SEMIQIT TECHNICAL SPECS

Compare our silicon quantum dot devices for researchers at a glance

Sl. No.	Feature	SemiQit 4	SemiQit 6	SemiQit 12	SemiQit 128M
1	General	Fully packaged device with plug-and-play FDSOI nanowire with two gate layers, barriers and plungers, for electrostatically defining the quantum dots.	Fully packaged device with plug-and-play FDSOI nanowire with two gate layers, barriers and plungers, for electrostatically defining the quantum dots.	Fully packaged device with plug-and-play FDSOI nanowire with two gate layers, barriers and plungers, for electrostatically defining the quantum dots.	Fully packaged device with plug-and-play, Quantum IC device with 6-bit digital multiplexer for addressing 64 pairs of double quantum dots. The quantum dots have two gate layers (barriers and plungers)
2	Qubits or Quantum Dots	4	6	12	128 (64 x double quantum dots)
3	Charge readout	Device has electrometer(s) for charge read-out	Device has electrometer(s) for charge read-out	Device has electrometer(s) for charge read-out	One of the double dot pair can be used as electrometer.
4	Operation temperature	1.5 K or below (test temperature 420 mK or 1.5 K)	1.5 K or below (test temperature 420 mK or 1.5 K)	1.5 K or below (test temperature 420 mK or 1.5 K)	1.5 K or below (test temperature 420 mK or 1.5 K)
5	Gate Leakage and operation	Below 1 nA / V for all the gate electrodes at room temperature, all gates must be able to pinch-off the channel	Below 1 nA / V for all the gate electrodes at room temperature, all gates must be able to pinch-off the channel	Below 1 nA / V for all the gate electrodes at room temperature, all gates must be able to pinch-off the channel	Below 1 nA / V for all the gate electrodes at room temperature, all gates must be able to pinch-off the channel
6	Backgate	Global backgate, channel potential tuning ~0.1 V/V	Global backgate, channel potential tuning ~0.1 V/V	Global backgate, channel potential tuning ~0.1 V/V	Global backgate, channel potential tuning ~0.1 V/V
7	Ambipolar	In the same device, both electrons and holes can be operated.	In the same device, both electrons and holes can be operated.	In the same device, both electrons and holes can be operated.	In the same device, both electrons and holes can be operated.
8	Charge noise	Below 10 μeV/sqrt(Hz) at 1 Hz @ 420 mK or below 18 μeV/sqrt(Hz) at 1 Hz @ 1.5 K for all the dots in the array.	Below 10 μeV/sqrt(Hz) at 1 Hz @ 420 mK or below 18 μeV/sqrt(Hz) at 1 Hz @ 1.5 K for all the dots in the array.	Below 10 μeV/sqrt(Hz) at 1 Hz @ 420 mK or below 18 μeV/sqrt(Hz) at 1 Hz @ 1.5 K for all the dots in the array.	Below 10 μeV/sqrt(Hz) at 1 Hz @ 420 mK or below 18 μeV/sqrt(Hz) at 1 Hz @ 1.5 K for selected 80 quantum dots (40 pairs).
9	DC-lines	Requirements: 39x lines (max.) that are thermalized and filtered to achieve electron temperature close to the operation temperature. Connection to sample holder with micro-D connector(s). Low noise DC-supplies for the lines, voltage range between -4 and 4 V	Requirements: 39x lines (max.) that are thermalized and filtered to achieve electron temperature close to the operation temperature. Connection to sample holder with micro-D connector(s). Low noise DC-supplies for the lines, voltage range between -4 and 4 V	Requirements: 39x lines (max.) that are thermalized and filtered to achieve electron temperature close to the operation temperature. Connection to sample holder with micro-D connector(s). Low noise DC-supplies for the lines, voltage range between -4 and 4 V	Requirements: 39x lines (max.) that are thermalized and filtered to achieve electron temperature close to the operation temperature. Connection to sample holder with micro-D connector(s). Low noise DC-supplies for the lines, voltage range between -4 and 4 V
10	Base band lines	Requirements (optional): 3x (4 quantum dots) - 11x (12 quantum dots) attenuated fast barrier tuning lines, 100 – 300 MHz (SMPM-connectors)	Requirements (optional): 3x (4 quantum dots) - 11x (12 quantum dots) attenuated fast barrier tuning lines, 100 – 300 MHz (SMPM-connectors)	Requirements (optional): 3x (4 quantum dots) - 11x (12 quantum dots) attenuated fast barrier tuning lines, 100 – 300 MHz (SMPM-connectors)	Requirements (optional): 1x attenuated fast barrier tuning line 100 – 300 MHz (SMPM-connectors)
11	RF-lines	Requirements (optional): 4 - 12x rf-lines (4 - 12 quantum dots) for qubit control, 8 – 16 GHz (SMPM-connectors)	Requirements (optional): 4 - 12x rf-lines (4 - 12 quantum dots) for qubit control, 8 – 16 GHz (SMPM-connectors)	Requirements (optional): 4 - 12x rf-lines (4 - 12 quantum dots) for qubit control, 8 – 16 GHz (SMPM-connectors)	Requirements (optional): 1 - 2x rf-lines for qubit control, 8 – 16 GHz (SMPM-connectors)
12	Magnet (required for qubit operation)	Typical operation point 1 – 1.5 T, minimum inner diameter of the magnet is 53 mm	Typical operation point 1 – 1.5 T, minimum inner diameter of the magnet is 53 mm	Typical operation point 1 – 1.5 T, minimum inner diameter of the magnet is 53 mm	Typical operation point 1 – 1.5 T, minimum inner diameter of the magnet is 53 mm
13	Sample stage mounting	Mounting bracket can be tailored to suit the system requirements	Mounting bracket can be tailored to suit the system requirements	Mounting bracket can be tailored to suit the system requirements	Mounting bracket can be tailored to suit the system requirements
14	Current readout (transport and electrometers)	Current amplifier and digital multimeter capable for pA-level current measurements. Two read-out channels are required, but preferably three should be available. The setup should be capable for sub-1 ms measurements.	Current amplifier and digital multimeter capable for pA-level current measurements. Two read-out channels are required, but preferably three should be available. The setup should be capable for sub-1 ms measurements.	Current amplifier and digital multimeter capable for pA-level current measurements. Two read-out channels are required, but preferably three should be available. The setup should be capable for sub-1 ms measurements.	Current amplifier and digital multimeter capable for pA-level current measurements. Two read-out channels are required, but preferably three should be available. The setup should be capable for sub-1 ms measurements.
15	Demonstration of required specifications and Installation	Prior to shipment all the quantum dots qubit in the chip is tested and datasheet made. The device shall not have any measurable gate leakage, and all the gates are able to provide pinch-off functionality.	Prior to shipment all the quantum dots qubit in the chip is tested and datasheet made. The device shall not have any measurable gate leakage, and all the gates are able to provide pinch-off functionality.	Prior to shipment all the quantum dots qubit in the chip is tested and datasheet made. The device shall not have any measurable gate leakage, and all the gates are able to provide pinch-off functionality.	Prior to shipment, at least 20 double quantum dot pairs in the quantum IC chip are tested and datasheet made. The device shall not have any measurable gate leakage, and all the gates are able to provide pinch-off functionality.
16	TrainingB38	Training to tune the device will be provided either by remote support or on-site visit.	Training to tune the device will be provided either by remote support or on-site visit.	Training to tune the device will be provided either by remote support or on-site visit.	Training to tune the device will be provided either by remote support or on-site visit.
17	Options	Integrated tank circuits, CMOS amplifiers, micromagnets, dc-multiplexers, rf-switches	Integrated tank circuits, CMOS amplifiers, micromagnets, dc-multiplexers, rf-switches	Integrated tank circuits, CMOS amplifiers, micromagnets, dc-multiplexers, rf-switches	Integrated CMOS amplifier

Have questions or interested in tailored guidance?

Get in touch

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