

# Why only one PIM standard in PIM Master™ accessory kits?

## Introduction

In the past, two PIM standards were shipped with Anritsu's PIM Master accessory kits. One was designed to produce PIM at approximately -80 dBm in the 1800-1900 MHz range and the other was designed to produce the same level of PIM in the 800 - 900 MHz range. This was done as a convenience to customers so that they would only have to remember one value (-80dBm) when verifying performance of their 850 MHz, 900 MHz or 1900 MHz PIM Masters.

Today, Anritsu produces PIM test instruments serving the 700 MHz, 800 MHz, 850 MHz, 900 MHz, 1800 MHz, 1900 MHz, 2100 MHz and 2600 MHz frequency bands. It is no longer economically feasible to develop a unique PIM standard for each frequency band simply for convenience. Rather, Anritsu now provides one PIM standard in each accessory kit with an instruction card describing the expected performance across the full range of test frequencies.

## Discussion

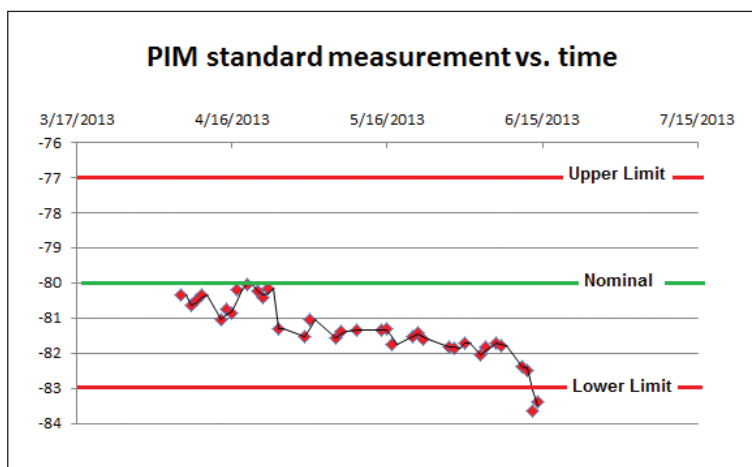
Only one PIM standard is required to correctly calibrate the MW82119A/B family of PIM test instruments. The magnitude of the PIM standard is not used during the calibration process. The fact that our PIM standards happen to measure -80 dBm at a particular frequency is interesting, but not relevant during calibration.

The PIM standard is only used during the first step of the calibration process to establish the "zero distance" location for Distance-to-PIM (DTP) measurements. Install the PIM standard on the instrument connector during calibration and the instrument connector will be the 0 meter mark for subsequent DTP measurements. During this step, you could use a -70 dBm, -80 dBm, -90 dBm or even -100 dBm PIM source. The magnitude of the PIM source is not used in any way during this calibration step. It only needs to be consistent (not changing in magnitude during the calibration process) and needs to generate a dominant PIM signal (stronger than the internal PIM of the instrument).



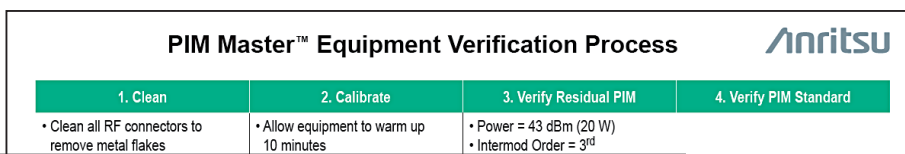
After calibration is completed you need to verify that the equipment is working properly. A simple way to accomplish this is to measure something that produces a known magnitude of PIM and verify that the instrument reports the expected value within some tolerance. It is not necessary to use a -80 dBm PIM standard for this step. The magnitude of the PIM standard could be anything as long as you know what it should be and can verify that the instrument reports the expected value within +/- 3 dB. Measuring a PIM standard verifies the output power and receiver operation in one simple step. If the test power is off by 1 dB, the PIM standard measurement will be off by almost 3 dB. If something is wrong with the receiver, the PIM standard measurement will be incorrect, indicating that a problem exists.

A good practice is to maintain an equipment log showing the results of your PIM standard measurement over time. The PIM standard that Anritsu provides in the accessory kit can vary more than 1 dB from the nominal advertised value due to normal manufacturing variation. Monitoring the PIM level that is measured on a particular PIM standard over time provides an early indication when something is changing with your unit. Below is data from an actual customer who was able to observe an equipment issue develop over time and take corrective action before taking invalid site measurements.



**Note:** Using a different low PIM termination in combination with a given PIM standard can also result in 1 dB variation. While not necessary, a more accurate indication of performance vs. time will be achieved using the same PIM standard + low PIM termination combination for each daily equipment verification.

So, to reiterate, only one PIM standard is required to calibrate the MW82119A/B PIM Master or to verify that the instrument is operating correctly. Since the expected PIM value from a PIM standard changes vs. frequency, Anritsu provides the Equipment Verification Process (11410-00726) shown below with each accessory kit. The guide describes the verification process on one side and provides the expected PIM value vs. frequency the current as well as previous PIM standards offered by Anritsu on the other. Providing data for all standards enables customers to use whichever standard they own during the equipment verification process.



**PIM Master™ Equipment Verification Process** **Anritsu**

Part Number	Description	IM3 Frequency	700L	701L / 702L	700U	701U / 702U	850	800	900 / 902	180	192, 193 / 194	190, 193 / 194	210	260		
			F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2	F1	F2
			734 MHz	768 MHz	734 MHz	768 MHz	869 MHz	791 MHz	935 MHz	1805 MHz	1930 MHz	1930 MHz	2110 MHz	2620 MHz		
1091-403-R	PIM STD, -80dBm @ 910 MHz	Typical IM3 @ 2x 20W	-81 dBm / -124 dBc	-81 dBm / -124 dBc	-80 dBm / -123 dBc	-80 dBm / -123 dBc	-80 dBm / -123 dBc	-80 dBm / -123 dBc	-80 dBm / -123 dBc	-74 dBm / -117 dBc	-74 dBm / -117 dBc	-72 dBm / -115 dBc	-72 dBm / -115 dBc	NA		
1091-446-R	PIM STD, -80dBm @ 1730 MHz	Typical IM3 @ 2x 20W	-87 dBm / -130 dBc	-88 dBm / -131 dBc	-90 dBm / -133 dBc	-89 dBm / -132 dBc	-85 dBm / -128 dBc	-90 dBm / -133 dBc	-85 dBm / -128 dBc	-80 dBm / -123 dBc	-80 dBm / -123 dBc	-78 dBm / -121 dBc	-77 dBm / -120 dBc	-73 dBm / -116 dBc		
1091-390-R	PIM STD, -80dBm @ 1775 MHz	Typical IM3 @ 2x 20W	-87 dBm / -130 dBc	-87 dBm / -130 dBc	-86 dBm / -129 dBc	-86 dBm / -129 dBc	-86 dBm / -129 dBc	-86 dBm / -129 dBc	-86 dBm / -129 dBc	-80 dBm / -123 dBc	-80 dBm / -123 dBc	-78 dBm / -121 dBc	-78 dBm / -121 dBc	-75 dBm / -118 dBc		

**Note:** Typical values shown. PIM standards can vary ±3 dB due to manufacturing variation. Record the starting value of your PIM standard and use that value for test equipment verification.

Attach PIM standard and Low PIM termination

**Note:** Okay to use 910 MHz, 1730 MHz, or 1775 MHz PIM standard for this step

Perform PIM vs. Time test

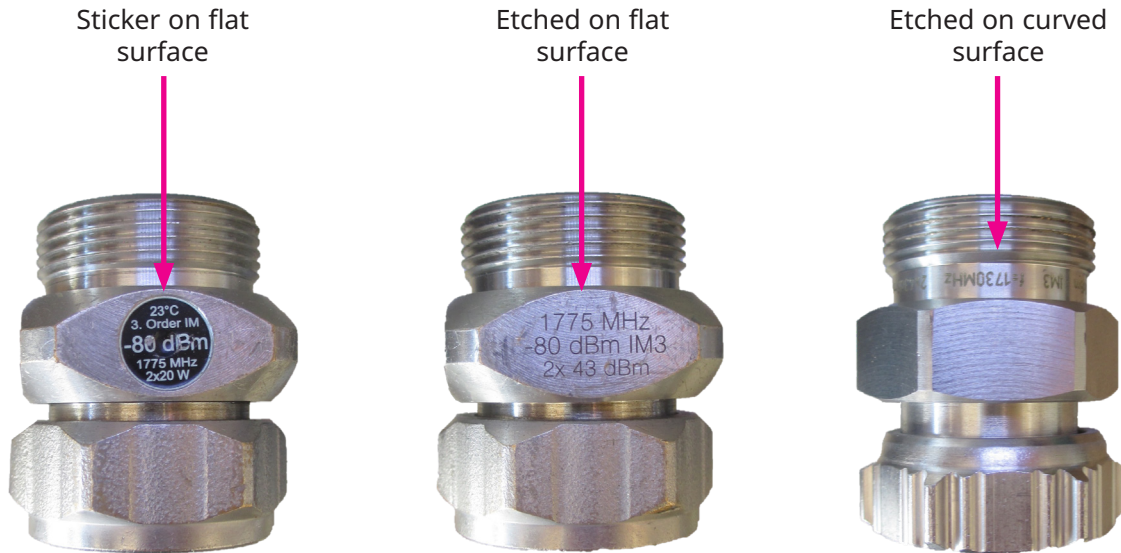
Verify Peak PIM value is within ± 3 dB of expected value (see other side)

Save this result to include with report

2015-09

## PIM Standard Identification

Each PIM standard is marked by the manufacturer with its expected PIM value at a particular frequency. Depending on the manufacturer, this marking may be located on one of the flat faces or on the cylindrical body of the PIM standard. Anritsu's part number is not marked on the PIM standard. The Anritsu part number is however included on the 11410-00726 verification card to facilitate ordering a replacement if a customer's PIM standard is lost or damaged.



## Summary

Only one PIM standard is required to calibrate the Distance-to-PIM (DTP) feature, and to verify that the PIM Master is operating properly. For this reason, Anritsu only supplies one PIM standard with its 2000-1745-R and 2000-1746-R PIM Master accessory kits.



• **United States**

**Anritsu Company**

1155 East Collins Boulevard, Suite 100,  
Richardson, TX, 75081 U.S.A.  
Toll Free: 1-800-267-4878  
Phone: +1-972-644-1777  
Fax: +1-972-671-1877

• **Canada**

**Anritsu Electronics Ltd.**

700 Silver Seven Road, Suite 120,  
Kanata, Ontario K2V 1C3, Canada  
Phone: +1-613-591-2003  
Fax: +1-613-591-1006

• **Brazil**

**Anritsu Eletrônica Ltda.**

Praça Amadeu Amaral, 27 - 1 Andar  
01327-010 - Bela Vista - São Paulo - SP - Brazil  
Phone: +55-11-3283-2511  
Fax: +55-11-3288-6940

• **Mexico**

**Anritsu Company, S.A. de C.V.**

Av. Ejército Nacional No. 579 Piso 9, Col. Granada  
11520 México, D.F., México  
Phone: +52-55-1101-2370  
Fax: +52-55-5254-3147

• **United Kingdom**

**Anritsu EMEA Ltd.**

200 Capability Green, Luton, Bedfordshire LU1 3LU, U.K.  
Phone: +44-1582-433280  
Fax: +44-1582-731303

• **France**

**Anritsu S.A.**

12 avenue du Québec, Batiment Iris 1-Silic 612,  
91140 Villebon-sur-Yvette, France  
Phone: +33-1-60-92-15-50  
Fax: +33-1-64-46-10-65

• **Germany**

**Anritsu GmbH**

Nemetschek Haus, Konrad-Zuse-Platz 1  
81829 München, Germany  
Phone: +49-89-442308-0  
Fax: +49-89-442308-55

• **Italy**

**Anritsu S.r.l.**

Via Elio Vittorini 129, 00144 Roma Italy  
Phone: +39-06-509-9711  
Fax: +39-06-502-2425

• **Sweden**

**Anritsu AB**

Kistagången 20B, 164 40 KISTA, Sweden  
Phone: +46-8-534-707-00  
Fax: +46-8-534-707-30

• **Finland**

**Anritsu AB**

Teknobulevardi 3-5, FI-01530 VANTAA, Finland  
Phone: +358-20-741-8100  
Fax: +358-20-741-8111

• **Denmark**

**Anritsu A/S**

Kay Fiskers Plads 9, 2300 Copenhagen S, Denmark  
Phone: +45-7211-2200  
Fax: +45-7211-2210

• **Russia**

**Anritsu EMEA Ltd.**

**Representation Office in Russia**  
Tverskaya str. 16/2, bld. 1, 7th floor.  
Moscow, 125009, Russia  
Phone: +7-495-363-1694  
Fax: +7-495-935-8962

• **Spain**

**Anritsu EMEA Ltd.**

**Representation Office in Spain**

Edificio Cuzco IV, Po. de la Castellana, 141, Pta. 8  
28046, Madrid, Spain  
Phone: +34-915-726-761  
Fax: +34-915-726-621

• **United Arab Emirates**

**Anritsu EMEA Ltd.**

**Dubai Liaison Office**

P O Box 500413 - Dubai Internet City  
Al Thuraya Building, Tower 1, Suite 701, 7th floor  
Dubai, United Arab Emirates  
Phone: +971-4-3670352  
Fax: +971-4-3688460

• **India**

**Anritsu India Pvt Ltd.**

2nd & 3rd Floor, #837/1, Binnamangla 1st Stage,  
Indiranagar, 100ft Road, Bangalore - 560038, India  
Phone: +91-80-4058-1300  
Fax: +91-80-4058-1301

• **Singapore**

**Anritsu Pte. Ltd.**

11 Chang Charn Road, #04-01, Shriro House  
Singapore 159640  
Phone: +65-6282-2400  
Fax: +65-6282-2533

• **P. R. China (Shanghai)**

**Anritsu (China) Co., Ltd.**

27th Floor, Tower A,  
New Caohejing International Business Center  
No. 391 Gui Ping Road Shanghai, Xu Hui Di District,  
Shanghai 200233, P.R. China  
Phone: +86-21-6237-0898  
Fax: +86-21-6237-0899

• **P. R. China (Hong Kong)**

**Anritsu Company Ltd.**

Unit 1006-7, 10/F., Greenfield Tower, Concordia Plaza,  
No. 1 Science Museum Road, Tsim Sha Tsui East,  
Kowloon, Hong Kong, P. R. China  
Phone: +852-2301-4980  
Fax: +852-2301-3545

• **Japan**

**Anritsu Corporation**

8-5, Tamura-cho, Atsugi-shi,  
Kanagawa, 243-0016 Japan  
Phone: +81-46-296-6509  
Fax: +81-46-225-8359

• **Korea**

**Anritsu Corporation, Ltd.**

5FL, 235 Pangyoeyeok-ro, Bundang-gu, Seongnam-si,  
Gyeonggi-do, 463-400 Korea  
Phone: +82-31-696-7750  
Fax: +82-31-696-7751

• **Australia**

**Anritsu Pty Ltd.**

Unit 21/270 Ferntree Gully Road,  
Notting Hill, Victoria 3168, Australia  
Phone: +61-3-9558-8177  
Fax: +61-3-9558-8255

• **Taiwan**

**Anritsu Company Inc.**

7F, No. 316, Sec. 1, Neihu Rd., Taipei 114, Taiwan  
Phone: +886-2-8751-1816  
Fax: +886-2-8751-1817

