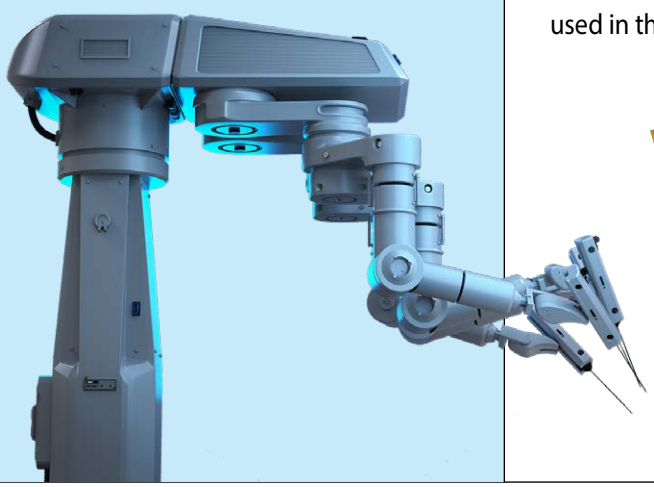
eGaN® FETs and ICs for Medical Technology

Revised February 6, 2025

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

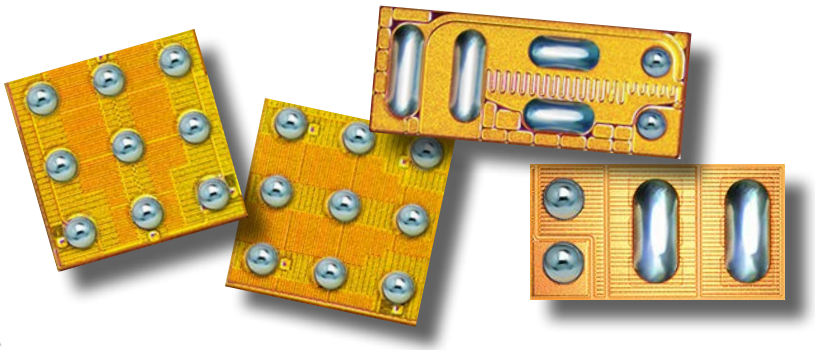
Advances in semiconductor technology are resulting in advances in the field of medicine. The high frequency switching and small size of GaN are enabling applications such as wireless power transfer.

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.

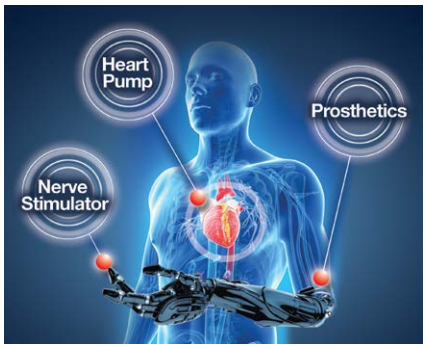
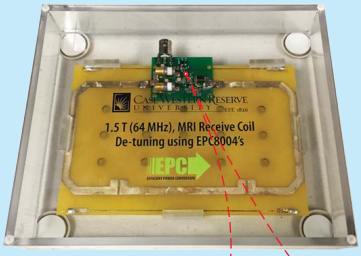
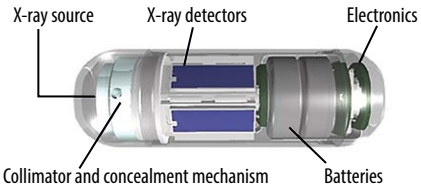
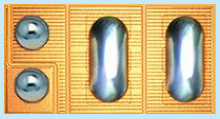
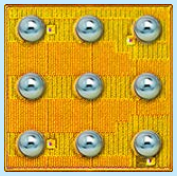
Many wireless power enabled **implantable devices** today require repeated charging, exposing patients to infections risks when using wires that penetrate the skin. With wireless power using GaN, exposed wires are no longer needed, reducing infection risk and improving quality of life for the patient.

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
Wireless Power for Implantable Devices	 On-patient wireless power applications	 **EPC2107** 100 V, 0.5 A Die size: 1.35 x 1.35 mm	**eGaN FET's** 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
Imaging Equipment and Diagnostics	 Image resolution is critical to MRI scanners	 MRI Receive coil using **EPC8004** courtesy of Case Western University  **EPC8004** 40 V, 7.5 A Die size: 2.1 x 0.8 mm	**eGaN FETs** 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
	 Non-invasive "colonoscopy pill" from Check-Cap Ltd	 **EPC2012C** 200 V, 22 A Die size: 1.7 x 0.9 mm	**eGaN FET's** high frequency switching increases performance of X-Ray based diagnostic systems and the FET's extremely small chip-scale packaging enables high energy density
Robotics		 **EPC2039** 80 V, 50 A Die size: 1.35 x 1.35 mm	GaN's small size, thermal efficiency, and high frequency switching contribute to high-resolution motor control for medical robotics

Recommended Devices for Medical Technology

Part Number	Configuration	V_{DS} (V)	Max $R_{DS(on)}$ (mΩ) @5 V_{GS}	Q_G typ (nC)	Q_{GS} typ (nC)	Q_{GD} typ (nC)	Q_{OSS} typ (nC)	Q_{RR} (nC)	I_D (A)	Pulsed I_D (A)	Package (mm)	Development Board	Recommended Devices by Application: Implantable[1] PSU*	Implantable[1] WiPo**	Medical Imaging and Diagnostics	Robotics
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 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 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 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				
EPC2234	Single – AEC-Q101	160	8	11	3.8	2.0	96	0	48	213	BGA 4.6 x 2.6	n/a				
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	62	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	133	260	QFN 3 x 5	EPC90140				

Note: Table data subject to change. Please refer to the Product section on https://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.