Norden Logic

NL022		Datasheet
Rev 1.0.3		

Product History		
Version	Date	Description
1.0.1	November 2019	Controller NL022
1.0.2	May 2020	NL022 Pin Dimension G and W change in table 6
1.0.3	July 2020	2D Bar Code and NVBitmap

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Introduction

The tiny NL022 is part of a new generation of powerful ARM based multi-head 58mm and 80mm thermal printer controllers designed and supplied by Norden Logic. The controllers shine with their tiny size, huge RAM and Flash memory, support for a wide range of input voltage, 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 NL022 can be switched between 58mm and 80mm print head support. NL022 is designed following printer head manufacturer's strobe control line specifications, for long print head life, faster heating time, clear print and reduced print current. The NL022 uses the industry standard ESC/POS control commands. The initial release of the NL022 supports directly 8-bit, UTF8 and UTF16 characters as well as Chinese and Japanese, 170 languages and many more.

Printer EVK development boards available for most common print heads from Seiko, Fujitsu, PRT, Samsung and others.

User Interface

- UART interface
- Stepper motor drive interface
- 6 individual STB lines
- TH thermal monitor line
- PHE paper-out monitor line
- Flash storage
- Selectable Print Head support

True Chip Size: NL022

Features

- Thermal heads: 58mm & 80mm
- Supply voltage: 3.5V~9V;
- Print speed: 80mm/second
- 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 Barcodes: QR on-chip generation using ESC
- Software API: ESC/POS (C libraries provided)
- UART interface: Flow Control: RTS/CTS , XON/XOFF
- Built-in: Overheat monitor, Paper-out monitor, Platen-out monitor
- Operating temperature: -40°C~+85°C
- Storage temperature: -50°C~+125°C

Application

- Medical device
- Taxi meter
- Ticket machine
- Handheld pos
- Tank meter
- Mobile pos
- Industrial meters
- Cash register

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1. General Description

The Norden Logic NL022 is a thermal printer head controller designed to control 58mm and 80mm (selectable via software interface) 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 NL022 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 development boards. Please contact us for more information.

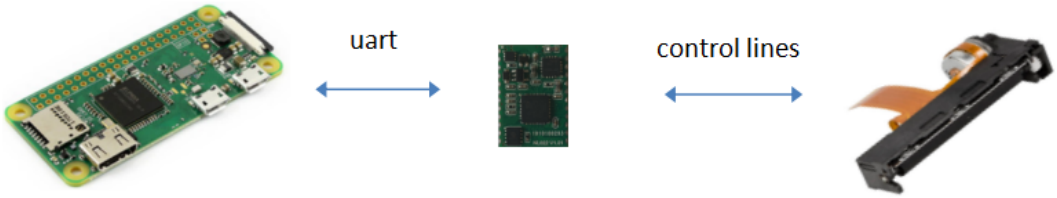

Figure1 Typical Host/NL022 interaction

- A host is always in command sending ESC/POS commands to the NL022 via the UART control lines RX/TX
- The NL022 in turn controls the thermal head via dedicated control lines
- The NL022 can be delivered in consumer grade or industrial grade

2. Overview

The NL022 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.

table 1 Main supported print heads

Type	PN	Voltage	STB line	Connector	Manufacturer
58mm	FTP628MCL101	7.2V	6	30pin head	Fujitsu
58mm	FTP628MCL103	7.2V	6	30pin head	Fujitsu
58mm	LPTZ245B/D	7.2V	6	30pin head	Seiko
58mm	SMP685	7.2V	6	30pin head	Samsung
58mm	SMP695	7.2V	6	30pin head	Samsung
58mm	PT486-B101	7.2V	6	30pin head	PRT
80mm	FTP638MCL101	7.2V	5	30pin head	Fujitsu
80mm	FTP638MCL103	7.2V	5	30pin head	Fujitsu
80mm	PT723F-B	7.2V	5	30pin head	PRT
58mm	LTP02-245-13	7.2V	1	24pin head	Seiko
58mm	LTP02-245-C1	4.2V	1	24pin low power head	Seiko

table 2 NL022 Function Overview

Print method	Thermal print dot lines
Print density	8dots/mm
Print points	384dots/line for 58mm heads, 576dots/line for 80mm heads
Print width	58mm heads and 80mm heads
Print speed	80mm/sec(max)
Print character (fonts)	Latin: 8x16, 12x24 dots DoubleByte: 16x16, 24x24 dots Over 170 combined possible languages
BMP print	Vertical print
	NV bitmap print (4MB storage) or custom fonts
1D barcode	UPCA, UPCE, EAN13, EAN8, CODE39 ITF25, CODABAR, CODE93, CODE128A
2D barcode	QR code on-chip generation using ESC/POS API
UART buffer	8K Bytes
Paper-out detection	Yes
Over-heat monitor	Yes
Platen detection	Yes
Dimensions	22.5 x 15.5 x 2.5mm

3. Pinout Description

NL022 pinout see figure 2:

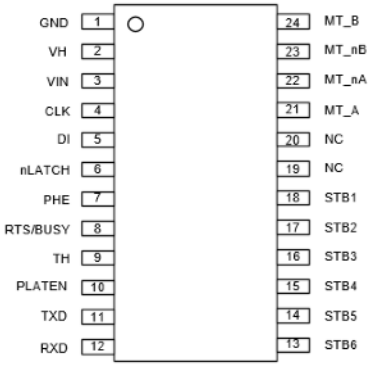

Figure2 NL022 pinout

The table 3 below describes the NL022 pinout in detail:

table 3 NL022 Pinout

Name	Pin	Direction	Type	Description
GND	1	IN	Power	Power GND
VH	2	Out	Power	Power line connect to external head
VIN	3	IN	Power	Power Supply
CLK	4	Out	For heads	Clock
DI	5	Out	For heads	Data in
nLATCH	6	Out	For heads	Latch signal
PHE	7	IN	For heads	Paper out detect pin , connects to PHE pin of head
RTS/BUSY	8	Out	For Host	RTS=0, NL022 is ready RTS=1, NL022 is busy, don't send data
TH	9	IN	For heads	Temperature monitor pin
PLATEN	10	IN	For heads	Platen monitor pin
TXD	11	Out	For Host	NL022 UART sending (connect to host RX pin)
RXD	12	IN	For Host	NL022 UART receiving (connect to host TX pin)
STB6	13	Out	For heads	Thermal head energizing control signal
STB5	14	Out	For heads	Thermal head energizing control signal
STB4	15	Out	For heads	Thermal head energizing control signal
STB3	16	Out	For heads	Thermal head energizing control signal
STB2	17	Out	For heads	Thermal head energizing control signal
STB1	18	Out	For heads	Thermal head energizing control signal
NC	19	NC	NC	Reserved
NC	20	NC	NC	Reserved
MT_A	21	Out	For Mortor	Stepmotor A
MT_nA	22	Out	For Mortor	Stepmotor nA
MT_nB	23	Out	For Mortor	Stepmotor nB
MT_B	24	Out	For Mortor	Stepmotor B

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4. Electrical characteristics

The table 4 below lists NL022 electrical characteristics:

table 4 Electrical Characteristics

Symbol	Parameter	Condition	Min	Typical	Max	Unit
Vin	Supply voltage	To=25°C	3.8	-	9	V
Is	Static current	Vin=7.2V		32mA		
VH	Print voltage		-	=Vin	-	V
I_H	Print current				6 (1)	A
Vdd	Vdd inside chip		3.2	3.3	3.4	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	Vin=7.2V	-	0.5	-	A
To	Operating temperature		-40		+85	°C
Ts	Storage temperature		-50		+125	°C
Tj	Solder joint temperature				250	°C
t_J	Soldering time				3	s

1.When connect to the Seiko LTP02-245-C1, max current can reach 6 Amp

5. Package characteristics

5.1 Mechanical Dimension

Figure 4 shows the package outline:

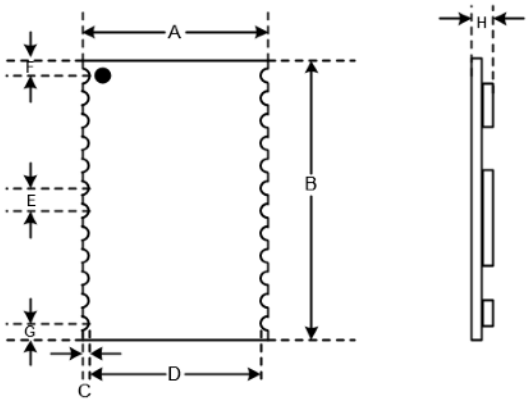

Figure 4 package outline

Table 5 lists the mechanical dimensions in mm;

table 5 Mechanical Dimensions

Symbol	A	B	C	D	E	F	G	H
Max								2.6
Typical	15.5	22.5	0.61	13.1	1.8	1.35	1.35	2.5

Figure 5 shows the layout dimensions:

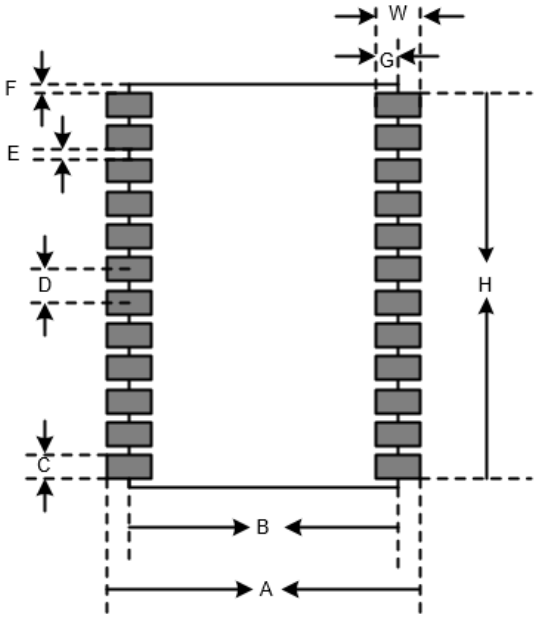

Figure 5 layout dimensions

Table 6 shows the layout dimensions in mm:

table 6 Layout Dimensions

Symbol	A	B	C	D	E	F	G	W	H
Max	17.8	15.5	1.40	1.80	0.40	0.65	0.85	1.7	21.2

6. Application circuit

NL022 is designed to connect to 58mm print heads compatible with FTP628MCL101.
See figure 6 below:

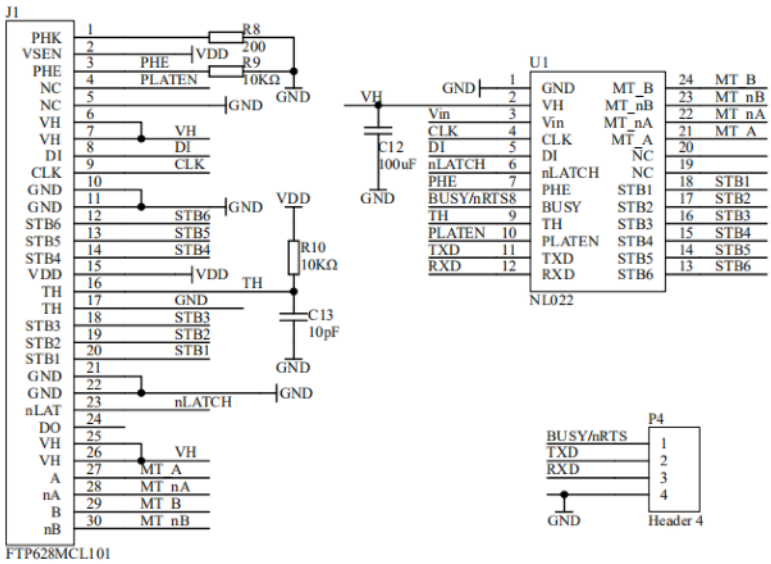

Figure 6 NL022 FTP628MCL101 Type

NL022 is designed to connect to 80mm print heads compatible with FTP638MCL101.
See figure 7 below:

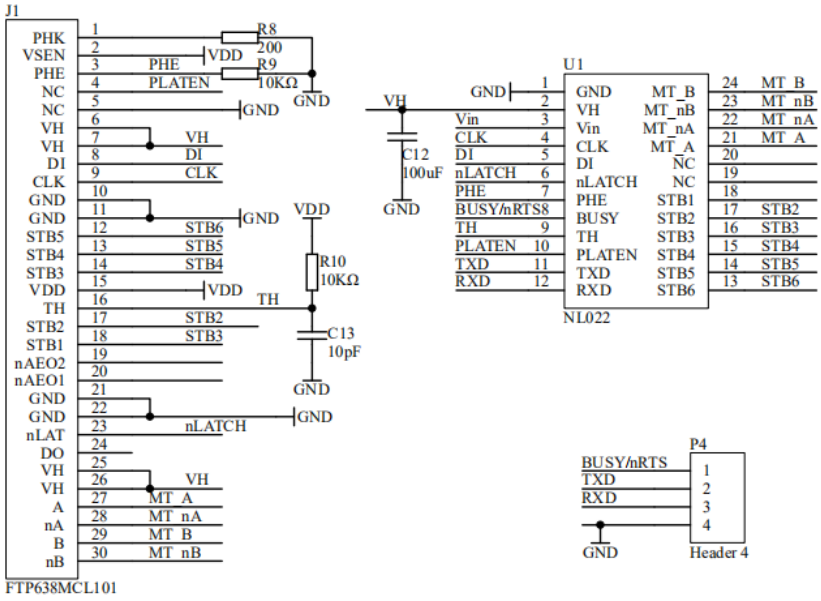

Figure7 NL022 FTP638MCL101 Type

NL022 is designed to connect to 58mm print heads compatible LTP02-245-13 or low power LTP02-245-C1.
See figure 8 below:

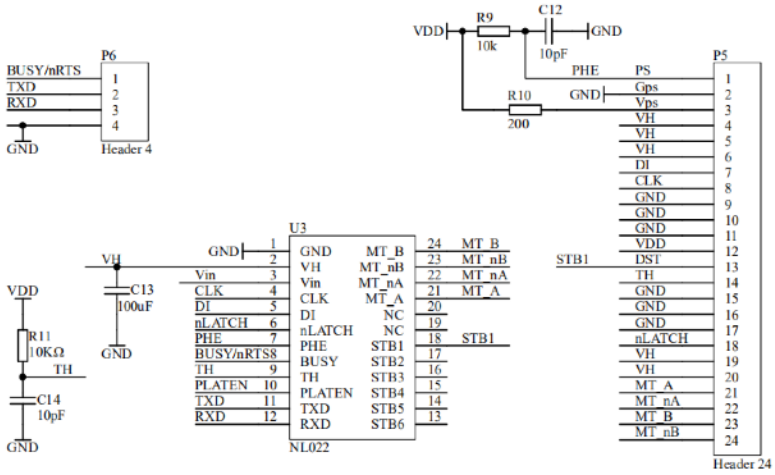

Figure 8 NL022 LTP02-245-C1 or LPT02-245-13