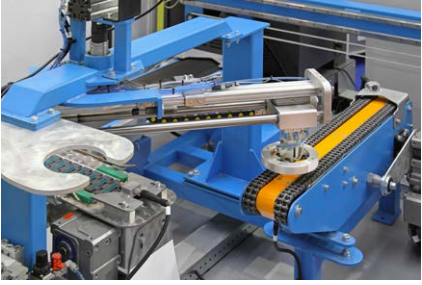

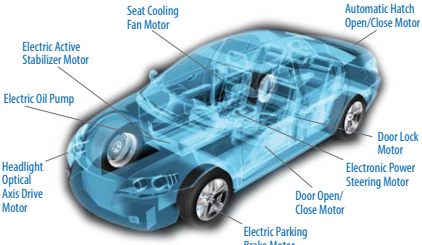



eGaN® FETs and ICs for Brushless DC (BLDC) Motors



	BLDC Application	Application Description	Benefits
Industrial Automation	 <p>Factory Conveyor Belt</p>	<p>For industrial applications, brushless DC motors are commonly used in:</p> <ul style="list-style-type: none"> • Linear motors • Servomotors • Extruder drive motors • Feed drives for CNC machine tools 	<p>eGaN FETs from EPC offer significantly higher performance switching than silicon-based MOSFETs in brushless DC motor designs.</p> <p>eGaN FET attributes:</p> <ul style="list-style-type: none"> - no parasitic p-n diode - zero Q_{RR} - lower Q_{OSS}
Robotics	 <p>Industrial Robot</p>	<p>BLDC motors are used as actuators for industrial robots.</p> <p>In the automotive industry, industrial robots used in the production of vehicles are in high demand.</p>	<p>eGaN FET attributes reduce the current noise generation in brushless DC motors and provide a 5x reduction in switching current noise.</p> <p>Lower noise equals higher current measurement accuracy.</p>
Automotive	 <p>Automotive Motors</p>	<p>Automobiles today contain over 50 small motors and the number of brushless DC motors (BLDC) being used is increasing rapidly. This is because BLDC motors save energy, have longer life, reduce noise, and are more compact.</p>	<p>Torque ripple caused by commutation in BLDC motors is unacceptable in applications such as electric power steering (EPS). Higher inverter switching frequencies with GaN minimize losses and torque ripple in BLDC motors used for EPS.</p>
Healthcare Surgical Robotics		<p>Robotic surgery requires great precision and in high-torque BLDC using rotor position sensing for intricate robot motion control eGaN FETs significantly outperform MOSFETs.</p> <p>In high-torque BLDC motors using rotor position sensing for intricate robot motion control, eGaN FETs outperform MOSFETs significantly.</p>	<p>GaN's small size, thermal efficiency, high frequency switching and low switching losses contribute to high-resolution and precise control in medical equipment such as surgical robotics.</p>

Recommended Devices for Brushless DC (BLDC) Motors

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)	C _{ISS} (pF)	C _{OSS} (pF)	C _{RSS} (pF)	I _D (A)	Pulsed I _D (A)	Max T _J (°C)	Package (mm)	Development Board
EPC2040	Single	15	30	0.745	0.23	0.14	0.42	0	86	67	20	3.4	28	150	BGA 0.85 x 1.2	n/a
EPC2023	Single	30	1.45	19	5.7	3.2	30	0	2150	1530	100	90	590	150	LGA 6.05 x 2.3	EPC9031
EPC2014C	Single	40	16	2	0.7	0.3	4	0	220	150	6.5	10	60	150	LGA 1.7 x 1.1	EPC9005C
EPC2015C	Single	40	4	8.7	2.7	1.2	19	0	980	710	18	53	235	150	LGA 4.1 x 1.6	EPC9001C
EPC2030	Single	40	2.4	17	5.8	3.4	32	0	1960	1120	62	48	490	150	BGA 4.6 x 2.6	EPC9060
EPC2024	Single	40	1.5	18	5.1	2.4	45	0	1920	1620	29	90	560	150	LGA 6.05 x 2.3	EPC9032
EPC2035	Single	60	45	0.88	0.25	0.16	2.6	0	95	60	2	1.7	24	150	BGA 0.9 x 0.9	EPC9049
EPC2102	Half Bridge	60	4.9	8	2.5	1.5	26,31	0	850	500,610	11	30	220	150	BGA 6.05 x 2.3	EPC9037
EPC2031	Single	60	2.6	16	5	3.2	48	0	1640	980	35	48	450	150	BGA 4.6 x 2.6	EPC9061
EPC2020	Single	60	2.2	16	3.9	2.3	50	0	1780	1020	24	90	470	150	LGA 6.05 x 2.3	EPC9033
EPC2039	Single	80	25	1.91	0.76	0.42	7.64	0	210	115	2	6.8	50	150	BGA 1.35 x 1.35	EPC9057
EPC2103	Half Bridge	80	5.5	6.5	2.2	1.1	30,34	0	730	445,525	7	30	195	150	BGA 6.05 x 2.3	EPC9039
EPC2029	Single	80	3.2	13	3.4	1.9	53	0	1410	820	17	48	360	150	BGA 4.6 x 2.6	EPC9046
EPC2021	Single	80	2.2	15	4.1	3	72	0	1610	1100	15	90	390	150	LGA 6.05 x 2.3	EPC9034
EPC2038	Single with Gate Diode	100	3300	0.044	0.02	0.004	0.134	0	7	1.6	0.02	0.5	0.5	150	BGA 0.9 x 0.9	EPC9507
EPC2037	Single	100	550	0.115	0.032	0.025	0.6	0	14	6.5	0.1	1.7	2.4	150	BGA 0.9 x 0.9	EPC9087
EPC2036	Single	100	73	0.7	0.17	0.14	3.9	0	75	50	0.7	1.7	18	150	BGA 0.9 x 0.9	EPC9050
EPC2106	Half Bridge	100	70	0.73	0.24	0.140	3.96,4.68	0	79	52,61	0.5	1.7	18	150	BGA 1.35 x 1.35	EPC9055
EPC2007C	Single	100	30	1.6	0.6	0.3	8.3	0	170	110	1.9	6	40	150	LGA 1.7 x 1.1	EPC9006C
EPC2051	Single	100	25	1.8	0.6	0.3	7.3	0	224	86	1	1.7	37	150	BGA 1.3 x 0.85	EPC9091
EPC2016C	Single	100	16	3.4	1.1	0.55	16	0	360	210	3.2	18	75	150	LGA 2.1 x 1.6	EPC9010C
EPC2052	Single	100	13.5	3.5	1.5	0.5	13	0	441	195	3.2	8.2	74	150	BGA 1.5 x 1.5	EPC9092
EPC2045	Single	100	7	6	1.9	0.8	25	0	767	295	3	16	130	150	BGA 2.5 x 1.5	EPC9078
EPC2001C	Single	100	7	7.5	2.4	1.2	31	0	770	430	10	36	150	150	LGA 4.1 x 1.6	EPC9002C
EPC2104	Half Bridge	100	6.8	6.8	2.3	1.4	35,41	0	730	430,500	5	30	180	150	BGA 6.05 x 2.3	EPC9040
EPC2032	Single	100	4	12	3	2	66	0	1270	800	12	48	340	150	BGA 4.6 x 2.6	EPC9062
EPC2053	Single	100	3.8	11.4	4.1	1.5	45	0	1453	642	10.4	48	246	150	BGA 3.5 x 2	EPC9093
EPC2022	Single	100	3.2	13.2	3.4	2.4	71	0	1400	840	7	90	390	150	LGA 6.05 x 2.3	EPC9035
EPC2033	Single	150	7	12	3.8	3.2	90	0	1160	480	6	48	260	150	BGA 4.6 x 2.6	EPC9047
EPC2012C	Single	200	100	1	0.3	0.2	10	0	100	64	0.4	5	22	150	LGA 1.7 x 0.9	EPC9004C
EPC2019	Single	200	50	1.8	0.6	0.35	18	0	200	110	0.7	8.5	42	150	LGA 2.7 x 0.95	EPC9014
EPC2010C	Single	200	25	3.7	1.3	0.7	40	0	380	240	1.8	22	90	150	LGA 3.6 x 1.6	EPC9003C
EPC2034C	Single	200	8	11.4	3.8	2.1	95	0	1166	630	2.8	48	213	150	BGA 4.6 x 2.6	EPC9048C

Note: Table data subject to change. Please refer to the Product section on www.epc-co.com.

ePower™ Stage

Part Number	Configuration	Nominal Logic Supply Voltage (V)	Maximum Input Voltage (V)	Typ R _{DS(on)} (mΩ)	Rated Output Current (A)	Features	Fault Protection	Max T _J (°C)	Package (mm)	Development Board
EPC2152	Half-Bridge ePower™ Stage	12	80	10	12.5	Level shifting, bootstrap circuits	UVLO	150	LGA 3.65 x 2.59	EPC90120

Design Support Materials @ www.epc-co.com

Books

1. GaN Transistors for Efficient Power Conversion
2. DC-DC Conversion Handbook
3. Wireless Power Handbook, 2nd Edition
4. GaN Transistors for Efficient Power Conversion, Chinese Edition

Design Support

- eGaN FET Reliability
- Chip-Scale Packaging
- DC-DC Power Conversion
- GaN Talk Blog - "Gallium nitride transistors open up new frontiers in high-speed motor drives"
- Video: eGaN FETs for Motor Drive Applications



eGaN FETs offer significantly higher performance switching than silicon-based MOSFETs in brushless DC motor designs.



For More Information

Please contact info@epc-co.com or your local sales representative
 Visit our website: epc-co.com
 Sign-up to receive EPC updates at bit.ly/EPCCupdates or text "EPC" to 22828



eGaN is a registered trademark of Efficient Power Conversion Corporation