

6011N Digital Board Hardware Description

A) Overview

The 6011N Pager is a 4-line alpha-numeric display FLEX pager. It has four keys and 128 x 32 dots LCD display. It is controlled by NEC μ PD78054 8-bits MCU. The FLEX signal data is received by the FLEX decoder Motorola XC68175 IC (or TI TLV5591) and will store to the external memory (RAM). The block diagram of digital module is shown in figure 1. The user can use the key to read the received message that will be displayed on the LCD glass. When the new user message is arrived, the pager can set the alert signals to user such as buzzing sound or vibration from vibrator.

B) FLEX decoder

The FLEX decoder is Motorola XC68175 IC or TI TLV5591 using a FLEXchip signal processor to connect the RF module to MCU of the digital module. The decoder will control the RF module ON & OFF and receive the 2 bits FSK data. The decoder will decode the FSK data and acknowledge to the MCU if CAP code (address) is correct. When the new message arrive, the decoder will generate the interrupt to the MCU. The decoder will also acknowledge the MCU about the low battery condition if voltage is below 1.1V. The 76.8K Hz crystal is used to drive the FLEX decoder. FLEXchip will communicate to MCU by 32 bits SPI.

C) MCU

The core MCU is 8-bits NEC μ PD78054 which will handle all the work of pager. The MCU has an initial procedure that read the initial setting from EEPROM and setup the I/O device. The MCU will receive the RF signal through RF module and FLEX decoder. After MCU receive the signal with respect address, it will turn the buzzer on or motor on to acknowledge the user. The user can access the pager by the key input to read the message from the LCD and setup the pager function. The 2 MHz resonator and 32.768 KHz crystal is used to drive the MCU. The DC/DC converter step up the battery voltage 1.5V to supply voltage 2.7V for MCU, FLEX decoder, EEPROM and LCD module. A 2.1V voltage detector with a RC delay circuit is used as reset circuit to the MCU.

D) I/O DEVICE

LCD -	A 128 x 32 STN type full dots matrix LCD display is used as the display of 6011N pager. It can display up to 4 line alpha-numeric character. It can be checked in the test mode.
RAM -	The data is stored in 256K bits RAM (32K byte).
EEPROM -	S-29430A, 8K bit serial EEPROM by Seiko Instruments Inc., is used to save the configuration information.
Buzzer & Motor -	It is used to acknowledge the user when call is arrived.
Lamp -	It is used to see the LCD in darkness place.
Key -	The key pad is a input device. In 6011N, there are four input keys.
DC/DC converter -	The voltage converter provide the necessary voltage level from 1.5V battery. Current voltage of DC/DC converter output is 2.7V.
Battery detector -	A voltage detector (2.1V) is used as a battery remove detector that will let the pager switch to sleep mode after battery is removed.
Backup battery -	A backup battery is used to maintain the memory data for a short time after the main 1.5V battery is removed.
Programmer connector -	The programmer connector is used to program the pager address.