


SANYO Semiconductors

DATA SHEET

LV8227LG — Bi-CMOS IC For MD and UMD System Motor Driver IC

Overview

The LV8227LG is a system motor driver IC that implements all the motor driver circuits needed for MD and UMD (Universal Media Disk) products. The LV8227LG provides a three-phase PWM spindle driver, a sled driver (as two three-phase stepping motor driver channels), and focus and tracking drivers (as two PWM H bridge driver channels). Since the LV8227LG uses Bi-CMOS process, it can contribute to further miniaturization, thinner form factors, and lower power in end products.

Functions

- PWM H bridge motor drivers (2 channels)
- Three-phase stepping motor driver (2 channels)

Specifications

Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range 1	V_{CC} max		6.5	V
Supply voltage range 2	V_G max		15.0	V
Output block supply voltage	V_M max		6.5	V
H-bridge channel 1 and 2 output current	I_O max1		0.3	A
Three-phase half-bridge channel 1 output current	I_O max2		0.3	A
Three-phase half-bridge channel 2 output current	I_O max3		0.6	A
Allowable power dissipation 1	P_d max1	Independent IC	0.3	W
Allowable power dissipation 2	P_d max2	Mounted on the specified board *	1.45	W
Operating temperature	T_{opr}		-20 to +85	$^\circ\text{C}$
Storage temperature	T_{stg}		-55 to +150	$^\circ\text{C}$

The specified board *: 50×40×0.8mm³ 4-layer glass-epoxy circuit board.

Allowable Operating Ranges at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Control circuit supply voltage	V_{CC}		1.6 to 5.0	V
Predriver supply voltage	V_G		$V_M+5.0$ to 12.0	V
Output block supply voltage	V_M		2.3 to 5.0	V

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LV8227LG

Electrical Characteristics at Ta = 25°C, VCC = 2.4V, VM = 3.6V, VG = 9.5V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Control circuit supply voltage						
Control circuit supply voltage 1	I _{CC1}	STALL pin: high (operating) Conditions: ST1 and ST2 pins			15	μA
Control circuit supply voltage 2	I _{CC2}	STALL pin: low (standby mode)			1.0	μA
Predriver supply voltage						
Predriver supply voltage 1	I _{G1}	STALL pin: high (operating) Conditions: ST1 and ST2 pins H bridge (2 channels): 88.2kHz Three-phase driver (2 channels):176.4kHz			1.5	mA
Predriver supply voltage 2	I _{G2}	STALL pin: low (standby mode)			1.0	μA
STALL pin						
High-level input voltage range	V _{STALLH}		V _{CC} ×0.8		V _{CC}	V
Low-level input voltage range	V _{STALLL}		0		V _{CC} ×0.2	V
STALL pin pull-down resistor	R _{STALL}		0.33	0.6	1.0	MΩ

Three-Phase Stepping Motor Block (spindle and sled) at Ta = 25°C, VCC = 2.4V, VM = 3.6V, VG = 9.5V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output Block						
Output on resistance	RonU, V, W	Sum of the high and low-side output on resistances,VG = 9.5V		0.75	1.40	Ω
Decoder Input Pins (UI1, 2 to WI1, 2 ST1, 2)						
High-level input voltage range	V _{IH}		V _{CC} ×0.8		V _{CC}	V
Low-level input voltage range	V _{IL}		0		V _{CC} ×0.2	V
ST pin pull-down resistor	R _{ST}		0.33	0.6	1.0	MΩ
Comparator Block						
Input offset voltage	V _{OFS}		-5		+5	mV
Common-mode input voltage range	V _{CM}		0		V _M	V
High-level output voltage	V _{OH}	I _O = -0.5mA	V _{CC} ×0.8		V _{CC}	V
Low-level output voltage	V _{OL}	I _O = 0.5mA	0		V _{CC} ×0.2	V
PWM Pin (PWM1,2)						
High-level input voltage range	V _{PWMH}		V _{CC} ×0.8		V _{CC}	V
Low-level input voltage range	V _{PWML}		0		V _{CC} ×0.2	V
PWM input frequency	f _{PWMLN}		88.2	176.4		kHz

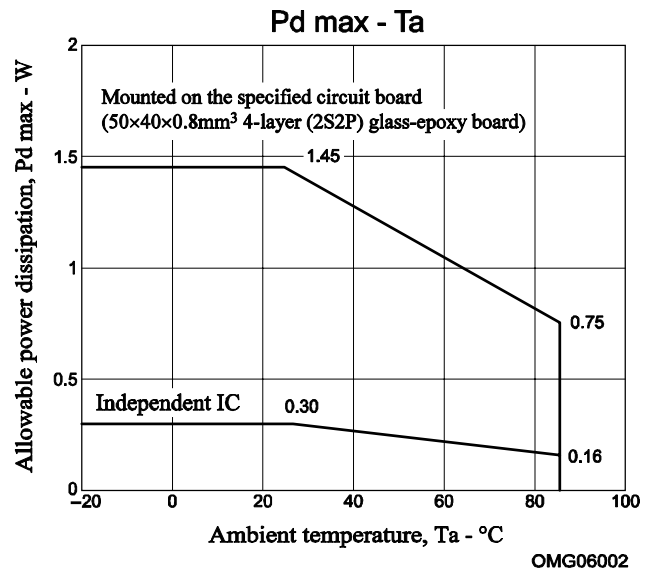
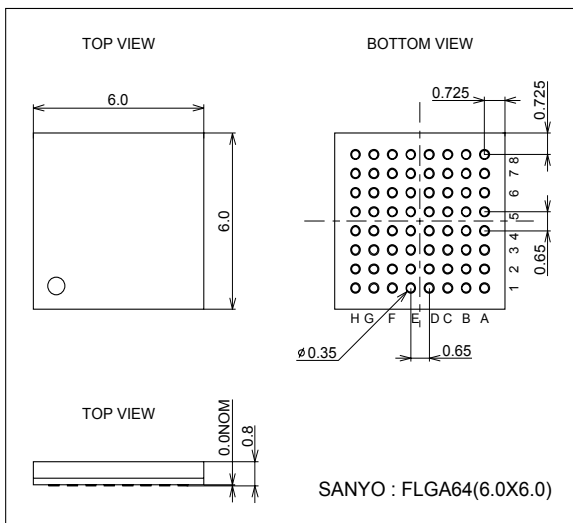
H-Bridge Block (focus and tracking) at Ta = 25°C, VCC = 2.4V, VM = 3.6V, VG = 9.5V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output Block						
Output on resistance	Ron1,2	Sum of the high and low-side output on resistances VG = 9.5V		0.7	1.30	Ω
Output transmission delay time (H bridge)	T _{RISE}	Design target value		0.1		μs
	T _{FALL}	Design target value		0.1		μs
Minimum input pulse width	T _{min}	Input pulse width: 89 ns Design target value		70		ns
H-Bridge Input Pins (FI1, FI2, RI1, and RI2)						
High-level input voltage range	V _{AIH}		V _{CC} ×0.8		V _{CC}	V
Low-level input voltage range	V _{AIL}		0		V _{CC} ×0.2	V

Package Dimensions

unit : mm

3320



Truth Table - Three-Phase Stepping Motor Block

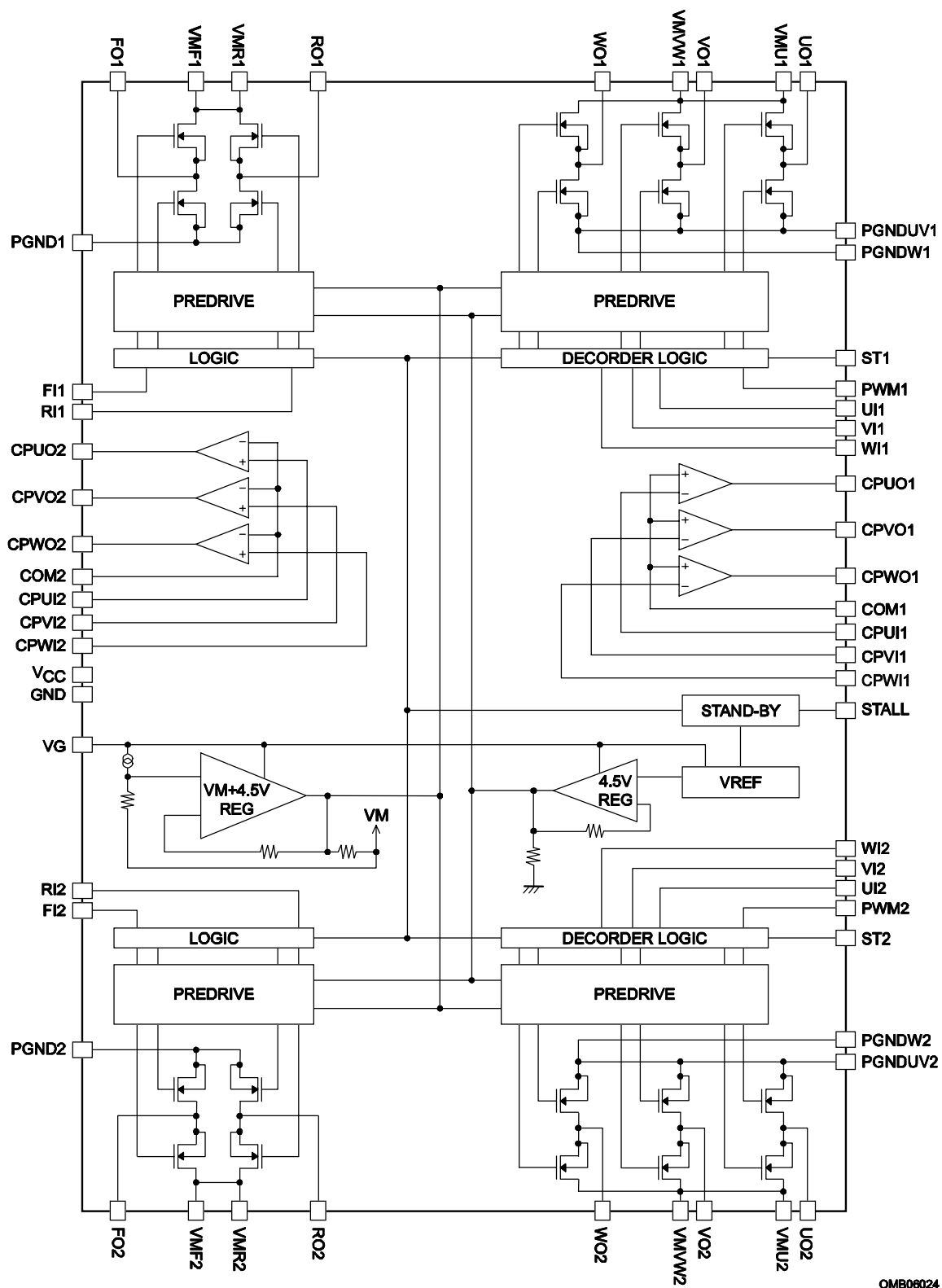
STALL	ST1, 2	UI1, 2	VI1, 2	WI1, 2	UO1, 2	VO1, 2	WO1, 2
H	L	L	L	L	L	L	L
H	L	L	L	H	Z	L	PWM
H	L	L	H	L	L	PWM	Z
H	L	L	H	H	L	Z	PWM
H	L	H	L	L	PWM	Z	L
H	L	H	L	H	PWM	L	Z
H	L	H	H	L	Z	PWM	L
H	L	H	H	H	L	L	L
H	H	x	x	x	Z	Z	Z
L	x	x	x	x	Z	Z	Z

Focus and Tracking Blocks

STALL	F11, 2	R11, 2	FO1, 2	RO1, 2
H	L	L	L	L
H	L	H	L	H
H	H	L	H	L
H	H	H	L	L
L	x	x	Z	Z

Z:open

Block Diagram



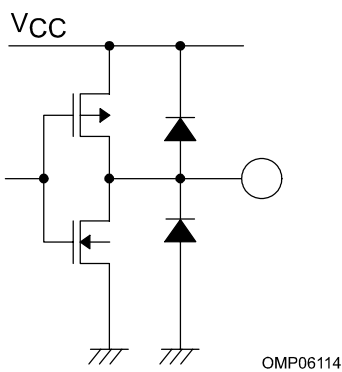
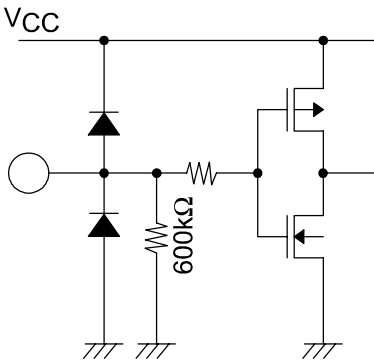
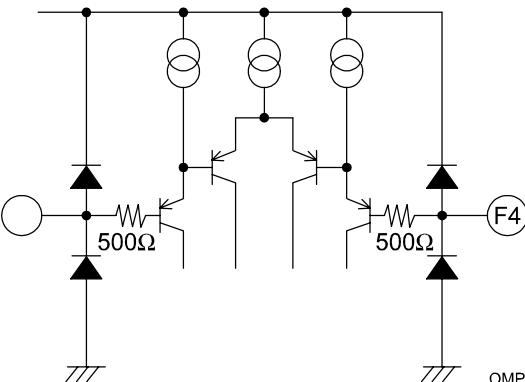
Pin Function

Pin No.	Symbol	Description	Equivalent circuit
A1 D1	PGNDW1 PGNDVU1	Spindle motor drive power supply Capacitors must be inserted between these pins and ground.	
C2 D2 E2	WO1 VO1 UO1	Spindle driver output Connect the spindle motor coil to these pins.	
C1 E1	VMVW1 VMU1	Spindle output block ground	
A8,B8 D6,E6	PGNDW2 PGNDVU2	Sled motor drive power supply Capacitors must be inserted between these pins and ground.	
B6,C6 D7,D8 E7,E8	WO2 VO2 UO2	Sled driver output Connect the sled motor coil to these pins.	
C7,C8 F7,F8	VMVW2 VMU2	Sled output block ground	
A2 D5	PWM1 PWM2	Spindle and sled block PWM signal inputs The output transistors will be on when these inputs are high.	
A7 B5 B7 B1 D3 E2	UI2 VI2 WI2 UI1 VI1 WI1	Spindle and sled block logic inputs	
E5 H7 G3 H2	RI2 FI2 RI1 FI1	Actuator H-bridge block logic inputs	

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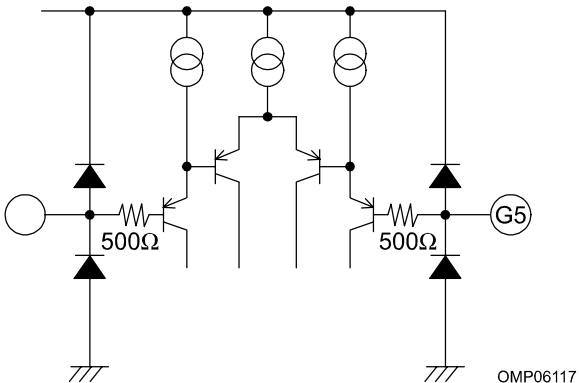
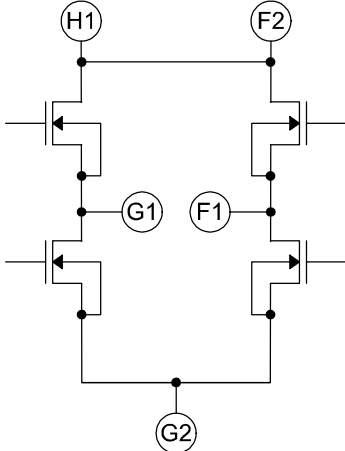
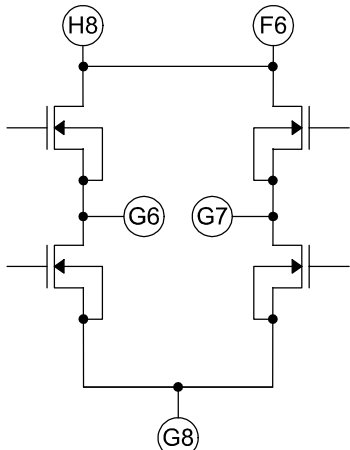
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Pin No.	Symbol	Description	Equivalent circuit
A3 B2 A4 A6 C5 A5	CPUO1 CPVO1 CPWO1 CPUO2 CPVO2 CPWO2	Comparator outputs	 OMP06114
B3	VG	Power supply for internal circuits A capacitor must be inserted between this pin and ground.	
B4	GND	Small-signal system circuit ground	
C3	STALL	System start/stop A high-level input specifies the start state.	 OMP06115
F3 H6	ST1 ST2	Muting for the spindle and sled block. The outputs go to the open state when a high level is input.	
C4	VCC	Small-signal system circuit power supply A capacitor must be inserted between this pin and ground.	
D4 H4 G4	CPUI1 CPVI1 CPWI1	Inputs for the OUT sides of the comparators for each of the spindle phases	 OMP06116
F4	COM1	Spindle comparator common input	

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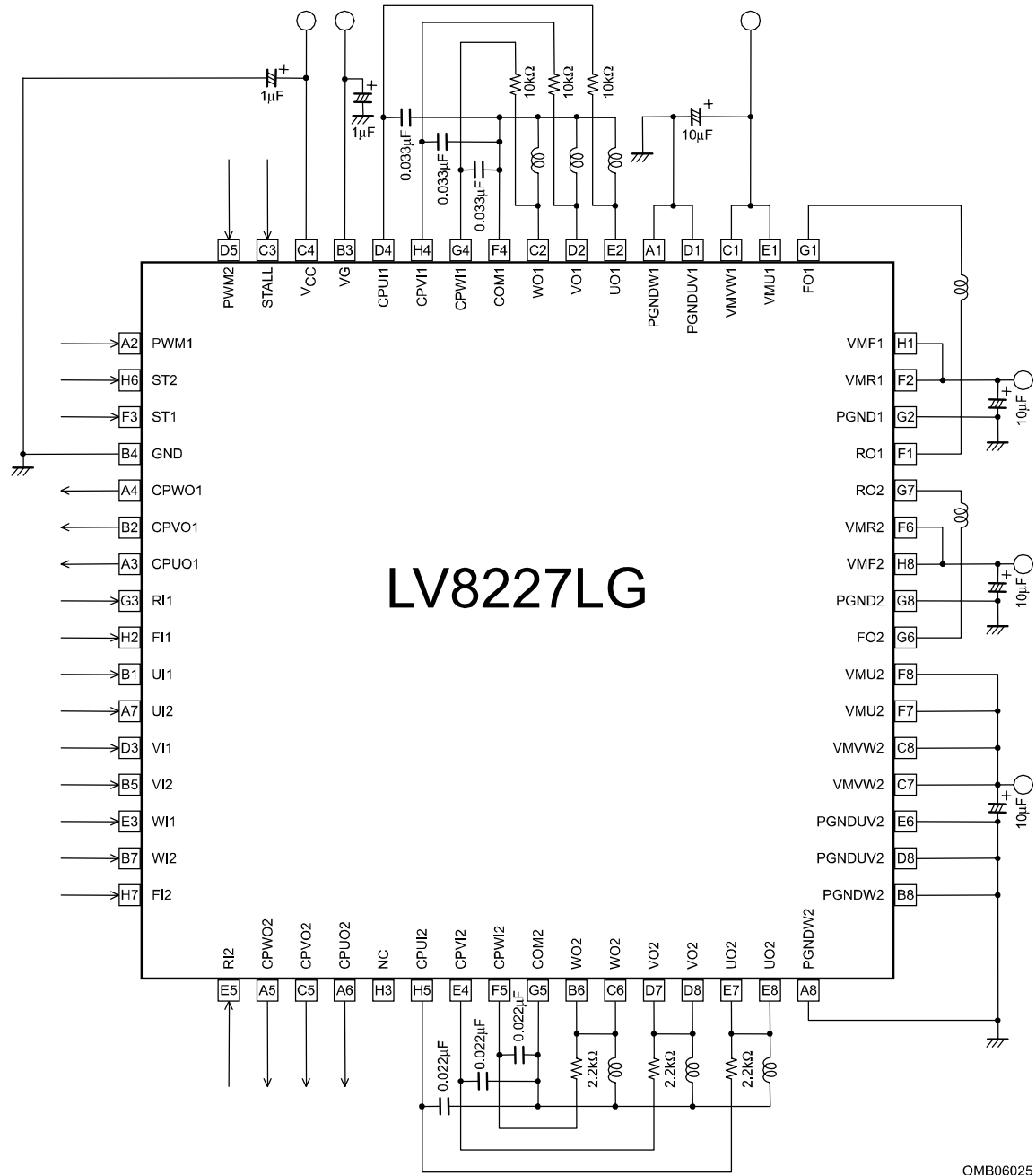
Pin Number	Symbol	Description	Equivalent circuit
H5 F5 G4	CPUI2 CPVI2 CPWI2	Inputs for the OUT sides of the comparators for each of the sled phases	
G5	COM2	Sled comparator common input	
H1 F2	VMF1 VMR1	H bridge 1 drive power supply Capacitors must be inserted between these pins and ground.	
G1 F1	FO1 RO1	H bridge 1 output Connect the actuator coil to these pins.	
G2	PGND1	H bridge 1 output block ground	
H8 F6	VMF2 VMR2	H bridge 2 drive power supply Capacitors must be inserted between these pins and ground.	
G6 G7	FO2 RO2	H bridge 2 output Connect the actuator coil to these pins.	
G8	PGND2	H bridge 2 output block ground	

Pin Assignments

A	PGNDW1	PWM1	CPUO1	CPWO1	CPWO2	CPUO2	UI2	PGNDW2
B	UI1	CPVO1	VG	GND	VI2	WO2	WI2	PGNDW2
C	VMVW1	WO1	STALL	V _{CC}	CPVO2	WO2	VMVW2	VMVW2
D	PGNDUV1	VO1	VI1	CPUI1	PWM2	PGNDUV2	VO2	VO2
E	VMU1	UO1	WI1	CPVI2	RI2	PGNDUV2	UO2	UO2
F	RO1	VMR1	ST1	COM1	CPWI2	VMR2	VMU2	VMU2
G	FO1	PGND1	RI1	CPWI1	COM2	FO2	RO2	PGND2
H	VMF1	FI1	NC	CPVI1	CPUI2	ST2	FI2	VMF2
	1	2	3	4	5	6	7	8

OMP06120

Application Circuit Example



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