

Ultrasonic transducer S3850

DATA SHEET

Intended use

An electro-magnetic acoustic transducer S3850 for the couplant-free transmitting and receiving ultrasonic shear waves by the novel electromagnetic biasing technology can be used for thickness measurements by A1270 EMAT.

Main technical specifications

Type of transducers: straight, coupled, transversal waves with circular polarization, with pulsed magnetic biasing	Nominal frequency:	5 MHz
Ultrasonic aperture diameter:		8 mm
Maximal excitation pulse voltage:		500 V
Pulsed magnetic biasing voltage:		12 V
Duration of the pulsed magnetic biasing, max.:		800 mcs
Direct current resistance of the signal inductor:		2.8 ± 0.1 Ohm
Operating temperature range:		from -20 to + 60 °C
Overall dimensions:		23x29 mm
Cable length:		1000 ± 10 mm
Weight with the cable:		220 gr



Measurement conditions and equipment used

Temperature 24°C, rel. humidity 85%

Generator transmitting signal: unipolar square pulse with amplitude 400 V ± 40 V, pulse duration 130±13 ns by 50 % of the maximum voltage amplitude.

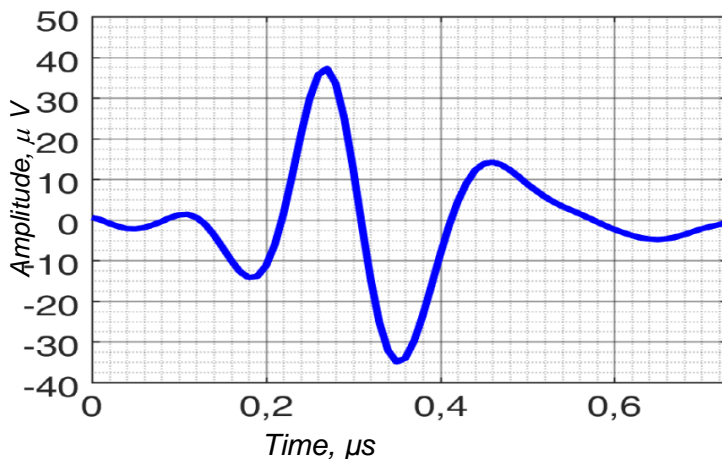
Calibration sample: CO-2, steel 20, serial number 006, longitudinal wave velocity 5930 m/s, shear waves velocity 3247 m/s.

Reference signal: backwall echo-signal on CO-2 at 59 mm depth.

Artificially induced interference: blank thermal noise with effective amplitude 1 mV induced by inductance coil located close by the transducer protector surface.

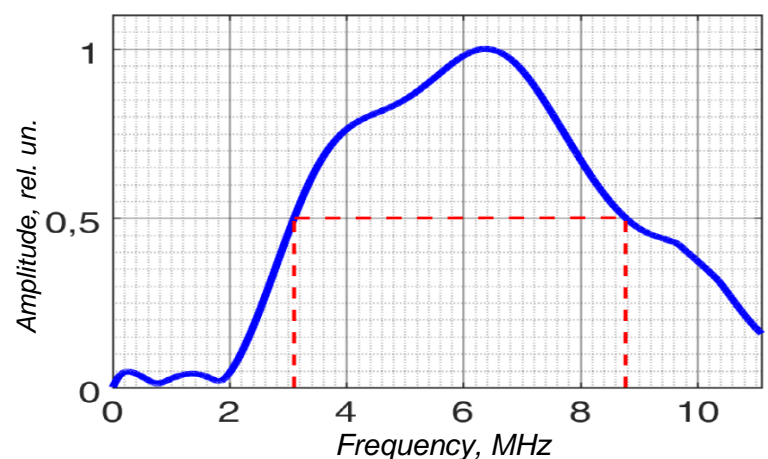
Measured characteristics

Shape of the measured pulse



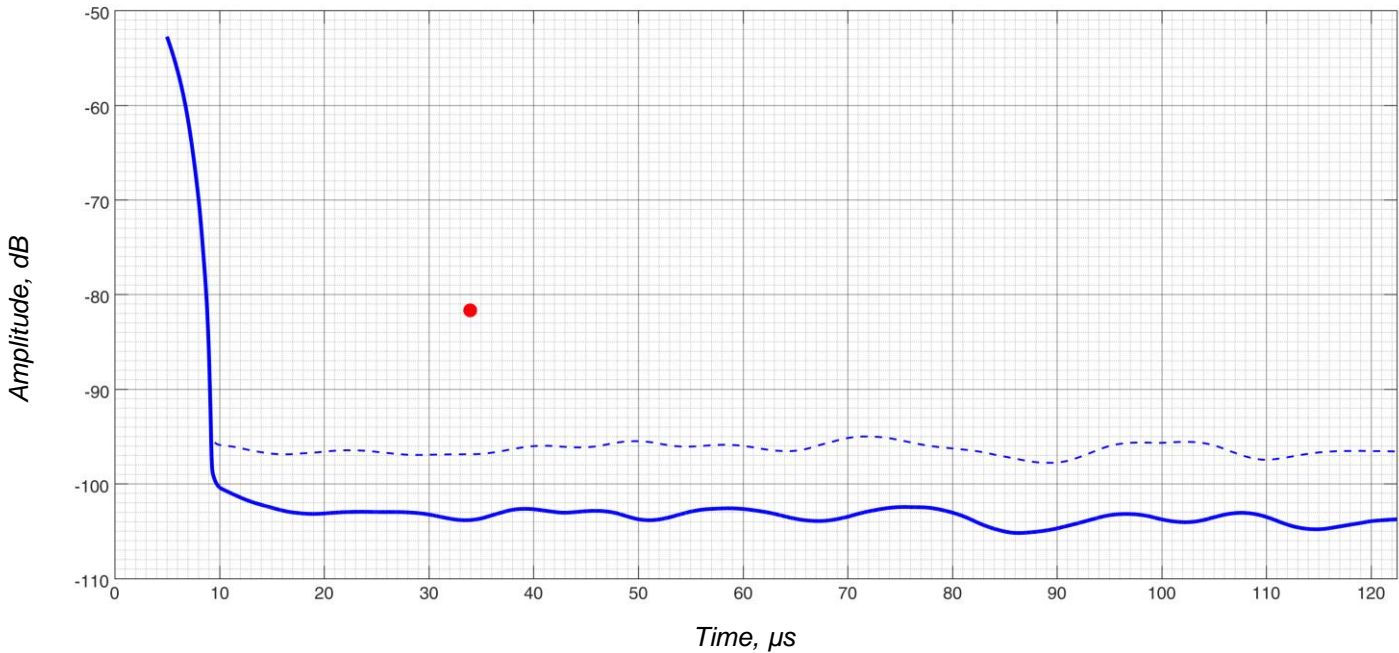
Duration of the echo pulse: **0.55 µs**
 Echo-Pulse amplitude: **37.2 µV**
 Band width: **5.7 MHz**
 Relative band width: **109 %**

Amplitude frequency response



Maximum AFR frequency f_p : **6.4 MHz**
 Lower AFR frequency f_l : **3.1 MHz**
 Upper AFR frequency f_u : **8.8 MHz**
 Operating AFR frequency f_c : **5.2 MHz**

Reverberation noise curve (RNC)

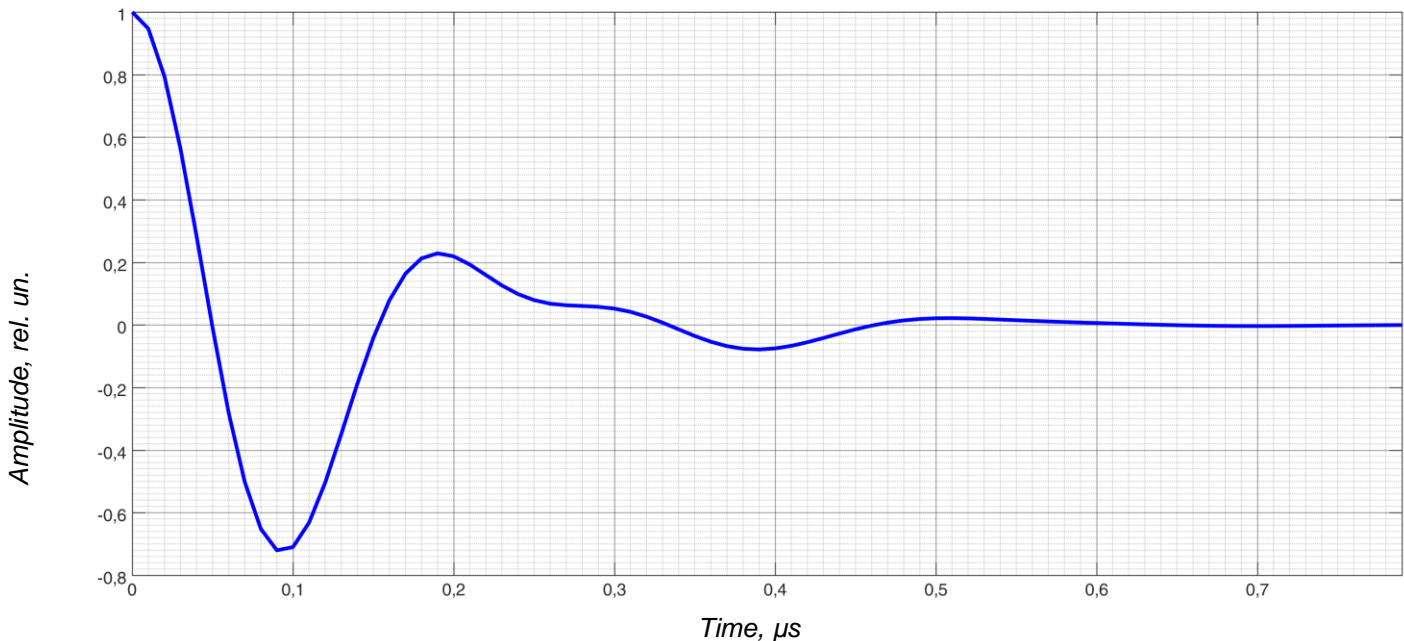


Signal-to-Noise ratio ($20 \lg A_e / RNC_{34\mu s}$) = 22 dB

Signal-to-Noise+Induced interference ratio ($20 \lg A_e / RNC_{34\mu s}$) = 15 dB

Note: RNC is normalized to the amplitude of transmitter pulse and represented in logarithmic scale. The solid line represents the RNC. The dashed line represents the amplitude of induced interference (blank thermal noise). The red dot represents the amplitude of the backwall signal on CO-2 specimen.

Auto-correlation function (ACF)



Main lobe maximum of ACF: 0.23

Time shift of the main lobe maximum of ACF: 0.19 μs