

# TIRF Technologies, Inc. - TIRF Sense Portable Chem-Biosensor



## GENERAL DESCRIPTION:

TIRF Sense is a portable multipurpose chem-bio sensor designed for use in the field and mobile labs. TIRF Sense integrates fluorescence optics, electrochemical system, microfluidics, electronics, software, and nanoengineered bioassays into one portable device. Analyses are performed in the format of real-time microarrays that are capable of parallel detecting up to hundreds of targets. TIRF Sense requires no or minimal sample preparation and is capable of analyzing complex biological fluids. In contrast to traditional microarrays that detect only end-point results, TIRF Sense monitors the entire course of association and dissociation kinetics. Additionally, the sensor measures the dependence of association and dissociation kinetics on electrochemical polarization, which allows for discriminating between perfect targets and their close homologs.



## TECHNICAL DESCRIPTION:

TIRF Sense chem-bio sensor employs synergistic combination of Total Internal Reflection Fluorescence (TIRF) with Electric field Control (TIRF-EC). TIRF-EC sensor chip represents a glass or plastic slide coated with a thin electroconducting transparent layer of indium tin oxide (ITO). TIRF-EC chips are incorporated into cartridges that are available in disposable or reusable formats. TIRF-EC chip carries a microarray of reagentless bioassays printed on the ITO surface. TIRF-EC sensor cartridge is engaged into optical, fluidic, and electrochemical subsystems that allow for performing supersensitive TIRF-EC analysis. TIRF provides real-time monitoring of the interactions between target molecules and bioassays, while the electric field enables several advantageous functions in TIRF system, including accelerated transport of target molecules to their detection sites and discrimination between close homologs of target molecules. TIRF-EC microarrays detect unlabeled, unmodified targets. TIRF-EC microarray may contain from a few spots of bioassays in a single flow channel to hundreds of chem-bio assays in two or three separate flow channels. TIRF Sense supports fluorescence assays, Electro-Chemi-Luminescence (ECL), other luminescence assays, as well as luminescence assays immobilized in a hydrogel layer printed at the TIRF-EC surface.

## Tier Selection

Final tier assignment is based on overall product score.

- Top Tier    ● Second Tier    ○ Third Tier
- ◐ Fourth Tier    ● Bottom Tier

### RANKINGS

	Biological	Chemical	Radiological
<b>FIELD USE System</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	N/A
<b>MOBILE Laboratory</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	N/A
<b>DIAGNOSTIC Laboratory</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	N/A
<b>ANALYTICAL Laboratory</b>	<span style="color: green;">●</span>	<span style="color: green;">●</span>	N/A

## CONTACT INFORMATION

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## COST

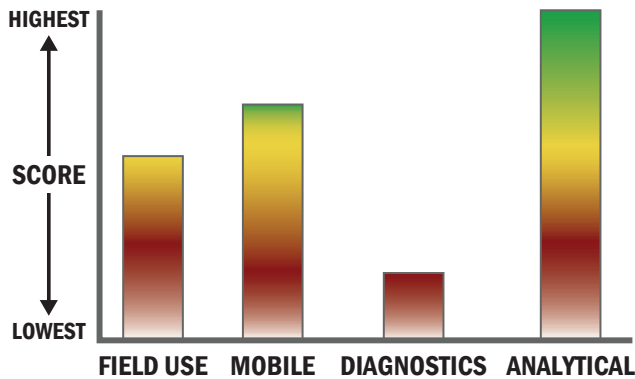
- \$34,000/system
- ~\$.70/analysis

## Survey Source

Vendor Supplied Information

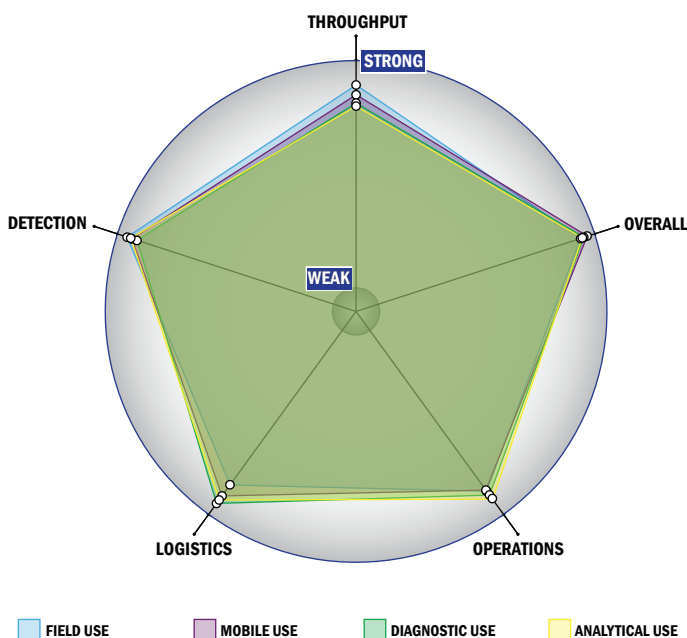
## Scoring Analysis

System scores are compared across the four scenarios and ranked from highest to lowest.



## Impact Chart

The Impact Chart is a spider graph representing specific categories and designed to give the reader a visual depiction of how a particular system is expected to operate across the four different scenarios. The score for each of the seven categories is presented as the percentage of the total possible score. Higher category scores extend the spokes of a graphic toward the outer edge of the chart. The area graphed for each of the four scenarios relates to how well the system performed in that scenario. Graphics for each of the four scenarios are super-imposed for ease of comparison.



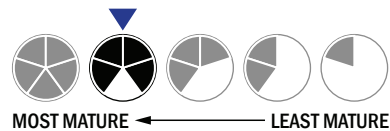
## Evaluation Criteria

### Throughput:

- Detection is instantaneous
- Multiple samples, multiple tests/sample per run
- 349-96 samples every 2 hours
- The system or device is currently semi-automated
- Device or system is intended for multiple detection assays
- 0-1 solutions, buffer, eluents, and/or reagents
- 1 component
- Less than 5 minutes is required for set-up
- Automatic detection

### Logistics:

- Very brief (minutes-hours) training and minimal technical skills
- Approximately the size of a toaster
- Between 1 and 5 kg
- Wireless and wired connections are available
- System or device uses batteries
- 4-8 hours battery life



### Operations:

- Can be used from -21 °C to 41 °C
- Components must be stored at room temperature (27 °C)
- Device or system has peak performance at normal relative humidity conditions
- Between 1 to 3 years shelf life
- 3-5 years expected life
- Results can be viewed in real-time
- The system could easily be adapted into a fully autonomous system
- The system software is open and available for modification
- The system hardware is open and available for modification

### Detection:

- Possible the system could receive 510K clearance, no current efforts at this time
- Possible the system could receive FDA approval, no current efforts at this time
- Less than 10 µL
- Superior specificity. System has a false alarm rate approaching zero (~0%)
- 1-100 CFU per mL
- 1-100 PFU per mL
- Less than 1 ng per mL
- < 1x10<sup>-6</sup> mg/m<sup>3</sup>
- < 1 ppb