

# ***bq20z40/bq20z45 and bq20z60/bq20z65 Data Flash Comparison***

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## **ABSTRACT**

This document compares the data flash values and functionality of the bq20z40/bq20z45 and the bq20z60/bq20z65 family of gas gauges. The comparisons are presented in tabular format in [Table 1](#) through [Table 13](#).

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# 1 1st Level Safety

**Table 1. 1st Level Safety**

| Subclass ID | Subclass    | Name                    | bq20z40/45 |              | bq20z60/65 |               |
|-------------|-------------|-------------------------|------------|--------------|------------|---------------|
|             |             |                         | Offset     | Range        | Offset     | Range         |
| 0           | Voltage     | LT COV Threshold        | 0          | 3700 to 5000 | 0          | 3700 to 5000  |
|             |             | LT COV Recovery         | 2          | 0 to 4400    | 2          | 0 to 4400     |
|             |             | ST COV Threshold        | 4          | 3700 to 5000 | 4          | 3700 to 5000  |
|             |             | ST COV Recovery         | 6          | 0 to 4400    | 6          | 0 to 4400     |
|             |             | HT COV Threshold        | 8          | 3700 to 5000 | 8          | 3700 to 5000  |
|             |             | HT COV Recovery         | 10         | 0 to 4400    | 10         | 0 to 4400     |
|             |             | COV Time                |            |              | 12         | 0 to 240      |
|             |             | CUV Threshold           | 13         | 0 to 3500    | 13         | 0 to 3500     |
|             |             | CUV Time                |            |              | 15         | 0 to 240      |
|             |             | CUV Recovery            | 16         | 0 to 3600    | 16         | 0 to 3600     |
| 1           | Current     | OC (1st Tier) Chg       | 0          | 0 to 20000   | 0          | 0 to 20000    |
|             |             | OC (1st Tier ) Chg Time |            |              | 2          | 0 to 240      |
|             |             | OC Chg Recovery         |            |              | 3          | –1000 to 1000 |
|             |             | OC (1st Tier) Dsg       | 5          | 0 to 20000   | 5          | 0 to 20000    |
|             |             | OC (1st Tier ) Dsg Time |            |              | 7          | 0 to 240      |
|             |             | OC Dsg Recovery         |            |              | 8          | 0 to 1000     |
|             |             | OC (2nd Tier) Chg       |            |              | 10         | 0 to 20000    |
|             |             | OC (2nd Tier ) Chg Time |            |              | 12         | 0 to 240      |
|             |             | OC (2nd Tier) Dsg       |            |              | 13         | 0 to 22000    |
|             |             | OC (2nd Tier ) Dsg Time |            |              | 15         | 0 to 240      |
|             |             | Current Recovery Time   | 16         | 0 to 240     | 16         | 0 to 240      |
|             |             | AFE OC Dsg              | 17         | 0x00 to 0xFF | 17         | 0x00 to 0xFF  |
|             |             | AFE OC Dsg Time         | 18         | 0x00 to 0xFF | 18         | 0x00 to 0xFF  |
|             |             | AFE OC Dsg Recovery     | 19         | 5 to 1000    | 19         | 5 to 1000     |
|             |             | AFE SC Chg Cfg          | 21         | 0x00 to 0xFF | 21         | 0x00 to 0xFF  |
|             |             | AFE SC Dsg Cfg          | 22         | 0x00 to 0xFF | 22         | 0x00 to 0xFF  |
|             |             | AFE SC Recovery         |            |              | 23         | 0 to 200      |
| 2           | Temperature | OT1 Chg Threshold       | 0          | 0 to 2550    | 0          | 0 to 2550     |
|             |             | OT1 Chg Time            | 2          | 0 to 240     | 2          | 0 to 240      |
|             |             | OT1 Chg Recovery        | 3          | 0 to 2550    | 3          | 0 to 2550     |
|             |             | OT2 Chg Threshold       | 5          | 0 to 2550    | 5          | 0 to 2550     |
|             |             | OT2 Chg Time            | 7          | 0 to 240     | 7          | 0 to 240      |
|             |             | OT2 Chg Recovery        | 8          | 0 to 2550    | 8          | 0 to 2550     |
|             |             | OT1 Dsg Threshold       | 10         | 0 to 2550    | 10         | 0 to 2550     |
|             |             | OT1 Dsg Time            | 12         | 0 to 240     | 12         | 0 to 240      |
|             |             | OT1 Dsg Recovery        | 13         | 0 to 2550    | 13         | 0 to 2550     |
|             |             | OT2 Dsg Threshold       | 15         | 0 to 2550    | 15         | 0 to 2550     |
|             |             | OT2 Dsg Time            | 17         | 0 to 240     | 17         | 0 to 240      |
|             |             | OT2 Dsg Recovery        | 18         | 0 to 2550    | 18         | 0 to 2550     |
| 4           | Host Comm   | Hi Dsg Start Temp       | 20         | 0 to 1200    | 20         | 0 to 1200     |
|             |             | Host Watchdog Timeout   |            |              | 0          | 0 to 255      |

## 2 2nd Level Safety

**Table 2. 2nd Level Safety**

| Subclass ID | Subclass          | Name                     | bq20z40/45 |            | bq20z60/65 |               |
|-------------|-------------------|--------------------------|------------|------------|------------|---------------|
|             |                   |                          | Offset     | Range      | Offset     | Range         |
| 16          | Voltage           | LT SOV Threshold         | 0          | 0 to 20000 | 0          | 0 to 20000    |
|             |                   | ST SOV Threshold         | 2          | 0 to 20000 | 2          | 0 to 20000    |
|             |                   | HT SOV Threshold         | 4          | 0 to 20000 | 4          | 0 to 20000    |
|             |                   | SOV Time                 | 6          | 0 to 240   | 6          | 0 to 240      |
|             |                   | PF SOV Fuse Blow Delay   | 7          | 0 to 65535 | 7          | 0 to 65535    |
|             |                   | SUV Threshold            | 9          | 0 to 20000 | 9          | 0 to 20000    |
|             |                   | SUV Time                 | 11         | 0 to 240   | 11         | 0 to 240      |
|             |                   | Rest CIM Current         | 12         | 0 to 200   | 12         | 0 to 200      |
|             |                   | Rest CIM Fail Voltage    | 13         | 0 to 5000  | 13         | 0 to 5000     |
|             |                   | Rest CIM Time            | 15         | 0 to 240   | 15         | 0 to 240      |
|             |                   | CIM Battery Rest Time    | 16         | 0 to 65535 | 16         | 0 to 65535    |
|             |                   | Rest CIM Check Voltage   | 18         | 0 to 65535 | 18         | 0 to 65535    |
|             |                   | Active CIM Fail Voltage  | 20         | 0 to 5000  | 20         | 0 to 5000     |
|             |                   | Active CIM Time          | 22         | 0 to 240   | 22         | 0 to 240      |
|             |                   | Active CIM Check Voltage | 23         | 0 to 32768 | 23         | 0 to 32768    |
|             |                   | PFIN Detect Time         | 25         | 0 to 240   | 25         | 0 to 240      |
|             |                   | PF Min Fuse Blow Voltage | 26         | 0 to 20000 | 26         | 0 to 20000    |
| 17          | Current           | SOC Chg                  | 0          | 0 to 30000 | 0          | 0 to 30000    |
|             |                   | SOC Chg Time             | 2          | 0 to 240   | 2          | 0 to 240      |
|             |                   | SOC Dsg                  | 3          | 0 to 30000 | 3          | 0 to 30000    |
|             |                   | SOC Dsg Time             | 5          | 0 to 240   | 5          | 0 to 240      |
| 18          | Temperature       | SOT1 Chg Threshold       | 0          | 0 to 2550  | 0          | 0 to 2550     |
|             |                   | SOT1 Chg Time            | 2          | 0 to 240   | 2          | 0 to 240      |
|             |                   | SOT2 Chg Threshold       | 3          | 0 to 2550  | 3          | 0 to 2550     |
|             |                   | SOT2 Chg Time            | 5          | 0 to 240   | 5          | 0 to 240      |
|             |                   | SOT1 Dsg Threshold       | 6          | 0 to 2550  | 6          | 0 to 2550     |
|             |                   | SOT1 Dsg Time            | 8          | 0 to 240   | 8          | 0 to 240      |
|             |                   | SOT2 Dsg Threshold       | 9          | 0 to 2550  | 9          | 0 to 2550     |
|             |                   | SOT2 Dsg Time            | 11         | 0 to 240   | 11         | 0 to 240      |
|             |                   | Open Thermistor          |            |            | 12         | -1000 to 1200 |
|             |                   | Open Time                |            |            | 14         | 0 to 240      |
| 19          | FET Verification  | FET Fail Limit           | 0          | 0 to 500   | 0          | 0 to 500      |
|             |                   | FET Fail Time            | 2          | 0 to 240   | 2          | 0 to 240      |
| 20          | AFE Verification  | AFE Check Time           | 0          | 0 to 255   | 0          | 0 to 255      |
|             |                   | AFE Fail Limit           | 1          | 0 to 255   | 1          | 0 to 255      |
|             |                   | AFE Fail Recovery Time   | 2          | 0 to 255   | 2          | 0 to 255      |
|             |                   | AFE Init Retry Limit     |            |            | 3          | 0 to 255      |
|             |                   | AFE Init Limit           |            |            | 4          | 0 to 255      |
| 21          | Fuse Verification | Fuse Fail Limit          |            |            | 0          | 0 to 20       |
|             |                   | Fuse Fail Time           |            |            | 2          | 0 to 240      |

### 3 Charge Control

**Table 3. Charge Control**

| Subclass ID | Subclass           | Name                      | bq20z40/45 |              | bq20z60/65 |              |
|-------------|--------------------|---------------------------|------------|--------------|------------|--------------|
|             |                    |                           | Offset     | Range        | Offset     | Range        |
| 32          | Charge Temp Cfg    | JT1                       | 0          | –400 to 1200 | 0          | –400 to 1200 |
|             |                    | JT2                       | 2          | –400 to 1200 | 2          | –400 to 1200 |
|             |                    | JT2a                      | 4          | –400 to 1200 | 4          | –400 to 1200 |
|             |                    | JT3                       | 6          | –400 to 1200 | 6          | –400 to 1200 |
|             |                    | JT4                       | 8          | –400 to 1200 | 8          | –400 to 1200 |
|             |                    | Temp Hys                  | 10         | 0 to 100     | 10         | 0 to 100     |
| 33          | Pre-Charge Cfg     | Pre-chg Voltage Threshold | 0          | 0 to 20000   | 0          | 0 to 20000   |
|             |                    | Pre-chg Recovery Voltage  | 2          | 0 to 20000   | 2          | 0 to 20000   |
|             |                    | Pre-chg Current           | 4          | 0 to 2000    | 4          | 0 to 2000    |
| 34          | Charge Cfg         | LT Chg Voltage            | 0          | 0 to 20000   | 0          | 0 to 20000   |
|             |                    | LT Chg Current1           | 2          | 0 to 20000   | 2          | 0 to 20000   |
|             |                    | LT Chg Current2           | 4          | 0 to 20000   | 4          | 0 to 20000   |
|             |                    | LT Chg Current3           | 6          | 0 to 20000   | 6          | 0 to 20000   |
|             |                    | ST1 Chg Voltage           | 8          | 0 to 20000   | 8          | 0 to 20000   |
|             |                    | ST1 Chg Current1          | 10         | 0 to 20000   | 10         | 0 to 20000   |
|             |                    | ST1 Chg Current2          | 12         | 0 to 20000   | 12         | 0 to 20000   |
|             |                    | ST1 Chg Current3          | 14         | 0 to 20000   | 14         | 0 to 20000   |
|             |                    | ST2 Chg Voltage           | 16         | 0 to 20000   | 16         | 0 to 20000   |
|             |                    | ST2 Chg Current1          | 18         | 0 to 20000   | 18         | 0 to 20000   |
|             |                    | ST2 Chg Current2          | 20         | 0 to 20000   | 20         | 0 to 20000   |
|             |                    | ST2 Chg Current3          | 22         | 0 to 20000   | 22         | 0 to 20000   |
|             |                    | HT Chg Voltage            | 24         | 0 to 20000   | 24         | 0 to 20000   |
|             |                    | HT Chg Current1           | 26         | 0 to 20000   | 26         | 0 to 20000   |
|             |                    | HT Chg Current2           | 28         | 0 to 20000   | 28         | 0 to 20000   |
|             |                    | HT Chg Current3           | 30         | 0 to 20000   | 30         | 0 to 20000   |
|             |                    | Cell Voltage Threshold1   | 32         | 0 to 5000    | 32         | 0 to 5000    |
|             |                    | Cell Voltage Threshold2   | 34         | 0 to 5000    | 34         | 0 to 5000    |
|             |                    | Cell Voltage Thresh Hys   | 36         | 0 to 1000    | 36         | 0 to 1000    |
| 36          | Termination Cfg.   | Maintenance Current       |            |              | 0          | 0 to 1000    |
|             |                    | Taper Current             | 2          | 0 to 1000    | 2          | 0 to 1000    |
|             |                    | Taper Voltage             | 6          | 0 to 1000    | 6          | 0 to 1000    |
|             |                    | Current Taper Window      |            |              | 8          | 0 to 240     |
|             |                    | TCA Set %                 |            |              | 9          | –1 to 100    |
|             |                    | TCA Clear %               | 10         | –1 to 100    | 10         | –1 to 100    |
|             |                    | FC Set %                  |            |              | 11         | –1 to 100    |
|             |                    | FC Clear %                | 12         | –1 to 100    | 12         | –1 to 100    |
| 37          | Cell Balancing Cfg | Min Cell Deviation        | 0          | 0 to 65535   | 0          | 0 to 65535   |
| 38          | Charging Faults    | Over Charging Voltage     |            |              | 0          | 0 to 3000    |
|             |                    | Over Charging Volt Time   |            |              | 2          | 0 to 240     |
|             |                    | Over Charging Current     |            |              | 3          | 0 to 2000    |
|             |                    | Over Charging Curr Time   |            |              | 5          | 0 to 240     |
|             |                    | Over Charging Curr Recov  |            |              | 6          | 0 to 2000    |
|             |                    | Depleted Voltage          |            |              | 8          | 0 to 16000   |
|             |                    | Depleted Voltage Time     |            |              | 10         | 0 to 240     |
|             |                    | Depleted Recovery         |            |              | 11         | 0 to 16000   |
|             |                    | Over Charge Capacity      | 13         | 0 to 4000    | 13         | 0 to 4000    |
|             |                    | Over Charge Recovery      |            |              | 15         | 0 to 100     |
|             |                    | CMTO                      |            |              | 17         | 0 to 65535   |

**Table 3. Charge Control (continued)**

| Subclass ID | Subclass | Name             | bq20z40/45 |              | bq20z60/65 |              |
|-------------|----------|------------------|------------|--------------|------------|--------------|
|             |          |                  | Offset     | Range        | Offset     | Range        |
|             |          | PCMTO            |            |              | 19         | 0 to 65535   |
|             |          | Charge Fault Cfg | 21         | b0: Reserved | 21         | b0: XCHGLV   |
|             |          |                  |            | b1: OC       |            | b1: OC       |
|             |          |                  |            | b2: Reserved |            | b2: OCHGI    |
|             |          |                  |            | b3: Reserved |            | b3: OCHGV    |
|             |          |                  |            | b4: Reserved |            | b4: CMTO     |
|             |          |                  |            | b5: Reserved |            | b5: PCMTO    |
|             |          |                  |            | b6: Reserved |            | b6: Reserved |
|             |          |                  |            | b7: Reserved |            | b7: Reserved |

## 4 SBS Configuration

**Table 4. SBS Configuration**

| Subclass ID | Subclass          | Name                      | bq20z40/45 |                  | bq20z60/65 |                  |
|-------------|-------------------|---------------------------|------------|------------------|------------|------------------|
|             |                   |                           | Offset     | Range            | Offset     | Range            |
| 48          | SBS Configuration | Rem Cap Alarm             | 0          | 0 to 700         | 0          | 0 to 700         |
|             |                   | Rem Energy Alarm          | 2          | 0 to 1000        | 2          | 0 to 1000        |
|             |                   | Rem Time Alarm            | 4          | 0 to 30          | 4          | 0 to 30          |
|             |                   | Init Battery Mode         | 6          | 0x0000 to 0xFFFF | 6          | 0x0000 to 0xFFFF |
|             |                   | Design Voltage            | 8          | 7000 to 18000    | 8          | 7000 to 18000    |
|             |                   | Spec Info                 | 10         | 0x0000 to 0xFFFF | 10         | 0x0000 to 0xFFFF |
|             |                   | Manuf Date                | 12         | 0 to 65535       | 12         | 0 to 65535       |
|             |                   | Ser. Num.                 | 14         | 0x0000 to 0xFFFF | 14         | 0x0000 to 0xFFFF |
|             |                   | Cycle Count               | 16         | 0 to 65535       | 16         | 0 to 65535       |
|             |                   | CC Threshold              | 18         | 100 to 32767     | 18         | 100 to 32767     |
|             |                   | CC %                      |            |                  | 20         | 0 to 100         |
|             |                   | CF MaxError Limit         | 21         | 0 to 100         | 21         | 0 to 100         |
|             |                   | Design Capacity           | 22         | 0 to 32767       | 22         | 0 to 32767       |
|             |                   | Design Energy             | 24         | 0 to 32767       | 24         | 0 to 32767       |
|             |                   | Manuf Name                | 26         | 11 Char String   | 26         | 11 Char String   |
|             |                   | Device Name               | 47         | 7 Char String    | 47         | 7 Char String    |
|             |                   | Device Chemistry          | 68         | 4 Char String    | 68         | 4 Char String    |
|             |                   | Deterioration Warn Limit  | 73         | 0 to 100         | 73         | 0 to 100         |
|             |                   | Deterioration Fault Limit | 74         | 0 to 100         | 74         | 0 to 100         |
|             |                   | Cell Life Limit           | 75         | 0 to 100         | 75         | 0 to 100         |
| 49          | Configuration     | TDA Set %                 | 0          | -1 to 100        | 0          | -1 to 100        |
|             |                   | TDA Clear %               | 1          | -1 to 100        | 1          | -1 to 100        |
|             |                   | FD Set %                  | 2          | -1 to 100        | 2          | -1 to 100        |
|             |                   | FD Clear %                | 3          | -1 to 100        | 3          | -1 to 100        |
|             |                   | TDA Set Volt Threshold    | 4          | 0 to 16800       | 4          | 0 to 16800       |
|             |                   | TDA Set Volt Time         | 6          | 0 to 240         | 6          | 0 to 240         |
|             |                   | TDA Clear Volt            | 7          | 0 to 16800       | 7          | 0 to 16800       |
|             |                   | FD Set Volt Threshold     |            |                  | 9          | 0 to 16800       |
|             |                   | FD Volt Time              |            |                  | 11         | 0 to 240         |
|             |                   | FD Clear Volt             |            |                  | 12         | 0 to 16800       |

## 5 System Data

**Table 5. System Data**

| Subclass ID | Subclass              | Name                      | bq20z40/45 |                 | bq20z60/65 |                  |
|-------------|-----------------------|---------------------------|------------|-----------------|------------|------------------|
|             |                       |                           | Offset     | Range           | Offset     | Range            |
| 56          | Manufacturer Data     | Pack Lot Code             |            |                 | 0          | 0x0000 to 0xFFFF |
|             |                       | PCB Lot Code              |            |                 | 2          | 0x0000 to 0xFFFF |
|             |                       | Firmware Version          |            |                 | 4          | 0x0000 to 0xFFFF |
|             |                       | Hardware Revision         |            |                 | 6          | 0x0000 to 0xFFFF |
|             |                       | Cell Revision             |            |                 | 8          | 0x0000 to 0xFFFF |
| 58          | Manufacturer Info     | Manuf. Info 0             | 0          | 31 Char String  | 0          | 31 Char String   |
|             |                       | Manuf. Block 1            | 32         | 20 Char String  | 32         | 20 Char String   |
|             |                       | Manuf. Block 2            | 53         | 20 Char String  | 53         | 20 Char String   |
|             |                       | Manuf. Block 3            | 74         | 20 Char String  | 74         | 20 Char String   |
|             |                       | Manuf. Block 4            | 95         | 20 Char String  | 95         | 20 Char String   |
| 59          | Lifetime Data         | Lifetime Max Temp         | 0          | 0 to 1400       | 0          | 0 to 1400        |
|             |                       | Lifetime Min Temp         | 2          | –600 to 1400    | 2          | –600 to 1400     |
|             |                       | Lifetime Max Cell Voltage | 4          | 0 to 32767      | 4          | 0 to 32767       |
|             |                       | Lifetime Min Cell Voltage | 6          | 0 to 32767      | 6          | 0 to 32767       |
|             |                       | Lifetime Max Pack Voltage | 8          | 0 to 32767      | 8          | 0 to 32767       |
|             |                       | Lifetime Min Pack Voltage | 10         | 0 to 32767      | 10         | 0 to 32767       |
|             |                       | Lifetime Max Chg Current  | 12         | –32767 to 32767 | 12         | –32767 to 32767  |
|             |                       | Lifetime Max Dsg Current  | 14         | –32767 to 32767 | 14         | –32767 to 32767  |
|             |                       | Lifetime Max Chg Power    | 16         | –32767 to 32767 | 16         | –32767 to 32767  |
|             |                       | Lifetime Max Dsg Power    | 18         | –32767 to 32767 | 18         | –32767 to 32767  |
|             |                       | Lifetime Max AvgDsg Cur   | 22         | –32767 to 32767 | 22         | –32767 to 32767  |
|             |                       | Lifetime Max AvgDsg Pow   | 26         | –32767 to 32767 | 26         | –32767 to 32767  |
|             |                       | Life Avg Temp             | 28         | 0 to 1400       | 28         | 0 to 1400        |
|             |                       | Life OT Count             |            |                 | 30         | 0 to 65535       |
|             |                       | Life OT Duration          |            |                 | 32         | 0 to 65535       |
|             |                       | Life OV Count             |            |                 | 35         | 0 to 65535       |
|             |                       | Life OV Duration          |            |                 | 37         | 0 to 65535       |
| 60          | Lifetime Temp Samples | LT Temp Samples           | 0          | 0 to 140000000  | 0          | 0 to 140000000   |

## 6 Configuration

**Table 6. Configuration**

| Subclass ID | Subclass  | Name                 | bq20z40/45 |                  | bq20z60/65 |                  |
|-------------|-----------|----------------------|------------|------------------|------------|------------------|
|             |           |                      | Offset     | Range            | Offset     | Range            |
| 64          | Registers | Operation Cfg A      | 0          | 0x0000 to 0xFFFF | 0          | 0x0000 to 0xFFFF |
|             |           | Operation Cfg B      | 2          | 0x0000 to 0xFFFF | 2          | 0x0000 to 0xFFFF |
|             |           | Operation Cfg C      | 4          | 0x0000 to 0xFFFF | 4          | 0x0000 to 0xFFFF |
|             |           | Permanent Fail Cfg   | 6          | 0x0000 to 0xFFFF | 6          | 0x0000 to 0xFFFF |
|             |           | Permanent Fail Cfg 2 | 8          | 0x0000 to 0xFFFF | 8          | 0x0000 to 0xFFFF |
|             |           | Non-Removable Cfg    | 10         | 0x0000 to 0xFFFF | 10         | 0x0000 to 0xFFFF |
| 65          | AFE       | AFE.State_CTL        | 0          | 0x00 to 0xFF     | 0          | 0x00 to 0xFF     |

**Table 7. Configuration**

| Subclass ID | Subclass  | Name            | bq20z40/45 |               | bq20z60/65 |               |
|-------------|-----------|-----------------|------------|---------------|------------|---------------|
|             |           |                 | Offset     | Range         | Offset     | Range         |
| 64          | Registers | Operation Cfg A | 0          | b00: ZVCHG0   | 0          | b00: ZVCHG0   |
|             |           |                 |            | b01: ZVCHG1   |            | b01: ZVCHG1   |
|             |           |                 |            | b02: Reserved |            | b02: SLED     |
|             |           |                 |            | b03: TEMP0    |            | b03: TEMP0    |
|             |           |                 |            | b04: TEMP1    |            | b04: TEMP1    |
|             |           |                 |            | b05: SLEEP    |            | b05: SLEEP    |
|             |           |                 |            | b06: Reserved |            | b06: Reserved |
|             |           |                 |            | b07: Reserved |            | b07: Reserved |
|             |           |                 |            | b08: CC0      |            | b08: CC0      |
|             |           |                 |            | b09: CC1      |            | b09: CC1      |
|             |           |                 |            | b10: Reserved |            | b10: LED0     |
|             |           |                 |            | b11: Reserved |            | b11: LED1     |
|             |           |                 |            | b12: Reserved |            | b12: DMODE    |
|             |           |                 |            | b13: Reserved |            | b13: CHGLED   |
|             |           |                 |            | b14: Reserved |            | b14: LEDRCA   |
|             |           |                 |            | b15: Reserved |            | b15: LEDR     |
|             |           | Operation Cfg B | 2          | b00: BCAST    | 2          | b00: BCAST    |
|             |           |                 |            | b01: HPE      |            | b01: HPE      |
|             |           |                 |            | b02: CPE      |            | b02: CPE      |
|             |           |                 |            | b03: NR       |            | b03: NR       |
|             |           |                 |            | b04: CHGIN    |            | b04: CHGIN    |
|             |           |                 |            | b05: CHGFET   |            | b05: CHGFET   |
|             |           |                 |            | b06: OTFET    |            | b06: OTFET    |
|             |           |                 |            | b07: CHGSUSP  |            | b07: CHGSUSP  |
|             |           |                 |            | b08: Reserved |            | b08: CCT      |
|             |           |                 |            | b09: CHGTERM  |            | b09: CHGTERM  |
|             |           |                 |            | b10: CSYNC    |            | b10: CSYNC    |
|             |           |                 |            | b11: NRCHG    |            | b11: NRCHG    |
|             |           |                 |            | b12: NCSMB    |            | b12: NCSMB    |
|             |           |                 |            | b13: RESCAP   |            | b13: RESCAP   |

**Table 7. Configuration (continued)**

| Subclass ID | Subclass | Name                 | bq20z40/45 |                   | bq20z60/65 |                   |
|-------------|----------|----------------------|------------|-------------------|------------|-------------------|
|             |          |                      | Offset     | Range             | Offset     | Range             |
|             |          |                      |            | b14: Reserved     |            | b14: PDF0         |
|             |          |                      |            | b15: Reserved     |            | b15: PDF1         |
|             |          | Operation Cfg C      | 4          | b00: RSOCL        | 4          | b00: RSOCL        |
|             |          |                      |            | b01: PRE_ZT_PF_En |            | b01: PRE_ZT_PF_En |
|             |          |                      |            | b02: SHUTV        |            | b02: SHUTV        |
|             |          |                      |            | b03: SUV_MODE     |            | b03: SUV_MODE     |
|             |          |                      |            | b04: LOCK_0       |            | b04: LOCK_0       |
|             |          |                      |            | b05: OCV_WGHT     |            | b05: OCV_WGHT     |
|             |          |                      |            | b06: Reserved     |            | b06: Reserved     |
|             |          |                      |            | b07: Reserved     |            | b07: Reserved     |
|             |          |                      |            | b08: CELL_TAPER   |            | b08: CELL_TAPER   |
|             |          |                      |            | b09: CHGOCV_DIS   |            | b09: CHGOCV_DIS   |
|             |          |                      |            | b10: Reserved     |            | b10: Reserved     |
|             |          |                      |            | b11: Reserved     |            | b11: Reserved     |
|             |          |                      |            | b12: Reserved     |            | b12: Reserved     |
|             |          |                      |            | b13: Reserved     |            | b13: Reserved     |
|             |          |                      |            | b14: Reserved     |            | b14: Reserved     |
|             |          |                      |            | b15: Reserved     |            | b15: Reserved     |
|             |          | Permanent Fail Cfg   | 6          | b00: XPFIN        | 6          | b00: XPFIN        |
|             |          |                      |            | b01: XSOV         |            | b01: XSOV         |
|             |          |                      |            | b02: XSOT1C       |            | b02: XSOT1C       |
|             |          |                      |            | b03: XSOT1D       |            | b03: XSOT1D       |
|             |          |                      |            | b04: XCIM_R       |            | b04: XCIM_R       |
|             |          |                      |            | b05: XCFETF       |            | b05: XCFETF       |
|             |          |                      |            | b06: XDFETF       |            | b06: XDFETF       |
|             |          |                      |            | b07: XDFF         |            | b07: XDFF         |
|             |          |                      |            | b08: XAFE_C       |            | b08: XAFE_C       |
|             |          |                      |            | b09: XAFE_P       |            | b09: XAFE_P       |
|             |          |                      |            | b10: XSOC         |            | b10: XSOC         |
|             |          |                      |            | b11: XSOC         |            | b11: XSOC         |
|             |          |                      |            | b12: Reserved     |            | b12: XSOPT1       |
|             |          |                      |            | b13: XSUV         |            | b13: XSUV         |
|             |          |                      |            | b14: XVSHUT       |            | b14: XVSHUT       |
|             |          |                      |            | b15: Reserved     |            | b15: Reserved     |
|             |          | Permanent Fail Cfg 2 | 8          | b00: XCIM_A       | 8          | b00: XCIM_A       |
|             |          |                      |            | b01: XSOT2C       |            | b01: XSOT2C       |
|             |          |                      |            | b02: XSOT2D       |            | b02: XSOT2D       |
|             |          |                      |            | b03: Reserved     |            | b03: XSOPT2       |
|             |          |                      |            | b04: Reserved     |            | b04: Reserved     |
|             |          |                      |            | b05: Reserved     |            | b05: Reserved     |
|             |          |                      |            | b06: Reserved     |            | b06: Reserved     |
|             |          |                      |            | b07: Reserved     |            | b07: Reserved     |
|             |          |                      |            | b08: Reserved     |            | b08: Reserved     |
|             |          |                      |            | b09: Reserved     |            | b09: Reserved     |

**Table 7. Configuration (continued)**

| Subclass ID | Subclass | Name              | bq20z40/45 |               | bq20z60/65 |               |
|-------------|----------|-------------------|------------|---------------|------------|---------------|
|             |          |                   | Offset     | Range         | Offset     | Range         |
|             |          |                   |            | b10: Reserved |            | b10: Reserved |
|             |          |                   |            | b11: Reserved |            | b11: Reserved |
|             |          |                   |            | b12: Reserved |            | b12: Reserved |
|             |          |                   |            | b13: Reserved |            | b13: Reserved |
|             |          |                   |            | b14: Reserved |            | b14: Reserved |
|             |          |                   |            | b15: Reserved |            | b15: Reserved |
|             |          | Non-Removable Cfg | 10         | b00: ASCD     | 10         | b00: ASCD     |
|             |          |                   |            | b01: ASCC     |            | b01: ASCC     |
|             |          |                   |            | b02: AOCD     |            | b02: AOCD     |
|             |          |                   |            | b03: Reserved |            | b03: Reserved |
|             |          |                   |            | b04: Reserved |            | b04: Reserved |
|             |          |                   |            | b05: Reserved |            | b05: Reserved |
|             |          |                   |            | b06: Reserved |            | b06: Reserved |
|             |          |                   |            | b07: Reserved |            | b07: Reserved |
|             |          |                   |            | b08: Reserved |            | b08: Reserved |
|             |          |                   |            | b09: Reserved |            | b09: Reserved |
|             |          |                   |            | b10: Reserved |            | b10: OCC2     |
|             |          |                   |            | b11: Reserved |            | b11: OCD2     |
|             |          |                   |            | b12: OCC      |            | b12: OCC      |
|             |          |                   |            | b13: OCD      |            | b13: OCD      |
|             |          |                   |            | b14: Reserved |            | b14: Reserved |
|             |          |                   |            | b15: Reserved |            | b15: Reserved |
| 65          | AFE      | AFE.State_CTL     | 0          | b00: Reserved | 0          | b00: Reserved |
|             |          |                   |            | b01: Reserved |            | b01: Reserved |
|             |          |                   |            | b02: Reserved |            | b02: Reserved |
|             |          |                   |            | b03: Reserved |            | b03: Reserved |
|             |          |                   |            | b04: RSNS     |            | b04: RSNS     |
|             |          |                   |            | b05: Reserved |            | b05: Reserved |
|             |          |                   |            | b06: Reserved |            | b06: Reserved |
|             |          |                   |            | b07: Reserved |            | b07: Reserved |

## 7 LED Support

**Table 8. LED Support**

| Subclass ID | Subclass | Name             | bq20z40/45 |       | bq20z60/65 |            |
|-------------|----------|------------------|------------|-------|------------|------------|
|             |          |                  | Offset     | Range | Offset     | Range      |
| 67          | LED Cfg  | LED Flash Period |            |       | 0          | 0 to 65535 |
|             |          | LED Blink Period |            |       | 2          | 0 to 65535 |
|             |          | LED Delay        |            |       | 4          | 1 to 65535 |
|             |          | LED Hold Time    |            |       | 6          | 0 to 255   |
|             |          | CHG Flash Alarm  |            |       | 7          | -1 to 101  |
|             |          | CHG Thresh 1     |            |       | 8          | -1 to 101  |
|             |          | CHG Thresh 2     |            |       | 9          | -1 to 101  |
|             |          | CHG Thresh 3     |            |       | 10         | -1 to 101  |
|             |          | CHG Thresh 4     |            |       | 11         | -1 to 101  |
|             |          | CHG Thresh 5     |            |       | 12         | -1 to 101  |
|             |          | DSG Flash Alarm  |            |       | 13         | -1 to 101  |
|             |          | DSG Thresh 1     |            |       | 14         | -1 to 101  |
|             |          | DSG Thresh 2     |            |       | 15         | -1 to 101  |
|             |          | DSG Thresh 3     |            |       | 16         | -1 to 101  |
|             |          | DSG Thresh 4     |            |       | 17         | -1 to 101  |
|             |          | DSG Thresh 5     |            |       | 18         | -1 to 101  |
|             |          | Sink Current     |            |       | 19         | 0 to 3     |

## 8 Power

**Table 9. Power**

| Subclass ID | Subclass | Name                    | bq20z40/45 |               | bq20z60/65 |               |
|-------------|----------|-------------------------|------------|---------------|------------|---------------|
|             |          |                         | Offset     | Range         | Offset     | Range         |
| 68          | Power    | Flash Update OK Voltage | 0          | 6000 to 20000 | 0          | 6000 to 20000 |
|             |          | Shutdown Voltage        | 2          | 5000 to 20000 | 2          | 5000 to 20000 |
|             |          | Shutdown Time           |            |               | 4          | 0 to 240      |
|             |          | Cell Shutdown Voltage   | 5          | 0 to 5000     | 5          | 0 to 5000     |
|             |          | Cell Shutdown Time      |            |               | 7          | 0 to 240      |
|             |          | Charger Present         | 8          | 0 to 23000    | 8          | 0 to 23000    |
|             |          | Sleep Current           | 10         | 0 to 100      | 10         | 0 to 100      |
|             |          | Bus Low Time            |            |               | 12         | 0 to 255      |
|             |          | Cal Inhibit Temp Low    |            |               | 13         | -400 to 1200  |
|             |          | Cal Inhibit Temp High   |            |               | 15         | -400 to 1200  |
|             |          | Sleep Voltage Time      |            |               | 17         | 1 to 240      |
|             |          | Sleep Current Time      |            |               | 18         | 1 to 255      |
|             |          | Wake Current Reg        | 19         | 0x00 to 0xFF  | 19         | 0x00 to 0xFF  |
|             |          | Sealed Ship Delay       | 20         | 0 to 255      | 20         | 0 to 255      |

## 9 Gas Gauging

**Table 10. Gas Gauging**

| Subclass ID | Subclass           | Name                  | bq20z40/45 |                 | bq20z60/65 |                 |
|-------------|--------------------|-----------------------|------------|-----------------|------------|-----------------|
|             |                    |                       | Offset     | Range           | Offset     | Range           |
| 80          | IT Cfg             | Load Select           | 0          | 0 to 255        | 0          | 0 to 255        |
|             |                    | Load Mode             | 1          | 0 to 255        | 1          | 0 to 255        |
|             |                    | Term Voltage          | 59         | –32768 to 32767 | 59         | –32768 to 32767 |
|             |                    | User Rate-mA          | 76         | –9000 to 0      | 76         | –9000 to 0      |
|             |                    | User Rate-mW          | 78         | –32768 to 0     | 78         | –32768 to 0     |
|             |                    | Reserve Cap-mAh       | 80         | 0 to 9000       | 80         | 0 to 9000       |
|             |                    | Reserve Cap-mWh       | 82         | 0 to 14000      | 82         | 0 to 14000      |
| 81          | Current Thresholds | Dsg Current Threshold | 0          | 0 to 2000       | 0          | 0 to 2000       |
|             |                    | Chg Current Threshold | 2          | 0 to 2000       | 2          | 0 to 2000       |
|             |                    | Quit Current          | 4          | 0 to 1000       | 4          | 0 to 1000       |
|             |                    | Dsg Relax Time        |            |                 | 6          | 0 to 240        |
|             |                    | Chg Relax Time        |            |                 | 7          | 0 to 240        |
| 82          | State              | Qmax Cell 0           | 0          | 0 to 32767      | 0          | 0 to 32767      |
|             |                    | Qmax Cell 1           | 2          | 0 to 32767      | 2          | 0 to 32767      |
|             |                    | Qmax Cell 2           | 4          | 0 to 32767      | 4          | 0 to 32767      |
|             |                    | Qmax Cell 3           | 6          | 0 to 32767      | 6          | 0 to 32767      |
|             |                    | Qmax Pack             | 8          | 0 to 32767      | 8          | 0 to 32767      |
|             |                    | Update Status         | 12         | 0x00 to 0x06    | 12         | 0x00 to 0x06    |
|             |                    | Cell 0 Chg dod at EoC | 13         | 0 to 16384      | 13         | 0 to 16384      |
|             |                    | Cell 1 Chg dod at EoC | 15         | 0 to 16384      | 15         | 0 to 16384      |
|             |                    | Cell 2 Chg dod at EoC | 17         | 0 to 16384      | 17         | 0 to 16384      |
|             |                    | Cell 3 Chg dod at EoC | 19         | 0 to 16384      | 19         | 0 to 16384      |
|             |                    | Avg I Last Run        | 21         | –32768 to 32767 | 21         | –32768 to 32767 |
|             |                    | Avg P Last Run        | 23         | –32768 to 32767 | 23         | –32768 to 32767 |
|             |                    | Delta Voltage         | 25         | –32768 to 32767 | 25         | –32768 to 32767 |
|             |                    | Max Avg I Last Run    | 31         | –32767 to 32767 | 31         | –32767 to 32767 |
|             |                    | Max Avg P Last Run    | 33         | –32767 to 32767 | 33         | –32767 to 32767 |

# 10 Ra Table

**Table 11. Ra Table**

| Subclass ID | Subclass | Name           | bq20z40/45 |                 | bq20z60/65 |                 |
|-------------|----------|----------------|------------|-----------------|------------|-----------------|
|             |          |                | Offset     | Range           | Offset     | Range           |
| 88          | R_a0     | Cell0 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | Cell0 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | Cell0 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | Cell0 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |
|             |          | Cell0 R_a 3    | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | Cell0 R_a 4    | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | Cell0 R_a 5    | 12         | -32768 to 32767 | 12         | -32768 to 32767 |
|             |          | Cell0 R_a 6    | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | Cell0 R_a 7    | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | Cell0 R_a 8    | 18         | -32768 to 32767 | 18         | -32768 to 32767 |
|             |          | Cell0 R_a 9    | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | Cell0 R_a 10   | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | Cell0 R_a 11   | 24         | -32768 to 32767 | 24         | -32768 to 32767 |
|             |          | Cell0 R_a 12   | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | Cell0 R_a 13   | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | Cell0 R_a 14   | 30         | -32768 to 32767 | 30         | -32768 to 32767 |
| 89          | R_a1     | Cell1 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | Cell1 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | Cell1 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | Cell1 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |
|             |          | Cell1 R_a 3    | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | Cell1 R_a 4    | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | Cell1 R_a 5    | 12         | -32768 to 32767 | 12         | -32768 to 32767 |
|             |          | Cell1 R_a 6    | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | Cell1 R_a 7    | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | Cell1 R_a 8    | 18         | -32768 to 32767 | 18         | -32768 to 32767 |
|             |          | Cell1 R_a 9    | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | Cell1 R_a 10   | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | Cell1 R_a 11   | 24         | -32768 to 32767 | 24         | -32768 to 32767 |

**Table 11. Ra Table (continued)**

| Subclass ID | Subclass | Name           | bq20z40/45 |                 | bq20z60/65 |                 |
|-------------|----------|----------------|------------|-----------------|------------|-----------------|
|             |          |                | Offset     | Range           | Offset     | Range           |
|             |          | Cell1 R_a 12   | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | Cell1 R_a 13   | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | Cell1 R_a 14   | 30         | -32768 to 32767 | 30         | -32768 to 32767 |
| 90          | R_a2     | Cell2 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | Cell2 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | Cell2 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | Cell2 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |
|             |          | Cell2 R_a 3    | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | Cell2 R_a 4    | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | Cell2 R_a 5    | 12         | -32768 to 32767 | 12         | -32768 to 32767 |
|             |          | Cell2 R_a 6    | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | Cell2 R_a 7    | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | Cell2 R_a 8    | 18         | -32768 to 32767 | 18         | -32768 to 32767 |
|             |          | Cell2 R_a 9    | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | Cell2 R_a 10   | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | Cell2 R_a 11   | 24         | -32768 to 32767 | 24         | -32768 to 32767 |
|             |          | Cell2 R_a 12   | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | Cell2 R_a 13   | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | Cell2 R_a 14   | 30         | -32768 to 32767 | 30         | -32768 to 32767 |
| 91          | R_a3     | Cell3 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | Cell3 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | Cell3 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | Cell3 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |
|             |          | Cell3 R_a 3    | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | Cell3 R_a 4    | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | Cell3 R_a 5    | 12         | -32768 to 32767 | 12         | -32768 to 32767 |
|             |          | Cell3 R_a 6    | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | Cell3 R_a 7    | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | Cell3 R_a 8    | 18         | -32768 to 32767 | 18         | -32768 to 32767 |

**Table 11. Ra Table (continued)**

| Subclass ID | Subclass | Name            | bq20z40/45 |                 | bq20z60/65 |                 |
|-------------|----------|-----------------|------------|-----------------|------------|-----------------|
|             |          |                 | Offset     | Range           | Offset     | Range           |
|             |          | Cell3 R_a 9     | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | Cell3 R_a 10    | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | Cell3 R_a 11    | 24         | -32768 to 32767 | 24         | -32768 to 32767 |
|             |          | Cell3 R_a 12    | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | Cell3 R_a 13    | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | Cell3 R_a 14    | 30         | -32768 to 32767 | 30         | -32768 to 32767 |
| 92          | R_a0x    | xCell0 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | xCell0 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | xCell0 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | xCell0 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |
|             |          | xCell0 R_a 3    | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | xCell0 R_a 4    | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | xCell0 R_a 5    | 12         | -32768 to 32767 | 12         | -32768 to 32767 |
|             |          | xCell0 R_a 6    | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | xCell0 R_a 7    | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | xCell0 R_a 8    | 18         | -32768 to 32767 | 18         | -32768 to 32767 |
|             |          | xCell0 R_a 9    | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | xCell0 R_a 10   | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | xCell0 R_a 11   | 24         | -32768 to 32767 | 24         | -32768 to 32767 |
|             |          | xCell0 R_a 12   | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | xCell0 R_a 13   | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | xCell0 R_a 14   | 30         | -32768 to 32767 | 30         | -32768 to 32767 |
| 93          | R_a1x    | xCell1 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | xCell1 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | xCell1 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | xCell1 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |
|             |          | xCell1 R_a 3    | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | xCell1 R_a 4    | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | xCell1 R_a 5    | 12         | -32768 to 32767 | 12         | -32768 to 32767 |

**Table 11. Ra Table (continued)**

| Subclass ID | Subclass | Name            | bq20z40/45 |                 | bq20z60/65 |                 |
|-------------|----------|-----------------|------------|-----------------|------------|-----------------|
|             |          |                 | Offset     | Range           | Offset     | Range           |
|             |          | xCell1 R_a 6    | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | xCell1 R_a 7    | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | xCell1 R_a 8    | 18         | -32768 to 32767 | 18         | -32768 to 32767 |
|             |          | xCell1 R_a 9    | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | xCell1 R_a 10   | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | xCell1 R_a 11   | 24         | -32768 to 32767 | 24         | -32768 to 32767 |
|             |          | xCell1 R_a 12   | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | xCell1 R_a 13   | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | xCell1 R_a 14   | 30         | -32768 to 32767 | 30         | -32768 to 32767 |
| 94          | R_a2x    | xCell2 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | xCell2 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | xCell2 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | xCell2 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |
|             |          | xCell2 R_a 3    | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | xCell2 R_a 4    | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | xCell2 R_a 5    | 12         | -32768 to 32767 | 12         | -32768 to 32767 |
|             |          | xCell2 R_a 6    | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | xCell2 R_a 7    | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | xCell2 R_a 8    | 18         | -32768 to 32767 | 18         | -32768 to 32767 |
|             |          | xCell2 R_a 9    | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | xCell2 R_a 10   | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | xCell2 R_a 11   | 24         | -32768 to 32767 | 24         | -32768 to 32767 |
|             |          | xCell2 R_a 12   | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | xCell2 R_a 13   | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | xCell2 R_a 14   | 30         | -32768 to 32767 | 30         | -32768 to 32767 |
| 95          | R_a3x    | xCell3 R_a flag | 0          | 0x0000 to xFFFF | 0          | 0x0000 to xFFFF |
|             |          | xCell3 R_a 0    | 2          | -32768 to 32767 | 2          | -32768 to 32767 |
|             |          | xCell3 R_a 1    | 4          | -32768 to 32767 | 4          | -32768 to 32767 |
|             |          | xCell3 R_a 2    | 6          | -32768 to 32767 | 6          | -32768 to 32767 |

**Table 11. Ra Table (continued)**

| Subclass ID | Subclass | Name          | bq20z40/45 |                 | bq20z60/65 |                 |
|-------------|----------|---------------|------------|-----------------|------------|-----------------|
|             |          |               | Offset     | Range           | Offset     | Range           |
|             |          | xCell3 R_a 3  | 8          | -32768 to 32767 | 8          | -32768 to 32767 |
|             |          | xCell3 R_a 4  | 10         | -32768 to 32767 | 10         | -32768 to 32767 |
|             |          | xCell3 R_a 5  | 12         | -32768 to 32767 | 12         | -32768 to 32767 |
|             |          | xCell3 R_a 6  | 14         | -32768 to 32767 | 14         | -32768 to 32767 |
|             |          | xCell3 R_a 7  | 16         | -32768 to 32767 | 16         | -32768 to 32767 |
|             |          | xCell3 R_a 8  | 18         | -32768 to 32767 | 18         | -32768 to 32767 |
|             |          | xCell3 R_a 9  | 20         | -32768 to 32767 | 20         | -32768 to 32767 |
|             |          | xCell3 R_a 10 | 22         | -32768 to 32767 | 22         | -32768 to 32767 |
|             |          | xCell3 R_a 11 | 24         | -32768 to 32767 | 24         | -32768 to 32767 |
|             |          | xCell3 R_a 12 | 26         | -32768 to 32767 | 26         | -32768 to 32767 |
|             |          | xCell3 R_a 13 | 28         | -32768 to 32767 | 28         | -32768 to 32767 |
|             |          | xCell3 R_a 14 | 30         | -32768 to 32767 | 30         | -32768 to 32767 |

# 11 PF Status

**Table 12. PF Status**

| Subclass ID | Subclass           | Name                 | bq20z40/45 |               | bq20z60/65 |                  |
|-------------|--------------------|----------------------|------------|---------------|------------|------------------|
|             |                    |                      | Offset     | Range         | Offset     | Range            |
| 96          | Device Status Data | Saved PF Flags 1     | 0          | b00: PFIN     | 0          | b00: PFIN        |
|             |                    |                      |            | b01: SOV      |            | b01: SOV         |
|             |                    |                      |            | b02: SOT1C    |            | b02: SOT1C       |
|             |                    |                      |            | b03: SOT1D    |            | b03: SOT1D       |
|             |                    |                      |            | b04: CIM_R    |            | b04: CIM_R       |
|             |                    |                      |            | b05: CFETF    |            | b05: CFETF       |
|             |                    |                      |            | b06: DFETF    |            | b06: DFETF       |
|             |                    |                      |            | b07: DFF      |            | b07: DFF         |
|             |                    |                      |            | b08: AFE_C    |            | b08: AFE_C       |
|             |                    |                      |            | b09: AFE_P    |            | b09: AFE_P       |
|             |                    |                      |            | b10: SOCC     |            | b10: SOCC        |
|             |                    |                      |            | b11: SOCD     |            | b11: SOCD        |
|             |                    |                      |            | b12: Reserved |            | b12: SOPT1       |
|             |                    |                      |            | b13: SUV      |            | b13: SUV         |
|             |                    |                      |            | b14: PFVSHUT  |            | b14: VSHUT       |
|             |                    |                      |            | b15: Reserved |            | b15: FBF         |
|             |                    | Saved PF Flags 2     | 2          | b00: CIM_A    | 2          | b00: CIM_A       |
|             |                    |                      |            | b01: SOT2C    |            | b01: SOT2C       |
|             |                    |                      |            | b02: SOT2D    |            | b02: SOT2D       |
|             |                    |                      |            | b03: Reserved |            | b03: SOPT2       |
|             |                    |                      |            | b04: Reserved |            | b04: Reserved    |
|             |                    |                      |            | b05: Reserved |            | b05: Reserved    |
|             |                    |                      |            | b06: Reserved |            | b06: Reserved    |
|             |                    |                      |            | b07: Reserved |            | b07: Reserved    |
|             |                    |                      |            | b08: Reserved |            | b08: Reserved    |
|             |                    |                      |            | b09: Reserved |            | b09: Reserved    |
|             |                    |                      |            | b10: Reserved |            | b10: Reserved    |
|             |                    |                      |            | b11: Reserved |            | b11: Reserved    |
|             |                    |                      |            | b12: Reserved |            | b12: Reserved    |
|             |                    |                      |            | b13: Reserved |            | b13: Reserved    |
|             |                    |                      |            | b14: Reserved |            | b14: Reserved    |
|             |                    |                      |            | b15: Reserved |            | b15: Reserved    |
|             |                    | Fuse Flag            |            |               | 4          | 0x0000 to 0xFFFF |
|             |                    | PF Voltage           |            |               | 6          | 0 to 32767       |
|             |                    | PF C4 Voltage        |            |               | 8          | 0 to 9999        |
|             |                    | PF C3 Voltage        |            |               | 10         | 0 to 9999        |
|             |                    | PF C2 Voltage        |            |               | 12         | 0 to 9999        |
|             |                    | PF C1 Voltage        |            |               | 14         | 0 to 9999        |
|             |                    | PF Current           |            |               | 16         | –32768 to 32767  |
|             |                    | PF Temperature       |            |               | 18         | –9999 to 9999    |
|             |                    | PF Batt Stat         |            |               | 20         | 0x0000 to 0xFFFF |
|             |                    | PF RC-mAh            |            |               | 22         | 0 to 32767       |
|             |                    | PF RC-10mWh          |            |               | 24         | 0 to 32767       |
|             |                    | PF Chg Status        |            |               | 26         | 0x0000 to 0xFFFF |
|             |                    | PF Safety Status 1   |            |               | 28         | 0x0000 to 0xFFFF |
|             |                    | PF Safety Status2    |            |               | 30         | 0x0000 to 0xFFFF |
|             |                    | Saved 1st PF Flags 1 | 32         | b00: PFIN     | 32         | b00: PFIN        |
|             |                    |                      |            | b01: SOV      |            | b01: SOV         |

**Table 12. PF Status (continued)**

| Subclass ID | Subclass | Name                 | bq20z40/45 |               | bq20z60/65 |               |
|-------------|----------|----------------------|------------|---------------|------------|---------------|
|             |          |                      | Offset     | Range         | Offset     | Range         |
|             |          |                      |            | b02: SOT1C    |            | b02: SOT1C    |
|             |          |                      |            | b03: SOT1D    |            | b03: SOT1D    |
|             |          |                      |            | b04: CIM_R    |            | b04: CIM_R    |
|             |          |                      |            | b05: CFETF    |            | b05: CFETF    |
|             |          |                      |            | b06: DFETF    |            | b06: DFETF    |
|             |          |                      |            | b07: DFF      |            | b07: DFF      |
|             |          |                      |            | b08: AFE_C    |            | b08: AFE_C    |
|             |          |                      |            | b09: AFE_P    |            | b09: AFE_P    |
|             |          |                      |            | b10: SOCC     |            | b10: SOCC     |
|             |          |                      |            | b11: SOCD     |            | b11: SOCD     |
|             |          |                      |            | b12: Reserved |            | b12: SOPT1    |
|             |          |                      |            | b13: SUV      |            | b13: SUV      |
|             |          |                      |            | b14: PFVSHUT  |            | b14: VSHUT    |
|             |          |                      |            | b15: Reserved |            | b15: FBF      |
|             |          | Saved 1st PF Flags 2 | 34         | b00: CIM_A    | 34         | b00: CIM_A    |
|             |          |                      |            | b01: SOT2C    |            | b01: SOT2C    |
|             |          |                      |            | b02: SOT2D    |            | b02: SOT2D    |
|             |          |                      |            | b03: Reserved |            | b03: SOPT2    |
|             |          |                      |            | b04: Reserved |            | b04: Reserved |
|             |          |                      |            | b05: Reserved |            | b05: Reserved |
|             |          |                      |            | b06: Reserved |            | b06: Reserved |
|             |          |                      |            | b07: Reserved |            | b07: Reserved |
|             |          |                      |            | b08: Reserved |            | b08: Reserved |
|             |          |                      |            | b09: Reserved |            | b09: Reserved |
|             |          |                      |            | b10: Reserved |            | b10: Reserved |
|             |          |                      |            | b11: Reserved |            | b11: Reserved |
|             |          |                      |            | b12: Reserved |            | b12: Reserved |
|             |          |                      |            | b13: Reserved |            | b13: Reserved |
|             |          |                      |            | b14: Reserved |            | b14: Reserved |
|             |          |                      |            | b15: Reserved |            | b15: Reserved |
| 97          | AFE Regs | AFE Status           | 0          | 0x00 to 0xFF  | 0          | 0x00 to 0xFF  |
|             |          | AFE Output           | 1          | 0x00 to 0xFF  | 1          | 0x00 to 0xFF  |
|             |          | AFE Regs             | 2          | 0x00 to 0xFF  | 2          | 0x00 to 0xFF  |
|             |          | AFE Function         | 3          | 0x00 to 0xFF  | 3          | 0x00 to 0xFF  |
|             |          | AFE Cell Select      | 4          | 0x00 to 0xFF  | 4          | 0x00 to 0xFF  |
|             |          | AFE OLV              | 5          | 0x00 to 0x1F  | 5          | 0x00 to 0x1F  |
|             |          | AFE OLT              | 6          | 0x00 to 0xFF  | 6          | 0x00 to 0xFF  |
|             |          | AFE SCC              | 7          | 0x00 to 0xFF  | 7          | 0x00 to 0xFF  |
|             |          | AFE SCD              | 8          | 0x00 to 0xFF  | 8          | 0x00 to 0xFF  |

## 12 Calibration

**Table 13. Calibration**

| Subclass ID | Subclass   | Name             | bq20z40/45 |                  | bq20z60/65 |                  |
|-------------|------------|------------------|------------|------------------|------------|------------------|
|             |            |                  | Offset     | Range            | Offset     | Range            |
| 104         | Data       | CC Gain          | 0          | 0.1 to 4         | 0          | 0.1 to 4         |
|             |            | CC Delta         | 4          | 29826 to 1193046 | 4          | 29826 to 1193046 |
|             |            | Ref Voltage      | 8          | 0 to 32767       | 8          | 0 to 32767       |
|             |            | AFE Pack Gain    | 12         | 0 to 32767       | 12         | 0 to 32767       |
|             |            | CC Offset        | 14         | –32768 to 32767  | 14         | –32768 to 32767  |
|             |            | Board Offset     | 16         | –32768 to 32767  | 16         | –32768 to 32767  |
|             |            | Int Temp Offset  | 18         | –128 to 127      | 18         | –128 to 127      |
|             |            | Ext1 Temp Offset | 19         | –128 to 127      | 19         | –128 to 127      |
|             |            | Ext2 Temp Offset | 20         | –128 to 127      | 20         | –128 to 127      |
| 105         | Config     | CC Current       | 0          | 0 to 32767       | 0          | 0 to 32767       |
|             |            | Voltage Signal   | 2          | 0 to 32767       | 2          | 0 to 32767       |
|             |            | Temp Signal      | 4          | 0 to 32767       | 4          | 0 to 32767       |
|             |            | CC Offset Time   | 6          | 0 to 65535       | 6          | 0 to 65535       |
|             |            | ADC Offset Time  | 8          | 0 to 65535       | 8          | 0 to 65535       |
|             |            | CC Gain Time     | 10         | 0 to 65535       | 10         | 0 to 65535       |
|             |            | Voltage Time     | 12         | 0 to 65535       | 12         | 0 to 65535       |
|             |            | Temperature Time | 14         | 0 to 65535       | 14         | 0 to 65535       |
|             |            | Cal Mode Timeout | 17         | 0 to 65535       | 17         | 0 to 65535       |
| 106         | Temp Model | Ext Coef 1       | 0          | –32768 to 32767  | 0          | –32768 to 32767  |
|             |            | Ext Coef 2       | 2          | –32768 to 32767  | 2          | –32768 to 32767  |
|             |            | Ext Coef 3       | 4          | –32768 to 32767  | 4          | –32768 to 32767  |
|             |            | Ext Coef 4       | 6          | –32768 to 32767  | 6          | –32768 to 32767  |
|             |            | Ext Min AD       | 8          | –32768 to 32767  | 8          | –32768 to 32767  |
|             |            | Ext Max Temp     | 10         | –32768 to 32767  | 10         | –32768 to 32767  |
|             |            | Int Coef 1       | 12         | –32768 to 32767  | 12         | –32768 to 32767  |
|             |            | Int Coef 2       | 14         | –32768 to 32767  | 14         | –32768 to 32767  |
|             |            | Int Coef 3       | 16         | –32768 to 32767  | 16         | –32768 to 32767  |
|             |            | Int Coef 4       | 18         | –32768 to 32767  | 18         | –32768 to 32767  |
|             |            | Int Min AD       | 20         | –32768 to 32767  | 20         | –32768 to 32767  |
|             |            | Int Max Temp     | 22         | –32768 to 32767  | 22         | –32768 to 32767  |
| 107         | Current    | Filter           | 0          | 0 to 255         | 0          | 0 to 255         |
|             |            | Deadband         | 1          | 0 to 255         | 1          | 0 to 255         |
|             |            | CC Deadband      | 2          | 0 to 255         | 2          | 0 to 255         |

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