

## Ultrasonic Phased Array Transducer M9170

### DATA SHEET

#### Main technical specifications

Type of transducer	linear array
Type of generated ultrasonic waves	shear
Nominal refracted beam angle in steel	55°
Nominal frequency	4 MHz
Number of elements	16
Pitch (interelement spacing)	1.75 mm
Elevation	10 mm
Nominal operation angle range	30...80°
Nominal element delay	1 $\mu$ s
Nominal echo pulse duration	1.2 $\mu$ s
Nominal relative bandwidth	30 %
Nominal sensitivity	-80 dB
Nominal cross-talk value	-25 dB
Operating surface adjustment	plain
Maximal amplitude of the transmitter pulse	$\pm 100$ V
Operating temperature range	-20 ÷ +45°C
Overall dimensions	32×18×44 mm
Weight	170 g



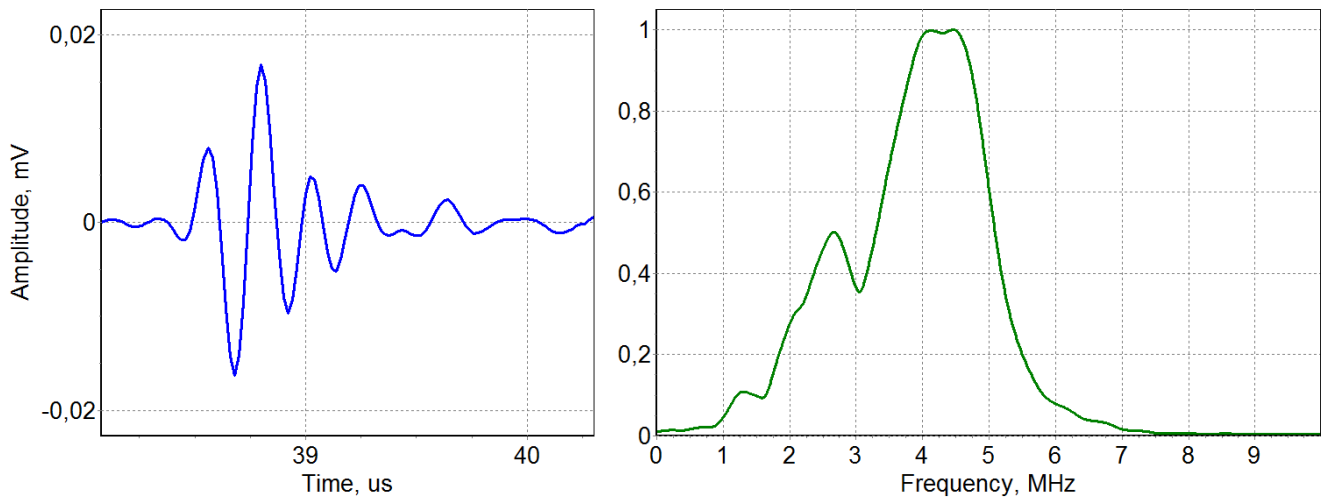
#### Measurement conditions and equipment used

<b>Transmitting:</b>	Square pulse with the amplitude 100 V and the pulse duration <b>125 ns</b> , equal to the half period of the nominal frequency.
<b>Receiving:</b>	Amplifier with the transmission band 0.01 to 15 MHz and the input resistance 400 Ohm. The effective noise value, put on the amplifier input is max. 20 $\mu$ V.
<b>Reference block:</b>	Wedge-shaped CB002-2 serial No. 004, wedge angle 55°. Shear wave velocity 3.250 m/s, average distance from elements to bottom surface 50 mm.
<b>Measurement Results:</b>	Are calculated as arithmetical mean values using the appropriate value of each array element. In the single crystal mode each element receives the echo signals from the backwall of the reference block.

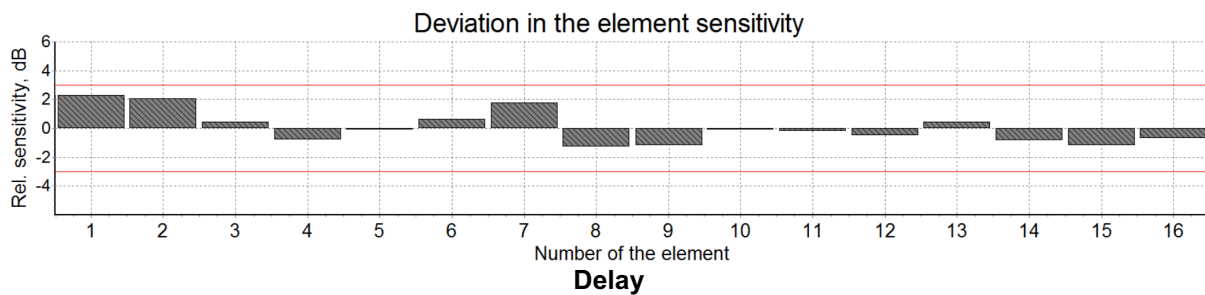
#### Measurement results (mean values for all elements)

Operating frequency (average from the range threshold frequencies), MHz	3.9
Duration of the echo pulse, $\mu$ s	0.99
Relative bandwidth of the echo pulse, %	43
Sensitivity (ratio of the backwall echo pulse amplitudes and excitation pulse amplitudes), dB	-74
Cross-talk value (ratio of the pulse amplitude on the neighboring element to the excitation pulse amplitude), dB	-55
Element delay, $\mu$ s	1.08

### The form of the averaged echo pulse and its spectral density



Echo pulse amplitude, V	0.021
Maximum spectrum frequency, MHz	4
Bandwidth, MHz	1.7
Lower cut-off frequency, MHz	3
Upper cut-off frequency, MHz	4.7



Element No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Delay, $\mu$ s	4.04	4.17	4.3	0.37	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.37	0.36	0.37	0.37	0.37

### Acceptance results

Parameter	Criterion	Result
Operating frequency	Within $\pm 15\%$ of the nominal frequency range	+
Duration of the echo pulse	$\leq$ nominal duration	+
Relative bandwidth of the echo pulse	$\geq$ nominal relative bandwidth of the echo-signal	+
Cross-talk value	$\geq$ nominal cross-talk	+
Sensitivity	Within $\pm 3$ dB relatively to the nominal value	-
Deviation in the sensitivity of individual elements	Within $\pm 12$ dB relatively to the average value	+
Number of elements fulfilling the requirements	16	+