iSine™

# DIG10 Isolated 10v Dimming IC Datasheet

Features

● Translates standard 10v dimming levels across high-voltage isolation to lamp ballast

● No power supply on the dimmer side

● Programmable minimum dim setting

● Programmable zero setting

● 30uA current consumption

● best 10v dim efficiency

Description

The DIG10 converts 10v dim control to line-isolated PWM with no power supply on the dimmer side. Zero (cutoff) level and minimum dim level adjustments are programmable.
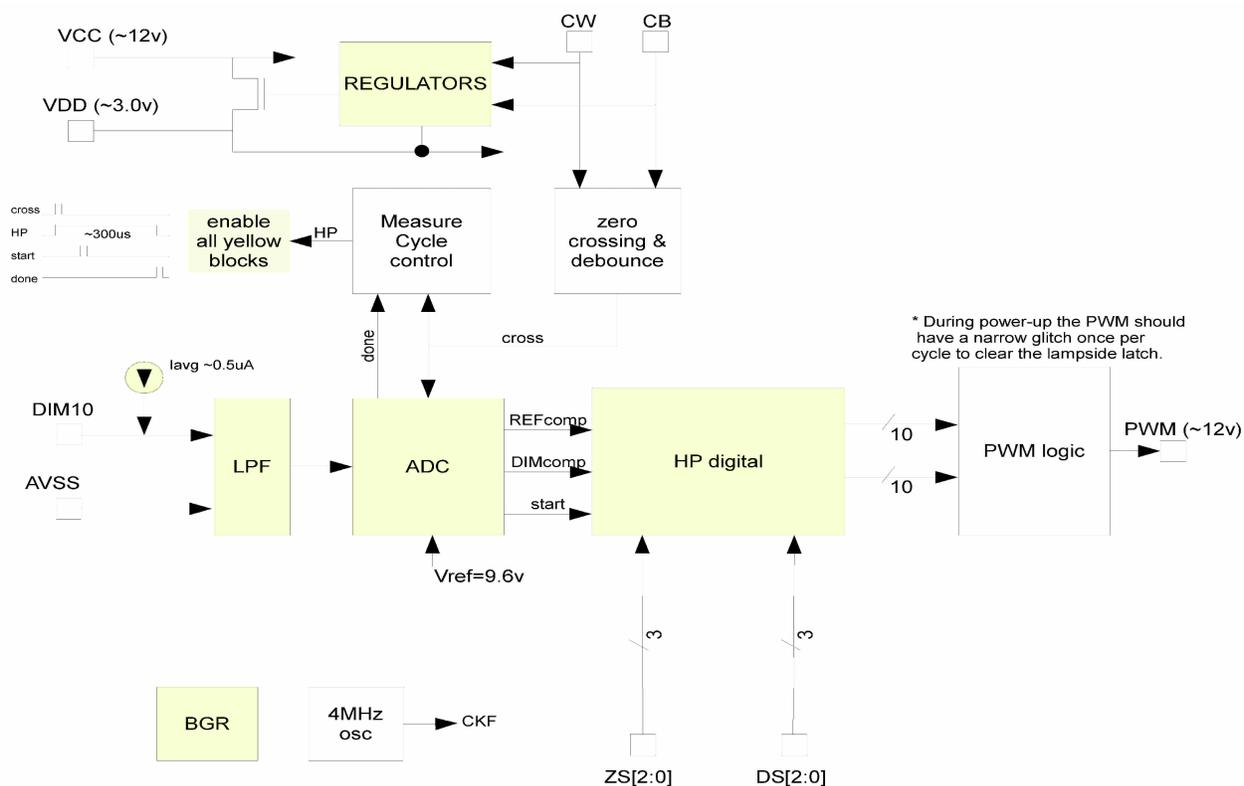
DIG10 Block Diagram

1. Overview:

The DIG10 IC converts standard 10v dimming voltages to line-isolated PWM for maximum efficiency applications. Zero level and minimum dim settings allow for a wide range of applications.

1.1 Pin Description

Number	Name	Type	Description
1	CW	input	capacitor coupled AC supply to comparatorW
2	DIM10	input	holding current reference
3	ZS[2]	input	Zero level setting, bit 2
4	ZS[1]	input	Zero level setting, bit1
5	ZS[0]	input	Zero level setting, bit 0
6	VDD	power	digital supply (3.0v)
7	VSS	power	ground
8	DS[2]	input	Minimum dim level setting, bit 2
9	DS[1]	input	Minimum dim level setting, bit 1
10	DS[0]	input	Minimum dim level setting, bit 0
11	PWM	output	PWM output
12	VCC	power	analog supply (12v)
13	IREC	power	Internal bridge rectifier output (tie to VCC externally)
14	CB	input	capacitor coupled AC supply to comparatorB
15	CBR	input	capacitor coupled AC to internal bridge rectifier
16	CWR	input	capacitor coupled AC to internal bridge rectifier
back plate	VSS	power	ground

1.2 Absolute Maximum Ratings

Parameter	Pins	Value	Units
Analog Supply Voltage	VCC to VSS	-0.3 to 18.0	V
Digital Supply Voltage	VDD to VSS	-0.3 to 3.6	V
Input Voltage	CB, CW to VSS	-0.7 to 18.0	V
	ZS[2:0], DS[2:0] to VSS	-0.3 to (VDD +0.3)	V
Output Voltage	PWM	-0.3 to (VCC+0.3)	V
Maximum power dissipation at Tcase < 85°C		0.1	W
Operating Ambient Temperature (T_a)		-40 to 85	°C
Storage Temperature		-65 to 150	°C
Junction Temperature (T_j)		90	°C
Lead Temperature (soldering, 10s)		300	°C

Note: Stresses beyond those listed above may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified under "Electrical Characteristics" is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

T_j = 0 to 125°C, VDD = 3.3V, VCC=12V, VSS = 0V (unless otherwise noted)

Parameter	Description	Conditions	Value			Units
			Min	Typ	Max	
Supply						
VCC-VSS	Analog supply voltage		11	12	13	V
I_{VCC}	Analog supply current				30	µA
I_{VCCmax}	Maximum voltage regulator shunt current				10	mA
VDD-VSS	Digital supply voltage		2.2		3.6	V
I_{VDD}	Supply current			50		µA
Inputs/Outputs						
F_{PWM}	PWM frequency			500		Hz
V_{OL}	PWM output low voltage	I_O=1 µA			0.1	V
V_{OH}	PWM output high voltage	I_O=-1 µA	9.9			V

Application Schematic
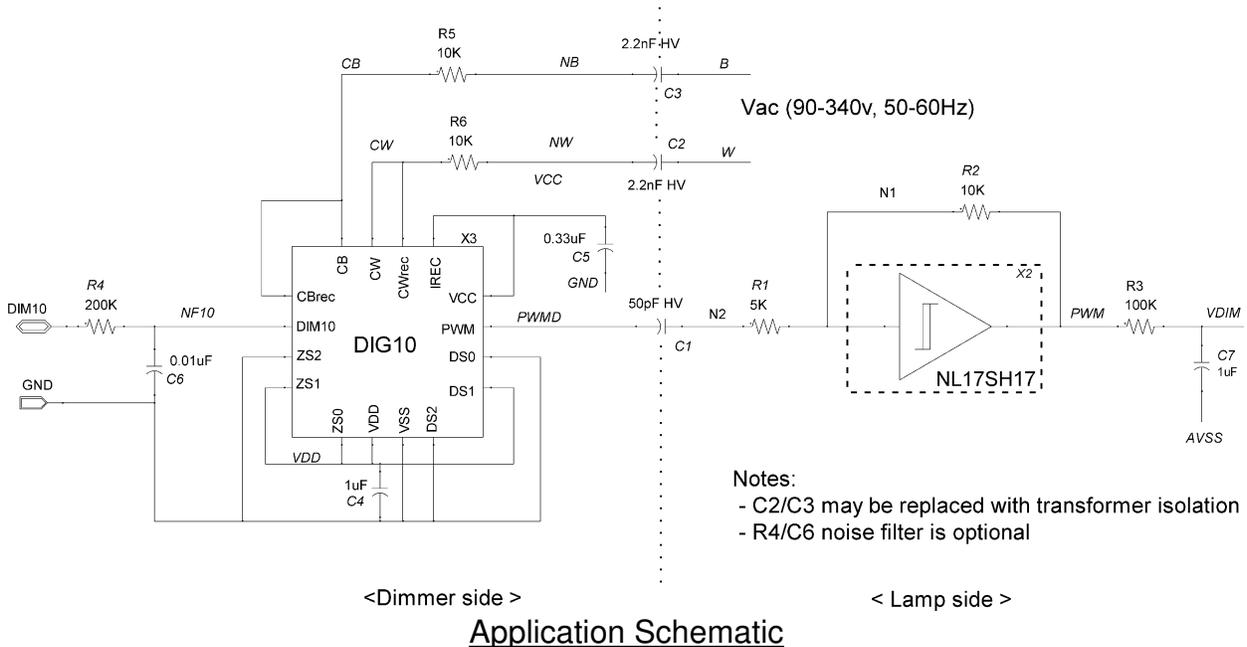
2. Circuit Operation:

The two wires from a 10v dimmer are connected to the DIG10. AC power from the lamp-side is coupled into the DIG10 to supply power through two voltage isolation capacitors. A PWM signal is generated to be coupled to the lamp-side through a voltage isolation capacitor. Six program pins are tied high or low to set the desired zero level and minimum dim level.

2.1 External requirements:

2.1.1) Three capacitors and resistors to couple power and the PWM signal for voltage isolation.

2.1.2) Decoupling capacitors for the VDD and VCC power supplies.

2.1.3) NL17SH17 or similar buffer and a resistor to reconstitute the PWM signal on the lamp-side at the lamp-side logic levels.

2.1.4) (Optional) Additional RC for the 10v dim input signal if the source is very noisy.

2.1.5) (Optional) Additional RC to convert the PWM to a DC level on the lamp-side.

3. Functional Description

3.1 10v dimming input (DIM10)

The 10v signal from the dimmer is low-pass filtered and measured by the DIG10. A small current is sourced from the DIG10 onto the DIM10 line in order to attain the maximum brightness level for a floating dimmer input. The 10V dimming ground reference is used as the DIG10 ground reference also.

3.2 Power supplies (CW, CB, VDD and VCC)

AC coupled power from the lamp-side is used to power the IC via the CW and CB pins. The high-voltage, VCC, and logic voltage supply, VDD, are generated using this energy.

3.3 Zero level setting (ZS[2:0])

The ZS[2:0] pins are tied to either VSS or VDD in order to chose the dimmer input voltage where the PWM will go to minimum level. Typical setting voltages are as follows:

ZS (pins)	Zero level (V)
0	0.15
1	0.30
2	0.45
3	0.60
4	0.75
5	0.90
6	1.05

3.4 Minimum dim level setting (DS[2:0])

The DS[2:0] pins are tied to either VSS or VDD in order to chose the PWM duty cycle when the dimmer is just above the zero level. Typical duty cycle settings are as follows:

DS (pins)	Zero level (V)
0	0.0%
1	1.6%
2	3.1%
3	4.7%
4	6.2%
5	7.8%
6	9.4%
7	10.9%

3.4 PWM output (PWM)

The dimmer voltage measurement is converted to a PWM waveform at VCC levels. The PWM output always creates a transition even at fully on or fully off dim levels.

4. Package information

16 pin DFN 6x6mm, 0.5mm pitch (TBD)

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