



MEASUREMENT SOLUTION PROVIDER



HSM-S SERIES HANDHELD XRF ALLOY ANALYZER

CATALOGUE NO. HSM-E01

Product Advantages



Customizable Functions

Customizable ore composition analysis mode and RoHS analysis mode.



Fast & Efficient Measurement

Alloy grade identification in 3–5 seconds, measurement results displayed in 10–15 seconds, and real-time spectral graph viewing.



Operation System

Professional Android-powered operating software—supports Chinese/English switching, delivering seamless operation with zero lag.



Easy Data Transmission

Supports versatile data transfer—USB, WiFi, and Bluetooth connectivity available.



Customizable Report Generation

Customize and create reports with export options in Excel, PDF, and more.

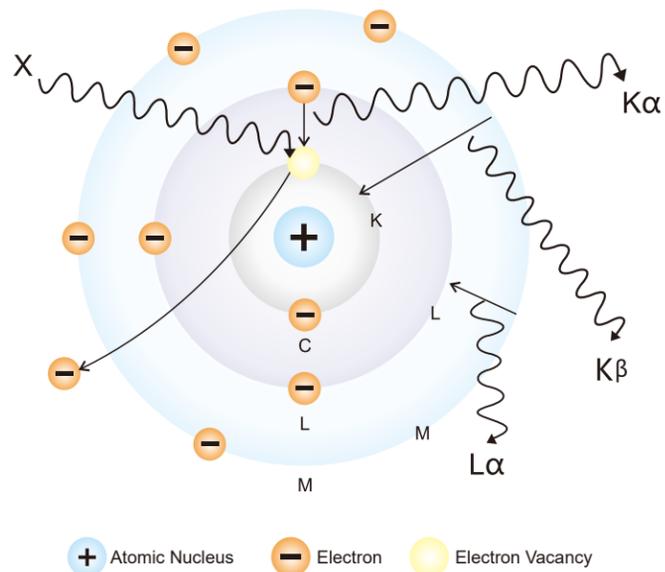


Non-Destructive Testing Method

No damage to or impact on the tested sample's performance—the entire testing process is completely non-destructive.

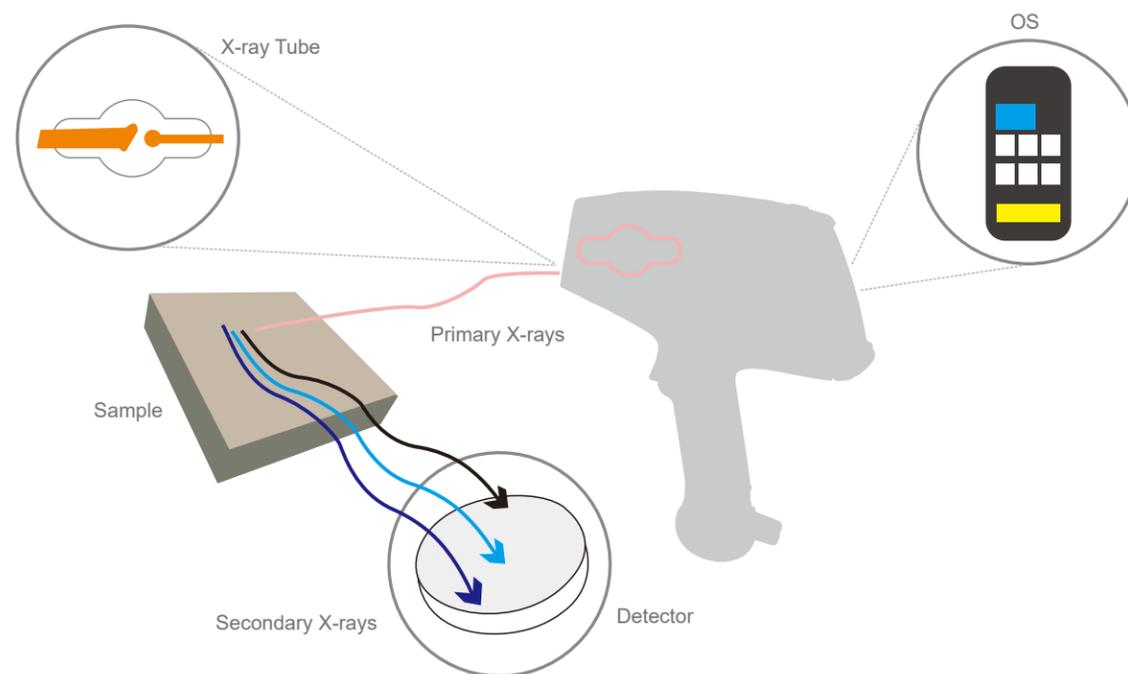
Working Principle

How are characteristic X-rays generated?



- The X-ray tube emits high-energy primary X-rays that bombard the sample surface.
- The primary X-rays eject K-shell/L-shell electrons (with lower energy than the primary X-rays) from atoms. To regain stability, higher-energy electrons from the outer shells of the atoms transition to the inner electron vacancies. The energy difference released during the transition is radiated as photons, forming element-specific characteristic X-rays.
- The detector captures these characteristic X-rays and converts them into electrical signals, which are processed to generate a spectrum. Qualitative analysis of elements is performed based on the positions of the characteristic peaks, while quantitative analysis of their contents is achieved through the peak intensities.

How does the handheld XRF alloy analyzer work?



Application Fields



Alloy Composition Analysis

Checking the composition and grade of alloys is very important for industries like waste alloy recycling and mechanical processing. Inspectors often need to quickly and accurately find out what's in different metal materials and their grades.

Plating Thickness Analysis

Plating is an indispensable basic process in social and economic development. It is mainly used to improve the surface appearance of workpieces, prevent metal parts from corrosion, and enhance the electrical conductivity of the metal in circuit patterns on circuit boards. Common types of coatings include chrome plating, nickel plating, copper plating, etc.

Precious Metal Element Analysis

Precious metals mainly consist of gold, silver, and six platinum group metals: ruthenium, rhodium, palladium, osmium, iridium, and platinum. To test their purity, people usually follow the new national standard GB/T18043-2013.

Ore Composition Analysis

It provides fast and accurate elemental analysis at every stage of mining, from grassroots exploration and development to ore grade control and even environmental surveys.

RoHS Hazardous Element Analysis

Hazardous elements restricted by RoHS are heavy metals like lead, mercury, chromium, cadmium, and total bromine.



Alloy Industry Applications

Alloy Composition Testing

Checking alloy composition and grade is crucial for industries like waste alloy recycling and mechanical processing. Inspectors often need to quickly and accurately figure out the composition and grade of different metal materials. Alloy analyzers are the most reliable testing tools for quality control (QA/QC), material identification (PMI), mixed material checking, scrap sorting, and grade ID. They can also test and sort large amounts of metal scrap on-site, giving users fast, efficient, and accurate information right away.

Analyzable Alloy Series

Aluminum-based Alloy Series (SDD Detector Required)

Cobalt-based Alloy Series

Titanium-based Alloy Series

High-temperature Alloy Series (Tungsten-molybdenum Alloys)

Nickel-based Alloy Series (Nickel-based Alloys, Nickel/Cobalt Superalloys)

Copper-based Alloy Series (Bronze, Brass, Nickel-copper Alloys, etc.)

Iron-based Alloy Series (Stainless Steel, Chromium/Nickel Alloy Steel, Low-alloy Steel, Tool Steel, Seamless Steel)

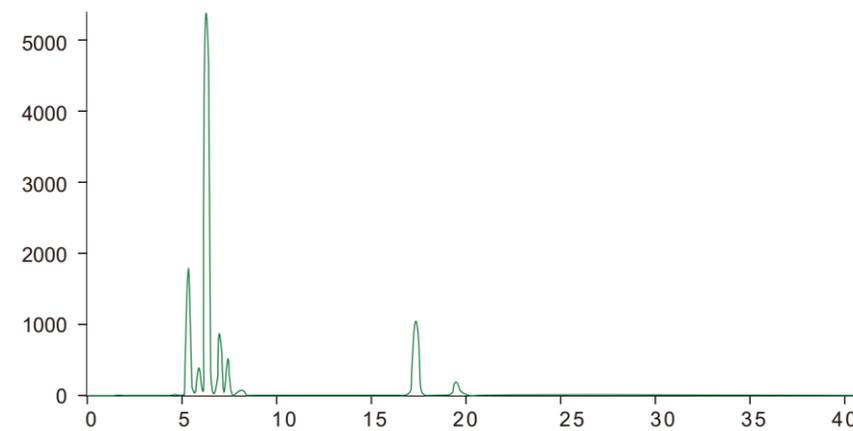


Application examples

316 Stainless Steel Sample Test Data

No.	Mode	V%	Cr%	Mn%	Fe%	Ni%	Cu%	Mo%
No.1	ALLOYS	0.13	16.56	1.22	69.558	10.18	0.322	2.03
No.2	ALLOYS	0.132	16.66	1.29	69.438	10.15	0.32	2.01
No.3	ALLOYS	0.13	16.61	1.2	69.645	10.15	0.315	2.05
No.4	ALLOYS	0.128	16.62	1.19	69.701	10.03	0.331	2.05
No.5	ALLOYS	0.126	16.68	1.18	69.489	10.15	0.325	2.05

Test Spectrum



Alloys	#110	30SEC	
316SS		0.019 precise	
Elem	%	+/-	SPEC
v	0.126	0.001	
Cr	16.68	0.102	[16.0-19.0]
Fe	69.49	0.202	[63.0-72.0]
Mn	1.18	0.081	[0.0-2.21]
Cu	0.325	0.002	[0.0-1.0]
Ni	10.15	0.121	[10.0-14.0]
Mo	2.05	0.075	[1.9-2.8]

Low Sample Requirements

For small samples such as fine iron wires/screws, measurements can be performed by increasing the number of samples to cover the test window.

Non-Destructive Testing (NDT)

NDT technology lets you analyze incoming materials and finished products without damaging them, quickly and accurately figuring out what kind of metal they are.





Application in Plating Thickness Measurement Field

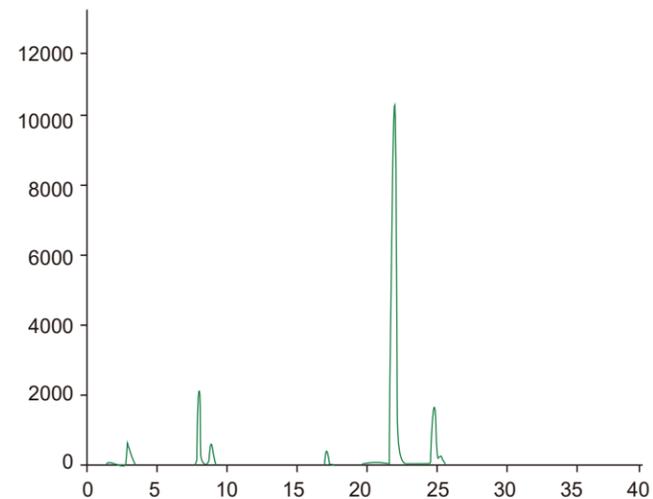
Plating is a necessary basic process for social and economic development. It mainly makes workpieces look better, protects metal parts from rusting, and improves the conductivity of metal lines on circuit boards. Common coatings include chrome plating, nickel plating, copper plating, and more.

The HSM-S130/HSM-S640 works for plating thickness measurement and material analysis. It has advantages like non-destructive testing, multi-layer alloy measurement, high efficiency, and consistent results. It can analyze the elements in samples (both qualitative and quantitative) and measure the thickness of coatings. It is widely used in industries such as circuit boards, semiconductors, electroplating, hardware, auto parts, sanitary ware, and jewelry-for testing functional coatings and the concentration of components in electroplating baths.

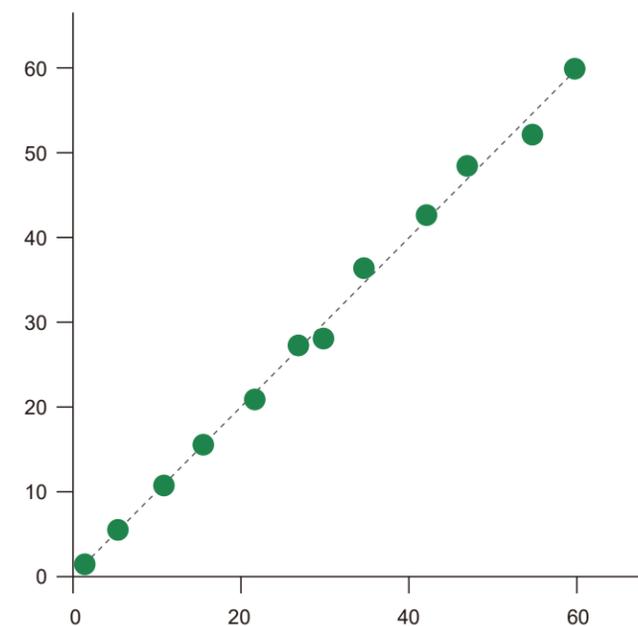
Using the Plating Mode of the HSM-S130, a series of copper-silver plated samples were analyzed, and the obtained results are as follows:

No.	Silver Plating Thickness	Test value	Uncertainty	Relative Error
1	0.91	0.954	0.015	0.044
2	5.08	5.16	0.03	0.08
3	10.62	10.28	0.06	0.34
4	15.65	15.2	0.08	0.45

Test Spectrum



Calibration Curve



Typical applications

PCB (Printed Circuit Board)

There are many surface treatment processes for PCBs today, such as HASL (Hot Air Solder Leveling), OSP (Organic Coating), ENIG (Electroless Nickel/Immersion Gold), immersion silver, immersion tin, and electroplated nickel-gold. Coating thickness gauges are crucial for PCBs to meet top-quality standards. To sell products globally, China has set clear rules for PCB coating thickness in export goods and foreign projects.



PCB

Scientific Research Laboratories

Scientific research organizations use coating thickness gauges for research—like developing electroplating bath recipes and seeing how product performance changes with different plating thicknesses.



Electroplating Bath/Plating Solution

Hardware Electroplating

The hardware electroplating industry also needs to measure the thickness of its metal coatings, as well as the concentration and content of metal electroplating baths, thereby determining whether the products meet the standards.



Hardware Electroplating

Jewelry and Accessories/Jewelry

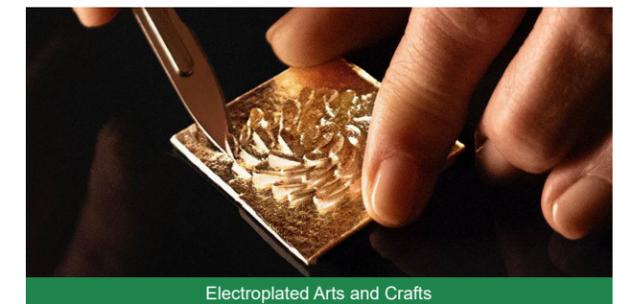
Plating thickness gauges are widely used in the jewelry business because they can also test the metal content of jewelry. Likewise, if your jewelry needs plating, you can use the plating thickness mode to measure how thick the plating is.



Gold-Plated Jewelry

Testing Institutions/Inspection Bodies

Testing organizations mainly use coating thickness gauges to check if products meet standards and are up to quality, then provide test results for the products.



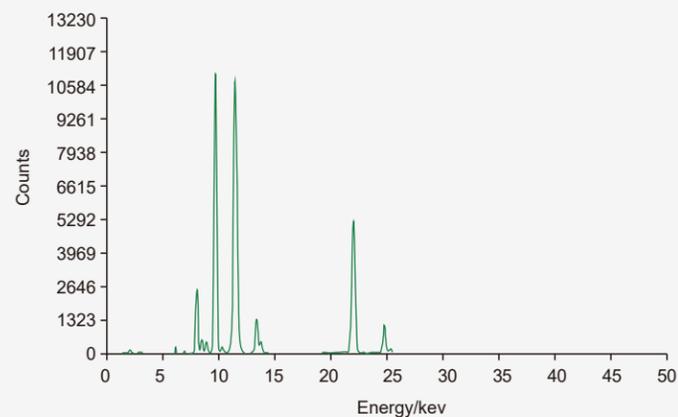
Electroplated Arts and Crafts



Precious Metals Field

Precious metals mainly include gold, silver, and platinum group metals (ruthenium, rhodium, palladium, osmium, iridium, platinum). Their purity testing usually follows the new national standard GB/T18043-2013. Traditional methods like the touchstone test, cupellation, fire assay, nitric acid check, and others are destructive-they not only waste samples but also take longer to prepare samples. Unlike traditional testing tools, the HSM-S series handheld XRF alloy analyzer is easy to use and completely non-destructive, making it perfect for analyzing gold and other precious metals. It's widely used to test the chemical composition and karat of precious metal products, as well as the relative purity and fineness of gold items.

Test spectrum



Test result

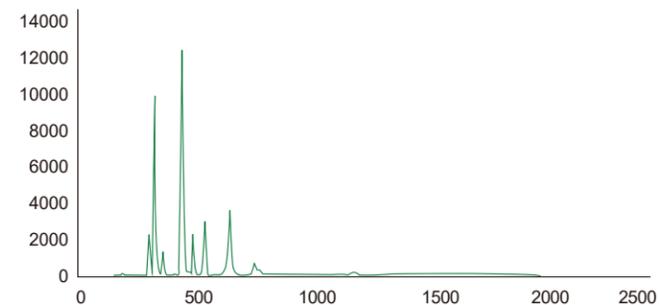
Element	Result(%)	+/-
Au	65.5	0.2
Ag	24.430	0.17
Cu	10.013	0.085

Typical applications

- Non-Destructive, Rapid Detection and Analysis of Precious Metals (Gold, Platinum, Silver, etc.)
- Precious Metal Grade Testing
- Waste/Recycled Precious Metal Content Testing



Lead-Zinc Ore Test Spectrum



Test Data of Lead-Zinc Ore Standard Sample (80-Second Test Duration)

No.	Mode	Fe203%	Mn%	Zn%	As%	Pb%
No.1	Mining	20.340	5.060	13.220	0.022	4.095
No.2	Mining	20.810	5.170	13.180	0.031	4.160
No.3	Mining	20.850	5.110	13.210	0.009	4.206
No.4	Mining	20.050	5.060	13.050	0.012	4.205
No.5	Mining	20.060	5.080	12.980	0.031	3.950

Note: These are lab test data – slight differences may appear with different instruments.

Analyzable Ore Types:

- Iron Ore (Hematite, Ilmenite, Siderite, etc.)
- Copper Ore (Chalcopyrite, Cuprite, Malachite, etc.)
- Tantalum Ore (Tantalite, Columbite, Pyrochlore, etc.)
- Molybdenum Ore (Molybdenite, Copper-Molybdenum Ore, Tungsten-Molybdenum Ore, etc.)
- Chromium Ore (Chromite Spinel, Chromite, Bismutochromite, etc.)
- Lead-Zinc Ore (Galena, Sphalerite, Cerussite, etc.)
- Nickel Ore (Limonitic Nickel Ore, Copper-Nickel Sulfide Ore, etc.)
- Tungsten Ore (Scheelite, Wolframite, Tin-Tungsten Ore, etc.)
- Other Ore Types

Typical applications

- Rapidly measure soil and exposed rock formations to identify potential drilling targets;
- Directly screen core samples and cuttings for rapid drilling rig decision-making;
- From base metals and gold ores to placer ores and platinum group elements (PGEs);
- Ore samples such as soil, sediments, rock fragments, bagged cuttings, and drilled core samples;
- Liquid substances containing highly acidic samples.



Mining Industry (Customized Application)

In the exploration and mining industry, traditional laboratory analysis typically takes hours or even days to deliver results-being both time-consuming and costly.

Handheld XRF ore composition analyzers can provide rapid, accurate elemental analysis with little to no sample preparation at all stages of mining activities, including grassroots exploration, ore grade control, and even environmental surveys. Compared with traditional laboratory methods, they enable higher sample density while saving time, effort, and resources.



RoHS Consumer Product Testing Application (Customized Application)

With the development of social economy, the hazards of harmful elements to humans have become an unavoidable and crucial issue.

Countries around the world have successively introduced relevant regulations to control the content of harmful elements in commodities, and the limit values for these elements are increasingly tightened. Handheld RoHS analyzers can perform on-site chemical composition analysis of consumer products such as toys, clothing, footwear, and electronic devices, and quickly detect harmful elements including lead (Pb), cadmium (Cd), mercury (Hg), chromium (Cr), and bromine (Br), thereby determining whether these products comply with RoHS requirements. Featuring high sensitivity and excellent repeatability, they are the ideal choice for incoming material inspection, safety audits of finished products, and storage product testing.

Testing Standard

- Compliance with EU RoHS 2.0 Directive (2011/65/EU)
- Compliance with Halogen-Free Directive (IEC 61249-2-21)
- Compliance with REACH Regulation
- Compliance with Toy Safety Directive (EN 71)
- Compliance with US CPSIA (Consumer Product Safety Improvement Act)
- Compliance with China-RoHS Voluntary Certification (Nationally Promoted)
- Compliance with IEC 62321 Standard
- Compliance with GB/T 26125-2011 Standard

RoHS Directive Limit Standards

Pb, Hg, Cr⁶⁺, PBB, PBDE ≤ 1000ppm; Cd ≤ 100ppm

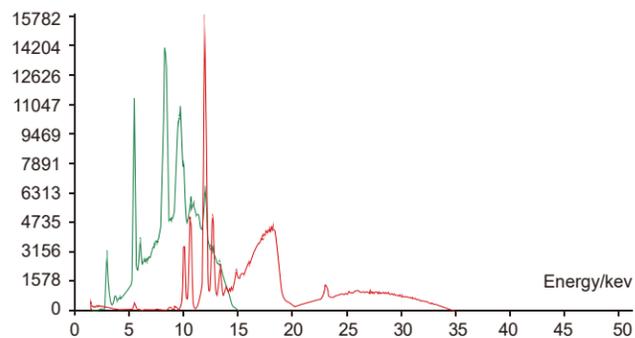
Halogen-Free Regulations

Cl ≤ 900ppm; Br ≤ 900ppm; Cl+Br ≤ 1500ppm

Testing for 8 Heavy Metals Restricted in the Toy and Other Industries

Cd, Pb, Hg, Cr, Sb, As, Ba, Se

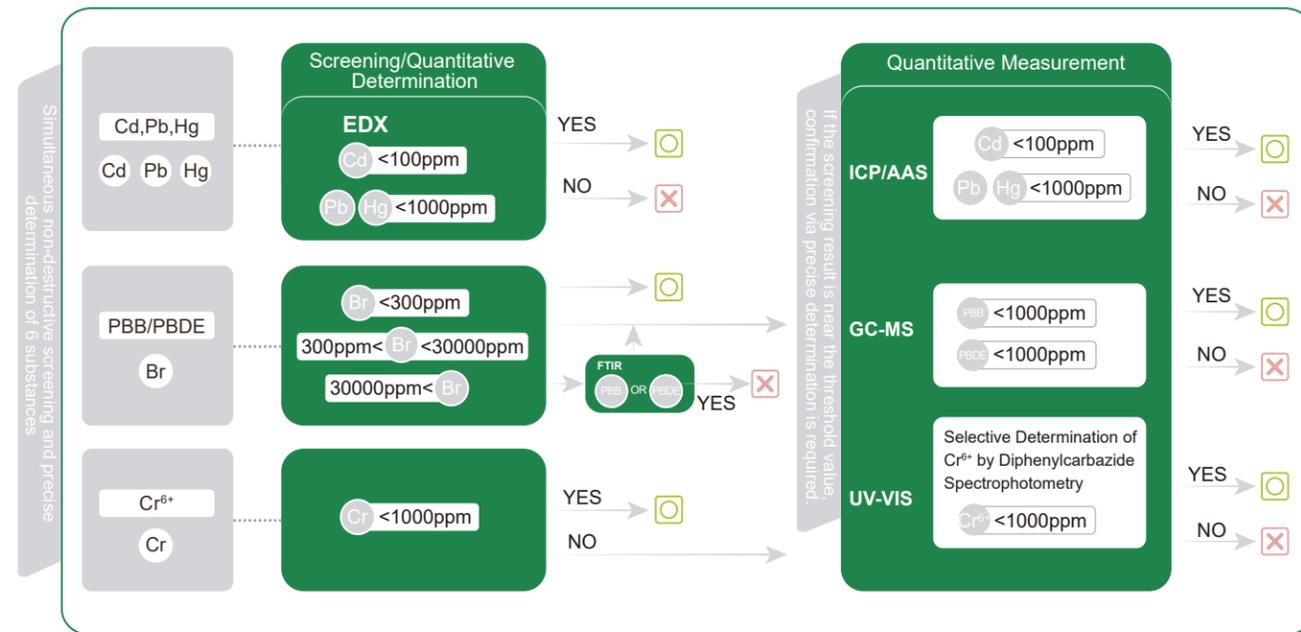
Test Spectrum



Result Comparison

Element	Pb	Hg	Br	Cr	Cd
Measured Value (ppm)	1201	1108	1091	1008	300
Standard Value (ppm)	1199	1099	1076	999	297

Recommended Screening Process



Note: This process is for reference only and not recommended by IEC

○ Harmful substances are below the standard limit
 ✗ Harmful substances exceed the standard limit

Typical applications

- Restricted Toxic Elements in Consumer Products
- Composition Analysis and Grade Identification of Metal Components/Fasteners
- Chlorine (Cl) and Bromine (Br) in Polymer Materials and Plastic Products
- Cadmium (Cd), Lead (Pb), and Mercury (Hg) in Packaging Materials
- Cadmium (Cd), Lead (Pb), Bromine (Br), Mercury (Hg), Chromium (Cr), and Other Elements in Electronic Components, Connectors, Cables, etc.
- Content of Elements such as Tin (Sn), Lead (Pb), Copper (Cu), Silver (Ag), Bismuth (Bi), and Cadmium (Cd) in Solder – Both in Raw Material State and at Different Stages of Use
- Whether an Appropriate Amount of Lead (Pb) is Present in High-Reliability Electronic Components



SPECIFICATION

Code	HSM-S110	HSM-S130	HSM-S620	HSM-S640
Analysis mode*	alloy analysis	alloy analysis plating analysis	alloy analysis	alloy analysis plating analysis
Detector	Si-PIN		SDD	
Elemental analysis range	Ti~U		Mg~U	
Target material	Ag target		Rh target	
Excitation source	50kV/200μA Max.			
Heat dissipation	dedicated T-slot heat sink enhances thermal dissipation performance of the instrument			
Display	4.3-inch industrial-grade resistive touchscreen			
Operation system	Android			
safety	air-test protection against untargeted operation			
Memory module	32G			
Data interface	mini-USB			
Data processing	reports can be generated in EXCEL and PDF formats, and users can customize the content 6600mAh			
Battery	6000mAh			
Working environment	-35~60°C			
Dimension (LxWxH)	254×79×280mm			
Net weight	1.6kg			

* Can be customized according to user requirements: RoHS analysis mode, ore analysis mode

STANDARD DELIVERY

Main unit	1 pc
Battery	2 pcs
Power adapter	1 pc
316 reference sample	1 pc
Window protective film (HSM-S110-FILM)	10 pcs

OPTIONAL ACCESSORY

Bluetooth printer	HSM-S110-BP
Stand	HSM-S110-STAND
Testing cup	HSM-S110-CUP



HANDHELD XRF ALLOY ANALYZER

HSM-S110

Non-destructive testing

Suitable for detection of high atomic number elements such as Mn, Fe, Ni, Mo, etc.

Suitable for detection of stainless steels, high-temperature alloy steels, nickel-based alloys, cobalt-based alloys and special alloys made of zirconium, tungsten or tantalum

Samples can be analyzed directly

Meets radiation safety standards



HANDHELD LIBS SPECTROMETER

HLS-B410

Microdestructive testing, generates a spark point of 1mm²

Suitable for detection of low atomic number elements such as Mg, Al, Si, etc.

Suitable for detection of aluminium alloys, magnesium alloys and low alloy steels

Samples need to be grinded to remove the oxide layer

Without radiation



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