AN3810K

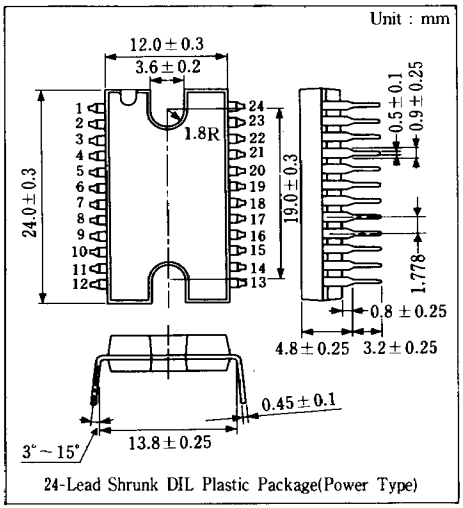
VCR Cylinder Direct Motor Drive Circuit

■ Outline

The AN3810K is an integrated circuit designed to drive the VCR cylinder DD motor.

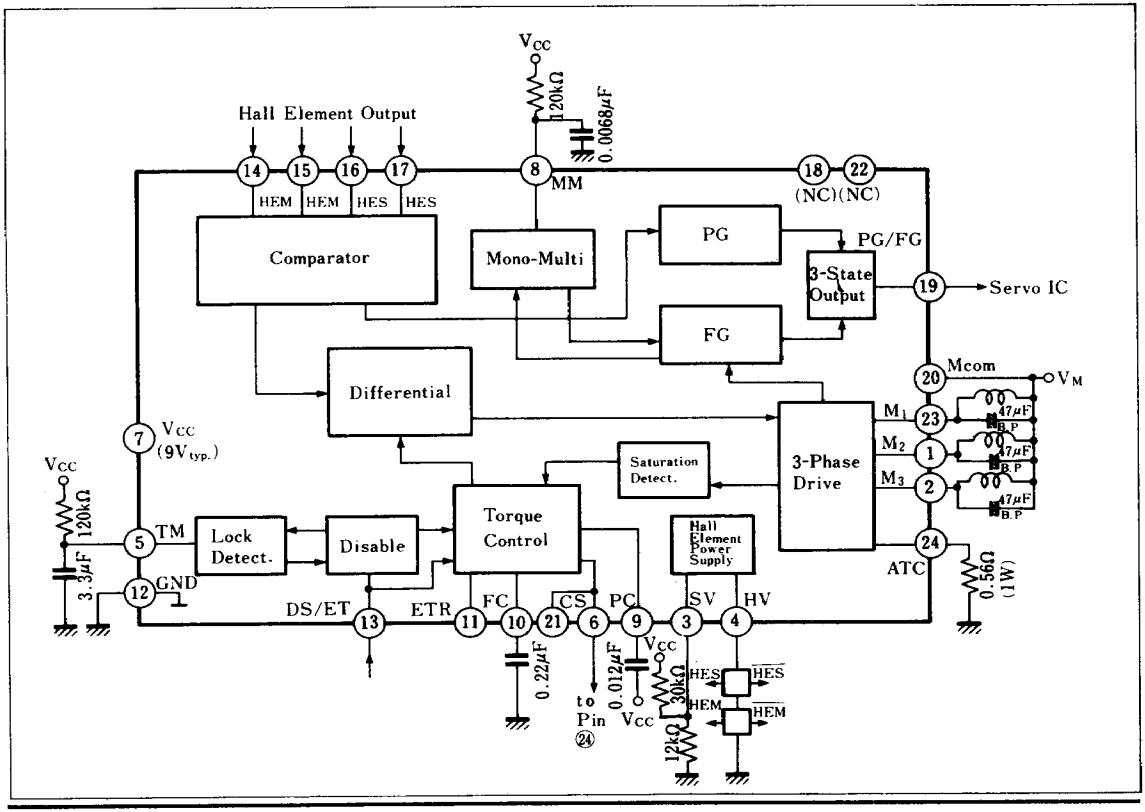
■ Features

- 3-phase motor drive circuit built-in
- PG and FG generator circuit built-in
- Motor lock detector circuit built-in
- Hall element input circuit built-in



24-Lead Shrunk DIL Plastic Package(Power Type)

■ Block Diagram and Peripheral Circuit



Panasonic

■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	Drive Output 2	13	Torque Control/Disable
2	Drive Output 3	14	H.E. Input
3	H.E Power Supply Control	15	H.E. Input
4	H.E. Power Supply	16	H.E. Input
5	Mono-Multi Cap.	17	H.E. Input
6	Current Detection	18	NC
7	V_{CC}	19	PG/FG Output
8	Mono-Multi Cap.	20	Voltage Supply for Motor
9	Phase Compensation	21	Current Detection
10	Soft Start	22	NC
11	Reference Voltage Input	23	Drive Output 1
12	GND	24	ATC

■ Absolute Maximum Ratings (Ta=25℃)

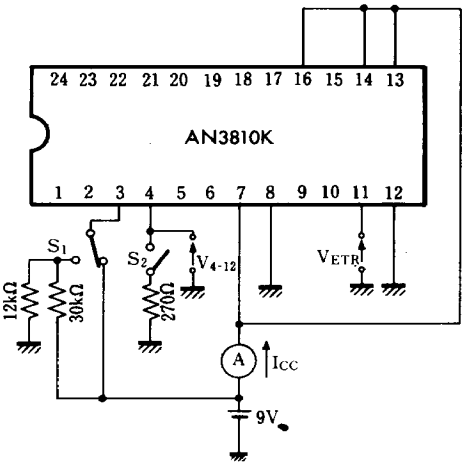
Item	Symbol	Rating		Unit	Note
Supply Voltage	V_{CC}	14.4		V	
Circuit Voltage	V_{n-12}	0	40	V	n=1, 2, 23
	V_{20-12}	0	24	V	
Circuit Current	I_n	0	1500	mA	n=1, 2, 23
Power Dissipation	P_D	2000		mW	
Operating Ambient Temperature	T_{opr}	−20~+75		℃	
Storage Temperature	T_{stg}	−55~+150		℃	

■ Electrical Characteristics (V_{CC}=9V, Ta=25℃)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Total Current	I_{CC}*	1		6		16	mA
Output Saturation Voltage	$V_{O(set)}$	2	I_O=1A			1	V
ATC Limit Voltage	V_{llm}	2	V_{ET}=0V (at full torque command)	0.41		0.53	V
Input/Output Transfer Gain	A_V	2	R_d=0.47Ω	0.9		1.4	
Saturation Detect Gain	A_d	3		0.5		1.5	
HV Output Voltage	V_{HV}	1	V_{SV}=2.6V, R_{HV}=270Ω	2.2		2.6	V
HV Protected Voltage	V_{prot}	1	$V_{SV}=V_{CC}$	3.3		4.3	V
DS Input Level Voltage	V_{DS}	2		3.1		4.1	V
ETR Voltage	V_{ETR}	1		2.1		2.9	V
ET Offset Voltage	V_{offET}	2		−30		30	mV
HEM-$\overline{HES}$ Comparator Offset Voltage	V_{offM}	4		−6		6	mV
HES-$\overline{HES}$ Comparator Offset Voltage	V_{offS}	4		−6		6	mV
PG/FG Three-State Output Voltage (1)	V_{OH}	4	$I_{19}=\pm10\mu A$	4.2			V
PG/FG Three-State Output Voltage (2)	V_{OM}	4	$I_{19}=\pm10\mu A$	2.1		2.9	V
PG/FG Three-State Output Voltage (3)	V_{OL}		$I_{19}=\pm10\mu A$			1	V
MM Theshold Voltage	V_{MM}	5		3.8		4.6	V
BFG Fetch Voltage	V_{BFG}	4	V_M=9V	0.5		1.2	V
TM Threshold Voltage	V_{TM}	5		4.1		4.9	V
ATC Residual Voltage	V_{Idle}	2		0		5	mV
ET Input Bias Current	I_{ET}					−10	μA
HEM, HEM, HES, HES Input Bias Current	I_B					−10	μA

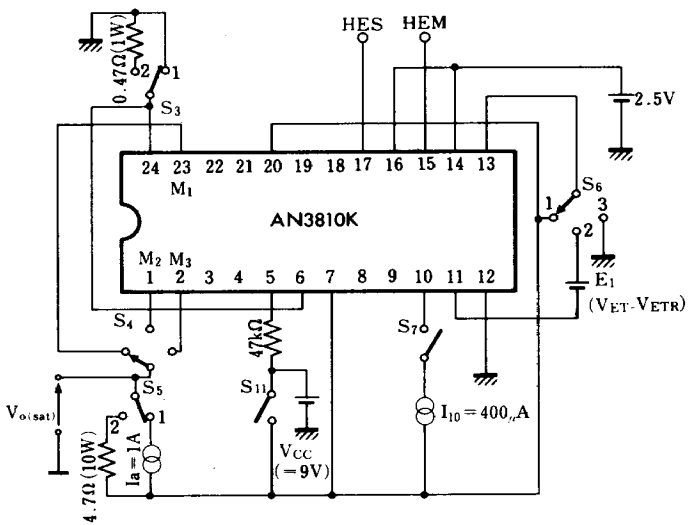
Note) Operating Supply Voltage Range: $V_{CC(opr)}$=8~13V
*Supply current to hall elements is not included.

Test Circuit 1 (I_{CC})



- Total current (I_{CC}) : S_1 ① side, S_2 open, measure I_{CC}.
- HV output voltage (V_{HV}) : S_1 ② side, S_2 short, measure V_{4-12}.
- HV protected voltage (V_{prot}) : S_1 ① side, S_2 open, measure V_{4-12}.
- ETR voltage (V_{ETR}): Measure V_{ETR}.

Test Circuit 2 ($V_{O(set)}$, V_{lim}, A_v, V_{DS}, V_{OFFET}, V_{idle})

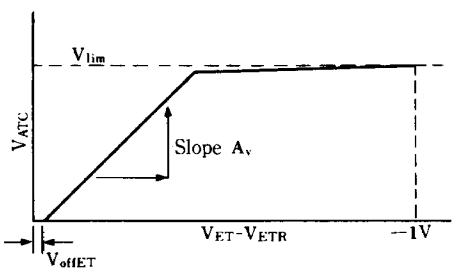


- Output saturation voltage ($V_{O(sat)}$) :
  S_3 ① side, S_5 ① side,
  S_6 ① side, S_7 ON
  Set the three-phase mode with Pins⑭, ⑮, ⑯ and ⑰ and switch the measuring pin with S_4.

Mode Setting / Measuring Pin	HEM (Pin⑮)	HES (Pin⑰)	
M1 (Pin㉓)	H	H. L	H:3V L:2V
M2 (Pin①)	L	H	
M3 (Pin②)	L	L	

- ATC limit voltage (V_{lim}) :
- Input/output transfer gain (A_V) :
- ET offset voltage (V_{offET}) :

} S_3 ② side, S_5 ② side, S_7 open, S_6 ② side



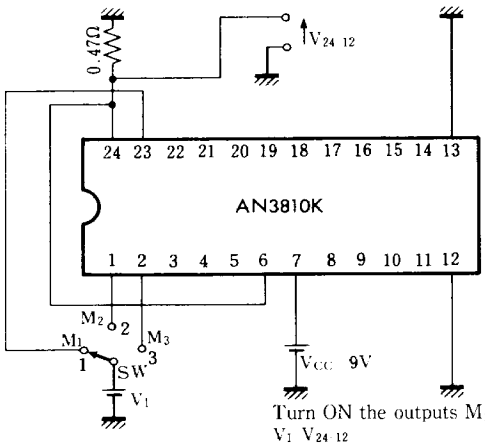
- DS input level voltage (V_{DC}) : HEM (Pin⑮) "H", one-phase (M1) ON
  STEP1. V_{CC} S_{11}. OFF→ON

  When V_{13-12} increases from 0F, it becomes from "H" to "L" and then measure it.

- ATC residual voltage (V_{Idec}) : S_3 ② side, S_5 ② side
  S_7 open, S_6 ① side

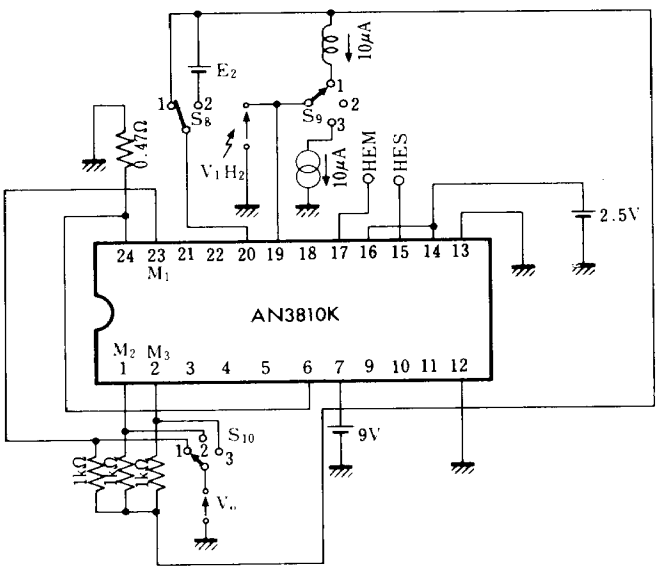
  Measure V_{24-12} when V_{ET} is in disable state.

Test Circuit 3 (A_d)

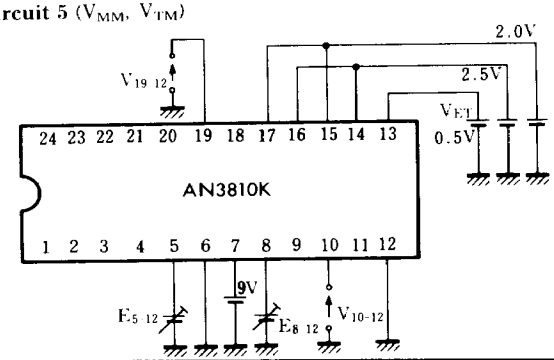


Turn ON the outputs M_1, M_2 and M_3 sequentially
V_1 $V_{24\ 12}$

Test Circuit 4 (V_{offM}, V_{offS}, V_{OH}, V_{OM}, V_{OL}, V_{BFG})



Test Circuit 5 (V_{MM}, V_{TM})



- HEM-$\overline{\text{HEM}}$
  Comparator offset voltage ($Voff_M$): S_8 ① side
- MES-$\overline{\text{MES}}$
  Comparator offset voltage ($Voff_S$):S_8 ① side HEM: L(2V)

Check V_0 to be switched by changing HES and HEM pin voltage by ±5mV.

$Voff_M$	HEM	H:2.5+5mV	⋯	L:2.5V−5mV
	S_{10}① side(M1)	L	⋯	H
$Voff_S$	HES	H:2.5V+5mV	⋯	L:2.5V−5mV
	S_{10}② side(M2)	L	⋯	H

- V_{OH}, V_{OM}, V_{OL}

			HES	HEM	MM
PG/FG three-phase output voltage(1) V_{OH}		S_8 ① side	H	H	H
			L		
V_{OM}	(2)		L	L	H
V_{OL}	(3)		L	L	L

Measure V_{19-12}, provided that S_8 is at ① side, ② side and ③ side. HES, HEM H : 3V, L : 2V MM H : 5.2V, L : 3.2V

- V_{BFG}

		HES	HEM	MM
BFG fetch voltage V_{BFG}	S_8 ② side	L	L	L
				H

Increase E_2 from 0V, when V_{19-12} change from "L" to "M", measure E_2.

- MM threshold Voltage (V_{MM}) :
  Gradually increase E_{8-12}. When V_{19-12} changed from L to M, measure E_{8-12}.
- TM threshold Voltage (V_{TM}) :
  Gradually increase E_{5-12}. When V_{10-12} changed from H to L, measure E_{8-12}.