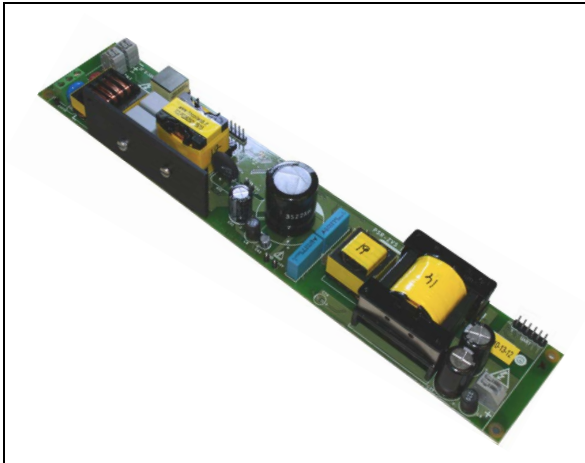


100 W LED street lighting application using STLUX385A

Data brief



Description

The STEVAL385LEDPSR demonstration board is a complete and configurable solution that efficiently controls a single dimmable high brightness LED string using the STLUX385A digital controller.

The LED efficiency is high during all stages of dimming and the STEVAL385LEDPSR can achieve a 92% efficiency during full load while maintaining a low < 200 mW power consumption during idle periods.

The STLUX385A device handles a primary side regulated power conversion stage as well as all the supported communication links.

The power conversion stage consists of a PFC regulator followed by a “Zero Voltage Switching” (ZVS) LC resonant stage. The high precision dimming is adjusted using a primary side regulation (PSR) control technique.

The LED brightness can be dimmed by controlling the LED current down to a very low level.

The STEVAL385LEDPSR demonstration board provides all the physical communication interfaces such as a DALI, insulated 0-10 and UART. All the communication is managed by the STLUX385A device. The UART interface and STLUX385A flexibility allow to quickly connect the STEVAL385LEDPSR board to alternative interfaces such as the Wi-Fi, power line modems, Bluetooth® and ZigBee®.

This demonstration board is available with an order code STEVAL-ILL066V1 now.

Features

- STLUX385A based
- High efficiency (92%)
- Primary side controlled
- Up to 100 W (100 V at 1 A or 200 V at 0.5 A)
- Single isolated output suitable for LED connection
- Wide input voltage range: 90 V to 265 V AC
- Adjustable LED current and dimming
- Output resolution: 11-bit equivalent
- IDLE mode power consumption: < 200 mW
- Real-time fault detection and protection (e. g.: short- or open circuit)
- Remote control via DALI, 0 - 10 V, UART

Contents

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1 Board description

Figure 1. STEVAL385LEDPSR demonstration board



Board connector pinout

Table 1. Connector J8 pinout - AC-DC input

Name	Type	Function
ACIN	Power	Main AC/DC input
ACIN	Power	Main AC/DC input
EARTH	Power	Protective earth connection

Table 2. Connector J4 pinout - DC output

Name	Type	Function
"+"	Power	Positive load connection
"-"	Power	Negative load connection

Table 3. Connector J3 pinout - DALI interfaces

Name	Type	Function
DALI	DALI signal	DALI signal for isolated DALI interfaces - without polarization
DALI	DALI signal	DALI signal for isolated DALI interfaces - without polarization

Table 4. Connector J9 pinout - 0 - 10 V

Name	Type	Function
“+”	Positive reference	Positive reference for isolated 0 - 10 V interfaces
“-”	Negative reference	Negative reference for isolated 0 - 10 V interfaces

Table 5. Connector J2 pinout - serial interfaces

Name	Type	Function
1 (black)	Negative power	Directly connected to isolated Serial GND
2 (brown)	CTS _n	Not used - pulled down
3 (red)	Fixed positive power	5.0 V power for the UART interfaces only
4 (orange)	TXD (input)	TXD signal - RXD on STLUX
5 (yellow)	RXD (output)	RXD signal - TXD from STLUX
6 (green)	RTS _n	Not connected

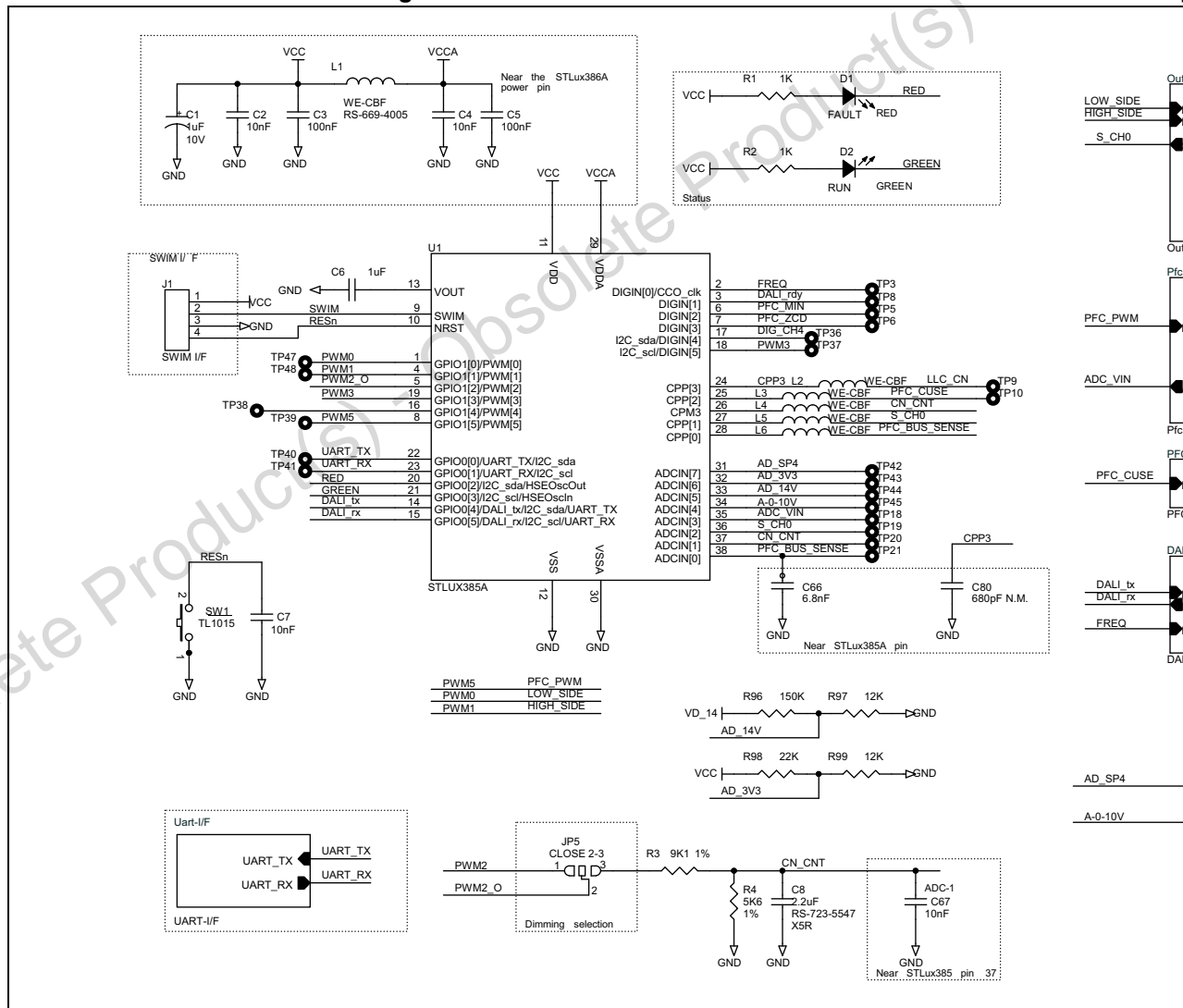
Table 6. Connector J1 pinout - SWIM interfaces

Name	Type	Function
1	VCC_SWIM	power reference from board
2	SWIM	SWIM signal to/from STLUX
3	GND_SWIM	Directly connected to primary GND
4	RES _n	Connected to STLUX NRST pin



2 Schematic diagrams

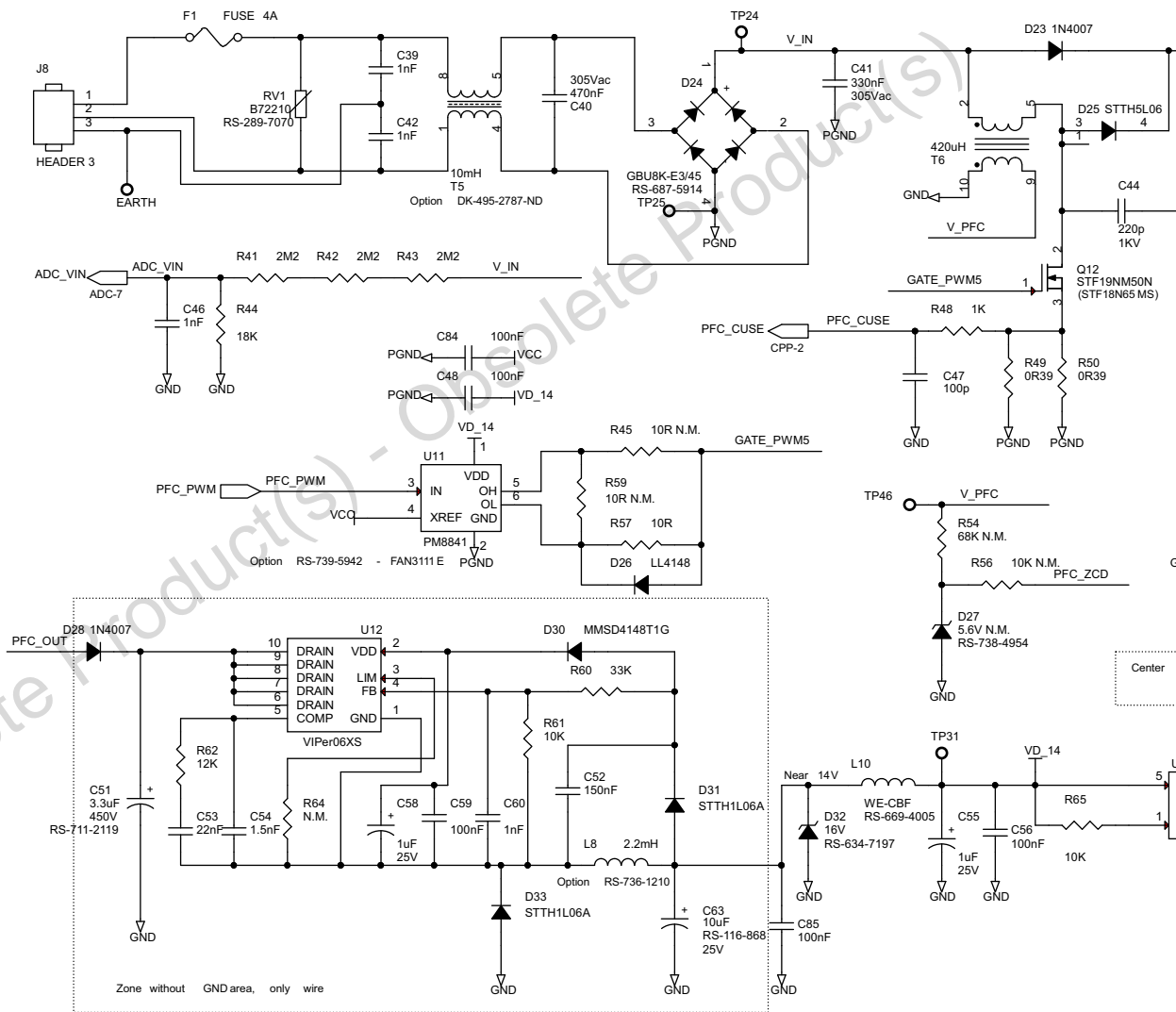
Figure 2. PSR-ZVS demonstration board schematic - STLUX385A - to



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Figure 3. PSR-ZVS demonstration board schematic - PFC and DC/DC



Obsolete Product(s)

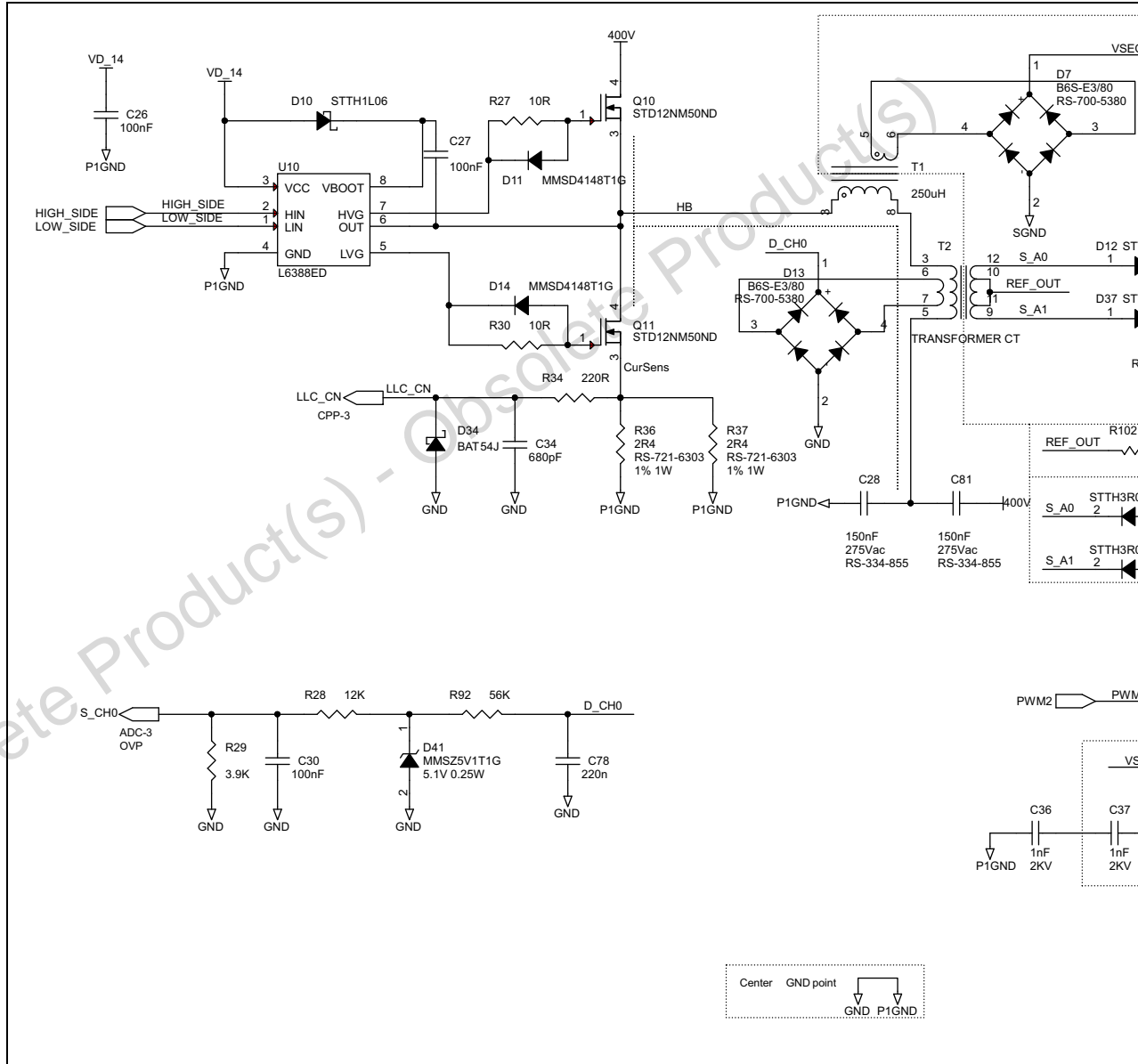




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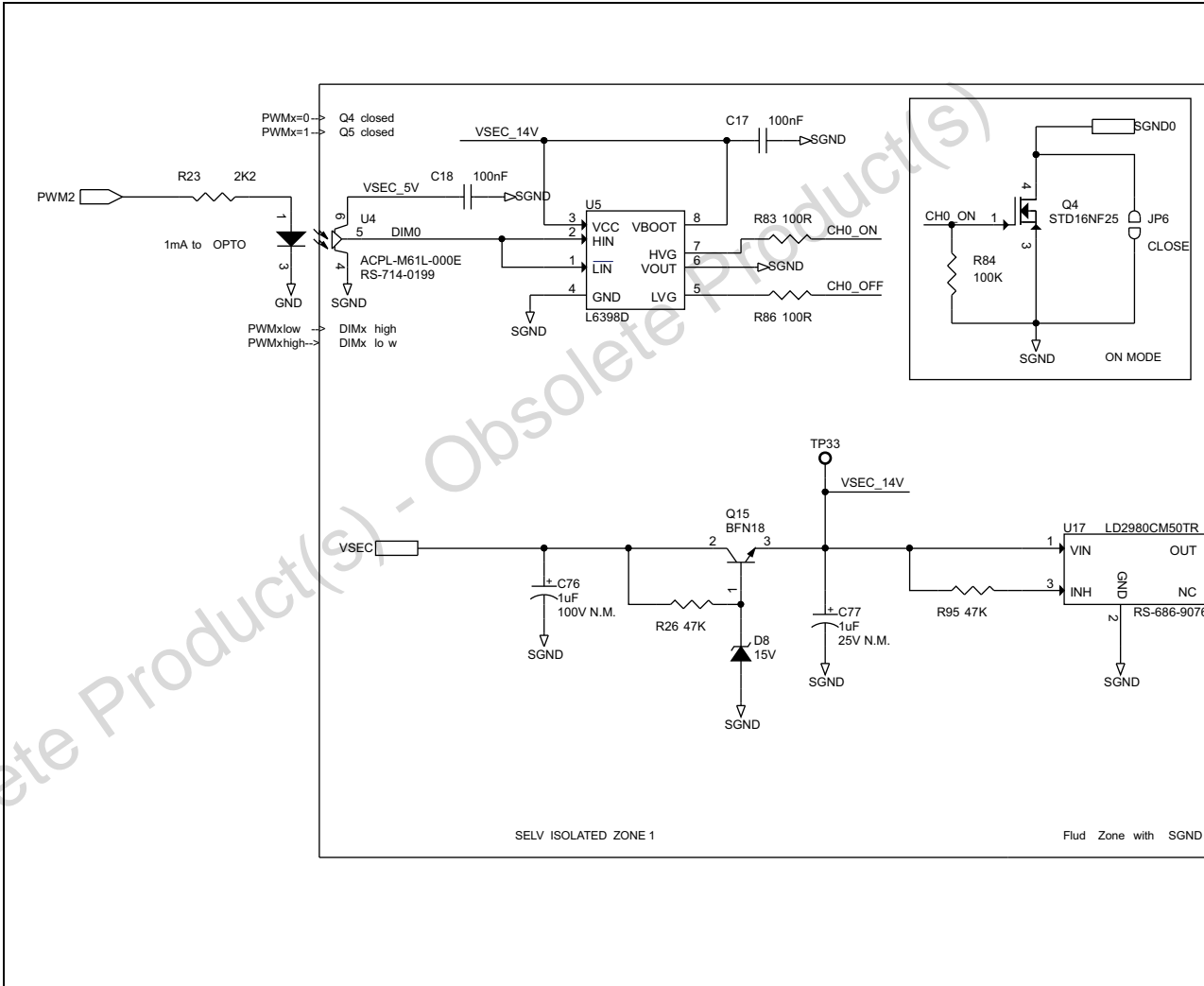
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Figure 4. PSR-ZVS demonstration board schematic - PSR-ZVS stage



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Figure 5. PSR-ZVS demonstration board schematic - digital dimming sta

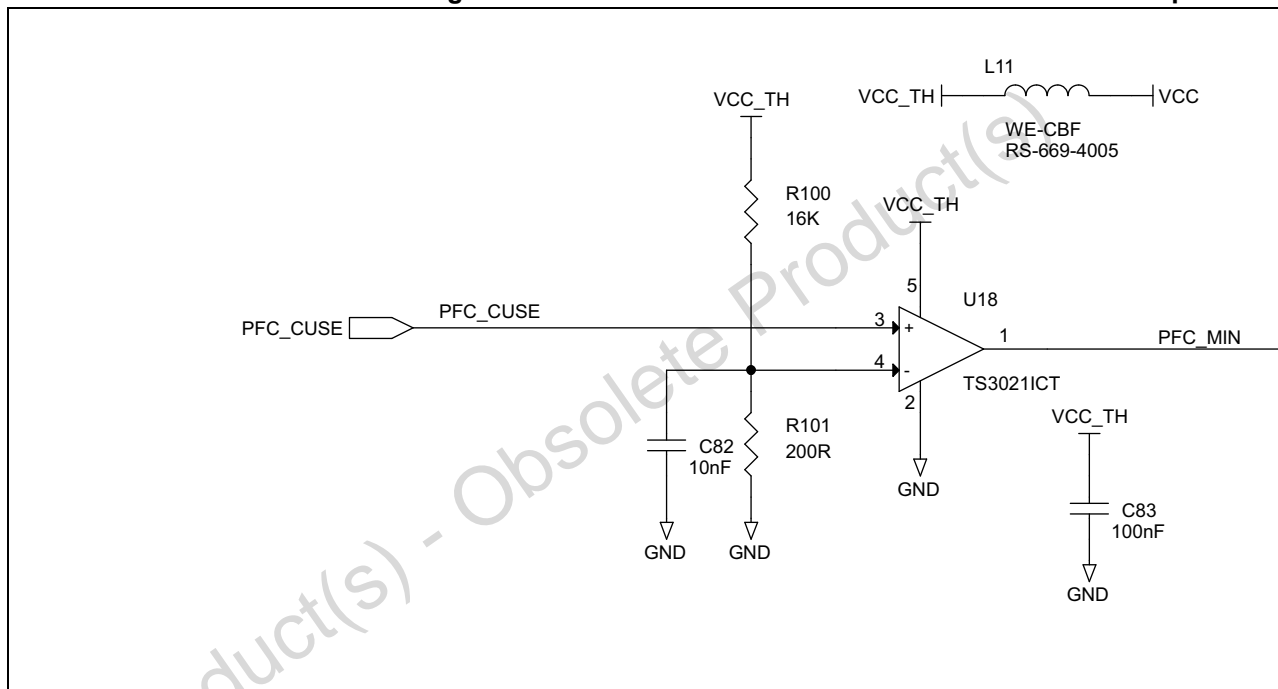


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Figure 6. PSR-ZVS demonstration board schematic - THD optimizer



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Figure 7. PSR-ZVS demonstration board schematic - DALI and 0 - 10V

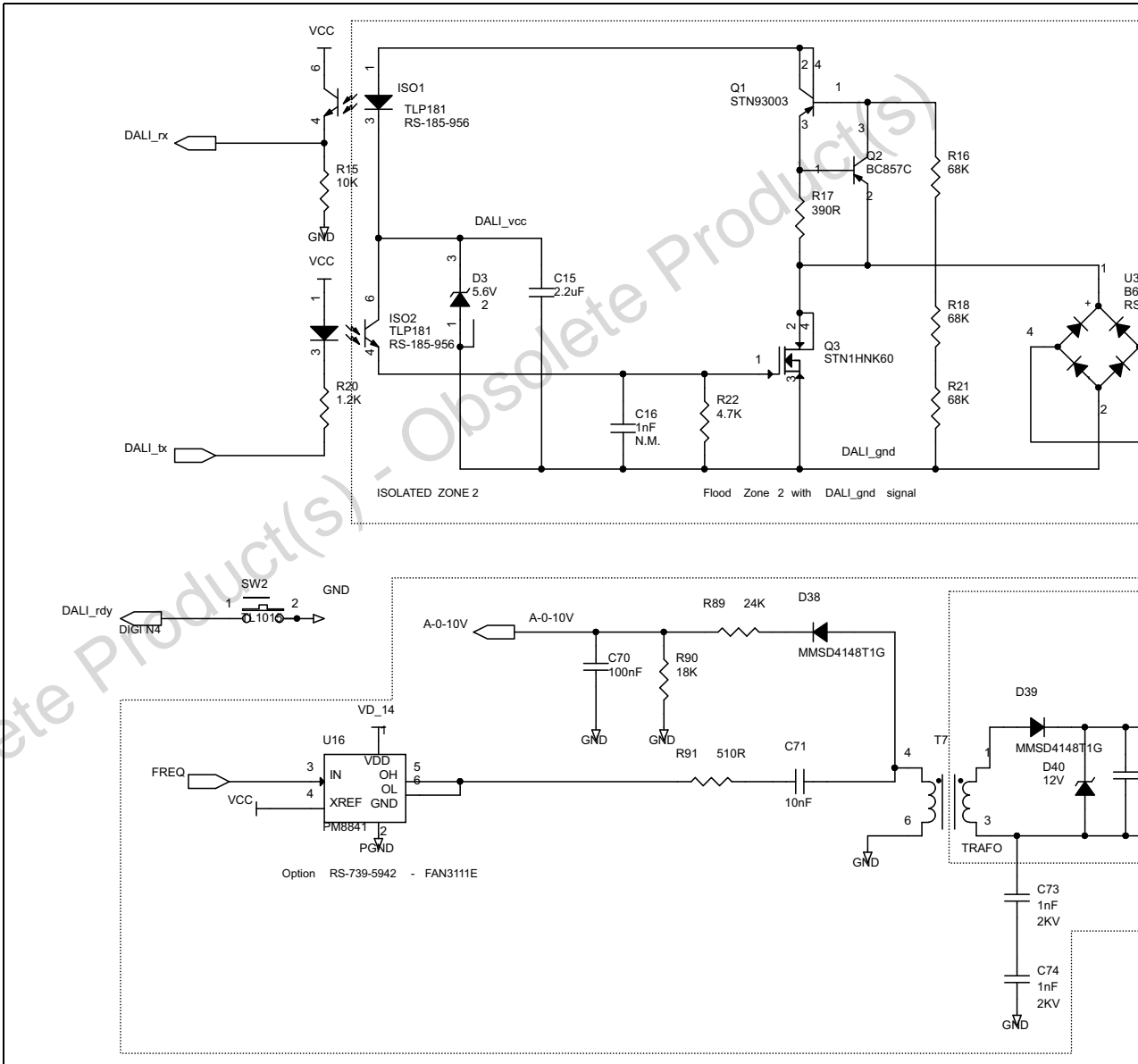
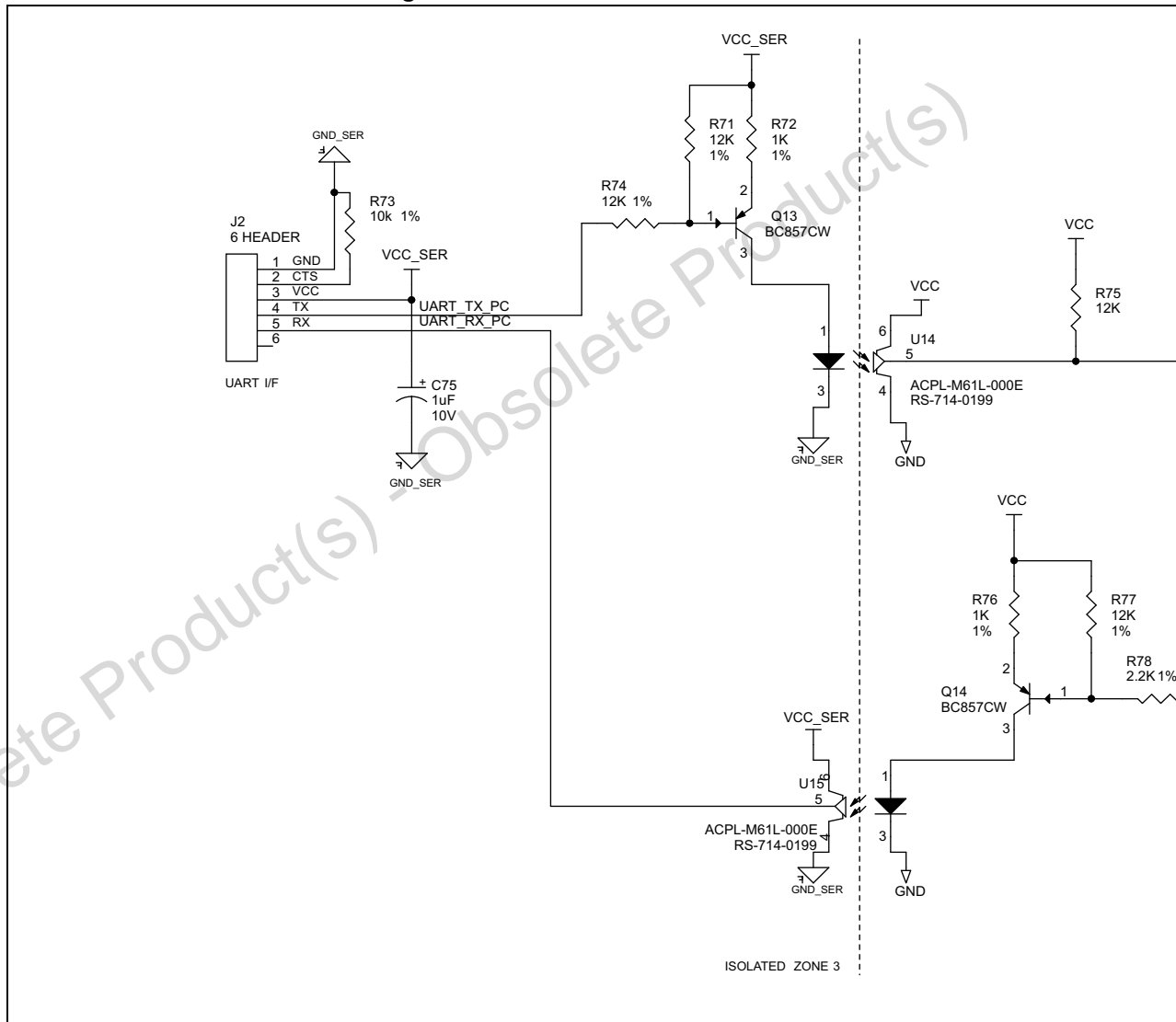




Figure 8. PSR-ZVS demonstration board schematic - serial interfaces





3 Bill of material

Table 7. Bill of material

Item	Qty.	Reference	Part	PCB footprint	Note	Manufact
1	3	C1, C6, C75	1 μ F	CAPC-0603	10 V	AVX
2	5	C2, C4, C7, C67, C82	10 nF	CAPC-0603		AVX
3	2	C3, C5	100 nF	CAPC-0603		AVX
4	1	C8	2.2 μ F	CAPC-0603	X5R	Murata
5	1	C15	2.2 μ F	CAPC-0805		Murata
6	1	C16	1 nF	CAPC-0603	N. M.	
7	1	C17	100 nF	CAPC-0603	N. M.	
8	1	C18	100 nF	CAPC-0805	N. M.	
9	1	C25	1 μ F	CAPC-0603	10 V N. M.	
10	9	C26, C30, C48, C56, C57, C62, C83, C84, C85	100 nF	CAPC-0603	25 V	AVX
11	1	C27	100 nF	CAPC-0805		TAIYO YU
12	2	C28, C81	150 nF	CER-P15L6	275 Vac	EPCOS
13	2	C29, C79	10 μ F	CAPE-R13H20-P5	350 V	Rubyco
14	1	C34	680 pF	CAPC-0603	25 V	KEMET
15	2	C36, C37	1 nF	C1210	2 KV	AVX
16	2	C39, C42	1 nF	CAPC-1206	1 kV	KEMET
17	1	C40	470 nF	CAPP-175X100X165-P15	305 Vac	Vishay [®]
18	1	C41	330 nF	CAPP-175X85X150-P15	305 Vac	Vishay
19	1	C43	100 μ F	CAPE-R30H35-P10-SI	450 V	Rubyco
20	1	C44	220 pF	CAPC-1206	1 KV	



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Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufact
21	1	C46	1 nF	CAPC-0603	50 V	AVX
22	1	C47	100 pF	CAPC-0603		
23	1	C49	2.2 nF	CAPC-0603		Vishay
24	1	C51	3.3 μ F	CAPE-R10HXX-P5	450 V	RS
25	1	C52	150 nF	CAPC-0603	50 V	Murata
26	1	C53	22 nF	CAPC-0603		AVX
27	1	C54	1.5 nF	CAPC-0603		KEMET
28	2	C55, C58	1 μ F	CAPC-0805	25 V	Murata
29	1	C59	100 nF	CAPC-0603	50 V	AVX
30	1	C60	1 nF	CAPC-0603	50 V	AVX
31	1	C61	22 μ F	CAPC-1206	10 V	KEMET
32	1	C63	10 μ F	CAPE-R5H11-P25	25 V	Panason
33	1	C65	100 pF N. M.	CAPC-0603	N. M.	
34	1	C66	6.8 nF	CAPC-0603		KEMET
35	2	C70, C72	100 nF	CAPC-0603	25 V	
36	1	C71	1 nF	CAPC-0805		
37	2	C73, C74	1 nF	C1210	2 KV	AVX
38	1	C76	1 μ F	CAPE-R5H11-P25	100 V N. M.	
39	1	C77	1 μ F	CAPC-0805	25 V N. M.	
40	1	C78	220 nF	CAPC-0603	25 V	
41	1	C80	680 pF	CAPC-0603		
42	1	D1	FAULT	LEDC-0603		OSRAM
43	1	D2	RUN	LEDC-0603		OSRAM
44	1	D3	5.6 V	SOT23		Diodes Ze
45	2	D4, D36	STTH3R06	DIODO-SMC	N. M.	

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Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufact
46	1	D7	B6S-E3/80	PONTE-SMD-MBXS	N. M.	Vishay
47	2	U3, D13	B6S-E3/80	PONTE-SMD-MBXS		Vishay
48	1	D8	Zener - 15 V	POWERDI323	N. M.	
49	1	D10	STTH1L06	DIODO-SMB		STMicroelectr
50	3	D11, D14, D30	MMSD4148T1G	SOD123		ON Semiconc
51	2	D12, D37	STTH3R06	DIODO-SMC		ST
52	1	D23	1N4007	DIODO-SMA		ST
53	1	D24	GBU8K-E3/45	KBU8XXG		TAIWAN SEMICONDU
54	1	D25	STTH5L06	DPAK		ST
55	1	D26	LL4148	SOD80	N. M.	
56	1	D27	Zener - 5.6 V N. M.	SOD123	N. M.	
57	1	D28	1N4007	DIODO-SMA		ST
58	2	D31, D33	STTH1L06A	DIODO-SMA		ST
59	1	D32	Zener 16 V	DIODO-SMA		Vishay
60	1	D34	BAT54J	SOD323		ST
61	2	D38, D39	MMSD4148T1G	SOD123		
62	1	D40	Zener - 12 V	SOD123		Diodes Ze
63	1	D41	MMSZ5V1T1G	SOD123	5.1 V 0.25 W	ON Semicon
64	2	D42, D43	STTH3R06	DIODO-SMC	Select 100 V / 1 A or 200 V / 0.5 output	ST
65	1	F1	FUSE	FUSEPTH-R85H80-P5	4 A	Wickmar
66	2	ISO1, ISO2	TLP181	OPTO-SOP127P-700X210-6-NO25		Toshiba





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Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufactu
67	1	JP5	JUMPER GOCCIA	JP3SO	CLOSE 2-3	
68	1	JP6	JUMPER GOCCIA	JP2SO	CLOSE	
69	1	J1	SWIM I/F	STRIP254P-M-4		
70	1	J2	6 HEADER	STRIP254P-M-6		
71	1	J3	DALI	MOR-2POLI-WAGO-250-402		WAGO
72	1	J4	CH0	MOR-2POLI-WAGO-250-402		WAGO
73	1	J8	HEADER 3	MOR-3POLI-508		TE Connec
74	1	J9	0 - 10 V	MOR-2POLI-WAGO-250-402		
75	3	L1, L10, L11	WE-CBF	CAPC-0603		WÜRTH ELEKTRO
76	5	L2, L3, L4, L5, L6	WE-CBF	CAPC-0603		WÜRTH ELEKTRO
77	1	L8	2.2 mH	IND-R090H120-P5	410 mA	Itacoil®
78	1	L9	SLD0608220	IND-R75H92-P3		Itacoil
79	1	Q1	STN93003	SOT223		ST
80	1	Q2	BC857C	SOT23		ST
81	1	Q3	STN1HNK60	SOT223		ST
82	2	Q4, Q5	STD16NF25	DPAK	N. M.	
83	2	Q10, Q11	STD12NM50ND	DPAK		ST
84	1	Q12	STF19NM50N	TO220-3PIN-split1		ST
85	2	Q13, Q14	BC857CW	SOT323		ST
86	1	Q15	BFN18	SOT89	N. M.	
87	1	RT1	PTC	RESC1206		Bourns
88	1	RV1	B72210	SIOV-S10K300		EPCOS
89	1	RV2	2.5 Ω	NTC-EPCOS-S237		EPCOS

Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufact
90	5	R1, R2, R48, R72, R76	1 K Ω	RESC-0603		Vishay
91	1	R3	9.1 K Ω	RESC-0603	1%	Panason
92	1	R4	5.6 K Ω	RESC-0603	1%	Panason
93	1	R22	4.7 K Ω	RESC-0603		Bourns
93	1	R15	10 K Ω	RESC-0603		
94	3	R16, R18, R21	68 K Ω	RESC-0603		Panason
95	1	R17	390 Ω	RESC-0603		Panason
96	1	R19	1 Ω	RES-900X320-P15-1W2		RS
97	1	R20	1.2 K Ω	RESC-0603		RS
98	1	R23	2.2 K Ω	RESC-0603	N. M.	
99	2	R26, R95	47 K Ω	RESC-0805	N. M.	
100	3	R27, R30, R57	10 Ω	RESC-0805		Bourns
101	3	R28, R97, R99	12 K Ω	RESC-0603	1%	RS
102	1	R29	3.9 K Ω	RESC-0603		
103	1	R34	220 Ω	RESC-0603		RS
104	2	R36, R37	2.4 Ω	RESC-2512	1% 1W	Panason
105	3	R40, R47, R53	330 K Ω	RESC-1206		TE Connec
106	6	R41, R42, R43, R46, R52, R55	2.2 M Ω	RESC-1206	1%	
107	2	R44, R58	18 K Ω	RESC-1206	0.1%	
108	2	R45, R59	10 Ω N. M.	RESC-0805	N. M.	
109	2	R49, R50	0.39 Ω	RESC-2512	1% 1W	Panason
110	1	R54	68 K Ω N. M.	RESC-0603	N. M.	
111	1	R56	10 K Ω N. M.	RESC-0603	N. M.	



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Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufactu
112	1	R60	33 K Ω	RESC-0603	1%	RS
113	1	R61	10 K Ω	RESC-0603	1%	Bourns
114	1	R62	12 K Ω	RESC-0603	1%	RS
115	1	R64	N. M.	RESC-0603	1%	
116	1	R65	10 K Ω	RESC-0805		RS
117	1	R67	33 K Ω	RESC-1206		TE Connect
118	4	R71, R74, R75, R77	12 K Ω	RESC-0603		YAGEO
119	1	R73	10 k Ω	RESC-0603		Bourns
120	1	R78	2.2 K Ω	RESC-0603		Bourns
121	2	R79, R98	22 K Ω	RESC-0603		Bourns
121a	1	R82	10 nF	CAPC-0603		AVX
122	2	R83, R86	100 Ω	RESC-0805	N. M.	
123	2	R84, R85	100 K Ω	RESC-0603	N. M.	
124	2	R88, R93	1 M Ω	RESC-1206	1%	TE Connect
125	1	R89	24 K Ω	RESC-0603	1%	
126	1	R90	18 K Ω	RESC-0603	1%	
127	1	R91	510 Ω	RESC-0603	1%	
128	1	R92	56 K Ω	RESC-0603		
129	1	R94	680 Ω	RESC-0805		
130	1	R96	150 K Ω	RESC-0603		
131	1	R100	16 K Ω	RESC-0603		Vishay
132	1	R101	200 Ω	RESC-0603		Vishay
133	1	R102	0 R Ω	RESC-1206		Bourns
134	2	SW1, SW2	TL1015	BUTTON-ESWITCH-TL1015		E-SWITC

Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufactu
135	7	TP22, TP23, TP24, TP25, TP31,TP32	TP	TPTH-ANELLO-1MM		
136	2	P400V, PGND	TP	TPTH-ANELLO-1MM		
137	1	T1	250 μ H	TRAFO-ROCCHETTO-EF20D		Itacoil
138	1	T2	TRANSFOR CT	TRAFO-STM-ETD341711		Itacoil
139	1	T5	10 mH	IND-ITACOIL-SCLE25		Itacoil
140	1	T6	420 μ H	INDPFC-ITACOIL-SMC037-100113		Itacoil
141	1	T7	TRAFO	TRAFO-ITACOIL-SMLEP1303		Itacoil
142	1	U1	STLUX385A	TSSOP050P-640X120-38		ST
143	1	U4	ACPL-M61L-000E	OPTO-SOP127P-700X210-6-NO2	N. M.	
144	1	U5	L6398D	SOP127P-600X168-8	N. M.	
145	1	U10	L6388ED	SOP127P-600X168-8		ST
146	1	U11	PM8841	SOT23-6		ST
147	1	U12	VIPer06XS	SSOP100p-620x175-10		ST
148	1	U13	LK112M33TR	SOT23-5		ST
149	2	U14, U15	ACPL-M61L-000E	OPTO-SOP127P-700X210-6-NO2		AVAGC TECHNOLO
150	1	U16	PM8841	SOT23-6		ST
151	1	U17	LD2980CM50TR	SOT23-5	N. M.	
152	1	U18	TS3021ICT	SC70-5		ST

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
18-Dec-2013	1	Initial release.
15-May-2014	2	Updated Section : Description on page 1 (added "This demonstration board is available also with an order code STEVAL-ILL066V1" sentence). Minor modifications throughout document.

Obsolete Product(s) - Obsolete Product(s)

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