

LM837 Low Noise Quad Operational Amplifier

General Description

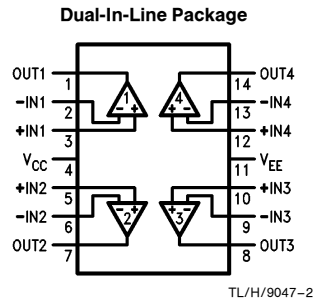
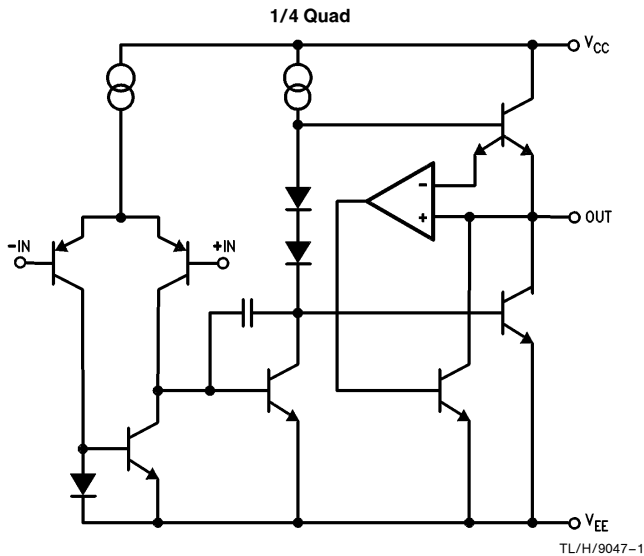
The LM837 is a quad operational amplifier designed for low noise, high speed and wide bandwidth performance. It has a new type of output stage which can drive a 600Ω load, making it ideal for almost all digital audio, graphic equalizer, pre-amplifiers, and professional audio applications. Its high performance characteristics also make it suitable for instrumentation applications where low noise is the key consideration.

The LM837 is internally compensated for unity gain operation. It is pin compatible with most other standard quad op amps and can therefore be used to upgrade existing systems with little or no change.

Features

- High slew rate 10 V/μs (typ)
8 V/μs (min)
- Wide gain bandwidth product 25 MHz (typ)
15 MHz (min)
- Power bandwidth 200 kHz (typ)
- High output current ±40 mA
- Excellent output drive performance > 600Ω
- Low input noise voltage 4.5 nV/√Hz
- Low total harmonic distortion 0.0015%
- Low offset voltage 0.3 mV

Schematic and Connection Diagrams



Top View

Order Number LM837M or LM837N
See NS Package Number M14A or N14A

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	V_{CC}/V_{EE}	$\pm 18V$
Differential Input Voltage (Note 1)	V_{ID}	$\pm 30V$
Common Mode Input Voltage (Note 1)	V_{IC}	$\pm 15V$
Power Dissipation (Note 2)	P_D	1.2W (N) 830 mW (M)
Operating Temperature Range	T_{OPR}	$-40^{\circ}C$ to $+85^{\circ}C$
Storage Temperature Range	T_{STG}	$-60^{\circ}C$ to $+150^{\circ}C$

Soldering Information

Dual-In-Line Package	
Soldering (10 seconds)	260°C
Small Outline Package	
Vapor Phase (60 seconds)	215°C
Infrared (15 seconds)	220°C

ESD rating is to be determined.

See AN-450 "Surface Mounting Methods and Their Effect on Product Reliability" for other methods of soldering surface mount devices.

DC Electrical Characteristics $T_A = 25^{\circ}C, V_S = \pm 15V$

Symbol	Parameter	Condition	Min	Typ	Max	Units
V_{OS}	Input Offset Voltage	$R_S = 50\Omega$		0.3	5	mV
I_{OS}	Input Offset Current			10	200	nA
I_B	Input Bias Current			500	1000	nA
A_V	Large Signal Voltage Gain	$R_L = 2\text{ k}\Omega, V_{OUT} = \pm 10V$	90	110		dB
V_{OM}	Output Voltage Swing	$R_L = 2\text{ k}\Omega$	± 12	± 13.5		V
		$R_L = 600\Omega$	± 10	± 12.5		V
V_{CM}	Common Mode Input Voltage		± 12	± 14.0		V
CMRR	Common Mode Rejection Ratio	$V_{IN} = \pm 12V$	80	100		dB
PSRR	Power Supply Rejection Ratio	$V_S = 15 \sim 5, -15 \sim -5$	80	100		dB
I_S	Power Supply Current	$R_L = \infty, \text{Four Amps}$		10	15	mA

AC Electrical Characteristics $T_A = 25^{\circ}C, V_S = \pm 15V$

Symbol	Parameter	Condition	Min	Typ	Max	Units
SR	Slew Rate	$R_L = 600\Omega$	8	10		V/ μ s
GBW	Gain Bandwidth Product	$f = 100\text{ kHz}, R_L = 600\Omega$	15	25		MHz

Design Electrical Characteristics $T_A = 25^{\circ}C, V_S = \pm 15V$ (Note 3)

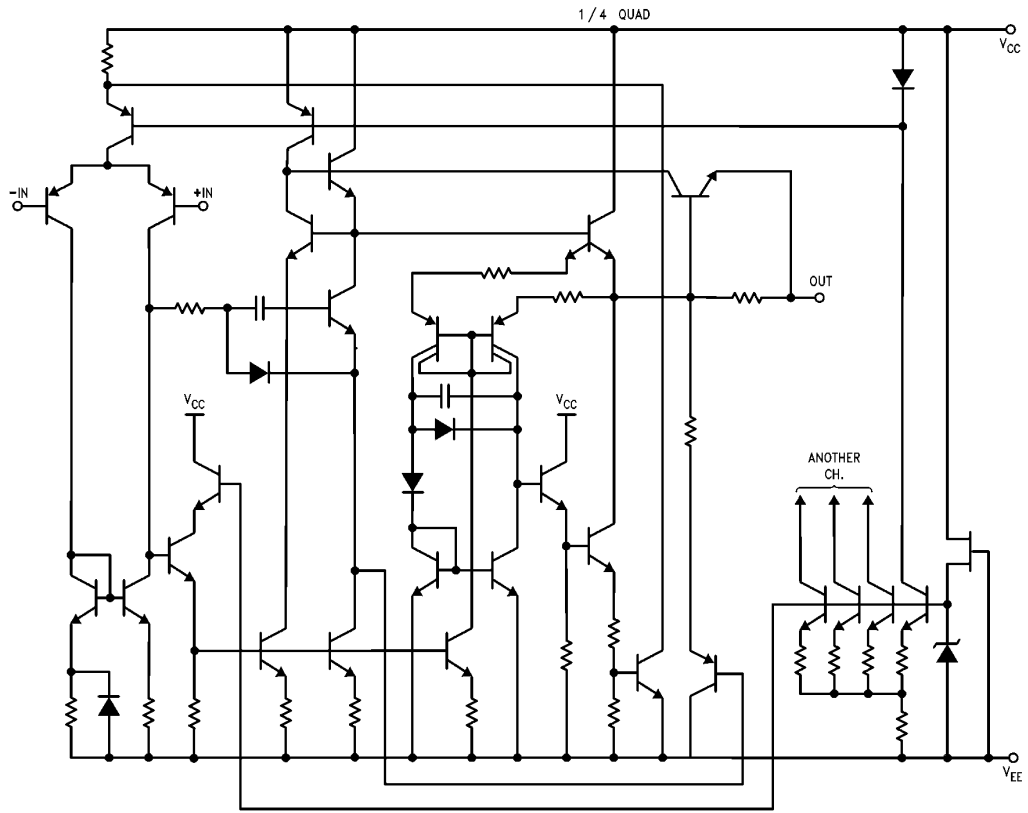
Symbol	Parameter	Condition	Min	Typ	Max	Units
PBW	Power Bandwidth	$V_O = 25 V_{P-P}, R_L = 600\Omega, THD < 1\%$		200		kHz
e_{n1}	Equivalent Input Noise Voltage	JIS A, $R_S = 100\Omega$		0.5		μ V
e_{n2}	Equivalent Input Noise Voltage	$f = 1\text{ kHz}$		4.5		nV/\sqrt{Hz}
i_n	Equivalent Input Noise Current	$f = 1\text{ kHz}$		0.7		pA/\sqrt{Hz}
THD	Total Harmonic Distortion	$A_V = 1, V_{OUT} = 3 V_{rms}, f = 20 \sim 20\text{ kHz}, R_L = 600\Omega$		0.0015		%
f_U	Zero Cross Frequency	Open Loop		12		MHz
ϕ_m	Phase Margin	Open Loop		45		deg
	Input-Referred Crosstalk	$f = 20 \sim 20\text{ kHz}$		-120		dB
$\Delta V_{OS}/\Delta T$	Average TC of Input Offset Voltage			2		μ V/ $^{\circ}C$

Note 1: Unless otherwise specified the absolute maximum input voltage is equal to the power supply voltage.

Note 2: For operation at ambient temperatures above 25°C, the device must be derated based on a 150°C maximum junction temperature and a thermal resistance, junction to ambient, as follows: LM837N, 90°C/W; LM837M, 150°C/W.

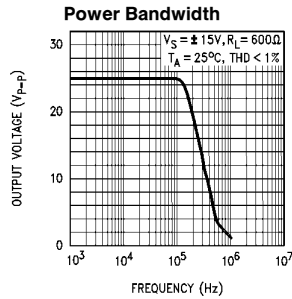
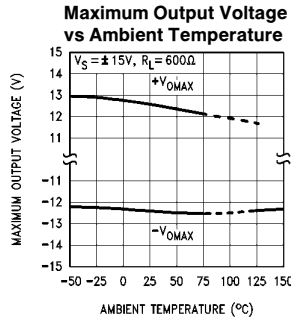
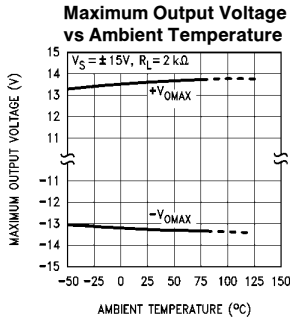
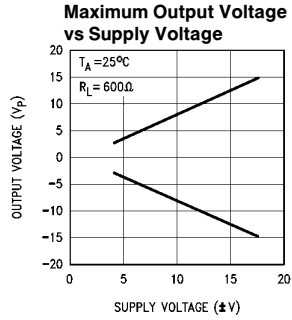
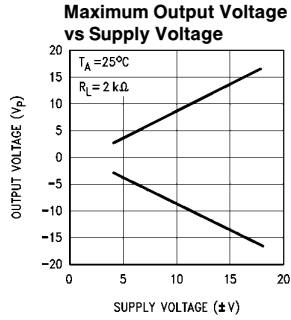
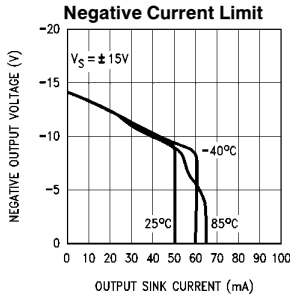
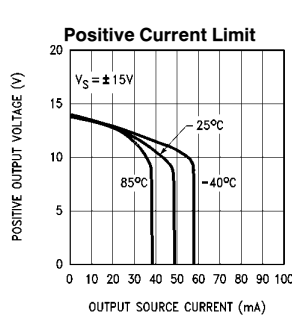
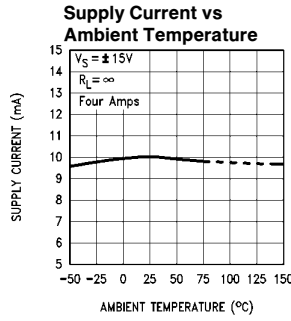
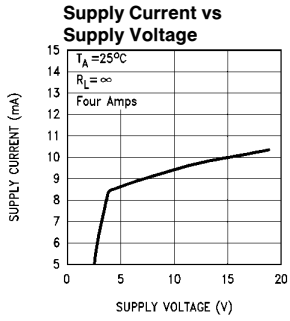
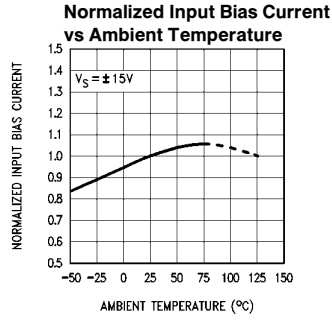
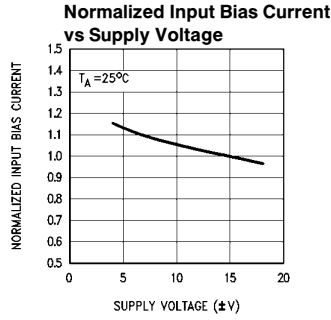
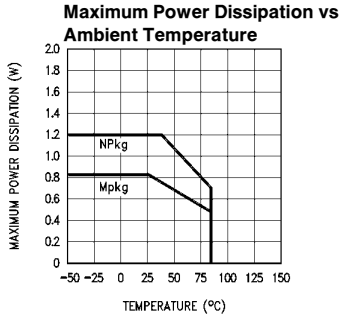
Note 3: The following parameters are not tested or guaranteed.

Detailed Schematic



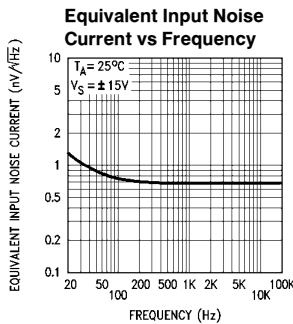
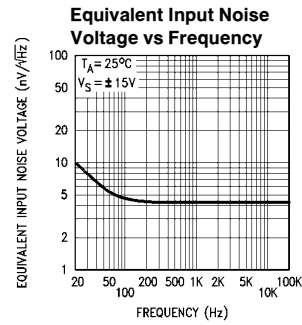
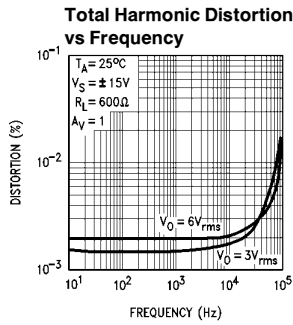
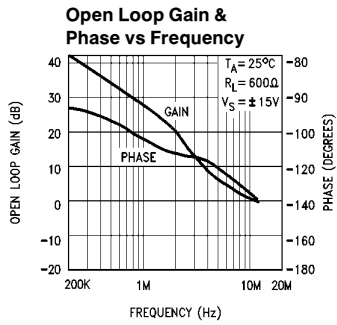
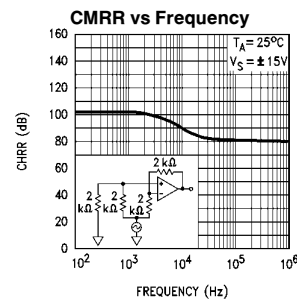
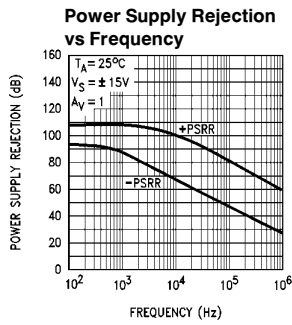
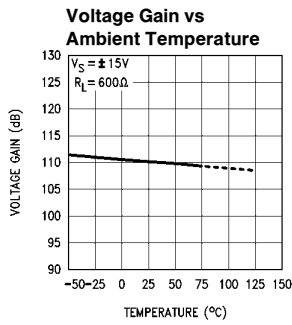
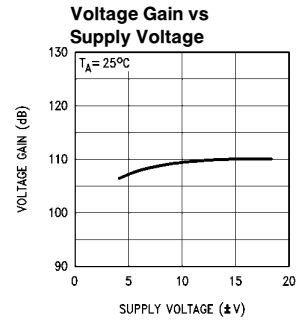
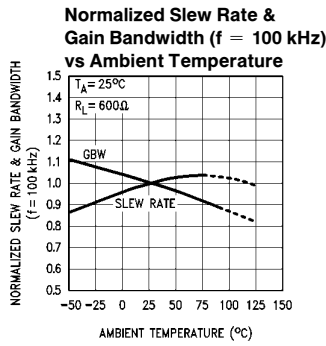
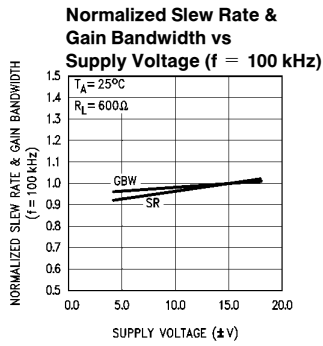
TL/H/9047-3

Typical Performance Characteristics



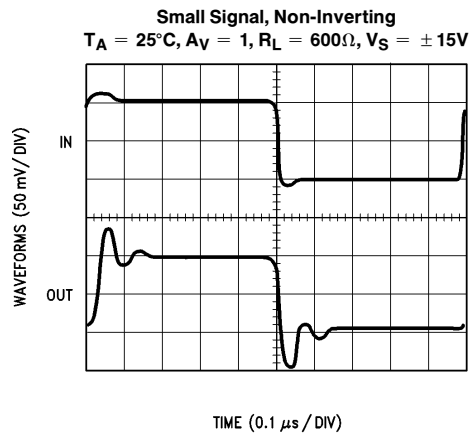
TL/H/9047-4

Typical Performance Characteristics (Continued)

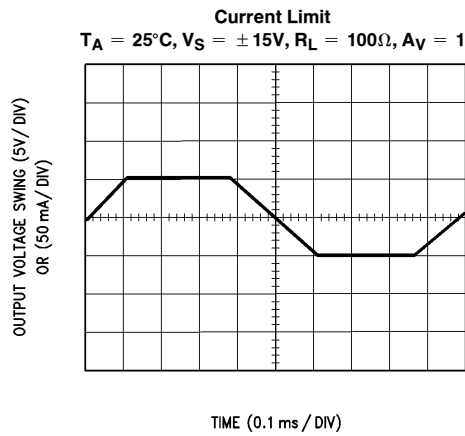


TL/H/9047-5

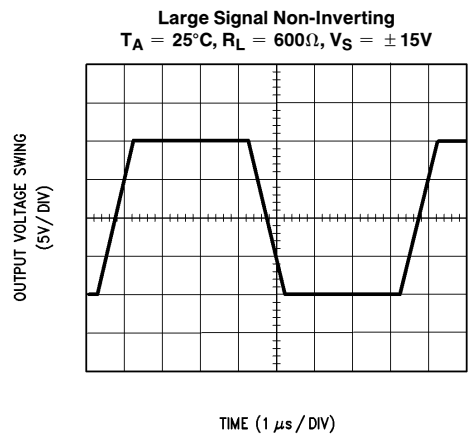
Typical Performance Characteristics (Continued)



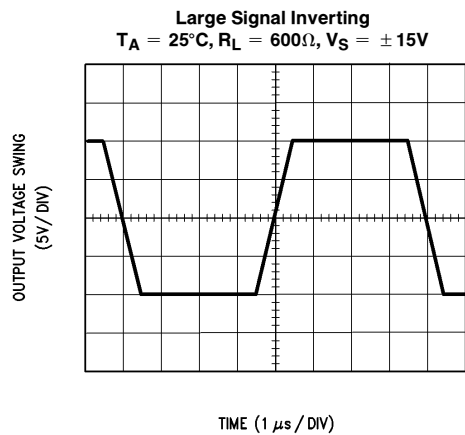
TL/H/9047-6



TL/H/9047-7

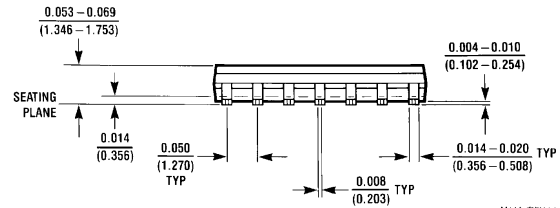
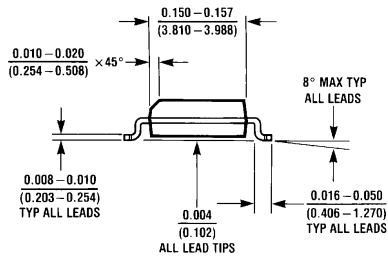
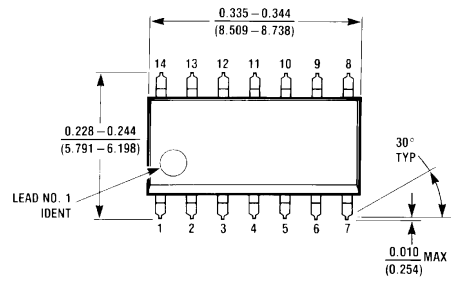


TL/H/9047-8



TL/H/9047-9

Physical Dimensions inches (millimeters)

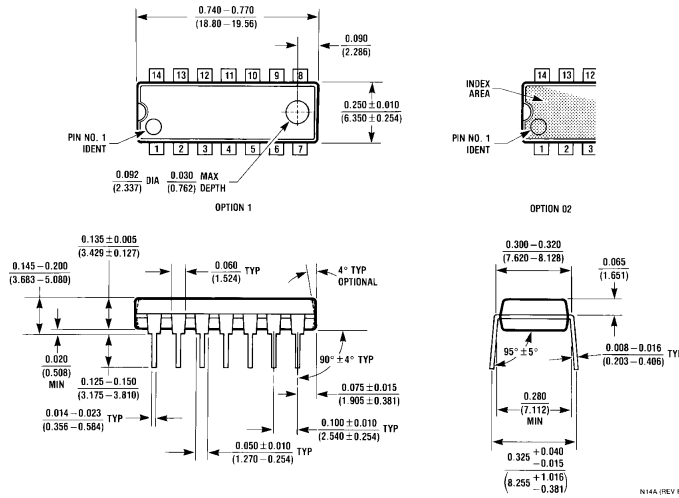


M14A (REV HI)

Molded Package (SO)
Order Number LM837M
NS Package Number M14A

Physical Dimensions inches (millimeters) (Continued)

Lit. # 107255



Molded Dual-In-Line Package
Order Number LM837N
NS Package Number N14A

LIFE SUPPORT POLICY

NATIONAL'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF NATIONAL SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

 <p>National Semiconductor Corporation 2900 Semiconductor Drive P.O. Box 58090 Santa Clara, CA 95052-8090 Tel: 1(800) 272-9959 TWX: (910) 339-9240</p>	<p>National Semiconductor GmbH Livny-Gargan-Str. 10 D-82256 Fürstenfeldbruck Germany Tel: (81-41) 35-0 Telex: 527549 Fax: (81-41) 35-1</p>	<p>National Semiconductor Japan Ltd. Sumitomo Chemical Engineering Center Bldg. 7F 1-7-1, Nakase, Mihama-Ku Chiba-City, Chiba Prefecture 261 Tel: (043) 299-2300 Fax: (043) 299-2500</p>	<p>National Semiconductor Hong Kong Ltd. 13th Floor, Straight Block, Ocean Centre, 5 Canton Rd. Tsimshatsui, Kowloon Hong Kong Tel: (852) 2737-1600 Fax: (852) 2736-9960</p>	<p>National Semicondutores Do Brazil Ltda. Rue Deputado Lacorda Franco 120-3A Sao Paulo-SP Brazil 05418-000 Tel: (55-11) 212-5066 Telex: 391-1131931 NSBR BR Fax: (55-11) 212-1181</p>	<p>National Semiconductor (Australia) Pty. Ltd. Building 16 Business Park Drive Monash Business Park Nottingham, Melbourne Victoria 3168 Australia Tel: (3) 558-9999 Fax: (3) 558-9998</p>
---	---	---	---	--	--

National does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and National reserves the right at any time without notice to change said circuitry and specifications.