



DT8211 Application *(19"wide & 20.1"wide Panel)*

4 Lamps Inverter Application Datasheet using DT8211

Rev1.0 - 18 April 2008

Application Datasheet



1. General description

This application is an example circuit of 4 lamps inverter using DT8211. The design contains protection functions such as OLP, OVP, SCP and basic functions such as ADIM (Analog Dimming) and BDIM (Burst Dimming). This design is intended to show how to use DT8211, implement basic functions and protection functions, and design a circuit. This document contains features, schematic, and bill of materials.

2. Features

- n Fixed Frequency Half Bridge Topology
- n Designed for 4 Lamp Inverter Solution
- n Positive Polarity Analog Dimming (Negative Polarity Possible)
- n Positive Polarity Internal Burst Dimming (Negative Polarity Possible)
- n ADIM & BDIM Polarity Selectable
- n Simultaneous Operation of ADIM and BDIM
- n Open Lamp Protection
- n Open Lamp Voltage Regulation (Over Voltage Protection)
- n Short Circuit Protection (HOT-GND, COLD-GND)

3. Applications

- n 4 Lamp CCFL Backlight Inverter Module
- n Monitor
- n TV
- n Advertisement Board

4. Pinning information

Pin	Symbol	Description
1	VCC	Power Input
2	EN	ON/OFF Control Pin
3	BDIM	Burst Dimming DC Level
4	ADIM	Analog Dimming DC Level
5	GND	Ground
6	GND	Ground

5. Absolute maximum ratings

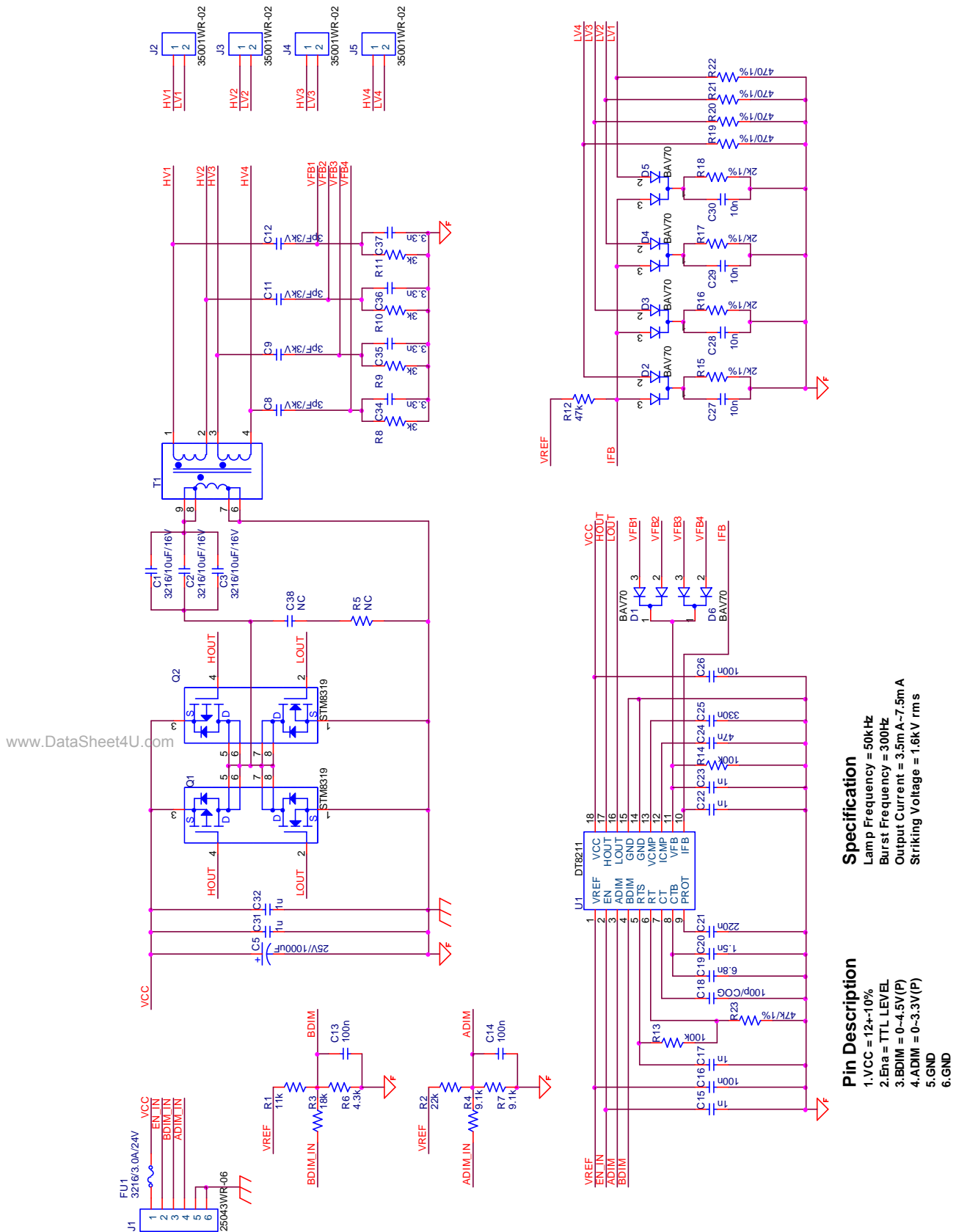
Parameter	Symbol	Conditions	Unit
Input Supply Voltage	V_{IN}	+45.0	V

6. Electrical characteristics

$T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<i>Power Supply section</i>						
Input Voltage	V_{IN}			12.0		V
Input Current	I_{IN}	$V_{IN}=12.0\text{V}$			2.5	A
<i>General Function section</i>						
ADIM Input	V_{ADIM}		0		3.3	V
BDIM Input	V_{BDIM}		0		4.5	V
Output Current	I_{OUT}	$V_{ADIM}=3.3\text{V}$ $V_{BDIM}=4.5\text{V}$	6.8	7.5	8.0	mA
		$V_{ADIM}=0\text{V}$ $V_{BDIM}=4.5\text{V}$	2.5	3.5	4.5	mA
		$V_{ADIM}=3.3\text{V}$ $V_{BDIM}=0\text{V}$	2.5	3.5	4.5	mA
Enable Input for Turn-On	V_{ON}		2.0		V_{IN}	V
Enable Input for Turn-Off	V_{OFF}		0		0.8	V
<i>Oscillator section</i>						
Main Oscillation Frequency	F_{MAIN}			50		kHz
Burst Oscillation Frequency	F_{BURST}			300		Hz
<i>Protection Function section</i>						
Open Lamp Protection Time	T_{OLP}		1		2	sec.
Over Voltage Protection	V_{OVP}		1600			V

7. Schematic



Specification

- Lamp Frequency = 50kHz
- Burst Frequency = 300Hz
- Output Current = 3.5mA-7.5mA
- Striking Voltage = 1.6kV rms

Pin Description

- 1.VCC = 12V-10%
- 2.Ena = TTL LEVEL
- 3.BDIM = 0-4.5V(P)
- 4.ADIM = 0-3.3V(P)
- 5.GND
- 6.GND

8. Bill of Material

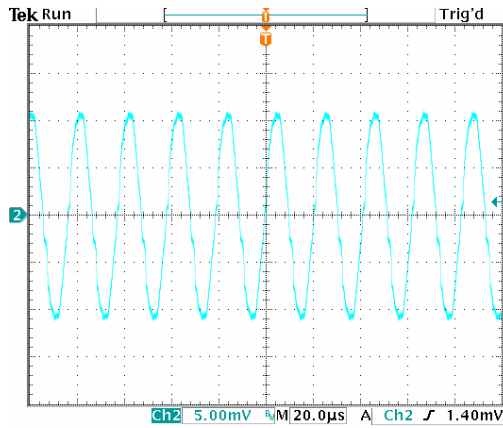
Item	Q'ty	Reference Number	Part Number
Resistor	1	R1	11k
Resistor	1	R2	22k
Resistor	1	R3	18k
Resistor	2	R4,R7	9.1k
Resistor	1	R6	4.3k
Resistor	4	R8,R9,R10,R11	3k
Resistor	2	R12, R23	47k/1%
Resistor	2	R13,R14	100k
Resistor	4	R15,R16,R17,R18	2k/1%
Resistor	4	R19,R20,R21, R22	470/1%
Capacitor	3	C1,C2,C3	3216/10uF/16V
Capacitor	1	C5	25V/1000uF
Capacitor	4	C8,C9,C11,C12	3pF/3kV
Capacitor	4	C13,C14, C16,C26	100n
Capacitor	1	C25	330n
Capacitor	4	C15,C17,C22,C23	1n
Capacitor	1	C18	100p/COG
Capacitor	1	C19	6.8n
Capacitor	1	C20	1.5n
Capacitor	1	C21	220n
Capacitor	1	C24	47n
Capacitor	4	C27,C28,C29,C30	10n
Capacitor	2	C31, C32	1u
Capacitor	4	C34,C35,C36,C37	3.3n
Resistor/Capacitor	2	R5, C10	NC
Diode	6	D1,D2,D3,D4,D5,D6	BAV70
Fuse	1	FU1	3216/3.0A/24V
Connector	1	J1	J-25043WR-06
Connector	4	J2,J3,J4,J5	J-35001WR-02
FET	2	Q1, Q2	STM8319
Transformer	1	T1	4 in 1
C	1	U1	DT8211

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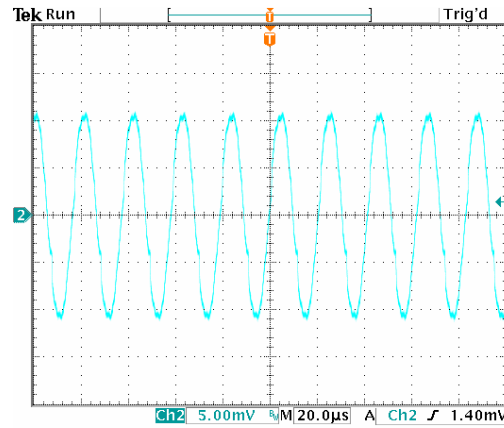
9. Test data

ADIM & BDIM Max Output Current Waveform

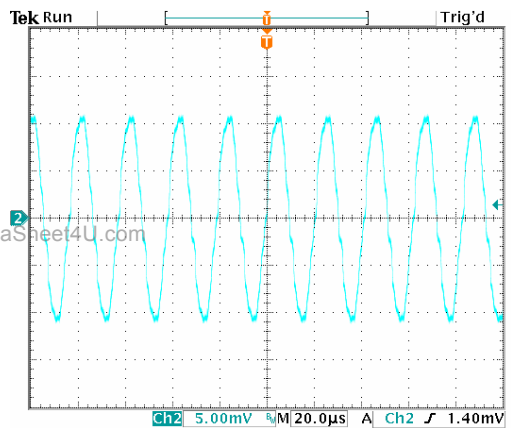
$V_{IN} = 12V$, $V_{BDIM} = 4.5V$, $V_{ADIM} = 3.3V$, unless otherwise specified.



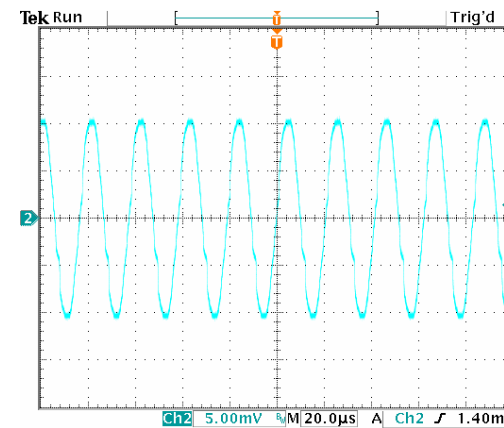
J2 Output Current = 7.82mArms



J3 Output Current = 7.78mArms



J4 Output Current = 7.69mArms



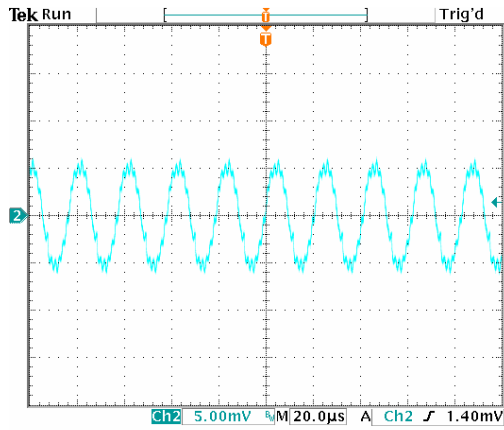
J5 Output Current = 7.60mArms

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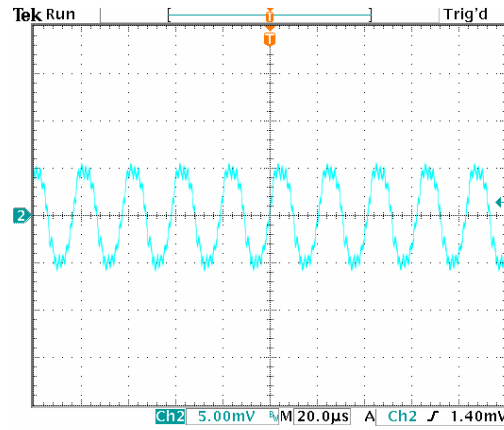
9. Test data

ADIM MIN Output Current Waveform

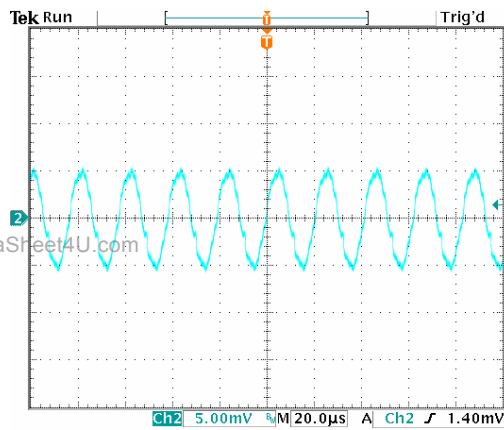
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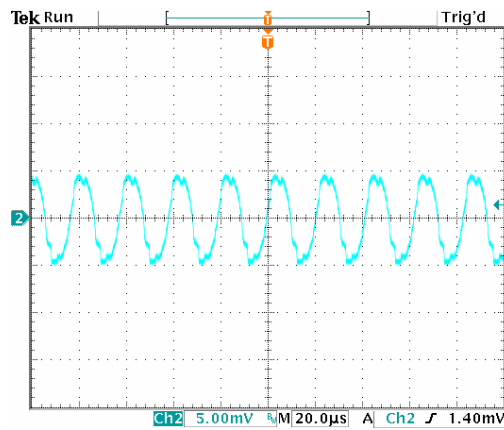
J2 Output Current = 3.88mArms



J3 Output Current = 3.79mArms



J4 Output Current = 3.60mArms



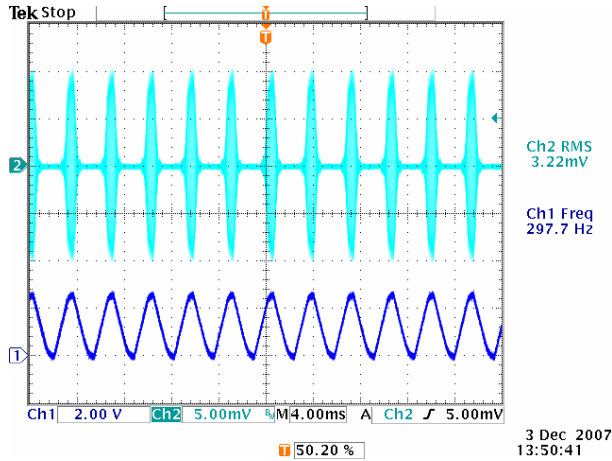
J5 Output Current = 3.41mArms

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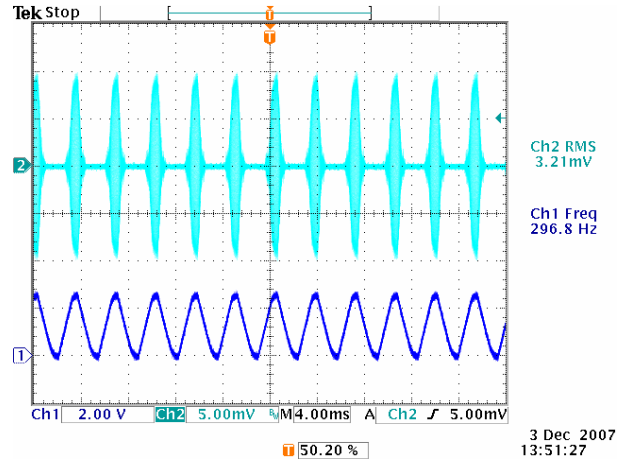
9. Test data

BDIM Min Output Current Waveform

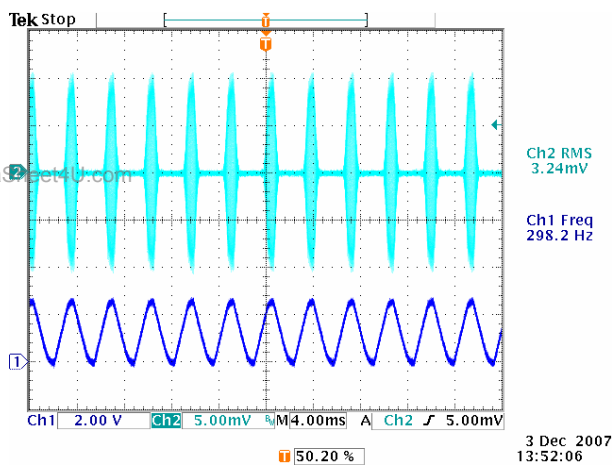
$V_{IN} = 12V$, $V_{BDIM} = 0V$, $V_{ADIM} = 3.3V$, unless otherwise specified.



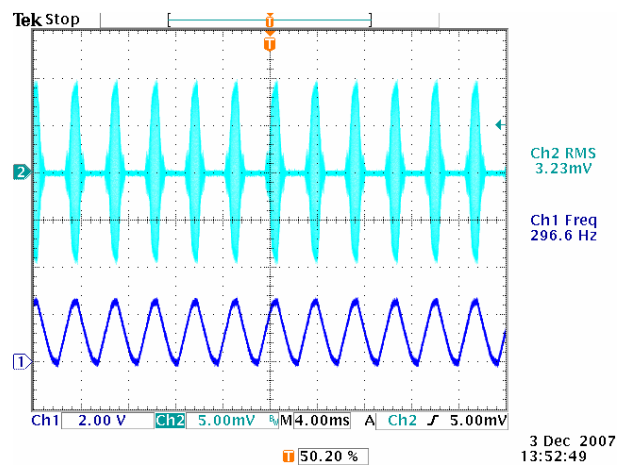
J2 Output Current = 3.22mArms
Burst Frequency = 297.7Hz



J3 Output Current = 3.21mArms
Burst Frequency = 296.8Hz



J4 Output Current = 3.24mArms
Burst Frequency = 298.2Hz

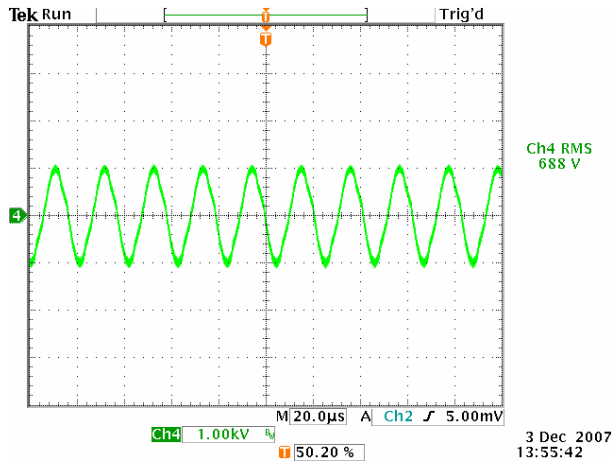


J5 Output Current = 3.23mArms
Burst Frequency = 296.6Hz

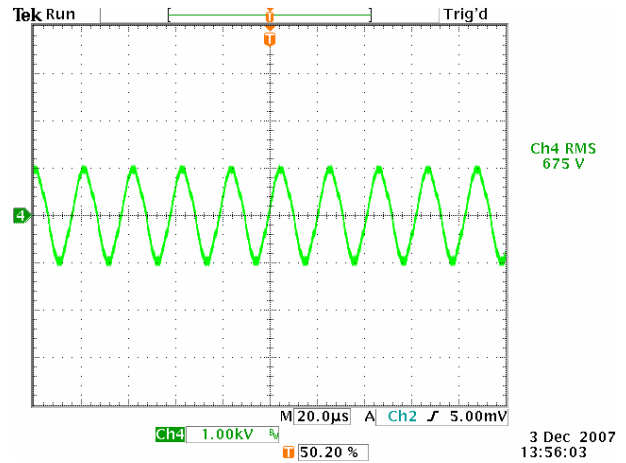
9. Test data

Output Voltage Waveform

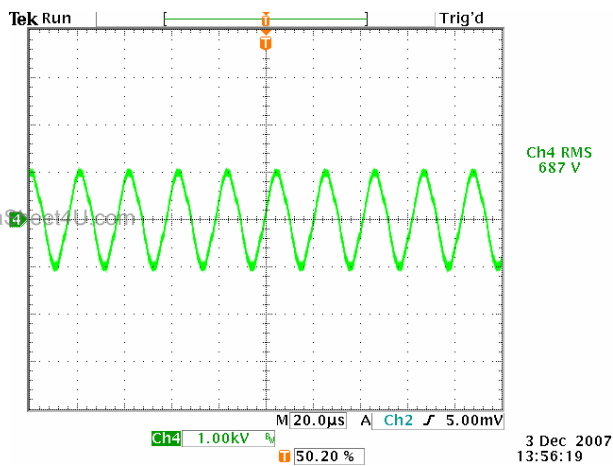
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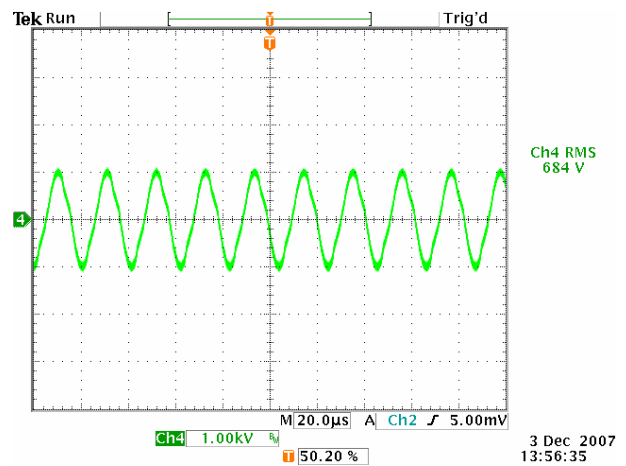
J2 Output Voltage = 688Vrms



J3 Output Voltage = 675Vrms



J4 Output Voltage = 687Vrms

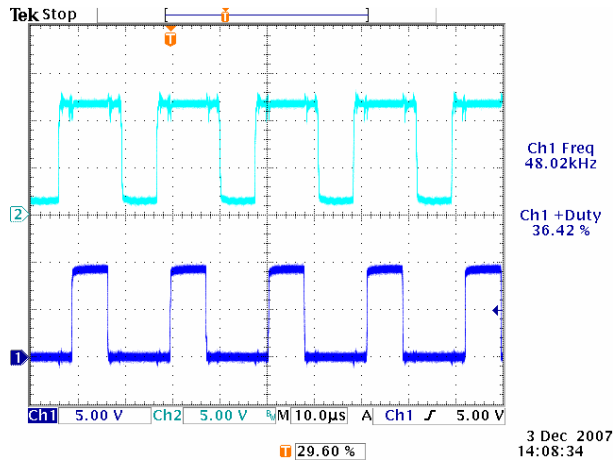


J5 Output Voltage = 684Vrms

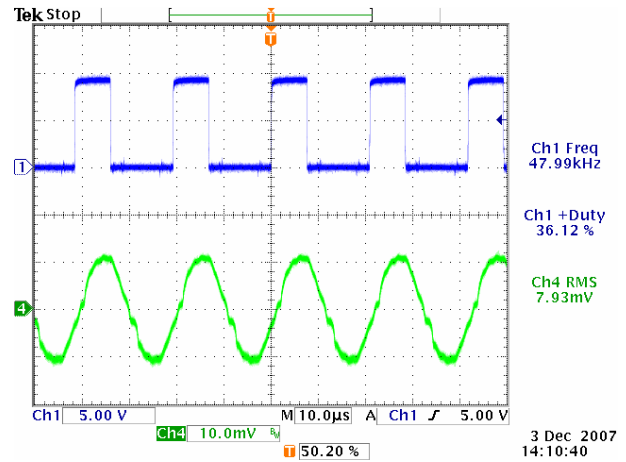
9. Test data

Hout & Lout Waveforms

$V_{IN} = 12V$, $V_{BDIM} = 4.5V$, $V_{ADIM} = 3.3V$, unless otherwise specified.



Cyan Waveform = U1.17 Hout Waveform
Blue Waveform = U1.16 Lout Waveform

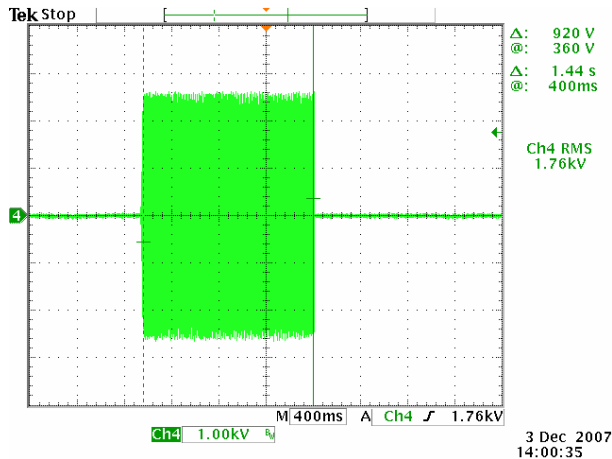


Blue Waveform = U1.16 Lout Waveform
Green Waveform = Current Waveform

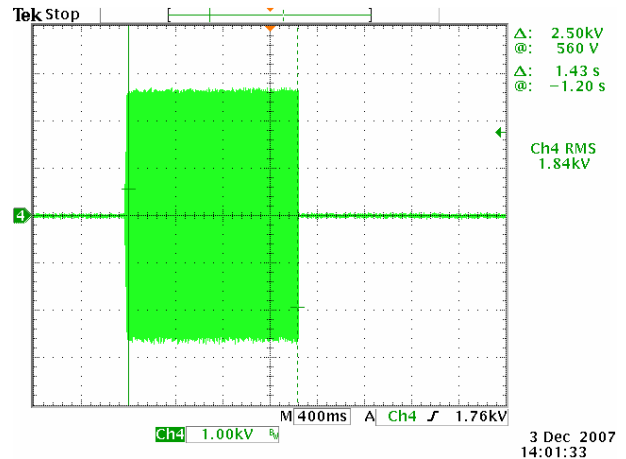
9. Test data

Open Lamp Protection (OLP) Waveform

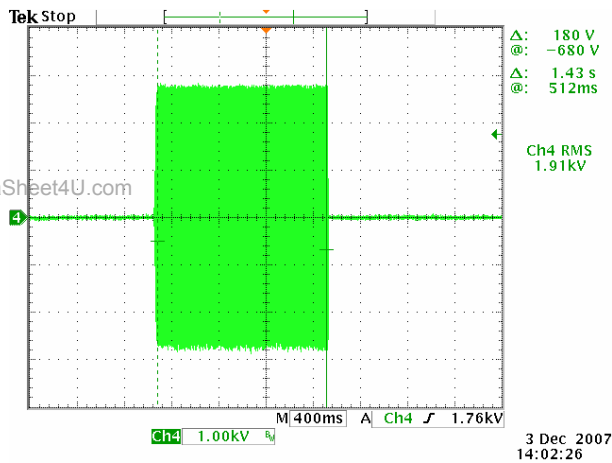
$V_{IN} = 12V$, $V_{BDIM} = 4.5V$, $V_{ADIM} = 3.3V$, unless otherwise specified.



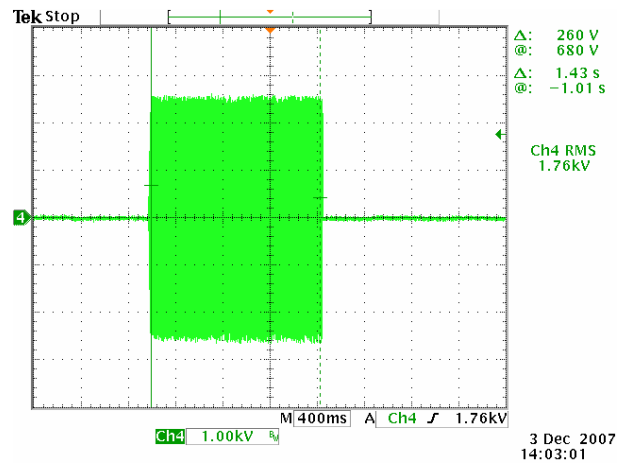
J2 Str. Voltage = 1.76kVrms
OLP Time = 1.44sec



J3 Str. Voltage = 1.84kVrms
OLP Time = 1.43sec



J4 Str. Voltage = 1.91kVrms
OLP Time = 1.43sec



J5 Str. Voltage = 1.76kVrms
OLP Time = 1.43sec

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9. Test data

Components Temperature

$T_A = 25^\circ\text{C}$, $V_{IN} = 12\text{V}$, unless otherwise specified.

Condition	Reference Number	Components	Temperature
BDIM=4.5V, ADIM=3.3V	U1	DT8211	45.4 °C
	Q1, Q2	MOSFET(STM8319)	60.1 °C , 65.8 °C
	T1	Transformer	54 °C
	C5	Electronics Capacitor	45.7 °C

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