



## Process Change Notice #1611161

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<b>PCN Issue Date:</b> 11/16/2016	<b>Effective Date:</b> 2/22/2017	
<b>Title:</b> EFM8BB2 Datasheet update		
<b>PCN Type:</b>		
<input checked="" type="checkbox"/> <b>Datasheet</b>	<input type="checkbox"/> <b>Foundry</b>	<input type="checkbox"/> <b>Packing</b>
<input type="checkbox"/> <b>Product Revision</b>	<input type="checkbox"/> <b>Assembly</b>	<input type="checkbox"/> <b>Labeling</b>
<input type="checkbox"/> <b>Discontinuance</b>	<input checked="" type="checkbox"/> <b>Test</b>	<input type="checkbox"/> <b>Other</b>
<b>Last Order Date:</b> NA		
<b>PCN Details</b>		



**Description of Change:**

Silicon Labs is pleased to announce V1.31 of the EFM8BB2 datasheet. This datasheet release corresponds to the release of the new automotive grade EFM8BB2 devices. These new EFM8BB2 devices have received full AEC-Q100 qualification and are specified for -40 °C to +125 °C operating temperature range. This datasheet release also corresponds to a change in one of the voltage regulator’s calibration routines.

The calibration routines for the low dropout voltage regulator (LDO) have been updated and results in a slightly increased (1.8 V vs. 1.85 V) typical LDO output target. This calibration change occurred due to a small drop observed in the LDO output voltage when the device enters lower power modes during an extended characterization study. This LDO output supplies the core and other digital logic on the device. The new calibration method ensures this drop does not occur. No direct issues have been observed on devices using the old calibration method, and this effort is part of the continual improvement process.

Below is a list of changed power consumption specs from the datasheet. Note that some typical values were also slightly increased.

Temperature Grade	Specification	Previous Data Sheet Value (mA)	New Data Sheet Value (mA)
G-grade devices, -40 °C to +85 °C	Normal Mode 49 MHz (Maximum)	9.7	10.1
	Normal Mode 24.5 MHz (Maximum)	4.85	5.2
	Idle Mode 49 MHz (Maximum)	6.6	6.8
	Idle Mode 24.5 MHz (Maximum)	3.2	3.3
I-grade devices, -40 °C to +125 °C	Normal Mode 49 MHz (Maximum)	10.47	10.9
	Normal Mode 24.5 MHz (Maximum)	5.49	5.6
	Idle Mode 49 MHz (Maximum)	7.3	7.4
	Idle Mode 24.5 MHz (Maximum)	3.86	3.9
G-grade devices, -40 °C to +85 °C	Normal Mode 49 MHz (Typical)	9.1	9.4
	Normal Mode 24.5 MHz (Typical)	4.3	4.5
	Idle Mode 49 MHz (Typical)	6.15	6.3
	Idle Mode 24.5 MHz (Typical)	2.8	2.9
I-grade devices, -40 °C to +125 °C	Normal Mode 49 MHz (Typical)	9.1	9.4
	Normal Mode 24.5 MHz (Typical)	4.3	4.5
	Idle Mode 49 MHz (Typical)	6.15	6.3



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	Idle Mode 24.5 MHz (Typical)	2.8	2.9
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- The following changes were also made to the V1.30 and V1.31 datasheet
- The addition of table 4.11 "1.8V Internal Low Dropout Voltage Regulator" to outline its minimum, typical, and maximum voltages.
  - The addition of automotive devices in the product selection table and ordering information.
  - Addition of AEC-Q100 under the key features and specifications.
  - Added thermal resistance (junction to case) for the QFN20 package.
  - Added a note linking to the output low voltage and output high voltage table of the port I/Os to the performance curves.
  - Added the sizes of transmit and receive FIFOs for the SMBus and I2C slave peripherals.
  - Added a line in the introduction section to mention the reference manual where an individual can find more technical information on registers and blocks.
  - Added a note on the comparator reference current consumption to clarify its source.

After the issue date of this PCN, the EFM8BB2 datasheet will reflect the changes listed above and all automotive (A) grade EFM8BB2 devices will adhere to the V1.31 datasheet. After the effective date of this PCN all commercial (G) and industrial (I) grade EFM8BB2 devices will adhere to the specifications in the aforementioned datasheet. For questions please contact your Silicon Labs representative.

**Reason for Change:**

1. The release of the new EFM8BB2 automotive qualified devices.
2. The release of V1.31 of the EFM8BB2 datasheet.
3. The calibration routine for the LDO has been updated and affects power consumption numbers in normal and idle mode.

**Impact on Form, Fit, Function, Quality, Reliability:**

This is considered a minor change to form, fit, function, quality, and reliability and is part of Silicon Labs' commitment to a continual improvement process.

**Product Identification:**

Devices affected at the issue date of this PCN:

- EFM8BB21F16A-C-QFN20
- EFM8BB21F16A-C-QFN20R
- EFM8BB22F16A-C-QFN28
- EFM8BB22F16A-C-QFN28R

Devices affected at the effective date of this PCN:

- EFM8BB21F16G-C-QFN20
- EFM8BB21F16G-C-QFN20R
- EFM8BB21F16G-C-QSOP24
- EFM8BB21F16G-C-QSOP24R
- EFM8BB21F16I-C-QFN20
- EFM8BB21F16I-C-QFN20R
- EFM8BB21F16I-C-QSOP24
- EFM8BB21F16I-C-QSOP24R
- EFM8BB22F16G-C-QFN28
- EFM8BB22F16G-C-QFN28R
- EFM8BB22F16I-C-QFN28
- EFM8BB22F16I-C-QFN28R



Appendix

**EFM8BB2x AEC-Q100 Qualification Report**



**W7101F1 - Product Qualification Report Record Rev. H**

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<b>EFM8BB2x Rev A2/A3/A4, HHGrace Fabrication, ASECL and UTACTH Assembly</b>							
Test Name	Test Condition	Qualification	Lot ID or Start	Fail/Pass or End	Notes	Summary	Status
<b>Test Group A – Accelerated Environment Stress Tests - 20QFN - CuPd Wire ASECL</b>							
HAST	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q037190	0/77	1		Pass
			Q037191	0/80	1	3 lots	
			Q037192	0/80	1	0/237	
UHASt	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q037199	0/81	1		Pass
			Q037200	0/80	1	3 lots	
			Q037202	0/82	1	0/243	
Temp Cycle	JA104 Cond C: -65°C to 150°C 500 cycles	3 lots, N=>77	Q037196	0/80	1		Pass
			Q037197	0/80	1	3 lots	
			Q037198	0/80	1	0/240	
HTSL	JA103 150°C, 1000hr	1 lot, N=>45	Q037193	0/30	1		Pass
			Q037194	0/30	1	3 lots	
			Q037195	0/30	1	0/90	
<b>Test Group A – Accelerated Environment Stress Tests - 28QFN - CuPd Wire UTACTH</b>							
HAST	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q035792	0/80	1		Pass
			Q035788	0/77	1	3 lots	
			Q035789	0/80	1	0/237	
UHASt	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q037163	0/80	1		Pass
			Q037164	0/80	1	3 lots	
			Q037165	0/80	1	0/240	
Temp Cycle	JA104 Cond C: -65°C to 150°C 500 cycles	3 lots, N=>77	Q037160	0/80	1		Pass
			Q037161	0/80	1	3 lots	
			Q037162	0/80	1	0/240	
HTSL	JA103 150°C, 1000hr	1 lot, N=>45	Q035682	0/30	1		Pass
			Q037977	0/80	1		
			Q037159	0/30	1	4 lots	
			Q037806	0/45	1	0/185	
<b>Test Group A – Accelerated Environment Stress Tests - 24QSP - CuPd Wire UTACTH</b>							
HAST	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q036513	0/80	1		Pass
			Q036515	0/80	1	3 lots	
			Q036519	0/80	1	0/240	
UHASt	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q036526	0/80	1		Pass
			Q036527	0/80	1	3 lots	
			Q036528	0/80	1	0/240	
Temp Cycle	JA104 Cond C: -65°C to 150°C 500 cycles	3 lots, N=>77	Q036523	0/80	1		Pass
			Q036524	0/80	1	3 lots	
			Q036525	0/80	1	0/240	
HTSL	JA103 150°C, 1000hr	1 lot, N=>45	Q036520	0/28	1		Pass
			Q036521	0/28	1	3 lots	
			Q036522	0/28	1	0/84	

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Test Name	Test Condition	Qualification	Lot ID or Start	Fail/Pass or End	Notes	Summary	Status
<b>Test Group A – Accelerated Environment Stress Tests - 24QFN - CuPd Wire UTACTH</b>							
HAST	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q035792	0/80	1		
			Q035788	0/77	1	3 lots	Pass
			Q035789	0/80	1	0/237	
UHASt	JA110 130°C, 85%RH Vcc=3.6V, 96 hours	3 lots, N=>77	Q037163	0/80	1		
			Q037164	0/80	1	3 lots	Pass
			Q037165	0/80	1	0/240	
Temp Cycle	JA104 Cond C: -65°C to 150°C 500 cycles	3 lots, N=>77	Q038520	0/80	1		
			Q038521	0/80	1	3 lots	Pass
			Q038522	0/80	1	0/240	
HTSL	JA103 150°C, 1000hr	1 lot, N=>45	Q035682	0/30	1		
			Q037977	0/80	1	3 lots	Pass
			Q037159	0/30	1	0/140	
<b>Test Group B – Accelerated Lifetime Simulation Tests</b>							
HTOL	JA108 T <sub>J</sub> ≥ 125°C, Dynamic Vcc=3.6V, 1000 hours	3 lots, N=>77	Q035684	0/84			
			Q035685	0/84		3 lots	Pass
			Q037250	0/80		0/248	
LTOL	JA108 -40°C, Dynamic Vcc=3.6V, 1000 hours	1 lot, N=>32	Q036550	0/35		1 lots	Pass
						0/35	
ELFR	AEC-Q100-008 T <sub>J</sub> ≥ 125°C, Dynamic Vcc=3.6V, 48 hours	3 lots, N=>800	Q035681	0/839			
			Q036910	0/839			
			Q037251	0/836		4 lots	Pass
			Q036509	0/840		0/3354	
Data Retention High Temp	AEC Q100-005 150°C, 1000hrs	3 lots, N=>39	Q035781	0/45			
			Q035783	0/44		3 lots	Pass
			Q037252	0/45		0/134	
Data Retention Low Temp	AEC Q100-005 25°C, 1000hrs	3 lots, N=>38	Q035784	0/45			
			Q035786	0/45		3 lots	Pass
			Q037253	0/45		0/135	
NVM P/E Cycling High Temp	AEC Q100-005 85°C, 24hrs	3 lots, N=>77	Q035787	0/84			
			Q035782	0/84		3 lots	Pass
			Q037254	0/84		0/252	
NVM P/E Cycling Low temp	AEC Q100-005 55°C, 24hrs	3 lots, N=>77	Q035791	0/80			
			Q035785	0/80		3 lots	Pass
			Q037255	0/84		0/244	

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Test Name	Test Condition	Qualification	LotID or Start	Fail/Pass or End	Notes	Summary	Status
Test Group C – Package Assembly Integrity Tests							
Wire Bond Pull	M-STD-883 Performed post-TC	5 units, N=>30 20QFN	Q037487	0/5	2	1 lots 0/5	Pass
Wire Bond Pull	M-STD-883 Performed post-TC	5 units, N=>30 28QFN	Q037489	0/5	3	1 lots 0/5	Pass
Wire Bond Pull	M-STD-883 Performed post-TC	5 units, N=>30 24QSOP	Q037707	0/5	4	1 lots 0/5	Pass
Wire Bond Pull	M-STD-883 Performed post-TC	5 units, N=>30 24QFN	Q038577	0/5	5	1 lots 0/5	Pass
Test Group E – Electrical Verification							
ESD-HBM	AEC-Q100-002	1 lot, N=>3	Q036561 Q035689 Q037643				2 kV 2 kV 2 kV
ESD-CDM	AEC-Q100-011	1 lot, N=>3	Q036705 Q035688 Q037648 Q036558 Q036512 Q038628		2 3 3 3 4 5		1500 V 1250 V 1250 V 1500 V 1500 V 1500 V
Latch Up	AEC-Q100-004 ±200mA	1 lot, N=>6	Q037647 Q037674	125 °C 25 °C			Pass Pass
Electromagnetic Compatibility	SAE J1752	1 lot, N=>1	Q038023				Pass

Notes:

1. Parts are Pre-conditioned at MSL2/260°C
2. 20-QFN
3. 28-QFN
4. 24-QSOP
5. 24-QFN

This report applies to the following part numbers:		
EFM8BB21F16G-C-QSOP24	EFM8BB21F16I-C-QSOP24	EFM8BB21F16A-C-QFN20
EFM8BB21F16G-C-QFN20	EFM8BB21F16I-C-QFN20	EFM8BB22F16A-C-QFN28
EFM8BB22F16G-C-QFN28	EFM8BB22F16I-C-QFN28	