

iMS4-P-opt (quad output). RevB

High Speed Synthesizer with Controller 'Pro'



0718

Description

The *iMS4-P* programmable frequency source is 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-P* will suit the drive requirements of the majority of Isomet AO devices.

The *iMS4-P* functions are controlled via high speed USB-III. (RS422 or GbE options available). 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* 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

EXTENDED TONE (Sweep) Mode (This feature not yet available from the GUI)

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 in this mode.

IMAGE Mode (20M)

The *iMS4-P* outputs are controlled from frequency "Image" data programmed into dedicated memory. There are two 128M x 16 memory banks each capable of storing over 10 million frequency/amplitude/phase points in multiple image files. Phase values are automatically inserted from a user defined compensation 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 auxiliary 12-bit outputs are user programmable and output synchronously with the frequency points.

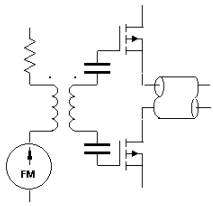
The image mode is highly flexible and allows fast continuous data throughput. Up to 256 frequency unique images can be downloaded including uni-directional, bi-directional and random frequency patterns. New image data can up-loaded from the host simultaneously during output play. A key advantage of this 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. 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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Quality Assured.
In-house: RF & Digital design
Software Development
OEM manufacture



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Specification

Maximum Frequency Bandwidth (full range):	<20 - 200 MHz
Outputs:	Quad independent outputs, phase continuous
Frequency resolution (full range):	32 bit
Frequency settling (Image mode) :	< 40nsec
Max. output rate (Image mode):	1.2 MHz (800nsec minimum dwell per image point)
Frequency stability (internal reference clock):	+/- 25ppm
Phase control (Dual output version):	+/- 180deg differential between outputs
Output Power per output:	> 0dBm. (1mW) at 80MHz
Output power flatness:	< +/- 1dB per octave, with no amplitude programming
Harmonics:	> 25dBc
RF On:Off contrast ratio	> 40dBc (using external analog modulation inputs) > 60dBc (using data control)
Max power adjustment range:	10dB via digital potentiometer
Amplitude resolution (Image/Tone 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/III, RS422 (option), Gigabit Ethernet.
External Clock, Trigger & Gate Inputs:	5V tolerant LVTTTL compatible, SMA connectors (std) 50MBd optical receiver AFBR2624 (option)
Memory capacity:	Configuration dependent, over 10 million frequency data points,
Auxiliary I/O features	Up to 16 analog and 16 digital I/O signals offering a variety of programmable test and control options. Includes quadrature encoder inputs for tracking applications.
Synchronous and GP digital IO:	5V opto-isolated.

Optional Features

USB III (included as standard)
RS422 serial
Optical receivers

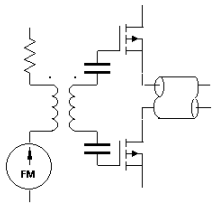
Option: -opt
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Associated models

Controller 'Lite' model 0.5MB memory see separate data sheet, IMS4-L
Frequency doubled output, 150-400MHz: see separate data sheet: IMS4-L-Fx2 or IMS4-P-Fx2
Power Amplifier Modules: see separate data sheets, IMPAxxx-4, RFA0110, 500C series & others

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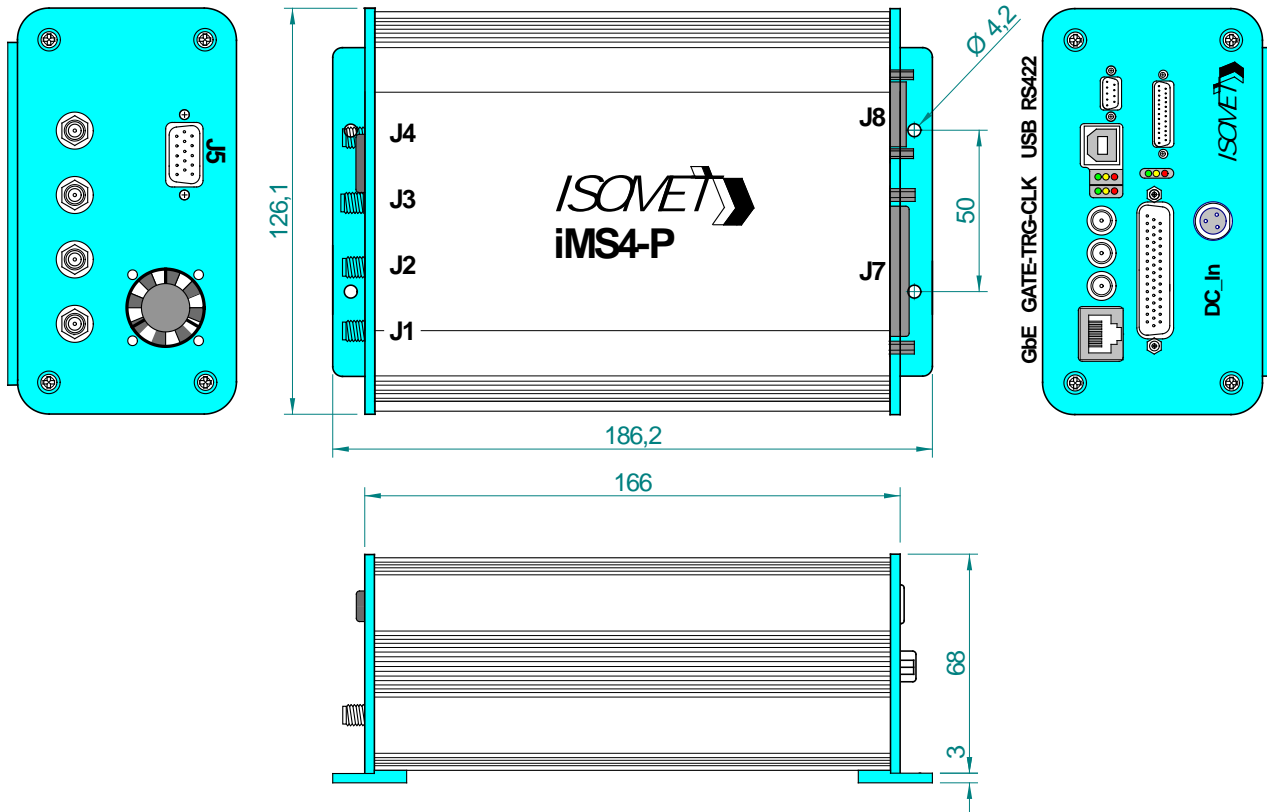
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Outline Drawing



Connector Summary

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

Ident	Type	Description
J1, J2, J3, J4	SMA	RF outputs
J5	15-way High density female D-type	External amplifier control and diagnostics *
J7	44-way High density female D-type	GPIO including 2 channel differential encoder inputs
J8	26-way High density female micro D-type	iMS4 control
J9	SMA or POF	Gate input
J10	SMA or POF	Trigger input
J11	SMA or POF	Clock input
J12	9-way female micro-D	RS422
USB	Type B	USB II/III
GbE	RJ45	Ethernet
Vdc	3-way TINI-Q male socket	15-24Vdc voltage input

* Compatible with Isomet RFA amplifiers such as RFA0110-1/2/4 and RFA0120-1/2/4 series

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