

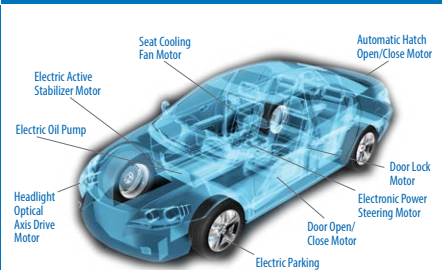



eGaN® FETs and ICs for Brushless DC (BLDC) Motors



	BLDC Application	Application Description	Benefits
eMobility		<p>The rapid emergence of e-scooters and e-bikes has created a surge in demand for compact, lightweight motor drives.</p> <p>The high frequency capability of GaN allows for the design of much smaller motor drives and this miniaturization enables better esthetic, lighter weight, and lower cost solutions for eMobility. Also, the higher efficiency provided by GaN is critical for longer battery life to achieve increased range between charges.</p>	<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 and Drones	 <p style="text-align: center;">Industrial Robot</p>	<p>Autonomous robots, lean production line collaborative robots and industrial drones use brushless DC motors where the input voltage is between 24 V and 150 V, typically 48 V and the emerging 96 V.</p> <p>GaN-based designs are smaller, lighter weight, have higher efficiency, and lower EMI.</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 style="text-align: center;">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
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
EPC2055	Single	40	3.6	6.6	2.3	0.7	13	0	841	408	8.8	29	161	150	LGA 2.5 x 1.5	EPC90132
EPC2067	Single	40	1.55	17.1	5.3	2	37	0	2178	1071	24	69	409	150	LGA 2.85 x 3.25	EPC90138
EPC2066	Single	40	1.1	25	8.9	3.2	59	0	3539	1670	30	90	639	150	LGA 6.05 x 2.3	EPC90149
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	EPC9038
EPC2031	Single	60	2.6	16	5	3.2	48	0	1640	980	35	48	450	150	BGA 4.6 x 2.6	EPC9061
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
EPC2065	Single	80	3.6	9.4	2.6	1.7	33	0	1097	534	8.9	60	215	150	LGA 3.5 x 2	EPC90137
EPC2206	Single-AEC-Q101	80	2.2	15	4.1	3	72	0	1610	1100	15	90	390	150	LGA 6.05 x 2.3	EPC90122
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
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
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
EPC2044	Single	100	10.5	4.3	1.3	0.5	15	0	503	196	1.8	9.4	89	150	BGA 2.5 x 1.5	EPC90128
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
EPC2204	Single	100	6	5.7	1.8	0.8	25	0	644	304	2.3	29	125	150	LGA 2.5 x 1.5	EPC9097
EPC2306	Single	100	3.8	11.0		1.1	41	0	1544	482	3.4	48	197	150	QFN 3 x 5	EPC90145
EPC2619	Single	100	3.3	8.3	2.1	1	27	0	1180	310	3	29	164	150	LGA 2.5 x 1.5	EPC90153
EPC2088	Single	100	3.2	12.5	4.4	1.4	47	0	1864	557	3.6	60	231	150	LGA 3.5 x 1.95	EPC90123
EPC2071	Single	100	2.2	18	6	1.8	71	0	2664	878	5.4	64	350	150	LGA 4.45 x 2.3	EPC90146
EPC2302	Single	100	1.8	23	8	2.3	85	0	3200	1000	7	101	408	150	QFN 3 x 5	EPC90142
EPC2361	Single	100	1.0 (typ)	28	7.2	2.5	86	0	4094	1147	12	101	519	150	QFN 3 x 5	EPC90156
EPC2308	Single	150	6	11	3.8	1.3	50	0	1454	405	2.6	48	157	150	QFN 3 x 5	EPC90148
EPC2305	Single	150	4	21	6.3	2.6	105	0	2900	920	7	80	329	150	QFN 3 x 5	EPC90143
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
EPC2054	Single	200	43	2.9	0.9	0.30	15	0	358	89	0.3	3.0	32	150	BGA 1.3 x 1.3	EPC9094
EPC2307	Single	200	10	10.6		1.3	58	0	1401	326	1.2	48	130	150	QFN 3 x 5	EPC90150
EPC2215	Single	200	8	13.6	3.3	2.1	69	0	1356	390	2	32	162	150	LGA 4.6 x 1.6	EPC9099
EPC2304	Single	200	5	21	0.0	2.6	115	0	2786	649	2.4	102	260	150	QFN 3 x 5	EPC90140

ePower™ Stage

Part Number	Configuration	Function	VPwr	I _{OUT}	I _{OUT} Peak	V _{DD}	Input Logic	F (Max)	UVLO	Package (mm)	Development Board
EPC2152	Half-Bridge ePower™ Stage	ePower™ Stage	80	12.5	90	12	3.3 V	3 MHz	7.5	LGA 3.9 x 2.6	EPC90120
EPC23101	HS FET + Driver + Level Shift	ePower™ Stage	100	65	240	6	5.5 V	3 MHz	0.5 – 4	QFN 3.5 x 5	EPC90142
EPC23102	HS FET + Driver + Level Shift	ePower™ Stage	100	35	140	6	5.5 V	3 MHz	0.5 – 4	QFN 3.5 x 5	EPC90147
EPC23103	HS FET + Driver + Level Shift	ePower™ Stage	100	25	61	6	3.3 V or 5 V	3 MHz		QFN 3.5 x 5	EPC90151
EPC23104	HS FET + Driver + Level Shift	ePower™ Stage	100	15	44	6	3.3 V or 5 V	3 MHz		QFN 3.5 x 5	EPC90152

Table data subject to change. Please visit: epc-co.com/epc/products/gan-fets-and-ics

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