



**Australian Government**  
**Department of Industry,  
Science and Resources**

**National  
Measurement  
Institute**

36 Bradfield Road, West Lindfield NSW 2070

**Certificate of Approval**  
**NMI 13/1/37**

Issued by the Chief Metrologist under Regulation 60  
of the  
*National Measurement Regulations 1999*

This is to certify that an approval for use for trade has been granted in respect of the instruments herein described.

Zebra model TC53 Dimensional Measuring Instrument

submitted by           Zebra Technologies Corporation  
                                  1 Zebra Plaza  
                                  Holtsville   NY     11742  
                                  USA

**NOTE:** This Certificate relates to the suitability of the pattern of the instrument for use for trade only in respect of its metrological characteristics. This Certificate does not constitute or imply any guarantee of compliance by the manufacturer or any other person with any requirements regarding safety.

This approval has been granted with reference to document NMI R 129, *Multi-dimensional Measuring Instruments*, dated July 2004.

This approval is subject to review at the decision of the Chief Metrologist in accordance with the conditions specified in the document NMI P 106.

**DOCUMENT HISTORY**

<b>Rev</b>	<b>Reason/Details</b>	<b>Date</b>
0	Pattern approved – certificate issued	28/03/23

## CONDITIONS OF APPROVAL

### General

Instruments purporting to comply with this approval shall be marked with approval number 'NMI 13/1/37' and only by persons authorised by the submitter.

It is the submitter's responsibility to ensure that all instruments marked with this approval number are constructed as described in the documentation lodged with the National Measurement Institute (NMI) and with the relevant Certificate of Approval and Technical Schedule. Failure to comply with this Condition may attract penalties under Section 19B of the National Measurement Act and may result in cancellation or withdrawal of the approval, in accordance with document NMI P 106.

Auxiliary devices used with this instrument shall comply with the requirements of General Supplementary Certificate of Approval No S1/0B.

### Special

Instruments are only approved for use for determination of the dimensions and volume of the smallest rectangular box that could contain an object, for the purposes of determining freight, postal or storage charges.

The dimensions determined may also be used for the calculation (by peripheral equipment) of a volume and/or 'dimensional weight' (\*) value of the object, also for the purposes of determining freight or postal charges.

(\*) A 'dimensional weight' value is a calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume.

Signed by a person authorised by the Chief Metrologist to exercise their powers under Regulation 60 of the *National Measurement Regulations 1999*.



**Darryl Hines**  
Manager  
Policy and Regulatory Services

TECHNICAL SCHEDULE No 13/1/37

**1. Description of Pattern** **approved on 28/03/23**

A Zebra model TC53 semi-automatic dimensional measuring instrument (Figure 1) which is approved for use for the determination of the linear dimensions of certain objects. Instruments fitted with output sockets or wireless data output interfacing capability for the connection of auxiliary and/or peripheral devices.

Instruments are approved for use over a temperature range of  $-20\text{ }^{\circ}\text{C}$  to  $+50\text{ }^{\circ}\text{C}$ .

**1.1 Details**

The pattern is approved for use for the determination of the linear dimensions of rectangular box-shaped (parallelepiped (#), cuboidal) objects only.

(#) A rectangular box (parallelepiped) is a polyhedron having six faces that are parallel in pairs; each face is a parallelogram and adjacent edges are perpendicular.

The pattern comprises a multi-interval measurement range with object limitations described in Table 1 below.

TABLE 1

	Interval 1	Interval 2
Maximum object dimension (length x width x height)	max < 20 cm	Max $\leq$ 80 cm
Minimum object dimension (length x width x height)	Min $\geq$ 10 cm	Min $\geq$ 20 cm
Scale interval of measurement (d)	d $\geq$ 1 cm	d $\geq$ 2 cm
Principle of measurement	Reflected light	
Method of operation	Semi-automatic	
Limitations of use	<ul style="list-style-type: none"> <li>• Not suitable for objects placed on black backgrounds</li> <li>• Not suitable for objects with highly reflective surfaces</li> <li>• Additional Limitations provided by the manufacture as described in the user guide</li> </ul>	

The pattern converts the detected characteristics into the linear dimensions of the smallest rectangular box (parallelepiped – #) that would fully contain the object.

The pattern is approved for use in measuring the linear dimensions of opaque objects only; the dimensions determined may also be used for the calculation of volume and/or 'dimensional weight' value (\*) of the item (refer to the Special Conditions of Approval).

(\*) A '**dimensional weight**' value is a calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume as calculated from the measured dimensions.

## 1.2 Hand-held scanning unit

The Zebra model TC53 (Figure 1) hand-held scanning unit includes a touchscreen display integrated optical cameras and barcode scanner. The scanning unit operates an Android based operating system running Zebra Dimension Capture software version 1.x.x.x.

Objects to be measured must be placed on a flat surface with an unobstructed view to the cameras of the hand-held scanning unit

Measurement results are stored in the memory of the device and may be transferred to peripheral devices using the USB data connection or using wireless connectivity.

## 1.3 Typical Operation

- A barcode may be scanned to identify the item to be measured.
- The user selects Start Dimensioning and the display provides a viewfinder for the built in dimensioning camera system (Figure 2).
- The user positions the hand-held scanner unit at a suitable angle relative to the measured object using an indicator on the display
- The instrument may instruct the user to adjust the angle and orientation to ensure the object is positioned in view of the dimensioning camera system (Figure 3).
- The camera system will detect the edges of the object and successful measurement results and bounding lines will be displayed in green (Figure 4).
- Results are then stored or transferred to a Business Application for further processing.
- Yellow caution symbols indicate the detected dimensions are out of range and cannot be used as legal-for-trade.
- Red caution symbols indicate the dimensions of the object could not be detected (Figure 5).

## 1.4 Indications

The hand-held scanning unit includes an LCD display for indication of results, however measurement data from the Zebra model TC53 is made available to other systems for indication and/or printing.

Printed and displayed information must be made available for verification and must comply with the requirements set out in document NMI R129, *Multidimensional Measuring Instruments*, in particular as per the extract below.

7.9.1 Any printed ticket or displayed indication shall include sufficient information to identify the transaction, for example:

- (a) dimensions: length ( $L$ ), width ( $W$ ) and height ( $H$ );
- (b) volume (vol);
- (c) weight ( $Wt$ ) if the instrument includes a weighing instrument;
- (d) dimensional weight (Dim  $Wt$  ... kg or  $DW$  ... kg);
- (e) dimensional tare ( $DT$  ... kg);
- (f) conversion factor ( $F$ );
- (g) quantity for charging, for example dimensions, vol or  $DW$  ... kg;
- (h) price rate and price; and
- (i) date, transaction number or other identification of the object.

*Note 1:* Icons may be used to identify indications.

*Note 2:* When the customer is not present during the measurement process the above information need not be displayed or printed out at the time but shall be available on request.

*Note 3:* The price interval and the price rate shall comply with the national regulations applicable for trade.

7.9.2 A printed ticket shall also contain the following printed or pre-printed information:

- (a) that the dimensions and/or volume shown are those of the smallest rectangular box that fully encloses the object; and
- (b) that the dimensional weight is a calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume or dimensions.

## 1.5 Descriptive Markings

- (a) The Zebra model TC53 shall carry the following markings on the back-side of the instrument

Manufacturer's mark, or name written in full	Zebra
Pattern approval mark	NMI 13/1/37

- (b) The Zebra model TC53 shall carry the following markings on the back-side of the instrument below the battery compartment or in the software identification screen on the display:

Model designation	.....
Serial number	.....
Year of manufacture	.....
Maximum dimension for each axis and measurement interval	<i>Max</i> ..... cm
Minimum dimension for each axis and measurement interval	<i>Min</i> ..... cm
Scale interval and measurement interval	<i>d</i> = ..... cm

The software identification screen is displayed by selecting the information icon ⓘ in the Mobile Dimensioning Application. (Figure 6)

## 1.6 Verification Provision

Provision is made for the application of a verification mark.

## 1.7 Sealing Provision

Provision is made for sealing the metrological changes in software using an event counter which records adjustments and a tamper-evident sealing label.

**2. Description of Variant 1**

**approved on 28/03/23**

Certain other models of the Zebra Hand-held scanning unit described in Table 2 below.

TABLE 2

Model	Description
TC53	Android smartphone with WiFi and Bluetooth connectivity
TC58	TC53 with the addition of cellular connectivity
TC73	Android smartphone with WiFi and Bluetooth connectivity (rugged version)
TC78	TC73 with the addition of cellular connectivity (rugged version)

TEST PROCEDURE No 13/1/37

Instruments shall be tested in accordance with any relevant tests specified in the National Instrument Test Procedures.

Note: Refer to clause **1.3 Indications** – Printed and displayed information must be made available for verification and must comply with the requirements set out in document NMI R 129, *Multi-dimensional Measuring Instruments*, dated July 2004.

**Maximum Permissible Errors**

The maximum permissible errors are specified in the *National Trade Measurement Regulations 2009*.

Instruments shall be tested as follows:

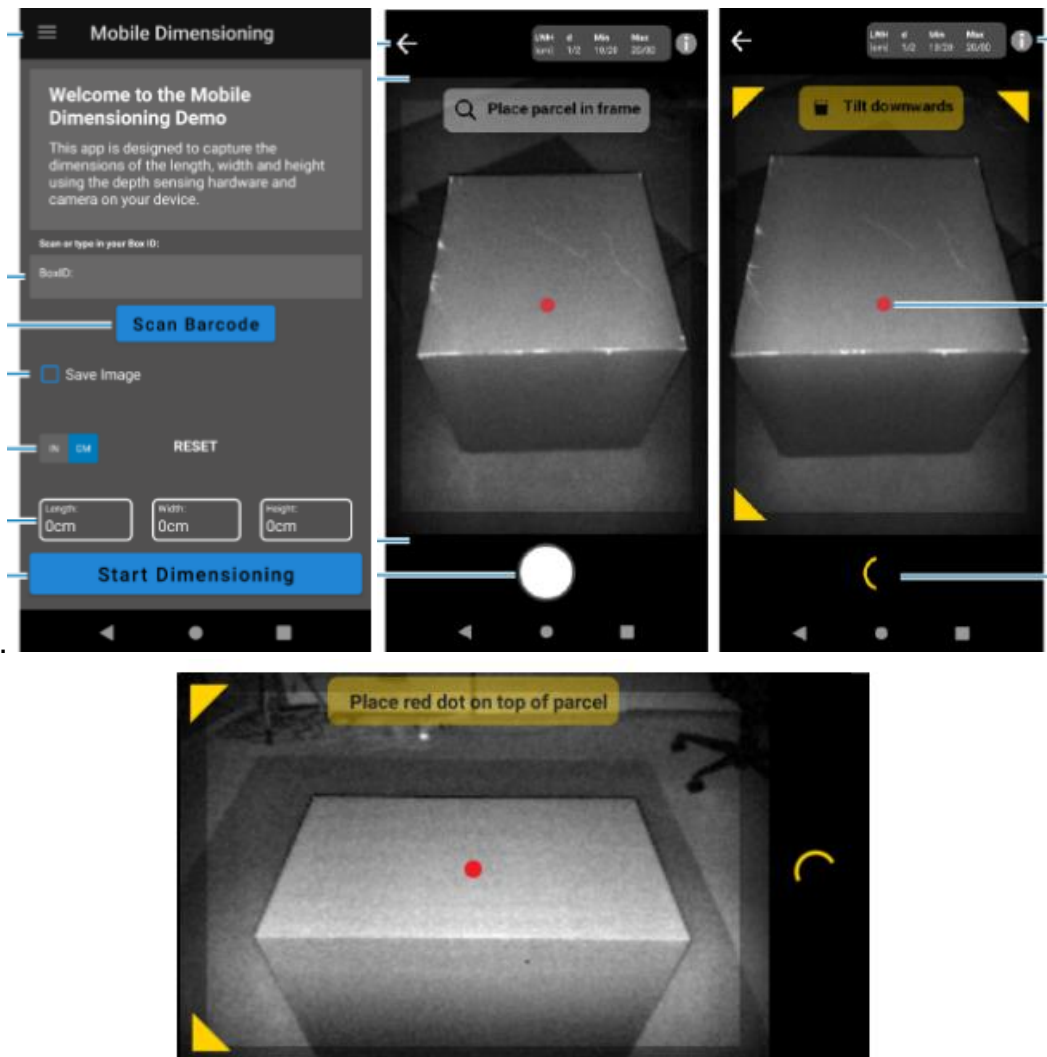
- (a) Test objects shall be used, in the shape of rectangular boxes with known linear dimensions such that each axis (i.e. length x width x height) is tested for at least five dimensions between and including the minimum and maximum dimensions (approximately) specified on the instrument nameplate. Each test object shall be rigid and with flat faces and well-defined edges. All adjacent faces and edges shall be perpendicular to each other. The dimensions of the test objects shall be equal to  $N \times d$  and the lengths shall be known to an uncertainty equal to or better than  $\pm 1/5$  of the maximum permissible error, which is equal to the scale interval ( $d$ ).  $N$  is a whole number.
- (b) Carry out at least three test runs for each length, varying position and orientation. Each measurement shall be within the maximum permissible error.
- (c) Check that instruments are marked in accordance with clause **1.5 Descriptive Markings**.

FIGURE 13/1/37 – 1



Zebra Hand-held scanner unit (Pattern and Variant 1)

FIGURE 13/1/37 – 2



Zebra Dimension Capture Software

FIGURE 13/1/37 – 3

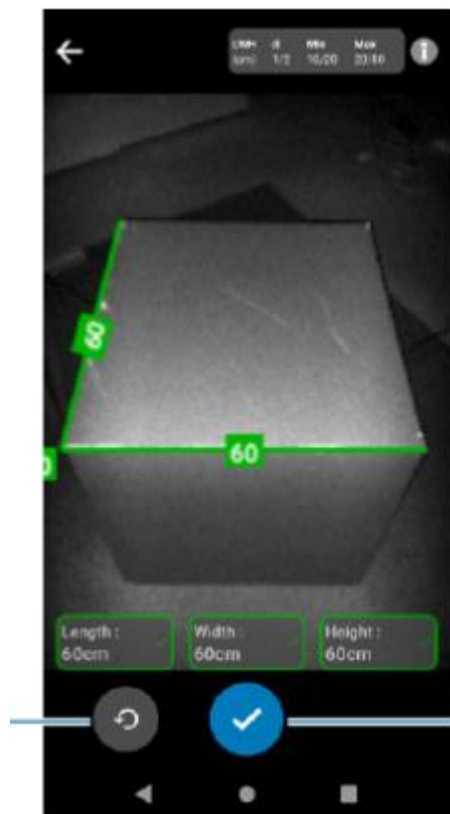
Rotate Parcel to fit in Viewfinder



1	Entire parcel is not in the viewfinder
2	Entire parcel is in the viewfinder

Zebra model TC53 hand-held scanning unit

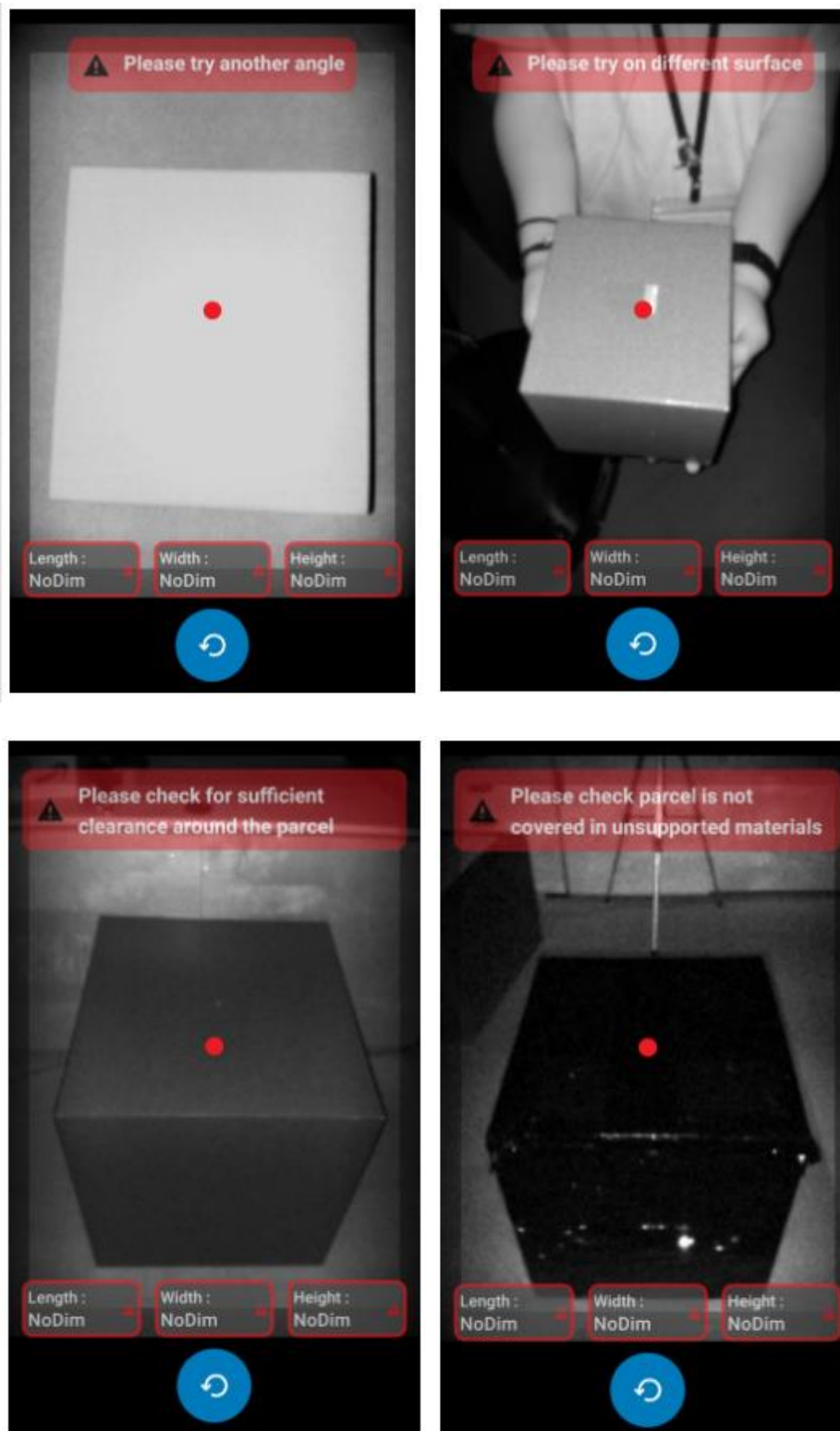
FIGURE 13/1/37 – 4



Zebra Dimension Capture Software - successful measurement



FIGURE 13/1/37 – 5



Zebra Dimension Capture Software - object could not be dimensioned

FIGURE 13/1/37 – 6

The metrological markings are placed on the back-side of the instrument:



Other information is marked below the battery compartment or in the information screen on the display:



Descriptive Markings

~ End of Document ~