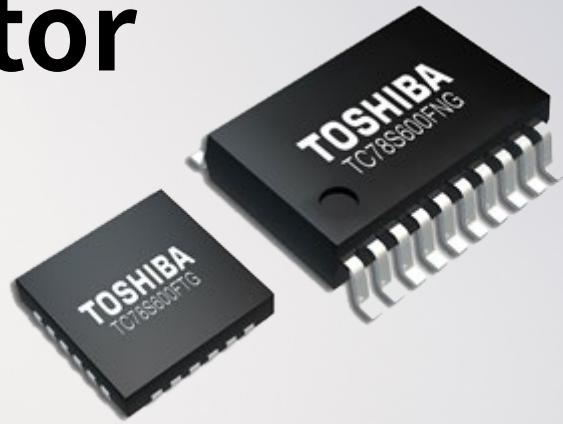


# Stepper Motor Drivers



## Improving System Efficiency

Toshiba is leveraging its unique manufacturing and circuit technologies to offer the industry's widest portfolio of next-generation motor driver ICs featuring low power consumption, low noise, high speed and high-precision motor control. Fabricated in Toshiba's 130nm BiCD mixed signal process the motor drivers improve the motor performance while featuring small footprints and attractive prices.

### Application

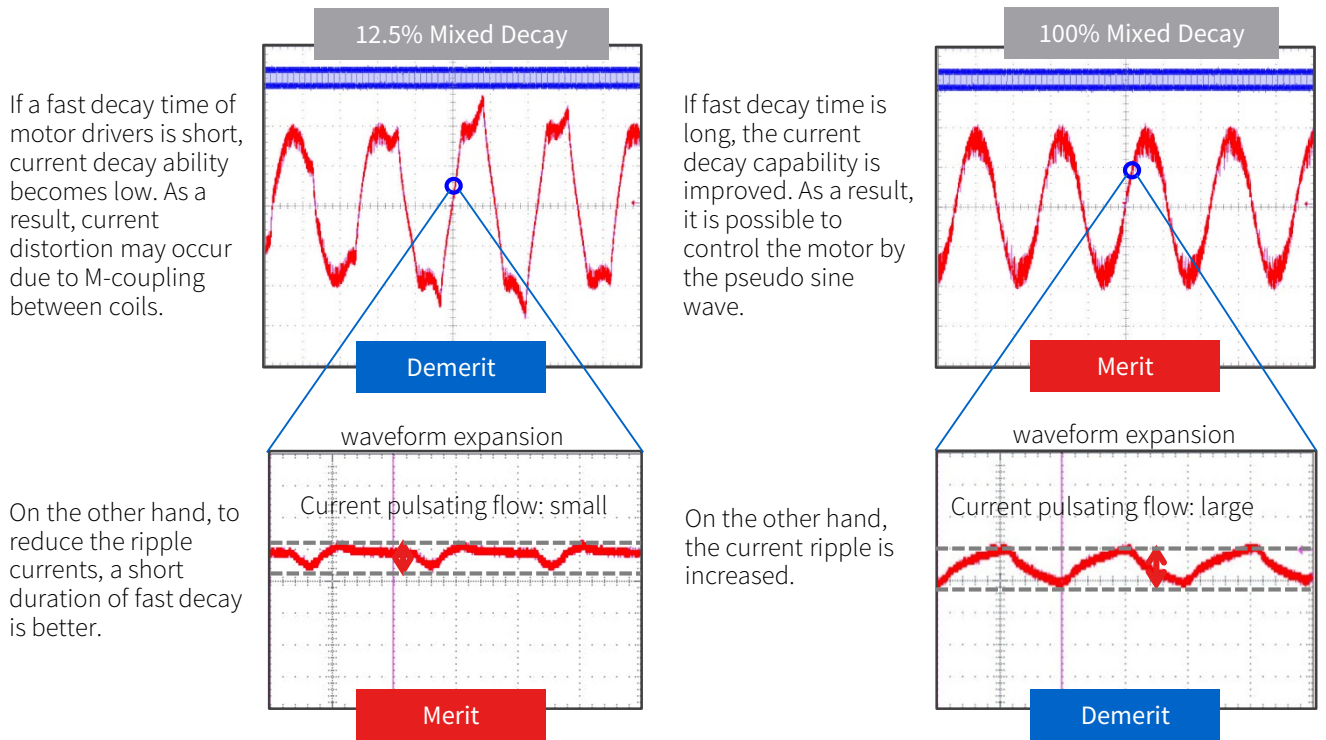
- Industrial applications
- Home appliances
- Sewing machines
- Surveillance cameras
- 3D printers
- CNC machines
- Packaging machines
- ATM
- Point-Of-Sales (POS)

Features	Advantages	Benefits
<ul style="list-style-type: none"> <li>• Pin and package compatible driver types available</li> <li>• Wide package lineup</li> <li>• Multiple control interfaces</li> <li>• Micro stepping technology</li> <li>• 130nm BiCD mixed signal process</li> <li>• Advanced Dynamic Mixed Decay (ADMD)</li> <li>• Advanced Current Detect System (ACDS)</li> <li>• Active Gain Control (AGC)</li> </ul>	<ul style="list-style-type: none"> <li>• Easy replacement with a driver with lower current rating and lower cost</li> <li>• Surface mount and through hole packages available. Small package sizes and packages for maximum heat dissipation available</li> <li>• The user can choose between phase input or clock input driver types</li> <li>• Step modes down to 1/32 step are available</li> <li>• Combination of low-voltage control circuitry with high voltage DMOS output drivers provides low Ron and small chipsize</li> <li>• Improve efficiency and reduced vibration at high rotation speeds</li> <li>• Constant current accuracy improvement without external RS resistance</li> <li>• Optimized motor drive current with lower heat generation and no step-out</li> </ul>	<p><b>Attractive cost effects:</b></p> <ul style="list-style-type: none"> <li>• Reduced board space</li> <li>• Reduced bill of material costs</li> <li>• Easy adaption to changed requirements</li> </ul> <p><b>Increased motor performance:</b></p> <ul style="list-style-type: none"> <li>• Low noise and low vibration motor operation</li> <li>• Reduced current distortion at high-speed</li> <li>• Improved system reliability and safety</li> <li>• Reduced heat dissipation</li> <li>• Improved efficiency</li> </ul>

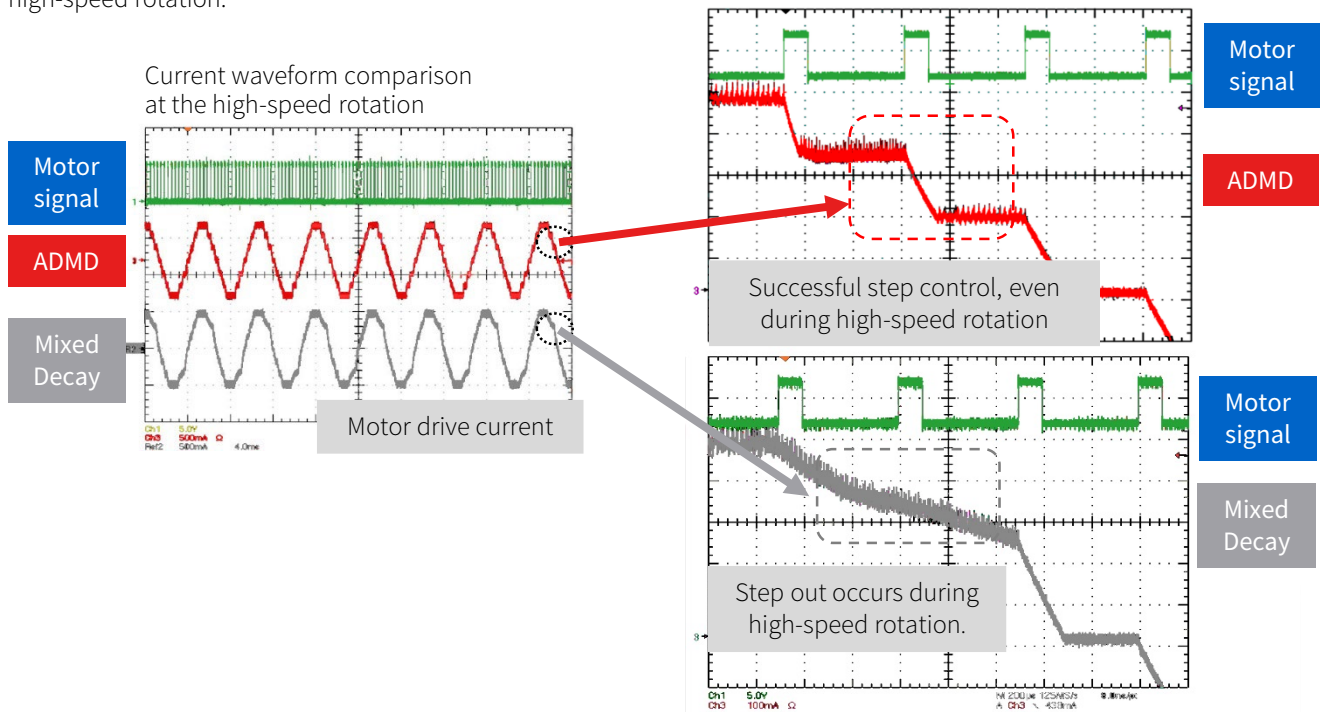
## Advanced dynamic Mixed Decay (ADMD)

Toshiba's ADMD micro stepping drive technology allows you to achieve high-speed rotation and high efficiency with low noise. ADMD has two threshold levels for current detection. As a result the following control to current fluctuation has been improved. Therefore, ADMD makes output current waveforms smoother and less distortional even in fast rotation in comparison to the old mixed decay system. ADMD reduces redundant current regeneration, making motor drive systems more efficient.

Toshiba's ADMD constant current technology realizes pseudo sine wave motor control and reduces the ripple current:

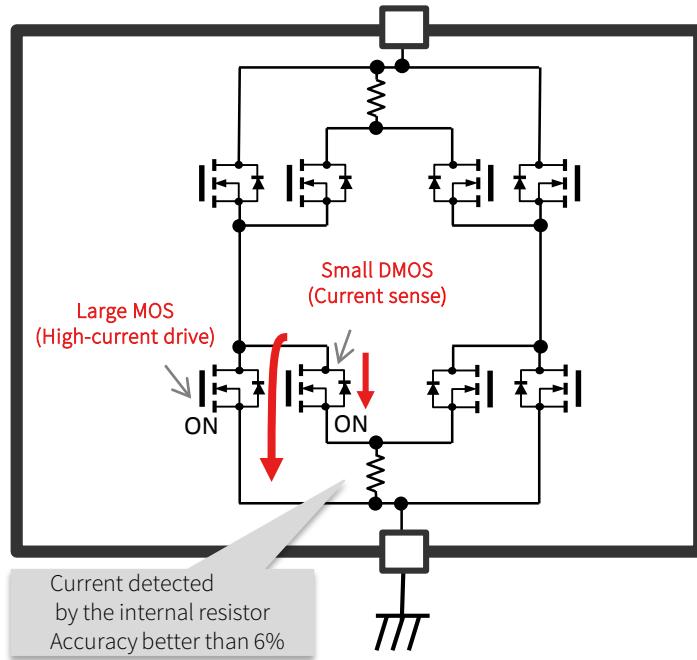


ADMD improves the current follow-up compared with conventional mixed decay to achieve high efficiency motor control in high-speed rotation.



## Advanced Current Detect System (ACDS)

Current detection technology contributes to constant current accuracy improvement and bill of material costs reduction by eliminating the need for an external RS resistance.



## Active Gain Control (AGC)

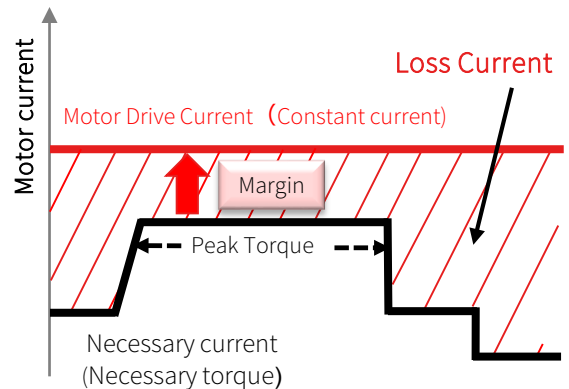
Prevent missing step-out by optimizing the motor current. Achieve high efficiency and low noise.

### General approach

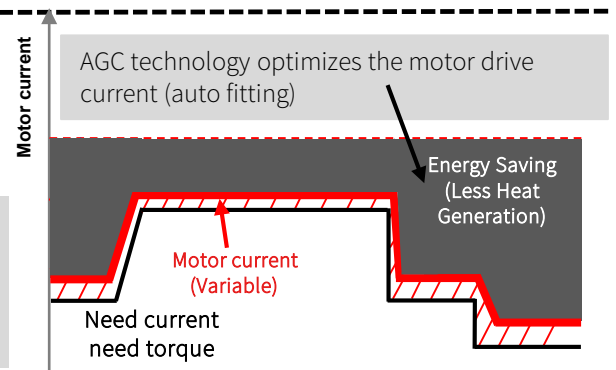
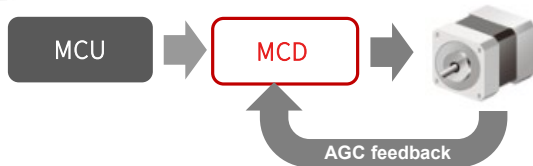


### “Stepping Motor with open loop control”

A maximum constant **current** is required for a stable motor drive and to avoid step-out. Accordingly, at light load conditions the current efficiency is bad.



### New approach “Active Gain Control”



### Benefits

- Current autofitting / no step-out
- Power consumption reduced by up to 30%
- Chip temperature reduction by around 30°C

## Bipolar Stepper Motor Drivers

Part Number	Interface			Max. Ratings		Stepping Mode								ADMD	ACDS	AGC	Temperature Range T <sub>A</sub>	Package
	Clock	Phase	Serial	Voltage [V]	IOUT (abs) [A]	Full	Half	1/4	1/8	1/16	1/32	1/64	1/128					
TB67S101AFNG	-	X	-	10-47	4.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	HTSSOP48-P-300-0.50
TB67S101AFTG	-	X	-	10-47	4.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S101ANG	-	X	-	10-47	4.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-SDIP24-0723-1.78
TB67S102AFNG	X	-	-	10-47	4.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	HTSSOP48-P-300-0.50
TB67S102AFTG	X	-	-	10-47	4.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S103AFTG	X	-	X	10-47	4.0	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S109AFNG	X	-	-	10-47	4.0	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	HTSSOP48-P-300-0.50
TB67S109AFTG	X	-	-	10-47	4.0	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S128FTG	X	-	X	6.5-44	5.0	X	X	X	X	X	X	X	X	X	X	X	-40 to +85	P-VQFN64-0909-0.50*
TB67S249FTG	X	-	-	10-47	4.5	X	X	X	X	X	X	-	-	X	X	X	-20 to +85	P-VQFN48-0707-0.50
TB67S261FTG	-	X	-	10-47	2.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S265FTG	-	-	X	10-47	2.0	X	X	-	-	-	-	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S269FTG	X	-	-	10-47	2.0	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S279FTG	X	-	-	10-47	2.0	X	X	X	X	X	X	-	-	X	X	X	-20 to +85	P-VQFN48-0707-0.50
TB67S285FTG	-	-	X	10-47	3.0	X	X	-	-	-	-	-	-	X	X	X	-20 to +85	P-VQFN48-0707-0.50
TB67S289FTG	X	-	-	10-47	3.0	X	X	X	X	X	X	-	-	X	X	X	-20 to +85	P-VQFN48-0707-0.50
TB67S508FTG	X	X	-	10-35	3.0	X	X	X	-	-	-	-	-	X	X	-	-20 to +85	P-VQFN36-0505-0.50

All devices listed here supports: Under Voltage Lockout (UVLO), Over Current Detection (ISD), Over Temperature Detection (TSD), Internal Regulator Output 5V, Single Power Supply. \* New Product

## Unipolar Stepper Motor Drivers

Part Number	Interface			Max. Ratings		Stepping Mode								ADMD	ACDS	AGC	Temperature Range T <sub>A</sub>	Package
	Clock	Phase	Serial	Voltage [V]	IOUT (abs) [A]	Full	Half	1/4	1/8	1/16	1/32	1/64	1/128					
TB67S141FTG	-	X	-	10-40	3.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S141HG	-	X	-	10-40	3.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	HZIP25-P-1.00F
TB67S141NG	-	X	-	10-40	3.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-SDIP24-0723-1.78
TB67S142FTG	X	-	-	10-40	3.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S142HG	X	-	-	10-40	3.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	HZIP25-P-1.00F
TB67S142NG	X	-	-	10-40	3.0	X	X	X	-	-	-	-	-	X	-	-	-20 to +85	P-SDIP24-0723-1.78
TB67S145FTG	-	-	X	10-40	3.0	X	X	-	-	-	-	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S149FG	X	-	-	10-40	3.0	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	P-HSSOP28-0819-0.80
TB67S149FTG	X	-	-	10-40	3.0	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	P-WQFN48-0707-0.50
TB67S149HG	X	-	-	10-40	3.0	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	HZIP25-P-1.00F
TB67S179FTG	X	-	-	10-60	1.5	X	X	X	X	X	X	-	-	X	-	-	-20 to +85	P-VQFN48-0707-0.50

All devices listed here supports: Under Voltage Lockout (UVLO), Over Current Detection (ISD), Over Temperature Detection (TSD), Internal Regulator Output 5V, Single Power Supply.