Maintenance Manual

MS2717B
Economy Spectrum Analyzer

9 kHz to 7.1 GHz

Anritsu Company
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

Part Number: 10580-00183
Revision: B
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DECLARATION OF CONFORMITY

Manufacturer's Name: ANRITSU COMPANY

Manufacturer's Address: Microwave Measurements Division
490 Jarvis Drive
Morgan Hill, CA 95037-2809
USA

declares that the product specified below:

Product Name: Economy Spectrum Analyzer

Model Number: MS2717B, MS2718B, MS2719B

conforms to the requirement of:

EMC Directive 89/336/EEC as amended by Council Directive 92/31/EEC & 93/68/EEC
Low Voltage Directive 2006/95/EC as amended by Council directive 93/68/EEC

Electromagnetic Compatibility: EN61326-1:1997 +A1:1998 +A2:2002 +A3:2003

Emissions:	EN55011: 1998 +A1:1999 +A2:2002 Group 1 Class A	
Immunity:	EN 61000-4-2:1995+ A1:1998+ A2:2001	- 4kV CD, 8kV AD
	EN 61000-4-3:2002+ A1:2002	- 3V/m
	EN 61000-4-4:2004	- 0.5kV SL, 1kV PL
	EN 61000-4-5:1995+ A1:2001	- 0.5kV L-L, 1kV L-E
	EN 61000-4-6:1996+ A1:2001	- 3V
	EN 61000-4-11:1994+ A1:2001	- 100% @ 20msec

Electrical Safety Requirement:

Product Safety: EN61010-1: 2001

Eric McLean, Corporate Quality Director

Morgan Hill, CA

21 MAR 2007
Date

European Contact: For Anritsu product EMC & LVD information, contact Anritsu LTD, Rutherford Close, Stevenage Herts, SG1 2EF UK, (FAX 44-1438-740202)

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N274

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产品中有毒有害物质或元素的名称及含量

For Chinese Customers Only YLNB

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 [Cr(VI)]	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷线路板 (PCA)	×	○	×	×	○	○
机壳、支架 (Chassis)	×	○	×	×	○	○
LCD	×	×	×	×	○	○
其他（电缆、风扇、连接器等） (Appended goods)	×	○	×	×	○	○

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Equipment marked with the Crossed-out Wheelie Bin symbol complies with the European Parliament and Council Directive 2002/96/EC (the "WEEE Directive") in the European Union.

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Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Company uses the following symbols to indicate safety-related information. For your own safety, read the information carefully *before* operating the equipment.

Symbols Used in Manuals

Danger

This indicates a very dangerous procedure that could result in serious injury or death, and possible loss related to equipment malfunction, if not performed properly.

Warning

This indicates a hazardous procedure that could result in light-to-severe injury or loss related to equipment malfunction, if proper precautions are not taken.

Caution

This indicates a hazardous procedure that could result in loss related to equipment malfunction if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manuals

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions *before* operating the equipment. Some or all of the following five symbols may or may not be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.

This indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.

This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.

This indicates a note. The contents are described in the box.

These indicate that the marked part should be recycled.

For Safety

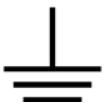
Warning

Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation, etc., is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced.

Moreover, this alert mark is sometimes used with other marks and descriptions indicating other dangers.

Warning

or



When supplying power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Warning

This equipment can not be repaired by the operator. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Warning

Use two or more people to lift and move this equipment, or use an equipment cart. There is a risk of back injury if this equipment is lifted by one person.

Caution

Electrostatic Discharge (ESD) can damage the highly sensitive circuits in the instrument. ESD is most likely to occur as test devices are being connected to, or disconnected from, the instrument's front and rear panel ports and connectors. You can protect the instrument and test devices by wearing a static-discharge wristband. Alternatively, you can ground yourself to discharge any static charge by touching the outer chassis of the grounded instrument before touching the instrument's front and rear panel ports and connectors. Avoid touching the test port center conductors unless you are properly grounded and have eliminated the possibility of static discharge.

Repair of damage that is found to be caused by electrostatic discharge is not covered under warranty.

Table of Contents

Chapter 1 — General Information

1-1 Introduction

This manual provides general service and preventative maintenance information for the Anritsu MS2717B Economy Spectrum Analyzer. Performance verification procedures, parts replacement procedures, and a replaceable parts list are provided.

Appendix A contains blank test records that should be copied before use.

Familiarity with the basic operation of the front panel keys is assumed (for example, how to change measurement mode or preset the unit, or the meaning of "soft key").

Before making any measurement, ensure that all equipment has been operating for at least 30 minutes to allow the internal circuitry to warm up and stabilize.

This manual contains the following sections for maintenance information:

- "General Information" ("General Information")
- "Performance Verification, Spectrum Analyzer" (Chapter 2)
- "Performance Verification, Installed Options" (Chapter 3)
- "Adjustment" (Chapter 4)
- "Removal and Replacement" (Chapter 5)
- "Test Records" (Appendix A)

Throughout this manual, the terms MS2717B, Economy Spectrum Analyzer, and Spectrum Analyzer are used interchangeably when referring to this instrument.

1-2 Description

The Anritsu Economy Spectrum Analyzer is a synthesizer-based Spectrum Analyzer that is designed for monitoring, measuring, and analyzing signals quickly and accurately. Measurements can be easily made by using the main instrument functions: frequency, span, amplitude, and bandwidth. Dedicated keys (for common functions) and a familiar calculator-type keypad are available for fast data entry.

Time and date stamping of measurement data is automatic. The internal memory provides for the storage and recall of more than 1000 measurement setups and more than 1000 traces. The bright, high-resolution color liquid crystal display (LCD) provides for easy viewing in a variety of lighting conditions.

A full range of marker capabilities (such as peak, center, and delta functions) are provided for faster, more comprehensive analysis of displayed signals. Upper and lower multi-segmented limit lines are available to create quick, simple pass/fail measurements. A menu option provides for an audible alert when the limit value is exceeded. The Anritsu Spectrum Analyzer can interface with Master Software Tools.

Anritsu Master Software Tools, a PC-based software program, provides for storing measurement data. Master Software Tools can also convert the Spectrum Analyzer measurement display into several graphic formats. An instrument can be easily updated with the latest firmware that is available from the Anritsu Web site:

http://www.us.anritsu.com

Measurements that are stored in internal memory can be downloaded to a PC by using the included USB or Ethernet cables. When stored, the graphic trace can then be displayed, scaled, or enhanced with markers and limit lines. Historical graphs can be overlaid with current data by using the PC mouse in a drag-and-drop manner. The measurement data can be extracted and used in spreadsheets or for other analytical tasks.

1-3 Recommended Test Equipment

The following test equipment is recommended for use in testing and maintaining the model MS2717B Spectrum Analyzer. Table 1-1 includes a list of test equipment that is required for verifying the Spectrum Analyzer functions. Table 1-2 includes a list of test equipment that is required for verifying optional functions.

Table 1-1. Recommended Test Equipment for Spectrum Analyzer Verification

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesized Signal Generator	Frequency: 0.1 Hz to 20 GHz Power Output: +16 dBm Step attenuator installed	Anritsu Model MG3692A or MG3692B with option 2A, option 4, option 22, option 15x[a]
Power Meter	Power Range: –70 to + 20 dBm	Anritsu Dual Channel Model ML2438A
Power Sensor	Frequency: 100 kHz to 18 GHz Power Range: –30 to +20 dB	Anritsu Model MA2421D (Quantity 2) or SC7816 (Quantity 2)
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: –67 to +20 dB	Anritsu Model MA2442D (Quantity 2)
VNMS	10 MHz to 9 GHz	Anritsu Model MS4624A, MS4624B, or MS4624D
Type N Calibration Kit for VNMS	10 MHz to 9 GHz	Anritsu Model 3753R
50 Ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
Adapter	Frequency: DC to 20 GHz N(m)-N(m), 50 Ohm	Anritsu Model 34NN50A
Adapter	Frequency: DC to 20 GHz K(m)-N(f), 50 Ohm	Anritsu Model 34RKNF50
RF Coaxial Cable	Frequency: DC to 18 GHz N(m)-N(f), 50 Ohm	Anritsu Model 15NN50-1.5B (Quantity 2)
Lowpass Filter	Frequency: 50 MHz	Anritsu Part Number 1030-96
Low Frequency Cal Fixture	Frequency: 9 kHz to 100 kHz	Anritsu Part Number T3449
Frequency Reference	Frequency: 10 MHz	Symmetricom Model RubiSource T&M
Signal Generator		Agilent Model 8648D[b] with Option 1ES and option 1EA
Multimeter	Capable of measuring True RMS AC voltage in millivolts range	Agilent Model 34401A
Fixed Attenuator	10 dB Attenuation	Aeroflex/Weinschel Model 44-10 (Quantity 2)
Fixed Attenuator	20 dB Attenuation	Aeroflex/Weinschel Model 44-20 (Quantity 2)
Fixed Attenuator	6 dB Attenuation	Aeroflex/Weinschel Model 44-6 (Quantity 2)
Fixed Attenuator	2 dB Attenuation	Aeroflex/Weinschel Model 44-2 (Quantity 2)
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
Coaxial Cable	BNC(m) to BNC(m), 50 Ohm	Any (Quantity 2)
Adapter	Dual Banana Plug to BNC(f)	Any

a.Only MG3692A models require option 15 to achieve power of +16 dBm at 3.5 GHz.

b.No critical specification is required for this signal generator.

Table 1-2. Recommended Test Equipment for Options Function Verification

Instrument	Critical Specification	Recommended Manufacturer/Model
Synthesizer	Frequency: 0.1 Hz to 20 GHz	Anritsu Model MG3692A or MG3692B with option 2A, option 4, option 15[a] and option 22
Vector Signal Generator	Frequency: 100 kHz to 3 GHz	Anritsu Model MG3700A[b] with Options: MG3700A-002, MG3700A-021
Power Meter	Power Range: −70 dBm to +20 dBm	Anritsu Dual Channel Model ML2438A
Power Sensor	Frequency: 10 MHz to 18 GHz Power Range: −60 dBm to +20 dBm	Anritsu Model MA2482D with Option 1 Quantity: 2 each
Frequency Counter	Frequency: 20 GHz	Anritsu Model MF2412B
Programmable Attenuator	Frequency: DC to 2 GHz Attenuation: 100 dB (in 1 dB and 10 dB steps)	Anritsu Model MN63A
Fixed Attenuator	Frequency Range: DC to 18 GHz Attenuation: 10 dB	Aeroflex/Weinschel Model 44-10 Quantity: 2 each
Power Splitter	Frequency: DC to 18 GHz	Aeroflex/Weinschel Model 1870A
RF Power Amplifier	Frequency: 100 MHz to 1000 MHz, Gain: 35 dB minimum	Mini Circuits Model TIA-1000-1R8 [Two each of BNC(m) to N(f) Adapters are required.]
Adapter	Frequency: DC to 20 GHz N(m)-N(m), 50 Ohm	Maury Microwave Model 8828B Quantity: 2 each [Required one each only if Anritsu Coupler and Circulator are used]
Adapter	Frequency: DC to 20 GHz K(m)-N(f), 50 Ohm	Anritsu Model 34RKNF50
Adapter	Frequency: 881.5 MHz BNC(m) to N(f), 50 Ohm	Midwest Microwave Model ADT-2615-NF-BNM-02 Quantity: 2 each
Adapter	Frequency: 881.5 MHz SMA(m) to N(f), 50 Ohm	Midwest Microwave Model ADT-2582-NF-SMM-02 Quantity: 4 each [Required only if Anritsu Coupler and Circulator are used.]
Adapter	Frequency: 881.5 MHz SMA(m) to SMA(m), 50 Ohm	Midwest Microwave Model ADT-2594-MM-SMA-02 [Required only if Anritsu Coupler and Circulator are used.]
50 Ohm Termination	Frequency: DC to 18 GHz	Anritsu Model 28N50-2
High Power Load	DC to 18 GHz, 10 W	Aeroflex/Weinschel Model M1418
Coupler	Frequency: 881.5 MHz Coupling Factor: 30 dB	Midwest Microwave Model CPW-5140-30-NNN-05 or CPW-5141-30-NNN-05 Alternative: Anritsu part number 1091-307 [Two SMA(m) to N(f) adapters are required.]

Table 1-2. Recommended Test Equipment for Options Function Verification

Instrument	Critical Specification	Recommended Manufacturer/Model
Circulator	Frequency Range: 800 MHz to 1000 MHz Isolation: 20 dB minimum	Meca Electronics, Inc. part number CN-0.900 Alternative: Anritsu part number 1000-50 [Two SMA(m) to N(f) adapter and one SMA(m) to SMA(m) Adapter are required.]
RF Coaxial Cable	Frequency: DC to 18 GHz N(m)-N(m), 50 Ohm	Anritsu Model 15NN50-1.5B Quantity: 3 each
Coaxial Cable	BNC(m) to BNC(m), 50 Ohm	Any

a.Only MG3692A models require option 15 to achieve power of +13 dBm.

b.The MG3700A requires several factory custom test pattern files installed into its memory.

1-4 Replaceable Parts

Table 1-3. Replaceable Parts

Part Number	Description
ND68032	MS2717B Main/Spectrum Analyzer Assembly; w/Opt 9 Hardware[a]
ND67553	Tracking Generator Assembly (Opt 20)
ND66821	Demodulation PCB (Opt 9)
3-15-118	LCD Display
61368	clear plastic LCD protector
3-66549-3	LCD Backlight Inverter PCB
40-170	Power Supply Module
631-81	1.6A slow blow fuse
ND66437	Fan
3-633-26	3v RTC battery
3-2000-1567	Internal Compact Flash card (512 MB)
65027-3	main keypad PCB
61362	main keypad
65340	main keypad bezel
61361	softkeys keypad
61378-1	softkey bezel
61333-3	softkey PCB
790-625	speaker
513-80	SMP Adapter
3-410-102	encoder (excluding knob)
61360-2	knob (excluding encoder)

a.When ordering the Main/Spectrum Analyzer PCB Assembly, in order to ensure installation of correct options on the replacement units, all options that are installed on the instrument must be declared on the order. Software based options (for example, Option 44 and Option 45) are enabled prior to shipment of the exchange assembly. The options are listed on a label on the top of the MS2717B and are shown in the System / Status display.

1-5 Troubleshooting

This section describes the primary troubleshooting operations that can be performed by all Anritsu Service Centers. Perform the troubleshooting suggestions in the order that they are listed. Operators of the MS2717B should refer to the MS2717B User Guide (Anritsu part number 10580-00181) for troubleshooting help. Error messages can be found in Appendix B of the User Guide.

Cautions:

Only qualified Anritsu personnel should replace internal assemblies.

Major subassemblies (as shown in the replaceable parts list) are typically the items that may be replaced.

Because they are highly fragile, items that must be soldered may not be replaced without special training.

Removing of RF shields from PC boards, or adjustment of screws on or near the shields, will detune sensitive RF circuits and will result in degraded instrument performance.

Turn-On Problems:

Unit cannot boot up, no activity occurs when On/Off key is pressed:

1. Verify that the On/Off switch on the rear panel is in the ON position.
2. Check the fuse. Replace the fuse if required.
3. The On/Off switch on the front panel may be damaged. Replace the keypad PCB or rubber keypad, as required.
4. Power supply may have failed. Check for 12 volts at the motherboard between the 2 wires from the power supply. Replace the power supply, as required.
5. Main PCB has failed. Replace the Main/Spectrum Analyzer PCB assembly.

Unit begins the boot process, but does not complete boot up:

1. Using Master Software Tools, perform the Emergency Repair procedure, then update the system software (via the Tools menu).
2. Main PCB has failed. Replace the Main/Spectrum Analyzer PCB assembly.

Unit makes normal boot-up sounds, but the display has a problem:

1. If the display is dim, check the brightness setting under the System Menu/System Options.
2. Replace the Backlight Driver PCB.
3. Replace the LCD assembly.
4. Main PCB has failed. Replace the Main/Spectrum Analyzer PCB assembly.

Boot-up Self Test fails:

1. Perform a Master Reset.
2. If the message relates to the RTC battery, then replace the battery on the Main PCB.
3. Main PCB has failed. Replace the Main/Spectrum Analyzer PCB assembly.

Lock Error message:

1. This message normally appears for 2 to 3 seconds when an external 10 MHz reference is applied.
2. Spectrum Analyzer PCB has failed. Replace the Main/Spectrum Analyzer PCB assembly.

Spectrum Analyzer Problems:

1. Inspect the Spectrum Analyzer RF In connector for damage.
2. Refer to the User Guide (Anritsu part number 10580-00181).
3. Update system software using Master Software Tools (via Tools menu).
4. Spectrum Analyzer PCB has failed. Replace the Main/Spectrum Analyzer PCB assembly.

1-6 Service Centers

For the latest service and sales information in your area, visit the following URL:

http://www.anritsu.com/Contact.asp

and choose a country for regional contact information.

Chapter 2 — Performance Verification, Spectrum Analyzer

The procedures in this chapter are used to verify the performance of the Anritsu MS2717B Spectrum Analyzer functions. Installed Options verification procedures are detailed in Chapter 3.

Blank performance verification test records are provided in Appendix A. These blank test records should be copied before use.

IMPORTANT

Before making any measurement, ensure that all equipment has been operating for at least 30 minutes to allow the internal circuitry to warm up and stabilize.

2-1 Frequency Accuracy

This test verifies the CW frequency accuracy of the Spectrum Analyzer in Anritsu Model MS2717B Economy Spectrum Analyzer.

Procedure:

1. Connect the external 10 MHz Reference to the Anritsu MG3692x Synthesized Signal Generator.

Note	**Do not connect** the external 10 MHz Reference to the MS2717B Spectrum Analyzer.

2. Connect the output of the Synthesized Signal Generator to the Spectrum Analyzer RF In of the MS2717B.
3. On the MS2717B, change the Mode to Spectrum Analyzer. Preset the MS2717B.
4. Set the MG3692x output to 1 GHz CW, with an RF output level of −30 dBm.
5. On the MS2717B, press the Amplitude soft key, and set the Reference Level to −10 dBm.
6. Press the Freq soft key and set the Center Freq to 1.0 GHz.
7. Press the Span soft key, set the span to 10 kHz.
8. Press the BW soft key and set RBW to 100 Hz.
9. Press the VBW soft key and set to 30 Hz.
10. Press the **Marker** key, and press the Peak Search soft key.
11. Record the marker frequency in the test records in Table A-1, "Spectrum Analyzer Frequency Accuracy". Ensure that the measured frequency is within specification.
12. Set the MG3692x output to 7.0 GHz CW and set the center frequency of the MS2717B to 7.0 GHz.
13. On the MS2717B, press the **Marker** key, and press the Peak Search soft key.
14. Record the marker frequency in the test records in Table A-1, "Spectrum Analyzer Frequency Accuracy". Ensure that the measured frequency is within specification.

Note	If the MS2717B fails the Spectrum Analyzer "Frequency Accuracy" test, then perform the Spectrum Analyzer "Internal Reference Frequency Adjustment" procedure in Section 4-2. If the MS2717B still fails the Frequency Accuracy test after the Internal Reference Frequency Adjustment has been completed, then replace the Main/SPA PCB assembly.

2-2 SSB Phase Noise Verification

This test verifies the single sideband phase noise of the Spectrum Analyzer in Anritsu Model MS2717B Economy Spectrum Analyzer.

Procedure:

1. Connect the external 10 MHz Reference to the Anritsu MG3692x Synthesized Signal Generator.
2. Connect the output of the Synthesized Signal Generator to the Spectrum Analyzer RF In connector of the MS2717B
3. Set the MG3692x output to 900 MHz CW, with an RF output level of +3 dBm.
4. Ensure that the MS2717B is in the Spectrum Analyzer mode. Preset the MS2717B.
5. Press the Amplitude soft key, then set the Reference Level to 0 dBm.
6. Press the Atten Lvl soft key and enter 15 dB.
7. Press the Freq soft key and set the Center Freq to 900.05 MHz.
8. Press the Span soft key and set span to 110 kHz.
9. Press the BW soft key and set the RBW to 1 kHz.
10. Press the VBW soft key and set to 3 Hz.
11. Press the **Shift** key, and then press the **Trace** (5) key.
12. Press Trace A Operations, and set the # of Averages to 7.
13. Wait until the Trace Count (left side of display) displays 7/7.
14. Press the **Marker** key and press the Peak Search soft key.
15. Press the Delta On/Off soft key to turn on Delta.
16. Use the keypad to enter 10 and press the kHz soft key.
17. Subtract 30 from the dB value that is shown on the marker readout in order to convert the value to dBc/Hz (for example, if the marker reads −80 dB, then the value becomes −110 dBc/Hz).
18. Record the dBc/Hz value in the test records in Table A-2, "Spectrum Analyzer SSB Phase Noise Verification".
19. Repeat Step 16 through Step 18 for 20 kHz marker delta, 30 kHz marker delta, and 100 kHz marker delta.
20. Press the Freq soft key and set the Center Freq to 905 MHz.
21. Press the Span soft key and set span to 12 MHz.
22. Press the BW soft key and set VBW to 300 Hz.
23. Wait until the Trace Count (left side of display) displays 7/7.
24. Repeat Step 16 through Step 18 for 1 MHz marker delta and 10 MHz marker delta.

2-3 Resolution Bandwidth Accuracy

This test verifies the resolution bandwidth accuracy of the Spectrum Analyzer in Anritsu Model MS2717B Economy Spectrum Analyzer.

Procedure:

1. Connect the external 10 MHz Reference to both the MG3692x Synthesized Signal Generator and the MS2717B Spectrum Analyzer.
2. Set the MS2717B to Spectrum Analyzer mode, then press **Shift** and press **Preset** (1) to preset the MS2717B, then set up the MS2717B as follows:

   Center Frequency: 1.0 GHz

   Reference Level: −10 dBm

   Atten Lvl: 0 dB
3. Set the MG3692x to 1 GHz CW, with an output level of −30 dBm. Apply the signal to the Spectrum Analyzer RF In connector of the MS2717B.
4. On the MS2717B, set the Span to 4.5 MHz.
5. Press the BW soft key and set the RBW to 3 MHz.
6. Under the **Measure** menu, press OCC BW and set it to ON.
7. Press the dBc soft key and enter 3.
8. Record the occupied bandwidth in the test record in Table A-3, “Spectrum Analyzer Resolution Bandwidth (RBW) Accuracy Test” and verify that it is within specification.
9. Repeat Step 4 through Step 8 for all other settings in the test record in Table A-3.

2-4 Second Harmonic Distortion

This test verifies the second harmonic distortion of the Spectrum Analyzer in the MS2717B.

Procedure:

1. Set the MG3692x Synthesized Signal Generator to 50.1 MHz CW and set the output level to -30dBm.
2. Connect the synthesized signal generator output to the Spectrum Analyzer RF In connector of the MS2717B through the 50 MHz lowpass filter.
3. Set the MS2717B to Spectrum Analyzer mode and then preset the unit.
4. Set the MS2717B as follows:

   Center Frequency: 50.1 MHz

   Span: 100 kHz

   Reference Level: -20 dBm

   Atten Lvl: 0 dB

   RBW: 1 kHz

   VBW: 10 Hz

   Detection: Peak
5. Press the **Shift** key and then the **Trace** key. Select Trace A Operations and set # of Averages to 5.
6. After the Trace Count displays “5/5” (left side of display), press the Marker soft key and select Peak.
7. Record the amplitude of the 50.1 MHz signal in Table A-4, “Spectrum Analyzer Second Harmonic Distortion”.
8. Change the Center Frequency of the MS2717B to 100.2 MHz. **Do not adjust** the MG3692x Synthesized Singal Generator.
9. After the Trace Count shows “5/5”, press the Marker soft key and select Peak Search.
10. Record the amplitude of the signal at 100.2 MHz in Table A-4.
11. Convert the values of the 50.1 and the 100.2 signals to positive values and subtract the smaller from the larger. Record the result in Table A-4 and verify that it is within specification.

2-5 Third Order Intercept Verification

The following test verifies the Third Order Intercept point (also known as TOI or IP3) of the Spectrum Analyzer in Anritsu Model MS2717B Economy Spectrum Analyzer.

600 MHz TOI Test

Procedure:

1. Connect the equipment as shown in Figure 2-1. The splitter will be used as an RF combiner (the normal RF outputs will become inputs, and the normal input will become the RF output).
2. Set the MG3692x Synthesized Signal Generator to 599.951 MHz CW, and set the Agilent 8648D Signal Generator to 600.051 MHz.

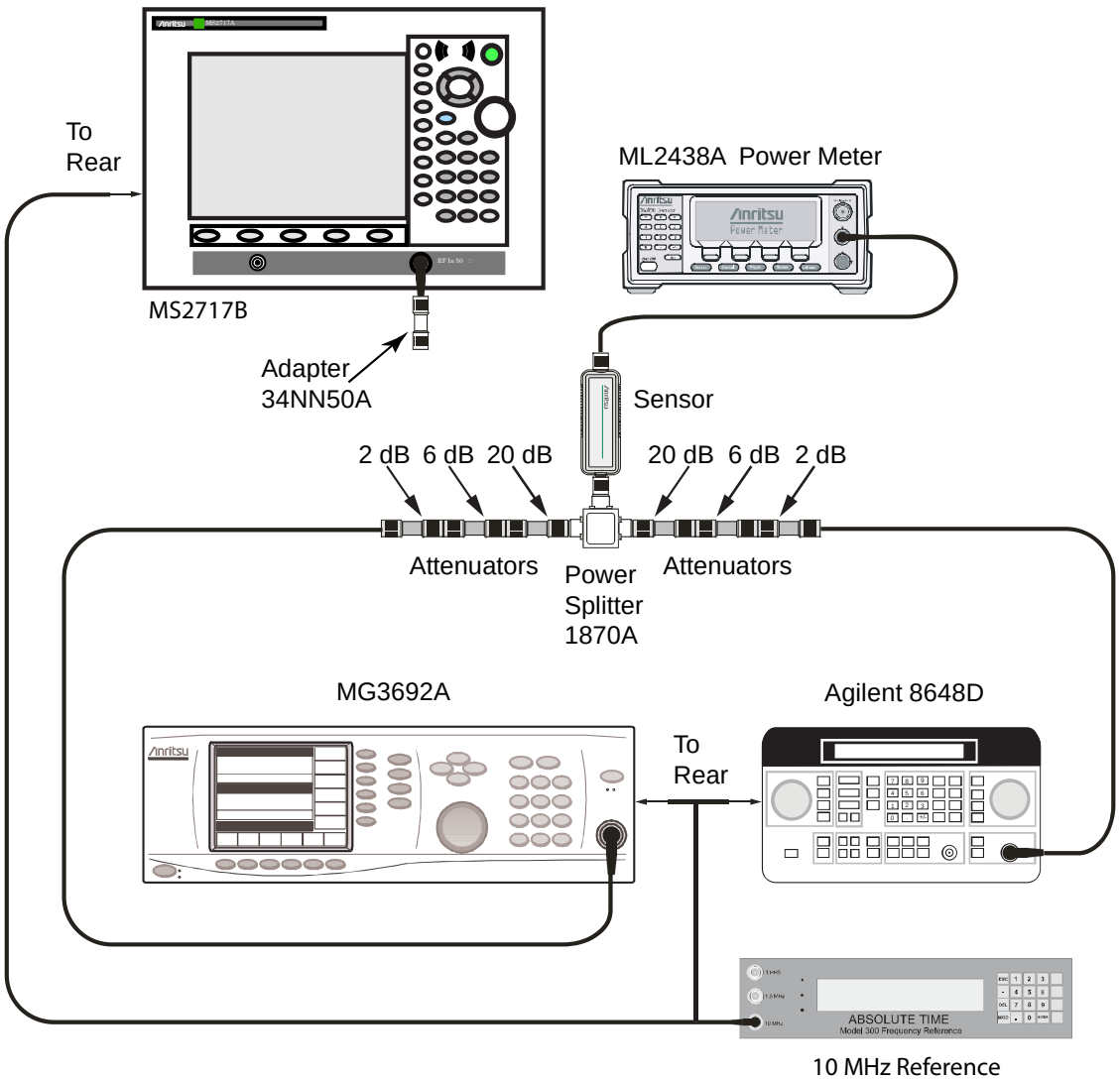


Figure 2-1. Third Order Intercept Verification (600 MHz) Setup

3. Set the Agilent 8648D Signal Generator RF to OFF ("RF OFF" appears on the right side of the display).
4. On the ML2438A power meter, set the calibration factor of the power sensor to 600 MHz.
5. Connect the power sensor to the splitter output, and adjust the power of the MG3692x (to approximately +16 dBm) so that –20 dBm appears at the splitter output.
6. Turn off the RF of the MG3692x Synthesized Signal Generator.

7. On the Agilent 8648D Signal Generator, turn on the RF and adjust the RF amplitude (to approximately +16 dBm) so that –20 dBm appears at the splitter output.
8. Set the MS2717B to Spectrum Analyzer mode, then press **Shift** and press **Preset** (1) to preset the MS2717B, then set up the MS2717B as follows:

   Center Frequency: 600.151 MHz

   Span: 100 Hz

   RBW: 30 Hz

   VBW: 1 Hz

   Reference Level: –15 dBm

   Atten Lvl: 0 dB

   Pre-amp: OFF
9. Press the **Shift** key and the **Sweep** (3) key. Press Detection, and press RMS (red dot appears on the label).
10. Disconnect the power sensor from the output of the splitter, and connect the splitter output to the MS2717B Spectrum Analyzer RF In connector through the Anritsu Model 34NN50A adapter as shown in Figure 2-2.

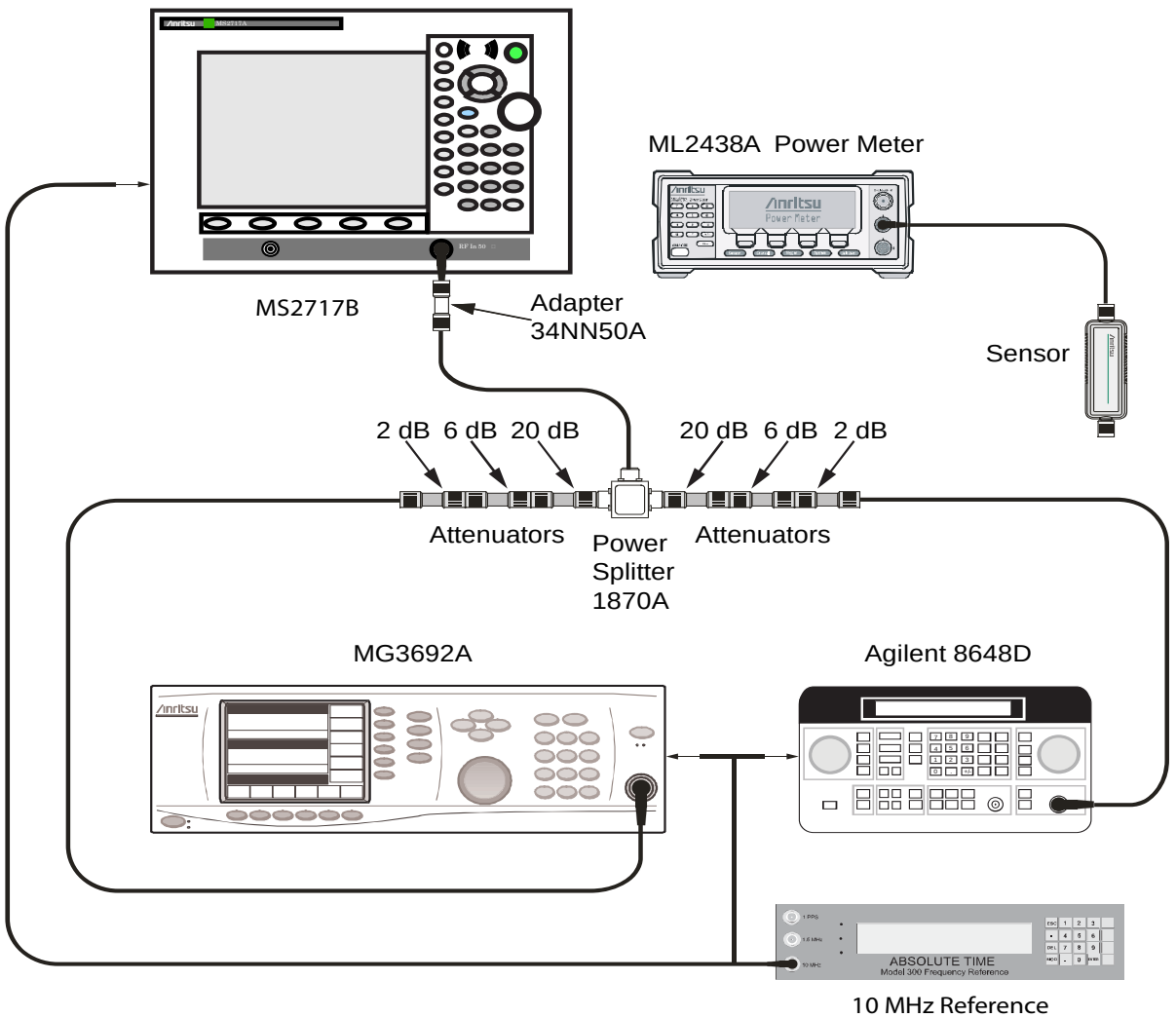


Figure 2-2. Third Order Intercept 600 MHz Test Setup

11. Turn on the RF of both the MG3692x and the 8648D.

12. Press the **Shift** key and then the **Trace** (5) key. Press Trace A Operations, and set # of Averages to 2.

13. After 2 sweeps have occurred ("Trace Count 2/2" appears on the left of the display), turn on a marker and press Marker to Peak. Record the amplitude of the signal at 600.151 MHz in Table A-5.

14. Change the Center Frequency of the MS2717B to 599.851 MHz. Record the amplitude of this signal in Table A-6 for use in the TOI calculation.

15. Determine which signal is larger (599.851 MHz or 600.151 MHz). Use the larger value for "max" in the following formula in order to calculate the TOI for 600 MHz (refer to the example calculation below):

```
TOI = –20 + [(–20 – "max")/2] dBm
```

Example: assuming "max" of –90 dBm

```
TOI = –20 + [(–20 – (–90))/2] = +15 dBm
```

16. Record the 600 MHz TOI calculated measurement in the test record in Table A-5.

3.5 GHz TOI Test

Procedure:

1. Remove the splitter output from the MS2717B Spectrum Analyzer RF In connector.
2. Set the MG3692x frequency to 3.499951 GHz, and set the 8648D Generator to 3500.051 MHz.

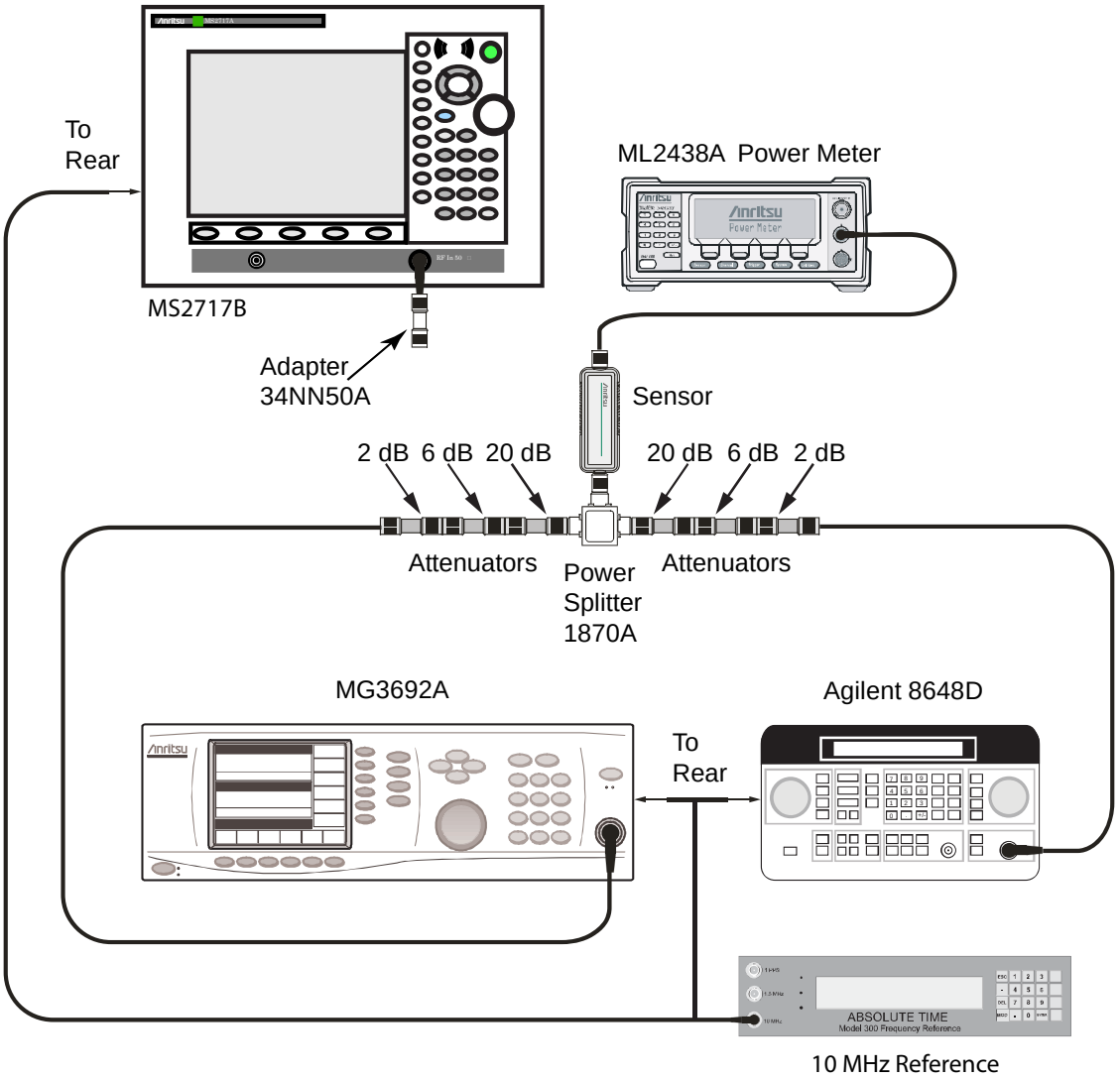


Figure 2-3. Third Order Intercept Verification 3.5 GHz Test Setup

3. Set the Agilent 8648D Signal Generator RF to OFF ("RF OFF" appears on the right side of the display).
4. On the ML2438A power meter, set the calibration factor of the power sensor to 3.5 GHz.
5. Connect the power sensor to the splitter output as shown in Figure 2-3 and adjust the power of the MG3692x (to approximately +16 dBm) so that –20 dBm appears at the splitter output.
6. Turn off the RF of the MG3692x.
7. On the 8648D Signal Generator, turn on the RF and adjust the RF amplitude (to approximately +16 dBm) so that –20 dBm appears at the splitter output.

8. Set the MS2717B to Spectrum Analyzer mode, then press **Shift** and press **Preset** (1) to preset the MS2717B, then set up the MS2717B as follows:

   Center Frequency: 3.500151 GHz

   Span: 100 Hz.

   RBW: 30 Hz

   VBW: 1 Hz

   Reference Level: −15 dBm

   Atten Lvl: 0 dB

   Pre-amp: Off

   Detection: RMS

9. Disconnect the power sensor from the output of the splitter, and connect the splitter output to the MS2717B Spectrum Analyzer RF In connector through the Anritsu Model 34NN50A adapter as shown in Figure 2-4.

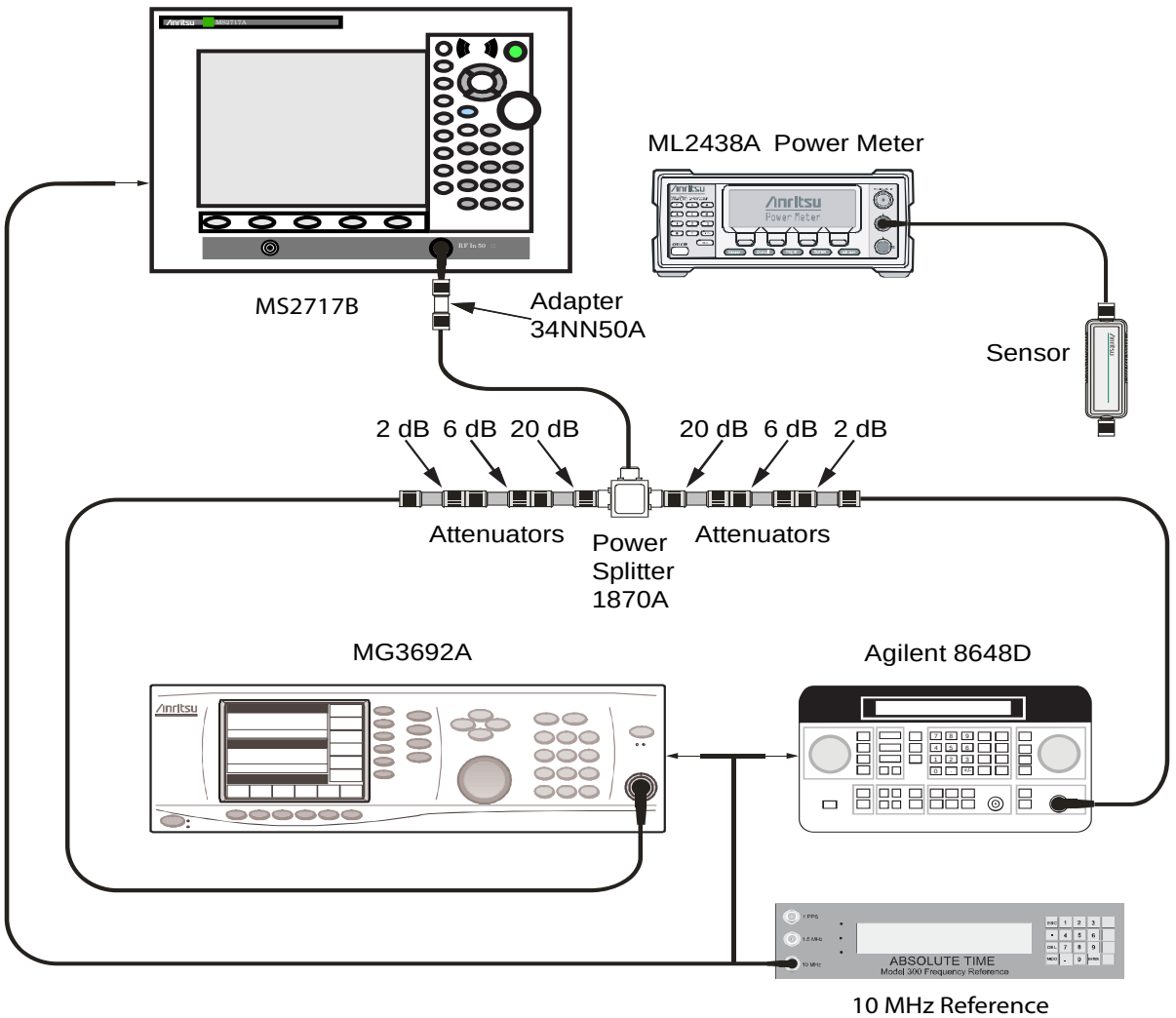


Figure 2-4. Third Order Intercept 3.5 GHz Test Setup

10. Turn on the RF of both the MG3692x and the 8648D.

11. Press the **Shift** key and then the **Trace** (5) key. Press Trace A Operations, and set # of Averages to 2.

12. After 2 sweeps have occurred ("Trace Count 2/2" appears on the left of the display), turn on a marker and press Marker to Peak. Record the amplitude of the signal at 3.500151 GHz in Table A-6 for use in the TOI calculation.

13. Change the Center Frequency of the MS2717B to 3.499851 GHz. Record the amplitude of this signal in Table A-6.

14. Determine which signal is larger (3.499851 GHz or 3.500151 GHz). Use the larger value for "max" in the following formula to calculate the TOI for 3.5 GHz (see the example calculation below):

```
TOI = –20 + [(–20 – "max")/2] dBm
```

Example: assume "max" of –90 dBm

```
TOI = –20 + [(–20 – (–90))/2] = +15 dBm
```

15. Record the 3.5 GHz Third Order Intercept measurement in the test record in Table A-5.

2-6 Displayed Average Noise Level (DANL)

The following test can be used to verify the Displayed Average Noise Level of the MS2717B. This test is performed using the RMS detection mode, first with pre-amp on, then with pre-amp off.

Procedure:

1. Connect the 28N50-2 50 Ohm termination to the MS2717B Spectrum Analyzer RF In.
2. Set the MS2717B to Spectrum Analyzer mode, and then preset the MS2717B.
3. Press the Amplitude soft key.
4. Set Atten Lvl to 0 dB and then set the Reference Level to –50 dBm.
5. Press the Pre-amp On/Off soft key to turn it ON.
6. Press the **Shift** key and then press the **Sweep** (3) key. Then press Detection, then press RMS (red dot appears on the RMS label).
7. Press the BW soft key. Select an RBW value of 100 kHz.
8. Enter the Start and Stop frequencies into the MS2717B from the table on the test record in Table A-7.
9. Wait until 1 sweep has completed.
10. Press the **Marker** key and press Peak Search.
11. Record the Marker reading in the Measured (100 kHz) column of the test record in Table A-7, "Spectrum Analyzer DANL with Preamp On".
12. Repeat Step 8 through Step 11 for the other frequencies on the list.
13. For each measured 100 kHz value in the chart (Table A-7), convert the value to 1 Hz RBW value by subtracting 50 dB.

    (For example, if the marker shows a value of –110 dBm at 100 kHz RBW, then the computed value at 1 Hz RBW is –160 dBm.)
14. Enter the computed values on the test record.
15. Press the Amplitude soft key and set the pre-amp to OFF.
16. Set the Reference Level to –20 dBm.
17. Repeat Step 8 through Step 14 for the pre-amp off measurements.
18. Enter the computed 1 Hz RBW values on the test record in Table A-8, "Spectrum Analyzer DANL with Preamp Off".

2-7 Residual Spurious Response

The following test verifies the residual spurious response of the Spectrum Analyzer. This test is performed using the positive peak detection mode. This test has two parts:

- "Residual Spurious Test with Preamp On"
- "Residual Spurious Test with Preamp Off"

Residual Spurious Test with Preamp On

Procedure:

1. Connect the 50 Ohm termination to the Spectrum Analyzer RF In connector.
2. Set the MS2717B to Spectrum Analyzer mode, and then preset the MS2717B.
3. Press the **Amplitude** key, then press the Reference Level soft key.
4. Use the keypad to enter –40 and press the dBm soft key.
5. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
6. Ensure that the Pre-Amp On/Off soft key is in the On position. If the pre-amp is off, then press the Pre-Amp On/Off soft key to turn it on.
7. Press the **Shift** key and then press the **Sweep** (3) key. Then press the Detection soft key, and then press the Peak soft key.
8. Press the **BW** key and press the RBW soft key.
9. Use the keypad to enter 10 and press the kHz soft key.
10. Press the VBW soft key and use the keypad to enter 1, then press the kHz soft key.
11. Press the **Freq** key and press the Start Freq soft key.
12. Use the keypad to enter 100, and then press the kHz soft key.
13. Press the Stop Freq soft key, enter 10, and then press the MHz soft key.
14. Wait until one sweep is completed.
15. Press the **Marker** key and press the Peak Search soft key.
16. Verify that the Marker 1 amplitude reading is ≤ –100 dBm and record it in the test records under Residual Spurious Test with Preamp On in Table A-9, if required.

Note	If a spur occurs with amplitude larger than –100 dBm, then wait another full sweep and observe whether the spur occurs at the same point on the second sweep. If the spur does not occur at the same point on the second sweep, then the spur on the first sweep was not real.

17. Repeat Step 11 through Step 16 for the other Start and Stop frequencies that are listed on the test record in Table A-9.

Residual Spurious Test with Preamp Off

Procedure:

1. Connect the 50 Ohm termination to the Spectrum Analyzer RF In connector.
2. Set the MS2717B to Spectrum Analyzer mode, and then preset the MS2717B.
3. Press the **Amplitude** key, then press the Reference Level soft key.
4. Use the keypad to enter –40 and press the dBm soft key.
5. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
6. Ensure that the Pre-Amp On/Off soft key is in the Off position. If the preamp is on, then press the Pre-Amp On/Off soft key to turn it off.
7. Press the **Shift** key and then press the **Sweep** (3) key, then press the Detection soft key and then the Peak soft key.
8. Press the **Freq** key, and press the Start Freq soft key.
9. Use the keypad to enter 100 and press the kHz soft key.
10. Press the Stop Freq soft key, enter 10 and press the MHz soft key.
11. Press the **BW** key and press the RBW soft key.
12. Use the keypad to enter 3 and press the kHz soft key.
13. Press the VBW soft key and use the keypad to enter 300, then press the Hz soft key.
14. Wait until one sweep is completed.
15. Press the **Marker** key and press the Peak Search soft key.
16. Record the Marker 1 amplitude reading and verify that it is ≤–90 dBm in the test records under Residual Spurious Test with Preamp Off in Table A-10, if required.

Note	If a spur occurs with amplitude larger than –90 dBm, then wait another full sweep and observe whether the spur occurs at the same point on the second sweep. If the spur does not occur at the same point on the second sweep, then the spur on the first sweep was not real.

17. Repeat Step 8 through Step 16 for the other Start and Stop frequencies that are listed on the test record in Table A-10.

2-8 Input Related Spurious (IRS) Signals

The following test verifies the input related spurious signals of the Spectrum Analyzer in Anritsu Model MS2717B Economy Spectrum Analyzer.

Procedure:

1. Connect the 10 MHz reference source to the MG3692x Synthesized Signal Generator.
2. Connect the output of the Signal Generator to the Spectrum Analyzer RF In connector.

1674 MHz Input Related Spurious check:

3. Set the MG3692x output to 1674 MHz CW, with an RF output level of −30 dBm.
4. Set the MS2717B to Spectrum Analyzer mode and then preset the MS2717B.
5. Press the **Amplitude** key, then press the Reference Level soft key.
6. Use the keypad to enter −27 and press the dBm soft key.
7. Press the Atten Lvl soft key and enter 0, then press the dB soft key.
8. Press the **Shift** key and then press the **Sweep** (3) key. Then press the Detection soft key, and then press the Peak soft key.
9. Press the **Freq** key and press the Center Freq soft key.
10. Use the keypad to enter 1674 and press the MHz soft key.
11. Press the **Span** key. Use the keypad to enter 2 and press the MHz soft key.
12. Press the **BW** key and press the RBW soft key.
13. Use the keypad to enter 10 and press the kHz soft key.
14. Press the VBW soft key and use the keypad to enter 1, then press the kHz soft key.
15. Wait until one sweep is completed.
16. Press the **Marker** key and press the Peak Search soft key.
17. Record the Marker 1 amplitude reading for 1674 MHz in the test record in Table A-12.
18. Press the **Freq** key and press the Start Freq soft key.
19. Use the keypad to enter 100 and press the kHz soft key.
20. Press the Stop Freq soft key, enter 1673, and press the MHz soft key.
21. Press the **Marker** key and press the Peak Search soft key.
22. Record the Marker 1 amplitude reading in the test records in Table A-12.
23. Calculate the input related spurious level by subtracting the above Marker 1 reading from the Marker 1 reading in Step 17. Record the result in the test record in Table A-12.
24. Verify that the calculated result is ≤−60 dBc.
25. Repeat Step 18 through Step 24, setting a start frequency of 1675 MHz and a stop frequency of 2800 MHz. Record the results in the test record in Table A-12.

1701 MHz Input Related Spurious Check:

26. Set the MG3692x output to 1701 MHz, with an RF output level of −30 dBm.

27. On the MS2717B, press the **Freq** key and press the Center Freq soft key.

28. Use the keypad to enter 1701 and press the MHz soft key.

29. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations soft key.

30. Press the # of Averages soft key. Use the keypad to enter 5, and then press the **Enter** key.

31. Wait until the Trace Count displays 5/5.

32. Press the **Marker** key and press the Peak Search soft key.

33. Record the amplitude at 1701 MHz in the test record in Table A-12.

34. Press the **Freq** key and press the Start Freq soft key.

35. Use the keypad to enter 26 and press the MHz soft key.

36. Press the Stop Freq soft key, enter 28, and press the MHz soft key.

37. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations soft key.

38. Press the # of Averages soft key, use the keypad to enter 5, and then press the **Enter** key.

39. Wait until the Trace Count displays 5/5.

40. Press the **Marker** key and press the Peak Search soft key.

41. Record the Marker 1 amplitude reading in the test records in Table A-12.

42. Calculate the input related spurious level by subtracting the above Marker 1 reading from the Marker 1 reading in Step 33. Record the result in the test record in Table A-12.

43. Verify that the calculated result is ≤ −60 dBc.

2145 MHz Input Related Spurious Check:

44. Set the MG3692x output to 2145 MHz, with an RF output level of −30 dBm.

45. Press the **Freq** key and press the Center Freq soft key.

46. Use the keypad to enter 2145 and press the MHz soft key.

47. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations soft key.

48. Press the # of Averages soft key, use the keypad to enter 5, and then press the **Enter** key.

49. Wait until the Trace Count displays 5/5.

50. Press the **Marker** key and press the Peak Search soft key.

51. Record the amplitude at 2145 MHz in the test record in Table A-12

52. Press the **Freq** key and press the Start Freq soft key.

53. Use the keypad to enter 470 and press the MHz soft key.

54. Press Stop Freq soft key, enter 472, and press the MHz soft key.

55. Press the **Shift** key and then press the **Trace** (5) key. Press the Trace A Operations soft key.

56. Press the # of Averages soft key, use the keypad to enter 5, and then press the **Enter** key.

57. Wait until the Trace Count displays 5/5.

58. Press the **Marker** key and press the Peak Search soft key.

59. Record the Marker 1 amplitude reading in the test records in Table A-12.

60. Calculate the input related spurious level by subtracting the above Marker 1 reading from the Marker 1 reading in Step 51. Record the result in the test record in Table A-12.

61. Verify that the calculated result is ≤ −60 dBc.

2-9 Absolute Amplitude Accuracy

The tests in this section verify the absolute amplitude accuracy of the Anritsu Model MS2717B Economy Spectrum Analyzer. This test has 3 parts:

- "A. 50 MHz Amplitude Accuracy Verification"
- "B. Amplitude Accuracy Across Frequency Verification"
  - "B.1 Amplitude Accuracy with Pre-Amp Off"
  - "B.2 Amplitude Accuracy with Pre-Amp On"
- "C. 9 kHz to 100 kHz Amplitude Accuracy Verification"

A. 50 MHz Amplitude Accuracy Verification

Test Setup Components Characterization:

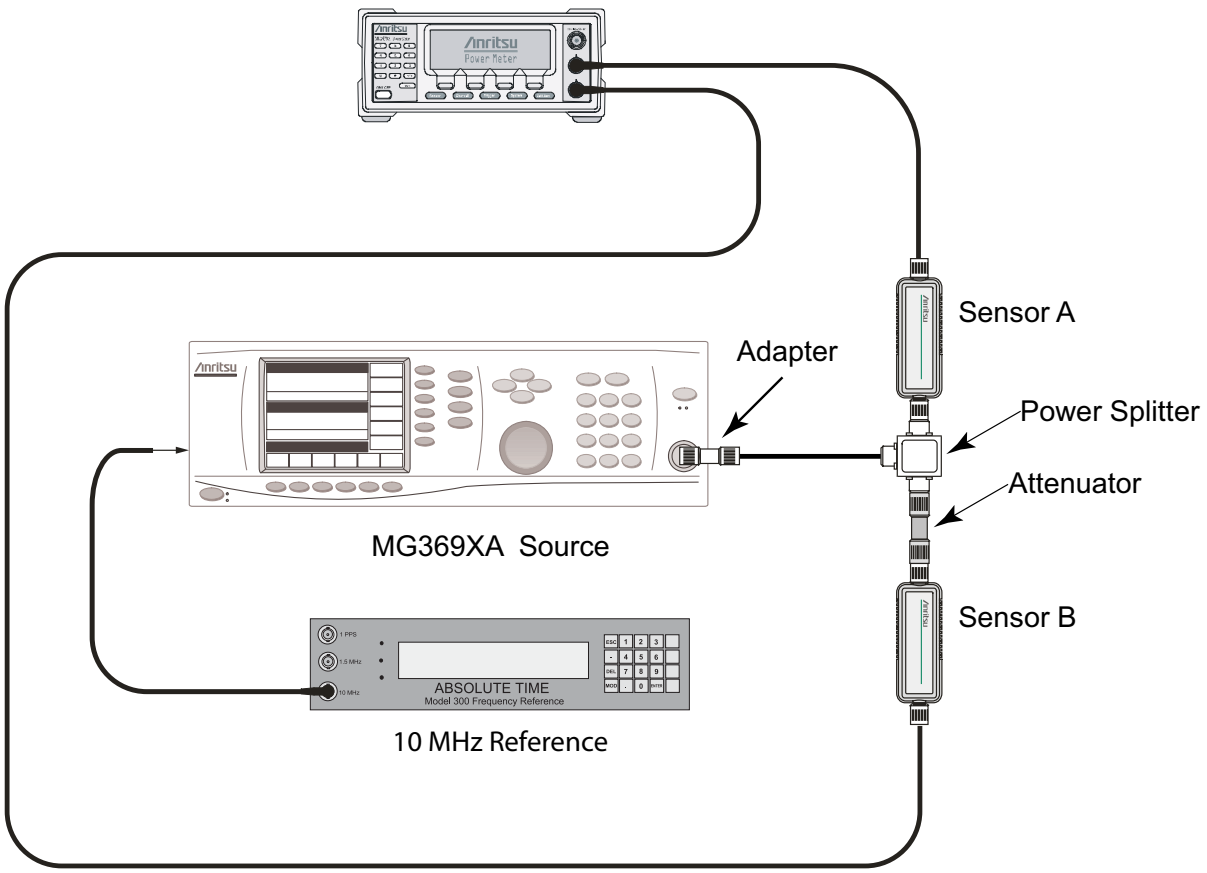


Figure 2-5. 50 MHz Amplitude Accuracy Verification Setup

1. Connect MA2442D power sensors to the power meter and calibrate the sensors.
2. Connect the 10 MHz Reference source to the 10 MHz Ref In connector of the MG3692x Synthesized Signal Generator.
3. Connect the model 1870A power splitter to the MG3692x output, and connect Sensor B to one of the power splitter outputs (Refer to Figure 2-5).
4. Install the 10 dB Fixed Attenuator to the other power splitter output, and then connect Sensor A to the end of the Attenuator.
5. Set the frequency of the MG3692x to 50 MHz.

6. Set the power meter to display both Channel A and Channel B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Repeat for Channel B. Press the **System** key to display the power reading.
7. Adjust the power level of the MG3692x to get a reading on Sensor A that matches the power level in the first column of the chart in Table A-13.
8. Record the Sensor B reading in the Sensor B Reading column in the chart in Table A-13.
9. Repeat Step 7 and Step 8 for the other power levels in the first column, and record the Sensor B reading in the second column in Table A-13.

Test Procedure:

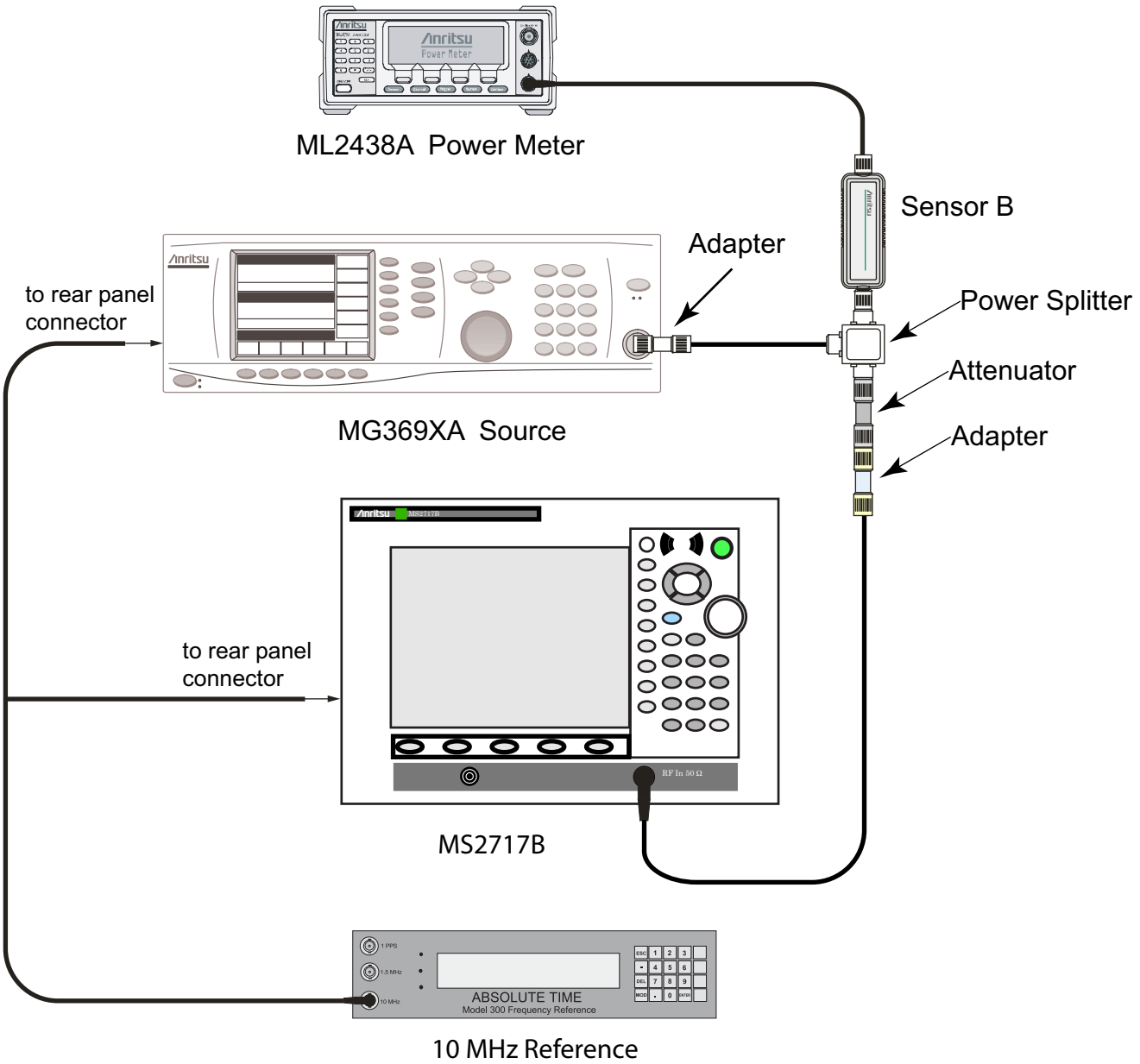


Figure 2-6. 50 MHz Amplitude Accuracy Verification Test Setup

1. Connect the equipment as shown in Figure 2-6.

Note	In order to maintain test setup integrity, do not disconnect Sensor B, the power splitter, or the fixed attenuator.

2. Set the MS2717B to Spectrum Analyzer mode, and then preset the MS2717B.

3. Set the MS2717B Center Frequency to 50 MHz.

4. Set the Span to 10 kHz.

5. Press the BW soft key and set the VBW to 10 Hz.

6. Set the RBW to 1 kHz.
7. Press the Amplitude soft key and set the Reference Level to 10 dBm.
8. Set the Atten Lvl to 30 dB.
9. Adjust the MG3692x power level so that the power meter Sensor B matches the Sensor B value that is shown on the characterization chart (Table A-13) in the previous section.
10. Press the **Marker** key and press the Peak Search soft key.
11. Record the Marker 1 amplitude reading in the test record in the Table A-14.
12. Repeat Step 9 through Step 11 for the other power levels on the test record in Table A-14. Change Reference Level and Atten Lvl settings as required.

B. Amplitude Accuracy Across Frequency Verification

Test Setup Component Characterization:

1. Connect both MA2442D power sensors to the power meter and calibrate the sensors.
2. Connect the equipment as shown in Figure 2-5 on page 2-17.
3. Set the MG3692x Frequency to 10.1 MHz.
4. Set the power meter to display both Channel A and Channel B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Repeat for Channel B. Press the **System** key to display the power reading.
5. Adjust the MG3692x output level so that the Sensor A reading is −2 dBm ±0.1 dB.
6. Record the Sensor B reading to the −2 dBm column in the Characterization chart (Table A-15, "Characterization Chart for Amplitude Accuracy Across Frequency").
7. Adjust the MG3692x output level so that the Sensor A reading is −30 dBm ±0.1 dB.
8. Record the Sensor B reading to the −30 dBm column in the Characterization chart (Table A-15).
9. Adjust the MG3692x output level so that the Sensor A reading is −50 dBm ±0.1 dB.
10. Record the Sensor B reading to the −50 dBm column in the Characterization chart (Table A-15).
11. Repeat Step 3 through Step 8 for all of the frequencies that are listed in the Characterization chart (Table A-15).

B.1 Amplitude Accuracy with Pre-Amp Off

Test Procedure:

1. Connect the equipment as shown in Figure 2-6 on page 2-19.

Note	In order to maintain test setup integrity, do not disconnect Sensor B, the power splitter, or the fixed attenuator.

2. Set the MS2717B to Spectrum Analyzer mode, and then preset the MS2717B.
3. Press the BW soft key. Then set the RBW to 1 kHz and set the VBW to 10 Hz.
4. Press the Span soft key, set span to 10 kHz.
5. Set the MG3692x frequency to 10.1 MHz CW.
6. Set the MG3692x Output to –20 dBm.
7. Set the power meter to display Channel B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
8. Adjust the MG3692x output power so that the power meter displays a reading that matches the Sensor B reading on the characterization chart (Table A-15) for –30 dBm.
9. On the MS2717B, press the Amplitude soft key, then set the Reference Level to –20 dBm.
10. Press the Freq soft key and press the Center Freq soft key.
11. Enter 10.1 MHz (or the next frequency).
12. Press the Amplitude soft key, then set the Atten Lvl to 0 dB.
13. Press the **Marker** key and press the Peak Search soft key.
14. Record the Marker 1 amplitude reading in the test records in Table A-16, “Amplitude Accuracy with Pre-Amp Off — at 10.1 MHz”.
15. Verify that the Marker 1 amplitude reading is within the specification.
16. Repeat Step 12 to Step 15 for Atten Lvl of 5 dB, 10 dB, and 20 dB. Refer to Table A-16.
17. Adjust the MG3692x output power so that the power meter displays a reading that matches the Sensor B reading on the characterization chart (Table A-15) for –2 dBm.
18. On the MS2717B, press the Amplitude soft key, then set the Reference Level to 10 dBm.
19. Repeat Step 12 to Step 15 for Atten Lvl of 30 dB, 40 dB, 50 dB, and 60 dB. Record the results in Table A-16.
20. Repeat Step 5 to Step 19 for all of the frequencies that are in the test records in Table A-17, “Amplitude Accuracy with Pre-Amp Off — at 50 MHz” through Table A-26, “Amplitude Accuracy with Pre-Amp Off — at 7000 MHz”.

B.2 Amplitude Accuracy with Pre-Amp On

Test Procedure:

1. Connect the equipment as shown in Figure 2-6 on page 2-19.

Note	In order to maintain test setup integrity, do not disconnect Sensor B, the power splitter, or the fixed attenuator.

2. Set the MS2717B to Spectrum Analyzer mode, and then preset the MS2717B.
3. Press the BW soft key. Then set the RBW to 1 kHz and set the VBW to 10 Hz.
4. Press the Span soft key and set span to 10 kHz.
5. Set the MG3692x frequency to 500 MHz CW (or the next frequency).
6. Set the MG3692x Output to –40 dBm.
7. Set the power meter to display Channel B. Press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter the value matching the frequency of MG3692x as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
8. Adjust the MG3692x output power so that the power meter displays a reading that matches the Sensor B reading on the characterization chart (Table A-15) for –50 dBm.
9. On the MS2717B, press the Amplitude soft key, then set the Reference Level to –50 dBm.
10. Press the Freq soft key and press the Center Freq soft key.
11. Enter 500 MHz (or the next frequency).
12. Press the Amplitude soft key, then set the Atten Lvl to 0 dB and set Pre-Amp to “On”.
13. Press the **Marker** key and press the Peak Search soft key.
14. Record the Marker 1 amplitude reading in the test records in Table A-27, “Amplitude Accuracy with Pre-Amp On”.
15. Repeat Step 5 to Step 14 for all of the frequencies in the test record in Table A-27.

C. 9 kHz to 100 kHz Amplitude Accuracy Verification

Test Setup Characterization:

1. Connect the equipment as shown in Figure 2-7. Ensure that the voltmeter (DVM) is set to read AC volt.

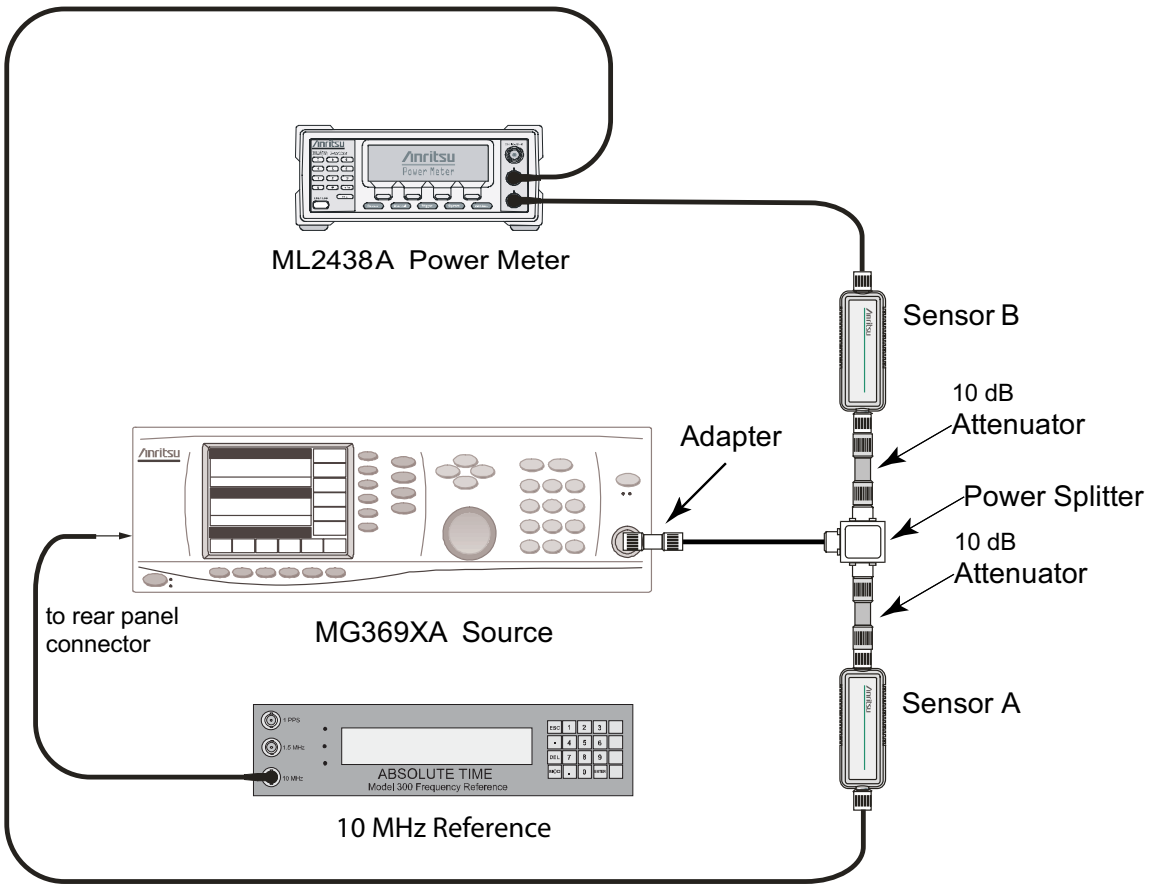


Figure 2-7. Test Setup for Power Adjustment

Note	Power Sensor A and Power Sensor B must be capable of measuring down to 100 kHz.

2. Set the MG3692x frequency to 100 kHz CW, and set output power to approximately –5 dBm.

3. Adjust the MG3692x output power so that Power Sensor B reads –20 dBm ±0.1 dB on the power meter.

4. Remove the Power Sensor B from the 10 dB attenuator and attach the N female end of the T3449 test fixture to the 10 dB attenuator through an N male to N male adapter. The BNC output of the T3449 should also be connected to the AC voltmeter voltage input via a BNC male to BNC male coaxial cable and a BNC female to banana plug adapter.

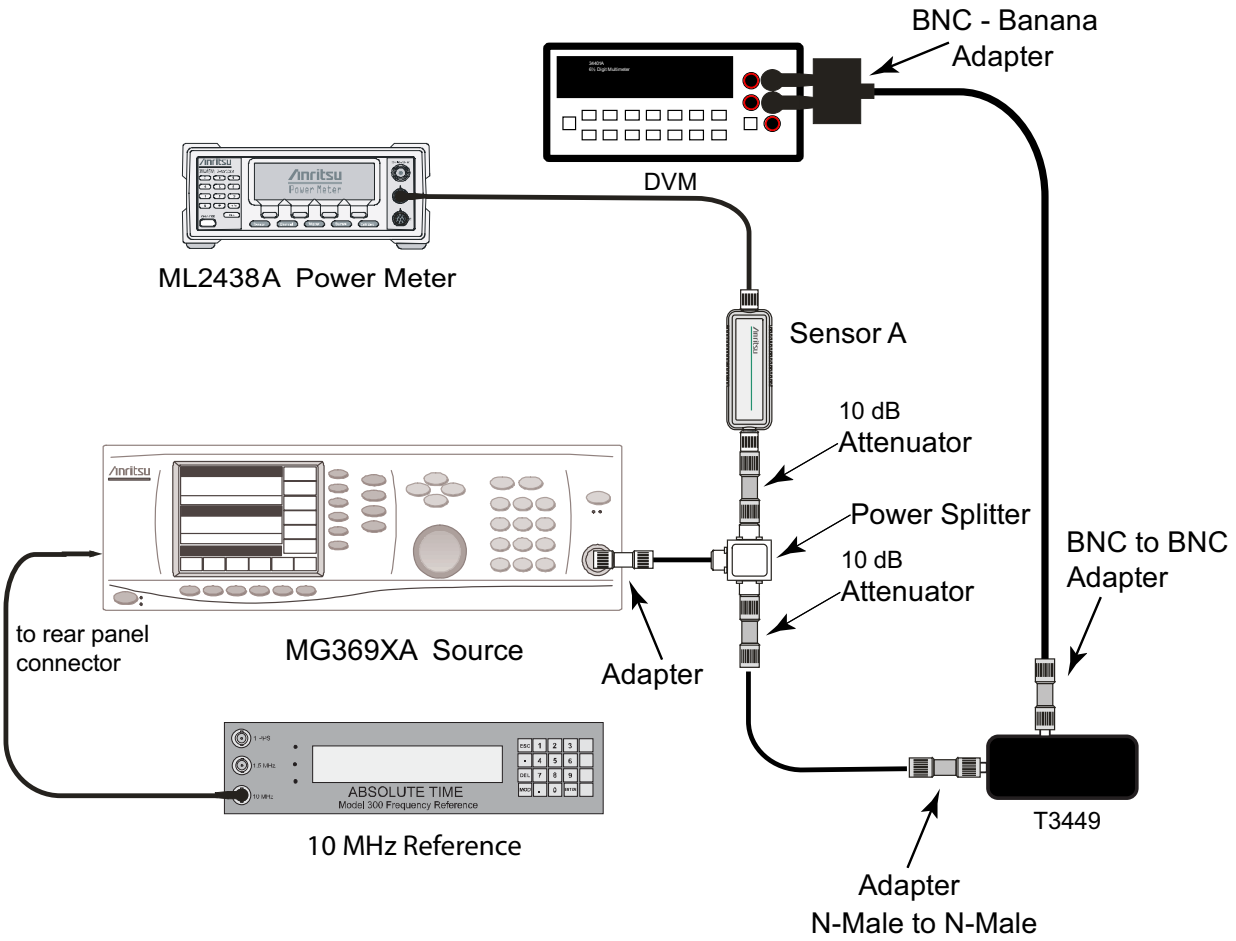


Figure 2-8. Test Setup for Voltage Measurement

5. Set the AC voltmeter to measure AC volt rms. The measured voltage should read 23.315 mV ±0.5 mV. Record the measured value to the Vm1 box in the characterization chart in Table A-28.
6. While keeping the MG3692x output power unchanged, set the frequency to 9.5 kHz and record the measured voltage to the Vm2 column in the characterization chart in Table A-29.
7. Convert the measured voltage to calculated power (power in or P_{in}) in dBm by using the following formula and the correction factor in Table A-29:

   P_{in} = (20*Log10 (Vm2/Vm1) + correction factor)

8. Enter the result in the characterization chart (Table A-29) as well as in the test record in Table A-30.
9. Repeat Step 6 to Step 8 for frequencies of 55 kHz and 95 kHz, using Table A-29, Table A-31, and Table A-32.
10. Remove the T3449 Test Fixture from the adapter.

Procedure:

1. Set the MS2717B to Spectrum Analyzer mode, and then preset the MS2717B.
2. Press the BW soft key. Then set the RBW to 1 kHz, and set the VBW to 10 Hz.
3. Press the Span soft key and set span to 10 kHz.
4. Press the Amplitude soft key. Then set the Reference Level to –20 dBm and set the Atten Lvl to 0 dB.
5. Connect the MS2717B to the test setup, as shown in Figure 2-9.

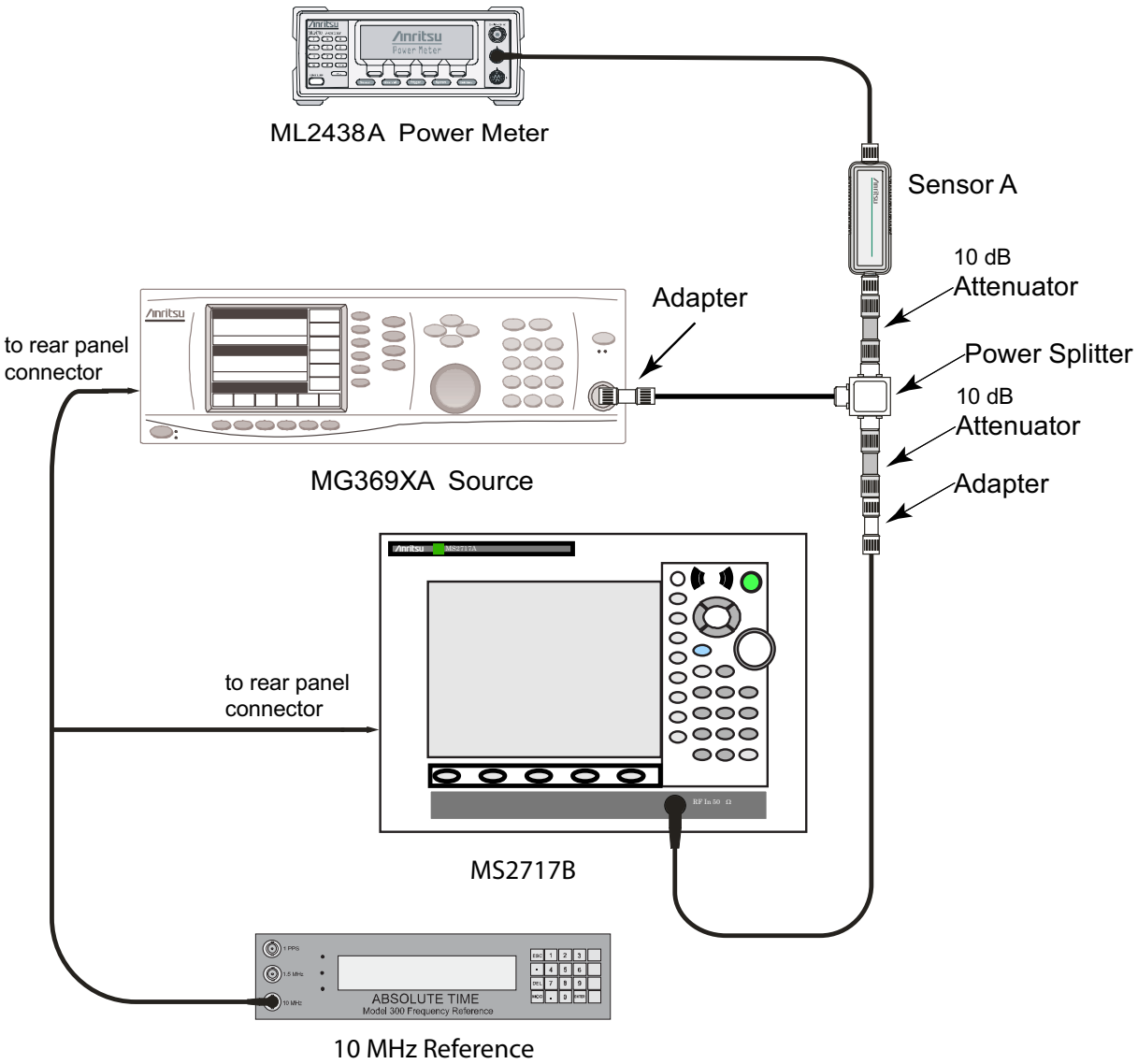


Figure 2-9. Test Setup for 9 kHz to 100 kHz Amplitude Accuracy Verification

6. Set the MG3692x frequency to 9.5 kHz. **Do not adjust** the output power.
7. On the MS2717B, press the Freq soft key and press the Center Freq soft key. Enter 9.5 kHz.
8. Press the **Marker** key and press the Peak Search soft key.
9. Record the Marker 1 amplitude reading in the test record in Table A-30.

10. Subtract the P_{in} value from the Marker 1 reading and record to the Error column in the test record in Table A-30.

11. Verify that the error is within the specification.

12. Repeat Step 6 to Step 11 for the other frequencies (55 Hz and 95 Hz) in the test records in Table A-31, and Table A-32.

2-10 RF Input VSWR Verification

This test verifies the Spectrum Analyzer RF Input VSWR of Anritsu Model MS2717B Economy Spectrum Analyzer.

Procedure:

1. Install an Anritsu Model 15NN50-1.5B cable on Port 1 of the MS4624x (VNMS) so that the test port (open end of cable) is the male connector.
2. On the VNMS, press the **Default** key, and press **Continue**. Allow the VNMS to default.
3. Press the **Freq** key. Then set the Start Frequency to 10 MHz, and set the Stop Frequency to 7.1 GHz.
4. Press the **CH1** key.
5. Press the **Display** key. Press **Display Mode** and then press **Single Channel**.
6. Observe the display on the MS4624x and ensure that S11 is displayed.
7. Press the **Cal** key and make the following selections:

   Perform Cal / Manual Cal / 2 Port / Next Cal Step / Reflection Only / Port 1 Only / Normal (1601 pts max) / Next Cal Step / Port 1 Connector = Type N (M) / Start Cal.
8. Perform the calibration at the end of the cable as prompted by the VNMS. Use the female components from the calibration kit.

Note	During calibration, **do not insert** any adapters between the cable and the female components from the calibration kit.

9. After the calibration is complete, ensure that the LED on the Cal key is lighted (on).
10. Press the **Display** key. Press **Graph Type**, and then press **SWR**.
11. Press **Return** and then **Scale**. Set the Resolution to .5 (x1) and set the Reference Value to 2.0 (x1).
12. Press **Return** and then **Limits**. Turn the Upper Limit on and set it to 2.0 (x1).
13. Press the **Marker** key and then make the following selections:

    Display Markers set to ON

    Press Marker Readout

    Set Marker 1 to ON
14. Set the MS2717B to Spectrum Analyzer mode, then press **Shift** and press **Preset** (1) to preset the MS2717B, then set up the MS2717B as follows:

    Set the Atten Lvl to 10 dB

    Set the Sweep to Single
15. Connect the MS2717B Spectrum Analyzer RF In connector to the end of the 15NN50-1.5B cable where the calibration was performed.
16. Verify that the measurement data reading falls completely under the Limit Line.
17. On the MS4624x, press the **Marker** key. Press Marker to Peak and then Marker to Max.
18. Read the maximum value and record it in the test record in Table A-33.
19. Change the MS2717B Atten Lvl to 20 dB (as in Step 14) and repeat Step 17 and Step 18.
20. Change the MS2717B Atten Lvl to 60 dB (as in Step 14) and repeat Step 17 and Step 18.

This completes the tests for the Spectrum Analyzer mode of the MS2717B.

Chapter 3 — Performance Verification, Installed Options

The procedures in this chapter are used to verify the performance of the installed options in the Anritsu MS2717B Spectrum Analyzer. Spectrum Analyzer verification procedures are detailed in Chapter 2.

Blank performance verification test records are provided in Appendix A. These blank test records should be copied before use.

IMPORTANT

Before making any measurement, ensure that all equipment has been operating for at least 30 minutes to allow the internal circuitry to warm up and stabilize.

3-1 Tracking Generator Verification (Option 20)

The tests in this section verify the performance of the built-in tracking generator in the Anritsu Model MS2717B Economy Spectrum Analyzer. This test has two parts:

- "Frequency Accuracy Verification"
- "Power Accuracy Verification"

Frequency Accuracy Verification

1. Connect the external 10 MHz Reference to the frequency counter. Do not connect the external 10 MHz signal to the MS2717B.
2. Set the MS2717B to Spectrum Analyzer mode and then preset the MS2717B.
3. Set the Center Frequency to 1.0 GHz, and set the Span to 0 Hz.
4. Press **Shift**, then **Measure** (4), and press Tracking Generator.
5. Set Track Gen to ON.
6. Set the Output Power of the tracking generator to 0 dBm.
7. Connect the frequency counter to the Gen Output connector of the MS2717B.
8. Record the frequency of the tracking generator in the test record in Table A-34.
9. Verify that the frequency is within specification.

Power Accuracy Verification

1. Install the MA2442D power sensor to the power meter and calibrate the sensor.
2. Connect the MA2442D power sensor to the Gen Output connector of the MS2717B.
3. Set the sensor calibration factor frequency to 450 MHz
4. Set the Center Frequency of the MS2717B to 450 MHz, and set the Span to 0 Hz.
5. Press **Shift**, then **Measure** (4), and press Tracking Generator.
6. Set Track Gen to ON.
7. Set the Output Power of the tracking generator to 0 dBm.
8. Record the power sensor reading in the Measured Power column of the test record in Table A-35.
9. Verify that the sensor reading is within specification.
10. Reduce the Output Power (Test Level) setting of the tracking generator to the next power level in the test record in Table A-35.
11. Repeat the power measurement for every Output Power (Test Level) on the test record in Table A-35.
12. Change the MS2717B Center Frequency to match the Frequency on the test record in Table A-36.
13. Set the power sensor calibration factor frequency to the same frequency.
14. Repeat the measurements for all frequencies and power levels (Test Level) that are shown on the test records in Table A-36, Table A-37, Table A-38, and Table A-39.

3-2 GSM/GPRS/EDGE Signal Analyzer Verification

Option 40 and/or 41

The tests in this section verify that the optional GSM/GPRS/EDGE Signal Analyzer functions correctly in the Anritsu Model MS2717B Economy Spectrum Analyzer. The tests include:

- "GSM Signal Analyzer Option Verification – (Option 40)"
- "EDGE Burst Power, Frequency Error, and Residual Error Tests – (Option 41)"

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Test Setup

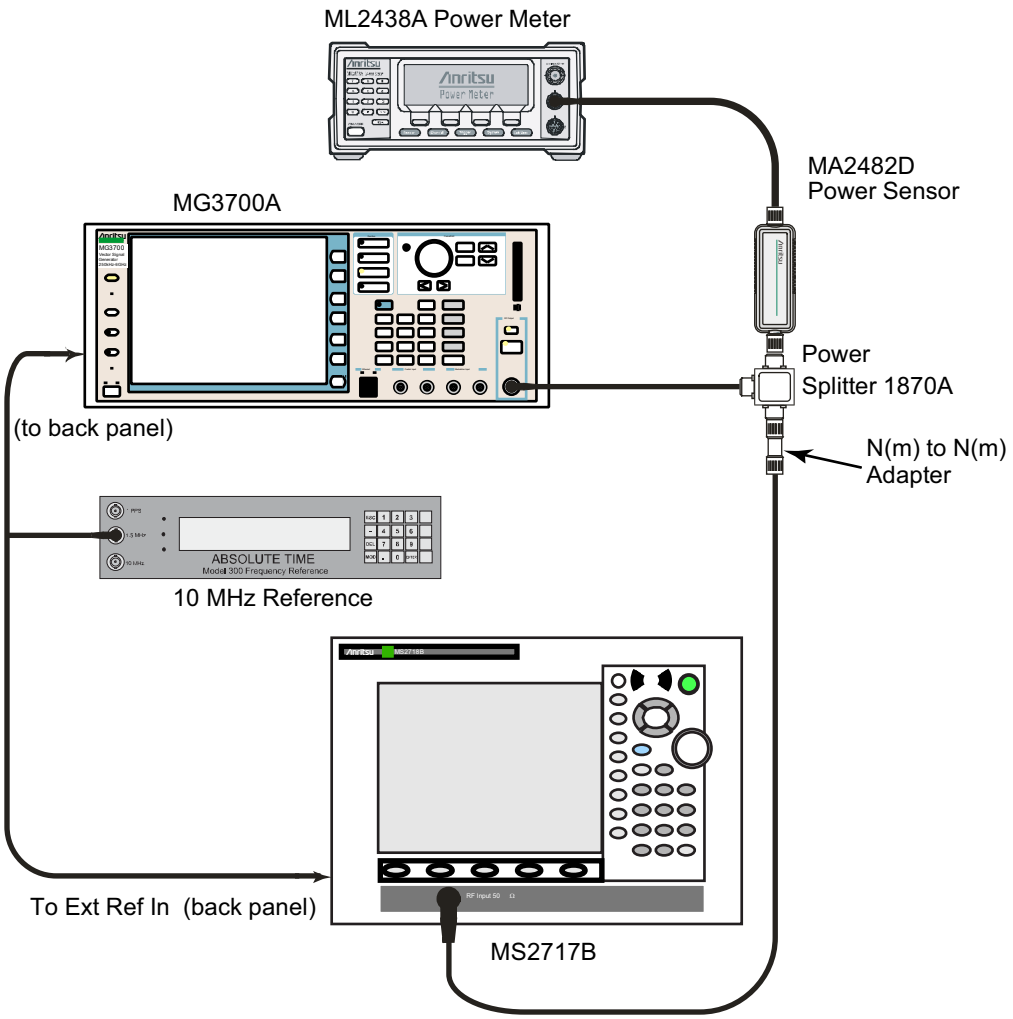


Figure 3-1. GSM/EDGE Signal Analyzer Option Verification

GSM Signal Analyzer Option Verification – (Option 40)

The tests in this section verify the function of the optional GSM Signal Analyzer in Model MS2717B Spectrum Master.

Procedure

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 3-1.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the MS2717B mode to GSM/GPRS/EDGE Signal Analyzer. Press **Shift** and press **Preset** (1) to preset the MS2717B.
5. On the MG3700A, press the Preset key (Yellow key on the upper left hand side).
6. Press the **Down Arrow** key or turn the knob to select Yes.
7. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

8. Press the (F1) soft key to select "Load File to Memory".
9. Press the (F1) soft key again to select "Select Package".
10. Using the **Down Arrow** key, step through the selection list until the "GSM" option is highlighted.
11. Press the **Set** key.
12. Press the (F6) soft key "Return".
13. Press the **Set** key. The "Select Package" box will appear. Use the rotary knob to highlight "GSM" and press the **Set** key to select.
14. Another File List will appear. Use the rotary knob to select "GsmBurst_1slot" and press the **Set** key to select.
15. Press the **MOD On/Off** key to turn the Modulation LED on and verify that the "Playing" indicator in the center of the LCD is flashing.
16. Press the **Frequency** key and enter 850 MHz.
17. Press the **Level** key, enter –10, and press the dBm soft key.
18. Adjust the MG3700A output so that the power meter reads –10 dBm ± 0.2 dB.
19. On the MS2717B, press the Frequency soft key and enter 850 MHz as Center Frequency.
20. Press the Measurements soft key and select GSM/EDGE Summary (a red dot will appear on the label).
21. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in Step 18. Then record the calculated Burst Power error and the displayed value of Freq Error into the test record in Appendix A in the section labeled "At 850 MHz, –10 dBm Level, TCH Pattern" in Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".
22. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) into the "At 850 MHz, –10 dBm Level, TCH Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator".
23. Verify that the measured values in Step 21 or Step 22 (or both) are within specifications.
24. On the MG3700A, change the selected signal pattern to "GsmBurst_8slot".
25. Adjust the Level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dBm. Then wait 15 seconds to allow the MS2717B to update the measured results.

26. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in Step 25. Then record the calculated Burst Power error and the displayed value of Freq Error into the test record in Appendix A in the section labeled "At 850 MHz, –50 dBm Level, TCH ALL Pattern"" in Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".

27. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) into the "At 850 MHz, –50 dBm Level, TCH ALL Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator".

28. Verify that the measured values in Step 26 or Step 27 (or both) are within specifications.

29. Change the frequency of MG3700A to 1800 MHz.

30. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 1800 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.

31. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dBm.

32. On the MS2717B, set the Center Freq to 1800 MHz. Then wait 15 seconds to allow the MS2717B to update its measured results.

33. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in Step 32. Then record the calculated Burst Power error and the displayed value of Freq Error into the "At 1800 MHz, –10 dBm Level, TCH ALL Pattern" row of Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".

34. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) into the "At 1800 MHz, –10 dBm Level, TCH ALL Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator".

35. Verify that the measured values in Step 33 or Step 34 (or both) are within specifications.

36. On the MG3700A, change the selected pattern to "GsmBurst_1slot".

37. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dBm. Then wait 15 seconds to allow the MS2717B to update its measured results.

38. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in Step 37. Then record the calculated Burst Power error and the displayed value of Freq Error into the "At 1800 MHz, –50 dBm Level, TCH Pattern" row of Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".

39. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed Phase Err RMS (deg) into the "At 1800 MHz, –50 dBm Level, TCH Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator"

40. Verify that the measured values in Step 38 or Step 39 (or both) are within specifications.

EDGE Burst Power, Frequency Error, and Residual Error Tests – (Option 41)

The tests in this section verify the function of the optional GSM Signal Analyzer in Model MS2717B Spectrum Master.

Procedure

1. Ensure that the equipment settings are unchanged from the previous test. Refer to Figure 3-1 on page 3-3.
2. On the MG3700A, change the selected pattern to "DL_MCS-9_1SLOT".
3. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dBm. Then wait 15 seconds to allow the MS2717B to update its measured results.
4. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in Step 3. Then record the calculated Burst Power error and the displayed value of Freq Error into the "At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern" row of Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".
5. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) into the "At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator".
6. Verify that the measured values in Step 4 or Step 5 (or both) are within specifications.
7. On the MG3700A, change the selected pattern to "DL_MCS-9_4SLOT".
8. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dBm. Then wait 15 seconds to allow the MS2717B to update its measured results.
9. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), subtract the displayed Burst Power value from the power meter reading in Step 8. Then record the calculated Burst Power error and the displayed value of Freq Error into the "At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern" row of Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".
10. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) into the "At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator".
11. Verify that the measured values in Step 9 or Step 10 (or both) are within specifications.
12. Change the frequency of MG3700A to 850 MHz.
13. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
14. Adjust the level of the MG3700A so that the power meter reads –50 dBm ± 0.2 dBm.
15. On the MS2717B, set the Center Freq to 850 MHz. Then wait 15 seconds to allow the MS2717B to update its measured results.
16. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), record the displayed values of Burst Power and Freq Error into the "At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern" row of Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".
17. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) into the "At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator".
18. Verify that the measured values in Step 16 or Step 17 (or both) are within specifications.
19. On the MG3700A, change the selected pattern to "DL_MCS-9_1SLOT".
20. Adjust the level of the MG3700A so that the power meter reads –10 dBm ± 0.2 dBm. Then wait 15 seconds to allow the MS2717B to update its measured results.

21. For MS2717B with Option 40 (GSM/GPRS/EDGE RF Measurements), record the displayed values of Burst Power and Freq Error into the "At 850 MHz, −10 dBm Level, DL_MCS-9_1SLOT Pattern" row of Table A-42, "Option 40 GSM/GPRS/EDGE RF Measurements".

22. For MS2717B with Option 41 (GSM/GPRS/EDGE Demodulator), record the displayed EVM (rms) into the "At 850 MHz, −10 dBm Level, DL_MCS-9_1SLOT Pattern" row of Table A-43, "Option 41 GSM/GPRS/EDGE Demodulator".

23. Verify that the measured values in Step 21 or Step 22 (or both) are within specifications.

3-3 CDMA Signal Analyzer Verification

Option 42 and/or 43 Verification

The tests in this section verify the optional CDMA Signal Analyzer functions in Anritsu Model MS2717B Economy Spectrum Analyzer. The tests include:

- "cdmaOne Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)"
- "CDMA2000 Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)"

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Test Setup

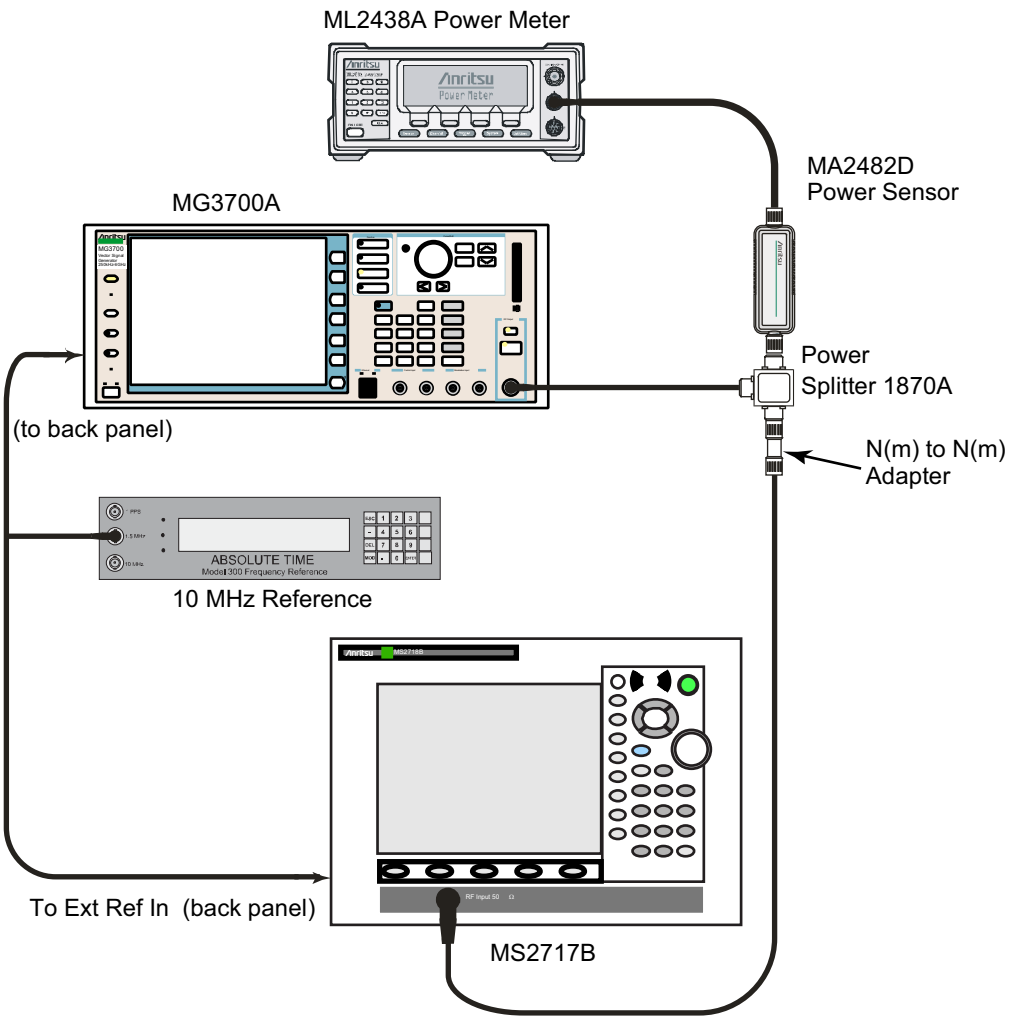


Figure 3-2. CDMA Signal Analyzer Option Verification

cdmaOne Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)

The tests in this section verify the function of the optional CDMA Signal Analyzer in the Model MS2717B Spectrum Master.

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 3-2.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 850 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
4. Set the MS2717B mode to CDMA Signal Analyzer. Press **Shift** and press **Preset** (1) to preset the MS2717B.
5. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
6. Press the **Down Arrow** key or turn the knob to select Yes.
7. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

8. Press the (F1) soft key to select "Load File to Memory".
9. Press the (F1) soft key again to select "Select Package".
10. Using the **Down Arrow** key step through the selection list until the "CDMA2000" option is highlighted.
11. Press the **Set** key.
12. Press the (F6) soft key "Return".
13. Press the **Set** key. The "Select Package" box will appear. Use the rotary knob to highlight "CDMA2000" and press the **Set** key to select.
14. Another File List will appear. Use the rotary knob to select "FWD_RC1-2_9channel" and press the **Set** key to select.
15. Press the **MOD On/Off** key to turn the Modulation LED on and verify that the "Playing" indicator in the center of the LCD is flashing.
16. Press the **Frequency** key, enter 870.03 MHz.
17. Press the **Level** key, enter –30 and press the dBm soft key.
18. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dBm.
19. On the MS2717B, press the Frequency soft key and enter 870.03 MHz as Center Frequency.
20. Press the Measurements soft key and select CDMA Summary (a red dot will appear on the label).
21. Press the Setup soft key and select PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger soft key twice. Then wait 15 seconds to allow the MS2717B to update its measured results.
22. For MS2717B with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 18. Then record the calculated Channel Power error into the test record in Appendix A in the "At 870.03 MHz, –30 dBm Level, cdmaOne" row of Table A-44, "Option 42 CDMA RF Measurements".
23. For MS2717B with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau into the test record in the "At 870.03 MHz, –30 dBm Level, cdmaOne"" row of Table A-45, "Option 43 cdmaOne and CDMA2000 1xRTT Demodulator".
24. Verify that the measured values in Step 22 or Step 23 (or both) are within specifications.
25. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 1930 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.

26. Set the MG3700A Frequency to 1930.05 MHz.
27. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dB.
28. On the MS2717B, press the Frequency soft key and enter 1930.05 MHz as Center Frequency. Wait 15 seconds to allow the MS2717B to update its measured results.
29. For MS2717B with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 26. Then record the calculated Channel Power error into the test record in the "At 1930.05 MHz, –30 dBm Level, cdmaOne" row of Table A-44, "Option 42 CDMA RF Measurements".
30. For MS2717B with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau into the test record in the "At 1930.05 MHz, –30 dBm Level, cdmaOne" row of Table A-45, "Option 43 cdmaOne and CDMA2000 1xRTT Demodulator".
31. Verify that the measured values in Step 29 or Step 30 (or both) are within specifications.

CDMA2000 Channel Power, Frequency Error, Rho, and Tau Verification (Option 42 and/or 43)

The tests in this section verify the function of the optional CDMA Signal Analyzer in Model MS2717B Spectrum Master.

Procedure

1. Ensure that the equipment settings are unchanged from the previous test. Refer to Figure 3-2.
2. On the MG3700A, change the selected pattern to "FWD_RC3-5_9channel".
3. Adjust the level of the MG3700A so that the power meter reads –30 dBm ± 0.2 dBm. Then wait 15 seconds to allow the MS2717B to update its measured results.
4. For MS2717B with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 3. Then record the calculated Channel Power error into the "At 1930.05 MHz, –30 dBm Level, CDMA2000" row of Table A-44, "Option 42 CDMA RF Measurements".
5. For MS2717B with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau into the test record in the "At 1930.05 MHz, –30 dBm Level, CDMA2000" row of Table A-45, "Option 43 cdmaOne and CDMA2000 1xRTT Demodulator".
6. Verify that the measured values in Step 4 or Step 5 (or both) are within specifications.
7. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 870.03 MHz as the input signal frequency, which sets the power meter to the proper power sensor calibration factor. Press the **System** key to display the power reading.
8. Set the MG3700A frequency to 870.03 MHz.
9. Adjust the MG3700A output so that the power meter reads –30 dBm ± 0.2 dBm.
10. On the MS2717B, press the Frequency soft key and enter 870.03 MHz as Center Frequency. Then wait 15 seconds to allow the MS2717B to update its measured results.
11. For MS2717B with Option 42 (CDMA RF Measurements), subtract the displayed Channel Power value from the power meter reading in Step 9. Then record the calculated Channel Power error into the "At 870.03 MHz, –30 dBm Level, CDMA2000" row of Table A-44, "Option 42 CDMA RF Measurements"
12. For MS2717B with Option 43 (cdmaOne and CDMA2000 1xRTT Demodulator), record the displayed Freq Error, Rho, and Tau into the test record in the "At 870.03 MHz, –30 dBm Level, CDMA2000" row of Table A-45, "Option 43 cdmaOne and CDMA2000 1xRTT Demodulator".
13. Verify that the measured values in Step 11 or Step 12 (or both) are within specifications.

3-4 WCDMA/HSDPA Signal Analyzer Option Verification

Option 44 and Option 45 or Option 65

The tests in this section can be used to verify the functionality of the WCDMA/HSDPA Signal Analyzer mode of the Anritsu Model MS2717B Economy Spectrum Analyzer. The tests include:

- "WCDMA Absolute Power Accuracy Verification (Option 44)"
- "WCDMA Occupied Bandwidth (OBW) Verification (Option 44)"
- "WCDMA RF Channel Power Accuracy and ACLR Verification (Option 44)"
- "HSDPA RF Channel Power Accuracy and ACLR Verification (Option 44)"
- "Error Vector Magnitude (EVM) Verification (Option 45 or Option 65)"

WCDMA Absolute Power Accuracy Verification (Option 44)

This test verifies the WCDMA absolute power accuracy in WCDMA/HSDPA Signal Analyzer Mode.

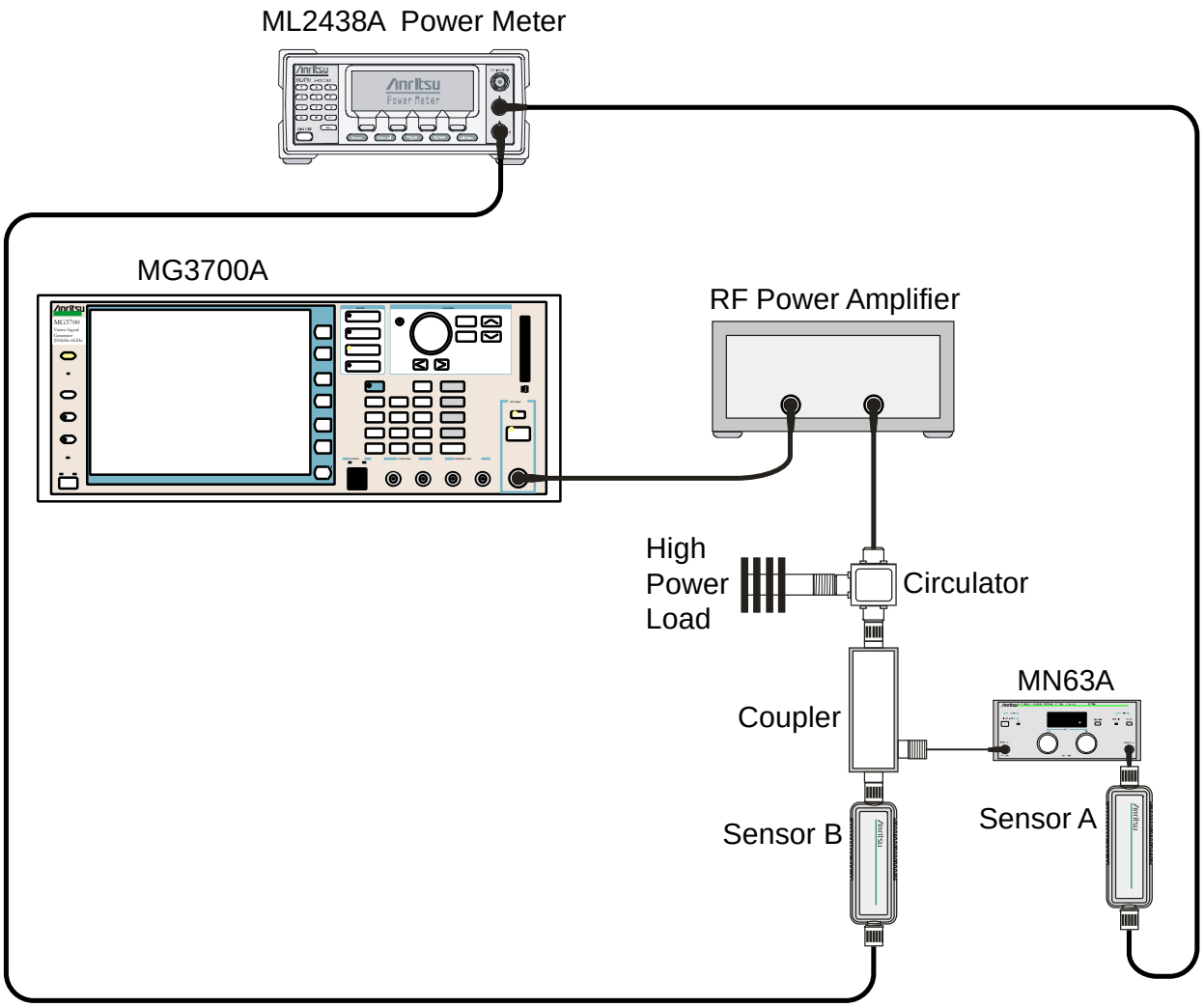


Figure 3-3. WCDMA Absolute Power Accuracy Verification — Characterization Setup

1. Connect the MG3700A, RF power amplifier, attenuator, power meter, and sensors as shown in Figure 3-3.

2. Turn on the MG3700A, the RF amplifier, the attenuator, and the power meter.
3. Connect the power sensors to the power meter and then calibrate the sensors.
4. Press the **On/Off** key to turn on the MS2717B and wait until the measurement display appears. Then press the **Shift** key and press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key, step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key (Return).
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModel_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is On.
19. Press the **Frequency** key, enter 881.5, then press the MHz soft key.
20. Press the **Level** key, enter –28, and press the dBm soft key.
21. Use the knob to adjust the power level so that Sensor B reads +10 dBm.
22. Set the MN63A attenuator to 0 dB.
23. Record the Sensor A reading (PMA.10) in Table A-40, "Sensor A and Sensor B Reading Components Characterization at 881.5 Mhz". This reading should be approximately –20 dBm.
24. Record the Sensor B reading (PMB.10) in Table A-40.
25. Calculate Δ1, which is the error of the coupler output port deviation from ideal +10 dBm by using the following formula:

    `Δ1 (dB) = (10 dBm – PMB.10)`

26. Record the Δ1 value in Table A-40.
27. Calculate the accurate value (PMA.10C) of Sensor A reading for coupler port output of +10 dBm by using the following formula:

    `PMA.10C = PMA.10 + Δ1`

28. Record the calculated value in Table A-40.
29. Set the MN63A attenuator to 18 dB and record the Sensor A reading (PMA.18) in Table A-40.
30. Calculate the accurate attenuation value by using the following formula:

    `ATT.18 = (PMA.10 – PMA.18)`

31. Record the calculated value in Table A-40.

32. Turn off the RF output of the MG3700A.

33. Disconnect the coupler from Sensor B and connect the coupler to the MS2717B, referring to Figure 3-4.

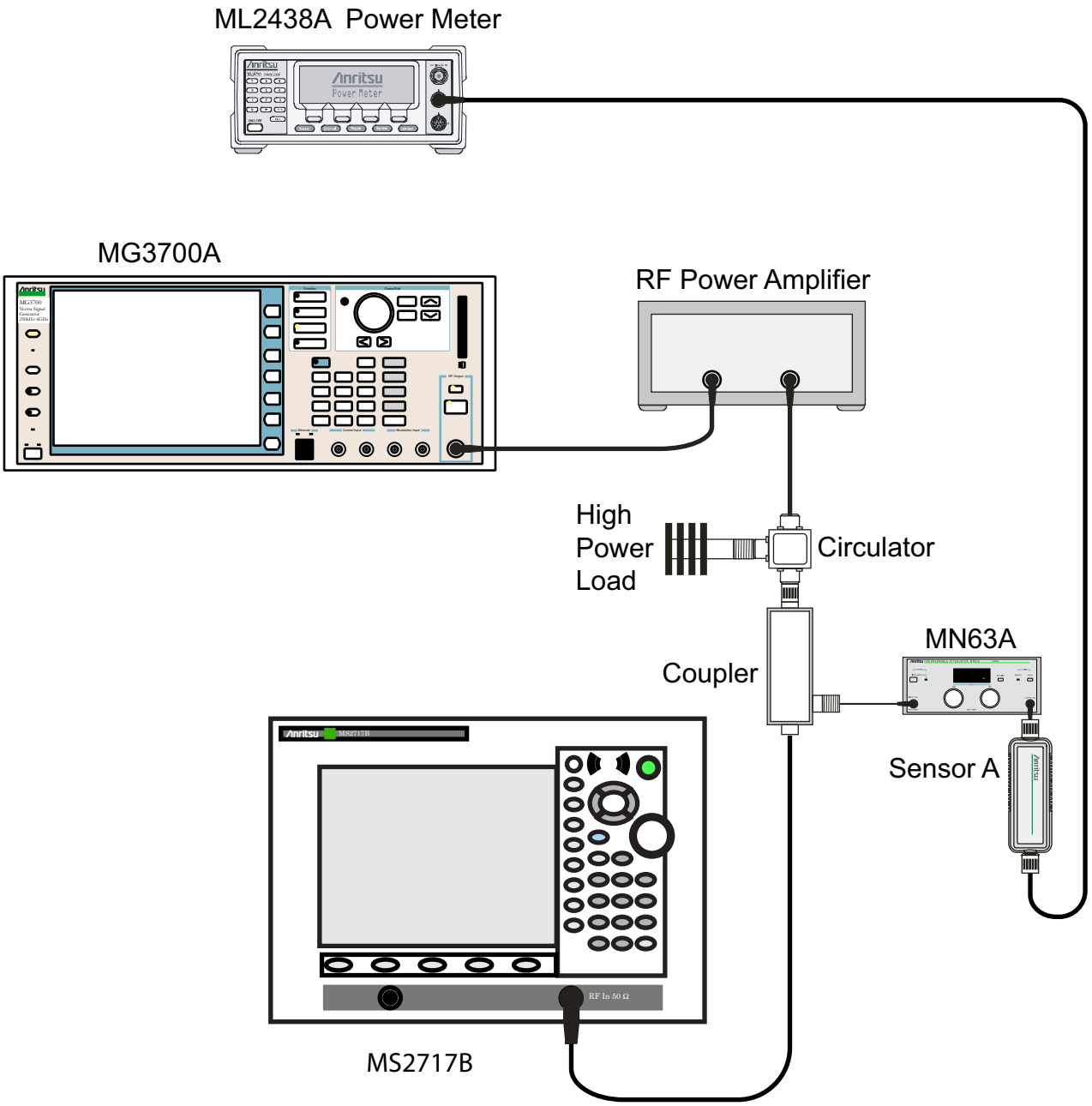


Figure 3-4. WCDMA Absolute Power Accuracy Verification — Measurement Setup

34. Set the MN63A attenuator to 0 dB.

35. On the MS2717B, press the Center Freq soft key, enter 881.5, and then press the **Enter** key.

36. Press the Measurements soft key, then the RF Measurement soft key, then the Spectrum soft key.

37. On the MG3700A, turn on the RF output and use the knob to adjust power level to read the value of PMA.10C on Sensor A in Table A-40.

38. Record the MG3700A power level setting (MG3700A.10) in Table A-41, "Power Level Setting Components Characterization at 881.5 Mhz".

39. On the MS2717B, press the **Amplitude** key and then press the Adjust Range soft key.

40. Record the channel power reading in the "Measured Power" column of the test record in Table A-46, "WCDMA Absolute Power Accuracy".

41. Use the following formula to calculate the absolute power accuracy of the MS2717B at +10 dBm:

```
Error = Measured Power – 10
```

42. Record the calculated value in the "Error" column of the test record in Table A-46 and verify that it is within specification.

43. Turn off the RF output of the MG3700A.

44. Set the MN63A attenuator to 18 dB.

45. Calculate the value of the MG3700A setting (MG3700A.28) for +28 dBm Test Level by using the following formula and pre-recorded values from Table A-41 and Table A-46:

```
MG3700A.28 = MG3700A.10 + ATT.18
```

46. Record the calculated value in Table A-41, "Power Level Setting Components Characterization at 881.5 Mhz".

47. On the MG3700A, turn on the RF output and use the knob to adjust power level to the recorded MG3700A.28 value in Table A-41.

48. On the MS2717B, press the **Amplitude** key and then press the Adjust Range soft key.

49. Record channel power reading in the "Measured Power" column for +28 dBm Test Level in the test record in Table A-46.

50. Use the following formula to calculate the absolute power accuracy of the MS2717B at +28 dBm:

```
Error = Measured Power – 28
```

51. Record the calculated value in the "Error" column of the test record in Table A-46 and verify that it is within specification.

52. Turn off the RF output of the MG3700A.

53. Set the MN63A attenuator to 0 dB.

54. Set power level of the MG3700A to –38 dBm.

55. Calculate the value of the Sensor A reading (PMA–10 in Table A-41) for –10 dBm Test Level by using the value of PMA.10C in Table A-40 and by using the following formula:

```
PMA–10 = PMA.10C – 20
```

56. Record the calculated value in Table A-41, "Power Level Setting Components Characterization at 881.5 Mhz".

57. Turn on the RF output and use the knob to adjust power level to read the value of PMA–10 on Sensor A, as recorded in Table A-41.

58. On the MS2717B, press the **Amplitude** key and then press the Adjust Range soft key.

59. Record channel power reading in the "Measured Power" column for –10 dBm Test Level in the test record in Table A-46.

60. Use the following formula to calculate the absolute power accuracy of the MS2717B at –10 dBm:

```
Error = Measured Power – (–10)
```

61. Record the calculated value in the "Error" column of the test record in Table A-46 and verify that it is within specification.

62. Turn off the RF output of the MG3700A.

63. Set the MN63A attenuator to 0 dB.

64. Decrease the power level of the MG3700A by 10 dB.

65. Calculate the value of the Sensor A reading (PMA–20) for – 20 dBm Test Level by using the value of PMA.10C in Table A-40 and by using the following formula:

```
PMA–20 = PMA.10C – 30
```

66. Record the calculated value in Table A-41, "Power Level Setting Components Characterization at 881.5 Mhz".

67. Turn on the RF output and use the knob to adjust power level to read the value of PMA–20 on Sensor A, as recorded in Table A-41.

68. On the MS2717B, press the **Amplitude** key and then press the Adjust Range soft key.

69. Record channel power reading in the "Measured Power" column of the test record in Table A-46, "WCDMA Absolute Power Accuracy".

70. Turn off the RF output of the MG3700A.

71. Use the following formula to calculate the absolute power accuracy of MS2717B at –20 dBm:

```
Error = Measured Power – (–20)
```

72. Record the calculated value in the "Error" column of the test record in Table A-46 and verify that it is within specification.

WCDMA Occupied Bandwidth (OBW) Verification (Option 44)

The tests in this section can be used to verify the WCDMA occupied bandwidth in WCDMA/HSDPA Signal Analyzer Mode.

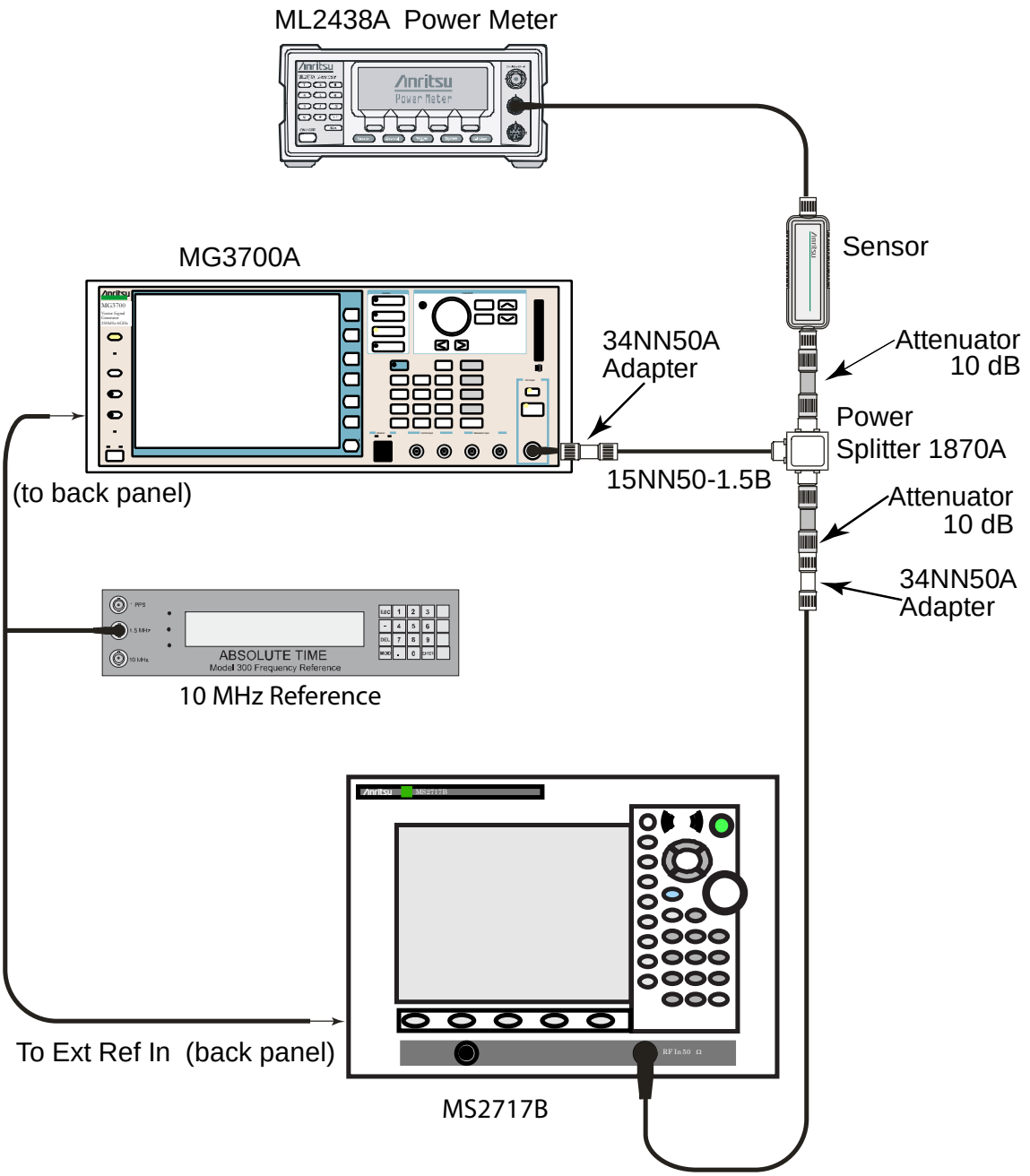


Figure 3-5. WCDMA OBW Verification Test Setup

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, sensor, and power meter as shown in Figure 3-5.
4. Press the **On/Off** key to turn on the MS2717B and wait until the measurement display appears. Then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.

5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key (Return).
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModel_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the MOD On/Off key and verify that the Modulation indicator on the display is ON.
19. Press the **Frequency** key, then enter one of the frequencies from Table A-47, "WCDMA Occupied Bandwidth (OBW)" starting with 881.5, and press the MHz soft key.
20. Press the **Level** key, then enter –2 and press the dBm key.
21. Use the knob to adjust the power level so that the power meter reads –20 dBm. Record the reading in the "Power Meter Reading" column of Table A-47, "WCDMA Occupied Bandwidth (OBW)".
22. On the MS2717B, press the Center Frequency soft key, enter one of the frequencies from Table A-47 starting with 881.5, then press the **Enter** key.
23. Press the Measurements soft key, then the RF Measurement soft key, and press the Channel Spectrum soft key.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the OBW reading in the "OBW" column of the test record in Table A-47 and verify that it is within 4.2 MHz ±100 kHz.
26. Repeat Step 19 to Step 25 for the other frequencies in Table A-47.

WCDMA RF Channel Power Accuracy and ACLR Verification (Option 44)

The tests in this section can be used to verify the WCDMA RF Channel Power Accuracy and ACLR Accuracy in WCDMA/HSDPA Signal Analyzer Mode.

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 3-5 on page 3-16.
4. Press the **On/Off** key to turn on the MS2717B and wait until the measurement display appears. Then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key (Return).
15. Press the **Set** key.
16. Using the **Down Arrow** key step through the selection list until the TestModel_1_16DPCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is ON.
19. Press the **Frequency** key, then enter 881.5, and press the MHz soft key.
20. Press the **Level** key, then enter –2 and press the dBm soft key.
21. Use the knob to adjust the power meter to read –20 dBm and record the Power Meter reading in the "Power Meter Reading" column of the test record in Table A-48, "WCDMA RF Channel Power Accuracy".
22. On the MS2717B, press the Center Frequency soft key, enter 881.5, and then press the **Enter** key.
23. Press the Measurements soft key, then press the RF Measurement soft key and press ACLR.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the measured CH 1 power in dBm to the "Measured RF Channel Power" column of the test record in Table A-48.
26. Calculate the RF Channel Power Error using the following formula:

```
RF Channel Power Error (dB) =
  Measured RF Channel Power – 0.246 – Power Meter reading
```

27. Record calculated value to the "RF CH Power Error" column of the test record in Table A-48 and verify that it is within specifications (±1.25 dB).

28. Record all four measured Adjacent Channel Leakage Ratios in dB at –10 MHz Offset, –5 MHz Offset, 5 MHz Offset, and 10 MHz Offset in the "Measured ACLR" column of the test record in Table A-49, "WCDMA ACLR Accuracy".

29. Calculate the ACLR Error at –10 MHz Offset and +10 MHz Offset using the following formula:

$$\text{ACLR Error at } -10 \text{ or } +10 \text{ MHz Offset} = 10\ \text{LOG10}(10^{(-50/10)} + 10^{(\text{Measured\_ACLR}/10)}) - (-50)\ \text{dB}$$

30. Record in the calculated results to the corresponding cells in the "Calculated ACLR Error" column on the test record in Table A-49 and verify that it is within specification.

31. Calculate the ACLR Error at –5 MHz Offset and +5 MHz Offset using the following formula:

$$\text{ACLR Error at } -5 \text{ or } +5 \text{ MHz Offset} = 10\ \text{LOG10}(10^{(-45/10)} + 10^{(\text{Measured\_ACLR}/10)}) - (-45)\ \text{dB}$$

32. Record in the calculated results to the corresponding cells in the "Calculated ACLR Error" column on the test record in Table A-49 and verify that it is within specification.

33. Repeat Step 19 to Step 32 for the other frequencies in Table A-49.

HSDPA RF Channel Power Accuracy and ACLR Verification (Option 44)

The tests in this section can be used to verify the RF Channel Power Accuracy and ACLR Accuracy for HSDPA signals in WCDMA/HSDPA Signal Analyzer Mode.

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor according to Figure 3-5, "WCDMA OBW Verification Test Setup" on page 3-16.
4. Press the **On/Off** key to turn on the MS2717B and wait until the measurement display appears. Then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key (Return).
15. Press the **Set** key.
16. Using the **Down Arrow** key step through the selection list until the TestModel_5_8HSPDSCH option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is ON.
19. Press the **Frequency** key, then enter 2680.5, and press the MHz soft key.
20. Press the **Level** key, then enter –2, and press the dBm key.
21. Use the knob to adjust the power meter to read –20 dBm and record the Power Meter reading in the "Power Meter Reading" column of the test record in Table A-50, "HSDPA RF Channel Power Accuracy".
22. On the MS2717B, press the Center Frequency soft key, enter 2680.5, and then press the **Enter** key.
23. Press the Measurements soft key, then press the RF Measurement soft key and press ACLR.
24. Press the **Amplitude** key, then press the Adjust Range soft key.
25. Record the measured CH 1 power in dBm to the "Measured RF Channel Power" column of the test record in Table A-50.
26. Calculate the RF Channel Power Error using the following formula:

```
RF Channel Power Error (dB) =
  Measured RF Channel Power – 0.246 – Power Meter reading
```

27. Record calculated value to the "RF CH Power Error" column in the test record in Table A-50 and verify that it is within specifications (±1.25 dB).

28. Record all four measured Adjacent Channel Leakage Ratios in dB at –10 MHz Offset, –5 MHz Offset, 5 MHz Offset, and 10 MHz Offset in the Measured ACLR column of the test record in Table A-51, "HSDPA ACLR Accuracy".

29. Calculate the ACLR Error at –10 MHz Offset and +10 MHz Offset by using the following formula:

$$\text{ACLR Error at } -10 \text{ or } +10 \text{ MHz Offset} = 10\ \text{LOG10}(10^{(-50/10)} + 10^{(\text{Measured\_ ACLR}/10)}) - (-50)\ \text{dB}$$

30. Record the calculated results in the corresponding cells in the "Calculated ACLR Error" column of the test record in Table A-51 and verify that they are within specification.

31. Calculate the ACLR Error at –5 MHz Offset and +5 MHz Offset by using the following formula:

$$\text{ACLR Error at } -5 \text{ or } +5 \text{ MHz Offset} = 10\ \text{LOG10}(10^{(-45/10)} + 10^{(\text{Measured\_ACLR}/10)}) - (-45)\ \text{dB}$$

32. Record the calculated results in the corresponding cells in the "Calculated ACLR Error" column of the test record in Table A-51 and verify that they are within specification.

Error Vector Magnitude (EVM) Verification (Option 45 or Option 65)

The tests in this section can be used to verify the functionality of the WCDMA and/or HSDPA Demodulator of the WCDMA/HSDPA Signal Analyzer in MS2717B Spectrum Analyzer.

Procedure:

1. Turn on the MG3700A Vector Signal Generator and the ML2438A power meter.
2. Connect the power sensor to the power meter and calibrate the sensor.
3. Connect the MG3700A, splitter, attenuator, power meter, and sensor as shown in Figure 3-5, "WCDMA OBW Verification Test Setup" on page 3-16.
4. Press the **On/Off** key to turn on the MS2717B and wait until the measurement display appears. Then press the **Shift** key then press the **Mode** (9) key to activate the mode selection menu.
5. Use the **Up/Down** arrow keys to select WCDMA and press the **Enter** key.
6. Press the **Shift** key, the **Preset** (1) key, and then the Preset soft key.
7. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).
8. Press the **Down Arrow** key to select Yes.
9. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

10. Press the (F1) soft key to select Load File to Memory.
11. Press the (F1) soft key again to select Select Package.
12. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.
13. Press the **Set** key.
14. Press the (F6) soft key (Return).
15. Press the **Set** key.
16. Using the **Down Arrow** key, step through the selection list until the TestModel_4_opt option is highlighted.
17. Press the **Set** key.
18. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is ON.
19. Press the **Frequency** key, then enter 1962.5, and press the MHz soft key.
20. Press the **Level** key, then enter –2, and press the dBm key.
21. Use the knob to adjust the power meter to read –20 dBm.
22. On the MS2717B, press the Center Frequency soft key, enter 1962.5, and then press the MHz soft key.
23. Press the Measurements soft key, then press the Demodulator soft key, and press the Modulation Summary soft key.
24. Press the Setup soft key, then press the Auto Scrambling soft key to turn it ON.
25. Press the Max Spreading Factor soft key to set it to 512.
26. Press the **Amplitude** key, then press the Adjust Range soft key.
27. Record the EVM reading to the test record in Table A-52, "WCDMA Error Vector Magnitude (EVM) (Test Model 4, Option 45 or Option 65)" and verify that it is within ±2.5%.
28. This completes the EVM test for MS2717B with Option 45 and completes the first EVM test for MS2717B with Option 65.

For MS2717B with Option 65:

29. On the MG3700A, press the **Preset** key (Yellow key on the upper left hand side).

30. Press the **Down Arrow** key to select Yes.

31. Press the **Set** key.

Note	The MG3700A has two Set keys, and they both have the same function.

32. Press the (F1) soft key to select Load File to Memory.

33. Press the (F1) soft key again to select Select Package.

34. Using the **Down Arrow** key step through the selection list until the W-CDMA(BS Tx test) option is highlighted.

35. Press the **Set** key.

36. Press the (F6) soft key (Return).

37. Press the **Set** key.

38. Using the **Down Arrow** key step through the selection list until the TestModel_5_8HSPDSCH option is highlighted.

39. Press the **Set** key.

40. Press the **MOD On/Off** key and verify that the Modulation indicator on the display is ON.

41. Press the **Frequency** key, then enter 1962.5, and press the MHz soft key.

42. Press the **Level** key, then enter –2, and press the dBm key.

43. Use the knob to adjust the power meter to read –20 dBm.

44. On the MS2717B, press the Center Frequency soft key, enter 1962.5, and then press the MHz soft key.

45. Press the Measurements soft key, then press the Demodulator soft key, and press the Modulation Summary soft key.

46. Press the Setup soft key, then press the Auto Scrambling soft key to turn it ON.

47. Press the Max Spreading Factor soft key to set it to 512.

48. Press the **Amplitude** key, then press the Adjust Range soft key.

49. Record the EVM reading to the test record in Table A-53, “HSDPA Error Vector Magnitude (EVM) (Test Model 5, Option 65)” and verify that it is within ±2.5%.

50. This completes the two EVM tests for MS2717B with Option 65.

3-5 Fixed WiMAX Signal Analyzer Verification

Option 46 and/or Option 47

The tests in this section verify the functionality of the Fixed WiMAX Signal Analyzer of the Anritsu Model MS2717B Economy Spectrum Analyzer.

Fixed WiMAX Channel Power Accuracy Tests (Option 46)

Procedure:

1. Connect the MA2482D Power Sensor to the power meter and zero the meter.
2. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
3. Connect the Power Sensor, 1870A splitter, and 10 dB attenuators (quantity 2), as shown in Figure 3-6, which is the same as Figure 3-5, "WCDMA OBW Verification Test Setup" on page 3-16.

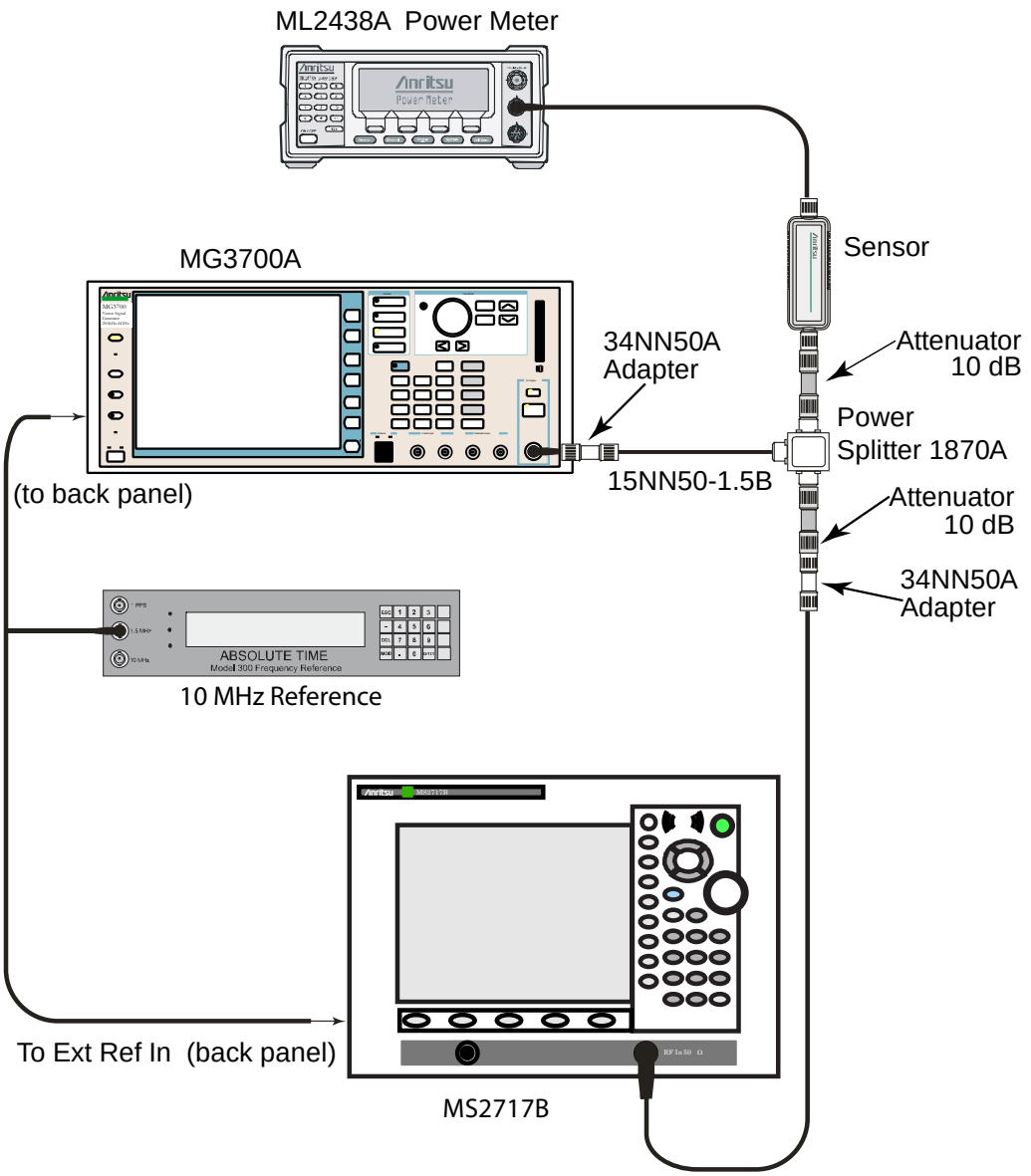


Figure 3-6. Fixed WiMAX Channel Power Accuracy Test Setup

4. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key
   c. Press the (F1) soft key to select Load File to Memory.
   d. Press the (F1) soft key again to select Select Package.
   e. Using the **Down Arrow** key step through the selection list until WiMax is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) soft key (Return).
   h. Press the **Set** key. The "Select Package" list box will appear. Again, press WiMax and **Set**.
   i. Another file list appears. Select (highlight) Mx10g32.
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is ON. Ensure that the "playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn on the output.
5. Adjust the MG3700A Level setting with the knob so that the power meter reads −15.0 dBm ±0.2 dB, and then record the actual power meter reading in Table A-54, "Fixed WiMAX Input Power, Power Meter Reference Reading".
6. Set the MS2717B to Fixed WiMax Signal Analyzer mode, then press **Shift** and press **Preset** (1) to preset the MS2717B, then set up the MS2717B as follows:
   a. Press the Freq soft key and set the Center Freq to 2600.5 MHz
   b. Press the Setup soft key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio soft key (under the Setup soft key) and set the CP Ratio to 1/32.
   d. Press the Measurements soft key and press RF. Then press Power vs. Time.
7. Record the MS2717B Channel Power (RSSI) reading to the test record in Table A-55, "Fixed WiMAX Channel Power Accuracy".
8. Calculated the Channel Power Error by subtracting the MS2717B "Channel Power (RSSI)" reading from the power meter reading in Step 5 (refer to Table A-54). Record the result to the test record in Table A-55, "Fixed WiMAX Channel Power Accuracy".
9. Verify that the error is within specification.
10. Adjust the MG3700A Level setting to approximately −33 dBm so that the power meter reads −50.0 dBm ±0.2 dB, and then record the actual power meter reading in Table A-54.
11. Record the MS2717B Channel Power (RSSI) reading to the test record in Table A-55, "Fixed WiMAX Channel Power Accuracy".
12. Calculated the Channel Power Error by subtracting the MS2717B "Channel Power (RSSI)" reading from the power meter reading in Step 10 (refer to Table A-54). Record the result to the "Error" column in the test record in Table A-55, "Fixed WiMAX Channel Power Accuracy".
13. Verify that the error is within specification.
14. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
15. Set MG3700A Frequency to 3600.5 MHz.
16. Change the Center Frequency of MS2717B to 3600.5 MHz.
17. Adjust the MG3700A Level setting with the knob so that the power meter reads −15.0 dBm ±0.2 dB (and later −50.0 dBm ±0.2 dB), and then record the actual power meter reading in Table A-54.

18. Measure the Channel Power (RSSI) for both –15 dBm and –50 dBm, and then record the measured results and calculated errors to the test record in Table A-55, "Fixed WiMAX Channel Power Accuracy".
19. Verify that the errors are within specification.
20. Set the calibration factor frequency of the power sensor to 5600.5 MHz.
21. Set MG3700A Frequency to 5600.5 MHz.
22. Change the Center Frequency of MS2717B to 5600.5 MHz.
23. Repeat Step 17 through Step 19, using Table A-54 and Table A-55.

Fixed WiMAX Residual EVM and Frequency Error Tests (Option 47)

Procedure:

1. Connect the MA2482D Power Sensor to the power meter and zero the meter.
2. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
3. Connect the Power Sensor, 1870A splitter, and 10 dB attenuators (quantity 2), as shown in Figure 3-7, which is the same as Figure 3-6, "Fixed WiMAX Channel Power Accuracy Test Setup" on page 3-24.

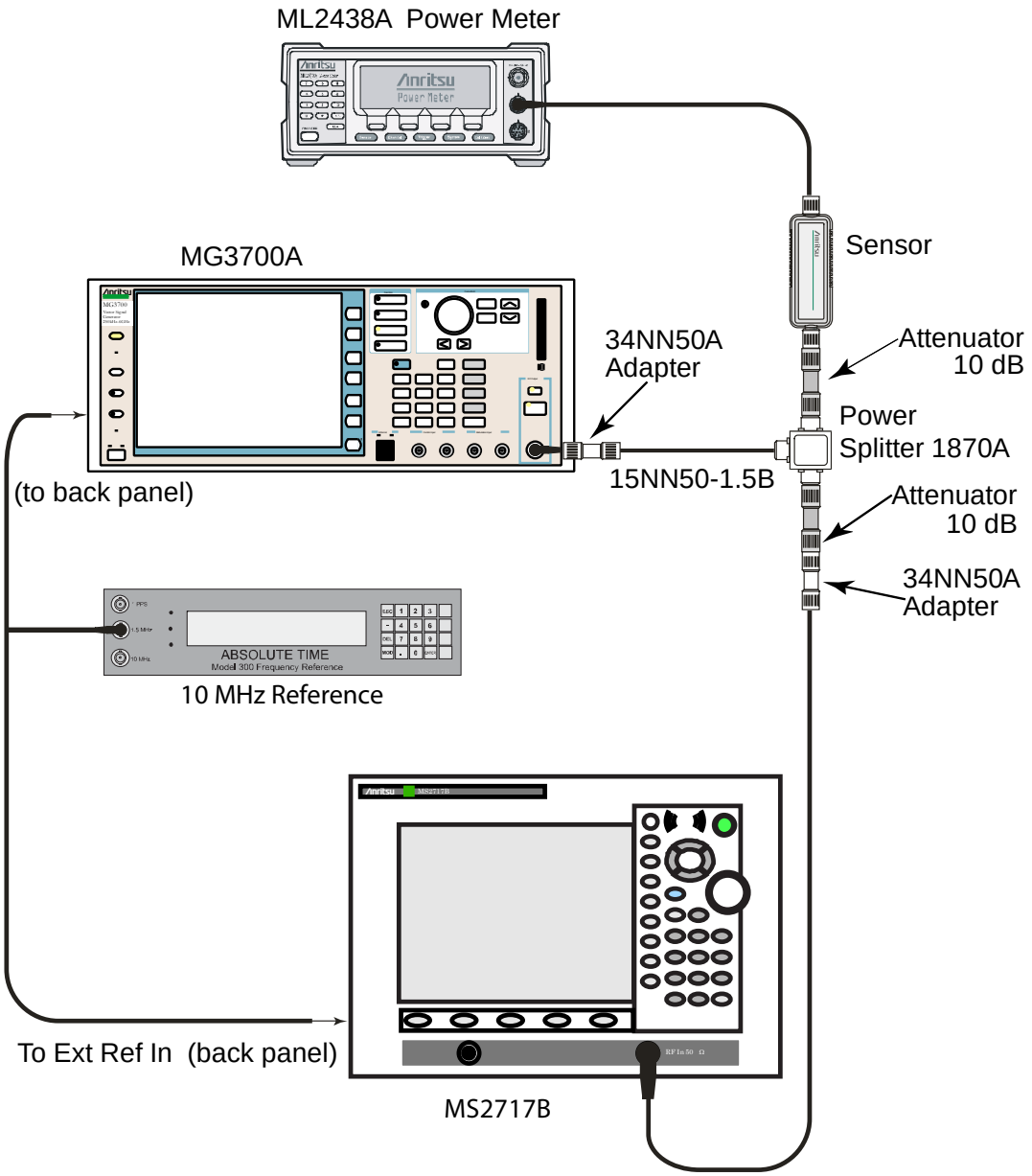


Figure 3-7. Fixed WiMAX Residual EVM and Frequency Error Test Setup

4. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key.

c. Press the (F1) soft key to select Load File to Memory.

d. Press the (F1) soft key again to select Select Package.

e. Using the **Down Arrow** key step through the selection list until WiMax is highlighted.

f. Press the **Set** key.

g. Press the (F6) soft key (Return).

h. Press the **Set** key. The "Select Package" list box will appear. Again, press WiMax and **Set**.

i. Another file list appears. Select (highlight) Mx10g32.

j. Press the **Set** key.

k. Press the **MOD On/Off** key and verify that the LED is ON. Ensure that the "playing" indicator is displaying the moving pattern.

l. Press the **Frequency** key, then enter 2600.5 MHz.

m. Press the **Level** key, then enter 2 dBm. Turn on the output.

5. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ±0.2 dB, and then record the actual power meter reading in Table A-56, "Fixed WiMAX Input Power, Power Meter Reference Reading".

6. Set the MS2717B to Fixed WiMax Signal Analyzer mode, then press **Shift** and press **Preset** (1) to preset the MS2717B, then set up the MS2717B as follows:

a. Press the Freq soft key and set the Center Freq to 2600.5 MHz.

b. Press the Setup soft key and set the Bandwidth to 10 MHz.

c. Press the CP Ratio soft key (under the Setup soft key) and set the CP Ratio to 1/32.

d. Press the Measurements soft key and press Demodulator. Then press Modulation Summary.

7. Record the MS2717B EVM(rms) reading to the "EVM(rms)" column in the test record in Table A-57, "Fixed WiMAX Residual EVM".

8. Verify that the measured EVM is within specification.

9. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm, and then record the actual power meter reading in Table A-56.

10. Record the MS2717B EVM(rms) reading to the "EVM(rms)" column in the "Fixed WiMAX Residual EVM" chart on the test record in Table A-57.

11. Verify that the measured EVM is within specification.

12. Record the MS2717B Freq Error reading to the test record in Table A-58, "Fixed WiMAX Frequency Error".

13. Verify that the measured Freq Error is within specification.

14. Set the calibration factor frequency of the power sensor to 3600.5 MHz.

15. Set MG3700A Frequency to 3600.5 MHz.

16. Change the Center Frequency of MS2717B to 3600.5 MHz.

17. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ±0.2 dB (and later –50.0 dBm ±0.2 dB), and then record the actual power meter reading in Table A-56, "Fixed WiMAX Input Power, Power Meter Reference Reading".

18. Measure the EVM(rms) for both –15 dBm and –50 dBm, and then record the measured results to the test record in Table A-57, "Fixed WiMAX Residual EVM".

19. Verify that the measured EVM is within specification.

20. Set the calibration factor frequency of the power sensor to 5600.5 MHz.

21. Set MG3700A Frequency to 5600.5 MHz.

22. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ±0.2 dB, and then record the actual power meter reading in Table A-56.

23. Change the Center Frequency of the MS2717B to 5600.5 MHz.

24. Record the MS2717B EVM(rms) reading to the test record in Table A-57.

25. Verify that the measured EVM is within specification.

26. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ±0.2 dB, and then record the actual power meter reading in Table A-56.

27. Record the MS2717B EVM(rms) reading to the test record in Table A-57.

28. Verify that the measured EVM is within specification.

29. Record the MS2717B Freq Error reading to the test record in Table A-58, "Fixed WiMAX Frequency Error".

30. Verify that the measured Freq Error is within specification.

3-6 TD-SCDMA Signal Analyzer Verification

Option 60 and/or 61 Verification

The tests in this section verify the function of the optional TD-SCDMA Signal Analyzer in Model MS2717B Spectrum Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Setup

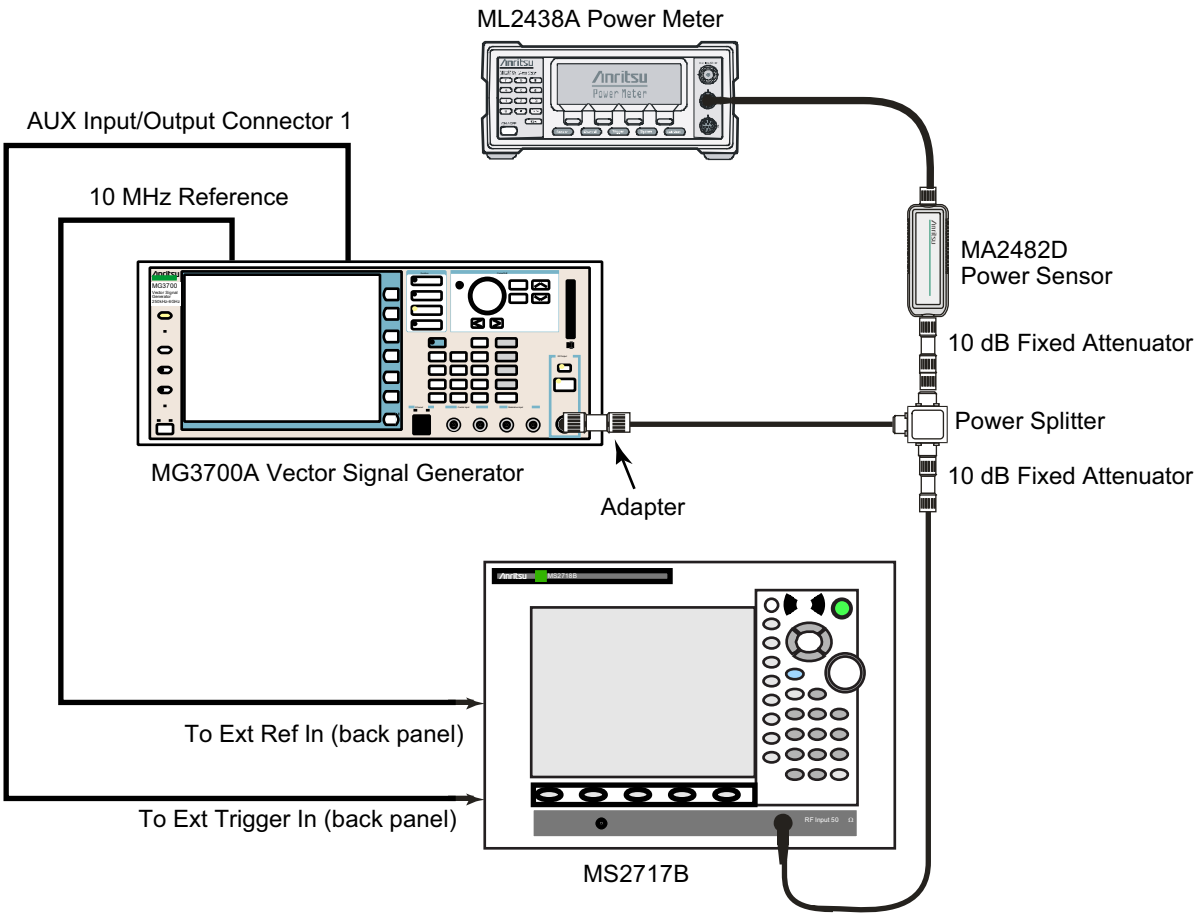


Figure 3-8. TD-SCDMA Signal Analyzer Option Verification

TD-SCDMA Signal Analyzer Verification (Option 60 and/or 61)

Procedure

1. Calibrate the power sensor prior to connecting to the power splitter.
2. Connect the equipment as shown in Figure 3-8.
3. On the power meter, press the **Sensor** key, the Cal Factor soft key, and then the Freq soft key. Use the keypad to enter 2010 MHz as the input signal frequency, which sets the power meter to the proper power sensor cal factor. Press the **System** key to display the power reading.
4. Set the power meter to Averaging, Moving and 256 samples.
5. Set the MS2717B to TD-SCDMA Signal Analyzer mode and preset the unit.
6. On the MG3700A, press the **Preset** key (yellow key on the upper left hand side).
7. Press the **Down Arrow** key or turn the knob to select Yes.
8. Press the **Set** key.

Note	The TD-SCDMA pattern requires a Waveform Data license MX370001A that must be purchased.

Note	Both Set keys on the MG3700A perform the same function.

9. Press the F1 soft key to select Load File to Memory.
10. Press the F1 soft key again to select Select Package.
11. Using the down arrow key step through the selection list until the TD-SCDMA(MX370001A) option is highlighted.
12. Press the **Set** key.
13. Press the Return (F6) soft key.
14. Press the **Set** key. The Select Package box will appear. Use the rotary knob to highlight TD-SCDMA(MX370001A) and press the **Set** key to select.
15. Another file list will appear. Use the rotary knob to select rmc-P-CCPCH_bs_dl and press the **Set** key to select.
16. Press the **MOD On/Off** key to turn the Modulation LED on and verify the "Playing" indicator in the center of the LCD is flashing.
17. Press the **Frequency** key, enter 2010 MHz.
18. Press the **Level** key, enter –20 and press the dBm soft key.
19. Adjust the MG3700A output so that the power meter reads –45 dBm ± 0.5 dB.
20. On the MS2717B, press the Frequency soft key and enter 2010 MHz as center frequency.
21. Press the Measurements soft key and select TD-SCDMA Summary (a red dot will appear on the label).
22. Press the Setup soft key and select PN Setup. Then change PN Trigger to Ext by pressing the PN Trigger soft key twice. Wait 15 seconds to allow the MS2717B to update its measured results.
23. For MS2717B with Option 60 (TD-SCDMA RF Measurements), subtract the displayed channel power value from the power meter reading in step 20. Then record the calculated channel power error to Table A-59, "TD-SCDMA for Units with Option 60, 61 Installed Only (at 2010 MHz, –45 dBm Level)" on page A-25.
24. For MS2717B with Option 61 (TD-SCDMA Demodulator), record the displayed frequency error, EVM and Tau to Table A-59, "TD-SCDMA for Units with Option 60, 61 Installed Only (at 2010 MHz, –45 dBm Level)" on page A-25.
25. Verify that the measured values in step 23 and/or step 24 are within specifications.

3-7 Mobile WiMAX Signal Analyzer Verification

Option 66 and/or 67

The tests in this section verify the functionality of the Mobile WiMAX Signal Analyzer of the MS2717B. The tests include:

- "Mobile WiMax Channel Power Accuracy Tests (Option 66)"
- "Mobile WiMAX Residual EVM and Frequency Error Tests (Option 67)"

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

Mobile WiMax Channel Power Accuracy Tests (Option 66)

Setup

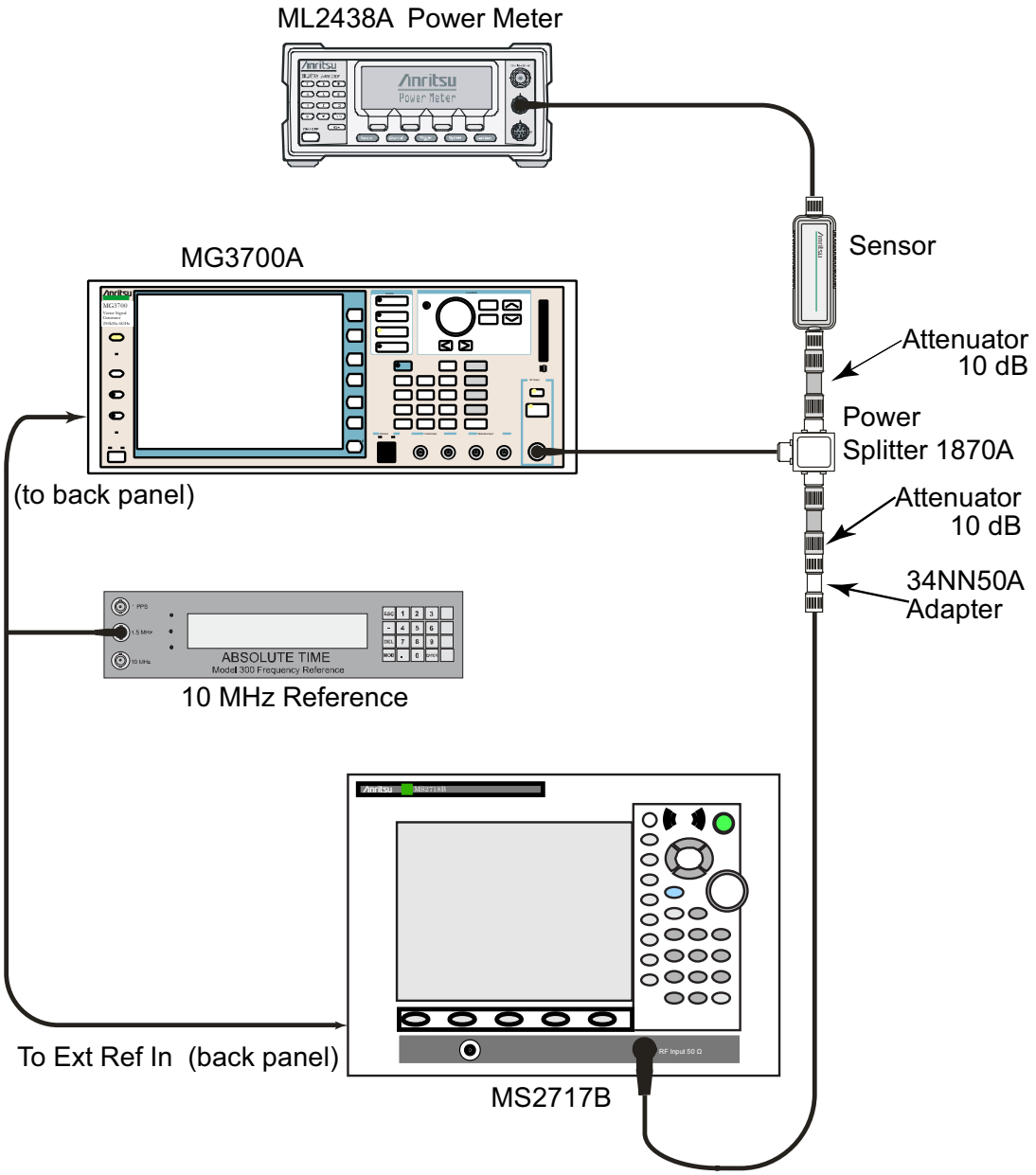


Figure 3-9. Mobile WiMAX Signal Analyzer Option Verification

Procedure

1. Connect the MA2482D Power Sensor to the power meter and zero the meter.
2. Set the Power Meter Measurement MODE to "True RMS", set Averaging MODE to "Moving", and set Averaging NUMBER to "256".
3. Set the calibration factor frequency of the power sensor to 2600.5 MHz.
4. Connect the Power Sensor, 1870A splitter, 10 dB attenuators (quantity 2), as shown in Figure 3-9 on page 3-33.

Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)

5. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer yes to the question).
   b. Press the **Set** key.
   c. Press the (F1) soft key to select "Load File to Memory".
   d. Press the (F1) soft key again to select "Select Package".
   e. Using the **Down Arrow** key step through the selection list until "mWiMax" is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) soft key "Return".
   h. Press the **Set** key. The "Select Package" list box will appear. Again select "mWiMax" and press **Set**.
   i. Another file list will appear. Select (highlight) "10m1024g8_0_10_cap".
   j. Press the **Set** key.
   k. Press the MOD On/Off key and verify that the LED is on. Ensure that the "Playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter 2 dBm. Turn the output on.
6. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dBm.
7. Set the MS2717B to Mobile WiMax Signal Analyzer Mode and preset the unit.
8. Set the MS2717B as follows:
   a. Press the Freq soft key and set the Center Freq to 2600.5 MHz.
   b. Press the Setup soft key and set the Bandwidth to 10 MHz.
   c. Press the Frame Length soft key and set the Frame Length to 10 ms.
   d. Press the Measurements soft key and select RF, then select Power vs. Time.
9. Record the MS2717B Channel Power (RSSI) reading into the test record in Appendix A in the "Measured Channel Power (RSSI)" column in row "2600.5 MHz" "–15 dBm" in Table A-60, "Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)".
10. Calculate the Channel Power Error by subtracting the MS2717B "Channel Power (RSSI)" reading from the power meter reading in Step 6. Record the result into the test record in the "Error" column in row "2600.5 MHz" "–15 dBm" in Table A-60, "Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)".
11. Verify that the error is within specification.
12. Adjust the MG3700A Level setting to approximately –33 dBm so that the power meter reads –50.0 dBm ± 0.2 dBm.
13. Record the MS2717B Channel Power (RSSI) reading into the test record in the column labeled "2600.5 MHz" "–50 dBm" in Table A-60, "Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)".

14. Calculate the Channel Power Error by subtracting the MS2717B "Channel Power (RSSI)" reading from the power meter reading that was recorded in Step 13. Record the result into the "Error" column in row "2600.5 MHz" "–50 dBm" in Table A-60, "Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)".
15. Verify that the error is within specification.
16. Set the calibration factor frequency of the power sensor to 3600.5 MHz.
17. Set MG3700A Frequency to 3600.5 MHz.
18. Change the Center Frequency of MS2717B to 3600.5 MHz. Press the **Set** key.
19. Measure the Channel Power (RSSI) for both –15 dBm and –50 dBm and then record the measured result and calculated error into the test record in the column labeled "Measured Channel Power (RSSI)" and in the column labeled "Error" for row "3600.5 MHz" "–15 dBm" in Table A-60, "Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)".
20. Verify that the error is within specification.

Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

21. Set the MG3700A as follows:
    a. Press the yellow **Preset** button (answer yes to the question).
    b. Press the **Set** key.
    c. Press the (F1) soft key to select "Load File to Memory".
    d. Press the (F1) soft key again to select "Select Package".
    e. Using the **Down Arrow** key step through the selection list until "mWiMax" is highlighted.
    f. Press the **Set** key.
    g. Press the (F6) soft key "Return".
    h. Press the **Set** key. The "Select Package" list box will appear. Again select "mWiMax" and press **Set**.
    i. Another file list will appear. Select (highlight) "5m512g8_2_5_cap".
    j. Press the **Set** key.
    k. Press the **MOD On/Off** key and verify that the LED is on. Ensure that the "playing" indicator is displaying the moving pattern.
    l. Press the **Frequency** key, then enter 2600.5 MHz.
    m. Press the **Level** key, then enter 2 dBm. Turn the output on.
22. Adjust the MG3700A Level setting with the knob so that the power meter reads –15.0 dBm ± 0.2 dBm.
23. Set the MS2717B to Mobile WiMax Signal Analyzer Mode and preset the unit.
24. Set the MS2717B as follows:
    a. Press the Freq soft key and set the Center Freq to 2600.5 MHz.
    b. Press the Setup soft key and set the Bandwidth to 5 MHz.
    c. Press the Frame Length soft key and set the Frame Length to 5 ms.
    d. Press the Measurements soft key and select RF, then select Power vs. Time.
25. Repeat Step 9 through Step 20, recording the results into the test record in Table A-61, "Mobile WiMAX Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)".

Mobile WiMAX Residual EVM and Frequency Error Tests (Option 67)

The tests in this section verify the function of the optional Mobile WiMAX Signal Analyzer in Model MS2717B Spectrum Master.

Equipment Required

- Anritsu MG3700A Vector Signal Generator
- Anritsu ML2438A Power Meter
- Anritsu MA2482D Power Sensor
- Anritsu 34NN50A Adapter (2)
- Anritsu 15NNF50-1.5C RF Coaxial Cable
- Aeroflex/Weinschel 1870A Power Splitter
- Aeroflex/Weinschel 44-10 10 dB Fixed Attenuator (2)
- Anritsu PN 3-806-169 Coaxial Cables (2)
- 10 MHz Reference Standard

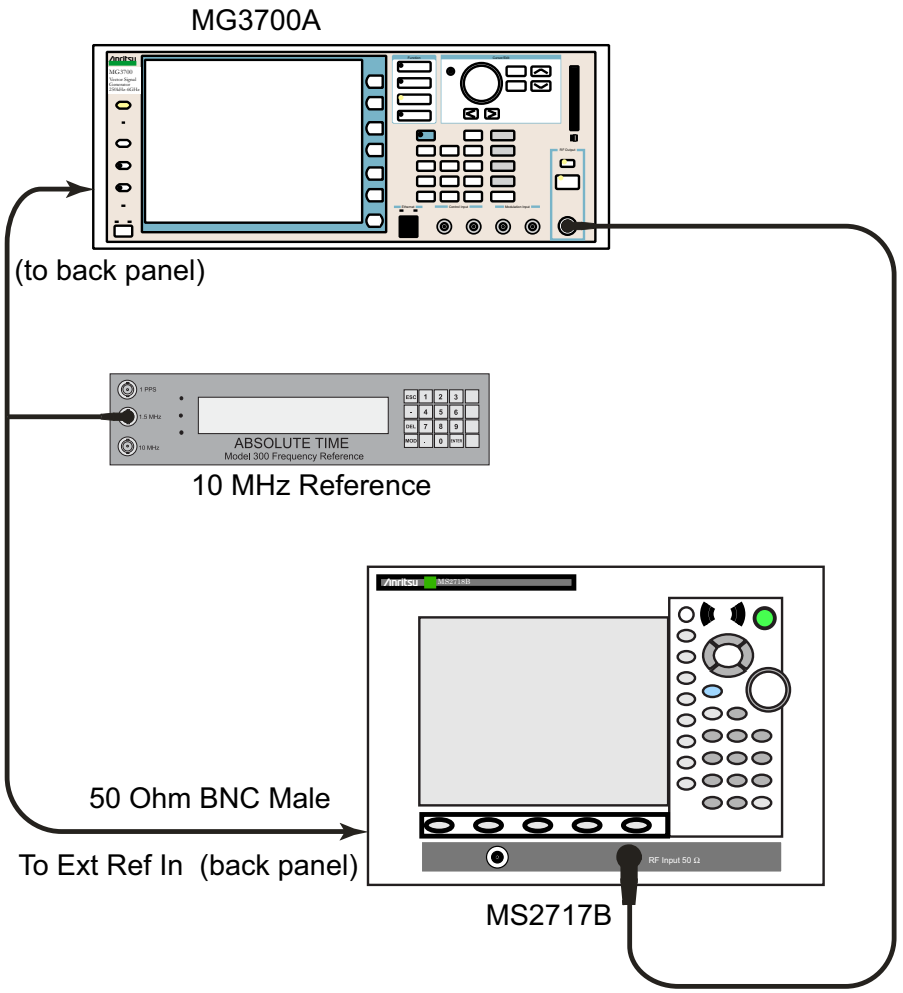


Figure 3-10. Mobile WiMAX Residual EVM and Frequency Error Test Setup

Procedure

1. Connect the 10 MHz Reference to the 10 MHz/5 MHz Ref Input of the MG3700A and to the Ext Ref In of the MS2717B as shown in Figure 3-10.
2. Connect the RF Out of the MG3700A to the Spectrum Analyzer RF In connector of the MS2717B.

Residual EVM and Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

3. Set the MG3700A as follows:
   a. Press the yellow **Preset** button (answer **yes** to the question).
   b. Press the **Set** key
   c. Press the (F1) soft key to select "Load File to Memory".
   d. Press the (F1) soft key again to select "Select Package".
   e. Using the **Down Arrow** key step through the selection list until "mWiMax" is highlighted.
   f. Press the **Set** key.
   g. Press the (F6) soft key "Return".
   h. Press the **Set** key. The "Select Package" list box will appear. Again select "mWiMax" and press **Set**.
   i. Another file list will appear. Select (highlight) "10m1024g8_0_10_cap".
   j. Press the **Set** key.
   k. Press the **MOD On/Off** key and verify that the LED is on. Ensure that the "playing" indicator is displaying the moving pattern.
   l. Press the **Frequency** key, then enter 2600.5 MHz.
   m. Press the **Level** key, then enter –15 dBm. Turn the output on.
4. Set the MS2717B to Mobile WiMax Signal Analyzer Mode and preset the unit.
5. Set the MS2717B as follows:
   a. Press the Freq soft key and set the Center Freq to 2600.5 MHz.
   b. Press the Setup soft key and set the Bandwidth to 10 MHz.
   c. Press the CP Ratio soft key (under the Setup soft key) and set the CP Ratio to 1/8.
   d. Press the Frame Length soft key and set the Frame Length to 10 ms.
   e. Press the Demod soft key and set Demod to FCH.
   f. Press the Measurements soft key and select Demodulator, then select Modulation Summary.
6. Record the MS2717B EVM (rms) reading into the test record in Appendix A in the column labeled "EVM (rms)", row "2600.5 MHz" "–15 dBm" in Table A-62, "Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)"
7. Verify that the measured EVM is within specification.
8. Set the MG3700A Level to –50.0 dBm.
9. Record the MS2717B EVM (rms) reading into the "EVM (rms)" column, row "2600.5 MHz" "–50 dBm" in Table A-62.
10. Verify that the measured EVM is within specification.
11. On the MS2717B, press the Setup soft key and set Demod to Auto.
12. Record the MS2717B Freq Error reading into the "Frequency Error" column, row "2600.5 MHz" in Table A-63, "Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)".
13. Verify that the measured Freq Error is within specification.
14. Set MG3700A Frequency to 3600.5 MHz.
15. On the MS2717B, change the Center Frequency to 3600.5 MHz.

16. Press the Setup soft key and set Demod to FCH.
17. Measure the EVM (rms) for both –15 dBm and –50 dBm and then record the measured results into the "3600.5 MHz" "–15 dBm" in Table A-62, "Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)"
18. Verify that the measured EVM is within specification.
19. Repeat Step 11 through Step 13 to measure the Frequency Error at –50 dBm, recording the reading into the "Frequency Error" column for row "3600.5 MHz" in Table A-63, "Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)".

Residual EVM and Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

20. Set the MG3700A as follows:
    a. Press the yellow **Preset** button (answer yes to the question).
    b. Press the Set key.
    c. Press the (F1) soft key to select "Load File to Memory".
    d. Press the (F1) soft key again to select "Select Package".
    e. Using the **Down Arrow** key step through the selection list until "mWiMax" is highlighted.
    f. Press the **Set** key.
    g. Press the (F6) soft key "Return".
    h. Press the **Set** key. The "Select Package" list box will appear. Again select "mWiMax" and **Set**.
    i. Another file list will appear. Select (highlight) "5m512g8_2_5_cap".
    j. Press the **Set** key.
    k. Press the **MOD On/Off** key and verify that the LED is on. Ensure that the "playing" indicator is displaying the moving pattern.
    l. Press the **Frequency** key, then enter 2600.5 MHz.
    m. Press the **Level** key, then enter -15 dBm. Turn the output on.
21. Set the MS2717B as follows:
    a. Press the Freq soft key and set the Center Freq to 2600.5 MHz.
    b. Press the Setup soft key and set the Bandwidth to 5 MHz.
    c. Press the CP Ratio soft key (under the Setup soft key) and set the CP Ratio to 1/8.
    d. Press the Frame Length soft key and set the Frame Length to 5 ms.
    e. Press the Demod soft key and set Demod to FCH.
    f. Press the Measurements soft key and select Demodulator, then select Modulation Summary.
22. Repeat Step 6 through Step 19, recording the MS2717B EVM (rms) readings into Table A-64, "Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)" and the Frequency Error readings into Table A-64, "Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)".

Chapter 4 — Adjustment

4-1 Introduction

This chapter contains the adjustment procedure for calibrating the MS2717B Economy Spectrum Analyzer if the results of any verification tests are not within specifications.

4-2 Internal Reference Frequency Adjustment

Use this procedure to adjust the Internal Reference frequency if the MS2717B fails the Spectrum Analyzer Frequency Accuracy verification test.

Procedure:

1. Connect the external 10 MHz Reference to the Anritsu MG3692x Synthesized Signal Generator as shown in Figure 4-1.

Note	**Do not connect** the external 10 MHz Reference to the MS2717B.

2. Connect the MG3692x output to the Spectrum Analyzer RF In of the MS2717B.

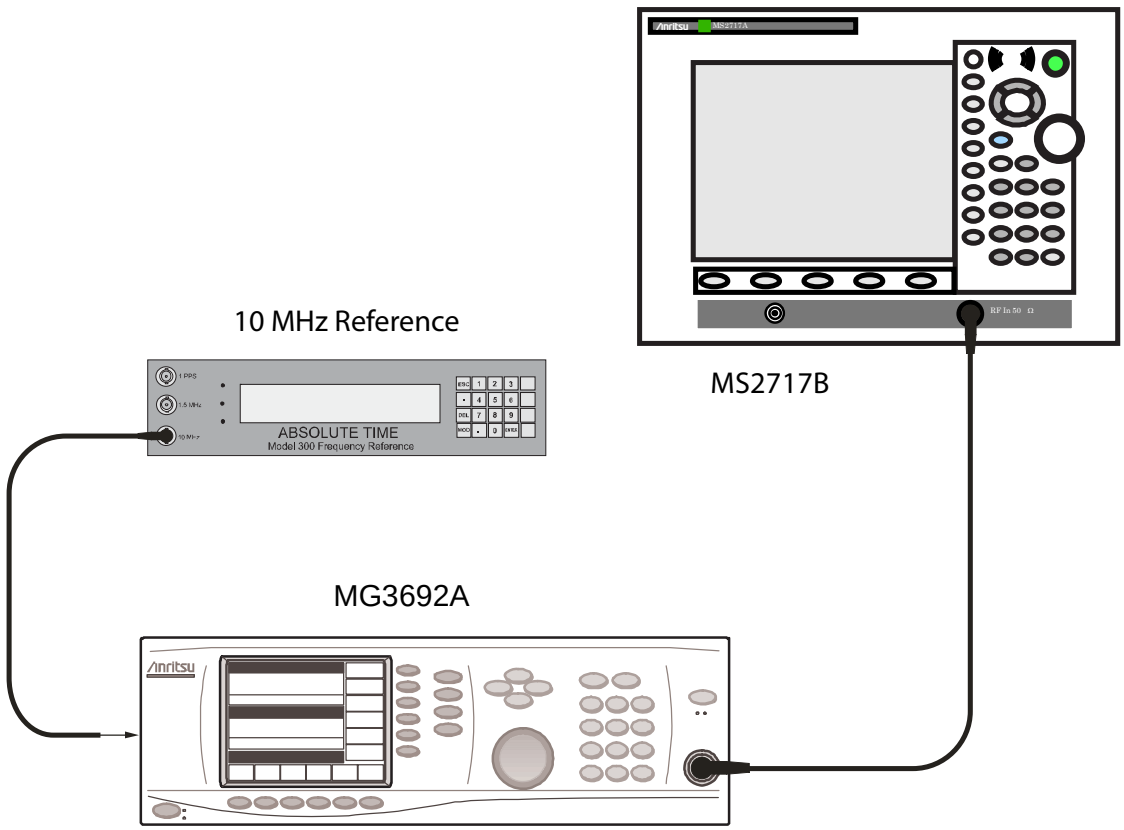


Figure 4-1. Internal Reference Frequency Adjustment Setup

3. Set the MS2717B to Spectrum Analyzer mode, then press **Shift** and press **Preset** (1) to preset the MS2717B.
4. Set the MG3692x output to 7 GHz with an RF output level of –30 dBm.

5. On the MS2717B, press the Amplitude soft key and set the Reference Level to –10 dBm.
6. Set the Atten Lvl to 0 dB.
7. Press the Freq soft key and set the Center Freq to 7.0 GHz.
8. Press the Span soft key and enter 10 kHz.
9. Press the BW soft key and set the RBW to 100 Hz.
10. Press the VBW soft key and set to 30 Hz.
11. Press and hold the **Shift** key and simultaneously press the 4th, 6th, and 8th soft keys (below the **Esc** key) in order to enter into the MS2717B Service Mode (Figure 4-2).
12. Press the Service Menu soft key, then the APP Service soft key.
13. Press the Calibration soft key, then the 10 MHz Ref soft key.
14. Use the **Up/Down** arrow keys or the rotary knob to slowly adjust the displayed signal to the center of the display. Allow the signal to stabilize between adjustments, and repeat as necessary.
15. Turn off the MS2717B and then turn it back on in order to exit Service Mode.

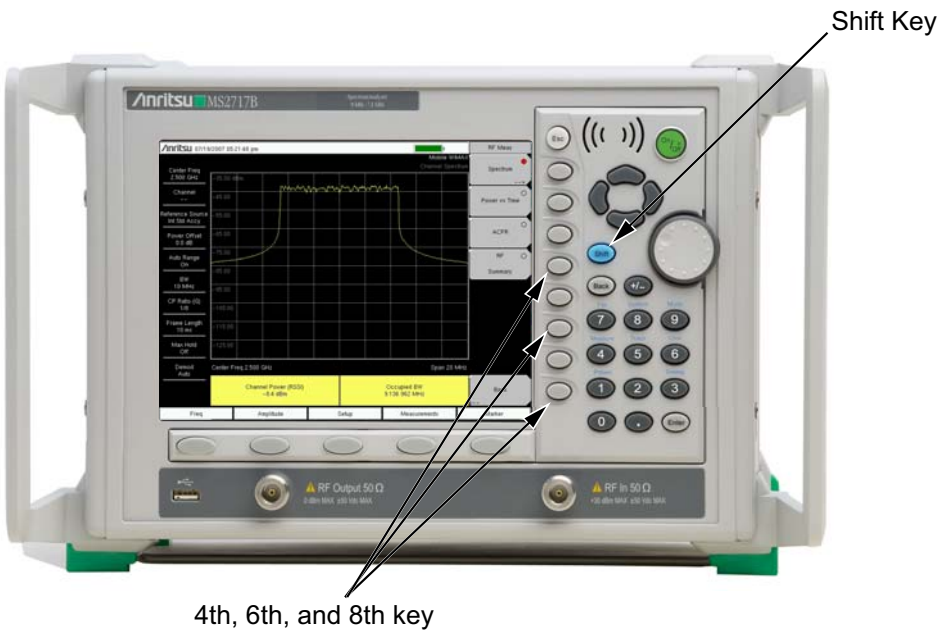


Figure 4-2. Entering Service Mode

Chapter 5 — Removal and Replacement

5-1 Introduction

Only qualified personnel should open the case and replace internal assemblies. Assemblies that are shown in the replaceable parts list are typically the only items that may be replaced. Because they are highly fragile, items that must be soldered may not be replaced without specialized training. Removing RF shields from PC boards or adjusting screws on or near the shields may detune sensitive RF circuits and will result in degraded instrument performance.

Caution	An Electrostatic Discharge (ESD) safe work area and proper ESD handling procedures (that conform to ANSI/ESD S20.20-1999 or ANSI/ESD S20.20-2007) are mandatory to avoid ESD damage when handling subassemblies or components found in the MS2717B. Additional information pertaining to ESD can be found at the ESD Association Web site: http://www.esda.org/s2020.html

5-2 Fuse

This procedure describes removing and replacing the power line fuses. The fuses are located within the power input module. The fuses can be replaced without opening the enclosure. The MS2717B line fuse value is printed on the rear panel next to the power connector. Refer to Table 1-3 on page 1-5 for the replacement part number.

Warning	Before changing the fuse, always remove the power cord from the power outlet. You risk receiving a fatal electric shock if the fuse is replaced with the power cord connected. Always use a new fuse of the type and rating that are specified by the fuse markings on the rear panel of the instrument.

1. Before replacing the line fuse, turn off the rear panel power switch and disconnect the MS2717B from the power source.
2. Place the MS2717B upright on a static protected work surface.
3. Using a small flat-blade screwdriver, carefully pry under the tab above the rear panel power switch to open the cover and gain access to the fuse holders as shown in the Figure 5-1.

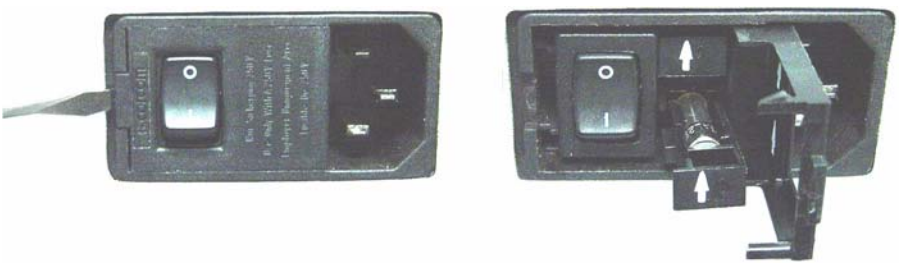


Figure 5-1. Fuse Holder within Input Module

4. Slide the fuse holder straight out of the power input module, then remove the fuse from the fuse holder as shown in Figure 5-2.

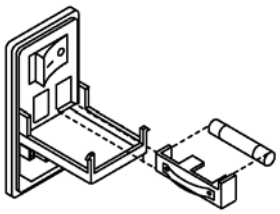


Figure 5-2. Removing Fuse from Fuse Holder

5. If the fuse is defective, then replace the fuse with a new fuse of the type and rating that are specified by the fuse markings on the rear panel of the instrument.
6. Reinstall the fuse holder in the rear panel power input module.
7. Close the cover to secure the fuse holder in place. The cover will close with an audible snap.

5-3 Enclosure

This procedure provides instructions for opening the enclosure (case). Except for fuse replacement (Section 5-2), all maintenance operations require opening the outer enclosure.

Ensure that all work is performed at a static-safe work area. Part numbers for all replaceable parts are found in Table 1-3 on page 1-5.

Before opening the case, Anritsu Company strongly recommends that all internally saved files be saved to a PC by using the Master Software Tools utility program or that they be copied to a USB memory drive or an external CF card on the MS2717B. In the event that the Main PCB needs to be replaced, this will prevent permanent loss of these internally saved files.

The handles and feet must be removed before the outer enclosure (case) can be separated from the chassis.

Figure 5-3. Benchtop and Rack-Mount

Rack-mounted instruments have two mounting brackets, each held by two screws. These mounting brackets may be left attached to the front panel bezel.

Figure 5-4. Rack-Mounting Brackets

1. In order to release the outer enclosure from the chassis, remove the larger screw (green head) from the green insert of each foot (1 screw each) and from the green insert on the side of each handle (2 screws on each handle). The smaller screws of the feet (center image in Figure 5-5) are attached to the enclosure only and can remain when the chassis is removed. The smaller screws in the handles hold the green plastic insert to the handle, and they need not be removed in order to release the chassis from the enclosure. The front panel bezel (metal ring) can slide off when the handles have been removed. Place the MS2717B face up on a static protected work surface and lift the front panel bezel straight up and off the enclosure.

Figure 5-5. Foot Screws

Figure 5-6. Handle Screws

2. Remove the 4 screws from the bottom of the outer enclosure and the 10 screws from the back panel, as shown in Figure 5-7.

Figure 5-7. Screws that Hold Chassis within Outer Enclosure

3. Slide the chassis from the outer enclosure.

Figure 5-8. Removing Chassis from Outer Enclosure

Replacement of the chassis into the enclosure is the reverse of the removal, with the following caution:

When replacing the screws in the handles and feet (refer to Figure 5-5 and Figure 5-6), the green-headed screws (that pass through the green plastic parts to secure the handles and feet to the enclosure) are engaged by threaded PIM nuts that are pressed into the interior side of the enclosure. These PIM nuts can be easily dislodged by too much inward pressure along the axis of the screws or by any off-center torque such as might be caused by cross-threading. The maximum torque for these screws is 6.2 in-lb. Be especially carefully with these screws. If a PIM nut breaks loose, then the entire outer enclosure must be replaced.

5-4 Battery

Main PCB Real Time Clock (RTC) Battery

This procedure describes removing and replacing the RTC battery on the Main PCB (motherboard).

Refer to Figure 5-9 for the location of this battery. Refer to Table 1-3 on page 1-5 for the replacement part number.

The chassis must be removed from the outer enclosure in order to gain access to the battery. Refer to section "Enclosure" on page 5-2. The battery is located on the Main PCB near the external memory Compact Flash (CF) card.

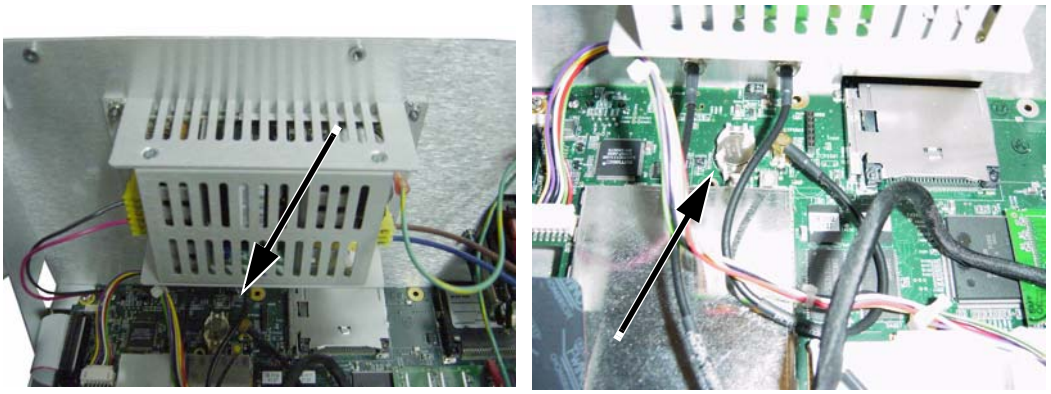


Figure 5-9. RTC Battery on Main PCB

1. With the chassis upright on a static protected work surface, remove the old battery and clean away any remaining RTV compound.
2. Install the new battery with the positive side (+) facing up. Apply 2 small drops of RTV compound in order to bridge the top of the battery and the holder as an extra precaution to hold the battery securely in place.

5-5 Power Input Module with Switch

This procedure describes removing and replacing the power input module, which contains a receptacle, switch, EMI filter, and fuses. The power input module is found in the replacement parts list as “EMI filter”. Refer to Table 1-3 on page 1-5 for the replacement part number.

The chassis must be removed from the outer enclosure in order to remove and replace the power input module. Refer to section “Enclosure” on page 5-2. The input module is mounted to the rear panel with two screws. The inside portion contains a grounding lead and a plug for the internal power supply.

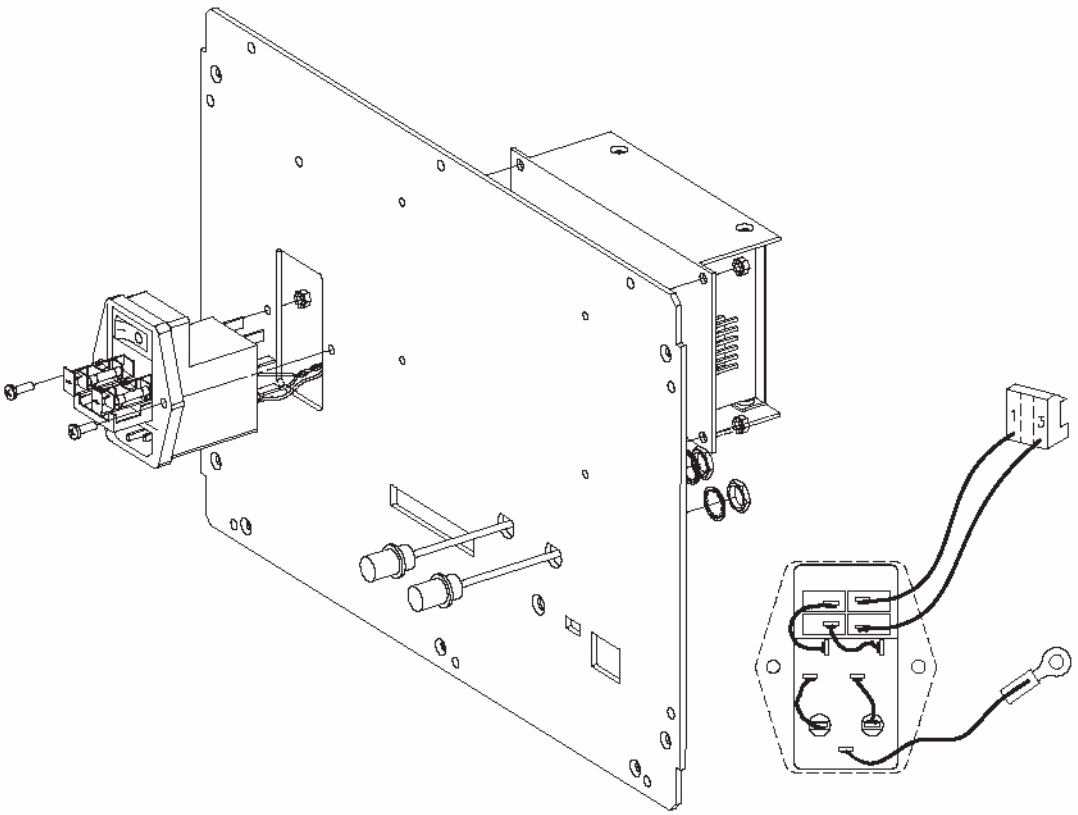


Figure 5-10. Power Input Module Mounting Details

1. Disconnect the power cord from the power input module.
2. Remove the outer enclosure as described in section “Enclosure” on page 5-2.
3. With the chassis upright on a static protected work surface, disconnect the internal power plug from the internal power supply and disconnect the ground lead from the grounding post (refer to Figure 5-11).
4. Remove the mounting nuts and screws and withdraw the input module from the rear panel.
5. Install the new power input module, tighten the nuts, and connect the ground lead and the internal power plug for the power supply.

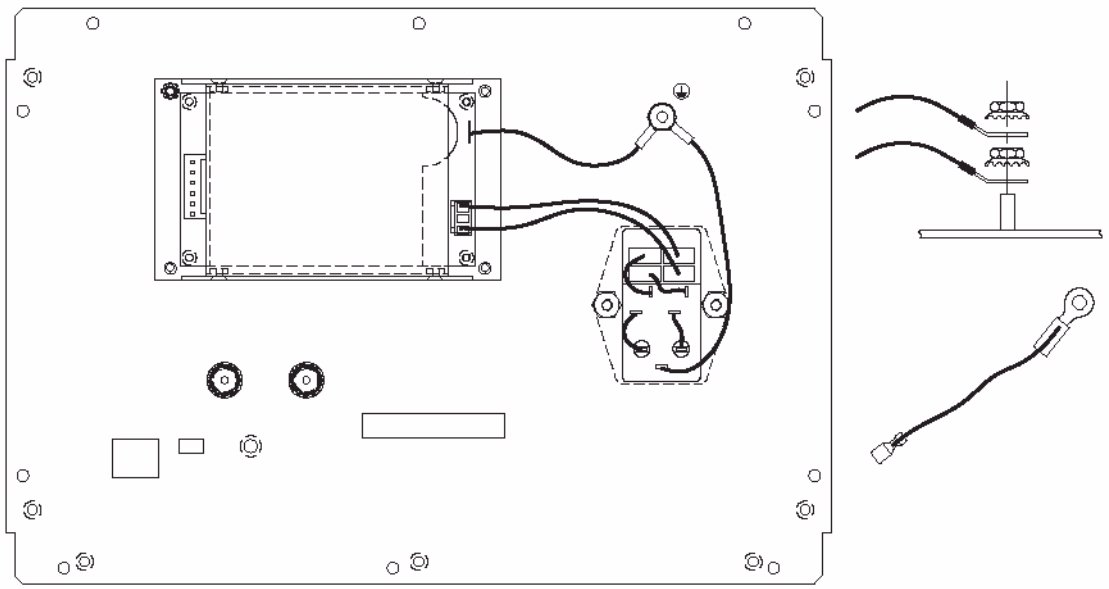


Figure 5-11. Power Input Module, Connections

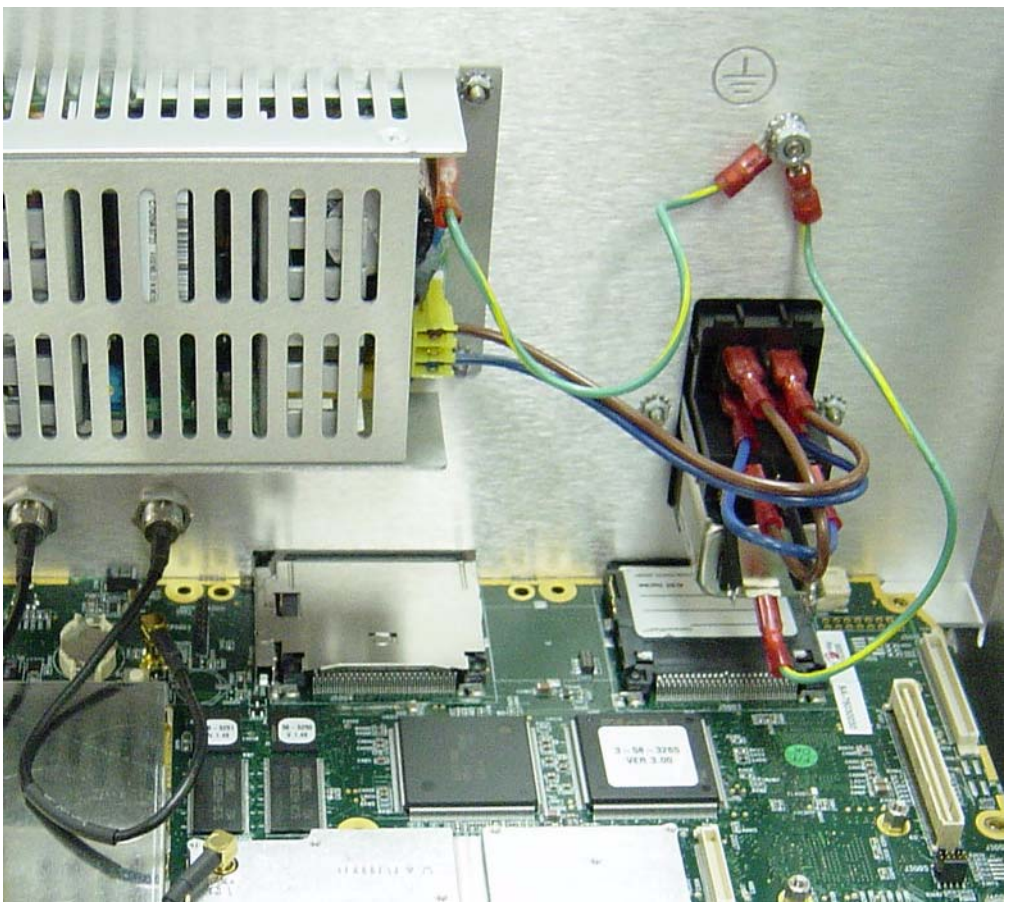


Figure 5-12. Power Input Module, Interior view

5-6 Fan

This procedure describes removing and replacing the fan assembly. To gain access to the fan, the chassis must be removed from the outer enclosure, as described in Section 5-3, "Enclosure". Refer to Table 1-3 on page 1-5 for the replacement part number.

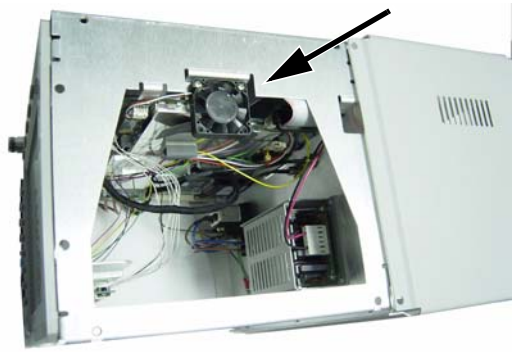


Figure 5-13. Fan on Left Side of Chassis

1. With the chassis upright on a static protected work surface, disconnect the fan power plug from J1002 of the Main PCB (motherboard). Refer to the arrow of Figure 5-14.
2. Remove the 2 screws that secure the bottom edge of the fan to the chassis and withdraw the fan assembly.
3. Replace the fan by attaching the new fan to the chassis and connecting the power plug to the Main PCB.

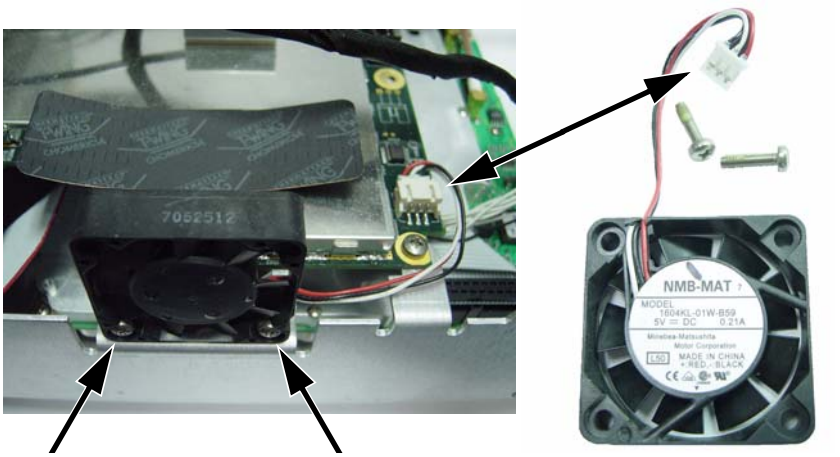


Figure 5-14. Fan Assembly, Mounted and Removed

5-7 Power Supply

This procedure describes removing and replacing the internal power supply. To gain access to the power supply, the chassis must be removed from the outer enclosure, as described in Section 5-3, "Enclosure". Refer to Table 1-3 on page 1-5 for the replacement part number.

The power supply is mounted on the rear panel with 4 screws and 4 nuts.

1. With the chassis upright on a static protected work surface, disconnect the power outlet plug from the left side of the power supply, and disconnect the power inlet plug and the grounding wire from the right side of the power supply. Refer to Figure 5-15.

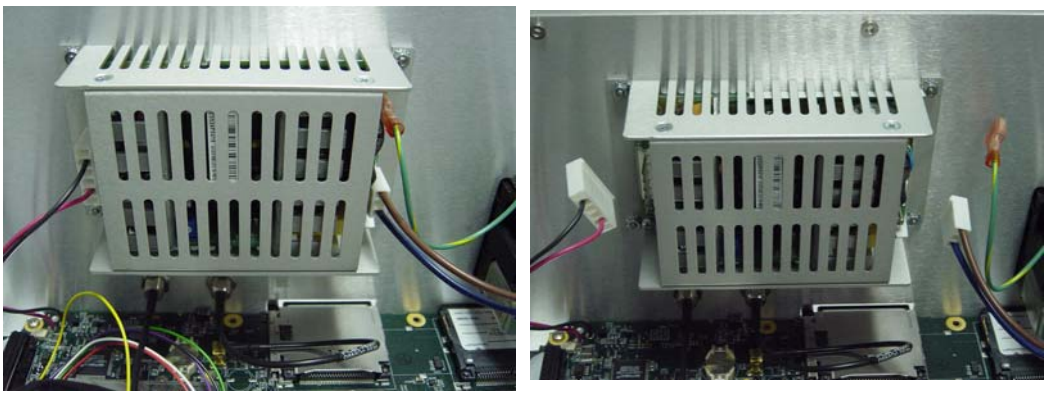


Figure 5-15. Power Supply Mounted on Rear Panel

2. Remove the 4 nuts and screws and withdraw the power supply from the chassis.

Figure 5-16. Power Supply Removed

3. Replace the power supply as a unit. Do not attempt repair.
4. Install the new power supply with the 4 screws and nuts.
5. Attach the power outlet plug, the power inlet plug, and the grounding wire.

5-8 Backlight Driver PCB for LCD

This procedure describes removing and replacing the backlight driver PCB. To gain access to this PCB, the chassis must be removed from the outer enclosure, as described in Section 5-3, "Enclosure". Refer to Table 1-3 on page 1-5 for the replacement part number.

1. With the chassis upright on a static protected work surface, unplug the backlight inverter cable connector from the backlight driver PCB. This connector is on the left edge of the PCB.
2. Using a tool such as tweezers or a knife blade, gently unplug the cable from the center of the backlight PCB. This connector is under the PCB. Access is restricted by the PCB mounting bracket. Use care when disconnecting.
3. Remove the 2 screws that hold the PCB to the mounting bracket.

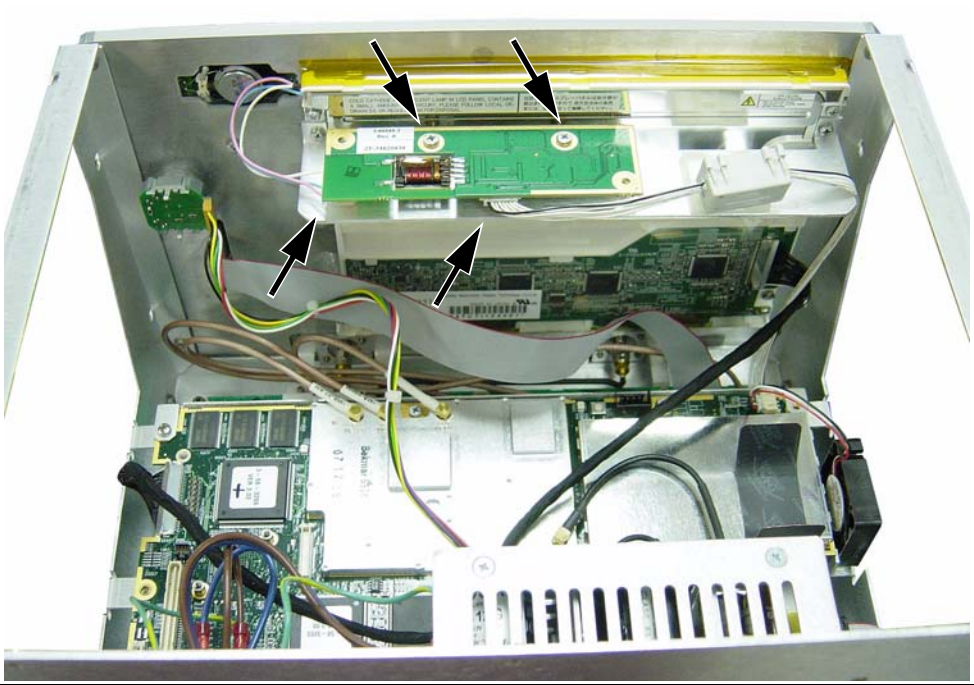


Figure 5-17. Backlight Driver PCB

4. Replace the PCB, tighten the 2 screws, and plug in the connectors.

5-9 Front Panel Assembly

This procedure describes removing the front panel from the chassis. Before removing the front panel, the chassis must be removed from the outer enclosure, as described in Section 5-3, "Enclosure".

The instrument front panel is held by 4 screws (refer to Figure 5-18). It must be removed in order to remove the Main PCB (mother board) or the LCD Display.

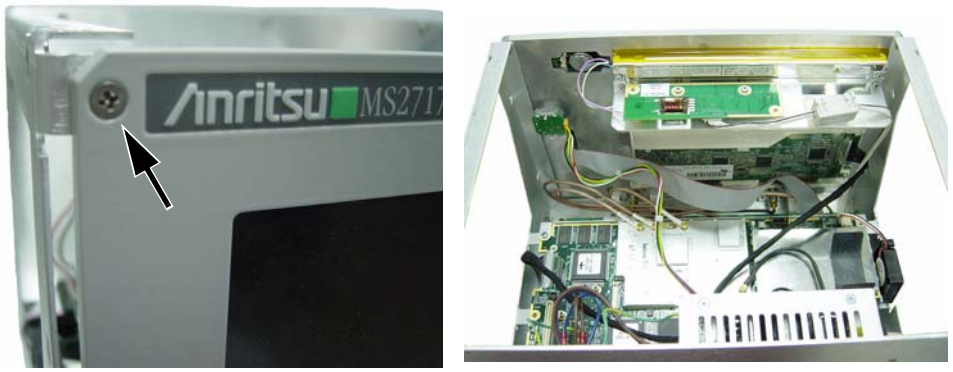


Figure 5-18. Exterior and Interior of Faceplate

1. With the chassis face up on a static protected work surface, remove the 4 screws from the corners of the front panel and support the front panel without straining the cables that are still connected within the chassis.

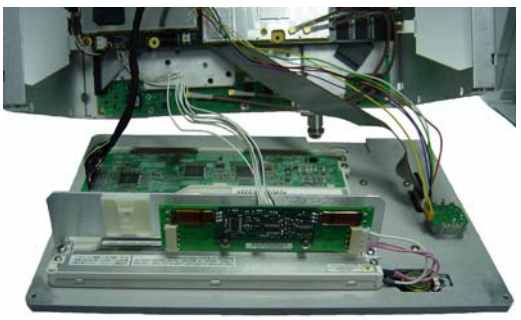


Figure 5-19. Front Panel with Cables Attached

2. Disconnect the following 4 cables before separating the front panel from the chassis:
   a. The cable from the backlight PCB to the Main PCB.

      Using a tool such as tweezers or a knife blade, gently unplug the cable from the center of the backlight PCB. Access is restricted by the PCB mounting bracket. Use care when disconnecting. The other end if this cable is connected on the bottom of the Main PCB.

      The noise filter (ferrite core) is attached to the PCB mounting bracket with a cable tie, which must be cut.

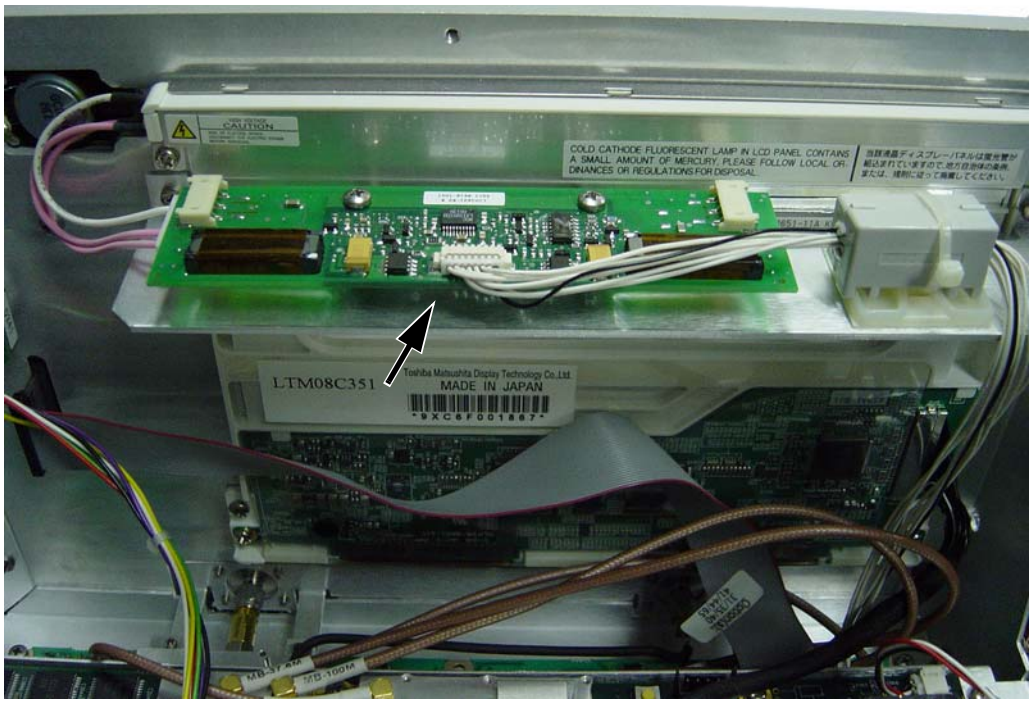


Figure 5-20. Backlight Cable Connector

b. The cable from the Rotary Knob to the Main PCB.

Disconnect the end at the left-rear corner of the Main PCB. Refer to Figure 5-21.

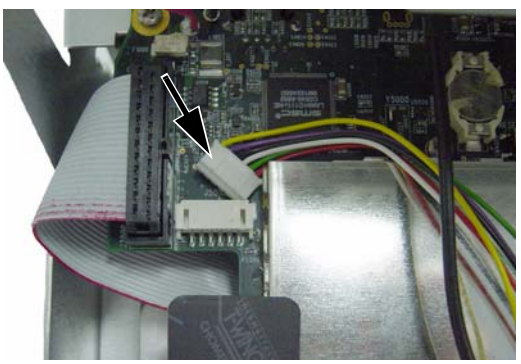


Figure 5-21. Rotary Knob Connector at Main PCB

c. The cable from the keypad to the Main PCB.

Disconnect the end behind the keypad. The other end is on the bottom of the Main PCB. Refer to Figure 5-22.

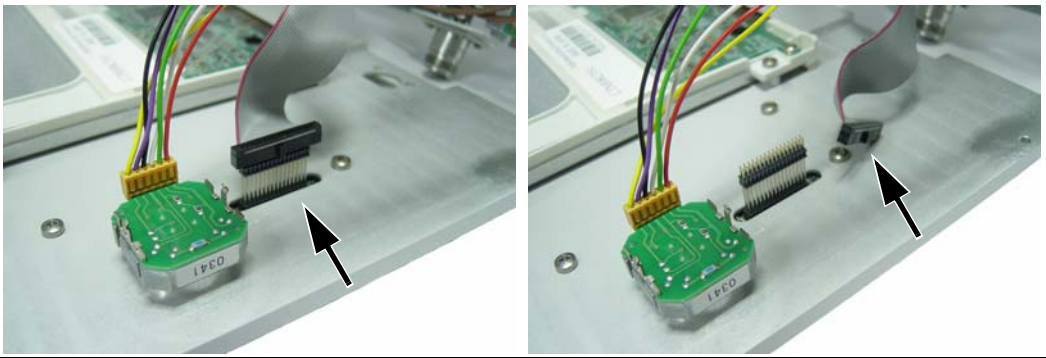


Figure 5-22. Keypad Cable Connector

d. The cable from the LCD to the Main PCB.

Disconnect either end.

Note	The LCD is static sensitive.

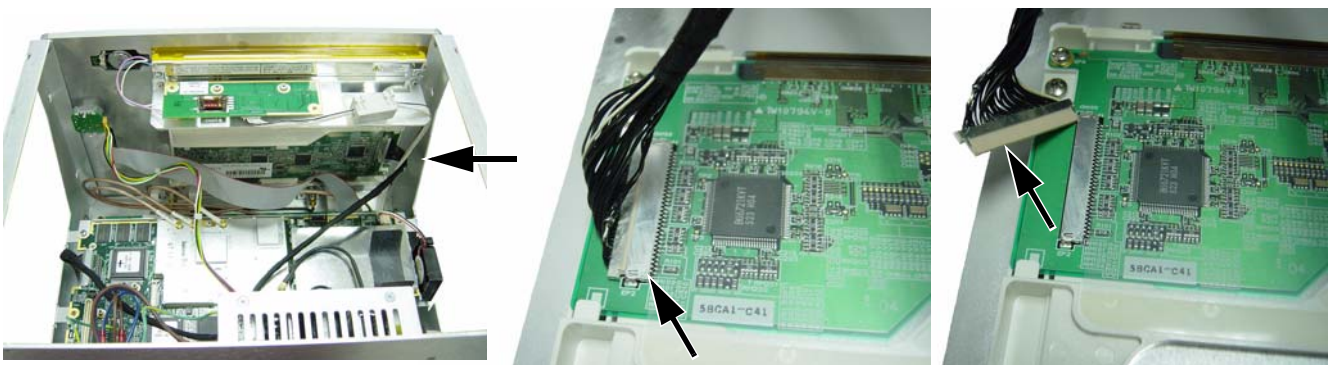


Figure 5-23. LCD Cable Connector at LCD

3. The front panel can now be separated from the chassis. Installation is the reverse of removal.

5-10 LCD Display

This procedure describes removing and replacing the color LCD display. The front panel must be removed from the chassis before removing the LCD display (refer to Section 5-9, "Front Panel Assembly"). Refer to Table 1-3 on page 1-5 for the replacement part number.

Note	The LCD is static sensitive.

1. With the front panel face down on a static protected work surface, unplug the backlight inverter cable from the end of the backlight driver PCB, release the noise filter (220 Ohm ferrite core) from the backlight driver PCB support bracket (cut the cable tie), and unplug the cable from the SPA PCB to the backlight driver PCB (refer to Figure 5-24)

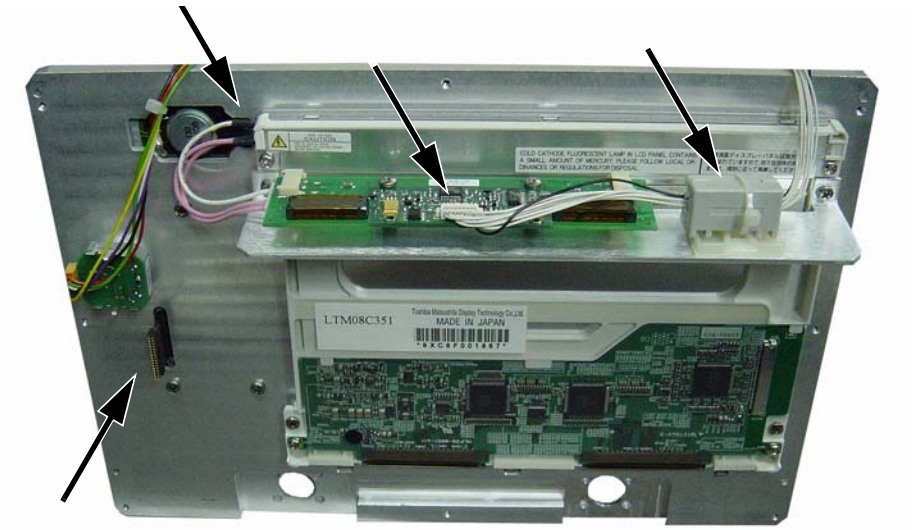


Figure 5-24. Front Panel, Separated

2. Uplug the ribbon cable from the SPA PCB to the keypad (at the keypad), and uplug the rotary knob cable at the main PCB (near the fan).
3. With the front panel face down, remove the upper 2 screws that attach the backlight driver PCB support bracket to the front panel. These 2 screws also attach the LCD to the front panel. Lift out the support bracket with the backlight driver PCB still attached (refer to Figure 5-25).
4. Remove the 2 screws that attach the lower edge of the LCD to the front panel (refer to Figure 5-25).

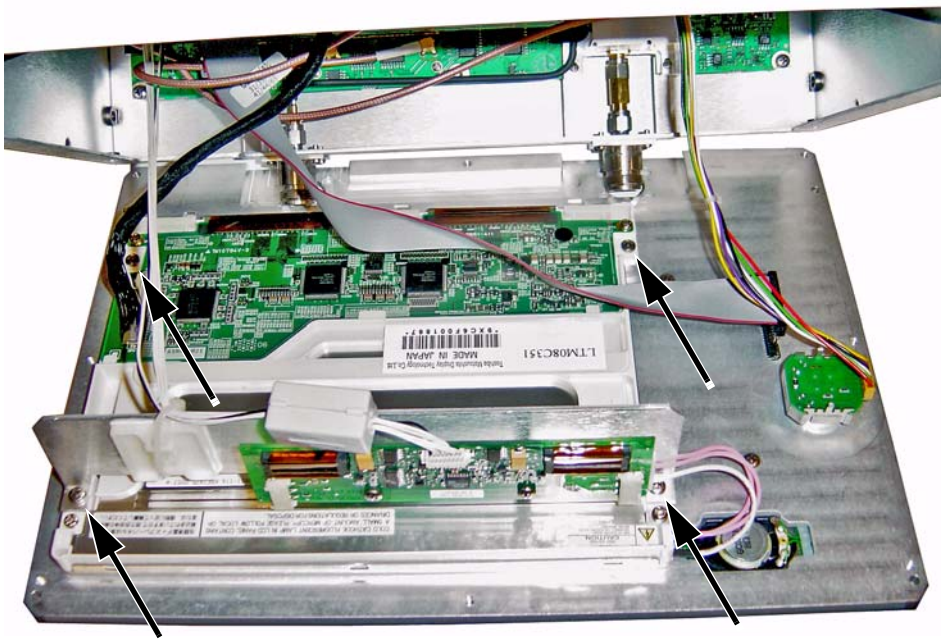


Figure 5-25. Front Panel – Interior Connections

5. With the front panel face down, lift off the LCD and backlight together. Take care to leave the plastic LCD protective cover and surrounding gaskets undisturbed. When ordering a new LCD, the backlight is already attached.

Figure 5-26. LCD Display with Backlight Attached

Installation

6. When installing a new LCD display, ensure that the rubber gasket strips (as shown in Figure 5-27) are properly aligned in the front panel gasket channels (grooves) that surround the plastic protective cover for the LCD. Replace any missing or damaged gasket strips.

Figure 5-27. Front Panel Gaskets for LCD Display

7. Align the new LCD display carefully to start the 2 lower screws. Then attach the backlight driver PCB and its mounting bracket with the 2 upper screws.
8. Reconnect cables and complete the installation in the reverse order of removal. A new cable tie must be used to reattach the noise filter to the backlight driver PCB mounting bracket.

5-11 Numeric Keypad

This procedure provides instructions for removing and replacing the numeric keypad rubber membrane and PCB. To gain access to these parts, the chassis must be removed from the outer enclosure, as described in section "Enclosure" on page 5-2. The keypad assembly is supplied as a single part. Refer to Table 1-3 on page 1-5 for the replacement part number.

1. Place the chassis face up on a static protected work surface and unplug the cable connector from the keypad to the Main PCB.

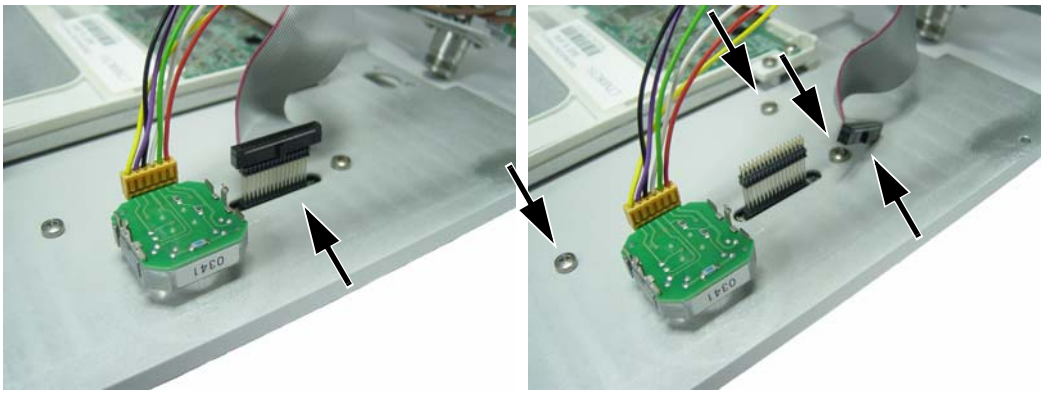


Figure 5-28. Keypad Cable Connector

2. The keypad bezel is held to the case with 3 screws on the inside (visible in Figure 5-28). The rotary knob is not connected to the keypad and need not be disturbed. Using a screwdriver, remove the screws while supporting the metal keypad bezel, and then carefully remove the bezel. This exposes the keypad rubber membrane.

Caution	The numeric keypad PCB is held in place by the rubber membrane and the bezel that was just removed. To avoid stress on the Mode key flexible switchpad, ensure that the numeric keypad PCB assembly is supported until the connector at J2 (lower left corner) has been disconnected.

3. Skip to Step 5 if you are replacing the numeric keypad PCB. If replacing only the keypad rubber membrane, then the connector at J2 is not disconnected. Carefully lift the speaker enough to pull away the keypad rubber membrane.
4. Replacement of the keypad rubber membrane is the reverse of removal, with the following cautions:
   a. Use care when adjusting the keypad rubber membrane under the speaker.
   b. Take care to properly orient the rubber membrane so that the rubber pins are aligned with the keypad switches on the PCB.
5. If replacing the PCB, then disconnect the Mode key flexible switchpad from J2 of the numeric keypad PCB (lower left corner, refer to Figure 5-29) by carefully lifting the locking tab on connector J2 to release the flexible switchpad. This type of connector typically has non-corrosive RTV adhesive on the connector to maintain the connection securely.

Figure 5-29. Connector J2

6. The numeric keypad may now be removed from the MS2717B.

7. Remove the numeric keypad rubber membrane by carefully lifting the speaker and pulling the membrane off the keypad PCB.

Caution	The speaker is held to the PCB by only the fragile connecting wires. Use care not to damage the speaker wires when removing or replacing the keypad rubber membrane or the PCB.

Figure 5-30. Numeric Keypad Rubber Membrane

8. Replacement of the PCB is the reverse of removal, with the following cautions:

a. Ensure that the clear insulator sheet is aligned between the PCB and the metal front panel.

b. Use care when adjusting the keypad rubber membrane under the speaker and aligning the rubber buttons to the keypad PCB switches.

c. Apply non-corrosive RTV adhesive on connector J2 to maintain the connection securely.

5-12 Mode Function Keypad

This procedure provides instructions for removing and replacing the Mode function keypad, which is a flexible switchpad. Before removing the Mode function keypad, the numeric keypad bezel must be removed, as described in Step 2 of Section 5-11. To gain access to these parts, the chassis must be removed from the outer enclosure, as described in Section 5-3, "Enclosure". The keypad assembly is supplied as a single part. Refer to Table 1-3 on page 1-5 for the replacement part number.

Figure 5-31. Front Panel Keypads

1. Place the chassis face up on a static protected work surface. After the metal numeric keypad bezel has been removed, disconnect the Mode key flexible switchpad from J2 of the numeric keypad PCB (lower left corner, refer to Figure 5-29) by carefully lifting the locking tab on connector J2 to release the flexible switchpad. This type of connector typically has non-corrosive RTV adhesive on the connector to maintain the connection securely.
2. The plastic bezel that surrounds the Mode function keypad is held in place by 6 locking tabs. Remove the plastic bezel by using a small flat-blade screwdriver or knife blade to press gently on the plastic spring tabs and lift the bezel. The bezel has 3 tabs on the top edge and 3 tabs on the bottom edge. Begin with either top or bottom.

Figure 5-32. Keypads and Bezels, Front Panel

3. Lift off the Mode keypad rubber membrane.

4. Gently lift the flexible switchpad to expose the attachment strip, which is held to the front panel by tape. Pull off the tape to release the flexible switchpad.

5. Reverse the above steps to install the replacement assembly, with the following cautions:

a. Ensure that the clear insulator sheet is aligned between the flexible switchpad and the metal front panel.

b. Take care to properly orient the rubber membrane so that the rubber pins are aligned with the flexible switchpad switches.

c. Verify that all 6 locking tabs are fully seated into the main body of the front panel when reinstalling the Mode keypad plastic bezel.

d. Apply non-corrosive RTV adhesive on connector J2 to maintain the connection securely.

5-13 Main PCB

Note	The Main PCB assembly (Motherboard) and the Spectrum Analyzer module (SPA PCB assembly) are always replaced as a set. Main and Spectrum Analyzer PCB assemblies are calibrated (adjusted) as a set at the factory.

This part of the procedure provides instructions for removing and replacing the Main PCB (Motherboard). To gain access to both the Main PCB and the SPA PCB, the chassis must be removed from the outer enclosure, as described in Section 5-3, "Enclosure", and the front panel must be removed as described in Section 5-9, "Front Panel Assembly". Refer to Table 1-3 on page 1-5 for the replacement part number.

1. Push the external compact flash (CF) card ejector button to the IN position in order to avoid interference between the button and the rear panel.
2. Disconnect the following cables before removing the front panel screws:
   a. The cable from the backlight PCB to the Main PCB.

      Disconnect the end at the backlight PCB. The other end is on the bottom of the Main PCB at J4005.

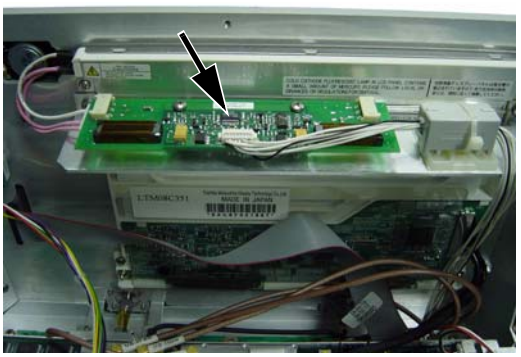


Figure 5-33. Backlight Cable Connector

   b. The cable from the Rotary Knob to the Main PCB.

Caution	The rotary switch is Static Sensitive.

      Disconnect the end at the left-rear corner of the Main PCB at J5010 (Refer to Figure 5-34).

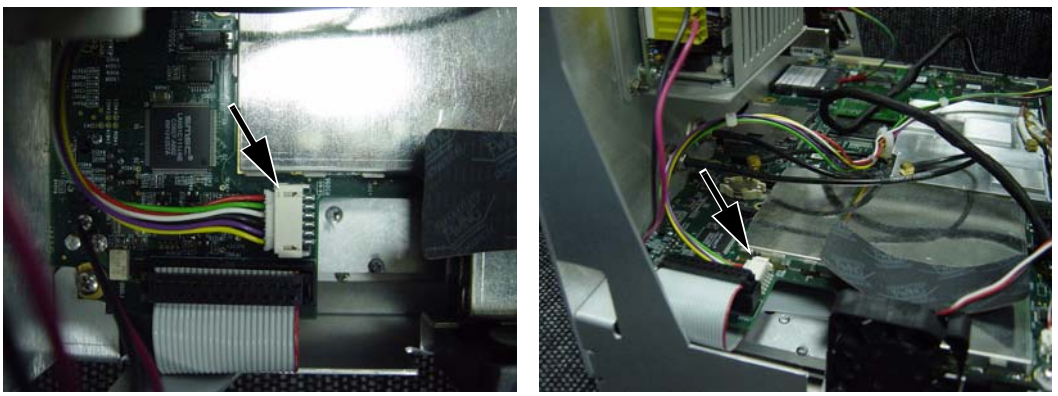


Figure 5-34. Rotary Knob Connector at Main PCB

c. The cable from the keypad to the Main PCB.

Disconnect the end behind the keypad. The other end is on the bottom of the Main PCB at J5006.

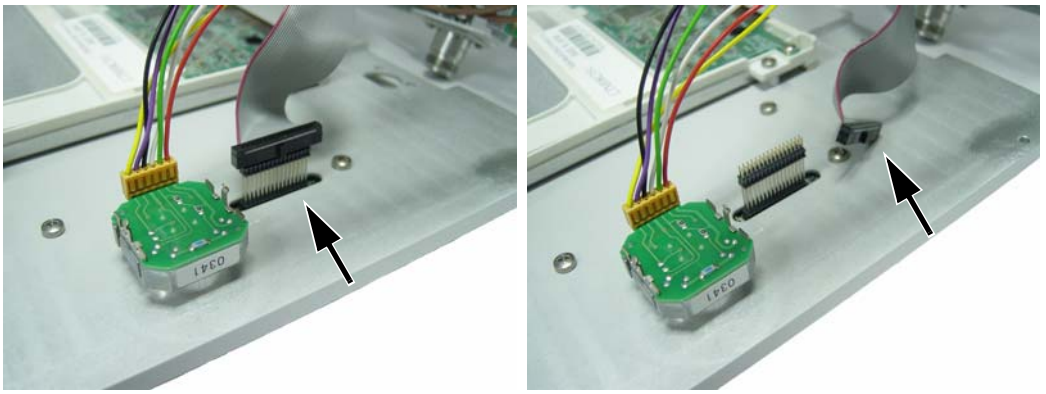


Figure 5-35. Keypad Cable Connector

d. The cable from the LCD to the Main PCB.

Disconnect either end. The cable connects to J4003 on the Main PCB.

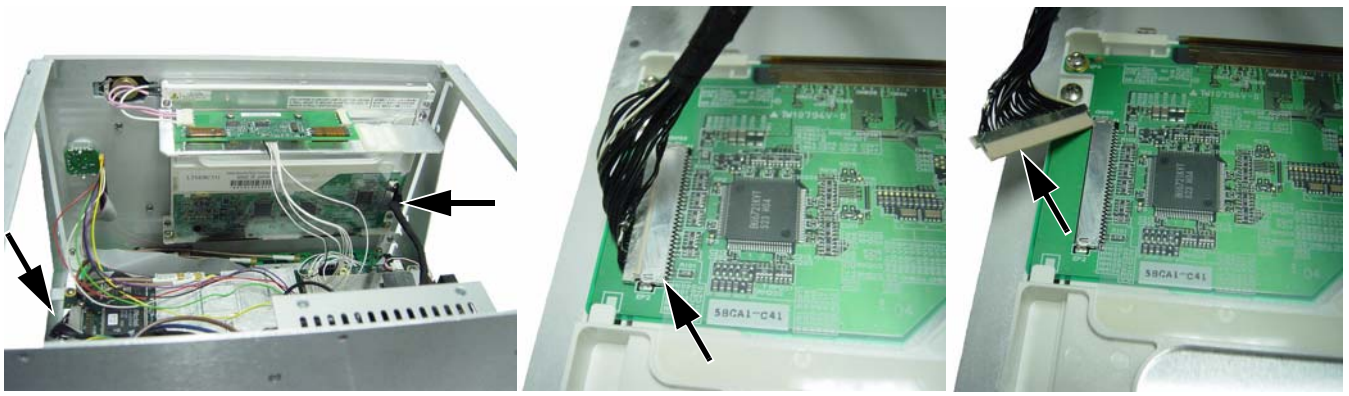


Figure 5-36. LCD Cable Connector at LCD

e. The cable to the fan.

Disconnect at J1002 on the Main PCB.

f. The cable that connects the Main PCB to the Spectrum Analyzer (SPA) PCB.

Disconnect the cable that connects the Main PCB to the SPA PCB. The connector is at the left-rear corner of the Main PCB at J4005. Refer to Figure 5-37.

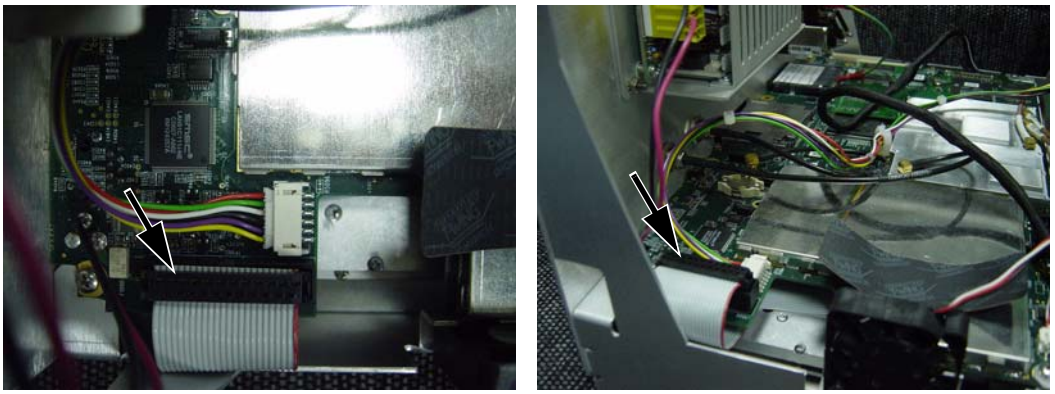


Figure 5-37. Cable Connector from Main PCB to SPA PCB

g. Unplug (from the Main PCB) the two RF cables that come from the SPA PCB (with Option 20, a third RF cable is used). These cables are plugged into the top of the Main PCB with snap-in MCX connectors. Also unplug the Ext Ref In and the Ext Trigger In cables (from the back panel) from the Main PCB (these 2 cables also have MCX connectors).

h. Unplug the connector from the power supply to the Main PCB. Refer to Figure 5-38.

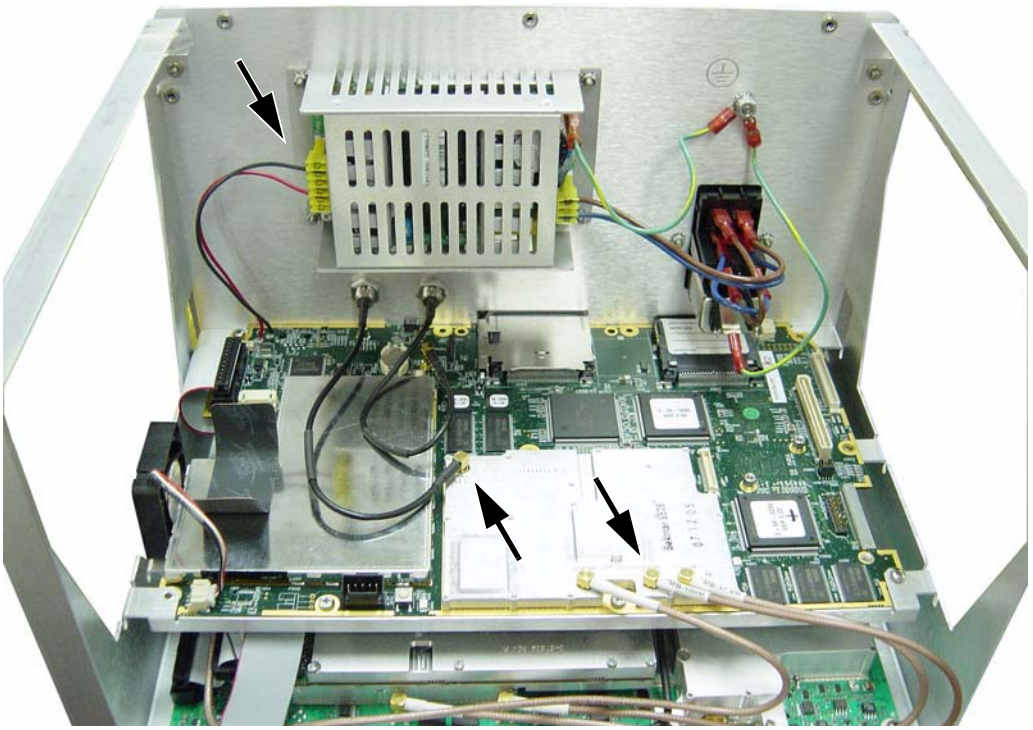


Figure 5-38. MCX Connectors from SPA PCB to Main PCB

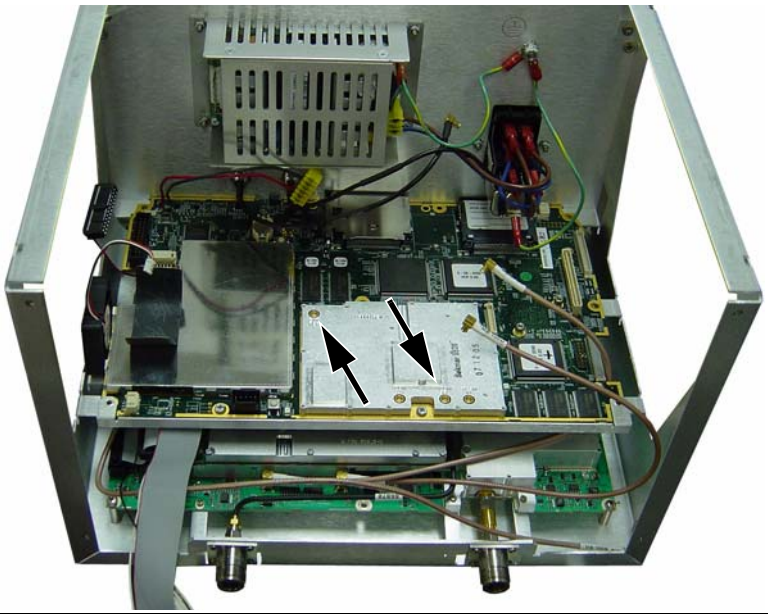


Figure 5-39. MCX Connectors Disconnected

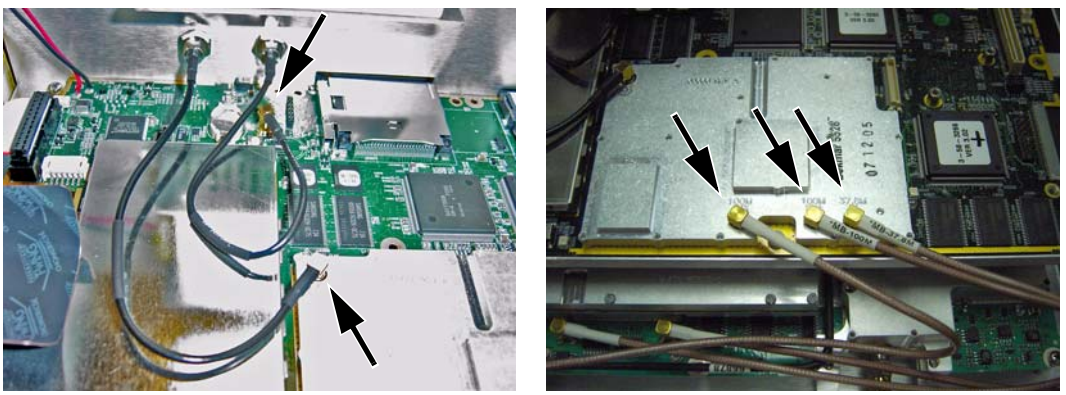


Figure 5-40. MCX Connectors for Ext Trigger In, Ext Ref In, and SPA

3. Remove the 5 screws around the edge of the Main PCB, as shown in Figure 5-41, to release the board from the chassis.

Caution	Do not remove or adjust any smaller screws that pass through the RF shields.

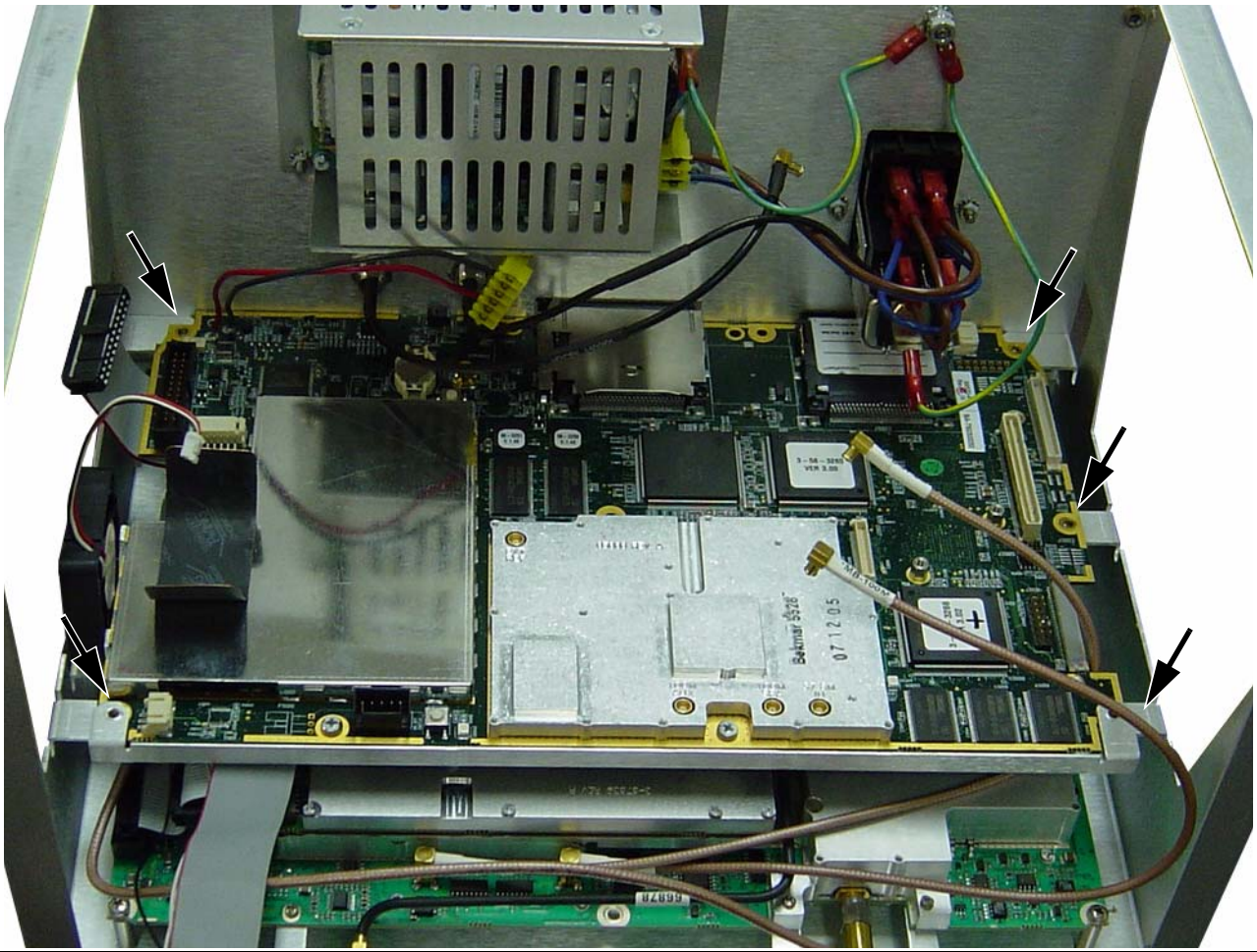


Figure 5-41. Main PCB Mounting Screws – Left and Right Edges

4. Carefully lift the main PCB from the chassis. Avoid contact with other components.
5. Disconnect the 2 cables that were left attached to the underside of the Main PCB:
   a. Disconnect the numeric keypad cable at J5006.
   b. Disconnect the Backlight driver PCB cable at J4005.
6. If your MS2717B has Option 9 installed, then leave the Option 9 PCB on the main PCB when returning the PCB set to the factory for repair.
7. Installation is the reverse of removal. Refer to "Important Notes Regarding Reassembly of Main PCB and SPA PCB:" on page 5-27.

5-14 SPA PCB

Note	The Main PCB assembly (Motherboard) and the Spectrum Analyzer module (SPA PCB assembly) are always replaced as a set. Main and Spectrum Analyzer PCB assemblies are calibrated (adjusted) as a set at the factory.

This part of the procedure provides instructions for removing and replacing the SPA PCB. To gain access to the SPA PCB, the chassis must be removed from the outer enclosure, as described in Section 5-3, "Enclosure", the front panel must be removed as described in Section 5-9, "Front Panel Assembly", and the Main PCB must be removed, as described in section Section 5-13, "Main PCB". Refer to Table 1-3 on page 1-5 for the replacement part number. Figure 5-42 shows the Tracking Generator PCB (option 20) attached to the SPA PCB. This option may not be installed on your MS2717B.

1. After the Main PCB has been removed, remove the 4 corner screws that attach the SPA PCB to the chassis. The RF In connector (also the RF Out connector with Option 20) is attached to the SPA PCB.

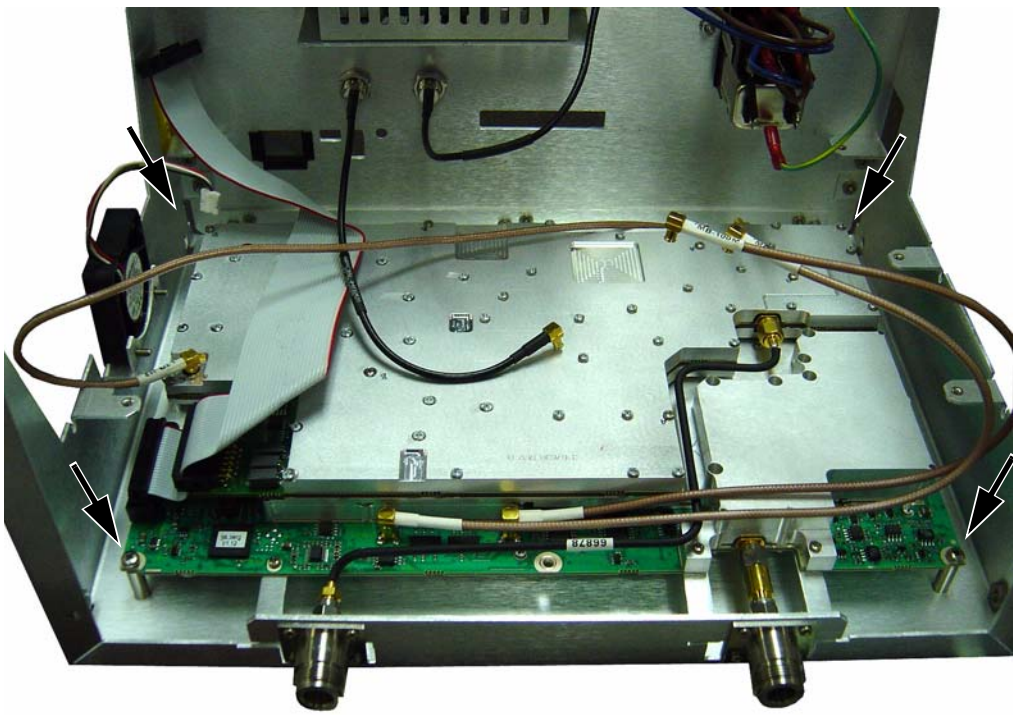


Figure 5-42. SPA PCB in Chassis (with Option 20 installed)

2. Carefully lift the SPA PCB from the chassis. Avoid contact with other components.
3. Disconnect the cables that were left attached to the SPA PCB:
   a. Unplug the two RF cables for 37.8 MHz IN and 100 MHz SPA.
   b. If Option 20 is installed, unplug the 100 MHz tracking generator reference cable.
4. Replacement of the Main PCB and the Spectrum Analyzer PCB is the opposite of removal, with the following precautions:

Important Notes Regarding Reassembly of Main PCB and SPA PCB:

a. Ensure that all wires and cables are correctly routed before reassembling the unit.

b. After replacement of the Main PCB and Spectrum Analyzer PCB, the instrument serial number (which is found on the outside of the rear panel) should be electronically saved to the Main PCB. To save the serial number, perform the following:

- Press and hold the **Shift** key and press three soft keys together (from the top, the 4th, 6th, and 8th unmarked vertical keys) in order to enter into the Spectrum Analyzer Service Mode.
- Press the Service Menu soft key.
- Press the Set External Serial # soft key.
- Using the keypad, enter the 7 digit serial number, then press **Enter**.
- Turn the Spectrum Analyzer Off and then back On in order to exit Service Mode.

c. If the front panel type N connectors (RF In and RF Out) have been disconnected or loosened, then use a maximum torque of 8 in-lb when tightening the connectors on the phase equal insertable between the SPA PCB and the front panel type N connector (RF In) and also (if Option 20 is installed) for the connectors on the semi-rigid RF cable from the tracking generator output to the RF Out connector.

5-15 Tracking Generator (Option 20)

This procedure provides instructions for removing and replacing the tracking generator PCB.

Caution	The tracking generator option PCB must be replaced by personnel who are experienced with SMP connectors and who are familiar with the special care that is required when blind-mating SMP connectors. The SMP interconnections are fragile and are easily damaged during installation of the connectors themselves and during installation of the tracking generator PCB. This type of damage can degrade performance, and such damage is not visible after the tracking generator PCB is installed.

To gain access to the tracking generator PCB, the chassis must be removed from the instrument enclosure, as described in section "Enclosure" on page 5-2, and the Main PCB must be removed from the chassis, as described in section "Main PCB" on page 5-21. The SPA PCB may be removed (as described in section "SPA PCB" on page 5-26) in order to provide easier access for TG board replacement. When Option 20 is installed, the tracking generator module is mounted on top of the Spectrum Analyzer PCB as shown in Figure 5-43. The arrows in this figure are indicating the flexible RF cable (100 MHz reference) and the semi-rigid RF cable (RF Out signal).

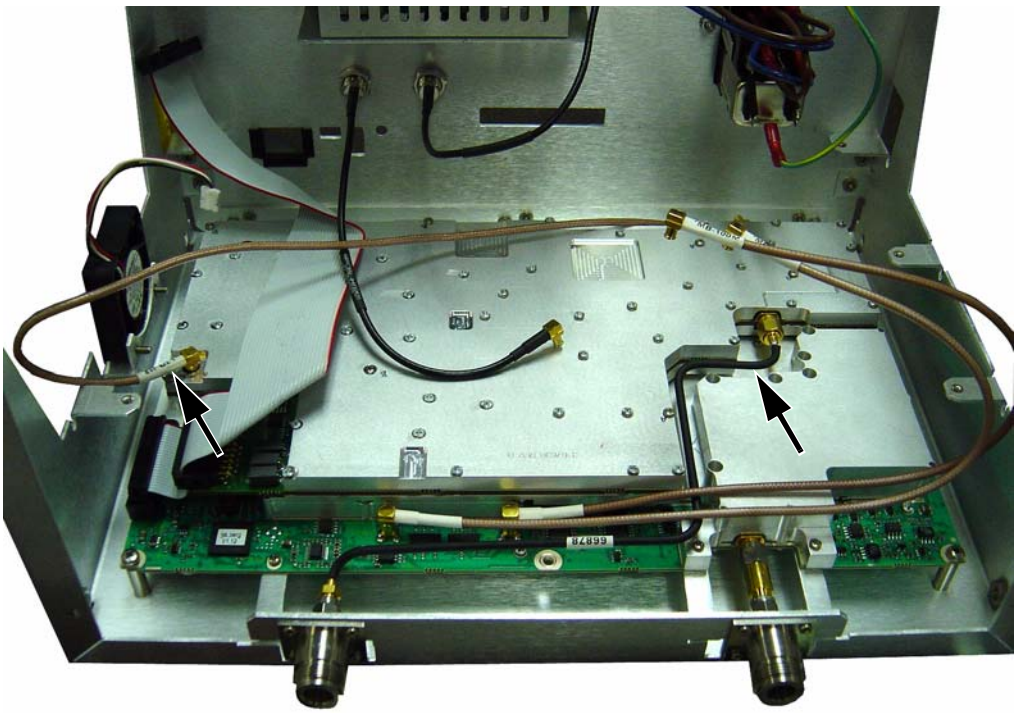


Figure 5-43. Tracking Generator Option with Motherboard Removed

To remove the tracking generator module, remove the semi-rigid and flexible RF cables from the module. The tracking generator module is mounted to the Spectrum Analyzer PCB with 8 screws in holes with the labels A, B, and C engraved in the cover (4 screws 18 mm long are in holes labeled A, 3 screws 16 mm long are in holes labeled B, and 1 screw 12 mm long is in the hole labeled C). Remove these 8 screws, as shown in Figure 5-44.

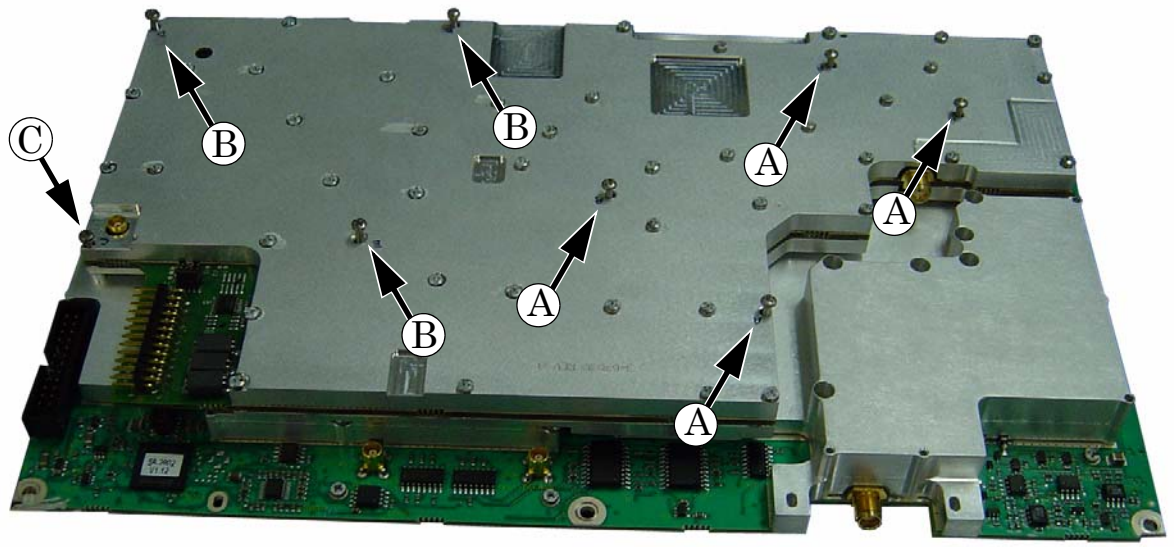


Figure 5-44. Tracking Generator PCB Mounted to SPA PCB

The tracking generator module is also attached to the Spectrum Analyzer board by 2 RF connectors (SMP type), which are not visible while the tracking generator board is connected to the Spectrum Analyzer board (Refer to Figure 5-45 and Figure 5-46). Lift the tracking generator module straight up off the Spectrum Analyzer board, and the RF SMP connectors unplug.

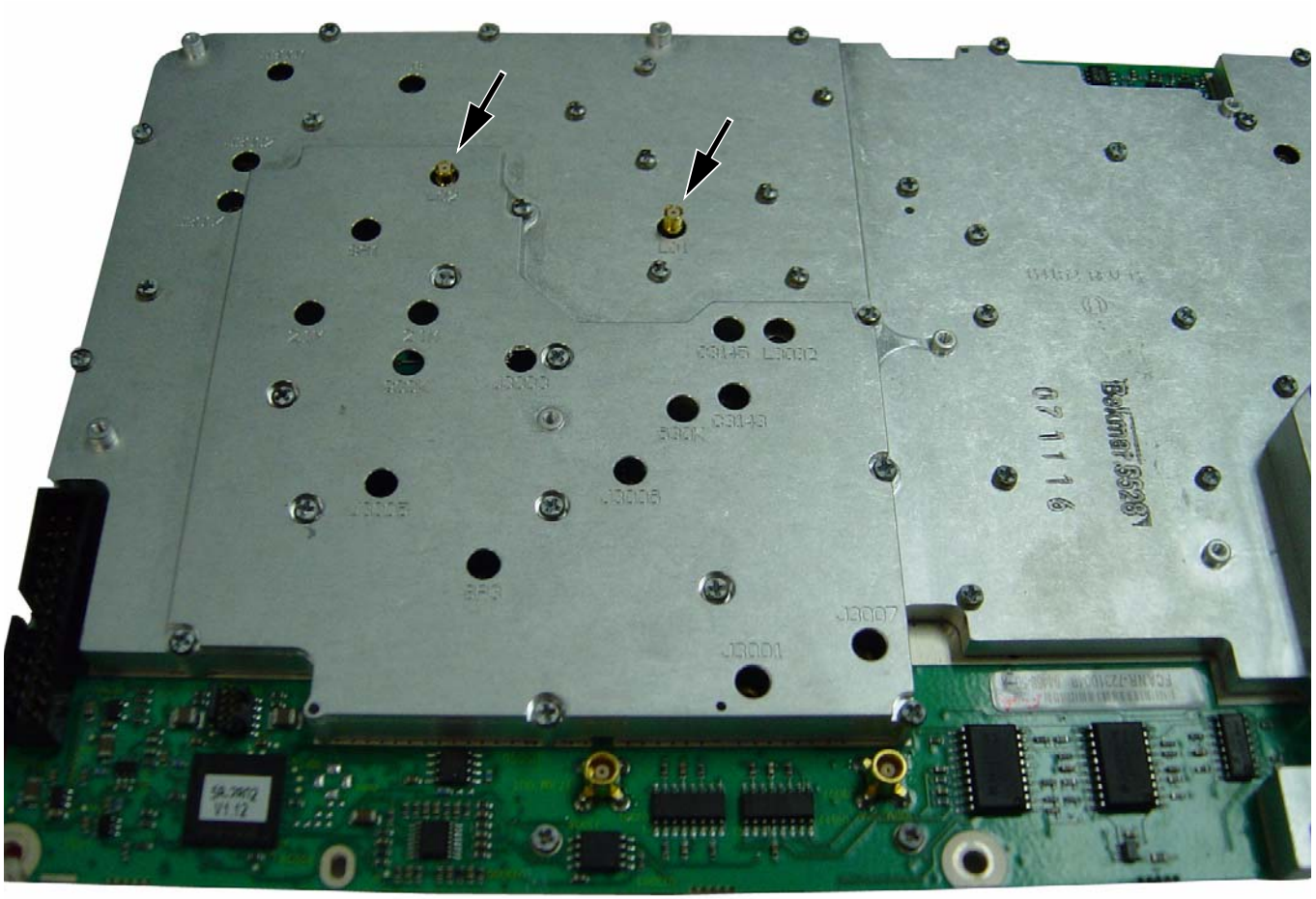


Figure 5-45. SPA PCB with SMP Connectors

The RF SMP connectors must be removed with a special tool. These RF SMP connectors are often damaged during removal. Replacement RF SMP connectors are included in the tracking generator replacement kit and are installed with an SMP adaptor tool. If the Spectrum Analyzer board is to be returned, then no replacement connectors are included. In this situation, if you need to replace damaged connectors, then they must be ordered. (Refer to the parts list in Table 1-3 on page 1-5.)

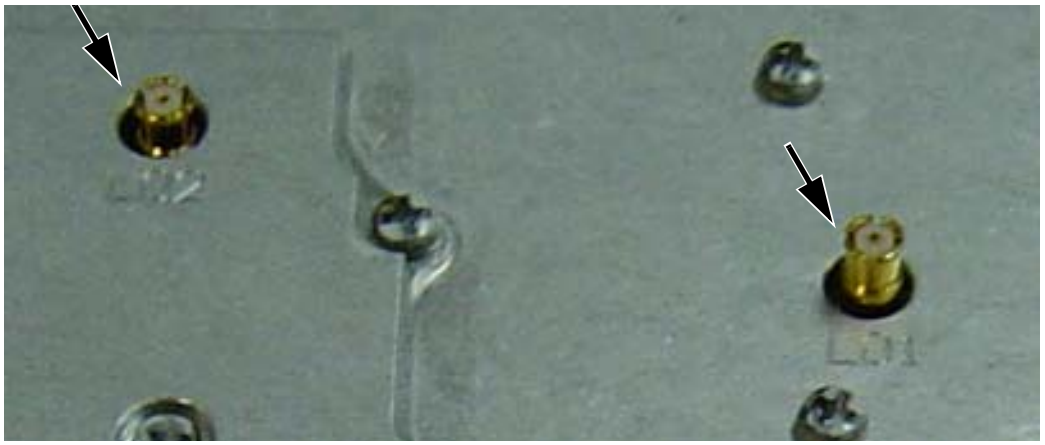


Figure 5-46. SMP Connectors in SPA PCB LO1 and LO2

The tracking generator exchange kit does not include the semi-rigid RF cable that is attached to the tracking generator board nor the front panel type N connector (RF Out). These two items must be saved for reuse with the replacement tracking generator kit.

Installation of the replacement tracking generator board is the opposite of removal. No recalibration is required. Use the following precautions:

The maximum torque is 3.9 in-lb for the 8 screws that hold the tracking generator PCB to the Spectrum Analyzer PCB.

The maximum torque is 8 in-lb for the connectors on the semi-rigid RF cable.

Appendix A Test Records

This appendix provides test records that can be used to record the performance of the MS2717B. Anritsu Company recommends that you make a copy of the following test record pages and document the measurements each time a Performance Verification is performed. Continuing to document this process each time it is performed will provide a detailed history of the instrument performance.

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Frequency Accuracy

Table A-1. Spectrum Analyzer Frequency Accuracy

Frequency	Measured Value	Error	Error Specification
1 GHz	GHz	Hz	±300 Hz
7 GHz	GHz	Hz	±2.1 kHz

Table A-2. Spectrum Analyzer SSB Phase Noise Verification

Frequency	Measured Value	Specification
10 kHz	dBc/Hz	≤ –100 dBc/Hz
20 kHz	dBc/Hz	≤ –100 dBc/Hz
30 kHz	dBc/Hz	≤ –100 dBc/Hz
100 kHz	dBc/Hz	≤ –102 dBc/Hz
1 MHz	dBc/Hz	≤ –100 dBc/Hz
10 MHz	dBc/Hz	≤ –100 dBc/Hz

Resolution Bandwidth Accuracy

Table A-3. Spectrum Analyzer Resolution Bandwidth (RBW) Accuracy Test

RBW Setting	Span	VBW	Measured OBW	Specification
3 MHz	4.5 MHz	Auto	Hz	2.7 MHz to 3.3 MHz
1 MHz	1.5 MHz	Auto	Hz	900 kHz to 1.1 MHz
300 kHz	450 kHz	Auto	Hz	270 kHz to 330 kHz
100 kHz	150 kHz	Auto	Hz	90 kHz to 110 kHz
30 kHz	45 kHz	Auto	Hz	27 kHz to 33 kHz
10 kHz	15 kHz	Auto	Hz	9 kHz to 11 kHz
3 kHz	4.5 kHz	Auto	Hz	2.7 kHz to 3.3 kHz
1 kHz	2 kHz	Auto	Hz	900 Hz to 1.1 kHz
300 Hz	450 Hz	Auto	Hz	270 Hz to 330 Hz
100 Hz	150 Hz	Auto	Hz	90 Hz to 110 Hz
30 Hz	50 Hz	3 Hz	Hz	27 Hz to 33 Hz
10 Hz	30 Hz	3 Hz	Hz	9 Hz to 11 Hz
1 Hz	10 Hz	3 Hz	Hz	0.9 Hz to 1.1 Hz

MS2717B Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Second harmonic

Table A-4. Spectrum Analyzer Second Harmonic Distortion

Frequency	Measured Value	2nd Harmonic Distortion	Specification
50.1 MHz	dBm		
100.2 MHz	dBm	dBc	–60 dBc max

TOI

Table A-5. Spectrum Analyzer Third Order Intercept (TOI)

TOI Freq	Measurement	Specification
600 MHz	dBm	≥ +7 dBm
3.5 GHz	dBm	≥ +9 dBm

Table A-6. Measured Amplitude to Find “max” for TOI Calculation

TOI Test Freq	Measured Amplitude	Check Mark for “max”
600.151 MHz	dBm	
599.851 MHz	dBm	
3.500151 GHz	dBm	
3.499851 GHz	dBm	

Calculation:

```
Calculated TOI = –20 + [(–20 – max)/2] dBm
```

MS2717B Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Displayed Average Noise Level (DANL)

Table A-7. Spectrum Analyzer DANL with Preamp On

Srart Freq	Stop Freq	RBW	VBW	Measured DANL for 100 kHz RBW	Calculated DANL for 1 Hz RBW	1 Hz Specification
10 MHz	1.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –161 dBm
1 GHz	2.2 GHz	100 kHz	1 kHz	dBm	dBm	≤ –159 dBm
2.2 GHz	2.8 GHz	100 kHz	300 Hz	dBm	dBm	≤ –153 dBm
2.8 GHz	4.0 GHz	100 kHz	300 Hz	dBm	dBm	≤ –159 dBm
4.0 GHz	7.1 GHz	100 kHz	300 Hz	dBm	dBm	≤ –154 dBm

Table A-8. Spectrum Analyzer DANL with Preamp Off

Srart Freq	Stop Freq	RBW	VBW	Measured DANL for 100 kHz RBW	Calculated DANL for 1 Hz RBW	1 Hz Specification
10 MHz	1.0 GHz	100 kHz	1 kHz	dBm	dBm	≤ –137 dBm
1 GHz	2.2 GHz	100 kHz	1 kHz	dBm	dBm	≤ –133 dBm
2.2 GHz	2.8 GHz	100 kHz	300 Hz	dBm	dBm	≤ –126 dBm
2.8 GHz	4.0 GHz	100 kHz	300 Hz	dBm	dBm	≤ –136 dBm
4.0 GHz	7.1 GHz	100 kHz	300 Hz	dBm	dBm	≤ –127 dBm

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Spectrum Analyzer Residual Spurious Response

Table A-9. Spectrum Analyzer Residual Spurious (Pre Amp ON)

Start Freq	Stop Freq	Measured Values	Specification
100 kHz	10 MHz	dBm	≤ –100 dBm
10 MHz	1.0 GHz	dBm	≤ –100 dBm
1.0 GHz	2.0 GHz	dBm	≤ –100 dBm
2.0 GHz	3.0 GHz	dBm	≤ –100 dBm
3.0 GHz	4.0 GHz	dBm	≤ –100 dBm
4.0 GHz	5.0 GHz	dBm	≤ –100 dBm
5.0 GHz	6.0 GHz	dBm	≤ –100 dBm
6.0 GHz	7.1 GHz	dBm	≤ –100 dBm

Table A-10. Spectrum Analyzer Residual Spurious (Pre Amp OFF)

Start Freq	Stop Freq	RBW	VBW	Measured Values	Specification
100 kHz	10 MHz	3 kHz	300 Hz	dBm	≤ –90 dBm
10 MHz	1 GHz	30 kHz	1 kHz	dBm	≤ –90 dBm
1 GHz	2.2 GHz	10 kHz	300 Hz	dBm	≤ –90 dBm
2.2 GHz	2.7 GHz	1 kHz	300 Hz	dBm	≤ –90 dBm
2.7 GHz	2.8 GHz	1 kHz	100 Hz	dBm	≤ –90 dBm
2.8 GHz	3.199 GHz	10 kHz	300 Hz	dBm	≤ –90 dBm
3.2 GHz	4.009 GHz	30 kHz	1 kHz	dBm	≤ –84 dBm
4.009 GHz	5.083 GHz	10 kHz	300 Hz	dBm	≤ –84 dBm
5.083 GHz	5.895 GHz	10 kHz	100 Hz	dBm	≤ –84 dBm
5.895 GHz	7.1 GHz	10 kHz	100 Hz	dBm	≤ –84 dBm

Table A-11. Exceptions to Table A-10, “Spectrum Analyzer Residual Spurious (Pre Amp OFF)”

Frequency	Spur Level
250, 300, and 350 MHz	–85 dBm max
–4010 MHz	–80 dBm max
–5084 MHz	–70 dBm max
–5894 MHz	–75 dBm max
–7028 MHz	–80 dBm max

MS2717B Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Spectrum Analyzer Input-Related Spurious Verification

A. Input-Related Spurious

Measured Input signal level for –30 dBm input at 1674 MHz, 1701 MHz, and 2145 MHz

Table A-12. Input-Related Spurious Verification at 1674 MHz, 1701 MHz, and 2145 MHz

Test Freq	Start Freq	Stop Freq	Measured Input Signal Level	Measured Spur Level	Calculated IRS	Specification
1674 MHz	100 kHz	1673 MHz	dBm	dBm	dBc	–60 dBc max
1674 MHz	1675 MHz	2800 MHz	dBm	dBm	dBc	–60 dBc max
1701 MHz	26 MHz	28 MHz	dBm	dBm	dBc	–60 dBc max
2145 MHz	470 MHz	472 MHz	dBm	dBm	dBc	–60 dBc max

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Amplitude Accuracy Verification

50 MHz amplitude Accuracy

Table A-13. Characterization Chart for 50 MHz Amplitude Accuracy Verification

Test Power Level @ 50 MHz	Required Sensor B Reading
0 dBm	dBm
–4 dBm	dBm
–10 dBm	dBm
–14 dBm	dBm
–20 dBm	dBm
–24 dBm	dBm
–30 dBm	dBm
–34 dBm	dBm
–40 dBm	dBm
–44 dBm	dBm
–50 dBm	dBm

B. 50 MHz Amplitude Accuracy Verification

Table A-14. 50 MHz Amplitude Accuracy Verification

Input Power Level	Reference Level	Input Attenuation Level	Marker 1 Measured Reading	Specification
0 dBm	+10 dBm	30 dB	dBm	±0.7 dB
–4 dBm	+10 dBm	30 dB	dBm	±0.7 dB
–10 dBm	0 dBm	20 dB	dBm	±0.7 dB
–14 dBm	0 dBm	20 dB	dBm	±0.7 dB
–20 dBm	–10 dBm	10 dB	dBm	±0.7 dB
–24 dBm	–10 dBm	10 dB	dBm	±0.7 dB
–30 dBm	–20 dBm	0 dB	dBm	±0.7 dB
–34 dBm	–20 dBm	0 dB	dBm	±0.7 dB
–40 dBm	–30 dBm	0 dB	dBm	±0.7 dB
–44 dBm	–30 dBm	0 dB	dBm	±0.7 dB
–50 dBm	–40 dBm	0 dB	dBm	±0.7 dB

MS2717B Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Amplitude Accuracy Across Frequency

Table A-15. Characterization Chart for Amplitude Accuracy Across Frequency

Sensor B	–2 dBm	–30 dBm	–50 dBm
10.1 MHz	dBm	dBm	dBm
50 MHz	dBm	dBm	dBm
100 MHz	dBm	dBm	dBm
500 MHz	dBm	dBm	dBm
1000 MHz	dBm	dBm	dBm
2000 MHz	dBm	dBm	dBm
3000 MHz	dBm	dBm	dBm
4000 MHz	dBm	dBm	dBm
5000 MHz	dBm	dBm	dBm
6000 MHz	dBm	dBm	dBm
7000 MHz	dBm	dBm	dBm

Table A-16. Amplitude Accuracy with Pre-Amp Off — at 10.1 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
–30 dBm	0 dB		±1.25 dB
–30 dBm	5 dB		±1.25 dB
–30 dBm	10 dB		±1.25 dB
–30 dBm	20 dB		±1.25 dB
–2 dBm	30 dB		±1.25 dB
–2 dBm	40 dB		±1.75 dB
–2 dBm	50 dB		±1.75 dB
–2 dBm	60 dB		±1.75 dB

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Amplitude Accuracy

Table A-17. Amplitude Accuracy with Pre-Amp Off — at 50 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
–30 dBm	0 dB		±1.25 dB
–30 dBm	5 dB		±1.25 dB
–30 dBm	10 dB		±1.25 dB
–30 dBm	20 dB		±1.25 dB
–2 dBm	30 dB		±1.25 dB
–2 dBm	40 dB		±1.75 dB
–2 dBm	50 dB		±1.75 dB
–2 dBm	60 dB		±1.75 dB

Table A-18. Amplitude Accuracy with Pre-Amp Off — at 100 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
–30 dBm	0 dB		±1.25 dB
–30 dBm	5 dB		±1.25 dB
–30 dBm	10 dB		±1.25 dB
–30 dBm	20 dB		±1.25 dB
–2 dBm	30 dB		±1.25 dB
–2 dBm	40 dB		±1.75 dB
–2 dBm	50 dB		±1.75 dB
–2 dBm	60 dB		±1.75 dB

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-19. Amplitude Accuracy with Pre-Amp Off — at 500 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
−30 dBm	0 dB		±1.25 dB
−30 dBm	5 dB		±1.25 dB
−30 dBm	10 dB		±1.25 dB
−30 dBm	20 dB		±1.25 dB
−2 dBm	30 dB		±1.25 dB
−2 dBm	40 dB		±1.75 dB
−2 dBm	50 dB		±1.75 dB
−2 dBm	60 dB		±1.75 dB

Table A-20. Amplitude Accuracy with Pre-Amp Off — at 1000 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
−30 dBm	0 dB		±1.25 dB
−30 dBm	5 dB		±1.25 dB
−30 dBm	10 dB		±1.25 dB
−30 dBm	20 dB		±1.25 dB
−2 dBm	30 dB		±1.25 dB
−2 dBm	40 dB		±1.75 dB
−2 dBm	50 dB		±1.75 dB
−2 dBm	60 dB		±1.75 dB

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-21. Amplitude Accuracy with Pre-Amp Off — at 2000 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
–30 dBm	0 dB		±1.25 dB
–30 dBm	5 dB		±1.25 dB
–30 dBm	10 dB		±1.25 dB
–30 dBm	20 dB		±1.25 dB
–2 dBm	30 dB		±1.25 dB
–2 dBm	40 dB		±1.75 dB
–2 dBm	50 dB		±1.75 dB
–2 dBm	60 dB		±1.75 dB

Table A-22. Amplitude Accuracy with Pre-Amp Off — at 3000 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
–30 dBm	0 dB		±1.25 dB
–30 dBm	5 dB		±1.25 dB
–30 dBm	10 dB		±1.25 dB
–30 dBm	20 dB		±1.25 dB
–2 dBm	30 dB		±1.25 dB
–2 dBm	40 dB		±1.75 dB
–2 dBm	50 dB		±1.75 dB
–2 dBm	60 dB		±1.75 dB

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-23. Amplitude Accuracy with Pre-Amp Off — at 4000 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
−30 dBm	0 dB		±1.25 dB
−30 dBm	5 dB		±1.25 dB
−30 dBm	10 dB		±1.25 dB
−30 dBm	20 dB		±1.25 dB
−2 dBm	30 dB		±1.25 dB
−2 dBm	40 dB		±1.75 dB
−2 dBm	50 dB		±1.75 dB
−2 dBm	60 dB		±1.75 dB

Table A-24. Amplitude Accuracy with Pre-Amp Off — at 5000 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
−30 dBm	0 dB		±1.75 dB
−30 dBm	5 dB		±1.75 dB
−30 dBm	10 dB		±1.75 dB
−30 dBm	20 dB		±1.75 dB
−2 dBm	30 dB		±1.75 dB
−2 dBm	40 dB		±1.75 dB
−2 dBm	50 dB		±1.75 dB
−2 dBm	60 dB		±1.75 dB

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-25. Amplitude Accuracy with Pre-Amp Off — at 6000 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
–30 dBm	0 dB		±1.75 dB
–30 dBm	5 dB		±1.75 dB
–30 dBm	10 dB		±1.75 dB
–30 dBm	20 dB		±1.75 dB
–2 dBm	30 dB		±1.75 dB
–2 dBm	40 dB		±1.75 dB
–2 dBm	50 dB		±1.75 dB
–2 dBm	60 dB		±1.75 dB

Table A-26. Amplitude Accuracy with Pre-Amp Off — at 7000 MHz

Input Power	Atten Level	Marker 1 Reading	Specification
–30 dBm	0 dB		±1.75 dB
–30 dBm	5 dB		±1.75 dB
–30 dBm	10 dB		±1.75 dB
–30 dBm	20 dB		±1.75 dB
–2 dBm	30 dB		±1.75 dB
–2 dBm	40 dB		± 2 dB
–2 dBm	50 dB		± 2 dB
–2 dBm	60 dB		± 3 dB

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

Table A-27. Amplitude Accuracy with Pre-Amp On

Freq (MHz)	P_{in}	Marker 1 Reading	Error	Error Specification
500	–50 dBm	dBm	dB	±1.5 dB
2000	–50 dBm	dBm	dB	±1.5 dB
4000	–50 dBm	dBm	dB	±1.5 dB
5000	–50 dBm	dBm	dB	±1.75 dB
6000	–50 dBm	dBm	dB	±1.75 dB
7000	–50 dBm	dBm	dB	±1.75 dB

MS2717B Firmware Revision: _____ **Operator:** _____ **Date:** _____

Serial Number: _____ **Options:** _____

9 kHz to 100 kHz Amplitude Accuracy

Characterization for 9 kHz to 100 kHz Amplitude Accuracy Verification

–20 dBm Reference Voltage (Vm1), at 100 kHz

Table A-28. Vm1 Measurement

Vm1	Specification
mV	23.315 mV ±0.5 mV

Table A-29. Characterization Chart for 9 kHz to 100 kHz Amplitude Accuracy Verification

Freq	Measured Vm2	Correction Factor	Calculated P_{in}
9.5 kHz	mV	0.047 dB	dBm
55 kHz	mV	0.002 dB	dBm
95 kHz	mV	0.000 dB	dBm

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9 kHz to 100 kHz Amplitude Accuracy

9 kHz to 100 kHz Amplitude Accuracy Verification

Table A-30. Amplitude Accuracy Verification at 9.5 kHz

P_{in}	Marker 1 Reading	Error	Error Specification
dBm	dBm	dB	±1.5 dB

Table A-31. Amplitude Accuracy Verification at 55 kHz

P_{in}	Marker 1 Reading	Error	Specification
dBm	dBm	dB	±1.5 dB

Table A-32. Amplitude Accuracy Verification at 95 kHz

P_{in}	Marker 1 Reading	Error	Specification
dBm	dBm	dB	±1.5 dB

Spectrum Analyzer RF Input VSWR Verification

Table A-33. Spectrum Analyzer RF Input VSWR Verification

Attenuation	VSWR	Specification
10 dB		< 2.00:1
20 dB		< 2.00:1
60 dB		< 2.00:1

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Option 20 Tracking Generator

Frequency Accuracy

Table A-34. Frequency Accuracy

Frequency	Measured Value	Specification
1 GHz	GHz	±300 Hz

Table A-35. Level Accuracy — 450 MHz

Test Level	Measured Power	Error	Error Specification
0 dBm	dBm	dB	±1.5 dB
–19.5 dBm	dBm	dB	±1.5 dB
–40 dBm	dBm	dB	±1.5 dB

Table A-36. Level Accuracy — 975 MHz

Test Level	Measured Power	Error	Error Specification
0 dBm	dBm	dB	±1.5 dB
–19.5 dBm	dBm	dB	±1.5 dB
–40 dBm	dBm	dB	±1.5 dB

Table A-37. Level Accuracy — 2975 MHz

Test Level	Measured Power	Error	Error Specification
0 dBm	dBm	dB	±1.5 dB
–19.5 dBm	dBm	dB	±1.5 dB
–40 dBm	dBm	dB	±1.5 dB

Table A-38. Level Accuracy — 4975 MHz

Test Level	Measured Power	Error	Error Specification
0 dBm	dBm	dB	±1.5 dB
–19.5 dBm	dBm	dB	±1.5 dB
–40 dBm	dBm	dB	±1.5 dB

Table A-39. Level Accuracy — 7075 MHz

Test Level	Measured Power	Error	Error Specification
0 dBm	dBm	dB	±1.5 dB
–19.5 dBm	dBm	dB	±1.5 dB
–40 dBm	dBm	dB	±1.5 dB

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Table A-40. Sensor A and Sensor B Reading Components Characterization at 881.5 Mhz

PMA.10	PMB.10	∆1	PMA.10C	PMA.18	ATT.18
dBm	dBm	dB	dBm	dBm	dB

Table A-41. Power Level Setting Components Characterization at 881.5 Mhz

MG3700A.10 Setting	MG3700A.28 Setting	PMA–10	PMA–20
dBm	dBm	dBm	dBm

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Option 40 GSM/GPRS/EDGE RF

Table A-42. Option 40 GSM/GPRS/EDGE RF Measurements

Error Type	Measured Value	Specification
At 850 MHz, –10 dBm Level, TCH Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 850 MHz, –50 dBm Level, TCH ALL Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –10 dBm Level, TCH ALL Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –50 dBm Level, TCH Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz
At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern		
Burst Power Error	dB	±1.5 dB
Frequency Error	Hz	±10 Hz

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Option 41 GSM/GPRS/EDGE Demodulator

Table A-43. Option 41 GSM/GPRS/EDGE Demodulator

Error Type	Measured Value	Specification
At 850 MHz, –10 dBm Level, TCH Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 850 MHz, –50 dBm Level, TCH ALL Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 1800 MHz, –10 dBm Level, TCH ALL Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 1800 MHz, –50 dBm Level, TCH Pattern		
Phase Err RMS (Deg)	Deg	≤ 1 Deg
At 850 MHz, –10 dBm Level, DL_MCS-9_1SLOT Pattern		
EVM RMS	%	≤ 2.5%
At 850 MHz, –50 dBm Level, DL_MCS-9_4SLOT Pattern		
EVM RMS	%	≤ 2.5%
At 1800 MHz, –10 dBm Level, DL_MCS-9_4SLOT Pattern		
EVM RMS	%	≤ 2.5%
At 1800 MHz, –50 dBm Level, DL_MCS-9_1SLOT Pattern		
EVM RMS	%	≤ 2.5%

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Option 42 CDMA RF Measurements

Table A-44. Option 42 CDMA RF Measurements

Error Type	Measured Value	Specification
At 870.03 MHz, –30 dBm Level, cdmaOne		
Channel Power Error	dB	±1.5 dB
At 1930.05 MHz, –30 dBm Level, cdmaOne		
Channel Power Error	dB	±1.5 dB
At 870.03 MHz, –30 dBm Level, CDMA2000		
Channel Power Error	dB	±1.5 dB
At 1930.05 MHz, –30 dBm Level, CDMA2000		
Channel Power Error	dB	±1.5 dB

Option 43 cdmaOne and CDMA2000 1xRTT Demodulator

Table A-45. Option 43 cdmaOne and CDMA2000 1xRTT Demodulator

Parameter	Measured Value	Specification
At 870.03 MHz, –30 dBm Level, cdmaOne		
Frequency Error	Hz	±20 Hz
Rho		$0.99 \leq x \leq 1$
Tau	µs	±1 µs
At 1930.05 MHz, –30 dBm Level, cdmaOne		
Frequency Error	Hz	±20 Hz
Rho		$0.99 \leq x \leq 1$
Tau	µs	±1 µs
At 1930.05 MHz, –30 dBm Level, CDMA2000		
Frequency Error	Hz	±20 Hz
Rho		$0.99 \leq x \leq 1$
Tau	µs	±1 µs
At 870.03 MHz, –30 dBm Level, CDMA2000		
Frequency Error	Hz	±20 Hz
Rho		$0.99 \leq x \leq 1$
Tau	µs	±1 µs

MS2717B Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

Option 44 WCDMA and HSDPA RF Measurements

Table A-46. WCDMA Absolute Power Accuracy

Test Level	Measured Power	Error	Error Specification
+28 dBm	dBm	dB	±1.25 dB
+10 dBm	dBm	dB	±1.25 dB
–10 dBm	dBm	dB	±1.25 dB
–20 dBm	dBm	dB	±1.25 dB

B. WCDMA Occupied Bandwidth (OBW) Verification

Table A-47. WCDMA Occupied Bandwidth (OBW)

Frequency	Power Meter Reading	OBW	Specification
881.5 MHz	dBm		4.2 MHz ±100 kHz
1962.5 MHz	dBm		4.2 MHz ±100 kHz
2680.5 MHz	dBm		4.2 MHz ±100 kHz

MS2717B Firmware Revision: _____ Operator: _____ Date: _____

Serial Number: _____ Options: _____

C. WCDMA RF Channel Power Accuracy and ACLR Verification

Table A-48. WCDMA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF CH Power Error	Error Specification
881.5 MHz	dBm	dBm	dB	±1.25 dB max
1962.5 MHz	dBm	dBm	dB	±1.25 dB max
2680.5 MHz	dBm	dBm	dB	±1.25 dB max

Table A-49. WCDMA ACLR Accuracy

Frequency / Offset	Measured ACLR	Calculated ACLR Error	Error Specification
881.5/–10 MHz	dB	dB	±0.8 dB
881.5/–5 MHz	dB	dB	±0.8 dB
881.5/5 MHz	dB	dB	±0.8 dB
881.5/10 MHz	dB	dB	±0.8 dB
1962.5/–10 MHz	dB	dB	±0.8 dB
1962.5/–5 MHz	dB	dB	±0.8 dB
1962.5/5 MHz	dB	dB	±0.8 dB
1962.5/10 MHz	dB	dB	±0.8 dB
2680.5/–10 MHz	dB	dB	±1.0 dB
2680.5/–5 MHz	dB	dB	±1.0 dB
2680.5/5 MHz	dB	dB	±1.0 dB
2680.5/10 MHz	dB	dB	±1.0 dB

Table A-50. HSDPA RF Channel Power Accuracy

Frequency	Power Meter Reading	Measured RF Channel Power	RF CH Power Error	Error Specification
2680.5 MHz	dBm	dBm		±1.25 dB max

Table A-51. HSDPA ACLR Accuracy

Frequency / Offset	Measured ACLR	Calculated ACLR Error	Error Specification
2680.5/–10 MHz	dB	dB	±1.0 dB
2680.5/–5 MHz	dB	dB	±1.0 dB
2680.5/5 MHz	dB	dB	±1.0 dB
2680.5/10 MHz	dB	dB	±1.0 dB

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Option 45 WCDMA Demodulator and Option 65 WCDMA/HSDPA Demodulator

Error Vector Magnitude (Test Model 4, Option 45 or Option 65)

Table A-52. WCDMA Error Vector Magnitude (EVM) (Test Model 4, Option 45 or Option 65)

Frequency	EVM	Specification
1962.5 MHz	%	≤ 2.5%

Table A-53. HSDPA Error Vector Magnitude (EVM) (Test Model 5, Option 65)

Frequency	EVM	Specification
1962.5 MHz	%	≤ 2.5%

Option 46 Fixed WiMAX RF Measurements

Table A-54. Fixed WiMAX Input Power, Power Meter Reference Reading

Frequency	Input Power Range	Power Meter Reading
2600.5 MHz	–15.0 dBm ±0.2 dB	dBm
2600.5 MHz	–50.0 dBm ±0.2 dB	dBm
3600.5 MHz	–15.0 dBm ±0.2 dB	dBm
3600.5 MHz	–50.0 dBm ±0.2 dB	dBm
5600.5 MHz	–15.0 dBm ±0.2 dB	dBm
5600.5 MHz	–50.0 dBm ±0.2 dB	dBm

Table A-55. Fixed WiMAX Channel Power Accuracy

Frequency	Input Power	Measured Channel Power (RSSI)	Error	Error Specification
2600.5 MHz	–15 dBm	dBm	dB	±1.5 dB
2600.5 MHz	–50 dBm	dBm	dB	±1.5 dB
3600.5 MHz	–15 dBm	dBm	dB	±1.5 dB
3600.5 MHz	–50 dBm	dBm	dB	±1.5 dB
5600.5 MHz	–15 dBm	dBm	dB	±1.5 dB
5600.5 MHz	–50 dBm	dBm	dB	±1.5 dB

Option 47 Fixed WiMAX Demodulator

Table A-56. Fixed WiMAX Input Power, Power Meter Reference Reading

Frequency	Input Power Range	Power Meter Reading
2600.5 MHz	–15.0 dBm ±0.2 dB	dBm
2600.5 MHz	–50.0 dBm ±0.2 dB	dBm
3600.5 MHz	–15.0 dBm ±0.2 dB	dBm
3600.5 MHz	–50.0 dBm ±0.2 dB	dBm
5600.5 MHz	–15.0 dBm ±0.2 dB	dBm
5600.5 MHz	–50.0 dBm ±0.2 dB	dBm

Table A-57. Fixed WiMAX Residual EVM

Frequency	Power	BW	EVM (rms)	Specification
2600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
2600.5 MHz	–50 dBm	10 MHz	%	≤ 3.5%
3600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
3600.5 MHz	–50 dBm	10 MHz	%	≤ 3.5%
5600.5 MHz	–15 dBm	10 MHz	%	≤ 3.5%
5600.5 MHz	–50 dBm	10 MHz	%	≤ 3.5%

Table A-58. Fixed WiMAX Frequency Error

Frequency	Power	Frequency Error Reading	Error Specification
2600.5 MHz	–50 dBm	Hz	± 260.05 Hz
5600.5 MHz	–50 dBm	Hz	± 560.05 Hz

Option 60 (TD-SCDMA RF Measurements) and Option 61 (TD-SCDMA Demodulator)

Table A-59. TD-SCDMA for Units with Option 60, 61 Installed Only (at 2010 MHz, –45 dBm Level)

Parameter	Specification	Opt. 60 Measured Value	Opt. 61 Measured Value
Channel Power (Error)	± 1.0 dB	dB	
EVM	< 3%		%
Frequency Error	± 20 Hz		Hz
Tau	± 0.1 µs		µs

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Option 66 Mobile WiMAX RF Measurements

Table A-60. Mobile WiMAX Channel Power Accuracy (10 MHz Bandwidth and 10 ms Frame Length)

Frequency	Input Power	Measured Channel Power (RSSI)	Error	Specification
2600.5 MHz	–15 dBm	dBm	dB	±1.5 dB
2600.5 MHz	–50 dBm	dBm	dB	±1.5 dB
3600.5 MHz	–15 dBm	dBm	dB	±1.5 dB
3600.5 MHz	–50 dBm	dBm	dB	±1.5 dB

Table A-61. Mobile WiMAX Channel Power Accuracy (5 MHz Bandwidth and 5 ms Frame Length)

Frequency	Input Power	Measured Channel Power (RSSI)	Error	Specification
2600.5 MHz	–15 dBm	dBm	dB	±1.5 dB
2600.5 MHz	–50 dBm	dBm	dB	±1.5 dB
3600.5 MHz	–15 dBm	dBm	dB	±1.5 dB
3600.5 MHz	–50 dBm	dBm	dB	±1.5 dB

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Option 67 Mobile WiMAX Demodulator

Table A-62. Mobile WiMAX Residual EVM (10 MHz Bandwidth and 10 ms Frame Length)

Frequency	Power	BW	EVM (rms)	Specification
2600.5 MHz	–15 dBm	10 MHz	%	≤3.5%
2600.5 MHz	–50 dBm	10 MHz	%	≤3.5%
3600.5 MHz	–15 dBm	10 MHz	%	≤3.5%
3600.5 MHz	–50 dBm	10 MHz	%	≤3.5%

Table A-63. Mobile WiMAX Frequency Error (10 MHz Bandwidth and 10 ms Frame Length)

Frequency	Power	Frequency Error	Specification
2600.5 MHz	–50 dBm	Hz	±10 Hz
3600.5 MHz	–50 dBm	Hz	±10 Hz

Table A-64. Mobile WiMAX Residual EVM (5 MHz Bandwidth and 5 ms Frame Length)

Frequency	Power	BW	EVM (rms)	Specification
2600.5 MHz	–15 dBm	5 MHz	%	≤3.5%
2600.5 MHz	–50 dBm	5 MHz	%	≤3.5%
3600.5 MHz	–15 dBm	5 MHz	%	≤3.5%
3600.5 MHz	–50 dBm	5 MHz	%	≤3.5%

Table A-65. Mobile WiMAX Frequency Error (5 MHz Bandwidth and 5 ms Frame Length)

Frequency	Power	Frequency Error	Specification
2600.5 MHz	–50 dBm	Hz	±10 Hz
3600.5 MHz	–50 dBm	Hz	±10 Hz

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