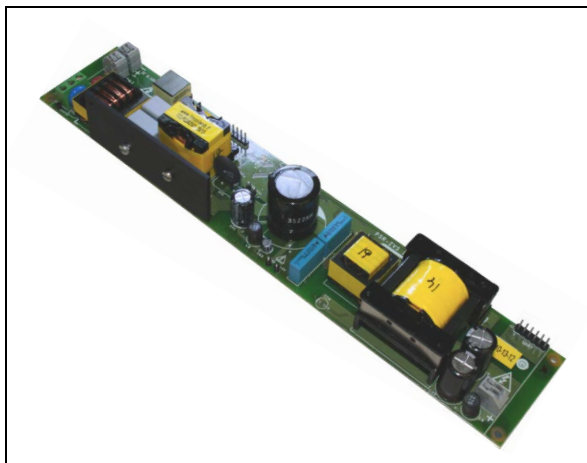


100 W LED street lighting application using STLUX385A

Data brief



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

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.

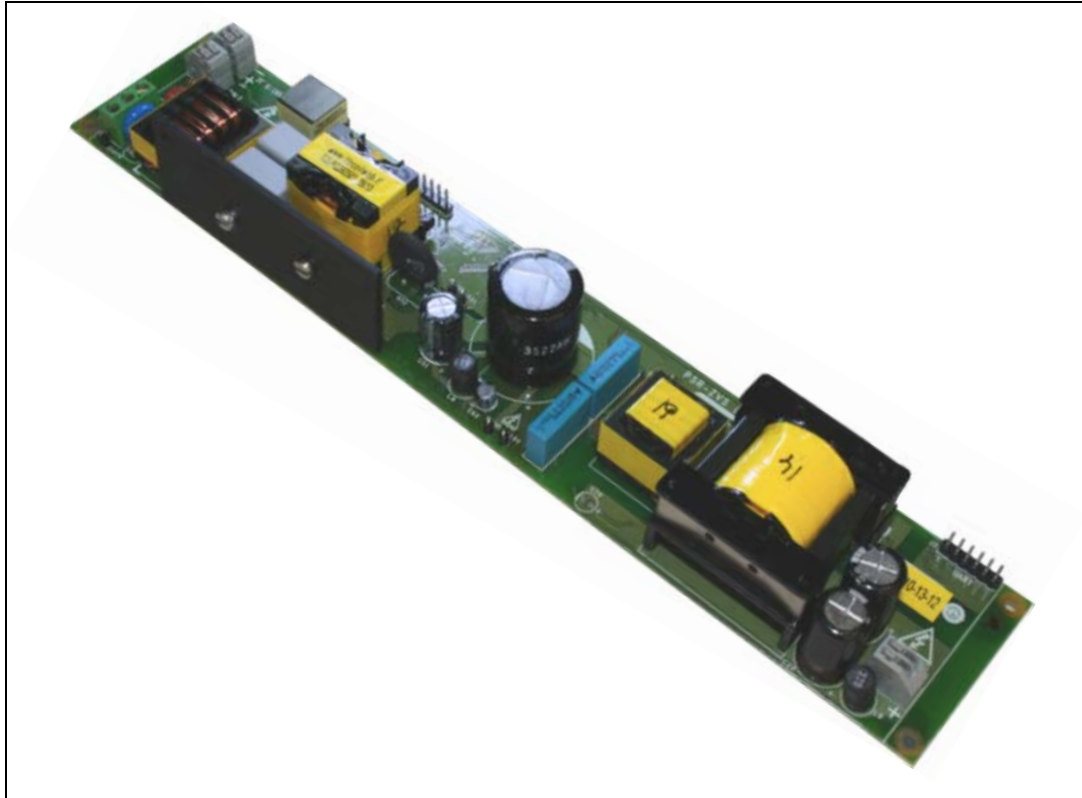
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4	Revision history	19



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)	CTSn	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)	RTSn	Not connected

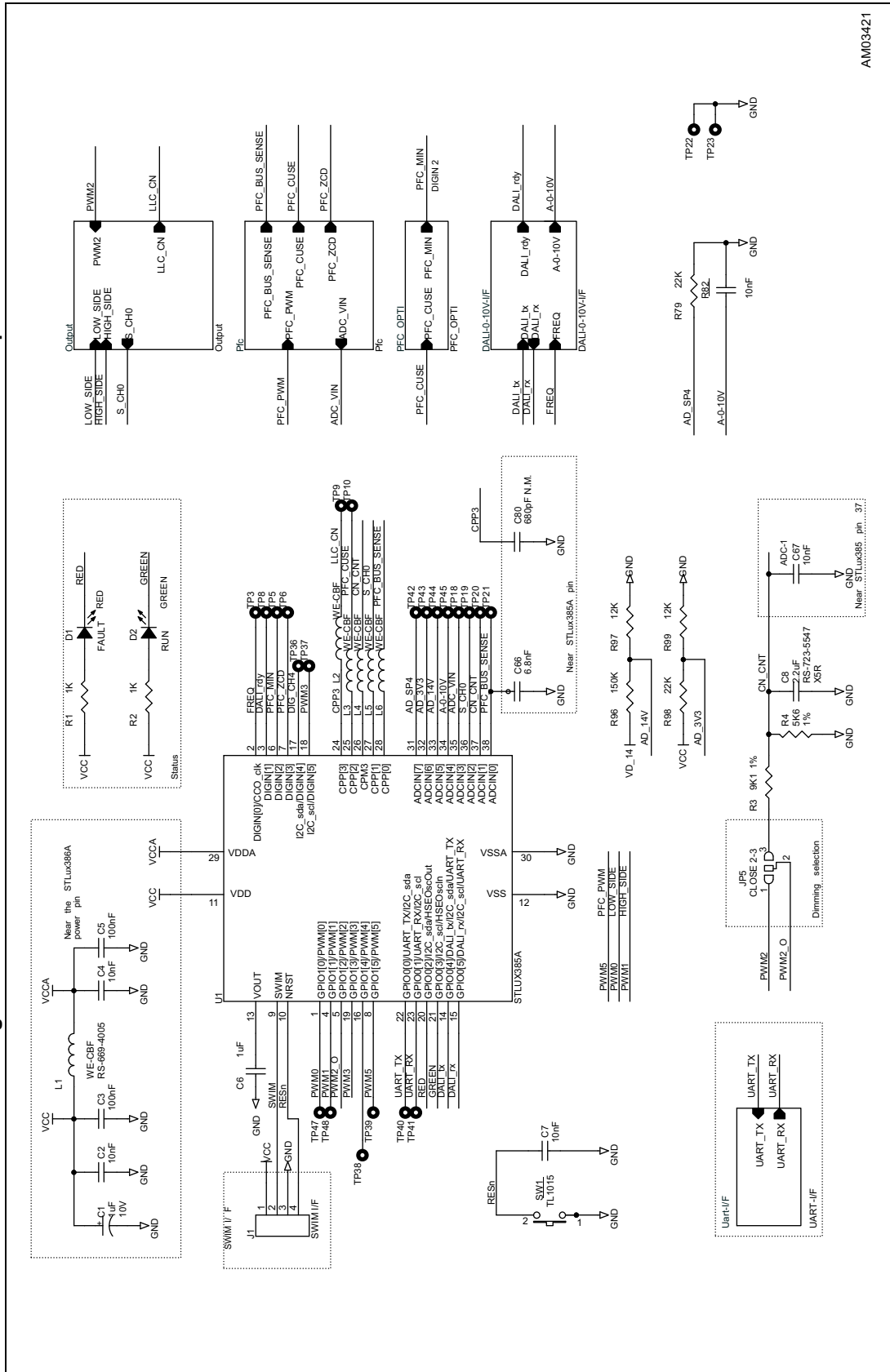
Table 6. Connector J1 pinout - SWIM interfaces

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	RESn	Connected to STLUX NRST pin

Schematic diagrams

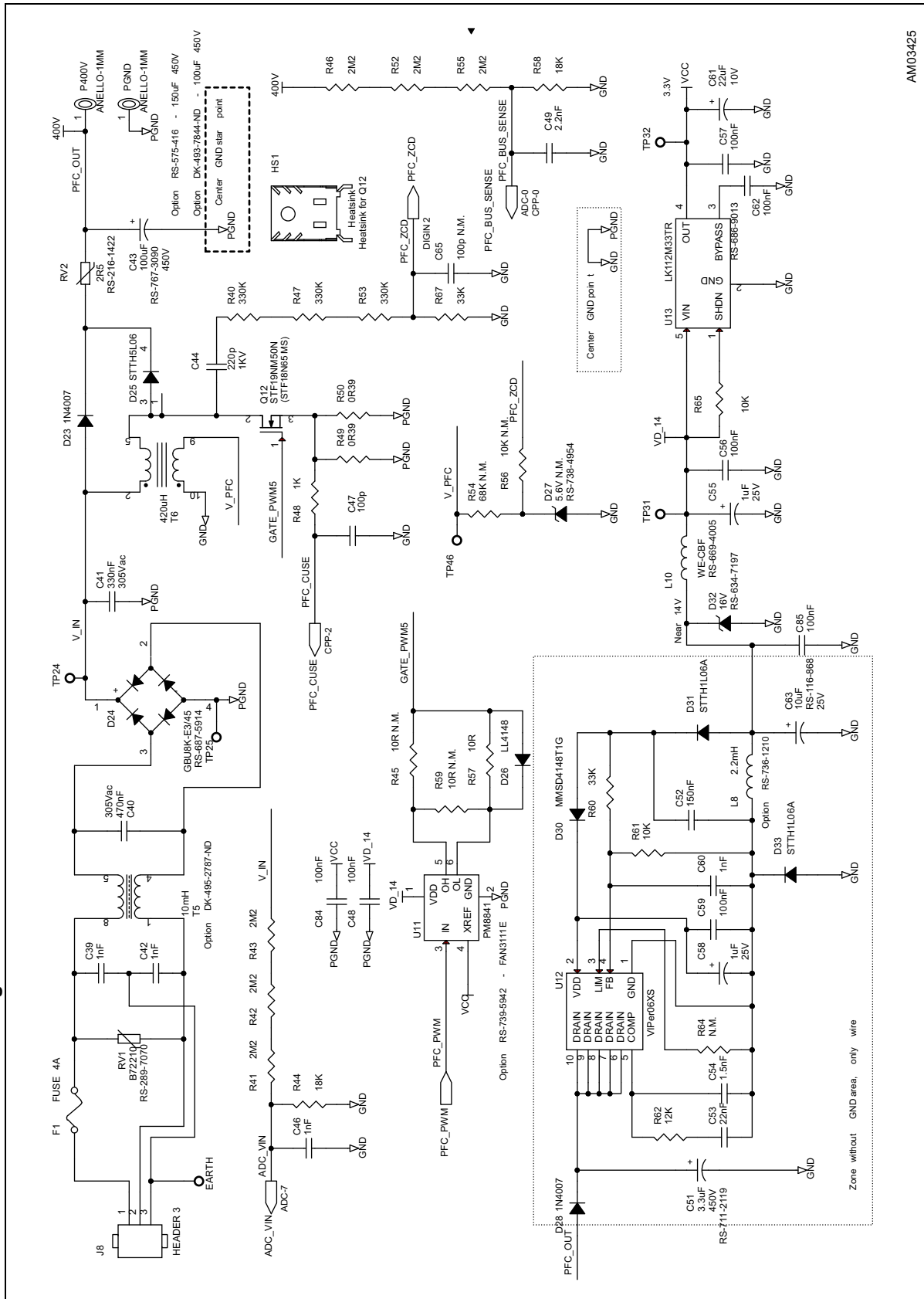
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Figure 2. PSR-ZVS demonstration board schematic - STLUX385A - top



AM03421

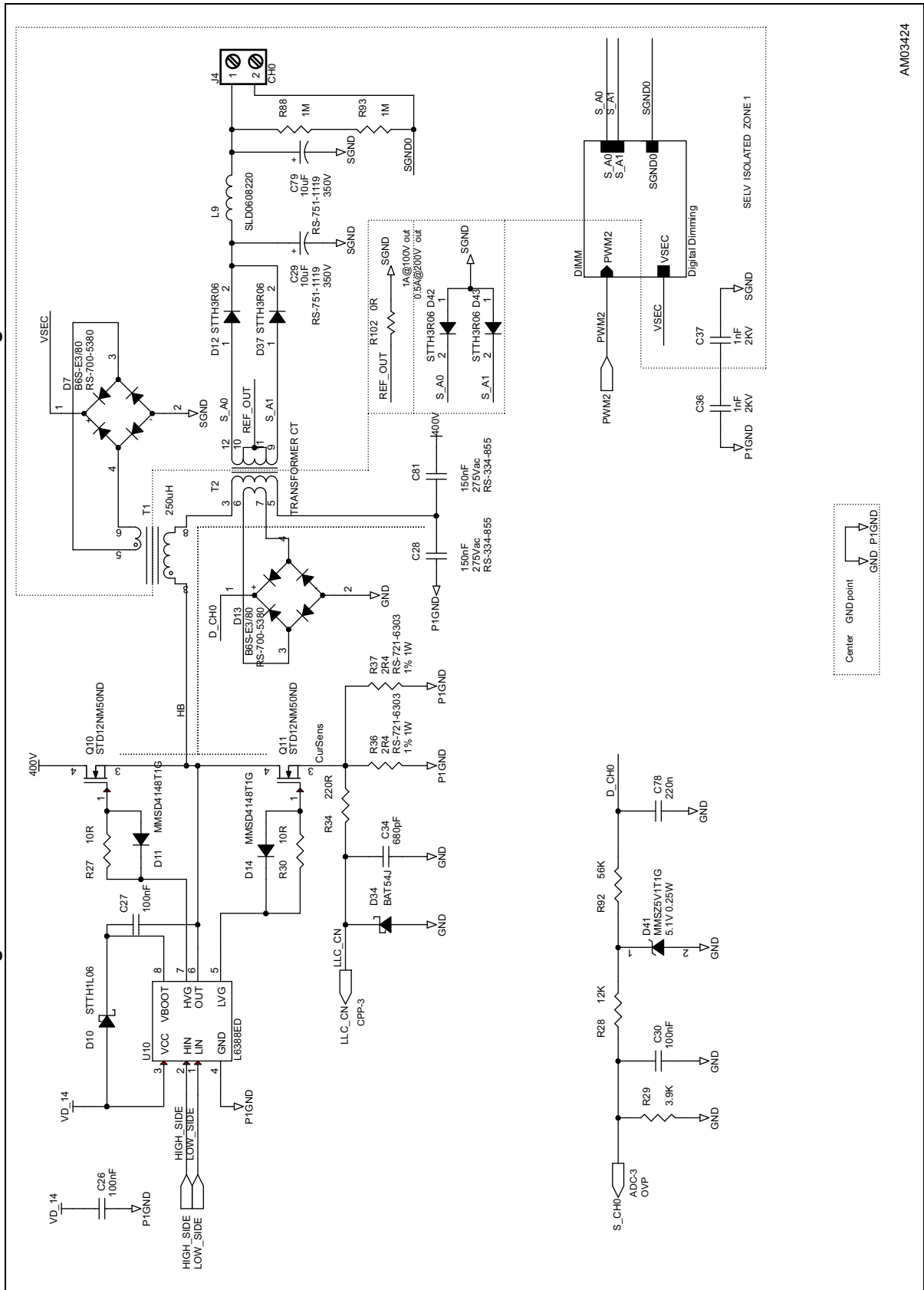
Figure 3. PSR-ZVS demonstration board schematic - PFC and DC/DC zone



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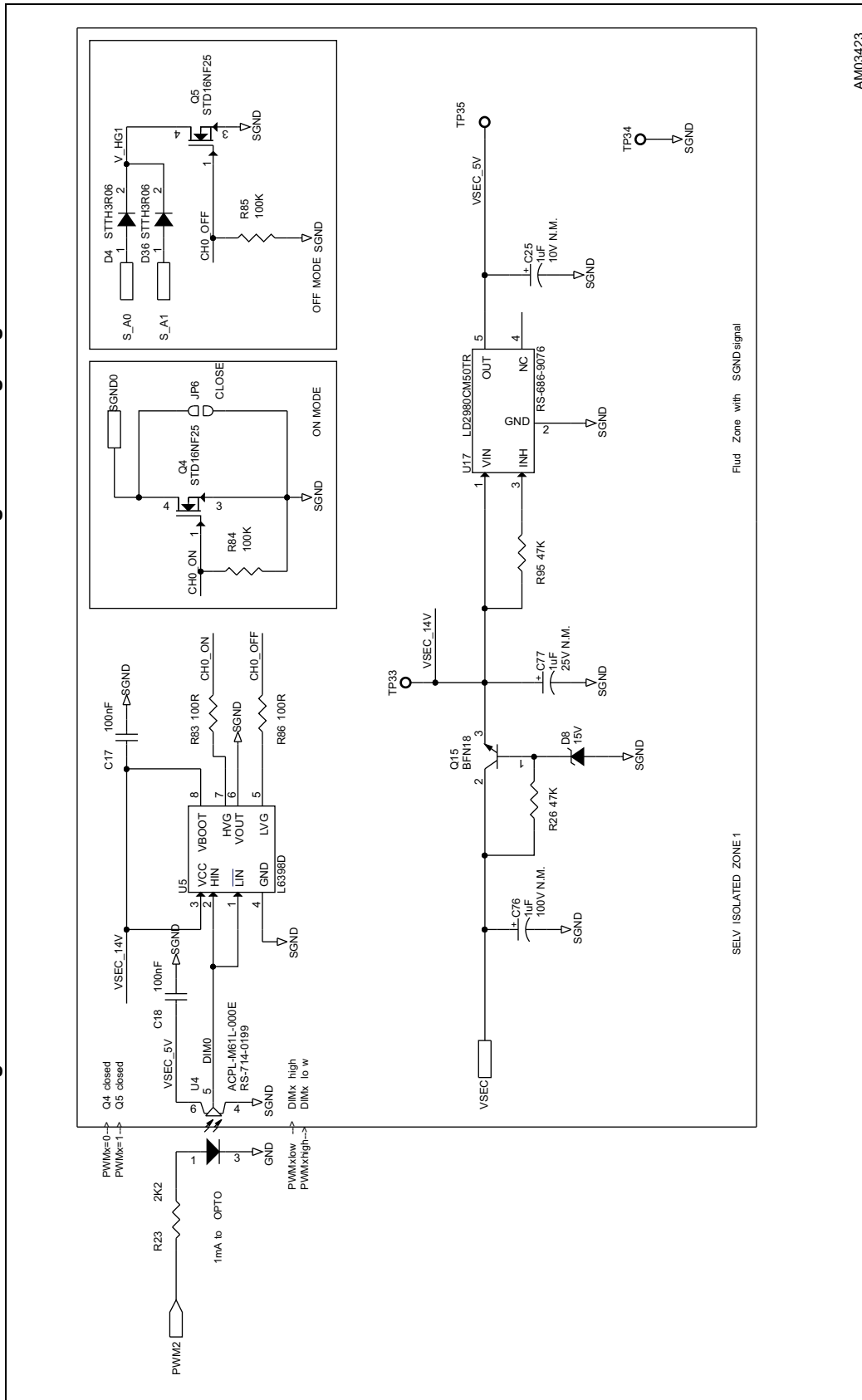
Figure 4. PSR-ZVS demonstration board schematic - PSR-ZVS stage



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



AM03423

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

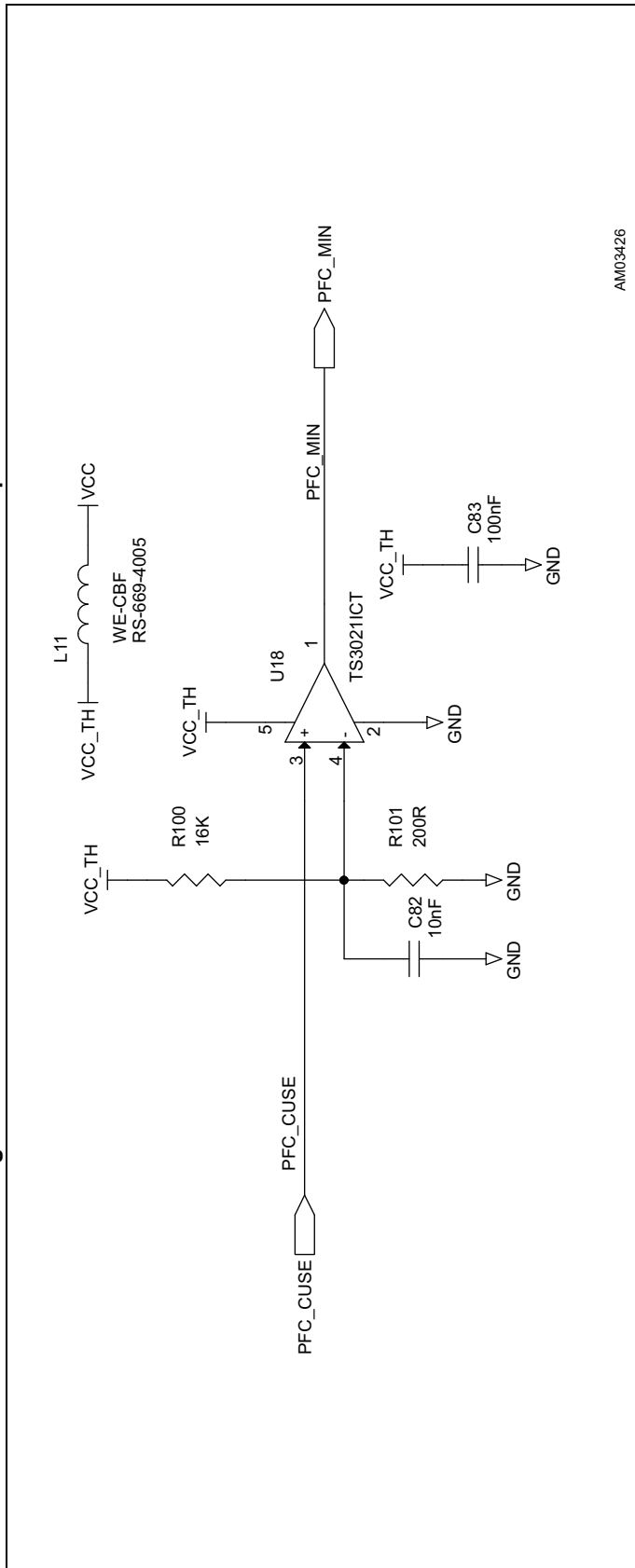
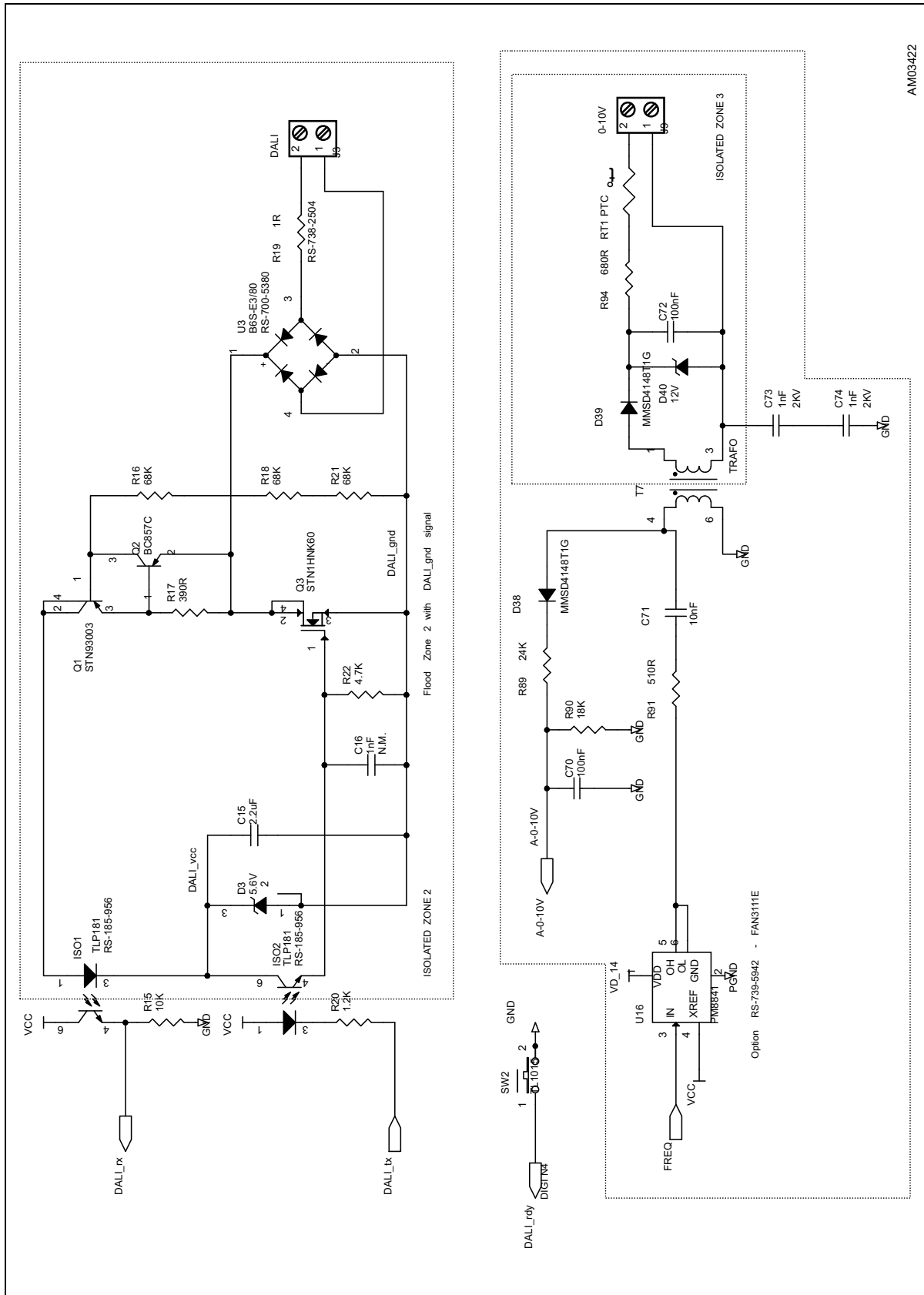
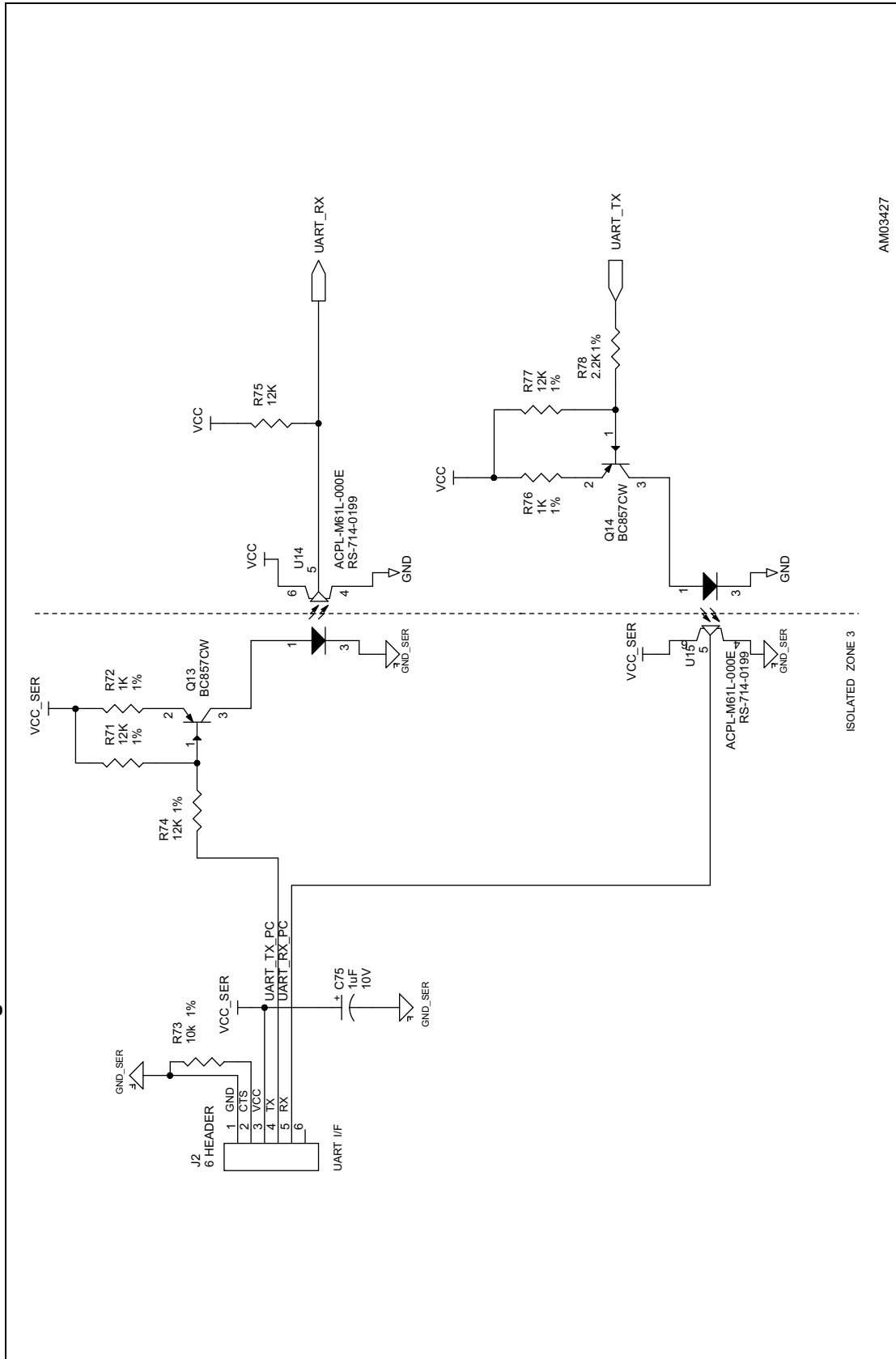


Figure 7. PSR-ZVS demonstration board schematic - DALI and 0 - 10 interfaces



AM03422

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



AM03427

3 Bill of material

Table 7. Bill of material

Item	Qty.	Reference	Part	PCB footprint	Note	Manufacturer	Part number
1	3	C1, C6, C75	1 μ F	CAPC-0603	10 V	AVX	0603ZG105ZAT2A
2	5	C2, C4, C7, C67, C82	10 nF	CAPC-0603		AVX	06033C103KAT2A
3	2	C3, C5	100 nF	CAPC-0603		AVX	06033G104ZAT2A
4	1	C8	2.2 μ F	CAPC-0603	X5R	Murata	GRM188R60J225KE19D
5	1	C15	2.2 μ F	CAPC-0805		Murata	GCM21BR71C225KA64L
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	06033G104ZAT2A
11	1	C27	100 nF	CAPC-0805		TAIYO YUDEN	HMK212BJ104KG-T
12	2	C28, C81	150 nF	CER-P15L6	275 Vac	EPCOS	B32922C3154K
13	2	C29, C79	10 μ F	CAPE-R13H20-P5	350 V	Rubycon	EEJEE2W100
14	1	C34	680 pF	CAPC-0603	25 V	KEMET	C0603C681J5GAC7867
15	2	C36, C37	1 nF	C1210	2 KV	AVX	1210GC102KAT1A
16	2	C39, C42	1 nF	CAPC-1206	1 kV	KEMET	C1206C102KDRAC
17	1	C40	470 nF	CAPP-175X100X165-P15	305 Vac	Vishay®	BFC233920474
18	1	C41	330 nF	CAPP-175X85X150-P15	305 Vac	Vishay	2222 339 20334
19	1	C43	100 μ F	CAPE-R30H35-P10-SI	450 V	Rubycon	450VXH100MEFCSN22X25
20	1	C44	220 pF	CAPC-1206	1 kV		

Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufacturer	Part number
21	1	C46	1 nF	CAPC-0603	50 V	AVX	06035C102KAT2A
22	1	C47	100 pF	CAPC-0603			
23	1	C49	2.2 nF	CAPC-0603		Vishay	VJ0603Y222KNAAO
24	1	C51	3.3 µF	CAPE-R10HXX-P5	450 V	RS	711-2119
25	1	C52	150 nF	CAPC-0603	50 V	Murata	GRM188R71E154KA01D
26	1	C53	22 nF	CAPC-0603		AVX	06035C223KAT2A
27	1	C54	1.5 nF	CAPC-0603		KEMET	C0603C152K1RAC7867
28	2	C55, C58	1 µF	CAPC-0805	25 V	Murata	GCM21BR71E105KA56L
29	1	C59	100 nF	CAPC-0603	50 V	AVX	06033G104ZAT2A
30	1	C60	1 nF	CAPC-0603	50 V	AVX	06035C102KAT2A
31	1	C61	22 µF	CAPC-1206	10 V	KEMET	C-1206C226M8PAC7800
32	1	C63	10 µF	CAPE-R5H11-P25	25 V	Panasonic	ECEA1EKS100
33	1	C65	100 pF N. M.	CAPC-0603	N. M.		
34	1	C66	6.8 nF	CAPC-0603		KEMET	C0603C682K5RAC7867
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	1210GC102KAT1A
38	1	C76	1 µF	CAPE-R5H11-P25	100 V N. M.		
39	1	C77	1 µF	CAPC-0805	25 V N. M.		
40	1	C78	220 nF	CAPC-0603	25 V		C0603C681J5GAC7867
41	1	C80	680 pF	CAPC-0603			
42	1	D1	FAULT	LEDC-0603		OSRAM	LS Q976
43	1	D2	RUN	LEDC-0603		OSRAM	LT Q39G-Q1S2-25-1
44	1	D3	5.6 V	SOT23		Diodes Zetex	BZX84C5V6-7-F
45	2	D4, D36	STTH3R06	DIODO-SMC	N. M.		



Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufacturer	Part number
46	1	D7	B6S-E3/80	PONTE-SMD-MBXS	N. M.	Vishay	B6S-E3/80
47	2	U3, D13	B6S-E3/80	PONTE-SMD-MBXS		Vishay	B6S-E3/80
48	1	D8	Zener - 15 V	POWERD1323	N. M.		
49	1	D10	STTH1L06	DIODO-SMB		STMicroelectronics®	STTH1L06U
50	3	D11, D14, D30	MMSD4148T1G	SOD123		ON Semiconductor®	MMSD4148T1G
51	2	D12, D37	STTH3R06	DIODO-SMC		ST	STTH3R06S
52	1	D23	1N4007	DIODO-SMA		ST	1N4007
53	1	D24	GBU8K-E3/45	KBU8XXG		TAIWAN SEMICONDUCTOR	KBU807G
54	1	D25	STTH5L06	DPK		ST	STTH5L06B-TR
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	1N4007
58	2	D31, D33	STTH1L06A	DIODO-SMA		ST	STTH1L06A
59	1	D32	Zener 16 V	DIODO-SMA		Vishay	SML4745-E3
60	1	D34	BAT54J	SOD323		ST	BAT54J
61	2	D38, D39	MMSD4148T1G	SOD123			
62	1	D40	Zener - 12 V	SOD123		Diodes Zetex	DDZ9699-7
63	1	D41	MMSZ5V1T1G	SOD123	5.1 V 0.25 W	ON Semiconductor	MMSZ5V1T1G
64	2	D42, D43	STTH3R06	DIODO-SMC	Select 100 V / 1 A or 200 V / 0.5 output	ST	STTH3R06S
65	1	F1	FUSE	FUSEPTH-R85H80-P5	4 A	Wickmann	3701400000
66	2	ISO1, ISO2	TLP181	OPTO-SOP127P-700X210-6-NO25		Toshiba	TLP181 (GB.F)

Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufacturer	Part number
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®	250-402
72	1	J4	CH0	MOR-2POLI-WAGO-250-402		WAGO	250-402
73	1	J8	HEADER 3	MOR-3POLI-508		TE Connectivity	282837-3
74	1	J9	0 - 10 V	MOR-2POLI-WAGO-250-402			
75	3	L1, L10, L11	WE-CBF	CAPC-0603		WÜRTH ELEKTRONIK	74279262
76	5	L2, L3, L4, L5, L6	WE-CBF	CAPC-0603		WÜRTH ELEKTRONIK	74279269
77	1	L8	2.2 mH	IND-R090H120-P5	410 mA	Itacoil®	SLD0608222
78	1	L9	SLD0608220	IND-R75H92-P3		Itacoil	SLD0608220
79	1	Q1	STN93003	SOT223		ST	STN93003
80	1	Q2	BC857C	SOT23		ST	BC857C
81	1	Q3	STN1HNK60	SOT223		ST	STN1HNK60
82	2	Q4, Q5	STD16NF25	DPAK	N. M.		
83	2	Q10, Q11	STD12NM50ND	DPAK		ST	STD12NM50ND
84	1	Q12	STF19NM50N	TO220-3PIN-split1		ST	STF19NM50N
85	2	Q13, Q14	BC857CW	SOT323		ST	BC857CW
86	1	Q15	BFN18	SOT89	N. M.		
87	1	RT1	PTC	RESC1206		Bourns®	MF-USMF005-2
88	1	RV1	B72210	SIOV-S10K300		EPCOS	B72210S0301K101
89	1	RV2	2.5 Ω	NTC-EPCOS-S237		EPCOS	B57237S259M



Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufacturer	Part number
90	5	R1, R2, R48, R72, R76	1 K Ω	RESC-0603		Vishay	CRCW06031K00FKEA
91	1	R3	9.1 K Ω	RESC-0603	1%	Panasonic	ERJP03F9101V
92	1	R4	5.6 K Ω	RESC-0603	1%	Panasonic	ERJP03F5601V
93	1	R22	4.7 K Ω	RESC-0603		Bourns	CR0603-JW-472ELF
93	1	R15	10 K Ω	RESC-0603			
94	3	R16, R18, R21	68 K Ω	RESC-0603		Panasonic	ERJ3GEYJ683V
95	1	R17	390 Ω	RESC-0603		Panasonic	ERJ3GEYJ391V
96	1	R19	1 Ω	RES-900X320-P15-1W2		RS	738-2504
97	1	R20	1.2 K Ω	RESC-0603		RS	RS-0603-1k2-5%-0.1W
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	CR0805-FX-10R0GLF
101	3	R28, R97, R99	12 K Ω	RESC-0603	1%	RS	RS-0603-12k-1%-0.1W
102	1	R29	3.9 K Ω	RESC-0603			
103	1	R34	220 Ω	RESC-0603		RS	RS-0603-220R-5%-0.1W
104	2	R36, R37	2.4 Ω	RESC-2512	1% 1W	Panasonic	ERJ1TRQF2R4U
105	3	R40, R47, R53	330 K Ω	RESC-1206		TE Connectivity	CRG1206F330K
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	Panasonic	ERJ1TRQFR39U
110	1	R54	68 K Ω N. M.	RESC-0603	N. M.		
111	1	R56	10 K Ω N. M.	RESC-0603	N. M.		



Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufacturer	Part number
112	1	R60	33 K Ω	RESC-0603	1%	RS	RS-0603-33k-1%-0.1W
113	1	R61	10 K Ω	RESC-0603	1%	Bourns	CR0603-FX-1002HLF
114	1	R62	12 K Ω	RESC-0603	1%	RS	RS-0603-12k-1%-0.1W
115	1	R64	N. M.	RESC-0603	1%		
116	1	R65	10 K Ω	RESC-0805		RS	RS-0805-10k-5%-0.125W
117	1	R67	33 K Ω	RESC-1206		TE Connectivity	CRG1206F33K
118	4	R71, R74, R75, R77	12 K Ω	RESC-0603		YAGEO	232270265123
119	1	R73	10 k Ω	RESC-0603		Bourns	CR0603-JW-103ELF
120	1	R78	2.2 K Ω	RESC-0603		Bourns	CR0603-FX-2201ELF
121	2	R79, R98	22 K Ω	RESC-0603		Bourns	CR0603-FX-2202ELF
121a	1	R82	10 nF	CAPC-0603		AVX	06033C103KAT2A
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 Connectivity	CRG1206F1M0
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	CRCW060316K0FKEA
132	1	R101	200 Ω	RESC-0603		Vishay	CRCW0603200RFKEA
133	1	R102	0 Ω	RESC-1206		Bourns	CR1206-J-000ELF
134	2	SW1, SW2	TL1015	BUTTON-ESWITCH-TL1015		E-SWITCH	TL1015BF160QG



Table 7. Bill of material (continued)

Item	Qty.	Reference	Part	PCB footprint	Note	Manufacturer	Part number
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	TLLE20D01
138	1	T2	TRANSFOR CT	TRAFO-STM-ETD341711		Itacoil	TSLETD3402
139	1	T5	10 mH	IND-ITACOIL-SCLE25		Itacoil	SCLE25103
140	1	T6	420 μ H	INDPFC-ITACOIL-SMC037-100113		Itacoil	TCLPQ262501
141	1	T7	TRAFO	TRAFO-ITACOIL-SMLEP1303		Itacoil	SMLEP1303
142	1	U1	STLUX385A	TSSOP050P-640X120-38		ST	STLUX385A
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	L6388ED
146	1	U11	PM8841	SOT23-6		ST	PM8841
147	1	U12	VIPer06XS	SSOP100p-620x175-10		ST	VIPer06XS
148	1	U13	LK112M33TR	SOT23-5		ST	LK112M33TR
149	2	U14, U15	ACPL-M61L-000E	OPTO-SOP127P-700X210-6-NO2		AVAGO TECHNOLOGIES	ACPL-M61L-000E
150	1	U16	PM8841	SOT23-6		ST	PM8841
151	1	U17	LD2980CM50TR	SOT23-5	N. M.		
152	1	U18	TS3021ICT	SC70-5		ST	TS3021ICT

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.

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