Minimum Performance Specifications and Recommended Test Methodology for the Modulator Assembly of the GMR60x/120x

Garmin Ltd. or its subsidiaries
c/o Garmin International Inc.
1200 East 151st Street
Olathe, KS 66062 U.S.A.

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Approvals		Date
Drawn:	**KLR**	**6/27/08**
Checked:	**SWR**	**6/30/08**
Project Engineer:	**TDS**	**6/30/08**
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Revisions

Revision	Date	Description of Change	Approved
1	**6/27/08**	**Experimental Release**	**----**
A	**12/29/08**	**Production Release**	**58659**
B	**1/29/09**	**Update MPS For Prototype Run**	**59476**
C	**3/9/09**	**Adjust For New Modulator Boards**	**60149**

1.0 Purpose

This document defines the Minimum Performance Specifications (MPS) for the Modulator sub-assembly assembly 012-01640-00 (GMR60x) or 012-01641-00 (GMR120x) in Table 1. This document also recommends a test methodology that can be used by manufacturing to verify acceptable performance. Manufacturing may deviate from the recommended test methodology as long as MPS specifications are achieved.

Notes:
-- Recommended Pass/Fail test limits shown below may be more stringent than the MPS limits. These limits will ensure that units meet MPS specifications over all operating conditions.
-- Unless otherwise specified, the tolerance on specifications is +/- 10%.
-- Unless otherwise specified, reference designators pertain to the 012-00991-00 assembly.

WARNING: This assembly generates High Voltage in excess of 3,000 volts. Use caution when handling. The wearing of safety glasses is recommended while performing the Transmitter Circuit tests (Section 6.0).

2.0 Recommended Test Equipment

Equipment:
-- Power Supply #1 capable of 36 VDC @ 4.0 amps.
-- Marine Radar Processor subassembly (012-01405-00)
-- Personal Computer loaded with Marine Radar Test Application Software.
-- DC Voltmeter
-- DC Ammeter (Qty. 2)
-- Oscilloscope (100MHz min)
--Current Probe – Tektronix TCP 202 or equivalent
-- Magnetrons and Load 690-A0004-01 or 690A0005-01 and 690-00009-00 (See Figure 1.)
-- Manufacturing may construct a bed-of-nails test fixture and an automatic-test-equipment (ATE) test program to run the recommended tests.
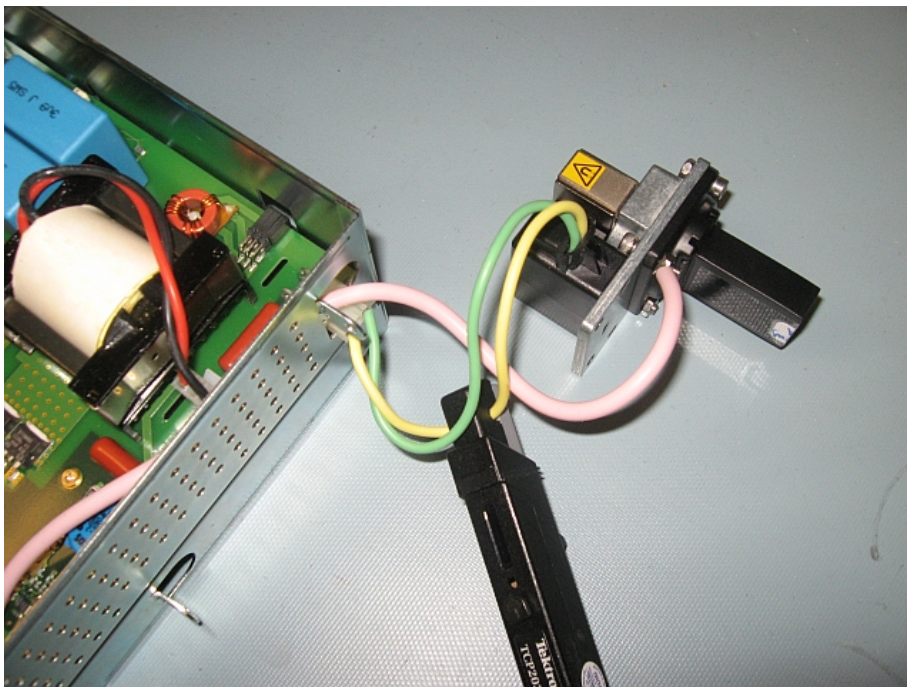
Magnetron and Load
Figure 1

3.0 Initial Test Setup

-- Mount the 012-01640-00 (GMR60x) or 012-01641-00 (GMR120x) assembly to be tested onto a suitable ground plane such as Marine Radar electronic box. (Note: To avoid arcing, high-voltage sections of the board must be at least ½" from any conductive surfaces.)

-- Connect the Magnetron and Load (see Figure 1)

-- Configure and connect the 012-01405-00 Marine Radar Processor subassembly as follows:
   a) Connect a 240 ohm, 1/8W resistor from center pin to ground at J603 of the 012-01405-00 assembly.
   b) Connect a wire harness from P700 of the 012-01405-00 assembly to P103 of the unit under test.
   c) Connect a coaxial cable from J701 of the 012-01405-00 assembly to J200 of the unit under test.
   d) Connect an Ethernet cable from the computer to J400 of the 012-01405-00 assembly.

-- Configure and connect power supply #1 as follows:
   a) Set output voltage to 36.0 VDC.
   b) Set current limit to 4.0 amps.
   c) Connect positive lead to P201-1, negative lead to P201-2 of the 012-01405-00 Marine Radar Processor subassembly.

-- Power-up the 012-01405-00 assembly and unit-under-test as follows:
   a) Connect J400-4 of the 012-01405-00 assembly to ground through a switch.
   b) Before proceeding, wait at least 15 seconds after applying power to allow the 012-01405-00 Marine Radar Processor subassembly sufficient time to initialize.
   c) Run the Marine Radar Test Application Software using the computer. (Note: Verify that the 'Auto' box in the AFC section is unchecked. If not, uncheck the 'Auto' box. To ensure that the change takes effect, click once on either the up or down AFC adjustment arrow, then close and restart the Marine Radar Test Application Software. The program will now default to the AFC Auto 'unchecked' setting when starting the Marine Radar Test Application Software.)
   d) Select TEST mode from the SYC Mode options list using the Marine Radar Test Application Software.
   e) Adjust High voltage between A106 (Positive) and A103 (Negative) to 385v for 012-01640-00 or 500v for 012-01641-00.

4.0 Power Supply Voltages and Currents Standby Mode

4.0.1   Current measurements:

   4.0.1.1   Measure: +VBATT current at P103-8 using a DC ammeter.
   Test limits: Min = 150mA   Max = 250mA

4.0.2   Voltage measurements:

   4.0.2.1   Measure: Voltage at A108 (test point P100).
   Test limits: Min = 7.0 VDC   Max = 8.0 VDC

   4.0.2.2   Measure: Voltage at A208 (test point P204).
   Test limits: Min = 3.14 VDC   Max = 3.47 VDC

   4.0.2.3   Measure: Voltage at A105 (test point P102).
   Test limits: Min = 15.0 VDC   Max = 24.0 VDC

   4.0.2.4   Measure: High Voltage (via Marine Radar Test Application Software).
   Test limits: 012-01640-00:   Min = 365 VDC Max = 405 VDC
                    012-01641-00:   Min = 480 VDC Max = 520 VDC

5.0 ID Voltage Circuit

      5.0.1   Measure: Displayed ID voltage reading using the Marine Radar Test Application Software of the 012-01640-00.
Test limits: Min = 1500 mVDC   Max = 1780 mVDC

      5.0.2   Measure: Displayed ID voltage reading using the Marine Radar Test Application Software of the 012-01641-00.
Test limits: Min = 1870 mVDC   Max = 2170 mVDC

6.0 Transmitter Circuit

WARNING: High Voltage in excess of 4,000 volts is generated during the following transmitter circuit tests. Use caution when handling. The wearing of safety glasses is recommended while performing these tests.

Setup:
-- Oscilloscope setup:
    a) Connect XMIT of the 012-01405-00 Marine Radar Processor subassembly using a standard 10X-oscilloscope probe.
    b) Connect the current probe to yellow lead of magnetron.
    c) Configure oscilloscope settings as shown in Figure 2.
-- After the 75 second warm-up period has timed out, select Transmitter = ON mode by clicking the "Txmtr is OFF" button using the Marine Radar Test Application Software.
-- Select 24nm range using the Marine Radar Test Application Software.

      6.0.1   Measure: +VBATT current at P103-8 using a DC ammeter.
Test limits: 012-01640-00:   Min = 550mA   Max = 800mA
               012-01641-00:   Min = 800mA   Max = 1100mA

      6.0.2   Measure: Displayed magnetron heater current (Htr Crnt) using the Marine Radar Test Application Software.
Test limits: Min = 450mA   Max = 650mA

      6.0.3   Measure: Displayed magnetron current (Crnt) using the Marine Radar Test Application Software.
Test limits: 012-01640-00:   Min = 2500mA   Max = 4500mA
               012-01641-00:   Min = 3500mA   Max = 5500mA

      6.0.4   Measure: Displayed 400/500 VDC power supply voltage (500V Sup) using the Marine Radar Test Application Software.
Test limits: 012-01640-00:   Min = 365 VDC Max = 405 VDC
               012-01641-00:   Min = 480 VDC Max = 520 VDC

-- Select Transmitter = OFF mode by clicking the "Txmtr is ON" button using the Marine Radar Test Application Software.

012-01640-00 (6kW)   012-01641-00 (12kW)
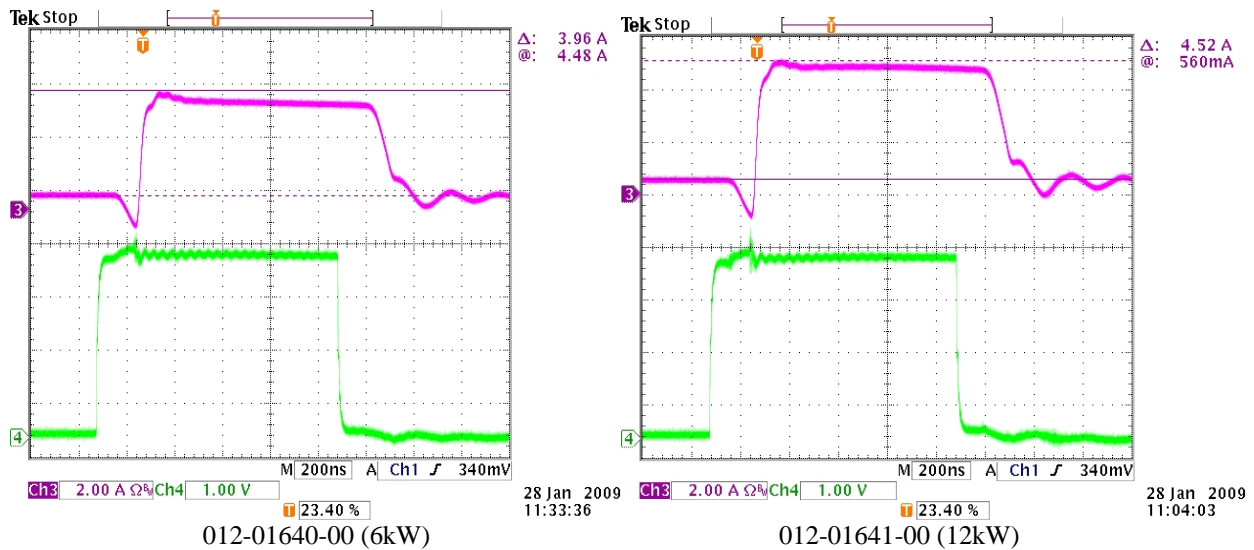
Channel 3 = Current pulse to magnetron on yellow lead.
Channel 4 = Oscilloscope trigger pulse from XMIT of the 012-01405-00 Marine Radar Processor.

Figure 2

7.0 Sleep Mode

-- Select COMM mode from the SYC Mode options list using the Marine Radar Test Application Software and wait 15 seconds before proceeding.

7.0.1   Sleep mode current measurements:

7.0.1.1   Measure: +VBATT current at P103-8 using a DC ammeter.
Test limits: Min = 0mA   Max = 0.5mA

7.0.2   Sleep mode voltage measurements:

7.0.2.1   Measure: Voltage at A108 (test point P100).
Test limits: Min = 0 VDC   Max = 0.100 VDC

7.0.2.2   Measure: Voltage at A208 (test point P204).
Test limits: Min = 0 VDC   Max = 0.100 VDC

7.0.2.3   Measure: Voltage at A105 (test pointP102).
Test limits: Min = 0 VDC   Max = 0.100 VDC

7.0.2.4   Measure: Voltage at A106 (via Marine Radar Test Application Software).
Test limits: Min = 0 VDC   Max = 1.00 VDC

Power-down the unit under test by removing the connection from J400-4 of the 012-01405-00 assembly to ground and then setting power supply #1 output voltage to 0.0 VDC.

8.0 MPS Limits

MPS Limits					
Parameter		Min	Max	Units	Section of Measurement
Standby Current		150	250	mA	4.0.1.1
Power Supply Voltages	A108	7.0	8.0	VDC	4.0.2.1
	A208	3.14	3.47	VDC	4.0.2.2
	A105	15.00	24.00	VDC	4.0.2.3
High Voltage	012-01640-00	365	405	VDC	4.0.2.4
	012-01641-00	480	520	VDC	
ID Voltage	012-01640-00	1500	1780	mVDC	5.0.1
	012-01641-00	1870	2170	mVDC	5.0.2
Transmitter Operating Current	012-01640-00	550	800	mA	6.0.1
	012-01641-00	800	1100	mA	
Heater Current		450	650	mA	6.0.2
Transmitter Magnetron Current	012-01640-00	2500	4500	mA	6.0.3
	012-01641-00	3500	5500	mA	
Sleep Mode Current		0	.5	mA	7.0.1.1
Sleep Mode Voltages	A108	0	.1	VDC	7.0.2.1
	A208	0	.1	VDC	7.0.2.2
	A105	0	.1	VDC	7.0.2.3
	High Voltage	0	1	VDC	7.0.2.4

Table 1.
MPS Limits