Test Data
For PMP10710
08/01/2015

Table of Contents

1. Design Specifications

Vin Minimum	**10.4V(Start up at 6v and delivers peak power at 10V)**
Vin Maximum	**15V**
Vin Nominal	**12V (Lead Acid Battery)**
Vout	**30V**
Iout	**6.5A**
Switching Frequency(SMPS)	**200 KHz**
Audio Amplifier Total Power	**200W**
Audio Amp Output	**100W +100 W Stereo(on 4 ohm BTL) or 200W Woofer (on 2 ohm PBTL)**
Audio Amp Input	**Stereo Inputs. Processing for Single input to differential is made .**

2. Circuit Description

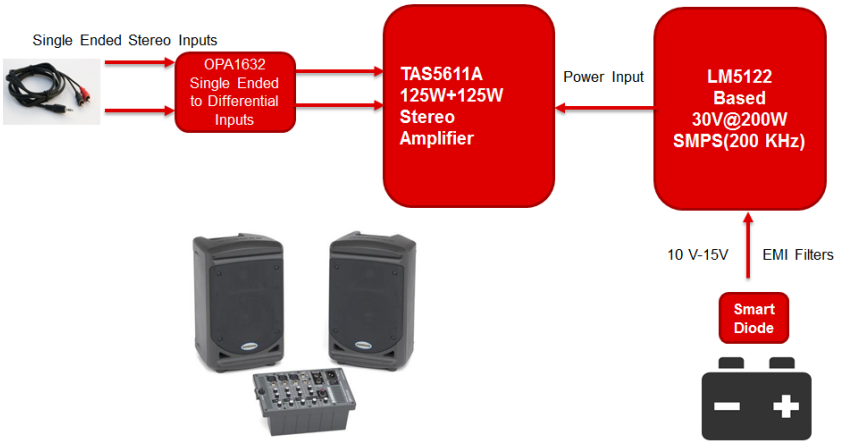
PMP10710 is a 200W design for public announcement audio system which can be used in 100W +100W Stereo or 200W Woofer Applications. The design is broadly divided into four main stages:

1. Single-Phase Synchronous Boost Converter using the LM5122 controller IC. The design accepts an input voltage of 10V to 15 VIN (12 VIN Nominal) and provides an output of 30V capable of supplying 6.5A of continuous current to the load.

2. 100W + 100W Stereo Audio Amplifier with TAS5611 Class D device.

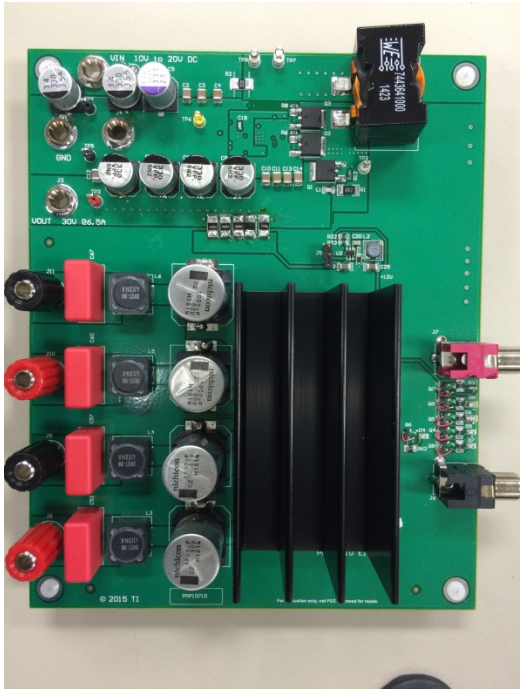
3. Single ended to differential conversion (with active low pass filter) for Stereo inputs using OPA1632 differential amplifier.

4. Simple Switcher LM16006 is used for all Aux supply needs .

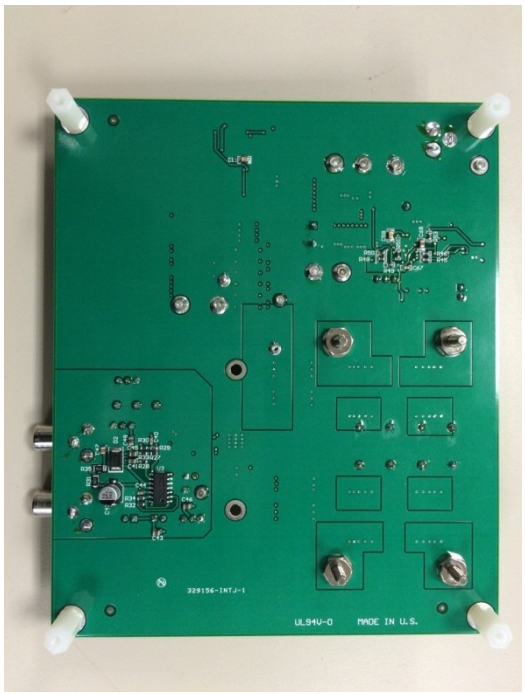


3. PMP10710 Board Photos

Board Dimensions: 6840mil *5555mil

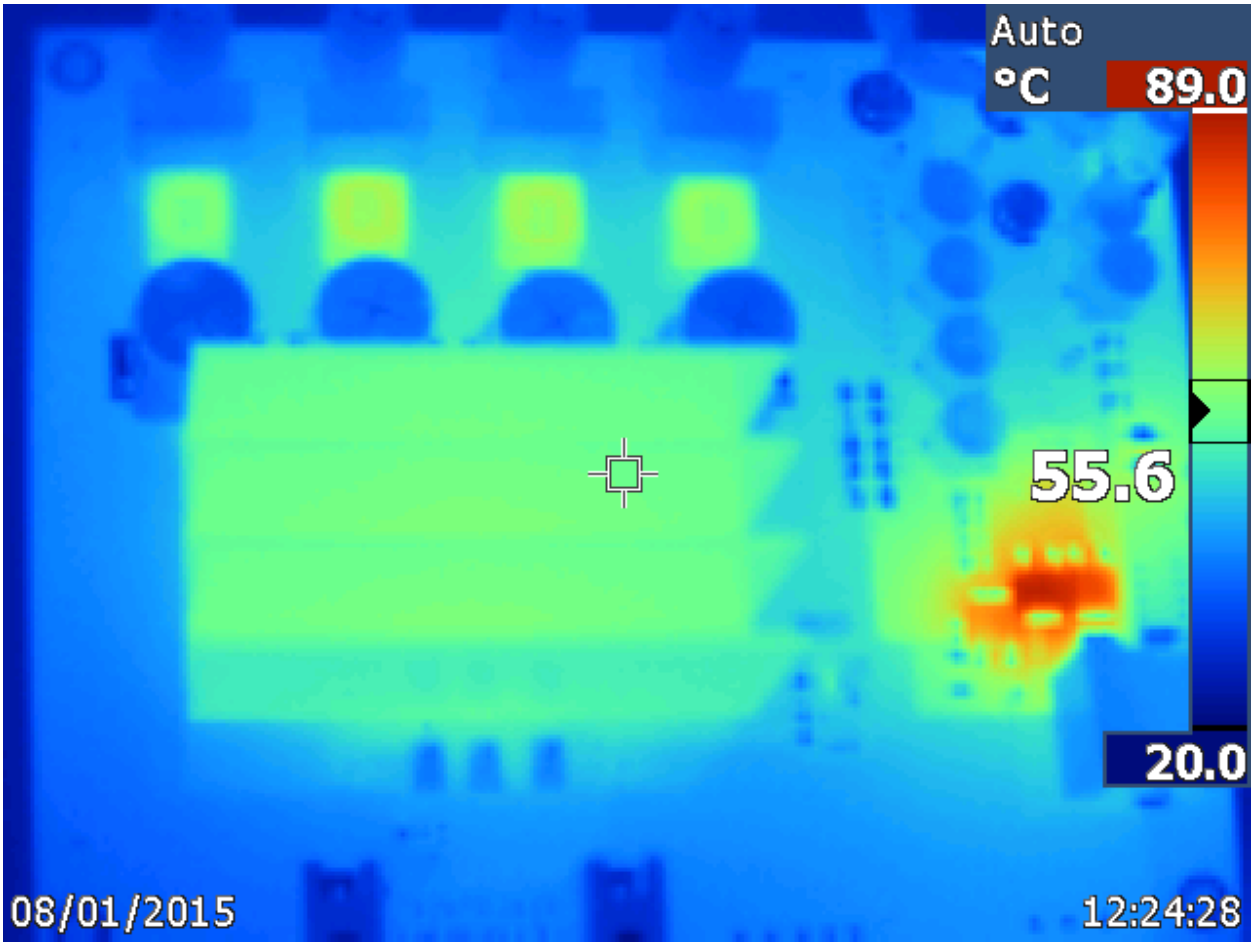


Board Photo (Top)



Board Photo (Bottom)

4. Thermal Data

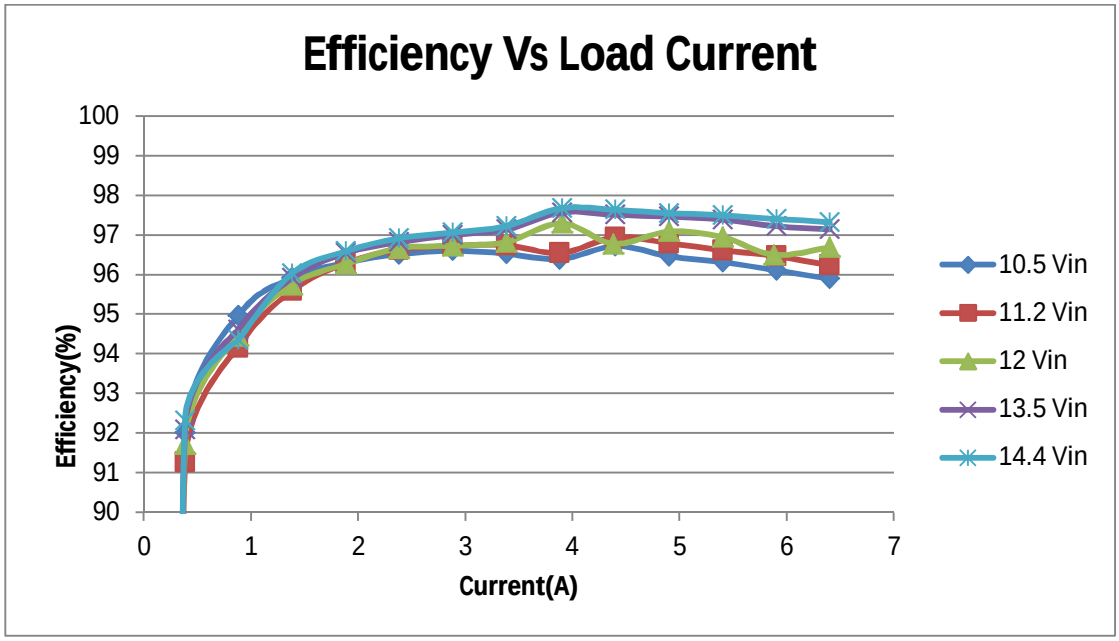


IR thermal image taken at steady state with 12 Vin and 100W +100W Stereo output

5. Test results – Boost

5.1 Efficiency

5.1.1 Efficiency Chart



5.1.2 Efficiency Data

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
10.503	0.05	30.258	0	0
10.503	1.19	30.259	0.38	91.998
10.503	2.67	30.261	0.88	94.96
10.503	4.145	30.262	1.38	95.927
10.503	5.625	30.263	1.88	96.302
10.503	7.105	30.264	2.38	96.522
10.503	8.59	30.266	2.88	96.614
10.503	10.09	30.267	3.38	96.534
10.503	11.6	30.269	3.88	96.396
10.503	13.11	30.27	4.4	96.727
10.503	14.64	30.272	4.9	96.468
10.503	16.16	30.274	5.4	96.318
10.503	17.695	30.276	5.9	96.114
10.503	19.24	30.279	6.4	95.897

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
11.204	0.05	30.269	0	0
11.204	1.125	30.27	0.38	91.258
11.204	2.525	30.271	0.88	94.162
11.204	3.9	30.271	1.38	95.602
11.204	5.275	30.271	1.88	96.292
11.203	6.655	30.272	2.38	96.635
11.204	8.045	30.273	2.88	96.727
11.203	9.44	30.273	3.38	96.753
11.203	10.86	30.274	3.88	96.547
11.203	12.265	30.275	4.4	96.947
11.203	13.68	30.276	4.9	96.8
11.203	15.105	30.278	5.4	96.62
11.203	16.53	30.279	5.9	96.469
11.203	17.975	30.281	6.4	96.238

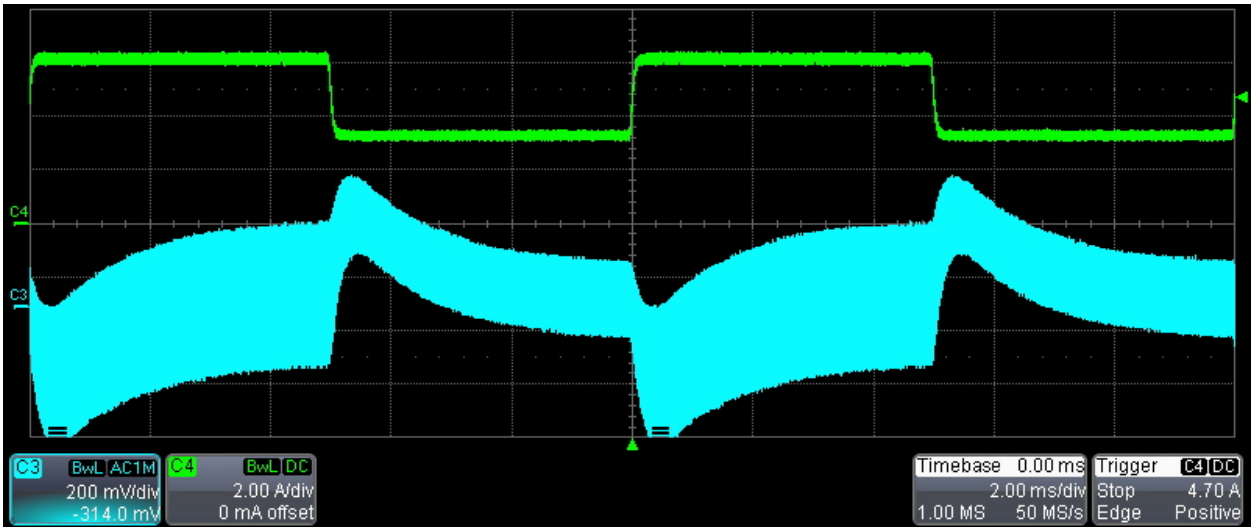
Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
12.003	0.05	30.272	0	0
12.003	1.045	30.273	0.38	91.713
12.003	2.35	30.273	0.88	94.445
12.003	3.635	30.273	1.38	95.75
12.003	4.925	30.273	1.88	96.276
12.002	6.21	30.273	2.38	96.669
12.002	7.51	30.274	2.88	96.732
12.002	8.805	30.274	3.38	96.829
12.002	10.11	30.275	3.9	97.307
12.003	11.415	30.276	4.38	96.785
12.003	12.73	30.277	4.9	97.094
12.003	14.05	30.278	5.4	96.952
12.003	15.37	30.279	5.88	96.506
12.002	16.7	30.281	6.4	96.69

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
13.506	0.05	30.274	0	0
13.505	0.925	30.274	0.38	92.091
13.505	2.085	30.274	0.88	94.613
13.506	3.225	30.274	1.38	95.916
13.505	4.365	30.274	1.88	96.549
13.505	5.51	30.274	2.38	96.828
13.505	6.655	30.274	2.88	97.011
13.505	7.8	30.275	3.38	97.143
13.505	8.96	30.275	3.9	97.577
13.505	10.115	30.275	4.4	97.516
13.505	11.27	30.276	4.9	97.471
13.505	12.43	30.277	5.4	97.396
13.505	13.605	30.278	5.9	97.227
13.505	14.77	30.279	6.4	97.151

Vin(V)	Iin(A)	Vout(V)	Iout(A)	Efficiency(%)
14.407	0.045	30.273	0	0
14.406	0.865	30.274	0.38	92.32
14.406	1.96	30.274	0.88	94.352
14.406	3.02	30.274	1.38	96.028
14.406	4.09	30.273	1.88	96.593
14.406	5.16	30.273	2.38	96.926
14.406	6.235	30.274	2.88	97.069
14.406	7.305	30.274	3.38	97.235
14.406	8.39	30.274	3.9	97.685
14.406	9.47	30.275	4.4	97.644
14.406	10.555	30.275	4.9	97.562
14.406	11.64	30.276	5.4	97.498
14.406	12.73	30.277	5.9	97.408
14.406	13.82	30.278	6.4	97.332

5.2 Waveforms

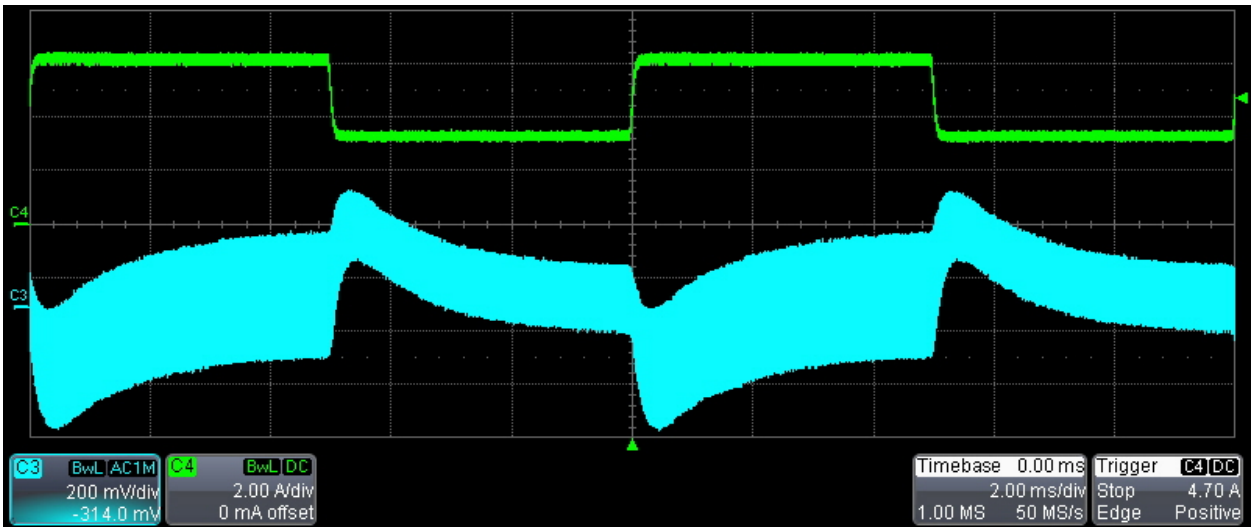
5.2.1 Load Transient Response



Load Transient Response at 10.5 Vin and 50%-to-100% (3.2A-to-6.5A) Load Step

C4- Iout

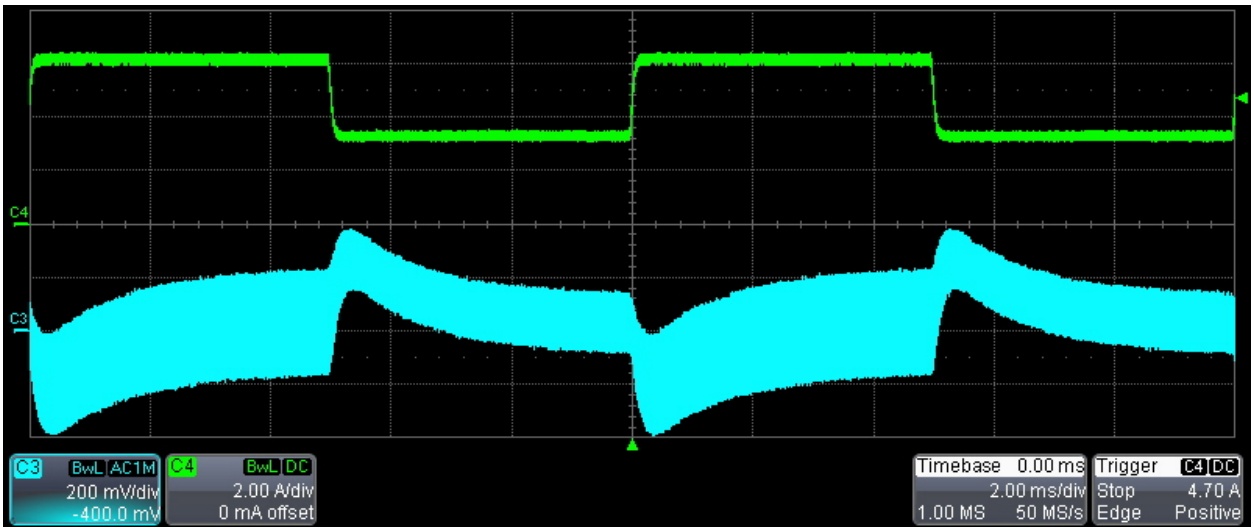
C3- Vout(AC coupled)



Load Transient Response at 12 Vin and 50%-to-100% (3.2A-to-6.5A) Load Step

C4- Iout

C3- Vout(AC coupled)

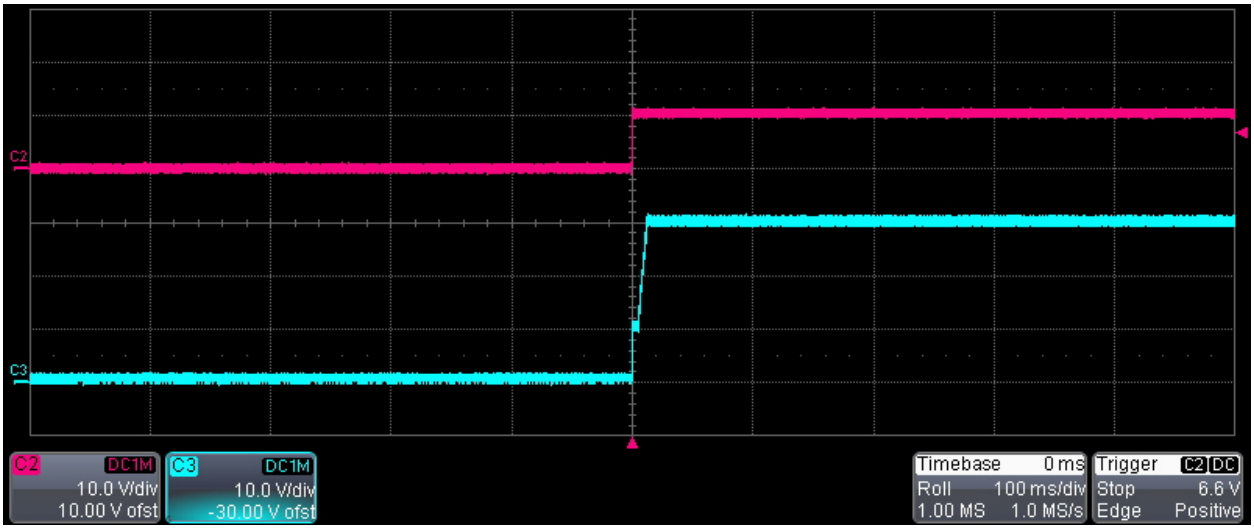


Load Transient Response at 14 Vin and 50%-to-100% (3.2A-to-6.5A) Load Step

C4- Iout

C3- Vout(AC coupled)

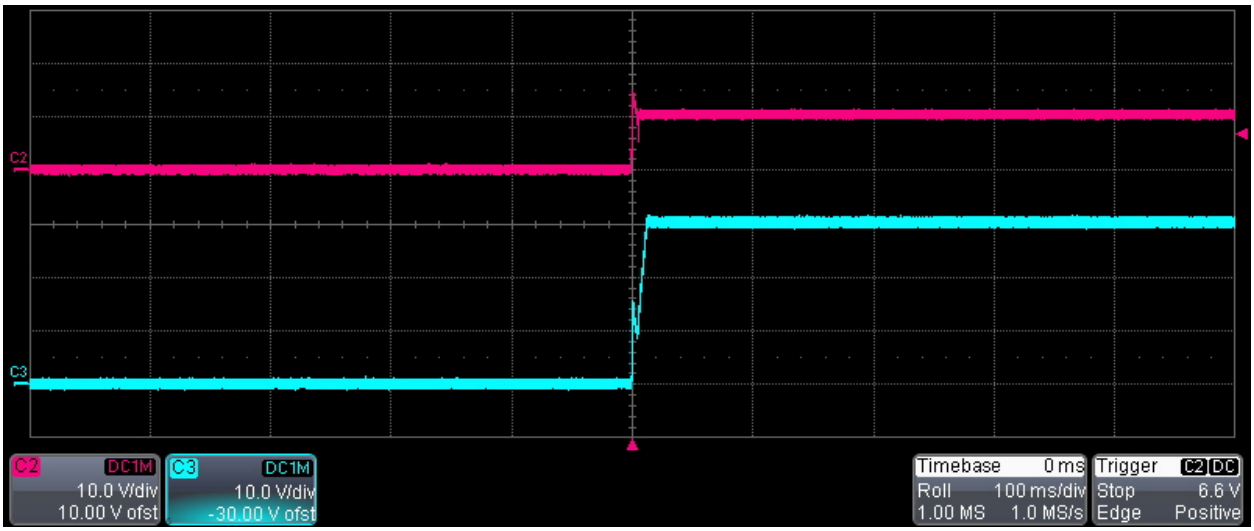
5.2.2 Startup



Startup into No Load at 10 Vin

C3- Vin

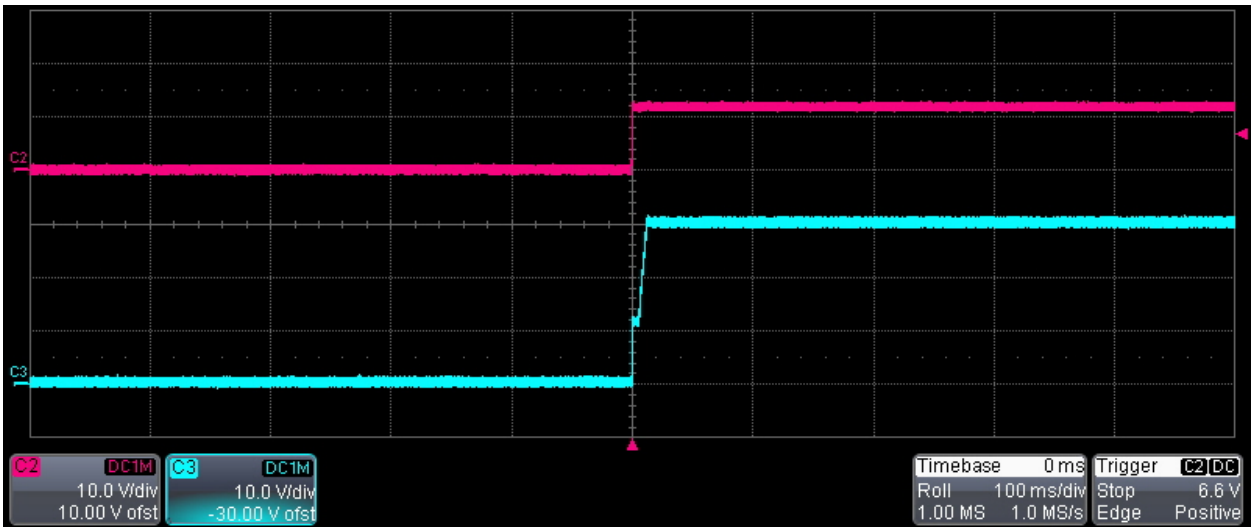
C2-Vout



Startup into Full Load(6.5A) at 10 Vin

C3- Vin

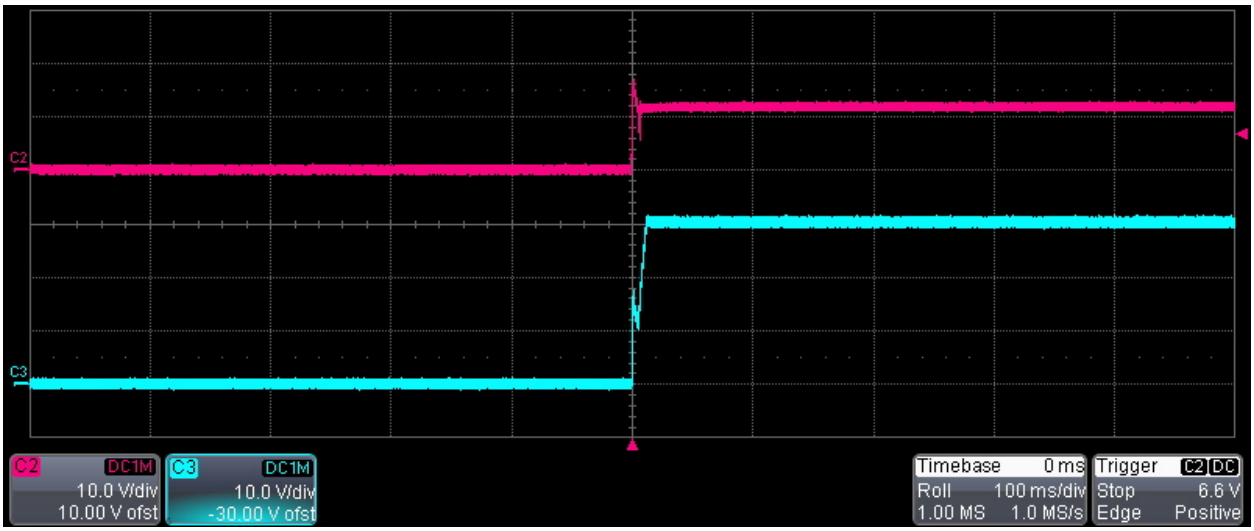
C2-Vout



Startup into No Load at 12 Vin

C3- Vin

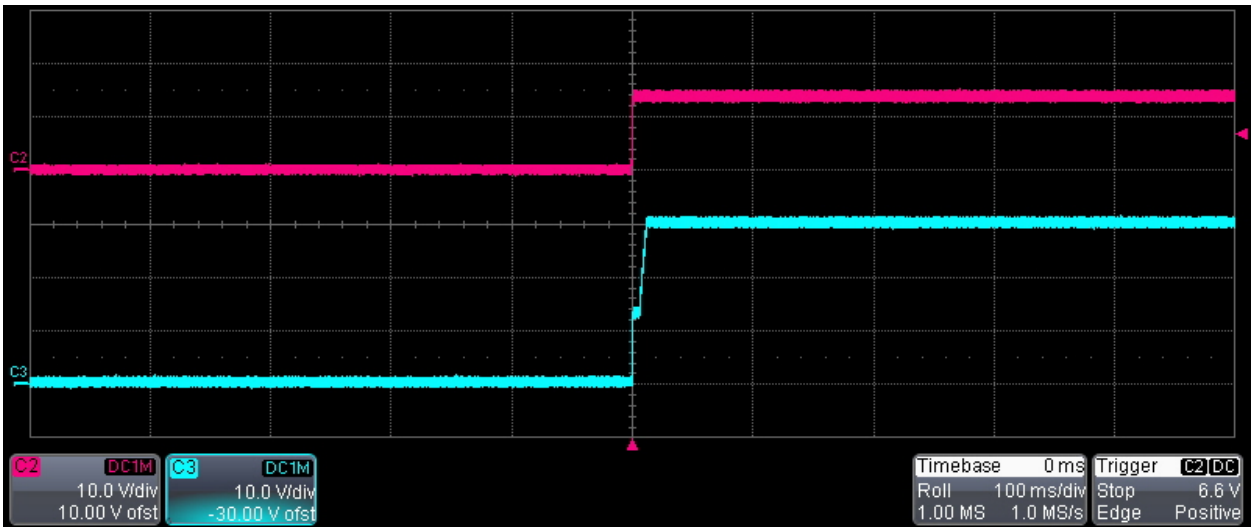
C2-Vout



Startup into Full Load(6.5A) at 12 Vin

C3- Vin

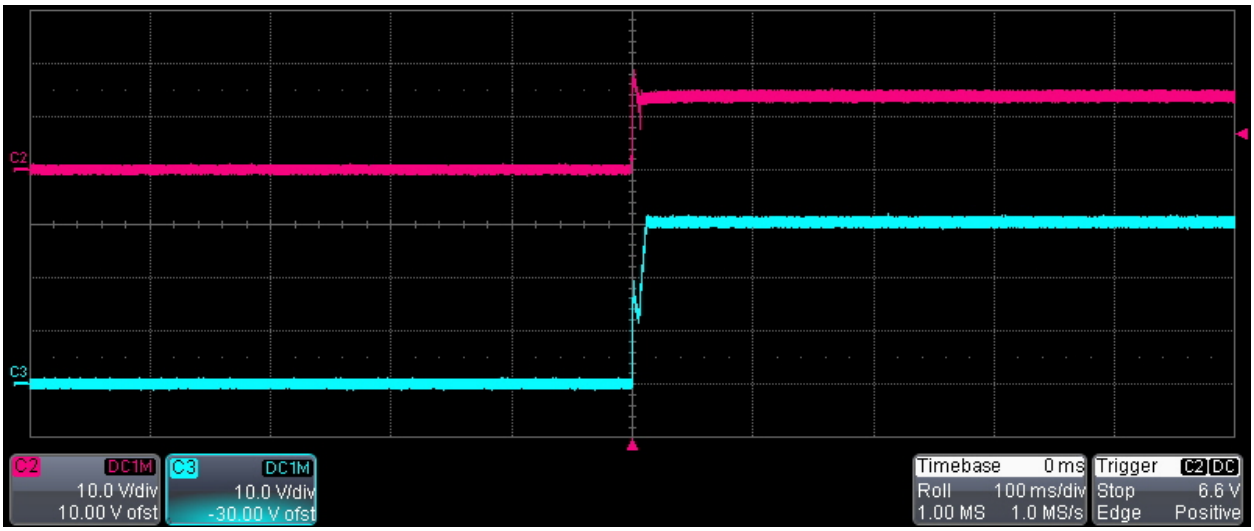
C2-Vout



Startup into No Load at 14 Vin

C3- Vin

C2-Vout

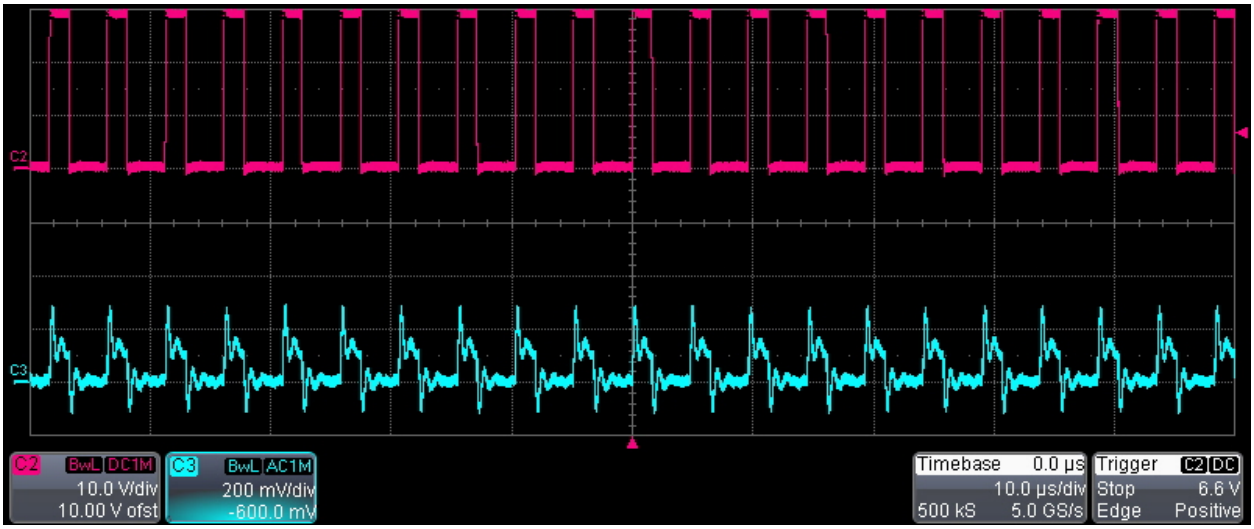


Startup into Full Load(6.5A) at 14 Vin

C3- Vin

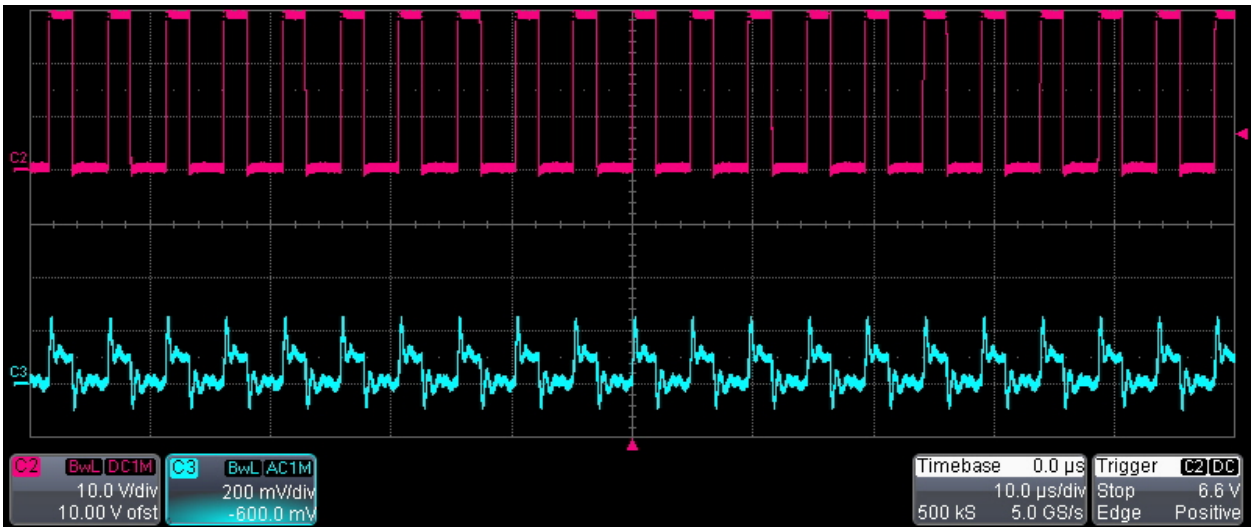
C2-Vout

5.2.3 Output Voltage Ripple and Switch Node Voltage



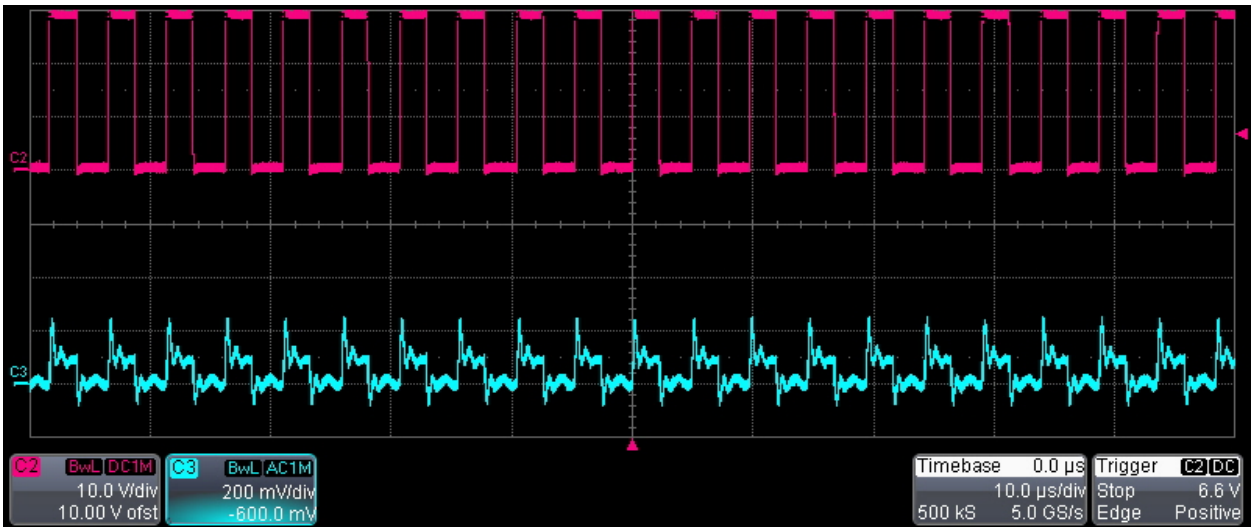
Ch2 - Switch Node Voltage

Ch3-Output Voltage Ripple at 10.8 Vin and 6.5A Load



Ch2 - Switch Node Voltage

Ch3-Output Voltage Ripple at 12 Vin and 6.5A Load



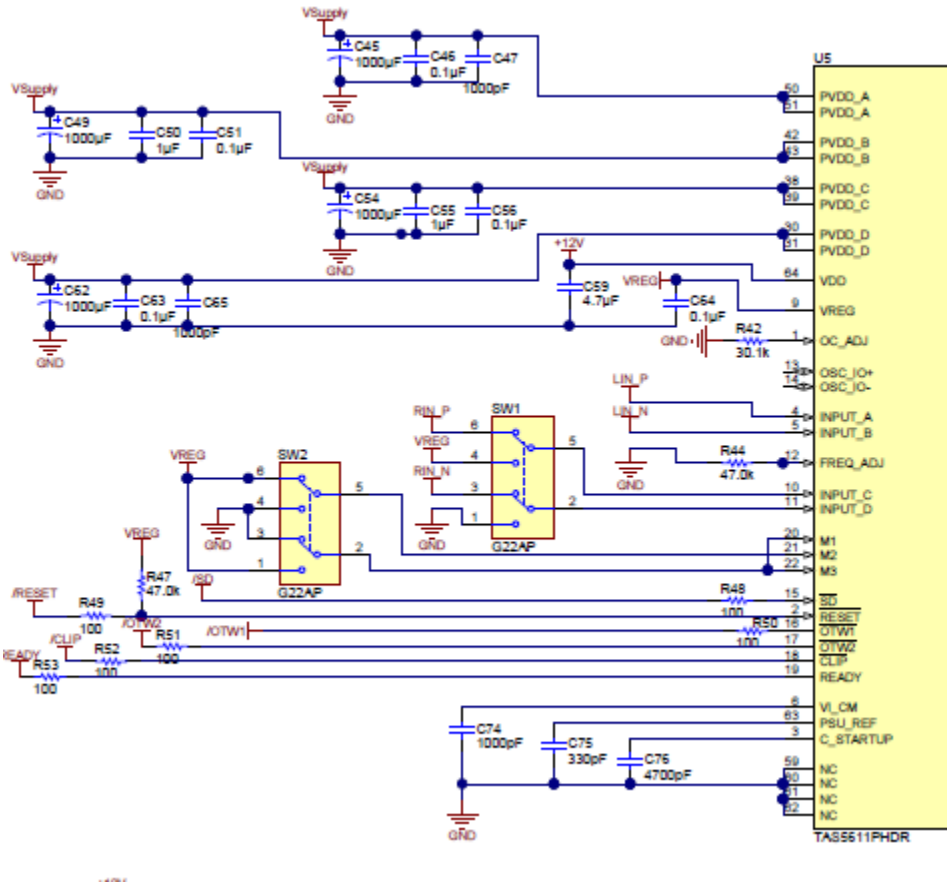
Ch2 - Switch Node Voltage

Ch3-Output Voltage Ripple at 14 Vin and 6.5A Load

6. Audio Power Amplifier's Test Result and switch position

The entire test on Audio Amplifier was done with 12 V input on DC/DC boost converter (output 30V). The results particularly THD Vs Power reveals that Audio performance remains excellent.

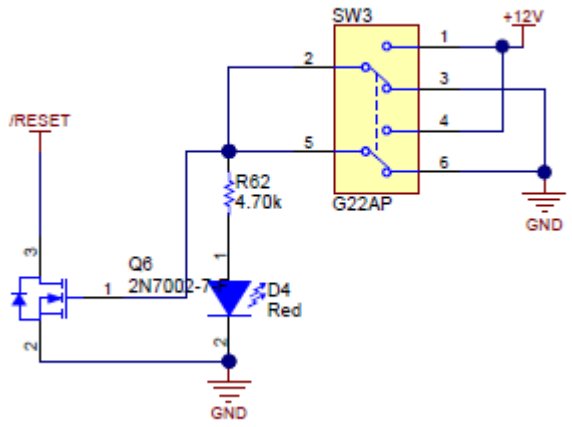
6.1 Switch positions



SW1 and SW2 are used to configure the amplifier in either BTL(Stereo- 100W + 100W on 4 ohm speakers) or PBTL(mono-200W on 2 ohm speaker) configuration .

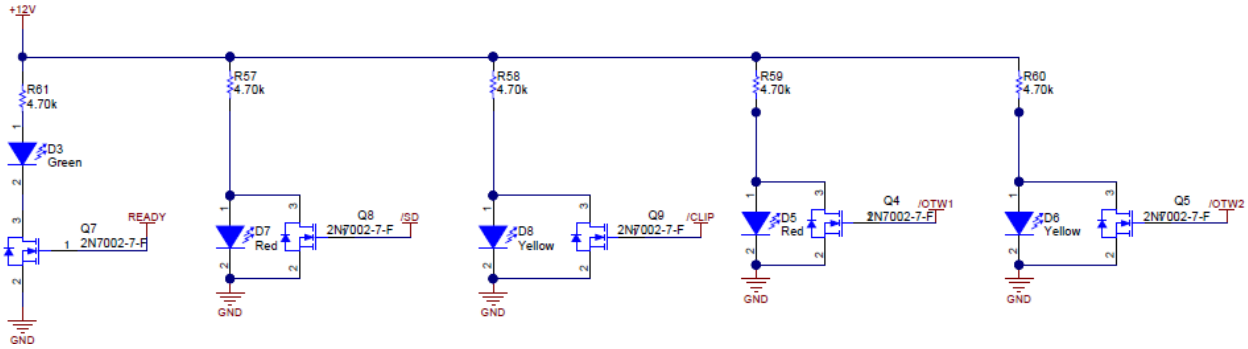
SW1 and SW2 when connected as per schematic default position – Stereo mode .

Both SW1 and SW2 moved to their alternative position – Mono mode PBTL .In this mode Short J8 and J9 , Short J10 and J11 and put 2 ohm load Across them .



SW3 is used for Shutdown of Audio Amplifier .In default position the Audio Amp is enabled.

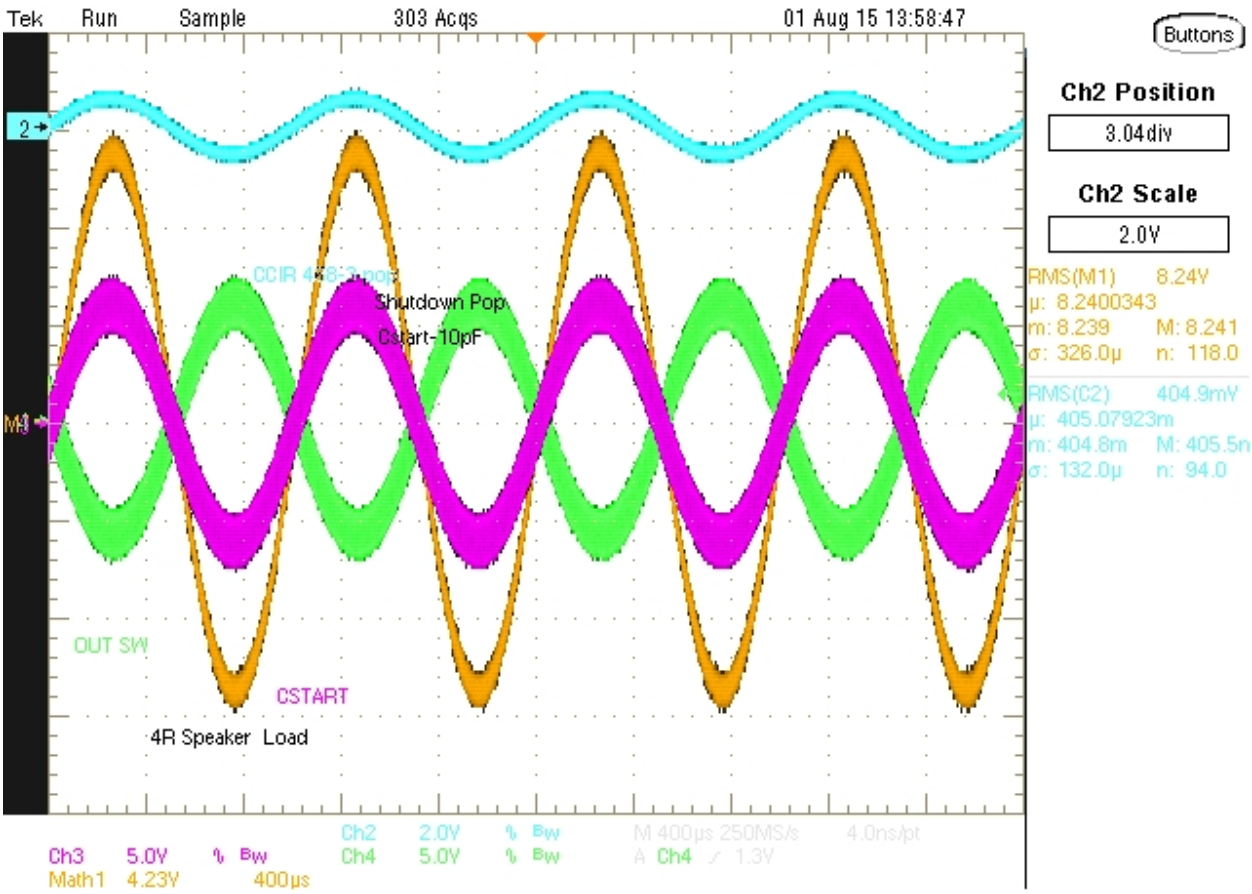
6.2 Indication LEDS



$\overline{SD}$	$\overline{OTW1}$	$\overline{OTW2}$, $\overline{OTW}$	DESCRIPTION
0	0	0	Overtemperature (OTE) or overload (OLP) or undervoltage (UVP)
0	0	1	Overload (OLP) or undervoltage (UVP). Junction temperature higher than 100°C (overtemperature warning)
0	1	1	Overload (OLP) or undervoltage (UVP)
1	0	0	Junction temperature higher than 125°C (overtemperature warning)
1	0	1	Junction temperature higher than 100°C (overtemperature warning)
1	1	1	Junction temperature lower than 100°C and no OLP or UVP faults (normal operation)

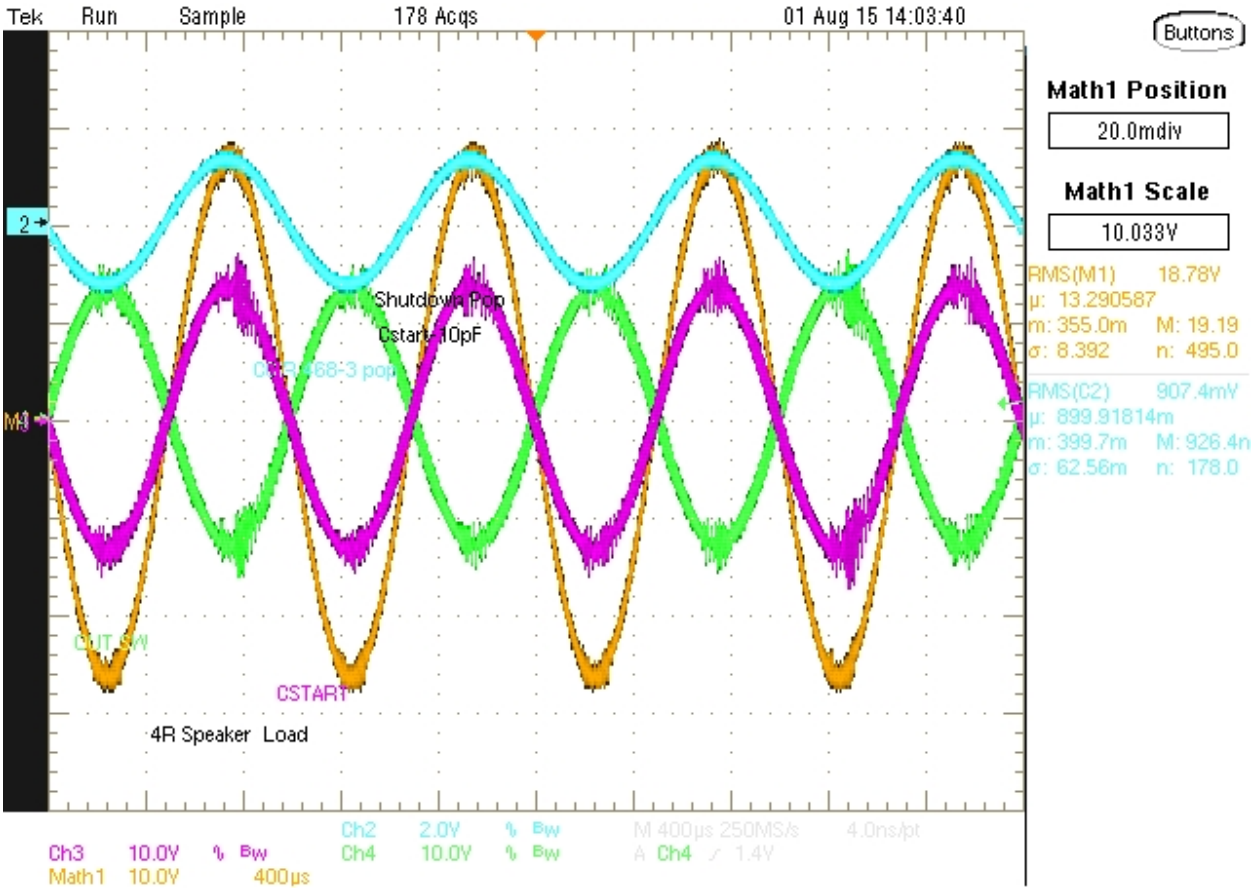
6.3 BTL: Stereo Waveforms

6.3.1 Input /Output Audio



CH3- Out L+ , CH4- Out L- , CH2-Input L ,Math M1- CH3-CH4 seen by the 4 Ohm Load (17W+17W)

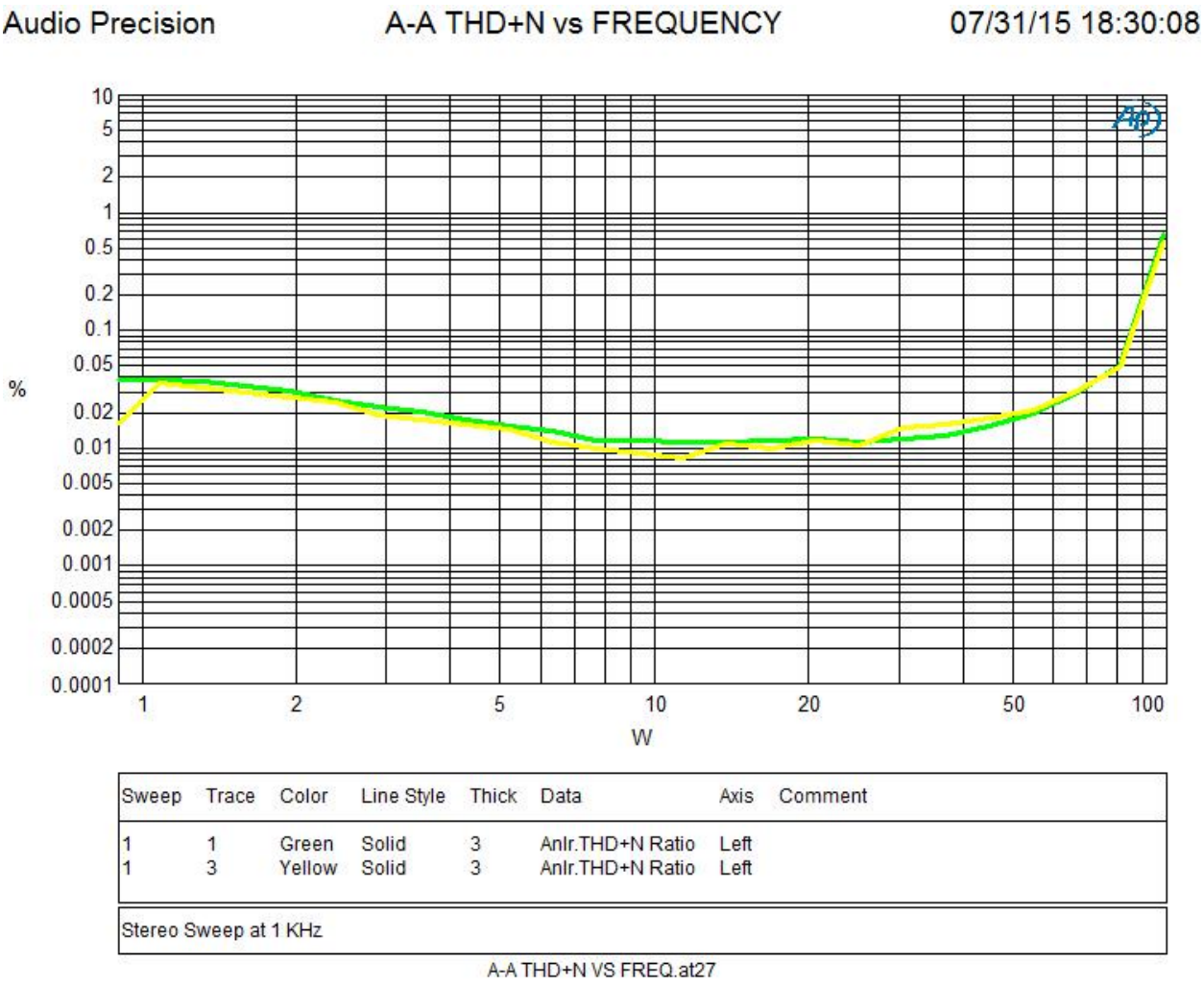
Input -400mV RMS 1 KHz Signal (20 dB Gain)



CH3- Out L+ , CH4- Out L- , CH2-Input L ,Math M1- CH3-CH4 seen by the 4 Ohm Load (90W+90W)

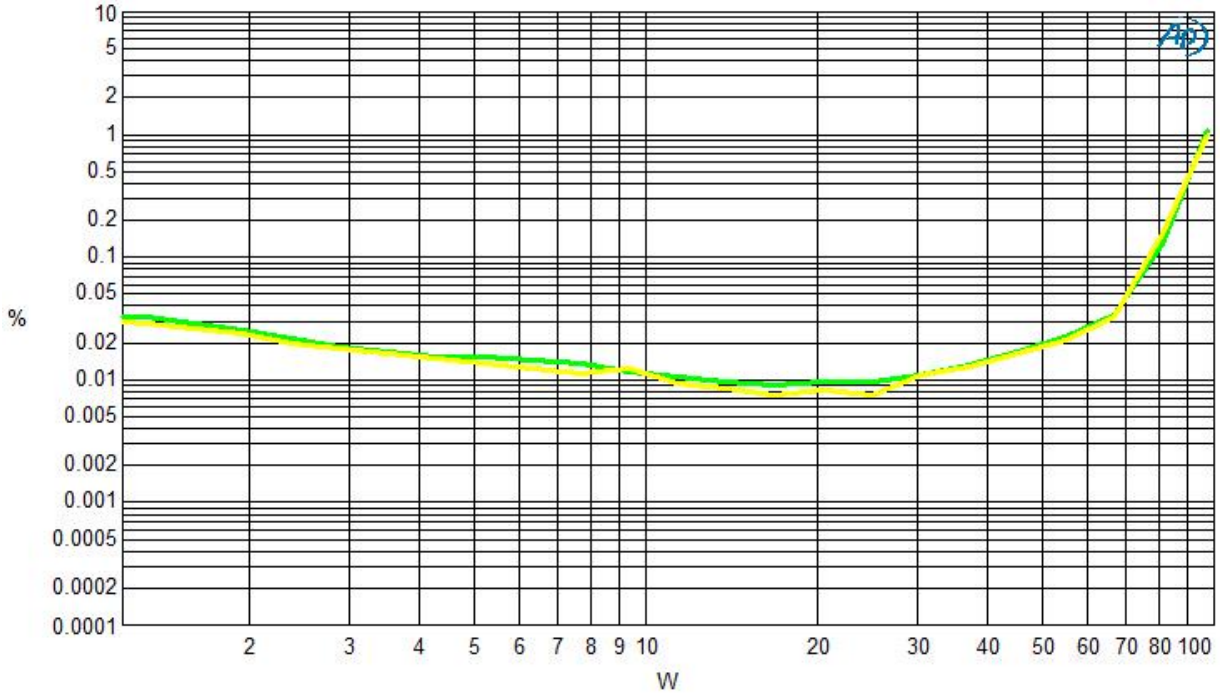
Input -900mV RMS 1 KHz Signal (20 dB Gain)

6.3.2 THD Vs Power: BTL mode



THD Vs Power at 1KHz input signals – Stereo sweeps

Audio Precision A-A THD+N vs FREQUENCY 07/31/15 18:34:09



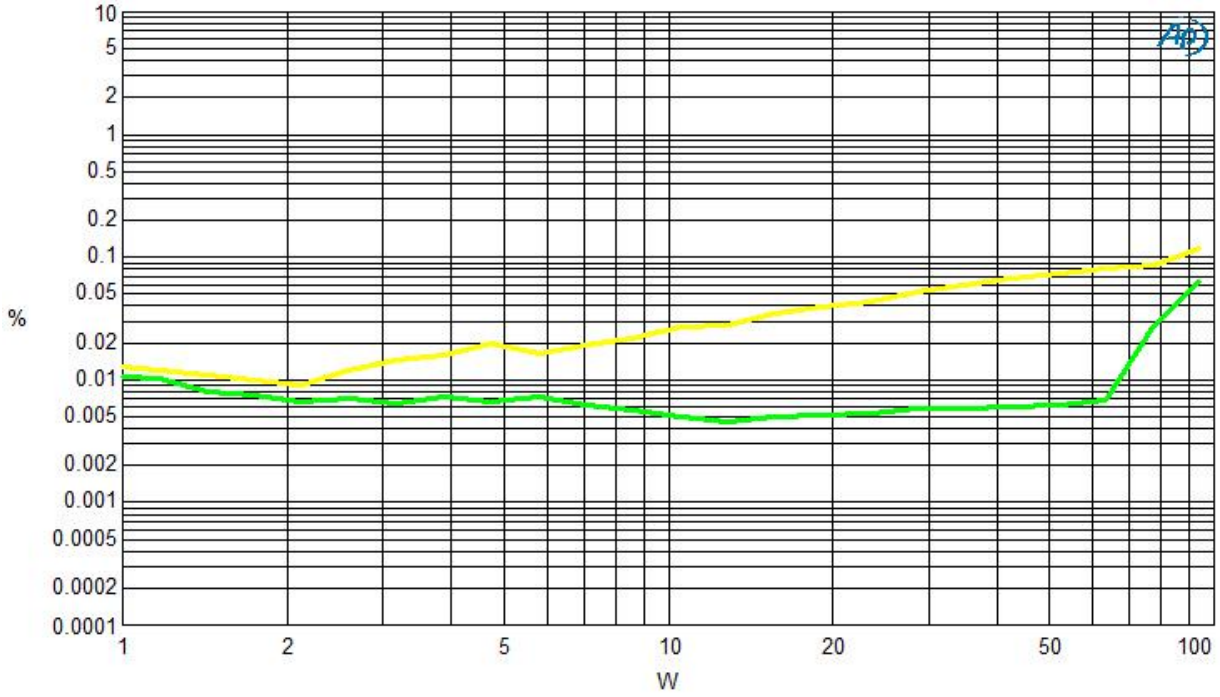
Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Green	Solid	3	Anlr.THD+N Ratio	Left	
1	3	Yellow	Solid	3	Anlr.THD+N Ratio	Left	

Stereo Sweep at 100Hz

A-A THD+N VS FREQ.at27

THD Vs Power at 100 Hz input signals – Stereo sweeps

Audio Precision A-A THD+N vs FREQUENCY 07/31/15 18:38:56



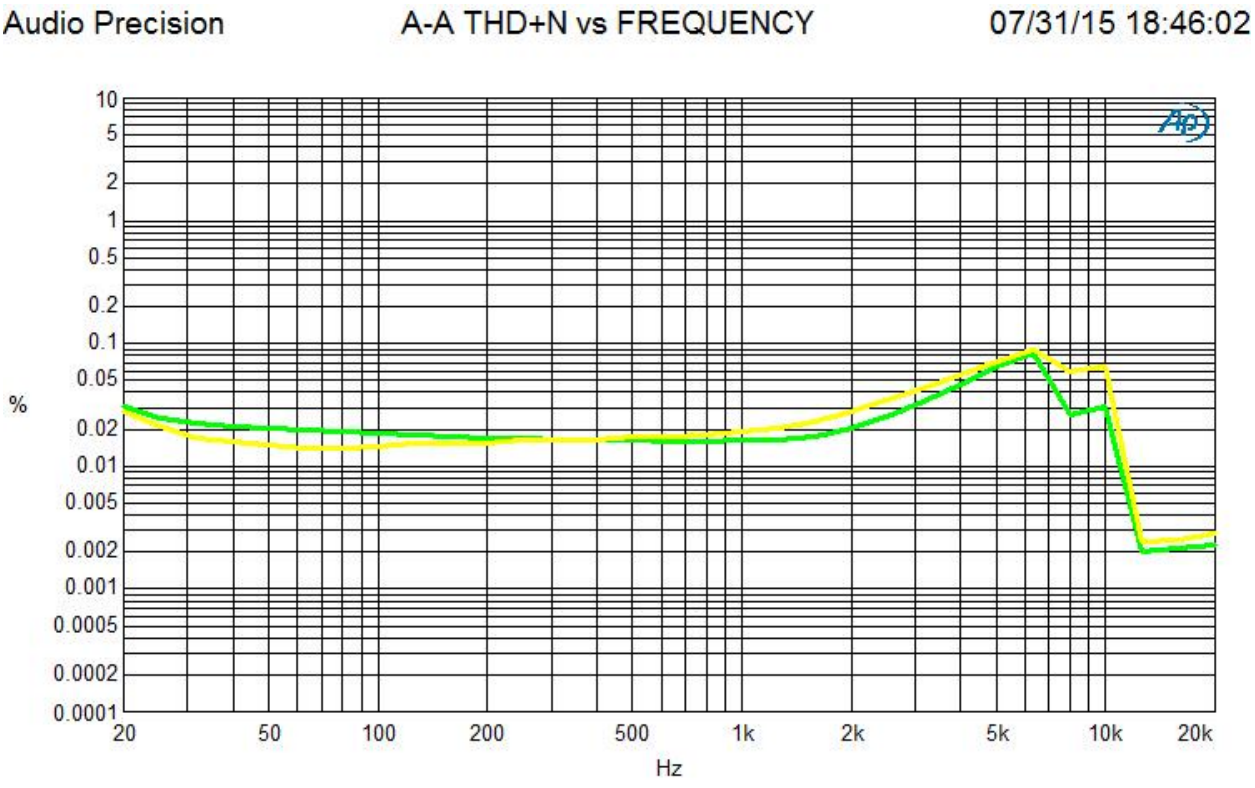
Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Green	Solid	3	Anlr.THD+N Ratio	Left	
1	3	Yellow	Solid	3	Anlr.THD+N Ratio	Left	

Stereo Sweep at 10 kHz

A-A THD+N VS FREQ.at27

THD Vs Power at 10 kHz input signals – Stereo sweeps

6.3.3 THD Vs Frequency: BTL mode

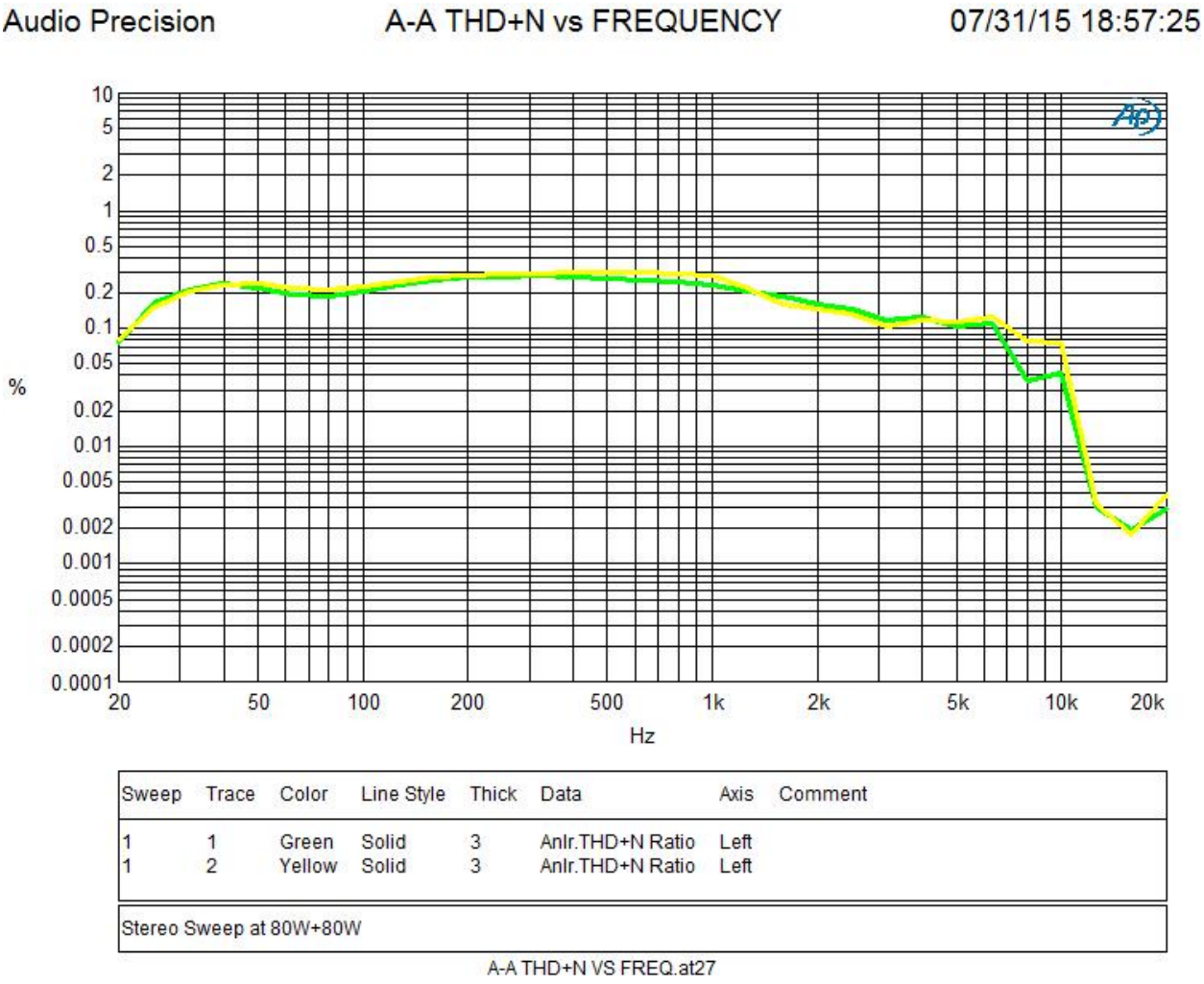


Sweep	Trace	Color	Line Style	Thick	Data	Axis	Comment
1	1	Green	Solid	3	Anlr.THD+N Ratio	Left	
1	2	Yellow	Solid	3	Anlr.THD+N Ratio	Left	

Stereo Sweep at 40W

A-A THD+N VS FREQ.at27

THD Vs Frequency at 40W+40W outputs – Stereo sweeps



THD Vs Frequency at 80W+80W outputs – Stereo sweeps

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Only those TI components that TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components that have ***not*** been so designated is solely at Buyer's risk, and Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265