CF-3650 / CF-3850

# Portable FFT Analyzer CF-3650 CF-3850


All-in-one display for measurement, analysis and report

## 4ch and 8ch High performance. All in one.

*All inclusive technology in a high performance analyzer*

ONOSOKKI

http://www.onosokki.co.jp/

# Easy Setup

**The ease of portability and setup makes the CF-3650/CF-3850 ideal for work on the jobsite.**

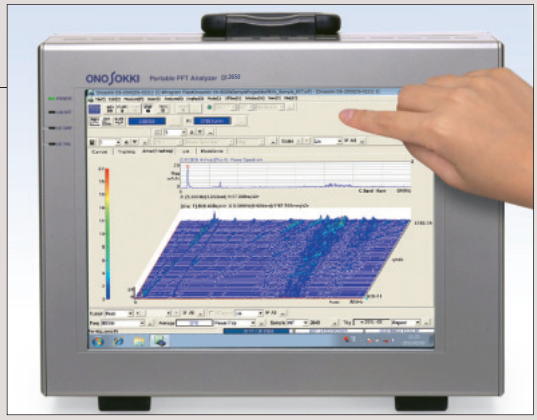
Simply plug the CF-3650/CF-3850 series in and connect the sensors and it is ready to take measurements.
The light weight all-in-one structure makes using the unit at the jobsite easy and efficient. A battery backup ensures the data will never be lost in the event of a power loss.

The CF-3650/CF-3850 provides convenient testing platform achieving high accuracy in noise and vibration analysis.

## Portable FFT Analyzer

# CF-3650/CF-3850

# Direct Interface

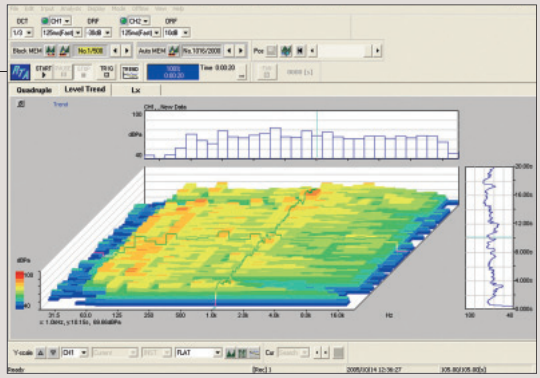


The CF-3650/CF-3850 series comes equipped with a 15-inch color touch panel monitor providing direct, intuitive operation and eliminates the need of a keyboard and mouse.

# Various Analysis

**Combined with application software, the CF-3650/CF-3850 provides a wide array of analysis tools.**

- Noise and vibration measurements.
- Tracking analysis provides the capability to evaluate rotating machines and engine dynamic characteristics.
- With real-time octave analysis, acoustical analysis is provided.
- Throughput disk function writes waveform data directly onto the built-in hard disk.
- 1/N real-time octave, octave tracking, and field balancing analyses are available by adding optional software.

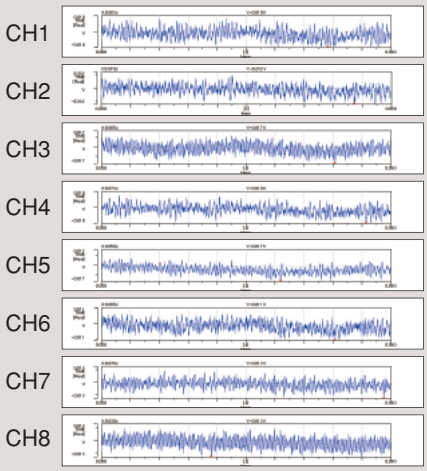


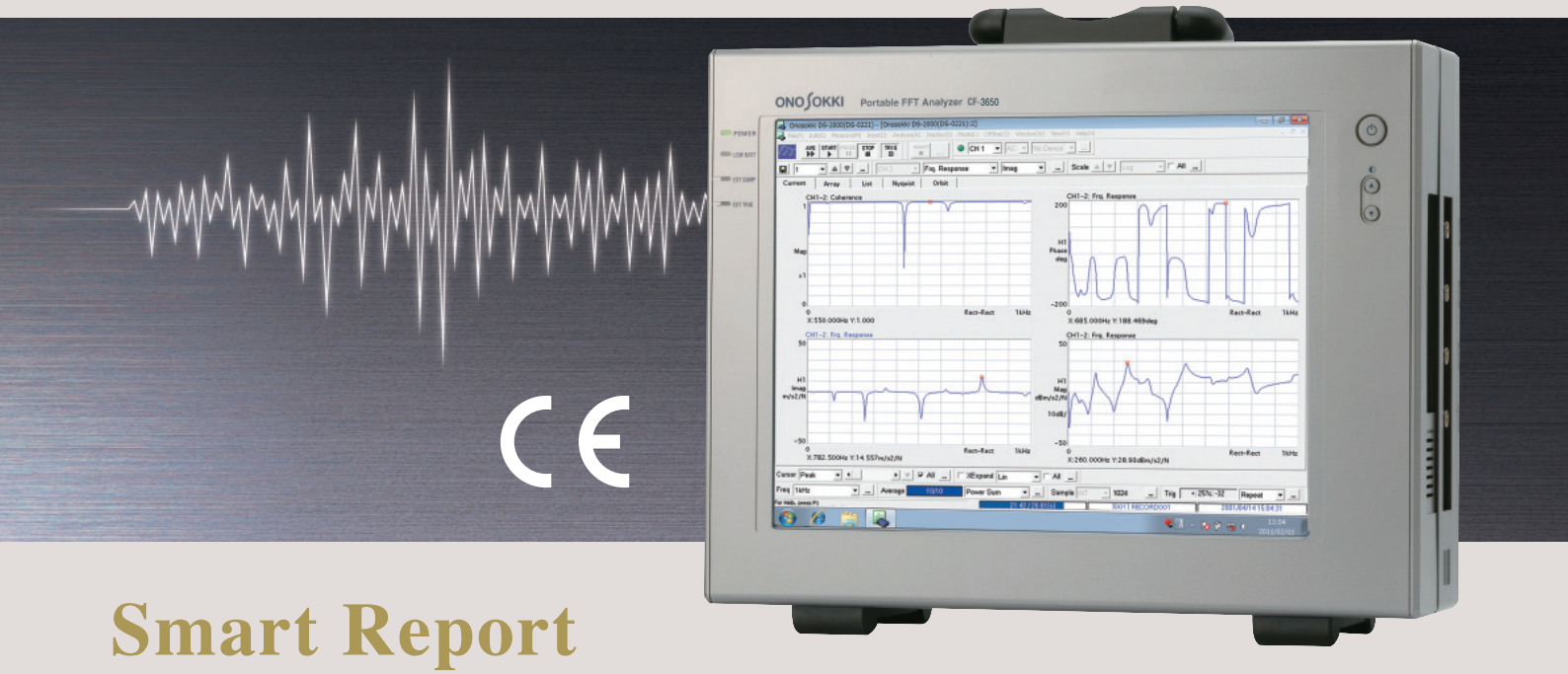
<Example of Octave Tracking Analysis (array display)>

# Digital Recording

CF-3650/CF-3850 series can perform on-site recording of waveform simultaneously up to 8ch with 24 bit A/D.
As well as off-line analysis of the recorded data, advanced and various analyses are possible such as multi-frequency range analysis and fluctuation sound analysis via PC analysis software or OS series by ONO SOKKI.

*8ch recording: CF-3850 series only

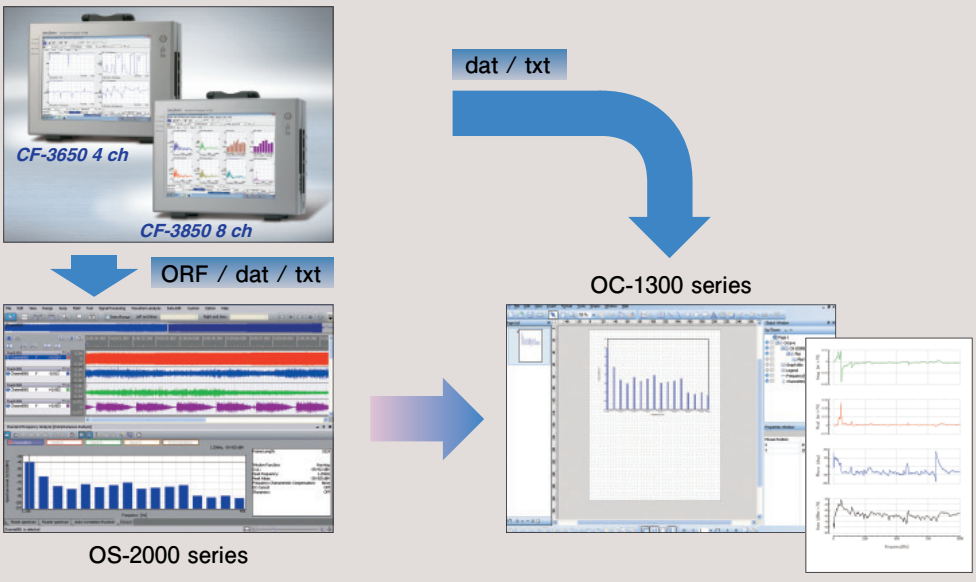



# Smart Report

## Easy data processing and efficient report creation.
## The OS-2000 series and OC-1300 series expand the networks and possibilities for future.

The time-axis data (dat. txt.) or recorded data (ORF) of the CF-3650/CF-3850 series can be freely edited and analyzed by the OS-2000 series time-series data analysis software. Moreover, the OC-1300 series multi-functioned graph creating software enables efficient report creation with various graphs using the analysis result of the CF-3650/3850 series or the OS-2000 series.



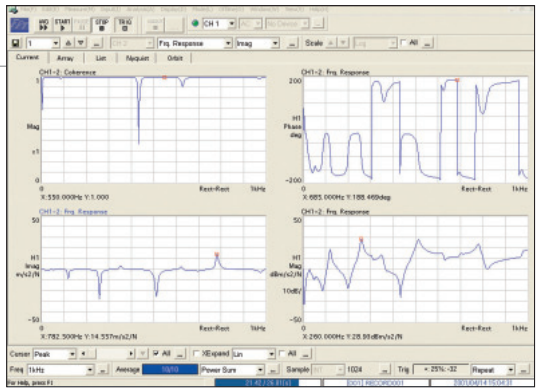
# Various optional software provides flexibility to meet individual needs

## Frequency Response Function Measurement

### CF-3650T, CF-3650R
### CF-3850T, CF-3850R

Resonance may cause not only chattering vibration in robots and machine tools but also noise and vibration in automobiles and home appliances. The most popular method for analyzing resonance is measurement of the frequency response function of the object, using an impulse hammer. Excitation by an impulse hammer is the ideal choice of the on-site measurement for trouble shooting because it reduces measurement time without the need to mount the measurement object on an exciter. It enables simultaneous processing of up to 8 ch*, 40 kHz range and 6,400 points of frequency analysis.

*8ch processing: CF-3850 series only



<Example of Frequency Response Function>

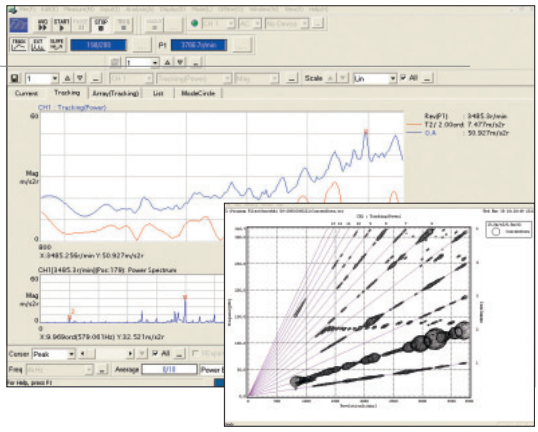
## Tracking Analysis

### CF-3650T, CF-3850T

Rotating machinery such as engines, compressors and turbines etc. must cover wide range of rotating speed from very low to high speed. The most important issue is resonance caused by the rotating speed of the machinery, in which the rotation frequency is the same as the natural frequency of the rotating machinery's components (e.g. axles, gears and brackets.).

In case of torsion vibration in large power generators and the like, resonance can cause serious accidents, creating vibration excitation energy that exceeds the tolerance of the machinery, destroying it.

Rotation tracking analysis is the effective method to identify the rotating speed at which resonance occurs in rotating equipment, and which components and orders (multipliers) of the rotating speed generate noise and vibration.



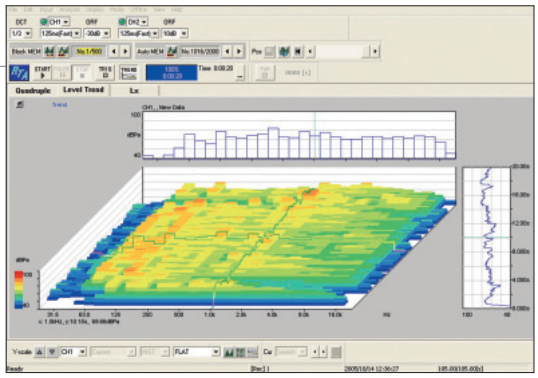
<Example of Tracking Analysis and Campbell Plot (option)>

## Octave Tracking Analysis

### DS-0243A: option

This octave tracking analysis software can analyze level trend of every band for the rotating speed by input of rotation information and retrieving of each fixed rotation as real-time octave analysis data.

Note: DS-0223WA real-time 1/1 and 1/3 octave analysis software is required.

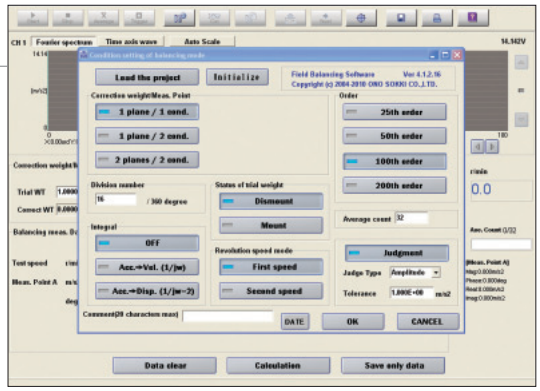


<Example of 1/3 Octave Tracking Analysis (option)>

## Field Balancing Software

### DS-0227A: option

The trouble of rotating machinery is caused most frequently by imbalanced phenomenon of rotating shaft. So the balancing correction is required, but the conventional vector calculation method with drawing takes some time and it makes on-site field balancing difficult. The DS-0227A measures the imbalanced phenomenon easily and efficiently by calculating and displaying the results of 1-plane 1-condition, 1-plane 2-condition and 2-plane 2-condition.




<Example of Field Balancing>

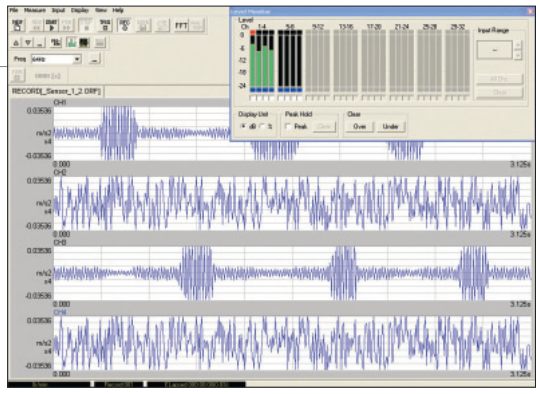
# Throughput Disk Function

## CF-3650T, CF-3650R
## CF-3850T, CF-3850R

The ability to directly store the original signal waveform to the HDD of CF-3650/CF-3850 series eliminates the needs to save to a data collector then retrieve it. This also allows you to store the data in non-degrading digital status. Use the data recorded via the throughput disk function to analyze it on the CF-3650/CF-3850 series as well as the offline analysis at the PC. By changing the measurement and analysis conditions allows for flexible analysis.

*8ch recording: CF-3850 series only

Note: Please consult us for details of regarding the licensed version of DS-0221LA, DS-0222LA, DS-0223LA, and other software.



<Example of Throughput Disk Function>

**■Maximum recording time (minutes)**

*Recording time at AD conversion with 16-bit data only

| f range \ ch | CF-3650 series | CF-3850 series |
|---|---|---|
| 40 kHz | 87 min | 43 min |
| 20 kHz | 175 min | 87 min |

### File Export Function (DS-0251A)

Converts files saved by the throughput disk function in ORF format into WAV, TXT, DADiSP, MATLAB, UFF and other formats, and export them to other applications for secondary analysis.

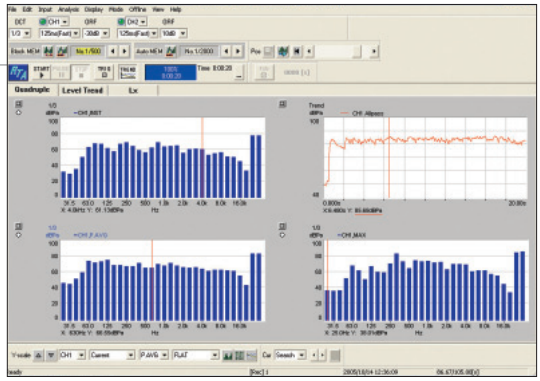
# Real-time Octave Analysis

## CF-3650R, CF-3850R

In order to solve the noise problem, the frequency analysis is required. And octave analysis has long been used for frequency analysis. An octave is a frequency with ratio of 1:2 to the frequency that is, double the frequency. The human ear senses sounds in geometric progressions to the frequency. A series of octave bands based on 1 kHz has been standardized, and the acoustic pressure level of each band.

The octave band based on 1 kHz is called the 1/1 octave band, while the bands formed by dividing into third are called the 1/3 octave bands. CF-3650/CF-3850 series performs real-time octave analysis for up to 8ch simultaneously.

※8ch: CF-3850 series only



<Example of Real-time Octave Analysis>

## 1/N Real-time Octave Analysis

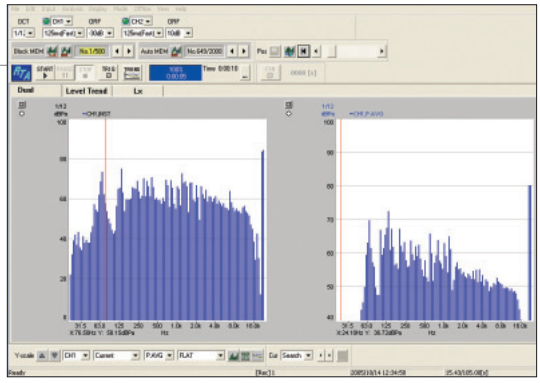
### DS-0224A: option

This software can analyze and display the signal power of noise and vibration as 1/6, 1/12, 1/24 real-time octave band. Simultaneous analysis of 2ch from 0.701 Hz to 17.20 kHz (1/24 octave) can be performed. Also the DS-0224A can measure the following four values simultaneously; maximum value, minimum value, power average value and power sum value.

1/6 octave band: ch1 to ch4 (CF-3650)
: ch1 to ch8 (CF-3850)

1/12, 1/24 octave band: ch1, ch2 (CF-3650)
: ch1, ch2, ch5, ch6 (CF-3850)

Note: DS-0223WA 1/1 and 1/3 real-time octave analysis software is required.



<Example of 1/12 Real-time Octave Analysis>

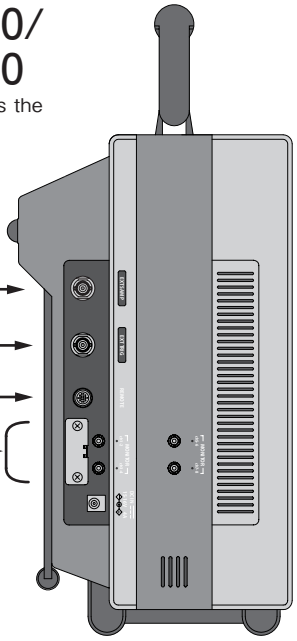
# System Configuration

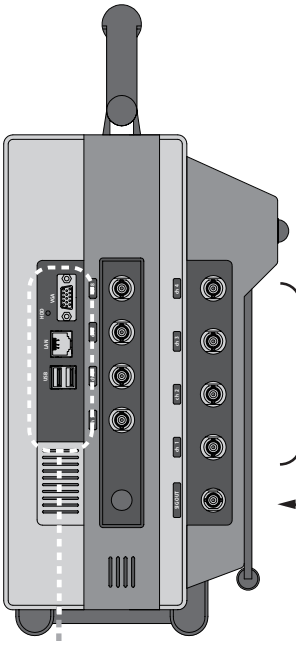
Various options and peripherals can expand the possibilities of the flexible measurement and analysis.

## Detectors

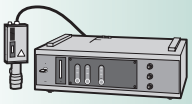
### CF-3650/ CF-3850

*The drawing is the CF-3850.





### Vibration



**LV series**
Laser Doppler Vibrometer

**NP-0021**
Miniature/BNC conversion adapter

**NP-0120/0130/ 0150 series**
Signal cable

**NP-3000 series**
Accelerometer
(Built-in preamplifier type)

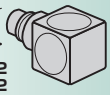
**CH-6130/6140**
Charge converter

**NP-0120/0130/ 0150 series**
Signal cable

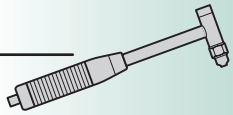
**NP-2000 series**
Accelerometer
(Charge output type)

**NP-0021×3**
Miniature/BNC conversion adapter

**NP-0222/0252 NP-0232/0262**
Signal cable (tri-axial type)



**NP-3500 series**
Accelerometer
(Tri-axial type)



**GK series**
Impulse hammer

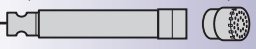
### Noise

**AX-501**
signal cable

**LA series**
Sound level meter

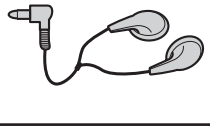
**MI-3111**
Microphone Preamplifier

**MI-1234/MI-1432**
1/2-inch Microphone



Other amplifiers

Line-out for monitoring



**CF-0375**(option)
1ch Signal output

**DS-0395**
(option)
Remote controller

Trigger signal

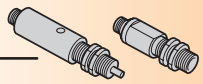
**TM-3100 series**
Digital Tachometer

**MX-603+MX-100 series cable**


**MX-7100 series cable**

### Rotation

Rotation detector



**LG-916**

**MP-981/9820**

**AX-501 signal cable**

**HT-5500**
Digital Handheld Tachometer

**CC-0036A**
Carrying case
(used for CF-3650/CF-3850)


Analog RGB (VGA) D-Sub 15-pin

10BASE/100BASE-TX/1000BASE-T Ethernet

USB 2.0 (High Speed)

External input device

Keyboard

Mouse

External storage

CD-R/DVD-R

ONO SOKKI is free from any respnsibility for troubles caused by installation of software sold in the market or setup of the PC related equipments.

## ■ Input section

| | |
|---|---|
| Number of channels | 4 (CF-3650), 8 (CF-3850) |
| Connector | BNC (CO2) |
| Impedance | 1 MΩ ± 0.5 %, 100pF or less |
| Format | Single ended |
| Coupling | DC or AC (−3 dB 0.55 Hz or less) |
| Current supply for sensor | 4 mA |
| Acoustic filter | A/C-weighting (standard)<br>・IEC 61672-1:2002 class1<br>・ANSI S1.4-1983 TYPE1<br>・JIS C1509-1:2005 Class1 |
| Voltage range | −40 to +20 dB Vrms (every 10 dB steps, 7 ranges) |
| Absolute maximum voltage | AC 70 Vrms for one minute (50 Hz) |
| Residual offset | −60 dBF.S. or less (after calibration: 0 dB Vrms range) |
| Frequency range | DC to 40 kHz |
| Sampling frequency | 32, 44.1, 48, 51.2, 64, 96, 102.4 kHz |
| Frequency accuracy | ±50 ppm or less |
| AD converter | 24-bit (⊿Σ type) |
| Dynamic range | 110 dB or more (when analyzed at 40 kHz range, 0 dB Vrms range, 2048 points) |
| Harmonic distortion | −90 dB or less (when input at 1 kHz, 0 dBVrms range, 1 $V_{o}$-p) |
| Areasing | −100 dB or less |
| Amplitude flatness | ±0.3 dB or less |
| Full scale accuracy | ±0.1dB or less (when input at 1 kHz) |
| Amplitude linearity | 0.0015 % (to F.S.) |
| Cross talk between channels | −100 dB or less (when input at 1 kHz) |
| Gain accuracy between channels | ±0.3 dB or less (in the same range) |
| Phase accuracy between channels | ±0.4° or less (DC-20 kHz), ±0.8° or less (20 to 40 kHz) |
| External sampling input | 1 ch, AC/DC selectable, ±12V, input impedance 100 kΩ, 0 to 300 kHz (with out-of-band filter)<br>0.5 to 1024 P/R, The clock divider function is available.<br>Use the internal clock divider function when exceeding 4 kHz of the frequency. |
| External trigger input | 1 ch, AC/DC selectable, ±12V, input impedance 100 kΩ, 0 to 300 kHz (with out-of-band filter) |

## ■ Output Terminal for Input Signal Monitoring

| | |
|---|---|
| Terminal for input signal monitor | 3.5 Φstereo jack<br>CF-3650: for ch1/2, ch3/4<br>CF-3850: for ch5/6, ch7/8<br>1 Vrms F.S. ±1.0% (when 1 kHz, 1MΩ loaded) |

## ■ Panel LED

| | |
|---|---|
| Power ON | Green |
| Low battery | Red, lights up when the voltage of the battery for instantaneous power failure drops. |
| External trigger | Green |
| External sampling | Green |

## ■ Touch Panel Computer

| | |
|---|---|
| CPU | Intel® Atom™ N270 1.6 GHz |
| Memory | 1 GB |
| HDD | 160 GB (with a green access lamp) |
| Network | 10 BASE/100 BASE-TX/1000 BASE-T x1 |
| LCD | 15-inch 1024 x 768-dot XGA, with brightness adjustment |
| Touch panel | Resistance film system (Windows multi-touch function is not available.) |
| USB I/F | USB 2.0 (High Speed) x 2 |
| OS | Microsoft Windows 7 Professional 32-bit |
| Video output | Analog RGB 15-pin D-Sub connector x1 |

## ■ General Specification

| | |
|---|---|
| Power requirement | Approx. 16 VDC |
| Operating temperature range | +5 to +40℃ (humidity: 20 to 80 % RH, with no condensation) |
| Storage temperature range | −10 to +55℃ (including lithium-ion secondary battery) (humidity: 20 to 80 % RH, with no condensation) |
| CE marking | EN61010-1, EN61326-1 |
| Cooling fan | Not provided (natural air cooling) |
| Countermeasure against instantaneous power failure | Equipped with lithium-ion secondary battery |
| Internal battery-charging circuit | Provided |
| Backup time for instantaneous power failure | 30 minutes max. |
| Power consumption | CF-3650: approx. 110 VA (100 VAC, AC adapter is used.)<br>CF-3850: approx. 130 VA (100 VAC, AC adapter is used.) |
| Outer dimensions | CF-3650: 410 (W) x 314(H) x 150 (D) mm, not including protruded section<br>CF-3850: 410 (W) x 314 (H) x 180 (D) mm, not including protruded section |
| Weight | CF-3650: approx. 10 kg<br>CF-3850: approx. 11.5 kg |

## ■ Output section (CF-0375 option)

| | |
|---|---|
| Number of channels | 1 |
| Connector | BNC |
| Impedance | 50 Ω±10 % |
| Voltage amplitude | ±10 mV to ±10 V |
| Offset voltage | ±10 V (The sum total value of the voltage amplitude and offset is ±10 V or less) |
| Maximum output current | 10 mA |
| Frequency range | 0 to 40 kHz |
| Conversion rate | 32, 44.1, 48, 51.2, 102.4 kHz |
| D/A converter | 24-bit (ΔΣ type) |
| Signal type | Sine, swept sine, pseudo random, random, impulse, time record data |
| THD | Sine wave (when at 1 kHz, 1 $V_{o}$-p −75 dB or less) |
| Applicable FFT analysis length | 64 to 16384 (power-of-two) |
| Zoom analysis | Provided (depending on the zoom analysis range) |
| Voltage amplitude accuracy | ±0.2 dB or less (when at 1 kHz, 1 $V_{o}$-p, 1 MΩ load) |
| Frequency accuracy | ±50 ppm or less |
| Digital filter (smoothing filter) | 10th order ellipse (base band), 6th order ellipse (zoom) |
| Digital filter (Octave band filter) | 6th order Butterworth (1/1, 1/3 octave) |
| Pink filter | Analog filter −3 dB/OCT. ± 1.0 dB (prescribed at 20Hz to 20kHz) |
| Burst function | Provided (continuous/single-shot: 1ms to 32 s / Number of burst cycles: 1 to 32767) |
| Taper function | Provided (1 ms to 32 s), invalid when the burst function is ON. |

## ■ Accessories

| | |
|---|---|
| Instruction manual | 1 |
| AC adapter | 1 |
| Power cable for AC adapter | 1 |
| Front panel protection cover | 1 |
| Windows® 7 license | 1 (DVD-ROM) |
| Lithium ion secondary battery cell | 1 (countermeasure against instantaneous power failure) |

## ■ AC adapter

| | |
|---|---|
| Rated input voltage | 100 to 240 VAC |
| Input frequency | 50/60 Hz |
| Output voltage | 15 VDC |
| Output current | 4 A |
| Safety standard | CE/UL/TUV/PSE |

## ■ Remote controller (DS-0395 option)

| | |
|---|---|
| Operating switch | 5 (START/STOP/F1/F2/F3)<br>・F1 to F3 are use-defined switches. |
| LED | Green LED x 5 (displaying the status), red LED x 1 (displaying A/D over) |
| Connection cable | 2 m |
| External dimension | 45 (W) x 25 (H) x 117 (D) mm (not including protruded section) |

## For Tracking Analysis

**CF-3650T**
**CF-3850T**

Configuration example:
- ●Main unit (CF-3650 or CF-3850)
- ●FFT Analysis Software
- ●Throughput Disk Function/ File Export Function
- ●Accessories
  (AC adapter, battery pack, front panel protection cover, instruction manual)
- ●Tracking Analysis Software

## For Real-time Octave Analysis

**CF-3650R**
**CF-3850R**

Configuration example:
- ●Main unit (CF-3650 or CF-3850)
- ●FFT Analysis Software
- ●Throughput Disk Function/File Export Function
- ●Accessories
  (AC adapter, battery pack, front panel protection cover, instruction manual)
- ●1/1 and 1/3 Real-time Octave Analysis Software

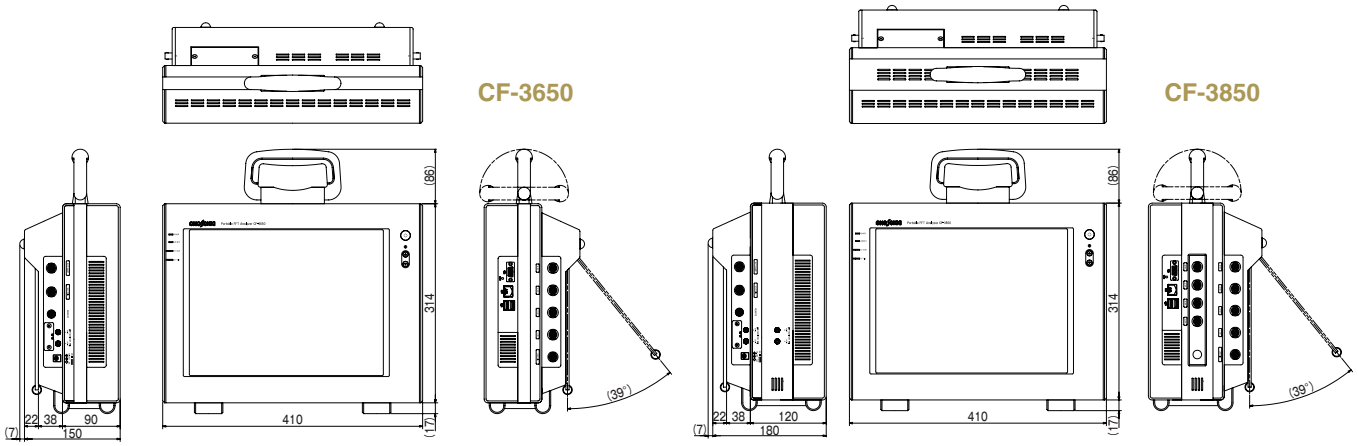
### ■Hardware option

| | |
|---|---|
| CF-0375 | 1ch Signal output module |
| CC-0036A | Hard carrying case *accommodates the main unit of the CF-3650/CF-3850 and accessories. |
| DS-0395 | Remote controller |

### ■Software option (pre-installable software)

| | |
|---|---|
| DS-0221WA | FFT Analysis |
| DS-0222WA | Tracking Analysis |
| DS-0223WA | 1/1 and 1/3 Real-time Octave Analysis |
| DS-0224A | 1/N Real-time Octave Analysis *The DS-0223WA is required. |
| DS-0227A | Field Balancing Software |
| DS-0243A | Octave Tracking Analysis *The DS-0223WA is required. |
| DS-0244A | Campbell Plot Function *The DS-0222WA is required. |
| DS-0250WA | Throughput Disk Function |
| DS-0251A | File Export Function (available to WAV, TXT, DADiSP, MATLAB, UFF) *The DS-0250WA is required. |

## Outer Dimensions (Unit: mm)






ONO SOKKI

＊Outer appearance and specifications are subject to change without prior notice.
URL: http://www.onosokki.co.jp/English/english.htm
E-mail: overseas@onosokki.co.jp

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URL : http:// www.onosokki.net

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