Title	**Demonstrate knowledge of basic electronic components**		
Level	**2**	**Credits**	**5**

Purpose	This unit standard is intended for use in high school or pre-employment electronics courses, or in the training of electronics technicians. It covers the operation and identification of basic electronic components. People credited with this unit standard are able to: – describe the electrical behaviour of conductors, insulators, and semiconductors; – describe basic electronic components; – identify basic electronic components and interpret their markings; – demonstrate knowledge of component ratings; – perform simple functional testing of components; and – demonstrate understanding of the relationship between physical components and their representation in circuit diagrams.

Classification	Electronic Engineering > Electronics Technology

Available grade	Achieved

Explanatory notes

1 Suitable drawing symbols can be found in Robertson, M, *Electronics for Young Entrepreneurs* (2002), which is available from the The Skills Organisation, PO Box 24-469, Royal Oak, Auckland 1345.

2 Definitions
LDR – light dependent resistor.
LED – light emitting diode.

3 Range
a All calculations and measurements are to be expressed in Système International (SI) units and multipliers.
b Use of resistor and capacitor colour coding charts is permitted during assessment.
c Except where otherwise stated, *basic electronic components* include battery, switch, bulb, resistor, variable resistor, thermistor, LDR, capacitor, inductor, diodes (signal, power, light emitting, and zener), transistor, buzzer, transformer.

Outcomes and evidence requirements

Outcome 1

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

Evidence requirements

1.1 The electrical behaviour of conductors, insulators, and semiconductors is described in terms of free and bound charges.

1.2 The effect of temperature on resistance is stated for metals, pure semiconductors, and insulators.

Outcome 2

Describe basic electronic components.

Range battery, switch, bulb, resistor, variable resistor, thermistor, LDR, capacitor, inductor, diodes (power, light emitting, zener), transistor, buzzer, transformer. Evidence of six required.

Evidence requirements

2.1 Basic electronic components are described in terms of their purpose, operation, electrical characteristic curves where appropriate, and the materials they are made of.

2.2 Basic electronic components are described in terms of uses in electronic circuits.

2.3 Basic electronic components are described in terms of input, output, and purpose.

Outcome 3

Identify basic electronic components and interpret their markings.

Evidence requirements

3.1 Basic electronic components are visually identified and their symbols drawn.

3.2 Resistor and capacitor markings relating to component value, rating, and tolerance are interpreted.

Range evidence of three linear resistors (limited to 4 band, E12 series) and three different types of capacitors is required.

3.3 The leads of diodes, transistors, and light emitting diodes are identified in accordance with manufacturers' data sheets.

Range transistors using three typical cases such as TO-92, TO-220, and TO-204 (TO-3).

Outcome 4

Demonstrate knowledge of component ratings.

Evidence requirements

4.1 Given a resistor, the power rating is identified, the maximum safe current and voltage are calculated from $P_{max} = I^2R = V^2/R$, and the consequence of exceeding the rating is stated.

4.2 Given a capacitor, the maximum permissible voltage across the terminals is identified, and the likely consequence of exceeding it is stated.

4.3 The ratings of additional components are explained 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}).

4.4 The need for heat sinking of power semiconductors is explained in terms of device rating and damage to components.

4.5 Methods used to dissipate heat from semiconductor devices are described in terms of function and construction.

Range methods – direct dissipation from device, heat sinks using natural air circulation.

Outcome 5

Perform simple functional testing of components.

Evidence requirements

5.1 Simple functional tests of components check their integrity.

Range components – resistor, battery, switch, bulb, thermistor, LDR, LED, buzzer, diode, transistor;
simple functional tests – such as are capable of being made with a multimeter.

Outcome 6

Demonstrate understanding of the relationship between physical components and their

representation in circuit diagrams.

Evidence requirements

6.1 The concepts of series and parallel connections of components are explained with the aid of a diagram.

6.2 A component layout diagram is drawn from a given simple electronic device.

Range simple electronic device – a circuit constructed with at least ten basic electronic components.

6.3 A circuit schematic diagram is drawn from a given simple electronic device.

Range simple electronic device – a circuit constructed with at least ten basic electronic components.

Planned review date	31 December 2018

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	N/A
Rollover and Revision	5	15 March 2012	N/A
Revision	6	15 January 2014	N/A
Rollover and Revision	7	27 January 2015	N/A

Consent and Moderation Requirements (CMR) reference	0003

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

Please note
Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.

Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that

applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

Comments on this unit standard

Please contact The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.