

TIDA-00589 Test Report

BMS/HPC

Abstract

TI design TIDA-00589 is designed for power bank applications and incorporates MaxCharge™ technology. It supports Adjustable High Voltage Adaptor for fast charging. It can also provide up to 3.1A on-the-go (OTG) current. The included application circuits illustrate how this device can be easily implemented for power bank applications.

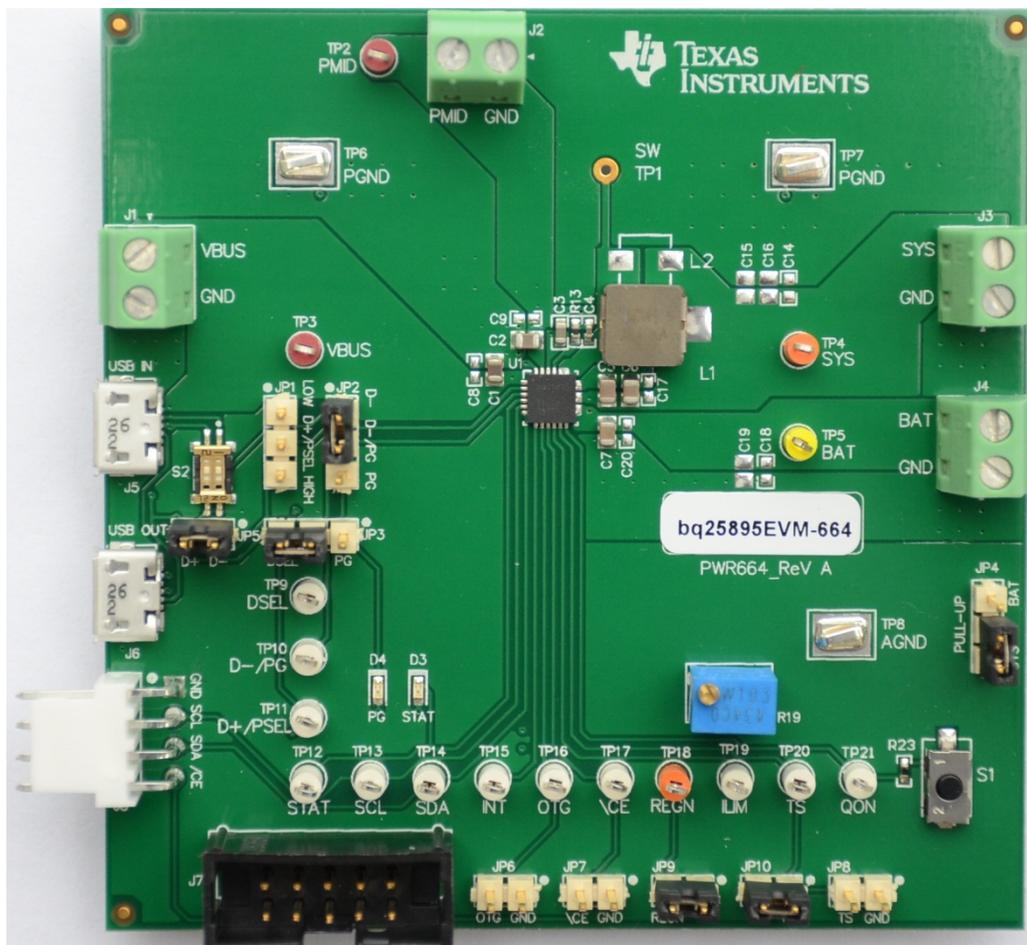


Figure 1. The board photo.

Document History

| Version | Date | Author | Notes |
|---------|--------------|-----------|---------------|
| 1.0 | May 22, 2015 | Eric Zhao | First release |

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Bench Set up

- TIDA-00589 was tested on a bench setup using PWR664A EVM. The test equipment is as follows:
 - Oscilloscope: Tektronix DPO 4050
 - Passive Voltage Probes: Tektronix P6139A – 500 Mhz, 8 pF, 10 MΩ, 10x
 - Current Probe: Tektronix TCP202A Current Probe
 - Power Supply: HP 6654A DC, KEPCO BOP20-5D
 - Electronic Load: HP 6060B
 - Multi-meter: HP 34401A

Application Circuits

The application circuit shown in Figure 2 illustrates the implementation of Adjustable High Voltage Adaptor with up to 2.4A OTG boost current.

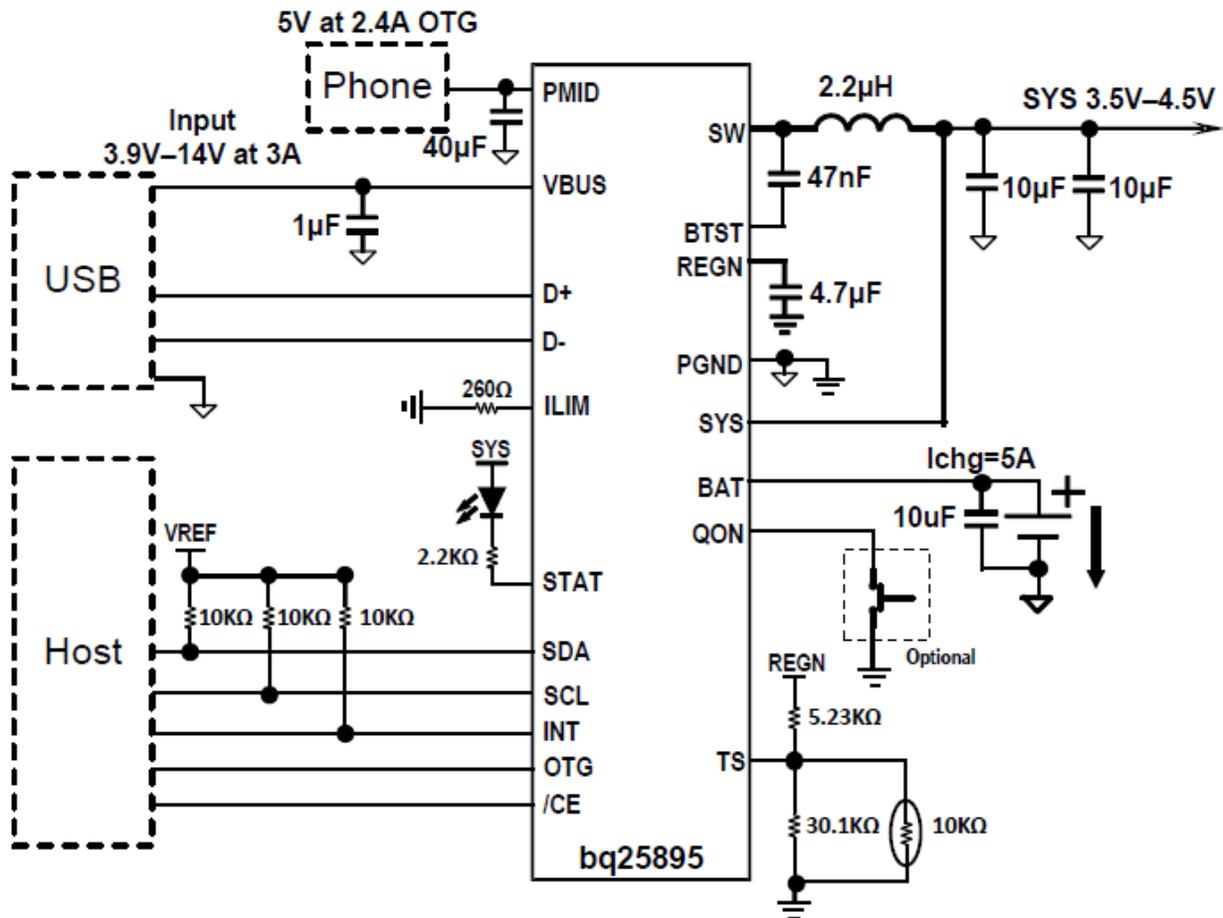


Figure 2. bq25895 with D+/D- interface and 2.4 A boost mode output.

Figure 3 illustrates the implementation of 3.1A OTG boost operation without thermistor connections. The external Schottky diode is added.

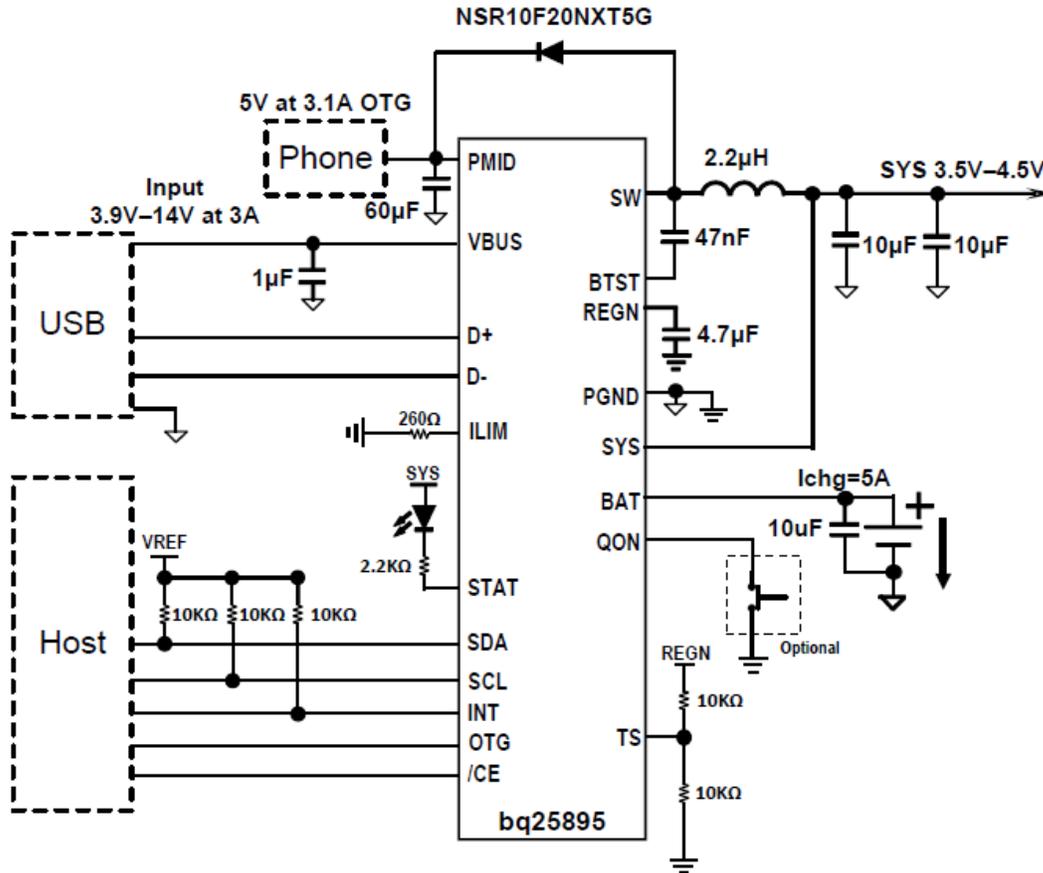


Figure 3. bq25895 with 3.1A boost mode output without thermistor connections.

Efficiency

Figure 4 shows the charging efficiency across the charge current range with the bq25895. At 4A charging current, the overall charging efficiency is greater than 89%.

Figure 5 shows bq25895 boost mode efficiency at different PMID load current and battery voltage.

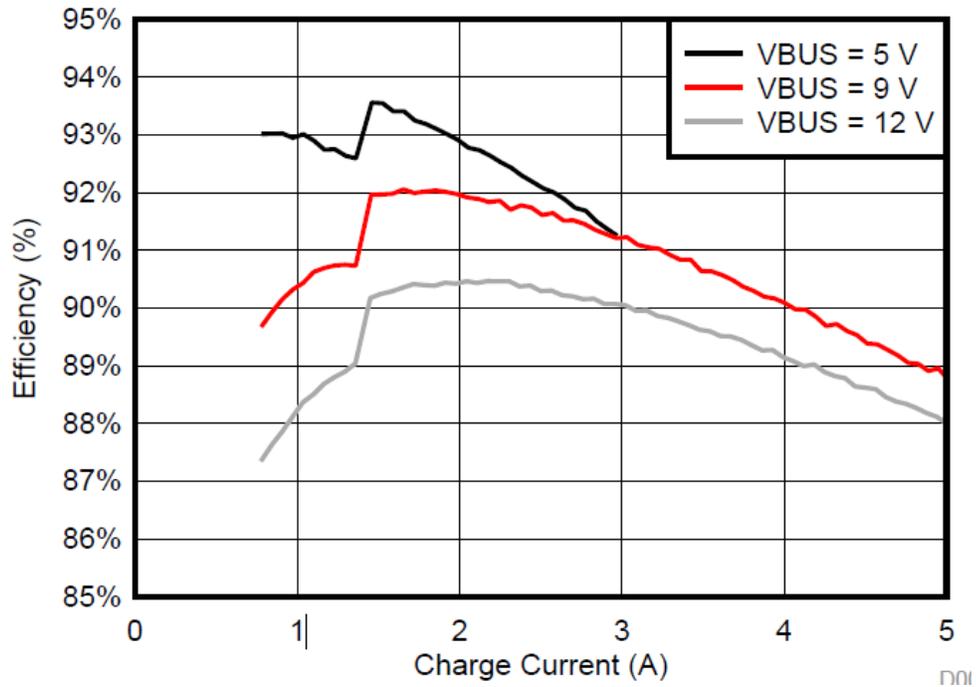


Figure 4. bq25895 charging efficiency vs. charging current at $V_{BAT} = 3.8V$

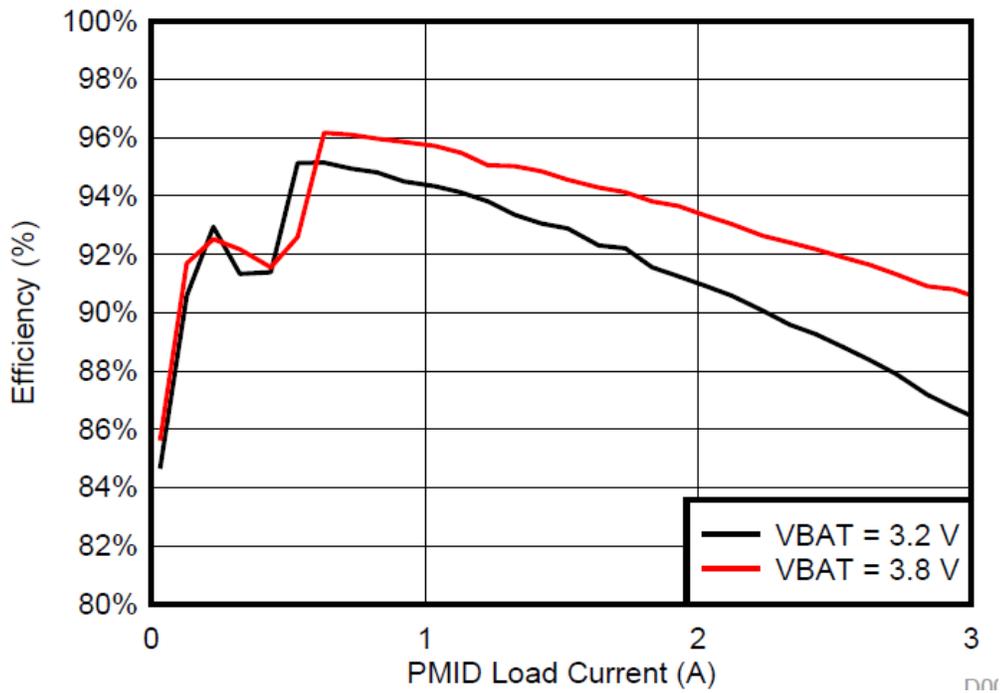


Figure 5. bq25895 boost mode efficiency vs. PMID load current

Boost Operation

Figure 6 shows the switching cycle waveforms of the bq25895 operation with 2.4A boost current at $V_{BAT} = 3.0V$.

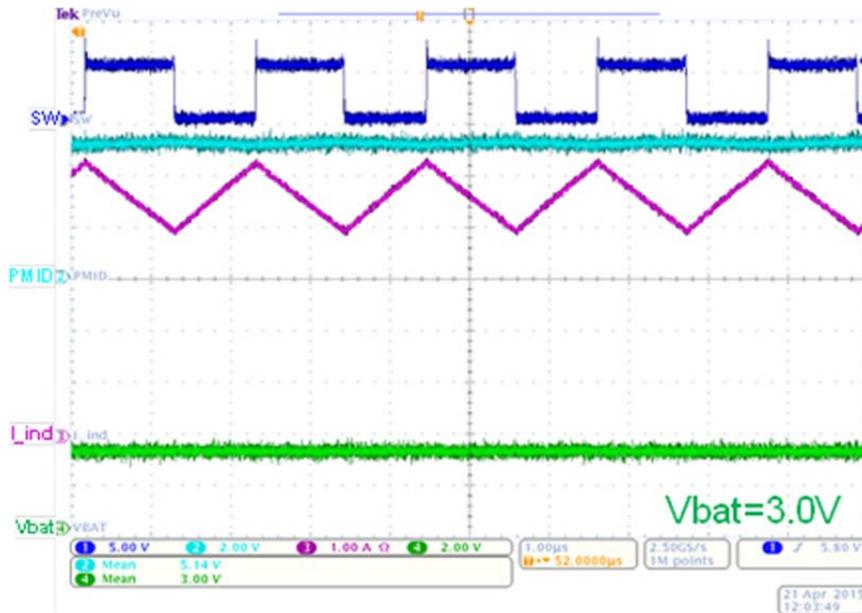


Figure 6. Switching cycle waveforms of bq25895 in boost mode

Thermal Measurements

Figure 7 shows thermal images of the bq25895 operating at different charging conditions. The ambient temperature is 25C. Table 1 shows the device temperature at different input and charging conditions.

Table 1. Device temperature at different charging conditions

| Test Condition | Min | Avg | Max |
|---|-------|-------|-------|
| $V_{IN} = 5V$ $V_{BAT} = 3.8V$ $I_{CHG} = 3.5A$ | 35.7C | 38.3C | 42.5C |
| $V_{IN} = 9V$ $V_{BAT} = 3.8V$ $I_{CHG} = 4A$ | 36.6C | 42.8C | 47.6C |

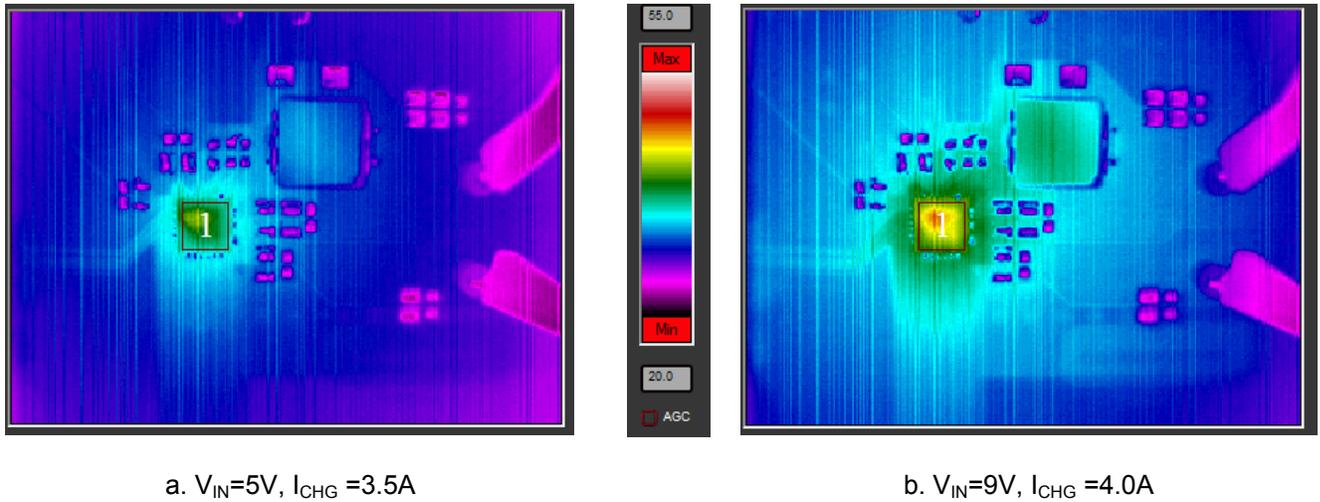


Figure 7. Thermal images at different charging conditions

Figure 8 shows thermal images of the bq25895 operating at different boost mode current and $V_{BAT} = 3.8V$. The ambient temperature is 25C. Table 2 shows the device temperature readings.

Table 2. Device and inductor temperature at different boost OTG current.

| Test Condition | T_bq25895 | T_inductor |
|--|-----------|------------|
| $V_{OTG} = 5.1V$ $I_{OTG} = 2.4A$ $V_{BAT} = 3.8V$ | 41 C | 37C |
| $V_{OTG} = 5.1V$ $I_{OTG} = 3.1A$ $V_{BAT} = 3.8V$ | 50 C | 39C |

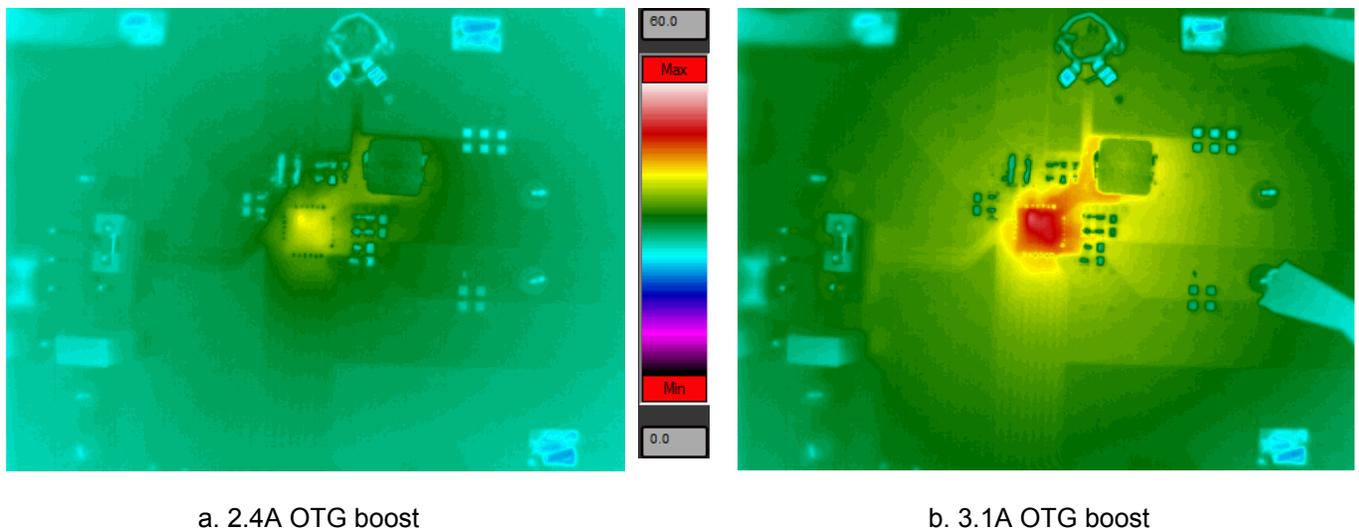


Figure 8. Thermal images at different boost current conditions and $V_{BAT} = 3.8V$

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