



PowerQUICC2 Pro Communications Processor MPC834x Product Family Rev. 1.1 and 3.1 Qualification Report

MPC8349/8347 - 672 Lead, 35 x 35 mm, 1mm pitch TBGA

MPC8343/8347 - 620 Lead, 29 x 29 mm TEPBGA2

Dev No./Rev.: MPC8349/8347/8343 / Rev. 3.1		Report Rev.: H
Description: PowerQUICC2 Pro		Revision date: 8/19/14
Technology:ATMC HiP7B	Package: 672 TBGA, 620 PBGA	Page 1 of 10



Product Information

Product / Technology / Fab / Package Description	
Package	672 Lead TBGA (ZU, VV) 35 x 35 mm, 1mm pitch 620 Lead TEPBGA2 (ZQ, VR) 29 x 29 mm, 1mm pitch
Device	MPC8349/8347/8343 PowerQUICC2 Pro Rev 1.1 and 3.1
Mask Set	W01K52M, M12E
Die Coating(s)	Polyimide
Die Fab Facility	Freescale Austin Technology & Manufacturing Center (ATMC)
Fab Process Technology	0.13um HiP7B
Poly / Metal layers	1P / 6M
Package Assembly Facility	Freescale Kuala Lumpur Final Manufacturing (KLM)
Moisture Sensitivity Level	MSL3 / 260°C Reflow
C5 Sphere Composition	Standard: 62% Pb, 36% Sn, 2% Ag (672 Lead TBGA (ZU) and 620 Lead TEPBGA2 (ZQ)) Pb Free: 95.5% Sn, 4.0% Ag, 0.5% Cu (672 Lead TBGA (VV) and 620 Lead TEPBGA2 (VR))
Substrate Supplier	672 Lead TBGA - Supplier A 620 Lead TEPBGA2 - Supplier A



MPC8349/8347/8343 PowerQUICC2 Pro Rev 1.1/3.1 Product Reliability Data Summary

Electrical Characterization

Lot / Mask Set / Rev / Pkg	Room, Hot and Cold Temperatures
D85766 (matrix) / W00K52M / Rev 1.0 / TBGA	0 / 180
Totals	0 / 180

Electrical Characterization

Lot / Mask Set / Rev / Pkg	Room, Hot and Cold Temperatures
DD17140 (matrix) / W00M12E / Rev 2.0 / TBGA	0 / 120
DD19519 (matrix) / W00M12E / Rev 2.0 / TBGA	0 / 30
DD23582 (matrix) / W01M12E / Rev 3.0 / TBGA	0 / 120
Totals	0 / 270

Electrostatic Discharge (ESD) and Latch-up Test

Lot / Mask Set / Rev / Pkg	HBM / 2KV	MM / 200V	CDM / 500V – No Socket	Latch-up / 200mA
D90228 / W01K52M / Rev 1.1 / TBGA	0 / 6	0 / 3	0 / 3	0 / 6
D90228 / W01K52M / Rev 1.1 / TEPBGA2	0 / 6	0 / 3	0 / 3	-
Totals	0 / 12	0 / 6	0 / 6	0 / 6

Electrostatic Discharge (ESD) and Latch-up Test

Lot / Mask Set / Rev / Pkg	HBM / 2KV	MM / 200V	CDM / 500V – No Socket	Latch-up / 200mA
DD23553 / W01M12E / Rev 3.0 / TBGA	0 / 6	0 / 3	0 / 3	0 / 6
DD25574 / W02M12E / Rev 3.1 / TBGA	-	-	0 / 5	-
Totals	0 / 6	0 / 3	0 / 8	0 / 6

High Temperature Operating Life Test (HTOL) – Vd1/Vd2 1.8v/3.3v, Tj 133C (Avg)

MPC8360/8358 ATMC 0.13um – Test Vehicle

Lot / Mask Set / Rev	10 Years @ 1.2v User (260hrs)	10 Years @ 1.3v User (565hrs)	(1242hrs)
D98781 / K53M / Rev 1.1	0 / 81	0 / 81	0 / 81
D96908 / K53M / Rev 1.1	0 / 75	0 / 75	0 / 75
D17481 / M13E / Rev 1.2	0 / 84	0 / 83	0 / 83
Totals	0 / 240	0 / 239	0 / 239

High Temperature Operating Life Test (HTOL) – Vd1/Vd2 1.8v/3.3v, Tj 133C (Avg)

MPC8349 Rev 3.0

Lot / Mask Set / Rev	2.5 Years (90 hrs)	10 Years (360 hrs)	(1008 hrs)
DD23553 / M12E / Rev 3.0	0 / 80	0 / 80	-
DD23554 / M12E / Rev 3.0	0 / 80	0 / 80	-
DD23851 / M12E / Rev 3.0	0 / 80	0 / 80	0 / 76*
Totals	0 / 240	0 / 240	0 / 76*

* One unit overheated due to thermocouple malfunction, corrective action requested.
Three units failed due to software which controlled oven temperature. Corrective action taken by IT.

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High Temperature Operating Life Test (HTOL) – Vd1/Vd2 1.8v/3.3v, Tj 133C (Avg)
MPC8349 Rev 3.1

Lot / Mask Set / Rev	5 Years (180 hrs)
DD25574 / W02M12E / Rev 3.1	0 / 80
Totals	0 / 80

High Temperature Operating Life Test (HTOL) Drift Analysis – Voltage 1.8v/3.3v, Tj 121°C (Avg)
MPC8349 – 672 Lead 35mm TBGA Package

Lot / Mask Set / Rev	10 Years (360hr)
D85194 / W00K52M / Rev 1.0	0 / 5
D84964 / W00K52M / Rev 1.0	0 / 5
D88577 / W00K52M / Rev 1.0	0 / 5
Totals	0 / 15

High Temperature Operating Life Test (HTOL) Drift Analysis – Voltage 1.8v/3.3v, Tj 125°C (Avg)
MPC8349 – 672 Lead 35mm TBGA Package

Lot / Mask Set / Rev	10 Years (360hr)
DD23553 / M12E / Rev 3.0	0 / 5
DD23554 / M12E / Rev 3.0	0 / 5
DD23851 / M12E / Rev 3.0	0 / 5
Totals	0 / 15

High Temperature Operating Life Test (HTOL) Fmax Analysis – Voltage 1.8v/3.3v, Tj 121°C (Avg)
MPC8349 – 672 Lead 35mm TBGA Package

Lot / Mask Set / Rev	10 Years (360hr)
D85194 / W00K52M / Rev 1.0	0 / 20
D84964 / W00K52M / Rev 1.0	0 / 23
D88577 / W00K52M / Rev 1.0	0 / 22
Totals	0 / 65

High Temperature Operating Life Test (HTOL) Fmax Analysis – Voltage 1.8v/3.3v, Tj 125°C (Avg)
MPC8349 – 672 Lead 35mm TBGA Package

Lot / Mask Set / Rev	10 Years (360hr)
DD23553 / M12E / Rev 3.0	0 / 5
DD23554 / M12E / Rev 3.0	0 / 5
DD23851 / M12E / Rev 3.0	0 / 5
Totals	0 / 15



MPC8349/8347/8343 PowerQUICC2 Pro Rev 1.1/3.1 Product Reliability Data Summary (cont.)

Moisture Sensitivity Level Characterization

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	MSL3 / 260°C
KLM / Substrate Supplier A / Assy lots 1-3	0 / 66
Totals	0 / 66

Temperature Cycle / -65°C to 150°C Air to Air with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	200 Cycles	500 Cycles	1000 Cycles
KLM / Substrate Supplier A / Assy lots 1-3	0 / 238	0 / 238	0 / 238
Totals	0 / 238	0 / 238	0 / 238

Temperature Cycle / -55°C to 125°C Air to Air with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	200 Cycles	500 Cycles	1000 Cycles
KLM / Substrate Supplier A / Assy lots 1-3	0 / 240	0 / 240	0 / 240
Totals	0 / 240	0 / 240	0 / 240

Temperature Humidity Bias / 85°C, 85%R.H., 0.9v/3.3v with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	504 Hours	1008 Hours
KLM / Substrate Supplier A / Assy lots 1-3	1 / 238*	0 / 234*
Totals	1 / 238	0 / 234
Failures	THB 504 hours - Mechanical damage observed on die. Cause inconclusive.	
Notes	*2 units found to be electrically overstressed at ATE test, but passed functionality. ATE test improvements implemented.	

High Temperature Bake / 150°C

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	504 Hours	1008 Hours
KLM / Substrate Supplier A / Assy lots 1-3	0 / 240	0 / 239
Totals	0 / 240	0 / 239

Moisture Sensitivity Level Characterization

MPC8360 – 740 Lead-free Qual Vehicle 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	MSL3 / 260°C
KLM / Substrate Supplier B / Assy lots 1-3	0 / 66
Totals	0 / 66

Temperature Cycle / -65°C to 150°C Air to Air with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8360 – 740 Lead-free Qual Vehicle 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	200 Cycles	500 Cycles	1000 Cycles
KLM / Substrate Supplier B / Assy lots 1-3	0 / 236	0 / 235*	0 / 235
Totals	0 / 236	0 / 235	0 / 235
Notes	* 1 unit missing ball handling related		

High Temperature Bake / 150°C

MPC8360 – 740 Lead-free Qual Vehicle 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	504 Hours	1008 Hours
KLM / Substrate Supplier B / Assy lots 1-3	0 / 239*	0 / 239
Totals	0 / 239	0 / 239
Notes	* 1 unit missing ball handling related	



MPC8349/8347/8343 PowerQUICC2 Pro Rev 1.1/3.1 Product Reliability Data Summary (cont.)

Moisture Sensitivity Level Characterization

MPC8347 – 620 Lead 29mm TEPBGA2 Package

Assy Site / Substrate Supplier / Lots	MSL3 / 260°C
KLM / Substrate Supplier A / Assy lots 1-3	0 / 66
Totals	0 / 66

Temperature Cycle / -55°C to 125°C Air to Air with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8347 – 620 Lead 29mm TEPBGA2 Package

Assy Site / Substrate Supplier / Lots	200 Cycles	500 Cycles	1000 Cycles
KLM / Substrate Supplier A / Assy lots 1-3	0/240	0/240	0/240
Totals	0 / 240	0 / 240	0 / 240

Temperature Humidity / 85°C, 85%R.H. with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8347 – 620 Lead 29mm TEPBGA2 Package

Assy Site / Substrate Supplier / Lots	504 Hours	1008 Hours
KLM / Substrate Supplier A / Assy lots 1-3	0 / 239	0 / 238
Totals	0 / 239	0 / 238

High Temperature Bake / 150°C

MPC8347 – 620 Lead 29mm TEPBGA2 Package

Assy Site / Substrate Supplier / Lots	504 Hours	1008 Hours
KLM / Substrate Supplier A / Assy lots 1-3	0 / 239	0 / 239
Totals	0 / 239	0 / 239

Autoclave / 121°C, 100%R.H., 15PSIG with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8347 – 620 Lead 29mm TEPBGA2 Package

Assy Site / Substrate Supplier / Lots	48 Hours	96 Hours	144 Hours
KLM / Substrate Supplier A / Assy lots 1-3	0 / 240	0 / 240	0 / 240
Totals	0 / 240	0 / 240	0 / 240



672TBGA MPC834x Center Gate Mold Qualification Summary

Moisture Sensitivity Level Characterization

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	MSL3 / 260°C
KLM / Substrate Supplier A / Assy lots 1-3	0 / 66
Totals	0 / 66

Temperature Cycle / -55°C to 125°C Air to Air with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	200 Cycles	500 Cycles	1000 Cycles
KLM / Substrate Supplier A / Assy lots 1-3	0 / 240	0 / 240	0 / 240
Totals	0 / 240	0 / 240	0 / 240

Temperature Humidity Bias / 85°C, 85%R.H., 0.9v/3.3v with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	504 Hours	1008 Hours
KLM / Substrate Supplier A / Assy lots 1-3	0/75	0/75
Totals	0/75	0/75

High Temperature Bake / 150°C

MPC8349 – 672 Lead 35mm TBGA Package

Assy Site / Substrate Supplier / Lots	504 Hours	1008 Hours
KLM / Substrate Supplier A / Assy lots 1-3	0 / 90	0 / 90
Totals	0 / 90	0 / 90

Unbiased HAST 130°C/85%RH with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8347 – 620 Lead 29mm TEPBGA2 Package

Assy Site / Substrate Supplier / Lots	96 Hours
KLM / Substrate Supplier A / Assy lots 1-3	0 / 240
Totals	0 / 240



MPC834x 672TBGA Conversion to Copper Wire Bond (QBS to MPC8360 740TBGA)

Temperature Cycle / -55°C to 125°C Air to Air with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8360, Rev 2.1 740 TBGA Package

Qual Lot	400 Cycles	700 Cycles
Qual Lot A	0 / 80	0 / 80
Qual Lot B	0 / 80	0 / 80
Qual Lot C	0 / 80	0 / 80
Totals	0 / 240	0 / 240

Moisture Sensitivity Level Characterization

MPC8360, Rev 2.1 740 TBGA Package

Qual Lot	MSL3 / 260°C
Qual Lot A	0 / 11
Qual Lot B	0 / 11
Qual Lot C	0 / 11
Totals	0 / 33

uHAST / 110°C, 85% RH, 17.7 psia with Preconditioning @ MSL3 / 260°C IR Reflow

MPC8360, Rev 2.1 – 740 TBGA Package

Qual Lot	264 hours
Qual Lot A	0 / 80
Qual Lot B	0 / 80
Qual Lot C	0 / 80
Totals	0 / 240

High Temperature Storage Life, 150°C

MPC8360, Rev 2.1 – 740 TBGA Package

Qual Lot	504 hrs	1008 hrs
Qual Lot A	0 / 30	0 / 30
Qual Lot B	0 / 30	0 / 30
Qual Lot C	0 / 30	0 / 29*
Totals	0 / 90	0 / 89

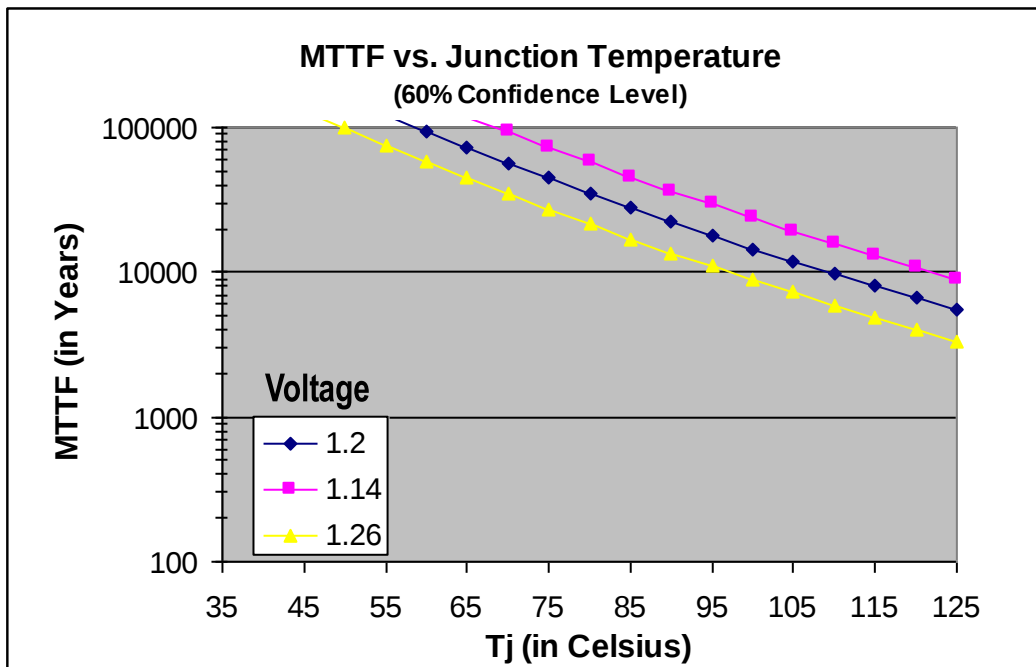
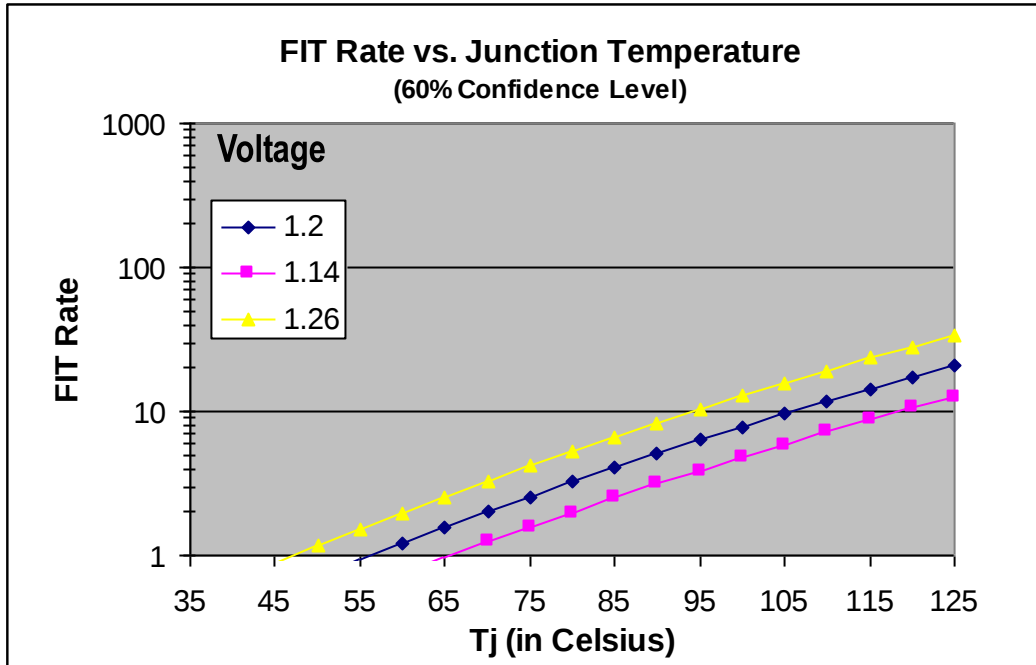
*1 unit with mechanical damage after HTSL 1008 hours

Temperature Humidity Biasing with Preconditioning @ MSL3 / 260°C IR Reflow*

MPC8360, Rev 2.1 740 TBGA Package

Qual Lot	504 hrs	1008 hrs
Qual Lot A	0 / 25	0 / 25
Qual Lot B	0 / 25	0 / 25
Qual Lot C	0 / 25	0 / 25
Totals	0 / 75	0 / 75

MPC8349/8347/8343 PowerQUICC2 Pro Rev 1.1 Product FIT Rate and MTTF Derated Curves





Revision History

Revision History			
Revision	Date	Comment	Author
Original	9/14/05	MPC8349/8347/8343 PowerQUICC2 Pro Rev 1.1Qualification Report.	Aaron Chapa
A	12/6/05	Added TBGA Pb free package suffix, updated HTOL data set and FIT / MTTF charts.	Aaron Chapa
B	1/4/06	Added latest environmental stress data.	Aaron Chapa
C	9/6/06	Added latest HTOL data set.	Gandhi / Chapa
D	11/1/06	Added 740 TBGA data	Dipak Gandhi
E	12/05/06	Added Rev 3.0 / 3.1 qualification data	Dipak Gandhi
F	12/16/06	Updated TEPBGA 2 data	Dipak Gandhi
G	4/12/12	Added Center Gate Molding Qualification data	Navin Kumar
H	8/19/14	Added MPC834x 672TBGA Cu Wire Bonding Qualification Data	Navin Kumar