DATA SHEET

GPMQ8005B

QI Compliant Wireless Charger
2 Coil Wireless Fast Charger
3 Coil QI Compliant Wireless Charger
Power Transmitter

SEP. 9, 2017

Version 1.1

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QI COMPLIANT WIRELESS POWER TRANSMITTER SERIES

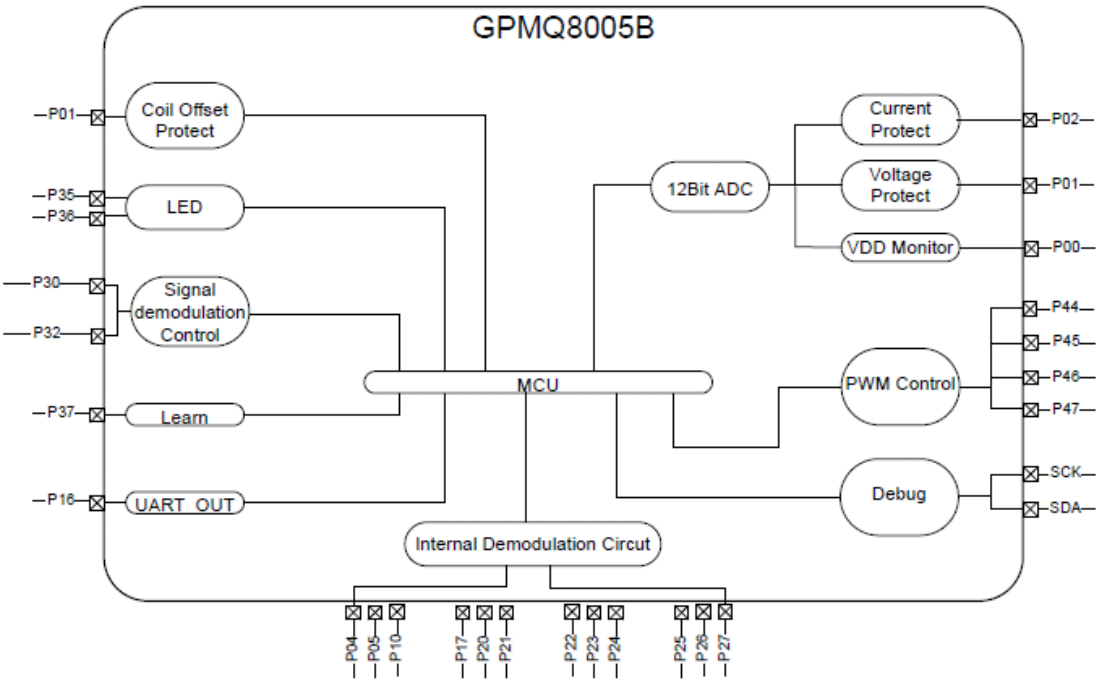
1. GENERAL DESCRIPTION

GPMQ8005B is a high-integrated solution for QI Compliant Wireless Power Transmitter. It integrates the WPC Qi standard of Version V1.2.3 and has high performance in PACKET (Signal) Demodulation. Several protection approaches are included to avoid system run into abnormal condition such as overcurrent, low voltage, thermal protection, and offset protection. GPMQ8005B provides an application circuit for wearable application. For wearable applications, PWM directly driver MOSFET is featured. ***The demodulation circuit and offset protection are under patent pending in many countries***

2. FEATURES

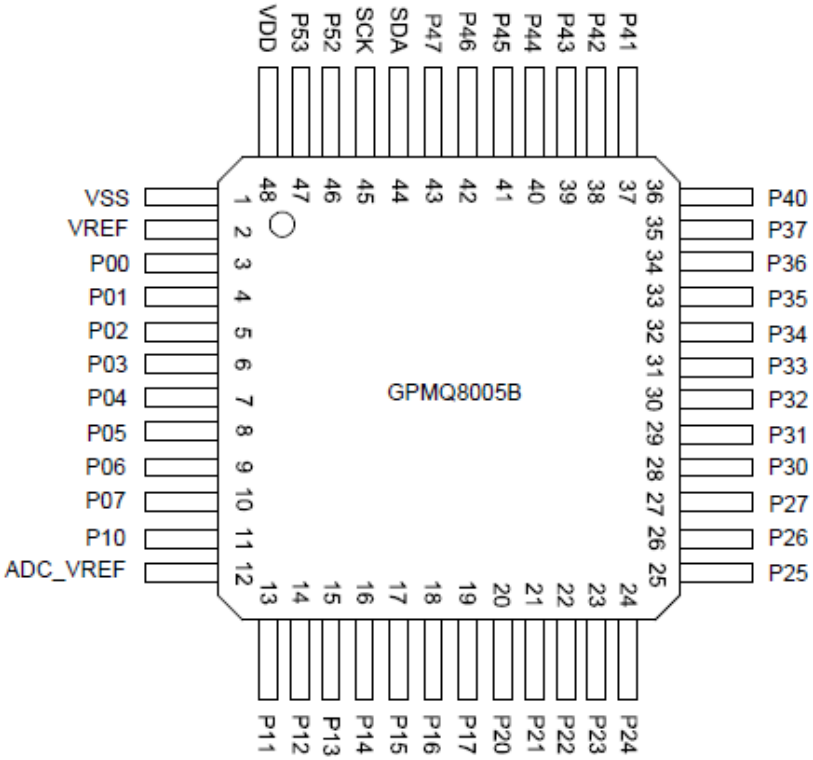
- Conforms to the Wireless Power Consortium (WPC) Wireless Power Transfer Transmitter V1.2.3 Specification.
- GPMQ8005B can use 5V DC supply system by USB Input. It uses A11 signal coil type.
- GPMQ8005B support wireless FAST Charger. Fast Charger need 9V DC adapter. We can identify the common adapter to apply 9V by GPMQ8005B.(Refer to section 7.3)
- GPMQ8005B support Qi standard A28 Coil type. It use 5V input voltage.(Refer to section 7.4)
- High performance at signal demodulation. The demodulation circuit is built in at GPMQ8005B.
- Patent method to easy compatible variable RX device.
- Status Indicators for:
  - Charge completed
  - Charging
  - Error (Transmitter over current , QI standard error message)
  - Standby
- Auto detecting the object put-on and removal
- Over current protection.
- Over Voltage Protection
- Package: LQFP 48, QFN32
- Chip is 5V input.

3. BLOCK DIAGRAM

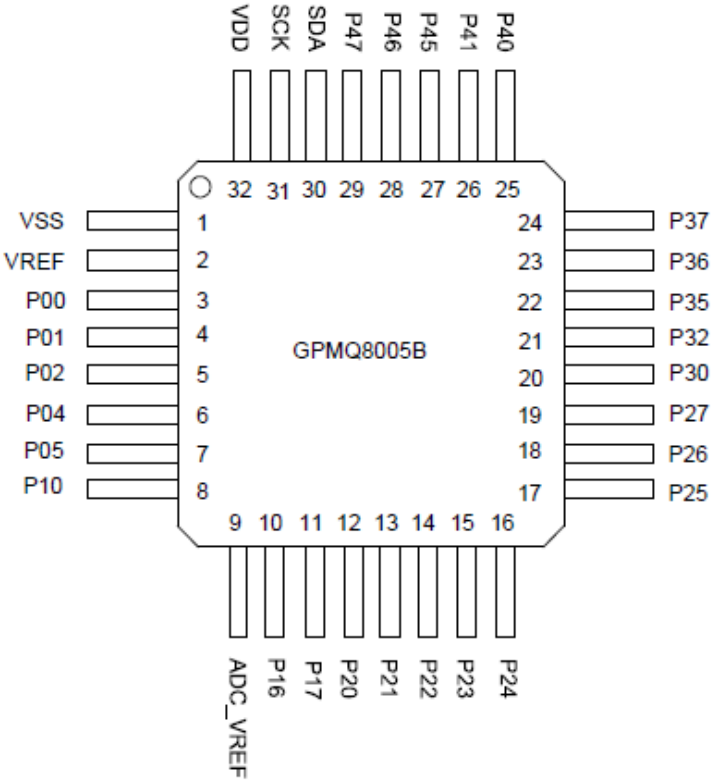


4. SIGNAL DESCRIPTIONS

LQFP48



QFN32



4.1. LQFP48 Pins description

No	Name	I/O	Description
1	VSS	S	GND
2	VREF	S	VREF
3	P00	I	VDD Monitor
4	P01	I	Coil Offset Protection
5	P02	I	Current Detector
6	P03	-	NC
7	P04	O	Internal De-modulation Circuit1
8	P05	I	Internal De-modulation Circuit1
9	P06	-	NC
10	P07	-	NC
11	P10	I	Internal De-modulation Circuit1
12	ADC_VREF	S	ADC_VREF
13	P11	-	NC
14	P12	-	NC
15	P13	-	NC
16	P14	-	NC
17	P15	-	NC
18	P16	O	UART TX for debug
19	P17	O	Internal De-modulation Circuit2
20	P20	I	Internal De-modulation Circuit2
21	P21	I	Internal De-modulation Circuit2
22	P22	O	Internal De-modulation Circuit3
23	P23	I	Internal De-modulation Circuit3
24	P24	I	Internal De-modulation Circuit3
25	P25	O	Internal De-modulation Circuit4
26	P26	I	Internal De-modulation Circuit4
27	P27	I	Internal De-modulation Circuit4
28	P30	I	Internal De-modulation1
29	P31	-	NC
30	P32	I	Internal De-modulation3
31	P33	-	NC
32	P34	-	NC
33	P35	O	RED LED
34	P36	O	GREEN LED
35	P37	I	MASS PRODUCTION LEARN PIN
36	P40	-	NC
37	P41	-	NC
38	P42	-	NC
39	P43	-	NC
40	P44	O	PWM0 / PMW1_MOSFET_HIGH
41	P45	O	PWM1 / PMW1_MOSFET_LOW
42	P46	O	PMW2 / PMW2_MOSFET_LOW
43	P47	O	PWM3 / PMW2_MOSFET_HIGH
44	SDA	O	PROBE SDA FOR DEBUG

No	Name	I/O	Description
45	SCK	I	PROBE SCK FOR DEBUG
46	P52	-	NC
47	P53	-	NC
48	VDD	S	VDD

4.2. QFN32

No	Name	I/O	Description
1	VSS	S	GND
2	VREF	S	VREF
3	P00	I	VDD Monitor
4	P01	I	Coil Offset Protection
5	P02	I	Current Detector
6	P04	O	Internal De-modulation Circuit1
7	P05	I	Internal De-modulation Circuit1
8	P10	I	Internal De-modulation Circuit1
9	ADC_VREF	S	ADC_VREF
10	P16	O	UART TX for Debug
11	P17	O	Internal De-modulation Circuit2
12	P20	I	Internal De-modulation Circuit2
13	P21	I	Internal De-modulation Circuit2
14	P22	O	Internal De-modulation Circuit3
15	P23	I	Internal De-modulation Circuit3
16	P24	I	Internal De-modulation Circuit3
17	P25	O	Internal De-modulation Circuit4
18	P26	I	Internal De-modulation Circuit4
19	P27	I	Internal De-modulation Circuit4
20	P30	I	Internal De-modulation1
21	P32	I	Internal De-modulation3
22	P35	O	RED LED
23	P36	O	GREEN LED
24	P37	I	MASS PRODUCTION LEARN PIN
25	P40	-	NC
26	P44	O	PWM0 / PMW1_MOSFET_HIGH
27	P45	O	PWM1 / PMW1_MOSFET_LOW
28	P46	O	PMW2 / PMW2_MOSFET_LOW
29	P47	O	PWM3 / PMW2_MOSFET_HIGH
30	SDA	O	PROBE SDA FOR DEBUG
31	SCK	I	PROBE SCK FOR DEBUG
32	VDD	S	VDD

5. FUNCTIONAL DESCRIPTIONS

5.1. QI Compliant Wireless Transmitter 1.2.3 Specification.

Conforms the QI standard of version 1.2.3. Low Power TX. GPMQ8005B can easily pass QI low power 5W Transmitter certification. Typically we use A11 coil type(5V). Please refer to SCH of section 7.1

5.2. Wearable Wireless Transmitter

Conforms the QI standard of version 1.2.3. The different is coil type. The wearable wireless charger is based on the Coil to modify the code.

5.3. Compatible Wireless Fast Charger(2 Coil)

Beside basic low power Qi 5Watt(QI V1.2.3). There is some un-standard wireless charger with higher power (10Watt). GPMQ8005B is compatible both of them. Please note that the SCH is different and the adapter need to use high voltage. Please refer to section 7.3.

5.4. Compatible Wireless Fast Charger(3 Coil)

3 Coil solution with A28 coil type. GPMQ8005B also support typical coil type A28. It conforms to Qi standard version 1.2.3 Low Power Transmitter. Please refer to the SCH of section 7.4.

5.5. Different Code for different application

We use GPMQ8005B to apply different solution. The code will be different. Different code has one Check Sum no. Please contact with Generalplus to get more information with this

5.6. Strong Demodulation for QI Packet and not easy to disconnect

Demodulation is very important for QI transmitter. If demodulation is good, RX is not easy to disconnect from TX. GPMQ8005B uses flexible process to resolve this problem. They have high performance at demodulating the PACKET. This method is now patent pending in many countries. GPMQ8005B uses the same method and builds in the circuit inside. The components outside are less than GPMQ8005A.

5.7. Over Voltage Protection

The system will protect and show the alarm message when the voltage pin (P01) detects the alarm voltage. System will not stop and keep the current limit charging.

Chip	Voltage Pin Protect Voltage	Unit
GPMQ8005B	1.4	V

User can modify the Dividing resistor to modify the over voltage protection level.

5.8. Over Current Protection

The system will protect and show FOD message when the current pin (P02) detects the alarm voltage. System will not stop and keep the current limit charging.

Chip	Current Pin Protect Voltage	Unit
GPMQ8005B	1.9	V

User can modify the current amplifier resister to modify the over current protection level.

5.9. LED INDICATE

LED Pin is P35 and P36. The output low sink current is 20mA.
Low(0): LED ON
High(1): LED OFF

GPMQ8005B

Condition	P35	P36	Description
Standby	Keep OFF	Keep OFF	When the transmitter does not detect any Qi Mobile device.
Charging	Keep OFF	Keep ON	When the transmitter receives Qi mobile device.
Charge Complete	Keep ON	Keep OFF	When the transmitter receives the charge complete packet. System stops charge and wait 5 minutes. After 5 minutes, system will restart again. After restarting for 3 times, system will stop until user removes the RX from the surface of TX.
Error	Keep OFF	Flashing	1. When the transmitter receives QI Error Code list as below. - D_QI_EndPowerTransfer_InternalFault

Condition	P35	P36	Description
			- D_QI_EndPowerTransfer_OverVoltage - D_QI_EndPowerTransfer_OverCurrent - D_QI_EndPowerTransfer_BatteryFailure - D_QI_EndPowerTransfer_Unkown - D_QI_EndPowerTransfer_NoResponse - Thermal Protection: If the thermal protection occurs, an error message shows up. 2. When the system receives the package, system will stop and restart again right away. After receiving 5 times of error message, system will stop until user removes the RX from the surface of TX.
FOD/USB warning	P35 ON , P36 OFF(0.5s) ➔ P35 ON , P36 OFF(0.5s) ➔Close Both(0.5s) ➔Repeating		1. USB Power not enough. 2. Foreigner Object detection. 3. Power(Current) Limit

6. ELECTRICAL SPECIFICATIONS

6.1. Absolute Maximum Rating

Characteristics	Symbol	Ratings
DC Supply Voltage	V_+	-0.3V ~ 6.0V
Input Voltage Range	V_{IN}	-0.3V to V_+ + 0.3V
Operating Temperature	T_A	-40℃ to +85℃
Operation Current	Iop	10mA

6.2. DC Characteristics (TA = 25℃)

Characteristics	Symbol	Limit			Unit	Test Condition
		Min.	Typ.	Max.		
Operating Voltage	VDD	-	5.0	-	V	
Operating Current	I_{OP}	-	-	15.0	mA	
Standby Current	I_{STBY}	-	-	10.0	uA	
Input High Level	V_{IH}	0.7VDD	-	-	V	VDD = 5.0V
Input Low Level	V_{IL}	-	-	0.3VDD	V	VDD = 5.0V
Output High Level	V_{OH}	0.8VDD	-	-	V	I_{OH} = -8mA at VDD = 5.0V
Output Low Level	V_{OL}	-	-	0.2VDD	V	I_{OL} = 20mA at VDD = 5.0V
Input Pull High Resistor	R_{PH1}	30	50	70	KΩ	
Input Pull Low Resistor	R_{PL1}	30	50	70	KΩ	

6.3. ADC Characteristics (TA = 25℃) 12bit

Characteristics	Symbol	Limit			Unit	Test Condition
		Min.	Typ.	Max.		
Operating Voltage	VDD	-	5.0	-	V	
ADC Input Voltage Range	V_{ADCIN}	0	-	VDD	V	
ADC Clock Period	T_{AD}	-	0.5	-	us	ADCLK=2MHz
Resolution			12		Bit	
No Missing Code			10		bits	
ADC Conversion Time	T_{CON}	-	4	-	us	
Integral Linearity Error	E_{INL}	-	±2	±3	LSB	
Differential Linearity Error	E_{DNL}	-	-1~+2	-1~+3	LSB	

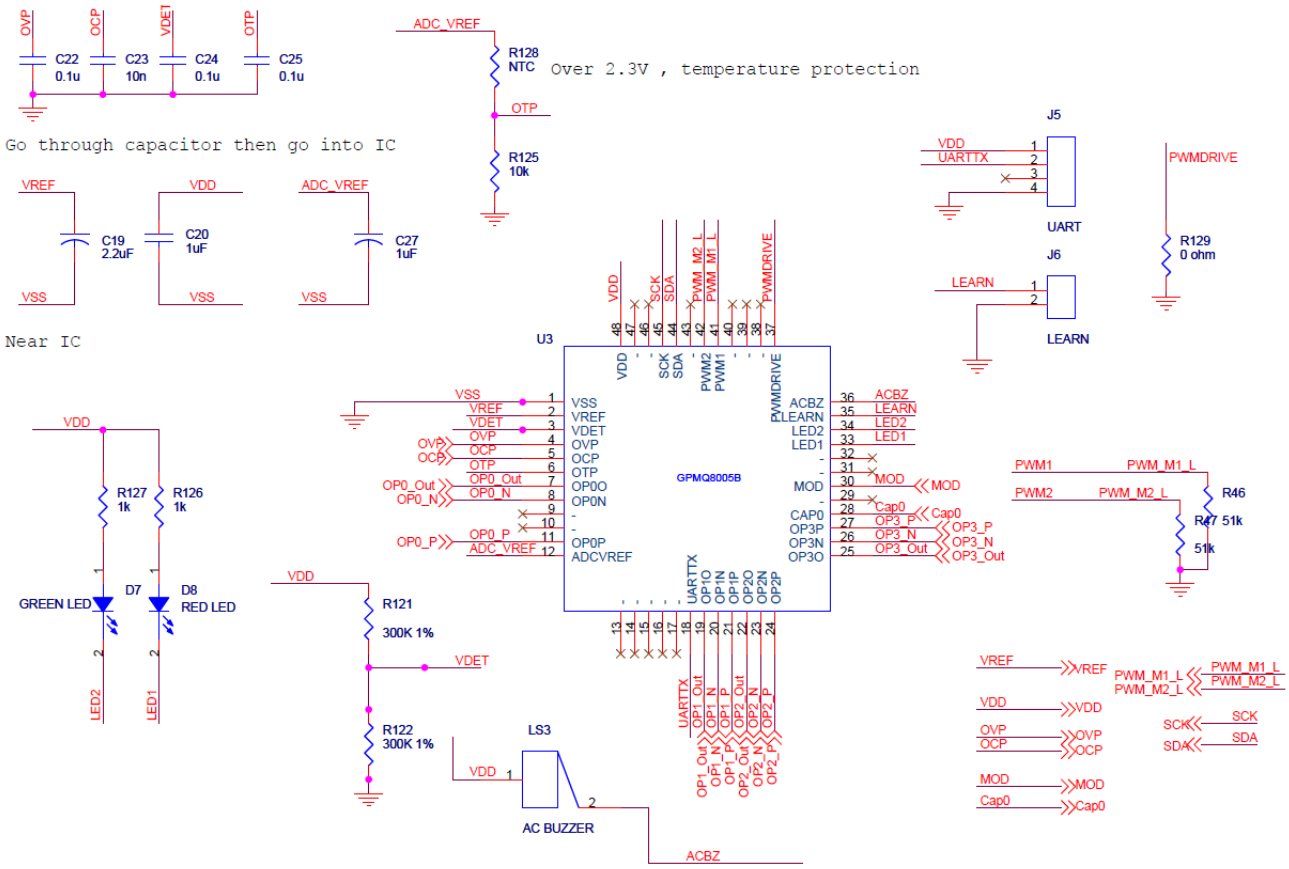
7. APPLICATION CIRCUITS

7.1. 5Vsystem typical Application (LPFQ 48 Package) / A11 signal coil type

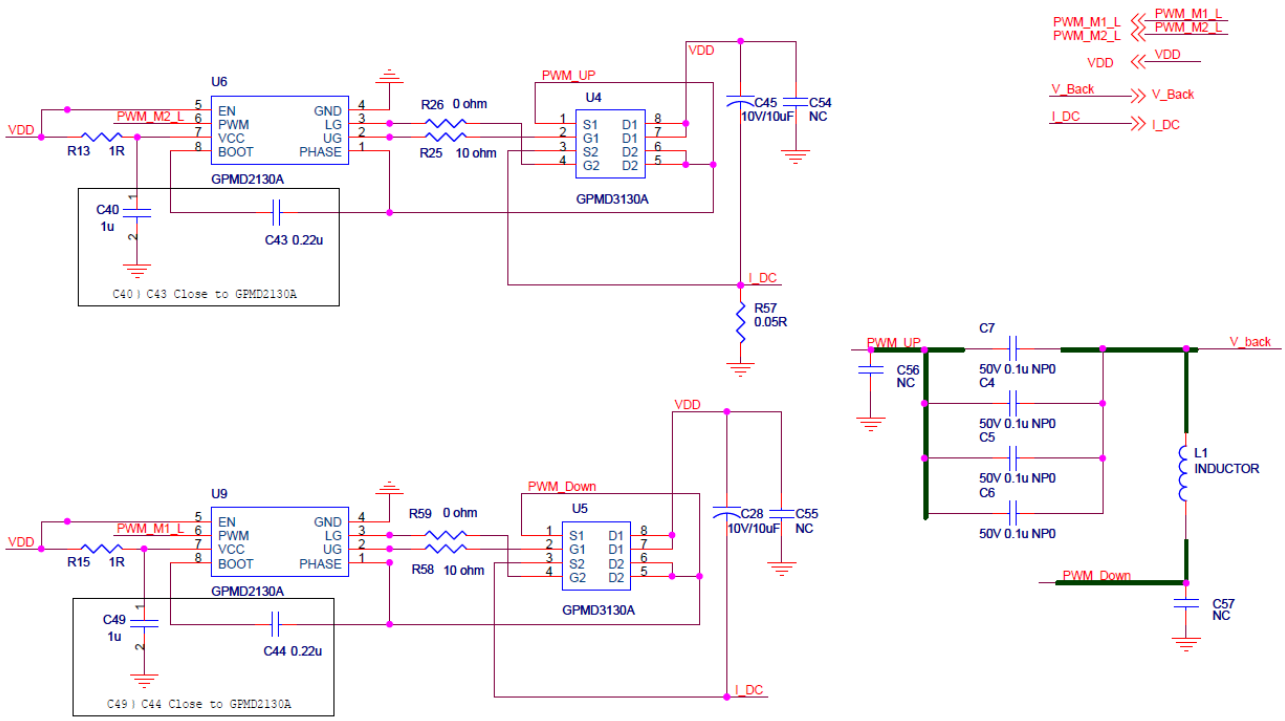
This application is a standard QI Compliant circuit, built-in LED and BUZZER supply user identification state of charge, device contains quad OPA- Amplifier with synchronous execution demodulator, get better demodulation performance.

7.1.1. Circuit for 5V System

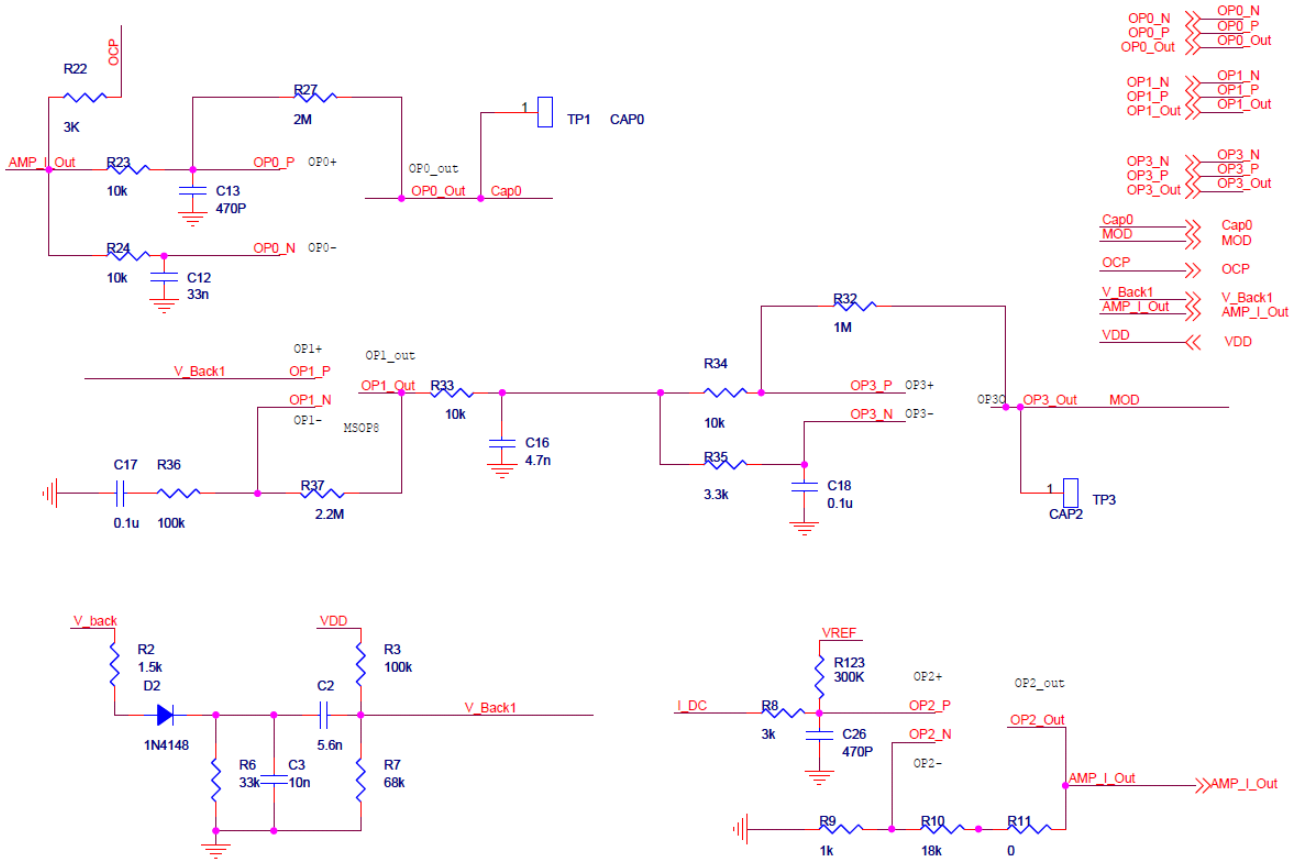
MCU



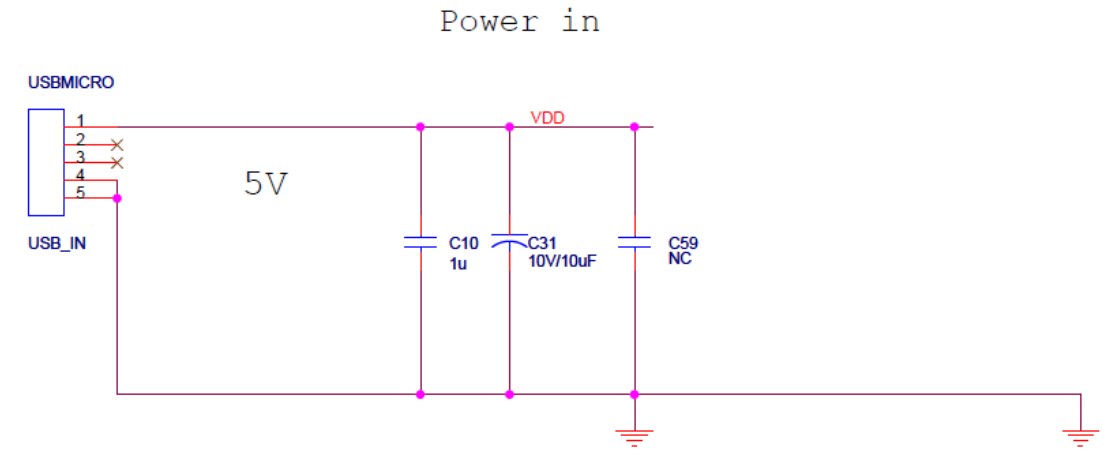
Full Bridge

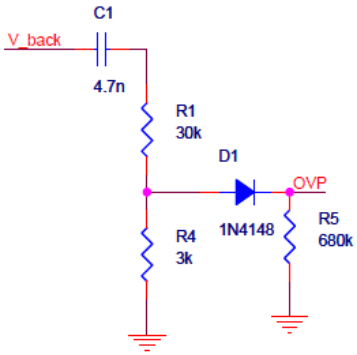

U6
EN
PWM
VCC
BOOT
GND
LG
UG
PHASE
GPMD2130A
PWM_M2_L
VDD
R13 1R
R26 0 ohm
R25 10 ohm
PWM_UP
U4
S1
G1
S2
G2
D1
D1
D2
D2
GPMD3130A
C45 10V/10uF
C54 NC
C40 1u
C43 0.22u
C40 | C43 Close to GPMD2130A
I_DC
R57 0.05R
U9
PWM_M1_L
R15 1R
R59 0 ohm
R58 10 ohm
PWM_Down
U5
C49 1u
C44 0.22u
C49 | C44 Close to GPMD2130A
C28 10V/10uF
C55 NC
PWM_M1_L
PWM_M2_L
V_Back
C7
C56 NC
C4
C5
C6
50V 0.1u NP0
L1
INDUCTOR
C57 NC

Feedback


OCP
R22
3K
R27
2M
TP1
CAP0
AMP_I_Out
R23
10k
OP0_P
OP0+
C13
470P
OP0_out
OP0_Out
Cap0
R24
10k
OP0_N
OP0-
C12
33n
OP0_N
OP0_P
OP0_Out
OP1_N
OP1_P
OP1_Out
OP3_N
OP3_P
OP3_Out
Cap0
MOD
OCP
V_Back1
AMP_I_Out
VDD
R32
1M
OP1+
V_Back1
OP1_P
OP1_out
OP1_Out
R33
10k
OP1_N
OP1-
MSOP8
C16
4.7n
R34
10k
OP3_P
OP3+
OP3_N
OP3-
OP3_Out
MOD
R35
3.3k
C18
0.1u
TP3
CAP2
C17
0.1u
R36
100k
R37
2.2M
V_back
R2
1.5k
D2
1N4148
VDD
R3
100k
C2
5.6n
V_Back1
R6
33k
C3
10n
R7
68k
VREF
R123
300K
I_DC
R8
3k
OP2+
OP2_P
OP2_N
OP2-
C26
470P
OP2_out
OP2_Out
AMP_I_Out
R9
1k
R10
18k
R11
0

Power & Protection





7.1.2. BOM for 5V system Circuit Application

GPMQ8005B-DE-M00V3.1

Item	Quantity	Reference	Part	PCB Footprint
1	2	C1,C16	4.7n	C-0603
2	1	C2	5.6n	C-0603
3	2	C3,C23	10n	C-0603
4	4	C4,C5,C6,C7	50V 0.1u NP0	C-1210
5	1	C10	1u/10V	C-0805
6	1	C12	33n	C-0603
7	2	C13,C26	470P	C-0603
8	5	C17,C18,C22,C24,C25	0.1u	C-0603
9	1	C19	2.2uF/10V	C-0603
10	2	C20,C27	1uF	C-0603
11	2	C28,C45	10V/10uF	C-1210
12	1	C31	10V/10uF	C-1206
13	2	C40,C49	1u	C-0603
14	2	C43,C44	0.22u	C-0603
15	3	C54,C55,C59	NC	C-0805
16	2	C56,C57	NC	C-0603
17	2	D1,D2	1N4148	D-1206
18	1	D7	GREEN LED	LED-0603
19	1	D8	RED LED	LED-0603
20	1	LS3	AC BUZZER	FMQ-SMD
21	1	L1	INDUCTOR	Coil
22	1	R1	30k	R-0603
23	1	R2	1.5k	R-0603
24	2	R3,R36	100k	R-0603
25	3	R4,R8,R22	3K	R-0603
26	1	R5	680k	R-0603
27	1	R6	33k	R-0603
28	1	R7	68k	R-0603
29	3	R9,R126,R127	1k	R-0603
30	1	R10	18k	R-0603
31	2	R13,R15	1R	R-0603
32	5	R23,R24,R33,R34,R125	10k	R-0603
33	2	R25,R58	10 ohm	R-0603
34	4	R11,R26,R59,R129	0 ohm	R-0603
35	1	R27	2M	R-0603
36	1	R32	1M	R-0603
37	1	R35	3.3k	R-0603

38	1	R37	2.2M	R-0603
39	2	R46,R47	51k	R-0603
40	1	R57	0.05R 1%	R-1206
41	2	R121,R122	300K 1%	R-0603
42	1	R123	300K	R-0603
43	1	R128	NTC	R-TTF103
44	1	USBMICRO	USB_IN	USBMICRO
45	1	U3	GPMQ8005B	QFP48-0.5
46	2	U4,U5	GPMD3130A	DIP8-SOP150
47	2	U6,U9	GPMD2130A	DIP8-SOP150

Note: (1) R57、R121、R122 demand precision resistors (1%), all resistors power& precision are standard values.

(2) Unlabeled capacitive voltage specifications 25V.

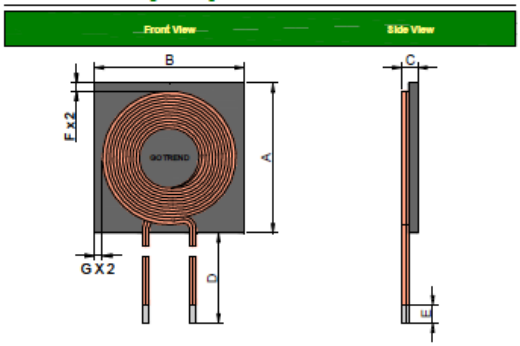
7.1.3. Coil spec for Criterion Application

Part No Example :

GW	505006	P	T	-	08	B	10	R	TN
1	2	3	4		5	6	7	8	9

1. Product Code : GW
2. Size Code : 505006 = 50 X 50 X 6
3. P = Pb Free < 1000ppm
4. [T] : Tx
5. Wire Size : 0.8 = 0.8 mm
6. Wire Count : A = Single , B = 2 Wire , C = 3 Wire ..... etc.
7. Wire Turns (Ts) : 10 = 10.0 Ts
8. Wire Color : Y = Copper Yellow , R = Copper Red
9. [TN] : Material Code

DIMENSION : [mm]



Size	A[+/-0.5]	B[+/-0.5]	C[Max.]	D[+/- 5.0]	E[+/-1.0]	F[Min.]	G[Min.]
505006	50.0	50.0	6.0	50.0	10.0	2.0	2.0

Test Equipment :

* HP4284A , HP42841A - L , IDC , Q , RDC

Standard Atmospheric Conditions :
Ambient Temp : 20 +/- 15ºC
Relative Humidity : 65 +/- 20%
If there may be any doubt on the result,
measurement shall be made within the following limits :
Ambient Temp : 25 +/- 5ºC
Relative Humidity : 75 +/- 10%

Attention & Caution :

Please avoid following matters:
* Splashing water or salt water
* Toxic Gas (Hydrogen sulfide, Sulfurous acid, Chlorine, Ammonia)
* Vibrations or shocks which exceed the specified condition
* Dew condenses
* Please be careful for the stress to this product by board flexure or something after the mounting.

Operating & Storage Condition :

OPERATING TEMP : -25 ~ +85ºC

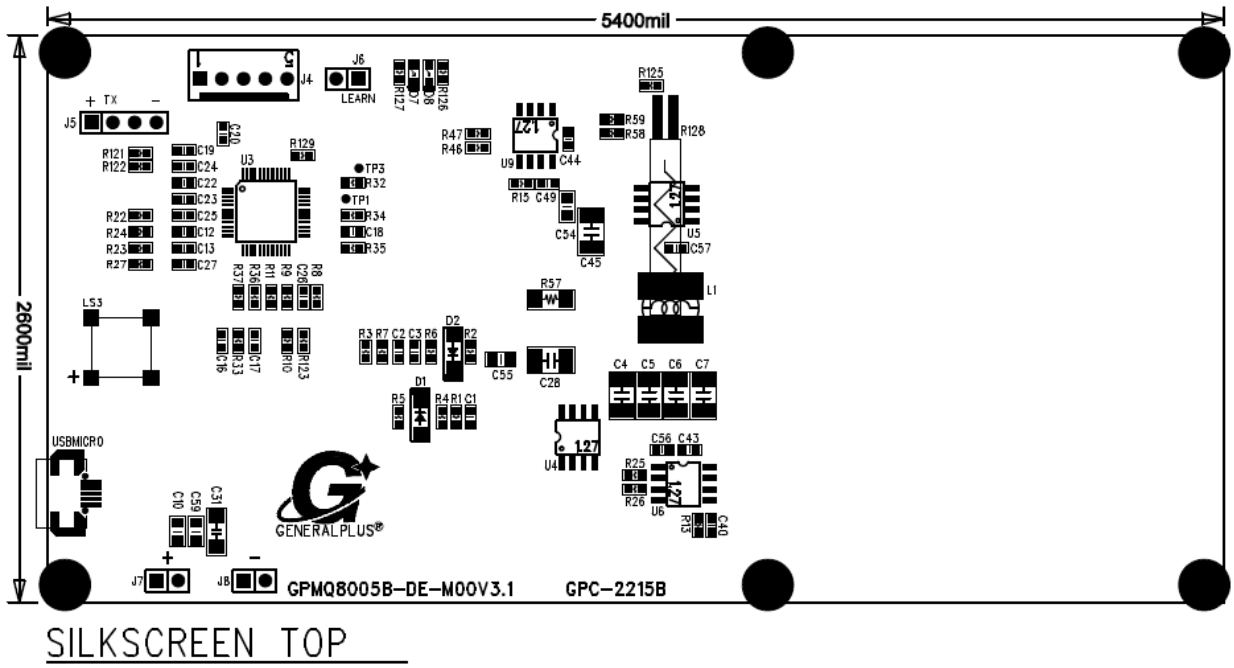
STORAGE TEMP : -40 ~ +85ºC
STORAGE LIFE TIME : 12 MONTH @25ºC , RH 40~65%

Electrical Characteristics :

GOTREND PN	Inductance (uH)	DCR (m Ohm)	Q (at 100KHz)	Isat (A)	Irms (A)
GW505006PT-08B10RTN	6.30 +/- 10%	28.5 Typ. / 35.0 Max	30 Min.	40.0 Max.	10.0 Max.

* Inductance Test Condition@100KHz,0.1Vrms, 25ºC Ambient
* Isat : Base on L drop 10% max.
* Irms : Base on temp. rise up 40 deg.C max.

7.1.4. Silkscreen Layer for Criterion Application



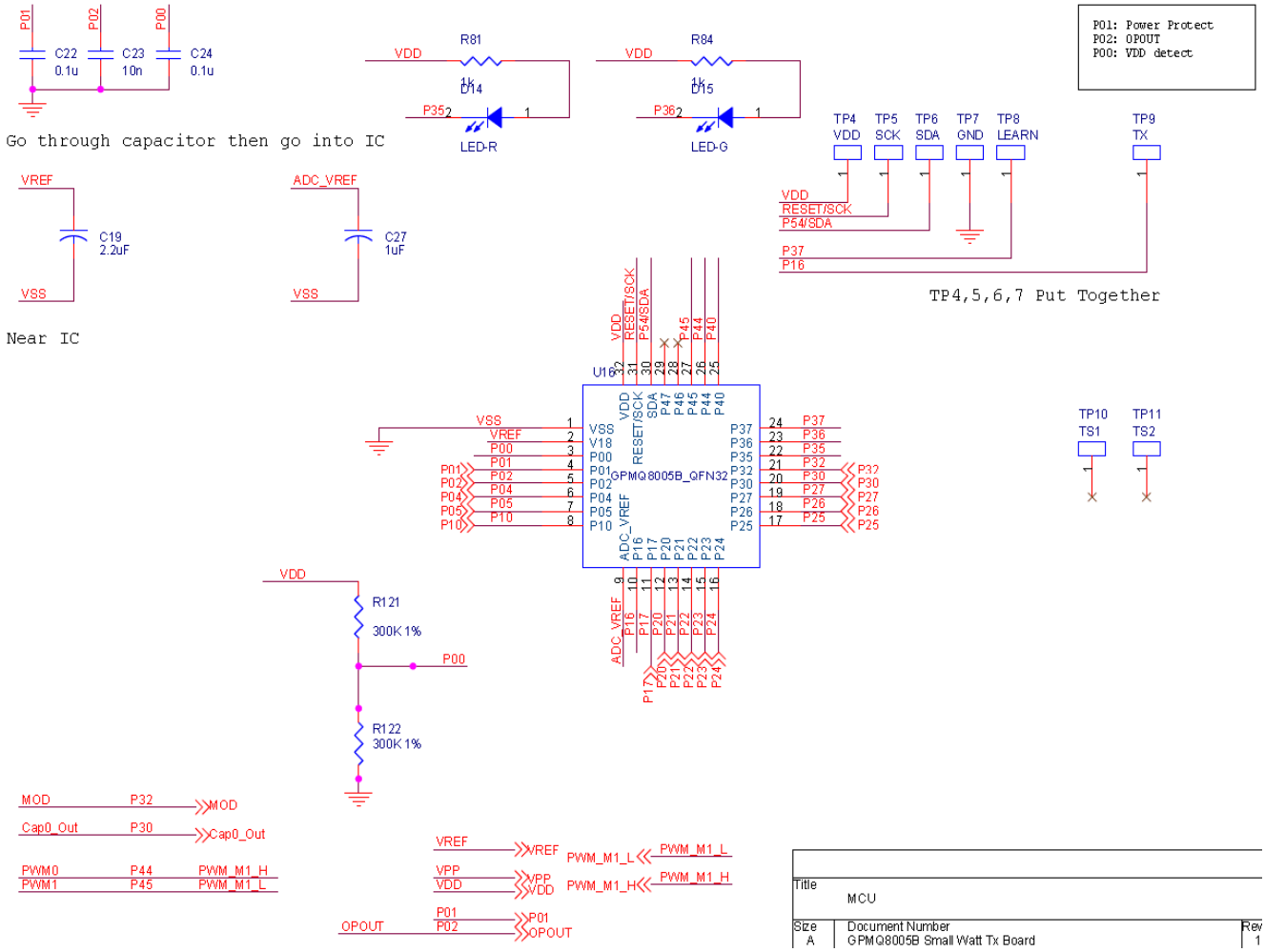
SILKSCREEN TOP

7.2. Wearable Application Circuits (QFN 32 Package)

This is a wearable application circuit, it is also used 5V input. Size can be reduced to 25mm diameter circular PCB board (See 7.2.4), Combined GPMQ5130A get better performance efficiency and smaller size in the application, built-in two LED supply user identification state of charge.

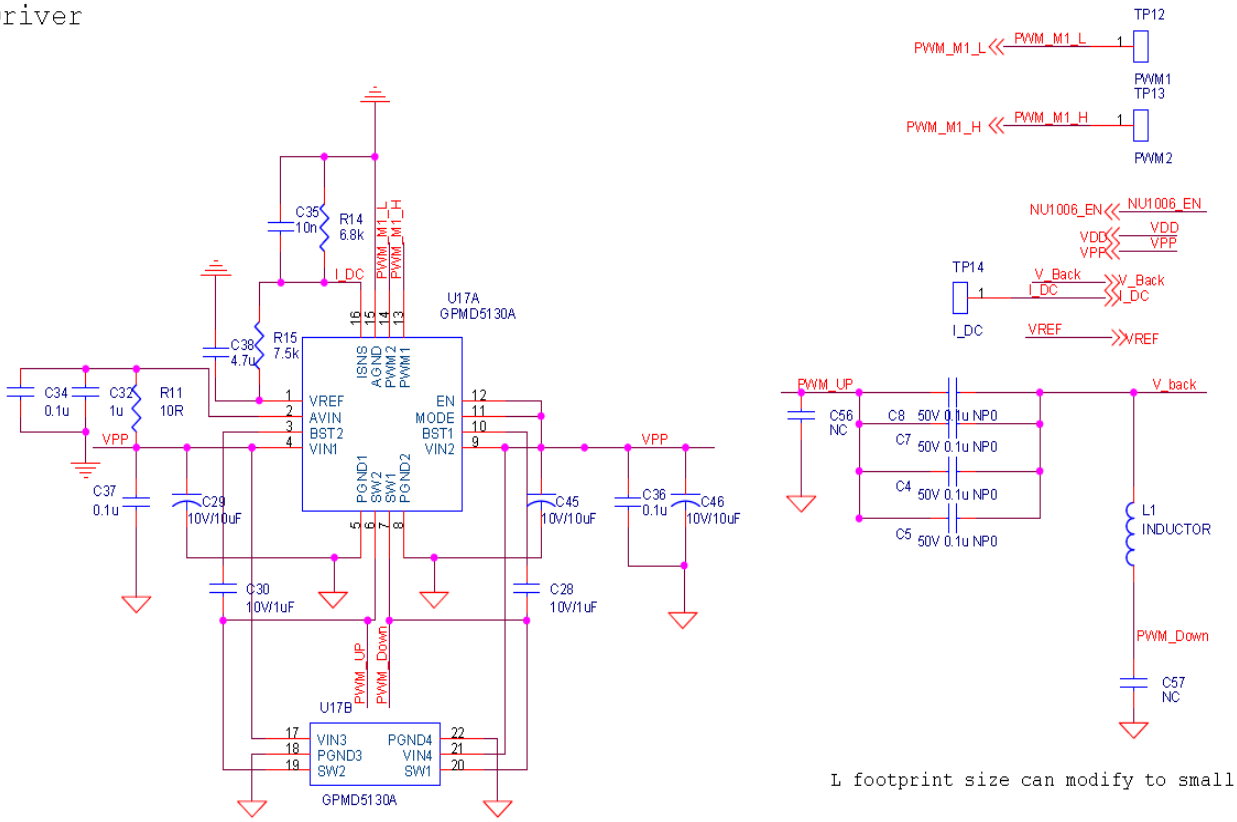
7.2.1. Circuit for Wearable Application

MCU



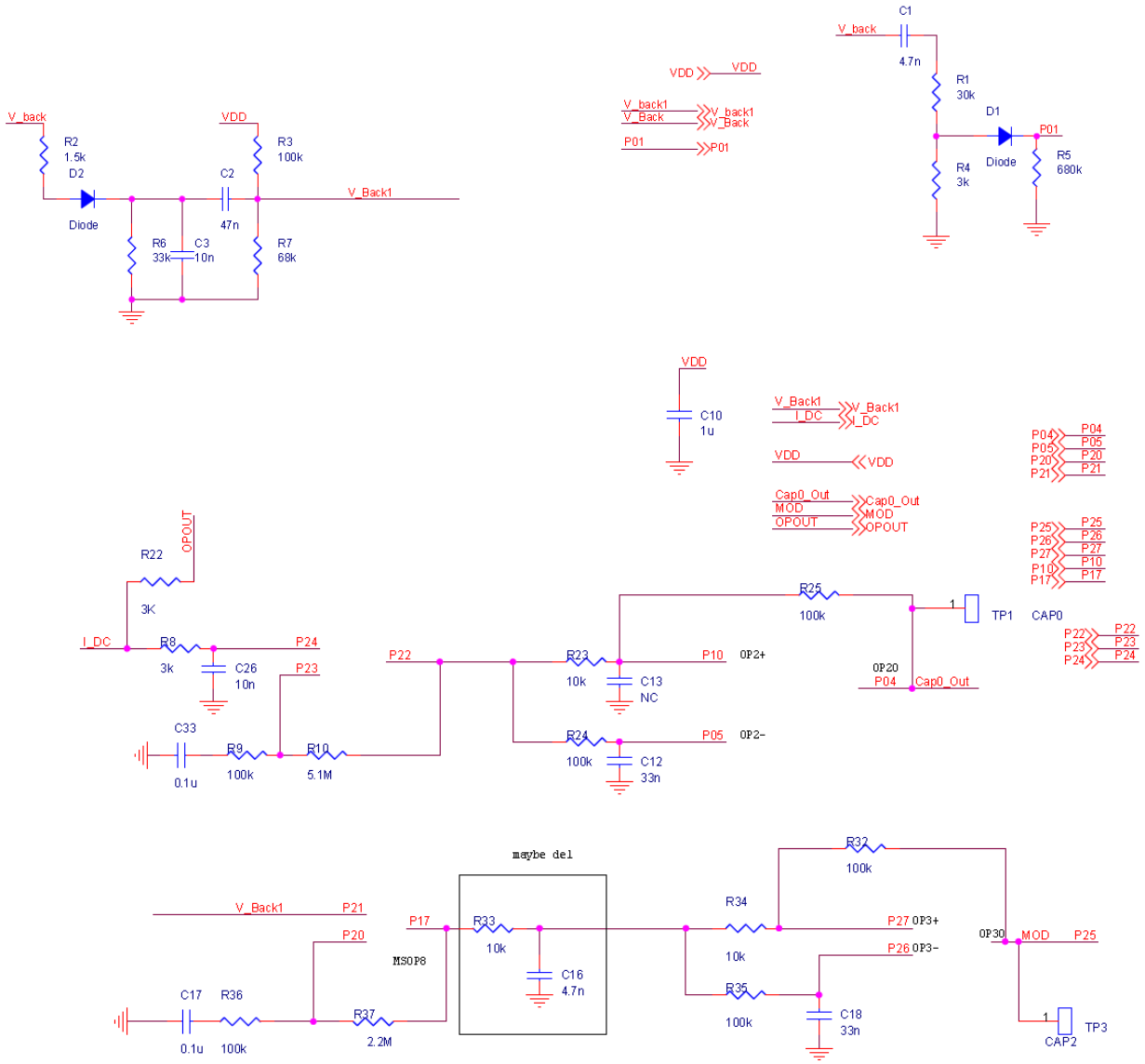
Full Bridge

PWM Driver

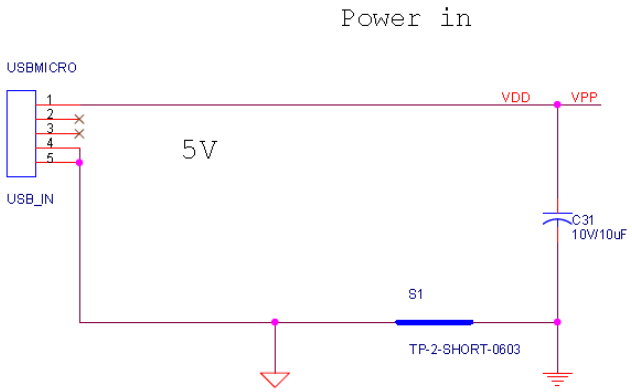


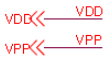
L footprint size can modify to small

Feedback


V_back
R2
1.5k
D2
Diode
VDD
R3
100k
C2
47n
V_Back1
R6
33k
C3
10n
R7
68k
C1
V_back
4.7n
R1
30k
D1
P01
Diode
R4
3k
R5
680k
VDD
VDD
V_back1
V_Back
V_back1
V_Back
P01
P01
C10
1u
V_Back1
I_DC
V_Back1
I_DC
VDD
VDD
Cap0_Out
MOD
OPOUT
Cap0_Out
MOD
OPOUT
P04
P05
P20
P21
P04
P05
P20
P21
P25
P26
P27
P10
P17
P25
P26
P27
P10
P17
P22
P23
P24
P22
P23
P24
R22
OPOUT
3K
I_DC
R8
3k
P24
C26
10n
P23
C33
0.1u
R9
100k
R10
5.1M
P22
R23
10k
C13
NC
P10
OP2+
R24
100k
C12
33n
P05
OP2-
R25
100k
1
TP1
CAP0
OP20
P04
Cap0_Out
maybe del
R32
100k
V_Back1
P21
P20
P17
R33
10k
C16
4.7n
MSOP8
C17
0.1u
R36
100k
R37
2.2M
R34
10k
R35
100k
C18
33n
P27
OP3+
P26
OP3-
OP30
MOD
P25
1
TP3
CAP2

Power & Protection





7.2.2. BOM for Wearable Application

GPMQ8005B_GPMD5130A_DEMO_BOARV11

Item	Quantity	Reference	Part	Size
1	2	C1,C16	4.7n	C-0402
2	1	C2	47n	C-0603
3	4	C3,C23,C26,C35	10n	C-0402
4	4	C4,C5,C7,C8	50V 0.1u NP0	C-1206
5	3	C10,C27,C32	1u/6.3V	C-0402
6	2	C12,C18	33n	C-0402
7	3	C13,C56,C57	NC	C-0402
8	7	C17,C22,C24,C33,C34,C36,C37	0.1u	C-0402
9	1	C19	2.2uF/10V	C-0603
10	2	C28,C30	1uF/10V	C-0603
11	4	C29,C31,C45,C46	10uF/10V	C-0603
12	1	C38	4.7u	C-0402
13	2	D1,D2	1N4148	D-0805
14	1	D14	LED（绿）	LED-0603
15	1	D15	LED（红）	LED-0603
16	1	R1	30k	R-0402
17	1	R2	1.5k	R-0603
18	7	R3,R9,R24,R25,R32,R35,R36	100k	R-0402
19	3	R4,R8,R22	3K	R-0402
20	1	R5	680k	R-0402
21	1	R6	33k	R-0402
22	1	R7	68k	R-0402
23	1	R10	5.1M	R-0402
24	1	R11	10R	R-0603
25	1	R14	6.8k	R-0402
26	1	R15	7.5k	R-0402
27	3	R23,R33,R34	10k	R-0402
28	1	R37	2.2M	R-0402
29	2	R81,R84	1k	R-0603
30	2	R121,R122	300K 1%	R-0402
31	1	USBMICRO	USB_MICRO	USB-Connector
32	1	U16	GPMQ8005B	QFN32-0.5-5X5
33	1	U17	GPMD5130A	GPMD5130A

Note: (1) R121、R122 demand precision resistors (1%), all resistors power& precision are standard values.

(2) Unlabeled capacitive voltage specifications 25V.

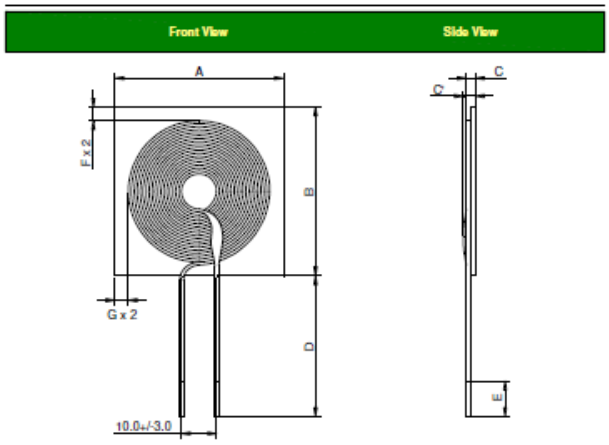
7.2.3. Coil spec for Wearable Application

Part No Example:

GW	242418	P	T	-	055	A	18	Y	TN
1	2	3	4		5	6	7	8	9

1. Product Code : GW
2. Size Code : 242418 = 24.0 x 24.0 x 1.8
3. P = Pb Free < 1000ppm
4. T = Tx
5. Wire Size : 055 = 0.55 mm ..... etc.
6. Wire Count : A = Single , B = 2 Wire , C = 3 Wire ..... etc.
7. Wire Turns (Ts) : 18 = 18.0 Ts
8. Wire Color : Y = Copper Yellow , R = Copper Red
9. TN : Material Code

DIMENSION : [mm]



Size	A[+/-0.5]	B[+/-0.5]	C[+/-0.3]	C'[Max]	D[+/-3.0]	E[+/-2.0]	F[Min.]	G[Min.]
242418	24.0	24.0	1.8	2.8	20.0	5.0	0.5	0.5

Test Equipment :

* HP4284A , HP42841A - L , RDC

Standard Atmospheric Conditions :
Ambient Temp : 20 +/- 15°C
Relative Humidity : 65 +/- 20%
If there may be any doubt on the result,
measurement shall be made within the following limits :
Ambient Temp : 25 +/- 5°C
Relative Humidity : 75 +/- 10%

Operating & Storage Condition :

OPERATING TEMP : -25 ~ +85°C

STORAGE TEMP : -40 ~ +85°C
STORAGE LIFE TIME : 12 MONTH @25°C , RH 40~65%

Attention & Caution :

Please avoid following matters:
* Splashing water or salt water
* Toxic Gas (Hydrogen sulfide, Sulfurous acid, Chlorine, Ammonia)
* Vibrations or shocks which exceed the specified condition
* Dew condenses
* Please be careful for the stress to this product by board flexure or something after the mounting.

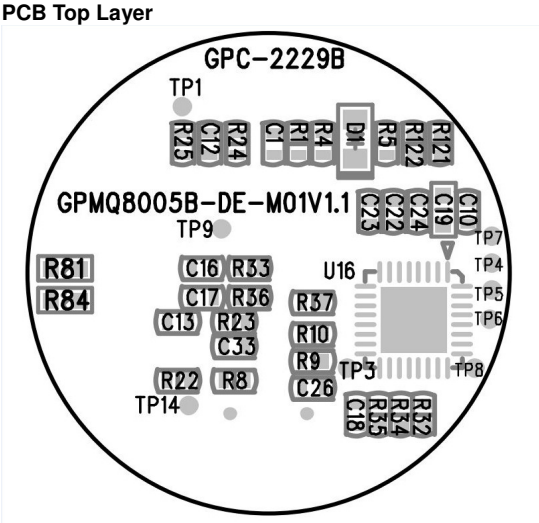
Electrical Characteristics :

GOTREND PN	Inductance (uH)	DCR (m Ohm)
GW242418PT-055A18YTN	6.30 +/- 10%	65.0 +/-20%

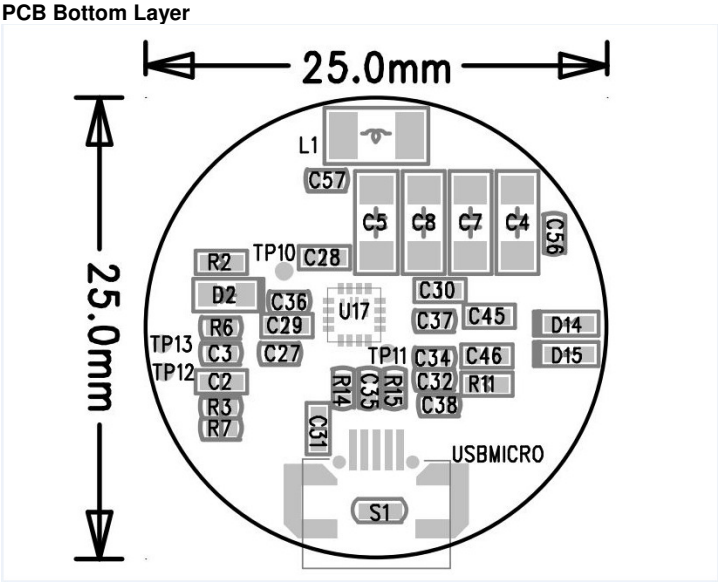
* Inductance Test Condition@100KHz,1.0Vrms, 25°C Ambient

7.2.4. Silkscreen Layer for Wearable Application

PCB Top Layer



PCB Bottom Layer



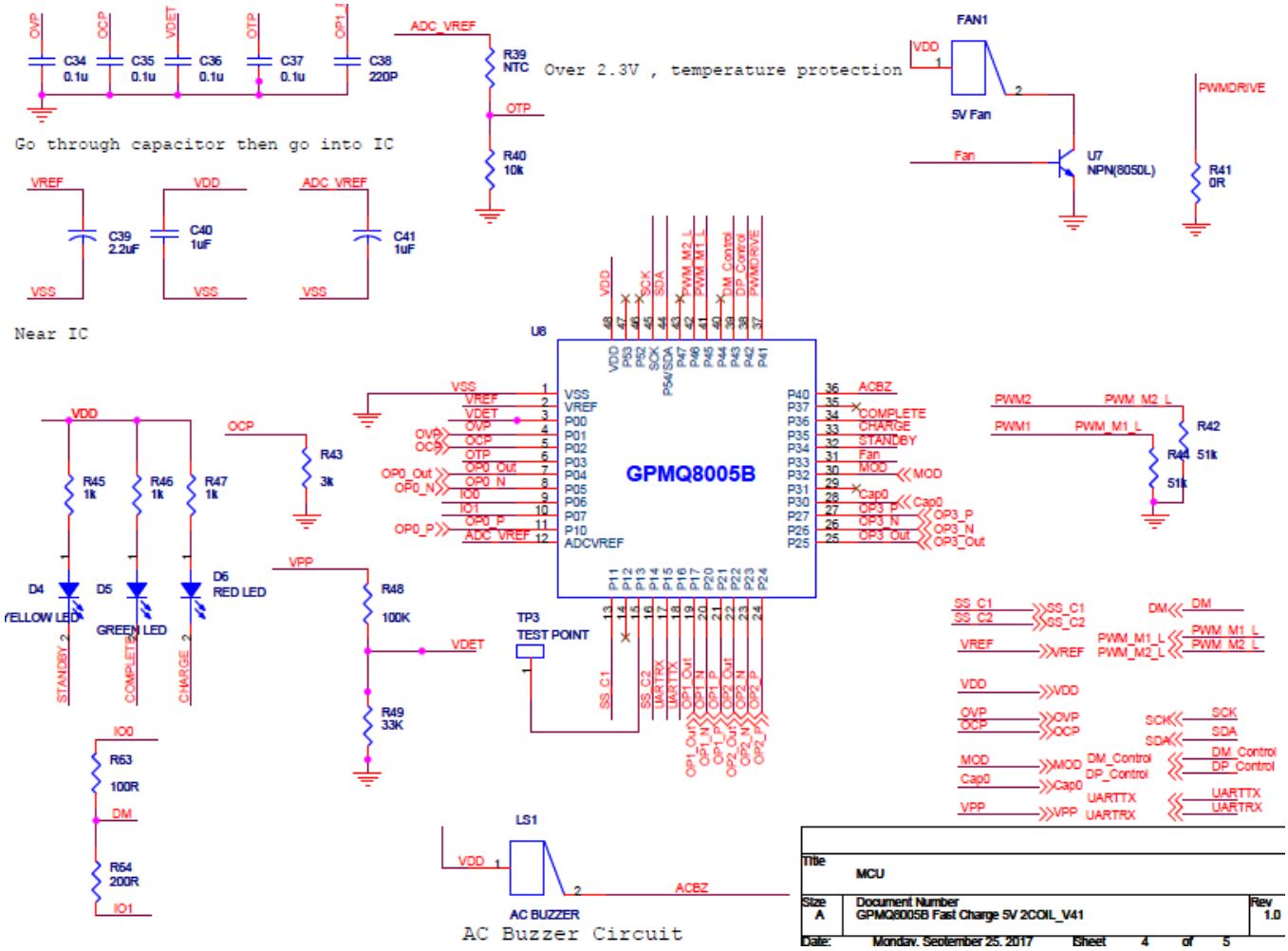
7.3. Wireless Fast Charger application circuit (2coil)

This application is Fast Charger Solution combine with low power solution. This is two-coil application. A standard QI Compliant circuit, built-in LED and BUZZER supply user identification state of charge, device contains quad OPA- Amplifier with synchronous execution demodulator, get better demodulation performance. Please note that USB adapter need to support 9V input.

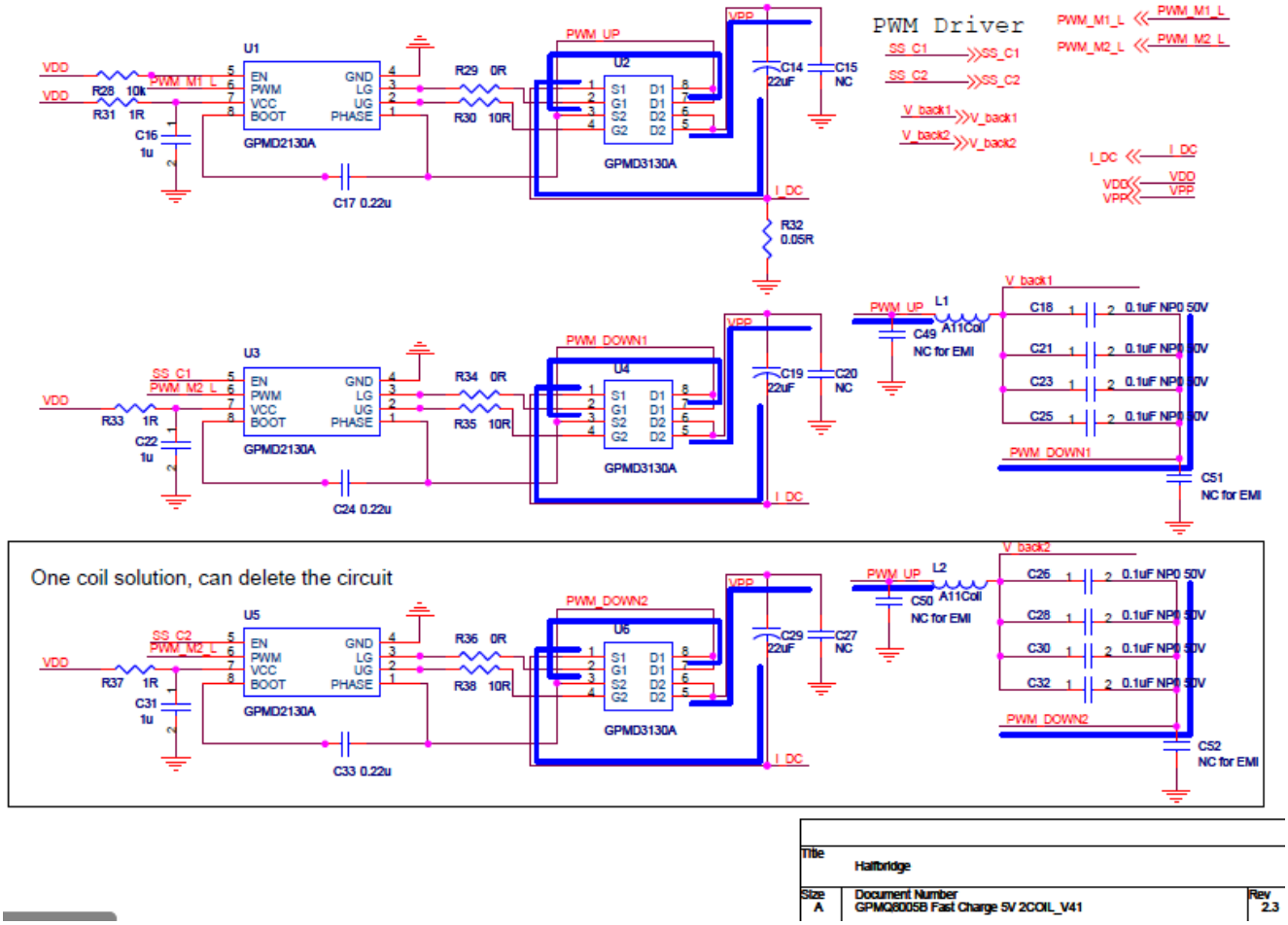
7.3.1. Circuit for Fast charger solution.

GPMQ8005B Fast Charge 5V 2COIL_V41

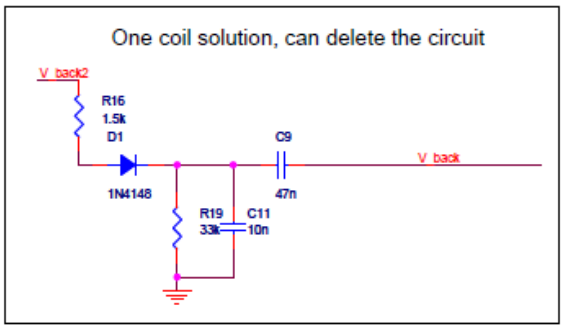
MCU

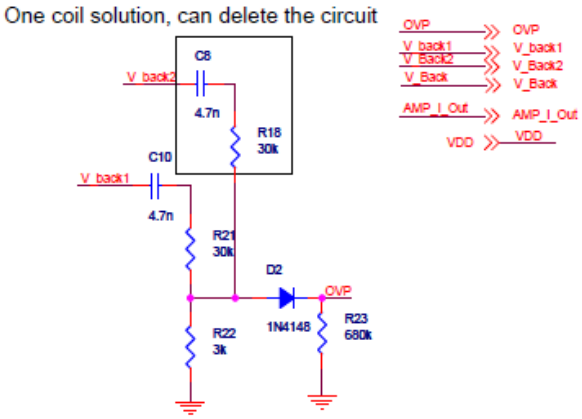


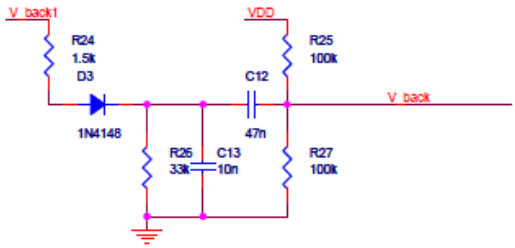
PWM Driver


PWM Driver
One coil solution, can delete the circuit
GPMD2130A
GPMD3130A
Halfbridge
GPMQ8005B Fast Charge 5V 2COIL_V41

Demodulation

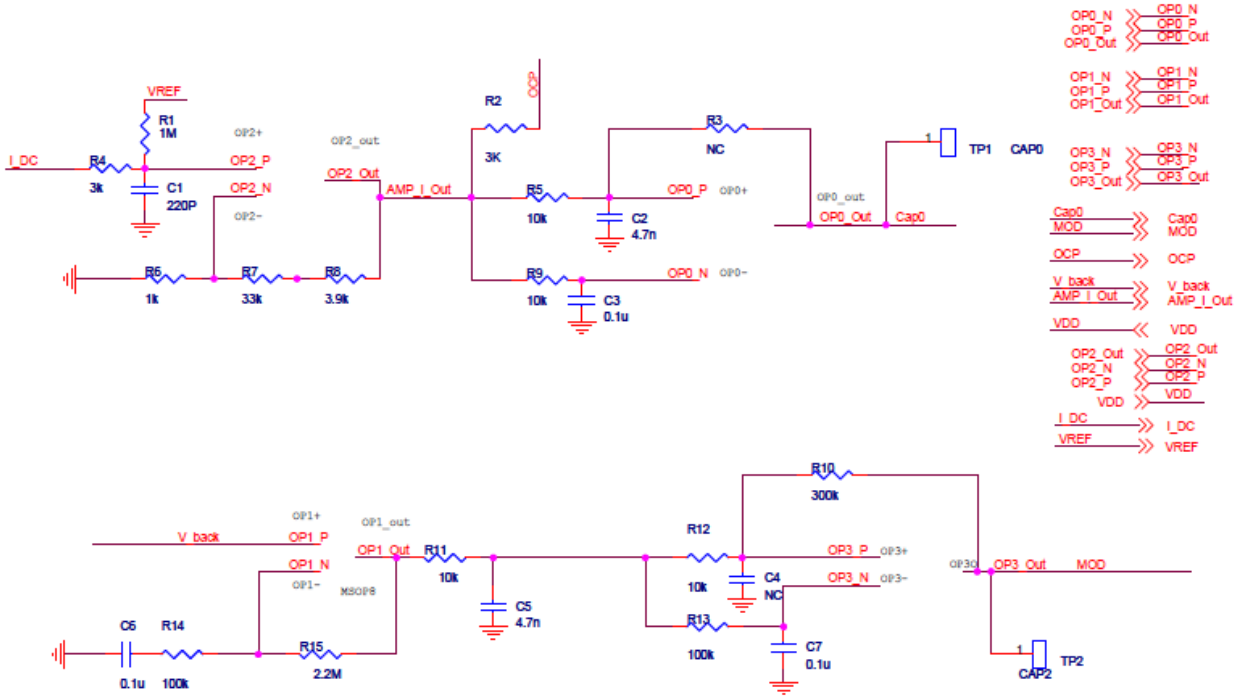






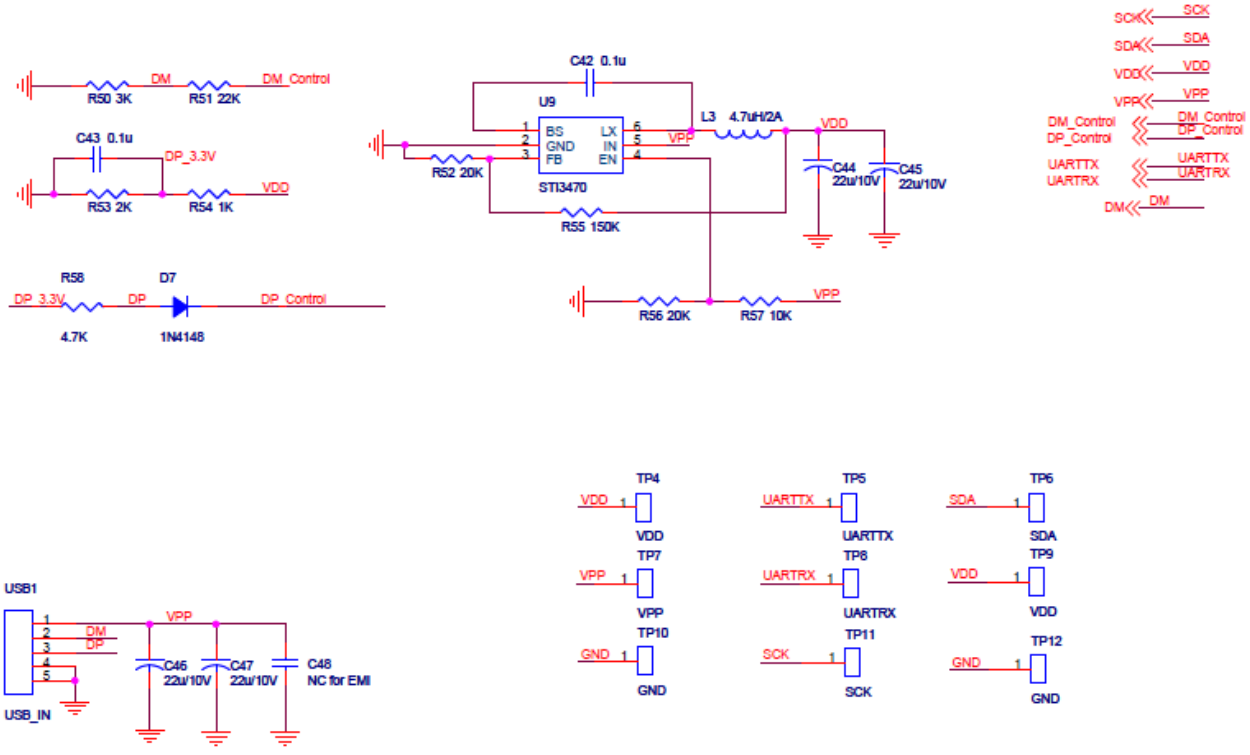
Title: Feedback		
Size: A	Document Number: GPMQ8005B Fast Charge 5V 2COIL_V41	Rev: 1.0
Date: Monday, September 25, 2017	Sheet 2 of 5	

Demodulation



Title	Feedback	
Size: A	Document Number: GPMQ8005B Fast Charge 5V 2COIL_V41	Rev: 1.0
Date: Thursday, December 22, 2016	Sheet 1 of 5	

Power Identification



Title: Power		
Size: A	Document Number: GPMQ8005B Fast Charge 5V 2COIL_V41	Rev: 1.0
Date: Monday, September 25, 2017	Sheet 5 of 5	

7.3.2. BOM for Fast charger solution.(2 Coil)

Item	Quantity	Reference	Part	PCB Footprint
1	2	C1,C38	220P	C-0603
2	4	C2,C5,C8,C10	4.7n	C-0603
3	9	C3,C6,C7,C34,C35,C36,C37,C42,C43	0.1u	C-0603
4	4	C4,C15,C20,C27	NC	C-0603
5	2	C9,C12	47n	C-0603
6	2	C11,C13	10n	C-0603
7	3	C14,C19,C29	22uF	C-0805
8	3	C16,C22,C31	1u	C-0603
9	3	C17,C24,C33	0.22u	C-0603
10	8	C18,C21,C23,C25,C26,C28,C30,C32	0.1uF NP0 50V	C-1210
11	1	C39	2.2uF	C-0603
12	2	C40,C41	1uF	C-0603
13	4	C44,C45,C46,C47	22u/10V	C-0805
14	5	C48,C49,C50,C51,C52	NC for EMI	C-0603
15	4	D1,D2,D3,D7	1N4148	D-1206
16	1	D4	YELLOW LED	LED-0603
17	1	D5	GREEN LED	LED-0603
18	1	D6	RED LED	LED-0603
19	1	FAN1	5V Fan	SIP2
20	1	LS1	AC BUZZER	SIP2
21	2	L1,L2	A11Coil	L-SMD-6.0
22	1	L3	4.7uH/2A	L-SMD-4.4
23	1	R1	1M	R-0603
24	5	R2,R4,R22,R43,R50	3K	R-0603
25	1	R3	NC	R-0603
26	7	R5,R9,R11,R12,R28,R40,R57	10K	R-0603
27	5	R6,R45,R46,R47,R54	1K	R-0603
28	4	R7,R19,R26,R49	33K	R-0603
29	1	R8	3.9k	R-0603
30	1	R10	300k	R-0603
31	5	R13,R14,R25,R27,R48	100K	R-0603
32	1	R15	2.2M	R-0603
33	2	R16,R24	1.5k	R-0603
34	2	R18,R21	30k	R-0603
35	1	R23	680k	R-0603
36	4	R29,R34,R36,R41	0R	R-0603
37	3	R30,R35,R38	10R	R-0603

38	3	R31,R33,R37	1R	R-0603
39	1	R32	0.05R	R-1206
40	1	R39	NTC	R-TTF103
41	2	R42,R44	51k	R-0603
42	1	R51	22K	R-0603
43	2	R52,R56	20K	R-0603
44	1	R53	2K	R-0603
45	1	R55	150K	R-0603
46	1	R58	4.7K	R-0603
47	1	R63	100R	R-0603
48	1	R64	200R	R-0603
49	1	USB1	USB_IN	MICROUSB-2
50	3	U1,U3,U5	GPMD2130A	DIP8-SOP150
51	3	U2,U4,U6	GPMD3130A	DIP8-SOP150
52	1	U7	NPN(8050L)	SOT-23-1
53	1	U8	GPMQ8005B	QFP48-0.5
54	1	U9	STI3470	SOT-23-6

Note: (1) R48、R49 demand precision resistors (1%), all resistors power& precision are standard values.

(2) Unlabeled capacitive voltage specifications 25V.

7.3.3. Coil spec.

Contact with GeneralPlus.

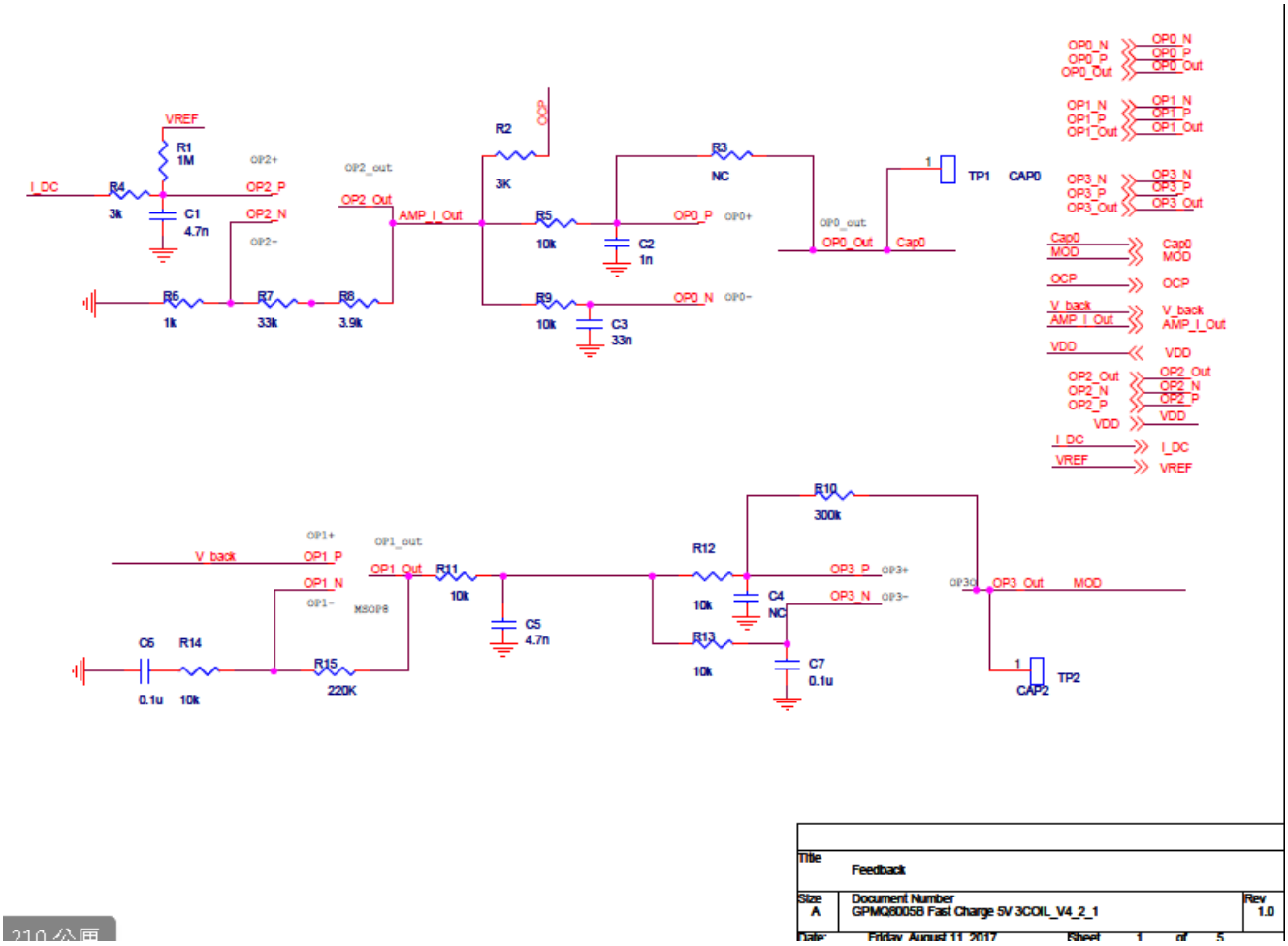
7.4. A28 3 Coil type application circuit

GPMQ8005B also has the solution for A28 coil. This is 3 coil type Transmitter. This uses 5V input voltage..

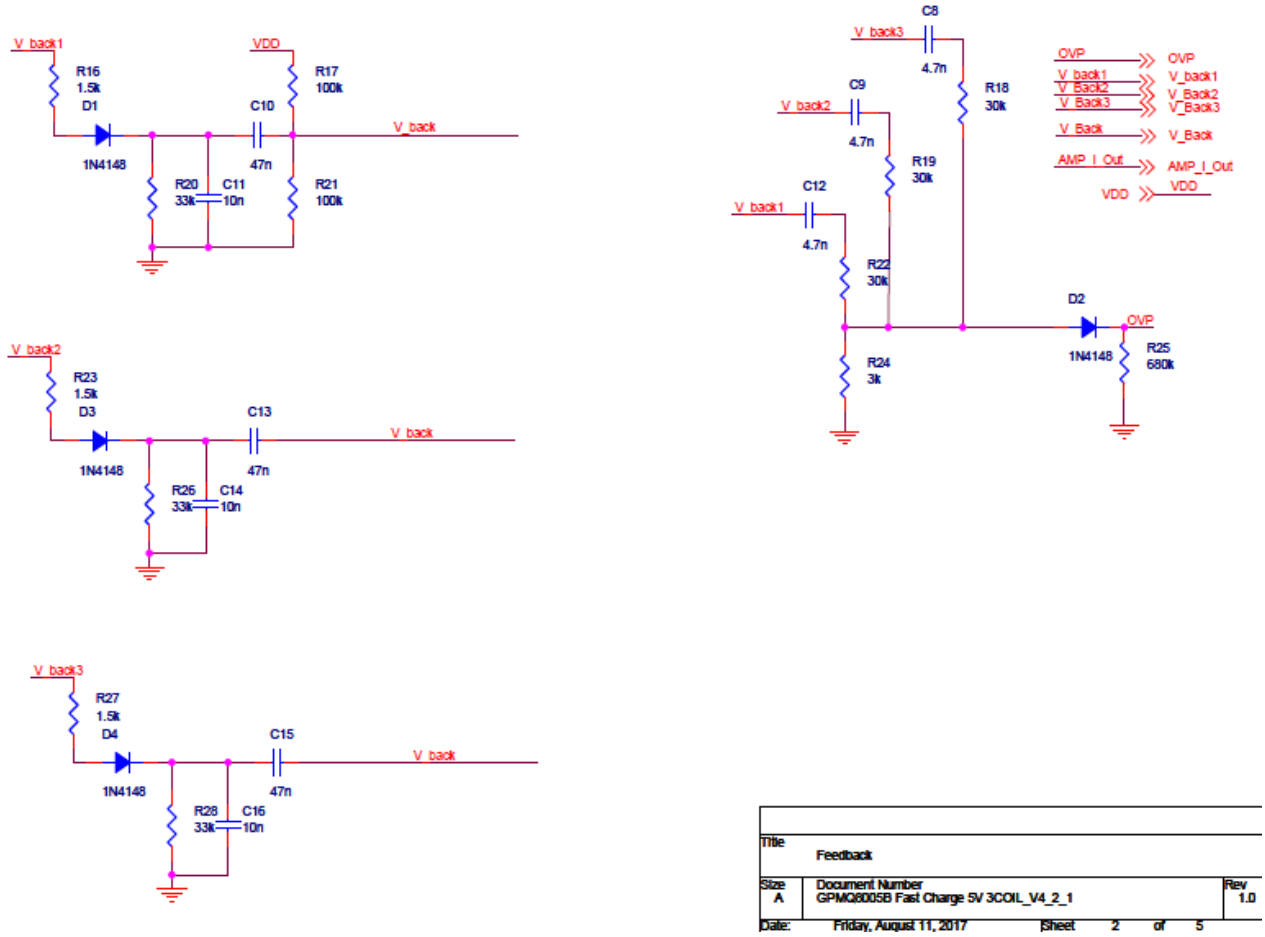
7.4.1. Circuit for 3 coil type solution

GPMQ8005B FAST CHARGE 5V 3COIL_V4_2_1

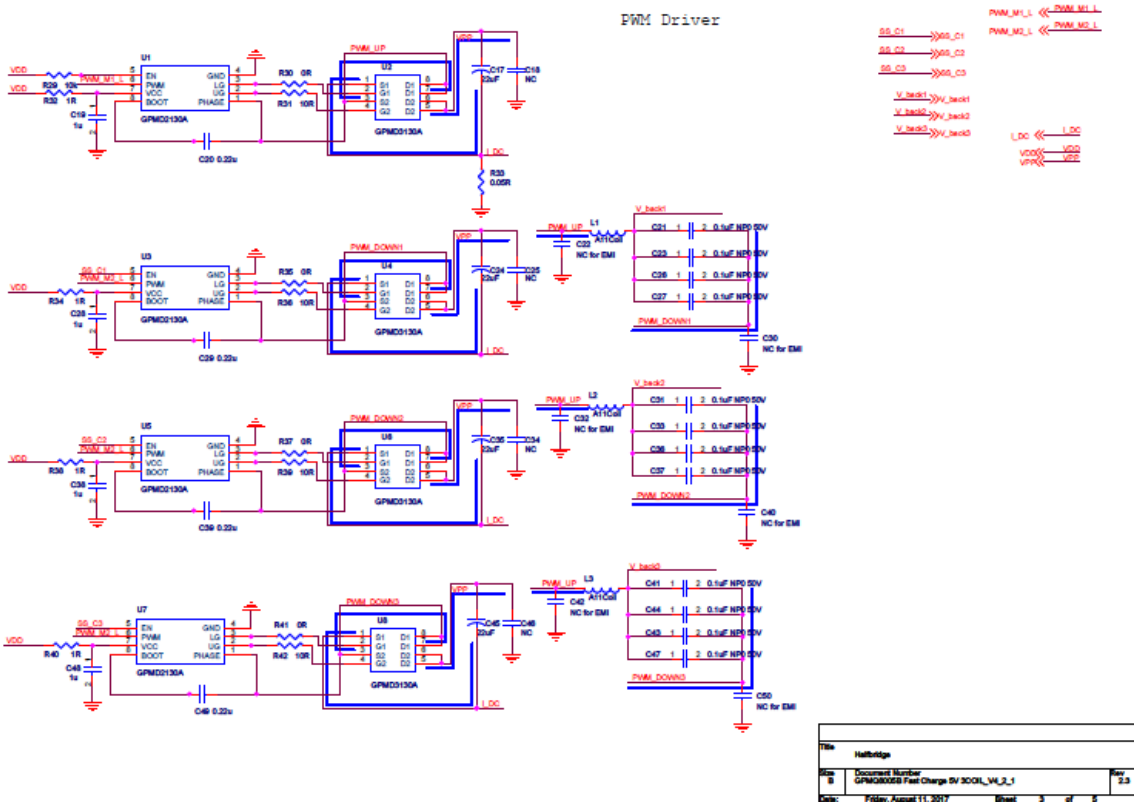
Demodulation



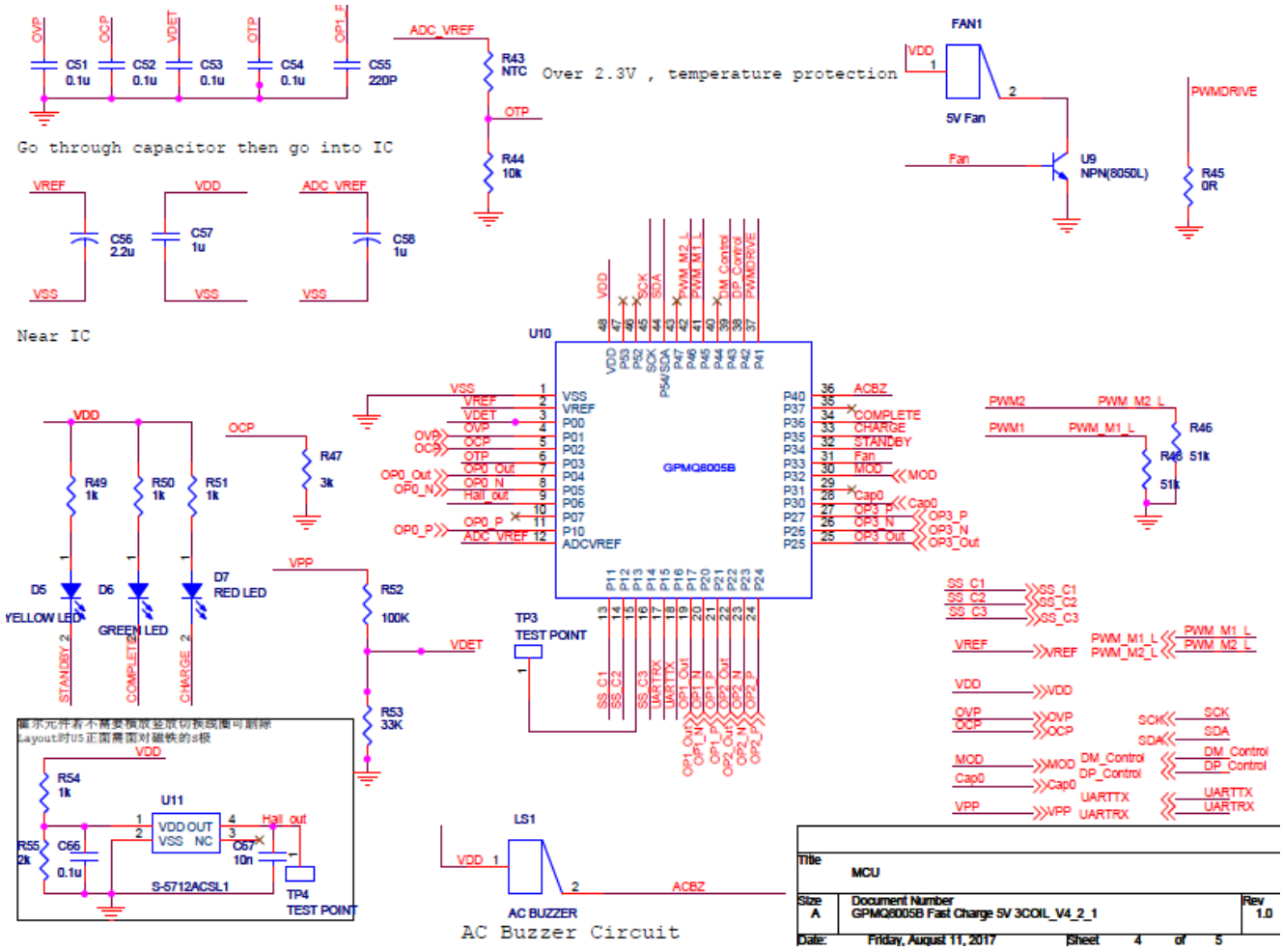
Demodulation



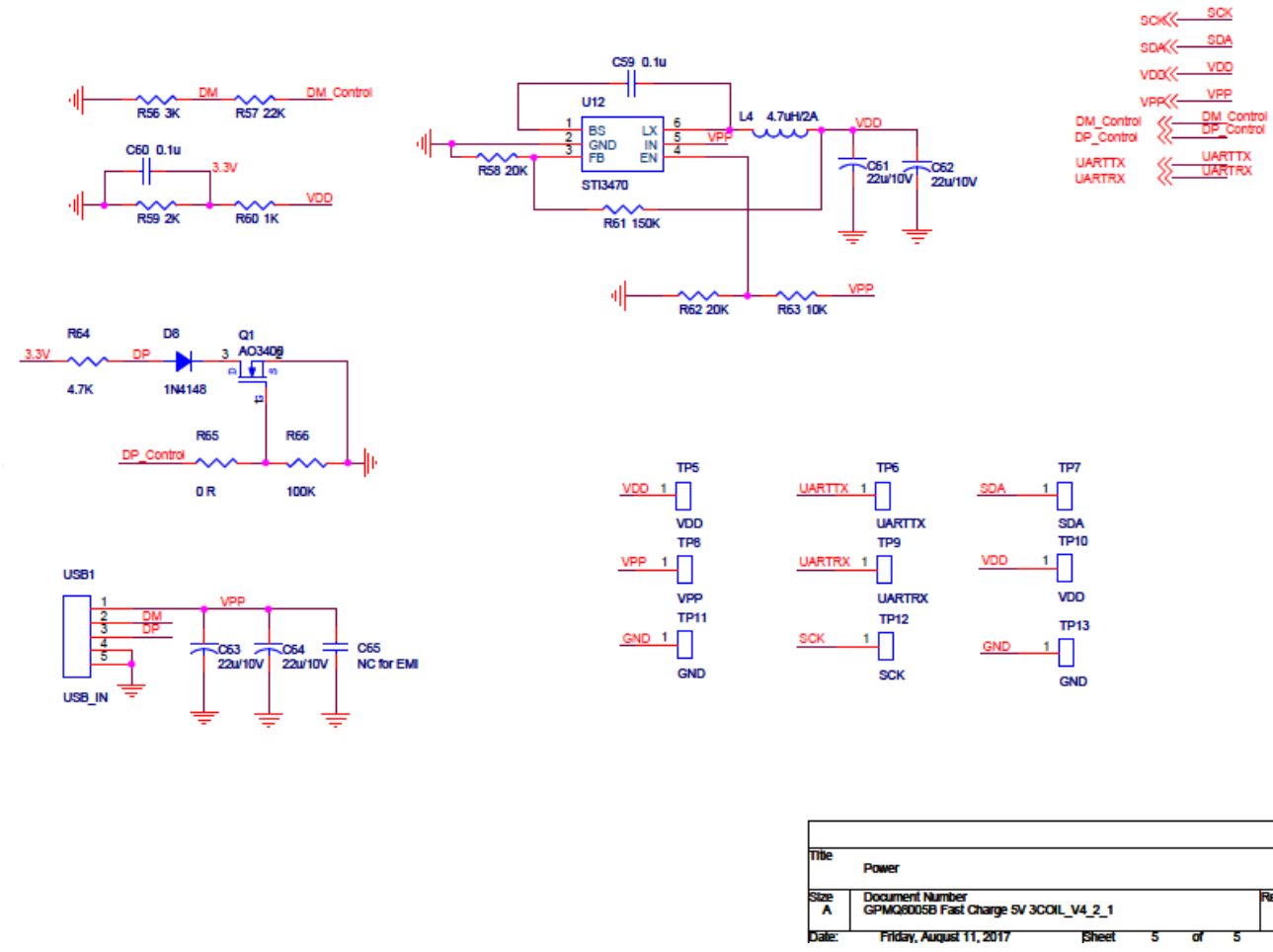
PWM Driver



MCU


Go through capacitor then go into IC
Over 2.3V , temperature protection
Near IC
GPMQ8005B
U10
U11
U9
NPN(8050L)
FAN1
5V Fan
TP3
TEST POINT
TP4
TEST POINT
LS1
AC BUZZER
AC Buzzer Circuit
S-5712ACSL1
YELLOW LED
GREEN LED
RED LED
Title
MCU
Size
A
Document Number
GPMQ8005B Fast Charge 5V 3COIL_V4_2_1
Rev
1.0
Date:
Friday, August 11, 2017
Sheet
4
of
5

Power IN



Title	Power	
Size: A	Document Number: GPMQ8005B Fast Charge 5V 3COIL_V4_2_1	Rev: 1.0
Date: Friday, August 11, 2017	Sheet 5 of 5	

BOM for 3 Coil Solution.(A28 Coil type)

Item	Quantity	Reference	Part	Footprint
1	5	C1,C5,C8,C9,C12	4.7n	C-0603
2	1	C2	1n	C-0603
3	1	C3	33n	C-0603
4	5	C4,C18,C25,C34,C46	NC	C-0603
5	9	C6,C7,C51,C52,C53,C54,C59,C60,C66	0.1u	C-0603
6	3	C10,C13,C15	47n	C-0603
7	3	C11,C14,C16,C67	10n	C-0603
8	4	C17,C24,C35,C45	22uF	C-0805
9	6	C19,C28,C38,C48,C57,C58	1u	C-0603
10	4	C20,C29,C39,C49	0.22u	C-0603
11	12	C21,C23,C26,C27,C31,C33,C36,C37,C41,C43,C44,C47	0.1uF NP0 50V	C-1210
12	7	C22,C30,C32,C40,C42,C50,C65	NC for EMI	C-0603
13	1	C55	220P	C-0603
14	1	C56	2.2u	C-0603
15	4	C61,C62,C63,C64	22u/10V	C-0805
16	5	D1,D2,D3,D4,D8	1N4148	D-1206
17	1	D5	YELLOW LED	LED-0603
18	1	D6	GREEN LED	LED-0603
19	1	D7	RED LED	LED-0603
20	1	FAN1	5V Fan	SIP2
21	1	LS1	AC BUZZER	SIP2
22	3	L1,L2,L3	A11Coil	L-SMD-6.0
23	1	L4	4.7uH/2A	L-SMD-4.4
24	1	Q1	AO3400	SOT-23-1
25	1	R1	1M	R-0603
26	5	R2,R4,R24,R47,R56	3K	R-0603
27	1	R3	NC	R-0603
28	9	R5,R9,R11,R12,R13,R14,R29,R44,R63	10k	R-0603
29	6	R6,R49,R50,R51,R54,R60	1K	R-0603
30	5	R7,R20,R26,R28,R53	33K	R-0603
31	1	R8	3.9k	R-0603
32	1	R10	300k	R-0603
33	1	R15	220K	R-0603
34	3	R16,R23,R27	1.5k	R-0603
35	4	R17,R21,R52,R66	100K	R-0603
36	3	R18,R19,R22	30k	R-0603
37	1	R25	680k	R-0603
38	5	R30,R35,R37,R41,R45	0R	R-0603
39	4	R31,R36,R39,R42	10R	R-0603

40	4	R32,R34,R38,R40	1R	R-0603
41	1	R33	0.05R	R-1206
42	1	R43	NTC	R-TTF103
43	2	R46,R48	51k	R-0603
44	2	R55,R59	2K	R-0603
45	1	R57	22K	R-0603
46	2	R58,R62	20K	R-0603
47	1	R61	150K	R-0603
48	1	R64	4.7K	R-0603
49	1	R65	0 R	R-0603
50	1	TP1	CAP0	TP40R
51	1	TP2	CAP2	TP40R
52	2	TP3,TP4	TEST POINT	TP30R
53	2	TP5,TP10	VDD	TP40R
54	1	TP6	UARTTX	TP40R
55	1	TP7	SDA	TP40R
56	1	TP8	VPP	TP40R
57	1	TP9	UARTRX	TP40R
58	2	TP11,TP13	GND	TP40R
59	1	TP12	SCK	TP40R
60	1	USB1	USB_IN	MICROUSB-2
61	4	U1,U3,U5,U7	GPMD2130A	DIP8-SOP150
62	4	U2,U4,U6,U8	GPMD3130A	DIP8-SOP150
63	1	U9	NPN(8050L)	SOT-23-1
64	1	U10	GPMW5019B	QFP48-0.5
65	1	U11	S-5712ACSL1	SNT-4A
66	1	U12	STI3470	SOT-23-6

Note: (1) R52、R53 demand precision resistors (1%), all resistors power& precision are standard values.

(2) Unlabeled capacitive voltage specifications 25V.

7.4.2. Coil spec.

This application use typical A28 coil type. Please refer to Qi spec. Part 4 A28 coil type or contact with Generalplus for more information.

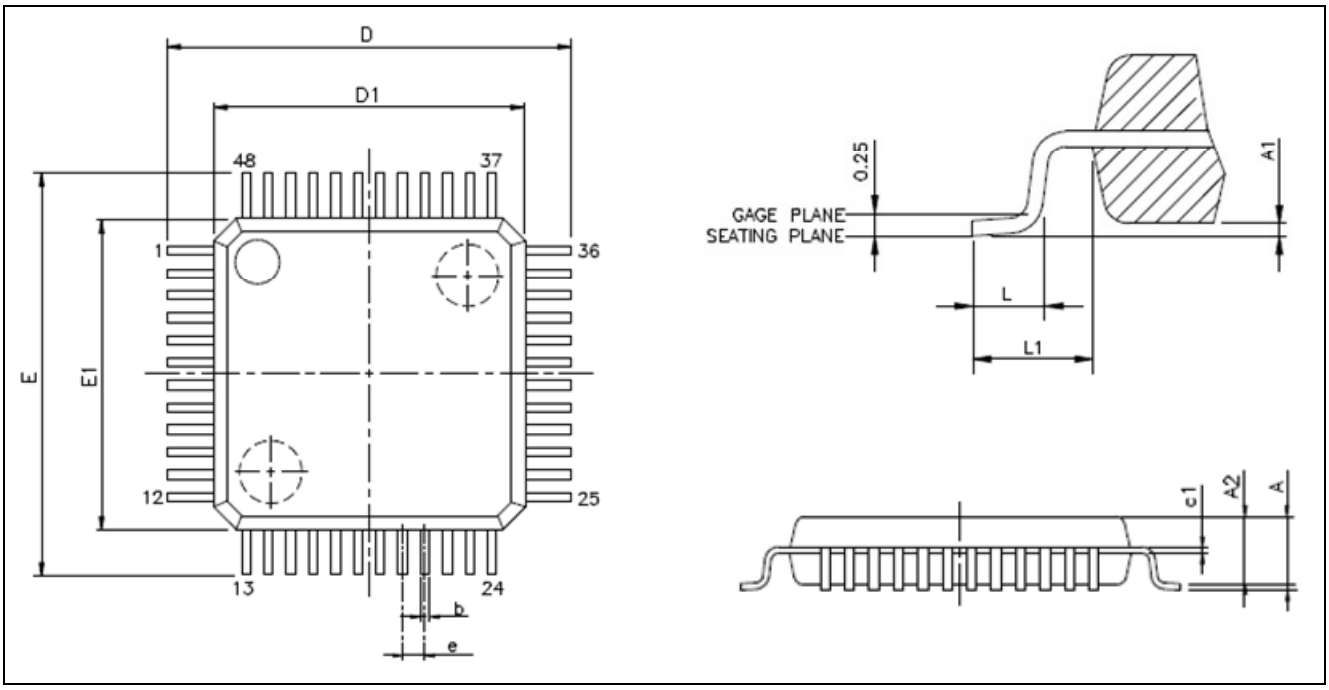
PACKAGE/PAD LOCATIONS

7.5. Ordering Information

Product Number	Package Type
GPMQ8005B-xxxA-QL23x	LQFP48
GPMQ8005B-xxxA-QV04x	QFN32

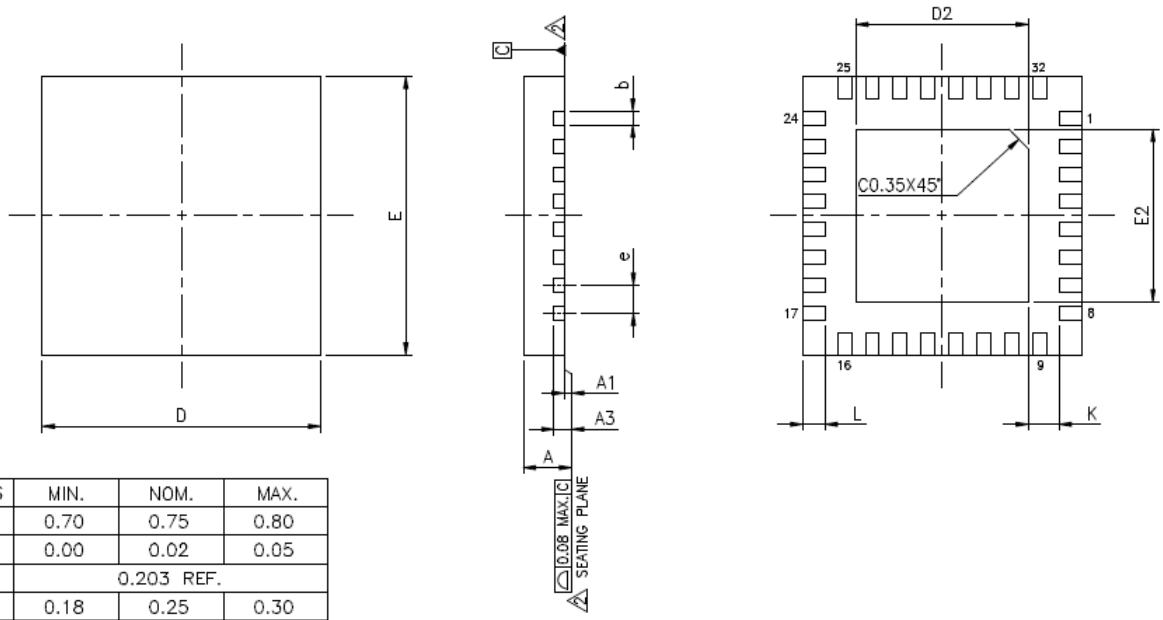
7.6. Package Information

7.7. LQFP 48



Symbol	Millimeter		
	Min.	Nom.	Max.
A	-	-	1.60
A1	0.05	-	0.15
A2	1.35	-	1.45
c1	0.09	-	0.16
D	9.00 BSC		
D1	7.00 BSC		
E	9.00 BSC		
E1	7.00 BSC		
e	0.50 BSC		
b	0.17	-	0.27
L	0.45	-	0.75
L1	1.00 REF		

7.8. QFN 32



SYMBOLS	MIN.	NOM.	MAX.
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A3		0.203 REF.	
b	0.18	0.25	0.30
D	4.90	5.00	5.10
E	4.90	5.00	5.10
e		0.50 BSC.	
L	0.35	0.40	0.45
K	0.20	—	—

UNIT : mm

	D2			E2		
EXPOSED PAD	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
2.7X2.7	2.60	2.70	2.80	2.60	2.70	2.80
3.2X3.2	3.10	3.20	3.30	3.10	3.20	3.30

UNIT : mm

NOTES :
1. JEDEC OUTLINE : N/A.
2. DIMENSION b APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.15mm AND 0.30mm FROM THE TERMINAL TIP. IF THE TERMINAL HAS THE OPTIONAL RADIUS ON THE OTHER END OF THE TERMINAL, THE DIMENSION b SHOULD NOT BE MEASURED IN THAT RADIUS AREA.
3. THE MINIMUM "K" VALUE OF 0.20mm APPLIES.
4. BILATERAL COPLANARITY ZONE APPLIES TO THE EXPOSED HEAT SINK SLUG AS WELL AS THE TERMINALS.

8. DISCLAIMER

The information appearing in this publication is believed to be accurate.

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9. REVISION HISTORY

Date	Revision #	Description	Page
Jun. 22, 2015	1.0	Original	29
SEP. 09,2017	1.1	Add fast charger and 3coil type	43