

*FCC PART 15, SUBPART B and C  
TEST REPORT*
*for*

iREMOTE TRANSMITTER

MODEL: 800-670

Prepared for

 TITAN TOOL, INC.  
 107 BAUER DRIVE  
 OAKLAND, NEW JERSEY 07436

Prepared by: \_\_\_\_\_

KYLE FUJIMOTO

Approved by: \_\_\_\_\_

MICHAEL CHRISTENSEN

 COMPATIBLE ELECTRONICS INC.  
 114 OLINDA DRIVE  
 BREA, CALIFORNIA 92823  
 (714) 579-0500

DATE: FEBRUARY 27, 2003

	REPORT BODY	APPENDICES					TOTAL
		A	B	C	D	E	
PAGES	16	2	2	10	15	47	

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## TABLE OF CONTENTS

Section / Title	PAGE
<b>GENERAL REPORT SUMMARY</b>	4
<b>SUMMARY OF TEST RESULTS</b>	4
1. PURPOSE	5
2. ADMINISTRATIVE DATA	6
2.1 Location of Testing	6
2.2 Traceability Statement	6
2.3 Cognizant Personnel	6
2.4 Date Test Sample was Received	6
2.5 Disposition of the Test Sample	6
2.6 Abbreviations and Acronyms	6
3. APPLICABLE DOCUMENTS	7
4. Description of Test Configuration	8
4.1 Description of Test Configuration - EMI	8
4.1.1 Cable Construction and Termination	9
5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT	10
5.1 EUT and Accessory List	10
5.2 EMI Test Equipment (Lab X)	11
6. TEST SITE DESCRIPTION	12
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
7. Test Procedures	13
7.1 Radiated Emissions (Spurious and Harmonics) Test	13
7.2 Bandwidth of the Fundamental	15
8. CONCLUSIONS	16



**LIST OF APPENDICES**

APPENDIX	TITLE
A	Laboratory Recognitions
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagrams, Charts, and Photos <ul style="list-style-type: none"><li>• Test Setup Diagrams</li><li>• Radiated Emissions Photos</li><li>• Antenna and Effective Gain Factors</li></ul>
E	Data Sheets

**LIST OF FIGURES**

FIGURE	TITLE
1	Plot Map And Layout of Radiated Site



## GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government.

Device Tested: iREMOTE Transmitter  
 Model: 800-670  
 S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified during the testing.

Manufacturer: Titan Tool, Inc.  
 107 Bauer Drive  
 Oakland, New Jersey 07436

Test Date: February 7, 2003

Test Specifications: EMI requirements  
 CFR Title 47, Part 15 Subpart B; and Subpart C, Sections 15.205, 15.209, and 15.231

Test Procedure: ANSI C63.4: 1992

Test Deviations: The test procedure was not deviated from during the testing.

## SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 450 kHz - 30 MHz	This test was not performed because the EUT operates on battery power only and cannot be plugged into the AC public mains.
2	Radiated RF Emissions, 10 kHz - 4180 MHz	Complies with the Class B limits of CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.



## 1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the iREMOTE Transmitter Model: 800-670. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the Class B specification limits defined by CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.



## 2. ADMINISTRATIVE DATA

### 2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California 92823.

### 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

### 2.3 Cognizant Personnel

Titan Tool, Inc.

Troy A. Anderson      Engineering Manager

Compatible Electronics, Inc.

Kyle Fujimoto      Test Engineer  
Michael Christensen      Test Engineer

### 2.4 Date Test Sample was Received

The test sample was received on February 6, 2003.

### 2.5 Disposition of the Test Sample

The sample has not been returned to Titan Tool, Inc. as of February 27, 2003.

### 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
HP	Hewlett Packard
ITE	Information Technology Equipment
CML	Corrected Meter Limit
LISN	Line Impedance Stabilization Network



### 3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

SPEC	TITLE
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4 1992	Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz



## 4. DESCRIPTION OF TEST CONFIGURATION

### 4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The iREMOTE Transmitter Model: 800-670 (EUT) was tested as a stand alone unit. The EUT was tested in three orthogonal axis. The EUT was continuously transmitting. The antenna is a SplatCh antenna soldered to the PCB inside the EUT.

The final radiated data was taken in the mode above. Please see Appendix E for the data sheets.



#### 4.1.1 **Cable Construction and Termination**

There are no external cables connected to the EUT.



**5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT****5.1 EUT and Accessory List**

EQUIPMENT	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	FCC ID
iREMOTE Transmitter(EUT)	TITAN TOOL, INC.	800-670	N/A	QVU-LSCNIREM



## 5.2      EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. DUE DATE
Radiated Emissions Data Capture Program	Compatible Electronics	2.0	N/A	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	2634A02962	February 8, 2002	Feb. 8, 2003
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	2517A09947	February 8, 2002	Feb. 8, 2003
Spectrum Analyzer – Quasi-Peak Adapter	Hewlett Packard	85650A	2811A01362	February 8, 2002	Feb. 8, 2003
Preamplifier	Com Power	PA-103	1582	March 7, 2002	Mar. 7, 2003
Biconical Antenna	Com Power	AB-100	1548	September 19, 2002	Sept. 19, 2003
Log Periodic Antenna	Com Power	AL-100	16131	February 3, 2003	Feb. 3, 2004
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Hewlett Packard	4530	US91912319	N/A	N/A
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
Microwave Preamplifier	Com-Power	PA-122	25195	January 2, 2003	Jan. 2, 2004
Horn Antenna	Com-Power	AH-118	10085	January 21, 2002	Jan. 21, 2004
Loop Antenna	Com-Power	AL-130	17070	June 19, 2002	June 19, 2003



## 6. TEST SITE DESCRIPTION

### 6.1 Test Facility Description

Please refer to section 2.1 and 7.1 of this report for EMI test location.

### 6.2 EUT Mounting, Bonding and Grounding

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.



## 7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

### 7.1 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, and the Com-Power Microwave Preamplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps.

The measurement bandwidths and transducers used for the radiated emissions test were:

FREQUENCY RANGE	EFFECTIVE MEASUREMENT BANDWIDTH	TRANSDUCER
9 kHz to 150 kHz	200 Hz	Active Loop Antenna
150 kHz to 30 MHz	9 kHz	Active Loop Antenna
30 MHz to 300 MHz	120 kHz	Biconical Antenna
300 MHz to 1 GHz	120 kHz	Log Periodic Antenna
1 GHz to 4.18 GHz	1 MHz	Horn Antenna

The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4: 1992. Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna in order to ensure accurate results. The loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.



**Radiated Emissions (Spurious and Harmonics) Test (con't)**

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3 meter test distance to obtain final test data. The final qualification data sheets are located in Appendix E.



## 7.2 Bandwidth of the Fundamental

The -20 dB bandwidth was checked to see that it was within 0.25% of the fundamental frequency for the EUT. A data sheet of the -20 dB bandwidth is located in Appendix E.



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**8. CONCLUSIONS**

The iREMOTE Transmitter Model: 800-670 meets all of the Class B specification limits defined in CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.



## APPENDIX A

### ***LABORATORY RECOGNITIONS***



## **LABORATORY RECOGNITIONS**

**Compatible Electronics has the following agency accreditations:**

National Voluntary Laboratory Accreditation Program - Lab Code: 200528-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

**Compatible Electronics is recognized or on file with the following agencies:**

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)



## APPENDIX B

### ***MODIFICATIONS TO THE EUT***

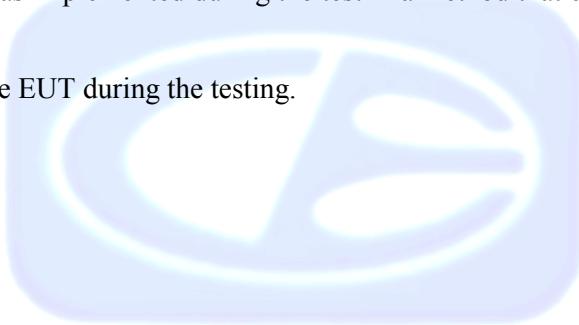


## MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC 15.231 or FCC Class B specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT during the testing.



## APPENDIX C

### ***ADDITIONAL MODELS COVERED UNDER THIS REPORT***



## **ADDITIONAL MODELS COVERED UNDER THIS REPORT**

USED FOR THE PRIMARY TEST

iREMOTE Transmitter  
Model: 800-670  
S/N: N/A

There were no additional models covered under this report.



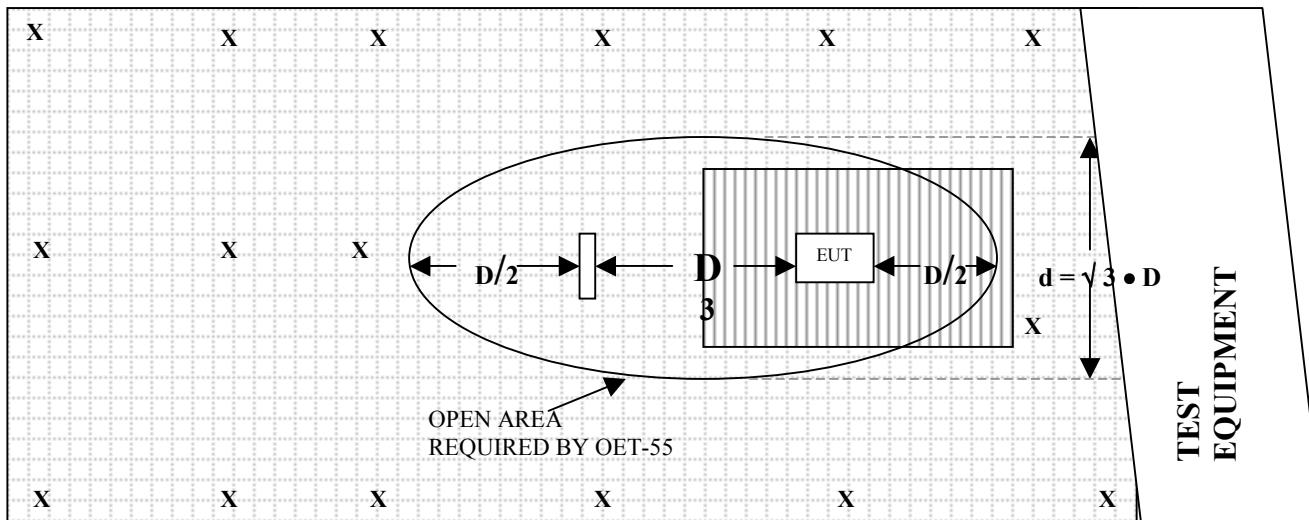
## APPENDIX D

### *DIAGRAMS, CHARTS, AND PHOTOS*



**FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED SITE**

OPEN LAND &gt; 15 METERS



OPEN LAND &gt; 15 METERS

	= GROUND RODS		= GROUND SCREEN
	= TEST DISTANCE (meters)		= WOOD COVER



**COM-POWER AB-100****BICONICAL ANTENNA****S/N: 01548****CALIBRATION DATE: SEPTEMBER 19, 2002**

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
30	14.30	120	10.70
35	14.00	125	11.40
40	13.70	140	12.70
45	12.00	150	12.50
50	11.40	160	12.90
60	9.70	175	14.10
70	8.30	180	14.70
80	7.60	200	15.10
90	7.80	250	16.90
100	8.60	300	19.10



**COM-POWER AL-100****LOG PERIODIC ANTENNA****S/N: 16131****CALIBRATION DATE: FEBRUARY 03, 2003**

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
300	12.80	700	20.50
400	15.30	800	21.60
500	16.50	900	20.60
600	17.30	1000	21.50



**COM-POWER PA-103****PREAMPLIFIER****S/N: 1582****CALIBRATION DATE: MARCH 7, 2002**

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
30	33.2	300	32.9
40	33.2	350	32.8
50	33.3	400	32.8
60	33.2	450	32.7
70	33.2	500	32.5
80	33.2	550	32.5
90	33.2	600	32.7
100	33.2	650	32.4
125	33.1	700	32.3
150	33.2	750	32.0
175	33.1	800	32.6
200	33.1	850	31.8
225	33.0	900	31.8
250	33.0	950	31.7
275	32.9	1000	32.6



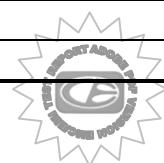
# COM-POWER PA-122

## MICROWAVE PREAMPLIFIER

S/N: 25195

CALIBRATION DATE: JANUARY 7, 2002

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	33.7	9.5	31.8
1.1	33.4	10.0	32.2
1.2	33.1	11.0	31.4
1.3	33.1	12.0	30.2
1.4	33.2	13.0	32.9
1.5	32.5	14.0	33.9
1.6	32.7	15.0	32.4
1.7	32.3	16.0	32.2
1.8	32.3	17.0	31.5
1.9	31.4	18.0	32.2
2.0	32.8	19.0	31.2
2.5	33.3	20.0	31.3
3.0	31.7	21.0	31.7
3.5	31.6	22.0	29.7
4.0	31.2		
4.5	31.2		
5.0	31.0		
5.5	31.3		
6.0	32.1		
6.5	32.1		
7.0	31.8		
7.5	32.0		
8.0	33.1		
8.5	32.0		
9.0	30.8		



**COM-POWER AH-118****HORN ANTENNA****S/N: 10085****CALIBRATION DATE: JANUARY 21, 2002**

FREQUENCY (GHz)	FACTOR (dB)	FREQUENCY (GHz)	FACTOR (dB)
1.0	25.8	9.5	39.2
1.5	28.9	10.0	38.6
2.0	32.0	10.5	40.2
2.5	31.9	11.0	38.8
3.0	31.3	11.5	42.1
3.5	32.0	12.0	40.0
4.0	31.5	12.5	44.9
4.5	32.9	13.0	45.2
5.0	34.6	13.5	41.4
5.5	33.9	14.0	40.4
6.0	38.3	14.5	44.5
6.5	43.9	15.0	48.5
7.0	42.0	15.5	47.4
7.5	38.3	16.0	46.7
8.0	39.4	16.5	44.2
8.5	38.9	17.0	39.9
9.0	39.6	17.5	43.4
		18.0	42.9



**COM-POWER AL-130****LOOP ANTENNA****S/N: 17070****CALIBRATION DATE: JUNE 19, 2002**

<b>FREQUENCY (MHz)</b>	<b>MAGNETIC (dB/m)</b>	<b>ELECTRIC (dB/m)</b>
0.009	-40.4	11.1
0.01	-40.3	11.2
0.02	-41.2	10.3
0.05	-41.6	9.9
0.07	-41.4	10.1
0.1	-41.7	9.8
0.2	-44.0	7.5
0.3	-41.6	9.9
0.5	-41.3	10.2
0.7	-41.4	10.1
1	-40.9	10.6
2	-40.6	10.9
3	-40.5	11.0
4	-40.8	10.7
5	-40.2	11.3
10	-40.7	10.8
15	-41.4	10.1
20	-41.6	9.9
25	-41.7	9.8
30	-42.9	8.6



**LOG ANTENNA**

TITAN TOOL, INC.  
iREMOTE TRANSMITTER  
MODEL: 800-670  
FCC SUBPART B AND C - RADIATED EMISSIONS – 02-07-03

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**



**HORN ANTENNA**

TITAN TOOL, INC.  
iREMOTE TRANSMITTER  
MODEL: 800-670  
FCC SUBPART B AND C - RADIATED EMISSIONS – 02-07-03

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**

**APPENDIX E**

***DATA SHEETS***



***RADIATED EMISSIONS***  
  
***DATA SHEETS***



## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

COMPANY	Titan Tool Inc.	DATE	2/7/03
EUT	iRemote Transmitter	DUTY CYCLE	10.6 %
MODEL	800-670	PEAK TO AVG	-19.4938827 dB
S/N	N/A	TEST DIST.	3 Meters
TEST ENGINEER	Kirit Ramani	LAB	X

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

PAGE 1 OF PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

<b>COMPANY</b>	Titan Tool Inc.	<b>DATE</b>	2/7/03	
<b>EUT</b>	iRemote Transmitter	<b>DUTY CYCLE</b>	10.6 %	
<b>MODEL</b>	800-670	<b>PEAK TO AVG</b>	-19.4938827 dB	
<b>S/N</b>	N/A	<b>TEST DIST.</b>	<b>3</b>	Meters
<b>TEST ENGINEER</b>	Kirit Ramani	<b>LAB</b>	X	

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

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PAGE 2 of PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

COMPANY	Titan Tool Inc.	DATE	2/7/03
EUT	iRemote Transmitter	DUTY CYCLE	10.6 %
MODEL	800-670	PEAK TO AVG	-19.4938827 dB
S/N	N/A	TEST DIST.	3 Meters
TEST ENGINEER	Kirit Ramani	LAB	X

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

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PAGE 3 of PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

<b>COMPANY</b>	Titan Tool Inc.	<b>DATE</b>	2/7/03
<b>EUT</b>	iRemote Transmitter	<b>DUTY CYCLE</b>	10.6 %
<b>MODEL</b>	800-670	<b>PEAK TO AVG</b>	-19.4938827 dB
<b>S/N</b>	N/A	<b>TEST DIST.</b>	3 Meters
<b>TEST ENGINEER</b>	Kirit Ramani	<b>LAB</b>	X

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PAGE 4 OF PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

<b>COMPANY</b>	Titan Tool Inc.	<b>DATE</b>	2/7/03
<b>EUT</b>	iRemote Transmitter	<b>DUTY CYCLE</b>	10.6 %
<b>MODEL</b>	800-670	<b>PEAK TO AVG</b>	-19.4938827 dB
<b>S/N</b>	N/A	<b>TEST DIST.</b>	3 Meters
<b>TEST ENGINEER</b>	Kirit Ramani	<b>LAB</b>	X

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PAGE 5 of PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

<b>COMPANY</b>	Titan Tool Inc.	<b>DATE</b>	2/7/03
<b>EUT</b>	iRemote Transmitter	<b>DUTY CYCLE</b>	10.6 %
<b>MODEL</b>	800-670	<b>PEAK TO AVG</b>	-19.4938827 dB
<b>S/N</b>	N/A	<b>TEST DIST.</b>	3 Meters
<b>TEST ENGINEER</b>	Kirit Ramani	<b>LAB</b>	X

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PAGE 6 of PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

<b>COMPANY</b>	Titan Tool Inc.	<b>DATE</b>	2/7/03
<b>EUT</b>	iRemote Transmitter	<b>DUTY CYCLE</b>	10.6 %
<b>MODEL</b>	800-670	<b>PEAK TO AVG</b>	-19.4938827 dB
<b>S/N</b>	N/A	<b>TEST DIST.</b>	3 Meters
<b>TEST ENGINEER</b>	Kirit Ramani	<b>LAB</b>	X

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

PAGE 7 of PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

<b>COMPANY</b>	Titan Tool Inc.	<b>DATE</b>	2/7/03	
<b>EUT</b>	iRemote Transmitter	<b>DUTY CYCLE</b>	10.6 %	
<b>MODEL</b>	800-670	<b>PEAK TO AVG</b>	-19.4938827 dB	
<b>S/N</b>	N/A	<b>TEST DIST.</b>	3	Meters
<b>TEST ENGINEER</b>	Kirit Ramani	<b>LAB</b>	X	

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PAGE 8 of PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

COMPANY	Titan Tool Inc.	DATE	2/7/03
EUT	iRemote Transmitter	DUTY CYCLE	10.6 %
MODEL	800-670	PEAK TO AVG	-19.4938827 dB
S/N	N/A	TEST DIST.	3 Meters
TEST ENGINEER	Kirit Ramani	LAB	X

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PAGE 9 of PAGE 10

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

COMPANY	Titan Tool Inc.	DATE	2/7/03
EUT	iRemote Transmitter	DUTY CYCLE	10.6 %
MODEL	800-670	PEAK TO AVG	-19.4938827 dB
S/N	N/A	TEST DIST.	3 Meters
TEST ENGINEER	Kirit Ramani	LAB	X

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

PAGE 10 of PAGE 10

Page: 1 of 1

Test location: Compatible Electronics  
Customer : TITAN TOOL, INC. Date : 2 /07/2003  
Manufacturer : TITAN TOOL, INC. Time : 16.25  
EUT name : iREMOTE TRANSMITTER Model: 800-670  
Specification: Fcc\_B Test distance: 3.0 mtrs Lab: X  
Distance correction factor(20\*log(test/spec)) : 0.00  
Test Mode : RADIATED SPURIOUS EMISSIONS - TRANSMIT MODE  
10 kHz - 4180 MHz  
VERTICAL AND HORIZONTAL POLARIZATION  
TESTED BY: KIRIT RAMANI

NO SPURIOUS EMISSIONS FROUND BETWEEN 10 kHz AND 4180 MHz  
IN EITHER POLARIZATION FOR THE EUT



***-20 dB BANDWIDTH***

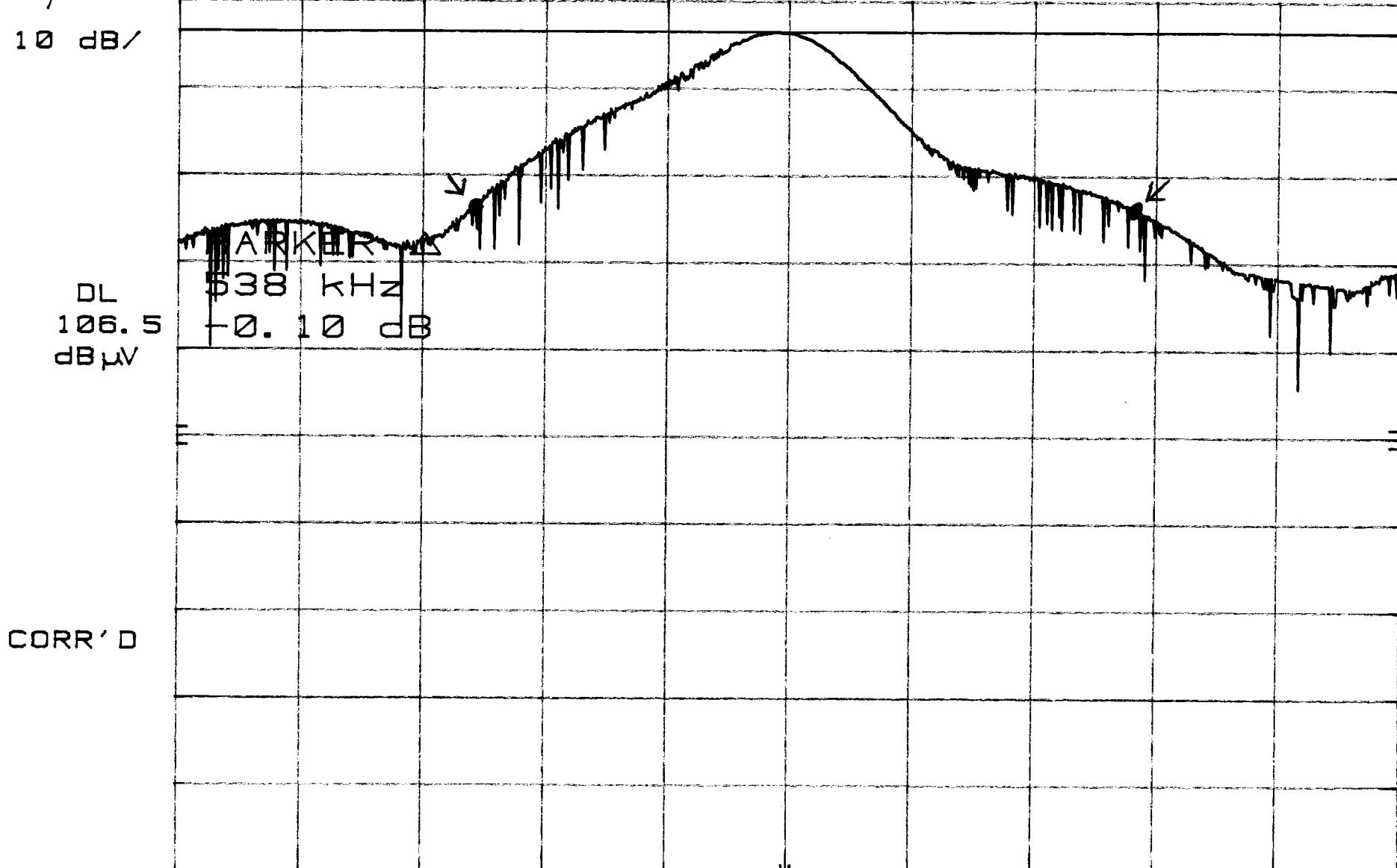
***DATA SHEET***



-20 dB BANDWIDTH OF FUNDAMENTAL

hp REF 110.0 dB $\mu$ V ATTEN 20 dB

MKR  $\Delta$  538 kHz  
-0.10 dB



CENTER 417.98 MHz

RES BW 100 kHz

VBW 100 kHz

SPAN 1.00 MHz

SWP 20.0 msec