

LM3370

Application Note 1428 LM3370 Evaluation Board



Literature Number: ZHCA203

LM3370 Evaluation Board

National Semiconductor
Application Note 1428
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Introduction

The LM3370 evaluation board is a working demonstration of a DUAL step down DC-DC converter. This application note contains information about the evaluation board. For more details and electrical characteristic on the dual buck converter operation, please refer to the LM3370 datasheet.

General Description

The LM3370 is a dual step-down DC-DC converter optimized for powering ultra-low voltage circuits from a single Li-Ion cell or 3 cell NiMH/NiCd batteries. Automatic intelligent switching between PWM low-noise and PFM low current mode offers improved system efficiency. The I²C compatible

offers dynamic controls of the output voltages, Auto PFM/PWM mode selection and other enabling enchantment features such as power-on-reset (nPOR) and spread spectrum.

Operating Conditions

- V_{IN} range: $2.7V \leq V_{IN} \leq 5.5V$
- Recommended load current: 0 to 600mA

I²C Compatible Interface

- V_{OUT1} (1V to 2V at 50mV step increment)
- V_{OUT2} (1.8V to 3.3V at 100mV steps increment).

Package

- LLP16 non-pullback, (4mm x 5mm x 0.8mm)

Typical Application

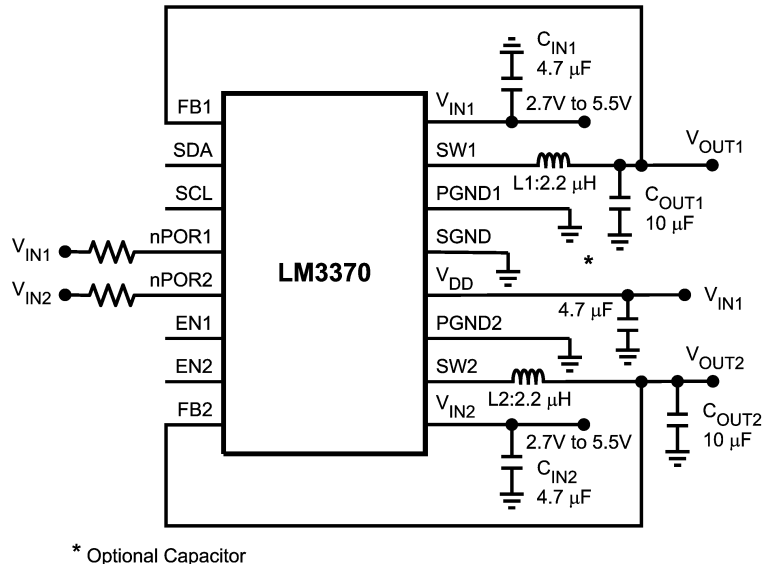


FIGURE 1. Typical Application Circuit

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Operating Information

The LM3370 evaluation board is pre-programmed to 1.2V at V_{OUT1} and 3.3V at V_{OUT2} for evaluation purpose (no additional interface hardware is needed). If different default output option is desired, the same evaluation board can be used by demount the existing device and replace with new voltage option (voltage option can be order from national website).

The device comes with the following default setting: Auto PFM and PWM transition mode when the I²C compatible interface is not enabled. For other settings, I²C compatible interface must be used to enable all other functions. Registers information are listed on page 4 for I²C compatible interface.

Powering Up The Evaluation Board

- Apply a voltage at the "Vin_EXT" pin Only (Not Vin_IO)
- All logic pins are tied to "Vin on the evaluation board

- Do not power the Vin_IO pin unless powering the logic pins via an external source(Jumper at Vin_IO must be removed)
- Vdd pin is tied to V_{IN1} & V_{IN2} on the evaluation board, no additional connection required (For any reason if VDD is not directly tied to V_{IN} , VDD need to be equal or greater of the two inputs (V_{IN1} or V_{IN2}) for proper operation.

I²C Interface Ready

If interface capability is available via I²C compatible, the SDA & SCL test pins of the evaluation board are brought out for such function. The SDA & SCL pins of the evaluation board are connected to 2K ohms resistors and pulled up to V_{IN} pin.

Pin Descriptions

1	V_{IN2}	Power supply voltage input to PFET and NFET switches for Buck2
2	SW2	Buck 2 Switch pin
3	PGND2	Buck 2 Power Ground
4	VDD	Signal supply voltage input, V_{DD} must be equal or greater of the two inputs (V_{IN1} or V_{IN2})
5	SGND	Signal GND
6	PGND1	Buck 1 Power Ground
7	SW1	Buck 1 Switch pin
8	V_{IN1}	Power supply voltage input to PFET and NFET switches for Buck1
9	FB1	Analog feedback input for Buck 1
10	SDA	I ² C Compatible Data, a 2K ohms pull up resistor is required
11	SCL	I ² C Compatible Data, a 2K ohms pull up resistor is required
12	nPOR1	Power ON Reset for Buck 1, Open drain output low when Buck 2 output is 92% of target output. A 100 k ohms pull up resistor is required
13	nPOR2	Power ON Reset for Buck 2, Open drain output low when Buck 2 output is 92% of target output. A 100 k ohms pull up resistor is required
14	EN1	Buck 1 Enable
15	EN2	Buck 2 Enable
16	FB2	Analog feedback input for Buck 2

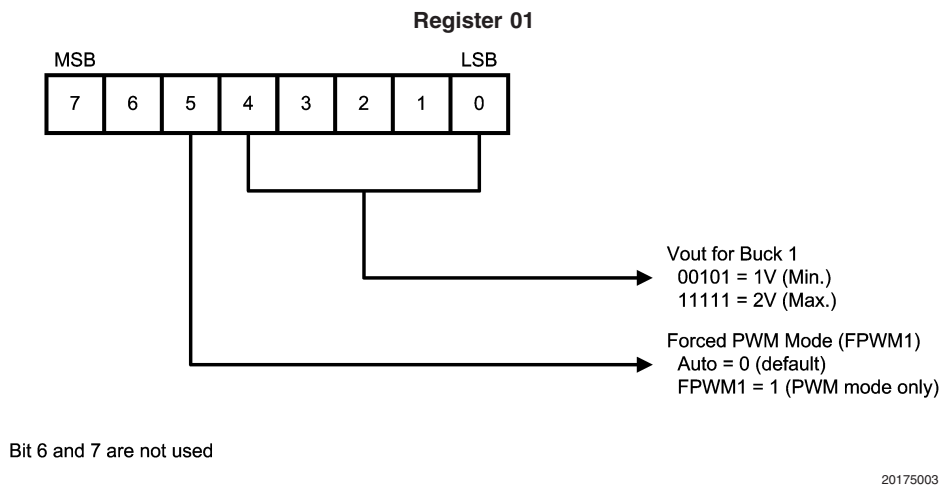
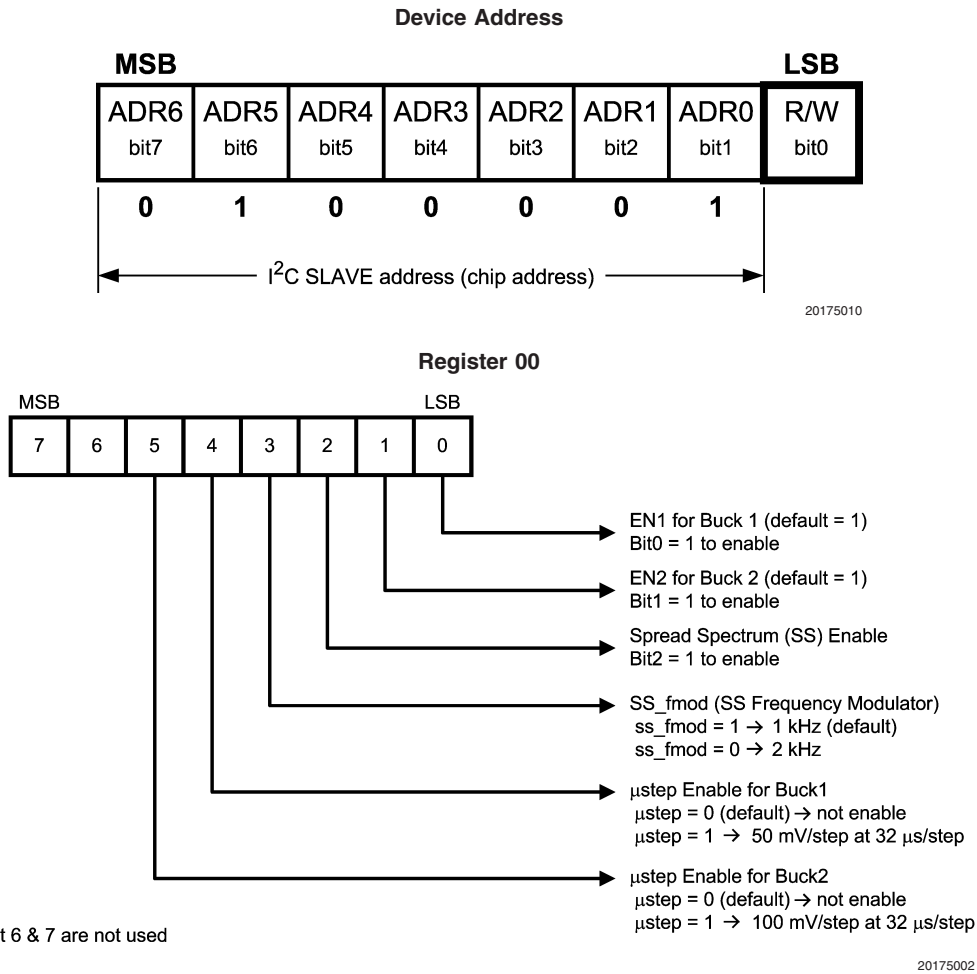
Setting Output Voltage Via I²C Compatible

Buck Output Voltage Selection Codes		
Data Code	Buck_1 (V)	Buck_2 (V)
00000	NA	NA
00001	NA	1.8
00010	NA	1.9
00011	NA	2.0
00100	NA	2.1
00101	1.0	2.2
00110	1.05	2.3
00111	1.1	2.4
01000	1.15	2.5
01001	1.2	2.6
01010	1.25	2.7
01011	1.3	2.8
01100	1.35	2.9
01101	1.4	3.0
01110	1.45	3.1
01111	1.5	3.2
10000	1.55	3.3
10001	1.6	NA
10010	1.65	NA
10011	1.7	NA
10100	1.75	NA
10101	1.8	NA
10110	1.85	NA
10111	1.9	NA
11000	1.95	NA
11001	2.0	NA
11010	NA	NA
11011	NA	NA
11100	NA	NA
11101	NA	NA
11110	NA	NA
11111	NA	NA

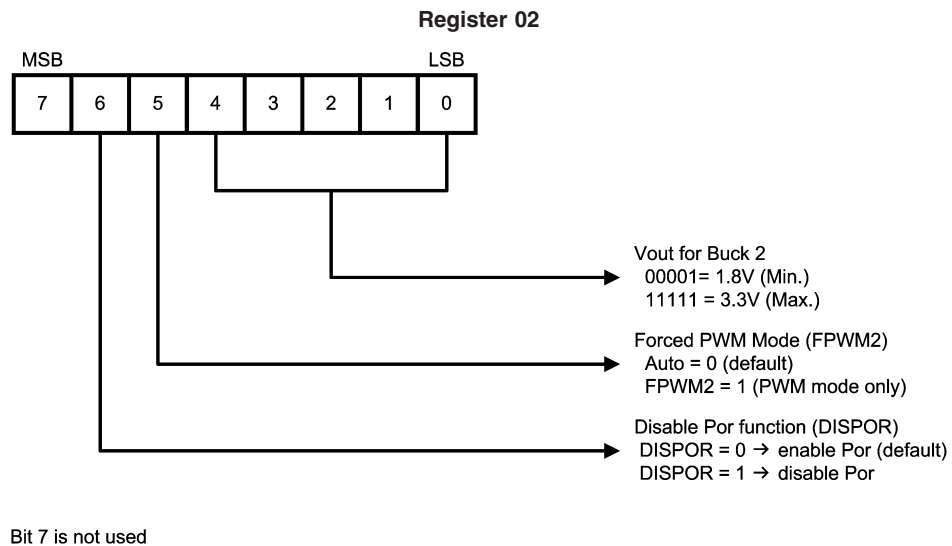
Device Ordering Information

Order Number	Voltage Option	Package marking	Supplied As
LM3370SD - 3013	1.2V & 2.5V	S0003UB	1000 units, Tape-and-Reel
LM3370SDX - 3013		S0003UB	4500 units, Tape-and-Reel
LM3370SD - 3021	1.2V & 3.3V	S0003TB	1000 units, Tape-and-Reel
LM3370SDX - 3021		S0003TB	4500 units, Tape-and-Reel
LM3370SD - 3416	1.4V & 2.8V	S0003VB	1000 units, Tape-and-Reel
LM3370SDX - 3416		S0003VB	4500 units, Tape-and-Reel
LM3370SD - 3806	1.6V & 1.8V	S0003XB	1000 units, Tape-and-Reel
LM3370SDX - 3806		S0003XB	4500 units, Tape-and-Reel
LM3370SD - 4021	1.8V & 3.3V	S0003YB	1000 units, Tape-and-Reel
LM3370SDX - 4021		S0003YB	4500 units, Tape-and-Reel

Registers Information



Registers Information (Continued)

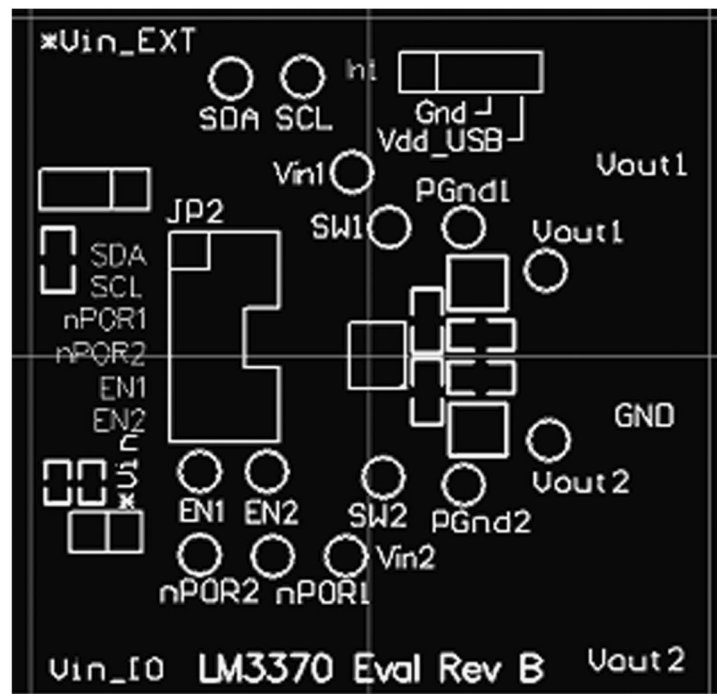


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Evaluation Board Layout

LM3370 is a 4-layer board designed to maximize the performance for the device.

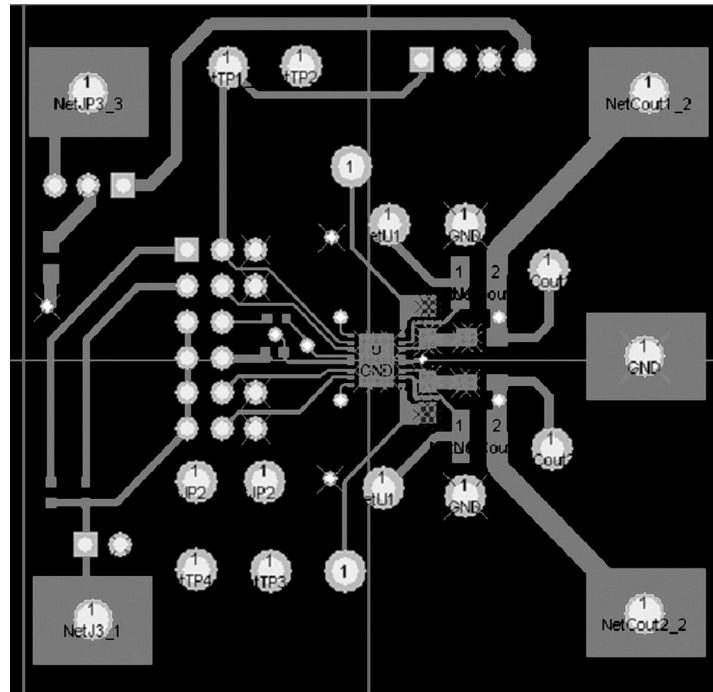
Silk Screen



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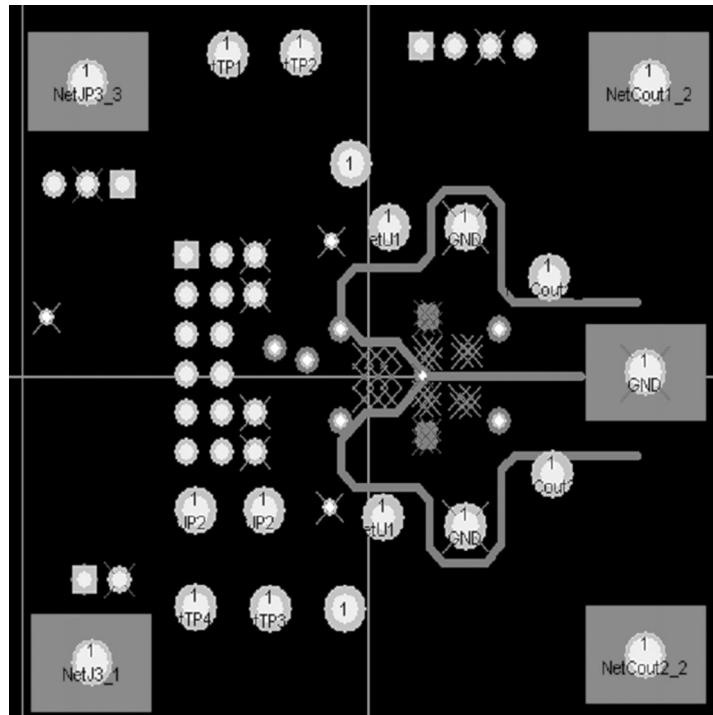
Evaluation Board Layout (Continued)

Top Layer



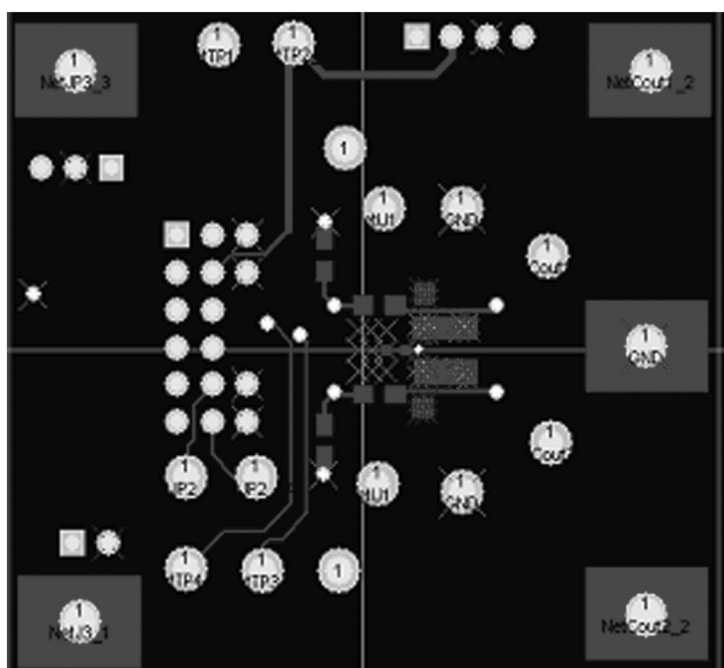
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Mid Layer 1



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Bottom Layer



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Bill of Materials

Component Name	Manufacture	Manufacture #	Specification
LM3370			
C _{IN1} & C _{IN2}	TDK	C2012X5R0J475K	4.7μF/6.3V/0805/X5R
	muRata	GRM219R60J475KE19D	
C _{OUT1} & C _{OUT2}	TDK	C2012X5R0J106K	10μF/6.3V/0805/X5R
	muRata	GRM219R60J106KE19D	
L1 & L2	Taiyo-Yuden	NR3015T-2R2M	2.2μH
R1-2(SDA+SCL)	Vishay		2k ohms
R3-4 (nPOR1-2)	Vishay		100k ohms
TEST Pins & Connectors			
V _{OUT1} , V _{OUT2} , GND, *Vin_EXT, Vin_IO			Turret 0.09 in
nPOR1, nPOR2, SDA, SCL, PGND1, PGND2, V _{IN1} , V _{IN2}			Turret 0.072 in
Jumper			
SDA/SCL/nPOR1	Jumpers Female(Handle centerline)		A26242-ND
nPOR2/EN1/EN2			
*VIN & *VIN_IO			
*VIN_IO	Berk stick	Header	2 in series (2x1)
*VIN_EXT			2 in series (2x1)
Int			4 in series (4x1)
JP2:SDA & SCL			6 in series(6x2)
nPOR1/ nPOR2/EN1& EN2			2 in series 2(2x1)

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