

# CTS-9009PLUS

Digital Ultrasonic Flaw Detector



Adjustable Square Wave Pulser

High-resolution Display Screen

VGA Video Output

Portable & Reliable

# CTS-9009PLUS

## Portable, Easy-to-Use, Reliable

— Advanced General-Purpose Digital Flaw Detector

- Adjustable spike & square wave pulser up to 500V
- High-resolution display screen with 640×480 pixels
- VGA video output
- Adjustable damping
- Operation Frequency up to 20MHz
- High dustproof & waterproof: IP65 (IP67 as option)



## Superior Features

- Operating frequency range: 0.5~20MHz, highlighting advantages of high sensitivity and broadband.
- Adjustable pulse width square wave transmission is up to 500V.
- 20 ~ 2000Hz PRF with 10 steps adjustable: avoid reverberation signals during flaw detection.
- The convenient and useful probe spectrum analysis function enables the users to know the probe waveform, spectrum and center frequency, resulting in more precise flaw detection evaluation.
- Measure crack height by edge peak echo method.
- Max. sampling rate 240MHz; Measurement resolution 0.1mm.
- RF (Radio Frequency) echo display: good to thin-wall material measurement, academic research or qualitative analysis.
- The DAC curve works with echo compare function, making echo quantification of different distances and amplitudes more convenient.
- The AGC (auto gain control) function, together with peak echo and image freeze function, help quickly identify the flaw highest echo, enabling efficient flaw detection.
- Advanced thickness measurement function available.
- Featured with AWS D1.1/D1.5 and API 5UE evaluation standards.
- The gate magnifier function magnifies the echo area within the gate to the whole screen display.
- Up to 500 sets of curve and waveform can be saved for various workpieces and flaw detection standards.



### VGA Video Output Function



 VGA port for VGA monitor or projector connection

VGA Video Output function makes it easier for you to have a presentation or a flaw detection demonstration.

# Application Examples

## Detection on Large Forged Pieces



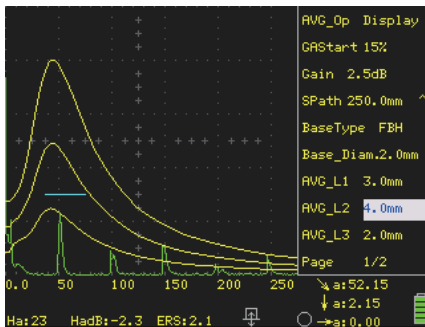
- Adjustable pulse width square wave transmission up to 500V.
- High penetration and large detection range to achieve detection on large forged pieces and coarse crystal material.
- This picture shows an echo from a 400mm 2 flat-bottom forged test block.

## Probe Spectrum Analysis Function



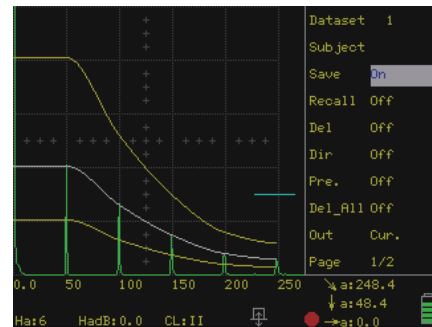
- The probe waveform, spectrum and center frequency of the probe can be measured precisely by capturing echoes.

## AVG/DGS Curve within Three Times of Near Field



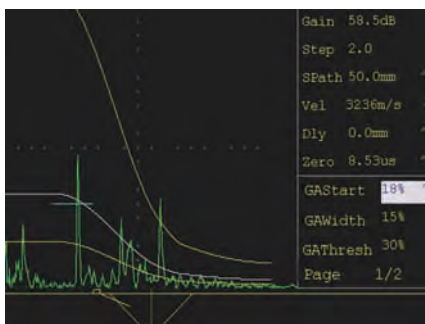
- AVG/DGS curve will be auto created by taking a known flat-bottom hole or large flat-bottom echo for reference.

## DAC Curve



- The DAC curve function brings easier and more convenient flaw evaluation.

## Weld Groove Profile Function



- The weld groove profile function can directly point out the location of the defect.

## Echo-to-Echo Thickness Measurement

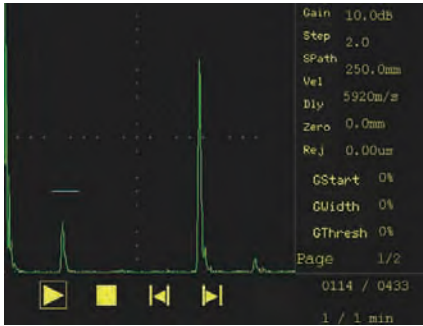


- With thickness measurement function module, CTS-9009PLUS can achieve a variety of thickness measurement modes.



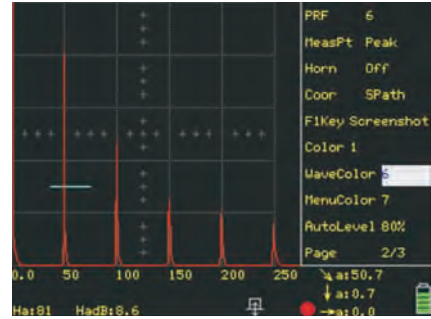
# Application Examples

## Dynamic Cineloop



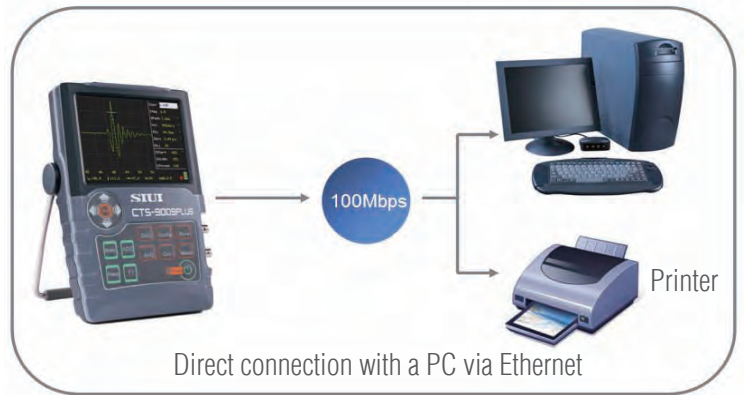
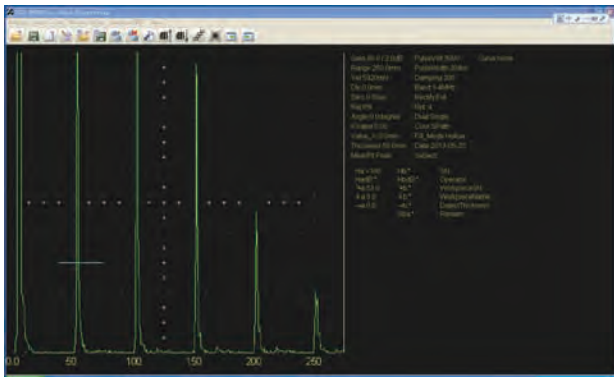
- Internal finite echo recording or external infinite USB dynamic recording function to achieve recording full scanning process.

## Multiple Waveform Colors



- Up to 11 kinds of waveform colors for selection

## Ethernet Communication



- With network communication, the CTS-9009PLUS can be connected to a PC directly via 100Mbps Ethernet, so as to achieve real-time display and remote control.

## Reporting



- Detection echoes, curves or parameters may be losslessly stored to a PC via 100Mbps Ethernet, facilitating report editing and data management.
- Screenshot and detailed info can be transferred into Microsoft Word for customized reporting.

# Typical Applications



The CTS-9009PLUS is designed to increase productivity in various inspection situations. It is suitable for inspection of flaw position and size, which can be widely used for various detection demands, such as pipes and tubes, welding seams, pressure vessels and airplane parts.

Application examples are as follows:

## Weld Inspection

- Weld groove profile function
- Peak memory function
- AVG/DGS curve
- Advanced DAC curve
- AWS



## Forgings and Casting Inspection

- Adjustable square wave pulser: Up to 500V pulse voltage
- Manual PRF adjustable: 20~2000Hz with 10 steps adjustable
- Peak memory function
- AVG/DGS curve

## Thin Plates Inspection

- High operating frequency: 0.5~20MHz
- Manual PRF adjustable: 20~2000Hz with 10 steps adjustable
- Good near-field resolution
- Peak memory function
- AVG/DGS curve



## Rail Inspection

- High PRF: Up to 2000Hz
- Lightweight: The whole unit weight (battery included) is approx. 1.25 kg.
- Peak memory function
- Advanced DAC curve
- AVG/DGS curve

Function	Unit	Specifications
<b>Testing Index</b>		
Attenuator Error	dB	Every 20dB $\pm 1$ dB
Vertical Linearity Error	%	$\leq 3$
Dynamic Range	dB	$\geq 32$
Horizontal Linearity Error	%	$\leq 0.5$
<b>Pulser</b>		
Transmission		Negative spike or negative square, with adjustable voltage Pulse voltage range: 50V ~ 500V; Square pulse width range: 51~ 850ns
PRF	Hz	20-2000, step: 20
Damping	$\Omega$	50 / 100 / 200 / 1000
<b>Receiver</b>		
Operating Frequency Range	MHz	0.5 ~ 20: multiple wide/narrow frequency steps for selection Including: 1~4/ 0.5~10 / 2~20/ 1/ 2.5/ 4/ 5/ 10/ 13/ 15/ 20
Reject	%	0 ~ 80
Gain Adjustment	dB	Range: 0 ~ 110; Adjustable Steps: 0.5 / 2 / 6 / 12
<b>Measurement</b>		
Detection Range	mm	0 ~ 13000 (Longitudinal wave in steel)
Pulse Shift Range	mm	-10 ~ 1000 (Longitudinal wave in steel)
Rectify		Positive/ Negative/ Full/ RF/ Filter
AWS D1.1/ D1.5		Welding level is calculated as per AWS (American Welding Society) steel structural welding code (D1.1) and bridge welding code (D1.5)
API 5UE		A quantitative method for defect depth according to API (American Petroleum Institute).
Curved Surface Correction		For depth and horizontal distance correction when testing circumference with an angle probe.
Crack Height Measure		Crack height calculated with endpoint reflected wave method when using an angle probe.
Thickness Measure		Simple thickness measurement when using a narrow-pulse normal probe.
Auto Gain		Enabling the echo amplitude within the gate auto adjusted to a designated amplitude Amplitude setup: 40% / 50% / 60% / 70% / 80% / 90% / 100%
Angle Measurement		Measure probe angle
TCG		Converted from DAC curve, echo amplitude compensated according to DAC curve, which enables artificial reflectors with different sound path but the same size have the same echo amplitude.
Network Projection		Display on the PC software the same image as on the system through network
Auto Freeze		Auto freeze signals within gate A/B exceeding gate thresh
Spectrum Display		Display signal spectrum within 50mm from gate A initial position.
<b>Gate</b>		
Gate		There are two measure alarm gates available. Gate mode: off / positive / negative / measurement Gate Start: 0~109% Gate Width: 1~109% Gate Thresh: 10~90%
<b>Optional Software</b>		
DAC_JP		DAC curve for Japanese standard
Manual DAC Adjustment		Manual adjust height of each point of DAC curve.
<b>General Technical Specification</b>		
Display Screen		5.7" high brightness TFT LCD, 640x480 pixels
Measure Unit		Inch / mm
Peripheral port		USB, Ethernet and VGA ports
Storage		500 data sets, including system setup, detection state, echo figures, etc.
Language		Up to seven kinds of language for selection, including English, Japanese, French, Spanish, Russian, German, Polish
Power Supply	V	12DC (external power supply); 7.4 (battery)
Battery Operating Time	h	$\geq 7$ (in factory default mode)
Operating Temperature	$^{\circ}\text{C}$	-10 ~ +40
IP Code		IP65
Weight	kg	Approx. 1.25 (including battery)
Dimension	mm	152 x 240 x 52 (WxHxL)



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