TRLEMC

CONTROLLED DOCUMENT	
REF Nº	RF029
ISSUE Nº	ISSUE 10
DATE:	26/5/00
AUTHORISED:	PK.

TRL EMC - SUSCEPTIBILITY TEST LOG SHEET

Date: 11th January 2001	ENG: GREG ASHE.	WON: EU1463
EUT: 1200 Sub-Miniature keyboard.	Serial No: Engineering Sample.	Specification: EN55024:1998
Test Method: RFS	Dwell Time: 4 Seconds	Step Size: 1%
Temp: 14 °C	Humidity: 44 %	Air Pressure: 1020 mb
Field / Injected Level Present →	Pre Test: Yes - ~~No - N/A~~	Post Test: Yes ~~No - N/A~~
Test Laboratory Used: ~~RFS1 LG~~ / ~~RFS2 LG~~ / RFS1 UH / ~~RFS2 UH~~ Ferrite Room		

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EUT / Antenna Orientation	
Position 1: Antenna towards front face of EUT ✓	Position 2: Antenna towards rear face of EUT ✓
Position 3: Antenna towards right hand side of EUT ✓	Position 4: Antenna towards left hand side of EUT ✓

Frequency (MHz)	Test Level (V/m / Vrms)	Observations and Comments	900M Pulse Mod 200Hz
80M-1GHz	3V/m with	(1) Front face of keyboard mounted Vertical - Standby - ANT HORIZ	
	80% AM on 1kHz	- PASS	- ✓
"	"	(2) Front face - Standby Mode - ANT Vertical	
		- PASS	- ✓
"	"	(3) BACK of EUT - standing up vert - Continuous key press - ANT Vert	
		- PASS	- ✓
"	10V/m with 80% AM	(4) BACK of EUT standing up - Continuous key press - ANT HORIZ	
	on 1kHz.	- PASS	- ✓
"	"	(5) LHS of EUT standing up - Standby Mode - ANT HORIZ	
		- PASS	- ✓
"	"	(6) LHS of EUT standing up - Standby Mode - ANT Vertical	
		- PASS	- ✓
		Performance	Criteria A
Note	EUT checked on	RHS up to = 10V/m 80% AM no	
		degradation of performance at spot	
		frequencies from 80M - 1G in 50MHz intervals.	

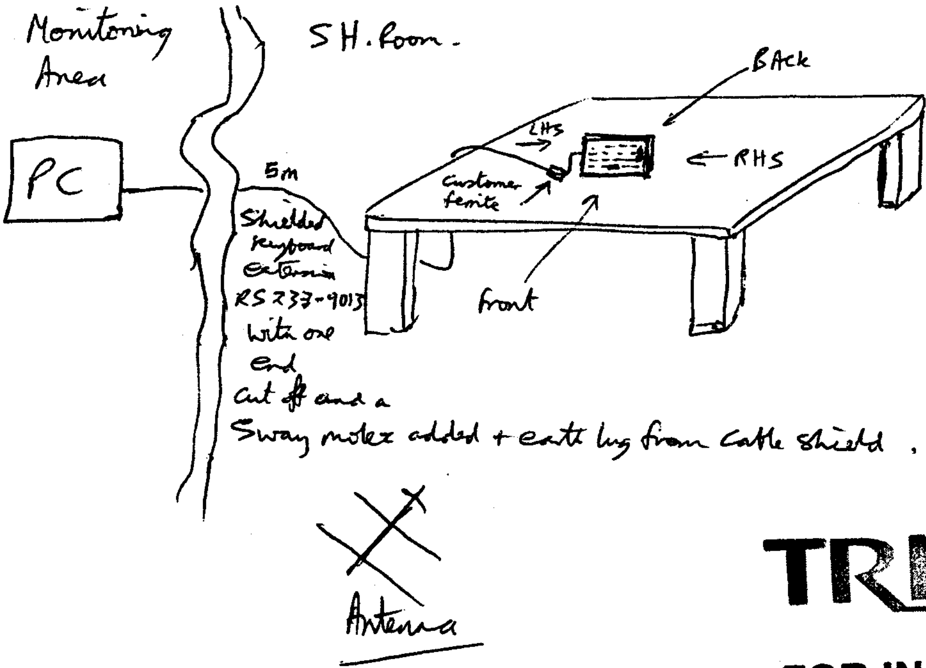
RF029 issue 10

Test equipment:-
Room UH 106
Ant UH 65
Cable UH 146
Sig gen UH 89
Power met UH 95
Pr Sensor UH126
Breakout UH 96
Amp UH103
Function gen UH 33
UH13
UH 20
UH 110

BLOCK DIAGRAM OF EQUIPMENT UNDER TEST

1. BLOCK DIAGRAM

To include all cable types and lengths, support equipment, supply voltages etc.



2. MODE OF OPERATION AND METHOD OF MONITORING FAILURES

To include data rates, client test software version, exact mode of operation, pass/fail criteria, methos of monitoring pass/fail criteria.

Mode of Operation:- (1) Standby no key pressing taking place

(2) Constantly sending a letter eg 'k' to the p.c.

Monitoring:- Performed via PC monitor for false key presses or failure to continue sending a 'k'

Pass/fail:- (1) false keypresses from standby seen on PC in Word document.

(2) failure to continue sending 'k's.

Keyboard Software:- ~~3V05~~ GA 000-IC-13-3V07

keyboard PCB:- keymat (110-90-092-IssA)

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CONTROLLED DOCUMENT	
REF Nº	RF036
ISSUE Nº	8
DATE:	22/12/00
AUTHORISED:	X. Heyes

TRL EMC – ELECTROSTATIC DISCHARGE TEST LOG SHEET

Date: 11th January 2001	ENG: Greg Ashe.	WON: EU1463
EUT: 1200 Sub-Miniature keyboard.	Serial No: ENGINEERING SAMPLE.	Specification: EN55024:1998
Test Method: ESD.	Test Laboratory: Transient Lab.	ESD Simulator: TRL UH 85

Environmental Conditions	IEC 801-2: 1984	IEC 801-2: 1991	EN61000-4-2: 1995
Temp: 15 °C	15 - 35°C	15 - 35°C	15 – 35°C
Humidity: 46 %	45 – 75%	30 – 60%	30 – 60%
Air Pressure: 1015 mb	680 – 1060mb	680 – 1060mb	680 – 1060mb

Test Point No.	Description of each test point	Discharge Type, Contact/Air	Number of discharges at each polarity
	~~Earth Reference Plane *~~		
Contact 1	Horizontal Coupling Plane *	Contact	
2	Vertical Coupling Plane *	"	
±4kV 3	bottom edge of keyboard (near spacebar)	"	
4	Top edge near 'No 6' key.	"	25 +ve
5	LHS near 'TAB'	"	25 -ve
6	RHS near 'ENTER' key.	"	
7.	Centre of keyboard between 'F' & 'G' keys.	"	
(1)	Space bar key.	AIR	
(2)	No '6' key.	"	
Air (3)	TAB key	"	10 +ve
±8kV (4)	ENTER key	"	10 -ve.
(5)	'G' key.	"	
	FOR INFORMATION ONLY		
		PASS Performance Criteria A	

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* Delete as necessary.

Note: For EN55024: 1998 – The EUT shall be exposed to at least 200 contact discharges, see clause 4.2.1

See Reverse for Test Results

TRL EMC – ELECTROSTATIC DISCHARGE TEST LOG SHEET

Test Point No.	Test Voltage (kV)	Pass	Fail	Comments
1		✓		
2		✓		
3		✓		
Contact 4	± 2kV	✓		
5	± 4kV	✓		
6		✓		
7		✓		
				All Pass Performance
				Criteria A
Air 1		✓		
2		✓		
3	± 2kV	✓		
4	± 4kV ± 6kV	✓		
5	± 8kV	✓		

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Set up:- EUT tested with standard keyboard lead coiled + with ferrite located near keyboard as specified by kemat - Tested in standby with regular key presses made during Testing.

* — See RFS sheet for more info — *

E4

11 Jan 2001 11:50

TRL EMC LIMITED
RADIATED EMISSIONS

EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room cnectd via 5m straight lead, ferrited at pc end, K-Key pressed front of EUT standing vertical, Antenna Horizontal

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

Final Measurement: X QP
Meas Time: 1sec
Subranges: 50
Acc Margin: 10 dB

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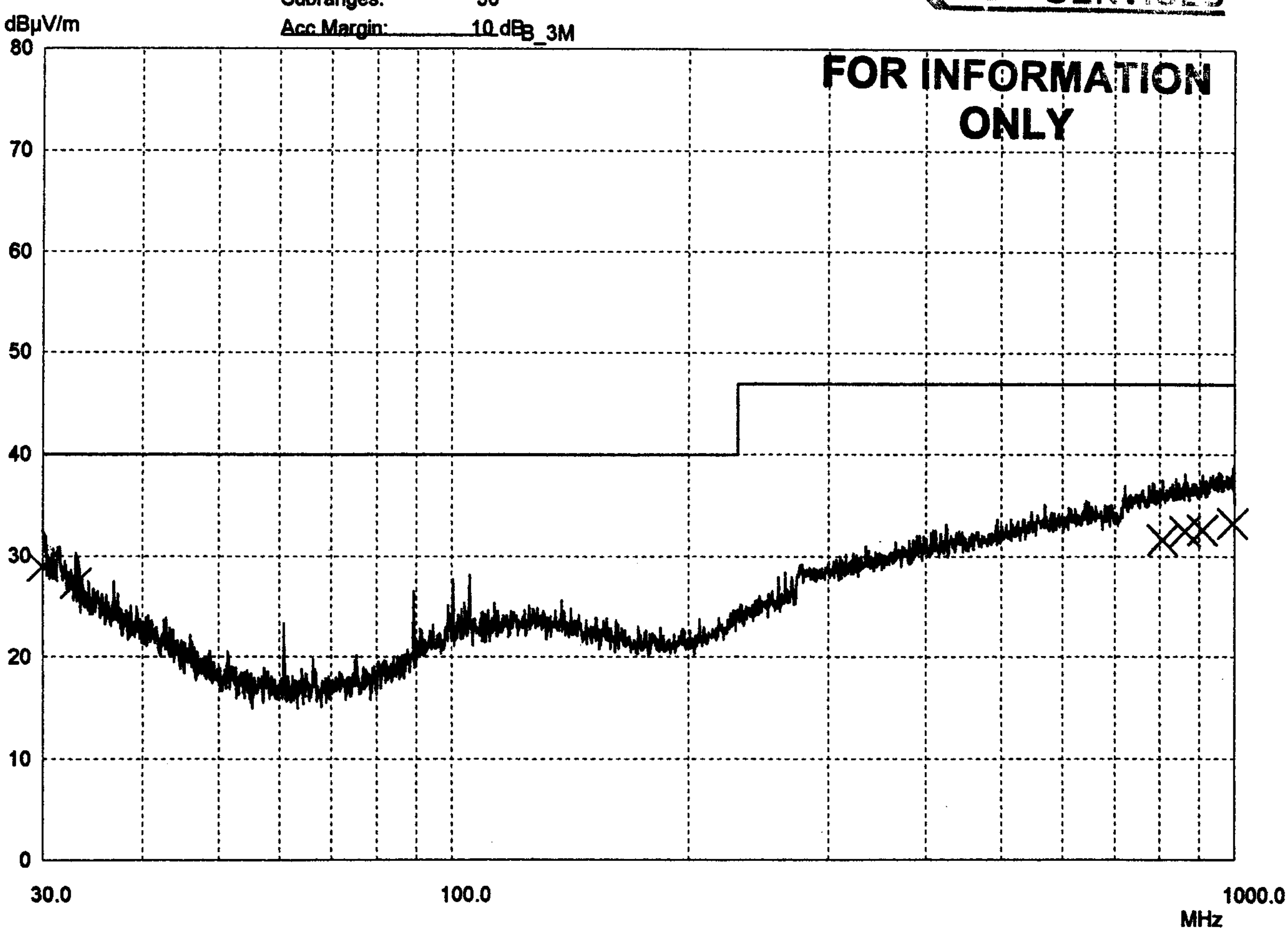

E4

11 Jan 2001 11:50

TRL EMC LIMITED
RADIATED EMISSIONS

EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room cnectd via 5m straight lead, ferrited at pc end, K-Key pressed front of EUT standing vertical, Antenna Horizontal

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

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Final Measurement: X QP

Meas Time: 1sec
Subranges: 50
Acc Margin: 10 dB

Final Measurement Results:

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB	Keyboard off
30.0	28.95	40.00	11.05	29.1
33.0	27.33	40.00	12.67	28.2
807.5	31.63	47.00	15.37	32.1
863.8	32.47	47.00	14.53	32.5
910.7	32.58	47.00	14.42	32.6
995.55	33.25	47.00	13.75	33.2

All Ambient noise

* limit exceeded

E3

11 Jan 2001 11:33

TRL EMC LIMITED
RADIATED EMISSIONS

TRL COMPLIANCE SERVICES

FOR INFORMATION ONLY

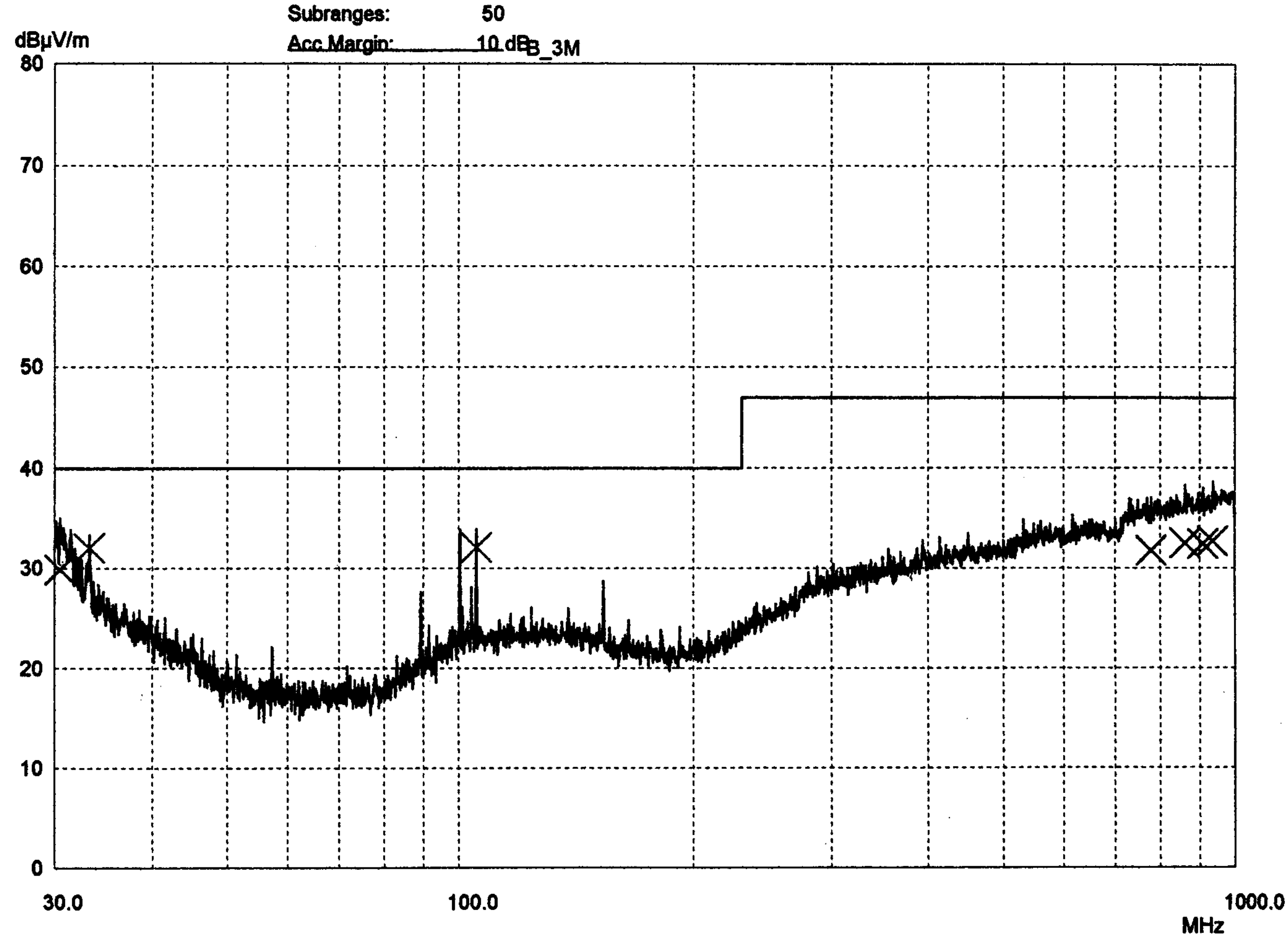
EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room cnctd via 5m straight lead, ferrited at pc end- K KEY depressed front edge of EUT (space bar, eut vertical), Antenna Vertical

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

Final Measurement: X QP
Meas Time: 1sec
Subranges: 50
Acc Margin: 10 dB



E3

11 Jan 2001 11:33

TRL EMC LIMITED
RADIATED EMISSIONS

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FOR INFORMATION ONLY

EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room cnctd via 5m straight lead, ferrited at pc end- K KEY depressed front edge of EUT (space bar, eut vertical), Antenna Vertical

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

Final Measurement: X QP

Meas Time: 1sec

Subranges: 50

Acc Margin: 10 dB

Final Measurement Results:

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB	Keyboard unplugged.
30.5	29.88	40.00	10.12	29.9
33.2	32.06	40.00	7.94	32.1
105.4	32.10	40.00	7.90	32.1
780.4	31.79	47.00	15.21	31.9
862.65	32.54	47.00	14.46	32.5
910.3	32.49	47.00	14.51	32.5
937.55	32.76	47.00	14.24	32.8

All ambient

* limit exceeded

E2

11 Jan 2001 11:14

TRL EMC LIMITED
RADIATED EMISSIONS

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FOR INFORMATION ONLY

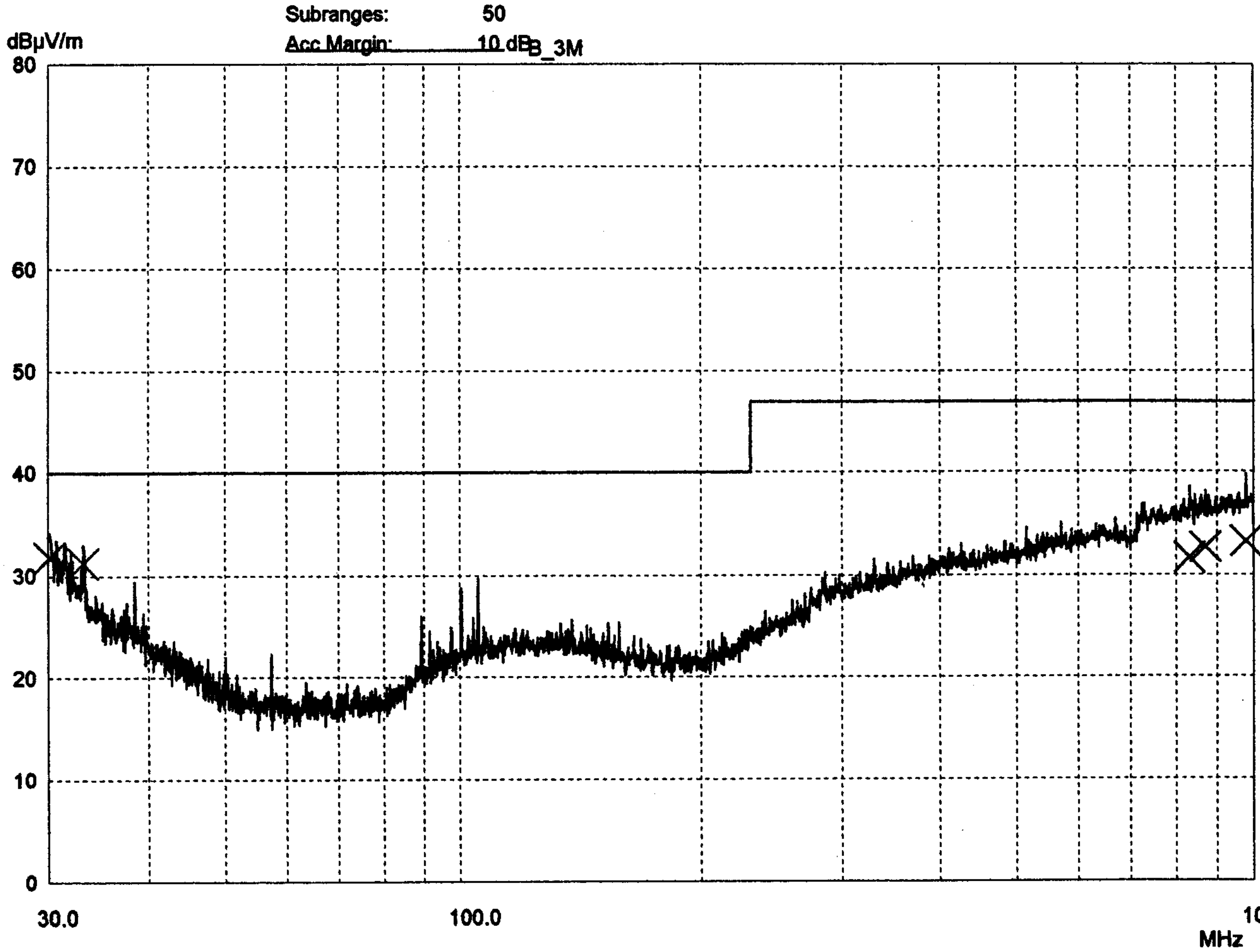
EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room connected via 5m straight lead, ferrited at pc end front edge of EUT (space bar, eut flat on table), Antenna Vertical

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

Final Measurement: X QP
Meas Time: 1sec
Subranges: 50
Acc Margin: 10 dB



E2

11 Jan 2001 11:14

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RADIATED EMISSIONS

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FOR INFORMATION ONLY

EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room connected via 5m straight lead, ferrited at pc end front edge of EUT (space bar, eut flat on table), Antenna Vertical

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

Final Measurement: X QP

Meas Time: 1sec
Subranges: 50
Acc Margin: 10 dB

Final Measurement Results:

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB	keyboard unplugged
30.1	31.82	40.00	8.18	31.9 A
33.15	31.27	40.00	8.73	31.3 A
832.5	31.68	47.00	15.32	32.5 A
872.35	32.68	47.00	14.32	32.7 A
979.75	33.25	47.00	13.75	33.2 A

All ambient noise

Note Scan performed with no activations of the keyboard.
Try holding down one key during the scan + retest also mount keyboard
Vertically with cable of LHS of table. See scan E3.

* limit exceeded

E1

11 Jan 2001 10:56

TRL EMC LIMITED
RADIATED EMISSIONS

TRL COMPLIANCE SERVICES

FOR INFORMATION ONLY

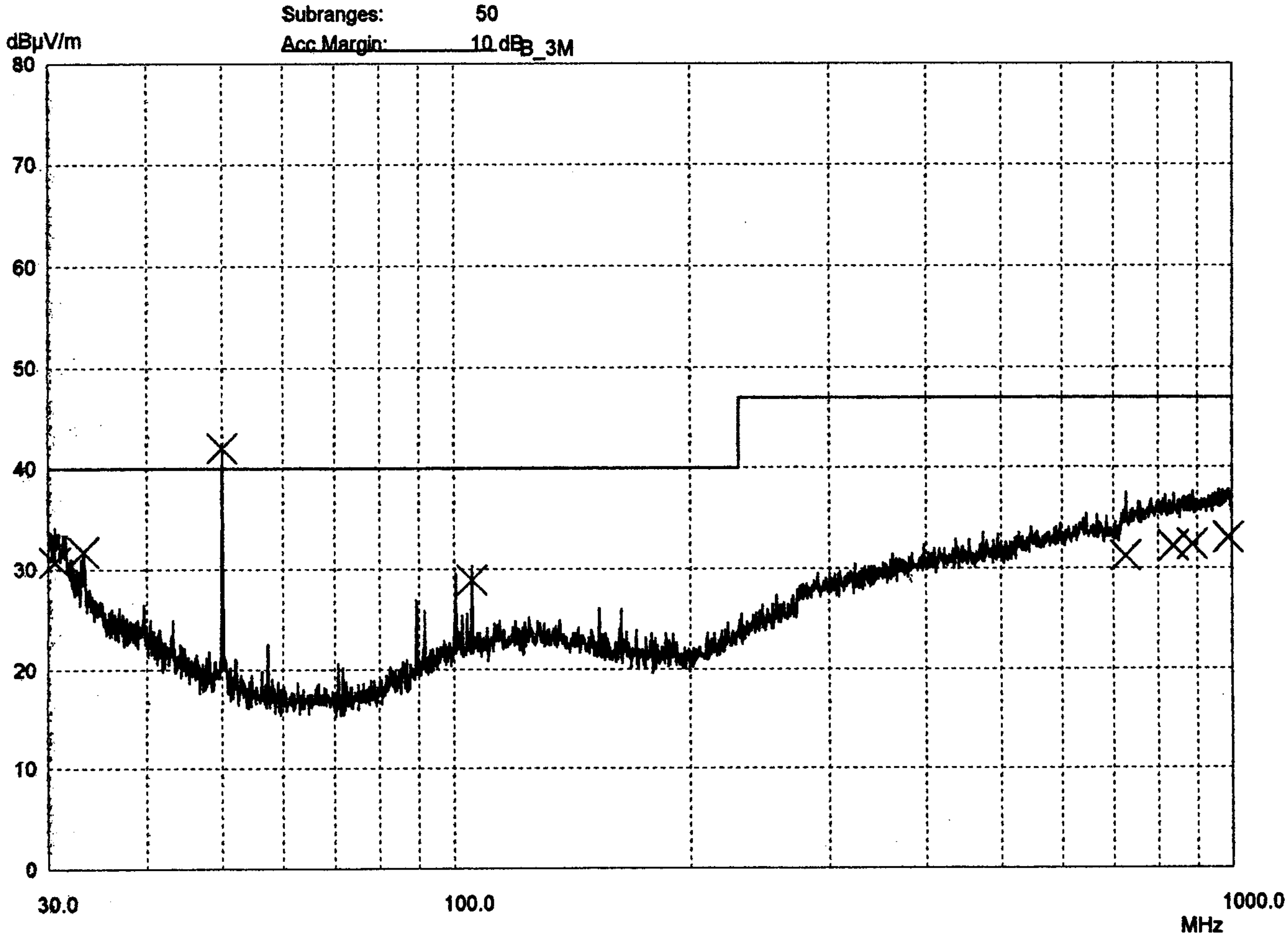
EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room connected via 5m straight lead front edge of EUT (space bar, eut flat on table), Antenna Vertical

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

Final Measurement: X QP
Meas Time: 1sec
Subranges: 50
Acc Margin: 10 dB



(E1)

11 Jan 2001 10:56

TRL EMC LIMITED
RADIATED EMISSIONS

TRL COMPLIANCE SERVICES

FOR INFORMATION ONLY

EUT:	1200 SUB-MINATURE KEYBOARD
Manuf:	KEYMAT TECHNOLOGY
Op Cond:	PRESCAN (INDOOR) AT 3m
Operator:	GREG ASHE
Test Spec:	EN55022 CLASS B (OR VARIANT)
Comment:	PC out of room connected via 5m straight lead front edge of EUT (space bar, eut flat on table), Antenna Vertical

Scan Settings (1 Range)

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

Transducer	No.	Start	Stop	Name
1	15	30MHz	1GHz	TRLUH72
	21	30MHz	1GHz	CBL6112

Final Measurement: X QP

Meas Time: 1sec

Subranges: 50

Acc Margin: 10 dB

Final Measurement Results:

Frequency MHz	QP Level dBµV/m	QP Limit dBµV/m	QP Delta dB	Keyboard unplugged from PC.
30.6	30.76	40.00	9.24	30·8 A
33.2	31.77	40.00	8.23	32·8 A
50.0	42.02*	40.00	-2.02	23·8 E
105.4	28.92	40.00	11.08	29·0 A
726.7	31.23	47.00	15.77	31·2 A
839.3	32.21	47.00	14.79	32·3 A
888.9	32.38	47.00	14.62	32·5 A
990.4	33.06	47.00	13.94	33·1 A

← due to support PC goes away when ferrited see Scan No 2.

* limit exceeded