THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

COMMUNICATION CONCERNING THE APPROVAL GRANTED (1)/ ~~APPROVAL EXTENDED (1)~~/ ~~APPROVAL REFUSED (1)~~/ ~~APPROVAL WITHDRAWN (1)~~/ ~~PRODUCTION DEFINITIVELY DISCONTINUED (1)~~ OF A TYPE OF ELECTRICAL/ ELECTRONIC SUB-ASSEMBLY (1) WITH REGARD TO REGULATION NO. 10.04

E11 Approval No: 10R-048244

Extension No: Not applicable

1. Make (trade name of manufacturer): SAMSUNG TECHWIN CO., LTD.

2. Type and general commercial description(s): SRM-872 / SRM-872 (MOBILE VIDEO RECORDER)

3. Means of identification of type, if marked on the ~~vehicle~~/component~~/separate technical unit~~(1): SRM-872 marking on adhesive label

3.1. Location of that marking: Top side of product

4. Category of vehicle: Not applicable

5. Name and address of manufacturer: SAMSUNG TECHWIN Co., Ltd.
Samsung Techwin R&D Center, 6, Pangyo-ro 319 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do 463-400 Republic of Korea

6. In the case of components and separate technical units, location and method of affixing of the ECE approval mark: Label on the top side of product

7. Address(es) of assembly plant(s): Win4NET Co.,Ltd
(Hogye-dong), 16-27, LS-ro91beon-gil, Dong-an-gu Anyang-si, Gyeonggi-do, Korea

8. Additional information (where applicable): See appendix

10-Jan-14
UK Approval Authority

KSP288201

9. Technical Service responsible for carrying out the tests: Vehicle Certification Agency

10. Date of test report: 19 December 2013

11. No. of test report: KSP288201 (8244)

12. Any remarks: See Appendix

13. Place: BRISTOL

14. Date: 10 JANUARY 2014

15. Signature: 

A. W. STENNING
Head of Technical and Quality Support Group

16. The index to the information package lodged with the Approval Authority, which may be obtained on request, is attached.

17. Reasons for extension: Not applicable

(1) Strike out what does not apply.

Appendix

to type-approval communication form No. 10R-048244

concerning the type-approval of an electrical/electronic sub-assembly under Regulation No. 10.04

1. Additional information:

1.1. Electrical system rated voltage: 12 – 24V. ~~pos/~~neg ground (1)

1.2. This ESA can be used on any vehicle type with the following restrictions: 12V and 24V negative earth vehicles only

1.2.1. Installation conditions, if any: Please see the manufacturer's documentation

1.3. This ESA can be used only on the following vehicle types: Not applicable

1.3.1. Installation conditions, if any: Not applicable

1.4. The specific test method(s) used and the frequency ranges covered to determine immunity were: (Please specify precise method used from Annex 9): Not applicable

1.5. Laboratory accredited to ISO 17025 and recognized by the Approval Authority responsible for carrying out the tests: EMC Compliance EMC Test Lab. and Korea EMC test lab.

2. Remarks: None

(1) Strike out what does not apply.

SAMSUNG	Information document no. EM-EMC 10R-048244-00 for type-approval of an electrical/electronic sub-assembly with respect to electromagnetic compatibility ECE R10.04 ESA Type : SRM-872	Page: 1

1.	Make (trade name of manufacturer)	: SAMSUNG TECHWIN CO., LTD.
2.	Type	: SRM-872 (MOBILE VIDEO RECORDER)
3.	Means of identification of type, if marked on the component	: SRM-872 marking on adhesive label
3.1.	Location of that marking	: Top side of product
4.	Name and address of manufacturer	: SAMSUNG TECHWIN Co., Ltd. Samsung Techwin R&D Center, 6, Pangyo-ro 319 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do 463-400 Republic of Korea
	Name and address of authorized representative, if any	: Not Applicable
5.	In the case of components, location and method of affixing of the approval mark	: Label on the top side of product
6.	Address (es) of assembly plant(s)	: Win4NET Co.,Ltd (Hogye-dong), 16-27, LS-ro91beon-gil, Dong-an-gu Anyang-si, Gyeonggi-do, Korea
7.	This ESA shall be approved as a component	
8.	Any restriction of use and conditions for fitting	: Manufacturer's instructions to be followed, DC 12V and 24V negative earth vehicles only
9.	Electrical system rated voltage	: DC 12V - 24V, Negative ground

List of contents

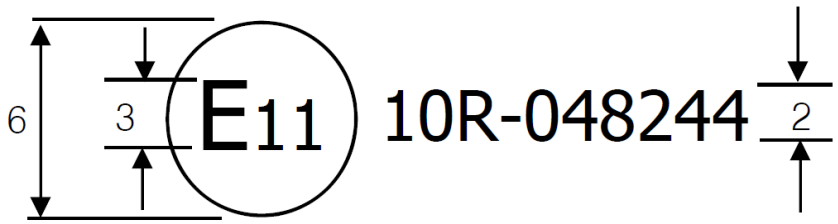
This information document consists of pages 1 to 47 including Appendix and Attachments.

1.	Audio signal	G.711, G.726
2.	Power input	12VDC, 24VDC
3.	Power consumption	Max. 100W
4.	Operation temperature	-25°C to +50°C (-13°F to +122°F) / 20% to 85% RH
5.	Dimensions	225.5(W) X 59(H) X 312.2(D) mm
6.	Weight(kg)	2.17 Kg
7.	Applicable Vehicles	CAR, Train
8.	X-TAL/CHIP	24 MHz
9.	Rated voltage	12V ~ 24VDC, 9A

Main

Front View

Location of
Type designation and E-mark



Main

Rear View

Control Box

Front View

Control Box

Rear View

Sensor Box

Front View

Sensor Box

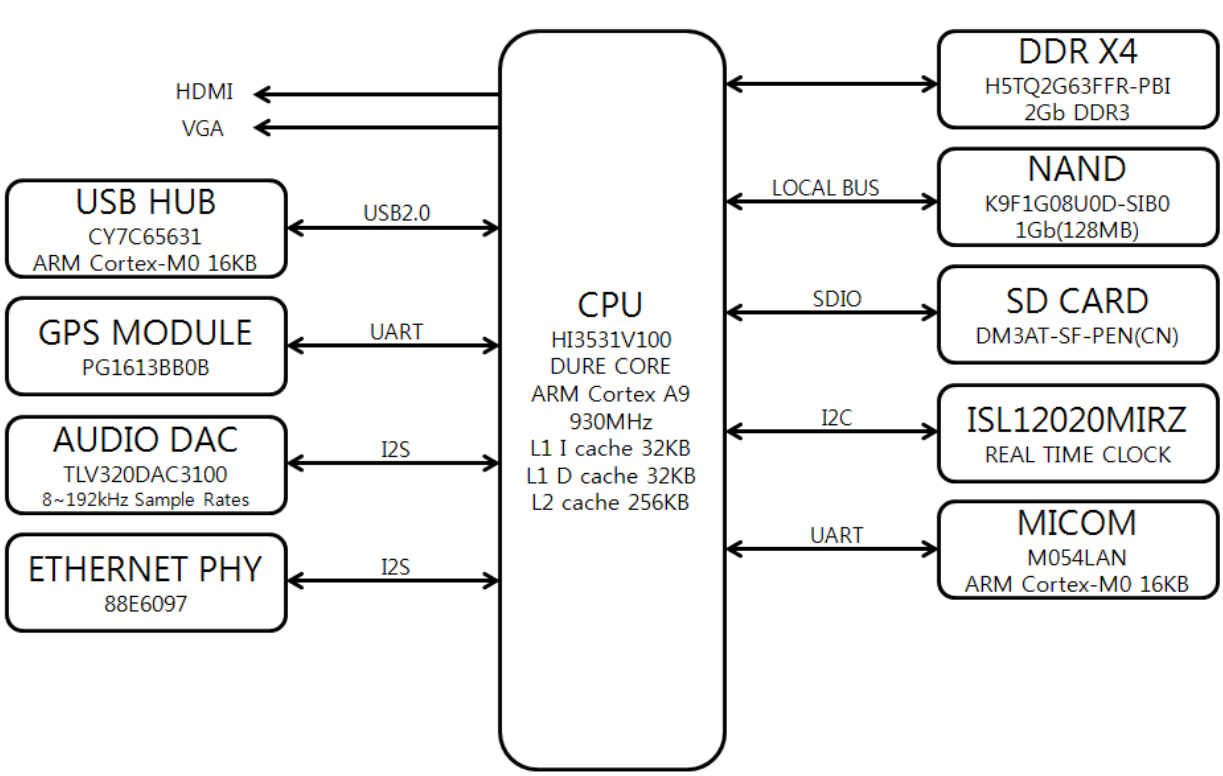
Rear View

Remote Control

Front View

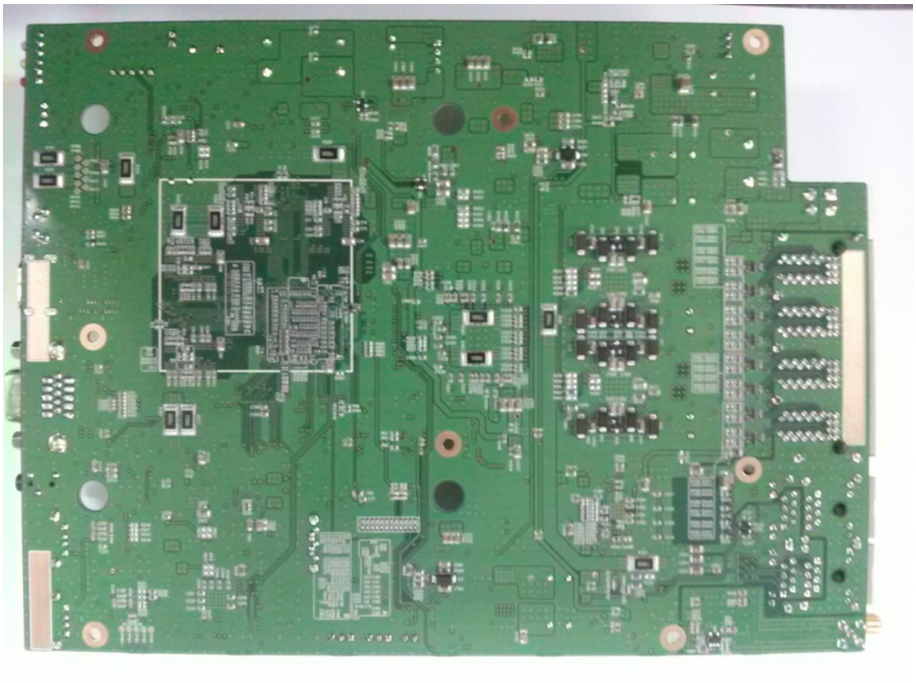
Remote Control

Rear View



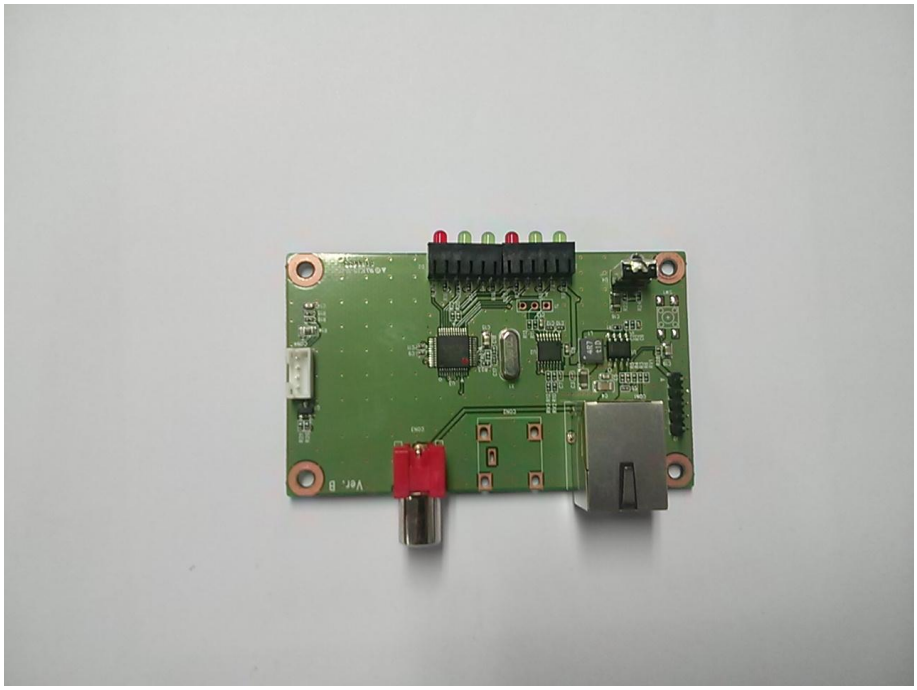
TOP of MAIN PCB

BOTTOM of MAIN PCB



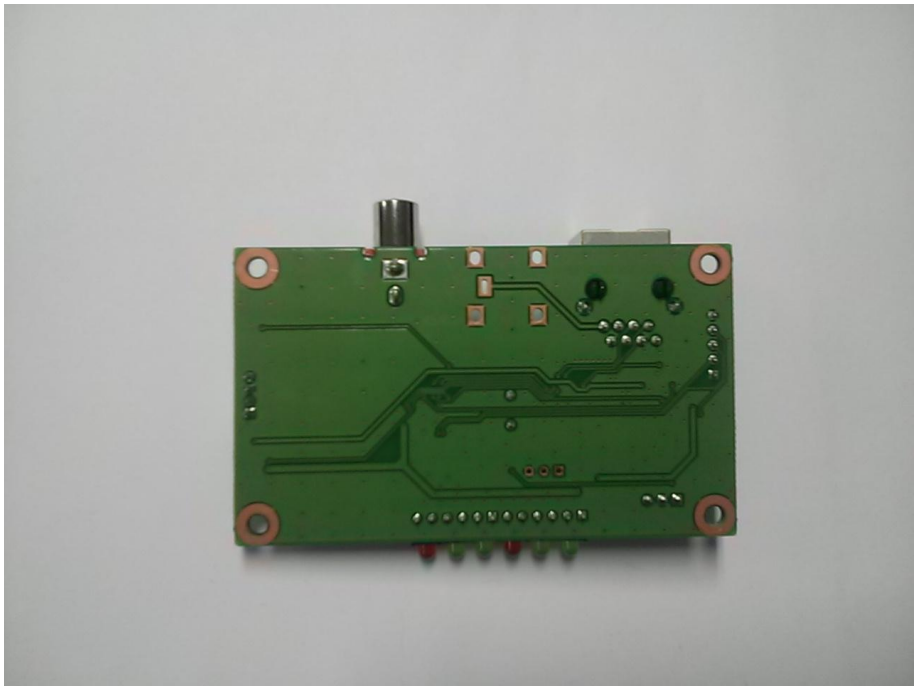
Control Box

Top of PCB



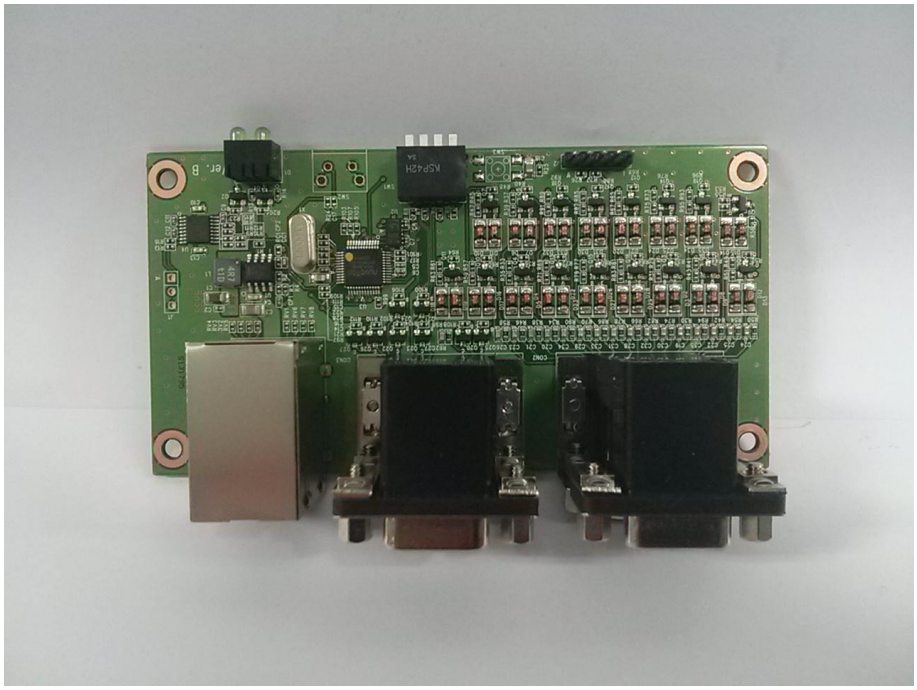
Control Box

Bottom of PCB



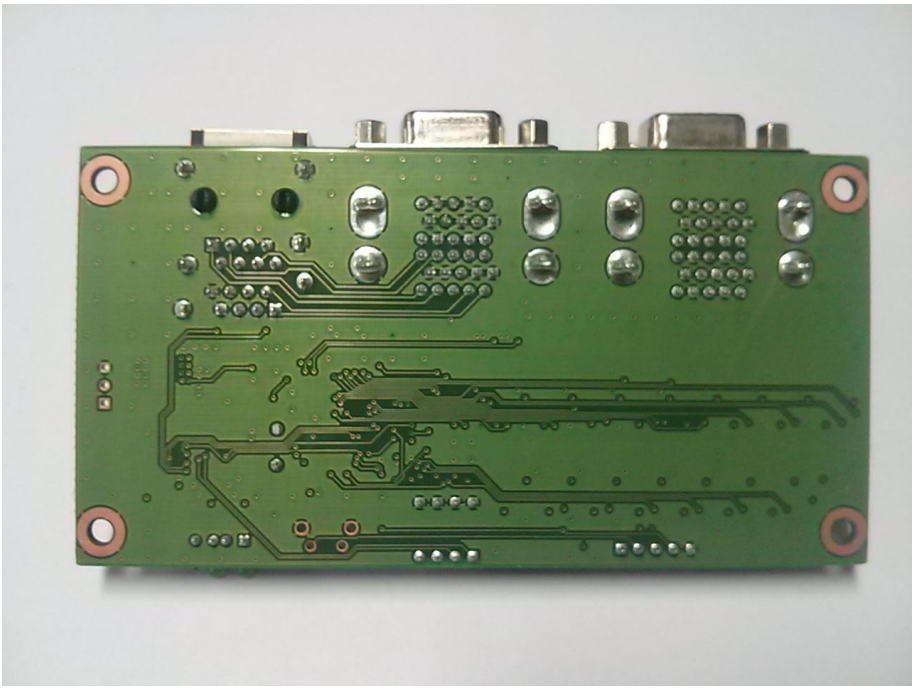
Sensor Box

Top of PCB



Sensor Box

Bottom of PCB



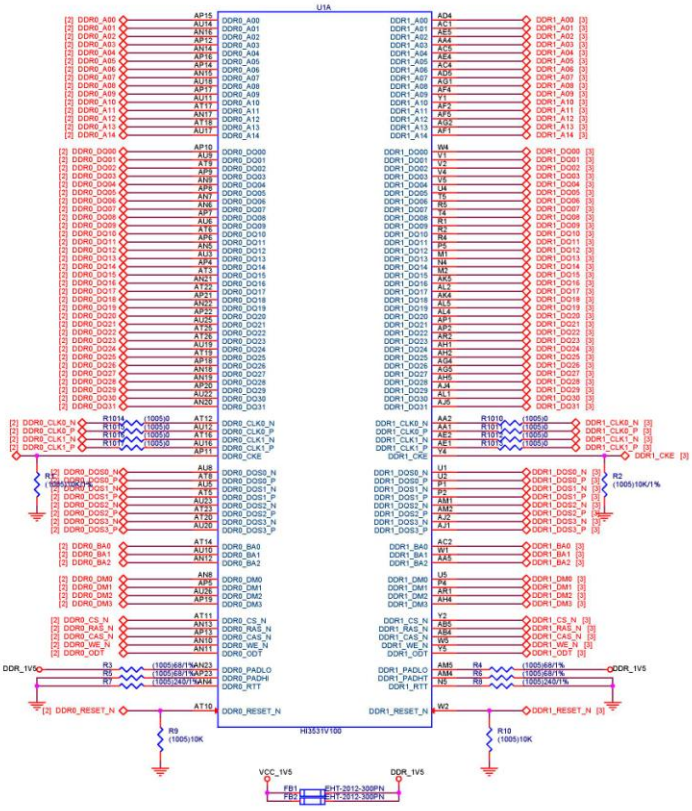
Remote Control

Top of PCB

Remote Control

Bottom of PCB

HI3531 DDR Ctrl



DDR3 Layout guideline:

note:the wire below consist of two parts:chip length + board length

1,VREF should be isolated with other Power supply;
the space between VREF and other signals must be more than 20 mils;

2,the decoupling capacitors of DDR power should be placed closed to DDR and DDRC 1V5 power pins;

3,DDR and DDRC use the same 1V5 power plane in POWER layer;

4,the length of the CLK signal should be less than 4inch;
Lclk < 4inch; the length of CLKxP and CLKxN should be equal;
|LCLKxP-LCLKxN| < 5mil;the CLK traces should be differencial;

5,the length of the DQSx should be 250mil more or less than CLKx, that is:LDQSx = LCLKx +/- 250mil;
|LDQSxP-LDQSxN| < 5mil;the DQS traces should be differencial;
(Note:CLK0 ==> DQS0 and DQS1;CLK1 ==> DQS2 and DQS3)

6,the length of the DQ should be 50mil more or less than DQS signal,that is:
LDQ[7:0] = LDQS0 +/- 50mil;
LDQ[15:8] = LDQS1 +/- 50mil;
LDQ[23:16] = LDQS2 +/- 50mil;
LDQ[31:24] = LDQS3 +/- 50mil;

7,the length of the DM should be 50mil more or less than DQS signal,that is:
LDMx = LDQSx +/- 50mil;

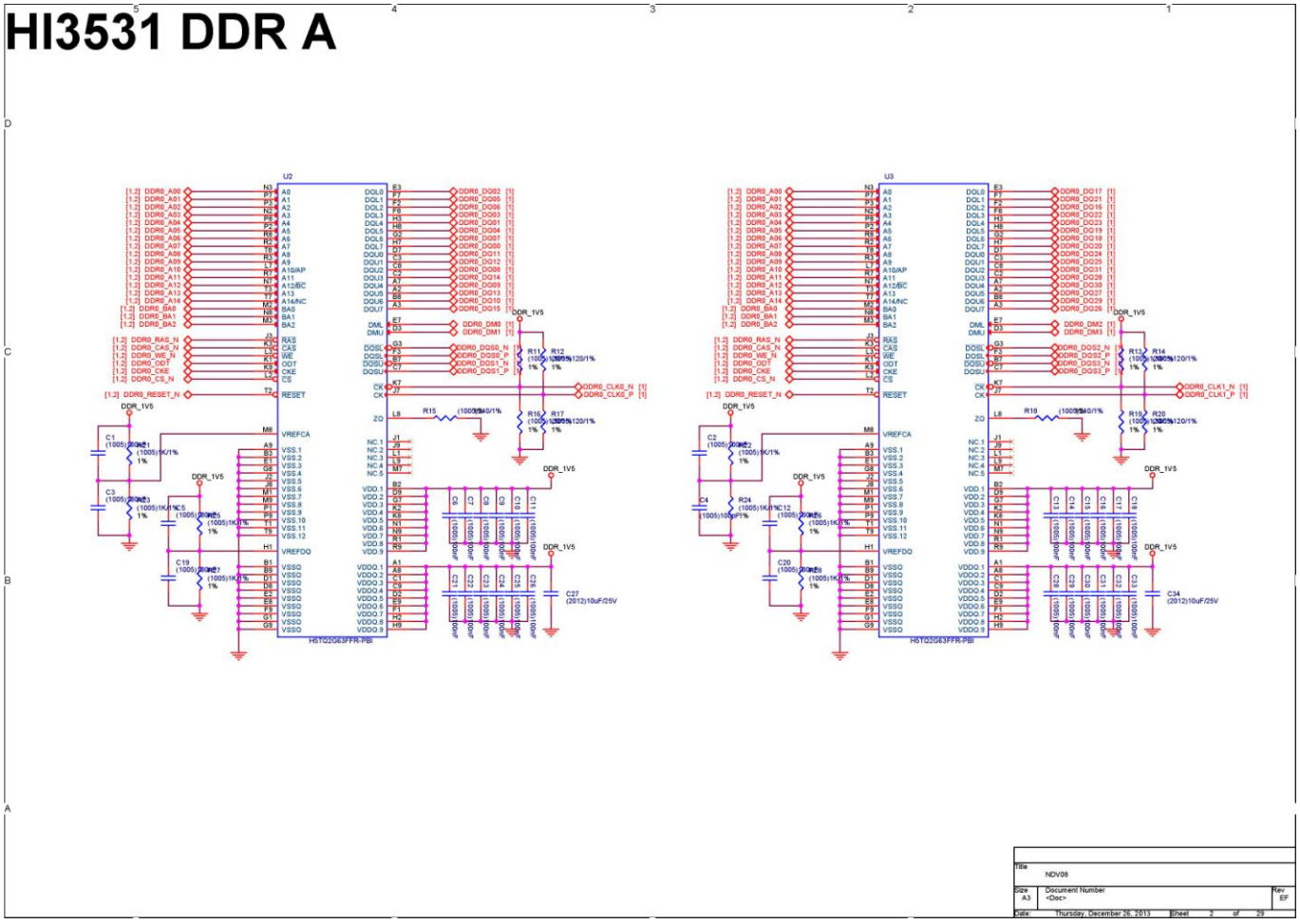
8,the length of the Address should be 100mil more or less than CLK signal,that is:
LADDR = LCLK +/- 100mil;Addr traces are T model,the length between T point and DDRC addr pin is 2inch max;T point to DDR addr pin is 1 inch max;

9,other command signal:
LCMD = LCLK +/- 100mil;

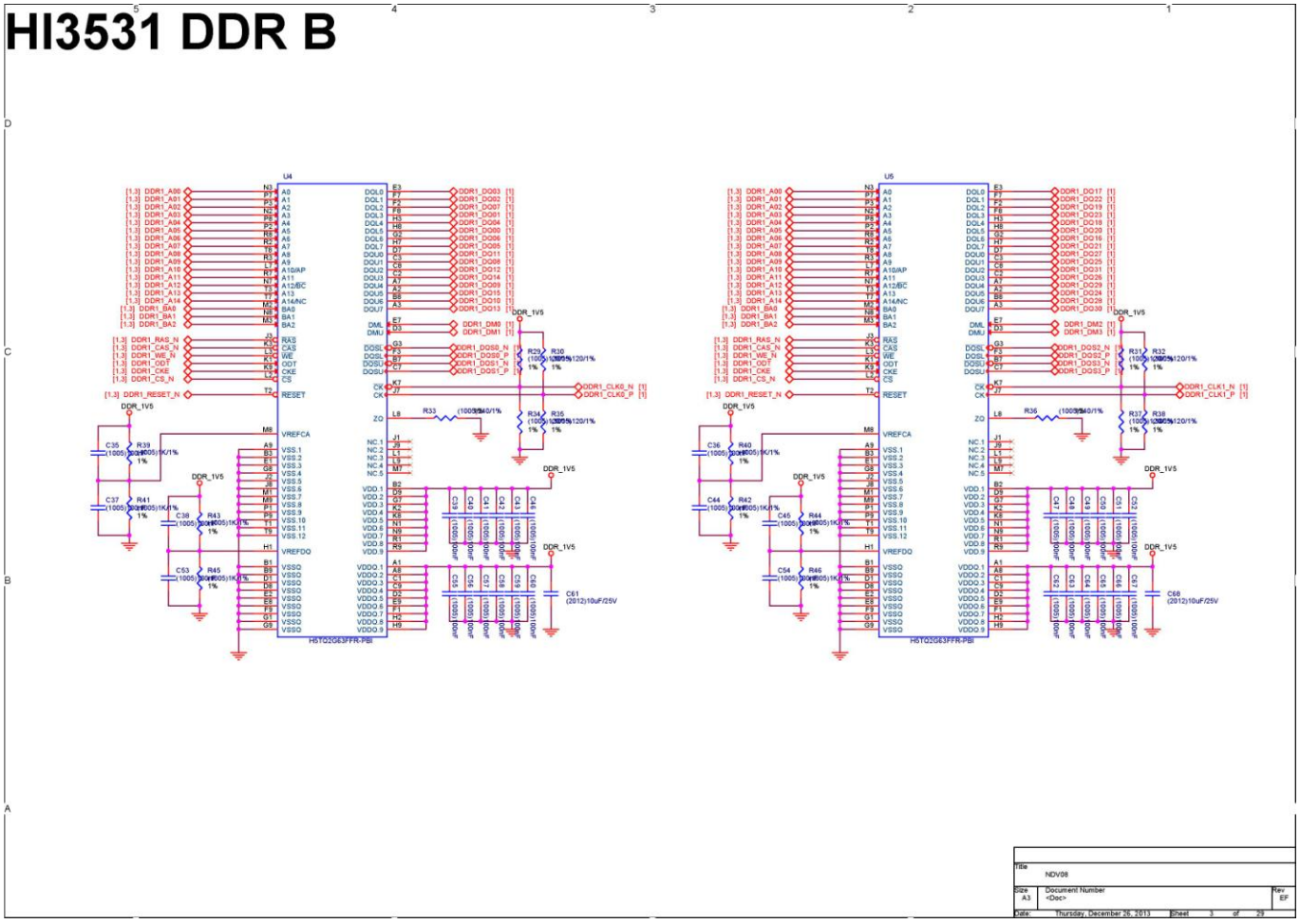
10,all signals use arc trace will be better.

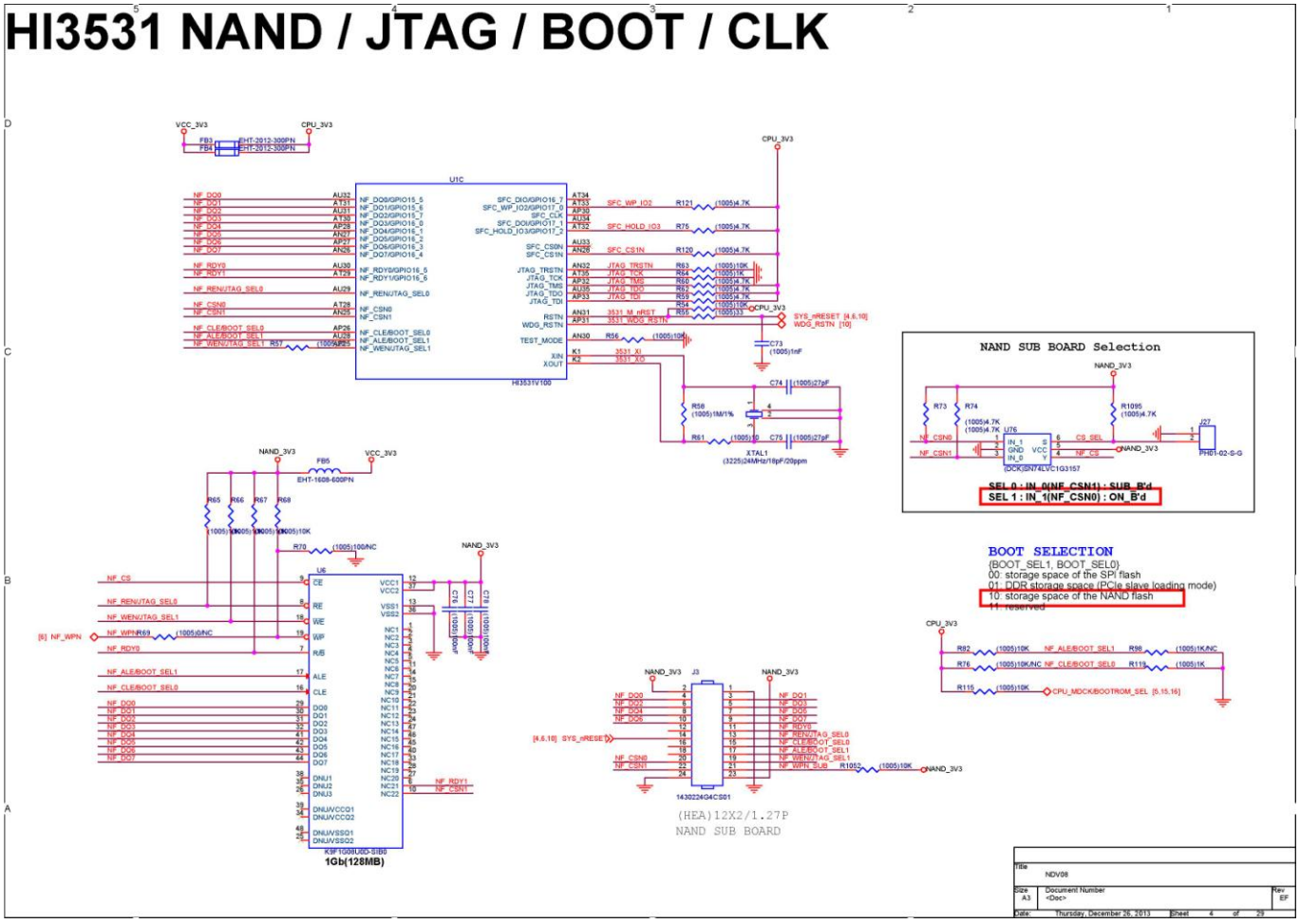
Title: NDV08		
Size: A3	Document Number: <Doc>	Rev: EF
Date: Thursday, December 26, 2013	Sheet 1 of 29	

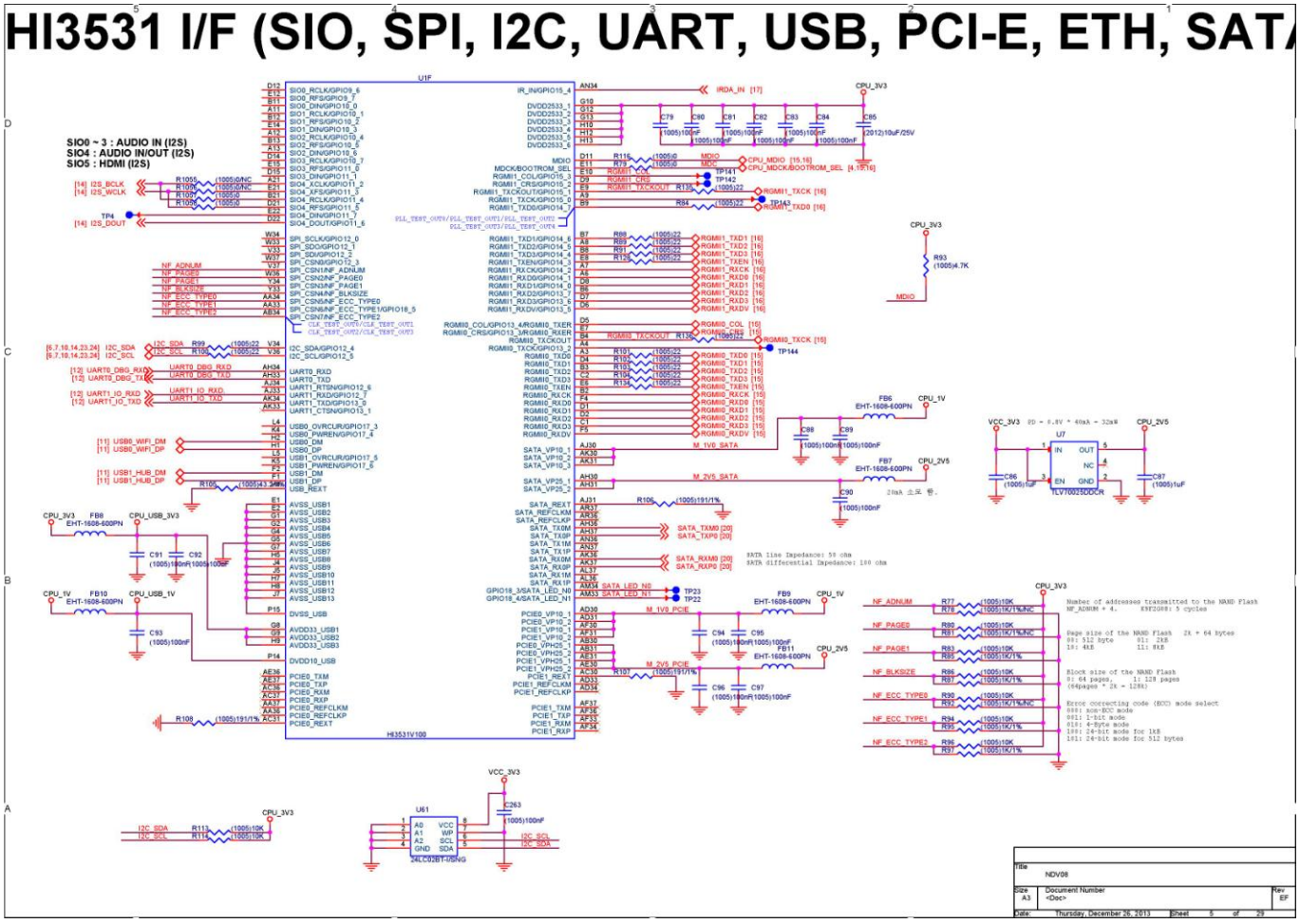
HI3531 DDR A

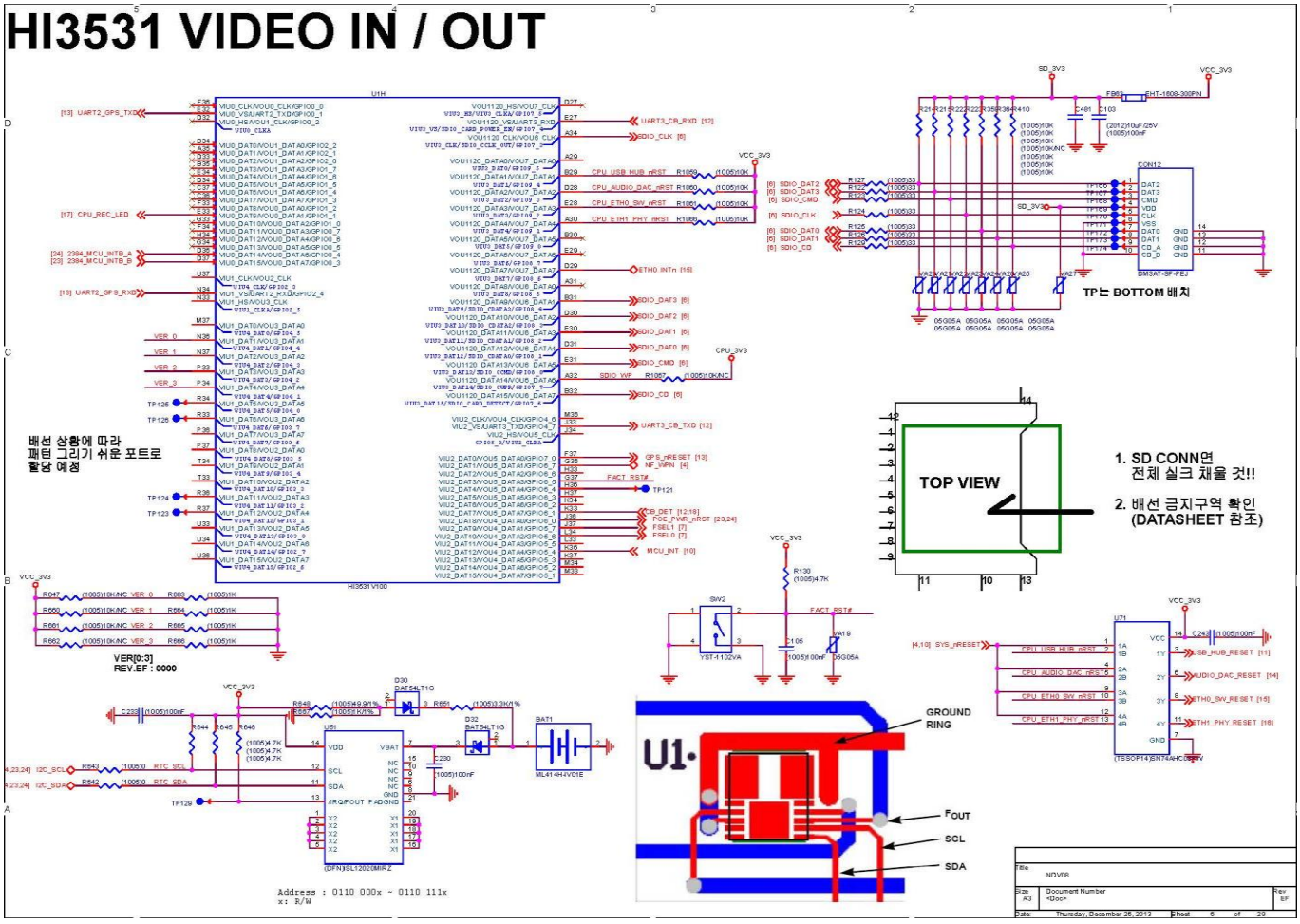


HI3531 DDR B

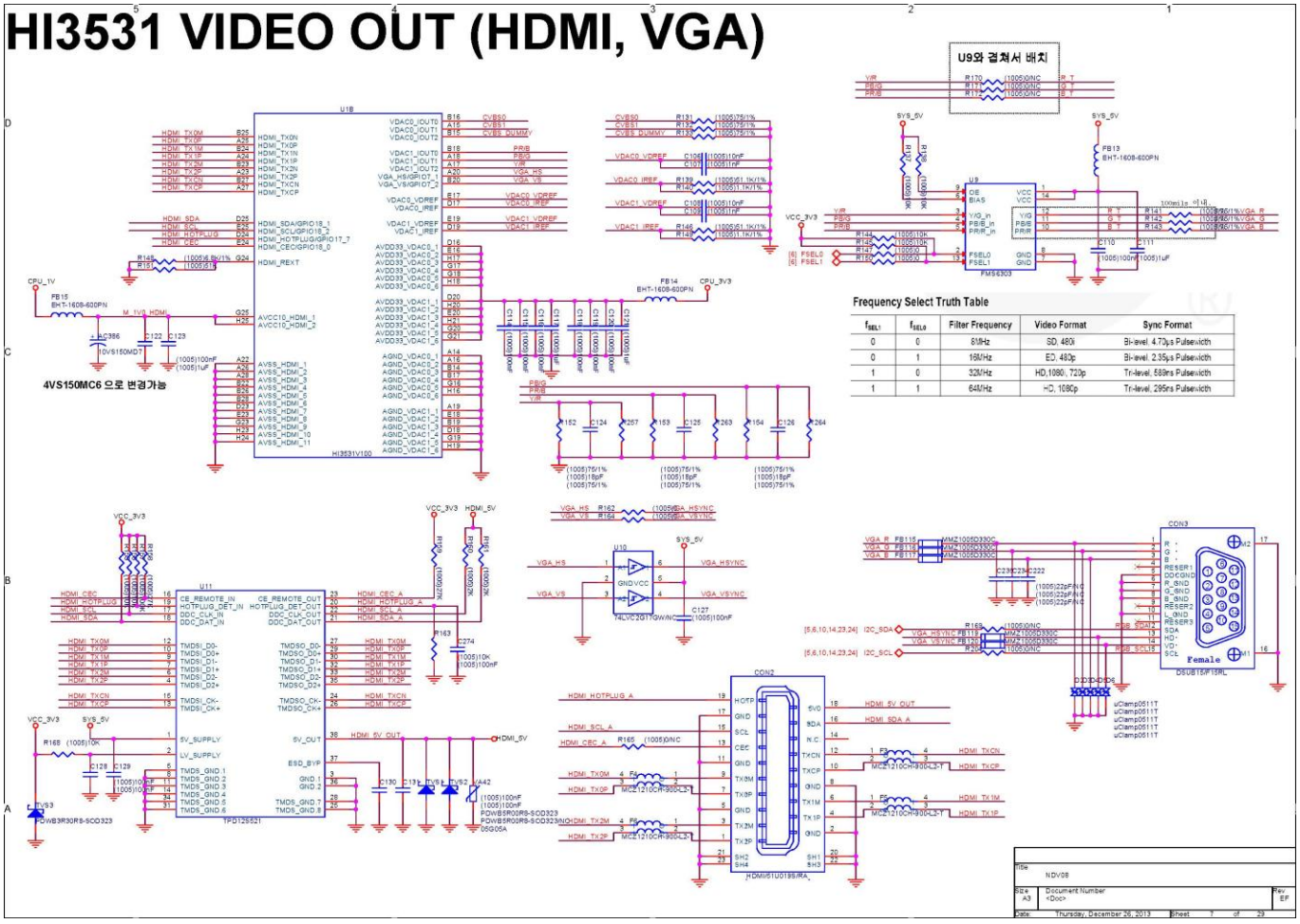


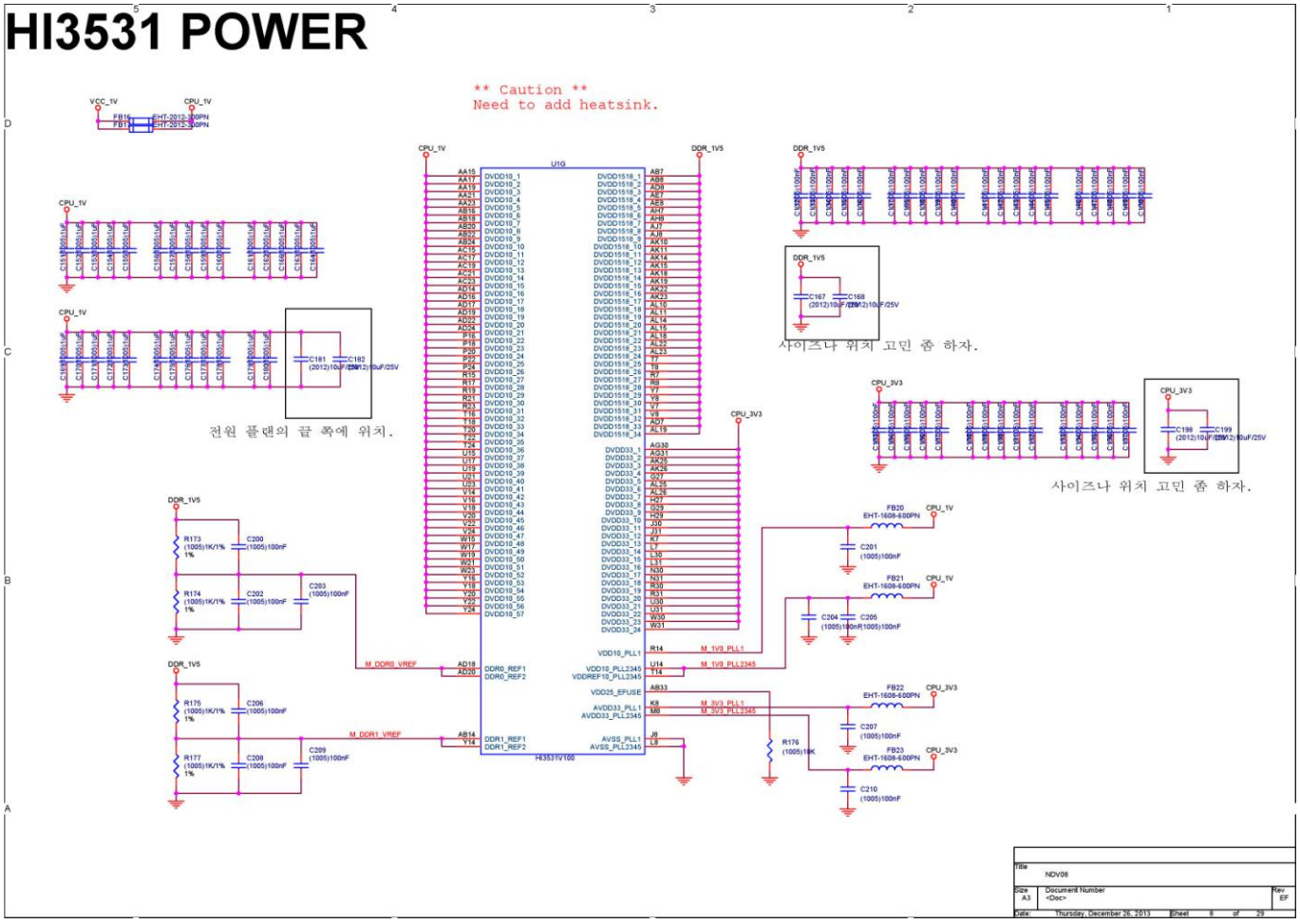




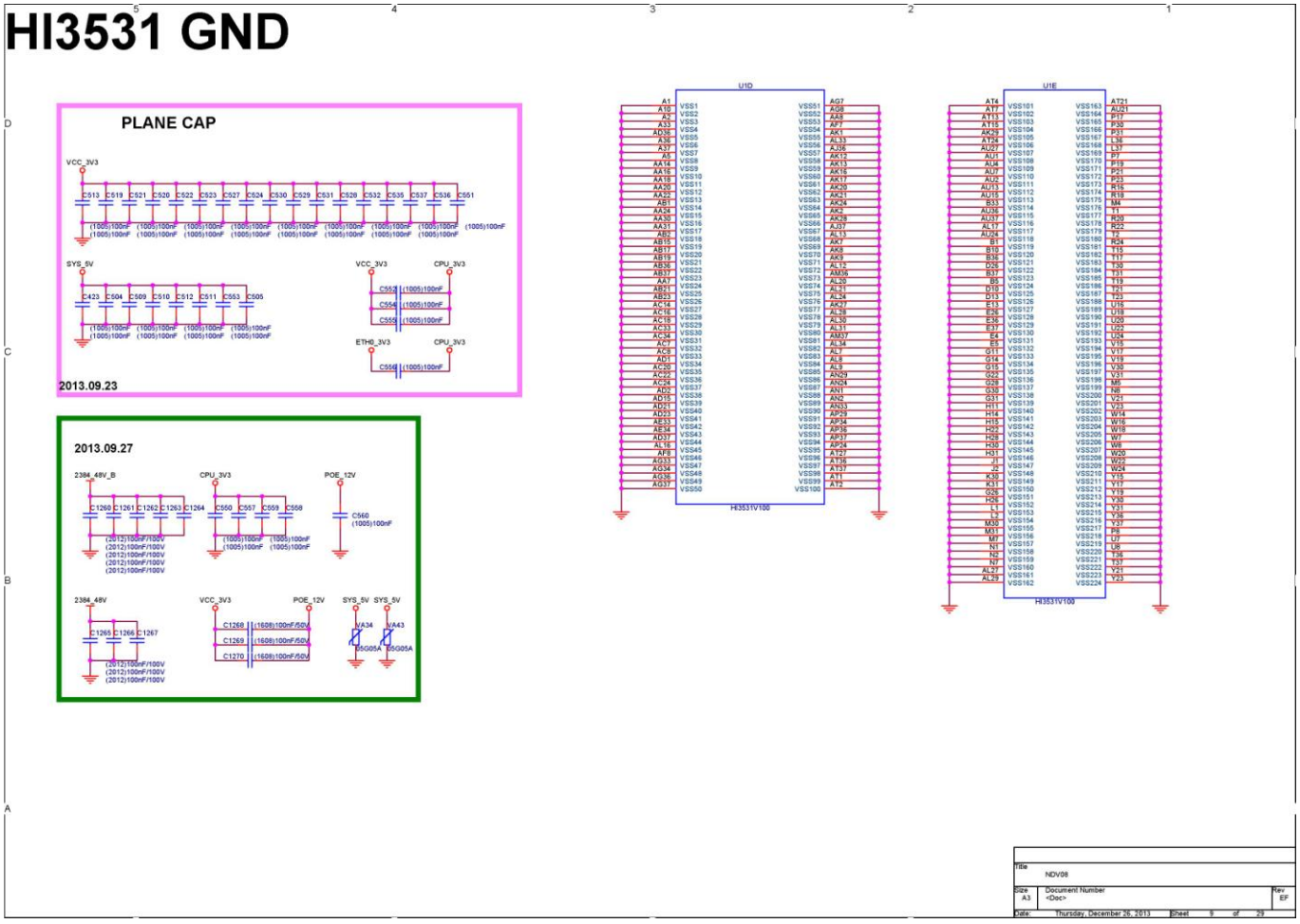


Electric Circuit

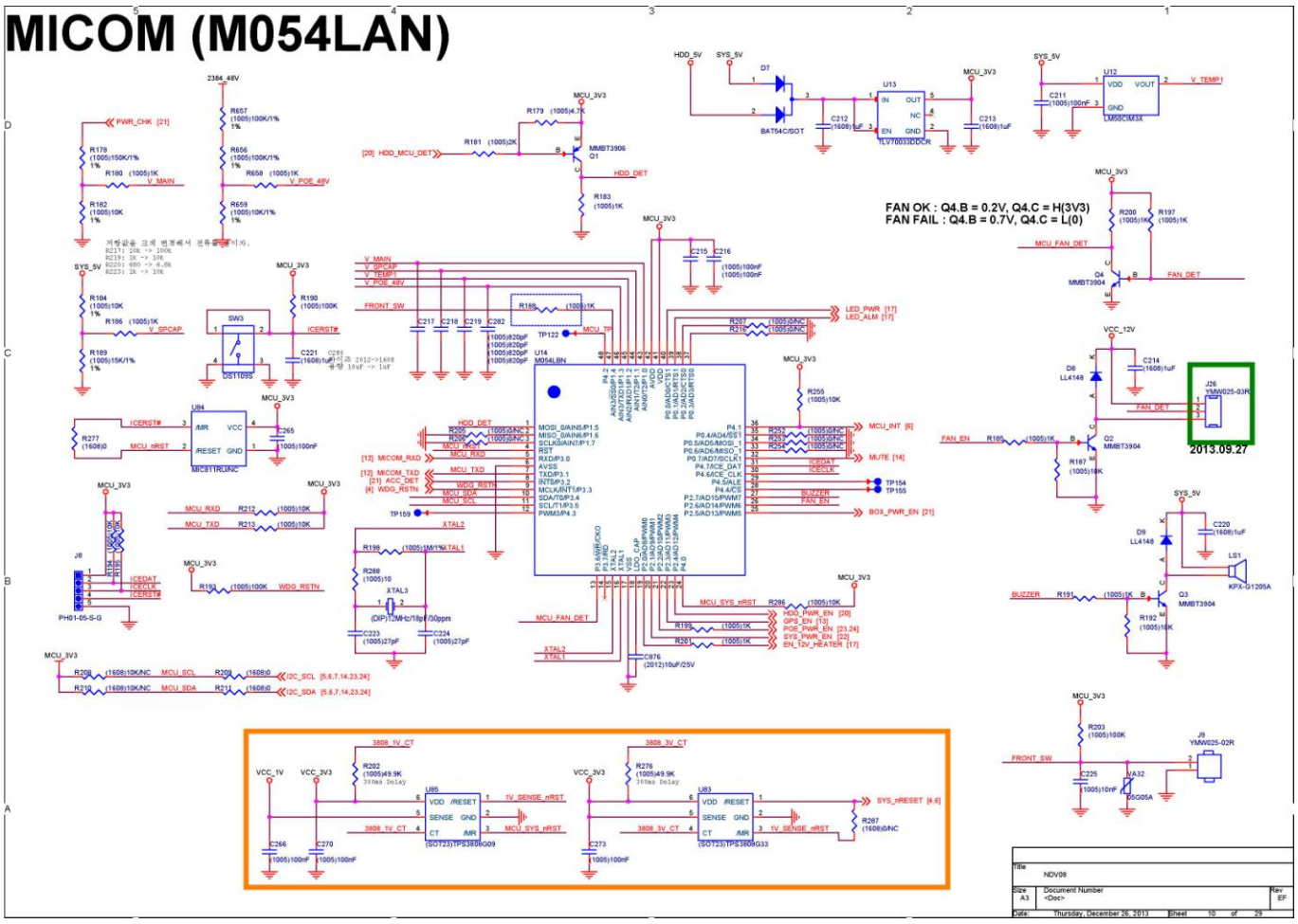


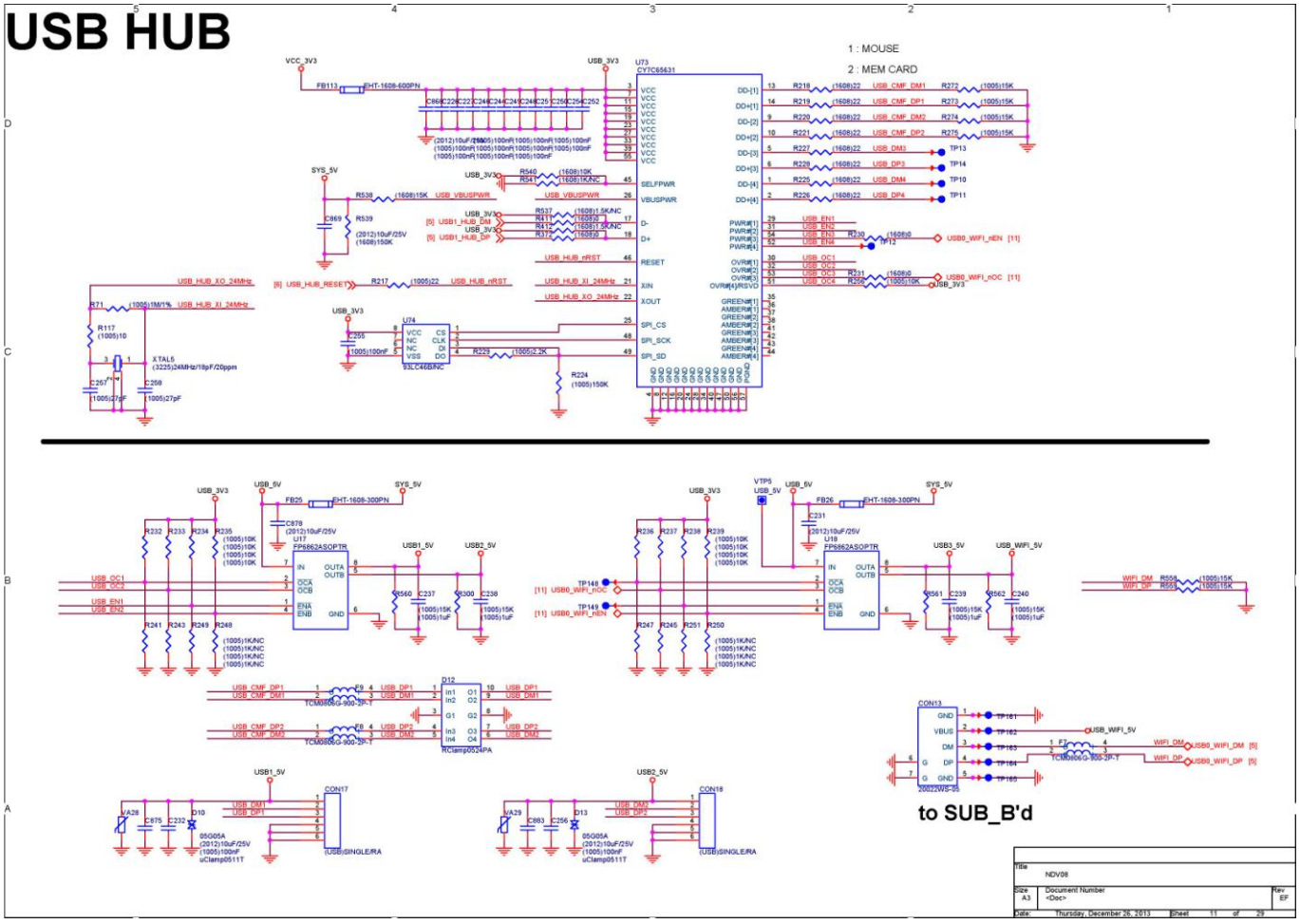


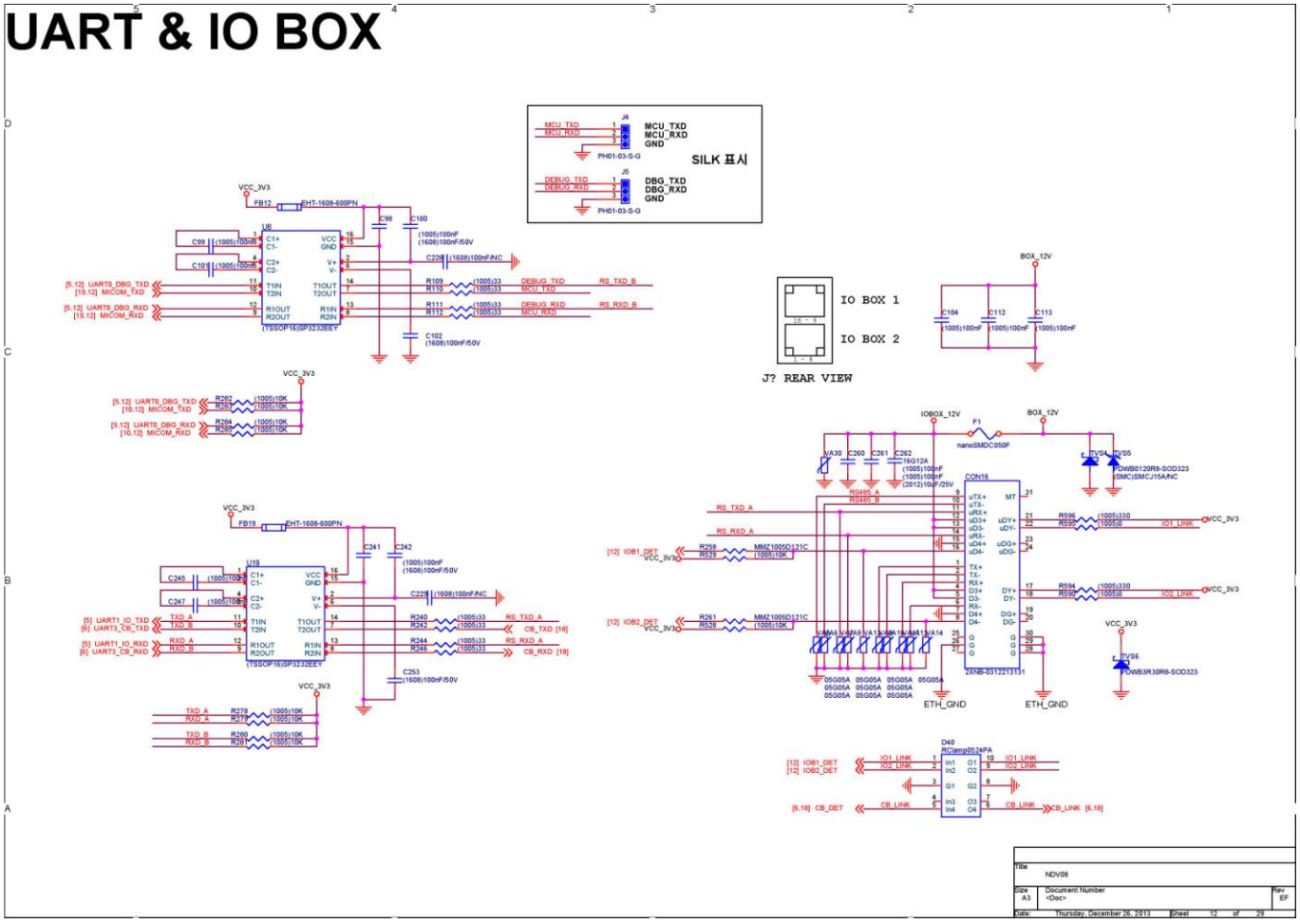
Electric Circuit

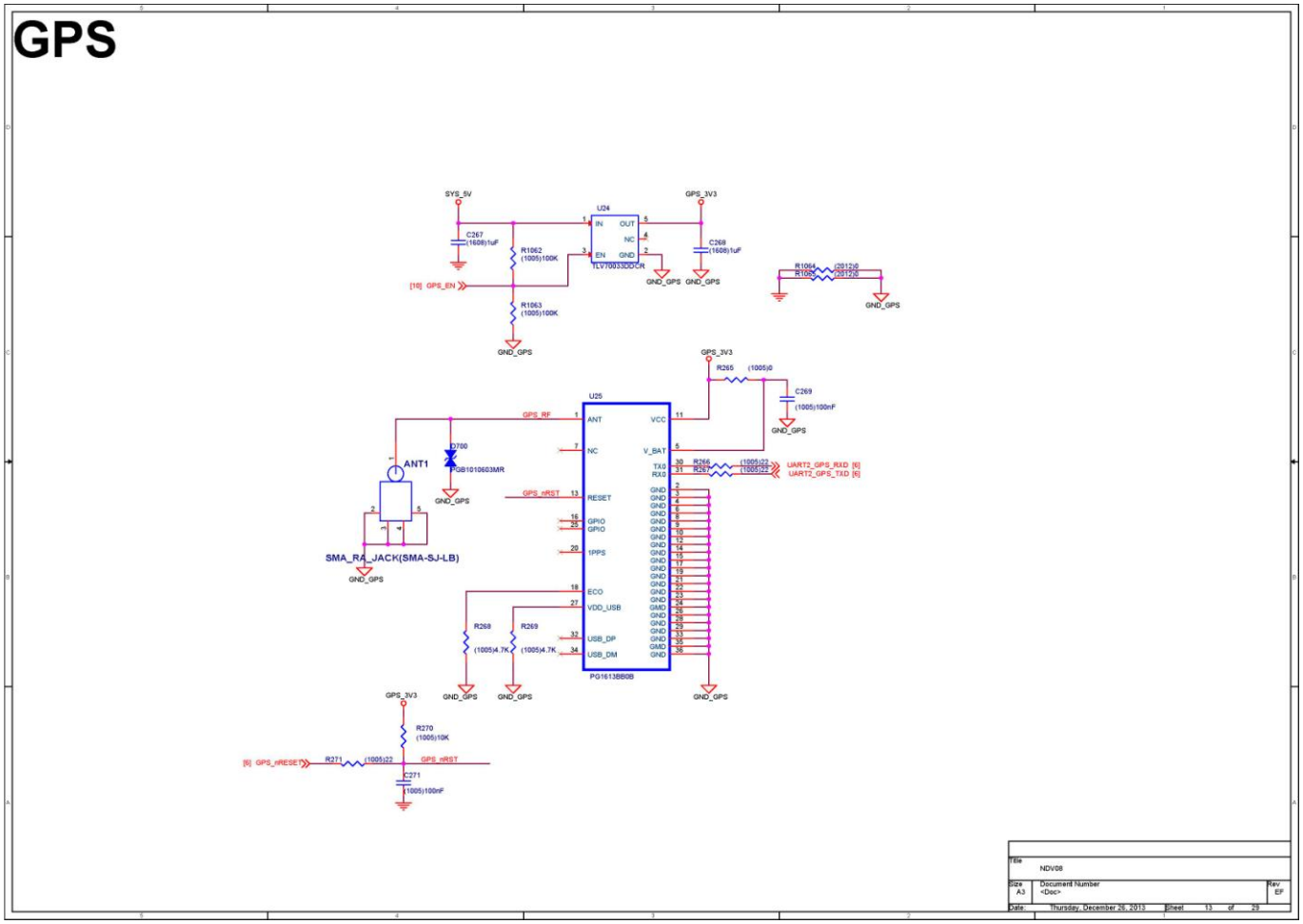


Electric Circuit

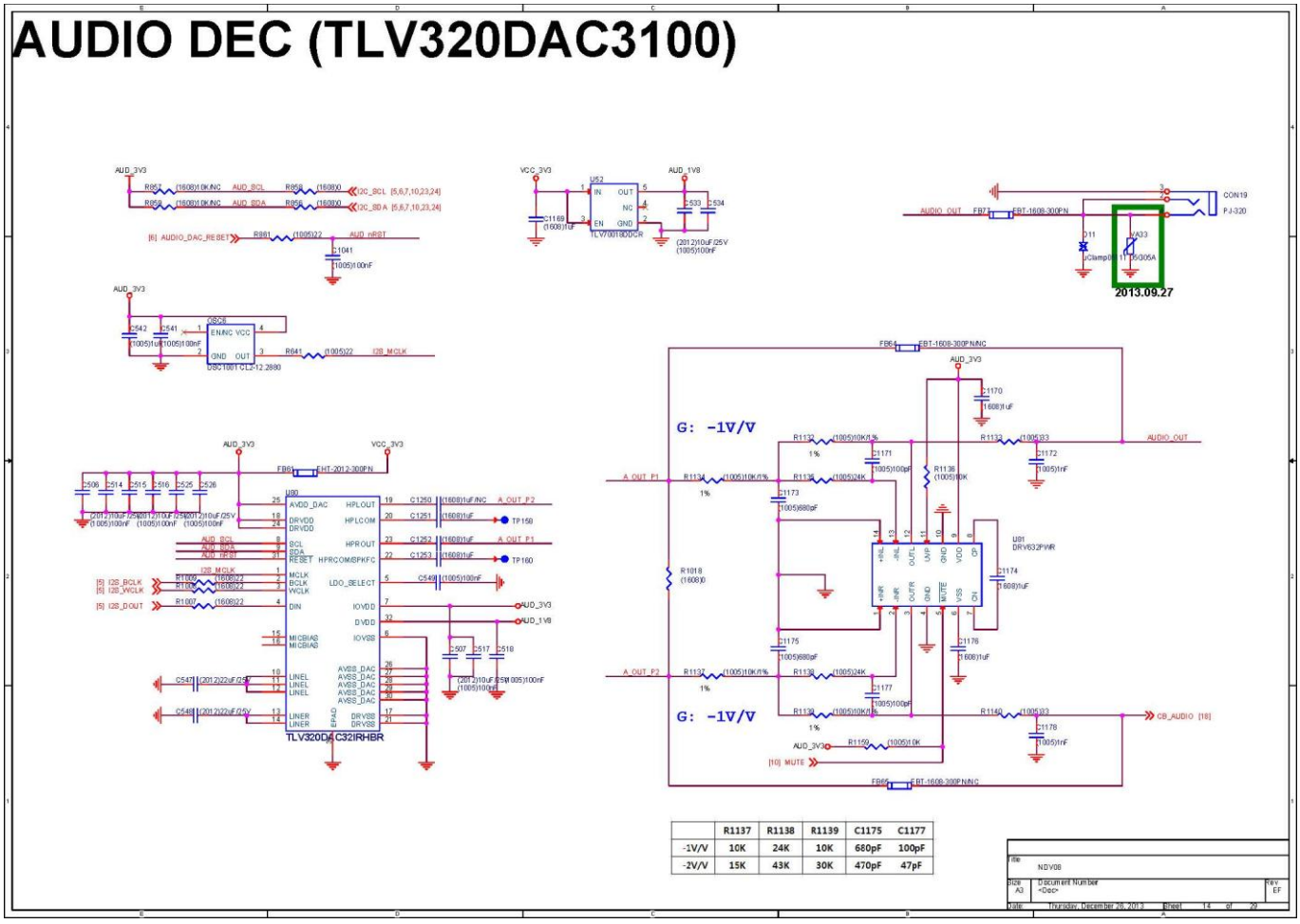




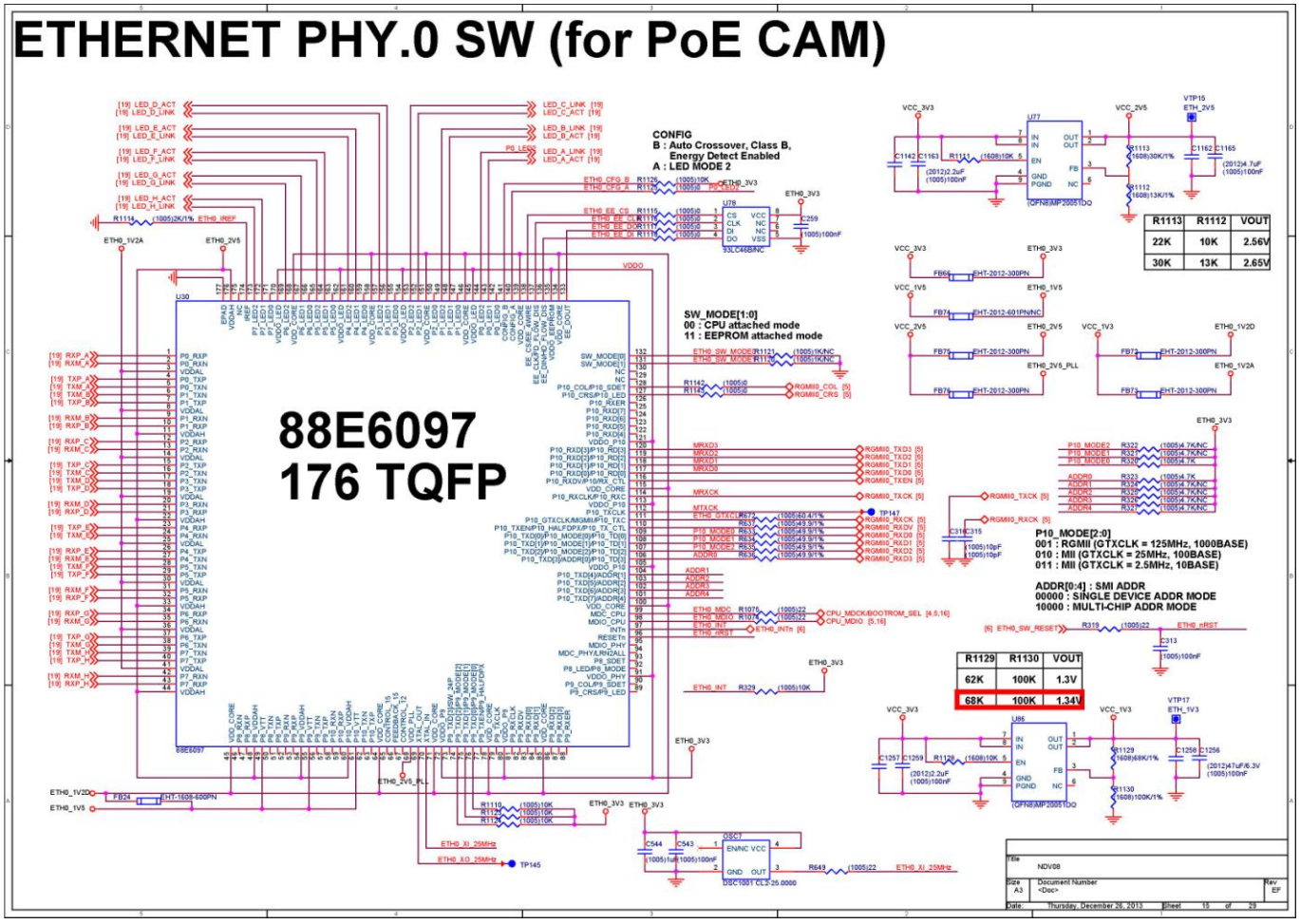


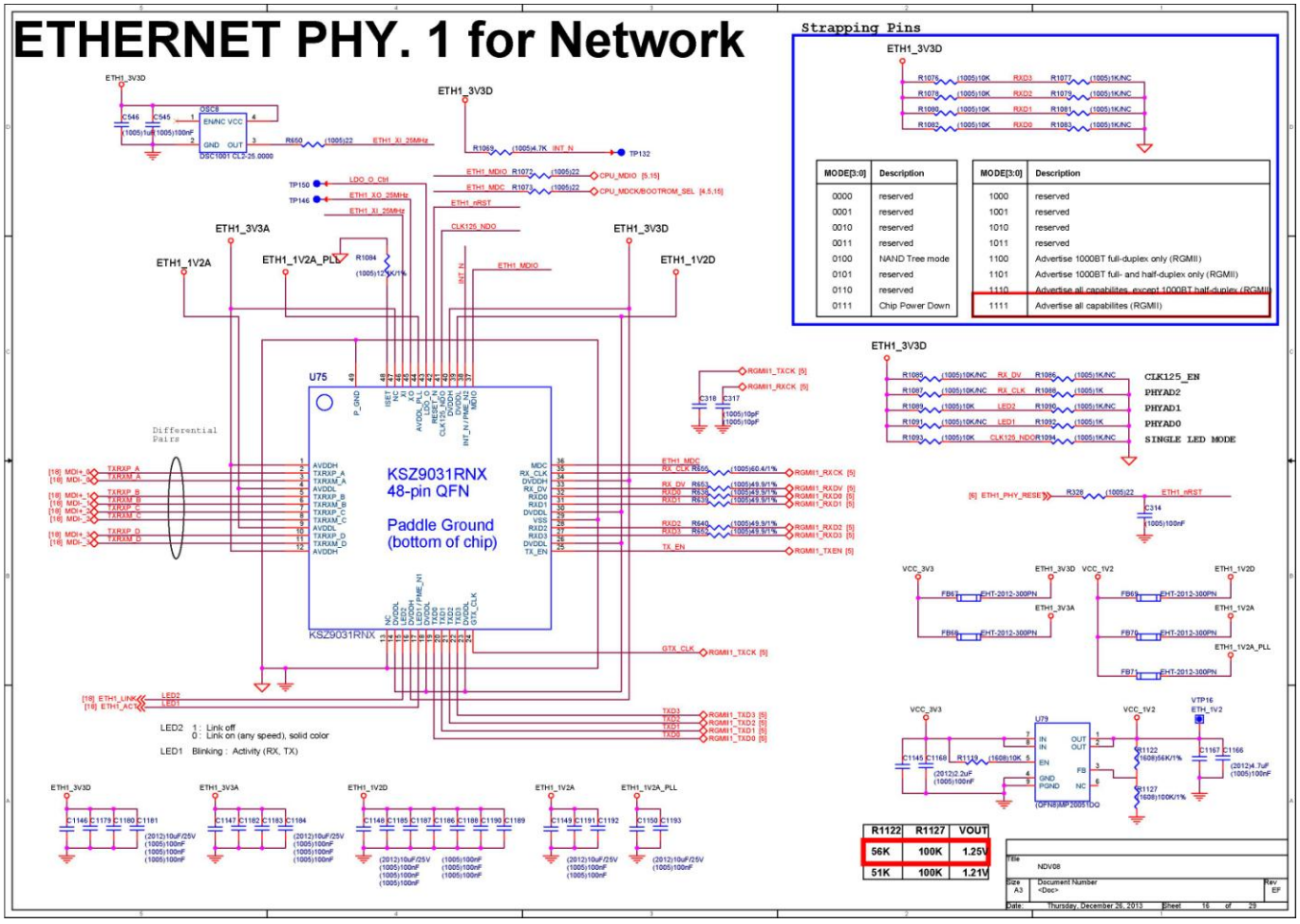


Electric Circuit

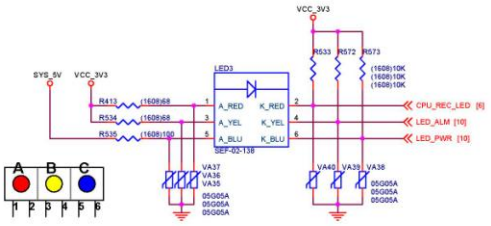


	R1137	R1138	R1139	C1175	C1177
-1V/V	10K	24K	10K	680pF	100pF
-2V/V	15K	43K	30K	470pF	47pF



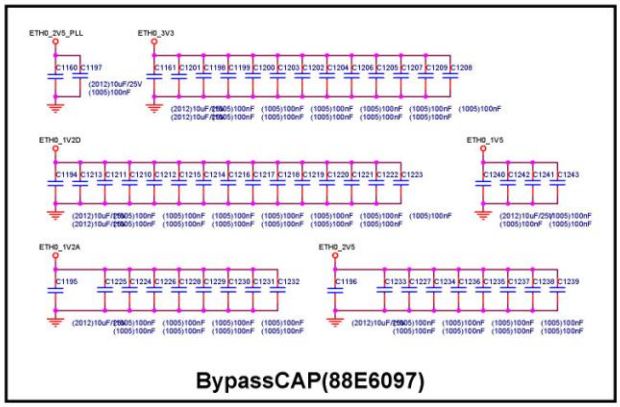


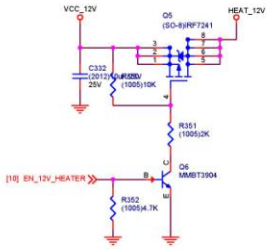
Front LED & HEATER & BypassCAP(88E6097)

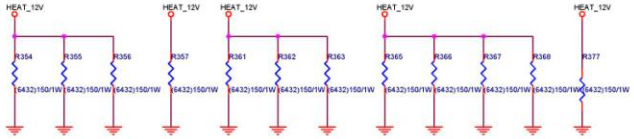


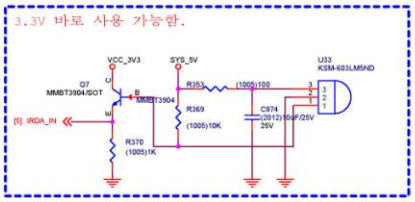
A : 3.3 / 0.05 = 66 OHm
B : 3.3 / 0.05 = 66 OHm
C : 5.0 / 0.05 = 100 OHm

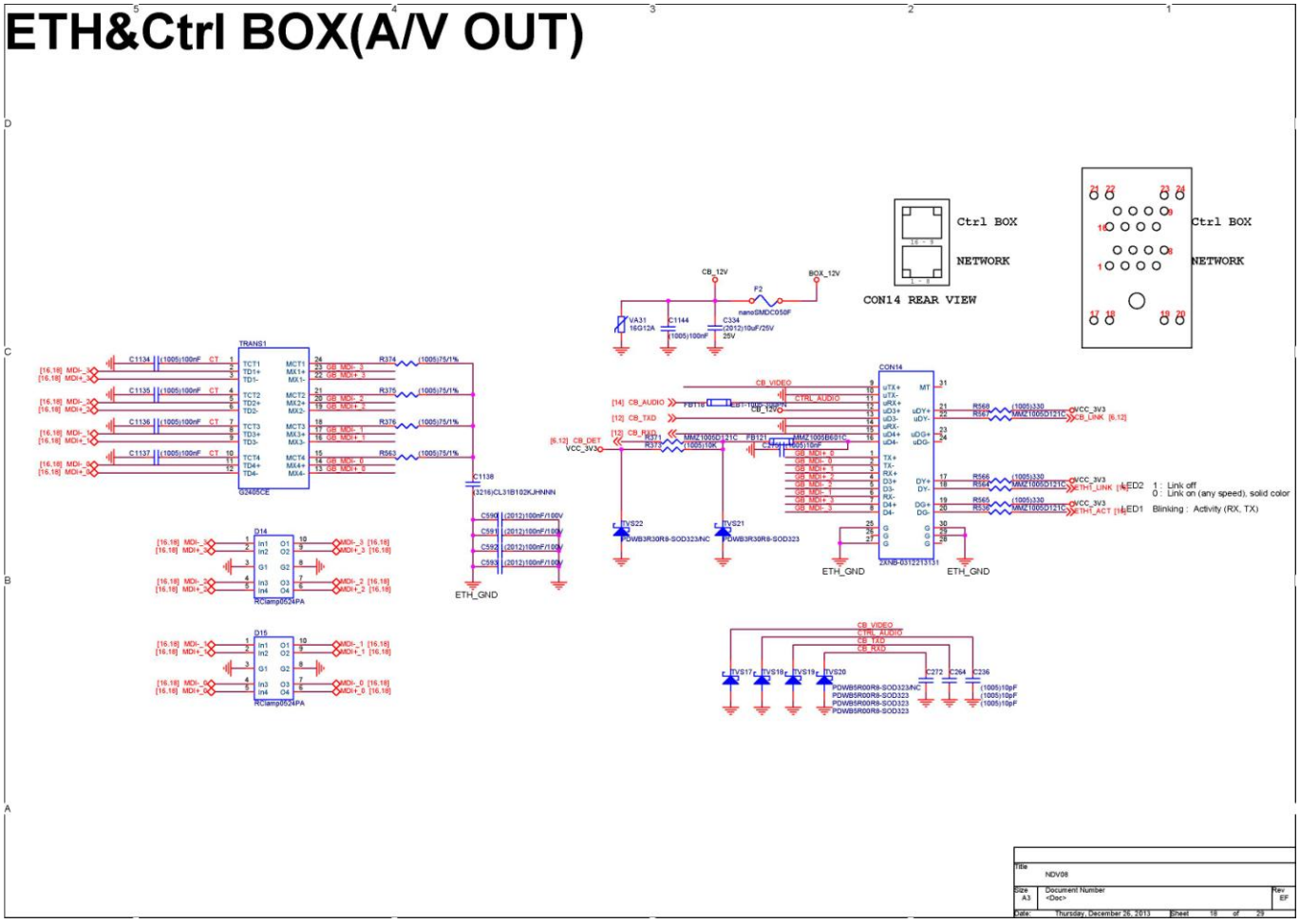
A : REC (RED) ON/OFF
B : ERROR (YELLOW) OFF/FLICKER
C : POWER (BLUE) ON/OFF



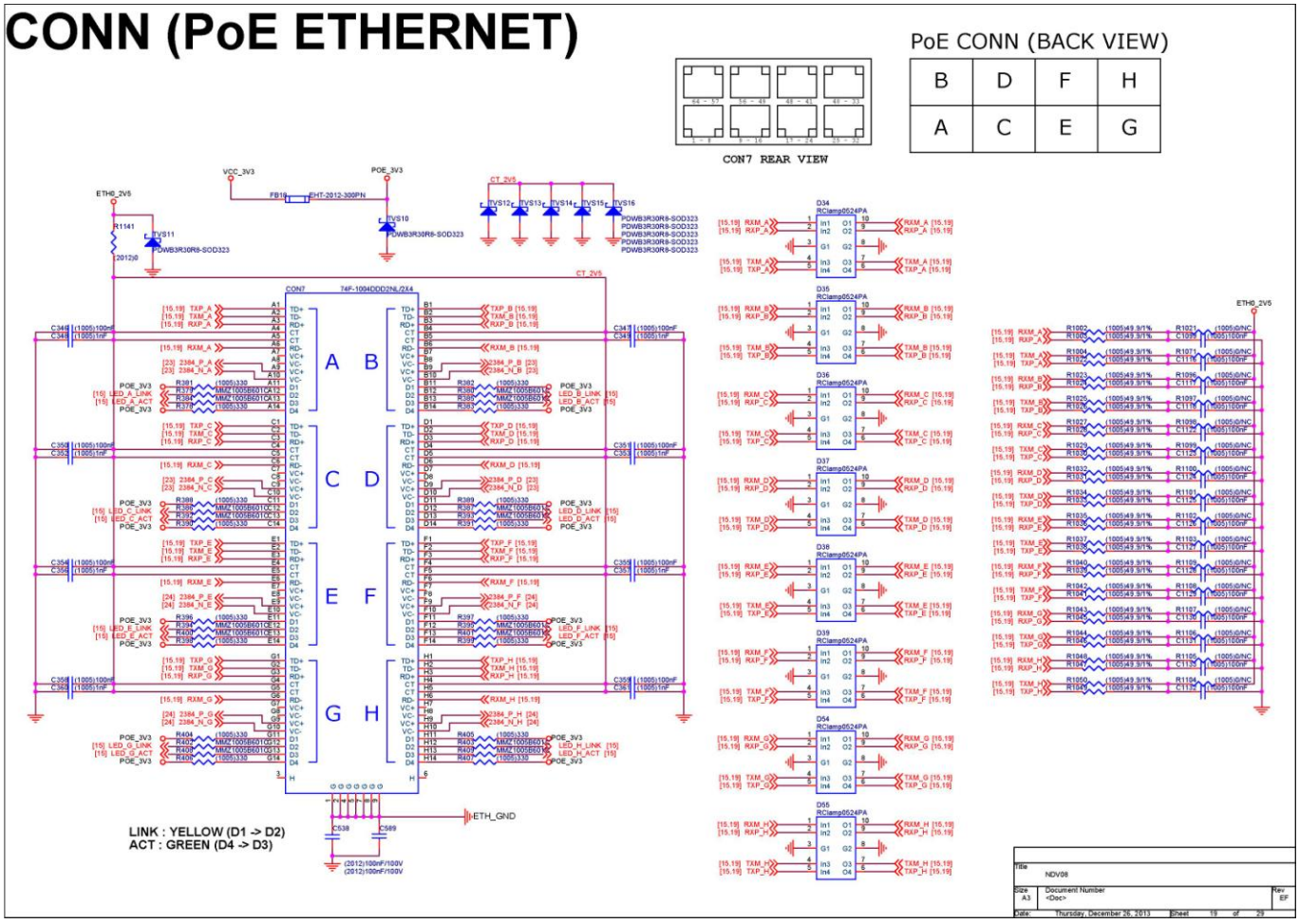




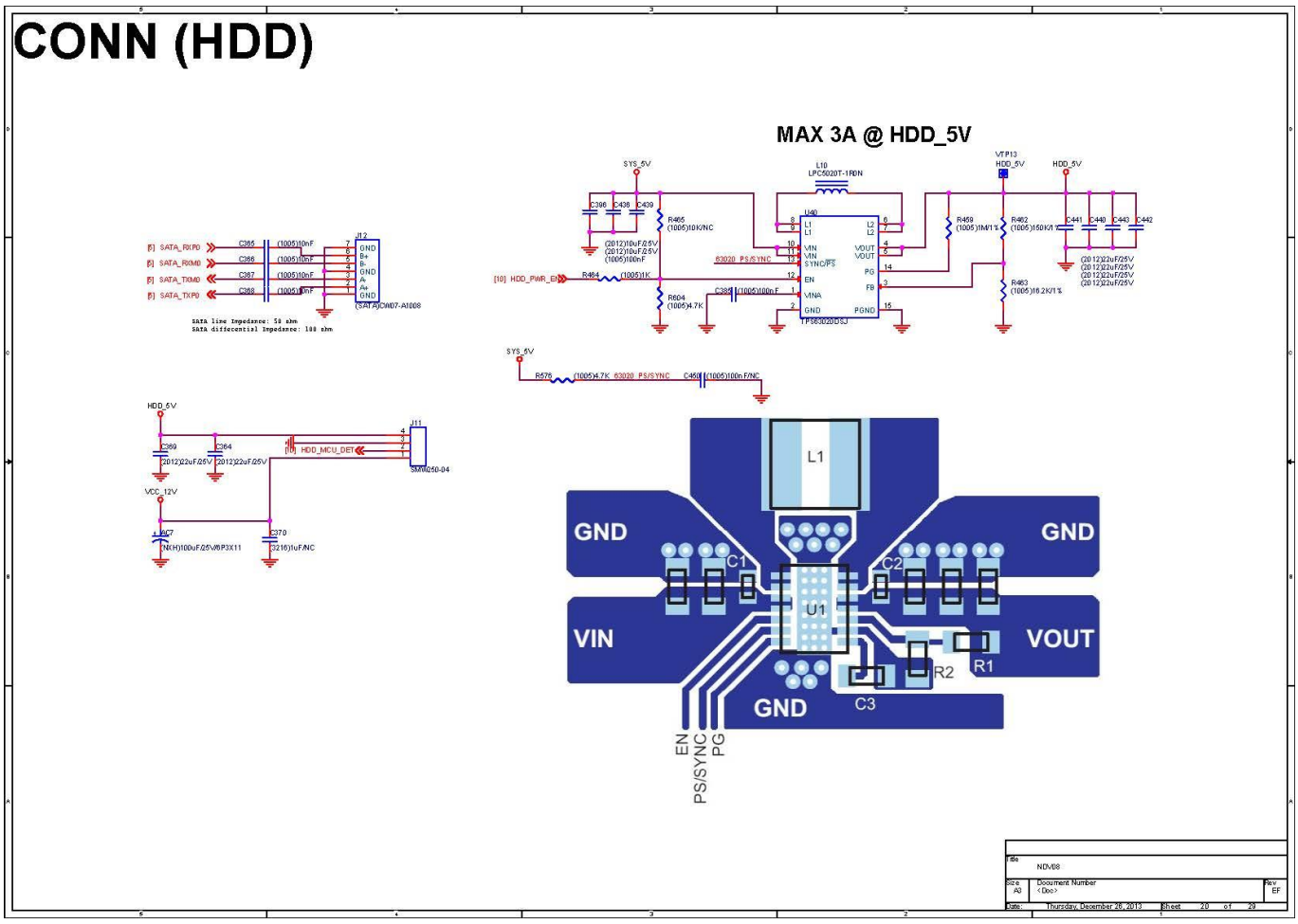


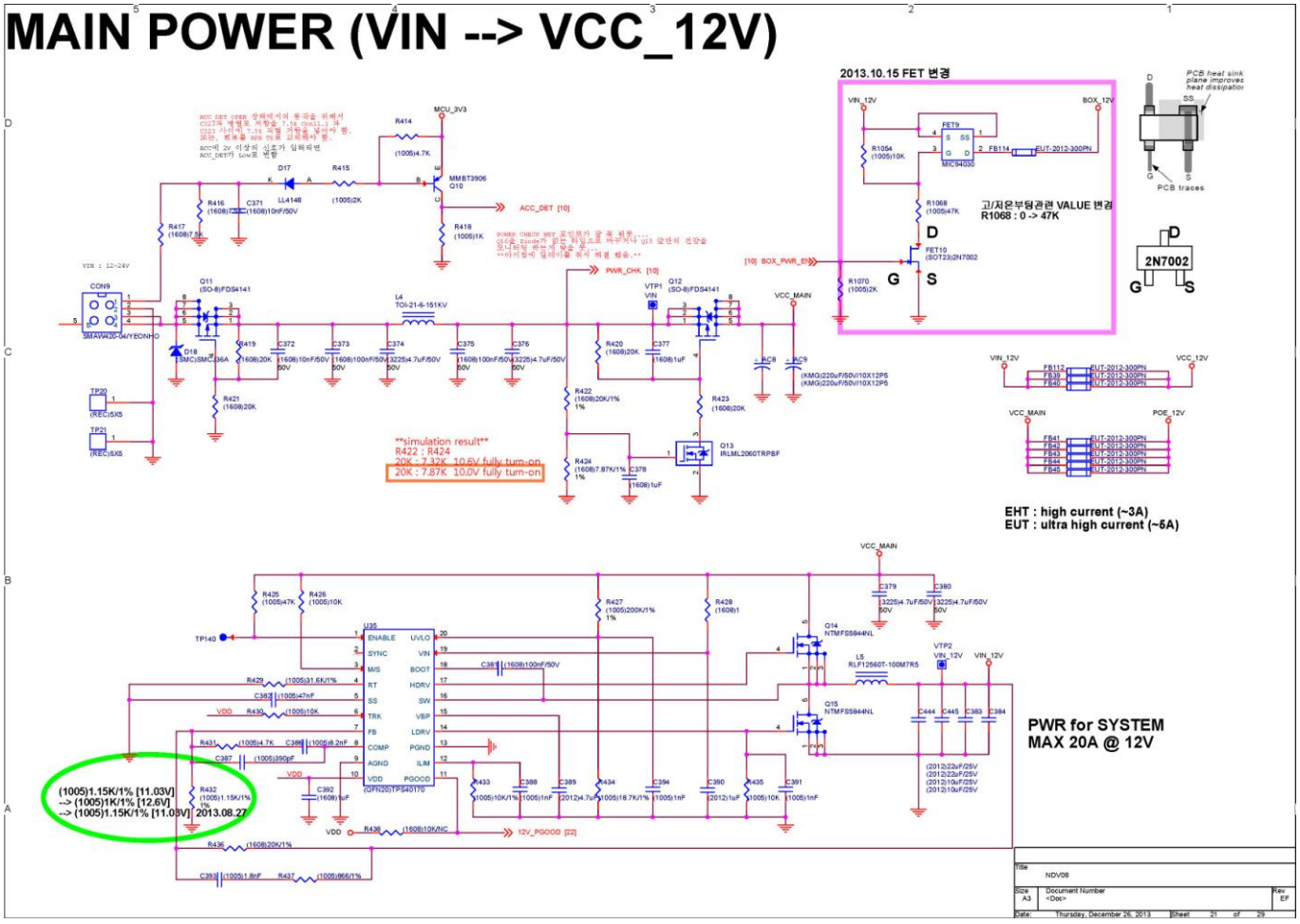


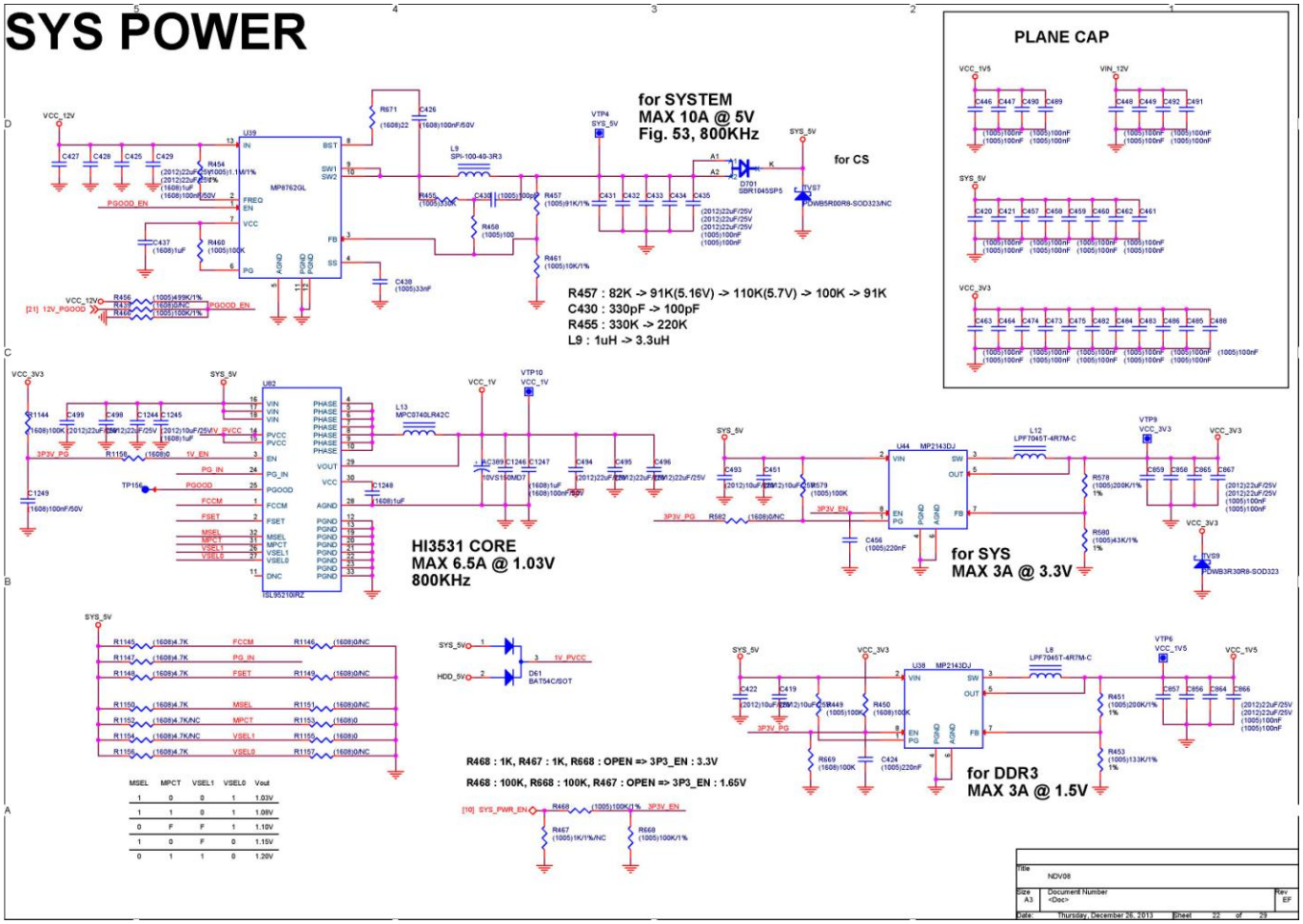
CONN (PoE ETHERNET)

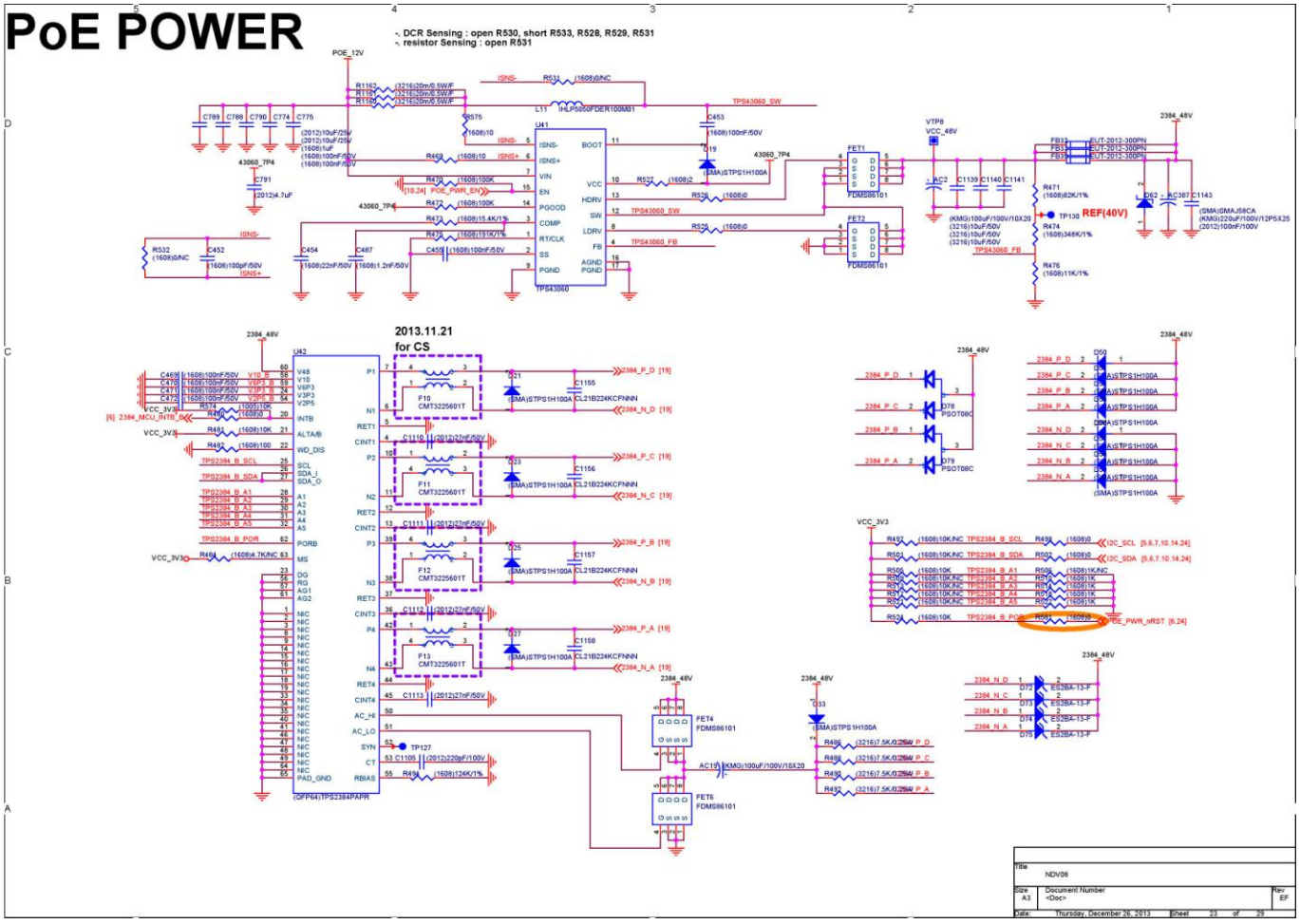


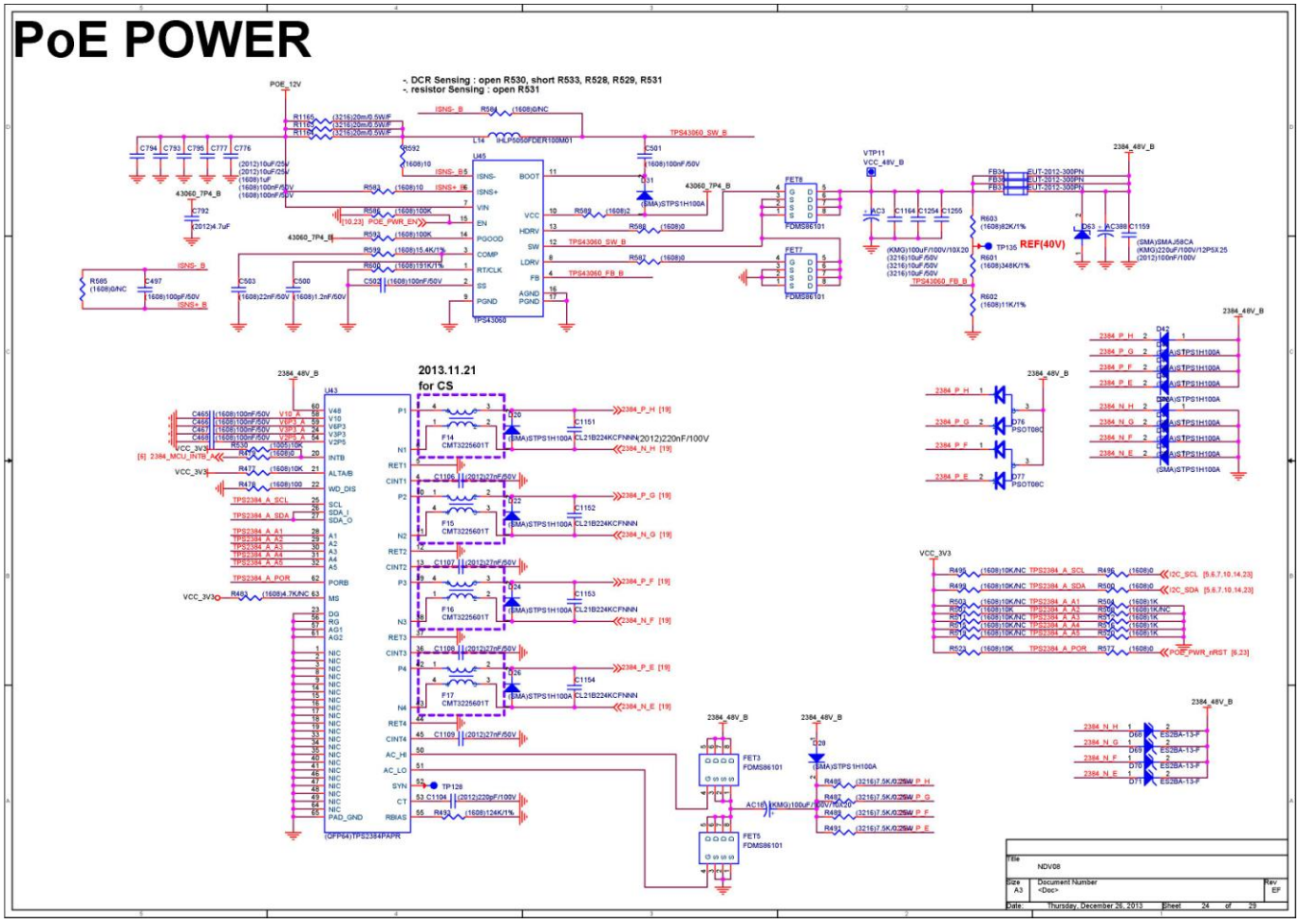
CONN (HDD)



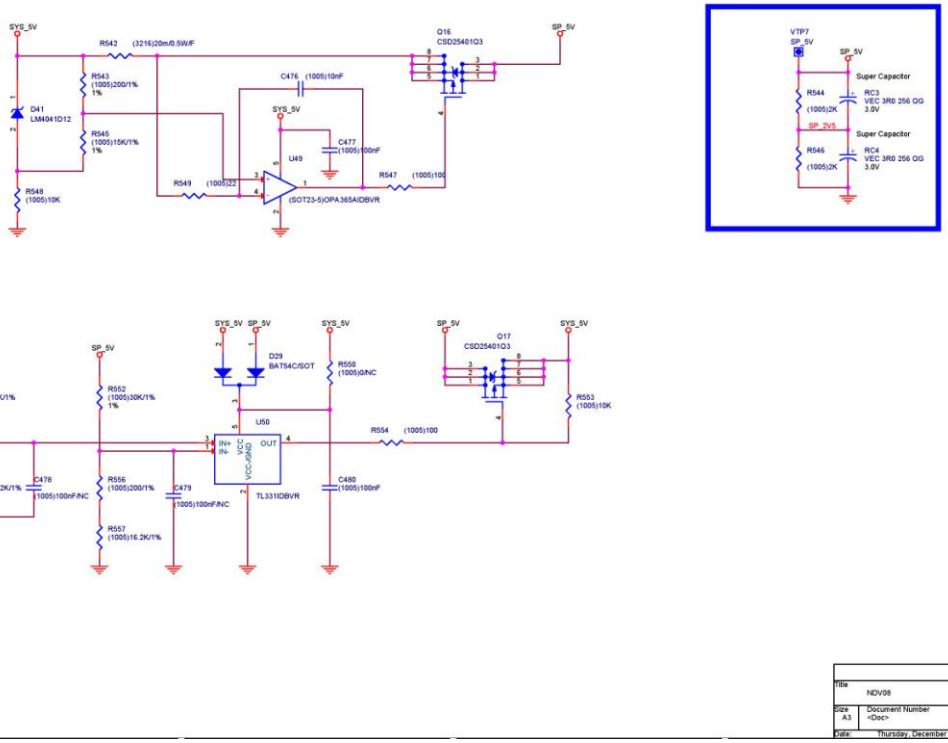


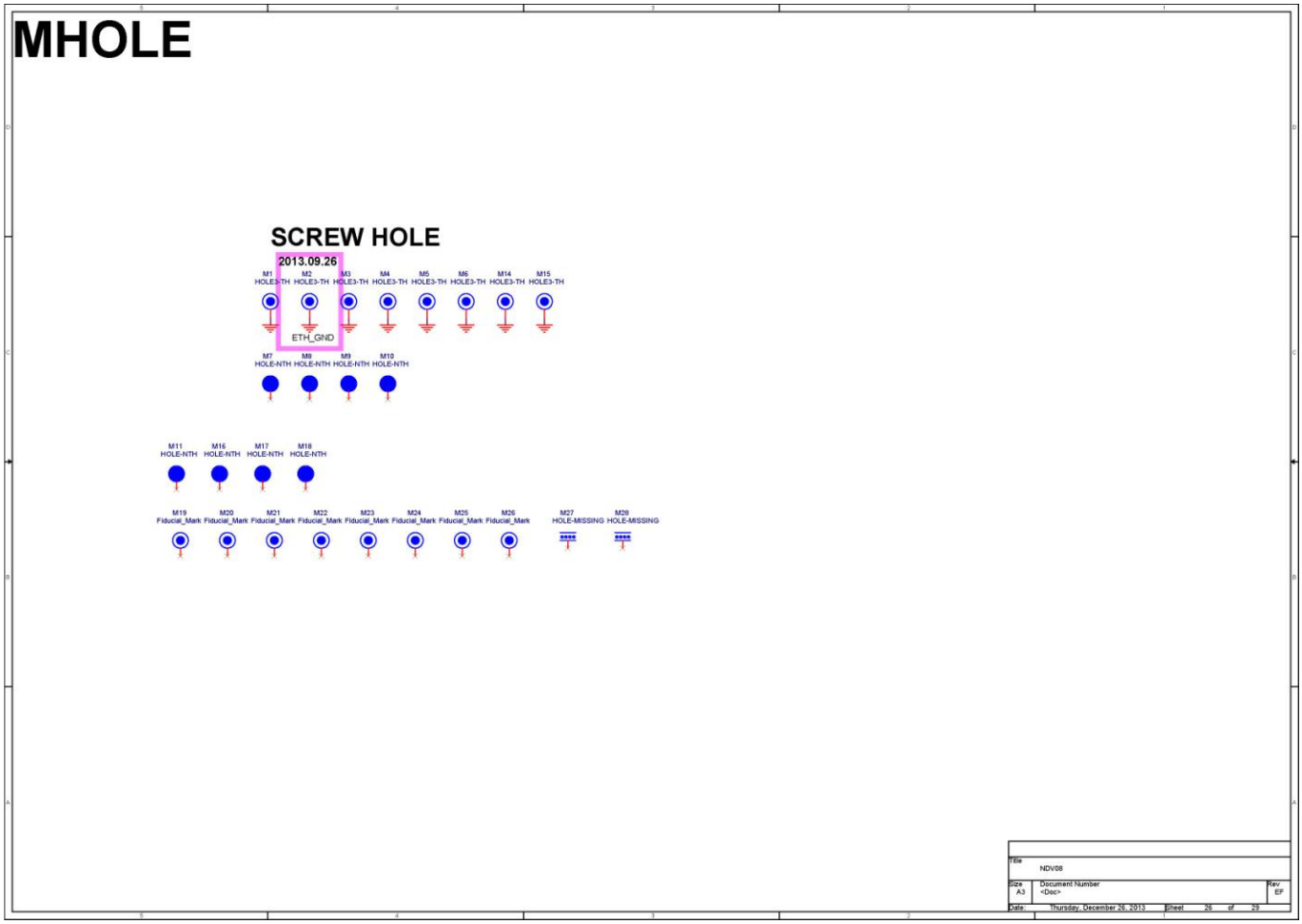




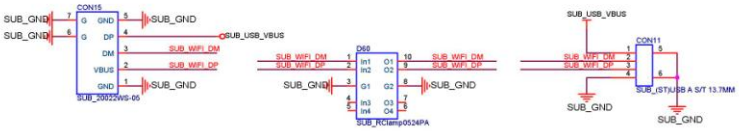


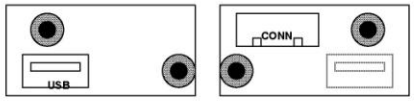
SUPER CAPs



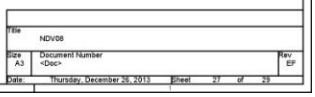


SUB_BOARD (USB)





SCREW HOLE



Component	Make / Manufacturer	Type / Model	Comment
Micro Processor	HISILICON	HI3531RFCV100	930MHz
DDR3	HYNIX	H5TQ2G63FFR-PBI	800MHz
NAND	SAMSUNG ELECTRO-MECHANICS	K9FG08U0D-SIB0	
SD CARD	MicroSD	DM3AT-SF-PEJ	
MICOM	NUVOTON	M054LBN	
USB HUB	VYPRESS	CY7C65631	
GPS MODULE	PARTRON	PG1613BB0B	
AUDIO DAC	TI	TLV320DAC32RIHBR	8~192kHz
ETHERNET PHY	MARVELL	88E6097-A2-TAH1I000	
Crystal	SIWARD	SX-3225 24MHz	24MHz

Vehicle Certification Agency,
1 The Eastgate Office Centre
Eastgate Road,
Bristol,
BS5 6XX,
United Kingdom.
Telephone: +44 (0) 117 951 5151
Fax: +44 (0) 117 952 4103
Email: enquiries@vca.gov.uk
www.dft.gov.uk/vca

TEST REPORT: ELECTROMAGNETIC COMPATIBILITY - ESA
Regulation 10.04 Consolidated to Supplement 2 (Revision 4 Amendment 2)

REPORT/JOB NUMBER:	KSP288201 (8244)

TEST DETAILS	
Location of Test	EMC Compliance EMC Test Lab. and Korea EMC test lab.
Date of Test	17 and 19 December 2013
VCA Representative	EunSeok Park
Manufacturer's Representative	Jong Uk Park
Reason for Test	New approval

MANUFACTURER DETAILS	
Manufacturer's Name	SAMSUNG TECHWIN Co., Ltd.
Manufacturer's Address	Samsung Techwin R&D Center, 6, Pangyo-ro 319 beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do 463-400 Republic of Korea
Model Type & description	SRM-872 / SRM-872 (MOBILE VIDEO RECORDER)
Category	Component

CONCLUSION	The above mentioned vehicle was tested in accordance with the above mentioned legislation was found to comply in all respects
Signature:	
Name:	EunSeok Park
Position:	Type Approval Engineer
Date:	19 December 2013

LIST OF ANNEXES		
ANNEX	**No of PAGES**	**SUBJECT**
1	2	Diagrams of BroadBand and NarrowBand radiated emissions, Horizontal and Vertical pol.
2	1	ISO 7637-2 test results
3	1	Photos of Test set-up
4	1	Photos of the ESA identification

Paragraph		*Complies (Yes,No,N/A)*

TEST SPECIFICATION AND WORST CASE RATIONALE

The ESA is not affect safety. So it does not need to do immunity test.

Tests required

- ❑ Narrowband emissions
- ❑ Broadband emissions
- ❑ ~~Radiated immunity~~
- ❑ Transient immunity
- ❑ Conducted transient emissions

COMPONENT SPECIFICATION (as agreed in specified worse case rationale)

Please see manufacturer's documentation

MANUFACTURERS DOCUMENTATION

Manufacturers documentation is complete and reflects the agreed specification for the vehicle tested and covers all variants and versions agreed in the worse case rationale	Yes

FACILITY AND EQUIPMENT CHECKS

1	Generic Risk assessment followed	N/A
	OR	
	Specific Risk assessment completed and stored in electronic job folder	N/A
2	Facilities and test equipment are appropriate	Yes
	Brief description of test equipment:	
3	Calibration certificates checked and valid, recorded below	Yes
	OR	
	Included in attached annex	N/A

Equipment	Serial No.	Calibration date
EMC Compliance EMC Test Lab.		
EMI Test Receiver	100710	28 October 2013

Paragraph		*Complies (Yes,No,N/A)*

Biconical Antenna	VHBB9124-591.592	26 June 2012
Logperiodic Antenna	VUSLP9111A-378.379	26 June 2012
Conducted Transient Immunity Test System	-	14 June 2013
Korea EMC Test Lab.		
Digital Phosphor Oscilloscope	B010526	5 October 2013

Paragraph		*Complies (Yes,No,N/A)*
Reg 10, 4.2.2	Manufacturer's documentation complete	Yes
Reg 10, 4.2.2.1	ESA corresponds to that agreed in worst-case meeting	Yes
	RADIATED EMISSIONS	
CISPR 25, 4.5	Measuring equipment complies with CISPR 16-1(93)	Yes
	Types and calibration date: See the above table	Yes
	TEST LOCATION	
Reg 10, Annex 7, 3.1 Reg 10, Annex 7, 3.2	Test performed in A.L.S.E (absorber-lined shielded enclosure) OR O.A.T.S. (open area test site)	Yes N/A
Reg 10, Annex 7, 3.2	Is O.A.T.S level, clear area free from electromagnetic reflecting surfaces within a circle of minimum radius 15m Measuring equipment outside 15m minimum radius circle	N/A N/A
Reg 10, Annex 7, 3.3	Ambient noise at least 6 dB below reference limits in either case	Yes
	TEST ARRANGEMENTS	
CISPR 25, 4.4.2	Is the EUT and antenna greater than 2m from the walls and ceiling and 1m from the nearest absorber material	Yes
CISPR 25, 6.1.1	Ground plane: 900 ± 50mm high and made from 0.5mm thick copper, brass or galvanised steel At least 2000mm length x 1000mm width	 Yes Yes
CISPR 25, 6.4.2.3	ESA and harness supported 50 ± 5mm above ground plane on low relative permittivity material	Yes
CISPR 25, 6.4.2.3	Face of the ESA within 200mm ± 10mm of edge of ground plane	Yes
CISPR 25, 6.4.2.4	Length of test harness parallel to the front of the ground plane is 1500 ± 75mm and does not exceed 2000mm	No
CISPR 25, 6.4.2.4	Long segment of test harness is located parallel to the edge of the ground plane facing the antenna at a distance of 100 ± 10mm from the edge	Yes
CISPR 25, 6.1.2	Artificial network (AN) is rated at 50Ω, 5µH	Yes

Paragraph		*Complies (Yes,No,N/A)*
	EUT remotely grounded (vehicle power return line longer than 200mm): two artificial networks are required, one for the positive supply line and one for the power return line) OR EUT locally grounded (vehicle power return line 200mm or shorter): one artificial network is required, for the positive supply	N/A Yes
	Case of ESA is grounded simulating actual vehicle configuration OR Case of ESA is not grounded simulating actual vehicle configuration	Yes N/A
	AN electrically bonded to ground plane	Yes
	ANTENNA	
	Types and calibration dates: See the above table	Yes
CISPR 25, 6.4.2.6	Height of phase centre 100 ± 10mm above ground plane	Yes
CISPR 25, 6.4.2.6	No part of any antenna radiating element closer than 250mm to the floor	Yes
	Radiating elements of the measuring antenna are not be closer than 1000mm to any absorber material, except that used on the floor, and not be closer than 2000mm to the walls or ceiling of the shielded enclosure	Yes
	Phase centre (for biconical) or tip (for log-periodic) is 1000 ± 50mm from the harness	Yes
	Antenna calibrated for this distance to correct measuring point (phase centre or tip)	Yes
	Phase centre of the antenna in line with centre of longitudinal part of the wiring harness	Yes
Reg 10, Annex 7, Annex 8, 4.3	Pre-test sweep supplied to show compliance throughout frequency range 30 to 1000 MHz	Yes
	Test frequencies chosen from pre-test data	N/A
	NARROWBAND TEST RESULTS	
Reg 10, Annex 8, 2	Operational mode of ESA: Normal operational mode	Yes
	Detector used and bandwidth: Peak detector with 120KHz bandwidth (for initial scan)	Yes

Paragraph		*Complies (Yes,No,N/A)*
	Average detector with 120kHz bandwidth (for inspection)	
Reg 10, 6.6.2	ESA meets narrowband emissions limits with both vertical and horizontal polarisations	Yes
	BROADBAND TEST RESULTS	
Reg 10, Annex 7, 2	Operational mode of ESA: Normal operational mode	Yes
	Detector used and bandwidth: Peak detector with 120KHz bandwidth (for initial scan) Quasi-peak detector with 120kHz bandwidth (for inspection)	Yes
Reg 10, 6.5.2	ESA meets broadband emissions limits with both vertical and horizontal polarisations	Yes

RADIATED IMMUNITY

TEST METHOD(S) USED AND FREQUENCY RANGE(S):

ISO 11452-4	BCI:	Allowable frequency range:	20 – 400 MHz
		Actual frequency range used:	
ISO 11452-2	Free field:	Allowable frequency range:	80 – 2000 MHz
		Actual frequency range used:	
ISO 11452-3	TEM Cell:	Allowable frequency range:	20 – 200 MHZ
		Actual frequency range used:	
ISO 11452-5	150 mm Stripline:	Allowable frequency range:	20 – 400 MHz
		Actual frequency range used:	
	800 mm Stripline:	Allowable frequency range:	20 – 2000 MHz
		Actual frequency range used:	

Maximum frequency step sizes do not exceed:

Frequency Band MHz	Linear steps MHz	Log Steps %	Actual steps used
20 – 200	5	5	
200 – 400	10	5	
400 – 1000	20	2	
1000 – 2000	40	2	

TEST ARRANGEMENTS (GENERAL)

Reg 10, Annex 9, 2.2 Operational mode of ESA: ……

Reg 10, Annex 9, 2.3 Extraneous equipment in place during calibration

Paragraph		*Complies (Yes,No,N/A)*

Reg 10, Annex 9, 2.4	Test equipment used same as for calibration
Reg 10, Annex 9, 2.5	Loads and actuators as realistic as possible
	Case of ESA is grounded simulating actual vehicle configuration OR Case of ESA is not grounded simulating actual vehicle configuration
Reg 10, Annex 9, 3.1	Test frequency range is 20 – 2000 MHz
Reg 10, Annex 9, 3.1	Test signal is R.F. sine wave amplitude modulated by a 1 kHz sine wave at a modulation depth of 0.8 ± 0.04 in the 20 – 800 MHz band and pulse modulation (time on 577 µs, period 4600 µs) in the 800 – 2000 MHz band
Reg 10, 6.7.2.1	Pre-test sweep supplied to show compliance throughout frequency range 20 to 2000 MHz
Reg 10, Annex 9, 3.2	Test frequencies chosen from pre-test data
Reg 10, 6.7.2.2	No degradation of immunity related functions during the tests
	BCI IMMUNITY
ISO11452-4	CALIBRATION: …
ISO11452-4, 5	Shielded area used Remarks : ….
ISO11452-4, 8.3.2.1	Forward power used to achieve specified current
ISO11452-4, 7.1	INSTALLATION OF ESA UNDER TEST
Reg 10, Annex 9, 4.3.2	Current Probe located 150 ± 10mm from ESA connectors
Reg 10, Annex 9, 4.3.2	ESA installed in a vehicle as ISO 11451-4 OR on a ground plane as ISO 11452-4
ISO11452-4, 7.1	Ground plane: Made from at least 0.5mm thick copper, brass or galvanised steel Minimum width of 1000mm and minimum length is 1500mm or length of the entire underneath of equipment plus 200mm, whichever is greater Height of 900 ± 100mm Bonded to shielded enclosure with straps at a distance no greater than 300mm apart

Paragraph		*Complies (Yes,No,N/A)*

ISO11452-4, 7.2	ESA remotely grounded (vehicle power return line longer than 200mm): two artificial networks are required, one for the positive supply line and one for the power return line) OR ESA locally grounded (vehicle power return line 200mm or shorter): one artificial network is required, for the positive supply Power supply is Artificial Network (AN) rated at 50Ω, 5µH	
ISO11452-4, 7.3	ESA and harness supported 50 ± 5mm above ground plane on low relative permittivity material Face of the ESA within 100mm of edge of ground plane At least 500mm between ESA and any metal parts, such as walls of shielded enclosure (exception is ground plane)	
ISO11452-4, 7.4	Length of test harness is 1000 ± 100mm, unless specified Actual wiring harness length: n.d. m BCI TEST RESULTS	
Reg 10, 6.7.2	No malfunction at 60mA or below Comments: ……	
	FREE FIELD IMMUNITY	
ISO11452-2	Calibration date:	
ISO11452-2, 5	Semi-anechoic chamber used	
ISO11452-2, 8.3.1	Forward power used to define test field OR another parameter directly related	
ISO11452-2, 8.3.2	Reference point: Distance from antenna: 1000mm ± 10mm 150 ± 10mm above ground plane 100 ± 10mm from edge of ground plane For frequencies 80 – 1000 MHz, the reference point is in the centre of the harness For frequencies 1000 – 2000 MHz, the reference point is in line with the ESA	
ISO11452-2, 7	TEST ARRANGEMENTS	

Paragraph		*Complies (Yes,No,N/A)*
ISO11452-2, 7.1	Ground plane: Made from 0.5mm thick copper, brass or galvanised steel Minimum width at least 1000mm and minimum length at least 2000mm Ground plane 900 ± 100m high Bonding straps no greater than 300mm apart	
ISO11452-2, 7.2	Power supply is Artificial Network (AN) rated at 50Ω, 5µH ESA remotely grounded (vehicle power return line longer than 200mm): two artificial networks are required, one for the positive supply line and one for the power return line) OR ESA locally grounded (vehicle power return line 200mm or shorter): one artificial network is required, for the positive supply AN mounted directly on the ground plane and cases bonded to ground plane	
ISO11452-2, 7.3	ESA and harness supported 50 ± 5 mm above table on low relative permittivity material Face of the ESA located 200 ± 10 mm from edge of ground plane	
ISO11452-2, 7.4	Test harness parallel to front edge of ground plane Actual wiring harness length: n.d. m (not exceeding 2000 mm) OR 1500 ± 75 mm between ECU and AN Harness at a distance of 100 ± 10 mm from edge of ground plane	
ISO11452-2, Fig. 1	Front face of ESA at least 1.0 m from all other conductive structures	
ISO11452-2, Fig. 1	ESA harness at least 2.0 m forward from chamber wall	
ISO11452-2, 7.6	Antenna type(s) and frequency range(s):	
Reg 10, Annex 9, 4.1.2 ISO11452-2, 7.6	Antenna; Vertically polarised Antenna in same position as calibration Phase centre 100 ± 10 mm above ground plane Antenna elements no closer than 250 mm to floor of facility and no closer than 0.5 m to any radio absorbent material and no closer than 1.5 m to the wall of the facility Distance between wiring harness and antenna 1000 mm ± 10 mm, measured from phase-centre of biconical antenna, or nearest part of log-periodic and horn antennas	

Paragraph		*Complies (Yes,No,N/A)*

Reg 10, Annex 9, 3.1	Test signal modulation is: AM, 1kHz modulation, 80% depth in 20 – 800 MHz frequency range PM, t on 577µs, period 4600µs in 800 – 2000 MHz frequency range
	FREE FIELD IMMUNITY TEST RESULTS
Reg 10, 6.7.2	No malfunction at 25 V/m or below
	Comments:
	150 mm STRIPLINE IMMUNITY
ISO11452-5	CALIBRATION: n.d. Date:
ISO11452-5, 5.3.1	Stripline housed in a shielded room
ISO11452-5, 6.2.2	Forward power used to define test field OR another parameter directly related
ISO11452-5, 6.2.3	Field probe in centre of stripline
ISO11452-5, 5.3	INSTALLATION OF ESA UNDER TEST
ISO11452-5, 5.3.1	ESA 200 + 20 – 0mm from edge of active conductor
ISO11452-5, 5.3.1	Peripherals minimum 200mm from edge of active conductor
	Harness supported 50mm above the ground plane and placed in centre of stripline
	Actual wiring harness length: n.d. mm OR minimum length under stripline 1000mm
	All wires in harness terminated or open according to vehicle application
	Connected to ground plane as specified by the vehicle installation
	Power supply is Artificial Network (AN) rated at 50Ω, 5µH
	ESA remotely grounded (vehicle power return line longer than 200mm): two artificial networks are required, one for the positive supply line and one for the power return line) OR ESA locally grounded (vehicle power return line 200mm or shorter): one artificial network is required, for the positive supply

Paragraph		*Complies (Yes,No,N/A)*

150 mm STRIPLINE TEST RESULTS

Reg 10, 6.7.2 — No malfunction at 50 V/m or below

Comments

800 mm STRIPLINE IMMUNITY

CALIBRATION: Date n.d.

Reg 10, Annex 9, 4.5.2.1 — Stripline housed in a screened room

Minimum 2000mm from walls or metallic enclosure

On non-conducting supports minimum 400mm high

Reg 10, Annex 9, 4.5.2.2 — Field probe positioned within central one third of the longitudinal, vertical and transverse dimensions of the space between the parallel plates with the system under test absent stripline

Forward power used to define test field
OR another parameter directly related

INSTALLATION OF ESA UNDER TEST

Reg 10, Annex 9, 4.5.2.3 — ESA in centre one-third of stripline

Supported on non-conducting material

Reg 10, Annex 9, 4.5.2.4 — Wiring loom arranged as Appendix 1 Figure 3

Associated equipment minimum 1000mm from stripline

800 mm STRIPLINE TEST RESULTS

Frequency Suggested (MHz)	Frequency (MHz)	Forward Power		Output level		Field Strength V/m
		Cal. (w)	Test (w)	Cal. (dBm)	Test (dBm)	

Paragraph		*Complies (Yes,No,N/A)*

Reg 10, 6.7.2	Malfunction at 12.5 V/m or below Comments: ….	

TRANSIENT TESTING

	Case of ESA is grounded simulating actual vehicle configuration OR Case of ESA is not grounded simulating actual vehicle configuration	Yes N/A

TRANSIENT IMMUNITY

Reg 10, 6.8.1	Test setup according to ISO 7637-2 (second edition 2004 and Amd.1:2008)	Yes
Reg 10, Annex 10, 2	Supply lines and other lines which may be connected to supply lines are tested	Yes
	Test voltage and time parameters within allowed envelopes	Yes

Test pulses and duration according to the following:

Test Pulse	Immunity Test Level	Functional Status for Systems		Test Duration	12V(24V) mode
		Related to immunity-related functions	Not related to immunity-related functions		
1	III	C	D	5000 pulses	D(D)
2a	III	B	D	5000 pulses	A(A)
2b	III	C	D	10 pulses	D(D)
3a	III	A	D	1 hour	A(A)
3b	III	A	D	1 hour	A(A)
4	III	B (for ESA which must be operational during engine start), or C (for other ESA)	D	1 pulse	C(A)

ESA operational after the tests according to above classification: Yes

EMISSION OF CONDUCTED DISTURBANCES

Reg 10, 6.9.1	Test setup according to ISO 7637-2	Yes
Reg 10, Annex 10, 3	Supply lines and other lines which may be connected to supply lines are tested	Yes

Paragraph		*Complies (Yes,No,N/A)*

Remarks:

Slow pulses and Fast pulses tested on both powering up and powering down	Yes

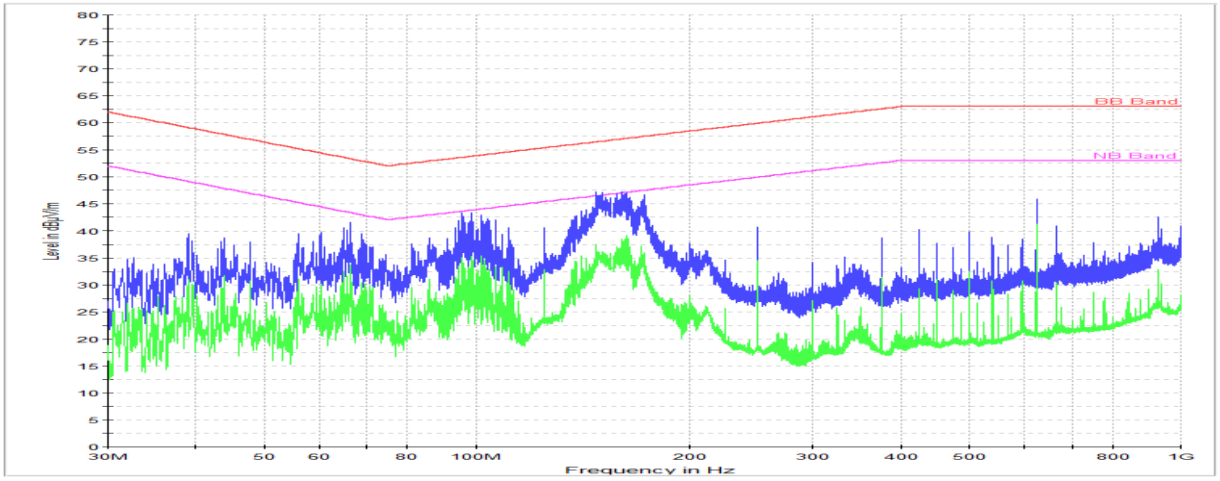
Polarity of pulse amplitude	Maximum allowed pulse amplitude for		
	Vehicles with 12V systems	Vehicles with 24V system	
Positive	+ 75 V	+ 150 V	Yes
Negative	- 100 V	- 450 V	Yes

Diagrams of BroadBand and NarrowBand radiated emissions

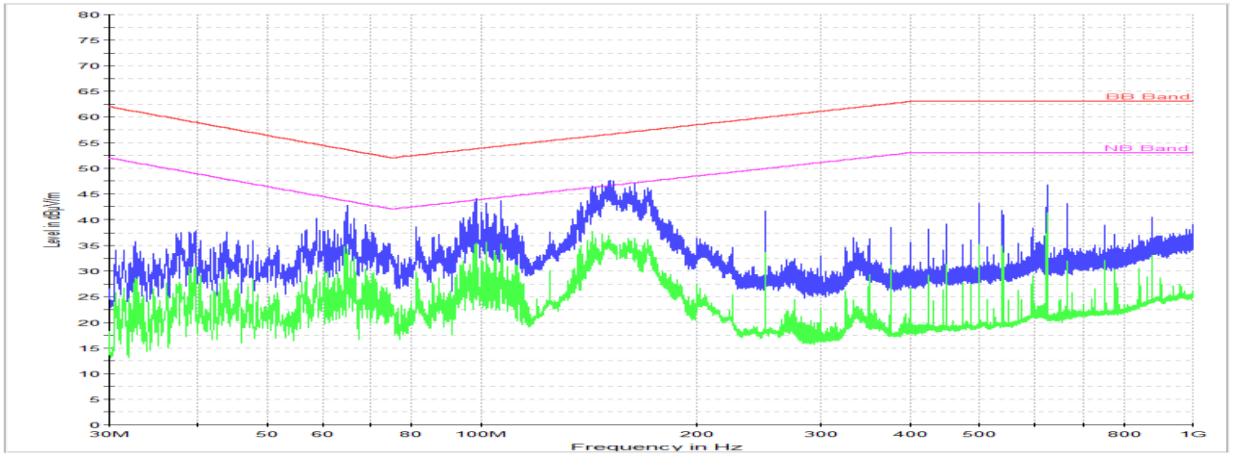
Test lab. : EMC Compliance EMC Test Lab.
Test product : SRM-872 (MOBILE VIDEO RECORDER)
Test date : 19 December 2013

Horizontal antenna polarization

12V mode



24V mode

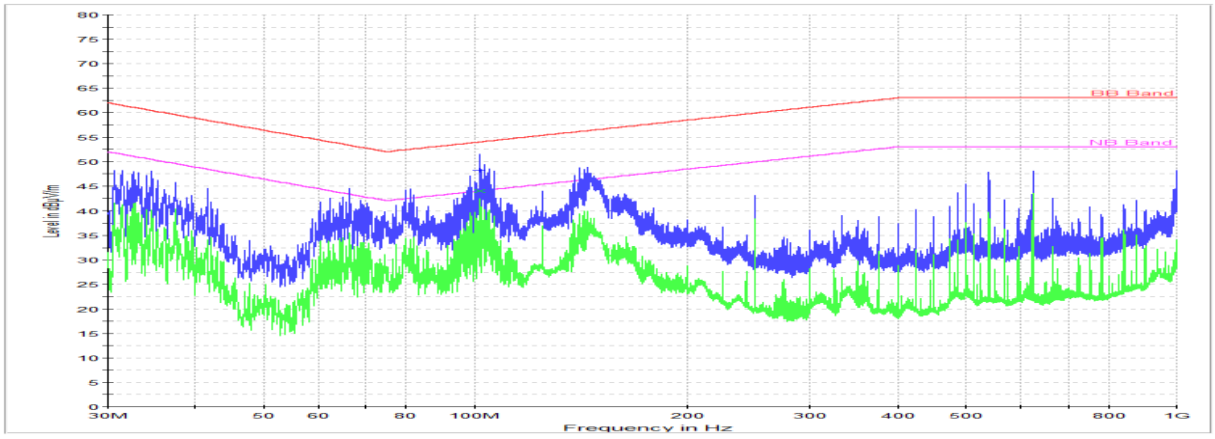


Diagrams of BroadBand and NarrowBand radiated emissions

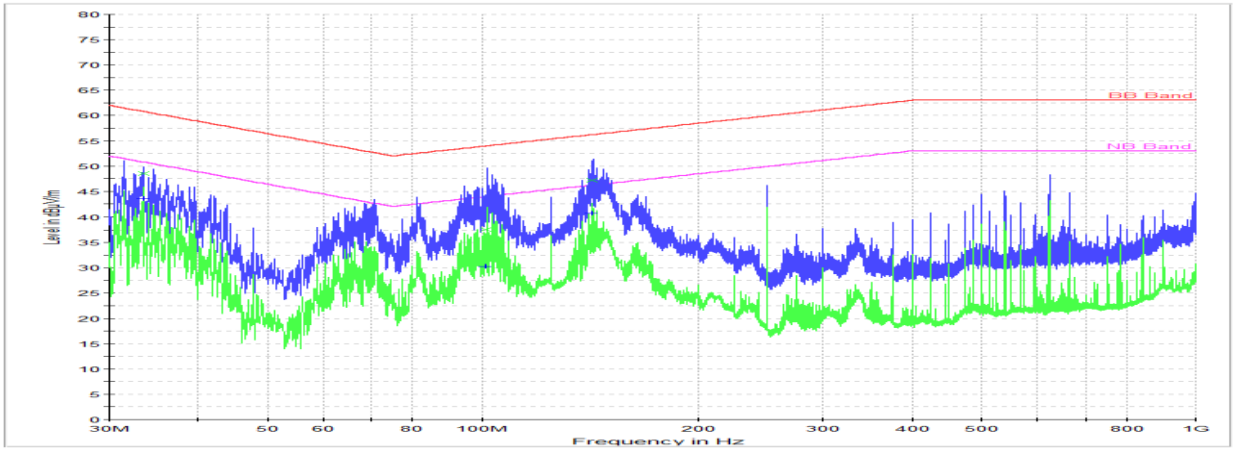
Test lab. : EMC Compliance EMC Test Lab.
Test product : SRM-872 (MOBILE VIDEO RECORDER)
Test date : 19 December 2013

Vertical antenna polarization

12V mode



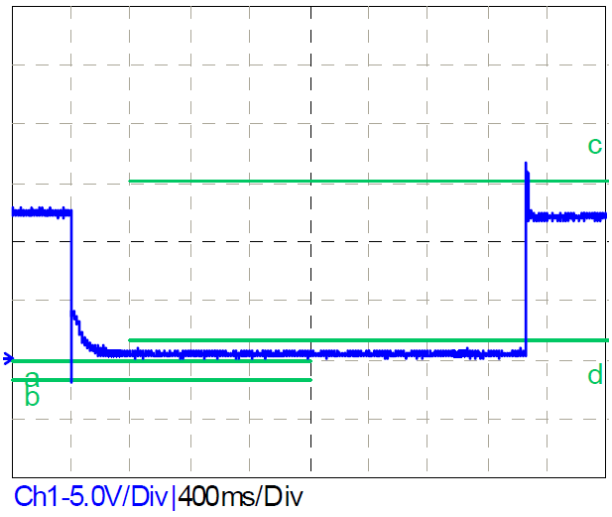
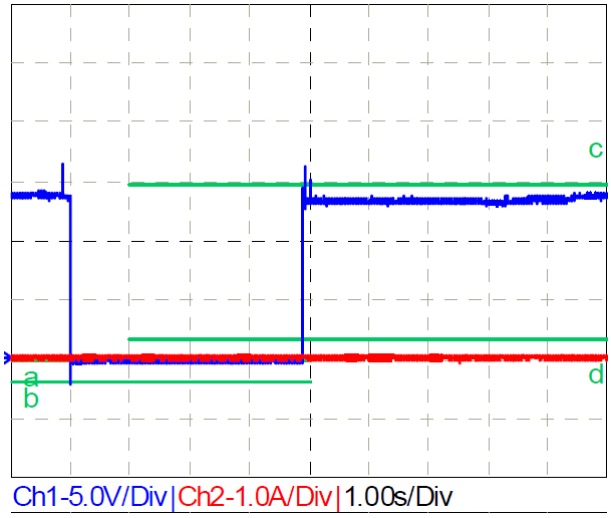
24V mode



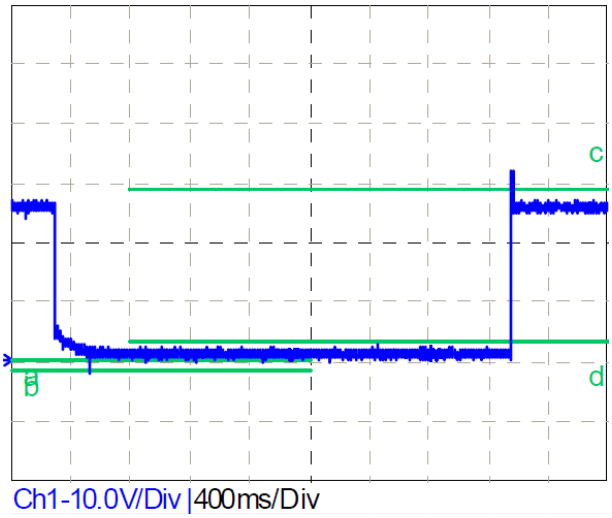
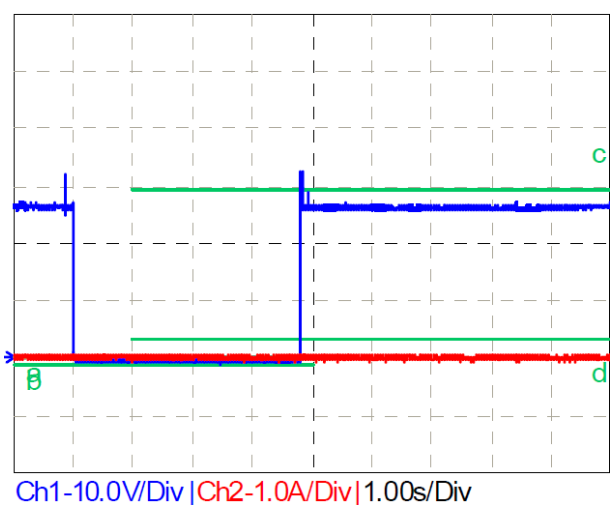
ISO 7637-2 test results

Test lab. : Korea EMC test lab.
Test product : SRM-872 (MOBILE VIDEO RECORDER)
Test date : 17 December 2013

1. 12V mode

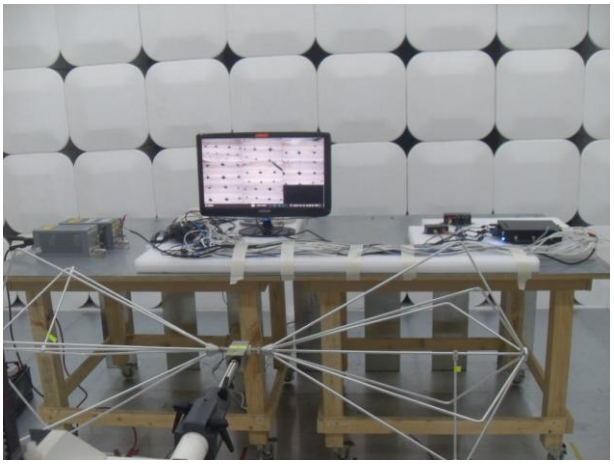
Fast	Slow
	
Ch1-5.0V/Div | 400ms/Div	Ch1-5.0V/Div | Ch2-1.0A/Div | 1.00s/Div

2. 24V mode

Fast	Slow
	
Ch1-10.0V/Div | 400ms/Div	Ch1-10.0V/Div | Ch2-1.0A/Div | 1.00s/Div

Photos of Test set-up

Test lab. : Korea EMC test lab.
Test product : SRM-872 (MOBILE VIDEO RECORDER)

Radiated Emission	Conducted Transient Emission
	
Conducted Transient Immunity	**Radiated Immunity**
	**N/A**

Photos of the ESA identification