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QUALIFICATION

TEST PROCEDURE (QTP)

FOR

WESTINGHOUSE

MODEL NUMBER PDS24433

SINGLE POLE, SEVEN THROW

PIN DIODE SWITCH

Drawing Number: 100-2237

Revision: A

AMC Drawing Number:100-2237
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1.0 SCOPE

The purpose of this document is to provide an electrical testing procedure for the Westinghouse model number PDS24433 single pole, seven throw PIN diode switch. This document is not a substitute for the American Microwave standard test procedures.

2.0 EQUIPMENT LIST

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

TABLE OF APPROVED TEST EQUIPMENT

SN	ITEM	MANUFACTURER	MODEL NUMBER
1	RF Source	Hewlett Packard	8350B
2	Isolator	Addington Labs	Appropriate for Frequency
3	Power Meter	Hewlett Packard	436A
4	Power Supply	Hewlett Packard	721A
5	Termination, 50 ohm	Mid-West	2444
6	Power Supply	Hewlett Packard	721A
7	Detector	Hewlett Packard	11664A
8	Network Analyzer	Hewlett Packard	8757A
9	VSWR Bridge	Hewlett Packard	85027E
10	Voltmeter	Beckman	DM25
11	Calibrated Short/Open	Wiltron	
12	Attenuator, fixed, Sma 3 dB, 6 dB, 10 dB, 20 dB	Mid-West Microwave	Appropriate for attenuation range
13	Printer	Hewlett Packard	Think Jet
14	Pulse Generator	Hewlett Packard	8013B
15	Oscilloscope	Tektronix	485
16	Signal Generator	Hewlett Packard	618 C
17	Double Balanced Mixer	Vari-L	DBM-1800
18	Low Pass Filter, 20 Mhz	Mini-Circuits	TBD
19	PDS24433 drive module	AMC	SK-321
20	Signal Generator	Hewlett Packard	618-B

table i

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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 to: START = 1.215 GHz, STOP = 1.400 GHz.

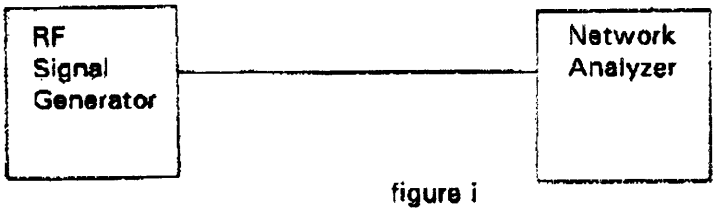

figure i

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

3.2 Measurement of the insertion loss of the Unit Under Test (UUT).

3.2.1 Connect the test equipment and the UUT as in figure ii with J8 as RF input and J1 as RF output.

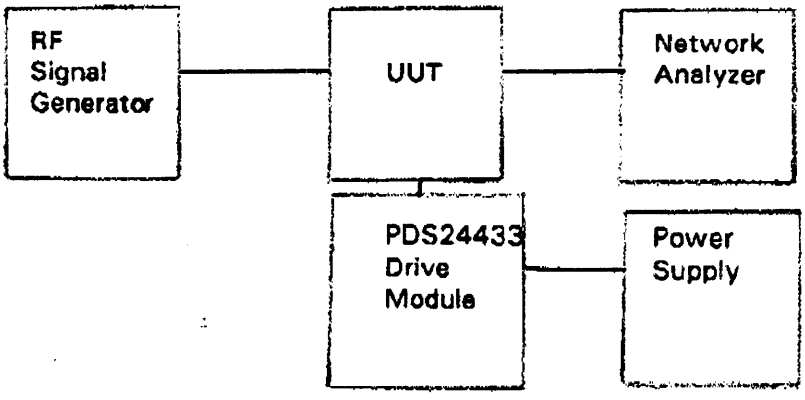

figure ii

3.2.2 Apply the Digital code of 000 to the UUT via the PDS24433 drive module (SN 19 on the approved equipment list).

3.2.3 Observe and record on Test Data Sheet I the maximum and minimum insertion losses displayed on the Network Analyzer.

3.2.4 Repeat 3.2.1 through 3.2.3 for RF outputs J2 through J7 using the control codes listed in table ii.

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3-BIT CONTROL CODE	RF PORT ENABLED J8 IS COMMON PORT
000	J1
001	J2
010	J3
011	J4
100	J5
101	J6
110	J7
111	NOT USED

table ii

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.

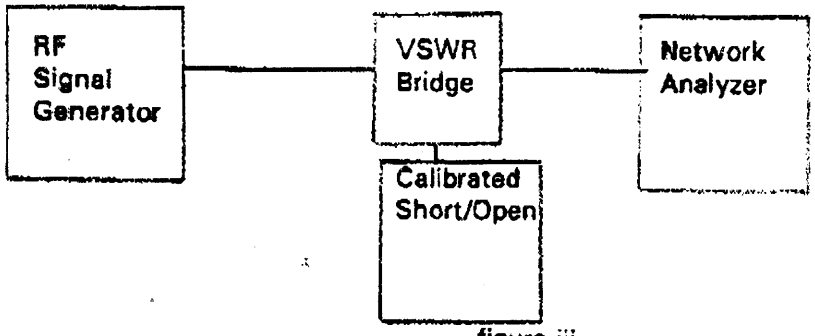

figure iii

4.1.2 Store the Short circuit reference in the internal memory of the Network Analyzer.

4.1.3 Connect the equipment as shown in figure iii with the calibrated open connected to the VSWR bridge.

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

4.1.5 Connect the equipment as shown in figure iii with the calibrated short connected to the VSWR bridge.

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

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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 Rf input J8 connected to the VSWR bridge and a 50 Ω terminated connected to J1.

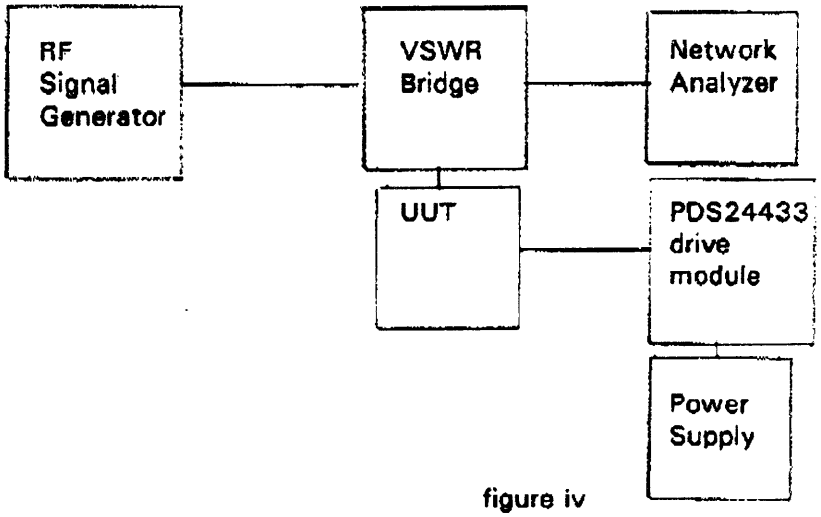

figure iv

4.2.2 Enable the RF path J8 to J1 by applying a logic 000 to the PDS24433 drive module.

4.2.3 Observe and record the maximum VSWR shown on test data sheet I.

4.2.4 Repeat 4.2.1 through 4.2.3 for RF outputs J2 through J7 per table ii.

4.3 Measurement of the output VSWR of the UUT.

4.3.1 Connect the UUT and the equipment as shown in figure iv with RF output J1 connected to the VSWR bridge and a 50 Ω termination connected to J8.

4.3.2 Enable the RF path J1 to J8 by applying a logic 000 to the PDS24433 drive module.

4.3.3 Observe and record the maximum VSWR shown on test data sheet I.

4.3.4 Repeat 4.3.1 through 4.3.3 for RF outputs J2 through J7 per table ii.

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 J8 connected to the RF signal generator, J1 connected to the Network Analyzer, and a 50 Ω termination connected to the unused RF ports on the UUT.

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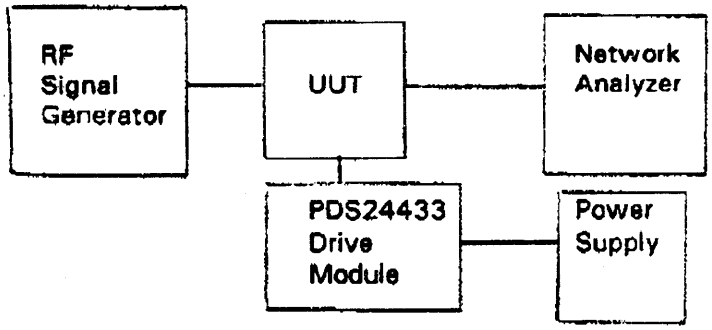

figure v

5.1.2 Enable the RF path J1 through J8 by applying a logic 000 to the PDS24433 drive 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 RF path J1 to J8 by an adjacent RF path, in this case the J8 to J2 path is appropriate.

5.2.2 Observe and record the minimum Isolation on test data sheet I.

5.2.3 Repeat 5.1 through 5.2.2 for RF ports J2 through J7 per table ii.

6.0 Switching Speed

6.1 Measurement of switching speed.

6.1.1 Set up the equipment as shown in figure vi with J8 connected to RF 1 and J1 connected to the Mixer. Terminate all unused ports in a 50 Ω termination. Adjust the pulse width on the pulse generator to 10 μsec TTL "high" and 10 μsec TTL "low".

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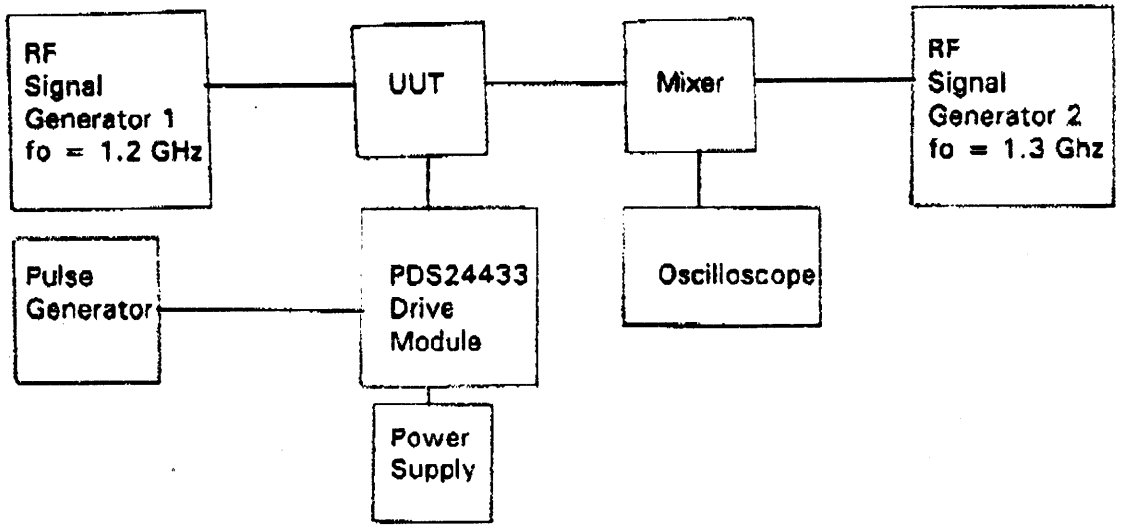

figure vi

6.1.2 Toggle between the J8 to J1 port and an adjacent RF port, in this case J8 to J2, by applying alternating enabling codes of 000 and 001 to the PDS24433 drive module.

6.1.3 Measure the RF on 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 RF output (90% RF power). Record the on time on test data sheet I.

6.1.4 Measure the RF off time by observing the time delay between the 50% voltage point of the pulsed TTL drive input and the 32% voltage point of the off going RF output (10% RF power). Record the off time on test data sheet I.

6.1.5 Repeat 6.1.1 through 6.1.5 for RF ports J2 through J7 per table ii.

7.0 Switching Transients

7.1 Measurement of switching transients, J1 through J7

7.1.1 Set up the equipment as shown in figure vii with J1 connected to the input of the oscilloscope. Terminate all other RF ports in 50 Ω. Adjust the Repetition rate on the pulse generator to 50 kHz.

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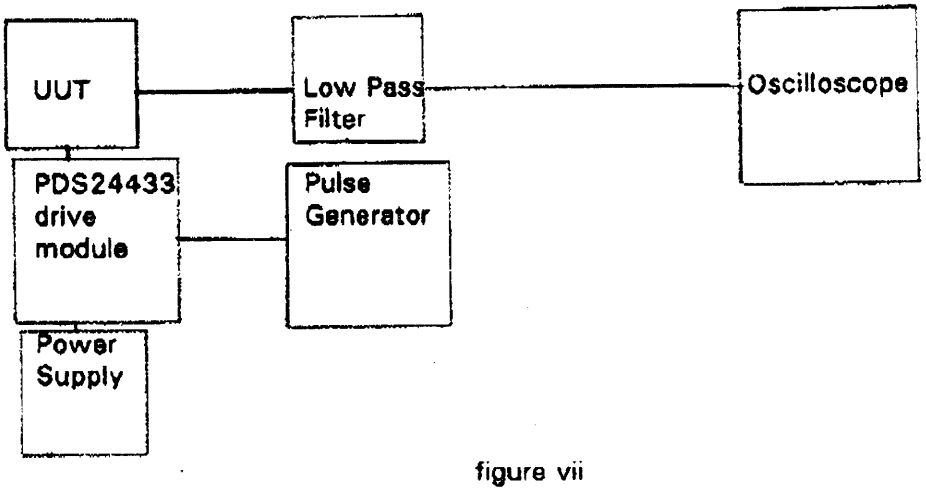

figure vii

7.1.2 Toggle between the J1 port and an adjacent port, in this case J2, by applying alternating enabling codes of 000 and 001 to the PDS24433 drive module.

7.1.3 Observe and record the peak to peak video spike voltage on test data sheet i.

7.1.4 Repeat 7.1.1 through 7.1.3 for RF ports J2 through J7.

7.2 Measurement of switching transients, J8

7.2.1 Set up the equipment as shown in figure vii with J8 connected to the input of the oscilloscope. Terminate all other RF ports in 50 Ω. Adjust the Repetition rate of the pulse generator to 50 kHz.

7.2.2 Toggle between the enabling code of 000 and 111 on the PDS24433 drive module.

7.2.3 Observe and record the peak to peak video spike voltage on test data sheet i.

8.0 RF Power test

8.1 Normalization of the test measurement system.

8.1.1 Set up the equipment as shown in figure viii.

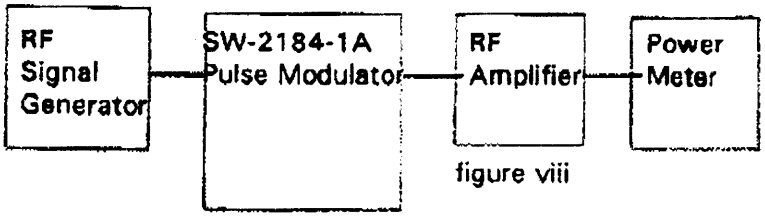

figure viii

8.1.2 With the pulse modulator at insertion loss, adjust the CW RF power at the power meter to 1.2 Watts. Note: an attenuator should be used on the power meter to protect

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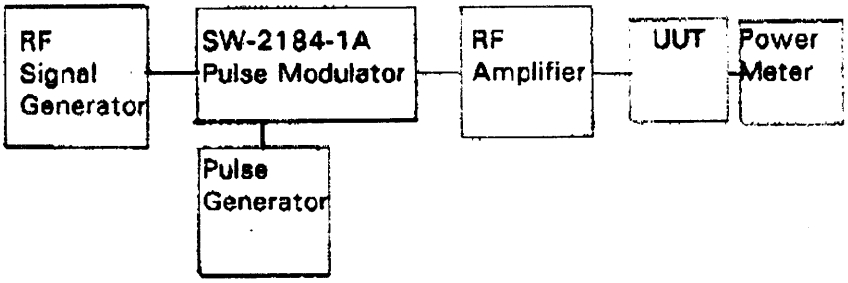
the power head.

8.2 Application of RF power

8.2.1 Set up the equipment as shown in figure ix with the pulse generator adjusted for 150 μsec TTL "High" and _____ TTL "Low".



8.2.2 With the UUT un-powered, apply the Pulsed power for a duration of 5 minutes.

8.2.3 Select the J8 - J1 RF path by applying a 000 to the PDS24433 drive module.

8.2.4 Apply the pulsed power for a duration of 5 minutes.

8.2.5 Repeat 8.2.3 and 8.2.4 for arms J2 through J7 per table ii.

8.3 Test for degradation of performance after power.

8.3.1 Repeat 3.0 (Insertion loss) recording data on test data sheet I.

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Westinghouse
PDS24433
Test Data Sheet I

Serial Number_____ Technician:_____

Dated:_____

Approved:_____

Dated:_____

Frequency: 1.215 GHz to 1.400 GHz

DC Power: +20 VDC @ 215 mA MAX
-20 VDC @ 35 mA MAX

3.2.3 Insertion loss:

Enabled RF Path J8 TO	Maximum Measured Insertion loss	Minimum Measured Insertion loss	Specified Insertion Loss	PASS Y/N
J1			TBD +/- 1.0	
J2			TBD +/- 1.0	
J3			TBD +/- 1.0	
J4			TBD +/- 1.0	
J5			TBD +/- 1.0	
J6			TBD +/- 1.0	
J7			TBD +/- 1.0	

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Westinghouse
PDS24433
Test Data Sheet I

Serial Number_____ Technician:_____

Dated:_____

Approved:_____

Dated:_____

4.2.3 Input VSWR

Enabled RF Path J8 to	Measured Input VSWR	Specified Input VSWR	Pass Y/N
J1		1.5:1	
J2		1.5:1	
J3		1.5:1	
J4		1.5:1	
J5		1.5:1	
J6		1.5:1	
J7		1.5:1	

4.3.3 Input VSWR

Enabled RF Path __ to J8	Measured Output VSWR	Specified Output VSWR	Pass Y/N
J1		1.5:1	
J2		1.5:1	
J3		1.5:1	
J4		1.5:1	
J5		1.5:1	
J6		1.5:1	
J7		1.5:1	

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Westinghouse
PDS24433
Test Data Sheet I

Serial Number_____ Technician:_____

Dated:_____

Approved:_____

6.1.3 Switching Speed

Measured port J8 to	Measured "on" time (80% TTL to 95% RF Voltage)	Specified "on" time	Measured "off" time (50% TTL to 32% RF Voltage)	Specified "off" time	Pass Y/N
J1		1 μs		1 μs	
J2		1 μs		1 μs	
J3		1 μs		1 μs	
J4		1 μs		1 μs	
J5		1 μs		1 μs	
J6		1 μs		1 μs	
J7		1 μs		1 μs	

7.1.3 Switching Transients J1 through J7

Toggled RF port	Measured peak to peak Video transients	Specified peak to peak Video transients	Pass Y/n
J1		100 mV	
J2		100 mV	
J3		100 mV	
J4		100 mV	
J5		100 mV	
J6		100 mV	
J7		100 mV	

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Test Data Sheet I

Serial Number_____ Technician:_____

Dated:_____

Approved:_____

8.3.1 Degradation of Insertion loss:

Enabled RF Path J8 TO	Maximum Measured Insertion loss	Minimum Measured Insertion loss	Specified Insertion Loss	PASS Y/N
J1			TBD +/- 1.0	
J2			TBD +/- 1.0	
J3			TBD +/- 1.0	
J4			TBD +/- 1.0	
J5			TBD +/- 1.0	
J6			TBD +/- 1.0	
J7			TBD +/- 1.0	