

Title	Describe and construct circuits to demonstrate the operation and properties of electronic devices		
Level	3	Credits	3

Purpose	<p>This unit standard is intended for use in a senior secondary school environment, pre-employment electronics courses, or for electronics technicians.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – describe the operation of semiconductor devices; – construct one or more circuits to demonstrate the individual properties of basic electronic devices; and – report on the construction of the circuit(s).
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Classification	Electronic Engineering > Electronics Technology
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Available grade	Achieved, Merit, and Excellence
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Criteria for Merit	For merit to be awarded, the candidate must meet the merit criteria specified in outcome 2.
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Criteria for Excellence	For excellence to be awarded, the candidate must meet the excellence criteria specified in outcome 2.
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Explanatory notes

- 1 References
Health and Safety in Employment Act 1992;
Safety in Technology Education: A Guidance Manual for New Zealand Schools, available from <http://technology.tki.org.nz/Curriculum-support/Safety-and-Technology-Education>;
and all subsequent amendments and replacements.
- 2 Definitions
BJT – bipolar junction transistor.
IR – infrared.
LCD – liquid crystal display.
LDR – light dependent resistor.
LED – light emitting diode.
Microcontroller – an integrated, programmable device.
MOSFET – metal oxide semiconductor field effect transistor.
n-type – negative type semiconductor.
Op-amp – operational amplifier.

p-type – positive type semiconductor.

RF – radio frequency.

3 Range

a Basic electronic devices may include but are not limited to:

Discrete components – reed switch, LDR, Hall-effect device, BJT, motor (pulse-width modulation control), 7-segment display, IR diode, n-channel MOSFET;

Integrated components – 555 astable or 555 monostable, gates, op-amp (comparator), op-amp (inverting amplifier), op-amp (non-inverting amplifier), LCD, RF transmitter, RF receiver, IR receiver/decoder, microcontroller.

b All activities must comply with any policies, procedures, and requirements of the organisations involved.

c Laboratory and workshop safety practices are to be observed at all times.

d It is recommended that a diary or log be kept for each stage of the process and may include – sketches, diagrams, schematics, photos, videos.

Outcomes and evidence requirements

Outcome 1

Describe the operation of semiconductor devices.

Evidence requirements

1.1 The properties of semiconductor materials are described based on their structure.

Range n-type semiconductor, p-type semiconductor, electron flow, hole flow.

1.2 The operation of semiconductor devices is described in terms of their make-up.

Range silicon diode, LED, BJT, LDR, n-channel MOSFET.
Evidence of three semiconductor devices is required.

Outcome 2

Construct one or more circuits to demonstrate the individual properties of basic electronic devices.

Range evidence of three discrete and three integrated devices is required.
Up to six circuits may be constructed.

For merit – the candidate must demonstrate the separate functions of all six electronic devices by utilising them in no more than three circuits.

For excellence – the candidate must demonstrate the separate functions of all six electronic devices by utilising them in no more than one circuit.

Evidence requirements

2.1 Constructed circuit(s) demonstrates the individual properties of basic electronic

devices.

Outcome 3

Report on the construction of the circuit(s).

Range report maybe based on the diary or log.

Evidence requirements

3.1 The construction of each circuit is described in a report.

Range report may include but is not limited to – design, construction procedure, schematic.

Replacement information	This unit standard replaced unit standard 19743.
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Planned review date	31 December 2018
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	16 April 2010	31 December 2012
Review	2	15 April 2011	N/A
Rollover and Revision	3	15 March 2012	N/A
Revision	4	15 January 2014	N/A
Rollover and Revision	5	27 January 2015	N/A

Consent and Moderation Requirements (CMR) reference	0003
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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.