Ordering number : ENA0482A

SANYO Semiconductors
DATA SHEET

LV8052GP, LV8052LP

Bi-CMOS IC
For Digital Still Camera
Single-Chip Motor Driver IC

Overview

The LV8052GP, LV8052LP is a single-chip motor driver IC for digital still camera.

Functions

- DSC actuator driver incorporated in a single chip
- Photo sensor driving transistor incorporated
- Various actuator applications possible
- Reduction of the current drain by MOS output

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage 1	V_M max		6	V
Supply voltage 2	V_{CC} max		6	V
Output peak current	I_O peak	OUT1 to 8	600	mA
Output continuous current	I_O max1	OUT1 to 8	400	mA
	I_O max2	PI	50	mA
Allowable power dissipation	Pd max	Mounted on a circuit board*	1.05	W
Operating temperature	Topr		-20 to +85	°C
Storage temperature	Tstg		-55 to +150	°C

* Standard circuit board : 40×50×0.8mm^3 glass epoxy four-layer board

Recommended Operating Conditions at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Supply voltage range 1	V_M		2.7 to 5.5	V
Supply voltage range 2	V_{CC}		2.7 to 5.5	V
Logic input voltage	V_{IN}		0 to V_{CC}+0.3	V
Input frequency	f_{IN}	EN, MD1 to 3, IN1 to 2, INA to B, SWPI	to 100	kHz

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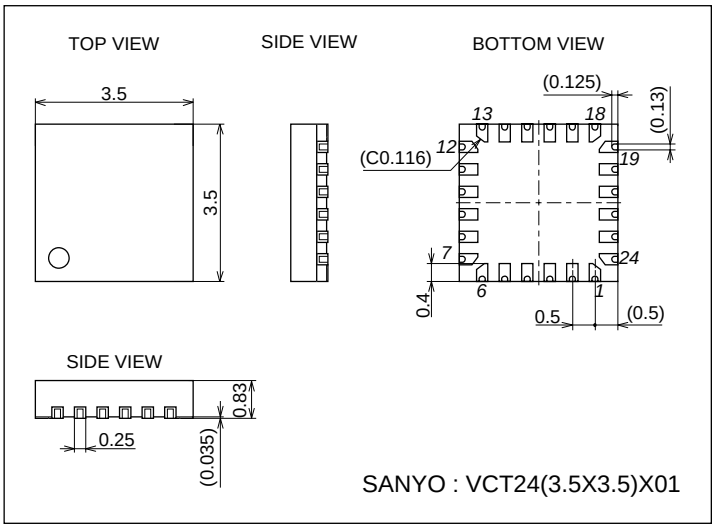
Electrical Characteristics at Ta = 25°C, V_M = 5.0V, V_{CC} = 3.3V

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Input H-level voltage	$V_{IN}H$	EN, MD1 to 3, IN1 to 2, INA to B, SWPI	2.5			V
Input L-level voltage	$V_{IN}L$	EN, MD1 to 3, IN1 to 2, INA to B, SWPI			1.0	V
Input pin current	$I_{IN}L$	V_{IN} = 0V			1.0	μA
	$I_{IN}H$	V_{IN} = 3.3V	20	33	50	μA
Current drain at standby	I_{CCO}	EN, INA to B = "L"			1.0	μA
Current drain 1	I_M	EN = "H", MD1 to 3, IN1 to 2, INA to B = "H", no load	40	80	160	μA
Current drain 2	I_{CC}	EN = "H", MD1 to 3, IN1 to 2, INA to B = "H", no load	0.5	1.0	1.8	mA
V_{CC} low-voltage cut voltage	$V_{th}V_{CC}$		2.1	2.35	2.6	V
Low-voltage hysteresis voltage	V_{th}HYS		100	150	200	mV
Thermal shutdown temperature	TSD	Design guarantee	150	180	200	°C
Thermal hysteresis width	ΔTSD	Design guarantee	20	40	60	°C
Motor driver for SH (OUT1-2)						
Output ON resistance	Ronu	I_O = 400mA, upper ON resistance		0.65	0.80	Ω
	Rond	I_O = 400mA, lower ON resistance		0.45	0.60	Ω
Output leak current	$I_O$leak				1.0	μA
Diode forward voltage	V_D	I_D = -400mA	0.7	0.9	1.2	V
Output constant current	I_O1	OUT2→OUT1, RRFS = 1Ω, 3.0V ≤ V_M ≤ 5.0V	117.5	125.0	132.5	mA
	I_O2	OUT1→OUT2, RRFS = 1Ω, 3.0V ≤ V_M ≤ 5.0V	117.5	125.0	132.5	mA
	I_O3	OUT2→OUT1, RRFS = 1Ω, 2.9V ≤ V_M ≤ 3.1V	116.9	123.0	129.1	mA
	I_O4	OUT1→OUT2, RRFS = 1Ω, 2.9V ≤ V_M ≤ 3.1V	116.9	123.0	129.1	mA
Stepping motor driver for AF (OUT2-3, OUT6-7)						
Output ON resistance	Ronu	I_O = 400mA, upper ON resistance		0.65	0.80	Ω
	Rond	I_O = 400mA, lower ON resistance		0.45	0.60	Ω
Output leak current	$I_O$leak				1.0	μA
Diode forward voltage	V_D	I_D = -400mA	0.7	0.9	1.2	V
Motor driver for ZOOM (OUT4-8)						
Output ON resistance	Ronu	I_O = 400mA, upper ON resistance		0.65	0.80	Ω
	Rond	I_O = 400mA, lower ON resistance		0.45	0.60	Ω
Output leak current	$I_O$leak				1.0	μA
Diode forward voltage	V_D	I_D = -400mA	0.7	0.9	1.2	V
Motor driver for AE (OUT5-6)						
Output ON resistance	Ronu	I_O = 400mA, upper ON resistance		0.65	0.80	Ω
	Rond	I_O = 400mA, lower ON resistance		0.45	0.60	Ω
Output leak current	$I_O$leak				1.0	μA
Diode forward voltage	V_D	I_D = -400mA	0.7	0.9	1.2	V
Photo sensor driving transistor (PI)						
Output ON resistance	Ron	I_O = 30mA		3.0	6.0	Ω
Output leak current	$I_O$leak				1.0	μA

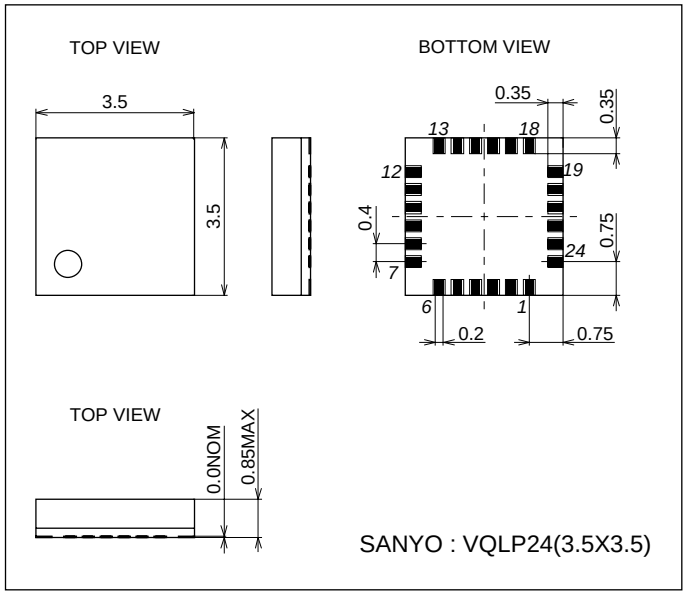
Package Dimensions

unit : mm (typ)

3322 [LV8052GP]

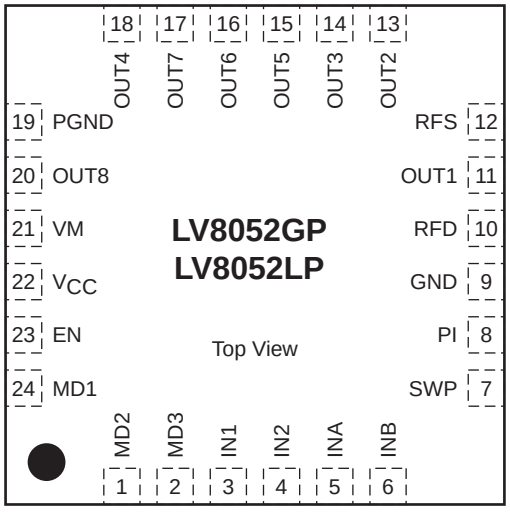


3321 [LV8052LP]



Pin Assignment

* The pin assignment is the same as LV8052GP and LV8052LP.



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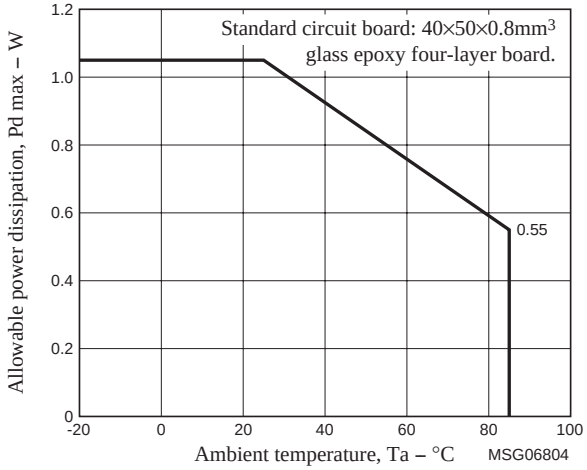
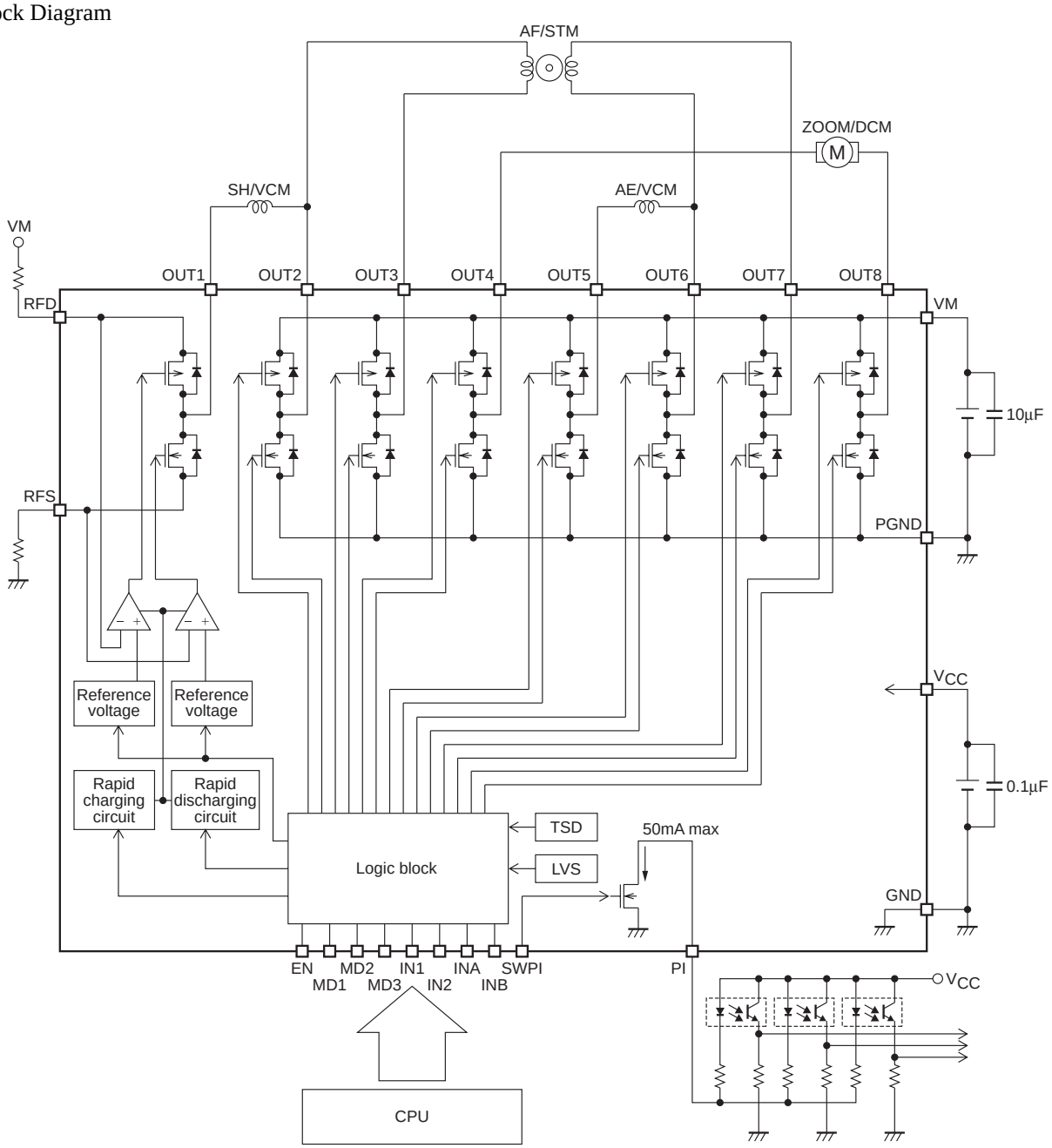
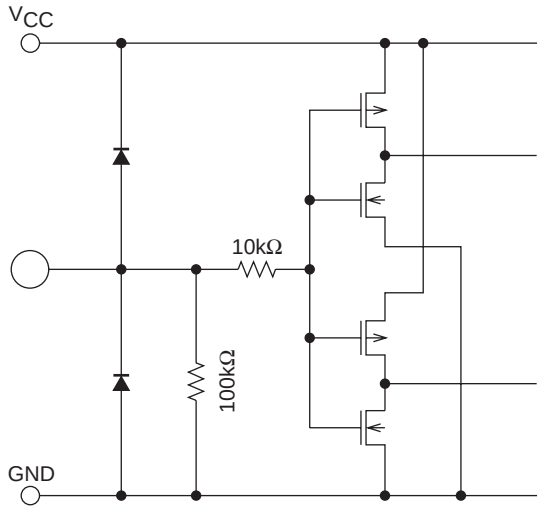
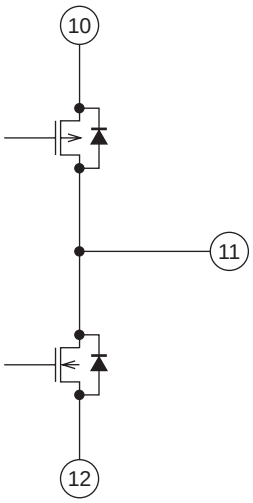
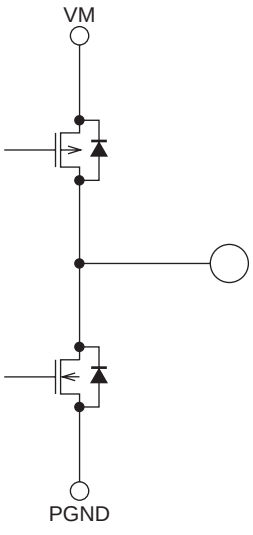
[LV8052GP,LV8052LP]



Block Diagram



Pin Function

Pin No.	Pin name	Function	Equivalent circuit
1 2 3 4 5 6	MD2 MD3 IN1 IN2 INA INB	Control signal input pin	
7	SWPI	Control signal input pin (photo sensor driving transistor)	
23 24	EN MD1	Control signal input pin	
10	RFD	OUT1→OUT2 Current detection resistance connection pin	
11	OUT1	Output pin	
12	RFS	OUT1→OUT2 Current detection resistance connection pin	
13 14 15 16 17 18 20	OUT2 OUT3 OUT5 OUT6 OUT7 OUT4 OUT8	Output pin	

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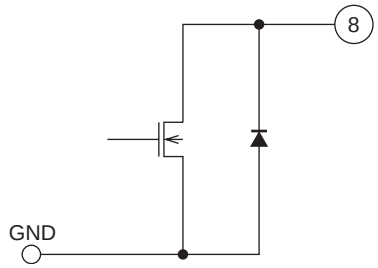
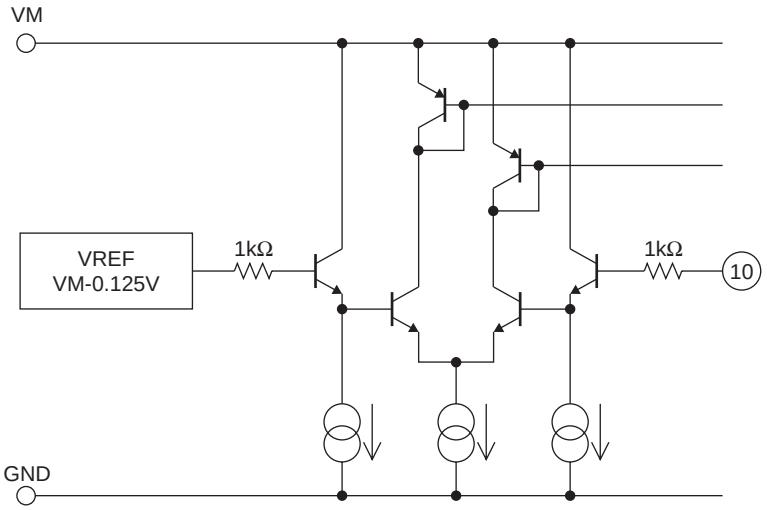
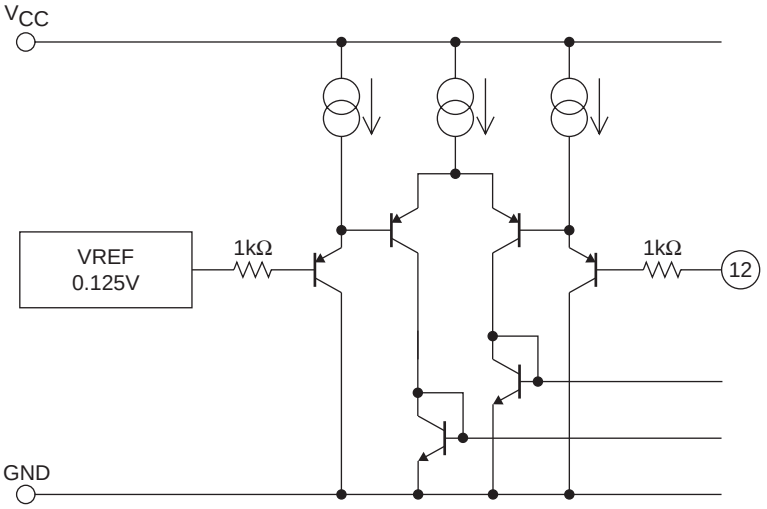
Pin No.	Pin name	Function	Equivalent circuit
8	PI	Photo sensor driving transistor output pin	
10	RFD	OUT1→OUT2 Current detection resistance connection pin	
12	RFS	OUT1→OUT2 Current detection resistance connection pin	
9	GND	Signal GND	
19	PGND	Power GND	
21	V_M	Motor power connection pin	
22	V_{CC}	Logic power connection pin	

Truth Table

Input						Output								Mode	
EN	MD1	MD2	MD3	IN1	IN2	INA	INB	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	Sample application1	Sample application1	Sample application1	Sample application1
L	*	*	*	*	*	L	L	-	-	-	-	-	-	-	-	Standby			
H	*	L	L	L	L	L	L	L	H	-	-	-	-	-	-	SH (VCM) "Close"		SH & AE (Single-phase excitation) (STM)	
								-	-				L			AE (VCM)			
				H	L			H	L				-			SH (VCM) "Open"			
								-	-				H			AE (VCM)			
				L	H			L	H				L					SH & AE (Two-phase excitation) (STM)	
				H	H			H	L				L						
								L	L				H						
								H	H				H						
		L	L	L	L			-	-	-	-	-	H	L	L	AF (Single-phase excitation) (STM)			
									H	L			-	-					
									-	-			L	H					
									L	H			-	-					
									L	L			H	L					
									H	L			L	H					
									L	H			H	L					
									H	H			L	H					
		L	H	L	L			-	-	-	-	-	H	L	L	AF (Two-phase excitation) (STM)			
									H	L			-	-					
									-	-			L	H					
									L	H			-	-					
									L	L			H	L					
									H	L			L	H					
									H	H			L	H					
									L	H			H	L					
		H	L	L	L			-	-	-	-	-	H	L	L	ZOOM (Single-phase excitation) (STM)		ZOOM (Single-phase excitation) (STM)	
									H	L			-	-					
									-	-			L	H					
									L	H			-	-					
									L	L			H	L					
									H	L			L	H					
									H	H			L	H					
									L	H			H	L					
		H	H	L	L			-	-	-	-	-	H	L	L	ZOOM (Two-phase excitation) (STM)		ZOOM (Two-phase excitation) (STM)	
									H	L			-	-					
									-	-			L	H					
									L	H			-	-					
									L	L			H	L					
									H	L			L	H					
									H	H			L	H					
									L	H			H	L					
		L	L	L	L			-	-	-	-	-	H	L	L	-		-	
									H	L			-	-					
									-	-			L	H					
									L	H			-	-					
									L	L			H	L					
									H	L			L	H					
									H	H			L	H					
									L	H			H	L					
		H	L	L	L			-	-	-	-	-	H	L	L	AE (Single-phase excitation) (STM)		AE (Two-phase excitation) (STM)	
									H	L			-	-					
									-	-			L	H					
									L	H			-	-					
									L	L			H	L					
									H	L			L	H					
									H	H			L	H					
									L	H			H	L					
		H	H	L	L			-	-	-	-	-	H	L	L	-		-	
									H	L			-	-					
									-	-			L	H					
									L	H			-	-					
									L	L			H	L					
									H	L			L	H					
									H	H			L	H					
									L	H			H	L					

" * " : Don't care.
" - " : Output off

Input							Output								Mode				
EN	MD1	MD2	MD3	IN1	IN2	INA	INB	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	Sample application1	Sample application2	Sample application3	Sample application4	Sample application5
L	*	*	*	*	*	H	L	-	-	-	H	-	-	-	L					
						L	H	L	H		L	L	H		H	ZOOM (DCM)		ZOOM (DCM)	ZOOM (DCM)	
						H	H	-	-		L	-	-		L					
					L	L	L	H	L		H	H	L		L					
						H	L	-	-		L	L	H		H					
						L	H	L	H		L	H	L		L					
						H	H	H	L		L	H	L		L					
						L	L	L	H		L	L	H		H					
						H	L	H	L		L	L	H		H					
					H	L	L	L	H		L	H	L		L					
						H	L	H	L		L	H	L		L					
						L	H	L	H		L	L	H		H					
						H	H	L	H		L	L	H		H					
				H	L	L	L	-	-		H	-	-		L					
						H	L	L	H		H	H	L		L					
						L	H	H	L		H	L	H		H					
						H	H	H	L		H	L	H		H					
					L	L	L	-	-		H	-	-		L					
						H	L	L	H		H	H	L		L					
						L	H	H	L		H	L	H		H					
						H	H	H	L		H	L	H		H					
				H	L	L	L	-	-		H	-	-		L					
						H	L	L	H		H	H	L		L					
						L	H	H	L		H	L	H		H					
						H	H	H	L		H	L	H		H					

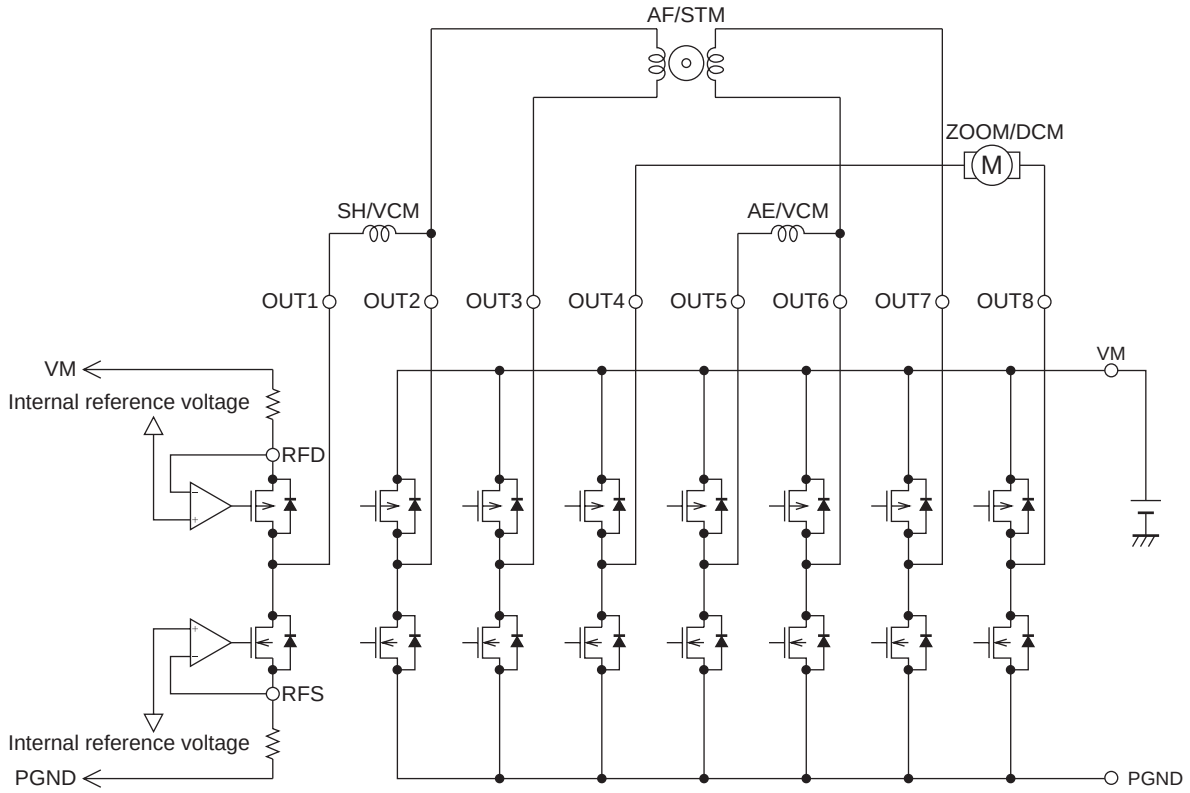
"*" : Don't care.
"-" : Output off

Input								Output								Mode				
EN	MD1	MD2	MD3	IN1	IN2	INA	INB	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	Sample application1	Sample application2	Sample application3	Sample application4	Sample application5
H	L	L	H	L	L	H	L	-	-	-	H	-	H	L	L	ZOOM (DCM)		ZOOM (DCM)	ZOOM (DCM)	
						L	H				L				H					
						H	H				L				L					
				H	L	H	L		H	L	H		-	-	L					
						L	H				L				H					
						H	H				L				L					
				L	H	H	L		-	-	H		L	H	L					
						L	H				L				H					
						H	H				L				L					
				H	H	H	L		L	H	H		-	-	L					
						L	H				L				H					
						H	H				L				L					
		H	H	L	L	H	L		L	H	H		H	L	L					
						L	H				L				H					
						H	H				L				L					
				H	L	H	L		H	L	H		H	L	L					
						L	H				L				H					
						H	H				L				L					
				L	H	H	L		H	L	H		L	H	L					
						L	H				L				H					
						H	H				L				L					
				H	H	H	L		L	H	H		L	H	L					
						L	H				L				H					
						H	H				L				L					
	H	*	*	*	*	H	L		-	-	H		-	-	L					
						L	H				L				H					
						H	H				L				L					

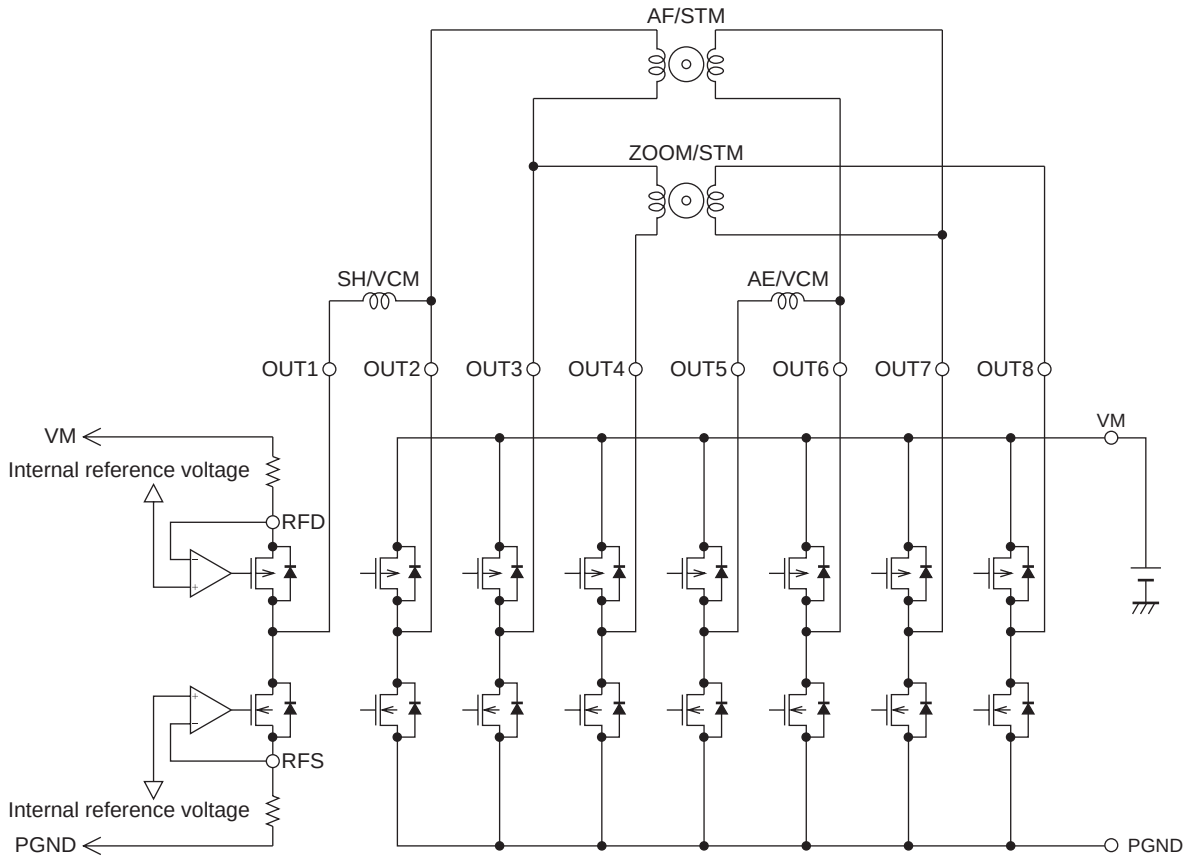
“ * ” : Don’t care.
“ - ” : Output off

Sample Application Circuit

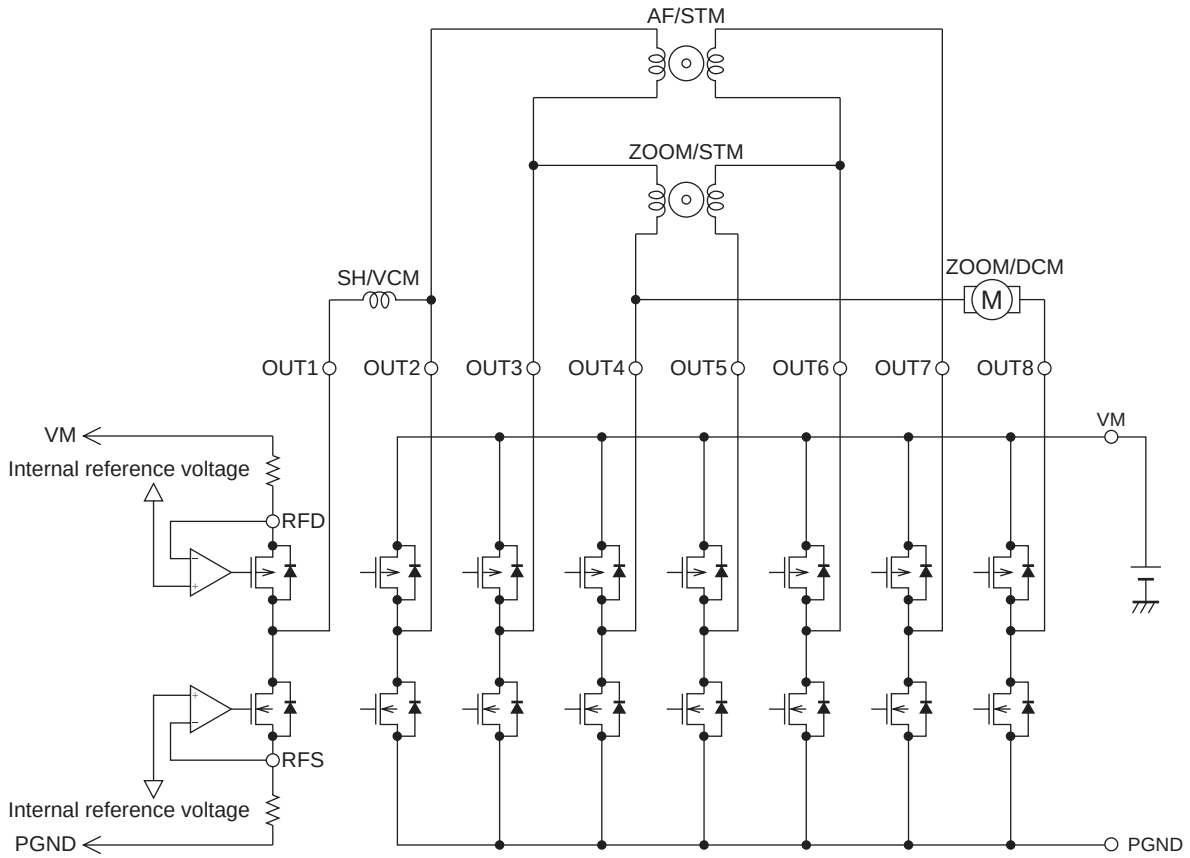
[Example 1]



[Example 2]



[Example 3]



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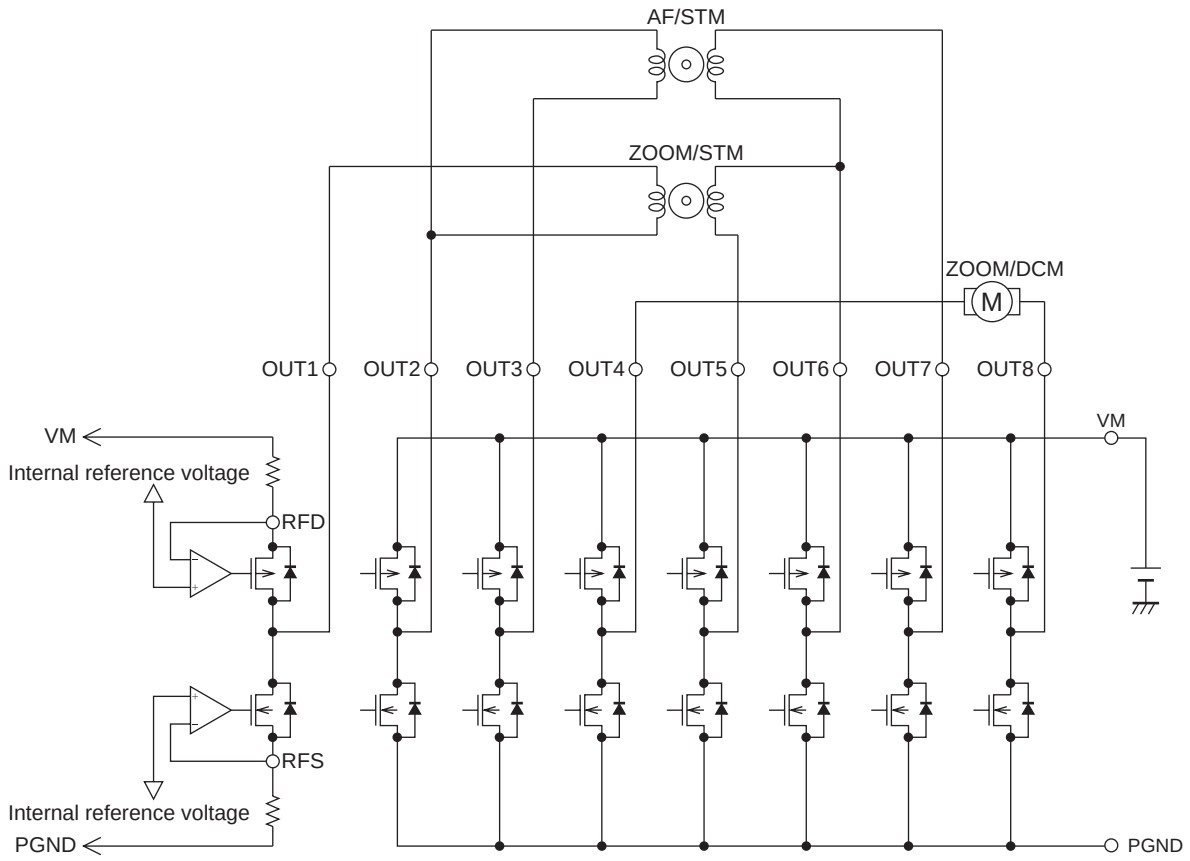
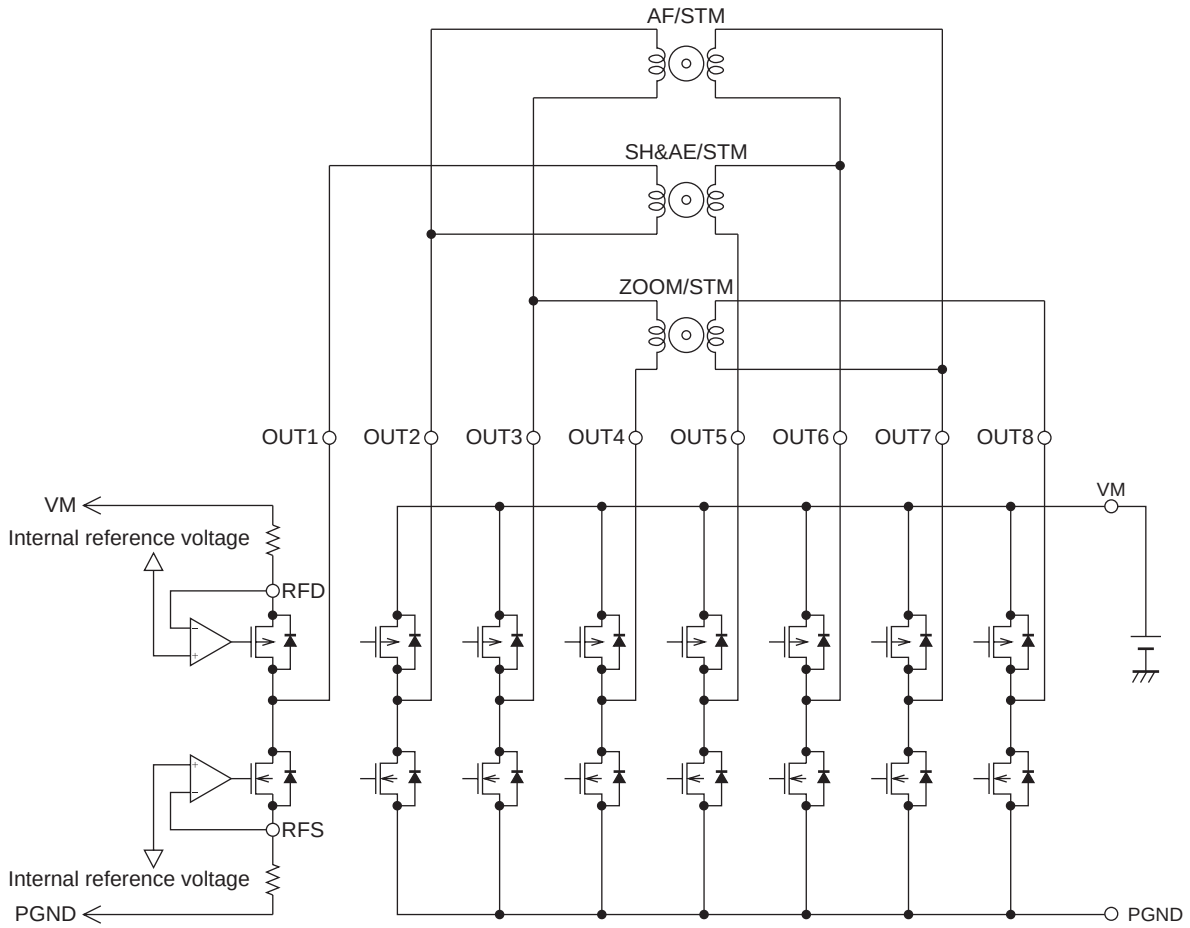


[Example 5]



Design Considerations

1. Method to calculate the set current value for shutter control
   The output current can be set from the internal reference voltage and the detection resistors, each connected between VM and RFD pins and between RFS pin and GND.
   I_{OUT} = Internal reference voltage 0.125V ÷ detection resistor

   From the above equation, the current value to flow from OUT2 to OUT1 when the detection resistor 1Ω is connected between the RFS pin and GND can be determined to be about 125mA.
   Similarly, the current value to flow from OUT1 to OUT2 when the detection resistor 1Ω is connected between VM and RFD can be determined to be about 125mA.

2. Changeover between the constant current and saturation drive
   Saturation drive is made by deleting the detection resistors between VM and RFD pins and between the RFS pin and GND.

3. OUT4 and OUT8 independent control with INA and INB pins
   When the INA or INB pin is set at “H”, OUT4 and OUT8 are activated regardless of the input conditions of MD1 to MD3 and IN1 to IN2.

4. Photo sensor driving transistor
   By setting the SWPI pin to “H”, the photo sensor driving transistor is activated.
   When thermal shutdown and V_{CC} low-voltage cut circuits are activated, OUT1 through OUT8 are turned OFF under control of the internal circuit. But the output (PI) of photo sensor driving transistor continues operation.

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