



**TEST REPORT**  
**ON**  
**2500 MHz TO 3250 MHz**  
**SINGLE POLE FOUR THROW**  
**ABSORPTIVE / NON-REFLECTIVE SWITCH MODULE**

**AMC MODEL No:**  
**MSN-4DT-05-STANDARD**  
**OPTION 24, 12X, LVT**

**Serial Numbers: 4MS909229 THRU 4MS909231**

**DESIGNED  
BY  
R. Afable**

**TESTED  
BY  
R. Butler**

**REPORTED  
BY  
E. Elder**

**October 26, 2004**

*Handwritten signatures and initials:*  
KH  
DRH  
LC  
JST  
JKM  
EBC  
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**ISO9001 : 2000 CERTIFIED**

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## SINGLE POLE FOUR THROW ABSORPTIVE / NON-REFLECTIVE SWITCH MODULE AMC MODEL No: MSN-4DT-05-STANDARD OPTION 24, 12X, LVT

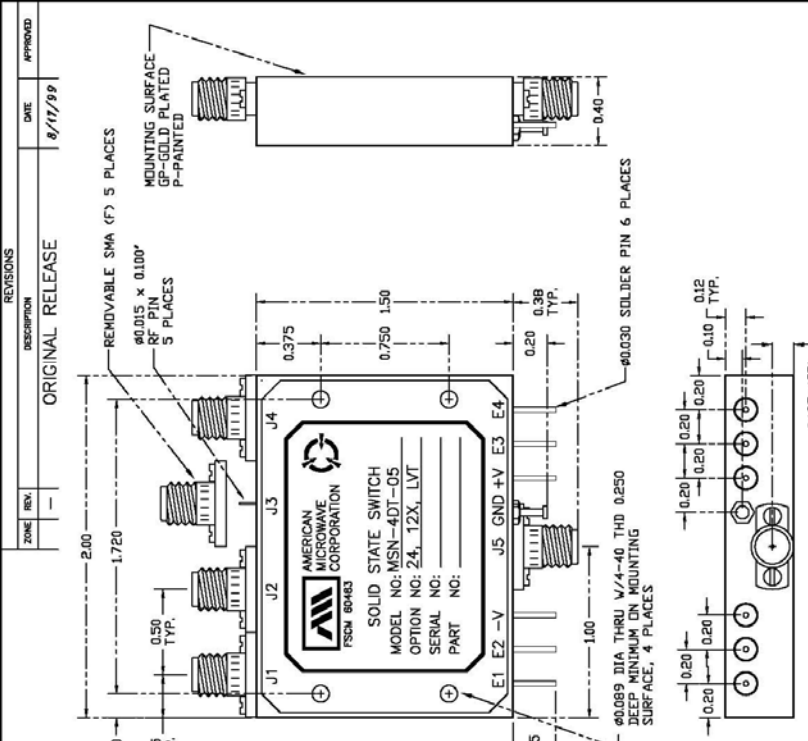
### FEATURES:

- **LOW INSERTION LOSS**
- **HIGH ISOLATION**
- **LOW VIDEO TRANSIENTS**
- **LOW HARMONIC DISTORTION**

### SPECIFICATIONS:

- FREQUENCY : 2500 TO 3250 MHz
- INSERTION LOSS : 1.5 dB MAXIMUM
- ISOLATION : 80 dB MINIMUM
- VSWR : 1.5:1
- SWITCHING SPEED : < 30 ns
- RISE / FALL TIME : < 10 ns
- MAXIMUM TOGGLE RATE : > 20 ns
- RF CONNECTORS : SMA FEMALE
- DC POWER SUPPLY : +5 V  $\pm 10\%$  @ 200 mA MAXIMUM  
-5 V  $\pm 10\%$  @ 100 mA MAXIMUM
- CONTROL : TTL LOGIC "0"=ON , "1"=OFF
- CONTROL INTERFACE : DC SOLDER PINS
- HARMONIC DISTORTION :  $\leq 70$  dB @ +10 dBm I/P
- FLATNESS ACROSS BAND (ON STATE) :  $\pm 0.5$  dB
- VIDEO LEAKAGE : 100 mV PEAK TO PEAK, 500 MHz BANDWIDTH (-60 dBm TO -65 dBm LEAKAGE POWER OR ENERGY IN THE BAND OF INTEREST)
- 1 dB COMPRESSION POINT : +20 dBm
- 2 TONE 3<sup>RD</sup> ORDER INTERCEPT POINT, P<sub>OUT</sub> 0dBm : +35 dBm
- 2 TONE 2<sup>ND</sup> ORDER INTERCEPT POINT, P<sub>OUT</sub> 0dBm : +55 dBm
- 0.1 dB PASS BAND : 2500 MHz TO 3250 MHz

## PRODUCT FEATURE

<p><b>REVISIONS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>ZONE</th> <th>REV.</th> <th>DESCRIPTION</th> <th>DATE</th> <th>APPROVED</th> </tr> <tr> <td></td> <td>1</td> <td>ORIGINAL RELEASE</td> <td>8/11/99</td> <td></td> </tr> </table>	ZONE	REV.	DESCRIPTION	DATE	APPROVED		1	ORIGINAL RELEASE	8/11/99		 <p style="font-size: small;">REMOVABLE SMA (F) 5 PLACES          90.015 x 0.100" RF PIN 5 PLACES          MOUNTING SURFACE GP-CG PLATED P-PAINTED          0.140 0.25 TYP. 0.50 TYP. 1.720 2.00 0.375 0.750 1.50 0.20 0.38 TYP. 0.25 1.00 0.125 (GP) 0.127 (FP)</p>	<p><b>DATE</b> 8/11/99</p> <p><b>APPROVALS</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DATE</td> <td>8/11/99</td> </tr> <tr> <td>DESIGNED</td> <td>WJG</td> </tr> <tr> <td>CHECKED</td> <td></td> </tr> <tr> <td>ASSEMBLED</td> <td></td> </tr> </table> <p><b>SIZE</b> FROM NO. A 60483</p> <p><b>SCALE</b> 100-4007-5</p> <p><b>REV.</b> 1 OF 3</p>	DATE	8/11/99	DESIGNED	WJG	CHECKED		ASSEMBLED	
ZONE	REV.	DESCRIPTION	DATE	APPROVED																
	1	ORIGINAL RELEASE	8/11/99																	
DATE	8/11/99																			
DESIGNED	WJG																			
CHECKED																				
ASSEMBLED																				

**DESCRIPTION:**  
 AMC MODEL MSN-4DT-05-STANDARD OPTION 24, 12X, LVT IS A SINGLE POLE FOUR THROW, ABSORPTIVE/NON-REFLECTIVE SWITCH MODULE WITH VERY LOW INSERTION LOSS, HIGH ISOLATION AND WITH INTEGRAL TTL DRIVER, DESIGNED FOR LOW VIDEO TRANSIENTS AND LOW HARMONIC DISTORTION OVER 2500 TO 3250 MHz BANDWIDTH.

**SPECIFICATIONS:**

- FREQUENCY: 2500 MHz TO 3250 MHz
- INSERTION LOSS: 1.5 dB MAXIMUM
- ISOLATION (ANY PORT): 80 dB MINIMUM
- USMR (ANY PORT, ANY STATE): 1.5:
- SWITCHING SPEED: <30 ns
- (50% TTL TO 10%/90% RF)
- RISE/FALL TIME: <10 ns
- (10% TO 90% RF)
- (90% TO 10% RF)
- MAXIMUM TOGGLE RATE: >20 MHz
- (50% DC)
- RF CONNECTORS: SMA FEMALE
- DC POWER SUPPLY: +5V ±10% @ 200 mA MAXIMUM
- CONTROL: -5V ±10% @ 100 mA MAXIMUM
- TTL LOGIC: "0"-ON "1"-OFF
- CONTROL INTERFACE: DC SOLDER PINS
- HARMONIC DISTORTION: ≤ 70dB @ +10 dBm /P
- FLATNESS ACROSS BAND: ±0.5dB
- (ON STATE)
- VIDEO LEAKAGE: 100 mV PEAK TO PEAK, 500 MHz BANDWIDTH (-60 dBm TO -65 dBm LEAKAGE POWER OR ENERGY IN THE BAND OF INTEREST)
- 1 dB COMPRESSION POINT: +20 dBm
- 2 TONE 3RD ORDER INTERCEPT POINT, POUT dBm: +35 dBm
- 2 TONE 2RD ORDER INTERCEPT POINT, POUT dBm: +55 dBm
- 0.1 dB PASS BAND: 2500 MHz TO 3250 MHz
- WEIGHT: 3.0 OUNCES TYPICAL
- SIZE: 2.00 (L) X 1.50 (W) X 0.40 (H)

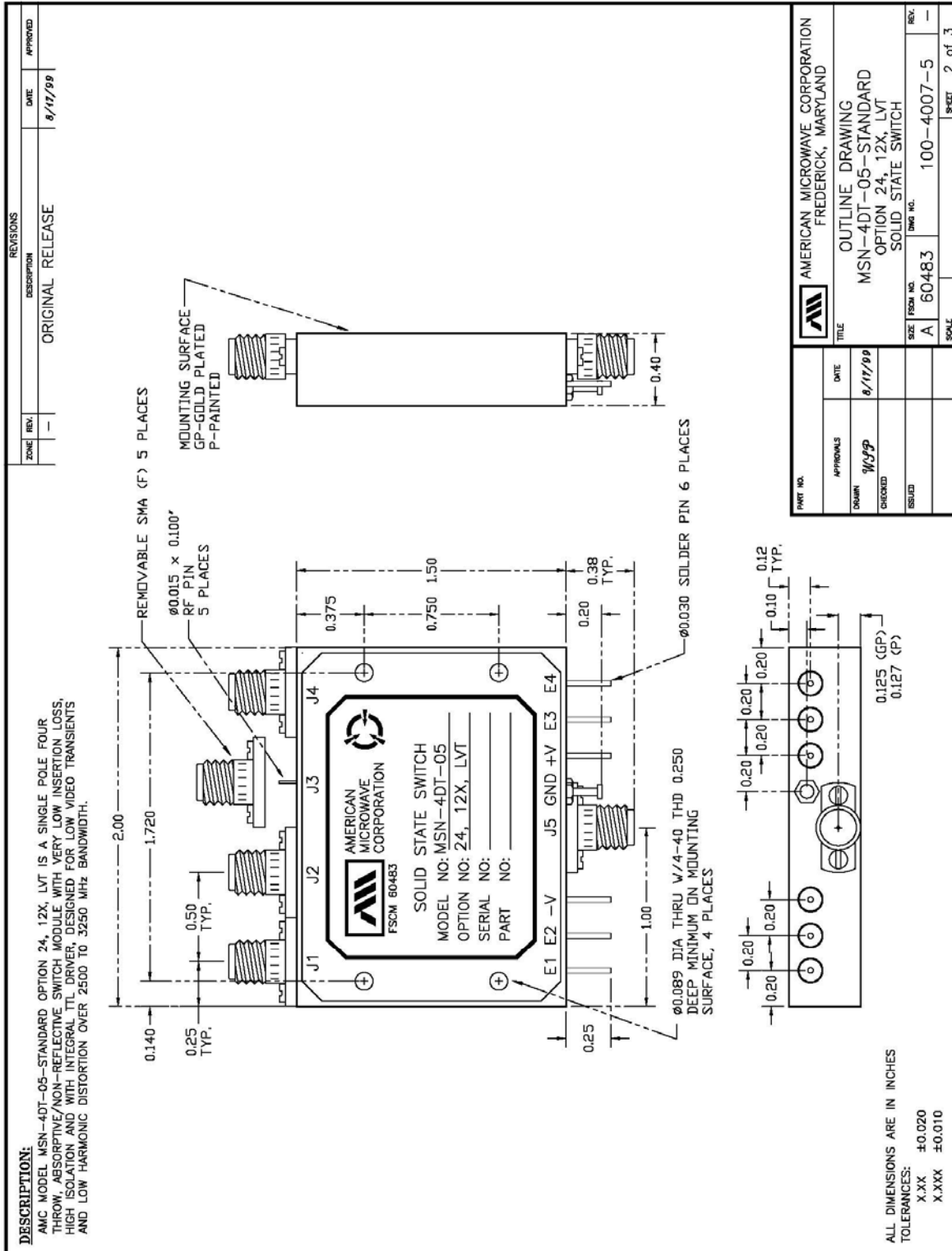
ALL DIMENSIONS ARE IN INCHES  
 TOLERANCES:  
 X.XX ±0.020  
 X.XXX ±0.010

**ENVIRONMENTAL RATINGS:**

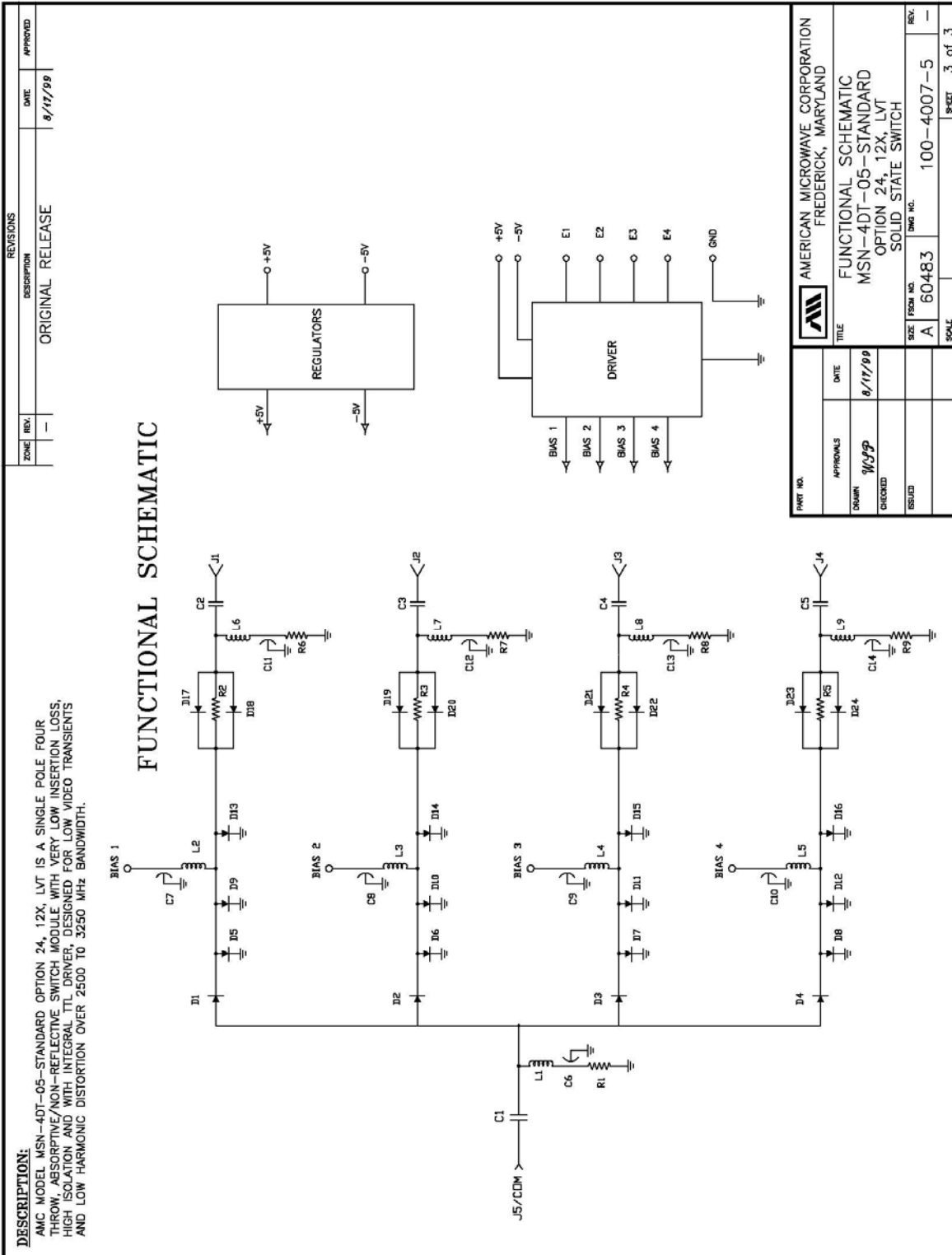
- TEMPERATURE: -10°C TO +55°C (OPERATING)
- -40°C TO +71°C (STORAGE)
- HUMIDITY: 95% OVER TEMPERATURE
- SHOCK: MIL-STD-202F, METHOD 213B COND. B
- VIBRATION: MIL-STD-202F, METHOD 204D COND. B
- MIL-STD-202F, METHOD 105C COND. B
- ALTITUDE: MIL-STD-202F, METHOD 107D COND. A
- TEMPERATURE CYCLE: MIL-STD-202F, METHOD 107D COND. A

NOTE: THE ABOVE SPECIFICATIONS ARE SUBJECT TO CHANGE OR REVISION

**OUTLINE DRAWING**



## FUNCTIONAL SCHEMATIC



## FINAL TEST DATA

FINAL TEST DATA SHEETS

FOR

AMC MODEL NUMBER

**MSN-4DT-05-STANDARD**  
**OPTION 24, 12X, LVT**

Serial Numbers:

**4MS909229 THRU 4MS909231**



**FINAL TEST DATA**

AMC MODEL NO: MSN-4DT-05-STANDARD OPTION 24, 12X, LVT SERIAL NUMBER: 4MS909229

AMERICAN MICROWAVE CORPORATION  
 GROVE RD., FREDERICK MD, 21704  
 TEL. 301-662-4700 FAX: 301-662-4938

DATE: 12-2-99

FINAL TEST DATA  
 ON  
 MICROWAVE SWITCH

CUSTOMER: Telemus  
 JOB NO: 907134E-2  
 MODEL NO: MSN-4DT-05-STD  
 SERIAL NO: 4MS909229

TECHNICIAN: \_\_\_\_\_  
 OPTION NO: 24, 12X, LVT  
 SPECIFICATION: \_\_\_\_\_

CURRENT DRAW: ± 5VDC @ 100 mA; - 5VDC @ 100 mA FREQUENCY RANGE: 2.5 GHz to 32.5 GHz

INSERTION LOSS (WORST CASE)	RETURN LOSS (WORST CASE)					
	INPUT dB	INPUT VSWR	OUTPUT ON dB	OUTPUT ON VSWR	OUTPUT OFF dB	OUTPUT OFF VSWR
<u>25-21 1.17</u> dB	16.00	1.37 : 1	19.4	1.24 : 1	17.9	1.29 : 1
<u>25-22 1.16</u> dB	20.5	1.20 : 1	21.2	1.19 : 1	24.4	1.12 : 1
<u>25-23 1.10</u> dB	20.8	1.20 : 1	22.2	1.16 : 1	25.7	1.10 : 1
<u>25-24 1.16</u> dB	15.02	1.43 : 1	18.03	1.27 : 1	24.4	1.13 : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1

ISOLATION	SWITCHING SPEED			
	DELAY ON	RISE TIME	DELAY OFF	FALL TIME
<u>25-21 &gt; 80</u> dB	<u>16</u> nS	<u>2</u> nS	<u>15</u> nS	<u>4</u> nS
<u>25-22 &gt; 80</u> dB	<u>16</u> nS	<u>3</u> nS	<u>17</u> nS	<u>5</u> nS
<u>25-23 &gt; 80</u> dB	<u>17</u> nS	<u>3</u> nS	<u>16</u> nS	<u>5</u> nS
<u>25-24 &gt; 80</u> dB	<u>17</u> nS	<u>2</u> nS	<u>15</u> nS	<u>4</u> nS
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS

NOTE: Any additional test data on back

TESTED ON: 8350 D / 8257A HP

QA/QC APPROVAL: AW

DATED: 1/20/99





**FINAL TEST DATA**

AMC MODEL NO: MSN-4DT-05-STANDARD OPTION 24, 12X, LVT SERIAL NUMBER: 4MS909230

AMERICAN MICROWAVE CORPORATION  
 7 GROVE RD., FREDERICK MD. 21704  
 TEL: 301-662-4700 FAX: 301-662-4938

DATE: 12-2-99

FINAL TEST DATA  
 ON  
 MICROWAVE SWITCH

CUSTOMER: Telemus TECHNICIAN: R. Butler  
 JOB NO: 907134E-2  
 MODEL NO: MSN-4DT-05-570 OPTION NO: 24, 12x LVT  
 SERIAL NO: 4MS909230 SPECIFICATION:  
 CURRENT DRAW: +5VDC @ 150mA; -5VDC @ 100mA FREQUENCY RANGE: 2.5 GHz to 325 GHz

INSERTION LOSS (WORST CASE)	RETURN LOSS (WORST CASE)					
	INPUT dB	INPUT VSWR	OUTPUT ON dB	OUTPUT ON VSWR	OUTPUT OFF dB	OUTPUT OFF VSWR
<u>05-01 1.39 dB</u>	<u>15.4 dB</u>	<u>1.40 : 1</u>	<u>18.2 dB</u>	<u>1.27 : 1</u>	<u>23.0 dB</u>	<u>1.15 : 1</u>
<u>05-02 1.29 dB</u>	<u>21.9 dB</u>	<u>1.17 : 1</u>	<u>19.9 dB</u>	<u>1.22 : 1</u>	<u>23.9 dB</u>	<u>1.13 : 1</u>
<u>05-03 1.30 dB</u>	<u>23.5 dB</u>	<u>1.14 : 1</u>	<u>19.0 dB</u>	<u>1.25 : 1</u>	<u>23.8 dB</u>	<u>1.13 : 1</u>
<u>05-04 1.42 dB</u>	<u>14.3 dB</u>	<u>1.47 : 1</u>	<u>16.6 dB</u>	<u>1.34 : 1</u>	<u>21.6 dB</u>	<u>1.17 : 1</u>
<u>dB</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>
<u>dB</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>
<u>dB</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>
<u>dB</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>
<u>dB</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>
<u>dB</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>	<u>dB</u>	<u>1. : 1</u>

ISOLATION	SWITCHING SPEED			
	DELAY ON	RISE TIME	DELAY OFF	FALL TIME
<u>05-01 &gt; 80 dB</u>	<u>19 nS</u>	<u>3 nS</u>	<u>18 nS</u>	<u>7 nS</u>
<u>05-02 &gt; 80 dB</u>	<u>14 nS</u>	<u>2 nS</u>	<u>18 nS</u>	<u>7 nS</u>
<u>05-03 &gt; 80 dB</u>	<u>15 nS</u>	<u>2 nS</u>	<u>15 nS</u>	<u>8 nS</u>
<u>05-04 &gt; 80 dB</u>	<u>17 nS</u>	<u>3 nS</u>	<u>20 nS</u>	<u>8 nS</u>
<u>dB</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>
<u>dB</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>
<u>dB</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>
<u>dB</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>
<u>dB</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>	<u>nS</u>

NOTE: Any additional test data on back

TESTED ON: 8350 B / 8257 A HP

QA/QC APPROVAL: HA

DATED: 11/30/99



**FINAL TEST DATA**

AMC MODEL NO: MSN-4DT-05-STANDARD OPTION 24, 12X, LVT SERIAL NUMBER: 4MS909231

AMERICAN MICROWAVE CORPORATION  
 G GROVE RD., FREDERICK MD. 21704  
 TEL: 301-662-4700 FAX: 301-662-4938

DATE: 12-2-99

FINAL TEST DATA  
 ON  
 MICROWAVE SWITCH

CUSTOMER: Telemus      TECHNICIAN: R. Butler  
 JOB NO: 907134E-2  
 MODEL NO: MSN-4DT-05-STD      OPTION NO: 24, 12X, LVT  
 SERIAL NO: 4MS909231      SPECIFICATION:  
 CURRENT DRAW: ±5VDC @ 100mA; -5VDC @ 100mA      FREQUENCY RANGE: 2.5 GHz to 32.5 GHz

INSERTION LOSS (WORST CASE)	RETURN LOSS (WORST CASE)					
	INPUT dB	INPUT VSWR	OUTPUT ON dB	OUTPUT ON VSWR	OUTPUT OFF dB	OUTPUT OFF VSWR
<u>05-01 1.43 dB</u>	<u>23.00 dB</u>	<u>1.15 : 1</u>	<u>18.3 dB</u>	<u>1.23 : 1</u>	<u>14.6 dB</u>	<u>1.45 : 1</u>
<u>05-02 1.23 dB</u>	<u>27.2 dB</u>	<u>1.09 : 1</u>	<u>18.8 dB</u>	<u>1.25 : 1</u>	<u>30.8 dB</u>	<u>1.05 : 1</u>
<u>05-03 1.23 dB</u>	<u>25.3 dB</u>	<u>1.11 : 1</u>	<u>19.8 dB</u>	<u>1.22 : 1</u>	<u>24.3 dB</u>	<u>1.12 : 1</u>
<u>05-04 1.50 dB</u>	<u>15.3 dB</u>	<u>1.41 : 1</u>	<u>16.6 dB</u>	<u>1.34 : 1</u>	<u>21.6 dB</u>	<u>1.18 : 1</u>
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1
dB	dB	1. : 1	dB	1. : 1	dB	1. : 1

ISOLATION	SWITCHING SPEED			
	DELAY ON	RISE TIME	DELAY OFF	FALL TIME
<u>05-01 &gt; 80 dB</u>	<u>16 nS</u>	<u>2 nS</u>	<u>23 nS</u>	<u>3 nS</u>
<u>05-02 &gt; 80 dB</u>	<u>15 nS</u>	<u>2 nS</u>	<u>14 nS</u>	<u>9 nS</u>
<u>05-03 &gt; 80 dB</u>	<u>16 nS</u>	<u>2 nS</u>	<u>15 nS</u>	<u>2 nS</u>
<u>05-04 &gt; 80 dB</u>	<u>15 nS</u>	<u>2 nS</u>	<u>17 nS</u>	<u>5 nS</u>
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS
dB	nS	nS	nS	nS

NOTE: Any additional test data on back

TESTED ON: 8350 B / 8257A HP

QA/QC APPROVAL: AV

DATED: 11/20/99