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EMC TEST REPORT For FCC

Test Report No.	:	2006070008
Date of Issue	:	July 24, 2006
FCC ID	:	T5ISN-260CA
Model/Type No.	:	SN-260CA, SNA-260CA, SN-260CB, SN-260BA, SN-260DA, SN-260DB, SN-260AA, SN-260AB, SNA-260AA, SNA-260AB, MERCURY and JUPITER
Kind of Product	:	Digital Satellite Receiver
Applicant	:	Tcom Technology Co., Ltd.
Applicant Address	:	602, Chungjuk tower 546-9, Sang2-dong, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea
Manufacturer	:	Tcom Technology Co., Ltd.
Manufacturer Address	:	602, Chungjuk tower 546-9, Sang2-dong, Wonmi-gu, Bucheon-si, Gyeonggi-do, Korea
Contact Person	:	Young-Gyu Kim / Assistant Research Engineer
Telephone	:	+82-32-326-4842
Received Date	:	July 3, 2006
Test period	:	Start : July 4, 2006 End : July 6, 2006
Test Results	:	☒ **In Compliance** ☐ **Not in Compliance**

The test results presented in this report relate only to the object tested.

CTK Co., Ltd. is accredited by Korea Laboratory Accreditation Scheme (KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

Tested by

Eun-Won, Lee
EMC Test Engineer
Date: July 24, 2006

Reviewed by

James Hong
EMC Technical Manager
Date: July 24, 2006

REPORT REVISION HISTORY

Date	Revision	Page No
July 24, 2006	Issued (2006070008)	All

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1.0 General Product Description

1.0.1 Tested Equipment

☒ Unless otherwise indicated, all tests were conducted on Model SN-260CA.

☒ Tests performed on Model SN-260CA were considered to be representative of Model(s) SNA-260CA, SN-260CB, SN-260BA, SN-260DA, SN-260DB, SN-260AA, SN-260AB, SNA-260AA, SNA-260AB, MERCURY and JUPITER

1.0.2 Equipment Size, Mobility and Identification

Dimensions:	260(W) by 210(L) by 45(H)	☒ mm ☐ inch
Mobility:	☐ Hand-held ☒ Table-top ☐ Built-in	
	☐ Traveling ☐ Floor-standing	
Serial No.:	Prototype	

1.0.3 Electrical Ratings

Input:	110–120 Vac, 60 Hz
Output:	-

1.0.4 Test Voltage & Frequency

Unless indicated otherwise on the individual data sheet or test results, the test voltage and frequency was as indicated below.

Voltage:	120 Vac
Frequency:	60 Hz

1.0.5 Clock & Other Frequencies Utilized

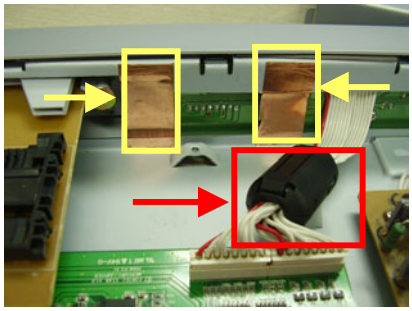
27.000 MHz

1.1 Model Differences

SN-260CA, SNA-260CA, SNA-260AA, SN-260CB, SN-260BA, SN-260DA, SN-260DB, SN-260AA, SN-260AB, SNA-260AA, SNA-260AB, MERCURY and JUPITER are identical to each other only except for model designations for the marketing purpose.

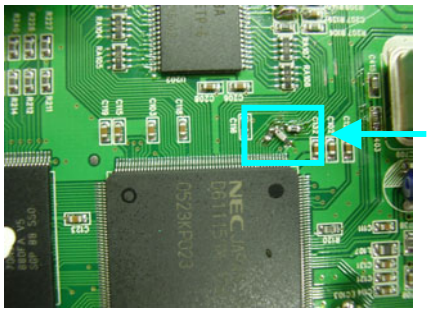
1.2 Device Modifications

The following modifications were necessary for compliance:

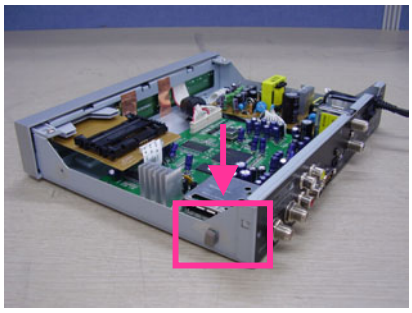


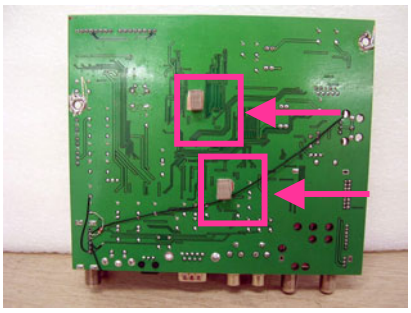
Core location	Manufacturer	Part No.
Display Cable	E-Tech Electronics Co., Ltd.	CU0930B

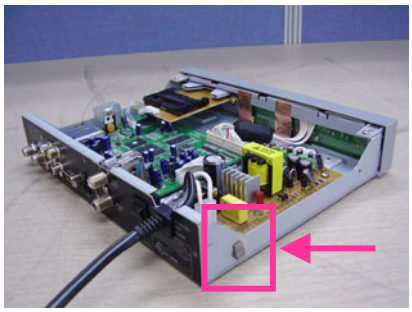
Copper Tape

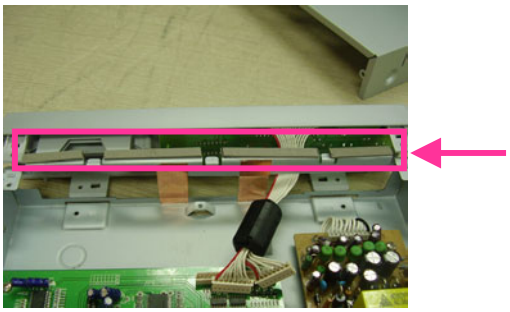


75Ω Beads and 10pF capacitor are inserted additionally in main board.









Gasket

1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Manufacturer	Model No.	Serial No.	FCC ID or DoC
CCTV Monitor	PHILIPS	LTC2814/90	-	-

☒ Cable Description

#	Description	Ferrite Core	Length (m)	Other Details
1	EUT Power Cable, Unshielded	No	1.8	Connect to AC Power
2	AC Power Cable, Unshielded	No	1.8	Connect to AC Power
3	S-Video Cable, Shielded	No	1.5	Between the EUT and CCTV Monitor
4	Audio R/L RCA Cable, Unshielded	No	1.5	Between the EUT and CCTV Monitor
5	Video RCA Cable, Unshielded	No	1.5	Between the EUT and CCTV Monitor
6	RCA Cable, Unshielded (0/12V output)	No	1.5	Unterminated (only cable)
7	RS-232C Cable, Shielded	No	1.8	Unterminated (only cable)
8	S/PDIF Output Cable, Unshielded	No	0.6	Unterminated (only cable)
9	TV Output Cable, Shielded	No	1.8	Unterminated (only cable)
10	Loop Output Cable, Shielded	No	1.8	Unterminated (only cable)
11	Antenna Input Cable, Shielded	No	20.0	Connect to the TV Test Transmitter (Analog Signal)
12	LNB Input Cable, Shielded	No	20.0	Connect to the TV Test Transmitter (Digital Signal)

1.4 Test Software

☐ EMC Test V 1.0
☐ Display Test Patterns – V1.5
☐ Ping.exe
☒ Not applicable

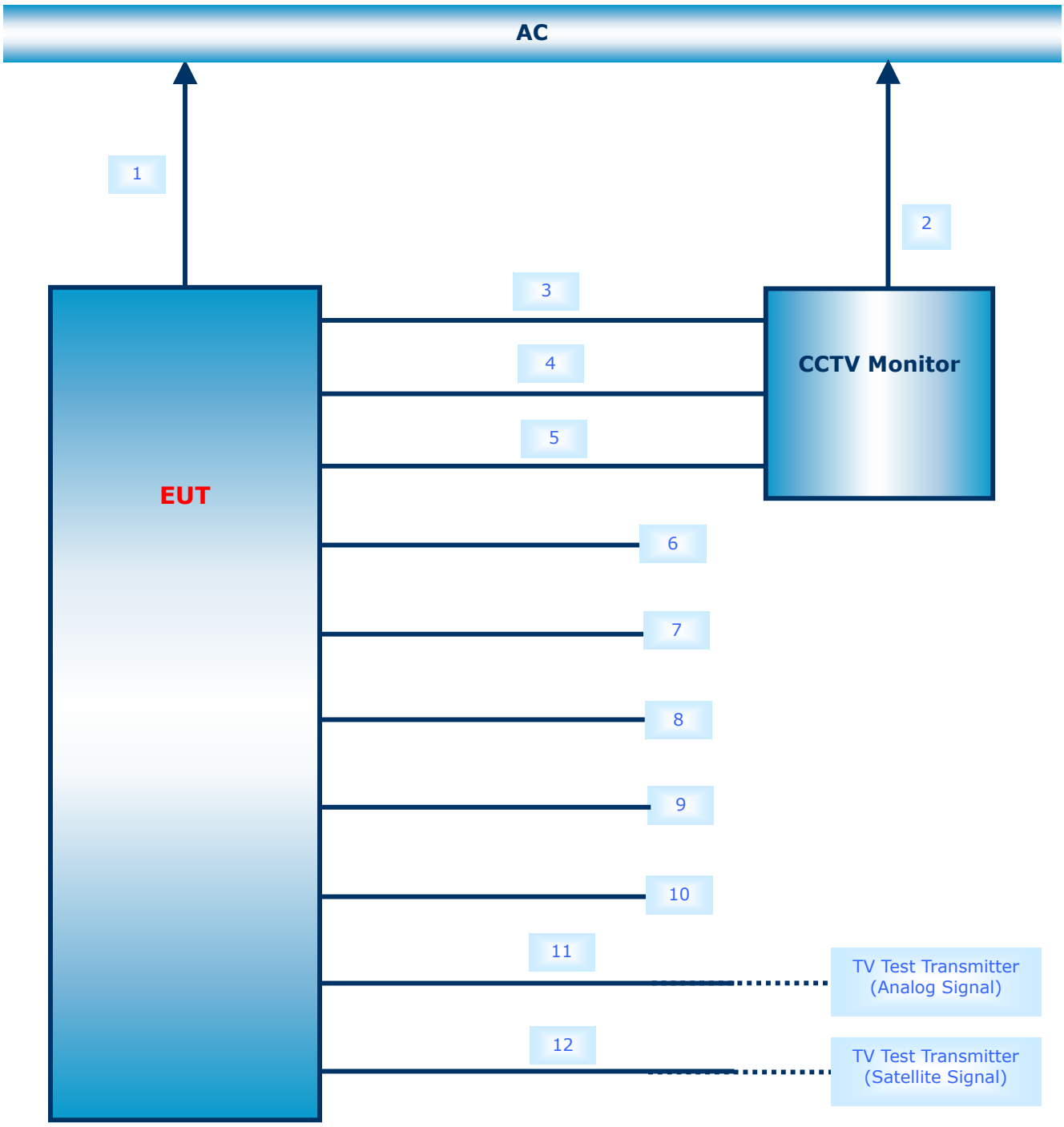
1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

☐ Standby
☐ Display circles pattern
☐ Scrolling 'H'
☐ Read / Write
☒ Practice operation – 1) Analog signal receiving mode
2) Satellite signal receiving mode

(EUT was tuned to the RF output frequency of color bar signal generator, with a standard television color bar signal according to ITU-R BT 471-1)

1.6 Configuration



1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.8 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4.

1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested.
Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)
Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Open Area Test Site. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-2003 7.2.3, 7.2.4, 8.3.1.1, 8.3.1.2

1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	**FCC**	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	93250
JAPAN	**VCCI**	10 meter Open Area Test Site and one conducted site.	R-948, C-986
KOREA	**MIC**	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	No. 51, KR0025
International	**KOLAS**	EMC	
Europe	**GLAS**	EMC EN 55011, EN 55022, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 50130-4, EN 55024, EN 61204-3, EN 60601-1-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11	No.13000796-02

2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

☐ EN 61000-6-3:2001	☐ Class A	☐ Class B
☐ EN 61000-6-4:2001	☐ Class A	☐ Class B
☐ EN 50083-2:2001		
☐ EN 55011:1998 +A1:1999	☐ Group 1 ☐ Class A	☐ Group 2 ☐ Class B
☐ EN 55011:1998 +A1:1999 +A2:2002	☐ Group 1 ☐ Class A	☐ Group 2 ☐ Class B
☐ EN 55013:1990 +A12:1994 +A13:1996 +A14:1999 ☐ EN 55013:2001		
☐ EN 55014-1:2000 ☐ EN 55014-1:2000 +A1:2001		
☐ EN 55015:2000 ☐ EN 55015:2000 +A1:2001		
☐ EN 55022:1994 +A1:1995 +A2:1997	☐ Class A	☐ Class B
☐ EN 55022:1998	☐ Class A	☐ Class B
☐ EN 55022:1998 +A1:2000	☐ Class A	☐ Class B
☐ EN 55022:1998 +A1:2000 +A2:2003	☐ Class A	☐ Class B
☐ EN 61000-3-2:2000		
☐ EN 61000-3-3:1995 +A1:2001		
☐ VCCI V-3/2004.04	☐ Class A	☐ Class B
☐ AS/NZS 3548:1995 +A1:1997 +A2:1997	☐ Class A	☐ Class B
☒ FCC Part 15 Subpart B	☐ Class A	☒ Class B
☐ CISPR 22:1997	☐ Class A	☐ Class B

The unit was tested to CISPR 22 and complied with the alternate methods allowed by FCC under paragraphs 15.107 and 15.109.

☐ CISPR 22:1997 +A1:2000	☐ Class A	☐ Class B

2.1 Conducted Voltage Emissions

Test Date
July 5, 2006

Test Location
Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
☒	Field Strength Meter	Rohde & Schwarz	ESHS30	862024/001	2007-03-10
☒	LISN	Rohde & Schwarz	ESH3-Z5	100207	2006-12-20
☒	LISN	EMCO	3825/2	9206-1971	2006-12-20

Frequency Range of Measurement
150 kHz to 30 MHz

Instrument Settings
IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.
Test was performed in Analog signal receiving mode and Satellite signal receiving mode. The emission of Satellite signal receiving mode was higher, only the test results of Satellite signal receiving mode is listed in Appendix A.

Test Results
The requirements are:

☒ MET

Frequency (MHz)	Measured Data (dBuV)	Margin (dB)	Remark
14.80	43.9	16.1	Quasi-peak

☐ NOT MET

Frequency (MHz)	Measured Data (dBuV)	Margin (dB)	Remark

Remarks
See Appendix A for test data.

2.2 Radiated Electric Field Emissions

Test Date
July 4, 2006

Test Location
☒ Testing was performed at a test distance of 3 meter Open Area Test Site

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
☒	Field Strength Meter	Rohde & Schwarz	ESVS30	826638/008	2007-04-25
☒	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2007-06-12
☐	Biconical Antenna	EMCO	3110	9202-1510	2007-04-25
☐	Log-periodic Antenna	EMCO	3146	9607-4567	2007-04-25

Frequency Range of Measurement
30 MHz to 1 GHz

Instrument Settings
IF Band Width: 120 kHz

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.
Measurements were performed with a quasi-peak detector.
Test was performed in Analog signal receiving mode and Satellite signal receiving mode. The emission of Satellite signal receiving mode was higher, only the test results of Satellite signal receiving mode is listed in Appendix A.

Test Results
The requirements are:

☒ MET

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
929.72	42.8	3.2	Quasi-peak

☐ NOT MET

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark

Remarks
See Appendix A for test data.

2.3 Antenna-Conducted Power

Test Date
July 6, 2006

Test Location
Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
☒	Spectrum Analyzer	Agilent	8564E	3551A00410	2006-11-08
☒	Matching Pad	Rohde & Schwarz	RAM	100630	2006-07-25
☒	TV-TEST TRANSMITTER	Rohde & Schwarz	SFQ	100547	2006-08-04
☒	TV-TEST TRANSMITTER	Rohde & Schwarz	SFM	100169	2006-08-04

Instrument Settings
IF Band Width: 100 kHz (30 to 1000 MHz)
IF Band Width: 1 MHz (Above 1000 MHz)

Test Procedures

Antenna-conducted power measurements are performed with the EUT antenna terminals connected directly to a spectrum analyzer, if the antenna impedance matches the impedance of the measuring instrument. Otherwise, use an impedance-matching network to connect the measuring instrument to the antenna terminals of the EUT. Losses in decibels in any impedance matching network used are added to the measured value in dBuV.
With the EUT tuned to one of the number of frequencies, measure both the frequency and voltage present at the antenna input terminals over the frequency range specified in the individual equipment requirements. Repeat this measurement with the EUT tuned to another frequency until the number of frequencies have been successively measured.
Power available from the EUT antenna terminals is the ratio of V^2/R, where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument.

Test Results
The requirements are:

☒ MET
☐ NOT MET

Remarks
No values due to local oscillator higher than 20dB below the limits was measured during the disturbance voltage at the antenna terminals.
Emissions 20dB's below the limit were not necessarily recorded.

2.4 Output and Spurious Conducted Level

Test Date
July 6, 2006

Test Location
Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
☒	Spectrum Analyzer	Agilent	8564E	3551A00410	2006-11-08
☒	Matching Pad	Rohde & Schwarz	RAM	100630	2006-07-25
☒	TV-TEST TRANSMITTER	Rohde & Schwarz	SFQ	100547	2006-08-04
☒	TV-TEST TRANSMITTER	Rohde & Schwarz	SFM	100169	2006-08-04

Instrument Settings
IF Band Width: 100 kHz (30 to 1000 MHz)
IF Band Width: 1 MHz (Above 1000 MHz)

Test Procedures

The Output signal level is the maximum voltage level present at the output terminals of the EUT on a particular frequency during normal use of the device.
Measurements were made by direct connection to the spectrum analyzer and EUT with proper impedance matching.
The Cable was supported between the EUT and the measuring instrument in a straight horizontal line so it had at least 75 cm clearance from any conducting surface.
The EUT was provided with a typical signal consistent with normal operation. For each channel on which the device operates and in each mode in which the device operates, the video carrier level, audio carrier level and the spurious emissions over the frequency rage was measured and recorded.

Test Results
The requirements are:

☒ MET
☐ NOT MET

Remarks
See Appendix A for test data.

2.5 Antenna Transfer Switch

Test Date
July 6, 2006

Test Location
Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
☒	Spectrum Analyzer	Agilent	8564E	3551A00410	2006-11-08
☒	Matching Pad	Rohde & Schwarz	RAM	100630	2006-07-25
☒	TV-TEST TRANSMITTER	Rohde & Schwarz	SFQ	100547	2006-08-04
☒	TV-TEST TRANSMITTER	Rohde & Schwarz	SFM	100169	2006-08-04

Instrument Settings
IF Band Width: 100 kHz

Test Procedures

Isolation was measured for all positions of an antenna transfer switch on all output channels of the EUT. All unused RF ports or terminals was terminated in a proper impedance. TV interface device transfer switch isolation is the difference the levels of a signal going into one antenna input port of the switch and that of the same signal coming out of another antenna input port of the transfer switch. The isolation of an antenna transfer switch equipped with coaxial connectors was performed by measuring the maximum voltage of the visual carrier. The maximum voltage corresponds to the peak envelope power of a modulated signal during maximum amplitude peaks.
Using an impedance-matching device, the length of coaxial cable was connected between the antenna terminal of the switch and the measuring instrument.
The measuring instrument was tuned to the output channel of the EUT in peak mode.
The voltage level present at the antenna input port of the EUT and the output channel of the EUT was measured and recorded

Test Results
The requirements are:

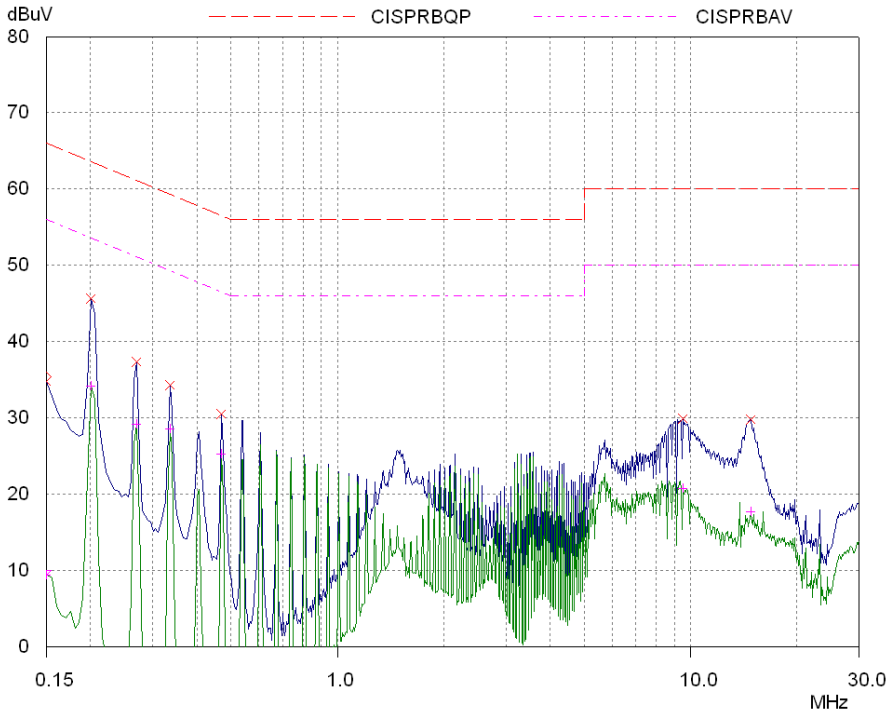
☒ MET
☐ NOT MET

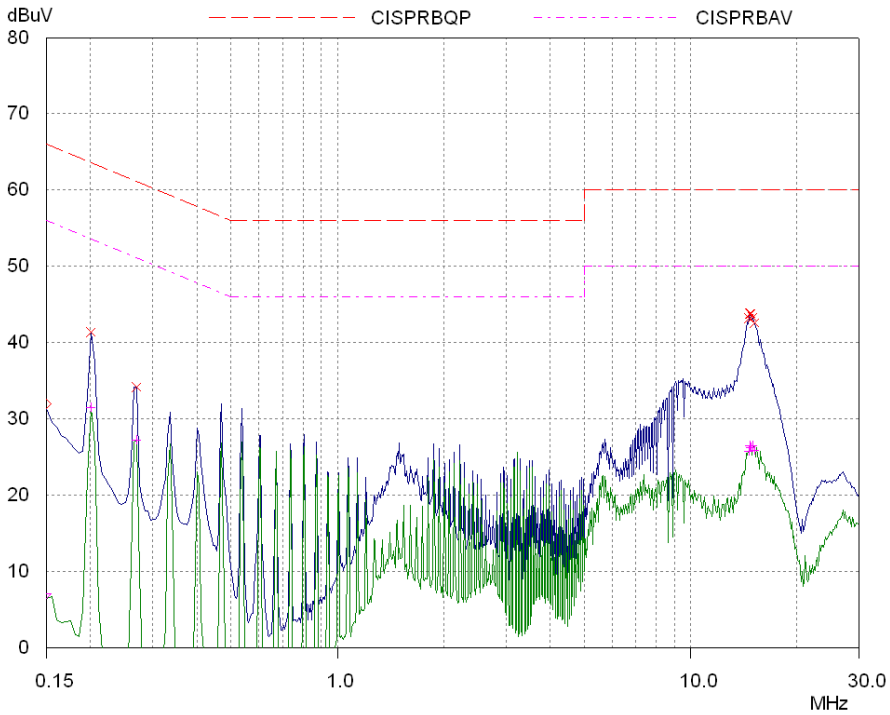
Remarks
No Values in other frequencies was detected during antenna transfer switch Measurements.

APPENDIX A – TEST DATA

Conducted Voltage Emissions

Frequency	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
0.20	0.2	0.1	H	63.6	45.3	45.6	18.0	53.6	33.9	34.2	19.4
14.60	0.2	0.3	N	60.0	42.7	43.2	16.8	50.0	25.3	25.8	24.2
14.66	0.2	0.3	N	60.0	43.3	43.8	16.2	50.0	26.0	26.5	23.5
14.80	0.2	0.3	N	60.0	43.4	43.9	16.1	50.0	25.8	26.3	23.7
15.00	0.2	0.3	N	60.0	42.8	43.3	16.7	50.0	26.0	26.5	23.5
15.13	0.2	0.3	N	60.0	42.1	42.6	17.4	50.0	25.4	25.9	24.1





Radiated Electric Field Emissions

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Cable			
78.56	27.6	V	2.0	7.4	1.0	40.0	36.0	4.0
224.03	26.3	V	2.0	8.2	2.0	46.0	36.5	9.5
398.61	20.4	V	2.3	13.3	2.9	46.0	36.5	9.5
796.35	17.8	H	1.0	19.4	4.6	46.0	41.8	4.2
929.72	17.4	V	4.0	20.5	4.9	46.0	42.8	3.2
958.86	11.4	V	1.8	20.7	5.0	46.0	37.1	8.9

Output and Spurious Conducted Level

[Output Signal Test Data]

Frequency [MHz]	Reading [dBuV/m]	MPL	Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
56.75	44.2	7.6	56.5	51.8	4.7
61.25	59.5	7.6	69.5	67.1	2.4
65.75	44.9	7.6	56.5	52.5	4.0

*MPL : Matching Pad Loss

[Output Terminal Conducted Spurious Test data]

Frequency [MHz]	Reading [dBuV/m]	MPL	Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
736.00	28.2	7.6	39.5	35.8	3.7
1451.00	28.5	7.6	39.5	36.1	3.4
2107.00	29.6	7.6	39.5	37.2	2.3

*MPL : Matching Pad Loss