



POWERQUICC II

Rev A Qualification Report

**MPC8270, MPC8280
ATMC HiP7AP
480 TBGA
516 PBGA**

PowerQUICC II Communications Processor

MPC8270, MPC8275, MPC8280 Product Information:

Product / Technology / Fab / Package Description	
Package	480 TBGA (ZU/VV), 37.5 x 37.5 mm, 1.27 C5 pitch, Pb and Pb Free Sphere 516 PBGA (ZQ/VR), 27 x 27 mm, 1mm pitch, Pb and Pb Free Sphere
Device	PowerQUICC 27
Mask Set	WB32K49M (516PBGA) and WB13K49M (480TBGA)
Die Size	6.879x6.754 (46.46mm ²)
Die Coating(s)	Polyimide - yes
Name/Location of Die Fab Facility	ATMC / Austin TX
Process Technology	0.13um HiP7AP
Poly / Metal layers	1P / 5+1M (Dual Inlaid - Layers via 2 , 3, and 4 metal 3 thru 5)
Assembly Location	Freescall, KLM
Wire Material / Size	Au / 0.8 mils
Moisture Sensitivity Level	MSL4 / 245°C , 260°C Reflow TBGA; MSL3 / 260°C Reflow PBGA
Lead Frame / Substrate Supplier	Supplier A TBGA Supplier B TBGA Three PBGA Suppliers are Supplier A / A Green , C and D
Assembly Location	StatsChipPac, Korea for PBGA package
Wire Material / Size	Pd-Cu / 0.7 mils
Moisture Sensitivity Level	MSL3
Substrate Supplier	Supplier K

Electrical Characterization

Lot / Mask Set	-40°C and 105°C
D763591/2K49M	0 / 5
D787829/2K49M	0 / 5
D787839/2K49M	0 / 5
D878793/2K49M	0 / 10
DD2686698/3K49M	0 / 5
DD268652/3K49M	0 / 5
Total	0 / 35

Electrostatic Discharge and Latch-up Test/Rev. A

Lot / Mask Set	HBM / 2KV	MM / 200V	CDM / 500V – No Skt	Latch-up / 200mA
D757211/2K49M	0/3	0 / 3	0 / 3	0 / 6
Total	0/3	0 / 3	0 / 3	0 / 6

High Temperature Operating Life Test (HTOL) – Vd1 2.0v, Vd2 4.0v, Ta 125°C

Lot / Mask Set	10 Years (240 hours) <100 FITs	20 Years (456 hours) <100 FITs	40 Years (1008 hours) <100 FITs For info only
D787829/2K49M	0/80	0/80	0/80
D763591/2K49M	0/53	0/53	0/53
D787839/2K49M	0/80	0/80	0/79
DD2686698/3K49M	0/80	---	0/80
Total	0/293	0/213	0/292

TBGA Supplier A

MSL4 Moisture Sensitivity Level Characterization

Lot Number	MSL4 / 245°C
D722821/1K49M	0/22
D722822/1K49M	0/22
D722823/1K49M	0/22
Totals	0/66

Temperature Cycle / -65°C to 150°C Air to Air after Preconditioning @ MSL4 / 245°C IR Reflow

Lot Number	200 Cycles	500 Cycles	1000 Cycles
D722821/1K49M	0/80	0/80	0/80
D722822/1K49M	0/80	0/80	0/80
D722823/1K49M	0/80	0/80	0/80
Totals	0/240	0/240	0/240

Temperature Humidity / 85°C, 85%R.H. after Preconditioning @ MSL4 / 245°C IR Reflow

Lot Number	504 Hours	1008 Hours
D722821/1K49M	0/80	0/80
D722822/1K49M	0/80	0/80
D722823/1K49M	0/80	0/80
Totals	0/240	0/240

Additional Similarity Data

Test Vehicle: MPC8360 rev 2 – 740 Lead-free Qual vehicle 37.5mm TBGA package

MSL3 Moisture Sensitivity Level Characterization

Lot Number	MSL3 / 260°C
Assembly Lot 1	0/22
Assembly Lot 2	0/22
Assembly Lot 3	0/22
Totals	0/66

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

Lot Number	400 Cycles	800 Cycles	1000 Cycles
Assembly Lot 1	0/80	0/80	0/80
Assembly Lot 2	0/80	0/80	0/80
Assembly Lot 3	0/80	0/80	0/80
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

Lot Number	504 Hours	1008 Hours
Assembly Lot 1	0/80	0/80
Assembly Lot 2	0/80	0/80
Assembly Lot 3	0/80	0/80
Totals	0/240	0/240

High Temperature Bake / 150°C

Lot Number	504 Hours	1008 Hours
Assembly Lot 1	0/80	0/80
Assembly Lot 2	0/80	0/80
Assembly Lot 3	0/80	0/80
Totals	0/240	0/240

TBGA Supplier B

MSL4 Moisture Sensitivity Level Characterization

Lot Number	MSL4 / 245°C
D8153011/2K49M	0/11
D8153012/2K49M	0/11
D8153013/2K49M	0/11
Totals	0/33

Temperature Cycle / -65°C to 150°C Air to Air after Preconditioning @ MSL4 / 245°C IR Reflow

Lot Number	200 Cycles	500 Cycles	1000 Cycles
D8153011/2K49M	0/80	0/80	0/80
D8153012/2K49M	0/80	0/80	0/80
D8153013/2K49M	0/80	0/80	0/80
Totals	0/240	0/240	0/240

Temperature Humidity / 85°C, 85%R.H. after Preconditioning @ MSL4 / 245°C IR Reflow

Lot Number	504 Hours	1008 Hours
D8153011/2K49M	0/80	0/80
D8153012/2K49M	0/80	0/80
D8153013/2K49M	0/80	0/80
Totals	0/240	0/240

PBGA Supplier A

Moisture Sensitivity Level Characterization

Product - Package Assy Site / Substrate Supplier / Lots	MSL3 / 245°C
MPC8270 – 516 PBGA KLM / Substrate Supplier A / 3 assy lots	0 / 66
Totals	0 / 66

Temperature Cycle / -65°C to 150°C Air to Air with Preconditioning @ MSL3 / 245°C IR Reflow

Product - Package Assy Site / Substrate Supplier / Lots	200 Cycles	500 Cycles
MPC8270 – 516 PBGA KLM / Substrate Supplier A / 3 assy lots	0 / 240	0 / 240
Totals	0 / 240	0 / 240

Temperature Cycle / -65°C to 150°C Air to Air with Preconditioning @ MSL3 / 245°C IR Reflow 1K49M Die with EAP Bond Pads (Extended Armor Pad) in the 516 PBGA Package

Lot / Mask Set	200 Cycles	500 Cycles
D71644.1/1K49M	0/55	0/55
D71644.2/1K49M	0/80	0/80
D71644.3/1K49M	0/80	0/80
Total	0/215	0/215

Temperature Humidity / 85°C, 85%R.H. with Preconditioning @ MSL3 / 245°C IR Reflow

Product - Package Assy Site / Substrate Supplier / Lots	168 Hours	504 Hours	1008 Hours
MPC8270 – 516 PBGA KLM / Substrate Supplier A / 3 assy lots	0 / 240	0 / 240	0/240
Totals	0 / 240	0 / 240	0 / 240

PBGA Supplier C

MSL3 Moisture Sensitivity Level Characterization

Lot Number	MSL3 / 260°C
QL1	0/22
QL2	0/22
QL3	0/22
Totals	0/66

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

Lot Number	200 Cycles	500 Cycles	1000 Cycles
QL1	0/80	0/80	0/80
QL2	0/80	0/80	0/80
QL3	0/80	0/80	0/80
Totals	0/240	0/240	0/240

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

Lot Number	504 Hours	1008 Hours
QL1	0/80	0/80
QL2	0/80	0/80
QL3	0/80	0/80
Totals	0/240	0/240

PBGA Supplier D

MSL3 Moisture Sensitivity Level Characterization

<i>Lot Number</i>	<i>MSL3 / 260°C</i>
WEMH2014W000	0/22
WEMH2014W100	0/22
WEMH2014W200	0/22
Totals	0/66

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

<i>Lot Number</i>	<i>200 Cycles</i>	<i>500 Cycles</i>	<i>1000 Cycles</i>
WEMH2014W000	0/80	0/80	0/80
WEMH2014W100	0/80	0/80	0/80
WEMH2014W200	0/80	0/80	0/80
Totals	0/240	0/240	0/240

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

<i>Lot Number</i>	<i>504 Hours</i>	<i>1008 Hours</i>
WEMH2014W000	0/80	0/80
WEMH2014W100	0/80	0/80
WEMH2014W200	0/80	0/80
Totals	0/240	0/240

High Temperature Bake / 150°C

<i>Lot Number</i>	<i>504 Hours</i>	<i>1008 Hours</i>
WEMH2014W000	0 / 80	0 / 80
WEMH2014W100	0 / 80	0 / 80
WEMH2014W200	0 / 80	0 / 80
Totals	0 / 240	0 / 240

PBGA Green Supplier A

Moisture Sensitivity Level Characterization

Product - Package Assy Site / Substrate Supplier / Lots	MSL3 / 260°C
MPC8270 – 516 PBGA KLM / Green Substrate Supplier A / 3 assy lots	0 / 66
Totals	0 / 66

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

Product - Package Assy Site / Substrate Supplier / Lots	200 Cycles	500 Cycles	850 Cycles	1000 Cycles
MPC8270 – 516 PBGA KLM / Green Substrate Supplier A / 3 assy lots	0 / 240	0 / 240	0 / 240	0 / 240
Totals	0 / 240	0 / 240	0 / 240	0 / 240

StatsChipPac – Korea PBGA Assembly Qualification Data Summary

Moisture Sensitivity Level Characterization

Wafer Lot	Trace Code	MSL3/260°C Fail/Sample Size
MXMH2056QV00	SXA1UH	0/10
MXMH2056QV00	SXA3UH	0/10
MXMH2056QV00	SXA2UH	0/10
Totals		0/30

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

Wafer Lot	Trace Code	MSL3/260°C Fail/Sample Size	400 Cycles Fail/Sample Size	700 Cycles Fail/Sample Size	1000 Cycles Fail/Sample Size
MXMH2056QV00	SXA1UH	0/25	0/25	0/25	0/25
MXMH2056QV00	SXA3UH	0/25	0/25	0/25	0/25
MXMH2056QV00	SXA2UH	0/25	0/25	0/25	0/25
Totals		0/75	0/75	0/75	0/75

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

Wafer Lot	Trace Code	MSL3/260°C Fail/Sample Size	200 Cycles Fail/Sample Size	500 Cycles Fail/Sample Size	1000 Cycles Fail/Sample Size
MXMH2056QV00	SXA1UH	0/200	1/200 ^A	0/199	0/79
MXMH2056QV00	SXA3UH	0/80	0/80	0/80	0/80
MXMH2056QV00	SXA2UH	0/80	0/80	0/80	0/80
Totals		0/360	1/360	0/359	0/239

^A Failure due to bin 8 opens on 2 pins due to foreign matter. FA report 118682a. Corrective action included improved clean room practices which were validated by Freescale audit of SCK facilities. Additional 120 units from same qual lot stressed through 500 cycles to decrease LTPD.

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

Wafer Lot	Trace Code	MSL3/260°C Fail/Sample Size	504 Hours Fail/Sample Size	1008 Hours Fail/Sample Size
MXMH2056QV00	SXA1UH	0/80	0/80	0/80
MXMH2056QV00	SXA3UH	0/80	0/80	0/80
MXMH2056QV00	SXA2UH	0/80	0/80	1/79 ^B
Totals		0/240	0/240	1/239

^B Failure due to EOS. Refer to FA reports 121630a and 120643a.

Unbiased HAST / 130°C, 85% RH, 33 psig

Wafer Lot	Trace Code	MSL3/260°C Fail/Sample Size	96 Hours Fail/Sample Size
MXMH2056QV00	SXA1UH	0/25	0/25
MXMH2056QV00	SXA3UH	0/25	0/25
MXMH2056QV00	SXA2UH	0/25	0/25
Totals		0/75	0/75

High Temperature Bake / 150°C

Wafer Lot	Trace Code	1008 Hours Fail/Sample Size
MXMH2056QV00	SXA1UH	0/80
MXMH2056QV00	SXA3UH	0/80
MXMH2056QV00	SXA2UH	1/80 ^C
Totals		1/240

^C Failed JTAG voltage levels due to foreign matter. FA report 120235a. Corrective action included improved clean room practices which were validated by Freescale audit of SCK facilities.

Substrate redesign to reduce noise on the VCCSYN1 pin.

Changes were minor and included reduced VCCSYN1 wire bond length, rerouting of a VCCSYN1 via in the VSS layer, moving the NVCC via and removal of overlap between the NVCC and VCCSYN1 layer.

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

Lot number	MSL3/260°C Fail/Sample Size	400 Cycles Fail/Sample Size	700 Cycles Fail/Sample Size	1000 Cycles Fail/Sample Size
MQ1133C	0/25	0/25	0/25	0/25
MQ1113D	0/25	0/25	0/25	0/25
MQ1113F	0/25	0/25	0/25	0/25
Totals	0/75	0/75	0/75	0/75

480TBGA PQ27A Center Gate Mold Qualification Summary

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

Lot number	MSL3/260°C Fail/Sample Size	400 Cycles Fail/Sample Size	700 Cycles Fail/Sample Size	1000 Cycles Fail/Sample Size
QUAL LOT A	0/80	0/80	0/80	0/80
QUAL LOT B	0/80	0/80	0/80	0/80
QUAL LOT C	0/80	0/80	0/80	0/80
Totals	0/240	0/240	0/240	0/240

Moisture Sensitivity Level Characterization

Wafer Lot	MSL3/260°C Fail/Sample Size
QUAL LOT A	0/22
QUAL LOT B	0/22
QUAL LOT C	0/22
Totals	0/66

Unbiased HAST / 130°C, 85% RH, 33 psig

Wafer Lot	MSL3/260°C Fail/Sample Size	96 Hours Fail/Sample Size
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

High Temperature Bake / 150°C*

Wafer Lot	1008 Hours Fail/Sample Size
QUAL LOT A	0/30
QUAL LOT B	0/30
QUAL LOT C	0/30
Totals	0/90

* QBS data from 672TBGA 8349 Center Gate Molding Qualification

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

Wafer Lot	MSL3/260°C Fail/Sample Size	504 Hours Fail/Sample Size	1008 Hours Fail/Sample Size
QUAL LOT A	0/25	0/25	0/25
QUAL LOT B	0/25	0/25	0/25
QUAL LOT C	0/25	0/25	0/25
Totals	0/75	0/75	0/75

* QBS data from 672TBGA 8349 Center Gate Molding Qualification

Nanya Substrate Qualification**Qual Vehicle: PQ27A / PQ27E (516 PBGA 27x27 mm, 1mm pitch, Pb and Pb Free Sphere)****Temperature Cycle / -55°C to 125°C Air to Air with Preconditioning @ MSL3 / 260°C IR Reflow**

Lot number	MSL3/260°C Fail/Sample Size	400 Cycles Fail/Sample Size	700 Cycles Fail/Sample Size	1000 Cycles Fail/Sample Size
QUAL LOT A	0/80	0/80	0/80	0/80
QUAL LOT B	0/80	0/80	0/80	0/80
QUAL LOT C	0/80	0/80	0/80	0/80
Totals	0/240	0/240	0/240	0/240

Moisture Sensitivity Level Characterization

Wafer Lot	MSL3/260°C Fail/Sample Size
QUAL LOT A	0/22
QUAL LOT B	0/22
QUAL LOT C	0/22
Totals	0/66

Unbiased HAST / 130°C, 85% RH, 33 psig

Wafer Lot	MSL3/260°C Fail/Sample Size	96 Hours Fail/Sample Size
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

High Temperature Bake / 150°C

Wafer Lot	1008 Hours Fail/Sample Size
QUAL LOT A	0/30
QUAL LOT B	0/30
QUAL LOT C	0/30
Totals	0/90

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

Wafer Lot	MSL3/260°C Fail/Sample Size	504 Hours Fail/Sample Size	1008 Hours Fail/Sample Size
QUAL LOT A	0/25	0/25	0/25
QUAL LOT B	0/25	0/25	0/25
QUAL LOT C	0/25	0/25	0/25
Totals	0/75	0/75	0/75

PQ27A 480TBGA Conversion to Copper Wire Bond

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

Lot number	MSL3/260°C Fail/Sample Size	400 Cycles Fail/Sample Size	700 Cycles Fail/Sample Size
QUAL LOT A	0/25	0/25	0/25
QUAL LOT B	0/25	0/25	0/25
QUAL LOT C	0/25	0/25	0/25
Totals	0/75	0/75	0/75

Moisture Sensitivity Level Characterization*

Lot number	MSL3/260°C Fail/Sample Size
QUAL LOT A	0/11
QUAL LOT B	0/11
QUAL LOT C	0/11
Totals	0/33

*QBS to MPC8360 740TBGA

Unbiased HAST / 110°C, 85% RH, 17.7 psia*

Lot number	MSL3/260°C Fail/Sample Size	264 Hours Fail/Sample Size
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

*QBS to MPC8360 740TBGA

High Temperature Bake / 150°C*

Lot number	504 Hours Fail/Sample Size	1008 Hours Fail/Sample Size
QUAL LOT A	0/30	0/30
QUAL LOT B	0/30	0/30
QUAL LOT C	0/30	0/29**
Totals	0/90	0/90

*QBS to MPC8360 740TBGA

**1 unit with mechanical damage after HTSL 1008 hours

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

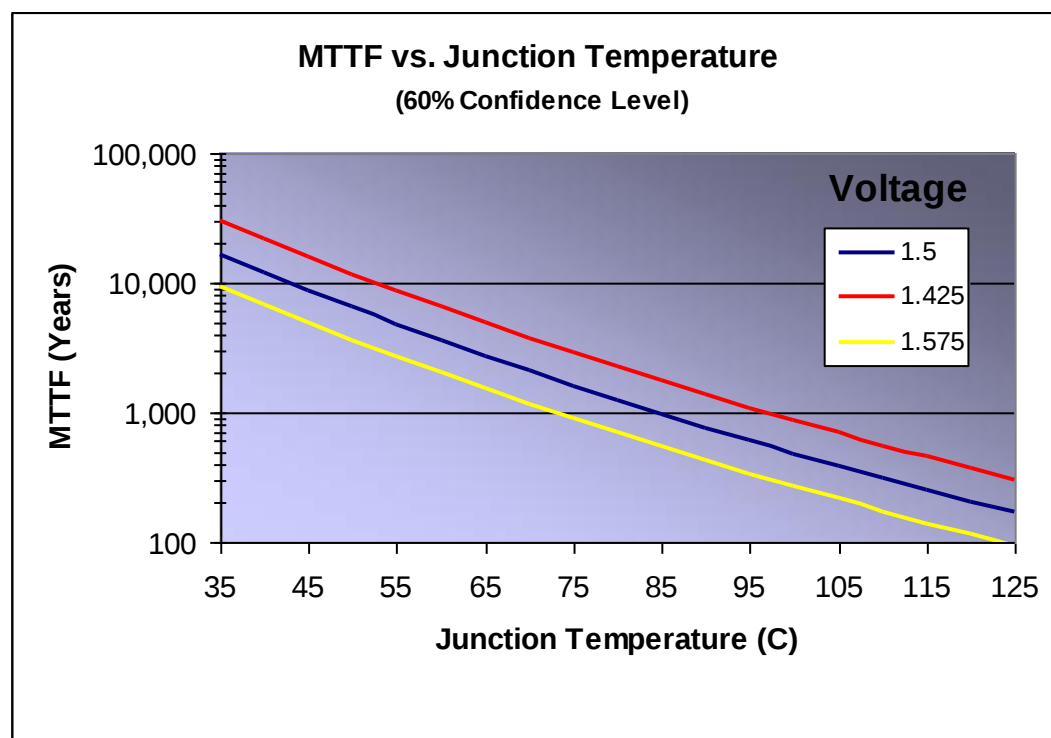
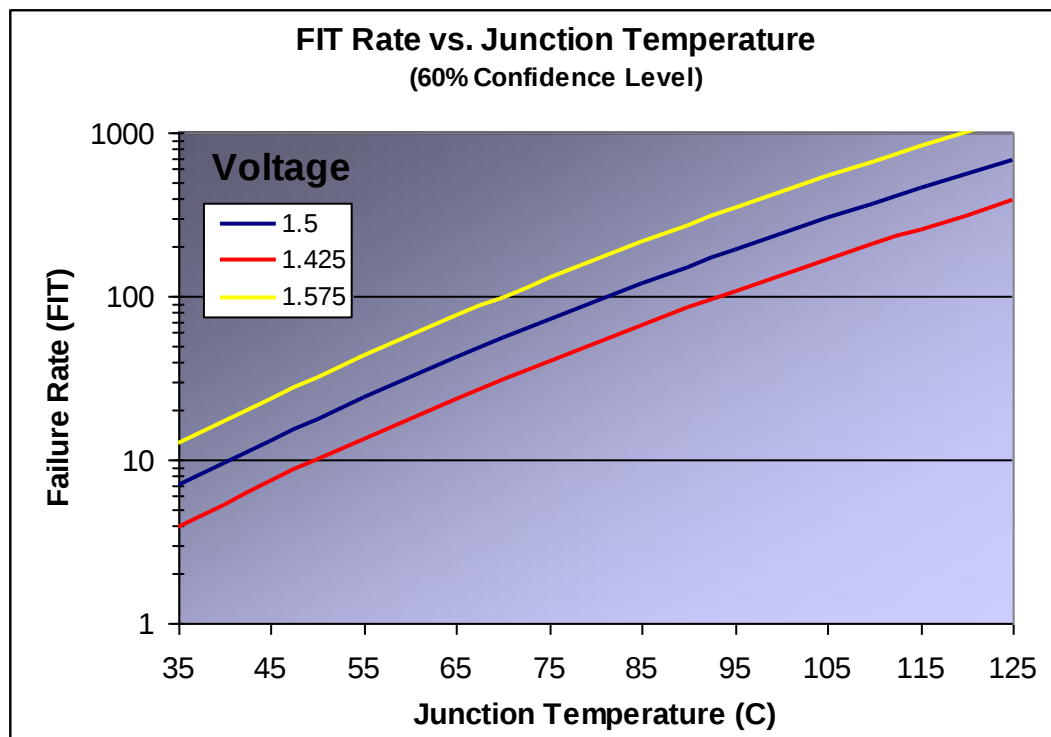
Lot number	MSL3/260°C Fail/Sample Size	504 Hours Fail/Sample Size	1008 Hours Fail/Sample Size
QUAL LOT A	0/25	0/25	0/25
QUAL LOT B	0/25	0/25	0/25
QUAL LOT C	0/25	0/25	0/25
Totals	0/75	0/75	0/75

*QBS to MPC8360 740TBGA

Description: PQ27 Qualification Report	Report Rev.: L
Device: MCP8270/MPC8275	Revision date: 8/19/2014
	Page 14 of 16

MPC8280, MPC8270 Product FIT Rate and MTTF Derated Curves:

All values calculated at 1.5 volts, 55C ambient at 60% confidence.



Revision History:

Revision History			
Revision	Date	Comment	Author
Original	4/22/05	Original Dual Inlaid Qualification Report	Noel Arguello
Rev. A	5/16/2005	Added ESD results	Noel Arguello
Rev B	4/3/07	Added PBGA data	Dipak Gandhi
Rev C	7/23//07	Added TBGA supplier A data of 8360 to QBS 260C reflow & PBGA data compiled	Dipak Gandhi
Rev D	11/17//07	Added HTOL and Elec CZ data for SIL process implementation (DD2686698,DD268652) & PBGA	Dipak Gandhi
Rev E	02/25/08	Updated product info section	Dipak Gandhi
Rev F	10/30/08	Added PBGA supplier A Green data	Dipak Gandhi
Rev G	10/05/2010	Added SCK Assembly Qualification Data	Kathy Badger Torres
Rev H	9/6/2011	Added results from substrate redesign qualification done with material assembled in StatsChipPac-Korea	Kathy Badger Torres
Rev I	10/17/2011	Added Cu Wire Qualification Results	Kathy Badger Torres
Rev J	1/19/2012	Added 480TBGA PQ27A Center Gate Mold Qualification Summary	Navin Kumar
Rev K	3/20/2012	Added Nanya Substrate Qualification Results	Navin Kumar
Rev L	8/19/2014	Added PQ27A 480TBGA Cu Wire Bond Qualification Data	Navin Kumar