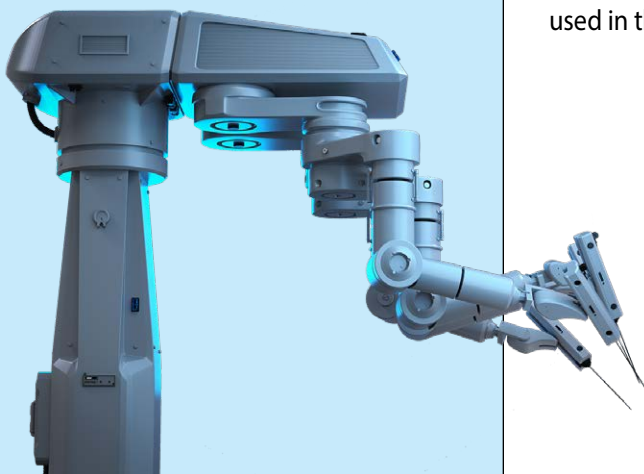


# eGaN® FETs and ICs for Medical Technology



## Benefits of eGaN FETs and ICs for Medical Technology

- **Imaging** - increased scanning speed by having more imaging coils while reducing power consumption *enabled by eGaN FET's high frequency capability and the need for less bias current*
- **Diagnostic Methods** - higher performance with high energy density *enabled by switching speed of GaN in a extremely small chip-scale package*
- **Implantable Devices** - eliminate need for through-skin cables using wireless power to charge devices while patient undertakes everyday activities, resulting in quality of life improvement *made possible by GaN enabled wireless power transfer*
- **Medical Robotics** – accurate control of high-resolution motors required for precision surgery is *enabled by GaN's small size, thermal efficiency, and fast switching speed*



## GaN Technology – Contributing to Medicine in No Small Way

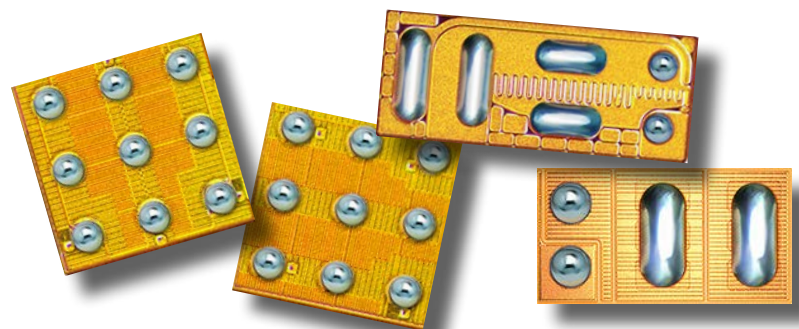
Advances in semiconductor technology are resulting in advances in the field of medicine. The high frequency switching and small size of GaN are enabling applications such as wireless power transfer.

Resolution is a critical attribute of all **medical imaging** devices, such as sonograms, CAT scans, and MRI. eGaN® FETs and ICs increase the speed and precision with which imaging equipment can conduct scanning measurements. The small size and efficiency of eGaN® FETs improves resolution of data collected, while lowering operating power resulting in faster imagery.

In the world of **diagnostic technology**, traditional methods such as those used in colonoscopies, are about to become a thing of the past. As an alternative, due to the small size of the eGaN FET, a micro-imaging system can fit inside an ingestible tablet. This non-invasive breakthrough of a “scanner within a pill” not only makes it more comfortable for the patient, but also significantly reduces the cost of health care through early warning and more comprehensive and higher resolution diagnostics.

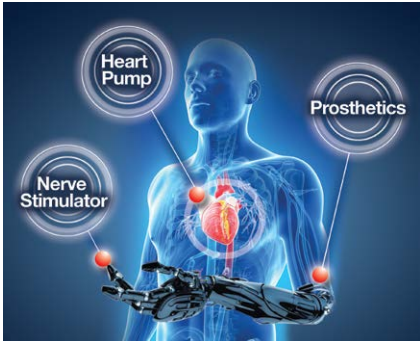




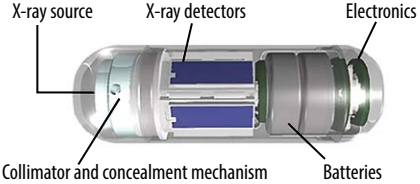
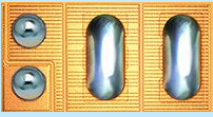
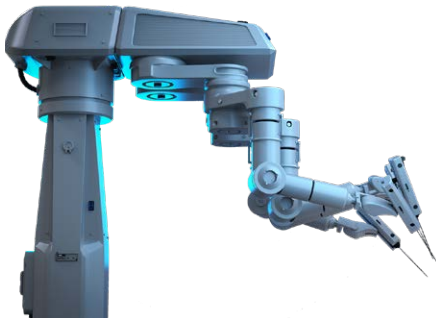
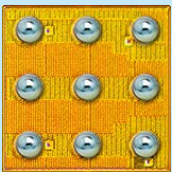
Many wireless power enabled **implantable devices** today require repeated charging, exposing patients to infections risks when using wires that penetrate the skin. With wireless power using GaN, exposed wires are no longer needed, reducing infection risk and improving quality of life for the patient.

**Medical robotics** are being used where extreme precision is needed. Overall, robotic surgery improves the clinical effectiveness of conventional modes of surgery. GaN technology is ideal for medical robots due to their small size, thermal efficiency, and most importantly, their high switching frequency, which results in higher resolution for the more than 50 extremely small motors often used in these robots.



EPC Chip-scale packaging information

# eGaN FETs and ICs for Medical Technology

|  | MedTech Application  | eGaN Technology  | Benefits  |
|--|--|--|---|
| <p><b>Wireless Power for Implantable Devices</b></p> |  <p><b>On-patient wireless power applications</b></p>               |  <p><b>EPC2107</b><br/>100 V, 0.5 A<br/>Die size: 1.35 mm x 1.35 mm</p>  | <p><b>eGaN FET's</b> switching speed enables wireless power transfer for implanted devices which eliminates the need for through-skin cables, reducing the mortality rate while making it possible for patients to maintain a quality of life</p> |
| <p><b>Imaging Equipment and Diagnostics</b></p>      |  <p><b>Image resolution is critical to MRI scanners</b></p>        |  <p>MRI Receive coil using <b>EPC8004</b> courtesy of Case Western University</p>  <p><b>EPC8004</b><br/>40 V, 7.5 A<br/>Die size: 2.1 mm x 0.8 mm</p> | <p><b>eGaN FETs</b> provide improved scanning speed allowing more coils to be employed, thus reducing distortion of the magnetic field and decreasing overall power consumption for imaging equipment</p>   |
|  |  <p><b>Non-invasive "colonoscopy pill" from Check-Cap Ltd</b></p> |  <p><b>EPC2012C</b><br/>200 V, 22 A<br/>Die size: 1.7 mm x 0.9 mm</p>  | <p><b>eGaN FET's</b> high frequency switching increases performance of X-Ray based diagnostic systems and the FET's extremely small chip-scale packaging enables high energy density</p>  |
| <p><b>Robotics</b></p>                               |   |  <p><b>EPC2039</b><br/>80 V, 50 A<br/>Die size: 1.35 mm x 1.35 mm</p>  | <p>GaN's small size, thermal efficiency, and high frequency switching contribute to high-resolution motor control for medical robotics</p>  |

Recommended Devices for Medical Technology

Recommended Devices by Application

| Part Number | Configuration          | V <sub>DS</sub> (V) | Max R <sub>DS(on)</sub> (mΩ) @5 V <sub>GS</sub> | Q <sub>G</sub> typ (nC) | Q <sub>GS</sub> typ (nC) | Q <sub>GD</sub> typ (nC) | Q <sub>OSS</sub> typ (nC) | Q <sub>RR</sub> (nC) | I <sub>D</sub> (A) | Pulsed I <sub>D</sub> (A) | Package (mm)    | Development Board | Implantable <sup>[1]</sup> |        | Medical Imaging and Diagnostics | Robotics |
|-------------|------------------------|---------------------|---|-------------------------|--------------------------|--------------------------|---------------------------|----------------------|--------------------|---------------------------|-----------------|-------------------|----------------------------|--------|---------------------------------|----------|
|             |                        |                     |   |                         |                          |                          |                           |                      |                    |                           |                 |                   | PSU*                       | WiPo** |                                 |          |
| EPC2014C    | Single                 | 40                  | 16  | 2                       | 0.7                      | 0.3                      | 4                         | 0                    | 10                 | 60                        | LGA 1.7 x 1.1   | EPC9005C          |                            |        |                                 |          |
| EPC2055     | Single                 | 40                  | 3.6   | 6.6                     | 2.3                      | 0.7                      | 13                        | 0                    | 29                 | 161                       | LGA 2.5 x 1.5   | EPC90132          |                            |        |                                 |          |
| EPC2108     | Dual                   | 60                  | 240   | 0.24                    | 0.106                    | 0.047                    | 0.17<br>0.93              | 0                    | 1.7                | 5.5                       | BGA 1.35 x 1.35 | EPC9064           |                            |        |                                 |          |
|             | Integrated Bootstrap   | 100                 | 3300  | 0.044                   | 0.02                     | 0.004                    | 0.134                     |                      | 0.5                | 0.5                       |                 |                   |                            |        |                                 |          |
| EPC2035     | Single                 | 60                  | 45  | 0.88                    | 0.25                     | 0.16                     | 2.6                       | 0                    | 1.7                | 24                        | BGA 0.9 x 0.9   | EPC9049           |                            |        |                                 |          |
| EPC8002     | Single                 | 65                  | 480   | 0.133                   | 0.057                    | 0.015                    | 0.344                     | 0                    | 2                  | 2                         | LGA 2.05 x 0.85 | EPC9022           |                            |        |                                 |          |
| EPC2039     | Single                 | 80                  | 25  | 1.91                    | 0.76                     | 0.42                     | 7.64                      | 0                    | 6.8                | 50                        | BGA 1.35 x 1.35 | EPC9057           |                            |        |                                 |          |
| EPC2107     | Dual                   | 100                 | 390   | 0.19                    | 0.077                    | 0.041                    | 0.9<br>1.25               | 0                    | 1.7                | 3.8                       | BGA 1.35 x 1.35 | EPC9063           |                            |        |                                 |          |
|             | Integrated Bootstrap   |                     | 3300  | 0.044                   | 0.02                     | 0.004                    | 0.134                     |                      | 0.5                | 0.5                       |                 |                   |                            |        |                                 |          |
| EPC2037     | Single                 | 100                 | 550   | 0.115                   | 0.032                    | 0.025                    | 0.6                       | 0                    | 1.7                | 2.4                       | BGA 0.9 x 0.9   | EPC9087           |                            |        |                                 |          |
| EPC2038     | Single with Gate Diode | 100                 | 3300  | 0.044                   | 0.02                     | 0.004                    | 0.134                     | 0                    | 0.5                | 0.5                       | BGA 0.9 x 0.9   | EPC9507           |                            |        |                                 |          |
| EPC2106     | Half Bridge            | 100                 | 70  | 0.73                    | 0.24                     | 0.140                    | 3.96<br>4.68              | 0                    | 1.7                | 18                        | BGA 1.35 x 1.35 | EPC9055           |                            |        |                                 |          |
| EPC2036     | Single                 | 100                 | 73  | 0.7                     | 0.17                     | 0.14                     | 3.9                       | 0                    | 1.7                | 18                        | BGA 0.9 x 0.9   | EPC9050           |                            |        |                                 |          |
| EPC2110     | Dual, Common Source    | 120                 | 110   | 0.8                     | 0.25                     | 0.18                     | 4                         | 0                    | 3.4                | 20                        | BGA 1.35 x 1.35 | EPC9058           |                            |        |                                 |          |
| EPC2059     | Single                 | 170                 | 9   | 5.7                     | 1.3                      | 0.9                      | 35                        | 0                    | 24                 | 102                       | LGA 2.8 x 1.4   | EPC9098           |                            |        |                                 |          |
| EPC2012C    | Single                 | 200                 | 100   | 1                       | 0.3                      | 0.2                      | 10                        | 0                    | 5                  | 22                        | LGA 1.7 x 0.9   | EPC9004C          |                            |        |                                 |          |
| EPC2207     | Single                 | 200                 | 22  | 4.5                     | 1.3                      | 0.7                      | 23                        | 0                    | 54                 | 150                       | LGA 2.8 x 0.9   | EPC90124          |                            |        |                                 |          |
| EPC2307     | Single                 | 200                 | 10  | 10.6                    |                          | 1.3                      | 58                        | 0                    | 48                 | 130                       | QFN 3 x 5       | EPC90150          |                            |        |                                 |          |
| EPC2215     | Single                 | 200                 | 8   | 13.6                    | 3.3                      | 2.1                      | 69                        | 0                    | 162                | 150                       | LGA 4.6 x 1.6   | EPC9099           |                            |        |                                 |          |
| EPC2304     | Single                 | 200                 | 5   | 21                      | 0.0                      | 2.6                      | 115                       | 0                    | 102                | 260                       | QFN 3 x 5       | EPC90140          |                            |        |                                 |          |

Note: Table data subject to change. Please refer to the Product section on [epc-co.com/epc/Products/gan-fets-and-ics](http://epc-co.com/epc/Products/gan-fets-and-ics)

\*PSU = Power Supply Unit

\*\*WiPo = Wireless Power

[1] Please be advised that EPC products are not specifically designed and tested for use in life-sustaining medical applications. EPC products are qualified to either an industrial or automotive standard as specified in the applicable datasheet.

For More Information

Please contact [info@epc-co.com](mailto:info@epc-co.com) or your local sales representative

Visit our website: [epc-co.com](http://epc-co.com)

Sign-up to receive EPC updates at [bit.ly/EPCupdates](https://bit.ly/EPCupdates)



eGaN is a registered trademark of Efficient Power Conversion Corporation