FAN7315

LCD Back Light Inverter Drive IC

Features

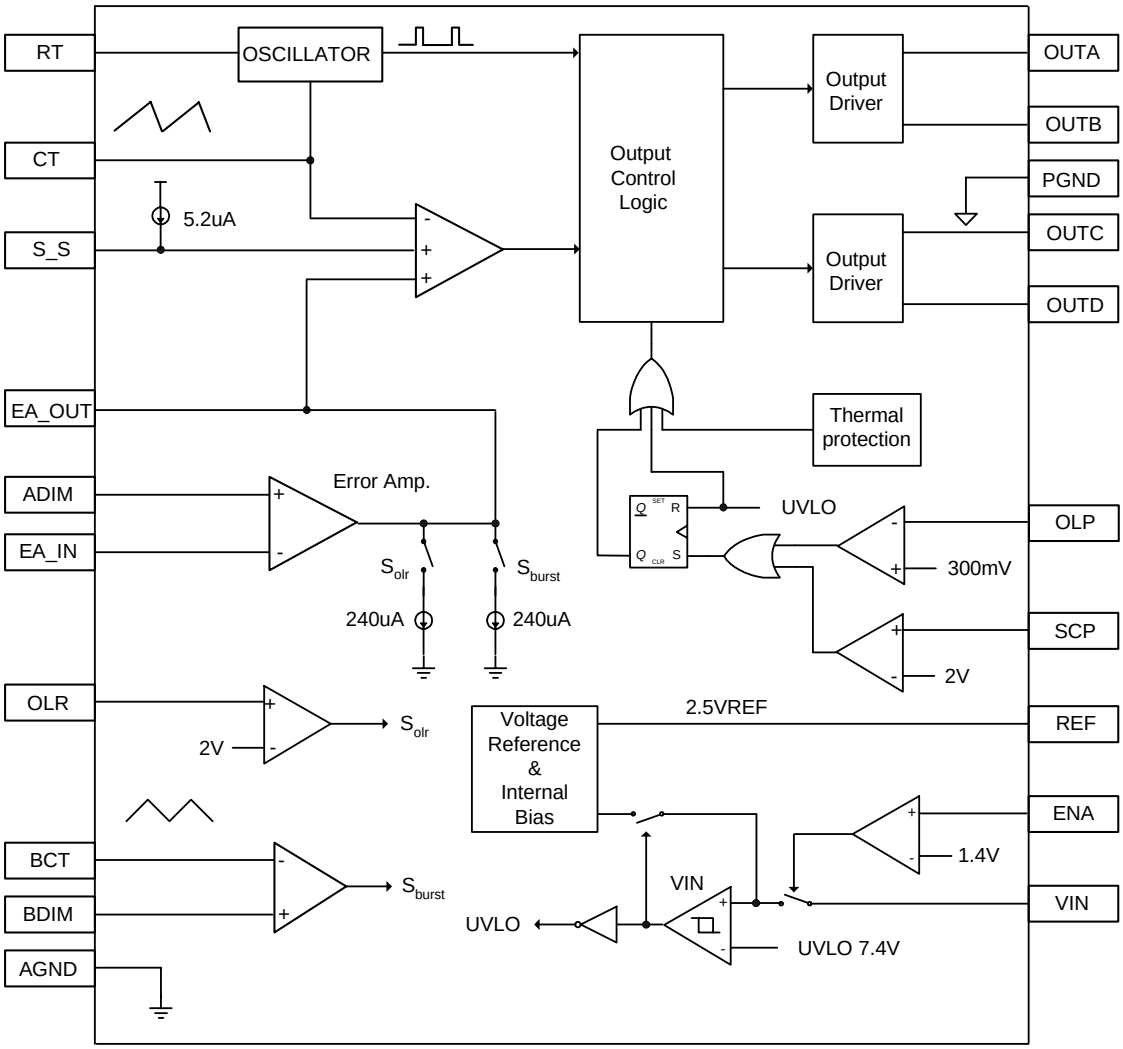
- Wide Dimming Range
  - Analog dimming (2.5 : 1)
  - Burst dimming (>100 : 1)
- High Efficiency Single Stage Power Conversion
- Wide Input Voltage Range 7.4V to 20V
- Back Light Lamp Ballast and Soft Dimming
- Few External Components
- Precision Voltage Reference Trimmed to 2%
- ZVS full-bridge topology
- 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

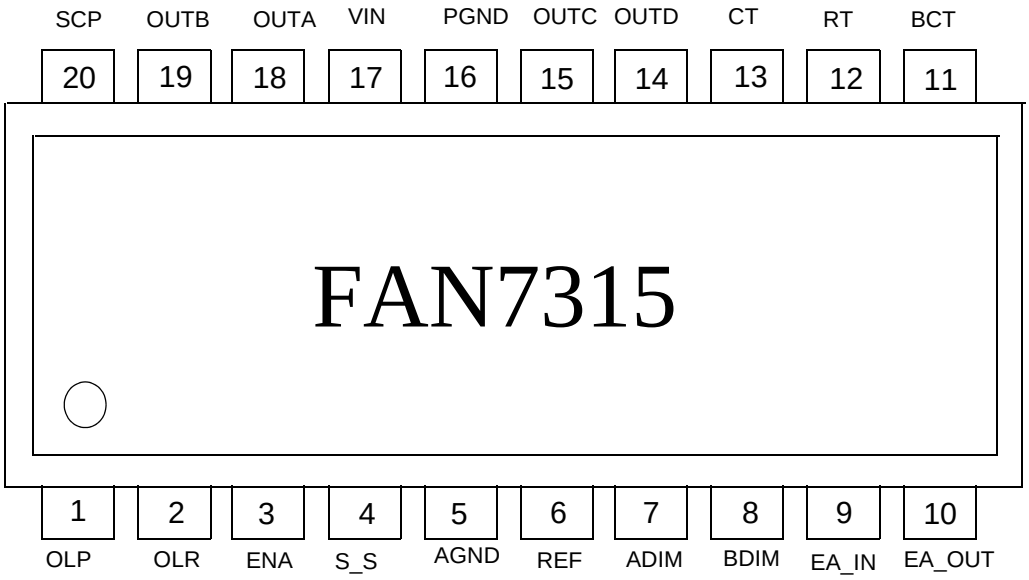
The FAN7315 provides all the control functions for a series parallel resonant converter and also contains a pulse width modulation (PWM) controller to develop a supply voltage. Typical operating frequency range is between 30kHz and 250kHz depending on the CCFL and the transformer's characteristics.

20-SSOP

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

Vcc=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 ≤ Vcc ≤ 20V, unless otherwise specified.

Characteristics	Symbol	Value	Unit
Supply Voltage	V_{CC}	7.4 ~ 20	V
Operating Temperature Range	Topr	-40 ~ 85	°C
Storage Temperature Range	Tstg	-65 ~ 150	°C
Thermal Resistance Junction-Air (Note1,2)	$R_{\theta JA}$	112	°C/W
Power Dissipation	Pd	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

Vcc=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 ≤ Vcc ≤ 20V, unless otherwise specified.

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
REFERENCE SECTION						
Load Regulation	ΔV25load	0 ≤ I25 ≤ 3mA	-	2	25	mV
Line Regulation	ΔV25line	7.4V ≤ V_{CC} ≤ 20V	-	2	25	mV
2.5V Regulation Voltage	V25	-	2.44	2.49	2.54	V
OSCILLATOR SECTION(MAIN)						
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	Vcth	-	-	1.95	-	V
CT Low Voltage	Vbctl	-	-	0.5	-	V
OSCILLATOR SECTION(BURST)						
Oscillation Frequency	foscb	Ctb = 6.8nF, Rt=45k	150	191	232	Hz
BCT High Voltage	Vbcth	-	-	2	-	V
BCT Low Voltage	Vbctl	-	-	0.5	-	V
ERROR AMP SECTION						
Error Amp Transconductance(Note1)	Gm	Va = 1~2.5V	100	360	600	umho
Output Sink Current	Isin	EA_OUT = 1V	44	73	100	uA
Output Source Current	Isur	EA_OUT = 1V	33	50	67	uA
Open Lamp Regulation Current	Iolr	OLR=2.5V	160	240	320	uA
EA_OUT High Volgate	Vea_outh		2.2	2.5	2.8	V
SOFT START SECTION						
Soft Start Current	I_{SS}	S_S=0V	3.5	5.2	6.9	uA
Soft Start Clamping Voltage	Vssh	-	2.2	2.55	2.9	V
PROTECTION SECTION						
Open Lamp Protection Voltage	Volp	-	245	300	425	mV
Open Lamp Regulation Voltage	Volr	-	1.8	2	2.2	V
Short Circuit Protection Voltage	Vscp	-	1.75	2	2.25	V
Thermal Shutdown On Temp.(Note1)	TSDon	-	130	150	170	°C
TSD Hysterisis(Note1)	TSDhy	-	-	30	-	°C
UNDER VOLTAGE LOCK OUT SECTION						
Start Threshold Voltage On	Vthon	-	5.2	6.3	7.4	V
UVLO Hysteresis	Vhys	-	100	300	500	mV
Start Up Current	Ist	V_{CC} = Vth-0.2V	48	85	122	uA
Operating Supply Current	Iop	V_{CC} = 12V	-	-	2	mA
Stand-by Current	Isb	V_{CC} = 12V, ENA=0V	55	80	105	uA

Electrical Characteristics (Continued)

Vcc=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 ≤ Vcc ≤ 20V, unless otherwise specified.

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
ON/OFF SECTION						
Off State Input Voltage	Voff	-	-	-	0.7	V
On State Input Voltage	Von	-	2.1	-	-	V
OUTPUT SECTION						
PMOS Gate High Voltage	Vpdhv	V_{CC} =12V	-	Vcc	-	V
PMOS Gate Low Voltage	Vpdlv	V_{CC} =12V	Vcc-7.25	Vcc-6.5	Vcc-5.55	
NMOS Gate High Voltage	Vndhv	V_{CC} = 12V	5.55	6.5	7.25	V
NMOS Gate Low Voltage	Vndlv	V_{CC} =12V			0.2	
PMOS Gate Voltage With UVLO Activated	Vpuv	V_{CC} = Vth-0.5V	Vcc-0.2	-	-	V
NMOS Gate Voltage With UVLO Activated	Vnuv	V_{CC} = Vth-0.5V	-	-	0.2	
Rising Time(Note1)	Tr	V_{CC} = 12V, Cload=1700pF	-	100	300	ns
Falling Time(Note1)	Tf	V_{CC} = 12V, Cload=1700pF	-	100	300	ns
Max./Min Overlap						
Min. Overlap between diagonal switches(Note1)		fosc=100KHz	-	0	-	%
Max. Overlap betwwen diagonal switches(Note1)		fosc=100KHz	-	100	-	%
Delay Time						
PDR_A/NDR_B(Note1)		fosc=100KHz, Rt=45k	-	325	-	ns
PDR_C/NDR_D(Note1)		fosc=100KHz, Rt=45k	-	325	-	ns

Note:

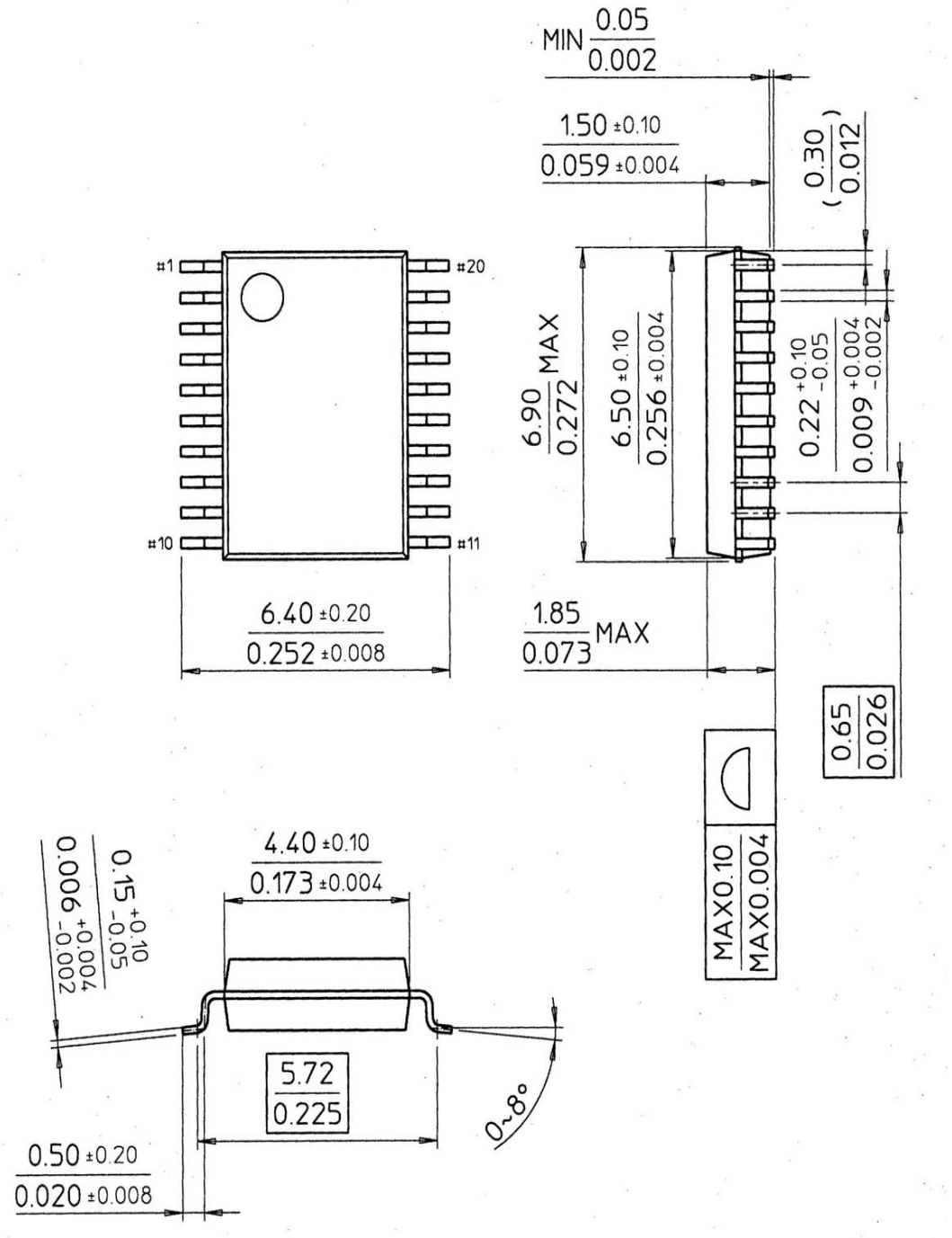
1. These parameters, although guaranteed, are not 100% tested in production.

Mechanical Dimensions

Package

Dimensions in millimeters

20-SSOP



Ordering Information

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