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Application Diagram

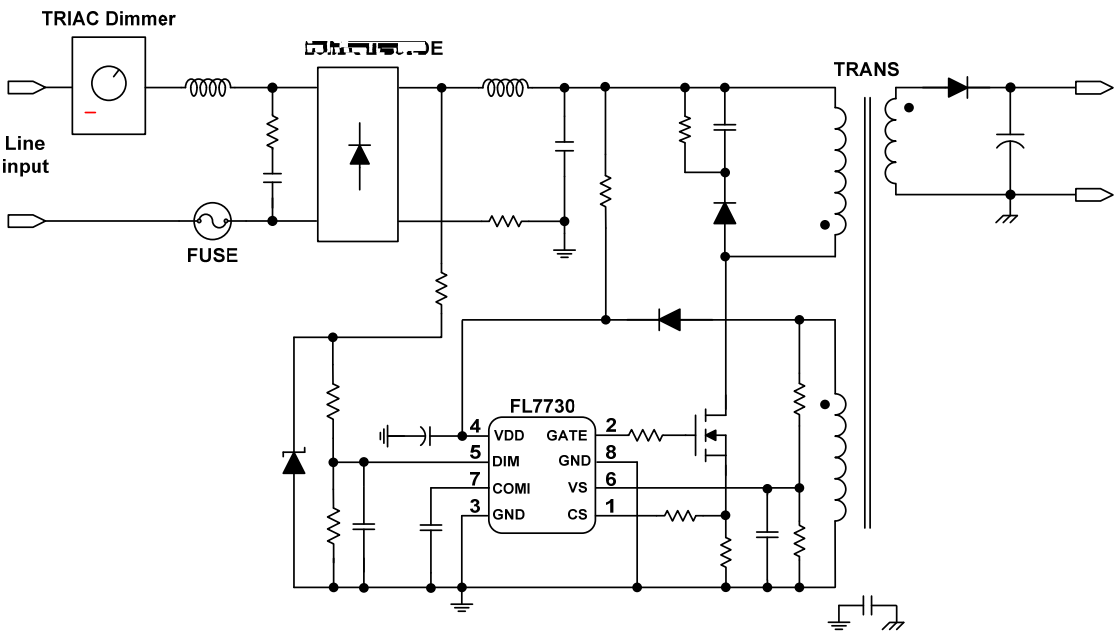
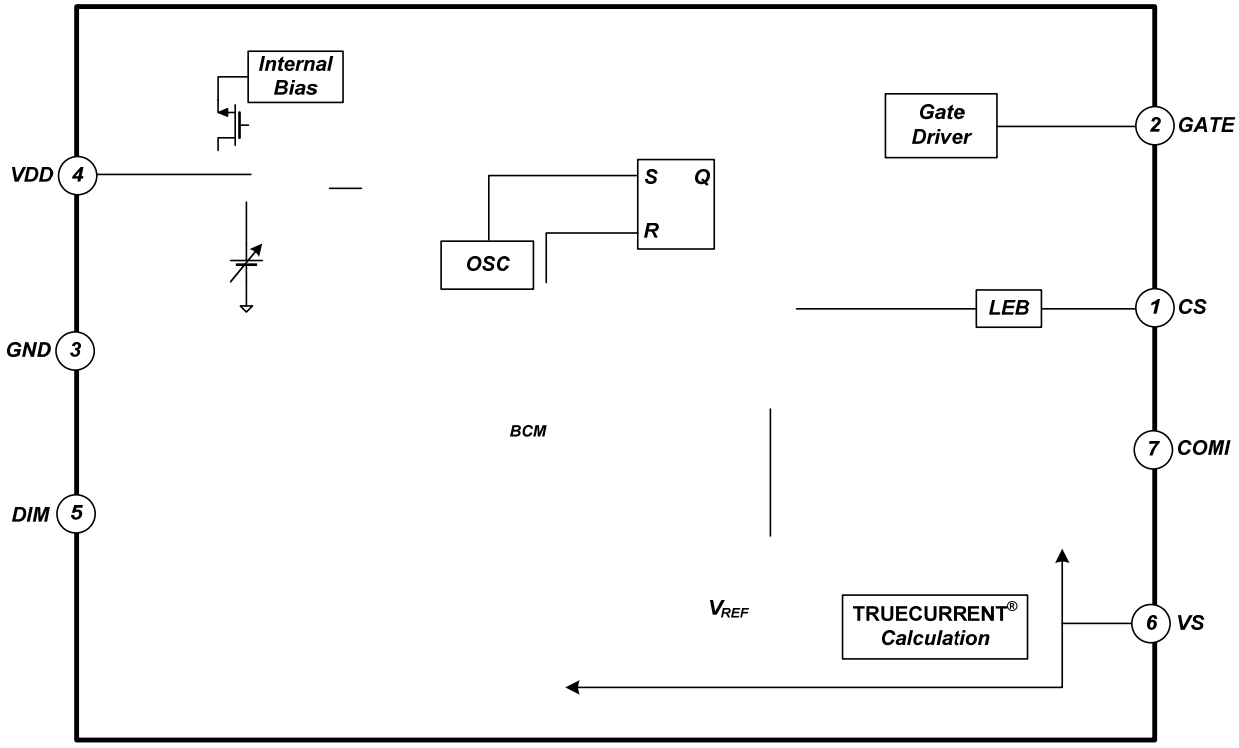


Figure 1. Typical Application

Internal Block Diagram



Marking Information

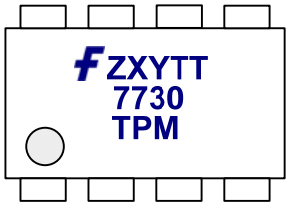


Figure 3. Top Mark

Pin Configuration

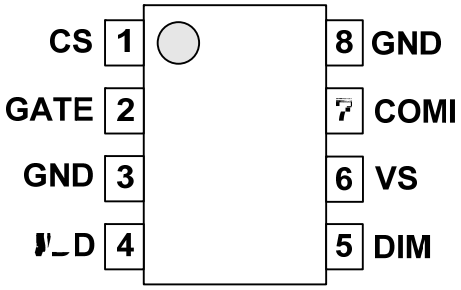


Figure 4. Pin Configuration

Pin Definitions

Pin #	Name

Electrical Characteristics

V_{DD}=20 V and T_A=25°C unless otherwise specified.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
VDD Section						
V_{DD-ON}	Turn-On Threshold Voltage		14.5	16.0	17.5	V
V_{DD-OFF}	Turn-Off Threshold Voltage		6.75	7.75	8.75	V
I_{DD-OP}	Operating Current	Maximum Frequency, C_{LOAD} = 1 nF	3	4	5	mA
I_{DD-ST}	Startup Current	$V_{DD} = V_{DD-ON} – 0.16$ V		2	20	µA
V_{OVP}	V_{DD} Over-Voltage-Protection		22.0	23.5	25.0	V
Gate Section						
V_{OL}	Output Voltage Low	V_{DD}=20 V,I_{GATE}=-1 mA			1.5	V
V_{OH}	Output Voltage High	V_{DD}=10 V,I_{GATE}=+1 mA	5			V
I_{source}	Peak Sourcing Current	V_{DD} = 10 ~ 20 V		60		mA
I_{sink}	Peak Sinking Current	V_{DD} = 10 ~ 20 V		180		mA
t_r	Rising Time	C_{LOAD} = 1 nF	100	150	200	ns
t_f	Falling Time	C_{LOAD} = 1 nF	20	60	100	ns
V_{CLAMP}	Output Clamp Voltage		12	15	18	V
Oscillator Section						
f_{MAX-CC}	Maximum Frequency in CC		60	65	70	kHz
f_{MIN-CC}	Minimum Frequency in CC		21.0	23.5	26.0	kHz
VS_{MAX-CC}	V_S for Maximum Frequency in CC	f = f_{MAX} -2 kHz	2.25	2.35	2.45	V
VS_{MIN-CC}	V_S for Minimum Frequency in CC	f = f_{MIN} +2 kHz	0.55	0.85	1.15	V
$t_{ON(MAX)}$	Maximum Turn-On Time		12	14	16	µs
Current Sense Section						
V_{RV}	Reference Voltage		2.475	2.500	2.525	V
V_{CCR}	EAI Voltage for Constant Current Regulation	V_{CS} = 0.44 V	2.38	2.43	2.48	V
t_{LEB}	Leading-Edge Blanking Time			300		ns
t_{MIN}	Minimum On Time in CC	V_{COMI} = 0 V		600		ns
t_{PD}	Propagation Delay to GATE		50	100	150	ns
$t_{tdis-BNK}$						

Electrical Characteristics

V_{DD}=15 V and T_A=25°C unless otherwise specified.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Over-Current Protection Section						
V_{OCP}	V_{CS} Threshold Voltage for OCP		0.60	0.67	0.74	V
V_{LowOCP}	V_{CS} Threshold Voltage for Low OCP		0.13	0.18	0.23	V
$t_{startup}$	Startup Time			13		ms
$V_{LowOCP-EN}$	VS Threshold Voltage to Enable Low OCP level			0.40		V
$V_{LowOCP-DIS}$	VS Threshold Voltage to Disable Low OCP level			0.60		V
Over-Temperature Protection Section						
T_{OTP}	Threshold Temperature for OTP(3)		140	150	160	°C
$T_{OTP-HYS}$	Restart Junction Temperature Hysteresis			10		°C
Dimming Section						
$V_{DIM-LOW}$	Maximum V_{DIM} at Low Dimming Angle Range		2.45	2.50	2.55	V
$V_{DIM-HIGH}$	Maximum V_{DIM} at High Dimming Angle Range		3.43	3.50	3.57	V
DS_{LOW}	V_{DIM} vs. $V_{cs,offset}$ Slope at Low Dimming Angle Range			0.19		V/V
DS_{HIGH}	V_{DIM} vs. $V_{cs,offset}$ Slope at High Dimming Angle Range			0.58		V/V

Typical Performance Characteristics

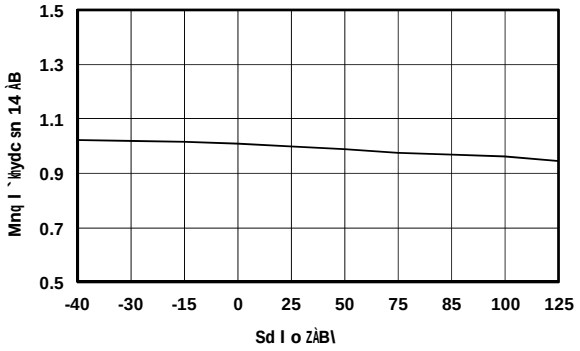


Figure 5. V_{DD-ON} **vs. Temperature**

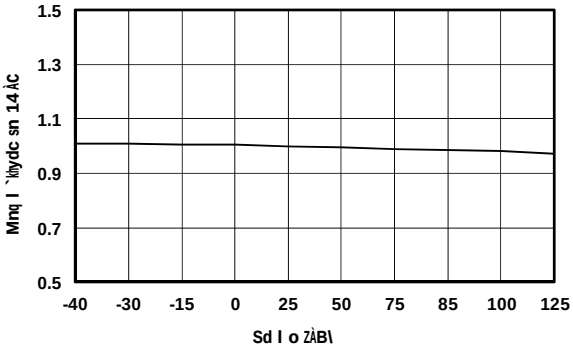
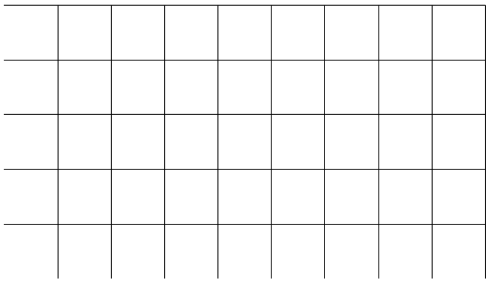


Figure 6.

Typical Performance Characteristics



Functional Description

FL7730 is AC-DC dimmable PWM controller for LED lighting applications. TRUECURRENT® technique and internal line compensation regulates accurate LED current independent of input voltage, output voltage, and magnetizing inductance variations. The TRIAC dim function block provides smooth brightness dimming control compatible with a conventional TRIAC dimmer. The linear frequency control in the oscillator reduces conduction loss and maintains DCM operation in a wide range of output voltages, which implements high power factor correction in a single-stage flyback topology. A variety of protections; such as short-LED protection, open-LED protection, over-temperature protection, and cycle-by-cycle current limitation; stabilize system operation and protect external components.

Startup

Powering at startup is slow due to the low feedback loop bandwidth in the PFC converter. To boost power during startup, an internal oscillator counts 12 ms to define Startup Mode. During Startup Mode, turn-on time is determined by Current Mode control with a 0.2 V CS voltage limit and transconductance becomes 14 times larger, as shown in Figure 17. After Startup Mode, turn-on time is controlled by Voltage Mode using the COMI voltage and the error amplifier transconductance is reduced to 85 μmho.

Open-LED Protection

FL7730 protects external components, such as diodes and capacitors on the secondary side, in the open-LED condition. During switch-off, the V_{DD} capacitor is charged up to the auxiliary winding voltage, which is applied as the reflected output voltage. Because the V_{DD} voltage has output voltage information, the internal voltage comparator on the VDD pin can trigger output Over-Voltage Protection (OVP), as shown in Figure 24. When at least one LED is open-circuited, output load impedance becomes very high and output capacitor is quickly charged up to V_{OVP} x Ns / Na. Then switching is shut down and V_{DD} block goes into “Hiccup” Mode until the open-LED condition is removed, shown in Figure 25.

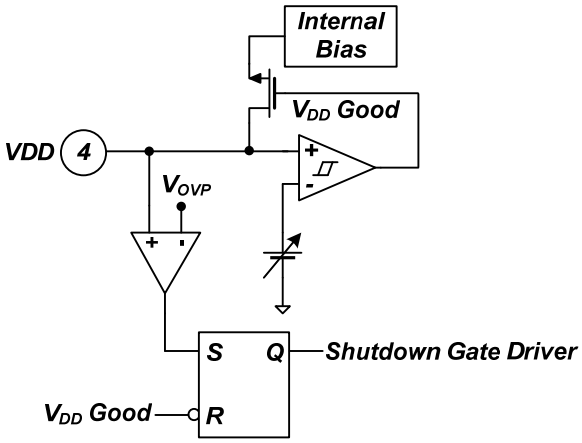
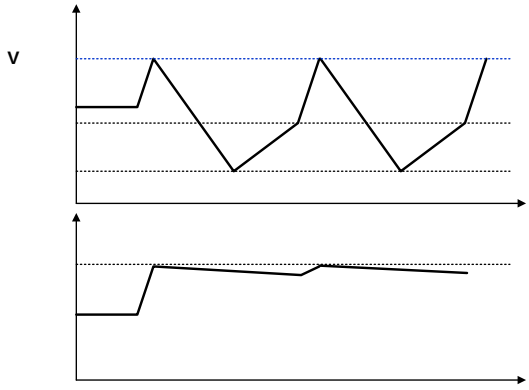


Figure 24. Internal OVP Block



Physical Dimensions

Figure 26. 8-Lead, SOIC, JEDEC MS-012, .150" Narrow Body

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