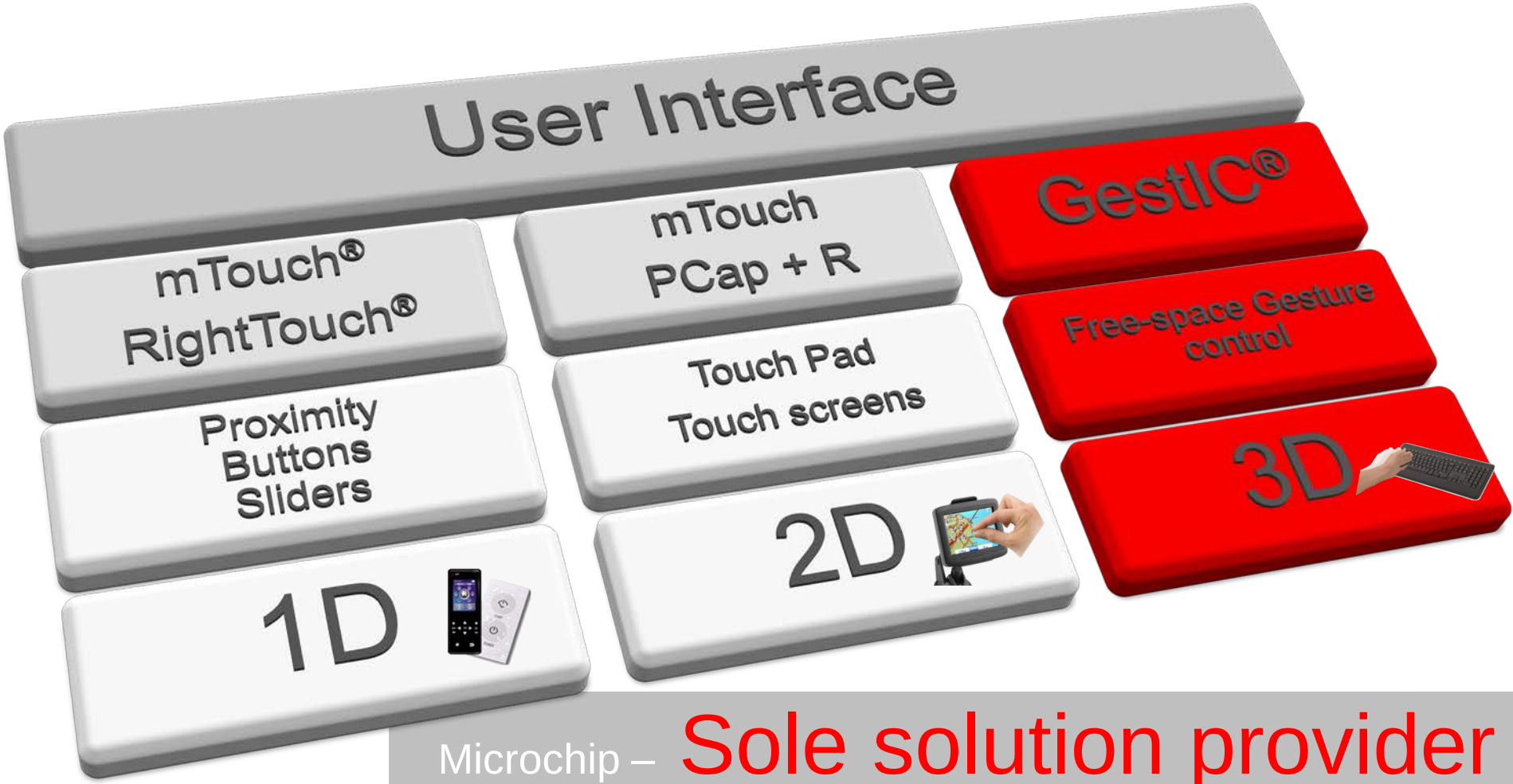
GestIC® Technology

Introduction

JAN 2015

Human Machine Interface Suite



Microchip – **Sole solution provider**

for all dimensions

Broad Solutions Covers Wide Range of Applications

Proximity

Touch Keys

Metal over Cap

Grip Detection

Sliders

Touch Screens

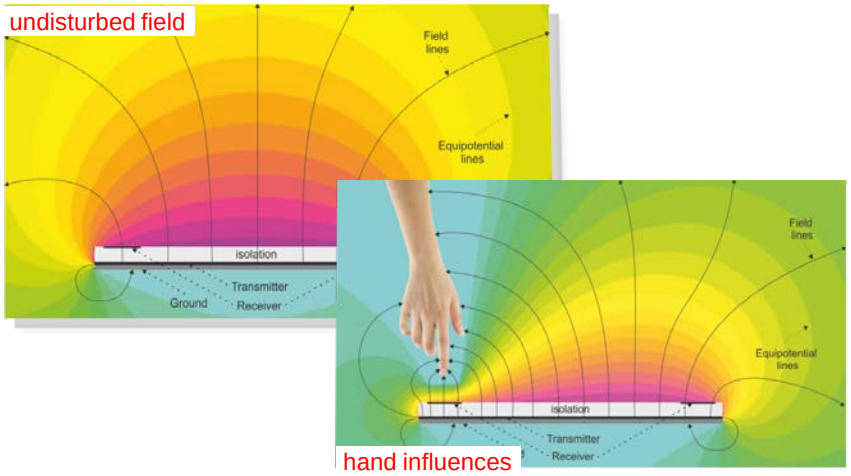
Touch Pads

Haptics

3D Track & Gesture

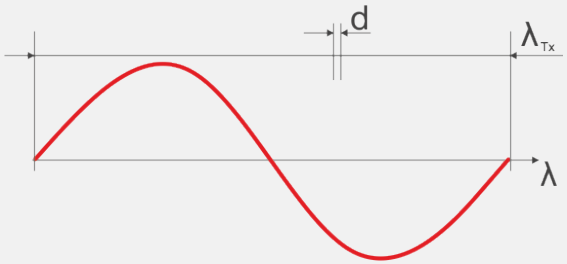
GestIC® Technology Basics

- Electrical Field for 3D sensing
- Field distortion translate into hand positions and gestures.
- Very low power consumption



E-field Operation

GestIC Wavelength



$\lambda_{Tx} = \frac{c}{f} = 3km$ (at 100kHz)

$d_{(electrode\ dimension)} << \lambda$

Quasi static E-field during operation

GestIC® Sensor

1 TX Electrode

4 RX Frame Electrodes

Optional RX Center Electrode

Optional Ground Layer

Material:

PCB, Plastic, Glass, etc.

Electrode size:

Min: 25mmx25mm

Max: 140mmx140mm

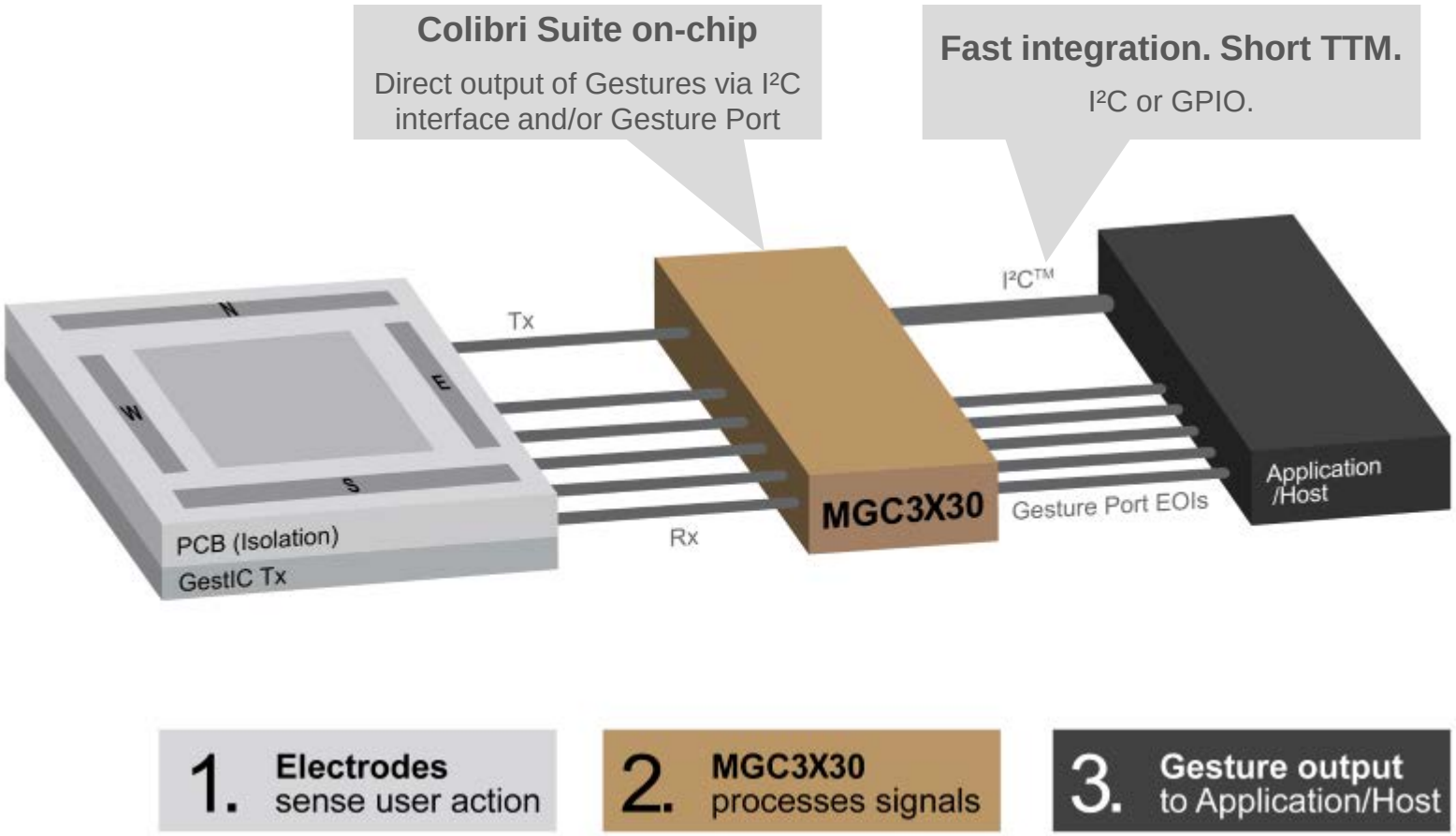
Detection range:

< 10…15cm

Detection:

Center of Gravity

GestIC® Topology



How it works

Direct output of gestures, approach & x/y/z.

Short development cycles. Short TTM.

Electrodes
sense user's action

1

MGC3130
processes signals

2

3

host receives pre-processed gestures and/or x/y/z positional data

Invisible

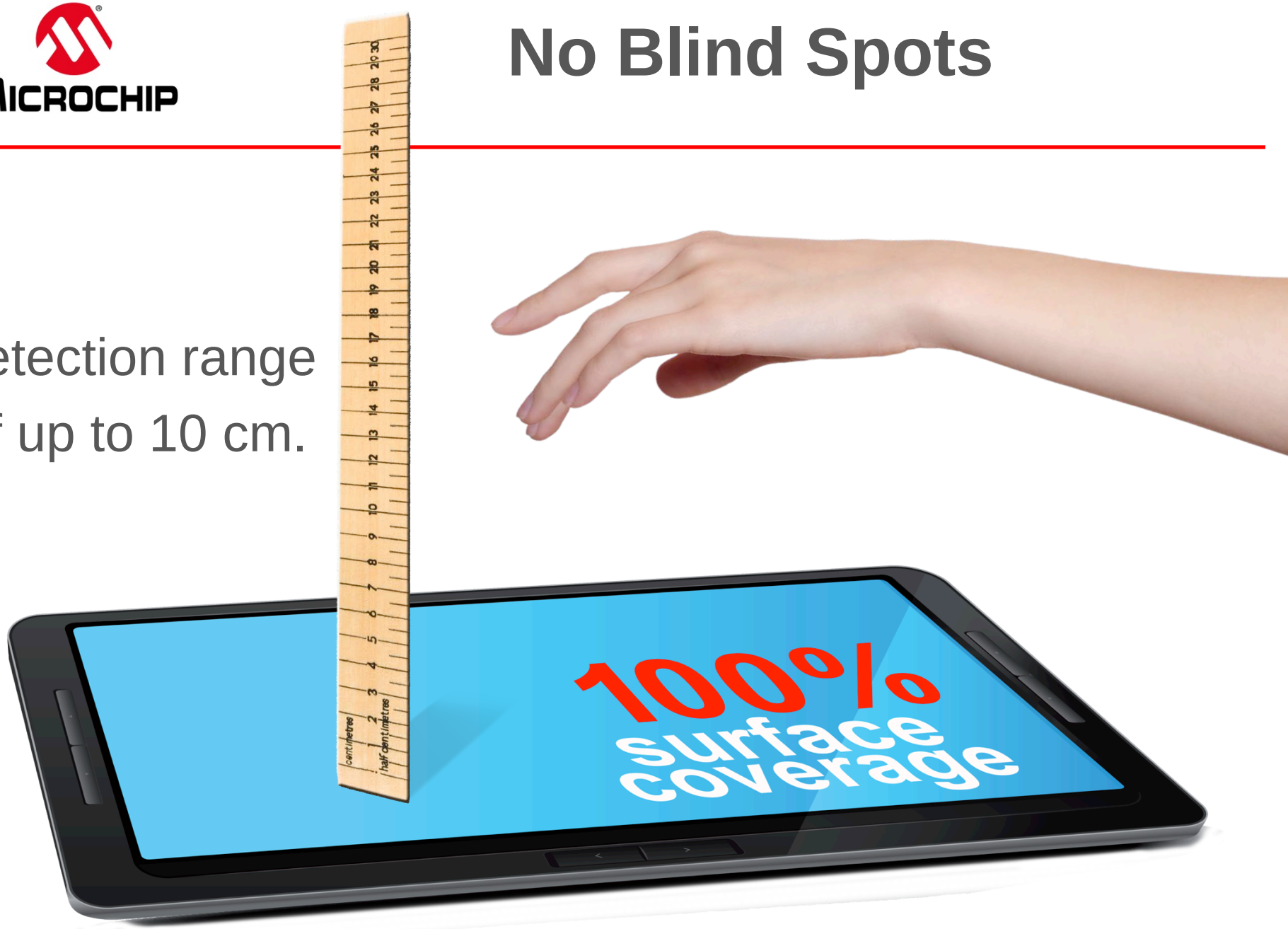
sensing electrodes invisible

hidden below device housing

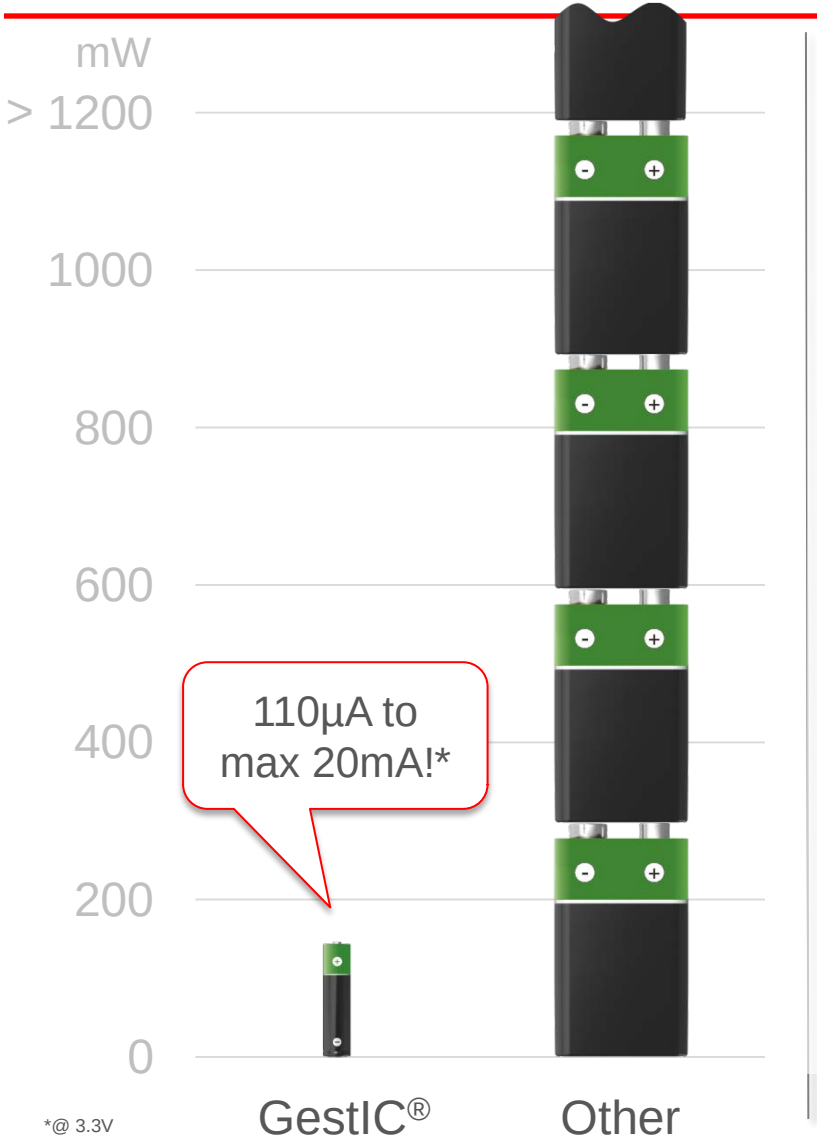
enable appealing industrial designs

No Blind Spots

Detection range of up to 10 cm.



Battery Efficiency



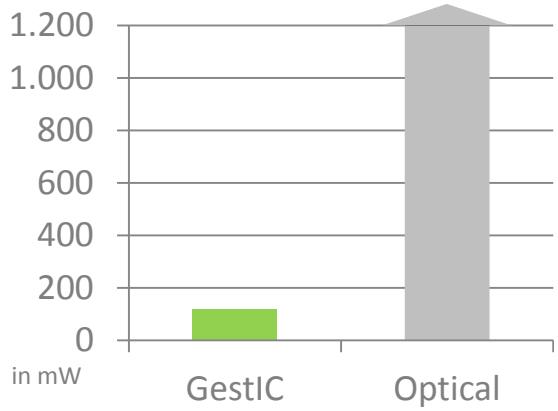
lowest power free-space of any 3D sensing technology

up to **90%** lower than camera systems

always-on gesture sensing even for mobile devices

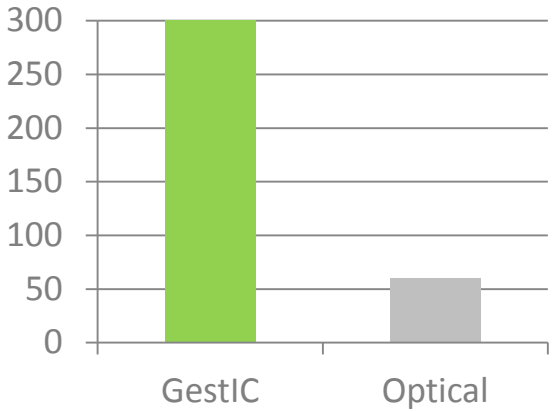
GestIC® Technology versus Optical

Power

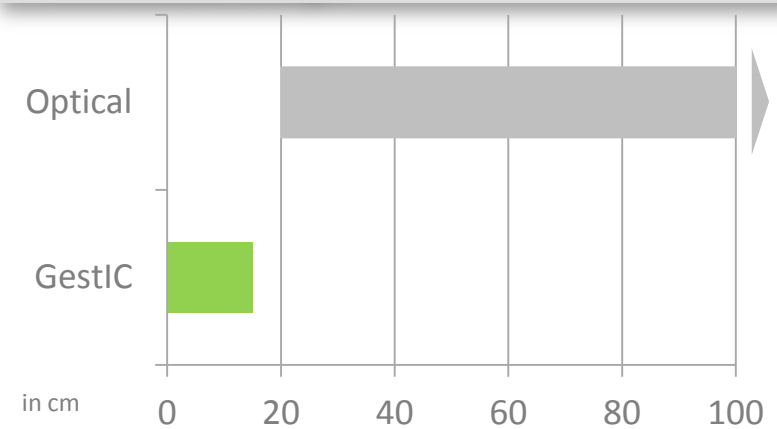


Blind Spots

Update Rate



Detection Range



GestIC® Applications

GestIC exclusive	Light Switches and Dimmer Audio Docks Headphones Household Appliances
GestIC and Keys/Buttons	Notebooks Accessory Keyboards Household Appliances Car Cockpit
GestIC and pCAP	Computer Touch Pads Remote Controls Game Controller Automotive
GestIC Touch Display	Tablets Mobile Phones Notebooks Industrial and Automotive

On-Chip Colibri Gesture Suite

3D gesture recognition

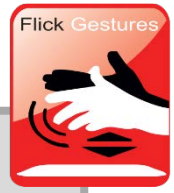
based on Hidden Markov Models

plus 3D hand tracking. Interfaced by:

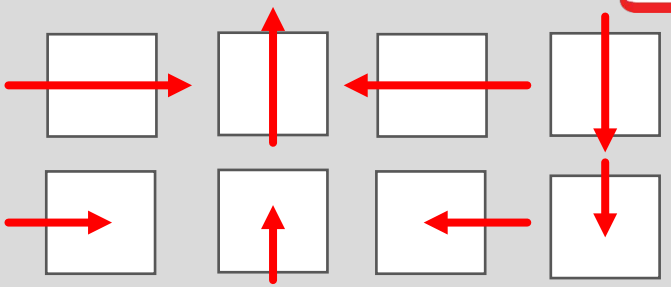
Approach
power saving self wake-up

Position Tracking
hand tracking in 3D

Sensor Touch
touch, multitouch, tap, double tap

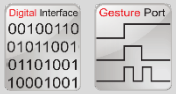


Flick Gestures

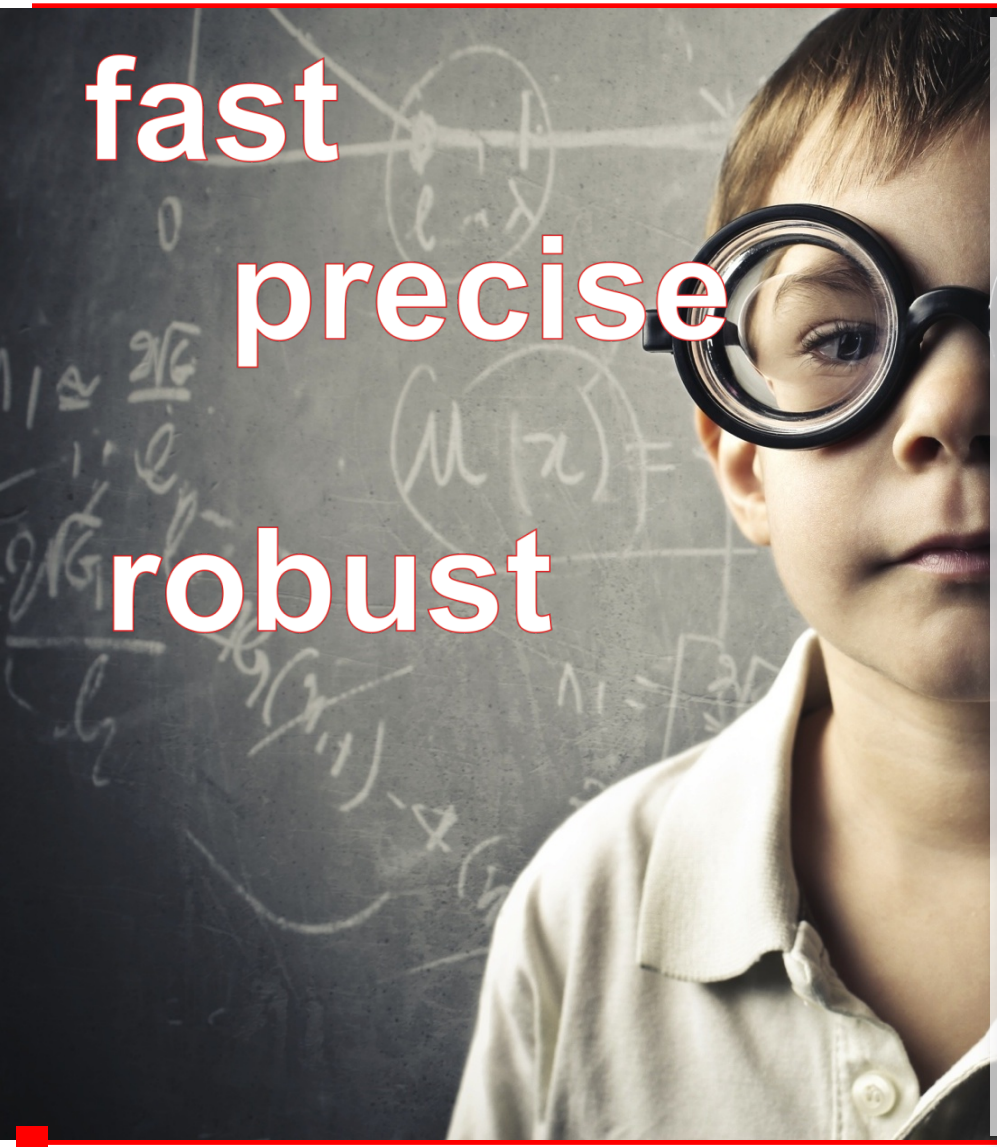


AirWheel
real time rotation control

MGC3xxx
Gesture controller family

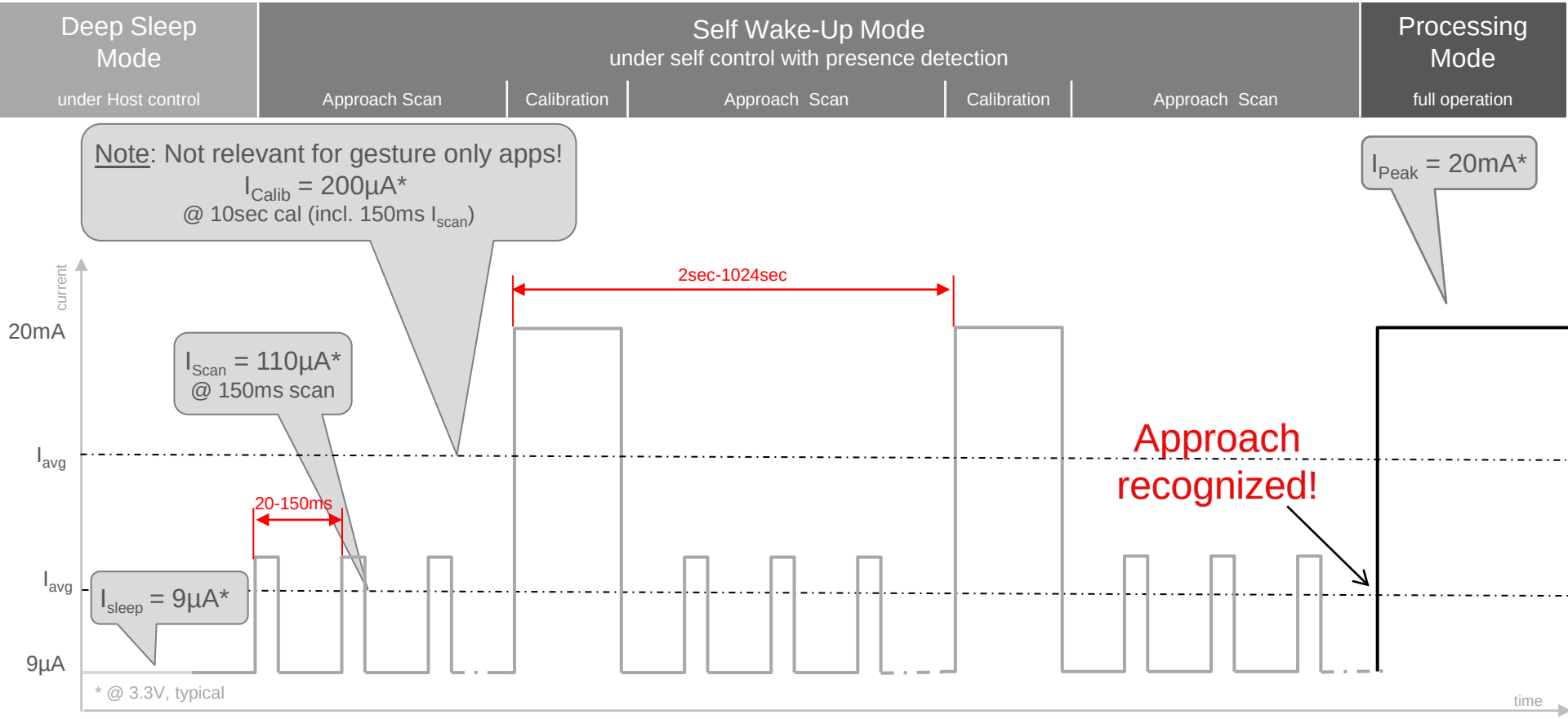
	MGC3030	MGC3130
Electrodes	5 RX, 1 TX	5 RX, 1 TX
Gesture detection	Yes, Colibri Gesture suite	Yes, Colibri gesture suite
Communication	I2C + gesture port 	I2C + gesture port 
Position tracking		Yes, 200 positions/s
Package	SSOP28L 	QFN28L 
Features	3D gestures, Touch, approach.	3D Gestures, Touch , approach and 3D position tracking

Smart Features



- fast data sampling at 200Hz
- 32-bit signal processing unit
- super low noise analog front end
- mouse-like resolution of 150dpi
- self calibration
- 44-115kHz range - no RF interference
- frequency hopping against noise
- no environmental influences
- self wake-up at 370µW
- field upgradable
- Colibri Gesture Suite on-chip
- I2C Interface providing variety of information
- Gesture Port for direct application control

Low Power



Mobile friendly power modes

Fast wake-up cycle time of <1ms
self activation: user approach detection
de-activation: no user interaction

Woodstar + Hillstar

GestIC® Development Kits

MGC3030 - Woodstar New

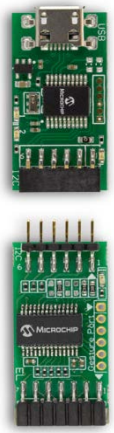
US$139, DM160226

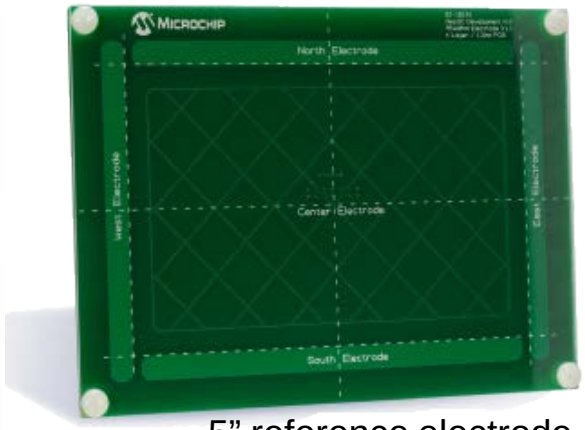
MGC3130 - Hillstar

DM160218, US$179

I²C to USB Bridge
System Parameterization
w/ **Aurea**

MGC3030 Unit

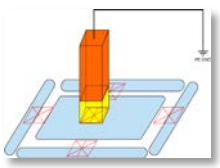


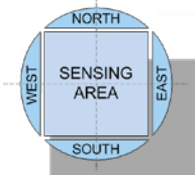


5” reference electrode

I²C to USB Bridge
System Parameterization
w/ **Aurea**

MGC3130 Unit





+ C sample host code

+ MGC3130 I²C manual

+ Electrode design Guide

10+ Electrode reference designs +

MGC3X30 samples +

www.microchip.com/gesticgettingstarted

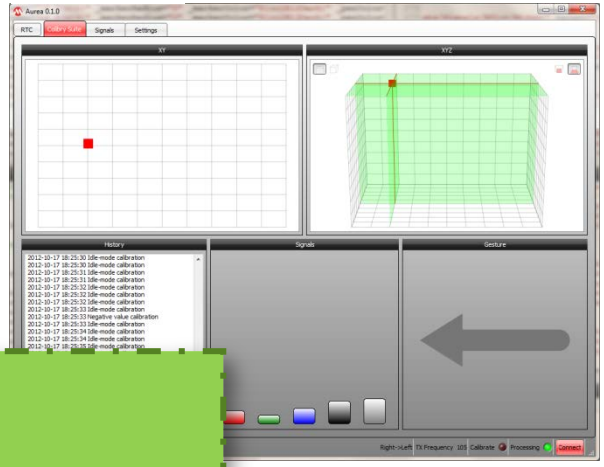
Woodstar / Hillstar

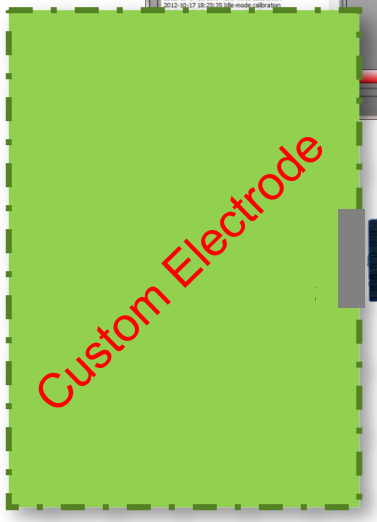
GestIC® Development Kit

Development Kit for Design-in

- **USB and I²C connection**
- **Microchip Aurea GUI on Windows® 7/8**
  - Colibri Gesture Suite
    - Real-time control
    - **Design-In** parameterization wizard
- **Reference Electrodes from 1.65 to 7” and aspect ratios from 1:1 to 1:2**
- **Electrode Design-Guide**

AUREA





GestIC Development Kits

GestIC DevKits – Fastest TTM.

3DTouchPad
2D + 3D Gesture DevKit

Promo Video

USMaster launch

PC peripheral + DevKit
(out of the box, driverless)

Winner of the Japan Embedded Systems Association (JASA) Special Award 2014.

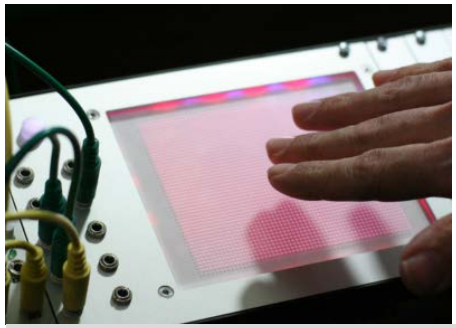
- **10 Finger Multi-Touch**
- **Win7/8 + MajorOS**
- **2D/ 3D Gestures including AirWheel**
  all browsers, e.g. Google image search
- **GUI / Drivers / Apps / Games**
  - 3DTouchpadGUI
    www.microchip.com/download3dtouchpadgui
  - API / SDK
    www.microchip.com/3dtouchpad
- **DM160225, US$99**

GestIC® MGC3X30

The effect of Wood/Hillstar

Inspired by GestIC
Empowered by MGC3130

KICKSTARTER



Vectr
Sound control in 3D.

Sphere
Home Control next Gen.

YouTube

Lighting
Goldee

Find many more …

MGC3130 Summary

technology

- ☑ lowest power
- ☑ robust
- ☑ precise
- ☑ fast

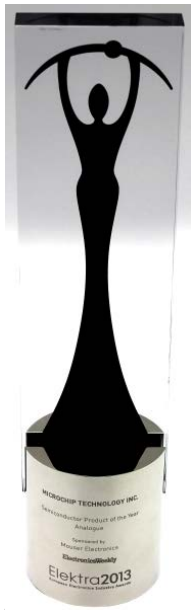
easy design

- ☑ one chip fits all
- ☑ gesture library
- ☑ high recognition rate
- ☑ fits anywhere

user interface

- ☑ always-on; mobile-friendly
- ☑ gestures AND... position
- ☑ no blind spots

Awards & Resources



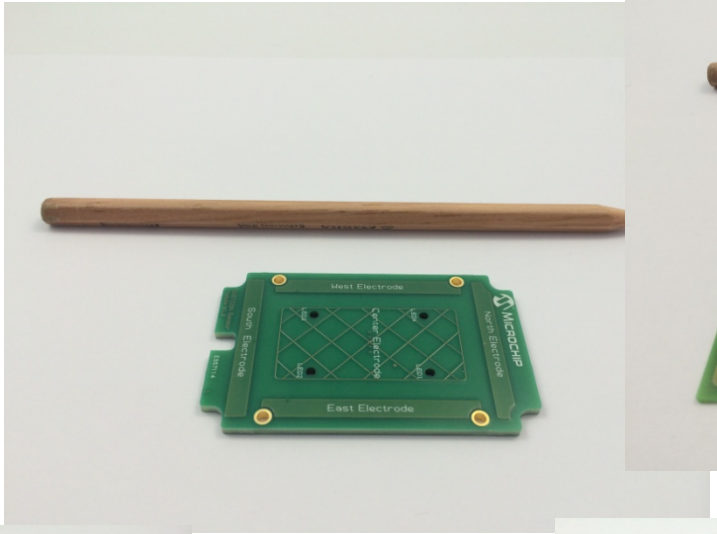
Contact:

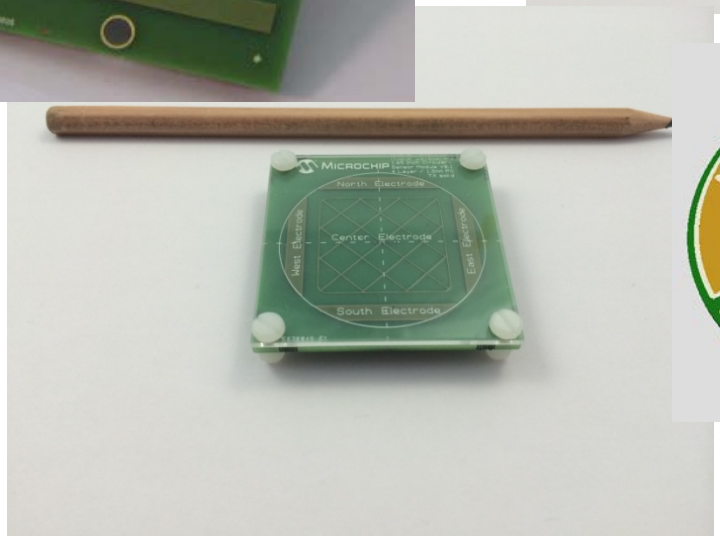
Andreas Guete
Marketing Manager HMID
andreas.guete@microchip.com

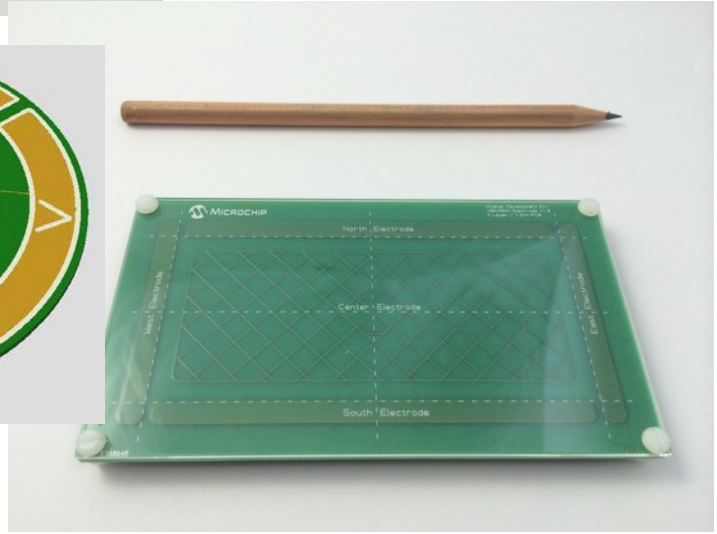
www.microchip.com/gestic

the next generation
of user interface
is at hand

Reference Electrodes / Demos







Noise Tests

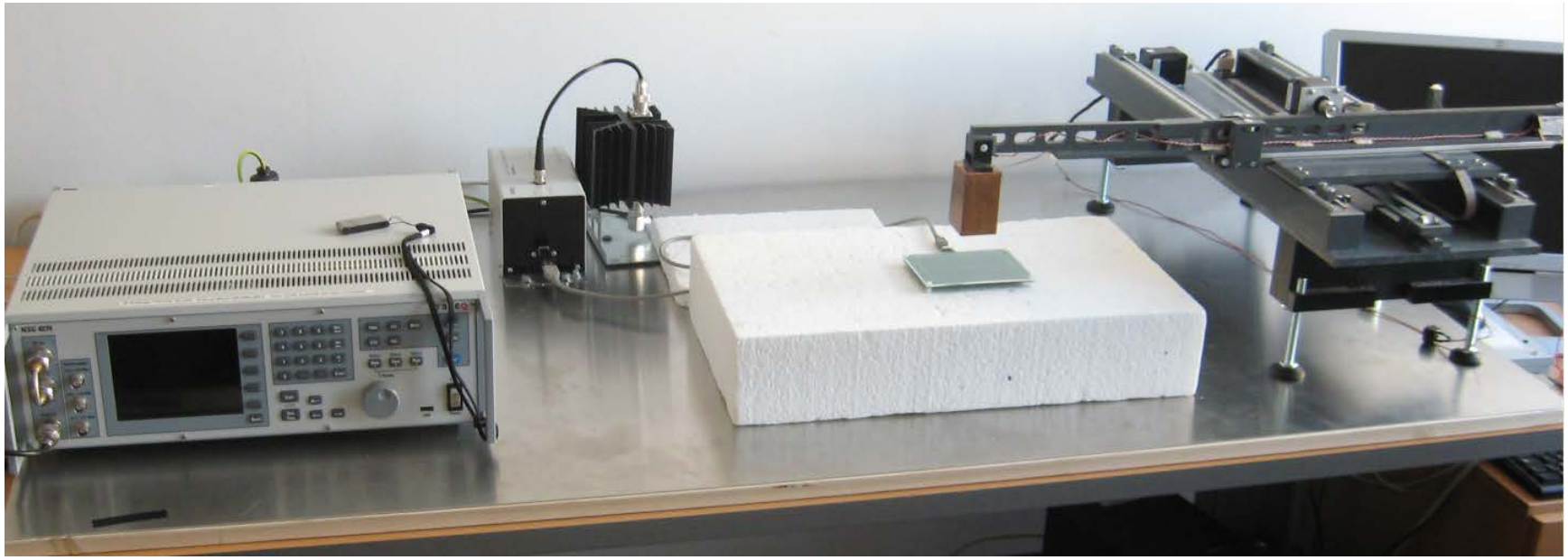
Noise Tests

- Conducted noise test
  - IEC61000-4-6
  - USB-chargers
- Radiated noise test
  - Energy saving lamps
- Burst test in Setup
  - IEC61000-4-4

Testcriteria

- Gesture detection rate
  -> ‘Windmill’
- Tracking linearity
  -> ‘Rotating brick’
- Gesture detection range
  -> ‘Poser’
- User experience
  -> manual operation

Conducted Noise Test



RF-Generator:	TESEQ NSG4070
Couple/Decouple Network:	TESEQ CDN / USB
Attenuator:	TESEQ, ATN6075 (6dB, 75W)

Right side: ‘Poser’ with 4cm hand brick for test of detection range
X- and Y-axis: motor driven, Z-axis: manual adjustment.

Conducted Noise Test Results

Conducted Noise test according IEC61000-4-6 (Hillstar FW 1.0.7)

	3V	6V	10V
Gesture detection	Pass	Pass	Pass
False gesture alarms	Pass	Pass	Pass
Approach detection	Pass	Pass	Pass
Tracking	Pass	Pass	Position jumps Scaling effects Ghost positions w/o hand

Notes:

- Due to generation of voltage spikes at each frequency change of the TESQ equipment, the test was started after a settling time of 3s.
- One flick gesture per frequency was tested
- 20 seconds per frequency were tested for false alarm oberservations
- frequency range: 150kHz – 80MHz (here: extended to 150MHz)

GestIC® Technology

MGC3030

MGC3xxx gesture controller family

GestIC® Technology Roadmap
2D Multi-Touch and 3D Gesture

Features

MGC 3030

- *Gesture* controller
- Full Colibri suite gesture set
- Cost down
- Cost efficient manufacturing
- SSOP28L package

3D Gesture Controller

MGC3130

5RX, 1TX channels
32bit MCU @ 22.5 MHz
I²C, QFN28

MGC3030

5RX, 1TX channels
32bit MCU @ 22.5 MHz
I²C, SSOP28

2D Multi-Touch & 3D Gesture Controller

MGC3430 (2015)

3D: 5RX + TX
2D: 48 RX/TX
32bit MCU @ 40 MHz
I²C, USB
64L/48L QFN

Launched: Jan 20th 2015
incl. DevKit Woodstar

In development

In production

Size/Channels

MGC3030

Part of GestIC® family

- Design-in
  - GestIC Aurea based
    ➔ same Aurea as MGC
    ➔ developers will feel at home
  - No host coding / Fastest TTM
- Compelling support landscape
  - GestIC Electrode reference designs
  - GestIC Electrode design guide
  - GestIC Host reference code
  - GestIC I^2C Interface Manual
- Runs GestIC Colibri suite

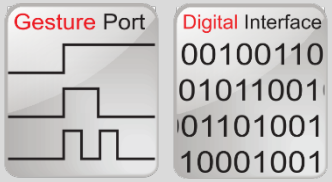
Best Gesture design-in.

Proven. Fast.

Features

- SSOP28L package
  - Lower cost of manufacturing
- Full Colibri Gesture suite

- Communication



- For real time XYZ positioning please use MGC3130.

Focus on Gestures.

More cost efficient.

MGC3030

It's all about gestures

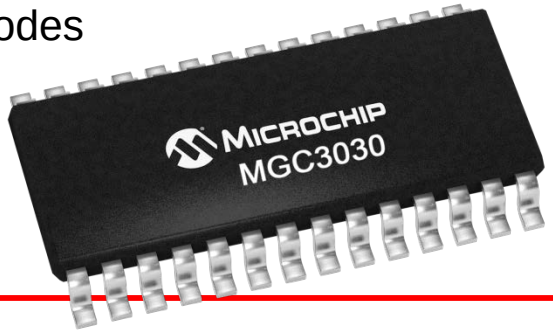
Feature focused

Further simplified design in

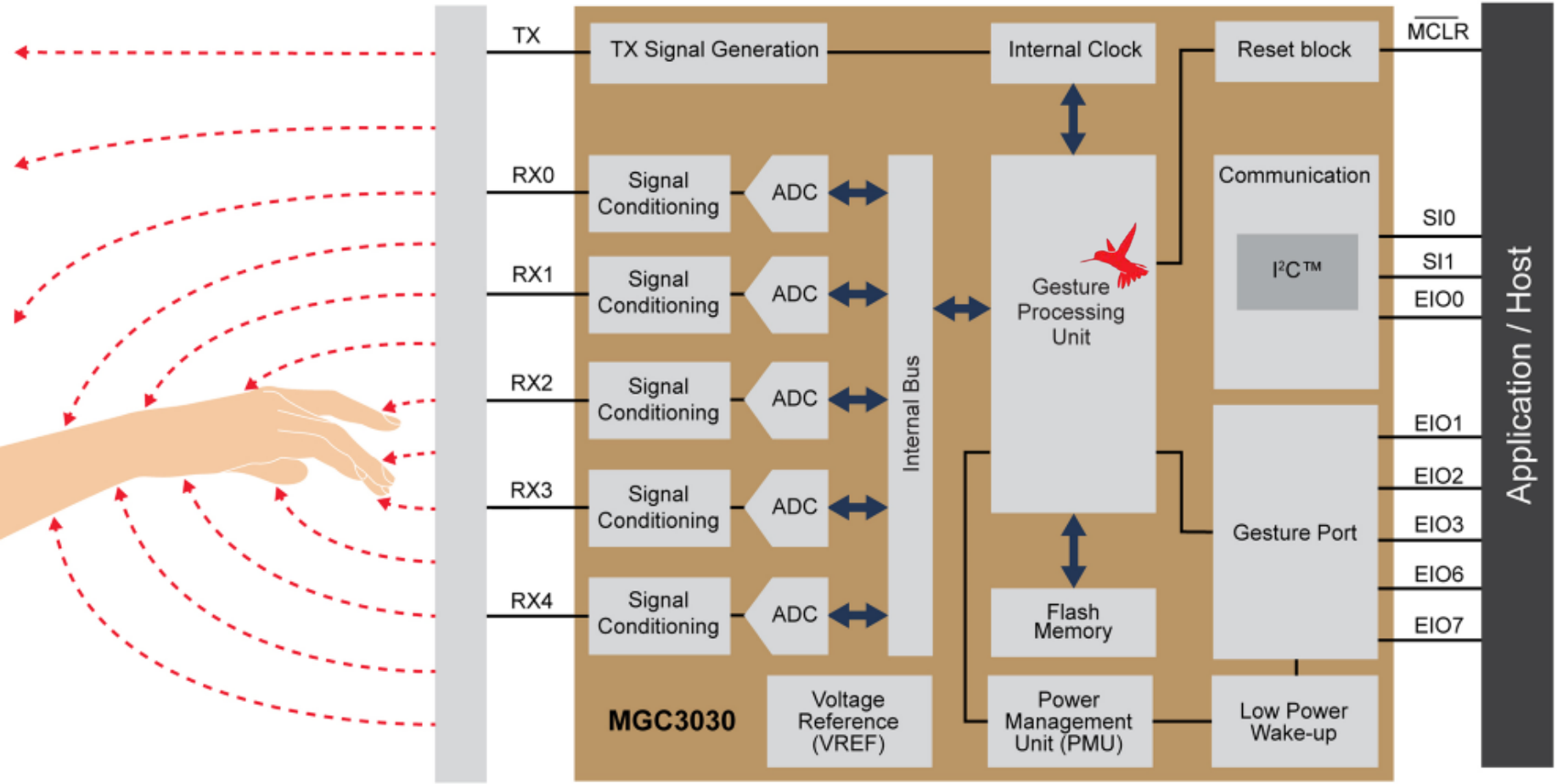
One step design in

- **I2C + EIO interface**
  - Gesture Port = mapping of gestures to EOIs
  - Gesture Port enables gestures for **ALL products**.

- **Takes advantage of GestIC® design-in tool set**
  www.microchip.com/gesticgettingstarted
  - AUREA SW suite (V1.2 or later)
  - Reference designs / Electrode Design Guide
  - Interface Manual
  - Reference Host codes
- **SSOP28L package**
  - Cost efficient manufacturing



MGC3030 Block Diagram



MGC3030

It's all about gestures

Feature focused

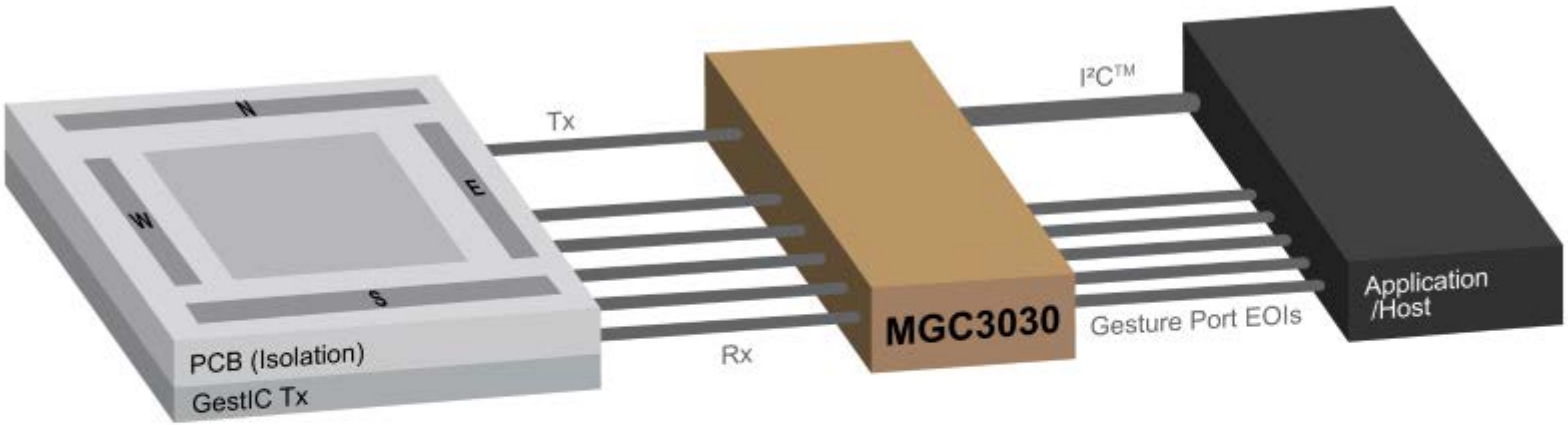
Further simplified design in

One step design in

- **Features**
  - Approach / wake up
  - linear Gestures
  - rotational Gestures
  - Touch

Based on Colibri gesture suite running on chip

Topology



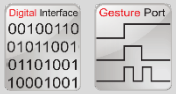
1. **Electrodes** sense user action

2. **MGC3030** processes signals

3. **Gesture output** to Application/Host

Gestures done right. MGC3030.

MGC3xxx
Gesture controller family

	MGC3030	MGC3130
Electrodes	5 RX, 1 TX	5 RX, 1 TX
Gesture detection	Yes, Colibri Gesture suite	Yes, Colibri gesture suite
Communication	I2C + gesture port 	I2C + gesture port 
Position tracking		Yes, 200 positions/s
Package	SSOP28L 	QFN28L 
Features	3D gestures, Touch, approach.	3D Gestures, Touch , approach and 3D position tracking
5k pricing (mDirect)	US$2.35	US$3.16

MGC3030 DevKit Woodstar

A new star is born

MGC3030

Feature focused

Further simplified design in

One step design in

- **MGC3030 DevKit Woodstar**
  - Available now
  - US$139
  - Available on mDirect
    http://www.microchipdirect.com/ProductSearch.aspx?keywords=DM160226

MGC3030 Woodstar Development Kit (Part # DM160226)

Trademarks