

REPORT

FCC/ ISED Permissive change

Applicant Name: JVC KENWOOD Corporation Address: 1-16-2, Hakusan, Midori-ku, Y 226-8525 Japan		Date of Issue: August 10, 2016 Test Site/Location: HCT CO., LTD., 74,Seoicheon-ro 578beon-gil,Majang- myeo,Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-R-1607-F028-1 HCT FRN: 0005866421 ISED Recognition No.: 5944A-5
FCC ID ISED APPLICANT	: K44431501 : 282F-431501 : JVC KENWOOD	Corporation
FCC Model(s): ISED Model(s): EUT Type: Frequency Range: FCC Rule Part(s):	NX-5300-K5 / NX-5300-K6 UHF P25 TRANCEIVER V FCC : 406.1 - 470 MHz ISED : 406.1 – 430 MHz a Part 90 and Part 2	nd 450 – 470 MHz
ISED Rule:	RSS- Gen Issue 4, RSS-119	Issue 12

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by : Seul Ki Lee Test engineer of RF Team

Approved by : Jong Seok Lee Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1607-F028	July 29, 2016	- First Approval Report
HCT-R-1607-F028-1	August 10, 2016	- Add the Limit for Emission Mask on Page 16 - Add the Information for Type of Emission on Page 6



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Model: NX-5300-K5

1. GENERAL INFORMATION

Applicant:	JVC KENWOOD Corporation
Address:	1-16-2, Hakusan, Midori-ku, Yokohama-shi, Kanagawa, 226-8525 Japan
FCC ID:	K44431501
ISED:	282F-431501
EUT Type:	UHF P25 TRANCEIVER WITH BLUETOOTH
FCC Model name(s):	NX-5300-K5, NX-5300-K6, NX-5300-F5, NX-5300-F6
ISED Model name(s):	NX-5300-K5 / NX-5300-K6 / TK-5330-F5 / TK-5330-F6 / VP5330-F5 / VP5330-F6
Date(s) of Tests:	July 01, 2016 ~ July 26, 2016
Place of Tests:	HCT Co., Ltd.
	74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Korea

2. EUT DESCRIPTION

EUT Type	UHF P25 TRANCEIVER WITH BLUETOOTH	
FCC Model Name	NX-5300-K5, NX-5300-K6, NX-5300-F5, NX-5300-F6	
ISED Model Name	NX-5300-K5 / NX-5300-K6 / TK-5330-F5 / TK-5330-F6 / VP5330-F5 / VP5330-F6	
Power Supply	DC 7.5 V	
Output Power	W (Power output continuously variable to 1 W)	
Battery type	i-ion Battery (EX-4621/ EX-4622/ EX-4623)	
Channel Bandwidth	CC / ISED : 12.5 kHz	
Operating Temperature	-30 °C ~ +60 °C	
Frequency Range	FCC : 406.1 - 470 MHz	
	ISED : 406.1 – 430 MHz and 450 – 470 MHz	



3. TEST METHODOLOGY

TIA-603-D dated June 24, 2010 entitled "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards" were used in the measurement.

3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the FCC Rules Part 2 and Part 90.

3.3 GENERAL TEST PROCEDURES

Radiated Emissions

Radiated emission measurements are performed in the Fully-anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-D-2010 Clause 2.2.17. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission. The level and position of the maximized emission is recorded with the spectrum analyzer using a positive peak detector.

A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

 $P_{d(dBm)} = Pg_{(dBm)}$ - cable loss $_{(dB)}$ + antenna gain $_{(dB)}$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting is programmed.

3.5 Type of Emission(Necessary Bandwidth Calculations)

7K60FXD, 7K60FXE (DMR)

Modulation = 7K60FXD, 7K60FXE			
Digital information rate (R), bps 9600			
Maximum Deviation (D), kHz	3.024		
Signaling States (S)	4		
Constant Factor (K)	0.463		
Necessary Bandwidth (BN), kHz	(R/log ₂ S)+2DK		
Necessary Bandwidth (BN), kHz	7.6		

Note :

Type of modulation of the main carrier : F = Frequency Modulation

Nature of signals modulating the main carrier : X = Cases not otherwise covered

Type of information to be transmitted : E = Telephony(including sound broadcasting)

D = Data transmission, telemetry, telecommand

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea.

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



6. SUMMARY TEST OF RESULTS

Test Description	FCC Part	IC Part	Test Limit	Test Condition	Test
Test Description	Section(s)	Section(s)	lest Linnt	Test Condition	Result
Carrier RF Output Power	§90.205(i)	RSS119-i12(5.4)			PASS
	§2.1046(a)	100110-112(0.4)	Varies		1700
Unwanted Emissions	§2.1051	RSS119-i12(5.8)	vanes	CONDUCTED	PASS
99% Bandwidth(IC)	NA	NA	NA	CONDUCTED	PASS
Emission Mask	§90.210, §2.1049(c)(1)	RSS119-i12(5.5)	Varies		PASS
Field Strength of Spurious Radiation	§2.1053	RSS119-i12(5.8)	Varies	RADIATED	PASS
Receiver Spurious Emissions	§15.109(a)	RSS-Gen-i4	cf. Section 7.10		PASS



7. TEST RESULT

7.1 Carrier Output Power

Definition

The conducted carrier power output rating for a transmitter is the power available at the output terminals of the transmitter when the output terminals are connected to the standard transmitter load.

TEST CONFIGURATION



TEST PROCEDURE

According to 2.2.1 in TIA-603-D Standard.

- a) Connect the equipment as illustrated.
- b) Measure the transmitter output power during the defined duty cycle(see 1.3.2).
 Correct for all losses in the RF path.
- c) The value recorded in step b) is the conducted carrier output power rating.



Model: NX-5300-K5

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TEST RESULTS

			Carrier Output Power					
Mode	Emission	Type of Channel	Freq.(MHz)	Low		High		
	Emission Spacing		dBm	W	dBm	W		
	7K60FXD,	YD.	406.15	29.532	0.898	36.932	4.934	
Digital	I 7K60FXD, 7K60FXE	Digital 12.5 kHz	12.5 kHz	469.95	29.629	0.918	36.938	4.941
			429.95	29.954	0.989	36.988	4.998	

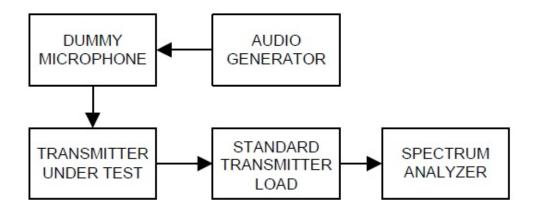


7.2 Occupied Bandwidth

Definition

The transmitter sideband spectrum denotes the sideband power produced at a discrete frequency separation from the carrier up to the test bandwidth (see TIA-603-D Section 1.3.4.4) due to all sources of unwanted noise within the transmitter in a modulated condition.

TEST CONFIGURATION



TEST PROCEDURE

According to TIA-603-D Section 2.2.11.2 / RSS-119 Section 5.5

- a) For EUT supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for +/- 2.5 kHz deviation (or 50 % modulation). (FM modulation).
- b) With level constant, the signal level was increased 16 dB..
- c) For EUT supporting digital modulation, the digital modulation mode was operated to its maximum extent.
- d) Adjust the spectrum analyzer for the following setting:
 - 1) RBW : 100Hz (Non modulation and Authorized Band 6 kHz),

100Hz (Non modulation and Authorized Band 11.25 kHz),

300Hz (Non modulation and Authorized Band 20 kHz).

- 2) VBW : Video Bandwidth at least 10 times the resolution bandwidth.
- 4) Sweep Speed : Sweep Speed slow enough to maintain measurement calibration.
- 5) Sampling Time : 10 times
- 6) Detector Mode = Positive Peak.
- e) The occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.



LIMIT

Frequency Band (MHz)	Channel Spacing (kHz)	Authorized Bandwidth (kHz)
406.1 - 470	12.5	11.25

I TEST RESULTS

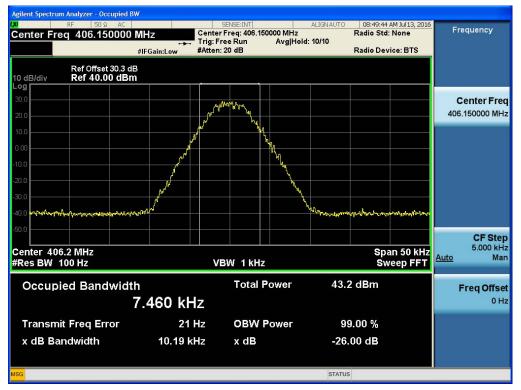
Conducted 99% Bandwidth Measurements for 7K60FXD, 7K60FXE

Mode		Measured Bandwidth	
Frequency [MHz]	Channel Spacing	[kHz]	Setting
406.15		7.460	
469.95	12.5 kHz	7.505	High Power
429.95		7.499	
406.15		7.462	
469.95	12.5 kHz	7.502	Low Power
429.95		7.500	

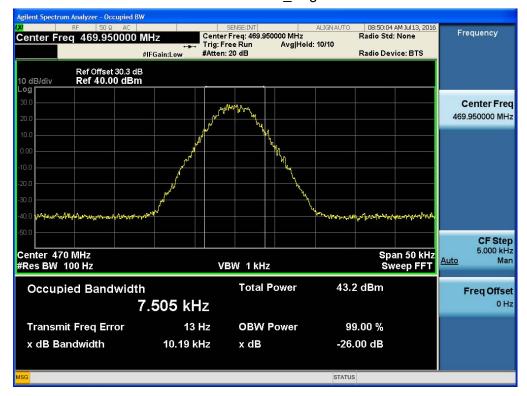


Plots of 99% Bandwidth

406.15 MHz_High

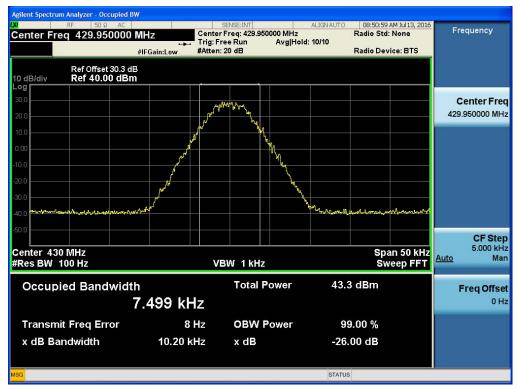


469.95 MHz High

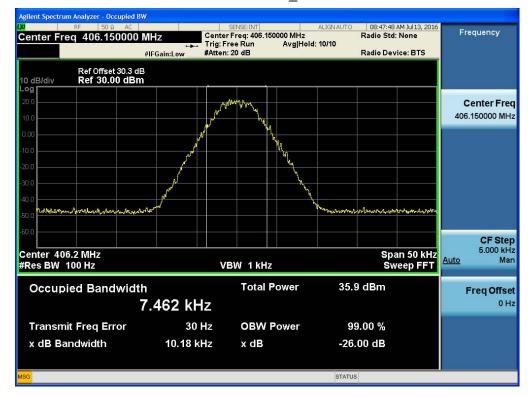




429.95 MHz_High



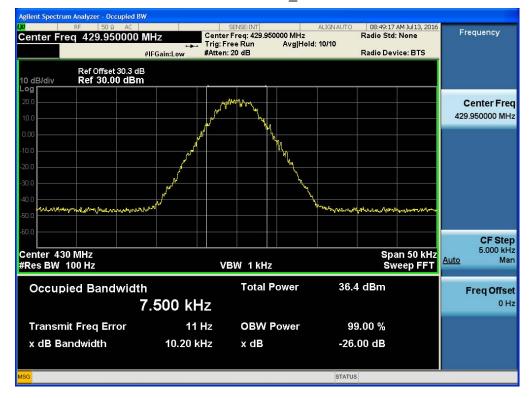
406.15 MHz_Low



469.95 MHz_ Low



429.95 MHz Low

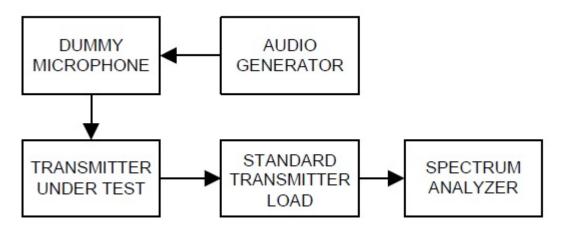


7.3 Emission Mask

Definition

The transmitter sideband spectrum denotes the sideband power produced at a discrete frequency separation from the carrier up to the test bandwidth (see 1.3.4.4) due to all sources of unwanted noise within the transmitter in a modulated condition.

TEST CONFIGURATION



TEST PROCEDURE

According to 2.2.11 in TIA-603-D Standard.

a) Connect the equipment as illustrated. Use the table to determine the spectrum analyzer resolution bandwidth:

Frequency Band (MHz)	Mask for Equipment with Audio Low Pass Filter	Mask for Equipment without Low Pass Filter	Spectrum Analyzer Resolution Bandwidth (Hz)
25-50	В	С	300
72-76	В	С	300
138-174	NTIA	NTIA	300
150-174	В	С	300
150-174	D or E	D or E	100
406-420	NTIA	NTIA	300
421-512	В	С	300
421-512	D or E	D or E	100
806-821/851-866	B or EA	G or EA	300
821-824/866-869	В	Н	300
896-901/935-940	I	J	300

Spectrum Analyzer Resolution Bandwidth

- b) Adjust the spectrum analyzer for the following settings:
 - 1) Resolution Bandwidth per the above table
 - 2) Video Bandwidth at least 10 times the resolution bandwidth.

- 3) Sweep Speed slow enough to maintain measurement calibration.
- 4) Detector Mode = Positive Peak.
- 5) Span that will allow proper viewing of the test bandwidth (see 1.3.4.4).
- c) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency. Key the transmitter, and set the level of the unmodulated carrier to a full scale reference line.
 This is the 0 dB reference for the measurement.
- d) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulating circuit. Transmitters employing digital modulation techniques that bypass the limiter and the audio low-pass filter shall be modulated as specified by the manufacturer.
- e) Record the resulting spectrum analyzer presentation of the emission level with an on-line recording device or in a photograph. It is recommended that the emission limit (as given in 3.2.11) be drawn on the plotted graph or photograph. The spectrum analyzer presentation is the sideband spectrum.

Limit : Mask D

Emission Mask D—12.5 *kHz channel bandwidth equipment.* For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

(1) On any frequency from the center of the authorized bandwidth f_0 to 5.625 kHz removed from f_0 : Zero dB.

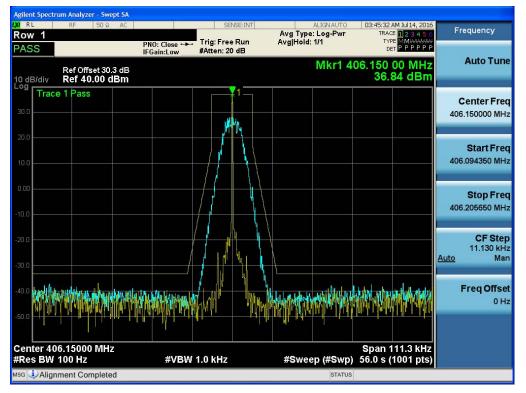
(2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.625 kHz but no more than 12.5 kHz: At least 7.27(f_d -2.88 kHz) dB.

(3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

(4) The reference level for showing compliance with the emission mask shall be established using a resolution bandwidth sufficiently wide (usually two or three times the channel bandwidth) to capture the true peak emission of the equipment under test. In order to show compliance with the emission mask up to and including 50 kHz removed from the edge of the authorized bandwidth, adjust the resolution bandwidth to 100 Hz with the measuring instrument in a peak hold mode. A sufficient number of sweeps must be measured to insure that the emission profile is developed. If video filtering is used, its bandwidth must not be less than the instrument resolution bandwidth. For emissions beyond 50 kHz from the edge of the authorized bandwidth, see paragraph (o) of this section. If it can be shown that use of the above instrumentation settings do not accurately represent the true interference potential of the equipment under test, an alternate procedure may be used provided prior Commission approval is obtained.

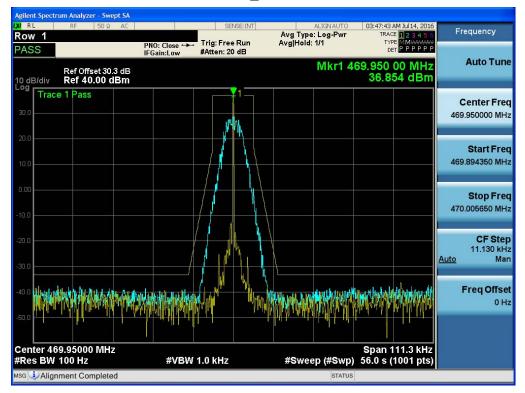


TEST RESULTS

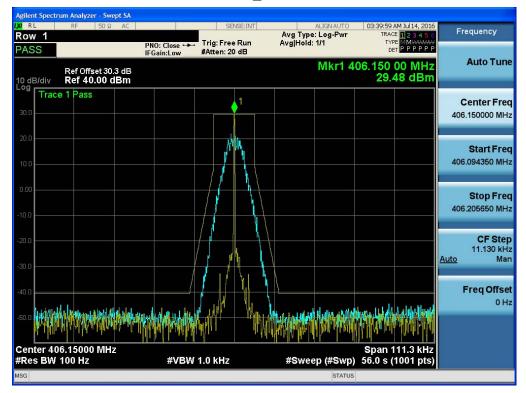


406.15 MHz_HIGH POWER

469.95 MHz_HIGH POWER

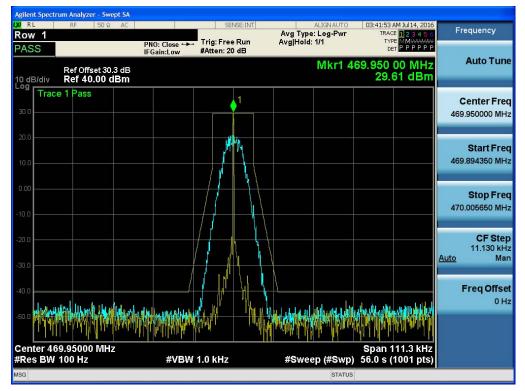


HCT CO. LTD



406.15 MHz_LOW POWER

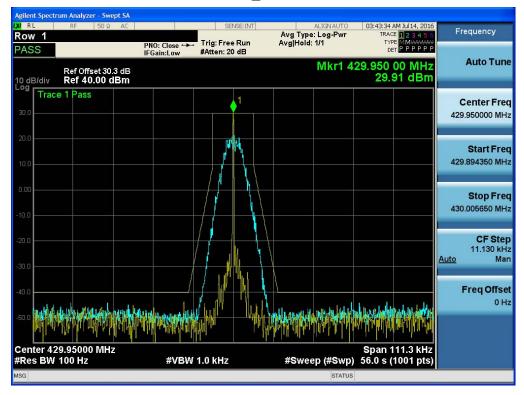
469.95 MHz LOW POWER



9:13 AM Jul 14, 2016 RACE 1 2 3 4 5 6 TYPE MMWWWW DET P P P P P P Frequency Avg Type: Log-Pwr Avg|Hold: 1/1 Row 1 PNO: Close +++ Trig: Free Run IFGain:Low #Atten: 20 dB PASS Mkr1 429.950 00 MHz 36.86 dBm Auto Tune Ref Offset 30.3 dB Ref 40.00 dBm 10 dB/div Log Trace 1 Pass **Center Freq** 429 950000 MHz 1 Start Freq 429.894350 MHz Stop Freq 430.005650 MHz CF Step 11.130 kHz Man Auto w.heeventerenterenterenter **Freq Offset** 0 Hz Span 111.3 kHz #Sweep (#Swp) 56.0 s (1001 pts) Center 429.95000 MHz #Res BW 100 Hz #VBW 1.0 kHz STATUS

429.95 MHz_HIGH POWER

429.95 MHz_LOW POWER

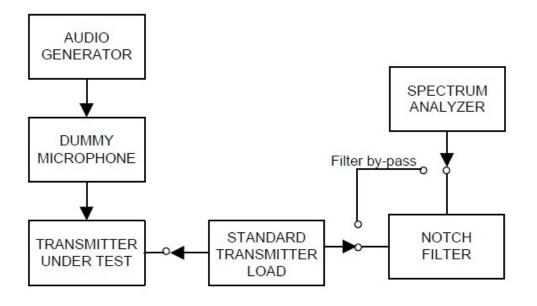


7.4 Unwanted Emissions : Conducted Spurious Emission

Definition

Conducted spurious emissions are emissions at the antenna terminals on a frequency or frequencies that are outside a band sufficient to ensure transmission of information of required quality for the class of communication desired.

TEST CONFIGURATION



TEST PROCEDURE

According to 2.2.13 in TIA-603-D Standard.

- e) Connect the equipment as illustrated, with the notch filter by-passed.
- f) Set the center frequency of the spectrum analyzer to the assigned transmitter frequency, key the transmitter, and set the level of the carrier to the full scale reference line.
- g) Modulate the transmitter with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of rated system deviation. The input level shall be established at the frequency of maximum response of the audio modulation circuit.
- h) Adjust the spectrum analyzer for the following settings:
 - 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
 - 2) Video Bandwidth \geq 3 times the resolution bandwidth.
 - 3) Sweep Speed ≤2000 Hz per second.
 - 4) Detector Mode = mean or average power.
- e) Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from:
- 1) The lowest radio frequency generated in the equipment to the carrier frequency minus the test bandwidth (see 1.3.4.4).

- 2) The carrier frequency plus the test bandwidth to a frequency less than 2 times the carrier frequency.
- f) Record the frequencies and levels of spurious emissions from step e).
- g) Unkey the transmitter. Replace the transmitter under test with the signal generator and adjust the signal level to reproduce the frequencies and levels of every spurious emission recorded in step f). Record the signal generator levels in dBm.
- h) Insert the notch filter.
- i) Adjust the spectrum analyzer for the following settings:
- 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1 GHz.
- 2) Video Bandwidth \geq 3 times the resolution bandwidth.
- 3) Sweep Speed ≤2000 Hz per second.
- 4) Detector Mode = mean or average power.
- j) Key the transmitter. Adjust the center frequency of the spectrum analyzer for incremental coverage of the range from a frequency equal to 2 times the carrier frequency and to the tenth harmonic of the carrier frequency.

Frequency Band (MHz)	Channel bandwidth (kHz)	Limit (dB)
406.1 – 470	12.5	50+10Log(P) or 70 dB

<u>Note</u>

- 1. Correct Level (dBm) : Substitute SG Level (dBm)
- 2. Emission Level (dBc) : Correct Level 10Log(P*1000)
- 3. P = Carrier Output Power(W)
 - (P value, please refer to Section 7.1)



TEST RESULTS

	Frequency			Spurious	Correct	Emission	Limit	Margin
No.	(MHz)	Band	Setting	Frequency	Level	Level	(dBc)	(dB)
	(101112)			(MHz)	(dBm)	(dBc)	(ubc)	(UD)
				874.87	-58.120	-95.052	-56.932	38.12
1	406.15	Low		880.69	-58.259	-95.191	-56.932	38.259
				3143.30	-37.415	-74.347	-56.932	17.415
				939.86	-56.415	-93.353	-56.938	36.415
2	469.95	High	High Power	884.57	-58.196	-95.134	-56.938	38.196
				2689.20	-37.556	-74.494	-56.938	17.556
				860.32	-57.585	-94.573	-56.988	37.585
3	429.95	Mid		872.93	-58.329	-95.317	-56.988	38.329
				2695.80	-37.407	-74.395	-56.988	17.407
				858.38	-58.397	-87.929	-49.532	38.397
4	406.15	Low		881.66	-58.469	-88.001	-49.532	38.469
				3143.30	-37.502	-67.034	-49.532	17.502
				897.18	-58.349	-87.978	-49.629	38.349
5	469.95	High	Low Power	903.97	-58.380	-88.009	-49.629	38.38
				2670.20	-37.417	-67.046	-49.629	17.417
				890.39	-58.305	-88.259	-49.954	38.305
6	429.95	Mid		892.33	-58.354	-88.308	-49.954	38.354
				2682.00	-37.585	-67.539	-49.954	17.585

Plots of Unwanted Emissions : Conducted Spurious Emission

vgilent Spo 4 Start F		RF	50	ΩΑ	e MHz F	NO: Fas Gain:Lo							LIGN AUTO Pwr(RMS 5/5) TF	24 AM Jul 13 RACE 1 2 3 TYPE A WA DET A N N	456	Frequ	ency
I0 dB/di	v	Ref Ref	Offset 30.30	30.3 d)dBr	B								MI	(r3 88) -58.	0.69 N 259 d		Au	to Tur
- og 20.3							\uparrow	1									Cen 515.000	ter Fre
9.70 19.7 29.7																		art Fre
-39.7 -49.7 -59.7														(3		St 1.00000	op Fre
Start 30 #Res B	0.0 M W 1	/IHz 0 kł	lz			#\	/BW	300 kH	z*				Sweep	Stop 1 11.5 s	1.0000 (1001	GHz pts)		CF Ste
2 N	TRC 1 1	f f			874.8	36 MHz 37 MHz 59 MHz		7 17.264 -58.120 -58.259	dBm	FUN	CTION	FUN	CTION WIDTH	FUNC	TION VALUE		<u>Auto</u> Fre	Ma q Offs 0 F
6 7 8 9 10 11 12																		
ISG													STATUS				1	

406.15 MHz_HIGH POWER

	RF 50 Ω AC		SENSE		ALIGNAUTO Type: Pwr(RMS)	09:08:12 AM Jul 13, 2016 TRACE 1 2 3 4 5 6	Frequency
tart Fre	q 999.999999	PNO: Fast + IFGain:Low	→ Trig: Free Ru #Atten: 20 dE	un Avg H	Hold: 100/100	TYPE A WWWWWW DET A N N N N N	
0 dB/div	Ref Offset 30.3 dE Ref 30.30 dBm	3			Mkr	1 3.143 3 GHz -37.415 dBm	Auto Tur
og 20.3 10.3 300							Center Fre 2.535000000 Gi
9.70 19.7 29.7					1		Start Fro 999.999999 Mi
39.7 49.7 59.7							Stop Fr 4.070000001 G
tart 1.00) GHz 1.0 MHz	#VB	W 3.0 MHz*		Sweep 5.	Stop 4.070 GHz .32 ms (6140 pts)	CF Sto 307.000000 M
Res BW						1	
KR MODE TF		× 3.143 3 GHz	۲ -37.415 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M
KR MODE TF					FUNCTION WIDTH	FUNCTION VALUE	Freq Offs
KR MODE TF 1 N 1 2 3 4 5					FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M Freq Offs 0



Agilent Spectrum Analyzer - Swept SA		INSE:INT	ALIGN AUTO	00/50/10/	AM Jul 13, 2016	
Start Freq 30.000000 MH		#Avg	Type: Pwr(RMS) Hold: 5/5	TRAC		Frequency
Ref Offset 30.3 dB 10 dB/div Ref 20.30 dBm	IFGain:Low #Atten: 2	2 dB	Mk	r3 881.	66 MHz 69 dBm	Auto Tune
- 0 g 10.3 .300 9.70						Center Free 515.000000 MH
19.7 29.7 39.7						Start Fre 30.000000 MH
69.7	<u></u>					Stop Fre 1.000000000 GH
Kart 30.0 MHz Res BW 10 kHz	#VBW 300 kHz	FUNCTION	Sweep	11.5 s (0000 GHz 1001 pts)	CF Ste 97.000000 MH Auto Ma
1 N 1 f 4 2 N 1 f 8	406.36 MHz 9.873 d 358.38 MHz -58.397 d 381.66 MHz -58.469 d	Bm Bm		PONCHU	N VALUE	Freq Offse 0 H
7 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9						
SG			STATUS			

406.15 MHz_LOW POWER

tart Fre	RF 50Ω 4		SENSE:INT		ALIGNAUTO Type: Pwr(RMS)	08:59:23 AM Jul 13, 2016 TRACE 1 2 3 4 5 6	Frequency
		PNO: Fast ← IFGain:Low	Trig: Free Run #Atten: 20 dB	Avg H	lold: 100/100	TYPE A WWWAAAA DET A N N N N N	
0 dB/div	Ref Offset 30.3 Ref 20.30 dB				Mkr	1 3.143 3 GHz -37.502 dBm	Auto Tu
29 0.3 300							Center F 2.535000000 0
70 3.7 3.7					11		Start F 999.999999 M
9.7 9.7 9.7 9.7							Stop F 4.070000001
tart 1.00 Res BW	1.0 MHz	#VB	W 3.0 MHz*		Sweep 5.	Stop 4.070 GHz 32 ms (6140 pts)	CF S 307.000000 I
R MODE T		× 3.143 3 GHz	۲ -37.502 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto
							Freq Off
2 2 3 4 5 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6 5 6							
3							



1FGain:1 et 30.3 dB 30 dBm	ast → Trig: Low #Atte	n: 22 dB		Mk	(r3 884.	57 MHz 96 dBm	Auto T Center F 515.000000 Start F 30.000000
		1					515.000000 Start F
					 \$	3{} ²	Stop F 1.000000000
X	Y		FUNCTION	Sweep	11.5 s (1001 pts)	CF S 97.000000 <u>Auto</u>
939.86 MH	Hz -56.41	5 dBm					Freq Of
	× 470.38 Mi 939.86 Mi	× Y 470.38 MHz 17.30 939.86 MHz -56.41	470.38 MHz 17.300 dBm 939.86 MHz -56.415 dBm	X Y FUNCTION 470.38 MHz 17.300 dBm 939.86 MHz -56.415 dBm	X Y FUNCTION FUNCTION WIDTH 470.38 MHz 17.300 dBm 939.86 MHz -56.415 dBm 939.86 MHz -56.415 dBm -58.196 dBm -58.196 dBm 884.57 MHz -58.196 dBm -58.196 dBm -58.196 dBm	#VBW 300 kHz* Sweep 11.5 s (X Y FUNCTION FUNCTION WIDTH FUNCTION 470.38 MHz 17.300 dBm 939.86 MHz 56.415 dBm 1000 dBm	X: Y FUNCTION FUNCTION WIDTH FUNCTION VALUE 470.38 MHz 17.300 dBm 939.86 MHz -56.415 dBm 939.86 MHz -58.196 dBm 930.86 MHz -58.196 dBm 930.86 MHz -58.196 dBm 930.86 MHz -58.196 dBm -58.196 dBm<

469.95 MHz_HIGH POWER

tart Fre	RF 50 Ω q 1.0000000		Trig: Fr			ALIGN AUTO /pe: Pwr(RMS) Id: 100/100	09:37:49 AM Jul 13, 20 TRACE 1 2 3 4 5 TYPE A WWWM DET A N N N N	Frequency
0 dB/div	Ref Offset 30.3 Ref 30.30 dE		#Atten:	20 dB		Mkr	1 2.689 2 GH -37.556 dBr	Auto Tu
og 20.3 10.3 300								Center Fr 2.850000000 G
9.70			1					Start Fr 1.000000000 G
19.7 19.7 19.7								Stop Fr 4.700000000 G
KR MODE TR	1.0 MHz	X	3W 3.0 MH Y	FU	NCTION	Sweep 6	Stop 4.700 GH 41 ms (7400 pts FUNCTION VALUE	
1 N 1 2 3 4 5 6	f	2.689 2 GHz	-37.556	dBm				Freq Off
7 8 9 9 0 1								
2								



Agilent Spectrum Analyzer - Swe RF 50 Ω Start Freq 30.00000	AC	SENSE:IN ► Trig: Free Run #Atten: 22 dB	#Avg	ALIGN AUTO Type: Pwr(RMS) Iold: 5/5	TYPE A		Frequency
Ref Offset 30. 10 dB/div Ref 20.30 d	3 dB	FIRCH 22 40		Mk	r3 903.97 -58.380	MHz dBm	Auto Tune
- og 10.3 0.300 							Center Fred 515.000000 MHz
19.7 29.7 39.7							Start Free 30.000000 MH:
-49.7 -59.7 					¢ ³		Stop Fred 1.000000000 GHz
Start 30.0 MHz #Res BW 10 kHz	#VB	W 300 kHz*		Sweep	Stop 1.000 11.5 s (100		CF Step 97.000000 MH
MKR MODE TRC SCL 1 N 1 f 2 N 1 f	× 470.38 MHz 897.18 MHz	Y 10.163 dBm -58.349 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VA	LUE	<u>Auto</u> Mar
3 N 1 f 4 5 6	903.97 MHz	-58.380 dBm					Freq Offse 0 Hz
7 8 9 10 11							
11 12 SG				STATUS			

469.95 MHz_LOW POWER

tart Freq 1.000000	AC 000 GHz	SENSE:INT	ALIGNAUTO #Avg Type: Pwr(RMS)	09:02:29 AM Jul 13, 2016 TRACE 2 3.4 5 6	Frequency
	PNO: Fast + IFGain:Low	Trig: Free Run #Atten: 20 dB	Avg Hold: 100/100	TYPE A WWWWW DET A N N N N N	
Ref Offset 30.3 0 dB/div Ref 20.30 d			Mkr	1 2.670 2 GHz -37.417 dBm	Auto Tur
og 10.3 300					Center Fr 2.850000000 G
9.7		1			Start Fr 1.000000000 G
9.7					Stop Fr 4.700000000 G
tart 1.000 GHz Res BW 1.0 MHz	#VB	W 3.0 MHz*	Sweep 6	Stop 4.700 GHz 41 ms (7400 pts)	CF St 370.000000 M
KR MODE TRC SCL	× 2.670 2 GHz	۲ -37.417 dBm	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> N
					Freq Offs
3 4 5					and the second s
2 3 4 5 6 7 7 8 9 9 0 1					0



tart Freq	RF 50 Ω 30.00000	0 MHz	ast 🛶 Trig: Fre		#Avg T Avg Ho	ALIGNAUTO ype: Pwr(RMS) old: 5/5	TRAC	AM JUI 13, 2016 E 1 2 3 4 5 6 E A Manana E A N N N N N	Frequency
0 dB/div	Ref Offset 30. Ref 30.30 d	3 dB				Mk		93 MHz 29 dBm	Auto T
09 20.3 10.3 300									Center F 515.000000 (
9.70 19.7 29.7									Start F 30.000000 1
39,7 49.7 59,7							<mark>∕</mark> 3		Stop F 1.000000000
tart 30.0 M Res BW 1		#	VBW 300 kHz	Z*		Sweep	Stop 1.0 11.5 s (0000 GHz 1001 pts)	CF S 97.000000
KR MODE TRC 1 N 1 2 N 1 3 N 1 4	SCL f f f	× 429.64 MH 860.32 MH 872.93 MH	z -57.585 c	iBm IBm	NCTION	FUNCTION WIDTH	FUNCTIO	IN VALUE	<u>Auto</u> Freq Off
7 8 9 0									

429.95 MHz_HIGH POWER

tart Fre	RF 50 Ω q 1.000000	000 GHz	SENS	#Av:	ALIGNAUTO g Type: Pwr(RMS) Hold: 100/100	09:40:33 AM Jul 13, 2016 TRACE 1 2 3 4 5 6 TYPE A MANAGEM	Frequency
		PNO: Fast IFGain:Low				DET A N N N N N	Auto Tur
0 dB/div	Ref Offset 30. Ref 30.30 d				Mkr	1 2.695 8 GHz -37.407 dBm	Auto Tu
. og 20.3							Center Fr
0.3							2.650000000 G
300							
.70							Start Fr
9.7 9.7				1			1.000000000 G
9.7							
3.7							Stop Fr
9.7							4.300000000 G
tart 1.00						Stop 4.300 GHz	
	1.0 MHz	#VI	3W 3.0 MHz*		Sweep 5	.72 ms (6600 pts)	CF St 330.000000 M
KR MODE T		×	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Auto M
1 N 1 2	f	2.695 8 GHz	-37.407 dBr	n			
							Freq Offs
3	1 (2)						0
3 4 4							
3 4 4 5 6 6 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							
3 4 5 6 7 8 9							
3							



RF 50: tart Freq 30.0000	Ω AC IOO MHZ PNO: Fast IFGain:Low	SENSE: →→ Trig: Free Ru #Atten: 22 dB	#Avg n Avg	ALIGN AUTO Type: Pwr(RMS) Hold: 5/5	TRAC	AM JUI 13, 2016 E <mark>1 2 3 4 5 6</mark> E A Manada T A N N N N N	Frequency
Ref Offset 3 dB/div Ref 20.30	0.3 dB			Mk		33 MHz 54 dBm	Auto Tun
og 10.3 300 1.70							Center Fre 515.000000 M⊦
9.7							Start Fre 30.000000 M⊦
9.7					(3	Stop Fre 1.000000000 GF
tart 30.0 MHz Res BW 10 kHz		3W 300 kHz*			11.5 s (0000 GHz 1001 pts)	CF Ste 97.000000 MI
KR MODE TRC SCL 1 N 1 f 2 N 1 f 3 N 1 f 4	× 429.64 MHz 890.39 MHz 892.33 MHz	Y 10.785 dBm -58.305 dBm -58.354 dBm	FUNCTION	FUNCTION WIDTH	FUNCTIO	IN VALUE	Auto Ma Freq Offs 0 H
7 8 9 0 1 2							
				STATUS			

429.95 MHz_LOW POWER

itart Fre	RF 50 Ω 9 1.000000	AC 000 GHz PNO: Fast			aLIGNAUTO g Type: Pwr(RMS) Hold: 100/100	09:05:16 AM Jul 13, 2016 TRACE 1 2 3 4 5 6 TYPE A WWWWW	Frequency
	Ref Offset 30.	IFGain:Low	#Atten: 20		-	1 2.682 8 GHz -37.585 dBm	Auto Tur
0 dB/div og 10.3	Ref 20.30 d	Bm				-37.365 UBIII	Center Fre
300							2.650000000 G
9.7				4			Start Fr
19.7 19.7							1.000000000 G
9.7 9.7							Stop Fr
9.7							4.300000000 G
	1.0 MHz	#VE	3W 3.0 MHz*		Sweep 5	Stop 4.300 GHz .72 ms (6600 pts)	CF St 330.000000 M
KR MODE TI		× 2.682 8 GHz	∨ -37.585 dB	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> M
							Freq Offs
2 3 4							0
2 2 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5							0
2 3 4 5 5 7 8 9 9 0							0



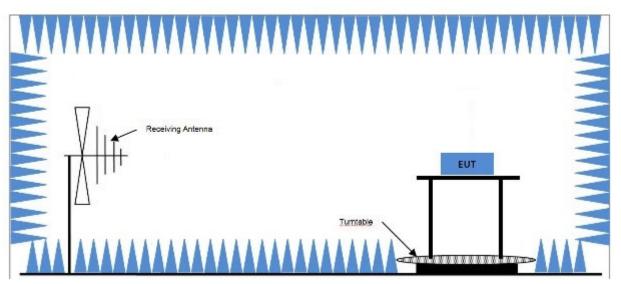
7.5 Unwanted Emissions : Radiated Spurious Emission

Definition

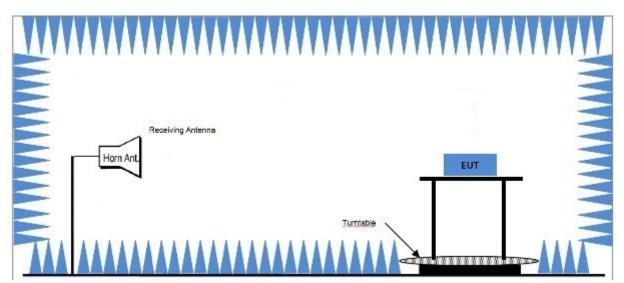
Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

TEST CONFIGURATION

Below 1 GHz



Above 1 GHz



TEST PROCEDURE USED

According to 2.2.12 in TIA-603-D Standard.

- a) Connect the equipment as illustrated.
- b) Adjust the spectrum analyzer for the following settings:
 - 1) Resolution Bandwidth = 10 kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1GHz.
 - 2) Video Bandwidth = 300 kHz for spurious emissions below 1 GHz, and 3 MHz for spurious emissions above 1 GHz.
 - 3) Sweep Speed slow enough to maintain measurement calibration.
 - 4) Detector Mode = Positive Peak.
- c) Place the transmitter to be tested on the turntable in the standard test site, or an FCC listed site compliant with ANSI C63.4-2001 clause 5.4. The transmitter is transmitting into a nonradiating load that is placed on the turntable. The RF cable to this load should be of minimum length. For transmitters with integral antennas, the tests are to be run with the unit operating into the integral antenna.
- d) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to ± the test bandwidth (see 1.3.4.4).
- e) Key the transmitter.
- f) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Then the turntable should be rotated 360° to determine the maximum reading.

Repeat this procedure to obtain the highest possible reading. Record this maximum reading.

- g) Repeat step f) for each spurious frequency with the test antenna polarized vertically.
- h) Reconnect the equipment as illustrated.
- i) Keep the spectrum analyzer adjusted as in step b).
- j) Remove the transmitter and replace it with a substitution antenna (the antenna should be halfwavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At the lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
- k) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a nonradiating cable. With the antennas at both ends horizontally polarized, and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level

of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.

I) Repeat step k) with both antennas vertically polarized for each spurious frequency.

m) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps k) and l) by the power loss in the cable between the generator and the antenna, and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna by the following formula:

Pd(dBm) = Pg(dBm) - cable loss (dB) + antenna gain (dB)

where:

Pd is the dipole equivalent power and

Pg is the generator output power into the substitution antenna.

n) The *Pd* levels record in step m) are the absolute levels of radiated spurious emissions in dBm.
 The radiated spurious emissions in dB can be calculated by the following:
 Radiated spurious emissions (dB) =

10*log₁₀(TX power in watts/0.001)- *the levels in step m*)

LIMIT

Frequency Band (MHz)	Channel bandwidth (kHz)	Limit (dBm)
406.1 – 470	12.5	-20

Operating Mode

EUT Type	Modulation	Potton	Test frequency
(Worst case)	Woddiation	Battery	(MHz)
Stand alone		EX-4621	406.15
	7K60FXD, 7K60FXE	EX-4622	469.95
		EX-4623	429.95



Model: NX-5300-K5

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TEST RESULTS

7K60FXD, 7K60FXE

	Frequency : 406.15 Battery : EX-4621						
Freq(MHz)	Reading[dBm]	Factor(dBm)	Pol	Result(dB)	Limit(dB)	Margin(dB)	
406.15	-42.08	25.79	Z-H	-16.29	-	-	
812.3	-80.11	32.16	Z-H	-47.95	-20	27.95	

7K60FXD, 7K60FXE

Frequency : 469.95 Battery : EX-4621						
Freq(MHz)	Reading[dBm]	Factor(dBm)	Pol	Result(dB)	Limit(dB)	Margin(dB)
469.95	-42.61	27.16	Z-H	-15.45	-	-
939.9	-79.36	34.03	Z-H	-45.33	-20	25.33

7K60FXD, 7K60FXE

Frequency : 429.95 Battery : EX-4621						
Freq(MHz)	Reading[dBm]	Factor(dBm)	Pol	Result(dB)	Limit(dB)	Margin(dB)
429.95	-41.70	26.45	Z-H	-15.25	-	-
859.9	-80.25	32.23	Z-H	-48.02	-20	28.02

<u>Note</u>

1. Result (dBm) = Reading + Factor

2. Limit (dBm) = -20



8. LIST OF TEST EQUIPMENT 8.1 LIST OF TEST EQUIPMENT(Conducted Test)

Manufacturer	Model / Equipment	Calibration	Calibration	Serial No.
Manufacturer	Model / Equipment	Date	Interval	Senai No.
Agilent	N9020A / Signal Analyzer	06/24/2016	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/24/2015	Annual	MY49431210
Agilent	N1911A / Power Meter	03/11/2016	Annual	MY45100523
Agilent	N1921A / Power Sensor	03/11/2016	Annual	MY52260025
Hewlett Packard	E3632A / DC Power Supply	03/09/2016	Annual	KR75303962
Agilent	8498A / Attenuator(30 dB)	02/16/2016	Annual	51162
Neng Yeol	NY-THR18750 / Temp & Humidity Chamber	11/04/2015	Annual	NY-200912201A

8.2 LIST OF TEST EQUIPMENT(Radiated Test)

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
CERNEX	CBLU1183540B-01/ POWER AMP	25540	Annual	05/13/2017
Wainwright	WHKX 10-900-1000-15000-40SS/H.P.F	5	Annual	08/11/2016
Schwarzbeck	BBHA 9120D/ Horn Antenna	9210D-1299	Biennial	10/16/2016
REOHDE&SCHWARZ	FSV40-N/Signal Analyzer	101068-SZ	Annual	09/23/2016
Schwarzbeck	VULB9160/ Bilog Antenna	3368	Biennial	10/10/2016
Agilent	8498A / Attenuator(30 dB)	51162	Annual	02/16/2017
narda	termination	-	-	-