Draft

CTIA Phantom Hand Family

“Monoblock” phone grip IXB-050R

“Fold” phone grip IXB-051R
“Narrow data” grip IXB-052R
“PDA” grip IXB-053R

For assessing the performance of mobile terminals in OTA test systems

- **Designed according to CTIA working group requirements**
- **Wide frequency range 800MHz – 3GHz**
- **Stable, elastic material with optimised stiffness**
- **Positioning spacer with graduation marks**
- **x 4 versions to ‘grip’ most handset types**
- **Optional fixing mounts & SAM assembly**

IXB-050 ‘Monoblock’ grip

IXB-051’Fold’ grip

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.

IndexSAR has worked closely with the CTIA ‘Head and hands ad hoc working group’. IndexSAR has also collaborated with a number of major handset manufacturers to develop first, a standard hand and, secondly, a range of phantom hands with ‘grips’ to meet the varying requirements of a wide range of wireless handsets and handheld devices and their specific applications.

Real human hands are inhomogeneous exist in a wide range of sizes and can assume an almost limitless range of shapes.
Carbon powder is used as the predominant lossy material to give the required attenuation over the wide frequency range of 800MHz to 3GHz.

The IXB 05XR phantom hands have been formed from a standard Hand whose dimensions have been based on a number of studies of human hands, the hand model shape and dimensions are 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]. Primarily “Hand Anthropometry of US Army Personal, Thomas M. Greiner; Army Natick Research Development and Engineering Center, 1991

The ‘grip’ shapes have been developed using human studies holding various generic handsets.

For positional repeatability the IXB-5XR and meet the standards requirement for stiffness, it also allows 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.

IXB-052 ‘Narrow data’ Grip

IXB-053 ‘PDA’ Grip

Air Spacer/positioning platforms IXBS-05XR

An important part of the hand development program has been the design of a detachable low loss ‘air’ spacer and phone positioner, IXBS-05XR, that fits, and can be 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 be 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.

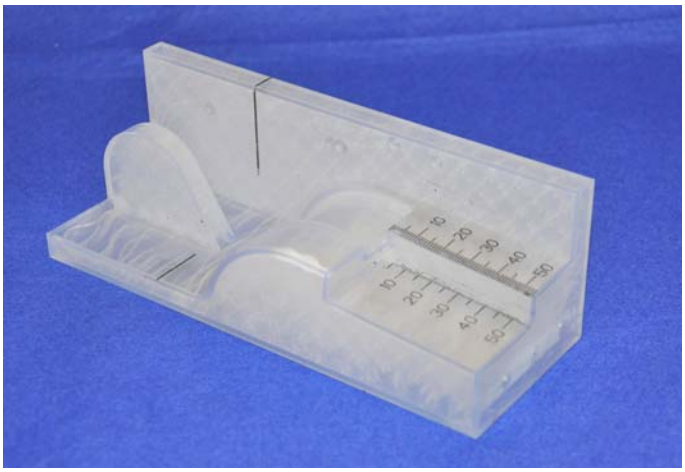
IXBS-050R for ‘Monoblock’

IXBS-052R for ‘narrow data’

IXBS-053R for ‘PDA’

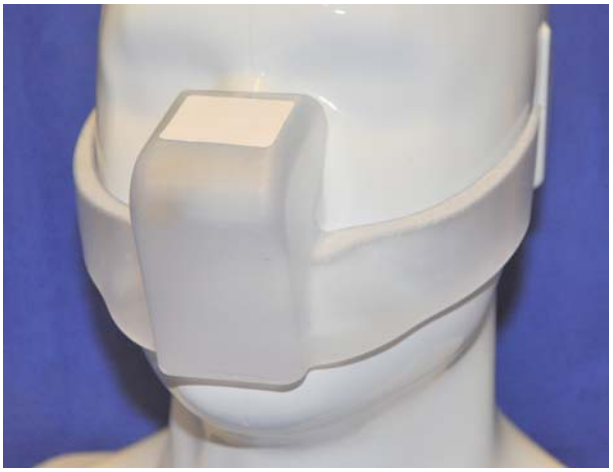
IXBS-051R for ‘Fold’

Alignment Jigs



IXJ-030 Phone alignment tool ‘B’ for ‘Fold’ handsets

IXJ-020 Phone alignment tool ‘A’ for ‘Monoblock’ handsets



IXJ-011 Full face mask

IXJ-010 SAM side face mask

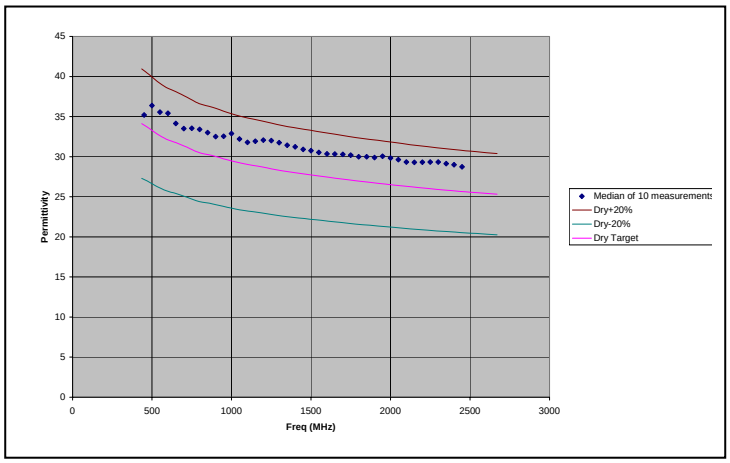
Composition and weight

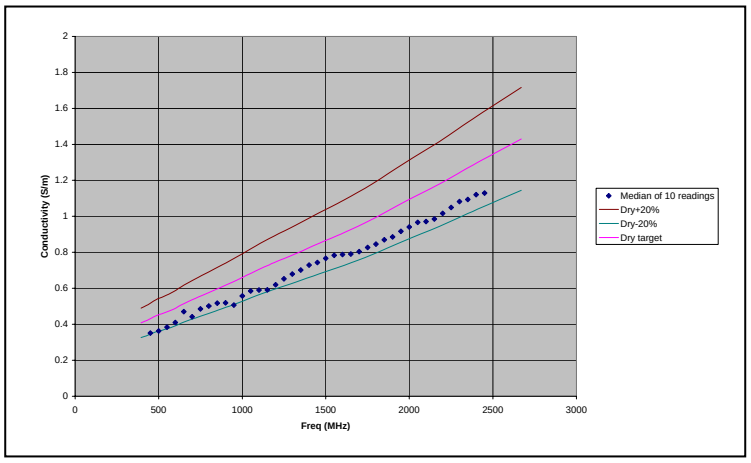
Hand Material formulation	Weight with fixing plug
35% carbon powder	IXB-050R 340g
65% Polyurethane + hardener	

Typical Spacer performance

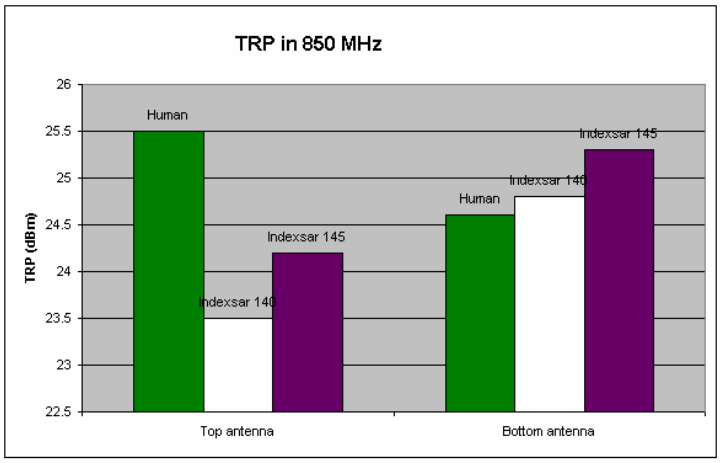
Permittivity	2.6
Loss tangent	0.012

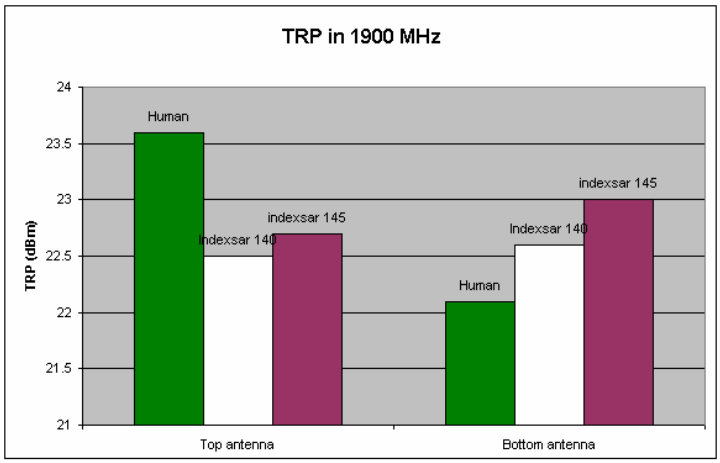
Typical Property hand measurements





Chamber Loss Comparison





Carry Case IXC-010

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A complete ‘CTIA hand kit hands, spacers, and alignment jigs, “***all together”***.

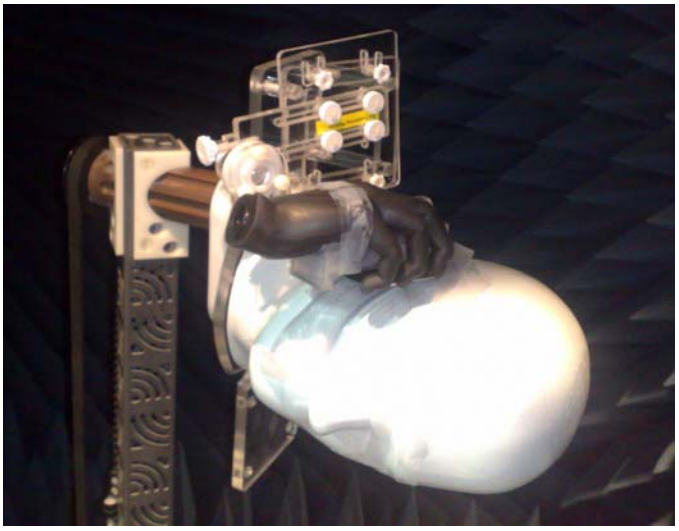
Fixtures

A CTIA head and Hand fixture IXBH-060

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

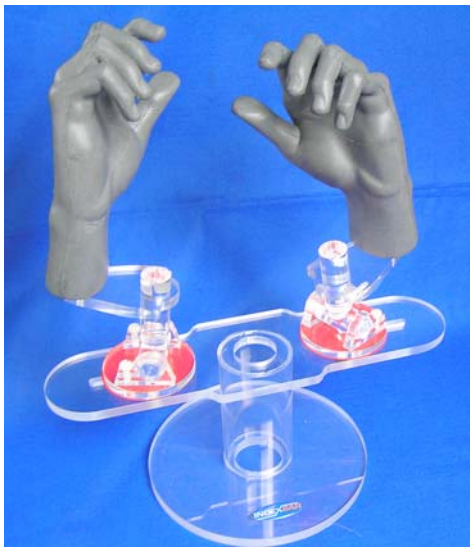
This fixture has been designed to give maximum flexibility and simple re-positioning and fix to existing platforms. The base plate will be symmetrical to allow for future left hand testing should this become a requirement.
The arm is setup so that the phone is parallel to and touching the head in the correct plane, the finger knobs are loosened, the top base plate is then simply moved away from the head by approx 15mm to allow for phones that do not have the earpiece at the top of the phone, rotated by 6º (as required in the standard), indexed by fixed slots, and then moved back towards the head until the phone just touches the surface. Fixture effects have been shown to be in the order of 0.1- 0.2dB when measured in an OTA chamber.

Data hand free space fixture on ETS-Lindgren ‘MAPS’ OTA system



IXBH-060 fixture with PDA hand on ETS MAPS

Other positioning devices are available, from a simple universal angle hand mount, to a full assembly including a SAM phantom and CTIA recipe tissue simulant liquid.



Fixtures shown with IndexSAR standard hands L & R and IXB-090R

Phone +44 (0) 1306 632 870
E-mail sales@indexsar.com