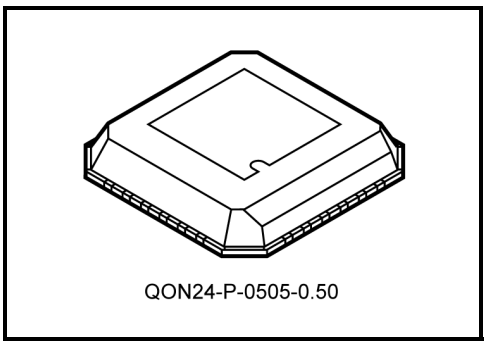
Toshiba Bipolar Linear Integrated Circuit Silicon Monolithic

TA8496FL

Magnetic Head R/W IC

This IC enables writing and detection of magnetic recording signals.

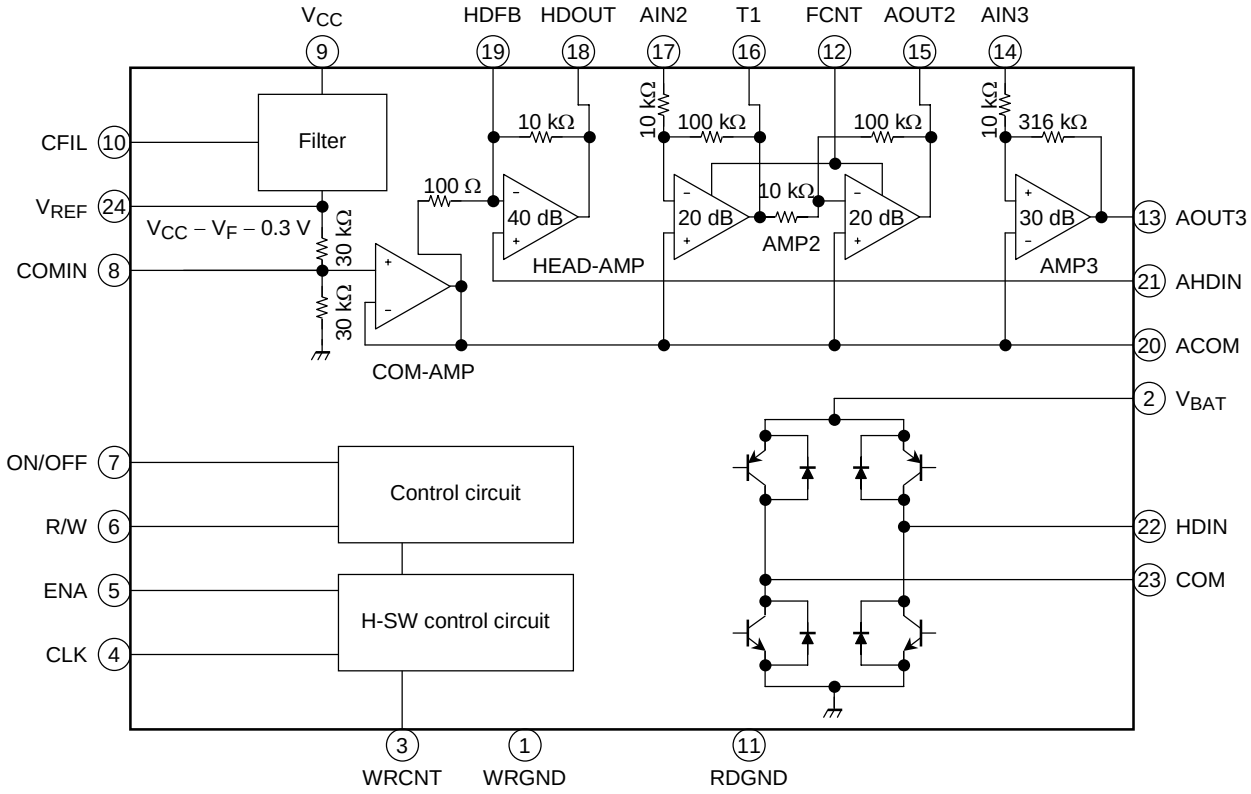


Weight: 0.05 g (typ.)

Features

- Operating voltage range: V_{CC} = 3.5 to 7 V
  V_{BAT} = 1.8 to 7 V
- Output current: I_{out} = 20 mA (max)
- Constant current operating function
  : I_{OC} = (0.25 (V) × 160 (A))/R_{WR} (typ.)

Block Diagram



Pin Function

Pin Number	Symbol	Description
1	WRGND	GND for write block
2	V_{BAT}	High-switch control power supply
3	WRCNT	Write output setting pin
4	CLK	High-switch operation control signal input
5	ENA	High-switch enable signal input
6	R/W	Read/write select signal input
7	ON/OFF	Chip enable signal input
8	COMIN	Internal reference voltage setting (fine adjustment)
9	V_{CC}	Power supply input pin
10	CFIL	Power supply filter connecting pin (C = 0.1 μF)
11	RDGND	GND for read block
12	FCNT	Cut-off frequency setting pin
13	AOUT3	Amp 3 output
14	AIN3	Amp 3 input
15	AOUT2	Amp 2 output
16	T1	Amp 2 test pin
17	AIN2	Amp 2 input
18	HDOUT	Head amp output
19	HDFB	Head amp feedback input
20	ACOM	COM amp output
21	AHDIN	Head amp output
22	HDIN	Write output
23	COM	Write output
24	V_{ref}	V_{CC} filter output (internal power supply)

Maximum Rating (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Power Supply Voltage	V_{CC}	8	V
	V_{BAT}	8	V
Input Voltage	V_I	6	V
Output Current	I_{OUT}	20	mA
Operating Temperature	T_{opr}	−20 to 70	°C
Storage Temperature	T_{stg}	−50 to 150	°C

Recommended Operating Conditions

Characteristics	Symbol	Rating	Unit
Power Supply Voltage	V_{CC}	3.5 to 7.0	V
	V_{BAT}	1.8 to 7.0	

Functions

Input				Write Unit		Read Unit
ON/OFF	R/W	ENA	CLK	COM	HDin	
H	H	H/L	H/L	∞	∞	Enable
	L	H	H	L	H	Disable
	L	H	L	H	L	Disable
	L	L	L	L	L	Disable
	L	L	H	∞	∞	Disable
L	H/L	H/L	H/L	∞	∞	Disable

∞: High impedance

Electrical Characteristics

Interface Block (unless otherwise is specified, V_{CC} = 5 V, V_{BAT} = 3 V, Ta = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Input Voltage	$V_{IN1\text{-}Hi}$	—	ENA, ON/OFF	2.5	—	V_{CC}	V
	$V_{IN1\text{-}Lo}$	—	ENA, ON/OFF	—	—	1.0	
	$V_{IN2\text{-}Hi}$	—	CLK, R/W	1.5	—	V_{CC}	
	$V_{IN2\text{-}Lo}$	—	CLK, R/W	—	—	0.5	
Input Current	$I_{IN1\text{-}Hi}$	1	CLK, V_{IN} = 5 V	—	15	25	μA
	$I_{IN1\text{-}Lo}$		CLK, V_{IN} = 0 V	—	−85	−120	
	$I_{IN2\text{-}Hi}$		ENA, V_{IN} = 5 V	—	85	120	
	$I_{IN3\text{-}Hi}$		R/W, V_{IN} = 5 V	—	15	25	
	$I_{IN3\text{-}Lo}$		R/W, V_{IN} = 0 V	—	−85	−120	
	$I_{IN4\text{-}Hi}$		ON/OFF, V_{IN} = 5 V	—	85	120	

Read Block (unless otherwise is specified, V_{CC} = 5 V, V_{BAT} = 3 V, Ta = 25°C)

Characteristics		Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Current Dissipation		I_{CCR}	2	When read block in operation	—	3.2	4.6	mA
		I_{CCO}		When chip disabled (on/off = low or open)	—	0	1	μA
Gain Characteristics	Head amp	G_H	3	—	—	40	—	dB
	Amp 2	G_2		—	—	40	—	
	Amp 3	G_3		—	—	30	—	
Head Amp Input Conversion Noise		E_{n1}	—	R_g = 0 Ω, f_c = 19 kHz	—	0.33	(0.64)*	μV_{rms}
		E_{n2}		R_g = 0 Ω, f_c = 1.7 kHz	—	0.15	(0.26)*	
Reference Voltage		V_{ACOM}	3	—	1.9	2.0	2.1	V
Output Offset Voltage	Head amp	V_{HOS}	3	—	—	−0.1	±0.25	V
	Amp 2	V_{2OS}			—	+0.7	±1.1	
	Amp 3	V_{3OS}			—	+0.1	±0.25	
Amp 3 Output Voltage Range	Low	V_{3OL}	4	R_L = 10 kΩ	—	0.2	—	V
	High	V_{3OH}			—	4.1	—	
Amp 3 Output Current	Output	I_{3OUT}	4	—	2.0	—	—	mA
	Input	I_{3IN}		—	0.1	0.2	0.3	

*: Guaranteed by design. Determined at design and does not change at manufacturing. Test not conducted.

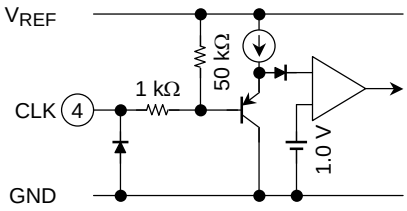
Write Block (unless otherwise is specified, V_{CC} = 5 V, V_{BAT} = 3 V, Ta = 25°C)

Characteristics	Symbol	Test Circuit	Test Condition		Min	Typ.	Max	Unit
Current Dissipation	I_{CCw}	2	During write, CLK = Low/High		—	3.7	5.2	mA
	I_{CCe}		When write enabled		—	1.9	2.8	
	I_{CCB}		When write in break		—	4.4	6.1	
	I_{bat}		During write, reactive current (R_{WR} = 5 kΩ)		—	1.4	1.8	
	I_{baB}		When write in break		—	1.0	1.6	
	I_{bar}		During read		—	0	1	μA
	I_{bao}		When chip disabled (on/off = low or open)		—	0	1	
Set Output Current	I_{OC}	5	I_{OC} = 10 mA (at V_{BAT} = 2.0 V)	V_{BAT} = 2.0 V	8	10	12	mA
				V_{BAT} = 5.0 V	—	11	13	
CLK Output Transfer Time	T_{pLH1}	6	0 to 10%	(Note1)	—	0.1	—	μs
	T_{pLH2}		0 to 90%	(Note1)	—	0.5	—	
	T_{pHL1}		0 to 10%	(Note1)	—	0.1	—	
	T_{pHL2}		0 to 90%	(Note1)	—	0.5	—	
ENA Output Transfer Time	T_{pZH1}	6	0 to 10%	(Note1)	—	0.3	—	μs
	T_{pZH2}		0 to 90%	(Note1)	—	0.5	—	
	T_{pHZ1}		0 to 10%	(Note1)	—	0.3	—	
	T_{pHZ2}		0 to 90%	(Note1)	—	0.5	—	

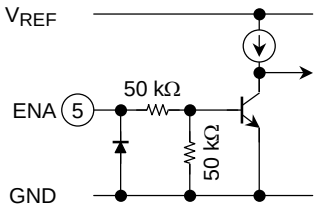
Note 1: Load RL = 36 Ω, CL = 10 pF

Input/Output Circuit

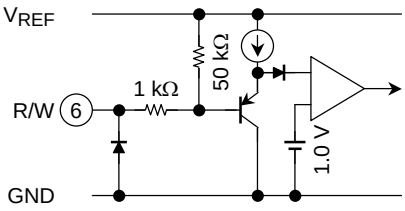
- CLK pin



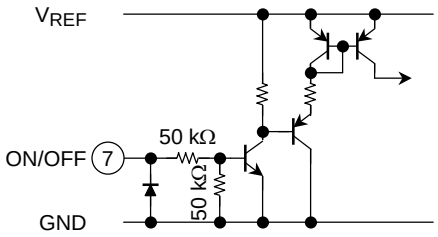
- ENA pin



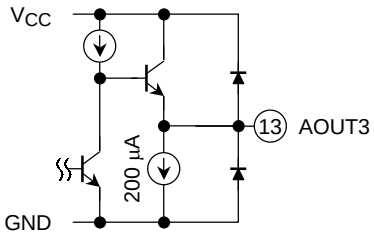
- R/W pin



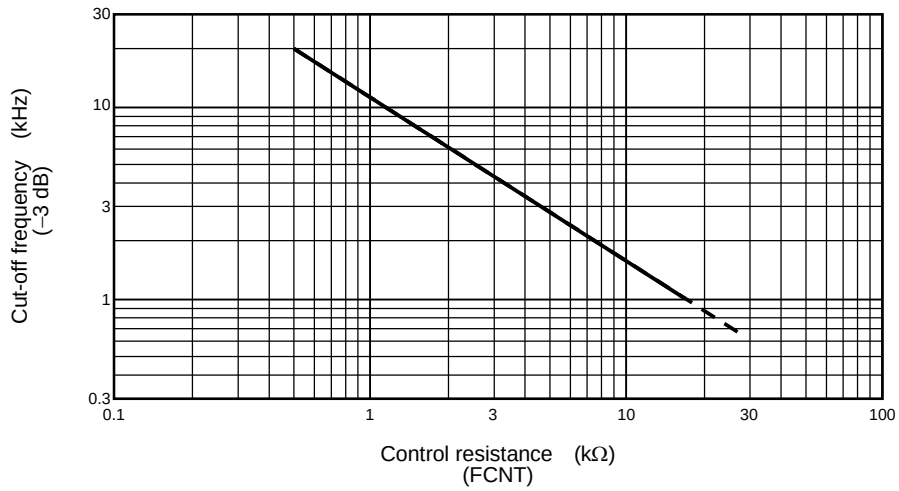
- ON/OFF pin



- AOUT3 pin

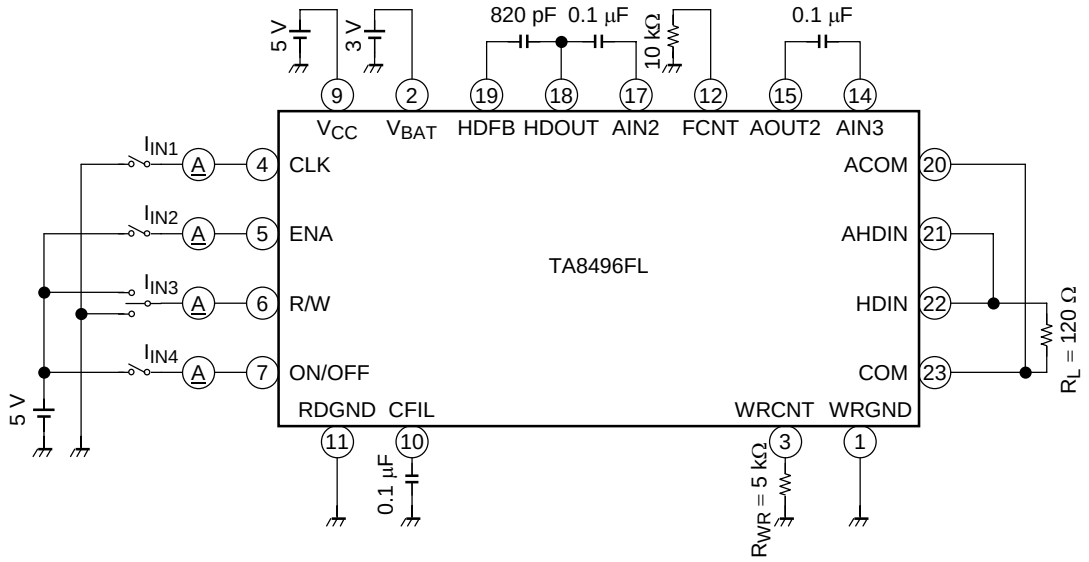


Secondly L.P.F characteristics (amp 2)

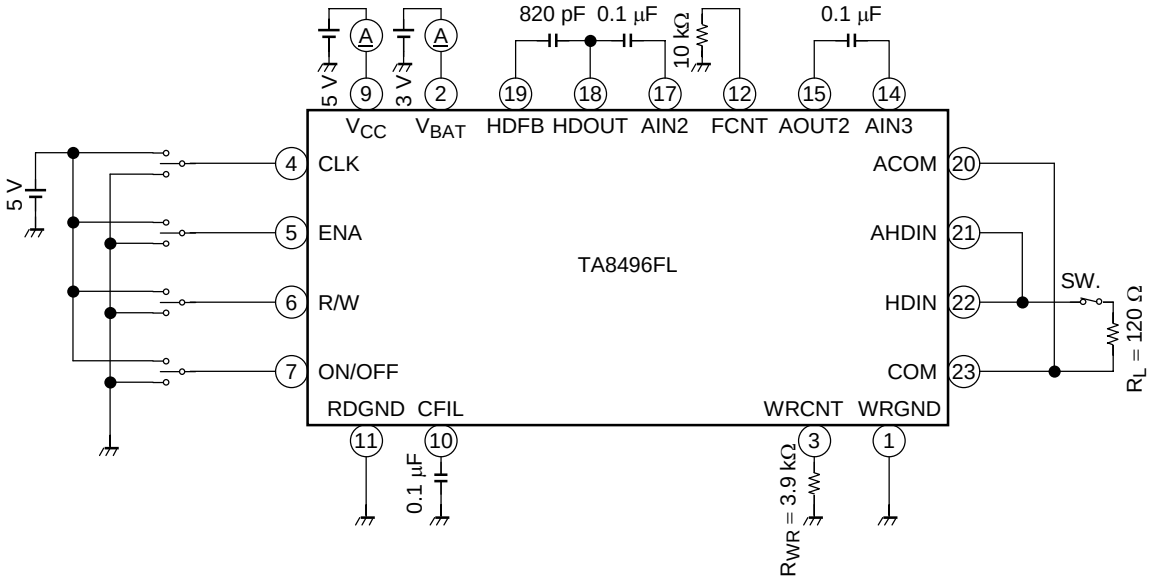


Test Circuit

1. Input Current (I_{IN1}, I_{IN2}, I_{IN3}, I_{IN4})



2. Current Consumption (I_{CCR}, I_{CCO}, I_{CCW}, I_{CCe}, I_{CCB}, I_{bat}, I_{baB}, I_{bar}, I_{bao})

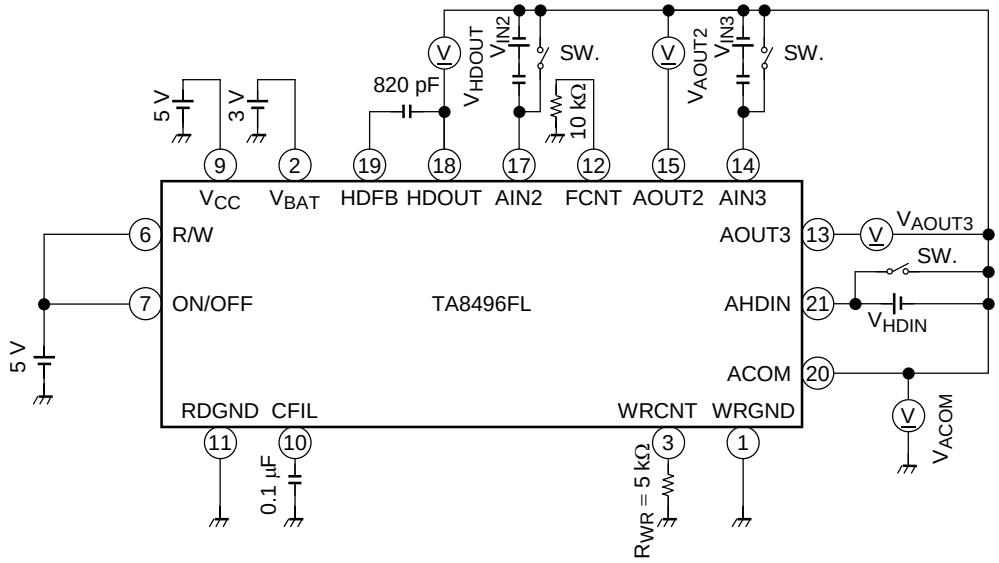


Input Sequence (H = 5 V, L = 0 V)

Current Consumption (V_{CC}, V_{BAT})	ON/OFF	R/W	ENA	CLK
I_{CCR}	H	H	L	H
I_{CCO}	L/OPEN	H	H/L	H
I_{CCW}	H	L	H	H/L
I_{CCe}	H	L	L	H
I_{CCB}	H	L	L	L
I_{bat} (Note2)	H	L	H	H/L
I_{baB}	H	L	L	L
I_{bar}	H	H	H/L	H/L
I_{bao}	L/OPEN	H/L	H/L	H/L

Note 2: SW. OFF

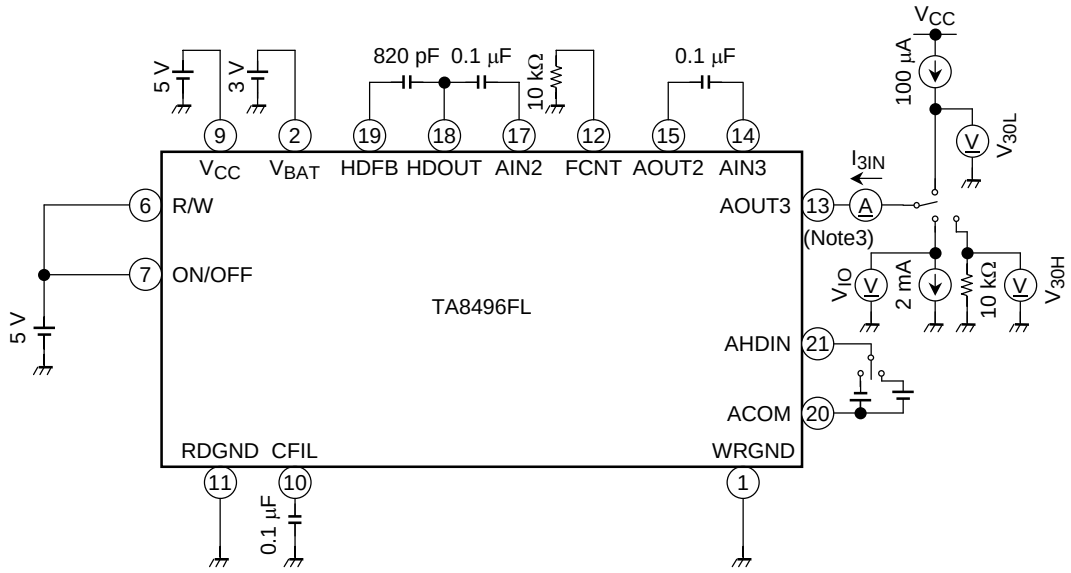
3. Gain Characteristics (G_H, G_2, G_3), Power Off-Set Voltage (V_{HOS}, V_{2OS}, V_{3OS})



$$G_H = 20\,\ell og \left| \frac{V_{HDOUT}}{V_{HDIN}} \right|,\ G_2 = 20\,\ell og \left| \frac{V_{AOUT2}}{V_{IN2}} \right|,\ G_3 = 20\,\ell og \left| \frac{V_{AOUT3}}{V_{IN3}} \right|$$

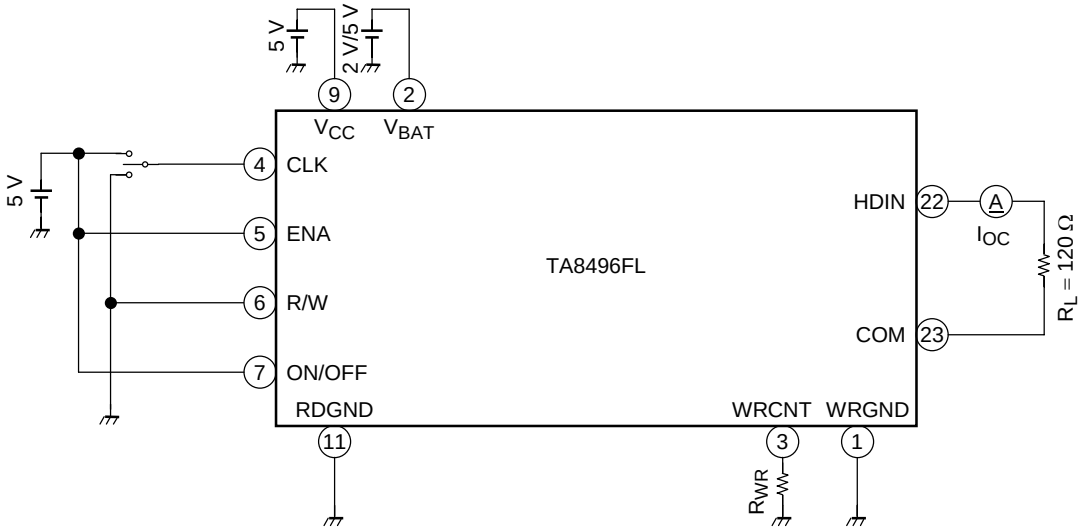
When off-set voltage is measured, SW turns ON.
$V_{HOS} = |V_{HDOUT}|$, $V_{2OS} = |V_{AOUT2}|$, $V_{3OS} = |V_{AOUT3}|$

4. Amp 3 Output Voltage Range (V_{3OL}, V_{3OH}), Amp 3 Output Current (I_{3OUT}, I_{3IN})



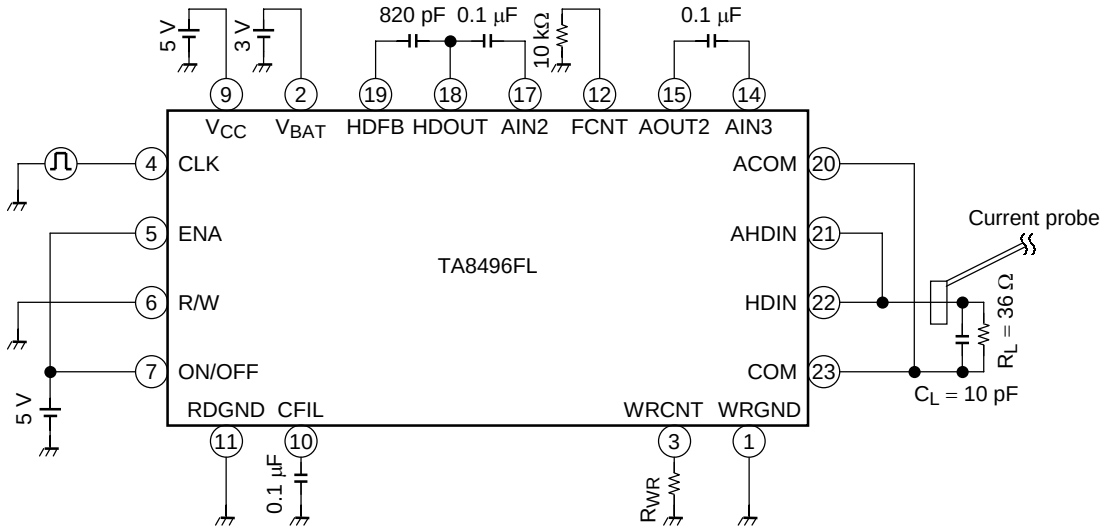
Note 3: I_{3OUT} must be measured on condition in $V_{IO} \geqq 4.0$ V

5. Set Output Current (I_{OC})

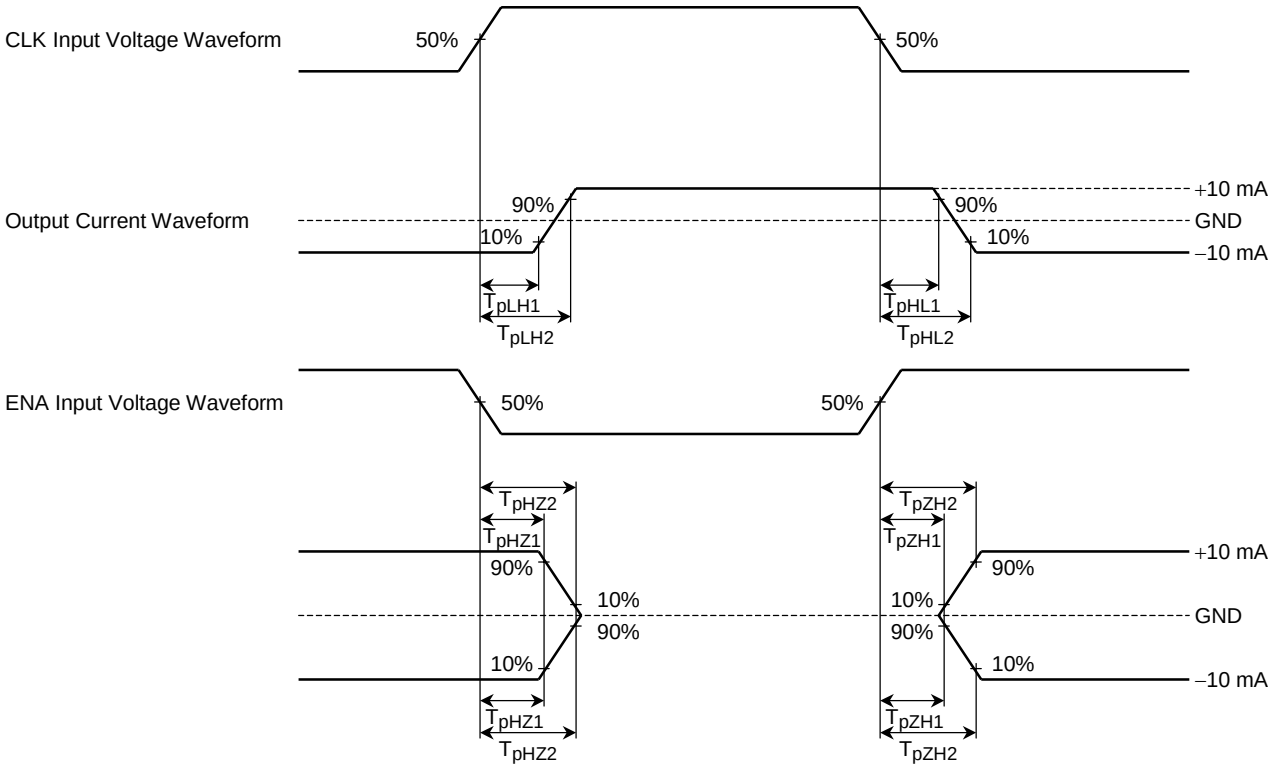


Set R_{WR} so that I_{OC} = 10 mA (at V_{BAT} = 2 V).
At this time, due to fluctuation in samples, I_{OC} fluctuates in the range of 8 to 12 mA. Also, I_{OC} fluctuates depending on the power supply (V_{BAT}) as follows: I_{OC} = 10 mA (at V_{BAT} = 2 V) → $I_{OC} \simeq$ 13 mA (at V_{BAT} = 5 V).

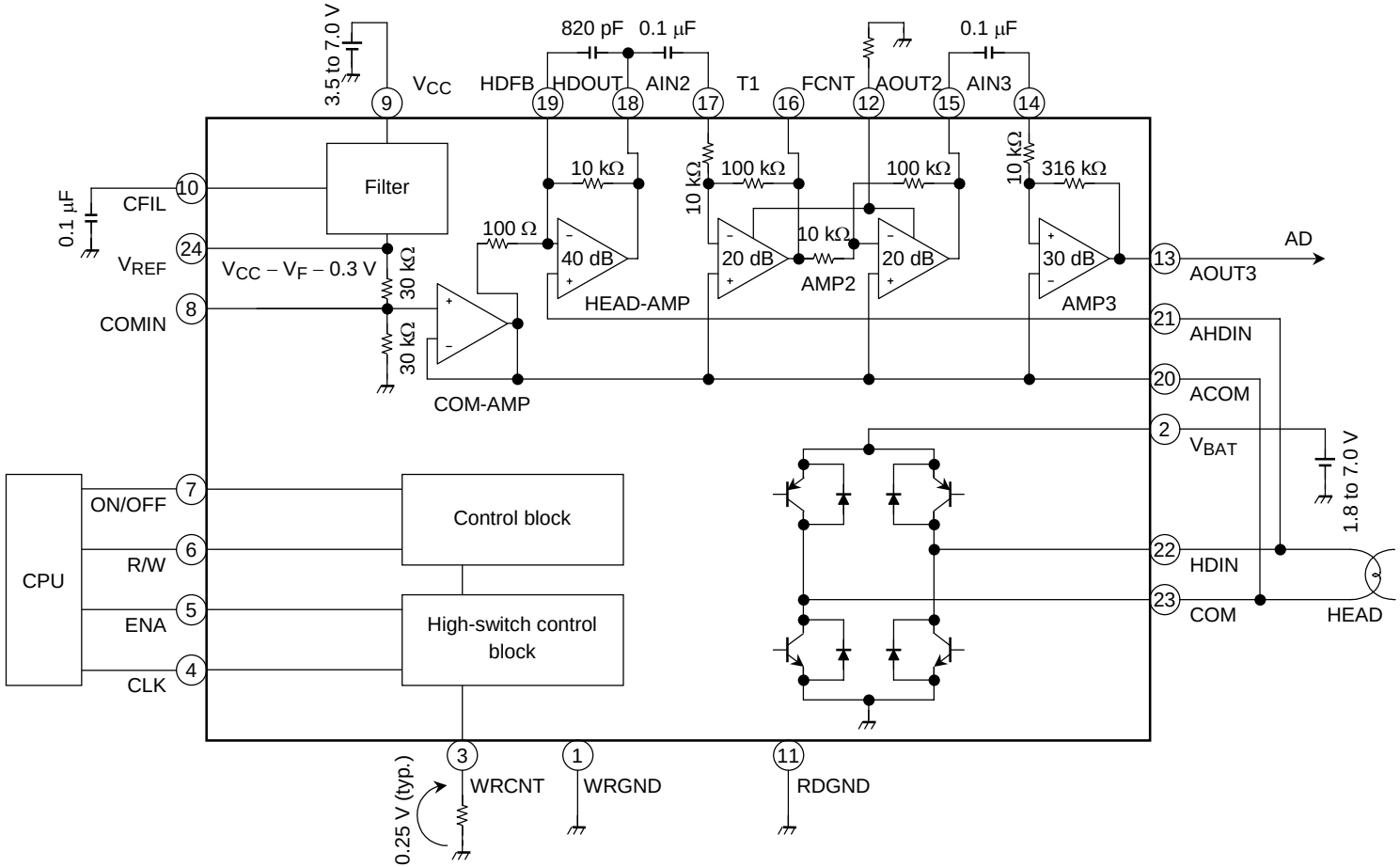
6. CLK, ENA Output Propagation Time ($T_{pLH1/2}$, $T_{pHL1/2}$, $T_{pZH1/2}$, $T_{pHZ1/2}$)



R_{WR}: I_{OC} is set 10 mA.



Example of Application Circuit



Note 4: Operating supply voltage range

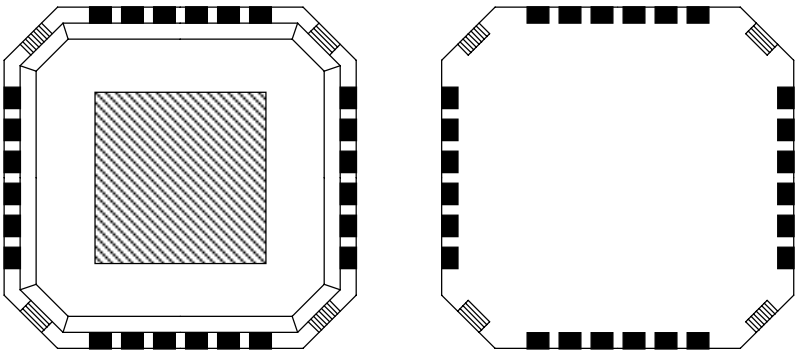
V_{CC} = 3.5 to 7.0 V, V_{BAT} = 1.8 to 7.0 V
However, set V_{CC} so that $V_{ACOM} \leq V_{BAT} + 0.5$ V. $V_{CC} \geq V_{BAT}$.
($V_{ACOM} = (V_{CC} - VF - 0.3)/2$)
By connecting a resistor to the COMIN pin, V_{ACOM} can be varied.

Note 5: The IC may be damaged by shorts between pins, to the power supply, or to ground. Take great care when designing lines.

Requests Concerning Use of QON

Outline Drawing of Package

(Upper surface) (Lower surface)



When using QON, please take into account the following items.

Caution

(1) Do not carry out soldering on the island section in the four corners of the package (the section shown on the lower surface drawing with diagonal lines) with the aim of increasing mechanical strength.

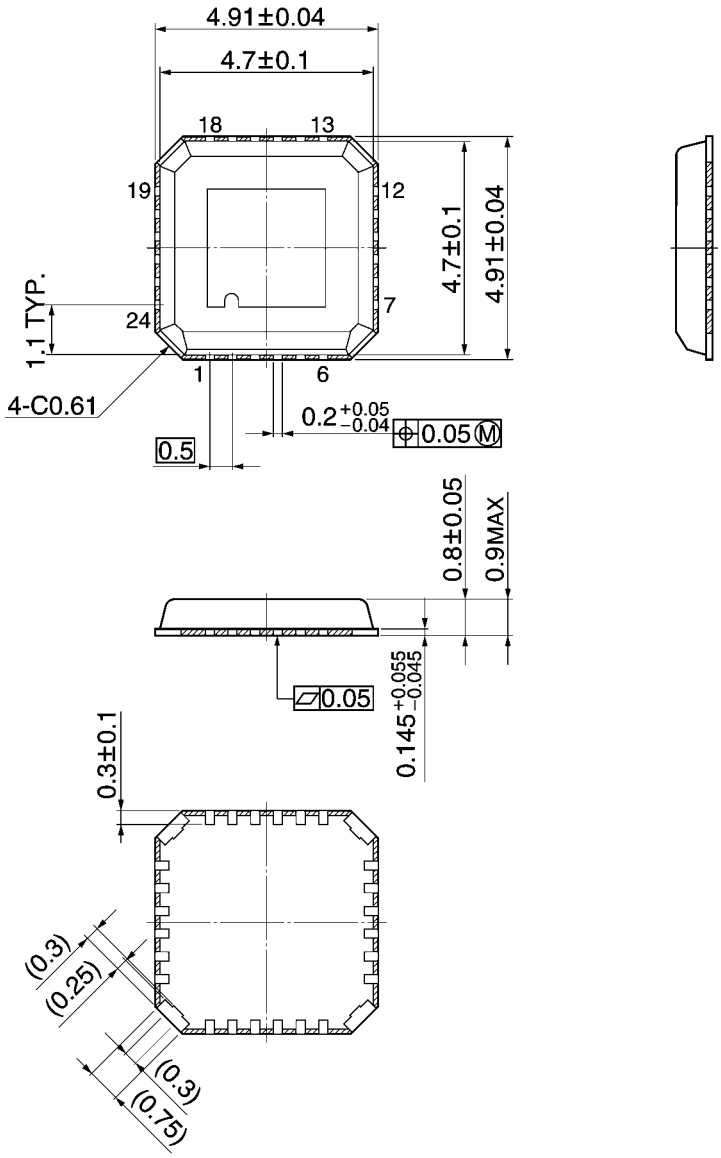
(2) The island section exposed on the package surface (the section shown on the upper surface drawing with diagonal lines) must be used as (Note 6) below while electrically insulated from outside.

Note 6: Ensure that the island section (the section shown on the lower surface drawing with diagonal lines) does not come into contact with solder from through-holes on the board layout.

- When mounting or soldering, take care to ensure that neither static electricity nor electrical overstress is applied to the IC (measures to prevent anti-static, leaks, etc.).
- When incorporating into a set, adopt a set design that does not apply voltage directly to the island section.

Package Dimensions

QON24-P-0505-0.50 Unit: mm



Note 1) The solder plating portion in four corners of tne package shall not be treated as an external terminal.

Note 2) Don`t carry out soldering to four corners of the package.

Note 3) area : Resin surface

Weight: 0.05 g (typ.)

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