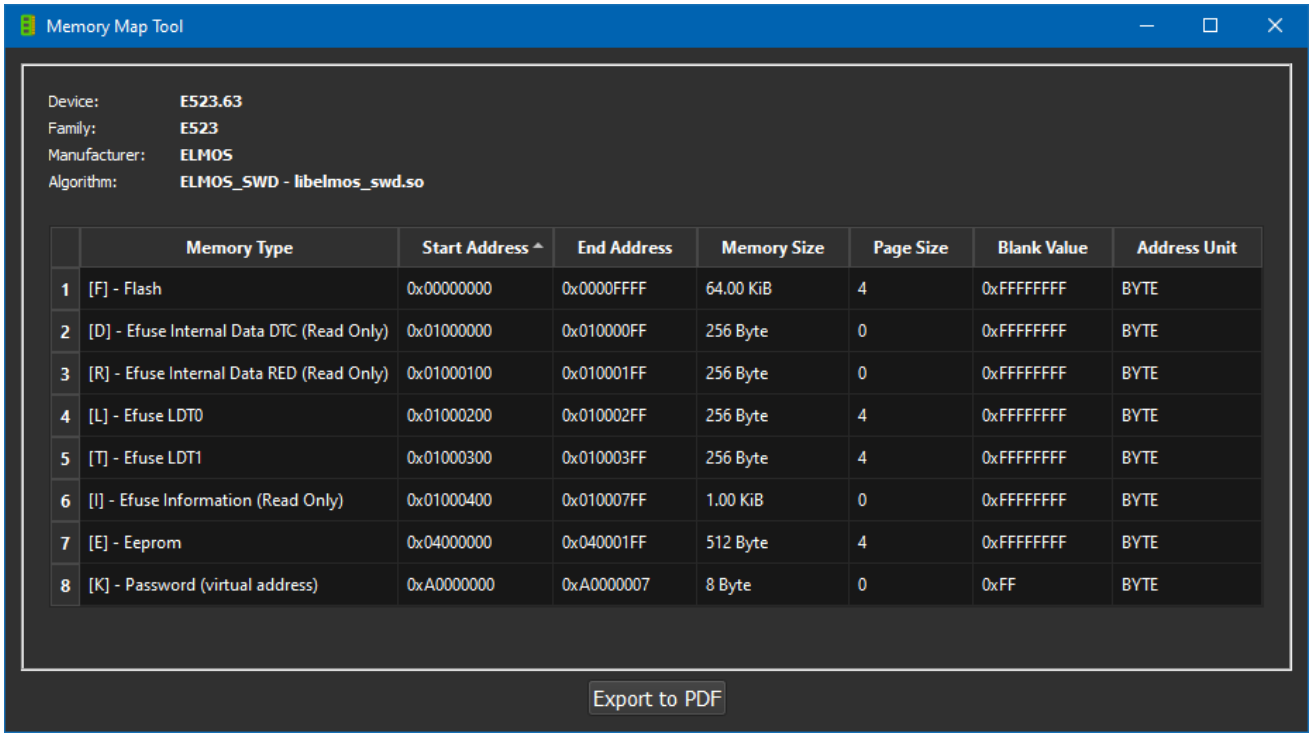
ELMOS E523.62 and E523.63 Memory Map

Memory Type	Start Address	End Address	Memory Size	Page Size	Blank Value	Address Unit
[F] - Flash	0x00000000	0x0000FFFF	64.00 KiB	4	0xFF	BYTE
[D] - Efuse Internal Data (Read Only)	0x01000000	0x010000FF	256 Byte	0	0xFF	BYTE
[R] - Efuse Internal Data (Read Only)	0x01000100	0x010001FF	256 Byte	0	0xFF	BYTE
[L] - Efuse LDT0	0x01000200	0x010002FF	256 Byte	4	0xFF	BYTE
[T] - Efuse LDT1	0x01000300	0x010003FF	256 Byte	4	0xFF	BYTE
[I] - Efuse Information (Read Only)	0x01000400	0x010007FF	1.00 KiB	0	0xFF	BYTE
[E] - Eeprom	0x04000000	0x040001FF	512 Byte	4	0xFF	BYTE
[K] - Password (virtual address)	0xA0000000	0xA000000F	8 Byte	0	0xFF	BYTE

Note: Memory listed below are “Read Only” and cannot be programmed or erased.

```
[D] - Efuse Internal Data (Read Only)
[R] - Efuse Internal Data (Read Only)
[I] - Efuse Information   (Read Only)
```



	Memory Type	Start Address	End Address	Memory Size	Page Size	Blank Value	Address Unit
1	[F] - Flash	0x00000000	0x0000FFFF	64.00 KiB	4	0xFFFFFFFF	BYTE
2	[D] - Efuse Internal Data DTC (Read Only)	0x01000000	0x010000FF	256 Byte	0	0xFFFFFFFF	BYTE
3	[R] - Efuse Internal Data RED (Read Only)	0x01000100	0x010001FF	256 Byte	0	0xFFFFFFFF	BYTE
4	[L] - Efuse LDT0	0x01000200	0x010002FF	256 Byte	4	0xFFFFFFFF	BYTE
5	[T] - Efuse LDT1	0x01000300	0x010003FF	256 Byte	4	0xFFFFFFFF	BYTE
6	[I] - Efuse Information (Read Only)	0x01000400	0x010007FF	1.00 KiB	0	0xFFFFFFFF	BYTE
7	[E] - Eeprom	0x04000000	0x040001FF	512 Byte	4	0xFFFFFFFF	BYTE
8	[K] - Password (virtual address)	0xA0000000	0xA0000007	8 Byte	0	0xFF	BYTE

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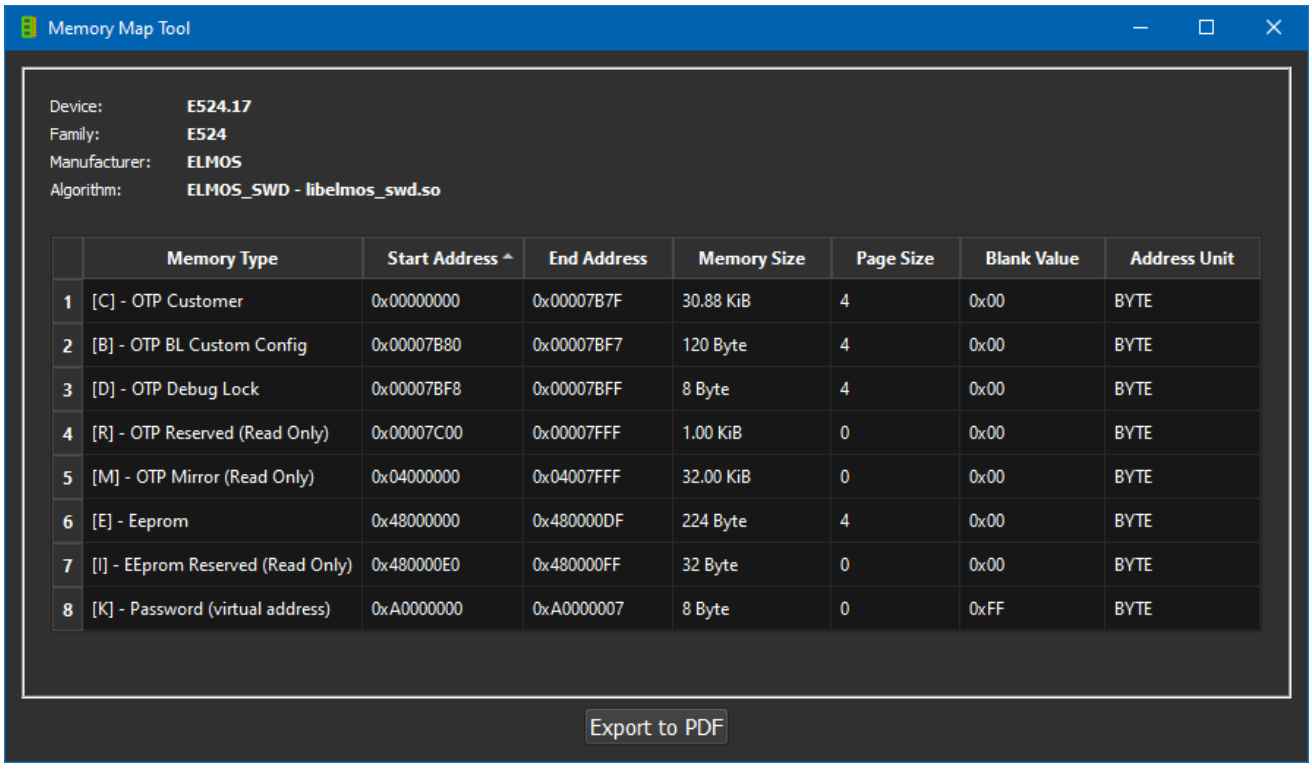
ELMOS E523.42 and E524.17 Memory Map

Memory Type	Start Address	End Address	Memory Size	Page Size	Blank Value	Address Unit
[C] - OTP Customer	0x00000000	0x00007B7F	30.88 KiB	4	0x00	BYTE
[B] - OTP BL Custom Config	0x00007B80	0x00007BF7	120 Byte	4	0x00	BYTE
[D] - OTP Debug Lock	0x00007BF8	0x00007BFF	8 Byte	4	0x00	BYTE
[R] - OTP Reserved (Read Only)	0x00007C00	0x00007FFF	1.00 KiB	0	0x00	BYTE
[M] - OTP Mirror (Read Only)	0x04000000	0x04007FFF	32.00 KiB	0	0x00	BYTE
[E] - Eeprom	0x48000000	0x480000DF	224 Byte	4	0x00	BYTE
[I] - EEprom Reserved (Read Only)	0x480000E0	0x480000FF	32 Byte	0	0x00	BYTE
[K] - Password (virtual address)	0xA0000000	0xA000000F	8 Byte	0	0xFF	BYTE

Note: Memory listed below are “Read Only” and cannot be programmed or erased.

```
[R] - OTP Reserved (Read Only)
[M] - OTP Mirror (Read Only)
[I] - EEprom Reserved (Read Only)
```



	Memory Type	Start Address	End Address	Memory Size	Page Size	Blank Value	Address Unit
1	[C] - OTP Customer	0x00000000	0x00007B7F	30.88 KiB	4	0x00	BYTE
2	[B] - OTP BL Custom Config	0x00007B80	0x00007BF7	120 Byte	4	0x00	BYTE
3	[D] - OTP Debug Lock	0x00007BF8	0x00007BFF	8 Byte	4	0x00	BYTE
4	[R] - OTP Reserved (Read Only)	0x00007C00	0x00007FFF	1.00 KiB	0	0x00	BYTE
5	[M] - OTP Mirror (Read Only)	0x04000000	0x04007FFF	32.00 KiB	0	0x00	BYTE
6	[E] - Eeprom	0x48000000	0x480000DF	224 Byte	4	0x00	BYTE
7	[I] - EEprom Reserved (Read Only)	0x480000E0	0x480000FF	32 Byte	0	0x00	BYTE
8	[K] - Password (virtual address)	0xA0000000	0xA0000007	8 Byte	0	0xFF	BYTE

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ELMOS SWD Driver Parameters

The standard parameters are used to configure some specific options inside ELMOS SWD driver.

#TCSETPAR ENTRY_CLOCK

Syntax: `#TCSETPAR ENTRY_CLOCK <Frequency>`

`<Frequency>` Accepted parameters 4000000, 2000000, 1000000, 500000, 100000 Hz

Description: Set the SWD frequency used in the Connect procedure before raising the PLL of the device, if the device PLL is available

Note: Default value 4.00 MHz

#TCSETPAR CPU_CORE_SYSTEM_CLOCK

Syntax: `#TCSETPAR CPU_CORE_SYSTEM_CLOCK <Value MHz>`

`<Value MHz>` **E533.06**, **E523.62**, **E523.63** and **E523.65** Accepted values are 40MHz, 20MHz, 10MHz or 5MHz
`<Value MHz>` **E523.42** and **E524.17** Accepted values are 24MHz, 12MHz, 8MHz or 4MHz

Description: Set the internal Elmos CPU Core System Clock

Note: None

#TCSETPAR SAMPLING_POINT

Syntax: `#TCSETPAR SAMPLING_POINT <Value>`

`<Value>` Accepted values are in the range 1-15

Description: Use this parameter to permanently set the sampling point of the FPGA
It is recommended to leave this parameter with the default value

Note: Default value 17

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ELMOS SWD Driver Commands

Here you can find the complete list of all available commands for SWD driver.

ELMOS E533.06, E523.62 and E523.63 Memory Map

```
F → Flash
D → Efuse Internal Data (Read Only)
R → Efuse Internal Data (Read Only)
L → Efuse LDT0
T → Efuse LDT1
I → Efuse Information (Read Only)
E → Eeprom
```

ELMOS E523.65 Memory Map

```
F → Flash
D → Efuse Internal Data (Read Only)
R → Efuse Internal Data (Read Only)
L → Efuse LDT0
T → Efuse LDT1
I → Efuse Information (Read Only)
```

ELMOS E523.42 and E524.17 Memory Map

```
C → OTP Customer
B → OTP BL Custom Config
D → OTP Debug Lock
R → OTP Reserved (Read Only)
M → OTP Mirror (Read Only)
E → Eeprom
I → EEprom Reserved (Read Only)
```

#TPCMD CONNECT

#TPCMD CONNECT

This command performs the entry and is the first command to be executed when starting the communication with the device. Here you can find the log of a standard connect.

If you need to use a password other than the default one to unlock your device, you can use the following command:

```
#DYNMEMCLR
#TPSETSRC DYNMEM
#DYNMEMSET2 0xA0000000 8 PASSWORD
```

Address = 0xA0000000
Size = 8
Password = PASSWORD

ELMOS E533.06, E523.62, E523.63 and E523.65

```
---#TPCMD CONNECT
Error turning on VPROG0. Setting voltage gradually to limit the peak of current.
Protocol selected SWD.
Entry Clock is 1.00 MHz.
Trying Hot Plug connect procedure with TSTEN high.
Wrong id Code. Read 0x00000000, instead of 0x0BF11477.
Debug is disabled! Try to enable it using OTP password.
Switch to TEST AP to analyse device configuration.
 * Test AP IDR value: 0x09820000.
 * Enable Customer Mode with signatures.
 * FRB Password cannot be used.
 * Use default SWD Password equal to 0x0000000000000000.
 * Startup breakpoint address is 0x02000110.
 * Execute Alternative Boot Sequence and Halt Startup Watchdog.
 * Alternative boot protocol version: 0x01.
 * Transmit Signature with handshaking.
IDCODE: 0x0BF11477.
Designer: 0x23B, Part Number: 0xBF11, Version: 0x0.
```


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```
JTAG-SWD Debug Port enabled.
Scanning AP map to find all APs.
AP[0] IDR: 0x04770025, Type: AMBA AHB5 bus.
AP[42] IDR: 0x09820000, Type: JTAG connection.
AP[0] ROM table base address 0xE00FF000.
CPUID: 0x411CD200.
Implementer Code: 0x41 - [ARM].
Found Cortex M23 revision r1p0.
Try to reset the device and halt the core using breakpoint unit.
 * Program counter value is 0x00001A00.
 * Valid Program Counter found. Forcing software breakpoint.
> Breakpoint software used correctly. Program Counter value is 0x02000110.
Cortex M23 Core halted [0.034 s].
CPU Core System Clock is set to 40.00 MHz.
Requested Clock is 37.50 MHz.
Generated Clock is 37.50 MHz.
Good samples: 3 [Range 6-8].
IDCODE: 0x0BF11477.
Designer: 0x23B, Part Number: 0xBF11, Version: 0x0.
ID-Code read correctly at 37.50 MHz.
Internal watchdog is already disabled.
Time for Connect: 1.361 s.
>|
```

ELMOS E523.42 and E524.17

```
---#TPCMD CONNECT
Protocol selected SWD.
Entry Clock is 4.00 MHz.
Trying Hot Plug connect procedure.
IDCODE: 0x0BB11477.
Designer: 0x23B, Part Number: 0xBB11, Version: 0x0.
ID-Code read correctly at 4.00 MHz.
Switch to TEST AP to analyse device configuration.
 * Test AP IDR value: 0x09820000.
 * Enable Customer Mode with signatures.
 * FRB Password cannot be used.
 * Use default SWD Password equal to 0x0000000000000000.
 * Startup breakpoint address is 0x08000144.
 * Execute Alternative Boot Sequence and Halt Startup Watchdog.
 * Alternative boot protocol version: 0x00.
 * Signature is not necessary now.
IDCODE: 0x0BB11477.
Designer: 0x23B, Part Number: 0xBB11, Version: 0x0.
JTAG-SWD Debug Port enabled.
Scanning AP map to find all APs.
AP[0] IDR: 0x04770021, Type: AMBA AHB3 bus.
AP[42] IDR: 0x09820000, Type: JTAG connection.
AP[0] ROM table base address 0xE00FF000.
CPUID: 0x410CC200.
Implementer Code: 0x41 - [ARM].
Found Cortex M0 revision r0p0.
Try to reset the device and halt the core using breakpoint unit.
 * Program counter value is 0x080000F4.
 * Valid Program Counter found. Forcing software breakpoint.
> Breakpoint software used correctly. Program Counter value is 0x08000144.
Cortex M0 Core halted [0.004 s].
CPU Core System Clock is unchanged.
Requested Clock is 10.00 MHz.
Generated Clock is 10.00 MHz.
Good samples: 10 [Range 0-9].
IDCODE: 0x0BB11477.
Designer: 0x23B, Part Number: 0xBB11, Version: 0x0.
ID-Code read correctly at 10.00 MHz.
Internal watchdog is already disabled.
Time for Connect: 0.263 s.
```

#TPCMD MASSERASE

#TPCMD MASSERASE <F|E|L|T> for **ELMOS E533.06, E523.62, E523.63 and E523.65**
#TPCMD MASSERASE <E> for **ELMOS E523.42 and E524.17**
This command performs a masserase of selected memory.

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#TPCMD ERASE

#TPCMD ERASE <F|E|L|T> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD ERASE <E> for ELMOS E523.42 and E524.17
This command performs a sector erase of all selected memory.

#TPCMD ERASE <F|E|L|T> <start address> <size> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD ERASE <E> <start address> <size> for ELMOS E523.42 and E524.17
This command performs a sector erase of selected part of memory based on start address and size.
Enter the Start Address and Size in hexadecimal format.

#TPCMD BLANKCHECK

#TPCMD BLANKCHECK <F|E|L|T> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD BLANKCHECK <C|B|D|E> for ELMOS E523.42 and E524.17
This command performs a verify if all selected memory is erased.

#TPCMD BLANKCHECK <F|E|L|T> <start address> <size> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD BLANKCHECK <C|B|D|E> <start address> <size> for ELMOS E523.42 and E524.17
This command performs a verify if selected part of memory based on start address and size is erased.
Enter the Start Address and Size in hexadecimal format.

#TPCMD PROGRAM

#TPCMD PROGRAM <F|E|L|T> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD PROGRAM <C|B|D|E> for ELMOS E523.42 and E524.17
This command performs a program of all selected memory based on the data in the FRB file.

#TPCMD PROGRAM <F|E|L|T> <start address> <size> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD PROGRAM <C|B|D|E> <start address> <size> for ELMOS E523.42 and E524.17
This command performs a program of selected part of selected memory based on the data in the FRB file.
Enter the Start Address and Size in hexadecimal format.

#TPCMD VERIFY

#TPCMD VERIFY <F|E|L|T> <R> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD VERIFY <C|B|D|E> <R> for ELMOS E523.42 and E524.17
R: Readout Mode.
Verify all memory of the selected type based on the data in the FRB file.

#TPCMD VERIFY <F|E|L|T> <R> <start address> <size> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD VERIFY <C|B|D|E> <R> <start address> <size> for ELMOS E523.42 and E524.17
R: Readout Mode.
Verify selected part of memory of the selected type based on the data in the FRB file.
Enter the Start Address and Size in hexadecimal format.

#TPCMD VERIFY <F|E|L|T> <S> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD VERIFY <C|B|D|E> <S> for ELMOS E523.42 and E524.17
S: Checksum 32 Bit Mode.
Verify all memory of the selected type based on the data in the FRB file.

#TPCMD VERIFY <F|E|L|T> <S> <start address> <size> for ELMOS E533.06, E523.62, E523.63 and E523.65
#TPCMD VERIFY <C|B|D|E> <S> <start address> <size> for ELMOS E523.42 and E524.17
S: Checksum 32 Bit Mode.
Verify selected part of memory based on the data in the FRB file.
Enter the Start Address and Size in hexadecimal format.

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#TPCMD READ

`#TPCMD READ <F|D|R|L|T|I|E>` for **ELMOS E533.06, E523.62, E523.63 and E523.65**
`#TPCMD READ <C|B|D|R|M|E|I>` for **ELMOS E523.42 and E524.17**
This command performs a read of all selected memory.
The result of the read command will be visible into the Terminal.

`#TPCMD READ <F|D|R|L|T|I|E> <start address> <size>` for **ELMOS E533.06, E523.62, E523.63 and E523.65**
`#TPCMD READ <C|B|D|R|M|E|I> <start address> <size>` for **ELMOS E523.42 and E524.17**
This command performs a read of selected part of memory based on start address and size.
The result of the read command will be visible into the Terminal.
Enter the Start Address and Size in hexadecimal format.

#TPCMD DUMP

`#TPCMD DUMP <F|D|R|L|T|I|E>` for **ELMOS E533.06, E523.62, E523.63 and E523.65**
`#TPCMD DUMP <C|B|D|R|M|E|I>` for **ELMOS E523.42 and E524.17**
This command performs a dump of all selected memory.
The result of the dump command will be stored in the FlashRunner 2.0 internal memory.

`#TPCMD DUMP <F|D|R|L|T|I|E> <start address> <size>` for **ELMOS E533.06, E523.62, E523.63 and E523.65**
`#TPCMD DUMP <C|B|D|R|M|E|I> <start address> <size>` for **ELMOS E523.42 and E524.17**
This command performs a dump of all selected memory.
The result of the dump command will be stored in the FlashRunner 2.0 internal memory.
Enter the Start Address and Size in hexadecimal format.

#TPCMD GET_DEVICE_INFORMATIONS

Syntax: `#TPCMD GET_DEVICE_INFORMATIONS`

Prerequisites: Only for ELMOS **E523.42** and **E524.17**

Description: This function reads some device informations from the device

Note: This command prints into Terminal and Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD GET_DEVICE_INFORMATIONS
Chip-Identifier:
 * Chip-Identifier lower 16 Bit: 0x67EE.
 * Chip-Identifier upper 16 Bit: 0x00FD.
Temperature sensor:
 * Temperature sensor gain calibration value: 0x20.
 * Temperature sensor offset calibration value: 0x1F4.
Eeprom status:
 * Eeprom is unlocked. Read value: 0x0000.
Access Flags:
 * OTP access is disabled. Read value: 0.
 * EEprom access is disabled. Read value: 0.
 * Flat 32 bit access is disabled. Read value: 0.
 * Read access is disabled. Read value: 0.
 * Proc call is disabled. Read value: 0.
 * Exit is disabled. Read value: 0.
Bootloader Key:
 * Bootloader key is 0x0000000000000000.
Time for Get Device Informations: 0.003 s.
```

#TPCMD GET_CHIP_IDENTIFIER

Syntax: `#TPCMD GET_CHIP_IDENTIFIER`

Prerequisites: Only for ELMOS **E523.42** and **E524.17**

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Description: This function reads the Device Chip Identifier

Note: This command prints into Terminal and Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD GET_CHIP_IDENTIFIER
Chip-Identifier:
 * Chip-Identifier lower 16 Bit: 0x67EE.
 * Chip-Identifier upper 16 Bit: 0x00FD.
Time for Get Chip Identifier: 0.001 s.
```

#TPCMD GET_BOOTLOADER_KEY

Syntax: `#TPCMD GET_BOOTLOADER_KEY`

Prerequisites: Only for ELMOS E523.42 and E524.17

Description: This function gets the Bootloader Key from the device

Note: This command prints into Terminal and Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD GET_BOOTLOADER_KEY
Bootloader Key:
 * Bootloader key is 0x0000000000000000.
Time for Get Bootloader Key: 0.001 s.
```

#TPCMD WRITE_EEPROM

Syntax: `#TPCMD WRITE_EEPROM <Mode> <Address> <Value> <Mask>`

<Mode>	Mode can be 8bit, 16bit, 24bit or 32bit
<Address>	Address in HEX format (i.e., 0x48000000)
<Value>	Value in HEX format (i.e., 0xDEADBEEF)
<Mask>	Mask in HEX format (i.e., 0xFFFFFFFF)

Prerequisites: Only for ELMOS E523.42 and E524.17

Description: This function writes the device EEprom at specific address <Address> with inserted Value <Value> using the Mask <Mask>

Note: This command prints into Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD WRITE_EEPROM 32Bit 0x48000000 0xDEADBEEF 0xFFFFFFFF
Time for Write EEprom: 0.015 s.
```

#TPCMD VERIFY_EEPROM

Syntax: `#TPCMD VERIFY_EEPROM <Mode> <Address> <Value> <Mask>`

<Mode>	Mode can be 8bit, 16bit, 24bit or 32bit
<Address>	Address in HEX format (i.e., 0x48000000)
<Value>	Value in HEX format (i.e., 0xDEADBEEF)
<Mask>	Mask in HEX format (i.e., 0xFFFFFFFF)

Prerequisites: Only for ELMOS E523.42 and E524.17

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Description: This function verifies the device EEprom at specific address <Address> with inserted Value <Value> using the Mask <Mask>

Note: This command prints into Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD VERIFY_EEPROM 32Bit 0x48000000 0xDEADBEEF 0xFFFFFFFF
Time for Verify EEprom: 0.015 s.
```

#TPCMD READ_MEM8

Syntax: #TPCMD READ_MEM8 <Address> <Byte Count>

<Address>	Address in HEX format (i.e., 0x52002020)
<Byte Count>	Byte count in decimal format (i.e., 8 -> eight bytes)

Prerequisites: none

Description: Read memory byte per byte from target SWD device

Note: This command prints into Terminal and Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD READ_MEM8 0x52002020 8
Read[0x52002020]: 0xF0
Read[0x52002021]: 0xAA
Read[0x52002022]: 0x16
Read[0x52002023]: 0x14
Read[0x52002024]: 0x00
Read[0x52002025]: 0x00
Read[0x52002026]: 0x00
Read[0x52002027]: 0x00
Time for Read Mem: 0.002 s
```

#TPCMD READ_MEM16

Syntax: #TPCMD READ_MEM16 <Address> <16-bit Word Count>

<Address>	Address in HEX format (i.e., 0x52002020)
<16-bit Word Count>	16-bit Word count in decimal format (i.e., 4 -> four 16-bit words)

Prerequisites: none

Description: Read memory 16-bit word per 16-bit word from target SWD device

Note: This command prints into Terminal and Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD READ_MEM16 0x52002020 4
Read[0x52002020]: 0xAAF0
Read[0x52002022]: 0x1416
Read[0x52002024]: 0x0000
Read[0x52002026]: 0x0000
Time for Read Mem: 0.002 s
```

#TPCMD READ_MEM32

Syntax: #TPCMD READ_MEM32 <Address> <32-bit Word Count>

<Address>	Address in HEX format (i.e., 0x52002020)

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	<32-bit Word Count>	32-bit Word count in decimal format (i.e., 2 -> two 32-bit words)

Prerequisites: none

Description: Read memory 32-bit word per 32-bit word from target SWD device

Note: This command prints into Terminal and Real Time Log

Examples: Correct command execution: 😊

```
---#TPCMD READ_MEM32 0x52002020 2
Read[0x52002020]: 0x1416AAF0
Read[0x52002024]: 0x00000000
Time for Read Mem: 0.002 s
```

#TPCMD DISCONNECT

#TPCMD DISCONNECT

Disconnect function. Power off and exit.

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ELMOS SWD Driver Changelog

Info about driver versions prior to 5.00
All driver versions prior to 5.00 are to be considered obsolete, please update your driver to the latest version.

Info about driver version 5.00 - 11/12/2023
Supported E523.42, E523.62 and E524.17 Elmos devices.

Info about driver version 5.01 - 08/02/2024
Supported E523.63 and E523.65 Elmos devices.
Updated connect with password for Elmos devices.

Info about driver version 5.02 - 22/04/2024
Updated connect procedure to disable start-up watchdog.

Info about driver version 5.03 - 04/07/2024
Supported E533.06 Elmos device.
Updated connect with password for Elmos devices using the Password from FRB file or Dynamic Memory.

Info about driver version 5.04 - 21/10/2024
Updated password management for Elmos devices.

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