

Fan Motor Driver

Monolithic IC MM1784XF

Outline

This IC is a motor driver IC for 5~12V fan.

The single-phase full-wave drive switching noise is small, efficient motor drive is possible.

This IC has a built-in Lock protection, FG output, TSD is suitable driver for fan motor.

Features

1. Supply voltage range	2.8~14V
2. Output current	0.8A
3. Operating temperature range	-40~90°C
4. Consumption current (Drive)	5mA typ.
5. Output put Vsat voltage (Upper + lower Vsat voltage)	1.1V typ, I _o =200mA
6. Hall Bias voltage (VHB=1.5V)	Built-in
7. Lock-Protection	Built-in
8. Auto Restart	Built-in
9. Thermal Shut Down circuit	Built-in

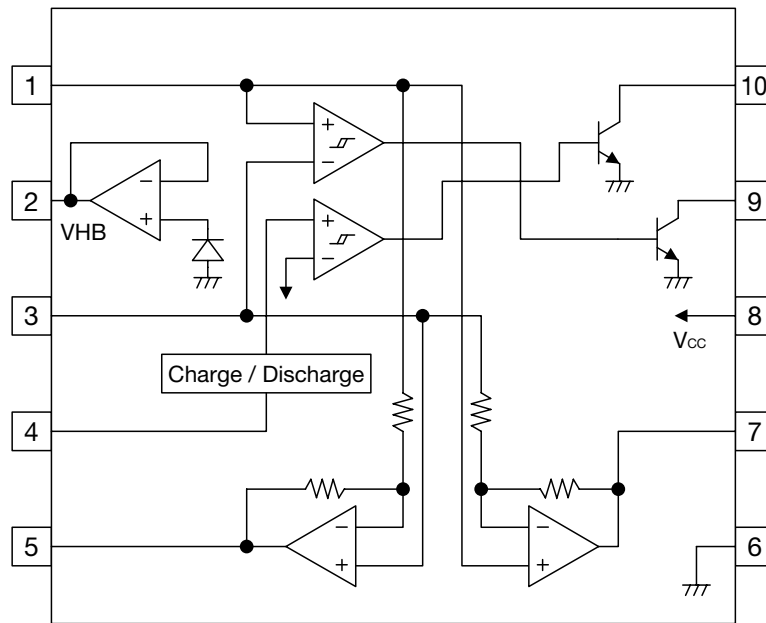
Package

SOP-10A

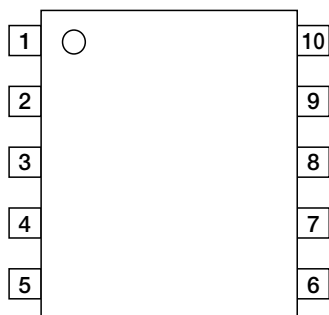
Applications

1. Cooling fan

Block Diagram



Pin Assignment



SOP-10A
(TOP VIEW)

1	IN+
2	HB
3	IN-
4	CT
5	OUT1
6	GND
7	OUT2
8	V _{CC}
9	FG
10	LD

Pin Description

Pin No.	Pin name	Functions	Internal equivalent circuit diagram
1 3	IN+ IN-	Hall input positive (+) Hall input negative (-)	
2	HB	Hall element bias	
4	CT	Capacitor Time	
5 6 7 8	OUT1 GND OUT2 Vcc	Driver output positive (+) GND Driver output negative (-) Vcc	
9 10	FG LD	Frequency generator Lock detection	

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Absolute Maximum Ratings (Except where noted otherwise Ta=25°C)

Item	Symbol	Ratings	Units
V _{CC} supply voltage	V _{CC}	-0.5~15	V
Output current	I _O	0.8	A
Output voltage	V _O	15	V
LD/FG output voltage	V _{RD} /V _{FG}	15	V
LD/FG output current	I _{RD} /I _{FG}	5	mA
HB output current	I _{HB}	10	mA
Power dissipation	P _d	0.8(Note1)	W
Operating temperature range	T _{OPR}	-40~+90	°C
Storage temperature range	T _{STG}	-55~+150	°C

Note1 : Use base condition 114.3mm×76.2mm, t=1.5mm Copper leaf 50% more than,
Material=Glass Epoxy

Recommended Operating Conditions (Except where noted otherwise Ta=25°C)

Item	Symbol	Min.	Typ.	Max.	Units
V _{CC} supply voltage	V _{CC}	2.8	12	14	V

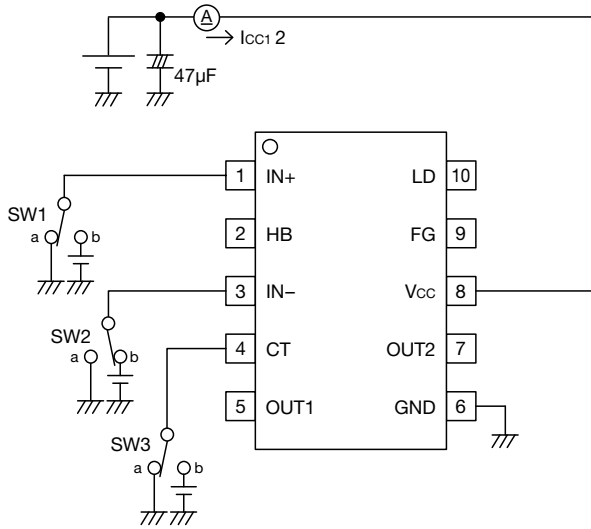
Electrical Characteristics (Except where noted otherwise $V_{CC}=12V$, $T_a=25^{\circ}C$)

Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Supply Current						
Supply current1	I_{CC1}	Operation (CT=L)		5	7.5	mA
Supply current2	I_{CC2}	Lock protection (CT=H)		3	4.5	mA
Motor driver circuit						
Gain	G_V	(Note2)	45	48	51	dB
Output "L" voltage	V_{OL}	$I_o=200mA$		0.2	0.3	V
Output "H" voltage	V_{OH}	$I_o=200mA$		0.9	1.2	V
Offset voltage of hall input	V_{OFF}			7	15	mV
Input voltage range of hall input	V_{CM}		0		$V_{CC}-1.5$	V
Lock circuit						
Charge current	I_{CTC}		2.0	2.8	3.5	μA
Discharge current	I_{CTD}		0.15	0.23	0.30	μA
charge/discharge current ratio	R_{CT}	$R_{CT}=I_{CTC}/I_{CTD}$	10.2	12	13.8	
CT charge voltage	V_{CT1}		1.6	1.7	1.8	V
CT discharge voltage	V_{CT2}		0.6	0.7	0.8	V
Output circuit						
LD output "L" voltage	V_{LD}	$I_{RD}=5mA$		0.1	0.2	V
FG output "L" voltage	V_{FG}	$I_{FG}=5mA$		0.1	0.2	V
LD output leak current	I_{LD}	$V_{RD}=15V$		1	30	μA
FG output leak current	I_{FG}	$V_{FG}=15V$		1	30	μA
Hall bias circuit						
Hall output voltage	V_{HB}	$I_{HB}=5mA$	1.3	1.5	1.7	V
Thermal shut down circuit						
Thermal shut down temperature	T_{SD}	(Note2)		175		$^{\circ}C$
Thermal shut down reset temperature	$T_{hys(SD)}$	(Note2)		150		$^{\circ}C$

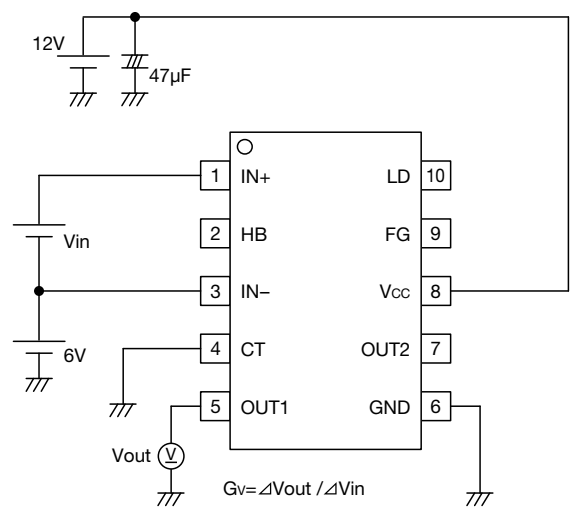
Note2 : The parameter is guaranteed by design.

Measuring Circuit

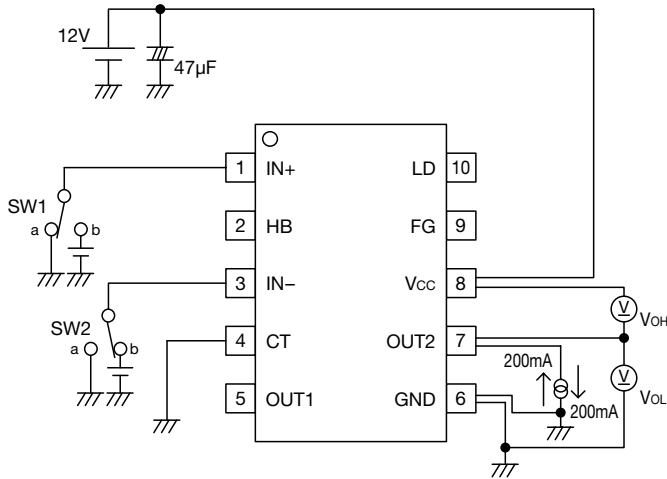
Supply current 1, 2



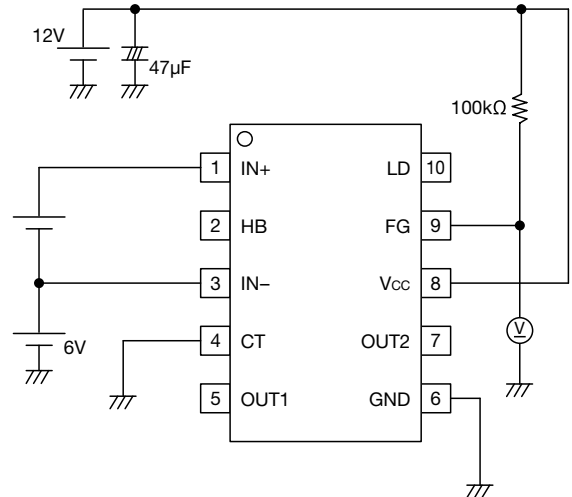
Gain



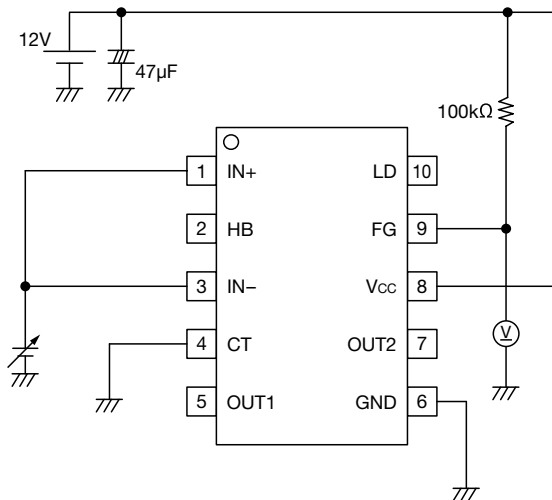
Output "L", "H" voltage



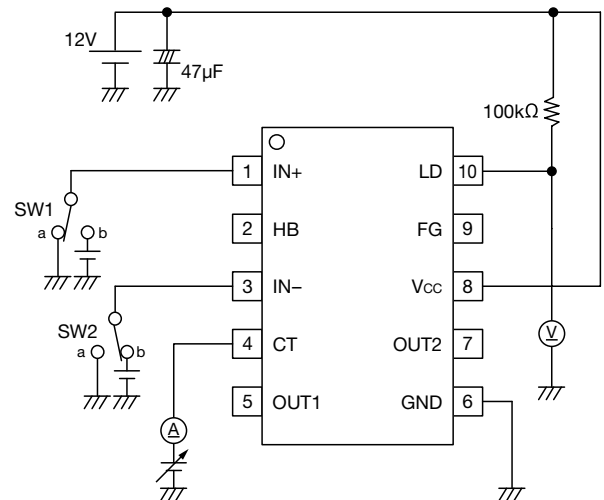
Offset voltage of hall input



Input voltage range of hall input

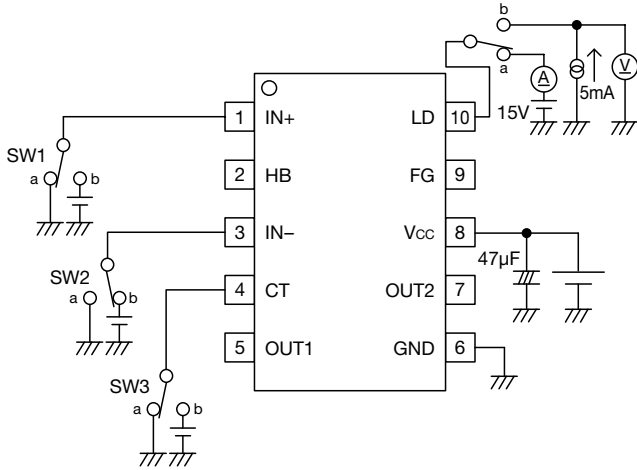


Charge, Discharge current CT charge, discharge voltage

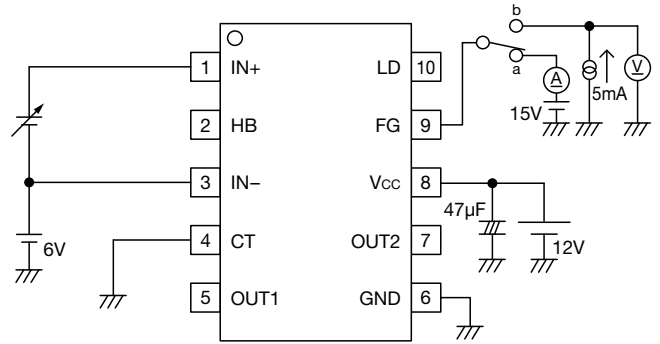


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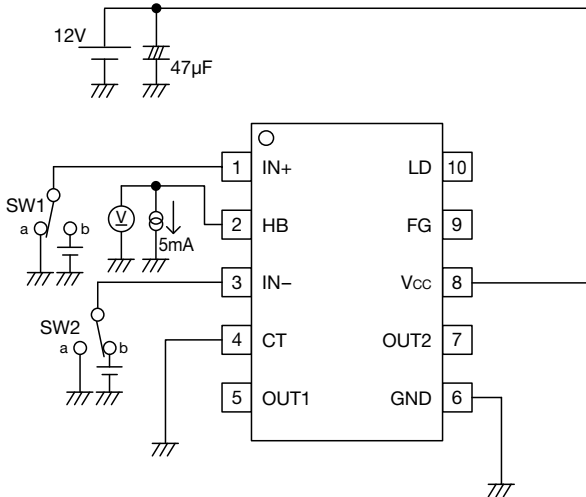
LD output "L" voltage, leak current



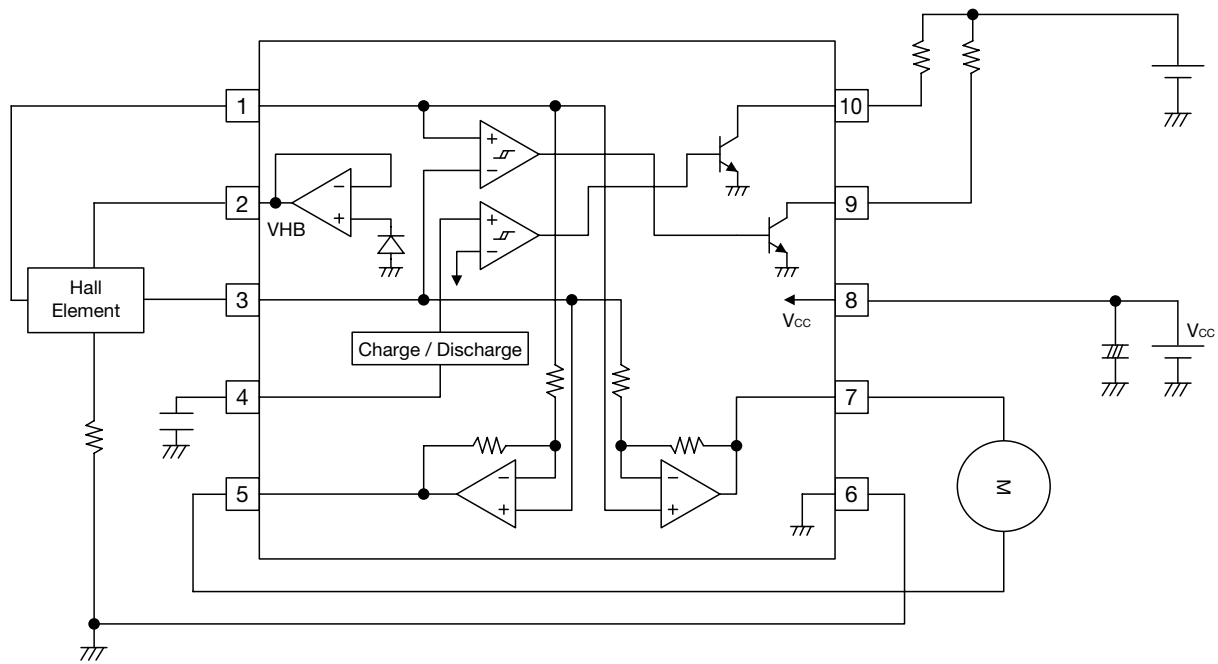
FG output "L" voltage, leak current



Hall output voltage



Typical Application Circuit



Truth Table

IN-	IN+	CT	OUT1	OUT2	FG	LD	Mode
H	L	L	H	L	L	L	Operation
L	H		L	H	H		
		H	OFF	OFF		H	Lock protection