



# Service Manual

# MOSCONI

# AS 200.4

Version 2010

Rev. 1.0  
Date: 25/01/2010

## CEA-2006-A SPECIFICATIONS

**POWER RATING:** 200 Watt per channel @ 4 Ohm < 1% THD+N  
**SN RATIO:** >86 dBA (reference: 1 Watt into 4 Ohm)

## MOS SPECIFICATIONS (Tcase = 25 °C / 4 Ohm stereo / 0.2V input level @ 14.4 Volt if not otherwise specified)

**TARGET POWERS:**  
 200 Watt per channel @ 4 Ohm  
 320 Watt per channel @ 2 Ohm  
 640 Watt BTL mode @ 4 Ohm  
 950 Watt BTL mode @ 2 Ohm (\*)

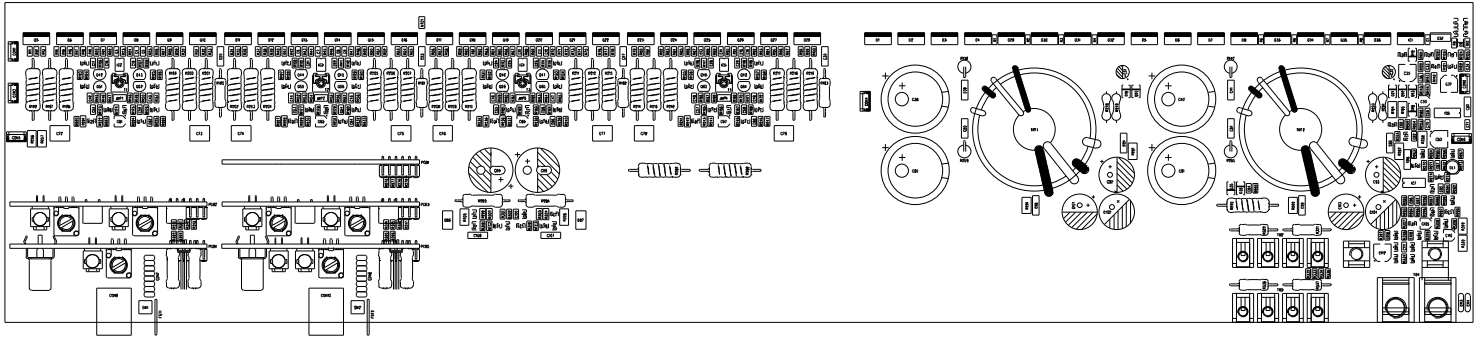
**EFFECTIVE POWERS:**  
 210 Watt (160 Watt @ 12V6) x 4 87.9 A ( $\eta = 66.3\%$ ) @ 4 Ohm / ST mode / 1% THD / 1KHz  
 326 Watt (252 Watt @ 12V6) x 4 151.2 A ( $\eta = 60.0\%$ ) @ 2 Ohm / ST mode / 1% THD / 1KHz  
 652 Watt (504 Watt @ 12V6) x 2 151.2 A ( $\eta = 60.0\%$ ) @ 4 Ohm / BTL mode / 1% THD / 1KHz

**THD @ 4 Ohm / ST mode:** < 0.03 % (1KHz / 90% Power rating ref)  
**THD @ 2 Ohm / ST mode:** < 0.035 % (1KHz / 90% Power rating ref)  
**DIM @ 4 Ohm / ST mode:** < ---- % (Power rating ref)  
**DIM @ 2 Ohm / ST mode:** < ---- % (Power rating ref)

**DC-DC converter typology:** Unregulated  
**Conversion frequency:** 50 KHz ( $\pm 6\%$ )  
**Absolute maximum operation supply voltage range:** 10 V ÷ 16 V  
**Recommended operation supply voltage range:** 11 V ÷ 14.4 V  
**Power-on/Power-off Voltage Threshold:** 9 V / 7.5 V  
**Mute delay time:** 3 secs  
**Secondary voltages (Amp. / Driver / Pre.):**  $\pm 46.8$  V /  $\pm 7.5$  V /  $\pm 13.5$  V  
**Max output offset voltage (each channel):**  $\pm 15$  mV  
**Standby current:** 1.8 mA (typical)  
**Quiescent consumption @ 12V / 14V4:** 1.22 A / 1.38 A (no idle current regulation)  
**Idle current regulation (no signal):** 0.08 A (each channel)  
**Quiescent consumption @ 12V / 14V4:** 1.54 A / 1.70 A (with idle current setted)  
**Thermal protection consumption:** 1.7 A  
**Battery ground vs secondary ground decoupling:** 125 Ohm  
**Body ground vs battery ground decoupling:** 65 Ohm  
**Bandwidth (-3dB ÷ 1 Watt):** < 5 Hz ÷ 150 KHz  
**Input sensitivity (Power rating ref):** 0.2 V ÷ 5 V  
**Input impedance @ 1 KHz (STEREO input):** 11 KOhm  
**Input capacitance @ 1 KHz (STEREO input):** 220 pF  
**Input ground decoupling:** 15R  
**S/N ratio (AP filter 10 Hz - 500 KHz) – Power rating ref:** 87 dB  
**S/N ratio (AP filter 10 Hz - 22 KHz) – Power rating ref:** 109 dB (“A” weighted)  
**Eq. Input noise (AP filter 10 Hz - 500 KHz):** 10 uV  
**Eq. Input noise (AP filter 10 Hz - 22 KHz):** 0.79 uV (“A” weighted)  
**Channel separation @ 100Hz / 1KHz / 10KHz – 10 Watt ref:** 83 dB / 73 dB / 56 dB  
**Xover functions:** HIGH Pass & LOW Pass (BAND Pass allowed)  
 (20 ÷ 175Hz) & (50 ÷ 300Hz)  
**Filter slope - Filter “Q”:** 12 dB/oct - 0.7 (Stereo & Mono)  
**Thermal cutoff Threshold:** 88 °C ( $\pm 5^\circ\text{C}$ )  
**ProSPEED® Fan Controller Threshold:** 55 °C ( $\pm 5^\circ\text{C}$ )  
**Damping factor @ 100 Hz - 10 Watt ref (Right / Left):** 83 / 91 [Front] - 116 / 137 [Rear]  
**Damping factor @ 1 KHz - 10 Watt ref (Right / Left):** 82 / 99 [Front] - 113 / 137 [Rear]  
**Damping factor @ 10 KHz - 10 Watt ref (Right / Left):** 75 / 89 [Front] - 93 / 119 [Rear]  
**Output impedance @ 1 KHz - 10 Watt ref (Right / Left):** 40.3 mOhm / 48.9 mOhm [Front] - 35.4 mOhm / 29.2 mOhm [Rear]  
**Load drive limitations (\*):** 1 Ohm / 2 Ohm (Stereo / Bridged)  
**Suggested fuse:** 150 A (Internal)

(\*) **VERY IMPORTANT NOTE - READ CAREFULLY**

**4 Ohm ST or 8 Ohm BTL – CONTINUOUS SINEWAVE SIGNAL** – pure resistive load or speaker load  
**2 Ohm ST or 4 Ohm BTL – MUSICAL SIGNAL** – pure resistive load or speaker load  
**1 Ohm ST or 2 Ohm BTL – MUSICAL SIGNAL** – speaker load only



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**INTEGRATED CIRCUITS**

| <i>Pcs</i> | <i>Component</i> | <i>Selection</i> | <i>Power/Case</i> | <i>Description</i>                   | <i>Volt</i> | <i>Manufacturer</i> | <i>Reference Number</i> |
|------------|------------------|------------------|-------------------|--------------------------------------|-------------|---------------------|-------------------------|
| 4          | NE5532           | DX               | SOP8              | Dual Low Noise Operational Amplifier |             | Fairchild           | IC2-5                   |
| 1          | LM339            | AD               | SOT14             | Low Power Quad Voltage Comparator    |             | ST                  | IC7                     |
| 1          | L7815            | CV               | TO220             | 1.5A Positive Voltage Regulator      | 15V         | ST                  | IC1                     |
| 1          | SG3525A          | DW               | SOIC-16L          | PWM Controller IC                    |             | ON Semiconductor    | IC6                     |

**TRANSISTORS & MOSFETS**

| <i>Pcs</i> | <i>Component</i> | <i>Selection</i> | <i>Power/Case</i> | <i>Description</i>                         | <i>Volt</i> | <i>Manufacturer</i> | <i>Reference Number</i>         |
|------------|------------------|------------------|-------------------|--|-------------|---------------------|---------------------------------|
| 6          | BC817            | -25              | SOT23             | NPN General Purpose Switching Transistor   | 45V         | Philips             | Q3-4 Q53 Q57 Q61 Q65            |
| 8          | BC846            | B                | SOT23             | NPN General Purpose Transistor             | 65V         | ON                  | Q66 Q68 Q70 Q72 Q74-77          |
| 1          | POTC143ET        |                  | SOT23             | NPN Digital Transistor (Built-in Resistor) | 50V         | Philips             | Q90                             |
| 1          | BCP56            | -16              | SOT223            | NPN Medium Power Transistor                | 80V         | Siemens             | Q87                             |
| 8          | BC337            | -25              | TO92              | NPN Amplifier Transistor                   | 45V         | ON                  | Q42 Q44 Q46 Q48 Q52 Q56 Q60 Q64 |
| 4          | MMBT5401         |                  | SOT23             | PNP General Purpose Transistor             | 150V        | Fairchild           | Q67 Q69 Q71 Q73                 |
| 6          | BC807            | -25              | SOT23             | PNP General Purpose Switching Transistor   | 45V         | Philips             | Q1-2 Q50 Q54 Q58 Q62            |
| 5          | BC860            | C                | SOT23             | PNP General Purpose Transistor             | 45V         | Philips             | Q39 Q61-62 Q85 Q88              |
| 1          | POTA143ET        |                  | SOT23             | PNP Digital Transistor (Built-in Resistor) | 50V         | Philips             | Q89                             |
| 1          | BCP53            | -16              | SOT223            | PNP Medium Power Transistor                | 80V         | Siemens             | Q86                             |
| 8          | BC327            | -25              | TO18              | PNP Amplifier Transistor                   | 45V         | ON                  | Q43 Q45 Q47 Q49 Q51 Q55 Q59 Q63 |
| 1          | BD140            | -16              | TO126             | PNP Medium Power Transistor                | 80V         | Fairchild           | Q37                             |
| 12         | FQP44N10         |                  | TO220             | N Channel Mosfet Rds(on)=0.039             | 100V        | Fairchild           | Q5-7 Q11-13 Q17-19 Q23-25       |
| 8          | FQP65N06         |                  | TO220             | N Channel Mosfet Rds(on)=0.012             | 60V         | Fairchild           | Q29-36                          |
| 12         | IRF5210          |                  | TO220             | P Channel Mosfet Rds(on)=0.06              | 100V        | IR                  | Q8-10 Q14-16 Q20-22 Q26-28      |
| 1          | ND57002A         |                  | SOT23             | N-Channel Field Effect Transistor          | 65V         | Fairchild           | Q78                             |

**DIODES**

| <i>Pcs</i> | <i>Component</i> | <i>Selection</i> | <i>Power/Case</i> | <i>Description</i>                      | <i>Volt</i> | <i>Manufacturer</i> | <i>Reference Number</i>          |
|------------|------------------|------------------|-------------------|---|-------------|---------------------|----------------------------------|
| 3          | BZX84-C6V8       | C                | SOT23             | 250mW Voltage Regulator Diode           | 6V8         | Philips             | D21-3                            |
| 2          | BZX84-CAV7       | C                | SOT23             | 250mW Voltage Regulator Diode           | 4V7         | Philips             | D24-5                            |
| 22         | BAV99            |                  | SOT23             | 200mA Silicon Switching Diode Array     | 70V         | Infineon            | D9-17 D24-27 D29-32 D37-38 DD1-3 |
| 2          | BA516            |                  | SOT23             | 215mA High-Speed Diode                  | 75V         | Philips             | D34 D39                          |
| 9          | ES1D             |                  | DO-214AC          | 1A Fast Rectifier Diode                 | 200V        | Fairchild           | D18-23 D28 D35-36                |
| 8          | TFPP20U20STU     |                  | TO220F            | 20A Ultra Fast Recovery Rectifier Diode | 200V        | Fairchild           | D1-6                             |
| 11         | BC850            | C                | SOT23             | NPN General Purpose Transistor          | 45V         | Philips             | D33 Q38 Q40-41 Q79 Q83-84 Q91-94 |

**RESISTORS**

| <i>Pcs</i> | <i>Component</i> | <i>Selection</i> | <i>Power/Case</i> | <i>Description</i>        | <i>Volt</i> | <i>Manufacturer</i> | <i>Reference Number</i>   |
|------------|------------------|------------------|-------------------|---------------------------|-------------|---------------------|---|
| 8          | 75R              | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R1-8  |
| 1          | 100R             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R144  |
| 5          | 182R             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R226 R233 R240 R247 R264  |
| 4          | 221R             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R107 R111 R114 R118   |
| 14         | 267R             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R151 R158 R165 R172-173 R175 R177 R179 R181 R183 R185 R187 R318-319   |
| 4          | 301R             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R108 R112 R115 R119   |
| 8          | 604R             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R146 R149 R153 R156 R160 R163 R167 R170   |
| 24         | 909R             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R12 R15 R18 R26 R29 R32 R35 R38 R41 R48 R51 R54 R57 R60 R63 R71 R74 R77 R80 R83 R86 R93 R96 R99                                     |
| 4          | 1K               | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R272 R298 R302 R331   |
| 27         | 3K32             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R13 R16 R19 R27 R30 R33 R36 R39 R42 R48 R52 R55 R58 R61 R64 R72 R75 R78 R81 R84 R87 R94 R97 R100 R104 R141 R286                     |
| 2          | 7K5              | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R105 R252   |
| 1          | 8K06             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R143  |
| 27         | 10K              | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R21-22 R44 R66-67 R89 R102 R106 R109-110 R113 R116-117 R120 R148 R155 R162 R169 R176 R180 R184 R188-189 R253 R255 R296 R308         |
| 2          | 14K              | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R122 R293   |
| 8          | 39K2             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R220 R223 R227 R230 R234 R237 R241 R244   |
| 6          | 68K1             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R204 R301 R332-335  |
| 8          | 100K             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R101 R103 R225 R232 R239 R246   |
| <i>Pcs</i> | <i>Component</i> | <i>Selection</i> | <i>Power/Case</i> | <i>Description</i>        | <i>Volt</i> | <i>Manufacturer</i> | <i>Reference Number</i>   |
| 4          | 130K             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R23 R45 R68 R90   |
| 3          | 162K             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R274 R285 R309  |
| 4          | 316K             | 1%               | 0805-1/8W         | Chip Resistor             |             |                     | R24 R46 R69 R91   |
| 4          | 8K25             | 1%               | 1206-1/4W         | Chip Resistor             |             |                     | R299-300 R303-304   |
| 32         | 39R              | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R11 R14 R17 R25 R28 R31 R34 R37 R40 R47 R50 R53 R56 R59 R62 R70 R73 R76 R79 R82 R85 R92 R95 R98 R124-125 R128-129 R132-133 R136-137 |
| 11         | 56R              | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R9-10 R145 R150 R152 R157 R159 R164 R166 R171 R280  |
| 3          | 1K5              | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R267 R273 R329  |
| 6          | 2K2              | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R121 R147 R154 R161 R168 R271   |
| 14         | 6K8              | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R224 R231 R238 R245 R265-266 R275 R282 R287-289 R297 R327-328   |
| 5          | 18K              | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R174 R178 R182 R186 R281  |
| 1          | 470K             | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R295  |
| 1          | 1M               | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R307  |
| 1          | 10M              | 5%               | 0805-1/8W         | Chip Resistor             |             |                     | R270  |
| 2          | 1K5              | 5%               | 1206-1/4W         | Chip Resistor             |             |                     | R142 R254   |
| 8          | 2K7              | 5%               | 1206-1/4W         | Chip Resistor             |             |                     | R221-222 R228-229 R235-236 R242-243   |
| 2          | 4R7              | 5%               | 2010-1/2W         | Chip Resistor             |             |                     | R195 R258   |
| 1          | 68R              | 5%               | 2010-1/2W         | Chip Resistor             |             |                     | R194  |
| 4          | 3K9              | 5%               | 2010-1/2W         | Chip Resistor             |             |                     | R256-257 R322 R330  |
| 2          | 5K6              | 5%               | 2010-1/2W         | Chip Resistor             |             |                     | R305-306  |
| 4          | 1R               | 5%               | 1W-Small          | Metal Oxide Film Resistor |             |                     | R248-251  |

|    |         |    |           |                           |           |  |
|----|---------|----|-----------|---------------------------|-----------|--|
| 4  | 2R2     | 5% | 2W-Small  | Metal Oxide Film Resistor |           | R190-193   |
| 4  | 68R     | 5% | 2W-Small  | Metal Oxide Film Resistor |           | R139-140 R259-260                                  |
| 2  | 330R    | 5% | 2W-Small  | Metal Oxide Film Resistor |           | R263-264   |
| 4  | 1K5     | 5% | 2W-Small  | Metal Oxide Film Resistor |           | R320-321 R336-337                                  |
| 24 | 0R15    | 5% | KNP-300-S | Wire Wound Resistor       | Royal Ohm | R106-219   |
| 1  | 68R     | 5% | 3W-Small  | Metal Oxide Film Resistor |           | R290   |
| 2  | 1K8     | 5% | 3W-Small  | Metal Oxide Film Resistor |           | R288-289   |
| 13 | 0R-JMPR |    | 0605-1/8W | Chip Resistor             |           | R123 R126-127 R130-131 R134-135 R138 R263 R276-279 |

CAPACITORS

| Pcs | Component | Selection | Power/Case     | Description  | Volt | Manufacturer | Reference Number   |
|-----|-----------|-----------|----------------|--|------|--------------|--|
| 4   | 10n       | X7R       | 0805           | Ceramic Chip Capacitor                             | 50V  | AVX          | C4 C8 C11 C15  |
| 2   | 22n       | X7R       | 0805           | Ceramic Chip Capacitor                             | 50V  | AVX          | C87 C100   |
| 28  | 100n      | X7R       | 0805           | Ceramic Chip Capacitor                             | 50V  | AVX          | C1 C34 C36 C51-59 C62 C64 C66 C68-71 C82 C94-97 C105 C108-109 C111                                       |
| 8   | 4p7       | NP0       | 0805           | Ceramic Chip Capacitor                             | 50V  | AVX          | C3 C7 C10 C14 C19 C22 C26 C29  |
| 12  | 22p       | NP0       | 0805           | Ceramic Chip Capacitor                             | 50V  | AVX          | C16 C21 C25 C28 C42-49   |
| 5   | 100p      | NP0       | 0805           | Ceramic Chip Capacitor                             | 50V  | AVX          | C5 C9 C12 C16 C33  |
| 4   | 1u        | 85°       | D4 mm          | Chip Type Electrolytic Capacitor                   | 50V  | NIC          | C61 C63 C65 C67  |
| 2   | 10u       | 85°       | D4 mm          | Chip Type Electrolytic Capacitor                   | 16V  | NIC          | C50 C110   |
| 4   | 100u      | 85°       | D6.3 mm        | Chip Type Electrolytic Capacitor                   | 16V  | NIC          | C35 C37 C83 C112   |
| 1   | 1u        | 85°       | Size A         | Chip Type Tantalum Capacitor                       | 16V  |              | C2   |
| 2   | 100n      | X7R       | Step 5 mm      | Multilayer Ceramic Leaded Capacitor                | 50V  |              | C113-114   |
| 1   | 1n8       | 5%        | Step 5 mm      | Polyester Film Capacitor                           | 100V | TPC          | C60  |
| 4   | 3n3       | 5%        | Step 5 mm      | Polyester Film Capacitor                           | 100V | TPC          | C38 C41 C80-81   |
| 6   | 150n      | 5%        | Step 5 mm      | Polyester Film Capacitor                           | 63V  | TPC          | C20 C23 C27 C30 C106-107   |
| 1   | 220n      | 5%        | Step 5 mm      | Polyester Film Capacitor                           | 63V  | TPC          | C86  |
| 8   | 1u        | 10%       | Step 5 mm      | Polyester Film Capacitor                           | 63V  | TPC          | C72-79   |
| 2   | 22u       | PW series | D5 / H11 mm    | 105°C - Low Impedance                              | 50V  | Nichicon     | C31-32   |
| 2   | 1000u     | RM series | D16 / H25 mm   | 85°C - Standard                                    | 63V  | Daewoo       | C88-89   |
| 6   | 2200u     | PW series | D12.5 / H25 mm | 105°C - Low Impedance                              | 16V  | Nichicon     | C92-93 C101-104  |
| 4   | 3300u     | LS series | D25 / H30 mm   | Large Capacitance Aluminium Electrolytic Capacitor | 63V  | Jamicon      | C38 C40 C90-91   |
| 33  | N.C.      |           |                | N.C.   |      |              | C6 C13 C17 C24 C84-85 C98-99 CON2 CON3 FST1 PCB1 Q80 R20 R43 R65 R88 R261-262 R291-292 R310-317 R323-326 |

MISCELLANEOUS

| Pcs | Component      | Selection                | Power/Case         | Description                                      | Volt | Manufacturer | Reference Number |
|-----|----------------|--------------------------|--------------------|--|------|--------------|------------------|
| 1   | NTC-20K        | 5%                       | 1206               | Rectangular Chip Thermistors P/NNSM1203J400J     |      | HDK          | NTC1             |
| 2   | NTC-500R       | 5%                       | 0805               | Rectangular Chip Thermistors P/NNSM2501J325J     |      | HDK          | NTC2-3           |
| 1   | LED            | L-59 EYC                 | 5mm                | Bi-Color LED Yellow/Red                          |      | Adimpex      | DL1              |
| 4   | TRM-22K        | 10%                      | 6 mm Snap In       | Horizontal Mounting Trimmer COD:CA6V5            |      | ACP          | T1-4             |
| 2   | Switch 2P2T    | KTH70065                 |                    | Non-Lock Push Switch                             |      | Adimpex      | SW1-2            |
| 5   | Connector      | J2504402                 | 2 x 2.5 mm Pitch   | Board to Wire Crimp Style Connector COD:J2504402 |      | Adimpex      | CON1 CON3-6      |
| 2   | Connector      | IR002316                 | 8+8 x 2 mm Pitch   | Pin Header Strip Connector P/NIR002316           |      | Adimpex      | CON7-8           |
| 1   | Connector      | FQ159966                 |                    | Low Profile Type Modular Jack COD:FQ159966       |      | Adimpex      | CON10            |
| 4   | Connector      | LE008002                 | 2 x 2.54 mm Pitch  | Pin Header Strip Connector P/NLE008002           |      | Adimpex      | JMP1-4           |
| 1   | Faston         |                          | 2.8 mm Right Angle | Faston for PCB P/N:VAS28P40                      |      | Micomp       | FST2             |
| 1   | Terminal Block |                          |                    | Terminal Block Output High                       |      | MOS          | TB2              |
| 1   | Terminal Block |                          |                    | Terminal Block Output Low                        |      | MOS          | TB3              |
| 1   | Terminal Block |                          |                    | Terminal Block Supply + Fuse Holder              |      | MOS          | TB4              |
| 2   | TRF4133511     | ANRA 53/1B - Aros Nuclei | 40/24/16           | 40.24.16.04.13.35.11.045                         |      | MOS          | TRF1-2           |
| 3   | PCB Spacer     | ADS                      | D6 / H3.5 mm       | Aluminum Ferrule                                 |      | MOS          | FET1-3           |
| 2   | PCB            |                          |                    | LP/HP Filter                                     |      | MOS          | PCB2-3           |
| 1   | PCB            |                          |                    | Preamplifier 2CH                                 |      | MOS          | PCB4             |
| 1   | PCB            |                          |                    | Preamplifier 4CH                                 |      | MOS          | PCB5             |
| 16  | Ferrite Tube   | K5A                      | 4 x 2 x 6          | Cylindrical EMI Suppression                      |      | Core-Tech    | For D1-8 Q29-36  |