Thermal printer controller

GCT-6782

Controller

for

Fujitsu FTP629 and FP639

Elektronik und Feinwerktechnik GmbH

Module und Geräte zum Eingeben, Auswerten, Anzeigen und Ausdrucken analoger und digitaler Daten.

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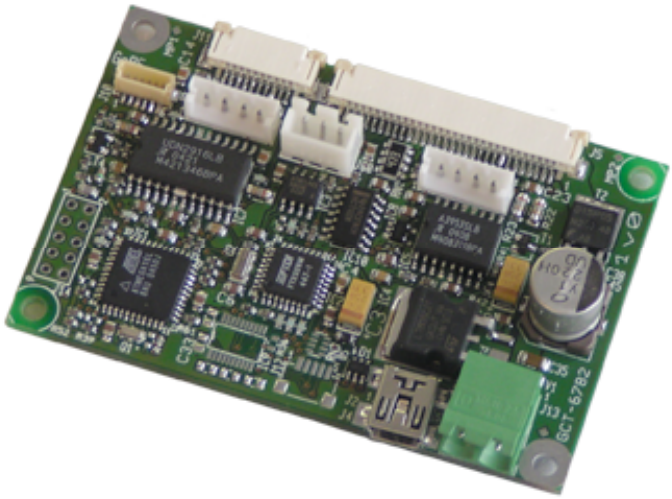

User Manual

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I SYSTEM DESCRIPTION

1.1 Serial Input/Output

Input buffer is 200 bytes.
The printer sends at 168 bytes a XOFF (13h) and sets the busy signal .
The printer sends at 32 bytes a XON (11h) and removes the busy signal.

1.1.1 Standard communication

USB V1.1 (2.0 compatible)

1.1.2 Option RS232

Baud rate:	150 - 115,200 bps (460,800 bps on request) Baud rate can be changed by software command.
Data bits	= 8
Stop bits	= 1
Parity	= None
Flow control	= Hardware AND Software handshake

1.1.3 Specifications

Default settings	
Interface	***USB or serial RS232C***
RS232 data format	9,600 baud, 8 data bit, no parity, 1 stop bit, hardware and software handshake. Baud rate can be changed by software.
Transmission to host	requested status etc.
Power on self test	feed at power-on initiates printout showing implemented font and firmware
Font set	similar to code table 850, see font table
Character size	8x16, 8x32, 16x16, 16x32, 16x64, 32x32, 32x64, 64x128
Character type	normal, bold, underline, inverse (white on black)
Default font	16x32
Graphics	normal / compressed
Temperature	storage: -40ºC to +85ºC 0-90 Operating: -10ºC to +65ºC 10-90%RH
Drivers	Windows CE.Net 4.2, Windows 9x, 2000 and XP
Approvals	CE

1.2 Command Set

1.2.1 Carriage Return

[Name]	Carriage Return		
[Format]	ASCII	CR	
	Hex	0D	
	Decimal	13	
[Description]	line feed (if last character <> LF)		

1.2.2 Line Feed

[Name]	Line Feed		
[Format]	ASCII	LF	
	Hex	0A	
	Decimal	10	
[Description]	When the printer controller receives this byte, the text data in the buffer will be printed. line feed (if last character <> CR)		

1.2.3 Form Feed

[Name]	Form Feed		
[Format]	ASCII	FF	
	Hex	0C	
	Decimal	12	
[Description]	Feeds to the next Label mark, if label mode is activated. Without label mode, <FF> will trigger a line feed.		

1.2.4 Feed Paper

[Name]	Feed Paper		
[Format]	ASCII	GS	n
	Hex	1D	n
	Decimal	29	n
[Range]	n: [-128;127]		
[Description]	When the printer controller receives this command, the paper will be fed n-dot lines. A negative value will cause a reverse form feed.		

1.2.5 Feed Paper Forward

[Name]	Feed Paper		
[Format]	ASCII	ESC	F
	Hex	1B	46
	Decimal	27	70
[Description]	Forward feed by 1 - 2,400 lines (300 mm max.)		

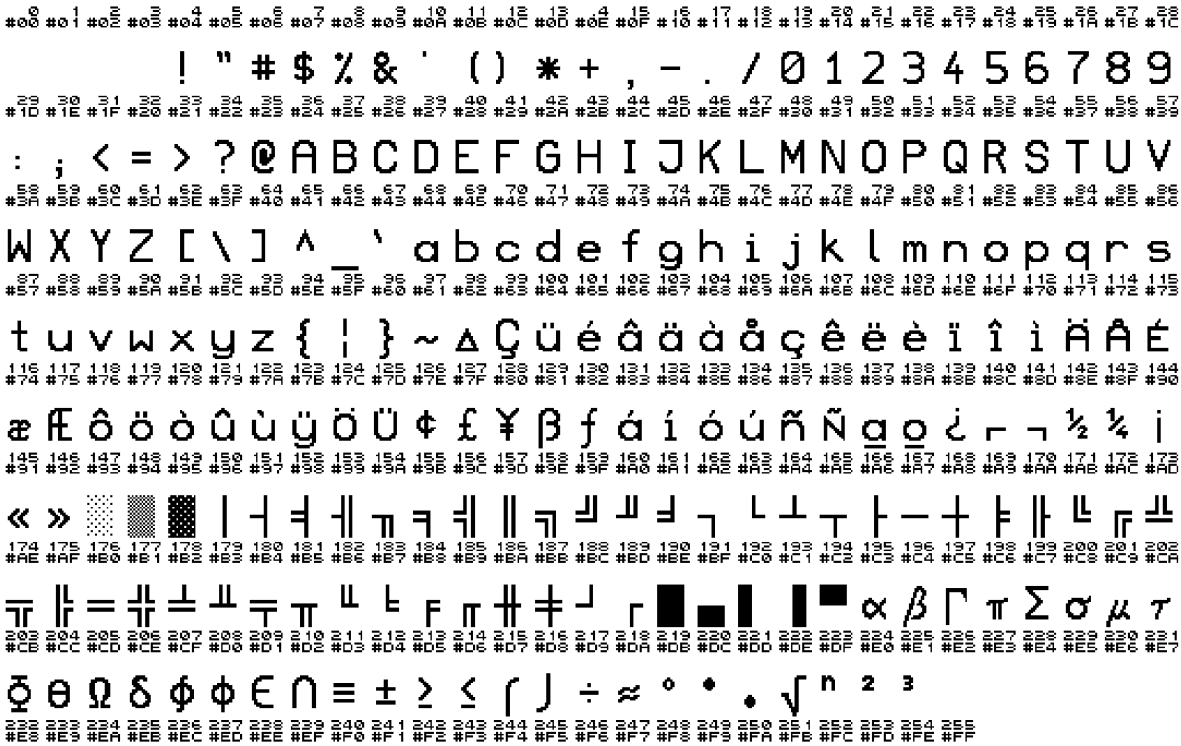
1.2.6 Feed Paper Backward

[Name]	Feed Paper		
[Format]	ASCII	ESC	\
	Hex	1B	5C
	Decimal	27	92
[Description]	Backward feed by 1 - 2,400 lines (300mm max.)		

1.2.7 Font Sizes

The controller has a character set with the size of 8x16 pixels. At the factory, or through a firmware or font update, it can be replaced with a different font of the same size.
Other font sizes are NOT possible.

Font	Width	Height
Small	Normal	Normal
Low	Double	Normal
Narrow	Normal	Double
Normal	Double	Double
Wide	Quadruple	Double
High	Double	Quadruple
Large	Quadruple	Quadruple
Xlarge	Octuple	Octuple



1.2.8 Small Font

[Name] Small Font (8x16)
[Format] ASCII NUL
Hex 00
Decimal 0
[Description] Selects small font starting from the current print position.

1.2.9 Low Font

[Name] Low Font (16x16)
[Format] ASCII SOH
Hex 01
Decimal 1
[Description] Selects low font from the current print position.

1.2.10 Narrow Font

[Name] Narrow Font (8x32)
[Format] ASCII STX
Hex 02
Decimal 2
[Description] Selects narrow font starting from the current print position.

1.2.11 Normal Font

[Name] Normal Font (16x32)
[Format] ASCII ETX
Hex 03
Decimal 3
[Description] Selects normal font starting from the current print position.
This is the default font after power-up or reset.

1.2.12 Wide Font

[Name] Wide Font (32x32)
[Format] ASCII EOT
Hex 04
Decimal 4
[Description] Selects wide font starting with the current print position.

1.2.13 High Font

[Name] High Font (16x64)
[Format] ASCII ENQ
Hex 05
Decimal 5
[Description] Selects high font starting from the current print position.

1.2.14 Large Font

[Name] Large Font (32x64)
[Format] ASCII ACK
Hex 06
Decimal 6
[Description] Selects large font starting from the current print position.

1.2.15 Xlarge Font

[Name] Xlarge Font (64x128)
[Format] ASCII BEL
Hex 07
Decimal 7
[Description] Selects Xlarge font starting from the current print position.

1.2.16 Text zoom horizontal

[Name] Text Zoom horizontal
[Format] ASCII ESC W
Hex 1B 57
Decimal 27 87
[Description] This command will go into effect following the letter that it was gi ven after. The following widths are possible:
0: single
1: double
2: quadruple
3: eightfold

1.2.17 Text zoom vertical

[Name] Text zoom vertical
[Format] ASCII ESC H
Hex 1B 48
Decimal 27 72
[Description] This command will go into effect in the line it was given in, and will affect the whole line.
A mix of different heights within one line is not possible.
The following heights are available: 0: single
1: double
2: triple
to 7 : eightfold

1.2.18 Reverse off

[Name] Reverse off
[Format] ASCII SO
Hex 0E
Decimal 14
[Description] This command will switch off reverse printing.

1.2.19 Reverse on

[Name] Reverse on
[Format] ASCII SI
Hex 0F
Decimal 15
[Description] This command will switch on reverse printing.

1.2.20 Reverse On/Off

[Name] Reverse on/off
[Format] ASCII ESC I
Hex 1B 49
Decimal 27 73
[Description] This command will go into effect following the letter that it was gi ven after. 0: normalprint, 1: inverted print

1.2.21 Underline off

[Name]	Underline off		
[Format]	ASCII	DLE	
	Hex	10	
	Decimal	16	
[Description]	This command will switch off underline printing.		

1.2.22 Underline on

[Name]	Underline on		
[Format]	ASCII	DC1	
	Hex	11	
	Decimal	17	
[Description]	This command will activate underline printing.		

1.2.23 Underline on/off

[Name]	Underline on/off		
[Format]	ASCII	ESC	L
	Hex	1B	4C
	Decimal	27	76
[Description]	This command will go into effect following the letter that it was gi ven after. 0: normal print, 1: underline		

1.2.24 Bold off

[Name]	Bold off	
[Format]	ASCII	DC2
	Hex	12
	Decimal	18
[Description]	This command will switch off bold printing.	

1.2.25 Bold on

[Name]	Bold on	
[Format]	ASCII	DC3
	Hex	13
	Decimal	19
[Description]	This command will activate bold printing.	

1.2.26 Bold on/off

[Name]	Bold on/off		
[Format]	ASCII	ESC	L
	Hex	1B	4C
	Decimal	27	76
[Description]	This command will go into effect following the letter that it was gi ven after. The graphical data of the character are moved to the right and ORed with the original. 0: normal print, 1: bold		

1.2.27 Initialize Printer Buffer

[Name]	Initialize Printer buffer		
[Format]	ASCII	ESC	A
	Hex	1B	41
	Decimal	27	65
[Description]	When the printer controller receives this byte, the printer buffer will be cleared.		

1.2.28 Initialize Printer

[Name]	Initialize		
[Format]	ASCII	SYN	
	Hex	16	
	Decimal	22	
[Description]	When the printer controller receives this byte, a reset of the prin ter will be initialized.		

1.2.28 Initialize Printer

[Name]	Initialize		
[Format]	ASCII	ESC	@
	Hex	1B	64
	Decimal	27	40
[Description]	When the printer controller receives this byte, a reset of the prin ter will be initialized.		

1.2.29 Request Status

[Name]	Request status		
[Format]	ASCII	ESC	k
	Hex	1B	6B
	Decimal	27	107
[Description]	When the printer controller receives this command, a status byte will be transmitted.		

If an error occurs, the Status LED (Console connector J10, Pin 1-2) flashes 1:1

The following bit definitions apply:

Bit	LED	Status	0	1
0	On	Near end	Logic level low	Logic level high
1	1:1	Paper	Present	Absent
2	1:1	Temperature	Not too hot	Head too hot to print
3	1:1	Head	Closed	Open
4	1:1	Paper Jam	No error	Error
5	On	Rx error	No error	Rx error
6	On	Buffer	Not full	Full (less than 16 bytes)
7		Always 1.		

1.2.30 Automatic status transmission

[Name]	Automatic status transmission		
[Format]	ASCII	ESC	a
	Hex	1B	61
	Decimal	27	97
[Description]	When this command is sent once, the board will transmit the status every time it changes.		

1.2.31 Stop automatic status transmission

[Name]	Stop automatic status transmission		
[Format]	ASCII	ESC	b
	Hex	1B	62
	Decimal	27	98
[Description]	When this command is sent, it will turn off the automatic status transmission.		

1.2.32 Heating time control

[Name]	Controls heating time		
[Format]	ASCII	RS	n
	Hex	1E	n
	Decimal	30	n
[Range] n:	[-15;15]		
[Description]	This command controls the time period that the print head will heat up for. A negative value results in a lighter printout, while a positive value results in a darker print image. default = 0 , In Printer Setup = 20.		

1.2.33 Bar code on

[Name]	Bar code on		
[Format]	ASCII	VT	
	Hex	0B	
	Decimal	11	
[Type]	Barcode	39	
[Description]	Turns bar code CODE39 on.		
[Barcode char]	Space , $, % , + , - , . , / , 0-9 , A-Z		
[Notes]	Bar code 39 must start and end with the character '*'. This character is the start and stop character in bar code 39, and the '*' can only be used for this purpose. If the bar code length exceeds the paper size, the following bar code characters will not be written as bar code. In that case, the last character will not be a '*' and therefore, the bar code will not be legible.		

1.2.34 Cut paper

[Name]	Cut Paper			
[Format]	ASCII	ESC	C	n
	Hex	1B	43	n
	Decimal	27	67	n

[Description]

n = 0 : Full Cut The paper is cut off completely.
n = 1 : Half Cut The paper is cut in such a way that a small connector tab is left.
Always use the full cut option for all easy loading mechanisms.
n = 2 : Initialize cutter
This command is used by the system after every reset, when the cutter flag (Param Bit 21) is set to 1. The controller will then check, if the cutter is in the home position. If not, the cutter is mo ved in the home position. For units without cutter, the cutter flag has to be set to 0. If an existing cutter is neither in the home posi tion nor reaches it within the next 2 seconds, the „paper jam“ er ror bit is set, and the printing process is stopped. The cutter error can be reset by pressing the feed button.

1.2.35 Text orientation

[Name]	Text orientation		
[Format]	ASCII	ESC D	“n”
	Hex	1B	44 “n”
	Decimal	27	68 “n”
[Description]	n = „0“ : Text mode (default)		
	n = „1“ : Data mode print upside down		

1.2.36 Graphics data - non compressed

[Name]	Graphic data - non compressed		
[Format]	ASCII	US	d1,d2,..,dX
	Hex	1F	d1,d2,..,dX
	Decimal	31	d1,d2,..,dX
[Range]	n: [0;255]		
	X=54 for FTP629		
	X=72 for FTP639 MCL383, or 354, or 103,		
	X=80 for FTP639 MCL364, or 064,		
[Description]	When the printer controller receives this command, the X graphic bytes (d1-dX) will be printed in one dot line. The MSB in d1 is the left most dot, and the LSB in dX is the right most dot.		

1.2.37 Graphics mode - compressed

[Name]	Graphics mode -compressed	
[Format]	ASCII	<ESC> m <Mode>
[Description]	Mode = 0:	graphics mode uncompressed
	Mode = 1:	graphics mode run-length
	Mode = 2:	grahics mode Tiff
	Mode = 3:	Graphics mode not implemented

[Name]	Graphics mode -compressed	
[Format]	ASCII	<ESC> m <Mode> <Parm>
	Mode = 4:	sets seft graphics margin in mm:
		Parm = 0: no left margin
		Parm = 1: left margin 1mm ...
	Mode = 5:	sets graphics height
		Parm = 0: height = single
		Parm = 1: height = double ...

1.2.38 Graphics data - compressed

[Name] Graphics data - compressed
[Format] ASCII <ESC> g <Graphics-Data>
[Description] Graphics data are processed in accordance with the compression type selected with <ESC> m.

0 : Unencoded
n : = lengths of graphics in bytes,
g1 ...gn = graphics bytes to be printed

In text mode, beginning from left to right, dot 0 is the MSB in the first byte, the dot on the far right is the LSB in the nth byte. A 1 in the respective bit position represents a black dot in the line. After the nth byte, the printer will automatically return to the character mode. During these n bytes, the printer will ignore all commands.

1 : Run length Encoded
n : = number of bytes following

Run length interprets graphical information in byte pairs. Each first byte is the repetition count byte for the respective second byte. A 0 for the repetition count byte means that the following graphics byte is printed once and not repeated. A 1 means that the graphics byte is printed twice. The repetition count byte has a value range from 0 - 255, which translates to a print factor from 1 to 256. the second byte contains the graphical information that is to be printed. In text mode from left to right, the dot on the very right is the LSBit. A 1 in the respective bit position represents a black dot in the line. After completing the line, the printer will automatically return to the character mode.

2 : TIFF (4.0) Encoded
n : = length of the following bytes

TIFF interprets graphical informatio as TIFF "pack bits" TIFF combines features of Unencoded and Run Length Encoding.
The graphical information is preceded by a control byte.
The control byte specifies (signed bit), whether the following byte is a graphics byte that is to be repeated (up to 127 times), or if a number of bytes follows (up to 127) that is to be printed as bit map. A positive control byte expects bitmap information, a negati ve control byte (double complement) a repeat byte.

1.2.39 Save Printer Setup

[Name] Save Printer Setup
[Format]
ASCII	ESC	V	<Param = NULL>
Hex	1B	V	<Param = 00hex>
Decimal	27	V	<Param = 0 Decimal>

[Description] With this command, the setup settings are permanently saved in the EEPROM. At this time, the only parameter allowed is 0.

1.2.40 Setup Printer

[Name] Setup Printer
[Format]
ASCII	ESC	Q	<Param-Adress>	<Param>
Hex	1B	Q	<Param-Adress>	<Param>
Decimal	27	Q	<Param-Adress>	<Param>

[Description] The Setup commands changes the printer settings. Setup commands write their settings into the RAM (ESC-Q). With the command Save Printer Setup <ESC> V, these settings are permanently saved in the EEPROM (see below).
In part, these settings will only go into effect with the next reset.

Param Address	Description	Range	Default
0	reserved	future use, do not use!	
1	baud rate	see baud rate table 9,600 only in effect after next reset	
2	baud-parms	see baud-param table in part only in effect after next reset	
3	blackening	0 .. 50, minimum = 0	25
4	Init text height	0 .. 7, see <ESC> H	1 (double height)
5	Init text width	0 .. 5, see <ESC> W	1 (double width)
6	Init text attr.	see table,	0
7	reserved	must be zero	
8	reserved	must be zero	
9	reserved	must be zero	
10	reserved	must be zero	
11	reserved	must be zero	
12	reserved	must be zero	
13	fixed to 72 decimal		72
14	fixed to 36, print in 2 strobe groups		36
15	UART send options		
16	label length	in mm	50 mm
17	mark length	in lines	3 mm
18	length	up to PE recognition in lines	10 mm
19	distance	print head <-> light barrier in lines	7.5 mm
20	label flags		label off
21	cutter flags:	1: cutter exists 0: no cutter	1
22	Maximum speed:	90	

The motor speed is given in (2 * mm/sec).
Value 50 also sets 100mm/sec.
In order to save the value in the flash,<ESC> V <22dez> has to be given.
min.= 20 / max.= 100

1.2.40.1 Label Mode

Configuration of the label mode:
ESC Q <16dez> <label length in mm>
ESC Q <17dez> <mark length minus app. 2 mm in lines >
ESC Q <18dez> <length up to PE recognition minus app. 2 mm in lines>
ESC Q <19dez> <label distance from print head to light barrier in lines>
ESC Q <20dez> <label flags>

Label flags:
Bit 0: enable label mode (1: label mode on)
Bit 1-7: future use (zeros must be set)

Form feed in label mode = off:
An FF command causes the printer to feed until the distance <label length> since the last feed command is reached. If the value <label length> has been exceeded since the last feed, only one line is fed.

Form feed in label mode = on:
A feed command causes the printer to feed until it detects a mark.
After a mark has been recognized, the value <label distance print head <-> light barrier in lines> is fed additionally in order to set the print position to the beginning of the next label.
If no mark is detected, the printer feeds for max. <label length>.
In this mode, <label length> is also the maximum terminating condition.

<Mark length in lines> determines, from which number of PE lines on a mark is considered valid.

<Length to PE recognition in lines> selects, from which number of recognized PE lines on a PE error is triggered. The PE error is erased, as soon as paper is recognized. A line feed is not necessary for this purpose.

With <label distance between print head <-> light barrier in lines>, the printer can be set up, so it positions the print head at the beginning of the next label after a FF. The required value may differ, depending on the width of the mark and the label gap.

Paper error recognition in label mode = off:
A paper error is recognized immediatelly after it occurs.

Paper error recognition in label mode = on:
In this mode the PE light barrier is used for recognizing the marks as well as for detection of missing paper. Therefore, a paper error is not recognized directly, but only after a preset number of lines.
If a paper error occurs, it will be reset right after paper has been inserted.

Table Baud Rate:

Parm = 0:	9,600 baud (default)	USB operation (1Mbit) default
Parm = 1:	921,600 baud	USB operation (500Kbit)
Parm = 2:	460,800 baud	RS232 assembling option
Parm = 3:	230,400 baud	
Parm = 4:	115,200 baud	
Parm = 5:	57,600 baud	
Parm = 6:	38,400 baud	
Parm = 7:	19,200 baud	
Parm = 8:	9,600 baud	
Parm = 9:	4,800 baud	
Parm = 10:	2,400 baud	
Parm = 11:	1,200 baud	
Parm = 12:	600 baud	
Parm = 13:	300 baud	
Parm = 14:	150 baud	
Parm > 15:	(custom)	special baud rates

Example: 8 data bits, 1, stop, no parity: Parameter = 0000 0010b = 02 decimal
Bits marked with an „x“ should be set to „0“.

Table Text Attributes:

0 := attribute not turned on 1:= attribute turned on

bolt	Bit 0
underlined	Bit 1
inverse	Bit 2

All other bits are 0 or for future use.

Table UART-Send Options:

Automatic Status Transmission:
If this bit is activated, the controller will automatically send the status byte to the host, whenever the status changes.

Auto-Send on	**xxxx xxx1 default**	(equivalent to command <ESC> a)
Auto-Send off	xxxx xxx0	(equivalent to command <ESC> b

Periodical Transmision of the Status Byte:
If this bit is activated, the controller will automatically send the status byte to the host once every second.

Periodical-Send on xxxx xx1x
Periodical-Send off **xxxx xx0x default**

Transmission of the Status Byte by Deactivating the RTS Line:
If the RTS line is pulled to "Low", the controller will send the status byte after about 200 ms. This is repeated every 200 ms until the RTS line is reactivated.

RTS-Send on xxxx x1xx
RTS-Send off **xxxx x0xx default**

Pinter Reset by Deactivating the RTS Line:
If the RTS line is pulled to "Low" for longer than 1 second, the controller will perform a reset.

RTS-RESET on xxxx 1xxx
RTS-RESET off **xxxx 0xxx default**

1.2.41 Firmware Download (not implemented yet)

[Name]	Firmware Download		
[Format]	ASCII	ESC	<Pass-Phrase><Firmware Data>
	Hex	1B	<Pass-Phrase><Firmware Data>
	Decimal	27	<Pass-Phrase><Firmware Data>

[Description] This command causes a jump into the bootloader program routines.
This command is only executed with a valid passphrase.
In addition, all encoded data are checked for accuracy before the flash is erased.
The currently set baud rate is used for the update.
After completion of the program update, a restart occurs.

1.2.42 Font Download (not implemented yet)

[Name]	Font Download		
[Format]	ASCII	ESC	<Pass-Phrase><Font Data>
	Hex	1B	<Pass-Phrase><Font Data>
	Decimal	27	<Pass-Phrase><Font Data>

[Description] The integrated font can be exchanged for a font of the same size.

II SPECIFICATIONS

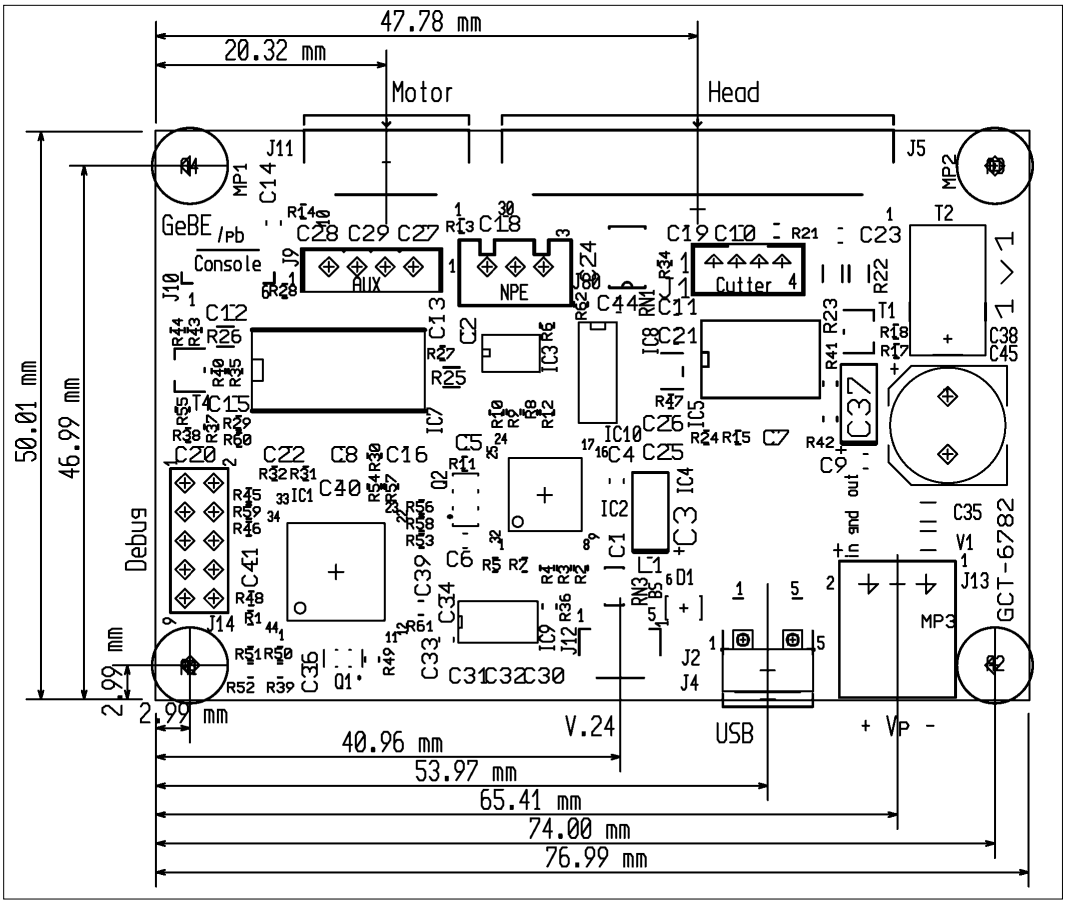
2.1 Electrical Data

Voltage: 18.5 - 26.5 V DC

		FTP629	FTP639
Current:	Maximum head current:	7 A peak	10 A peak
	Medium, 25% black	3A	4.5 A
	Maximum motor current:	800 mA	
	Vcc idle current	app. 55 mA	

No power-up sequence required

2.2 Mechanical Data



2.3 Environmental Data

Operation:	Temperature:	0°C- +60°C -10°C- +65°C with GeBE specified paper
	Humidity:	10%-99% RH, no moisture condensation
Storage:	Temperature:	-40°C - +85°C
	Humidity:	0%-99% RH, no moisture condensation

III CONNECTOR PIN ASSIGNMENT

3.1 J13: Power Connector

Pin	Function
1	GND
2	+18.5 - +26.5V DC

Part number: Phönix MSTB 2,5/ 2-G-5,08

3.2 J2: 1st USB Interface Connector

Pin	Function	Dir
1	Vcc	
2	D -	I / O
3	D +	I / O
4	NC	
5	GND	

Part number: Mini USB Type B

3.3 J4: 2nd USB Interface Connector

Pin	Function	Dir
1	Vcc	
2	GND	
3	D -	I / O
4	D +	I / O
5	Frame	

Part number: 1,25mm pitch, 53261-0590, Molex
Mating Connector Receptacle, 51021-0500, Molex
Crimp terminal: 50079-8000, Molex

3.4 J12: Serial Interface Connector

Pin	Function	Dir
1	GND	
2	TXD	I
3	RXD	O
4	RTS	I
5	CTS	O

Part number: 1 mm pitch, JST SM05B-SRSS-TB
Mating Connector Receptacle: , JST SHR-05V-S
Crimp terminal: , JST SSH-003T-P0.2 AWG 32 bis 28

3.5 J10: Console Connector

Pin	Function Dir	
1	Vcc	
2	/ Status LED	
3	GND	
4	/ Feed switch	
5	/ Test	(activates a test printout)
6	GND	

Part number: 1 mm pitch, JST_SM06B-SRSS-TB
Mating Connector Receptacle: , JST SHR-06V-S
Crimp terminal: , JST SSH-003T-P0.2 AWG 32 bis 28

3.6 J14: Debug Connector

Pin	Function
1	TCK
2	GND
3	TDO
4	Vcc
5	TMS
6	/RESET
7	Vcc
8	nTRST
9	TDI
10	GND

3.7 J1: Cutter Connector

Pin	Function	Dir
1	Cutter Busy	I
2	GND	
3	C_OUT_A	O
4	C_OUT_B	O

Part number: JST, B4B-EH-A
Mating Connector: None (from Cutter)

3.8 J11: Motor/Sensors Connector

Pin	Function	Pin	Function
1	NC	6	/M_OUT_B
2	MOTOR TEMP	7	M_OUT_B
3	GND	8	/LED Kath
4	/M_OUT_A	9	Vcc
5	M_OUT_A	10	PE_in

Part number: Molex 10 Pin 52207-1085
Mating Connector: None (flex cable 1mm pitch, from printer mechanism)

3.9 J5: Head Connector

Pin	Function	Pin	Function
1	Head up	16	GND
2	GND	17	GND
3	VH	18	GND
4	VH	19	GND
5	VH	20	GND
6	VH	21	GND
7	DATA IN	22	GND
8	/STB2	23	/STB0
9	/STB3	24	/STB1
10	Vcc	25	SIO /LAT
11	Head Temp	26	SCK
12	GND	27	DATA OUT
13	GND	28	VH
14	GND	29	VH
15	GND	30	VH

Part number: Molex, 30 Pin, 52207-3085
Mating Connector: None (flex cable 1mm pitch, from Printer mechanism)

3.10 J80: Near Paper End

Pin	Function	Dir
1	GND	
2	NPE_IN	I
3	NPE_LED	O

Part number: JST, B03B-XH-A

3.11 J9: AUX S ensor

Pin	Function	Dir
1	GND	
2	AUX_IN	I
3	AUX_LED	O
4	GND	

Part number: JST, B04B-EH-A