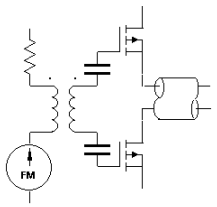

iMS4-L, (Rev-C)

Quad Output High Speed Synthesizer with Controller '*Lite*'

ISOMET

2621

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 option 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-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

EXTENDED TONE (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

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 16-bit Frequency, 10-bit Amplitude, 14-bit Phase and 12-bit synchronous GPIO. 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 1usec. The user can specify trigger, clock, repeat, and output delay functions. The 12-bit GPIO 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 software control or an 8-bit external port. Data addressing is not clocked. Outputs change value immediately after a new buffer address is applied. Maximum update rate in this mode is 90KHz.

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ISOMET CORP, 10342 Battleview Parkway, Manassas, VA 20109, USA.
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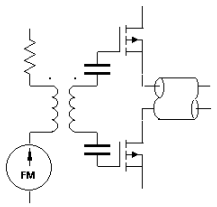
Quality Assured.
In-house: RF & Digital design
Software Development
OEM manufacture



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.Specification

Maximum Frequency Bandwidth (full range):	10 - 210 MHz
Outputs:	Quad independent outputs, phase continuous
Maximum frequency resolution:	32bit fundamental, 16bit SDK limit
Frequency settling (Image mode):	< 100nsec
Max. output rate (Image mode):	Configuration dependent, 0.3MHz - 1MHz (See iMS4-P for faster rates)
Frequency stability (internal reference clock):	+/- 2.5ppm
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 (using external analog modulation inputs) > 60dBc (using data control)
Peak power adjustment range:	>35dB via digital potentiometers
Amplitude resolution (Image/Tone data):	10bit full range, zero to set peak power level.
External asynchronous modulation input(s):	0-5V or 0-1V (option), full range, zero to set peak power level. *Configurable: common or channel scoped, override or disable control.*
DC Supply:	+24V nominal @ 1A, (Input voltage range +15V to +30V)
Communications:	USB II, RS422 (option).
External Clock, Trigger Inputs:	5V tolerant LVTTL compatible. SMA connectors
Memory capacity:	4096 frequency data points, single 'Image'
Auxiliary I/O - Synchronous:	12bits SDIO, 2x DAC outputs
- Asynchronous:	16bits GPIO, 1x DAC output, 2x ADC inputs
Synchronous and GP digital IO:	5V opto-isolated.

Optional Features	Model:
RS422 serial	iMS4-L-R
0-1V external modulation	iMS4-L-1V

Associated models:

Controller 'Pro', 10MB memory, multi-image:	see separate data sheet: iMS4-P
Higher Frequency, dual output, 40-400MHz:	see separate data sheet: iMS2-HF
Power Amplifier Modules:	see separate data sheets: AJ0, AG0, AF0, AM1 series & others

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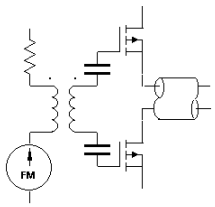

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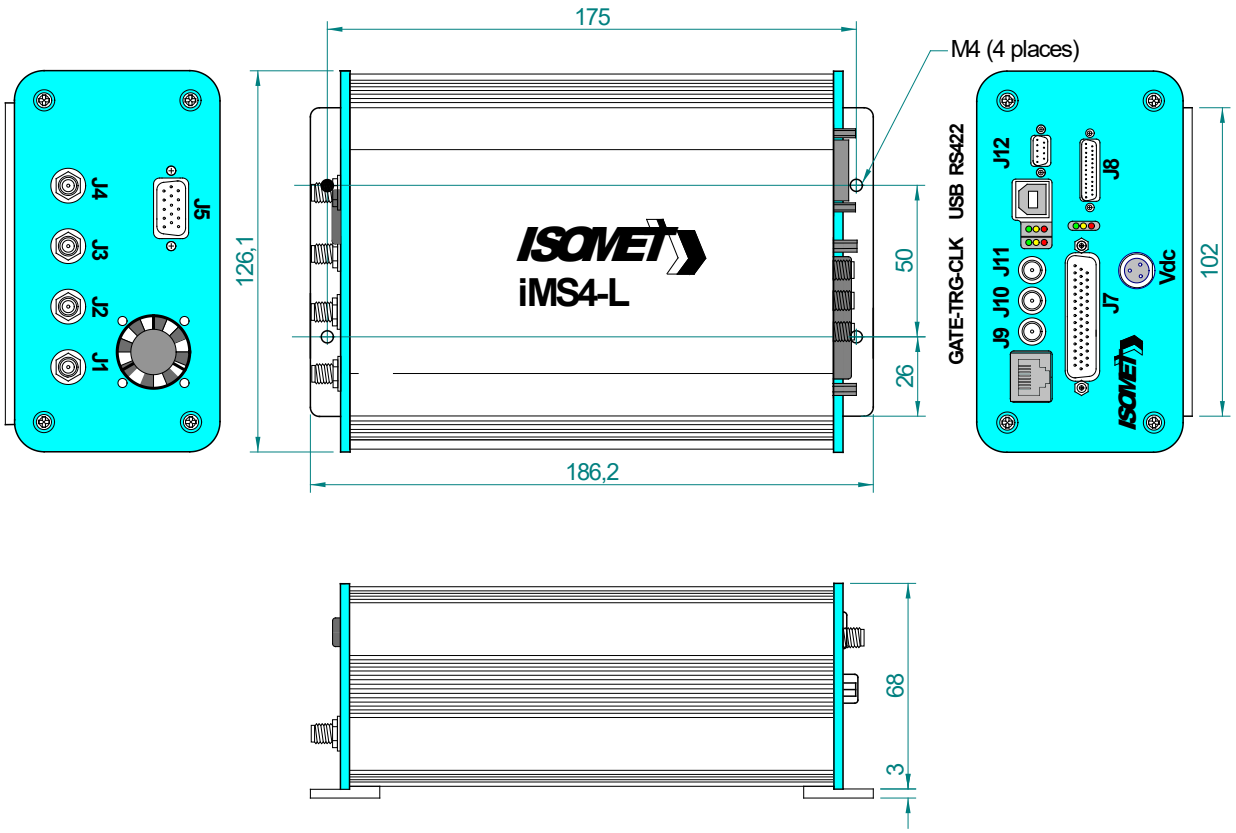
Outline Drawing



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*	*Not currently enabled in iMS4-L*
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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