![ISOMET]

QUICK Start Guide

Build rev-B, rev-C

[E] [A] Gate   [E] Trigger   [E] Clock

Ethernet

J9 J10 J11   J12

USB II / III

[I] Sync Digital OUT
[I] GPIO
[I] DAC Outputs

[E] Tone Buffer Address
[E] Amplitude Modulation

[I] 5Vdc isolated
supply IN

J7

J8

DC_In

DC Supply
(15-24Vdc)

J5

[A] Gate
[A] Interlock
[A] Diagnostics

J4   J3   J2   J1

[A] 5Vdc isolated
supply IN

RF Outputs

Build rev-D

J9   J10   J11

Ethernet   [E] [A] Gate   [E] Trigger   [E] Clock

USB II / III

J7
[I] 5Vdc isolated supply IN
[I] Sync Digital OUT
[I] GPIO
[I] DAC Outputs

J12
[E] RS232

[E] Tone Buffer Address
[E] Amplitude Modulation

J8
[E] Reference Clock *

DC Supply
(15-24Vdc)

J5
[A] Gate
[A] Interlock
[A] Diagnostics
[A] 5Vdc isolated
supply IN

J5

J4   J3   J2   J1

* Factory Fit Option

[A] Interlock *

RF Outputs

1. Hardware Connections.

- Minimum Connections:

- USB II / III or Gb Ethernet to host PC. (Ethernet not used on the iMS4-L variants)
- DC Supply, 15V(min),2A to 24V(max),1A
- One or more RF outputs J1….J4 , as required. Terminate with 50ohm load.

- Optional connections, identified as follows in the diagram above:

E] = hardwired control signals from external signal source(s).
Functionally equivalent software generated control signal are provided in the SDK.

[I] = opto-isolated IO buffered signals requiring an external 5Vdc supply connection to either J7 or J8

[A] = external power amplifier connections (see explanation below)

The iMS4-P provides external power amplifier diagnostic and control signals via J5.
This is an opto-isolated interface and requires a 5Vdc feed (5V_RFA) supplied from the connected RF amplifier. An appropriate interface card must exist within the power amplifier.

2. Software

Download the iMS software from
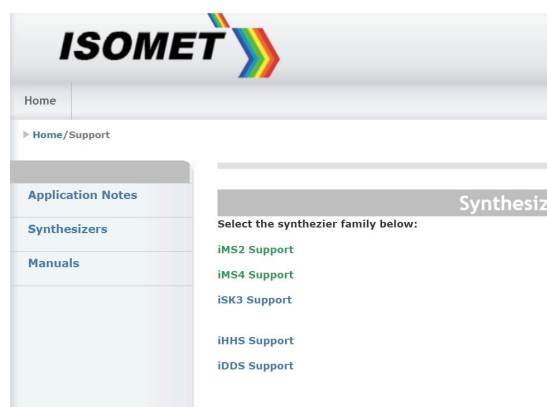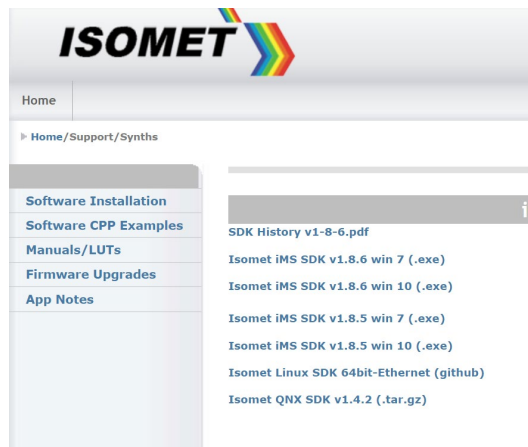
https://www.isomet.com/ims4_sw.html

Depending on your computer, select
and run one of the following:

Isomet iMS SDK v 1.xx Win7 Setup.exe
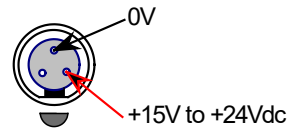Isomet iMS SDK v 1.xx Win10 Setup.exe

Supporting documentation is provided at

https://www.isomet.com/synth_home.html

3. Apply DC power.

A mating connector is provided.
15V(min),2A to 24V(max),1A

0V

+15V to +24Vdc

View into iMS *Vdc* connector

Initializing and LED indicators

All LEDs on the iMS4-P will illuminate briefly on initial power up.

An automatic boot sequence then follows; read internal flash, initialize peripherals, request Ethernet DHCP * and USB power up.

Once initialization is complete, the upper red LED's will remain illuminated and the two green LED's will beat synchronously at ~1Hz rate .

(*DHCP request times out after ~10sec if not connected and reverts to the default static IP of 192.168.1.10. It can be reassigned).

4. Connect USB or Ethernet

(Only USB is functional on the iMS4-L).
It is recommended that the USB or Ethernet lead is connected to the iMS4- prior to power up.
Only attempt software communication AFTER initialization is complete.

If the GUI is not closed correctly, crashes or will not open, then please use Windows Task Manager to delete the *Isomet iMS Studio* and *ims_hw_server* processes.
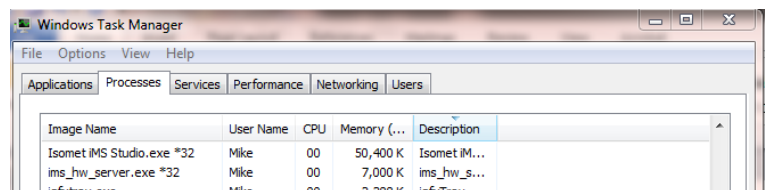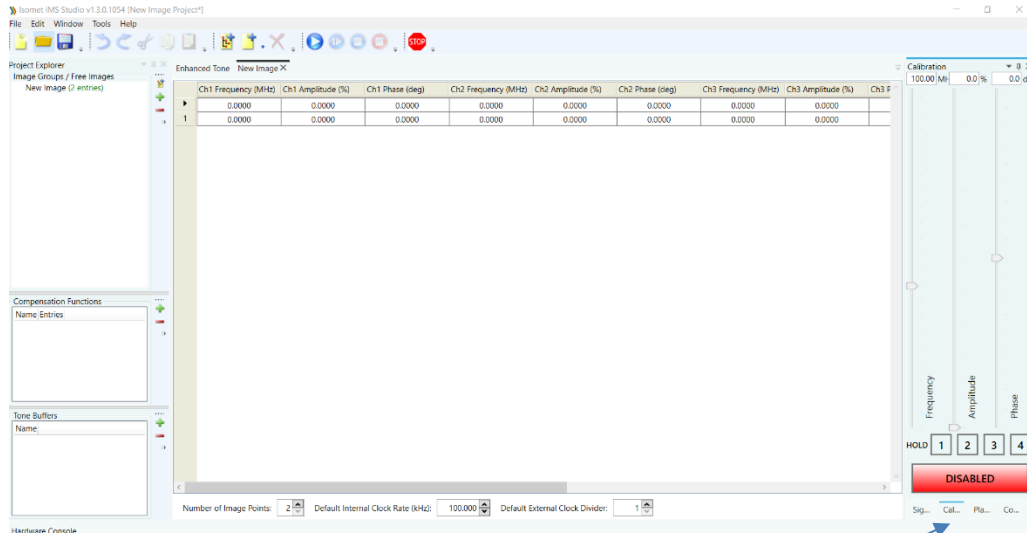
5. Does my iMS work ?

Run the Isomet iMS Studio, e.g. click the desktop icon

A new Project Window will open

Select **Cal**ibration (Single Tone) Mode

We will use the Calibration (Single Tone) mode as a simple method to check the basic functions and prove communication with the Host PC.
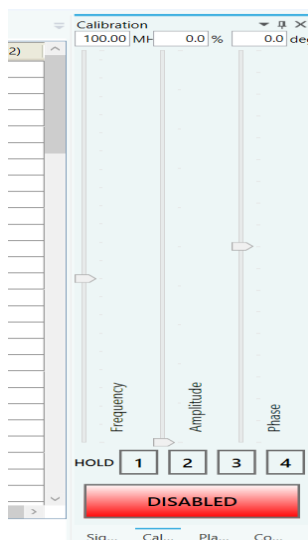
This mode will generate a constant RF signal on all RF output channels; J1…J4.

There is no sync output on J7 in this mode (SDIO-n)
 Select Calibration Tab

Select the DISABLED button. It will change to ENABLED and the RF outputs will be active.
Adjust the Frequency and Amplitude sliders as required.

Note: This mode will prevent Image Play. Return to DISABLED when finished.

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At 100 % amplitude, the RF output on J1, J2, J3 or J4 will be ~10-700mV peak to peak into 50 ohm, depending on the Signal Tab settings (see Section 9)

Typical output levels at 110MHz, V peak-peak voltage, **50ohm** termination

	Ch1, Ch2, Ch3 or Ch4 level / Ext'l modulation Level										
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
10%	0.006	0.014	0.032	0.07	0.11	0.16	0.21	0.25	0.27	0.28
20%	0.008	0.016	0.036	0.08	0.12	0.17	0.22	0.26	0.28	0.29
30%	0.008	0.016	0.04	0.082	0.13	0.18	0.23	0.27	0.29	0.31
40%	0.008	0.02	0.05	0.09	0.14	0.19	0.24	0.28	0.31	0.33
50%	0.01	0.03	0.06	0.1	0.15	0.21	0.26	0.3	0.33	0.35
60%	0.01	0.04	0.07	0.12	0.17	0.23	0.28	0.32	0.35	0.38
70%	0.02	0.05	0.09	0.14	0.19	0.25	0.3	0.35	0.39	0.42
80%	0.04	0.08	0.13	0.18	0.23	0.29	0.34	0.39	0.44	0.47
90%	0.07	0.13	0.19	0.25	0.3	0.36	0.41	0.47	0.53	0.57
100%	0.09	0.17	0.24	0.32	0.39	0.46	0.54	0.6	0.66	0.73

(The leftmost column is labelled **DDS Level** vertically.)

6. Running the example Isomet iMS Studio Project(s)

- **Load Example Project**

Go to *Tool bar > File > Open*
Select example project file *.ipp
and open.
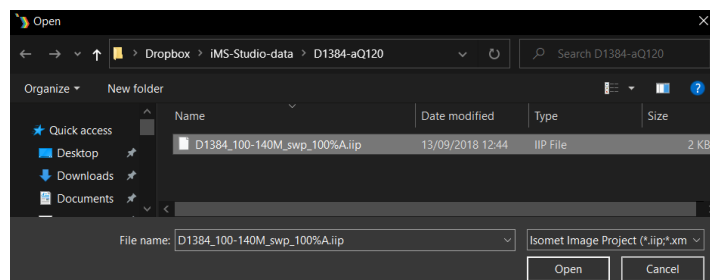
In this case we select the file; *D1384_100-140M_swp_100%A.ipp*
This IMAGE file generates a linear frequency ramp followed by an OFF period. It comprises of 120 image points with the same data on all four iMS4 channels. Points 1-100 are programmed with the 100-140MHz sweep at 100% amplitude. Points 101-119 are at an arbitrary frequency (131MHz) and 0% amplitude.

The *Sync Data (Dig)* field, is programmed with 0x0001 expect for 5 point around the mid-scan frequency (120 – 121 MHz). Use the L<-> R slider bar to display. The Sync Data outputs are inverted at the output J7. This data will give a logic high signal to indicate the mid-scan position

The GUI window should look like this:
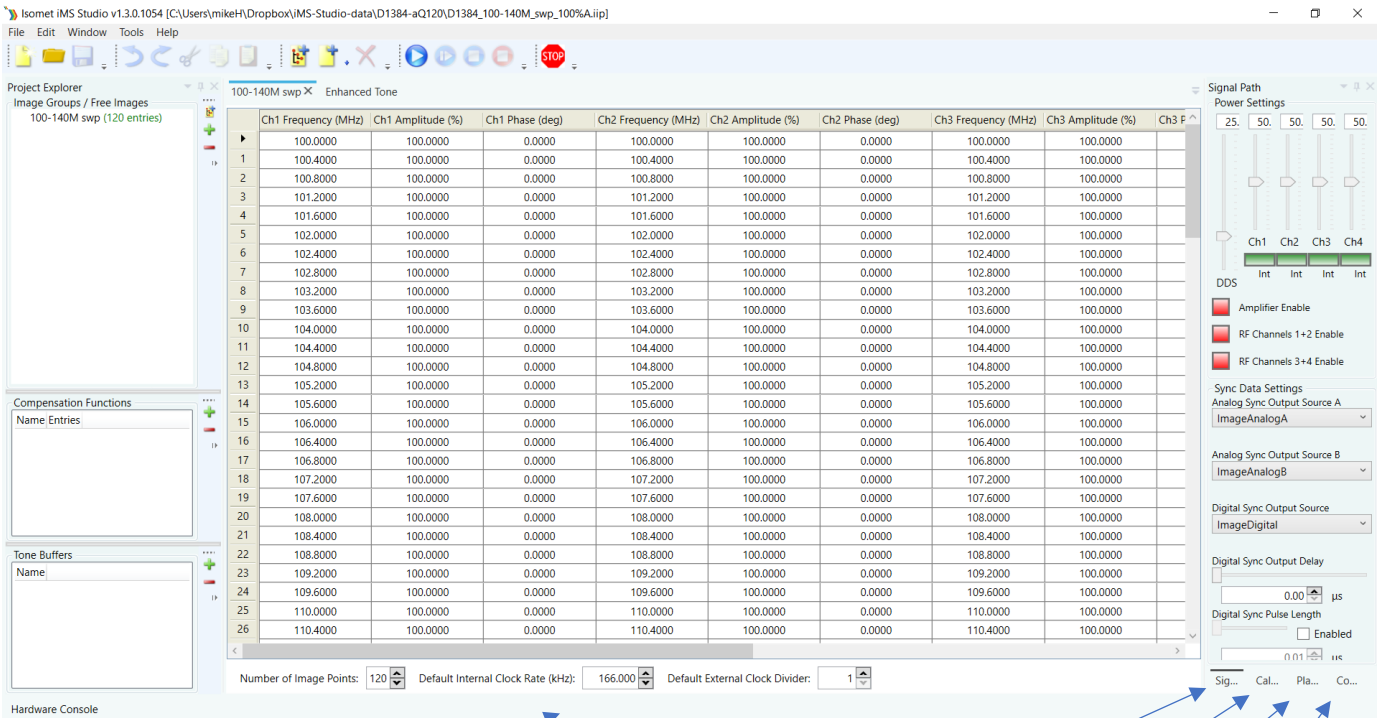
Internal Clock rate

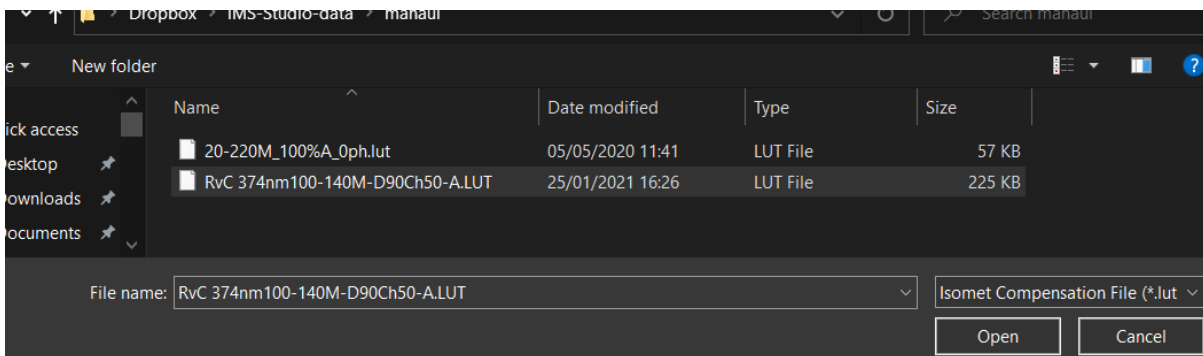Tabs: Signal Path   Player

Calibration   Compensation

7. **Select Compensation Tab**

Click on Import Button
Open the required *.LUT files

LUT file size = 57KB is a *Global* compensation file that applies the same data to ALL outputs of the iMS4. (This is the only option for older Rev-A and Rev-B of the iMS4 Synthesizers).

LUT file size = 225KB is a Channel scoped (channel specific) compensation file that can apply unique values to each channel. This is the recommended LUT option for X-Y deflector use.
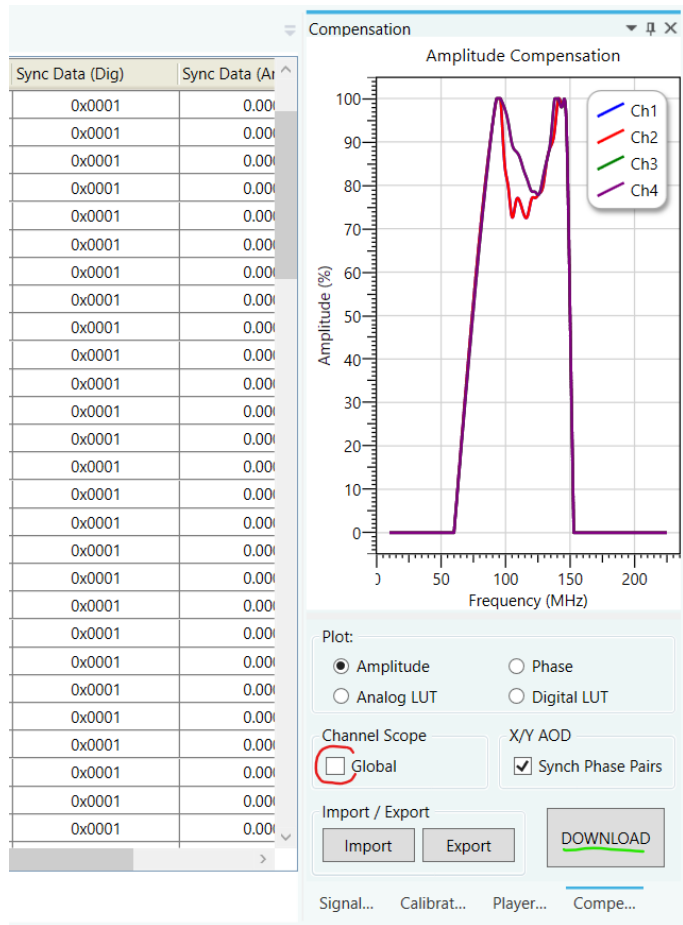
In this example we will open:

RvC 374nm100-140M-D90Ch50-A.LUT

[This Compensation file generated for a D1384 at 374nm. 100-140MHz freq' range using a RFA0120-4-15 amp. iMS4 Power Settings DDS=90% , Chn=50% (See Signal tab)]

The graphic will show a plot of the compensation response

Make sure *Global* box is unchecked

Click *Download*

8. **Select Player Tab**

This example will use the *Internal* clock source and *No Trigger* with repeated image play (*Repeat Forever*).

Internal clock rate is set on the lower tool bar, main window

For external signals , check **External** buttons and apply:
- Trigger input to J10
- Clock input to J11

Note: If you <u>do not</u> want to use a compensation *.LUT file (see previous section) , then <u>uncheck</u> these highlighted boxes to disable compensation.

The RF output will be zero unless a *.LUT file is downloaded into the iMS4 <u>or</u> these boxes are unchecked.
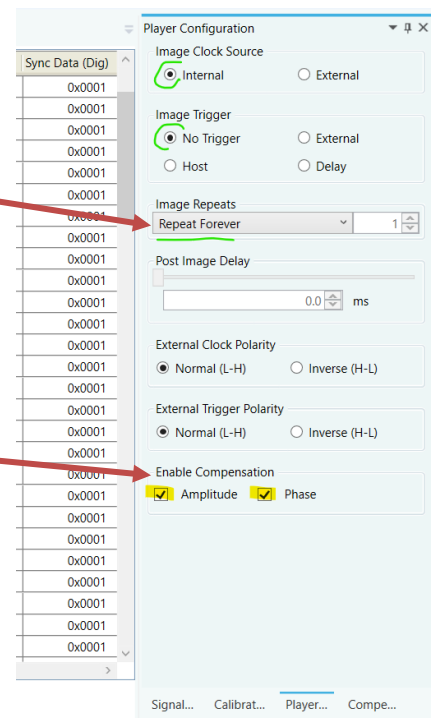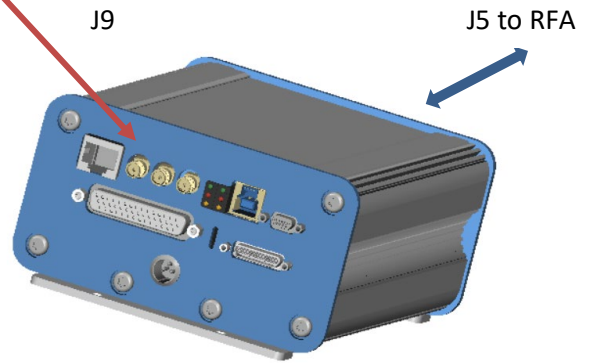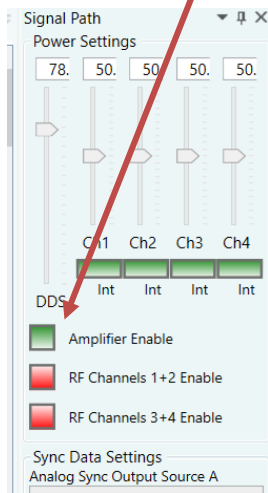
When using a RF amplifier with connection to iMS4 connector J5:

For <u>BOTH</u> *Internal* and *External* signals apply:
- Gate input to J9 (Logic high – ON)

Check Amplifier Enable button
(Red -> Green)

J9

J5 to RFA

Select Signal Tab

Two *Power Settings* control the RF output level:

- *DDS* is common to all four outputs.

- *Ch1, Ch2, Ch3, Ch4* sliders set the power for each output channel independently.
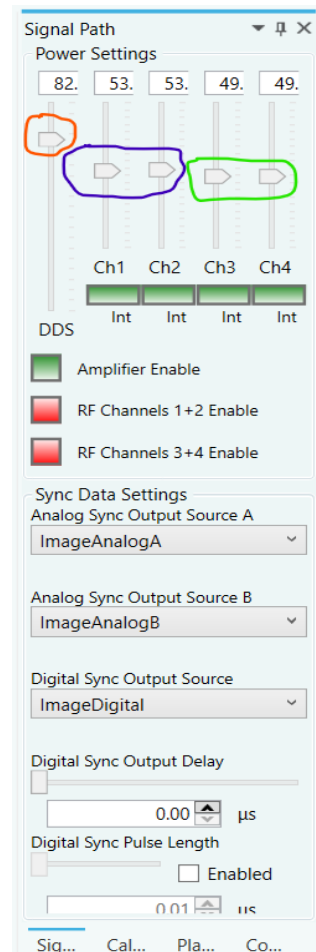
Typical settings when used with RFA0110-2-15 are:
DDS = 70% - 90%
Ch1 = Ch2 = 40% - 60%
Ch3 = Ch4 = 40% - 60%

For XY AOD applications, Ch1 = Ch2 and Ch3 = Ch4

iMS4 RF output connectors.
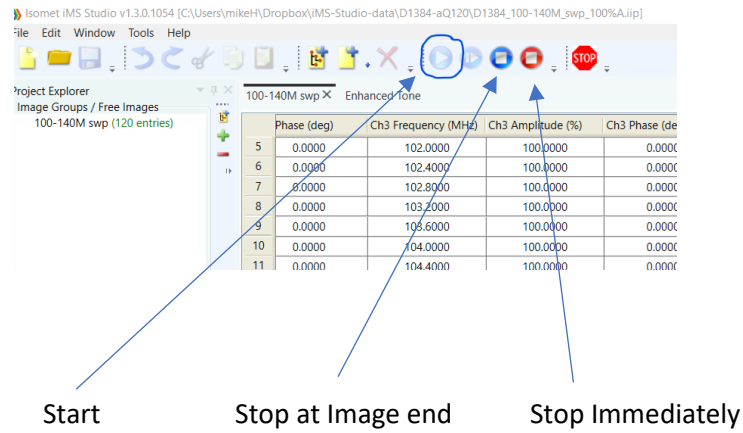Terminate in a 50ohm input or load.

J1 = Ch1
J2 = Ch2,
J3 = Ch3
J4 = Ch4

9. Start Image Play

Click the *Play Button* to start Image play.
(It will 'grey' out).

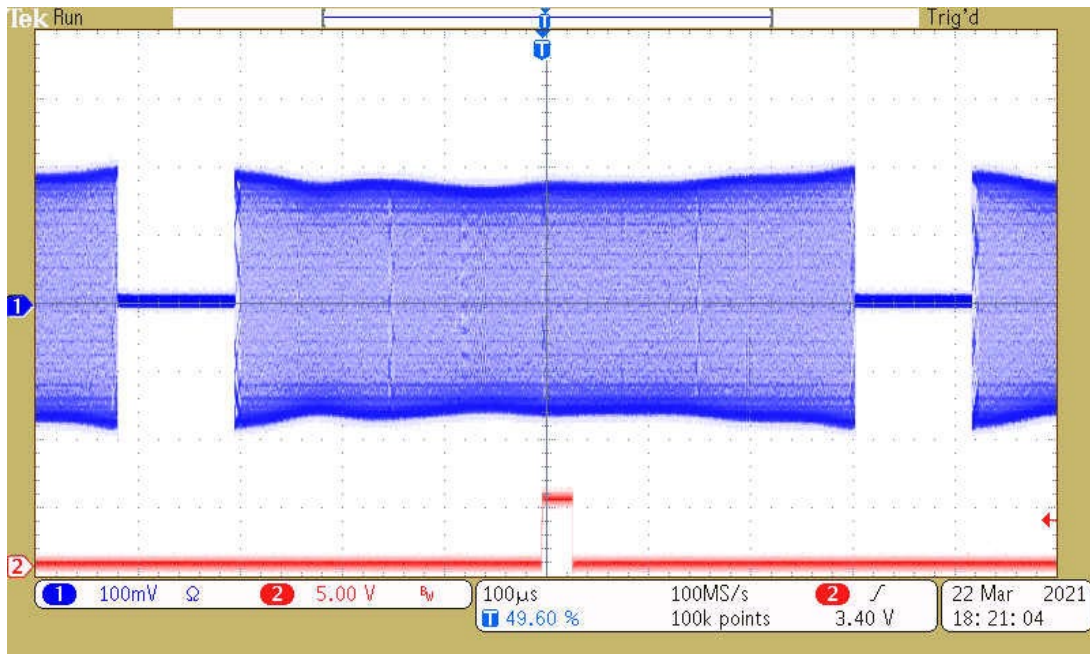Start   Stop at Image end   Stop Immediately

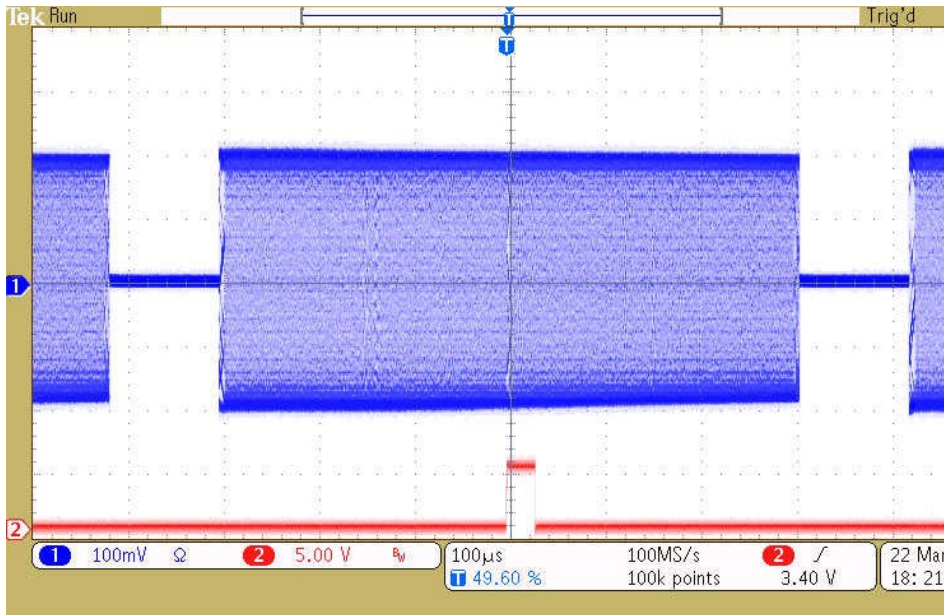(Check: *Repeat Forever* is selected, Section 8)

Typical output waveforms on oscilloscope for the files and signal levels described above.
For an Internal Clock rate = 166KHz

Trace 1 = RF output (50ohm terminated); J1, J2

Trace 2 = SDIO-0; J7 pin 33, (rtn pin 26)

The same settings and Image files with **Compensation Disabled**

10. Connection for SDIO-0 signal and return

View into iMS4 connector J7
SDIO outputs are opto- isolated and require a separate +5V supply to operate

Rev B, Rev C   **Rev D**
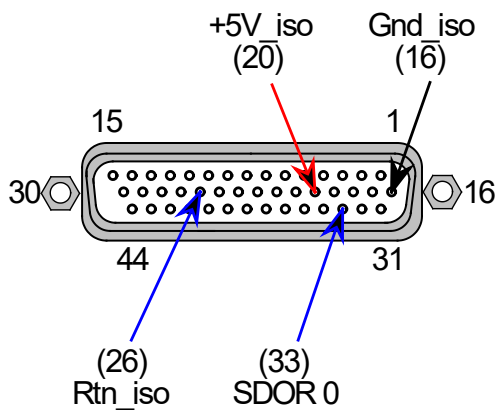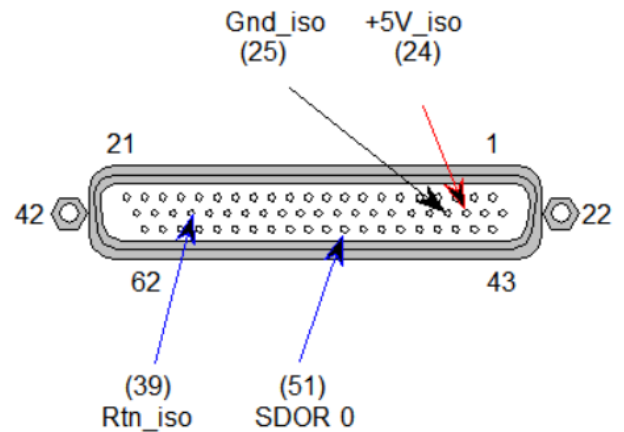
View into iMS **J7** connector   View into iMS **J7** connector

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11. Documentation and Hardware Revision

- To check the SDK and iMS4 build revisions:

Go to *Tool bar > Help > About*
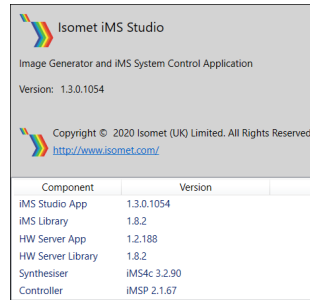
- For Isomet SDK documentation

Go to *Tool bar > Help > iMS Documentation*
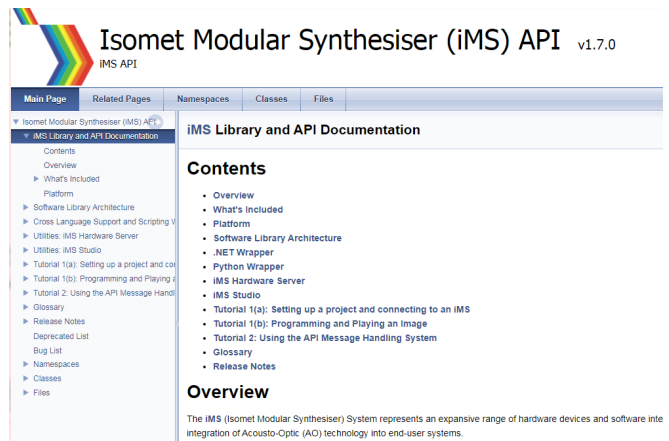
- To check software actions andiMS4 hardware status/response:

Click on *Hardware Console* lower left of main GUI window
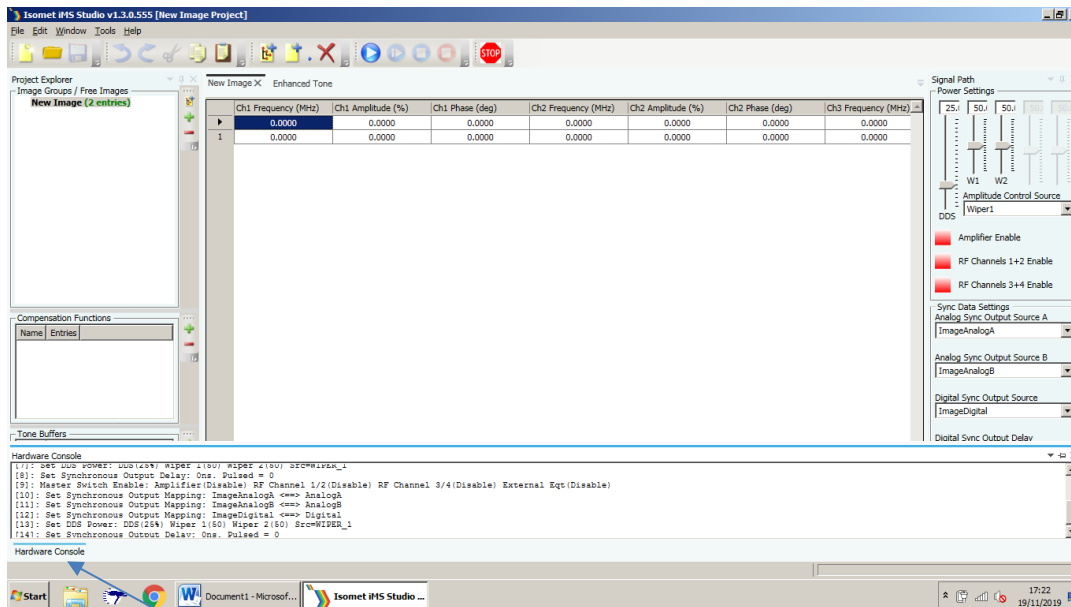
To expand this view, select the Down Arrow at the top right bar of the <u>Console</u> window
and select : *Dock as Tabbed Document*

12. Trouble Shooting Log File

In cases of difficulty and when seeking Isomet support, it can be helpful to generate a log file. The log files will need to initiated. This is the default condition.

Check the system.ini file has been correctly loaded and active. This is automatically installed with SDK. Typical location:

C:\Users\<username>\AppData\Local\Isomet\iMS_SDK\settings.ini

Open the system.ini file with Notepad and check the first few lines of text

```
settings.ini - Notepad
File  Edit  Format  View  Help
# Logging core settings section. May be omitted if no parameters specified within it.
[Core]
DisableLogging=false
Filter="%Severity% >= trace"

# Sink settings sections
[Sinks.LogFile]

# Sink destination type
Destination=TextFile

# The file name pattern for the sink backend. Include an absolute path to specify which folder to place
# the log file into. If no path is specified, the log will go into the users' temp
# directory (on Windows, typically C:\Users\<username>\AppData\Local\Temp, on *nix, "/tmp")
FileName="C:\Users\Mike\AppData\Local\Temp\imslog_%5N.log"

# Sink-specific filter. Optional, by default no filter is applied.
#Filter="%Target% contains \"LogFile\""

# Formatter string. Optional, by default only log record message text is written.
Format="[%TimeStamp%]: (%Severity%) %Message%"

# File size, in bytes, upon which file rotation will be performed. If not specified, no size-based rotation will be made.
RotationSize = 1048576

# Time interval, in seconds, upon which file rotation will be performed. See also the RotationTimePoint parameter and the note
below.
#RotationInterval = 3600

# Time point or a predicate that detects at what moment of time to perform log file rotation, e.g. at midnight
RotationTimePoint= "00:00:00"

# Enables or disables final file rotation on sink destruction, which typically happens on program termination.
EnableFinalRotation = true

# The flag shows whether the sink should be asynchronous
Asynchronous=false

# Enables automatic stream flush after each log record.
AutoFlush=true

# Appends log data to existing file if true, or clears if false
Append=true

# Uncomment the below for logging to console
#[Sinks.Console]
#Destination=Console
#Filter="%Severity% >= warning"
#Format="[%TimeStamp%]: (%Severity%) %Message%"
#AutoFlush=true
```
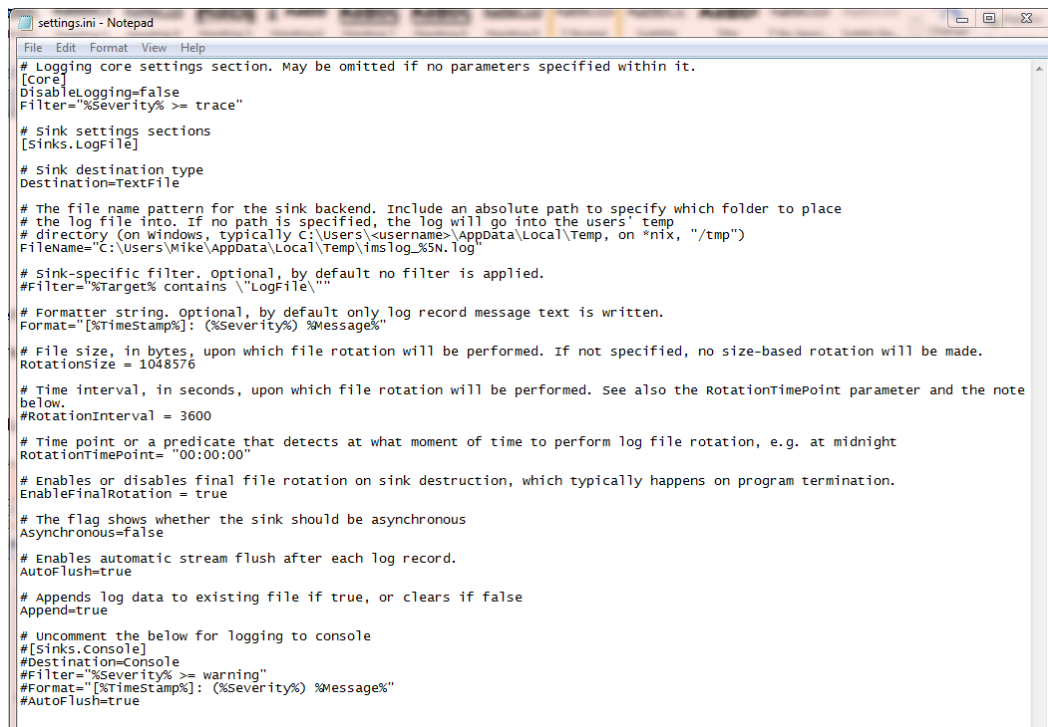
By default, the log file is active; *DisableLogging = false*

(If logging needs to be deactivated, then change to *DisableLogging = true*)

Default severity level for logging data is "error"; *Filter="%Severity% >= error*

For a more detailed record, change to *Filter="%Severity% >= trace"*

To find and view log file

Location: **C:\Users\<username>\AppData\Local\Temp**
File: **imslog_#####.log**

where ##### starts at 00000 and increments with each new log write.
Sort and find by date stamp.