Tabor, Simplifying Quantum Computing

TABOR ELECTRONICS

Marketplace conditions

Research into the fields of Quantum Computing and Quantum Communications is moving at a frantic pace. Its promise for application in both cryptanalysis and secure communications has caught the attention of many national government and military agencies who are eager to fund further research. Quantum Computing is now evolving into its next chapter: The Realization of Quantum Supremacy. As experiments move from single Qubits to multiple Qubits, they're evolving into commercialized products for sale to end users.

Target customers, markets and opportunities

Universities (Princeton, Stanford, Berkeley, SUNY) Government Research Labs (Sandia, Brookhaven, LNL, BNL), private companies (Google, IBM, Amazon) and startups (Rigetti Computing, IonQ)

Key Product features

Arbitrary Waveform Generator		Digitizer	
Sample Rate	1.25GS/s, 2.5GS/s, 9GS/s	Sample Rate	2.7GS/s, 5.4Gs/s
Channels	2 or 4	Channels	2
Resolution	16 bits	Resolution	14Bit
Output	1.2Vp-p	Input voltage range full scale	±500 mV / ±1 V
Output Analog BW (Max)	9 GHz	Analog BW (Max)	9 GHz
Memory (Max)	16GS	**FPGA**	
Markers	4, 8 or 16	Type	Kintex Ultrascale KU060
DUC	2 IQ Modulators per Channel with modulation BW up to 2.5GHz	LUT's	331,680

Competitor analysis

Frequency Range

Tabor is the only supplier that can generate Quantum Signals Directly to/from Microwave – Unlike Keysight (M3300A/M3302A) and Zurich (HDAWG) whose focused Quantum solutions stop at 2.5GS/s forcing the customer to use hard to maintain IQ Modulators and Signal Generators. IQ Modulator balance and alignment is a major Pain for the customer and Proteus performs it digitally with no impairments. The compactness, channel density and modularity of the Tabor Proteus solution is ideal for applications with a large and growing number of control and readout signals involved.

Real Time Feedback

The Proteus AWG also has a transceiver option – this includes a built-in digitizer and user configurable FPGA. Unlike Keysight (M3300A/M3302A) and Zurich (UHFAWG) the customer can receive signals up to 9GHz and using our easy to program block mode, write FPGA control code directly from Python

Trade-off

Direct to Microwave Instrumentation increases the competitive price by over $10k. However, using a direct o/p 9GS/s unit with the built in IQ modulator removes the need for the complex setup of low sample rate AWG's, traditional IQ modulators and L.O. generators. Thus, removing risk from an already complicated setup. If you consider the cost of the synth will be between $10k and $15k, the jump to a higher sample rate is both cost effective and reduces calibration needs and integration time. If the customers already have analog or vector signal generators and they are happy with them, then focus on selling the 1.25GS/s and 2.5GS/s versions for baseband signal generation.

Customer and segment specific propositions

Improve and simplify your quantum experiment –
For the quantum physicist looking to increase the number of qubits, and trying to eliminate noise and interference, while supporting complex instrumentation setups.
The Tabor Proteus AWG with its modular form factor, provides multi-channel direct to microwave capability.
It also has an optional digitizer and FPGA based feedback system for real-time adjustments of the experiment.
We have been serving the quantum physics community for several years.

Golden questions

What type of Device – Computer, Radar, Communications MRI?

How much time do you spend calibrating your IQ modulators?

How do you make the measurements today – Tabor Electronics has an integrated digitizer.

What kind of amplitude do you require?

How many channels do you wish to interface to
Additional information

Objection management

Can you give me examples of customers who use your solutions today

We have been serving the quantum physics community for several years. We have instruments' controlling systems at both major government research institutes, as Sandia & Lawrence Berkeley Labs, Universities Waterloo, Maryland and commercial companies such as IBM.

My Software is written around other types of AWG

we are fully SCPI compatible and can help you modify the code to get you up and running quickly.

My budget is limited

We can create an instrument combination that will help you meet the budget goals. Direct-To-RF saves money by removing the need for expensive mixers, modulators and L.O. generators.

Additional information

Tabor Electronics Quantum Tutorial Series

Simplify Quantum Experiments with Direct to RF Waveform Generation

Digital IQ vs Analog