Four-Channel BTL Driver for CD Players

HITACHI

ADE-207-330 (Z)

1st Edition Dec. 2000

Description

HA13143 is a four-channel BTL driver IC for driving CD player actuators (focus and tracking) and motors (carriage and spindle). It is ideal for small-profile players, since it requires few external parts and adopts a compact, surface-mounting package (MP-26 DT).

Functions

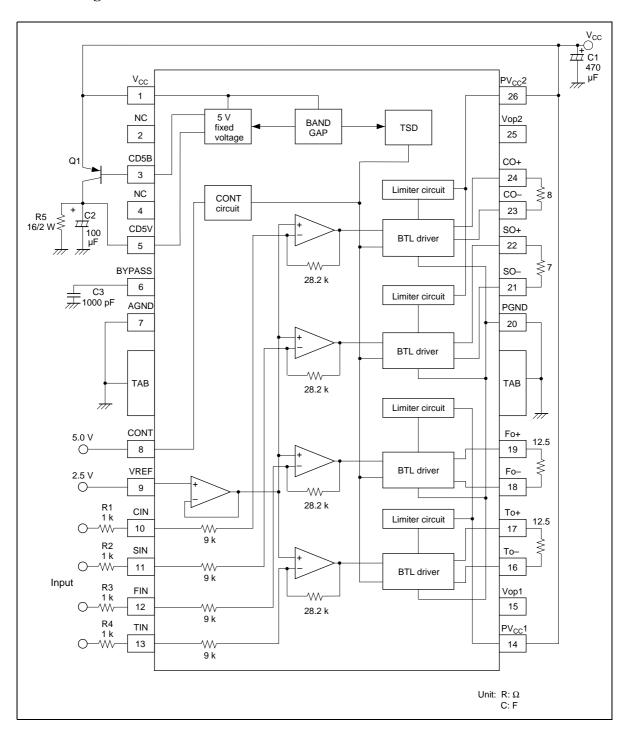
- 4-channel BTL driver
- 5 V power-supply circuit
- · Standby circuit
- Built-in protection circuits (surge current, TSD)

Features

- Four channels for driving the actuators and motors in a CD player
- · High driving current
- Built-in protection against surge currents from other circuits or from short circuits
- Built-in thermal shutdown protection circuit with hysteresis
- Built-in 5 V power supply (uses external pnp transistor)
- Compact MP-26 DT surface-mounting package enabling use in small-profile players



Block Diagram



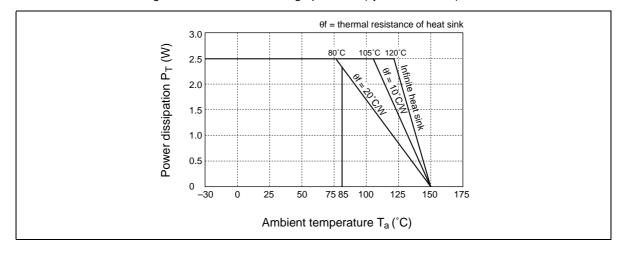
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Symbol Rating		Remarks	
Supply voltage	V _{cc}	18	V		
Output current	I _o -Peak	See Note 1	Α	1	
Power dissipation	P _T	2.5	W	2	
Operating temperature	Topr	-30 to +85	°C		
Storage temperature	Tstg	-55 to +125	°C		
Junction temperature	Tj	150	°C		

Notes: 1. Output current from each channel is as shown in table below.

	Focus	Tracking	Carriage	Spindle	Unit
Max. output current	1200	1200	1200	1400	mA

- 2. In normal play mode.
- 3. Usable operating voltage range Vopr = 7 to 10 V.
- 4. The derating curve is as shown in the graph below (θ jc = 8.0°C max.).



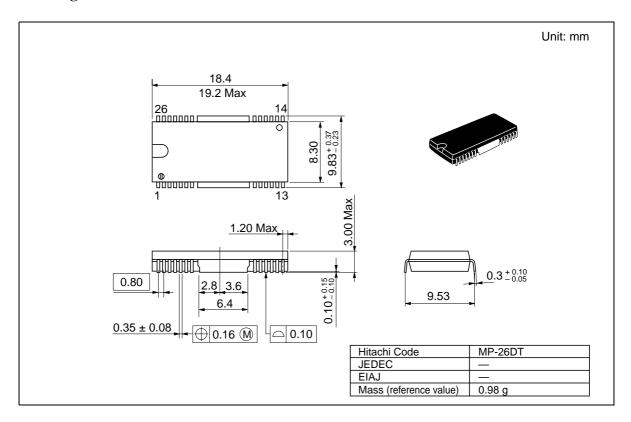
Electrical Characteristics (Ta = 25°C, V_{cc} = 8.0 V)

Item	Symbol	Min	Тур	Max	Unit	Test Conditions	Applicable Pins
Output voltage with stable 5 V power supply	Vs	4.65	5.00	5.35	V	I _L = 300 mA	5
Ripple rejection	SVR vs	40	_	_	dB		5
Output leakage current	lo L5B	_	_	1.0	μA	V _{cc} = 0 V	3
Focus driver							
Output voltage	Vfo	3.75	3.95	4.15	V	$R_{\scriptscriptstyle L}$ = 12.5 Ω	19, 20
Output offset voltage	VooF fo	-110	0	+110	mV	$R_{\scriptscriptstyle L}$ = 12.5 Ω	19, 20
Gain	Gv fo	14	15	16	dB	$R_L = 12.5 \Omega$, fin = 1 kHz	19, 20
Max. output amplitude	Vo fo	5.2	_	_	V	$R_{\scriptscriptstyle L}$ = 12.5 Ω	19, 20
Ripple rejection	SVR fo	30	_	_	dB		19, 20
Cutoff frequency	Fc fo	50	100	200	kHz		19, 20
Tracking driver							
Output voltage	Vtr	3.75	3.95	4.15	V	$R_{\scriptscriptstyle L}$ = 12.5 Ω	16, 17
Output offset voltage	VooFtr	-110	0	+110	mV	$R_{\scriptscriptstyle L}$ = 12.5 Ω	16, 17
Gain	Gv tr	14	15	16	dB	$R_L = 12.5 \Omega$, fin = 1 kHz	16, 17
Max. output amplitude	Vo tr	5.2	_	_	V	$R_{\scriptscriptstyle L}$ = 12.5 Ω	16, 17
Ripple rejection	SVRtr	30	_	_	dB		16, 17
Cutoff frequency	fctr	50	100	200	kHz		16, 17
Spindle driver							
Output voltage	Vsp	3.80	4.00	4.20	V	$R_{\scriptscriptstyle L} = 7.0 \ \Omega$	21, 22
Output offset voltage	VooFsp	-110	0	+110	mV	$R_{\scriptscriptstyle L} = 7.0 \ \Omega$	21, 22
Gain	Gvsp	14	15	16	dB	$R_L = 7.0 \Omega$, fin = 1 kHz	21, 22
Max. output amplitude	Vo sp	4.2	_	_	V	$R_{\scriptscriptstyle L} = 7.0 \ \Omega$	21, 22
Ripple rejection	SVR sp	30	_	_	dB		21, 22
Cutoff frequency	fcsp	50	100	200	kHz		21, 22
Carriage driver							
Output voltage	Vcr	3.80	4.00	4.20	V	$R_{\scriptscriptstyle L} = 8.0 \ \Omega$	23, 24
Output offset voltage	VooF cr	-110	0	+110	mV	$R_{\scriptscriptstyle L}$ = 8.0 Ω	23, 24
Gain	Gvcr	14	15	16	dB	$R_L = 8.0 \Omega$, fin = 1 kHz	23, 24
Max. output amplitude	Vocr	4.2	_	_	V	$R_{\scriptscriptstyle L} = 8.0 \ \Omega$	23, 24
Ripple rejection	SVR cr	30	_	_	dB		23, 24
Cutoff frequency	Fccr	50	100	200	kHz		23, 24

Electrical Characteristics (Ta = 25°C, V_{cc} = 8.0 V) (cont)

Item	Symbol	Min	Тур	Max	Unit	Test Conditions	Applicable Pins
Channel crosstalk	СТ	50	_	_	dB	fin = 1 kHz, 4 ch	16, 17, 18, 19, 21, 22, 23, 24
Operating voltage (1)	Vop1	3.75	3.95	4.15	V	Actuators	16
Operating voltage (2)	Vop2	3.80	4.00	4.20	V	Motors	25
Protection circuits							
Limiter operating current Focus	I _{LMT} fo	_	860	_	mA		18, 19
Limiter operating current Tracking	I _{LMT} tr	_	860	_	mA		16, 17
Limiter operating current Spindle	I _{LMT} sp	_	1100	_	mA		21, 22
Limiter operating current Carriage	I _{LMT} Cr	_	930	_	mA		23, 24
TSD operating temperature	Ttsd	_	165	_	°C		
TSD hysteresis temperature	Thys	_	30	_	°C		
CONT circuit High-level input voltage	V _{IH} cut	_	_	3.0	V		8
0Low-level input voltage	V _⊩ cut	2.0	_	_	V		8
High-level input current	I _⊪ cut	0.3	1.0	5.0	μA	CONT = 3.0 V	8
Low-level input current	I cut	_	_	0.1	μA	CONT = 2.0 V	8
Circuit current when no signal (standby)	Istby 1	4.0	6.0	10.0	mA	CONT = 2.0 V BYPASS = OPEN	1, 14, 26
Circuit current when no signal (standby)	Istby 2	3.0	5.0	9.0	mA	CONT = 3.0 V BYPASS = "L"	1, 14, 26
Circuit current when no signal	lcc 1	10	20	30	mA	CONT = 3.0 V BYPASS = OPEN	1, 14, 26
Bypass voltage	Vbps	1.3	1.45	1.6	V		6
Driving performance Focus	lo fo	500	860	_	mA		18, 19
Driving performance Tracking	lo tr	500	860	_	mA		16, 17
Driving performance Spindle	lo sp	750	1100	_	mA		21, 22
Driving performance Carriage	lo cr	650	930	_	mA		23, 24

Package Dimensions



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