TOSHIBA

TOSHIBA Thermal Printer

B-SA4T SERIES

Product Description

Document No. **EO10-33016A**

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TOSHIBA TEC CORPORATION

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NOTE:

Though the pictures used in this document are mostly those of the B-SA4TM (Metal cover model), the replacement procedures are in common with the B-SA4TP (Plastic cover model).

[B-SA4TM]

[B-SA4TP]

CAUTION!

1. *This manual may not be copied in whole or in part without prior written permission of TOSHIBA TEC.*
2. *The contents of this manual may be changed without notification.*
3. *Please refer to your local Authorised Service representative with regard to any queries you may have in this manual.*

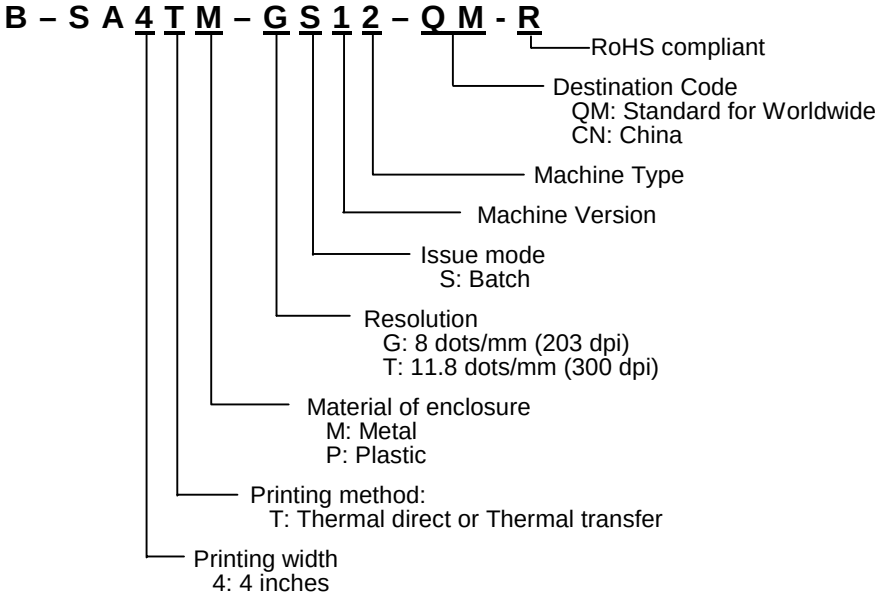
1. OUTLINE

1.1 Printer Specifications

1) Various bar codes, characters and graphic data can be printed using both thermal transfer and thermal direct methods. This printer can also print writable characters and logos at designated coordinates by using a graphic command.
2) Centronics, LAN, and USB are provided as standard interfaces for communicating with a PC. Additionally, serial interface and wireless LAN interface are optionally available.
3) A 32-bit CPU and a Field Programmable Gate Array (FPGA) equipped with several peripheral LSIs realizes high system performance.
4) An area required to place a printer is about A4 size, in spite of both media and ribbon being loaded inside it. Also, the Top Cover is opened upward, which saves the installation space.
5) Clear print is realized by an 8 dots/mm (203 dpi) (GS12 model) or 11.8 dots/mm (300 dpi) (TS12 model) print head, at a printing speed of 50.8 mm/sec. (2 inches/sec.), 101.6 mm/sec. (4 inches/sec.), or 152.4 mm/sec. (6 inches/sec.)
6) As the enclosure is made of metal, the printer can be used in an industrial environment such as a factory.
7) Design of the printer is simple. Especially, attachment and removal of the print head and platen are very simple, which makes maintenance easy.
8) Optional cutter module or optional strip module will expand the application of the printer.

NOTE: *Every size is written in millimeter (mm) in this manual. To obtain the size in inch, divide by 25.4.*

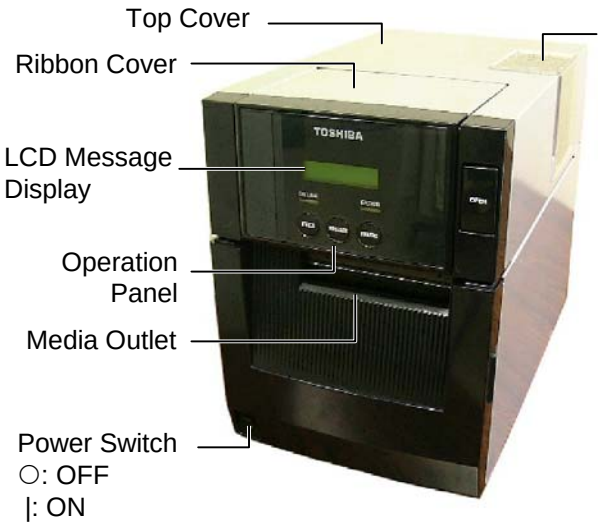
1.2 Description of Model Number



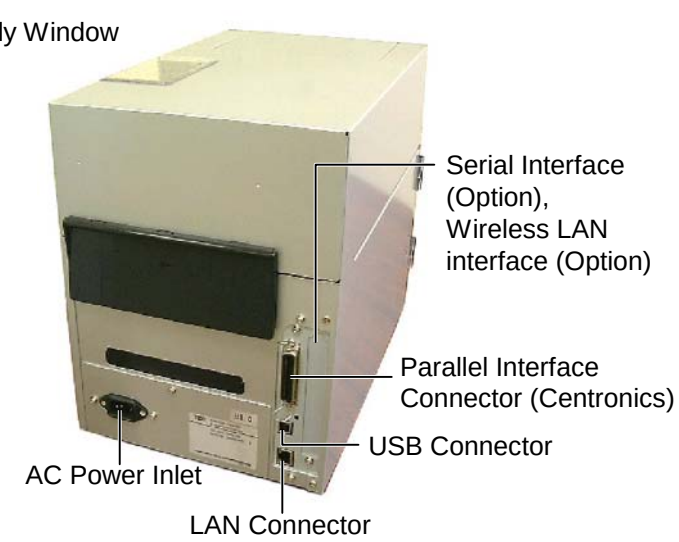
1.3 Appearance and Dimensions (Approximate)

1.3.1 Front View/Rear View

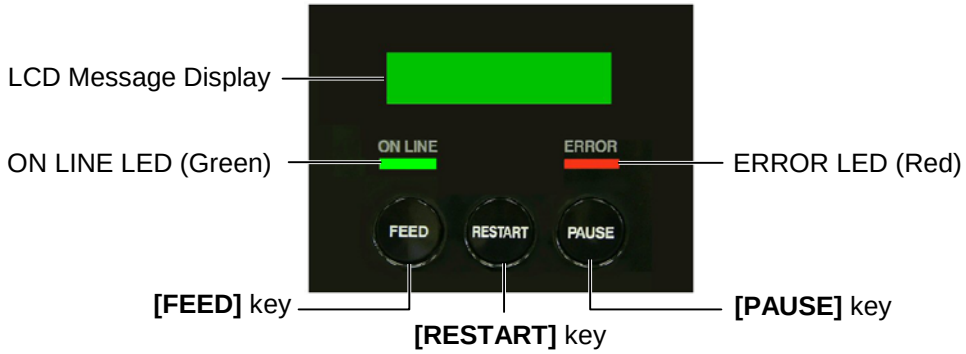
Front View



Rear View



1.3.2 Operation Panel



LCD Message Display:	When the power is turned on and it is ready to print, ON LINE is displayed.
ON LINE LED (Green):	1) Flashes when communicating with a host PC. 2) Lights while printing.
ERROR LED (Red):	Lights when the printer is in an erroneous state.
FEED key:	Feeds media.
RESTART key:	Resets the printer when paused or when an error occurs. Used to set a threshold. (Refer to the Owner's Manual.)
PAUSE key:	Pauses printing. Message display shows PAUSE and a remaining count. Used to set a threshold (Refer to the Owner's Manual.)

1.3.3 Dimensions (Approximate)

B-SA4TM (Metal cover type): 238 mm (W) x 402 mm (D) x 332 mm (H)
B-SA4TP (Plastic cover type): 238 mm (W) x 339 mm (D) x 332 mm (H)

1.3.4 Weight

B-SA4TM (Metal cover type): 15Kg
B-SA4TP (Plastic cover type): 12Kg

1.4 Basic Specifications

1) Printing method: Thermal direct printing or thermal transfer printing

2) Print head

	GS12 model	TS12 model
Total number of dots	832 dots	1248 dots
Dot density	8 dots/mm	11.8 dots/mm
Effective print width	104 mm	105.7 mm
Thermal pitch	0.125 mm	0.0847 mm

3) Print speed: 6”/sec., 4”/sec., 2”/sec.

NOTE: *These print speeds are available when printing ratio is less than 30% of the entire label or tag paper.*

4) Format size (W) x (L)

GS12 model: Max. 104.0 mm x 997.0 mm
TS12 model: Max. 105.7 mm x 997.0 mm

5) Issue mode

- Batch
- Auto cut (Auto cut mode is available only when the optional cutter is attached.)
- Strip (Strip mode is available only when the optional strip module is attached.)

6) Type of bar code/two dimensional code

(1) JAN8, EAN8, JAN13, EAN13, UPC-A, UPC-E
(2) EAN8, EAN13, UPC-A, UPC-E + 2digit
(3) EAN8, EAN13, UPC-A, UPC-E + 5digit
(4) NW-7
(5) CODE39 (STANDARD)
(6) CODE39 (FULL ASCII)
(7) ITF
(8) MSI
(9) CODE93
(10) CODE128 (Automatic code change)
(11) EAN128
(12) Data Matrix
(13) PDF417
(14) QR Code
(15) Industrial 2 of 5
(16) Customer Bar Code
Postal code for Japan)
(17) POSTNET (Postal code for USA)
(18) RM4SCC (Postal code for UK)
(Royal Mail 4 State Customer Code)
(19) KIX CODE (Postal code for Belgium)
(20) Maxi Code
(21) Micro PDF417
(22) CP CODE
(23) RSS14
(24) High priority customer bar code
(25) GTIN (Global Trade Item Number)

7) Bar code rotation: 0°, 90°, 180°, 270°

8) Magnification of bar code

■ UPC/EAN/JAN/CODE93/128/PDF417 ..... Up to 6 modules can be automatically calculated using 1-module width designation (1 to 15 dots).

Bar code \ Dots/Module		2	3	4	5	6	7	8
UPC-A/E EAN8/13 JAN8/13	Min. Module Width (mm)	0.25	0.38	0.50	0.63	–	–	–
	Magnification (times)	0.76	1.14	1.51	1.91	–	–	–
CODE93 EAN128 CODE128 PDF417	Min. Module Width (mm)	0.25	0.38	0.50	0.63	0.75	0.88	1.00

Bar code \ Dots/Module		9	10	11	12	13	14	15
UPC-A/E EAN8/13 JAN8/13	Min. Module Width (mm)	–	–	–	–	–	–	–
	Magnification (times)	–	–	–	–	–	–	–
CODE93 EAN128 CODE128	Min. Module Width (mm)	1.13	1.25	1.38	1.50	1.63	1.75	1.88
PDF417		1.13	1.25	–	–	–	–	–

■ NW-7/CODE39/ITF/MSI/Industrial 2 of 5 ..... The width of narrow bars, wide bars and spaces can be optionally changed in a range of 1 to 99 dots.

■ Data Matrix ..... The width of one cell can be changed in a range of 1 to 99 dots.

9) Type of characters

(1) Times Roman medium (12, 15 point)
(2) Times Roman bold (15, 18, 21 point)
(3) Times Roman Italic (18 point)
(4) Helvetica medium (9, 15, 18 point)
(5) Helvetica bold (18, 21 point)
(6) Helvetica Italic (18 point)
(7) Presentation bold (27 point)
(8) Letter Gothic medium (14.3 point)
(9) Prestige Elite medium (10.5 point)
(10) Prestige Elite bold (15 point)
(11) Courier medium (15 point)
(12) Courier bold (18 point)
(13) OCR-A, B (12 point)
(14) Outline font (Helvetica bold, Helvetica bold proportional, Price Font (1,2,3), Times roman proportional, Pop Proportional, Proportional)
(15) Writable characters (2-byte character is available.)

10) Character code

(1) PC-850 (2) PC-8 (3) PC-852 (4) PC-857 (5) Arabic (6) LATIN 9 (7) PC-1257 (8) PC-1254
(9) PC-1253 (10) PC-1252 (11) PC-1251 (12) PC-1250 (13) PC-855 (14) PC-851 (15) PC-866

11) Character magnification

(1) Regular font: 0.5 to 9.5 times (magnified by 0.5 times in each direction)
(2) Outline font: 2.0 to 85.0 mm (magnified 0.1 mm in each direction)

NOTE: *When the outline font size is large, the ribbon may wrinkle according to the quality of the ribbon or print tone.*

12) White or black background all types of characters are available.

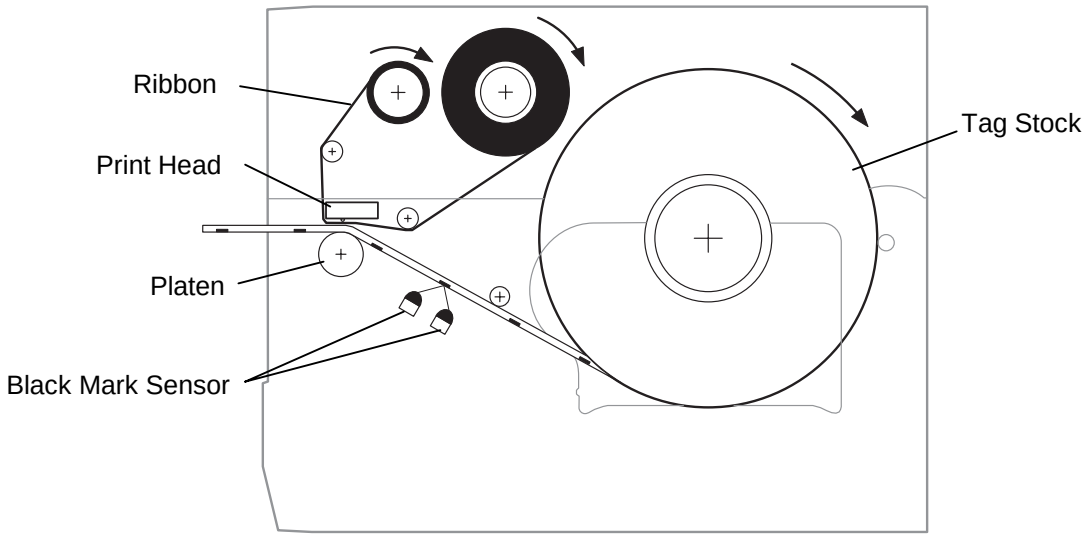
13) Character rotation: 0°, 90°, 180°, 270°

14) Character strings rotation: 0°, 90°, 180°, 270°

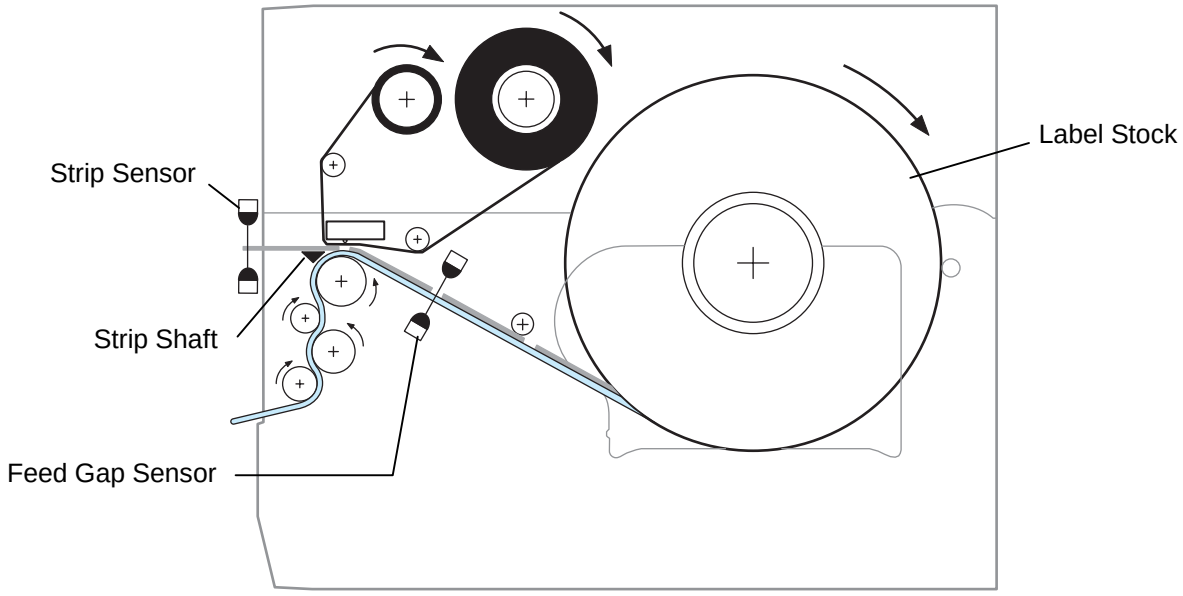
15) Type of line
(1) Horizontal line (2) Vertical line (3) Slant line (4) Square (5) Rounded Rectangle (6) Circle

16) Line Width: 0.1 to 9.9 mm can be specified (in units of 0.1 mm)

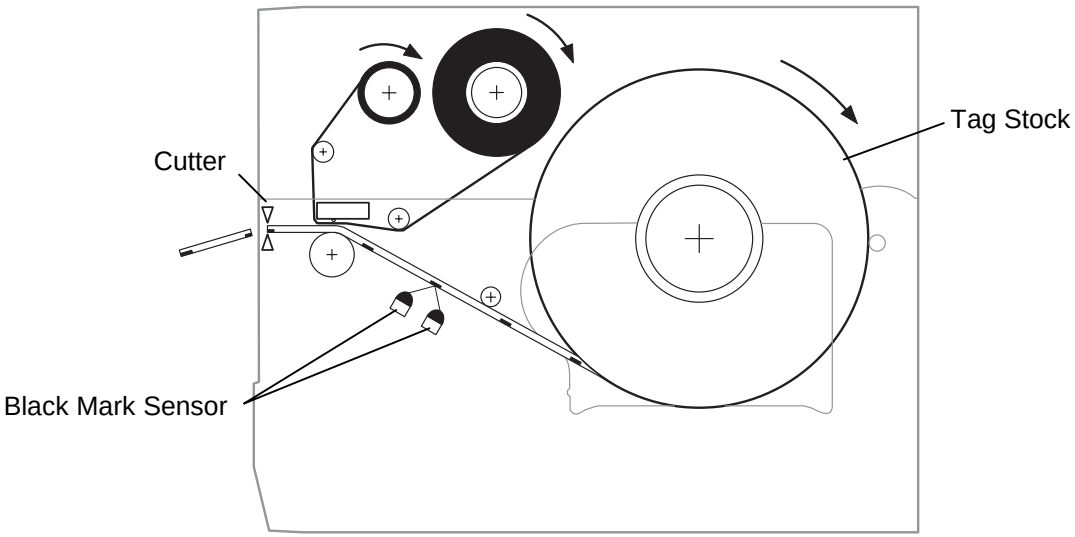
17) Mechanism
(1) Batch mechanism
This is the standard mechanism which lets the printer print continuously until the number of media specified in the label issue command has been printed.



(2) Strip mechanism (Option)
When an optional strip module is attached, a label is stripped from the backing paper by the strip shaft, and the backing paper is drawn into the strip module. The next label will not be printed until the preceding label is removed, as a presence of the label at the strip shaft is monitored by the strip sensor.



(3) Auto cut mechanism (Option)
When an optional cutter module is attached, printed media is fed to the cutter unit and cut off from the media roll.



18) Power supply
Universal power supply: AC100 to 240 V ±10%, 50/60Hz
Harmonics: Class A

19) Power consumption
During a print job: 2.1A (100V) to 1.1A (240V), 155W rating
During standby: 0.19A (100V) to 0.15A (240V), 13W (100V) to 22W (240V)

20) Rush current
100V input: 10A
240V input: 22A

***NOTE**: Be sure to use an exclusive power outlet for the printer.*

21) Operating temperature range
Thermal direct:: 0°C to 40°C
Thermal transfer: 5°C to 40°C

22) Relative humidity
25% to 85%RH (no condensation)

1.5 Electronics Specifications

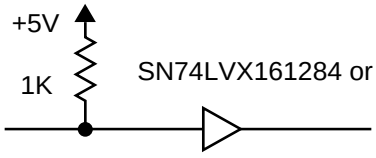
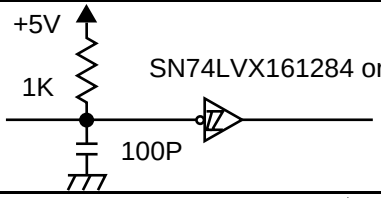
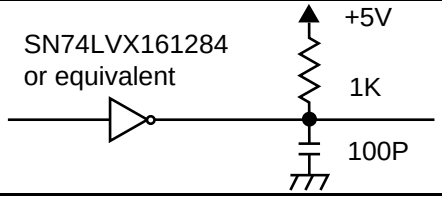
1) CPU: HD6417705F133BV

2) Memory
   (1) Program: 16-MB Flash ROM
   (2) Backup: 512-byte EE-PROM
   (3) Image buffer + Work: 16-MB SD-RAM

3) Interface
   (1) Parallel interface (Standard interface)
   ① Centronics interface conforming to IEEE1284, supporting SPP mode (compatibility mode) and nibble mode.
   ② Data input method: 8-bit parallel (DATA 1 to 8)
   ③ Control signals

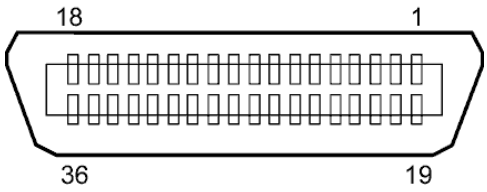
Compatibility mode	nStrobe, nAck, Busy, PError, Select, nAutoFd, nInit, nFault, nSelectIn
Nibble mode	HostClk, PtrClk, PtrBusy, AckDataReq, Xflag, HostBusy, nInit, nDataAvail, IEEE1284Active

   ④ Data input code: ASCII, JIS 8-bit code for European characters, 8-bit code for graphic
   ⑤ Receiving buffer: 1MB (shared with other interfaces)
   ⑥ Input/Output circuit configuration and Input/Output conditions

Type	Signal Name	Configuration	
Input/ Output	Data 1 to 8		
Input	nStrobe/HostClk nInit/nReverseRequest nAutoFd/HostBusy/HostAck nSelectIn/IEEE1284Active		Logical level (input) "1" = 2~5V "0" = 0~0.4V
Output	Busy/PtrBusy/PeriphAck nFault/nDataAvail/nPeriphRequest nAck/PtrClk/PeriphClk Select/XFlag PError/AckDataReq/nAckReverse		Logical level (output) "1" = 2.4~5V "0" = 0~0.4V

⑦ Pin Layout (IEEE1284-B Connector)

PIN No.	Signal	
	SPP Mode	Nibble Mode
1	nStrobe	HostClk
2	Data 1	Data 1
3	Data 2	Data 2
4	Data 3	Data 3
5	Data 4	Data 4
6	Data 5	Data 5
7	Data 6	Data 6
8	Data 7	Data 7
9	Data 8	Data 8
10	nAck	PtrClk
11	Busy	PtrBusy
12	PError	AckDataReq
13	Select	Xflag
14	nAutoFd	HostBusy
15	NC	NC
16	0V	0V
17	CHASSIS GND	CHASSIS GND
18	+5V (For detection)	+5V (For detection)
19	TWISTED PAIR GND(PIN1)	TWISTED PAIR GND(PIN1)
20	TWISTED PAIR GND(PIN2)	TWISTED PAIR GND(PIN2)
21	TWISTED PAIR GND(PIN3)	TWISTED PAIR GND(PIN3)
22	TWISTED PAIR GND(PIN4)	TWISTED PAIR GND(PIN4)
23	TWISTED PAIR GND(PIN5)	TWISTED PAIR GND(PIN5)
24	TWISTED PAIR GND(PIN6)	TWISTED PAIR GND(PIN6)
25	TWISTED PAIR GND(PIN7)	TWISTED PAIR GND(PIN7)
26	TWISTED PAIR GND(PIN8)	TWISTED PAIR GND(PIN8)
27	TWISTED PAIR GND(PIN9)	TWISTED PAIR GND(PIN9)
28	TWISTED PAIR GND(PIN10)	TWISTED PAIR GND(PIN10)
29	TWISTED PAIR GND(PIN11)	TWISTED PAIR GND(PIN11)
30	TWISTED PAIR GND(PIN31)	TWISTED PAIR GND(PIN31)
31	nInit	nInit
32	nFault	NDataAvail
33	0V	0V
34	NC	NC
35	NC	NC
36	nSelectIn	IEEE1284Active



IEEE1284-B Connector

⑧ Input/Output Signals

SPP mode

Signal	I/O	Description
Data1 to 8	Input	● Input data signals for the 1st to 8th bits. ● Logic 1 is "High" level. ● Min. data pulse width of 2.5 µsec.
nStrobe	Input	● Synchronizing signal for reading the above data. ● Normally at "High" level. The data is read at the rise of the Low level pulse. ● Minimum data pulse width of 0.5 µsec.
Busy	Output	● This signal indicates that the printer is in a Busy state. ● When initialized after the power is turned on, the printer becomes ready to receive data and turns the signal to "Low" level. ● The signal turns to "High" level (in a Busy state) when data is set from the host (at the fall of the nStrobe signal). ● The signal turns to "Low" level when the printer reads the data. ● When the free space of the receive buffer becomes 512 bytes or less, the printer keeps the signal at "High" level (in a Busy state) for 10 seconds when data is set from the host, to extend the data read interval. ● When the receive buffer has become full, the printer stops reading data. When data is set from the host, then, it keeps the signal at "High" level (in a Busy state) until the receive buffer has a free space. ● The signal is kept at "High" level (in a Busy state) until one of the following states is cleared. • PAUSE state caused by the [PAUSE] key • Paper end state • Ribbon end state • Head open state • Printer error state ● Initialization in progress upon receipt of the nInit signal
nAck	Output	● This signal indicates that the printer has read the data set by the host and is ready to receive the next data. ● The signal is normally at "High". It is at "Low" for about 5 µsec. after the fall of the BUSY signal. The host should usually set data after the ACK signal is turned from "Low" to "High". ● If the nAck signal is ignored and the next data is set while the nAck signal is Low, the "LOW" level continues about further 5 µsec at the fall of the BUSY signal. However, the data can be received properly.
nInit	Input	● Reset request signal from the host. ● Normally at "High" level. An input of this signal at "Low" level causes the printer to be initialized in the same manner as when the power is turned on. * When "Reset process when the nInit signal is ON" is set to "OFF" in the parameter setting in the system mode, the printer is not initialized even if it receives this signal at low level. ● When the nInit signal is input during printing, the printer completes printing one tag/label which is being printed, cancels the next processing, then is initialized in the same manner as when the power is turned on. * When "Reset process when the nInit signal is ON" is set to "OFF" in the parameter setting in the system mode, the next process proceeds without being canceled. ● Minimum pulse width of 0.5 µsec.

Select	Output	● This is an output signal which indicates whether the printer is in Pause state or placed online. The printer can receive data while placed online. ● The signal is at "Low" level while the printer is in a Pause state. ● The signal is kept at "Low" level (in a Pause state) until one of the following states is cleared. • Pause state caused by the [PAUSE] key • Paper end state • Ribbon end state • Head open state • Printer error state • Initialization in progress upon power on or receipt of the nInit signal
nFault	Output	● Output signal indicating that the printer is in a Fault state. ● At "Low" level while the printer is in a Fault state. ● The signal is kept at "Low" level (in a Fault state) until one of the following states is cleared. • Pause state caused by the [PAUSE] key • Paper end state • Ribbon end state • Head open state • Printer error state • Initialization in progress upon power on or receipt of the nInit signal
Perror	Output	● Output signal indicating a label end or ribbon end state. ● At "High" level when the printer is in a label end or ribbon end state. ● Turns to "Low" level when the label end or ribbon end state is cleared.
+5V	----	● This is not a signal but a +5 V power supply voltage. ● The maximum current of 500 mA can be taken out.
nSelectIn	Input	Not used
nAutoFd	Input	Not used

Nibble mode

Signal	I/O	Description	
PtrClk	Output	● Reverse data transfer phase:	It is used for evaluating data sent to the host.
		● Reverse idle phase:	When the printer changes the signal from Low to High, an interrupt informing the host that the data is available, occurs
PtrBusy	Output	● Reverse data transfer phase:	Data bit 3 is used for the first transfer. Data bit 7 is used for the second transfer. Indicates the forward channel is in a Busy state.
AckDataReq	Output	● Reverse data transfer phase:	Data bit 2 is used for the first transfer. Data bit 6 is used for the second transfer.
		● Reverse idle phase:	This signal is set to high until the data transfer is requested by the host. Then, the process is performed according to the nDataAvail signal.
Xflag	Input	● Reverse data transfer phase:	Data bit 1 is used for the first transfer. Data bit 5 is used for the second transfer.

HostBusy	Input	● Reverse data transfer phase:	It indicates that the host can receive data from the printer by setting the signal to low. Then, the host sets the signal to high, and sends the Ack indicating that the nibble data is received. When the signal is set to low after one reverse channel data transfer is performed, the interface phase changes to the idle phase. At that time, there is no available data on the printer.
		● Reverse idle phase:	When this signal is set to high according to the low pulse of the PtrClk signal, the host enters the reverse data transfer phase again. If this signal is set to high when the IEEE1284 Active signal is low, the IEEE1284 idle phase stops, and the interface enters the Compatibility mode.
nDataAvail	Output	● Reverse data transfer phase:	When the signal is low, it indicates the printer has data to be sent to the host. And it is used for sending data bits 0 and 4.
		● Reverse idle phase:	It is used for indicating that the data is available.

(2) USB (Standard interface)

① Standard: Conforming to Rev. 2.0
② Transfer type: Control transfer, Bulk transfer
③ Transfer rate: Full speed (12M bps)
④ Transfer control method: Data transfer is controlled by sending/receiving a status with the receive buffer free space information.
⑤ Receiving buffer: 1MB (shared with other interface)

(3) LAN interface (Standard interface)

CAUTION!

Do not directly connect the LAN cable wired outside of a building to the LAN port provided on this product, as the LAN port on this product is intended for indoor connection.
To connect such LAN cable to the product, be sure to use any communication equipment, like a router, a hub, or a modem which is located within the same building as the product.

① Constitution: 10 Base-T or 100 Base-TX LAN controller
② Protocol: TCP/IP
③ Network specifications:

Function	Description
LPR Server Function	Supporting LPR protocol (Line Printer Daemon Protocol) which enables printing via TCP/IP network.
WEB printer function	When the printer is connected to a PC via TCP/IP network, browsing the printer status, issuing media, checking or changing the printer settings, or downloading the firmware are enabled.
Socket communication protocol	Socket is an end point of a connection to other host computer via TCP/IP network, which is used to send/receive data between the PC and the printer. Use of Socket Communication protocol allows a communication only by reading/writing data to/from the socket.
E-mail function	Commands are sent to the printer by an e-mail. This function allows remote control of the printer.

④ Receiving buffer: 1MB (shared with other interface)

(4) Serial interface (Optional interface)

A serial interface conforming to RS-232C is available when an optional serial interface board, B-SA704-RS-QM-R, is installed in the printer.

① Communication mode: Full-duplex
② Transmission speed: 2400,4800,9600,19200, 38400, 115200 bps (selectable)
③ Synchronization: start-stop synchronization
④ Transmission parameter
- ■ Parity: None, EVEN, ODD
- ■ Start bit: 1-bit
- ■ Stop bit: 1-bit or 2-bit
- ■ Word length: 7-bit or 8-bit

⑤ Error detection
- ■ Parity check: VRC (Vertical Redundancy Checking)
- ■ Framing error: This error occurs when no stop bit is found in the frame specified starting with the start bit.

⑥ Data entry code: ASCII, 8-bit code for European characters, 8-bit code for graphic
⑦ Receiving buffer: 1MB (shared with other interface)
⑧ Protocol: No-procedure method

⑨ Flow control

■ XON/XOFF (DC1/DC3) protocol

This is a software flow control using XON (DC1)/XOFF (DC3) code.

- When initialized after power on, this printer becomes ready to receive data and sends an XON code (11H). (Transmission or non-transmission of XON code is selectable by means of the parameter setting.)
- The printer sends an XOFF code (13H) when the free area in the receive buffer becomes 10K Bytes or less.
- The printer sends an XON code (11H) when the free area in the receive buffer are 512KB or more.
- When there is no free area in the receive buffer, the printer discards received data which exceeds the receive buffer capacity without storing it in the buffer. (After detecting the XOFF code, the host computer must stop transmission before the printer receive buffer becomes full.)
- The printer sends an XOFF code (13H) at power off time. (Transmission or non-transmission of XOFF code is selectable with the parameter setting.)
- The DTR signal is always “High” level (Ready).
- The RTS signal is always “High” level (Ready).

■ READY/BUSY (DTR) protocol

This is a hardware flow control using DTR signal as a control code.

- When initialized after power on, this printer becomes ready to receive data and converts the DTR signal to "High" level (READY).
- The printer converts the DTR signal to "Low" level (BUSY) when the free area in the receive buffer amount to 10K bytes or less.
- The printer converts the DTR signal to "High" level (READY) when the free area in the receive buffer amount to 512KB or more.
- When there is no free area in the receive buffer, the printer discards received data which exceeds the receive buffer capacity without storing it in the buffer. (After detecting a BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)
- The RTS signal is always “High” level.

■ XON/XOFF (DC1/DC3) protocol + READY/BUSY (DTR) protocol

This is a software and hardware flow control using XON/XOFF code and DTR signal.

- When initialized after power on, this printer becomes ready to receive data and converts the DTR signal to "High" level (READY). The printer sends an XON code (11H).
- When the free area in the receive buffer are 10K bytes or less, the printer converts the DTR signal to "Low" level (BUSY) and sends an XOFF code (13H).
- When the free area in the receive buffer are 512KB or more, the printer converts the DTR signal to "High" level (READY) and sends an XON code (11H).
- When there is no free area in the receive buffer, the printer discards received data which exceeds the receive buffer capacity without storing it in the buffer. (After detecting the XOFF code or BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)
- The printer sends an XOFF code (13H) at power off time.
- The RTS signal is always “High” level.

■ READY/BUSY (RTS) Protocol

This is a hardware flow control using RTS signal as a control code.

- When initialized after power on, this printer becomes ready to receive data and converts the RTS signal to "High" level (READY).
- The printer converts the RTS signal to “Low” level (BUSY) when the free area in the receive buffer amount to 10K bytes or less.
- The printer converts the RTS signal to “High” level (READY) when the free area in the receive buffer amount to 512KB or more.
- When there is no free area in the receive buffer, the printer discards received data which exceed the receive buffer capacity without storing it in the buffer. (After detecting a BUSY signal, the host computer must stop transmission before the printer receive buffer becomes full.)
- The DTR signal is always “High” level (READY).
- The host should keep the DSR signal “High” level.

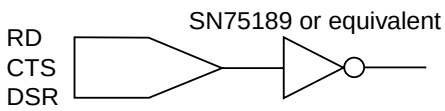
***NOTE**: Be sure to select the READY/BUSY (RTS) protocol when controlling the flow between the Windows. Also, be sure to select “Hardware” for the flow control in the Windows communication port setting.*

⑩ Pin description

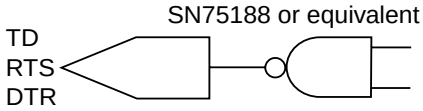
Pin No.	Signal	I/O	Description
1	FG (Frame Ground)	---	Ground line for circuit protection.
2	RD (Received Data)	Input	Data line from which the printer receives data from the host (receive data line). Logic “1” is “Low”, and “0” is “High”. It is LOW (MARK) while no data is being sent.
3	TD (Transmit Data)	Output	Data line from which the printer sends data to the host (send data line). Logic “1” is “low”, and “0” is “High”. It is LOW (MARK) while no data is being sent.
4	CTS (Clear to Send)	Input	Input signal from the host. This printer ignores this signal.
5	RTS (Request to Send)	Output	Output signal to the host. When READ/BUSY (RTS) protocol is selected, this signal means READY to receive data. When the receive buffer is nearly full, the signal turns to “Low”, and “High” when nearly empty. In case of other protocol is selected, this signal is always “High” level after the power is turned on.
6	DTR (Data Terminal Ready)	Output	Output signal from the printer. When READY/BUSY (DTR) or XON/XOFF (DC1/DC3)+READY/BUSY (DTR) is selected, this signal means READY to receive data. When the receive buffer is nearly full, the signal turns to “Low”, and “High” when nearly empty. In case of XON/XOFF (DC1/DC3) or READY/BUSY (RTS), this signal is always “High” level after the power is turned on.
7	SG (Signal Ground)	---	Ground line for all data and control signals.
20	DSR (Data Set Ready)	Input	Input signal from the host. It must be “High” for the printer to receive data.

⑩ Interface circuit

■ Input circuit



■ Output circuit



■ Signal level

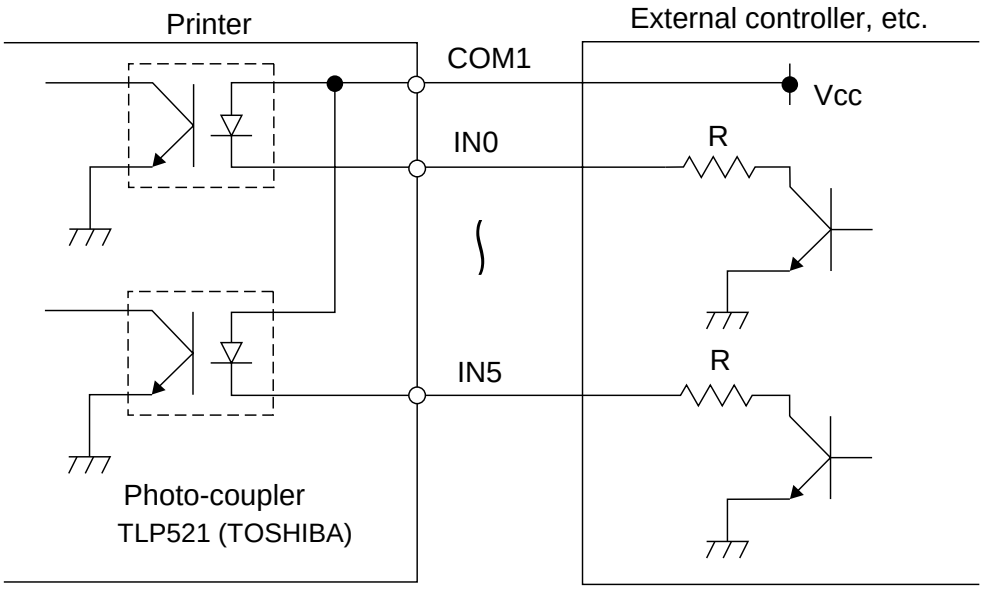
Input voltage: "H" .. +3V~ + 15V
"L" ... –3V~ – 15V

Output voltage: "H" .. +6V ~ +13V
"L" ... –6V ~ –13V

(5) Expansion I/O interface (Optional interface)

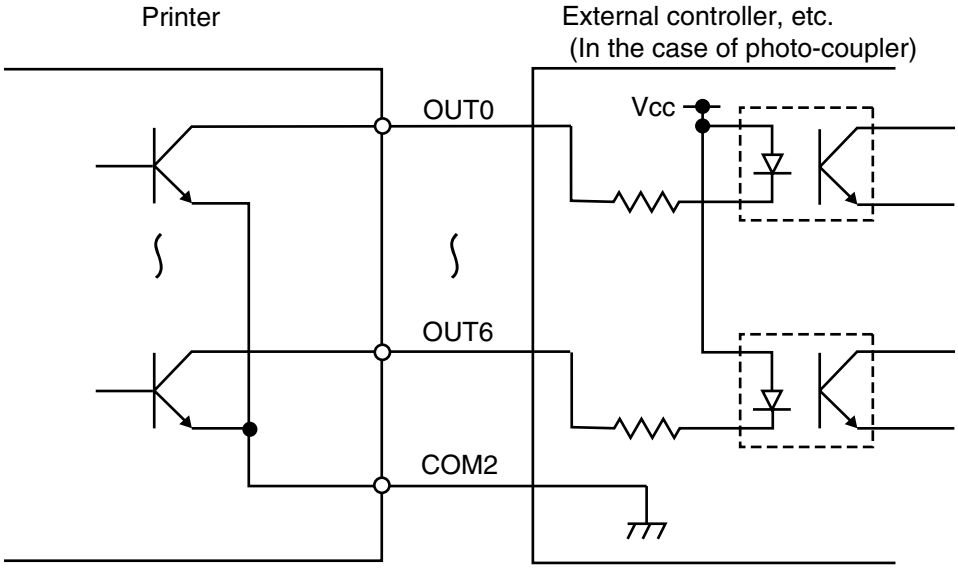
Interface circuit

■ Input circuit



There are six input circuits, and each input is a current loop using a photo-coupler.
The anode of the photo-coupler is connected to common pin COM1 in each of the six circuits. Each cathode is independent. The voltage of Vcc is 24 V (max.) while the diode operating current is 16 mA.

■ Output circuit



There are seven output circuits, and each output is an open collector. The voltage of Vcc is 24V (max.) while the operating current is 150 mA.
For other details, please refer to the Expansion I/O specifications stored in the enclosed CD-ROM or posted on the web site with the URL, http://barcode.toshibatec.co.jp.

4) Sensor/switch

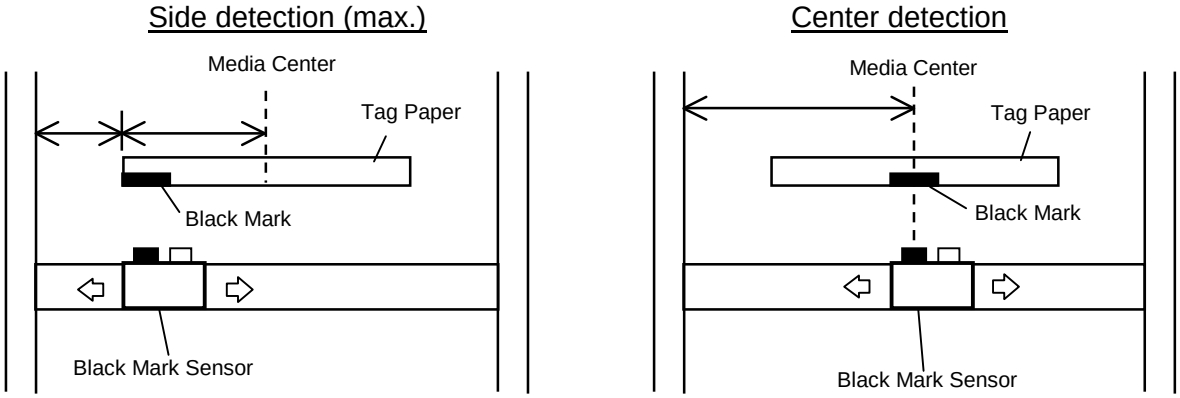
(1) Media sensor

This sensor is comprised of the black mark sensor and feed gap sensor. It is positioned 92.1 mm from the platen.

The sensor position is adjustable according to the black mark position. It can be manually moved from the center to the left edge of media.

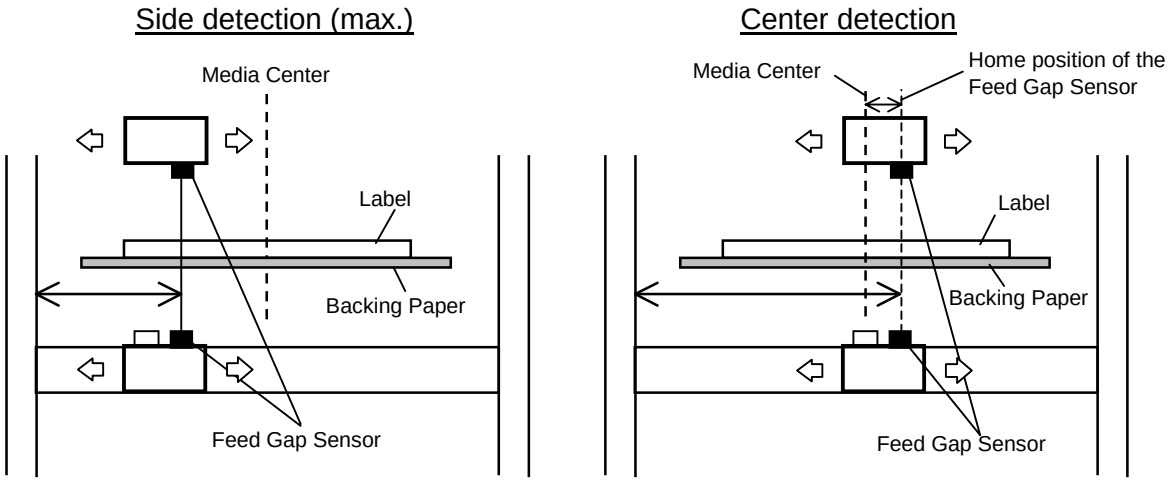
■ Black mark sensor (Reflective sensor)

This sensor detects the difference of potential between a black mark and a print area to find a print start position of the tag paper.



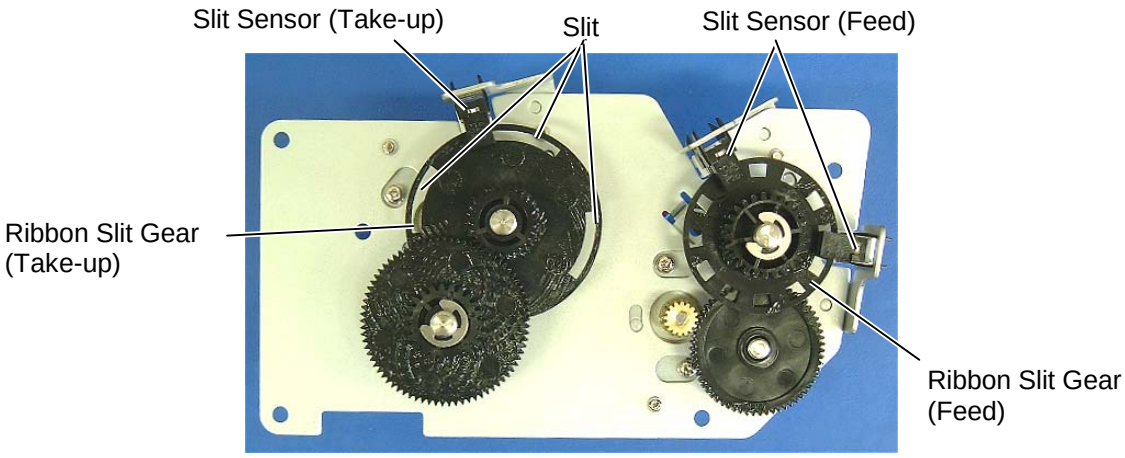
■ Feed gap sensor (Transmissive sensor)

This sensor detects the difference in potential between the backing paper and the label to find the print position of the label. The feed gap sensor is located at 10 mm to the right of the black mark sensor.



(2) Slit sensor (Transmissive sensor)

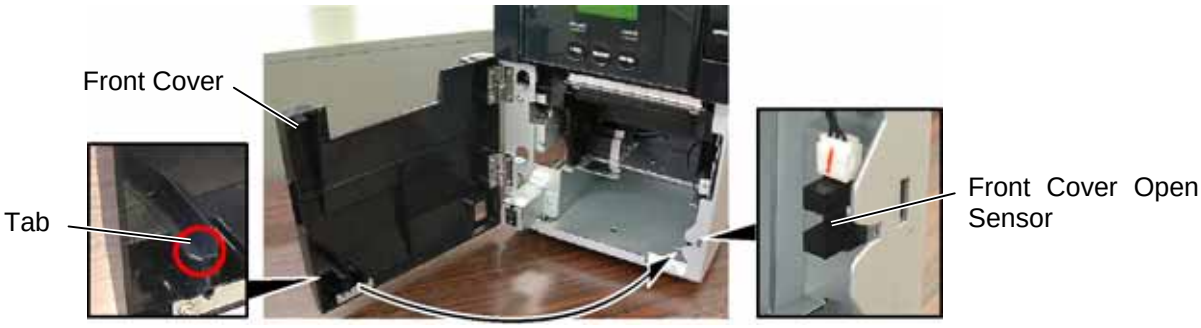
The ribbon motor block has three same slit sensors: Two of them are attached to the ribbon feed motor side, and the other one is to the ribbon take-up side.
A slit sensor is a photo-coupler, consisting of an LED and a transistor.
This sensor detects the amount of taken ribbon, ribbon feed amount, the rotation count of the ribbon shaft and the ribbon motors, and the direction of rotation.
The slit sensor on the ribbon take-up side detects the amount of taken ribbon by monitoring the time of detecting slits of the ribbon slit gear.
The two slit sensors on the ribbon feed side detects a ribbon end when the motor rotates in the reverse direction at a ribbon break or ribbon end.



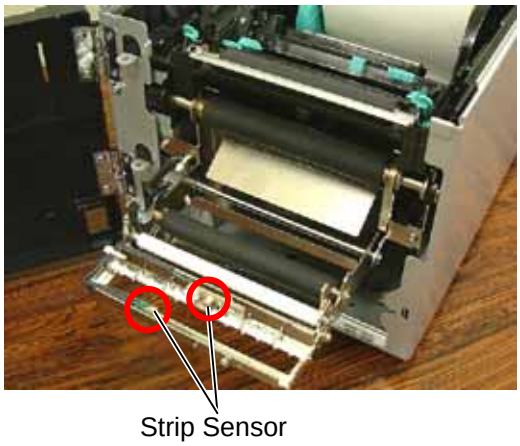
(3) Top cover open sensor

On each side of the printer, same top cover open sensor is provided. This sensor is a photo-coupler, consisting of an LED and a transistor. A top cover open status is detected depending on the two hook plates linked with the top cover release button intercept the photo-coupler or not.
When a top cover open status is detected, “HEAD OPEN” is displayed on the LCD, the error LED illuminates, and printing is stopped.

(4) Front cover open sensor
On the right side of the printer front, a front cover open sensor is provided. This sensor is a photo-coupler, consisting of an LED and a transistor. A front cover open status is detected depending on the tab of the front cover intercepts the photo-coupler or not.
When a front cover open status is detected, “COVER OPEN”.

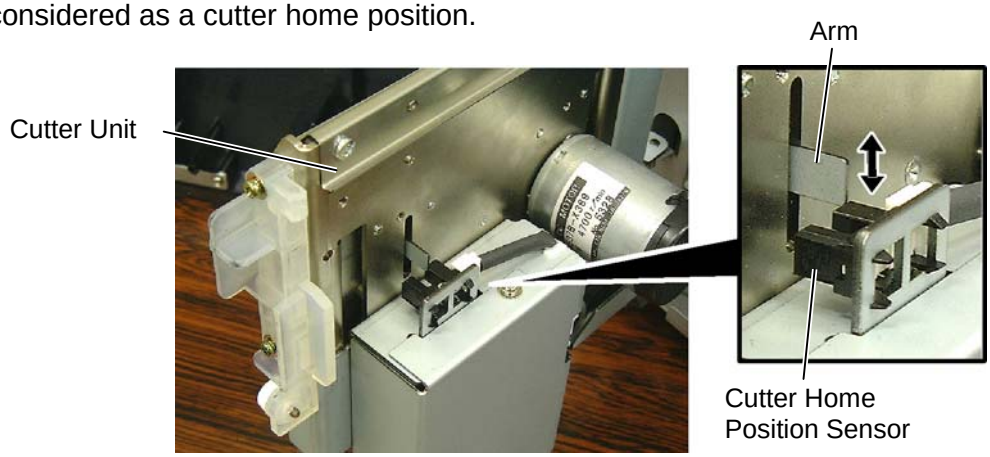


(5) Strip sensor (transmissive sensor) for optional strip module
This sensor detects whether or not the label has been taken away from the media outlet and controls the label feed.



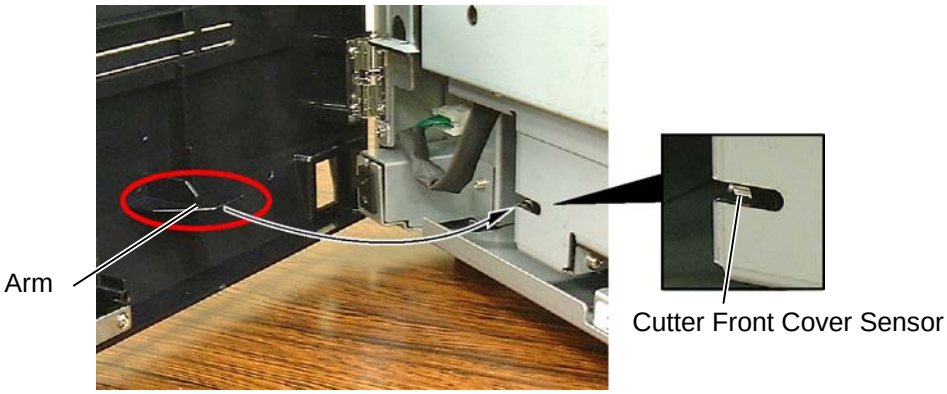
(6) Cutter home position sensor for optional cutter module

This sensor is positioned inside of the cutter unit. This is a photo-coupler, consisting of an LED and a transistor. When the arm linked with the cutter blade intercepts the photo-coupler, it is considered as a cutter home position.



(7) Cutter front cover sensor (micro switch)

The cutter front cover sensor is a micro switch, which is provided on the lower left of the cutter unit. When the cutter front cover is closed, the arm of the cover turns the micro switch. A cutter front cover status is detected depending on the micro switch is turned on or off.

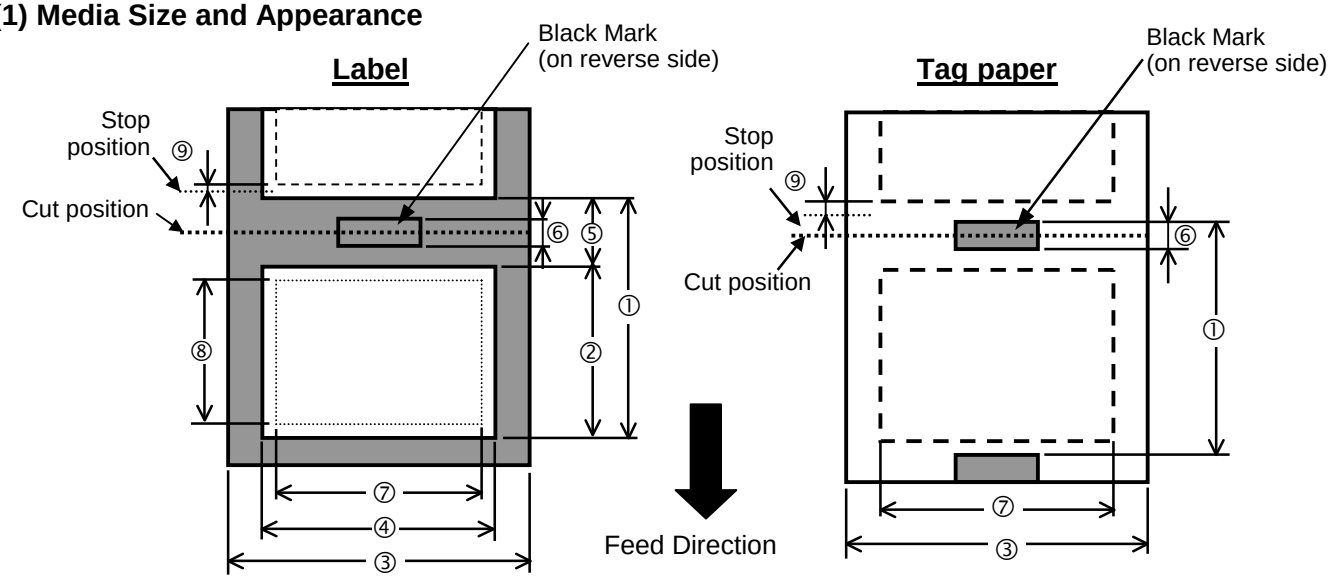


2. SUPPLY SPECIFICATIONS

Information regarding the supply specifications contained in Product Description is essential to service engineers. Detail specifications and other information on the media and ribbon are described in Supply Manual by model. It is issued by and sent from TOSHIBA TEC H.Q (Sales Division) upon release of new model or manual's revision. When purchasing the supplies locally, be sure to refer to the Supply Manual for details. Use of non-specified media may shorten the print head life and result in problems with bar code readability or print quality. Be sure to read carefully and understand the Supply Manual since it also includes the details about notes, precision of the print start position, limitations on printing, etc. When selling the products to VARs, instruct them to buy media and ribbons that the substances described in the following precautions are not included

2.1 Media

(1) Media Size and Appearance

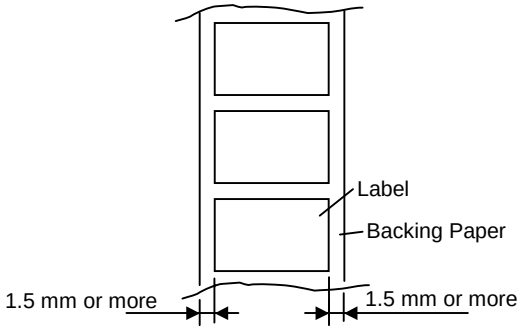


(Unit: mm)

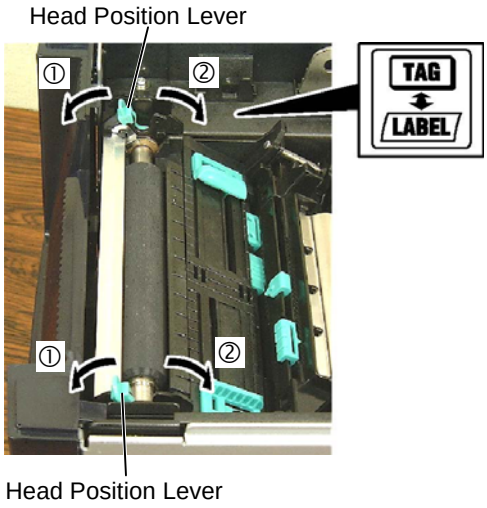
Item		Label dispensing mode	Batch mode	Strip mode	Cut mode
① Media pitch		Thermal direct	10.0 – 999.0	19.0 – 999.0	19.0 - 999.0
		Thermal transfer	15.0 – 999.0		
② Label length		Thermal direct	8.0 – 997.0	17.0 – 997.0	16.0 – 997.0
		Thermal transfer	13.0 – 997.0		
③ Media width/backing paper width		Thermal direct	25.0 – 118.0		
		Thermal transfer	25.0 – 114.0		
④ Label width		Thermal direct	22.0 – 115.0		
		Thermal transfer	22.0 – 111.0		
⑤ Gap length			2.0 – 20.0	2.0 – 5.0	3.0 – 20.0
⑥ Black mark length (Tag paper)			2.0 – 10.0		
⑦ Maximum effective print width			104.0 (200-dpi type), 105.7 (300-dpi type)		
⑧ Effective print length	Label	Thermal direct	6.0 – 995.0	15.0 – 995.0	14.0 - 995.0
		Thermal transfer	11.0 – 995.0		
	Tag paper	Thermal direct	8.0 – 997.0	----	17.0 – 997.0
		Thermal transfer	13.0 – 997.0		
⑨ Print speed up/slow down area			1.0		
Thickness		Thermal direct	0.08 – 0.17 (Note 4)	0.13 – 0.17	0.08 – 0.17 (Note 4)
		Thermal transfer	0.1 – 0.17 (Note 4)	0.13 – 0.17	0.1 – 0.17 (Note 4)
Maximum outer roll diameter			Ø200 (B-SA4TM) / Ø152.4 (B-SA4TP)		
Roll direction			Inside/Outside		
Inner core diameter			Ø38, 40, 42, 76.2±0.3		

***NOTES**:*

1. *To ensure print quality and print head life use only TOSHIBA TEC specified media.*
2. *The ratio of a label length to a gap length must be a minimum of 3 to 1 (3:1).*
3. *Backing paper must be wider than a label; the distance between the edge of the backing paper and that of a label should be at least 1.5 mm.*



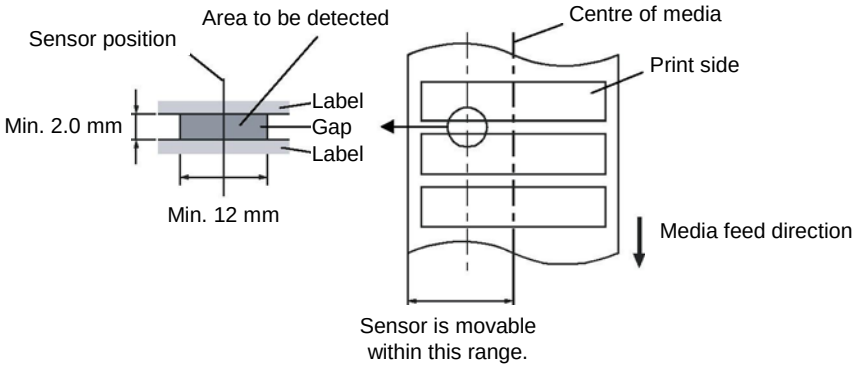
4. *For the backing paper Glassine paper 7K or 8K white or equivalent should be used. Also, the light transmission rate of the backing paper should be 22% or above.*
5. *When cutting media, fine adjust a cut position properly. (See System Mode Manual, Section 2.3.)*
6. *If a printing stop position (strip position) is improper, use a procedure for the strip position fine adjustment to correct the position. (See System Mode Manual, Section 2.3.)*
7. *When a gap length is 5 mm or mover, first set a label length to the maximum (= label pitch – 2mm), then, fine adjust a strip position using a Strip position fine adjustment procedure. (See System Mode Manual, Section 2.3.)*
8. *If the top edge of media is curled onto the platen during the cut issue, set the Forward Wait parameter in the system mode to ON. (See System Mode Manual, Section 2.2.)*
9. *When using a label stock, or tag paper with a thickness of 150μm (0.15mm) or less, move the Head Position Levers toward the printer front (① LABEL). If clear print cannot be obtained, move the levers opposite.*
   When using tag paper with a thickness of exceeding 150μm (0.15mm), move the Head Position Levers toward the printer back (② TAG). If clear print cannot be obtained, move the levers opposite.



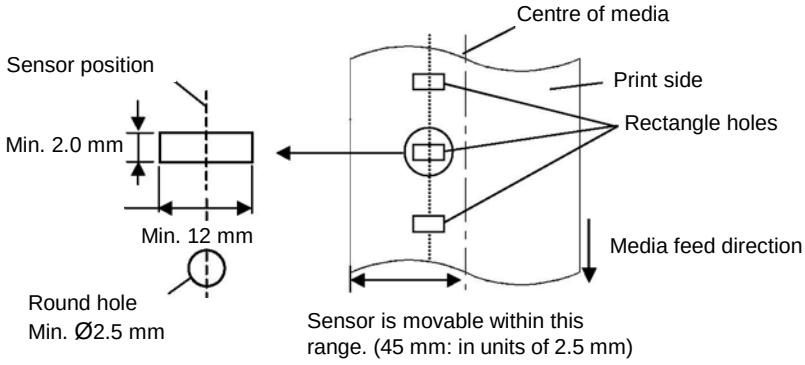
10. *Thermal paper used for the direct thermal printing must not have the specifications which exceed Ca^{2+}, K^{+}, Na^{+} 800 ppm, K^{+} 250 ppm, and Cl^{-} 500 ppm.*
11. *Avoid using media containing SiO_2 or talc which wears the print head protection layer.*
12. *Ink used for pre-printing the media should not contain hard substances such as carbonic calcium ($CaCO_3$) and Kaolin (Al_2O_3, $2SiO_2$, $2H_2O$).*
13. *Use of the tag paper of 25 mm to 50 mm in width and 171 μm to 263 μm in thickness may shorten the platen life.*
14. *When using a label stock in cut mode, be sure to cut the gaps. Cutting labels will cause the glue to stick to the cutter, which may affect the cutter performance and shorten the cutter life.*
15. *To make tearing off a label easier, set the Auto Forward Wait function (Forward Wait parameter) to ON in the system mode (See System Mode Manual, Section 2.2). Doing so will cause the last label printed to be fed and stopped past the strip shaft. However, if a next label is issued without tearing off the label on the strip shaft, the label may peel while it is fed backward, causing a printer failure.*

(2) Specification of a Gap or a Black Mark

- **Feed Gap Sensor and a Gap**

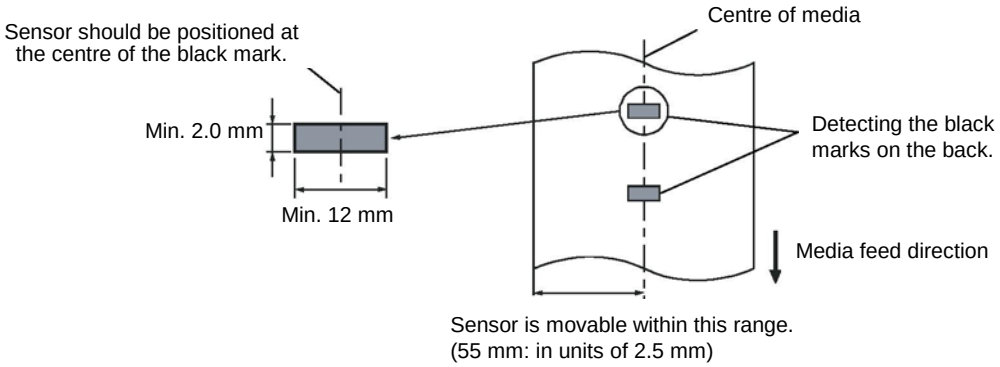


<Tag paper> A hole is used for detection.



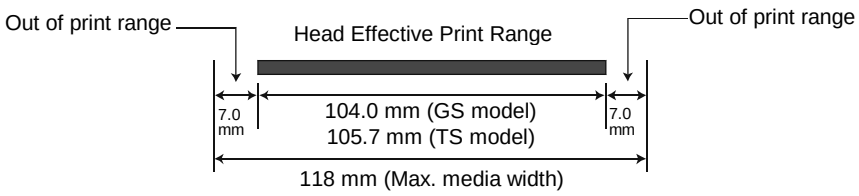
- **Black Mark Sensor and a Black Mark**

<Tag paper> A black mark is used for detection.

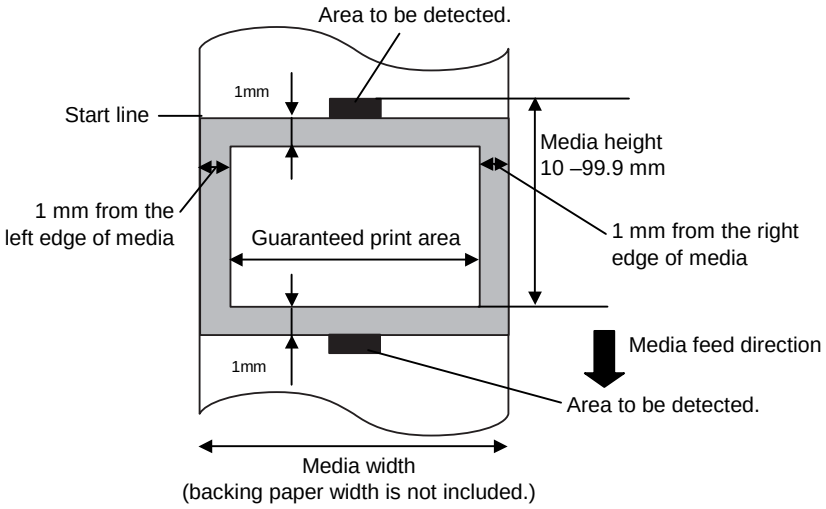


(3) Effective Printing Area

- Relationship between the head effective print width and paper



- Effective printing area of a label/tag paper



***NOTES**:*

1. *Be sure not to print on the 1-mm wide area from the media edges (shaded area in the above figure). Printing this area may cause ribbon wrinkles, resulting in a poor print quality of the guaranteed print area.*
2. *The center of media is positioned at the center of the Print Head.*
3. *Print quality in the 3-mm area from the print head stop position (including 1-mm non-printable area for print speed slow down) is not guaranteed.*

2.2 Ribbon

(1) Specification of Ribbon

No.	Item		Specification
1	Shape		Spool type
2	Width		60 to 110 mm (Recommended width is 60, 90, and 110 mm)
3	Max. length		450 m (within ø 75 mm)
4	Max. outer diameter		ø 75 mm
5	Back treatment		Coated
6	Core	Material	Cardboard
		Shape	See the following figures.
7	Leader tape		Polyester film (Opaque), 260 ± 5 mm long
8	End tape		None
9	Winding method		The ink side faces outside of ribbon winding

NOTES: *1. To ensure print quality and print head life use only TOSHIBA TEC specified ribbons.*
2. Too much difference in width between media and ribbon may cause ribbon wrinkles. To avoid ribbon wrinkles use a ribbon for proper media width shown in the above table. Do not use a ribbon that is narrower than media.

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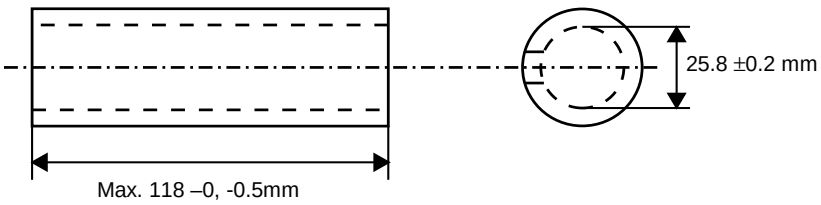
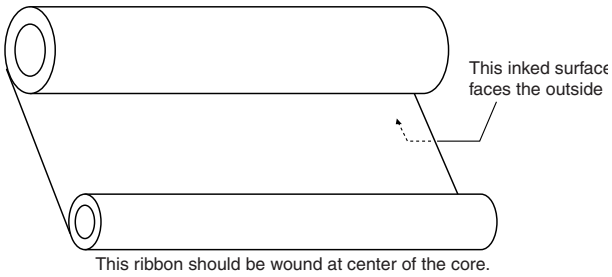
Ribbon width	60 mm	90 mm	110 mm
Proper media width	25 to 55 mm	55 to 85 mm	85 to 105mm

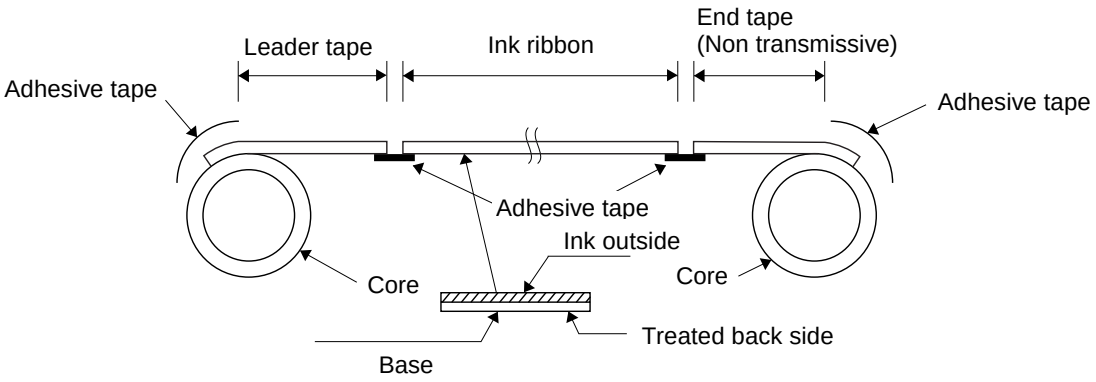
(2) Ribbon Core Shape



NOTE: *When purchasing ribbon locally, they must meet the above size. There may be TOSHIBA TEC-approved ribbons which do not fall within the above size, however, they have no functional problem.*

(3) Appearance of Ribbon





2.3 Care and Handling of the Media and Ribbon

CAUTION!
Be sure to read carefully and understand the Supply Manual. Use only media and ribbon which meet specified requirements. Use of non-specified media and ribbon may shorten the head life and result in problems with bar code readability or print quality. All media and ribbon should be handled with care to avoid any damage to the media, ribbon or printer. Read the following guideline carefully.

- Do not store the media and ribbon for longer than the manufactures recommended shelf life.
- Store media rolls on the flat end, do not store them on the curved sides as this might flatten that side causing erratic media advance and poor print quality.
- Store the media in plastic bags and always reseal after opening. Unprotected media can get dirty and the extra abrasion from the dust and dirt particles will shorten the print head life.
- Store the media and ribbon in a cool, dry place. Avoid areas where they would be exposed to direct sunlight, high temperature, high humidity, dust or gas.

For further information please contact your local distributor or your media and ribbon manufacturer.

2.4 Specification of RFID Tag

2.4.1 General Description

The RFID supplies are RFID tag (wireless IC tag) inlays designed to be converted into tag and label applications. Printers, which are equipped with an RFID kit, can print data on the surface of RFID tags as well as write data on them.
The B-SA4T series optional RFID kit, B-SA704-RFID-U2-EU-R, is destined for Europe and operates in the UHF band 869.7MHz to 870.0MHz (Center Frequency: 869.85MHz).

***NOTE**: Regarding the specification of RFID supplies and the ribbon used for printing on them, refer to Section 2.1 MEDIA and Section 2.2 RIBBON.*

2.4.2 Available RFID Tag

The B-9704-RFID-U2-EU-R supports EPC C1 Gen2 tags.

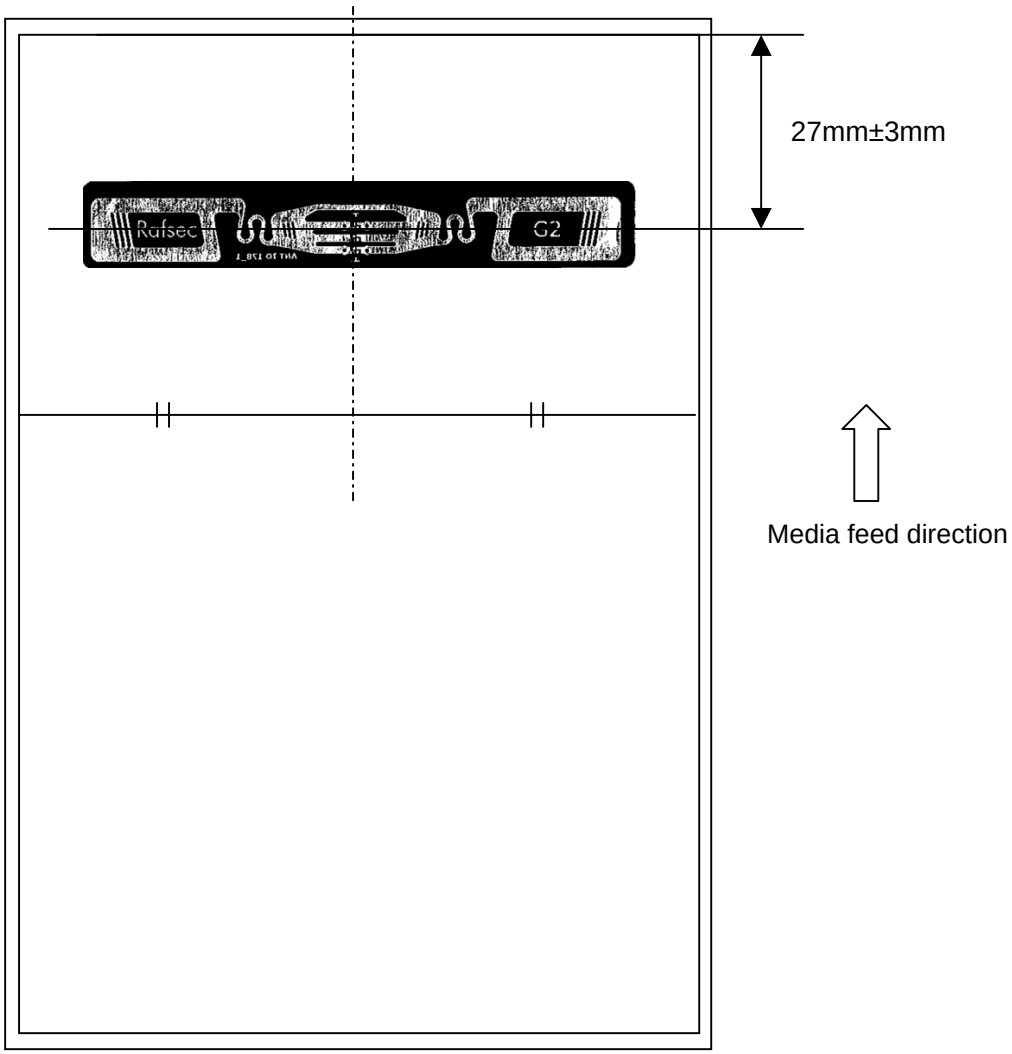
2.4.3 Location of RFID Tag

The location of an RFID tag in a label influences on the accuracy of writing data on the RFID tag. It is impossible to define the one best location for every RFID tag in labels because the best location depends on the type of RFID tag and RFID tag antenna.
The RFID Analyze Tool (7FM001113) can evaluate the accuracy of writing data on the RFID tag. For the usage of this tool, refer to the RFID Analyze Tool Operation Specification (TAA-2195).

As a guideline, the best location for some common RFID tags is given below.
It is recommended to use the RFID Analyze Tool to evaluate the accuracy of writing data on an RFID tag to be used, then determine a specific location of the RFID tag.
If the RFID tag cannot be placed on the best location specified, perform a forward/reverse feed before a data write using the RFID Tag Position Adjustment Command ([ESC]@003).
However, the label bottom edge may be stuck on the print head edge during a reverse feed from the print start position, resulting in a feed jam. Therefore, a location where no reverse feed is required is the ideal location.

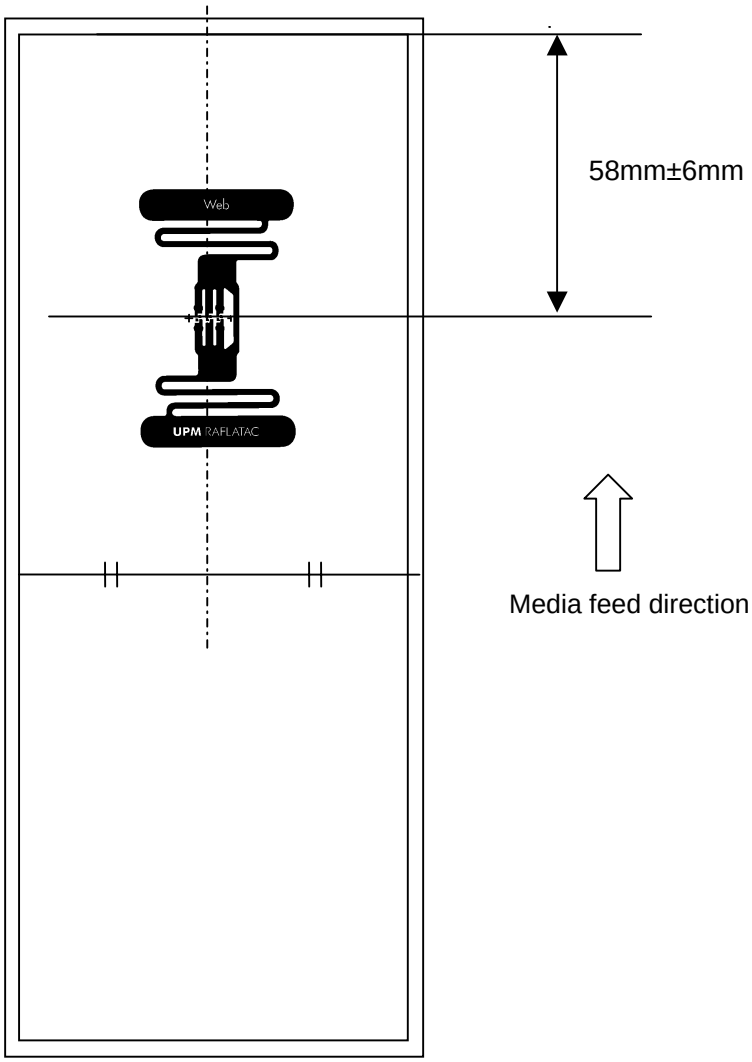
Note that the best location described in this specification may not be applicable depending on the type or paper or glue even if the same RFID tags are used. This guideline applies to RFID labels for thermal transfer issue. When using the media made of PET or thermal paper, the best location needs to be found again.

(1) UPM Raflatac's Rafsec Short Dipole 2 Tag
It is recommended to locate the vertical center of an RFID tag at 27 mm ± 3 mm from a leading edge of a label and align the horizontal center with the horizontal center of the label.



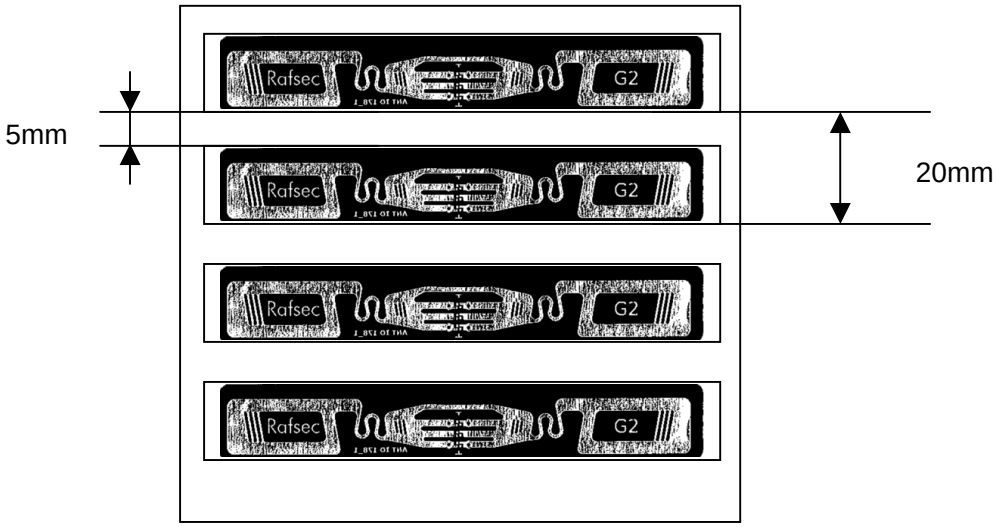
(2) UPM Raflatac's Rafsec WEB Tag
It is recommended to locate the vertical center of an RFID tag at 58 mm ± 6 mm from a leading edge of a label and align the horizontal center with the horizontal center of the label.

As this tag intersects vertically to the antenna of the RFID kit, the radio receiving area becomes narrower, which may cause the sensitivity to be low. In this case, an AGC threshold for data write is required to be set again. The factory default of the AGC threshold for data write is 11, however, it is recommended to change this value to 10.
Especially, when the operating temperature is low (5°C to 10°C), the sensitivity tends to become low. Variation of the sensitivity of tags may also lower the read rate. Operation at normal temperature (15°C to 30°C) is desired.



2.4.4 Short-pitch tag (Rafsec Short Dipole2)

A Shield Sheet is supplied with the B-SA704-RFID-U2-EU-R to enable the RFID kit to encode short-pitch tags properly. When the Shield Sheet is attached to the printer, the write field will be narrower.
The RFID kit is designed so that the second label is positioned just above the antenna while the first label is at the print start position, when using the following short-pitch label.



After printing a label, a reverse feed for a distance equivalent to one label pitch is required to write data onto its tag. During this reverse feed, the bottom edge of the printed label may be stuck on the print head edge, causing a feed jam. This is because the labels become thicker due to embedded tags.
When several labels are issued in a batch, set the offset printing parameter to 1 (Offset printing is performed without a reverse feed of the first label.) in order to make the printer issue labels without performing a reverse feed. In this case, however, the printer does not print or write data on the first label, so it is wasteful. This mode is not suitable for applications where a small number of labels are issued on an as-needed basis.
For details of the offset printing feature, refer to the B-SA4T External Equipment Interface Specification (EAA-2165).

2.4.5 Cautions for using RFID Tags

(1) Damage to Thermal Head by RFID Chip
The thermal head may be damaged when it passes over an RFID tag chip.
Our endurance test using TOPPAN's Class 1 Generation 2 labels proved that issuing 1,200,000 labels did not damage the thermal head. However, the thermal head may be damaged depending on RFID tag types or embedded conditions of tags.

(2) Storage of RFID Supplies
Do not store RFID tags close to printers, or their communication performance may not be as specified when they are used.

(3) Roll-type RFID Supplies
When RFID supplies are to be rolled, roll hardness must be concerned.
Although it depends on the type of glue, tag, and backing paper, RFID-tag embedded labels tend to stay rolled. Especially, when they are wound outside, a media jam error may occur. Unless otherwise specified, it is recommended that the RFID-tag embedded labels be wound inside.

(4) Sensor
When the transmissive sensor or reflective sensor is enabled, transmissivity or reflectivity of a label or tag may vary at an RFID-tag embedded area depending on the pattern of an antenna or other factors. In such cases, a manual threshold setting is required in Online mode. For details, refer to the B-SA4T Key Operation Specifications (EAA-2166).

(5) Cutter
When an RFID label or tag is used in cut issue mode, care must be taken not to cut an antenna of the RFID tag or an IC chip in order not to damage the cutter.

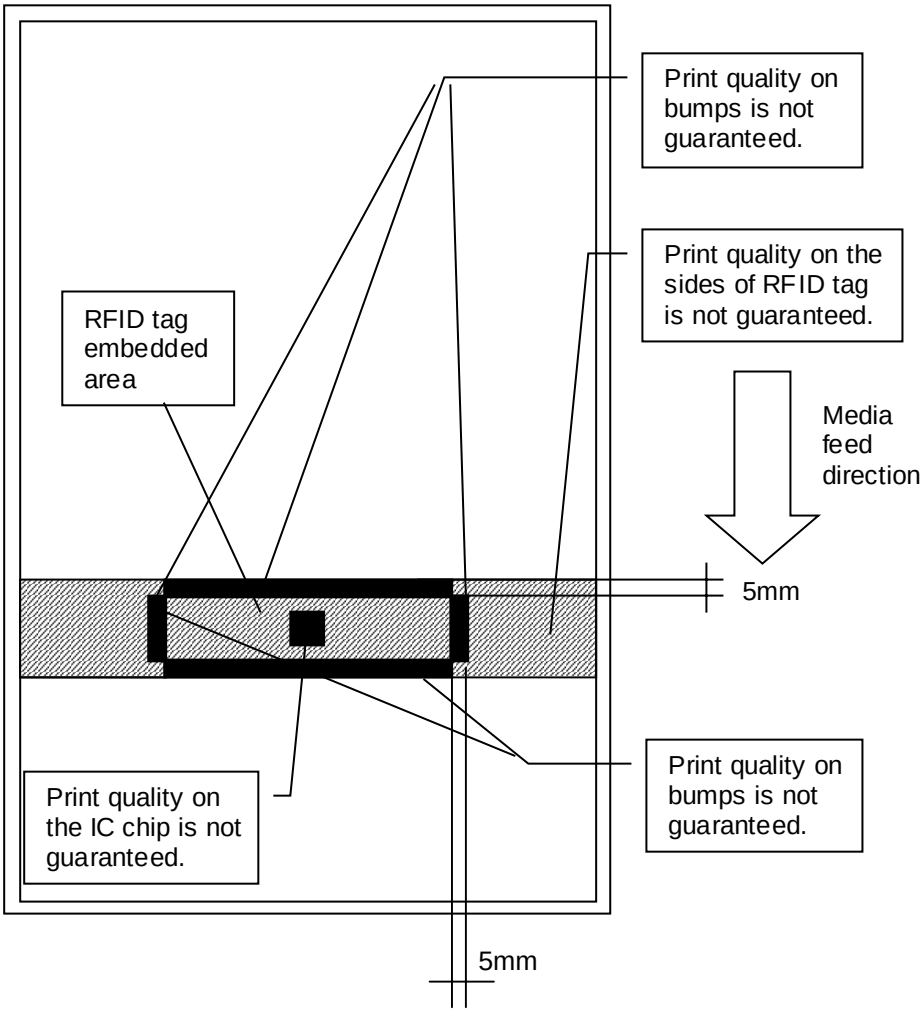
(6) Static Electricity
When printing is performed in a place where humidity is low or under some specific conditions, writing data on an RFID tag may fail due to static electricity generated by a label or a ribbon.

2.4.6 Printing on Bump (Chip/Antenna) Area

Embedding RFID tags in labels creates bumps in a chip/antenna area in the labels, causing incomplete printing.

Especially, in the areas 5 mm from and left and right sides of the RFID-tag embedded area shown in the figure below, uneven printing or incomplete printing can occur easily.

NOTE: *The degree of poor printing quality differs depending on height of a chip/antenna used.*



2.4.7 Ambient Temperature

Low temperature deteriorates wireless performance, under which conditions writing data on an RFID tag may fail.

2.4.8 Strip Issue

Stripping performance in strip issue mode depends on the type of glue, tag, and backing paper. For some RFID supplies used, an issue may not be performed properly in strip issue mode.

2.4.9 Caution for Minimum Label Pitch Length

When media, of which label pitch length is short, is used, data may be written on an RFID tag next to the target RFID tag.
As the location, where data is to be written, differs among RFID tag types, a check must be performed to make sure that the data is written on the target RFID tags.
The B-SA RFID Analyze Tool (7FM001113) can be used for this purpose.

2.4.10 Defective RFID Tag

Defective tags could be embedded while they are converted into labels, and the error rate differs depending on the tag types or the conversion methods.
Label manufacturers should mark such defective labels with something to indicate the tag is defective, or should prevent defective tags from being used.
Also, how to identify defective tags and good tags should be properly notified to end users.

2.4.11 Print Position Accuracy

When using RFID tag embedded media, the print position accuracy may exceed the guaranteed tolerance of ±1 mm in all issue modes.
It is required to check the print position accuracy for each media type.

2.4.12 Paper Jam Error

Depending on the type of glue or the flexibility of labels, a label may come unstuck in front of the sensor unit, which cause a paper jam. Particularly, the frequency of paper jam could become higher on the condition of low operating temperature or use of short-pitch labels.
It is required to check the media feed using the media to be used under the actual operating environment.

2.4.13 Improvement of Writing Accuracy

As RFID tags use wireless technologies, writing data on the RFID tag may fail depending on environment and characteristics of the RFID tags.
In order to improve the accuracy of writing data on the RFID tags, the following method can be used:

(1) Change of the maximum number of write retries
The maximum number of write retries is variable and can be changed in the system mode. Setting the greater value can improve the writing accuracy. However, overall printing throughput may become worse because a retry is also performed for tags on which data cannot be written.
For details of settings, refer to the B-SA4T Key Operation Specification (EAA-2166).

(2) Enabling of RFID adjustment for retry
The printer has the RFID adjustment for retry feature. If writing data on the RFID tag fails, the printer automatically feeds the RFID tag forward or backward for a specified length in order to retry a data write.
Enabling this feature can improve the writing accuracy. However, overall printing throughput may become worse because a retry is performed even for defective tags.
For details of settings, refer to the B-SA4T Key Operation Specification (EAA-2166).

(3) Adjustment of location of antenna

When writing data on tags, especially on short-pitch tags, the antenna may communicate with non-target tags, and this lowers the write rate.

The B-SA4T has a feature to pinpoint a target tag by evaluating the output power (AGC) of tags. Setting an AGC threshold for data write enables choosing a tag of which AGC is higher than the threshold, determining this tag to be a target tag positioned just above the antenna, and writing data on it. This feature can prevent writing data to non-target tags (= off the antenna).

For details of settings, refer to the B-SA4T Key Operation Specification (EAA-2166).

3. OPTIONAL KIT

Option Name	Type	Usage
300-dpi Print Head	B-SA704-TPH3-QM-R	This print head enables a conversion of a 203-dpi print head of the B-SA4TM-GS12 model into a 300-dpi print head. This option is intended for use when you desire to print Kanji (Chinese characters) or to obtain clearer print.
Cutter module	B-SA204-QM-R B-SA204P-QM-R B-SA204-QM	A cutter which cuts the media one by one. This module is slim and compact enough to be fitted in the Front Cover. ***NOTE:*** *The B-SA204-QM and the B-SA204-QM-R are exclusively for the B-SA4TM series.* *The SA-204P-QM-R is exclusively for the B-SA4P series.*
Strip module	B-SA904-H-QM-R B-SA904P-H-QM-R	This module peels off a printed label from the backing paper at the media outlet. It is slim and compact enough to be fitted in the Front Cover. ***NOTE:*** *The B-SA904-H-QM-R is exclusively for the B-SA4TM series. The B-SA904P-H-QM is exclusively for the B-SA4TMP series.*
Serial Interface Board	B-SA704-RS-QM-R	Installing this PC board provides an RS232C interface port.
Wireless LAN Board	B-SA704-WLAN-QM B-SA704-WLAN-QM-R	Installing this PC board allows a communication by wireless LAN.
RFID module	B-SA704-RFID-U2-EU-R	Installing this module enables read and write of RFID tags. Frequency range: 869.7-870.0MHz (Center frequency: 869.85MHz). Available RFID tag type: EPC C1 Gen2.
Expansion I/O Board	B-SA704-IO-R-QM	Installing this board in the printer allows a connection with an external device with the exclusive interface.
Real Time Clock	B-SA704-RTC-QM-R	This module holds the current time: year, month, day, hour, minute, second

NOTE*: To purchase the optional kits, please contact the TOSHIBA TEC Head Quarters.*

3.1 Cutter Module: B-SA204-QM/B-SA204-QM-R/B-SA204P-QM-R

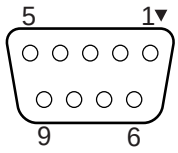
Item	Specification
Cutting method	Guillotine cutter
Media to be cut	Thermal paper, normal paper, label stock
Media thickness	80 to 290µm
Rated voltage	DC24V ±5%
Cutter life	80 to 160mm-thick paper: 1000000 cuts 160 to 290mm-thick paper: 500000 cuts
Operating environment Temperature Humidity	 0 to 40°C 25 to 85% RH (No condensation)
Storage environment Temperature Humidity	 -10 to 50°C 5 to 90% RH (No condensation)
Media feed speed	2”/sec., 4”/sec., 6”/sec.
Cutting time	0.5 sec. or less/cut
Cut cycle	2 sec. or more/cycle
Dimension	184mm (W) x 212mm (H) x 87mm (D)
Weight	Approximate1500 g
Safety device	Power supply is stopped when the interlock switch detects an open of the cutter front cover.
Removal of jammed media	In case of a cutter error due to a media jam, rotate the cutter motor shaft by hand to remove the jammed media.

3.2 Strip Module: B-SA904-H-QM-R/B-SA904P-H-QM-R

Item	Specification
Peel off method	Backing paper feed rollers draw the backing paper.
Media to be stripped	Thermal label, normal label
Backing paper width	25.4mm to 114 mm
Label width	21.4 to 110 mm
Label length	13 to 997 mm
Label pitch	15 to 999 mm
Gap length	2 to 5 mm
Effective print length	11 to 995 mm
Media thickness	130 to 170µm
Operating environment Temperature Humidity	 0 to 40°C 25 to 85% RH (No condensation)
Storage environment Temperature Humidity	 -40 to 60°C 10 to 90% RH (No condensation)
Strip speed	2 ips, 4 ips, 6 ips
Dimension	146mm (W) x 201 mm (H) x 50mm (D) (Front cover is not included.)
Weight	Approximate 1000 g

***NOTE**: Labels of which length exceeds 76.2 mm may stick to the media outlet after it is stripped from the backing paper.*

3.3 Serial Interface Board: B-SA704-RS-QM-R

Item	Specification		
Type	RS-232C		
Communication mode	Full duplex		
Transmission speed	2400 bps, 4800 bps, 9600 bps, 19200 bps, 38400 bps, 115200 bps		
Synchronization	Start-stop synchronization		
Start bit	1 bit		
Stop bit	1 bit, 2 bit		
Data length	7 bit, 8 bit		
Parity	None, Even, Odd		
Error detection	Parity error, Framing error, Overrun error		
Protocol	Unprocedure communication		
Data input code	ASCII code, European character 8 bit code, Graphic 8 bit code, JIS 8 code, Shift JIS Kanji code, JIS Kanji code		
Receive buffer	1M byte (shared with other interface)		
Connector	Pin No.	Signal	
	1	N.C	
	2	TD (Transmit Data)	
	3	RD (Received Data)	
	4	DSR (Data Set Ready)	
	5	SG (Signal Ground)	
	6	DTR (Data Terminal Ready)	
	7	CTS (Clear to Send)	
	8	RTS (Request to Send)	
	9	N.C	

3.4 Wireless LAN Board: B-SA704-WLAN-QM

■ Hardware Specification

Item	Specification		
Wired LAN part	Connected to a wired LAN port of the printer.		
Wireless LAN part	IEEE802.11a	Transfer mode	Conforming to IEEE802.11a Orthogonal Frequency-Division Multiplexing (OFDM)
		Channel	Depending on countries
		Transmission speed	54, 48, 36, 24, 18, 12, 9, 6 (Mbps) (Fix/automatic)
		Access method	CSMA/CA+ACK (RTS/CTS)
		Wireless category	Small power data communication system (5.150 to 5.250GHz)
		Radio wave power	10mW/MHz or less
	IEEE802.11b	Transfer mode	Conforming to IEEE802.11b DSSS
		Channel	Depending on countries
		Transmission speed	11, 5.5, 2, 1 (Mbps) (Fix/automatic)
		Access method	CSMA/CA+ACK (RTS/CTS)
		Wireless category	Small power data communication system (2.4 to 2.497GHz)
		Radio wave power	10mW/MHz or less
	IEEE802.11g	Transfer mode	Conforming to IEEE802.11g OFDM, DSSS
		Channel	Depending on countries
		Transmission speed	54, 48, 36, 24, 18, 12, 9, 6, 11, 5.5, 2, 1 (Mbps) (Fix/automatic)
		Access method	CSMA/CA+ACK (RTS/CTS)
		Wireless category	Small power data communication system (2.4 to 2.4835GHz)
		Radio wave power	10mW/MHz or less
	Antenna		Chip type, diversity antenna

■ Software Specification

Item	Specification
Unit type	Access point [Station]
Operating mode	Standard, [Compatible], Advanced
Default country code	US
Default IP address	192.168.10.21
Default subnet mask	255.255.255.0
Default password	Described separately.
Encryption	WEP (64.128.152 bit) or AES, AES-OCB (128 bit) TKIP (only when using WPA, WPA-PSK) TWSL (Unique encryption) only when a POS is connected.
Parameter setting	Browser or telnet (For telnet, internal use only)
Browser	Microsoft IE5.01 or greater
Protocol	IP (RFC791), ICMP (RFC792), UDP (RFC768) TCP (RFC793, 896), ARP (RFC826), HTTPD (RFC1866), TELNET FTPD (RFC959), DHCP (RFC2131), SNMP

■ Country code

As available frequency bands are different from country to country, be sure to set a country code before installing a wireless LAN module in a user's printer. Also, ask an end user to confirm a country code. Use of a wireless LAN module with a wrong country code could violate each country's Laws and Regulations for Radio Equipment, and violators could be subject to penalties.
The country code cannot be changed through the Web browser, but TELNET.

<How to set a country code using TELNET>

CAUTION! *The following information must not be disclosed to users. (Internal use only)*

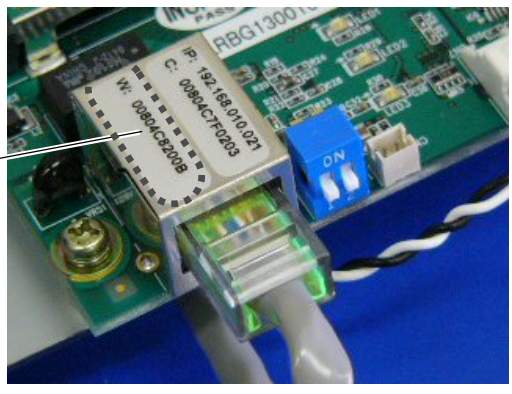
(1) Disconnect the LAN cable connected to the printer, connect the printer to a host PC with a straight LAN cable via a relay connector.
When using a hub in place of a relay connector, use a cross cable or
(2) Open the MS-DOS prompt, type in "telnet 192.168.10.21" (default IP address).
(3) Enter a password, "tecbcp", to log in.
(4) From the top menu, change a country code using the following command.
=>ctryXX (XX=new country code. See Country Code Table.)
(5) The new country code will become effective by turning the printer off and on again.
(6) A country code can be checked by typing "=>ctry" on the telnet console.

Country Code Table

Country code	Country name	Country code	Country name	Country code	Country name
US	U.S.A./Canada	GR	Greece	IE	Ireland
FR	France	SE	Sweden	GB	U.K.
PT	Portugal	HU	Hungary	AU	Australia
NO	Norway	BE	Belgium	FI	Finland
DE	Germany	IT	Italy	LU	Luxembourg
ES	Spain	NL	Netherlands	CH	Switzerland
IS	Iceland	LI	Liechtenstein	NZ	New Zealand
AT	Austria	DK	Denmark		

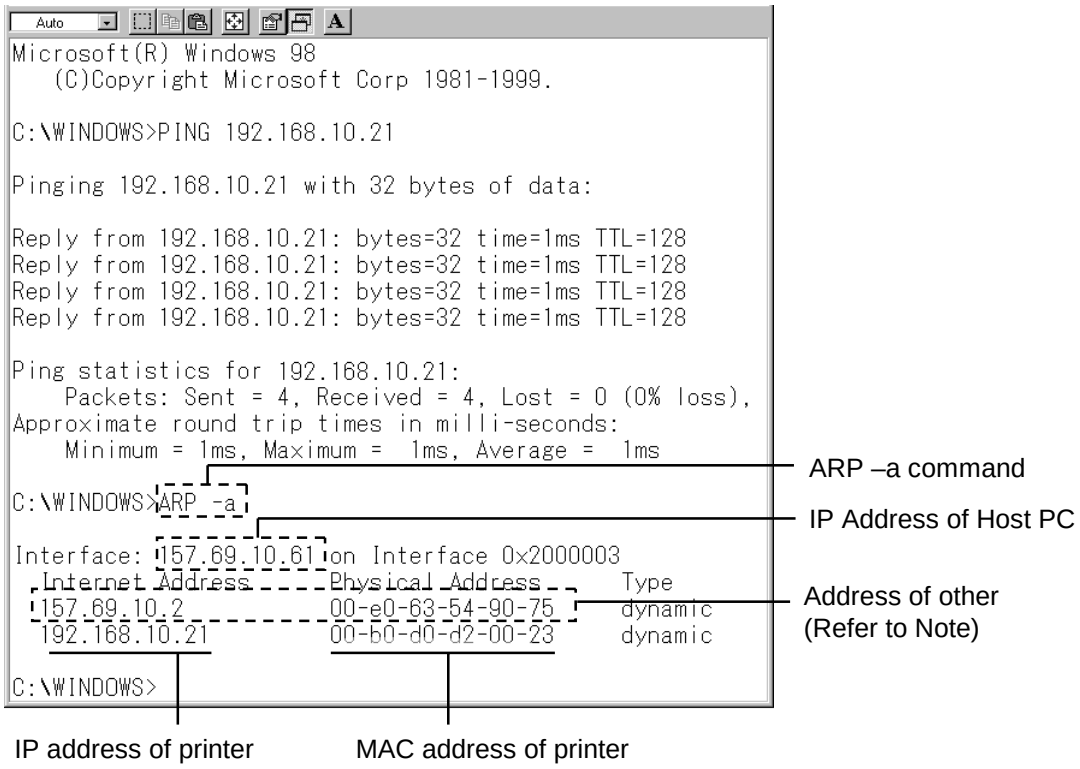
■ MAC address

MAC address of the Wireless LAN module will be necessary when setting the MAC address filtering function of an access point. As it is printed on the top of the wired LAN connector on the Wireless LAN Board, write down it on Installation Manual before mounting the covers so that an end user can know the MAC address.



***NOTE**: MAC address can be checked by using "arp -a" command on MS-DOS Prompt.*

<Example>
The following screen shows an example of executing an arp –a command on MS-DOS Prompt.
After wireless LAN board (default IP address: 192.168.10.21) is pinged, IP address and MAC address are displayed.



***NOTE**: As obtained IP address and MAC address are stored in the cache of the host for a certain period of time, other device's address may be displayed.*

■ LED

<Operation>

LED	Status	LAN status
LED1 (Red)	ON	Communicating
	Blink	Starting
LED 2 (Orange)	ON	Wired LAN is connected.
	Blink	Communicating with the printer
	OFF	Disconnected from the printer.
LED 3 (Orange)	ON	In case of station mode: Log in the access point. In case of access point mode: User unit is log in.
	Blink	Communicating with a device connected via wireless LAN.
	OFF	In case of station mode: Log out from the access point. In case of access point mode: User unit is log out.

<Downloading the firmware>

LED	Status	LAN status
LED1 LED2 LED3	Blink at the same time	Firmware is being overwritten.

<Error>

LED	Status	LAN status
LED2	Blink	Wired LAN error
LED3	Blink	Wireless LAN error

■ Certification

The wireless LAN module complies with the following standards.

FCC: Part 15B/Part 15C/Part 15E
CE: R&TTE (Certification for wireless LAN module)
IC: Canada EMC standard (To be certified in August 2005)

■ Precautions

- When using this product, please follow the Laws and Regulations for Radio Equipment.
- IEEE802.11g and IEEE802.11b uses 2.4GHz band. As a microwave uses the same frequency band, interference may take place depending on the location where this product is installed.
- Also, this frequency band is IMS band. Do not use this product in locations where use may be forbidden, for example, in an airport or hospital.
- This product communicates with other devices by radio. Depending on the installation location, orientation, environment, etc., its communication performance may deteriorate or devices installed near by may be affected.
- Before installing this product, conduct a site survey.

■ Handling Precautions for B-SA704-WLAN-QM

- Even in a country where the printer is shipped, this wireless LAN module cannot be used unless the country code is matched.
- Use of this module in Japan is prohibited.
- Regarding the shipment to Canada:
  This module is under application for certification as of June 2005, and to be certified in August 2005. Until then, a shipment or use of this module to/in Canada is forbidden by the Radio Waves Law of Canada. As soon as certified, we will announce to you separately.
  The country code is “US”.
- IEEE802.11a standard
  IEEE802.11a-compliant devices are only for indoor use. Outdoor use is prohibited by Radio Law. (As of June 2005)
- How to connect to telnet and set a country code must be secret to end users.
  Use of a wireless LAN module with a wrong country code could violate each country’s Laws and Regulations for Radio Equipment, and violators could be subject to penalties.
- Take security measures to prevent illegal access.

3.5 300-Dpi Print Head: B-SA704-TPH3-QM-R

Item	Specification
Print head type	KPG-106-12TAO4-TE
Effective print width	105.7±0.2mm
Number of dots	1248 dots
Resolution	11.8 dots/mm
Thermal element pitch	0.0847 mm
Average resistance	1000 ohm±3%
STROBE	2 strobe
Data input method	4 data input
Glazing Width Height	 700µm 25µm
Operating environment Temperature Humidity	 0 to 40°C 20 to 90% RH (No condensation)
Storage environment Temperature Humidity	 -5 to 50°C 5 to 90% RH (No condensation)
Applied voltage	24 V

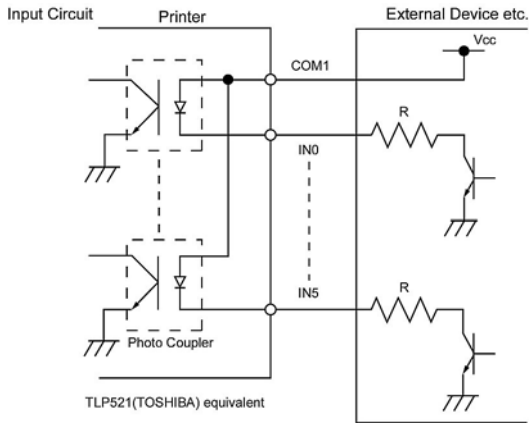
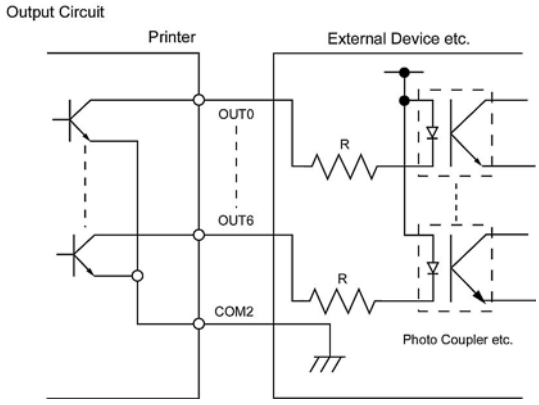
***NOTES**:*

1. *Do not touch the print head by bare hands.*
2. *Use TOSHIBA TEC approved media only.*
3. *Do not perform printing when the printer built up dew condensation.*
4. *Use a print head cleaner or a cotton swab or soft cloth slightly moistened with absolute ethyl alcohol to clean the print head element.*
5. *Care must be taken not to damage the print head by hitting a hard or sharp object against it.*

3.6 Real Time Clock: B-SA704-RTC-QM-R

Item	Specification
Clock function	Time counter (second/minute/hour) and calendar counter (day/day of the week/month/year) Automatic adjustment of leap years Battery-powered time keeping
Accuracy	RRT daily variance ±4 sec. (25°C)
Functions	Time and calendar data printing Low battery voltage detection Clock adjustment function
Battery	CR2032 (Standardized products can be used.)
Battery life	Approximately 2 years or more when the battery is fully charged. The battery power is burned as long as the battery is installed, as the real time clock automatically functions.
Operating Environment Temperature Humidity	 0°C to 40°C 20% to 90% (No condensation)

3.7 Expansion I/O Board: B-SA704-IO-QM-R

<table>
<tr><th>Item</th><th>Specification</th></tr>
<tr><td>Input Signal</td><td>IN0 – IN5</td></tr>
<tr><td>Output Signal</td><td>OUT0 – OUT6</td></tr>
<tr><td>Connector (External Device Side)</td><td>FCN-781P024-G/P or equivalent</td></tr>
<tr><td>Connector (Printer Side)</td><td>FCN-685J0024 or equivalent
<table>
<tr><th>Pin</th><th>Signal</th><th>I/O</th><th>Function</th><th>Pin</th><th>Signal</th><th>I/O</th><th>Function</th></tr>
<tr><td>1</td><td>IN0</td><td>Input</td><td>FEED</td><td>13</td><td>OUT6</td><td>Output</td><td></td></tr>
<tr><td>2</td><td>IN1</td><td>Input</td><td>PRINT</td><td>14</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>3</td><td>IN2</td><td>Input</td><td>PAUSE</td><td>15</td><td>COM1</td><td>Common (Power)</td><td></td></tr>
<tr><td>4</td><td>IN3</td><td>Input</td><td></td><td>16</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>5</td><td>IN4</td><td>Input</td><td></td><td>17</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>6</td><td>IN5</td><td>Input</td><td></td><td>18</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>7</td><td>OUT0</td><td>Output</td><td>FEED</td><td>19</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>8</td><td>OUT1</td><td>Output</td><td>PRINT</td><td>20</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>9</td><td>OUT2</td><td>Output</td><td>PAUSE</td><td>21</td><td>COM2</td><td>Common (Ground)</td><td></td></tr>
<tr><td>10</td><td>OUT3</td><td>Output</td><td>ERROR</td><td>22</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>11</td><td>OUT4</td><td>Output</td><td></td><td>23</td><td>N.C.</td><td>-----</td><td></td></tr>
<tr><td>12</td><td>OUT5</td><td>Output</td><td>POWER ON</td><td>24</td><td>N.C.</td><td>-----</td><td></td></tr>
</table>
N.C. : No Connection</td></tr>
<tr><td>Input Circuit</td><td> 
</td></tr>
<tr><td>Output Circuit</td><td> 
</td></tr>
<tr><td>Operating environment
Temperature
Humidity</td><td>
0°C to 40°C
20% to 90% (No condensation)</td></tr>
</table>

3.8 RFID Module: B-SA704-RFID-U2-EU-R

Item	Specification
Module	TOSHIBA TEC TRW-EUM-01 for Europe
Applicable standard	ETSI EN 300 220
Frequency range	869.7-870.0MHz
Center frequency	869.85MHz
Output power (ERP)	Max. 5mW (Power class 7a)
Output power (Conducted)	100mW
Modulation method (RW→Tag)	DSB-ASK
Modulation method (Tag→RW)	Back scatter ASK
Transmission speed (RW→Tag)	40kbps
Transmission speed (Tag→RW)	40kbps
Encoding (RW→Tag)	PIE
Encoding (Tag→RW)	FM0
Number of channels	1
Duty Cycle	Max. 100% (Class 4)
Carrier sense feature	None
Environmental standard	RoHS directive
Available RFID tag type	EPC C1 Gen2