Technical Datasheet

AirScope MX

www.daselsistemas.com

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1 CHANNELS

The AirScope system has 4 physical multiplexed channels for emission (connectors) and 4 physical multiplexed channels for reception (connectors).

The user can program an acquisition sequence with up to 32 virtual channels, these virtual channels are defined assigning one connector for emission of the pulse and other connector for reception of the signal, and it is possible to share connectors between virtual channels.

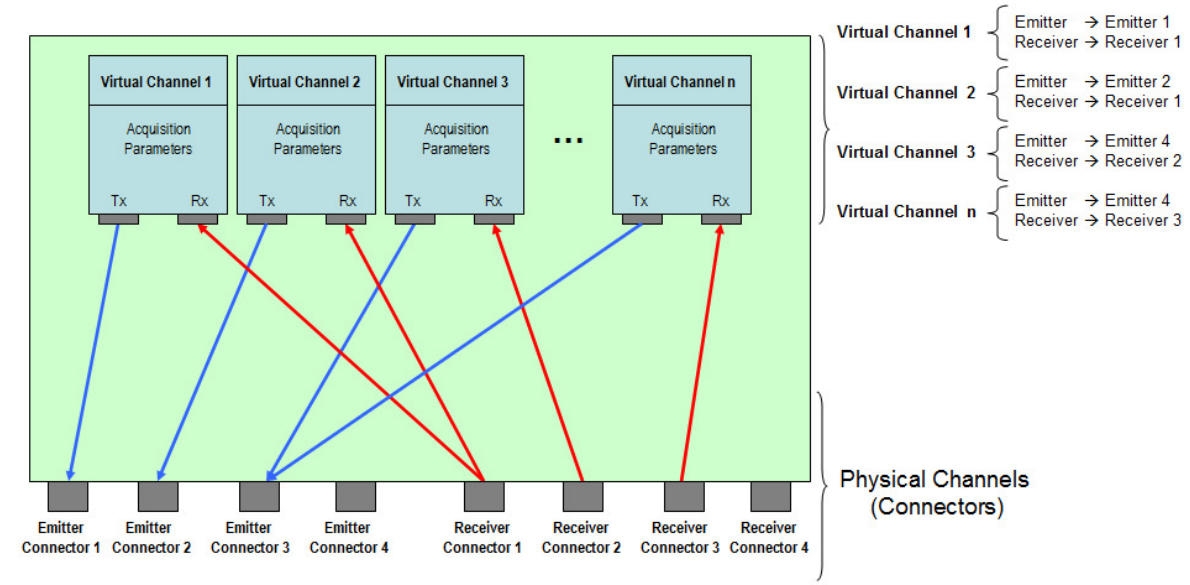

Fig 1.- Connection scheme of the virtual channels.

The acquisition parameters are independent for each virtual channel (emitter connector, receiver connector, pulser parameters, average, filters, range, etc.)

Channels:		
Emitter channels:	4 channels	
Receiver channels:	4 channels	

2 PULSER

Pulser:	Negative square wave pulse	
Excitation voltage	Programmable -20 V to -400 V	
Pulse width	Programmable from 200 ns to 25 µs, with resolution of 5 ns	
Fall time	< 5 ns.	
Rise Time	< 15 ns.	
Pulse repetition frequency (PRF)	Up to 20 kHz	
Burst mode	Up to 256 consecutive pulses	

3 TRIGGER MODES

Trigger Modes	
Software Trigger.	
Internal PRF	
Encoder Trigger	
External Input Signal Trigger.	

4 TIME-GAIN COMPENSATION (TGC)

Time-Gain-Compensation function (TGC)		
Gain range	0 dB to 100 dB	
Time resolution	Programmable between 100 ns and 25.6 us, with resolution of 100 ns.	
Time range	Up to 105 ms depending on timing resolution.	

5 CONTROL SIGNALS

Control Signals	Trigger sources and I/O signals	
Encoder inputs	2 quadrature encoder inputs	
Input-Output	External trigger input, sync output	

6 RECEIVER

Amplifier	Wide-band and low-noise amplifier	
Gain	Programmable from 0 dB to 100 dB	
Bandwidth (-3 dB)	20 KHz to 2.5 MHz	
Input protection circuit	Active circuit with auto-blocking in emission and low impedance in reception.	
Maximum input signal	5 Vpp	
Input impedance	200 Ω	

Sampling (A/D Conversor):	Differential input A/D converters with LVDS output	
Resolution	14 bits	
Sampling frequency	25 MHz maximum, programmable from 24.4 MHz	

Acquisition Modes:	Pulse-echo, transmission. Each channel (connector) can be configured as emitter or receiver or emitter and receiver (pulse-echo).	
Automatic start of the acquisition with programmable threshold (echo-start)		
Acquisition depth	**2. Sampling frequency < 25 MHz → 65.500 samples** With a sampling frequency of 25 MHz, the maximum range is 2620 us (~786 mm in air) With a sampling frequency of 20 MHz, the maximum range is 3275 us (~982 mm in air) With a sampling frequency of 3 MHz, the maximum range is 21833 us (~6.5 m in air) **3. With EMI Filter or Average → 20.480 samples with any sampling frequency**	
Start Delay (Inhibition Time)	Programmable up to 26 ms, with 100 ns of resolution	
Attenuator	Programmable 0 dB / - 20 dB	
Channel Cross-Talk	< -60 dB	

Filters	
Anti-aliasing Low-Pass Filter (2.5 MHz)	
Band-Pass Digital Filter (see section 7)	

7 SIGNAL PROCESSING

Signal processing	Real-time signal processing of acquired scan lines (Hardware Implemented)	
Band-Pass filter with programmable cutoff frequencies 64 coefficients FIR implementation. - Constant response in the pass band (ripple < 0.1 dB) - High attenuation in the stop band (typ. > -50 dB)		(1)
Signed 16 bits format data		
Acquisition information data in real-time: A-scan, B-scan, peak position and amplitude (gates), encoders count		
3 hardware gates for the peak detection (Independent or linked): - gate type → Detection of the maximum, the minimum, the positive edge or negative edge. - start / end gate → Programmable from the first acquired sample to the last acquired sample. - threshold gate → Programmable (0 to 100 % screen)		(2)
3 software for the peak detection (Independent or linked): - gate type → Detection of the maximum, the minimum, the first peak over the threshold, the positive edge or negative edge. - start / end gate → Programmable from the first acquired sample to the last acquired sample. - threshold gate → Programmable (0 to 100 % screen)		(3)
Scan compression with Non-Peak-Loss compression algorithm, up to 128:1 compression rate.		

Programmable down-sampling factor from 1 to 1024 (equivalent sampling frequencies between 24.4 MHz and 25 MHz)	
Digital Envelope detection, implemented by Hilbert Transform.	
EMI Filter, 2 to 5 A-Scan signals - ***Removes, in real-time, the impulsive noise*** - ***Improves flaw detection and reduces the production of false alarms*** - ***Keeps a high dynamic range in noisy environments for C and D-scans***	
Average (2, 4, 8, 16, 32, 64, 128, 256)	

(1) The cut-off frequency resolution depends of the sampling frequency.
(2) When the gates are linked, the start time of the gates 2 and 3 depends on the peak detected by the gate 1.
(3) Software processing

8 OTHER SPECIFICATIONS

Power consumption	7 W max = 1100 mA (6 V), Loaded 50 Ω, PRF=5 KHz, pulse amplitude -400 V.	
Power supply	100 - 220 Volt 47- 63 Hz	
Temperature range	0 ºC to 50 ºC (Ambient)	
Operative system	Microsoft Windows 32/64 bits 7, VISTA / XP / 2000 / 98SE	
Communication	Ethernet 100 Mbit/s. TCP/IP y UDP/IP. Data Rate: >7 MBytes/s.	
Internal Memory	48 MB (24 Mega-Samples)	

9 SOFTWARE

DASEL provides the "***UTView***" application to configure all the acquisition parameters, as well to show, save and load the A-Scan signals acquired by the system. This application also allows getting B-Scan and C-Scan images triggering with an encoder or an external signal.

All the data acquired with the "***UTView***" application can be loaded from MatLab, to make a post processing.

DASEL also provides a programming library to operate the system from MatLab, LabView, Python, Visual Studio, Borland C++, etc.

This library offers the functions set to configure all the acquisition parameters, and get the acquisition data.

The "***UTView***" application and the programming library are available to run in Windows 32/64 bits 7 / VISTA / XP / 2000 / 98SE.