IME 1050.5 SERIES	GOLD-Au	PLATINUM-Pt	INDIUM TIN OXIDE-ITO
Monolithic un-packaged	IME 1050.5-M-Au	IME 1050.5-M-Pt-U	IME 1050.5-M-ITO-U
Monolithic-packaged	IME 1050.5-M-Au-P	IME 1050.5-M-Pt-P	
Combined Differential-un-packaged	IME 1050.5-CD-Au-U	IME 1050.5-CD-Pt-U	IME 1050.5-CD-ITO-U
Combined Differential-packaged	IME 1050.5-CD-Au-P	IME 1050.5-CD-Pt-P	
Full Differential-un-packaged	IME 1050.5-FD-Au-U	IME 1050.5-FD-Pt-U	IME 1050.5-FD-ITO
Full Differential-packaged	IME 1050.5-FD-Au-P	IME 1050.5-FD-Pt-P	
IME 0550.5 SERIES	**GOLD-Au**	**PLATINUM-Pt**	**INDIUM TIN OXIDE-ITO**
Monolithic un-packaged	IME 0550.5-M-Au	IME 0550.5-M-Pt-U	IME 0550.5-M-ITO-U
Monolithic-packaged	IME 0550.5-M-Au-P	IME 0550.5-M-Pt-P	
Combined Differential-un-packaged	IME 0550.5-CD-Au-U	IME 0550.5-CD-Pt-U	IME 0550.5-CD-ITO-U
Combined Differential-packaged	IME 0550.5-CD-Au-P	IME 0550.5-CD-Pt-P	
Full Differential-un-packaged	IME 0550.5-FD-Au-U	IME 0550.5-FD-Pt-U	IME 0550.5-FD-ITO
Full Differential-packaged	IME 0550.5-FD-Au-P	IME 0550.5-FD-Pt-P	

IME 2025.3 SERIES	GOLD-Au	PLATINUM-Pt	INDIUM TIN OXIDE-ITO
Monolithic un-packaged	IME 2025.3-M-Au	IME 2025.3-M-Pt-U	IME 2025.3-M-ITO-U
Monolithic-packaged	IME 2025.3-M-Au-P	IME 2025.3-M-Pt-P	
Full Differential-un-packaged	IME 2025.3-FD-Au-U	IME 2025.3-FD-Pt-U	IME 2025.3-FD-ITO
Full Differential-packaged	IME 2025.3-FD-Au-P	IME 2025.3-FD-Pt-P	
IME 1525.3 SERIES	**GOLD-Au**	**PLATINUM-Pt**	**INDIUM TIN OXIDE-ITO**
Monolithic un-packaged	IME 1525.3-M-Au	IME 1525.3-M-Pt-U	IME 1525.3-M-ITO-U
Monolithic-packaged	IME 1525.3-M-Au-P	IME 1525.3-M-Pt-P	
Full Differential-un-packaged	IME 1525.3-FD-Au-U	IME 1525.3-FD-Pt-U	IME 1525.3-FD-ITO
Full Differential-packaged	IME 1525.3-FD-Au-P	IME 1525.3-FD-Pt-P	
IME 1025.3 SERIES	**GOLD-Au**	**PLATINUM-Pt**	**INDIUM TIN OXIDE-ITO**
Monolithic un-packaged	IME 1025.3-M-Au	IME 1025.3-M-Pt-U	IME 1025.3-M-ITO-U
Monolithic-packaged	IME 1025.3-M-Au-P	IME 1025.3-M-Pt-P	
Full Differential-un-packaged	IME 1025.3-FD-Au-U	IME 1025.3-FD-Pt-U	IME 1025.3-FD-ITO
Full Differential-packaged	IME 1025.3-FD-Au-P	IME 1025.3-FD-Pt-P	
IME 0525.3 SERIES	**GOLD-Au**	**PLATINUM-Pt**	**INDIUM TIN OXIDE-ITO**
Monolithic un-packaged	IME 0525.3-M-Au	IME 0525.3-M-Pt-U	IME 0525.3-M-ITO-U
Monolithic-packaged	IME 0525.3-M-Au-P	IME 0525.3-M-Pt-P	
Full Differential-un-packaged	IME 0525.3-FD-Au-U	IME 0525.3-FD-Pt-U	IME 0525.3-FD-ITO
Full Differential-packaged	IME 0525.3-FD-Au-P	IME 0525.3-FD-Pt-P	

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INTERDIGITATED MICROSENSOR ELECTRODES (IMEs)

IME DEVICES	Line and Space, Digit Length	Designs	Conductor
IME 2050.5 SERIES	**20 microns, 5 mm long**	**M**	**Au, Pt, ITO**
IME 1550.5 SERIES	**15 microns, 5 mm long**	**M, CD, FD**	**Au, Pt, ITO**
IME 1050.5 SERIES	**10 microns, 5 mm long**	**M, CD, FD**	**Au, Pt, ITO**
IME 0550.5 SERIES	**5 microns, 5 mm long**	**M, CD, FD**	**Au, Pt, ITO**
IME 2025.3 SERIES	**20 microns, 3 mm long**	**M, CD, FD**	**Au, Pt, ITO**
IME 1525.3 SERIES	**15 microns, 3 mm long**	**M, CD, FD**	**Au, Pt, ITO**
IME 1025.3 SERIES	**10 microns, 3 mm long**	**M, CD, FD**	**Au, Pt, ITO**
IME 0525.3 SERIES	**5 microns, 3 mm long**	**M, CD, FD**	**Au, Pt, ITO**

ABTECH -- Chemical and biological sensor devices, instruments, and sensor systems.

■ **Interdigitated Microsensor Electrodes (IMEs)** are inert, array microelectrodes formed from microlithographically patterned conductors onto an insulating substrate chip. They are designed for the simultaneous interrogation of the electrical, electrochemical, and optical properties of thin polymeric films and coatings, for applications in microelectrochemistry, for electrical/electrochemical impedance spectroscopy, and for chemical and biological sensor development. ■ **Microfabricated** from magnetron sputter-deposited gold (Au), e-gun vapor-deposited platinum (Pt), or indium tin oxide (ITO) these devices occur in three configurations; Monolith (M), Combined Differential (CD) and Full Differential (FD), and as packaged electrodes (with attached leadwires and encapsulated) or as un-packaged chips. ■ **IME chips** are available with 5 µm, 10 µm, 15 µm or 20 µm line and space dimensions and of defined cell constant. ■ **Investigate** the chemoresistive responses of transducer-active, polymeric films in the same electrode configuration, the same test environment, and on the same sample film. ■ **In research and product development**, these devices are widely used for conductimetric/impedimetric, chemoresistive chemical and biological sensors using electrically conducting (electroconductive) polymers, for impedance sensors based on Langmuir-Blodgett thin films, for studying the environmental effects on polymer thin films, in micro-electrochemistry and in cell-based biochips. ■ **Develop** these devices into products where the application requires a compact, durable and versatile chemical or biological chemoresistive sensor of low cost.

■ Introduction

Interdigitated Microsensor Electrodes (IMEs) is the registered trade name for a family of devices developed by ABTECH. Also called interdigitated arrays (IDAs), these devices are microfabricated (using microelectronics fabrication techniques) from patterns of noble metals deposited on an insulating substrate chip. They are designed for the simultaneous interrogation of the electrical, electrochemical and optical properties of thin polymeric films and coatings, for applications in microelectrochemistry, and for electrical/electrochemical impedance spectroscopy.

■ Applications

Applications of IMEs in research and product development include:

3 Conductimetric chemical sensors and biosensors[1] based on electroactive polymers[2]. These devices exploit the very large change in electrical impedance that accompanies oxidation/reduction of these polymer films.

3 Electrical and Electrochemical Impedance Spectroscopy of organic thin films and coatings[3]

3 Capacitance probes and humidity sensors, e.g. based on Langmuir-Blodgett films[4].

3 Modern microelectrochemistry. The performance of electroanalysis in high impedance environments[5].

3 Conductimetry. To determine the conductance of low conductivity media and conductimetric titrations.

■ Coatings

Film or coating application to the IME device may be achieved by dip coating, spin casting, spray painting, air-brushing, brush painting, by Langmuir-Blodgett thin film deposition, by electropolymerization, and by molecular self assembly

For further information, request Application Notes:

IME1 - *Interdigitated Microsensor Electrodes: Applications and References.*

IME2 - *Conductimetric Urea Biosensor Formed From Interdigitated Microsensor Electrodes*

■ Technical Specifications

Substrate: Schott D263 Borosilicate Glass

Dielectric Constant, ε_r, at 1 MHz	6.7
Dielectric Loss Angle, tan δ, at 1 MHz	61 x 10^{-4}
Electrical Resistivity (50 Hz) (250 °C)	1.6 x 10^{8} Ω cm
Coefficient of Linear Thermal Expansion α, 20-300 °C	7.2 x 10^{-6} K^{-1}
Refractive Index at 20°C, n_e (λ = 546.1 nm)	1.5249

Metallization: 100 Å Ti /W | 1,000 Å Au or Pt

XX50 Series	**2050.5**	**1550.5**	**1050.5**	**0550.5**
Digit length, d, (µm):	4,980 µm	4,985 µm	4,990 µm	4,995 µm
No. of digit pairs, N	50	50	50	50
Digit Width, a, (µm):	20 µm	15 µm	10 µm	05 µm
Interdigit Space, a, (µm):	20 µm	15 µm	10 µm	05 µm
Spatial Periodicity, λ, (µm)	80 µm	60 µm	40 µm	20 µm
Zaretsky[6,7] Meander Length, M, (cm)	24.90	24.93	24.95	24.98
Center Line or Serpentine Length[9] (cm)	49.70	49.65	49.60	49.55
Cell Constant[8] (cm^{-1})	0.040	0.040	0.040	0.040

XX25 Series	**2025.3**	**1525.3**	**1025.3**	**0525.3**
Digit length, d, (µm):	2,980 µm	2,985 µm	2,990 µm	2,995 µm
No. of digit pairs, N	25	25	25	25
Digit Width, a, (µm):	20 µm	15 µm	10 µm	05 µm
Interdigit Space, a, (µm):	20 µm	15 µm	10 µm	05 µm
Spatial Periodicity, λ, (µm)	80 µm	60 µm	40 µm	20 µm
Zaretsky[6,7] Meander Length, M, (cm)	7.45	7.46	7.48	7.49
Center Line or Serpentine Length (cm)	14.80	14.77	14.75	14.73
Cell Constant[8] (cm^{-1})	0.040	0.040	0.040	0.040

IME Chip Dimensions	Un-packaged Die (*l* x *w* x *t*)	Packaged Electrode* (*l* x *w* x *t*)
M, CD and FD	2.00 x 1.00 x 0.05 cm	13.2 x 1.38 x 0.7 cm
XX25.3 M	1.00 x 0.50 x 0.05 cm	13.2 x 1.38 x 0.7 cm

*Electrode Body: PVC–jacketed printed circuit board

*Encapsulant: Epoxy header. Polyimide packaged chip.

*Leadwires: Color coded, 30AWG stranded copper, shielded, and PVC jacketed.

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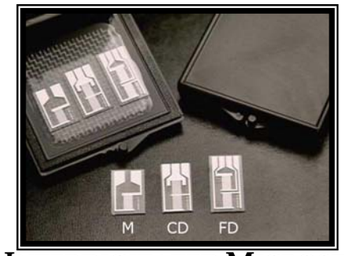
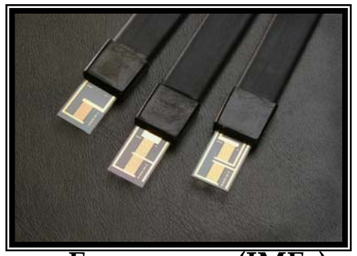
■ General Ordering Information





INTERDIGITATED MICROSENSOR ELECTRODES (IMES)

IME M - XX50 or 25 - FD, CD or M - *P or U

where M = Au or Pt *and* XX = 20, 15, 10 or 05 µm

IME 2050.5 SERIES	**GOLD-Au**	**PLATINUM-Pt**	**INDIUM TIN OXIDE-ITO**
Monolithic un-packaged	IME 2050.5-M-Au	IME 2050.5-M-Pt-U	IME 2050.5-M-ITO-U
Monolithic-packaged	IME 2050.5-M-Au-P	IME 2050.5-M-Pt-P	
IME 1550.5 SERIES	**GOLD-Au**	**PLATINUM-Pt**	**INDIUM TIN OXIDE-ITO**
Monolithic un-packaged	IME 1550.5-M-Au	IME 1550.5-M-Pt-U	IME 1550.5-M-ITO-U
Monolithic-packaged	IME 1550.5-M-Au-P	IME 1550.5-M-Pt-P	
Combined Differential-un-packaged	IME 1550.5-CD-Au-U	IME 1550.5-CD-Pt-U	IME 1550.5-CD-ITO-U
Combined Differential-packaged	IME 1550.5-CD-Au-P	IME 1550.5-CD-Pt-P	
Full Differential-un-packaged	IME 1550.5-FD-Au-U	IME 1550.5-FD-Pt-U	IME 1550.5-FD-ITO
Full Differential-packaged	IME 1550.5-FD-Au-P	IME 1550.5-FD-Pt-P	