



**MC7447A/B/C Microprocessor  
MOS-13 HiP7SOI  
41 - L25S / 42 - L25S / 53 – L25S / 55 – L25S / 58 – L25S  
Qualification Report**

Device No./Rev.: MC7447A/B Rev. 1.1/1.1.1/1.2		Report Rev.: 6
Description: MC7447A Commercial/Industrial Tier MC7447B Node4b Commercial Tier MC7447B Node4b Commercial Tier (RoHS)		Revision date: 01April-05
Technology:MOS13 HiP7SOI	Package: 360 HiCTE	Page 1 of 13

## MC7447A/B Product Information:

Product / Technology / Wafer Fab / Package Description	
Package	MC7447A/B: 360 HCTE, 25 mm (VU), with lead free solder spheres (SnAgCu) - RoHS MC7447A/B: 360 HCTE, 25 mm (VS), with land grid array (LGA) - RoHS MC7447A/B: 360 HCTE, 25 mm (HX), with lead bearing solder spheres - (SnPbAg)
Device	7447A/B/C
Mask Set	Node 3: 41 – L25S ; 42 – L25S; Node 4: 53 – L25S ; Node 4B: 55 – L25S, Node 4C: 58 L25S
Die Coating	Yes
Name/Location of Die Fab Facility	MOS-13 / Austin TX
Process Technology	0.13um HiP7SOI
Poly / Metal layers	1P / 9M
Assembly Location	Freescale - KLM / Kuala Lumpur, Malaysia & Freescale - Austin, Tx
Underfill Material	UL94SPEC Compliant
Bump Location	Phoenix, Az & Research Triangle Park, NC
Bump Material / Diameter	Lead Bearing: 90% Pb, 10% Sn / 4.0 mils , Lead Free: (SnAgCu)
Moisture Sensitivity Level	MSL1 @ 245degC

## MC7447A Node3 Product Specification:

Spec	Application Tier	Nom Vdd	Tj max	Speed (MHz)	Package	Part Number
1500W	Commercial	1.25V	85C	1500	360 HTCE	MC7447AHX1500WB
1333W	Commercial	1.18V	85C	1333	360 HTCE	MC7447AHX1333WB
X	Commercial	1.15V	85C	1333	360 HTCE	MC7447AHX1333XB
V	Commercial	1.15V	85C	1197/1064	360 HTCE	MC7447AHX1064VB/1197
Y	Commercial	1.28V	85C	1500	360 HTCE	MC7447AHX1500YB
N	Industrial	1.1V	105C	1000/867/733/600	360 HTCE	MC7447AHX1000NB/867/733/600
L	Industrial	1.3V	105C	1420/1333/1267	360 HTCE	MC7447AHX1420LB/1333/1267

## MC7447B/C Node4 Product Specification:

Spec	Application Tier	Nom Vdd	Tj max	Speed (MHz)	Package	Part Number
1500W	Commercial	1.24V -30/+50mV	85C	1500	360 HTCE	MC7447BHX1500WD
1333X	Commercial	1.15V -30/+50mV	85C	1333	360 HTCE	MC7447BHX1333XD
1333A	Commercial	1.17V -30/+50mV	85C	1333	360 HTCE	MC7447BHX1333AD
1197A	Commercial	1.15V -30/+50mV	85C	1197	360 HTCE	MC7447BHX1197AD
1420Q	Commercial	1.24V -50/+100mV	85C	1420/1250	360 HTCE	MC7447BHX1420QD/1250
1250R	Commercial	1.32V -100/+50mV	78C	1250/1000	360 HTCE	MC7447BHX1250RD/1000
1667W	Commercial	1.28V -30/+50mV	85C	1667	360 HTCE	MC7447BHX1667WE
1500W	Commercial	1.20V -30/+50mV	85C	1500	360 HTCE	MC7447BHX1500WE
1667D	Commercial	1.26V -30/+50mV	85C	1667	360 HTCE	MC7447BHX1667DE
1667Y	Commercial	1.28V -30/+50mV	85C	1667	360 HTCE	MC7447BHX1667YE
1500X	Commercial	1.19V -30/+50mV	85C	1500	360 HTCE	MC7447BHX1500XE
1500Z	Commercial	1.15V -30/+50mV	85C	1500	360 HTCE	MC7447BHX1500ZE
1333A	Commercial	1.17V -30/+50mV	85C	1333	360 HTCE	MC7447BHX1333AE
1197A	Commercial	1.15V -30/+50mV	85C	1197	360 HTCE	MC7447BHX1197AE
1420Q	Commercial	1.24V -50/+100mV	85C	1420/1250	360 HTCE	MC7447BHX1420QE/1250
1420R	Commercial	1.32V -100/+50mV	78C	1250/1000	360 HTCE	MC7447BHX1420RE/1000
1700W	Commercial	1.32V -100/+50mV	85C	1700	360 HTCE	MC7447BVS1700WG
1700Z	Commercial	1.32V -100/+50mV	85C	1700	360 HTCE	MC7447BVS1700ZG

Device No./Rev.: MC7447A/B Rev. 1.1/1.1.1/1.2	Report Rev.: 6
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Technology:MOS13 HiP7SOI	Package: 360 HiCTE Page 2 of 13

**HTCE MSL1 @ 260degC RoHS Compliant Product Specification:**

Spec	Customer/App	Nom Vdd	Tj	Speed	Pkg	Part#
VU	Pb-free Industrial Tier	1.1 +/- 0.05V	105C	600, 867	360 HTCE	MC7447AVUNB
VS	Pb-free Industrial Tier	1.1 +/- 0.05V	105C	600, 733, 867, 1000, 1167	360 HTCE-LGA	MC7447AVSNB
VS	Pb-free Industrial Tier	1.3 +/- 0.05V	105C	1000, 1267, 1333, 1420	360 HTCE-LGA	MC7447AVSLB
VS	Pb-free Commercial Tier	1.32V - 100/+50mV	85C	1700	360 HTCE - LGA	MC7447BVS1700WG
VS	Pb-free Commercial Tier	1.32V - 100/+50mV	85C	1700	360 HTCE - LGA	MC7447BVS1700ZG

**HTCE MSL1 @ 260degC Compliant Product Specification:**

Spec	Customer/App	Nom Vdd	Tj	Speed	Pkg	Part#
HX	Industrial Tier	1.1 +/- 0.05V	105C	600, 733, 867, 1000, 1167	360 HTCE	MC7447AHXNB
HX	Industrial Tier	1.1 +/- 0.05V	-40 TO 105C	1000, 1167	360 HTCE	MC7447ATHXNB
HX	Industrial Tier	1.3 +/- 0.05V	105C	1000, 1267, 1333, 1420	360 HTCE	MC7447AHXLB
HX	Industrial Tier	1.38 +/- 0.05V	75C	1000, 1250, 1420, 1600, 1700	360 HTCE	MC7447AHXPC

**Product Reliability Data Summary:**

HTOL - MC7447A Node 3 1.85V, 105C Tj							
Lot / Mask Set	25 Hours	67 Hours (5yr Commercial)	97 Hours	169 Hours	217 Hours (N-Spec 10yr Industrial)	505 Hours	1075 Hours (L-Spec 10yr Industrial)
Q71400/ Rev 1.1	0 / 178	0 / 167	0 / 167	0 / 162	0 / 156	0 / 156	0 / 149
Q71658/ Rev 1.1	0 / 136	0 / 123	0 / 123	0 / 117	0 / 105	1 / 105 (a)	0 / 90
Q71913/ Rev 1.1	0 / 229	0 / 223	0 / 211	0 / 201	0 / 201	0 / 201	0 / 185
Totals	0 / 543	0 / 513	0 / 501	0 / 480	0 / 462	0 / 462	0 / 424
Failure Comments	(a) = ABIST failure. No defect found.						

Device No./Rev.: MC7447A/B Rev. 1.1/1.1.1/1.2	Report Rev.: 6
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HTOL – MC7447B Node 4A 1.85V, 105C Tj							
Lot / Mask Set	12 Hours	24 Hours	48 Hours	70 Hours (Q-spec 5 yr commercial)			
D77443	0 / 97	0 / 96	0 / 96	0 / 96			
D77443B	0 / 39	0 / 39	0 / 39	0 / 39			
D77164	0 / 435	0 / 320	0 / 320	0 / 320			
D79944A	1 / 94 (b)	0 / 77	0 / 58	0 / 57			
D79944B	1 / 93 (c)	0 / 84 (d)	0 / 72	0 / 72			
D81493	0 / 448	0 / 448	---	---			
TOTAL		0 / 1064	0 / 585	0 / 584			
Failure Comments	(b) = ABIST failure. No defect found. (c) = LSRL (d) = Thermal overstress: unit discounted as failure						

HTOL - MC7447B Node 4B 1.85V, 105C Tj							
Lot / Mask Set	2.5 Hours	12 Hours	24 Hours	48 Hours	70 Hours (Q-spec 5 yr commercial)		
D82516A	---	0 / 153	0 / 120	0 / 130	0 / 129		
D82516B	---	0 / 144	0 / 139	0 / 138	0 / 137		
D82525A	0 / 160	0 / 158	0 / 158	0 / 155	0 / 150		
D82525B	0 / 145	0 / 143	0 / 142	0 / 138	0 / 138		
D80296A	0 / 142	0 / 113	0 / 108	0 / 107	0 / 106		
D80296B	1 / 115 (e)	0 / 100	0 / 96	0 / 83	0 / 82		
TOTAL	1 / 562	0 / 811	0 / 763	0 / 751	0 / 742		
Failure Comments	(e) = MSS scan tests at multiple capture latches. FA shows nmos gate defect.						

HTOL - MC7447B Node 4C 1.55V, 90C Tj							
Lot / Mask Set	0.5 Hours	2 Hours	4 Hours	10 Hours			
D88544	0 / 95	0 / 95	0 / 95	0 / 95			
D88953	0 / 98	0 / 98	0 / 98	0 / 98			
D89312	0 / 67	0 / 67	0 / 67	0 / 67			
TOTAL	0 / 258	0 / 258	0 / 258	0 / 258			
Failure Comments							

ESD / Latch-up					
Lot / Mask Set	Human Body Model	Machine Model	Charged Device Model	Latch-up / 200mA	
Q71400/ Rev 1.1	0 / 5 @ 2KV	0 / 5 @ 200V	0 / 5 @ 500V	0 / 3	
Q71658/ Rev 1.1	0 / 5 @ 2KV	0 / 5 @ 200V	0 / 5 @ 500V	0 / 3	
Q71913/ Rev 1.1	0 / 5 @ 2KV	0 / 5 @ 200V	0 / 5 @ 500V	0 / 3	
D74438 / "B"	0 / 5 @ 2KV	0 / 5 @ 200V	0 / 5 @ 500V	0 / 3	
Totals	0 / 20	0 / 20	0 / 20	0 / 12	
Failure Comments					

## HTCE Environmental Reliability Data

Moisture Sensitivity Level Characterization				
Lot		MSL1 @ 260degC		
WED695771000B		0/154		
WED698251000B		0/154		
WED672171000B		0/154		
(RoHS) WED827691001		0/163		
(RoHS) WED827691002		0/138		
(RoHS) WED827691003		0/161		
Totals		0/924		
Failure Comments				

Temperature Cycle / -55°C +125°C Air-to-Air, with MSL1 @ 260degC Preconditioning				
Lot	400 Cycles	800 Cycles	1000 Cycles	
WED695771000B	0 / 88	0 / 88	0 / 88	
WED698251000B	0 / 77	0 / 77	0 / 77	
WED672171000B	0 / 66	0 / 66	0 / 66	
D700731003/EYAAQF	0 / 77	0 / 77	---	
D700731004/EYAAQG	0 / 77	0 / 77	---	
D700731005/EYAAQE	0 / 77	0 / 77	---	
(RoHS) WED827691001	0 / 77	0 / 77	0 / 77	
(RoHS) WED827691002	0 / 77	0 / 77	0 / 77	
(RoHS) WED827691003	0 / 77	0 / 77	0 / 77	
Totals	0 / 693	0 / 693	0 / 462	
Failure Comments				

Thermal Shock / -55°C +125°C Liquid-to-Liquid, with MSL1 @ 260degC Preconditioning				
Lot	250 Cycles	500 Cycles	1000 Cycles	
WED695771000B	0 / 77	0 / 77	0 / 77	
WED698251000B	0 / 79	0 / 79	0 / 79	
WED672171000B	0 / 76	0 / 76	0 / 76	

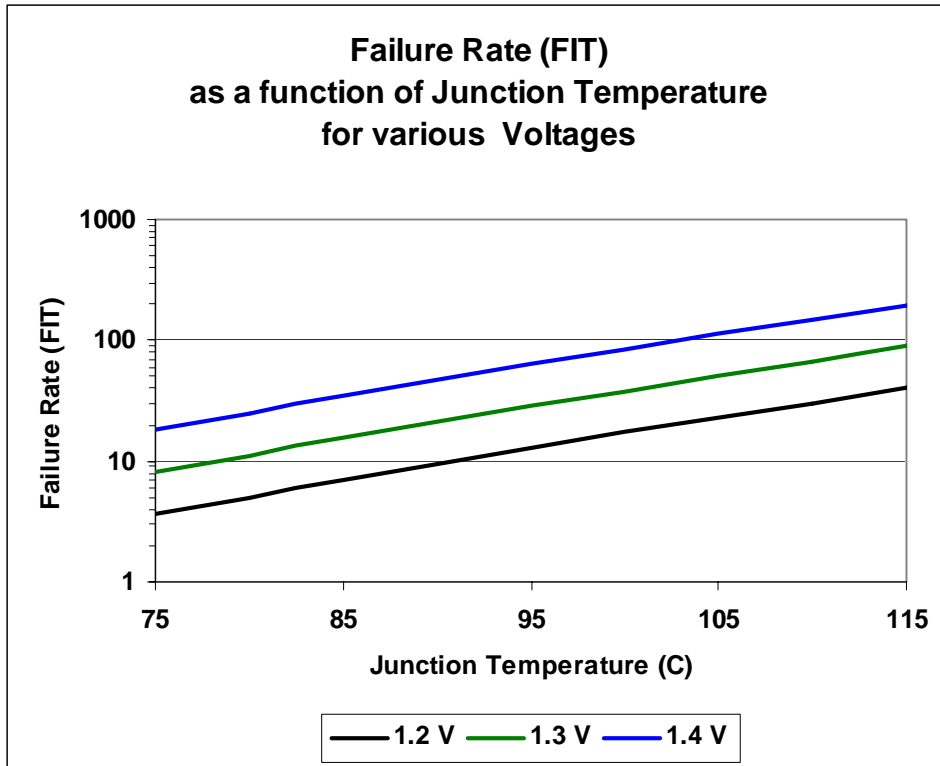
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Description: MC7447A Commercial/Industrial Tier MC7447B Node4b Commercial Tier MC7447B Node4b Commercial Tier (RoHS)		Revision date: 01April-05
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D700731003/EYAAQF	0 / 77	0 / 77	---		
D700731004/EYAAQG	0 / 77	0 / 77	---		
D700731005/EYAAQE	0 / 77	0 / 77	---		
(RoHS) WED827691001	0/77	0/77	0/77		
(RoHS) WED827691002	0/77	0/77	0/77		
(RoHS) WED827691003	0/77	0/77	0/77		
Totals	0 / 694	0 / 694	0 / 463		
Failure Comments					

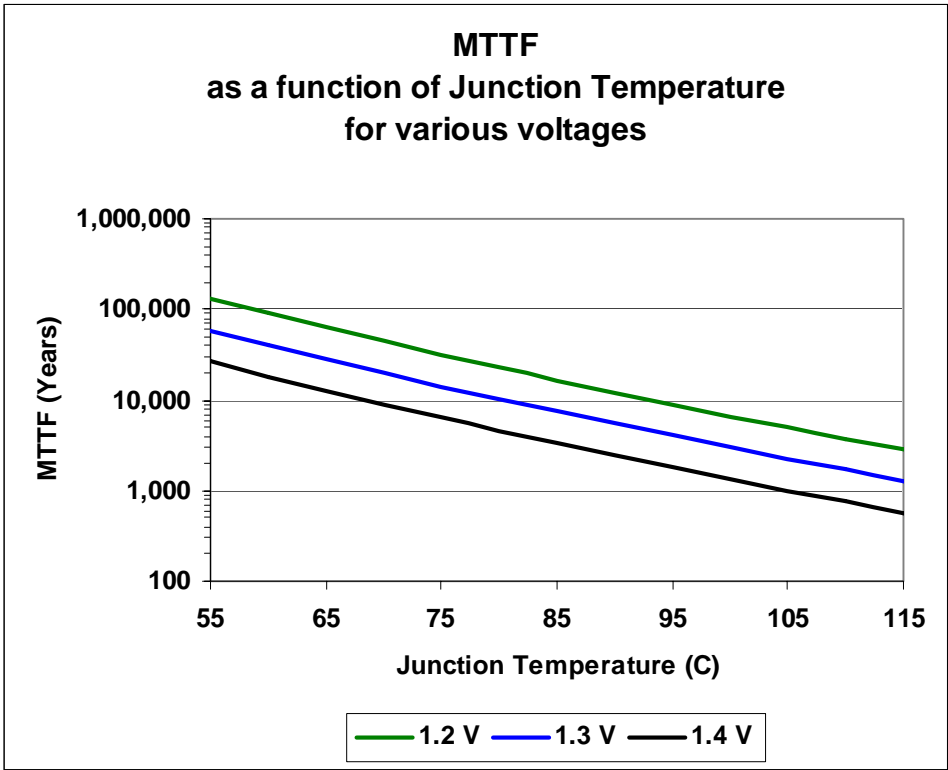
HAST / with MSL1 @ 260degC Preconditioning					
Lot	48 hrs	96 hrs	144 hrs		
WED695771000B	0 / 81	0 / 81	---		
WED698251000B	0 / 78	0 / 78	---		
WED672171000B	0 / 72	0 / 72	---		
D700731003/EYAAQF	0 / 73	0 / 73	---		
D700731004/EYAAQG	0 / 73	0 / 73	---		
D700731005/EYAAQE	0 / 73	0 / 73	---		
(RoHS) WED827691001	0/77	0/77			
(RoHS) WED827691002	0/77	0/77			
(RoHS) WED827691003	0/77	0/77			
Totals	0 / 681	0 / 681			
Failure Comments					

**MC7447A FIT Rate and MTTF Derated 60% C.L. Curves.**

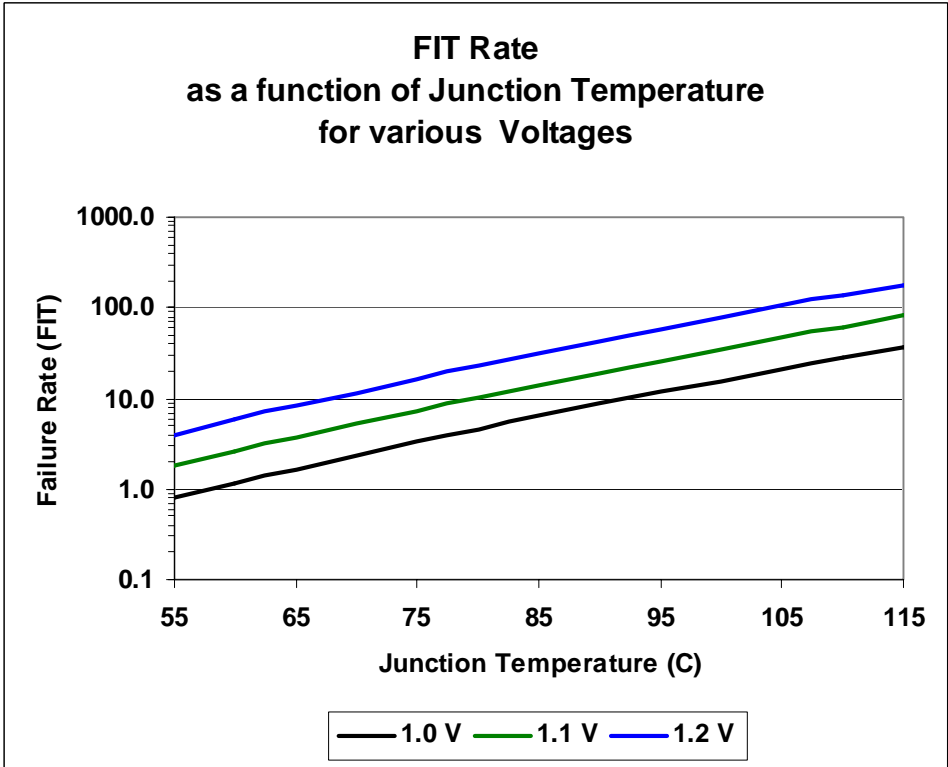
Industrial Tier L-spec: 1.3V, 105degC Tj, 10 Year Operation, eA = 0.7 eV



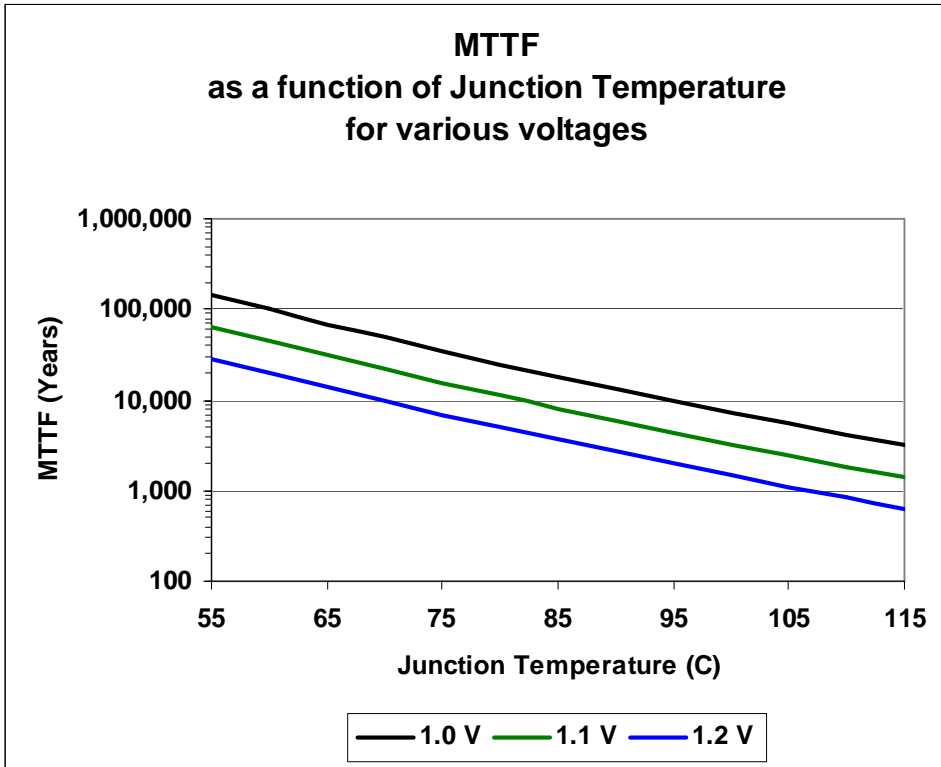
Device No./Rev.: MC7447A/B Rev. 1.1/1.1.1/1.2		Report Rev.: 6
Description: MC7447A Commercial/Industrial Tier MC7447B Node4b Commercial Tier MC7447B Node4b Commercial Tier (RoHS)		Revision date: 01April-05
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Industrial Tier N-spec: 1.1V, 105degC Tj, 10 Year Operation, eA = 0.7 eV



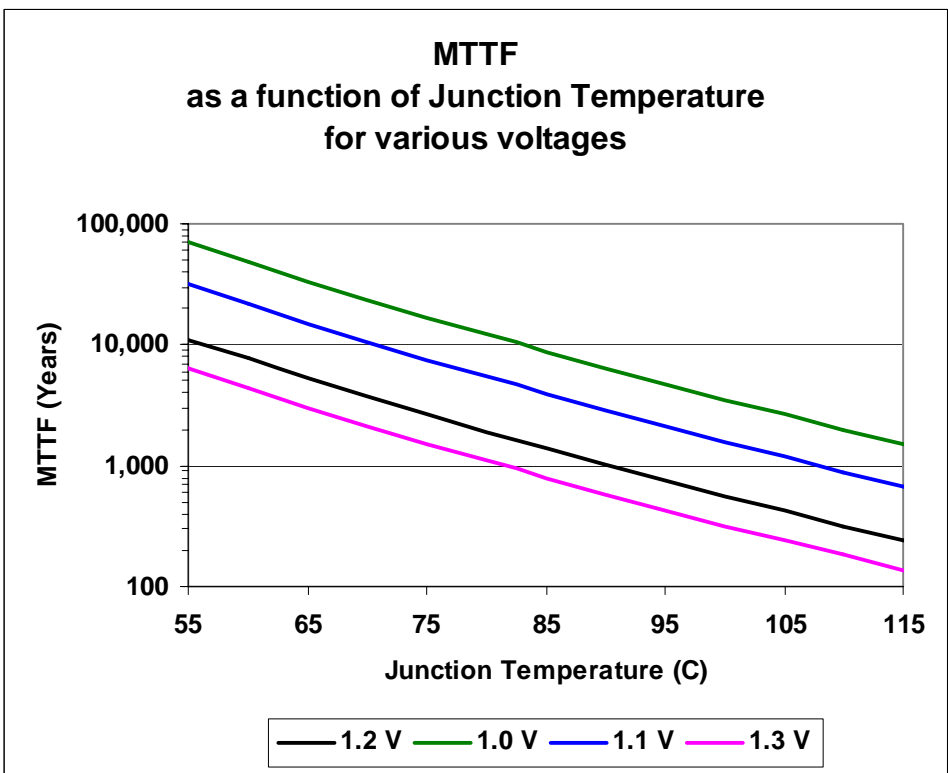
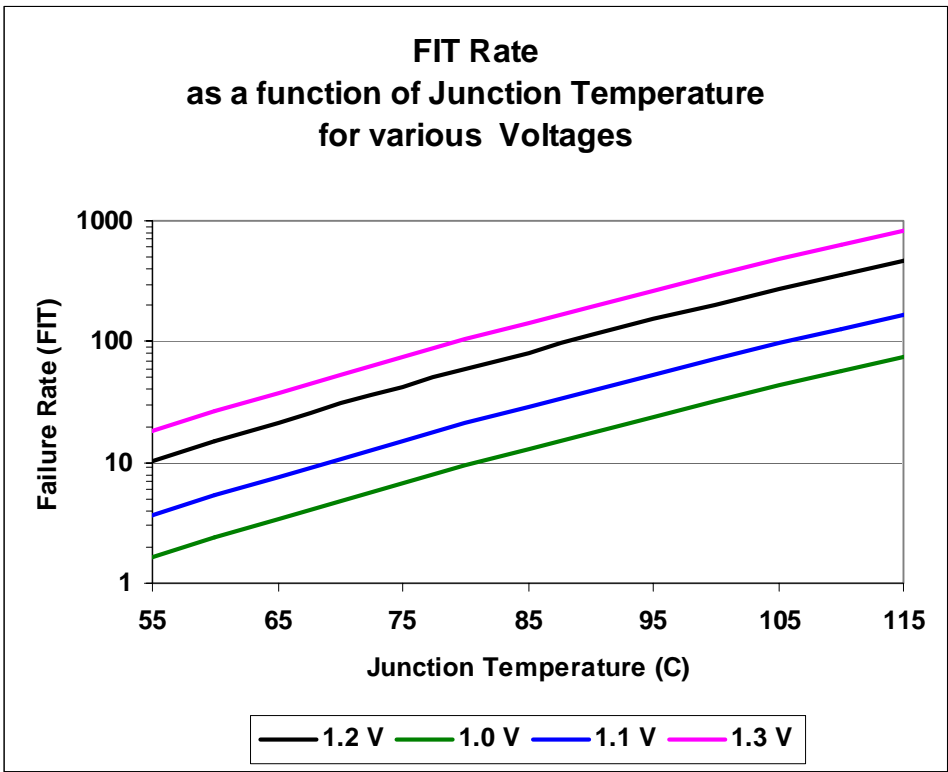
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Description: MC7447A Commercial/Industrial Tier MC7447B Node4b Commercial Tier MC7447B Node4b Commercial Tier (RoHS)	Revision date: 01April-05
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Commercial Tier: 1.28V\*, 1.25V, 1.18V, 1.15V, 85degC Tj, 5 Year Operation, eA = 0.7 eV  
 \* Denotes Voltage used in FIT Rate Calculation

Device No./Rev.: MC7447A/B Rev. 1.1/1.1.1/1.2		Report Rev.: 6
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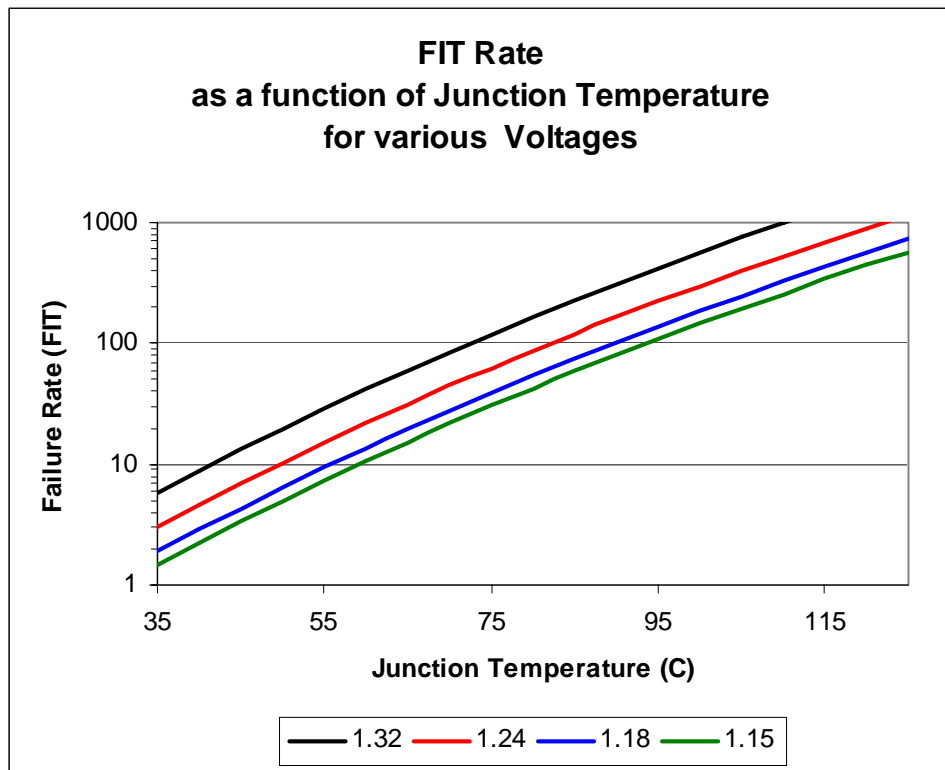




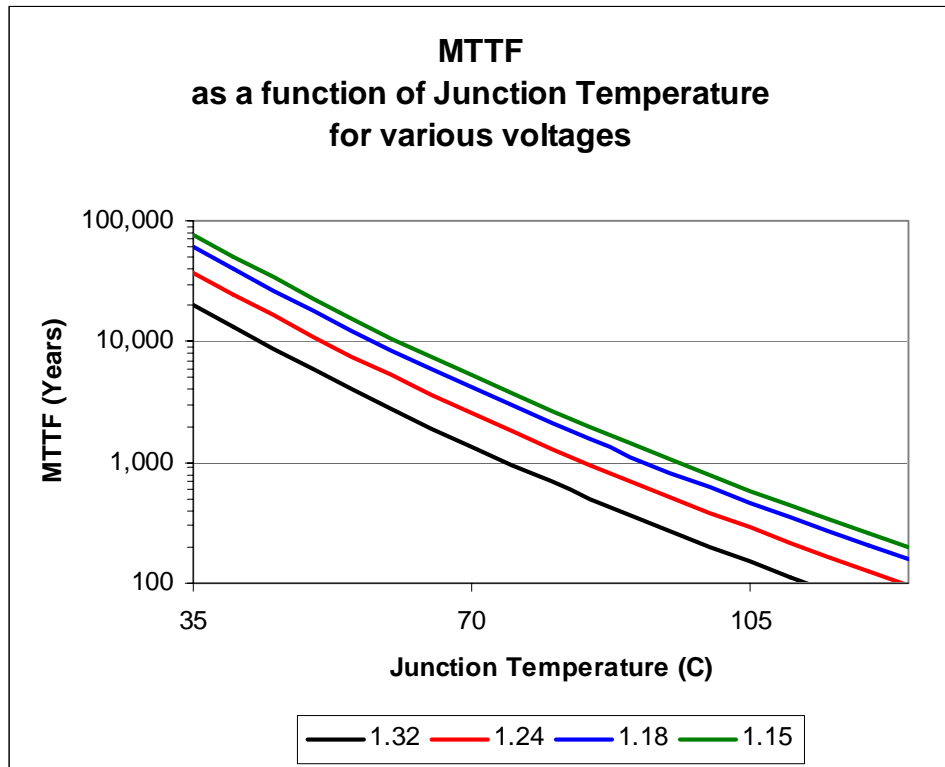
**MC7447B FIT Rate and MTTF Derated 60% C.L. Curves.**

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Description: MC7447A Commercial/Industrial Tier MC7447B Node4b Commercial Tier MC7447B Node4b Commercial Tier (RoHS)		Revision date: 01April-05
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Commercial Tier: 1.24V\*, 1.17V, 1.15V, 85degC Tj\*, 132V, 78degC Tj, 5 Year Operation,  
 eA = 0.7 eV \* Denotes Voltage and Temperature used in FIT Rate Calculation



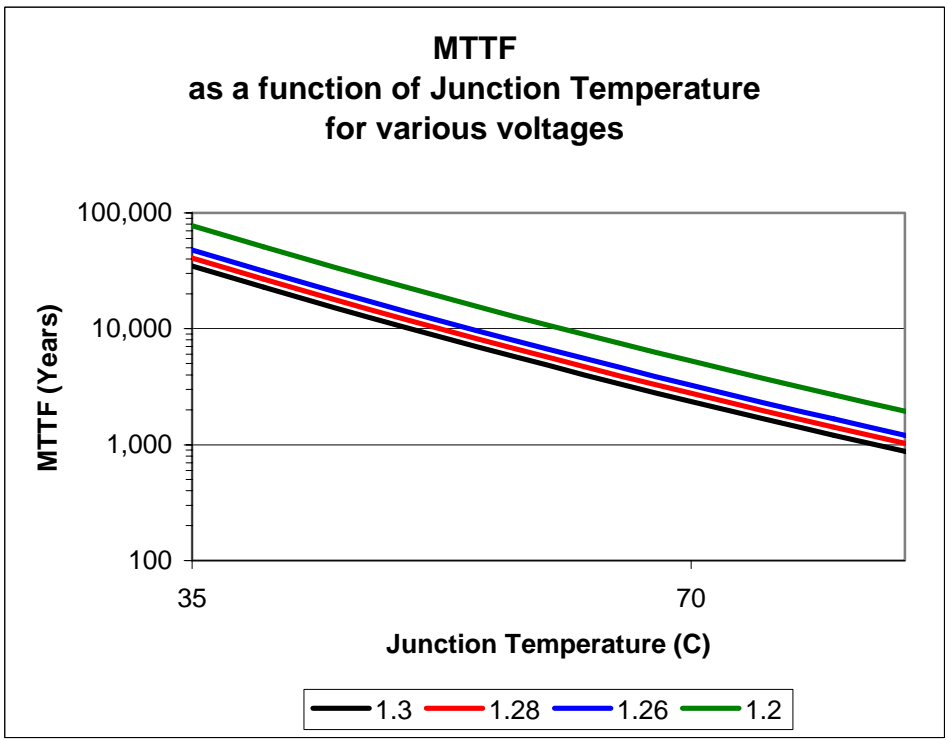
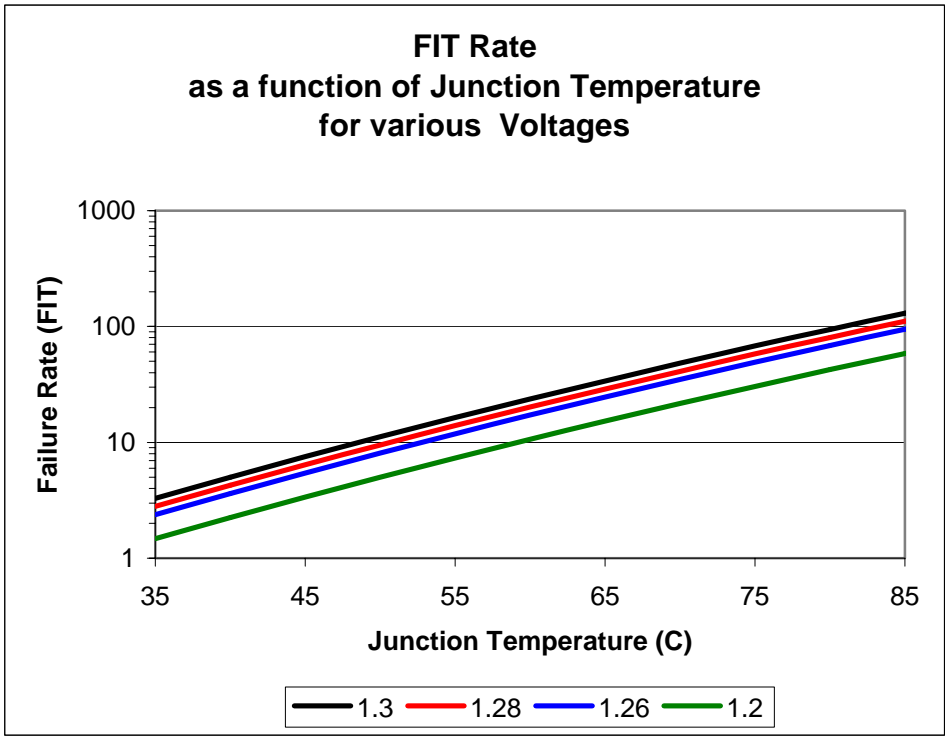
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Description: MC7447A Commercial/Industrial Tier MC7447B Node4b Commercial Tier MC7447B Node4b Commercial Tier (RoHS)	Revision date: 01April-05
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**MC7447B N4B/C FIT Rate and MTTF Derated 60% C.L. Curves.**

Commercial Tier: 1.28V\*, 1.17V, 1.15V, 85degC Tj\*, 132V, 78degC Tj, 5 Year Operation,  
eA = 0.7 eV \* Denotes Voltage and Temperature used in FIT Rate Calculation

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**Revision History:**

Device No./Rev.: MC7447A/B Rev. 1.1/1.1.1/1.2	Report Rev.: 6
Description: MC7447A Commercial/Industrial Tier MC7447B Node4b Commercial Tier MC7447B Node4b Commercial Tier (RoHS)	Revision date: 01April-05
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Revision History			
Revision	Date*	Comment	Author
0	11-March-04	Initial Release – Commercial Tier/ Industrial Qual N-spec Node3 (MC7447A)	Keith Minwell
1	02-April-04	Industrial L-Spec	Keith Minwell
2	23-August-04	Add Qual results of Alternative Bump Supplier	Keith Minwell
3	29-Sept-04	Z53 – L25S Commercial Tier Node4 (MC7447B)	Keith Minwell
4	15-Dec-04	Z55 – L25S Commercial Tier Node4B (MC7447B)	Keith Minwell
5	17-Mar-05	Updated formatting	Dean Dreier
6	01-April-05	Added Pb-free MSL1/260C data and (VS), (VU), (HX) Table	Keith Minwell

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