

## 20W High-Integration, High-Efficiency Power Solution for Wireless Power Transmitter Evaluation Board

### FEATURES

- Input Voltage Range: 4.2V-17V
- Up to 20W Power Transfer
- Integrated High Efficiency Full-Bridge Power Stage
- Integrated High Efficiency 5V-1A Buck Convertor
- Optimized for EMI
- Build in 3.3V-200mA LDO
- Provide 2.5V Voltage Reference
- Integrated Input Current sense with  $\pm 2\%$  accuracy for FOD and modulation
- 3.3V and 5V PWM Signal compatible
- Input Under-Voltage Lockout
- Over current protection
- Thermal shutdown
- 3mm\*4mm QFN-19L Package
- Friendly for PCB layout

### APPLICATIONS

- WPC Compliant Wireless Chargers of 7.5W to 15W Systems for Mobiles, Tablets and Wearable devices
- General Wireless Power Transmitters for Consumer, Industrial and Medical Equipment
- Proprietary Wireless Chargers and Transmitters

### DESCRIPTION

The SCT63240 is a highly integrated power solution optimized for wireless power transmitter applications. This product can be combined with a specialized controller or general MCU based transmitter controller to achieve high performance, high efficient and cost effective wireless power transmitter system which compliant with WPC specification.

This device integrates all the power functions in a wireless power transmitter including Full bridge power stage, 5V Buck converter, 3.3V LDO and input current sensing to simplify system design and minimize external components thus improve system efficiency.

The integrated Full bridge supports up to 20W power transfer and ensures efficient switching with EMI emission. The build in 5V buck convertor and 3.3V LDO to provide power rails to transmitter controller and external equipment and also the power stage driver inside. The build in current detection circuits provides input current information with  $\pm 2\%$  accuracy to support FOD (Foreign Object Detection) and current demodulation.

The SCT63240 has built-in protection features including input under-voltage lockout, power stage over current protection and short-circuit protection, and thermal shutdown protection.

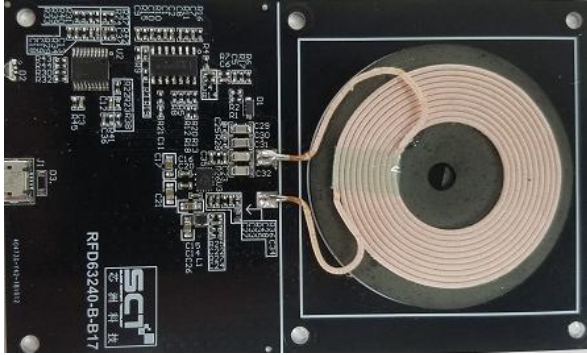
| Board Number  | IC Number |
|---------------|-----------|
| EV63240-B-01A | SCT63240  |

### PERFORMANCE SUMMARY

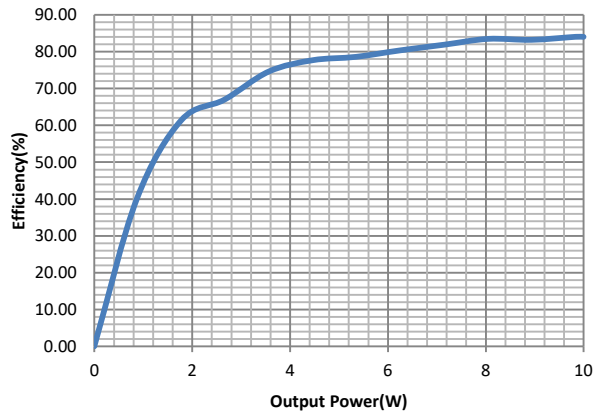
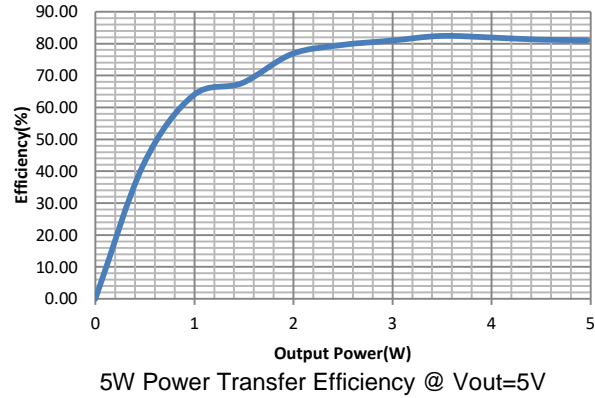
Table 1. Performance

Specifications are at TA = 25°C

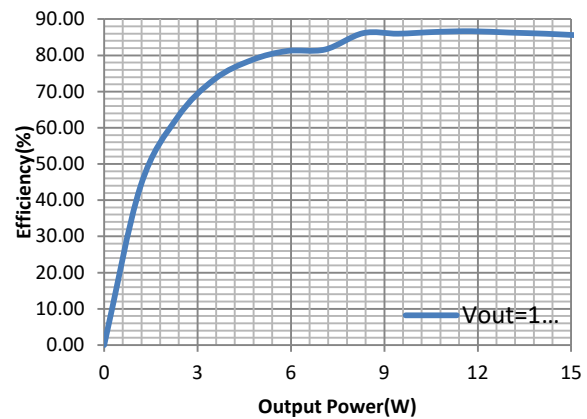
| Parameter     | Condition                             | Value       |
|---------------|---------------------------------------|-------------|
| Input Voltage | PVIN DC up to 20V<br>VIN DC up to 17V | 5V, 9V      |
| Output Power  | VIN=5V, 9V                            | 5W,7,5W,10W |
|               | VIN=12V                               | 15W         |



EV63240-B-01A Evaluation Board Top View



10W Power Transfer Efficiency @ Vout=9V



5W Power Transfer Efficiency @ Vout=12V

## QUICK START PROCEDURE

Evaluation board EV63240-B-01A is easy to set up to evaluate the performance of SCT63240 wireless power transmitter IC. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

1. Input /Output Connection:
  - J1: USB input connection.
  - D2: Status indication.
2. Meters:
  - Connect ammeter between USB cable and J1 connector to measure input current.
  - Connect voltmeter across TVS diode D3 to measure input voltage.
3. Once an adapter that supports Quick Charge 2.0 is plugged in, the indicator D2 will light for five seconds and then go out. The voltage across D3 will be 9.0V.
4. The indicator D2 will light again when a receiver module or a mobile phone which supports wireless charging placed.
5. Generally a buzzer will ring when the power reaches the receiver's requirement.
6. Remove R38 for higher transmit power like 15W.
7. The indicator D2 will flash when the system detects a foreign object.

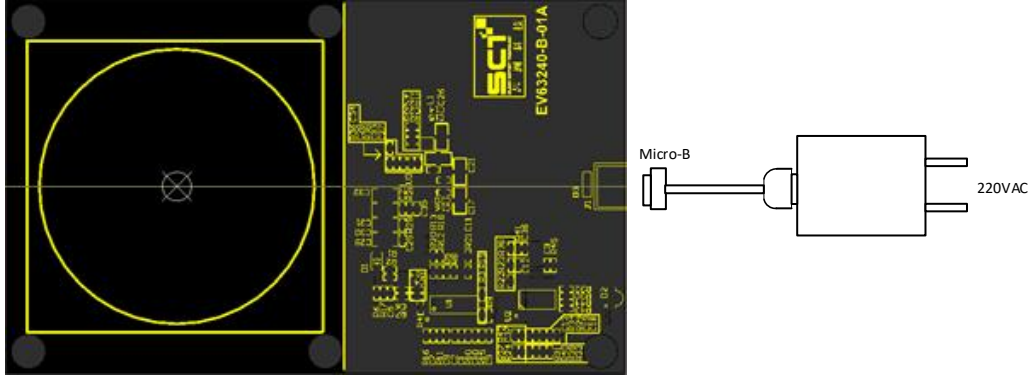
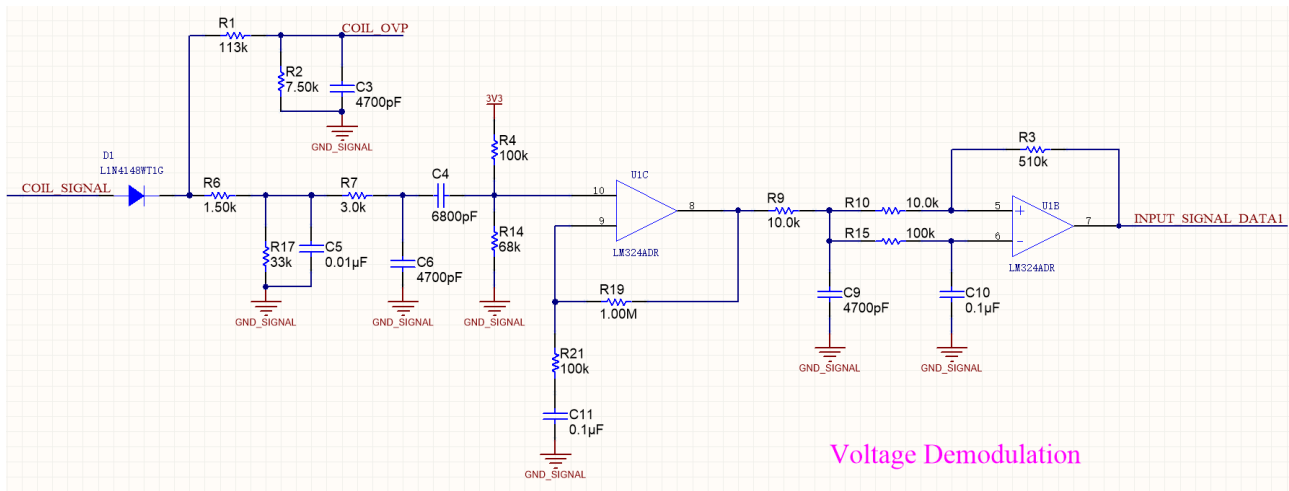
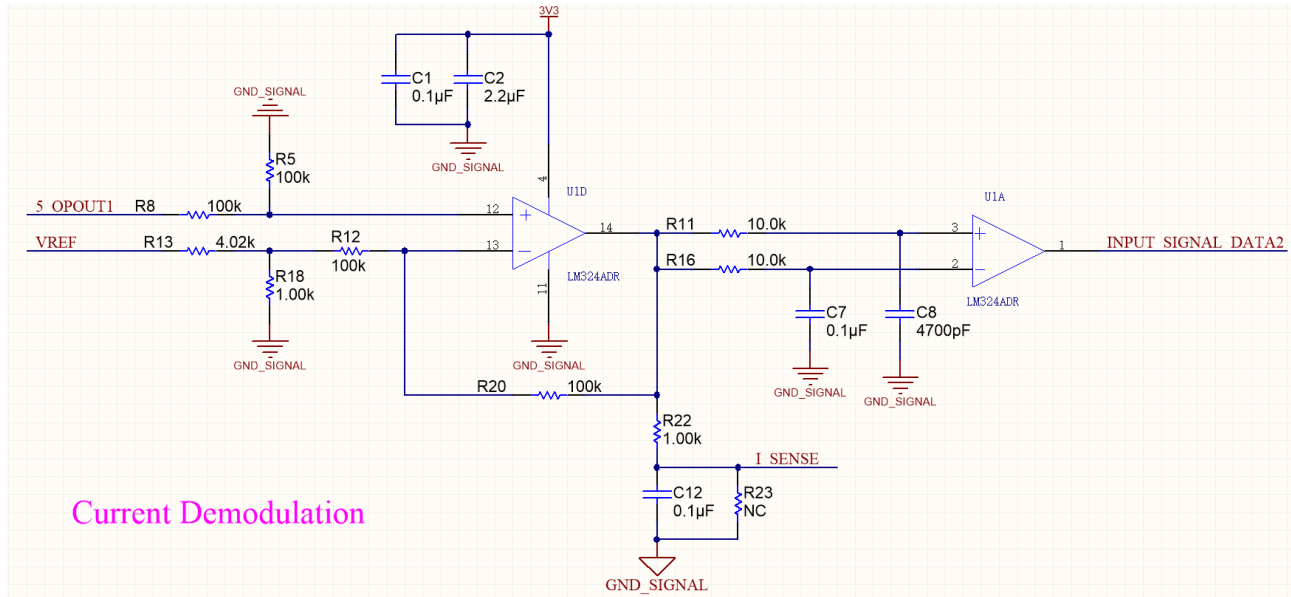
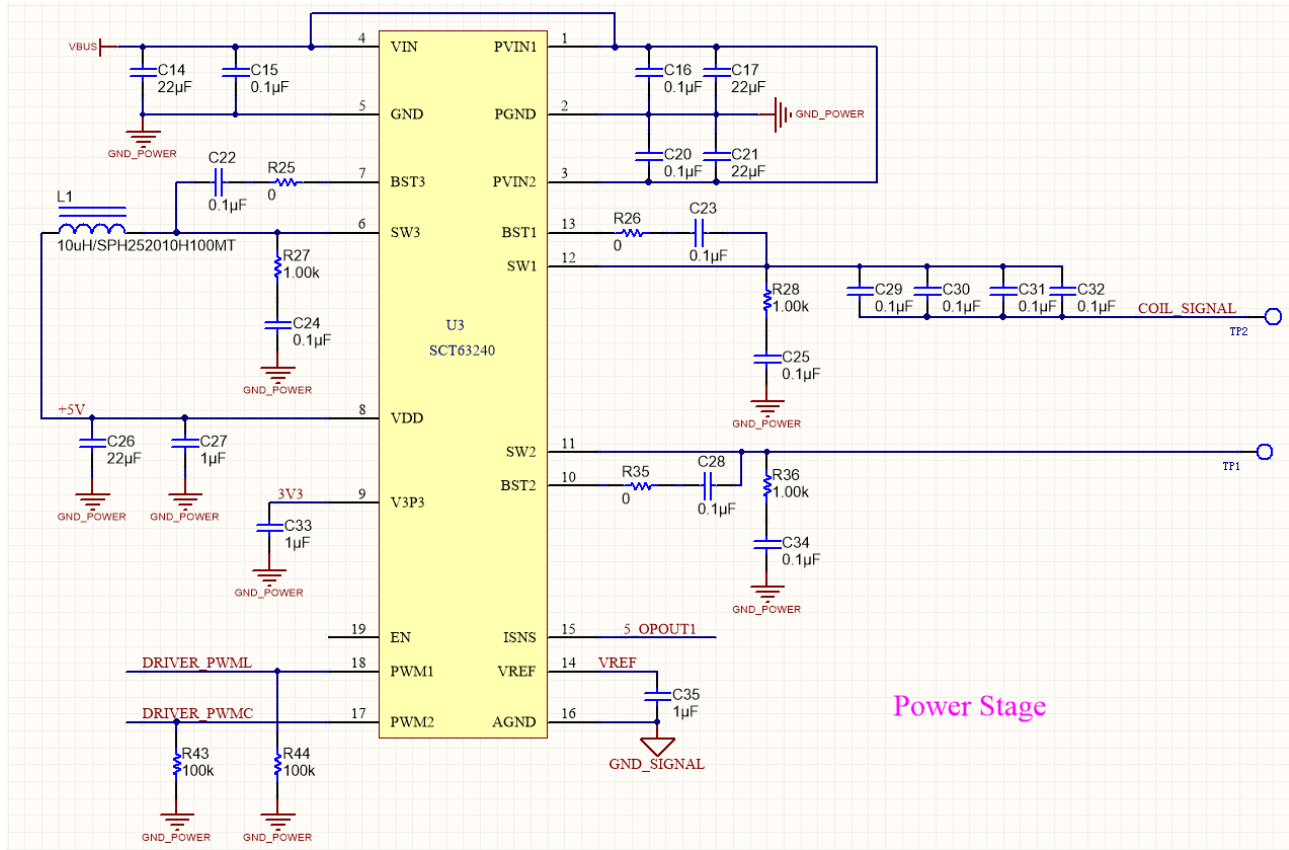


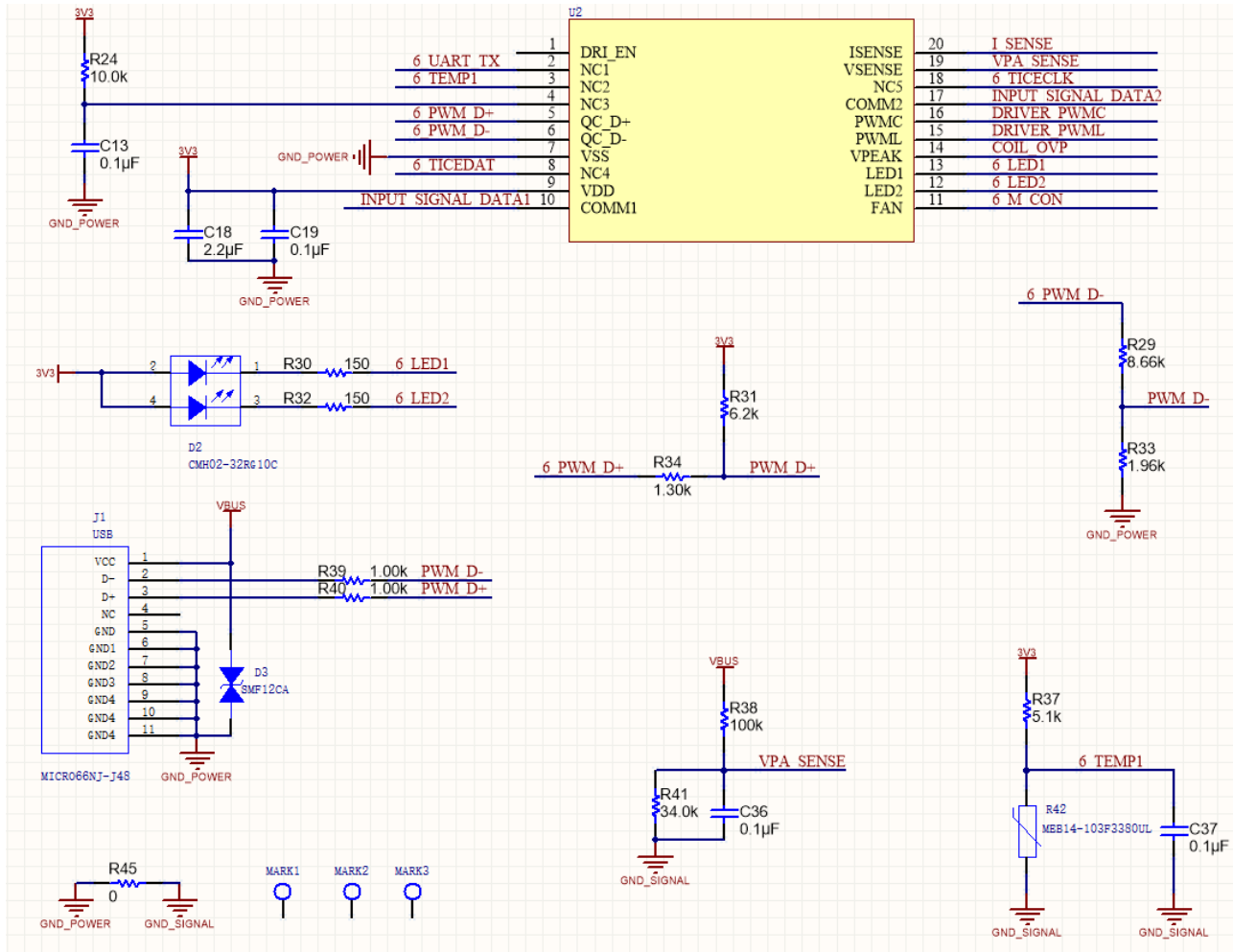
Figure1 Power Supply, Load and Measurement Equipment Setup

## SCHEMATIC DIAGRAM









**Figure 2 Evaluation Board Schematic**

## BILL OF MATERIALS

Table 2. Bills of Materials

| Designator   | LibRef             | Description                                  | Comment            | Quantity |
|--|--------------------|--|--------------------|----------|
| C1, C7, C10, C11, C12, C13, C15, C16, C19, C20, C22, C23, C24, C25, C28, C34, C36, C37 | 0603YC104JAT2A     | CAP, CERM, 0.1 μF, 16 V, +/- 5%, X7R, 0402   | 0603YC104JAT2A     | 18       |
| C2, C18  | C0603C225K8PACTU   | CAP, CERM, 2.2 μF, 10 V, +/- 10%, X5R, 0402  | C0603C225K8PACTU   | 2        |
| C3, C6, C8, C9   | C0603C472J5RACTU   | CAP, CERM, 4700 pF, 50 V, +/- 5%, X7R, 0402  | C0603C472J5RACTU   | 4        |
| C4   | C0603C682J5RACTU   | CAP, CERM, 6800 pF, 50 V, +/- 5%, X7R, 0603  | C0603C682J5RACTU   | 1        |
| C5   | 06031C103JAT2A     | CAP, CERM, 0.01 μF, 100 V, +/- 5%, X7R, 0402 | 06031C103JAT2A     | 1        |
| C14, C17, C21, C26   | GRM32ER71E226KE15L | CAP, CERM, 22 μF, 25 V, +/- 10%, X7R, 0805   | GRM32ER71E226KE15L | 4        |
| C27, C33, C35  | C0603C105K4PACTU   | CAP, CERM, 1 μF, 16 V, +/- 10%, X5R, 0402    | C0603C105K4PACTU   | 3        |

|   |                       |   |                       |    |
|---|-----------------------|---|-----------------------|----|
| C29, C30, C31, C32                            | 12061C104JAT2A        | CAP, CERM, 0.1 $\mu$ F, 100 V, +/- 5%, X7R, 1206                                    | 12061C104JAT2A        | 4  |
| D1  | DIODE                 | DIODE, GEN PURP 100V 300mA SOD123-2-X0_9Y1_2-3_3                                    | DIODE                 | 1  |
| D2  | LTST-C191KRKT_1       | LED, UR_VG 20mA 4PIN DB1204A13  | LTST-C191KRKT_1       | 1  |
| D3  | DIODE_BI-DIR_TRIG     | TVS, 12VWM 19.9VC Bilateral SOD123-2-X0_8Y1-3_35                                    | DIODE_BI-DIR_TRIG     | 1  |
| J1  | 10118193-0001LF-USB_2 | CONN, USB MICRO B RECPT SMT USB-B-5   | 10118193-0001LF-USB_2 | 1  |
| L1  | 744314101             | Inductor, Shielded Drum Core, WE-Superflux200, 10 uH, 3.5 A, 0.033 ohm, SMD         | 744314101             | 1  |
| MARK1, MARK2, MARK3                           | TPSMD                 | CONN, TP-DRI-1  | TPSMD                 | 3  |
| R1  | CRCW0402113KFKE D     | RES, 113 k, 1%, 0.063 W, 0402   | CRCW0402113KFKE D     | 1  |
| R2  | CRCW04027K50FKE D     | RES, 7.50 k, 1%, 0.063 W, 0402  | CRCW04027K50FKE D     | 1  |
| R3  | CRCW0402510KJNE D     | RES, 510 k, 5%, 0.063 W, 0402   | CRCW0402510KJNE D     | 1  |
| R4, R5, R8, R12, R15, R20, R21, R38, R43, R44 | CRCW0402100KDHE DP    | RES, 100 k, 0.5%, 0.063 W, 0402   | CRCW0402100KDHE DP    | 10 |
| R6  | CRCW04021K50FKE D     | RES, 1.50 k, 1%, 0.063 W, 0402  | CRCW04021K50FKE D     | 1  |
| R7  | CRCW04023K00JNE D     | RES, 3.0 k, 5%, 0.063 W, 0402   | CRCW04023K00JNE D     | 1  |
| R9, R10, R11, R16, R24                        | CRCW040210K0FKE D     | RES, 10.0 k, 1%, 0.063 W, 0402  | CRCW040210K0FKE D     | 5  |
| R13   | CRCW04024K02FKE D     | RES, 4.02 k, 1%, 0.063 W, 0402  | CRCW04024K02FKE D     | 1  |
| R14   | CRCW040268K0JNE D     | RES, 68 k, 5%, 0.063 W, 0402  | CRCW040268K0JNE D     | 1  |
| R17   | CRCW040233K0JNE D     | RES, 33 k, 5%, 0.063 W, 0402  | CRCW040233K0JNE D     | 1  |
| R18, R22, R23, R27, R28, R36, R39, R40        | CRCW04021K00FKE D     | RES, 1.00 k, 1%, 0.063 W, 0402  | CRCW04021K00FKE D     | 8  |
| R19   | CRCW04021M00FKE D     | RES, 1.00 M, 1%, 0.063 W, 0402  | CRCW04021M00FKE D     | 1  |
| R25, R26, R35, R45                            | CRCW06030000Z0EA      | RES, 0, 5%, 0.1 W, 0402   | CRCW06030000Z0EA      | 4  |
| R29   | CRCW04028K66FKE D     | RES, 8.66 k, 1%, 0.063 W, 0402  | CRCW04028K66FKE D     | 1  |
| R30, R32                                      | CRCW0402150RFKE D     | RES, 150, 1%, 0.063 W, 0402   | CRCW0402150RFKE D     | 2  |
| R31   | CRCW04026K20JNE D     | RES, 6.2 k, 5%, 0.063 W, 0402   | CRCW04026K20JNE D     | 1  |
| R33   | CRCW04021K96FKE D     | RES, 1.96 k, 1%, 0.063 W, 0402  | CRCW04021K96FKE D     | 1  |
| R34   | CRCW04021K30FKE D     | RES, 1.30 k, 1%, 0.063 W, 0402  | CRCW04021K30FKE D     | 1  |
| R37   | CRCW04025K10JNE D     | RES, 5.1 k, 5%, 0.063 W, 0402   | CRCW04025K10JNE D     | 1  |
| R41   | CRCW040234K0FKE D     | RES, 34.0 k, 1%, 0.063 W, 0402  | CRCW040234K0FKE D     | 1  |
| R42   | RESISTOR_0            | RES, NTC 10 KOhm BEAD SMD-2-X0_8Y2_7-1_8  | RESISTOR_0            | 1  |
| TP1, TP2                                      | TPDRI_2               | CONN, TP-SMD-CIR1   | TPDRI_2               | 2  |
| U1  | LM324ADR_4            | IC, OPAMP GP 1.2MHZ SOIC-14-1_27-5_4  | LM324ADR_4            | 1  |
| U2  |                       | IC, Wireless Charger Single Coil TSSOP20  |                       | 1  |
| U3  | SCT63240              | 20W High-Integration, High-Efficiency Power Solution for Wireless Power Transmitter | SCT63240              | 1  |

## PRINTED CIRCUIT BOARD LAYOUT

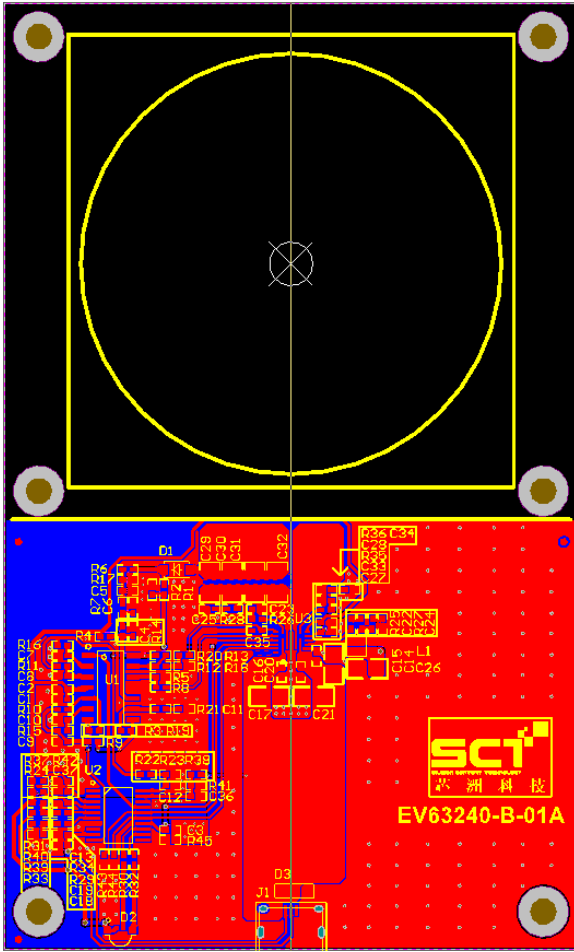


Figure 3. Top Layer

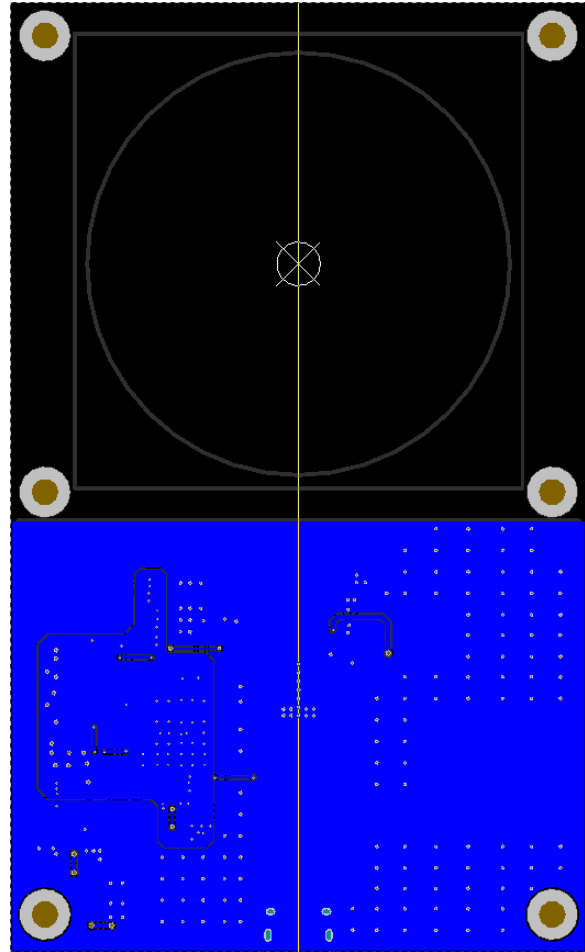
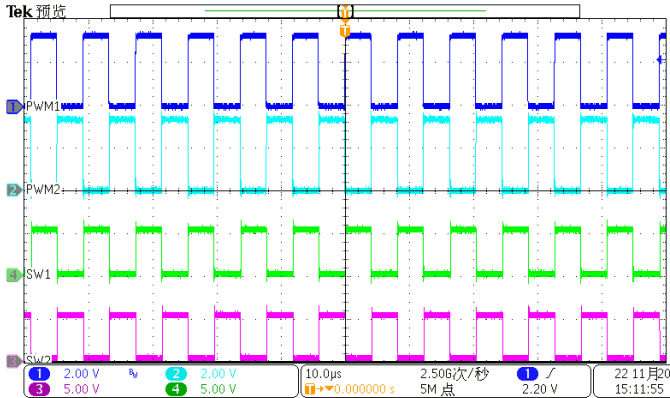


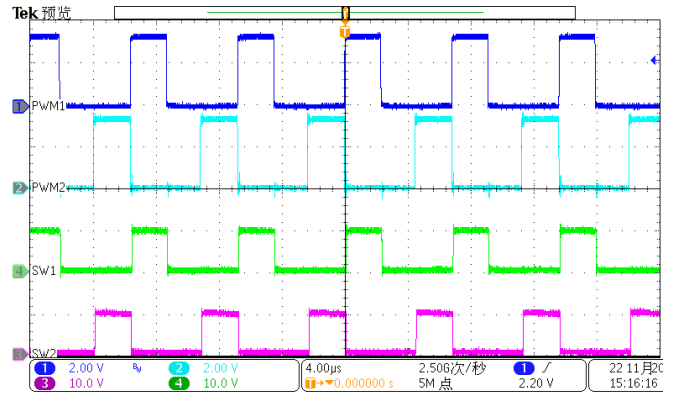
Figure 4. Bottom Layer



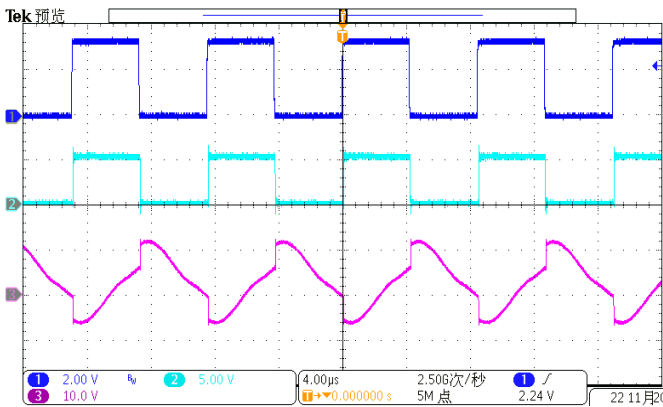
# EVB TEST RESULTS



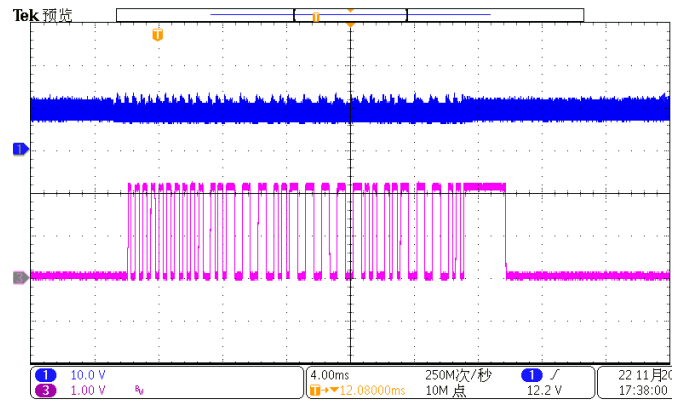
**Figure5. 5W PWM and SW**  
(CH1: PWM1, CH2: PWM2, CH3: SW2, CH4: SW1)



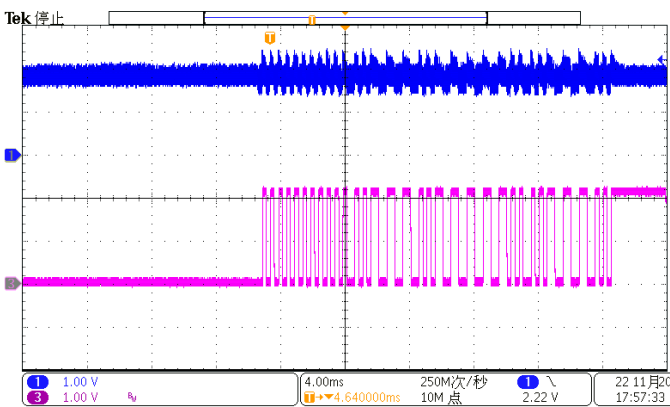
**Figure 6. 10W PWM and SW**  
(CH1: PWM1, CH2: PWM2, CH3: SW2, CH4: SW1)



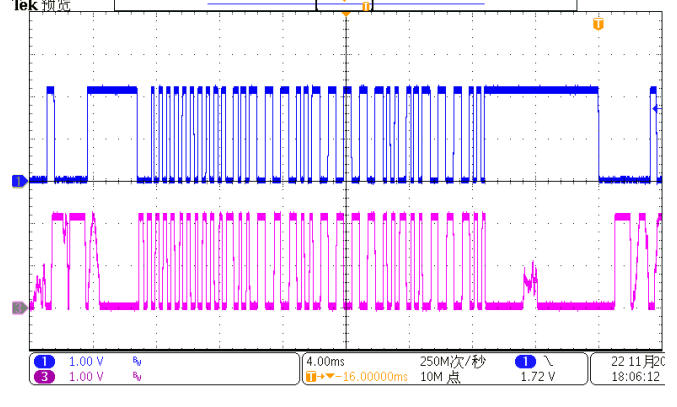
**Figure 7. 5W PWM and Coil Voltage**  
(CH1: PWM2, CH2: SW2, CH3: Coil signal)



**Figure 8. 5W Voltage demodulation signal**  
(CH1: Rectified signal, CH3: Voltage demodulation signal)



**Figure 9. 10W current demodulation signal**  
(CH1: ISNS, CH3: Current demodulation signal)



**Figure 10. 10W Voltage and current demodulation**  
(CH1: Voltage demodulation, CH3: Current demodulation)

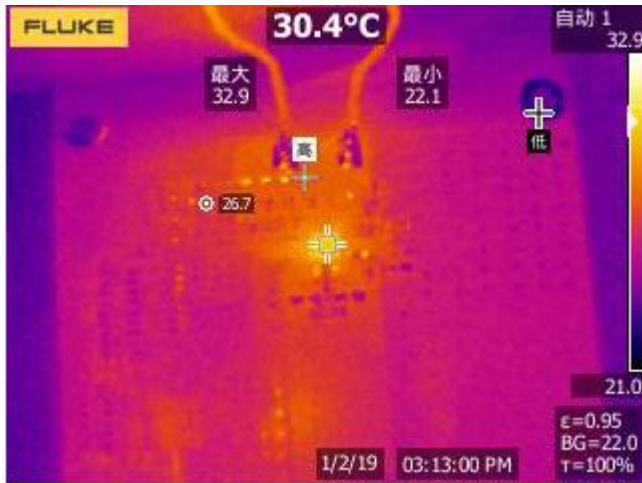


Figure 11. Thermal @ RX=5W



Figure 12. Thermal @ RX=10W

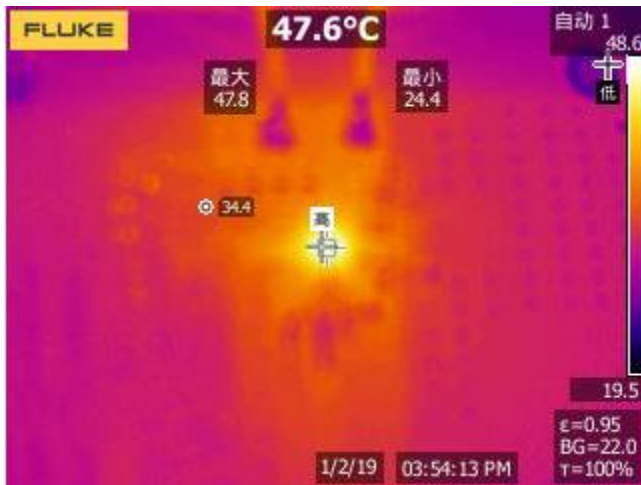


Figure 13. Thermal @ RX=15W

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