ChargEdge™ ("CE") is truly disruptive. Unlike other hopeful technologies using RF (radio-frequency) transmissions (e.g. microwave blasts from Energous/Ossia-Cota), or super-resonant (loosely-coupled) magnetic-fields (e.g. Rezence/Witricity), which seem to have run either into insurmountable regulatory or safety hurdles for years, or simply mass-production/cost limitations, CE receivers and transmitters not only offer full backward compatibility to Qi to smoothen out the transition, but can support charging of multiple devices simultaneously.

Using the FluxLaser™ principle, traditional form-factor restrictions and charging alignments are now a thing of the past. With CE technology, you can charge multiple smartphones/tablets, in a vertical configuration too. Also, fitness-trackers, drones, cameras, 2-way radios, tools, robots, virtual reality glasses, Bluetooth earpieces, laptops, EVs, you name it! At any angle.

All this at power levels 10 times more than Qi while using receiver coils over 10 times smaller, costing 10 times less. CE also reduces the heat/losses specifically within the receiver, which is now being recognized as a major roadblock in increasing power transfer levels, one which can potentially degrade phones leading to mysterious failures, even battery explosions. CE reduces that receiver-side heat by 4 times typically.

Qi has clearly run into potential future electromagnetic compatibility problems too, since as its frequency of operation (110-205 kHz) interferes with low-frequency RFIDs (125/134 kHz), car-fob frequencies (124 kHz), home-automation (Insteon: 132 kHz, X10 power-line: 120 kHz) etc., due to which the SAE automotive J2954 task force recently finalized 85 kHz as the only approved, future-proof, automotive-friendly frequency for wireless power transfer. Same frequency chosen by ChargEdge™.
Power Density Comparison: Rezence, Qi and CE

Sanjaya Maniktala is the author of 7 well-known books in Power Electronics and around 30 patents ongoing. He has worked in well-known companies such as National Semi (TI), Siemens, Freescale, Fairchild, Broadcom, IDT, Power Integrations etc., across 3 continents for 3 decades. In April 2016, Sanjaya was invited by China Power Electronics Society for a 2-week tour of 5 cities with 7 all-day seminars which were attended by almost 3000 engineers.
FAQ

Question: How does CE manage such high power delivery and power density, at such a low (safe) frequency?

Answer: Looking at the power per unit volume plot above, CE receivers’ power density is a staggering 10-20 times larger than Qi and 20-40 times better than Rezence/A4WP/Witricity. Incidentally, no Rezence products have yet been released, after years of broken promises, and also that the frequency Rezence uses (the ISM band of 6.78 MHz) still has no worldwide acceptance (see Wikipedia). Besides that, since it uses no shielding, only air-cored coils, despite its very high frequency, Rezence coils are thus much bigger than even Qi, which operates at only around 100 kHz. CE operating at 85 kHz as per SAE Task Force recommendation, uses the FluxLaser™ proprietary principle in its transmitters, to literally focus and concentrate the magnetic flux exactly where needed, through tiny longitudinal receiver coils, not the usual large spiral receiver coils of other topologies. Hence the amazing power delivery and density. Not to mention the huge coil cost savings (10 times) and higher efficiency too (4 times less receiver-side losses).

Question: Why can’t you charge my phone from several feet away?

Answer: That is an enduring wish-list (Power over Air) created by overactive Tesla fans! Indeed, it can be done, but at what cost? And at what cost to human safety? There are companies who have been claiming to do that for years, especially at CES, but with no commercially released products yet—because of regulatory standards or huge design/cost/efficiency hurdles. They use beams of microwaves, or infrared or ultrasonic audio, and therefore are not only inherently very inefficient (<20%), but typically hit maximum EMI emission limits and SAR (specific absorption rate) limits for ensuring human safety. For more details see Links in "Further Information" below.

Question: Why don’t you use the much-touted ISM band of 6.78 MHz, as the Rezence standard does?

Answer: First, 6.78 MHz is still not a worldwide ISM frequency band, but subject to local acceptance. Second, various technical issues remain, as evidenced by a major computer chip manufacturer closing down its foray into Rezence recently after years of working on it and investing in it too. [http://www.forbes.com/sites/elseackerman/2016/06/06/inte l-ceases-work-on-wireless-charging/](http://www.forbes.com/sites/elseackerman/2016/06/06/intel-ceases-work-on-wireless-charging/). No commercially released Rezence products exist so far. Third, even though 6.78 MHz may be an arguably “allowed” or “unrestricted” EMI band, electro-magnetic compatibility (EMC) is still not assured even by the government. You are essentially “on your own”. For example, the second harmonic is 13.56 MHz, another ISM band, but extensively used by very low-power NFC/RFID devices. You therefore run the risk of interfering with such devices— including FasTrak and inventory control systems. In addition, costs may be prohibitive if and when released, as they use GaN transistors and other expensive materials.

Question: Why don’t you make dual or tri-mode devices?

Answer: There is an ongoing turf battle among existing WPT standards. Major mobile phone carriers are deeply involved in this fight too. For example, Verizon supports Qi, whereas AT&T is with PMA. So, even if a tri-mode phone is created, the carriers may continue to force phone vendors to deactivate the “other” standard. In effect, you could end up paying for three standards, whereas you will only be able to use one (or two). Also, considering Rezence has so far no products on the market, it may be a long time before we see a true tri-mode device appear. Please also see discussion on [EE Times China](http://www.eetimes.com.cn/).

Question: Aren’t PMA and Rezence one standard by now (AirFuel Alliance)?

Answer: The PMA and Rezence standards are mutually incompatible. PMA works at around 300 kHz, whereas Rezence at 6.78 MHz. Rezence also needs a Bluetooth link at 2.4 GHz. There are no real similarities between them in technical terms. No cost synergies seem to exist either, which justify “two-in-one” solutions. Please also see discussion on [EE Times China](http://www.eetimes.com.cn/).

Question: Why is ChargEdge® so different as claimed?

Answer: The familiar WPT paradigm consists of an expensive spiral transmitter coil, pressed against a similar spiral receiver coil, through plastic device casing. This forces phone manufacturers to allocate a significant amount of real-estate, cost and phone thickness to accommodate the spiral coil on the back of the phone. In comparison, ChargEdge® coils are tiny and deliver astonishing amounts of power. They can also be positioned on one or more side edges.

Question: What about efficiency?

Answer: Unlike microwave methods, which use traveling (electromagnetic) waves and are therefore inherently wasteful, near-field methods such as inductive (MI) and resonant (MR), can theoretically achieve close to ideal efficiency. Even energy trapped in the leakage inductance can be recovered. It is not lost, despite perceptions. MR systems, can therefore also be very efficient since they use zero-voltage (soft) switching. The main “loss terms” are related to their conduction losses. So, to achieve high efficiency, it is important to simply use low-resistance switches and coils. A typical, cost-effective efficiency target is about 80% for Qi, PMA and also for ChargEdge®. Since ChargEdge® receiver coils are so small, their resistance is very low too, and they promise to increase the receiver-side efficiency significantly at a lower cost.
Further Information


Video Demos (unedited):

http://v.youku.com/v_show/id_XMTcwNDExNzk4OA==.html, http://v.youku.com/v_show/id_XMTczNzA0MzkwNg==.html, http://v.youku.com/v_show/id_XMTg1NzIwNDkwMA==.html,

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