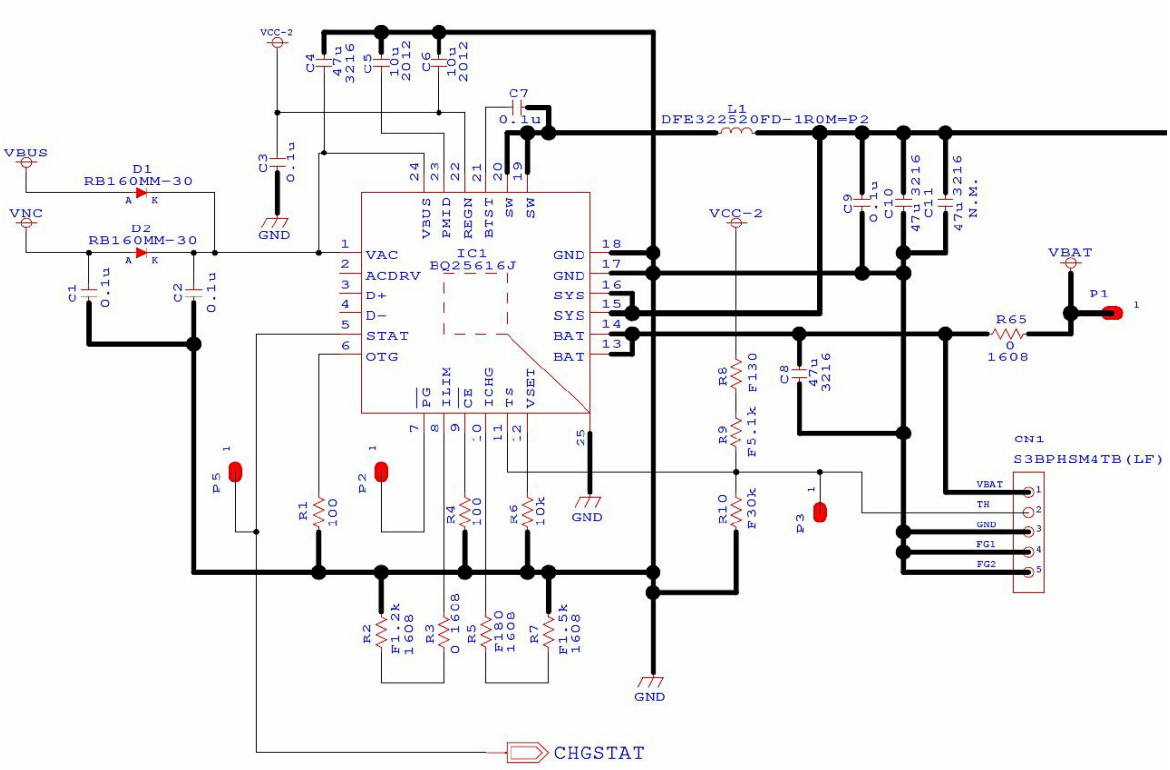
**bq25616j Charging circuit problems**

2023/2/6

I have made inquiries several times, but after that, I was able to perform additional verification, so I will report it.

Charging circuit for products under development [circuit diagram]




Preference pin status

| | | | |
|---|---|---|---|
| ILIM:400mA | (Problem occurs even at 500mA) | VSET:4.1V | (The problem occurs even at 4.2V) |

Environmental test results:

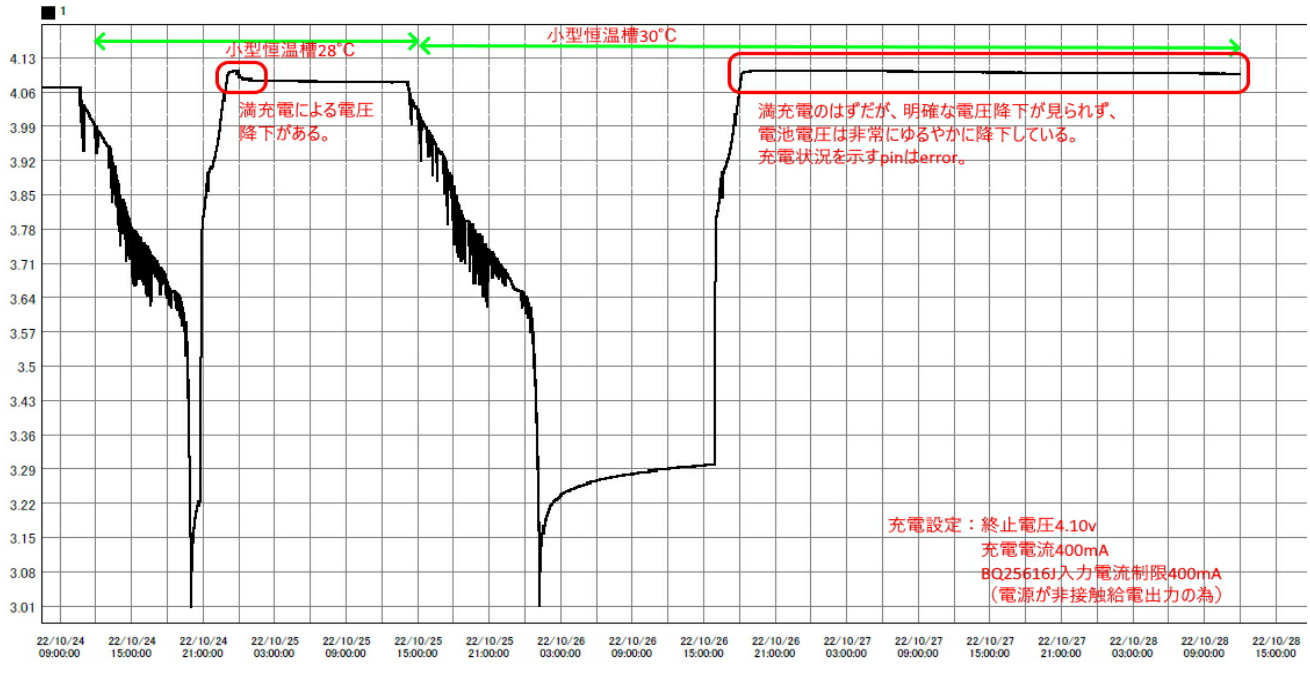
| | |
|---|---|
| Product condition: | 30deg: NG, 28deg: OK |
| Charging board and battery only: | 43deg: NG, 42deg: OK |

Consideration: The battery pack has a thermistor for temperature measurement, and if the temperature read by bq25616j exceeds 45deg, an error (STAT-pin: 1KHz) will occur.

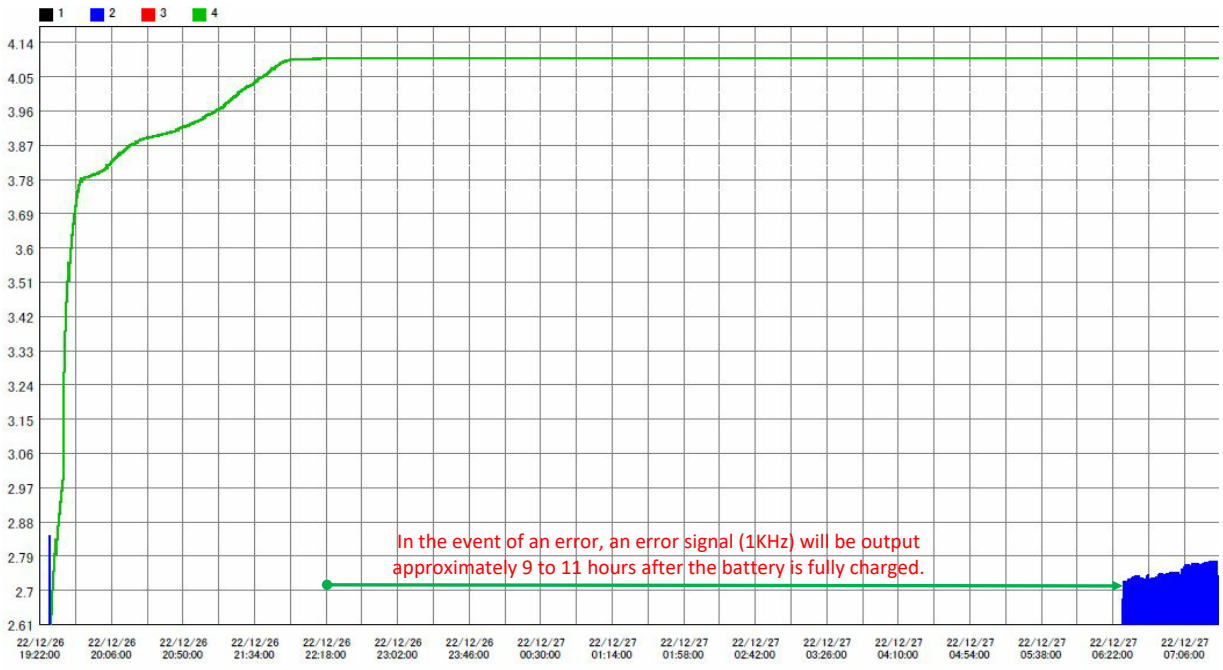
Battery voltage graph during product testing

Constant temperature bath 28deg: voltage drop is seen when fully charged → normal

Constant temperature bath 30deg: No voltage drop when fully charged → error



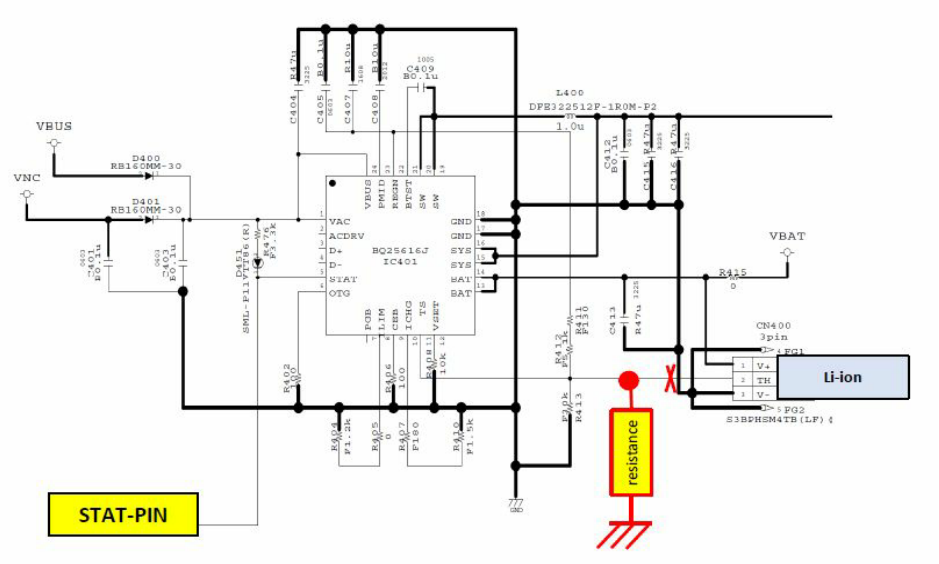
Measurement by placing the charging board and battery in a constant temperature chamber　　45deg




Replace ILIM, VSET, and battery pack thermistors with resistors and check error occurrence status

Using a battery that is almost fully charged,

| |
|---|
| A: Change ILIM to 400mA/500mA |
| B: Change VSET to 4.1V/4,2V |
| C: Replace the thermistor with a resistor to change the battery pack temperature |



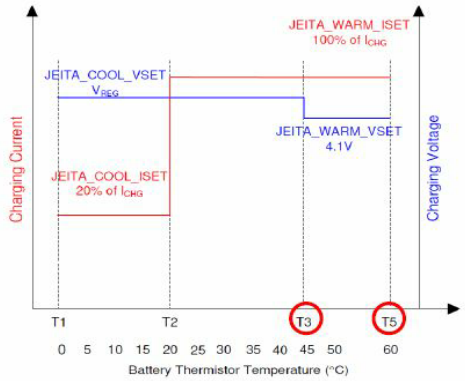

Measurement result

| | | | | 500mA～3200mA | 300mA～3000mA | | | |
|---|---|---|---|---|---|---|---|---|
| TEST | SET-DEG(℃) | resistance(kΩ) | VSET(V) | ILIM(mA) | ICHG(mA) | STAT-PIN | RESULT | Consideration |
| 1 | 46 | 4.7 | 4.1 | 398(1.2kΩ) | 403(1.68kΩ) | 1kHz | NG | STAT-PIN＝ERROR(1KHz) |
| 2 | 46 | 4.7 | 4.2 | 398(1.2kΩ) | 403(1.68kΩ) | 1kHz | NG | STAT-PIN＝ERROR(1KHz) |
| 3 | 46 | 4.7 | 4.2 | 525(910Ω) | 403(1.68kΩ) | 1kHz | NG | STAT-PIN＝ERROR(1KHz) |
| 4 | 25 | 10 | 4.2 | 525(910Ω) | 403(1.68kΩ) | Hi | OK | within 30 minutes STAT-PIN＝Lo→Hi |
| 5 | 25 | 10 | 4.1 | 525(910Ω) | 403(1.68kΩ) | Hi | OK | within 30 minutes STAT-PIN＝Lo→Hi |
| 6 | 41 | 5.6 | 4.1 | 525(910Ω) | 403(1.68kΩ) | Hi | OK | within 30 minutes STAT-PIN＝Lo→Hi |
| 7 | 52 | 3.9 | 4.1 | 525(910Ω) | 403(1.68kΩ) | 1kHz | NG | STAT-PIN＝ERROR(1KHz) |
| 8 | 63 | 2.7 | 4.1 | 525(910Ω) | 403(1.68kΩ) | 1kHz | OK | Immediately after power on STAT-PIN＝1kHz |
| 9 | 44 | 5.1 | 4.1 | 525(910Ω) | 403(1.68kΩ) | 1kHz | NG | STAT-PIN＝ERROR(1KHz) |
| 10 | -1 | 30 | 4.1 | 525(910Ω) | 403(1.68kΩ) | 1kHz | OK | Immediately after power on STAT-PIN＝1kHz |

Casio's opinion

with the temperature profile during charging. The problem occurred between T3 and T5, and changing the ILIM and VSET settings did not solve the problem.

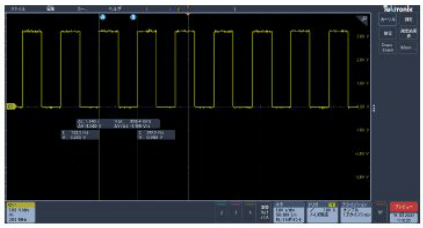
（JEITA　充電プロファイル）




（STAT端子：充電状態表示）

| CHARGING STATE | STAT INDICATOR |
|---|---|
| Charging in progress (including recharge) | LOW |
| Charging termination (top off timer may be running) | HIGH |
| Sleep mode, charge disable, boost mode | HIGH |
| Charge suspend (input over-voltage, TS fault, safety timer fault or system over-voltage) | Blinking at 1 Hz |

（STAT端子 1kHz発振状態波形）



We don't want the bq25616j STAT-PIN to give an error in the temperature range between T3-T5 and keep the battery voltage as set by VSET. I would like to know the cause of this error. Also, please provide a means to prevent this error from occurring.

At the very least, we need to stop this error in order to bring the product to market, and it is difficult to add error protection to our circuits. The time from making a prototype to mass production is limited, so we request that you respond as soon as possible.

At that time, there was no IC with equivalent functions other than bq25616j. I hope you find a way to stop this error.

thank you.