MCA4K

4000 Channel Analyzer for Spectroscopy

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1 Programming

The device is connected to a computer via USB interface and uses an integrated circuit FT245RL from Future Technology Device International Ltd. For proper operation, it is necessary to download the current version of the driver from www.ftdichip.com.

The device is controlled by a standard set of commands for setting and reading parameters, for obtaining data from the analyzer's memory and for obtaining data from the internal oscilloscope.

The commands are optimized for easy and quick passage through the structure of the USB drivers.

1.1 Standard Command Format

8 bytes of data are sent to the device, and 8 bytes of data are received from the device in the following format:

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID																														
Command DATA																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA																														

1.2 Receiving a response from the device - unknown command

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x00000000																														
Answer DATA = 0xFFFFFFFF																														

1.3 List of basic commands

A brief list of commands is in the following table

Command name	Command code	Description
MCA4K_GET_ID	0x00000001	Device identification
MCA4K_SET_TIME	0x00000002	Setting the Measurement Time
MCA4K_GET_TIME	0x00008002	Reading the Measurement Time
MCA4K_SET_CONTROL	0x00000003	Control Registry Settings
MCA4K_GET_CONTROL	0x00008003	Read the control register
MCA4K_SET_OFFSET	0x00000005	Offset settings
MCA4K_GET_OFFSET	0x00008005	Offset reading
MCA4K_SET_HV	0x00000006	High Voltage Setting
MCA4K_GET_HV	0x00008006	High voltage reading
MCA4K_SET_GAIN	0x00000007	Preamp gain settings
MCA4K_GET_GAIN	0x00008007	Preamp gain reading
MCA4K_SET_TTLOUT	0x00000008	TTL output settings
MCA4K_GET_TLLINOUT	0x00008008	Read the TTL status of input and output
MCA4K_SET_SCOPE	0x00000009	Oscilloscope register settings
MCA4K_GET_SCOPE	0x00008009	Reading the register of the oscilloscope
MCA4K_SET_USBTOUT	0x0000000A	USB timeout setting
MCA4K_GET_USBTOUT	0x0000800A	Reading USB timeout
MCA4K_GET_SCOPETRIG	0x0000000B	Determining whether the oscilloscope has been started
MCA4K_GET_MCARUN	0x0000000C	Determining if a measurement is in progress
MCA4K_GET_TIMER	0x0000000D	Finding the time of the measurement in progress
MCA4K_GET_DEADTIMER	0x0000000E	Detection of the dead time of a measurement in progress
MCA4K_ZERO	0x0000000F	Reset analyzer memory and time counters
MCA4K_START	0x00000010	Start analyzer measurement
MCA4K_STOP	0x00000011	Stop analyzer measurements
MCA4K_GET_MCA_DATA	0x00000012	Reading analyzer memory
MCA4K_GET_SCOPE_DATA	0x00000013	Reading data from an oscilloscope
MCA4K_GET_TEMPERATURE	0x00000014	Internal temperature of the device
MCA4K_GET_HVREADBACK	0x00000015	High Voltage Backward Measurement
MCA4K_GET_SETUP_RO	0x00000102	Loading RO setup into buffer
MCA4K_GET_SETUP_RW	0x00000100	Loading the RW setup into the buffer
MCA4K_SET_SETUP_RW	0x00000101	Writing a buffer to the RW setup
MCA4K_GET_BUF	0x00000110	Loading the setup buffer
MCA4K_SET_BUF	0x00000111	Setting the setup buffer

1.4 Supplemental commands

Command name	Command code	Description
MCA4K_GET_PUPCNT	0x00000016	Number of accumulated pulses in the current measurement
MCA4K_GET_PREAMP	0x00000017	Reading the status of an external preamplifier
MCA4K_SET_SCRATCH	0x00000018	Write a universal registry
MCA4K_GET_SCRATCH	0x00008018	Reading the Universal Registry
MCA4K_SET_SCOPE2	0x00000019	Oscilloscope Extension Settings
MCA4K_GET_SCOPE2	0x00008019	Reading the Oscilloscope Extension Settings

1.5 Trapezoidal Filter – Extension Commands

Extension commands are not always standard, it depends on the specific configuration of the device

Command name	Command code	Description
MCA4K_SET_TF	0x00000104	Setting the Trapezoidal Filter
MCA4K_GET_TF	0x00008104	Reading Trapezoidal Filter Settings
MCA4K_SET_PZ	0x00000105	Setting the P-Z compensation of the trapezoidal filter and coefficients
MCA4K_GET_PZ	0x00008105	Reading the P-Z settings of the trapezoidal filter compensation and coefficients
MCA4K_SET_SCALE	0x00000106	Setting the Trapezoidal Filter Scaler
MCA4K_GET_SCALE	0x00008106	Reading the Trapezoidal Filter Scaler Settings

1.6 Anti-Coincidence Shielding (ACS) - Extension Commands

Extension commands are not always standard, it depends on the specific configuration of the device

Command name	Command code	Description
MCA4K_SET_ACSCMP	0x00000205	Setting the ACS Pulse Comparative Level
MCA4K_GET_ACSCMP	0x00008205	Reading the comparative level of the ACS pulse
MCA4K_SET_ACSHV	0x00000206	ACS High Voltage Setting
MCA4K_GET_ACSHV	0x00008206	Reading ACS High Voltage Settings
MCA4K_GET_ACSHVREADBACK	0x00000215	Reading the Real Value of ACS High Voltage

1.7 Coincidence – Extension Commands

Extension commands are not always standard, it depends on the specific configuration of the device

Command name	Command code	Description
MCA4K_SET_COINC	0x00030000	Set up a coincidence
MCA4K_GET_COINC	0x00038000	Read the coincidence setting
MCA4K_GET_COINC_MAIN	0x00038001	Number of pulses coincidence main channel
MCA4K_GET_COINC_CNTRL	0x00038002	Number of pulses coincidence control channel
MCA4K_GET_COINC_PASS	0x00038003	Number of valid pulses evaluated by coincidence

1.8 Sorting by Descending Edge Length – Extension Commands

Extension commands are not always standard, it depends on the specific configuration of the device

Command name	Command code	Description
MCA4K_SET_SLOPE	0x00020001	Setting the Descending Edge Resolution
MCA4K_GET_SLOPE	0x00020000	Read the Descending Edge Resolution Settings
MCA4K_SET_SLOPE_MEM	0x00021001	Preparing Memory for Descending Edge Resolution

1.9 Basic commands detailed description

1.9.1 MCA4K_GET_ID - Device Identification

Transmitting to the device

MSB		LSB
31	. . . . .	0
Command ID = 0x00000001		
Command DATA = 0x00000000		

Receiving a response from the device

MSB		LSB
31	. . . . .	0
Answer ID = 0x80000000		
Answer DATA = 0x12345678		

1.9.2 MCA4K_SET_TIME - Setting the Measurement Time

ddddddddd ... Measurement time in milliseconds

Transmitting to the device

MSB		LSB
31	. . . . .	0
Command ID = 0x00000002		
Command DATA = 0xddddddddd		

Receiving a response from the device

MSB		LSB
31	. . . . .	0
Answer ID = 0x80000000		
Answer DATA = 0x00000000		

1.9.3 MCA4K_GET_TIME –Reading the Measurement Time

ddddddddd ... Measurement time in milliseconds

Transmitting to the device

MSB		LSB
31	. . . . .	0
Command ID = 0x00008002		
Command DATA = 0x00000000		

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.9.4 MCA4K_SET_CONTROL - Setting up the control register

ddddddddd ... data to the device

bit 31 ... Analyzer dead time correction
bit 30 ... Correction for dead pulse duration
Bit 29 ... Input switching 1 = external 0 = scintillation probe preamp
Bit 28 ... Input signal inversion
bit 27 ... Input signal filtration 1= filtration, 0= no filtration

Bit 26 … 1=first maximum pulse registration, 0= absolute maximum pulse registration
bit 25 … Pile-Up Reject (PUR)
Bit 24 … 1=Power On 0=Power Off External Preamp If Installed

bit 23..12 ... THDL
bit 11..0 ... THDH

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000003																														
Command DATA = 0xddddddddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.5 MCA4K_GET_CONTROL - Reading the Control Register

ddddddddd ... as in the case of MCA4K_SET_CONTROL

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008003																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.9.6 MCA4K_GET_OFFSETFINE - Fine Offset Reading

DDD ... offset

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008004																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000ddd																														

1.9.7 MCA4K_SET_OFFSET - Offset Setting

DDD ... offset

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000005																														
Command DATA = 0x00000ddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.8 MCA4K_GET_OFFSET - Offset reading

DDD ... offset

Transmitting to the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008005																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000ddd																														

1.9.9 MCA4K_SET_HV - High Voltage Setting

e0000ddd ... data to the device

Bit 31 ... 1=enable high voltage output, 0=high voltage disconnected
bit 11..0 ... High voltage

Transmitting to the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000006																														
Command DATA = 0xe00000ddd																														

Receiving a response from the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.10 MCA4K_GET_HV - High Voltage Reading

e0000ddd ... See MCA4K_SET_HV

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008006																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xe0000ddd																														

1.9.11 MCA4K_SET_GAIN - Preamp Gain Adjustment

0000000d ... data to the device

bit 3..0 ... Reinforcement

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000007																														
Command DATA = 0xe00000ddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.12 MCA4K_GET_GAIN - Preamp Gain Reading

0000000d ... See MCA4K_SET_GAIN

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008007																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0x0000000d																															

1.9.13 MCA4K_SET_TTLOUT - TTL Output Settings

d000000d ... data to the device

Bit 31 … 1 = TTL output pin 1 is the pulse of the analyzer 0= TTL output pin 1 according to bit 0
Bit 30 … 1 = TTL input pin 6 is the input for coincidence 0= TTL input pin 6 is TTL input

bit 3 ... TTL output pin 4
bit 2 ... TTL output pin 3
bit 1 ... TTL Output Pin 2
Bit 0 ... TTL Output Pin 1

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000008																															
Command DATA = 0xd000000d																															

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0x00000000																															

1.9.14 MCA4K_GET_TLLINOUT - Reading the TTL status of input and output

d00000dd ... data from the device

Bits 31, 30 See MCA4K_SET_TTLOUT

bit 7 ... TTL Input Pin 9
bit 6 ... TTL input pin 8
bit 5 ... TTL Input Pin 7
Bit 4 ... TTL Input Pin 6
bit 3 ... TTL output pin 4
bit 2 ... TTL output pin 3
bit 1 ... TTL Output Pin 2
Bit 0 ... TTL Output Pin 1

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008008																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x000000dd																														

1.9.15 MCA4K_SET_SCOPE - Oscilloscope register settings

ddddddddd ... data to the device

bit 31 ... 1 = Oscilloscope initialization
bit 30 ... 1 = trigger immediately, regardless of trigger conditions
Bit 29 ... 1 = Oscilloscope Release
Bit 28 ... trigger edge 1 = uphill, 0 = descending
bit 27..24 ... Sample rate reduction 1/1 to 1/16
bit 23..16 ... pretrigger

bit 15 … trigger from the main coincidence channel
bit 14 … Pile up detection trigger
bit 13 … MCA pulse counting trigger
Bit 12 … Pulse Maximum Detection Trigger

bit 11..0 ... trigger

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000009																														
Command DATA = 0xddddddddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.16 MCA4K_GET_SCOPE – Reading the oscilloscope register

ddddddddd ... See MCA4K_SET_SCOPE

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008009																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.9.17 MCA4K_SET_USBTIMEOUT - Setting the USB timeout

ddddddddd ... Timeout in multiples of 12.5 ns

After turning on the device, the register is set to 0x04C4B400 i.e. Timeout 1 second

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0000000A																														
Command DATA = 0xddddddddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.18 MCA4K_GET_USBTIMEOUT - Reading USB timeout

ddddddddd ... Timeout in multiples of 12.5 ns

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0000800A																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.9.19 MCA4K_GET_SCOPETRIG - Determining whether the oscilloscope has been started

d ... 1 = oscilloscope running, memory full, 0 = oscilloscope not running, memory not full

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0000000B																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x0000000d																														

1.9.20 MCA4K_GET_MCARUN - Determining whether a measurement is in progress

d ... 1 = measurement in progress, 0 measurement is over or has not started

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0000000C																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0x0000000d																															

1.9.21 MCA4K_GET_TIMER - Reading the time of the measurement in progress

ddddddddd ... Measurement time in milliseconds

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0000000D																															
Command DATA = 0x00000000																															

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0xddddddddd																															

1.9.22 MCA4K_GET_DEADTIMER - Reading the dead time of a measurement in progress

ddddddddd ... dead time time in milliseconds

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0000000E																															
Command DATA = 0x00000000																															

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0xddddddddd																															

1.9.23 MCA4K_ZERO - Reset analyzer memory and time counters

Transmitting to the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0000000F																													
Command DATA = 0x00000000																													

Receiving a response from the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																													
Answer DATA = 0x00000000																													

1.9.24 MCA4K_START – Start the analyzer measurement

Transmitting to the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000010																													
Command DATA = 0x00000000																													

Receiving a response from the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																													
Answer DATA = 0x00000000																													

1.9.25 MCA4K_STOP – Stop analyzer measurement

Transmitting to the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000011																													
Command DATA = 0x00000000																													

Receiving a response from the device

MSB																													LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																													
Answer DATA = 0x00000000																													

1.9.26 MCA4K_GET_MCA_DATA - Reading the analyzer memory

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000012																															
Command DATA = 0x00000000																															

Receiving a response from the device - analyzer data

A non-standard response of the device, the Answer ID is followed by 32 bits of the current measurement time, 32 bits of dead time and 4096x32 bits of data from channels 0 to 4095.

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000001																															
Time																															
Dead Time																															
MCA DATA0																															
MCA DATA 1 ... MCA DATA 4094																															
MCA DATA 4095																															

1.9.27 MCA4K_GET_SCOPE_DATA - Reading data from an oscilloscope

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000013																															
Command DATA = 0x00000000																															

Receiving a response from the device – no oscilloscope data available, memory not full

Standard Instrument Response

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0x00000000																															

Receiving a response from the device – oscilloscope data

Non-standard response of the device, the Answer ID is followed by 256x32 bits of data, the oscilloscope data is in the lower 12 bits every 32 bits of data.

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000002																															
Scope DATA 0 = 0x00000ddd																															
Scope DATA 1 ... Scope DATA 254																															
Scope DATA 255 = 0x00000ddd																															

1.9.28 MCA4K_GET_TEMPERATURE – Internal temperature of the device

00000ddd ... Device temperature $*2^{-4}$

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000014																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000ddd																														

1.9.29 MCA4K_GET_HVREADBACK – High Voltage Backward Measurement

0000dddd ... high voltage at the output, need to be calibrated

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000015																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x0000dddd																														

1.9.30 MCA4K_GET_SETUP_RO – Loading RO setup into buffer

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000102																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.31 MCA4K_GET_SETUP_RW – Loading RW setup into buffer

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000100																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.32 MCA4K_SET_SETUP_RW – Writing buffer to RW setup

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000101																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.9.33 MCA4K_GET_BUF – Loading the setup buffer

Receiving a response from the device – data from setup reading data after the command MCA4K_GET_SETUP_RO, MCA4K_GET_SETUP_RW

A non-standard device response, Answer ID and Answer DATA are followed by 264x32 bits of data in the buffer.

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000110																														
Command DATA = 0x00000000																														

Receiving a response from the device

000000dd ... data from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														
Buffer 0 = 0x000000dd																														
.....																														
Buffer 263 = 0x000000dd																														

1.9.34 MCA4K_SET_BUF – Setting the setup buffer

Non-standard transmission to the device, the Command ID is followed by 264x32 bits of data to the buffer.

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000111																														
Buffer 0 = 0x000000dd																														
.....																														
Buffer 263 = 0x000000dd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.10 Additional Commands Detailed Description

1.10.1 MCA4K_GET_PUPCNT – number of accumulated pulses

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000016																														
Command DATA = 0x00000000																														

Receiving a response from the device

ddddddddd ... Number of accumulated pulses

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.10.2 MCA4K_GET_PREAMP – external preamp status

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000017																														
Command DATA = 0x00000000																														

Receiving a response from the device

00000000d … Preamp Status

Bit 3 … 1=The preamp is OK
Bit 2..0 … Preamp identification

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x0000000d																														

1.10.3 MCA4K_SET_SCRATCH - Write a universal registry

ddddddddddd ... register content, the device does not use this value, freely user-configurable and accessible

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000018																														
Command DATA = 0xddddddddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.10.4 MCA4K_GET_SCRATCH - reading the universal register

ddddddddddd ... Contents of the register

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008018																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.10.5 MCA4K_SET_SCOPE2 - Oscilloscope register settings

000000dd ... data to the device

Bit 0 ... Pulse Oscilloscope Trigger ACS

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000019																														
Command DATA = 0x000000dd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.10.6 MCA4K_GET_SCOPE2 – Reading the oscilloscope register

000000dd ... See MCA4K_SET_SCOPE2

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008019																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x000000dd																														

1.11 Trapezoidal filter detailed description

1.11.1 MCA4K_SET_TF - Setting the trapezoidal filter

ddddddddd ... data to the device

bit 31 ... 1= trapezoidal filter is used, 0=trapezoidal filter is bridged, not used
bit 30 ... 1=reset the trapezoidal filter, 0=normal operation, it is necessary to perform a reset when changing the trapezoidal filter settings
Bit 29 ... 1 = trapezoidal filter does not use field-zero compensation 0 = uses compensation

bit 19..10 ... Leading edge length plus trapezoidal filter areas in multiples of 12.5 ns
bit 9..0 ... Leading edge length of trapezoidal filter R in multiples of 12.5 ns

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000104																														
Command DATA = 0xddddddddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.11.2 MCA4K_GET_TF - Reading the Trapezoidal Filter Register

ddddddddd ... as in the case of MCA4K_SET_TF

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008104																															
Command DATA = 0x00000000																															

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0xddddddddd																															

1.11.3 MCA4K_SET_PZ - Setting Field-Zero Compensation

Specify the compensation constant K for the field-zero compensation of the trapezoidal filter. The compensation constant K is in the range of 256 to 8191.

Recalculated compensation constant P = 16777215.0 / K

ddddddddd ... data to the device

bit 29..13 ... recalculated compensation constant P
bit 12..0 ... compensation constant K

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000105																															
Command DATA = 0xddddddddd																															

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0x00000000																															

1.11.4 MCA4K_GET_PZ - Reading the Field-Zero Compensation Register

ddddddddd ... as in the case of MCA4K_SET_PZ

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008105																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.11.5 MCA4K_SET_SCALE - Setting the Trapezoidal Filter Scaler

Input of the norm factor of the trapezoidal filter. The trapezoidal filter accumulates/integrates the impulse by the principle of operation, and therefore in order for the filter output to be standardized to the original amplitude of the filter, the norm constant M must be used.

Standard constant M = 1048575.0 / (R / 2.0)

Where R is the length of the leading edge of the trapezoidal filter (the same number as written with the command MCA4K_SET_TF bit 0 to 9)

000ddddd ... data to the device

bit 19..0 ... standardization constant M

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000106																														
Command DATA = 0x000ddddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.11.6 MCA4K_GET_SCALE - Reading the register of the trapezoidal filter scaler

000ddddd ... as in the case of MCA4K_SET_PZ

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008106																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x000ddddd																														

1.12 Anti coincidence shielding ACS detailed description

Commands to control the anti-coincidence shielding module, has no effect if the module is not installed

1.12.1 MCA4K_SET_ACSCMP - Setting the ACS Pulse Comparative Level

00000ddd ... data to the device

bit 11..0 ... ACS Pulse Comparator Level

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000205																														
Command DATA = 0x00000ddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.12.2 MCA4K_GET_ACSCMP - Reading the comparative level of ACS pulse

00000ddd ... as in the case of MCA4K_SET_ACSCMP

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008205																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000ddd																														

1.12.3 MCA4K_SET_ACSHV - ACS High Voltage Setting

e0000ddd ... data to the device

Bit 31 ... 1=enable ACS high voltage output, 0=ACS high voltage disconnected
bit 11..0 ... High voltage

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000206																														
Command DATA = 0xe0000ddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.12.4 MCA4K_GET_ACSHV – ACS High Voltage Reading

e0000ddd ... as in the case of MCA4K_SET_ACSHV

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00008206																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xe0000ddd																														

1.12.5 MCA4K_GET_ACSHVREADBACK – ACS High Voltage Backward Measurement

0000dddd ... high voltage on the ACS output, need to be calibrated

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00000215																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x0000dddd																														

1.13 Coincidence detailed description

1.13.1 MCA4K_SET_COINC - Setting the coincidence

e0ddddddd ... data to the device

bit 31 ... coincidence active
bit 30 … 1= anti-coincidence mode, 0=coincidence

bit 23..12 ... coincidence time after the main pulse when the coincidence is valid
bit 11..0 ... coincidence time before the main impulse when the coincidence is valid

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0030000																														
Command DATA = 0xe0dddddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.13.2 MCA4K_GET_COINC - Reading the coincidence settings

00000ddd ... as in the case of MCA4K_SET_COINC

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0038000																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xe0dddddd																														

1.13.3 MCA4K_GET_COINC_MAIN - Number of pulses coincidence main channel

ddddddddd ... number of coincidence pulses in the main channel, the MCA4K_ZERO is reset

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0038001																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xddddddddd																														

1.13.4 MCA4K_GET_COINC_CNTRL - Number of pulses coincidence control channel

ddddddddd ... number of coincidence pulses in the control channel, the MCA4K_ZERO is reset

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0038002																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0xddddddddd																															

1.13.5 MCA4K_GET_COINC_PASS - Number of valid pulses evaluated by coincidence

ddddddddd ... number of coincidence pulses of elapsed coincidences, the MCA4K_ZERO is reset

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0038003																															
Command DATA = 0x00000000																															

Receiving a response from the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																															
Answer DATA = 0xddddddddd																															

1.14 Sorting by the length of the descending edge detailed description

With active sorting by the length of the descending edge, the range of 4096 channels is divided into two halves, and in each half there are pulses with a slower (higher channels) and a faster descending edge (lower channels)

Before activating sorting, you need to initialize the descending edge resolution memory with the MCA4K_SET_ SLOPEM command

1.14.1 MCA4K_SET_SLOPE - Setting the Descending Edge Resolution

e0000000 ... data to the device

bit 31 ... 1=sorting active 0=sorting inactive

Transmitting to the device

MSB																															LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0020000																															
Command DATA = 0xe0000000																															

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

1.14.2 MCA4K_GET_SLOPE - Reading Descending Edge Resolution Settings

0xe0ddddd ... data from the device

bit 31 ... 1=sorting active 0=sorting inactive

bit 27..16 … A value for backward calculation of the descending edge directive
bit 11..0 … T value for backward calculation of the descending edge directive

These values can be used to reverse calculate the descending edge resolution directive

Decision value K=(A-THDL)/T

Where:

K… Required Line Directive
A… index in table
T… calculated pulse length

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x0020001																														
Command DATA = 0x00000000																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0xe0dddddd																														

1.14.3 MCA4K_SET_ SLOPEM- Preparing Memory for Descending Edge Resolution

This memory is a sorting table (look up table) according to which it is decided to classify the pulse according to the length of the descending edge into two categories.

To calculate the values in the table:

The THDL value – end of pulse, which is set by the MCA4K_SET_CONTROL command in bits 23 to 12 enters the calculation

The table has a total of 4096 values.

The index (order of value) represents the amplitude of the signal A of the multichannel analyzer. For example, the three-hundredth value in the table corresponds to the pulse that would be counted in the three-hundredth channel.

The value in the table corresponds to the maximum pulse length T, in multiples of 12.5 ns, which will be counted in the lower half of the channels, when sorting is active, otherwise the pulse will be counted in the upper half of the channels.

Decision value T=(A-THDL)/K

Where:

K… Required Line Directive
A… index in table
T… calculated pulse length

Transmitting to the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Command ID = 0x00021001																														
Buffer 0 = 0x00000ddd																														
.....																														
Buffer 4095 = 0x00000ddd																														

Receiving a response from the device

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

Standard Instrument Response

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000000																														
Answer DATA = 0x00000000																														

Receiving a response from the device – oscilloscope data

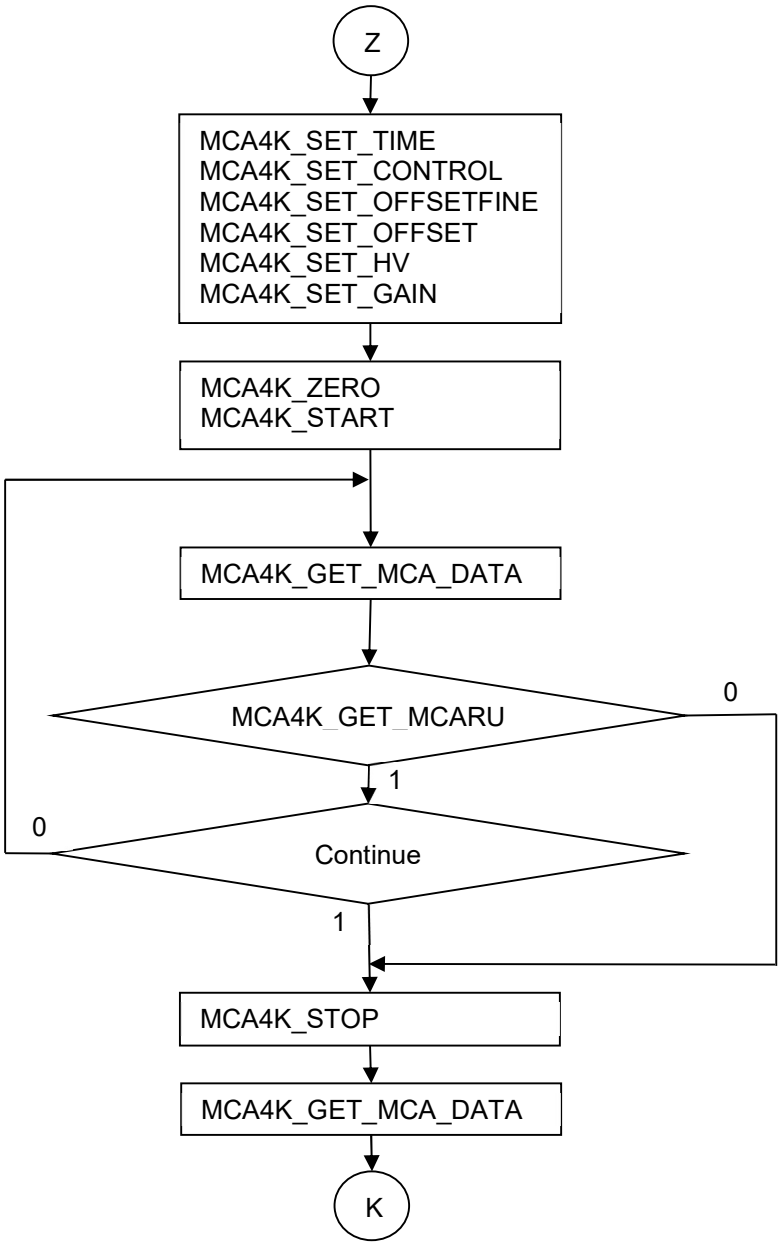
Non-standard response of the device, the Answer ID is followed by 256x32 bits of data, the oscilloscope data is in the lower 12 bits every 32 bits of data.

MSB																														LSB
31	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0
Answer ID = 0x80000002																														
Scope DATA 0 = 0x00000ddd																														
Scope DATA 1 ... Scope DATA 254																														
Scope DATA 255 = 0x00000ddd																														

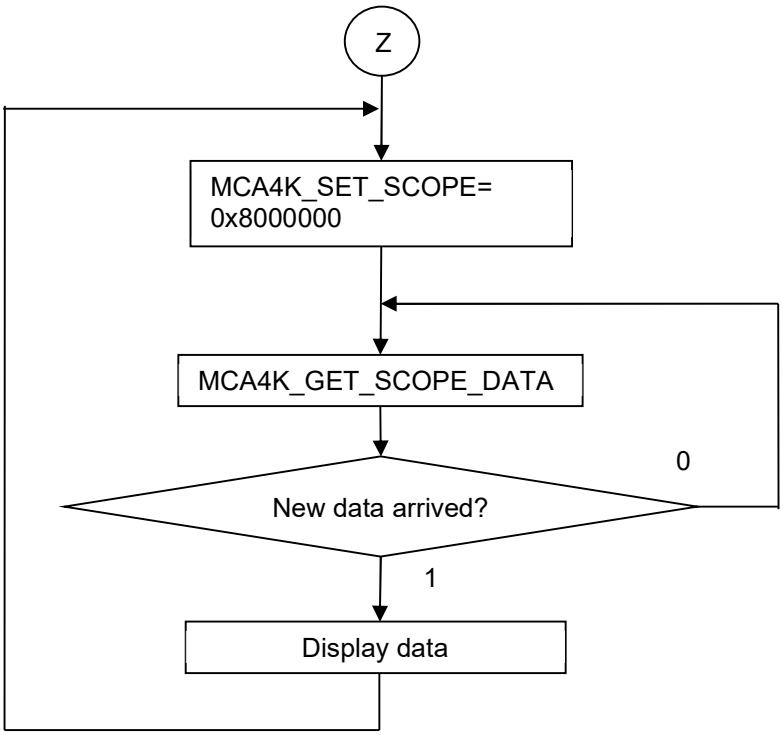
2 Basic algorithms for working with the analyzer

The following flowcharts illustrate typical analyzer control cases

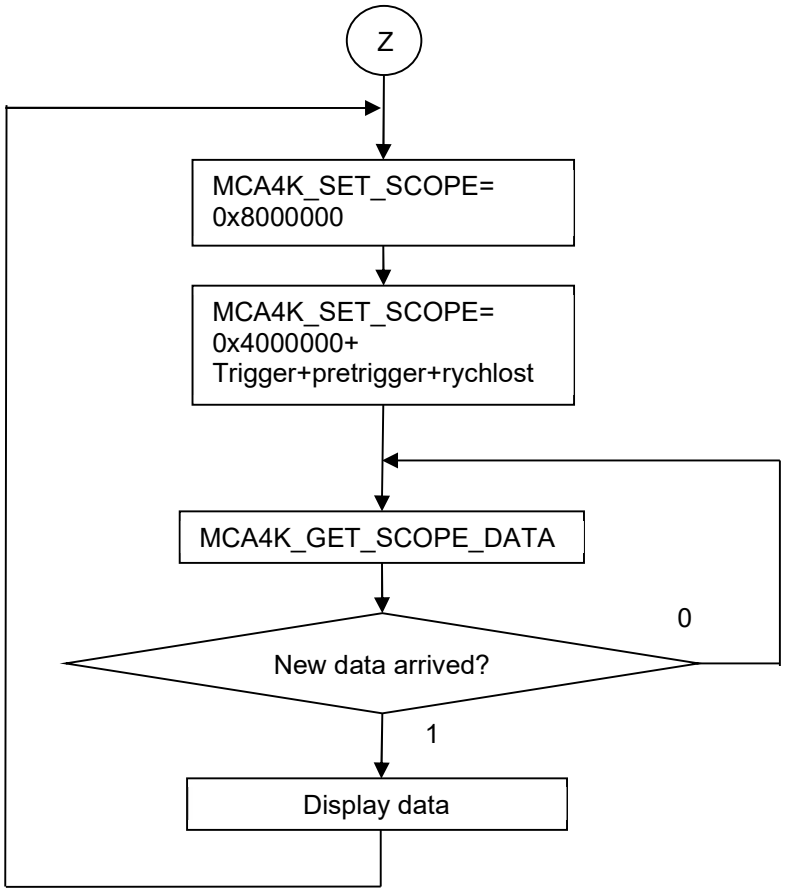
2.1 MCA Measurement



2.2 Oscilloscope - trigger



2.3 Oscilloscope - Instant Trigger



3 Version

Version	Description	Date
1	First Edition of the Document	1.12.2014
2	Delete the BLR function	6.10.2021
3	Addition of extension commands, trapezoidal filter, ACS module, coincidence and sorting by the length of the descending edge of the pulse	25.9.2026
4	Correction of MCA4K_SET_TF commands	29.10.2026