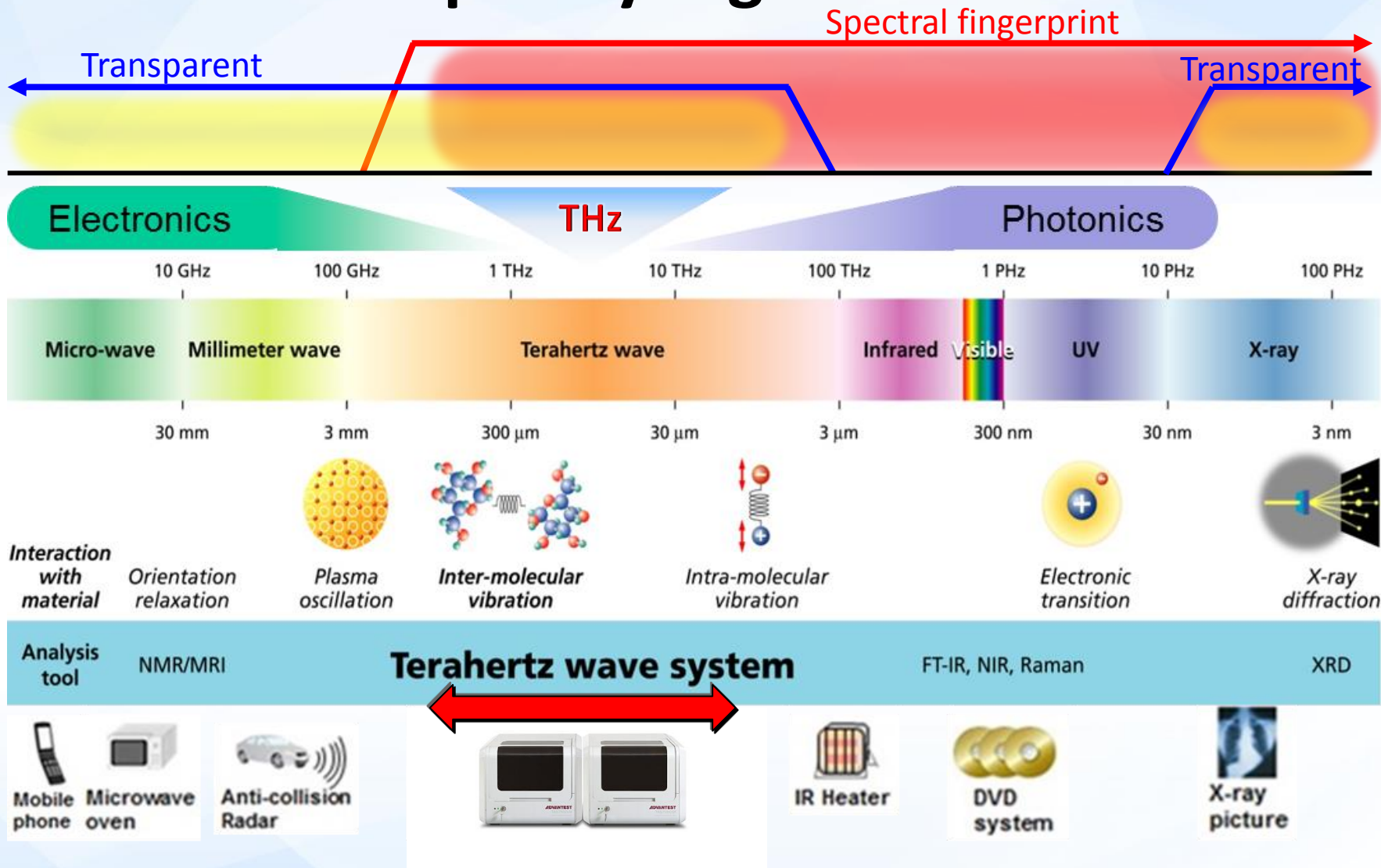


Introduction of Terahertz Spectroscopy Imaging Systems and Applications



Terahertz frequency region



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TAS7500/TAS7400 series Spectroscopy /Imaging System

~ for researching, industrial use ~



TAS7500IM
Terahertz Imaging System

For tablet coating, structure analysis

TAS7500SP/TAS7400SP (0.1 to 4THz (standard))
Terahertz Spectroscopic System

For chemical, pharmaceutical research

TAS7500SL/TAS7400SL (0.03 to 2THz (low range))
Terahertz Spectroscopic System

For Terahertz communication analysis

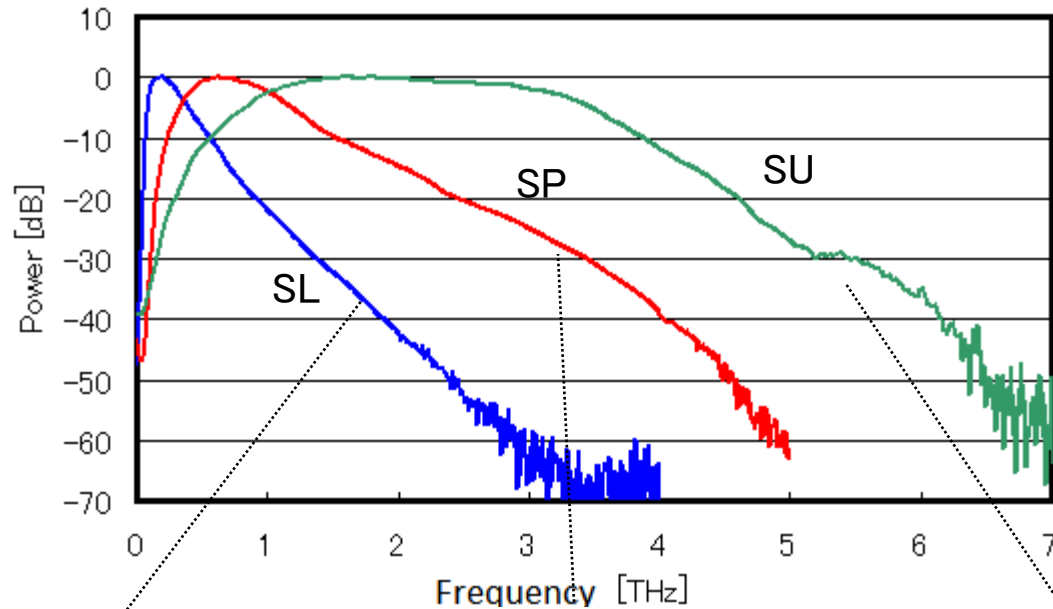
TAS7500SU/TAS7400SU (0.5~7THz (broadband))
Terahertz Spectroscopic System

For terahertz analysis in broad band range

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TAS7500/TAS7400 Frequency Range

- Three ranges for various applications:



SL model, low frequency
range: **0.03 to 2THz**

For sub-terahertz
communication device
evaluation



SP model, standard range
range: **0.1 to 4THz**

For chemicals,
pharmaceutical, bio
material spectroscopy



SU model, ultra broadband
range: **0.5 to 7THz**

For wide band analysis, bio
material analysis

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Specification comparison of TAS7400 and TAS7500

Model	TAS7400Sx	TAS7500Sx
■ Analysis method	Spectroscopic Analysis	
■ Measurement Modules (option)	Transmittance*1/ Reflectance*1/ ATR*1/ Polarization*1	
■ Analysis Object	Dielectric materials, pharmaceutical tablet, preparation (powders, liquid), other reagents, chemical materials	
■ Object dimension	Trans/Ref mode: $\Phi 5\text{mm} \sim 30\text{mm}$, less than 10mm thickness ATR mode: Less than $\Phi 5\text{mm}$ (Powder/liquid), $\Phi 5\text{mm} \sim 20\text{mm}$, less than 10mm thickness (solid)	
■ Measurement method	Master-free run difference frequency method	Phase modulation method
■ Frequency range*2	0.1 ~ 4 THz (SP), 0.5 ~ 7 THz (SU), 0.03 ~ 2 THz (SL)	
■ Frequency accuracy*2	Max. ± 10 GHz (@1.41 THz)	
■ Frequency resolution	7.6 GHz / 1.9 GHz	7.6 GHz
■ Dynamic range*2	60 dB (@peak, Average16k)	
■ Throughput	200 ms/scan	8 ms/scan
■ Dry air purge	Built-in dry air unit (external air supply required)	
■ Controller	Built-in (OS:Windows7 Pro. 64bit)	
■ Imaging function option	Not available	Available

*1 Optional

*2 In temperature range of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$

Option adaptor (Common in TAS7400 & TAS7500)

■ Adaptor	Temperature control module (type A: $-10 \sim +80^{\circ}\text{C}$, type B: room temperature $\sim +300^{\circ}\text{C}$)
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Terahertz Measurement unit & Module Products

~ Free Layout of Fiber type module components ~



TAS7500TS

Terahertz Wave Optical Sampling System

Flexible Terahertz wave measurement and analysis platform



TAS1110 0.1 - 4THz (standard type)

TAS1120 0.03 - 2THz (low-frequency type)

TAS1130 0.5 - 7THz (broadband type)

TAS1110, TAS1120, TAS1130 Terahertz Source Modules



TAS1230 0.03 - 7THz (broadband type)
Fiber coupled compact terahertz wave detector with transimpedance amplifier

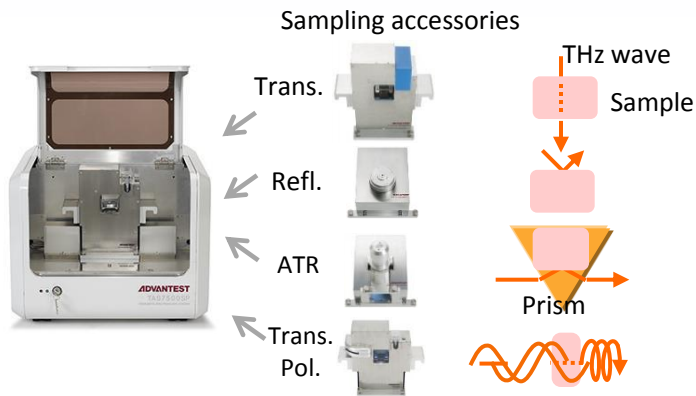
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TAS7500/7400 System Component

High-speed spectroscopy and imaging analysis systems with small footprint

1. TAS7500-7400

SL/SP/SU spectroscopy measure units



+

Analysis frame

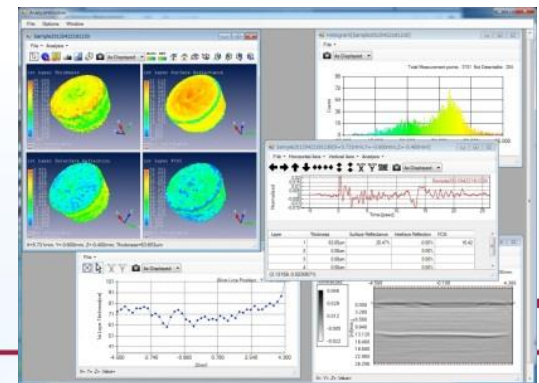
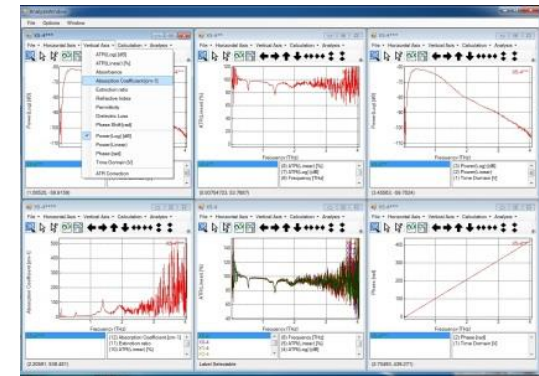
Controller PC



common

2. TAS7500IM

imaging measure unit

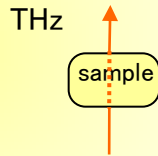


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Four measurement module accessories

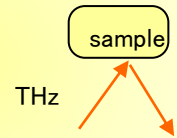
Various type of samples measurement

Transmit Module



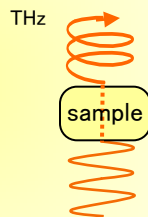
For low absorbance materials

Reflection Module

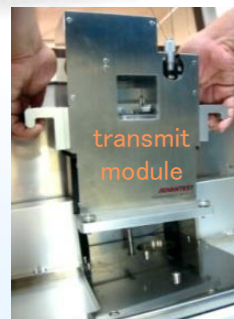


For membrane, layers structure

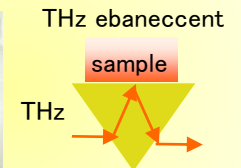
Polarization module



Analysis of sample polarity



ATR module*



For high absorption, biological materials

* ATR:Attenuated Total Reflection

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Each module attachable with guide
(easy change, any tool not required)

Features of TAS7500/TAS7400 SL/SP/SU

1. High-speed measurements with small footprint (**Industrial fastest**)

- Self-developed, industrial fastest measurements*

TAS7500SP/SL/SU: 8 ms per scan;

TAS7400SP/SL/SU: 200ms per scan

2. Flexibility for various types of spectroscopic applications (**Multifunctional**)

- Four inter-exchangeable sampling accessories (trans., refl., ATR., trans pol.) allow comprehensive spectroscopy of a wide variety of samples
- Wideband spectral coverage: 0.03 to 7 THz
 - i. Low-frequency (SL): 30 GHz to 2 THz
 - ii. Standard (SP): 100 GHz to 4 THz
 - iii. Ultra-wideband (SU): 500 GHz to 7 THz



1. Attached dry air filter: eliminates water vapor absorption, enables clear spectroscopic measurement (**Simple measurement**)

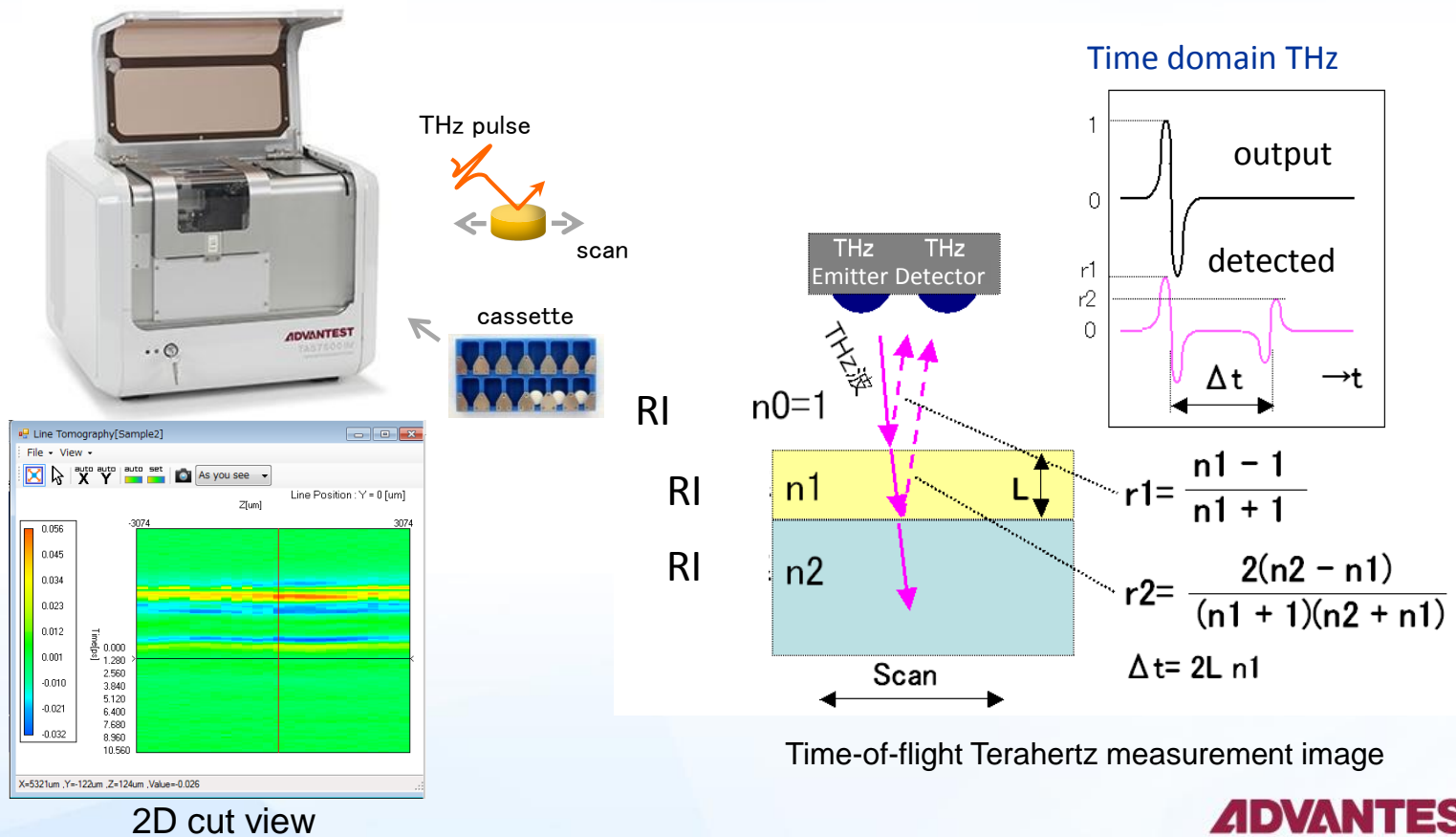
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Sample holder in transmission
module with dry air purging

TAS7500IM: TOF imaging measurement unit

■ Tablet internal structure analysis by Terahertz TOF (time of flight)

- Coating thickness, density internal distribution non-destructive analysis.
- Auto-analysis number of tablets by the Cassette (up to 10)



Pharmaceutical Tablet Imaging Analysis

■ analysis case

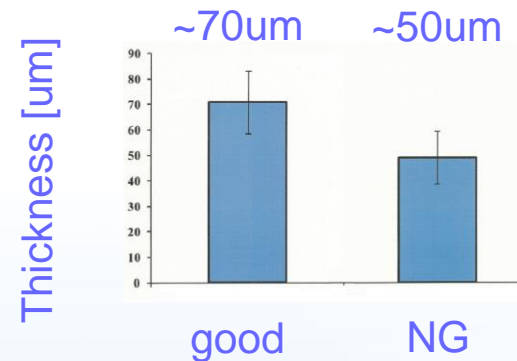
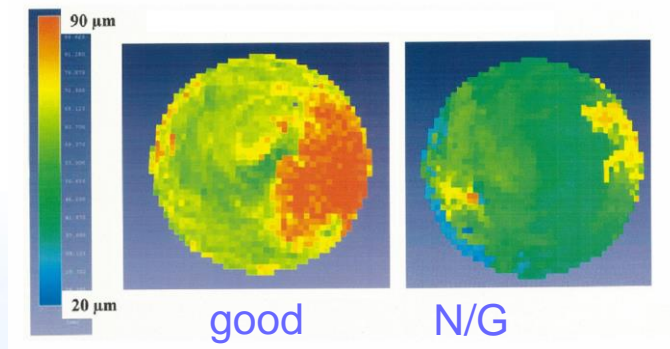
Find defects of thinner coat tablets by using TAS7500IM

■ sample



■ result

⇒ can be distinguish good and NG by imaging result



TAS7500IM can analysis in non-destructive method to find defects

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Terahertz Spectroscopy / imaging analysis platform TAS7500TS/ 7400TS



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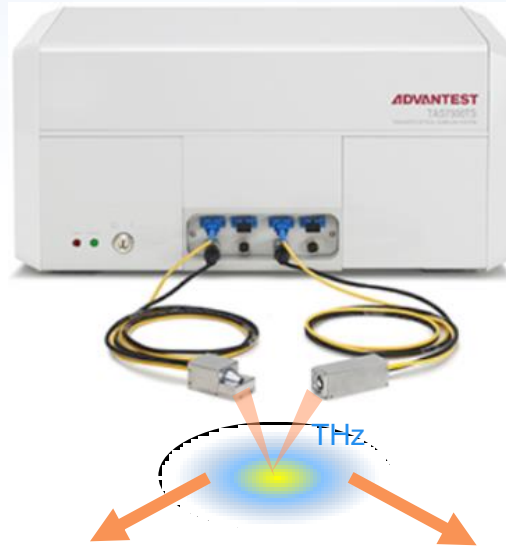
Optical, Imaging analysis platform



Customize system for various application with max.1ms high throughput terahertz spectroscopic.

Terahertz Optical Sampling Analysis TAS7500TS

+
Terahertz Components

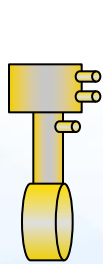


Emission/Detection fiber laser and data capture block

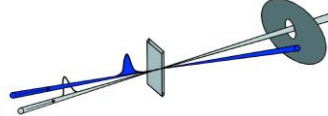
THz emitter/detector

In Lab, R&D use

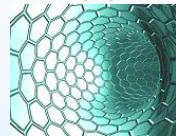
Industrial, embedded use



Very low temp.



Pump probing



Nano-material science



polymer



semiconductor



Pharmaceutical

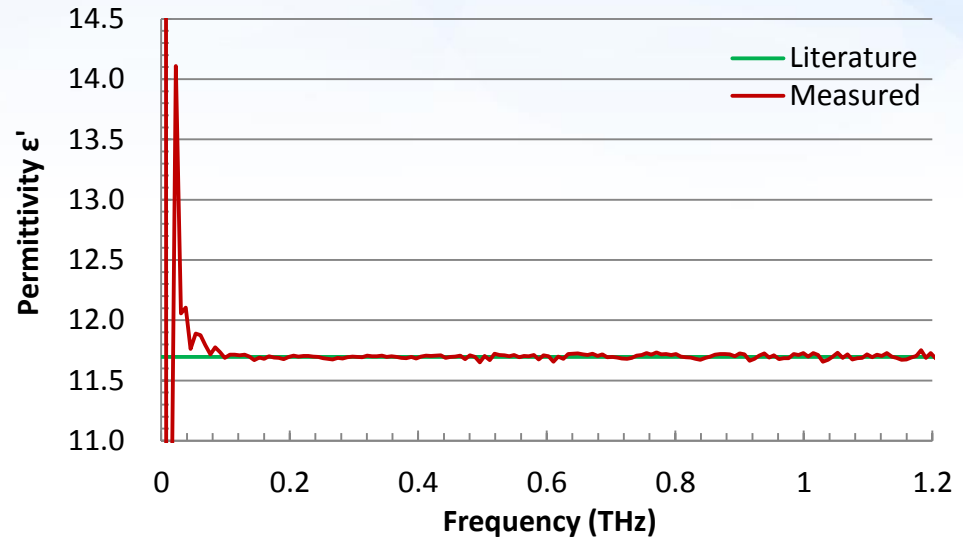


Permittivity Measurement of Silicon Substrate

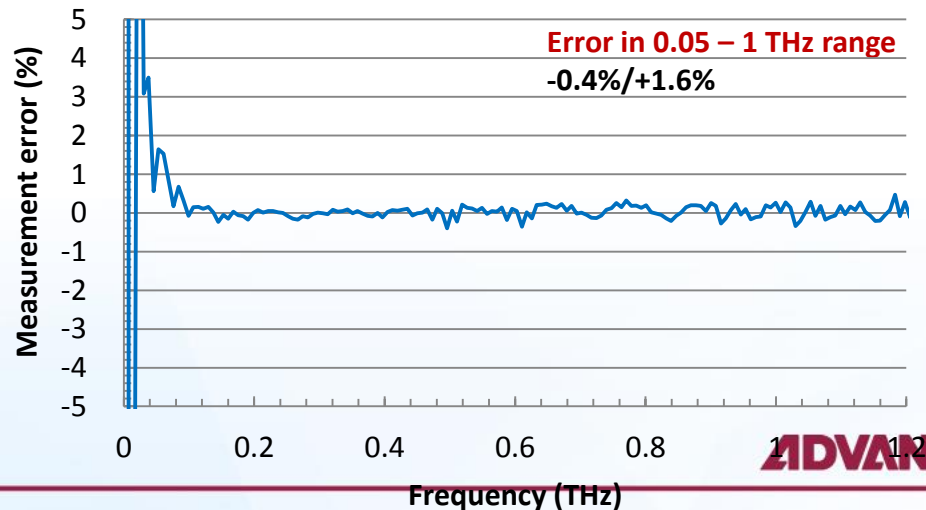
■ **Sample:** Hi resistive silicon substrate (thickness: 188 μm)

■ **Instruments:** TAS7500SL

■ **Measurement result**



■ **Measurement error**



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Thank you!



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