7051

Extended Specification

V1.7
SPECIFICATIONS DETAILS

1. Accuracies are shown as ± (ppm or % of output + floor).
2. Specifications apply for settings between 10% and 100% of range.
3. Specifications apply at ambient temp of 23°C ±5°C
4. For temperatures outside the above range apply 0.2 x specification per °C
5. Calibrator warm up time at least 30 minutes.
6. All values are relative to calibration standards.
7. Accuracies quoted are for 1 year.

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.

Calibrator (Source)

<table>
<thead>
<tr>
<th>DC VOLTAGE</th>
<th>Range</th>
<th>Accuracy ppm</th>
<th>Output Resistance</th>
<th>Max Output Current</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20mV ¹</td>
<td>100 + 4uV</td>
<td>10Ω³</td>
<td>-</td>
<td>100nV</td>
</tr>
<tr>
<td></td>
<td>200mV ¹</td>
<td>30 + 6uV</td>
<td>10Ω³</td>
<td>-</td>
<td>1uV</td>
</tr>
<tr>
<td></td>
<td>2V</td>
<td>15 + 20uV</td>
<td>&lt; 0.1 Ω</td>
<td>20mA</td>
<td>1uV</td>
</tr>
<tr>
<td></td>
<td>20V</td>
<td>15 + 150uV</td>
<td>&lt; 0.1 Ω</td>
<td>20mA</td>
<td>10uV</td>
</tr>
</tbody>
</table>

With 9782 High Voltage/Current option fitted

|            | 200V ¹ | 30 + 6mV   | < 5Ω              | 20mA               | 100uV      |
|            | 1050V  | 50 + 30mV  | < 10Ω             | 10mA               | 1mV        |

1. Over-Range 10%. Specifications are between 0.1Hz and 10Hz bandwidth. Maximum capacitance 1000pF.

<table>
<thead>
<tr>
<th>AC VOLTAGE 10Hz to 20kHz (sine wave)</th>
<th>Range RMS</th>
<th>Frequency ²</th>
<th>Accuracy %</th>
<th>Output Resistance</th>
<th>Max Output Current</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>20mV ¹</td>
<td>10Hz to 45Hz</td>
<td>0.05 + 250uV</td>
<td>10Ω³</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45Hz to 1kHz</td>
<td>0.05 + 100uV</td>
<td>10Ω³</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1kHz to 10kHz</td>
<td>0.05 + 150uV</td>
<td>10Ω³</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10kHz to 20kHz</td>
<td>0.05 + 250uV</td>
<td>10Ω³</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10Hz to 45Hz</td>
<td>0.05 + 250uV</td>
<td>10Ω</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45Hz to 1kHz</td>
<td>0.04 + 100uV</td>
<td>10Ω</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1kHz to 10kHz</td>
<td>0.04 + 150uV</td>
<td>10Ω</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10kHz to 20kHz</td>
<td>0.05 + 250uV</td>
<td>10Ω</td>
<td>-</td>
<td>1uV</td>
<td></td>
</tr>
<tr>
<td>2V ¹</td>
<td>10Hz to 45Hz</td>
<td>0.08 + 500uV</td>
<td>&lt; 0.1Ω</td>
<td>20mA</td>
<td>10uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45Hz to 1kHz</td>
<td>0.03 + 170uV</td>
<td>&lt; 0.1Ω</td>
<td>20mA</td>
<td>10uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1kHz to 10kHz</td>
<td>0.03 + 250uV</td>
<td>&lt; 0.1Ω</td>
<td>20mA</td>
<td>10uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10kHz-20kHz</td>
<td>0.08 + 500uV</td>
<td>&lt; 0.1Ω</td>
<td>20mA</td>
<td>10uV</td>
<td></td>
</tr>
<tr>
<td>20V ¹</td>
<td>10Hz to 45Hz</td>
<td>0.08 + 4mV</td>
<td>&lt; 5Ω</td>
<td>20mA</td>
<td>100uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45Hz to 1kHz</td>
<td>0.03 + 2mV</td>
<td>&lt; 5Ω</td>
<td>20mA</td>
<td>100uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1kHz to 10kHz</td>
<td>0.03 + 3mV</td>
<td>&lt; 5Ω</td>
<td>20mA</td>
<td>100uV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10kHz to 20kHz</td>
<td>0.08 + 4mV</td>
<td>&lt; 5Ω</td>
<td>20mA</td>
<td>100uV</td>
<td></td>
</tr>
</tbody>
</table>

With 9782 High Voltage/Current option fitted

|            | 200V ¹ | 40Hz to 1kHz | 0.06 + 20mV | < 5Ω | 20mA | 1mV |
|            | 1050V  | 40Hz to 1kHz | 0.08 + 90mV | < 10Ω | 10mA | 10mV |

1. Over-Range 10%
2. The frequency accuracy for AC ranges is 0.01% and is crystal controlled. The setting resolution is 1Hz.
3. The output resistance on the 20mV and 200mV ranges is 10Ω. This must be taken into account when loads of 100kΩ or less are being driven. A 100kΩ load will result in a 0.01% error.
All AC outputs exclude the DC component.
### DC CURRENT

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy ppm</th>
<th>Compliance Voltage</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>200µA¹</td>
<td>150 + 15nA</td>
<td>11V</td>
<td>1nA</td>
</tr>
<tr>
<td>2mA¹</td>
<td>100 + 40nA</td>
<td>11V</td>
<td>10nA</td>
</tr>
<tr>
<td>20mA¹</td>
<td>80 + 20nA</td>
<td>11V</td>
<td>10nA</td>
</tr>
<tr>
<td>200mA¹</td>
<td>80 + 3µA</td>
<td>11V</td>
<td>100nA</td>
</tr>
</tbody>
</table>

With 9782 High Voltage/Current option fitted

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy ppm</th>
<th>Compliance Voltage</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A¹</td>
<td>250 + 40µA</td>
<td>5V</td>
<td>1µA</td>
</tr>
<tr>
<td>20A¹</td>
<td>600 + 2mA</td>
<td>4V</td>
<td>10uA</td>
</tr>
</tbody>
</table>

1. Over-Range 10%.

### AC CURRENT (sine-wave)

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Accuracy %</th>
<th>Compliance Voltage rms</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>200µA¹</td>
<td>20Hz to 1kHz</td>
<td>0.07 + 300nA</td>
<td>8V</td>
<td>10nA</td>
</tr>
<tr>
<td>2mA¹</td>
<td>20Hz to 1kHz</td>
<td>0.05 + 300nA</td>
<td>8V</td>
<td>10nA</td>
</tr>
<tr>
<td>20mA¹</td>
<td>20Hz to 1kHz</td>
<td>0.05 + 3µA</td>
<td>8V</td>
<td>100nA</td>
</tr>
<tr>
<td>200mA¹</td>
<td>20Hz to 1kHz</td>
<td>0.05 + 30µA</td>
<td>8V</td>
<td>1uA</td>
</tr>
</tbody>
</table>

With 9782 High Voltage/Current option fitted

<table>
<thead>
<tr>
<th>Range</th>
<th>Frequency</th>
<th>Accuracy %</th>
<th>Compliance Voltage rms</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A¹</td>
<td>20Hz to 500Hz</td>
<td>0.1 + 0.5mA</td>
<td>3.5V</td>
<td>10uA</td>
</tr>
<tr>
<td>20A¹</td>
<td>20Hz to 500Hz</td>
<td>0.2 + 5mA</td>
<td>3V</td>
<td>100uA</td>
</tr>
</tbody>
</table>

1. Over-Range 10%.

### THERMOCOUPLE SIMULATION

<table>
<thead>
<tr>
<th>Thermocouple Type</th>
<th>Temperature Range °C</th>
<th>Accuracy ± °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>-210 to -50</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>-50 to 1200</td>
<td>0.18</td>
</tr>
<tr>
<td>K</td>
<td>-270 to 1372</td>
<td>0.25</td>
</tr>
<tr>
<td>T</td>
<td>-270 to -150</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>-150 to 0</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0 to 400</td>
<td>0.15</td>
</tr>
<tr>
<td>R</td>
<td>-50 to 50</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>50 to 250</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>250 to 1768</td>
<td>0.6</td>
</tr>
<tr>
<td>S</td>
<td>-50 to 300</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>300 to 1768</td>
<td>0.8</td>
</tr>
<tr>
<td>B</td>
<td>0 to 800</td>
<td>1.8</td>
</tr>
<tr>
<td></td>
<td>800 to 1820</td>
<td>1.0</td>
</tr>
<tr>
<td>N</td>
<td>-270 to -100</td>
<td>0.8</td>
</tr>
<tr>
<td></td>
<td>260-100 to 1300</td>
<td>0.3</td>
</tr>
<tr>
<td>E</td>
<td>-270 to -100</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>-100 to 0</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0 to 1000</td>
<td>0.15</td>
</tr>
</tbody>
</table>

Resolution 0.1°C. Switchable automatic internal cold junction reference, accuracy ±0.5°C (applies to ambient changes of ±1°C)

The accuracy of the thermocouple simulation is determined by the accuracy of the 7051’s DC Voltage function and the accuracy of the standard thermocouple tables (BS EN 60584-1) published by the British Standards Institute. The 7051 uses precise digital interpretation of the tables to output voltage levels that are within the accuracies specified in the table above. Additional errors apply for temperatures below -200°C.
DECADE RESISTANCE

<table>
<thead>
<tr>
<th>Value</th>
<th>Accuracy</th>
<th>Max Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ω</td>
<td>800 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>10 Ω</td>
<td>70 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>100 Ω</td>
<td>30 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>1 kΩ</td>
<td>20 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>10 kΩ</td>
<td>20 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>100 kΩ</td>
<td>30 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>1 MΩ</td>
<td>150 ppm</td>
<td>200V</td>
</tr>
<tr>
<td>10 MΩ</td>
<td>0.1%</td>
<td>200V</td>
</tr>
<tr>
<td>100 MΩ</td>
<td>1%</td>
<td>200V</td>
</tr>
<tr>
<td>1 GΩ</td>
<td>10%</td>
<td>200V</td>
</tr>
</tbody>
</table>

1. Resistance specifications are ±5mΩ.

SIMULATED RESISTANCE

<table>
<thead>
<tr>
<th>RANGE</th>
<th>ACCURACY</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to 40Ω</td>
<td>0.15% of setting + 20mΩ</td>
</tr>
<tr>
<td>400Ω</td>
<td>0.05% of setting + 0.05% of range</td>
</tr>
<tr>
<td>4kΩ</td>
<td>0.02% of setting + 0.05% of range</td>
</tr>
<tr>
<td>40kΩ</td>
<td>0.02% of setting + 0.05% of range</td>
</tr>
<tr>
<td>400kΩ</td>
<td>0.02% of setting + 0.05% of range</td>
</tr>
<tr>
<td>4MΩ</td>
<td>0.05% of setting + 0.05% of range</td>
</tr>
<tr>
<td>40MΩ</td>
<td>0.2% of setting + 0.05% of range</td>
</tr>
</tbody>
</table>

1. After subtraction of lead resistance.

Maximum measure current allowed in simulated resistance mode is 20mA. Simulated resistance mode is suitable for DC only, i.e. only DC current may be passed through the active resistance.

Simulated resistance limitations

It should be noted that the 7051's simulated resistance circuitry has a 2V voltage compliance. This means that the simulation is only valid if the measure current multiplied by required resistance is less than 2V. For example, if the measure current is 1mA, the maximum simulated resistance will be 2K ohms. The user should be aware of the measure currents being used by the instrument being calibrated in order to prevent incorrect simulated resistance being output by the 7051.

It should also be noted that some DMMs use measuring currents which are outside the 7051 simulated resistance limits. If in doubt over the validity of the 7051's output it is recommended that the voltage across the output terminals is checked – it should be less than 2V for correct operation.

PRT SIMULATION (Uses Simulated Resistance option)

| Pt100 DIN | Alpha 0.00385 | Range -180 to 850ºC | Accuracy ±0.1ºC |

CONDUCTANCE

<table>
<thead>
<tr>
<th>Value</th>
<th>Accuracy</th>
<th>Max Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 S</td>
<td>800 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>100m S</td>
<td>70 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>10m S</td>
<td>30 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>1m S</td>
<td>20 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>100u S</td>
<td>20 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>10u S</td>
<td>30 ppm</td>
<td>0.1W</td>
</tr>
<tr>
<td>1u S</td>
<td>150 ppm</td>
<td>200V</td>
</tr>
<tr>
<td>100n S</td>
<td>0.1%</td>
<td>200V</td>
</tr>
<tr>
<td>10n S</td>
<td>1%</td>
<td>200V</td>
</tr>
<tr>
<td>1n S</td>
<td>10%</td>
<td>200V</td>
</tr>
</tbody>
</table>

1. Conductance specifications are +/- 5mΩ.

10MHz DIGITAL FREQUENCY

Variable Values 0.1Hz to 10MHz, ~2V pk-pk square wave. Accuracy 20ppm

PERIOD

Variable Values 100nS to 10S, ~2V pk-pk square wave. Accuracy 20ppm
## DMM (Measure)

### DC VOLTAGE

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy PPM (Reading + Range)</th>
<th>Input Impedance</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV</td>
<td>50 + 40</td>
<td>10MΩ</td>
<td>1uV</td>
</tr>
<tr>
<td>1 V</td>
<td>40 + 8</td>
<td>10MΩ</td>
<td>1uV</td>
</tr>
<tr>
<td>10 V</td>
<td>35 + 6</td>
<td>10MΩ</td>
<td>10uV</td>
</tr>
<tr>
<td>100 V</td>
<td>45 + 7</td>
<td>10MΩ</td>
<td>100uV</td>
</tr>
<tr>
<td>1 kV</td>
<td>45 + 10</td>
<td>10MΩ</td>
<td>1mV</td>
</tr>
</tbody>
</table>

### AC VOLTAGE

<table>
<thead>
<tr>
<th>Range RMS</th>
<th>Frequency</th>
<th>Accuracy % (Reading + Range)</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 mV</td>
<td>5 Hz – 10 Hz</td>
<td>0.4 ± 0.04</td>
<td>10uV</td>
</tr>
<tr>
<td></td>
<td>10 Hz – 20 kHz</td>
<td>0.06 ± 0.04</td>
<td>10uV</td>
</tr>
<tr>
<td></td>
<td>20 Hz – 50 kHz</td>
<td>0.12 ± 0.05</td>
<td>10uV</td>
</tr>
<tr>
<td></td>
<td>50 kHz – 100 kHz</td>
<td>0.6 ± 0.1</td>
<td>10uV</td>
</tr>
<tr>
<td></td>
<td>100 kHz – 300 kHz</td>
<td>5.0 ± 0.5</td>
<td>10uV</td>
</tr>
<tr>
<td>1V to 750V</td>
<td>5 Hz – 10 Hz</td>
<td>0.4 ± 0.03</td>
<td>0.01% of f.s.</td>
</tr>
<tr>
<td></td>
<td>10 Hz – 20 kHz</td>
<td>0.15 ± 0.05</td>
<td>0.01% of f.s.</td>
</tr>
<tr>
<td></td>
<td>20 kHz – 50 kHz</td>
<td>0.6 ± 0.1</td>
<td>0.01% of f.s.</td>
</tr>
<tr>
<td></td>
<td>50 kHz – 100 kHz</td>
<td>5.0 ± 0.5</td>
<td>0.01% of f.s.</td>
</tr>
</tbody>
</table>

### DC CURRENT

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy PPM (Reading + Range)</th>
<th>Burden Voltage</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 mA</td>
<td>500 + 200</td>
<td>&lt;0.1V</td>
<td>100nA</td>
</tr>
<tr>
<td>100 mA</td>
<td>500 + 50</td>
<td>&lt;0.7V</td>
<td>1uA</td>
</tr>
<tr>
<td>1 A</td>
<td>1000 + 100</td>
<td>&lt;1V</td>
<td>10uA</td>
</tr>
<tr>
<td>3 A</td>
<td>1200 + 200</td>
<td>&lt;2V</td>
<td>100uA</td>
</tr>
</tbody>
</table>

### AC CURRENT

<table>
<thead>
<tr>
<th>Range RMS</th>
<th>Frequency</th>
<th>Accuracy % (Reading + Range)</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A</td>
<td>10Hz – 5kHz</td>
<td>0.15 ± 0.05</td>
<td>100uA</td>
</tr>
<tr>
<td>3 A</td>
<td>10Hz – 5kHz</td>
<td>0.25 ± 0.1</td>
<td>100uA</td>
</tr>
</tbody>
</table>

### RESISTANCE

<table>
<thead>
<tr>
<th>Range</th>
<th>Test Current</th>
<th>Accuracy (Reading + Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100Ω</td>
<td>1mA</td>
<td>100ppm + 40ppm</td>
</tr>
<tr>
<td>1 kΩ</td>
<td>1mA</td>
<td>100ppm + 10ppm</td>
</tr>
<tr>
<td>10 kΩ</td>
<td>100uA</td>
<td>100ppm + 10ppm</td>
</tr>
<tr>
<td>100 kΩ</td>
<td>10uA</td>
<td>100ppm + 10ppm</td>
</tr>
<tr>
<td>1 MΩ</td>
<td>5uA</td>
<td>100ppm + 10ppm</td>
</tr>
<tr>
<td>10 MΩ</td>
<td>0.5uA</td>
<td>400ppm + 10ppm</td>
</tr>
<tr>
<td>100 MΩ</td>
<td>0.1uA</td>
<td>1% + 10ppm</td>
</tr>
</tbody>
</table>

### FREQUENCY/PERIOD (100mV – 750V)

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy (Reading)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Hz to 10Hz</td>
<td>0.1%</td>
</tr>
<tr>
<td>10Hz to 40Hz</td>
<td>0.03%</td>
</tr>
<tr>
<td>40Hz to 300kHz</td>
<td>0.01%</td>
</tr>
</tbody>
</table>

### THERMOCOUPLES

<table>
<thead>
<tr>
<th>Thermocouple Type</th>
<th>Temperature Range ºC</th>
<th>Accuracy ºC</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>-210 to 1200</td>
<td>0.18</td>
</tr>
<tr>
<td>K</td>
<td>-270 to 1300</td>
<td>0.4</td>
</tr>
<tr>
<td>T</td>
<td>-200 to 380</td>
<td>0.4</td>
</tr>
<tr>
<td>R</td>
<td>-50 to 1749</td>
<td>1.0</td>
</tr>
<tr>
<td>S</td>
<td>-50 to 1749</td>
<td>1.2</td>
</tr>
<tr>
<td>N</td>
<td>-270 to 1280</td>
<td>0.4</td>
</tr>
<tr>
<td>E</td>
<td>-50 to 988</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Resolution ±0.001°C. Switchable automatic internal cold junction compensation, accuracy ±0.5°C (applies to ambient changes of ±1°C). Additional errors apply for temperatures below -200°C.

### RTD

<table>
<thead>
<tr>
<th>Range ºC</th>
<th>Accuracy ºC</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>-180 to -100</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>-100 to 550</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>550 to 850</td>
<td>0.15</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Version 1.7

Time Electronics 7051 Extended Specifications

Page 5
Calibrator Options
(Optional code shown in brackets)

### CAPACITANCE AND INDUCTANCE (9798)

<table>
<thead>
<tr>
<th>Value</th>
<th>Frequency</th>
<th>Accuracy (of displayed value)</th>
<th>Max Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 nF</td>
<td>1kHz</td>
<td>0.5% + 10pf</td>
<td>100V</td>
</tr>
<tr>
<td>10 nF</td>
<td>1kHz</td>
<td>0.5% + 10pf</td>
<td></td>
</tr>
<tr>
<td>100 nF</td>
<td>1kHz</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>1 uF</td>
<td>1kHz</td>
<td>0.25%</td>
<td></td>
</tr>
<tr>
<td>10 uF</td>
<td>1kHz</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>100 uF</td>
<td>1kHz</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>1 mH, 1.9 mH</td>
<td>1kHz</td>
<td>0.1%</td>
<td>10mA</td>
</tr>
<tr>
<td>5 mH, 10 mH</td>
<td>1kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19 mH, 50 mH</td>
<td>1kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 mH, 190 mH</td>
<td>1kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500 mH, 1H</td>
<td>1kHz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10H</td>
<td>100Hz</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Specifications apply to the displayed value, after subtraction of residual capacitance / inductance.

### OSCILLOSCOPE (9770)

<table>
<thead>
<tr>
<th>FREQUENCY</th>
<th>Fixed Values 1, 2, 5 steps</th>
<th>PERIOD</th>
<th>Fixed Values 1, 2, 5 steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1Hz to 10MHz</td>
<td>accuracy 0.1ppm*</td>
<td>100nS to 10S</td>
<td>accuracy 0.1ppm*</td>
</tr>
<tr>
<td>20, 50, 100MHz</td>
<td>accuracy 20ppm</td>
<td>50, 20, &amp; 10nS</td>
<td>accuracy 20ppm</td>
</tr>
</tbody>
</table>

* Fitted with Oven-Controlled Frequency Reference. Otherwise - 20ppm.

1.5V pk-pk - 0.1Hz to 100kHz. 1V pk-pk - 100kHz to 100MHz (sine-wave at 100MHz)

### DUTY CYCLE

3 frequencies, 100Hz, 1kHz, 10kHz. Duty cycle settable from 0 to 100%
Setting resolution 0.01% at 100Hz, 0.1% at 1 kHz, 1% at 10 kHz
Deviation function is not available.

### AMPLITUDE

**Output per div**: 1mV to 50V in 1, 2, 5 sequence. 1kHz square wave or DC.

**Graticule X**: 1, 2, 4, 6, 8. Max output 200V pk-pk

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>6mV to 200mV</td>
<td>0.2% + 4uV</td>
</tr>
<tr>
<td>200mV to 200V</td>
<td>0.05%</td>
</tr>
<tr>
<td>6mV to 20mV 50Ω</td>
<td>0.5% + 10uV</td>
</tr>
<tr>
<td>20mV to 2V 50Ω</td>
<td>0.25%</td>
</tr>
</tbody>
</table>

**FAST RISE**: 400ps ±150ps (Into 50Ω Load)

1. At 1mV/div 1,2,4X not available

### 2.2GHz-LEVELLED SWEEP (9769)

1V pk-pk Sine-Wave, 50Ω Output.

<table>
<thead>
<tr>
<th>Range</th>
<th>Amplitude Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 MHz to 200 MHz</td>
<td>1%</td>
</tr>
<tr>
<td>200 MHz to 500 MHz</td>
<td>2%</td>
</tr>
<tr>
<td>500 MHz to 1 GHz</td>
<td>4%</td>
</tr>
<tr>
<td>1 GHz to 2.2 GHz</td>
<td>6%</td>
</tr>
</tbody>
</table>

From 100 to 500 MHz an additional floor of 5mVpk-pk applies.
Calibrator Options (continued)

### FULL RANGE RESISTANCE (9787)

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy¹</th>
<th>Resolution</th>
<th>Max Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1Ω to 20Ω</td>
<td>0.01% + 7mΩ</td>
<td>1Ω</td>
<td>0.1W</td>
</tr>
<tr>
<td>20Ω to 99.999Ω</td>
<td>0.01% + 7mΩ</td>
<td>1mΩ/5mΩ*</td>
<td>0.1W</td>
</tr>
<tr>
<td>100Ω to 999.999Ω</td>
<td>0.01% + 5mΩ</td>
<td>1mΩ</td>
<td>0.1W</td>
</tr>
<tr>
<td>1kΩ to 9.999kΩ</td>
<td>0.02% + 20mΩ</td>
<td>1Ω</td>
<td>0.1W</td>
</tr>
<tr>
<td>10kΩ to 99.999kΩ</td>
<td>0.01% + 1Ω</td>
<td>1Ω</td>
<td>0.1W</td>
</tr>
<tr>
<td>100kΩ to 999.999kΩ</td>
<td>0.01% + 10Ω</td>
<td>10Ω</td>
<td>0.1W</td>
</tr>
<tr>
<td>1MΩ to 9.999MΩ</td>
<td>0.02% + 100Ω</td>
<td>100Ω</td>
<td>0.1W</td>
</tr>
<tr>
<td>10MΩ to 120MΩ</td>
<td>0.1% + 1kΩ</td>
<td>1kΩ</td>
<td>0.1W</td>
</tr>
</tbody>
</table>

¹. After subtraction of lead resistance. Add end resistance variation ±2.5mΩ

* Output resolution is 5mΩ below 50Ω.

### RTD SIMULATION

<table>
<thead>
<tr>
<th>Range °C</th>
<th>Accuracy °C</th>
<th>Resolution °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>-180 to 200</td>
<td>±0.07</td>
<td>0.01</td>
</tr>
<tr>
<td>200 to 850</td>
<td>±0.15</td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that the accuracy of the RTD simulation is determined by the accuracy of the PRT tables BS EN 60751.

The 7051 uses precise digital interpretation of the tables to output resistance values that are within the accuracies specified in the table above.

### AC VOLTAGE HI FREQUENCY (9771)

<table>
<thead>
<tr>
<th>Range</th>
<th>20 kHz to 100 kHz</th>
<th>100 kHz to 300 kHz</th>
<th>300kHz to 1MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>20mV</td>
<td>0.05% + 0.1mV</td>
<td>0.1% + 0.5mV</td>
<td>-</td>
</tr>
<tr>
<td>200mV</td>
<td>0.05% + 0.1mV</td>
<td>0.1% + 0.5mV</td>
<td>-</td>
</tr>
<tr>
<td>2V</td>
<td>0.05% + 1mV</td>
<td>0.1% + 5mV</td>
<td>1% + 10mV</td>
</tr>
<tr>
<td>20V</td>
<td>0.1% + 10mV</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Frequency Accuracy 0.01%

### PC SPECIFICATION

<table>
<thead>
<tr>
<th>Processor</th>
<th>64 bit quad Core (or equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAM</td>
<td>4 GB (or higher)</td>
</tr>
<tr>
<td>Hard Drive</td>
<td>60 GB Solid State (or higher)</td>
</tr>
<tr>
<td>Ports</td>
<td>4 x USB, 1 x Fast Ethernet</td>
</tr>
<tr>
<td>Display</td>
<td>10.4 inch Touch Screen</td>
</tr>
<tr>
<td>Operating System</td>
<td>Windows 8.1</td>
</tr>
</tbody>
</table>

### GENERAL

### POWER SUPPLY

<table>
<thead>
<tr>
<th>Mains Voltage</th>
<th>100 to 260V AC 50/60 Hz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Consumption</td>
<td>125W typical, 220W Max.</td>
</tr>
</tbody>
</table>

### MAXIMUM ALLOWABLE VOLTAGE BETWEEN TERMINALS

<table>
<thead>
<tr>
<th>Source</th>
<th>&lt; 75V Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between V- and Earth</td>
<td>&lt; 75V Peak</td>
</tr>
<tr>
<td>Between Main, Aux and Earth</td>
<td>&lt; 75V Peak</td>
</tr>
<tr>
<td>Measure</td>
<td>&lt; 1000V Peak</td>
</tr>
<tr>
<td>Between V+ and V- terminals</td>
<td>&lt; 75V Peak</td>
</tr>
<tr>
<td>Between V- and Earth &lt; 75V Peak</td>
<td>&lt; 75V Peak</td>
</tr>
</tbody>
</table>

### ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Operating Temperature</th>
<th>15 to 35°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-10°C to 50°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>Operating &lt; 80%</td>
</tr>
<tr>
<td>Altitude</td>
<td>0 to 3km. Non Operating 3km to 12km</td>
</tr>
</tbody>
</table>

Due to continuous development Time Electronics reserves the right to change specifications without prior notice.