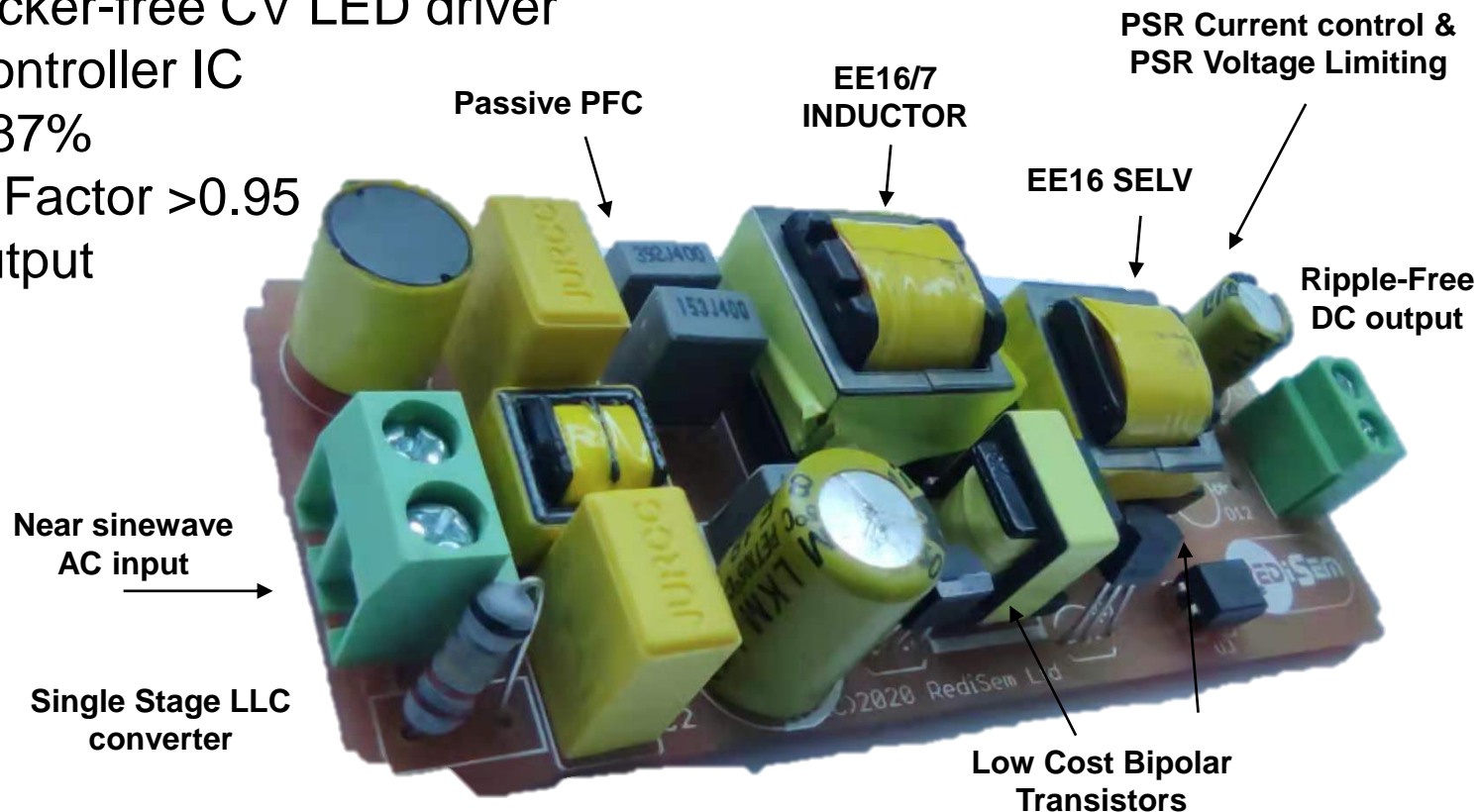


RED2542 30W CV LED Driver Design Report

August 2021

- Low-cost Flicker-free CV LED driver
- RED2542 controller IC
- Efficiency >87%
- High Power Factor >0.95
- 12V 2.6A output
- Low EMI



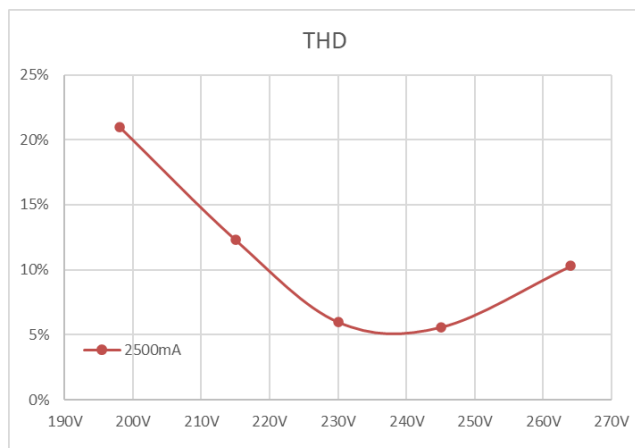
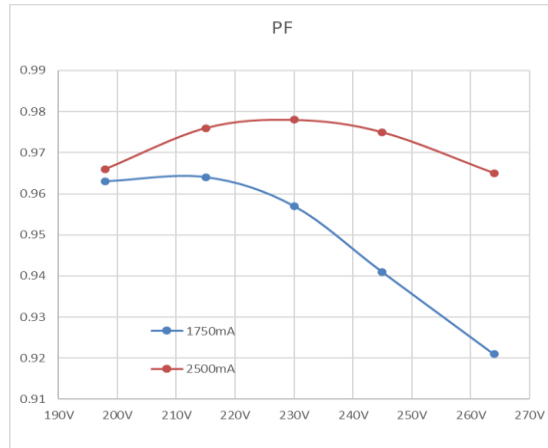
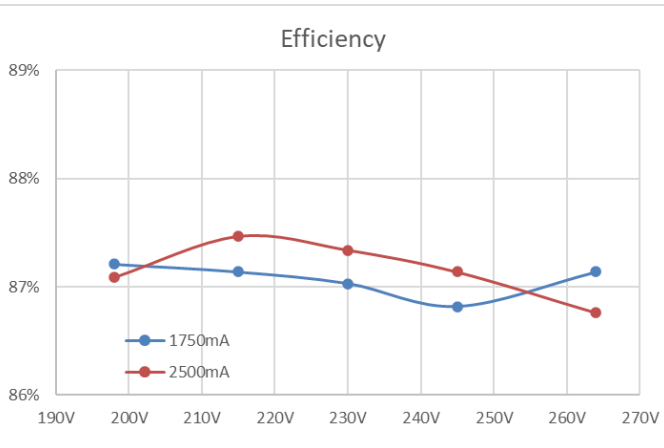
Overview

RediSem IC	RED2542 SOT23-6 LLC LED Driver IC
Output Power	30W
Output Voltage	12V constant voltage
Line regulation	0% (198 - 264VAC)
Load Regulation	0% (2.5A - 0A)
Output Current range	2.5A - 0A
Low Freq. Ripple	<0.1% @ 230V full load
Efficiency	87% @ 230V full load
Magnetics	EE16/7, EE16 SELV, EE10 basedriver
Audio noise	silent during PWM load, burst mode activates below 5% of output current
Input	198-264VAC, 50Hz
Survive input range	170 - 320VAC
PF	0.98 @ 230V full load
THD	6.4% @ 230V full load
Size	113mm x 40mm x 23mm
Protection	Short circuit, Over Load, Over temperature, SELV
Converter	1.5 boost PFC CV LLC converter
Component Count	55

Test Results



Output Current	1750mA					2500mA				
Input voltage	198V	215V	230V	245V	264V	198V	215V	230V	245V	264V
Output Voltage	12.06V	12.06V	12.06V	12.06V	12.05V	12.06V	12.06V	12.06V	12.06V	12.06V
Input Power	24.20	24.22	24.25	24.31	24.20	34.62	34.47	34.52	34.60	34.75
Output Power	21.11	21.11	21.11	21.11	21.09	30.15	30.15	30.15	30.15	30.15
Efficiency	87.2%	87.1%	87.0%	86.8%	87.1%	87.1%	87.5%	87.3%	87.1%	86.8%
Power Factor	0.963	0.964	0.957	0.941	0.921	0.966	0.976	0.978	0.975	0.965
THD	16.3%	12.1%	13.4%	19.1%	25.0%	21.0%	12.3%	6.0%	5.6%	10.3%
LF Voltage Ripple (pk-pk) %	0.07%	0.05%	0.07%	0.05%	0.05%	2.52%	0.03%	0.03%	0.03%	0.03%



Thermal Results



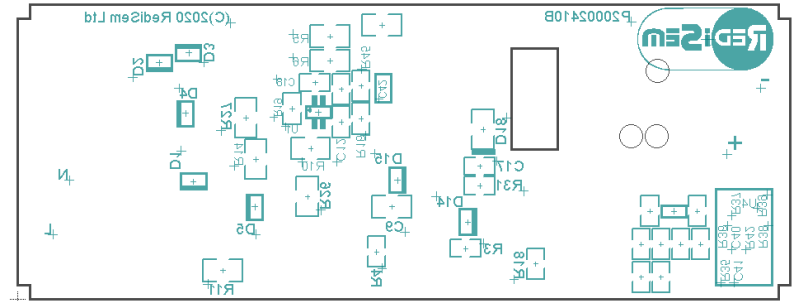
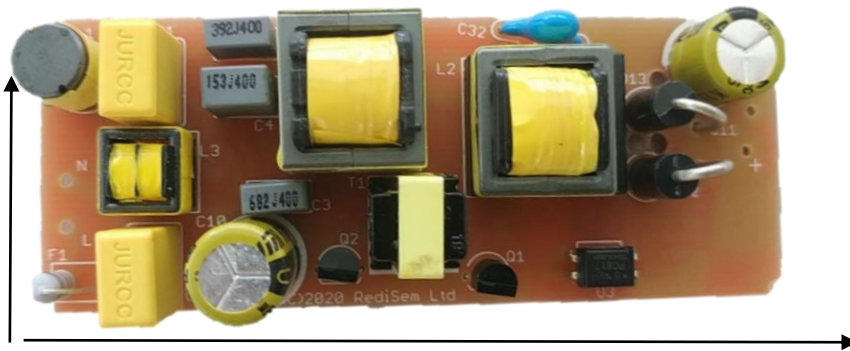
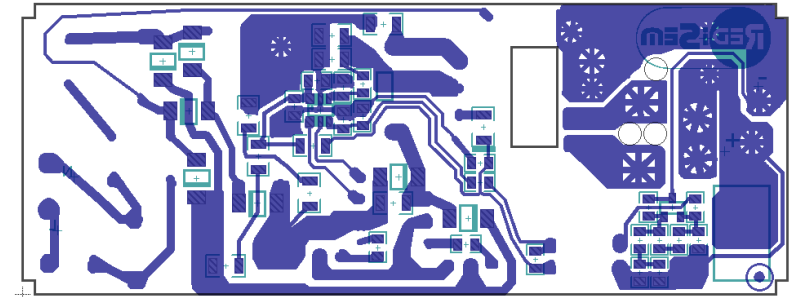
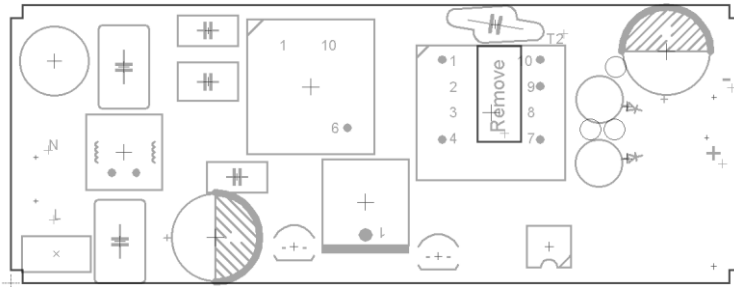
Thermal Results (cased)	198V 2.5A	264V 2.5A
Ta	36C	36C
Q1	108C	109C
Q2	110C	114C
L2 core	100C	119C
L2 winding	100C	119C
T2 core	109C	117C
T2 winding	101C	110C
TDIODE1	114C	121C
TDIODE2	106C	113C

PCB layout



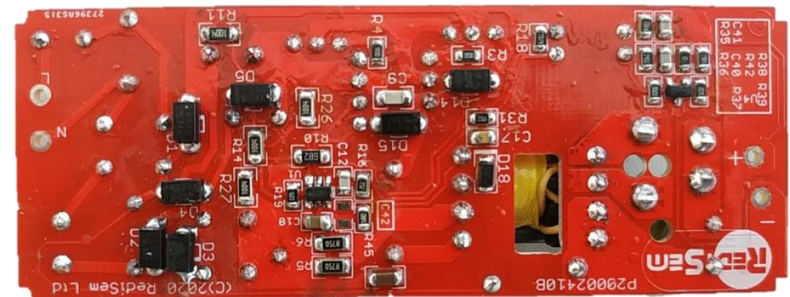
Top Side

Bottom Side

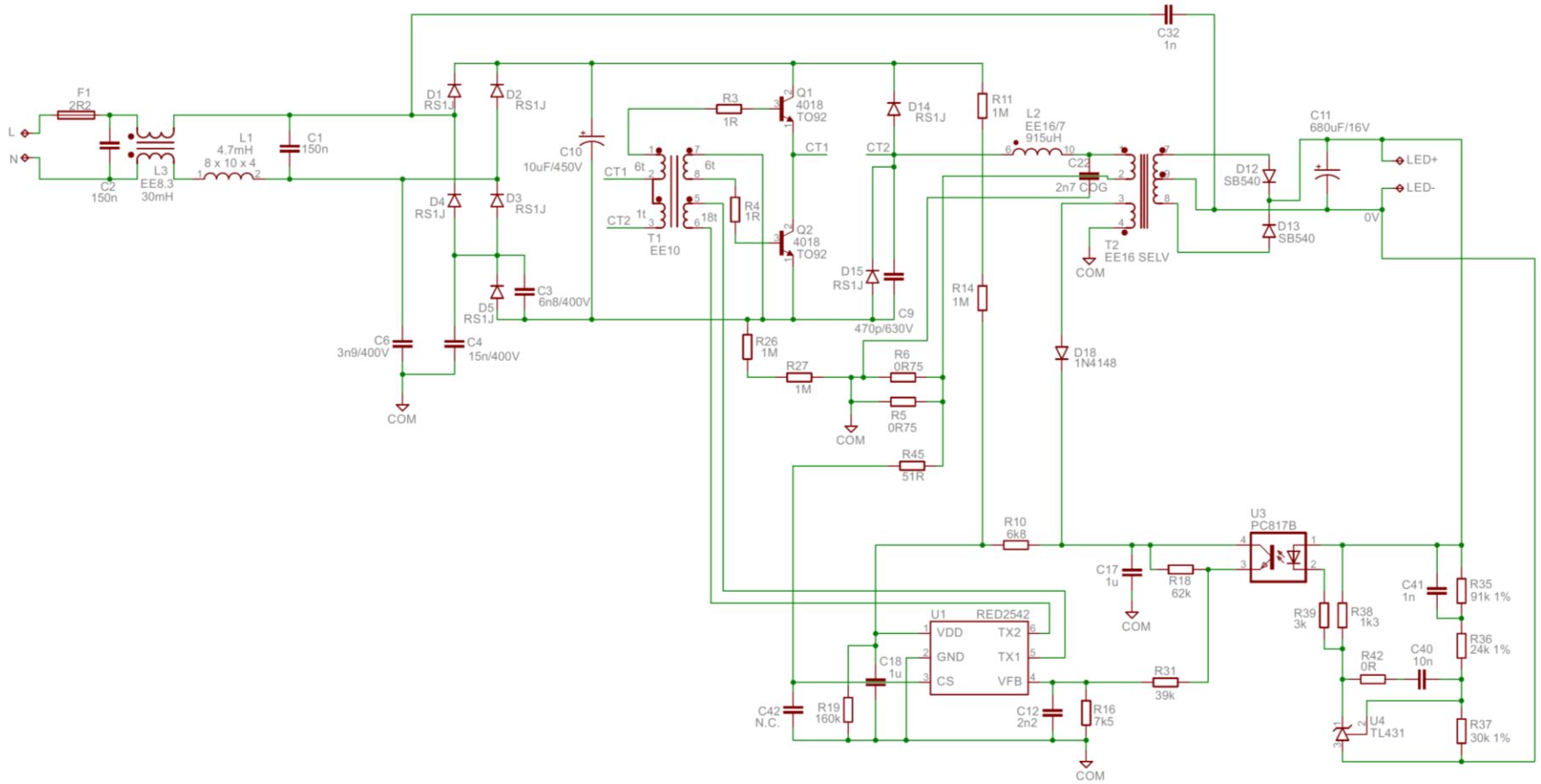


113mm

- Single sided PCB
- 1mm thick
- 1 Oz copper



Schematic



Code	Value	Description	Qty	Supplier
C1	150n	X2 MKP 20% 275VAC	1	Tenta
C2	150n	X2 MKP 20% 275VAC	1	Tenta
C3	6n8	MKP 5% 400VDC	1	Fara
C4	15n	MKP 5% 400VDC	1	Fara
C6	3n9	MKP 5% 400VDC	1	Fara
C9	470p	1206 NPO 5% 630VDC	1	Murata
C10	10u	ELEC 20% 450VDC	1	Ymin
C11	680u	ELEC 20% 16VDC	1	Aishi
C12	2n2	0805 COG 5% 50VDC	1	Samsung
C17	1u	0805 X7R 10% 50VDC	1	Samsung
C18	2u2	0805 X7R 10% 10VDC	1	Samsung
C32	1n	Y-CAP	1	
C40	10n	0805 X7R 10% 50VDC	1	
C41	1n	0805 X7R 10% 50VDC	1	
D12,13	SB540		2	
D1,2,3,4,5,14,15	RS1J	Fast Diode 600VDC 1A	7	TSC/Vishay
D18	1N4148	MiniMELF	1	Vishay
F1	2R2	Resistor Fuse	1	
L1	4m7H	8x10x3 Drum Core	1	
L2	915uH	EE16/7 Main Inductor	1	
L3	30mH	EE8.3 Common mode	1	
R3,4	1R	0805 0.06W 1.0%	2	
R5,6	0R75	1206 0.25W 1.0%	2	
R11,14,27,28	1M	0805 0.06W 1.0%	4	
R10	6k8	0805 0.06W 1.0%	1	
R16	7k5	0805 0.06W 1.0%	1	
R18	62k	0805 0.06W 1.0%	1	
R19	160k	0805 0.06W 1.0%	1	
R31	39k	0805 0.06W 1.0%	1	
R35	91k	0805 0.06W 1.0%	1	
R36	24k	0805 0.06W 1.0%	1	
R37	30k	0805 0.06W 1.0%	1	
R38	1k3	0805 0.06W 1.0%	1	
R39	3k	0805 0.06W 1.0%	1	
R42	0R	0805 0.06W 1.0%	1	
R45	51R	0805 0.06W 1.0%	1	
Q1,Q2	4018	TO-92 2A NPN Transistor (Ts=2-2.5us)	2	
T1	EE10	Base Drive , 18:6:6:1 turns	1	
T2	EE16 SELV	Output Transformer	1	
U1	RED2542	LLC LED controller IC	1	Redisem
U3	PC817B	Photocoupler	1	SHARP
U4	TL431B	Shunt Voltage Regulator	1	
TOTAL			55	

RED2542 Datasheet



RED2542

Improved Resonant Controller for CV LED Drivers

Features

- Reduced pincount for smaller size & lower cost
- Reduced audio noise with improved burst-mode performance
- Reduced output ripple
- Improved transient response
- Reduced standby power
- Accurate primary side limiting of output current
- Boost current feature to ensure reliable startup with constant power loads
- Protection modes:
 - Overload output including short-circuit
 - No-Load output
 - Over-temperature
- Low standby power
- Smallest SOT23-6 IC package



SOT23-6

Applications

- Passive PFC CV LED drivers 30W
- Active PFC CV LED drivers up to 75W

Order code

Part Number	Package	Packaging
RED2542AL-TR7	SOT23-6	Tape and reel

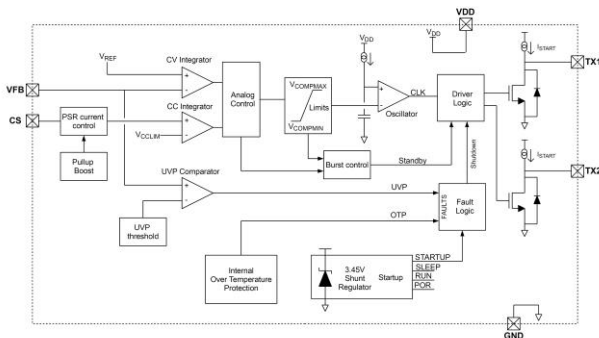


Figure 1: Block diagram



RED2542 LED LLC Controller

Device Pins

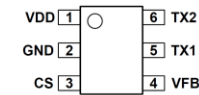
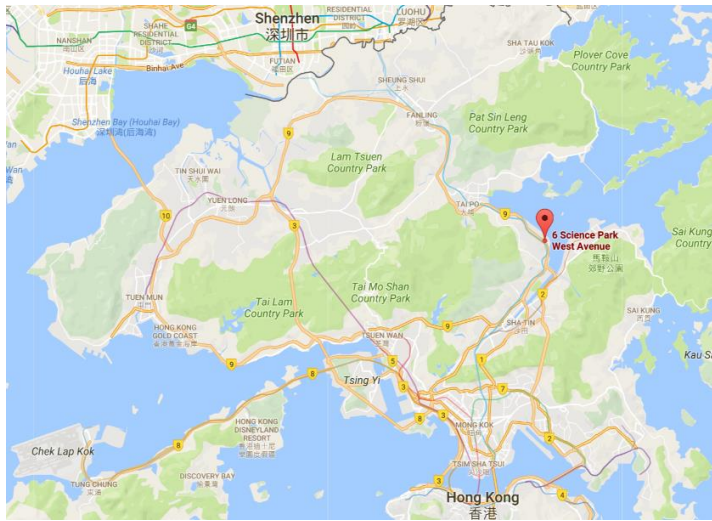


Figure 2: SOT23-6 pin connections (top view)

Pin Functions

Pin #	Name	Function
1	VDD	IC Power Supply pin
2	GND	Chip ground
3	CS	PSR Current Sense input provides output current regulation and cycle-by-cycle over-current protection. The CS pin is connected to the half-bridge current sense resistor
4	VFB	PSR Feedback input for output voltage regulation. Connect to primary sense winding
5	TX1	Output to control transformer
6	TX2	Output to control transformer

Contact details



RediSem Hong Kong

218-219 Photonics Centre No 2,
Science Park East Avenue
H. K. Science & Technology Park Shatin,
New Territories, Hong Kong

info@redisem.com
tel. +852 2607 4141
fax. +852 2607 4140

RediSem Shenzhen

Room 1505, 15 Floor Caiwuwei
JinLong Building No. 139
Hongbao Road Guiyuan Street, Luohu
District Shenzhen City

eko.liu@redisem.com
tel. +86 755 8227 342

Approved Distributors

China

Mobicon Electronic Trading (Shenzhen) Ltd.

17F, International Trade Bldg.
Renmin South Road
Luoho District, Shenzhen P.R.C.
Tel. (86-755) 8221 1737
Fax. (86-755) 8221 1774
china@mobicon.com

Honestar Shenzhen Headquarter

Rm.1502, East Tower, FIYTA Tech. Bldg.
Nanshan District
Shenzhen 518057 P.R. China
Tel. 86-755-86018818
Fax. 86-755-86018808
sales@honestar.com

India

Innovatech Switching Power India Private Ltd.

55, Ground Floor, 15th Cross, 9th Main
Vyalikaval
Bangalore, Karnataka 560003
Tel. 91-80-23560288
Tel. 91-9844088331
customer.service@ispipl.com

Korea

SOONAM Co., Ltd.

697 Pangyo-Ro, (A-905, Bundang Techno Park),
Bundang-Gu, Seongnam-Si,
Kyonggi-Do, 463-816, Korea
Contact Person: Mr. Seungjib Hong
Contact Number: +82 (0)10 9001 8248
seungjib.hong@redisem.com