PWM BOOST CONTROLLER

PRODUCTION DATA SHEET

Pb Free Product

DESCRIPTION

The NX2158 controller IC is a boost controller IC designed for step up DC to DC converter applications. The NX2158 operates at programmable frequency from 200kHz to 2MHz and employs cycle by cycle current limiting by sensing the Rdson of NMOSFET.

Other features of the device are: thermal shutdown, adaptive deadband control, internal digital soft start, VCC UVLO and Shutdown capability via the ENBUS pin.

FEATURES

- Single Supply Voltage fom 3V to 5.5V
- Programmable Frequency up to 2MHz
- Internal Digital Soft Start Function
- Cycle by Cycle Current Limit by Sensing Rdson of NMOSFET
- Pb-free and RoHS compliant

APPLICATIONS

- USB 3.0 3.3V to 5V conversion

TYPICAL APPLICATION

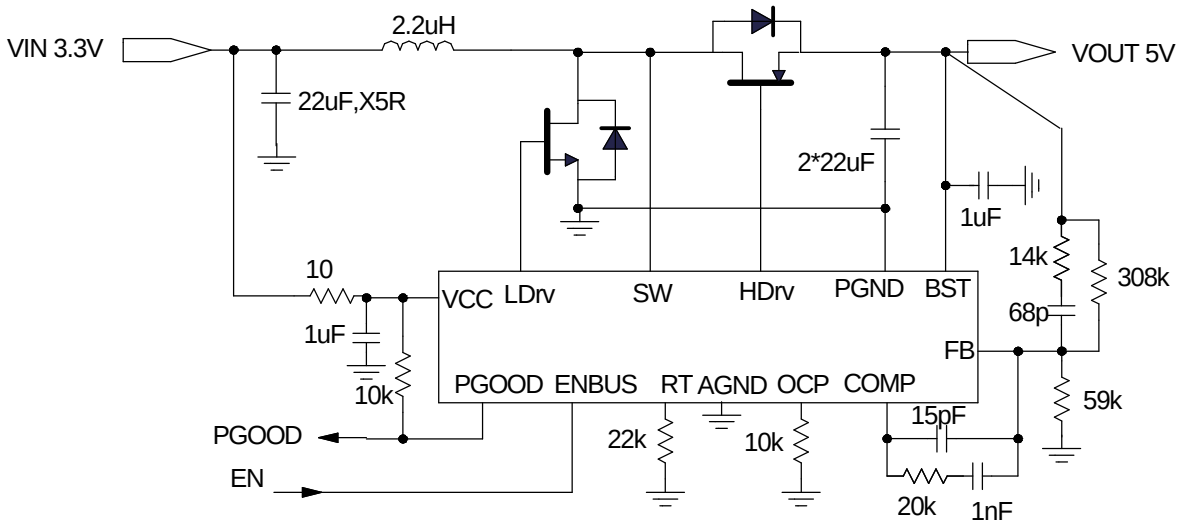


Figure1 - Typical application of NX2158

ORDERING INFORMATION

Device	Temperature	Package	Frequency	Pb-Free
NX2158CMTR	0 to 70°C	3X3 MLPQ-16L	200kHz to 2MHz	Yes

Package Marking : NX2158XXX XXX is date code. For example, 935 means that this NX2158 is packaged in the 35th week of 2009

Microsemi
Analog Mixed Signal Group
11861 Western Avenue, Garden Grove, CA. 92841, 714-898-8121, Fax: 714-893-2570

ABSOLUTE MAXIMUM RATINGS(NOTE1)

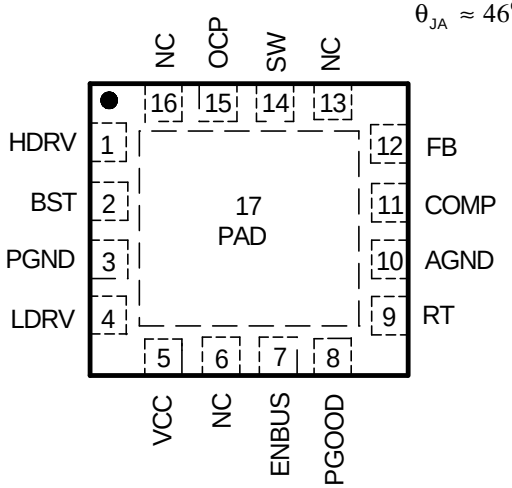
VCC to GND 6.5V
BST to GND Voltage 6.5V
VIN to GND Voltage 6.5V
SW to GND ..... -2V to 6.5V
All other pins ..... -0.3V to 6.5V
Storage Temperature Range ..... -65°C to 150°C
Operating Junction Temperature Range ..... -40°C to 125°C

NOTE1: Stresses above those listed in "ABSOLUTE MAXIMUM RATINGS", may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

PACKAGE INFORMATION

16-LEAD PLASTIC 3X3 MLPQ

$\theta_{JA} \approx 46^{o}C/W$



ELECTRICAL SPECIFICATIONS

Unless otherwise specified, these specifications apply over V_{CC}=3.3V, V_{ENBUS}=1.5V, V_{BST}=5V, T_A = 25°C. Low duty cycle pulse testing is used which keeps junction and case temperatures equal to the ambient temperature.

PARAMETER	SYM	Test Condition	Min	TYP	MAX	Units
Reference Voltage						
Ref Voltage	V_{REF}		0.793	0.8	0.808	V
Ref Voltage line regulation		V_{CC}=3V to 5.5V		0.7	1	%
Supply Voltage(VCC)						
V_{CC} Voltage Range	V_{in}					V
Input Voltage Current(Static)		No switching,ENBUS=0V		3		mA
Input Voltage Current (Dynamic)		COMP=2.4V		3.5		mA
Under Voltage Lockout						
V_{CC}-Threshold	V_{CC}_UVLO	V_{CC} Rising	2.6	2.8	3	V
V_{CC}-Hysteresis	V_{CC}_Hyst	V_{CC} Falling	0.1	0.2	0.355	V

PARAMETER	SYM	Test Condition	Min	TYP	MAX	Units
ENBUS						
ENBUS threshold			1	1.2	1.4	V
ENBUS Hysteresis			0.05	0.1	0.15	V
SS						
Soft Start time	Tss	Rt=44k		1.6		mS
Oscillator (Rt)						
Frequency	F_S	Rt=44k	550	640	720	kHz
Ramp-Amplitude Voltage	V_{RAMP}		0.4	0.5	0.58	V
LDRV Max Duty Cycle		Rt=44k	60	70	80	%
HDRV Min Controlable On Time					250	nS
Error Amplifiers						
Transconductance			1500	1800	2500	umho
Input Bias Current	Ib				100	nA
Comp SD Threshold				0.3		V
High Side Driver(C_L=2200pF)						
Output Impedance , Sourcing	R_{source}(Hdrv)	I=200mA		1.9		ohm
Output Impedance , Sinking	R_{sink}(Hdrv)	I=200mA		1.7		ohm
Rise Time	THdrv(Rise)			14		ns
Fall Time	THdrv(Fall)			17		ns
Deadband Time	Tdead(L to	Ldrv going Low to Hdrv		30		ns
Low Side Driver (C_L=2200pF)						
Output Impedance, Sourcing	R_{source}(Ldrv)	I=200mA		1.9		ohm
Output Impedance, Sinking Current	R_{sink}(Ldrv)	I=200mA		1		ohm
Rise Time	TLdrv(Rise)			13		ns
Fall Time	TLdrv(Fall)			12		ns
Deadband Time	Tdead(H to L)	SW going Low to Ldrv going High, 10% to 10%		10		ns
OCP						
OCP current			30	37	50	uA
Over temperature						
Threshold				150		^oC
Hysteresis				20		^oC
PGOOD						
Pgood high rising threshold			78	90	95	% Vref
Power good hysteresis				5		%

PIN DESCRIPTIONS

PIN #	PIN SYMBOL	PIN DESCRIPTION
5	VCC	Voltage supply for the low side fet driver and internal logic circuit. A high frequency 1uF ceramic capacitor must be connected from this pin to the GND pin as close as possible.
7	ENBUS	Enable pin for the controller.
12	FB	This pin is the error amplifier inverting input.
11	COMP	This pin is the output of the error amplifier and together with FB pin is used to compensate the voltage control feedback loop. This pin is also used as a shut down pin. When this pin is pulled below 0.3V, both drivers are turned off and internal soft start is reset.
2	BST	This pin supplies voltage to the high side driver. A high frequency ceramic capacitor of 0.1 to 1 uF must be connected from this pin to ground.
15	OCP	An internal current source is flown to the OCP resistor sets the OCP voltage across the Rdson of the low side MOSFET. Current limit point is this voltage divided by the Rds-on.
14	SW	This pin is used by driver circuit and also sensing the RDSON of NMOSFET.
1	HDRV	PMOS MOSFET gate driver.
3	PGND	Power ground.
10	AGND	Analog ground
4	LDRV	NMOSFET gate driver.
7	RT	Oscillator's frequency can be set by using an external resistor from this pin to GND.
8	PGOOD	Power good indicator.
17	PAD	PAD should be connected to ground.
13,16	NC	Not used.

BLOCK DIAGRAM

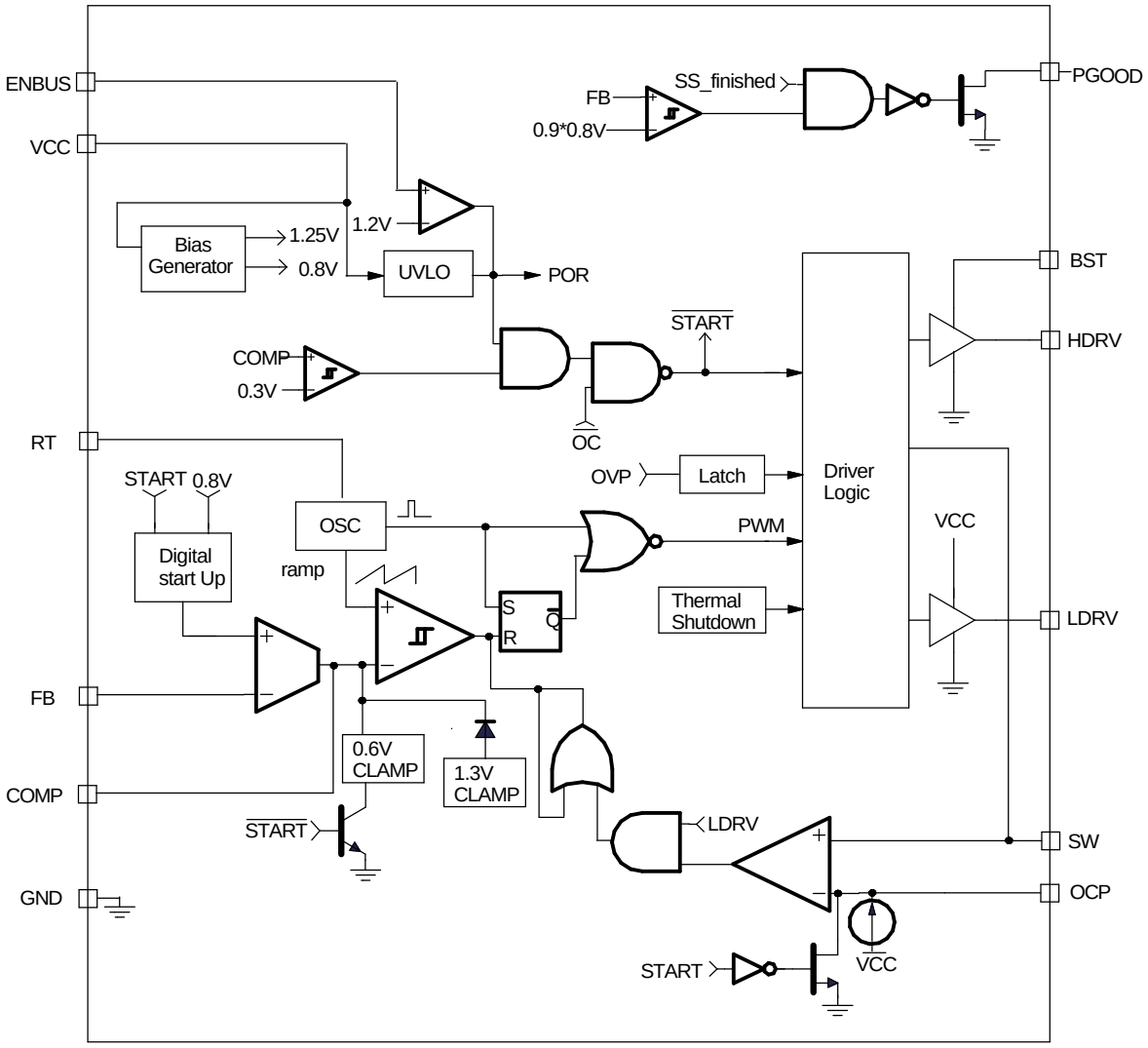


Figure 2 - Simplified block diagram of the NX2158