

# FAN7315

## LCD Back Light Inverter Drive IC

### Features

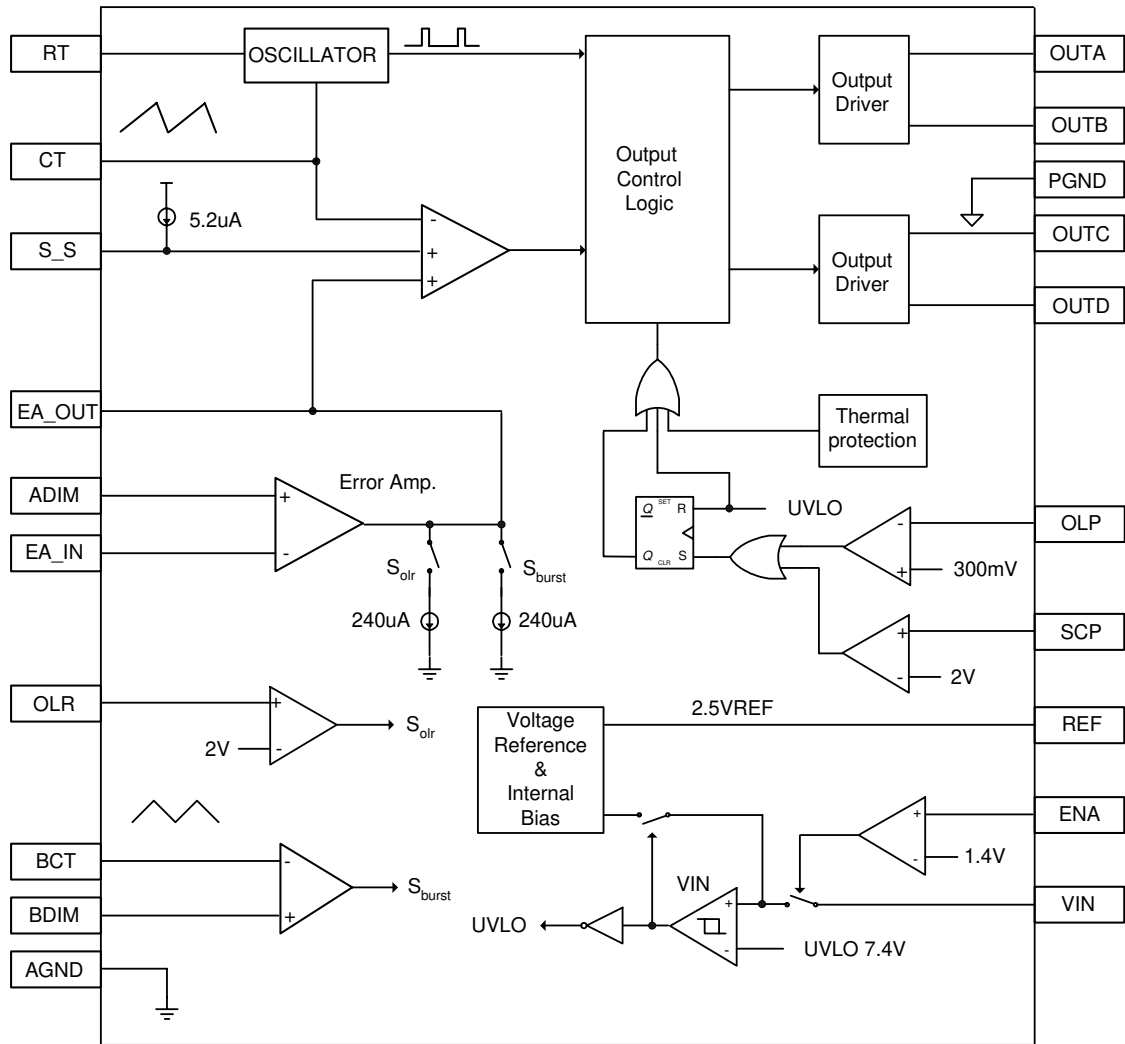
- Wide Dimming Range
  - Analog dimming ( 2.5 : 1 )
  - Burst dimming ( >100 : 1 )
- High Efficiency Single Stage Power Conversion
- Wide Input Voltage Range 7.4V to 20V
- Back Light Lamp Ballast and Soft Dimming
- Few External Components
- Precision Voltage Reference Trimmed to 2%
- ZVS full-bridge topology
- Soft Start
- PWM Control at fixed frequency
- Analog, Burst Dimming Function
- Open Lamp Protection
- Open Lamp Regulation
- Short Lamp Protection
- Thermal Protection
- 20 Pin SSOP

### Description

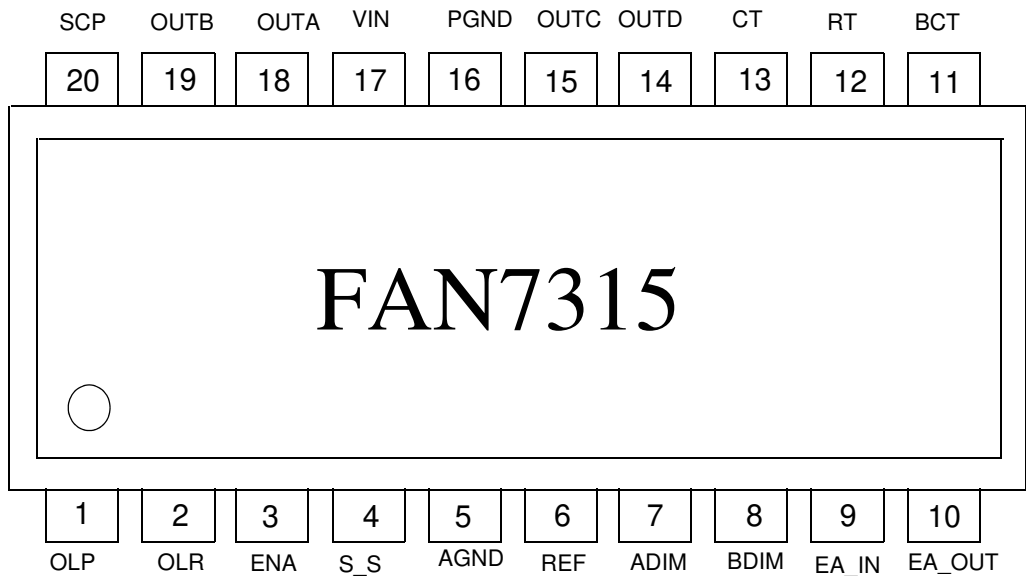
The FAN7315 provides all the control functions for a series parallel resonant converter and also contains a pulse width modulation (PWM) controller to develop a supply voltage. Typical operating frequency range is between 30kHz and 250kHz depending on the CCFL and the transformer's characteristics.



# Internal Block Diagram



## Pin Assignments



## Pin Definitions

No	Name	Function Description	No	Name	Function Description
1	OLP	Open Lamp Protection	11	BCT	Burst Dimming Timing Capacitor
2	OLR	Open Lamp Regulation	12	RT	Timing Resistor
3	ENA	Enable Input	13	CT	Timing Capacitor
4	S/S	Soft Start	14	OUTD	NMOSFET Drive Output D
5	AGND	Analog Ground	15	OUTC	PMOSFET Drive Output C
6	V25	2.5V Reference Voltage	16	PGND	Power Ground
7	ADIM	Analog Dimming Input	17	VIN	Supply Voltage
8	BDIM	Burst Dimming Input	18	OUTA	PMOSFET Drive Output A
9	EA_IN	Error Amplifier Input	19	OUTB	NMOSFET Drive Output B
10	EA_OUT	Error Amplifier Output	20	SCP	Short Circuit Protection

## Absolute Maximum Ratings

V<sub>cc</sub>=12V, for typical values T<sub>a</sub>=25°C, for min/max values T<sub>a</sub> is the operating ambient temperature range with -40°C ≤ T<sub>a</sub> ≤ 85°C and 7.4V ≤ V<sub>cc</sub> ≤ 20V, unless otherwise specified.

Characteristics	Symbol	Value	Unit
Supply Voltage	V <sub>CC</sub>	7.4 ~ 20	V
Operating Temperature Range	T <sub>opr</sub>	-40 ~ 85	°C
Storage Temperature Range	T <sub>stg</sub>	-65 ~ 150	°C
Thermal Resistance Junction-Air (Note1,2)	R <sub>θJA</sub>	112	°C/W
Power Dissipation	P <sub>d</sub>	1.1	W

**Note:**

1. Thermal resistance test board  
Size: 76.2mm \* 114.3mm \* 1.6mm(1S0P)  
JEDEC standard: JESD51-3, JESD51-7
2. Assume no ambient airflow

## Electrical Characteristics

V<sub>CC</sub>=12V, for typical values Ta=25°C, for min/max values Ta is the operating ambient temperature range with -40°C ≤ Ta ≤ 85°C and 7.4V ≤ V<sub>CC</sub> ≤ 20V, unless otherwise specified.

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>REFERENCE SECTION</b>						
Load Regulation	ΔV <sub>25load</sub>	0 ≤ I <sub>25</sub> ≤ 3mA	-	2	25	mV
Line Regulation	ΔV <sub>25line</sub>	7.4V ≤ V <sub>CC</sub> ≤ 20V	-	2	25	mV
2.5V Regulation Voltage	V <sub>25</sub>	-	2.44	2.49	2.54	V
<b>OSCILLATOR SECTION(MAIN)</b>						
Oscillation Frequency	fosc	Ta=25°C, Ct = 330pF, Rt = 45k	93	100	107	kHz
		Ct = 330pF, Rt = 45k	89	100	111	kHz
CT High Voltage	V <sub>cth</sub>	-	-	1.95	-	V
CT Low Voltage	V <sub>ctl</sub>	-	-	0.5	-	V
<b>OSCILLATOR SECTION(BURST)</b>						
Oscillation Frequency	fosc <sub>b</sub>	C <sub>tb</sub> = 6.8nF, R <sub>t</sub> =45k	150	191	232	Hz
BCT High Voltage	V <sub>bcth</sub>	-	-	2	-	V
BCT Low Voltage	V <sub>bctl</sub>	-	-	0.5	-	V
<b>ERROR AMP SECTION</b>						
Error Amp Transconductance(Note1)	G <sub>m</sub>	V <sub>a</sub> = 1~2.5V	100	360	600	umho
Output Sink Current	I <sub>sin</sub>	EA_OUT = 1V	44	73	100	uA
Output Source Current	I <sub>sur</sub>	EA_OUT = 1V	33	50	67	uA
Open Lamp Regulation Current	I <sub>olr</sub>	OLR=2.5V	160	240	320	uA
EA_OUT High Volgate	V <sub>ea_outh</sub>		2.2	2.5	2.8	V
<b>SOFT START SECTION</b>						
Soft Start Current	I <sub>ss</sub>	S_S=0V	3.5	5.2	6.9	uA
Soft Start Clamping Voltage	V <sub>ssh</sub>	-	2.2	2.55	2.9	V
<b>PROTECTION SECTION</b>						
Open Lamp Protection Voltage	V <sub>olp</sub>	-	245	300	425	mV
Open Lamp Regulation Voltage	V <sub>olr</sub>	-	1.8	2	2.2	V
Short Circuit Protection Voltage	V <sub>scp</sub>	-	1.75	2	2.25	V
Thermal Shutdown On Temp.(Note1)	TSD <sub>on</sub>	-	130	150	170	°C
TSD Hysterisis(Note1)	TSD <sub>hy</sub>	-	-	30	-	°C
<b>UNDER VOLTAGE LOCK OUT SECTION</b>						
Start Threshold Voltage On	V <sub>thon</sub>	-	5.2	6.3	7.4	V
UVLO Hysteresis	V <sub>hys</sub>	-	100	300	500	mV
Start Up Current	I <sub>st</sub>	V <sub>CC</sub> = V <sub>th</sub> -0.2V	48	85	122	uA
Operating Supply Current	I <sub>op</sub>	V <sub>CC</sub> = 12V	-	-	2	mA
Stand-by Current	I <sub>sb</sub>	V <sub>CC</sub> = 12V, ENA=0V	55	80	105	uA

**Electrical Characteristics** (Continued)

V<sub>cc</sub>=12V, for typical values T<sub>a</sub>=25°C, for min/max values T<sub>a</sub> is the operating ambient temperature range with -40°C ≤ T<sub>a</sub> ≤ 85°C and 7.4V ≤ V<sub>cc</sub> ≤ 20V, unless otherwise specified.

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>ON/OFF SECTION</b>						
Off State Input Voltage	V <sub>off</sub>	-	-	-	0.7	V
On State Input Voltage	V <sub>on</sub>	-	2.1	-	-	V
<b>OUTPUT SECTION</b>						
PMOS Gate High Voltage	V <sub>pdhv</sub>	V <sub>CC</sub> =12V	-	V <sub>cc</sub>	-	V
PMOS Gate Low Voltage	V <sub>pdlv</sub>	V <sub>CC</sub> =12V	V <sub>cc</sub> -7.25	V <sub>cc</sub> -6.5	V <sub>cc</sub> -5.55	
NMOS Gate High Voltage	V <sub>ndhv</sub>	V <sub>CC</sub> = 12V	5.55	6.5	7.25	V
NMOS Gate Low Voltage	V <sub>ndlv</sub>	V <sub>CC</sub> =12V			0.2	
PMOS Gate Voltage With UVLO Activated	V <sub>puv</sub>	V <sub>CC</sub> = V <sub>th</sub> -0.5V	V <sub>cc</sub> -0.2	-	-	V
NMOS Gate Voltage With UVLO Activated	V <sub>nuv</sub>	V <sub>CC</sub> = V <sub>th</sub> -0.5V	-	-	0.2	
Rising Time(Note1)	T <sub>r</sub>	V <sub>CC</sub> = 12V, C <sub>load</sub> =1700pF	-	100	300	ns
Falling Time(Note1)	T <sub>f</sub>	V <sub>CC</sub> = 12V, C <sub>load</sub> =1700pF	-	100	300	ns
<b>Max./Min Overlap</b>						
Min. Overlap between diagonal switches(Note1)		f <sub>osc</sub> =100KHz	-	0	-	%
Max. Overlap between diagonal switches(Note1)		f <sub>osc</sub> =100KHz	-	100	-	%
<b>Delay Time</b>						
PDR_A/NDR_B(Note1)		f <sub>osc</sub> =100KHz, R <sub>t</sub> =45k	-	325	-	ns
PDR_C/NDR_D(Note1)		f <sub>osc</sub> =100KHz, R <sub>t</sub> =45k	-	325	-	ns

**Note:**

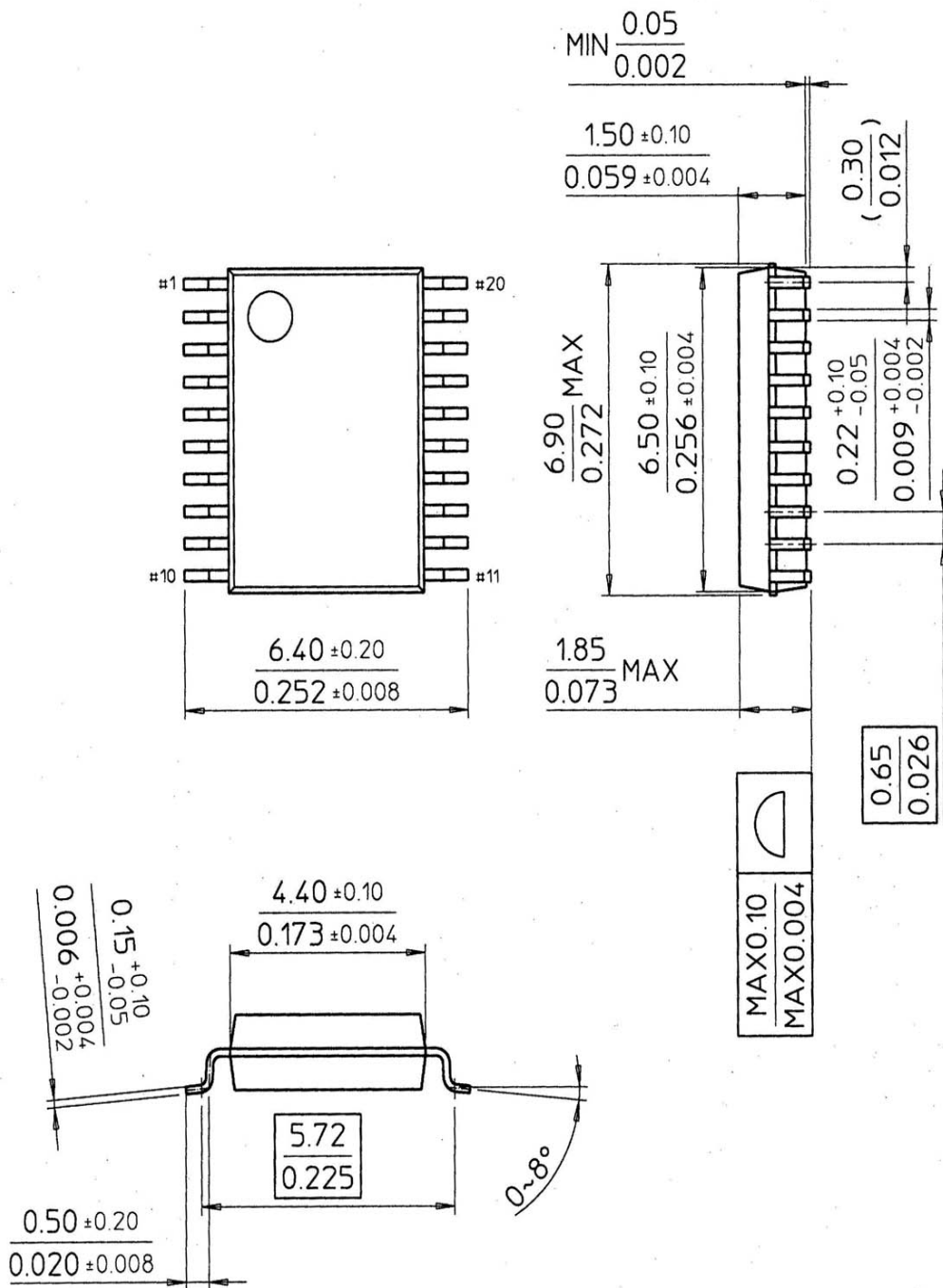
1. These parameters, although guaranteed, are not 100% tested in production.

# Mechanical Dimensions

Package

Dimensions in millimeters

## 20-SSOP



## Ordering Information

Product number	Package	Operating Temperature
FAN7315G	20-SSOP	-40°C ~ 85°C

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