

SERVICE MANUAL



BENEFON EXION TDP80DN

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1.0 GENERAL

General

1.1 TECHNICAL INFORMATION

1.1.1 Network standard

NMT-450i

Output power=1,2 W

1.1.2 Dimensions

(with 900 mAh Lion)

Size: 46 x 100 x 21 mm

Weight: 109 g

Volume: 81 cm³

1.1.3 Display

Full-graphics high-contrast screen

Electro-luminescent lighting

Resolution 100 x 48 pixels

Up to 5 lines of text

Indicators: fields strength, battery status, charging, time, date, timers, alarm, key-lock, silent, message, call divert and roaming, voice priaxiaty, mic muting

Graphical icons and scroll bars

Gyrillic alphabets

1.1.4 Keypad and editing

Automatic and manual key lock

Full-screen editor

International access (+) function (Operator dependent function)

Any-key answering

1.1.5 Personal organiser

Clock and date

Alarm clock with snooze

Calendar

Calendar appointment manager with reminders

Phone power on and off timers

1.1.6 Other phone features

Autonomous Power Control

Calculator and currency converter

Several games for entertainment

Personalised ringing melody groups

External antenna connector

Vibrating alert

NMT-pager (DTMF)

1.1.7 Call management

One-touch dialling

Last or recent numbers redial (10)

Multiparty calls (Operator dependent function)

Calling Line Identification Presentation (CLIP) (Operator dependent function)

Caller Line Name Presentation (CLNP) (Operator dependent function)

DTMF transmission

Semiautomatic and manual network selection

Optional automatic network selection

Automatic answer with headset and car kit

1.1.8 Phone book and memory functions

Supports up to 300 phone book entries

Various ways to scroll or search the phone book memory

Dialled calls (10) list with time or date stamp

Answered calls (10) list with time or date stamp and calling number or name identification

Received DTMF-messages (10) with time and date stamp

Unanswered calls (10) list with time or date stamp and calling number or name identification

Access phone book for sending SMS

Pick SMS sender's number for phone book

Show sender number or name (if stored in phone book) as an SMS header

Customized ringing tones for 5 phone book groups

1.1.9 Short messages service (SMS) (Operator dependent function)

Send and receive text messages of up to 160 characters

Time and date stamp for received messages

Answer to message

Forward message

Pick sender number from message text

Call SMS sender

1.1.10 Security and call counters

SIS-security check

Call timers: last outgoing/incoming calls, all outgoing/incoming calls

Phone lock code

Voice privacy

1.1.11 Tone control

40 different ringing tones and melodies for incoming call, alarm, calendar and short messages

Downloadable ringing melody using BeneWin

User-compasable ringing melodies using BeneWin

Adjustable ringing tone volume levels, including silent mode

Keypad tone volume levels

Several tone set-ups for different environments

1.1.12 Battery packs and operating times

Initially two battery packs are available for Benefon Exion, namely

Battery type	Stand-by time	Talk time	Charging time Fast	Charging time Normal
Lithium ion 900 mAh	20 h -150 h	50 min - 1 h 40 min	1 h 45 min	4 h 30 min
Lithium ion 1200 mAh	26 h - 200 h	1 h 10 min -2 h 20 min	2 h 30 min	5 h 30 min

Operating times can vary substantially depending on distance to base station, network settings and network usage.

1.1.13 Power Consumption

Batteries: 3,6 V Lion

Sleep current: app. 600 μ A

Standby current: app. 43 mA

Conversation mode, high power: app. 1.1 A

Conversation mode, low power: app. 0.45 A

1.1.14 Accessories

Mains charger

Cigarette lighter charger

Portable hands free (HF) kit

Digital, full duplex, plug-in HF car kit

Hands free car kit with voice recognition and external antenna

Car cradle

Belt clip

BeneWin software & editor cable

Carrying case

Line interface for data transmission

Antenna alternatives: city, standard, off-road and super 1/2-wave

1.1.15 BeneWin

BeneWin PC software:

Edit and back up phone book memory

Send and receive SMS messages by using a PC keyboard

Compose and change ringing melodies with BeneWin Maestro

Manage phone settings

1.1.16 Manufacturer

BENEFON OYJ

P.O. Box 84

(Meriniitynkatu 11)

FIN 24101 SALO

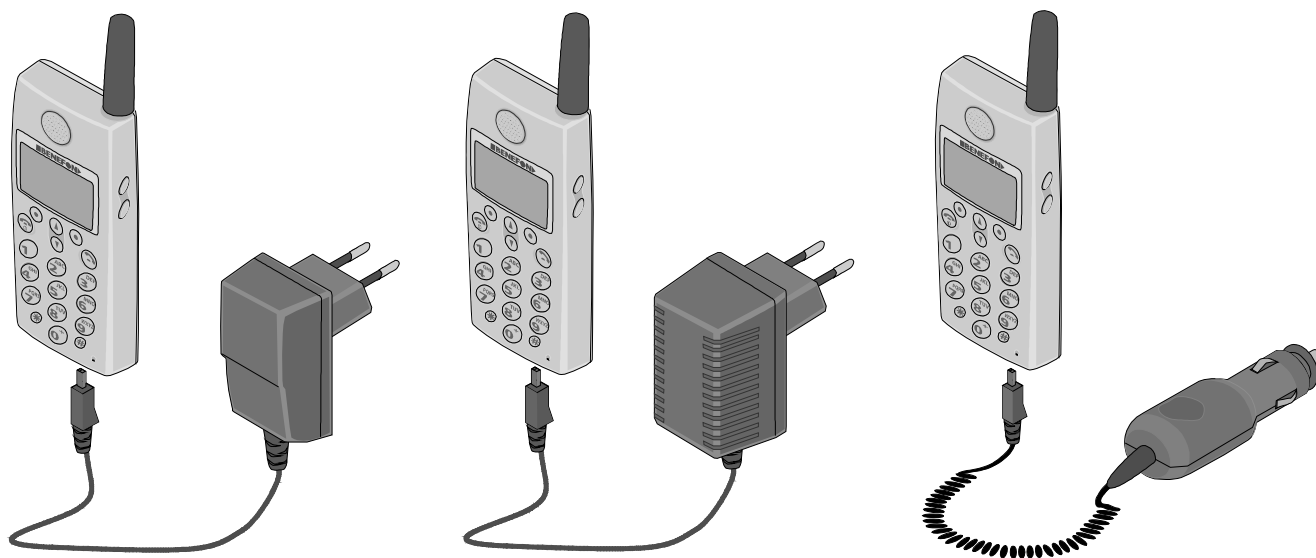
FINLAND

Telephone: + 358 2 77 400

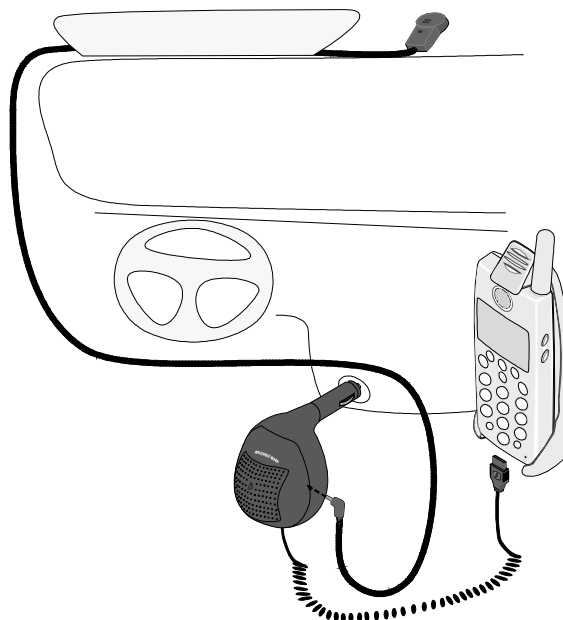
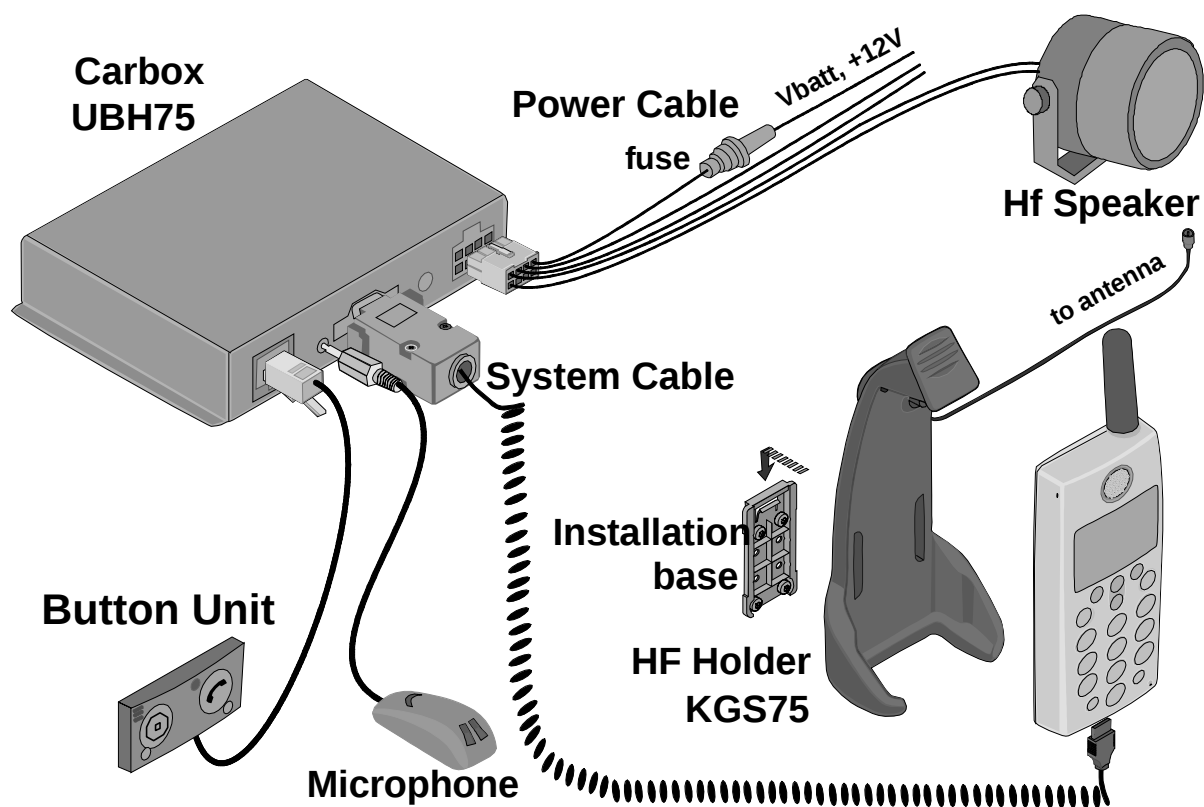
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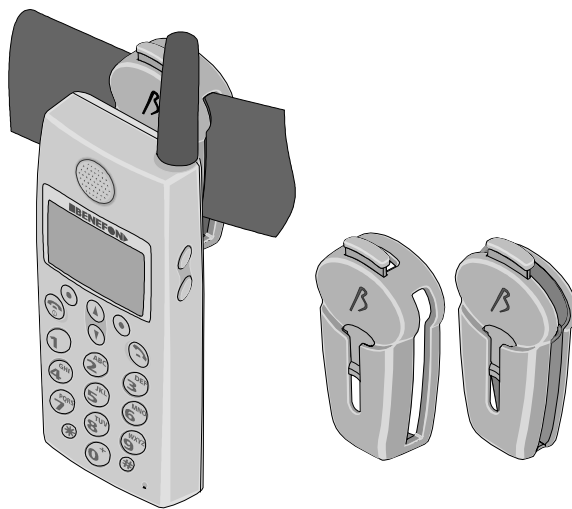
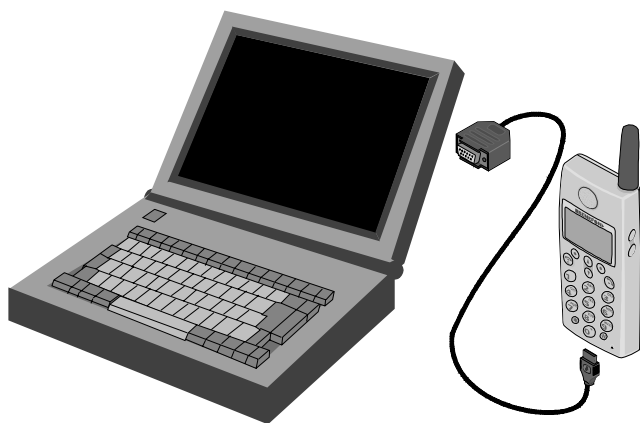
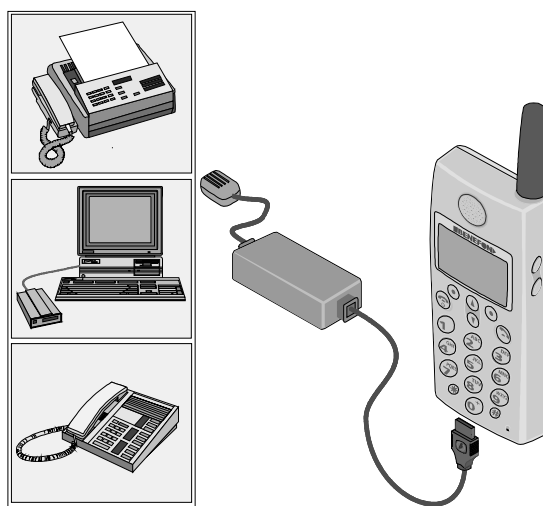
1.2 PRODUCT FAMILY

- BENEFON EXION HANDPORTABLE TDP80DN
- MAINS CHARGER
- CIGARETTE LIGHTER CHARGER
- PORTABLE HANDS FREE (HF) KIT
- DIGITAL, FULL DUPLEX, PLUG-IN HF CAR KIT
- HANDS FREE CAR KIT WITH VOICE RECOGNITION AND EXTERNAL ANTENNA
- CAR CRADLE
- BELT CLIP
- BENEWIN SOFTWARE & EDITOR CABLE
- CARRYING CASE
- LINE INTERFACE FOR DATA TRANSMISSION
- ANTENNA ALTERNATIVES: CITY, STANDARD, OFF-ROAD AND SUPER 1/2-WAVE



Benefon Exion and chargers

**Portable hands free (HF) kit****Digital, full duplex, plug-in HF car kit****Hands free car kit with voice recognition and external antenna**

**Car cradle****Belt clip****BeneWin software & editor cable****Line interface for data transmission**

2.0 OWNER'S MANUAL

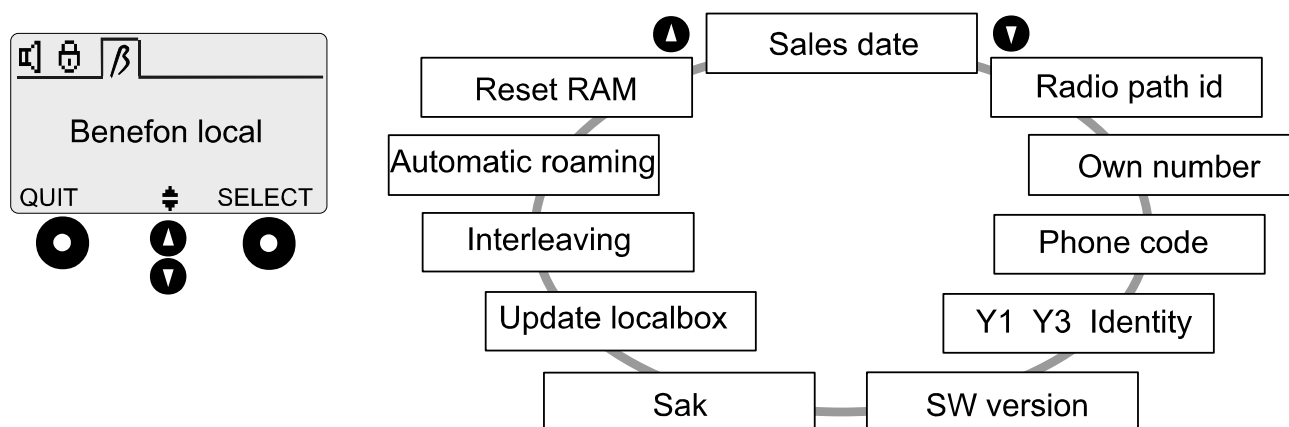
3.0 INSTALLATION INSTRUCTIONS

Installation Instructions

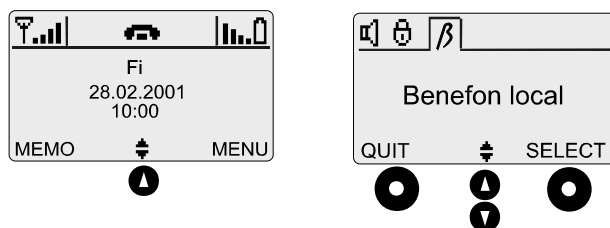
3.1 Phone Programming

You can program Benefon Exion by using either the keys on your phone, or the BeneLoc computer program and maintenance adapter. In either case, you will need a localbox.

Programming Menu Commands:



3.1.1 To program Using the Phone Keys

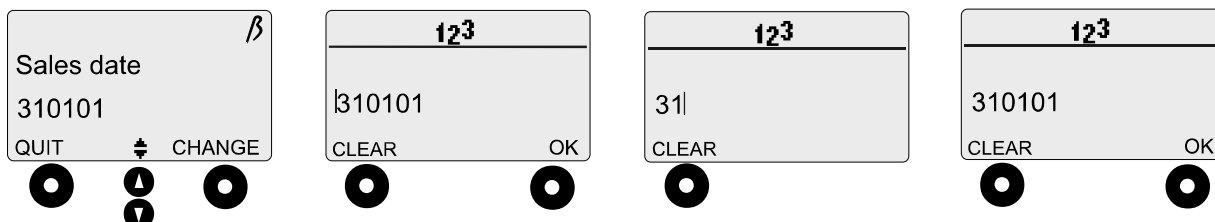


1. Connect the QPS50 localbox via maintenance adapter to your phone, and turn the phone on.  will be flashing in the display in stand-by mode. Press .

The menu symbols are displayed on the upper row. Use  to scroll through the menus. Press  to enter the **Benefon local** menu. Select the desired sub-menus with . Press . Press  after each setting.

Press  to cancel the operation and return previous menu level.

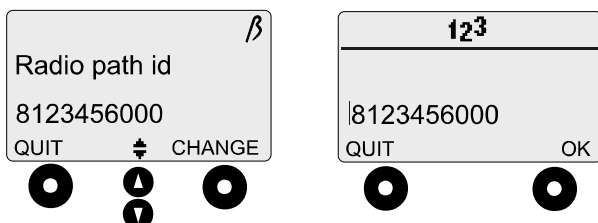
3.1.1.1 Sales Date



1. Select the **Sales date** sub-menu with **8**. Press **CHANGE**.
2. Press **CHANGE**. [XXXXXX] will be replaced by the date [daydaymonthmonthyear]. Remember to check that the date is correct. If the date is correct, press **OK**. If the date is incorrect, delete it by choosing **CLEAR** and enter the correct date (six digits in the following form: daydaymonthmonthyear). To save the date, press **OK**.

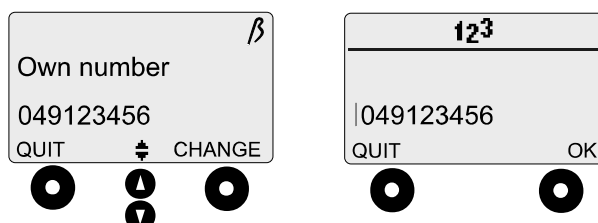
NOTE! It is possible to program the sales date **ONLY ONCE**, which means that you will not be able to change it again afterwards. If the sales date has not been programmed, your phone will not enter the normal stand-by mode.

3.1.1.2 Radio Path Identification



1. Select the **Radio path id** sub-menu with **8**. Press **CHANGE**.
2. Enter the radio path identification (ten digits), and save the identification by pressing **OK**. Remember to check that the radio path identification is correct.

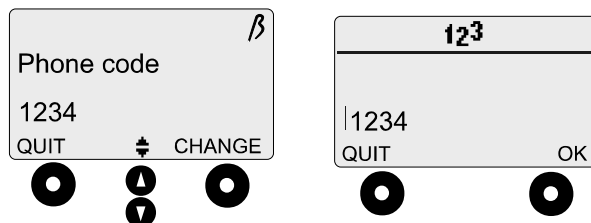
3.1.1.3 Own number



1. Select the **Own number** sub-menu with **8**. Press **CHANGE**.
2. Enter the own number (follow the instruction of the operator), and save it by pressing **OK**. Remember to check that the own number is correct.

NOTE! SMS doesn't work if the own number has not been programmed.

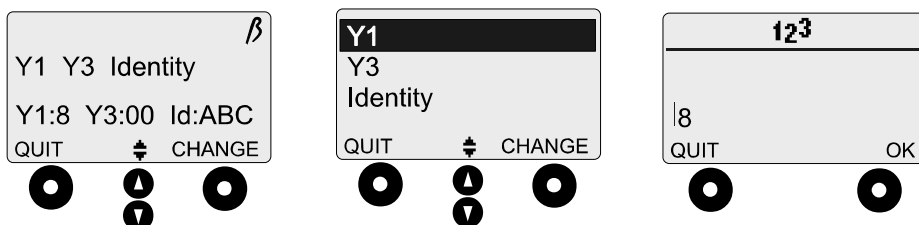
3.1.1.4 Phone code



1. Select the **Phone code** sub-menu with **8**. Press **CHANGE**.
2. Enter the phone code (four digits), and save the code by pressing **OK**.

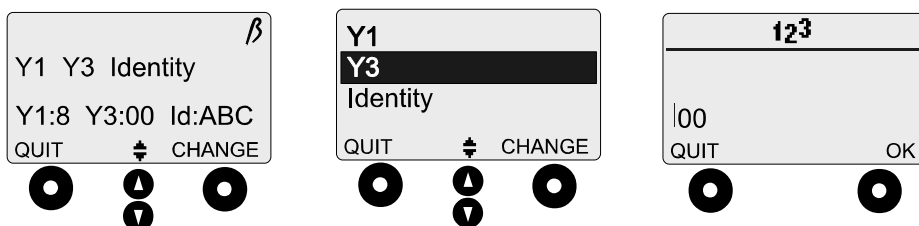
3.1.1.5 Y1 Y3 ID (Additional operator indicator)

Use this feature only in case the operator name is missing ie. RU1 works if Y3 is in use.

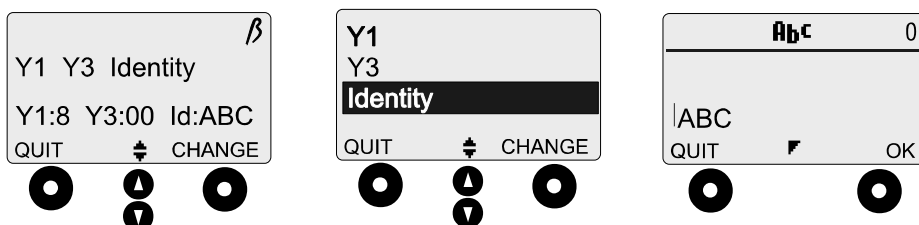


It is possible to change old/add new operator indicator which operates in automatic roaming mode. (network selection mode: Automatic)

1. Select the **Y1 Y3 Identity** sub-menu with **8**. Press **CHANGE**.
2. Select the **Y1** with **8**. Press **CHANGE**.
3. Enter Y1 (Country code: one digit) and save it by pressing **OK**.

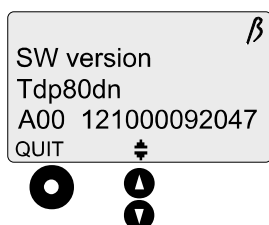


Enter Y3 (Operator code: two digits) and save it by pressing **OK**.

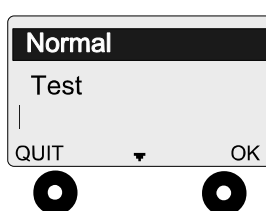
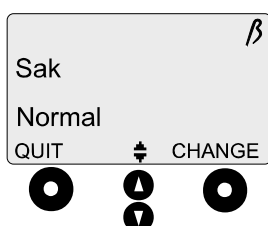


Enter ID (Operator indicator, 3 characters) and save it by pressing **OK**.

3.1.1.6 Sw version

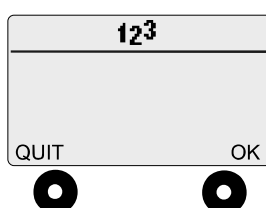
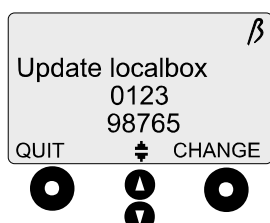


3.1.1.7 Sak

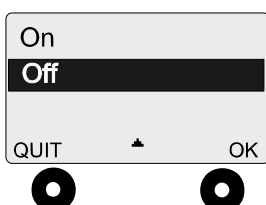
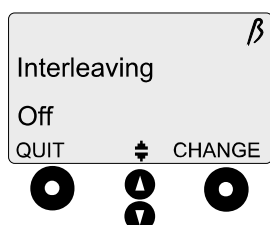


After ID is programmed SAK changes to normal mode.

3.1.1.8 Update localbox

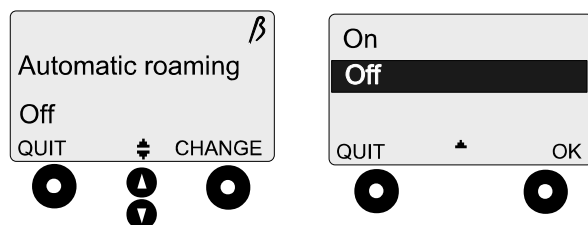


3.1.1.9 Interleaving



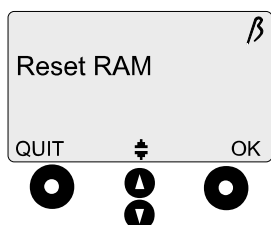
The Dealer activates or deactivates them according to the operator's or the customer's likings.

3.1.1.10 Automatic roaming



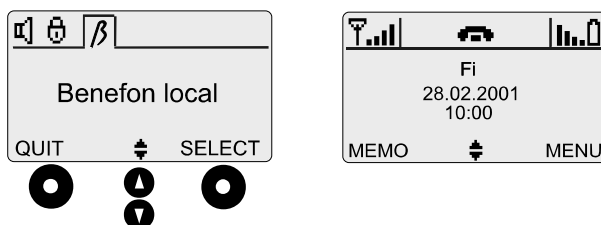
The Dealer activates or deactivates them according to the operator's or the customer's likings.

3.1.1.11 Reset RAM



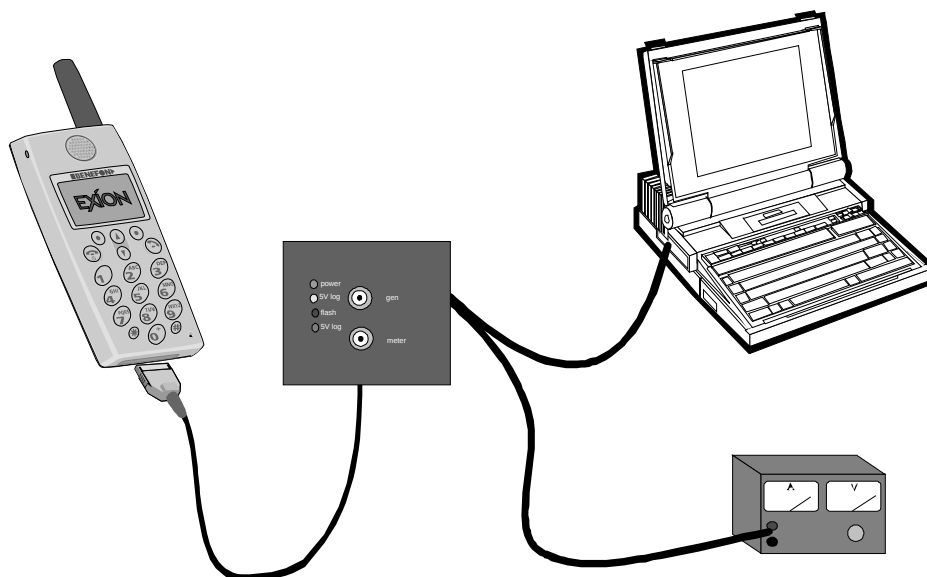
Resets user settings and phone book.

3.1.1.12 Closing Instructions

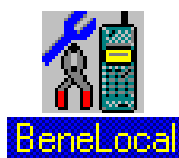


1. Having programmed the necessary information press **QUIT** to return to stand-by mode.
2. Turn off your phone, and disconnect the localbox.
3. Turn the phone on once more, and make a test call.

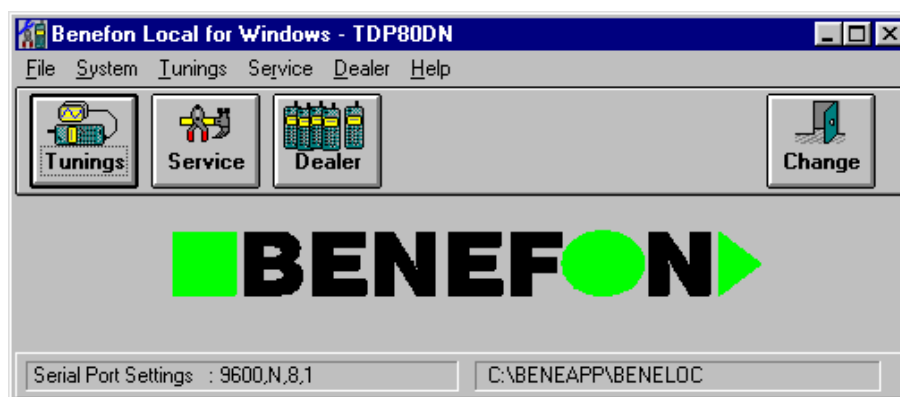
3.1.2 To program Using the BeneLoc Program



Start the installed program by clicking the icon. The phone must be connected to the system as described above.



Main window



Press Dealer-key to enter the programming window.

Benefon NMT Dealer - Exion

Read Write Close

Benefon Exion NMT450

Mobile information

Radio Path ID

Own number

Sales date

Phone code

Autoroaming ☐

Interleaving ☐

Scrambler enable

Scrambler disable

Y1 Y3 Pair

Repair date

Repair dates

SIM Information

Manufacturer[0031]

Date [22/11/00]
(dd/mm/yy)

Serial number [01581]

Checksum [135]

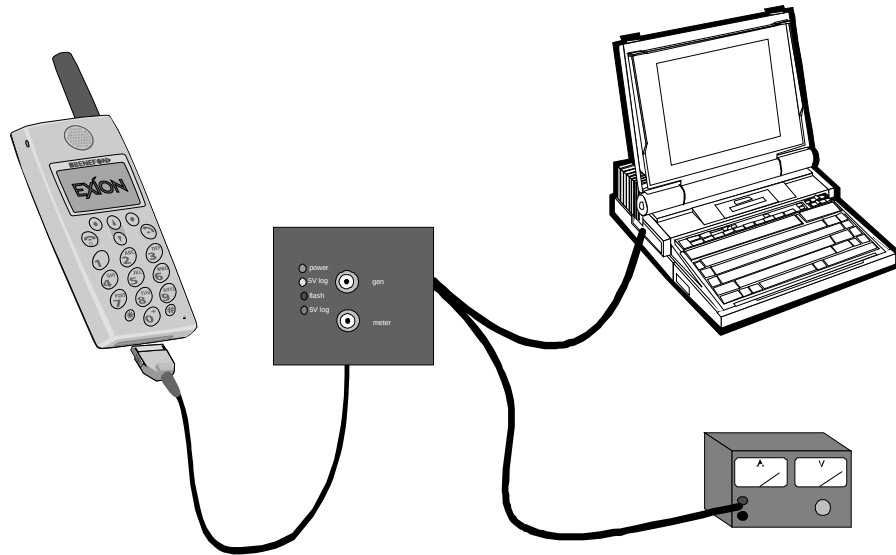
Ready.

You can read the phone data by pressing the **Read** -key. You can change the miscellaneous settings with the computer and transfer them to phone by pressing the **Write** -key.

BeneLoc includes **Help**-program for further information.

4.0 BeneLoc

BeneLoc



BeneLoc program is designed to help service person on tuning and service purpose. With Flasher Program you can change the software to Benefon phones.

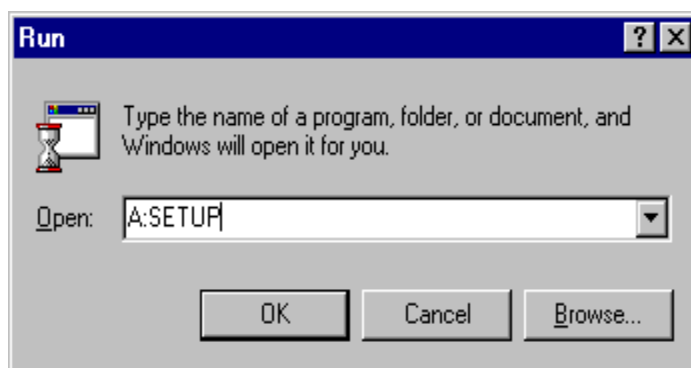
Both, BeneLoc and Flasher program will need Power Supply and Localbox with service rights to work.

4.0.1 Installation of BeneLoc program

Start Windows. Close all other programs except **Program Manager**.

Insert BeneLoc Installation Disc 1 in the floppy disk drive of your computer. In the **Program Manager** window, choose **Run** from **File** menu.

Type the letter **A:** or **B:** to indicate your floppy disc drive, and then type **SETUP.EXE**. For example, **A:\SETUP.EXE**.



Click the **OK** button, and follow the instructions displayed on your screen.

The Setup Program will ask you to specify the drive and directory in which you want

to install the BeneLoc Program. The Program suggests the following: **C:\Bene-App\BeneLoc**. Accept the drive and directory by clicking **Next** button. You can also type your own directory for BeneLoc Program.

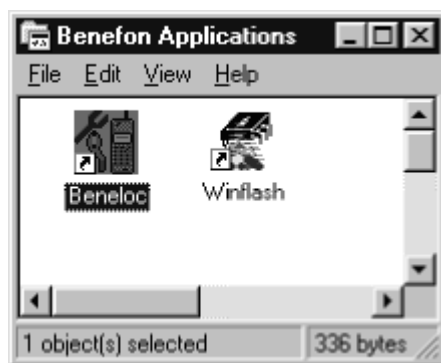
The Setup Program creates all necessary directories and subdirectories to your computer. Setup Program also creates its own group window in Program Manager.

4.0.2 To start the BeneLoc program

Connect the Service Localbox to serial port of your computer, which is called COM1 or COM2. The serial ports are usually located in the back of your computer, and more precise instructions can be found in the manual accompanying the computer. Adjust the Power Supply voltage to 4.0 Vdc. Connect the Service Localbox to the Power Supply.

Connect the Service Adapter to the phone. Plug the cable with flat connector into the connector at the bottom of the phone. When the cable has been connected and the phone is switched on, the phone should be in LOCAL mode. You can test this by pressing arrow button. There should be *****Benefon local***** on the display, if not, clean connectors and try again. When phone is in LOCAL mode you can start the BeneLoc Program.

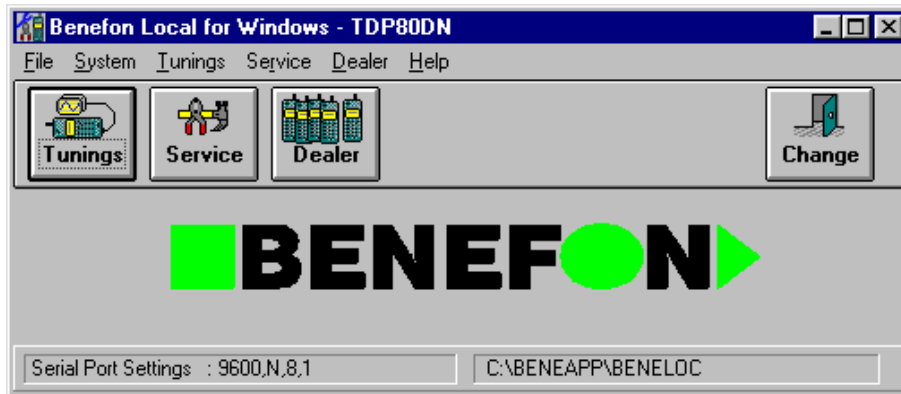
To start the BeneLoc Program, double click the **BeneLoc** icon.



In the BeneLoc Startup window, first select the correct serial port. Then, you have to select type of the phone. After selection click OK to start BeneLoc Program. When operating without external power supply the phone may be on sleep mode and registration fails. You can wake up the phone by pressing some buttons on the phone.

4.0.3 Using the BeneLoc program

In the main window of the BeneLoc, you will find submenus and buttons. Clicking the buttons you can go to the submenus.



Change

For changing phone to another similar you do not need to do more than enter into main menu. It means that this button is not needed. If you are going to change the tested phone to one having different software in, clicking Change will start the registration protocol again.

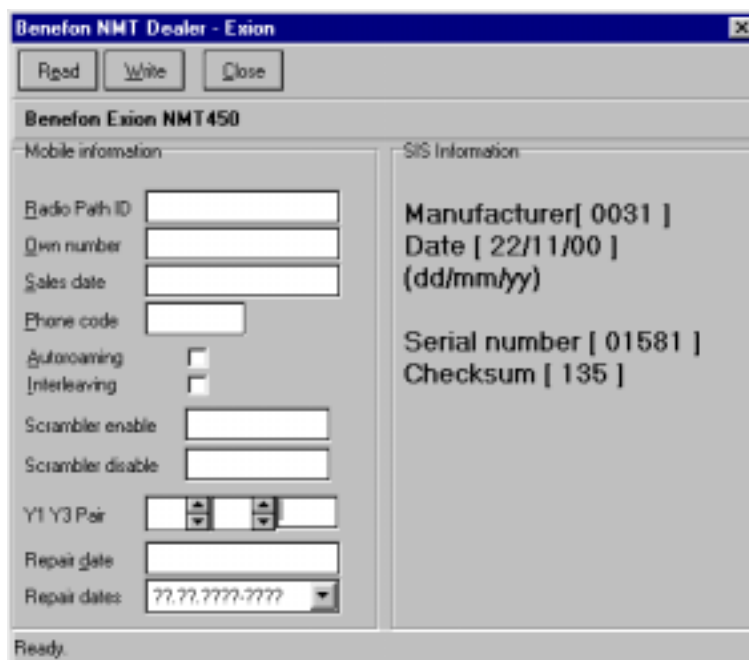
Help

About BeneLoc submenu will tell you version of the BeneLoc Program and also the state of memory.

About Cellular submenu will show you information of the phone. Type of phones software, sales date, date of the software, serial number and present tuning values of the phone. You can not change the tuning values from Help menu.

Dealer

From Dealer submenu you can make or check programming of the phone. You will also find the SIS information from Dealer submenu.



Service

You can control the audio lines (for example, switch Rx audio and compander on/off) in the Service main menu. It is also possible to control the phone to desired channel. There is also possible to change the power of transmitter.

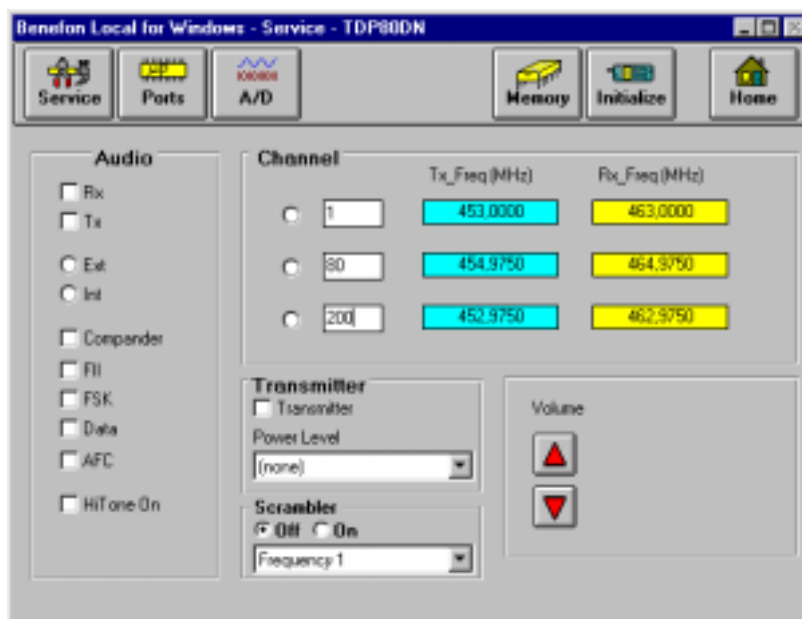
In the **Ports** submenu is you can see the status of different digital ports. There is also possible to control some of the output ports.

You can read the status of the A/D converters from the **A/D** submenu. Select 8 different topics to view. By clicking **SCAN AD** button The Beneloc will scan A/D the state of converters continuously. Scanning can stopped by clicking **STOP AD**.

Memory submenu allows you to make **Ram** reset.

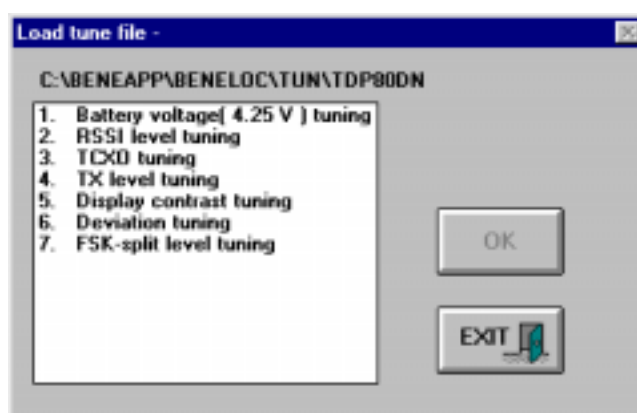
By clicking **Initialize** You can clear all LOCAL settings in service menu.

Home button will return you back to main menu.



Tunings

From Tunings main menu you can select different tunings to do. Every tuning have they own instruction window. Follow given instructions to do tunings. Clicking **START** will start tuning. The value will be stored only by clicking **SAVE**. Some of the tunings are chained and you can enter to next phase by clicking **NEXT**.



System

You select used mobile phone system from this submenu.

File

From **settings** submenu you can manually change settings of the communication port.

LOGIC / AUDIO

OC2720 Processor/Audio/RF

5.1 General description for the baseband

The baseband is built with DSP asic (Digital Signal Processor) made by VLSI.

All the functions are found within a single OC2700 board. The processor controls the RF parts, internal devices and external accessories. The audio functions are done with the DSP. The keyboard is situated on separate board and it is connected to logic module with 10 pin connector. The keypad and display is illuminated with EL-sheet.

5.2 DSP-processor

The DSP-processor performs all the baseband functions.

The chip includes VS_DSP processor, memory, an analog audio interface and a variety of peripheral devices

- VS_DSP processor
- 64k x 16-bit data RAM
- 4k x 32-bit program RAM
- 4k x 32-bit program ROM

Peripheral devices:

- a 32-bit general IO port
- 2 RS232 serial ports
- LCD controller
- PLL (synthesizer) controller
- 450 kHz frequency counter
- a keyboard controller
- 8-bit interrupt IO port
- 6 timers (32-bit)
- synchronous serial port (SSP)

Analog interface:

- 2 speech Analog-to-digital converters (ADC), for microphone and RX
- 2 speech Digital-to-analog converters (DAC), for earphone and TX
- 8-input 10-bit ADC
- 6 10-bit DACs

An interrupt controller

An external bus interface

A real-time clock

Power on/off logic

5.2.1 Pin description of the DSP baseband asic

180 pin FBGA

Pin Name	Number	Pin	Type	Function
CAP	176	A3	AIO	Blocking capacitor of voltage reference
MIC1+	172	A4	AI	Positive microphone input
MIC1-	169	B5	AI	Negative microphone input
MIC2+	170	D6	AI	Positive microphone input
MIC2-	171	C5	AI	Negative microphone input
XMIC	173	B4	AI	External microphone input
RX 1	A1	AI		Receive signal analog input
MOD 4	C3	AO		Transmit signal analog output
DAC0	178	C4	AO	Digital to analog converter 0 output
DAC1	179	A2	AO	Digital to analog converter 1 output
DAC2	180	B2	AO	Digital to analog converter 2 output
DAC3	177	B3	AO	Digital to analog converter 3 output
DAC4	2	B1	AO	Digital to analog converter 4 output
DAC5	6	C1	AO	Digital to analog converter 5 output
ADC0	157	A8	AI	Analog to digital converter 0 input
ADC1	158	C8	AI	Analog to digital converter 1 input
ADC2	159	D8	AI	Analog to digital converter 2 input
ADC3	160	B7	AI	Analog to digital converter 3 input
ADC4	161	A7	AI	Analog to digital converter 4 input
ADC5	162	C7	AI	Analog to digital converter 5 input
ADC6	164	B6	AI	Analog to digital converter 6 input
ADC7	165	A6	AI	Analog to digital converter 7 input
HEAR	10	D1	AO	Headset earphone output
XEAR	5	C2	AO	External earphone output
EAR+	7	D4	AO	Positive earphone output
EAR-	9	D2	AO	Negative earphone output
AGND0	11	D3	P	Analog ground
AGND1	163	D7	P	Analog ground
AGND2	166	C6	P	Analog ground
AGND3	168	A5	P	Analog ground

AGND4	174	E6	P	Analog ground
AVDD0	167	E7	P	Analog power supply
AVDD1	175	D5	P	Analog power supply
PGND	8	E5	P	Earphone driver ground
PVDD	3	G5	P	Earphone driver power supply
RTCOSC1	66	P7	AO	Crystal oscillator output for real time clock
OSC0	70		AI	Crystal oscillator input (13 or 26 MHz)
OSC1	71	P8	AO	Crystal oscillator output (13 or 26 MHz)
XRESET	51	P3	DI	Reset input, active low
XRE-SETOUT	63	P6	DO	Reset output, active low
TEST	64	M6	DI	Manufacturing test mode select
BATTERY	62	N6	DI	VBATTERY detect
PWRKEY	56	M4	DI	Power key input
VCHARGE	60	M5	DI	VCHARGE detect
REGUEN	12	E4	DO	Regulator enable
ALARM	13	E2	DO	RTC alarm output
A0	121	F12	DO	Address output of external memory bit 0
A1	120	F14	DO	Address output of external memory bit 1
A2	119	F13	DO	Address output of external memory bit 2
A3	117	G12	DO	Address output of external memory bit 3
A4	116	G14	DO	Address output of external memory bit 4
A5	115	G13	DO	Address output of external memory bit 5
A6	113	H12	DO	Address output of external memory bit 6
A7	112	H14	DO	Address output of external memory bit 7
A8	111	H13	DO	Address output of external memory bit 8
A9	109	J12	DO	Address output of external memory bit 9
A10	108	J14	DO	Address output of external memory bit 10
A11	107	J13	DO	Address output of external memory bit 11
A12	105	K12	DO	Address output of external memory bit 12
A13	104	K14	DO	Address output of external memory bit 13
A14	103	K13	DO	Address output of external memory bit 14
A15	101	L12	DO	Address output of external memory bit 15
A16	100	L14	DO	Address output of external memory bit 16
A17	99	L13	DO	Address output of external memory bit 17
A18	96	M14	DO	Address output of external memory bit 18
A19	95	M13	DO	Address output of external memory bit 19
A20	94	M12	DO	Address output of external memory bit 20
A21	92	N14	DO	Address output of external memory bit 21
A22	91	P14	DO	Address output of external memory bit 22
A23	90	N13	DO	Address output of external memory bit 23
D0	146	C11	DIO	Data IO of external memory bit 0
D1	145	A11	DIO	Data IO of external memory bit 1
D2	144	B11	DIO	Data IO of external memory bit 2
D3	141	A12	DIO	Data IO of external memory bit 3
D4	140	B12	DIO	Data IO of external memory bit 4
D5	139	C12	DIO	Data IO of external memory bit 5
D6	135	B13	DIO	Data IO of external memory bit 6
D7	134	B14	DIO	Data IO of external memory bit 7
D8	133	C12	DIO	Data IO of external memory bit 8
D9	132	C13	DIO	Data IO of external memory bit 9
D10	131	C14	DIO	Data IO of external memory bit 10

D11	128	D13	DIO	Data IO of external memory bit 11
D12	127	D14	DIO	Data IO of external memory bit 12
D13	126	E12	DIO	Data IO of external memory bit 13
D14	124	E13	DIO	Data IO of external memory bit 14
D15	123	E14	DIO	Data IO of external memory bit 15
XCS0	86	P12	DO	Chip select 0 of an external memory
XCS1	87	N12	DO	Chip select 1 of an external memory
XCS2	88	M11	DO	Chip select 2 of an external memory
XCS3	89	P13	DO	Chip select 3 of an external memory
XWE	137	A13	DO	Write enable of an external memory
XOE	136	A14	DO	Output enable of an external memory
IO0	14	E1	DIO	General purpose IO, bit 0
IO1	15	E3	DIO	General purpose IO, bit 1
IO2	17	F2	DIO	General purpose IO, bit 2
IO3	18	F1	DIO	General purpose IO, bit 3
IO4	19	F3	DIO	General purpose IO, bit 4
IO5	20	F4	DIO	General purpose IO, bit 5
IO6	21	G2	DIO	General purpose IO, bit 6
IO7	22	G1	DIO	General purpose IO, bit 7
IO8	23	G3	DIO	General purpose IO, bit 8
IO9	24	G4	DIO	General purpose IO, bit 9
IO10	25	H2	DIO	General purpose IO, bit 10
IO11	26	H1	DIO	General purpose IO, bit 11
IO12	27	H3	DIO	General purpose IO, bit 12
IO13	29	J2	DIO	General purpose IO, bit 13
IO14	30	J1	DIO	General purpose IO, bit 14
IO15	31	J3	DIO	General purpose IO, bit 15
IO16	33	K1	DIO	General purpose IO, bit 16
IO17	34	K2	DIO	General purpose IO, bit 17
IO18	36	K3	DIO	General purpose IO, bit 18
IO19	37	L1	DIO	General purpose IO, bit 19
IO20	40	K4	DIO	General purpose IO, bit 20
IO21	52	L4	DIO	General purpose IO, bit 21
IO22	53	K5	DIO	General purpose IO, bit 22
IO23	57	L5	DIO	General purpose IO, bit 23
IO24	72	M8	DIO	General purpose IO, bit 24
IO25	76	M9	DIO	General purpose IO, bit 25
IO26	81	M10	DIO	General purpose IO, bit 26
IO27	85	L10	DIO	General purpose IO, bit 27
IO28	97	L11	DIO	General purpose IO, bit 28
IO29	98	K10	DIO	General purpose IO, bit 29
IO30	102	K11	DIO	General purpose IO, bit 30
IO31	130	E11	DIO	General purpose IO, bit 31
INTIO0	142	D11	DIO	Interrupt IO, bit 0
INTIO1	143	E10	DIO	Interrupt IO, bit 1
INTIO2	147	D10	DIO	Interrupt IO, bit 2
INTIO3	153	A9	DIO	Interrupt IO, bit 3
INTIO4	154	C9	DIO	Interrupt IO, bit 4
INTIO5	155	D9	DIO	Interrupt IO, bit 5
INTIO6	156	B8	DIO	Interrupt IO, bit 6
INTIO7	32	D8	DIO	Interrupt IO, bit 7
KEYIN0	38	L2	DI	Keyboard interface input #0

KEYIN1	41	M1	DI	Keyboard interface input #1
KEYIN2	42	M2	DI	Keyboard interface input #2
KEYIN3	43	L3	DI	Keyboard interface input #3
KEYIN4	44	N1	DI	Keyboard interface input #4
KEYOUT0	45	N2	DO	Keyboard interface output #0
KEYOUT1	46	P1	DO	Keyboard interface output #1
KEYOUT2	47	P2	DO	Keyboard interface output #2
KEYOUT3	49	M3	DO	Keyboard interface output #3
KEYOUT4	50	N3	DO	Keyboard interface output #4
BUZ	54	N4	DO	Buzzer drive output
SDA	83	N11	DIO	Data IO of serial interface
SCL	82	P11	DI	Clock output of serial interface
TXD0	148	B10	DO	Data output of RS232 interface #0
RXD0	149	A10	DI	Data input of RS232 interface #0
TXD1	150	C10	DO	Data output of RS232 interface #1
RXD1	152	B9	DI	Data input of RS232 interface #1
SISCLK	55	P4	DO	Clock output (4.3 MHz)
IF	68	M7	AI	Input of intermediate frequency counter
LCDCLK	78	P10	DO	LCD serial clock
LCCTX	79	N10	DO	LCD serial data
LCDXCS	74	N9	DO	LCD chip select
LCDA0	75	P9	DO	LCD A0
PLLCLK	58	N5	DO	PLL serial clock
PLLTx 59	P5	DO	PLL	serial data
DVDD0	28	H4	P	Digital power supply
DVDD1	48	K7	P	Digital power supply
DVDD2	69	L7	P	Digital power supply
DVDD3	73	L8	P	Digital power supply
DVDD4	77	K8	P	Digital power supply
DVDD5	93	H10	P	Digital power supply
DVDD6	114	H11	P	Digital power supply
DVDD7	118	G11	P	Digital power supply
DVDD8	122	G10	P	Digital power supply
DVDD9	138		P	Digital power supply
DVDD10	159	D8	P	Digital power supply
DGND0	16	F5	P	Digital ground
DGND1	35	J4	P	Digital ground
DGND2	39	J5	P	Digital ground
DGND3	61	K6	P	Digital ground
DGND4	65	L6	P	Digital ground
DGND5	80	L9	P	Digital ground
DGND6	84	K9	P	Digital ground
DGND7	106	J10	P	Digital ground
DGND8	110	J11	P	Digital ground
DGND9	125	F11	P	Digital ground
DGND10	129	F10	P	Digital ground
DGND11	151	E9	P	Digital ground

5.2.2 Connectors

5.2.2.1 The system connector

Nbr	NAME	FUNCTION	STATE	IN/OUT
1	AGND	Analog Ground	0V	
2	RS1CTS / !2CINT	RS1 Clear to Send / I2C Interrupt (NMT)	0V 2,7V	in
3	EXTMIC	External MIC line	0V -1,5V pp DC	in out
4	RS1RTS / ACCPWR	RS1 Ready to Send / Accessory pwr control	0V 2,7V	out
5	EXTERP	External ERP line + BOOT pin	0V -1,5V pp 0V/12V DC	out in
6	CHARGE	Charging Current + Power On		in
7	HEADSETDET	Headset Detector / Accessory pwr control	0V 2,7V	in/out
8	RS1RX	RS1 Receive Data	0V 2,7V	in
9	VBAT	Battery Voltage	2,7V - 6,0V	out
10	RS1TX	RS1 Transmit Data	0V 2,7V	out
11	NMEAIN / I2CDATA	NMEA input (GPS) / I2C data (NMT)	0V 2,7V	in/out
12	NMEAOUT / I2CCLK	NMEA output (GPS) / I2C clock (NMT)	0V 2,7V	out
13	AUXDET	Headset Hook / Accessory Detector	0V 2,7V	in
14	RS2RX	RS2 Receive Data	0V 2,7V	in
15	RS2TX	RS2 Transmit Data	0V 2,7V	out
16	DGND	Digital Ground	0V	
17	NC	Not connected		in
18	DGND	Digital Ground	0V	
19	NC	Not connected		in
20	CHARGE	Charging Current + Power On		in

PIN 6: Charging current input, max. 1,0A. Connecting a charger to this pin will also powers on the mobile phone.

PIN 9: The maximum current from the VBAT line is 300 mA.

PIN 16: The maximum current of DGND pin is 1,0A.

PIN 18: Same as pin 16. The maximum current of DGND pin is 1,0A.

PIN 20: Same as pin 6. The maximum current of CHARGE pin is 1,0A.

The maximum current of all pins except pins 6, 9 and 16 - 20 is 10 mA.

5.2.2.2 Battery connector, V50

1	VB	3 – 5 V DC
2	GND	ground

5.2.2.3 Battery identification connector, V51

1	SBAT_ID0	Battery temperature, pulled at VCCS
2	SBAT_ID1	Detect different battery packs, pulled at VCCS

5.2.2.4 Display connector, V80

1	VRAM	2.5 V
2	GND	0 V
3	GND	0 V
4	GND	0 V
5	VRAM	2.5 V
6	SI	Serial data input
7	SCL	Serial clock 0 / 2.8 V pulses
8	NC	Not connected
9	NC	Not connected
10	NC	Not connected
11	NC	Not connected
12	NC	Not connected
13	NC	Not connected
14	NC	Not connected
15	NC	Not connected
16	A0	Control data / Display data
17	X_LOGRST	Reset, 0 V reset active, normally 2.8 V
18	CS1	Display chip select

5.2.2.5 Keyboard connector, V52

1	Keyin 00	Keypad matrix input
2	Keyin 01	Keypad matrix input
3	Keyin 02	Keypad matrix input
4	Keyin 03	Keypad matrix input
5	Keyin 04	Keypad matrix input
6	Keyout 00	Keypad matrix output, 17.5 kHz square
7	Keyout 01	Keypad matrix output, 17.5 kHz square
8	Keyout 02	Keypad matrix output, 17.5 kHz square
9	Keyout 03	Keypad matrix output, 17.5 kHz square
10	PWRKEY	Normally high (VB), grounded when key pressed

Keypad matrix inputs normally low state, when key pressed 17.5 kHz square wave is seen also in corresponding key input port.

5.2.2.6 Circuit Diagram

The processor, audio and RF circuit diagrams are split into seven pages.
Logic diagrams are found in first four pages.

Pages:

1 of 7	Module connector pins
2 of 7	Power supply and on/off logic
3 of 7	Memory, DSP logic and SIS function
4 of 7	Audio parts
5-7 of 7	RF parts

5.2.3 Functions

5.2.3.1 Processor I151

All the logic and audio function are implemented in the digital signal processor (DSP).

Audio filters, copander/expander, limiter, scambler, modem, uart etc. are done with DSP code. DSP program is executed once for each input sample by the operating system.

Information between the DSP code and the higher level C code is passed trough variables and events

5.2.3.2 Memories

The chip contains a total of 64k x 16-bit data RAM. The RAM is powered by the VRAM-supply, so the the RAM keeps its information when the phone is powered off. There is also a backup battery coupled with VRAM. It is for a short voltage break in the main battery pack.

The program code is stored in the 16 Mbit flash memory (I201).

5.2.3.3 Sleep timer

The phone puts the central functions to sleep for a time. Although everything seems normal to the user, but most of the functions are closed down. The DSP still has a power supply, but the processor is halted and has minimal power consumption. Only a sleep timer and its 32 kHz crystal oscillator remain active. The phone is "woken up" by interrupting the sleep timer or changing the state of the keyboard.

5.2.3.4 Power switch

When the power switch is pressed, the PWRKEY line goes low and drives the transistor conductive. The PWRSW line goes approximately to 2.5 V caused

from voltage divider R143, R144 and depending also from the battery voltage (VB).

The PWRSW line is coupled to DSP on/off logic. The DSP drives REGUEN signal high and it drives the main regulator (I111) to operate.

The power off operation is done with the same way. The power switch is pressed a little longer and the shutdown procedure begins. The REGUEN signal goes low and powers off the phone.

5.2.3.5 Sis

SIM is performed by a BENEFON ASIC IG2048 manufactured by ATMEL. Integrated circuit IG2048 is E2 logic array. This type of array incorporates both electrically and programmable read only memory (EEPROM) and a gate array for SIM function.

User specific information is stored in EEPROM which CANNOT be read from outside the chip. All external attempts to read the information clear both EEPROM and RAM (fill with FF).

5.2.3.6 Charging control

The charging function is controlled by the software. The charger is detected by PWRCRG line (High = charger detected, low = charger not detected). The type of charger (fast or slow) is detected by the voltage at V_CHG_ADC line.

The charger switches also the power on.

There is a NTC resistor in the battery pack to measure the temperature. This is done with SBAT_ID0 line and the voltage is read by an AD converter in DSP.

The type of battery pack is detected in a same way with SBAT_ID1 line with another channel of ADC.

ID resistors in battery pack:

N/A	0 ohm	reserved for future use
900 mAh	47 kohm	900 – 1000 mAh
1150 mAh	100 kohm	1050 – 1300 mAh
1400 mAh	150 kohm	1350 - 1550 mAh
1600 mAh	220 kohm	> 1600 mAh
adapter	10 kohm	adapter
battery fail	open	not detected

RF

5.3 RX SYNTHESIZER

5.3.1 General

The RX synthesizer generates an upper side injection frequency for the receiver. The injection frequency is fed to the receiver's first mixer.

Operating voltage	3.0 VDC
Current consumption	14 mA
Output level to the receiver	+1 dBm
Frequency range	540.950...545.925 MHz

5.3.2 Functional Description

The RX injection frequency is generated with a phase locked loop. The Voltage Controlled Oscillator (VCO) produces the injection frequency determined by the control voltage. After the VCO stage comes the amplifier stage Q430. After the amplifier stage, part of the signal is fed to the synthesizer circuits I400 pre-scanner Fin1. The synthesizer circuit contains a pre-scanner, programmable divider, reference frequency divider, and a phase detector.

The synthesizer circuit produces current pulses at output DO1 as controlled by the phase detector. The current pulses either charge or discharge the loop filter. The VCO control voltage is derived from the loop filter output.

The synthesizer 12.5kHz reference frequency is made by dividing the 13.00 MHz signal from the temperature compensated oscillator (TCXO). The series-form signal which controls the channel frequency comes from the processor. SDATA, SCLK and SLE signals are common to both TX- and RX-synthesizers. A positive pulse in the SLE line loads the division ratio (corresponding to the frequency of the channel) fed to the SDATA line, to the synthesizer circuit I400.

5.3.3 Control- and Output-Signals

VRX	RX synthesizer operating voltage	3.0 V
SCLK	Clock signal for the synthesizer control data	
SDATA	Synthesizer control data	
SLE	ENABLE pulse to the synthesizer	
RXINJ	RX synthesizer output to the receiver	+1 dBm
RX_REG	Control line for VRX-regulator	

5.4 TX-SYNTHESIZER

5.4.1 General

The TX synthesizer generates the final modulated transmission frequency, which is fed to the transmitter.

Operating voltage	3.0 VDC
Current consumption	<30 mA
Output level to the transmitter	+6 dBm
Frequency range	452.500...457.475 MHz

5.4.2 Function Description

The TX frequency is generated with a phase locked loop (PLL). The VCO produces the injection frequency determined by the control voltage, and the VCO also has a modulation input. After the VCO stage come two amplifier stages Q470 and Q480. These ensure separation between the VCO and transmitter, and also boost the injection level sufficiently. Part of the signal is fed from between the amplifier stages to the synthesizer circuit I400 pre-scaler input Fin2. The synthesizer circuit contains a pre-scaler, programmable divider, reference frequency divider, and a phase detector.

The synthesizer circuit produces current pulses at output DO2 as a result of the phase detection. The current pulses either charge or discharge the loop filter condensators. The VCO control voltage is derived from the loop filter output.

The synthesizer 12.5kHz reference frequency is made by dividing the 13.00 MHz signal from the temperature compensated oscillator (TCXO). The series-form signal which controls the channel frequency comes from the processor. SDATA and SCLK signals are common to both TX- and RX-synthesizers. A positive pulse in the SLE-line loads the division ratio (corresponding to the TX frequency of the channel) fed to the SDATA line, to the synthesizer circuit I400.

Modulation is fed to the TX synthesizer TX-AUDIO line. The frequency response is corrected by the components R455 - R458, C454 and C455. Modulation sensitivity is set by the resistor R459.

5.4.3 Control- and Output-Signals

VTXS	TX synthesizer operating voltage (3.0 V)
TXAUDIO	Transmitter audio signal
13MHz	13.00 MHz signal to the receiver circuit.
SCLK	Clock signal for synthesizer control data
SDATA	Synthesizer control data
SLE	ENABLE pulse to the synthesizer
TXINJ	TX synthesizer output to the transmitter (+6 dBm)
AFC	AFC control voltage from processor
TXS_REG	Control line for VTXS-regulator

5.5 RECEIVER

5.5.1 General

The module contains all FM-receiver functional blocks.

RF-amplifier	3SK320
1. mixer	balanced mixer
1. IF-amplifier	3SK320
FM IF system	SA 607 includes the following blocks:
	2. mixer
	IF limiter
	quadrature detector
	RSSI (received signal strength indicator)

When the RF signal is received it is brought through the RX-filter(X500) to the amplifier stage Q500. The amplified signal is passed through the attenuator to the balanced mixer. The balanced mixer is made by using discrete components, diode D510 and RF-transformer M510.

The upper side injection frequency is brought from the synthesizer through a small resistive attenuator to the mixer. The 78.45 MHz intermediate frequency from the mixer output is fed through the IF- filter X520 to the FM IF-circuit I550.

RX injection frequency 540.950...545.925MHz

Injection-level/impedance +1 dBm / 50 ohm

The second intermediate-frequency local-oscillator-frequency required by the FM IF-circuit is generated by multiplying the 13.00 MHz reference-oscillator frequency by six. The multiplier circuit is made with transistor Q530.

The second intermediate frequency is 450 kHz. The phase-shift required by the quadrature detector is made with the L550. The detected AF-signal temperature correction is done in the buffer amplifier stage.

5.5.2 Input- and Output-Signals

RF input from the duplex filter	462.500...467.475 MHz
RXINJ	RX injection signal to the balanced mixer
13MHz	13.00 MHz signal to the multiplier for the 2.mixer
VRX	RX operating voltage 3.0V from the regulator
450 kHz	Output from 2. IF to the AFC detector
RXAUDIO	Receiver audio output 175mVrms
RSSI	Received signal strength indicator output 0,5...2V

SENSITIVITY CHECK

channel	RF input	SINAD psof.
001	-113 dBm	>20 dB
180	-113 dBm	>20 dB

5.6 TRANSMITTER

5.6.1 General

Operating voltage	3.5 ... 4.5 v
Current consumption	mid power max. 1.1 A
	low power max. 0.45 A
Input level from the synthesizer	+6 dBm
Output level to the duplex filter	mid power 33 dBm (2.0W)
	low power 24.7 dBm (0.3W)
Frequency range	452.500...457.475 MHz

5.6.2 Function Description

The transmitter unit is comprised of three amplifier stages and two filters. The amplifier chain consists of pre-amplifier Q620/Q621 and power module I650.

The attenuator R620/R621 is included to enhance the electric separation between the TX synthesizer and the transmitter.

The filter X620 and duplexfilter X660 ensure that unwanted signals will not reach the antenna.

The operational amplifier I640 and transistors Q641 and Q642 serve as a power regulator circuit, which adjusts the power level so that the voltage from the transmitter power detector X650/D660 and the control voltage TXPWR from the processor unit are equal at inputs of I640.

The negative voltage is generated with the Switched Capacitor Voltage Inverter I610.

The switching frequency is typically 100 kHz and resistors R611/R612 sets the output voltage to -2.5 V.

I600 serves as voltage regulator for pre-amplifier and for the negative voltage generator.

Q631 is ON/OFF switch for the power amplifier.

5.6.3 Control- and Output-Signals

VBAT	Transmitter operating voltage from the battery-pack (fused)	
TXBIAS	Power ON/OFF control	
TXPWR	Power level control signal from the D/A converter	0...3V
TXINJ	RF signal from the TX synthesizer	+6dBm
RXDUPLEX	To RX duplex filter	

5.7 Parts list OC2720 (The Layout PC2700 A0)

OC2720_A0

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
AB0614	A101	Rechargeable battery	3V/0.7mAh	Varta	MC614
AM1846	A301	Electret condenser mocro	phone with rubber holder+zeb	BSE	OBG18S46-C33
AE0023	A321	Dynamic transducer	13,3x2,6 low Z	Philips	WD00518/32U
AE2700	A322	*** EI KOODATTU VARAS-TOON ***			
CG0101	C1	SMD capasitor X7R	100pF Ò5%	Murata	
CG0471	C10	SMD capasitor X7R	470pF Ò10%	Murata	
CH0105	C101	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CG0101	C102	SMD capasitor X7R	100pF Ò5%	Murata	
CH0105	C103	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CU3106	C104	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CG0471	C11	SMD capasitor X7R	470pF Ò10%	Murata	
CG0101	C111	SMD capasitor X7R	100pF Ò5%	Murata	
CH0105	C112	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CG0101	C113	SMD capasitor X7R	100pF Ò5%	Murata	
CG0101	C114	SMD capasitor X7R	100pF Ò5%	Murata	
CG0104	C115	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CH0105	C116	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CG0101	C117	SMD capasitor X7R	100pF Ò5%	Murata	
CH0105	C118	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C119	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CG0471	C12	SMD capasitor X7R	470pF Ò10%	Murata	
CF0105	C121	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0471	C122	SMD capasitor X7R	470pF Ò10%	Murata	
CU3106	C123	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CC2103	C124	SMD capasitor	10nF 10% 100V X7R	AVX	12061C103KAT2A
CG0471	C13	SMD capasitor X7R	470pF Ò10%	Murata	
CG0471	C131	SMD capasitor X7R	470pF Ò10%	Murata	
CG0100	C141	SMD capasitor NPO	10pF-+0.25pF	Murata	
CG0104	C142	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C143	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0100	C144	SMD capasitor NPO	10pF-+0.25pF	Murata	
CG0104	C145	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C146	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C147	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C148	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0220	C149	SMD capasitor NPO	22pF Ò5%	Murata	
CG0104	C150	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C151	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C152	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C153	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0220	C154	SMD capasitor NPO	22pF Ò5%	Murata	
CG0104	C155	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C156	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C157	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0103	C161	SMD capasitor X7R	10nF Ò10%	Murata	
CG0103	C162	SMD capasitor X7R	10nF Ò10%	Murata	
CG0104	C163	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C164	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0471	C2	SMD capasitor X7R	470pF Ò10%	Murata	
CG0104	C221	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0103	C222	SMD capasitor X7R	10nF Ò10%	Murata	
CG0104	C241	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CG0223	C242	SMD capasitor X7R	22nF 20%	Murata	
CG0103	C243	SMD capasitor X7R	10nF 010%	Murata	
CG0471	C3	SMD capasitor X7R	470pF 010%	Murata	
CG0330	C301	SMD capasitor NPO	33pF 05%	Murata	
CG0330	C302	SMD capasitor NPO	33pF 05%	Murata	
CF0105	C303	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0101	C305	SMD capasitor X7R	100pF 05%	Murata	
CF0105	C306	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C307	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C308	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0102	C309	SMD capasitor X7R	1nF 010%	Murata	
CG0101	C321	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C322	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C323	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C324	SMD capasitor X7R	100pF 05%	Murata	
CF0105	C331	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CU3106	C332	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CG0102	C333	SMD capasitor X7R	1nF 010%	Murata	
CG0470	C334	SMD capasitor NPO	47pF 05%	Murata	
CG0470	C335	SMD capasitor NPO	47pF 05%	Murata	
CG0104	C351	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0101	C352	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C353	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C354	SMD capasitor X7R	100pF 05%	Murata	
CH0105	C355	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CG0104	C356	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C357	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0104	C358	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0102	C359	SMD capasitor X7R	1nF 010%	Murata	
CG0222	C360	SMD capasitor X7R	2.2nF 010%	Murata	
CF0105	C361	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C362	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0471	C4	SMD capasitor X7R	470pF 010%	Murata	
CG0223	C400	SMD capasitor X7R	22nF 20%	Murata	
CF0105	C401	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C402	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0223	C403	SMD capasitor X7R	22nF 20%	Murata	
CD0223	C410	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0334	C411	SMD capasitor	330nF 10% 16V X7R	AVX	
CD0103	C412	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0223	C413	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CG0101	C420	SMD capasitor X7R	100pF 05%	Murata	
CG0120	C421	SMD capasitor NPO	12pF 05%	Murata	
CG0479	C423	SMD capasitor NPO	4.7pF 00,25pF	Murata	
CG0150	C424	SMD capasitor NPO	15pF 05%	Murata	
CG0120	C425	SMD capasitor NPO	12pF 05%	Murata	
CG0270	C426	SMD capasitor NPO	27pF 05%	Murata	
CG0101	C430	SMD capasitor X7R	100pF 05%	Murata	
CG0223	C431	SMD capasitor X7R	22nF 20%	Murata	
CG0339	C433	SMD capasitor NPO	3.3pF 00,25pF	Murata	
CG0101	C434	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C435	SMD capasitor X7R	100pF 05%	Murata	
CU3106	C436	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CG0103	C440	SMD capasitor X7R	10nF 010%	Murata	
CF0105	C441	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0330	C442	SMD capasitor NPO	33pF 05%	Murata	
CG0101	C443	SMD capasitor X7R	100pF 05%	Murata	
CG0103	C444	SMD capasitor X7R	10nF 010%	Murata	
CD0473	C450	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CU2105	C451	SMD tantal	1uF/10V	AVX	TAJR105M010R

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CD0103	C452	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CD0223	C453	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0334	C454	SMD capasitor	330nF 10% 16V X7R	AVX	
CD0334	C455	SMD capasitor	330nF 10% 16V X7R	AVX	
CG0101	C456	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C460	SMD capasitor X7R	100pF 05%	Murata	
CG0829	C461	SMD capasitor NPO	8.2pF 00,25pF	Murata	
CG0399	C463	SMD capasitor NPO	3.9pF 00,25pF	Murata	
CG0120	C464	SMD capasitor NPO	12pF 05%	Murata	
CG0120	C465	SMD capasitor NPO	12pF 05%	Murata	
CG0390	C466	SMD capasitor NPO	39pF 05%	Murata	
CG0101	C470	SMD capasitor X7R	100pF 05%	Murata	
CG0223	C471	SMD capasitor X7R	22nF 20%	Murata	
CG0109	C472	SMD capasitor NPO	1.0pF 00,25pF	Murata	
CG0390	C473	SMD capasitor NPO	39pF 05%	Murata	
CG0101	C474	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C475	SMD capasitor X7R	100pF 05%	Murata	
CU3106	C476	SMD tantal	10uF / 6V +20%	AVX	TAJA106M006R
CG0101	C480	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C481	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C482	SMD capasitor X7R	100pF 05%	Murata	
CG0109	C483	SMD capasitor NPO	1.0pF 00,25pF	Murata	
CG0229	C484	SMD capasitor NPO	2.2pF 00,25pF	Murata	
CH0105	C490	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CG0104	C491	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CU3106	C492	SMD tantal	10uF / 6V +20%	AVX	TAJA106M006R
CG0102	C493	SMD capasitor X7R	1nF 010%	Murata	
CU2105	C494	SMD tantal	1uF/10V	AVX	TAJR105M010R
CG0104	C495	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CU3106	C496	SMD tantal	10uF / 6V +20%	AVX	TAJA106M006R
CG0102	C497	SMD capasitor X7R	1nF 010%	Murata	
CU0224	C498	SMD tanlat	0.22uF/20V/10%	AVX/KYO-CER	TAJR224K020R
CG0471	C5	SMD capasitor X7R	470pF 010%	Murata	
CG0101	C50	SMD capasitor X7R	100pF 05%	Murata	
CF0569	C500	SMD capasitor	5.6 pF/0.25pF 50 V NPO	Philips	
CG0101	C501	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C502	SMD capasitor X7R	100pF 05%	Murata	
CG0180	C503	SMD capasitor NPO	18pF 05%	Murata	
CG0339	C505	SMD capasitor NPO	3.3pF 00,25pF	Murata	
CG0101	C506	SMD capasitor X7R	100pF 05%	Murata	
CG0180	C507	SMD capasitor NPO	18pF 05%	Murata	
CG0279	C509	SMD capasitor NPO	2.7pF 00,25pF	Murata	
CG0101	C51	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C510	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C511	SMD capasitor X7R	100pF 05%	Murata	
CG0829	C513	SMD capasitor NPO	8.2pF 00,25pF	Murata	
CG0101	C52	SMD capasitor X7R	100pF 05%	Murata	
CG0390	C520	SMD capasitor NPO	39pF 05%	Murata	
CG0150	C521	SMD capasitor NPO	15pF 05%	Murata	
CG0102	C522	SMD capasitor X7R	1nF 010%	Murata	
CG0102	C523	SMD capasitor X7R	1nF 010%	Murata	
CG0829	C524	SMD capasitor NPO	8.2pF 00,25pF	Murata	
CG0569	C525	SMD capasitor NPO	5.6pF 00,25pF	Murata	
CG0101	C526	SMD capasitor X7R	100pF 05%	Murata	
CG0103	C527	SMD capasitor X7R	10nF 010%	Murata	
CG0101	C53	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C530	SMD capasitor X7R	100pF 05%	Murata	
CG0150	C531	SMD capasitor NPO	15pF 05%	Murata	
CG0103	C532	SMD capasitor X7R	10nF 010%	Murata	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CG0103	C533	SMD capasitor X7R	10nF Ò10%	Murata	
CG0102	C534	SMD capasitor X7R	1nF Ò10%	Murata	
CG0103	C535	SMD capasitor X7R	10nF Ò10%	Murata	
CG0150	C536	SMD capasitor NPO	15pF Ò5%	Murata	
CG0399	C537	SMD capasitor NPO	3.9pF Ò0,25pF	Murata	
CG0330	C538	SMD capasitor NPO	33pF Ò5%	Murata	
CG0399	C539	SMD capasitor NPO	3.9pF Ò0,25pF	Murata	
CG0102	C54	SMD capasitor X7R	1nF Ò10%	Murata	
CG0279	C540	SMD capasitor NPO	2.7pF Ò0,25pF	Murata	
CG0479	C541	SMD capasitor NPO	4.7pF Ò0,25pF	Murata	
CG0223	C542	SMD capasitor X7R	22nF 20%	Murata	
CG0101	C55	SMD capasitor X7R	100pF Ò5%	Murata	
CG0223	C550	SMD capasitor X7R	22nF 20%	Murata	
CG0223	C551	SMD capasitor X7R	22nF 20%	Murata	
CG0223	C552	SMD capasitor X7R	22nF 20%	Murata	
CG0223	C553	SMD capasitor X7R	22nF 20%	Murata	
CG0223	C554	SMD capasitor X7R	22nF 20%	Murata	
CG0100	C555	SMD capasitor NPO	10pF-+0.25pF	Murata	
CG0223	C556	SMD capasitor X7R	22nF 20%	Murata	
CF0471	C557	SMD capasitor	470 pF 5% 50 V NPO	Philips	
CG0101	C56	SMD capasitor X7R	100pF Ò5%	Murata	
CG0103	C560	SMD capasitor X7R	10nF Ò10%	Murata	
CG0103	C561	SMD capasitor X7R	10nF Ò10%	Murata	
CF0105	C562	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0331	C563	SMD capasitor X7R	330pF Ò10%	Murata	
CH0105	C57	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CU3106	C570	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CG0102	C571	SMD capasitor X7R	1nF Ò10%	Murata	
CG0223	C572	SMD capasitor X7R	22nF 20%	Murata	
CG0101	C58	SMD capasitor X7R	100pF Ò5%	Murata	
CG0101	C59	SMD capasitor X7R	100pF Ò5%	Murata	
CG0471	C6	SMD capasitor X7R	470pF Ò10%	Murata	
CG0101	C60	SMD capasitor X7R	100pF Ò5%	Murata	
CG0102	C601	SMD capasitor X7R	1nF Ò10%	Murata	
CG0103	C602	SMD capasitor X7R	10nF Ò10%	Murata	
CG0104	C603	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CU1105	C604	SMD tantal	1uF/16V	AVX	TAJR105M016R
CU3106	C605	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CG0101	C61	SMD capasitor X7R	100pF Ò5%	Murata	
CF0105	C610	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C611	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C612	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C613	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C614	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0103	C615	SMD capasitor X7R	10nF Ò10%	Murata	
CG0101	C62	SMD capasitor X7R	100pF Ò5%	Murata	
CG0101	C620	SMD capasitor X7R	100pF Ò5%	Murata	
CG0104	C621	SMD capasitor	100nF/10% 6,3V X5R	AVX	CM05X5R104K06AH
CG0220	C622	SMD capasitor NPO	22pF Ò5%	Murata	
CG0101	C623	SMD capasitor X7R	100pF Ò5%	Murata	
CG0569	C624	SMD capasitor NPO	5.6pF Ò0,25pF	Murata	
CH0105	C63	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C630	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C631	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CG0222	C640	SMD capasitor X7R	2.2nF Ò10%	Murata	
CG0332	C641	SMD capasitor X7R	3.3nF Ò10%	Murata	
CF0105	C642	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CF0105	C643	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0102	C644	SMD capasitor X7R	1nF Ò10%	Murata	
CG0102	C645	SMD capasitor X7R	1nF Ò10%	Murata	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CF0105	C646	SMD capasitor	1uF 10% 6,3V X5R	AVX	CM105X5R105K06AT
CG0101	C650	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C651	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C652	SMD capasitor X7R	100pF 05%	Murata	
CG0471	C7	SMD capasitor X7R	470pF 010%	Murata	
CG0471	C8	SMD capasitor X7R	470pF 010%	Murata	
CG0101	C80	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C81	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C82	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C83	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C84	SMD capasitor X7R	100pF 05%	Murata	
CG0101	C85	SMD capasitor X7R	100pF 05%	Murata	
CG0471	C9	SMD capasitor X7R	470pF 010%	Murata	
DY0054	D101	Shottky diode		Philips	BAT 54
DY0384	D102	SMD shottky barrier diod	15V/200mA/VF=0.35V	Toshiba	1SS384-TE85L
DZ3327	D111	SMD zenerdiode	2V7 5% 500mW	Temic	BZM55C2V7-TR
DS0019	D121	SMD diode	100v / 200mA	Philips	BAS19
DS1070	D131	SMD diode pair	70V/100mA common cathode	Philips	BAV 70W
DY0016	D132	SMD shottky diode	40V/1,33A VF=0.55V	Shindengen	M1FS4
DS1070	D321	SMD diode pair	70V/100mA common cathode	Philips	BAV 70W
DS1099	D331	SMD diode pair	70 V 200 mA	Philips	BAV 99W 115
DC0229	D420	SMD silicon tuning diode	1V/19pF...4V/11pF	Toshiba	1SV229
DC0229	D460	SMD silicon tuning diode	1V/19pF...4V/11pF	Toshiba	1SV229
DY0071	D510	SMD shottky diode	70V 15mA	SGS-Thomso	BAS 70-04
DY0063	D660	SMD shcottky diode	40V 20mA	Siemens	BAT 62-07W
AF1035	F1	PolySwitch		Raychem	miniSMDC035-2
AF4300	F50	SMD fuse	3A	Littlefuse	0430003.WR
IR7063	I101	Regulator	50mA, 2,5V	Impala	ILC7062CM-25
IR7080	I111	Regulator	2,85V 100mA/SOT23-5	Impala	ILC7081AIM5-28
IX5061	I112	Power supply reset monit	or/ 2,6V	Impala	ILC5061M-26
IX0826	I121	EL-lamp driver	4,5V / 120V	Supertex	HV826MG
IG2000	I151	DSP-asic, Basic	180pin BGA, 64k RAM VSDSP	CSM	BENE IG2000
IM1603	I201	Flash memory	16Mb90ms 3V	SST	SST39VF160-90-4C
IG2048	I241	SIS ASIC		Atmel	
IS2335	I400	Dual freg.synthesizer	PLL+prescaler 1.2GHz	NationalSe	LMX23352TMX
IR1230	I490	Regulator	3,0V	Toko	TK11230BM
IR1230	I495	Regulator	3,0V	Toko	TK11230BM
IV6070	I550	FM IF-system		Philips	SA607DK
IR1230	I600	Regulator	3,0V	Toko	TK11230BM
IR2687	I610	Negative regulator		Nat.Semico	LM2687
IA2211	I640	Single op. amp.	2,7 - 10V 150mW	Texas Inst	TLV2211CDBV
IW2391	I650	RF-power amplifier	450MHz-485MHz	Iwatsu	HAB239B
LC2334	L1	SMD inductor	330 nH/+ -10%	TDK	MLF2012DR33KT
LC0567	L121	SMD inductors	560uH 10% 3,2x2,5mm	Murata	LQH3C561K34
LC5224	L420	SMD inductor	220n +-5%	TaiyoYuden	HK2125 R22J-T
LC3123	L430	SMD inductor	12n +-2%	PANA-SONIC	ELJRE12NGF2
LC5224	L460	SMD inductor	220n +-5%	TaiyoYuden	HK2125 R22J-T
LC1682	L461	SMD induktor	6.8nH	TaiyoYuden	HK2125 6N8J-T
LC3333	L470	SMD inductor	33n +-2%	Panasonic	ELJRE33NGF2
LC3183	L480	SMD inductor	18n +-2%	PANA-SONIC	ELJRE18NGF2
LC3223	L500	SMD inductor	22n +-2%	Panasonic	ELJRE22NGF2
LC3183	L501	SMD inductor	18n +-2%	PANA-SONIC	ELJRE18NGF2
LC3562	L502	SMD inductor	5n6 +-2%	Panasonic	ELJRE5N6ZF2
LC3183	L503	SMD inductor	18n +-2%	PANA-SONIC	ELJRE18NGF2
LC3333	L504	SMD inductor	33n +-2%	Panasonic	ELJRE33NGF2
LC3273	L510	SMD inductor	27nH +-2%	Panasonic	ELJRE27NGF2

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
LC3332	L513	SMD inductor	3n3 +-2%	Panasonic	ELJRE3N3ZF2
LC3334	L520	SMD inductor	330nH +-10%	TDK	MLF1608DR33K
LC3334	L521	SMD inductor	330nH +-10%	TDK	MLF1608DR33K
LC3224	L530	SMD inductor	220nH+-10% magnet.shielded	TDK	MLF1608DR22KT
LC3104	L531	SMD inductor	100nH+-10% magnet.shielded	TDK	MLF1608DR10KT
LC3334	L540	SMD inductor	330nH +-10%	TDK	MLF1608DR33K
LI0450	L550	SMD Quad. coil	450kHz	Sagami	950997404
LG0273	L620	SMD inductor	Multilayer 27nF-+5%	Murata	LQG10A27NJ00
LC3332	L660	SMD inductor	3n3 +-2%	Panasonic	ELJRE3N3ZF2
LC3562	L661	SMD inductor	5n6 +-2%	Panasonic	ELJRE5N6ZF2
LT1019	M510	RF-transformer SM-T4	1:1.1, 4,5->600MHz	Neosid	00 5532 05
QS1847	Q101	piensignaali yleistransi	NPN 100mA/45V hfe=200...450	Philips	BC847BW
QS1857	Q102	piensignaali yleistransi	PNP 100mA/45V hfe=220...470	Philips	BC857BW
QS0060	Q121	SMD transistor arrey	NPN/PNP 100mA/50V	Siemens	BCR 10PN
QS0718	Q131	SMD transistori	PNPswitching power	Zetex	FMMT7187TA
QS1847	Q132	piensignaali yleistransi	NPN 100mA/45V hfe=200...450	Philips	BC847BW
QF0200	Q133	N-channel MOSFET	20V/0,73A	TEMIC	TN0200T
QS1857	Q141	piensignaali yleistransi	PNP 100mA/45V hfe=220...470	Philips	BC857BW
QS1847	Q221	piensignaali yleistransi	NPN 100mA/45V hfe=200...450	Philips	BC847BW
QF0200	Q321	N-channel MOSFET	20V/0,73A	TEMIC	TN0200T
QF0200	Q331	N-channel MOSFET	20V/0,73A	TEMIC	TN0200T
QA4867	Q420	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QA4867	Q430	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QS1847	Q440	piensignaali yleistransi	NPN 100mA/45V hfe=200...450	Philips	BC847BW
QA4867	Q460	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QA4867	Q470	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QA4867	Q480	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QF0320	Q500	SMD Dual FET	N-channel	Toshiba	3SK320
QF0320	Q520	SMD Dual FET	N-channel	Toshiba	3SK320
QA4867	Q530	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QA4867	Q620	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QA4867	Q621	SMD RF-transistor	NPN G=13dB NF=1.2dB/1GHz	Sanyo	2SC4867-4
QF0138	Q630	N-channel fet	50V/0,2A	Motorola	BSS138LT1
QF7663	Q631	P-channel MOSFET	Rds 0.020,	IR	IRF7663
QS1847	Q640	piensignaali yleistransi	NPN 100mA/45V hfe=200...450	Philips	BC847BW
QS1847	Q641	piensignaali yleistransi	NPN 100mA/45V hfe=200...450	Philips	BC847BW
QS0031	Q642	SMD transistor	PNP 1A/25V	Sanyo	2SB1119S-TD
RG0101	R1	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R10	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0104	R101	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R102	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0225	R103	SMD resistor	2M2 5% 0.063W	Kamaya	RMC1/16S
RG0101	R104	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R11	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0104	R111	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0472	R112	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0103	R113	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0223	R114	SMD resistor	22k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R115	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0101	R12	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0102	R121	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0102	R122	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0564	R123	SMD resistor	560k 5% 0.063W	Kamaya	RMC1/16S
RG0224	R124	SMD resistor	220k 5% 0.063W	Kamaya	RMC1/16S
RG0472	R125	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0472	R126	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0101	R13	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0104	R131	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R132	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0102	R133	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RG0104	R134	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R135	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0101	R14	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0472	R141	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0104	R142	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R143	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0154	R144	SMD resistor	150k 5% 0.063W	Kamaya	RMC1/16S
RG0105	R145	SMD resistor	1M0 5% 0.063W	Kamaya	RMC1/16S
RF0106	R146	SMD resistor	10 M 5% 0.125 W	Kamaya	
RG0154	R147	SMD resistor	150k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R148	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R149	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0470	R15	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0470	R16	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0104	R161	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0684	R162	SMD resistor	680k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R163	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0102	R164	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0684	R165	SMD resistor	680k 5% 0.063W	Kamaya	RMC1/16S
RT2500	R166	NTC resistor	150k+-5% B=4750	TaiyoYuden	TBPS1R154J475H5Q
RG0105	R167	SMD resistor	1M0 5% 0.063W	Kamaya	RMC1/16S
RG0105	R168	SMD resistor	1M0 5% 0.063W	Kamaya	RMC1/16S
RG0470	R17	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0470	R18	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R19	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R2	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R20	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0000	R201	SMD resistor	0 ohm		
RG0000	R202	SMD resistor	0 ohm		
RG0101	R21	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R22	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R221	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R222	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0105	R223	SMD resistor	1M0 5% 0.063W	Kamaya	RMC1/16S
RG0103	R224	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R23	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0101	R24	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R241	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0472	R25	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0472	R26	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0101	R27	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0102	R28	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0101	R29	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R3	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0104	R30	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0681	R301	SMD resistor	680R 5% 0.063W	Kamaya	RMC1/16S
RG0152	R302	SMD resistor	1k5 5% 0.063W	Kamaya	RMC1/16S
RG0152	R303	SMD resistor	1k5 5% 0.063W	Kamaya	RMC1/16S
RG0000	R304	SMD resistor	0 ohm		
RG0681	R305	SMD resistor	680R 5% 0.063W	Kamaya	RMC1/16S
RG0332	R306	SMD resistor	3k3 5% 0.063W	Kamaya	RMC1/16S
RG0332	R307	SMD resistor	3k3 5% 0.063W	Kamaya	RMC1/16S
RG0222	R308	SMD resistor	2k2 5% 0.063W	Kamaya	RMC1/16S
RG0104	R31	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R32	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0100	R321	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0100	R322	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R323	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0104	R324	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R33	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S

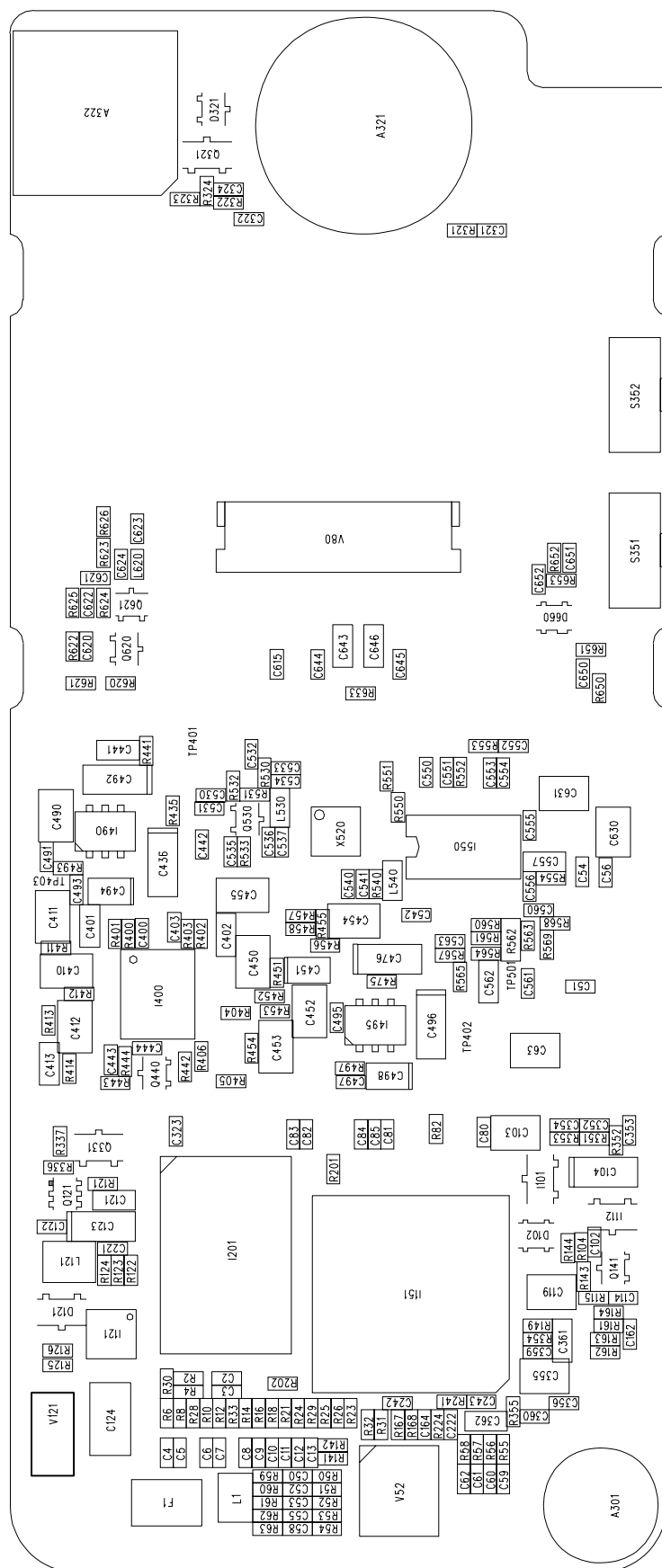
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RG0473	R331	SMD resistor	47k 5% 0.063W	Kamaya	RMC1/16S
RG0472	R332	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0000	R333	SMD resistor	0 ohm		
RG0470	R334	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0470	R335	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R336	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R337	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R351	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0102	R352	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0102	R353	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0152	R354	SMD resistor	1k5 5% 0.063W	Kamaya	RMC1/16S
RG0561	R355	SMD resistor	560R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R4	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0470	R400	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0220	R401	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0220	R402	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0470	R403	SMD resistor	47R 5% 0.063W	Kamaya	RMC1/16S
RG0472	R404	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0472	R405	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0472	R406	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0272	R411	SMD resistor	2k7 5% 0.063W	Kamaya	RMC1/16S
RG0152	R412	SMD resistor	1k5 5% 0.063W	Kamaya	RMC1/16S
RG0152	R413	SMD resistor	1k5 5% 0.063W	Kamaya	RMC1/16S
RG0100	R414	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0682	R420	SMD resistor	6k8 5% 0.063W	Kamaya	RMC1/16S
RG0152	R421	SMD resistor	1k5 5% 0.063W	Kamaya	RMC1/16S
RG0680	R422	SMD resistor	68R 5% 0.063W	Kamaya	RMC1/16S
RG0220	R430	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0392	R431	SMD resistor	3k9 5% 0.063W	Kamaya	RMC1/16S
RG0102	R432	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0151	R433	SMD resistor	150R 5% 0.063W	Kamaya	RMC1/16S
RG0151	R434	SMD resistor	150R 5% 0.063W	Kamaya	RMC1/16S
RG0100	R435	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R440	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0100	R441	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0473	R442	SMD resistor	47k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R443	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R444	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0182	R451	SMD resistor	1k8 5% 0.063W	Kamaya	RMC1/16S
RG0472	R452	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0472	R453	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0100	R454	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0183	R455	SMD resistor	18k 5% 0.063W	Kamaya	RMC1/16S
RG0823	R456	SMD resistor	82k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R457	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0472	R458	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0151	R459	SMD resistor	150R 5% 0.063W	Kamaya	RMC1/16S
RG0682	R460	SMD resistor	6k8 5% 0.063W	Kamaya	RMC1/16S
RG0152	R461	SMD resistor	1k5 5% 0.063W	Kamaya	RMC1/16S
RG0101	R462	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0220	R470	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0392	R471	SMD resistor	3k9 5% 0.063W	Kamaya	RMC1/16S
RG0102	R472	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0101	R473	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R474	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0100	R475	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0182	R480	SMD resistor	1k8 5% 0.063W	Kamaya	RMC1/16S
RG0392	R481	SMD resistor	3k9 5% 0.063W	Kamaya	RMC1/16S
RG0220	R482	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0100	R483	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RG0221	R484	SMD resistor	220R 5% 0.063W	Kamaya	RMC1/16S
RG0473	R493	SMD resistor	47k 5% 0.063W	Kamaya	RMC1/16S
RG0473	R497	SMD resistor	47k 5% 0.063W	Kamaya	RMC1/16S
RG0101	R5	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0102	R50	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0101	R501	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0471	R502	SMD resistor	470R 5% 0.063W	Kamaya	RMC1/16S
RG0100	R503	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R504	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0333	R505	SMD resistor	33k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R51	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0271	R510	SMD resistor	270R 5% 0.063W	Kamaya	RMC1/16S
RG0180	R511	SMD resistor	18R 5% 0.063W	Kamaya	RMC1/16S
RG0271	R512	SMD resistor	270R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R513	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R52	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0220	R520	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0472	R521	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0102	R522	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0471	R523	SMD resistor	470R 5% 0.063W	Kamaya	RMC1/16S
RG0102	R53	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0100	R530	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0333	R531	SMD resistor	33k 5% 0.063W	Kamaya	RMC1/16S
RG0473	R532	SMD resistor	47k 5% 0.063W	Kamaya	RMC1/16S
RG0471	R533	SMD resistor	470R 5% 0.063W	Kamaya	RMC1/16S
RG0102	R54	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0472	R540	SMD resistor	4k7 5% 0.063W	Kamaya	RMC1/16S
RG0102	R55	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0272	R550	SMD resistor	2k7 5% 0.063W	Kamaya	RMC1/16S
RG0102	R551	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0222	R552	SMD resistor	2k2 5% 0.063W	Kamaya	RMC1/16S
RG0332	R553	SMD resistor	3k3 5% 0.063W	Kamaya	RMC1/16S
RG0273	R554	SMD resistor	27k 5% 0.063W	Kamaya	RMC1/16S
RG0102	R56	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0393	R560	SMD resistor	39k 5% 0.063W	Kamaya	RMC1/16S
RG0683	R561	SMD resistor	68k 5% 0.063W	Kamaya	RMC1/16S
RTN157	R562	(RNT157)NTC resistor	22k 5% B=3750	Ohizumi	157-223-65001
RG0102	R563	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0682	R564	SMD resistor	6k8 5% 0.063W	Kamaya	RMC1/16S
RG0473	R565	SMD resistor	47k 5% 0.063W	Kamaya	RMC1/16S
RG0683	R567	SMD resistor	68k 5% 0.063W	Kamaya	RMC1/16S
RG0333	R568	SMD resistor	33k 5% 0.063W	Kamaya	RMC1/16S
RG0222	R569	SMD resistor	2k2 5% 0.063W	Kamaya	RMC1/16S
RG0102	R57	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0220	R570	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0102	R58	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0103	R59	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0101	R6	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R60	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0473	R600	SMD resistor	47k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R61	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0100	R610	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0224	R611	SMD resistor	220k 5% 0.063W	Kamaya	RMC1/16S
RG0184	R612	SMD resistor	180k 5% 0.063W	Kamaya	RMC1/16S
RG0680	R613	SMD resistor	68R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R62	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0220	R620	SMD resistor	22R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R621	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0821	R622	SMD resistor	820R 5% 0.063W	Kamaya	RMC1/16S
RG0222	R623	SMD resistor	2k2 5% 0.063W	Kamaya	RMC1/16S

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RG0222	R624	SMD resistor	2k2 5% 0.063W	Kamaya	RMC1/16S
RG0222	R625	SMD resistor	2k2 5% 0.063W	Kamaya	RMC1/16S
RG0100	R626	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0103	R63	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R630	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0224	R631	SMD resistor	220k 5% 0.063W	Kamaya	RMC1/16S
RG0224	R632	SMD resistor	220k 5% 0.063W	Kamaya	RMC1/16S
RG0223	R633	SMD resistor	22k 5% 0.063W	Kamaya	RMC1/16S
RG0224	R640	SMD resistor	220k 5% 0.063W	Kamaya	RMC1/16S
RG0332	R641	SMD resistor	3k3 5% 0.063W	Kamaya	RMC1/16S
RG0102	R642	SMD resistor	1k0 5% 0.063W	Kamaya	RMC1/16S
RG0271	R643	SMD resistor	270R 5% 0.063W	Kamaya	RMC1/16S
RG0271	R644	SMD resistor	270R 5% 0.063W	Kamaya	RMC1/16S
RG0101	R645	SMD resistor	100R 5% 0.063W	Kamaya	RMC1/16S
RG0224	R650	SMD resistor	220k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R651	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0104	R652	SMD resistor	100k 5% 0.063W	Kamaya	RMC1/16S
RG0103	R653	SMD resistor	10k 5% 0.063W	Kamaya	RMC1/16S
RG0100	R7	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0100	R8	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0100	R81	SMD resistor	10 R 5% 0.063W	Kamaya	RMC1/16S
RG0000	R82	SMD resistor	0 ohm	Kamaya	RMC1/16S
AS2502	S351	Side switch		ITT Cannon	KSS223G
AS2502	S352	Side switch		ITT Cannon	KSS223G
VN2301	V1	In phone connector		L&K	HO1433G9-A1
VW2500	V121	Zebra elastomeric connec	tor	Fujipoly	
VN2503	V331	Connector	2pin,receptacle,vertical	AVX/Kyocer	
VM0002	V50	Modulat cntact	2pin 2A/pin	Bours	70AAJ002M0
VM0002	V51	Modulat cntact	2pin 2A/pin	Bours	70AAJ002M0
VN2501	V52	Board to board connector	10 pin	Matsustiha	AXK5F10545
VR2502	V600	EXT-RF-connector		AMP	619026Rev C1
VN2303	V80	SMD connector	18 pin 0,5mm pitch	Elco	046239018001800
VR0248	V902	SMA connector		?????????	982589
LF0062	X1	SMD EMI filter	10nF/2A	Panasonic	ELKE103FA
X26000	X141	26MHz smd crystal	+30ppm 16pF	SDK Crysta	CPX-49SM
X32768	X142	SMD quartz crystal	32.768kHz +-30ppm	MicroCryst	MS2V-TS
XR1668	X420	Coaxial resonator	ceramic F=668MHz 2x2x12mm	Transtech	SR9000SMQ0668BY
XO0174	X440	VCTCXO 3,5*6,0mm	13.0 MHz 2,5ppm 3V+-5%	Raltron	RTVY-174EF230S13
LF0062	X50	SMD EMI filter	10nF/2A	Panasonic	ELKE103FA
XW0465	X500	SAW Rx-filter		TemexS.A.	TSF0465-03
				W	
LF0062	X51	SMD EMI filter	10nF/2A	Panasonic	ELKE103FA
XF7846	X520	Crystal filter	78.45 MHz	KDS	DSF334SAF
XC7450	X550	SMD ceramic filter	450kHz ?pole	Murata	SFUXC450EH110H
XC7450	X551	SMD ceramic filter	450kHz ?pole	Murata	SFUXC450EH110H
XW0454	X620	SAW Tx-filter		TemexS.A.	TSF0455-02
				W	
XI0005	X650	Directional coupler	NMT450	MKT Taisei	DCS3120-09
XW0455	X660	SAW Tx-filter		TemexS.A.	
				W	
PC2700	Y253	*** EI KOODATTU VARAS-TOON ***			

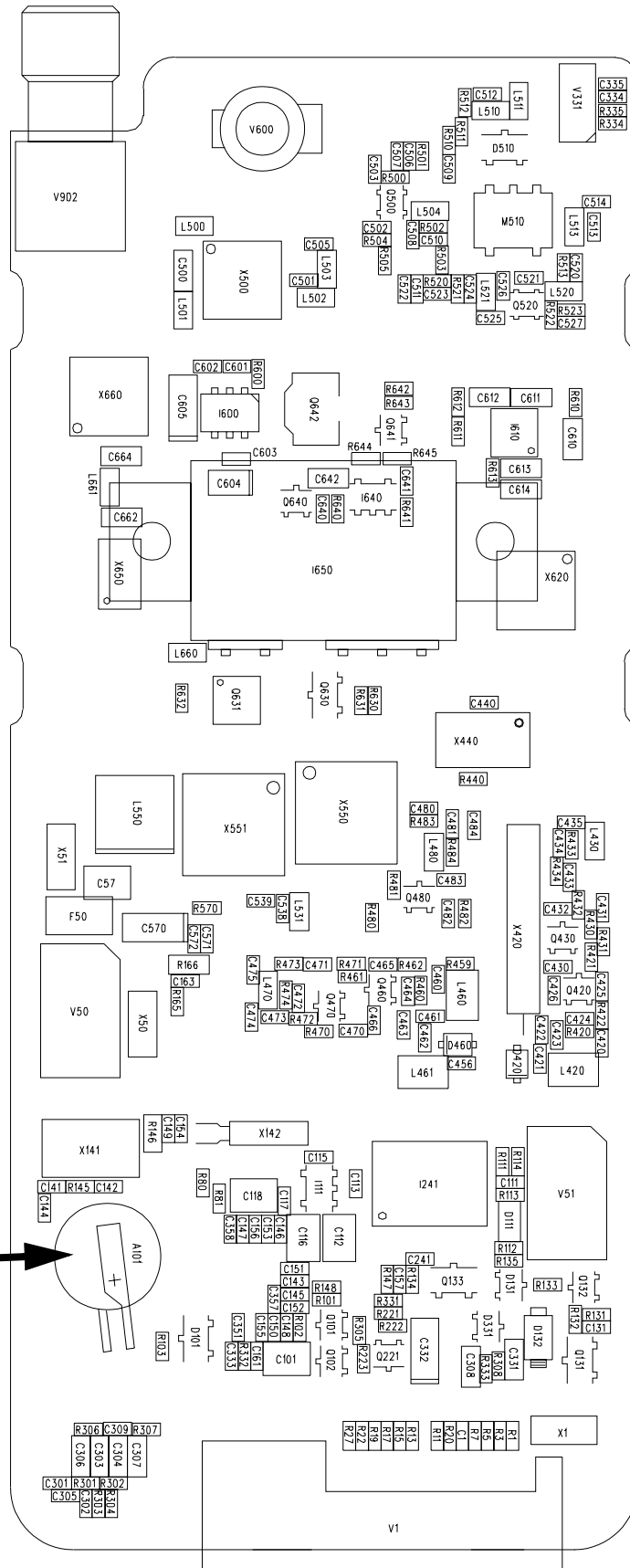
Last
update
26.01.01

The Top Side Layout PC2700 A0



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The Bottom Side Layout PC2700 A0

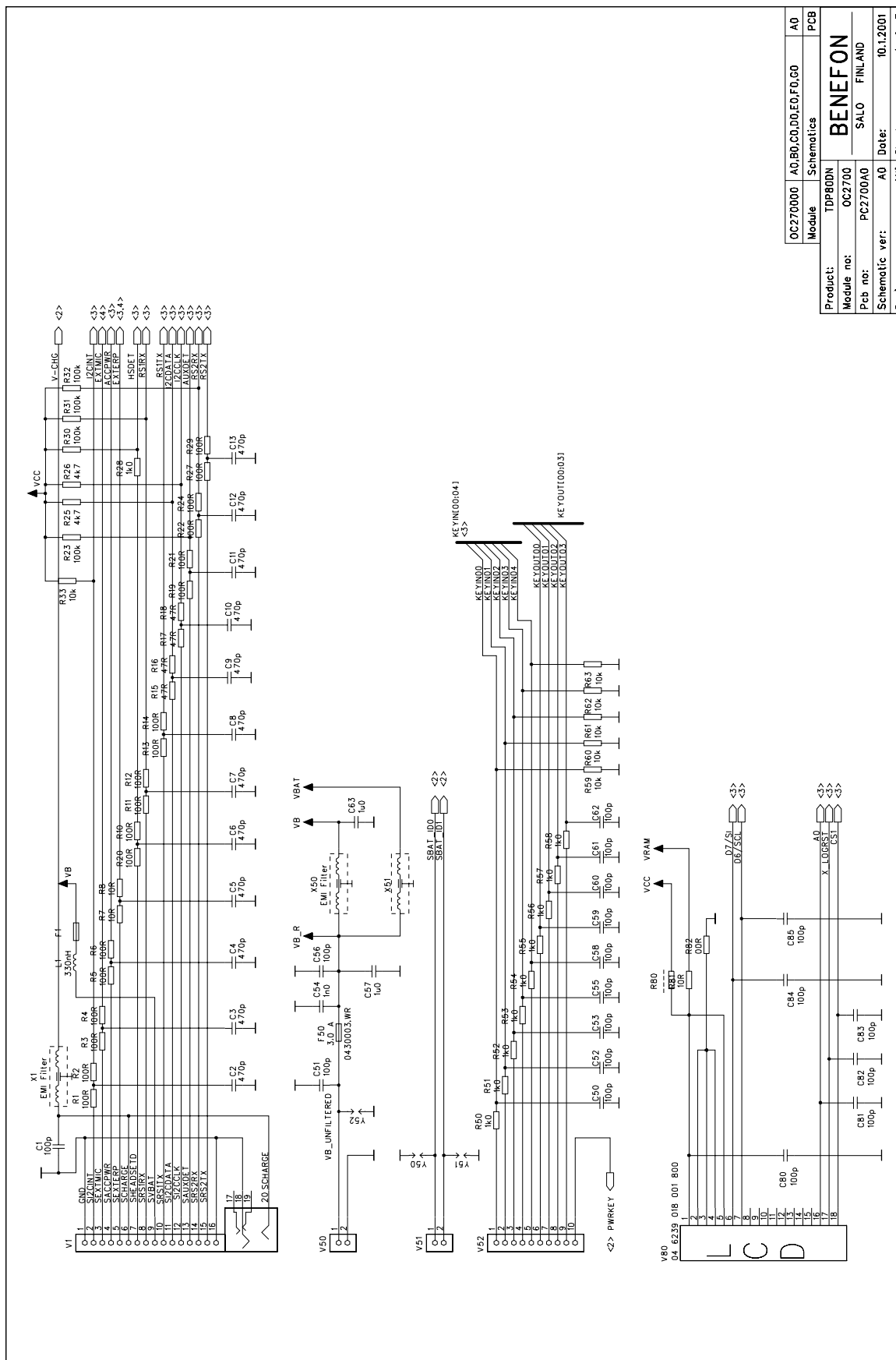


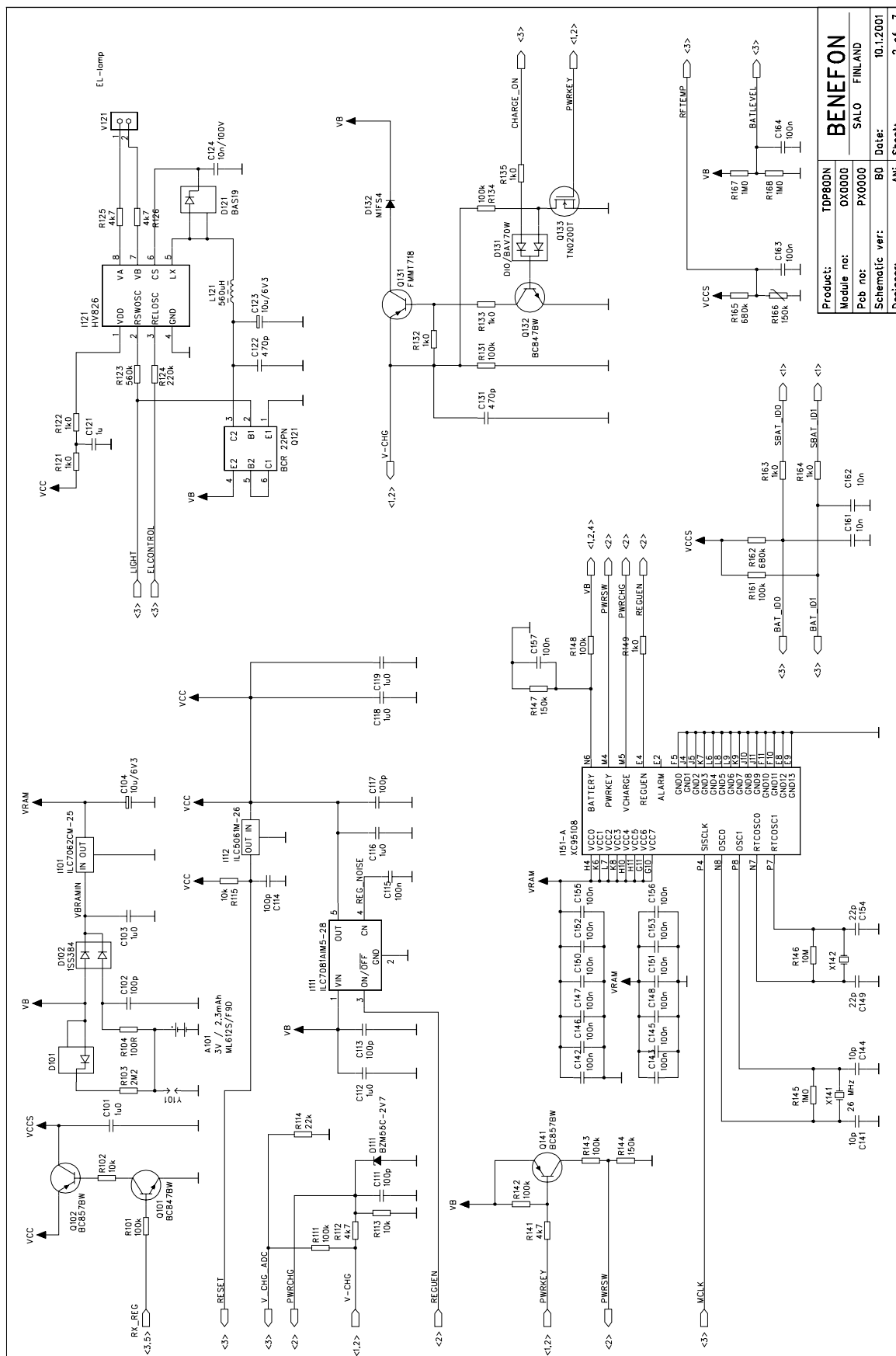
CAUTION

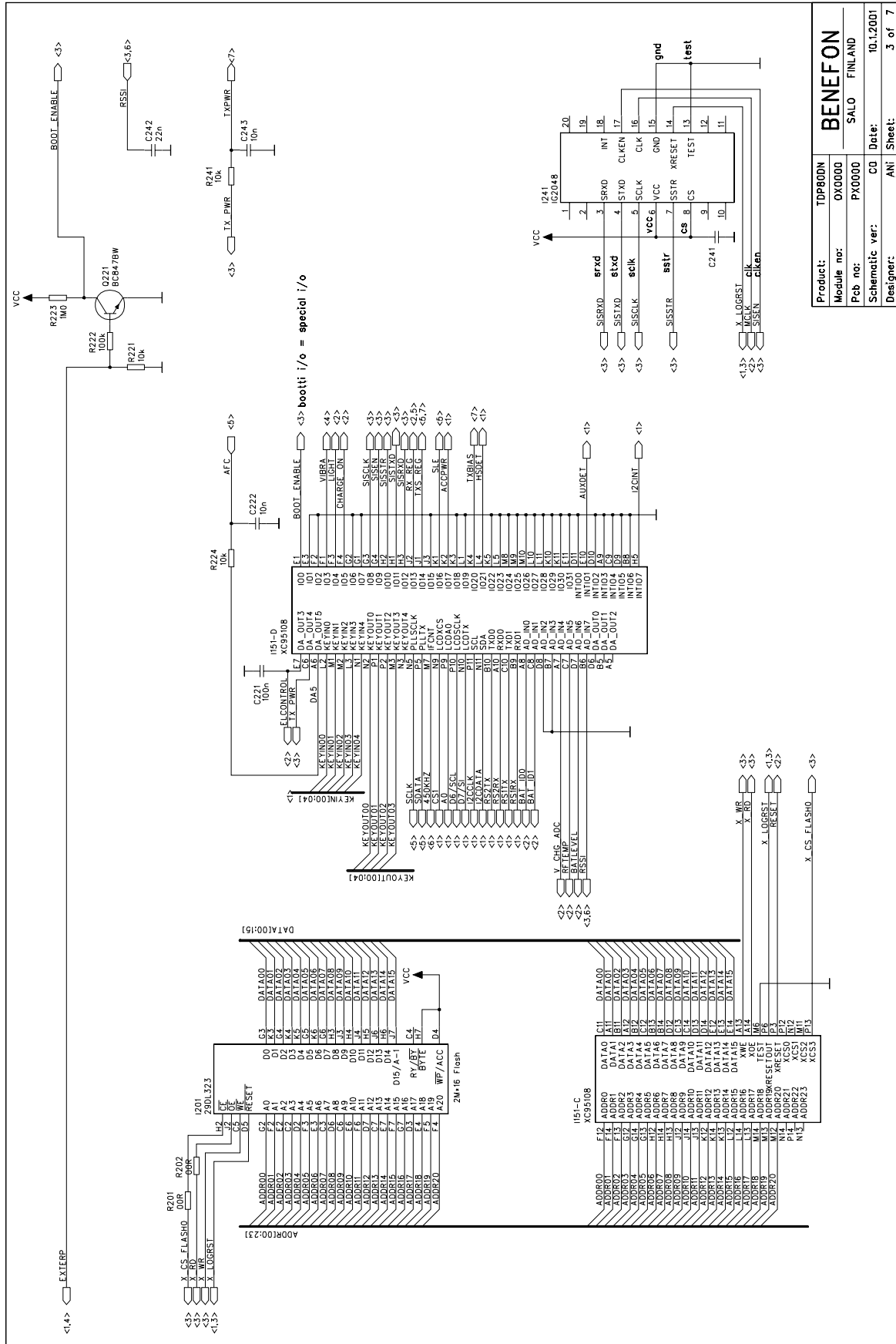
Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer.

Discard used batteries according to manufacturer's instructions.

PC5200A0 103

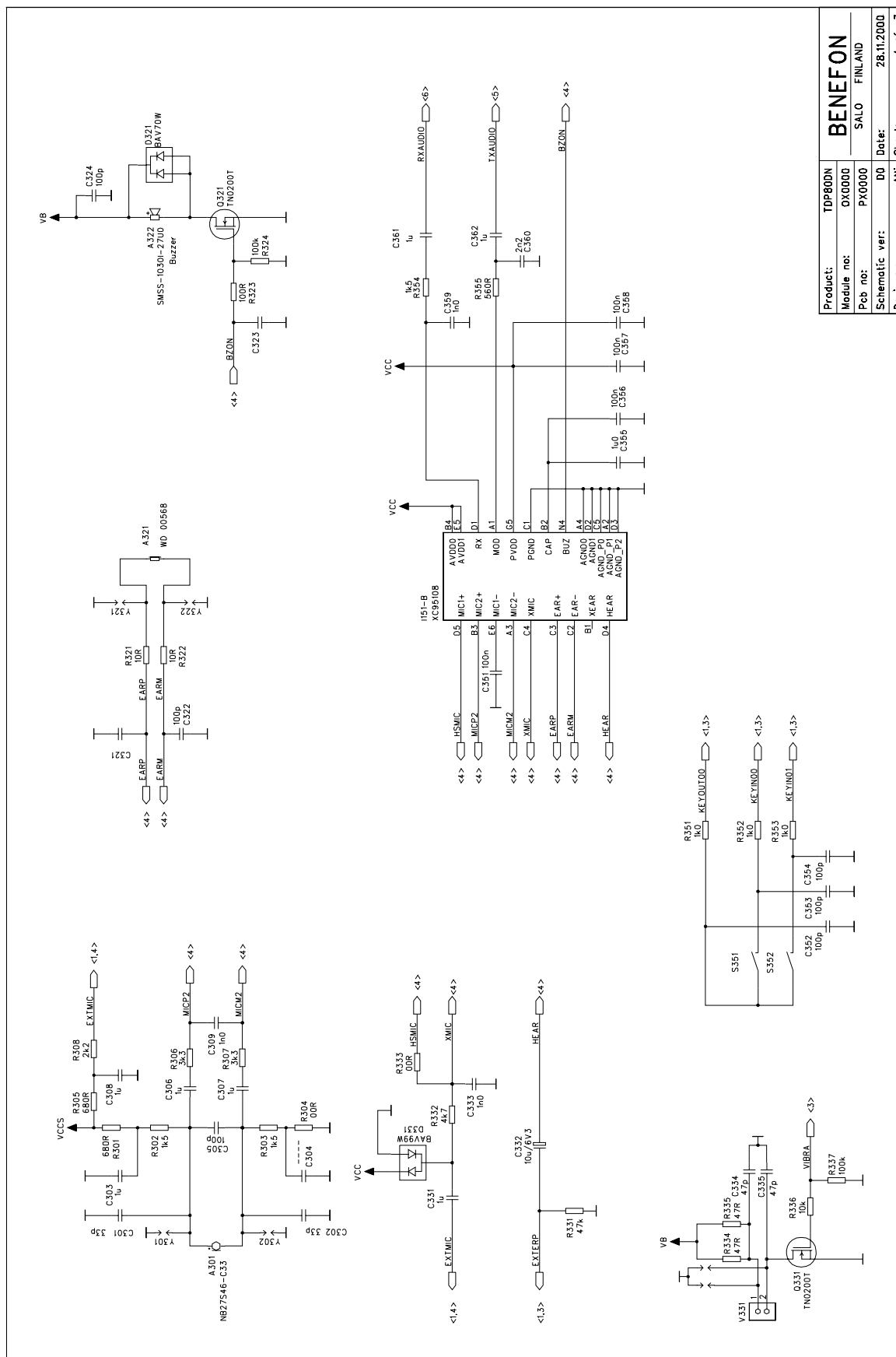


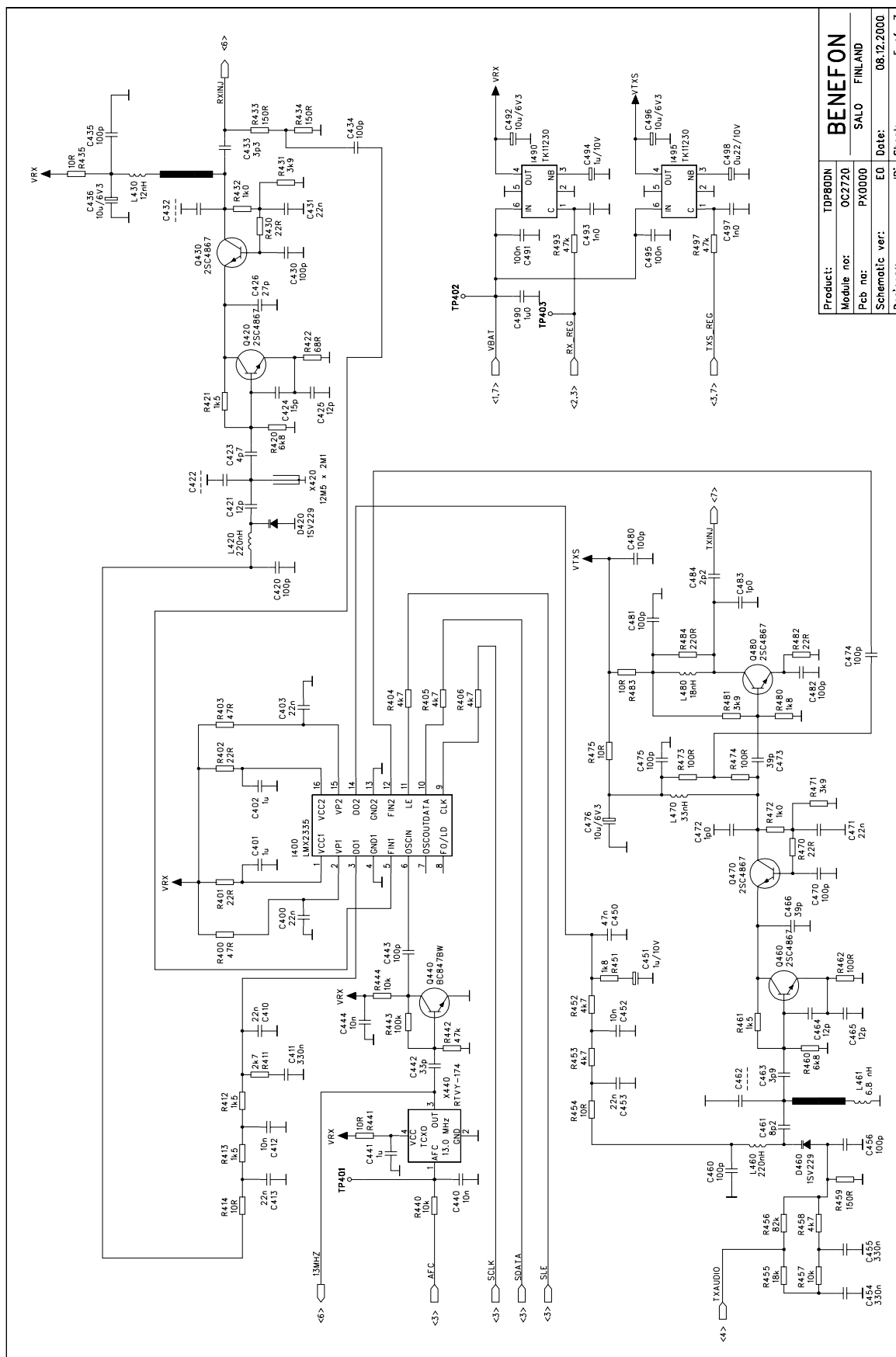


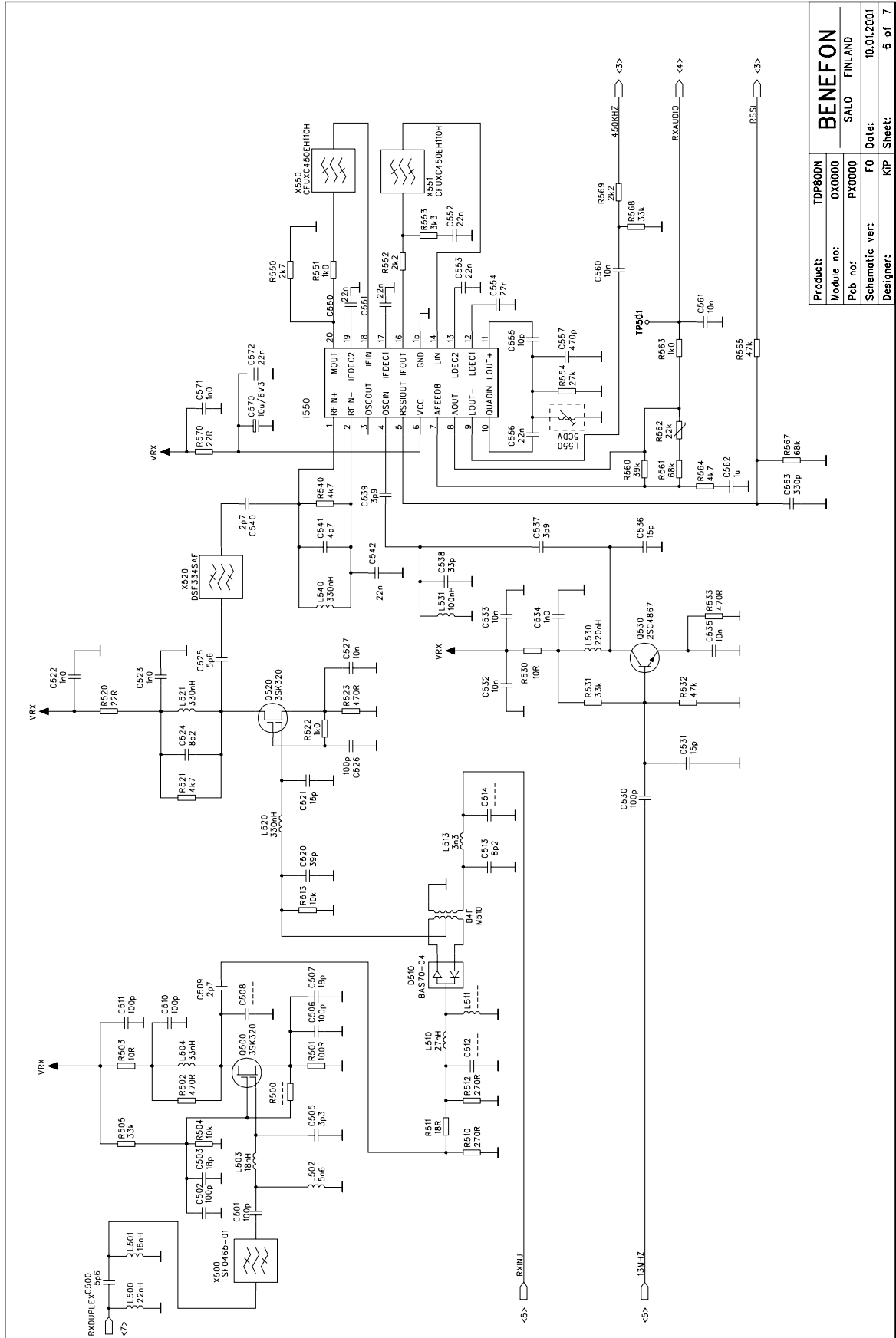


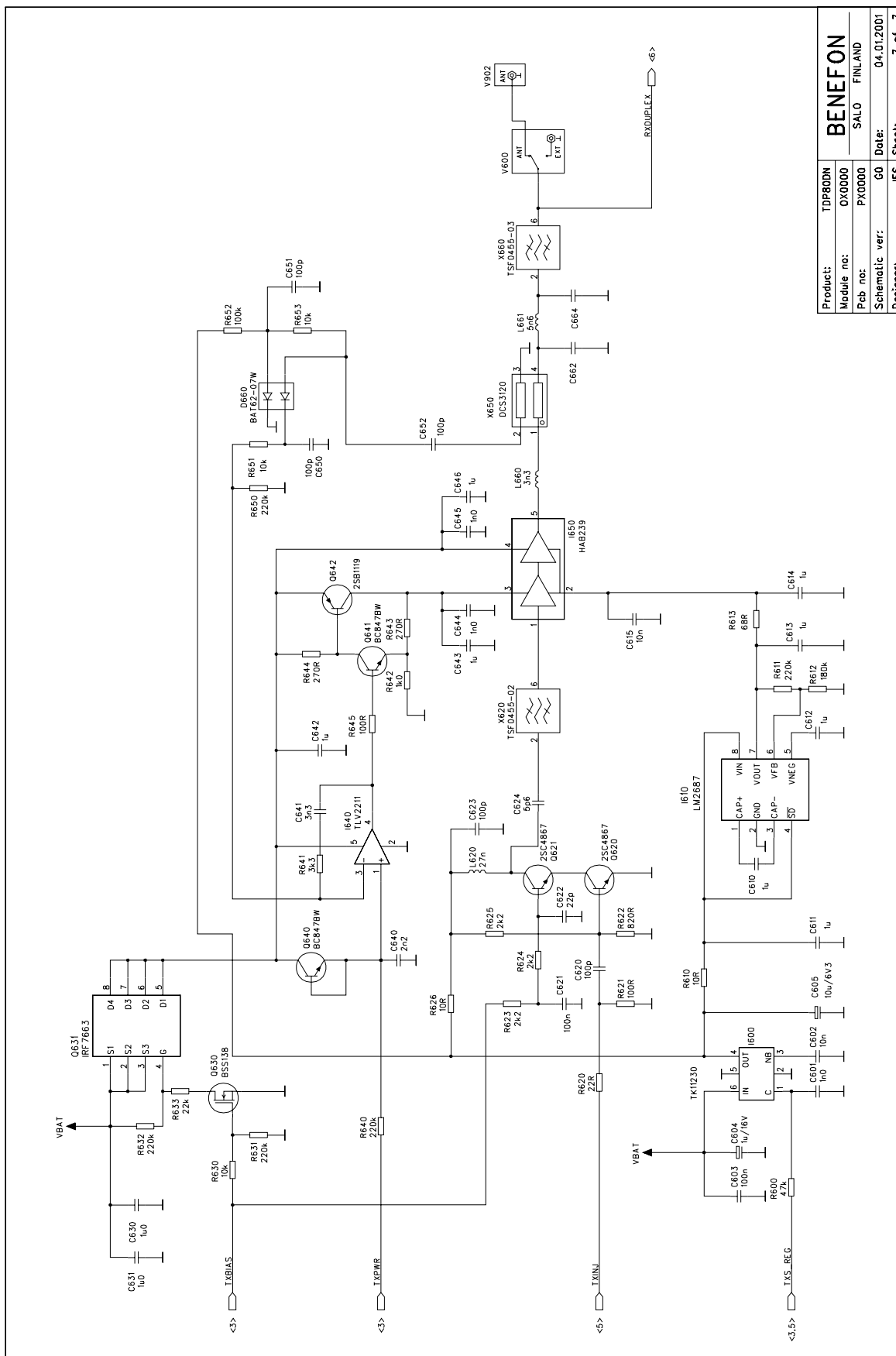
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Module no:	OX0000
Pcb no:	PX0000
Schematic ver:	C0
Date:	10.1.2001
Designer:	ANI
Sheet:	3 of 7

BENEFON
SALO FINLAND



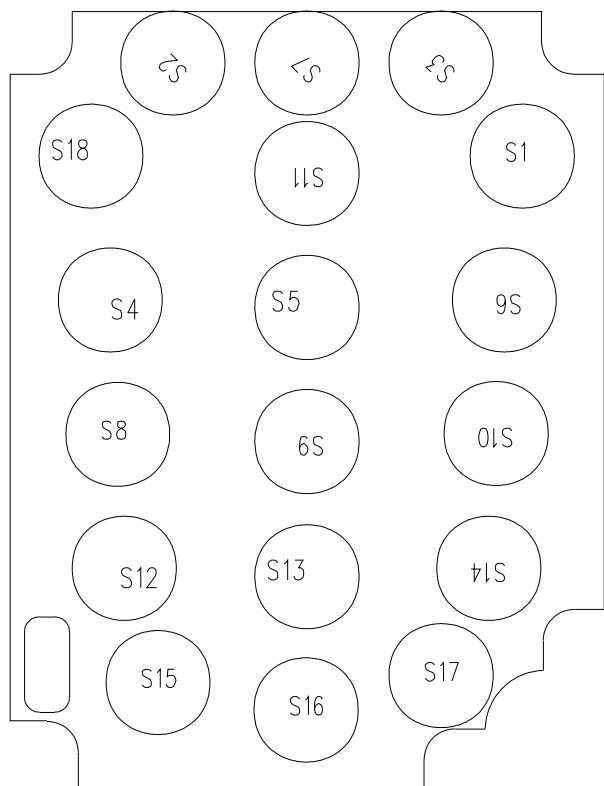




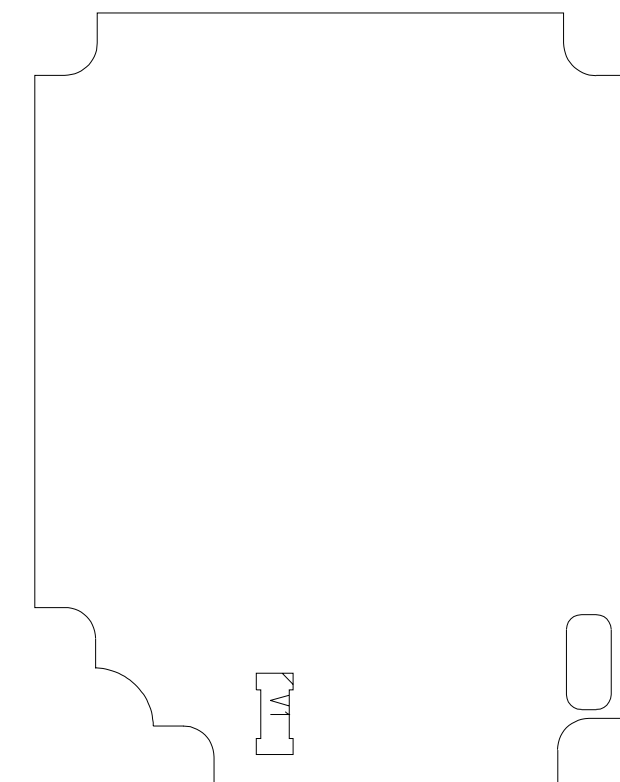


5.8 Keyboard

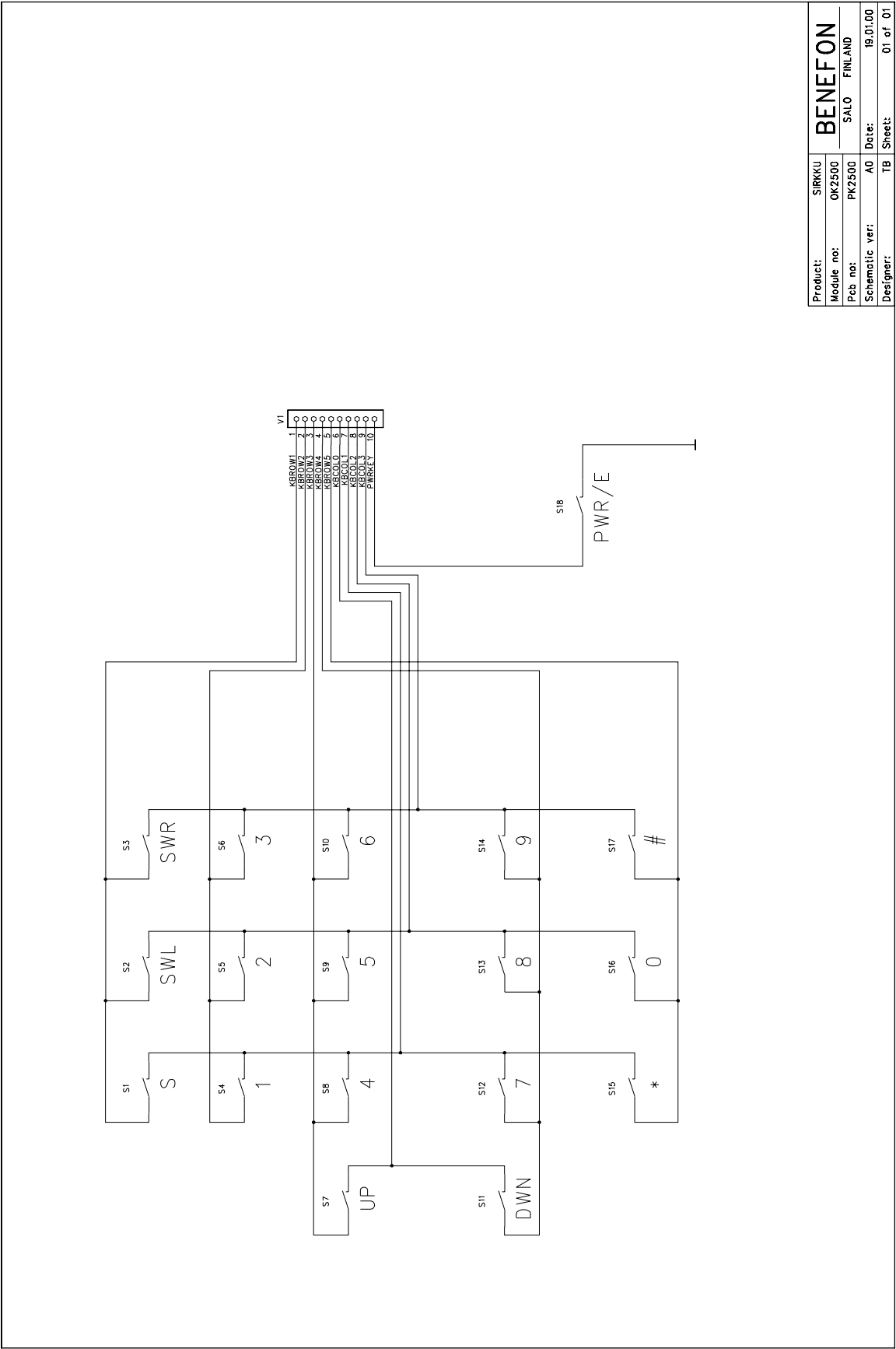
OK2500



PK2500A0 003



PK2500A0 003



Product:	SIRKKU	BENEFON
Module no:	OK2500	
Pcb no:	PK2500	SALO FINLAND
Schematic ver:	A0	Date: 19.01.00
Designer:	TB	Sheet: 01 of 01