Camera PMIC with Flash LED Driver Evaluation Board User's Manual

Overview

The NCP6951EVK evaluation kit is a full assembled circuit board for evaluation and test of the NCP6951. This document provides documentation, test procedure and equipment set–up for the complete evaluation of the NCP6951.The NCP6951EVK comes with one NCP6951 evaluation board, 1 MCU board for I²C master and associated cables.

General Description

The NCP6951 integrated circuit is part of the ON Semiconductor mini power management IC family. It is optimized to supply battery powered portable application sub-systems such as camera function, microprocessors, etc. This device integrates one high efficiency 600 mA Step-down DCDC converter with DVS (Dynamic Voltage Scaling), 5 low dropout (LDO) voltage regulators and a 1.5 A Flash LED driver in WLCSP24 package.

Features

- 1 Flash LED Driver
 - Adaptive Boost Supply or Bypass Mode depending on V_{in} and V_{flash} Conditions
 - Programmable Flash Current from 100 mA to 1.6 A by 100 mA Steps
 - Programmable Safety and Inhibit Timer to Limit the Flash Duration and Protect the Application



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EVAL BOARD USER'S MANUAL

- 1 DC-DC Converters (3 MHz, 1 µH / 10 µF, 600 mA)
 - ◆ Peak Efficiency 95%
 - Programmable Output Voltage from 0.8 V to 2.3 V by 50 mV Steps
- 5 Low Noise Low Dropout Regulators
 - Programmable Output Voltage from 1.7 V to 3.3 V for LDOs 1, 2, 3
 - Programmable Output Voltage from 1.2 V to 2.85 V for LDOs 4, 5
 - 200 mA Output Current Capability: LDOs 1, 2, 3, 4
 - 300 mA Output Current Capability LDO 5
 - 45 μVrms Low Output Noise
- Control
 - Fully Programmable through a 400 kHz / 3.4 MHz I²C with Pins Selectable I²C Address and Interrupt Output
- Small Footprint: 2.57 x 1.65 mm WLCSP 0.4 mm Pitch



Figure 1. Evaluation Board Picture

Table 1. BOARD COMPONENTS DESCRIPTION

Qty	Reference	Value	PCB Footprint	MFR	Part Number
1	-	NCP6951 PMIC	_	ON Semiconductor	NCP6951
1	C1	Ceramic Capacitor 2.2 μF 6.3 V X5R	0402	TDK	C1005X5R0J225K050BC
7	$C3 \rightarrow C9$	Ceramic Capacitor 1 μF 6.3 V X5R	0402	TDK	C1005X5R0J105K05BB
1	C11	Ceramic Capacitor 4.7 μF 6.3 V X5R	0603	TDK	C1608X5R0J475K080AB
1	C2	Ceramic Capacitor 10 μF 6.3 V X5R	0603	TDK	C1608X5R0J106K080AB
1	C10	Ceramic Capacitor 22 μF 6.3 V X5R	0603	TDK	C1608X5R0J226M080AC
4	$C13 \rightarrow C16$	Ceramic Capacitor 100 μF 6.3 V X5R	1210	TDK	C3225X5R0J107M250AC
1	C12	Ceramic Capacitor 100 nF 6.3 V X5R	0402	TDK	
1	L1	Inductor	2016	ТОКО	DFE201612R-H-1R0N
1	L2	Inductor		ТОКО	FDSD0412-1R0 or DFE252012F-1R0
1	D1			LUMILED	LXCL-PWF4
1	D2			SAMSUNG	SPFCW04301BL
8	$LTR100 \rightarrow LTR107$	Jumper Header Vertical Mount, 2 positions, 100 mils	100 mils	Tyco Electronics / AMP	5-826629-0
3	$J15 \rightarrow J17$	Jumper Header Vertical Mount, 3 positions, 100 mils	100 mils	Tyco Electronics / AMP	5-826629-0
14	$J1 \rightarrow J14$	Banana Jack		Hirchmann Test and Measurement	930160000
1	J18	Connector header 26 pos		3M	N2526-6002-RB
19	$TP1 \rightarrow TP19$	Test Point		Keystone Electronics	5011
4	Q1, Q3, R1, R2	Not Mounted			
3	$JUMP1 \rightarrow JUMP3$	Jumper Connector	400 mils	Harwin	D3082-B01
10	$S101 \rightarrow S110$	Shorted			
4	$SH1 \rightarrow SH4$	Current sense			
4	Spacer nylon	H1, H2, H3, H4		Richco Plastic co	R908-4

Table 2. CONNECTOR DESCRIPTION

	Pin	Description	
Input Power			
$J1 \rightarrow J6$	J3, J5	Negative input connected to GND pin	
J1 Flash LED power supply		Flash LED power supply	
	J2	DCDC power supply	
	J4, J5	LDOs power supply	

Input Power

$J7 \rightarrow J14$	J8, J14	Negative output connected to GND pin	
	J7	DCDC1 output	
	J9	LDO1 output	
	J10	LDO2 output	
	J11	LDO3 output	
	J12	LDO4 output	
	J13	LDO5 output	

Chip Control

MCU	SDA	I ² C data, connect to SDA pin or the 26 pins ribbon cable	
SCL I ² C data, connect to SCL pin or the 26 pins rib		I^2C data, connect to SCL pin or the 26 pins ribbon cable	
	HWEN Master enable pin connected to the 26 pins ribbon cable thru J3		
FLEN FI		Flash LED driver enable pin	
	FLSEL	Flash LED driver selectable pin	

ASSEMBLY LAYER



Figure 2. Assembly Layer

SCHEMATIC



Figure 3. Evaluation Board Schematic

SOFTWARE INSTALLATION

Double click on NCP6951_setup.exe file. Follow the instructions set–up.

It is recommended to copy the NCP6951_setup.exe to a local directory: If eval kit is already installed, a simple double click on NCP6951.exe will launch the GUI.

Important notice: In order to properly install drivers and software, please launch NCP6951_setup.exe file before connects the MCU board.

🕐 NCP6951						
File Option						
GUI Generic Registers						
IO Settings IPC Access Management						
HWEN FLEN IPC Address 20 Change Read All Write on Change: ON Write						
Flash Settings						
EN 🗖 FLASH	EN Die Temperature	e monitoring 🔲 ON Semiconductor®				
Flash Current 1.6 A 🔹	Torch Current 33 mA	y monitoring				
Reduced Current 100 = 0	Torch Rise Time 33 mA / 64 us	Retry Mode LDO Settings				
	FLSE	EN LDO1				
Flash Rise Time 100 mA / 16 μs ▼		FUNCTION VOUT Prog(V) 2.80				
	Current Limit 3.0 A Pre Flash Current	100 mA Active Discharge				
Safety Timer 📃 256 ms 👻	UVLO High 2.9 V - Pre Flash Count	3 -				
Inhibit Timer 🔲 1536 ms 👻	UVLO Low 275 V Time Out Enable					
		VOUT Prog(V) 2.80 -				
Read Status		STATUS Active Discharge				
Torch UVLO Flash TSD Warning PA Bu	st Flash UVLO Flash OVP Flash SC Flash TSD	Flash Timeout				
Re-Arming after TSD Startup T	me DCDC Settings					
Re-arm IC Reset ▼		DCDC1				
PMIC status	Vitable	EN LDO4				
Ack Sense LD01	256 μs VOUT Prog(V) V2 table 1.10					
TSD Warning LDO2	512 µs EN Active Dis					
	1024 ms					
Power Up	MODE Auto	EN LDO5				
	2.048 ms	V2 VOUT Prog(V) 1.80 V				
Read Acks LDO5	4.096 ms ▼ DVS 2.67 μ	s / step				

Figure 4.

QUICK CONFIGURATION

Power Supply

NCP6951 requires at least 1 external power supply: Vbat (J2) : supply between 2.5V to 5.5V.

Jumpers Configuration

The HWEN, FLEN and FLSEL jumpers are configured by default to work with the ON Smiconductor I^2C interface board.

S103, S104 and S106 shunt are soldered to use only one power supply for the DCDCs, LDOs and FLASH.

S101, S102 and S110 are soldered to close the loop of the inside buck and boost converter. To measure the current, user has to unsolder the jumper and use SH1, SH2 or SH4.

Load

DCDCx Converters

An electronic load or passive load can be connected between J7 and J8 for DCDC1.

LDOx Regulators

An electronic load or passive load can be connected between J9 and J8 or J14 for LDO1, between J10 and J8 or J14 for LDO2, J11 and J8 or J14 for LDO3, J12 and J8 or J14 for LDO4, J13 and J8 or J14 for LDO5.

FLASH LED Driver

Evaluation board is delivered with D1 or D2 soldered.



PCB LAYOUT

Figure 5. Top Layer



Figure 6. Bottom Layer

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