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Product Brief

Motor Controller and Driver ICs

Highlights

- Four types of motor controller and driver ICs for a range of applications
- Leading-edge BiCMOS and BiCD (Bipolar+ CMOS+DMOS) processes
- Broad range of package sizes and a selection of small package sizes
- Wide operating supply voltage range
- The combination motor driver ICs feature high-speed pulse width modulation (PWM)
- The brushless DC motor controller and driver ICs include a sine wave PWM drive controller and a high-voltage driver integrated in a single package
- The TB6586FG/AFG motor controller IC employs a lead angle control function that enables highly efficient driving of three-phase brushless motors

Description

Toshiba develops its motor controller and driver ICs in its leading-edge BiCMOS and BiCD (Bipolar+CMOS+DMOS) processes. The BiCD process combines the analog advantages of bipolar devices, with the digital and low-power consumption benefits of MOSFETs, as well as the high-power capabilities of DMOS devices. The family consists of brushed DC motor driver ICs, brushless DC motor controller/driver ICs, stepping motor driver ICs, and combination motor driver ICs.

Brushed DC Motor Driver ICs (Bridge Drivers)

- Highly efficient driver
- Used for switching or as an interface driver

Toshiba provides low-cost brushed DC motor driver ICs as a cost-effective way to control motion in a range of products including home and office appliances, pumps, robotics, electronic and radio-controlled toys, computer numerical control (CNC) machines, and many other rotary applications. Toshiba bridge drivers (H-Switch) for brushed DC motors are used for switching between forward and reverse rotation (stop and braking operations are also available).

Brushed DC Motor Driver ICs (Bridge Drivers)

Part Number	Function	Vopmax (Vm*)	Io (Ipeak)	Channel	PWM Drive	Package	RoHS Compatible†
TA7267BP	Driver	18V (25V)	1A (3A)	1-ch	n/a	HSIP7	yes ††
TA7288P	Driver	18V (25V)	1A (2A)	2-ch	n/a	HSIP10	yes ††
TA7291FG	Driver	20V (25V)	0.4A (1.2A)	1-ch	n/a	HSOP16	yes
TA7291P	Driver	20V (25V)	1A (2A)	1-ch	n/a	HSIP10	yes ††
TA7291SG	Driver	20V (25V)	0.4A (1.2A)	1-ch	n/a	SIP9	yes
TA8409FG	Driver	20V (25V)	0.4A (1.0A)	1-ch	n/a	SSOP10	yes
TA8409SG	Driver	20V (25V)	0.4A (1.0A)	1-ch	n/a	SIP9	yes
TA8428FG	Driver	27V (30V)	0.8A (2.4A)	1-ch	n/a	HSOP20	yes
TA8428K	Driver	27V (30V)	1.5A (3A)	1-ch	n/a	HZIP7	yes ††
TA8429HQ	Driver	27V (30V)	3A (4.5A)	1-ch	n/a	HZIP12	yes ††
TA8440HQ	Driver	(50V)	1.5A (3A)	1-ch	direct PWM	HZIP12	yes ††
TA84007FG	Driver	27V (30V)	0.4A (1.2A)	1-ch	n/a	HSOP16	yes
TA84007PQ	Driver	27V (30V)	1A (2A)	1-ch	n/a	HSIP10	yes ††
TA84007SG	Driver	27V (30V)	0.4A (1.2A)	1-ch	n/a	SIP9	yes
TB6549FG	Driver	27V (30V)	2A (3.5A)	1-ch	direct PWM	HSOP20	yes
TB6549HQ	Driver	27V (30V)	3.5A (4.5A)	1-ch	direct PWM	HZIP25	yes ††
TB6549PG	Driver	27V (30V)	2A (3.5A)	1-ch	direct PWM	DIP16	yes
TB6552FLG	Driver	13.5V (15V)	0.8A (1A)	2-ch	direct PWM	QON24	yes
TB6552FNG	Driver	13.5V (15V)	0.8A (1A)	2-ch	direct PWM	SSOP16	yes
TB6555FLG	Driver	13.5V (15V)	0.6A (0.8A)	4-ch	direct PWM	QON36	yes
TB6557FLG	Driver	13.5V (15V)	0.6A (0.8A)	6-ch	direct PWM & constant current PWM	QON36	yes
TB6558FLG	Driver	13.5V (15V)	0.6A (0.8A)	2-ch	constant current PWM	QON24	yes
TB6559FG	Driver	30V (50V)	1A (2.5A)	1-ch	direct PWM & constant current PWM	HSOP16	yes
TB6561FG	Driver	36V (40V)	(1.5A)	2-ch	direct PWM	SSOP30	yes

†, †† See RoHs statement at the end of this document.

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Brushed DC Motor Driver ICs (Bridge Drivers) —continued

Part Number	Function	Vopmax (Vm*)	Io (Ipeak)	Channel	PWM Drive	Package	RoHS Compatible†
TB6590FTG	Driver	5.5V (6V)	0.4A (0.5A)	2-ch	direct PWM	VQON16	yes
TB6591FLG	Driver	5.5V (6V)	0.6A (0.8A)	7-ch	direct PWM & constant current PWM	QON48	yes
TB6592FLG	Driver	5.5V (6V)	0.6A (0.8A)	2-ch	direct PWM	QON24	yes
TB6594FLG	Driver	5.5V (6V)	0.6A (0.8A)	2-ch	direct PWM	QON24	yes
TB6595FLG	Driver	5.5V (6V)	0.6A (0.8A)	4-ch	direct PWM	QON36	yes
TB6607FLG	Driver	5.5V (6V)	0.6A (0.8A)	5-ch	direct PWM & constant current PWM	QON36	yes
TB6613FTG	Driver	5.5V (6V)	0.6A (0.8A)	8-ch	direct PWM & constant current PWM	VQON44	yes

*Absolute maximum ratings (T_A = 25°C)
Under Function, the driver contains the controller and high-power output stage in one chip.
† See RoHs statement at the end of this document.

Brushless DC Motor Controller/Driver ICs

- Sine wave PWM
- Contains three bi-directional drivers to drive high-current DC power
- Built-in bootstrap control circuit

Toshiba three-phase brushless DC (BLDC) motor driver ICs provide excellent performance characteristics with or without position sensors. Sensor-based BLDCs are used when the initial load is unknown or it varies, or when high initial torque is required. Sensor-less BLDC motors are typically used in fans where they save Hall sensors and wiring. Typical applications include power tools, refrigerator/cooling (compressors) and HVAC (e.g. fan).

Brushless DC Motor Controller/Driver ICs

Part Number	Function	Vopmax (Vm*)	Io	Sinusoidal Current Wave	Sensor-less	Speed Feedback loop	Package	RoHS Compatible†
TA84006FG	Driver****	20V (25V)	1A	no	no	no	SSOP30	yes
TB6537FG	Controller	5.0V (5.5V)	20mA	no	yes	no	SSOP24	yes
TB6537PG	Controller	5.0V (5.5V)	20mA	no	yes	no	DIP18	yes
TB6539FG	Controller	5.0V (18V)	20mA	yes	no	no	SSOP30	yes
TB6539NG	Controller	5.0V (18V)	20mA	yes	no	no	NDIP24	yes
TB6548FG	Controller	5.0V (5.5V)	20mA	no	yes	no	SSOP24	yes
TB6551FG	Controller	7V (12V)	2mA	yes	no	no	SSOP24	yes
TB6556FG	Controller	7V (12V)	2mA	yes	no	no	SSOP24	yes
TB6571FG	Controller	17V (30V)	20mA	yes	no	yes	QFP52	yes
TB6572AFG ***	Controller	17V (30V)	20mA	yes	no	yes	QFP52	yes
TB6575FNG	Controller	5.0V (5.5V)	20mA	no	yes	no	SSOP24	yes
TB6581HG	Controller & Driver	280V (500V)	1A	yes	no	no	HZIP25	yes
TB6582FG **	Controller	15V (18V)	±2mA	yes	yes	no	QFP52	yes
TB6586AFG	Controller	10V (18V)	2mA	150 degree drive	no	no	SSOP24	yes
TB6586FG	Controller	10V (18V)	2mA	150 degree drive	no	no	SSOP24	yes
TB6588FG	Controller & Driver	24V (50V)	2.5A	no	yes	no	HSOP36	yes

* Absolute maximum ratings (T_A = 25°C)
** Under Development
*** Improved overcurrent protection
**** This driver is only high output stage. Additional controller is necessary.
Under Function, the "Controller & Driver" is a dual die package and the "Driver" is a power stage with no controller.
† See RoHs statement at the end of this document.

Stepping Motor Driver ICs

- Low output ON resistances
- Forward and reverse rotation control available

Toshiba offers a wide selection of stepper motor driver ICs to meet automation and budget requirements, including high-precision/high-speed devices that generate sine-wave currents by using micro-stepping to enable high-speed and low-noise motor drive. These bipolar motor driver ICs generate more power without increasing motor weight compared to unipolar motor driver ICs. The devices are available with reset and enable pins, internal PWM current control, and an internal thermal-shutdown circuit.

Stepping Motor Driver ICs

Part Number	Function	Vopmax (Vm*)	Io (Ipeak)	Excitation	I/F	Mixed Decay Mode	Package	RoHS Compatible†
TA7774FG	Driver	(17V)	(±100mA)	Full step	phase input (2-bit/phase)	no	HSOP16	yes
TA7774PG	Driver	(17V)	(±100mA)	Full step	phase input (2-bit/phase)	no	DIP16	yes
TA84002FG	Driver	30V (35V)	0.8A (1A)	1/2 step	phase input (2-bit/phase)	no	HSOP20	yes
TA8435HQ	Driver	26.4V (40V)	1.5A (2.5A)	1/8 step	CLK input	no	HZIP25	yes ††
TB62206FG	Driver	35V (40V)	1.5A (1.8A)	1/2 step	phase input (2-bit/phase)	included	HSOP20	yes
TB62209FG	Driver	34V (40V)	1.5A (1.8A)	1/16 step	CLK input	included	HSOP36	yes
TB6560AFG	Driver	34V (40V)	1.5A (2.5A)	1/16 step	CLK input	included	THQFP64	yes
TB6560AHQ	Driver	34V (40V)	3.0V (3.5A)	1/16 step	CLK input	included	HZIP25	yes ††
TB6562AFG	Driver	34V (40V)	(1.5A)	1/4 step	phase input (3-bit/phase)	no	SSOP30	yes
TB6562ANG	Driver	34V (40V)	(1.5A)	1/4 step	phase input (3-bit/phase)	no	NDIP24	yes
TB6598FNG	Driver	13.5V (15V)	0.6A (0.8A)	1/2 step	phase input (2-bit/phase)	no	SSOP16	yes
TB6608FNG	Driver	13.5V (15V)	0.6A (0.8A)	1/8 step	CLK input	no	SSOP24	yes
TB6613FTG	Driver	5.5V (6V)	0.6A (0.8A)	6 bit u-step	serial input	no	VQON44	yes

*Absolute maximum ratings (T_A = 25°C)

Under Function, the driver contains the controller and high-power output stage in one chip.

†, †† See RoHs statement at the end of this document.

Product Brief

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Combination Motor Driver ICs

- Low output ON resistances
- Forward and reverse rotation control
- High breakdown voltage and large current output

The Toshiba next-generation combination motor driver ICs feature low noise, high-speed and high-accuracy control for general purpose and battery-powered applications. Using proprietary production and circuit technologies, the ICs are designed for different drive modes, can support DC motors as well as stepper motors and can be used to drive several motors with one chip. High-speed and efficient power control is achieved with PWM, constant-current or direct PWM, on the order of several hundred kHz. The devices are available with an independent, power-saving, standby-mode control function, a through current prevention function for the output driver section by dead time control (Typ.= 300 ns), a built-in thermal shutdown (TSD) circuit, and a V_{CC} power supply under voltage detection (UVLO) circuit.

Combination Motor Driver ICs

Part Number	Function	Vopmax (Vm*)	Io (Ipeak)	Channel	I/F	Option	Package	RoHS Compatible†
TB6557FLG	Driver	13.5V (15V)	13.5V (0.8A)	6-ch	serial input	Const current x2	QON36	yes
TB6591FLG	Driver	5.5V (6V)	0.6A (0.8A)	7-ch	phase input	Const current x1	QON48	yes
TB6594FLG	Driver	5V (5.5V)	(0.8A)	2-ch	phase input	DC/DC Converter	QON24	yes
TB6595FLG	Driver	5.5V (6V)	0.6A (0.8A)	4-ch	phase input		QON36	yes
TB6596FLG	Driver	5.5V (6V)	0.6A (0.8A)	6-ch	serial input	Const current x2 FLL Speed Control	QON36	yes
TB6607FLG	Driver	5.5V (6V)	0.6A (0.8A)	5-ch	serial input	Const current x2	QON36	yes
TB6613FTG	Driver	5.5V (6V)	0.6A (0.8A)	8-ch	serial input	6-bit u-Step STM drive x2 Const current x1	VQON44	yes

*Absolute maximum ratings (T_A = 25°C)

Under Function, the driver contains the controller and high-power output stage in one chip.

† RoHS-Compatible products either (i) contain no more than a maximum concentration value of 0.1% by weight in Homogeneous Materials for lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) and of 0.01% by weight in Homogeneous Materials for cadmium; or (ii) fall within any of the application exemptions set forth in the Annex to the RoHS Directive (Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment). Homogeneous Material means a material of uniform composition that cannot be mechanically disjointed (meaning separated, in principle, by mechanical actions such as unscrewing, cutting, crushing, grinding and/or abrasive processes) into different materials. Examples of Homogeneous Materials would be individual types of plastics, ceramics, glass, metals, alloys, paper, board, resins and coatings.

†† This product is RoHS-Compatible due to application exemptions in the RoHS Directive.

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