

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA8488AF

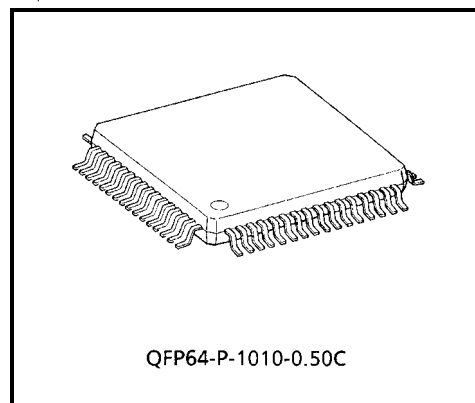
## CYLINDER AND CAPSTAN MOTOR CONTROLLER IC FOR VTR MOVIES

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.)



## PIN DESCRIPTIONS

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

## MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT	REMARKS
Logic Power Voltage	V <sub>CC</sub>	8	V	V <sub>CC</sub>
Motor Power Voltage	V <sub>M</sub>	10	V	YVM, CVM
Output Pin Voltage	V <sub>N</sub>	10	V	YM1, YM2, YM3, YU1, YU2, YU3, YL1, YL2, YL3, CM1, CM2, CM3, CU1, CU2, CU3, CL1, CL2, CL3
Input Pin Voltage	V <sub>I</sub>	-0.3~ V <sub>CC</sub> + 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 <sub>D</sub>	0.95	W	IC unit
Operating Temperature	T <sub>opr</sub>	-20~75	°C	
Storage Temperature	T <sub>stg</sub>	-55~125	°C	

## RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN	TYP	MAX	UNIT
Power Voltage	V <sub>CC</sub>	4.0	4.5	5.0	V
Motor Power Voltage	V <sub>M</sub>	2.0		6.0	V
Output Voltage	I <sub>O</sub>	—	—	12	mA

## ELECTRICAL CHARACTERISTICS (Ta = 25°C, VCC = 4.5 V, YVM = CVM = 6 V when not specifically designated)

### Cylinder area

No.	CHARACTERISTICS	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
1	Power Supply Current (1)	I <sub>CC (1)</sub>	1	During STB			20	mA
2	Power Supply Current (2)	I <sub>CC (2)</sub>	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	YECOFS	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 <sub>M</sub> 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	Y PGL	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	Y PGG	31		45			dB
31	YFG Amplifier Loop Gain	YFGG	31		45			dB

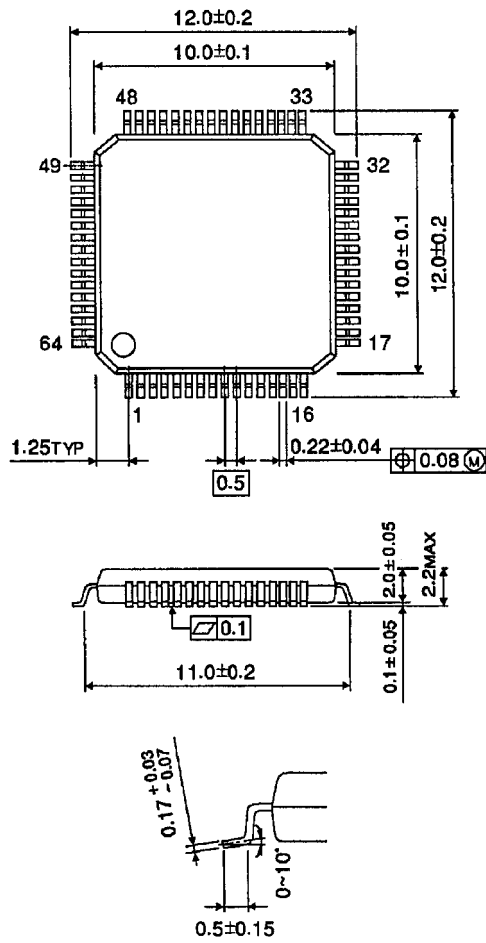
## Capstan area

No.	CHARACTERISTICS	SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
32	Torque Command Input Current	CIEC	14		-2			μA
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

## PACKAGE DIMENSIONS

QFP64-P-1010-0.50C

Unit : mm



Weight : 0.48 g (Typ.)

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