M54548AL

BI-DIRECTIONAL MOTOR DRIVER WITH MOTOR SPEED CONTROL

DESCRIPTION

The M54548AL, BI-DIRECTIONAL MOTOR DRIVER, consists of a full bridge power driver designed for use in a D-C motor control circuit. The internal operational amplifier is capable for controlling the voltage across the bridge outputs.

FEATURES

- Wide operating voltage range
- NMOS and CMOS compatible input
- 1.2A output current
- Integral operational amplifier for output source voltage
- Intergral diodes for transient suppression
- Braking mode input
- 12pin shrink single inline package with heat shink

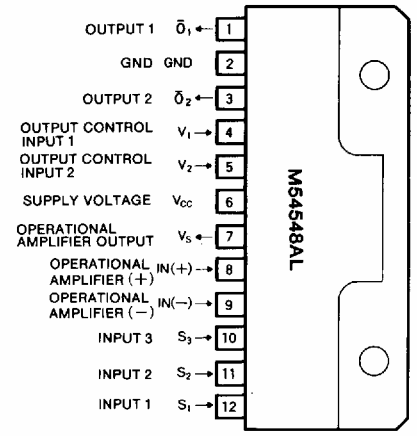
APPLICATION

Audio, video cassette recorder

FUNCTION

The M54548AL, full bridge motor driver, has the logic circuitry and the quasi-darlington power driver for bidirectional control of D-C motors operating at current up to 1.2A. The inputs, S_1, S_2 and S_3, are capable to control the bridge output polarity and also to select the supply voltage of the predriver from the voltages drived by V_1, V_2 or the output of the operational amplifier.

PIN CONFIGURATION (TOP VIEW)

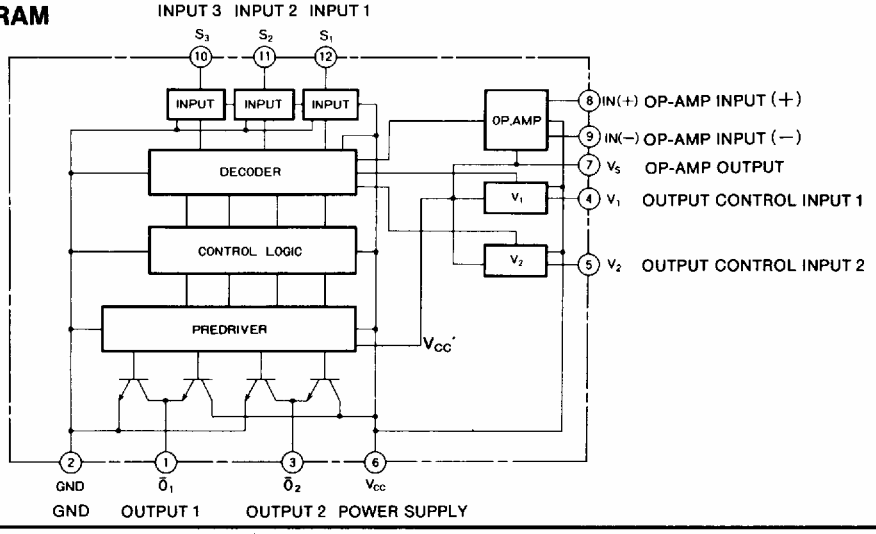


Outline 12P9B

LOGIC TRUTH TABLE

Inputs			Output		Driver power supply	Note
S_1	S_2	S_3	$\bar{O}_1$	$\bar{O}_2$	(V_{CC}')	
L	L	L	"OFF" state	"OFF" state	—	STOP
L	L	H	H	L	OP-AMP OUTPUT	PLAY(+)
L	H	L	L	H	OP-AMP OUTPUT	PLAY(−)
L	H	H	H	L	V_2	FF(2)
H	L	L	L	H	V_2	REW(2)
H	L	H	H	L	V_1	FF(1)
H	H	L	L	H	V_1	REW(1)
H	H	H	L	L	V_S	BRAKING

BLOCK DIAGRAM



MITSUBISHI ELECTRIC

ABSOLUTE MAXIMUM RATINGS (T_a=25℃, unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CC}	Supply voltage	With external heat sink (3000mm²×1.5mm^t)	−0.5～+18	V
V_I	Input voltage	4Pin, 5Pin	−0.5～+14 or V_{CC}	V
		Other input pins	−0.5～V_{CC}	
V_O	Output voltage		−0.5～ V_{CC} +2.5	V
$I_{O(max)}$	Allowable motor charge current	t_{op} = 10ms; Repetitive cycle 0.2 Hz max	±1.2	A
$I_{O(1)}$	Continuous output current (1)		±300	mA
$I_{O(2)}$	Continuous output current (2)	With an external heat sink (3000mm²×1.5mm^t)	±600	mA
Pd	Power dissipation	T_a =75℃	1.1	W
Topr	Operating temperature		−10～+75	℃
Tstg	Storage temperature		−55～+125	℃

RECOMMENDED OPERATING CONDITIONS (T_a=−25℃, unless otherwise noted)

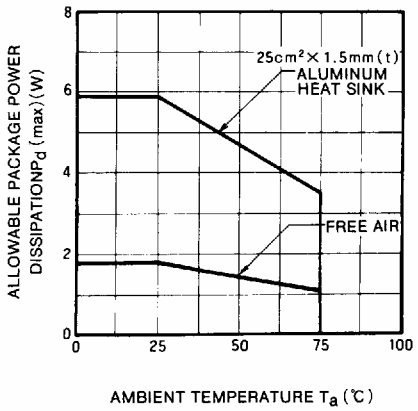
Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V_{CC}	Supply voltage		4	12	16	V
I_O	Output current				±200	mA
V_{IH}	High-level input voltage		3			V
V_{IL}	Low-level input voltage				1	V
t_B	Motor braking interval		10	100		ms

ELECTRICAL CHARACTERISTICS (T_a=25℃, unless otherwise noted)

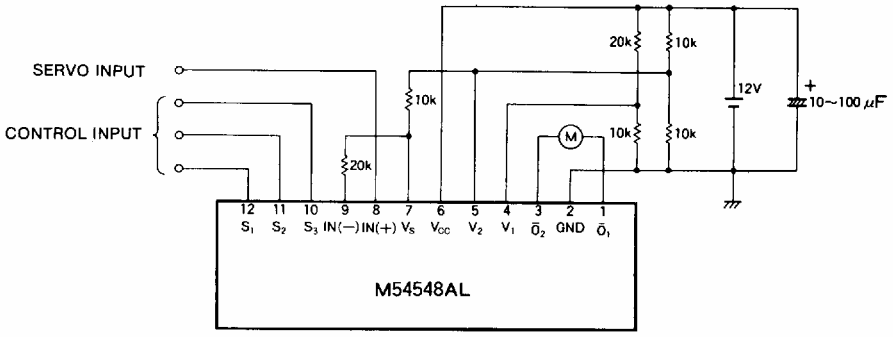
Symbol	Parameter	Test conditions			Limits			Unit
					Min	Typ	Max	
$I_{O(leak)}$	Output leakage current	V_{S1}=0V, V_{S2}=0V, V_{S3}=0V	V_O=0V, V_{CC}=V_S=20V				−100	μA
			V_O=14V, V_{CC}=V_S=14V				+100	
$V_{OH(1)}$	High-level output saturation voltage (1)	V_{CC}=16V, $V_{IN(-)}$=0V, $V_{IN(+)}$=3V	V_{S1}=V_{S2}=0V, V_{S3}=3V	I_{OH}=−200mA	13			V
				I_{OH}=−500mA	12.8			
$V_{OH(2)}$	High-level output saturation voltage (2)	V_{CC}=16V, $V_{IN(-)}$=0V, $V_{IN(+)}$=3V	V_{S1}=V_{S3}=0V, V_{S2}=3V	I_{OH}=−200mA	13			V
				I_{OH}=−500mA	12.8			
$V_{OL(1)}$	Low-level output saturation voltage (1)	V_{CC}=16V, $V_{IN(-)}$=0V, $V_{IN(+)}$=3V	V_{S1}=V_{S3}=0V, V_{S2}=3V	I_{OL}=200mA			0.5	V
				I_{OL}=500mA			1.4	
$V_{OL(2)}$	Low-level output saturation voltage (2)	V_{CC}=16V, $V_{IN(-)}$=0V, $V_{IN(+)}$=3V	V_{S1}=V_{S2}=0V, V_{S3}=3V	I_{OL}=200mA			0.5	V
				I_{OL}=500mA			1.4	
I_{IH}	High-level input current	V_{CC}=16V, V_{IS}=3V (S_1, S_2, S_3)					10	μA
I_{IL}	Low-level input current	V_{CC}=16V, V_{IS}=0V (S_1, S_2, S_3)					−20	μA
I_{CC}	Supply current	V_{CC}=16V, V_{S1}=V_{S2}=V_{S3}=3V					30	mA
A	Op-amp open loop gain				50			dB

TYPICAL CHARACTERISTICS

ALLOWABLE AVERAGE POWER DISSIPATION



APPLICATION EXAMPLE



Unit : Ω

MITSUBISHI ELECTRIC