2. Product specification and feature

2.1 Product Specifications

2.1.1 Product Overview

SCX-4600 series (3 in 1)

SCX-4623 series (4 in 1)

1. Print / Copy Speed
   • 23 ppm in letter

2. Processor
   • Jupiter5 375 Mhz

3. Printer Language Emulations
   • SPL

4. Memory
   • 64 MB (4600/4623F)
   •128 MB (4623FN)

5. Interfaces
   • One USB port
   • One 10/100 Base TX network connector (4623FN)

6. Toner cartridge
   • Initial : 0.7K / 1K
   • Sales : 1.5K / 2.5K two types

7. ADF (4623 series)

2.1.2 Specifications

• Product Specifications are subject to change without notice. See below for product specifications.

2.1.2.1 General Specifications

Items	SCX-4600 series	SCX-4623 Series
Net Dimension (W x D x H)	416 x 409 x 275.8 mm (16.4 x 16.1 x 10.9 inches)	416 x 415.4 x 318.9 mm (16.4 x 16.4 x 12.6 inches) * SCX-4623FH : Without hand set
Weight with Consumables	10.59 Kg (23.34 lbs)	SCX-4623F/FN : 11.54 Kg (25.44 lbs)
LCD	2 line x 16 characters	2 line x 16 characters
Memory	64MB	SCX-4623F : 64MB SCX-4623FN : 128 MB
Interface	Hi-Speed USB 2.0	Hi-Speed USB 2.0 Ethernet 10/100 Base TX (SCX-4623FN)
OS Compatibility *****	Windows 2000(32bit)/XP(32/64bit)/2003 Server(32/64bit)/Vista(32/64bit) Various Linux OS including Red Hat 8~9, Fedora Core 1~4, Mandrake 9.2~10.1, and SuSE 8.2~9.2 Mac 10.3, 10.4, 10.5	Windows 2000(32bit)/XP(32/64bit)/2003 Server(32/64bit)/Vista(32/64bit) Various Linux OS including Red Hat 8~9, Fedora Core 1~4, Mandrake 9.2~10.1, and SuSE 8.2~9.2 Mac 10.3, 10.4, 10.5
WHQL	Windows 2000, XP, 2003 Server, Vista(32/64bits)	Windows 2000, XP, 2003 Server, Vista(32/64bits)
Wired network Protocol	N/A	TCP/IP, Ethertalk, SNMP, HTTP 1.1 (SCX-4623FN)
Wired network Supporting OS	N/A	SCX-4623FN : Windows 2000/XP(32/64bits)/2003 Server/Vista(32/64bits) NetWare 5.x, 6.x Mac OS 8.6~9.2, 10.1~10.4 Various Linux OS including Red Hat 8~9, Fedora Core 1~4, Mandrake 9.2~10.1, SuSE 8.2~9.2 Unix AT&T system V(Rel 4.2), BSD4.3, HP-UX (Rel 9.x & Rel 10.x), SCO 5.x, SUNOS 5.5, Sparc or Solaris 2.5.
Noise ******	Stand by : Less than 26 dBA Printing : Less than 50 dBA Coping : Less than 52 dBA	Stand by : Less than 26 dBA Printing : Less than 50 dBA Coping : Less than 52 dBA
Power Requirement	110 ~ 127 VAC, 50/60 Hz, 4.5A 220 ~ 240 VAC, 50/60 Hz, 2.8A	110 ~ 127 VAC, 50/60 Hz, 4.5A 220 ~ 240 VAC, 50/60 Hz, 2.8A

Items	SCX-4600 series	SCX-4623 Series
Operating Conditions	Temperature : 10 ℃ ~ 32 ℃ (50 °F ~ 89 °F) Humidity : 20 % ~ 80 % RH	Temperature : 10 ℃ ~ 32 ℃ (50 °F ~ 89 °F) Humidity : 20 % ~ 80 % RH
Power Consumption	Ready : Less than 45W Average : Less than 370W Save : Less than 10W Power off : Less than 1W	Ready : Less than 45W Average : Less than 370W Save : Less than 10W Power off : Less than 1W
AMPV	142 pages	SCX-4623F : 194 pages SCX-4623FN : 269 pages
Duty Cycle, monthly	12,000 pages	12,000 pages
MTBF	10,000 pages	10,000 pages
MTTR	30 min.	30 min.
SCANLife Cycle	20,000 sheets or 5 years (whichever comes first)	20,000 sheets or 5 years (whichever comes first)
ADF Life Cycle	N/A	20,000 sheets or 5 years (whichever comes first)
SET Life Cycle	50,000 sheets or 5 years (whichever comes first)	50,000 sheets or 5 years (whichever comes first)

2.1.2.2 Print Specifications

Items	SCX-4600 series	SCX-4623 Series
Method	Laser Beam Printing	Laser Beam Printing
Speed (Simplex)*	Up to 22 ppm (letter)	Up to 22 ppm (letter)
FPOT (letter)	Less than 19sec (from sleep mode) Less than 10sec (from stanby mode)	Less than 19sec (from sleep mode) Less than 10sec (from stanby mode)
Warm-up	Less than 60 seconds (from power ON at room temp. 23℃/73°F) Less than 15 seconds (from sleep room temp. 23 ℃/73°F)	Less than 60 seconds (from power ON at room temp. 23℃/73°F) Less than 15 seconds (from sleep room temp. 23 ℃/73°F)
Resolution	Up to 1200dpi Effective Output (Addressable 1200x1200dpi)	Up to 1200dpi Effective Output (Addressable 1200x1200dpi)
Processor	Jupiter5 375MHz	Jupiter5 375MHz
Memory	64MB	SCX-4623F : 64MB SCX-4623FN : 128 MB
Emulation	SPL	SPL
Duplex Print	Manual	Manual

2.1.2.3 Copy Specifications

Items	SCX-4600 series	SCX-4623 Series
Speed **	SDMC: up to 23 cpm in letter	SDMC: up to 23 cpm in letter
Resolution (Optical)	Text: 600 x 300 dpi (Platen) Mixed: 600 x 300 dpi (Platen) Photo: 600 x 600 dpi (Platen)	Text: 600 x 300 dpi (Platen) Mixed: 600 x 300 dpi (Platen) Photo: 600 x 600 dpi (Platen)
FCOT(from Standby mode)	Approx. 15 seconds: Platen	Approx. 15 seconds: Platen Approx. 15 seconds: ADF
Zoom Rate	25~400% (platen)	25~400% (platen), 25~100% (ADF)
Multy Copy	1~99 pages	1~99 pages
Special Copy	AutoFit Copy: Yes(Platen only) 2-side Copy: Yes(Platen only) Clone: Yes(Platen only) Poster: Yes(Platen only)	N-up copy: 2-up / 4-up Collation Copy: Yes AutoFit Copy: Yes(Platen only) 2-side Copy: Yes(Platen only) Clone: Yes(Platen only) Poster: Yes(Platen only)
Duplex Copy	N/A	N/A
Duplex Print	Manual	Manual

2.1.2.4 Scan Specifications

Items	SCX-4600 series	SCX-4623 Series
Scanning Device	Color 1200 dpi CIS (Contact Type Image Sensor) Module	Color 1200 dpi CIS (Contact Type Image Sensor) Module
Supported OS	Windows 98/Me/NT4.0/2000/XP, Various Linux OS (via USB interface only) including Red Hat 8.0~9.0, Fedora Core 2~9, Mandrake 9.0~10.2, and SuSE 8.2~9.2, Mac 10.3~10.6	Windows 98/Me/NT4.0/2000/XP, Various Linux OS (via USB interface only) including Red Hat 8.0~9.0, Fedora Core 2~9, Mandrake 9.0~10.2, and SuSE 8.2~9.2, Mac 10.3~10.6
Compatibility	TWAIN Standard, WIA Standard (Win XP only)	TWAIN Standard, WIA Standard (Win XP only)
Maximum Scan Width	216mm (8.5 inches)	216mm (8.5 inches)
Effective Scan Width	208mm (8.2 inches)	208mm (8.2 inches)
Optical Resolution	Max 1200 x 1200 dpi	Max 1200 x 1200 dpi
Interpolated Resolution	Maximum 4800 dpi x 4800 dpi	Maximum 4800 dpi x 4800 dpi
Preview Scan	75 dpi	75 dpi

Items	SCX-4600 series	SCX-4623 Series
Scan Modes/Speeds: (PC Environment : Win XP, P4-2.4GHz, 512M RAM, 300 dpi, Letter, USB1.1, Photoshop 6.0.1)	Line Art, Halftone : 15 sec on Platen, 15 sec on ADF Gray : 23 sec on Platen, 26 sec on ADF 256 Color 300 dpi : 65 sec on Platen, 70 sec on ADF True Color 300dpi : 65 sec on Platen, 70 sec on ADF	Line Art, Halftone : 15 sec on Platen, 15 sec on ADF Gray : 23 sec on Platen, 26 sec on ADF 256 Color 300 dpi : 65 sec on Platen, 70 sec on ADF True Color 300dpi : 65 sec on Platen, 70 sec on ADF
ADF Capacity:	N/A	40 sheets (20 lb)

2.1.2.5 Fax Specifications

Items	SCX-4600 series	SCX-4623 Series
Compatibility	N/A	ITU-T Group 3, ECM
Applicable line	N/A	Public Switched Telephone Network (PSTN)
Modem Speed	N/A	33.6 Kbps
Transmission Speed ***	N/A	Approx. 3 seconds per page
Compression Mode	N/A	MH/ MR/ MMR/ JBIG/ JPEG
Scan Speed ****	N/A	Std : Approx. 2.5 seconds per page (LTR) Fine/S.Fine : Approx. 5 seconds per page (LTR)
Fax mode	N/A	Standard : 203 x 98 dpi Fine : 203 x 196 dpi Super Fine : 300 x 300 dpi
Memory	N/A	4MB (About 600 Sheets of CCITT No.1 Chart at standard resolution). User selectable parameters will be stored in NVRAM.
Functions	N/A	Voice Request : No TTI : Yes RTI : Yes Polling :No Earth/Recall :No Auto Reduction : Yes F/W Remote upgrade :Yes

2.1.2.6 Paper Handling

Items		SCX-4600 series	SCX-4623 Series
Standard Capacity		250-sheets Cassette Tray, 1-sheet Multi Purpose Tray @ 80g/㎡	250-sheets Cassette Tray, 1-sheet Multi Purpose Tray @ 80g/㎡
Maximum Capacity		251 sheets @ 80g/㎡	251 sheets @ 80g/㎡
Printing	Max. Size	216 x 356 mm (8.5” x 14”)	216 x 356 mm (8.5” x 14”)
	Min. Size	76 x 127 mm (3.0” x 5.0”)	76 x 127 mm (3.0” x 5.0”)
1st Tray	Capacity	250 sheets @ 80g/㎡	250 sheets @ 80g/㎡
	Media Sizes	A4, A5, A6, Letter, Legal, Executive, Folio, Oficio, ISO B5, JIS B5	A4, A5, A6, Letter, Legal, Executive, Folio, Oficio, ISO B5, JIS B5
	Media types	Plain paper, Thick Paper, Thin Paper, Recycled Paper, Archive Paper	Plain paper, Thick Paper, Thin Paper, Recycled Paper, Archive Paper
	Media weight	16~32lb (60 to 120g/㎡)	16~32lb (60 to 120g/㎡)
	Sensing	Paper empty sensor	Paper empty sensor
2nd Tray Capacity		N/A	N/A
Manual Tray	Capacity	1 sheet @ 80g/㎡	1 sheet @ 80g/㎡
	Media Sizes	A4, A5, A6, Letter, Legal, Folio, Oficio, Executive,ISO B5, JIS B5, 3"x5",Monarch, No.10, DL, C5, C6	A4, A5, A6, Letter, Legal, Folio, Oficio, Executive,ISO B5, JIS B5, 3"x5",Monarch, No.10, DL, C5, C6
	Media types	Plain paper, Thick Paper, Thin Paper, Recycled Paper, Archive Paper,Transparency, Envelope, Labels, Post Card, Card stock, Custom	Plain paper, Thick Paper, Thin Paper, Recycled Paper, Archive Paper,Transparency, Envelope, Labels, Post Card, Card stock, Custom
	Media weight	16~43lb (60 to 163g/㎡)	16~43lb (60 to 163g/㎡)
	Sensing	NA	NA
Output Stacking		80 sheets @ 75g/㎡	80 sheets @ 75g/㎡
Printable Area Non-Printable Area		Envelop : 10mm(0.4”) from edge(Top, Bottom, Left, Right) Other Media : 4mm(0.16”) from edge(Top, Bottom, Left, Right)	Envelop : 10mm(0.4”) from edge(Top, Bottom, Left, Right) Other Media : 4mm(0.16”) from edge(Top, Bottom, Left, Right)
ADF Capacity		N/A	40 sheets (Letter / A4, 20 lb / 75 g/㎡)
ADF Document Size		N/A	Width: 142 ~ 216mm (5.6”~8.5”) Length : 148 ~ 356mm (5.8” ~ 14.0”)
Media Size (for Fax and Copy)		Letter, A4, Legal	Letter, A4, Legal

2.1.2.7 Consumables (CRU)

Items	SCX-4600 series	SCX-4623 Series
Type	Single Cartridge	Single Cartridge
Yield	Initial : Average Cartridge Yield 0.7K standard pages Standard: Average Cartridge Yield 1.5K standard pages. High Yield: Average cartridge Yield 2.5K standard pages. Declared cartridge yield in accordance with ISO/IEC 19752.	Initial : Average Cartridge Yield 1K standard pages Standard: Average Cartridge Yield 1.5K standard pages. High Yield: Average cartridge Yield 2.5K standard pages. Declared cartridge yield in accordance with ISO/IEC 19752.
Key	Electronic key(CRUM) Only	Electronic key(CRUM) Only
Code		

2.1.2.8 Consumables (FRU)

Item	Image	Part code	Life
Fuser		JC91-00945A(220V) JC91-00946A(110V)	50K
Transfer Roller		JC66-01218A	50K
Pick up Roller		JC93-00087A	50K
Cassette holder pad		JC90-00941A	50K

2.1.2.9 Options

Items	SCX-4600 series	SCX-4623 Series
Network	N/A	Yes [SCX-4623FN]
Memory	N/A	N/A
SCF	N/A	N/A
PS	N/A	N/A

* Print speed will be affected by Operating system used, computing performance, application software, connecting method, media type, media size and job complexity.
** Copy Speed is based on Single Document Multiple Copy
*** Condition: Standard resolution, MMR(JBIG), Maximum modem speed, Phase “C” by ITU-T No.1 Chart, Memory Tx, ECM
**** Condition: ITU-T No.1 Chart, Standard Resolution
***** Please visit www.samsungprinter.com to download the latest software version.
****** Sound Pressure Level, ISO7779
******* May be affected by operating environment, printing interval, media type and media size

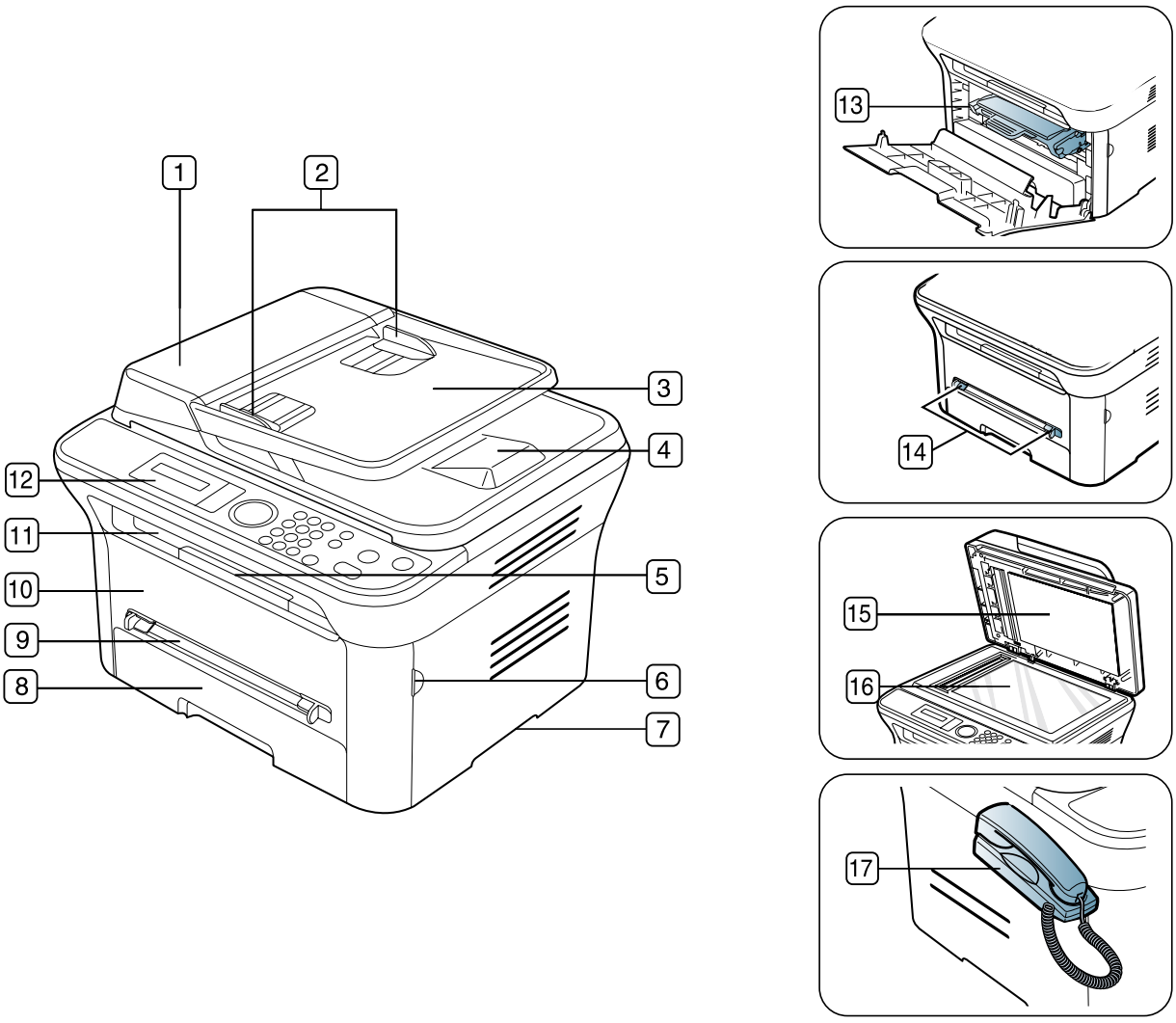
2.1.3 Model Comparison Table

		Samsung SCX-4623FN	Samsung SCX-4521F	Brother MFC-7440N (Brother)
Image				
Print	Speed (A4)	22ppm	20ppm	22ppm
	Resolution	1,200 x 600 dpi	600 x 600 dpi	2,400 x 600 dpi
	Emulation	SPL	SPL	GDI
	FPOT	10 sec from ready	11 sec from ready	10 sec from ready
Copy	Resolution	600 x 600 dpi	600 x 600 dpi	600 x 300 dpi
Scan	Mode	Scan To PC	Scan To PC	Scan To PC
	Resolution (optical)	1,200 x 1,200 dpi	600 x 600 dpi	600 x 2,400 dpi
	Resolution (Enhanced)	4,800 x 4,800 dpi	4800 x 4800 dpi	9,600 x 9,600 dpi
Fax	Modem Speed	33.6 Kbps	33.6 Kbps	14.4 Kbps
	Memory	4 MB	2 MB	16 MB
Paper	Input Capacity	250 Cassette	150 sheets	250 Cassette
	ADF Capacity	40 sheets	30 sheets	35 sheets
General	Interface	USB 2.0, N/W	USB 2.0	USB 2.0, N/W
Toner Yield	Sales/Initial	1.5K/2.5K (1K)	3K (1K)	1.5K/2.6K (1K)

2.2 System Overview

This chapter describes the functions and operating principal of the main component.

2.2.1 Front View

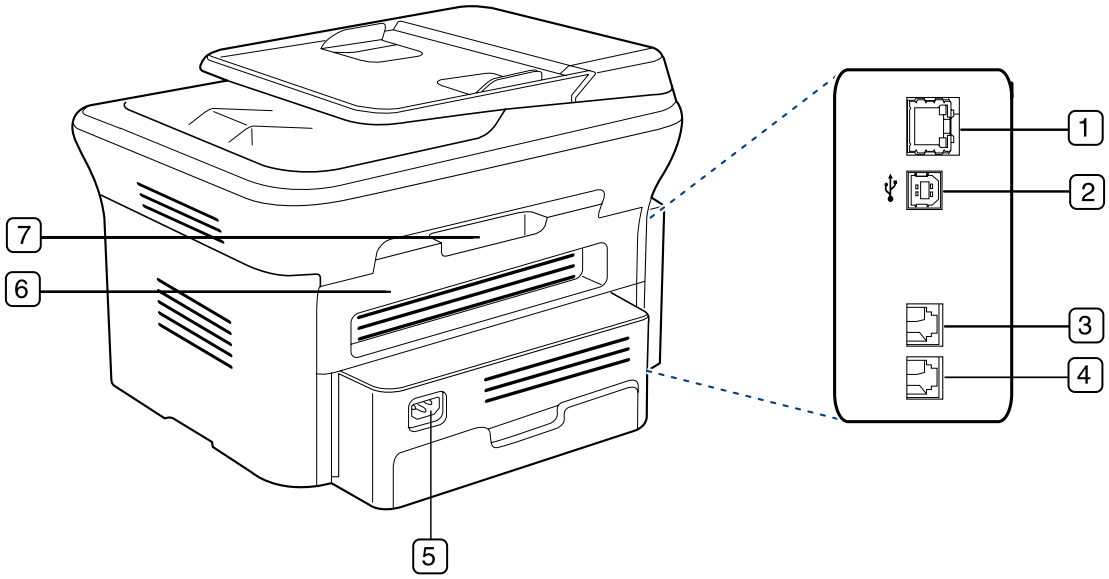


This illustration may differ from your machine depending on its model.

1	Document feeder cover[a]	**7**	Handle	**13**	Toner cartridge
2	Document feeder width guides[a]	**8**	Tray 1	**14**	Manual tray paper width guides
3	Document feeder input tray[a]	**9**	Manual tray		
4	Document feeder output tray[a]	**10**	Front door	**15**	Scanner lid
5	Output support	**11**	Document output tray	**16**	Scanner glass
6	Front door handle	**12**	Control panel	**17**	Handset[b]

a. SCX-4623F(K), SCX-4623FN, SCX-4623FH(K)
b. SCX-4623FH(K) only.

2.2.2 Rear View



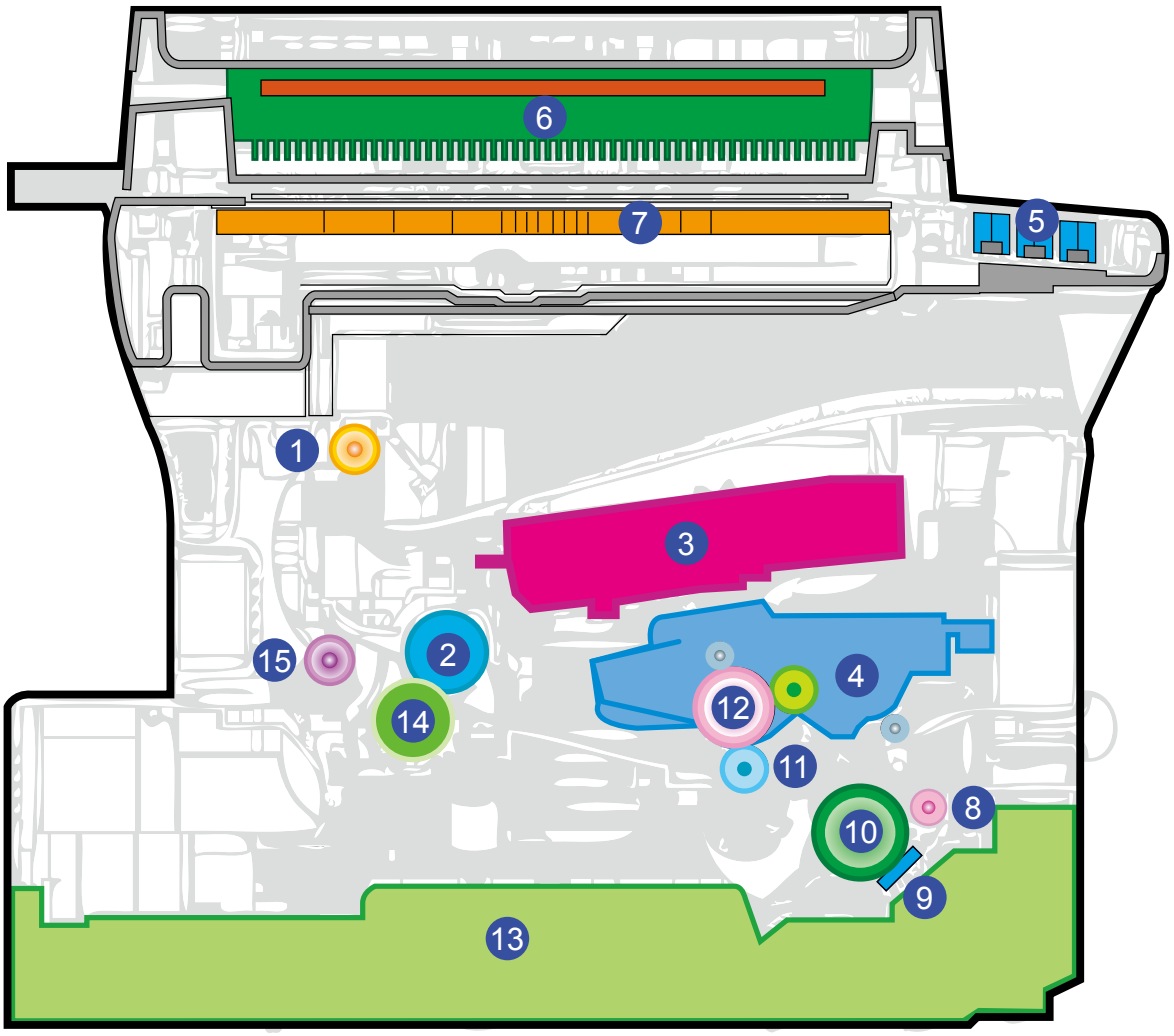
This illustration may differ from your machine depending on its model.

1	Network port[a]	**5**	Power receptacle
2	USB port	**6**	Rear door
3	Telephone line socket[b]	**7**	Rear door handle
4	Extension telephone socket (EXT)[b]		

a. SCX-4623FN
b. SCX-4623F(K), SCX-4623FN, SCX-4623FH(K)

2.2.3 System Layout

This model is consisted of the Engine parts and F/W, and said engine parts is consisted of the mechanical parts comprising Frame, Feeding, Developing, Driving, Transferring, Fusing, Cabinet and H/W comprising the main control board, power board, operation panel, PC Interface.



1	Top out-bin delivery roller
2	Fusing roller
3	LSU
4	Toner Cartridge
5	OPE
6	ADF
7	Platen
8	Feed roller

9	Separation Pad
10	Pick up roller
11	Transfer roller
12	OPC
13	Cassette
14	Pressure roller
15	Fuser Exit roller

2.2.3.1 Feeding Part

It is consists of a basic cassette, an Manual tray for supplying different types of media (envelope, label, special paper) and parts related to paper transferring.

1) Separation method

Paper is separated by the friction pad mounted to the center of the cassette.

2) Basic cassette

It takes a center loading method and applies 'friction pad separating method.'
Both the side guide and the rear guide can be adjusted for for various types of papers from invoice to legal size paper.
It has a paper existence sensing function (Capacity: 250 sheets (75g/㎡, 20lb paper standard), paper arranging function, various size papers accepting function.
In the front side, there is a paper level indicator.

3) Pick- up roller

It initializes paper transport out of the cassette. The Pickup Roller is driven by a solenoid.

4) Registration roller

It has a paper registration [skew correction] function, paper transferring function, paper detecting function, jam removing
function, and so on.

5) Manual tray

It has a paper registration [skew correction] function, paper transferring function, jam removing function, and so on.
It uses manual feed method to feed 1 sheet of paper and 1 envelope.

2.2.3.2 Transfer Roller

- The transfer roller delivers the toner from the OPC drum to the paper.
- There is no PTL Ass'y.
- Life Span : Print over 50,000 sheets (in15~30℃)

2.2.3.3 Driver Assy

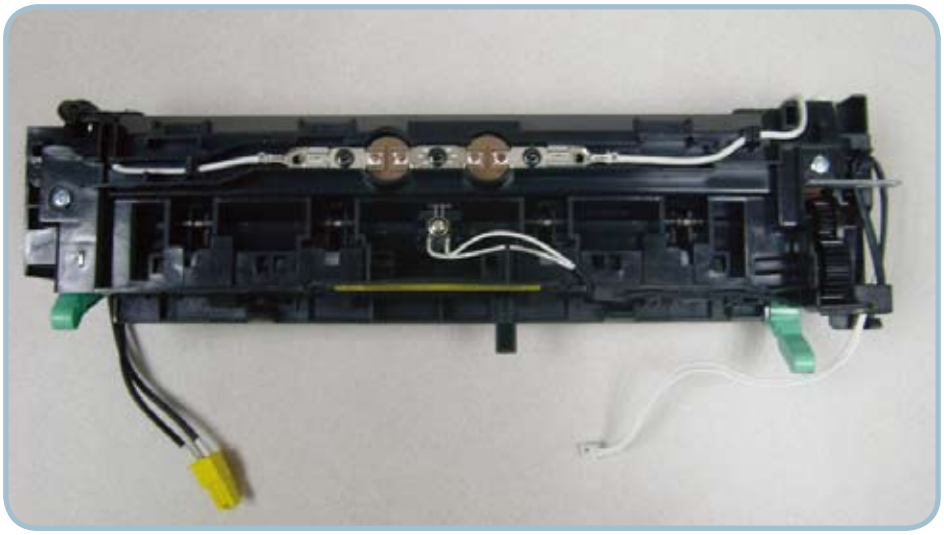
- In SCX-4600/4623 series, the driving device consisted of Φ55 BLDC motor, OPC, Pick- up, Feed, gear block all mounted as an assembly.

  • Driving Frequency: BLDCΦ55 Motor : 2200rpm(1650 Clock)

  • It is a power delivery unit by gearing: BLDCΦ55 Motor - >Pickup/Feeder/Developer/Fuser/Duplex

2.2.3.4 Fuser

It is consists of a halogen lamp, heat roller, pressure roller, thermistor and thermostat. It fuses the toner on to the paper by heat and pressure to complete the printing job.



1) Thermostat

When a heat lamp is overheated, a Thermostat cuts off the main power to prevent over- heating.

- Thermostat Type : Non- Contact type THERMOSTAT
- Control Temperature : 170℃ ± 5 ℃

2) Thermistor

It is a temperatrue detecting sensor.

- Temperature Resistance : 7 kΩ (180 ℃)

3) Heat roller

The heat roller transfers the heat from the lamp to apply a heat on the paper.
The surface of a heat roller is coated with Teflon, so toner does not stick to the surface.

4) Pressure roller

A pressure roller mounted under a heat roller is made of a silicon resin, and the surface also is coated with Teflon. When a paper passes between a heat roller and a pressure roller, toner adheres to the surface of a paper permanently.

5) Halogen Lamp

- Voltage 120 V : 115 ± 5 %
  220 V : 230 ± 5 %
- Capacity : 750 Watt ± 25 W

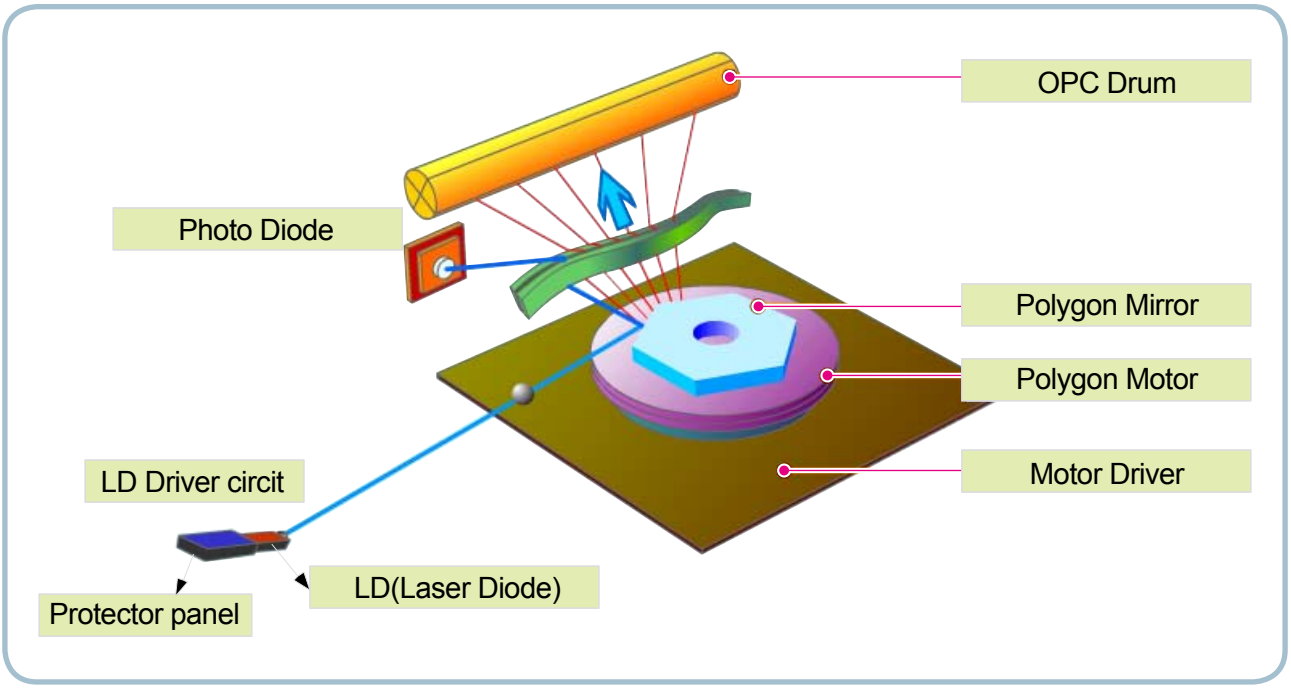
6) Items for safety

Protecting device for overheating
- 1st protection device: Hardware cuts off when overheated
- 2nd protection device: Software cuts off when overheated
- 3rd protection device: Thermostat cuts off main power.

Safety device
- A fuser power is cut off when a front cover is opened
- Maintain a temperature of fuser cover's surface under 80℃ for user, and attach a caution label at where customer can see easily when customer open a rear cover.

2.2.3.5 LSU (Laser Scanner Unit)

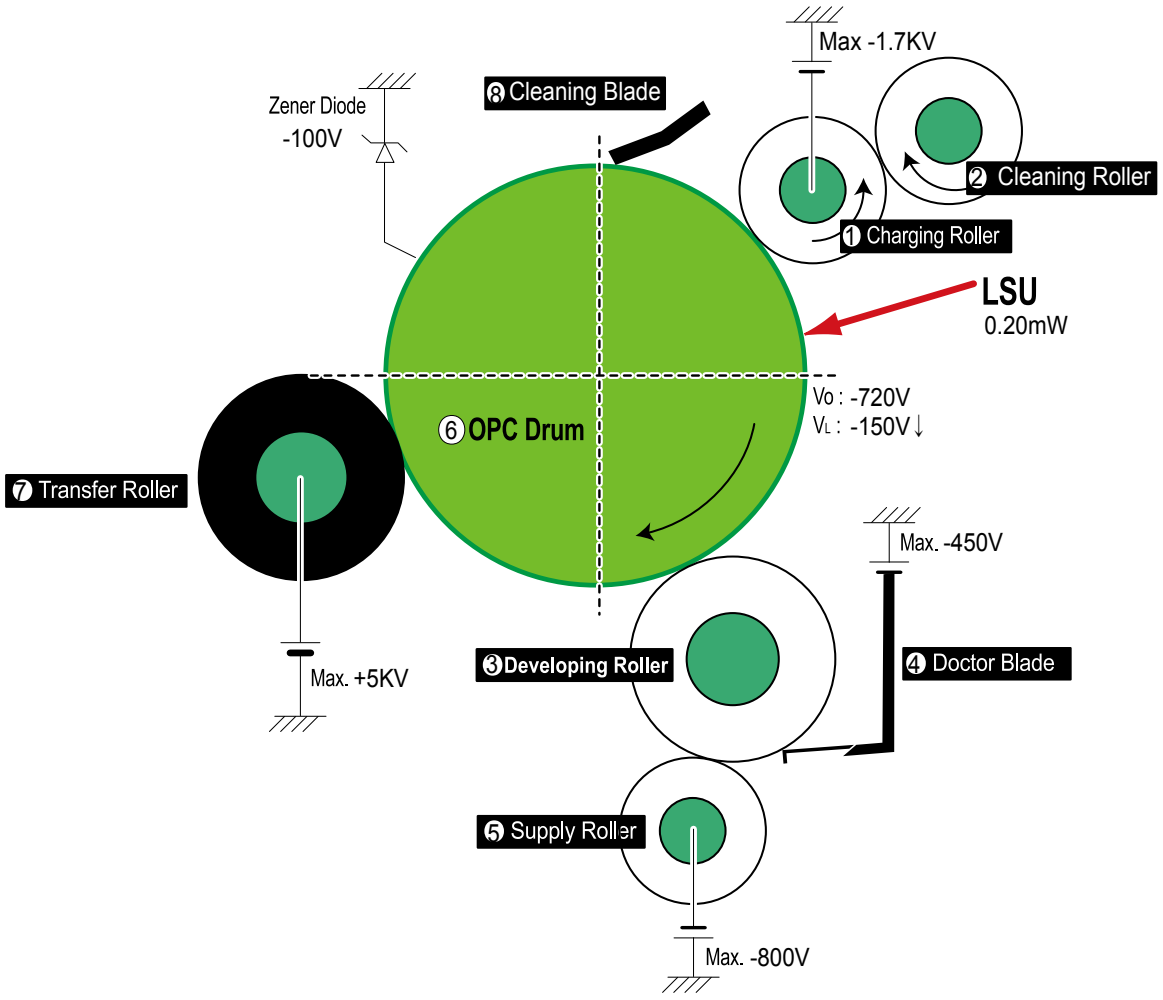
It is the core part of the LBP which switches the video data received to the controller to the electrostatic latent image on the OPC drum by controlling laser beam, exposing OPC drum, by use of a polygon mirror. The OPC drum is synchronized with the paper feeding speed. The /HSYNC signal is created when the laser beam from LSU reaches the end of the polygon mirror, and the signal is sent to the controller.
The controller detects the /HSYNC signal to adjust the vertical line of the image on paper. The /HSYNC signal is used to synchronize the image data with the left margin of the paper.
The one side of the polygon mirror is one line for scanning.



2.2.3.6 Toner Cartridge

By using the electronic photo process, it creates a visual image. In the toner cartridge, the OPC unit and the developing unit are contained in one assembly. The OPC unit houses the OPC drum and charging roller; the toner cartridge unit houses the toner, supply roller, developing roller, and blade (Doctor blade)

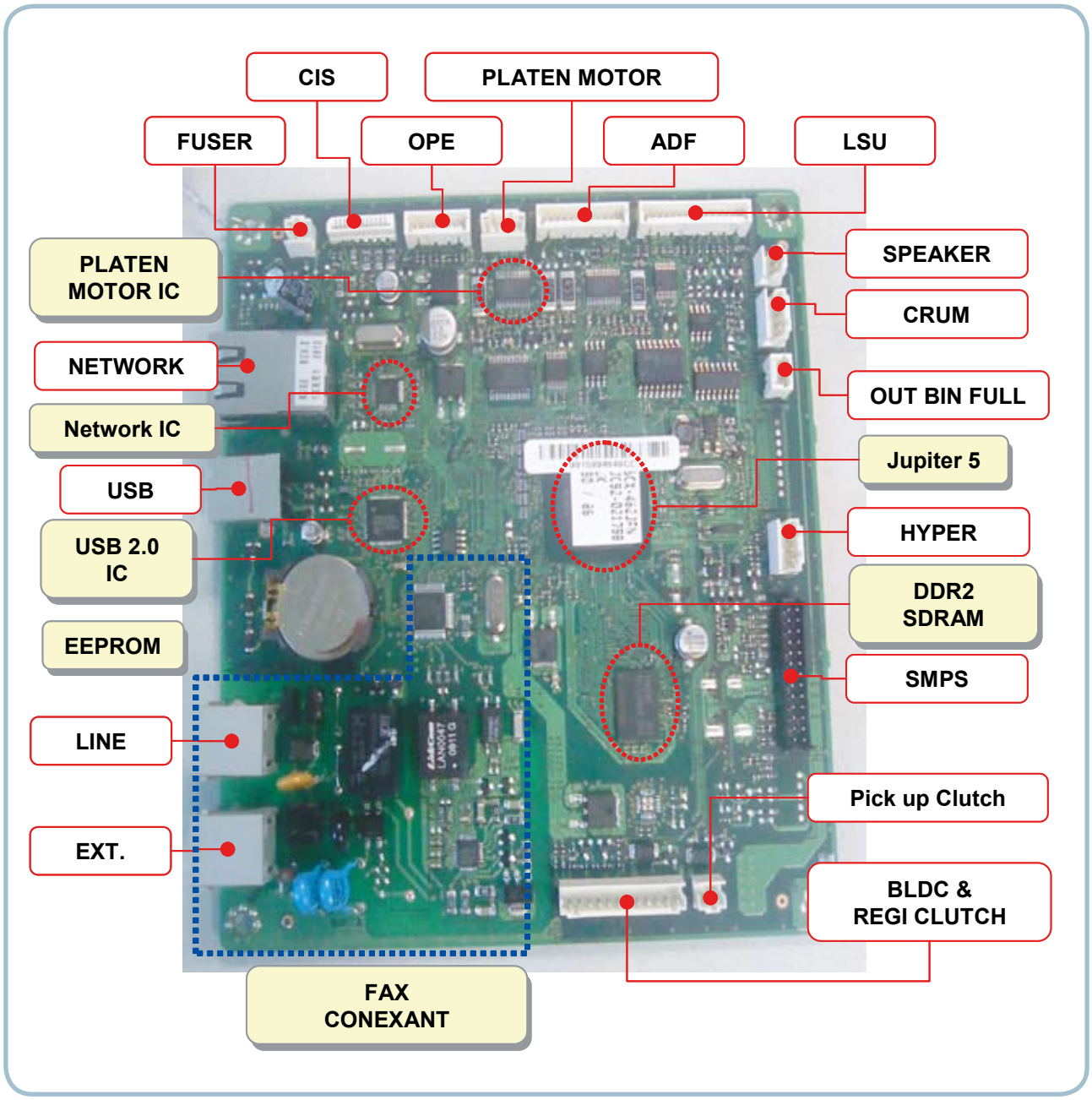
- Developing Method : Non magnetic 1 element contacting method
- Toner : Non magnetic 1 element shatter type toner
- Charging capacity : - 39.1 ± 3 μC/g
- Average OD : 8.0 ± 0.5㎛ (Toner)
- Toner Qty : 30gf / 40gf / 80gf (Initial : 1K/ Sales :1k / 2.5k)
- The life span of toner: 1k/2.5k sheets (ISO 19752 Pattern / letter standard)
- Toner Residual Sensor : Dot count with CRUM(CRU Monitor)
- OPC Cleaning : Collect the toner by using cleaning blade.
- Handling of wasted toner : Waste [residual] toner is cleaned off the drum by means of a cleaning blade.
- OPC Drum Protecting Shutter : None
- Classifying device for toner cartridge: ID is classified by CRUM.



2.2.4 Engine H/W Specifications

2.2.4.1 Main PBA

The Engine and the Printer Controller function are housed into one Main Board called Main PBA. The CPU is functioned as the bus control, I/O handling, drivers, and PC interface. The main board sends the Current Image of Video data to the LSU and The CPU on Main PBA manages the circuits for the motors: paper feed, paper path, clutches, pre- transfer lamp, current control to driver components, and fan driving. The signals from the paper feed jam sensor and paper empty sensor are directly inputted to the main board.



(a) Asic (Jupiter5)

• CPU core : ARM926EJS
  - 16KB I-cache, 16KB D-cache

• Operating Frequency
  - CPU : 375MHz
  - Bust : 125MHz recommended

• Multi-Port DDR SDRAM Controller
  - DDR1, 2 combos
  - Internal 32 bits data width, external 16 bits data width

• External ROM Controller
  - 2 channel NOR flash controller
  - 32 MB address space per each channel

• MAC
  - 10M/100Mbps
  - Full IEEE 802.3 Compatibility

• Engine Controller
  - LSU Interface Unit
  - Step Motor : 2 Channels
  - PWM : 8 Channels
  - ADC : 4 Channels

(b) Memory

• Flash Memory : It stores System Program and downloads the System Program through PC Interface, and in case of model for export it compresses the PCL font, then stores it.
  - Capacity : 8M Byte (NOR Flash)
  - Access Time : 90ns
  - Page read Time : 25ns

• DRAM : It is used as Swath Buffer, System Working Memory Area, etc. when printing.
  It stores Font List, compressed into Flash memory, on DRAM and uses it as PCL font in case of model for export.
  - Capacity : SCX-4600/4623F : 64MB
    SCX-4623F : 128 MB
  - Type : SDRAM 100MHz/133MHz, 16bit

(c) Sensor Input Circuit

■ Paper Empty Sensing & Paper Width Sensor

The Paper Empty/Width Sensor is mounted on the HVPS. This one sensor is used to detect both an “empty paper” condition, and as to whether e.g. invoice [narrow paper] paper is installed.
When a printing job comes to the CPU, the CPU initializes the pickup action regardless of the state of the sensor. If paper is then detected by the Feed Sensor, the paper will then be recognized as e.g.invoice paper even though the Paper Empty Sensor was on. If no paper is detected by the Feed Sensor, then the CPU will recognize that a “Paper Empty” condition exists and displays the RED warning light on the OPE PBA.

■ Regi Sensing

The registration sensor (Regi Sensor, a photo interrupter) informs the CPU that paper is registered at the registration rollers, and waiting for proper leadedge schronization
with the image on the drum.

■ Paper Feeding/With Toner Cartridge Sensing

When the leadedge of the paper is detected by the Feed Sensor (photo interrupter), it begins the development process of the drum after a predetermined time.
A paper jam condition is detected if the leadedge of the paper is not detected by the feed sensor within 1sec. after the initialization of paper feed; then the LED warning light will be display (RED color).
The toner cartridge detection is monitored by the CRUM sensors. If all of the CRUM sensors are off, the CPU knows the cartridge is not in the machine, and takes appropriate action by turning on the out of toner light. If the CRUM sensors do not detect that the correct cartridge is inserted, the CPU will display the toner cartridge is invalid, it will show invalid sign on a LED.

■ Paper Exit Sensing

The Paper Exit Sensor is mounted on the Fuser Unit exit side, and is used to ensure that paper has indeed exited the machine. If the on/off time of exit sensor is abnormal, then a JAM2 is informed. The LED on the display will turn on a RED warning color.

■ Cover Open Sensing

The Cover Open Sensor is located on the HVPS. When the front cover is opened, all +24VS is shut off. Then the customer will be notified on the display that the door is open [“door open”] and the red will turn on.

■ DC FAN / SOLENOID Driving

DC Fans and Clutches are driven by turning on and off TRs, which is controlled by the CPU. The diode in the Fan and Clutch driving circuits protects TR driven from noise when these driver components de-energize.

■ Motor Driving

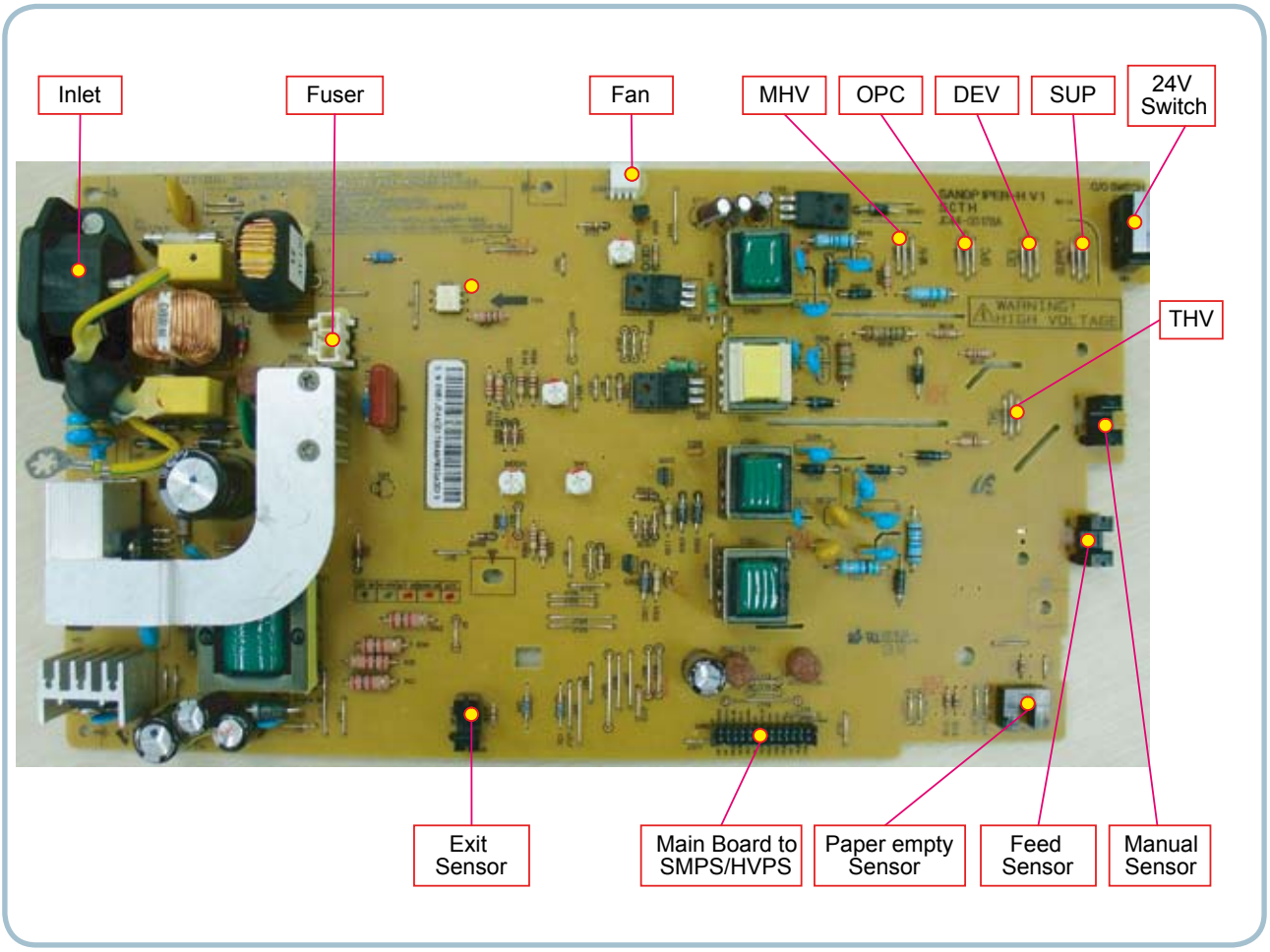
The main motor driving circuits are located on the BLDC Motor Ass’y Unit. The Main Controller has the interfacing circuits to proper control the components. There is motor driver IC on the Motor Control Board to control the BLDC Motor assembly unit.

2.2.4.2 HVPS and SMPS Board

The HVPS Board and SMPS Board housed in one board.

The HVPS board creates the high voltage of THV/MHV/Supply/Dev and supplies it to the developer portion f The HVPS portion takes the 24V and outputs the high voltage for THV/MHV/BIAS, and supplied to the high voltage, OPC cartridge, and transfer roller for optimum latent image and toner transfer quality.

It is the power source of entire system. It is assembled by an independent module, so it is possible to use for common use. It is mounted on the side of the machine.
It is consisted of the SMPS portion, which supplies the DC power for driving the system, and AC to power the Fuser Unit. SMPS has two output channels, which are +5V and +24V.



■ HVPS Board

• Transfer High Voltage (THV+)

- Input Voltage: 24 V DC ± 15%
- Output Voltage: +1.3KV(Duty Variable)
- Line Regulation : under±3% (fluctuation input 21.6V ~ 27.6V)
- Output Voltage Rising Time 50ms Max
- Output Voltage Falling Time : 100 ms Max
- Fluctuating transfer voltage with environmental various : 0 V~ 5 KV
- Environment Recognition Control Method : The THV-PWM ACTIVE is transfer active signal. It detects the resistance by recognizing the voltage value, F/B, while permits the environmental recognition voltage.
- Output Voltage Control Method : Transfer Output Voltage is outputted and controlled by changing Duty of THVPWM Signal.

• Charge Voltage (MHV)

- Input Voltage : 24 V DC ± 15%
- Output Voltage : -1.3KV DC ± 3%
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Control Signal(MHV-PWM) : CPU is HV output when PWM is Low

• Cleaning Voltage (THV-)

- -1.2KV ± 15%
- The (+) Transfer Voltage is not outputted because the THV PWM is controlled with high.
- The (-) Transfer Voltage is outputted because the THV-Enable Signal is controlled with low
- The output fluctuation range is big because there is no Feedback control & connection Resistor.

• Developing Voltage (DEV)

- Input Voltage : 24 V DC ± 15%
- Output Voltage: -480V DC ± 3%
- Output Voltage Fluctuation Method : PWM Control
- Line Regulation : under±3% (fluctuation input 21.6V ~ 27.6V)
- Load Regulation : Under ±3%
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Control Signal (BIAS-PWM) : the CPU output is HV output when PWM is low.

• Supply

- Output Voltage : -630V DC ± 5% (ZENER using, DEV)
- Line Regulation : under±3% (fluctuation input 21.6V ~ 27.6V)
- Load Regulation : Under ±3%
- Output Voltage Rising Time : 50 ms Max
- Output Voltage Falling Time : 50 ms Max
- Output Control Signal (BIAS-PWM) : the CPU is HV output when PWM is low

■ SMPS Board

◆ AC Input

Input Rated Voltage	AC 220V ~ 240V AC 110V ~ 127V
Input Voltage fluctuating range	AC 180V ~ 270V AC 90V ~ 135V
Rated Frequency	50/60 Hz
Frequency Fluctuating range	47 ~ 63 Hz
Input Current	Under 4.0Arms / 2.0Arms (But, the status when e-coil is off or rated voltage is inputted/outputted)

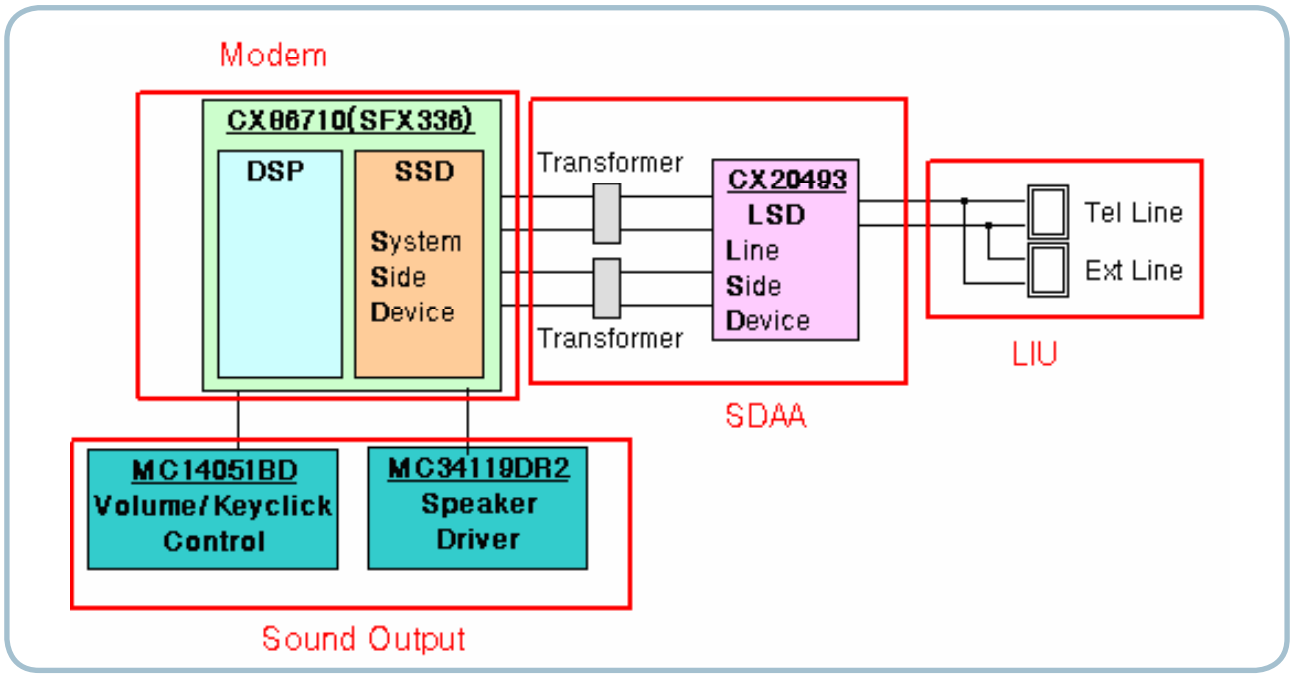
◆ Rated Output Power

NO	ITEM	CH1	CH2	Remark
1	CHANNEL NAME	+5.0V	+24.0V	
2	CONNECTOR PIN	CON 14 5V PIN : 7,15,16 GND PIN : 4,8,13,14	CON 14 24V PIN : 5,6 GND PIN : 4,8,13,14	CON 14 24VS PIN : 9,10,11
3	Rated Output	+5.1V ± 5% (4.845 ~ 5.355V)	+24V ± 10% (21.6 ~ 26.4V)	
4	Max. Output Current	1.0 A	2.0 A	
5	Peak Loading Current	1.2 A	2.3 A	
6	RIPPLE NOISE Voltage	Under 100mVp-p	Under 500mVp-p	
7	Normal output	5.0W	43.2W	
8	Maximum output	6.0W	55.2W	
9	Protection for loading shortage and overflowing current	Shut down or Fuse Protection (Under LPS spec)	Shut down(2.8A~4.5A) or Voltage Drop(tnip-10%)	

2.2.4.3 Fax

Our fax feature is based on Conexant DAA (Data Access Arrangement) Solution, and is controlled by a dual Chip Set Solution.

- CX86710 (SFX336) : This Modem Chip adds SSD (System Side Device) for interfacing between LSD and DIB of FM336Plus Core
- CX20493 (LSD) : This Modem Chip LIU (Line Interface Unit) is controlled by SSD and satisfies each PSTN requirement by modulating the internal configuration with connecting Tel Line.



2.2.4.4 Scan

1) Pictorial signal input part: output signal of CIS passes through MP Cap change to ADC at LAFE1001, and defined signal between LAFE1001 and JUPITER5 processes the Image signal. When AFE accepts each pixel, CDS (Correlated Double Sampling) technique which samples arm-level twice is used on each pixel by the CIS signal.

2) The image processing portion is read by CIS Pixel data in 1200dpi Line and processed using an Error Diffusion Algorithm on Text mode and Photo mode. When scanning at machine and/or on PC Scan, the data is stored in a Scan Buffer without algorithm.
Shading and Gamma Correction are executed immediately in every mode, then processing is executed later.

* Scan Image Control Specification
① Minimum Scan Line Time : 0.75ms(300dpi)
② Scan Resolution : Max. 1200DPI
③ Scan Width : 216mm
④ main function
- Internal 10bit ADC
- White Shading Correction
- Gamma Correction
- CIS Interface
- 256 Gray Scale

3) CIS Operating Part : CISM Image sensor use +3.3V and LEDs uses +12V
- CIS Maximum Operating Frequency : 4MHz
- CIS Line time : 0.75ms
- White Data output Voltage : 1.0Vmin (Color mode : 300dpi, 0.75ms/line)
- Maximum LED Current : 45~60 mA Max.(+12V)

2.2.5 Engine F/W Contol Algorithm

2.2.5.1 Feeding

If feeding from a cassette, the drive to the pickup roller is controlled by a solenoid. The on/off time the solenoid is controlled by Main PBA. The Paper Jam protocols are as follows:

Item	Description
JAM 0	- After picking up, paper cannot be entered due to paper is not fed. - After picking up, paper does not reach the Feed Sensor in after a predetermined time due to paper slippage, etc. - After picking up, if the Feed Sensor does not detect paper after a predetermined time following the initialization of another take-up retry. ** It is a status that the leading edge of the paper doesn't pass the feed sensor.* - Even though the paper reaches to the feed sensor, the feed sensor doesn't be ON. ** It is a status that the leading edge of the paper already passes the feed sensor.*
JAM 1	- The trailing edge of the paper must clear the Feed Sensor after predetermined time. (The feed sensor cannot be OFF) - The leading edge of the paper must detect the Exit Sensor within a predetermined after leaving the Feed Sensor. (The exit sensor cannot be ON) ** The paper exists between the feed sensor and the exit sensor.*
JAM 2	- The trailing edge of the paper must clear the Exit Sensor after predetermined time.

2.2.5.2 Transfer

The charging, developing and the transfer voltages are controlled by PWM (Pulse Width Modulation). Each output voltage may change due to the PWM duty. The transfer voltage admitted when the paper passes the transfer roller is decided by environment recognition. The resistance value of the transfer roller is changed due to the surrounding environment through AD converter. The voltage value for impressing to the transfer roller is decided by this value change.

2.2.5.3 Fusing

The temperature change of the heat roller's surface is changed to the resistance value through the thermistor. The Heat Roller temperate (warmup) is measured by converting the resistance of the thermistor to a measurable DC voltage value. The AD converter changes it to a digital value so it knows when it has reach its proper fusing temperature. The AC power to the fuser lamp is controller by comparing the target temperature to the value from the thermistor. If the value from the thermistor is out of controlling range an error will occur and power disabled. The table below lists the types of Fuser Errors that can occur:

• Open Heat Error

During warmup, if the Fuser Unit does not reach its proper operating temperature within a predetermined time an "Open Heat Error will occur. An error message will be displayed on the Control Panel alerting the customer. The engine stops all functions and keeps it at the error state until the issue is resoled by a qualified technician.

• Low Heat Error

After initial warmup had been achieved, if the Fuser Unit at any time does not reach its proper operating temperature within a predetermined time an "Low Heat Error will occur. An error message will be displayed on the Control Panel alerting the customer. The engine stops all functions and keeps it at the error state until the issue is resoled by a qualified technician.

• Over Heat Error
If the Fuser Unit at any time exceeds the specified range [too hot] for proper operating temperature an "Over Heat Error will occur. An error message will be displayed on the Control Panel alerting the customer. The engine stops all functions and keeps it at the error state until the issue is resoled by a qualified technician.

2.2.5.4 LSU

LSU receives the image data from PVC or HPVC and makes the latent image on OPC surface.
It uses the single beam, LD.
The errors related to LSU are as follows:

- **By LReady :** When the printing is started, the engine drives the polygon motor of LSU. After the specified time is elapsed, if the motor is not in a ready status, the engine detects the error that the polygon motor is not in a ready status. If this error happens, the engine stops all functions and keeps it at the error state. Also, the engine informs the error status of the main system and the error message is displayed at LCD window to inform the error status to the customer.

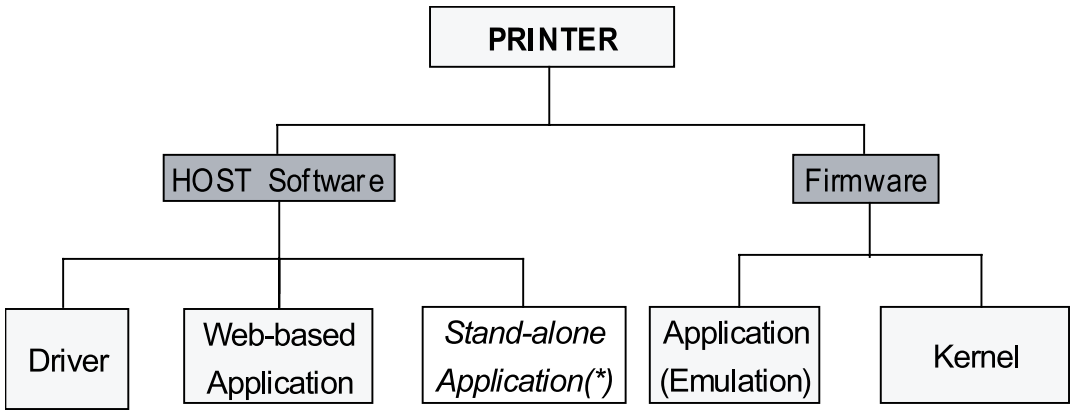
- **By Hsync :** When the polygon motor is ready, the LSU sends out the signal called Hsync and it is used to synchronize with each image line. So, if the engine does not detect consecutively the signal for a fixed time, it defines the Hsync Error. If this error happens, the engine stops all functions and keeps it at the error state. Also, the engine informs the error status of the main system and then the error message is displayed at LCD window to inform the error status to the customer.
  LSU Error Recovery: If the LReady or Hsync error occurs, the paper is exited with no image on it. The engine mode is changed to recovery mode and the engine informs the main system of the engine mode. And the engine checks the LSU error. If the error doesn't happen, the printing job will be proceeding.

2.2.6 S/W Descriptions

2.2.6.1 Overview

The software of ML-2855ND system is constructed as follows:
1) The Host Software is an application software that can operate in a Windows and/or Web Environment.
2) The Firmware portion is an Embedded software controlling the print job.

2.2.6.2 Architecture

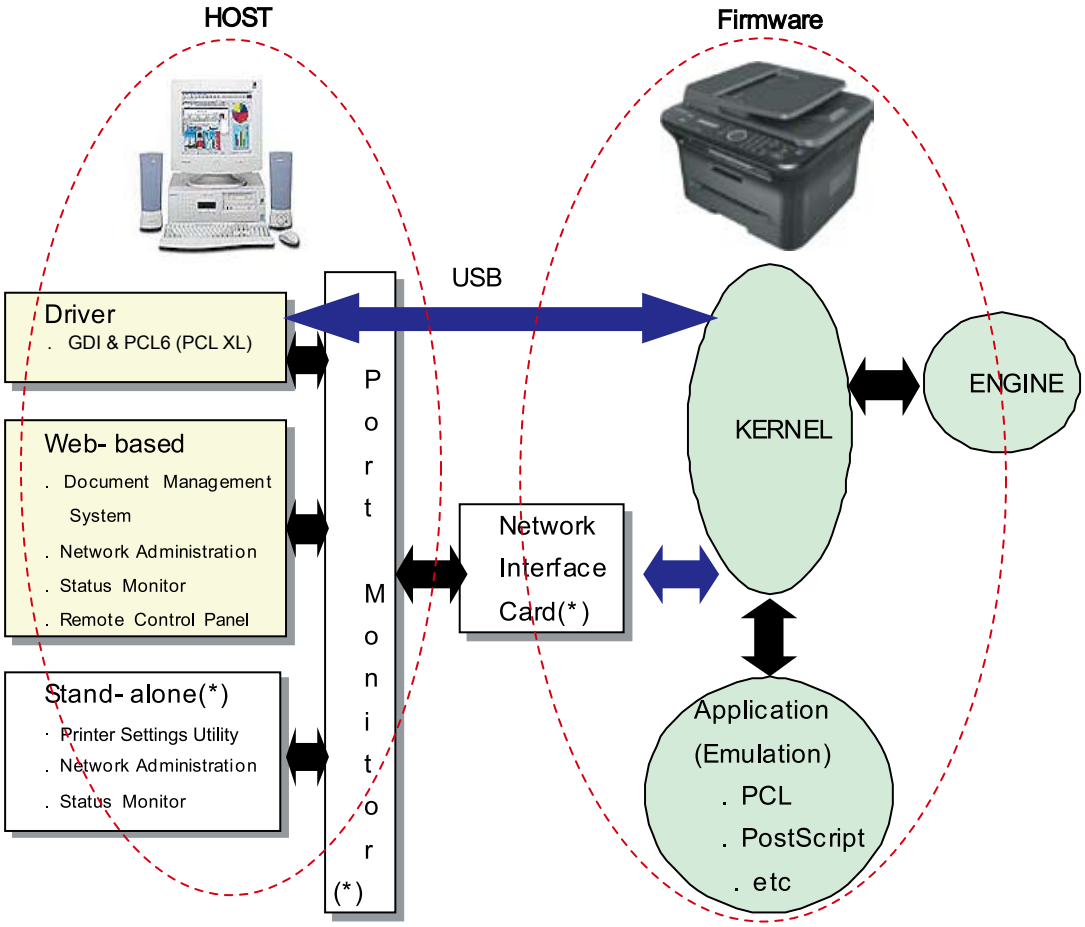


☞ (*) is job for common S/W team

Host Software is made up of:
1. Graphic User Interface that offers the various editing functions to user in Host.
2. Driver that translates the received document to a Printing Command Language which the printer can understand and transfers data to spooler.
3. Stand-alone Application that offers the various printing application, PSU(Printer Settings Utility), Printer Status Monitor, Network Management in Window system.
4. Web-based-Application that offers the same functions as Stand-alone Application and RDC(Remote Diagnosis Control) in Web environment.

Firmware is made up of:
1. Application (Emulation) that is a interpreter translate data received from Host to a printing language (PCL, PS, GDI(ML-2855ND), etc.) to be able to allow the user to take same output as original composed in Host.
2. Kernel that control and management the whole procedure include of Control flow and Printing Job before transfer to Engine system.

2.2.6.3 Data and Control Flow



Note: (*) is role of N/W I/F

Provided below is a detail explanation of the Block Diagram above.

Host Side is made up of:

1. The Print Driver that is Windows application software translates printed data to one of printer languages and creates spooler file.
2. Web-based Application offer a varity of additional functions for the printer; management of printing job, printer administration, Status monitor to monitoring the printer status by real time in Web, independent environment on OS.
3. Stand-alone Application that is a similar Window software as same as above 2,
4. Port Monitor that manages the network communication between spooler and Network Interface Card, or various additional application and Network Interface Card,(this is, at first, make communication logical port, manage the data, transfer them from spooler to network port, and offer the result of printing).

Firmware Side is made up of:

1. Network Interface Card is that relay the communication between Host and kernel using various network protocols.
2. Kernel manages the flow control of emulation procedure, receiving data from the Host or Network card and printing with engine & rendering job.
3. Emulation interprets the various output data from selected emulation.
4. Engine prints rendered bit-map data to paper with required size and type by Kernel.

Job Spooling function for Multi-User, Multi-Printing that is occurred in Network printing and various additional printing functions, this Kernel use max. 10 Queuing systems in a memory.

In Printing, the two procedures are:

(1) Case of using USB Port
- After user starts to print their document to PCL string or compressed GDI bit-map data; the driver translates all graphic data and sends the data to host spooler. The spooler then sends the data stream to the printer via USB port.
- Kernel receives this data from the Host, and then selects the emulation fit to data and start selected one. After emulation job ends, Kernel sends the output bit-map data to Engine using Printer Video Controller (by clock type for LSU).
- Engine print the received data to required paper with the sequential developing process.

(2) Network Interface Card
- After the user starts to print their document to PCL string or compressed GDI bit-map data, the driver translates the graphic data and send data to host spooler.
- If so, Port monitor managing network port receives data from spooler and sends a data stream to the Network Interface Card.
- Network interface card receives it and send to Kernel part.
- Kernel receives this data from Host, and selects emulation fit to data and start selected one. After emulation job ends, Kernel sends the output bit-map data to the Engine using Printer Video Controller (by clock type for LSU).
- Engine print the received data to required paper with the sequential developing process.

The additional printing function are realized in:

(1) Web environment
(2) Window environment

In addition, Kernel informs the printing and printer status to end-user making the printing job with the Status Monitor.