

# Agilent 6540 and 6538 Ultra High Definition (UHD) Accurate-Mass Q-TOF LC/MS Systems

Exceptional MS and MS/MS performance without compromises



*Agilent 6540 Q-TOF LC/MS integrates Ultra High Definition TOF technology, Agilent Jet Stream technology, and MassHunter Workstation data mining tools for sensitive, high resolution, accurate-mass MS and MS/MS analyses.*

## Summary

The Agilent 6540 and 6538 UHD Accurate-Mass Quadrupole Time-of-Flight (Q-TOF) LC/MS systems feature Ion Beam Compression (IBC) and Enhanced Mirror Technology (EMT) for significantly improved mass accuracy and resolution. The 6538 Q-TOF features dual ESI technology, while the 6540 Q-TOF features Agilent Jet Stream technology for added sensitivity performance. These new UHD Q-TOF systems, deliver exceptional sensitivity, dynamic range, isotopic fidelity, mass accuracy and resolution to meet your most challenging research needs.

## Clearly better performance—by any measure—just got better

The Agilent UHD Accurate-Mass Q-TOF LC/MS systems are designed to provide superior data quality and advanced analytical capabilities for profiling, identifying, characterizing, and quantifying low molecular-weight compounds and biomolecules with greater confidence. The 6540 Q-TOF platform delivers outstanding performance characteristics without speed related performance compromises (sensitivity, dynamic range, isotopic fidelity, mass range) associated with orbital trapping instruments. Innovative Enhanced Mirror Technology (EMT) and Ion Beam Compression (IBC) produce Ultra High Definition mass accuracy and mass resolution without having to use excessive flight tube length or complex ion flight paths which diminish signal as found in other Q-TOF designs.

- Femtogram MS/MS sensitivity enables identification of very low-abundance compounds
- 500 ppb mass accuracy improves confidence and reduces false positives
- Fast data acquisition rates of 20 spectra/second ensure maximum compatibility with Agilent 1290 UHPLC and high throughput methods
- 5 orders of in-spectrum dynamic range improves detection of trace level targets in the presence of high abundance compounds
- 40,000 mass resolution capability distinguishes target analytes from interferences
- High definition isotopic fidelity confirms molecular formulas with greater confidence



**Agilent Technologies**

## Powerful Data Mining and Analysis Capabilities

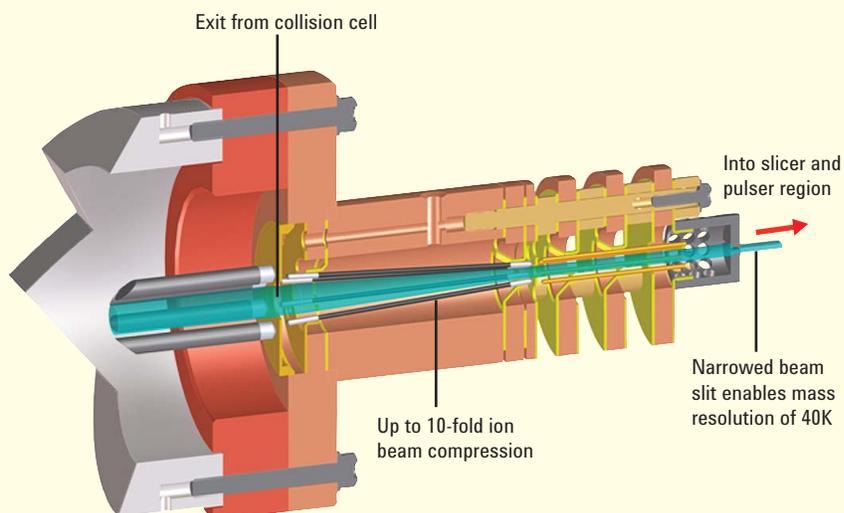
Agilent's MassHunter Workstation software facilitates faster and easier finding, comparing and identification of compounds. Compound-centric data mining and navigation capabilities enable efficient analyses of complex MS data. A sophisticated molecular feature extraction (MFE) algorithm automatically retrieves all spectral and chromatographic information for each component in a sample mixture, including those in overlapping and co-eluting peaks, thereby saving hours of analysis time. MassHunter's Qualitative Analysis is designed to work with Mass Profiler Professional for multivariate differential analysis. MassHunter Workstation software can be used to perform additional processing steps such as molecular formula generation, accurate mass/retention time (AMRT) database search, MS/MS library search, deconvolution or charge-state determination for confident compound identification. The unique Molecular Formula Generator uses not only the largest isotope but also isotope spacing, isotopic abundance distribution in MS mode and accurate mass of fragment ions and corresponding neutral losses in the MS/MS domain.

## Enhanced mass accuracy and mass resolution while maintaining acquisition speeds compatible with UHPLC methods

UHD Q-TOF technology has significantly improved mass accuracy and mass resolution performance while maintaining acquisition speeds compatible with the most demanding UHPLC methods. No other commercially available benchtop Q-TOF can simultaneously provide exceptional accurate mass, sensitivity, dynamic range, mass resolution and isotopic fidelity all at the highest acquisition speed compatible with Agilent 1290 UHPLC separations.

UHD Q-TOF technology is the result of new innovations in ion beam compression, enhanced mirror technology, plus a longer flight tube, fast bipolar detector and further refinements in reference mass calibration.

- Ion Beam Compression (IBC) compresses and cools the ion beam into a very dense layer of ions for enhanced mass resolution and mass accuracy with minimum sensitivity loss
- Enhanced Mirror Technology (EMT) minimizes variations in arrival time and energy for greater mass resolution of ions
- Faster bipolar detector measures arrival times with greater precision enabling significantly improved low mass resolution in the extended dynamic range mode
- Refinements to the internal reference mass calibration significantly reduce mass measurement error as low as 500 ppb



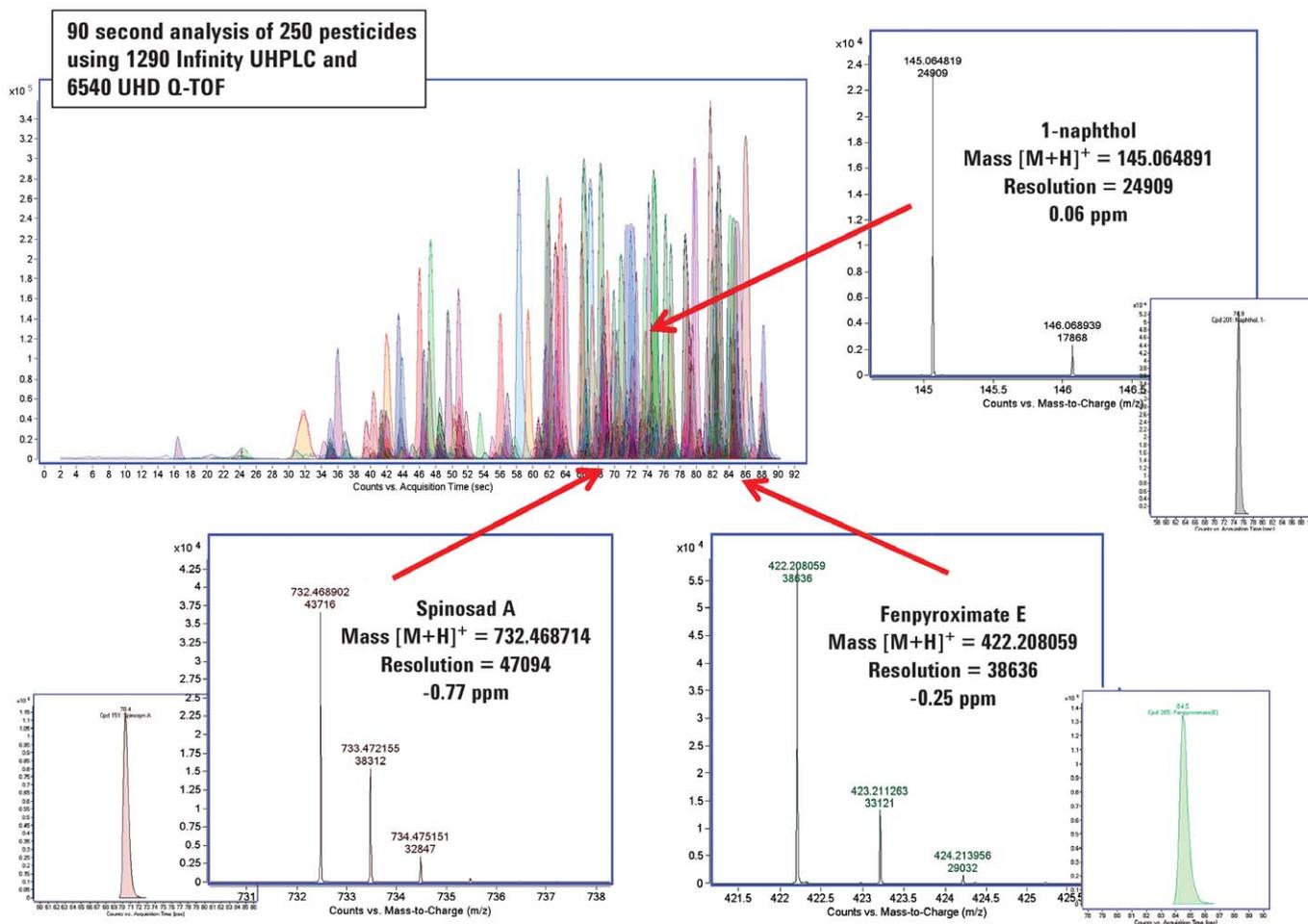
***Ion Beam Compression (IBC) Technology\* drives higher resolution. IBC technology compresses and cools the ion beam up to 10-fold. The more dense and uniform the ion beam, the fewer the ion losses, resulting in more precise mass assignment. Both mass resolution and mass accuracy are improved by up to 200%.***

*\* Patent pending*

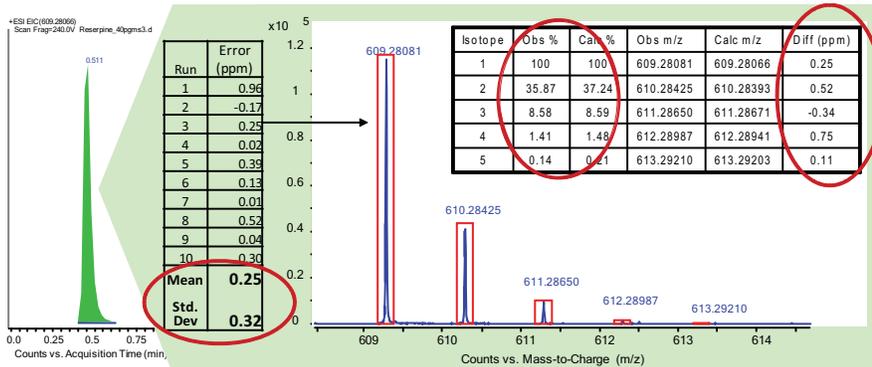
## Designed for the Most Demanding Applications

The Agilent 6540 UHD Accurate-Mass Q-TOF LC/MS system delivers exceptional MS and MS/MS analyses for applications that demand the most accurate mass measurements, without compromising sensitivity and speed. Integration of Agilent Jet Stream Thermal Gradient Focusing technology ensures the highest level of sensitivity for your most challenging samples. Powerful

new data mining tools take advantage of accurate mass MS and MS/MS and high definition isotopic data to facilitate profiling, characterization, identification and quantification of compounds in complex mixtures. These performance characteristics enable the 6540 Q-TOF system to support demanding applications such as proteomics, metabolomics, impurity testing, product degradation studies, forensics, food safety, and environmental analyses.



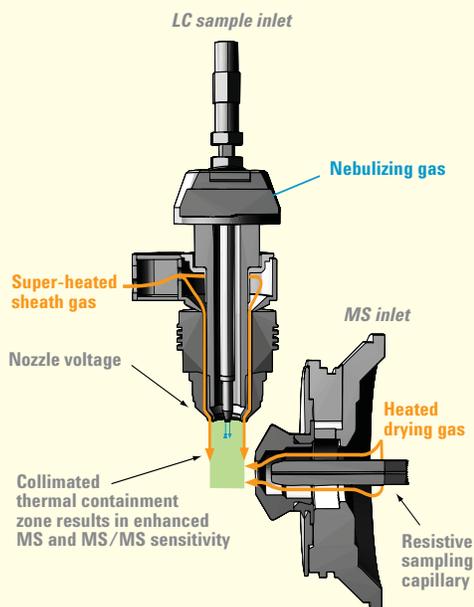
**Ultra fast analyses of multi-residues like pesticides is illustrated using the 1290 Infinity UHPLC and 6540 Ultra High Definition Q-TOF. In this example, a 90-second assay of a suite of 250 pesticides (10 Hz acquisition rate, 125 pg on-column) yields excellent chromatographic and mass spectral resolution across the pesticide mass range. Three pesticide examples are detailed which represent low, mid and high m/z. Mass resolution values were 24909, 38636 and 47094 and measured mass accuracies were +0.06, -0.25 and -0.77 ppm, respectively. Chromatographic peak widths were less than 0.8sec (FWHM.)**



**Mass accuracy calibration to 250 ppb is observed with 6540 Ultra High Definition Q-TOF. The mass calibration data was generated using 10 injections of reserpine on-column. Excellent isotopic ratio fidelity is shown for reserpine injection at 40 µg on-column. An excellent standard deviation of 320 ppb was achieved.**

## Agilent Jet Stream Technology Enhances LC/MS Sensitivity 5- to 10-fold

Agilent Jet Stream technology significantly increases LC/MS sensitivity by improving the spatial focusing of electrospray droplets. The subsequent enhancements in ion density and desolvation result in higher MS signal intensities and improved signal-to-noise ratios. On average, a 5- to 10-fold improvement in MS and MS/MS sensitivity is realized by using Agilent Jet Stream technology at optimal LC flow rates. Easy to use and tune, Agilent Jet Stream technology provides maximum sensitivity for multiple applications, including the analysis of drug candidates and trace levels of food contaminants, metabolites or biomarkers.



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