

System Overview

SCX-4517F is made of Main Control part, Operation Panel part, PC Interface part, Scan part, Line Interface part, Power part.

Each part is independent with each other and the design concept is common use/standard design rule.

Chorus2 ASIC which is made for only printer is used in the Main Control part, and another Micom which can communicate with Chorus2 through UART for Key-Scan, LCD display, LED control, etc.. is used for OPE Panel part.

PC Interface control part - USB 1.1 and IEEE1284 - is comprised in the Chorus2 Main Controller ASIC and Image processor and CIS Interface part is comprised in the Chorus2 too. Modem chip, FM336 which make a function of FACSIMILE can the machine communicate with the other FAX machine on the speed of 33.6Kbps and the LIU(Line Interface Unit) supports the line connection with PABX or PSTN line.

Power part which made of two part - SMPS and HVPS - supplies Voltage source to the controller part and high voltage to the printing image developing process.

1. Engine H/W Specification

- 1) Recording Method : LSU(Laser Scanning Unit)
- 2) Printing Speed : 16ppm
(In continuing printing base A4, printing pages from 2nd to last during 1min)
- 3) Recording Density: 600 dpi
- 4) Cassette Capa. : Cassette ; 150sheets(75g/m² Base),
1-sheet Feeding : N/A((DRIVE Selection : Paper, OHP, Envelop - 1 sheet)
- 5) Manual Tray : All paper 1 sheet
- 6) Paper Size : Cassette ,Manual; Width = 76 ~ 216mm, Length = 125mm ~ 356mm
- 7) Effective recording size
 - A4 : 202 x 291 mm
 - Letter : 208 x 273 mm
 - Legal : 208 x 350 mm
 - Folio : 208 x 325 mm
 - Top Margin : 2 ± 2 mm
 - Left, Right Margin : 2 ± 2 mm
- 8) CRU(Toner Cartridge)Life : 3,000pages Printing(A4, ISO 5% Pattern Printing)
- 9) First Print Out Time : within 11sec (Standby)
- 10) Warming up time : within 35sec (Ambient : 25°C)

2. Main Board Control Part

Main control part of SCX-4517F is made of ASIC(CPU, Image processor, PC I/F part include,

Scan interface part, FAX Modem part and Printing process I/F part.

CPU handles the BUS control, I/O interface, scan interface, PC interface and other miscellaneous driver circuit.

1) Main Board

Main Board has a function of sending Current Image Video Data to LSU of the machine, controlling motor Driving Circuit and monitoring Paper Exit Sensor, Cover Open switch, OPE Panel Inputs.

2) Main Controller

-CPU : Chorus2 is the main CPU and is made up on the 16/32bit RISC architecture using ARM7TDMI core.
Main CPU controls the whole system according to the program code which stored in the Flash-ROM memory.

-Summary of the Key Function Block:

- ▶ 1.8V for internal Core, 3.3V for I/O Pad with 4KByte Cache.
- ▶ Image Processor included.
- ▶ On-Chip clock generator with PLL.
- ▶ Memory and External Bank Control.
- ▶ DMA Control (5-Channel)
- ▶ Interrupt Control.
- ▶ 2-port USB Host/1-port USB device(ver 1.1) interface control.
- ▶ Parallel interface control.
- ▶ UART(2-Channel)
- ▶ Synchronous Serial Interface Control.
- ▶ A/D Converter(10-bit, 2channel).
- ▶ General I/O Port control.
- ▶ Tone Generator.
- ▶ RTC with calendar function.
- ▶ S/W Assistant function(Rotator)

-Flash Memory : Stores system program and can be updated to the newer system program code through the PC interface.

It stores the FAX Journal List, One Touch dial number, speed dial number, and machine configuration setup data.

.Capacity : 2 Mbyte

.Access Time : 70 nsec

-SDRAM : SDRAM is used for Print Buffer, Scan buffer when scanning, ECM Buffer when FAX Receiving, and system working memory.

.Capacity : 16 Mbyte

.Access Time : 66MHz based on system bus clock.

.Data Backup : 48 Hours

.Backup Battery Charging Time : 100hours when completely discharged.

3. Scan Part

1) Image Signal Input Part

Image Signal from CIS has a level of about 1.2V and is goes to ADC of Chorus2.

After ADC, CIS analog signal will be converted to 8-bit Digital signal.

2) Image Processing

On the surface of the original paper, the light from the CIS LED reflected and goes to the CIS Sensor. Then the light is converted to the appropriate voltage suitable for ADC input.

Analog signal from CIS sensor is used for ADC input then is converted to 8-bit digital data.

Image processor of the Chorus2 will do the Shading correction function at first, then Gamma correction function next.

After then, the data goes to different module according to the copy or FAX resolution mode.

When Text mode, the image data goes to LAT module, when Photo mode, the image data goes to Error Diffusion module, when PC-Scan mode, the image data goes directly to the PC through DMA access.

◇ Summary of the Image sensor interface is as below;

① Minimum Scan Line Time : 1.5ms

② Scan Resolution : 600*600 dpi

③ Scan Width : 208mm

④ function

- White Shading Correction

- Gamma Correction

- CIS Interface

- 256 Gray Scale

3) CIS Driving Part

- CIS Supply Voltage : +3.3V

- CIS Max frequency : 5MHz

- CIS Line time

Fax/Copy - 1.5ms

PC-Scan - 4.5ms

- White output volt. : Max 0.8V

4) ADF Driving Part : Driving ADF Stepper motor, and the maximum motor speed is 2000PPS.

- MOTOR DRIVER : A3978(Allegro)

- Driving Voltage : 24V DC

- Phase : 2-2 Phase 2000PPS at Quick Scan,
2-2 Phase 1000PPS AT Fine Scan,
2-2 Phase 667PPS AT Super Fine Scan

4. Fax Modem Part

1) Modem Part

The modem part is consist of FM336(FAX Modem chip), LIU(Line Interface Unit) and modem analog front end(AFE) functional part.

* The feature of the SFM336 modem chip is as below;

- ① Communication Mode : Half Duplex
- ② Modem Method
 - GROUP 3 : ITU-T V34, V17, V29, V27ter
 - Tonal Signal : ITU-T T.30
 - Binary Signal : ITU-T V.21, T.30
- ③ Image Transmission Time : 3sec (ITU-T NO.1 CHART/Memory Tx/ECM)
- ④ Data Compress : MH, MR, MMR, JPEG
- ⑤ Modem Speed : 33600 / 28800 / 14400 / 12000 / 9600 / 7200 / 4800 / 2400 bps
- ⑥ Receive Level : 0 ~ -48dBm
- ⑦ Output Level
 - Adjustable : -6 ~ -15dBm (1dBm Step)
 - Initial Setting : -12dBm
- ⑧Receive dynamic range:
 - 0 dBm to -43 dBm for V.17, V.29, V.27 ter and V.21
 - -9 dBm to -43 dBm for V.34 halfduplex

2) The Gain of the Line signal can be adjusted by setting the register value of the FAX modem chip ,Tx and Rx path is almost directly connected to the impedance matching transformer of the LIU.

- Adjust Tx Level within Setting Level+0,-2dB range.
- Adjust Rx Level that has the same level as the TMS out level if possible, and must not exceed the TMS out level.

3) Speaker Driving Part

Analog Switch(MC14053BD) makes a path for FAX Tone, Ring, Key click sound and Analog MUX (MC14051) makes a different signal level so that the the Speaker driver chip(MC34119) can driving the Speaker with different sound volume.

5. Printing Process Part

Printing Process part is made of PC-Interface part, PVC(Printer Video Controller), LSU control part, High Voltage control part and Fuser Unit control part.

PC-interface core is included in the Chorus2 ASIC and controls the PC-interface.

LSU control part controls the LSU polygon motor, Laser diode, video data output so that the printing image can be made up on the OPC Drum.

6. Line Interface Part

Line interface part helps the machine connect to the PSTN or PABX Line and is made of almost primary circuit.

Its main function is Line connection, Line state monitoring and TAD interface that enables a extension telephone or TAD machine to connect to the SCX-4517F machine.

7. Engine Paper Feeding

- 1) Feeding Type : MP Cassette Type
- 2) Feeding Standard : Center Loading
- 3) Feeding Qty: Cassette 150 sheets (75g/m², 20lb paper standard)
- 4) 1 sheet (Paper, OHP, Envelope etc.)
- 5) Separating Type: Cassette - Friction Pad Type
- 6) Manual Tray : 1 sheet
- 7) Driver Type : Driving by Gearing from Main Motor
- 8) Pick_up Roller Driver : Solenoid
- 9) Pick up Roller Rubber Material : EPDM+IR $\mu=1.3$ or more
- 10) Pick up Velocity : 94.8731mm/Sec (Process : 93.0667mm/sec)
- 11) Paper detecting Sensor : Photo Sensor
- 12) Paper Size Sensor : None
- 13) Paper Separating Pad Material : NBB 52°, $\mu=0.8\sim1.2$
- 14) Separating Pad Pressure : TBD 150 gf
- 15) Pick_up Roller RPM : 47.683 RPM
- 16) Feeding Pressure (Same as Transfer Roller)
: TBD 150~200 gf (SPRING H mm, based on 1sheet)
TBD 150~200 gf (SPRING H mm, based on 150sheets)
- 17) Paper Exit Type : Face Down
- 18) Feed Roller Force : TBD Kg.f or more.
- 19) Spring Feed Tensile Force : TBD gf
- 20) Feed roller Velocity : mm/sec
- 21) Feed Roller Material : -
- 22) Exit Sensor : Photo Sensor

8. Develope Process

- ▶ Developing Method : Non magnetic 1 element contacting method
- ▶ Toner : Non magnetic 1 element shatter type toner
- ▶ Toner Qty : 35 gf / 60gf (1k / 3k)
- ▶ The life span of toner : 1k/3k sheets (ISO 5% Coverage)
- ▶ Toner Residual Sensor : None
- ▶ OPC Cleaning : Use the conventional cleaning blade
- ▶ Handling of wasted toner : Discard by collecting waste-toner at waste-toner bin.
- ▶ OPC Drum Protecting Shutter : None
- ▶ Classifying device for toner cartridge: ID is classified by interruption of the frame channel.
- ▶ Development Roller type : conductive elastic roller
- ▶ Doctor BLADE Type : Regulating toner layer by pressure
- ▶ Charge Roller Type : Conductive Roller Contact-Charge

9. Sanner Part

600dpi Color CIS Module for Flat bed, SCX-4517F uses the CIS scanning method

1) CIS SPEC

- ▶ Scanning size : 216 mm (width for letter-size)
- ▶ Light source : LED
- ▶ Scanning sensor: CIS 600/300 dpi
- ▶ Scanning mode : Color SCAN / Mono SCAN
- ▶ MTF : 30% (300 dpi Chart)
- ▶ CIS interface : Analog output
- ▶ Power supply : 3.3V
- ▶ Clock Frequency: 5.5MHz max.
- ▶ Number of output : 1
- ▶ LED Current : Green/Blue : 50mA, Red : 60mA
- ▶ Clamp Level : 1.4V
- ▶ Connection : 12 pin FFC connector (pitch 1.0mm)

2) Scan Resolution

(a) Translation

- ▶ Normal : Vertial: 3.85 Line/mm, Horizontal: 8 Pels/mm :203 x 98dpi
- ▶ Fine : Vertial: 7.7 Line/mm, Horizontal: 8 Pels/mm :203 x 196dpi
- ▶ Super Fine : Vertial: 11.8 Line/mm, Horizontal: 11.8 Pels/mm ;300 x 300dpi

(b) When Copy : Vertical: 11.8 Line/mm, Horizontal: 23.6 Pels/mm :600x300dpi(ADF)
Vertical: 23.6 Line/mm, Horizontal: 23.6 Pels/mm :600x600dpi(Platen)

3) Half Tone (Gray Scale) : 256 Levels

4) Scan Line Time

(a) Tx

- ▶ Normal : 1.5 ms/Line
- ▶ Fine : 1.5 ms/Line
- ▶ Super Fine : 1.5 ms/Line

(b) Copy : 1.5 ms/Line

(c) Scan

- ▶ Color : 4.5msec/line
- ▶ Gray : 4.5msec/line
- ▶ Mono : 4.5msec/line

5) Scanning Width

- ▶ MAX SCAN WIDTH : 216 mm (8.5 inches)
- ▶ Effective Scan Width : 208 mm

6) ADF Motor

(a) Motor Spec

- ▶ 정격전압 : 24V DC
- ▶ 정격전류 : 0.6A(Peak)

7) Motor Driver speed & method

(a) FAX Transmission

- ▶ Normal Mode : 2000 pps, 2-2
- ▶ Fine Mode : 1000 pps, 2-2
- ▶ Super Fine Mode : 667 pps, 2-2

(b) Copy Job : 667 pps, 2-2

- ▶ max(30sheets) : 50gf
- ▶ min(1sheets) : 20gf

8) Document Detect sensor

- (a) Type : Photo interrupt
- (c) LED
 - max current : 30mA
 - max voltage : 3.3V
- (d) Output
 - Logic "H" : Not Paper
 - Logic "L" : Paper
- (e) Lever-Sensor DOC : ADF Lower Torsion Spring

9) Regi Detect sensor

- (a) Type : Photo interrupt
- (b) Position : ADF PBA
- (c) LED
 - max current : 50mA
 - max voltage : 3.3V
- (d) Output
 - Logic "H" : Not Paper
 - Logic "L" : Paper
- (e) Lever-Sensor DOC : ADF Lower Torsion Spring

10) Document Scan sensor

- (a) Type : Photo interrupt
- (b) Position : ADF PBA
- (c) LED : - Max current : 50mA
- Max Voltage : 3.3V
- (d) Output : - Logic "H" : Off(No Position),No Paper
- Logic "L" : On (Doc Position),Paper
- (e) LEVER-SENSOR SCAN : Scan Lower Torsion Spring

10. OPE(Operational Panel Equipment)

1) Ope Panel

OPE Panel has a MICOM Chip on it and communicates with Main CPU using Serial communication Line(SIO).

OPE Panel consists of Micom, Key Matrix Part, LED Driving Part and LCD Part.

2) Key Description

No	Part	Feature	Function
1	Common	3*4Key	Dialing and Option Input
		Start	Starting Fax/Copy Job
		Stop/Clear	Cancel Current Job/Return to default
		Menu	Option select
		Upper Level	Return to upper level menu
		Enter	Option select/Execute
		▶	Next menu or Next option item
		◀	Previous menu or Previous option item
2	Save	Toner Save	TONER SAVE MODE select
3	Copy	Reduce/Enlarge	Select ZOOM ratio when copy
		No.of Copies	Select the number of copies
		Original Type	Change Copy Modes(Text,Text/Photo,Photo)
		Darkness	Change the Darkness of the Copied image (Light/Normal/Dark)
		Template	Select one of the predefined Copy templates.
4	Fax	Resolution	STANDARD>FINE>SUPER FINE>PHOTO>COLOR
		Phone Book	Search the user defined Phone number.
		Broadcasting	When sending FAX data to many place in the same time.
		On Hook Dial	On Hook Dial
		Redial / Pause	Last number Redial / Pause
5	Scan	Scan to	select [scan to PC], [scan to FAX], [scan to E-mail] function.

3) LCD Part

-Number of Characters: 16 Characters x 2 line

- ▶ Clock, Date display
- ▶ System Status display
- ▶ Alarm, Error Message display
- ▶ Function Dialog Message display