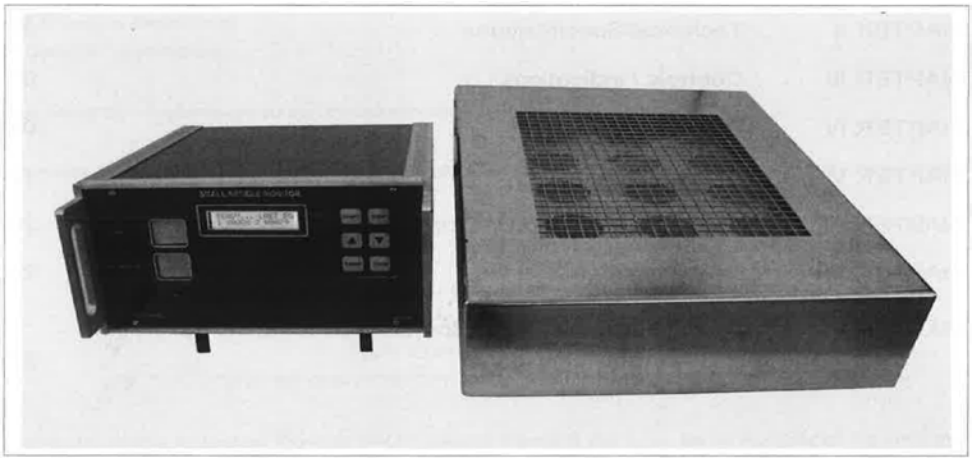
INSTRUCTION MANUAL

SMALL ARTICLE MONITOR

MODEL: SAM802 (TYPE-2)



NUCLEONIX SYSTEMS PRIVATE LIMITED

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CONTENTS

CHAPTER - I
INTRODUCTION

Small Article Monitor Type SAM802 manufactured by Nucleonix systems is a sensitive large area installed contamination monitor designed for checking tools and articles of personnel working in nuclear installations. This product is designed for detection of Beta/Gamma contamination in the articles placed in the sample tray placed inside the detection counts.

The detection assemblies are based on pancake GM detectors covered with lead shielding to get enhanced MDA. Counts / count rate are displayed on 16 X 2 LCD display apart from other textual messages. LED indication is provided for CLEAN, CONTAMINATION & HIGH BG (BG-Background) conditions. Equipment is designed for 240VAC, 50Hz operation.

FEATURES:

- Uses 12 no's of pan cake GM detectors in bottom tray of detector assembly.
- 16X2 LCD along with 2 large bar LEDs indicate contamination / clean status along with textual message and count rate information.
- Counting time is in the range of 1 to 99 seconds.
- Background subtraction is automatic and can be enabled / disabled.

SMALL ARTICLE MONITOR

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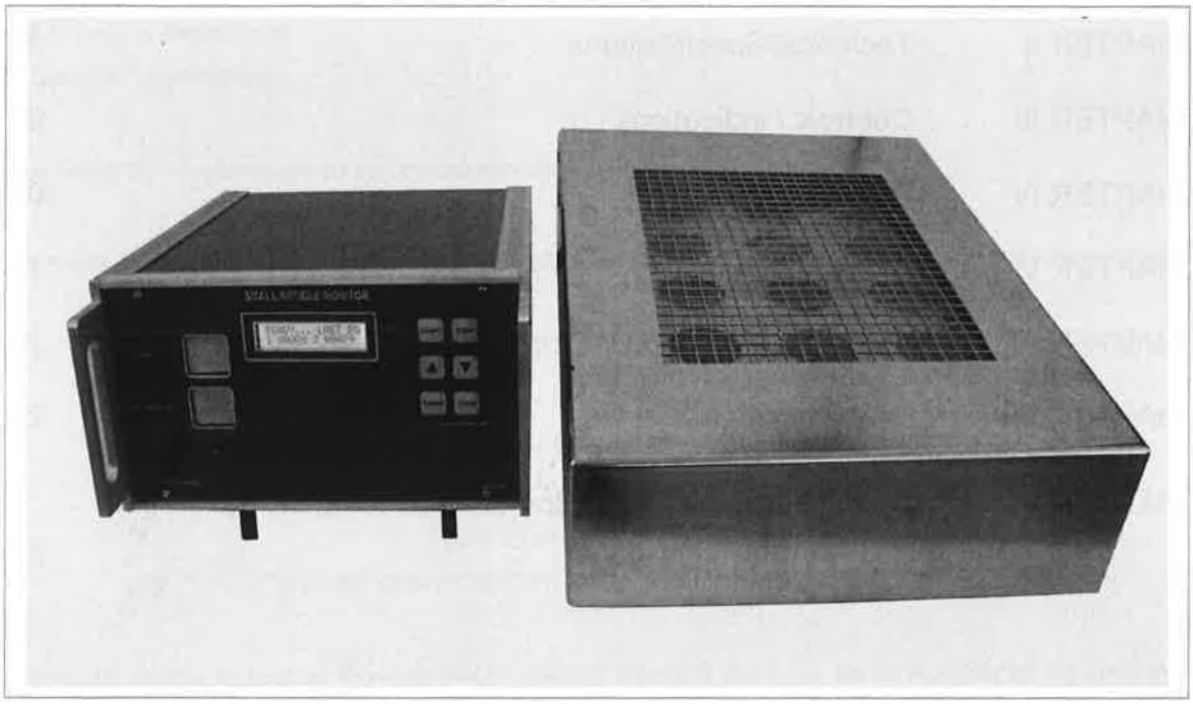


CHAPTER - II

FRONT AND REAR PANEL CONTROLS / INDICATIONS

1. **Front Panel Indications and Controls: a). 16X2 LCD display:**
   This display indicates counts/count-rate on the LCD display aspect from textual messages during acquisition and configuration.

   b). Bar LEDs (Green and RED):
   2 no. of large bar LEDs RED & GREEN are provided for indication of alarm status at the end of acquisition contamination and clean.

   c). Matrix Keypad:
   6 key matrix keypad is provided for user interface with the instrument during operation / configuration. 6 keys are PROG, UP, DOWN STORE, START&STOP.

2. **Rear Panel Controls, Indications and Connectors:**

   a). Power ON/OFF control:
   A rocker switch is provided on the rear panel of the instrument to power ON/OFF.

   Power Controls:
   A male audio jack is provided on the rear panel for feeding +24VDC power to the unit using an AC adapter.

   b). High Voltage Connectors to Detector Channels:
   Two no. of MHV high voltage connectors HV-CH1 and HV2 are provided on the rear panel for feeding HV and taking detector output from the two detector channels.

   c). Detector Pulse Outputs:
   Two no. of BNC connectors CH-1 output and CH-2 output are provided on the rear panel for checking detector pulse outputs of the two channels.

   d). Test Points:
   Three test points +5V, +12V and GND are provided on the rear panel for fault diagnostic purposes.

CHAPTER – III

SPECIFICATIONS

No. of detectors & type of detector used:
Detectors Used: Pancake GM Detectors
12 nos. of detectors of dimension 210 X 240 mm placed ON bottom side of the articles.

Area Covered:
300 X 300 mm at top & bottom of the detector assembly

Shape and dimension of enclosure:
325X450 mm for the detection assembly including lead shielding. Electronic unit is kept beside this assembly. Metallic mesh provided for the whole article will be rugged & designed to protect the detector assembly

Display:
16 X 2 LCD display for indication of counts/count rate, elapsed time and textual messages. LED status indicates high background clean & contamination

Alarms:
Audio visual alarms are generated when preset levels exceeded or on hardware fault

Measurement units:

Preset time, CPS & CPM modes

Counting Time: 1 to 99 seconds

Background Subtraction: ON/OFF

Gamma Sensitivity:

Lead shielding of suitable thickness will be provided to minimize gamma background

Power Supply: 240V +/- 10%, 50 Hz AC

CHAPTER -IV

OPERATING INSTRUCTIONS

Small Article Monitor is a micro-controller-based instrument with intelligent user interface. It is provided with matrix keypad for configuring and use of the instrument. It has six keys-PROG, ▲,▼, START, STOP & STORE (not used presently). Before use for monitoring of tools / articles, configuration may be done as per below indications.

4.1 Configuration before Use:

4.1.1 Acquisition Mode Selection:

The unit is provided with three modes of acquisition-Preset count, CPS & CPM to set suitable mode, press PROG key to select below menu

ACQ MODE PRT.TIME /CPS/CPM

Using ▲ or ▼ keys select the desired acquisition mode.

4.1.2 Preset Time:

In preset time mode of acquisition, this menu can be used to set acquisition time for counting. To set, press PROG key to select below menu

PR. TIME XXXXX

Now using ▲ and ▼ keys, set the desired preset time in seconds. Use ▲ to increment digit and ▼ to scroll horizontally.

4.1.3 Iterations:

Iterations are applicable for preset time mode of acquisition. Depending on the number of iterations, acquisition for preset time is repeated and the average result is displayed at the end of counting. To set, press PROG key to show below screen

ITER XX

Now press ▲ or ▼ keys set the number of iterations.

4.1.4 Alarm set points:

Alarm level for counting can be set using this menu option for both the detection channels. To set select the below menu option using PROG key.

ALRM LEVEL: ╱╲ 1: XXXX

Now using ▲ & ▼ keys, set the alarm level for each channel. Press ▲ button with cursor over 1:/2: results in channel change

4.1.5 Background update time:

Background radiation levels are update automatically at a refresh rate decided through this menu option. To set, press PROG key to show below screen.

.

BG UPDATE TIME:
(MIN) XX

Now using ▲ & ▼ keys, select the desired refresh rate in minutes for both the channels

4.1.6 BG SUBTRACT (ON/OFF):

Background subtract during acquisition cycle can be set ON/OFF through this menu.

To set status, press PROG key to show below screen.

BG SUBTRACT
ON / OFF

Now using ▲ & ▼ keys, set background subtraction to ON/OFF.

4.1.7 High BG Alarm Level:

In case BG readings of the instrument are very high, high background message has to be shown and acquisition should not be allowed until unit is decontaminated. To set high background alarm level for both the channels, select below menu option.

HIGH BG ∧
LEVEL 1: XXXX

Now using ▲ & ▼ keys, set the digit or scroll through the digit. To select channel use ▲ key at 1: / 2:

4.1.8 View stored data:

To view stored data, select below menu option, using PROG key.

REC XXXX
1: XXXXX 2: XXXXX

To scroll through stored readings, press □ or ▼ keys.

4.1.9 To save parameters:

To save all the above settings, select below menu option

SAVE?
(PRG)

Now press ▲ or ▼ keys, to save the settings

4.1.10 To view EHT to the detectors:

To view the EHT set for all the detectors, press below menu option using PROG key

EHT XXXXX

This completes configuration of the instrument.

4.2 Acquisition Cycle:

Acquisition happens in two modes background mode and sample mode

I. To update background manually before acquisition, select below menu option using PROG key

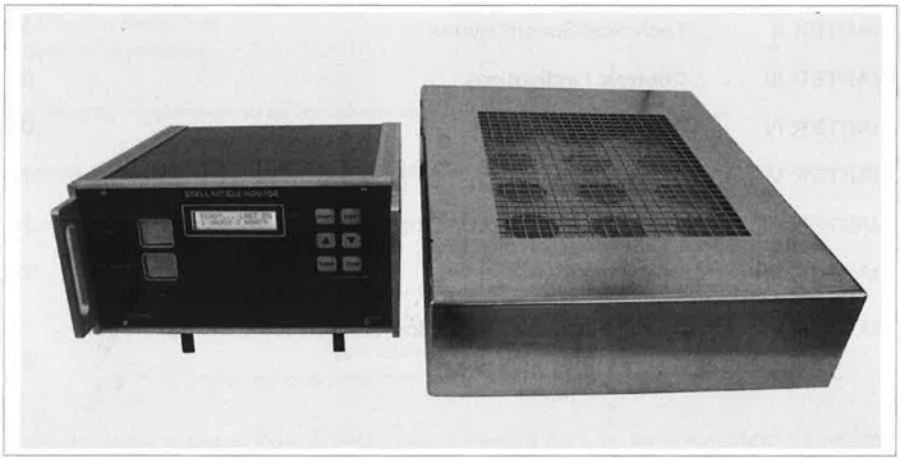
Now press START button to update BG.

PRESS START TO UPDATE BG

If the instrument is in ready condition, then place

II. Acquisition for tools / articles

The tools / articles are to be placed in the sample tray shown in the below picture



Close the door after placing the tools, now press START to commence acquisition.

At the end of counting, obtained counts are checked with preset level set and the below screen appears automatically.

Clean….

This message is accompanied by a single long beep and green LED indication for clean condition

Or

Contamination.

This message is accompanied by a flashing RED LED indication for contamination condition.

BLOCK DIAGRAM AND DESCRIPTION

CHAPTER – V

BLOCK DIAGRAM DESCRIPTION

The Small Article Monitor Type SAM802 is a micro-controller-based unit. It essentially is a pan cake GM detector based small tools / articles monitor. Maximum dimension of the sampler is 300X300X150mm. This system essentially comprises of two sub-assemblies.

a). Electronic display and measurement unit
b). Tool box assembly comprising of sample tray and pan cake GM detectors

Tool box assembly comprises of single detector trays comprising of 12 pan cake GM detectors each along with corresponding lead shielding cups for background reduction.

Electronic measurement and display unit comprises of following sub-assemblies

i) High voltage module

High voltage module operating on +12V DC generates 0-1200V DC for biasing the GM pan cake Detectors of the detector channels (Typically 550v).

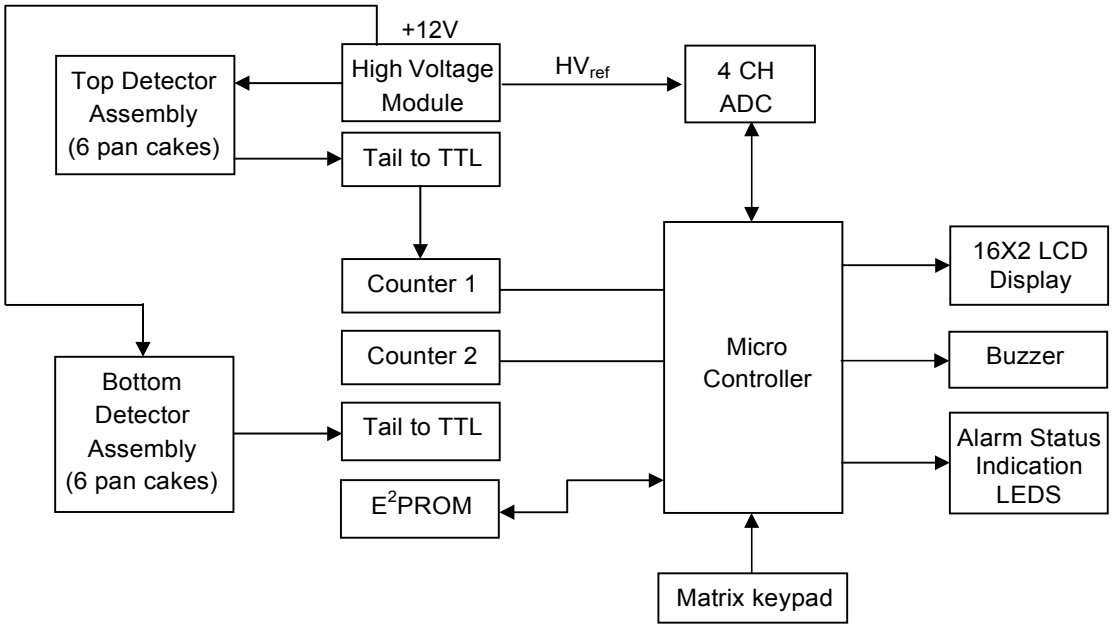
ii) Power supply controller and display circuits

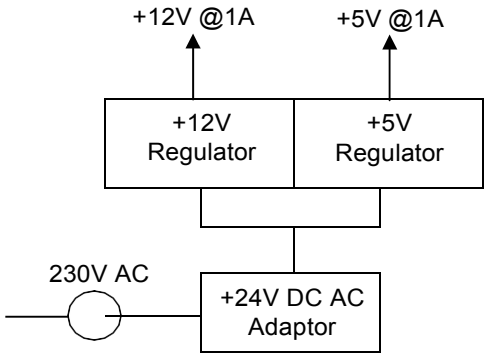
Micro controller based on 8051 family is used for control and measurement. It fetches counts from both the detector channels and indicates on LCD during acquisition for Background and tools / articles. It also takes user input visual interface through 16X2 LCD display. Audio visual alarms are generated during acquisition cycle and indicated by RED/GREEN bar LEDs and DC buzzer.

All settings are stored in E^2PROM provided. High voltage indication is read out through a 4-channel ADC and displayed on the LCD.

Two no. of switching regulators are provided to generate +5V and +12V respectively based on +24V DC output from the AC adaptors.

Block Diagram of Small Article Monitor





CIRCUIT DIAGRAMS AND DESCRIPTION

CHAPTER – VI

Circuit Description

The following description mainly focuses on hardware circuit description, including detectors functionality & how micro-controller is interfaced to various devices to perform different tasks.

It consists of mainly three PCBs (a) Microcontroller PCB (b) Display PCB (c) HV module PCB.

- **HV module (0-1200V)**:

This HV module is a sub-system and is an integral part of the electronic unit. This HV module provides detector bias voltage for GM detector module primarily draws LV power +12V and this module generates regulated stable HV output with low ripple. Output is 0-1200V can be preset to any value within this range and ripple/ RMS noise is less than 30mV.

HV circuit basically has a free running Osc based around 555 (U1) with ON/OFF time adjustment. U2 serves as the divider. This divider (U2) with gating U3C drives Osc pulses out of phase to the gate (s) of MOSFETS (Q1 & Q2).

T1 serves as the R.F transformer which steps up secondary voltage gain of 25 KHz Osc by 50 times approx. secondary signals are passed through voltage quad-doubler consisting of C40, D3, C41, D4, C42, D5, C43, D6 respectively.

C11, C12 serve as output filter capacitors. R4, R13, R5, R8 & P2 serves as bleeder network. Fraction of output across R8 & P2 is taken and compared with reference voltage across P5 centre tap at the input pins of op-amp (U6). Output of this error amp is fed to regulator chip 723.

This gives output proportional to the set HV value & corrects for achieving regulation. There is HVref faction of output taken through U4A – 1 to microcontroller for indicating HV failure. This HV supply provides (0-1200V).

Detection system:

This indicate detector & pulse processing circuits for both channel. This essentially uses pan cake G.M detector LND 7312 as the beta/gamma detector. Beta/gamma contamination when detected by this G.M tube produces ionization in detector giving rise to negative tail pulses, which are coupled through C13 coupling capacitor. HV biasing of 500V, is applied though load resistors R10 & R11 to the G.M. detector. Negative tail pulses are received at U10-9, pulse processing chip, are converted TTL pulses. Threshold voltage is set by trim pot P8 cut-off any noise. This TTL2 beta pulse output goes to analog MUX CD4052 for further processing. All this processing is done in the main controller board.

Description of Micro-controller part of circuit:

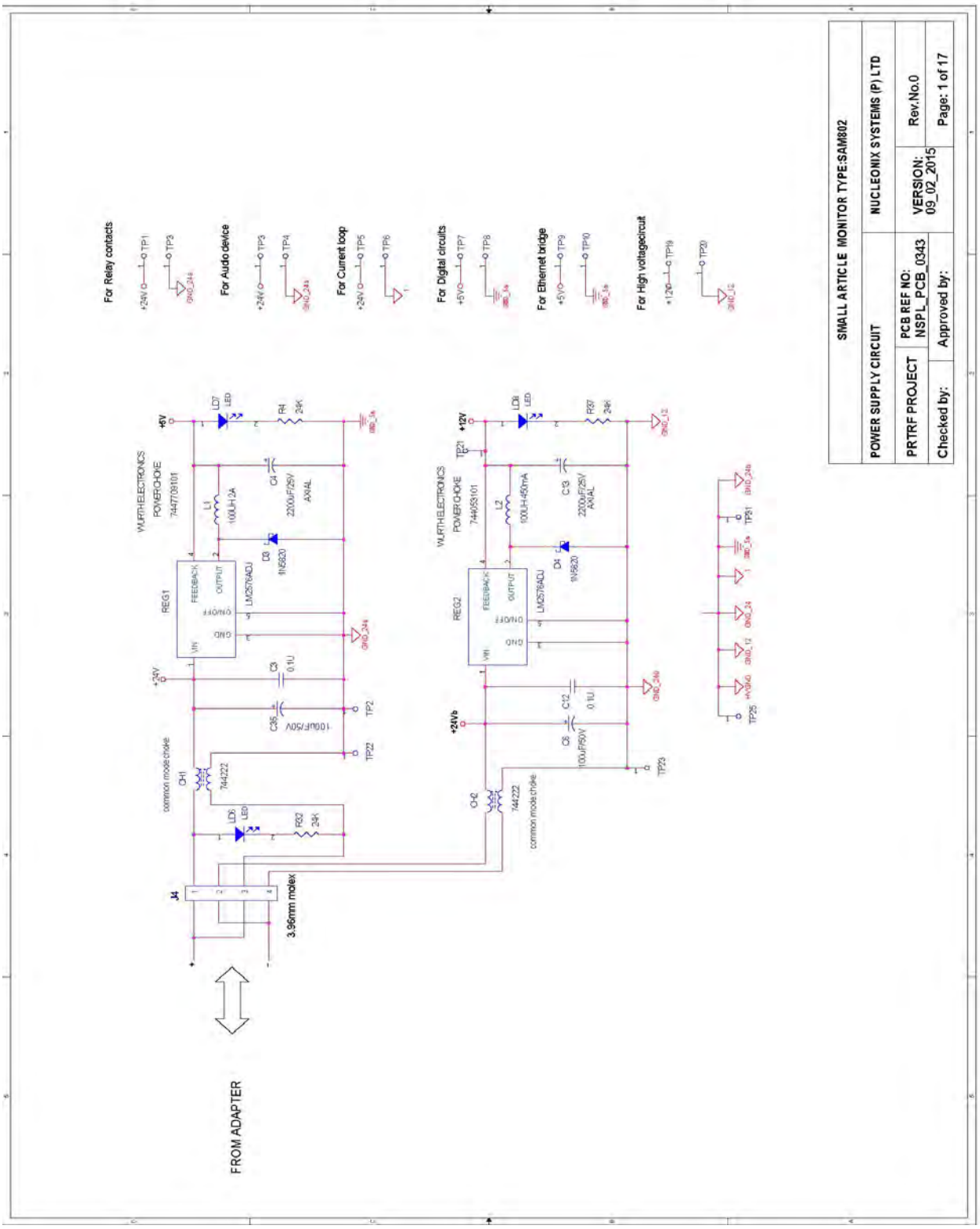
It has 8-bit micro-controller P89V51 (U6) indicating connections to various ports & other peripheral devices.

ADC (U5) – MAX1111 is a FOUR channel serial ADC, a peripheral device with serial bus for programmability. It is interfaced to micro-controller through port P1.1 to P1.4. This ADC basically reads fraction of LV supplies namely (a) +24V through R6 & R9 junction (b) +12V through R7 & R10 junction and fraction of HV (HVref) to U5-4.

Analog MUX, counter & CLEAN cluster LED control circuit:

Analog MUX (U12) receives TTL signals, from sources G.M. detector pulses from P1.6 of microcontroller. Under program control through P3.4 & P0.4 one of these three signals are selected. MUX output from U12-13 goes to 8-digit serial BCD counter which is programmed through microcontroller through I^2C bus. receives from TTL1 (CH-1) TTL2 (CH-2) from U9-6 & U10-6 into analog MUX chip. These two TTL outputs are counted by two separate counters (U10&U8) under program control, activity displayed in the LCD. (measuring unit selected).

U9 (MAX 813L) is a watch dog-timer IC which is connected to micro-controller through U6.6 (port P1.5) & receives micro-controller timer check signal continuously, as watch dog data in (WDI). When micro-controller fails or hangs, this data will not come within 1.6 sec & failure is sensed by watch dog timer & it generates a '**mc RESET'** signal, which resets micro-controller to restart the program & also triggers mono (U20A).
This mono U20 A, pulse of 0.8 sec duration is passed through XOR (U21) IC to driver transistor Q5, which drives CLEAN cluster LED, to ON state. If the controller fails totally, then '**mc RESET'** is generated continuously triggering mono U20A every 1.6 sec & this makes CLEAN cluster LED blink continuously indicating micro-controller failure to the user.
CLEAN /CONTAMINATION (green & red cluster LED lamps) are driven by transistor Q5 & Q6.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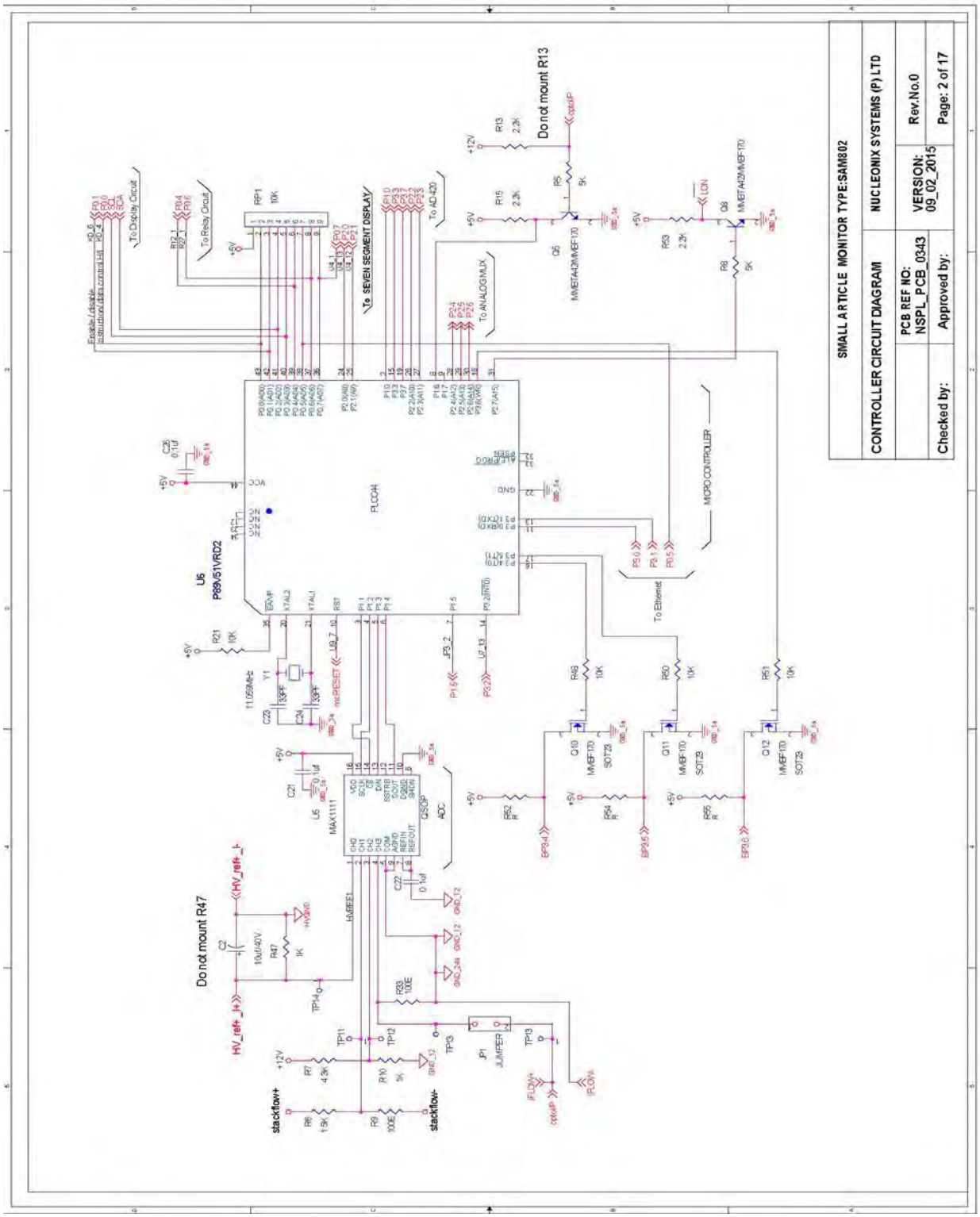
POWER SUPPLY CIRCUIT
NUCLEONIX SYSTEMS (P) LTD
PRTRF PROJECT
PCB REF NO: NSPL_PCB_0343
VERSION: 09_02_2015
Rev.No.0
Checked by:
Approved by:
Page: 1 of 17
For Relay contacts
For Audio device
For Current loop
For Digital circuits
For Ethernet bridge
For High voltagecircuit
FROM ADAPTER
3.96mm molex
common mode choke
WURTH ELECTRONICS
REG1
REG2
LM2576ADJ
1N5820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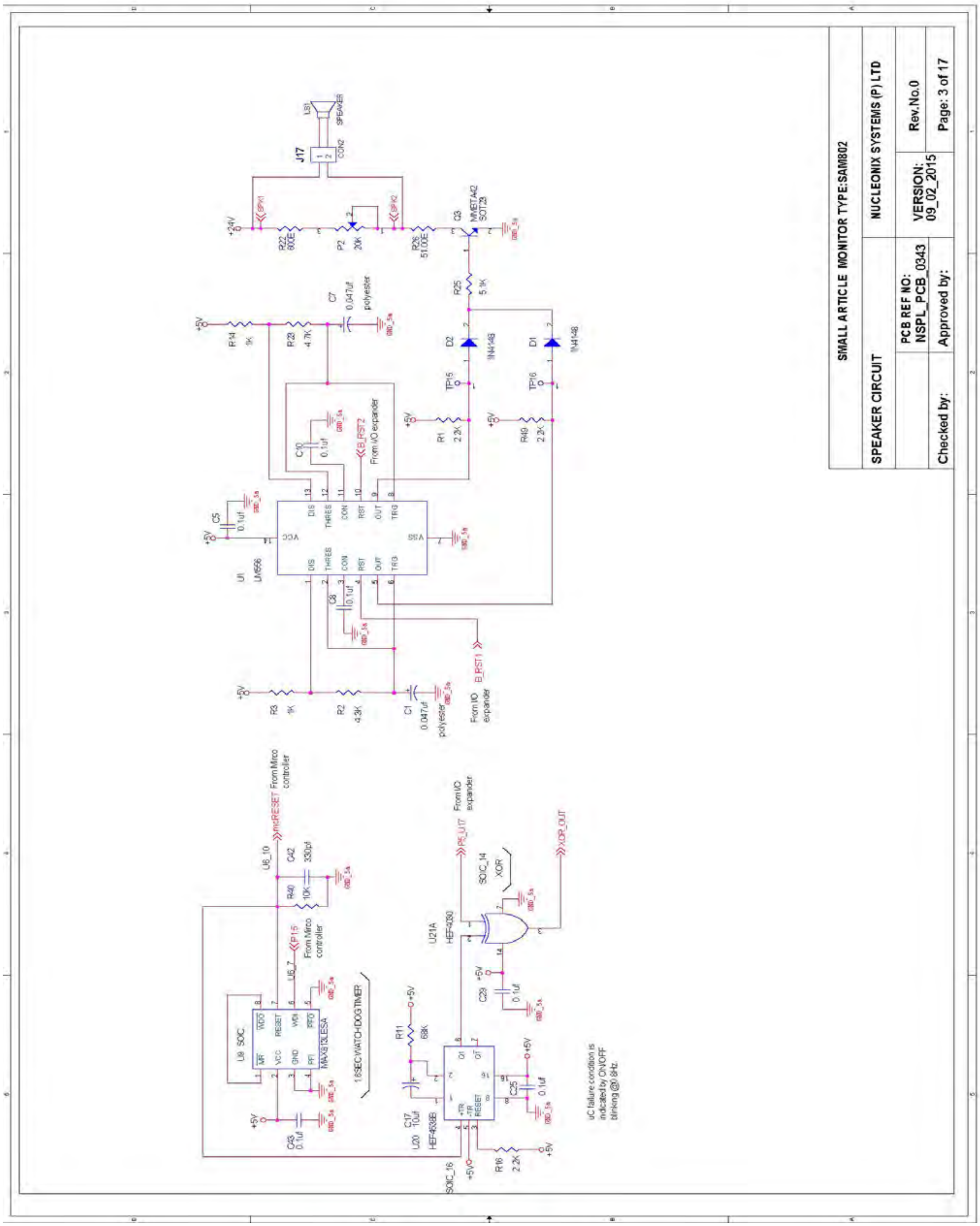
CONTROLLER CIRCUIT DIAGRAM
NUCLEONIX SYSTEMS (P) LTD
PCB REF NO: NSPL_PCB_0343
VERSION: 09_02_2015
Rev.No.0
Checked by:
Approved by:
Page: 2 of 17
Do not mount R13
Do not mount R47
To Display Circuit
To Relay Circuit
To SEVEN SEGMENT DISPLAY
To AD420
To ANALOGMUX
To Ethernet
MICROCONTROLLER
U6
P89V51VRD2
U5
MAX1111
ADC
stackflow+
stackflow-
JUMPER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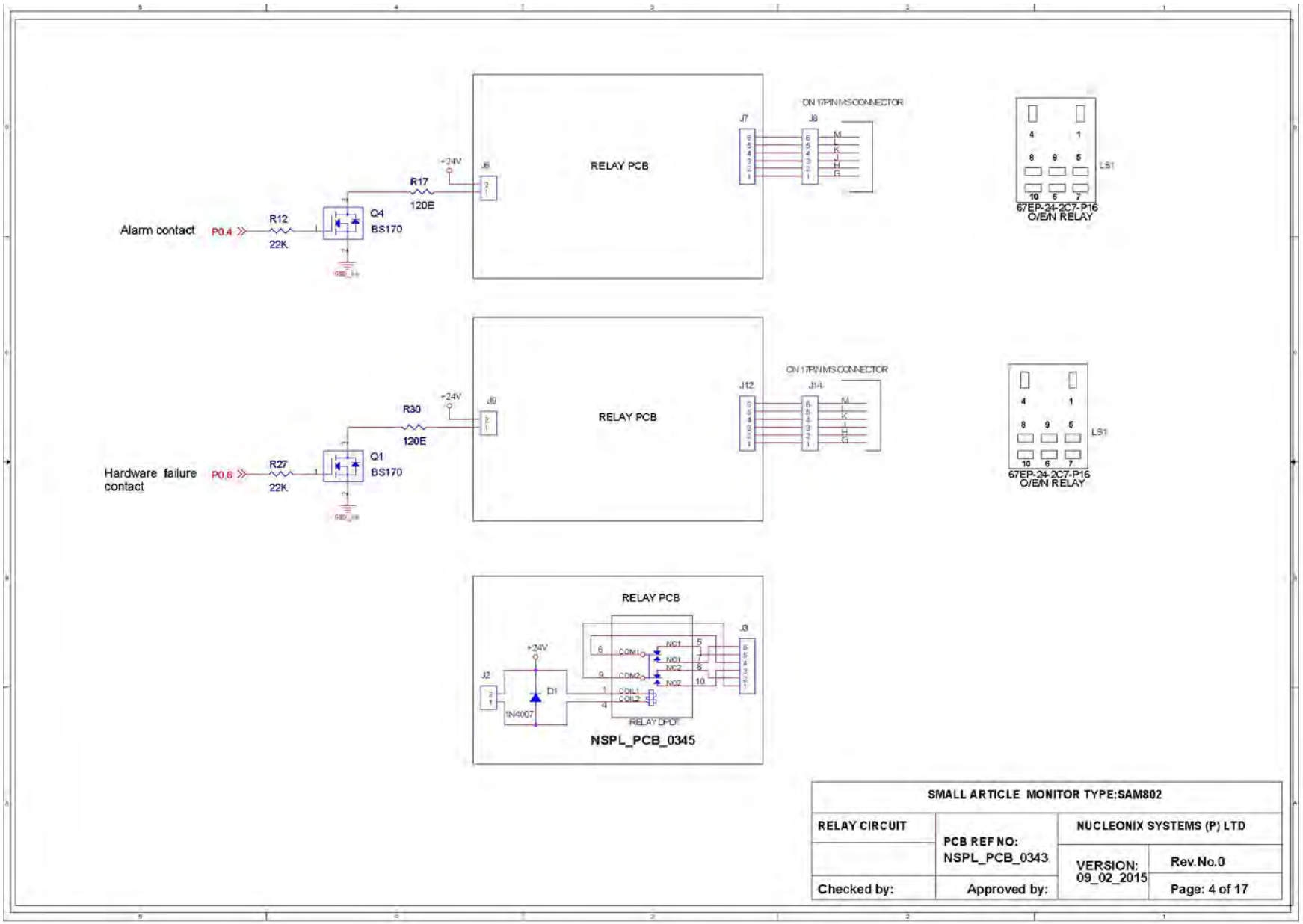
NUCLEONIX SYSTEMS (P) LTD
SPEAKER CIRCUIT
PCB REF NO:
NSPL_PCB_0343
VERSION:
09_02_2015
Rev.No.0
Page: 3 of 17
Checked by:
Approved by:



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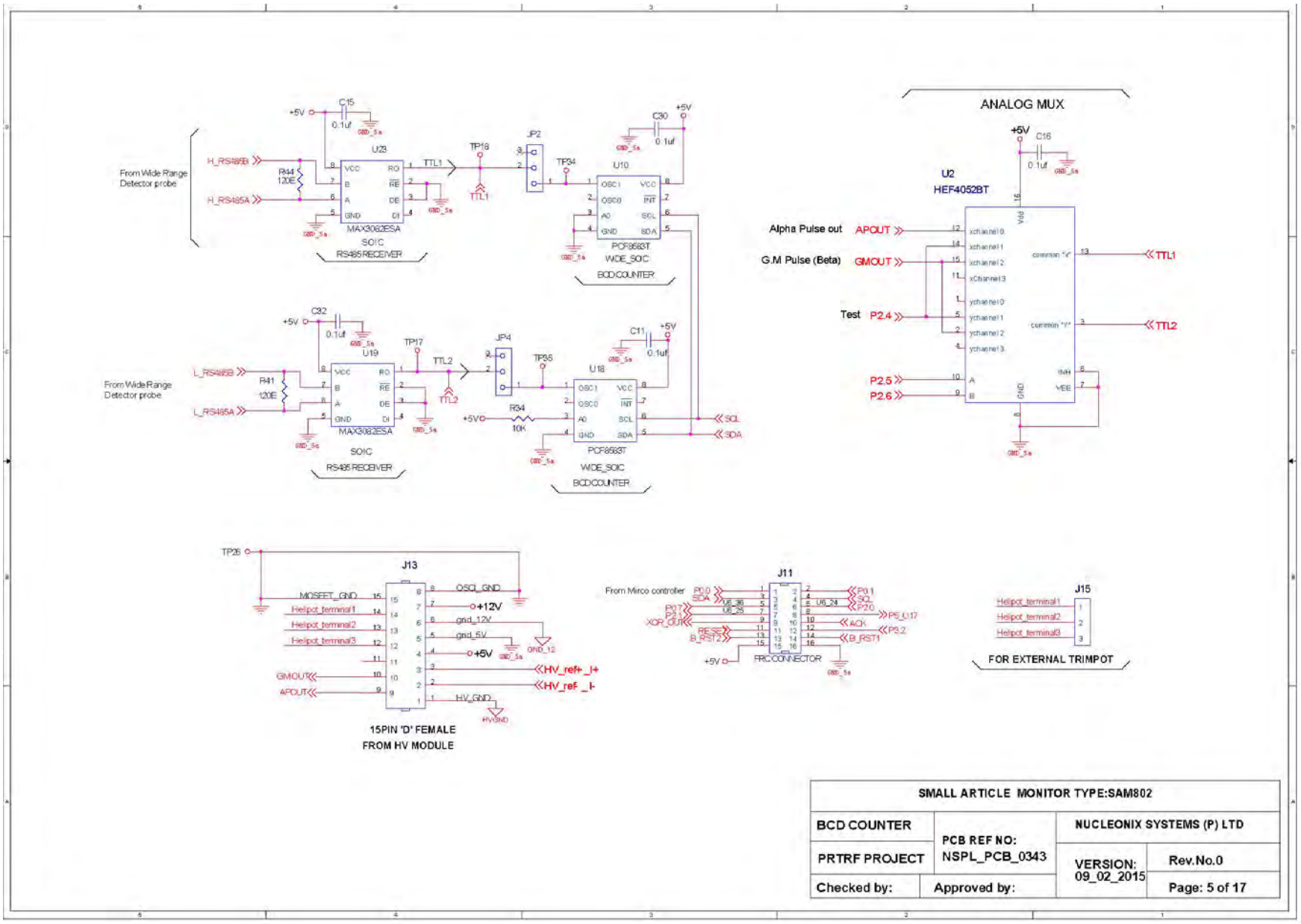
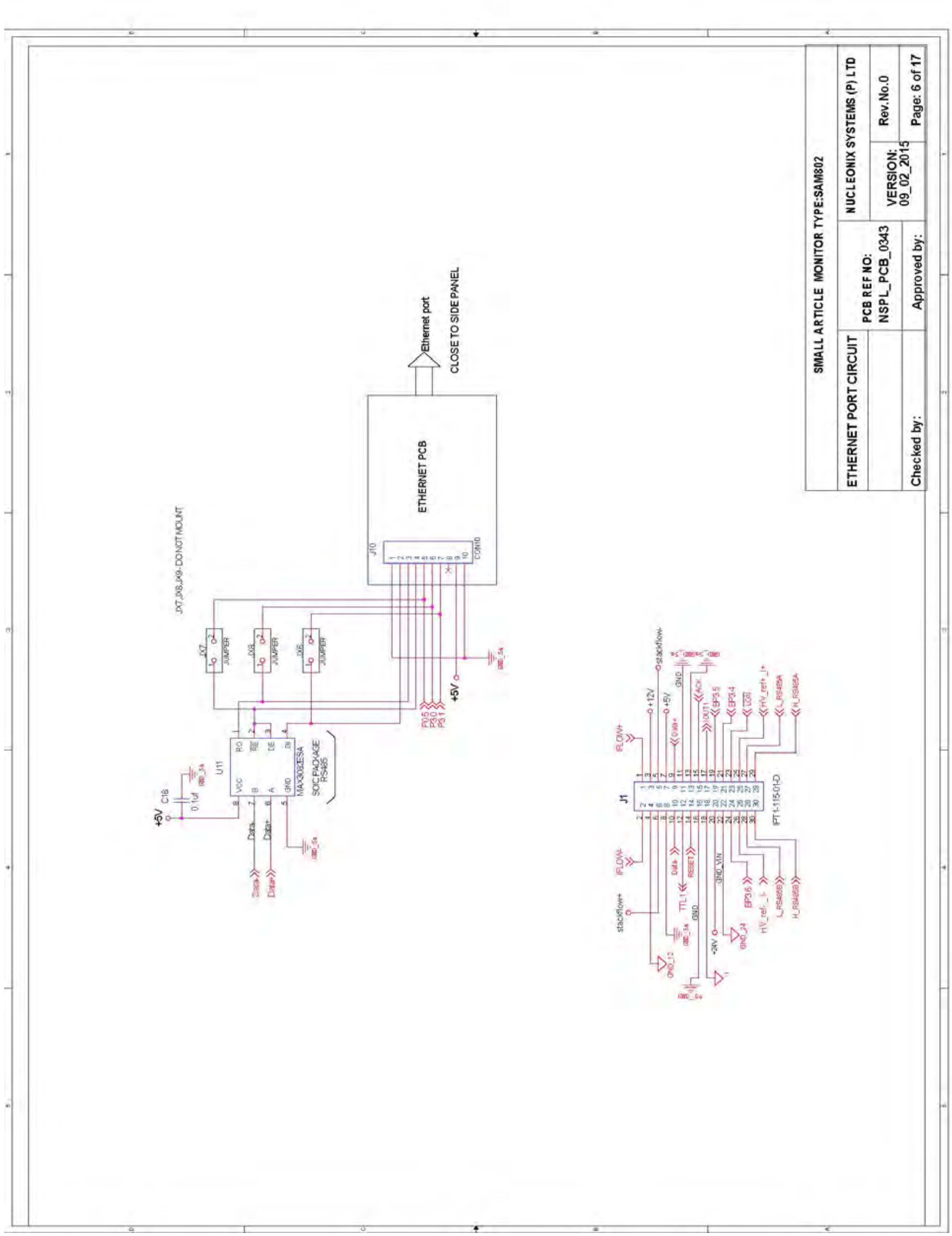
RELAY CIRCUIT	PCB REF NO: NSPL_PCB_0343	NUCLEONIX SYSTEMS (P) LTD	
		VERSION: 09_02_2015	Rev.No.0
Checked by:	Approved by:		Page: 4 of 17


From Wide Range Detector probe
H_RS485B
H_RS485A
R44 120E
C15 0.1uf
U23
MAX3082ESA
SOIC
RS485 RECEIVER
TP18
TTL1
JP2
TP34
U10
PCF8583T
WIDE_SOIC
BCD COUNTER
C30 0.1uf
From Wide Range Detector probe
L_RS485B
L_RS485A
R41 120E
C32 0.1uf
U19
MAX3082ESA
SOIC
RS485 RECEIVER
TP17
TTL2
JP4
TP35
U18
PCF8583T
WIDE_SOIC
BCD COUNTER
C11 0.1uf
R34 10K
SCL
SDA
ANALOG MUX
U2
HEF4052BT
C16 0.1uf
Alpha Pulse out
APOUT
G.M Pulse (Beta)
GMOUT
Test
P2.4
P2.5
P2.6
TTL1
TTL2
TP26
J13
MOSFET_GND
Helpot_terminal1
Helpot_terminal2
Helpot_terminal3
GMOUT
APOUT
OSCL_GND
+12V
gnd_12V
gnd_5V
+5V
HV_ref+_I+
HV_ref-_I-
HV_GND
15PIN 'D' FEMALE
FROM HV MODULE
From Mirco controller
P0.0
SDA
P0.7
P2.7
XOR_OUT
RESET
B_RST2
J11
P0.1
SCL
P2.0
U6_24
U6_25
P5_U17
ACK
P3.2
B_RST1
FRC CONNECTOR
J15
Helpot_terminal1
Helpot_terminal2
Helpot_terminal3
FOR EXTERNAL TRIMPOT
SMALL ARTICLE MONITOR TYPE:SAM802
BCD COUNTER
PCB REF NO:
NSPL_PCB_0343
NUCLEONIX SYSTEMS (P) LTD
PRTRF PROJECT
VERSION:
09_02_2015
Rev.No.0
Checked by:
Approved by:
Page: 5 of 17


JX7,JX8,JX9- DO NOT MOUNT
ETHERNET PCB
Ethernet port
CLOSE TO SIDE PANEL
SMALL ARTICLE MONITOR TYPE:SAM802
ETHERNET PORT CIRCUIT
NUCLEONIX SYSTEMS (P) LTD
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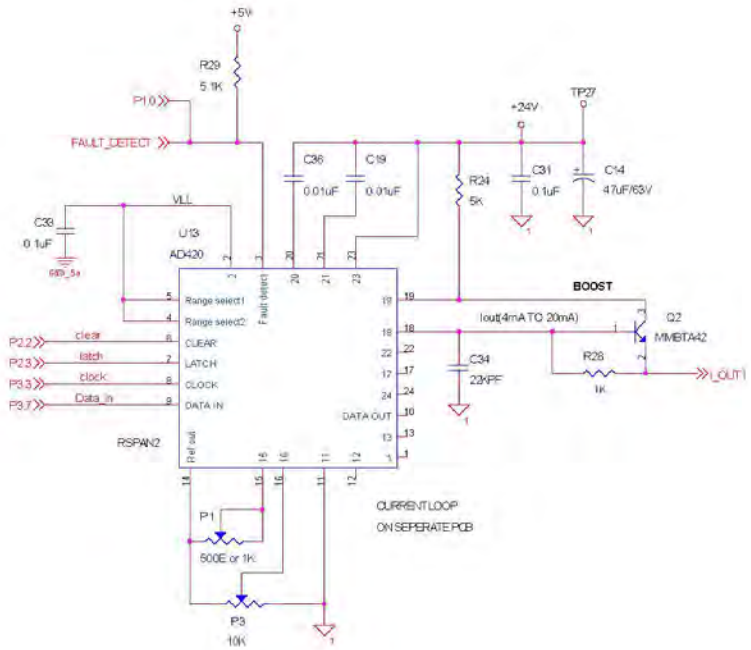
NSPL_PCB_0343
VERSION:
09_02_2015
Rev.No.0
Checked by:
Approved by:
Page: 6 of 17



SMALL ARTICLE MONITOR TYPE:SAM802			
CURRENT LOOP CIRCUIT		NUCLEONIX SYSTEMS (P) LTD	
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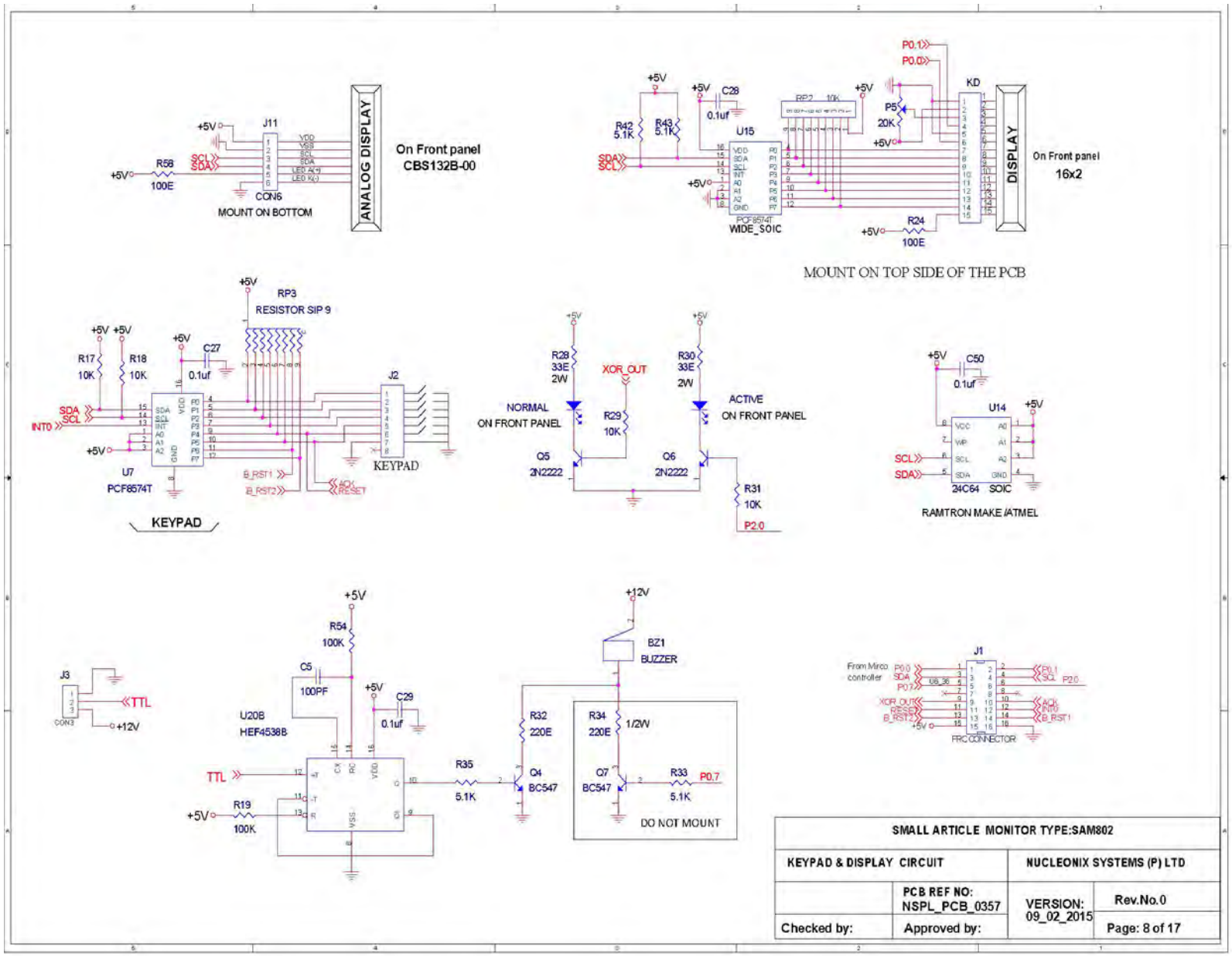
Checked by:	Approved by:		Page: 7 of 17


ANALOG DISPLAY
On Front panel
CBS132B-00
MOUNT ON BOTTOM
CON6
DISPLAY
On Front panel
16x2
MOUNT ON TOP SIDE OF THE PCB
RESISTOR SIP 9
KEYPAD
PCF8574T
NORMAL
ON FRONT PANEL
ACTIVE
ON FRONT PANEL
XOR_OUT
2N2222
24C64 SOIC
RAMTRON MAKE /ATMEL
BUZZER
DO NOT MOUNT
HEF4538B
BC547
FRC CONNECTOR
SMALL ARTICLE MONITOR TYPE:SAM802
KEYPAD & DISPLAY CIRCUIT
NUCLEONIX SYSTEMS (P) LTD
PCB REF NO: NSPL_PCB_0357
VERSION: 09_02_2015
Rev.No.0
Checked by:
Approved by:
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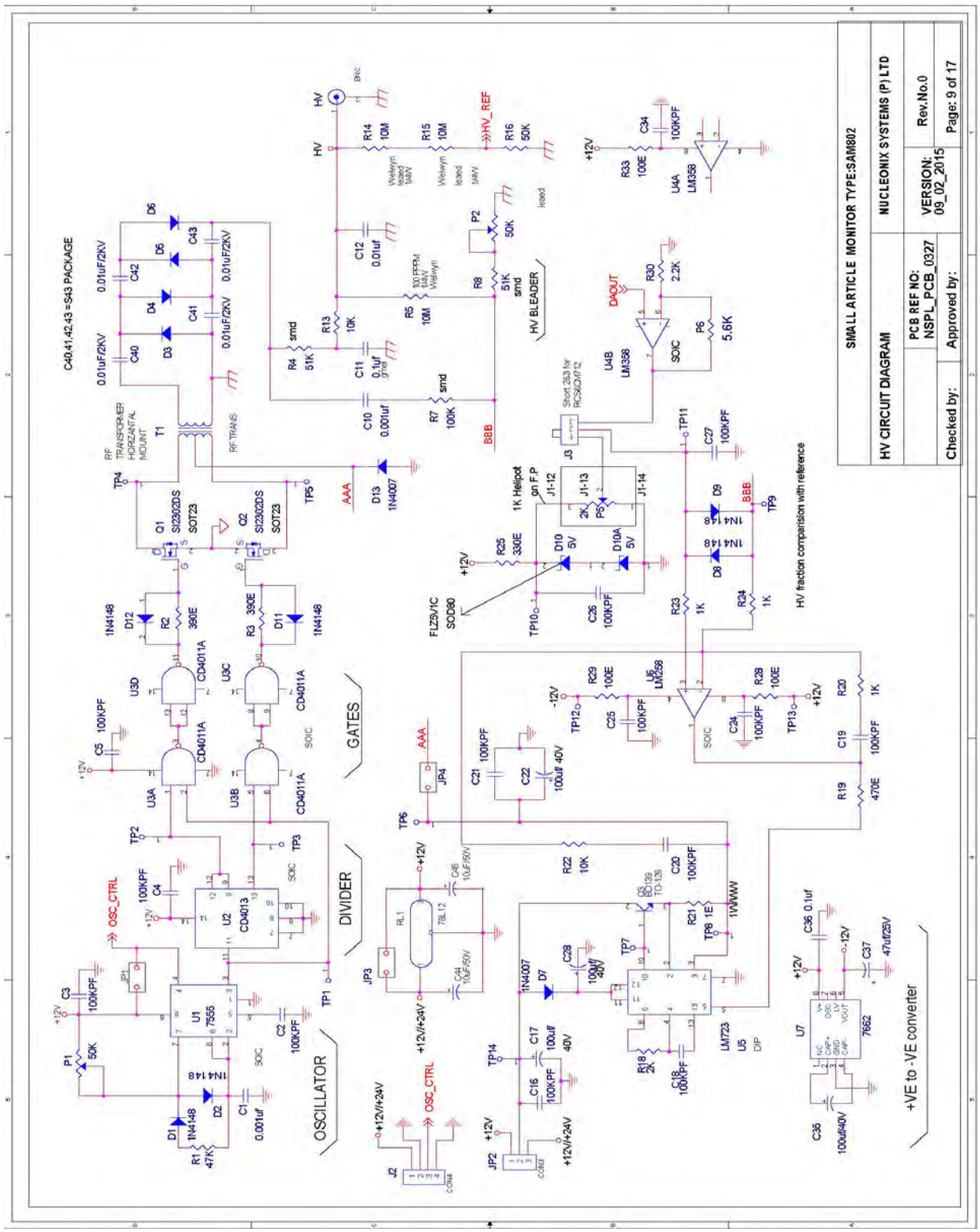
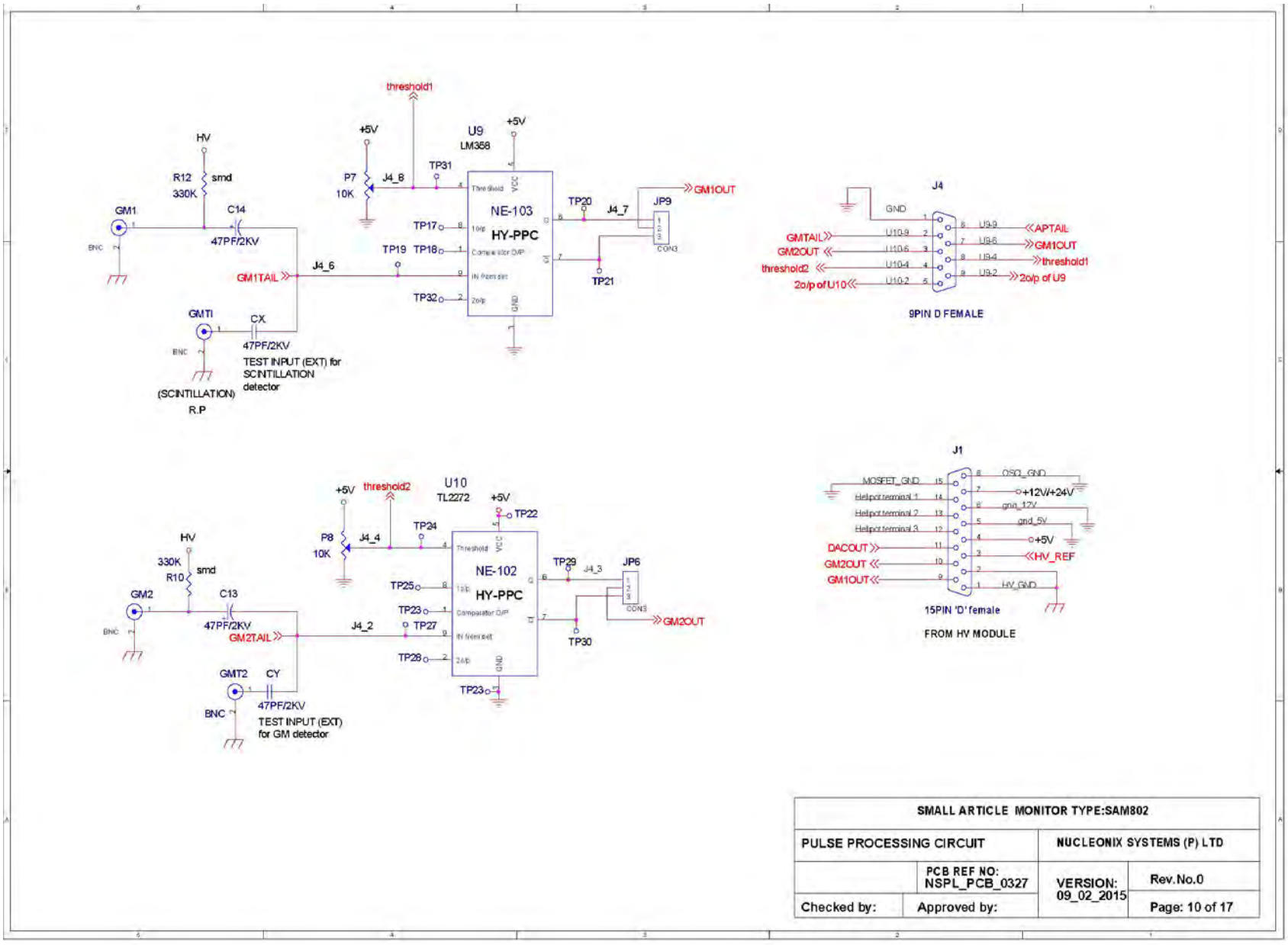

SMALL ARTICLE MONITOR TYPE:SAM802
HV CIRCUIT DIAGRAM
NUCLEONIX SYSTEMS (P) LTD
PCB REF NO: NSPL_PCB_0327
VERSION: 09_02_2015
Rev.No.0
Checked by:
Approved by:
Page: 9 of 17
OSCILLATOR
DIVIDER
GATES
HV BLEADER
HV fraction comparision with reference
+VE to -VE converter
C40,41,42,43 =S43 PACKAGE



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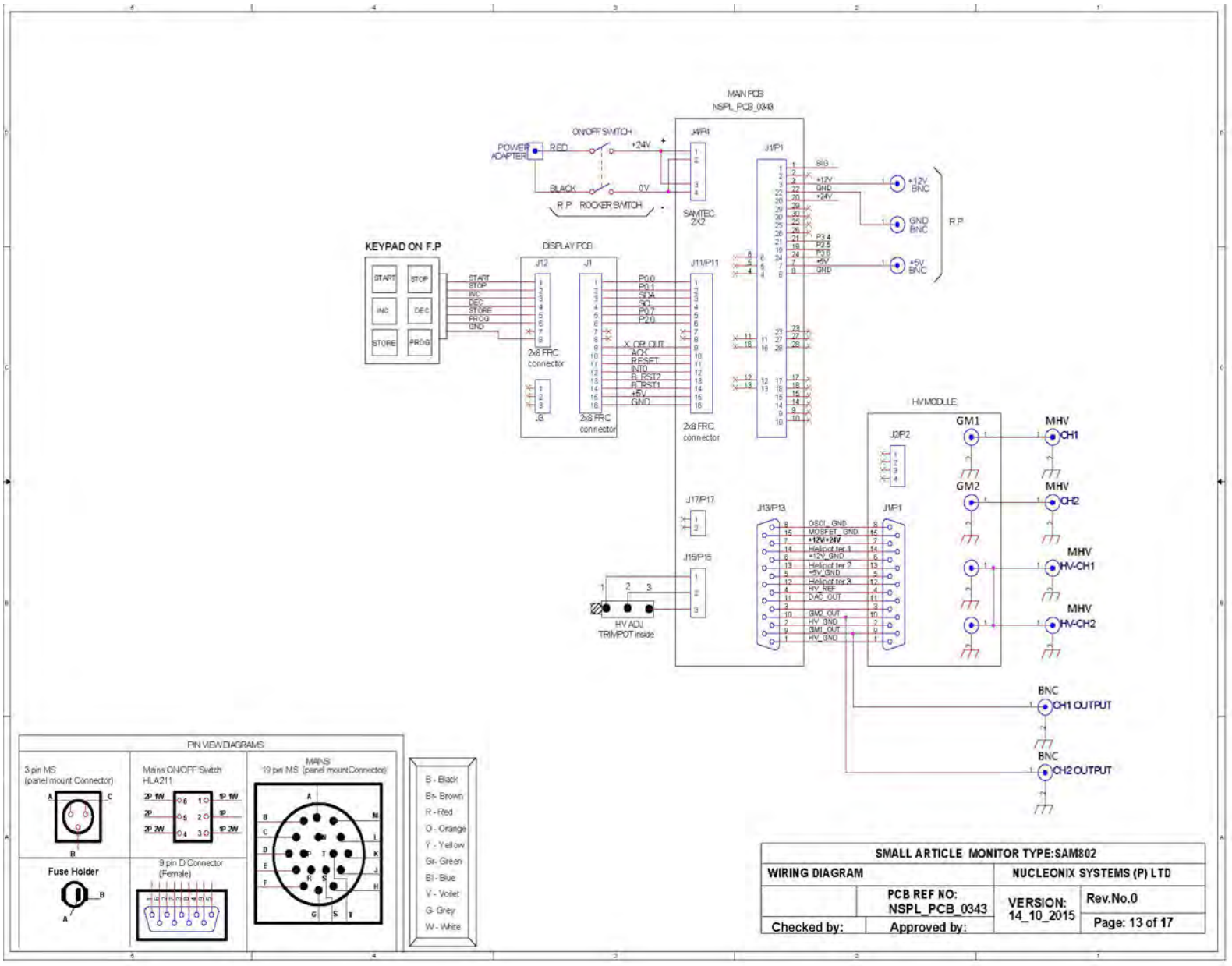
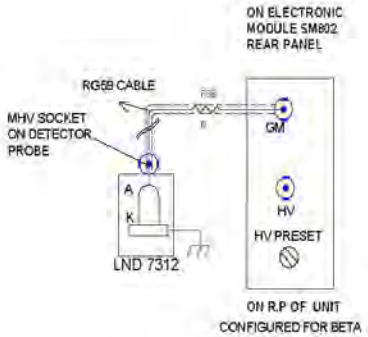
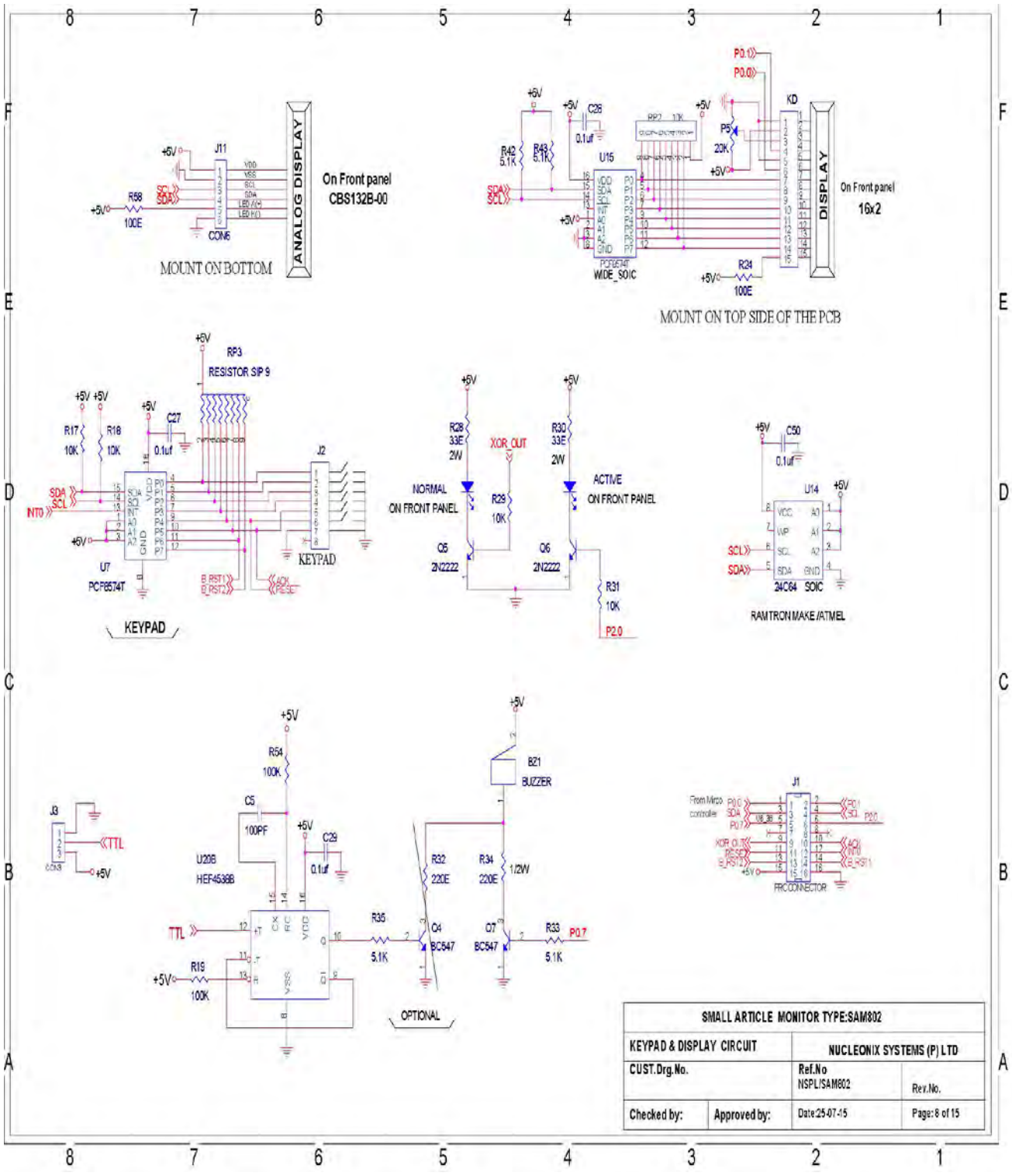
Checked by:	Approved by:		Page: 10 of 17


MAIN PCB
NSPL_PCB_0343
ON/OFF SWITCH
POWER ADAPTER
RED
BLACK
+24V
0V
R.P. ROCKER SWITCH
SAMTEC 2X2
J4/P4
J1/P1
SIG
+12V
GND
+24V
+12V BNC
GND BNC
+5V BNC
R.P
KEYPAD ON F.P
START
STOP
INC
DEC
STORE
PROG
DISPLAY PCB
J12
J1
J3
2x8 FRC connector
J11/P11
P0.0
P0.1
SDA
SCL
P0.7
P2.0
X_OR_OUT
ADV
RESET
INT0
R_RST2
R_RST1
+5V
GND
HV MODULE
J2/P2
J1/P1
GM1
GM2
MHV CH1
MHV CH2
MHV HV-CH1
MHV HV-CH2
J17/P17
J15/P15
HV ADJ
TRIMPOT inside
J13/P13
OSCI_GND
MOSFET_GND
+12V/+24V
Heatsnk ter 1
+12V_GND
Heatsnk ter 2
+5V_GND
Heatsnk ter 3
HV_REF
DAC_OUT
GM2_OUT
HV_GND
GM1_OUT
HV_GND
BNC
CH1 OUTPUT
BNC
CH2 OUTPUT
PIN VIEW DIAGRAMS
3 pin MS (panel mount Connector)
Mains ON/OFF Switch HLA211
MAINS 19 pin MS (panel mountConnector)
Fuse Holder
9 pin D Connector (Female)
B - Black
Br- Brown
R - Red
O - Orange
Y - Yellow
Gr- Green
Bl - Blue
V - Violet
G- Grey
W - White
SMALL ARTICLE MONITOR TYPE:SAM802
WIRING DIAGRAM
NUCLEONIX SYSTEMS (P) LTD
PCB REF NO: NSPL_PCB_0343
VERSION: 14_10_2015
Rev.No.0
Checked by:
Approved by:
Page: 13 of 17

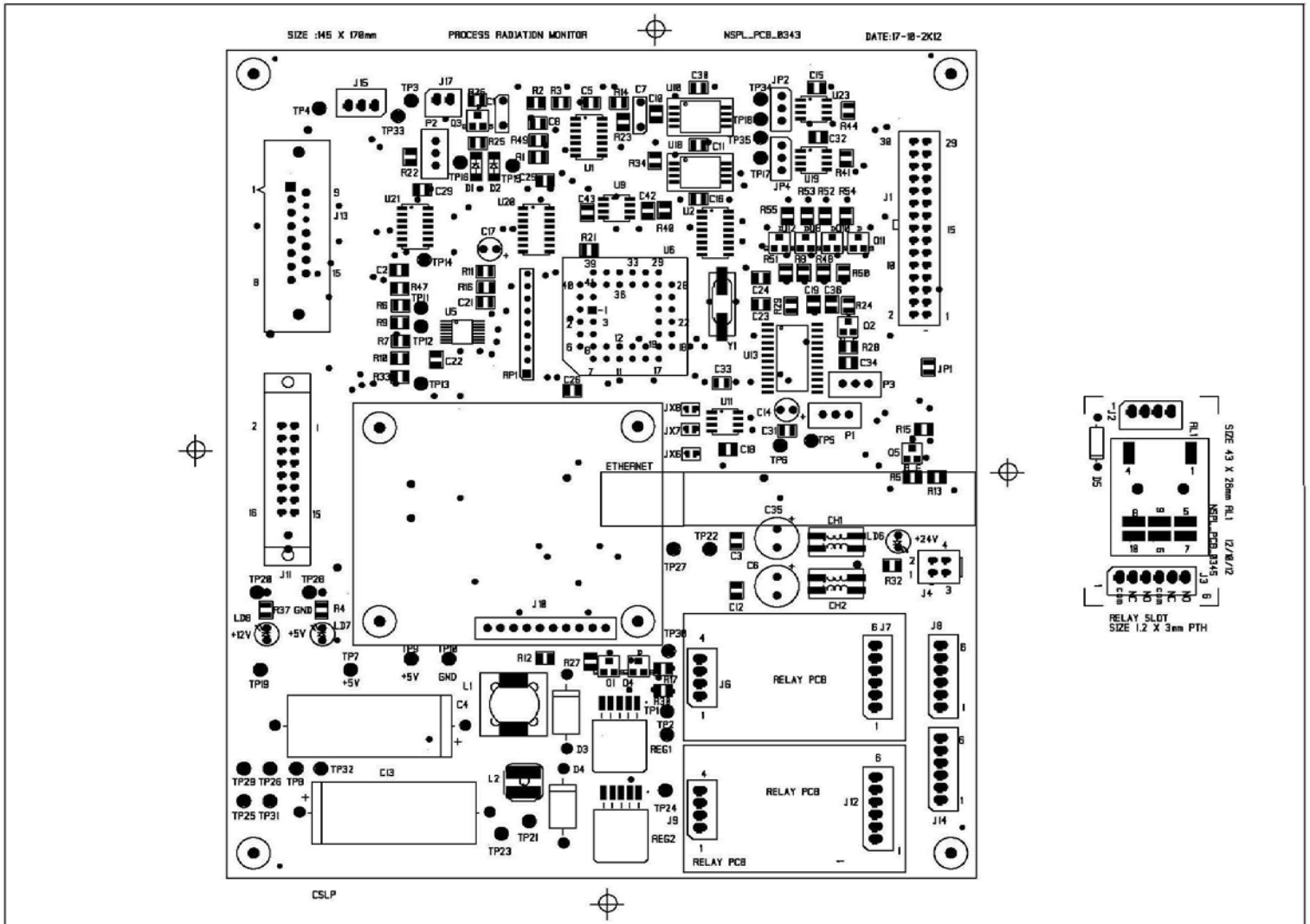


SMALL ARTICLE MONITOR TYPE:SAM802			
DETECTOR & KEYPAD WIRING DIAGRAM		NUCLEONIX SYSTEMS (P) LTD	
PRTRF PROJECT	PCB REF NO: NSPL_PCB_0343	VERSION: 09_02_2015	Rev.No.0
Checked by:	Approved by:		Page: 15 of 17

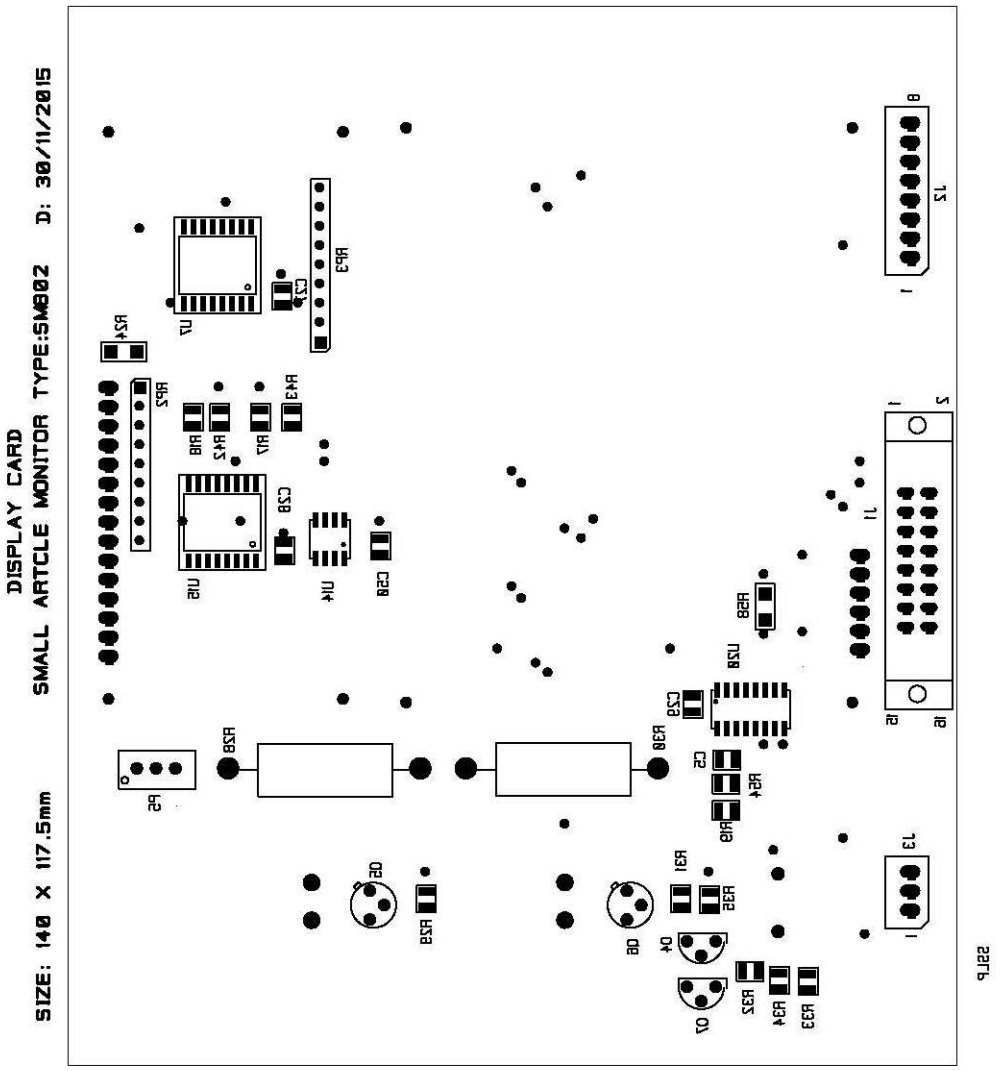

ANALOG DISPLAY
On Front panel
CBS132B-00
MOUNT ON BOTTOM
DISPLAY
On Front panel
16x2
MOUNT ON TOP SIDE OF THE PCB
RESISTOR SIP 9
KEYPAD
NORMAL
ON FRONT PANEL
ACTIVE
ON FRONT PANEL
XOR_OUT
RAMTRON MAKE /ATMEL
BUZZER
OPTIONAL
SMALL ARTICLE MONITOR TYPE:SAM802
KEYPAD & DISPLAY CIRCUIT
NUCLEONIX SYSTEMS (P) LTD
CUST.Drg.No.
Ref.No
NSPL/SAM602
Rev.No.
Checked by:
Approved by:
Date:25-07-15
Page: 8 of 15

CHAPTER VII

PCB LAYOUTS



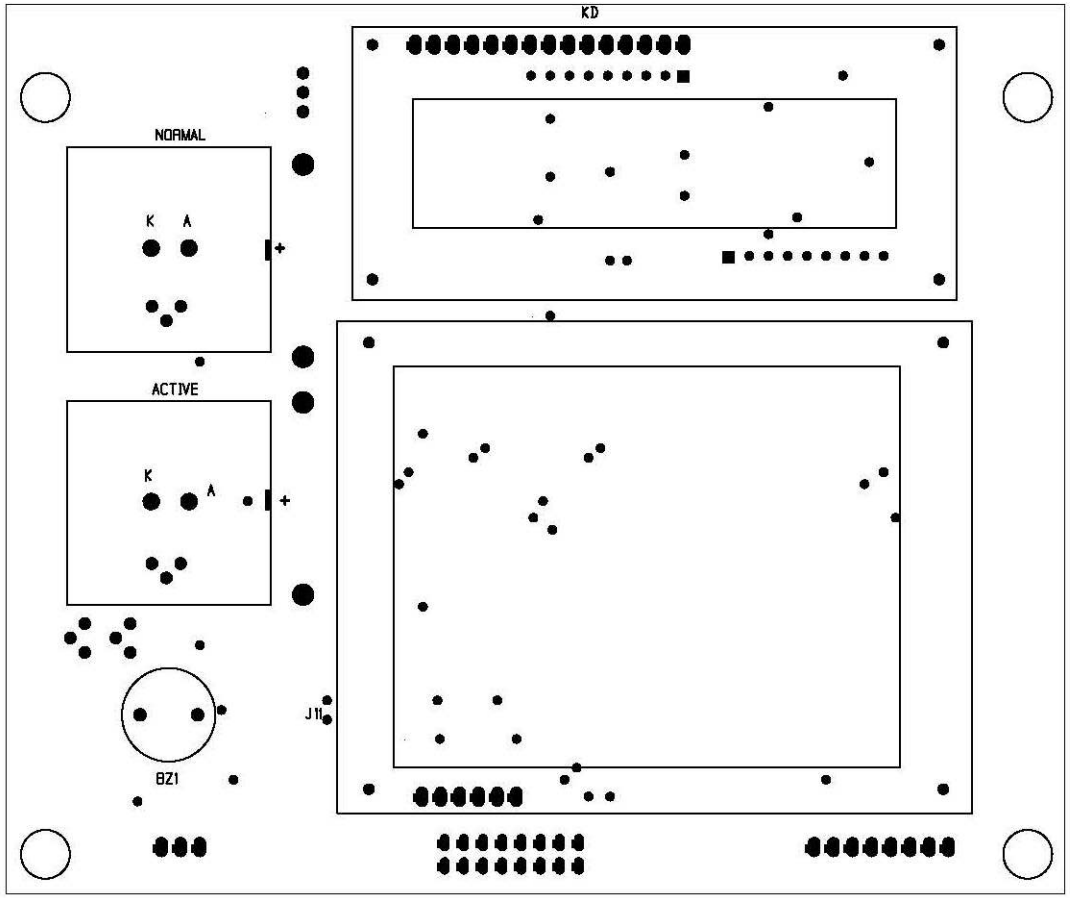
					3	CIRCUIT DIAGRAM	NSPL/SM802/02/ED	Title: SMALL ARTCLE MONITOR TYPE:SM802	
FOR APPROVAL					2	WIRING DIAGRAM	NSPL/SM802/01/WD		
FOR APPROVAL					1	BILL OF MATERIALS	NSPL/SM802/02/BM	CONTROLLER, REALY PCB LAYOUT	NUCLEONIX SYSTEMS (P) LTD
PURPOSE	DATE	REV.NO	DETAILS	APPRD	S.NO	TITLE	DOCUMENT NO.	NSPL DRG NO. NSPL/SM802/02/DD	PCB REF NO. NSPL_PCB_0343.NSPL_PCB_0345
ISSUES		REVISIONS				REF.DOCUMENTS		Checked by: / Approved by:	D: 23-01-2013 / Page 1 of 1


DISPLAY CARD
SMALL ARTCLE MONITOR TYPE:SM802 D: 30/11/2015
SIZE: 140 X 117.5mm

DISPLAY CARD

SIZE: 140 X 117.5mm

SMALL ARTCLE MONITOR TYPE:SM802 D: 30/11/2015



CHAPTER VIII

BILL OF MATERIALS

PROJ. Name.

SMALL ARTCLE MONITOR

TYPE:SM802

INDEX

S.NO	DESCRIPTION		NO.OF PAGES
1	SMALL ARTCLE MONITOR DISPLAY PCB BILL OF MATERIALS		
2	SMALL ARTCLE MONITOR CONTROLLER PCB BILL OF MATERIALS		
3	SMALL ARTCLE MONITOR HV PCB BILL OF MATERIALS		
4	GENERAL ASSEMBLY		

REFERENCE		SMALL ARTCLE MONITOR **TYPE : SM802**		
DATE	29.09.2015			
PREPD				
CHKD		NUCLEONIX SYSTEMS PRIVATE LIMITED		
APPD		IDA PHASE II, CHERLAPALLY,		
		HYDERABAD - 500 051, Ph. 40-27263701	REV. 0	

REV. NO.	DATE	REVISIONS / ISSUES	PREPARED	APPROVED
	NOTES:	**1. Operating temperature of all components Is -10^{0}C to +60^{0}C** **2. Storage temperature of all components is -10^{0}C to +70^{0}C** **3. IND : Indian component** **4. IMP : Imported component** **5. CS : Component Side** **6. SS : Solder Side**		

DATE	6/8/2015

SMALL ARTCLE MONITOR
TYPE : SAM802

PREPD	R.UPENDRA
CHKD	
APPD	

Display PCB Bill of Material
NUCLEONIX SYSTEMS PRIVATE LIMITED
IDA PHASE II, CHERLAPALLY,
HYDERABAD - 500 051

BM-NSPL_PCB_0509-A4	
SHT. 1	OF 3
REV.0	VER:14-8-15

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	IND/Imp
	PCB					
1	**SMALL ARTCLE MONITOR DISPLAY PCB**		1	NSPL_PCB_0510	**1.6mm thick 2Layer PCB**	IND
	RESISTOR PACK					
2	100K RESISTOR NETWORK SIP 9-PIN	RP1,RP2	2	MAKE: BOURNS P/N:4609X101-103LF	Through hole	Imp
	RESISTORS					
3	10K, Thick film 125mW ±1% 100PPM	R17,R18 R29,R31	4	MAKE: YAGEO/EQVT P/N:RC0805FR-0710KL	SMD 0805	Imp
4	5.1K, Thick film 125mW ±1% 100PPM	R33,R35 R41,42	4	MAKE: YAGEO/EQVT P/N:RC0805FR-075.1KL	SMD 0805	Imp
5	100K, Thick film 125mW ±1% 100PPM	R19,R54	2	MAKE: YAGEO/EQVT P/N:RC0805FR-07100KL	SMD 0805	Imp
6	33Ω, WW 2W ±5% ±200PPM VPA SERIES Rated at 70°C ambient	R28,30	2	MAKE: VARITURN/EQVT P/N:VPA-2, 2W,33R . 14.0. 35. 0.8 OD ±5.0	Through hole	**IND**
7	220Ω, Thick film, 125mW, ±1%, ±100PPM	R32,34	2	MAKE: YAGEO/EQVT P/N:RC0805FR-07220RL	SMD 0805	**IMP**
8	100Ω, Thick film, 125mW, ±1%, ±100PPM	R9, 24,58	3	MAKE: YAGEO/EQVT P/N:RC0805FR-07100RL	SMD 0805	**IMP**
	CAPACITORS					
9	0.1μF/50V, ±10%, CERAMIC CHIP CAPACITOR	C27,28,29 C50	4	MAKE: AVX/EQVT P/N:08055C104KAT2A	SMD 0805	**IMP**
10	100PF/50V CAP CER 100PF 50V ±5% COG	C5	1	MAKE: AVX/EQVT P/N:08055A101JAT2A	SMD 0805	Imp
	TRIMPOTS					
11	20KΩ, 500mW, TRIMMER,20%	P1	1	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-203LF	Through hole TOP TRIM	**IMP**

DATE	06/08/15			
PREPD	R.UPENDRA			
CHKD		**SMALL ARTCLE MONITOR**		
APPD		**TYPE : SAM802**	**BM-NSPL_PCB_0509A4**	
		Display PCB Bill of Material		
		NUCLEONIX SYSTEMS PRIVATE LIMITED	SHT. 2	OF 4
		IDA PHASE II, CHERLAPALLY,	REV.0	
		HYDERABAD - 500 051	VER:14-8-15	

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./MAKE&TYPE	REMARKS	IND/ IMP
	DISPLAYS					
11	KLLB 274 UR,LIGHT BAR (9LED) ULTRA RED,27X27mm LED DISPLAY	ACTIVE (SS)	1	MAKE: KWALITY PHOTONICS/EQVT P/N: KLLB 274 UR	Through hole	IND
12	KLLB 274 UG,LIGHT BAR (9LED) ULTRA GREEN,27X27mm LED DISPLAY	NORMAL (SS)	1	MAKE: KWALITY PHOTONICS/EQVT P/N: KLLB 274 UG	Through hole	IND
13	LM16200, 16 X2 LCD DISPLAY WITH BACKLIGHT CONN HEADER 3POS	DISPLAY (SS)	1	MAKE:LAMPEX/EQVT P/N: LM16200 (OR) P/N:CDM16216SL	Through hole	IND
15	CBS132B-00 LCD DISPLAY WITH BACKLIGHT Mount on IC socket	DISPLAY (SS)		MAKE:LAMPEX/EQVT P/N:CBS132B-00		
	TRANSISTORS					
16	2N2222, P-CHANNEL TRANSISTOR	Q5,Q6	2	MAKE:FAIRCHILD SEMI-CONDUCTOS/EQVT P/N:2N2222	Through hole	**IMP**
17	BC547 N-CHANNEL MOSFET	Q4,Q7	2	MAKE:FAIRCHILD SEMI-CONDUCTOS/EQVT P/N:BC547	Through hole	**IMP**
	ICS					
18	PCF8574AT, REMOTE 8-BIT **I/O** I2C-EXPANDER FOR BUS, PLASTIC SMALL OUTLINEWITH 16 LEADS	U7,U15	2	MAKE: PHILIPS/EQVT P/N: PCF8574AT	SMD-SOIC-16 Body width 7.5mm	**IMP**
19	AT24C64BN-10SU-2.7, 2 WIRE SERIAL **EEPROM** 64K	U14	1	MAKE: ATMEL/EQVT P/N: AT24C64BN-10SU-2.7	SMD-SO-8 Body width 3.9mm	**IMP**
20	HEF4538B, DUAL PRECISION MONO-STABLE MULTIVIBRATOR	U20	1	MAKE: NXP / EQVT P/N: HEF4538B	SMD-SOIC-16 Body width 3.9mm	**IMP**

DATE	7/7/2015		
PREPD	R.UPENDRA		
CHKD			
APPD			
		SHT. 3	OF 4
		REV.0	
		VER:14-8-15	

SMALL ARTCLE MONITOR
TYPE : SAM802
Display PCB Bill of Material
NUCLEONIX SYSTEMS PRIVATE LIMITED
IDA PHASE II, CHERLAPALLY,
HYDERABAD - 500 051

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./MAKE&TYPE	REMARKS	IND/ IMP
	CONNECTORS					
21	16 PIN FRC CONNECTOR STRAIG (2X8)	J1		MAKE: OEN / EQVT	Through hole	IMP
22	CONN HEADER 3POS 0.100"VERT TIN	J8	1	MAKE:MOLEX/EQVT P/N: 0022232031	Through hole	Imp
23	CONN HOUSING 3 POS 0 .100 W/RAMP	XP8	1	MAKE:MOLEX/EQVT P/N0022012037		Imp

DATE	7/7/2015			
PREPD	R.UPENDRA	**SMALL ARTCLE MONITOR**		
CHKD		**TYPE : SAM802**		
APPD		**Display PCB Bill of Material**		
		NUCLEONIX SYSTEMS PRIVATE LIMITED	SHT. 4	OF 4
		IDA PHASE II, CHERLAPALLY,	REV.0	
		HYDERABAD - 500 051	VER:14-8-15	

REV. NO.	DATE	REVISIONS / ISSUES	PREPARED	APPROVED
0				

REFERENCE		**SMALL ARTCLE MONITOR** **TYPE:SM802**		
DATE	15.8.2015	HV PCB		
PREPD		BILL OF MATERIAL		
CHKD		NUCLEONIX SYSTEMS PRIVATE LIMITED		
APPD		IDA PHASE II CHERLAPALLY	SHT. 1 OF 6	
		HYDERABAD - 500 051	REV. 0	0

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./MAKE&TYPE	REMARKS	PROC. REF.
1	MICRO CONTROLLER PCB	PCB	1	NSPL_PCB_0343-A4		
	RESISTORS PACKS					
2	10KΩ, 9 TERMINAL ±2% ±100PPM, RESISTOR NETWORK	RP1	1	MAKE:BOURNS/EQVT P/N: 4609X-101-103LF	THROUGH HOLE	
	RESISTORS					
3	2.2KΩ, TFR 125mW ±1% ±100PPM	R53,54	2	MAKE: YAGEO/EQVT P/N:RC0805FR-072.2KL	SMD 0805	
4	4.3K Ω, TFR, 125mW, ±1%, ±100PPM	R2	1	MAKE: YAGEO/EQVT P/N:RC0805FR-074.3KL	SMD 0805	
5	1KΩ, TFR, 125mW, ±1%, ±100PPM	R3,14,28, 47	4	MAKE: YAGEO/EQVT P/N:RC0805FR-071KL	SMD 0805	
6	68KΩ, TFR, 125mW, ± 1%, ±100PPM	R11	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0768KL	SMD 0805	
7	22KΩ, TFR, 125mW, ±1%, ±100PPM	R12	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0722KL	SMD 0805	
8	10KΩ, TFR, 125mW, ± 1%, ±100PPM	R21	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0710KL	SMD 0805	
9	600Ω, TFR, 125mW, ±1%, ±100PPM	R22	1	MAKE: YAGEO/EQVT P/N:RC0805FR-07600RL	SMD 0805	
10	4.7KΩ, TFR, 125mW, ±1%, ±100PPM	R23	1	MAKE: YAGEO/EQVT P/N:RC0805FR-074.7KL	SMD 0805	
11	5.1KΩ, TFR, 125mW, ± 1%, ±100PPM	R24,25, 29	3	MAKE: YAGEO/EQVT P/N:RC0805FR-075.1KL	SMD 0805	
12	51Ω, TFR, 125mW, ±1%, ±100PPM	R26	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0751RL	SMD 0805	
13	24KΩ, TFR, 125mW, ±1%, ±100PPM	R32	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0724KL	SMD 0805	
14	100Ω, TFR, 125mW, ±1%, ± 100PPM	R22	1	MAKE: YAGEO/EQVT P/N:RC0805FR-07100RL	SMD 0805	
15	120Ω, TFR, 125mW, ±1%, ±100PPM	R17,44	2	MAKE: YAGEO/EQVT P/N:RC0805FR-07120RL	SMD 0805	
	TRIMPOTS					
16	500Ω, 500mW, TRIMMER	P1	1	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-501LF	THROUGH HOLE TOP TRIM	

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
17	20KΩ, 500mW, TRIMMER	P2	1	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-203LF	THROUGH HOLE TOP TRIM	
18	10KΩ, 500mW, TRIMMER	P3	1	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-103LF	THROUGH HOLE TOP TRIM	
	CAPACITOR					
19	0.047µF/100Vdc/63Vac, 10%, Radial Box, Metalized Poly propylene film capacitor,-55/+105C, General Purpose, 100VDC@85° C	C1,7	2	MAKE:KEMET /EQVT P/N:R82EC2470AA50K	THROUGH HOLE Lead Spacing = 5 mm	
20	10µF/40V,±20% ELCTROLYTIC RADIAL CAPACITOR	C2,17	2	MAKE:RUBYCON/EQVT P/N:YXF-40V-10UF+/-20% 29366	THROUGH HOLE	
21	0.1µF/50, ±10%, CERAMIC CHIP CAPACITOR	C3,8,10,15, 18,21,22,25, 29 31,33, 43	12	MAKE: AVX/EQVT P/N:08055C104KAT2A	SMD 0805	
22	2200µF/25V, ±20% ELCTROLYTIC AXIAL CAPACITOR	C4	1	MAKE: :RUBYCON/EQVT P/N:202255M2200-25EBS 13295	THROUGH HOLE	
23	100µF/50V, ±10% ELCTROLYTIC RADIAL CAPACITOR	C35	1	MAKE: RUBYCON/EQVT P/N:YXF-50V-100UF+/-20% 29366	THROUGH HOLE	
24	33PF/50V,X7R,±10%, CERAMIC CHIP CAPACITOR	C23,24	2	MAKE: AVX/EQVT P/N: 08055C330KAT2A	SMD 0805	
25	330PF/50V,X7R,±10%, CERAMIC CHIP CAPACITOR	C42	1	MAKE: AVX/EQVT P/N: 08055C331KAT2A	SMD 0805	
26	22KPF/50V,X7R,±10%,, CERAMIC CHIP CAPACITOR	C34	1	MAKE: AVX/EQVT P/N: 08055C223KAT2A	SMD 0805	
27	47µF/63V, ±20% ELCTROLYTIC RADIAL CAPACITOR	C14	1	MAKE: :RUBYCON/EQVT P/N:YXF-63V-47UF+/-20% 29366	THROUGH HOLE	
28	0.01µF/50V, ±10%, CERAMIC CHIPCAPACITOR	C19,36	2	MAKE: AVX/EQVT P/N:08055C103KAT2A	SMD 0805	
	CHOKES / LINE FILTERS					
29	COMMON MODE SMD LINE FILTER	CH1	1	MAKE:WEÜRTH ELEKTRONIK/EQVT P/N:744224--SL2	SMD	

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
	INDUCTORS					
30	FIXED INDUCTORS WE-PD SHIELDED PWR INDUCTOR 2.5A 0.068 OHMS 100mH	L1	1	MAKE:WEÜRTH ELEKTRONIK/EQVT P/N:7447709101	SMD	
	REGULATORS					
31	DC/DC SWITCHING REGULATORS 3A 1.23-37V **ADJ** BUCK PWM	REG1	1	MAKE:TEXAS INSTUMENT P/N:LM2576HVSX **-ADJG** /NOPB	SMD-5LEAD DDPAK	
	TRANSISTORS					
32	N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR	Q1,4,10, 11,12	5	MAKE:FAIRCHILD SEMI-CONDUCTOS/EQVT P/N:MMBF170	SMD SOT-23	
33	TRANSISTORS BIPOLAR BJT NPN HIGH VOLTAGE	Q2,3,5,8	4	MAKE:FAIRCHILD SEMI-CONDUCTOS/EQVT P/N:MMBTA42	SMD SOT-23	
	ICS					
34	LM556CM, DUAL TIMER	U1	1	MAKE: N.S/EQVT P/N: LM556CM	SMD-SO-14 Body width 3.9mm	
35	**MAX1111EEE**, +2.7V LOW POWER MULTI CHANNEL SERIAL 8BIT **ADC**	U5	1	MAKE: MAXIM/EQVT P/N: MAX1111EEE	SMD SSOP-16	
36	44 PIN IC BASE	FOR U6 IC	1	MAKE: FCI/EQVT P/N:54020-224T-LF	THROUGH HOLE PLCC	
37	**P89V51RD2**, 8 BIT **MICRO** CONTROLLER	U6	1	MAKE:NXP/SST/EQVT P/N: P89V51RD2	SMD-44 PLCC	
38	MAX813LESA, ACTIVE HIGH **RESET IC** 1.6SEC WATCHDOG TIMER	U9	1	MAKE: MAXIM / EQVT P/N: MAX813LESA	SMD-SO-8 Body width 3.9mm	
39	AD420ARZ-32, SERIAL INPUT 16 BIT 4mA TO 20mA DAC	U13	1	MAKE: ANALOG DEVICES / EQVT P/N: AD420ARZ-32	SHT. 3 Body width 7.5mm	
40	HEF4538B, DUAL PRECISION MONO-STABLE MULTIVIBRATOR	U20	1	MAKE: NXP / EQVT P/N: HEF4538B	SMD-SO-16 Body width 3.9mm	
41	HEF4030BT, QUADRUPLE EXCLUSIVE OR GATE	U21	1	MAKE: CMOS / EQVT P/N: HEF4030BT	SMD-SO-14 Body width 3.9mm	
	DIODES					
42	1N4148W, HIGH SPEED SWITCHING DIODE	D1,2	2	MAKE:DIODES_INC P/N:1N4148W-7-F	SMD-1206	

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
	SCHOTTKY DIODES					
43	MINIATURE SCHOTTKY BARRIER RECTIFIER 3.0A	D3,4	2	MAKE: ON SEMI CONDUCTORS/EQVT P/N:1N5820	THROUGH HOLE DO201AD	
	CRYSTALS					
44	11.0592 MHz SMD PROFILE MICROPROCESSOR CRYSTAL	Y1	1	MAKE: ABRACON CORP P/N: ABLS2-11.0592MHz -D4Y-T	SMD	
	LEDS					
45	FAULT STATUS LEDS (REV POLARITY OVER TEMP) , RED	LD6,7,8	3	MAKE: KWALITY PHOTONICS P/N:5332H1	THROUGH HOLE	
	JUMPERS					
46	SINGLE ROW BERG STICK	JP1	1	MAKE: MULTICOMP/EQVT P/N:2211S-02G P/N:2211S-MC34743	THROUGH HOLE	
	LINK, SHORTING, BLACK, GOLD			MAKE: TE-CONNECTIVITY/ EQVT P/N:2-382811-0		
47	SINGLE ROW BERG STICK	JP2,4	2	MAKE: MULTICOMP/EQVT P/N:2211S-03G P/N:2211S-MC34743	THROUGH HOLE	
	LINK, SHORTING, BLACK, GOLD			MAKE: TE-CONNECTIVITY/ EQVT P/N:2-382811-0		
48	0Ω, TFR 125mW ±5% ±100PPM	JX6,7,8	3	MAKE: YAEGO/EQVT P/N:RC0805JR-070.0RL	SMD 0805	
	CONNECTORS					
49	CONN HEADER 30POS .100" VERT DUAL TIN CONNECTOR (2X15)	J1		MAKE:SAMTEC/EQVT P/N:IPT1-115-01-D	THROUGH HOLE	
50	CONN HOUSING 30POS .100" DUAL CONNECTOR (2X15)	P1		MAKE:SAMTEC/EQVT P/N:MMSD-15-20-S-04.25-D		
51	CONN HEADER 4POS .100" VERT DUAL TIN CONNECTOR(2X2)	J4		MAKE:SAMTEC/EQVT P/N:IPL1-102-01-D	THROUGH HOLE	
52	CONN HOUSING 4POS .100" DUAL VERT MINIMATE CONNECTOR	P4		MAKE:SAMTEC/EQVT P/N:MMSD-02-20-S-04.25-D		

	REFERENCE	**SMALL ARTCLE MONITOR TYPE:SM802**		
	DATE:29.09.2015	MICRO CONTROLLER PCB		
	PREPD	BILL OF MATERIAL		
	CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED		
	APPD	IDA PHASE II CHERLAPALLY	SHT. 4	OF 5
		HYDERABAD - 500 051	VER:14-8-15	REV. 0

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
53	CONN DSUB SOCKET 15POS VERT PCB	J13	1	MAKE:FCI CONNECTORS/EQVT P/N:DAP15S365TLF	THROUGH HOLE	
54	CONN DSUB PLUG 15POS SOLDERCUP	P1	1	MAKE:FCI CONNECTORS/EQVT P/N:DA15P064TXLF		
55	CONN HEADER 16POS DUAL VERT PCB	J11	1	MAKE:FCI CONNECTORS/EQVT P/N:71918-116LF 609-1754-ND	THROUGH HOLE	
56	16PIN FRC STRAIGHT HOUSING	P11	1	MAKE:FCI CONNECTORS/EQVT	THROUGH HOLE	
57	CONN HEADER 2POS .100" VERT TIN	J17	1	MAKE:MOLEX/EQVT P/N: 0022232021 WM4200-ND	THROUGH HOLE	
58	CONN HOUSING 2POS .100 W/RAMP	P17	1	MAKE:MOLEX/EQVT P/N:0022012027 WM2011-ND		
59	CONN HEADER 3POS .100" VERT TIN	J15	1	MAKE:MOLEX/EQVT P/N: 0022232031 WM4201-ND	THROUGH HOLE	
60	CONN HOUSING 3POS .100 W/RAMP	P15	1	MAKE:MOLEX/EQVT P/N:0022012037 WM2012-ND		

	REFERENCE	**SMALL ARTCLE MONITOR** **TYPE:SM802**		
	DATE:29.09.2015	MICRO CONTROLLER PCB		
	PREPD	BILL OF MATERIAL		
	CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED		
	APPD	IDA PHASE II CHERLAPALLY	SHT.5	OF 5
		HYDERABAD - 500 051	VER:14-8-15	REV. 0

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
1	**GCS HV PCB** **RESISTORS**	**PCB**	**1**	**NSPL_PCB_0347-A4**	1.6mm thick FR4 2Layer pcb	
2	47KΩ, TFR 125mW ±1% ±100PPM	R1	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0747KL	SMD 0805	
3	390Ω, TFR, 125mW, ±1%, ± 100PPM	R2,3	2	MAKE: YAGEO/EQVT P/N:RC0805FR-07390RL	SMD 0805	
4	51KΩ, TFR, 125mW, ±1%, ±100PPM	R4,8	2	MAKE: YAGEO/EQVT P/N:RC0805FR-0751KL	SMD 0805	
5	10MΩ,/20MΩ HV, 250mW, ±5%, ±100PPM	R5,14,15	3	MAKE: WELWYN P/N:10MΩ,/20MΩ	THROUGH HOLE	
6	100KΩ, TFR, 125mW, ± 1%, ±100PPM	R7	1	MAKE: YAGEO/EQVT P/N:RC0805FR-07100KL	SMD 0805	
7	330KΩ, TFR, 125mW, ±1%, ±100PPM	R10,R12	2	MAKE: YAGEO/EQVT P/N:RC0805FR-07330KL	SMD 0805	
8	10KΩ, TFR, 125mW, ±1%, ±100PPM	R13,22	2	MAKE: YAGEO/EQVT P/N:RC0805FR-0710KL	SMD 0805	
9	3.3MΩ, HV, 250mW, ±5%, ±100PPM VR25 SERIES	R11	1	MAKE: VISHAY/EQVT P/N:VR25000003304JA100	THROUGH HOLE	
11	50KΩ, MFR, 250mW, ±1%, ±100PPM TRIMPOT	R16	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0750KL	THROUGH HOLE	
12	10Ω, TFR, 125mW, ±1%, ± 100PPM	R17	1	MAKE: YAGEO/EQVT P/N:RC0805FR-0710RL	SMD 0805	
13	2KΩ, TFR, 125mW, ±1%, ±100PPM	R18,26	2	MAKE: YAGEO/EQVT P/N:RC0805FR-072KL	SMD 0805	
14	470Ω, TFR, 125mW, ±1%, ± 100PPM	R19	1	MAKE: YAGEO/EQVT P/N:RC0805FR-07470RL	SMD 0805	

REFERENCE	**SMALL ARTCLE MONITOR** **TYPE:SM802**		
DATE:15.8.2015	HV PCB		
PREPD	BILL OF MATERIAL		
CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED		
APPD	IDA PHASE II CHERLAPALLY	SHT. 2	OF 6
	HYDERABAD - 500 051	REV. 0	

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
15	1KΩ, TFR, 125mW, ± 1%, ±100PPM	R20,23,24	3	MAKE: YAGEO/EQVT P/N:RC0805FR-071KL	SMD 0805	
16	1Ω, WW, 1W, ± 1%, ±100PPM	R21	1	MAKE: VEPL/EQVT P/N:1Ω	THROUGH HOLE	
17	330Ω, TFR, 125mW, ± 1%, ±100PPM	R25	1	MAKE: YAGEO/EQVT P/N:RC0805FR-07330RL	SMD 0805	
18	100Ω, TFR, 125mW, ± 1%, ±100PPM	R28,29,33	3	MAKE: YAGEO/EQVT P/N:RC0805FR-07100RL	SMD 0805	
19	2K2Ω, TFR, 125mW, ± 1%, ±100PPM	R30	1	MAKE: YAGEO/EQVT P/N:RC0805FR-072K2L	SMD 0805	
20	5.6KΩ, TFR, 125mW, ± 1%, ±100PPM	P6	1	MAKE: YAGEO/EQVT P/N:RC0805FR-075K6L	SMD 0805	
	TRIMPOTS					
21	50KΩ, 500mW, TRIMMER	P1,P2	2	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-503LF	THROUGH HOLE TOP TRIM	
22	20KΩ, 500mW, TRIMMER	P3,R16	2	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-203LF	THROUGH HOLE TOP TRIM	
23	10KΩ, 500mW, TRIMMER	P7,P8	2	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-103LF	THROUGH HOLE TOP TRIM	
	CAPACITORS					
24	0.001µF/50V(1N), ±10%, CERAMIC CHIP CAPACITOR	C1	1	MAKE: AVX/EQVT P/N:08055C102KAT2A	SMD 0805	
25	0.1µF/50V, ±10%, CERAMIC CHIP CAPACITOR	C2,3,4,5,9, 16,18,19, 20,21,24, 26,27,30, ,33,34,36	19	MAKE: AVX/EQVT P/N:08055C104KAT2A	SMD 0805	
26	100µF/50V, ±10% ELCTROLYTIC RADIAL CAPACITOR	C17,22, ,C28,35	4	MAKE: RUBYCON/EQVT P/N:YXF-50V-100UF+/-20% 29366	THROUGH HOLE	

REFERENCE	**SMALL ARTCLE MONITOR TYPE:SM802**			
DATE:15.8.2015	HV PCB			
PREPD	BILL OF MATERIAL			
CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED			
APPD	IDA PHASE II CHERLAPALLY		SHT.3	OF 6
	HYDERABAD - 500 051		REV. 0	

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
27	0.1mF/2000VDC ±20%, FMD-11, EI-Ci-Ar CAPACITORS	C11	1	MAKE: NEOTRONICS/EQVT P/N: 100nF,±20%, 2000VDC	Through hole	
28	0.01μF/2KV, HV, GMEL,±10% PCB MOUNT CAPACITOR	C12,14	2	MAKE:GMEL /EQVT P/N:0.01μF/2KV,	THROUGH HOLE PCB MOUNT	
29	0.001μF/2KV, HV, CERAMIC ,±10% PCB MOUNT CAPACITOR	C10 (CX,OPTIONAL)	1	MAKE: AVX/EQVT P/N:0.001μF/2KV	THROUGH HOLE	
30	47PF/2KV, HV, CERAMIC,±10% PCB MOUNT CAPACITOR	C13 (CY,OPTIONAL)	1	MAKE:AVX /EQVT P/N:47PF/2KV	THROUGH HOLE PCB MOUNT	
31	27PF/50V,X7R,±10%,, CERAMIC CHIP CAPACITOR	C25	1	MAKE: AVX/EQVT P/N: 08055C270KAT2A	SMD 0805	
32	10μF/16V, ±20% ELCTROLYTIC RADIAL CAPACITOR	C29	1	MAKE: :RUBYCON/EQVT P/N:YXF-16V-10μF+/-20%	THROUGH HOLE	
33	47μF/25V, ±20% ELCTROLYTIC RADIAL CAPACITOR	C37	1	MAKE: :RUBYCON/EQVT P/N:YXF-25V-47μF+/-20%	THROUGH HOLE	
34	0.01μF/2KV, HV, GMEL,±10% PCB MOUNT CAPACITOR	C40,41,42,43	4	MAKE:GMEL /EQVT P/N:202S43W103KV4T	SMD-1812 PCB MOUNT	
	TRANSISTORS					
35	Si2302DS-T1, 1.25W,2.5V, N-CHANNEL MOSFET	Q1,2	2	MAKE:FAIRCHILD SEMI-CONDUCTOS/EQVT P/N:Si2302DS-T1	SMD SOT-23-3	
36	BD139,POWER Transistor	Q3		MAKE:FAIRCHILD SEMI-CONDUCTOS/EQVT P/N:BD139	THROUGH HOLE TO-202	
	TRIMPOTS					
37	50K, 500mW, TRIMMER, 20%,100ppm	P1,2	2	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-503LF	Through hole TOP TRIM	
38	10K, 500mW, TRIMMER 20%,100ppm	P7,8	2	MAKE: BOURNS_INC/EQVT P/N: 3296W-1-103LF	Through hole TOP TRIM	

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
	DIODES					
39	**ESJA54-06,** 5KV HV DIODES	D3,4,5,6	4	MAKE:TAIWAN P/N:ESJA54-06 Supplier: madhu subtronics	Through hole	
40	**1N4148W,** HIGH SPEED SWITCHING DIODE	D1,2,8, 9,11,12	10	MAKE:DIODES_INC P/N:1N4148W-7-F	SMD-1206	
41	**1N4007,** GENERAL PURPOSE RECTIFIERS	D7,13	1	MAKE:FAIRCHILD SEMI-CONDUCTORS/EQVT P/N:1N4007	SMD-2010	
	ZENER DIODES					
42	**FLZ5V1C-5V,** ZENER DIODES	D10,D10A	2	MAKE:DIODES_INC P/N:FLZ5V1C-5V	SMD-SOD-80	
	ICS					
43	IC7555ESA+, IC OSC SGL TIMER 500KHZ 8-SOIC	U1	1	MAKE: N.S/EQVT P/N:ICM/NE7555ESA+	SMD-SOIC-8 Body width 3.9mm 1.27mm pitch	
44	HEF4013BT, IC D-TYPE POS TRG DUAL 14SOIC	U2	1	MAKE: NXP / EQVT P/N: HEF4013BT,653	SMD-SO-14 Body width 3.9mm 1.27mm pitch	
45	HEF4011BT,652 IC GATE NAND 4CH 2-INP 14-SO	U3	1	MAKE:NXP SEMI-CONDUCTORS/EQVT P/N:HEF4011BT,652	SMD-SOIC-14 Body width 3.9mm 1.27mm pitch	
46	LM358DT, GP 1.1MHZ, DUAL OPERATIONAL AMPLIFIER	U4	1	MAKE:ST MICRO /EQVT P/N: LM358DT	SMD-SOIC-8 Body width 3.9mm 1.27mm pitch	
47	LM723, IC REG LDO ADJ 0.15A 14DIP	U5	1	MAKE: TEXAS /EQVT P/N:LM723CN/NOPB	DIP-14	
48	LM258DT, GP 1.1MHZ, DUAL OPERATIONAL AMPLIFIER	U6	1	MAKE:ST MICRO /EQVT P/N: LM258DT	SMD-SOIC-8 Body width 3.9mm 1.27mm pitch	
49	ICL7662	U7	1	MAKE:ANALOG DEVICES /EQVT P/N: ICL7662CBA+T	SMD-SOIC-8 Body width 3.9mm 1.27mm pitch	
50	NE103, Hybrid pre amplifier with LM358	U9	1	MAKE:NSPL P/N:NE10-SIP10	THROUGH HOLE	
51	NE103, Hybrid pre amplifier with LM358	U10	1	MAKE:NSPL P/N:NE103-SIP10	THROUGH HOLE	

REFERENCE	**SMALL ARTCLE MONITOR TYPE:SM802**	
DATE:15.8.2015	HV PCB	
PREPD	BILL OF MATERIAL	
CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED	
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ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
	CONNECTORS					
51	15PIN 'D' L Type Connector female PCB MOUNT	J1	1	Data systems(M)		
52	9PIN 'D' L Type Connector female PCB MOUNT	J2	1	Data systems(M)		
53	RF TRANSFORMER GC601A HORIZANTAL MOUNT	T1	1	MAKEMD/EQVT P/N:RF601 RF TRANSFORMER HORIZANTAL MOUNT		
54	BANANA SOCKETS RED	+5V	1	MAKE: /EQVT		
	ORANGE	+12V	1	P/N:BS 2		
	Black/Green	GND	1			

REFERENCE	**SMALL ARTCLE MONITOR TYPE:SM802**		
DATE:15.8.2015	HV PCB		
PREPD	BILL OF MATERIAL		
CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED		
APPD	IDA PHASE II CHERLAPALLY	SHT. 6	OF 6
	HYDERABAD - 500 051	REV. 0	

REV. NO.	DATE	REVISIONS / ISSUES	PREPARED	APPROVED

REFERENCE		**SMALL ARTCLE MONITOR** TYPE:SM802 HV	
DATE PREPD	15.8.2015		
CHKD		NUCLEONIX SYSTEMS PRIVATE LIMITED IDA PHASE II CHERLAPALLY HYDERABAD - 500 051	SHT. 1 OF 2 REV. 0

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./MAKE&TYPE	REMARKS	PROC. REF.
1	GENERAL ASSEMBLY	CASTED ENCLOSURE	1	MAKE:MARUTI ENGG/EQVT P/N:GCS -ENCLOSURE		
2	ANADIC FRONT PANEL GREY COLOUR Size:310X255mm		1	MAKE:ALPRINT/EQVT P/N:GC601A/GC602A - FRONT PANEL		
3	POLYCORBONATE STICKER GREY COLOUR		1	MAKE:ALPRINT/EQVT		
4	TECHTILE KEYPAD		1	MAKE:PROTOLAB/EQVT SIZE:145 X 170mm		
5	MAINS ON, NEON LAMP		1	MAKE:B.G TRONICS/EQVT SIZE:		
6	BUZZER		1	MAKE:SONITRON/EQVT SIZE:SCS32		
7	24V ADAPTOR		1	MAKE:CINCON P/N: TRG30RA240		
	SWITCH					
8	DPDT SWITCH	SW1	1	MAKE:ELICO/EQVT P/N:HLA211	PANEL MOUNT	
	CHOKE					
9	TORROIDAL CHOKE	L1	1	MAKE:NSPL/EQVT	CHASSIS MOUNT	
	LINE FILTER					
10	62-PRF-010-5-12, LINE FILTER OR EP660 – 3 /06 SS, LINE FILTER	LF1	1	MAKE:SPECTRUM CONTROLS/EQVT P/N:62-PRF-010-5-12	CHASSIS MOUNT	
	FUSES					
11	FUSE HOLDERS		1	MAKE:ELCOM/EQVT P/N:FH1		
12	FUSES	F1	1	MAKE: MALNAD/EQVT P/N:750mA – FUSE		
13	a. Helipot b.Standard Knob (Dark Grey) c. Cap (Grey) d.Nut Cover (for 15mm Knob)		1 1 1 1	a. 2K (3590S) KL-15 CL-15 N-15		

	REFERENCE	**SMALL ARTCLE MONITOR TYPE:SM802**		
	DATE:15.8.2015	GENERAL ASSEMBLY HV		
	PREPD	BILL OF MATERIAL		
	CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED		
	APPD	IDA PHASE II CHERLAPALLY	SHT. 2	OF 2
		HYDERABAD - 500 051	REV. 0	

REV. NO.	DATE	REVISIONS / ISSUES	PREPARED	APPROVED

REFERENCE		**SMALL ARTCLE MONITOR**	
		TYPE:SM802	
		EMI/EMC FILTER PCB	
DATE	29.09.2015	BILL OF MATERIAL	
PREPD		NUCLEONIX SYSTEM S PRIVATE LIMITED	
CHKD		IDA PHASE II CHERLAPALLY	
		HYDERABAD - 500 051	SHT. 1 OF 2
			VER:14-8-15 REV. 0

REV. NO.	DATE	REVISIONS / ISSUES	PREPARED	APPROVED

REFERENCE		**SMALL ARTCLE MONITOR** **TYPE:SM802** MECHANICAL BILL OF MATERIAL NUCLEONIX SYSTEMS PRIVATE LIMITED IDA PHASE II CHERLAPALLY HYDERABAD - 500 051	
DATE PREPD	29.09.2015		
CHKD			
			SHT. 1 OF 4
			VER:14-8-15 REV. 0

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
1						
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	REFERENCE	**SMALL ARTCLE MONITOR**		
		TYPE:SM802		
	DATE:29.09.2015	MECHANICAL		
	PREPD	BILL OF MATERIAL		
	CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED		
	APPD	IDA PHASE II CHERLAPALLY	SHT. 2	OF 4
		HYDERABAD - 500 051	VER:14-8-15	REV. 0

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
13						
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	REFERENCE					
		SMALL ARTCLE MONITOR				
		TYPE:SM802				
	DATE:29.09.2015	MECHANICAL				
	PREPD	BILL OF MATERIAL				
	CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED				
	APPD	IDA PHASE II CHERLAPALLY			SHT. 3	OF 4
		HYDERABAD - 500 051			VER:14-8-15	REV. 0

ITEM NO.	DESCRIPTION	IDENTITY	QTY.	MATL. SPEC./ DRG. NO./ MAKE&TYPE	REMARKS	PROC. REF.
1						
2						
3						
4						

REFERENCE	**SMALL ARTCLE MONITOR**			
	TYPE:SM802			
DATE:29.09.2015	MECHANICAL			
PREPD	BILL OF MATERIAL			
CHKD	NUCLEONIX SYSTEMS PRIVATE LIMITED			
APPD	IDA PHASE II CHERLAPALLY	SHT4	OF 4	
	HYDERABAD - 500 051	VER:14-8-15	REV. 0	

CHAPTER – IX

MAINTENANCE/ CALIBRATION SERVICES AND WARRANTY CLAUSE

9.1 GENERAL:

As per the warranty clause of the company, we provide one-year warranty during which period we provide free service at our works. Hence in case of any mal-function in our instruments, you are requested to send the unit back to our works by RPP/COURIER/SPEED POST PARCEL/GATI/XPS/door delivery. We shall arrange immediate rectification/replacement within two weeks from the date of receipt of the equipment at our place. Please note that the equipment will be serviced at our works only.

The equipment is to be sent to :

The Servicing Department
NUCLEONIX SYSTEMS PRIVATE LIMITED
Plot No: 162 A & B, PHASE II, I.D.A.Cherlapally, Hyderabad - 500 051
Ph : 040-29706486, Mob : +91-7331104481 / 82
E-mail: info@nucleonix.com Web : www.nucleonix.com

For all the Radiation monitoring equipment, detectors built-in or external probes will not have one-year warranty, but only inspection warranty at the time of supply is provided. Since detectors will / may have fragile glass construction, we do not provide warranty. In case of failure of these components, Nucleonix will supply detector replacement at cost-cost price.

Note: In respect of all types of portable radiation monitors, it may be necessary to checkup and **recalibrate the equipment once a year** at our works.

9.2 HOW TO AVAIL SERVICES FOR EQUIPMENT REPAIRS (DURING & AFTER WARRANTY)

9.2.1 DURING WARRANTY:

The following procedure is to be followed by the customers with in India for availing services / repairing facility during warranty period.

- Customer must register service request / compliant with customer support department, Nucleonix.
- For all equipments, costing less than 3.0 lakhs or equipments weighting not more than 20Kg, one year warranty & free service is offered, when the equipments are sent to our

works only.

- Equipment is to be properly packed with adequate cushion to prevent any damages in transit. Nucleonix Systems is not responsible for damages or loss during transportation.
- Packing / Freight charge is to be borne by customer when he sends the equipment to our works. However when we return after servicing packing will be Nucleonix responsibility & Freight charges will be to your account.
- Please indicate in your correspondence equipment model & serial number.
- All the equipments are to be sent to our works only on door delivery basis.
- For Door Delivery Transportation contact XPS/GATI cargo in your city / town or a reliable courier service to pick the consignment from your place. For their nearest local address & phone no's look into their websites. Transit insurance if the customer feels is necessary it is to be covered.
- Nucleonix Systems will not receive the equipments sent by other modes of transportation, such as Rail/Road.
- After servicing equipments will be send back by same mode of transport such a XPS/GATI/COURIER/RPP.
- All types of Radiation detectors, glass ware, PMTs etc., which are fragile are not covered in warranty.
- You can also send the equipment personally to our works for repairs either during or after warranty, after fixing up with our service dept (Customer Support Division). If possible we may repair on same day or your person can stay for a day & get it repaired.

9.2.2 AFTER WARRANTY SERVICES

- On expiry of 1 year warranty, if you like to send the equipment (low cost less than 3.0 lakhs & smaller in size & weight less than 20 Kg) of repairs to our works, you may please follow the following procedure.
- Submit, Service request form given here, mentioning that you agree to pay service charges which includes: Basic service charges per unit / module are RS:2000 + cost of components if it exceeds Rs:200 + packing charges (Rs:200) + Return Freight charges Rs:300 or actual which ever is higher.
- Followed by this you can send the equipment straight away if it is within 5 years old. If the equipment is beyond 5 years old, then you can send it for repairs, only after you receive confirmation from Customer Support Division, that it is repairable & is not an obsolete model.
- For all equipments costing above Rs:3.0 lakhs which are to be attended in the field only, you can obtain a quotation with relevant details by submitting service request form & avail the services accordingly.
- For all field servicing jobs, since we need to depute engineers, it is likely, to take time & also it will cost more which includes Engineer's TA & DA etc., apart from basic service charges + cot of spares etc. Please note that basic service charges will be different for different products depending upon sophistication.
- For all jobs to be serviced in the field, customer is requested to provide adequate details on the nature of problems, to enable our engineer to come prepared with adequate spares.

9.3 HOW TO AVAIL CALIBRATION SERVICES

- It is best advised that each of the Radiation monitors including Area monitors are calibrated once in a year. When you want to send your Radiation monitor / Area monitor / Contamination monitor for calibration to our works, you may submit **"Calibration Services request form"** & send the equipment for calibration, by following the steps given below:
- Send your equipment along with your work order, if it is 5 years old or less.
- Also send work order & clearly indicate that you will agree to pay calibration charges & also equipment repair charges additionally if the unit is faulty & requires repairs before one can take it up for calibration.
- You are requested to ensure good packing to avoid any transportation damages.
- Use only the specified following mode of transportation system for dispatching on door delivery basis. XPS/GATI cargo/Courier/RPP/Speed Post parcel etc., Send the equipment on freight paid basis. (Equipments sent by other methods such as Rail/Road etc., will not be collected.
- Immediately on receipt of the equipment, we will send an acknowledgement & also a profoma bill by email/post.
- Based on the proforma bill, once we receive the payment, equipment will be dispatched back b similar mode of transportation as mentioned above.

CHAPTER –X

CONTACT US FOR AVAILING SERVICES

Postal/Mailing Address (Phone / Fax / Email)

Nucleonix Systems Pvt Ltd.
Plot No. 162 A&B, Phase II, I.D.A.,
Cherlapally, Hyderabad - 500 051, Telangana, India.
Phone: + 91-40-27263701, 040-27262146, 68888777
Mobile: 7331104480, 7331104481, 7331104482
Fax : + 91-40 - 27262146
Email : info@nucleonix.com

For any information, Contact by email is always appreciated.
(This will help us to respond to you quickly)

Marketing Department:

a) Sales / Commercial Information / Field installation and servicing

For any Commercial, Price information, Product information, customer coordination & quotation of our products customer related commercial services, please contact front office marketing staff through the listed Email Ids or Phone Nos. given below

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Whom to Contact:

Business Executives:	Contact Numbers	Contact by E-mail ID
1. R.Maniram (Sr. Business Executive)	Mob:7331104481, Ph-040-27263701	info@nucleonix.com
2. Ch.Gayatri (Business Executive)	Mob:7331104481, Ph-040-27263701	info@nucleonix.com
3. K.Swapna (Business Executive)	Mob:7331104481, Ph-040-27263701	info@nucleonix.com

Note: Our business executives will also connect you to concerned Engineer or General Manager for any technical clarifications if required

b) Factory Services

For **Servicing and Calibration** factory services & follow up on the above jobs including dispatch related/payment related issues of serviced & calibrated items please contact

Ms. K.Sarika **Mob:**7331104482 **E-mail:** info@nucleonix.com
(Executive services)

She will also connect you to concerned engineer or general manager if required, for any clarifications & deficiencies in services

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c) Dispatch Related Issues (Production Items)

For dispatch related issues of your ordered equipments, including delays, purchase order related document deficiencies, payment proofs, dispatch docket details and bills etc,.contact

Ms.V.Anusha / Renuka Devi (Executive Dispatch) **Ph:**040-27263701, Ex-26 **E-mail:** info@nucleonix.com

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d) Product Technical Information / Clarifications

Whom To Contact:

Contact any front office "Business Executive"- He/She will take your details and connect you to concerned product engineer for any technical clarifications. Best thing is to email your technical queries and obtain the reply, rather than on telephone.

You can also contact General Manager or Director (Tech) if required.

e) Marketing Manager

On business matters for all your marketing services / techno commercial requirements about Nucleonix Products contact:

Bhaskara I.V.
Mob:8019662500
Land lines : 91-40-27263701, 91-40-68888777
Email: info@nucleonix.com

f) General Manager
Dr.M.S.R.Murthy PhD (Nuclear physics)
Land line: 91-40-27263701, 91-40-68888777
Email: info@nucleonix.com

Contact General Manager for all sales / servicing and technical information including customer support related issues, on the delays, gaps & lapses by our staff. Contact G.M. regarding field installations & field servicing jobs schedule etc.

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g) H.R -Incharge
Contact her regarding, job vacancies, sending resume for employment, H.R. related issues etc. contact

Shanthi Sri.P **Mob:**7331104480 **Email:** recruit@nucleonix.com

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h) Director -Technical
Mr. J. Dheeraj Reddy
Email: jdreddy@nucleonix.com
Mobile No :+91-7674009005

Contact him for, any Technical Information and clarifications on products, which cannot be answered by General Manager / Customer support executives.

For any technical deficiencies in products, related issues & suggestions on product improvements you may contact by email or telephone. This will help the company to improve the product & serve you better.

Dealer's complaints, on commercials, lapses by our commercial staff, or any other discripancy, or you like to give any feedback on any Nucleonix staff doing any wrong thing against cleaner / ethical business principles / practices can be complained to any of the directors or managing director.

i) Director - IT
Mr. J. Nishanth Reddy
Email: nishureddy@yahoo.com; info@nucleonix.com
Mobile No. +91-9966691000

For any deficiencies in product software's, related issues, & any suggestions or improvisations in software's can be contact by email or telephone. This will help the company to improve the product & serve you better.

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j) Managing Director
Shri. J.Narender Reddy (Managing Director)
Email : jnreddy@nucleonix.com; info@nucleonix.com

Contact Managing Director for, Foreign relations, International Business co-operation, Joint ventures, Exports, Dealership in other countries, Policy matters, Technology tie-ups etc.

k) Dealers Complaints :
Dealers complaints, on commercials, lapses by our commercial staff, or any other discripancy, or you like to give any feedback on any Nucleonix staff doing any wrong thing against cleaner / ethical business principles / practices can be complained to any of the directors or managing director.

An innovative company working towards excellence in the field of Nuclear Instrumentation

NUCLEONIX SYSTEMS PVT. LTD.
Plot No.162 A & B, Phase-II, IDA, Cherlapally, Hyderabad- 500051 INDIA.
Ph : 91-40-29706483 / 84 / 85, Mobile No: 7331104481 / 82
E-mail: info@nucleonix.com website: www.nucleonix.com