SOLARIS

Quantum DAC

OPERATOR'S MANUAL

Version 1.2
20201103

CRANE SONG LTD.

Thank you and congratulations on your recent purchase of the Crane Song Solaris Quantum DAC.

The Solaris Quantum DAC is a 2 channel Digital-to-Analog Converter, designed by Dave Hill. It is centred around a 32-bit converter and 32 bit ASRC (Asynchronous Sample Rate Converter) that up-samples to 211kHz in order to reduce jitter.

The reference clock of the Solaris has less than 1ps (picosecond) jitter and employs a proprietary re-construction filter for accurate time domain response.

The jitter measured for the clock, between our auditory spectrum of 10Hz - 20kHz, is typically around 0.045ps (44fs, femtoseconds)!

Be prepared for your ears to be amazed. Crane Song's 5th generation Quantum DAC will deliver a solid stereo image with defined low frequencies and a crystal clear high end.

Before you get started, please do read through the following safety instructions.

IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions
2. Keep these instructions
3. Heed all warnings
4. Follow all instructions
5. Do not use this apparatus near water
6. Clean only with dry cloth
7. Install in accordance with the manufacturer's instructions
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat
9. Protect the power cord from being walked on or pinched particularly at plugs and the point where they exit from the apparatus
10. Only use attachments/accessories specified by the manufacturer
11. Unplug this apparatus during lightning storms or when unused for long periods of time
12. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped
13. CAUTION: To disconnect the unit completely from the MAINS, unplug the unit. Turning the power switch off does not disconnect the unit completely from the MAINS.

THE INs AND OUTs OF THE SOLARIS

On the back of the DAC you'll find the inputs and outputs.

The input options are AES, S/PDIF, Optical and USB.

The AES input connects over XLR, S/PDIF via RCA Phono, Optical goes in on Toslink.

USB allows you to connect the Solaris directly to your computer and use it as a dual-channel/stand-alone output only interface. The USB drivers are built into **MAC**. For **PC Windows 7** and later, you can download the Windows driver from our website (www.cranesong.com)

Solaris has two sets of balanced analog outputs. The Main output has discrete output amplifiers with a stepped attenuator (GAIN). Their maximum output is +24dBu.

The secondary output Left and Right outputs (OUT 2) have a max. fixed output of +18dBu.

And finally there's the front panel headphone, trs stereo, output with its own stepped attenuator (HEADPHONE LEVEL).

SUGGESTED SOLARIS USES

In addition to how you will put the Solaris to use within your audio setup, here are some suggestions on implementing the unit.

• DAW setup monitor controller. If you're working completely in the box, you will still benefit from top notch D-A and ultra-low jitter Conversion. You can hook up the Solaris to your DAW via USB. Therefore you're using the unit as your interface. The Solaris will convert your mix from the digital domain to analog to feed your monitors, giving you monitor level control with the Gain knob, Monitor Mute and separate Headphone Level control.

• On-The-Go Conversion and Monitor control. There will be situations where you find yourself away from your studio set up and you still need to work on mixes. For example, you may be on tour and you're working on edits and mixes on the road. Or you find you need to tweak balances for live performance backing tracks. Whatever the case, Solaris gives you that clear image you've been working with in the studio. Just plug up via USB and you've got your Crane Song sound feeding your portable rig. You can take it a step further and feed the backing track mix to Front Of House and deliver the pristine Crane Song sound to be part of the live performance.

• Digital Source Switcher. You may have a few digital sources in your studio, DAW on USB, a playback device on AES, another one on S/PDIF and a third unit outputting Optical. The Solaris easily switches between these various formats.

• Output Extender. Assuming you're already set up with an interface, the Solaris can perform several tasks. You can use it as your master output from the DAW and it can provide an extra set of analog outs fed from your interface's digital outputs. You can make the Solaris your DAC for analog processing. So if you're running a bunch of analog outboard to process mix components you can feed them to the Solaris to convert them, process them and then record them back in through your A-D Converter, like the Crane Song HEDD.

• That NY Compression Trick. You've probably heard of NY or parallel compression, where you take a parallel feed of your drums and maybe the bass, EQ and compress them together and then blend that signal back into the mix.
Of course you can approach this old school trick within your DAW, but there's nothing like doing this the analog way. Solaris' dual output architecture allows you to do that. You buss your rhythm parts to the Solaris so you have level control on one set of outputs and then you can route the secondary outputs to your analog parallel processing.

• A Mastering DAC

THE FRONT PANEL

LCD Function Display

MUTE
On power on all outputs including the
Headphones are muted
After that the Headphones do not mute

POWER

SOURCE
This selects the input
AES, S/PDIF, OPTICAL,
USB

GAIN
This is the main output level
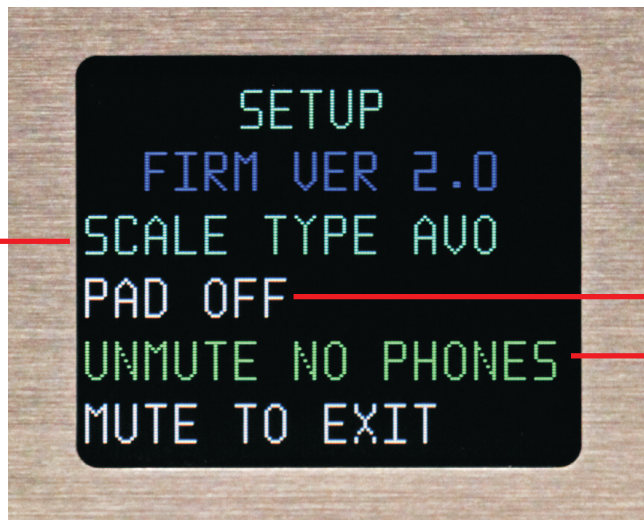
HEADPHONE LEVEL

HEADPHONES

CONFIGURATION
Built in Pad
Scale type
Muting

Set up for the Solaris could not be easier.

Plug up your in and outputs, power up and you're ready to go.

When you power up the Solaris and hold down the MUTE button until the red SOLARIS name switches to full black screen, you'll engage the Setup Menu.

SETUP
FIRM VER 2.0
SCALE TYPE AVO
PAD OFF
UNMUTE NO PHONES
MUTE TO EXIT

SCALE
CHANGED BY THE GAIN KNOB IN SETUP MODE

POWER UP MUTE MODE
AND
HEADPHONE MUTING
CHANGED BY THE HEADPHONE LEVEL KNOB IN SETUP

PAD
CHANGED BY THE SOURCE KNOB IN SETUP MODE

MUTE MODES

UNMUTE PHONES

Solaris will auto unmute and the MUTE button will mute both the main outputs and the phones

UNMUTE NO PHONES

Solaris will auto unmute and the MUTE button will mute the main outputs, the phones are not muted with the button

MUTE PHONES

Solaris will be muted on power up and the MUTE button will mute both the main outputs and the phones

MUTE NO PHONES

Solaris will be muted on power up and the MUTE button will mute the main outputs, the phones are not muted with the button

DEFAULT SETTING FOR SETUP MENU

SCALE = ATT
PAD = OFF
MUTE = MUTE PHONES

The Set Up Menu offers you the option to engage a 6dB PAD on the Main output. Simply select On or OFF with the SOURCE knob.

This pad will reduce the Main output to +18dBu from its standard +24dBu.

You can also change the GAIN SCALE of your unit by changing the SCALE TYPE from ATT to AVO.
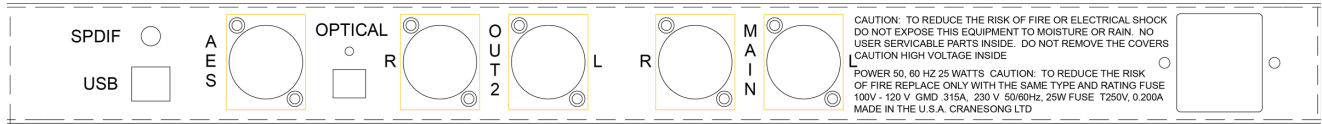When you switch the SCALE TYPE, with the GAIN knob, the display scale for the GAIN will change. In ATT mode the the maximum output number is 0dB. When AVO is selected the maximum output number is +12dB, mimicing the Cranesong Avocet Monitor Controller.

RELATIONSHIP OF THE TWO SCALE CHOICES IN DB

ATT	AVO	ATT	AVO
0	12	-26	-14
-1	11	-27	-15
-2	10	-28	-16
-3	9	-29	-17
-4	8	-30	-18
-5	7	-31	-19
-6	6	-32	-20
-7	5	-33	-21
-8	4	-34	-22
-9	3	-35	-23
-10	2	-36	-24
-11	1	-37	-25
-12	0	-38	-26
-13	-1	-39	-27
-14	-2	-40	-28
-15	-3	-41	-29
-16	-4	-42	-30
-17	-5	-43	-31
-18	-6	-44	-32
-19	-7	-45	-33
-20	-8	-46	-34
-21	-9	-47	-35
-22	-10	-48	-36
-23	-11	-50	-38
-24	-12	-60	-48
-25	-13	OFF	OFF

To exit SETUP press the MUTE button

BACK PANEL REFERENCE

SPDIF

USB

A
E
S

OPTICAL

R

O
U
T
2

L

R

M
A
I
N

L

CAUTION: TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK
DO NOT EXPOSE THIS EQUIPMENT TO MOISTURE OR RAIN. NO
USER SERVICABLE PARTS INSIDE. DO NOT REMOVE THE COVERS
CAUTION HIGH VOLTAGE INSIDE

POWER 50, 60 HZ 25 WATTS CAUTION: TO REDUCE THE RISK
OF FIRE REPLACE ONLY WITH THE SAME TYPE AND RATING FUSE
100V - 120 V GMD .315A, 230 V 50/60Hz, 25W FUSE T250V, 0.200A
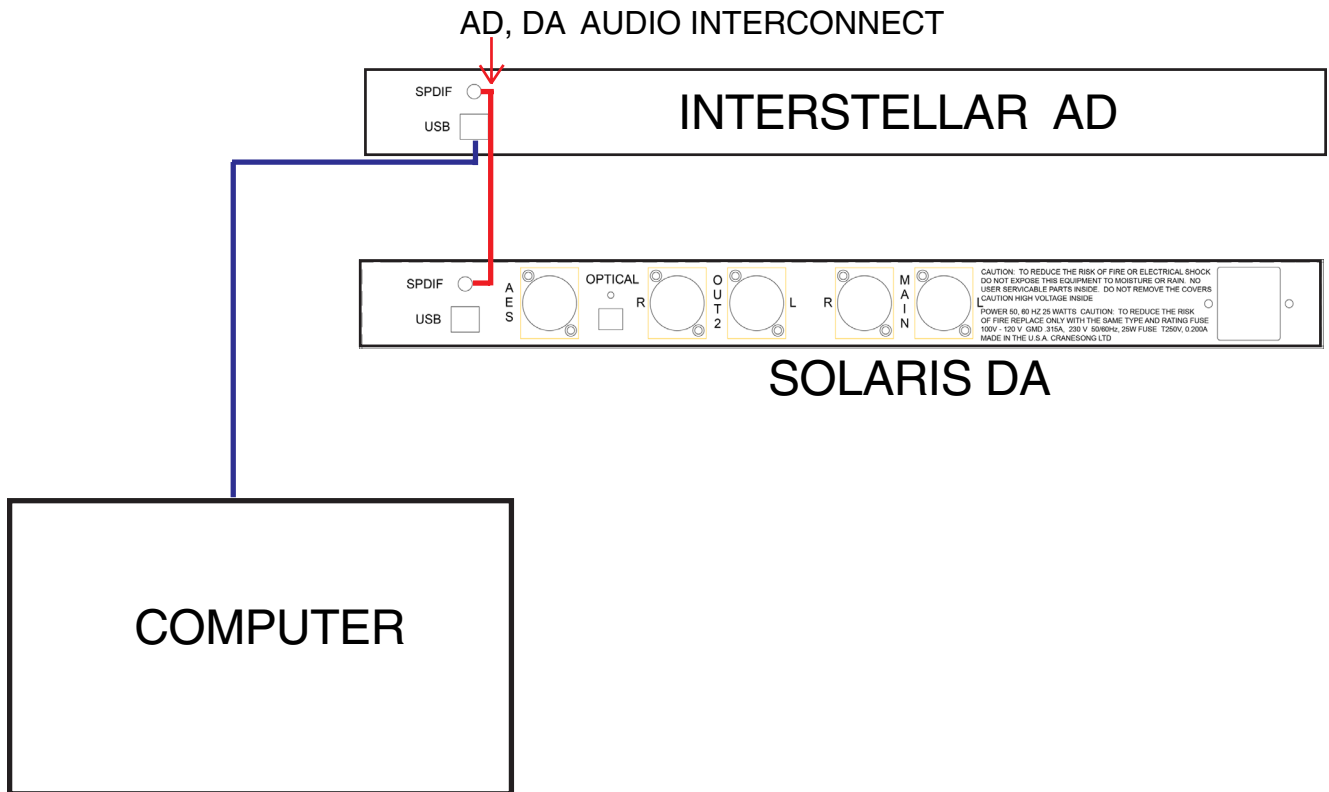MADE IN THE U.S.A. CRANESONG LTD

FIXED OUTPUT
Digital 0 =+18dbu

ADJUSTABLE OUTPUT
Digital 0 =+24dbu With
internal pad off
internal pad on = +18dbu

SYSTEM REFERENCE for USB
For both AD and DA, a complete interface

AD, DA AUDIO INTERCONNECT

	INTERSTELLAR AD
SPDIF ○	
USB	

		OPTICAL	O U T 2		M A I N	CAUTION: TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK DO NOT EXPOSE THIS EQUIPMENT TO MOISTURE OR RAIN. NO USER SERVICABLE PARTS INSIDE. DO NOT REMOVE THE COVERS CAUTION HIGH VOLTAGE INSIDE
SPDIF ○	A E S	R		L R		POWER 50, 60 HZ 25 WATTS CAUTION: TO REDUCE THE RISK OF FIRE REPLACE ONLY WITH THE SAME TYPE AND RATING FUSE 100V - 120 V GMD 315A, 230 V 50/60Hz, 25W FUSE T250V, 0.200A MADE IN THE U.S.A. CRANESONG LTD
USB						

SOLARIS DA

COMPUTER

By using the AD as the master interface the clocking will be uncompromised
For playback only SOLARIS can connect directly to the computer by USB

QUANTUM D/A AND CLOCKING TECHNOLOGY

The Quantum D/A and clocking technology uses an extremely low jitter reference for jitter reduction and a unique combination of analog and digital reconstruction filters. The reference oscillator uses techniques that are borrowed from microwave communication and test instruments in it's design, and is the result of 2 years of research. The DAC is the latest generation high end AKM 32 bit part.

The result is a DAC with unsurpassed imaging and transient response.

The jitter spec on the reference oscillator-clock is the lowest published jitter spec in Pro Audio.

Jitter reduction can be accomplished by several different methods.

As mentioned earlier on in this manual, the Quantum series works by using
an ASRC (Asynchronous Sample Rate Converter) that up-samples to 211kHz to
reduce jitter.

http://www.cranesong.com/jitter_1.html for further understanding of that
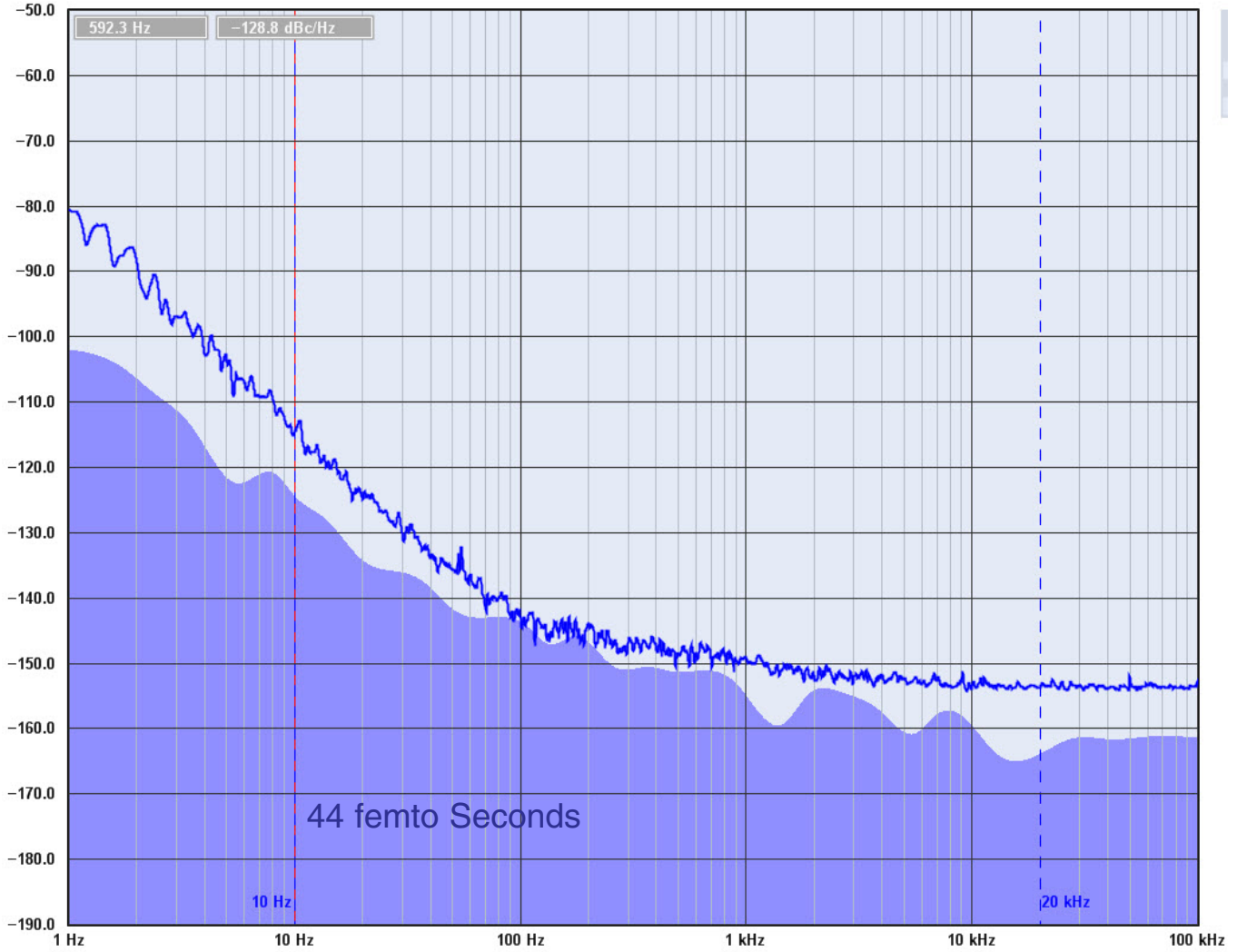"**Black Magic**" word **JITTER.**

Phase Noise L(f) in dBc/Hz
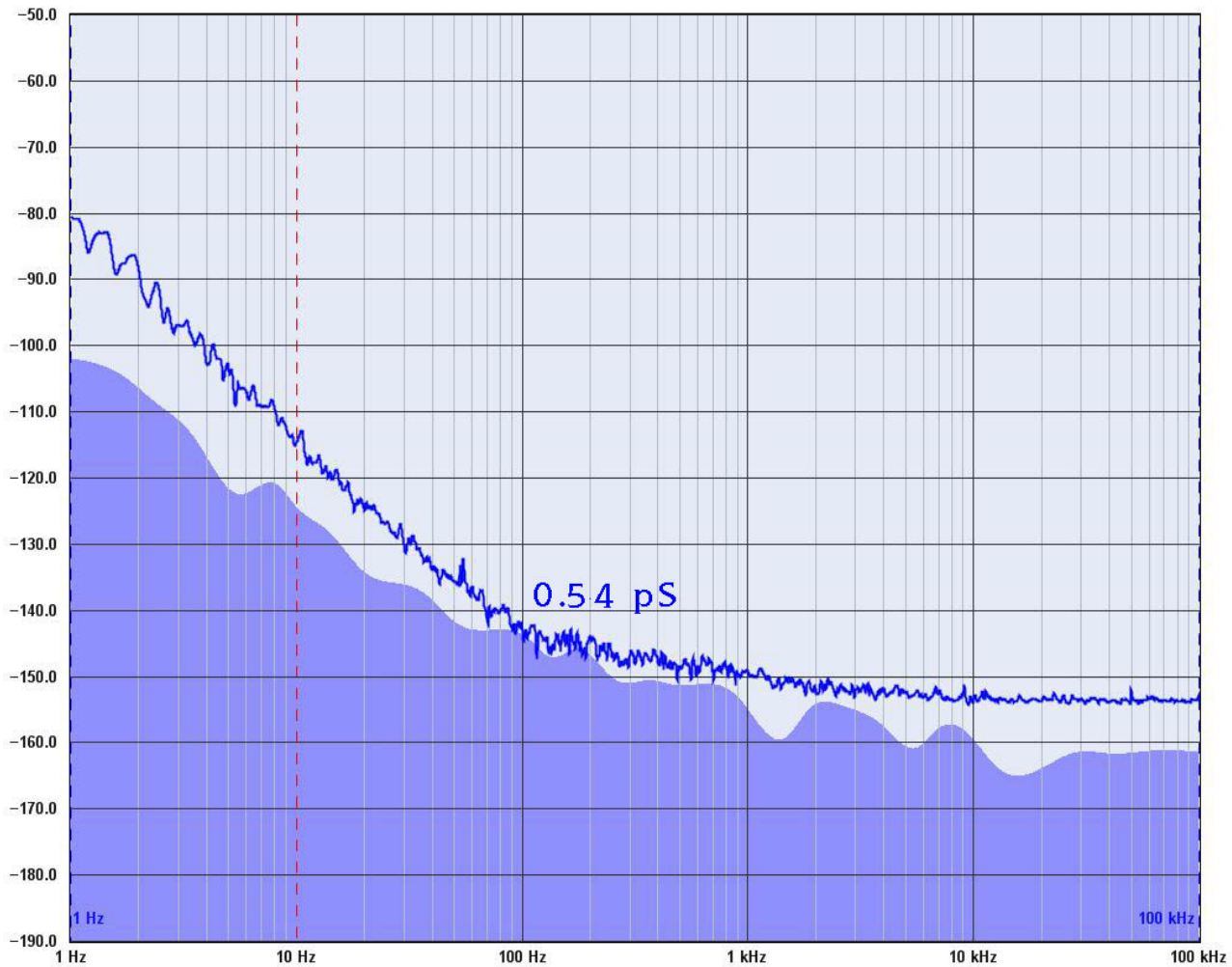
Notes	Input Freq	Sample Interval	dBc/Hz at 10 Hz	RMS Jitter	Duration	Acquired	Instrument	O
▶ Avocet -114dBcHz	27.000 MHz	0.010 s	−114.5	5.4E−13 s	3m 0s	18000 pts	Symmetricom 3120A	St

Jitter measured from 1Hz to 100KHz is 0.54pS typical.
Measured with a Symmetricom 3120A, using a Stanford Research Systems
Rubidium Frequency Standard, PRS10.
Without info on the measurement bandwidth and test instrument used, the
measurement is impossible to know about. Phase noise at 10Hz is critical.

Phase Noise L(f) in dBc/Hz

| 592.3 Hz | −128.8 dBc/Hz |

44 femto Seconds

10 Hz

20 kHz

Notes	Input Freq	Sample Interval	dBc/Hz at 10 Hz	RMS Jitter	Duration	Acquired	Instrument
▶ -114dBcHz	27.000 MHz	0.010 s	−114.5	4.4E−14 s	3m 0s	18000 pts	Symmetricom 31

Jitter measured from 10Hz to 20KHz is 0.044pS or 44 fS typical.
Measured with a Symmetricom 3120A, using a Stanford Research Systems
Rubidium Frequency Standard, PRS10.
Without info on the measurement bandwidth and test instrument used, the
measurement is impossible to know about.

TECH SPEC

CROSS TALK measured main output, gain set to 0
1 kHZ -122 dB
10 kHz -100 dB

THD + NOISE MAIN OUTPUT
INPUT 0 dBFS
GAIN SET TO -6 dB 0.0005%
INPUT -6 dBFS 0.0003%

MAIN OUTPUT MAX LEVEL +24 dbu
FIXED OUTPUT MAX LEVEL +18 dbu

NOISE MAIN OUTPUT
GAIN =0 -93 dbu A-weighted
GAIN =0 -90 dbu AES17

HEADPHONES
GAIN = 0
NOISE -88 dbu , AES17
MAX OUTPUT +24 dbu

POWER
21 WATTS
50-60 Hz
110V TO 120V
FUSE GMD 315mA
220V TO 240V
FUSE GMD 200mA

FRIMWARE
ver 2.0 adds the extended MUTE functions 202010222
SN SL683086