

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8488AF

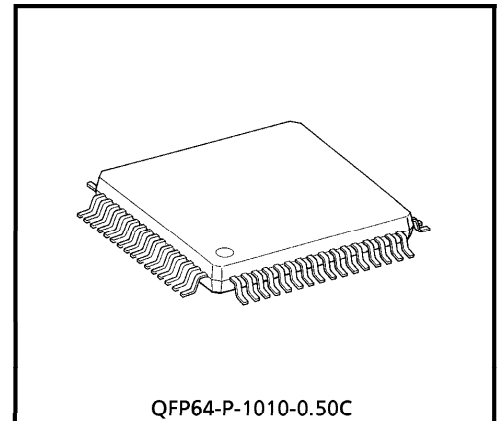
CYLINDER AND CAPSTAN MOTOR CONTROLLER IC FOR VTR MOVIES

The TA8488AF is a single-chip IC for VTR movie cylinder motor controllers and capstan motor controllers.

Both the cylinder and capstan areas are soft-switching pre-drivers based on a 3-phase full-wave drive and pseudo-sine wave commutation control.

FEATURES

- Operating power voltage : $V_{CC(opr.)} = 3.0$ to 5.5 V
- <Cylinder area>
- Built-in FG amplifier and PG amplifier
 - 3-phase full-wave drive with hole sensors
 - Soft switching with pseudo-wine wave commutation control
 - Built-in short-break function
- <Capstan area>
- Built-in filter amplifier
 - 3-phase full-wave drive with hole sensors
 - Soft switching with pseudo-wine wave commutation control
 - Built-in short-break function

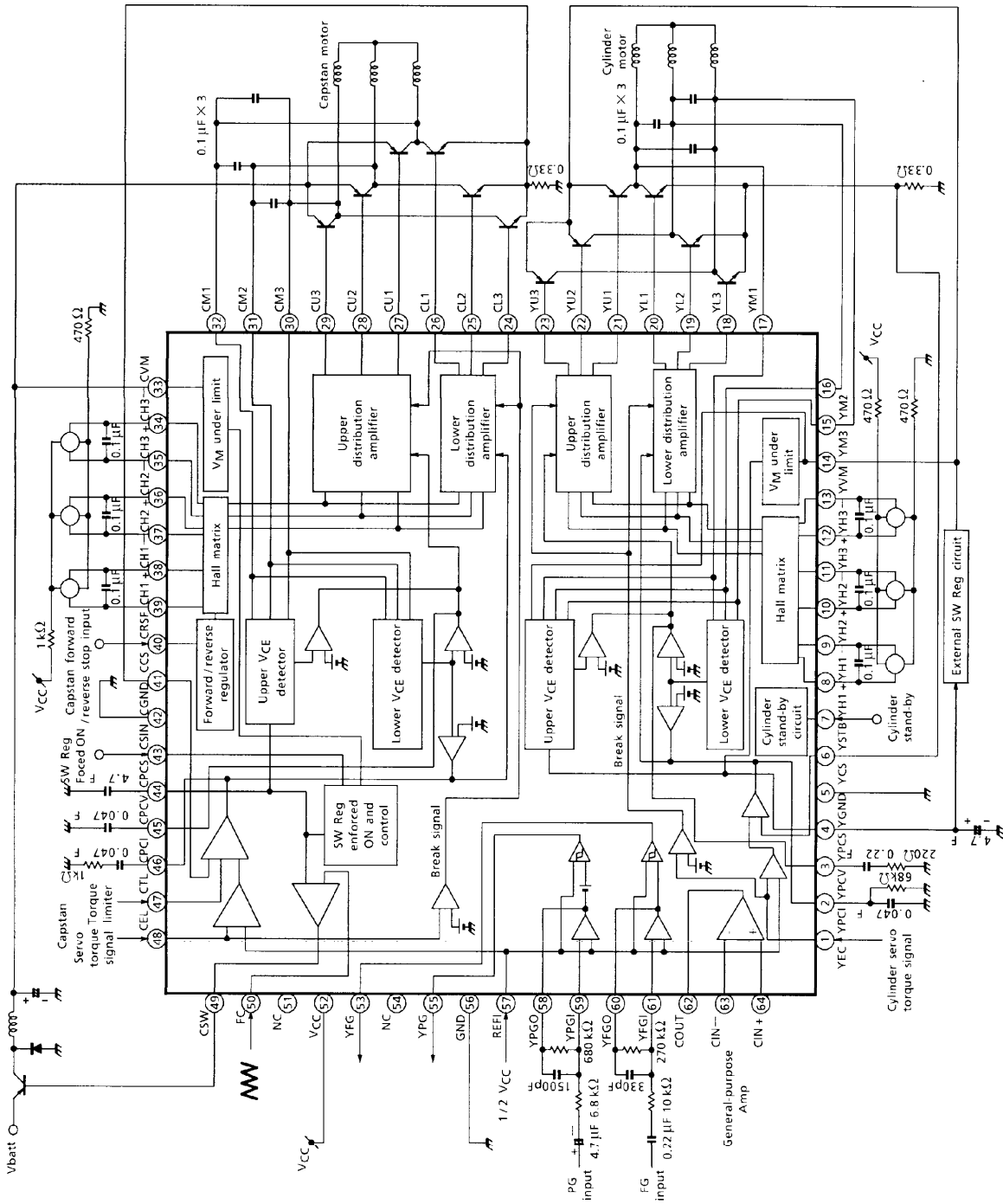


Weight : 0.48 g (Typ.)

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BLOCK DIAGRAM



(Note) Short circuiting between output and line to ground faults may result in damage to the IC. Ensure that great care is taken during the design of the output line, VCC (VM, VS, VEE) and the GND line.

PIN DESCRIPTIONS

PIN No.	PIN SYMBOL	PIN DESCRIPTION	PIN No.	PIN SYMBOL	PIN DESCRIPTION
1	YEC	Cylinder area's torque command input pin	34	CH3 –	Capstan motor hall element input
2	YPCI	Cylinder area's current feedback phase compensation	35	CH3 +	〃
3	YPCV	Cylinder area's voltage feedback phase compensation	36	CH2 –	〃
4	YPCS	Cylinder area's switching power control output	37	CH2 +	〃
5	YGND	Cylinder area's ground pin	38	CH1 –	〃
6	YCS	Cylinder area's current detection input pin	39	CH1 +	〃
7	YSTB	Cylinder area's stand-by switch input	40	CRSF	Capstan area's direction command input pin
8	YH1 +	Cylinder motor hall element input	41	CCS	Capstan area's current detection input pin
9	YH1 –	〃	42	CGND	Capstan area's ground pin
10	YH2 +	〃	43	CSIN	Capstan area's switching power control No. input
11	YH2 –	〃	44	CPCS	Capstan area's switching power control output
12	YH3 +	〃	45	CPCV	Capstan area's voltage feedback phase compensation
13	YH3 –	〃	46	CPCI	Capstan area's current feedback phase compensation
14	YVM	Cylinder motor power pin	47	CTL	Capstan area's torque limit
15	YM3	Cylinder motor coil pin	48	CEC	Capstan Area's torque command input pin
16	YM2	〃	49	CSW	Capstan area's switching pre-driver output
17	YM1	〃	50	FC	Switching comparator triangular wave input
18	YL3	Cylinder motor lower pre-driver output	51	—	Non-connection
19	YL2	〃	52	V _{CC}	Control circuit power pin
20	YL1	〃	53	YFG	Cylinder area's FG wave output
21	YU1	Cylinder motor upper pre-driver output	54	—	Non-connection
22	YU2	〃	55	YPG	Cylinder area's PG wave output
23	YU3	〃	56	GND	FG, PG and general-purpose amplifier's ground pin
24	CL3	Capstan motor lower pre-driver output	57	REFI	FG, PG and control circuit's standard voltage input
25	CL2	〃	58	YPGO	Cylinder area's PG amplifier output
26	CL1	〃	59	YPGI	Cylinder area's PG input
27	CU1	Capstan motor upper pre-driver output	60	YFGO	Cylinder area's FG amplifier output
28	CU2	〃	61	YFGI	Cylinder area's FG input
29	CU3	〃	62	COUT	General-purpose amplifier output
30	CM3	Capstan motor coil pin	63	CIN –	General-purpose amplifier minus input
31	CM2	〃	64	CIN +	General-purpose amplifier plus input
32	CM1	〃			
33	CVM	Capstan motor power pin			

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT	REMARKS
Logic Power Voltage	V _{CC}	8	V	V _{CC}
Motor Power Voltage	V _M	10	V	YVM, CVM
Output Pin Voltage	V _N	10	V	YM1, YM2, YM3, YU1, YU2, YU3, YL1, YL2, YL3, CM1, CM2, CM3, CU1, CU2, CU3, CL1, CL2, CL3
Input Pin Voltage	V _I	-0.3~ V _{CC} + 0.3	V	YEC, YSTB, YH1+, YH1-, YH2+, YH2-, YH3+, YH3-, CH1+, CH1-, CH2+, CH2-, CH3+, CH3-, CRSF, CSIN, CTL, FC, YPGI, YFGI, CIN-, CIN+
Power Dissipation	P _D	0.95	W	IC unit
Operating Temperature	T _{opr}	-20~75	°C	
Storage Temperature	T _{stg}	-55~125	°C	

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN	TYP.	MAX	UNIT
Power Voltage	V _{CC}	4.0	4.5	5.0	V
Motor Power Voltage	V _M	2.0		6.0	V
Output Voltage	I _O	—	—	12	mA

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V_{CC} = 4.5\text{ V}$, $YVM = CVM = 6\text{ V}$ when not specifically designated)

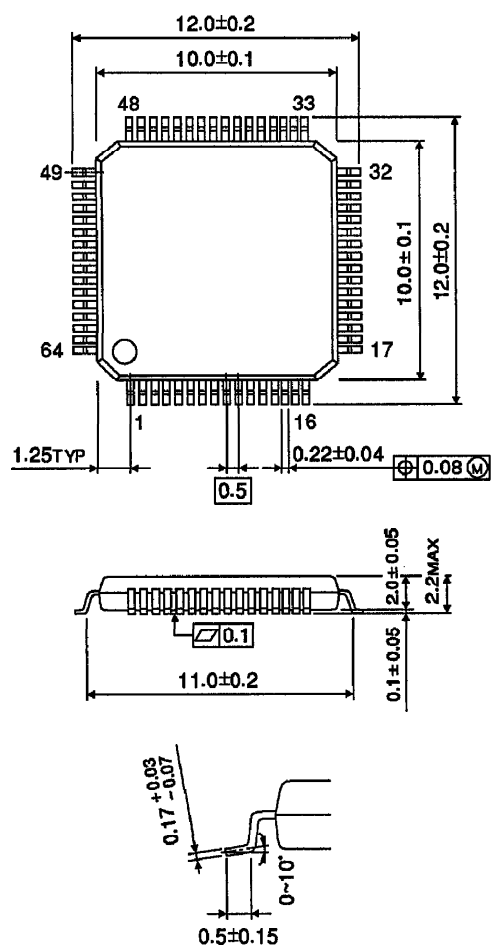
Cylinder area

No.	CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
1	Power Supply Current (1)	$I_{CC}(1)$	1	During STB			20	mA
2	Power Supply Current (2)	$I_{CC}(2)$	1	When both CAP and CYL are operating			20	mA
3	Torque Command Input Current	YIEC	2		- 2.3			μA
4	Torque Command Input Voltage	YEC	3		0.5		3.5	V
5	Maximum Output Voltage	YCSMAX	3		0.21			V
6	Torque Command I/O Gain	YGIO	3		0.215		0.275	
7	Output Idling Voltage	YCSIDLE	3				4	mV
8	Torque Command Input Offset	YECOF5	3		- 100		100	mV
9	Lower VCE Voltage (1)	YVLL (1)	4		0.22		0.45	V
10	Lower VCE Voltage (2)	YVLL (2)	4		0.5		1.0	V
11	Hall Element Input Power Dissipation	YHIN	5		1.5		2.5	V
12	Hall Element Input Conversion Offset	YHOFS	6		- 8		8	mV
13	Ripple Cancel Ratio	YR	3		6		16	%
14	Stand-by Cancel Voltage	YSTBL	7				1	V
15	Stand-by Operating Voltage	YSTBH	7		3.5			V
16	Maximum Upper Drive Current	YIU	8		12			mA
17	Maximum Lower Drive Current	YIL	8				- 12	mA
18	Short Break On Voltage	YBRK	9		2.55		2.85	V
19	Short Break Pre-current	YIBRK	9		0.8		2.0	mA
20	SW Power Control Output Gain	YGPCS	10		11		19	
21	SW Power Control Voltage	YVUD	10		0.35		0.7	V
22	V_M Under Limit	YVML	11		1.4		2.4	V
23	YPG Thresh Level	YPGTH	12		0.475		0.575	V
24	YPG Hysteresis	YPGHYS	—	Design assurance		54		mV
25	YPG High Level	YPGH	13		3			V
26	YPG Low Level	YPGL	13				1.5	V
27	YFG Hysteresis	YFGHYS	—	Design assurance		26		mV
28	YFG High Level	YFGH	13		3			V
29	YFG Low Level	YFGL	13				1.5	V
30	YPG Amplifier Loop Gain	YPGG	31		45			dB
31	YFG Amplifier Loop Gain	YFGG	31		45			dB

Capstan area

No.	CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
32	Torque Command Input Current	CIEC	14		-2			μ A
33	Torque Command Input Voltage	CEC	15		0.5	—	3.5	V
34	Maximum Output Voltage	CCSMAX	15		0.21			V
35	Torque Command I/O Gain	CGIO	15		0.215		0.275	
36	Output Idling Voltage	CCSIDLE	15				4	mV
37	Torque Command Input Offset	CECOFS	15		-100		100	mV
38	Lower VCE Voltage (1)	CVLL (1)	16		0.22		0.45	V
39	Lower VCE Voltage (2)	CVLL (2)	16		0.5		0.8	V
40	Hall Element Input Power Dissipation	CHIN	17		1.5		2.5	V
41	Hall Element Input Conversion Offset	CHOFS	18		-8		8	mV
42	TL-CS Offset (1)	CTLOFS1	19		1		10	mV
43	TL-CS Offset (2)	CTLOFS2	19		8		23	mV
44	Reverse Command Voltage	CVF	20				0.8	V
45	Stop Command Voltage	CVS	20		1.7		3	V
46	Reverse Command Voltage	CVR	20		3.7			V
47	Ripple Cancel Ratio	CR	15		12		22	%
48	Maximum Upper Drive Current	CIU	21		12			mA
49	Maximum Lower Drive Current	CIL	22				-12	mA
50	SW Power Input Offset	CSWOFS	23		-20		20	mV
51	SW Power Control Output Gain	CGPCS	24		6		12	
52	SW Power Control Voltage (1)	CVUD (1)	24		0.2		0.5	V
53	SW Power Control Voltage (2)	CVUD (2)	24		0.4		0.8	V
54	Maximum SW Power Output Current (1)	CISWB (1)	25	CEC = 0 V	10			mA
55	Maximum SW Power Output Current (2)	CISWB (2)	25	CEC = 2.25 V	6			mA
56	SW Power Control On Voltage	CSWON	26		3.5			V
57	SW Power Control Off Voltage	CSWOFF	26				1	V
58	VM Under Limit	CVML	27		1.4		2.2	V
59	Short Break On Voltage	CBRK	28		2.50		2.75	V
60	Short Break Pre-current	CIBRK	28		0.8		2.0	mA
61	Amplifier Input Bias Current	CAII	29		-120			nA
62	Amplifier Input Offset	CAVO	30		-5		5	mV
63	Amplifier Output High Level	CAMPH	13		3.4			V
64	Amplifier Output Low Level	CAMPL	13				0.5	V
65	Amplifier Loop Gain	CAMPG	31		45			dB

Unit : mm



Weight : 0.48 g (Typ.)