

Dialog SSL Lighting Solutions

21th Big-bit LED Lighting Driver Technology Seminar

第二十一届大比特（深圳）LED通用照明驱动技术研讨会



...personal
...portable
...connected

Lighting New Products



Residential

iW3688

iW3689

- Top dimming performance at low BOM cost

Commercial

iW3629

iW3631

iW3627

- Medium-high power
- High power factor
- CV and CC
- 0-10V dimming

Smart-Lighting

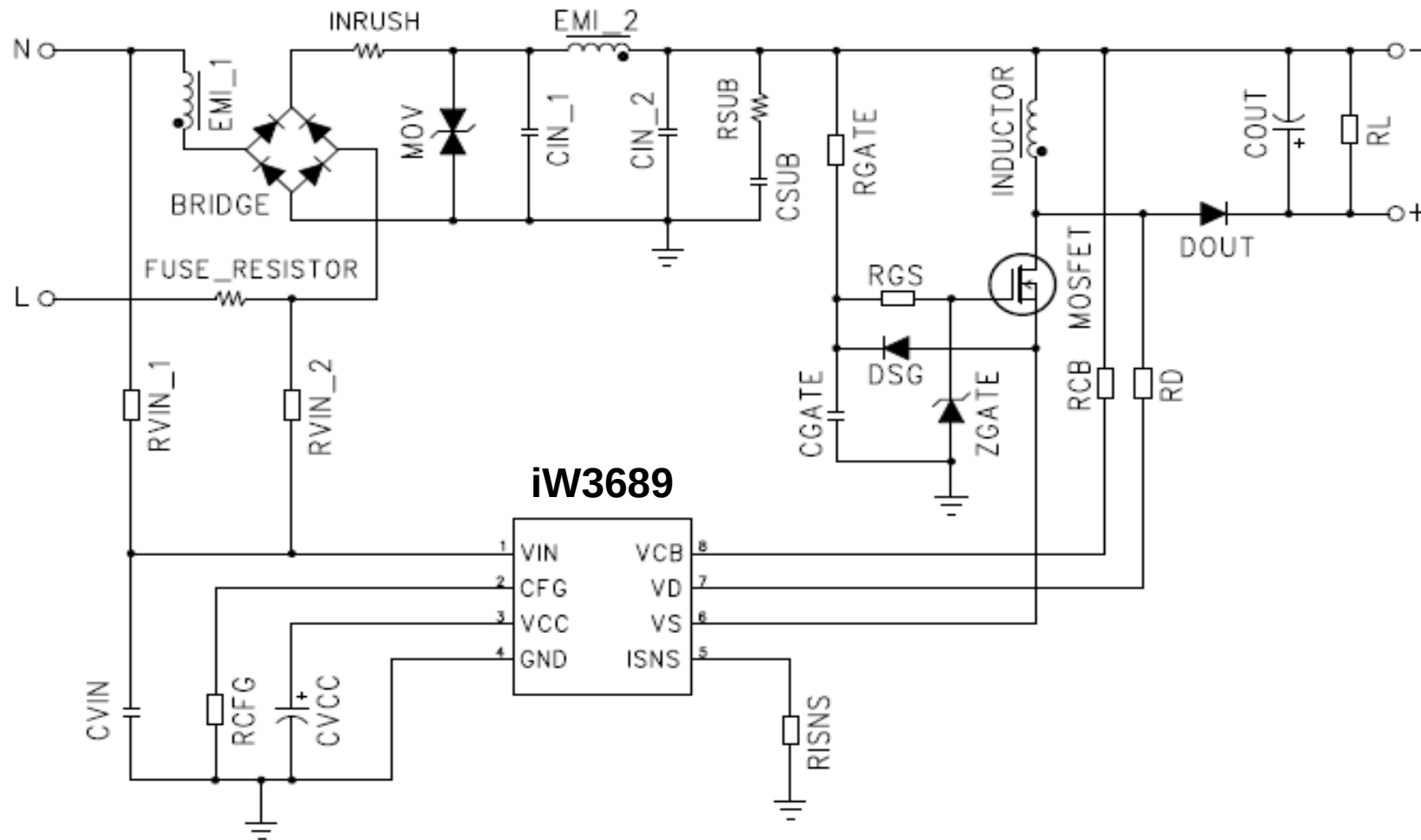
iW6401

iW3690

- Wireless or wired
- Deep dimming
- TRIAC compatible
- Highly configurable

iW3689 Schematic

Single-winding inductor solution



iW3689 – Highest Performance Phase-cut Dimming



- **Ultimate dimming performance and compatibility with ultra-low BOM cost**
 - Patented digital algorithms . . .
 - Provide exceptional dimmer compatibility – TRIAC and digital dimmers
 - Automatic detection of dimmer type
 - Immune to noise and instability – no flicker, no shimmering
 - Wide dimming range 1% to 100%
- **Low total BOM size/cost**
 - Eliminates external bleeder circuit for both 120V and 230V applications
 - Eliminate Vcc winding
 - No added cost for potting
- **Low total harmonic distortion < 20% with high PF > 0.95**
- **Built-in LED over-temperature protection derating**

Reference Design

Description		Symbol	Min	Typ	Max	Units	Comment
Input							
Voltage		V_{IN}	180	230	264	V _{AC}	2 Wire
Frequency		f_{LINE}		50		Hz	
Open-load Input Power (264V _{AC})						W	
Output							
Const Voltage	Output Voltage	V_{OUT_CV}				V	
	Output Current	I_{OUT_CV}				A	
Const Current	Output Voltage	V_{OUT_CV}		150		V	
	Output Current	I_{OUT_CV}		35		mA	
Total Output Power							
Continuous Output Power		P_{OUT}		5.25		W	
Over Current Protection		I_{OUT_MAX}				A	
Efficiency		η	84			%	Measured at end of PCB@230V
Power Fact		PF		0.9			Harmonic meet IEC61000-3-2
Turn on Delay Time						Sec	
Conducted EMI			Meets EN55015B				
Hi-pot test						KV	
Operation temperature		T_{opr}		40		° C	Free convection, sea level

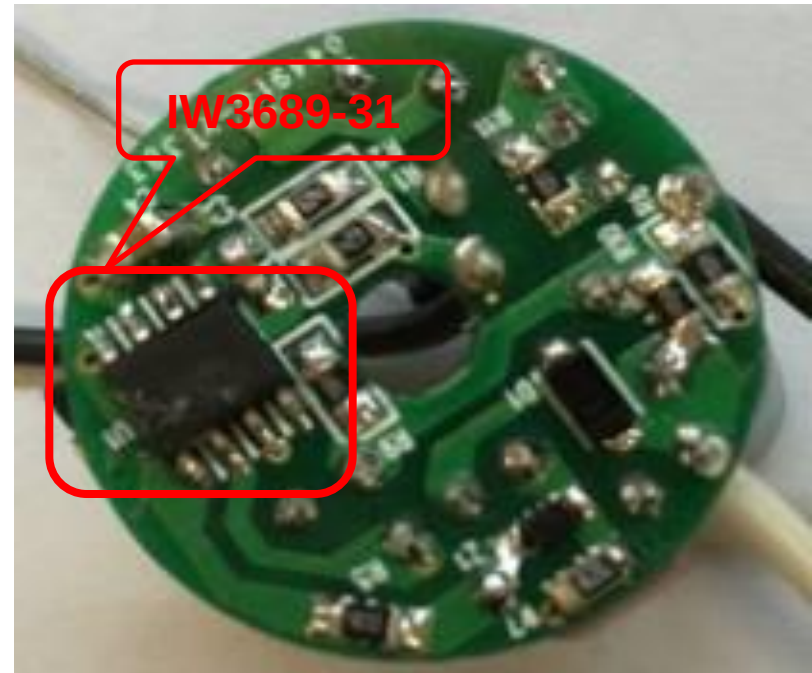
Circuit Board



Top View



Bottom View



Regulation and Efficiency Measurement



Test condition: 180Vac~264Vax with LED load

Input Voltage (Vac)	PF	Vout (Vdc)	Iout (mA)	Input power (W)	Output power (W)	Efficiency (%)
180	0.9545	149.3	33.3	5.94	4.97	83.70
190	0.952	149.56	36.2	6.46	5.41	83.81
200	0.9508	149.36	39.1	6.97	5.84	83.79
210	0.9322	149.36	37.8	6.68	5.65	84.52
220	0.9172	149.33	37.7	6.66	5.63	84.53
230	0.9014	149.31	37.7	6.65	5.63	84.65
240	0.8842	149.28	37.6	6.64	5.61	84.53
250	0.8669	149.26	37.6	6.64	5.61	84.52
264	0.8423	149.25	37.6	6.65	5.61	84.39

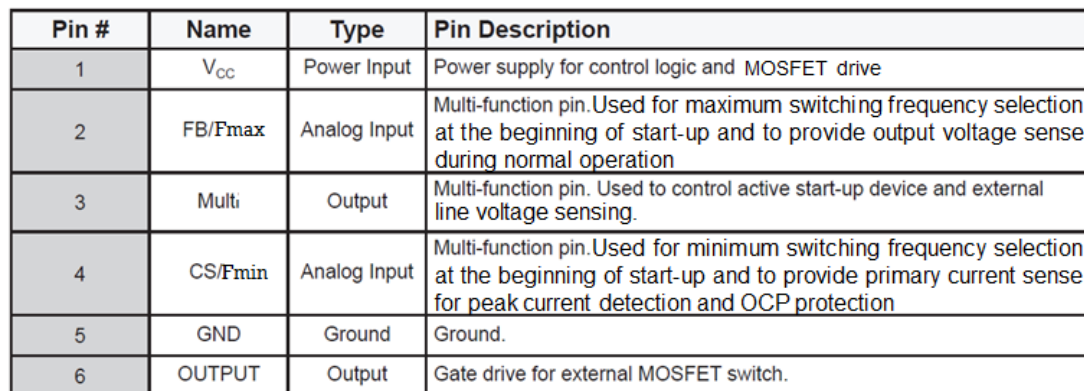


iW3627 – High PF, Fastest DLR CV PSR

High Power Factor, Single-stage Front-end Controller

- ✓ Constant voltage output
- ✓ Support multiple topology: buck, flyback, buck-boost
- ✓ High accuracy output voltage regulation to reduce power loss for application using linear second stage
- ✓ High power factor across wide load range from 50% to 100% with power factor > 0.9 ; THD $< 15\%$
- ✓ Below 0.2W standby power
- ✓ Support loading types including: DC-DC, LED, CC and CR
- ✓ Support power up to 90W
- ✓ Fast Dynamic Load Response (DLR) with overshoot and undershoot below $\pm 5\%$
- ✓ Multiple layer protections: OCP, OVP, OTP, output short, Vin brown-out
- ✓ Simple EMI design





Reference Design

Description		Symbol	Min	Typ	Max	Units	Comment
Input							
Voltage		V_{IN}	90	230	264	V _{AC}	2 Wire
Frequency		f_{LINE}		50		Hz	
Open-load Input Power (264V _{AC})						W	
Output							
Const Voltage	Output Voltage	V_{OUT_CV}		38		V	Measured at the PCB connector
	Output Current	I_{OUT_CV}		400		mA	
Const Current	Output Voltage	V_{OUT_CV}				V	Min Vout is depend on Vcc
	Output Current	I_{OUT_CV}				mA	
Total Output Power							
Continuous Output Power		P_{OUT}		15		W	
Over Current Protection		I_{OUT_MAX}				A	Auto-restart
Efficiency		η	87			%	Measured at end of PCB@230V
Power Fact		PF	0.9				Harmonic meet IEC61000-3-2
Turn on Delay Time						Sec	
Conducted EMI			Meets EN55015B				
Hi-pot test						KV	
Operation temperature		T_{opr}		40		° C	Free convection, sea level

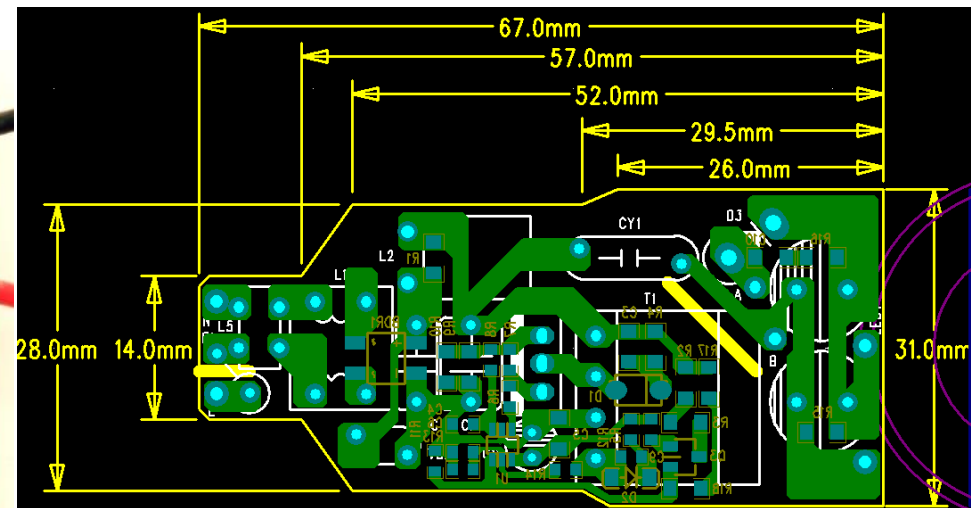
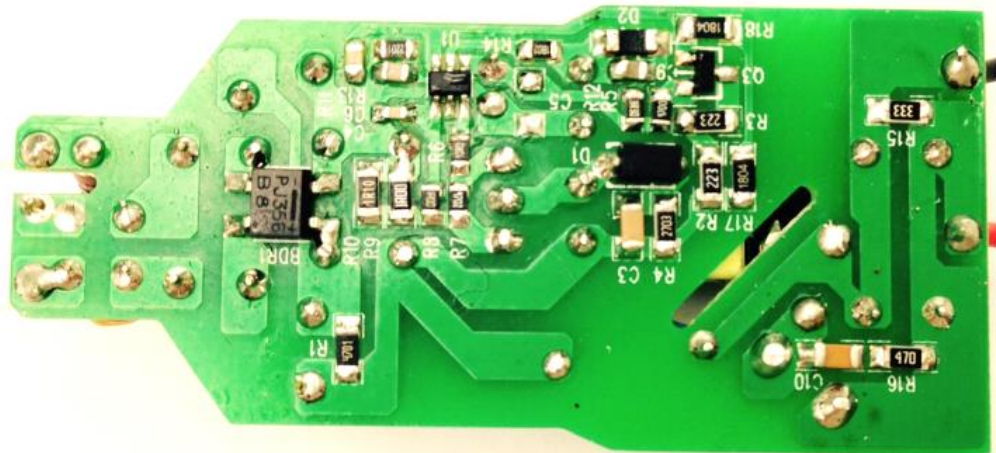


Circuit Board



AC Input

DC Output TO LED

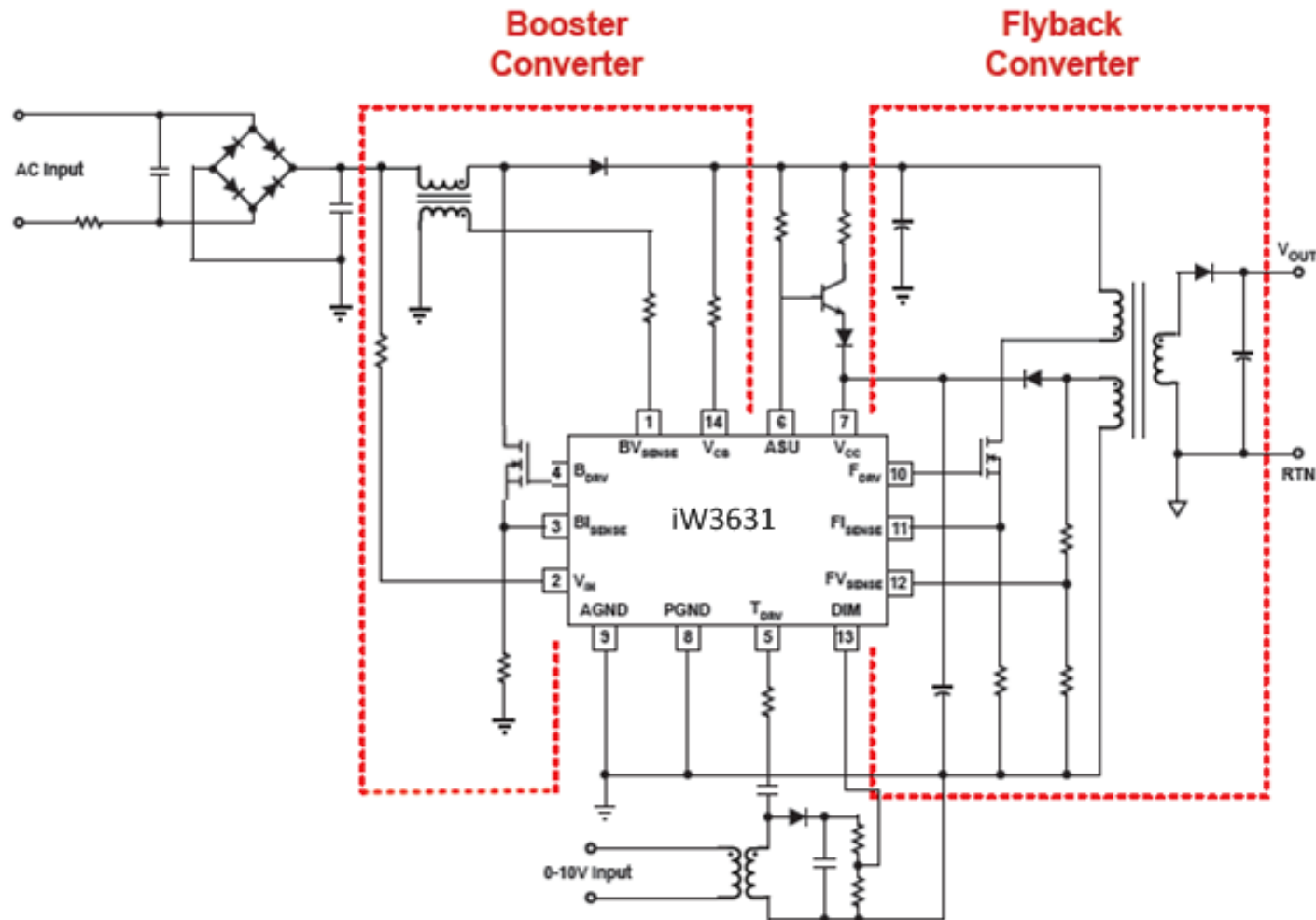


Line Regulation and Efficiency

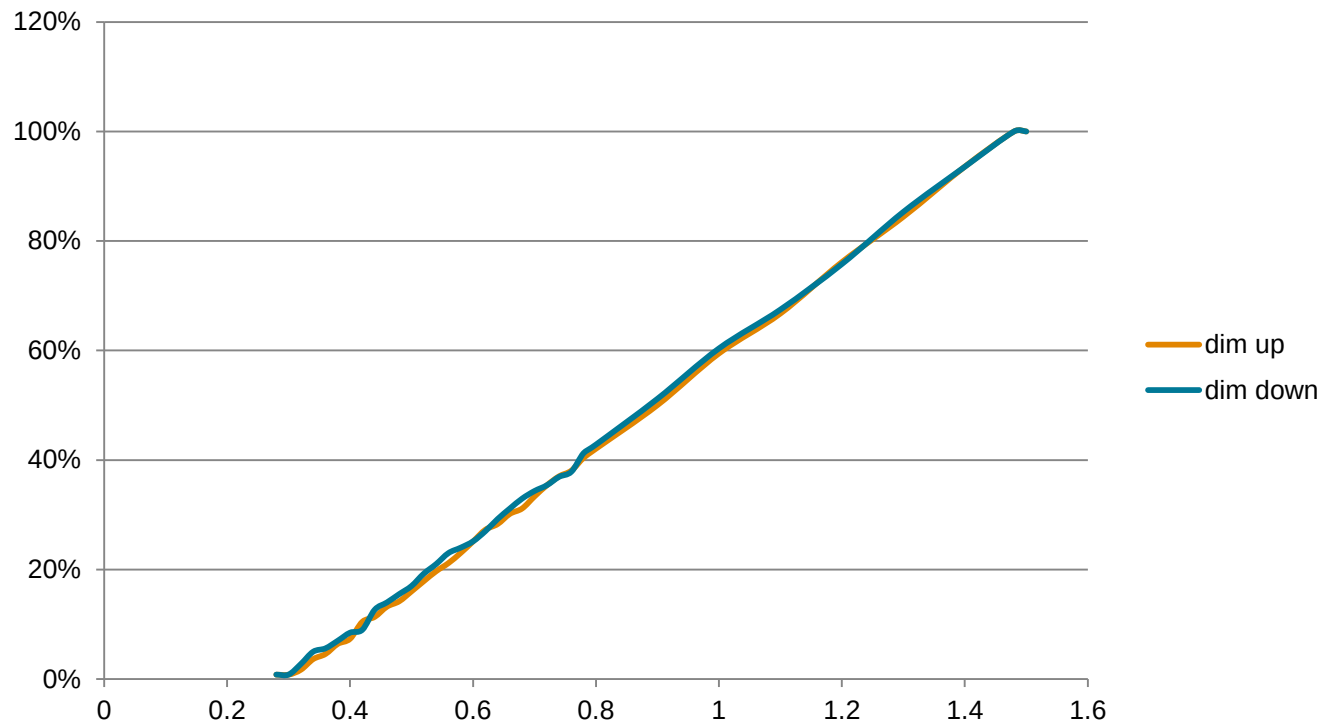
Vin (V)	Pin (W)	Vout (V)	Iout(max) (mA)	PF	Eff (%)
90	17.58	37.46	400	0.997	85.23%
100	17.43	37.46	400	0.996	85.97%
110	17.31	37.46	400	0.995	86.56%
120	17.23	37.46	400	0.993	86.96%
130	17.18	37.47	400	0.99	87.24%
140	17.14	37.46	400	0.988	87.42%
150	17.12	37.46	400	0.984	87.52%
160	17.11	37.47	400	0.981	87.60%
170	17.11	37.47	400	0.978	87.60%
180	17.12	37.47	400	0.979	87.55%
190	17.11	37.47	400	0.975	87.60%
200	17.13	37.47	400	0.97	87.50%
210	17.14	37.47	400	0.967	87.44%
220	17.17	37.48	400	0.96	87.32%
230	17.2	37.48	400	0.954	87.16%
240	17.23	37.49	400	0.948	87.03%
250	17.26	37.49	400	0.942	86.88%
260	17.3	37.49	400	0.927	86.68%
264	17.31	37.49	400	0.927	87.56%

iW3631 All-in-One 0-10V Dimmable Driver

Zero-ripple and integrated dimmer driver

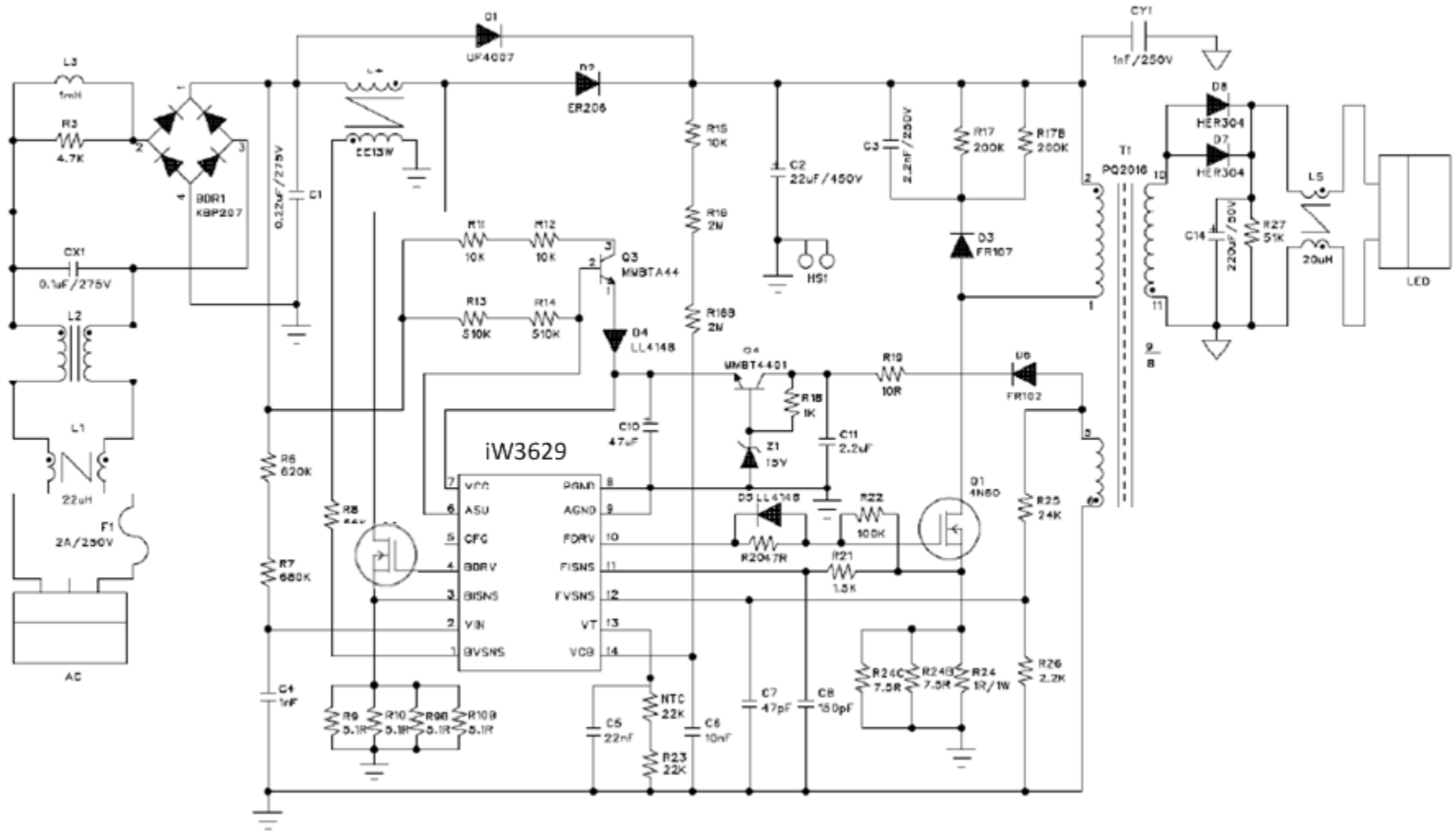


iW3631: Dimming Curve Check



iW3629 Non-dimmable Circuit

Zero-ripple two-stage controller



Dialog Light Management



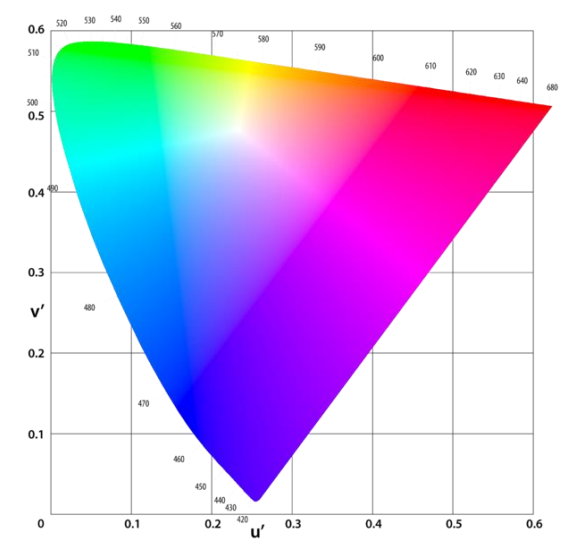
Single-Channel Dim



Tunable White



RGB(W)



iW3690: 3-in-1 Dimming Lamp Controller

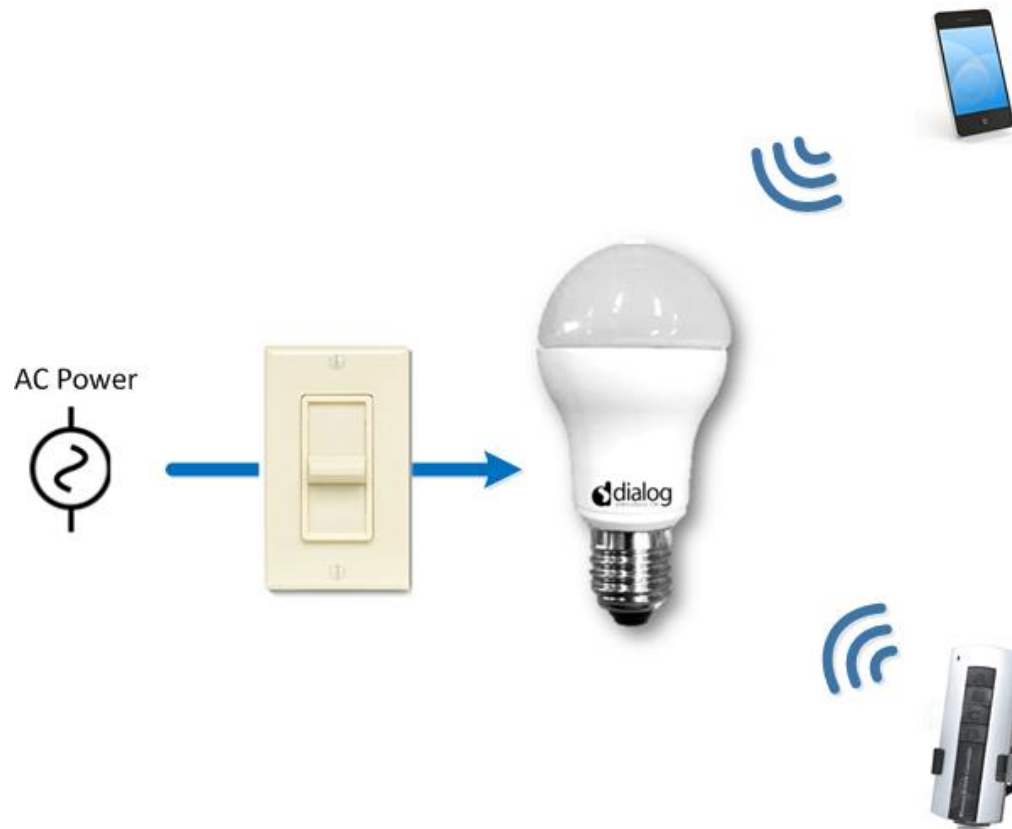


Dialog Semiconductor ***iW3690 Smart Lighting LED Driver*** **Concurrent TRIAC and I²C Dimming**

- ✓ Turn-key system solution for multi-room wireless lighting control via smartphone or tablet
- ✓ Digital interface to work with Bluetooth® Smart and other wireless protocols
- ✓ Superior phase-cut (TRIAC) dimmer compatibility



3-in-1 Dimming with iW3690



iW6401 Smart Digital Driver IC

Target markets and applications



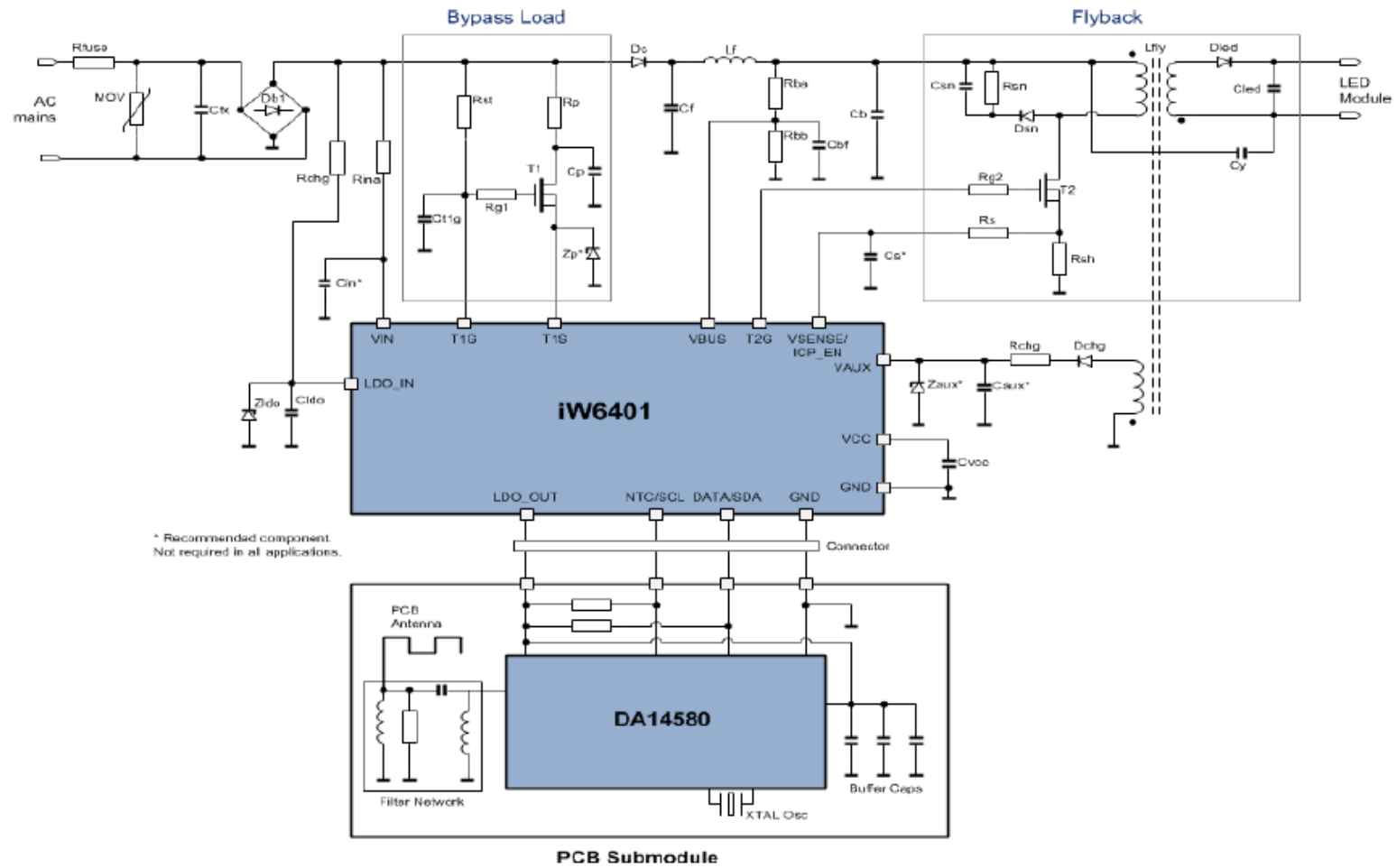
Digital light control

- Wireless enabled lamps
- DLT (Ledotron) digital dimmer controller lamps
- Fully programmable digital controller
- Intelligent sensor controlled lamps
- Colour and tunable-white systems



- ✓ Smart Homes
- ✓ Hospitality
- ✓ Office Rooms
- ✓ Meeting Rooms

iW6401+DA14580 Chipset



Dimmable Product Selection



	Part#	Topology	Package	Power	Description
New	iW3688	Buck-Boost	SOIC14	<20W	Phase-cut Dimmable, Bulb, Luminaire
	iW3689/1	Buck-Boost	SOIC8	<20W	Phase-cut Dimmable, Bulb, Luminaire
	iW3605	Buck-Boost	SOIC8	<45W	Phase-cut Dimmable, 120V Bulb, Luminaire, Tube
	iW3602	Buck-Boost	SOIC8	<7W	Phase-cut Dimmable, (No Line Flicker), Candle, GU10
	iW3662	Boost+ Buck/Lnear	QFN16	<10W	Phase-cut Dimmable MR16
New	iW3631	Boost + Flyback	SOIC14	<90W	High PF, No Line Flicker, 0-10V Dimmable Luminaire, Tube
	iW6401	Flyback	DFN10	<100W	I ² C(BLE) Dimmable, Full-featured Bulb, Luminaire
New	iW3690	Buck-Boost	SOIC14	<20W	I ² C Dimmable, Phase-cut Compatible Bulb, Luminaire

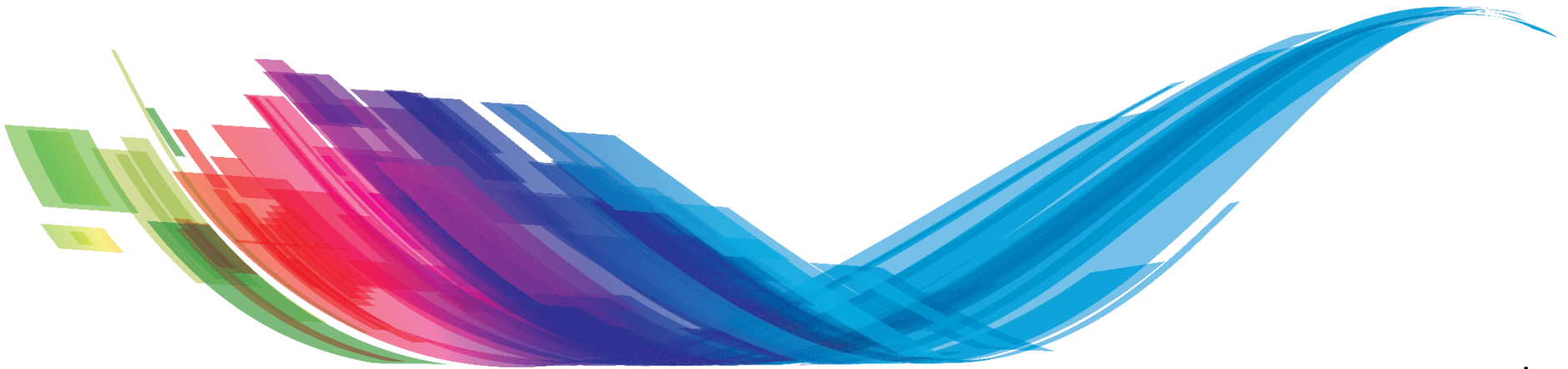


Non-Dimmable Product Selection



Part#	Topology	Package	Power	Description
iW3627	Flyback	SOT23	<90W	High PF, Constant Voltage Output, Good DLR, Luminaire, Smart-lamp Front-end
iW3629	Boost + Flyback	SOIC14	<90W	High PF, No Line Frequency Ripple, Constant Current Output Luminaire, Tube
iW3625	Buck	SOT23	<45W	High PF, Constant Current Luminaire, Tube
iW3620	Flyback	SOT23	<45W	High PF, Constant Current Luminaire, Tube
iW3626	Flyback, Buck	SOT23	<12W	High PF, Constant Current, Support BJT Bulb

The Power To Be...



...personal
...portable
...connected