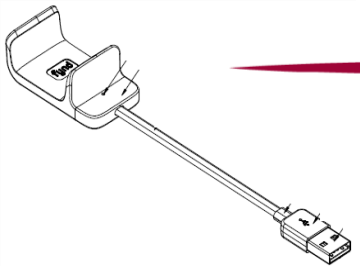
Solutions for Wearable Devices

Simula

1. **Reference Design of Chargers**
   Connectors + CKT to Cable (or Sub-System)
2. Pogo Pin & Pogo Pad
3. Magnetic Pogo Connection
4. Feature _ ID & CKT
5. Feature _ Waterproof (5 ATM / 10 ATM)
6. Feature _ High Speed & Video
7. Feature _ High Current
8. Wireless Charging
9. What we do is ……

Reference Design

Reference Design



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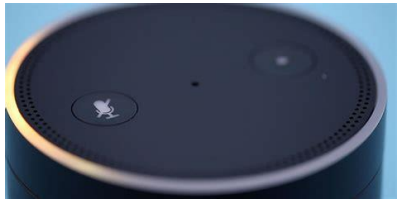
Pogo Pad

Wearable

Pogo Pad

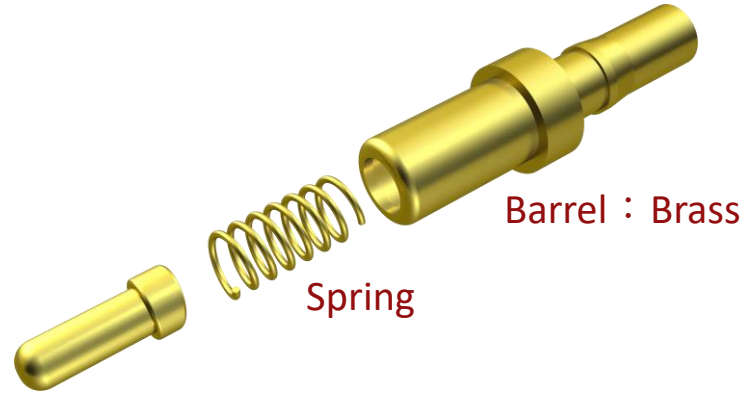


Home Device

Industrial Device

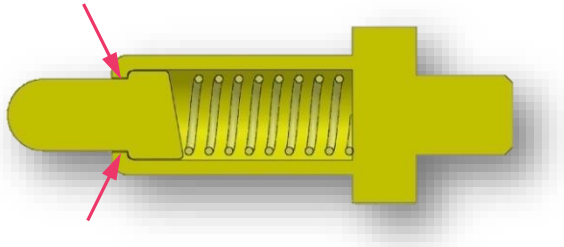
Portable Device

Pogo Pin



Spring Material	Durability	Current Rating
Stainless steel	100K~300K	1~3A
BeCu	1KK	3~5A

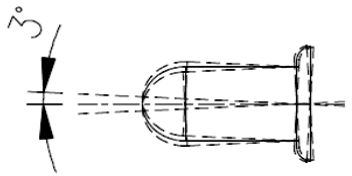
*** Price** **Stainless Steel**
*** Performance** **BeCu**



Barrel contact with Plunger

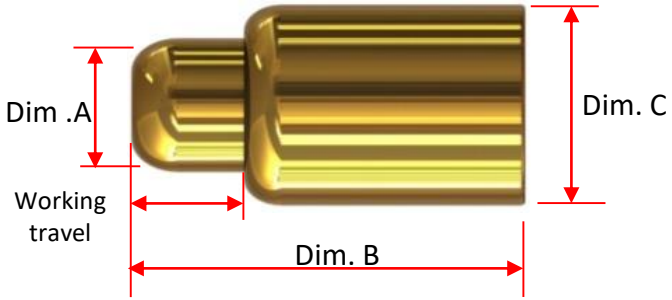
Standard Design :

1. Bias type of plunger design increases the contact stability.
2. Plunger deviation angle : 3°



Max . Deviation Angle

Pogo Pin



Materials
Plunger : Brass
Barrel : Brass
Spring : Stainless steel
Plating : Au or Customized

Normal Force : Customized
Durability : More then 100K cycles

For different customer needs, SIMULA provides standard product solutions.
The solutions are based on size / pitch / durability .....

For 1A / Per pin					
Item	Dim. A	Dim. B	Dim. C	Working Stoke	Minimal Pitch
Dimensions	0.9mm	2.10mm	1.5mm	0.50mm	2.0mm

For 3A / Per pin					
Item	Dim. A	Dim. B	Dim. C	Working Stoke	Minimal Pitch
Dimensions	2.0mm	9.3mm	3.2mm	1.00mm	4.50mm

Customization available !

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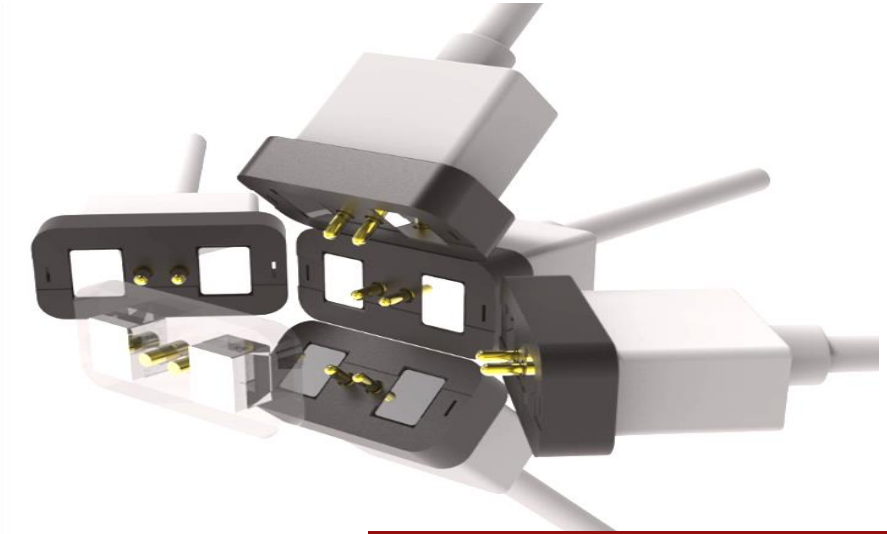
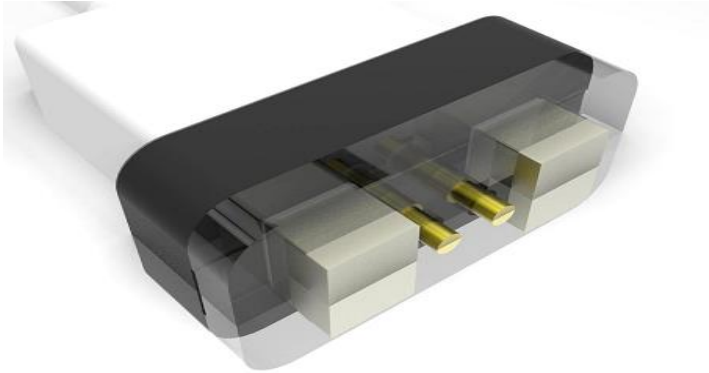
Magnetic Solutions



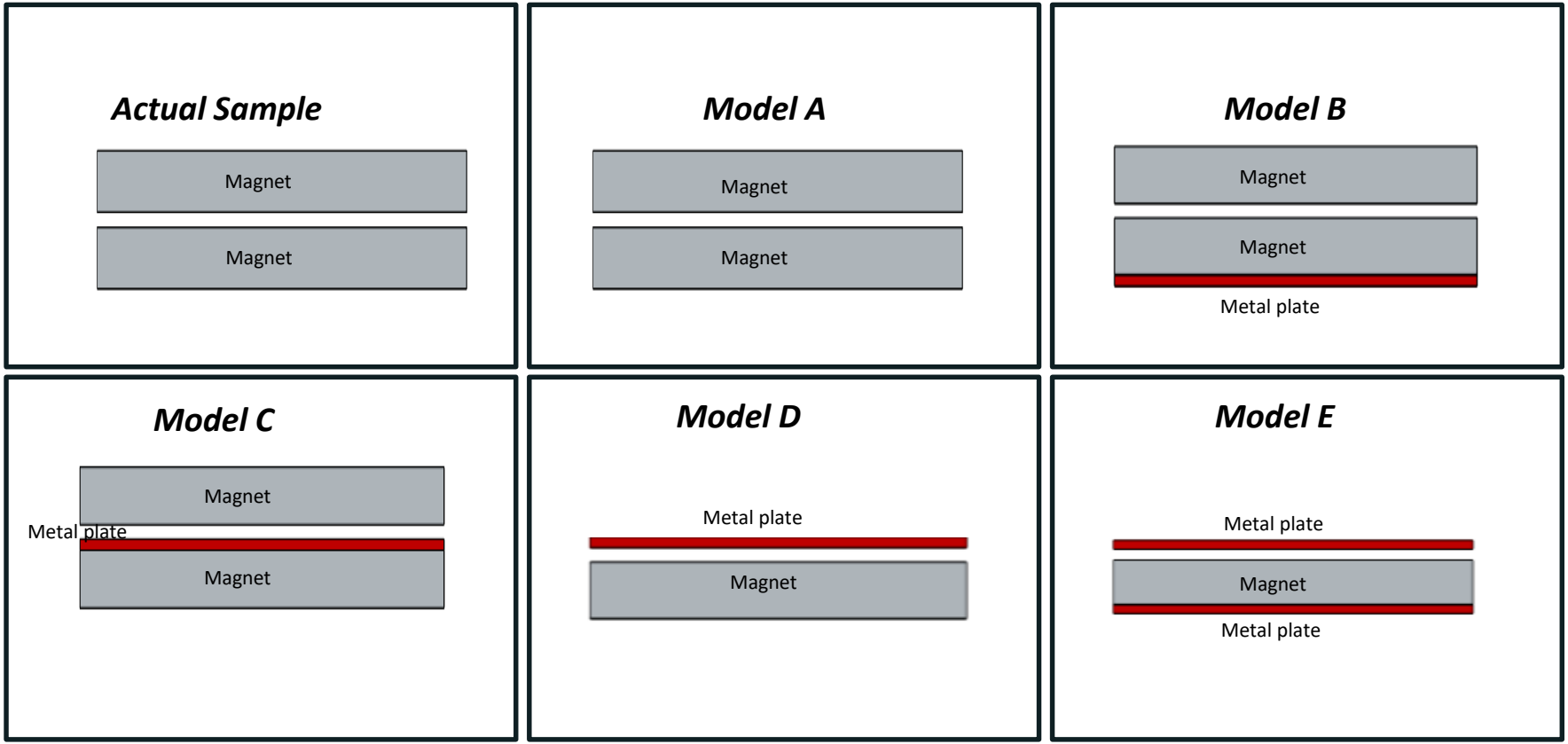


Friendly to “blind-mate” conditions

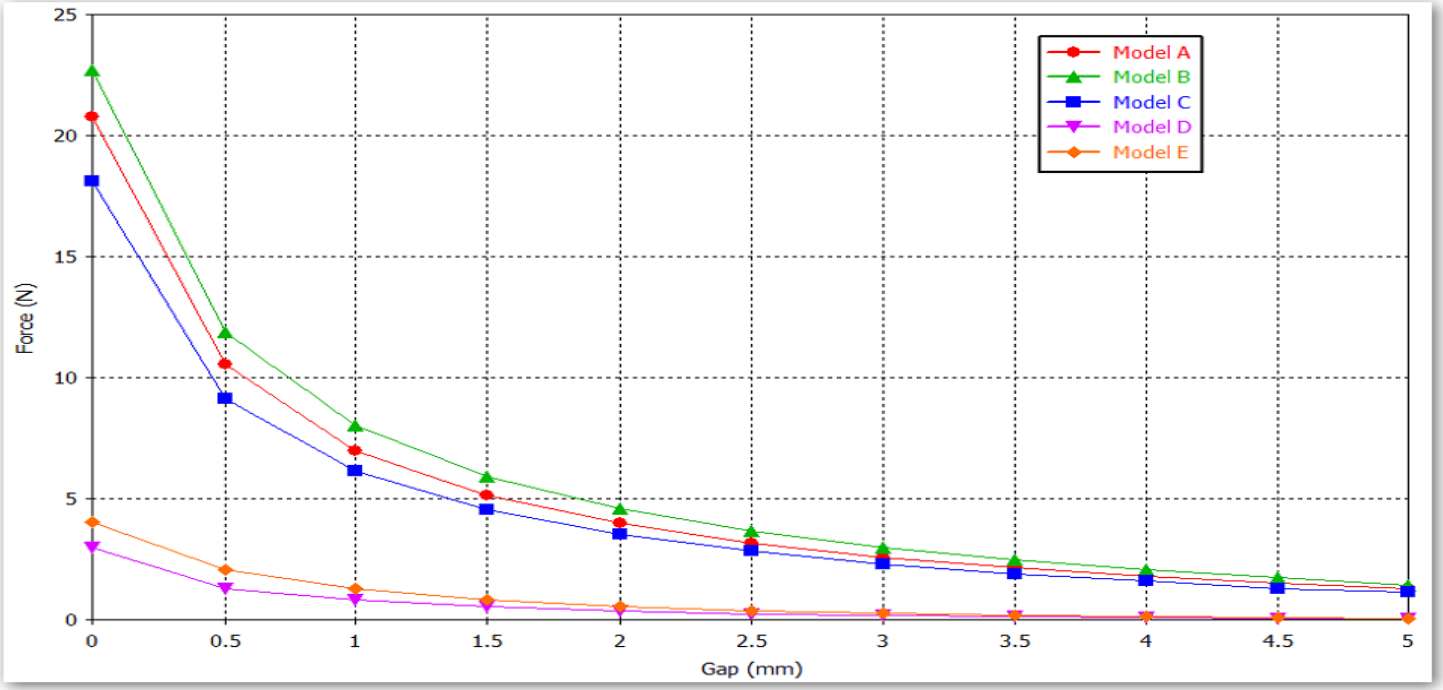
POGOs connected easily with magnetic force & polarity
POGO could deliver data (up to 5Gbps) or power, therefore, it could be applied widely.

Capability of Magnetic Force Analysis

Example

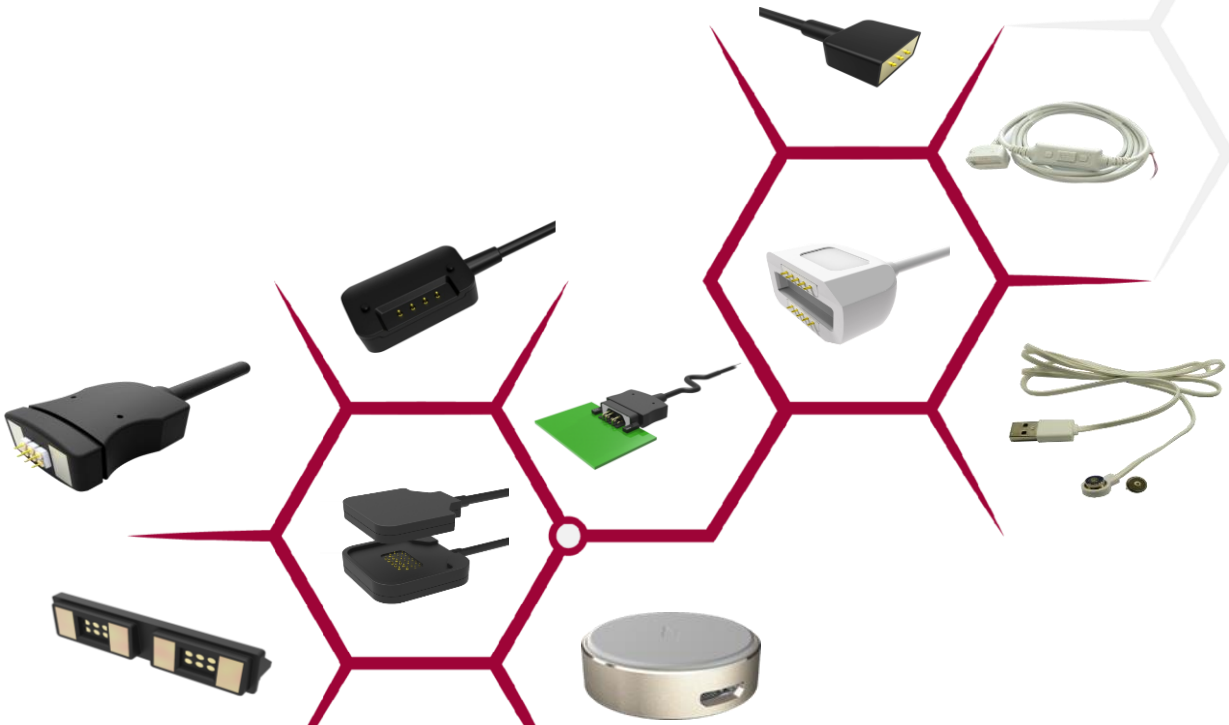


Analysis capability of magnets- Force Result Example



	Real Sample	Model A	Model B	Model C	Model D	Model E
Magnetic Force	25N	21N	23N	18N	3.5N	4N

Magnetic Pogo Cables for Medical & Healthcare



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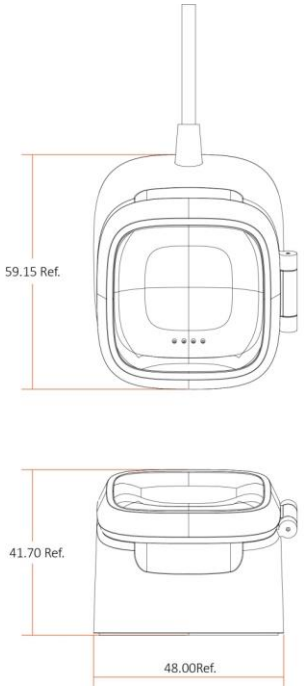
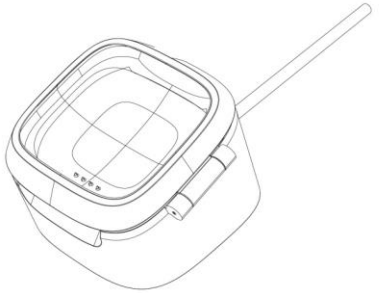
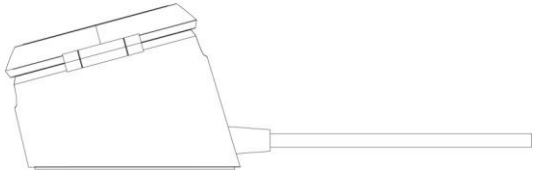
Design Concept _ Proposal A

Design Concept _ Proposal A

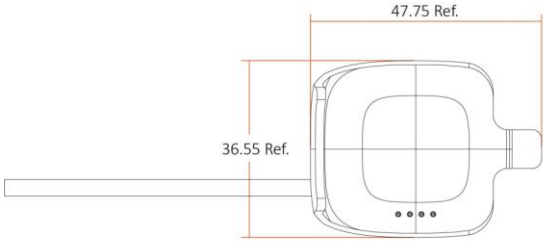


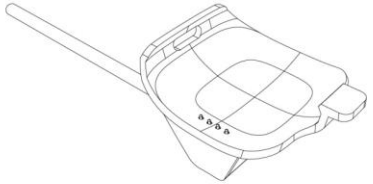


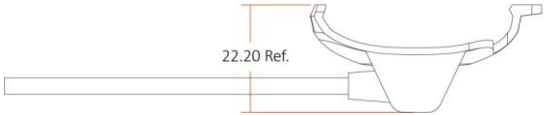


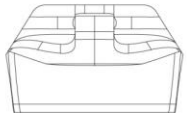
Design Concept _ Proposal B

Design Concept _ Proposal B



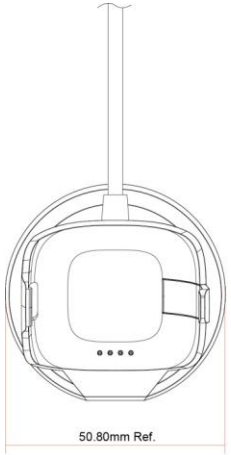


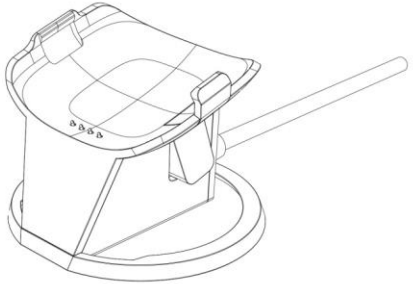


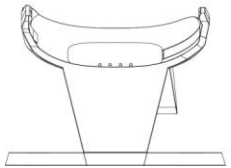


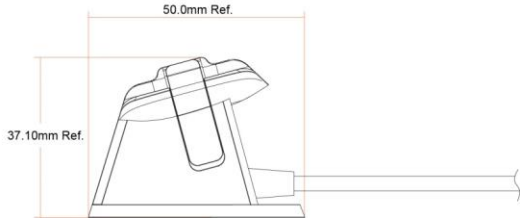
Design Concept _ Proposal C

Design Concept _ Proposal C









OVP / OCP Module

TI TPS259535 Low On-Resistor e-Fuse Protection

- Low on-resistor: 34 mΩ (Typ.) ; 37 mΩ (Max.@ 25˚C)
- Provide overloads, short circuits, over-voltage, inrush current, and over temperature protection
- Current limit Formula as below, set R_{ILM} as 4.32K for 0.502A current limit

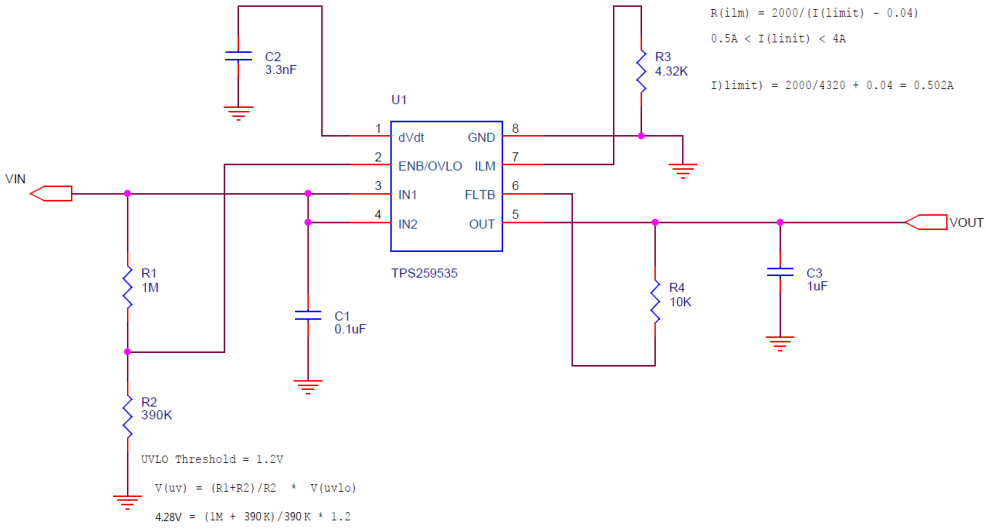
$$R_{ILM} = \frac{2000}{\left(I_{LIMIT} - 0.04\right)}$$

- The undervoltage lockout (UVLO) trip point as below which V_{UVLO} as 1.2

$$V_{UV} = \frac{R1+R2}{R2} \times V_{UVLO(R)}$$

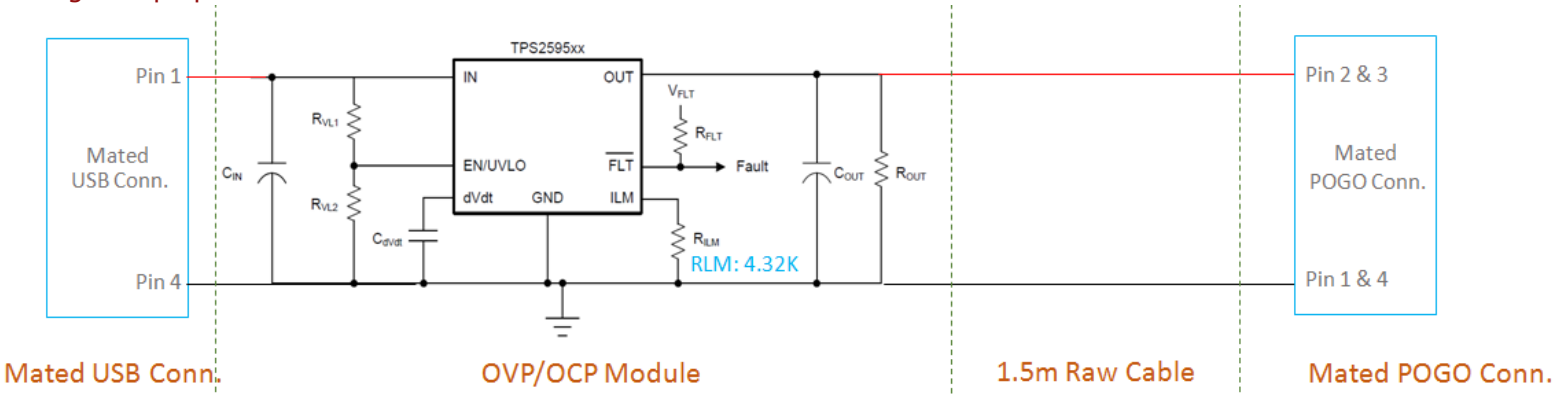
set R1: 1M, R2: 390K.

then VUV will be 4.28V



DCR & Voltage Budget _ EX. 28X2C/28X2C OD： 2.6mm

The DCR and Voltage Drop budget list as below. Both of 250 or 500mA application can meet USB 2.0 voltage drop specification which define as 250mV Max.



	Mated USB Conn.		OVP/OCP Module	1.5m Raw Cable		Mated POGO Conn.		Total Loop
	VBUS Pin	GND Pin	RON (mΩ) ON state resistance	VBUS (26AWGx2C)	GND (26AWGx2C)	VBUS Pin (2Pin Parallel)	GND Pin (2Pin Parallel)	
DCR (mΩ)	10	10	37	101	101	10	10	279
Voltage Drop @250mA (mV)	2.5	2.5	9.25	25.25	25.25	2.5	2.5	69.75
Voltage Drop @502mA (mV)	5.02	5.02	18.57	50.70	50.70	5.02	5.02	140.06

Structure of raw cable based on customer's requirement !

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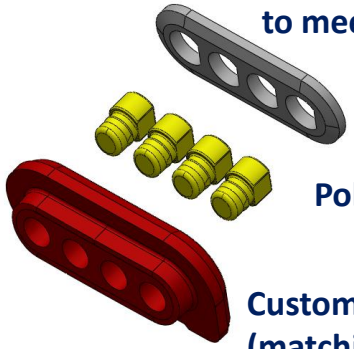
5 ATM Charging Block

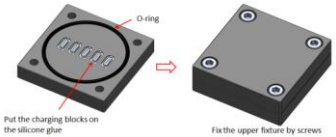


Epoxy base waterproof glue
to meet 5 ATM spec

Polished metal pin

Customized ID surface
(matching texture & color)

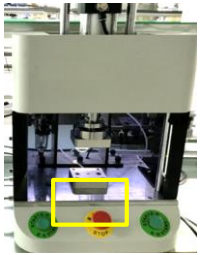
- **Real water test**

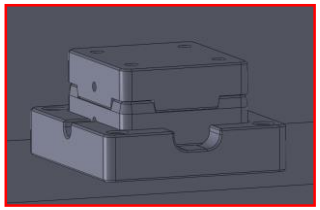


PDF

5 ATM real water test report

- **100% on line air leak test**





Verification Equipment (by SGS)

Cover

5 ATM testing equipment

Pressure meter

Testing barrel

- Testing method follows IEC 60529

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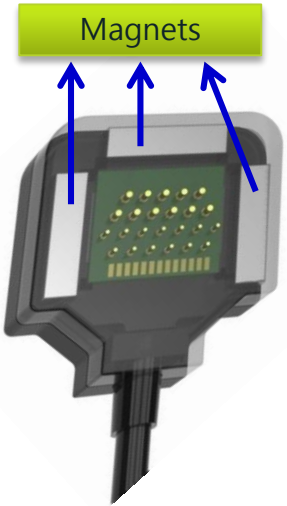
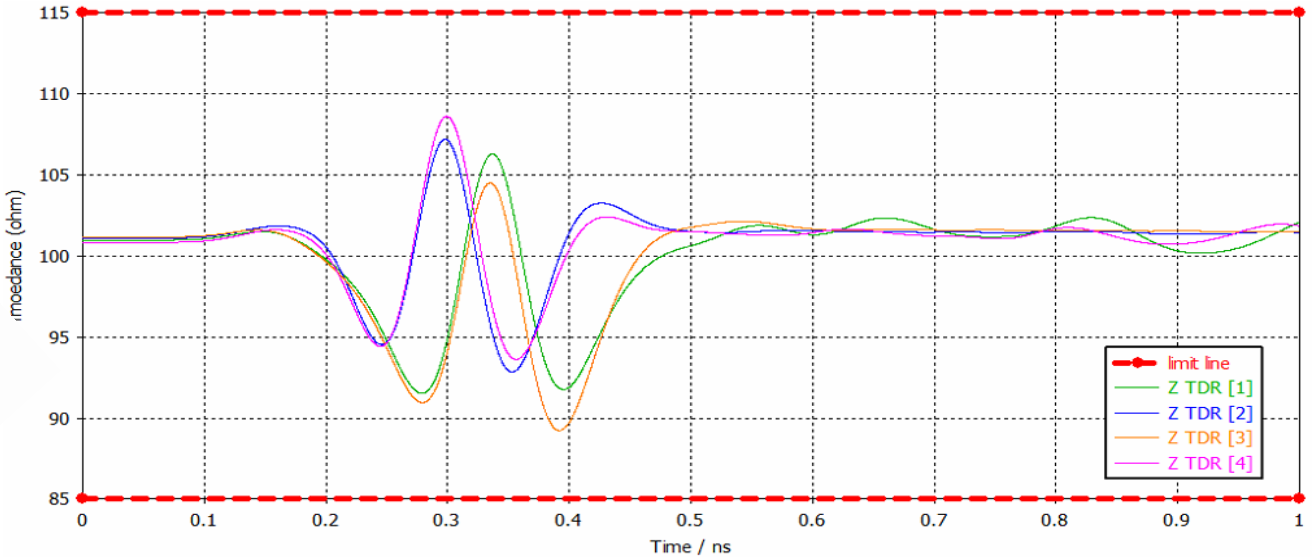
Magnetic Pogo _ HDMI 2.0 + USB 3.0

- Reference Design of HDMI 2.0 + USB 3.0
- Material of Magnet : NdFeB N52
- Magnetic Force : 1.5kg (Reference)
- Power delivery (12V/5A).

Pogo to HDMI 2.0





■ Simulated differential impedance (in spec.)

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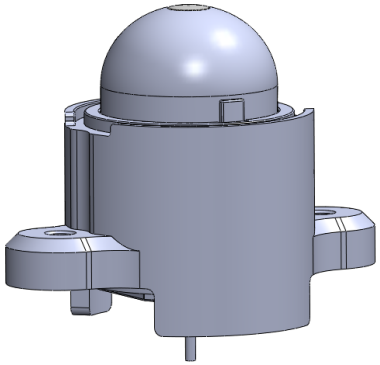
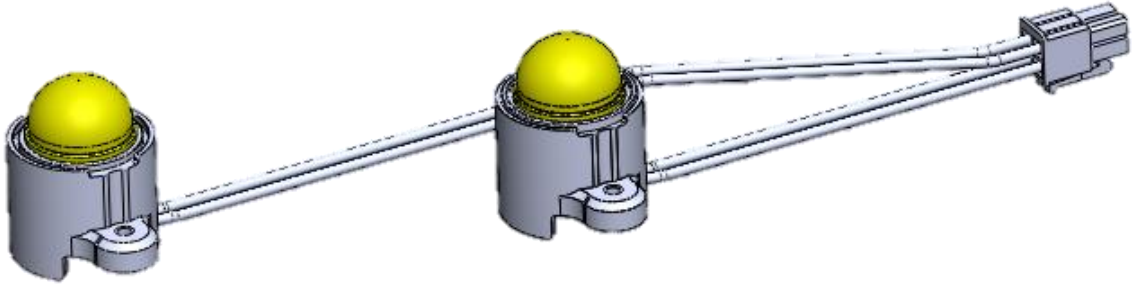
Pogo for Power _ over 10A





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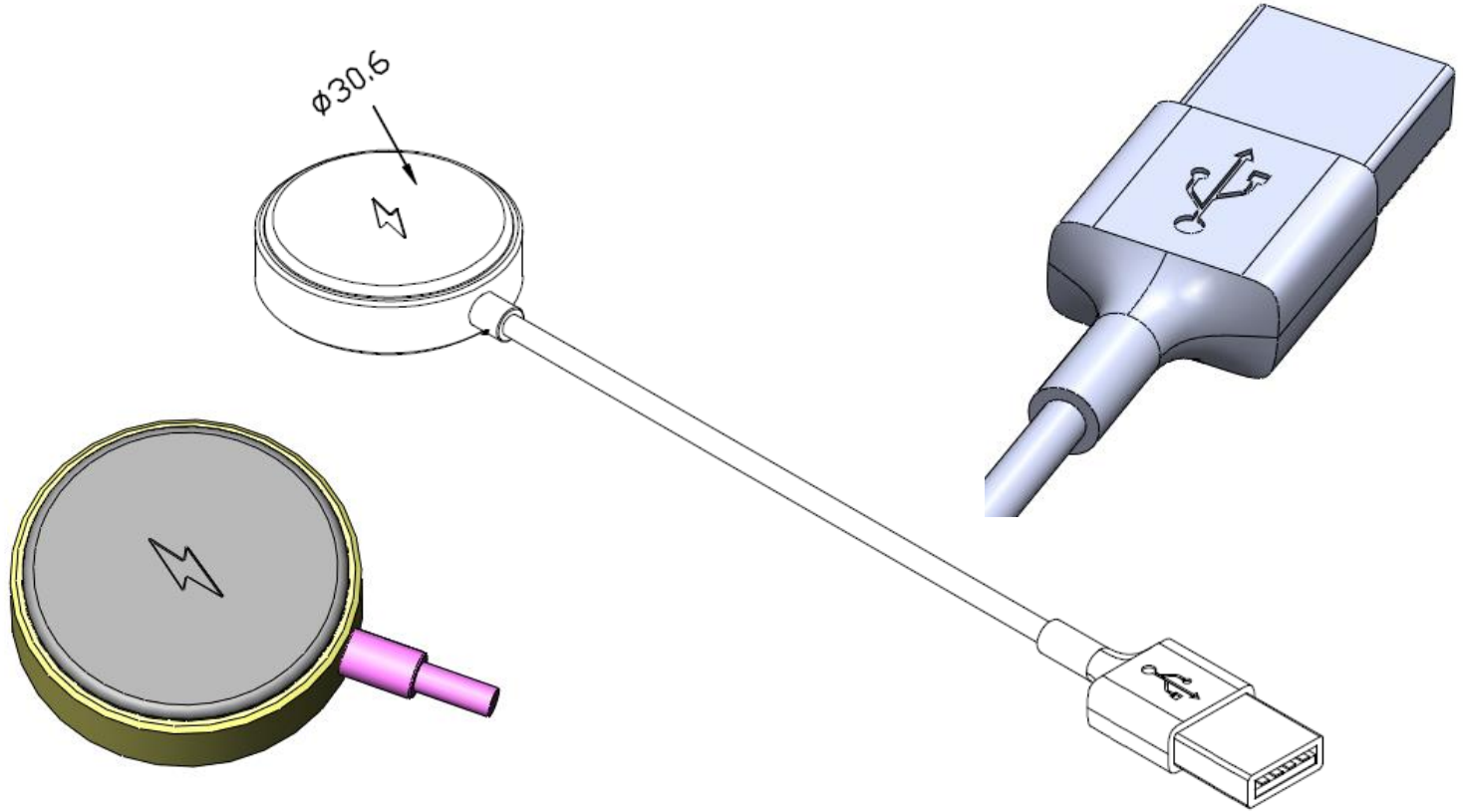
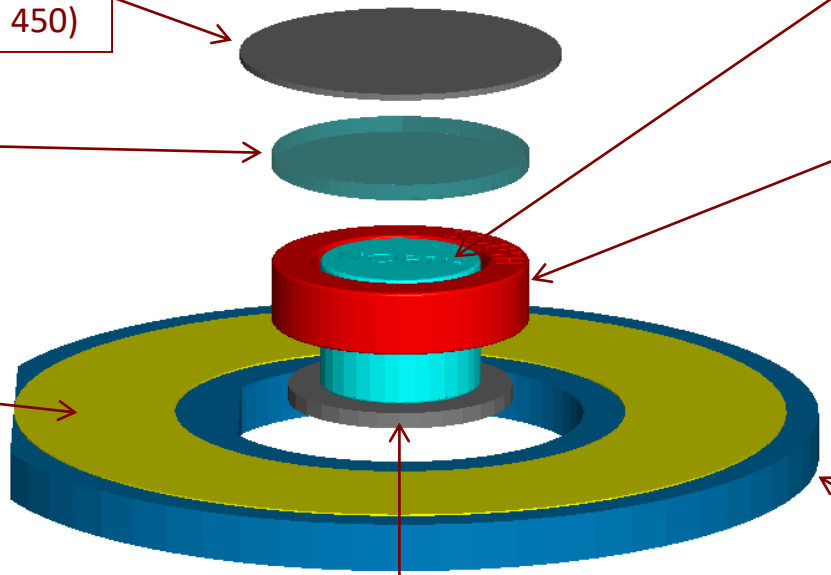
Wireless Charging



Wireless Charging _ Magnets & Coil Module



Higher permeability material
Relative permeability (μr：450)

Rx Magnet
Material：N52

Adhesive
Please ignore

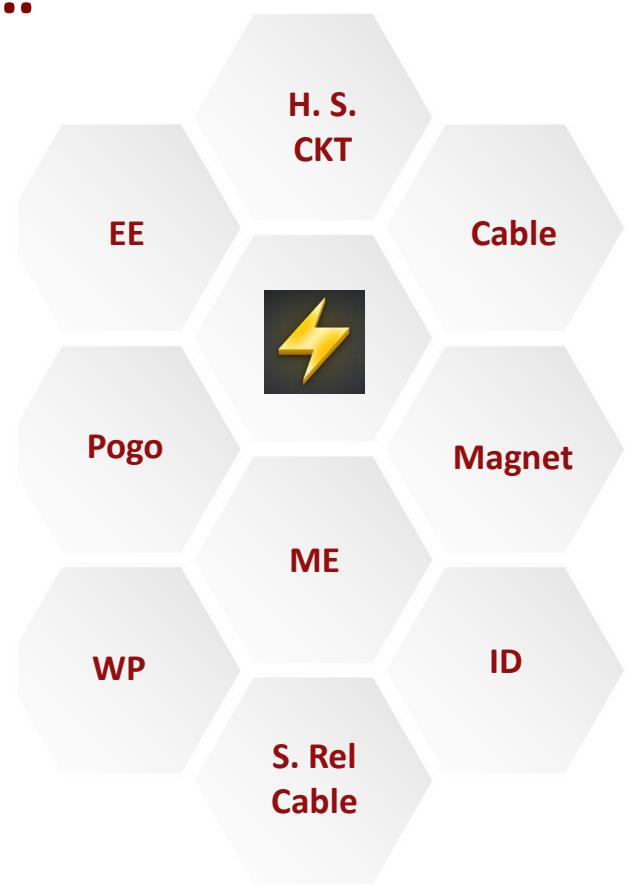
TX Magnet _ Cylinder
Material：N52

TX Magnet _ Ring
Material：N35

Higher permeability material
Relative permeability (μr: 450)

Ferrite
Relative permeability (μr: 150)

What we do is ……



Thank you