ET2001 AC-DC Transfer Standard System

General:
A new compact AC-DC transfer standard based on the fast-reversed DC method. The system has been developed through a collaborative research between SunJEM co. Ltd. and AIST (National Institute of Advanced Industrial Science and Technology, Japan).

Function:
1. Evaluation of thermoelectric transfer difference of a thermal converter
2. AC-DC difference comparison measurement of thermal converters
3. Generation of precision ac sine-wave (1V - 10V, 10Hz - 1MHz)
4. Calibration of ac voltage (using external DC voltage standard)

Composition:
1. Thermal Converter (TC module)
2. Fast-Reversed DC source (FRDC module)
3. Precision Digital Sine-wave Synthesizer (DSS module)
4. Power Supply with USB-Interface (PS/USB module)
5. Precision Amplifier Module (AMP module)
6. Special Thermal Converters (HF-TVC / LF-TVC)

Feature:
1. Measurement monitoring over Internet
2. Easy operation by fully automated measurement
3. Compact, transportable system

Application:
1. Establishment of primary ac-dc transfer standard
2. International comparison at highest level of accuracy (@3V, up to 1MHz)
3. Calibration of ac-dc standard instruments such as Fluke 792A (at 1V to 10V)
4. Calibration of precision ac voltmeter such as Agilent 3458 (at 1V to 10V)
ET2001 AC-DC Transfer Standard System

Initial "Monitor" Price (Domestic/Overseas)

<table>
<thead>
<tr>
<th>Module</th>
<th>Price (Domestic)</th>
<th>Price (Overseas)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRDC Module</td>
<td>553,350 / 565,000 JPY</td>
<td></td>
</tr>
<tr>
<td>DSS Module</td>
<td>553,350 / 565,000 JPY</td>
<td></td>
</tr>
<tr>
<td>TC Module</td>
<td>372,750 / 380,000 JPY</td>
<td></td>
</tr>
<tr>
<td>AMP Module</td>
<td>303,450 / 310,000 JPY</td>
<td></td>
</tr>
<tr>
<td>USB/PS Module</td>
<td>249,900 / 255,000 JPY</td>
<td></td>
</tr>
<tr>
<td>HF-TVC</td>
<td>105,000 / 100,000 JPY</td>
<td></td>
</tr>
<tr>
<td>LF-TVC</td>
<td>136,500 / 130,000 JPY</td>
<td></td>
</tr>
</tbody>
</table>

(The "monitor" price is available for a limited number and period)  
(Price does not include transportation/Handling fee to overseas)

Contact Address for Purchasing
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TEL: +81-3-3251-3161
FAX: +81-3-3251-3166
e-mail: keytechno@pop14.odn.ne.jp

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TEL/FAX: +81-29-855-8171
e-mail: info@iquantum.jp
http://www.iquantum.jp

IQUANTUM Corporation, Japan
http://www.iquantum.jp
**ET2001ADS-FRDC-V02**

**FRDC (Fast-Reversed DC) Module**

**Function:**
FRDC module is a rectangular-waveform voltage source to be used in FRDC-DC difference measurement. It produces accurate FRDC and DC waveforms with amplitudes from 1 V to 10 V and switching frequencies between 0.1 Hz and 10 kHz. The design of the FRDC circuit is based on the "source A/B switching" scheme, in order to establish the equality of rms values between the FRDC and DC waveforms.

**Specifications:**

1. **Output Characteristics**
   - **Output Voltage**
     - Setting Range: 1.00V to 10.23V
     - Setting Resolution: 0.0025V * 12 bit
     - Accuracy: 1% (all four sources)
   - **Voltage Adjustment**
     - Setting Range: -4.094% to +4.094%
     - Resolution: 0.002%
     - Accuracy (> 0.1%): < 1% (MAX)
   - **Stability**
     - Thermal Drift: < 10 ppm/deg (typ.)
     - Short Term (0.1Hz - 10Hz): < 2 ppm (typ)
   - **Current Compliance**: 20 mA

2. **Switching Period (Frequency)**
   - **Setting Range**: 10 s (0.1 Hz) to 0.1 ms (10 kHz)
   - **Resolution**: 0.001/0.01/1.0/10/100 ms * 10 bit
   - **Accuracy**: <1%

3. **Isolation between Sources**
   - 0.1 Hz to 100 Hz: < 1 ppm
   - 100 Hz to 1 kHz: < 2 ppm

4. **Power Consumption**
   - Analog (±18V*2): <50mA (MAX)
   - Analog (+5V*2): <50mA (MAX)
   - Digital (+5V): <50mA (MAX)
ET2001ADS-FRDC-V02

FRDC (Fast-Reversed DC) Module

5. Miscellaneous
   Connectors
   - Control/Power Supply: MDR-26 pin
   - Voltage Output: Type N-R
   - Serial Interface: RS232C compatible
   - Dimension: 8 cm x 6 cm x 11 cm
   - Weight: 0.6 kg

Options/Accessories:
1. MDR interface cable 26p (1m) with EMI core
   Order#: ET2001-CMN-MDR26P
2. Output cable (30cm) with NP at both ends
   Order#: ET2001-NP/NP-CABLE

IQUANTUM Corporation, Japan
http://www.iquantum.jp
ET2001ADS-DSS-V02
DSS (Digital Sine-wave Synthesizer) Module

Function:
DSS module generates highly stable sinusoidal ac and dc outputs to be used in ac-dc difference measurements. The module is based on a direct digital synthesizer device and generate frequencies between 10 Hz and 1 MHz at rms voltages from 1 V to 10 V. In the evaluation of low-frequency characteristics of thermal converters, the DSS module is used as a reference in ac voltage standard.

Specifications:

1. Output Characteristics
   Output Voltage
<table>
<thead>
<tr>
<th>Setting Range</th>
<th>Setting Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00V to 10.23V</td>
<td>(1V to 2V) 0.0005V * 12 bit</td>
</tr>
<tr>
<td></td>
<td>(2V to 5V) 0.00125V * 12 bit</td>
</tr>
<tr>
<td></td>
<td>(5V to 10V) 0.0025V * 12 bit</td>
</tr>
</tbody>
</table>
   Accuracy 1%
   Voltage Adjustment
<table>
<thead>
<tr>
<th>Setting Range</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 4.094 % to + 4.094 %</td>
<td>0.002%</td>
</tr>
<tr>
<td>Accuracy (&gt; 0.1%)</td>
<td>&lt; 1% (MAX)</td>
</tr>
</tbody>
</table>
   Stability
<table>
<thead>
<tr>
<th>Thermal Drift</th>
<th>Current Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20 ppm/deg (typ.)</td>
<td>30 mA</td>
</tr>
<tr>
<td>Short Term (0.1Hz - 10Hz)</td>
<td></td>
</tr>
</tbody>
</table>

2. AC Characteristics
   Frequency Setting Range
<table>
<thead>
<tr>
<th>Normal Mode</th>
<th>Low-Frequency Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 Hz to 1 MHz</td>
<td>4Hz to 1 kHz</td>
</tr>
</tbody>
</table>
   Frequency Setting Resolution
<table>
<thead>
<tr>
<th>Normal Mode</th>
<th>Low-Frequency Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1/32) µs * 32 bit in period</td>
<td>0.5/1.0 ms * 8 bit in period</td>
</tr>
</tbody>
</table>
   DC Offset Correction
<table>
<thead>
<tr>
<th>Uncorrected Offset</th>
<th>Adjustment Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% (typ.)</td>
<td>- 4.094 % to + 4.094 %</td>
</tr>
<tr>
<td>Setting Resolution</td>
<td>Correction Sensitivity</td>
</tr>
<tr>
<td>0.002%</td>
<td>&lt; 0.05%</td>
</tr>
</tbody>
</table>
ET2001ADS-DSS-V02

DSS (Digital Sine-wave Synthesizer) Module

Distortion
  DAC Resolution  10 bit (-62dB)
  Total Harmonic Distortion < - 40dBc
  Spurious Noise >100kHz  < - 60dBc

3. Power Consumption
  Analog-Main (±18V)  < 50mA (MAX)
  Analog-Main (+5V)  < 50mA (MAX)
  Analog-Sub (±18V)  < 80mA (MAX)
  Analog-Sub (+5V)  < 20mA (MAX)
  Digital (+5V)  < 50mA (MAX)

4. Miscellaneous
  Connectors
    Control/Power Supply  MDR-26 pin
    Voltage Output  Type N-R
    Serial Interface  RS232C compatible
    Dimension  8 cm x 6 cm x 11 cm
    Weight  0.6 kg

Options/Accessories:
  1. MDR interface cable 26p (1m) with EMI core
     Order#: ET2001-CMN-MDR26P
  2. Output cable (30cm) with NP at both ends
     Order#: ET2001-NP/NP-CABLE

IQUANTUM Corporation, Japan
http://www.iquantum.jp
ET2001ADS-TC-01
TC (Thermal Converter) Module

Function:
TC module is a digital-output thermal converter. The module consists of a thermal converter element, a precision A/D converter as a nV detector, a D/A converter for offset compensation, and an optically isolated digital control circuit.

Specifications:

1. Thermal Conversion
   10V Model (ET2001-TC01-10V)
   - Input Voltage Range: 5 V to 10 V
   - Max. Input Voltage: 20 V
   - Input Resistance: 1kΩ
   - Output EMF Voltage
     - 10V Input: 30 mV/ 40 mV (min./typ)
     - 5V Input: 7 mV/ 10 mV (min./typ)
   5V Model (ET2001-TC01-5V)
   - Input Voltage Range: 2 V to 5 V
   - Max. Input Voltage: 10 V
   - Input Resistance: 500 Ω
   - Output EMF Voltage
     - 5V Input: 30 mV/ 40 mV (min./typ)
     - 2V Input: 5 mV/ 7 mV (min./typ)
   2V Model (ET2001-TC01-2V)
   - Input Voltage Range: 1 V to 2 V
   - Max. Input Voltage: 6 V
   - Input Resistance: 200 Ω
   - Output EMF Voltage
     - 2V Input: 12 mV/ 16 mV (min./typ)
     - 1V Input: 3 mV/ 4 mV (min./typ)

2. A/D Conversion
   - Nominal Input Range: 0 mV to +250 mV
   - Input Equivalent Noise: <100 nV / √Hz (Typ.)
   - Effective Resolution: 23 bit
   - Linearity: 0.001%
   - Update Rate
     - Line Frequency 50 Hz: 6.25 rdg/s***
     - Line Frequency 60 Hz: 7.5 rdg/s***

3. Back-up Voltage
   - Setting Range: 0 mV to 250 mV
   - Setting Resolution: (250 mV/4096) * 12 bit
ET2001ADS-TC-01

TC (Thermal Converter) Module

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Drift</td>
<td>&lt; 10 ppm/deg (typ.)</td>
</tr>
<tr>
<td>Short Term (0.1Hz - 10Hz)</td>
<td>&lt; 2 ppm (typ)</td>
</tr>
</tbody>
</table>

4. Power Consumption

<table>
<thead>
<tr>
<th>Type</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analog (±5V)</td>
<td>&lt; 50mA (MAX)</td>
</tr>
<tr>
<td>Digital (+5V)</td>
<td>&lt; 50mA (MAX)</td>
</tr>
</tbody>
</table>

5. Miscellaneous

<table>
<thead>
<tr>
<th>Connector</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control/Power Supply</td>
<td>MDR-20 pin</td>
</tr>
<tr>
<td>Voltage Input</td>
<td>Type N-R</td>
</tr>
<tr>
<td>Serial Interface</td>
<td>RS232C compatible</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimension</th>
<th>7 cm (DIA) x 11cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>0.3 kg</td>
</tr>
<tr>
<td>Weight</td>
<td>0.6 kg</td>
</tr>
</tbody>
</table>

**Options/Accessories:**

1. MDR interface cable 20p (1m) with EMI core
   Order#: ET2001-CMN-MDR20P
2. Input cable (30cm) with NP at both ends
   Order#: ET2001-NP/NP-CABLE

IQUANTUM Corporation, Japan
http://www.iquantum.jp
ET2001ADS-AMP-01

AMP (Precision A/D Converter) Module

**Function:**
The AMP module has a similar function to the TC module, except that it does not contain a dedicated thermal converter element, and the type-N input connector is replaced with a low-thermal DC input connector to be combined with an external thermal converter such as HF-TVC.

**Specifications:**
1. A/D Conversion
   - Max. Input Voltage: -2.5 V to +2.5 V
   - Nominal Input Range: 0 mV to +250 mV
   - Input Equivalent Noise: < 100 nV/√Hz (Typ.)
   - Effective Resolution: 23 bit
   - Linearity: 0.001%
   - Update Rate
     - Line Frequency 50 Hz: 6.25 rdg/s***
     - Line Frequency 60 Hz: 7.5 rdg/s***

2. Back-up Voltage
   - Setting Range: 0 mV to 250 mV
   - Setting Resolution: (250 mV/4096) * 12 bit
   - Thermal Drift: < 10 ppm/deg (typ.)***
   - Short Term (0.1Hz - 10Hz): < 2 ppm (typ)

3. Power Consumption
   - Analog (±5V): < 50mA (MAX)
   - Digital (+5V): < 50mA (MAX)

4. Miscellaneous
   - Connectors
     - Control/Power Supply: MDR-20 pin
     - DC Input: LEMO FBB 3-pin
     - Serial Interface: RS232C compatible
   - Dimension: 7 cm (DIA) x 11cm
   - Weight: 0.3 kg

**Options/Accessories:**
1. MDR interface cable 20p (1m) with EMI core
   - Order#: ET2001-CMN-MDR20P
2. Input cable (40cm) with two LEMO connectors at both ends
   - Order#: ET2001-AMP-CABLE-L3P/L3P

IQUANTUM Corporation, Japan
http://www.iquantum.jp
ET2001ADS-USB&PS-02
USB&PS (Power Supply with USB I/F) Module

Function:
USB&PS module provides isolated DC power sources to the main modules. Switching regulator circuits are avoided to minimize the effect of high-frequency interference to the sensitive nano-volt detection circuit. The module also provides an optically isolated USB-to-serial interface circuit between a PC controller and the FRDC, DSS, and TC modules.

Specifications:
Channel-1 (DSS/FRDC Module)
Power Supply
- Analog (±18V x 2 ch) >200mA
- Analog (+5V x 2 ch) >100mA
- Digital (+5V) >100mA
Connector MDR-26 pin

Channel-2 (TC/AMP Module)
Power Supply
- Analog(±5V) >100mA
- Digital (+5V) >100mA
Connector MDR-20 pin

Channel-3 (TC/AMP Module)
Power Supply
- Analog(±5V) >100mA
- Digital (+5V) >100mA
Connector MDR-20 pin

Miscellaneous Interface
- Module Control RS232C compatible
- PC (controller) USB 1.0

AC Power Line
- Voltage Selector 100 V - 120V / 200V - 240V
- Frequency 50 Hz / 60 Hz (auto-detect)

Dimension 7 cm x 16 cm x 11cm
Weight 1.3 kg

Options/Accessories:
1. MDR interface cable 26p (1m) with EMI core
   Order#: ET2001-CMN-MDR26P
2. Output cable (30cm) with NP at both ends
   Order#: ET2001-NP/NP-CABLE

IQUANTUM Corporation, Japan
http://www.iquantum.jp
RF SOLUTION – NIKKOHM

高周波TVC
HIGH FREQUENCY THERMAL VOLTAGE CONVERTER
HF-TVC

Features and Applications
The HF-TVC (High-Frequency Thermal Voltage Converter) is a complete thermal converter module using the JSTC04 thermal converter as a core device. The JSTC04 device is built in a dedicated high-frequency chassis with input and output connectors, and is ready to be used as a high-precision AC-DC transfer standards. The HF-TVC employs the virtual-TEE configuration ("internal" or "built-in" TEE), making the evaluation of frequency characteristic of the ac-dc transfer difference possible at 10-6 level up to 1MHz.

All the HF-TVC modules are identified by serial production numbers, and are individually inspected and guaranteed for the specifications. The inspection data include input resistance, output resistance, sensitivity (output voltage), reversal error. The ac-dc transfer difference data with respect to the NIKKOHM’s reference standard will also be attached to the HF-TVC.

Note: Both TVC01R/P, TVC02R/P have the same dimensions, except that the SMA connector is not mounted in the case of TVC02R/P. The suffices “R” or “P” indicates the selection of the input connector, i.e., an N-R(receptacle) or an N-P(plug) connector.
RF SOLUTION – NIKKOHM

高周波 TVC
HIGH FREQUENCY THERMAL VOLTAGE CONVERTER

HF-TVC

形名呼称  Ordering Information

<table>
<thead>
<tr>
<th>Ordering P/N</th>
<th>Type Connect</th>
<th>Input resistance TC</th>
<th>Input resistance</th>
<th>Input resistance Tolerance</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVC01RE100ohmG</td>
<td>TVC01 R</td>
<td>E (+/-25ppm/K)</td>
<td>100 Ohms</td>
<td>G (+/-2%)</td>
<td></td>
</tr>
<tr>
<td>TVC01PE500ohmG</td>
<td>TVC01 P</td>
<td>E (+/-25ppm/K)</td>
<td>500 Ohms</td>
<td>G (+/-2%)</td>
<td></td>
</tr>
<tr>
<td>TVC02RE1000ohmG</td>
<td>TVC02 R</td>
<td>E (+/-25ppm/K)</td>
<td>1000 Ohms</td>
<td>G (+/-2%)</td>
<td>No SMA</td>
</tr>
</tbody>
</table>

仕様性能  Specifications and Performances

**[入力]  INPUT**

<table>
<thead>
<tr>
<th>条件</th>
<th>TVC01, TVC02</th>
</tr>
</thead>
<tbody>
<tr>
<td>定格電力 Rated Power</td>
<td>0.1 W</td>
</tr>
<tr>
<td>最大入力電力 Max Applied Power</td>
<td>0.5 W</td>
</tr>
<tr>
<td>公称抵抗値 Resistance</td>
<td>50, 100, 200, 500, 1K, 2K Ohms</td>
</tr>
<tr>
<td>抵抗温度係数 TCR</td>
<td>+/-25ppm/K (E)</td>
</tr>
<tr>
<td>抵抗値許容差 Tolerance</td>
<td>+/-2% (G)</td>
</tr>
<tr>
<td>周波数範囲 Frequency Range</td>
<td>DC-10MHz</td>
</tr>
</tbody>
</table>

**[出力]  OUTPUT**

<table>
<thead>
<tr>
<th>条件</th>
<th>TVC01, TVC02</th>
</tr>
</thead>
<tbody>
<tr>
<td>定格出力電圧 Rating output voltage</td>
<td>More than 60mV</td>
</tr>
<tr>
<td>出力内部抵抗 Output resistance</td>
<td>340 Ohms +/- 30%</td>
</tr>
<tr>
<td>内部抵抗の TCR of Output resistance</td>
<td>+/- 300ppm/K</td>
</tr>
</tbody>
</table>

**【総合】 INPUT/OUTPUT**

<table>
<thead>
<tr>
<th>条件</th>
<th>TVC01, TVC02</th>
</tr>
</thead>
<tbody>
<tr>
<td>変換感度 Sensitivity</td>
<td>More than 0.6 V/W</td>
</tr>
<tr>
<td>感度の温度依存性 TC of Sensitivity</td>
<td>-0.001mV/mW/K</td>
</tr>
<tr>
<td>応答時間 Response Time</td>
<td>2.5 +/-0.6 seconds</td>
</tr>
<tr>
<td>交流変換誤差 AC-DC Difference, 10k-100kHz</td>
<td>Less than 10ppm</td>
</tr>
<tr>
<td>交流変換誤差 AC-DC Difference, 100K-1MHz</td>
<td>Less than 100ppm</td>
</tr>
<tr>
<td>動作温度 Operating Temp.</td>
<td>25 +/- 5 degree C</td>
</tr>
<tr>
<td>保存温度 Storage Temp.</td>
<td>-20 to 60 degree C</td>
</tr>
</tbody>
</table>

内部の構造  Internal schematic

Values of the ID Resistor (Ri)

<table>
<thead>
<tr>
<th>Input Resistance, R</th>
<th>ID Sense Resistors, Ri</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 Ohm</td>
<td>50 - (56) - 82 Ohms</td>
</tr>
<tr>
<td>100 Ohm</td>
<td>100 - (120) - 180 Ohms</td>
</tr>
<tr>
<td>200 Ohm</td>
<td>200 - (220) - 470 Ohms</td>
</tr>
<tr>
<td>500 Ohm</td>
<td>500 - (560) - 820 Ohms</td>
</tr>
<tr>
<td>1K Ohm</td>
<td>1K - (1.2K) - 1.8k Ohms</td>
</tr>
<tr>
<td>2K Ohm</td>
<td>2K - (2.2K) - 4.7k Ohms</td>
</tr>
</tbody>
</table>

Note: The values in parenthesis are nominal values. Other values are available on request.

Note: Output Capacitance
The shunting capacitance between the output pins is 10 nF. Other values are available on request.
RF SOLUTION - NIKKOHM

低周波 T V C
LOW FREQUENCY THERMAL VOLTAGE CONVERTER
LF-TVC

特長用途
独立行政法人産業技術総合研究所(AIST)との共同研究によって開発された低周波特性に優れたサーマルコンバーターです。超低周波領域での測定用に開発されたJSTC05型サーマルコンバーターを、入出力コネクター付の専用シェルに内蔵しました。JSTC05型サーマルコンバーターは、JSTC04型と比較してヒーターの熱時定数が2倍（6秒）に、また、ヒーター抵抗温度係数が約1/3（<10ppm/K）に改良されているため、通常のサーマルコンバーターでは熱リップルの影響で測定精度の劣化する低周波数領域（10Hz-100Hz）においても、その影響は1/10以下に抑制されます。高周波TVC（HF-TVC）やファストリバース DC 法と組み合わせることによって、国家標準クラスの AC-DC トランスファースペキュレーションが実現できます。出力低周波 TVC には、全て個体識別用の製品番号が付され、入出力抵抗値、感度（出力電圧）、正逆差の特性データ、および交直差の参考データが添付されます。

Features and Applications
The LF-TVC is specially designed as a high-precision reference standard in AC-DC transfer standard at low frequency range (10 Hz - 100 Hz). The LF-TVC uses a JSTC05 thermal converter element as a core device. The JSTC05 element has exceptionally large time constant of 6 seconds and temperature coefficient smaller than 10 ppm (<5 ppm optional), which helps to suppress the effect of thermal ripple to more than one order of magnitude smaller than that of the standard JSTC04 elements.

All the LF-TVC modules are identified by serial production numbers, and are individually inspected and guaranteed for the specifications. The inspection data include input resistance, output resistance, sensitivity (output voltage), reversal error. The ac-dc transfer difference data with respect to the NIKKOHM’s reference standard will also be attached to the LF-TVC.

The LF-TVC has been developed through the collaboration with AISt (National Institute of Advanced Industrial Science and Technology, Japan).

```
AC INPUT
SUHNER N-R
23N_50-0-23/133NE
SUHNER N-P
13N_50-0-33/133NE

DC OUTPUT
LEMO 3pin
EHG.2B.303.CLL
```

Note: The suffixes “R” or “P” indicates the selection of the input connector, i.e., an N-R(receptacle) or an N-P(plug) connector.
**RF SOLUTION - NIKKOHM**

**低周波 TVC**

LOW FREQUENCY THERMAL VOLTAGE CONVERTER

LF-TVC

<table>
<thead>
<tr>
<th>Ordering P/N</th>
<th>Type</th>
<th>Input Connect</th>
<th>Input resistance TC</th>
<th>Input resistance</th>
<th>Input resistance Tolerance</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFTVC01RN200ohmK</td>
<td>LFTVC01</td>
<td>R</td>
<td>N (+/-10ppm/K)</td>
<td>200 Ohms</td>
<td>K (+/-10%)</td>
<td></td>
</tr>
<tr>
<td>LFTVC01RZ200ohmK</td>
<td>LFTVC01</td>
<td>R</td>
<td>Z (+/-5ppm/K)</td>
<td>200 Ohms</td>
<td>K (+/-10%)</td>
<td></td>
</tr>
</tbody>
</table>

**仕様性能 Specifications and Performances**

<table>
<thead>
<tr>
<th>[入力]</th>
<th>INPUT</th>
<th>LFTVC01, Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>定格電力</td>
<td>Rated Power</td>
<td>0.1 W</td>
</tr>
<tr>
<td>最大入力電力</td>
<td>Max Applied Power</td>
<td>0.5 W</td>
</tr>
<tr>
<td>公称抵抗値</td>
<td>Resistance</td>
<td>200 Ohm</td>
</tr>
<tr>
<td>抵抗温度係数</td>
<td>TCR (+/-5ppm/K (Z), +/-10ppm/K (N))</td>
<td></td>
</tr>
<tr>
<td>抵抗値許容差</td>
<td>Tolerance</td>
<td>+/-10% (K)</td>
</tr>
<tr>
<td>周波数範囲</td>
<td>Frequency Range</td>
<td>DC-100kHz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>[出力]</th>
<th>OUTPUT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>定格出力電圧</td>
<td>Rating output voltage</td>
<td>More than 60mV</td>
</tr>
<tr>
<td>出力内部抵抗</td>
<td>Output resistance</td>
<td>340 Ohms +/- 30%</td>
</tr>
<tr>
<td>内部抵抗の TCR</td>
<td>TC of Output resistance</td>
<td>+/-300ppm/K</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>[総合]</th>
<th>INPUT/OUTPUT</th>
<th>Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>変換係数</td>
<td>Sensitivity</td>
<td>More than 0.6 V/W</td>
</tr>
<tr>
<td>感度の温度依存性</td>
<td>TC of Sensitivity</td>
<td>-0.001mV/mW/K</td>
</tr>
<tr>
<td>応答時間</td>
<td>Response Time</td>
<td>6.0 +/-1.0 seconds</td>
</tr>
<tr>
<td>交流変換誤差</td>
<td>AC-DC Difference, 10Hz-1kHz</td>
<td>Less than 10ppm</td>
</tr>
<tr>
<td>動作温度</td>
<td>Operating Temp.</td>
<td>25 +/- 5 degree C</td>
</tr>
<tr>
<td>保存温度</td>
<td>Storage Temp.</td>
<td>-10 to 60 degree C</td>
</tr>
</tbody>
</table>

**内部の構造 Internal schematic**

Values of the ID Resistor (Ri)

<table>
<thead>
<tr>
<th>Input Resistance, R</th>
<th>ID Sense Resistors, Ri</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 Ohm</td>
<td>200 - (220) - 470 Ohms</td>
</tr>
</tbody>
</table>

Note: The values in parenthesis are nominal values. Other values are available on request.

Note: Output Capacitance
The shunting capacitance between the output pins is 10 nF. Other values are available on request.