TEST REPORT NO: RU1172/6172

COPY NO: 2

ISSUE NO: 1

FCC ID: S33IP31356

REPORT ON THE CERTIFICATION TESTING OF A
BLACKROC SYSTEMS Ltd
IP3 1356
WITH RESPECT TO
THE FCC RULES CFR 47, PART 15.225
INTENTIONAL RADIATOR SPECIFICATION

TEST DATE: 31st March 2005 – 1st April 2005

TESTED BY: Daniel Winstanley Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = GB, O = TRL Compliance Services Date: 2005.05.10 09:10:23 +01'00' D WINSTANLEY

APPROVED BY: Peter Green Digitally signed by Peter Green DN: CN = Peter Green, C = GB Reason: I am approving this document Date: 2005.05.10 11:51:41 +01'00' P GREEN
EMC PRODUCT MANAGER

DATE: 6th May 2005

Distribution:

Copy Nos:
1. Blackroc Systems Ltd
2. FCC EVALUATION LABORATORIES
3. TRL EMC

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FS 21805

0728

CONTENTS

Notes:

1. Component failure during test — YES [ ] NO [X]
2. If Yes, details of failure:
3. The facilities used for the testing of the product contain in this report are FCC Listed.
4. The contents of the attached applicants declarations and other supplied information are not covered by the scope of this laboratory's UKAS or FCC accreditations' and is provided in good faith.

CERTIFICATE OF CONFORMITY & COMPLIANCE

FCC IDENTITY:	S33IP31356					
PURPOSE OF TEST:	Certification					
TEST SPECIFICATION:	FCC RULES CFR 47, Part 15.225					
TEST RESULT:	Compliant to Specification					
EQUIPMENT UNDER TEST:	IP3 1356					
EQUIPMENT SERIAL No:	Engineering Sample					
ITU: EMISSION CODE:	100KA1D					
EQUIPMENT TYPE:	RFID Reader					
PRODUCT USE:	Product Identification					
CARRIER EMISSION:	87.3 µV/m @ 30m					
ANTENNA TYPE:	Integral					
ALTERNATIVE ANTENNA:	Not applicable					
FREQUENCY OF OPERATION:	13.56MHz					
CHANNEL SPACING:	Not applicable, wideband					
NUMBER OF CHANNELS:	Not applicable					
FREQUENCY GENERATION:	SAW Resonator	[ ]	Crystal	[X]	Synthesiser	[ ]
MODULATION METHOD:	Amplitude	[ ]	Digital	[ ]	Angle	[X]
POWER SOURCE(s):	+3.6Vdc					
TEST DATE(s):	31st March 2005 – 1st April 2005					
ORDER No(s):	POR13070					
APPLICANT:	Blackroc Systems Ltd					
ADDRESS:	Drummond Rd Astonfields industrial Estate Stafford United Kingdom ST16 3HJ					

TESTED BY: Daniel Winstanley — Digitally signed by Daniel Winstanley DN: CN = Daniel Winstanley, C = GB, O = TRL Compliance Services Date: 2005.05.10 09:09:58 +01'00' — D WINSTANLEY

APPROVED BY: Peter Green — Digitally signed by Peter Green DN: CN = Peter Green, C = GB Reason: I am approving this document Date: 2005.05.10 11:51:49 +01'00' — P GREEN EMC PRODUCT MANAGER

APPLICANT'S SUMMARY

EQUIPMENT UNDER TEST (EUT):	IP3 1356
EQUIPMENT TYPE:	RFID Reader
SERIAL NUMBER OF EUT:	Engineering Sample
PURPOSE OF TEST:	Certification
TEST SPECIFICATION(s):	FCC RULES CFR 47, Part 15.225
TEST RESULT:	COMPLIANT Yes [X] No [ ]
APPLICANT'S CATEGORY:	MANUFACTURER [X] IMPORTER [ ] DISTRIBUTOR [ ] TEST HOUSE [ ] AGENT [ ]
APPLICANT'S ORDER No(s):	POR13070
APPLICANT'S CONTACT PERSON(s):	Mr T Jephcott
E-mail address:	tgj@blackroc.com
APPLICANT:	Blackroc Systems Ltd
ADDRESS:	Drummond Rd Astonfields industrial Estate Stafford United Kingdom ST16 3HJ
TEL:	01785 213777
FAX:	01785 251546
MANUFACTURER:	Blackroc Systems Ltd
EUT(s) COUNTRY OF ORIGIN:	United kingdom
TEST LABORATORY:	TRL EMC
UKAS ACCREDITATION No:	0728
TEST DATE(s)	31st March 2005 – 1st April 2005
TEST REPORT No:	RU1172/6172

EQUIPMENT TEST / EXAMINATIONS REQUIRED

1.

TEST/EXAMINATION	RULE PART	DETECTOR	APPLICABILITY
Intentional Emission Frequency:	15.225	Quasi Peak	Yes
Intentional Emission Field Strength:	15.225	Quasi Peak	Yes
Intentional Emission Band Occupancy:	15.225	Quasi Peak	Yes
Intentional Emission ERP (mW):	N/A	-	No
Spurious Emissions – Conducted:	15.207	Quasi Peak Average	No
Spurious Emissions – Radiated <1000MHz:	15.209	Quasi Peak	Yes
Spurious Emissions – Radiated >1000MHz:	N/A	-	No
Maximum Frequency of Search:	15.33	-	Yes
Antenna Arrangements Integral:	15.203	-	Yes
Antenna Arrangements External Connector:	15.204	-	No
Restricted Bands	15.205	-	Yes
Extrapolation Factor	15.31(f)	-	Yes

2. Product Use: Product Identification

3. Emission Designator: 100KA1D

4. Duty Cycle: <100%

5. Transmitter bit or pulse rate and level: 26kbps

6. Temperatures: Ambient (Tnom) 9^{o}C

7. Supply Voltages: Vnom +3.6Vdc

   Note: Vnom voltages are as stated above unless otherwise shown on the test report page

8. Equipment Category:
   Single channel [X]
   Two channel [ ]
   Multi-channel [ ]

9. Channel spacing:
   Narrowband [ ]
   Wideband [X]

TRANSMITTER TESTS

TRANSMITTER SPURIOUS EMISSIONS – RADIATED – PART 15.209

Ambient temperature	=	9^{o}C(<1GHz)	10m measurements <30MHz	[X]
Relative humidity	=	62% (<1GHz),	3m measurements >30MHz	[X]
Conditions	=	Open Area Test Site (OATS)	30m extrapolated from 10m	[X]
Supply voltage	=	+3.6Vdc		
Channel number	=	1		

	FREQ. (MHz)	MEAS. Rx. (dBµV)	CABLE LOSS (dB)	ANT FACT. (dB/m)	FIELD STRENGTH (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)	LIMIT (µV/m)
1.705MHz - 30MHz								
30MHz - 88MHz								
88MHz - 216MHz								
216MHz - 960MHz	244.1 298.3 610.2	31.10 21.60 17.30	1.6 1.8 2.9	11.10 13.00 18.60	43.80 36.40 38.80	- - -	154.88 66.09 87.09	200 200 200
960MHz - 1GHz								
1GHz - 5GHz								

Limits		
	1.705MHz to 30MHz	30µV/m @ 30m
	30MHz to 88MHz	100µV/m @ 3m
	88MHz to 216MHz	150µV/m @ 3m
	216MHz to 960MHz	200µV/m @ 3m
	960MHz to 1GHz	500µV/m @ 3m
	1GHz to 5GHz	500µV/m @ 3m

Notes:

1 Results quoted are extrapolated as indicated
2 Emissions were searched to: (**x**) 1000MHz inclusive, as per Part 15.33a
3 Extrapolation factor 9.5dB from 1m to 3m, as per Part 15.31f
4 Extrapolation factor 19.08dB from 10m to 30m, as per Part 15.31f
5 Measurements >1GHz @ 1m as per Part 15.31f(1)
6 Receiver detector >1GHz = CISPR, Quasi-Peak, 120kHz bandwidth
7 Receiver detector >1GHz = Peak Hold, 1MHz resolution bandwidth
8 New of fully charged batteries used for battery powered products.
9 Emissions 20dB's below the limit were not necessarily recorded.
10 For emission below 30MHz the measuring receiver automatically compensates for the loss due to the antenna factor of the loop antenna. This loss is 20dB's across the measurement range 9kHz to 30MHz.
11 For emissions below 30 MHz the cable losses are assumed to be negligible.

Test Method:

1 As per Radio – Noise Emissions, ANSI C63.4: 2003
2 Measuring distances as Notes 1 to 4 above
3 EUT 0.8 metre above ground plane
4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m (>30MHz).
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes.
Maximum results recorded.

The test equipment used for the Transmitter Spurious Emissions – Radiated – Part 15.209 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	
SPECTRUM ANALYSER	TEKTRONIX	2756P	B010109	164	
BICONE ANTENNA	CHASE	BBA9106	N/A	193	
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
ANTENNA, BICONE 20MHz - 300MHz	CHASE	VBA6106A	1193	251	
BILOG ANTENNA	CHASE	CBL6112	2098	274	
RECEIVER	ROHDE & SCHWARZ	ESVS10	837948/003	317	
RECEIVER	ROHDE & SCHWARZ	ESVS10	844594/003	352	
RECEIVER	ROHDE & SCHWARZ	ESHS10	844077/019	353	
V / UHF RECEIVER 20MHz - 1GHz	ROHDE & SCHWARZ	ESVS 20	838804 / 005	415	
BILOG ANTENNA	SCHAFFNER	CBL6112B	2761	431	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	**X**
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	**X**
RANGE 1	TRL	3 METRE	N/A	UH06	**X**
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	**X**
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	**X**
SPECTRUM ANALYSER	MARCONI	2386/2380	152076/004	UH120	

TRANSMITTER TESTS

TRANSMITTER INTENTIONAL EMISSION – RADIATED – Part 15.225

Ambient temperature	=	9°C(<1GHz),	3m measurements @ fc	[X]
Relative humidity	=	62%(<1GHz),	10m measurements @ fc	[X]
Conditions	=	Open Area Test Site (OATS)	30m measurements @ fc	[ ]
Supply voltage	=	+3.6Vdc	30m extrapolated from 3m	[X]
Channel number	=	1	30m extrapolated from 10m	[X]

FREQ. (MHz)	MEASUREMENT DISTANCE (Meters)	MEASUREMENT Rx. READING (dBµV/m)	EXTRAP. FACTOR (dB)	FIELD STRENGTH (µV/m)
13.56	3	66.8	27.98	87.3
13.56	10	57.9	19.08	87.3
Limit value @ fc		**15848 (µV/m)**		
Band occupancy @ -20dBc		**f lower**	**f higher**	
		13.5204 MHz	13.6024 MHz	

See spectrum analyser plot – Annex C

Notes:

1 Results quoted are extrapolated as indicated
2 Receiver detector @ fc = Quasi Peak 10kHz bandwidth
3 The 3m-10m extrapolation factor is 8.9dB calculated from the results above.
4 Extrapolation factor 10-30m is 19.08dB using the extrapolation factor of 40dB/decade as per 15.331(f).
3 When battery powered the EUT was powered with new or fully charged batteries
5 For emission below 30MHz the measuring receiver automatically compensates for the loss due to the antenna factor of the loop antenna. This loss is 20dB's across the measurement range 9kHz to 30MHz.
6 The results quoted are the maximum seen after the supply voltage was varied between 85% and 115%.
7 For emission below 30 MHz the cable losses are assumed to be negligible.

Test Method:

1 As per Radio – Noise Emissions, ANSI C63.4: 2003
2 Measuring distances 3m &10 m (to produce extrapolation factor)
3 EUT 0.8 metre above ground plane
4 Emissions maximised by rotation of EUT, on an automatic turntable.
Raising and lowering the receiver antenna between 1m & 4m (>30MHz).
Horizontal and vertical polarisations, of the receive antenna.
EUT orientation in three orthagonal planes.
Maximum results recorded

The test equipment used for the Transmitter Intentional Emission – Radiated – Part 15.225 tests is shown overleaf:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	
HORN ANTENNA	EMCO	3115	9010-3580	138	
HORN ANTENNA	EMCO	3115	9010-3581	139	
SPECTRUM ANALYSER	TEKTRONIX	2756P	B010109	164	
BICONE ANTENNA	CHASE	BBA9106	N/A	193	
ANTENNA, LOG PERIODIC 300MHz – 1GHz	CHASE	UPA6108	1061	203	
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
ANTENNA, BICONE 20MHz - 300MHz	CHASE	VBA6106A	1193	251	
BILOG ANTENNA	CHASE	CBL6112	2098	274	
RECEIVER	ROHDE & SCHWARZ	ESVS10	837948/003	317	
RECEIVER	ROHDE & SCHWARZ	ESVS10	844594/003	352	
RECEIVER	ROHDE & SCHWARZ	ESHS10	844077/019	353	
V / UHF RECEIVER 20MHz - 1GHz	ROHDE & SCHWARZ	ESVS 20	838804 / 005	415	
BILOG ANTENNA	SCHAFFNER	CBL6112B	2761	431	
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	**X**
RECEIVER	ROHDE & SCHWARZ	ESVS 10	825892/003	UH04	
RANGE 1	TRL	10 METRE	N/A	UH07	**X**
AE, LOOP, Z2, 9kHz - 30MHz	ROHDE & SCHWARZ	HFH2	881058 - 53	07	**X**
BILOG ANTENNA	CHASE	CBL6112	2129	UH93	
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**
ENVIRONMENTAL CHAMBER	SHARETREE	TCC 125-815P	CS 203	11	**X**

TRANSMITTER TESTS

TRANSMITTER EMISSIONS – FREQUENCY TOLERANCE Part 15.225 (c)

Ambient temperature = 20°C
Relative humidity = 60%

Fc @ Vnom Tnom = 13.5604 MHz

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
-20°C	3.6	13.5604	0	±1.356
+50°C	3.6	13.5604	0	±1.356

TEMPERATURE	VOLTAGE	FREQUENCY MHz	DEVIATION kHz	LIMIT kHz
+20°C	3.06	13.5604	0	±1.356
+20°C	4.14	13.5604	0	±1.356

Notes: 1 One hour was allowed for temperature stabilisation.

Test Method:
1 EUT was placed inside the environmental chamber and temperature adjusted accordingly.
2 The DC power was varied from an external dc power supply.
3 Frequency was recorded on the spectrum analyzer.

The test equipment used for the Transmitter Frequency Tolerance – Part 15.225 (c) test was:

TYPE OF EQUIPMENT	MAKER/ SUPPLIER	MODEL No	SERIAL No	TRL No	ACTUAL EQUIPMENT USED
RECEIVER	ROHDE & SCHWARZ	ESHS20	837960/003	237	
LISN / AMN	ROHDE & SCHWARZ	ESH3-Z5	83746/010	289	
RECEIVER	ROHDE & SCHWARZ	ESHS10	844077/019	353	
ENVIRONMENTAL CHAMBER	SHARETREE	TCC 125-815P	CS 203	11	**X**
POWER SUPPLY	MANSON	EP603	60316619	UH177	**X**
MULTIMETER	AVO METER	M3004	M3270006	UH41	**X**
RECEIVER	ROHDE & SCHWARZ	ESHS 10	830051/001	UH03	
LISN/AMN	ROHDE & SCHWARZ	ESH3-Z5	863906/018	UH05	
SPECTRUM ANALYSER	ANRITSU	MS2665C	MT26089	479	**X**

ANNEX A

PHOTOGRAPHS

PHOTOGRAPH No. 1 **TEST SETUP**

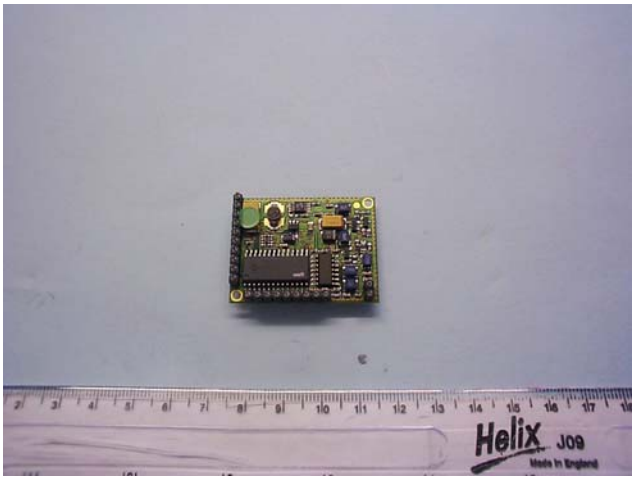
PHOTOGRAPH No. 2 **TRANSMITTER FRONT VIEW**

PHOTOGRAPH No. 3 **TRANSMITTER REAR VIEW NO BATTERY**

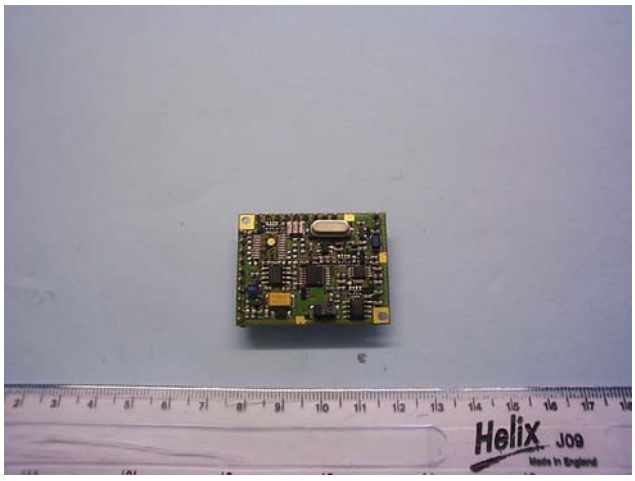
PHOTOGRAPH No. 4 **MAIN PCB TRACK AND ANTENNA SIDE**

PHOTOGRAPH No. 5 **MAIN PCB COMPONENT SIDE**

PHOTOGRAPH No. 6 **RF PCB COMPONENT SIDE**



PHOTOGRAPH No. 7 **RF PCB COMPONENT SIDE**



ANNEX B

APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

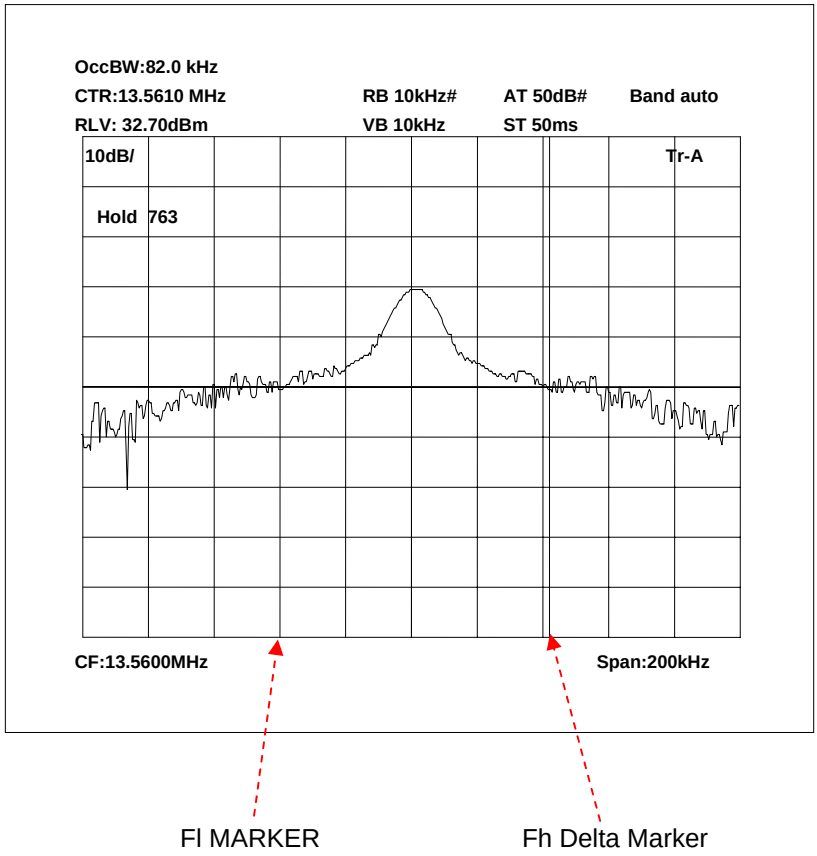
APPLICANT'S SUBMISSION OF DOCUMENTATION LIST

a.	TCB	-	APPLICATION	[X]
		-	FEE	[X]
b.	AGENT'S LETTER OF AUTHORISATION	-		[X]
c.	MODEL(s) vs IDENTITY	-		[X]
d.	ALTERNATIVE TRADE NAME DECLARATION(s)	-		[ ]
e.	LABELLING	-	PHOTOGRAPHS	[X]
		-	DECLARATION	[X]
		-	DRAWINGS	[X]
f.	TECHNICAL DESCRIPTION	-		[X]
g.	BLOCK DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
h.	CIRCUIT DIAGRAMS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
i.	COMPONENT LOCATION	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
j.	PCB TRACK LAYOUT	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
k.	BILL OF MATERIALS	-	Tx	[X]
		-	Rx	[ ]
		-	PSU	[ ]
		-	AUX	[ ]
l.	USER INSTALLATION / OPERATING INSTRUCTIONS	-		[X]

ANNEX C

BANDWIDTH PLOT

BANDWIDTH PLOT

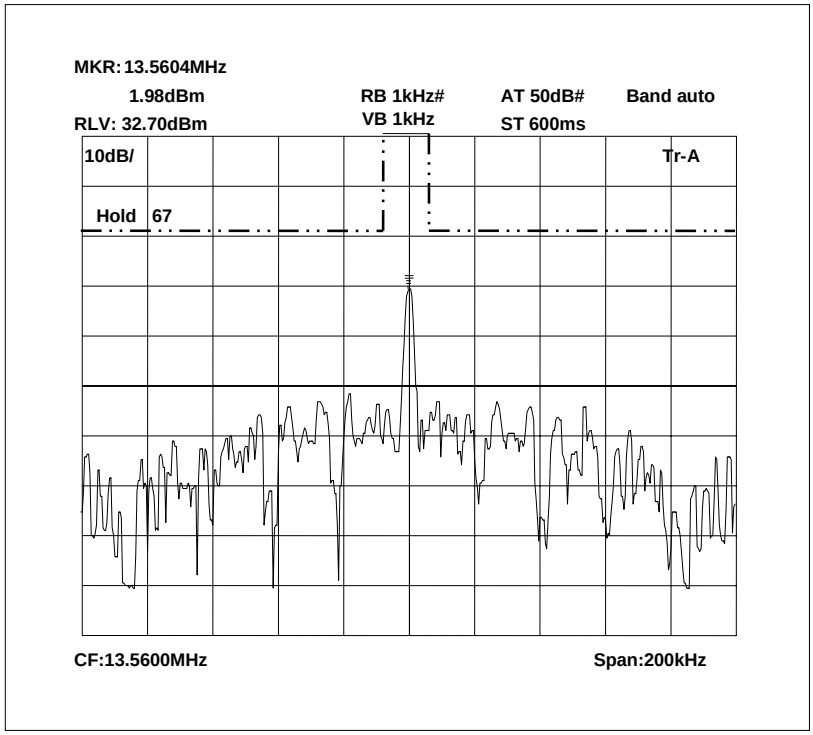


Fl	=	13.5204 MHz
Fh	=	13.6024 MHz
Occupied Bandwidth	=	82.0 kHz

ANNEX D

MASK PLOT

MASK PLOT


MKR: 13.5604MHz
1.98dBm
RLV: 32.70dBm
RB 1kHz#
VB 1kHz
AT 50dB#
ST 600ms
Band auto
10dB/
Tr-A
Hold 67
CF:13.5600MHz
Span:200kHz

ANNEX E

SCAN PLOT(s)

TRL Compliance

31 Mar 2005 09:17

H Field

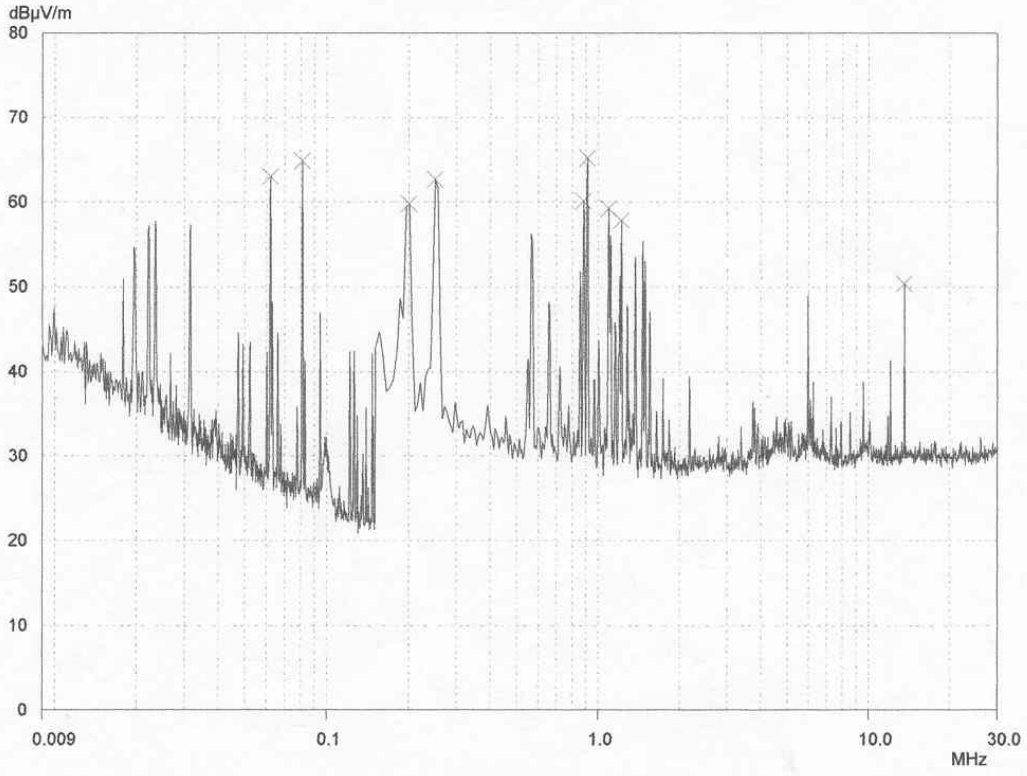
EUT:	IP3 1356
Manuf:	Blackroc
Op Cond:	Pre Scan 9kHz - 30MHz
Operator:	D Winstanley
Test Spec:	FCC Part 15
Comment:	Unit On Constant TX. No Tag Present. Unit Face on.

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
9kHz	150kHz	100Hz	200Hz	PK	100msec	Auto	OFF	60dB
150kHz	30MHz	5kHz	10kHz	PK	20msec	Auto	OFF	60dB

Prescan Measurement:

Detector:	X PK
Meas Time:	see scan settings
Peaks:	8
Acc Margin:	25 dB



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TRL Compliance Services Ltd

31 Mar 2005 09:20

E-Field Radiation

EUT:

Manuf:	Blackroc
Op Cond:	3m Indoor Prescan
Operator:	D Winstanley
Test Spec:	CFR47 FCC part 15.109 (Class B)
Comment:	Unit on Constant TX. Unit Face on. Handheld Pc in cradle. No Tag
	RX antenna Vertical.

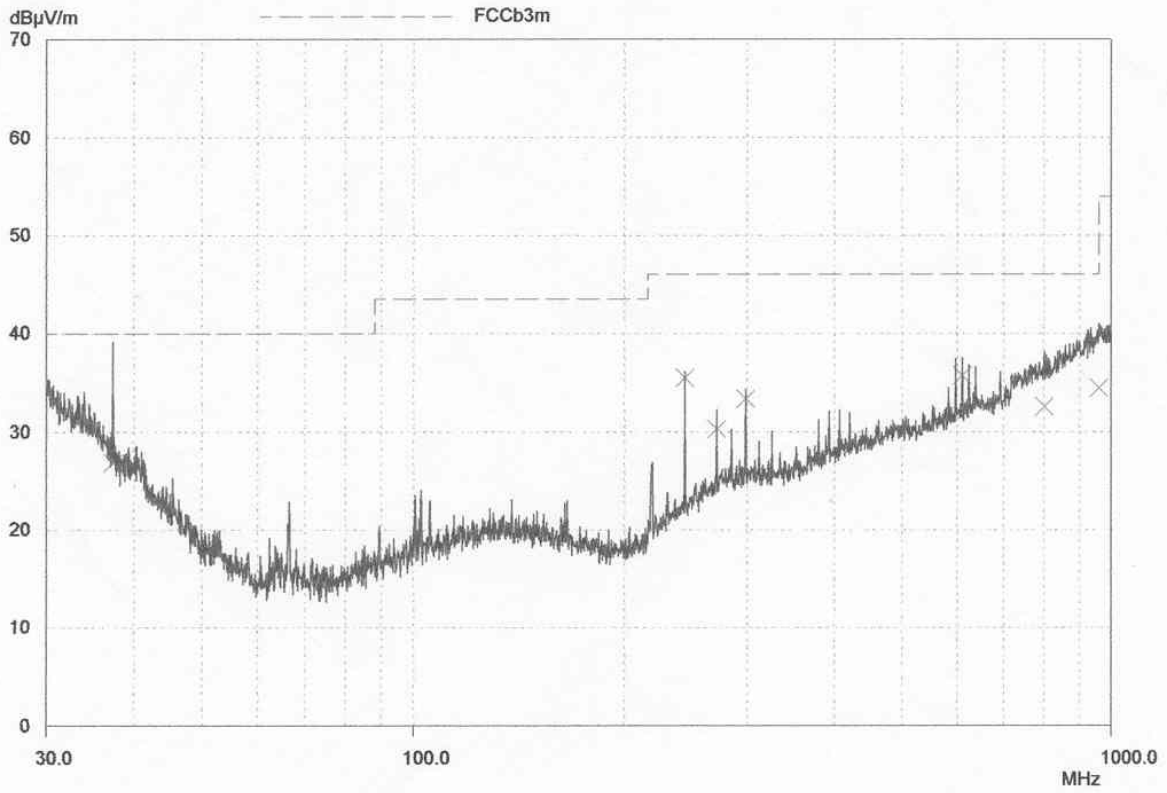
Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
30MHz	1000MHz	50kHz	120kHz	PK	1msec	Auto	ON	60dB

Transducer	No.	Start	Stop	Name
1	15	30MHz	1000MHz	TRLUH72
	20	30MHz	1000MHz	UH191

Final Measurement:

Detector:	X QP
Meas Time:	2sec
Subranges:	50
Acc Margin:	10 dB



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