A Solutions Company

SPECIFICATION

ARP-2005-00

SWITCHING POWER SUPPLY

December 1, 2006

Revision History of SPECIFICATION

Rev.	Description of Changes	Owner	Approve	Date
00	Preliminary Specificaiton	Sam		01-12-2006

Table of Contents

1. SCOPE

This specification describes the physical, functional and electrical characteristics of the 200 watts, 5-outputs which +3.3V,+5V,+12V,-12V and +5VSB, switching power supply. The power supply is power factor corrected.

2. INPUT CHARACTERISTICS

2.1 Input Voltage

Nominal input voltage: 90-264 Vrms

2.2 Input Frequency

Input frequency range: 47 Hz to 63 Hz

2.3 Input current

Input current should be lower than 6/3 Arms under full-load and 115/230 Vrms input voltage conditions.

2.4 Power Factor

The power factor shall be greater than 0.95 at full load / 100 Vrms input voltage conditions
, and 0.9 at full load / 240Vrms input voltage conditions

2.5 In-Rush Current

Under all other conditions, power supply should not be damaged.

2.6 Input Leakage Current

Input leakage current from line to ground should less than 3.5mArms at 230 Vrms/ 60 Hz input.

2.7 Isolation (Hi-Pot)

Primary to ground: 1800 Vac, 50Hz, 3 sec, cut –off current :10mA .

2.8 Harmonic Current

Power Supply is designed to meet the ***EN 61000-3-2 Power Line Harmonic Current Requirement.***

2.9 Power Line Transient

The power supply shall comply with the following requirements and associated test parameters:
IEC 1000-4-4: 1988 Elec. Fast Transients --- test level: ± 1000 volts on AC power port
IEC 1000-4-5: High energy Transients --- test level: ± 2000 volts on AC power port

The test should not result in: a). damage to the power supply.
b). disruption of the normal operation of the power supply

2.10 Electrostatic Discharge (ESD)

The power supply shall withstand ESD test voltage conditions at any point on the system enclosure, using the test setups and conditions as defined in ***IEC 1000-4-2, Level 4***. The following test levels shall be used in test: 8 kV contact discharge; 15kV air discharge with no abnormal operation.

The storage capacitance shall be 150 pF and the discharge resistance shall be 330 Ω.

3. OUTPUT CHARACTERISTICS

3.1 Output Characteristics

Output voltage, load current, combine power limit, voltage regulation and output noise of power supply should meet the specifications, which defined on the tables below:

200W Outputs Characteristics

Output Voltage	V1 3.3V	V2 5V	V3 12V	V4 -12V	Standby 5VSB
Peak Current					
Max. Load	8A	13A	16A	0.3A	2A
Min. Load	0.2A	0.5A	1.0A	0A	0A
3.3V & 5V Combined Power	80W		--		
Total Output Power	200W				
Load Reg.(V)	3.135 ~ 3.465	4.845 ~ 5.355	11.4 ~ 12.6	-10.8 ~ -13.2	4.75 ~ 5.25
Ripple & Noise (+/- mV)	100mV	100mV	200mV	200mV	100mV

Note 1: The 3.3V and 5V combined power shall not be exceed 80 Watts
Note 2: The 3.3V,5V and 12 V combined power shall not be exceed 200 watts.
Note 3: Noise band-width is from DC to 20MHz.
Note 4: Add 0.1uF ceramic in parallel with 10uF electrical capacitor are placed at point of Ripple and Noise measurement.
Note 5: The total output power is 100% output load at Ambient 50 degree C

3.2 Cross Regulation

Each output shall remain within the specified limits for the +5V, +3.3V and +12V which acceptable load combinations are in the following table.

Cross Regulation Table

Item	Output Current (A)					3.3V and 5V Combined Power	Output Power
	3.3V	5V	12V	-12V	5Vsb		
LOAD1	0.2	0.5	1	0.3	0	3.16	18.76
LOAD2	0.2	3	16	0.3	2	15.66	221.26
LOAD3	0.2	13	4	0.1	1	65.66	119.86
LOAD4	0.2	13	15	0	1	65.66	250.66
LOAD5	8	0.5	1	0	0	28.9	40.9
LOAD6	8	3	16	0.1	1	41.4	239.6
LOAD7	8	11	4	0.1	1	81.4	135.6
LOAD8	5	13	4	0.1	1	81.5	135.7
LOAD9	8	11	13.5	0.1	1	81.4	249.6
LOAD10	6	6.5	16	0.1	1	52.3	250.5

3.3 Dynamic Load Response Time

The +3.3VDC and +5VDC outputs transient response are measured by switching the output load from 70 to 100 to 70 percent of its full value. The +12V output transient response is measured by switching the output load from 50 to 100 to 50 percent of its full value. The transient slew rate will 2.5A/us at a frequency of 100 Hz and 50% duty cycle. The power supply should be stable under all transient conditions from any steady state load, and the over/undershoot should be within the regulation band

Output Voltage	Δ Step Load Size	Load Slew Rate	Capacitive Load
+3.3V	30% of max load	2.5A / uS	6000uF
+5V	30% of max load	2.5A / uS	6000uF
+12V	50% of max load	2.5A / uS	6000uF
-12V	0% of max load	2.5A / uS	350uF
+5VSB	0% of max load	2.5A / uS	350uF

3.4 Overshoot

Any output overshoot during turn-on shall not exceed 10% of nominal output voltage.

3.5 Efficiency

67% typical under full load and 115 Vrms input at Cross Regulation Load 4.

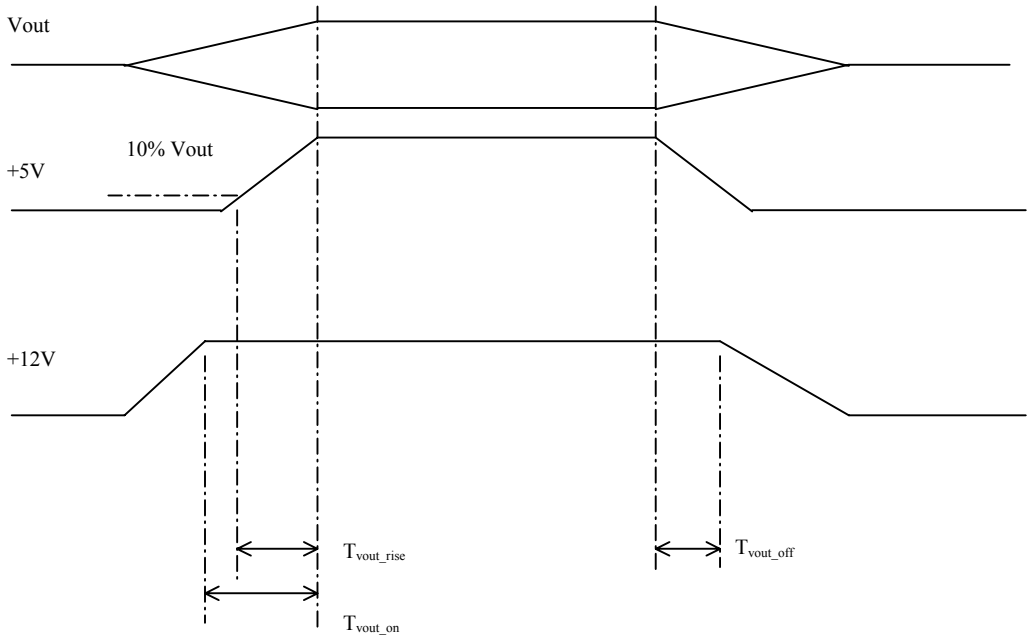
4. TIME SEQUENCE

Here are the timing requirements for the power supply operation. The output voltages must rise from 10% to within regulation limits (T_{vout_rise}) within 70ms. The +3.3V, +5V and +12Voutput voltages should start to rise approximately at the same time. All outputs must rise monotonically. Each output voltage shall reach regulation within 50ms (T_{vout_on}) of each other during turn on of the power supply. Each output voltage shall fall out of regulation within 400msec (T_{vout_off}) of each other during turn off. Refer to Figure 1 Power Supply Timing. Figure 2 Turn-on Turn-off Timing shows the timing requirements for the power supply being turned on and off via the AC input with PSON held low, and the power supply being turned on and off with the PSON signal after AC input is applied.

Output Voltage Timing

Item	Description	Min	Max	Units
T_{vout_rise}	Output voltage rise time from each main output	1	70	msec
T_{vout_on}	All main outputs must be within regulation of each other within this time	--	50	msec
T_{vout_off}	All main outputs must leave regulation within this time	--	400	msec

Figure 1: Power Supply Timing



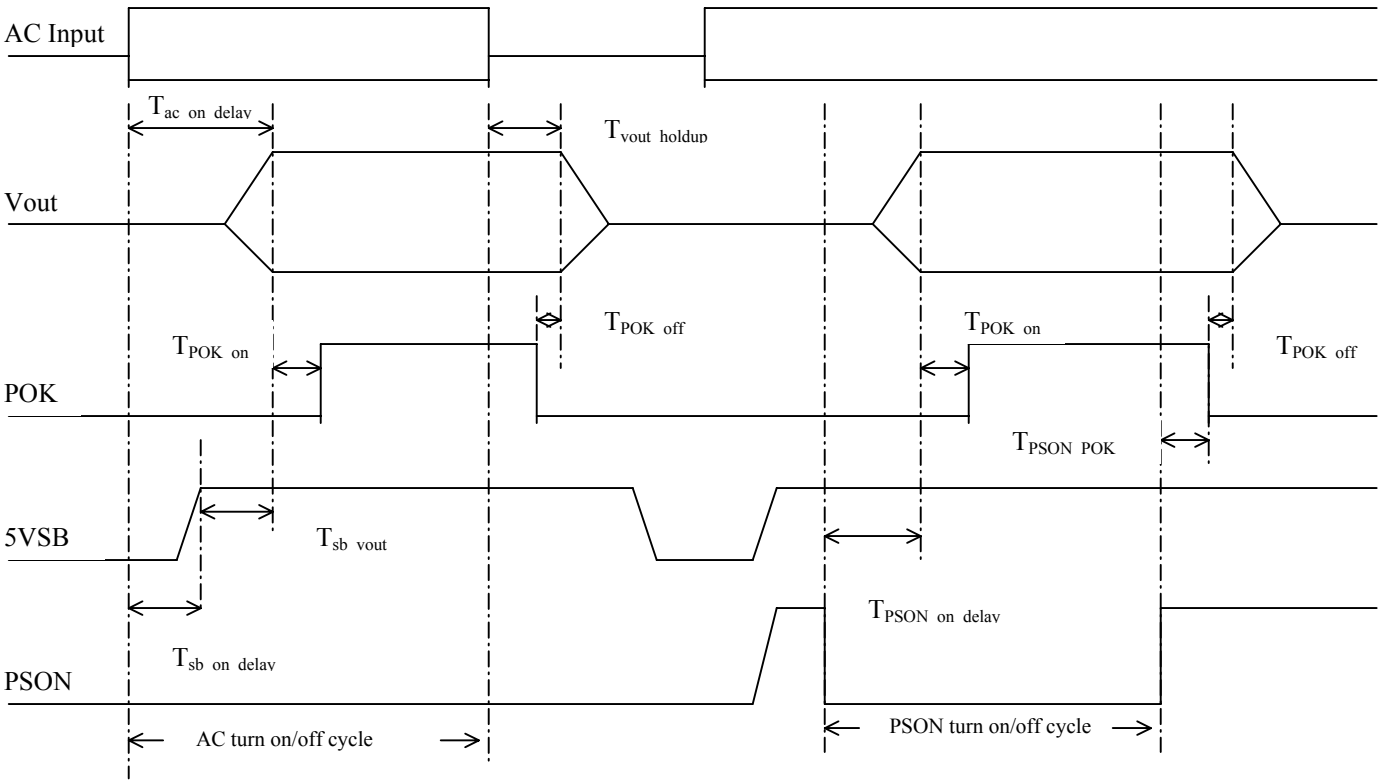
AC Turn On/Turn Off Timing

Item	Description	Min	Max	Units
$T_{sb\_on\_delay}$	Delay from AC being applied to 5VSB being within regulation	--	1800	msec
$T_{ac\_on\_delay}$	Delay from AC being applied to all output voltages being within regulation	--	2500	msec
T_{sb_vout}	Delay from 5VSB being in regulation to output voltages being in regulation at AC turn	50	1000	msec
T_{pok_on}	Delay from output voltages within regulation limits to POK asserted at turn on	100	1000	msec
T_{vout_holdup}	Time all output voltages stay within regulation after loss of AC	16	--	msec
T_{pok_off}	Delay from POK deasserted to output voltages dropping out of regulation limits	1	--	msec

PSON Turn On/Turn Off Timing

Item	Description	Min	Max	Units
$T_{pson\_on\_delay}$	Delay from PSON# active to output voltages within regulation limits	5	400	msec
T_{pok_on}	Delay from output voltages within regulation limits to POK asserted at turn on	100	1000	msec
T_{pson_pok}	Delay from PSON# deactive to POK being deasserted	--	100	msec
T_{pok_off}	Delay from POK deasserted to output voltages dropping out of regulation limits	1	--	msec

Figure 2 Timing Diagram



4.1 Output Voltage Timing

4.1.1 Output Rise Time(Tvout_rise)

Output rise time of each main outputs should be greater than 1 msec and less than 70 msec.

4.1.2 Turn On Time Between Each Main Outputs(Tvout_on)

All main outputs must be within regulation of each other within 50 msec.

4.1.3 Output Voltage Turn Off Time(Tvout_off)

All main outputs must be leave regulation within 400 msec.

4.2 AC Turn On / Off Timing

4.2.1 5VSB Turn On Delay Time ($T_{sb\_on\_delay}$)

5VSB Turn on Delay time is measured from AC turn-on to the moment that +5VSB output stays within regulation limit. 5VSB shall be stable and stay within regulation limits less then 1800 msec under any load and line conditions.

4.2.2 AC Turn On Delay Time ($T_{ac\_on\_delay}$)

AC Turn on Delay time is measured from AC turn-on to the moment that +5V output stays within regulation limit. All outputs shall be stable and stay within individual regulation limits less then 2500 msec under any load and line conditions.

4.2.3 5VSB To Main Output Time(T_{sb_vout})

5VSB To Main Output Time is measured from 5VSB being in regulation to output voltages being in regulation at AC turn on. It should be greater than 50 msec and less than 1000 msec.

4.2.4 POK Turn On Time (T_{pok_on})

POK Turn on Time is measured from output voltages within regulation limits to POK asserted at turn on under any load and line conditions. It should be greater than 100 msec and less than 1000 msec.

4.2.5 Hold-Up Time(T_{vout_holdup})

Under 100 Vrms and 80% output load conditions, unit shall continue to supply regulated outputs for at least 16 msec after lose of AC input.

4.2.6 POK Turn Off Time (T_{pok_off})

POK Turn off Time is measured from POK deasserted to output voltages dropping out of regulation limits at turn off under any load and line conditions. It should be greater than 1 msec.

4.3 PSON Turn On / Off Timing

4.3.1 PSON Turn On Delay Time ($T_{pson\_on\_delay}$)

PSON Delay time is measured from PSON active low to output voltages within regulation limits. It should be greater than 5 msec and less then 400 msec under any load and line conditions.

4.3.2 POK Turn On Time (T_{pok_on})

POK Turn on Time is measured from output voltages within regulation limits to POK asserted at turn on under any load and line conditions. It should be greater than 100 msec and less than 1000 msec.

4.3.3 PSON Deactive To POK Being Deasserted Time(T_{posn_pok})

PSON Deactive To POK Being Deasserted Time is measured from PSON deactive to POK being deasserted. It should be less than 100 msec.

4.3.4 POK Turn Off Time (T_{pok_off})

POK Turn off Time is measured from POK deasserted to output voltages dropping out of regulation limits at turn off under any load and line conditions. It should be greater than 1 msec.

5 SIGNALS AND INDICATOR FUNCTIONS

5.1 PSON (Remote turn on PSU Control)

The PSON signal is required to remotely turn on the power supply. PSON is an active low signal that turns on the +3.3V, +5V, and +12V power rails. When this signal is pulled high by the system, or left open, the outputs shall be turn off.

PSON Signal Characteristics

Signal Type	Description	
PS KILL = Low	PSU On	
PS KILL = Open	PSU Off	
PS KILL = High	PSU Off	
	MIN	MAX
Logic level low (power supply ON)	0V	1.0V
Logic level high (power supply OFF)	2.0V	5.25V
Source current, Vpson = low	--	4mA

5.2 POK (Power OK)

POK is a power OK signal and will be pulled HIGH by the power supply to indicate that all the outputs are within the regulation limits of the power supply . When any output voltage falls below regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed , POK will be de-asserted to a LOW state . See Figure 2 for a representation of the timing characteristics of POK .The start of the POK delay time shall be inhibited as long as any power supply outputs is in current limit.

POK Signal Characteristics

Signal Type	+5V TTL Compatible signal	
POK = High	Power OK	
POK = Low	Power not OK	
	MIN	MAX
Logic level low	--	0.4V
Logic level high	2.4V	5.25V
Source current, Vpson = low	--	4mA
T_{pok_on}	100msec	1000msec
T_{pok_off}	1msec	--

6. PROTECTIONS

6.1 Over-Voltage Protection

The power supply over voltage protection shall be locally sensed. The power supply shall shutdown and latch off after an over voltage condition occurs. This latch shall be cleared by toggling the PSON# signal or by an AC power interruption contains the over voltage limits. The values are measured at the output of the power supply's connectors. The voltage shall never exceed the maximum levels when measured at the power pins of the power supply connector during any single point of fail. The voltage shall never trip any lower than the minimum levels when measured at the power pins of the power supply connector.

Over Voltage Limits

Output Voltage	MAX (V)
3.3V	4.3
5V	6.5
12V	15.6

6.2 Over Current Protection

This power supply is designed to shutdown in a latch off mode after a current overload. The latch is then cleared by cycling the PS-ON signal in the OFF condition.

Over Current Limits

Output Voltage	MAX (A)
3.3V	35
5V	35
12V	20

6.3 Short Circuit Protection

An output short circuit is defined as any output impedance less than 0.1 ohms. The power supply shall shutdown and latch off for shorting +3.3V,+5V or +12V rail to secondary return. But the power supply shall recover automatically or by cycling the PS-ON once the short is removed.

6.4 No Load Operation

When primary power is applied and with no load on any output, neither damage nor hazardous condition shall occur. The power supply may latch into shutdown state.

6.5 Reset After Shutdown

If the power supply latches into a shutdown state, power supply shall return to normal operation only after the fault has been removed and a power off/on cycle is complete. The power off/on cycle may be performed by disconnecting the AC input or by transiting the PS-ON signal for high to low state.

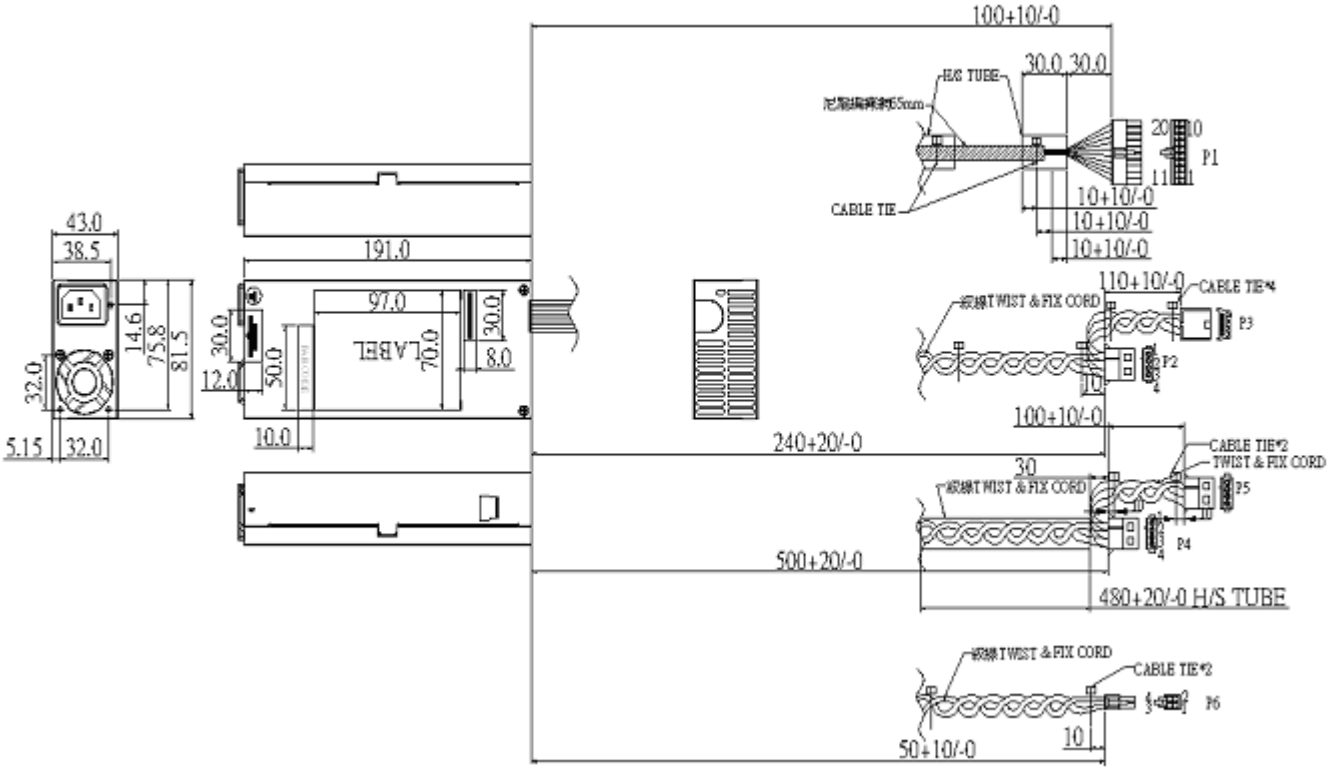
6.6 Inputs Over Current Protection

The power supply shall incorporate one input fuse on the LINE side for input over-current protection to prevent damage to the power supply and meet product safety requirements. Fuses should be slow blow type or equivalent to prevent nuisance trips. AC inrush current shall not cause the AC line fuse to blow under any conditions. All protection circuits in the power supply shall not cause the AC fuse to blow unless a component in the power supply has failed. This includes DC output load short conditions.

7. PHYSICAL CHARACTERISTICS

7.1 Weight : 0.85 Kgs

7.2 Cage Dimension : 82.00mm(W) × 43mm(H)×190 mm(L)



7.3 OUTPUT DC CONNECTORS

P1 Baseboard Power Connector
Connector housing: P2 - I4002 or equivalent

PIN	SIGNAL	18 AWG COLOR	PIN	SIGNAL	18 AWG COLOR
1	+3.3 VDC	Orange	11	+3.3 VDC	Orange
2	+3.3 VDC	Orange	12	-12 VDC	Blue
3	COM	Black	13	COM	Black
4	+5 VDC	Red	14	PS_ON	Green
5	COM	Black	15	COM	Black
6	+5 VDC	Red	16	COM	Black
7	COM	Black	17	COM	Black
8	P.G	Gray	18	--	--
9	+5VSB	Purple	19	+5 VDC	Red
10	+12V	Yellow	20	+5 VDC	Red

P3 Floppy Power Connectors
Connector housing: Amp 171822-4 or equivalent

Pin	Signal	18 AWG Color
1	+12 V	Yellow
2	COM	Black
3	COM	Black
4	+5 V	Red

P2,P4,P5 Peripheral Power Connectors
Connector housing: Amp P4-A10202 or equivalent

Pin	Signal	18 AWG Color
1	+12 V	Yellow
2	COM	Black
3	COM	Black
4	+5 V	Red

P6 Process Power Connectors
Connector housing: Amp P4-I4002 or equivalent

Pin	Signal	18 AWG Color
1	COM	Black
2	COM	Black
3	+12V	Yellow
4	+12V	Yellow

8.ENVIRONMENTAL REQUIREMENTS

8.1 Temperature

Operating: 10°C to 50°C
Non–Operating: -40°C to 70°C

8.2 Relative Humidity

Operating: 5% to 90 % relative humidity (non-condensing)
Non-operating: 5% to 90 % relative humidity (non-condensing)

8.3 ACOUSTIC

The PSU audible noise will not excess of 37dbMAX,at a distance of 50cm for 50% load.

9. REGULATORY AGENCY CERTIFICATION

9.1 RFI/EMI Standards

The power supply, when installed in system, shall comply with the following radiated and conducted emissions standards:

a) ***FCC part 15, Subpart B, Class B computing devices***.
b) ***CISPR22-B(EN55022)***

9.2 Safety Standards

The power supply shall be approved/licensed/certified as the following safety standards,

a) ***UL***
b) ***TUV***
c) ***CE***
d) ***CB***
e) ***FCC***
f) ***BSMI***
g) ***CCC***