Configure Rohde & Schwarz ZVA Series Network Analyzers for OML Millimeter Wave Frequency Extension Modules

OML millimeter wave frequency extension modules are designed to work with all manufacturers' millimeter wave configurable vector network analyzers. This paper describes Rohde & Schwarz ZVA series vector network analyzers "direct-connect" instrumentation configuration for OML frequency extension modules.

The 4-Port ZVA24 network analyzer used to develop this procedure has the following installed options with firmware version 4.01. Contact manufacturer for the latest minimum options and firmware version required to configure external millimeter converter.

Software Option
- ZVA-K8 Converter Control

Hardware Option

- ZVAB-B4	- ZVA24-B22
- ZVA24-B32	- ZVA24-B23
- ZVA24-B34	- ZVA24-B24
- ZVA24-B16	- ZVA24-B31
- ZVA24-B21	- ZVA24-B33

OML offers standalone DC power supplies to energize OML frequency extension modules (Contact OML for more details). Otherwise, any good DC power supplies such the ones below will satisfy the DC requirements:
- One +12VDC, 7A, DC power supply (E3632A)

Or

- Two +12VDC, 3A, DC power supplies (U8001A)

OML millimeter wave frequency extension modules are simply "plug 'n' play" after configuring the ZVA network analyzer for millimeter wave measurement.

Hardware Connection

Connect ZVA network analyzer and OML millimeter wave frequency extension modules and DC power supply as shown in Figure 1.

ZVA Port Configuration

Frequency Extension Module	ZVA VNA
LO Source IN	Port 3 & 4
RF Source IN	Port 1 &2
Module 1 Ref IF Out	Port 1 REF IN
Module 1 Test IF Out	Port 1 MEAS IN
Module 2 Ref IF Out	Port 2 REF IN
Module 2 Test IF Out	Port 2 MEAS IN

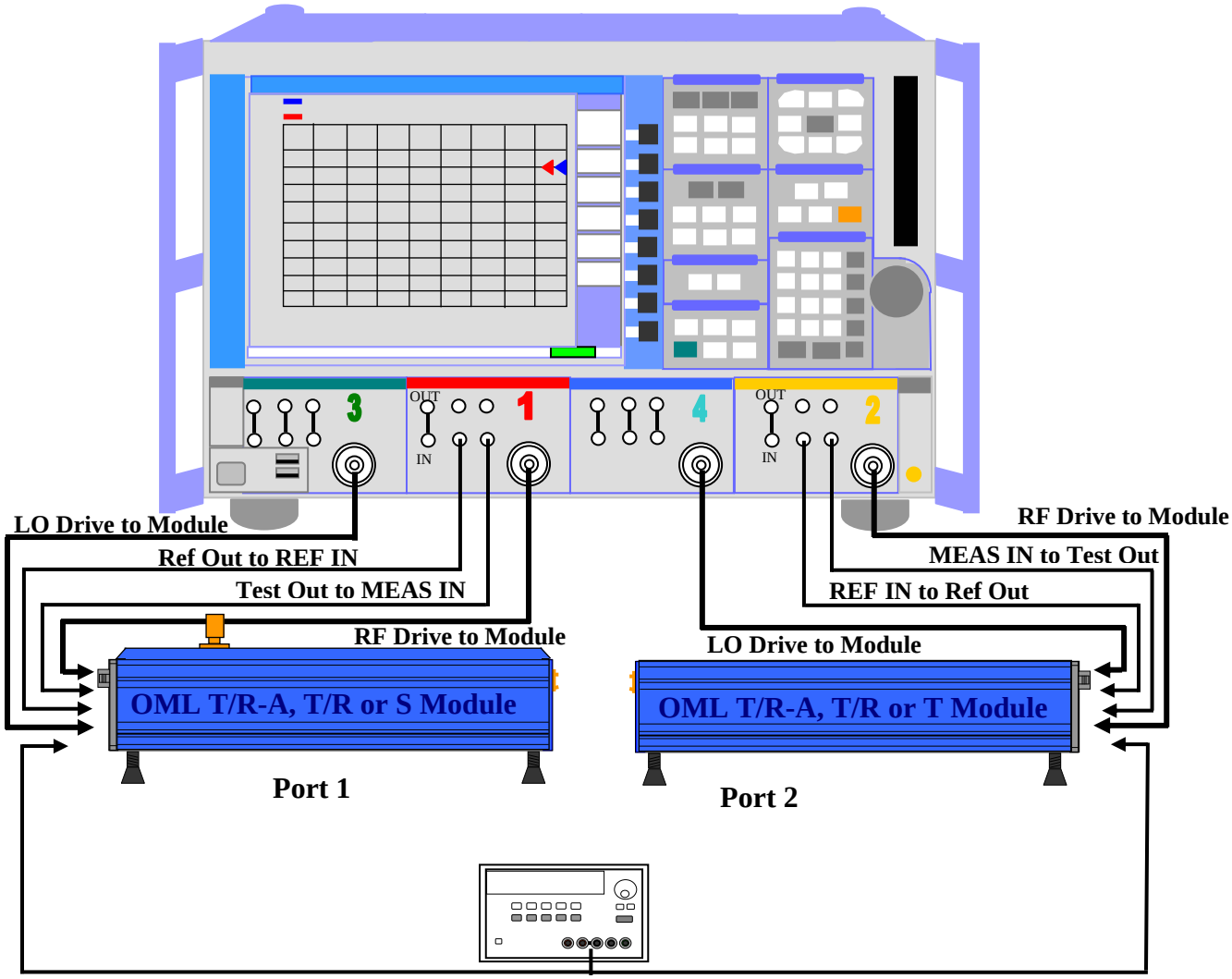

Figure 1– ZVA Vector Network Analyzer and OML module Connection

Instrumentation Configuration

ZVA with firmware version 4.01 is used for capturing the screen displays in this procedure. Different firmware versions may have slightly different displays.

Selecting Frequency Extension Model

1. Press "**SYSTEM CONFIG**" hard key on the front panel under **SYSTEM** selection section and press "System Config" soft key to access the System Configuration setup table (Figure 2).
2. Click on the upper right-hand arrow on the "System Configuration" dialogue display with the mouse until "Frequency Converter" tab appears.
3. Click on the "Frequency Converter" tab to activate frequency converter configuration setup.

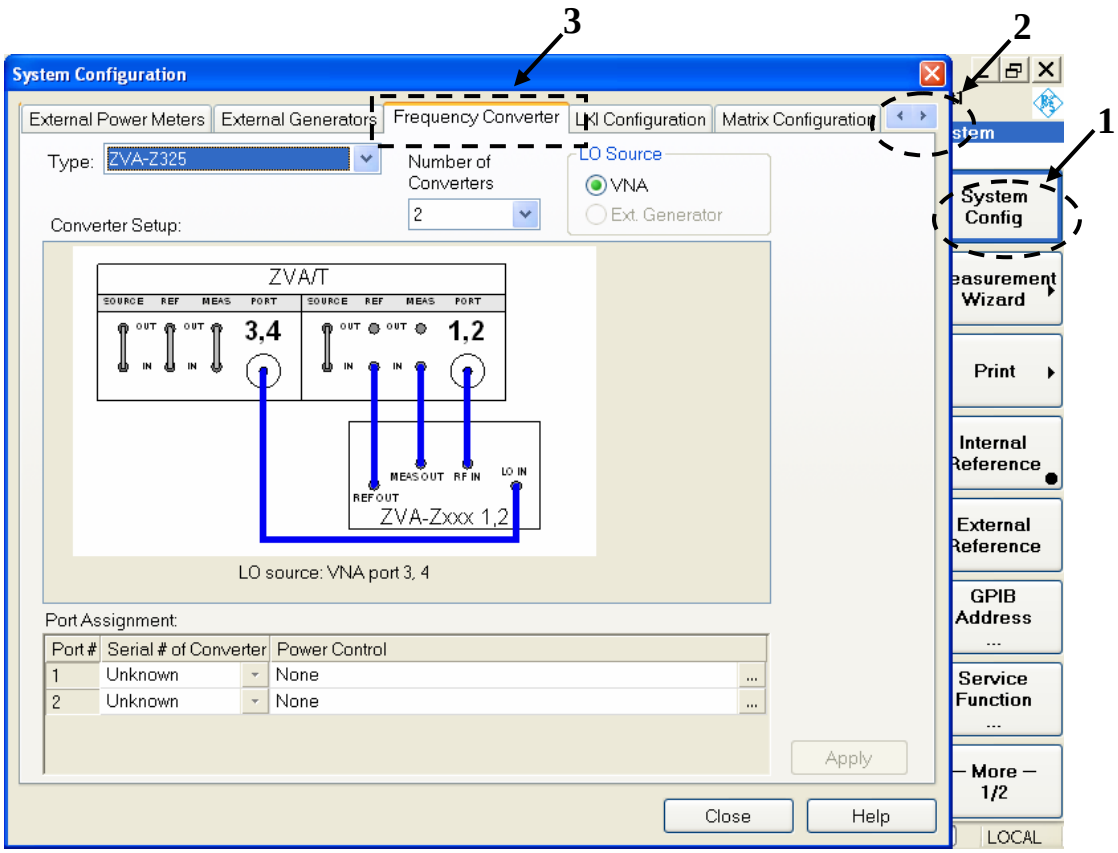

Figure 2 – System Configuration Setup Table

4. Click on the "Type" pull down selection and highlight the frequency extender to be used in the setup with the mouse (Figure 3).
5. Click on the "Number of Converters" pull down selection and select the number of converter attached to the vector network analyzer, if different from two (2).
6. Click the "Apply" tab to activate configuration and the "Close" tab to close the system configuration dialogue display.

   (Note: ZVA-Z110, ZVA-Z170, ZVA-Z220 & ZVA-Z90 use the same RF & LO multiplication factor as OML V10VNA2-T/R, V06VNA2-T/R, V05VNA2-T/R & V12VNA2R-T/R frequency extenders. There is no need to modify the "Port Configuration" setup for these four Bands. See "OML and ZVA Model Cross Reference Table" at the end of this paper.)

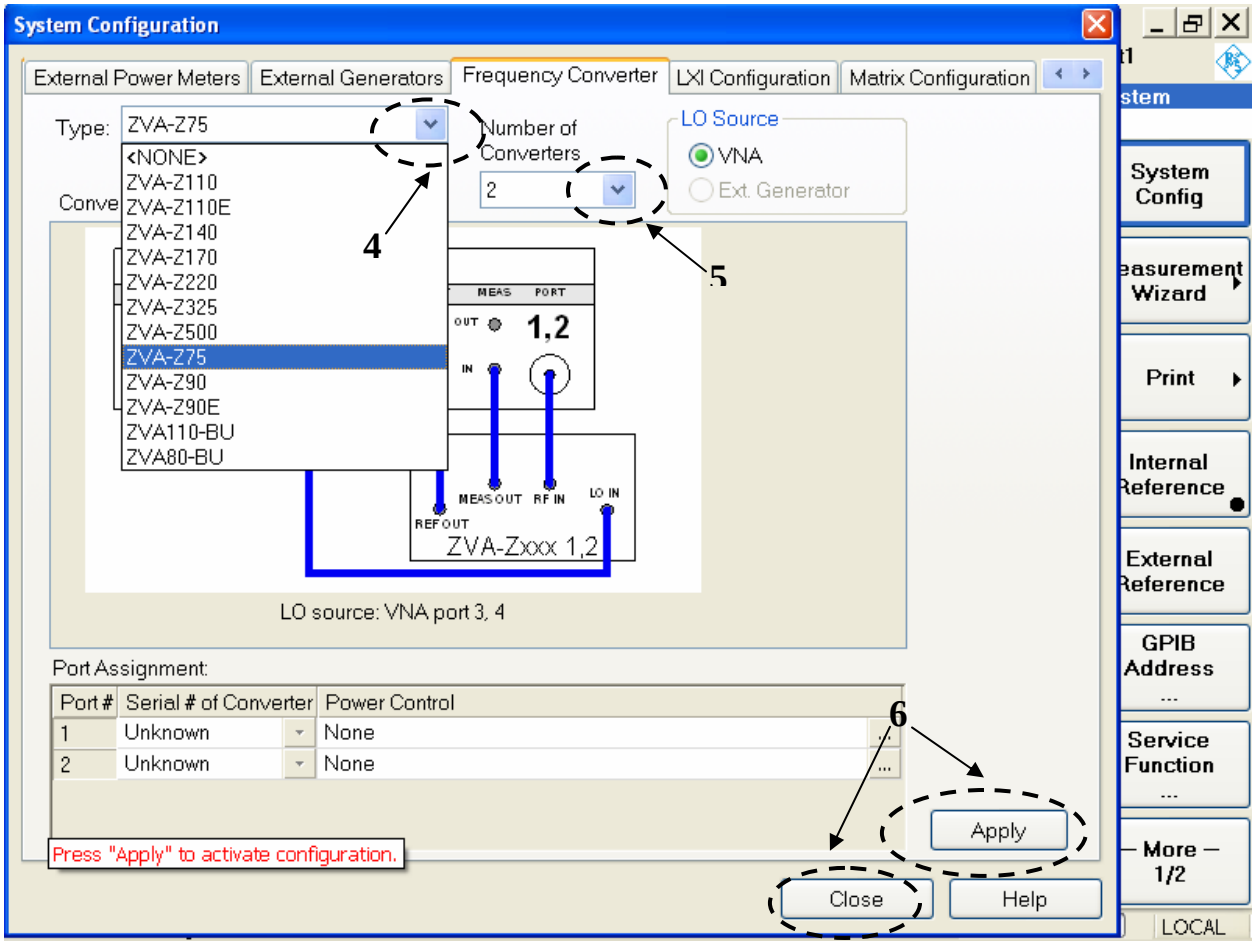

Figure 3 – System Configuration Table with Freq. Extender Model Numbers

Modify Factory Installed Model Multiplication Factors

Check "OML and ZVA Model Number Cross Reference Table" for OML models that require either LO and/or RF multiplication factor modification.

LO Multiplication Factor – WR15 Frequency Band Example

7. Press the "**MODE**" hard key on the front panel under **CHANNEL** selection section and press the "Port Config" soft key to access to the Port Configuration setup table (Figure 4).

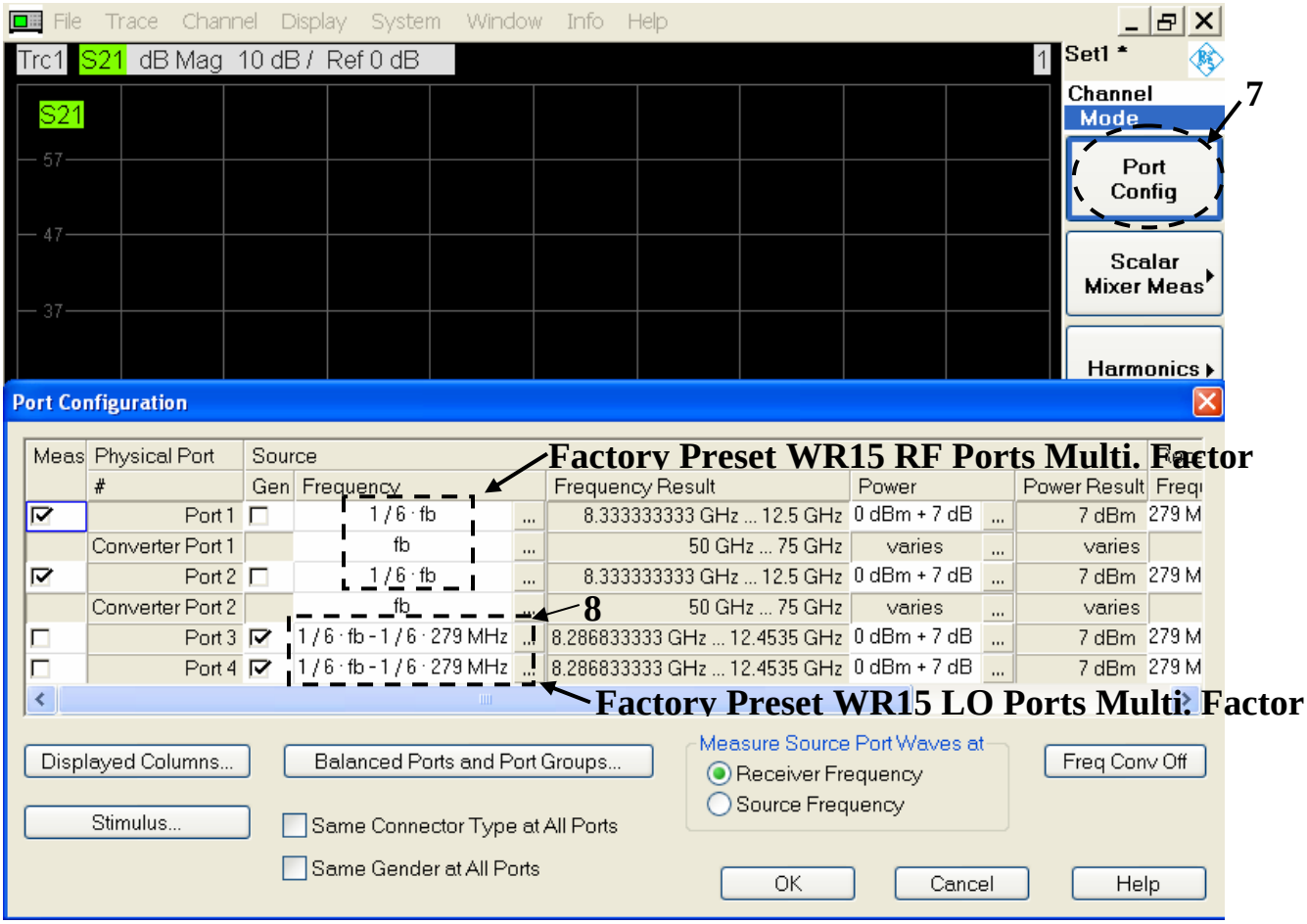

Figure 4 – Port Configuration Table with Preset Multiplication Factors

8. Click on the cell under frequency column next to Port 3 with a check mark to change the LO multiplication factor 1/6 fb – 1/6 279MHz.

9. Use the up/down arrow key or the **DATA ENTRY** key pad to change the multiplication factor from 6 to 5 in both cells. This will automatically change Port 4 Source Frequency multiplication factor (Figure 5).

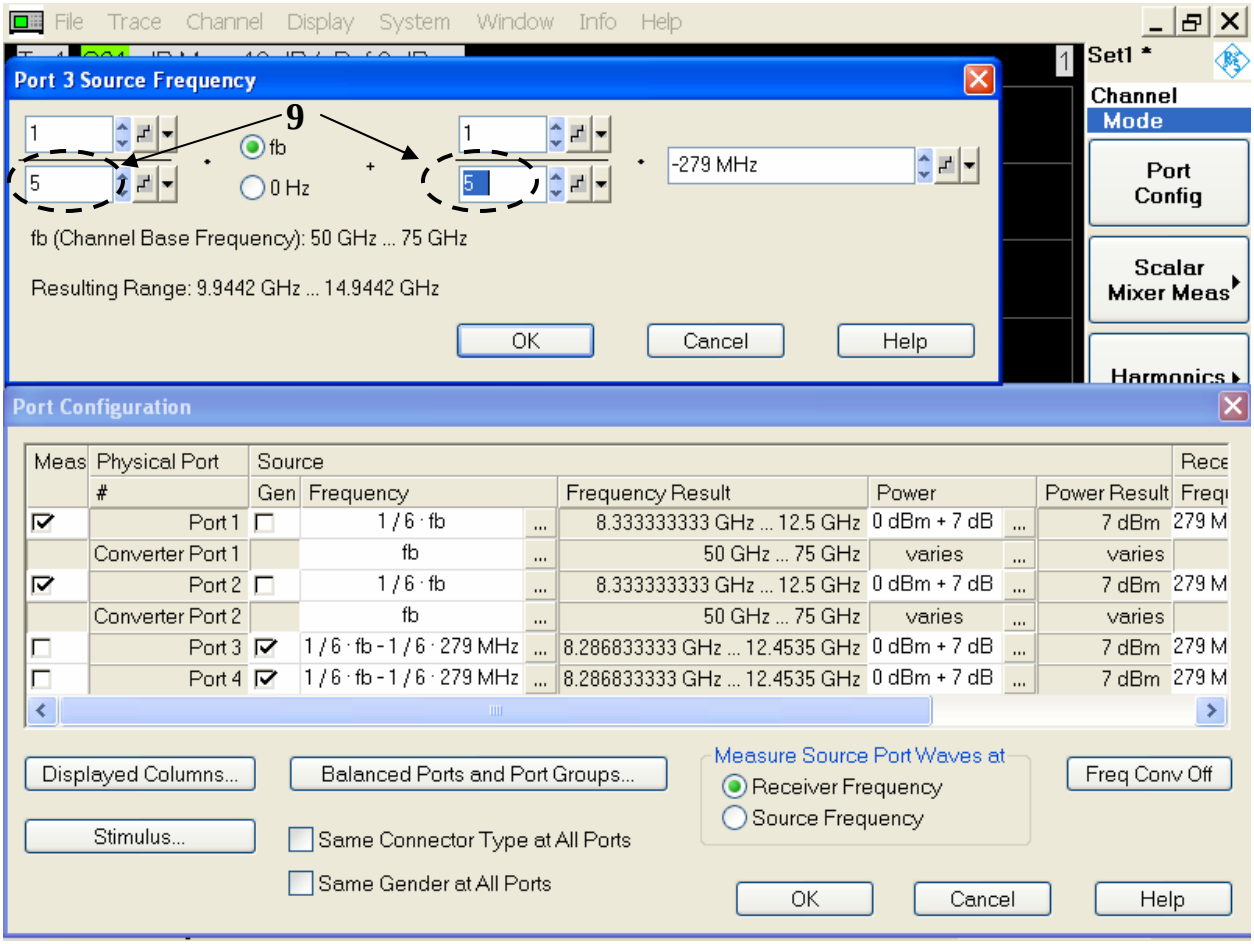

Figure 5 – Modifying LO Port Multiplication Factor in Configuration Table

10. Press "OK" to accept the new LO multiplication factor for port 3 and port 4 (Figure 6).

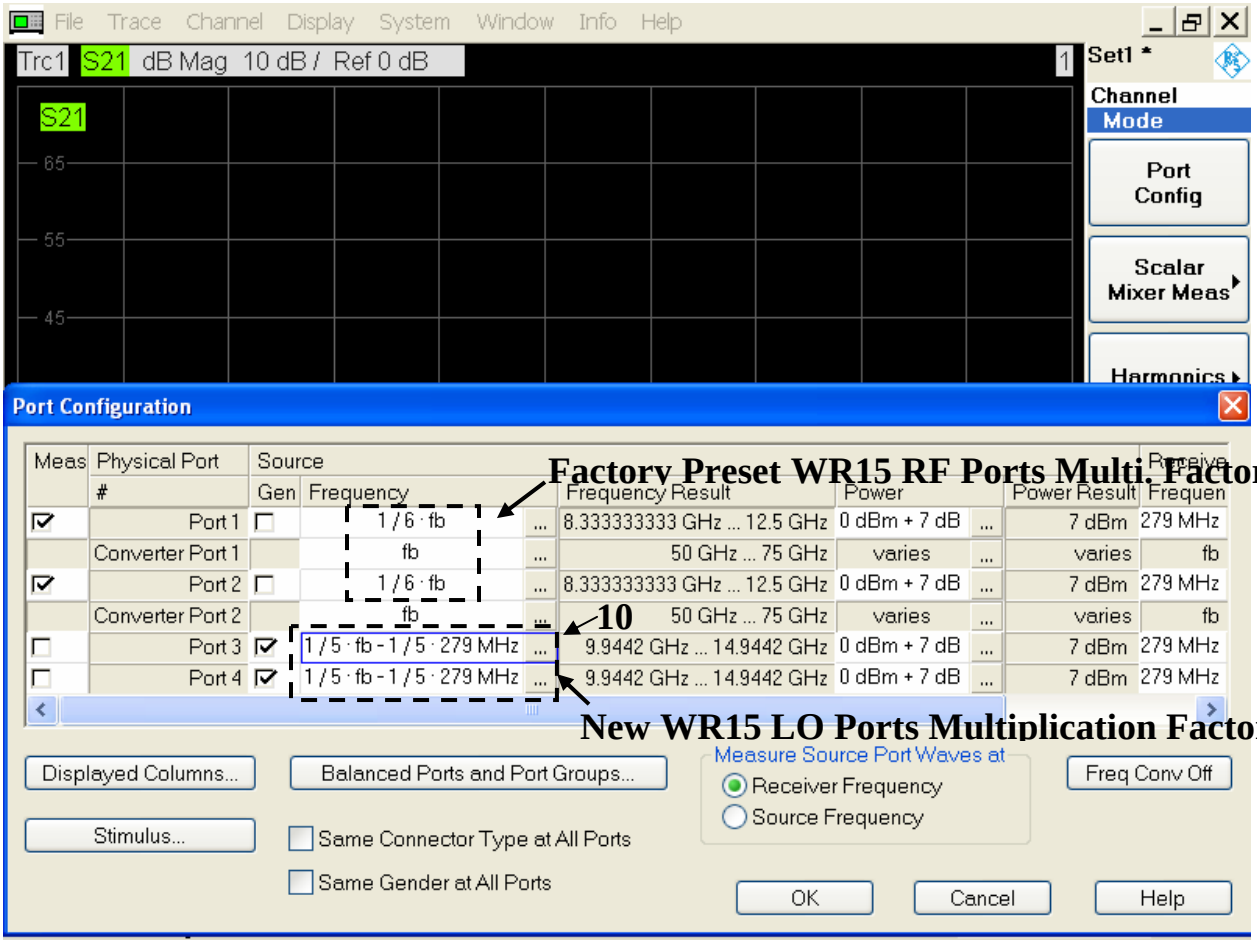

Figure 6 – New LO Port Multiplication Factor in Configuration Table

RF Multiplication Factor – WR15 Frequency Band Example

11. Click on the cell under frequency column next to Port 1 without a check mark to change the RF multiplication factor 1/6 fb (Figure 7).
12. Change the multiplication factor from 6 to 4 using the up/down arrow or use the **DATA ENTRY** keypad.

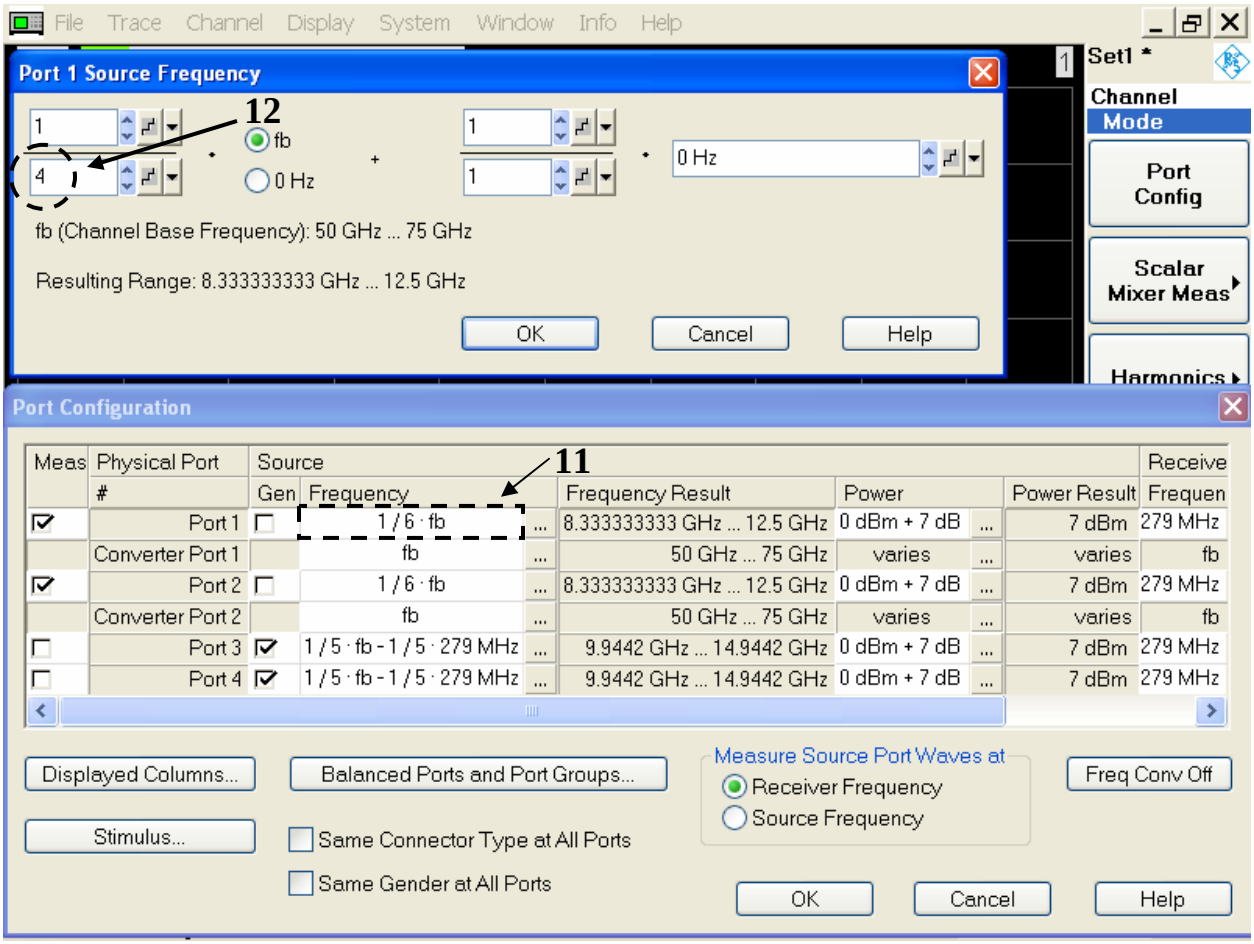

Figure 7 – Configured RF Port 1 Multiplication Factor in Configuration Table

13. Press "OK" to accept the new RF multiplication factor for port 1.
14. Click on the cell under frequency column next to Port 2 without a check mark to change the RF multiplication factor 1/6 fb (Figure 8).
15. Change the multiplication factor from 6 to 4 using the up/down arrow or use the **DATA ENTRY** keypad.

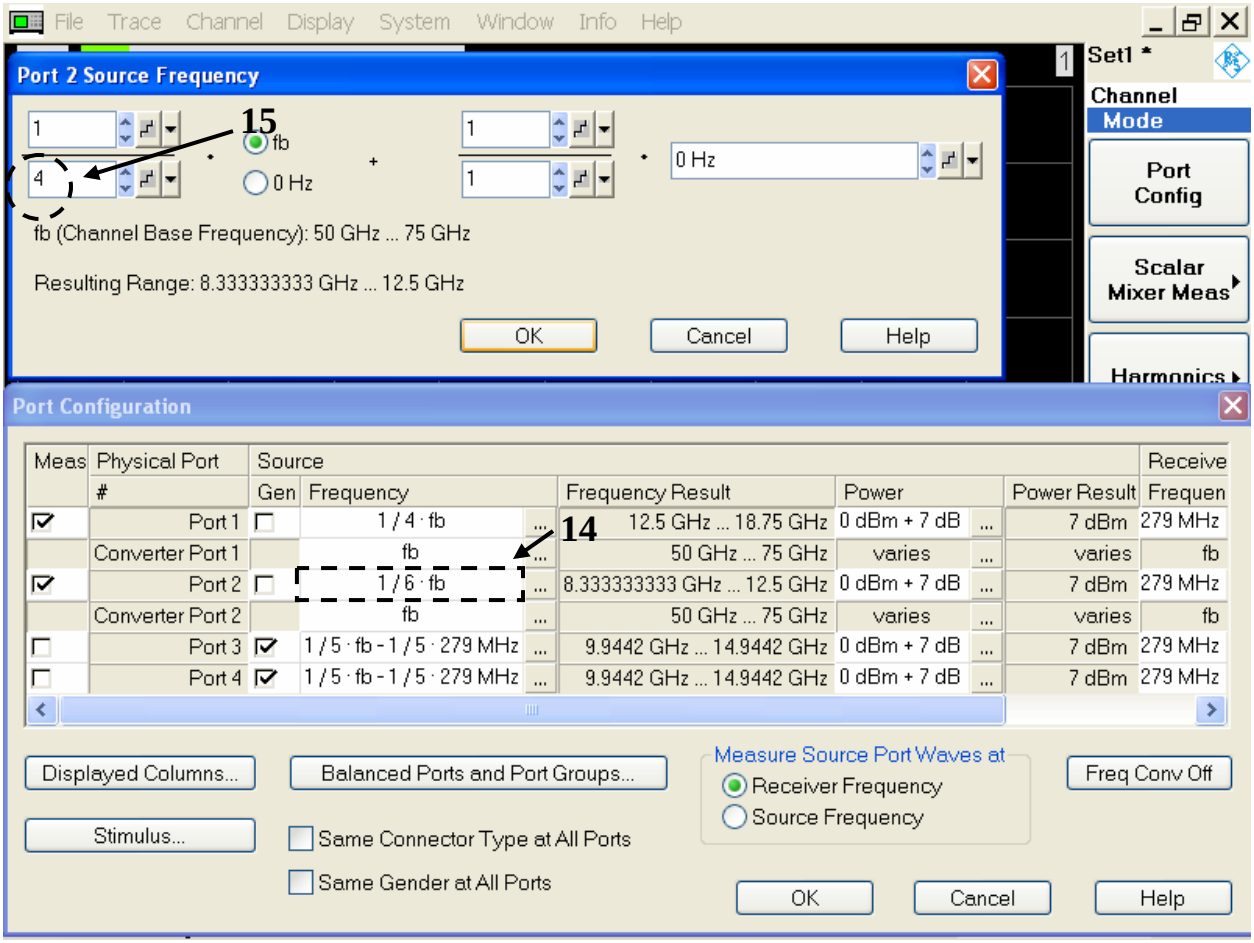

Figure 8 – Configured RF Port 2 Multiplication Factor in Configuration Table

16. Press "OK" to accept the new RF multiplication factor for port 2 (Figure 9).

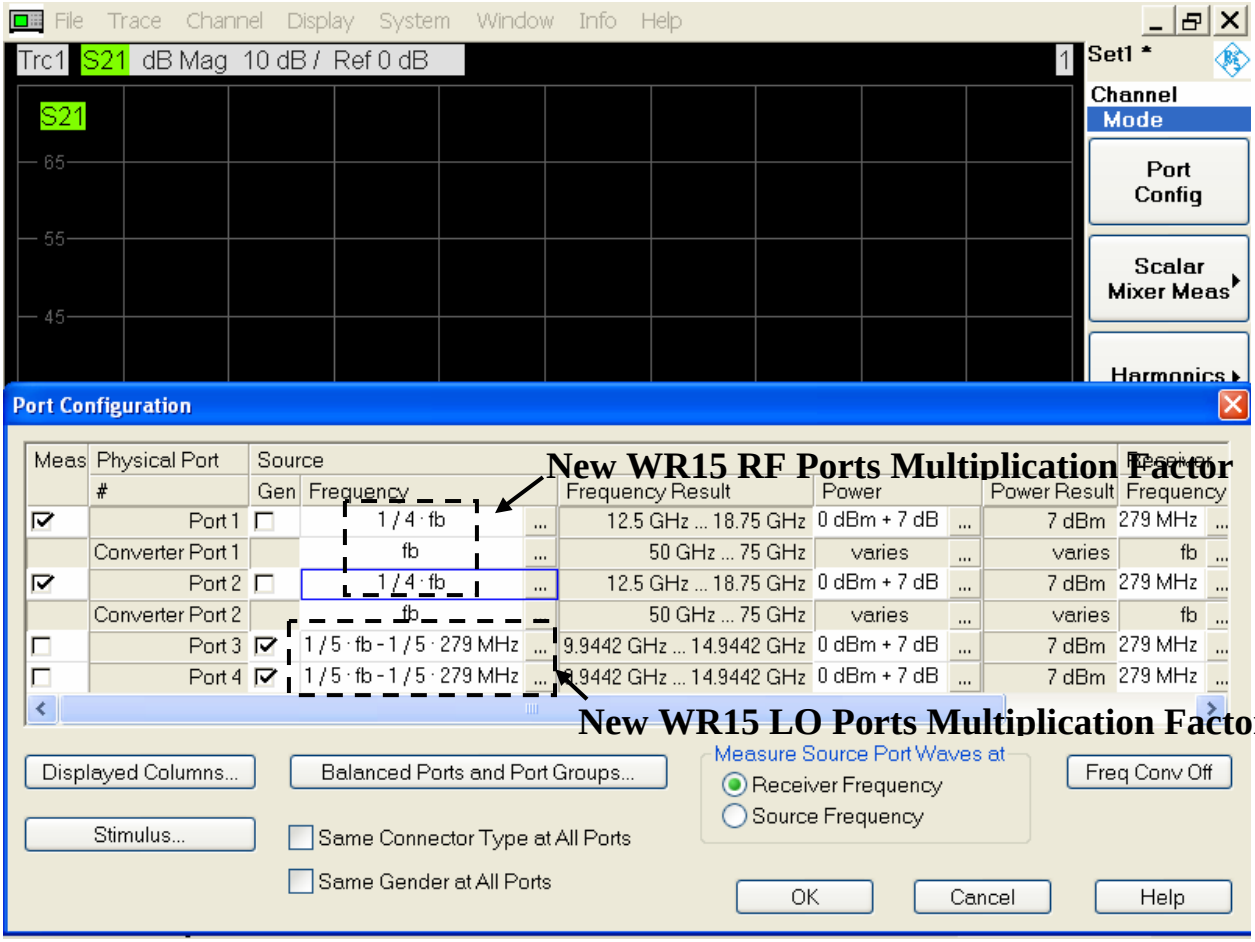

Figure 9 – Completed Modification of RF & LO Multiplication Factor

17. Press "OK" to exit "Port Configuration" setup table.

Modify Factory Port 1, 2, 3 & 4 Output Power

ZVA series network analyzers default all four VNA ports output power to +7dBm in the millimeter wave "direct-connect" configuration. The procedure below shows the steps necessary to increase the port power to +10 dBm to insure adequate RF power level is delivered to OML RF & LO input power, if needed.

1. Press the "**MODE**" hard key on the front panel under **CHANNEL** selection section and press the "Port Config" soft key to access to the Port Configuration setup table.
2. Click on the cell located along "Port 1" row and under "Power" column 0 dBm + 7 dB (Figure 10).

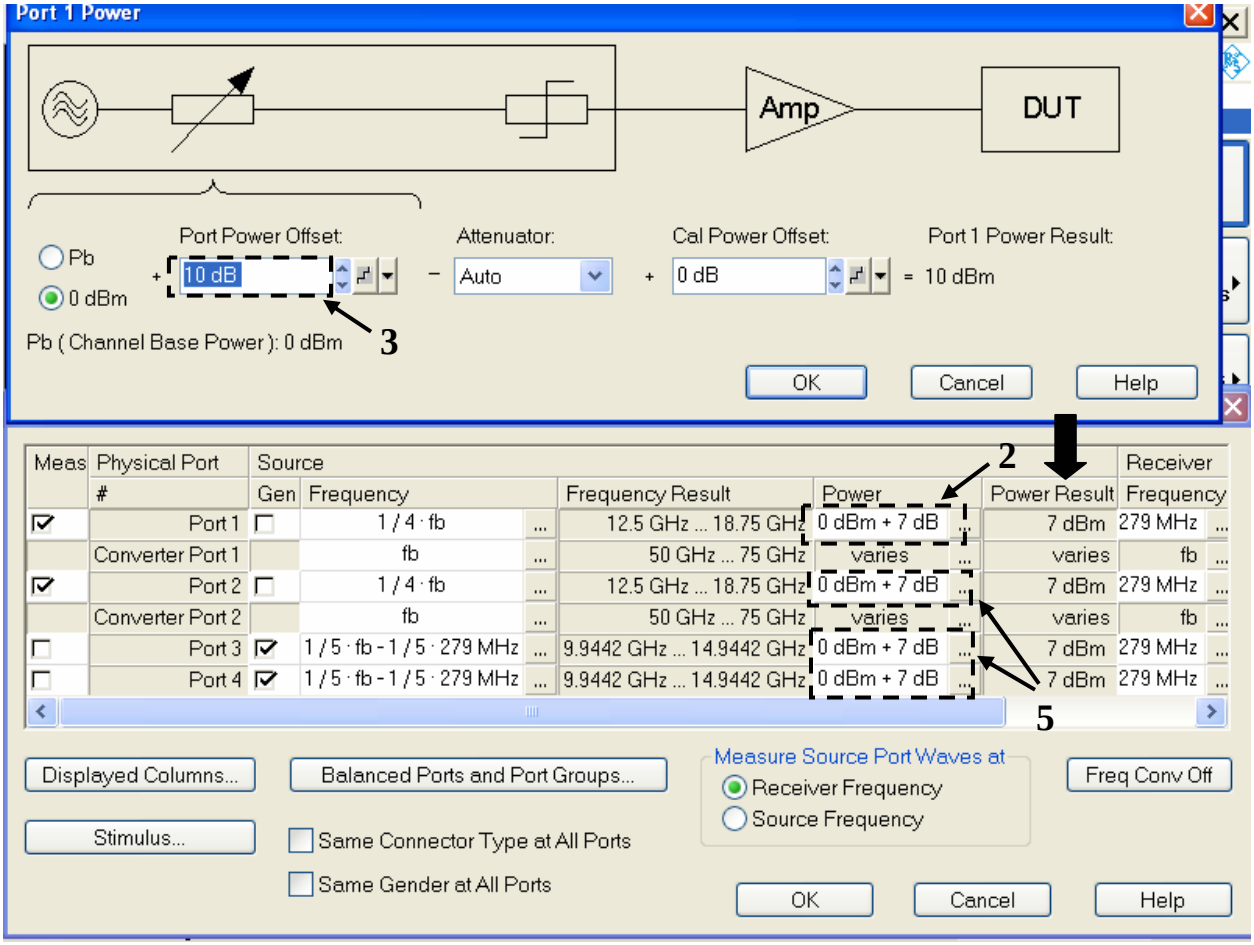

Figure 10 – Port Power Configuration

3. Click on the "Port Power Offset" tab and change the 7 dB to 10 dB using either the up/down arrow or the **DATA ENTRY** keypad.
4. Press "OK" to accept the change to the port power.
5. Repeat steps 2, 3 and 4 for Port 2, Port 3 & Port 4 row and "Power" column 0 dBm + 7 dB (Figure 11).

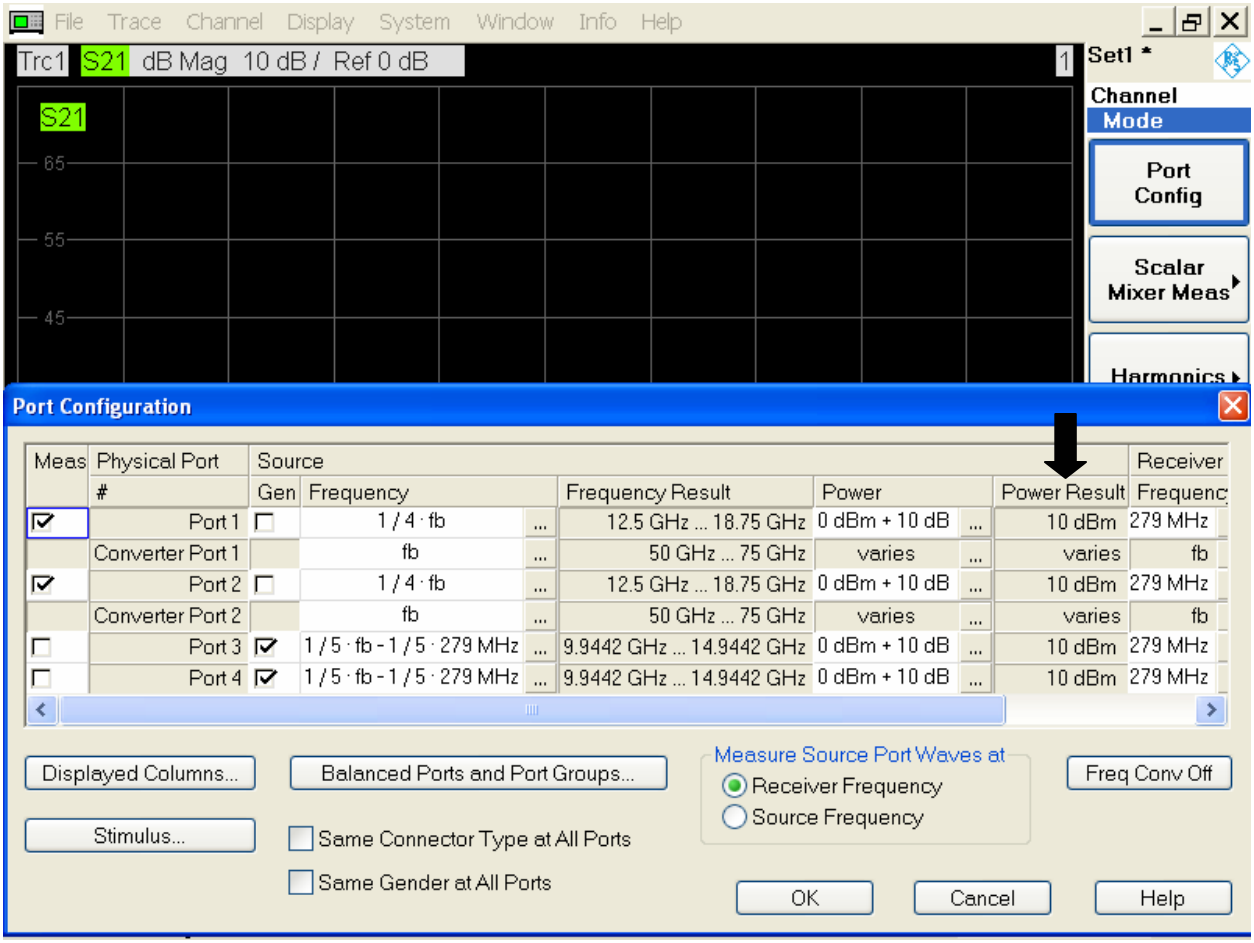

Figure 11 – Completed Port Power Configuration

6. Press "OK" to exit Port Power Configuration.

OML and ZVA Model Number Cross Reference

OML Model #	RF xN	LO xN	R&S Model #	RF xN	LO xN
V10VNA2-T/R	**6**	**8**	ZVA-Z110	**6**	**8**
V08VNA2-T/R	8	**8**	ZVA-Z140	12	**8**
V06VNA2-T/R	**12**	**10**	ZVA-Z170	**12**	**10**
V05VNA2-T/R	**12**	**12**	ZVA-Z220	**12**	**12**
V03VNA2-T/R	**18**	18	ZVA-Z325	**18**	16
V02.2VNA2-T/R	**30**	28	ZVA-Z500	**30**	24
V15VNA2-T/R	4	5	ZVA-Z75	6	**6**
V15VNA2R-T/R	4	**6**			
V12VNA2-T/R	**6**	5	ZVA-Z90	**6**	**6**
V12VNA2R-T/R	**6**	**6**			

Table 1 – OML & ZVA Model Number Cross Reference Table