Autoclean BLDC-PCBA

Manufactured By:
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Why Choose Melux BLDC PCBA?
Backed by Power Integration's globally trusted semiconductors and leveraging Melux's engineering excellence, this controller offers unmatched reliability, safety, and energy savings—making it ideal for modern ceiling fans, air movers, and other domestic or industrial, Kitchen hood,Air purifier, Air coolers,ACmotor BLDC applications.

Melux BLDC PCBA – Intelligent Motor Control Powered by Global InnovationMelux proudly presents its BLDC Motor Controller PCBA, an advanced solution engineered around world-class Power Integration semiconductors, the global pioneer in high-efficiency power conversion and proven BLDC motor control technology. Designed for robust performance, this controller is optimized for 90–160 Watt BLDC motors, offering superior energy efficiency, intelligent control, and long-term reliability.

Key Features:Wide Input Voltage Range:
Operates reliably from 120V to 277V AC, supporting both global and Indian grid conditions.
9-Speed Control: Smooth, precise speed regulation across 9 selectable levels, enabling optimized airflow and energy use.

Input **High Voltage Protection:** Built-in input over voltage protection that safeguards the system from voltages exceeding 290V AC, ensuring longevity in unstable supply conditions.

EMI/EMC Compliant: Designed to meet IS 302-13 (Indian standard) and IEC-class EMC/EMI requirements, ensuring safe and interference-free operation in residential and commercial environments.

Comprehensive Motor Protections: Overload Protection –
Prevents motor overheating and damage under heavy load.
No Load Protection – Detects and halts operation in absence of connected motor load.

Motor Lock Detection – Automatically stops the motor in case of rotor blockage or seizure.

Thermal (Over-Temperature) Protection – Monitors internal temperatures and triggers shutdown if thresholds are exceeded.

High RPM Protection – Prevents mechanical stress & potential damage from over speed conditions.

Smart Interface Protection: Touch-Gesture Communication Monitoring:
Continuous check on communication integrity between the main controller and the Touch-Gesture user interface board. If broken or disrupted, the system safely shuts down or alerts the user to prevent mishandling.

Melux BLDC PCBA – Intelligent Motor Control Powered by Proven Global Technology
Melux introduces a highly reliable and feature-rich BLDC PCBA (Printed Circuit Board Assembly), engineered for advanced motor control applications ranging from 90 to 160 Watts. Built on Power Integrations' world-class semiconductor platform, the design incorporates industry-leading BLDC (Brush-less DC) motor control technology, ensuring unmatched performance, safety, & energy efficiency.

MAIN POINTS COMPARISON FOR BLDC MELUX CGPL AND CHINESE CONTROLLERS

1	Input Supply Voltage Protection	Input Over voltage protection >290VAc Auto recovery	No such any protections provided
2	Circuit Efficiency	>90%	>82%
3	Thermal Management	Even for 130watt excellent thermal management no device heating	Heatsink required as temp for full load >90 deg observed
4	ZVS GaN technology	Devices by Power Integration with ZVS(Zero Voltage Switching and GaN used for excellent fail safe performance	Used with IGBT and no ZVS No GaN switching device components.
5	Startup	Smooth startup, with sensor less tech. improves motor life, no impact on motor or devices even if high speed switching.	Shunt Sensors may impact sudden surge if spped switched directly to high speed.
6	Over current draw	During commutation no external sensor for current sensing, operates reliabal without jerks, Cycle by cycle internal	Shunt sensors for over current sense, unreliable operation with jerks observed creates noise in the motor.
7	Electrolytic capacitors	Main role of electrolytic capacitors to filter in DC, Low ESR caps less heating, long life, High MTBF,	No Low ESR capacitors resulting short performancelife.
8	Reliable operating range	Wide operating voltage range 165-277VAc	Generally IGBTs based designs operates 190-260VAc
9	Driving	Integrated Half bridge High & Low side switching, device protected with UVLO,Thermal,OCP,OVP,	Discrete gate drive topology without protections to device, device fails under uncertain conditions.
10	Motor operation	During suction blockage Supports dynamic torque adjustment	During suction blockage Unreliable or aggressive startup behavior,

DETILED OPERATIONAL FEATURES COMPARISON

Sr.	Category	Bridge Switch Power Integrations -Based Driver	Chinese Low-Cost Mosfet-IGBT BLDC Driver
1	**Controller IC**	Uses Power Integrations' high-performance Bridge Switch	Generic or clone-based motor drivers
2	**Design Philosophy**	Industrial-grade design with integrated safety, efficiency, and noise control	Cost-focused design, often compromising on features
3	**Voltage Range**	Typically supports wide input voltage (e.g., 120–265 VAC)	Limited or unreliable voltage range
4	**Motor Control**	Advanced sinusoidal or FOC-based sensorless control	Often trapezoidal control, less efficient and noisier
5	**Efficiency**	Optimized for high efficiency (>90%) across a range of loads	Lower efficiency due to poor switching and losses
6	**Thermal Design**	Superior thermal performance with integrated thermal management, No extra heatsinks required being high efficiency lowest losses.	Poor heat dissipation; prone to overheating, Typically Aluminium heatsinks are used as lower efficiency high thermal losses
7	**Noise (Audible + EMI)**	Very low acoustic noise and EMI due to sinusoidal control	High noise, often produces audible whine
8	**Startup Performance**	Smooth and reliable startup, including under load	Unreliable or aggressive startup behavior, startup humming/kick resulting vibrations
9	**Protection Features**	Built-in OVP, OCP, UVLO, OTP, stall detection	Minimal or no protection

10	**Sensorless Operation**	Robust, intelligent sensorless startup and real-time commutation	Unstable or delayed lock-in
11	**Closed-Loop Support**	Closed-loop speed and torque control with firmware support	Open-loop only or fake closed-loop claims
12	**Diagnostics and**	Offers fault reporting and real-time diagnostics	No diagnostics, only LED indicators (if any)
13	**Control Inputs**	Multiple input options: analog, PWM, UART, I^2C	Basic PWM or analog only
14	**Current Sensing**	Integrated current sensing for feedback and protection	No current sensing or inaccurate external shunts
15	**Torque Control**	Supports dynamic torque adjustment	Fixed or unstable torque response
16	**Load Handling**	Maintains performance under varying load conditions	Struggles with variable or heavy loads
17	**Energy Consumption**	Low standby and operating power	High power loss due to inefficient switching
18	**Firmware Quality**	Developed, tested, and optimized firmware stack from Power Integrations	Often closed, buggy, or outdated firmware
19	**Design Tools**	PI provides simulation tools and reference designs (e.g., PI Expert)	No official design tools
20	**Certifications**	Can meet international standards (UL, CE, RoHS, Energy Star)	Typically uncertified, grey market compliance
21	**EMI Compliance**	Designed to pass FCC/CISPR standards, Passes CISPR14-1	High EMI, often fails compliance tests
22	**Cost**	Higher initial cost due to advanced features	Very low cost; attractive for prototypes or non-critical apps
23	**Flexibility**	Can be customized for HVAC, fans, pumps, compressors, Efficiency optimization possible.	One-size-fits-all design, not optimized, lower efficiency
24	**MTBF / Reliability**	Designed for high reliability with EN61000-4-4 & 4-5 standards compliance	Shorter life, MTBF often not documented, not passes global standards,
25	**Application Suitability**	Used in white goods, ceiling fans, commercial HVAC, electric tools, etc.	Suitable only for hobby projects or non-critical low-end consumer devices
26	**Cost optimization**	If desired components are not used fails to optimize.	Operates but with failures >5%
27	**Electrolytic capacitors**	Low ESR,1uf/watt min required for best performance	Though required similar design parameters lower cap values can work with lowest performance.
28	**Startup Lock-in Time**	<0.2s for sensorless startup	0.5–1s typical, with stalls possible
29	**Efficiency**	94–97% under optimal conditions	80–88% typical, with poor part matching
30	**Current Rating**	Peak current up to 5–10A with thermal protection	Claimed 5A peak, but real-world ~2–3A
31	**Switching Device**	GaN-like performance with low RDS(on) (~30-60 mΩ) FETs	Higher RDS(on) FETs (~150-300 mΩ)
32	**Topology**	Integrated half-bridge with high-side and low-side FETs, with ZVS-Zero Voltage switching, results high efficiency fail safe design	Discrete or outdated gate drive topology without protections to device, device fails under uncertain conditions.
33	**Overcurrent Protection**	cycle-by-cycle OCP, keeps shutdown mode auto recovery	Usually missing or slow-responding fuse only device fails.