

Panasonic

Reduce external components and improve reliability

For 3.5inch HDD Motor Comb IC / AN8428GAK

Overview

AN8428GAK is motor comb IC for 3.5inch HDD.
 By new retract circuit, reduce external components and shorten the brake time of the disk to improve reliability of HDD.
 Spindle motor sensor less linear drive.
 VCM linear drive, PWM-DAC control.
 Built-in Retract, 12 V/5 V/3.3 V power monitor, 3.3 V-Regulator.
 80-pin TQFP package with exposed heat sink.

Features

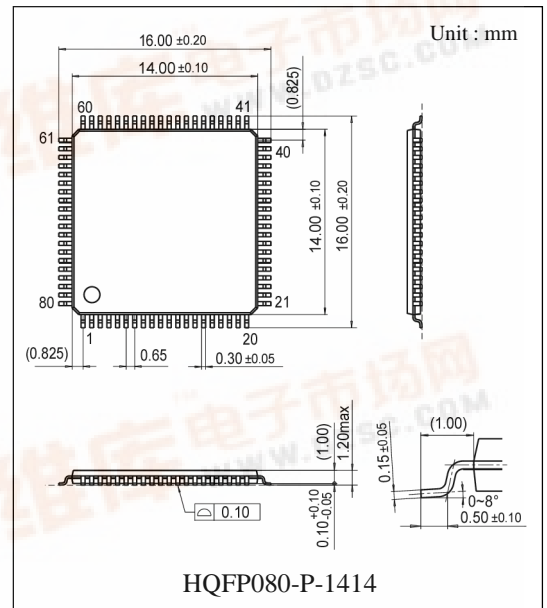
- By new retract circuit, reduce external components and shorten the brake time 1/2 of the disk to improve reliability of HDD.
 - Built-in shock sensor amplifier for mechanical shock protection and 3.3 V regulator for logic semiconductor.
 - 10 dB acoustic noise reduction by trapezoidal current on spindle motor drive.
 - 80-pin TQFP package with the smallest thermal resistance in the industry.
- Meet to increase speed of HDD higher 30 % than previous.

Principle functions

- (1) Spindle motor sensor less linear drive : 2.7 A peak current drivers, $R_{on}=1.1 \Omega$
- (2) VCM linear drive : 1.8 A peak current, $R_{on}=1.5 \Omega$
- (3) Retract function exists
- (4) Built in 12 V/5 V/3.3 V power monitor
- (5) Built in shock sensor amplifier
- (6) Built in 3.3 V regulator

Applications

3.5 inch HDD



HQFP080-P-1414



■ Maximum Ratings

PARAMETER	SYMBOL	Ratings	unit
Supply voltage +3.3 V	V _{cc3.3}	- 0.3 ~ 6.0	V
Supply voltage +5V	V _{cc5}	- 0.3 ~ 6.0	V
Supply voltage +12V	V _{cc12}	- 0.3 ~ 13.5	V
Output voltage (Spindle)	V _{SDRV}	- 0.3 ~ 15	V
Output voltage (VCM)	V _{CMN,VCMP}	- 0.3 ~ 15	V
Spindle Motor Peak Output Current	I _{Ospeak}	3.0	A
Voice coil Motor Peak Output Current	I _{Ovpeak}	2.0	A

■ Supply voltage range

+3.3 V Supply voltage range	V _{CC3.3}	3.0 V ~ 5.5 V	V
+5V Supply voltage range	V _{CC5}	4.5 V ~ 5.5 V	V
+12V Supply voltage range	V _{CCS12}	10.8 V ~ 13.2 V	V
+12V Supply voltage range	V _{CCV12}	10.8 V ~ 13.2 V	V
+12V Supply voltage range	V _{CCA12}	10.8 V ~ 13.2 V	V

■ Electrical Characteristics (T_a=25 °C ± 2 °C unless otherwise specified)

PARAMETER	SYMBOL	Conditions	min	typ	max	unit
+3.3 V Supply Current	I _{CC3.3}	Linear mode	—	1.1	3.0	mA
	I _{CC3.3 S}	Sleep mode	—	1.1	3.0	
+5V Supply Current	I _{CC5}	Linear mode	—	16.0	20.0	mA
	I _{CC5S}	Sleep mode	—	14.0	—	
+12V Supply Current	I _{CC12}	Linear mode	—	35.0	55.0	mA
	I _{CC12S}	Sleep mode	—	10.0	—	
[Power Monitor Comparators]						
12V Threshold voltage	V _{I12}		8.7	9.0	9.3	V
5V Threshold voltage	V _{I5}		4.2	4.3	4.4	V



■ Electrical Characteristics (Ta=25 °C±2 °C unless otherwise specified)

PARAMETER	SYMBOL	Conditions	min	typ	max	unit
[SPM block]						
Total Output on Resistance	Rds(on)	Iout =2.7 A	—	0.65	1.1	Ω
Voltage Ratio SPWMFLT/SISENH	KSP		4.8	5.1	5.4	V/V
Voltage at pin SISENH for 100% duty cycle	V _{I00}		0.33	0.348	0.376	V
Voltage at pin SISENH for 50% duty cycle	V ₅₀		0.160	0.18	0.200	V
Voltage at pin SISENH for 5% duty cycle	V ₅		—	0.018	0.026	V
Voltage at pin SISENH for 0% duty cycle	V ₀		—	0.0	2.0	mV
[VCM block]						
Vretract Regulation	V _{RET2}	Supply OFF	0.55	0.87	1.15	V
Irrct2	Irrct2	VBEMF=2V VCM=10.5 Ω	15	80	130	mA
Current Ratio between MSB/LSB	Ratio		31.5	32	32.7	
Time of Crossover Distortion	T _{CRO}	Ramp Input VCMINP 20 μs	—	2	5	μs
Symmetry VCM Drivers VCMP , VCMN	Ratio $\frac{I_2}{I_1}$	I2=IRVCM at Duty Cycle =10% I1=IRVCM at Duty Cycle=90% RS=0.33, R1=10k, R2=6.6k, RL =10 Ω	0.93	1	1.07	mA/mA
Linearity VCM Drivers VCMP , VCMN	Ratio $= \frac{I_2 - I_0}{I_1 - I_0}$	I2=IRVCM at Duty Cycle =30% I1=IRVCM at Duty Cycle=70% I0=IRVCM at Duty Cycle=50% RS=0.33, R1=10k, R2=6.6k, RL =10 Ω	0.97	1.0	1.03	mA/mA
Total Resistance (Source + Sink + Isolation)	RDSON25		—	1.0	1.5	Ω
VCM Output Drivers Offset Current	Ios	MPWM& MPWNL at 50% Duty Cycle RS=0.33, R1=10K, R2 =6.6K, RL=10 Ω	-28	0	28	mA
[Shock sensor]						
Input Current of Shock Sensor Amplifier	I _{SHKIN}		-1	—	1	nA
Gm of Shock Sensor Amplifier	Gmshk		-	5.9	-	mS
[3.3 V – Regulator]						
Output voltage Regulation	VCC3V3		3.168	3.33	3.49	V
	Δ VLDR	ILOAD=0~4mA	-	33	-	mV

