Application Report
SLUA520–July 2009

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
		Hi Dsg Start Temp	20	0 to 1200	20	0 to 1200
4	Host Comm	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: XSOCC		b10: XSOCC
				b11: XSOCD		b11: XSOCD
				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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