

<b>Title</b>	<b>Demonstrate knowledge of basic electronic components</b>		
<b>Level</b>	<b>2</b>	<b>Credits</b>	<b>5</b>

<b>Purpose</b>	<p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> <li>– describe the electrical behaviour of conductors, insulators, and semiconductors;</li> <li>– demonstrate knowledge of basic electronic components;</li> <li>– demonstrate knowledge of component markings and ratings;</li> <li>– perform simple functional testing of components; and</li> <li>– draw circuit diagrams.</li> </ul>
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<b>Classification</b>	Electronic Engineering > Electronics Technology
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 Suitable drawing symbols can be found in Robertson, M, *Electronics for Young Entrepreneurs* (2016), available from The Skills Organisation, [www.skills.org.nz](http://www.skills.org.nz).
- 2 Definitions
 

*Basic electronic components* – refers to components such as: battery, switch, bulb, resistor (banded, ceramic case), variable resistor, thermistor, LDR, capacitor (aluminium electrolytic, film, mica, ceramic, variable), inductor, diodes (signal, power, light emitting, and zener), transistor (small signal, power), buzzer, transformer.

*LDR* – light dependent resistor.

*LED* – light emitting diode.

*Simple electronic device* – a circuit constructed with at least eight basic electronic components.
- 3 Assessment
 

Where needed, sketches and drawings may be used to aid explanations.
- 4 Range
  - a All calculations and measurements must be expressed in Système International (SI) units and multipliers.
  - b Use of resistor and capacitor colour coding charts is permitted during assessment.

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### Outcomes and performance criteria

#### Outcome 1

Describe the electrical behaviour of conductors, insulators, and semiconductors.

**Performance criteria**

- 1.1 Describe the electrical behaviour of conductors, insulators, and semiconductors in terms of free and bound charges.
- 1.2 Describe the effect of temperature on conductors, semiconductors, and insulators in terms of conductivity and resistance.

**Outcome 2**

Demonstrate knowledge of basic electronic components.

**Performance criteria**

- 2.1 Identify and describe basic electronic components in terms of their purpose, operation, electrical characteristic curves where appropriate, and the materials they are made of.
- Range evidence of five components is required.
- 2.2 Identify the leads of diodes, transistors, and light emitting diodes in accordance with manufacturers' data sheets.
- Range transistors using three typical cases such as TO-92, TO-220, and TO-204 (TO-3).

**Outcome 3**

Demonstrate knowledge of component markings and ratings.

**Performance criteria**

- 3.1 Interpret resistor and capacitor markings relating to component value, rating, and tolerance.
- Range evidence of three linear resistors and three different types of capacitors is required.
- 3.2 Identify the power rating of a resistor, calculate the maximum safe current and voltage, and state the consequence of exceeding the rating.
- Range  $P_{max} = I^2R = V^2/R = VI$ .
- 3.3 Identify the maximum permissible voltage across the terminals of a capacitor and state the likely consequence of exceeding it.

3.4 Explain the ratings of additional components in terms of maximum current and/or voltage.

Range additional components (with the ratings in brackets) – switch (current, d.c. voltage), bulb (voltage), thermistor (current), LDR (current), diode (forward current, reverse voltage), buzzer (voltage), transistor ( $I_{Cmax}$ ,  $P_{Cmax}$ ,  $V_{CEmax}$ ).

3.5 Explain the need for heat sinking of power semiconductors in terms of device rating and damage to components.

3.6 Describe the methods and structures used for heat sinking in terms of the types of heat transfer.

Range types of heat transfer – conduction, convection, radiation; methods and/or structures may include but are not limited to – metal component leads, natural and forced air circulation, finned aluminium heat sinks, dark coloured heat sinks.

#### Outcome 4

Perform simple functional testing of components.

##### Performance criteria

4.1 Perform simple functional tests of components using a multimeter.

Range components may include but are not limited to – resistor, battery, switch, bulb, thermistor, LDR, LED, buzzer, diode, transistor; a simple circuit consisting of a battery, leads, (and a series resistor if included); evidence of five different components is required.

#### Outcome 5

Draw circuit diagrams.

##### Performance criteria

5.1 Identify series and parallel connections in a simple electronic circuit.

5.2 Draw a circuit schematic diagram from a simple electronic device.

5.3 Draw a component layout diagram from a simple electronic device.

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<b>Planned review date</b>	31 December 2025
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**Status information and last date for assessment for superseded versions**

Process	Version	Date	Last Date for Assessment
Registration	1	30 April 2001	31 December 2012
Revision	2	12 March 2002	31 December 2012
Revision	3	17 March 2004	31 December 2012
Review	4	25 May 2007	31 December 2024
Rollover and Revision	5	15 March 2012	31 December 2024
Revision	6	15 January 2014	31 December 2024
Rollover and Revision	7	27 January 2015	31 December 2024
Review	8	24 June 2021	N/A

**Consent and Moderation Requirements (CMR) reference**

0003

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

**Comments on this unit standard**

Please contact The Skills Organisation [reviewcomments@skills.org.nz](mailto:reviewcomments@skills.org.nz) if you wish to suggest changes to the content of this unit standard.