AMERICAN MICROWAVE CORPORATION

ACCEPTANCE

TEST PROCEDURE (ATP)

FOR

LOCKHEED SANDERS

MODEL NUMBER 8202761

SINGLE POLE, DOUBLE THROW

PIN DIODE SWITCH

Drawing Number: 100-3587
Revision B

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TABLE OF CONTENTS

1.0 SCOPE

The purpose of this document is to provide an electrical testing procedure for the Lockheed Sanders Model Number 8202761 Single Pole, Double Throw PIN-Diode Switch. This document is not a substitute for the American Microwave standard test procedures. This procedure is only to be performed by a test technician experienced in the testing of RF and microwave devices.

2.0 EQUIPMENT LIST

The following equipment is to be used in conjunction with this Acceptance Test Procedure (ATP) provided that all said equipment has displayed a valid calibration notice that can be traced to the National Institute of Standards and Technologies (NIST).

TEST OF APPROVED TEST EQUIPMENT

ITEM NO:	ITEM	MANUFACTURER	MODEL NUMBER
1	RF Source	Hewlett Packard	8350B
1 a	RF Source, Plug-In	Hewlett Packard	83692B
2	Power Meter (see note 1)	Hewlett Packard	436A
2 a	Power Meter, RF Sensor	Hewlett Packard	8481A
3	Power Supply	Hewlett Packard	721A
4	Termination, 50 ohm (2 needed)	Mid-West	2444
5	Power Supply	Hewlett Packard	721A
6	Detector	Hewlett Packard	11664A
7	Network Analyzer	Hewlett Packard	8757A
8	VSWR Bridge	Hewlett Packard	85027E
9	Multimeter (see note 1)	Beckman	DM25
10	Calibrated Short/Open	Wiltron	22KF50
11	Pulse Generator	Hewlett Packard	8013B
12	Oscilloscope	Tektronix	485
13	Signal Generator (2 items needed)	Hewlett Packard	618 C
14	Double Balanced Mixer	Vari-L	dBm-1800
15	Spectrum Analyzer	Hewlett Packard	8559A

Note 1: Further to paragraph 1.0, this test procedure assumes a rudimentary knowledge of testing techniques. The test equipment referenced to this note are listed as acceptable for measuring required voltages and output power for verification purposes.

3.0 INSERTION LOSS

3.1 Normalization of the test measurement system.

3.1.1 Connect the test equipment as in Figure I with swept frequencies set per Table I and RF Power Level to 0 dBm.

Figure I

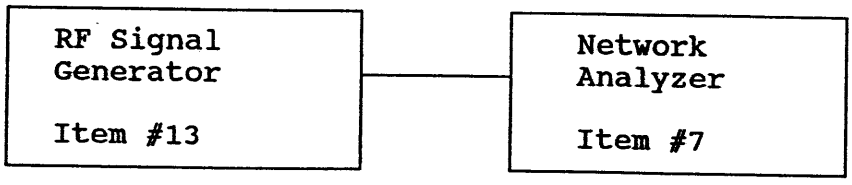


TABLE I
(For Insertion Loss, Insolation and VSWR Tests)

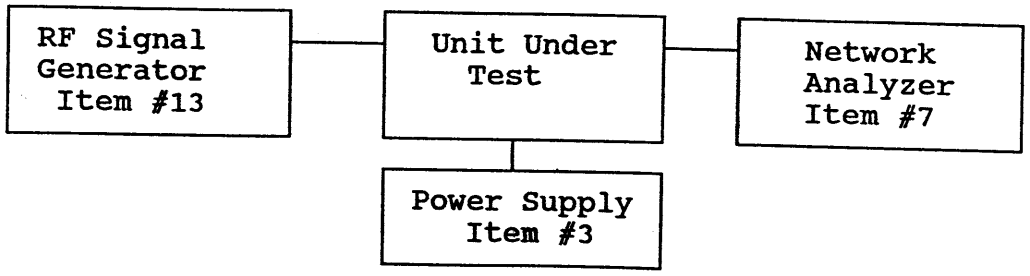
Lockheed Sander's Spec No:	Start Frequency GHz	Stop Frequency GHz
8202761	8.0	18.0

3.1.2 Store the through line reference level in the internal memory of the Network Analyzer.

3.2 Measurement of the Unit Under Test (UUT).

3.2.1 Connect the test equipment and the UUT as in Figure II with common port (J1) as RF input and (J2) as RF output. Set RF power level to +0 dBm. Make this test with UUT at 25°C, -40°C, and +85°C.

Figure II



3.2.2 Apply the appropriate TTL Logic Code to the UUT via the Table II.

Table II

Lockheed Sander's Spec No:	Control Signal (J4)	Path On	Path Off
8202761	Logic "1"	J1 - J2	J1 - J3
8202761	Logic "0"	J1 - J3	J1 - J2

3.2.3 Observe and record on Test Data Sheet IV the maximum insertion loss displayed on the Network Analyzer.

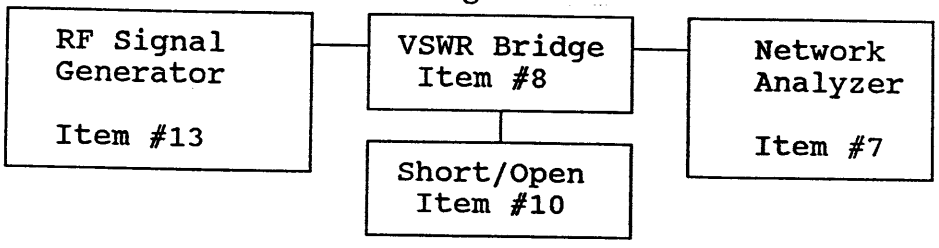
3.2.4 Repeat 3.2.1, 3.2..2, and 3.2.3 for J1 to J3 Path.

4.0 VSWR

4.1 Normalization of the test measurement system.

4.1.1 Connect the equipment as shown in Figure III with the calibrated short connected to the VSWR bridge. Set RF power level to +0 dBm.

Figure III



4.1.2 Connect the equipment as shown in Figure III with the calibrated open connected to the VSWR bridge.

4.1.3 Store the open circuit reference data in the internal memory of the Network Analyzer.

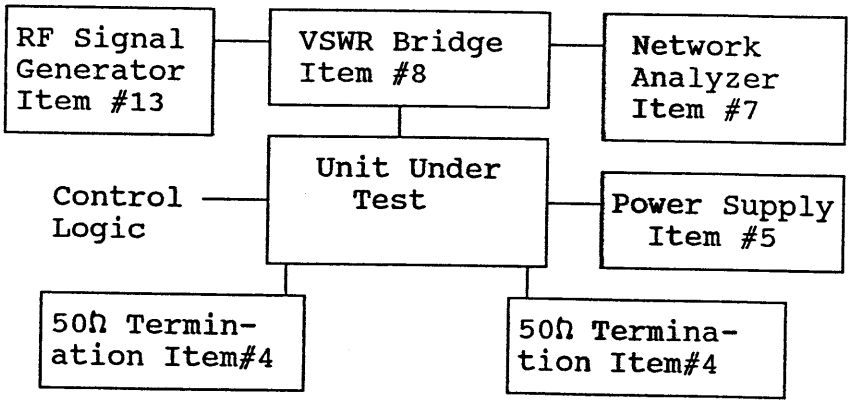
4.1.4 Connect the equipment as shown in Figure III with the calibrated short connected to the VSWR bridge.

4.1.5 Store the short circuit reference data in the internal memory of the Network Analyzer.

4.2 Measurement of the input VSWR of the UUT.

4.2.1 Connect the UUT and the equipment as shown in Figure IV with common port(J1) RF input and terminate J2 and J3 output ports into 50Ω load.

Figure IV



4.2.2 Enable the RF path from common port(J1) to the J2 output port by applying the proper logic word to the switch.

4.2.3 Observe and record the maximum VSWR shown on Test Data Sheet II for the path selected.

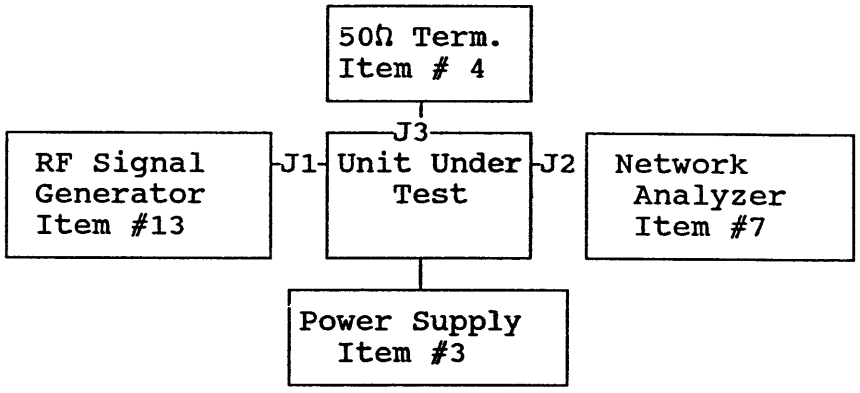
4.2.4. Repeat 4.2.1, 4.2.2, and 4.2.3 for the J1 to J3 path.

5.0 ISOLATION (RF signal on/off ratio)

5.1 Normalization of the test measurement system

5.1.1 Set up the equipment and the UUT as shown in Figure V with common port (J1) connected to the RF signal generator, output (J2) connected to the Network Analyzer, and a 50Ω termination connected to the unused RF port (J3) on the UUT. Set RF power level to +0 dBm.

Figure V



5.1.2 Enable the RF common path through output by applying the proper logic control to the module.

5.1.3 Store the displayed insertion loss in the internal memory of the Network Analyzer.

5.2 Measurement of Isolation

5.2.1 Disable the selected path and record the minimum isolation on Test Data Sheet II.

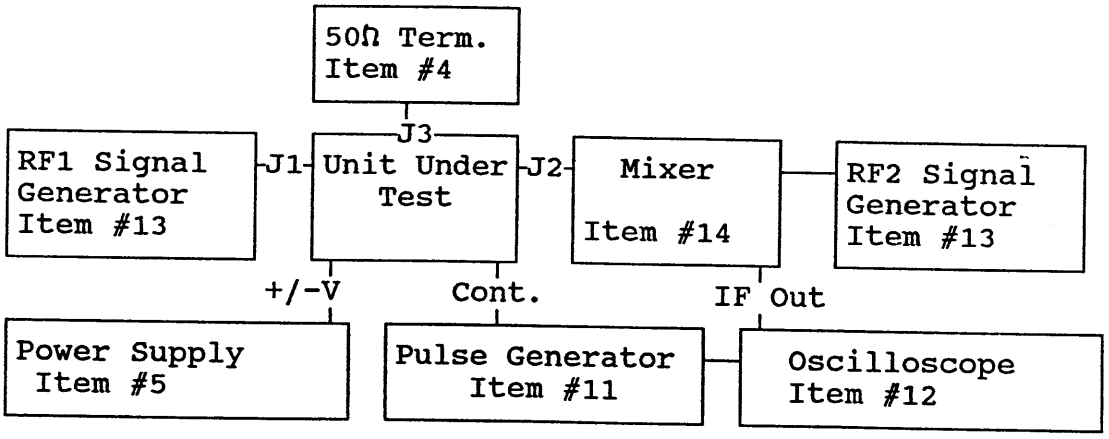
5.2.2 Repeat 5.1.1 through 5.2.1 for J1 to J3 path.

6.0 SWITCHING SPEED CHARACTERISTICS AND VIDEO LEAKAGE/TRANSIENTS

6.1 Measurement of switching speed characteristics.

6.1.1 Set up the equipment as shown in Figure VI with common port (J1) connected to RF1 and the J2 port connected to the Mixer. RF1 and RF2 are 200 MHz apart CW frequencies in the switch pass band (Example: RF1 = 8 GHz, RF2 = 8.20 GHz). Terminate port J3 into a 50Ω termination. Adjust the pulse width on the pulse generator to a 1 μsec TTL "high" and a 1 μsec TTL "low".

Figure VI



6.1.2 Pulse from off to on position and vise versa by connecting the pulse generator to the control logic inputs.

6.1.3 Delay time measurement (Off to On)

6.1.3.1 Measure the IF frequency <u>on</u> time by observing the time delay between the 50% voltage point of the pulsed TTL drive input and the 95% voltage point of the on going IF output (i.e. 90% RF power). Record the time delay on Test Data Sheet I.

6.1.3.2 Repeat 6.1.1, 6.1.2, 6.1.3, and 6.1.3.1 for J1 to J3 path.

6.1.4 Rise/Fall Time Measurement

6.1.4.1 With J1 to J2 path selected, change Scope time scale to high resolution for better viewing and measure the IF Frequency rise time by observing the time delay between the 33% voltage (10% power) to 95% voltage (90% power) of the on going IF output. Record the rise time on Test Data Sheet I.

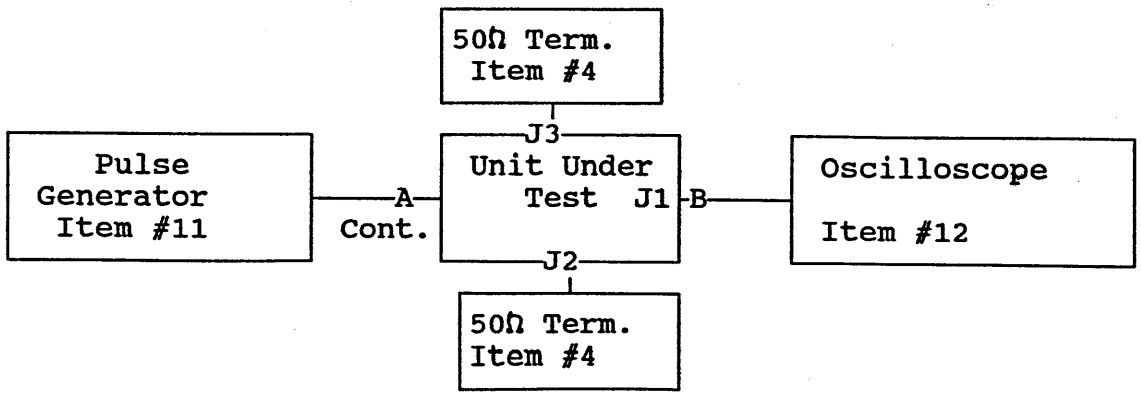
6.1.4.2 Measure the IF frequency fall time by observing the time delay between the 95% voltage (90% power) to 33% voltage (10% power) of the off going IF output. Record the fall time on Test Data Sheet I.

6.1.5 Repeat 6.1.4.1 and 6.1.4.2 for J1 to J3 path.

6.1.6 Video Transients

Setup equipment as shown in Figure VII with vertical set to 0.5 volts/division and the sweep speed set to 5 microseconds per division on the Oscilloscope. Connect control to point A and J1 RF port to point B. Attach a 50 Ohm termination to all unused RF ports (J2 and J3).Apply a TTL High to control input. Adjust pulse generator to obtain a 0 volt to +5 volt square wave, 100 KHZ repetition rate. Observe the video transients on the screen of the oscilliscope. Record the peak-to-peak transient voltage on Data Sheet I. Repeat procedure for J2 and J3 RF ports.

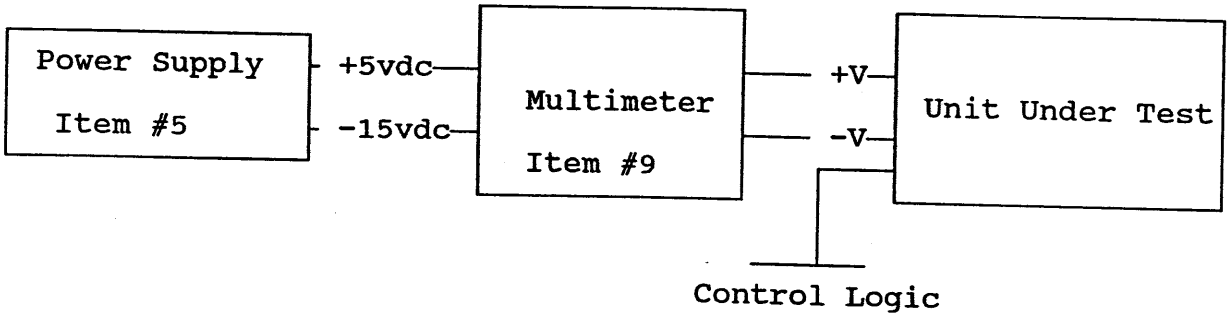
FIGURE VII



7.0 D.C. POWER MEASUREMENT

7.1 Set up equipment as shown in Figure VIII.

Figure VIII



7.2 With all logic combinations applied to the switch control terminals, measure the maximum current I1 and I2. Record on Test Data Sheet II.

8.0 Pulse width range/PRF range

8.1 Set up the equipment as shown in Figure VI with Common Port J1 connected to RF1 and J2 output Port connected to the Mixer; RF1 and RF2 are 200 MHZ apart. CW frequency is in switch pass-band (Example: RF1 = 8 GHZ; RF2 = 8.2 GHZ). Terminate Port J3 into 50 OHM termination. Narrow the pulse width on the pulse generator to 100 ns with 1 μs total wave form repetition interval and observe the modulated RF pulse on the scope. The RF pulse must not compress from its steady-state conditions in ON or OFF conditions and Rising or Falling transistion shape of the pulse must remain the same as the pulse width narrows to 100ns, if so, enter Pass on Test Data Sheet III and repeat for J3 Port.

8.2 With equipment set per paragraph 8.1 set pulse shape to square wave and vary the pulse repetition rate from 10 HZ to 1 MHZ repetition rate and observe the RF pulse detected. The RF pulse must not compress or change shape on the leading and trailing edge of the envelope detected, if so enter pass in Test Data Sheet III.

9.0 Visual Inspection

9.1 Quality Assurance will visually inspect each unit and compare them to the outline drawing. Outline Drawing, Lockheed SCD No: 28202761 (attached as on Page 15) The physical dimensions, connector locations and connector types to be examined and recorded on Test Data Sheet III. Only when this inspection is complete will the inspector then complete a certificate of compliance for all of the units.

Drawing No: 100-3587
Revision: B

Lockheed Sanders
Model No: 8202761
Test Data Sheet I

Serial Number: _____

Technician: _____
Dated: _____

Approved: _____
Dated: _____

6.1.3 SWITCHING TIME (Delay time)

RF Path Common To	Delay ON ns	Delay OFF ns	Specified Time ns	PASS Y/N
J2			60 Max.	
J3			60 Max.	

6.1.4 SWITCHING TIME (Rise/Fall)

RF Path Common To	Rise ns	Fall ns	Specified Spec		PASS Y/N
			Rise ns	Fall ns	
J2			10 Max.	15 Max.	
J3			10 Max.	15 Max.	

6.1.6 VIDEO TRANSIENTS (PEAK - PEAK VOLTAGE, 50 OHM SYSTEM)

Tested Port	Measured Peak - Peak Voltage (mV)	Specified Video Transient Voltage(mV)	PASS Y/N
J1		20 Max. P-P	
J2		20 Max. P-P	
J3		20 Max. P-P	

Drawing No: 100-3587
Revision: B

Lockheed Sanders
Model No: 8202761
Test Data Sheet II

Serial Number: _____

Technician: _____
Dated: _____

Approved: _____
Dated: _____

Frequency: Start: 8.0 GHz For VSWR and Isolation Tests
Stop : 18.0 GHz

PARA.
7.0 DC Power

DC Power	Measured Current	Specified Limit	Pass Y/N
+5 VDC		250mA Max.	
-15 VDC		100mA Max.	

PARA.
4.0 INPUT VSWR:

Enabled RF Path Common J1 To	Measured Input Maximum VSWR	Specified Input VSWR	PASS Y/N
J2		2.0:1 Max.	
J3		2.0:1 Max.	

PARA.
5.0 ISOLATION:

"OFF" RF Path Common J1 To	Measured Isolation Minimum	Specified Isolation	PASS Y/N
J2		60 dB min	
J3		60 dB min	

Drawing No: 100-3587
Revision: B

Lockheed Sanders
Model No: 8202761
Test Data Sheet IV

Serial Number: _____

Technician: _____
Dated: _____

Approved: _____
Dated: _____

Frequency: Start: 8.0 GHz For Insertion Loss Tests
Stop : 18.0 GHz

PARA.
3.0 INSERTION LOSS @ +25°c:

Enabled RF Path: Common (J1) To	Maximum Measured Insertion Loss	Specified Insertion Loss	Pass Y/N
J2		3.0dB Max.	
J3		3.0db Max.	

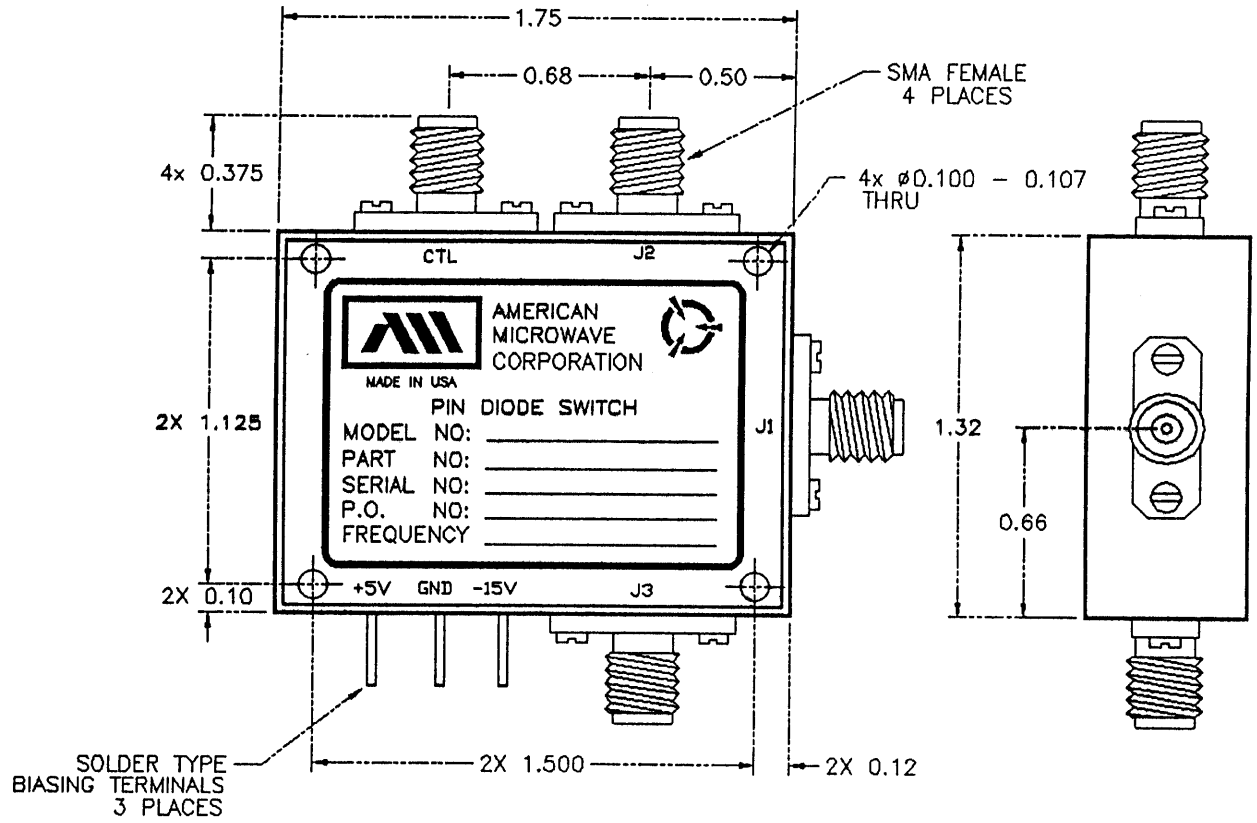
PARA.
3.0 INSERTION LOSS @ -40°c:

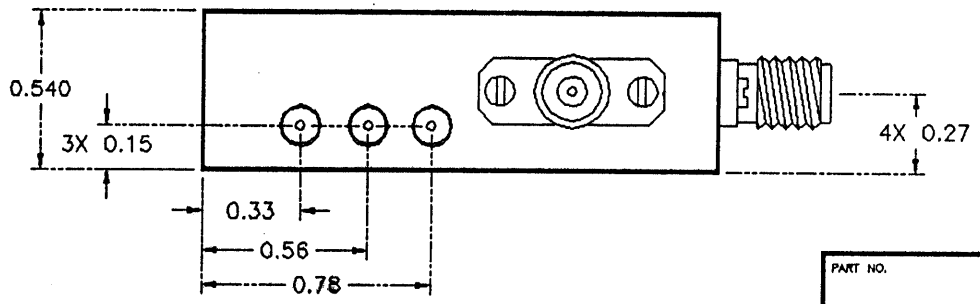
Enabled RF Path: Common (J1) To	Maximum Measured Insertion Loss	Specified Insertion Loss	Pass Y/N
J2		3.0dB Max.	
J3		3.0db Max.	

PARA.
3.0 INSERTION LOSS @ +85°c:

Enabled RF Path: Common (J1) To	Maximum Measured Insertion Loss	Specified Insertion Loss	Pass Y/N
J2		3.0dB Max.	
J3		3.0db Max.	

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
	A	ORIGINAL RELEASE	10/24/94	





PART NO.	
APPROVALS	DATE
DRAWN WSP	10/24/94
CHECKED	
ISSUED	

AMERICAN MICROWAVE CORPORATION
FREDERICK, MARYLAND

TITLE
OUTLINE
SW–2TDR–LS1
TO LOCKHEED SANDERS SCD 8202761

SIZE	FSCM NO.	DWG NO.	REV.
A	60483	100–3588	A

SCALE 1.5:1 SHEET 1 of 1