

**2.5 EMISSION LIMITATIONS FOR CELLULAR – OUT OF BAND**

Test Summary	
Test Lab: MPB Technologies Inc. Ottawa Test Personnel: D. BECK Test Date: February 9, 2001	Product: BST301 <i>iDEN</i> Motorola Trunking Booster

Test Description	
Objectives/Criteria	Specifications
On any frequency twice or more then twice the fundamental frequency, the mean power of emissions must be attenuated below the mean power of the unmodulated carrier by a minimum of 60 <u>or</u> 43+10logP dB.	FCC PART 90: 1996, Subpart H Section 90.210  $f_c - 10x f_c \ 43+10\log P \text{ dB}$ Note: dB refers to attenuation from the mean power of the unmodulated carrier. $f_c$ refers to frequency of the carrier $f_d$ refers to displacement frequency from the carrier in kHz P refers to the mean power of the unmodulated carrier wave.

Test Result: <b>PASS</b>
<p>Comments: <math>P \leq 3.0W</math>, Therefore <math>43 + \text{Log}P \text{ dB}</math> is 58.4dB. 58.4 dB down from unmodulated carrier is the limit for that frequency range of the mask.</p> <p>Refer to Test Report Data sheets for more detail.</p>

**2.6 MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

Test Summary	
Test Lab: MPB Technologies Inc. Ottawa Test Personnel: D. BECK Test Date: February 7, 2001	Product: BST301 <i>iDEN</i> Motorola Truncking Booster

Test Description	
Objectives/Criteria	Specifications
For devices to be operated more then 20 cm from the users body, the equipment shall not exceed that listed in the table based on an averaging time of 30 minutes and that the limit is for the general population/uncontrolled exposure.	Power Density Requirements, FCC Part 1.1310  Frequency mW/cm <sup>2</sup> 0.3 – 1.34 (100) 1.24 – 30 (180/f <sup>2</sup> ) 30-300 0.2 <b>300-1500 f/1500</b> 1500-10000 1

Test Result: <b>PASS</b>
<p>Comments:</p> <p>Limit distance is at 8.8 inches from antenna. Statement to be incorporated shall read as follows:</p> <p>The glass mount antenna must be mounted in a location that will provide a minimum of 12 inches separation between it and vehicle occupants in order to meet the MPE (Maximum Permissible Exposure) limit and requirements in accordance with FCC CFR 47 Part 1.1301.</p> <p>The maximum permissible power output limit is at 8.8 inches from the antenna, this is equivalent to 0.557mW/cm<sup>2</sup>. Max Output measured at 824 MHz was 0.194 mW/cm<sup>2</sup> at 12 inches. Refer to Test Report Data sheets for more detail.</p> <p>All measurements were performed while the EUT was transmitting a CW signal which is deemed to be worst case.</p>

### **3.0 TEST FACILITY**

#### **3.1 LOCATION**

The EUT was tested for Electromagnetic Compatibility at the Electronics Test Centre, located in Kanata, Ontario, Canada.

#### **3.2 GROUNDING PLANE**

The EUT was located on a wooden table 80 cm above the ground plane. The EUT was grounded according to the Clients specifications.

#### **3.3 POWER**

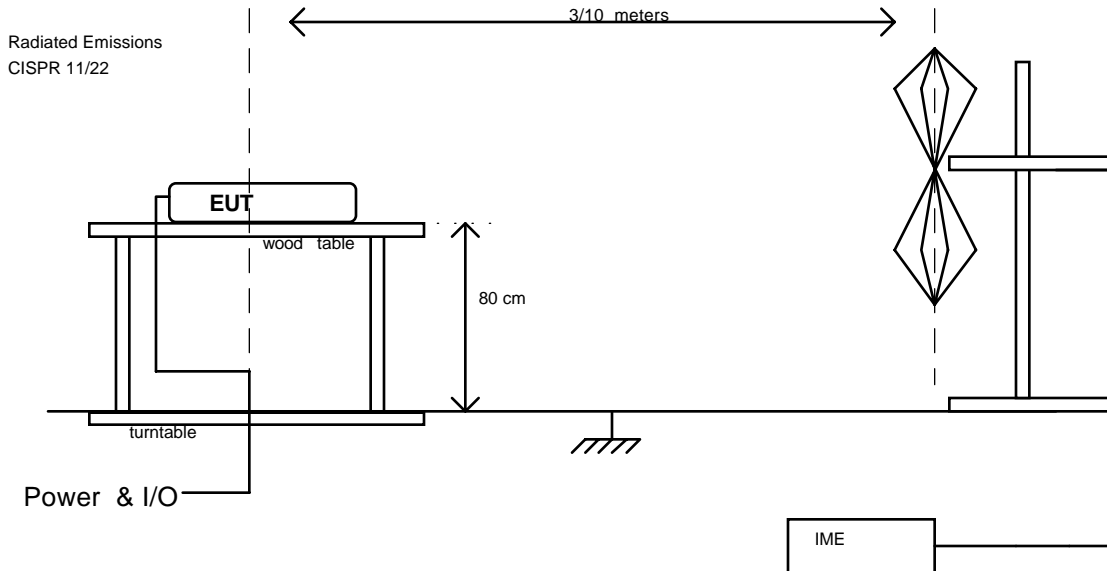
AC power was supplied via a CORCOM RFI feed through, 60-Ampere wall mounted filter. Bonding to hydro ground is via one inch grounding braid straps.

#### **3.4 EMISSIONS PROFILE**

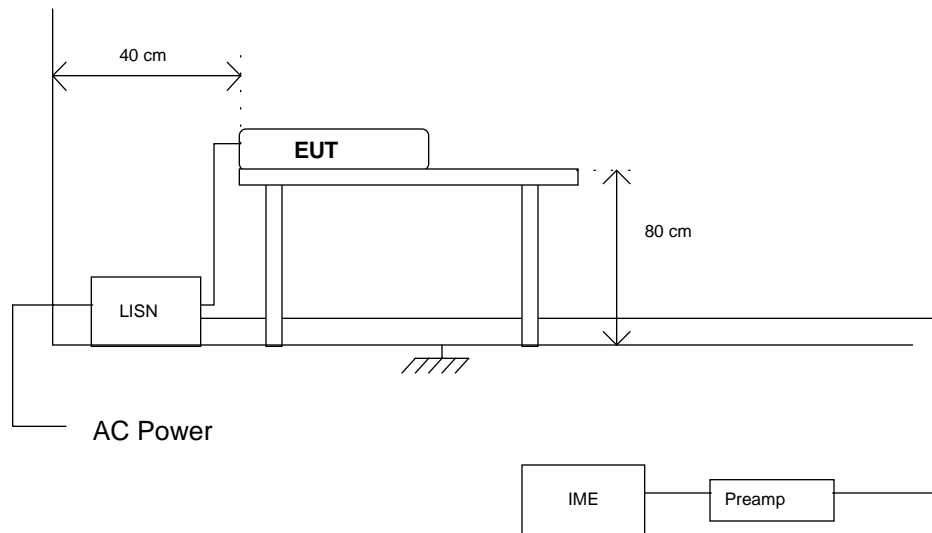
Conducted electromagnetic emission profiles were generated throughout the tests and are included in the Test Report Data sheets.

### 3.5 TEST CONFIGURATION

The following diagrams illustrate the configuration of the EUT test and measurement equipment used for CISPR Radiated and Conducted Emissions Testing.



Conducted Emissions CISPR 11 / 22



## 4.0 TEST EQUIPMENT

The following equipment was utilized for this procedure. All measurement devices are calibrated annually, traceable to NIST. Please refer to Appendix C for calibration data.

### 4.1 RADIATED EMISSIONS

- a) Spectrum Analyzer
- b) Receiver with CISPR Quasi-peak Adapter
- c) Power Isolation Transformers
- d) Biconilog antenna (25 MHz to 2 GHz)
- e) Antenna mast positioner, and controller
- f) Flush-mounted turntable, and controller

### 4.2 CONDUCTED EMISSIONS

- a) Spectrum Analyzer
- b) Line Impedance Stabilization Network, 50  $\mu$ H
- c) CISPR Quasi-peak Adapter
- d) Power Isolation Transformer
- e) Personal Computer and EMI/EMC Software

### 4.3 EMI SPECTRUM ANALYZER AND RECEIVER

#### 4.3.1 Spectrum Analyzer

##### Range 1 of 2

Start Frequency	0.15 MHz
Stop Frequency	30 MHz
Transducer	LISN per CISPR 16
Quasi-Peak Bandwidth	9 kHz
Spectrum Analyzer BW	10 kHz
Video Bandwidth	100 kHz
Reference Level	100 dB $\mu$ V

##### Range 2 of 2

Start Frequency	30 MHz
Stop Frequency	1000 MHz
Transducer	Biconilog Antenna
Quasi-Peak Bandwidth	120 kHz
Spectrum Analyzer BW	120 kHz
Video Bandwidth	1 MHz
Reference Level	100 dB $\mu$ V

#### 4.3.2 Receiver

Transducer	Biconilog Antenna
Quasi-Peak Bandwidth	120 kHz
Measurement Window	20 dB $\mu$ V

### Appendix A CLIENT SAMPLE DESCRIPTION

	New <input checked="" type="checkbox"/>	Repeat	
MPBT Personnel	Date	Project/Work Order	
D. BECK	Feb 7, 2001	M34R2460	

<b>Contact</b>	Tom Vagenas	M.C.T. INC.
<b>Company</b>		360 Industrial Parkway South, Unit #1
	M.C.T. INC.	Aurora, ON
		L4G 3V7
<b>Client Code</b>	M34	
		Phone: 416-726-3444   Fax: 905-726-4233

Product Application	Product Category	Product Type
Commercial <input checked="" type="checkbox"/>	Cellular	Truncking Booster
<b>Product Name/Part No.</b>	BST301 <i>iDEN</i> Motorola Truncking Booster	
<b>Serial Number</b>		
<b>Power Requirements: AC/DC, Current</b>	DC, 12 VDC	
<b>Operational Frequency</b>	NA	
<b>Typical Installation Instructions or Configuration</b>	DC Car with adapter or with supplied AC/DC converter.	
<b>Ground EUT</b>	No	
<b># Interconnecting Leads</b>	2	
<b>Modulation Type</b>	N/A (Amp boosts incoming signal, for test purposes TDMA PDC was used)	
<b>Peripheral Equipment</b>	Signal Generator/Cell Phone	
<b>Cables</b>	FME type Cable 50 ohm.	
<b>Functional or Self-Test Duration</b>	EUT is ready on power up.	
<b>Brief Functional Description</b>	The EUT is for boosting cellular signals in areas of weak reception.	
<b>Other Remarks</b>		

Prepared By:		Title:	Date:
D. Beck		EMC Technologist	February 7, 2000

**Appendix B**

**TEST REPORT DATA SHEETS  
and PLOTS**

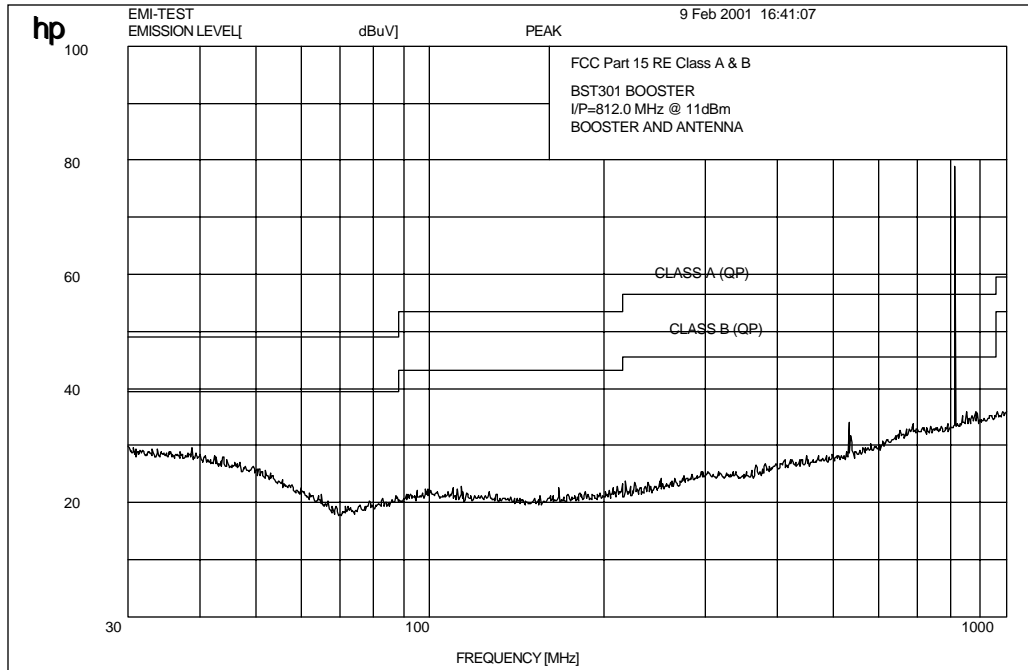
TEST REPORT DATA				
Customer No: PO# 208		MPBT No.: M34R2460	Test Date:7-Feb-01	
TEST COMP./PART:	TEST DESCRIPTION: RADIATED EMISSIONS CLASS B		TEST CRITERIA:	
MIL-SPECS./STDS.:	CISPR 22, FCC PART 15 SUBPART B		QUAL: ✓ ENG.:	
FACILITY: <b>MPB TECHNOLOGIES INC.</b>	TEST ENGINEER: D. BECK		INTERNAL:	
QA PERSONNEL:	OTHER: TEMP.: 21 C                      HUMIDITY: 35 %			
TEST PROCEDURES	DETAILS/DEVIATIONS: QUASI-PEAK LIMITS	PASS	FAIL	INIT
FCC PART 15	30 MHz - 88 MHz, 40 dBμV/m	✓		D.B
SUBPART B	88 MHz -216 MHz, 43.5 dBμV/m	✓		D.B
	216 MHz – 960 MHz, 46.0 dBμV/m	✓		D.B
	> 960 MHz, 54.0 dBμV/m	✓		D.B
MPBT: D.BECK	CUSTOMER: M.C.T. INC.		1 OF 6	

NOTE: This emission was below noise floor when a ferrite bead was applied to output of the signal generator outside of the shielded room.





TEST REPORT DATA					
Customer No 208		MPBT No.: M34r2460	Test Date: February 7, 2000		
TEST COMP./PART:	TEST DESCRIPTION : CONDUCTED EMISSIONS CLASS B		TEST CRITERIA:		
MIL-SPECS./STDS.:	FCC PART 15 SUBPART B		QUAL ✓ ENG.:		
FACILITY: <b>MPB TECHNOLOGIES INC.</b>	TEST ENGINEER: D. BECK		INTERNAL:		
QA PERSONNEL:	OTHER: TEMP.: 21 C HUMIDITY: 45 %				
TEST PROCEDURES	DETAILS/DEVIATIONS: QUASI-PEAK LIMITS	PASS	FAIL	INIT	
FCC PART 15	Quasi-Peak 450 kHz - 30 MHz, 48 dBμV	✓		D.B	
CLASS B					
	Note: If the Quasi-Peak reading exceeds 48 dBμV,				
	an average measurement is performed. If the Quasi-Peak				
	measurement is more then 6dB higher then the average				
	measurement, the Quasi-Peak measurement is reduced by				
	13 dB.				
MPBT: D. BECK	CUSTOMER: M.C.T. INC.		2 OF 6		



**Radiated Emissions**  
**BST301 Trunking Booster**  
**Sample 1758**