AN3891FBP

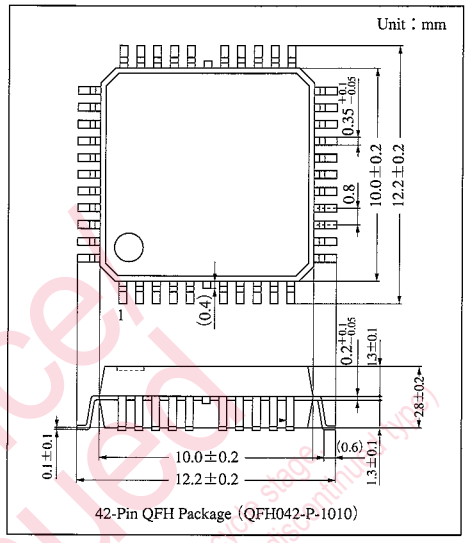
Spindle Motor Driver IC for Multi-Laser Player

■ Overview

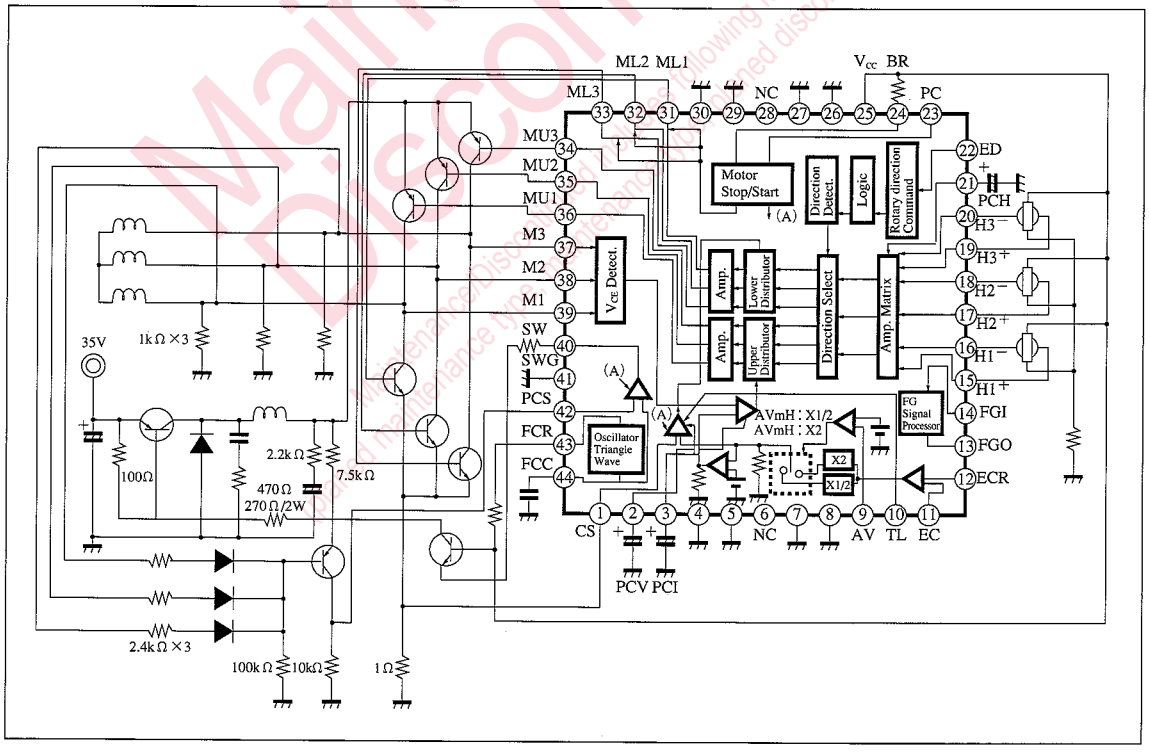
The AN3891FBP is a spindle motor driver IC for multi-laser player.

■ Features

- 3-phase full-wave overlapping drive
- Forward and reverse rotations
- Adjustable driver-gain
- Dynamic braking
- Built-in switching regulator control circuit



■ Block Diagram



■ Pin Descriptions

Pin No.	Pin name and Symbol		Pin No.	Pin name and Symbol	
1	Motor current detection	CS	23	Power-cut control	PC
2	Voltage feedback phase correction	PCV	24	Dynamic brake current setting	BR
3	Voltage feedback phase correction	PCI	25	Power supply	V_{CC}
4	Ground	GND	26	Ground	GND
5	Ground	GND	27	Ground	GND
6	No connection		28	No connection	
7	Ground	GND	29	Ground	GND
8	Ground	GND	30	Ground	GND
9	A/V switching control	AV	31	Lower predrive output (1)	ML1
10	Torque limiter control	TL	32	Lower predrive output (2)	ML2
11	Torque reference	EC	33	Lower predrive output (3)	ML3
12	Torque command	ECR	34	Upper predrive output (3)	MU3
13	FG signal output	FG_{OUT}	35	Upper predrive output (2)	MU2
14	FG signal input	FG_{IN}	36	Upper predrive output (1)	MU1
15	Hall-element input	$H1^+$	37	Motor coil voltage detection (3)	M3
16	Hall-element input	$H1^-$	38	Motor coil voltage detection (2)	M2
17	Hall-element input	$H2^+$	39	Motor coil voltage detection (1)	M1
18	Hall-element input	$H2^-$	40	Switching regulator drive signal	SW
19	Hall-element input	$H3^+$	41	Ground for switching regulator	SWG
20	Hall-element input	$H3^-$	42	Switching drive voltage feedback	PCS
21	Hall-element AGC phase correction	PCH	43	External resistor for triangle wave	FC_R
22	Turn-over control	ED	44	External capacitor for triangle wave	FC_C

■ Absolute Maximum Ratings

Parameter		Symbol	Rating	Unit
Supply voltage		V_{CC}	6.0	V
Supply current		I_{CC}	—	mA
Output terminal voltage (1)	$V_{O(1)}$=37, 38, 39, 40	$V_{o(1)}$	−0.7 to +20	V
Output terminal voltage (2)	$V_{O(2)}$=34, 35, 36	$V_{o(2)}$	0 to 20	V
Terminal voltage (1)	Vn=10, 11, 12, 15, 16, 17, 18, 19, 20, 21, 22, 23, 42, 44, 14, 9	Vn	−0.3 to V_{CC}	V
Power dissipation		P_D	780	mW
Operating ambient temperature Note)		T_{opr}	−20 to +70	℃
Storage temperature Note)		T_{stg}	−55 to +125	℃

Note) Ta=25℃ except operating ambient temperature and storage temperature.

■ Recommended Operating Range (Ta=25℃)

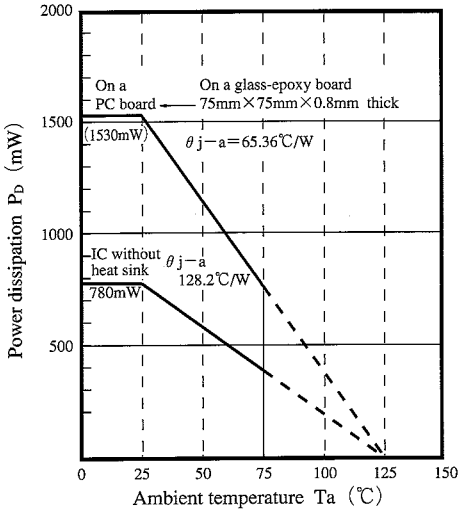
Parameter	Symbol	Range
Operating supply voltage range	V_{CC}	4.5V to 5.5V

■ Electrical Characteristics (V_{CC}=5V, Ta=25±2℃)

Parameter	Symbol	Condition	min	typ	max	Unit
Circuit current	I_{CC}		—	—	20	mA
Torque command input voltage	EC		0.5	—	4.0	V
Torque command input current	I_{EC}	$V_{EC}=V_{ECR}$=2.5V	−1	—	—	μA
Torque command offset voltage	EC_{OFS}	AV=L	−150	—	150	mV
Torque command dead zone (A)	$EC_{DZ(A)}$	AV=H	50	—	200	mV
Torque command dead zone (V)	$EC_{DZ(V)}$	AV=L	50	—	150	mV
Output idle voltage	ATC idle		0	—	4	mV
Input-output gain (A)	Gio (A)	AV=H	0.115	0.13	0.145	times
Input-output gain (V)	Gio (V)	AV=L	0.46	0.52	0.58	times
Max. output voltage (A)	V_{ATC} max. (A)	AV=H	0.135	—	—	V
Max. output voltage (V)	V_{ATC} max. (V)	AV=L	0.540	—	—	V
Hall input allowable voltage	Hin		1.0	—	3.5	V
Hall input offset	H_{OFS}		−8	—	8	mV
TL-CS offset	TL_{OFS}	V_{TL}=0.1V	0	7	15	mV
Upper drive max. current	I_{MP}		40	—	—	mA
Switching power supply drive current	I_{SW}		100	—	—	mA
Switching power supply rise time	SW_{ONt}		—	—	1.0	μs
Switching power supply fall time	SW_{OFFt}		—	—	1.0	μs
Switching power supply comparator offset	PCS_{OFS}		−10	—	10	mV
Switching power supply comparator input current	I_{PCS}		−5	—	—	μA
FG comparator hysteresis width	FGhw		150	—	250	mV
FG comparator output voltage (H)	$V_{FG(H)}$	I_{FGOUT}=−100μA	3.5	—	—	V
FG comparator output voltage (L)	$V_{FG(L)}$	I_{FGin}=1mA	—	—	1.5	V
Power-cut ON voltage	PC_{ON}		3.5	—	—	V
Power-cut OFF voltage	PC_{OFF}		—	—	1.5	V
Forward command voltage	ED_F		3.5	—	—	V
Reverse command voltage	ED_R		—	—	1.5	V
Brake current	I_{BR}	V_{BR}=3V $I_{ML1}-I_{ML3}$	−40	—	—	mA
Switching power supply oscillator oscillation frequency	f_{SW}	R_{FCR}=2400Ω C_{FCC}=1000pF	155	185	215	kHz
A/V change-over audio mode	$A/V_{(A)}$		3.5	—	—	V
A/V change-over video mode	$A/V_{(V)}$		—	—	1.5	V
Lower output voltage (1)	$V_{N(1)}$	V_{ATC}=140mV	0.36	0.52	0.68	V
Lower output voltage (2)	$V_{N(2)}$	V_{ATC}=700mV	0.955	1.36	1.775	V
Lower drive max. current	I_{ML}		−40	—	—	mA
Switching power supply oscillator oscillation level (H)	$FC_{C(H)}$	R_{FCR}=2400Ω C_{FCC}=1000pF	3.0	3.1	3.2	V
Switching power oscillator oscillation level (L)	$FC_{C(L)}$	R_{FCR}=2400Ω C_{FCC}=1000pF	1.9	2.0	2.1	V
Torque command reference voltage	EC_R		2.0	—	3.0	V

■ Reference

$P_D - Ta$



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