

MNLM1575HV-X-12 REV 0B0

Original Creation Date: 08/29/95

Last Update Date: 09/29/95

Last Major Revision Date: 08/29/95

SIMPLE SWITCHER(TM) 1A STEP-DOWN HIGH VOLTAGE REGULATOR

General Description

The LM1575HV regulator is a monolithic integrated circuit that provides all the active functions for a step-down (buck) switching regulator, capable of driving 1A load with excellent line and load regulation.

Requiring a minimum number of external components, this regulator is simple to use and includes internal frequency compensation and a fixed-frequency oscillator.

The LM1575HV offers a high-efficiency replacement for popular three-terminal linear regulators. It substantially reduces the size of the heat sink, and in many cases no heat sink is required.

A standard series of inductors optimized for use with the LM1575HV are available from several different manufacturers. This feature greatly simplifies the design of switch-mode power supplies.

Other features include a guaranteed $\pm 4\%$ tolerance on output voltage within specified input voltage and output load conditions, and $\pm 10\%$ on the oscillator frequency. External shutdown is included, featuring 50uA (typical) standby current. The output switch includes cycle-by-cycle current limiting, as well as thermal shutdown for full protection under fault conditions.

Industry Part Number

LM1575HV-12

NS Part Numbers

LM1575HVK12-QML

Prime Die

LM1575-12

Controlling Document

5962-9167302QXA

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

- Adjustable version output voltage range, $\pm 4\%$ max over line and load conditions
- Guaranteed 1A output current
- Requires only 4 external components
- 52KHz fixed frequency internal oscillator
- TTL shutdown capability, low power standby mode
- High efficiency
- Uses readily available standard inductors
- Thermal shutdown and current limit protection

Applications

- Simple high-efficiency step-down (buck) regulator
- Efficient pre-regulator for linear regulators
- On-card switching regulators
- Positive to negative converted (Buck-Boost)

(Absolute Maximum Ratings)

(Note 1)

Maximum Supply Voltage	63V
ON/OFF Pin Input Voltage	$-0.3V \leq V \leq +V_{in}$
Output Voltage to Ground (Steady State)	-1V
Power Dissipation	Internally Limited
Storage Temperature Range	-65 C to +150 C
Minimum ESD Rating (C = 100pF, R = 1.5K Ohms)	3KV
Lead Temperature (Soldering, 10 Sec.)	300 C
Maximum Junction Temperature	150 C
Thermal Resistance	
ThetaJA	
Metal Can (Still Air)	45 C/W
Metal Can (500LF/Min Air flow)	10 C/W
ThetaJC	
Metal Can	3.3 C/W

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics.

Recommended Operating Conditions

Temperature Range	$-55\text{ C} \leq T_A \leq +125\text{ C}$
Supply Voltage	60V

Electrical Characteristics

ELECTRICAL CHARACTERISTICS: SYSTEM PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: $V_{in} = 25V$, and $I_{load} = 200mA$.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vout	Output Voltage		1		11.88	12.12	V	1
		$0.2A \leq I_{load} \leq 1A$, $15V \leq V_{in} \leq 60V$	1		11.64	12.42	V	1
		$0.2A \leq I_{load} \leq 1A$, $15V \leq V_{in} \leq 60V$	1		11.52	12.54	V	2, 3

ELECTRICAL CHARACTERISTICS: DEVICE PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: $V_{in} = 25V$, and $I_{load} = 200mA$.

Vsat	Saturation Voltage	$I_{out} = 1A$	2			1.2	V	1
			2			1.4	V	2, 3
Icl	Current Limit	Peak Current, $t_{ON} \leq 3\mu S$	2		1.7	3.0	A	1
		Peak Current, $t_{ON} \leq 3\mu S$	2		1.3	3.2	A	2, 3
Il	Output Leakage Current	$V_{in} = 35V$, Output = 0V	4			2	mA	1
		$V_{in} = 35V$, Output = -1V	4			30	mA	1
Iq	Quiescent Current		4			10	mA	1
			4			12	mA	2, 3
Istby	Standby Quiescent Current	ON/OFF Pin = 5V (OFF)				200	uA	1
		ON/OFF Pin = 5V (OFF)				500	uA	2, 3

AC ELECTRICAL CHARACTERISTICS: DEVICE PARAMETERS

(The following conditions apply to all the following parameters, unless otherwise specified.)
AC: $V_{in} = 25V$, and $I_{load} = 200mA$.

fo	Oscillator Frequency				47	58	KHz	4
					43	62	KHz	5, 6
Dc	Max Duty Cycle (ON)		3		93		%	9

Electrical Characteristics

ELECTRICAL CHARACTERISTICS: ON/OFF CONTROL

(The following conditions apply to all the following parameters, unless otherwise specified.)
DC: $V_{in} = 25V$, and $I_{load} = 200mA$.

SYMBOL	PARAMETER	CONDITIONS	NOTES	PIN-NAME	MIN	MAX	UNIT	SUB-GROUPS
Vih	ON/OFF Pin Logic Input Level	Vout = 0V			2.2		V	1
Vih	ON/OFF Pin Logic Input Level	Vout = 0V			2.4		V	2, 3
Vil	ON/OFF Pin Logic Input Level	Vout = 12V				1.0	V	1
Vil	ON/OFF Pin Logic Input Level	Vout = 12V				.8	V	2, 3
Iih	ON/OFF Pin Input Current	ON/OFF Pin = 5V (OFF)				30	uA	1
Iil	ON/OFF Pin Input Current	ON/OFF Pin = 0V (ON)				10	uA	1

Note 1: External components such as the catch diode, inductor, input and output capacitors can affect switching regulator system performance.

Note 2: Output sourcing current. No diode, inductor or capacitor connected to output.

Note 3: Feedback removed from output and connected to 0V.

Note 4: Feedback removed from output and connected to 25V to force the output transistor OFF.

Graphics and Diagrams

GRAPHICS#	DESCRIPTION
KA04BRA	METAL CAN, T0-3, 4 LEAD, LOW PROFILE (P/P DWG)

See attached graphics following this page.

