GENERAL DESCRIPTION

The OB3341S is a high power factor, monolithic Buck regulator with advanced features to provide high efficiency control and high accuracy constant current output for LED lighting applications.

OB3341S integrates a 2A MOSFET to decrease physical volume. It adopts constant on time control for power factor correction (PFC), zero current detectors (ZCD) to ensure quasi-resonant valley turn-on for high efficiency operation.

OB3341S offers good protection coverage including VCC under voltage lockout (UVLO), VCC over voltage protection, cycle-by-cycle current limiting, over temperature protection, COMP pin floating protection and LED open/short protection.

OB3341S is provided with DIP8 package.

FEATURES

- Buck topology power switching with single stage PFC (PF>0.9)
- Integrated 2A 600V MOSFET
- Quasi-resonant valley turn-on mode operation to achieve high efficiency (>90%)
- High accuracy output current (±3%)
- LED open/short protection
- Low power dissipation at LED short
- Ultra-low start-up current (typical 5uA)

APPLICATIONS

- LED lighting
- Tube lighting
- PAR lighting
- Bulb lighting

TYPICAL APPLICATION

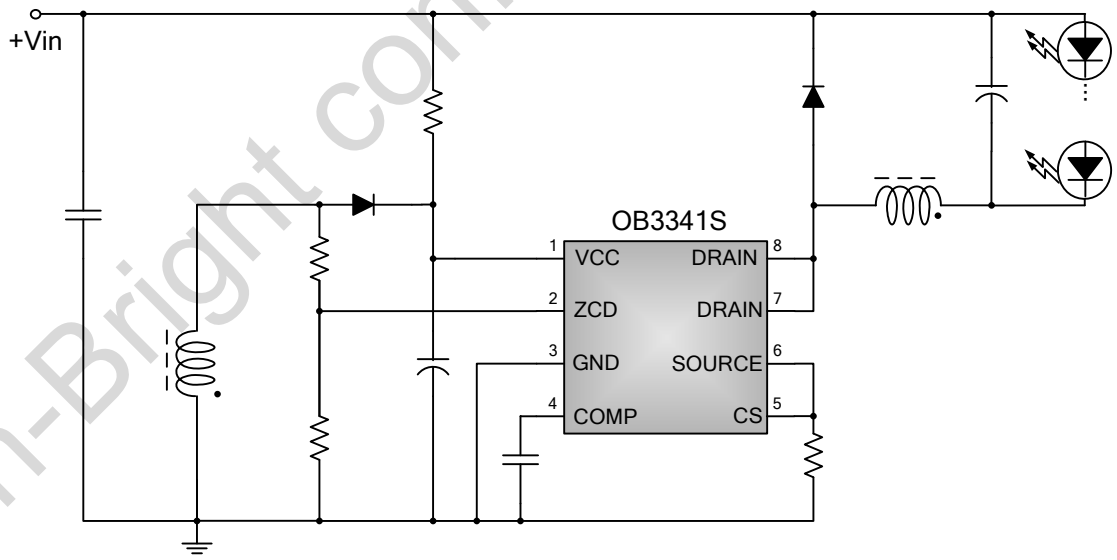
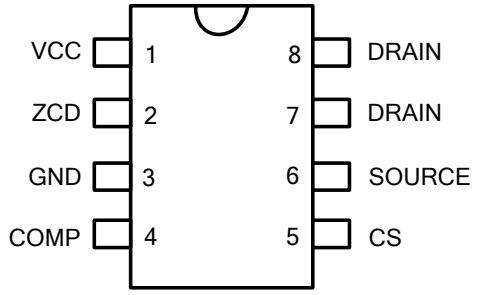


Figure1: OB3341S Typical Application Schematic

GENERAL INFORMATION

Terminal Assignment

In DIP8 Package.



Ordering Information[1]

Part Number	Description
OB3341SAP-H	8 Pin DIP, Pb free in Tube

Note1: All Devices are offered in Pb-free Package if not otherwise noted.

Package Dissipation Rating

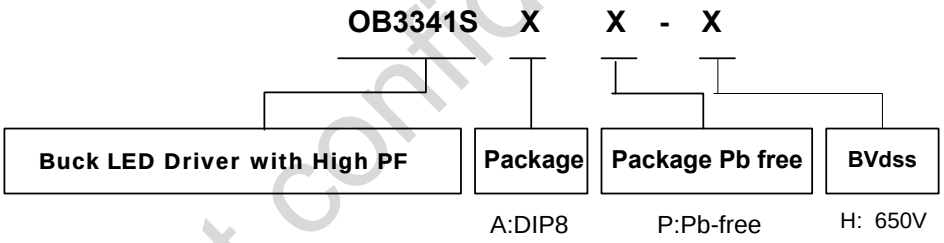
Package	RθJA (℃/W)
DIP8	75

Absolute Maximum Ratings[2]

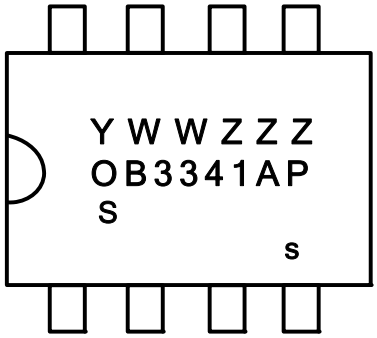
Parameter	Value
VCC Input Voltage to GND	-0.3V to 40V
ZCD to GND[3]	-1V to 7V
COMP, and CS to GND	-0.7V to 7V
Operating Ambient Temp. T_A	-20℃ ~ 85℃
Operating Junction Temp. T_J	-40 ~150℃
Min/Max Storage Temp. T_{stg}	-55 ~150℃
Lead Temp. (10 Sec)	260 ℃

Note2: Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

Note3: Rating value refers to DC only. For small duty cycle pulse in less than 3%, negative spike value is relaxed to -1.2V.



MARKING INFORMATION



Y: Year Code

WW: Week Code (01-52)

ZZZ:Lot Code

A: DIP8

P:Pb-free Package

S:Character Code

s: Internal Code(Optional)

TERMINAL ASSIGNMENT

Number	Pin Name	Pin Function
1	VCC	DC supply voltage pin.
2	ZCD	Zero current detection pin. When activated, a new switching cycle starts. Connect this pin through resistor divider from the auxiliary winding to ground. This pin is also used for output over voltage protection (OVP).
3	GND	Ground pin.
4	COMP	Loop compensation pin. Connect to a compensation network to stabilize the LED driver and achieve a constant LED driver current.
5	CS	Current sense input pin.
6	SOURCE	Source of intergraded MOSFET
7,8	DRAIN	Drain of intergraded MOSFET

FUNCTIONAL BLOCK DIAGRAM

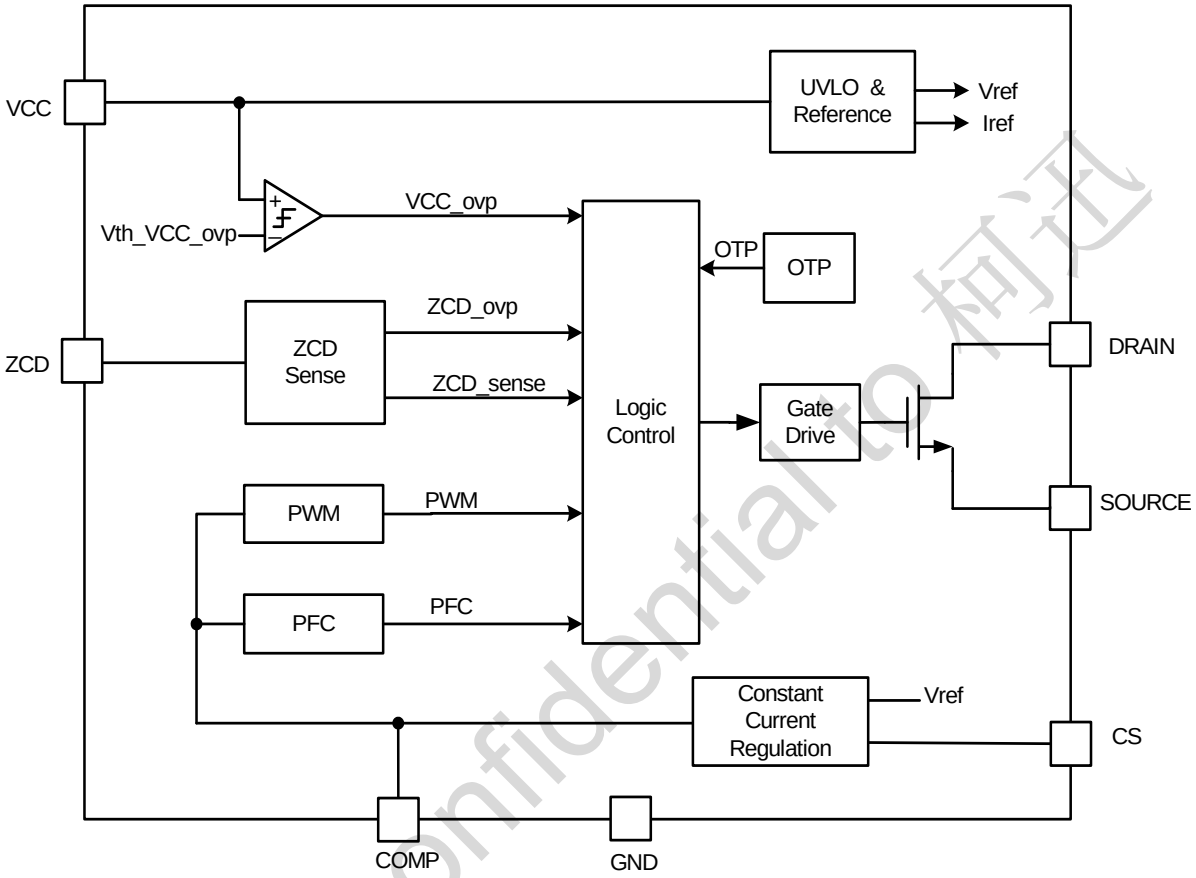


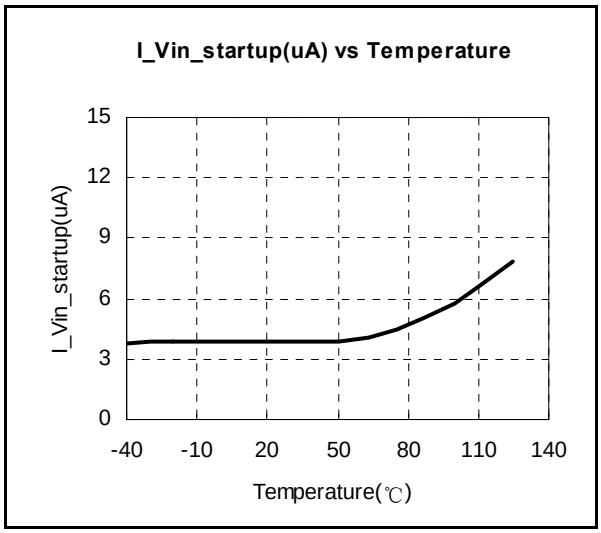
Figure2: OB3341S Functional Block Diagram

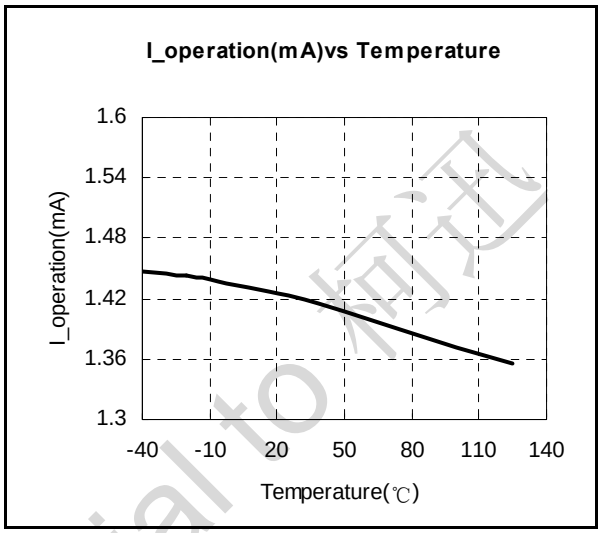
ELECTRICAL CHARACTERISTICS

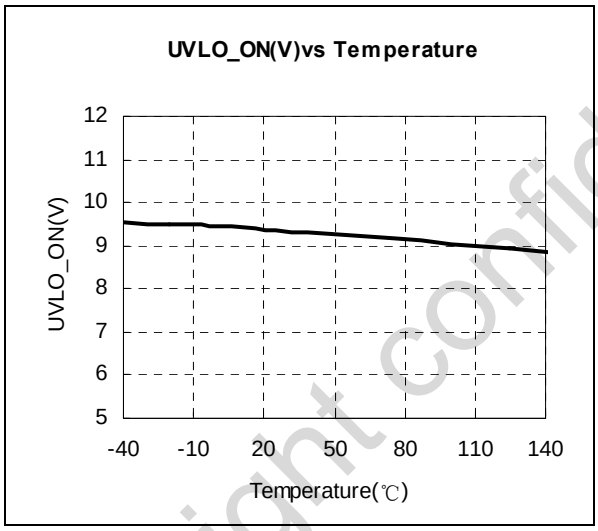
VCC=20V, T_A=25℃, if not otherwise noted.

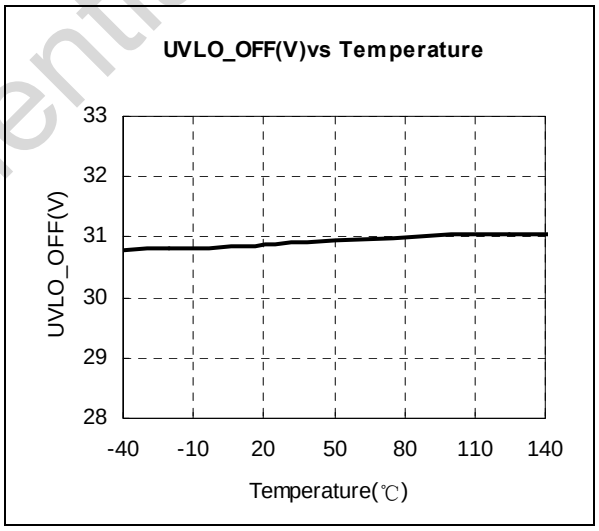
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Supply Voltage Section						
I_Vcc_st	Startup Current	VCC = UVLO_off – 0.5V		5	15	uA
I_static	Static Current	no switching		1.5	2.5	mA
UVLO_on	VCC Under Voltage Lockout Enter	VCC falling	8	9	10	V
UVLO_off	VCC Under Voltage Lockout Exit	VCC rising	28	30	32	V
Vcc_ovp	VCC Over Voltage Protection			36		V
Current Sense Section						
T_leb	Lead Edge Blanking Time			300		ns
Td_oc	OCP Propagation Delay	From OCP comparator to Gate drive		100		ns
Vth_ocp	Over Current Protection Threshold	ZCD > 0.55V		1.1		V
Vth_ocp_sh	Over Current Protection Threshold when LED short	ZCD < 0.5V		0.4		V
ZCD Section						
Vovp	Output Over Voltage Protection		3.88	4.00	4.12	V
Vth_dem_h	When ZCD rises up this voltage, demagnetization began			0.9		V
Vth_dem_l	When ZCD drops below this voltage, demagnetization finished			0.3		V
Constant Current Section						
Vref	EA Reference Voltage		392	400	408	mV
Gm	EA Transconductance Gain			80		us
Vcomp_range	COMP Dynamic Range		1.2		3.5	V
Vcomp_l	Lower Clamp Voltage			1.1		V
Isource_max	EA Maximum Source Current			32		uA
Isink_max	EA Maximum Sink Current			100		uA
PWM Control Section						
Toff_max	Re-start timer period			70		us
Ton_max	Maximum on time			20		us
OTP Section						
OTP_on	Over Temperature Protection Threshold			150		℃

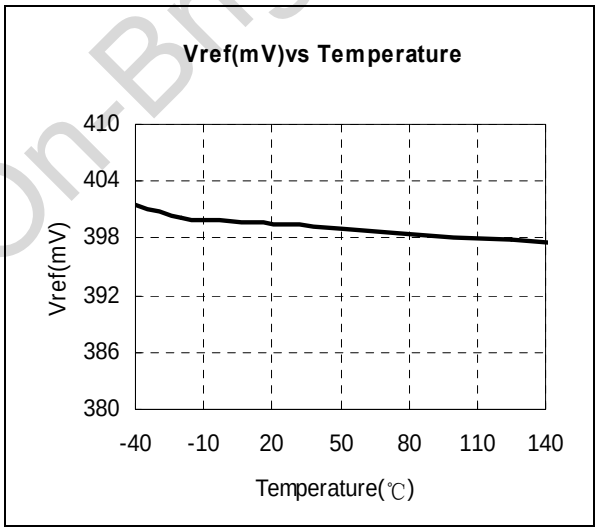
TYPICAL PERFOMANCE CHART

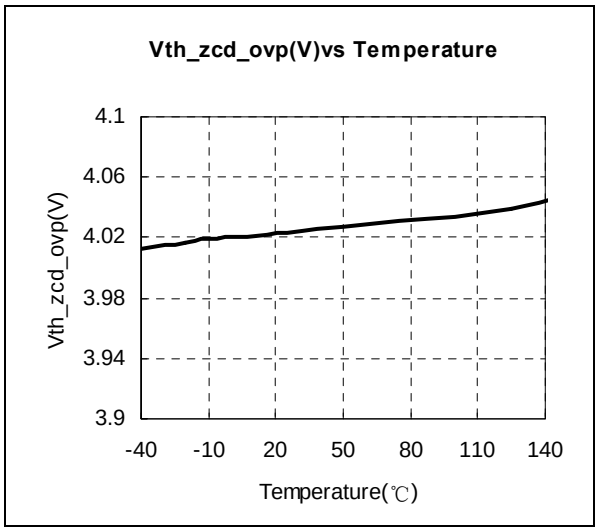












FUNCTION DESCRIPTION

General Operation
The OB3341S is a monolithic Buck regulator with high power factor specialized for LED lighting application. It integrates a 2A MOSFET and provides LED open/short protection. It's operating in quasi-resonant mode to reduce the switch turn-on loss, improve the conversion efficiency. Constant on time control ensure good power factor correction (PFC).

Startup
The typical startup current of OB3341S is 5uA (typical) when VCC pin is lower than the UVLO_off threshold. VCC is charged through the start up resistor from the buck line. The high value, low wattage startup resistor can be used to minimize the power loss.

UVLO
An under-voltage lockout with a hysteresis control is provided on VCC. When the voltage at this pin exceeds a threshold of approximately 30V (typical), the IC starts the normal operation. If the voltage at this pin drops below a threshold of approximately 9V (typical), the IC stops switching operation. The IC resumes switching operation when the voltage at pin VCC recovers above 30V (typical).

LED Constant Current Regulation
OB3341S uses the constant current control method to accurately control the LED current. It detects LED current and forces the average LED current equals to the ratio of reference voltage to resistance at CS pin as shown in the equation below.

$$I_{LED} = \frac{Vref}{2R_{CS}}$$

Rcs—the sensing resistor connected between the CS pin and GND.

PFC
The duration of the turn on period is generated by comparing an internal fixed saw-tooth wave with the voltage of COMP pin. With a fixed output power level, the COMP pin voltage is fixed. Therefore the turn on time is constant. This scheme achieves high power factor (PF).

Current Sensing
Cycle-by-Cycle Over Current Protection (OCP) is offered in OB3341S. The switching current is detected by a sense resistor connected between the CS pin and GND. An internal leading edge blanking circuit chops off the sense voltage spike at MOSFET on state. The current limit comparator is disabled and thus cannot turn off the external MOSFET during the blanking period.

Zero Current Detection
OB3341S performs zero current detection (ZCD) through ZCD pin by monitoring the voltage activity on the auxiliary windings in series with external resistors. This voltage features output voltage. When the stored energy of the buck inductance fully release to the output, the voltage at ZCD pin decreases. When ZCD pin voltage falls below 0.3V (typical), an internal ZCD comparator is triggered and a new PWM switching cycle is initiated.

Maximum and Minimum On-Time
The minimum on-time of the system is determined by the LEB time (typical 300ns). The IC limits the on-time to a maximum value of approximately 20us (typical).

Output OVP Protection
The output over-voltage condition is monitored independently through the voltage at pins ZCD. During normal operation, when the voltage at ZCD pin exceeds a threshold of approximately 4.0V (typical), the over-voltage protection function is activated and the driver is turned off immediately.

VCC OVP Protection
VCC is supplied with auxiliary winding output. When VCC is higher than 36V (typical), OVP protection is triggered and driver is shut down, so the device enters power on startup sequence thereafter.

LED String Open Protection
When LED string open happens, the positive plateau of ZCD voltage rise up due to the auxiliary winding voltage increases. If the voltage at ZCD pin is higher than a threshold of approximately 4V (typical), the over-voltage protection function is activated and the driver is turned off immediately.

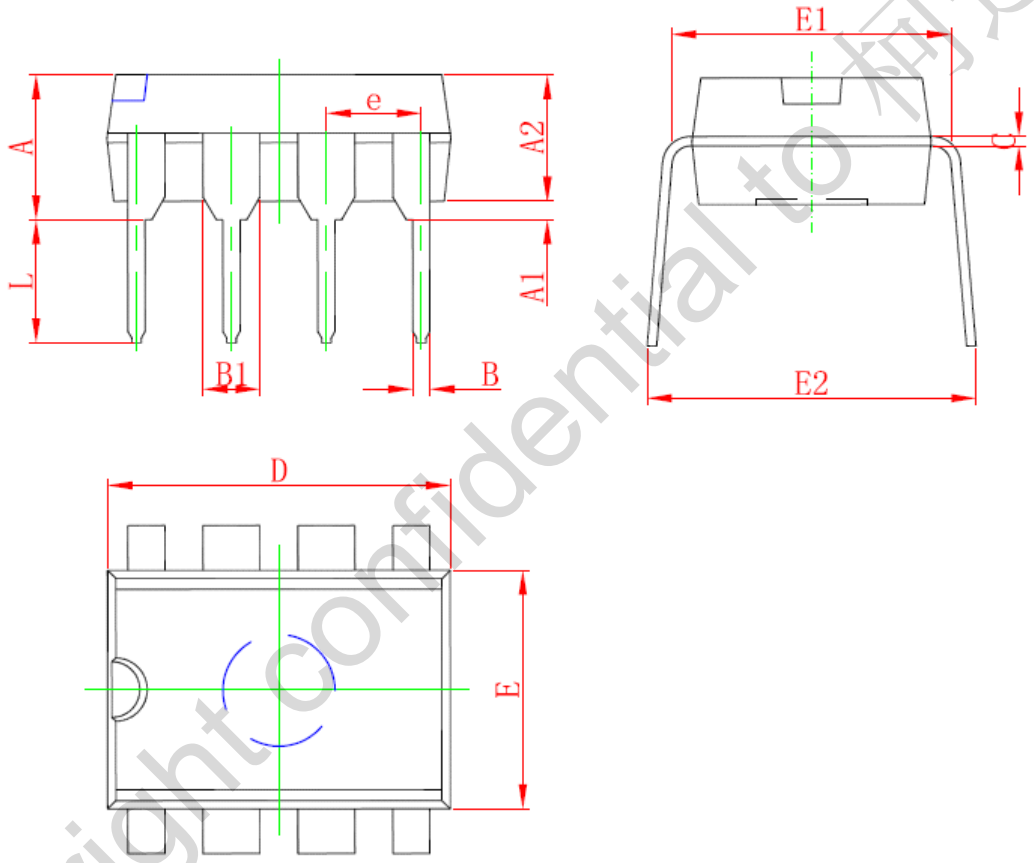
LED String Short Protection
When LED string is short, the positive plateau of ZCD voltage from auxiliary winding falls to near zero. If the voltage at ZCD pin is lower than a threshold of approximately 0.5V (typical), the threshold of OCP will drop down from 1.1V (typical) to 0.4V (typical), therefore a low power loss can be achieved.

Thermal Shutdown
OB3341S provides an on chip thermal shutdown protection. The IC will stop switching when the junction temperature exceeds the thermal shutdown temperature, typically 150 ℃.

PACKAGE MECHANICAL DATA

8-Pin Plastic DIP (DIP8)

DIP8 PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	5.334	0.146	0.210
A1	0.381		0.015	
A2	2.921	4.953	0.115	0.195
B	0.350	0.650	0.014	0.026
B1	1.524 (BSC)		0.06 (BSC)	
C	0.200	0.360	0.008	0.014
D	9.000	10.160	0.354	0.400
E	6.096	7.112	0.240	0.280
E1	7.320	8.255	0.288	0.325
e	2.540 (BSC)		0.1 (BSC)	
L	2.921	3.810	0.115	0.150
E2	7.620	10.920	0.300	0.430

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