

EddyCus® TF map 5050A – Anisotropy Imaging Device

P_T_5050A_20



Highlights

- ▶ Contact-free imaging
- ▶ High resolution imaging (25 to 1,000,000 points)
- ▶ Defect imaging
- ▶ Mapping of encapsulated layers

Applications

- ▶ Touch panel sensors(TPS)
- ▶ Printed electronics
- ▶ Wearable electronics
- ▶ Smart textiles
- ▶ Photovoltaics
- ▶ Smart / switchable films
- ▶ Medical surfaces and devices
- ▶ Biological sensors
- ▶ Aerospace, automotive, transport
- ▶ Semiconductor and memory
- ▶ Energy storage

Device Series

- ▶ Metal thickness (nm, μm)
- ▶ Sheet resistance (Ohm/sq)
- ▶ Emissivity
- ▶ Conductivity / resistivity (mOhm·cm)
- ▶ Electrical anisotropy (%)
- ▶ Weight (g/m^2) and drying status (%)
- ▶ Permeability (H/m) Beta

Materials

- ▶ Nanowire films
 - ▶ Conductive NW (Ag, Ni, Pt, Au)
 - ▶ Semiconductor NW (Si, SiC)
 - ▶ Magnetic NW (Fe₃O₄-AgNWs)
 - ▶ Multilayer NW (ZnO/AgNW/ZnO)
- ▶ Carbon Nano Tubes and Buds
- ▶ Fiber reinforced composites
- ▶ Metal meshes, smart meshes
- ▶ Anisotropic grain / domain materials
- ▶ Anisotropic effect / defect directions (cracks, line defects)

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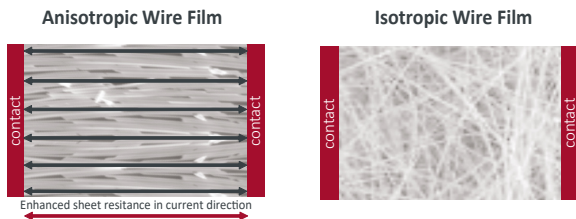
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Anisotropy Term and Concept

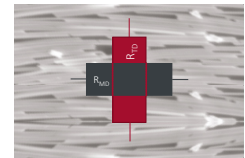
- ▶ Electrical anisotropy refers to a difference in electrical resistance depending on the direction of current flow
- ▶ Wire and mesh structures can have anisotropic resistances
- ▶ Bulk materials with dominant directional characteristics \ effects \ defects can also have electrical anisotropy
- ▶ Anisotropy can be optimized to the layout of the contacts
- ▶ Anisotropy can save material and improve optical transparency to sheet resistance ratio
- ▶ Described by anisotropy direction and strength
- ▶ Both characteristics must be obtained at the same position
- ▶ The anisotropy strength is calculated using the lowest and highest resistance that align in perpendicular directions
- ▶ Inline deposition, eg. slot die coating on moving web, tends to create lower resistances in machine direction “MD” and higher resistance in traversing direction “TD”
- ▶ Calculation as ratio of lowest and highest resistance



$$\text{Anisotropy Ratio} = \frac{R_{\text{HIGHEST}}}{R_{\text{LOWEST}}}$$



$$\text{Anisotropy Ratio} = \frac{R_{\text{TD}}}{R_{\text{MD}}}$$



Device Characteristics

Measurement technology	Non-contact eddy current sensor with directed current induction
Substrates	Foils, glass, wafer, etc.
Max. scanning area	20 inch / 508 mm x 508 mm (larger on request)
Max. sample thickness / sensor gap	2 / 5 / 10 / 25 mm (defined by the thickest sample)
Sheet resistance range	0.01 – 1,000 Ohm / sq; 1 to 5 % accuracy
Anisotropy range	0.33 – 3 (larger on request)
Scanning pitch	1 / 2 / 5 / 10 mm (other on request)
Measurement points per time (square shape)	10,000 measurement points in 5 minutes 1,000,000 measurement points in 30 minutes
Scanning time	8 inch / 200 mm x 200 mm in 0.5 to 5 minutes (1 – 10mm pitch) 12 inch / 300 mm x 300 mm in 1.5 to 15 minutes (1 – 10mm pitch)
Device dimensions (w/h/d) / weight	46.5" x 11.4" x 35.4" / 1,180 mm x 290 mm x 900 mm / 120 kg
Available features	Metal thickness imaging

Device Control and Software

- ▶ Pre-defined measurement and product recipes (sizes, pitches, thresholds)
- ▶ Line scan, histogram and area analysis
- ▶ Black and colored image coding
- ▶ Csv & pdf export,
- ▶ SPC summary and export
- ▶ 3 user levels
- ▶ Material database for parameter conversion
- ▶ Edge effect compensation
- ▶ Storage and import of data
- ▶ Export of data sets (eg. to EddyEva, MS Excel, Origin)

