UBA2021

630 V driver IC for CFL and TL lamps

Rev. 04 — 25 July 2008 | Product data sheet

1. General description

The UBA2021 is a high voltage IC intended to drive and control Compact Fluorescent Lamps (CFL) or fluorescent TL lamps. It contains a driver circuit for an external half-bridge, an oscillator and a control circuit for starting up, preheating, ignition, lamp burning and protection.

2. Features

- Adjustable preheat and ignition time.
- Adjustable preheat current.
- Adjustable lamp power.
- Lamp power independent from mains voltage variations.
- Overpower protection.
- Lamp temperature stress protection at higher mains voltages.
- Capacitive mode protection.
- Protection against a drive voltage that is too low for the power MOSFETs.

3. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
High voltage supply						
V_{FS}	high side supply voltage	$I_{FS} < 15$ µA; $t < 0.5$ s	-	-	630	V
Start-up state						
$V_{VS(start)}$	oscillator start voltage		-	11.95	-	V
$V_{VS(stop)}$	oscillator stop voltage		-	10.15	-	V
$I_{VS(standby)}$	standby current	$V_{VS} = 11$ V	-	200	-	µA
Preheat mode						
f_{start}	start frequency		-	108	-	kHz
t_{ph}	preheat time	$C_{CP} = 100$ nF	-	666	-	ms
$V_{RS(ctrl)}$	control voltage at pin RS		-	–600	-	mV
Frequency sweep to ignition						
f_B	bottom frequency		-	42.9	-	kHz
t_{ign}	ignition time		-	625	-	ms
Normal operation						
f_B	bottom frequency		-	42.9	-	kHz
t_{no}	non-overlap time		-	1.4	-	µs

founded by Philips

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
I_{tot}	total supply current	f_B = 43 kHz	-	1	-	mA
$R_{G1(on)}$, $R_{G2(on)}$	high and low side on resistance		-	126	-	Ω
$R_{G1(off)}$, $R_{G2(off)}$	high and low side off resistance		-	75	-	Ω
Feed-forward						
f_{ff}	feed-forward frequency	I_{RHV} = 0.75 mA	-	63.6	-	kHz
		I_{RHV} = 1.0 mA	-	84.5	-	kHz
$I_{i(RHV)}$	operating range of input current at pin RHV		0	-	1000	µA

4. Ordering information

Table 2. Ordering information

Type number	Package		
	Name	Description	Version
UBA2021T	SO14	plastic small outline package; 14 leads; body width 3.9 mm	SOT108-1
UBA2021P	DIP14	plastic dual in-line package; 14 leads (300 mil)	SOT27-1

5. Block diagram

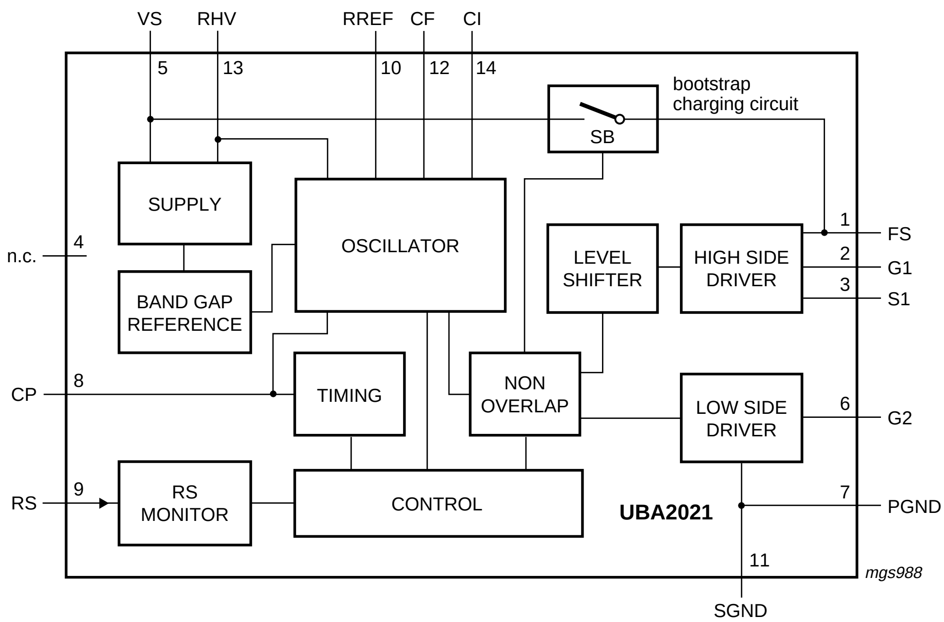


Fig 1. Block diagram

6. Pinning information

6.1 Pinning

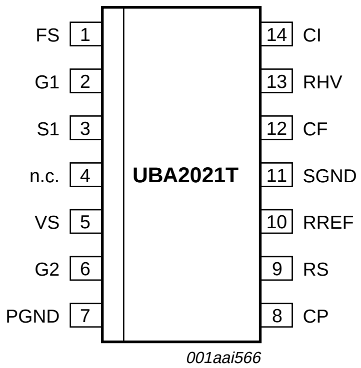


Fig 2. Pin configuration (SO14)

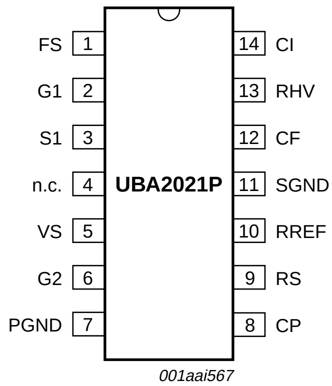


Fig 3. Pin configuration (DIP14)

6.2 Pin description

Table 3. Pin description

Symbol	Pin	Description
FS	1	high side floating supply voltage
G1	2	gate high transistor (T1)
S1	3	source high transistor (T1)
n.c.	4	high-voltage spacer, not to be connected
VS	5	low voltage supply
G2	6	gate low transistor (T2)
PGND	7	power ground
CP	8	timing/averaging capacitor
RS	9	current monitoring input
RREF	10	reference resistor
SGND	11	signal ground
CF	12	oscillator capacitor
RHV	13	start-up resistor/feed-forward resistor
CI	14	integrating capacitor

7. Functional description

7.1 Introduction

The UBA2021 is an integrated circuit for electronically ballasted compact fluorescent lamps and their derivatives operating with mains voltages up to 240 V (RMS). It provides all the necessary functions for preheat, ignition and on-state operation of the lamp. In addition to the control function, the IC provides level shift and drive functions for the two discrete power MOSFETs, T1 and T2 (see Figure 7).

7.2 Initial start-up

Initial start-up is achieved by charging capacitor CS9 with the current applied to the RHV-pin. At start-up, MOSFET T2 conducts and T1 does not conduct. This ensures C_{boot} becomes charged. This start-up state is reached for a supply voltage of $V_{VS(reset)}$. This is the voltage level on the VS-pin at which the circuit will be reset to its initial state and maintained until the low voltage supply (V_{VS}) reaches a value of $V_{VS(start)}$. The circuit is reset to the start-up state.

7.3 Oscillation

When the low voltage supply (V_{VS}) has reached the value of $V_{VS(start)}$ the circuit starts oscillating in the preheat state. The internal oscillator is a current-controlled circuit which generates a sawtooth waveform. The frequency of the sawtooth is determined by the capacitor C_{CF} and the current out of the CF-pin, mainly set by R_{RREF}. The sawtooth frequency is twice the frequency of the signal across the load. The IC brings MOSFETs T1 and T2 alternately into conduction with a duty factor of approximately 50 %. Figure 4 represents the timing of the IC. The circuit block 'non-overlap' generates a non-overlap time t_{no} that ensures conduction periods of exclusively T1 or T2. Time t_{no} is dependent on the reference current I_{RREF}.

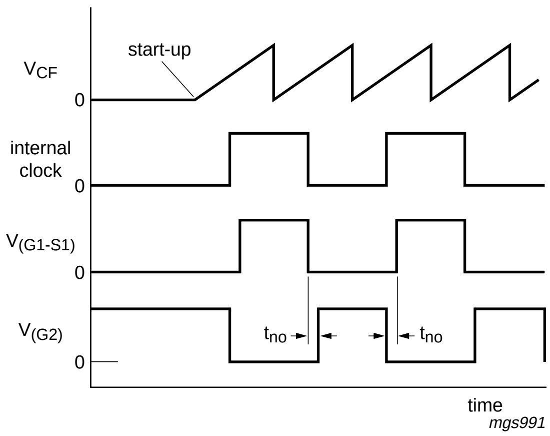


Fig 4. Oscillator timing

7.4 Operation in the preheat mode

The circuit starts oscillating at approximately $2.5 \times f_B$ (108 kHz). The frequency gradually decreases until a defined value of current I_{shunt} is reached (see Figure 5). The slope of the decrease in frequency is determined by capacitor C_{CI}. The frequency during preheating is approximately 90 kHz. This frequency is well above the resonant frequency of the load, which means that the lamp is off, the load only consists of L2, C5 and the electrode resistance. The preheat time is determined by capacitor C_{CP}. The circuit can be locked in the preheat state by connecting the CP-pin to ground. During preheating, the circuit monitors the load current by measuring the voltage drop over external resistor R_{shunt} at the end of

conduction of T2 with decision level $V_{RS(ctrl)}$. The frequency is decreased as long as $V_{RS} > V_{RS(ctrl)}$. The frequency is increased for $V_{RS} < V_{RS(ctrl)}$.

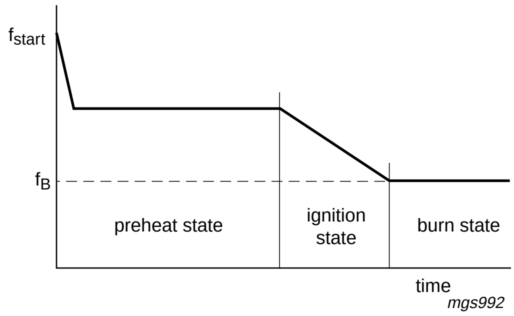


Fig 5. Operation in the preheat mode

7.5 Ignition state

The RS monitoring function changes from $V_{RS(ctrl)}$ regulation to capacitive mode protection at the end of the preheat time. Normally this results in a further frequency decrease down to the bottom frequency f_B (approximately 43 kHz). The rate of change of frequency in the ignition state is less than that in the preheat mode. During the downward frequency sweep the circuit sweeps through the resonant frequency of the load. A high voltage then appears across the lamp. This voltage normally ignites the lamp.

7.6 Failure to ignite

Excessive current levels may occur if the lamp fails to ignite. The IC does not limit these currents in any way.

7.7 Transition to the burn state

Assuming that the lamp has ignited during the downward frequency sweep, the frequency normally decreases to the bottom frequency. The IC can transit to the burn state in two ways:

1. In the event that the bottom frequency is not reached, transition is made after reaching the ignition time t_{ign}.
2. As soon as the bottom frequency is reached.

The bottom frequency is determined by R_{RREF} and C_{CF}.

7.8 Feed-forward frequency

During burn state a feed-forward mechanism ensures that the lamp power will not increase above the maximum allowed value due to an increased mains voltage. In the feed-forward range the UBA2021 driver IC can be configured in such a way that the application is optimized for close to constant lamp power. Above a defined voltage level the oscillation frequency also depends on the supply voltage of the half-bridge (see Figure 6). The current for the current controlled oscillator is derived from the current through R_{RHV} in the feed-forward range. The feed-forward frequency is proportional to the average value of the current through R_{RHV} within the operating range of $I_{i(RHV)}$, given the lower limit set by f_B. For currents beyond the operating range (i.e. between 1.0 mA and 1.6 mA) the feed-forward frequency is clamped. In order to prevent feed-forward of ripple on

V_{in}, the ripple is filtered out. The capacitor connected to the CP-pin is used for this purpose. This pin is also used in the preheat state and the ignition state for timing (t_{ph} and t_{ign}).

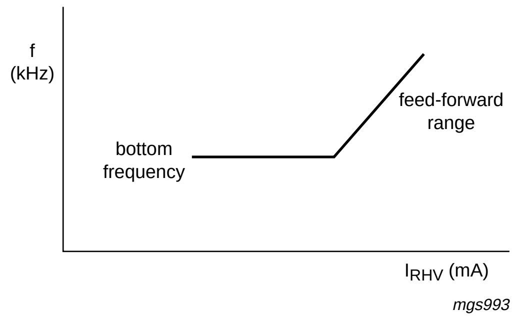


Fig 6. Feed-forward frequency

7.9 Capacitive mode protection

When the preheat mode is completed, the IC will protect the power circuit against losing the zero voltage switching condition and getting too close to the capacitive mode of operation. This is detected by monitoring voltage V_{RS} at the RS-pin. If the voltage is below $V_{RS(cap)}$ at the time of turn-on of T2, the capacitive mode operation is assumed. Consequently the frequency increases as long as the capacitive mode is detected. The frequency decreases down to the feed-forward frequency if no capacitive mode is detected. Frequency modulation is achieved via the CI-pin.

7.10 IC supply

Initially, the IC is supplied from V_{in} by the current through R_{RHV}. This current charges the supply capacitor CS9 via an internal diode. As soon as V_{VS} exceeds $V_{VS(start)}$, the circuit starts oscillating. After the preheat phase is finished, the pin is connected to an internal resistor $R_{i(RHV)}$, prior to this the RHV-pin is internally connected to the VS-pin. The voltage level at the RHV-pin thus drops from $V_{VS} + V_{diode}$ to $I_{RHV} \times R_{i(RHV)}$. The capacitor CS9 at the VS-pin will now be charged via the snubber capacitor CS7. Excess charge is drained by an internal clamp that turns on at voltage $V_{VS(clamp)}$.

7.11 Minimum gate-source voltage of T1 and T2

The high side driver is supplied via capacitor C_{boot}. Capacitor C_{boot} is charged via the bootstrap switch during the on periods of T2. The IC stops oscillating at a voltage level $V_{VS(stop)}$. Given a maximum charge consumption on the load at the G1-pin of 1 nC/V, this safeguards the minimum drive voltages $V_{(G1-S1)}$ for the high side driver, see Table 1.

Table 4. Minimum gate-source voltages

FREQUENCY	VOLTAGE
< 75 kHz	8 V (min)
75 kHz to 85 kHz	7 V (min)
≥ 85 kHz	6 V (min)

The drive voltage at G2 will exceed the drive voltage of the high side driver.

7.12 Frequency and change in frequency

At any point in time during oscillation, the circuit will operate between f_B and f_{start}. Any change in frequency will be gradual, no steps in frequency will occur. Changes in frequency caused by a change in voltage at the CI-pin show a rather constant Δf/Δt over the entire frequency range. The following rates are realized (at a frequency of 85 kHz and with a 100 nF capacitor connected to the PCI-pin):

- For any increase in frequency: Δf/Δt is between 15 kHz/ms and 37.5 kHz/ms.
- During preheat and normal operation: Δf/Δt for a decrease in frequency is between –6 kHz/ms and –15 kHz/ms.
- During the ignition phase: Δf/Δt for a decrease in frequency is between –150 Hz/ms and –375 Hz/ms.

7.13 Ground pins

The PGND-pin is the ground reference of the IC with respect to the application. As an exception the SGND-pin provides a local ground reference for the components connected to the CP-pin, CI-pin, RREF-pin and thee CF-pin. For this purpose the PGND-pin and SGND-pin are short circuited internally. External connection of the PGND-pin and the SGND-pin is not preferred. The sum of currents flowing out of the CP-pin, CI-pin, RREF-pin, CF-pin and the SGND-pin must remain zero at all time.

7.14 Charge coupling

Due to parasitic capacitive coupling to the high voltage circuitry, all pins are burdened with a repetitive charge injection. Given the typical application in Figure 7, the RREF-pin and the CF-pin are sensitive to this charge injection. For the rating Q_{couple} a safe functional operation of the IC is guaranteed, independent of the current level. Charge coupling at current levels below 50 mA will not interfere with the accuracy of the $V_{RS(cap)}$ and $V_{RS(ctrl)}$ levels. Charge coupling at current levels below 20 mA will not interfere with the accuracy of any parameter.

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134). All voltages referenced to ground.

Symbol	Parameter	Conditions	Min	Max	Unit
V_{FS}	high side floating supply voltage	operating	-	570	V
		t ≤ 0.5 s	-	630	V
$I_{VS(clamp)}$	clamp current		-	35	mA
V_{RS}	input voltage pin RS		–2.5	+2.5	V
		transient of 50 ns	–15	+2.5	V
SR	slew rate at pins S1, G1 and FS (with respect to ground)		–4	+4	V/ns
P	power dissipation		-	500	mW
T_{amb}	ambient temperature		–40	+150	°C
T_j	junction temperature		–40	+150	°C

Table 5. Limiting values *...continued*

In accordance with the Absolute Maximum Rating System (IEC 60134). All voltages referenced to ground.

Symbol	Parameter	Conditions		Min	Max	Unit
T_{stg}	storage temperature			–55	+150	°C
Q_{couple}	charge coupling at pins RREF and CF	operating		–8	+8	pC
V_{es}	electrostatic handling voltage	human body model	[1]	-	2000	V
		machine model	[2]	-	250	V

[1] HBM: 2000 V, except pins FS, G1, S1 and VS which are 1000 V maximum and G2 which is 800 V maximum.

[2] MM: 250 V except for the G1-pin which is 100 V.

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		
	S014		100	K/W
	DIP14		60	K/W
$R_{th(j-pin)}$	thermal resistance from junction to PCB	in free air		
	S014		50	K/W
	DIP14		30	K/W

10. Characteristics

Table 7. Characteristics

V_{VS} = 11 V; V_{FS} - V_{S1} = 11 V; T_{amb} = 25 °C; all voltages referenced to ground; unless otherwise specified. See Figure 8.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
High voltage supply							
I_L	leakage current on high voltage pins	V_{FS}, V_{G1} and V_{S1} = 630 V		-	-	15	µA
Start-up state							
$V_{VS(reset)}$	reset voltage	T1 off; T2 on		4	5.5	6.5	V
$V_{VS(start)}$	oscillator start voltage			11.35	11.95	12.55	V
$V_{VS(stop)}$	oscillator stop voltage			9.55	10.15	10,75	V
$V_{VS(hys)}$	supply voltage hysteresis			1.5	1.8	2	V
$I_{VS(standby)}$	standby supply current at pin VS	V_{VS} = 11 V	[1]	150	200	250	µA
$\Delta V_{(RHV-VS)}$	voltage difference between pins RHV and VS	I_{RHV} = 1.0 mA		0.7	0.8	1	V
$V_{VS(clamp-start)}$	clamp margin $V_{VS(clamp)}$ to $V_{VS(start)}$		[2]	0.2	0.3	0.4	V

Table 7. Characteristics *...continued*

V_{VS} = 11 V; V_{FS} - V_{S1} = 11 V; T_{amb} = 25 °C; all voltages referenced to ground; unless otherwise specified. See Figure 8.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$I_{VS(clamp)}$	clamp current	V_{VS} < 17 V		-	14	35	mA
Preheat mode							
f_{start}	starting frequency	V_{CI} = 0 V		98	108	118	kHz
t_g	conducting time T1 and T2	f_{start} = 108 kHz		-	3.2	-	µs
$I_{CI(charge)}$	charge current at pin CI	V_{CI} = 1.5 V; V_{RS} = –0.3 V		38	44	50	µA
$I_{CI(discharge)}$	discharge current at pin CI	V_{CI} = 1.5 V; V_{RS} = –0.9 V		79	93	107	µA
t_{ph}	preheat time			599	666	733	ms
$I_{CP(charge)}$	charge current at pin CP	V_{CP} = 1 V		-	6	-	µA
$I_{CP(discharge)}$	discharge current at pin CP	V_{CP} = 1 V		-	5.95	-	µA
$\Delta V_{CP(pk)}$	peak voltage difference at pin CP	when timing		-	2.5	-	V
$V_{RS(ctrl)}$	control voltage at pin RS		[3]	–636	–600	–564	mV
Frequency sweep to ignition							
$I_{CI(charge)}$	charge current at pin CI	V_{CI} = 1.5 V; f ≈ 85 kHz		0.8	1	1.2	µA
f_B	bottom frequency	V_{CI} at clamp level		-	42.9	-	kHz
t_{ign}	ignition time			-	625	-	µs
Normal operation							
f_B	bottom frequency			41.21	42.9	44.59	kHz
t_g	conducting time T1 and T2	f_B = 43 kHz		-	10.2	-	µs
t_{no}	non-overlap conductance time			1.05	1.4	1.75	µs
I_{tot}	total supply current	f_B = 43 kHz	[4]	0.85	1	1.1	mA
$V_{RS(cap)}$	capacitive mode control voltage		[5]	0	20	40	mV
V_{RREF}	reference voltage		[6]	2.425	2.5	2.575	V
$V_{G1(on)}$	on voltage at pin G1	$\lvert I_{G1} \rvert$ = 1 mA		10.5	-	-	V
$V_{G1(off)}$	off voltage at pin G1	$\lvert I_{G1} \rvert$ = 1 mA		-	-	0.3	V
$V_{G2(on)}$	on voltage at pin G2	$\lvert I_{G2} \rvert$ = 1 mA		10.5	-	-	V
$V_{G2(off)}$	off voltage at pin G2	$\lvert I_{G2} \rvert$ = 1 mA		-	-	0.3	V
$R_{G1(on)}$	high side driver on resistance	$V_{(G1 - S1)}$ = 3 V	[7]	100	126	152	Ω
$R_{G1(off)}$	high side driver off resistance	$V_{(G1 - S1)}$ = 3 V	[7]	60	75	90	Ω
$R_{G2(on)}$	low side driver on resistance	V_{G2} = 3 V	[7]	100	126	152	Ω
$R_{G2(off)}$	low side driver off resistance	V_{G2} = 3 V	[7]	60	75	90	Ω
V_{drop}	voltage drop at bootstrap switch	I_{FS} = 5 mA		0.6	1	1.4	V
Feed-forward							
$R_{i(RHV)}$	input resistance at pin RHV		[8]	1.54	2.2	2.86	kΩ
$I_{i(RHV)}$	operating range of input current at pin RHV			0	-	1000	µA

Table 7. Characteristics *...continued*

V_{VS} = 11 V; V_{FS} - V_{S1} = 11 V; T_{amb} = 25 °C; all voltages referenced to ground; unless otherwise specified. See Figure 8.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
f_{ff}	feed-forward frequency	I_{RHV} = 0.75 mA		60.4	63.6	66.15	kHz
		I_{RHV} = 1 mA		80.3	84.5	88.2	kHz
SYM_{ff}	symmetry	I_{RHV} = 1 mA	[9]	0.9	1	1.1	
RR	ripple rejection	f_{Vin} = 100 Hz		-	6	-	dB
$R_{CP(sw)}$	CP switch series resistance	I_{CP} = 100 µA		0.75	1.5	2.25	kΩ
R_{AV}	averaging resistor	I_{CP} = 10 µA		22.4	32	41.6	kΩ

[1] The start-up supply current is specified in a temperature (T_{vj}) range of 0 °C to 125 °C. For T_{vj} < 0 °C and T_{vj} >125 °C the start-up supply current is < 350 µA.

[2] The clamp margin is defined as the voltage difference between turn-on of the clamp and start of oscillation. The clamp is in the off-state at start of oscillation.

[3] Data sampling of $V_{RS(ctrl)}$ is performed at the end of conduction of T2.

[4] The total supply current is specified in a temperature (T_{vj}) range of –20 °C to +125 °C. For T_{vj} < –20 °C and T_{vj} >125 °C the total supply current is < 1.5 mA.

[5] Data sampling of $V_{RS(cap)}$ is performed at the start of conduction of T2.

[6] Within the allowed range of R_{RREF}, defined as 30 kΩ +10 %.

[7] Typical values for the on and off resistances at T_{vj} = 87.5 °C are: $R_{G2(on)}$ and $R_{G1(on)}$ = 164 Ω, $R_{G2(off)}$ and $R_{G1(off)}$ = 100 Ω.

[8] The input current at RHV pin may increase to 1600 µA during voltage transient at V_{in}. Only for currents I_{RHV} beyond approximately 550 µA is the oscillator frequency proportional to I_{RHV}.

[9] The symmetry SYM_{ff} is calculated from the quotient $SYM_{ff} = T1_{tot} / T2_{tot}$, with $T1_{tot}$ the time between turn-off of G2 and turn-off of G1, and $T2_{tot}$ the time between turn-off of G1 and turn-off of G2.

11. Design information

11.1 Design equations

- Bottom frequency:

$$f_B = \frac{1}{2 \times \{[(C_{CF} + C_{par}) \times (X1 \times R_{RREF} - R_{int})] + \tau\}} \quad (1)$$

- Feed-forward frequency:

$$f_{ff} = \frac{1}{2 \times \left\{\left[(C_{CF} + C_{par}) \times \left(\frac{X2 \times V_{RREF}}{I_{i(RHV)}} - R_{int}\right)\right] + \tau\right\}} \quad (2)$$

- Where:
  - X1 = 3.68.
  - X2 = 22.28.
  - τ = 0.4 µs.
  - R_{int} = 3 kΩ.
  - C_{par} = 4.7 pF
- Operating frequency is the maximum of f_B, f_{ff} or f_{cm}.

- Where:
- f_B = bottom frequency.
- f_{ff} = feed-forward frequency.
- f_{cm} = frequency due to capacitive mode detection.
- Preheat time: $t_{ph} = \frac{C_{CP}}{150nF} \times \frac{R_{RREF}}{30K\Omega}$
- Ignition time: $t_{ign} = \frac{15}{16} \times t_{ph}$
- Non-overlap time: $t_{no} = 1.4\mu s \times \frac{R_{RREF}}{30k\Omega}$

12. Application information

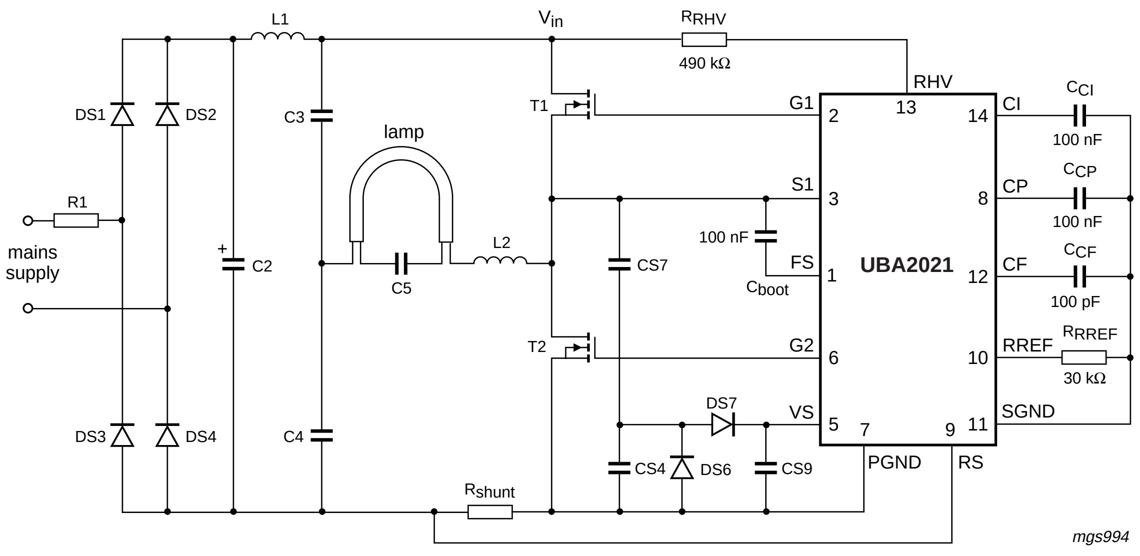
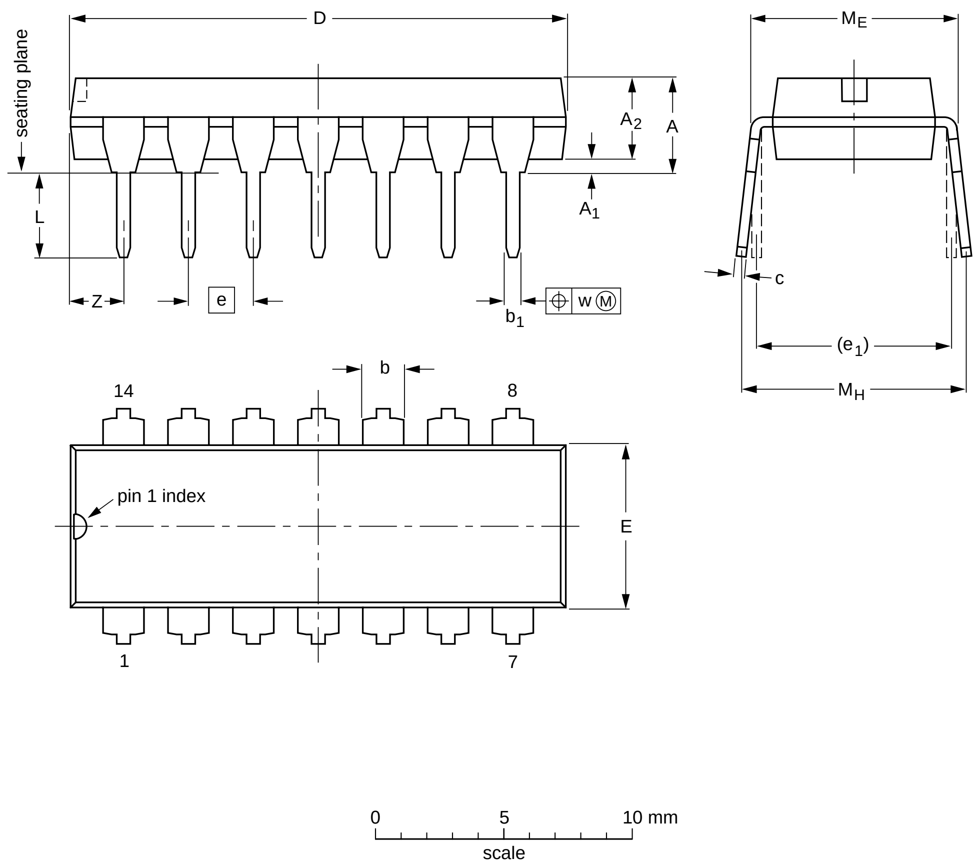


Fig 7. Application diagram

13. Package outline

DIP14: plastic dual in-line package; 14 leads (300 mil) **SOT27-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.02	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.1	0.3	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

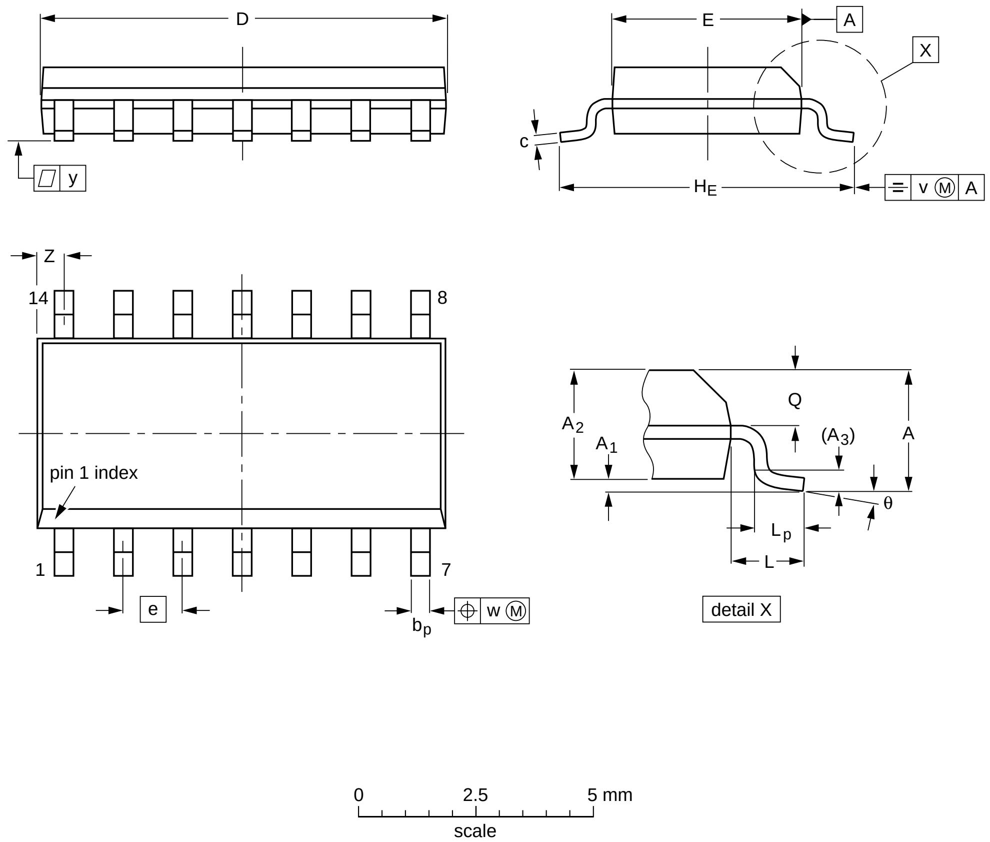
Note

1. Plastic or metal protrusions of 0.25 mm (0.01 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT27-1	050G04	MO-001	SC-501-14			~~99-12-27~~ 03-02-13

Fig 8. DIP14: plastic dual in-line package;

SO14: plastic small outline package; 14 leads; body width 3.9 mm **SOT108-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	D (1)	E (1)	e	H_E	L	L_p	Q	v	w	y	Z (1)	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8^o 0^o
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.05	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm (0.006 inch) maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT108-1	076E06	MS-012				~~99-12-27~~ 03-02-19

Fig 9. SO14 plastic small outline package

14. Revision history

Table 8. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
UBA2021_4	20080725	Product data sheet	-	UBA2021_3
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
UBA2021_3	20080802	Product data sheet	-	UBA2021_2
UBA2021_2	20010130	Product data sheet	-	UBA2021_1
UBA2021_1	20000724	Product data sheet	-	-

15. Legal information

15.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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17. Contents

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