RTL8125D_8125B(G)(I)(S) _8111K(I) Series Reference Schematic V122

RTL8125D-CG
RTL8125B-CG
RTL8125BS-CG
RTL8125BI-CG
RTL8125BG-CG
RTL8125BGS-CG
RTL8111K-CG
RTL8111KI-CG

Realtek Semiconductor Corp.
No.2, Industry E. Rd. IX, Science-Based Industrial Park, Hsinchu, Taiwan 300

Title: RTL8125D_8125B(G)(I)(S) _8111K(I) Series Reference Schematic: Index

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IC Power

1. Place all caps to IC power pins as close as possible
2. Please reference the tables to choose the RTL8125D, RTL8125BG, RTL8125B(S) or RTL8111K RBOM. If you have any question, please contact Realtek FAE for more detail.

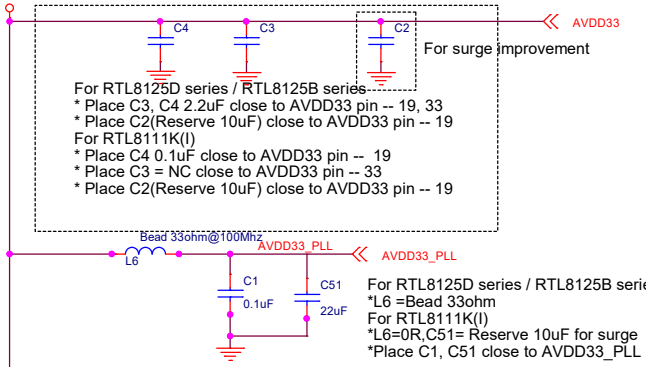
noun description
RTL8125B series:
RTL8125B(S) / RTL8125BI / RTL8125BG(S)
RTL8125D series:
RTL8125D

Notice

3.3V For RTL8125D series / RTL8125B series the 3.3V from switching regulator must be PWM mode and Freq>=1Mhz

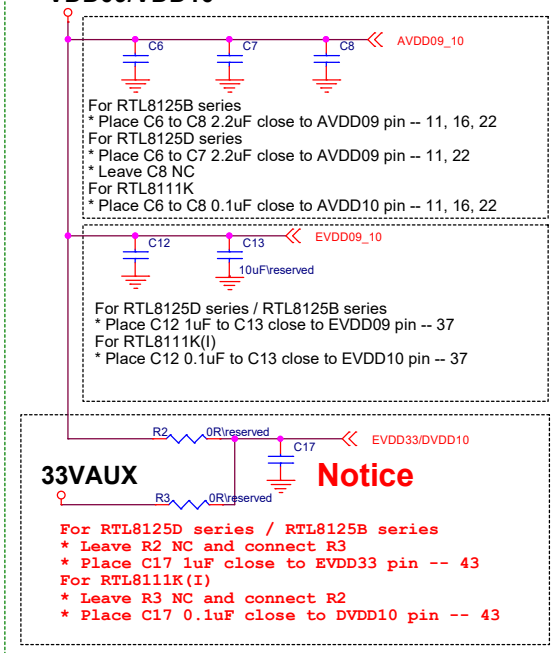
RTL8125D series 0.9V
RTL8125B series 0.95V
RTL8111K(I) 1.0V

33VAUX

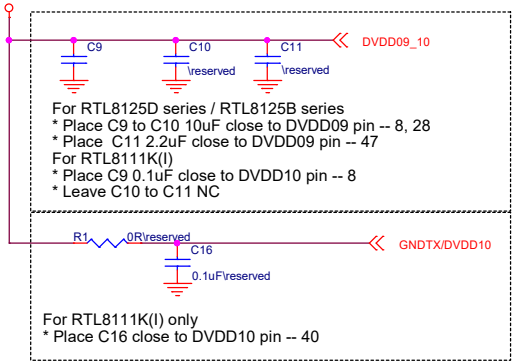


RTL	Core Source	C3	C15	C18	C19	C20	C21	C25
8111K(I)	SWR	X	X	O	O	O	X	X
	LDO	X	X	X	X	O	X	X
	EXTERNAL	X	X	X	X	O	X	X
8125BS 8125BGS	SWR	O	O	O	O	O	O	O
	EXTERNAL	O	O	X	X	X	X	O
8125B(I) 8125BG	EXTERNAL	O	O	X	X	X	X	O
8125D	SWR	O	O	O	O	O	O	O
	LDO	O	O	O	O	O	O	O
	EXTERNAL	O	O	X	X	X	X	O

VDD09/VDD10

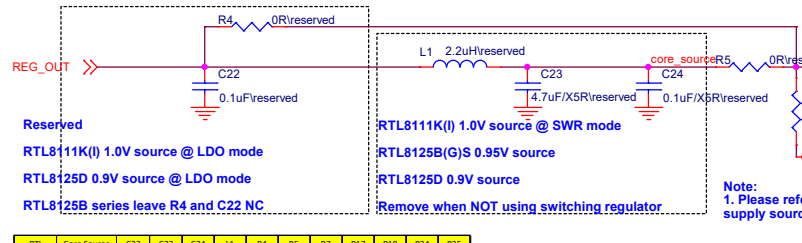


VDD09/VDD10



RTL	C10	C11	C16	R1	R2	R3	C8
8111K(I)	X	X	O	O	O	X	O
8125B(I) 8125BS 8125BG(S)	O	O	X	X	X	O	O
8125D	O	O	X	X	X	O	X

Core Source Option



Note:
1. Please refer to the table above when using different supply source of RTL8125D series, RTL8125B series or RTL8111K(I).

RTL	Core Source	C22	C23	C24	L1	R4	R5	R7	R17	R18	R34	R35
8111K(I)	SWR	X	O	O	O	X	O	X	O	X	X	X
	LDO	O	X	X	X	O	X	X	X	O	X	X
	EXTERNAL	X	X	X	X	X	X	O	X	O	O	X
8125BS 8125BGS	SWR	X	O	O	O	X	O	X	O	X	X	X
	EXTERNAL	X	X	X	X	X	X	O	X	O	O	X
8125B(I) 8125BG	EXTERNAL (Use PDN_EXT_SWR)	X	X	X	X	X	X	O	X	X	X	O
8125B(I) 8125BG	EXTERNAL (No use PDN_EXT_SWR)	X	X	X	X	X	X	O	X	X	O	X
8125D	SWR	X	O	O	O	X	O	X	O	X	X	X
	LDO	O	X	X	X	O	X	X	X	O	X	X
	EXTERNAL	X	X	X	X	X	X	O	X	O	O	X

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Title: RTL8125D_8125B(G)(I)(S) _8111K(I) Series Reference Schematic: Power

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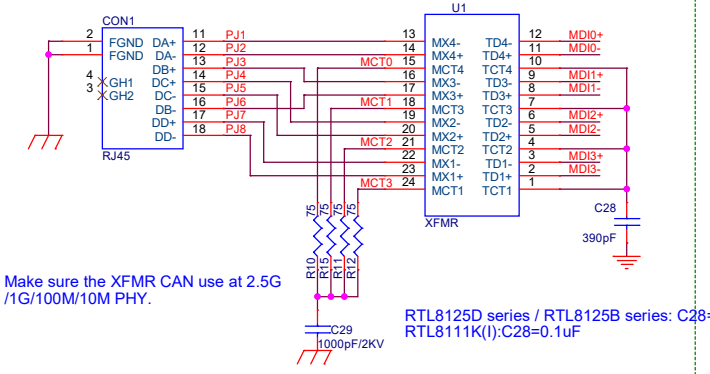
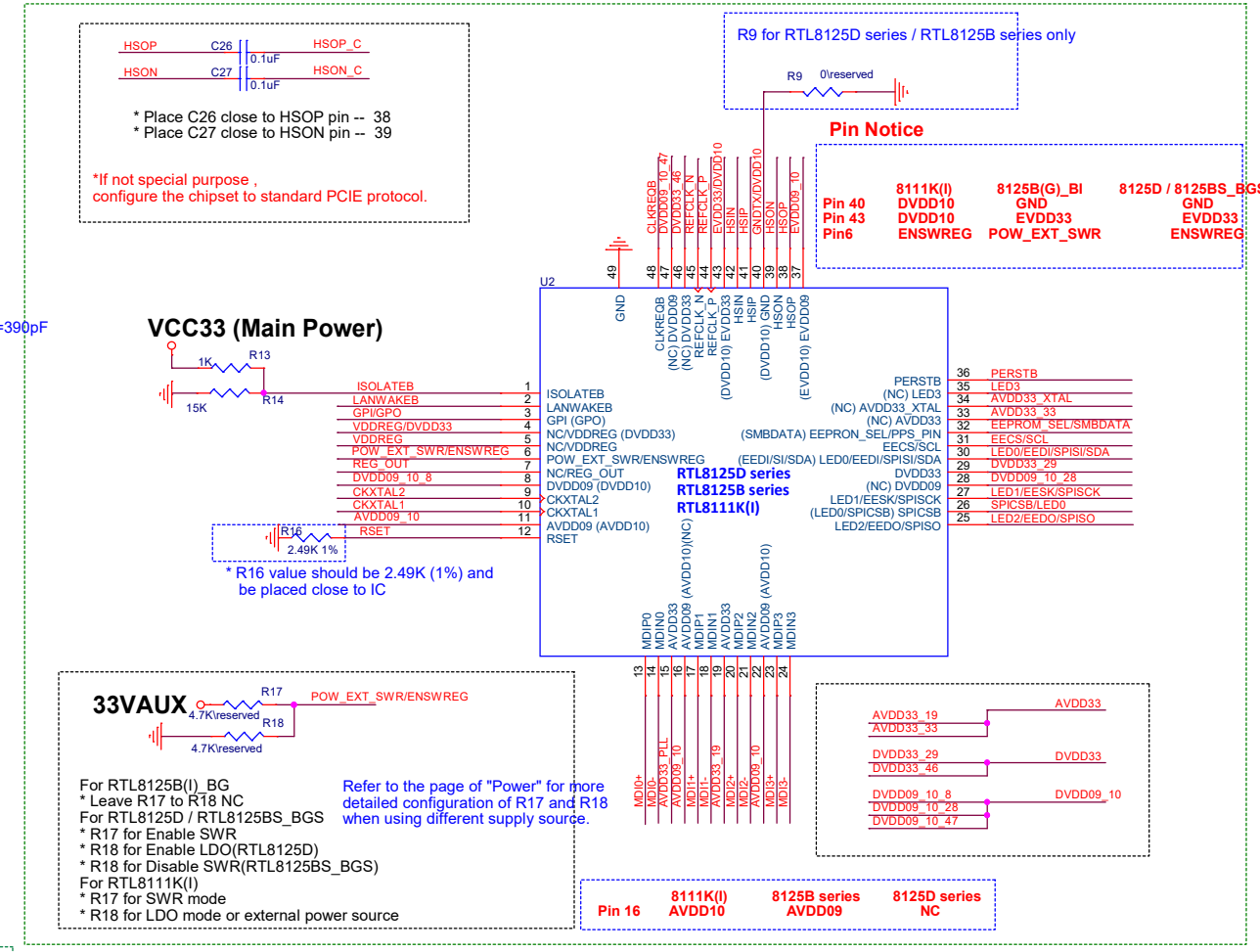
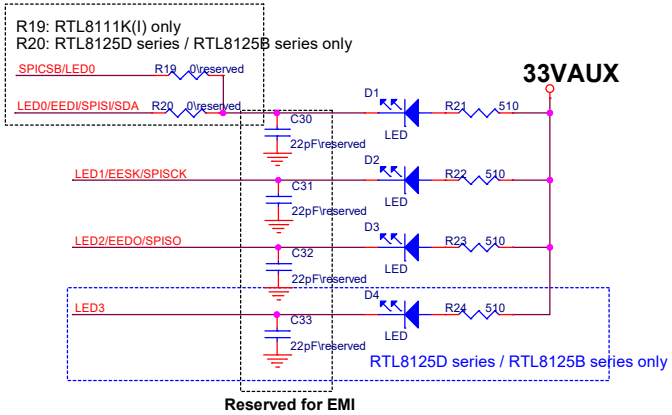
RJ-45 Connector + Transformer



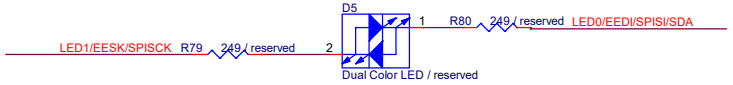
Ethernet PHY



LED (Low active)



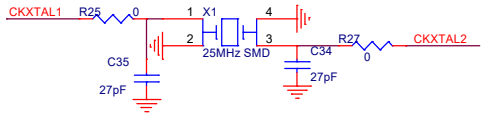
Optional LED Configurations (Low Active)



Support R>= 125 ohm Resister For Dual Color LED

For RTL8125D series / RTL8125B series: When using EEPROM › Dual Color LED Configuration only for LED3 with another LED
For RTL8111K: When using EEPROM › Dual Color LED Configuration only for LED0 with another LED

Clock Source



Please must to use SMD type XTAL and use the series resistor on CKXTAL path. (R25 or R27, please refer below information)

For RTL8125D series / RTL8125B series
* R27 is based on the XTAL drive level spec to choose the appropriate resistor. Do not cascade R25 on CKXTAL1 path.
For RTL8111K(I)
* R25 is based on the XTAL drive level spec to choose the appropriate resistor. Do not cascade R27 on CKXTAL2 path.

Refer to the page of "Reserved Components" for External Clock Source

External Resistor

*. R26 is needed for ensuring IC latch to normal operation mode.
*. R28, R30 could be saved by sharing the pull-up resistors which might be possibly existed on the chipset side already.

HSIP, HSIN, REFCLK_P, REFCLK_N, POW_EXT_SWR/ENSWREG, REG_OUT, DVDD33, DVDD09_10, AVDD33, VDDREG, VDDREG/DVDD33, AVDD09_10, EVDD09_10, EVDD33/DVDD10, GNDTX/DVDD10, AVDD33_XTAL

EEPROM_SEL/SMBDATA, EECS/SCL, SPICSB/LED0, LANWAKEB, GPI/GPO, CLKREQB, PERSTB, HSOP_C, HSON_C, CKXTAL1

LED0/EEDI/SPISI/SDA, LED1/EESK/SPISCK, LED2/EEDO/SPISO, LED3

MDI0+, MDI0-, MDI1+, MDI1-, MDI2+, MDI2-, MDI3+, MDI3-

AVDD33_PLL

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Title	RTL8125D_8125B(G)(I)(S) _8111K(I) Series Reference Schematic: Ethernet PHY
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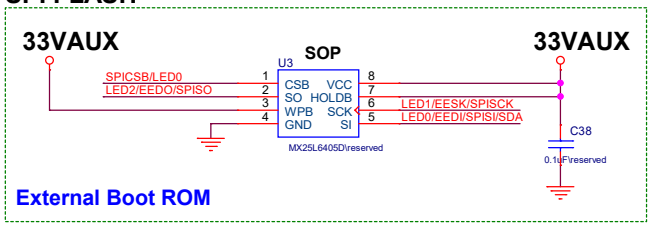
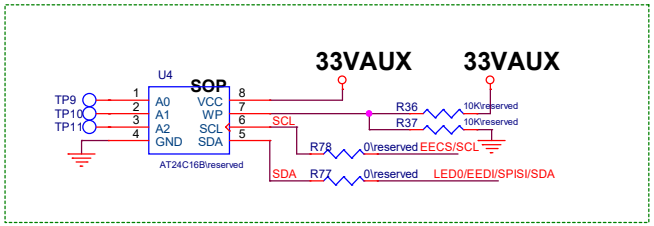
SPI FLASH

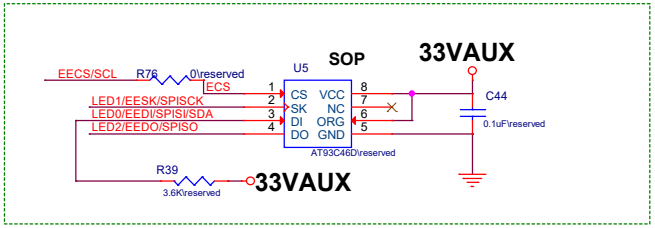


External Boot ROM

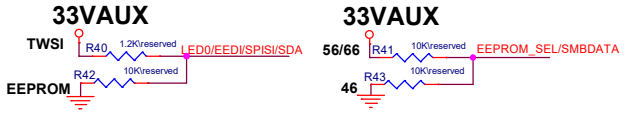
TWSI



EEPROM

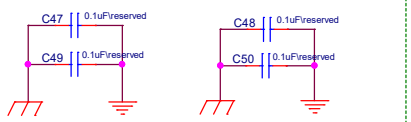


EEPROM Option



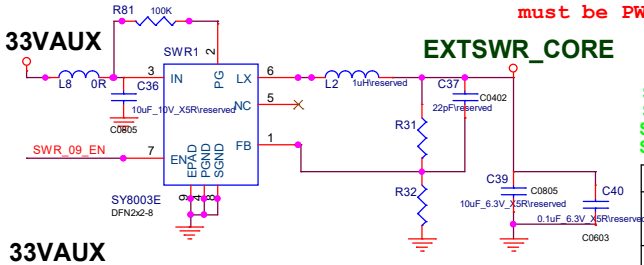
For RTL8125D series / RTL8125B series
* R48 for TWSI
R49 for EEROM
For RTL8111K(I)
* Connect R49 and leave R48 NC

Noise Isolation



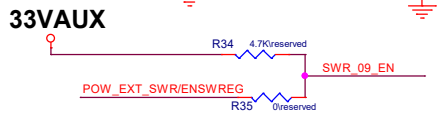
C47 to C50 Reserved for Noise Isolation between Chassis GND and System GND (optional)

Power Module for External Core Power



SWR Vin = 2.7V ~ 5.5V
SWR Vout = 0.6 * (1 + RH / RL)
SWR Maximum Output = 3A
Switching freq = 1MHz

EN Voltage	Min	Typ	Max
VIH	1.5V	---	---
VIL	---	---	0.4V



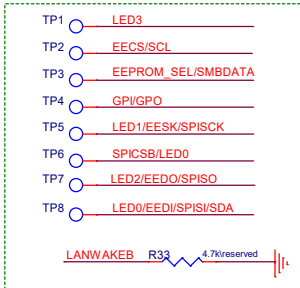
Refer to the page of "Power" for more detailed configuration of R34 to R35

RTL	voltage of core power	R31	R32
8111K(I)	1.0V	50K (1%)	75K (1%)
RTL8125B series	0.95V	59K (1%)	100K (1%)
RTL8125D series	0.9V	50K (1%)	100K (1%)

For RTL8125D series / RTL8125B series the 0.9V / 0.95V from switching regulator must be PWM mode and Freq>=1Mhz

Notice

Internal test



Reserved for internal test

Reserved for external clock source

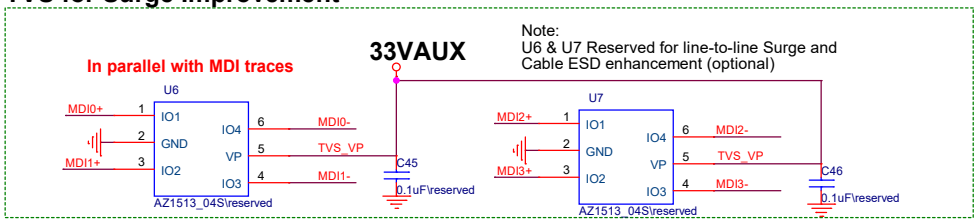
RTL	External Clock Voltage swing
8125D series	0.9V
8125B series 8111K(I)	3.3V

RTL	PIN9
RTL8125D series RTL8125B series	floating
8111K(I)	GND

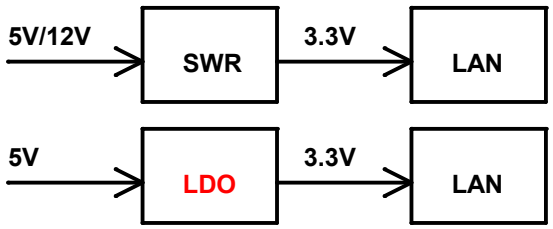
R38 is needed when using external clock source.

Note:
When using external clock source,
PIN9 please refere to the table to chose the correct circuit.

TVS for Surge Improvement



3.3V power source



For RTL8125D series / RTL8125B series the 3.3V from switching regulator must be PWM mode and Freq>=1Mhz

Please reserve LDO (5V->3.3V) for XG test mode jitter improvement

MDI0+
MDI0-
MDI1+
MDI1-
MDI2+
MDI2-
MDI3+
MDI3-

CKXTAL1
LANWAKEB
LED0/EEDI/SPISI/SDA
LED1/EESK/SPISCK
LED2/EEDO/SPISO
LED3
EEPROM_SEL/SMBDATA
EECS/SCL
SPICSB/LED0
POW_EXT_SWR/ENSWREG
GPI/GPO

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Title: RTL8125D_8125B(G)(I)(S) _8111K(I) Series Reference Schematic: Reserved Components

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RTL8125D/RTL8125B(G)S SWR

Bill Of Materials

Item	Quantity	Reference	Part
01	01	CON1	RJ45
02	09	C1,C3,C4,C6,C7,C8, C9,C11,C25	2.2uF
03	07	C14,C15,C18,C20,C24, C26,C27	0.1uF
04	02	C12,C17	1uF
05	03	C19,C21,C23	4.7uF
06	02	C34,C35	27pF
07	01	C28	390pF
08	01	C29	1000pF/2KV
09	04	D1,D2,D3,D4	LED
10	06	R3,R5,R6,R9,R20,R27	0
11	03	R17,R26,R29	4.7k
12	01	R16	2.49k 1%
13	01	R13	1k
14	01	R14	15k
15	04	R21,R22,R23,R24	510
16	04	R10,R11,R12,R15	75
17	01	U1	XFMR
18	01	U2	Realtek IC
19	01	X1	25MHz
20	01	L1	2.2uH
21	01	C51	22uF
22	01	C10	10uF

RTL8125D/RTL8125B(G)S External

Bill Of Materials

Item	Quantity	Reference	Part
01	01	CON1	RJ45
02	09	C1,C3,C4,C6,C7,C8, C9,C11,C25	2.2uF
03	04	C14,C15,C26,C27	0.1uF
04	02	C12,C17	1uF
05	02	C34,C35	27pF
06	01	C28	390pF
07	01	C29	1000pF/2KV
08	04	D1,D2,D3,D4	LED
09	06	R3,R7,R6,R9,R20,R27	0
10	04	R18,R26,R29,R34	4.7k
11	01	R16	2.49k 1%
12	01	R13	1k
13	01	R14	15k
14	04	R21,R22,R23,R24	510
15	04	R10,R11,R12,R15	75
16	01	U1	XFMR
17	01	U2	Realtek IC
18	01	X1	25MHz
19	01	C51	22uF
20	01	C10	10uF

Note:
Power Modules are not included in the BOM list.
Designer could choose proper solution for system design.

RTL8125B(G)(I)

Bill Of Materials

Item	Quantity	Reference	Part
01	01	CON1	RJ45
02	09	C1,C3,C4,C6,C7,C8, C9,C11,C25	2.2uF
03	04	C14,C15,C26,C27	0.1uF
04	02	C12,C17	1uF
05	02	C34,C35	27pF
06	01	C28	390pF
07	01	C29	1000pF/2KV
08	04	D1,D2,D3,D4	LED
09	07	R3,R7,R6,R9,R20,R27,R35	0
10	02	R26,R29	4.7k
11	01	R16	2.49k 1%
12	01	R13	1k
13	01	R14	15k
14	04	R21,R22,R23,R24	510
15	04	R10,R11,R12,R15	75
16	01	U1	XFMR
17	01	U2	Realtek IC
18	01	X1	25MHz
19	01	C51	22uF
20	01	C10	10uF

Note:
Power Modules are not included in the BOM list.
Designer could choose proper solution for system design.

RTL8125D LDO

Bill Of Materials

Item	Quantity	Reference	Part
01	01	CON1	RJ45
02	09	C1,C3,C4,C6,C7,C8, C9,C11,C25	2.2uF
03	07	C14,C15,C18,C20,C22, C26,C27	0.1uF
04	02	C12,C17	1uF
05	02	C19,C21	4.7uF
06	02	C34,C35	27pF
07	01	C28	390pF
08	01	C29	1000pF/2KV
09	04	D1,D2,D3,D4	LED
10	06	R3,R4,R6,R9,R20,R27	0
11	03	R18,R26,R29	4.7k
12	01	R16	2.49k 1%
13	01	R13	1k
14	01	R14	15k
15	04	R21,R22,R23,R24	510
16	04	R10,R11,R12,R15	75
17	01	U1	XFMR
18	01	U2	Realtek IC
19	01	X1	25MHz
20	01	C51	22uF
21	01	C10	10uF

RTL8111K(I) SWR mode

Bill Of Materials

Item	Quantity	Reference	Part
01	01	CON1	RJ45
02	15	C1,C6,C7,C8,C9, C12,C14,C16,C17,C18, C20,C24,C26,C27	0.1uF
03	03	C19,C23,C4	4.7uF
04	02	C34,C35	27pF
05	01	C28	0.01uF
06	01	C29	1000pF/2KV
07	03	D1,D2,D3	LED
08	05	R1,R2,R5,R19,R25	0
09	02	R17,R26	4.7k
10	01	R16	2.49k 1%
11	01	R13	1k
12	01	R14	15k
13	04	R21,R22,R23,R24	510
14	04	R10,R11,R12,R15	75
15	01	U1	XFMR
16	01	U2	RTL8111K
17	01	X1	25MHz
18	01	L1	2.2uH

RTL8111K(I) LDO mode

Bill Of Materials

Item	Quantity	Reference	Part
01	01	CON1	RJ45
02	13	C1,C6,C7,C8,C9, C12,C14,C16,C17, C20,C22,C26,C27	0.1uF
04	02	C34,C35	27pF
05	01	C28	0.01uF
06	01	C29	1000pF/2KV
07	03	D1,D2,D3	LED
08	05	R1,R2,R4,R19,R25	0
09	02	R18,R26	4.7k
10	01	R16	2.49k 1%
11	01	R13	1k
12	01	R14	15k
13	04	R21,R22,R23,R24	510
14	04	R10,R11,R12,R15	75
15	01	U1	XFMR
16	01	U2	RTL8111K
17	01	X1	25MHz

RTL8111K(I) External

Bill Of Materials

Item	Quantity	Reference	Part
01	01	CON1	RJ45
02	13	C1,C6,C7,C8,C9, C12,C14,C16,C17, C20,C26,C27	0.1uF
04	02	C34,C35	27pF
05	01	C28	0.01uF
06	01	C29	1000pF/2KV
07	03	D1,D2,D3	LED
08	05	R1,R2,R7,R19,R25	0
09	03	R18,R26,R34	4.7k
10	01	R16	2.49k 1%
11	01	R13	1k
12	01	R14	15k
13	04	R21,R22,R23,R24	510
14	04	R10,R11,R12,R15	75
15	01	U1	XFMR
16	01	U2	RTL8111K
17	01	X1	25MHz

Note:
Power Modules are not included in the BOM list.
Designer could choose proper solution for system design.

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Title
RTL8125D_8125B(G)(I)(S) _8111K(I) Series Reference Schematic: BOM

Size	Document Number	Rev
B		

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V100

1. First release

V101 - 2019/07/26

1. Add bead (33ohm) for AVDD33_PLL
2. Remove 2.2R from MDI
3. Add bead (0R) for VDDREG
4. Add 22uF for AVDD33_PLL
5. Add notice for SMD XTAL
6. Change SWR1 part name (G2262BAU1U)

V102 - 2019/08/22

1. Update core power (0.95V) table for RTL8125B
2. Remove R54,R55,R56
3. Add dual color LED circuit
4. SWR1 part name is SY8003E

V103 - 2019/08/26

1. Add RTL8125BG

V104 - 2019/08/27

1. C9 and C10=10uF for RTL8125B(S)/RTL8125BG

V105 - 2019/11/05

1. C51=22uF for RTL8125B(S)/RTL8125BG
2. Add notice for Pin40,pin43

V106 - 2020/1/3

Add RTL8125BI

V107 - 2020/3/5

1. Add RTL8125BGS,8111KI
2. Core power table adjustment

V108 2020/3/13

Add 3.3V LDO for XG test mode jitter

V109 2020/3/31

Modiy RTL8125B(S) pin name (align with Datasheet)

V110 2020/4/16

1. Change netname, from "LED1/EESK" to "LED1/EESK/SPISCK"
2. Add PPS_PIN in Pin32

V111 2020/5/4

1. Change netname, from "EEPROM_SEL" to "EEPROM_SEL/SMBDATA"
2. update BOM

V112 2020/7/22

1. C28=390pF for RTL8125B(G)_BS EMI noise
2. update BOM

V113 2020/9/24

1. Add 3.3V and 0.95V SWR notice

V114 2022/1/4

1. Add Flash note.

V115 2022/4/13

1. Correct U2 pin41,42 pin name typo.

V116 2023/2/16

1. Correct U2 pin40 net name typo.
2. Update the note of the SY8003E spec.

V117 2023/3/2

1. Change the R25, R27 from reserved to must.

V118 2023/3/8

1. Merge the RTL8125D & RTL8125DB in this file.

V119 2023/12/05

1. PIN 19 cap updated.

V120 2023/12/19

1. Remove RTL8125DB.

V121 2024/2/21

1. Modify RTL8125D series pin 16 to NC.

V122 2024/8/27

1. Remove RTL8125DI.

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Title: RTL8125D_8125B(G)(I)(S) _8111K(I) Series Reference Schematic: Change Note

Size	Document Number	Rev
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