

# **PAMS Technical Documentation**

## **NHX-7 Transceiver**

### **Chapter 3**

## **UIF MODULE JE3**



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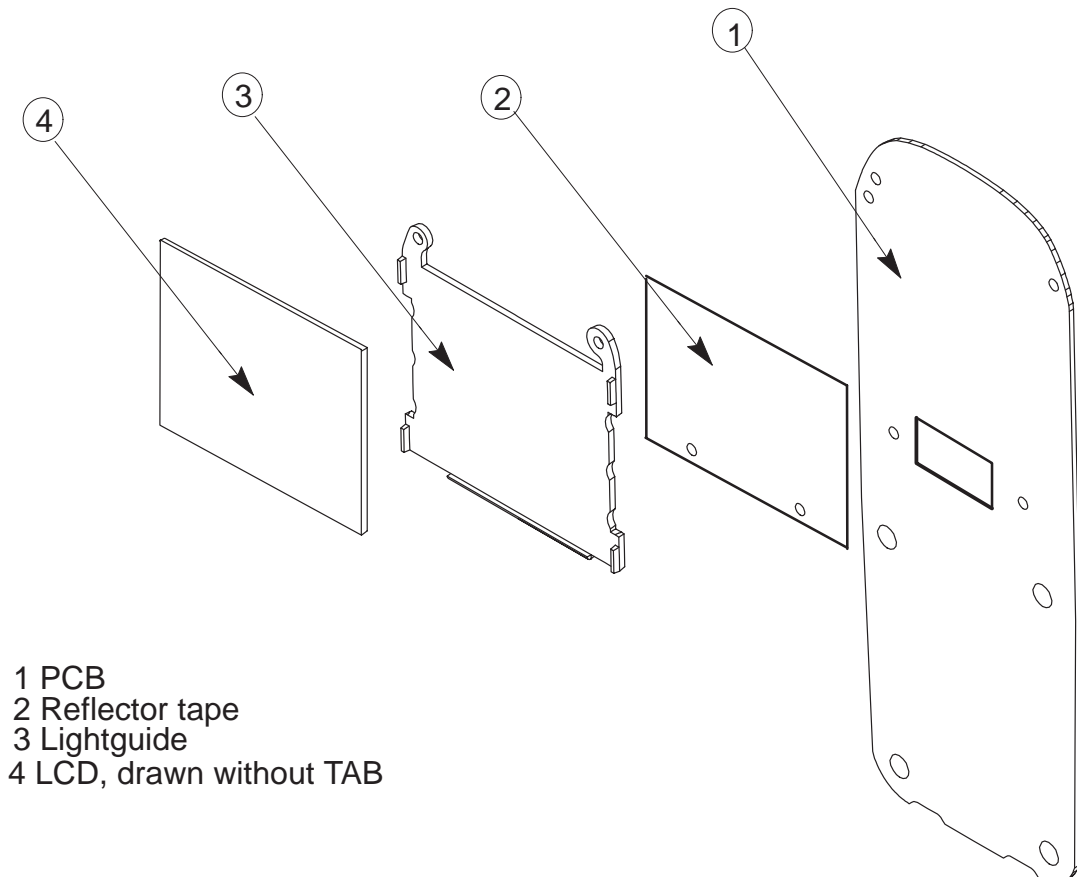
## Schematic Diagrams

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## JE3 User Interface Module Introduction

This document describes the UI-Module (UIM) JE3. The module is used in handportable phone NHX-7N of Nokia Mobile Phones.

### Design



The LCD module CD20 is sub-assembly from LCD manufacturer. It includes the LCD cell and mechanical parts of the module.

### Electronics

The following sections of circuitry are included on the UI-PCB.

- Speaker circuit
- Buzzer circuit
- LCD module
- Keyboard and display backlighting circuits
- EMI & ESD circuits for LCD and speaker

### Maximum Ratings

Operating temperature range	–10... +55 °C
Storage temperature range	–40... +85 °C

## DC Characteristics

Table 1. Supply Voltages and Power Consumption

Pin / Conn.	Line Symbol	Minimum	Typical / Nominal	Maximum	Unit / Notes
21	VL	2.7		2.85	V
13,14	VBAT	3.0		5.3	V
23, 24	GND		0		V
25, 26	DGND		0		V

## The Engine Interface

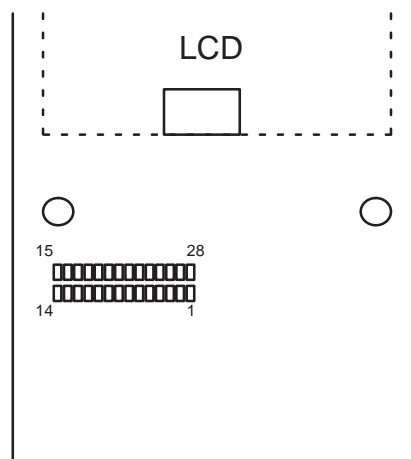
Table 2. Engine interface, 28-way

Pin	Line Symbol	Parameter	Min	Typ	Max	Unit	Notes
1	ROW0	Keyboard matrix row 0	0 0.7xVL		0.2xVL VL	V	Low High
2	ROW1	Keyboard matrix row 1	0 0.7xVL		0.2xVL VL	V	Low High
3	ROW2	Keyboard matrix row 2	0 0.7xVL		0.2xVL VL	V	Low High
4	ROW3	Keyboard matrix row 3	0 0.7xVL		0.2xVL VL	V V	Low High
5	COL0	Keyboard matrix column 0	0 VL-0.5		0.4 VL	V V	Low High
6	COL1	Keyboard matrix column 1	0 VL-0.5		0.4 VL	V V	Low High
7	COL2	Keyboard matrix column 2	0 VL-0.5		0.4 VL	V	Low High
8	COL3	Keyboard matrix column 3	0 VL-0.5		0.4 VL	V	Low High
9	XPWRON	Power on/off detection line					
10	GND	Analog ground		0		V	
11	KEYBLIGHT	Illumination control	VL-0.5 0		VL 0.4	V	High / Active Low
12	LCDBLIGHT	Illumination control	VL-0.5 0		VL 0.4	V	High / Active Low
13	VBATT	Battery voltage	3.0		5.3	V	
14	VBATT	Battery voltage	3.0		5.3	V	

Table 2. Engine interface, 28-way

Pin	Line Symbol	Parameter	Min	Typ	Max	Unit	Notes
15	LCDCLK	Display driver clock (external)		80		kHz	
			VL-0.5 0		VL 0.4	V V	High Low
16	SCLK	Mux'd LCD serial dataclock				Hz	
			VL-0.5 0		VL 0.4	V V	High Low
17	LCDENX	Display driver enable	0		0.4	V	Low
			VL-0.5		VL	V	High
18	LCDDC	Mux'd LCD data or command	VL-0.5 0		VL 0.4	V V	High Low
			0		0.4	V	Low
19	LCSDA	Mux'd LCD driver serial data	0		0.4	V	Low
			VL-0.5		VL	V	High
20	LCDRES	Reset for display driver	0		0.4	V	Low
			VL-0.5		VL	V	High
21	VL	LCD voltage	2.7		2.85	V	
		LCD current			5	mA	
22	BUZZER	Buzzer PWM control	0		2.85	V	
23	GND	Analog ground		0		V	
24	GND	Analog ground		0		V	
25	DGND	Digital ground		0		V	
26	DGND	Digital ground		0		V	
27	EARN	Speaker negative	0		1.78	V <sub>pp</sub>	
28	EARP	Speaker positive	0		1.78	V <sub>pp</sub>	

UIM Connector pads seen from the rear (2/2)



## Functional Description

### Power Distribution Diagrams

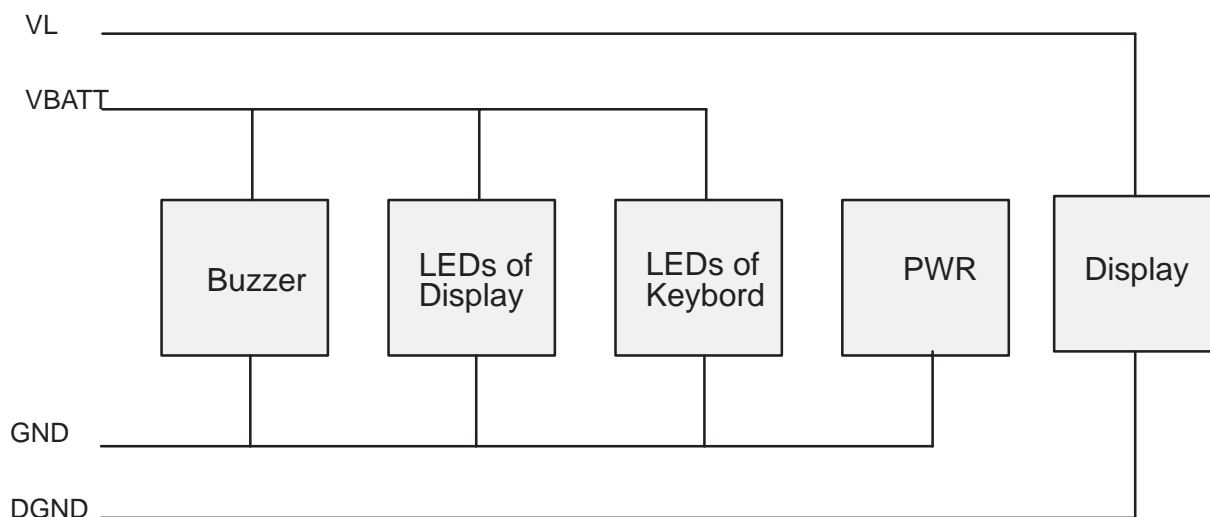


Figure 1. Power distribution diagram

### Keyboard

The keyboard is typed as a matrix pattern. The size of the matrix is 4 rows and 4 columns. The powerkey is separated from matrix. Rows are connected with pull-up resistors at the MCU.

### Backlight

Switching circuits for backlighting are located on UI board. Display and keyboard light controls are separated. On system board there is a possibility to control keyboard backlight illumination by i/o line state. Basically when both lines are in HIGH-state output and lights are bright, black keymat is used. Keyboard control I/O line can be set to INPUT-state to dim keyboard backlight for white keymat. Dimming scale is controlled at the system board by resistors.

The leds used for display backlights (6 pc) are side illuminating and are compatible with CL270-YG. Color of LEDs is yellow-green ( $\lambda \approx 570$  nm).

The leds used for keyboard backlights (6 pc) are top illuminating and are compatible with CL190-YG. Color of LEDs is yellow-green ( $\lambda \approx 570$  nm).

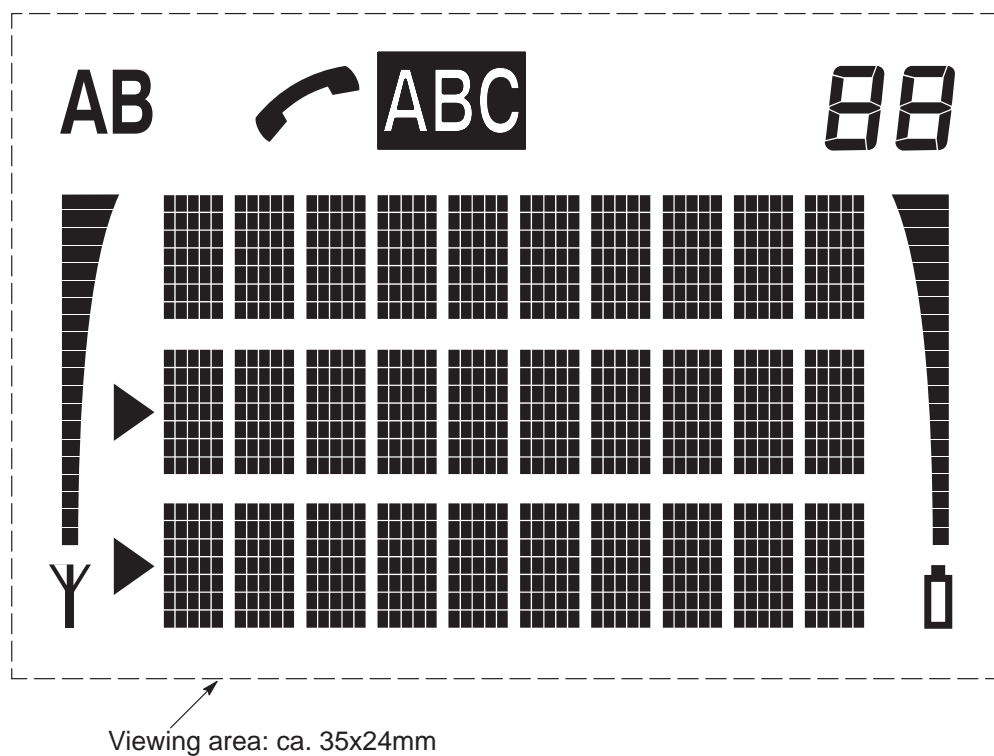
### Buzzer

The buzzer used is SMD type and controlled by PWM signal, produced by MCU. Same buzzer is used in DCT3 generation phones.

## Speaker

The speaker circuit includes pads for speaker and a few resistors and spark caps for EMC circuits. The speaker used is partly open air model speaker. The most part of the leak holes behind the capsule are closed by support ring designed. The speaker with the support ring shall be assembled to A-covers specified well. The front resonance well with the hole of 1.2 mm and partly leaking back cavitation the frequency response is more constant. Tight contact with the UI-board is needed to ensure stable back leak tolerant. Outer ring leak holes are not needed.

## LCD





**Parts list of JE3** (EDMS Issue 2.4)

Code: 0201213

ITEM	CODE	DESCRIPTION	VALUE	TYPE
R901	1430035	Chip resistor	1.0 k	5 % 0.063 W 0603
R902	1430087	Chip resistor	100 k	5 % 0.063 W 0603
R903	1430087	Chip resistor	100 k	5 % 0.063 W 0603
R904	1430167	Chip resistor	47	5 % 0.063 W 0603
R911	1430033	Chip resistor	150 k	1 % 0.063 W 0603
R912	1430033	Chip resistor	150 k	1 % 0.063 W 0603
R920	1430043	Chip resistor	2.2 k	5 % 0.063 W 0603
R921	1430053	Chip resistor	5.6 k	5 % 0.063 W 0603
R922	1430155	Chip resistor	15	5 % 0.063 W 0603
R930	1430155	Chip resistor	15	5 % 0.063 W 0603
R931	1430047	Chip resistor	3.3 k	5 % 0.063 W 0603
R932	1430043	Chip resistor	2.2 k	5 % 0.063 W 0603
R950	1430159	Chip resistor	22	5 % 0.063 W 0603
R951	1430144	Chip jumper		0603
R952	1430159	Chip resistor	22	5 % 0.063 W 0603
C904	2320045	Ceramic cap.	27 p	5 % 50 V 0603
C910	2312401	Ceramic cap.	1.0 u	10 % 10 V 0805
C911	2320779	Ceramic cap.	100 n	10 % 16 V 0603
C912	2320779	Ceramic cap.	100 n	10 % 16 V 0603
C913	2320779	Ceramic cap.	100 n	10 % 16 V 0603
C914	2320779	Ceramic cap.	100 n	10 % 16 V 0603
C915	2320779	Ceramic cap.	100 n	10 % 16 V 0603
C916	2312401	Ceramic cap.	1.0 u	10 % 10 V 0805
C917	2312401	Ceramic cap.	1.0 u	10 % 10 V 0805
C918	2320107	Ceramic cap.	10 n	5 % 50 V 0603
B904	5140087	Buzzer	85db 2600hz 3.6v	10x10x3.5
Z001	3640035	Filt	z>450r/100m 0r7max 0.2a	0603
Z002	3640035	Filt	z>450r/100m 0r7max 0.2a	0603
H910	4850061	LCD display module 5x7dotmx30+cui+driver		
V001	4864388	Led	Green	0603
V002	4864388	Led	Green	0603
V003	4864388	Led	Green	0603
V004	4860005	Led	Green	0603
V005	4860005	Led	Green	0603
V009	4864388	Led	Green	0603
V010	4864388	Led	Green	0603
V012	4864388	Led	Green	0603
V017	4860005	Led	Green	0603
V020	4860005	Led	Green	0603
V021	4860005	Led	Green	0603
V022	4860005	Led	Green	0603
V901	4210100	Transistor	BC848W	npn 30 V SOT323
V902	4200875	Transistor BCX54-16	npn	45 V 1.5 A SOT89

V904	4100278	Diode x 2 BAV7070 V 200 mA COMCAT	.SOT23
V920	4200836	Transistor BCX19 npn 50 V 0.5 A	SOT23
V930	4200836	Transistor BCX19 npn 50 V 0.5 A	SOT23
	9854321	PCB JE3 41.0X113.1X0.8	D 4/PA

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