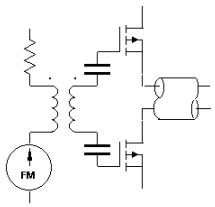

iMS4-P revE

Quad Output High Speed RF Synthesizer with Controller 'Pro'

1824

Description

The *iMS4-P* rev-E is a programmable frequency source designed around 2x dual output direct digital synthesizers (DDS) operating in parallel. This revision is optimized for high speed dual axis AO deflector applications and offers the user independent timing adjustment between X and Y axis drives and the update clock input. 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 or Gb Ethernet (RS422 option available). Windows7 & 10/11 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

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

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 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 less than 0.3usec (3.5MHz update rate). The user can specify trigger, clock, repeat, input 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. Multiple images and play sequences can be created and downloaded on-the-fly. Each frequency point can be modified by the LUT compensation function. This function automatically applies AO device specific phase and amplitude calibration data to the image file(s) within the iMS4. Active phase control across the multiple RF outputs is ideally suited for driving Isomet (acoustic) beam steered AO deflectors.

Local Tone Buffer

Similar to 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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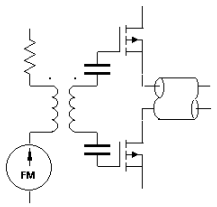
Quality Assured.
In-house: RF & Digital design
Software Development
OEM manufacture



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Specification

Maximum Frequency Bandwidth (full range):	10 - 210 MHz
Outputs:	Quad independent outputs, phase continuous
Frequency resolution (full range):	32bit fundamental, 16bit SDK limit
Frequency settling (Image mode):	< 40nsec.
Max. output rate (Image mode):	3.5 MHz* (290nsec minimum dwell per image point)
Frequency stability (internal reference clock):	+/- 2.5ppm
Phase control (Dual output version):	+/- 180deg differential between outputs
Output Power per output:	1dBm. (1.3mW) 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):	0-10V or 0-1V (option), full range, zero to defined power level. *Configurable: common or channel scoped, override or disable control.*
DC Supply:	+24V nominal @ <0.5A, (voltage range +15V to +30V)
Communications:	USB II/III, Gb Ethernet, RS422 (option)
External Clock, Trigger & Gate Inputs:	5V logic, buffered with hysteresis, SMA connectors (std) 50MB optical receiver AFBR2624 (option) 50ohm termination (option)
Memory capacity:	Configuration dependent, 4-40million frequency data points.
Calibration 'Look-Up-table function:	Channel specific frequency dependent compensation data.
Auxiliary I/O - Synchronous:	12bits SDIO, 2x DAC outputs
- Asynchronous:	4bits GPO, 8bits GPI, 1x DAC output, 2x ADC inputs, Quadrature encoder inputs for 'on-the-fly' tracking applications.
Synchronous and GP digital IO:	5V logic, isolated. (non-isolated as option).

Optional Features	Model:
RS422 serial	iMS4-P-R
Optical receivers	iMS4-P-O
0-1V external modulation	iMS4-P-1V

Associated models:

Controller 'Lite', 0.5MB memory, single image:	see separate data sheet: iMS4-L
Higher Frequency, dual output, 25-400MHz:	see separate data sheet: iMS2-HF
Power Amplifier Modules:	see separate data sheets: AJ0, AG0, AF0, AM1 series & others.

* For dual axis AOD configurations. 5MHz for single axis

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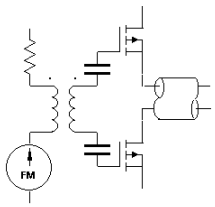

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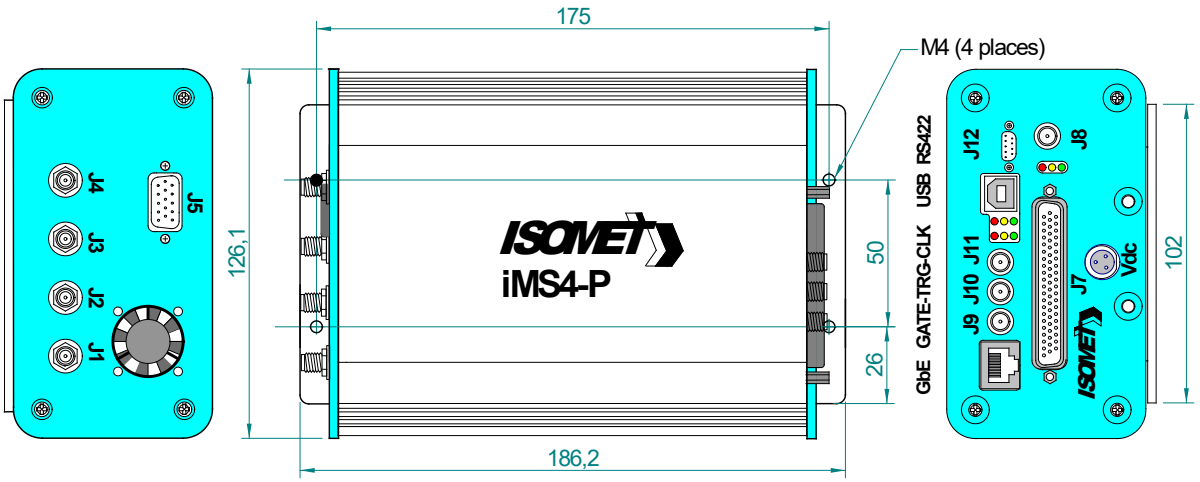
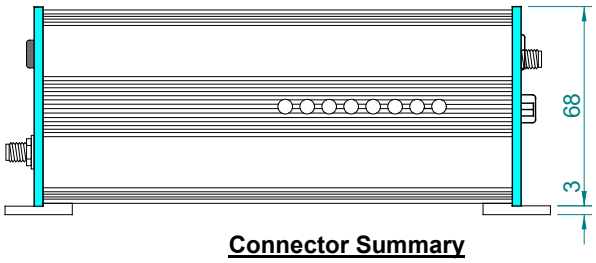
Outline Drawing





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	62-way High density female D-type	Control, GPIO, differential encoder inputs
J8	SMA	Reference Clock Input (Option)
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-, RFA0120-, RFA0140-, RFA0170- (= AM1 series)

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