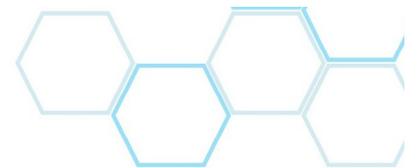


Automatic Test Solution of Multi-port Devices



TRANSCOM
INSTRUMENTS

Automatic Test Solution of Multi-Port Devices

[Abstract] With increasingly severe competition in the mobile communication manufacturing industry, what seems important to win is to improve production efficiency and reduce production costs. The solution in the paper can help to effectively solve the problems of manufacturers.

[Keywords] Vector network analyzer RF switch matrix multiple purposes

Port Extender Switch-for VNA

The Port Extender Switch-for VNA, developed by Shanghai TRANSCOM Instruments Co., Ltd., offers models of 2×8 , 2×10 , 2×12 , etc., and can realize full cross connection. The standing wave ratio of the ports is less than 1.2, and the port isolation is up to 85dB.



Fig. 1: RSM High-performance RD Switch Matrix

Main Technical Parameters

Measurement Port	
Impedance	50Ω
Connector	N-type, female SMA-type, female
Maximum Input Power	2 W
Maximum Output Power	1 W
Maximum Control Voltage	26V DC
Electrical Parameters	
Frequency Range	DC to 9GHz
Insertion Loss	0.6dB to 1.2dB
Isolation	75dB to 100dB, 85dB Typ.
Standing Wave Of Port	1.2 typ.
Control Voltage	24VDC
Control Current	85~125mA
Switch life	0.1W: 100 million times 1W: 10 million times (The switch life is the limit in the case of routine maintenance.)
Matching load	Built-in matching load
Operating Environment	
Operating temperature	-15°C to +45°C
Storage temperature	-15°C to +45°C
System power supply	220 ± 22 V (AC), 50/60 Hz; 70W
Size & Weight	
Dimensions (W×H×D)	438mm × 100mm × 360mm
Weight	7 kg
Remote control	
USB interface	USB (Type B)-Female, used for switch control.

Automatic Test Solution of Multi-port Devices

The automatic test system to measure the parameter S of the multi-port RF microwave device is formed by combining RSM and the two-port vector network analyzer and can be used to test the TD-LTE/TD 9-port smart antenna, 6-port mobile terminal antenna, multi-port filter, duplexer, multiplexer, coupler and power divider. The LTE-TD/TD 9-port smart antenna is taken as an example below.

Automatic Test System of TD-LTE/TD 9-port Smart Antenna

Introduction to TD- LTE/TD 9-port Smart Antenna

The TD-LTE/TD is developed with the multi-array and multi-beam smart antenna technology. The typical TD-LTE/TD smart antenna is equipped with nine unit ports, including one calibration port in the middle and eight antenna unit ports. The calibration port is used to calibrate the phase difference between each receiving (transmitting) channel and antenna aperture in the actual application of the smart antenna matrix, and eight antenna unit ports are respectively connected to the receiver/transmitter channel of the base station.



Fig. 1: Nine-port Single-pole TD Smart Antenna



Fig. 2: Nine-port Double-pole TD Smart Antenna

I. Test indicators of nine-port single-pole TD smart antenna:

1. Standing wave of ports:

S_{11} , S_{22} , S_{33} , S_{44} , S_{55} , S_{66} , S_{77} , S_{88} and S_{00} .

2. Isolation degree of adjacent ports:

S_{12} , S_{23} , S_{34} , S_{45} , S_{56} , S_{67} and S_{78} .

3. Amplitude and phase consistency of calibration port and unit ports:

$Mag|S_{10}|$, $|Mag|S_{20}|$, $M ag|S_{30}|$, $M ag|S_{40}|$, $Mag|S_{50}|$, $M ag|S_{60}|$, $M ag|S_{70}|$, $M ag|S_{80}|$, $Pha|S_{10}|$, $Pha|S_{20}|$, $Pha|S_{30}|$, $Pha|S_{40}|$, $Pha|S_{50}|$, $Pha|S_{60}|$, $Pha|S_{70}$ | and $Pha|S_{80}|$.

II. Test indicators of nine-port double-pole TD smart antenna:

1. Standing wave of ports:

S_{11} , S_{22} , S_{33} , S_{44} , S_{55} , S_{66} , S_{77} , S_{88} and S_{00} .

2. Isolation degree of cell ports of the same pole:

S_{12} , S_{13} , S_{14} , S_{23} , S_{24} , S_{34} ; S_{56} , S_{57} , S_{58} , S_{67} , S_{68} and S_{78} .

3. Isolation degree of cell ports of different poles:

In the same row: S_{15} , S_{26} , S_{37} and S_{48} ; S_{16} and S_{17} .

In different rows: S_{18} , S_{25} , S_{27} , S_{28} , S_{35} , S_{36} , S_{38} , S_{45} , S_{46} and S_{47} .

4. Amplitude and phase consistency of calibration port and unit ports:

$Mag|S_{10}|$, $|Mag|S_{20}|$, $M ag|S_{30}|$, $M ag|S_{40}|$, $Mag|S_{50}|$, $M ag|S_{60}|$, $M ag|S_{70}|$, $M ag|S_{80}|$; $Pha|S_{10}|$, $Pha|S_{20}|$, $Pha|S_{30}|$, $Pha|S_{40}|$, $Pha|S_{50}|$, $Pha|S_{60}|$, $Pha|S_{70}|$ and $Pha|S_{80}|$.

According to the above analysis results, the parameter S of the nine-port TD antenna can be measured by 28-49 steps with the two-port vector network analyzer. The workload is large, the troublesome operation may easily result in errors, and the test accuracy cannot be guaranteed. If the network analyzer of nine ports or more is used, the instrument price is high and the production cost will not be accepted easily. The automatic test solution of RSM and two-port vector network analyzer is the best solution to test the multi-port TD smart antenna.

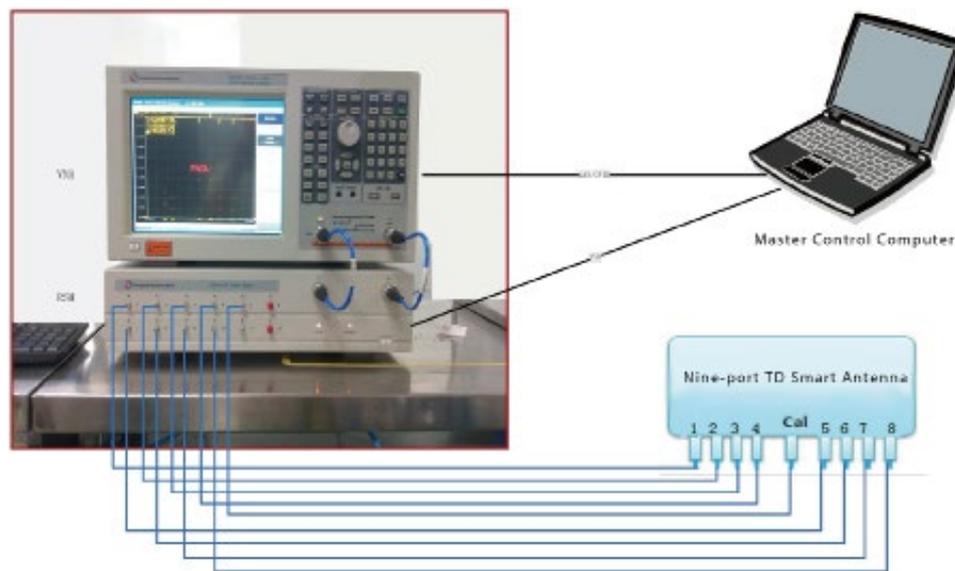


Fig. 3-3: Structural Diagram of Automatic TD Antenna Test System with RSM and Two-port Vector Network Analyzer

As shown in the above diagram, the nine-port TD antenna can be tested only by connecting nine ports to the corresponding ports of RSM with RF cables, and the parameter S of the antenna can be automatically tested by VNA (vector network analyzer) and RSM (RF switch matrix) controlled by the master computer.

System features:

The parameter S of the antenna can be tested automatically by one-time connection.

The labor intensity and time of test can be reduced, and the production efficiency can be increased.

RSM is equipped with a matching load. The free port can be automatically connected to the matching load to ensure the accuracy and consistency of test results.

Test results will be saved automatically, and the production and test reports can be made according to the custom template.

Conclusion

The RSM (RF switch matrix) can help to effectively eliminate the conflict caused by a few ports of the vector network analyzer, mobile terminal test instrument, etc. and increasing ports of tested devices, and solve the problem of low rate of utilization caused by waiting for manual operation. With promotion of RSM, good economic benefits will be brought to enterprises.

Keep innovating for excellence!

About Transcom

Shanghai Transcom Instrument Co., Ltd. (NEEQ: 831961), established in 2005, independently research and develop high-end radio frequency communication testing instruments and is a professional provider of overall testing solutions. Starting from 2009, Transcom, titled as National High-Tech Enterprise and the fostered enterprise by Shanghai Little Giant Project, has undertaken the tasks of development for National "New-Generation Broadband Wireless Mobile Communication Network" and the construction of Shanghai Engineering Research Center for Wireless Communication Testing Instruments.

In 2015, Transcom officially announced its new five-year development strategy "1+3". In detail, Transcom will continue to enhance its potential to be the national team for domestic wireless communication instruments, and develop security software for mobile communication network (network communication/data mining), wireless signal (spectrum monitoring/situation analysis) and Beidou navigation (signal monitoring for satellite navigation/mobile anti-jam verification platform). The strategy has now been implemented systematically with progressive achievements in Shanghai, Guangdong and other cities.

Keep innovating for excellence!



ISO9001



ISO14001

Headquarter

6F,Buliding29,No.69 Guiqing Road,Xuhui District,SHANGHAI,PRC.200233

Tel:+86 21 6432 6888

Fax:+86 21 6432 6777

Hotline:400 6778077

Mail:info@transcom.net.cn

www.transcom.net.cn

Beijing office

Room 512,513,geology building, No.13 Peace Street, Chaoyang District, BEIJING,PRC.100013

Tel:010-84263611

Fax:010-82051758

Guangzhou office

Room 1004, Houhe building,No.77 Zhongshan Road, Tianhe District, GUANGZHOU,PRC.510630

Tel:020-38846191/38846192/ 38846190

Fax:020-38846191-603

Shenzhen office

Room 726,Lankun Building,No.213 Minkang Road, Nanshan District,SHENZHEN,PRC.518131

Tel:0755-26509997

Fax:0755-26509995

Chendu office

Room 403,Unit 1,Keller international Building 3, No.14 Ninehing Road,Hi Tech District, CHENGDU,PRC.610042

Tel:028-83227390

Fax:028-85120797

Xi'an office

Room 1101,Jiatian building 2,Kechuang Road,Yanta District,XI'AN,PRC.710065

Tel:029- 88240745

Fax:029- 88227690



company profile



wechat