DN2.59x - 16 channel 16 bit digitizerNETBOX up to 125 MS/s

- **4, 8 or 16 channels with 5 MS/s up to 125 MS/s**
- **Software selectable single-ended or differential inputs**
- **Simultaneously sampling on all channels**
- **Separate ADC and amplifier per channel**
- **complete on-board calibration**
- **6 input ranges: ±200 mV up to ±10 V**
- **512 MSample/1 GSample acquisition memory**
- **Programmable input offset of ±100%**
- **Window, pulse width, re-arm, spike, OR/AND trigger**
- **Streaming, ABA mode, Multiple Recording, Gated Sampling, Timestamps**

Speed	SNR	ENOB
5 MS/s	up to 86.0 dB	up to 14.0 LSB
20 MS/s	up to 81.0 dB	up to 13.2 LSB
40 MS/s	up to 75.3 dB	up to 12.2 LSB
125 MS/s	up to 73.3 dB	up to 11.8 LSB

Digital Pulse Generator FPGA Option: 4 independent digital pulses with programmable high, low, delay, loop on multi-purpose I/O lines X0 to X3

- Ethernet Remote Instrument
- LXI Core 2011 compatible
- GBit Ethernet Interface
- Sustained streaming mode up to 70 MB/s
- Direct Connection to PC/Laptop
- Connect anywhere in company LAN
- Embedded Webserver for Maintenance/Updates
- Embedded Server option for open Linux platform

Operating Systems
- Windows 7 (SP1), 8, 10, Server 2008 R2 and newer
- Linux Kernel 2.6, 3.x, 4.x, 5.x
- Windows/Linux 32 and 64 bit

SBench 6 Professional Included
- Acquisition, Generation and Display of analog and digital data
- Calculation, FFT
- Documentation and Import, Export

Drivers
- LabVIEW, MATLAB, LabWindows/CVI
- Visual C++, GNU C++, VB.NET, C#, Delphi, Java, Python, Julia
- IVI

Model	Single-Ended Inputs		Differential Inputs	
DN2.591-04	4 channels	5 MS/s	4 channels	5 MS/s
DN2.591-08	8 channels	5 MS/s	4 channels	5 MS/s
DN2.591-16	16 channels	5 MS/s	8 channels	5 MS/s
DN2.592-04	4 channels	20 MS/s	4 channels	20 MS/s
DN2.592-08	8 channels	20 MS/s	4 channels	20 MS/s
DN2.592-16	16 channels	20 MS/s	8 channels	20 MS/s
DN2.593-04	4 channels	40 MS/s	4 channels	40 MS/s
DN2.593-08	8 channels	40 MS/s	4 channels	40 MS/s
DN2.593-16	16 channels	40 MS/s	8 channels	40 MS/s
DN2.596-04	4 channels	125 MS/s	4 channels	125 MS/s
DN2.596-08	8 channels 4 channels	80 MS/s 125 MS/s	4 channels	125 MS/s
DN2.596-16	16 channels 8 channels	80 MS/s 125 MS/s	8 channels	125 MS/s

General Information

The digitizerNETBOX DN2.59x series allows recording of up to 16 channels with sampling rates of 80 MS/s or 8 channels with sampling rates of 125 MS/s. These Ethernet Remote instruments offer outstanding A/D features both in resolution and signal quality. The inputs can be switched between Single-Ended with a programmable offset and True Differential. If used in differential mode each two inputs are connected together reducing the number of available channels by half.
Importantly, the high-resolution 16-bit ADCs deliver sixteen times more resolution than digitizers using older 12-bit technology and 256 times more resolution than what is available from digital scopes that commonly use 8-bit ADCs. The digitizerNETBOX can be installed anywhere in the company LAN and can be remotely controlled from a host PC.

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Software Support

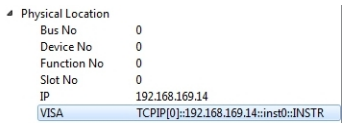
Windows Support

The digitizerNETBOX/generatorNETBOX/hybridNETBOX can be accessed from Windows 7, Windows 8,Windows 10 (either 32 bit or 64 bit). Programming examples for Visual C++, C++ Builder, LabWindows/CVI, Delphi, Visual Basic, VB.NET, C#, Julia, Python, Java and IVI are included.

Linux Support

The digitizerNETBOX/generatorNETBOX/hybridNETBOX can be accessed from any Linux system. The Linux support includes SMP systems, 32 bit and 64 bit systems, versatile programming examples for Gnu C++, Python, Julia as well as drivers for MATLAB for Linux. SBench 6, the powerful data acquisition and analysis software from Spectrum is also included as a Linux version.

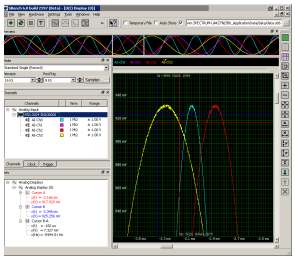
Discovery Protocol



The Discovery function helps you to find and identify any Spectrum LXI instruments, like the digitizerNETBOX and generatorNETBOX, available to your computer on the network. The Discovery function will also locate any Spectrum card products that are managed by an installed Spectrum Remote Server somewhere on the network.

After running the discovery function the card information is cached and can be directly accessed by SBench 6. Furthermore the qualified VISA address is returned and can be used by any software to access the remote instrument.

SBench 6 Professional



The digitizerNETBOX, generatorNETBOX and hybridNETBOX can be used with Spectrum's powerful software SBench 6 – a Professional license for the software is already installed in the box. SBench 6 supports all of the standard features of the instrument. It has a variety of display windows as well as analysis, export and documentation functions.

- Available for Windows Windows 7, Windows 8, Windows 10 and Linux
- Easy to use interface with drag and drop, docking windows and context menus
- Display of analog and digital data, X-Y display, frequency domain and spread signals
- Designed to handle several GBytes of data
- Fast data preview functions

IVI Driver

The IVI standards define an open driver architecture, a set of instrument classes, and shared software components. Together these provide critical elements needed for instrument interchangeability. IVI's defined Application Programming Interfaces (APIs) standardize common measurement functions reducing the time needed to learn a new IVI instrument.

The Spectrum products to be accessed with the IVI driver can be locally installed data acquisition cards, remotely installed data acquisition cards or remote LXI instruments like digitizerNETBOX/generatorNETBOX. To maximize the compatibility with existing IVI based software installations, the Spectrum IVI driver supports IVI Scope, IVI Digitizer and IVI FGen class with IVI-C and IVI-COM interfaces.

Third-party Software Products

Most popular third-party software products, such as LabVIEW, MATLAB or LabWindows/CVI are supported. All drivers come with examples and detailed documentation.

Embedded Webserver

The integrated webserver follows the LXI standard and gathers information on the product, set up of the Ethernet configuration and current status. It also allows the setting of a configuration password, access to documentation and updating of the complete instrument firmware, including the embedded remote server and the webserver.

Hardware features and options

LXI Instrument

The digitizerNETBOX and generatorNETBOX are fully LXI instrument compatible to LXI Core 2011 following the LXI Device Specification 2011 rev. 1.4. The digitizerNETBOX/generatorNETBOX has been tested and approved by the LXI Consortium.

Located on the front panel is the main on/off switch, LEDs showing the LXI and Acquisition status and the LAN reset switch.

Chassis features

The chassis is especially desigend for usage in different application arreas and has some advanced features for mobile and shared usage:

- stable metal chassis
- 8 bumper edges protect the chassis, the desk and other components on it. The bumper edges allow to store the chassis either vertically or horizontally and the lock-in structure allows to stack multiple chassis with a secure fit onto each other. For 19" rack mount montage the bumpers can be unmounted and replaced by the 19" rack mount option
- The handle allows to easily carry the chassis around in juts one hand.
- A standard GND screw on the back of the chassis allows to connect the metal chassis to measurement ground to reduce noise based on ground loops and ground level differences.

Front Panel

Standard BNC connectors are used for all analog input or output signals and all auxiliary signals like clock and trigger. No special adapter cables are needed and the connection is secure even when used in a moving environment.

Custom front panels are available on request even for small series, be it SMA, LEMO connectors or custom specific connectors.

Ethernet Connectivity

The GBit Ethernet connection can be used with standard COTS Ethernet cabling. The integration into a standard LAN allows to connect the digitizerNETBOX/generatorNETBOX either directly to a desktop PC or Laptop or it is possible to place the instrument somewhere in the company LAN and access it from any desktop over the LAN.

DC Power Supply Option

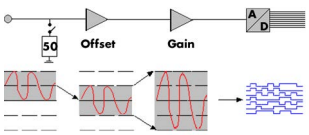
The digitizerNETBOX/generatorNETBOX/hybridNETBOX can be equipped with an internal DC power supply which replaces the standard AC power supply. This power supply options is available with an input range of nominal 24 V. Contact the sales team if other DC levels are required.

Using the DC power supply the device can be used for mobile applications together with a Laptop in automotive or airborne applications.

Boot on Power Option

The digitizerNETBOX/generatorNETBOX can be factory configured to automatically start and boot upon availability of the input power rail. That way the instrument will automatically become available again upon loss of input power.

Input Amplifier



The analog inputs can be adapted to real world signals using a wide variety of settings that are individual for each channel. By using software commands the input termination can be changed between 50 Ohm and 1 MOhm, one can select a matching input range and the signal offset can be compensated for.

Differential inputs

With a simple software command the inputs can individually be switched from single-ended (in relation to ground) to differential by combining each two single-ended inputs to one differential input. When the inputs are used in differential mode the A/D converter measures the difference between two lines with relation to system ground.

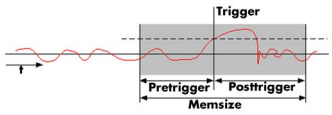
Additional Digital Inputs

The eight channel version of the digitizerNETBOX can have an option with additional eight digital input channels for mixed-mode operation. The eight additional digital channels are accessible through BNC connectors on the front panel. Together with the standard three multi-purpose digital I/O lines the digitizerNETBOX can have a total of 11 digital inputs channels together with eight analog input channels. When activated the digital data is stored inside the analog channel by reducing the analog resolution.

Automatic on-board calibration

All of the channels are calibrated in factory before the board is shipped. To compensate for different variations like PC power supply, temperature and aging, the software driver provides routines for an automatic onboard offset and gain calibration of all input ranges. All the cards contain a high precision on-board calibration reference.

Ring buffer mode



The ring buffer mode is the standard mode of all oscilloscope instruments. Digitized data is continuously written into a ring memory until a trigger event is detected. After the trigger, post-trigger samples are recorded and pre-trigger samples can also be stored. The number of pre-trigger samples available simply equals the total ring memory size minus the number of post trigger samples.

FIFO mode

The FIFO mode is designed for continuous data transfer between remote instrument and PC memory or hard disk. The control of the data stream is done automatically by the driver on interrupt request. The complete installed on-board memory is used for buffer data, making the continuous streaming extremely reliable.

Channel trigger

The data acquisition instruments offer a wide variety of trigger modes. Besides the standard signal checking for level and edge as known from oscilloscopes it's also possible to define a window trigger. All trigger modes can be combined with the pulsewidth trigger. This makes it possible to trigger on signal errors like too long or too short pulses. In addition to this a re-arming mode (for accurate trigger recognition on noisy signals) the AND/OR conjunction of different trigger events is possible. As a unique feature it is possible to use deactivated channels as trigger sources.

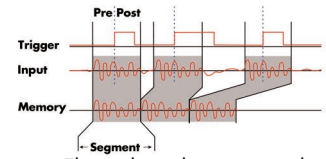
External trigger I/O

All instruments can be triggered using an external TTL signal. It's possible to use positive or negative edge also in combination with a programmable pulse width. An internally recognised trigger event can - when activated by software - be routed to the trigger connector to start external instruments.

Pulse width

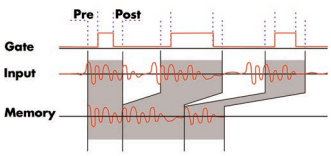
Defines the minimum or maximum width that a trigger pulse must have to generate a trigger event. Pulse width can be combined with channel trigger, pattern trigger and external trigger.

Multiple Recording



The Multiple Recording mode allows the recording of several trigger events with an extremely short re-arming time. The hardware doesn't need to be restarted in between. The on-board memory is divided in several segments of the same size. Each of them is filled with data if a trigger event occurs. Pre- and posttrigger of the segments can be programmed. The number of acquired segments is only limited by the used memory and is unlimited when using FIFO mode.

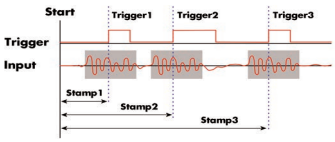
Gated Sampling



The Gated Sampling mode allows data recording controlled by an external gate signal. Data is only recorded if the gate signal has a programmed level. In addi-

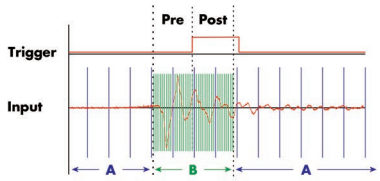
tion a pre-area before start of the gate signal as well as a post area after end of the gate signal can be acquired. The number of gate segments is only limited by the used memory and is unlimited when using FIFO mode.

Timestamp



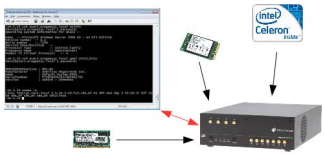
The timestamp function writes the time positions of the trigger events in an extra memory. The timestamps are relative to the start of recording, a defined zero time, externally synchronized to a radio clock, an IRIG-B a GPS receiver. Using the external synchronization gives a precise time relation for acquisitions of systems on different locations.

ABA mode



The ABA mode combines slow continuous data recording with fast acquisition on trigger events. The ABA mode works like a slow data logger combined with a fast digitizer. The exact position of the trigger events is stored as timestamps in an extra memory.

Option Embedded Server



The option turns the digitizerNETBOX/generatorNETBOX in a powerful PC that allows to run own programs on a small and remote data acquisition system. The digitizerNETBOX/generatorNETBOX is enhanced by more memory, a powerful CPU, a freely accessable internal SSD and a remote software development access method.

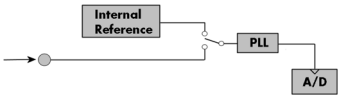
The digitizerNETBOX/generatorNETBOX can either run connected to LAN or it can run totally independent, storing data to the internal SSD. The original digitizerNETBOX/generatorNETBOX remote instrument functionality is still 100 % available. Running the embedded server option it is possible to pre-calculate results based on the acquired data, store acquisitions locally and to transfer just the required data or results parts in a client-server based software structure. A different example for the digitizerNETBOX/generatorNETBOX embedded server is surveillance/logger application which can run totally independent for days and send notification emails only over LAN or offloads stored data as soon as it's connected again.

Access to the embedded server is done through a standard text based Linux shell based on the ssh secure shell.

External clock I/O

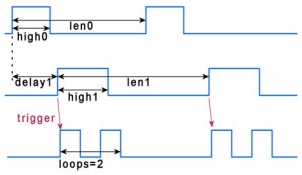
Using a dedicated connector a sampling clock can be fed in from an external system. It's also possible to output the internally used sampling clock to synchronise external equipment to this clock.

Reference clock



The option to use a precise external reference clock (normally 10 MHz) is necessary to synchronize the instrument for high-quality measurements with external equipment (like a signal source). It's also possible to enhance the quality of the sampling clock in this way. The driver automatically generates the requested sampling clock from the fed in reference clock.

Firmware Option Digital Pulse Generator



The digital pulse generator option adds 4 internal independent digital pulse generators with programmable duty cycle, output frequency, delay and number of loops. These digital pulse generators can be triggered by software, hardware trigger or can trigger each other allowing to form complex pulse schemes to drive external equipment or experiments. The digital pulse generators can be output on the existing multi-XIO lines (X0, X1, ...), to trigger other pulse generators or can be used to trigger the instrument's main trigger internally. Time resolution of the pulse generator depends on the cards type and the selected sampling rate and can be found in the technical data section.
The pulse generator option is a firmware option and can be later installed on all shipped cards.

DN2 / DN6 Technical Data

Only figures that are given with a maximum reading or with a tolerance reading are guaranteed specifications. All other figures are typical characteristics that are given for information purposes only. Figures are valid for products stored for at least 2 hours inside the specified operating temperature range, after a 30 minute warm-up, after running an on-board calibration and with proper cooled products. All figures have been measured in lab environment with an environmental temperature between 20°C and 25°C and an altitude of less than 100 m.

Analog Inputs

Resolution		16 bit (can be reduced to acquire simultaneous digital inputs)
Input Range	software programmable	±200 mV, ±500 mV, ±1 V, ±2 V, ±5 V, ±10 V
Input Type	software programmable	Single-ended or True Differential
Input Offset (single-ended)	software programmable	programmable to ±100% of input range in steps of 1%
ADC Differential non linearity (DNL)	ADC only	591x: ±0.2/±0.8 LSB (typ./max.) 592x: ±0.2/±0.8 LSB (typ./max.) 593x, 8x3: ±0.5/±0.9 LSB (typ./max.) 594x: ±0.5/±0.9 LSB (typ./max.) 596x, 8x6: ±0.5/±0.9 LSB (typ./max.
ADC Integral non linearity (INL)	ADC only	591x: ±1.0/±2.3 LSB (typ./max.) 592x: ±1.0/±2.3 LSB (typ./max.) 593x, 803, 813: ±2.0/±7.5 LSB (typ./max.) 594x: ±2.0/±7.5 LSB (typ./max.) 596x, 806, 816: ±2.0/±7.5 LSB (typ./max.)
Offset error (full speed), DC signal	after warm-up and calibration	≤ 0.1% of range
Gain error (full speed), DC signal	after warm-up and calibration	≤ 0.1% of reading
Offset temperature drift	after warm-up and calibration	typical 5 ppm/°K
Gain temperatur drift	after warm-up and calibration	typical 45 ppm/°K
AC accuracy	1 kHz signal	≤ 0.3% of reading
AC accuracy	50 kHz signal	≤ 0.5% of reading

Crosstalk: Signal 1 MHz, 50 Ω	range ≤ ±1V range ≥ ±2V	≤ 95 dB on adjacent channels ≤ 90 dB on adjacent channels
Crosstalk: Signal 10 MHz, 50 Ω	range ≤ ±1V range ≥ ±2V	≤ 87 dB on adjacent channels ≤ 85 dB on adjacent channels
Analog Input impedance	software programmable	50 Ω /1 MΩ || 30 pF
Analog input coupling	fixed	DC
Over voltage protection	range ≤ ±1V	±5 V (1 MΩ), 3.5 Vrms (50 Ω)
Over voltage protection	range ≥ ±2V	±50 V (1 MΩ), 5 Vrms (50 Ω)
Anti-Aliasing Filter (digital filtering active)	591x (5 MS/s)	Digital Anti-Aliasing filter at 40% of sampling rate. Examples: 5 MS/s sampling rate -> anit-aliasing filter at 2 MHz 1 MS/s sampling rate -> anti-aliasing filter at 400 kHz
Anti-Aliasing Filter (standard)	591x (5 MS/s) 592x (20 MS/s) 593x (40 MS/s) 594x (80 MS/s) 596x (125 MS/s)	fixed 2.5 MHz 3rd order butterworth alike fixed 10 MHz 3rd order butterworth alike fixed 20 MHz 3rd order butterworth alike fixed 40 MHz 3rd order butterworth alike fixed 60 MHz 3rd order butterworth alike
CMRR (Common Mode Rejection Ratio)	range ≤ ±1V	100 kHz: 75 dB, 1 MHz: 60 dB, 10 MHz: 40 dB
CMRR (Common Mode Rejection Ratio)	range ≥ ±2V	100 kHz: 55 dB, 1 MHz: 52 dB, 10 MHz: 50 dB

Common Mode Voltage Range Differential Input	Input Range	±200 mV	±500 mV	±1 V	±2 V	±5 V	±10 V
	VCM (1 MΩ termination)	±900 mV	±2.25 V	±2.25 V	±9 V	±22.5 V	±22.5 V
	VCM (50 Ω termination)	±900 mV	±2.25 V	±2.25 V	±3.5 V	±3.5 V	±3.5 V

Channel selection (single-ended inputs)	software programmable	1, 2, 4 or 8 channels (maximum is model dependent)
Channel selection (true differential inputs)	software programmable	1, 2 or 4 channels (maximum is model dependent)
Calibration	Internal	Self-calibration is done on software command and corrects against the onboard references. Self-calibration should be issued after warm-up time.
Calibration	External	External calibration calibrates the onboard references used in self-calibration. All calibration constants are stored in nonvolatile memory. A yearly external calibration is recommended.

Trigger

Available trigger modes	software programmable	Channel Trigger, External, Software, Window, Pulse, Re-Arm, Spike, Or/And, Delay
Trigger level resolution	software programmable	14 bit
Trigger edge	software programmable	Rising edge, falling edge or both edges
Trigger pulse width	software programmable	0 to [4G - 1] samples in steps of 1 sample
Trigger delay	software programmable	0 to [4G - 1] samples in steps of 1 samples
Trigger holdoff (for Multi, ABA, Gate)	software programmable	0 to [4G - 1] samples in steps of 1 samples
Multi, ABA, Gate: re-arming time		< 40 samples (+ programmed pretrigger + programmed holdoff)
Pretrigger at Multi, ABA, Gate, FIFO	software programmable	8 up to [32 kSamples / number of active channels] in steps of 8
Posttrigger	software programmable	8 up to [8G - 4] samples in steps of 8 (defining pretrigger in standard scope mode)
Memory depth	software programmable	16 up to [installed memory / number of active channels] samples in steps of 8
Multiple Recording/ABA segment size	software programmable	8 up to [installed memory / number of active channels] samples in steps of 8
Internal/External trigger accuracy		1 sample
Timestamp modes	software programmable	Standard, Startreset, external reference clock on X1 (e.g. PPS from GPS, IRIG-B)
Data format		Std., Startreset: 64 bit counter, increments with sample clock (reset manually or on start) RefClock: 24 bit upper counter (increment with RefClock) 40 bit lower counter (increments with sample clock, reset with RefClock)
Extra data	software programmable	none, acquisition of X1/X2/X3 inputs at trigger time, trigger source (for OR trigger)
Size per stamp		128 bit = 16 bytes

		Ext	**X1, X2, X3**
External trigger			
External trigger type		Single level comparator	3.3V LVTTL logic inputs
External trigger impedance	software programmable	50 Ω / 5 kΩ	For electrical specifications refer to „Multi Purpose I/O lines“ section.
External trigger input level		±5 V (5 kΩ), ±2.5 V (50 Ω),	
External trigger over voltage protection		±20 V (5 kΩ), 5 Vrms (50 Ω)	
External trigger sensitivity (minimum required signal swing)		200 mVpp	
External trigger level	software programmable	±5 V in steps of 10 mV	
External trigger bandwidth	50 Ω 5 kΩ	DC to 400 MHz DC to 300 MHz	n.a. DC to 125 MHz
Minimum external trigger pulse width		≥ 2 samples	≥ 2 samples
Resulting max detectable trigger frequency		[Current Samplerate]/2	[Current Samplerate]/2

Multi Purpose I/O lines

Number of multi purpose output lines		one, named X0	
Number of multi purpose input/output lines		three, named X1, X2, X3	
Multi Purpose line		**X0**	**X1, X2, X3**
Input: available signal types	software programmable	n.a.	Synchronous Digital-In, Asynchronous Digital-In, Timestamp Reference Clock, Logic trigger
Input: signal levels		n.a.	3.3 V LVTTL (Low ≤ 0.8 V, High ≥ 2.0 V)
Input: impedance		n.a.	10 kΩ to 3.3 V
Input: maximum voltage level		n.a.	-0.5 V to +4.0 V
Input: maximum bandwidth		n.a.	125 MHz
Output: available signal types	software programmable	Run-, Arm-, Trigger-Output, Asynchronous Digital-Out, ADC Clock Output Digital Pulse Generator (option)	Run-, Arm-, Trigger-Output, Asynchronous Digital-Out Digital Pulse Generator (option)
Output: impedance		50 Ω	
Output: drive strength		Capable of driving 50 Ω loads, maximum drive strength ±48 mA	
Output: type / signal levels		3.3V LVTTL, TTL compatible for high impedance loads	
Output: update rate (synchronous modes)		sampling clock	

Option M2p.xxxx-PulseGen

Number of internal pulse generators		4
Number of pulse generator output lines		4 (Existing multi-purpose outputs X0 to X3)
Time resolution of pulse generator		Selected Sampling Rate, max is 125 MS/s (8 ns)
Programmable output modes		Single-shot, multiple repetitions on trigger, gated
Programmable trigger sources		Software, Card Trigger, Other Pulse Generator, XIO lines.
Programmable trigger gate		None, ARM state, RUN state
Programmable length (frequency)		2 to 4G samples in steps of 1 (32 bit)
Programmable width (duty cycle)		1 to 4G samples in steps of 1 (32 bit)
Programmable delay		0 to 4G samples in steps of 1 (32 bit)
Programmable loops		0 to 4G samples in steps of 1 (32 bit) - 0 = infinite
Output level of digital pulse generators		Please see section of multi-purpose I/O lines

Option DN2.59x-08-Dig

Number of additional multi-purpose I/O lines		8 (X4 to X11)
Input: signal levels		3.3 V LVTTL
Input: impedance		10 kΩ to 3.3 V
Input: maximum voltage level		-0.5 V to +4.0 V
Input: maximum bandwidth		125 MHz
Input: available signal types	software programmable	Synchronous Digital-In, Asynchronous Digital-In
Output: available signal types	software programmable	Run-, Arm-, Trigger-Output, Asynchronous Digital-Out
Output: update rate (synchronous modes)		sampling clock
Output: type / signal levels		3.3V LVTTL, TTL compatible for high impedance loads
Output: impedance		50 Ω
Output: drive strength		Capable of driving 50 Ω loads, maximum drive strength ±48 mA

Clock

Clock Modes	software programmable	internal PLL, external clock, external reference clock, sync
Internal clock range (PLL mode)	software programmable	see „Clock Limitations and Bandwidth" table below
Internal clock accuracy	after warm-up	≤ ±1.0 ppm (at time of calibration in production)
Internal clock aging		≤ ±0.5 ppm / year
PLL clock setup granularity (int. or ext. reference)		1 Hz
External reference clock range	software programmable	128 kHz up to 125 MHz
Direct external clock to internal clock delay	single card only	4.3 ns
Direct external clock range		see „Clock Limitations and Bandwidth" table below
Direct external clock minimum LOW/HIGH time		see „Clock Limitations and Bandwidth" table below
External clock type		Single level comparator
External clock input level		±5 V (5 kΩ), ±2.5 V (50 Ω),
External clock input impedance	software programmable	50 Ω / 5 kΩ
External clock over voltage protection		±20 V (5 kΩ), 5 Vrms (50 Ω)
External clock sensitivity (minimum required signal swing)		200 mVpp
External clock level	software programmable	±5 V in steps of 1mV
External clock edge		rising edge used
External reference clock input duty cycle		45% - 55%
Clock output electrical specification		Available via Multi Purpose output X0. Refer to „Multi Purpose I/O lines" section.
Synchronization clock multiplier „N" for different clocks on synchronized cards	software programmable	N being a multiplier (1, 2, 3, 4, 5, ... Max) of the card with the currently slowest sampling clock. The card maximum (see „Clock Limitations and Bandwidth" table below) must not be exceeded.
ABA mode clock divider for slow clock	software programmable	8 up to (64k - 8) in steps of 8
Channel to channel skew on one card		< 200 ps (typical)
Skew between star-hub synchronized cards		< 100 ps (typical)

Connectors

Analog Inputs or Outputs		9 mm BNC female (one for each single-ended Ch.)	Cable-Type: Cab-9m-xx-xx
Trigger Input		9 mm BNC female	Cable-Type: Cab-9m-xx-xx
Clock/Reference Clock Input		9 mm BNC female	Cable-Type: Cab-9m-xx-xx
Clock Output, Multi-Purpose X0		9 mm BNC female	Cable-Type: Cab-9m-xx-xx
Multi-Purpose I/O X1, X2, X3	Programmable Direction	9 mm BNC female	Cable-Type: Cab-9m-xx-xx

Connection Cycles

All connectors have an expected lifetime as specified below. Please avoid to exceed the specified connection cycles or use connector savers.

BNC connector	500 connection cycles
Power connecctor	500 connection cycles
LAN connector	750 connection cycles

Option digitizerNETBOX/generatorNETBOX embedded server (DN2.xxx-Emb, DN6.xxx-Emb)

CPU	Intel Quad Core 2 GHz	
System memory	4 GByte RAM	
System data storage	Internal 128 GByte SSD	
Development access	Remote Linux command shell (ssh), no graphical interface (GUI) available	
Accessible Hardware	Full access to Spectrum instruments, LAN, front panel LEDs, RAM, SSD	
Integrated operating system	OpenSuse 12.2 with kernel 4.4.7.	
Internal PCIe connection	DN2.20, DN2.46, DN2.47, DN2.49, DN2.59, DN2.60, DN2.65 DN6.46, DN6.49, DN6.59, DN6.65, DN2.80, DN2.81	PCIe x1, Gen1
	DN2.22, DN2.44, DN2.66 DN6.22, DN6.44, DN6.66, DN2.82	PCIe x1, Gen2

Ethernet specific details

LAN Connection		Standard RJ45	
LAN Speed		Auto Sensing: GBit Ethernet, 100BASE-T, 10BASE-T	
LAN IP address	programmable	DHCP (IPv4) with AutoIP fall-back (169.254.x.y), fixed IP (IPv4)	
Sustained Streaming speed		DN2.20, DN2.46, DN2.47, DN2.49, DN2.60 DN6.46, DN6.49	up to 70 MByte/s
		DN2.59, DN2.65, DN2.22, DN2.44, DN2.66 DN6.59, DN6.65, DN6.22, DN6.44, DN6.66	up to 100 MByte/s
Used TCP/UDP Ports		Webserver: 80 VISA Discovery Protocol: 111, 9757 Spectrum Remote Server: 1026, 5025	mDNS Daemon: 5353 UPNP Daemon: 1900

AC Power connection details (default configuration)

Mains AC power supply	Input voltage: 100 to 240 VAC, 50 to 60 Hz
AC power supply connector	IEC 60320-1-C14 (PC standard coupler)
Power supply cord	power cord included for Schuko contact (CEE 7/7)

DC 24 V Power supply details (option DN2.xxxx-DC24)

Input Voltage	18 V to 36 V
Power supply connector	screw terminal
Power supply cord	no cord included

Serial connection details (DN2.xxx with hardware ≥ V11)

Serial connection (RS232)	For diagnostic purposes only. Do not use, unless being instructed by a Spectrum support agent.

Certification, Compliance, Warranty

Conformity Declaration	EN 17050-1:2010	General Requirements
EU Directives	2014/30/EU	EMC - Electromagnetic Compatibility
	2014/35/EU	LVD - Electrical equipment designed for use within certain voltage limits
	2011/65/EU	RoHS - Restriction of the use of certain hazardous substances in electrical and electronic equipment
	2006/1907/EC	REACH - Registration, Evaluation, Authorisation and Restriction of Chemicals
	2012/19/EU	WEEE - Waste from Electrical and Electronic Equipment
Compliance Standards	EN 61010-1: 2010	Safety regulations for electrical measuring, control, regulating and laboratory devices - Part 1: General requirement
	EN 61187:1994	Electrical and electronic measuring equipment - Documentation
	EN 61326-1:2021	Electrical equipment for measurement, control and laboratory use
	EN 61326-2-1:2021	EMC requirements - Part 1: General requirements EMC requirements - Part 2-1: Particular requirements - Test configurations, operational conditions and performance criteria for sensitive test and measurement equipment for EMC unprotected applications
	EN IEC 63000:2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances
Product warranty	5 years starting with the day of delivery	
Software and firmware updates	Life-time, free of charge	

Clock Limitations and Bandwidth

	M2p.591x, DN2.591-xx DN6.591-xx	M2p.592x, DN2.592-xx DN6.592-xx	M2p.593x DN2.593-xx DN6.593-xx DN2.803-xx DN2.813-xx	M2p.594x	M2p.596x DN2.596-xx DN6.596-xx DN2.806-xx DN2.816-xx
max internal clock (non-synchronized cards)	5 MS/s	20 MS/s	40 MS/s	80 MS/s	125 MS/s
min internal clock (non-synchronized cards)	1 kS/s	1 kS/s	1 kS/s	1 kS/s	1 kS/s
max internal clock (cards synchronized via star-hub)	5 MS/s	20 MS/s	40 MS/s	80 MS/s	125 MS/s
min internal clock (cards synchronized via star-hub)	128 kS/s	128 kS/s	128 kS/s	128 kS/s	128 kS/s
max direct external clock	5 MS/s	20 MS/s	40 MS/s	80 MS/s	125 MS/s
min direct external clock	1 MS/s	1 MS/s	1 MS/s	1 MS/s	1 MS/s
min direct external clock LOW time	25 ns	25 ns	4 ns	4 ns	4 ns
min direct external clock HIGH time	25 ns	25 ns	4 ns	4 ns	4 ns
-3 dB analog input bandwidth	> 2.0 MHz	> 10 MHz	> 20 MHz	> 40 MHz	> 60 MHz
-3 dB analog input bandwidth, digital filter de-activated	> 2.5 MHz	n.a.	n.a.	n.a.	n.a.

RMS Noise Level (Zero Noise), typical figures

M2p.591x, DN2.591-xx, DN6.591-xx digital filtering active

Input Range	±200 mV		±500 mV		±1		±2 V		±5 V		±10 V	
Voltage resolution	6.1 µV		15.3 µV		30.5 µV		61.0 µV		152.6 µV		305.2 µV	
50 Ω	<1.5 LSB	<10 µV	<1.2 LSB	<19 µV	<1.0 LSB	<31 µV	<3.0 LSB	<183 µV	<1.6 LSB	<245 µV	<1.2 LSB	<367 µV
1 MΩ	<1.5 LSB	<10 µV	<1.2 LSB	<19 µV	<1.0 LSB	<31 µV	<3.0 LSB	<183 µV	<1.6 LSB	<245 µV	<1.2 LSB	<367 µV

M2p.592x, DN2.592-xx, DN6.592-xx

Input Range	±200 mV		±500 mV		±1		±2 V		±5 V		±10 V	
Voltage resolution	6.1 µV		15.3 µV		30.5 µV		61.0 µV		152.6 µV		305.2 µV	
50 Ω	<4.0 LSB	<25 µV	<2.6 LSB	<40 µV	<2.1 LSB	<65 µV	<4.3 LSB	<263 µV	<2.6 LSB	<397 µV	<2.1 LSB	<641 µV
1 MΩ	<4.5 LSB	<28 µV	<3.0 LSB	<46 µV	<2.5 LSB	<107 µV	<4.5 LSB	<275 µV	<3.0 LSB	<458 µV	<2.5 LSB	<763 µV

M2p.593x, DN2.593-xx, DN6.593-xx, DN2.803-xx, DN2.813-xx

Input Range	±200 mV		±500 mV		±1		±2 V		±5 V		±10 V	
Voltage resolution	6.1 µV		15.3 µV		30.5 µV		61.0 µV		152.6 µV		305.2 µV	
50 Ω	<6.0 LSB	<37 µV	<5.0 LSB	<77 µV	<4.5 LSB	<138 µV	<6.5 LSB	<397 µV	<5.0 LSB	<763 µV	<4.5 LSB	<1.4 mV
1 MΩ	<6.5 LSB	<40 µV	<5.0 LSB	<77 µV	<4.5 LSB	<138 µV	<6.5 LSB	<397 µV	<5.0 LSB	<763 µV	<4.5 LSB	<1.4 mV

M2p.594x

Input Range	±200 mV		±500 mV		±1		±2 V		±5 V		±10 V	
Voltage resolution	6.1 µV		15.3 µV		30.5 µV		61.0 µV		152.6 µV		305.2 µV	
50 Ω	<7.0 LSB	<43 µV	<5.5 LSB	<85 µV	<4.5 LSB	<138 µV	<7.5 LSB	<458 µV	<5.5 LSB	<840 µV	<4.5 LSB	<1.4 mV
1 MΩ	<7.5 LSB	<46 µV	<5.8 LSB	<89 µV	<4.5 LSB	<138 µV	<7.7 LSB	<470 µV	<5.8 LSB	<886 µV	<4.5 LSB	<1.4 mV

M2p.596x, DN2.596-xx, DN6.596-xx, DN2.806-xx, DN2.816-xx

Input Range	±200 mV		±500 mV		±1		±2 V		±5 V		±10 V	
Voltage resolution	6.1 µV		15.3 µV		30.5 µV		61.0 µV		152.6 µV		305.2 µV	
50 Ω	<9.0 LSB	<55µV	<6.8 LSB	<104 µV	<5.5 LSB	<168 µV	<9.0 LSB	<550 µV	<6.8 LSB	<1.1 mV	<5.5 LSB	<1.7 mV
1 MΩ	<9.5 LSB	<58µV	<7.1 LSB	<109 µV	<5.5 LSB	<168 µV	<9.5 LSB	<580 µV	<7.1 LSB	<1.1 mV	<5.5 LSB	<1.7 mV

Dynamic Parameters, typical figures

M2p.591x, DN2.591-xx, DN6.591-xx digital filtering active

Test - sampling rate	5 MS/s							
Input Range	±200 mV		±500 mV		±1 V		±2 V	
Test Signal Frequency	20 kHz	1 MHz	20 kHz	1 MHz	20 kHz	1 MHz	20 kHz	1 MHz
SNR (typ)	≥ 83.5 dB	≥ 82.8 dB	≥ 85.0 dB	≥ 84.9 dB	≥ 86.2 dB	≥ 85.7 dB	n.a.	n.a.
THD (typ)	(≤ 84.4 dB)	≤ -93.5 dB	(≤ 86.3 dB)	≤ -93.1 dB	(≤ 86.9 dB)	≤ -91.8 dB	n.a.	n.a.
SFDR (typ), excl. harm.	≥ 103.0 dB	≥ 103.0 dB	≥ 104.0 dB	≥ 107.0 dB	≥ 103.0 dB	≥ 107.0 dB	n.a.	n.a.
ENOB (based on SNR)	≥ 13.6 LSB	≥ 13.4 LSB	≥ 13.8 LSB	≥ 13.8 LSB	≥ 14.0 LSB	≥ 13.9 LSB	n.a.	n.a.
ENOB (based on SINAD)	≥ 13.1 LSB	≥ 13.4 LSB	≥ 13.4 LSB	≥ 13.7 LSB	≥ 13.6 LSB	≥ 13.8 LSB	n.a.	n.a.

M2p.591x, DN2.591-xx, DN6.591-xx digital filtering active

Test - sampling rate	3 MS/s		1 MS/s		500 kS/s		200 kS/s	
Input Range	±200 mV	±1 V	±200 mV	±1 V	±200 mV	±1 V	±200 mV	±1 V
Test Signal Frequency	20 kHz		20 kHz		20 kHz		20 kHz	
Input bandwidth due to digital filter	1.2 MHz		400 kHz		200 klHz		80 kHz	
SNR (typ)	≥ 85.3 dB	≥ 86.6 dB	≥ 87.2 dB	≥ 89.1 dB	≥ 86.2 dB	≥ 89.7 dB	≥ 86.4 dB	≥ 89.4 dB
THD (typ)	(≤ 88.9 dB)	(≤ -88.5 dB)	(≤ 86.4 dB)	(≤ -88.6 dB)	(≤ 86.9 dB)	(≤ -90.8 dB)	(≤ 89.7 dB)	(≤ -93.8 dB)
SFDR (typ), excl. harm.	≥ 103.1 dB	≥ 103.6 dB	≥ 102.8 dB	≥ 105.6 dB	≥ 103.1 dB	≥ 103.1 dB	≥ 103.1 dB	≥ 103.5 dB
ENOB (based on SNR)	≥ 13.9 LSB	≥ 14.1 LSB	≥ 14.2 LSB	≥ 14.5 LSB	≥ 14.0 LSB	≥ 14.6 LSB	≥ 14.1 LSB	≥ 14.6 LSB
ENOB (based on SINAD)	≥ 13.5 LSB	≥ 13.7 LSB	≥ 13.6 LSB	≥ 14.0 LSB	≥ 13.6 LSB	≥ 14.2 LSB	≥ 13.8 LSB	≥ 14.3 LSB

(20 kHz measurements are missing the correct bandpass filter and therefore show a larger THD that is coming from the generator)

	M2p.592x, DN2.592-xx, DN6.592-xx							
Test - sampling rate	20 MS/s							
Input Range	±200 mV		±500 mV		±1 V		±2 V	
Test Signal Frequency	1 MHz	n.a.	1 MHz	n.a.	1 MHz	n.a.	1 MHz	n.a.
SNR (typ)	≥ 77.2 dB	n.a.	≥ 79.8 dB	n.a.	≥ 81.0 dB	n.a.	≥ 75.0 dB	n.a.
THD (typ)	≤ 92.5 dB	n.a.	≤ -92.8 dB	n.a.	≤ -89.5 dB	n.a.	≤ -76.5 dB	n.a.
SFDR (typ), excl. harm.	≥ 103.0 dB	n.a.	≥ 103.0 dB	n.a.	≥ 105.0 dB	n.a.	≥ 93.0 dB	n.a.
ENOB (based on SNR)	≥ 12.5 LSB	n.a.	≥ 13.0 LSB	n.a.	≥ 13.2 LSB	n.a.	≥ 12.2 LSB	n.a.
ENOB (based on SINAD)	≥ 12.5 LSB	n.a.	≥ 13.0 LSB	n.a.	≥ 13.1 LSB	n.a.	≥ 11.8 LSB	n.a.

	M2p.593x, DN2.593-xx, DN6.593-xx, DN2.803-xx, DN2.813-xx							
Test - sampling rate	40 MS/s							
Input Range	±200 mV		±500 mV		±1		±2 V	
Test Signal Frequency	1 MHz	10 MHz	1 MHz	10 MHz	1 MHz	10 MHz	1 MHz	10 MHz
SNR (typ)	≥ 73.0 dB	≥ 72.6 dB	≥ 74.6 dB	≥ 74.4 dB	≥ 75.3 dB	≥ 75.3 dB	≥ 71.9 dB	≥ 71.8 dB
THD (typ)	≤ -87.8 dB	≤ -67.0 dB	≤ -89.0 dB	≤ -67.0 dB	≤ -86.1 dB	≤ -67.2 dB	≤ -79.0 dB	≤ -67.2 dB
SFDR (typ), excl. harm.	≥ 98.3 dB	≥ 96.5 dB	≥ 98.8 dB	≥ 99.5 dB	≥ 101.0 dB	≥ 100.0 dB	≥ 81.7 dB	≥ 91.3 dB
ENOB (based on SNR)	≥ 11.8 LSB	≥ 11.8 LSB	≥ 12.1 LSB	≥ 12.0 LSB	≥ 12.2 LSB	≥ 12.2 LSB	≥ 11.7 LSB	≥ 11.6 LSB
ENOB (based on SINAD)	≥ 11.8 LSB	≥ 10.7 LSB	≥ 12.1 LSB	≥ 10.7 LSB	≥ 12.2 LSB	≥ 10.8 LSB	≥ 11.6 LSB	≥ 10.7 LSB

	M2p.594x							
Test - sampling rate	80 MS/s							
Input Range	±200 mV		±500 mV		±1		±2 V	
Test Signal Frequency	1 MHz	10 MHz	1 MHz	10 MHz	1 MHz	10 MHz	1 MHz	10 MHz
SNR (typ)	≥ 70.6 dB	≥ 70.5 dB	≥ 72.9 dB	≥ 72.8 dB	≥ 74.2 dB	≥ 74.2 dB	≥ 69.8 dB	≥ 69.8 dB
THD (typ)	≤ -87.3 dB	≤ -76.9 dB	≤ -86.6 dB	≤ -76.3 dB	≤ -84.8 dB	≤ -70.1 dB	≤ -79.0 dB	≤ -77.9 dB
SFDR (typ), excl. harm.	≥ 97.5 dB	≥ 105.0 dB	≥ 101.0 dB	≥ 104.0 dB	≥ 100.0 dB	≥ 100.0 dB	≥ 96.9 dB	≥ 96.6 dB
ENOB (based on SNR)	≥ 11.4 LSB	≥ 11.4 LSB	≥ 11.8 LSB	≥ 11.8 LSB	≥ 12.0 LSB	≥ 12.0 LSB	≥ 11.2 LSB	≥ 11.2 LSB
ENOB (based on SINAD)	≥ 11.4 LSB	≥ 11.3 LSB	≥ 11.8 LSB	≥ 11.5 LSB	≥ 12.0 LSB	≥ 11.1 LSB	≥ 11.2 LSB	≥ 11.2 LSB

	M2p.596x, DN2.596-xx, DN6.596-xx, DN2.806-xx, DN2.816-xx											
Test - sampling rate	125 MS/s											
Input Range	±200 mV			±500 mV			±1 V			±2 V		
Test Signal Frequency	1 MHz	10 MHz	40 MHz	1 MHz	10 MHz	40 MHz	1 MHz	10 MHz	40 MHz	1 MHz	10 MHz	40 MHz
SNR (typ)	≥ 68.1 dB	≥ 66.2 dB	≥ 65.5 dB	≥ 70.5 dB	≥ 69.9 dB	≥ 68.7 dB	≥ 73.3 dB	≥ 72.7 dB	≥ 71.5 dB	≥ 67.8 dB	≥ 65.8 dB	≥ 65.1 dB
THD (typ)	≤ -81.5 dB	≤ -74.5 dB	≤ -53.7 dB	≤ -82.5 dB	≤ -77.6 dB	≤ -55.3 dB	≤ -83.3 dB	≤ -68.9 dB	≤ -57.3 dB	≤ -78.0 dB	≤ -75.6 dB	≤ -53.7 dB
SFDR (typ), excl. harm.	≥ 95.0 dB	≥ 93.4 dB	≥ 92.3 dB	≥ 97.5 dB	≥ 96.8 dB	≥ 94.0 dB	≥ 98.5 dB	≥ 98.1 dB	≥ 96.4 dB	≥ 91.5 dB	≥ 89.0 dB	≥ 89.0 dB
ENOB (based on SNR)	≥ 11.0 LSB	≥ 10.7 LSB	≥ 10.6 LSB	≥ 11.4 LSB	≥ 11.3 LSB	≥ 11.1 LSB	≥ 11.8 LSB	≥ 11.8 LSB	≥ 11.6 LSB	≥ 11.0 LSB	≥ 10.6 LSB	≥ 10.5 LSB
ENOB (based on SINAD)	≥ 11.0 LSB	≥ 10.6 LSB	≥ 8.6 LSB	≥ 11.4 LSB	≥ 11.1 LSB	≥ 8.9 LSB	≥ 11.7 LSB	≥ 11.0 LSB	≥ 9.2 LSB	≥ 10.9 LSB	≥ 10.6 LSB	≥ 8.6 LSB

Dynamic parameters are measured at ±1 V input range (if no other range is stated) and 50Ω termination with the samplerate specified in the table. Measured parameters are averaged 20 times to get typical values. Test signal is a pure sine wave generated by a signal generator and a matching bandpass filter. Amplitude is >99% of FSR. SNR and RMS noise parameters may differ depending on the quality of the used PC. SNR = Signal to Noise Ratio, THD = Total Harmonic Distortion, SFDR = Spurious Free Dynamic Range, SINAD = Signal Noise and Distortion, ENOB = Effective Number of Bits.

DN2 specific Technical Data

Environmental and Physical Details DN2.xxx

Dimension of Chassis without connectors or bumpers	L x W x H	366 mm x 267 mm x 87 mm
Dimension of Chassis with 19" rack mount option	L x W x H	366 mm x 482.6 mm x 87 mm (2U height)
Weight (1 internal acquisition/generation module)		6.3 kg, with rack mount kit: 6.8 kg
Weight (2 internal acquisition/generation modules)		6.7 kg, with rack mount kit 7.2 kg
Warm up time		20 minutes
Operating temperature		0°C to 40°C
Storage temperature		-10°C to 70°C
Humidity		10% to 90%
Dimension of packing (single DN2)	L x W x H	470 mm x 390 mm x 180 mm
Volume weight of Packing (single DN2)		7.0 kg

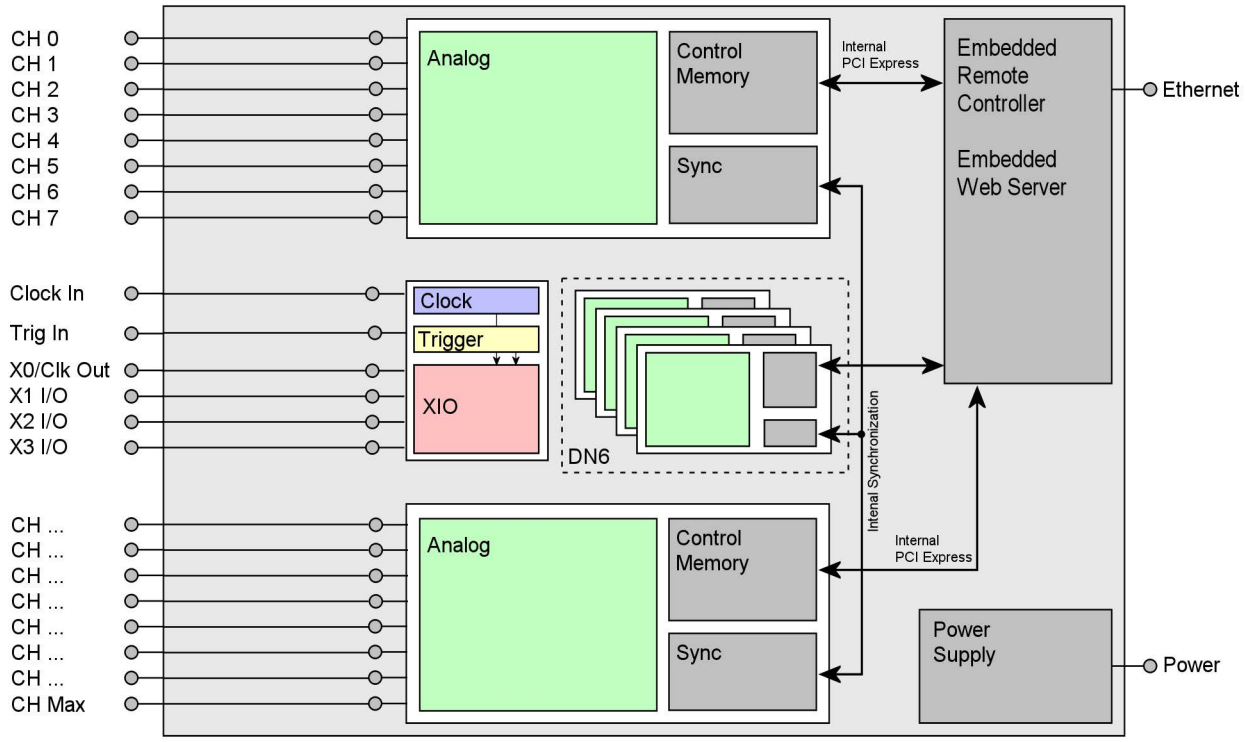
Power Consumption

	230 VAC		12 VDC		24 VDC	
4 channel versions	0.12 A	28 W	2.7 A	32 W	1.3 A	32 W
8 channel versions	0.13 A	30 W	2.7 A	33 W	1.3 A	32 W
16 channel versions	0.21 A	48 W	4.2 A	51 W	2.1 A	50 W

MTBF

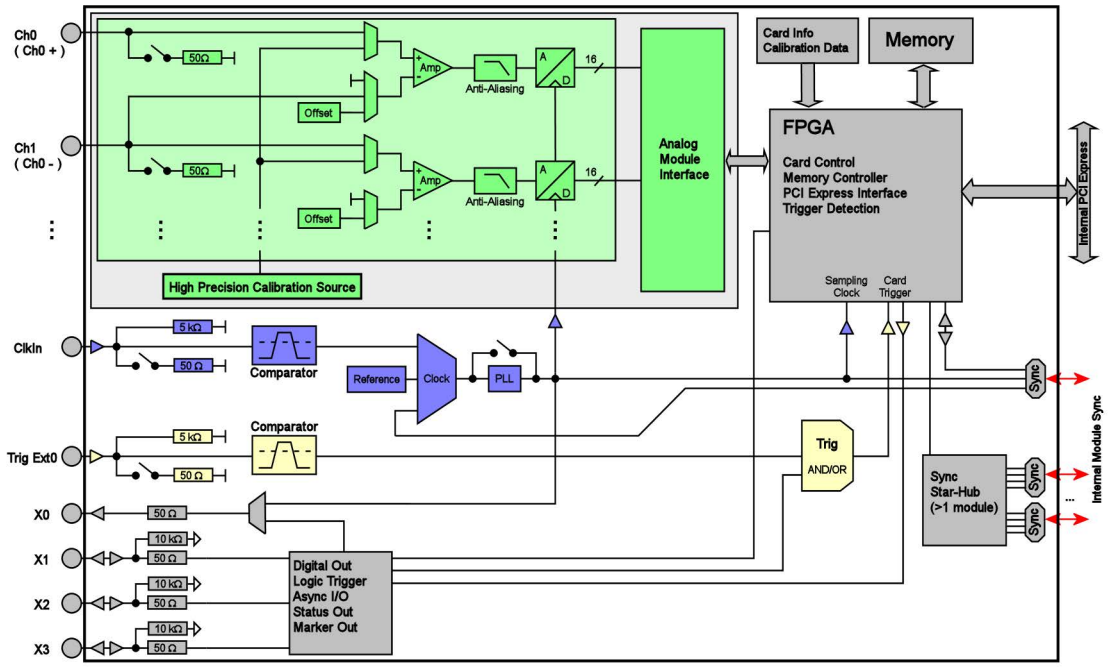
MTBF	100000 hours

Block diagram of digitizerNETBOX DN2



- The number of maximum channels and internal digitizer modules and existance of a synchronization Star-Hub is model dependent.

Block diagram of digitzerNETBOX module DN2.59x



Order Information

The digitizerNETBOX is equipped with a large internal memory for data storage and supports standard acquisition (Scope), FIFO acquisition (streaming), Multiple Recording, Gated Sampling, ABA mode and Timestamps. Operating system drivers for Windows/Linux 32 bit and 64 bit, drivers and examples for C/C++, IVI (Scope and Digitizer class), LabVIEW (Windows), MATLAB (Windows and Linux), .NET, Delphi, Java, Python, Julia and a Professional license of the oscilloscope software SBench 6 are included.

The system is delivered with a connection cable meeting your countries power connection. Additional power connections with other standards are available as option.

digitizerNETBOX DN2 - Ethernet/LXI Interface

Order no.	A/D Resolution	Bandwidth	Memory	Single-Ended Inputs		Differential Inputs		
DN2.591-04	16 Bit	2.5 MHz	1 x 512 MSamples	4 channels	5 MS/s	4 channels	5 MS/s	
DN2.591-08	16 Bit	2.5 MHz	1 x 512 MSamples	8 channels	5 MS/s	4 channels	5 MS/s	
DN2.591-16	16 Bit	2.5 MHz	2 x 512 MSamples	16 channels	5 MS/s	8 channels	5 MS/s	
DN2.592-04	16 Bit	10 MHz	1 x 512 MSamples	4 channels	20 MS/s	4 channels	20 MS/s	
DN2.592-08	16 Bit	10 MHz	1 x 512 MSamples	8 channels	20 MS/s	4 channels	20 MS/s	
DN2.592-16	16 Bit	10 MHz	2 x 512 MSamples	16 channels	20 MS/s	8 channels	20 MS/s	
DN2.593-04	16 Bit	20 MHz	1 x 512 MSamples	4 channels	40 MS/s	4 channels	40 MS/s	
DN2.593-08	16 Bit	20 MHz	1 x 512 MSamples	8 channels	40 MS/s	4 channels	40 MS/s	
DN2.593-16	16 Bit	20 MHz	2 x 512 MSamples	16channels	40 MS/s	8 channels	40 MS/s	
DN2.596-04	16 Bit	60 MHz	1 x 512 MSamples	4 channels	125 MS/s	4 channels	125 MS/s	
DN2.596-08	16 Bit	60 MHz	1 x 512 MSamples	4 channels 8 channels	125 MS/s 80 MS/s	4 channels	125 MS/s	
DN2.596-16	16 Bit	60 MHz	2 x 512 MSamples	8 channels 16 channels	125 MS/s 80 MS/s	8 channels	125 MS/s	

Digital Options

Order no.	Option
DN2.59x-08-Dig	Only availabe for 8 channel models DN2.59x-08. The option gives 8 additional digital inputs with multiple data formats. All 8 digital inputs are available on BNC conector on the front panel.

Options

Order no.	Option
DN2.xxx-Rack	19" rack mounting set for self mounting
DN2.xxx-Emb	Extension to Embedded Server: CPU, more memory, SSD. Access via remote Linux secure shell (ssh)
DN2.xxx-DC12	12 VDC internal power supply. Replaces AC power supply. Accepts 9 V to 18 V DC input. Screw terminals.
DN2.xxx-DC24	24 VDC internal power supply. Replaces AC power supply. Accepts 18 V to 36 V DC input. Screw terminals
DN2.xxx-BTPWR	Boot on Power On: the digitizerNETBOX/generatorNETBOX/hybridNETBOX automatically boots if power is switched on.

Firmware Options

Order no.	Option
M2p.xxxx-PulseGen	Firmware Option: adds 4 freely programmable digital pulse generators that use the XIO lines for output (later installation by firmware - upgrade available)

Calibration

Order no.	Option
DN2.xxx-Recal	Recalibration of complete digitizerNETBOX/generatorNETBOX/hybridNETBOX DN2 including calibration protocol

BNC Cables

The standard adapter cables are based on RG174 cables and have a nominal attenuation of 0.3 dB/m at 100 MHz.

for Connections	Connection	Length	to SMA male	to SMA female	to BNC male	to SMB female	
All	BNC male	80 cm	Cab-3mA-9m-80	Cab-3fA-9m-80	Cab-9m-9m-80	Cab-3f-9m-80	
All	BNC male	200 cm	Cab-3mA-9m-200	Cab-3fA-9m-200	Cab-9m-9m-200	Cab-3f-9m-200	

Technical changes and printing errors possible