National Semiconductor

MILITARY DATA SHEET

MNLM140-06H REV 0B0

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THREE TERMINAL POSITIVE REGULATORS

General Description

The LM140 monolithic 3-terminal positive voltage regulators employ internal current-limiting, thermal shutdown and safe-area compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver over 0.5A output current. They are intended as fixed voltage regulators in a wide range of applications including local (on-card) regulation for elimination of noise and distribution problems associated with single-point regulation. In addition to use as fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

Considerable effort was expended to make the entire series of regulators easy to use and minimize the number of external components. It is not necessary to bypass the output, although this does improve transient response. Input bypassing is needed only if the regulator is located far from the filter capacitor of the power supply.

Industry Part Number

LM140

NS Part Numbers

LM140H-6.0/883

Prime Die

LM141

Processing

MIL-STD-883, Method 5004

Quality Conformance Inspection

MIL-STD-883, Method 5005

Subgrp	Description	Temp (^{o}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

- Output current in excess of 0.5A
- No external components
- Internal thermal overload protection
- Internal short circuit current-limiting
- Output transistor safe-area compensation

(Absolute Maximum Ratings)
(Note 1)

DC Input Voltage	35V
Internal Power Dissipation (Note 2)	Internally Limited
Maximum Junction Temperature	150 C
Storage Temperature Range	-65 C to +150 C
Lead Temperature	300 C
Thermal Resistance	
ThetaJA	
(Still Air)	232 C/W
(500 LF/Min Air Flow)	77 C/W
ThetaJC	15 C/W
ESD Susceptibility (Note 3)	2KV

Note 1: Absolute Maximum Ratings are limits beyond which damage to the device may occur. Operating Conditions are conditions under which the device functions but the specification might not be guaranteed. For guaranteed specifications and test conditions see the Electrical Characteristics.
Note 2: The Maximum allowable power dissipation at any ambient temperature is a function of the maximum junction temperature for operation (TjMAX = 150 C), the junction-to-ambient thermal resistance (ThetaJA), and the ambient temperature (TA), PDMAX = (TjMAX - TA)/ThetaJA. If this dissipation is exceeded, the die temperature will rise above TjMAX and the electrical specifications do not apply. If the die temperature rises above 150 C, the device will go into thermal shutdown.
Note 3: Human body model, 100pF discharged through 1.5K Ohms.

Recommended Operating Conditions
(Note 1)

Temperature Range (TA) (Note 2)	-55 C to +125 C

Note 1: Absolute Maximum Ratings are limits beyond which damage to the device may occur. Operating Conditions are conditions under which the device functions but the specifications might not be guaranteed. For guaranteed specifications and test conditions see the Electrical Characteristics.
Note 2: The Maximum allowable power dissipation at any ambient temperature is a function of the maximum junction temperature for operation (TjMAX = 150 C), the junction-to-ambient thermal resistance (ThetaJA), and the ambient temperature (TA), PDMAX = (TjMAX - TA)/ThetaJA. If this dissipation is exceeded, the die temperature will rise above TjMAX and the electrical specifications do not apply. If the die temperature rises above 150 C, the device will go into thermal shutdown.

Electrical Characteristics

DC PARAMETERS:

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: Vin = 11V, Il = 350mA

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vout	Output Voltage				5.75	6.25	V	1
		Vin = 9V			5.7	6.3	V	1, 2, 3
		Vin = 9V, Il = 5mA			5.7	6.3	V	1, 2, 3
		Vin = 21V, Il= 5mA			5.7	6.3	V	1, 2, 3
		Vin = 21V			5.7	6.3	V	1, 2, 3
RLINE	Line Regulation	8V <= Vin <= 25V, Il = 200mA			-60	60	mV	1
					-120	120	mV	2, 3
		9V <= Vin <= 25V, Il = 200mA			-30	30	mV	1
					-60	60	mv	2, 3
		9V <= Vin <= 20V, Il = 200mA			-30	30	mV	1
					-60	60	mv	2, 3
RLOAD	Load Regulation	5mA <= Il <= 500mA			-60	60	mV	1
					-120	120	mV	2, 3
		5mA <= Il <= 200mA			-30	30	mV	1
					-60	60	mV	2, 3
IQ	Quiescent Current					7	mA	1, 2, 3
Delta IQ	Quiescent Current Change	9V <= Vin <= 25V, Il = 200mA			-0.8	0.8	mA	1, 2, 3
		5mA <= Il <= 350mA			-0.5	0.5	mA	1, 2, 3
Ipk	Peak Current	Vin - Vout = 7V	1		0.4	2	A	1, 2, 3
Vdo	Dropout Voltage		2			2.5	V	1
Ios	Short Circuit Current	Vin = 35V				1	A	1, 2, 3

AC PARAMETERS:

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: Vin = 11V, Il = 350mA

Rr	Ripple Rejection	ei = 1Vrms, f = 2.4KHz, Il = 125mA, Vin = 11V			59		dB	4, 5, 6

Note 1: Vout is set to 90% Reference Voltage.

(Continued)

Note 2: Vdo = Vin - Vout when Vo is 95% of Reference Voltage.

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
H03ARC	(blank)

See attached graphics following this page.