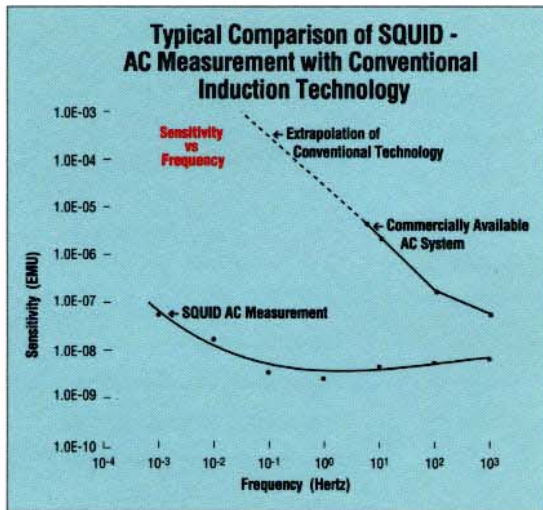


MPMS Option Specifications



opens up new regimes for scientific study. This is in contrast to conventional AC systems where signal sensitivity depends on measurement frequency. The AC Measurement option adds the ability to evaluate AC susceptibility by upgrading the system controller, and incorporating a Programmable Waveform Synthesizer plus a high-speed Analog-to-Digital converter. AC susceptibility is measured automatically by (1) applying an AC field to the sample, (2) digitizing the SQUID system's output, (3) programming the Waveform

Synthesizer to generate the proper compensation feedback, and (4) digitally recording the sample's AC response. AC response voltage readings can be recorded in a data file, or processed using the system's advanced digital techniques to determine the real and imaginary components of the sample's susceptibility. The MPMS's SQUID detection system provides full 1E-8 EMU sensitivity through the entire AC measurement frequency spectrum—a significant advantage over non-SQUID systems.

	MPMS XL1	MPMS XL5	MPMS XL7
AC Frequency Range	0.01 Hz to 1 KHz	0.01 Hz to 1 KHz	0.01 Hz to 1 KHz
Typical AC Field Strength¹	2E-4 to 3 Gauss	2E-4 to 3 Gauss	2E-4 to 3 Gauss
Typical Sensitivity²	0.1 Hz to 1 KHz @ 1 Tesla: 1E-8 EMU	0.1 Hz to 1 KHz @ 0 Tesla: 1E-8 EMU 0.1 Hz to 1 KHz @ 5 Tesla: 5E-8 EMU	0.1 Hz to 1 KHz @ 0 Tesla: 2E-8 EMU 0.1 Hz to 1 KHz @ 7 Tesla: 1E-7 EMU
DC Applied Field	±0.01G ³ to 10K Gauss	±0.05G ³ to 50K Gauss	±0.05G ³ to 70K Gauss

Note: All sensitivity tests were done with either an EMS-1 or EMS-2 Shield. The M120 option is not compatible with the transverse option M101A for the MPMS-5S.

¹ The AC field strength depends on the $\frac{B}{I}$ value and the roll-off intrinsic to each system.

² Level of precision in (measuring the Dy₂O₃) response amplitude when the value of the phase component is within specification of ± 0.5 degrees.

³ (when using M125/M127 Ultra Low Field Option)

Option M125

Ultra-Low Field Capability

This option actively cancels residual magnetic flux in the MPMS-XL1 or MPMS-XL5's superconducting solenoid so samples can be cooled in a very low field—typically less than ±0.01 Gauss in the MPMS-XL1 and ±0.05 Gauss for the MPMS-XL5. This capability is extremely important for measurements of high temperature superconductors and spin-glass materials. It can also be used in concert with the External Device Control option for the measurement of resistivity and other transport property measurements. The Low Field option incorporates additional electronics for the system's controller, and a custom magnetometer specifically designed for this application. In operation, the MPMS measures

the residual field and then nulls it by setting a compensating DC field, using a drive coil installed in the superconducting solenoid. The result in the MPMS-XL1 solenoid is ±10 milligauss along the longitudinal axis (<7.0 milligauss typical). The Ultra-Low Field option requires use of the Environmental Magnetic Shield (EMS) option which both reduces excessive environmental magnetic noise by creating locally quiet conditions, and screens out the earth's ambient field. Also available for MPMS-XL7, as the M127 7Tesla Ultra Low Field.

Low Field Plots

