NL024/NL024B Datasheet		datasheet
Rev 1.1	Date: 07.05.2025	

Product History		
Version	Rev. Date	Description
1.0	JAN 2020	First version datasheet
1.1	May 2025	

Norden Logic

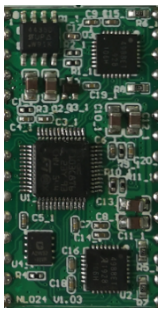
Introduction

The tiny NL024B is part of a new generation of powerful ARM based multi-head 58mm and 80mm thermal printer controllers designed and supplied by Norden Logic.
It supports a wide range of input voltage (from 7V to 26V). With a new MCU the B version supports high speed printing with high-speed print heads.
Integrated support for auto-cutters of a variety of thermal heads.
The controllers shine with their tiny size, huge RAM and Flash memory, real-time head temperature control， real-time paper-out monitor, custom fonts, user definable flash storage and a big selection of built-in language fonts. The NL024 can be switched between 58mm and 80mm print head support.
The NL024B uses the industry standard ESC/POS control commands. The initial release of the NL024 supports directly 8-bit, UTF8 and UTF16 characters as well as Chinese and Japanese. 170 languages and more.

User Interface

- UART interface
- print stepper motor drive interface
- cutter stepper motor drive interface
- 4 individual STB lines
- TH thermal monitor line
- PHE paper-out monitor line
- CUT_PHE cut position monitor line
- Flash storage
- Selectable Print Head support

Picture of NL024 not NL024B



Features

- Auto-cutter support
- Thermal heads： 58mm & 80mm
- Supply voltage： 7V~26V；
- Print speed： 80mm/second --7.2V normal head
- Print speed： 200mm/second --24V (high speed head)
- Languages: 170 and more
- Grayscale： 8 level
- Font Attributes： Double width, Double height, Bold, Italic, Reverse, Underline, Normal
- 1D Barcode： UPC-A, UPC-E, EAN-13, EAN-8, CODE39, CODE93, ITF25, CODABAR, CODE128-A
- 2D Barcode：QR via POS GS v command
- Software API： ESC/POS (C libraries provided)
- UART interface：Flow Control: RTS, XON/XOFF
- Built-in: Overheat monitor, Paper-out monitor,
- Operating temperature：-40℃~+85℃
- Storage temperature： -50℃~+125℃

Application

- Medical device
- Taxi meter
- Calculator
- Handheld pos
- Tank meter
- Mobile pos
- Industrial meters
- Cash register
- Sticker printer

Norden Logic

1. Description

The Norden Logic NL024B is a thermal printer head controller designed to support auto-cutter print heads with power requirements of 7V~26V. It controls 58mm and 80mm thermal print heads from manufacturers such as Seiko, Fujitsu, Samsung, ALPS, PRT and others. The controller is designed to interface with a host controller via the UART interface. The NL024 exposes many settable properties via the industry standard ESC/POS programming interface. A comprehensive ESC/POS command interface document is available as well as C library source files with all supported commands and a command test software application - to make integration fast and easy.

Also available are our Printer EVK boards ready to print evaluation boards.

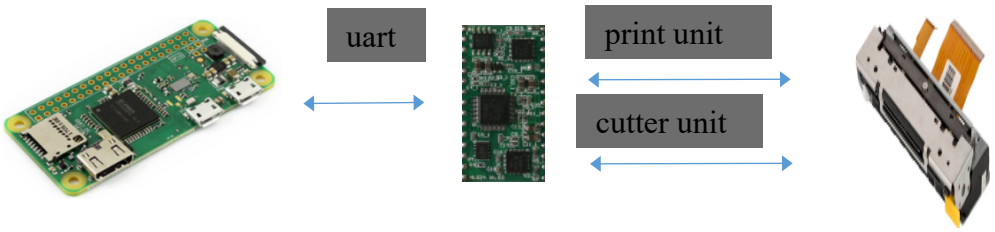


Figure1 application diagram

- A host is always in command sending ESC/POS commands to the NL024B via the UART control lines RX/TX
- The NL024B in turn controls the thermal head via detected control lines
- The NL024B can control the auto-cutter of a variety of print heads (see table below)
- The NL024B can be delivered in consumer grade or industrial grade

The NL024B diagram is as below。

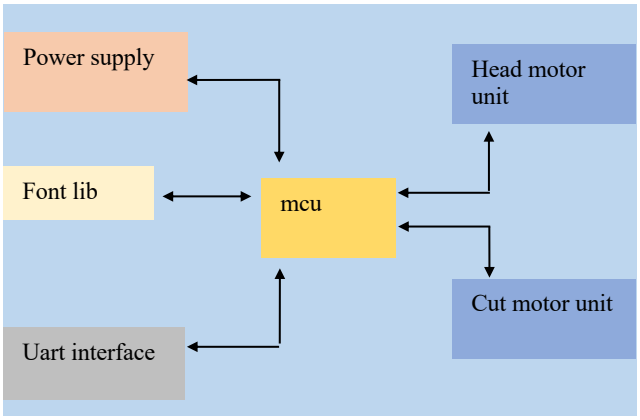


Figure2 NL024B diagram

2. Overview

The NL024B supports a variety of print heads available on the market. Many heads are compatible designs and feature the exact same characteristics. As we can not list all heads on the market we have put a table together with the type we currently support. More are added and if your head is not listed, please contact us.

table1 supported heads

types	PN	voltage	stb lines	connector	cutter	manufacturer
58mm	FTP628MCL101	7.2V	6	30pin head	NC	Fujitsu
58mm	FTP628MCL103	7.2V	6	30pin head	NC	Fujitsu
58mm	LPTZ245B/D	7.2V	6	30pin head	NC	Seiko
58mm	SMP685	7.2V	6	30pin head	NC	Samsung
58mm	SMP695	7.2V	6	30pin head	NC	Samsung
58mm	PT486-B101	7.2V	6	30pin head	NC	PRT
80mm	FTP638MCL101	7.2V	5	30pin head	NC	Fujitsu
80mm	FTP638MCL103	7.2V	5	30pin head	NC	Fujitsu
80mm	PT723F-B	7.2V	5	30pin head	NC	PRT
58mm	LTP02_245_13	7.2V	1	24pin head	NC	Seiko
58mm	PT486F08401	7.2V	6	30pin head	YES	PRT
58mm	FTP628MCL401	7.2V	6	30pin head	YES	Fujitsu
80mm	PT723F08401	7.2V	5	30pin head	YES	PRT
80mm	FTP638MCL401	7.2V	5	30pin head	YES	Fujitsu
80mm	PT723F24401	24V	4	30pin head	YES	PRT
80mm	FTP637MCL403	24V	4	30pin head	YES	Fujitsu
80mm	A300(sticker print)	7.2V	1	30pin head	YES	PRT
80mm	PT72EP-H	24V	4	50pin head	YES	PRT

NL024B feature table.

table2 function overview

types	description
print method	dot lines thermal print.
print density	8dots/mm.
print point	384dots/line for 58mm, 576dots/line for 80mm heads.
print width	58mm heads and 80mm heads.
print speed	140mm/sec and higher.
print character	8x16 dots 12x24 dots Total 16 language groups can support over 170 countries.
auto-cutter	full cut, partial cut
7-26V thermal head	supported
BMP print	vertical print
	NV bitmap print
1D barcodes	Support UPCA, UPCE, EAN13, EAN8, CODE39 ITF25, CODABAR, CODE93, CODE128A
2D barcodes	user can print it in BMP print mode or ESC command
UART receiver Cache	8K Bytes
Paper out detection	supported
Over-heat monitor	supported
Dimension	19.0x31.3x 2.6mm

The auto-cutter has two cut types: full cut, partial cut. After partial cut operation, the paper is still connected with a tab. After full cut operation, the paper is cut into two pieces.

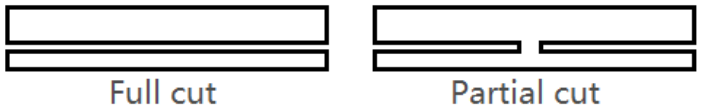


Figure3 cut type

3. Pin descriptions

NL024B pinout see figure4:

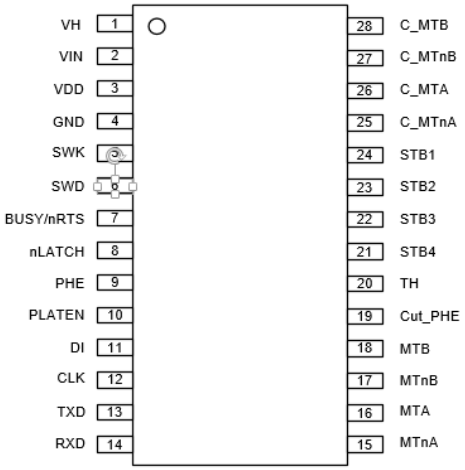


Figure4 NL024B pinout

The table 3 below describes the NL024B pinout in detail:

Table3 NL024B pinout

name	sort	direction	type	Descriptions
VH	1	OUT	Power	Power line connect to external head.
VIN	2	IN	Power	Power supply for head and stepper motor.
VDD	3	IN	Power	3.3V digital power supply.
GND	4	IN	Power	Power GND
NC	5	NC	NC	
NC	6	NC	NC	
BUSY/nRTS	7	Out	Power	nRTS=0, NL024B is ready nRTS=1, NL024B is busy, don’ t send data to chip
nLATCH	8	Out	Head	Latch signal
PHE	9	IN	Head	Paper out detection pin, connects to PHE pin of head
PLATEN	10	IN	Head	Platen monitor pin
DI	11	Out	Head	Data In
CLK	12	Out	Head	Clock output to head
TXD	13	Out	Host	NL024B UART sending (connect to host RX pin)
RXD	14	IN	Host	NL024B UART receiving (connect to host TX pin)
MT_nA	15	Out	Motor	Stepper motor nA
MT_A	16	Out	Motor	Stepper motor A
MT_nB	17	Out	Motor	Stepper motor nB
MT_B	18	Out	Motor	Stepper motor B
Cut_PHE	19	IN	Host	Cut position monitor pin
TH	20	IN	Head	Temperature monitor pin
STB4	21	Out	Head	Thermal head energizing control signal
STB3	22	Out	Head	Thermal head energizing control signal

STB2	23	Out	Head	Thermal head energizing control signal
STB1	24	Out	Head	Thermal head energizing control signal
C_MTnA	25	Out	Motor	Cut Stepper motor nA
C_MTA	26	Out	Motor	Cut Stepper motor A
C_MTnB	27	Out	Motor	Cut Stepper motor nB
C_MTB	28	Out	Motor	Cut Stepper motor B

4. Electrical characteristics

NL024B electrical parameter is list in table 4.

table 4 electrical characteristics

symbol	parameter	conditions	min	typ	max	unit
VIN	Supply voltage	To=25℃	7		26	V
VH	print voltage for thermal head	To=25℃	7		26	V
Is	static current	VH=7.2V VH=24V		32mA		
I_H	print current				6A@24V	A
VDD	VDD		3.0	3.3	3.6	V
V_{IH}	Logic Supply	VDD=3.3V	0.7VDD	-	-	V
V_{IL}		VDD=3.3V			0.3VDD	V
V_{OH}		VDD=3.3V	VDD-0.4			V
V_{OL}		VDD=3.3V			0.4	V
I_{OH}		VDD=3.3V	8			mA
Fclk				2		Mhz
Im	stepper motor current		-	0.5	-	A
To	operation temperature		-40		+85	℃
Ts	storage temperature		-50		+125	℃
Tj	Junction temperature				250	℃
t_J	soldering time				3	s

5. Package characteristics

5.1 mechanical dimension

Figure 5 shows the package outline:

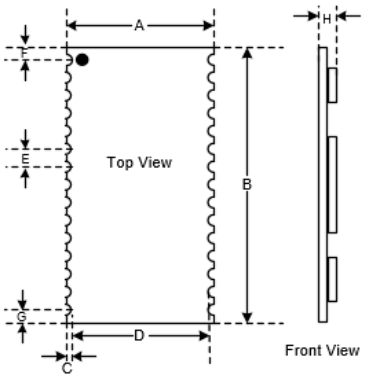


Figure5 package outline

Table 5 lists the mechanical dimensions in mm.

table5 mechanical dimensions

symbol	A	B	C	D	E	F	G	H
max	19.05	31.33	0.45	18.15	2.00	2.47	2.47	2.6

Figure 6 shows the recommended layout pattern.

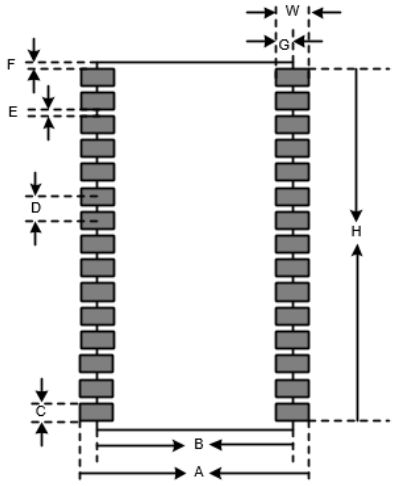


Figure6 recommended layout pattern

Table 6 show the layout dimensions in mm.

table6 layout dimensions

symbol	A	B	C	D	E	F	G	W	H
max	21.05	19.05	1.6	2.00	0.40	2.47	1.25	2.50	31.33

6. Application circuit

NL024B is designed to connect to 80mm print heads PT723F24401. For the thermal head, VIN and VH is around 24V. The J1 connects with thermal head's connector, the J2 connects with auto-cutter's connector, the P2 connects to host's MCU UART pin.

For some thermal heads, the voltage of VH maybe around 24V, so the capacitors voltage (C10) must be above 30V.

See figure 7 below:

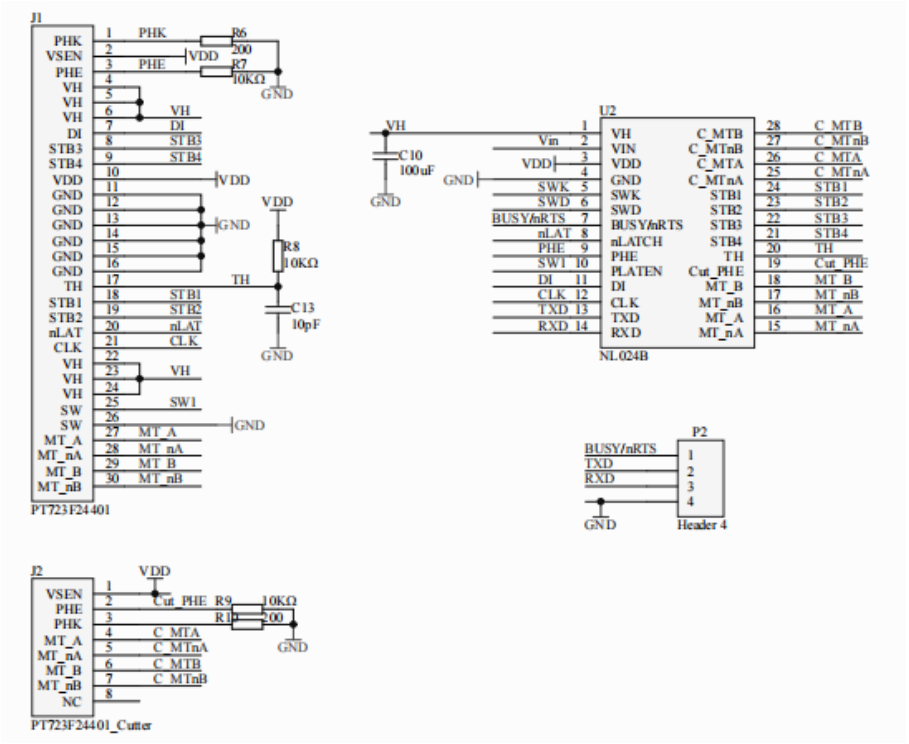


Figure7 NL024B connect with PT723F24401