

## iMS4-L-opt (quad output)



### High Speed Synthesizer with Controller 'Lite'

0417

#### Description

The *iMS4-L* programmable frequency sources are based on a quad output direct digital synthesizer (DDS) offering the user a wide variety of frequency generation and signal control options. The *iMS4* is designed around a modular concept. When mated to one of many compatible power amplifiers, the *iMS4-* will suit the drive requirements of the majority of Isomet AO devices.

The *iMS4-L* functions are controlled via high speed USB-II, (RS422 optional). Windows7 & 10 GUI software and a comprehensive C++ SDK are both provided. The SDK defines all the function calls that are possible on an *iMS* system and allows the system integrator to quickly and efficiently develop application software at a high level of abstraction. All low level protocol communication is handled by the library functions. (DLL call functions).

#### **DIRECT Mode**

The *iMS4-L* outputs are controlled directly from the host PC. All output parameters can be set independently. The tuning rate is limited by the host PC interface.

Available Functions:

- Single tone (static frequency) output.
- Zero to Max Amplitude control.
- 0-360° phase shift between outputs
- Differential frequency offset between the outputs

#### **SWEEP Mode**

Frequency sweep parameters are configured at the host PC and downloaded directly to the DDS chip. A single trigger (via PC or external input) initiates the sweep. The increment step value and step duration are user programmable.

Available Functions:

- Up or Down
- Dwell or No dwell at completion

The sweep mode offers the fastest frequency scan capability, with a minimum dwell time of 8nsec per frequency increment. Amplitude and phase values remain constant.

#### **IMAGE Mode (4K)**

The *iMS4-L* outputs are controlled from "Image" data programmed into internal memory. This memory is capable of storing a single image of up to 4096 frequency points with the same frequency/amplitude across all outputs or 1024 points with a different frequency/amplitude at each output. Phase values are automatically inserted from a user defined look-up-table (LUT) pre-loaded during initialization. The stored image points each comprise of 32-bit Frequency, 10-bit Amplitude, 14-bit Phase and 12-bit ancillary control. Output data is addressed in sequence under the control of external or internally generated trigger and clock signals. The RF signal responds to a new data set at each valid update clock. The minimum dwell time per frequency point is less than 1usec. The user can specify trigger, clock, repeat, and output delay functions.

The image mode is highly flexible and allows fast continuous data throughput. Up to 256 frequency unique images can be downloaded including uni-directional, bi-directional and random frequency patterns. New image data can up-loaded from the host simultaneously during output play. A key advantage of this mode is that each frequency point may be modified by the LUT, providing an efficient method of applying phase control and amplitude calibration to the downloaded image data. Active phase steering across the multiple RF outputs is ideal for Isomet (acoustic) beam steered AO deflectors.

#### **Local Tone Buffer**

Similar to the Image mode except the data is limited to 256 separately programmable frequency, amplitude and phase points and does not use the LUT. These points may be addressed randomly from an 8-bit external port. Outputs change value immediately after a new buffer address is applied.

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ISOMET CORP, 5263 Port Royal Rd, Springfield, VA 22151, USA.

Tel: (703) 321 8301 Fax: (703) 321 8546

E-mail: [ISOMET@ISOMET.COM](mailto:ISOMET@ISOMET.COM) Web Page: [WWW.ISOMET.COM](http://WWW.ISOMET.COM)

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**In-house: RF & Digital design  
Software Development  
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#### Specification

|   |  |
|---|--|
| Maximum Frequency Bandwidth (full range):       | <20 - 200 MHz  |
| Outputs:  | Quad independent outputs, phase continuous   |
| Maximum frequency resolution:                   | 32 bit   |
| Frequency settling (Image mode) :               | < 40nsec   |
| Max. output rate (Image mode):                  | 1.2MHz (800nsec minimum dwell per image point)   |
| Frequency stability (internal reference clock): | +/- 25ppm  |
| Phase control:                                  | +/- 180deg differential between outputs  |
| Maximum Output Power per output:                | > 0dBm typical. (1mW) at 80MHz   |
| Output power flatness:                          | < +/- 1dB per octave, with no amplitude programming  |
| Harmonics:                                      | > 25dBc  |
| RF On:Off contrast ratio                        | > 40dBc  |
| Max power adjustment range:                     | 10dB via digital potentiometer   |
| Amplitude resolution (Image mode data):         | 10 bit (zero to max power)   |
| Amplitude modulation, external input(s) *:      | 0-5V (zero to max power)   |
| * Available configurations                      | One input per channel, Override, Disable   |
| DC Supply:                                      | +24V nominal @ 1A, (Input voltage range +15V to +30V)  |
| Communications:                                 | USB II, (Option: RS422).   |
| External Clock, Trigger Inputs:                 | 5V tolerant LVTTTL compatible. SMA connectors  |
| Memory capacity:                                | 4096 frequency data points, single 'Image'   |
| Auxiliary I/O features                          | Up to 16 analog and 16 digital I/O signals offering a variety of programmable test and control options |
| Digital GPIO:                                   | 5V opto-isolated.  |

#### Optional Features

USB serial (included as standard)  
RS422 serial interface

Option: -opt  
-  
-R

#### Associated models

Controller 'Pro' model, 512Mbyte memory  
Frequency doubled output, 150-400MHz:  
Power Amplifier Modules:

see separate data sheet, iMS4-P  
see separate data sheet, iMS4-L-Fx2, iMS4-P-Fx2  
see separate data sheets, iMPAxxx-4, 500C series & others

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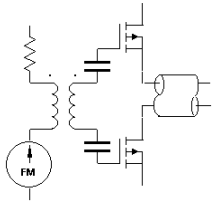
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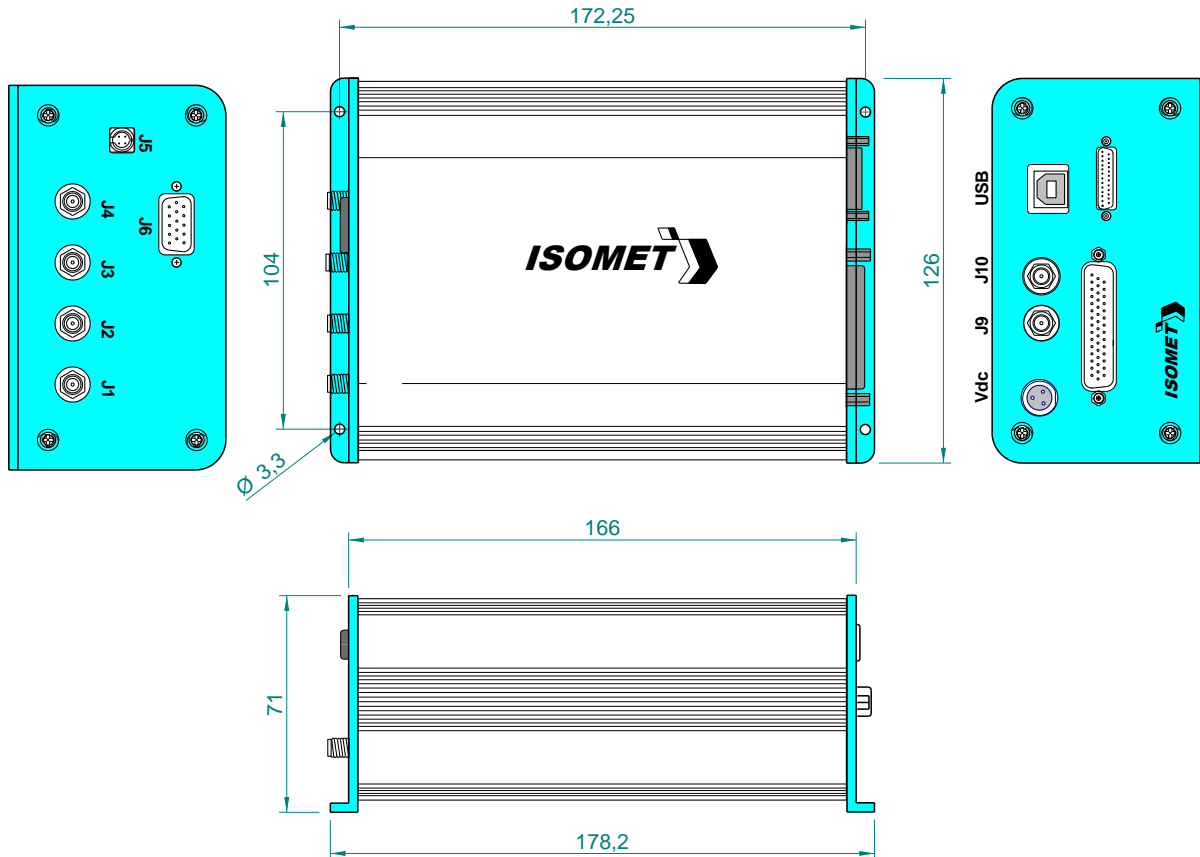
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#### Outline Drawing



#### Connector Summary

All digital I/O signals on J6, J9 are ESD protected to IEC6100-4-2 and include EMI suppression.

- J1,2,3,4:** SMA RF outputs
- J5:** Binder 719, Interlock NC contact input (Thermal interlock from AO device) \*
- J6:** 15-way High density female D-type, (Diagnostics) \*
- J7:** 44-way High density female D-type, (GPIO)
- J8:** 26-way High density female micro D-type, (Control)
- J9:** External Trigger, SMA
- J10:** External Clock, SMA
  
- Vdc** 3-way TINI-Q male socket. (15-24Vdc voltage Input)

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