National Semiconductor

MILITARY DATA SHEET

MNLMD18200-2-X REV 0B1

Original Creation Date: 08/03/94
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Last Major Revision Date: 08/03/94

LMD18200 3A, 55V H-BRIDGE

General Description

The LMD18200 is a 3A H-Bridge designed for motion control applications. The device is built using a multi-technology process which combines bipolar and CMOS control circuitry with DMOS power devices on the same monolithic structure. Ideal for driving DC and stepper motors; the LMD18200 accommodates peak output currents up to 6A. An innovative circuit which facilitates low-loss sensing of the output current has been implemented.

Industry Part Number

LMD18200

NS Part Numbers

LMD18200-2D/883

Prime Die

LM18200

Controlling Document

5962-9232501MXA

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (°C)
1	Static tests at	+25
2	Static tests at	+125
3	Static tests at	-55
4	Dynamic tests at	+25
5	Dynamic tests at	+125
6	Dynamic tests at	-55
7	Functional tests at	+25
8A	Functional tests at	+125
8B	Functional tests at	-55
9	Switching tests at	+25
10	Switching tests at	+125
11	Switching tests at	-55

Features

- Delivers up to 3A continuous output
- Operates at supply voltages up to 55V
- Low Rds(ON) typically 0.3 Ohms per switch
- TTL and CMOS compatible inputs
- No "shoot-through" current
- Thermal warning flag output at 145 C
- Thermal shutdown (outputs off) at 170 C
- Internal clamp diodes
- Shorted load protection
- Internal charge pump with external bootstrap capability

Applications

- DC and stepper motor drives
- Position and velocity servomechanisms
- Factory automation robots
- Numerically controlled machinery
- Computer printers and plotters

(Absolute Maximum Ratings)
(Note 1)

Total Supply Voltage at Vs Pin Vs, Pins 6 & 7	60V
Voltage at Pins Pins 3, 4, 5, 9, 10, 15, 16, 17, 21 & 22	12V
Voltage at Bootstrap Pins Pins 1, 12, 13, & 24	Vout + 16V
Peak Output Current (200ms)	6A
Continuous Output Current (Note 2)	3A
Power Dissipation (Note 3)	25W
Power Dissipation (Ta = 25 C, Free Air)	3W
Junction Temperature, Tj(max)	150 C
Thermal Resistance ThetaJA (Still Air) (500LF/Min Air flow)	 40.5 C/W 13 C/W
ThetaJC	1.4 C/W
ESD Susceptibility (Note 4)	1500V
Storage Temperature, Tstg	-65 C to +150 C
Lead Temperature (Soldering, 10 Sec.)	300 C

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. DC and AC electrical specifications do not apply when operating the device beyond its rated operating conditions.
Note 2: See Application Information for details regarding current limiting.
Note 3: The maximum power dissipation must be derated at elevated temperatures and is a function of Tj (max), Tja, and Ta. The maximum allowable power dissipation at any temperature is Pd(max) = (Tj(max) - Ta)/Tja, or the number given in the Absolute Ratings, whichever is lower. The typical thermal resistance from junction to case (Tjc) is 1.0 C/W and from junction to ambient (Tja) is 30 C/W. For guaranteed operation Tj(max) = 125 C.
Note 4: Human-body model, 100pF discharged through a 1.5K Ohm resistor. Except Bootstrap pins (pins 1, 12, 13, and 24) which are protected to 1000V of ESD.

Recommended Operating Conditions
(Note 1)

Junction Temperature, Tj	-55 C to +125 C
Vs Supply Voltage	+12V to +55V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage the device may occur. DC and AC electrical specifications do not apply when operating the device beyond its rated operating conditions.

Electrical Characteristics

DC PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vs = 42V

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Rds (ON)	Switch ON Resistance	Output current = 2.4A	1			0.6	Ohms	1
			1			0.7	Ohms	2, 3
Vclamp	Clamp Diode Foward Drop	Clamp current = 2.4A	1			1.70	V	1, 2, 3
Vil	Logic Low Input Voltage			3,4,5, 15,16, 17	-0.1	0.8	V	1, 2, 3
Iil	Logic Low Input Current	Vin = -0.1V		3,4,5, 15,16, 17		-10	uA	1, 2, 3
Vih	Logic High Input Voltage			3,4,5, 15,16, 17	2	12	V	1, 2, 3
Iih	Logic High Input Current	Vin = 12V		3,4,5, 15,16, 17		10	uA	1, 2, 3
Iout Sense	Current Sense Output	Iout = 1A			250	500	uA	1
					225	525	uA	2, 3
Ilin Sense	Current Sense Linearity	1A $\leq$ Iout $\leq$ 2.4A	2		-20	20	%	1, 2, 3
	Undervoltage Lockout	Outputs turn OFF			9	15	V	1, 2, 3
If(OFF)	Flag Output Leakage	Vf = 12V				10	uA	1, 2, 3
Is	Quiescent Supply Current	All logic inputs low				25	mA	1, 2, 3

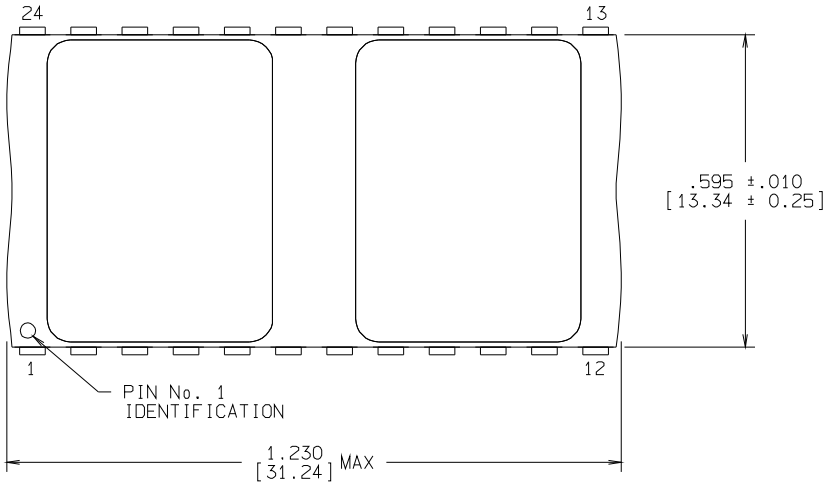
Note 1: Output currents are pulsed (tw<2ms, duty cycle <5%).
Note 2: Regulation is calculated relative to the current ssense output value with a 1A load.

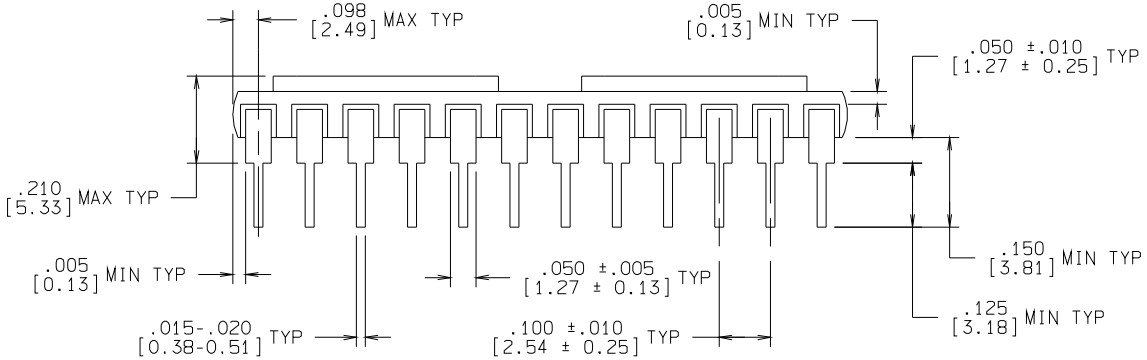
Graphics and Diagrams

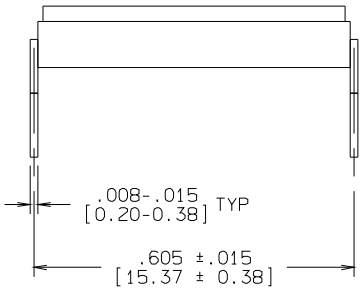
GRAPHICS#	DESCRIPTION
6257HRD2	H DIP, SIDEBRAZE,24LD,DUAL CAV .600CTS (B/I CKT)
DA24BRA	DIP,S/B, 24LD, DUAL CAV .600CTS (P/P DWG)
P000001B	H DIP, S/B, 24LD DUAL CAV. .600CTS (PIN OUT)

See attached graphics following this page.

REVISIONS				
LTR	DESCRIPTION	E.C.N.	DATE	BY/APP'D
A	RELEASE TO DOCUMENT CONTROL	10324	02/15/94	MS/







MIL/AERO
CONFIGURATION CONTROL

CONTROLLING DIMENSION: INCH

NOTES: UNLESS OTHERWISE SPECIFIED

1. LEAD FINISH TO BE ONE OF THE FOLLOWING:
   a) 200 MICROINCHES/5.08 MICROMETERS MINIMUM SOLDER MEASURED AT THE CREST OF THE MAJOR FLATS.
   b) 50 TO 225 MICROINCHES/1.27 TO 5.72 MICROMETERS GOLD OVER 50 TO 350 MICROINCHES/1.27 TO 8.89 MICROMETERS NICKEL UNDERPLATE.
2. REFERENCE JEDEC REGISTRATION MS-015, VARIATION CA, DATED 7/90.

APPROVALS	DATE
DRAWN MARTA SUCHY	02/15/94
DFTG. CHK.	
ENGR. CHK.	
APPROVAL	

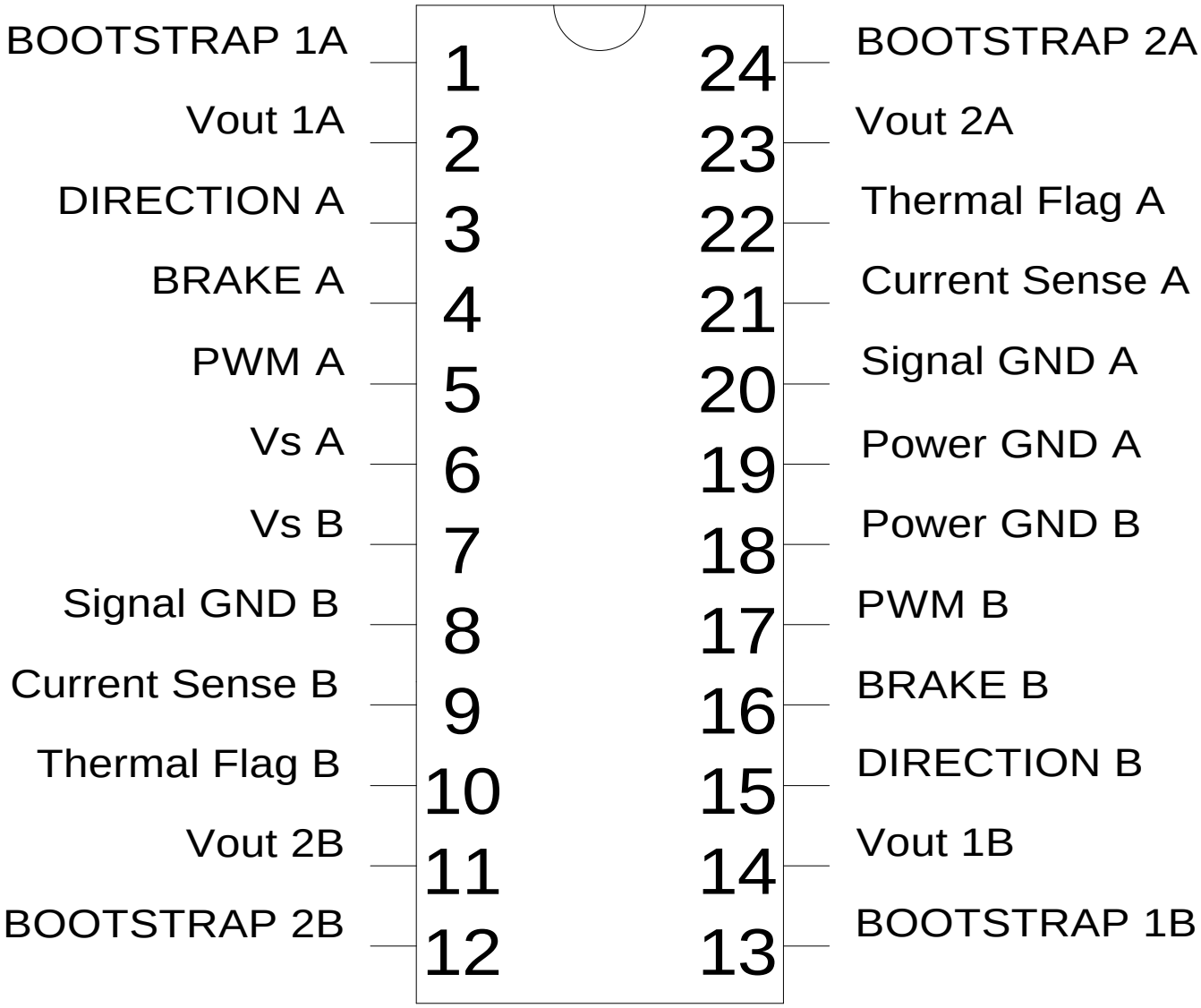
PROJECTION
INCH
[MM]

NATIONAL SEMICONDUCTOR CORPORATION
2900 Semiconductor Drive, Santa Clara, CA 95052-8090

DIP, SIDEBRAZED, CERAMIC, 24 LEAD, DUAL CAVITY, .600 CTRS

SCALE	SIZE	DRAWING NUMBER	REV
N/A	B	MKT-DA24B	A

DO NOT SCALE DRAWING | SHEET 1 OF 1



LMD18200-2D/883
CONNECTION DIAGRAM

24 - LEAD DIP
(TOP VIEW)

P000001B