Phantom Head+HandTest Kit

RFxpert™

Rapid pre-compliant OTA performance bench top test system

Total Radiated Power (TRP) measurements using a phantom head and hand are an important performance requirement for mobile device manufacturers and wireless service providers; CTIA therefore developed a Test Plan for Mobile Station Over the Air (OTA) Performance. EMSCAN collaborated with a CTIA listed phantom fixture manufacturer, IndexSAR, to provide an OTA Performance bench top test fixture with phantom head+hand. The bench top test fixture can be used for 'talk mode' testing or as a device fixture for free space testing. The applications, range from RF designers and antenna engineers to 'end of line' manufacturing testing. This dedicated test fixture used with the RFX2 scanner performs fast accurate measurements with excellent correlation to a full compliant OTA test system.

Mobile devices can be placed repeatedly against the RFX2 and provide TRP measurements in seconds. To obtain TRP values, two sets of measurements are taken. First, by placing the head+hand, DUT assembly (ear side) against the surface of the RFX2, once in position the assembly is simply locked during the measurement scan. The second data set is taken after rotating the assembly through 180° (head side). The 3D software combines the two measurements to produce TRP values. The turntable with the head+hand DUT assembly can also be set to any selected angular position if required.

An optional fixture for the free space testing of devices can be provided to drop in place of the phantom head+hand assembly.

Users can execute real-time analysis of their mobile devices and test multiple design iterations. This unique test approach gives designers the freedom to make rapid prototypes and explore new designs, materials and forms. Optimizing complex embedded antenna designs at the desktop without wasting time and money or waiting in congested anechoic chamber lines. When used in manufacturing in end of line testing, it can give confidence that the final assembled product conforms to the user's specifications.

The Test Fixture is manufactured from high density polypropylene with a typical permittivity of 2.25 and a loss tangent of 1 milliradian or less. It consists of a rigid up-stand to hold the RFX2 in the vertical plane, with a phantom head+hand and DUT fixture assembly mounted on a turntable. The turntable allows the DUT mounted against the phantoms to be presented perpendicularly to the RFX2 field sensors and rotated 180°. The turntable has adjustable stops to allow for DUTs of varying thickness.

The phantom hands are manufactured from silicone with carbon powder as the predominant lossy material to give the required dielectric properties over the wide frequency range of 600 MHz to 3 GHz (3 - 6 GHz hands available). The phantom head used is half a standard CTIA SAM (Specific Anthropomorphic Mannequin): IXB-035 filled with CTIA tissue simulating gel IXG CTIA 3.2 (690 MHz - 6 GHz).

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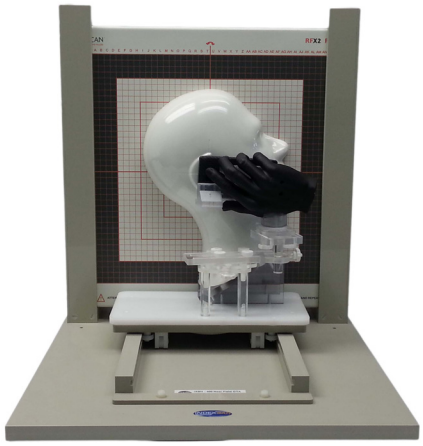
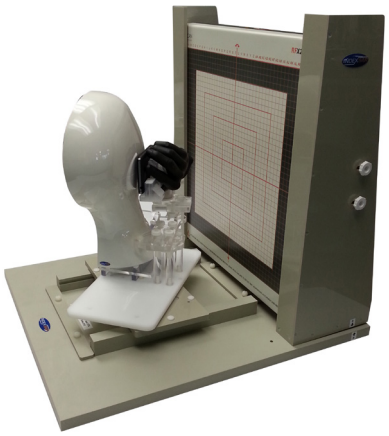
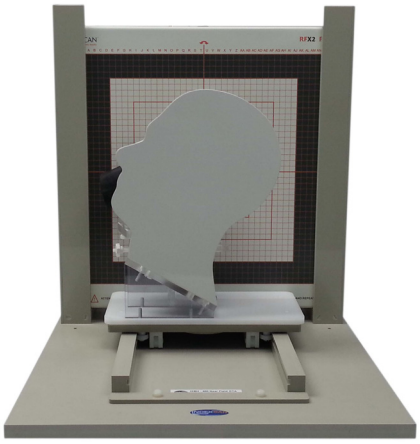
Operation



TRP measurement: Top / Head side



Rotate turntable for next measurement



TRP measurement: Bottom / Ear side

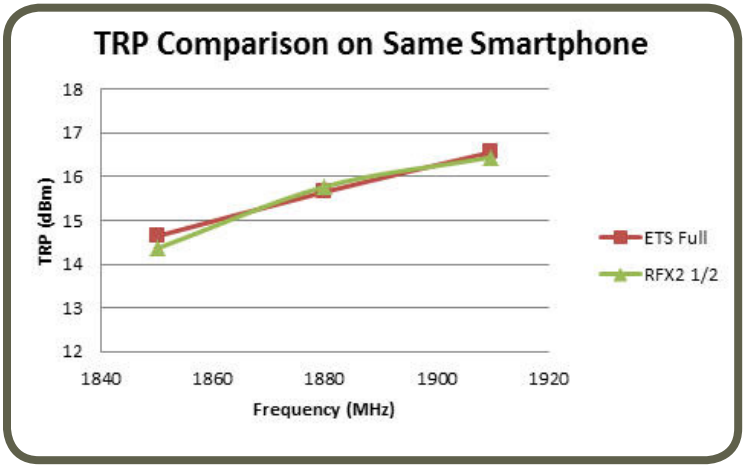
TRP measurement: Rotate turntable for next TRP measurement: ‘Head’ side measurement ‘Ear’ side

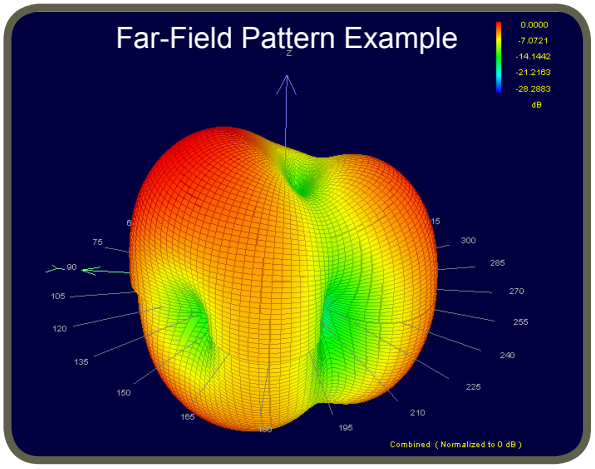
Phantom Head+Hand Test Kit Comparison Results

Tests in compliant CTIA chambers have shown that results from a half+head and a full head show good correlation. A +/- 2 dB accuracy with two rotated half-head measurements compared to a CTIA chamber should be possible, given typical OTA measurement uncertainties.

The measurement results below are typical using the RFX2 / IXS-020 and comparing results measured in an ETS AMS-8700 CTIA compliant OTA system. More extensive test results are available on demand.

The results on the RFX2 include a frequency dependent offset. The plots are displayed with the RFX2 values with this offset applied. This offset is -3.6 dB for all GSM850 measurements and +4.0 dB for all GSM1900 measurements. In a given band it is constant for all channels and for most phone models.





EMSCAN real-time results

Phantom Head+Hand Test Kit Features and Specifications

Features		Half gel-filled SAM phantom Head IXB-035 (R or L) + Hand fixture Turntable with adjustable stops to allow for DUTs of varying thickness Soft indexing of turntable to allow positive 180° positioning
Part number	**3000-0306R**	Phantom Right Head+Hand Test Kit as per CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1 for RFX2 that includes - Half-head derived from full head specifications - PDA grip right hand for smartphone - Palm spacer and alignment tool - Test fixture for holding RFX2 including sliding/rotating head+hand fixture with material properties as per CTIA compliant fixtures
	3000-0307R	Additional Right CTIA Hand as per Appendix C of CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1. Includes Palm Spacer and Alignment Tool - 'Mono' IXB-050R / Custom hands on request
	3000-0317R	Additional Right CTIA Hand as per Appendix C of CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1. Includes Palm Spacer and Alignment Tool - 'Fold' IXB-051R / Custom hands on request
	3000-0327R	Additional Right CTIA Hand as per Appendix C of CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1. Includes Palm Spacer and Alignment Tool - 'Data' IXB-052R / Custom hands on request
	3000-0337R	Additional Right CTIA Hand as per Appendix C of CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1. Includes Palm Spacer and Alignment Tool - Ultra-wide 'PDA' hand IXB-054R / Custom hands on request
	3000-0306L	Phantom Left Head+Hand Test Kit as per CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1 for RFX2 that includes - Half-head derived from full head specifications - PDA grip left hand for smartphone - Palm spacer and alignment tool - Test fixture for holding RFX2 including sliding/rotating head+hand fixture with material properties as per CTIA compliant fixtures
	3000-0307L	Additional Left CTIA Hand as per Appendix C of CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1. Includes Palm Spacer and Alignment Tool - 'Mono' IXB-050L / Custom hands on request
	3000-0317L	Additional Left CTIA Hand as per Appendix C of CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1. Includes Palm Spacer and Alignment Tool - 'Fold' IXB-051L / Custom hands on request
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	3000-0327R	Additional Right CTIA Hand as per Appendix C of CTIA Test Plan for Mobile Station Over the Air Performance 3.2.1. Includes Palm Spacer and Alignment Tool. - 'Data' IXB-052R / Custom hands on request
	3000-0347	Tablet Fixture for free space tablet and large device testing
Dimensions		L 60.3 cm x W 52.4 cm x H 55 cm (L 23.74" x W 20.63" x H 21.65")
Weight		14.52 kg / 32 lb.

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