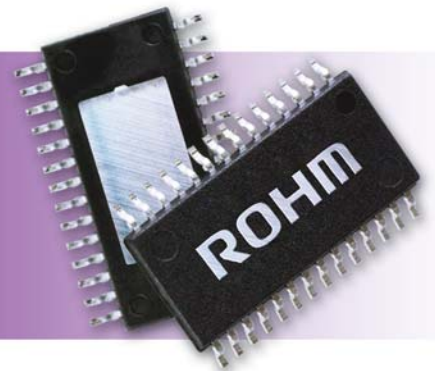




*Innovations Embedded*

**IC** *Motor Drivers*

# Stepper Motor Driver Series



- Office Machines
- Sewing Macines
- Security Cameras
- Robotics
- Factory Automation

# Stepper Motor Drivers from ROHM Semiconductor

ROHM Stepper Motor Drivers (SMDs) offer designers a selection of products with the performance features required for printers and copiers, scanners, security cameras, robotics, sewing machines, factory automation and other applications requiring precision motor control.

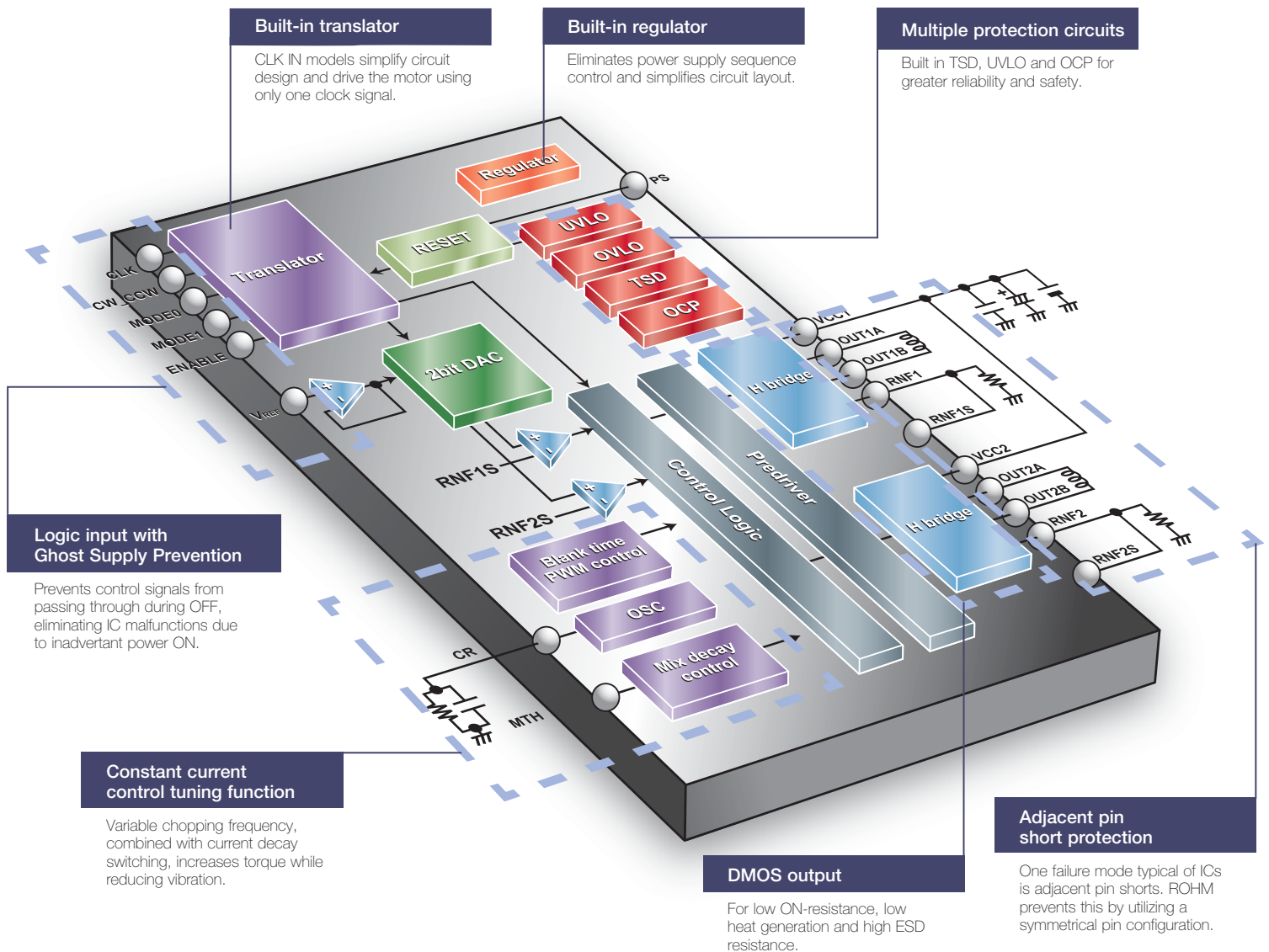
Five product series are offered providing the ability to optimize the combination

of function, performance, power and package size.

Reliable operation is the hallmark of ROHM Stepper Motor Drivers. A built-in voltage regulator in most models eliminates the need for control sequencing during power ON/OFF to prevent circuit malfunctions. ROHM SMDs also incorporate voltage, current and thermal protection circuits not

typically found in this class of device. Plus, ROHM's exclusive Ghost Supply Prevention function prevents aberrant operation in OFF mode.

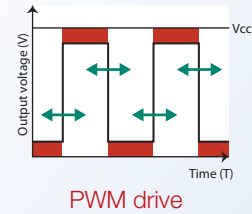
Finally, ROHM's fabrication process yields products that exhibit exceptional ESD withstand, low ON resistance and low heat generation. The small package sizes are further enhanced by the reduction in external components.



## Important Performance Benefits of ROHM SMDs

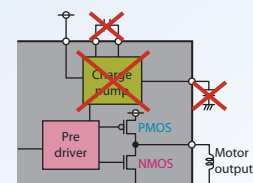
- PWM constant current drive significantly increases efficiency

ROHM's stepping motor drivers utilize PWM constant current drive for increased efficiency and eliminate the need for additional circuitry (i.e. snubber circuit), resulting in lower power consumption.



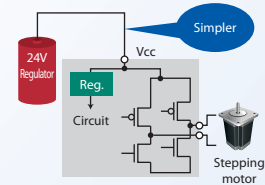
- No charge pump required, eliminating the need for external capacitors

With no charge pump, there is no need for external capacitors, contributing to greater miniaturization while eliminating capacitor shorts, resulting in greater reliability.



- Only one power supply needed due to built-in regulator

All ROHM stepper motor drivers (except the low voltage line) feature an integrated voltage regulator that eliminates the need for an additional power supply, simplifying design.



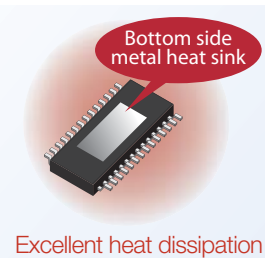
- High ESD resistance (HBM)

An electrostatic discharge resistance of 8kV has been achieved through optimization of processes and circuitry, ensuring high reliability in all environments.



- Thin, high power package

ROHM's stepping motor drivers employ a thin package with a bottom side metal heat sink, significantly increasing allowable loss while simplifying thermal design.



# Stepper Motor Drivers Product Lineup

## High Performance - High Reliability 36V Stepping Motor Driver Series

BD63877EFV	CLK IN	I <sub>max.</sub> 2.0A	1/4STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection
BD63875EFV	CLK IN	I <sub>max.</sub> 1.5A	1/4STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection
BD63873EFV	CLK IN	I <sub>max.</sub> 1.0A	1/4STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection
BD63876EFV	PARA IN	I <sub>max.</sub> 2.0A	1/4STEP	Constant Current PWM		DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection
BD63874EFV	PARA IN	I <sub>max.</sub> 1.5A	1/4STEP	Constant Current PWM		DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection
BD63872EFV	PARA IN	I <sub>max.</sub> 1.0A	1/4STEP	Constant Current PWM		DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection

## Standard 36V Stepping Motor Driver Series

BD6290EFV	PARA IN	I <sub>max.</sub> 0.8A	1/4STEP	Constant Current PWM			Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE		ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	4kV		
BD63801EFV	CLK IN	I <sub>max.</sub> 0.8A	1/2STEP	Constant Current PWM	FW/RW Switching		Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	4kV		

## Microstep 36V Stepping Motor Driver Series

BD63847EFV	CLK IN	I <sub>max.</sub> 2.0A	1/16STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection
BD63843EFV	CLK IN	I <sub>max.</sub> 1.0A	1/16STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE	ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	8kV	Short Protection	Protection
BD63860EFV	CLK IN	I <sub>max.</sub> 2.5A	1/16STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG			ONE POWER	T.S.D.	O.C.P.	UV LO	OVLO	4kV		

## Low Voltage Stepping Motor Driver Series

BD6381EFV	PARA IN	I <sub>max.</sub> 1.2A	1/2STEP	Constant Current PWM			Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE		T.S.D.	O.C.P.	UV LO		4kV	Short Protection	STANDBY 0μA
BD6380EFV	PARA IN	I <sub>max.</sub> 0.8A	1/2STEP	Constant Current PWM			Thin PKG	SMALL SIZE POWER PKG	FUNCTION COMPATIBLE	EPIN COMPATIBLE		T.S.D.	O.C.P.	UV LO		4kV	Short Protection	STANDBY 0μA

## High Voltage Stepping Motor Driver Series

BD6425EFV	CLK IN	I <sub>max.</sub> 1.5A	1/4STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG			ONE POWER	T.S.D.	O.C.P.	UV LO		8kV	Short Protection	
BD6423EFV	CLK IN	I <sub>max.</sub> 1.5A	1/4STEP	Constant Current PWM	FW/RW Switching	DECAY SW	Thin PKG	SMALL SIZE POWER PKG			ONE POWER	T.S.D.	O.C.P.	UV LO		8kV	Short Protection	

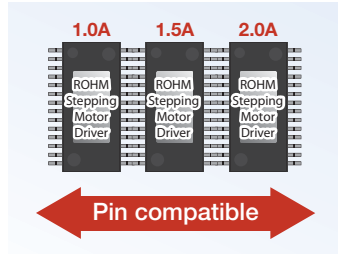
## Key

		Max. output current		Small power package		Built-in thermal shutdown circuit		Function compatible
		Clock IN/Parallel IN type control signal input		Package type		Built-in overcurrent protection circuit		Pin compatible
		Excitation mode (No. of steps)		Inverse mounting protection		Built-in undervoltage lock out circuit		Capable of switching between forward and reverse during CLK-IN
		Standby current 0μA		One power supply system due to built-in regulator		Built-in overvoltage lock out circuit		SLOW/FAST/MIX DECAY Switching function
		ESD resistance		Constant current PWM		Adjacent pin short protection		

## High Performance - High Reliability - 36V Series

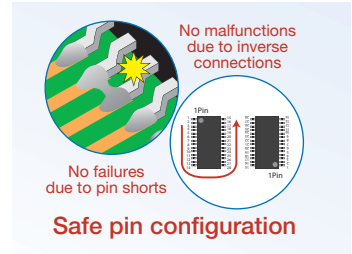
- Pin compatibility simplifies replacement

ROHM offers 3 motor drivers (I<sub>omax</sub> = 1.0A, 1.5A, 2.0A) that are pin-compatible, allowing different motors to be used without changing the board pattern, reducing both development time and costs.



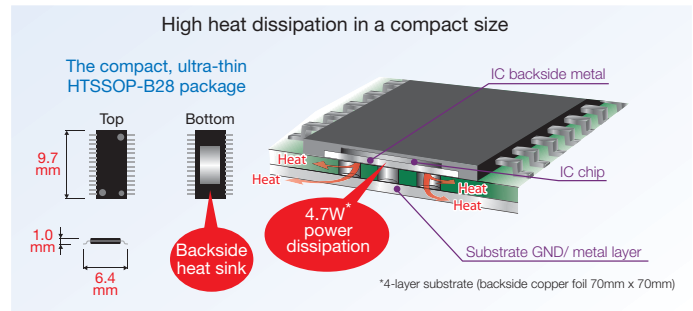
- No failures due to adjacent pin shorts or inverse insertion

The carefully designed terminal configuration prevents failures due to reverse orientation or adjacent pin shorts caused by incorrect mounting or poor soldering, eliminating two major failure modes of the assembly process.



- Ultra-thin, compact size and high heat dissipation characteristics simplify thermal design — even with large currents

The ultra-thin, compact package (HTSSOP-Bxx) dissipates heat to the substrate through the metal backside, resulting in large power dissipation. Compared with conventional HSOP packages that radiate heat through the leads, the HTSSOP-Bxx can handle large currents while reducing mounting area significantly.



- Current decay mode switching function reduces vibration, even during high rotation speeds

Generally, Slow Decay mode alone causes deformation of the current waveform during high speed rotation, resulting in motor vibration. ROHM stepping motor drivers feature an MTH terminal that allows selection of FAST/SLOW/MIX DECAY modes, ensuring low vibration driving — even during high speed rotation. In addition, the FAST/SLOW ratio can be linearly set during MIX DECAY, allowing optimization of the current decay.



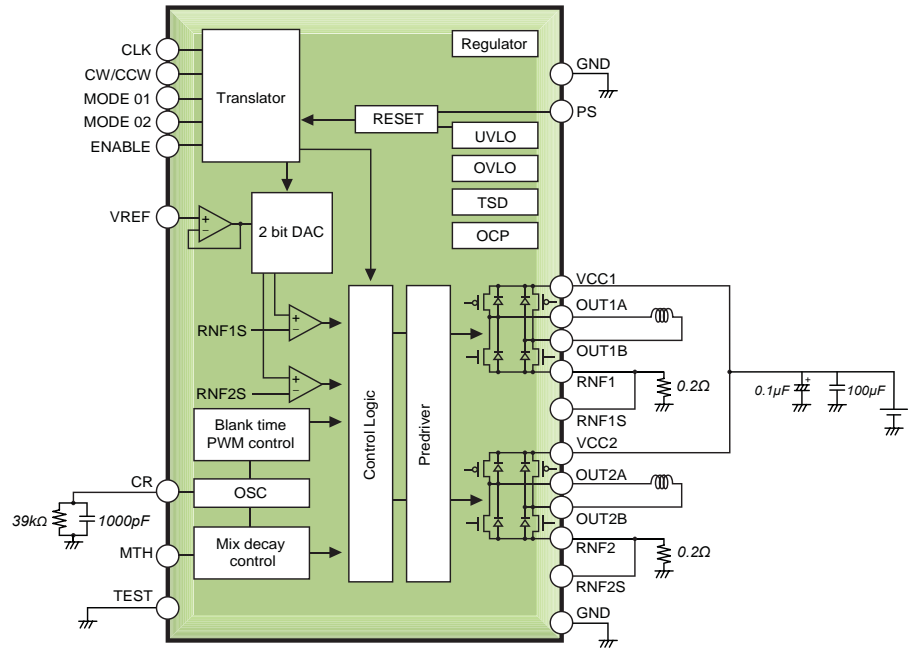
Low vibration, even during high speed rotation

Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance (Ω)	Package
	V <sub>CC</sub>			H level voltage(V)	L level voltage(V)		
BD63877EFV	19 to 28	2.0	2.5	2.0	0.8	0.65	HTSSOP-B28
BD63875EFV	19 to 28	1.5	2.5	2.0	0.8	1.00	HTSSOP-B28
BD63873EFV	19 to 28	1.0	2.5	2.0	0.8	1.90	HTSSOP-B28
BD63876EFV	19 to 28	2.0	2.5	2.0	0.8	0.65	HTSSOP-B28
BD63874EFV	19 to 28	1.5	2.5	2.0	0.8	1.00	HTSSOP-B28
BD63872EFV	19 to 28	1.0	2.5	2.0	0.8	1.90	HTSSOP-B28

## High Performance - High Reliability - 36V Series CLK Interface

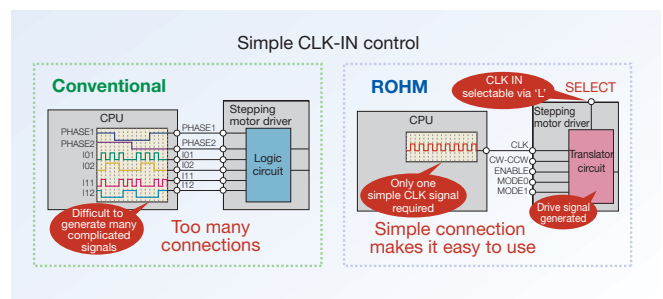
### Important Features

- Single supply voltage ( $V_{CC} = 36V$ ) with internal voltage regulator
- 1.0A, 1.5A and 2.0A output current models
  - Pin-compatible line-up
  - Small, thin power package (HTSSP-B28)
- CLK-IN with built-in translator
  - Full-step/ half-step/ quarter-step
- Constant current PWM driver
  - Variable frequency by external CR
  - FAST / SLOW / MIX DECAY modes
- DMOS output (Pch+Nch)
  - No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
  - Adjacent pin short protection
- Ghost supply prevention function



### Easy board layout with simple CLK-IN control

Compared with PARALLEL IN devices that require drive signals from the CPU, ROHM's CLK-IN stepper motor drivers feature a built-in translator circuit making it possible to drive stepper motors using a single CLK signal. This cuts down both the amount of software processing as well as the number of signals significantly reducing the development time, simplifying board layout and decreasing costs.

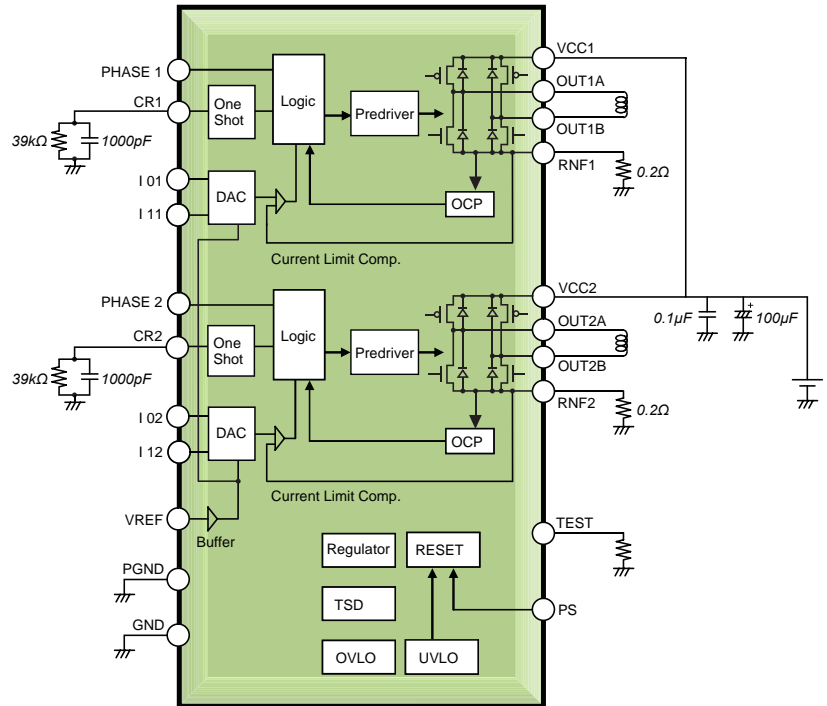


Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance ( $\Omega$ )	Package
	$V_{CC}$			H level voltage(V)	L level voltage(V)		
<b>BD63877EFV</b>	19 to 28	2.0	2.5	2.0	0.8	0.65	HTSSOP-B28
<b>BD63875EFV</b>	19 to 28	1.5	2.5	2.0	0.8	1.00	HTSSOP-B28
<b>BD63873EFV</b>	19 to 28	1.0	2.5	2.0	0.8	1.90	HTSSOP-B28

## High Performance - High Reliability - 36V Series PARALLEL Interface

### Important Features

- Single supply voltage (Vcc, max = 36V) with internal voltage regulator
- 1.0A, 1.5A and 2.0A output current models
  - Pin-compatible line-up
  - Small, thin power package (HTSSP-B28)
- Parallel IN
  - Full-step/ half-step/ quarter-step
- Constant current PWM driver
  - Variable frequency by external CR
  - FAST / SLOW / MIX DECAY modes
- DMOS output (Pch+Nch)
- No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
  - Adjacent pin short protection
- Ghost supply prevention function



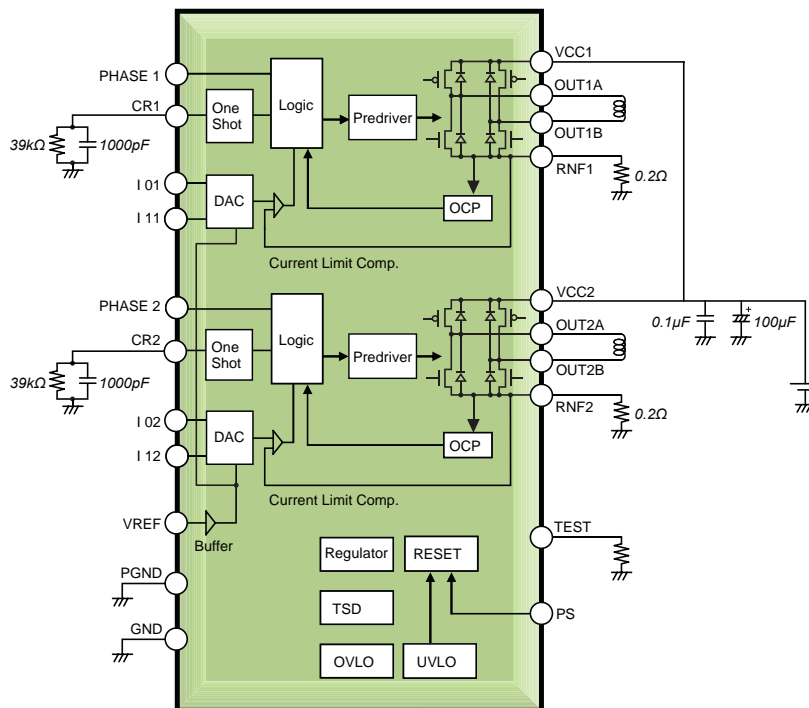
Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance (Ω)	Package
	Vcc			H level voltage(V)	L level voltage(V)		
<b>BD63876EFV</b>	19 to 28	2.0	2.5	2.0	0.8	0.65	HTSSOP-B28
<b>BD63874EFV</b>	19 to 28	1.5	2.5	2.0	0.8	1.00	HTSSOP-B28
<b>BD63872EFV</b>	19 to 28	1.0	2.5	2.0	0.8	1.90	HTSSOP-B28



## High Performance - High Reliability - 36V Series Standard / PARALLEL IN

### Important Features

- Single supply voltage (Vcc, max = 36V) with internal voltage regulator
- 0.8A output current
- Parallel-In
  - Full-step/ half-step/ quarter-step
- Constant current PWM driver
  - SLOW decay mode
- DMOS output (Pch+Nch)
  - No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
  - Adjacent pin short protection
- Ghost supply prevention function



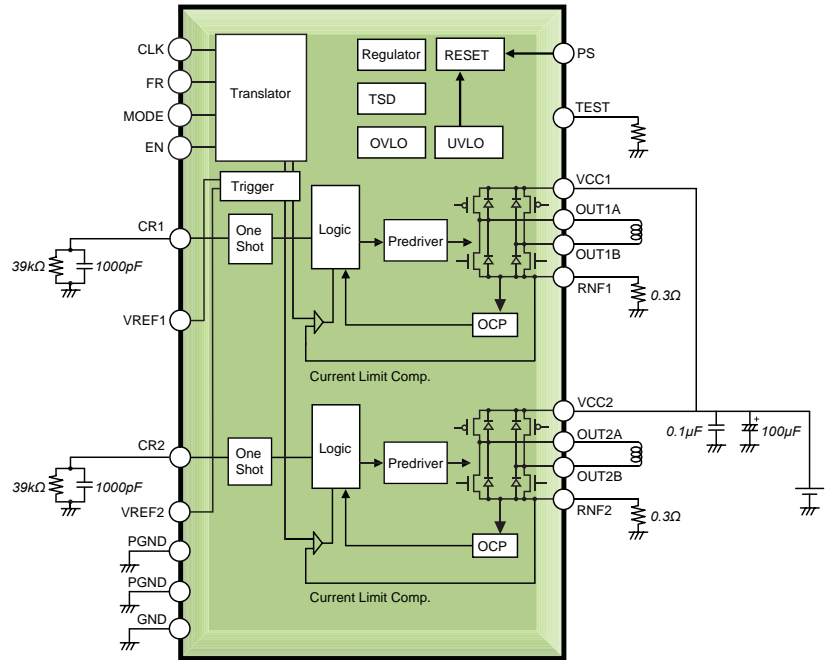
Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance (Ω)	Package
	Vcc			H level voltage(V)	L level voltage(V)		
<b>BD6290EFV</b>	19 to 28	0.8	3.0	2.0	0.8	2.8	HTSSOP-B24



## High Performance - High Reliability - 36V Series Standard / CLK IN

### Important Features

- Single supply voltage (Vcc, max = 36V) with internal voltage regulator
- 0.8A output current
- Clock-In
  - Full-step/ half-step
- Constant current PWM driver
  - SLOW decay mode
- DMOS output (Pch+Nch)
  - No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
  - Adjacent pin short protection
- Ghost supply prevention function

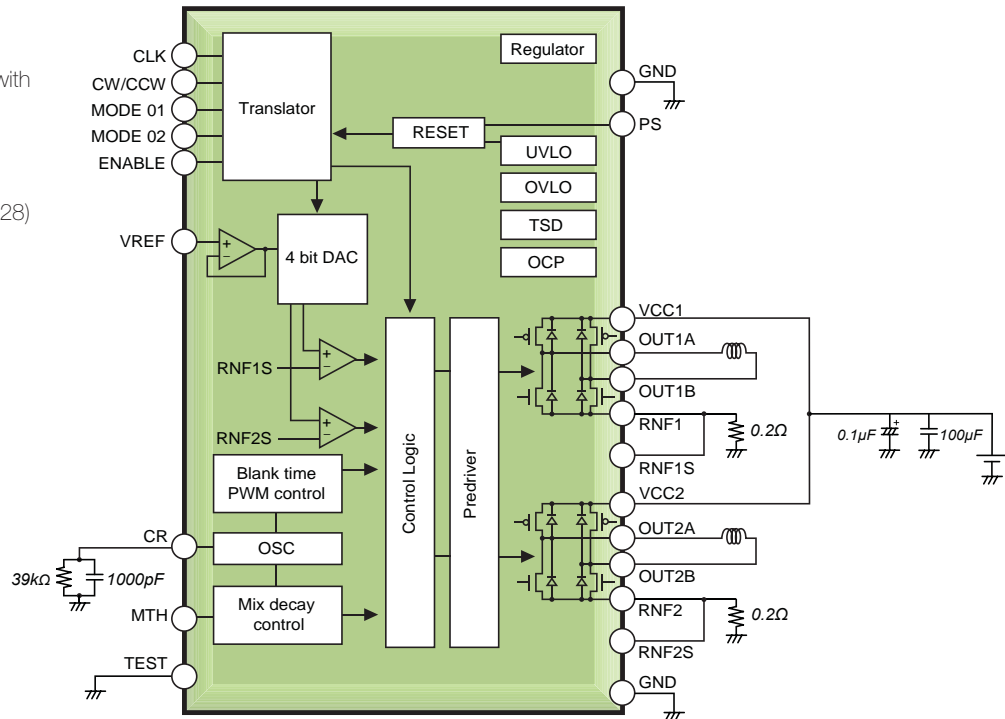


Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance (Ω)	Package
	Vcc			H level voltage(V)	L level voltage(V)		
BD63801EFV	19 to 28	0.8	2.7	2.0	0.8	2.8	HTSSOP-B24

## High Performance - High Reliability - 36V Series Microstep

### Important Features

- Single supply voltage ( $V_{cc} = 36V$ , max) with internal voltage regulator
- 1.0A and 2.0A output current models
  - Pin-compatible line-up
  - Small, thin power package (HTSSOP-B28)
- CLK-IN with built-in translator
  - Full-step/ half-step/ eighth-step / sixteenth-step
- Constant current PWM driver
  - Variable frequency by external CR
  - FAST / SLOW / MIX DECAY modes
- DMOS output (Pch+Nch)
  - No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
  - Adjacent pin short protection



- 4 mode settings possible from full step to sixteenth step via 4-bit logic input

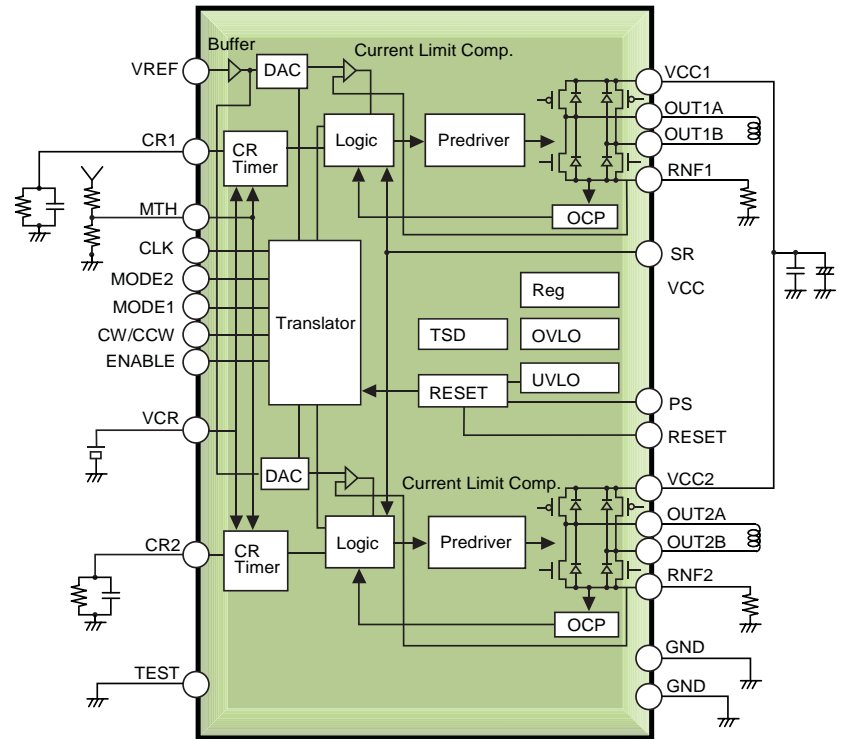
Select between Full-Step, Half-Step, Eighth-Step or Sixteenth-Step operation based on the control input terminal settings. Full-step mode is ideal for sets requiring large current for high torque, while sixteenth-step mode features a smooth output waveform for lower noise and vibration.

Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance (Ω)	Package
	V <sub>cc</sub>			H level voltage(V)	L level voltage(V)		
<b>BD63843EFV</b>	19 to 28	1.0	2.5	2.0	0.8	1.9	HTSSOP-B28
<b>BD63847EFV</b>	19 to 28	2.0	2.5	2.0	0.8	0.85	HTSSOP-B28

## High Performance - High Reliability - 36V Microstep

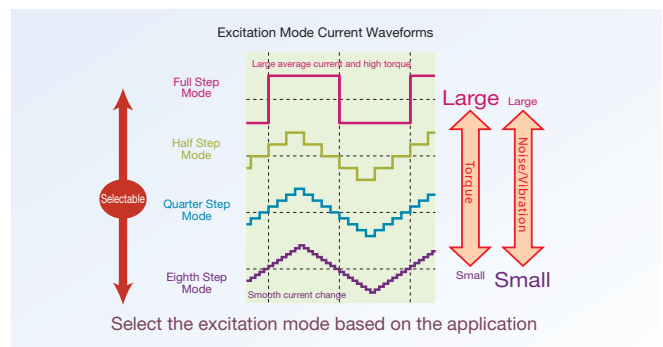
### Important Features

- Single supply voltage ( $V_{CC} = 36V$ ) with internal voltage regulator
- 2.5 output current
  - Small, thin power package (HTSSOP-B28)
- CLK-IN with built-in translator
  - Full-step/ half-step/ quarter-step / eighth-step
- Constant current PWM driver
  - Variable frequency by external CR
  - FAST / SLOW / MIX DECAY modes
- DMOS output (Pch+Nch)
  - No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
- Ghost supply prevention function



- 4 mode settings possible from full step to eighth step via 3-bit logic input

Select between Full-Step, Half-Step, Quarter-Step or Eighth-Step operation based on the control input terminal settings. Full-step mode is ideal for sets requiring large current for high torque, while eighth-step mode features a smoother output waveform for lower noise and vibration.



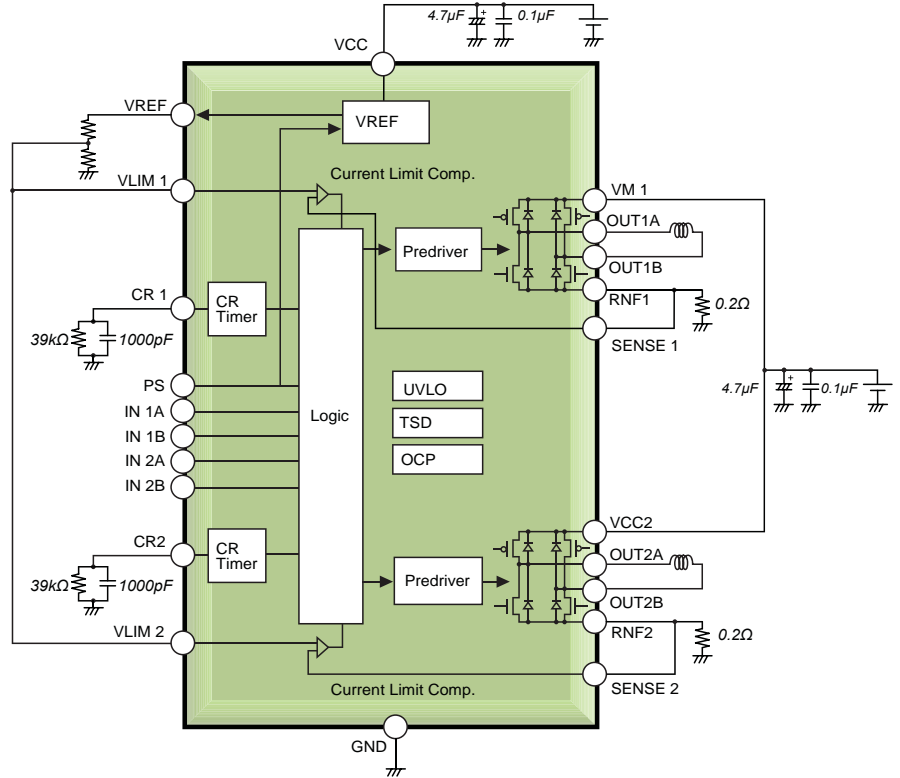
Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance ( $\Omega$ )	Package
	$V_{CC}$			H level voltage(V)	L level voltage(V)		
BD63860EFV	16 to 28	2.5	4.0	2.0	0.8	0.8	HTSSOP-B28

High Performance - High Reliability - 36V Series

## Low Voltage Series Parallel-in (Vcc 2.5V-5.5V)

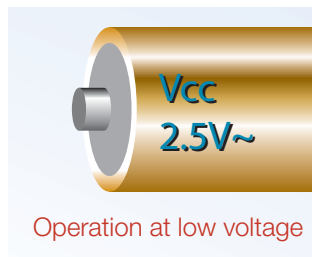
### Important Features

- 0.8A, and 1.2A output current models
  - Pin-compatible line-up
  - Small, thin power package (HTSSOP-B24)
- Parallel-In
  - Full-step/ half-step
- Constant current PWM driver
  - SLOW decay mode
- DMOS output (Pch+Nch)
  - No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
  - Adjacent pin short protection
- Ghost supply prevention function



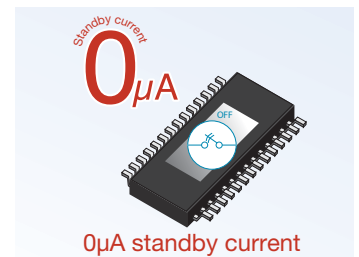
- Compatible with low voltage (Vcc=2.5V) operation

Operation is possible from a voltage as low as Vcc=2.5V, enabling compatibility with a wide range of battery-driven applications.



- 0 μA standby current

The built-in power save function features virtually no standby current, contributing to increased energy savings and longer battery life.

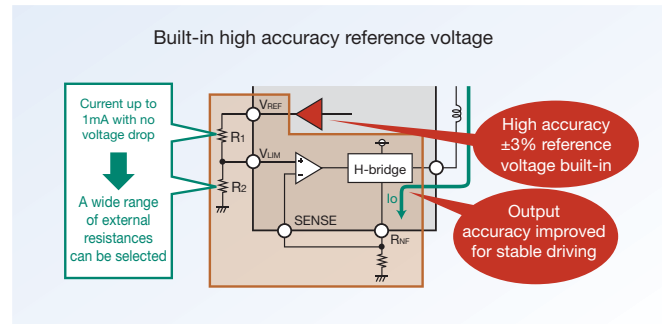


Part No.	Supply voltage(V)		Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance (Ω)	Package
	Vcc	VM			H level voltage(V)	L level voltage(V)		
BD6381EFV	2.5 to 5.5	6.0 to 13.5	1.2	1.6	2.0	0.8	1.0	HTSSOP-B24
BD6380EFV	2.5 to 5.5	4.0 to 13.5	0.8	1.6	2.0	0.8	1.2	HTSSOP-B24

## High Performance - High Reliability - Low Voltage Vcc 2.5 - 55

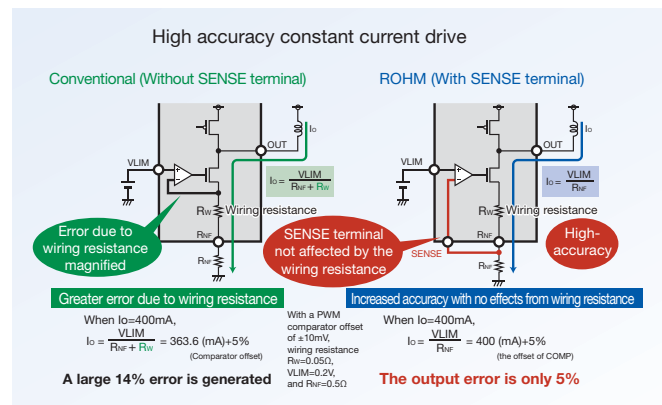
- High reference voltage output accuracy, even during battery driving

The high accuracy ( $\pm 3\%$ ) reference voltage is stable, even during voltage fluctuations. This allows arbitrary setting of the input at the constant current limit setting terminal via external resistor division. Dependable operation is ensured, even in battery driven applications with wide voltage variations. In addition, an external analog power supply is not required, reducing overall costs.



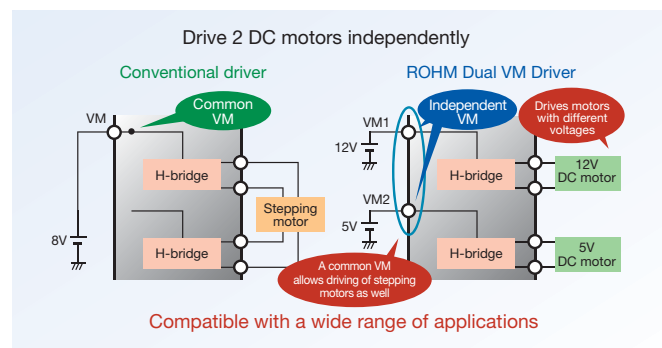
- SENSE terminal enables high accuracy constant current drive

Motor current is detected by the SENSE terminal, eliminating any adverse effects due to the internal wiring resistance, ensuring precise control (i.e. during microstep driving via external DAC), resulting in lower noise and vibration.



- Drive two DC motors with the independent VM terminals

Two independent motor power supply terminals (VM) allow for two different voltage settings, making it possible to drive two different DC motors (or one stepping motor). In addition, the PWM frequency can be set separately for each output.

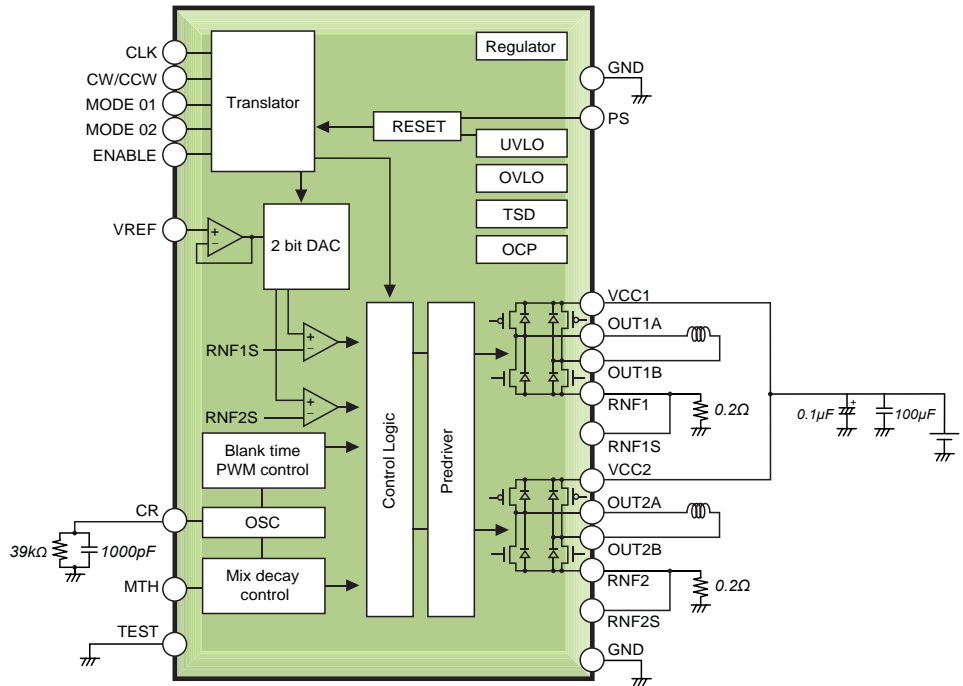


High Performance - High Reliability - High Voltage Series

## Vcc up to 45V

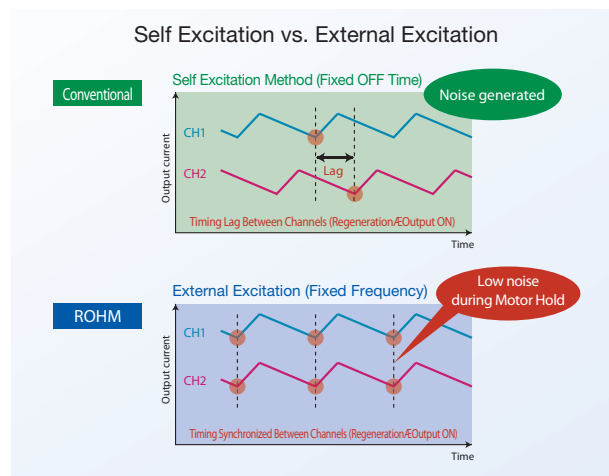
### Important Features

- Single supply voltage with internal voltage regulator
- 1.0A and 1.5A output current models
  - Small, thin power packages
  - 1.0A HTSSOP-B24
  - 1.5A HTSSOP-B28
- CLK-IN with built-in translator
  - Full-step/ half-step/ quarter-step
- Parallel-In (1.0A only)
  - Full-step/ half-step/ quarter-step
- Constant current PWM driver
  - Variable frequency by external CR
  - Four decay mode settings
- DMOS output (Pch+Nch)
  - No charge pump
- Built-in circuit protection
  - Undervoltage lockout
  - Overvoltage lockout
  - Thermal shutdown
  - Overcurrent protection
  - Adjacent pin short protection
- Ghost supply prevention function



- Low noise during motor hold with external PWM excitation

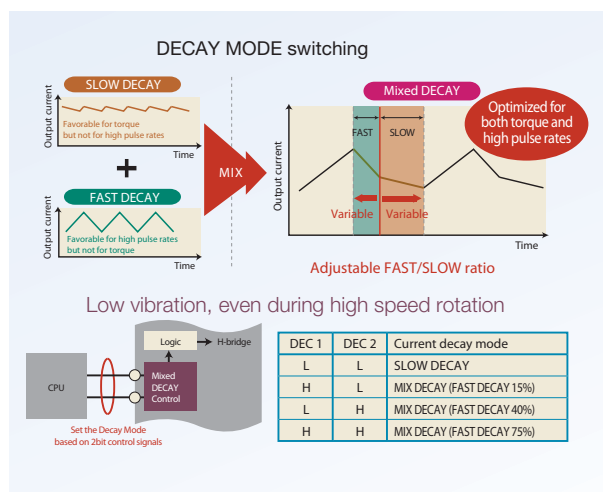
This series utilizes an external excitation (fixed frequency) PWM method for constant current control. Conventional self-excitation methods feature a timing lag between channels between regeneration and output ON, resulting in noise. Conversely, ROHM's high voltage stepping motor drivers utilize external excitation with synchronized timing, reducing noise significantly.



## High Performance - High Reliability - 36V High Voltage Series (Vcc up to 45V)

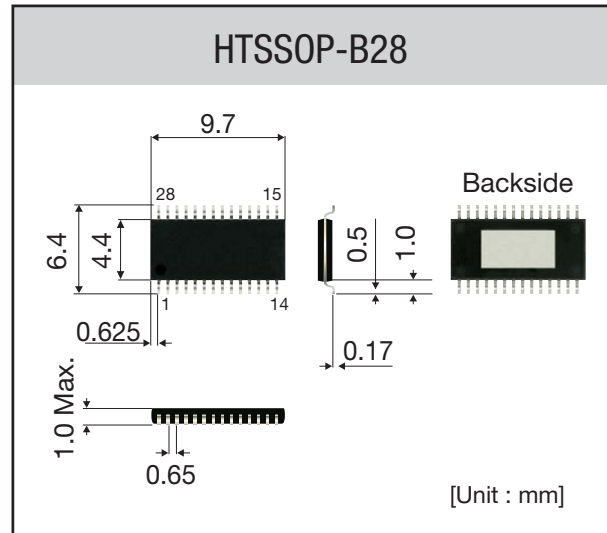
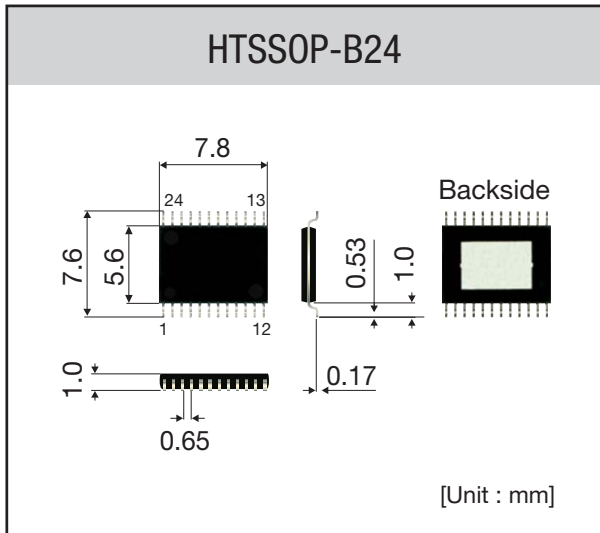
- Current decay mode switching possible via 2-bit logic input

Four decay mode settings (Slow Decay + 3 Mixed Decay modes) can be set via two 2-bit logic input terminals. Each mode features a different decay ratio between fast and slow, enabling optimization based on motor specs for lower distortion and vibration.



Part No.	Supply voltage(V)	Output current (A)	Circuit current (mA)	Input threshold voltage		Output ON resistance (Ω)	Package
	Vcc			H level voltage(V)	L level voltage(V)		
<b>BD6425EFV</b>	19 to 42	1.5	2.0	2.0	0.8	1.1	HTSSOP-B28
<b>BD6423EFV</b>	19 to 42	1.0	2.0	2.0	0.8	2.0	HTSSOP-B24







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