

# Defiant Technologies, Inc. - FROG-4000



## GENERAL DESCRIPTION:

The FROG-4000™ Portable Gas Chromatograph (GC) analysis system. MEMS technology allows us to reduce the size of a lab GC to a volatile organic compound (VOC) analyzer that weighs less than 5 pounds and is battery operated. The FROG-4000™ scrubs the ambient air for its carrier gas. The FROG-4000™ can provide lab quality results with ppb detection limits in a 5 minute analysis.



The FROG-4000™ can be calibrated for a variety of VOCs to include benzene, toluene, TCE, PCE, and many other VOCs. The instrument display will inform the user which VOCs are detected and their concentration. An on-board SD card stores all of the data the FROG-4000™ has acquired and that data can be downloaded to a computer later.

The FROG-4000™ includes a purge and trap collection system for easy analysis VOCs of soil and water. The FROG-4000™ is intended to be used in the field to provide lab quality results in about 5 minutes of analysis time.

## TECHNICAL DESCRIPTION:

The FROG-4000™ is a portable Gas Chromatograph analysis instrument. It is a “systems approach to chemical analysis” constructed using Micro-electromechanical Systems (MEMS) technology components. The key components are a pre-concentrator (PC), a micro gas chromatograph (GC) column (4.8 meters), and a Photo-Ionization Detector (PID).

The system employs a built in purge-and-trap collection system to allow rapid sample loading. Ambient air is used as the carrier gas. The air is scrubbed using an activated charcoal filter and pumped through the purge-and-trap collector. This air is then pumped over the PC for about 30 seconds, at which point using proprietary ELLVIN™ software that is included with the instrument. The software allows for real time monitoring of the instrument, and displays the chromatogram as it develops. The software is also used to calibrate the instrument and perform routine maintenance functions.

## 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>	N/A	○	N/A
<b>MOBILE Laboratory</b>	N/A	◐	N/A
<b>DIAGNOSTIC Laboratory</b>	N/A	◐	N/A
<b>ANALYTICAL Laboratory</b>	N/A	○	N/A

## CONTACT INFORMATION

Defiant Technologies, Inc.  
 6814A Academy Parkway West, NE  
 Albuquerque, NM 87109  
 POC: John Kiegel  
 505-999-5880 X 25  
 jkiiegel@defiant-tech.com

## Survey Source

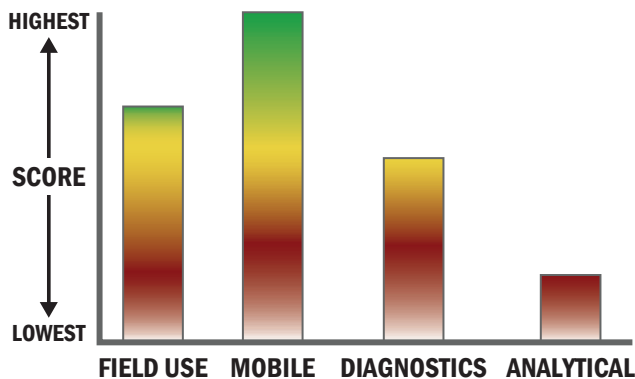
Vendor Supplied Information

## COST

- \$21,050/system
- \$0/analysis

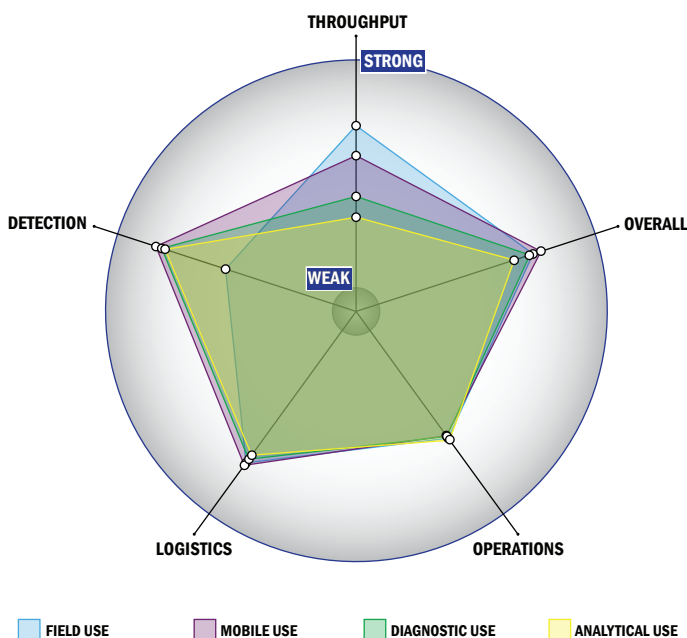
## Scoring Analysis

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.



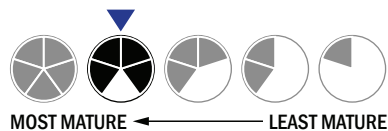
## Evaluation Criteria

### Throughput:

- Between 2 and 15 minutes for detection
- 1 sample, single test/sample per run
- Less than 32 samples every 2 hours
- The system could be adapted to a semi-automated system with some effort
- 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
- 1-2 steps are required for detection

### Logistics:

- A day of training and technical skills are required
- Approximately the size of a toaster
- Between 1 and 5 kg
- Wired connections are available
- 4-8 hours battery life



### Operations:

- Can be used from 4 °C to 41 °C
- Components must be stored at 4 °C
- Performance is not influenced by relative humidity
- 3-5 years expected life
- Results can be viewed in real-time
- The system could be adapted to a fully autonomous system with significant effort
- The system software is closed and not available for modification
- The system hardware is closed and not 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
- Greater than 250 µL
- Superior specificity. System has a false alarm rate approaching zero (~0%)
- > 1x10<sup>-3</sup> mg/m<sup>3</sup>
- < 1 ppb
- System currently can identify aerosolized chemical agent
- System currently can identify liquid chemical agent

