iCSA050-2-90 (BR)

Synthesizer and RF Driver
(PRELIMINARY)

ISOMET

0425

The iCSA050 is a dual output programmable frequency synthesizer and power amplifier pair. It is ideally suited for driving Isomet beam steered Germanium and Quartz acousto-optic devices where stable and rapid programmable frequency tuning is required. This driver includes a high-speed FPGA controlled synthesizer. Once programmed, the driver will operate in one of three modes described below. Independent analog modulation and digital Gate inputs provide asynchronous control of the output. Diagnostics include AOM and driver temperature (depends on AO model). Protection includes over-temperature shut down and DC supply over-voltage clamp. The unit operates from a +24V or +28Vdc supply. LED's indicate the status of the thermal interlocks, DC supply and RF output activity. Heatsinking is by an integral water-cooled base.
Functions and programming are controlled via USB-II, (RS485 option available). Windows 10/11 GUI software and a comprehensive C++ SDK with support for Python are all provided.

DIRECT Mode
The iCSA- 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.
In contrast to IMAGE mode, the amplitude and phase values remain constant.

IMAGE Mode
The iCSA- outputs are controlled from "Image" data programmed into internal memory. This memory can store a single image of up to 10K frequency points with different frequency/amplitude at each output.
The stored image points each comprise of 16-bit Frequency, 10-bit Amplitude, 14-bit Phase and 2-bit synchronous IO. 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 0.2usec. The user can specify trigger, clock, repeat, and output delay functions. The IO bits are user programmable and output synchronously with the frequency points.

The image mode is highly flexible and allows fast continuous data throughput. A key advantage of this mode is that each frequency point may be modified by preloaded compensation data (LUT). This provides an efficient method of applying phase control* and/or amplitude calibration to the downloaded image data. Active phase steering across the multiple RF outputs is the basis for Isomet (acoustic) beam steered AO deflectors* Amplitude compensation enhances uniformity of the scan pattern intensity   (* not relevant for single transducer AO models).

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 a subset of 8 points via 3-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. This data can be stored in non-volatile memory.

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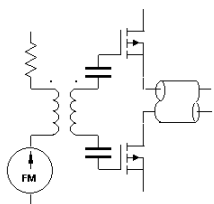
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.Specification

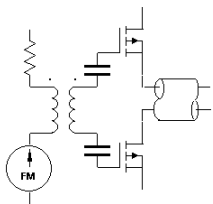|	
Power amp 3dB bandwidth frequency range:	35 - 65MHz
(Synthesizer maximum frequency range:	10 - 210MHz)
RF Outputs:	Dual, phase continuous RF Outputs, BNC Connectors
Output amplitude settling:	< 300/100ns Rise/Fall, 0 to 70 Watts
DC Supply:	+24V to +28Vdc, 0.25% regulation, <16A
Interlock input:	Binder 719, 3-pin (connect to AO)
Maximum frequency resolution:	32bit fundamental, 16bit typical operation
Frequency settling (Image mode):	< 100nsec
Max. output rate (Image mode):	Configuration dependent, up to 5MHz
Frequency stability (internal reference clock):	+/- 2.5ppm
Maximum Power (total):	> 180W, 24Vdc supply
	> 190W, 28Vdc supply
Output power flatness:	< +/- 1.5dB, 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.
Communications:	USB II, RS485 (option).
Memory capacity:	10K frequency data points, single 'Image'.
Auxiliary I/O - Synchronous:	2bits SDIO, 2x DAC outputs
or	
- Asynchronous:	2bits GPIO
Temperature Range:	0º to 50ºC, Thermal shutdown if exceeded
	Integral water-cooled heatsink is provided.

*Options: multiple combinations possible:

- BR	: Brass water cooled heatsink
- Y	:0-1V analog inputs
- R	:RS485

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Refer application note AN1906 regarding Coolant Specification

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OUTLINE DRAWING

Water cooled.

ISOMET

RF DRIVER
MODEL :
S/N :

CLIO

TRIG

GATE

CTRL

+24V

0V

114

240

125,3

6,3

RF2

RF1

INT

Interlock from AO
Binder 719

RF Outputs
BNC (2 off)

SMB (3x)

25way HD
D-type Plug

G 1/8" Thread
Pipe fittings (2 off)

DC Input
6/32 UNC screw
terminal

230

Mounting Holes
(4 places)
M5 Thread

80

17

5
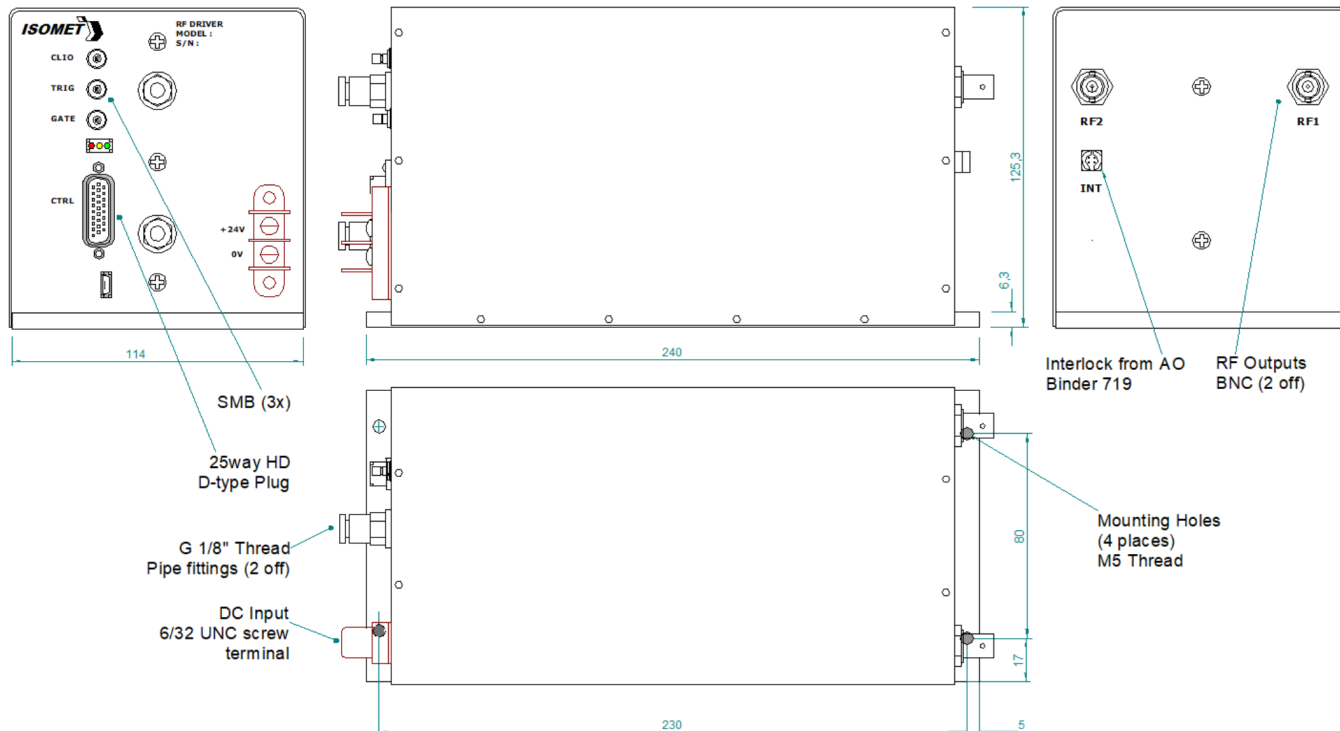
CTRL	Control signals -	:	26-way high density 'D' type
	External analog modulation 1	:	pinouts TBD
	Reset		
	DDS Profile registers		
	GPIO		
	RS485		
GATE	5V logic	:	SMB (coax)
TRIGGER	5V logic	:	SMB (coax)
CLIO	Configurable multi-function IO	:	SMB (coax)
	As input - update clock		
	As output - sync output		