Table 1: Comparison of key CTQs between IQ8H-3P (Enphase single-channel microinverter) and Q2000-4302

Critical to Quality (CTQ)	Enphase (IQ8H-3P-72-E-US)	SPARQ (Q2000-4302)
DC Power (Panel)	380–640 (clipping at 475W)	680+ (clipping at 500W per channel)
AC Power (W)	475	2000
MPPT voltage range (V)	35.5–53	19.5V to 60
Power Density (W/in^3)	4.13	12.46
Weight Density (W/kg)	297	400
Power Clipping	475 per channel	500 per channel
MPPT	Highly fluctuating (3.5% Average)	Single point (~0% fluctuations)
MPPT Efficiency	Not Specified	Static: 99.85% Dynamic: 99.8%
Total Harmonic Distortion (THD)	<5%	<2%
Power Factor (PF)	Limited 0.85 leading – 0.85 lagging	Full-Range 1.0 leading – 1.0 lagging
Efficiency (Peak/CEC)	97.6/97.0	97.5/97.0
Continuous AC Power	No, Burst-Mode below 30% load	Yes
Modes of Operation	Grid-Connected	Grid-Connected Off-Grid Dual-Mode Motor Control (BLDC, Induction, PSMS)

Sparq was the first to introduce Quad Architecture for microinverters with below industry disruptive performance characteristics:

1. Integrated four isolated ultra-high-frequency, ZVS, DC/DC converters, one energy-combiner and one high-power DC-AC inverter in one enclosure (eliminated three DC/AC converters),
2. Eliminated low reliability electrolytic capacitors by eliminating inherent double-frequency ripple at PV-panels
3. Implemented independent MPPT for every PV-panel,
4. Reduced THD by novel ripple-steering among four DC/DC converters,
5. Enabled dual-mode operation or motor control without power clipping at high-temperature,
6. Reduced cost by implementing all digital controls through one shared FPGA,
7. Resolved longstanding partial shading and major safety concerns due to HVDC arcing and electric shock in string inverters
8. Eliminated need for Rapid Shut-Down. This feature is inherent and comes at no extra cost
9. Developed SparqLinq (wireless supervisory Gateway/Controller for parallel microinverters), and SparqVu (cloud-based PHM to access real-time-data and historical records) development

As compared to IQ8H-3P (Enphase single-channel 3-P microinverter), a rigorous study concluded that Q2000-4302 help:

- eliminates low reliability electrolytic capacitors resulting in longer life,
- reduce low voltage DC-link by 99.64%,
- reduce THD from 5% to 2%,
- increase gravimetric power density by 34.7%
- increase volumetric power density by 201.5%

References:

[1] Enphase IQ8H-3P datasheet

[2] Sparq Q2000-4302 datasheet