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FINAS Finnish Accreditation Service T117 (EN ISO/IEC 17025)

FCC Part 15B Compliance Test Report

Test Report no.:	Tre_FCC_0618_03.doc	**Date of Report:**	9.5.2006
Number of pages:	11	**Customer's Contact person:**	Niko Balabanis
Testing laboratory:	TCC Nokia Tampere Laboratory P.O. Box 68 Sinitaival 5 FIN-33720 TAMPERE, FINLAND Tel. +358 (0) 7180 46800 Fax. +358 (0) 7180 46880	**Client:**	Nokia Corporation P.O. Box 50 Elektroniikkatie 10 FIN-90571 OULU, FINLAND Tel. +358 (0) 7180 08000 Fax. +358 (0) 7180 47222
FCC listing no.: **IC recognition no.:**	94436 3608		
Tested devices/ accessories:	**GSM phone RM-86 / Battery BL-5B, AC charger AC-3, Data cable CA-53, Laptop IBM Thinkpad T22, AC adapter 02K6543, Printer HP deskjet 1600CC3540A, Digital camera FUJI DS-7, Serial cable for camera, Parallel cable for printer**		
FCC ID:	LJPRM-86	**IC:**	661E-RM86
Supplement reports:	-		
Testing has been carried out in accordance with:	**CFR 47, FCC rules Part 15 Subpart B, ANSI C63.4 (2003), ICES-003, CISPR 22 and IC standards RSS-132, RSS-133 and RSS-210. Deviations, modifications or clarifications (if any) to above mentioned documents are written in each section under "Test method and limit".**		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory. The documentation of the testing performed on the tested devices is archived for 15 years at TCC Nokia.		
Test Results:	**The EUT complies with the requirements in respect of all parameters subject to the test.** The test results relate only to devices specified in this document.		
Date and signature for the contents:	Digitally signed by Jari Jantunen Date: 2006.05.09 13:16:04 +03'00'		

Jari Jantunen, System Manager

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1. Summary for FCC Part 15B Compliance Test Report

Date of receipt	19.4.2006
Testing completed	9.5.2006
The customer's contact person	Niko Balabanis
Test Plan referred to	\EMC\TESTPLAN\
Notes	-
Document name	T:\Projects\RM-86\EMC\Results\FCC\Tre_FCC_0618_03.doc

1.1. EUT and Accessory Information

The EUT is a triple band (GSM900/1800/1900) mobile phone with GPRS, EGPRS and Bluetooth. GSM band is tested in idle mode. Bluetooth is tested with maximum rated TX power.

Product	Type	SN	HW	MV	SW	DUT
GSM phone	RM-86	004400641617301	0901	-	2.14	40642
Battery	BL-5B	-	-	-	-	40644
AC-Charger	AC-3	-	1.1	0.4	-	40646
Data cable	CA-53	-	-	-	-	40647
Laptop	IBM Thinkpad T22	555V2PT	-	-	-	40201
AC Adapter	02K6543	-	-	-		40202
Printer	HP deskjet 1600CC3540A	USB8302546	-	-	-	40077
Digital camera	FUJI DS-7	7102516	-	-	-	40076
Serial cable for camera	-	-	-	-	-	40088
Parallel cable for printer	-	-	-	-	-	40087

1.2. Summary of Test Results

GSM 1900:

Section in CFR 47	Section in ICES-003 (RSS-133)	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	PASSED
15.109, a	5.5 (9)	Radiated emissions	PASSED

Bluetooth:

Section in CFR 47	Section in ICES-003	Name of the test	Result
15.107, a	5.3	AC powerline conducted emissions	PASSED
15.109, a	5.5	Radiated emissions	PASSED

PASSED	The EUT complies with the essential requirements in the standard.
FAILED	The EUT does not comply with the essential requirements in the standard.
NP	The test was not performed by the TCC Nokia Tampere Laboratory.

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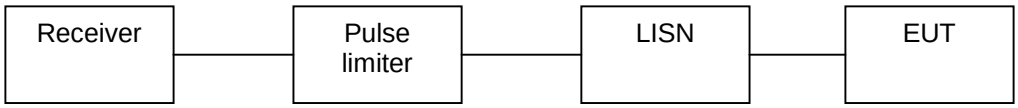
2. AC powerline conducted emissions

(FCC §15.107, ICES-003 section 5.3)

EUT with DUT number	RM-86 DUT 40642
Accessories with DUT numbers	BL-5B DUT 40644, AC-3 DUT 40646, CA-53 DUT 40647, IBM Thinkpad T22 DUT 40201, 02K6543 DUT 40202, HP deskjet 1600CC3540A DUT 40077, FUJI DS-7 DUT 40076, Serial cable for camera DUT 40088, Parallel cable for printer DUT 40087
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Continuous data transfer was active between the phone and the computer during the test.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	20 / 47 / 102.3
Date of measurements	9.5.2006
Measured by	Jari Jantunen

2.1. Test setup



2.2. Test method and limit

The measurement is made according to ANSI C63.4-2003 as follows:

The EUT is placed on a wooden table 80 cm above the reference groundplane.

The EUT is connected via LISN to a test power supply.

The measurement results are obtained as described below:

$$U\ [dB\mu V] = U_{RX} + A_{TOT}$$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable and pulse limiter attenuations.

CISPR 22 Class B limits

Frequency range [MHz]	Quasi peak limit [dBµV]	Average limit [dBµV]
0.15 - 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

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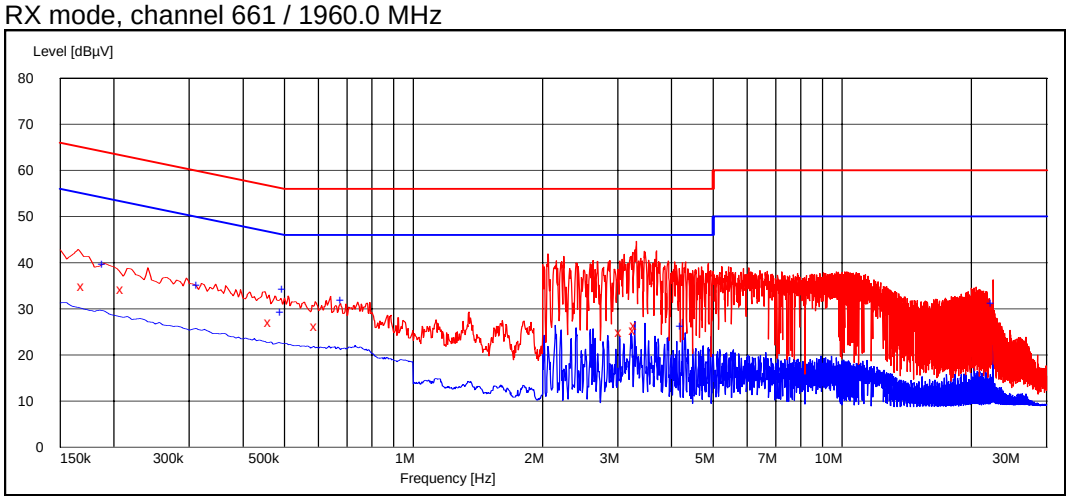
2.3. GSM 1900 Test results

RX mode, channel 661 / 1960.0 MHz



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.170000	34.80	N	PASSED
0.210000	34.30	N	PASSED
0.465000	27.10	L1	PASSED
0.595000	26.30	L1	PASSED
3.055000	25.00	L1	PASSED
3.290000	25.40	L1	PASSED
3.310000	26.50	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.190000	39.60	L1	PASSED
0.315000	35.10	L1	PASSED
0.495000	29.40	L1	PASSED
0.500000	34.20	L1	PASSED
0.685000	31.80	L1	PASSED
4.240000	26.20	L1	PASSED
22.500000	31.20	L1	PASSED

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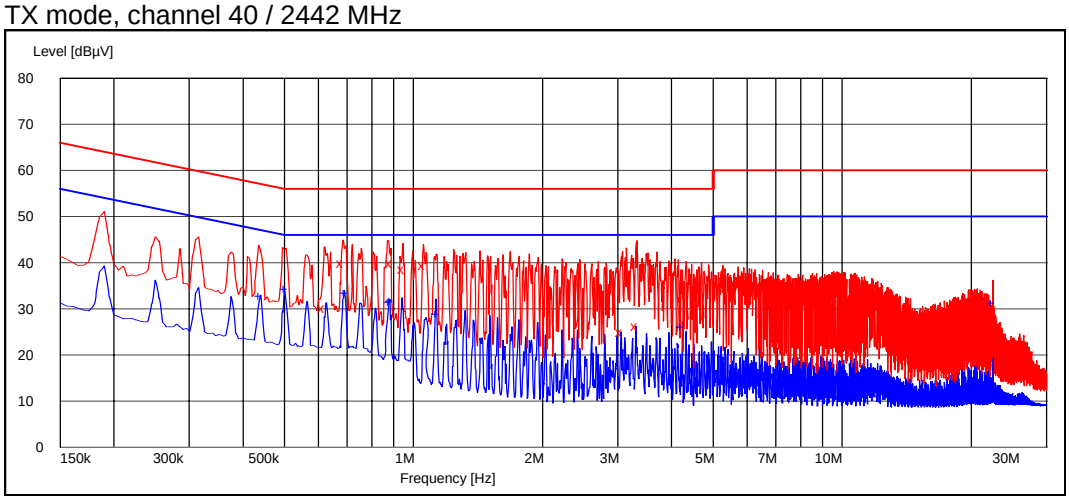
2.4. Bluetooth Test results

TX mode, channel 40 / 2442 MHz



Quasi peak (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.620000	30.20	N	PASSED
0.685000	40.00	L1	PASSED
0.890000	39.80	L1	PASSED
0.950000	38.70	L1	PASSED
1.060000	39.40	L1	PASSED
3.060000	25.00	L1	PASSED
3.325000	26.30	L1	PASSED

Average (RBW: 9 kHz)

Frequency [MHz]	U [dBµV]	Line	Result
0.440000	32.80	L1	PASSED
0.505000	34.30	L1	PASSED
0.695000	33.40	N	PASSED
0.885000	31.50	N	PASSED
0.890000	31.70	N	PASSED
1.140000	28.90	L1	PASSED
4.240000	26.10	N	PASSED
22.500000	31.20	L1	PASSED

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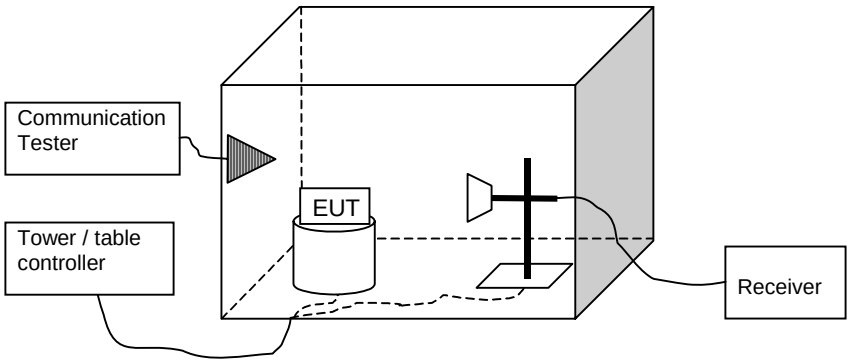
3. Radiated emissions

(FCC §15.109, ICES-003 section 5.5, RSS-132 6.6, RSS-133 9)

EUT with DUT number	RM-86 DUT 40642
Accessories with DUT numbers	BL-5B DUT 40644, AC-3 DUT 40646, CA-53 DUT 40647, IBM Thinkpad T22 DUT 40201, 02K6543 DUT 40202, HP deskjet 1600CC3540A DUT 40077, FUJI DS-7 DUT 40076, Serial cable for camera DUT 40088, Parallel cable for printer DUT 40087
Operation Voltage [V] / [Hz]	115 / 60
Result	PASSED
Remarks	Continuous data transfer was active between the phone and the computer during the test.
Temp [°C] / Humidity [%RH] / Air Pressure [kPa]	22-23 / 47-48 / 103.7-103.8
Date of measurements	5-8.5.2006
Measured by	Jari Jantunen

3.1. Test setup



3.2. Test method and limit

The measurement is made according to ANSI C63.4-2003as follows:

The measurement is performed in the Semi-Anechoic Chamber with conducting metal floor.

The measurement distance is 3 m.
The EUT is placed on a nonconductive plate at 80 cm height.

For each suspected frequency, the turntable is rotated 360 degrees and antenna is scanned from 1 to 4 m. This is repeated for both horizontal and vertical receive antenna polarizations.

The emissions less than 20 dB below the permissible value are reported.

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The measurement results are obtained as described below:

$E\ [\mu V/m] = U_{RX} + A_{TOT}$

Where U_{RX} is receiver reading and A_{TOT} is total correction factor including cable loss, antenna factor and preamplifier gain ($A_{TOT} = L_{CABLES} + AF - G_{PREAMP}$).

CISPR 22 and FCC Part 15 Class B limits (3 m measurement distance)

Frequency range [MHz]	Quasi peak limit [dBµV/m]	Average limit [dBµV/m]	Peak limit [dBµV/m]
30 – 230	40	-	-
230 – 1000	47	-	-
Above 1000	-	54	74

3.3. GSM 1900 Test results

RX mode, channel 512 / 1930.2 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
3860.000000	42.10	127.35	44.80	-2.70	HORIZONTAL	PASSED
7720.000000	46.70	216.27	43.50	3.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
3860.000000	29.00	28.18	31.70	-2.70	VERTICAL	PASSED
7720.000000	30.60	33.88	27.40	3.20	VERTICAL	PASSED

RX mode, channel 661 / 1960.0 MHz

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
501.302004	37.30	73.28	65.80	-28.50	VERTICAL	PASSED
734.066934	19.80	9.77	43.90	-24.10	HORIZONTAL	PASSED
845.291383	26.10	20.18	49.20	-23.10	VERTICAL	PASSED
866.133467	20.60	10.72	43.60	-23.00	VERTICAL	PASSED
893.887575	32.40	41.69	54.90	-22.50	VERTICAL	PASSED
948.797796	23.10	14.29	45.30	-22.20	VERTICAL	PASSED

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
3920.000000	46.00	199.53	48.30	-2.30	HORIZONTAL	PASSED
7840.179359	48.90	278.61	45.60	3.30	VERTICAL	PASSED

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Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
1230.966934	20.50	10.59	40.10	-19.60	VERTICAL	PASSED
1260.019038	36.00	63.10	55.30	-19.30	VERTICAL	PASSED
1293.589178	30.60	33.88	49.20	-18.60	VERTICAL	PASSED
2933.365731	32.10	40.27	37.40	-5.30	VERTICAL	PASSED
3920.000000	30.80	34.67	33.10	-2.30	HORIZONTAL	PASSED
7840.179359	19.00	8.91	15.70	3.30	VERTICAL	PASSED

RX mode, channel 810 / 1989.8 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
3980.000000	45.60	190.55	47.60	-2.00	HORIZONTAL	PASSED
7960.000000	46.70	216.27	43.00	3.70	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
3980.000000	30.00	31.62	32.00	-2.00	HORIZONTAL	PASSED
7960.000000	30.90	35.08	27.20	3.70	VERTICAL	PASSED

3.4. Bluetooth Test results

RX mode, channel 0 / 2402 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4804.000000	40.00	100.00	41.30	-1.30	HORIZONTAL	PASSED
7206.000000	42.10	127.35	40.10	2.00	HORIZONTAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4804.000000	27.00	22.39	28.30	-1.30	VERTICAL	PASSED
7206.000000	29.10	28.51	27.10	2.00	VERTICAL	PASSED

RX mode, channel 40 / 2442 MHz

Quasi peak (RBW: 120 kHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
248.697194	11.70	3.85	35.20	-23.50	VERTICAL	PASSED
270.040481	29.80	30.90	52.30	-22.50	VERTICAL	PASSED

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Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4884.000000	41.10	113.50	42.70	-1.60	VERTICAL	PASSED
7273.041082	42.50	133.35	39.90	2.60	HORIZONTAL	PASSED
7288.077154	43.30	146.22	40.60	2.70	VERTICAL	PASSED
7401.795591	44.00	158.49	40.70	3.30	VERTICAL	PASSED
7421.341683	43.40	147.91	40.10	3.30	HORIZONTAL	PASSED
17906.813627	55.60	602.56	34.40	21.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4884.000000	27.40	23.44	29.00	-1.60	HORIZONTAL	PASSED
7269.041082	30.30	32.73	27.70	2.60	HORIZONTAL	PASSED
7285.077154	30.30	32.73	27.60	2.70	VERTICAL	PASSED
7398.295591	30.40	33.11	27.10	3.30	VERTICAL	PASSED
7422.341683	30.60	33.88	27.30	3.30	HORIZONTAL	PASSED
17909.313627	42.40	131.83	21.20	21.20	VERTICAL	PASSED

RX mode, channel 78 / 2480 MHz

Peak (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4960.000000	40.50	105.93	41.50	-1.00	HORIZONTAL	PASSED
7440.000000	42.80	138.04	39.60	3.20	VERTICAL	PASSED

Average (RBW: 1 MHz)

Frequency [MHz]	E [dBµV/m]	E [µV/m]	U_{RX} [dBµV]	A_{TOT} [dB]	Polarisation	Result
4960.000000	27.90	24.83	28.90	-1.00	HORIZONTAL	PASSED
7440.000000	30.30	32.73	27.10	3.20	HORIZONTAL	PASSED

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4. Test Equipment

4.1. Conducted measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM37610	Spectrum analyzer	FSU	R&S	15C,22/24
TM37678	Radio communication tester	CMU-200	R&S	15C,22/24
	Attenuator 10 dB	6251.17.A	Huber+Suhner AG	15C,22/24
TM22901	Step attenuator 110dB	8496A	Agilent	15C,22/24
TM37499	Power splitter	11667A	Agilent	15C,22/24
	Temperature chamber	VT4002	Vötsch	15C,22/24
TM38112	DC power supply	6632A	Agilent	15C,22/24
TM38111	Multimeter	34401A	Agilent	15C,22/24
TM38845	EMI receiver	ESI 40	R&S	15B,15C
TM37773	Radio communication tester	CMU-200	R&S	15B,15C
TM38631	Signal generator	83640L	Agilent	15B,15C
TM38114	DC power supply	6632A	Agilent	15B,15C
TM22835	Multimeter	87	Fluke	15B,15C
TM30600	Pulse Limiter	ESH3-Z2	R&S	15B,15C
TM26490	LISN 50 µH	ESH3-Z5/	R&S	15B,15C
TM30636	LISN 50 µH	L2-16/	PMM	15B,15C

4.2. Radiated measurements

Eq. No	Equipment	Type	Manufacturer	Used in
TM30599	3m semi-anechoic chamber		TDK	15B,15C, 22/24
TM38845	EMI receiver	ESI 40	R&S	15B,15C, 22/24
TM37498	Preamplifier	AMF-5D-020180-26-10P	MITEQ	15B,15C, 22/24
TM37523	Preamplifier	AMF-4D-10M-3G-25-20P	MITEQ	15B,15C, 22/24
TM37516	Biconilog antenna	HL562	R&S	15B,15C, 22/24
TM26496	Double ridged waveguide antenna	3115	EMCO	15B,15C, 22/24
TM39158	Horn antenna	3116	EMCO	15B,15C, 22/24
TM26492	Reference dipole set	UHAP/VHAP	Schwarzbeck	15B,15C, 22/24
TM37501	Dipole antenna	3125-870	EMCO	22/24
TM37502	Dipole antenna	3125-1880	EMCO	22/24
TM37773	Radio communication tester	CMU-200	R&S	15B,15C, 22/24
TM38631	Signal generator	83640L	Agilent	15B,15C, 22/24
TM38066	High pass filter	4HC3000/18000-3-KK	Trilithic	15B,15C, 22/24
	High pass filter	WHK2010-10SS	Trilithic	15B,15C, 22/24
	Low pass filter	WLK1750-10SS	Trilithic	15B,15C, 22/24
TM26511	Tunable notch filter	WRCA870	Wainwright	22/24
TM38215	Tunable notch filter	WRCD1850/1910-0.2/40	Wainwright	22/24
TM38214	Band reject filter	WRCT 2402/2480-2400/2483.5-30	Wainwright	15C
TM30642	Turntable controller	HD-100	Deisel	15B,15C, 22/24
TM26500	Turntable	DS412	Deisel	15B,15C, 22/24
TM38842	Antenna mast controller	2090	EMCO	15B,15C, 22/24
TM38843	Antenna mast	2075	EMCO	15B,15C, 22/24
TM38114	DC power supply	6632A	Agilent	15B,15C, 22/24
TM22835	Multimeter	87	Fluke	15B,15C, 22/24

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