Quick Start Guide

iCSA Producing 90W RF

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Last Updated: N/A

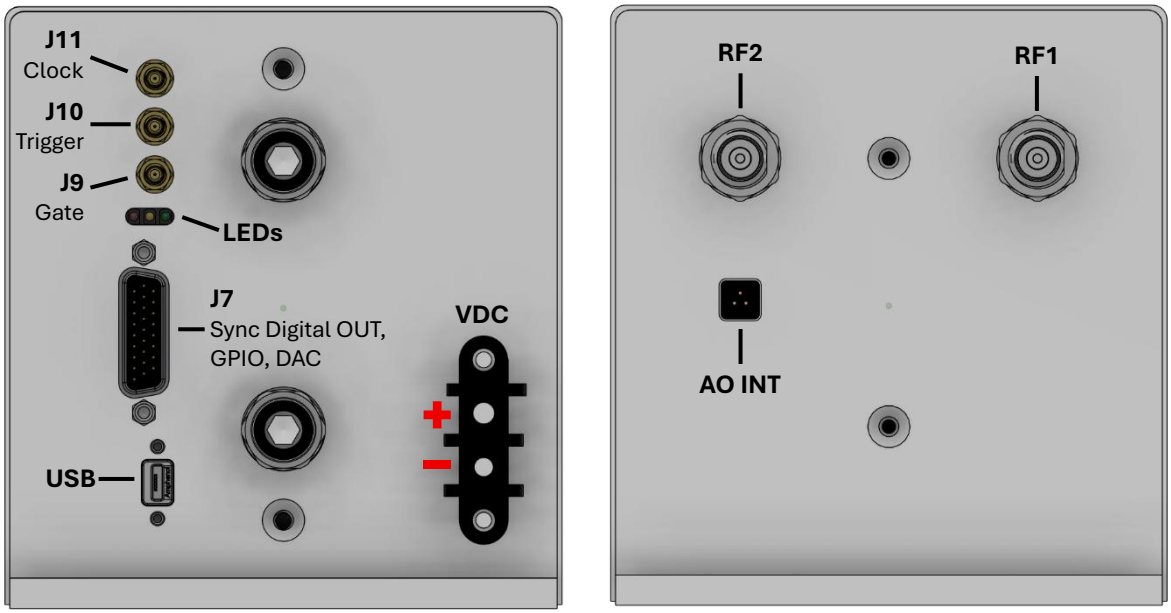
Applicable Models:
iCSA-**A**T-**B**-**C**

Frequency(**A**)
- 80T 60–100 MHz

Outputs(**B**)
- 1 RF1 only
- 2 RF1 and RF2

Maximum RF Power(**C**)
- 90 90 Watts

Front & Rear



ISOMET CORP, 10342 Battleview Parkway, Manassas, VA 20109, USA.
Tel: (703) 321 8301, e-mail: isomet@isomet.com

ISOMET (UK) Ltd, 18 Llantarnam Park, Cwmbran, Torfaen, NP44 3AX, UK.
Tel: +44 1633-872721, e-mail: sales-uk@isomet.com

1. **Hardware Connections.**

Minimum:

Interface	Termination	Note
USB	Host PC running S/W	SDK v.1.9.1 or later
DC Supply	Voltage as specified	
RF Outputs	50Ω Load	
INT	Closed Circuit	Pins 1-2
External Gate (J9)	Logic High	TTL/TTLV Levels

Optional:

Interface	Termination	Note
External Clock	TTL Levels	Requires Software Enable
External Trigger	TTL Levels	
External Gate (J9)	Logic High	TTL/TTLV Levels
INT	AO INT	

SDK output assignment:

Connector	SDK Channel
RF1	1
RF2	2

Note[1]: By default, J9 (External Gate) is an unused control. Units can be configured so that J9 (External Gate) and SDK software enables are required in conjunction with AO INT to enable the amplifiers.

2. **Software**

The Compact Synthesiser works with SDK Version 2.0.0 and higher.

The SDK is available for Python, C++, and C#, allowing you to integrate the synthesiser into various development environments. Example programs demonstrating usage in each language can be found on our website for reference.

For Python users, you can install the necessary build directly by running `***pip install imslib***` in your terminal.

To obtain the Isomet SDK itself, visit www.isomet.com. Alternatively, if you prefer open-source solutions or want to view the codebase, you can access the open-source version on GitHub at https://github.com/Isomet-Corporation.

3. **Upon application of DC power**

   See the data sheet for specific power requirements and pin assignments.

   No interlock is required to power on or communicate with the iCSA control unit. At initial power-up, the green LED will light and begin a steady pulse (~1 Hz). The device will then be accessible via software.

4. **Upon satisfaction of the device's interlock requirements**

   In the iCSA product range, the interlock is configured to control the DC supply to the amplifiers of the device. **See the data sheet for device interlock specifications.**

LED State	Meaning
Green (pulsing)	Device powered and active (does not indicate RF state)
Amber	All interlocks and gates active
Red	Hardware interlock/gate inactive

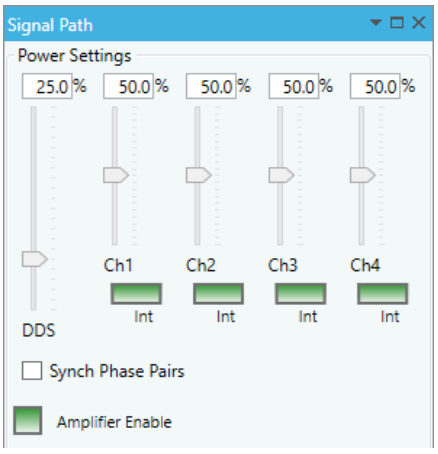
Requirements:

Connector/control	State
INT	Closed Circuit/connection to AO INT
J9 Gate	Logic High (TTL/TTLV Levels)
SDK Amplifier enable	Enabled in software

4.1. Enabling SDK Amplifier Enable

<u>Method A: Using iMS Studio</u>

To enable this using the iMS Studio application, navigate to Signal Path > Power Settings and set Amplifier Enable to true (green).



<u>Method B: Explicit Python programming</u>

Using the Python SDK previously mentioned, the hardware gate can be enabled using the snippet below:

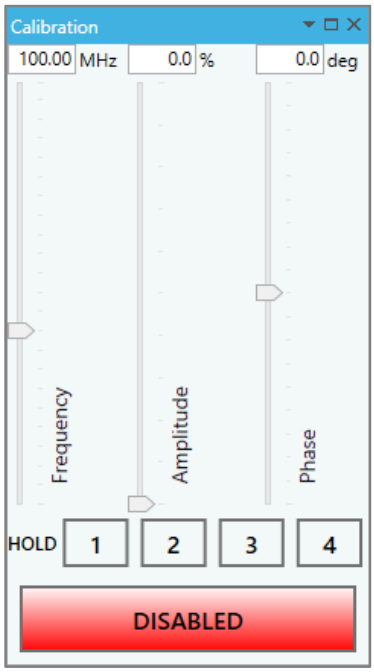
```
import imslib
from imslib import SystemFunc

sysf = SystemFunc(ims)
sysf.EnableAmplifier(True)
```

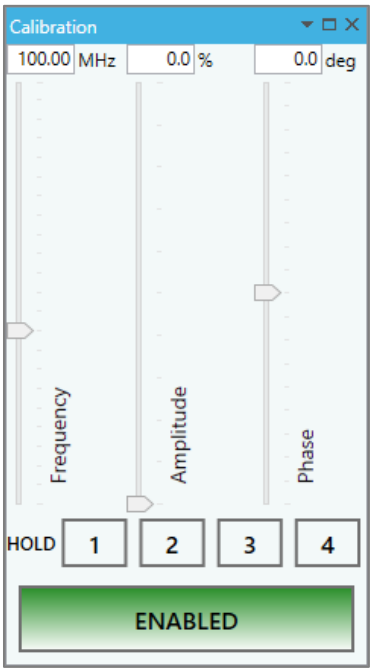
5. Validating correct operation

We recommend that users use the ***Isomet iMS Studio*** application included with the ***Isomet SDK*** when attempting to validate that the device is operating correctly. The same methods can also be carried out by explicit programming using the SDK.

Procedure (Using iMS Studio)

a. Open the ***Isomet iMS Studio*** application.
   Verify that the software has connected to the synthesiser in the bottom left-hand corner of the application.
b. In the tabbed menu located on the right-hand side of the user interface, select Signal Path.
c. Set all amplitude values to approximately 50%.
d. In the tabbed menu located on the right-hand side of the user interface, select Calibration (Calibration mode).
   Calibration mode *will produce a single tone at the defined frequency, amplitude and phase (FAP) on all channels. The channel hold controls can be used to maintain the selected FAP, at the time when the hold is applied, on a specific RF channel while others continue to follow the sliders. There is no sync output in this mode.*
e. Set the frequency to the centre of the device's output range.
f. Enable CAL mode by clicking the **DISABLED** button which will then change to **ENABLED** .
g. Adjust the amplitude slider and validate the device's RF output(s).
   Compare the device's output to that stated on the ***Test Data Sheet.***
h. When finished click the **ENABLED** button to set calibration mode to **DISABLED** as image playback will not work while calibration mode is active.





6. Compensation

Compensation *allows users to create a lookup table for the output of the synthesiser (amplitude and phase), so that the device's output, or the combination of the synthesiser, amplifier, and acousto-optic device, is as linear as possible for a linear input. Compensation can be used for applications such as maintaining consistent deflection efficiency across the full sweep of an acousto-optic deflector.*

LUT file size = 57 KB *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 iMS4 synthesisers.*

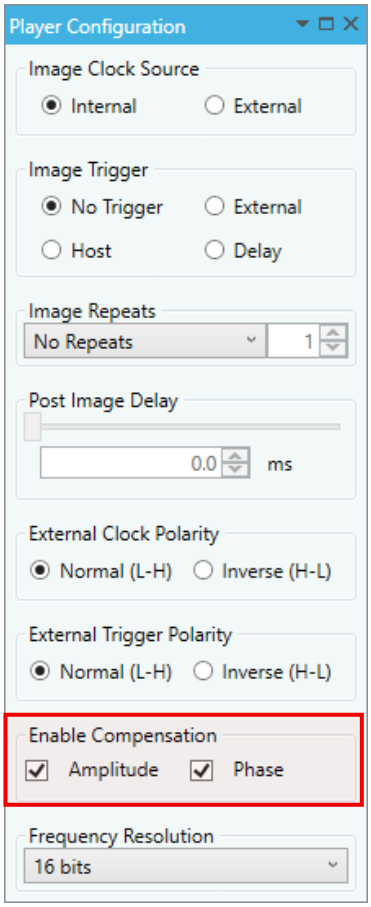
LUT file size = 225 KB *is a channel-scoped (channel-specific) compensation file that can apply unique values to each channel. This is the recommended LUT option for X-Y deflector use.*

Disabling compensation

Users may wish to bypass compensation, meaning the output will be that which is inherent to the devices themselves.

Note: This is not recommended when driving AODs

In the ***Isomet iMS Studio*** application, this can be done by navigating to the Player Configuration tab and adjusting the controls in the Enable Compensation section.



Creating a compensation table (iMS Studio)

To create a compensation table using the ***Isomet iMS Studio*** application:

Step 1. In the project explorer, navigate to the Compensation Functions section and select the located next to the table to create a new entry.
Tip: Add a name to keep them organised

Step 2. On the right-hand side of the main page, change the # Specification Points to the desired amount.

Specification points *are frequency points where you will specify exact values of amplitude, phase, analogue sync, and digital sync. Intermediate points, with the exception of digital sync data, will be interpolated as specified in the Interpolation Styles section.*

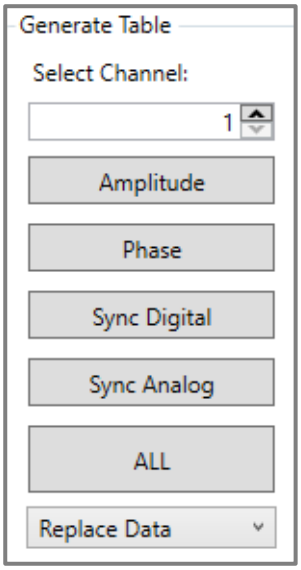
Step 3. Populate the table as desired.
Tip: Enabling calibration mode and selecting a specific row will recall the value to the output of the device. In this way you can set the measured output at each specification point to be as desired.

Step 4. Repeat steps 1, 2, and 3 for each channel of the device if channel-specific compensation is desired.

Step 5. To apply a **global** compensation table, ensure that the Global selector is ticked in the Channel Scope section of the Compensation tab located on the right-hand side of the application. Otherwise, uncheck Global.

Step 6. To generate a compensation table that can be applied to the synthesiser, navigate to the Generate Table section, located on the right-hand side of the main window. Select the data to add, or select ALL.

For channel-specific compensation, select the desired channel.



Step 7. Using the graphs in the Compensation tab, verify that data has been added as desired.

Step 8. Download the data to the connected synthesiser or export for later use.

Tip: By default, unless bypassed, compensation is set to 0 and thus there will be no output. Always check that compensation is downloaded if the device does not appear to be working.

7. Tone Buffers

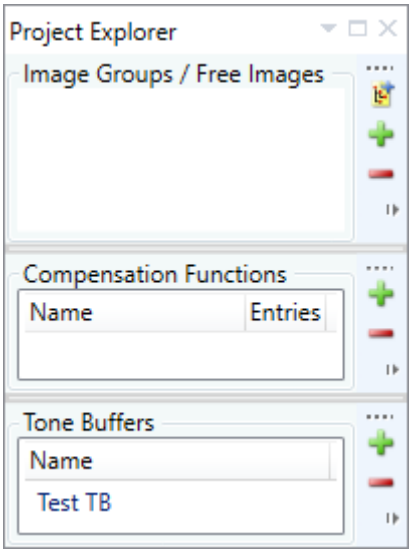
*A **Tone Buffer** is a table where each entry holds values of frequency, amplitude and phase (FAP) per channel. That can be manually stepped through either within the Isomet iMS Studio application or using external controls. Tone buffers hold a maximum of 255 entries.*

Creating a tone buffer

a. In the project explorer navigate to 'Tone Buffer' section and select the ✚ located next to the table to create a new entry.

Tip: Add a name to keep them organised

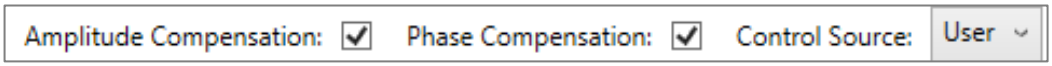
b. Populate the FAP for each channel as required and save.



Playing a tone buffer

Step 1. Select the desired tone buffer in the project explorer such that it appears in the main window.

Step 2. Select whether you wish compensation to apply to the table at the bottom window.



Step 3. In the 'Signal Path' tab, located on the right-hand side of the application, set the DDS and Ch power levels as required.
Note: We always recommend starting low and increasing as required.

Step 4. Select the first row in the table and press the ▷ button in top task bar.

Step 5. Step through the table entries as desired.

Step 6. When finished select the ◻ button.

8. Images

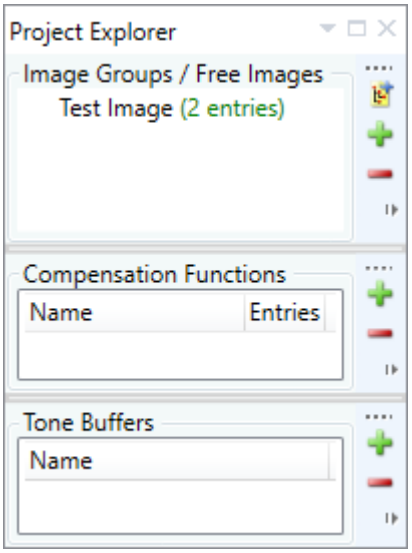
*An **image** is a table where each entry holds values of frequency, amplitude and phase (FAP) per channel. That can be played (automatically stepped through) to create programable outputs. Images can be applied to acousto-optic deflectors to create swept or patterned outputs.*

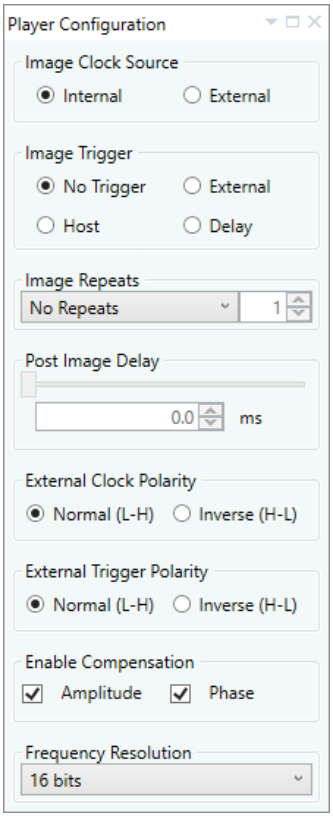
Creating an image table

a. In the project explorer navigate to 'Image Groups / Free Images' section and select the ✚ located next to the table to create a new entry.

Tip: Add a name to keep them organised

b. In the bottom left of the main window set the 'Number of points' as required.
c. Populate the FAP for each channel as required and any required sync data for each entry.
d. Set the 'default Internal Clock Rate' for the image at the bottom of the main window.
e. Save.





Playing an image

Step 1. Select the desired image from the project explorer such that it appears in the main window.
Step 2. Ensure compensation is set as desired through the previously mentioned procedures.
Step 3. In the 'Player Configuration' tab, located on the right-hand side of the application, configure the 'Image Clock Source', 'Image Trigger' and 'Image Repeats'
Step 4. In the 'Signal Path' tab, located on the right-hand side of the application, set the DDS and Ch power levels as required.
Note: We always recommend starting low and increasing as required.
Step 5. Select the first row in the table and press the ▷ button in top task bar.
Step 6. When finished select the ◻ button.

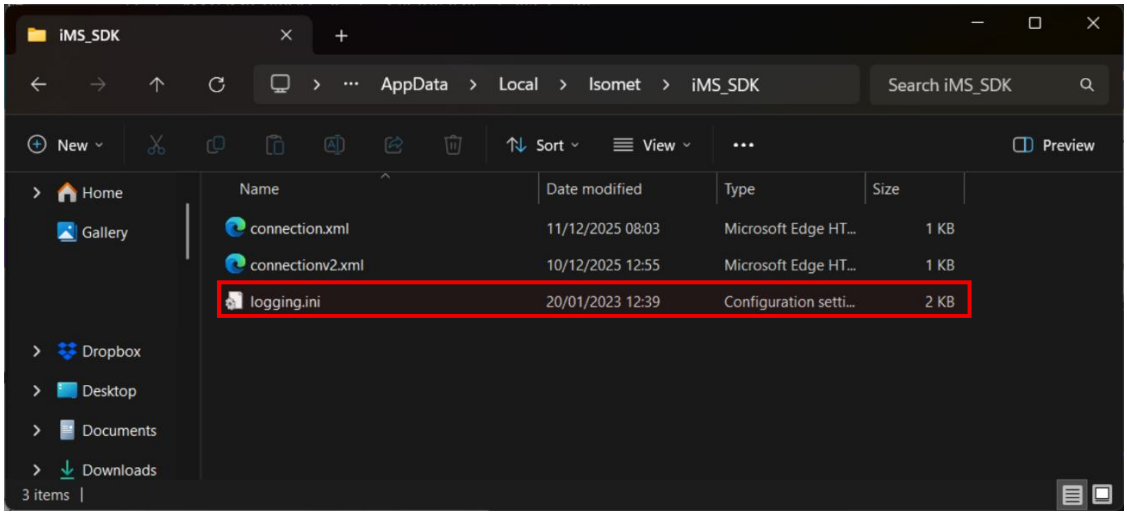
9. **Documentation and Hardware Revision**
   - To Check the SDK and iCSA build revision:
     a. In the **Isomet iMS Studio** application navigate to ***Tool bar > Help > About***
     b. When programming call:
        - iCSA Firmware Version: *iMS::IMSController::GetVersion ( )*
        - SDK Version: *iMS::LibVersion::GetVersion ( )*
   - To Access Isomet SDK Documentation:
     a. In the **Isomet iMS Studio** application navigate to ***Tool bar > Help > iMS Documentation***
     b. In the Isomet SDK file structure ***Program Files\Isomet\iMS_SDK\v#.#.#\doc***

10. Trouble Shooting Log files

In cases of difficulty and when seeking Isomet support, it can be helpful to generate a log file. Log files are Generated by default.

Configuring Logs

Step 1. Navigate to '***C:\Users\<username>\AppData\Local\Isomet\iMS_SDK\logging.ini***'



Step 2. Open the ***logging.ini*** file with Notepad and locate the first few lines of text pertaining to logging activation and severity filter.

Step 3. Confirm that logging is enabled (the default condition)

DisableLogging = false

Step 4. Set the severity as desired:

Error (Default)	***Filter="%Severity% >= error***
Trace (More Detail)	***Filter="%Severity% >= trace***

Locating Logs

Once configured you can replicate the error if possible and then Locate the log files in '***C:\Users\<username>\AppData\Local\Temp***'. Log files are named with the structure '***imslog_#####.log***' where ##### starts at 00000 and increments with each new log write.