Smart IGBT Driver and Controller Solution for Inductive Heating Control

1 Description

The iW248 is a highly integrated solution for induction heating (IH) cooking applications for home appliances. The iW248 consists of a highly integrated hardware controller which supports I²C or Dialog's digital link (DLNK) communication protocol; a plate feedback network which ensures the stability of operation and a smart IGBT gate driver, significantly reducing the number of discrete components required. The hardware controller integrates valley-mode switching IGBT control to allow effective operation. It includes key built-in protection features in order to effectively protect the IGBT from damage. An innovative continuous low power mode allows the system to deliver continuous output power with 10W resolution. It provides several built-in pot detection features to allow fault-free heating to protect the IGBT from damage with different pot materials. The driving capability of the controller enables driving two IGBTs in parallel for higher output power applications.

2 Features

- Dedicated IGBT driving protection when over voltage occurs at gate voltage
- Supports both constant-current operation and constant-power operation
- Reduces EMI using valley-mode switching and optional turn-on time control feature
- Innovative pot detection through IGBT ring detection circuit
- Programmable protections include:
  - Over voltage protection - IGBT collector
  - Three dedicated temperature (OTP) sensing pins
  - Input surge voltage protection
  - Input surge current protection
  - Output power compensation to improve power accuracy
- Advanced innovative features (optional):
  - Low Power Continuous Mode (LPCM) for low output power operation
  - Able to control output power by 10W per step

3 Applications

- Inductive heating control

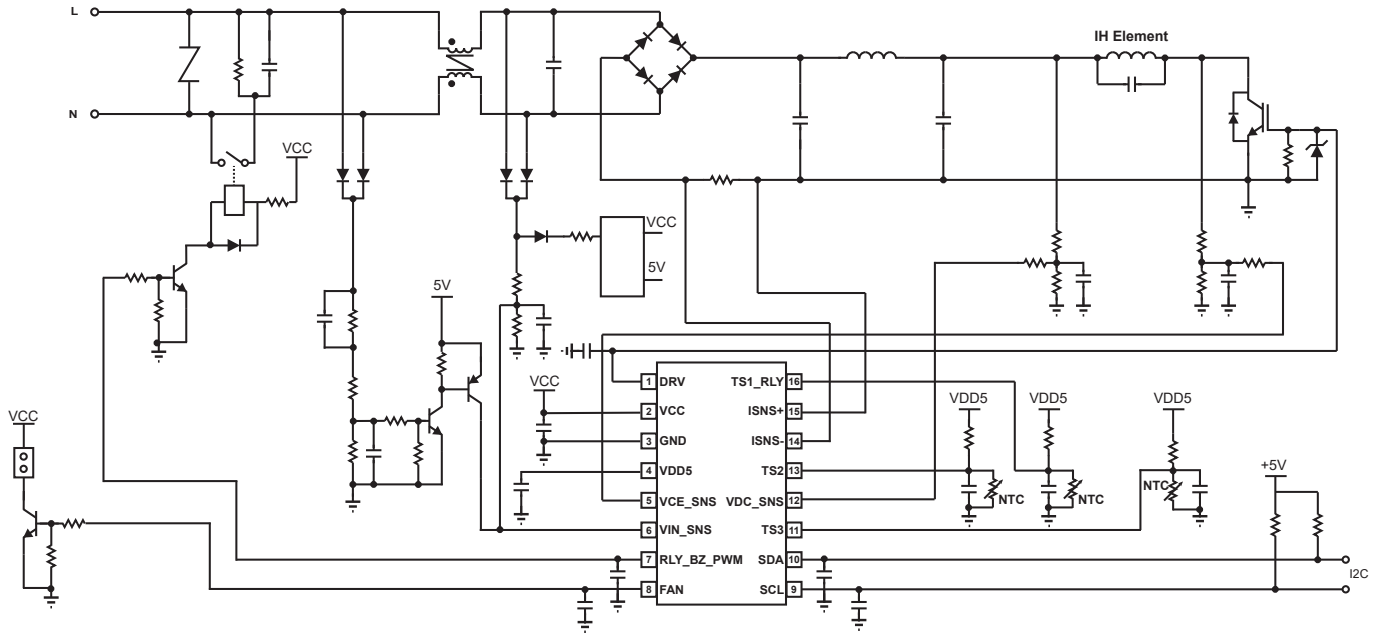


Figure 3.1 : iW248 Typical Application Circuit using I²C

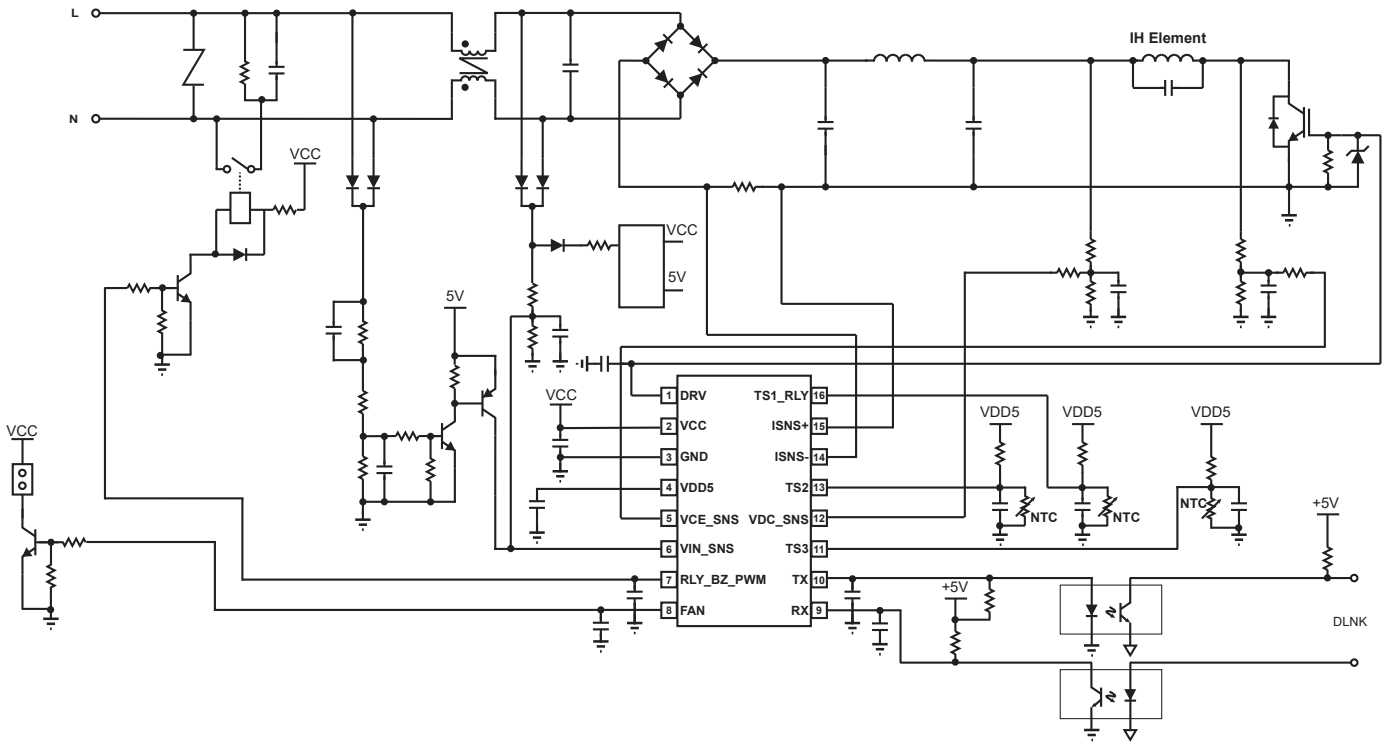


Figure 3.2 : iW248 Typical Application Circuit using DLNK

4 Pinout Description

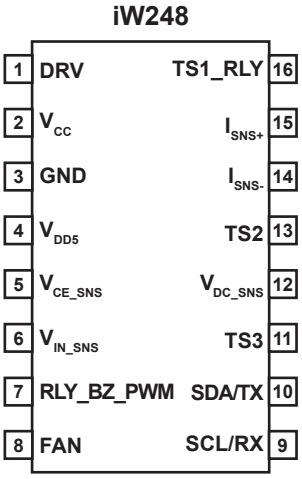


Figure 4.1 : 16-Lead SOIC Package

Pin #	Name	Type	Pin Description
1	DRV	Digital Output	Gate drive for the external IGBT.
2	V_{CC}	Power Input	Determined by the V_{GE} of the chosen IGBT (16-20V).
3	GND	Ground	Ground.
4	V_{DD5}	Power	Output of 5V DC. Connect this pin to a capacitor.
5	V_{CE_SNS}	Analog Input	IGBT collector voltage sense.
6	V_{IN_SNS}	Analog Input	AC line voltage sense.
7	RL_BZ_PWM	Digital Output	Multi-function control pin for relay, buzzer and PWM driver.
8	FAN	Digital Output	PWM signal for Fan driver.
9	SCL/RX	Digital Input	I^2C SCL/DLNK RX.
10	SDA/TX	Digital Input/ Output	I^2C SDA/DLNK TX (open drain).
11	TS3	Analog Input/ Output	Temperature sense. Connect this pin to an NTC resistor.
12	V_{DC_SNS}	Analog Input	Coil Voltage sense.
13	TS2	Analog Input/ Output	Temperature sense. Connect this pin to an NTC resistor.
14	I_{SNS-}	Analog Input	Current sense input. Connect to negative terminal.
15	I_{SNS+}	Analog Input	Current sense input. Connect to positive terminal.
16	TS1_RLY	Analog Input/ Output	Multi-function pin. Connect to an NTC resistor for temperature sensing. Or, use to control relay.

5 Absolute Maximum Ratings

Absolute maximum ratings are the parameter values or ranges which can cause permanent damage if exceeded. For maximum safe operating conditions, refer to the Electrical Characteristics section.

Parameter	Symbol	Value	Units
DC supply voltage range (pin 2, I_{CC} = 20 mA max)	V_{CC}	-0.3 to 22.0	V
Internal DC supply voltage range (pin 4, I_{CC} = 20 mA max)	V_{DD5}	-0.3 to 6.5	V
Current sense (pin 15)	V_{ISNS+}	-0.3 to 0.3	V
Current sense (pin 14)	V_{ISNS-}	-0.8 to 0.3	V
Voltage sense input (pin 5, 6, 12)	V_{CE_SNS}, V_{DC_SNS}, V_{IN_SNS}	-0.3 to 6.5	V
Temperature sense input (pin 11, 13, 16)	TS1, TS2, TS3	-0.3 to 6.5	V
Digital input (pin 9, 10)	SCL/RX, SDA/TX	-0.3 to 6.5	V
Maximum junction temperature	T_{JMAX}	150	°C
Operating junction temperature	T_{JOPT}	-40 to 150	°C
Storage temperature	T_{STG}	-55 to 150	°C
Electrostatic Discharge Capability (Human Body Model), JEDEC JS-001-2017	$ESD_{(HBM)}$	±2000	V
Electrostatic Discharge Capability (Charged Device Model), JS-002-2014	$ESD_{(CDM)}$	±1000	V
Latch-up test per JESD78E		±100	mA

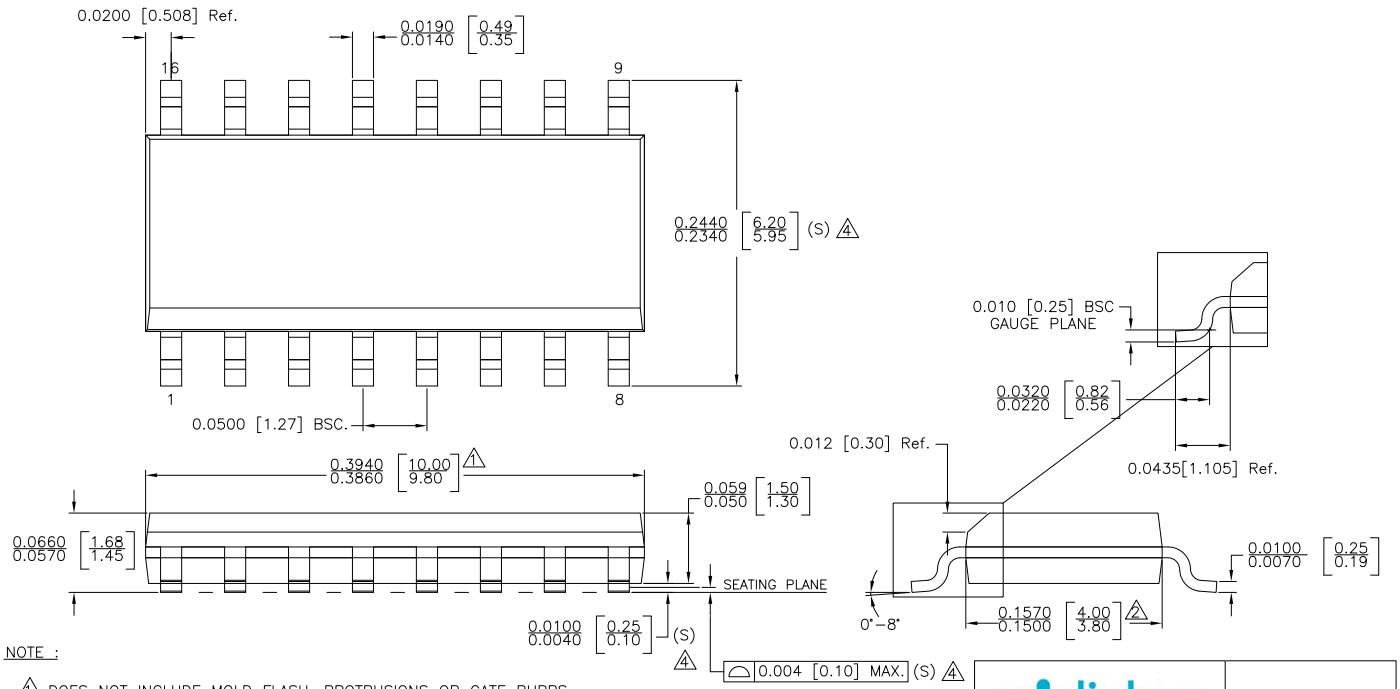
6 Thermal Information

Parameter	Symbol	Value	Unit
Thermal Shutdown Threshold (Note 1)	T_{SD}	145	°C
Thermal Shutdown hysteresis (Note 1)	T_{Hy}	30	°C

Notes:

Note 1. These parameters are typical and they are guaranteed by design.

7 Physical Dimensions



NOTE :

1. DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED .006 INCH PER SIDE.
2. DOES NOT INCLUDE INTER–LEAD FLASH OR PROTRUSIONS. INTER–LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .010 INCH PER SIDE.
3. THIS PART IS COMPLIANT WITH JEDEC SPECIFICATION MS–012 AC.
4. LEAD SPAN/STAND OFF HEIGHT/COPLANARITY ARE CONSIDERED AS SPECIAL CHARACTERISTIC.(S)
5. CONTROL DIMENSIONS IN INCHES.[mm]

STATUS: RELEASED	SCALE: DO NOT SCALE
TERMINAL FINISH: 100% Sn	
TITLE: 16 SOIC PACKAGE OUTLINE	
REV: A	REVISION NOTE: NEW DRAWING — DATE: 25–OCT–2017

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