Wide ‘PDA’ Phantom Hand

CTIA compliant hand for assessing the performance of ultra wide (73-92mm) hand held ‘PDA’ mobile terminals in OTA test systems

IXB-056 L&R (left and right)

- **Compliant to CTIA X.x Test Plan uses same base ‘open’ hand shape as all CTIA hands**
- **Wide frequency range 400MHz – 2.8GHz**
- **‘Talk mode’ & ‘Data mode’ use**
- **Stable, elastic material with optimised stiffness**
- **Positioning spacer with graduation marks**
- **Left and right hands available**
- **Optional fixing mounts & SAM assembly for most major OTA test systems (ETS, SATIMO, R&S/Maturo Howland, Bluetest), custom also possible.**

The energy absorbed from a handset by the hand is an important issue as it can alter the radiation pattern and cause considerable degradation of phone performance. Real human hands are inhomogeneous exist in a wide range of sizes and can assume an almost limitless range of shapes.

IndexSAR has worked closely with a CTIA ‘Head and hands working group’, in collaboration with a number of major handset manufacturers, to develop a standard hand with dimensions primarily based on the anthropomorphic data of the average male + female 50th percentile adult hand dimensions as published by the US Army [Gorden et al., 1989]. “Hand Anthropometry of US Army Personal, Thomas M. Greiner; Army Natick Research Development and Engineering Center, 1991.

IndexSAR have a range of CTIA approved phantom hands with ‘grips’ to meet the varying requirements of a wide range of wireless handsets and handheld devices. The introduction of larger smartphone devices has created the demand for a new hand.

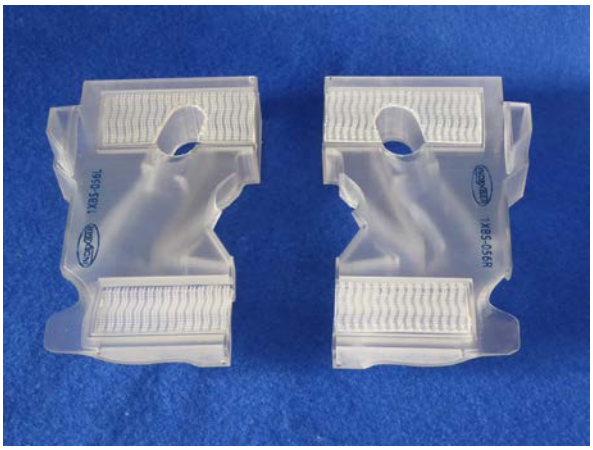
The IXB-056R & L phantom hands have been formed using a standard CTIA “open” hand CAD file..
The ‘grip’ shape has been developed using a number human studies holding various large (greater than 73mm wide) handsets.

Hands are manufactured from silicone with carbon powder as the predominant lossy material to give the required dielectric properties inside CTIA limits over the wide frequency range 400MHz – 2.8GHz, extended usable range, 300MHz to 3GHz.

For positional repeatability the IXB-056R & L meet the standards requirement for stiffness, they also allow some flexibility to cater for varying sized DUT’s inside the overall limits.

Positioning accuracy and repeatability are of key importance, and with the unique air spacer/ platform, repeatability +/- 0.1dB has been achieved in OTA tests.

Air Spacer/positioning platforms IXBS-056R & L



IXBS-056R spacer for ‘UWPDA Phantom hand

An important part of the hand development program has been the design of a detachable low loss ‘air’ spacer and phone positioner (IXBS-056R & L), that fits, and can be permanently fixed to the palm of hand, this allows the phone to be held as shown in the human studies and, most importantly, be able to position the handset with repeatability. The hand spacers and mounts are formed from an SLA plastic made hollow with a wall thickness of 1mm to minimize their RF effects. The IXBS spacers have been produced from the original hand data files, being equivalent to the volume of air from the back plane of the phone to the palm of the hand. The DUT is fixed to the spacer using 3M ‘Dual Lock’ strip for easy device holding, giving virtually no lateral movement. The spacer has number graduations to permit easy positioning. OTA tests have shown excellent repeatability. (Within +/- 0.1dB).

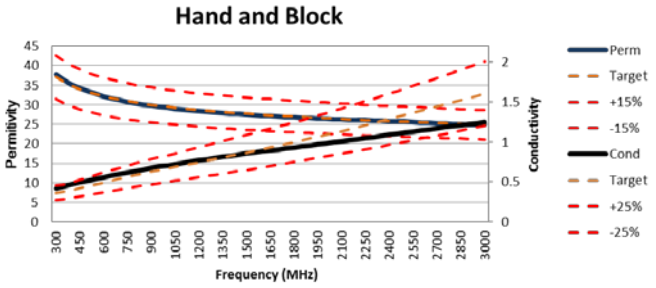
Typical spacer dielectric properties @ 2GHz

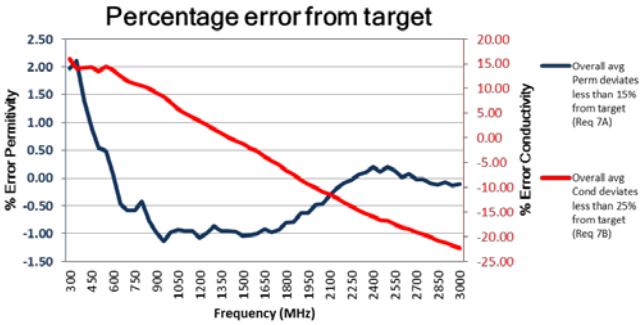
Permittivity	3.18
Loss tangent	0.011

Material composition and weight

Hand Material formulation	Weight with fixing plug No spacer
35% carbon powder 65% Silicone + hardener	IXB-056R & L approx. 450g

Typical dielectric property measurement results of hand material





Dual (L&R) PDA case IXC-020

UWPDA/PDA hand kit carry case IXC-020 hands, spacers, material sample blocks

Carry Case IXC-010

A complete 'CTIA hand kit hands, spacers, and alignment jigs, material sample blocks *"all together"*

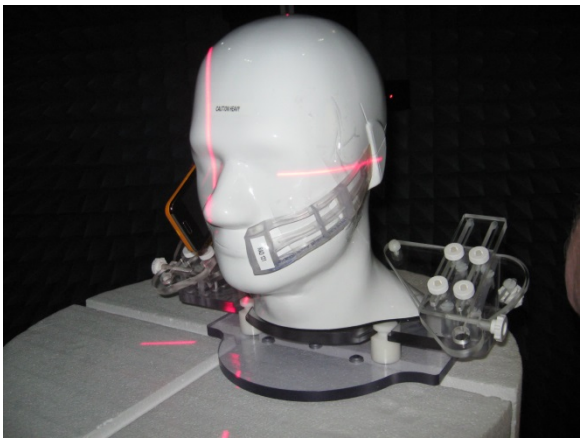
Fixtures

CTIA head and Hand fixture IXBH-06x

Designed for both ‘conical cut’ and ‘roll over azimuth OTA systems

This fixture has been designed to give maximum flexibility and simple re-positioning and fix to existing platforms.
Using finger knobs ease adjustment. When measured in an OTA chamber, fixture effects have been shown to be in the order of 0.1- 0.2dB.

UWPDA hand mounted on IXBH-060 fixture for left and right device testing



IXBH-060 (ETS) fixture on ETS 8900 “Conical cut” OTA System with face mask IXJ-010

Other IndexSAR phantom products

Data hand free space fixture IXBH-090

CTIA SAM head IXB-034G filled with tissue simulant Gel 700MHz - 6GHz For existing liquid users gel upgrade possible

Compact drive test system IXDT-010

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