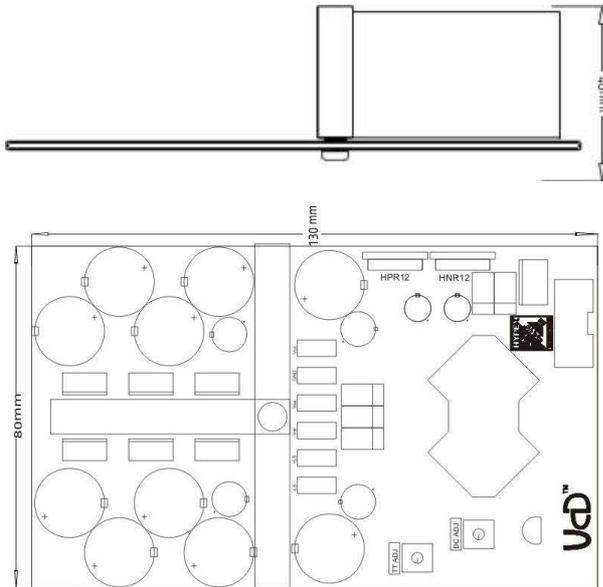


High Efficiency Power Amplifier Module



Highlights

- Flat, fully load-independent frequency response
- Low output impedance
- Very low, frequency-independent THD
- Very low noise
- Fully passive loop control
- Consistent top performer in listening trials

Features

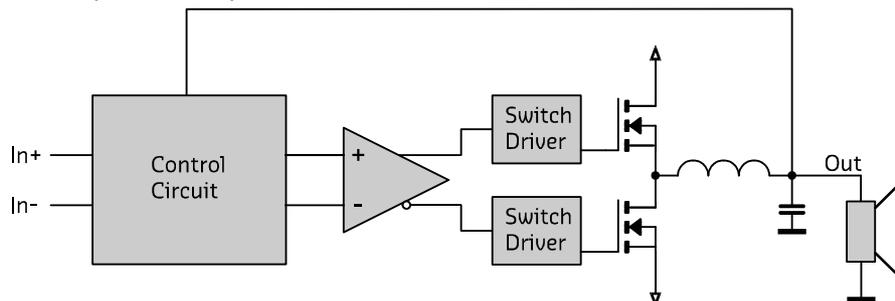
- Runs on unregulated +/- rails
- Pop-free start and stop control
- Differential audio input
- No compromise components
- LM4562 buffer OpAmp
- HxR12 ready
- Improved on-board buffer supply
- Overcurrent and overvoltage protection
- Weight: 280gms

Applications

- Monitor loudspeakers for recording and mastering studios
- Audiophile power amplifiers for professional and consumer use
- Public Address systems
- Home theatre systems
- Active loudspeakers

Description

The UcD700HG amplifier module is a self-contained high-performance class D amplifier intended for a wide range of audio applications, ranging from Public Address systems to ultrahigh-fidelity replay systems for studio and home use. Chief distinguishing features are flat frequency response irrespective of load impedance, nearly frequency-independent distortion behaviour and very low radiated and conducted EMI. Control is based on a phase-shift controlled self-oscillating loop taking feedback only at the speaker output.



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1 Performance Data

Power supply = +/-85V, Load=4Ω, MBW=40kHz, unless otherwise noted

| Item | Symbol | Min | Typ | Max | Unit | Notes |
|-------------------------|-------------|------|-------|-------|------|---|
| Output Power | P_R | - | 700 | - | W | THD=1%, Load=4Ω |
| | | - | 360 | - | W | THD=1%, Load=8Ω |
| Distortion | THD+N | - | - | 0.02 | % | 20Hz<f<20kHz ¹⁾ Pout<P _o /2 |
| | | - | - | 0.005 | % | 20Hz<f<20kHz Pout=1W |
| DC offset | V_{DC} | - | - | 1 | mV | |
| Output noise | U_N | - | 30 | 35 | μV | Unwtd, 20Hz-20kHz |
| Output Impedance | Z_{OUT} | - | - | 20 | mΩ | f<1kHz |
| | | - | - | 150 | mΩ | f<20kHz |
| Power Bandwidth | PBW | | 20-35 | | kHz | ²⁾ |
| Frequency Response | | 10 | - | 50 | kHz | +0/-3dB. All loads |
| Voltage Gain | A_V | 25.5 | 26 | 26.5 | dB | |
| Supply Ripple Rejection | PSRR | | 65 | | dB | Either rail, all frequencies |
| Efficiency | η | | 92 | | % | Full power |
| Idle Losses | P_o | | 15 | | W | +/- 90V rails |
| Standby Current | I_{STBY} | | 10 | | mA | |
| Current Limit | $I_{OUT,P}$ | | 28 | | A | Stop mode after limiting for 80ms |

Note 1: At higher audio frequencies there are not enough harmonics left in the audio band to make a meaningful THD measurement. High frequency distortion is therefore determined using a 18.5kHz+19.5kHz 1:1 two-tone IMD test.

Note 2: Dielectric losses in the output capacitor limit long term (>30s) full-power bandwidth to 15kHz.

2 Absolute Maximum Ratings

Correct operation at these limits is not guaranteed. Operation beyond these limits may result in irreversible damage

| Item | Symbol | Rating | Unit | Notes |
|-----------------------|-------------|---------|------|---|
| Power supply voltage | V_B | +/- 100 | V | Unit shuts down when either rail exceeds 100V |
| Peak output current | $I_{OUT,P}$ | | A | Unit current-limits at 28 A |
| Input voltage | V_{IN} | +/-13 | V | Either input referenced to ground |
| Air Temperature | T_{AMB} | 65 | °C | |
| Heat-sink temperature | T_{SINK} | 90 | °C | User to select heat sink to insure this condition under most adverse use case |

3 Recommended Operating Conditions

| Item | Symbol | Min | Typ | Max | Unit | Notes |
|--|------------|-------------------|-----|------------------|------------|---|
| Power supply voltage | V_b | 75 | 90 | 95 ¹⁾ | V | |
| Driver supply voltage | V_{DR} | | 15 | | V | Referenced to $-V_b$. |
| Load impedance | Z_{LOAD} | 1 | | | Ω | |
| Source impedance | Z_{SRC} | | | 7 | k Ω | Differential. Corresponds to 3dB noise increase. |
| Effective power supply storage capacitance | C_{SUP} | 10m ²⁾ | | | F | Per rail, per attached amplifier. 4 Ω load presumed. |

Note 1: Unit shuts down when either rail exceeds 100V.

Note 2: The effective power supply storage capacitance of Hypex SMPS is already in excess of 10.000 μ F. Do not add supplementary capacitance.

4 Connections

4.1 Connection diagram

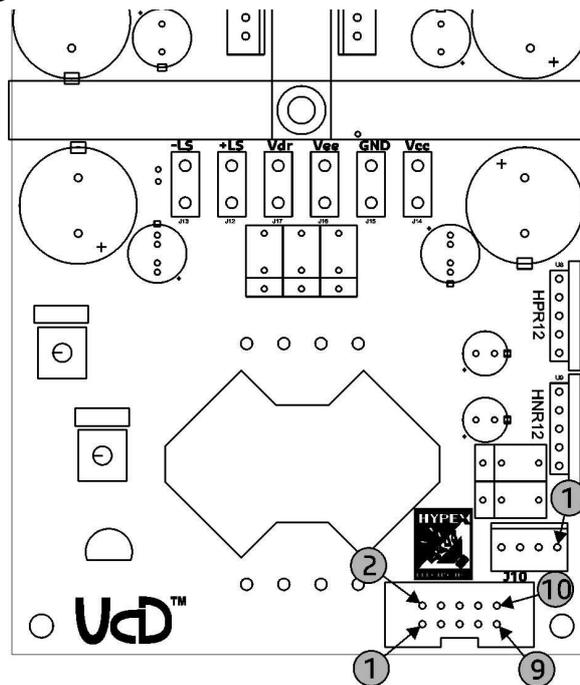


Fig.1 Connector pinning UcD700HG.

4.2 Signal Connectors Specification

| Pin (4-pin MOLEX [®] KK [®] part number 22-27-2041) | Pin (10-pin Flatcable header) | Function |
|---|----------------------------------|---------------------------|
| 4 | 7 | Non inverting Audio Input |
| 3 | 9,4,3 | GND |
| 2 | 8 | Inverting Audio Input |
| 1 | 6 | ON/OFF control |
| | 10 | DC Protect |
| | 1 | +VSIG ¹⁾ |
| | 2 | -VSIG ¹⁾ |

Note 1: These voltages have to be applied to the module externally. The UcD700HG does not provide these voltages. More information regarding the supply can be downloaded from our website: www.hypex.nl. When HPR12/HNR12 are installed externally supplied voltage should be >15V and <25V, otherwise quality is not important. When this option is not installed, the externally supplied voltage should be +12V/-12V regulated and quality can affect sonic performance.

4.3 Input Characteristics

| Item | Symbol | Min | Typ | Max | Unit | Notes |
|---|----------|-----|-----|-----|------------|--|
| Input Impedance | Z_{IN} | | 100 | | k Ω | Either input to ground |
| Common Mode Rejection Ratio | CMRR | | 75 | | dB | All frequencies |
| Control voltage on pin 1, amplifier ON | | | | 3 | V | ¹⁾ |
| Control voltage on pin 1, amplifier OFF | | 12 | | | V | Internally pulled up to 15V ¹⁾ |

Note 1: It is recommended to use an open collector output to control the on/off pin.

4.4 Power Connectors Specification

| Pin FASTON [®] tab | Function |
|-----------------------------|--|
| -LS | Loudspeaker output (cold) |
| +LS | Loudspeaker output (hot) |
| Vee | Negative power supply connection |
| Vdr | Driver supply connection ¹⁾ |
| GND | Power supply ground connection |
| Vcc | Positive power supply connection |

Note 1: Referenced to VEE

All supply voltages need to come up simultaneously. Removing or shorting supply voltages while the amplifier is running may damage the device.

4.5 Cabling

The Faston crimp connectors included in this package are suitable for a maximum wire gauge of 13 AWG (2.5mm²). Make sure these connectors are crimped with a suitable crimp tool. A well crimped Faston connector cannot be removed from the wire by pulling the ends with force. Check this thoroughly! Poor cable connections may result in loss of performance or in damage to the device. Even with the low EMI produced by the UcD700HG it is advisable to twist the loudspeaker cables and to bundle all the power supply cables (Vee, Vdr, GND and Vcc) to reduce EMI even more.

5 Application Information

5.1 Standby Control

The Standby pin is used to put the amplifier in a low power consumption mode. When this pin is held low the amplifier will be enabled. Only after initial power-up the amplifier will be disabled for 1.5 sec. regardless of the state of the Standby pin. When the UcD700HG is used with the matching UcD700 power supply, this pin will be controlled automatically upon (dis)connecting the mains voltage. When external control has been selected, ON/OFF must be controlled as shown in Fig 3 or Fig 4.

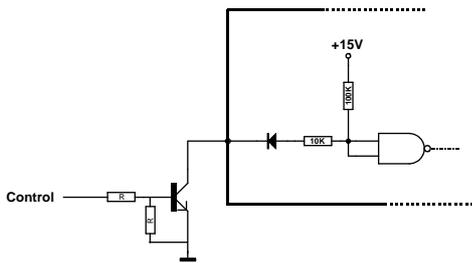


Fig. 2 Transistor controlled ON/OFF

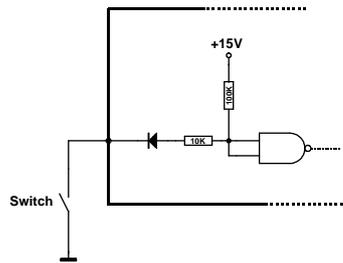


Fig. 3 Switch controlled ON/OFF

5.2 Input Select

The default settings for input select are based on using the UcD700 with the matching Power Supply: ON/OFF controlled by supply and audio signal must be applied to the 4-pin connector. User selectable options can be made by means of a 0Ω SMD0805 resistor according to the table below.

| Item Select | R78 | R76 / R77 | Notes |
|---|------------|------------|-----------------|
| ON/OFF (4-pin MOLEX [®] KK [®]) | not placed | NA | |
| ON/OFF (10-pin Flatcable header) | placed | NA | Default setting |
| | | | |
| Input Signal (4-pin MOLEX [®] KK [®]) | NA | not placed | Default setting |
| Input Signal (10-pin Flatcable header) | NA | placed | |

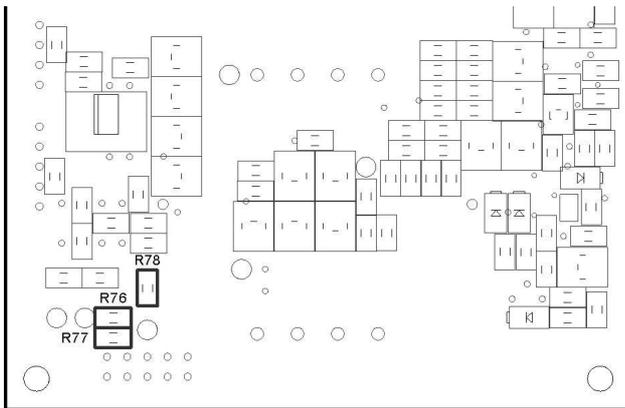


Fig. 4 User selectable input (bottom side PCB)

5.3 Protection

- Output current is limited to $28A_{pk}$. To prevent overheating in case of a continuous overcurrent condition, the unit will shut down if an overcurrent condition persists for over 80ms. Operation is automatically resumed after 1.5s.
- If the applied supply voltage exceeds a level of 100V (either rail) the unit shuts off until a safe supply voltage is being applied.
- For optimal performance and protection the matching UcD700 power supply should be used to ensure your loudspeakers are fully protected against dangerous DC voltages. This means that in case of an amplifier component failure the supply is switched off until the amplifier is disconnected from the mains for about 3 minutes. DC error is interfaced like shown below.

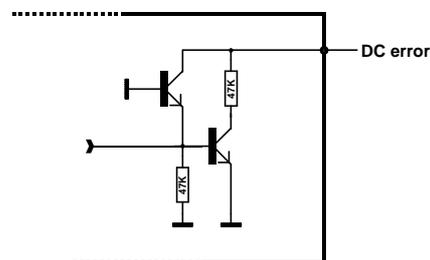


Fig. 5 DC error output

WARNING! The amplifier has a DC error detection to signal catastrophic failure of the power stage. This is an open collector line. If this line is pulled down, the power supply should shut down and remain latched off until the power is cycled. The Hypex UcD700 power supply board supports this feature.

To fully ensure the protection of your loudspeaker the matching Hypex UcD700 supply is very much recommended.

6 Heatsink Considerations

Even with an efficiency of over 90% there is almost 70 Watts to dissipate with 700W continuously output. The UcD700 has no temperature sensing. When in a certain application temperature monitoring is required, it has to be done externally by the customer (The Hypex SoftStart module could be used for this purpose).

Since the UcD700 is designed for music only it will never have to deliver 700 Watts continuously. Therefore the heatsink can remain relatively small. Mounting the module on an aluminium backplane (use thermal compound) is sufficient under normal conditions.

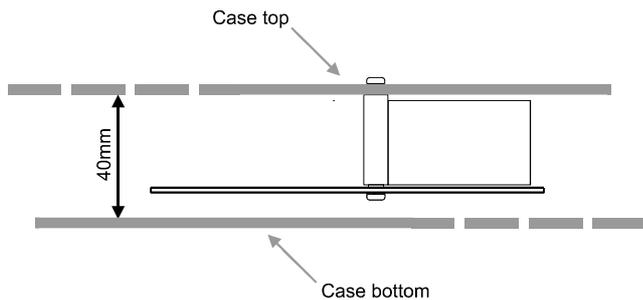
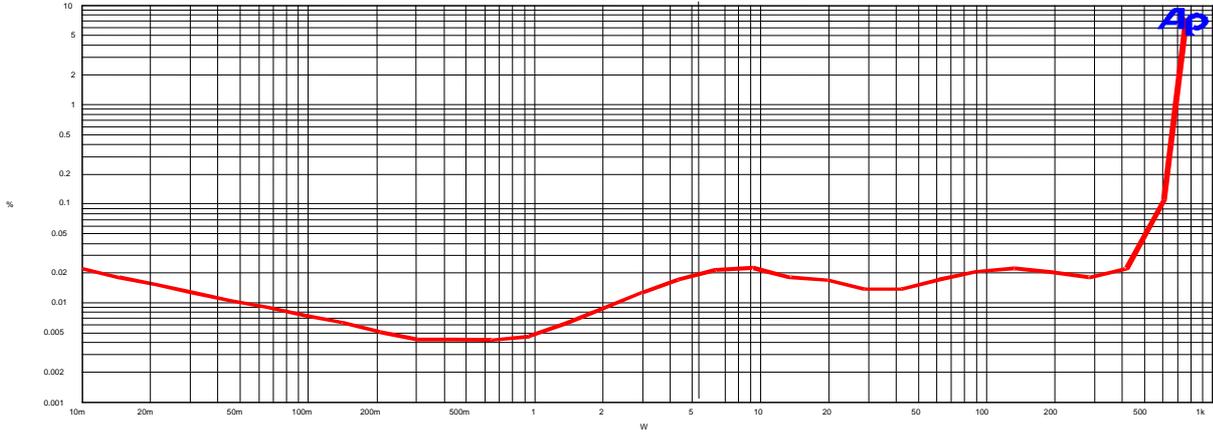


Fig. 6 UcD700 1HE implementation

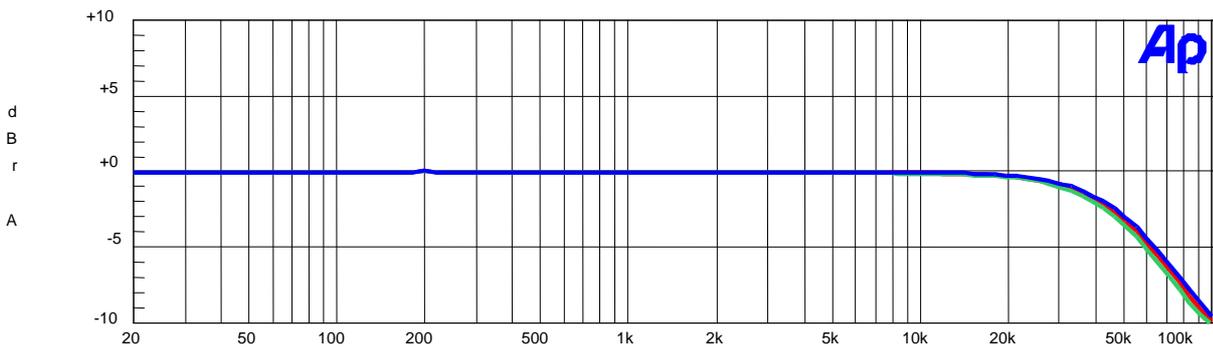
Because of the small dimension of the UcD700 it is relatively easy to implement the module in a 1HE 19" housing with an internal height of only 40mm.

7 Typical Performance Graphs

7.1 THD vs. Power (1KHz, 4Ω)

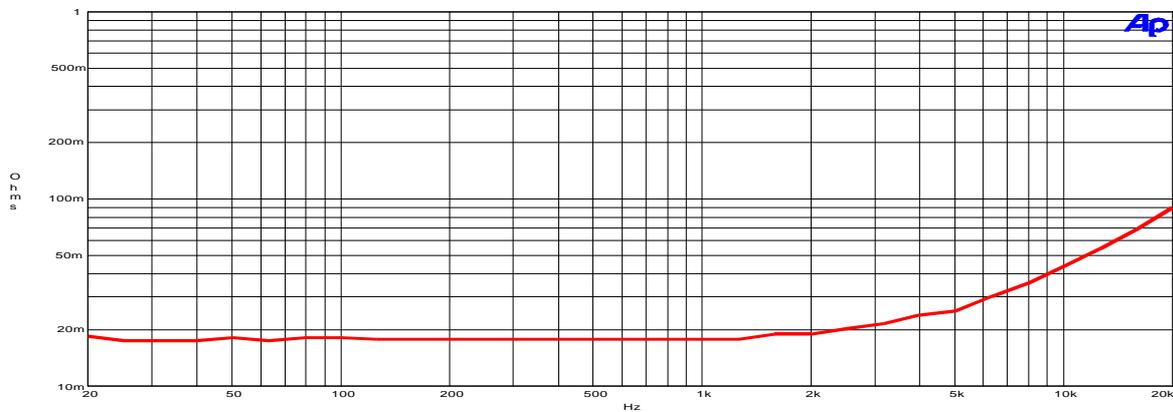


7.2 Frequency Response (4Ω, 8Ω and open circuit).

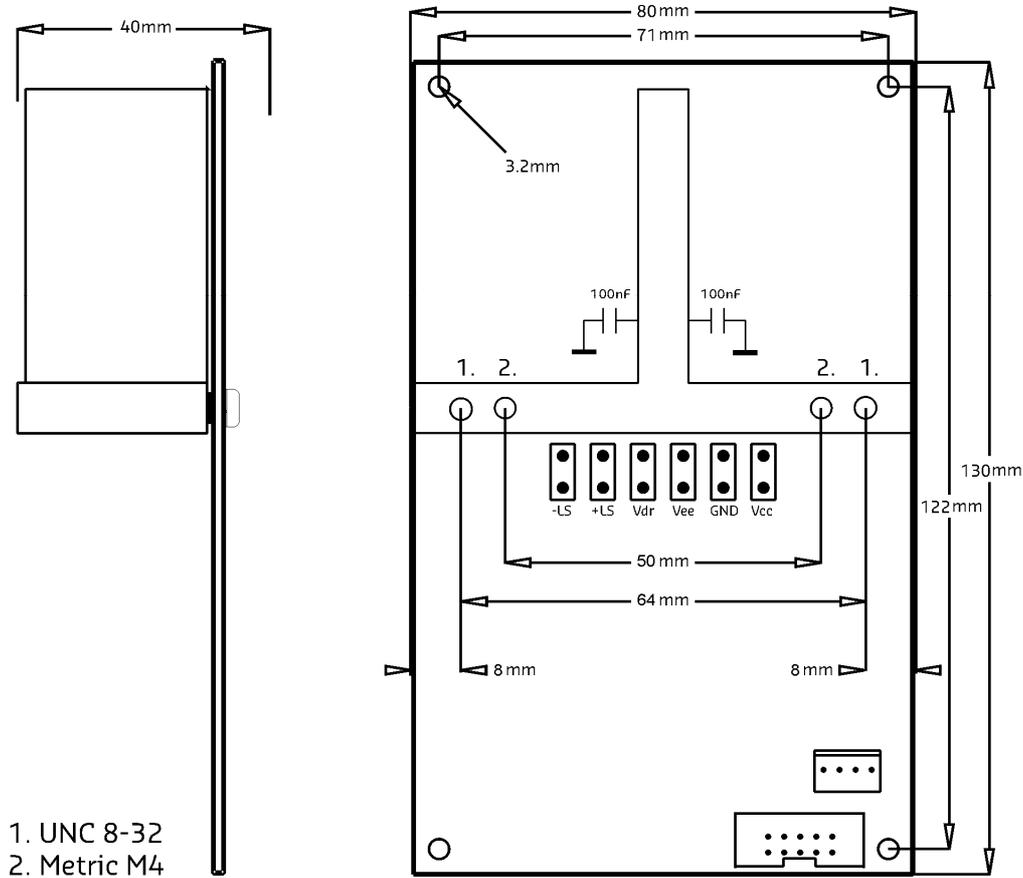


From top to bottom: open circuit, 8Ω, 4Ω

7.3 Output Impedance



8 Connection Diagram



DISCLAIMER: This subassembly is designed for use in music reproduction equipment only. No representations are made as to fitness for other uses. Except where noted otherwise any specifications given pertain to this subassembly only. Responsibility for verifying the performance, safety, reliability and compliance with legal standards of end products using this subassembly falls to the manufacturer of said end product.

LIFE SUPPORT POLICY: Use of Hypex products in life support equipment or equipment whose failure can reasonably be expected to result in injury or death is not permitted except by explicit written consent from Hypex Electronics BV.

| Document Revision | PCB Version | Description | Date |
|-------------------|-------------|--|------------|
| R1 | UcD700HGV2 | Initial draft. | 31.10.2007 |
| R4 | UcD700HGV2 | OVP increased to 100V Output filter capacitors changed to Wima MKI2 Current limiting duration increased Pin numbers of the 10pin flatcable header changed | 11.02.2010 |
| R5 | UcD700HGV2 | Format changed | 09.03.2012 |
| R6 | UcD700HGV2 | Recommended operating conditions updated | 25.05.2012 |
| R7 | UcD700HGV2 | HXR supply info added, Linear supply setup removed. | 20.1.2015 |
| R8 | UcD700HGV2 | Input characteristics added | 24.06.2015 |