Keysight N9911X Economical Waveguide Calibration Components

KEYSIGHT TECHNOLOGIES

User's Guide

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Notices

Manual Part Number

N9911-90002

Edition

August 2014

Keysight Technologies
1400 Fountaingrove Parkway
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- Click **Search**.
- Click the **Manuals** hyperlink.
- Click the hyperlink title for the document you want to print - this downloads the PDF
- Print the document after the PDF has fully downloaded.

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1 General Information

Overview

N9911X Economical Waveguide Calibration Components are used to calibrate FieldFox analyzers. With the calibration data properly loaded in the analyzer and a measurement calibration completed, systematic errors are minimized. For information on components available to purchase, refer to the online document *Keysight N9911X Economical Waveguide Calibration Components Configuration Guide* (part number N9911-90003).

Recording the Components Serial Numbers

The N9911X Economical Waveguide Components are individually serialized (serial numbers are labeled onto the body of each component). Record these serial numbers in the appropriate table. Recording the serial numbers will prevent confusion with similar components.

The N9911X calibration components are manufactured by Flann Microwave. Each component is imprinted with a Flann logo, part ID number, and serial number. To determine the Keysight option number for a component, use the cross-references in the following tables.

Table 1-1 Serial Number Record, Waveguide Designators C-Band/WR137/WG14, 5.38 – 8.18 GHz

Description	Component Serial Number	Keysight Option Number	Flann Part ID Number
Calibration Components – Metric			
Adapter 1, waveguide to type-N (male) coax		N9911X–110	14091–NM70–6332
Adapter 2, waveguide to type-N (male) coax		N9911X–110	14091–NM70–6332
Termination		N9911X–111	14045–6333
Flush short		N9911X–112	14191–6334
¼ wavelength offset shim		N9911X–113	14491–02–6335
Calibration Components – English (Imperial)			
Adapter 1, waveguide to type-N (male) coax		N9911X–115	14091–NM70–6136
Adapter 2, waveguide to type-N (male) coax		N9911X–115	14091–NM70–6136
Termination		N9911X–116	14045–3703
Flush short		N9911X–117	14191–704
¼ wavelength offset shim		N9911X–118	14491–02–3483

Table 1-2 Serial Number Record, Waveguide Designator X-Band/WR90/WG16, 8.2 – 12.5 GHz

Description	Component Serial Number	Keysight Option Number	Flann Part ID Number
Calibration Components – Metric			
Adapter 1, waveguide to type-N (male) coax		N9911X–210	16091–NM70–6336
Adapter 2, waveguide to type-N (male) coax		N9911X–210	16091–NM70–6336
Termination		N9911X–211	16045–6337
Flush short		N9911X–212	16191–6338
¼ wavelength offset shim		N9911X–213	16491–02–6339
Calibration Components – English (Imperial)			
Adapter 1, waveguide to type-N (male) coax		N9911X–215	16091–NM70–6141
Adapter 2, waveguide to type-N (male) coax		N9911X–215	16091–NM70–6141
Termination		N9911X–216	16045–5509
Flush short		N9911X–217	16191–2547
¼ wavelength offset shim		N9911X–218	16491–02–2401

Table 1-3 Serial Number Record, Waveguide Designator Ku-Band/WR62/WG18, 11.9 – 18 GHz

Description	Component Serial Number	Keysight Option Number	Flann Part ID Number
Calibration Components – Metric			
Adapter 1, waveguide to type-N (male) coax		N9911X–310	18091–NM–6340
Adapter 2, waveguide to type-N (male) coax		N9911X–310	18091–NM–6340
Termination		N9911X–311	18045–6341
Flush short		N9911X–312	18191–6342
¼ wavelength offset shim		N9911X–313	18491–02–6343
Calibration Components – English (Imperial)			
Adapter 1, waveguide to type-N (male) coax		N9911X–315	18091–NM–6024
Adapter 2, waveguide to type-N (male) coax		N9911X–315	18091–NM–6024
Termination		N9911X–316	18045–2546
Flush short		N9911X–317	18191–4127
¼ wavelength offset shim		N9911X–318	18491–02–4095

Table 1-4 Serial Number Record, Waveguide Designator K-Band/WR42/WG20, 17.6 – 26.7 GHz

Description	Component Serial Number	Keysight Option Number	Flann Part ID Number
Calibration Components – Metric			
Adapter 1, waveguide to 3.5 mm (male) coax		N9911X–310	20091–JM–2371
Adapter 2, waveguide to 3.5 mm (male) coax		N9911X–310	20091–JM–2371
Termination		N9911X–311	20045–2376
Flush short		N9911X–312	20191–6349
¼ wavelength offset shim		N9911X–313	20491–02–6351
Calibration Components – English (Imperial)			
Adapter 1, waveguide to 3.5 mm (male) coax		N9911X–315	20091–JM–2372
Adapter 2, waveguide to 3.5 mm (male) coax		N9911X–315	20091–JM–2372
Termination		N9911X–316	20045–5174
Flush short		N9911X–317	20191–6348
¼ wavelength offset shim		N9911X–318	20491–02–6350

Preventive Maintenance

The best techniques for maintaining the integrity of the components include:

- routine visual inspection
- routine cleaning
- proper connection techniques

All of these are described in Chapter 3. Failure to detect and remove dirt or metallic particles on a mating plane surface can degrade repeatability and accuracy and can damage any component mated to it. Improper connections resulting from poor connection techniques, can also damage these components.

When to Calibrate the Analyzer

An analyzer calibration remains valid as long as the changes in the systematic error are insignificant. This means that changes to the uncorrected leakages (directivity and isolation), mismatches (source match and load match), and frequency response of the system are small (<10%) relative to accuracy specifications.

Change in the environment (especially temperature) between calibration and measurement is the major cause in calibration accuracy degradation. The major effect is a change in the physical length of external and internal cables. Other important causes are dirty and damaged test port connectors and calibration standards. If the connectors become dirty or damaged, measurement repeatability and accuracy is affected. Fortunately, it is relatively easy to evaluate the general validity of the calibration. To test repeatability, remeasure one of the calibration standards. If you can not obtain repeatable measurements from your calibration standards, maintenance needs to be performed on the test port connectors, cables and calibration standards. Also, maintain at least one sample of the device under test or some known device as your reference device.

How to Calibrate the Analyzer

Your analyzer's calibration user interface prompts you through each step in a 1-port or a 2-port calibration procedure. For detailed information on using your analyzer, refer to the appropriate user guide. See "Where to Look for More Information" on page 4-3.

2 Specifications

Environmental Requirements

Table 2-1 Environmental Requirements

Parameter	Limits
Temperature	
Operating[1]	+4 °C to +40 °C
Storage	-20 °C to +70 °C

1. The temperature range over which the calibration components maintain performance to their specifications.

Temperature—What to Watch Out For

Changes in temperature can affect electrical characteristics. Therefore, the operating temperature is a critical factor in performance. During a measurement calibration, the temperature of the calibration components must be stable and within the range shown in Table 2-1.

IMPORTANT Avoid unnecessary handling of the components during calibration because your fingers act as a heat source and may increase the temperature of the component.

Typical VSWR Values

Table 2-2 and Table 2-3 list the typical VSWR values for the N9911X terminations and waveguide-to-coax adapters.

Table 2-2 Typical VSWR Values for Terminations

Keysight Option Number for Termination	Waveguide Band Designator	Thread Type	Frequency	VSWR, Maximum
N9911X–111	C-Band, WR137, WG14	Metric	5.38 to 8.18 GHz	1.10
N9911X–116		English (Imperial)		1.02
N9911X–211	X-Band, WR90, WG16	Metric	8.2 to 12.5 GHz	1.02
N9911X–216		English (Imperial)		
N9911X–311	Ku-Band, WR62, WG18	Metric	11.9 to 18 GHz	1.02
N9911X–316		English (Imperial)		
N9911X–411	K-Band, WR42, WG20	Metric	17.6 to 26.7GHz	1.03
N9911X–416		English (Imperial)		

Table 2-3 Typical VSWR Values for Waveguide-to-Coax Adapters

Keysight Option Number for Adapter	Waveguide Band Designator	Thread Type	Frequency	VSWR, Maximum
N9911X–110	C-Band, WR137, WG14	Metric	5.38 to 8.18 GHz	1.10
N9911X–115		English (Imperial)		
N9911X–210	X-Band, WR90, WG16	Metric	8.2 to 12.5 GHz	1.10
N9911X–215		English (Imperial)		
N9911X–310	Ku-Band, WR62, WG18	Metric	11.9 to 18 GHz	1.10
N9911X–315		English (Imperial)		
N9911X–410	K-Band, WR42, WG20	Metric	17.6 to 26.7GHz	1.20
N9911X–415		English (Imperial)		

Instrument Interface Specifications

Table 2-4 N9911X Instrument Interface Specifications

Waveguide Band Designator	Thread Type	Compatible Flange Type
C-Band/ WR137/ WG14	Metric	Flange (UAR 70, PAR 70, CAR 70, UDR 70, RDR 70, PDR 70)
	English (Imperial)	Flange (UG-441/U, UG-344/U, UG-343B/U, UG-440B/U, UG-1733/U, UG-1732/U, UG-1356/U, UG-1357/U, CPR 137F, CPR 137G)
X-Band/ WR90/ WG16	Metric	Flange (UBR 100, PBR 100, CBR 100, UDR 100, PDR 100, RDR 100)
	English (Imperial)	Flange (UG-39/U, UG-135/U, M3922/53-009, M3922/53-010, M3922/53-015, M3922/53-016, UG-40B/U, UG-136B/U, M3922/59-013, M3922/59-014, UG-1736/U, UG-1737/U, UG-1360/U, UG-1361/U, CPR 90F, CPR 90G)
Ku-Band/ WR62/ WG18	Metric	Flange (UBR 140, PBR 140, CBR 140, UDR 140, PDR 140, RDR 140)
	English (Imperial)	Flange (UG-419A/U, UG-1665/U, M3922/53-011, M3922/53-012, M3922/53-017, M3922/53-018, UG-541A/U, UG-1666/U)
K-Band/ WR42/ WG20	Metric	Flange (UBR 220, PBR 220, CBR 220, UDR 220, PDR 220, RDR 220)
	English (Imperial)	Flange (UG-595/U, UG-597/U, UG596A/U, UG-598A/U, M3922/70-027, M3922/70-028)

Dimension Specifications

Table 2-5 N9911X Dimension Specifications

Component	Parameter	WR137	WR90	WR62	WR42
Adapter, waveguide-to-coax	Waveguide aperture tolerance	46 um MAX	25 um MAX	23 um MAX	20 um MAX
Termination	Waveguide aperture tolerance	46 um MAX	25 um MAX	23 um MAX	20 um MAX
Flush short	Shorting face flatness	25 um	25 um	25 um	25 um
1/4 wavelength offset shim	Waveguide aperture tolerance	46 um MAX, 14.711 mm +/– 45 um	25 um MAX, 9.63 mm +/– 35 um	23 um MAX, 6.668 mm +/– 30 um	20 um MAX, 4.501 mm +/– 25 um

NOTE Refer to the Appendix for graphics showing the component dimensions.

3 Use, Maintenance, and Care of the Components

Electrostatic Discharge

Protection against electrostatic discharge (ESD) is essential while connecting, inspecting, or cleaning connectors attached to a static-sensitive circuit (such as those found in test sets).

Static electricity can build up on your body and can easily damage sensitive internal circuit elements when discharged. Static discharges too small to be felt can cause permanent damage. Devices such as calibration components and devices under test (DUT), can also carry an electrostatic charge. To prevent damage to the test set, components, and devices:

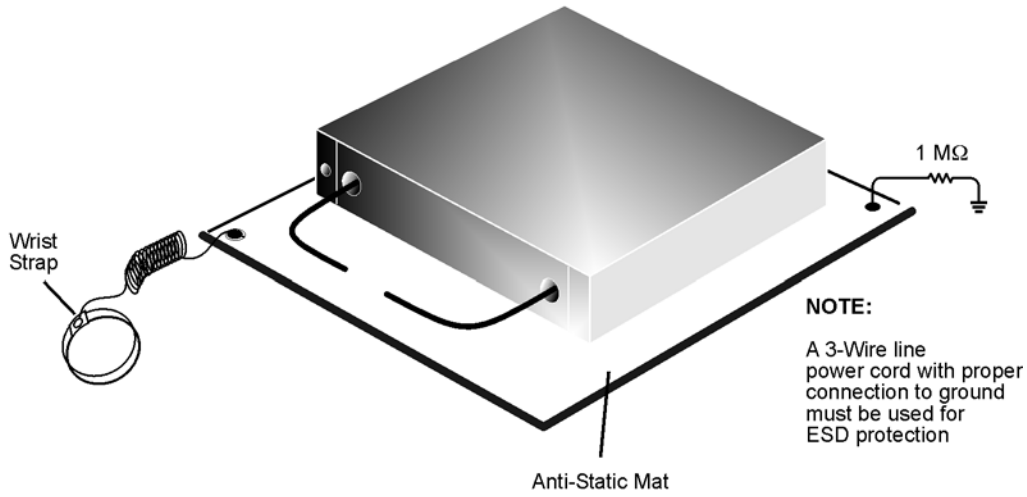
- *always* wear a grounded wrist strap having a 1 MW resistor in series with it when handling components and devices or when making connections to the test set.
- *always* use a grounded antistatic mat in front of your test equipment.
- *always* wear a heel strap when working in an area with a conductive floor. If you are uncertain about the conductivity of your floor, wear a heel strap.
- *always* ground yourself before you clean, inspect, or make a connection to a static-sensitive device or test port. You can, for example, grasp the grounded outer shell of the test port or cable connector briefly.
- *always* ground the center conductor of a test cable before making a connection to the analyzer test port or other static-sensitive device. This can be done as follows:

  1. Connect a short to one end of the cable to short the center conductor to the outer conductor.
  2. While wearing a grounded wrist strap, grasp the outer shell of the cable connector.
  3. Connect the other end of the cable to the test port.

- Remove the short from the cable.

Figure 3-1 shows a typical ESD protection setup using a grounded mat and wrist strap.

Figure 3-1 ESD Protection Setup



esd_setup

Visual Inspection

Visual inspection and, if necessary, cleaning should be done every time a connection is made. Inspect mating surfaces for dirt, dust, foreign particles, or scratches, which can degrade component performance. A damaged mating surface can damage any good surface connected to it. If necessary, clean all mating surfaces.

Magnification is helpful when inspecting mating surfaces, but it is not required and may actually be misleading. Defects and damage that cannot be seen without magnification generally have no effect on electrical or mechanical performance. Magnification is of great use in analyzing the nature and cause of damage and in cleaning mating surfaces, but it is not required for inspection.

Cleaning the Mating Plane Surfaces

1. **Use Compressed Air or Nitrogen**

WARNING **Always use protective eyewear when using compressed air or nitrogen.**

Use compressed air (or nitrogen) to loosen particles on the mating plane surfaces. Clean air cannot damage a component or leave particles or residues behind.

You can use any source of clean, dry, low-pressure compressed air or nitrogen that has an effective oil-vapor filter and liquid condensation trap placed just before the outlet hose.

Ground the hose nozzle to prevent electrostatic discharge, and set the air pressure to less than 414 kPa (60 psi) to control the velocity of the air stream. High-velocity streams of compressed air can cause electrostatic effects when directed into a component. These electrostatic effects can damage the component. Refer to "Electrostatic Discharge" earlier in this chapter for additional information.

WARNING **Keep isopropyl alcohol away from heat, sparks, and flame. Store in a tightly closed container. It is extremely flammable. In case of fire, use alcohol foam, dry chemical, or carbon dioxide; water may be ineffective.**

Use isopropyl alcohol with adequate ventilation and avoid contact with eyes, skin, and clothing. It causes skin irritation, may cause eye damage, and is harmful if swallowed or inhaled. It may be harmful if absorbed through the skin. Wash thoroughly after handling.

In case of spill, soak up with sand or earth. Flush spill area with water.

Dispose of isopropyl alcohol in accordance with all applicable federal, state, and local environmental regulations.

2. **Clean the Mating Plane Surfaces**
   a. Apply a small amount of isopropyl alcohol to a lint-free cleaning swab.
   b. Clean the mating plane surfaces.
   c. Let the alcohol evaporate, then blow the mating plane surface dry with a gentle stream of clean, low-pressure compressed air or nitrogen. Always completely dry a component before you reassemble or use it.
3. **Inspect**
   a. Inspect the mating plane surface to make sure that no particles or residue remain. "Visual Inspection" on page 3-3.

Connections

Good connections require a skilled operator. Slight errors in operator technique can have a significant effect on measurements and measurement uncertainties*. The most common cause of measurement error is poor connections.*

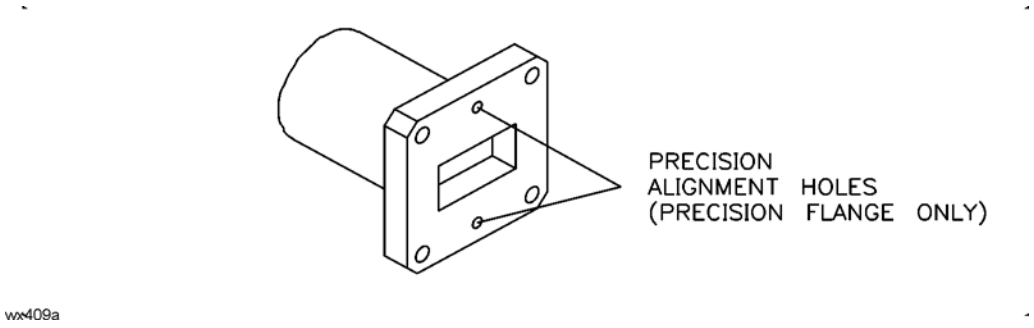
The following procedures illustrate how to make good connections.

IMPORTANT Unlike threaded components, the WR-90, WR-62, WR-42 waveguide mating planes are flanges that you must carefully screw together. Always connect waveguide in the same flange orientation. For example, use the label as a reference and always connect components with the labels facing the same direction.

Aligning Two Precision Flanges

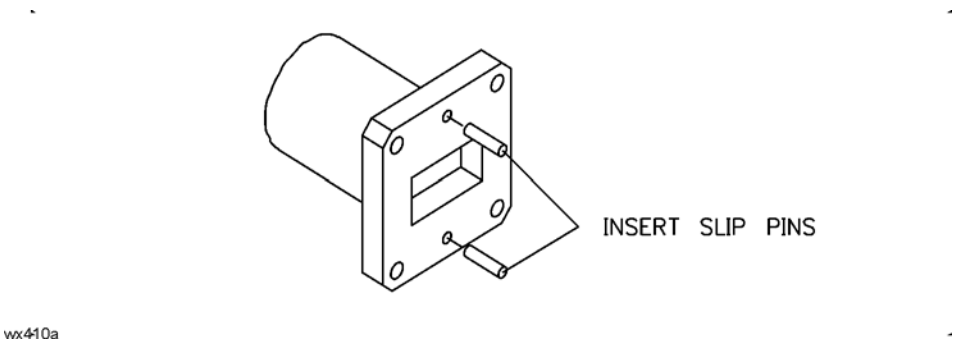
A precision flange has two precision alignment holes, as shown in Figure 3-2. A non-precision flange has only screw holes*.*

Figure 3-2 Precision Alignment Holes



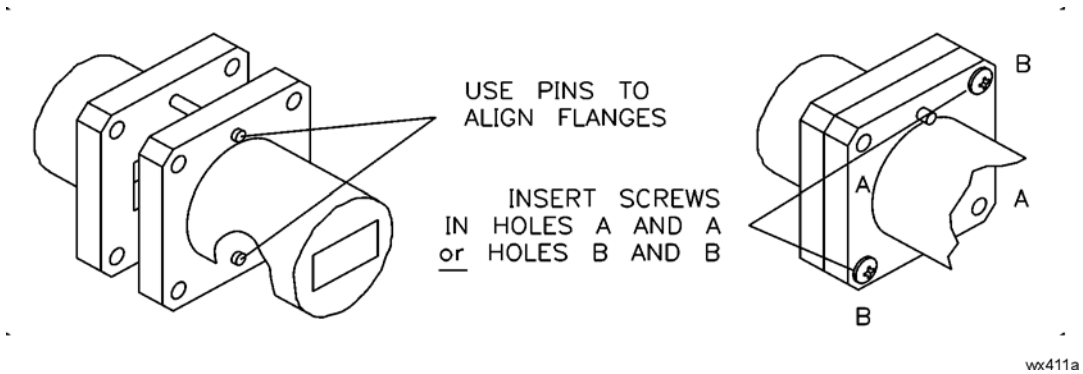
1. Place the slip pins in the top and bottom holes of one flange, as shown in Figure 3-3.

Figure 3-3 Inserting Slip Pins



2. Using the pins as guides for the adapter, offset shim, and waveguide-to-coax adapter, carefully align the flanges and insert two screws in the diagonal corner holes, as shown in Figure 3-4.

Figure 3-4 Aligning Flanges



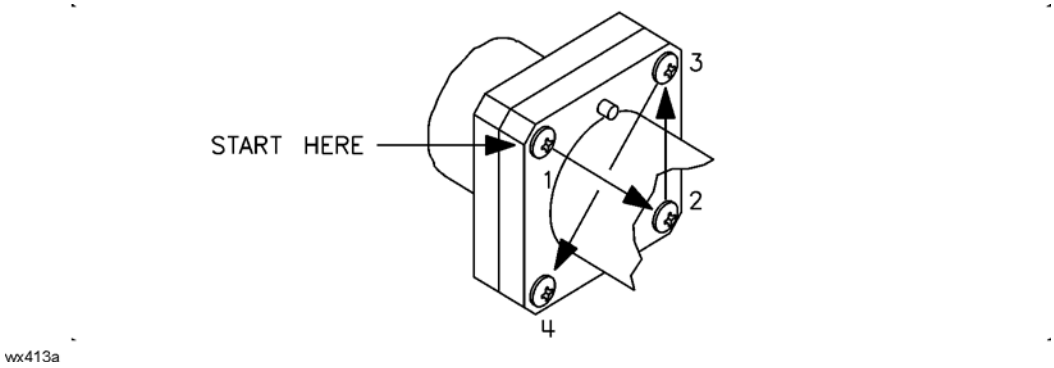
3. Place a lock washer and nut on each screw, and finger tighten.
4. Insert the remaining two screws.
5. Place a lock washer and nut on each screw, and finger tighten.
6. Remove the slip pins.
7. Go to "Tightening a Flange Connection" on page 3-7.

Tightening a Flange Connection

NOTE The best connection has symmetrical pressure applied as you gradually tighten the screws.

1. In an "X" pattern (for equal compression), tighten all four screws using a hex ball driver. Do *not* over-tighten. See Figure 3-5.
2. Visually inspect the connection. Refer to the following section "Inspecting a Flange Connection."

Figure 3-5 "X" Screw Pattern



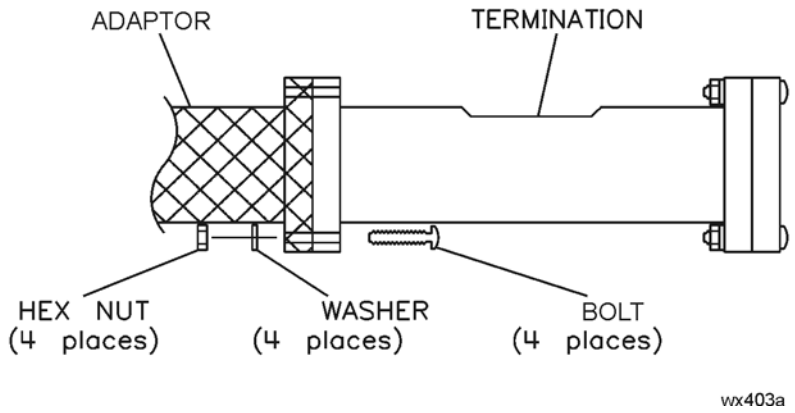
Inspecting a Flange Connection

Inspect the flange connection as follows:

1. Place an electric light or white paper behind the connection.
2. Check the flange matings for any gap. A good connection has no gaps between the connected waveguide flanges, and the waveguide walls are flush. There is no step or offset.
3. Ensure that all four screws are equally tight.

Connecting a Termination to a Waveguide-to-Coax Adapter

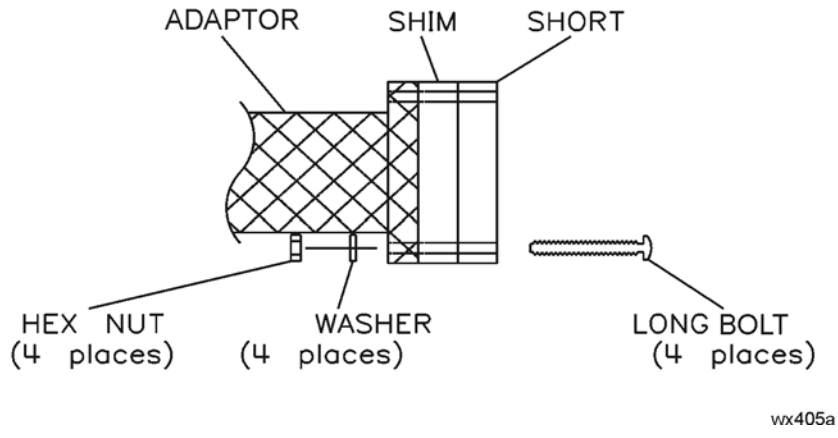
Figure 3-6 Termination and Adapter



Connecting an Offset Shim Between a Flush Short and Waveguide-to-Coax Adapter

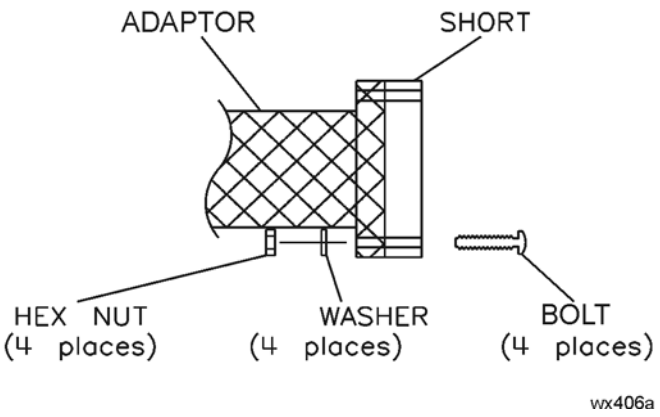
Create an offset short by connecting the offset shim between the short and the appropriate adapter, as shown in Figure 3-7.

Figure 3-7 Shim, Flush Short, and Adapter (Creates an Offset Short)



Connecting a Flush Short to a Waveguide-to-Coax Adapter

Figure 3-8 Flush Short and Adapter



Handling and Storage

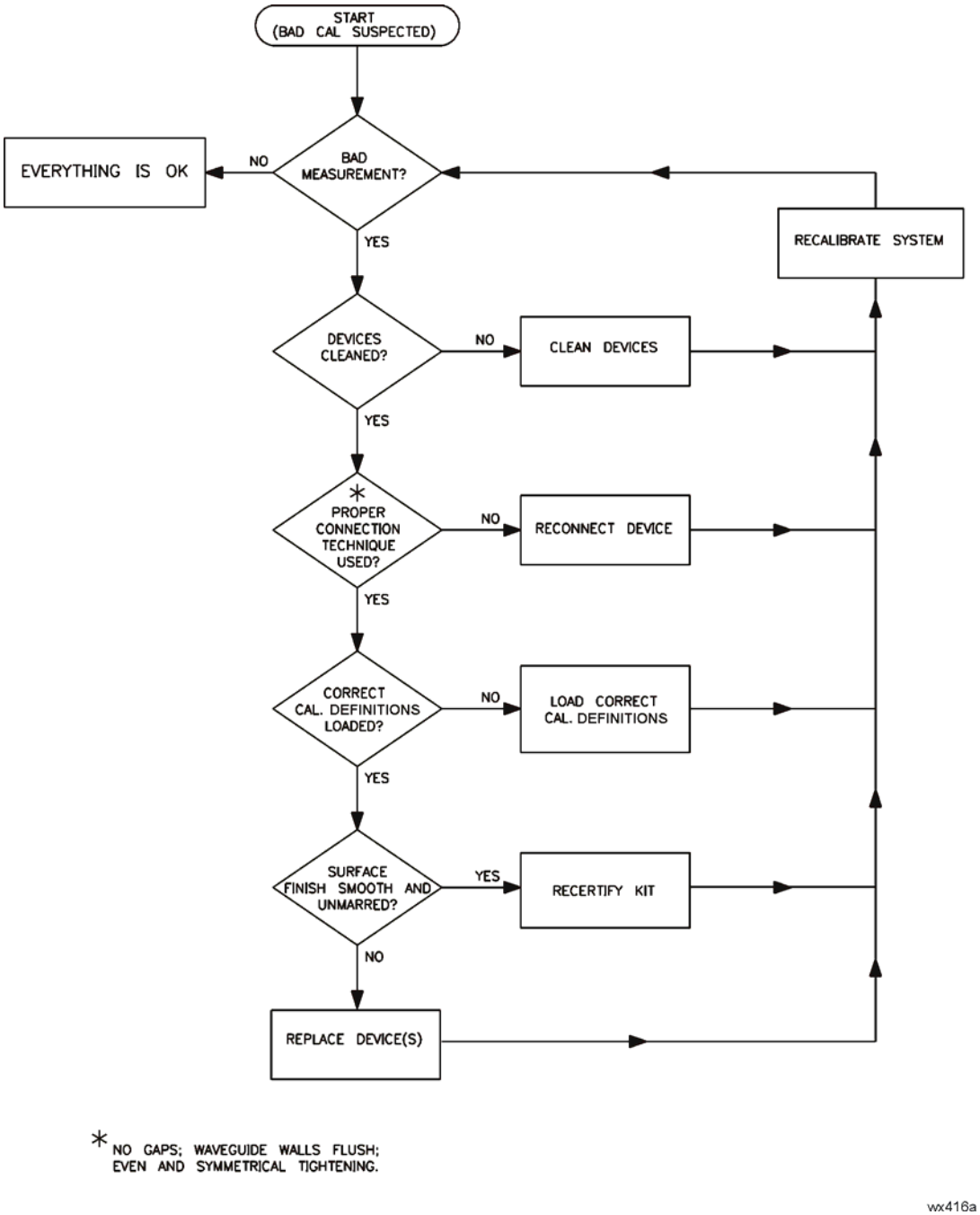
- Install the protective end caps and store the calibration components when not in use.
- Never store components loose in a box, or in a desk or bench drawer. This is the most common cause of component damage during storage.
- Keep components clean.
- Do not touch mating plane surfaces. Natural skin oils and microscopic particles of dirt are easily transferred to a component and are very difficult to remove.
- Do not set components contact-end down on a hard surface. The plating and the mating plane surfaces can be damaged if the interface comes in contact with any hard surface.

4 Troubleshooting

Troubleshooting Process

If you suspect a bad calibration, or if your analyzer does not pass performance verification, follow the steps in Figure 4-1

Figure 4-1 Troubleshooting Flowchart



Where to Look for More Information

This manual contains limited information about analyzer system operation. For detailed information on using a FieldFox analyzer, refer to the appropriate user guide.

To view an online FieldFox user guide, use the following steps:

1. Go to *www.keysight.com*.
2. Enter your FieldFox model number (Ex: N9928A) in the Search box and click **Search**.
3. Click **Manuals.**
4. Click the title/hyperlink for the document PDF you want to view.

If you need additional information, see "Contacting Keysight" on page 4-4.

Returning a Component to Keysight

If an N9911X component requires service, contact Keysight Technologies for information on where to send it - see "Contacting Keysight" on page 4-4. Please provide the following information:

- your company name and address
- a technical contact person within your company, and the person's complete telephone number
- the Keysight option number, Flann part ID number, and serial number of the component (refer to "Recording the Components Serial Numbers" on page 1-3)
- the type of service required
- a *detailed* description of the problem and how the component was being used when the problem occurred

NOTE When returning a component to Keysight, install the protective end caps on the component.

Contacting Keysight

Assistance with test and measurement needs and information on finding a local Keysight office are available on the Web at:
www.keysight.com/find/assist

If you do not have access to the Internet, please contact your Keysight field engineer.

NOTE In any correspondence or telephone conversation, refer to the Keysight product by its model number and full serial number. With this information, the Keysight representative can determine whether your product is still within its warranty period.

5 Component Dimensions

Table 5-1 List of Figures

Figure Title and Location

Table 5-1 List of Figures

Table 5-1 List of Figures

Figure Title and Location

Flange Dimensions

NOTE The dimensions shown in the following graphics are in millimeters.

Figure 5-1 Flange, Waveguide Designators C-Band/WR137/WG14, Metric

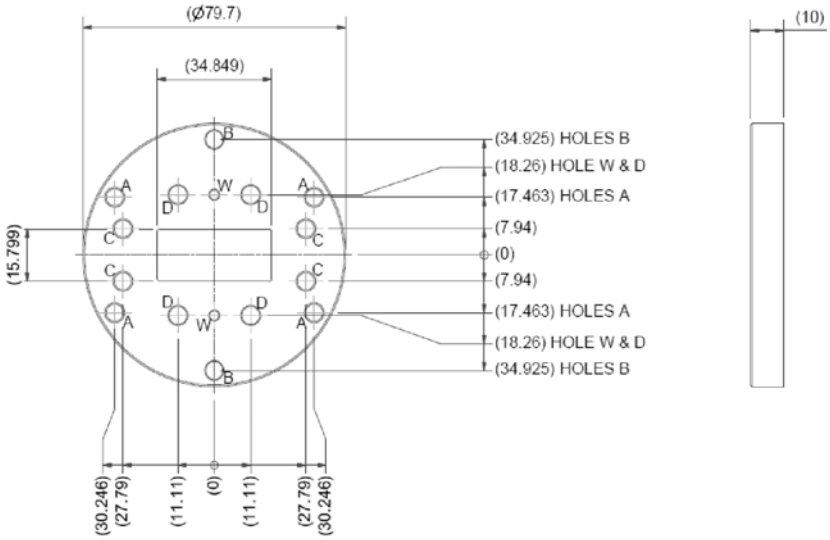
UAR 70 HOLES	
HOLE	DESCRIPTION
A	Ø5.155± 0.015 THRU
B	Ø5.38± 0.24 THRU

UDR 70 HOLES	
HOLE	DESCRIPTION
C	Ø5.155± 0.015 THRU
D	Ø5.38± 0.24 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	$\emptyset^{3.2}_{3.19}$ THRU ON FINISHED COMPONENTS

FLANGE PROFILE BASED ON:- UAR 70
FLANGE THICKNESS BASED ON: - UDR 70

INTERFACE COMPATABLE WITH:-
UAR 70, PAR 70, CAR 70,
UDR 70, RDR 70, PDR 70



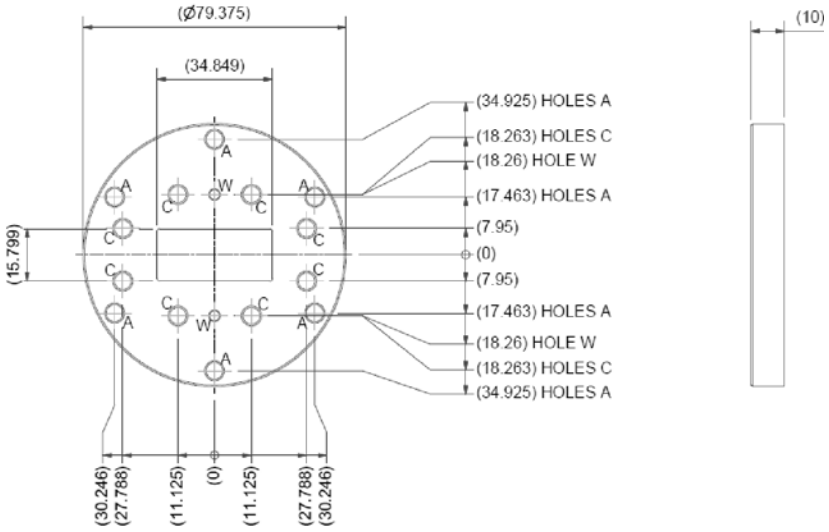
N9911_002_201

Figure 5-2 Flange, Waveguide Designators C-Band/WR137/WG14, English (Imperial)

UG-344/U HOLES	
HOLE	DESCRIPTION
A	Ø5.105± 0.05 THRU

UG-1732/U HOLES	
HOLE	DESCRIPTION
C	Ø5.029± 0.05 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	$\emptyset\ ^{3.2}_{3.19}$ THRU ON FINISHED COMPONENTS



FLANGE PROFILE BASED ON:- UG-344/U
FLANGE THICKNESS BASED ON: - UDR 70

INTERFACE COMPATABLE WITH:-
UG-344/U, UG-441/U,
UG-343B/U, UG-440B/U
UG-1732/U, UG-1733/U, UG-1356/U, UG-1357/U,
CPR 137 F, CPR 137 G

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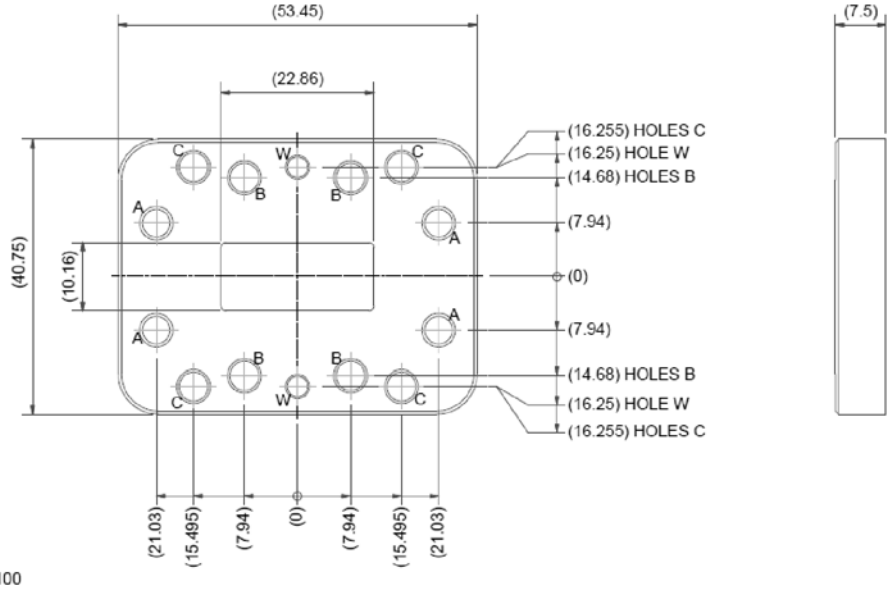
Figure 5-3 Flange, Waveguide Designators X-Band/WR90/WG16, Metric

UDR 100 HOLES	
HOLE	DESCRIPTION
A	Ø4.085± 0.015 THRU
B	Ø4.31± 0.24 THRU

UBR 100 HOLES	
HOLE	DESCRIPTION
C	Ø4.255± 0.015 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	$\emptyset\ ^{3.2}_{3.19}$ THRU ON FINISHED COMPONENTS



FLANGE PROFILE BASED ON:- UDR 100
FLANGE THICKNESS BASED ON: - UDR 100

INTERFACE COMPATABLE WITH:-
UDR 100, RDR 100, PDR 100,
UBR 100, PBR 100, CBR 100

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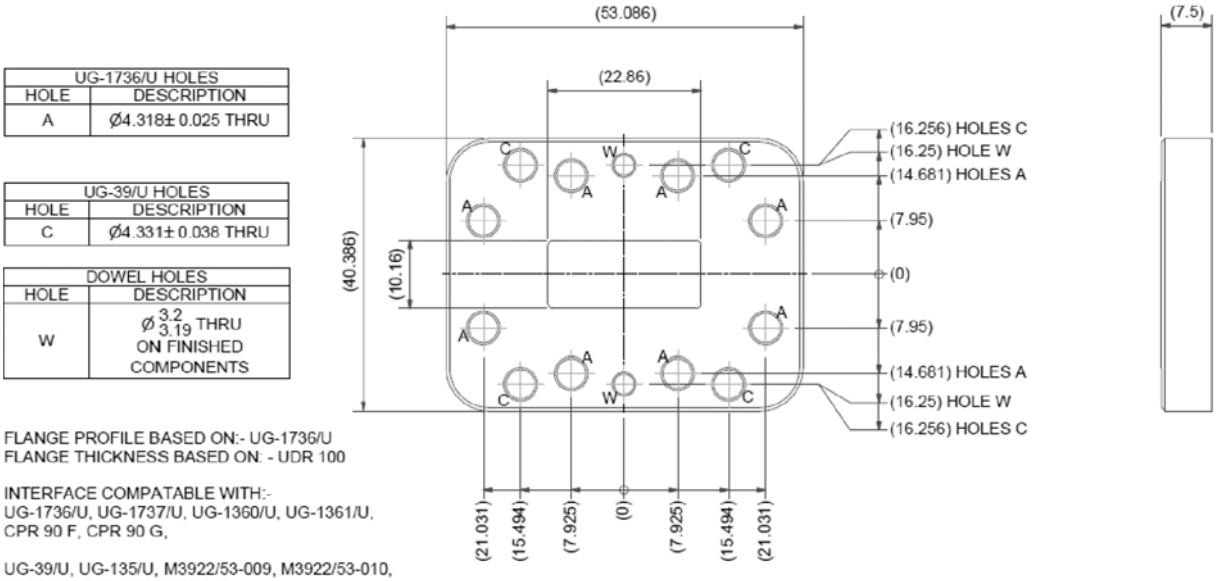
Figure 5-4 Flange, Waveguide Designators X-Band/WR90/WG16, English (Imperial)



UG-1736/U HOLES	
HOLE	DESCRIPTION
A	Ø4.318± 0.025 THRU

UG-39/U HOLES	
HOLE	DESCRIPTION
C	Ø4.331± 0.038 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	$\emptyset\ ^{3.2}_{3.19}$ THRU ON FINISHED COMPONENTS

FLANGE PROFILE BASED ON:- UG-1736/U
FLANGE THICKNESS BASED ON: - UDR 100

INTERFACE COMPATABLE WITH:-
UG-1736/U, UG-1737/U, UG-1360/U, UG-1361/U,
CPR 90 F, CPR 90 G,

UG-39/U, UG-135/U, M3922/53-009, M3922/53-010,
M3922/53-015, M3922/53-016,
M3922/54-007, M3922/54-008, M3922/54-013, M3922/54-14
UG-40B/U, UG-136B/U, M3922/59-013, M3922/59-014

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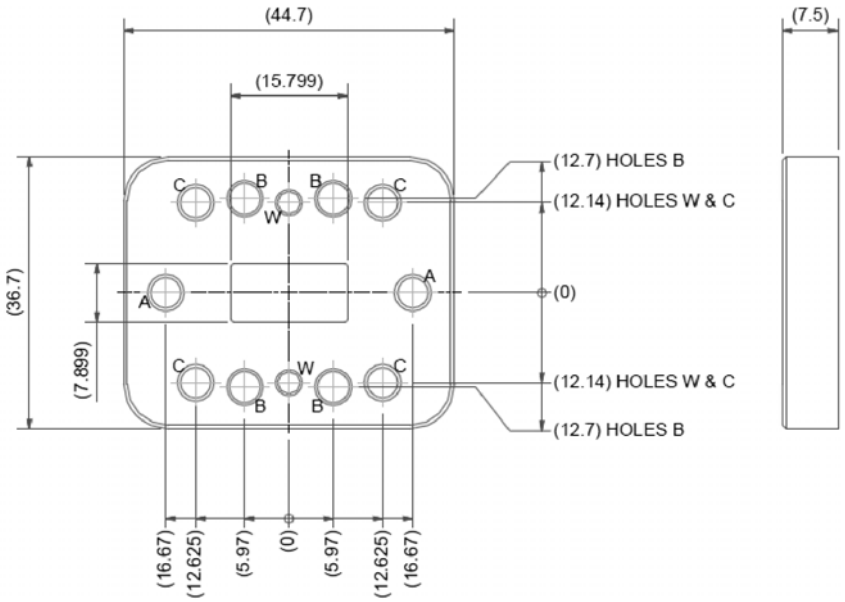
Figure 5-5 Flange, Waveguide Designators Ku-Band/WR62/WG18, Metric



UDR 140 HOLES	
HOLE	DESCRIPTION
A	Ø4.085± 0.015 THRU
B	Ø4.31± 0.24 THRU

UBR 140 HOLES	
HOLE	DESCRIPTION
C	Ø4.085± 0.015 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	$\emptyset\ ^{3.2}_{3.19}$ THRU ON FINISHED COMPONENTS

FLANGE PROFILE BASED ON:- UDR 140
FLANGE THICKNESS BASED ON: - UDR 140

INTERFACE COMPATABLE WITH:-
UDR 140, RDR 140, PDR 140,
UBR 140, PBR 140, CBR 140

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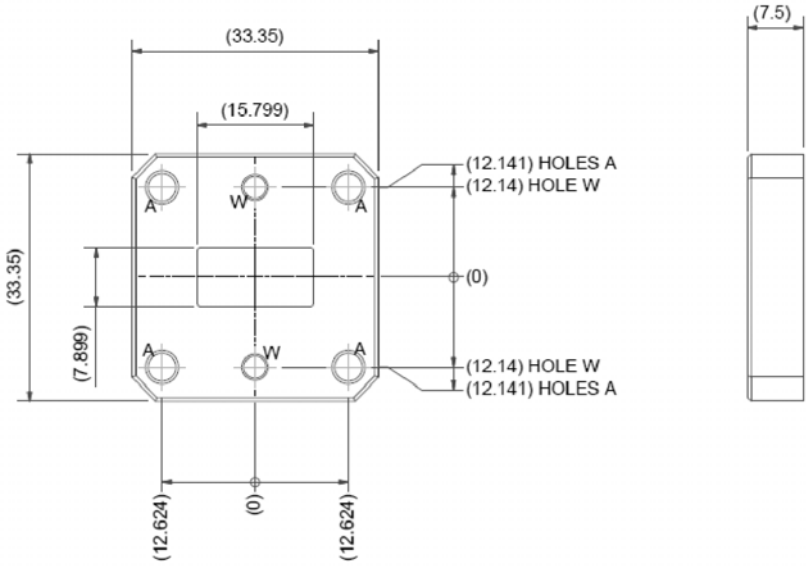
Figure 5-6 Flange, Waveguide Designators Ku-Band/WR62/WG18, English (Imperial)

UG-419/U HOLES	
HOLE	DESCRIPTION
A	Ø3.696± 0.038 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	$\emptyset\,^{3.2}_{3.19}$ THRU ON FINISHED COMPONENTS



FLANGE PROFILE BASED ON:- UG-419/U
FLANGE THICKNESS BASED ON: - UDR 140

INTERFACE COMPATABLE WITH:-
UG-419/U, UG-1665/U,
M3922/53-011, M3922/53-012, M3922/53-017, M3922/53-018,
M3922/54-009, M3922/54-010,
UG-541A/U, UG-1666/U,
M3922/70-007, M3922/70-008, M3922/70-019, M3922/70-020,

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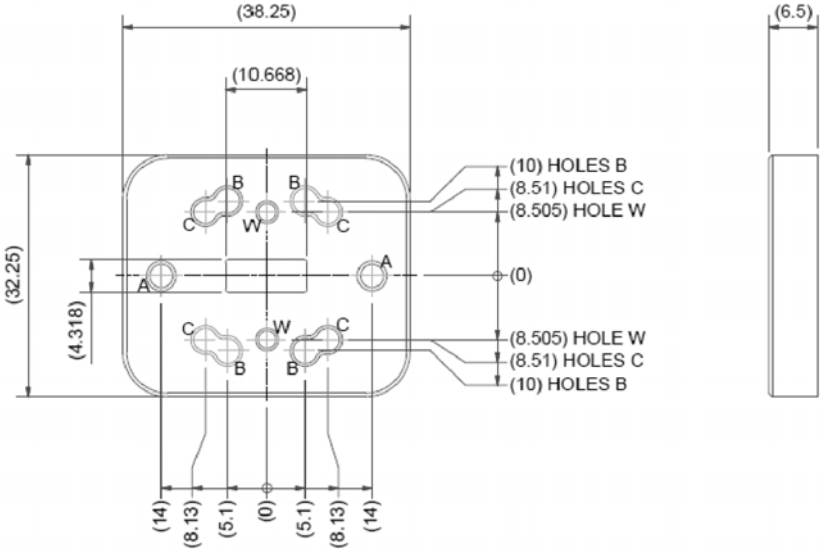
Figure 5-7 Flange, Waveguide Designators K-Band/WR42/WG20, Metric

UDR 220 HOLES	
HOLE	DESCRIPTION
A	Ø3.0725± 0.0125 THRU
B	Ø3.26± 0.2 THRU

UBR 220 HOLES	
HOLE	DESCRIPTION
C	Ø3.0725± 0.0125 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	$\emptyset\,^{2.39}_{2.38}$ THRU ON FINISHED COMPONENTS



FLANGE PROFILE BASED ON:- UDR 220
FLANGE THICKNESS BASED ON: - UDR 220

INTERFACE COMPATABLE WITH:-
UDR 220, RDR 220, PDR 220,
UBR 220, PBR 220, CBR 220

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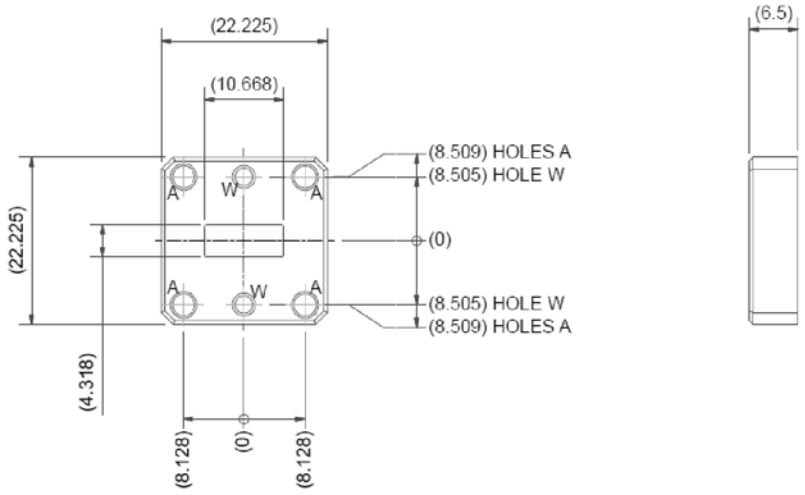
Figure 5-8 Flange, Waveguide Designators K-Band/WR42/WG20, English (Imperial)

UG-595/U HOLES	
HOLE	DESCRIPTION
A	Ø2.972± 0.025 THRU

DOWEL HOLES	
HOLE	DESCRIPTION
W	Ø 2.39 / 2.38 THRU ON FINISHED COMPONENTS



FLANGE PROFILE BASED ON:- UG-595/U
FLANGE THICKNESS BASED ON: - UDR 220

INTERFACE COMPATABLE WITH:-
UG-595/U, UG-597/U,
UG-596A/U, UG598A/U,
M3922/70-027, M3922/70-028

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Waveguide-to-Coax Adapter Dimensions

NOTE The dimensions shown in the following graphics are in millimeters.

Figure 5-9 Adapter, Waveguide Designators C-Band/WR137/WG14, Metric, Keysight Part Number N9911X-110

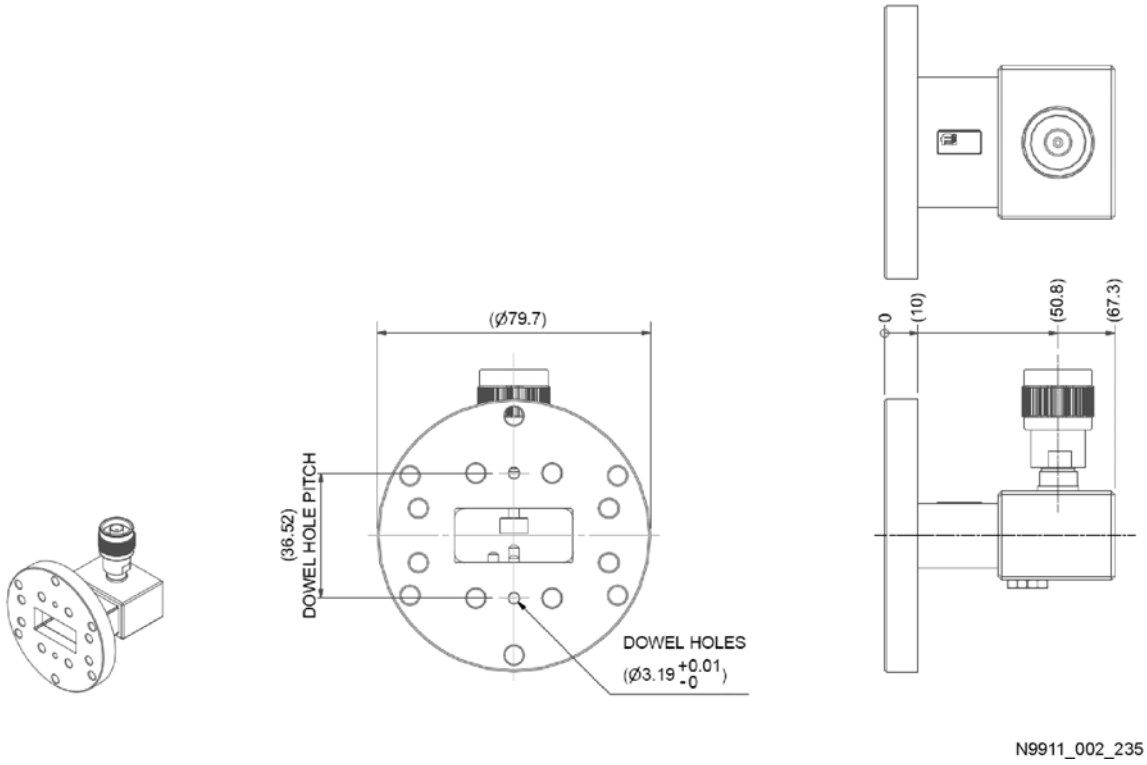


Figure 5-10 Adapter, Waveguide Designators C-Band/WR137/WG14, English (Imperial), Keysight Part Number N9911X-115

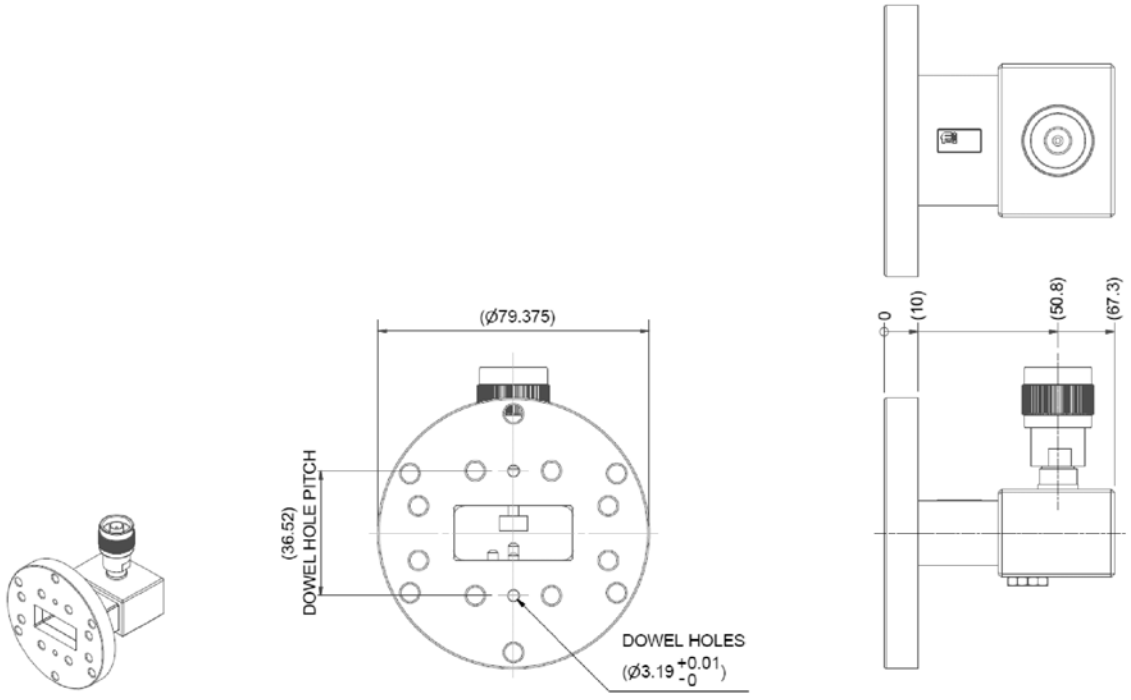


Figure 5-11 Adapter, Waveguide Designators X-Band/WR90/WG16, Metric, Keysight Part Number N9911X-210

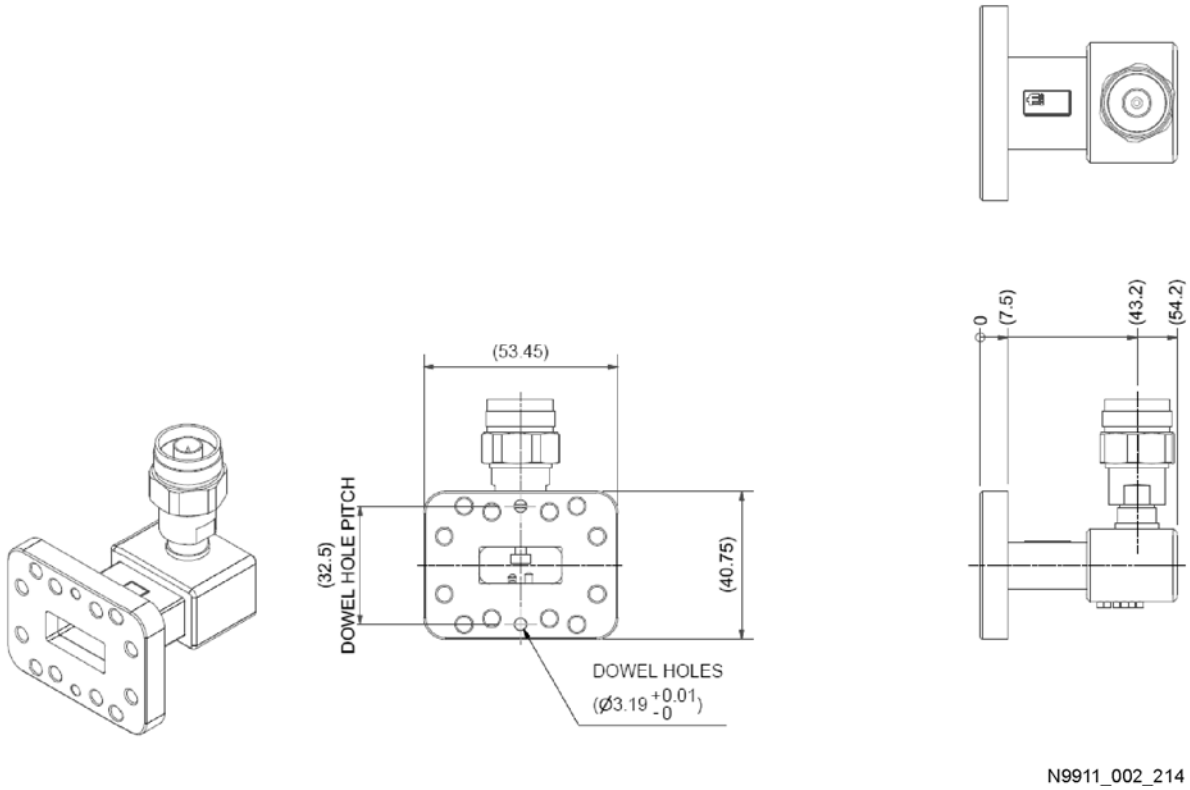


Figure 5-12 Adapter, Waveguide Designators X-Band/WR90/WG16, English (Imperial), Keysight Part Number N9911X-215

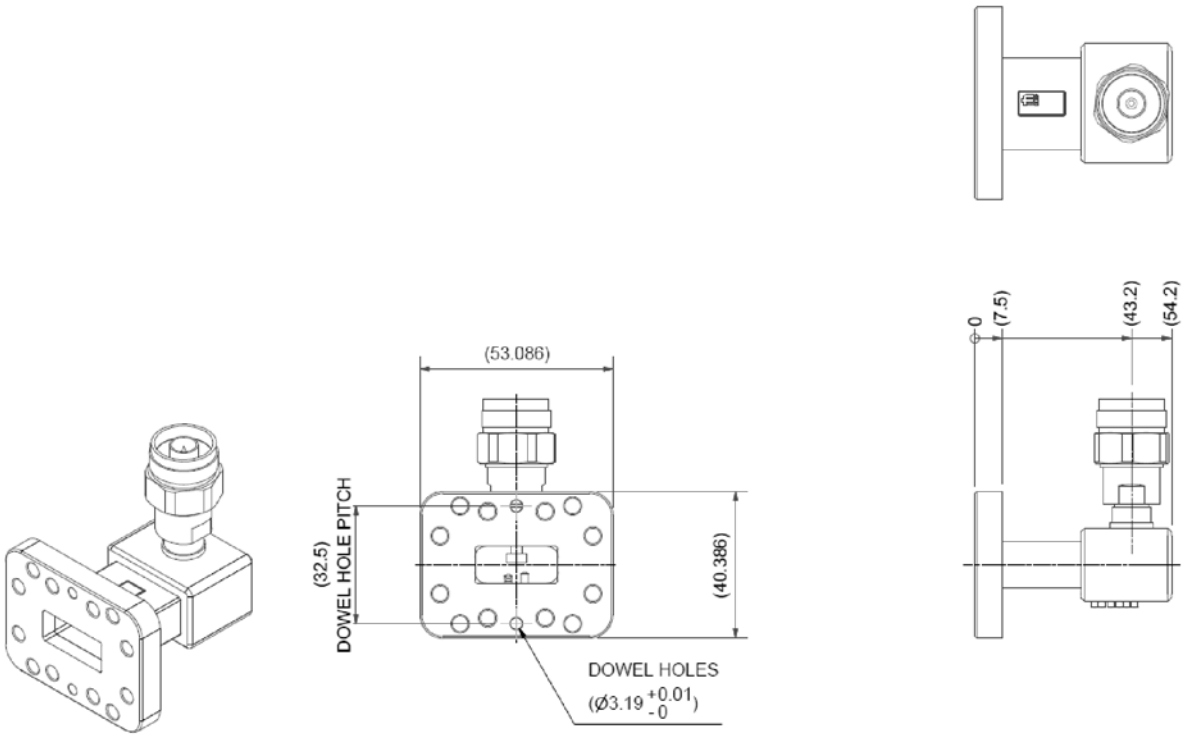


Figure 5-13 Adapter, Waveguide Designators Ku-Band/WR62/WG18, Metric, Keysight Part Number N9911X-310

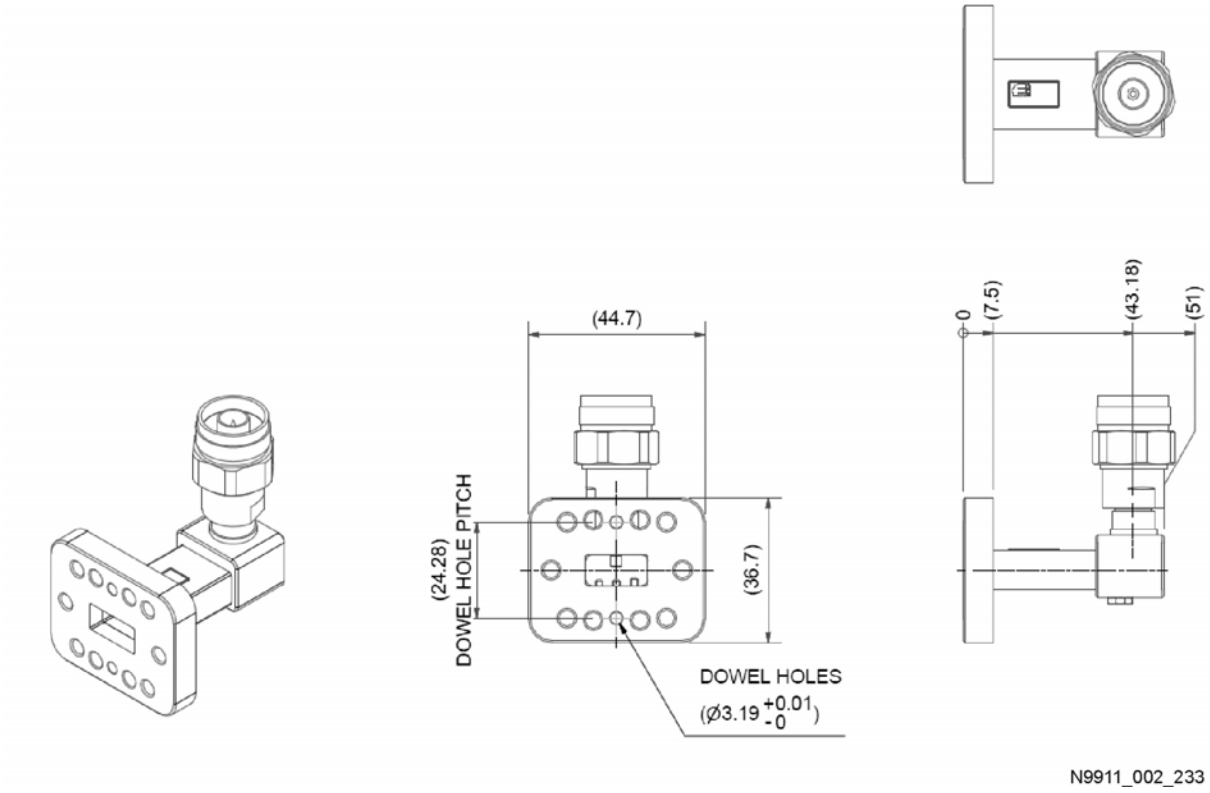


Figure 5-14 Adapter, Waveguide Designators Ku-Band/WR62/WG18, English (Imperial), Keysight Part Number N9911X-315

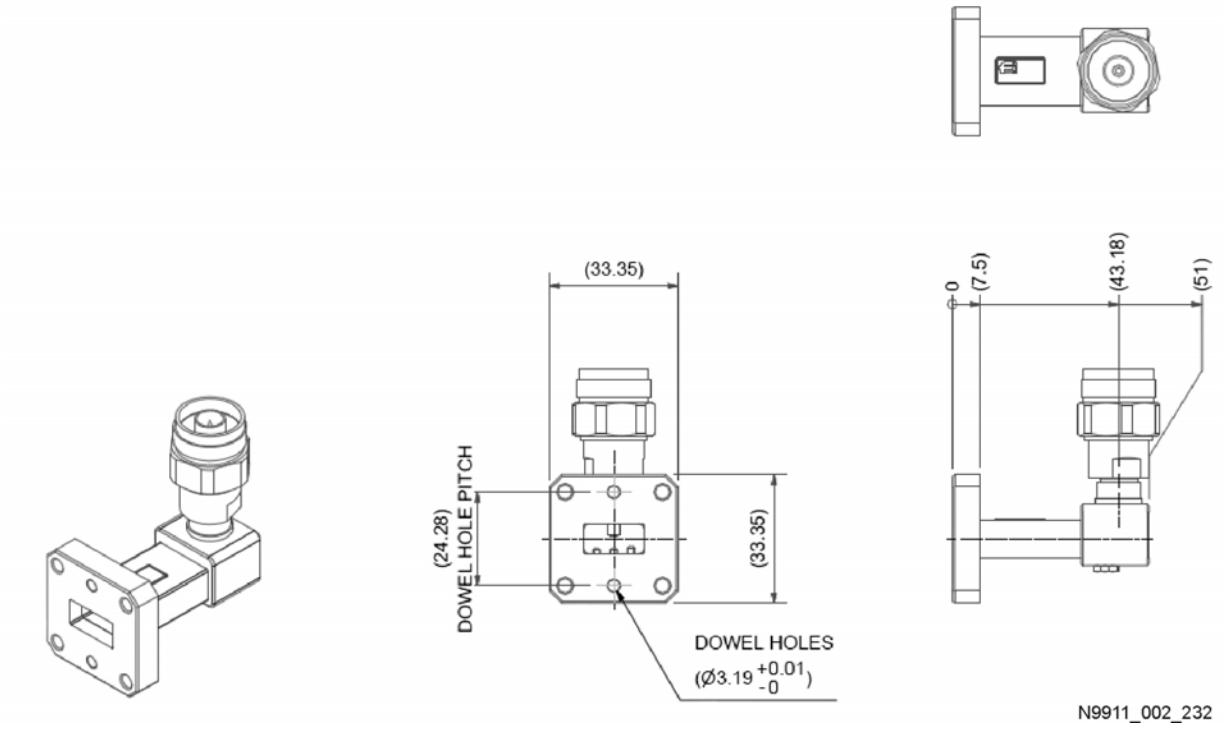


Figure 5-15 Adapter, Waveguide Designators K-Band/WR42/WG20, Metric, Keysight Part Number N9911X-410

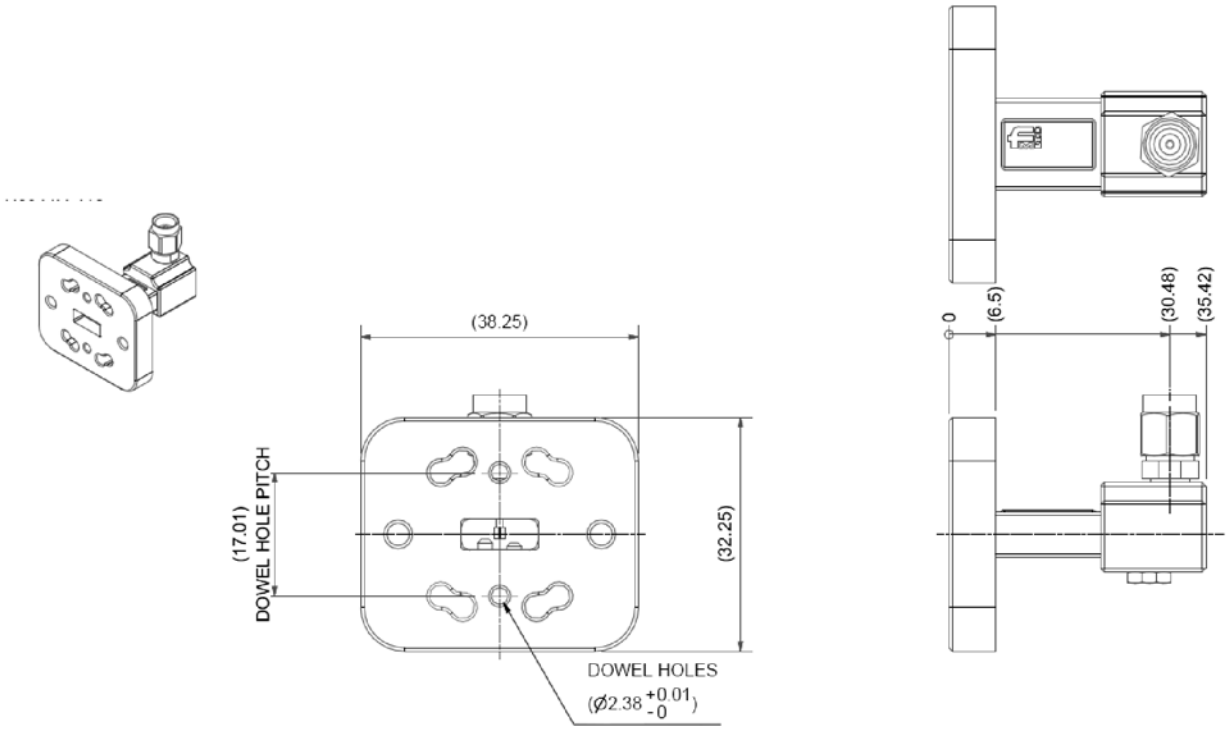
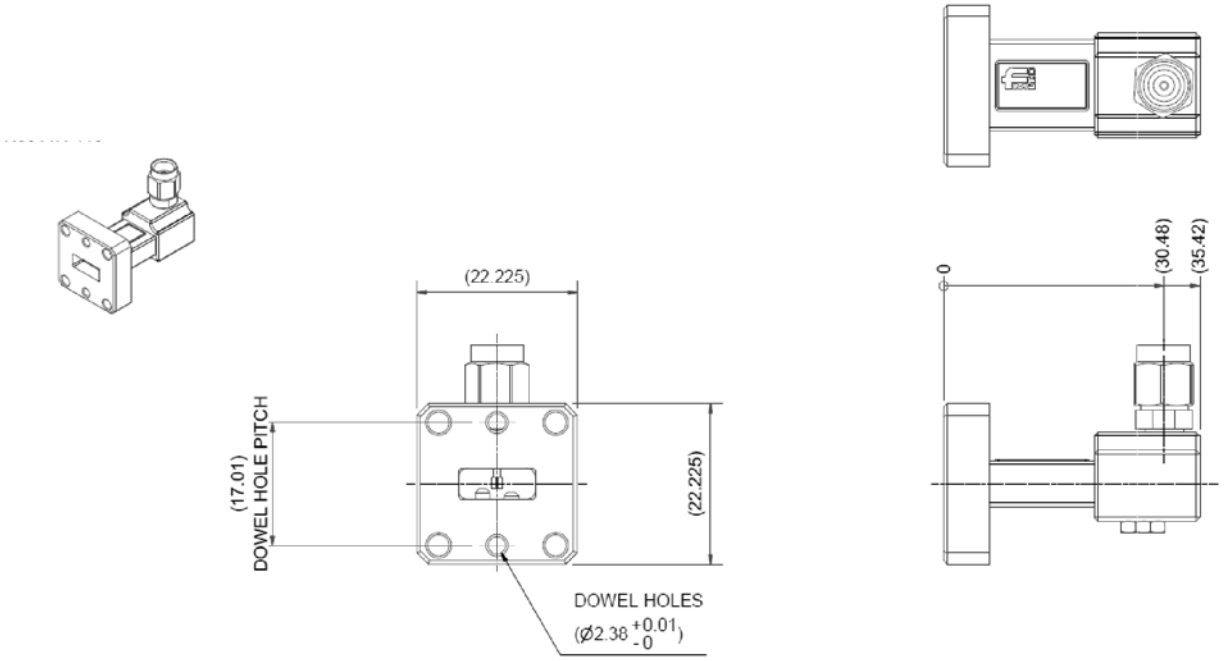


Figure 5-16 Adapter, Waveguide Designators K-Band/WR42/WG20, English (Imperial), Keysight Part Number N9911X-415



Termination Dimensions

NOTE The dimensions shown in the following graphics are in millimeters.

Figure 5-17 Termination, Waveguide Designators C-Band/WR137/WG14, Metric, Keysight Part Number N9911X-111

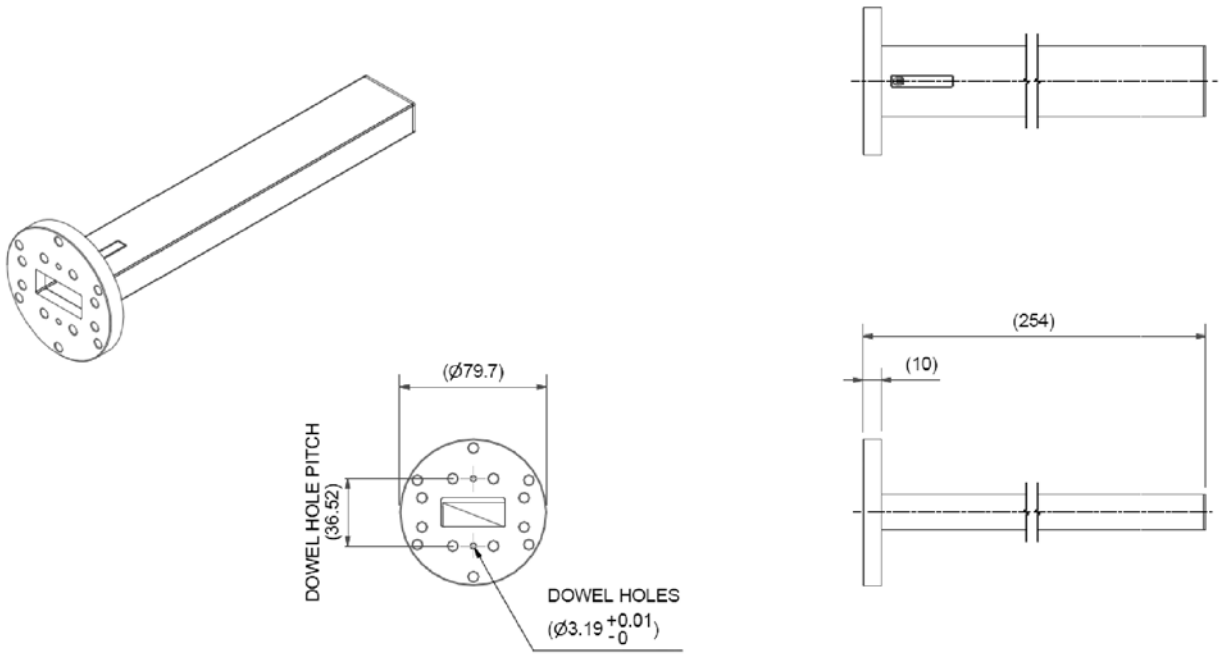


Figure 5-18 Termination, Waveguide Designators C-Band/WR137/WG14, English (Imperial), Keysight Part Number N9911X-116

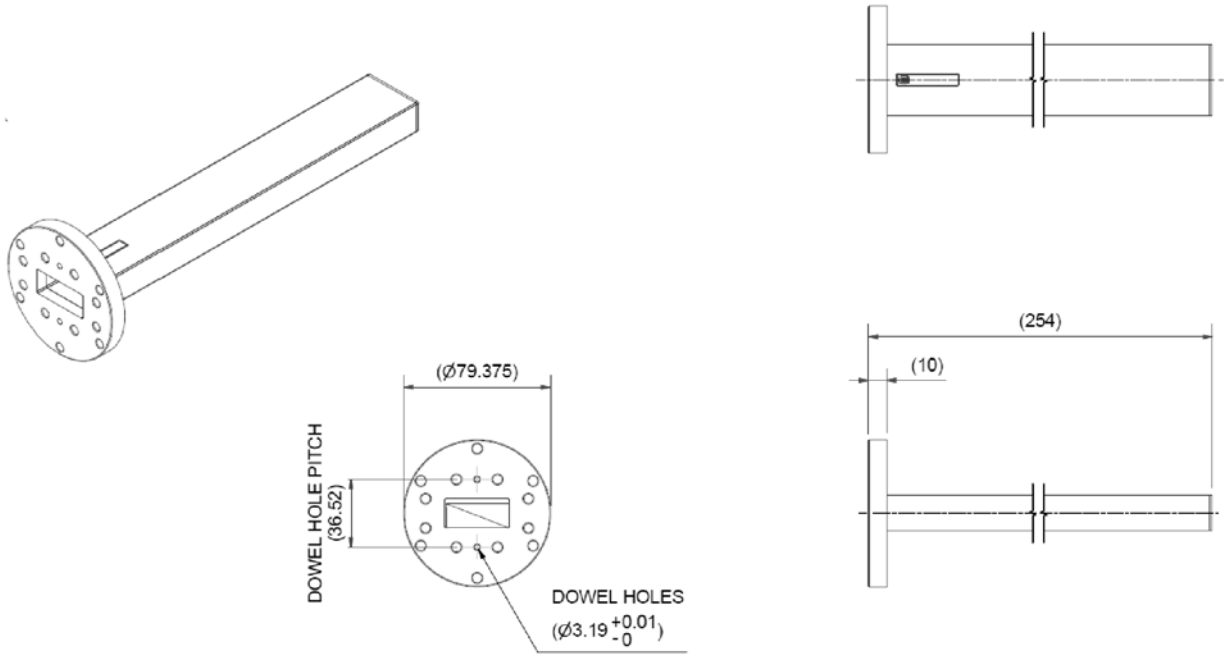


Figure 5-19 Termination, Waveguide Designators X-Band/WR90/WG16, Metric, Keysight Part Number N9911X-211

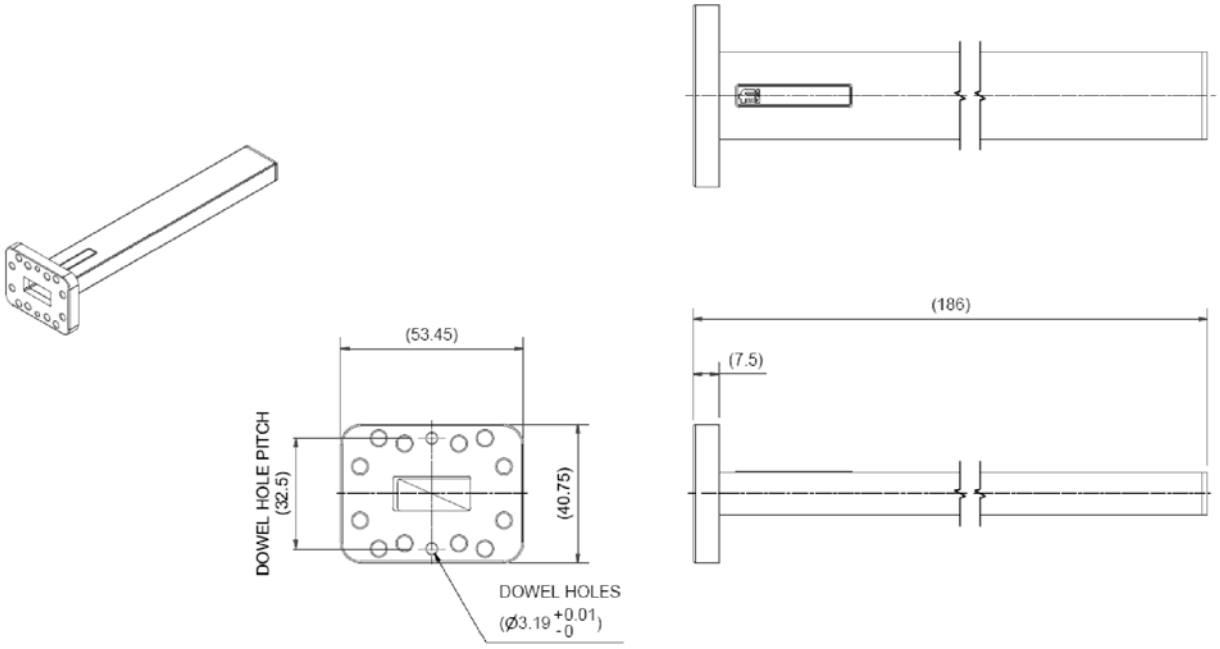


Figure 5-20 Termination, Waveguide Designators X-Band/WR90/WG16, English (Imperial), Keysight Part Number N9911X-216

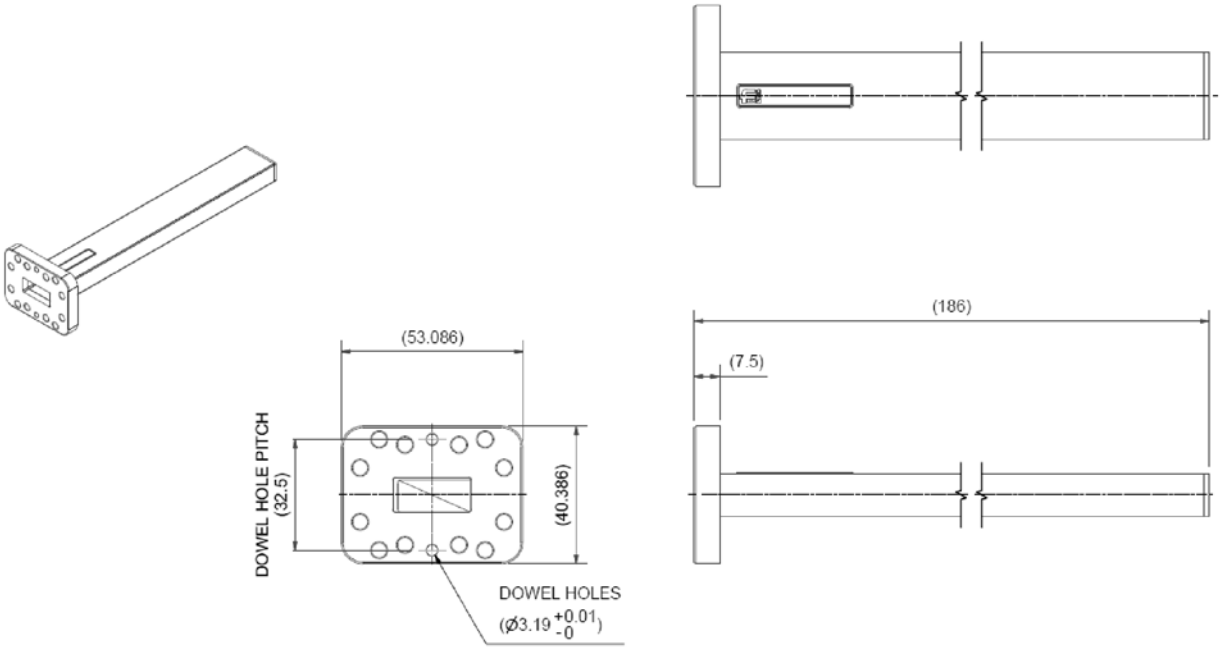


Figure 5-21 Termination, Waveguide Designators Ku-Band/WR62/WG18, Metric, Keysight Part Number N9911X-311

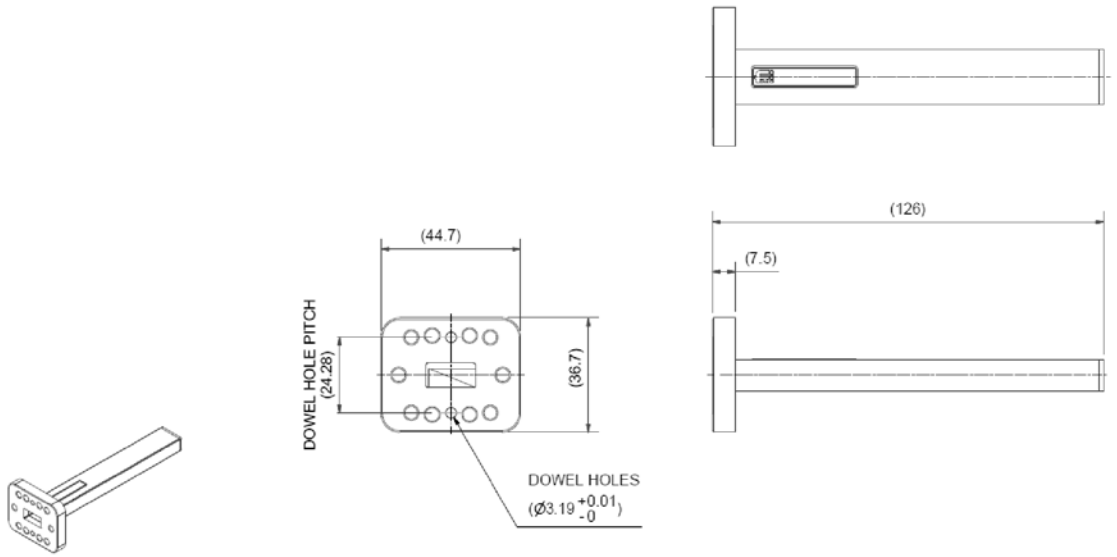


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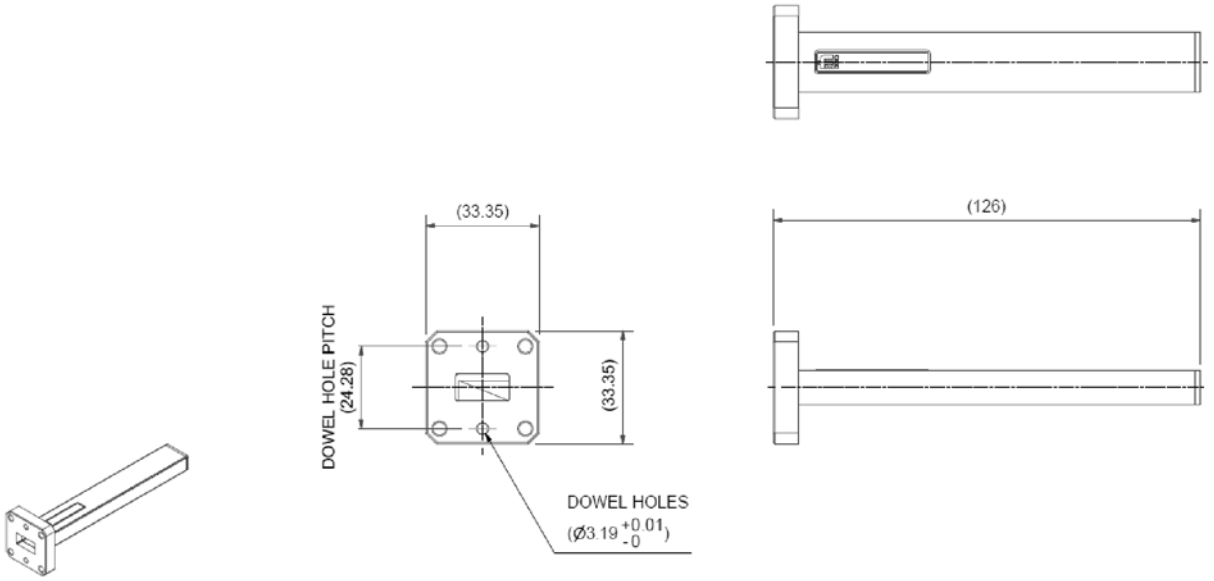
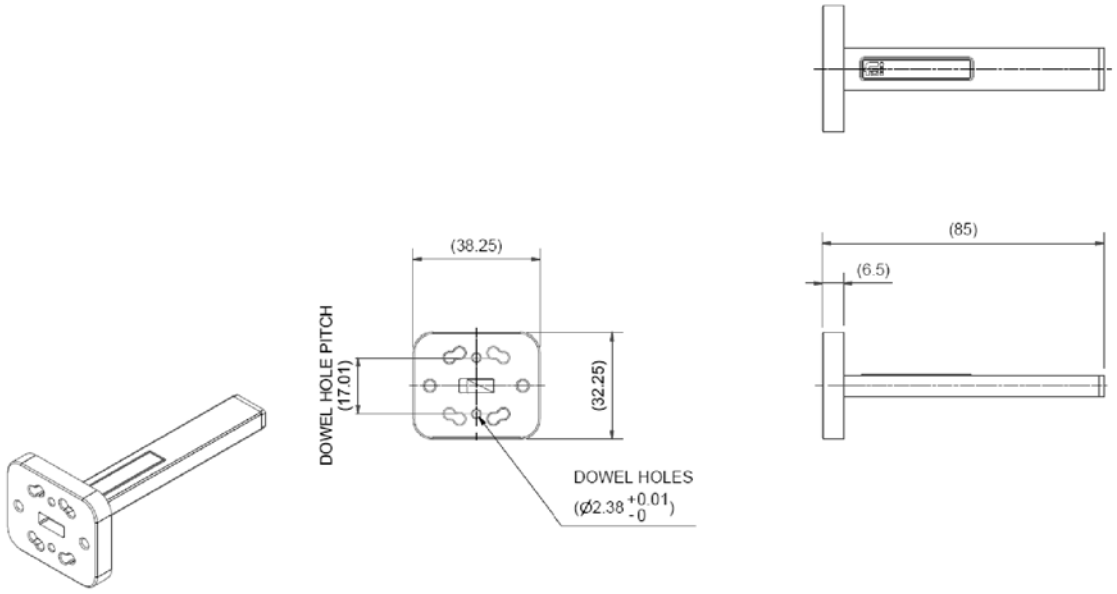
Figure 5-22 Termination, Waveguide Designators Ku-Band/WR62/WG18, English (Imperial), Keysight Part Number N9911X-316



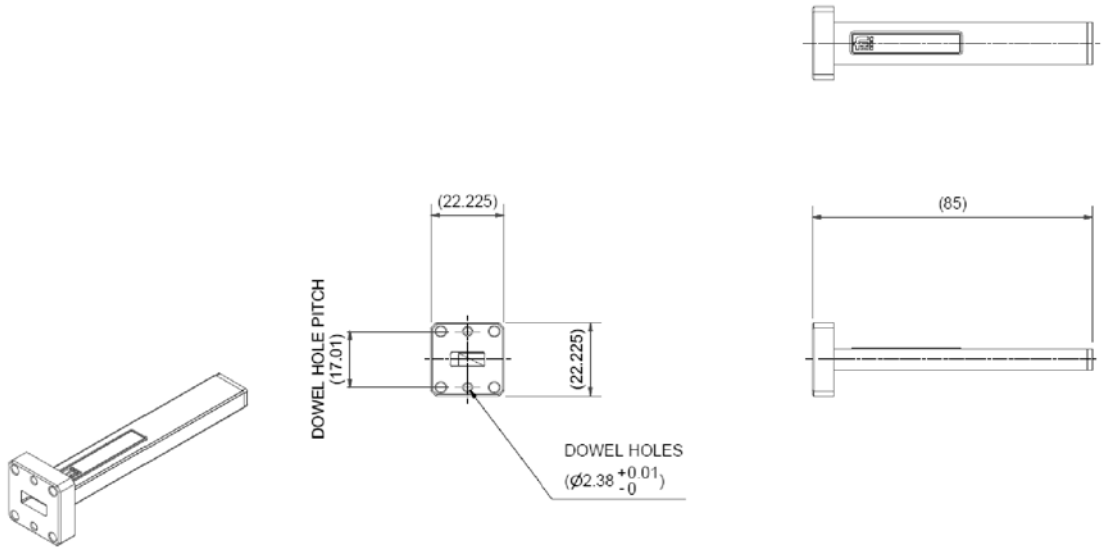
N9911_002_217

Figure 5-23 Termination, Waveguide Designators K-Band/WR42/WG20, Metric, Keysight Part Number N9911X-411



N9911_002_216

Figure 5-24 Termination, Waveguide Designators K-Band/WR42/WG20, English (Imperial), Keysight Part Number N9911X-416

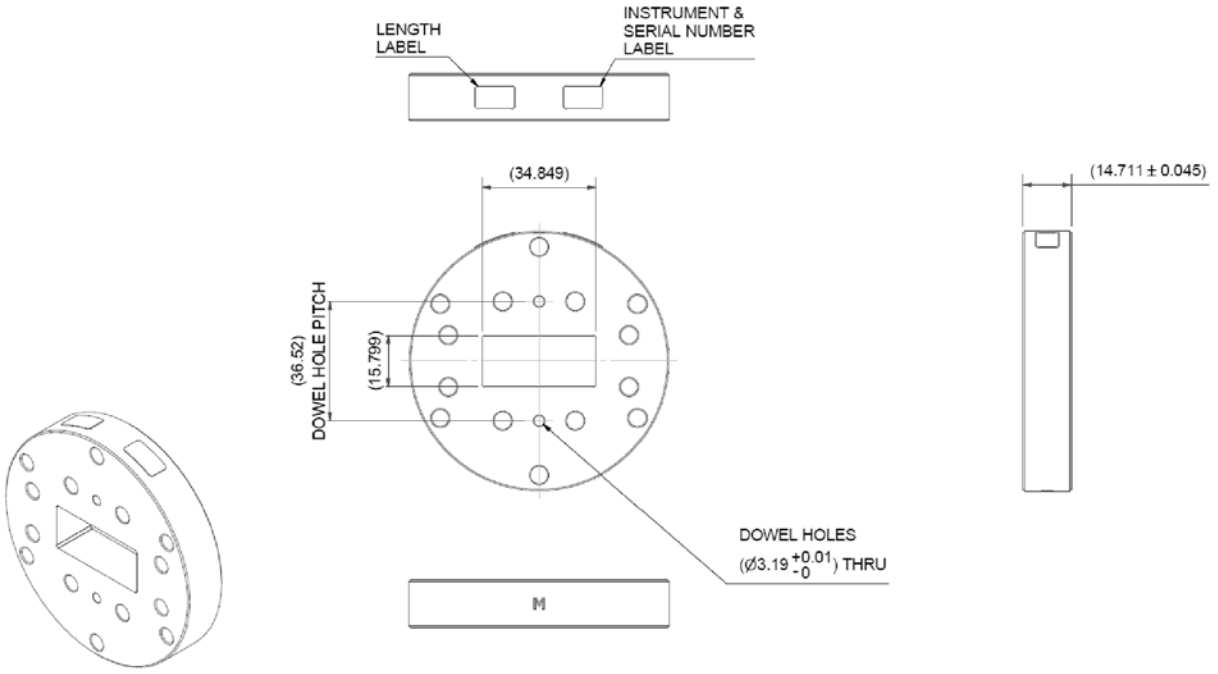


N9911_002_215

Offset Shim Dimensions

NOTE The dimensions shown in the following graphics are in millimeters.

Figure 5-25 Offset Shim, Waveguide Designators C-Band/WR137/WG14, Metric, Keysight Part Number N9911X-113



N9911_002_238

Figure 5-26 Offset Shim, Waveguide Designators C-Band/WR137/WG14, English (Imperial), Keysight Part Number N9911X-118

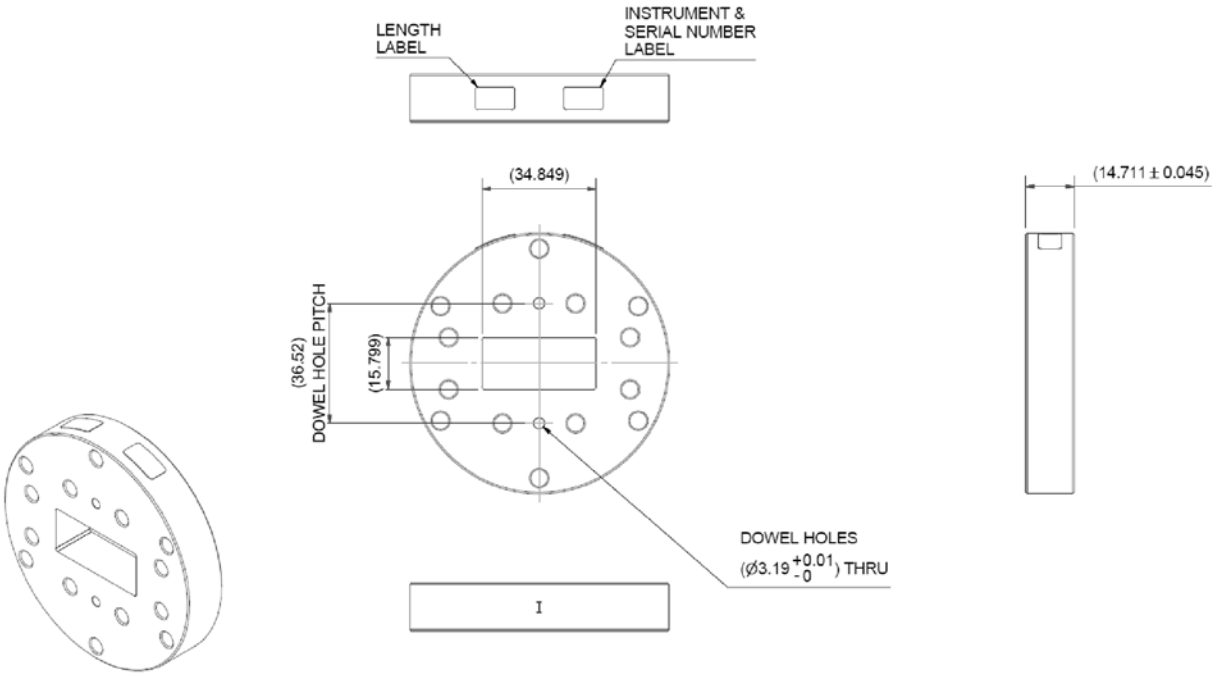


Figure 5-27 Offset Shim, Waveguide Designators X-Band/WR90/WG16, Metric, Keysight Part Number N9911X-213

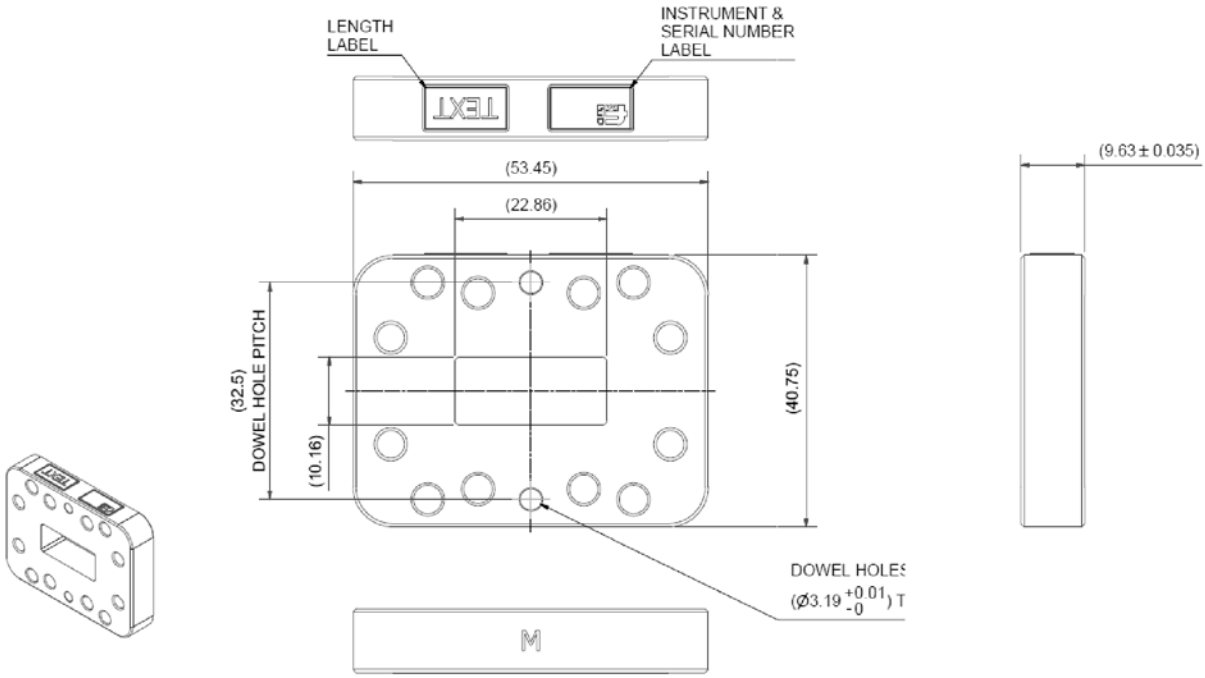
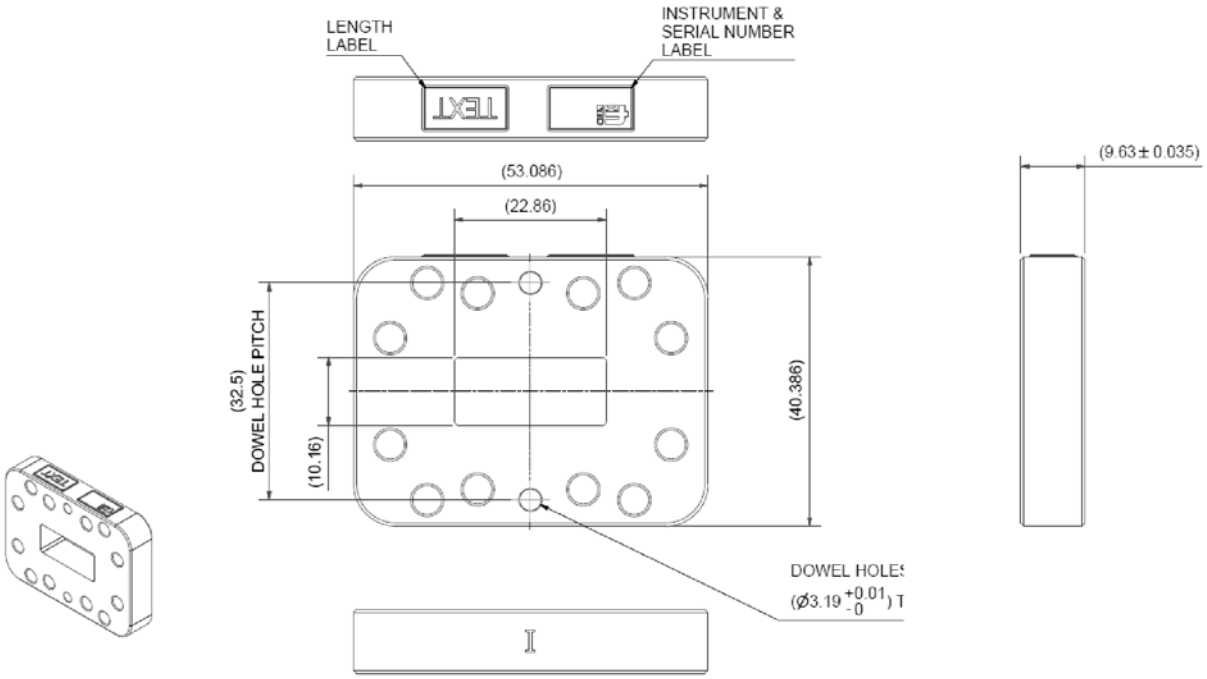
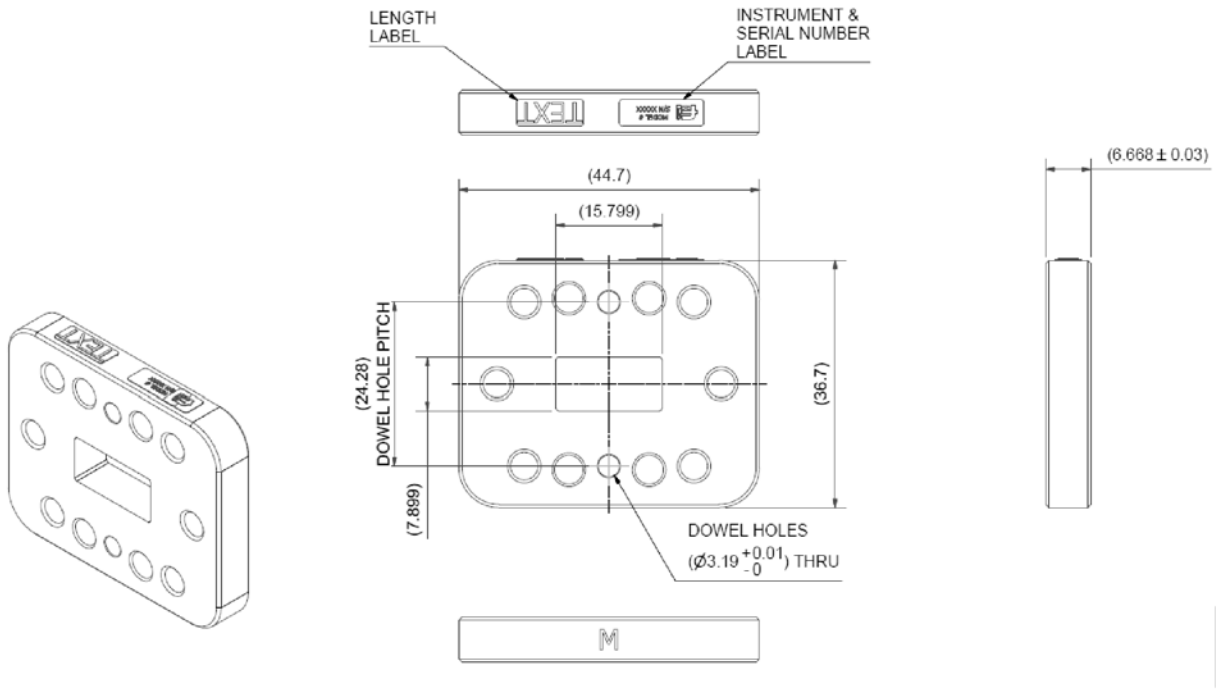


Figure 5-28 Offset Shim, Waveguide Designators X-Band/WR90/WG16, English (Imperial), Keysight Part Number N9911X-218



N9911_002_224

Figure 5-29 Offset Shim, Waveguide Designators Ku-Band/WR62/WG18, Metric, Keysight Part Number N9911X-313



N9911_002_223

Figure 5-30 Offset Shim, Waveguide Designators Ku-Band/WR62/WG18, English (Imperial), Keysight Part Number N9911X-318

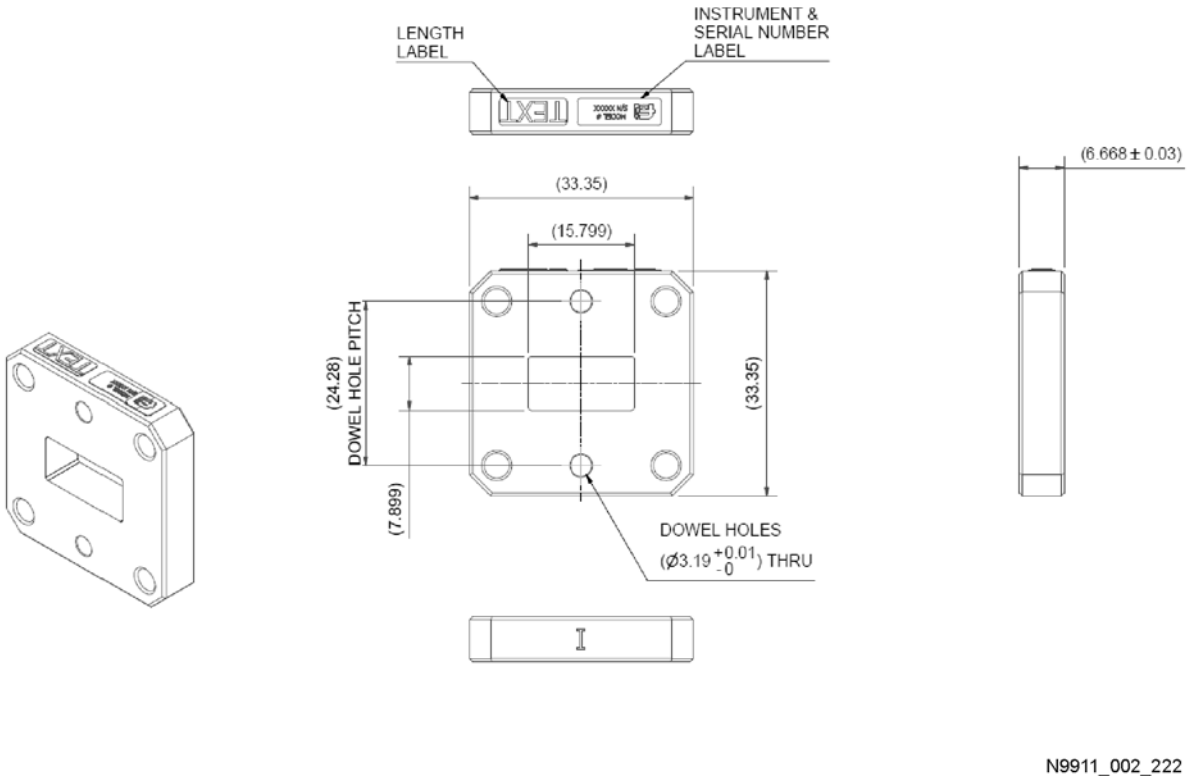
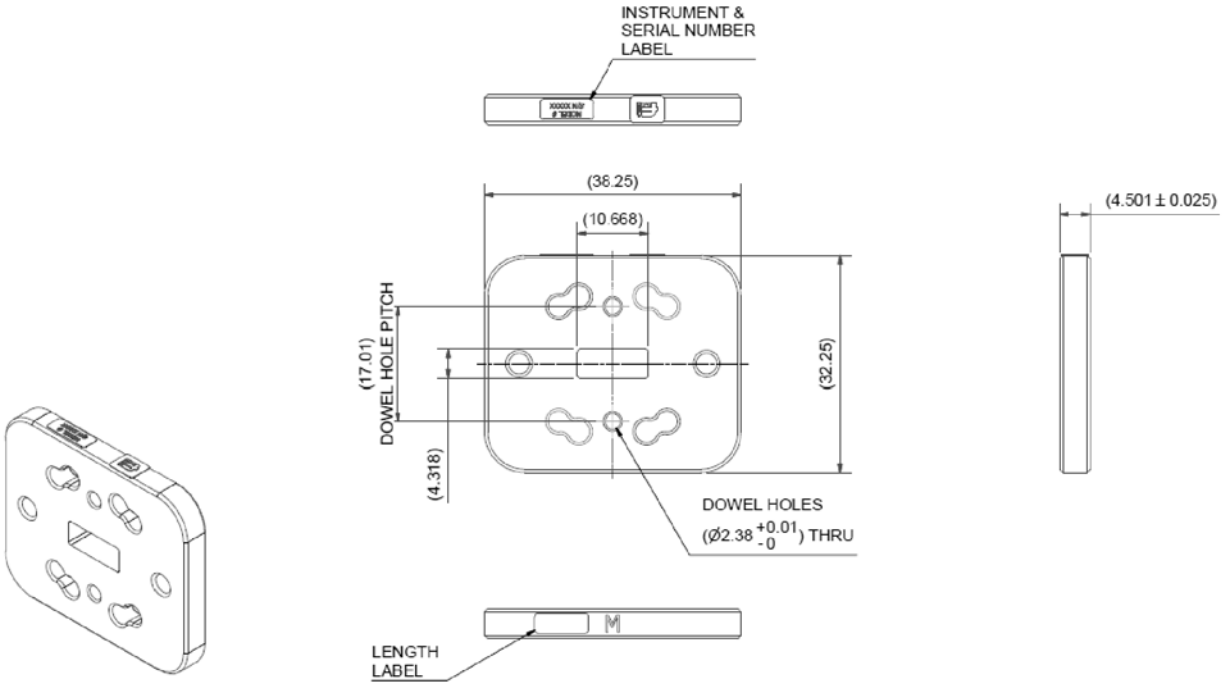
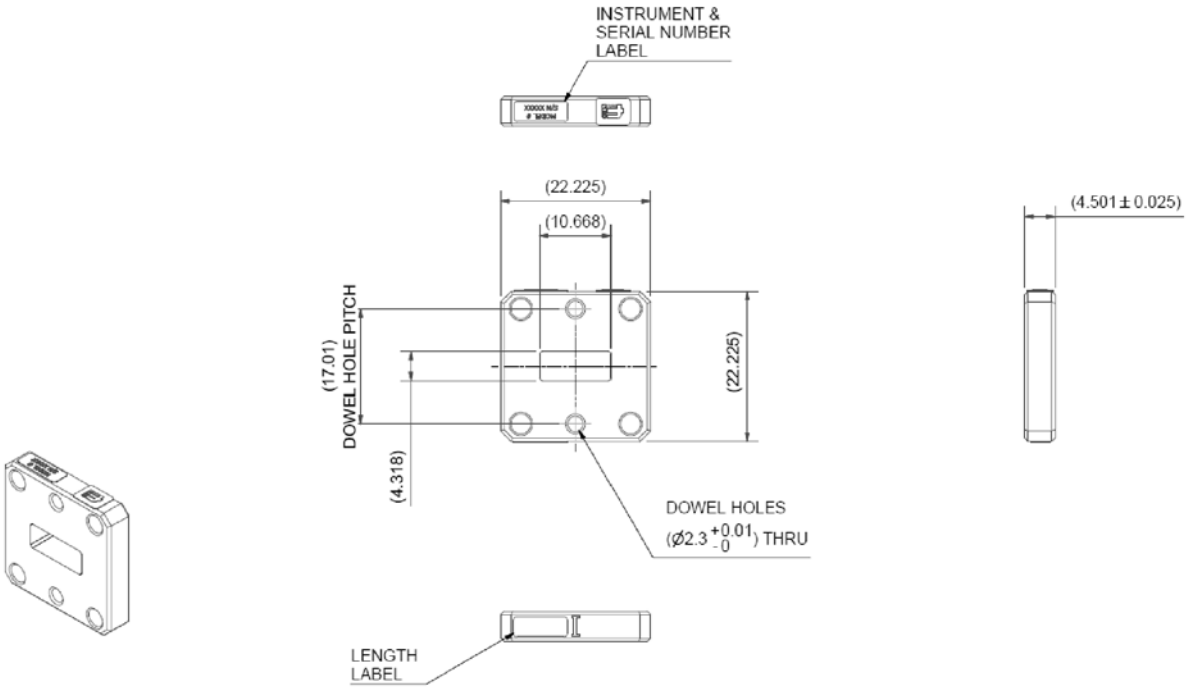


Figure 5-31 Offset Shim, Waveguide Designators K-Band/WR42/WG20, Metric, Keysight Part Number N9911X-413



N9911_002_210

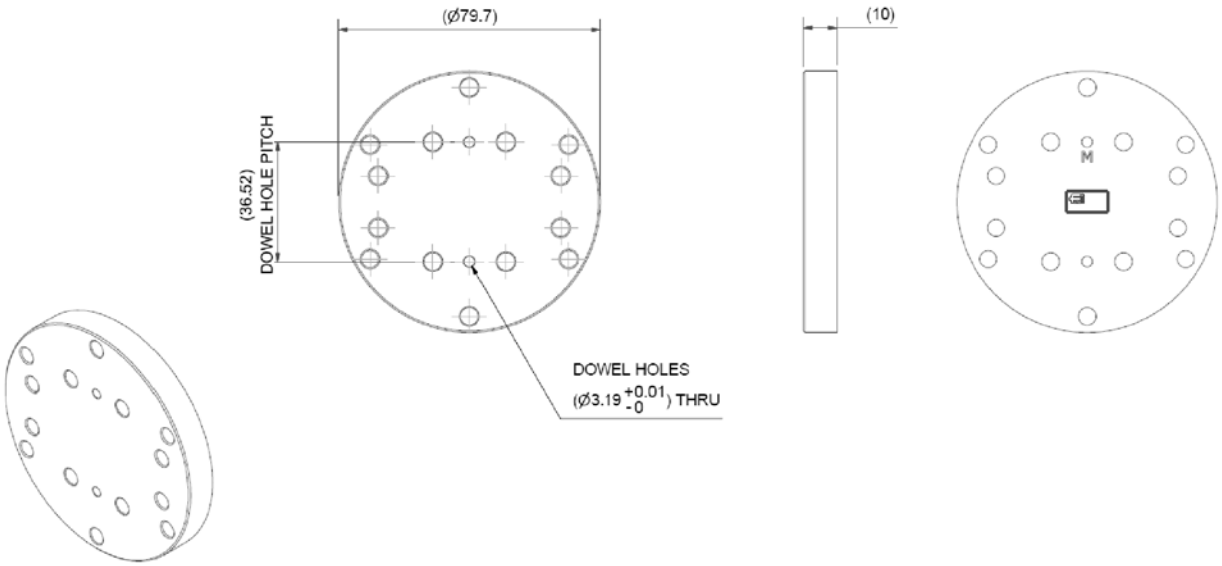
Figure 5-32 Offset Shim, Waveguide Designators K-Band/WR42/WG20, English (Imperial), Keysight Part Number N9911X-418



Flush Short Dimensions

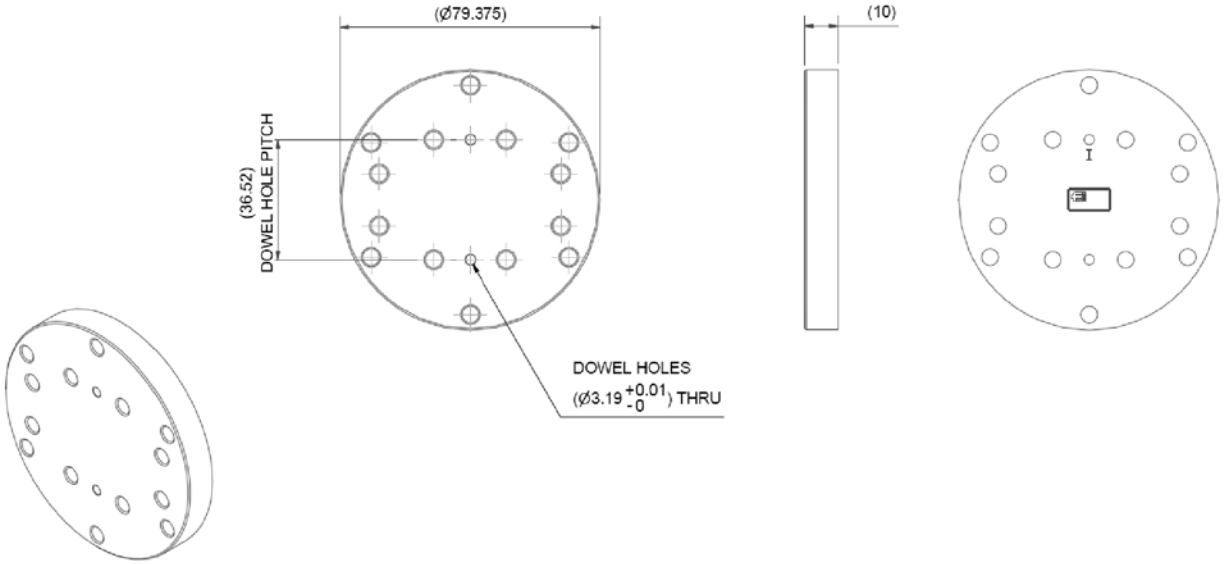
NOTE The dimensions shown in the following graphics are in millimeters.

Figure 5-33 Flush Short, Waveguide Designators C-Band/WR137/WG14, Metric, Keysight Part Number N9911X-112



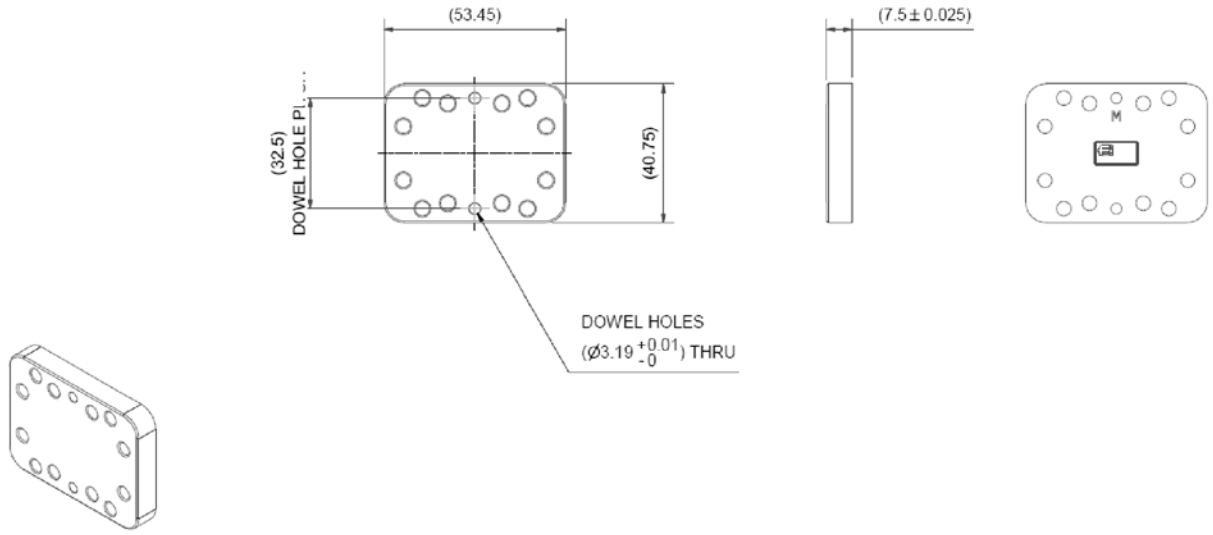
N9911_002_240

Figure 5-34 Flush Short, Waveguide Designators C-Band/WR137/WG14, English (Imperial), Keysight Part Number N9911X-117



N9911_002_241

Figure 5-35 Flush Short, Waveguide Designators X-Band/WR90/WG16, Metric, Keysight Part Number N9911X-212



N9911_002_231

Figure 5-36 Flush Short, Waveguide Designators X-Band/WR90/WG16, English (Imperial), Keysight Part Number N9911X-217

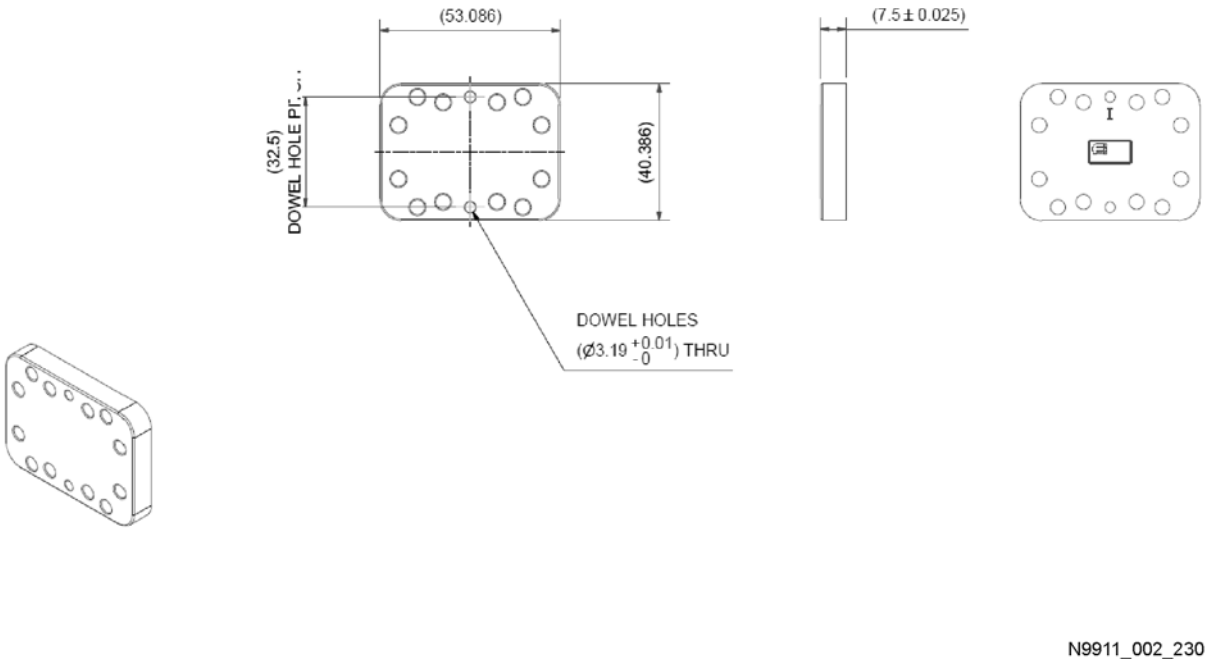
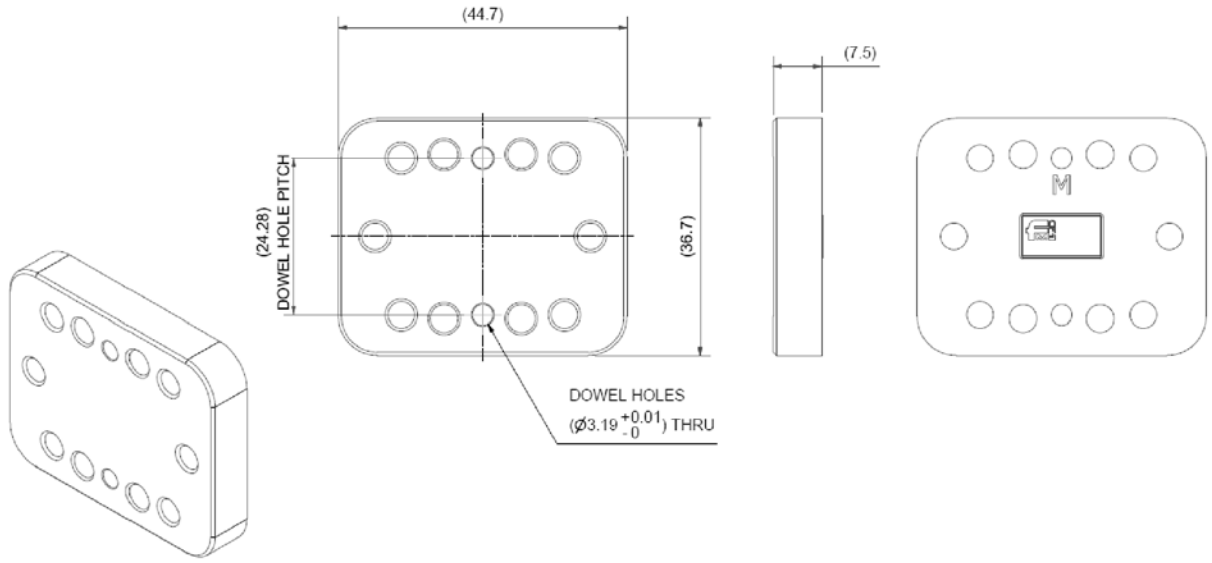
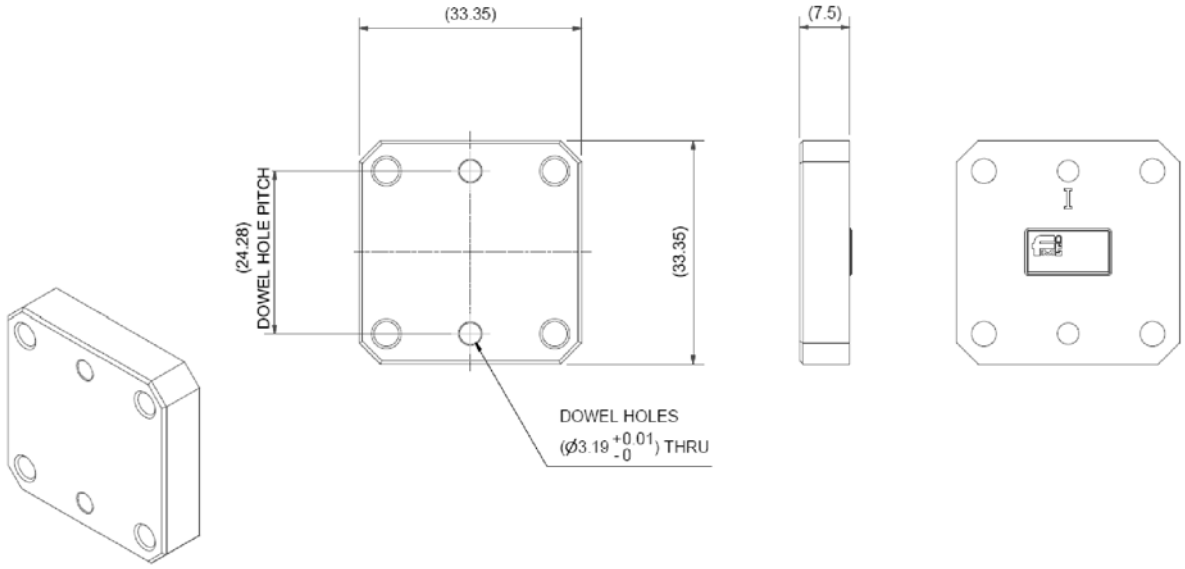


Figure 5-37 Flush Short, Waveguide Designators Ku-Band/WR62/WG18, Metric, Keysight Part Number N9911X-312



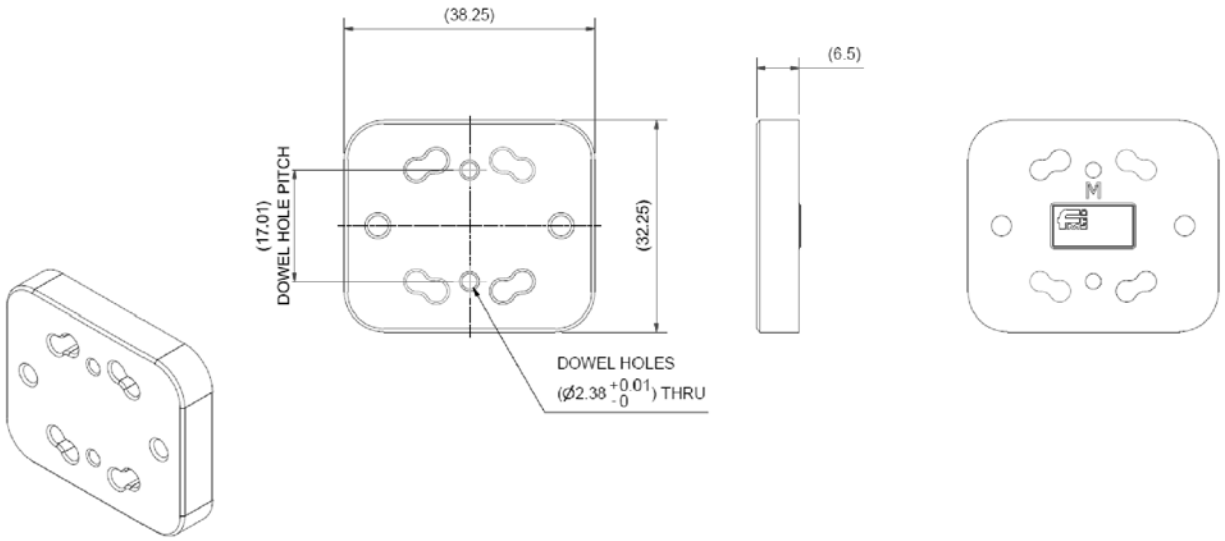
N9911_002_229

Figure 5-38 Flush Short, Waveguide Designators Ku-Band/WR62/WG18, English (Imperial), Keysight Part Number N9911X-317



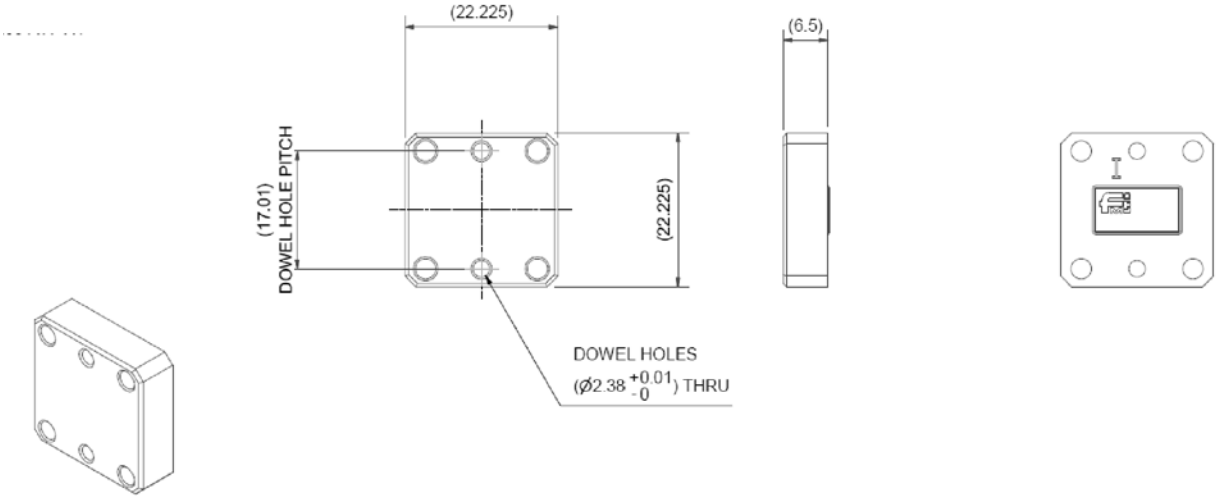
N9911_002_228

Figure 5-39 Flush Short, Waveguide Designators K-Band/WR42/WG20, Metric, Keysight Part Number N9911X-412



N9911_002_227

Figure 5-40 Flush Short, Waveguide Designators K-Band/WR42/WG20, English (Imperial), Keysight Part Number N9911X-417



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