08 GRP11 Two - Mode Hybrid Battery Pack Control Module (BPCM)

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
12 V Battery Potential								
12V Battery Potential – Out of Range – High	P1A0D	Out of range high	12V System Voltage	> 16.0 V	No active DTCs: BPCM Power Mode	P0A1F =RUN	3 seconds (30 fail/40 sample; 100 ms frequency)	Non-MIL
12V Battery Potential – Out of Range – Low	P1A0C	Out of range low	12V System Voltage	< 9.0 V	No active DTCs: BPCM Power Mode	P0A1F =RUN	3 seconds (30 fail/40 sample; 100 ms frequency)	Non-MIL
CAN Communication:								
CAN Communication Loss - BCM	U1866	Communication Error	No message from BCM (System Power Mode)	> 250ms	High Speed Comm is enabled	> 400ms	250ms	Non-MIL
CAN Communication Loss – HCP	U1885	Communication Error	No message from HCP (Contactor Command)	> 75ms	High Speed Comm is enabled	> 400ms	75ms	Two Trips
CAN Communication Loss – ECM	U1886	Communication Error	No message from ECM (Vehicle Speed Average)	> 250ms	High Speed Comm is enabled	> 400ms	250ms	Two Trips
CAN Communication Loss – CGM	U1862	Communication Error	No message from CGM (Fan Speed Limit)	> 75ms	High Speed Comm is enabled	> 400ms	75ms	Special Type "C"
Block 1 Voltage Sensor Circuit:								
Block 1 Voltage measurement – Out of Range - Low	P0B3D	Out of range low	Block 1 AND Block 2	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 1 Voltage measurement – Out of Range - High	P0B3E	Out of range high	Block 1	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 1 Voltage measurement –	P0B3C	Rationality compares block voltage sensor to pack voltage sensor	| Block 1 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	9 seconds	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Rationality			AND | Block 2 * 20 - Battery Pack Voltage|	 > 70 V	Block 1 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	= VALID P0A1F P0B3D P0B3E P0ABC P0ABD P0ABB =RUN > 100ms	(90 fail/100 sample; 100 ms frequency)	
Block 2 Voltage Sensor Circuit:								
Block 2 Voltage measurement – Out of Range - Low	P0B42	Out of range low	Block 2 AND Block 3	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 2 Voltage measurement – Out of Range - High	P0B43	Out of range high	Block 2	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 2 Voltage measurement – Rationality	P0B41	Rationality compares block voltage sensor to pack voltage sensor	| Block 2 * 20 - Battery Pack Voltage| AND | Block 3 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 2 Voltage sensor input No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V = VALID P0A1F P0B42 P0B43 P0ABC P0ABD P0ABB =RUN	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					Time since contactors closed	> 100ms		
Block 3 Voltage Sensor Circuit:								
Block 3 Voltage measurement – Out of Range - Low	P0B47	Out of range low	Block 3 AND Block 4	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 3 Voltage measurement – Out of Range - High	P0B48	Out of range high	Block 3	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 3 Voltage measurement – Rationality	P0B46	Rationality compares block voltage sensor to pack voltage sensor	| Block 3 * 20 - Battery Pack Voltage| AND | Block 4 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 3 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B47 P0B48 P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 4 Voltage Sensor Circuit:								
Block 4 Voltage measurement – Out of Range - Low	P0B4C	Out of range low	Block 4 AND Block 5	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 4 Voltage measurement – Out of	P0B4D	Out of range high	Block 4	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Range - High					No active DTCs: BPCM Power Mode	P0A1F =RUN	(15 fail/20 sample; 100 ms frequency)	
Block 4 Voltage measurement – Rationality	P0B4B	Rationality compares block voltage sensor to pack voltage sensor	| Block 4 * 20 - Battery Pack Voltage| AND | Block 5 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 4 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B4C P0B4D P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 5 Voltage Sensor Circuit:								
Block 5 Voltage measurement – Out of Range - Low	P0B51	Out of range low	Block 5 AND Block 6	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 5 Voltage measurement – Out of Range - High	P0B52	Out of range high	Block 5	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 5 Voltage measurement – Rationality	P0B50	Rationality compares block voltage sensor to pack voltage sensor	| Block 5 * 20 - Battery Pack Voltage| AND | Block 6 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 5 Voltage sensor input No active DTCs:	>= 9.0 V <= 18.0 V = VALID P0A1F	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0B51 P0B52 P0ABC P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Block 6 Voltage Sensor Circuit:								
Block 6 Voltage measurement - Out of Range - Low	P0B56	Out of range low	Block 6 AND Block 7	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 6 Voltage measurement - Out of Range - High	P0B57	Out of range high	Block 6	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 6 Voltage measurement - Rationality	P0B55	Rationality compares block voltage sensor to pack voltage sensor	| Block 6 * 20 - Battery Pack Voltage| AND | Block 7 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 1 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B56 P0B57 P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 7 Voltage Sensor Circuit:								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Block 7 Voltage measurement - Out of Range - Low	P0B5B	Out of range low	Block 7 AND Block 8	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 7 Voltage measurement - Out of Range - High	P0B5C	Out of range high	Block 7	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 7 Voltage measurement - Rationality	P0B5A	Rationality compares block voltage sensor to pack voltage sensor	| Block 7 * 20 - Battery Pack Voltage| AND | Block 8 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 7 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B5B P0B5C P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 8 Voltage Sensor Circuit:								
Block 8 Voltage measurement - Out of Range - Low	P0B60	Out of range low	Block 8 AND Block 9	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 8 Voltage measurement - Out of Range - High	P0B61	Out of range high	Block 8	> 23 V	12V System Voltage No active DTCs:	>= 9.0 V <= 18.0 V P0A1F	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					BPCM Power Mode	=RUN		
Block 8 Voltage measurement - Rationality	P0B5F	Rationality compares block voltage sensor to pack voltage sensor	| Block 8 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	9 seconds	Two Trips
			AND		Block 8 Voltage sensor input	= VALID	(90 fail/100 sample; 100 ms frequency)	
			| Block 9 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F		
						P0B60		
						P0B61		
						P0ABC		
						P0ABD		
						P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Block 9 Voltage Sensor Circuit:								
Block 9 Voltage measurement - Out of Range - Low	P0B65	Out of range low	Block 9	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips
			AND		No active DTCs:	P0A1F		
			Block 10	< 2 V	BPCM Power Mode	=RUN	(15 fail/20 sample; 100 ms frequency)	
Block 9 Voltage measurement - Out of Range - High	P0B66	Out of range high	Block 9	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips
					No active DTCs:	P0A1F	(15 fail/20 sample; 100 ms frequency)	
					BPCM Power Mode	=RUN		
Block 9 Voltage measurement - Rationality	P0B64	Rationality compares block voltage sensor to pack voltage sensor	| Block 9 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	9 seconds	Two Trips
			AND		Block 9 Voltage sensor input	= VALID	(90 fail/100 sample; 100 ms frequency)	
			| Block 10 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F		
						P0B65		
						P0B66		
						P0ABC		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Block 10 Voltage Sensor Circuit:								
Block 10 Voltage measurement - Out of Range - Low	P0B6A	Out of range low	Block 10	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips
			AND		No active DTCs:	P0A1F		
			Block 11	< 2 V	BPCM Power Mode	=RUN	(15 fail/20 sample; 100 ms frequency)	
Block 10 Voltage measurement - Out of Range - High	P0B6B	Out of range high	Block 10	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips
					No active DTCs:	P0A1F	(15 fail/20 sample; 100 ms frequency)	
					BPCM Power Mode	=RUN		
Block 10 Voltage measurement - Rationality	P0B69	Rationality compares block voltage sensor to pack voltage sensor	| Block 10 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	9 seconds	Two Trips
			AND		Block 10 Voltage sensor input	= VALID	(90 fail/100 sample; 100 ms frequency)	
			| Block 11 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F		
						P0B6A		
						P0B6B		
						P0ABC		
						P0ABD		
						P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Block 11 Voltage Sensor Circuit:								
Block 11 Voltage measurement - Out of Range - Low	P0B6F	Out of range low	Block 11	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips
			AND		No active DTCs:	P0A1F		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			Block 12	< 2 V	BPCM Power Mode	=RUN	(15 fail/20 sample; 100 ms frequency)	
Block 11 Voltage measurement - Out of Range - High	P0B70	Out of range high	Block 11	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 11 Voltage measurement - Rationality	P0B6E	Rationality compares block voltage sensor to pack voltage sensor	| Block 11 * 20 - Battery Pack Voltage| AND | Block 12 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 11 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B6F P0B70 P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 12 Voltage Sensor Circuit:								
Block 12 Voltage measurement - Out of Range - Low	P0B74	Out of range low	Block 12 AND Block 13	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 12 Voltage measurement - Out of Range - High	P0B75	Out of range high	Block 12	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 12 Voltage measurement - Rationality	P0B73	Rationality compares block voltage sensor to pack voltage sensor	| Block 12 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	9 seconds	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			AND		Block 12 Voltage sensor input	= VALID	(90 fail/100 sample; 100 ms frequency)	
			| Block 13 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F		
						P0B74		
						P0B75		
						P0ABC		
						P0ABD		
						P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Block 13 Voltage Sensor Circuit:								
Block 13 Voltage measurement - Out of Range - Low	P0B79	Out of range low	Block 13	< 2 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips
			AND		No active DTCs:	P0A1F		
			Block 14	< 2 V	BPCM Power Mode	=RUN	(15 fail/20 sample; 100 ms frequency)	
Block 13 Voltage measurement - Out of Range - High	P0B7A	Out of range high	Block 13	> 23 V		>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips
					No active DTCs:	P0A1F	(15 fail/20 sample; 100 ms frequency)	
					BPCM Power Mode	=RUN		
Block 13 Voltage measurement - Rationality	P0B78	Rationality compares block voltage sensor to pack voltage sensor	| Block 13 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	9 seconds	Two Trips
			AND		Block 13 Voltage sensor input	= VALID	(90 fail/100 sample; 100 ms frequency)	
			| Block 14 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F		
						P0B79		
						P0B7A		
						P0ABC		
						P0ABD		
						P0ABB		
					BPCM Power Mode	=RUN		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					Time since contactors closed	> 100ms		
Block 14 Voltage Sensor Circuit:								
Block 14 Voltage measurement - Out of Range - Low	P0B7E	Out of range low	Block 14 AND Block 15	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 14 Voltage measurement - Out of Range - High	P0B7F	Out of range high	Block 14	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 14 Voltage measurement - Rationality	P0B7D	Rationality compares block voltage sensor to pack voltage sensor	| Block 14 * 20 - Battery Pack Voltage| AND | Block 15 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 14 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B7E P0B7F P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 15 Voltage Sensor Circuit:								
Block 15 Voltage measurement - Out of Range - Low	P0B83	Out of range low	Block 15 AND Block 16	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 15 Voltage measurement - Out of	P0B84	Out of range high	Block 15	> 23 V	12V System Voltage	>= 9.0 V <= 18.0 V	1.5 seconds	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Range - High					No active DTCs: BPCM Power Mode	P0A1F =RUN	(15 fail/20 sample; 100 ms frequency)	
Block 15 Voltage measurement - Rationality	P0B82	Rationality compares block voltage sensor to pack voltage sensor	| Block 15 * 20 - Battery Pack Voltage| AND | Block 16 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 15 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B83 P0B84 P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 16 Voltage Sensor Circuit:								
Block 16 Voltage measurement - Out of Range - Low	P0B88	Out of range low	Block 16 AND Block 17	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 16 Voltage measurement - Out of Range - High	P0B89	Out of range high	Block 16	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 16 Voltage measurement - Rationality	P0B87	Rationality compares block voltage sensor to pack voltage sensor	| Block 16 * 20 - Battery Pack Voltage| AND | Block 17 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 16 Voltage sensor input No active DTCs:	>= 9.0 V <= 18.0 V = VALID P0A1F	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0B88 P0B89 P0ABC P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Block 17 Voltage Sensor Circuit:								
Block 17 Voltage measurement - Out of Range - Low	P0B8D	Out of range low	Block 17 AND Block 18	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 17 Voltage measurement - Out of Range - High	P0B8E	Out of range high	Block 17	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 17 Voltage measurement - Rationality	P0B8C	Rationality compares block voltage sensor to pack voltage sensor	| Block 17 * 20 - Battery Pack Voltage| AND | Block 18 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 17 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B8D P0B8E P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 18 Voltage Sensor Circuit:								

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Block 18 Voltage measurement - Out of Range - Low	P0B92	Out of range low	Block 18 AND Block 19	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 18 Voltage measurement - Out of Range - High	P0B93	Out of range high	Block 18	> 23 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 18 Voltage measurement - Rationality	P0B91	Rationality compares block voltage sensor to pack voltage sensor	| Block 18 * 20 - Battery Pack Voltage| AND | Block 19 * 20 - Battery Pack Voltage|	> 70 V > 70 V	12V System Voltage Block 18 Voltage sensor input No active DTCs: BPCM Power Mode Time since contactors closed	>= 9.0 V <= 18.0 V = VALID P0A1F P0B92 P0B93 P0ABC P0ABD P0ABB =RUN > 100ms	9 seconds (90 fail/100 sample; 100 ms frequency)	Two Trips
Block 19 Voltage Sensor Circuit:								
Block 19 Voltage measurement - Out of Range - Low	P0B97	Out of range low	Block 19 AND Block 20	< 2 V < 2 V	12V System Voltage No active DTCs: BPCM Power Mode	>= 9.0 V <= 18.0 V P0A1F =RUN	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips
Block 19 Voltage measurement - Out of Range - High	P0B98	Out of range high	Block 19	> 23 V	12V System Voltage No active DTCs:	>= 9.0 V <= 18.0 V P0A1F	1.5 seconds (15 fail/20 sample; 100 ms frequency)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					BPCM Power Mode	=RUN		
Block 19 Voltage measurement - Rationality	P0B96	Rationality compares block voltage sensor to pack voltage sensor	| Block 19 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0 V <= 18.0 V	9 seconds	Two Trips
			AND		Block 19 Voltage sensor input	= VALID	(90 fail/100 sample; 100 ms frequency)	
			| Block 20 * 20 - Battery Pack Voltage|	> 70 V	No active DTCs:	P0A1F		
						P0B97		
						P0B98		
						P0ABC		
						P0ABD		
						P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Block 20 Voltage Sensor Circuit:								
Block 20 Voltage measurement - Out of Range - Low	P0B9C	Out of range low	Block 20	< 2 V	12V System Voltage	>= 9.0V <= 18.0V	1.5 seconds	Two Trips
					No active DTCs:	P0A1F	(15 fail/20 sample; 100 ms frequency)	
					BPCM Power Mode	=RUN		
Block 20 Voltage measurement - Out of Range - High	P0B9D	Out of range high	Block 20	> 23 V	12V System Voltage	>= 9.0V <= 18.0V	1.5 seconds	Two Trips
					No active DTCs:	P0A1F	(15 fail/20 sample; 100 ms frequency)	
					BPCM Power Mode	=RUN		
Block 20 Voltage measurement - Rationality	P0B9B	Rationality compares block voltage sensor to pack voltage sensor	| Block 20 * 20 - Battery Pack Voltage|	> 70 V	12V System Voltage	>= 9.0V <= 18.0V	9 seconds	Two Trips
					Block 20 Voltage sensor input	= VALID	(90 fail/100 sample; 100 ms frequency)	
					No active DTCs:	P0A1F		
						P0B9C		
						P0B9D		
						P0ABC		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0ABD P0ABB		
					BPCM Power Mode	=RUN		
					Time since contactors closed	> 100ms		
Battery Pack Voltage Sensor Circuit:								
Hybrid Battery Pack Voltage Sense Circuit Low	P0ABC	Out of range low	Battery Pack Voltage	< 40 V	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	One Trip
					BPCM Power Mode	=RUN	(300 fail/400 sample; 10 ms frequency)	
					Time since contactors closed	> 100ms		
					No active DTCs:	P0A1F		
Hybrid Battery Pack Voltage Sense Circuit High	P0ABD	Out of range high	Battery Pack Voltage	> 430 V	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	One Trip
					BPCM Power Mode	=RUN	(300 fail/400 sample; 10 ms frequency)	
					Contactor closed timer	> 100ms		
					No active DTCs:	P0A1F		
Hybrid Battery Pack Voltage Sense Circuit Rationality	P0ABB	Rationality compares pack voltage sensor to sum of the block voltages	|Sum of battery block voltages - Battery Pack voltage|	> 50 V	12V System Voltage	>= 9.0V <= 18.0V	7 seconds	One Trip
			AND		Pack Voltage sensor input	= VALID	(70 fail/80 sample; 100ms frequency)	
			BPCM High Voltage Battery Pack Voltage Validity	= VALID	BPCM Power Mode	=RUN		
					Contactor closed timer	> 100ms		
					No active DTCs:	P0A1F P0ABC P0ABD		
Current sensor Circuit:								
Hybrid Battery Pack Current Sensor Circuit	P0AC1	Out of range low By convention, battery discharging	Current Sensed (High range)	> 200 A	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Low		corresponds to a positive current.	AND		BPCM Power Mode	=RUN	(30fail/40 sample; 100 ms frequency)	
			Current Sensed (Mid range)	> 52 A	No active DTCs:	P1A07		
			AND			P0A1F		
			Current Sensed (Low range)	> 22 A				
Hybrid Battery Pack Current Sensor Circuit High	P0AC2	Out of range high By convention, battery charging corresponds to a negative current.	Current Sensed (High range)	< -200 A	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	One Trip
			AND		BPCM Power Mode	=RUN	(30fail/40 sample; 100 ms frequency)	
			Current Sensed (Mid range)	< -52 A	No active DTCs:	P1A07		
			AND			P0A1F		
			Current Sensed (Low range)	< -22 A				
Hybrid Battery Pack Current Sensor Circuit Rationality	P0AC0	Rationality checks sensor offset; rationalizes battery voltage change to net current (energy) input/output	(| Current Sensor Offset (High range) |	> 5 A	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	One Trip
			OR		BPCM Power Mode	=RUN	3 fail/10 sample; 1000ms frequency)	
			| Current Sensor Offset (Mid range) |	> 5 A				
			OR		No active DTCs:	P1A07		
			| Current Sensor Offset (Low range) |)	> 5 A		P0A1F		
			OR			P0AC1		
			(Deviation of accumulated block voltage for 1sec	> 10 V		P0AC2		
			AND					
			Deviation of current for 1sec)	< 0.5 A				
			OR					
			(|Current sensor Input (Hi range)|	<= 20A				
			AND					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			| Current sensor Input (Hi range) - Current sensor Input (Me range) | AND | Current sensor Input (Hi range) - Current sensor Input (Lo range) |)	>= 4A >= 4A				
Temperature sensor1 Circuit:								
Temperature Sensor 1 Circuit Low	P0A9D	Out of range low	Temperature Input1 AND (Temperatue Input2 OR Temperature Input3 OR Temperature Input4)	> 95 ºC < 70 ºC < 70 ºC < 70 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Two Trips
Temperature Sensor 1 Circuit High	P0A9E	Out of range high	Temperature Input1	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Two Trips
Temperature Sensor 1 Circuit Rationality	P0A9C	Rationality compares temperature with the other 3 sensor values read	| Temperature Input1 - Temperature Input2 | AND |Temperature Input1 - Temperature Input3| AND |Temperature Input1 - Temperature Input4|	> 15 ºC > 15 ºC > 15 ºC	12V System Voltage BPCM Power Mode Temperature Sensor 1 Input No active DTCs:	>= 9.0V <= 18.0V =RUN = VALID P0A1F P0A9D P0A9E	9 seconds (90 fail/100 sample; 100ms frequency)	Two Trips
Temperature sensor2 Circuit:								
Temperature Sensor 2 Circuit Low	P0AC7	Out of range low	Temperature Input2	> 95 ºC	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			AND		BPCM Power Mode	=RUN	(30 fail/40 sample; 100 ms frequency)	
			(Temperatue Input1	< 70 ºC				
			OR					
			Temperature Input3	< 70 ºC	No active DTCs:	P0A1F		
			OR					
			Temperature Input4)	< 70 ºC				
Temperature Sensor 2 Circuit High	P0AC8	Out of range high	Temperature Input2	< -45 ºC	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	Two Trips
					BPCM Power Mode	=RUN	(30 fail/40 sample; 100 ms frequency)	
					No active DTCs:	P0A1F		
Temperature Sensor 2 Circuit Rationality	P0AC6	Rationality compares temperature with the other 3 sensor values read	| Temperature Input2 - Temperature Input1 |	> 15 ºC	12V System Voltage	>= 9.0V <= 18.0V	9 seconds	Two Trips
			AND		BPCM Power Mode	=RUN	(90 fail/100 sample; 100ms frequency)	
			| Temperature Input2 - Temperature Input3 |	> 15 ºC	Temperature Sensor 2 Input	= VALID		
			AND		No active DTCs:	P0A1F		
			| Temperature Input2 - Temperature Input4 |	> 15 ºC		P0AC7 P0AC8		
Temperature sensor3 Circuit:								
Temperature Sensor 3 Circuit Low	P0ACC	Out of range low	Temperature Input3	> 95 ºC	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	Two Trips
			AND		BPCM Power Mode	=RUN	(30 fail/40 sample; 100 ms frequency)	
			(Temperatue Input1	< 70 ºC				
			OR					
			Temperature Input2	< 70 ºC	No active DTCs:	P0A1F		
			OR					
			Temperature Input4)	< 70 ºC				
Temperature Sensor 3 Circuit High	P0ACD	Out of range high	Temperature Input3	< -45 ºC	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					BPCM Power Mode	=RUN	(30 fail/40 sample; 100 ms frequency)	
					No active DTCs:	P0A1F		
Temperature Sensor 3 Circuit Rationality	P0ACB	Rationality compares temperature with the other 3 sensor values read	|Temperature Input3 - Temperature Input1|	> 15 ºC	12V System Voltage	>= 9.0V <= 18.0V	9 seconds	Two Trips
			AND		BPCM Power Mode	=RUN	(90 fail/100 sample; 100ms frequency)	
			| Temperature Input3 - Temperature Input2 |	> 15 ºC	Temperature Sensor 3 Input	= VALID		
			AND		No active DTCs:	P0A1F		
			|Temperature Input3 - Temperature Input4|	> 15 ºC		P0ACC		
						P0ACD		
Temperature sensor4 Circuit:								
Temperature Sensor 4 Circuit Low	P0AEA	Out of range low	Temperature Input4	> 95 ºC	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	Two Trips
			AND		BPCM Power Mode	=RUN	(30 fail/40 sample; 100 ms frequency)	
			(Temperatue Input1	< 70 ºC				
			OR					
			Temperature Input2	< 70 ºC	No active DTCs:	P0A1F		
			OR					
			Temperature Input3)	< 70 ºC				
Temperature Sensor 4 Circuit High	P0AEB	Out of range high	Temperature Input4	< -45 ºC	12V System Voltage	>= 9.0V <= 18.0V	3 seconds	Two Trips
					BPCM Power Mode	=RUN	(30 fail/40 sample; 100 ms frequency)	
					No active DTCs:	P0A1F		
Temperature Sensor 4 Circuit Rationality	P0AE9	Rationality compares temperature with the other 3 sensor values read	| Temperature Input4 - Temperature Input1 |	> 15 ºC	12V System Voltage	>= 9.0V <= 18.0V	9 seconds	Two Trips
			AND		BPCM Power Mode	=RUN	(90 fail/100 sample; 100ms frequency)	
			| Temperature Input4 - Temperature Input2 |	> 15 ºC	Temperature Sensor 4 Input	= VALID		
			AND		No active DTCs:	P0A1F		
			| Temperature Input4 - Temperature Input3 |	> 15 ºC		P0AEA		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0AE9		
Inlet Air Temperature sensor Circuit:								
Inlet Air Temperature Sensor Circuit Low	P0AAE	Out of range low	Temperature Sensor Inlet Air Input	> 95 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Two Trips
Inlet Air Temperature Sensor Circuit High	P0AAF	Out of range high	Temperature Sensor Inlet Air Input	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Two Trips
Inlet Air Temperature Sensor Circuit Rationality	P0AAD	Rationalizes that inlet air temperature should not be higher than the outlet temperature	Temperature Sensor Inlet Air Input - Temperature Sensor Outlet Air Input	> 10 ºC	12V System Voltage BPCM Power Mode Fan Command No active DTCs:	>= 9.0V <= 18.0V =RUN = ON P0AAE P0AAF P0AB4 P0A1F	9 seconds (90 fail/100 sample; 100ms frequency)	Two Trips
Outlet Air Temperature sensor Circuit:								
Outlet Air Temperature Sensor Circuit Low	P0AB3	Out of range low	Temperature Sensor Outlet Air Input AND (Temperatue Input1 OR Temperature Input2 OR Temperature Input3 OR	> 95 ºC < 70 ºC < 70 ºC < 70 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			Temperature Input4)	< 70 ºC				
Outlet Air Temperature Sensor Circuit High	P0AB4	Out of range high	Temperature Sensor Outlet Air Input	< -45 ºC	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Two Trips
Outlet Air Temperature Sensor Circuit Rationality	P0AB2	Rationalizes that the outlet air temperature should not be higher than the highest battery pack module temperature	Temperature Sensor Outlet Air Input - BPCM High Voltage Battery Pack Max Module Temperature	> 10 ºC	12V System Voltage Fan Command BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V = ON =RUN P0A1F P0A9C P0A9D P0A9E P0AB3 P0AB4 P0AC6 P0AC7 P0AC8 P0ACB P0ACC P0ACD P0AE9 P0AEA P0AEB	9 seconds (90 fail/100 sample; 100ms frequency)	Two Trips
Battery Cooling Fan:								
Fan Relay Welded	P0BC1		Fan control signal monitor voltage	>= 0.9 V	12V System voltage Fan command	>= 9.0 V <= 18.0 V = OFF	1 sec (10fails / 20samples; 100msec freq.)	Two Trips

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					Waiting Time After Fan command = OFF	= 2.0 sec		
Fan Unit Failure	P0A81		Fan control signal monitor voltage	>= 2.3 V OR <= 0.5 V	12V System voltage Fan command Fan speed Waiting Time After Fan speed >= 35 %	>= 9.0 V <= 18.0 V = ON >= 35 % = 3.0 sec	5 sec (50fails / 50samples; 100msec freq.)	Two Trips
Battery Cooling System Performance	P0C32		Inlet air temperature AND Maximum battery temperature	<= 40 C >= 50 C	12V System voltage No active DTCs: Fan command	>= 9.0 V <= 18.0 V P0AAE P0AAF = ON	120 sec (1200fails / 1200samples; 100msec freq.)	Two Trips
Current Sensor Voltage Supply:								
Current Sensor Voltage Supply	P1A07	Out of range	Current Sensor Supply Voltage OR Current Sensor Supply Voltage	< 4.8 V > 5.2 V	12V System Voltage BPCM Power Mode No active DTCs:	>= 9.0V <= 18.0V =RUN P0A1F	0.8 sec (8 fail/10 sample; 100 ms frequency)	One Trip
HS Comm Enable Circuit:								
HS Comm Enable Signal High	U209D	Out of range high	HS Comm Enable input	True	12V System Voltage Hybrid Accessory input Contactor Power Dowm Timer GMLAN communication (during Power down)	>= 9.0 V <= 18.0 V False (transiitons from Hi to Low) has opened has expired has ended	1 sec (10 fails/10 sample: 100ms frequency)	Non-MIL

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					No active DTCs:	P0A1F		
Hybrid Acc Circuit:								
Hybrid Acc Signal High	U1813	Out of range high	Hybrid Accessory input	True	12V System Voltage HS Comm Enable input Contactor Power Dowm Timer GMLAN communication High Voltage Management Virtual Network Activation (during Power down) No active DTCs:	>= 9.0 V <= 18.0 V False (transiitons from Hi to Low) has opened has expired has ended = Inactive P0A1F	1 sec (10 fails/10 sample: 100ms frequency)	Non-MIL
Hybrid Acc Signal Low	U1812	Out of range low	Hybrid Accessory input	False	12V System Voltage BPCM Power Mode HS Comm Enable input High Voltage Management Virtual Network Activation System State No active DTCs:	>= 9.0 V <= 18.0 V =RUN =True = Inactive = Wakeup P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Non-MIL
FUSE:								
Fuse out of Range	P0A95	Out of range low	Block Voltage Input10 AND Block Voltage Input11 AND Block Voltage Input12	>= 2 V < 2 V >= 2 V	12V System Voltage AND HVIL AND BPCM Power Mode	>= 9.0 V <= 18.0 V AND = Normal = RUN	900ms (9 fail/10 sample; 100 ms frequency)	Non-MIL

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					No active DTCs:	P0A1F		
Contactor Command :								
Contactor Command Input – Out of Range	P1AE5	Out of range	Duty cycle	< 25% OR > 75% OR (>35% and <65%)	Vehicle Power Mode	= RUN		Non-MIL
			OR		AND		2 seconds	
			Frequency	>253Hz OR <247Hz	12V System Voltage	>= 9.0 V <= 18.0 V	(20 fail/30 sample; 100 ms frequency)	
					AND			
					No active DTCs:	P0A1F		
Contactor :								
Pre-charge Contactor Output – Out of Range - High	P0AE7	Out of range High	12VInput(BPCM Internal) - Precharge Contactor driver monitor voltage	< 2V	Precharge Contactor command	=OFF	3 seconds	Non-MIL
					AND		(30 fail/40 sample; 100 ms frequency)	
					12V System Voltage	>= 9.0 V <= 18.0 V		
					AND			
					No active DTCs:	P0A1F		
					AND			
					BPCM Power Mode	= RUN		
Main Positive Contactor Output – Out of Range - Low	P0ADB	Out of range low	12VInput(BPCM Internal) - Main Positive Contactor driver monitor voltage	> 2V	Main Positive Contactor command	=ON	3 seconds	Non-MIL
					AND		(30 fail/40 sample; 100 ms frequency)	
					12V System Voltage	>= 9.0 V <= 18.0 V		
					AND			
					No active DTCs:	P0A1F		
					AND			
					Jump Assist	= False		
					AND			

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					BPCM Power Mode	= RUN		
Main Positive Contactor Output – Out of Range - High	P0ADC	Out of range High	12VInput(BPCM Internal) - Main Positive Contactor driver monitor voltage	< 2V	Main Positive Contactor command AND 12V System Voltage AND No active DTCs:	=OFF >= 9.0 V <= 18.0 V P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Non-MIL
Main Negative Contactor Output – Out of Range - Low	P0ADF	Out of range low	12VInput(BPCM Internal) - Main Negative Contactor driver monitor voltage	> 2V	Main Negative Contactor command AND 12V System Voltage AND No active DTCs: AND Jump Assist AND BPCM Power Mode	=ON >= 9.0 V <= 18.0 V P0A1F = False = RUN	3 seconds (30 fail/40 sample; 100 ms frequency)	Non-MIL
Main Negative Contactor Output – Out of Range - High	P0AE0	Out of range High	12VInput(BPCM Internal) - Main Negative Contactor driver monitor voltage	< 2V	Main Negative Contactor command AND 12V System Voltage AND No active DTCs:	=OFF >= 9.0 V <= 18.0 V P0A1F	3 seconds (30 fail/40 sample; 100 ms frequency)	Non-MIL
High Voltage Interlock Circuit:								
High Voltage Interlock Circuit Low	P1AE3	Out of range low	HVIL Current Output	>= 5 mA	12V System Voltage	>= 9.0V <= 18.0V	10 ms	Special Type "C"

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			AND		BPCM Power Mode	= RUN		
			HVIL Current Output	<= 18 mA	HVIL State	= Asserted	(1 fail/1 sample; 10 ms frequency)	
			AND		No active DTCs:	P0A1F		
			HVIL Current Input	< 5 mA				
High Voltage Interlock Circuit High	P1AE4	Out of range high	HVIL Current Output	< 5 mA	12V System Voltage	>= 9.0V <= 18.0V	10 ms	Special Type "C"
			AND		BPCM Power Mode	= RUN	(1 fail/1 sample; 10 ms frequency)	
			HVIL Current Input	> 35 mA	HVIL State	= Asserted		
					No active DTCs:	P0A1F		
High Voltage Interlock Circuit Open	P1AE2	Open	HVIL Current Output	< 5 mA	12V System Voltage	>= 9.0V <= 18.0V	10 ms	Special Type "C"
			AND		BPCM Power Mode	= RUN	(1 fail/1 sample; 10 ms frequency)	
			HVIL Current Input	< 5 mA	HVIL State	= Asserted		
					No active DTCs:	P0A1F		
Isolation detection :								
Isolation fault detection circuit failure	P1AE6	Isolation Fault Detection Circuit Failure. The BPCM intentionally creates an isolation fault to check isolation fault detection circuit failure.	AC isolation resistance (during self-check)	> 200 [kOhm]	After Contactor OPEN (Power down)		2 seconds	Non-MIL
					No active DTCs:	P0A1F	(5 fail/25 sample; 400 ms frequency)	
HV Isolation Fault	P1AE7	HV Isolation fault	AC isolation resistance	< 200 [kOhm]	After Contactor OPEN (Power down) OR Device control Request		18.4 seconds	Non-MIL
					No active DTCs:	P0A1F	(46 fail/50 sample; 400 ms frequency)	
Pre-Charge Voltage :								
Pre-Charge Too Slow	P1A20	Precharge is not completed.	| BPCM High Voltage pack Voltage - Sum of battery block voltages |	> 23V	# of Block Voltage sensors failed (with Active DTC's)	< 4	1times	Non-MIL

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
					12V System Voltage	=> 9.0 V =< 18.0 V		
					BPCM pack Voltage sensor OR TPIM Voltage	= Valid		
					BPCM Power Mode	= RUN		
					Precharge time	> 140ms		
					No active DTCs:	P0A1F		
Pre-Charge too Fast	P0C77	HV bus = Open	([BPCM High Voltage pack Voltage AND Precharge Time]	< 60V, =0ms	12V System Voltage	=> 9.0 V =< 18.0 V	1times	Special Type "C"
			AND		BPCM Power Mode	= RUN		
			[| BPCM High Voltage pack Voltage - Sum of battery block voltages |	=< 23V				
			AND Precharge Time])	=<20ms				
		OR HV bus = Short	OR (BPCM High Voltage Battery Pack Current	 => 25A				
			AND Precharge Time)	> 100ms				
High Voltage Battery:								
Battery Module – Voltage deviation EOL	P0BBD	Voltage deviation is high	Maximum | Block Voltage(n) - Block Voltage (n+1) |	> 3.0 V	BPCM Power Mode	= RUN	3 seconds	Two Trips
					12V System Voltage	>= 9.0V <= 18.0V	(3 fail/3 sample; 1 second frequency)	
					Battery current	>0.2A		
					Min. battery temp.	>= -7ºC		
					No active DTC's:	P0B3D		
						P0B3E		
						P0B3C		
						P0B42		
						P0B43		
						P0B41		
						P0B47		
						P0B48		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0B46		
						P0B4C		
						P0B4D		
						P0B4B		
						P0B51		
						P0B52		
						P0B50		
						P0B56		
						P0B57		
						P0B55		
						P0B5B		
						P0B5C		
						P0B5A		
						P0B60		
						P0B61		
						P0B5F		
						P0B65		
						P0B66		
						P0B64		
						P0B6A		
						P0B6B		
						P0B69		
						P0B6F		
						P0B70		
						P0B6E		
						P0B74		
						P0B75		
						P0B73		
						P0B79		
						P0B7A		
						P0B78		
						P0B7E		
						P0B7F		
						P0B7D		
						P0B83		
						P0B84		
						P0B82		
						P0B88		
						P0B89		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0B87 P0B8D P0B8E P0B8C P0B92 P0B93 P0B91 P0B97 P0B98 P0B96 P0B9C P0B9D P0B9B P0A1F		
Battery Module – Over Voltage	P1A4E	Voltage too high	Sum of battery block voltages OR Any Block Voltage N	> 408 V > 20.4 V	BPCM Power Mode 12V System Voltage Block voltage rationality No active DTC's:	= RUN >= 9.0V <= 18.0V = Pass (at least 1block) P0B3D P0B3E P0B3C P0B42 P0B43 P0B41 P0B47 P0B48 P0B46 P0B4C P0B4D P0B4B P0B51 P0B52 P0B50 P0B56 P0B57 P0B55	4 seconds (40 fail/40 sample; 100 ms frequency)	Special Type "C"

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0B5B		
						P0B5C		
						P0B5A		
						P0B60		
						P0B61		
						P0B5F		
						P0B65		
						P0B66		
						P0B64		
						P0B6A		
						P0B6B		
						P0B69		
						P0B6F		
						P0B70		
						P0B6E		
						P0B74		
						P0B75		
						P0B73		
						P0B79		
						P0B7A		
						P0B78		
						P0B7E		
						P0B7F		
						P0B7D		
						P0B83		
						P0B84		
						P0B82		
						P0B88		
						P0B89		
						P0B87		
						P0B8D		
						P0B8E		
						P0B8C		
						P0B92		
						P0B93		
						P0B91		
						P0B97		
						P0B98		
						P0B96		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0B9C P0B9D P0B9B P0A1F		
Battery Module – Under Voltage	P1A1F	Voltage too low	Sum of battery block voltages OR Any Block Voltage N	< 168 V < 8.4 V	BPCM Power Mode 12V System Voltage Block voltage rationality No active DTC's:	= RUN >= 9.0V <= 18.0V = Pass (at least 1block) P0B3D P0B3E P0B3C P0B42 P0B43 P0B41 P0B47 P0B48 P0B46 P0B4C P0B4D P0B4B P0B51 P0B52 P0B50 P0B56 P0B57 P0B55 P0B5B P0B5C P0B5A P0B60 P0B61 P0B5F P0B65 P0B66 P0B64 P0B6A	4 seconds (40 fail/40 sample; 100 ms frequency)	Special Type "C"

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
						P0B6B P0B69 P0B6F P0B70 P0B6E P0B74 P0B75 P0B73 P0B79 P0B7A P0B78 P0B7E P0B7F P0B7D P0B83 P0B84 P0B82 P0B88 P0B89 P0B87 P0B8D P0B8E P0B8C P0B92 P0B93 P0B91 P0B97 P0B98 P0B96 P0B9C P0B9D P0B9B P0A1F		

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Battery Module – resistance High EOL	P0A80	High Module Resistance	Max Block Resistance – Avg Block Resistance (Same block resistance should be the highest continuously.) OR Avg Block Resistance/3.16	Resistance as defined in table below; Bat. Temp. Vs Resistance C mOhm -10 141.33 -5 112.05 0 88.90 5 68.67 10 52.92 15 40.10 25 27.00 35 23.55 45 21.22 50 20.00	BPCM Power Mode System Voltage Battery current Charge samples in 60s Discharge samples in 60s $\frac{1}{n}\left(\sum_{i}^{n} X_i^2\right) - \bar{X}^2$ *n = # of measurements in 60s* *X = measured current* Battery temperature # of calculated block resistances meeting above criteria	= RUN >= 9.0V <= 18.0V > -70 A < +100 A ≥ 15 ≥ 15 > 64 A^2 > -10ºC < +50ºC >= 5blocks	10 minutes (10 fail/10 sample; 100ms measurement frequency; 1 minute sample frequency)	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Battery – Over temperature	P1ABE	Battery temp. too high	Battery Temperature Rise Rate	> alpha[°C/20sec] Note1: alpha is defined in the following table (e.g. Battery Temp - Inlet Air Temp >= 0°C): Fan mode alpha [°C/20sec] FS0: 2.00 FS1: 1.80 FS2: 1.60 FS3: 1.40 FS4: 1.40 FS5: 1.40 Note2: FS0: Duty Ratio from vehicle 0%~19% FS1: 20%~34% FS2: 35%~49% FS3: 50%~69% FS4: 70%~85% FS5: 86%~	BPCM Power Mode System Voltage No active DTC's:	= RUN >= 9.0V <= 18.0V P0AC1 P0AC2 P0AC0 P0A9D P0A9E P0A9C P0AC7 P0AC8 P0AC6 P0ACC P0ACD P0ACB P0AEA P0AEB P0AE9 P0A1F	Rise Rate 60sec (3 fail/3 sample; 20sec measurement frequency)	Special Type "C"

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			If 2 or more Battery temperatures meet the right conditions; If 1 Battery temperature meets the right condition:	[BPCM High Voltage Battery Pack Max Module Temperature > 65deg.C 70 deg C < [BPCM High Voltage Battery Pack Max Module Temperature <= 95 deg C AND Time ≥ 5sec			Over Temp. 5sec (50 fail/50 sample; 100ms measurement frequency) Extreme Over Temp. 5sec (50 fail/50 sample; 100ms measurement frequency)	
Controller Faults (BPCM) :								
Controller – RAM Error	P1A05	Microcomputer detects RAM Failure	Read value does not match write value.	(Conduct a verify check by writing 4bytes pitch from the first digit accordingly. If the read value does not match write value when the test pattern of 0x55555555 and 0xAAAAAAAA are written.)			5 Sec (50 fail/50 sample; 100ms measurement frequency)	One Trip
Controller – ROM Error	P1A06	Microcomputer detects ROM Failure	Calculated CS of ROM and the already written CS in the GMHeader area is not the same.				100ms	One Trip

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
Controller – EEPROM Error	P1A01	Error occur at mirror check during EEPROM downloading	(If any of following failures is detected by verifying check sum during EEPROM read at the BPCM start-up.) a) Calibration area b) Parameter area c) Diag area (status history) d) Diag area (X/Y counter)				100ms	One Trip
Micro controller failure	P0A1F	Microcomputer detects watchdog timeout.	Watchdog timer interruption occurred and the BPCM is reset.				10ms	One Trip
			OR					
		Processor StackOverflow	Usage of micro processor stack	> 80%				
			OR					
		Program Processing Time-out	Previously activated DMA transmission incomplete					
			OR					
		Program Processing Time-out	10msec transaction time	> 10ms (No waiting time available during 10ms process waiting time.)				
		A/D Conversion Failure	(AD conversion interrupt does not activate the standard number of times in 10msecs					
			AND					
			AD conversion interrupt is not completed)					
			OR					
			Abnormal reference Voltage					

Component / System	Fault Code	Monitor Strategy Description	Malfunction Criteria	Threshold Value	Secondary Parameters	Enable Conditions	Time Req'd	MIL Illum
			AD conversion interrupt does not activate the standard number of times in 1secs					