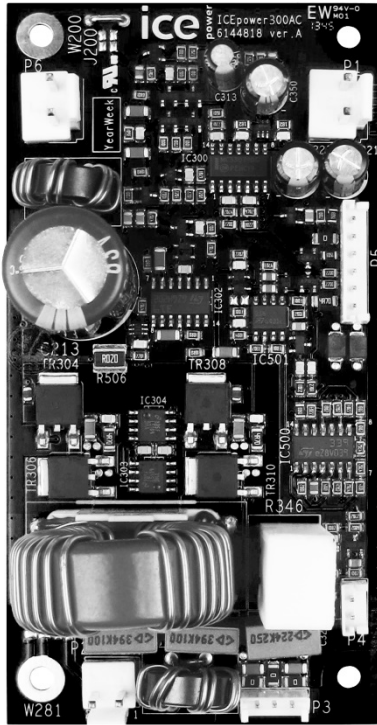


ICEpower a/s, Vandtårnsvej 62A 3B, DK-2860 Søborg  
Phone [45] 31710001, CVR-no. 25053591

info@icepower.dk, www.icepower.dk



# ICEpower300A1

300W ICEpower Amplifier

Data Sheet

## Contents

---

General Description .....	3
Block Diagram .....	5
Connection Diagram.....	6
Absolute Maximum Ratings .....	9
Power Specifications .....	10
Power supply draw vs. output power .....	11
Audio Specifications.....	12
General Audio Specifications .....	13
Electrical Specifications.....	14
Timing Specifications.....	14
Mechanical Specifications.....	15
Other environmental testing .....	15
Typical Performance Characteristics.....	16
Output Impedance .....	20
Damping Factor .....	20
Power Efficiency .....	21
Dissipated Power.....	21
Input/Output Schematics and Features.....	22
Protection Features.....	24
Physical Dimensions.....	26
Safety Standards .....	28
EMI Standards .....	28
ESD Warning.....	29
Packaging and Storing.....	29
Contact .....	30
Legal Notes.....	31

## General Description

ICEpower300A1 is a high performance 300W Class D amplifier designed particularly for highly competitive consumer and professional audio applications. It can be used as a stand-alone single channel amplifier module or with the 100AS1/2, 200AS1/2 300AS1, or 700AS1/2 amplifier with integrated power supply to build multichannel systems. Both the 300AS1 and 700AS1/2 have all required supply voltages available for 300A1. 100AS1/2 and 200AS1/2 only require +/-12V regulators for the P3 supply and an external fuse on the Hanger Rail Supply. It's pre-approved for EMC and safety for fast design-in and to minimize time to market. ICEpower300A1 is an integrated power solution, which eliminates the need for heat sinks and EMI shields.

### Key benefits include:

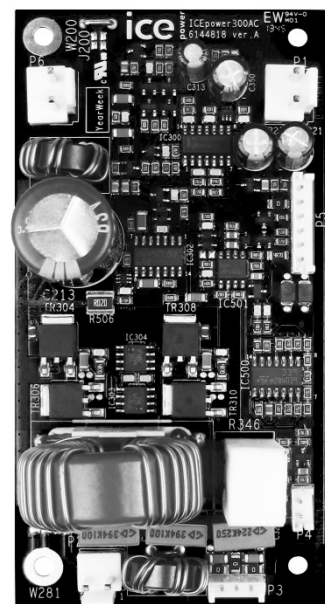
- ICEpower's patented HCOM modulation and control techniques ensure excellent audio performance
- A comprehensive set of features for plug-and play implementation in a wide range of applications such as active speakers and subwoofers, HTIB, and A/V amplifiers and receivers
- Fully backwards compatible with ICEpower200AC module - same dimensions, mounting holes and connectors

### Key Specifications

- 300W at 1% THD+N, 4Ohm
- 280W at 0.1% THD+N, 4Ohm
- Max output voltage / current: 50V<sub>p</sub> / 20A<sub>p</sub>, 4Ω
- Full power bandwidth (20Hz – 20kHz)
- 113dBA dynamic range (300W, 4Ohm)
- THD+N = 0.005% (1W, 4Ohm)
- Audio input impedance 47kOhm (fully balanced)
- High output current limit = 20A<sub>p</sub>
- Low output impedance = 6mOhm
- Damping factor = 660, 4Ohm
- Power efficiency 90% (DC supplies to Audio Out)
- Idle power consumption 5.5W
- Disabled power consumption 1.2W

### Key Features

- Rugged construction
- Disable and Mute control inputs
- Suitable for CE and FCC approved designs
- Thermal protection
- Over current and short circuit protection
- DC servo for low DC offset
- Designed as hanger for both 300AS1 and 700AS1/2
- EMI conforms to: EN55013 and others
- Safety conforms to: UL62368 and others



## Release Notes

PCB Version	Data Sheet Version	Date	Revised by	Description
C	1.0	July 4, 2014	MPS/SMK	Datasheet created
C	1.1	January 6, 2016	MFM/SOL	Module name changed – product identical
C	1.2	June 1, 2017	TOC/DIT	Address updated Legal Notes updated
C	1.3	September 5, 2017	LBH/DIT	Output voltage / current spec. added Safety and EMI standards updated
D	1.4	October 23, 2018	LBH	Absolute Maximum Ratings section updated
D	1.5	December 11, 2018	LBH/DIT	Table 11 added, Power / Current supply draw vs. output power Thermal Section updated
D	1.6	January 14, 2020	LBH	Table 12 updated with additional module supply options
D	1.7	May 13, 2020	LBH/NKK	Safety Standards updated

Table 1: Release notes

### Block Diagram

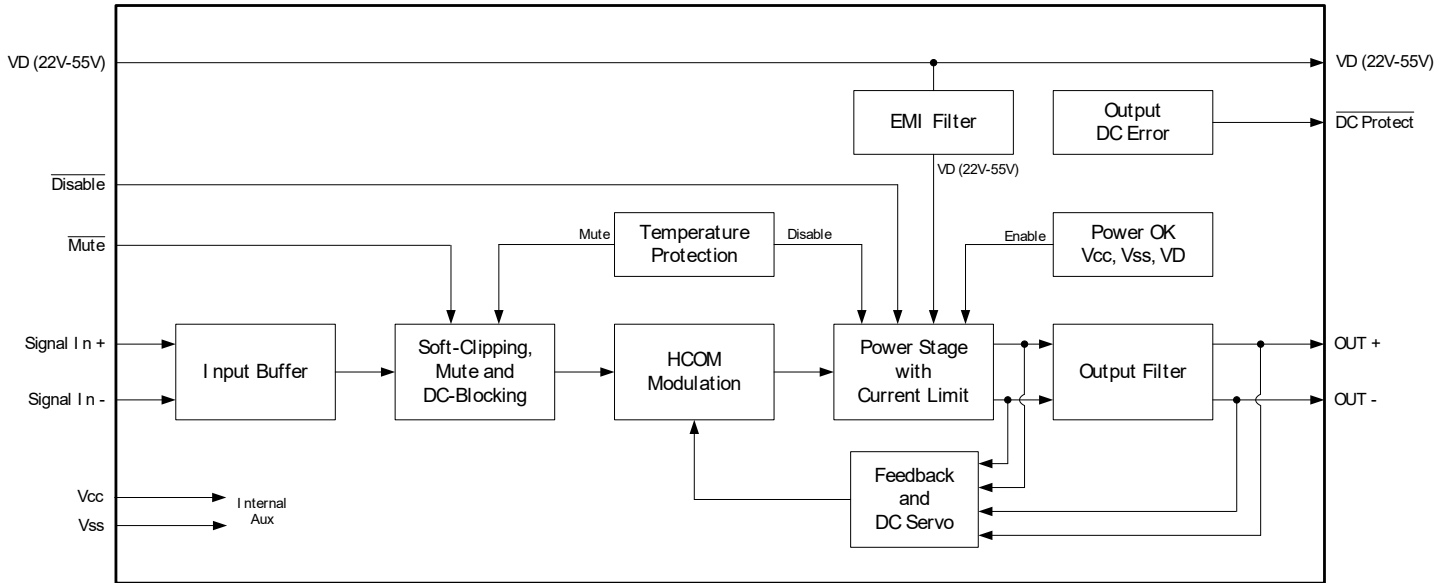


Figure 1: ICEpower300A1 block diagram

Connection Diagram

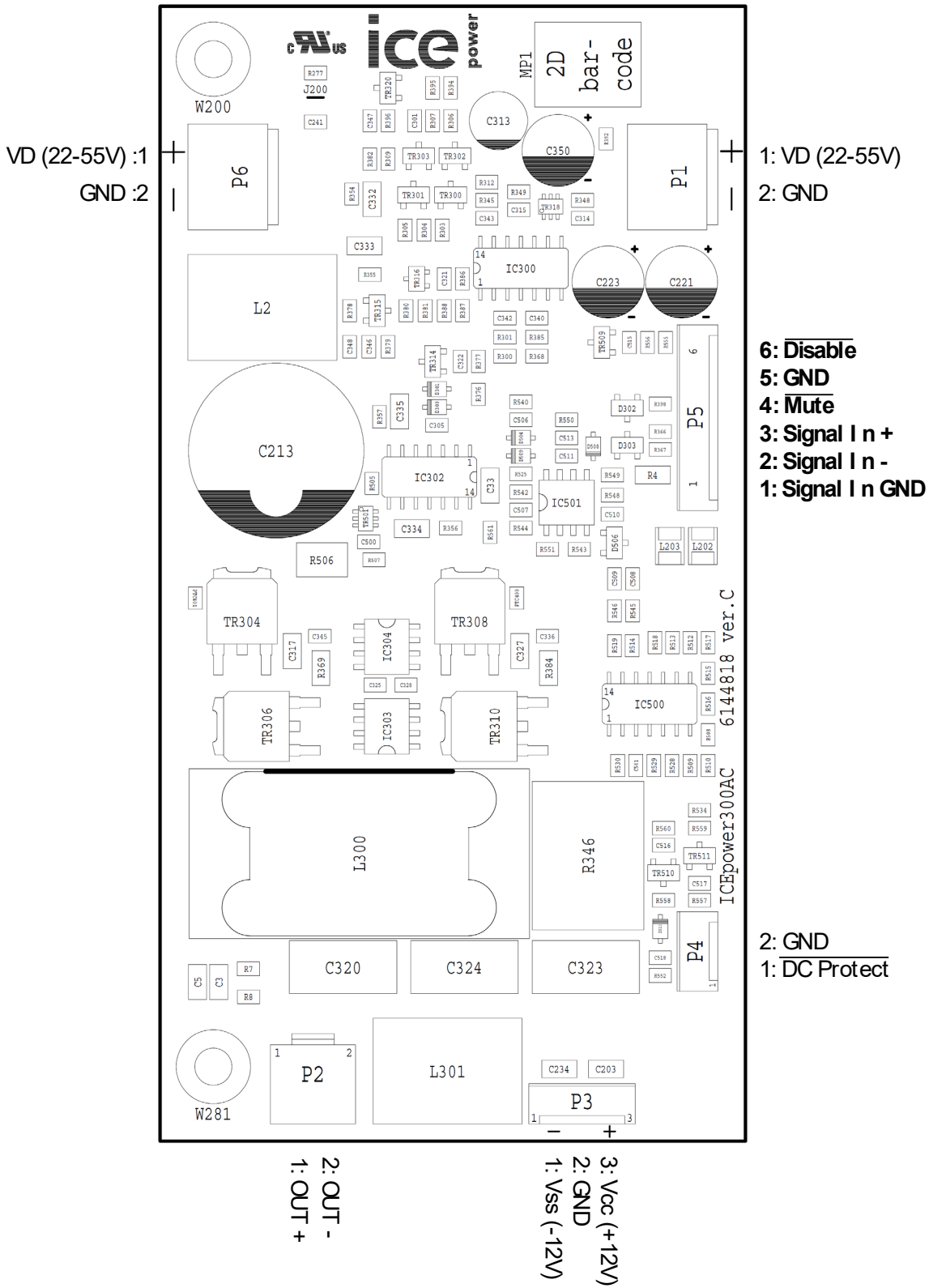


Figure 2: ICEpower300A1 connections

The plug interface of the ICEpower300A1 modules has six industry standard connectors selected for long-term reliability.

#### DC-bus Header Specification (P1 & P6)

Type: JST B 2P-NV			
PIN	Function	Description	Type
1	VD (+22-55V)	Power supply +22V to +55V	Input
2	GND	Ground terminal for the power section	GND

Table 2: DC bus connector specifications

#### Speaker Header Specification (P2)

Type: JST B 2P-VH			
PIN	Function	Description	Type
1	OUT+	Positive balanced audio power output terminal	Output
2	OUT-	Negative balanced audio power output terminal	Output

Table 3: Speaker connector specifications

#### Auxiliary Supply Header Specification (P3)

Type: JST B3B-EH-A			
PIN	Function	Description	Type
1	Vss (-12V)	Power supply -12V	Input
2	GND	Ground terminal for the auxiliary section	GND
3	Vcc (+12V)	Power supply +12V	Input

Table 4: Auxiliary supply specifications

#### Protection Header Specification (P4)

Type: JST B2B-EH-A			
PIN	Function	Description	Type
1	DC protect	Pulled low if DC is present on the amplifier output	Output
2	GND	Ground terminal for DC Protect	GND

Table 5: Signal Sense and Trigger Connector specifications

## Signal Header Specification (P5)

Type: JST B8B-EH-A			
PIN	Function	Description	Type
1	Signal GND	Ground terminal for the input signal.	GND
2	Signal In -	Negative input (full balanced input buffer).	Audio Input
3	Signal In +	Positive input (full balanced input buffer).	Audio Input
4	Mute	Mute audio signal (active low)	Input
5	GND	Ground terminal for Mute and Disable	GND
6	Disable	Disable amplifier power stage (active low)	Input

Table 6: Signal In connector specifications



## Absolute Maximum Ratings

Absolute maximum ratings indicate limits beyond which damage may occur.

### Input Section

Symbol	Parameter	Value	Unit
VD	Maximum voltage from GND to pin	+55	V
Vcc	Maximum voltage from GND to pin	+16	V
Vss	Minimum voltage from GND to pin	-16	V
Vin+ , Vin-	Maximum voltage range on pin	Vss – Vcc	V
Mute	Minimum voltage from GND to pin	Vcc	V
Disable	Minimum voltage from GND to pin	Vcc	V

Table 7: Absolute maximum ratings, input section

### Output Section

Symbol	Parameter	Value	Unit
R <sub>load</sub> <sup>3)</sup>	Minimum load	2.5	Ω
C <sub>L</sub>	Maximal pure capacitive loading	220	nF

Table 8: Absolute maximum ratings, output section

3) The overcurrent protection will act to protect the amplifier. (See "Protection features" page 23)

### Thermal Section

Symbol	Parameter	Value	Unit
T <sub>a</sub>	Max. operating ambient temperature when supplied from 300AS1	50	°C
T <sub>a</sub>	Max. operating ambient temperature when supplied from another DC supply (not 300AS1) and 30x30 mm gap pad applied between PCB at output MOSFET and mounting plate	50	°C

Table 9: Absolute maximum ratings, thermal section

## Power Specifications

Unless otherwise specified.  $T_a=25\text{ }^\circ\text{C}$ ,  $f=1\text{kHz}$ ,  $\text{Load}=4\Omega$ ,  $V_D=55\text{V}$ ,  $V_{cc}=+12\text{V}$ ,  $V_{ss}=-12\text{V}$

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_D$	Normal operating DC supply voltage		+22	-	+55	V
$V_{cc}$	Normal operating pos. analog supply		+11	+12	+14	V
$V_{ss}$	Normal operating neg. analog supply		-14	-12	-11	V
$t_{Pmax}$	Time of maximum rated output power	300W out, no preheating.		120		s
$P_T$	Continuous output power without thermal shutdown	Thermal stab. at $T_a = 25\text{ }^\circ\text{C}$ . Thermal stab. at $T_a = 50\text{ }^\circ\text{C}$ .	- -	105 38	- -	W
$P_{FTC}$	FTC rated output power		-	130	-	W
$I_q$	Quiescent current consumption	$V_D$ $V_{cc}$ $V_{ss}$	- - -	75 75 30	85 85 40	mA
$P_q$	Total quiescent power consumption		-	5.4	6.2	W
$I_{disable}$	Disabled current consumption	$V_D$ $V_{cc}$ $V_{ss}$	- - -	5 50 25	10 60 35	mA
$P_{disable}$	Disabled power consumption		-	1.2	1.7	W
$\eta$	Total power efficiency	$P_o = 300\text{W}$ , $R_L = 4\Omega$ $P_o = 200\text{W}$ , $R_L = 4\Omega$ $P_o = 100\text{W}$ , $R_L = 4\Omega$	- - -	90 89 87	- - -	%

Table 10: Power specifications

## Power supply draw vs. output power

Supply Voltage [Vdc]	Measured supply current draw [Adc]	Rated supply current draw [A]	Measured supply power draw [W]	Rated supply power draw [W]	Test Condition
22.0	1.99	2	43.7	44	12.7 Vrms / 40.6 W I Measurements on: +12Vdc: 60 mAdc -12Vdc:25 mAdc <sup>1)</sup>
43.0	4.67	4.7	200.6	205	27.3 Vrms / 186.6 W I Measurements on: +12Vdc:58 mAdc -12Vdc:26 mAdc <sup>1)</sup>
55.0	6.04	6.1	331.8	335	35.1 Vrms / 308.3 W I Measurements on: +12Vdc: 58 mAdc -12Vdc:27 mAdc <sup>1)</sup>
22.0	0.814	0.9	17.9	18	4.55 Vrms / 5.14 W I Measurements on: +12Vdc: 69 mAdc -12Vdc: 25 mAdc P1: 0.555 Adc <sup>2)</sup>
43.0	1.89	1.9	81.2	82	9.71 Vrms / 23.4 W I Measurements on: +12Vdc: 69 mAdc -12Vdc: 26 mAdc P1: 1.27 Adc <sup>2)</sup>
55.0	2.434	2.5	133.8	135	12.45 Vrms / 38.5 W I Measurements on: +12Vdc: 68 mAdc -12Vdc: 26 mAdc P1: 1.63 Adc <sup>2)</sup>

Table 11: Power / Current supply draw vs. output power

1) 1 kHz sine wave input, all channels driven, (maximum) non-clipped output power, 4 ohm output loads.

Supply +/-12Vdc on P3 (supply on +/-12Vdc after VD input)

2) 1 kHz sine wave input, all channels driven, 1/8 non-clipped output power, 4 ohm output loads.

Supply +/-12Vdc on P3 (supply on +/-12Vdc after VD input) and VD loop-through connector loaded equal to 2 hanger modules.

## Audio Specifications

Unless otherwise specified.  $T_a=25\text{ }^\circ\text{C}$ , Load= $4\Omega$ ,  $V_{cc}=+12\text{V}$ ,  $V_{ss}=-12\text{V}$

Measurements are done using an Audio Precision AES17 20 kHz 7<sup>th</sup> order measurement filter unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_o$	Output power at 1%THD+N  $f = 1\text{kHz}$	VD=55V	-	310	-	W
		VD=45.5V (e.g. 200AS2)	-	220 <sup>3)</sup>	-	
		VD=43.6V (e.g. 200AS1)	-	200 <sup>3)</sup>	-	
		VD=43V (e.g. 700AS1/2)	-	190	-	
		VD=32.5V (e.g. 100AS1/2)	-	105 <sup>3)</sup>	-	
$P_o$	Output power at 1%THD+N  $20\text{Hz} < f < 20\text{kHz}$	VD=55V	-	305	-	W
		VD=45.5V (e.g. 200AS2)	-	210 <sup>3)</sup>	-	
		VD=43.6V (e.g. 200AS1)	-	185 <sup>3)</sup>	-	
		VD=43V (e.g. 700AS1/2)	-	180	-	
		VD=32.5V (e.g. 100AS1/2)	-	100 <sup>3)</sup>	-	
$P_o$	Output power at 0.1%THD+N  $20\text{Hz} < f < 20\text{kHz}$	VD=55V	-	280	-	W
		VD=45.5V (e.g. 200AS2)	-	190 <sup>3)</sup>	-	
		VD=43.6V (e.g. 200AS1)	-	170 <sup>3)</sup>	-	
		VD=43V (e.g. 700AS1/2)	-	160	-	
		VD=32.5V (e.g. 100AS1/2)	-	85 <sup>3)</sup>	-	
$P_o$	Output power at 10%THD+N  $f = 1\text{kHz}$  NOTE: Exceeding 300W will trigger the thermal protection after a short period of time.	VD=55V	-	380	-	W
		VD=45.5V (e.g. 200AS2)	-	290 <sup>3)</sup>	-	
		VD=43.6V (e.g. 200AS1)	-	265 <sup>3)</sup>	-	
		VD=43V (e.g. 700AS1/2)	-	250	-	
		VD=32.5V (e.g. 100AS1/2)	-	140 <sup>3)</sup>	-	

Table 12: Audio specifications

3) For 200AS2 a 1.0 A fast acting fuse, for 200AS1 a 1.6 A fast acting fuse and for 100AS1/2 a 2 A fast acting fuse, MUST be included in the supply line for 300A1 (or optional amplifier module) connected to the Hanger Rail Supply connector. This means that this fuse can blow if 300A1 delivers the output power mentioned in **table 12** for more than a short period of time. Due to the dynamics of music the average output power will be much

lower in practice (e.g. an average 40W output power from 300A1, will draw around 1A from the 200AS2 Hanger Rail Supply). The auxiliary voltages from 100AS1, 100AS2, 200AS1 and 200AS2 must be regulated down with linear +/-12V regulators, for the P3 connector on 300A1.

## General Audio Specifications

Unless otherwise specified.  $T_a=25\text{ }^\circ\text{C}$ ,  $f=1\text{kHz}$ , Load= $4\Omega$ ,  $V_D=55\text{V}$ ,  $V_{CC}=+12\text{V}$ ,  $V_{SS}=-12\text{V}$

Measurements are done using an Audio Precision AES17 20 kHz 7<sup>th</sup> order measurement filter unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$V_{O-max}$	Max output voltage	$R_L = 4\Omega$	-	50	-	$V_p$
$I_{O-max}$	Max output current	(output current limited)	-	20	-	$A_p$
THD+N	THD+N in $4\Omega$	$f = 100\text{Hz}$ , $P_O = 1\text{W}$	-	0.005	-	%
$V_{N,O}$	Output referenced idle noise	A-weighted	-	75	-	$\mu\text{V}$
		Un-weighted, BW=20kHz	-	105	-	
$A_V$	Nominal Voltage Gain	$f = 1\text{ kHz}$	28.0	28.15	28.3	dB
f	Frequency response	20Hz - 20kHz, $Z_L \geq 4\Omega$	-	$\pm 0.5$	$\pm 1.0$	dB
$f_u$	Upper bandwidth limit (-3dB)	$R_L = 8\Omega$	-	70	-	kHz
		$R_L = 4\Omega$	-	55	-	kHz
$f_l$	Lower bandwidth limit (-3dB)	$R_L = \text{All loads}$	-	2	-	Hz
$R_i$	Input impedance, Signal IN+ and IN-		-	47	-	$k\Omega$
$Z_o$	Absolute output impedance	$f = 100\text{Hz}$	-	6	-	$m\Omega$
$Z_L$	Load impedance range		2.5	4	$\infty$	$\Omega$
D	Dynamic range	A-weighted at 300W, $4\Omega$	-	113	-	dB
IMD	Intermodulation Distortion (CCIF)	$f = 18\text{kHz}$ , $19\text{kHz}$ , $P_O = 10\text{W}$	-	0.0015	-	%
TIM	Transient Intermodulation Distortion (TIM)	$f_1 = 3.15\text{kHz}$ square, $f_2 = 15\text{kHz}$ , $P_O = 10\text{W}$	-	0.0035	-	%

Table 13: General audio specifications

## Electrical Specifications

Unless otherwise specified,  $T_a=25\text{ }^\circ\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$f_o$	Switching frequency, amplifier	Idle	-	480	-	kHz
$f_s$	Switching frequency range, amplifier	Idle to full scale variation	100	-	500	kHz
$V_{OFF,DIFF}$	Differential offset on output terminals	Input terminated	-	$\pm 5$	$\pm 20$	mV
$V_{OFF,CM}$	Common mode offset on output terminals	Input terminated	-	$VD/2$	-	V

Table 14: Electrical specifications

## Timing Specifications

Unless otherwise specified,  $T_a=25\text{ }^\circ\text{C}$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Units
$t_{sd}$	Switching delay at start up	Time from all power supplies are good to amplifier starts switching	-	220	-	ms
$t_{audio}$	Audio delay	Time from amplifier starts switching to audio is un-muted during start-up	-	2	-	ms
$t_{mute}$	Mute delay	Output mute delay from mute signal is pulled low	-	5	-	ms
$t_{un-mute}$	Un-mute delay	Output un-mute delay from mute signal is released	-	2	-	ms
$t_{disable}$	Disable delay	Delay from disable signal is pulled low to amplifier stops switching	-	0.1	-	ms
$t_{enable}$	Un-mute delay	Delay from disable signal is released to amplifier starts switching		0.02		ms

Table 15: Timing specifications

## Mechanical Specifications

During development, the ICEpower300A1 has sustained tough mechanical tests to ensure high reliability.

Test	Acceleration	Amount
Unpowered tests: The unit is powered after the test to verify functionality.		
Random vibration	2,1G rms, random profile composed of 5 frequencies in the range 5 Hz to 275 Hz	3 perpendicular directions 3 x 20 min. + 3 x 10 min. + 3 x 10 min.
Bump	10G, 16 ms pulse, half sinusoidal	1000 bumps in 6 directions 2-4 bumps per second
Shock	40G/26ms to 70G/12ms in steps of 10G	6 directions, 3 shocks per direction
Powered tests: The unit is tested with power applied.		
Sinusoidal vibrations	5 - 10 Hz/2,5 mm 10 - 100 Hz/1 g	3 directions, 2 hours per direction
Random vibrations	10 - 20 Hz 0,01g <sup>2</sup> /Hz 20 -150 Hz, - 3 dB/oct. 0,7 g RMS	3 directions, 2 hours per direction

Table 16: Mechanical tests

## Other environmental testing

Extensive environmental testing is performed to ensure the module robustness. These tests include Highly Accelerated Life Test (HALT), thermal shock and cycling, moisture and mechanical shock and vibration.

### Typical Performance Characteristics

All measurements in this section is done for VD=55V

#### Frequency Response

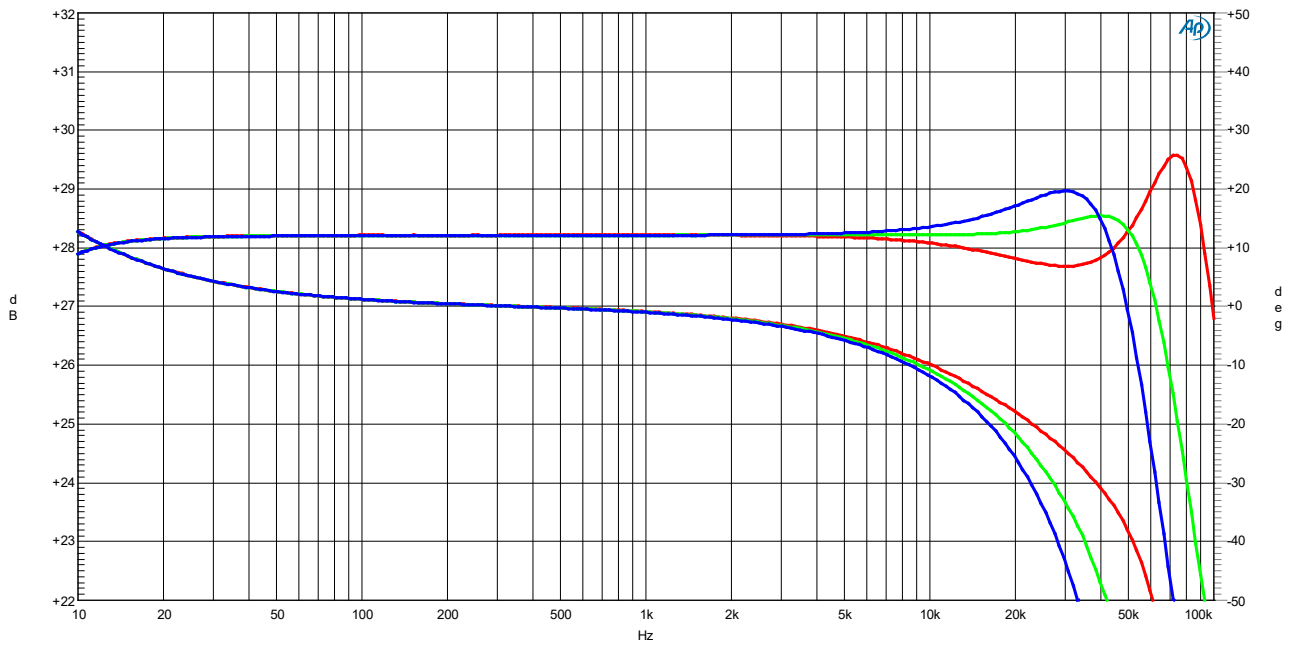


Figure 3: Frequency response in 4Ω (blue), 8Ω (green) and open load (red). Top – amplitude. Bottom – phase



### Harmonic Distortion & Noise

All measurements are done with an Audio Precision AES17 20 kHz 7<sup>th</sup> order measurement filter.

#### THD+N vs. Power

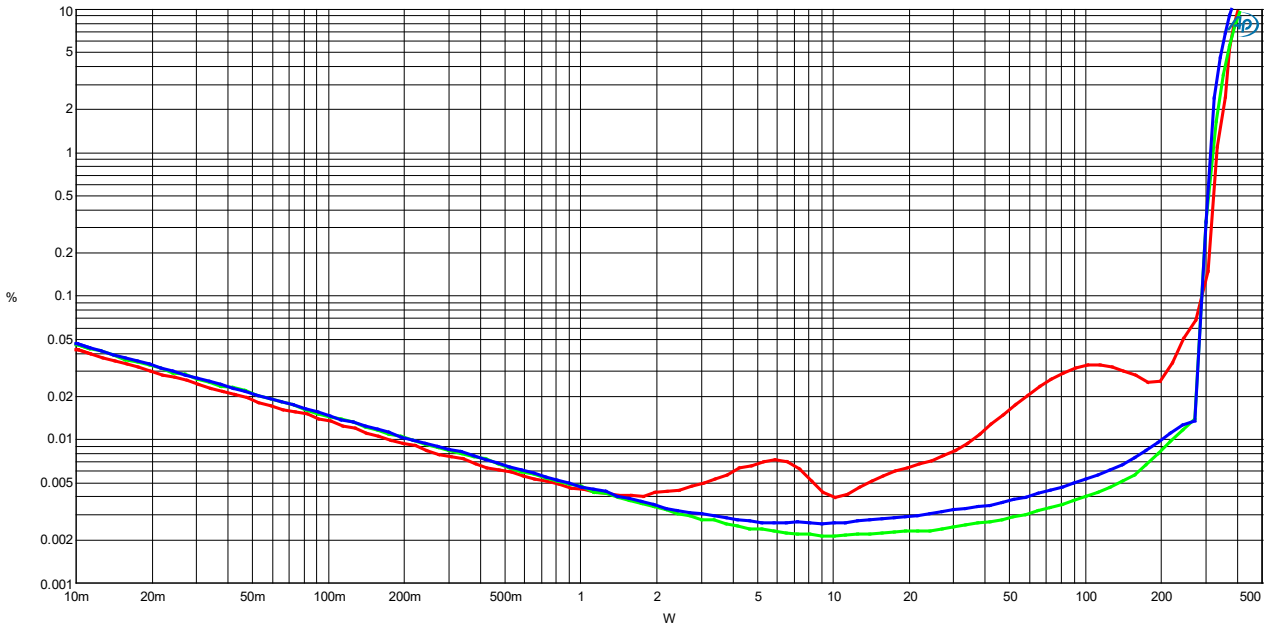


Figure 4: THD+N vs. Po at 100Hz (blue), 1kHz (green) and 6.67kHz (red), 4Ω

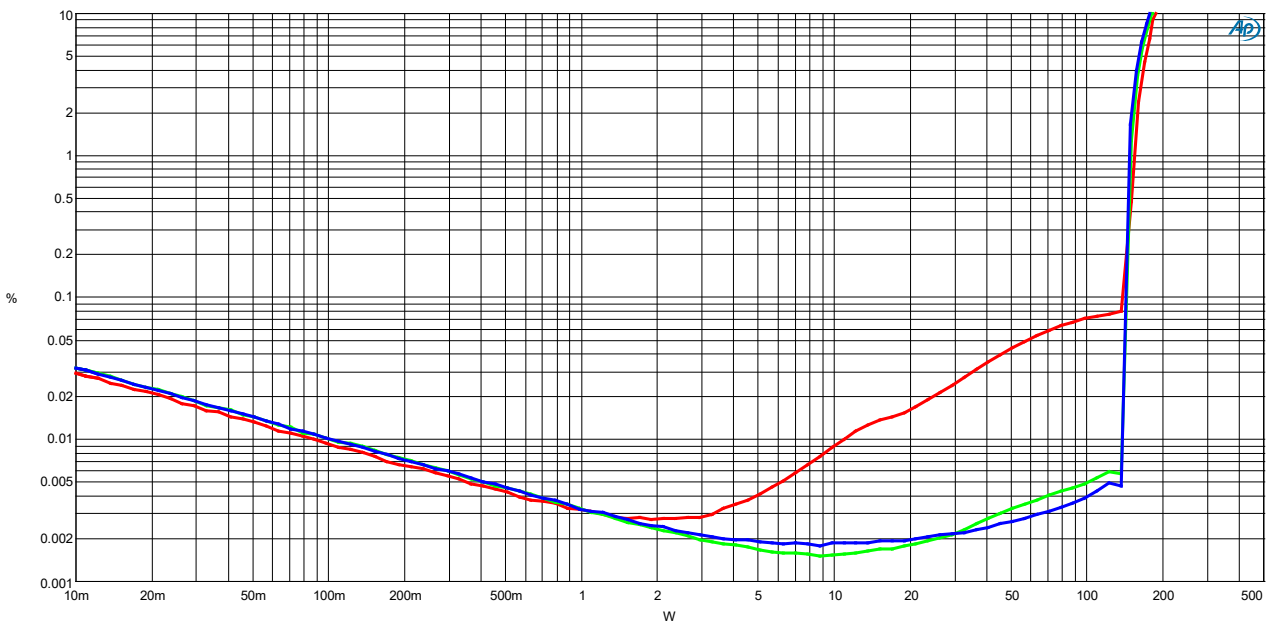


Figure 5: THD+N vs. Po at 100Hz (blue), 1kHz (green) and 6.67kHz (red), 8Ω

### Spectral View (FFT)

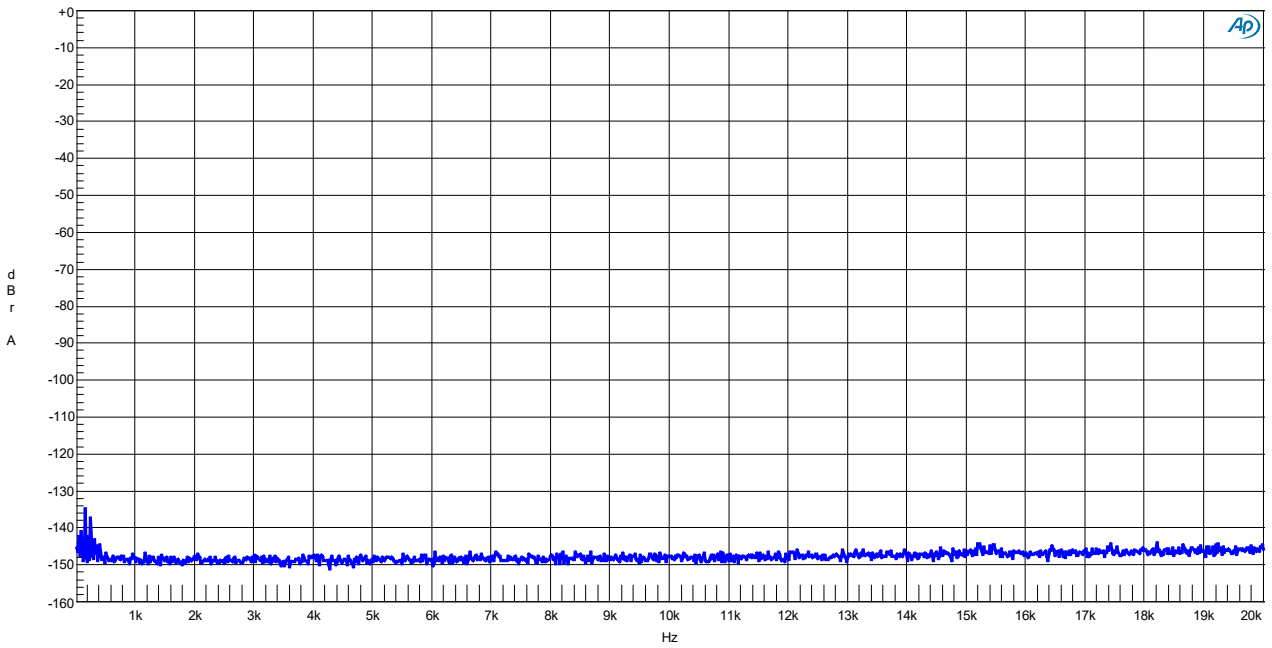


Figure 6: Idle noise (16K FFT). Residual = 75 $\mu$ V(A)

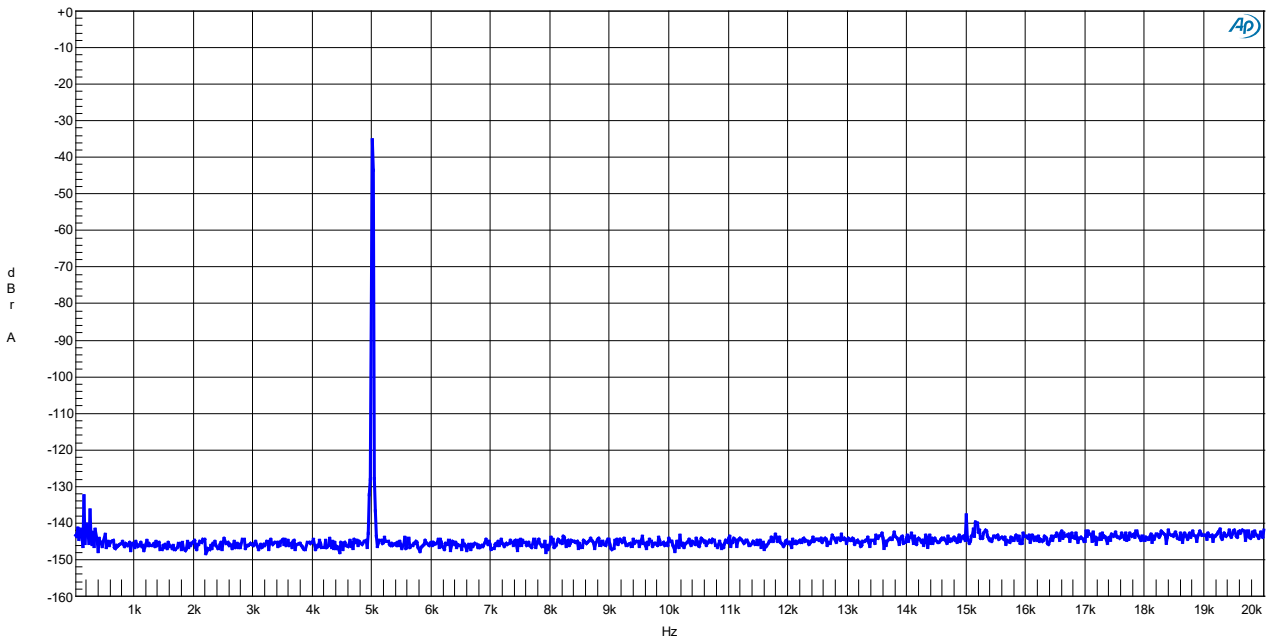


Figure 7: f = 5kHz. Po = 100mW, 4 $\Omega$

### Intermodulation Distortion (CCIF & TIM)

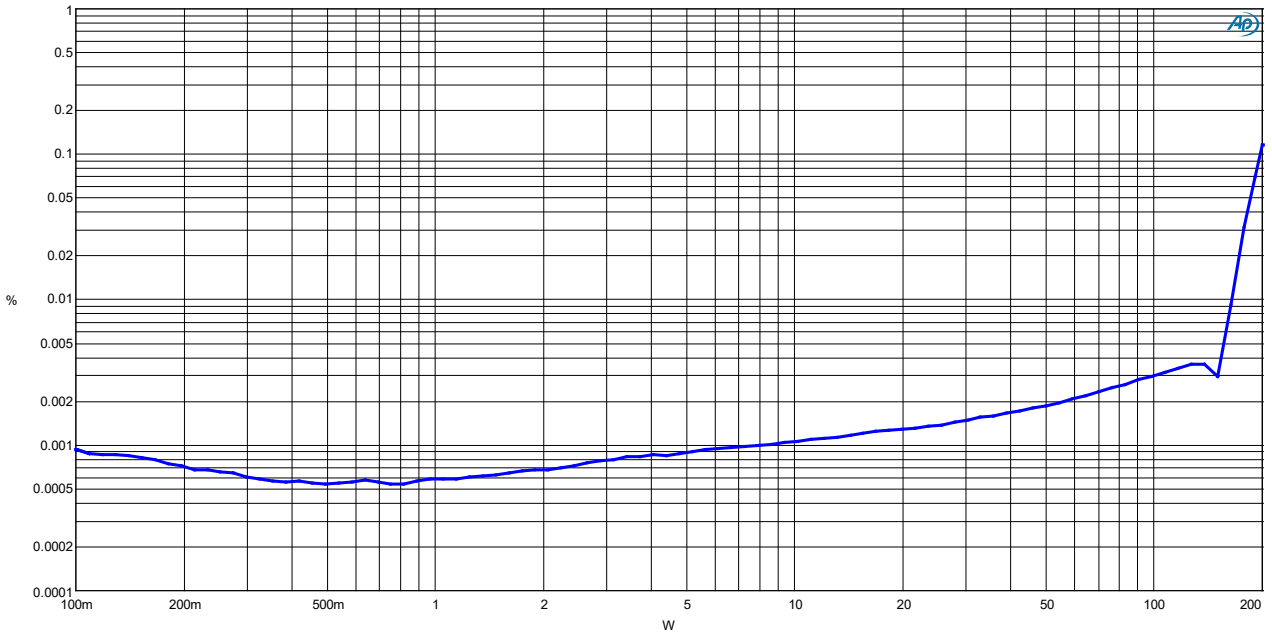


Figure 8: CCIF IMD vs. Output Power,  $R_L = 4\Omega$ ,  $f_1 = 18\text{kHz}$ ,  $f_2 = 19\text{kHz}$ . 1kHz

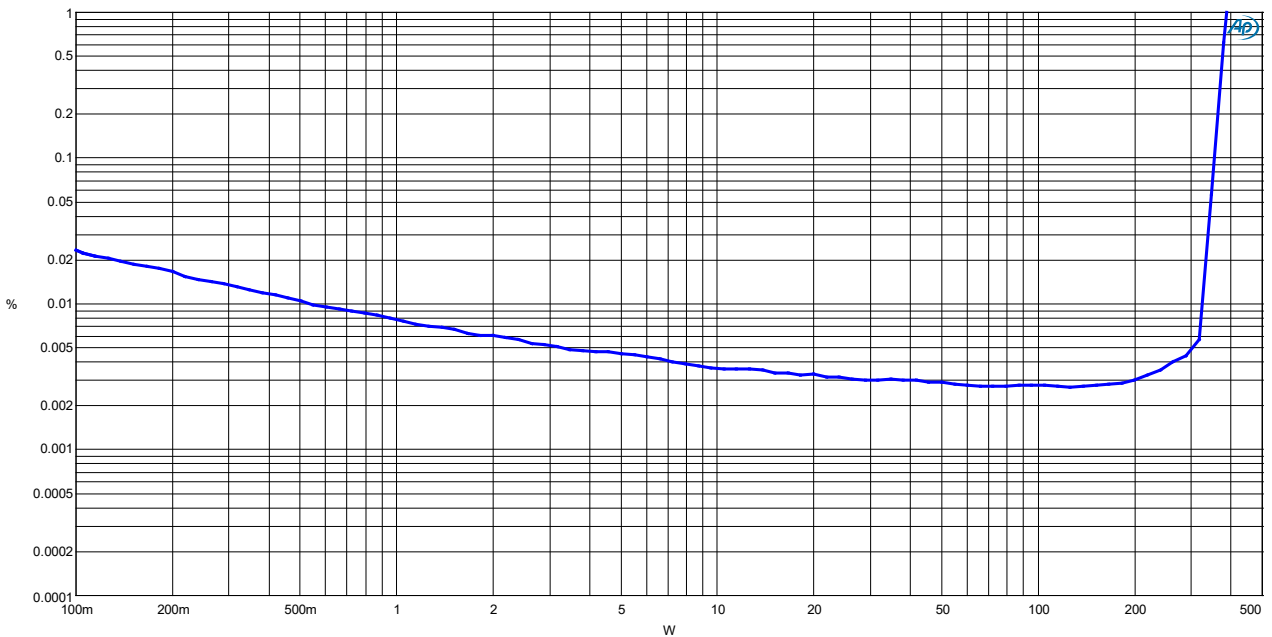


Figure 9: TIM vs. output power.  $R_L = 4\Omega$

### Output Impedance

The output impedance is measured using a delta load method where the difference in output amplitude at two different resistive loads is used to calculate the equivalent output impedance of the amplifier. The output impedance is measured directly at the terminals on the PCB.

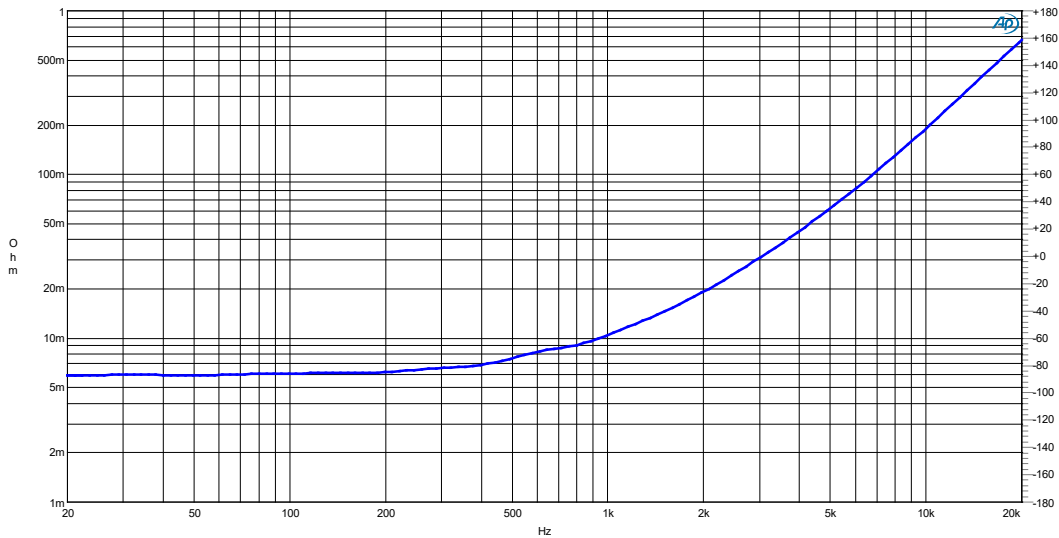


Figure 10: Output impedance at the output terminals

### Damping Factor

The damping factor is calculated as the ratio between the output impedance of the amplifier and the load impedance.

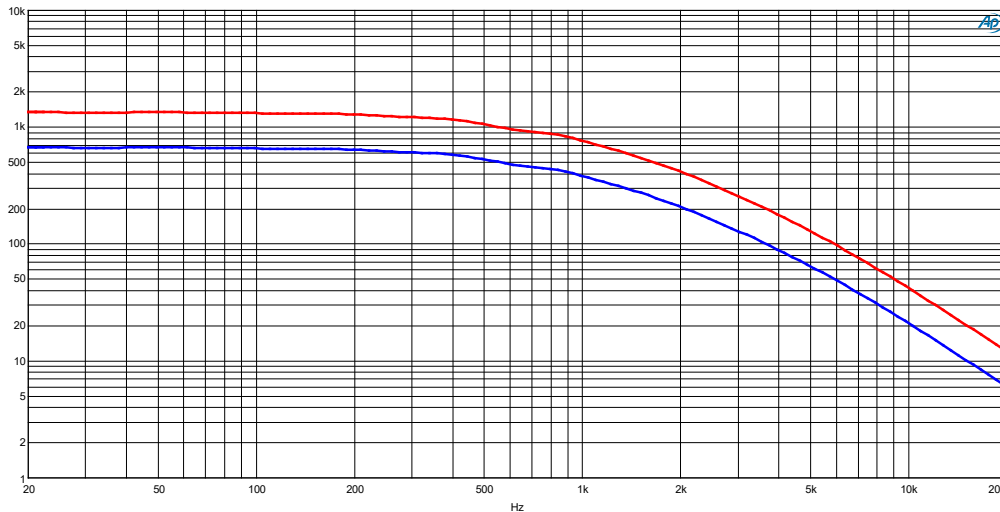


Figure 11: Damping factor vs. frequency 4Ω (blue) and 8Ω (red)

With its low output impedance, the ICEpower300A1 is designed to be unaffected by loudspeaker loading characteristics. However, care should be taken with purely capacitive loads.

The maximum purely capacitive load allowed is 220nF.

### Power Efficiency

The total power efficiency from all DC supplies to amplifier output is given below.

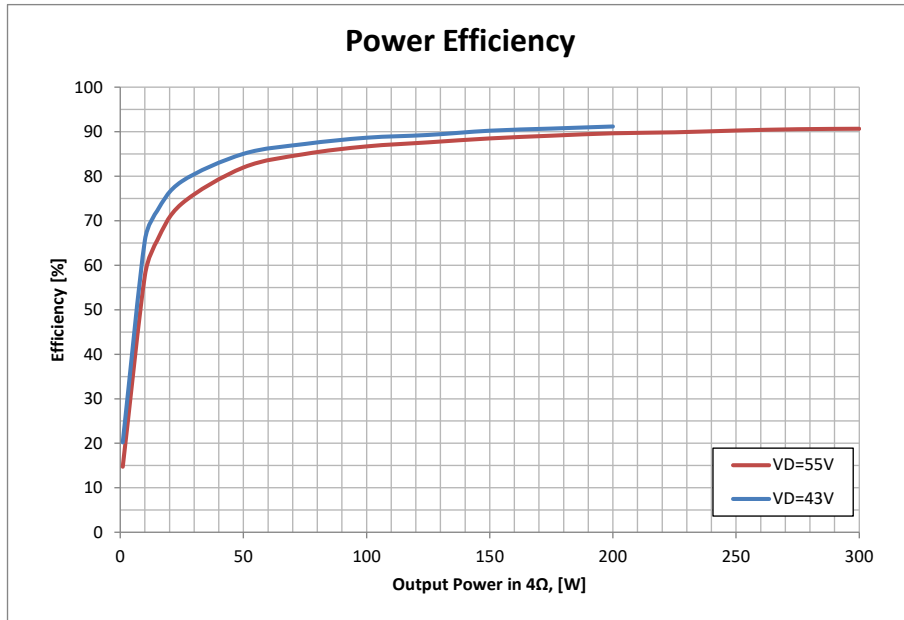


Figure 12: Efficiency vs. output power

### Dissipated Power

The total dissipated power within the module from all DC supplies to amplifier output is given below.

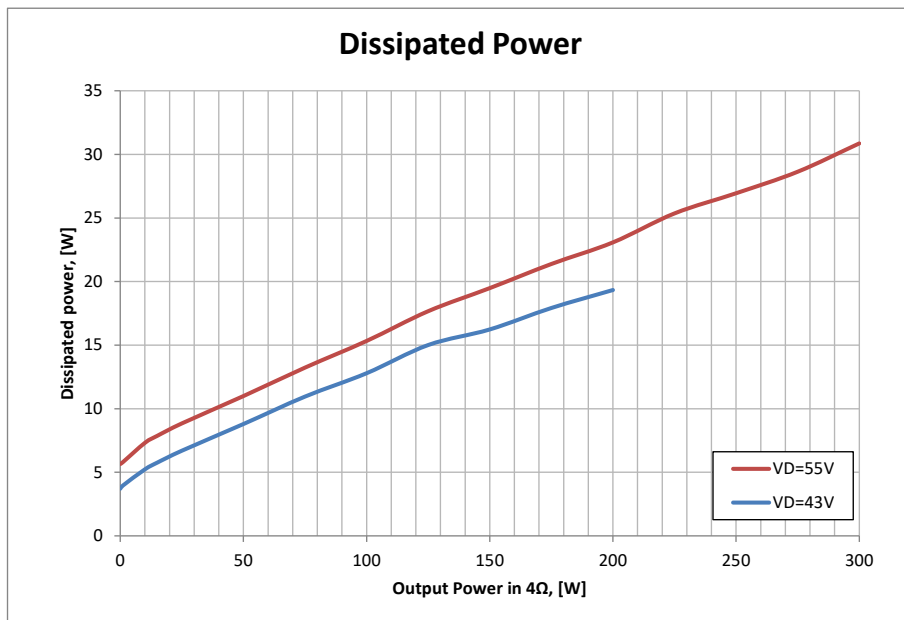


Figure 13: Dissipated power vs. output power

## Input/Output Schematics and Features

### Input Stage

The balanced input section provides signal buffering and anti-aliasing filtering. The balanced configuration helps to avoid hum and noise pick-up from poorly shielded cables. An unbalanced input can be obtained by applying a short between Signal In- and Signal GND. This does not affect the overall gain.

The input impedance is  $R_i=47\text{kohm}$  at low frequencies and  $|Z_i|>25\text{k}\Omega$  over the full audio band.

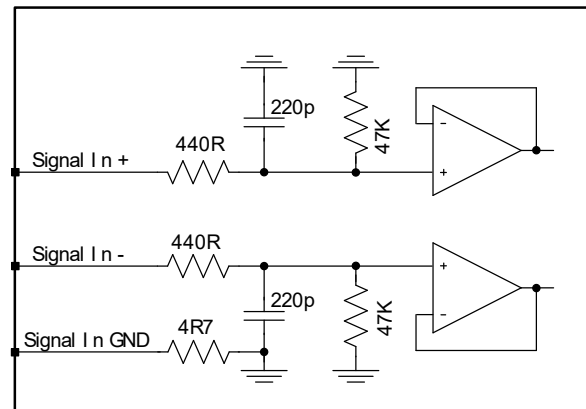


Figure 14: Balanced input buffer

### Output Stage

The output stage is a full bridge topology with a 2<sup>nd</sup> order filter, thus the power output on the terminals Vo+ and Vo- is balanced. The filter design is a part of the proprietary MECC topology and has been chosen as a compromise between demodulation characteristics, efficiency and filter compactness.

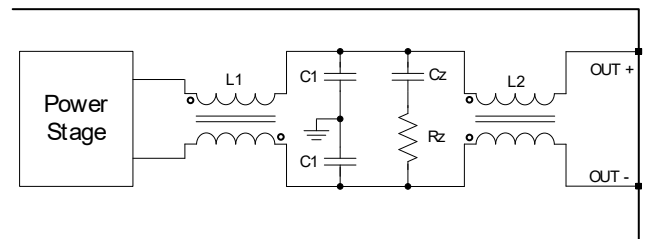


Figure 15: Output filter section with compensating Zobel network

**Warning:** The balanced speaker outputs are both “hot” with a common-mode DC level equal to  $V_D/2$ . Shorting one of the terminals to ground will cause high stress to the module and should be avoided. Balanced probes should always be used for monitoring and measurements.

### VD (22-55V)

The high power DC input is looped through the module to allow daisy chaining. On-board EMI filtering ensures easy design-in of the 300A1 module.

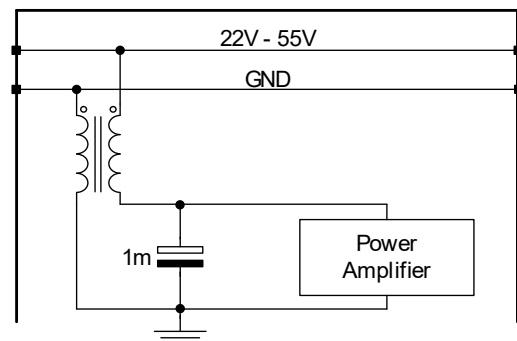


Figure 16: VD (22V-55V) input

### ±12V Auxiliary Input

The ±12V inputs have on-board filtering to reduce EMI and provide low noise supplies for the signal circuitry.

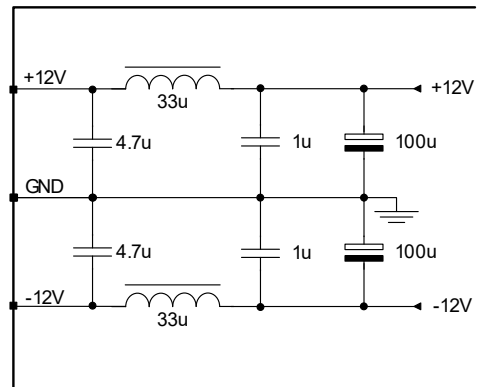


Figure 17: ±12V Auxiliary input

### Mute and Disable Control Signals

The mute and disable pin are active low and both have internal pull-up resistors. If the pins are left open, the 300A1 will power on and un-mute automatically.

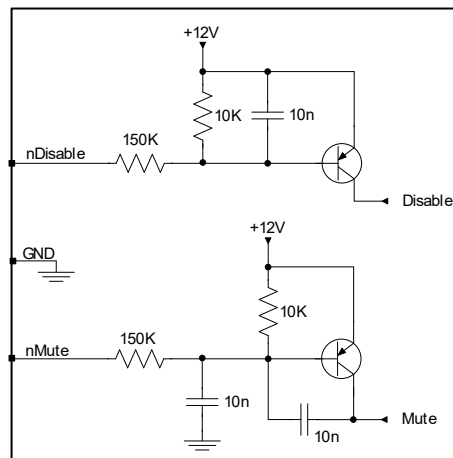


Figure 18: Mute and Disable input

### DC Protect Status Signal

In the event that a differential DC voltage is present on the output terminals, the DC Protect output will go low. The internal pull-up resistor keeps the signal high during normal operation. This output is designed to drive the trigger inputs of e.g. the 300AS1 and thereby shut down the main power supply if there is a DC error on the 300A1 module.

When triggered the DCprotect signal will stay low until VD has been fully discharged and the module is powered up again.

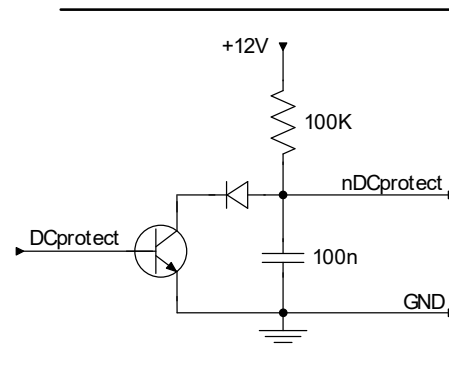


Figure 19: DC Protect output

### Protection Features

The ICEpower300A1 is equipped with several protection features for surviving overload without damage.

The schematic below illustrates the different protection features.

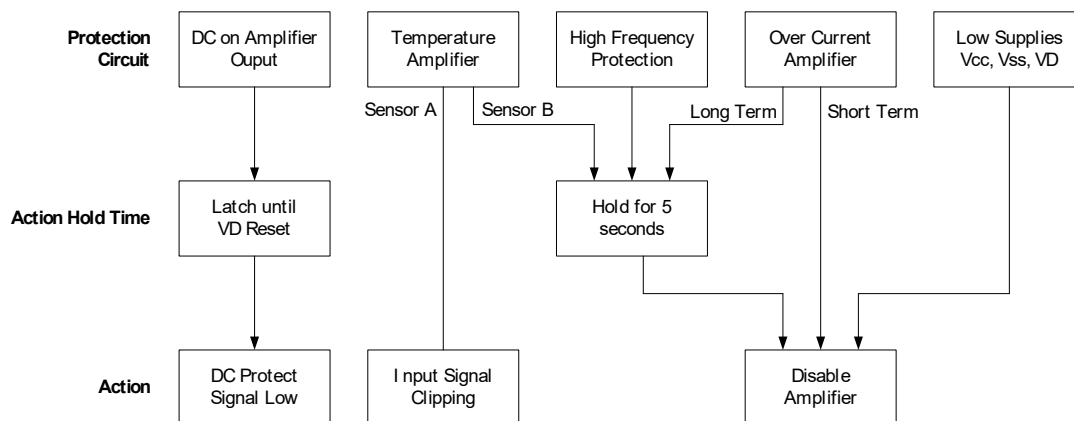


Figure 20: Block diagram of protection features

### DC on Amplifier Output

The audio input itself is AC coupled and to further reduce DC offset on the amplifier output a DC servo acts to keep the DC voltage below  $\pm 20\text{mV}$ . However, if a differential DC voltage of more than 3V is present on the amplifier output, the DC protect signal will be driven low. This signal can be used externally to turn off a power supply such as the 300AS1.

### Thermal Protection

The ICEpower300A1 is equipped with two thermal protection circuits to monitor the amplifier temperature. If the amplifier overheats, the first circuit acts by muting the input signal for a short duration and thereby



reduce the overall output power. The second disables the amplifier switching completely for approximately 5 sec.

In both cases, the amplifier will return to normal operation automatically.

Thermal shut down is only expected to occur in case of abuse or under fault conditions.

#### High-Frequency Protection (Amplifier)

The amplifier has full power bandwidth from 20Hz to 20kHz. However, the output filter of the amplifier is not designed for long-term high frequency signals (>20kHz) with full amplitude. This is due to the power capabilities of the output Zobel-network. In such cases, the high-frequency protection circuit disables the amplifier for 5 seconds and then restarts.

#### Overcurrent Protection

This feature protects the amplifier in case the output current exceeds 20A. When the current reaches 20A, the amplifier power stage will be briefly disabled and then continue normal operation. This means that the amplifier will perform automatic current clipping.

If the output is shorted or is in continuous over current, the amplifier will shut down for 5 second before continuing operation.

#### Low Supplies (Vss, Vcc, VD)

Under voltage lockout is implemented to ensure that all supply voltages for the amplifier is within an acceptable range before the amplifier is enabled. If one of the low voltage supplies are below  $\pm 10V$  or the VD supply drops below +18V, the amplifier is disabled.

#### Thermal Design

The ICEpower300A1 is a self-cooled module thus eliminating the need for special attention to thermal design.

If the average power exceeds 105W in  $4\Omega$  (typical) for a long period of time at 25°C ambient temperature, the module will reach its maximum allowable temperature and the temperature protection will be activated. At 50°C ambient temperature, more than 38W in  $4\Omega$  (typical) average power will activate the temperature protection.

To get optimal airflow and cooling of the module, vertical mounting is recommended.

### Physical Dimensions

All dimensions are in mm.

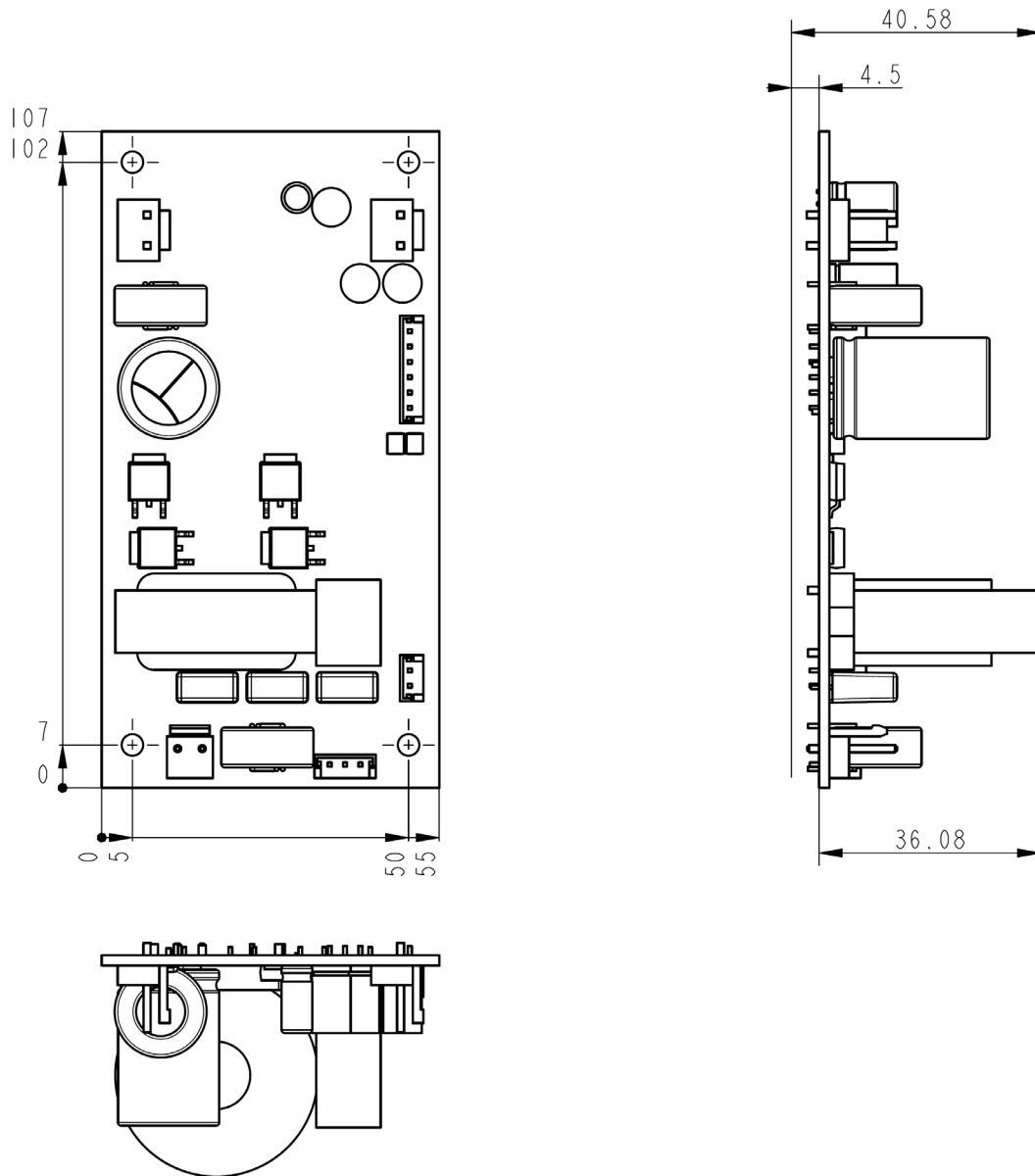


Figure 21: Physical dimensions in mm.

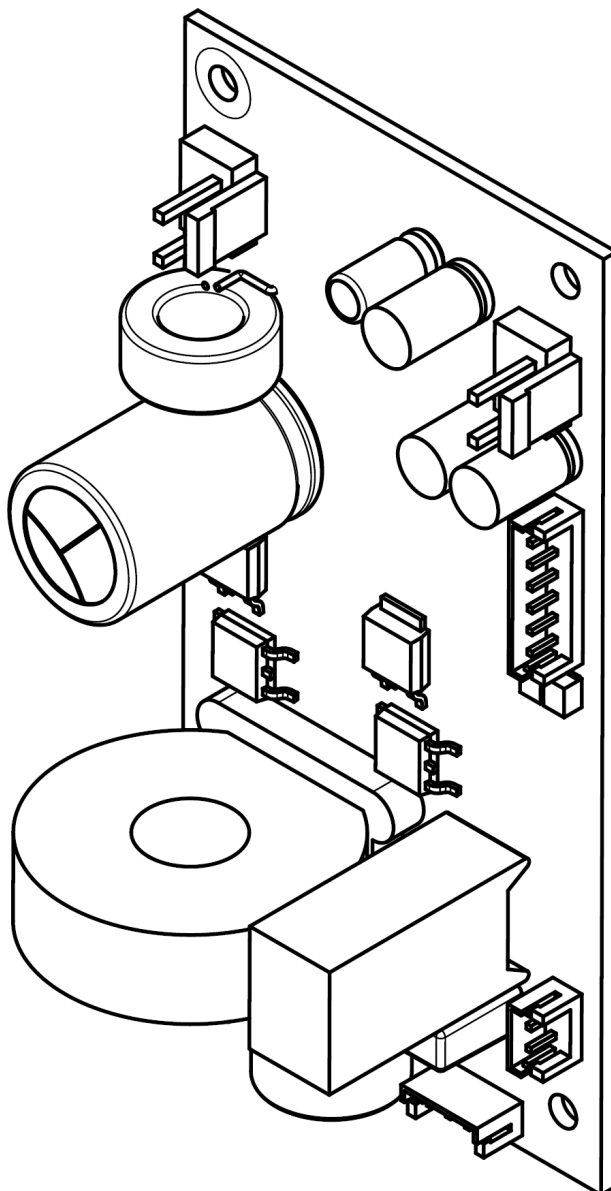


Figure 22: 3D view of the board.

Note: Always ensure sufficient clearance for insulation and to ensure adequate ventilation

## Safety Standards

The ICEpower300A1 has been pre-approved for safety by UL to ease the design-in procedure and complies with the following standards:

### Europe:

IEC 62368-1:2014 (Second Edition)

IEC 60065 7th ed. + AM1 + AM2

IEC 60065 8th ed.

US: UL60065 7<sup>h</sup> ed.

### CA:

UL 62368-1 & CAN/CSA C22.2 No. 62368-1-14

CAN/CSA-C22.2 No. 60065-03, 1st Edition + A1:2006 + A2:2012

Safety class: Class 2 (without earth)

## EMI Standards

EMI Conforms to:

EN55013

EN55020

EN61000-3-2

EN61000-3-3

CISPR 13

CISPR 20

IEC 61000-3-2

IEC 61000-3-3

FCC part 15-B

EN 55032: Note 1

Note1: Depends on cable routing on the mains/amplifier outputs and load characteristics. Connecting safety ground to the mains side/ Additional filtering may be needed.

## ESD Warning

ICEpower products are manufactured according to the following ESD precautions:

- ANSI/ESD-S20.20-2007: Protection of Electrical and Electronic Parts, Assemblies and Equipment.

Further handling of the products should comply with the same standard.

The general warranty policy of ICEpower a/s does not cover ESD damaged products due to improper handling.

## Packaging and Storing

Package	Dimensions (w x d x h)	Gross Weight
Carton (30 modules)	29 x 39 x 15 cm	3.8 kg
Pallet (12 cartons)	Tbd	Appr. 67.6 kg

Table 17: Package dimensions and weight

ESD safe cardboard is used for wrapping.

### Storage humidity

Do not expose the pallets to rain or humidity levels higher than 85%.

### Storage temperature

The pallets are to be stored at temperatures from 0°C to 70°C.

### Stacking

Pallets may not be stacked on top of each other.

## Contact

For additional information about the ICEpower® technology from ICEpower a/s, please visit our web site or contact us.

**ICEpower a/s, Vandtårnsvej 62A 3B**

**DK-2860 Søborg**

Phone +45 31710001

Website: [www.ICEpower.dk](http://www.ICEpower.dk)

E-mail: [info@ICEpower.dk](mailto:info@ICEpower.dk)

## Legal Notes

ICEpower a/s believes that the information in this datasheet is accurate and reliable. However it is provided "as is" without any warranties of any kind. ICEpower a/s and its suppliers, to the fullest extent permitted by law, disclaim all warranties, including the warranty of merchantability, warranty of non-infringement of third-party rights, and the warranty of fitness for a particular purpose. ICEpower a/s and its suppliers make no warranties about the accuracy, reliability, completeness, or timeliness of the material, services, software, text, graphics and links. In no event will ICEpower a/s be liable to any party for any damages whether direct, indirect, special, consequential or other for any use or inability to use of this datasheet, including, without limitation, any damages for lost profits, business interruption, loss of programs or other data on your information handling system or otherwise, even if we are expressly advised of the possibility of such damages.

Information in this datasheet may contain technical inaccuracies or typographical errors. The information in the datasheet may be changed at any time without prior notice or obligation.

ICEpower® is a trademark of ICEpower a/s.

ICEpower a/s products are not authorized for use as critical components in life support devices or life support systems without the express written approval of the president and general counsel of ICEpower a/s. As used herein:

- Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labelling, can be reasonably expected to result in a significant injury to the user.
- A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

ICEpower a/s ©2018