



MACRONIX
INTERNATIONAL Co., LTD.

Quality & Reliability Quarterly Report

Q2, 2025





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1. Quality/Reliability Monitoring Test Items and Conditions:

Test Item	Test Method	Test Conditions	Typical Sample Size (units)
Quality Validation (QV)	JESD86	DC/AC tests for full range temperature, Vcc/Vpp, refer to datasheet	All samples
Early Life Failure Rate (ELFR)	JESD22-A108 and JESD74	125°C, Vcc(max), 48 hrs	2000
Non-Volatile Memory Cycling Endurance (NVCE)	JESD47 JESD22-A117 (For Industrial Product)	Half samples at 25 °C, half samples at max operating Temperature, 1K/10K/100K Program/Erase cycles. (NAND: 10%/100% cycles of max endurance specification.) For flash products only.	77
NVM Endurance, Data Retention and Operational Life (EDR)	AEC-Q100-005 (For Automotive Product)	77units at 25 °C / 154 units at ≥85 °C to max cycling spec per note. For flash products only.	231
Nonvolatile Memory Low-Temperature Data Retention and Read Disturb (LTDDR)	JESD47 JESD22-A117 (For Industrial Product)	25 °C, Vcc(max), cycles per NVCE (≥25 °C), 168hrs/500hrs. For flash products only.	77
Low Temperature Data Retention (LTDR)	AEC-Q100-005 (For Automotive Product)	25 °C, Vcc(max), cycles per NVCE (25 °C), 168hrs/500hrs/1000hrs. For flash products only.	77
Nonvolatile Memory Post-cycling High Temperature Data Retention (PCHTDR)	JESD47 JESD22-A117 (For Industrial Product)	125°C, cycles per NVCE (≥55 °C), 10hrs/100hrs. (at 10 hours if cycles to max spec, at 100 hours if cycles ≤10% max. spec) (NAND SLC at 100 hours if cycles ≤1% max. spec). For flash products only.	77
High Temperature Data Retention (HTDR)	AEC-Q100-005 (For Automotive Product)	125°C for plastic package, cycles per NVCE (≥55 °C), 10hrs/100hrs. (If product spec define the retention lifetime fitting to >55 °C, QRE defines the bake time per datasheet definition and Ea). For flash products only.	77
High Temperature Operating Life (HTOL)	JESD22-A108 and JESD85 AEC-Q100-005 (For Automotive Product)	125°C, Vcc(max), 168hrs/500hrs/1000hrs	77 Automotive Product:77
High Temperature Storage Life (HTSL)	JESD22-A103	150°C, 168hrs/500hrs/1000hrs	77
Preconditioning (PC) SMD only	JESD22-A113 J-STD-020	Refer to OI# 5650-0901(must be done before HAST/AC/TC for SMDs)	All the SMD qual samples for package tests
Temperature Cycling (TC)	JESD22-A104 condition C	-65°C to 150°C, 200/500 cycles	77
Highly-Accelerated Temperature and Humidity Stress (HAST)	JESD22-A110	130°C, 85% RH, Vcc(max), 96hrs	77



Autoclave (AC) or Unbiased HAST (UHAST)	JESD22-A102 JESD22-A118	121°C /100%RH, 96 hrs or 130°C / 85%RH, 96 hrs	77
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2. Flash Quarterly Reliability Monitor Results:

2-1. Quality Validation & Early Life Failure Rate:

Tech.	EPN Code	QV		ELFR	
		SS	Reject	SS	Reject
150 nm	MX29LV400C	2000	0	*1	*1
130 nm	MX29LV160D	2000	0	2000	0
110 nm	MX25L6445E	2000	0	2000	0
	MX25L3206E	2000	0	*1	*1
	MX25U1635E	*1	*1	*1	*1
	MX25L6445E	600	0	*2	*2
	MX25L3235E	600	0	*2	*2
	MX25U3235E	600	0	*2	*2
75 nm	MX25L12833F	2000	0	2000	0
	MX25L12835F	2000	0	2000	0
	MX25R8035F	*1	*1	*1	*1
	MX25U12832F	*1	*1	*1	*1
	MX25S6433F	*1	*1	*1	*1
	MX25L12833F	*1	*1	*2	*2
	MX25L3233F	600	0	*2	*2
	MX25V1635F	600	0	*2	*2
55 nm	MX25U12832F	600	0	*2	*2
	MX25L25645G	2000	0	*1	*1
	MX25U51245G	2000	0	*1	*1
	MX25L25645G	600	0	*2	*2
45 nm	MX25U51245G	600	0	*2	*2
	MX25L51245J	4000	*10	*1	*1
36 nm	MX30LF1G18AC	*1	*1	*1	*1
	MX30LF4G18AC	600	0	*2	*2
19 nm	MX30LMBGX8AA	2000	0	*1	*1
	MX30LF2G28AD	2000	0	2000	0
	MX30UF4G28AD	*1	*1	*1	*1

*1: Means the test is “on going”. The results will be updated next quarter.

*2 : No ELFR test, the samples are only used for QV and NVCE test.



2-2. Non-Volatile Memory Cycling Endurance:

Tech.	EPN Code	NVCE@25°C		NVCE@85°C	
		SS	Reject	SS	Reject
150 nm	MX29LV400C	*1	*1	77	0
130 nm	MX29LV160D	38	0	39	0
110 nm	MX25L6445E	38	0	39	0
	MX25L3206E	38	0	39	0
	MX25U1635E	*1	*1	*1	*1
75 nm	MX25L12833F	38	0	39	0
	MX25L12835F	38	0	39	0
	MX25R8035F	*1	*1	*1	*1
	MX25U12832F	*1	*1	39	0
	MX25S6433F	*1	*1	*1	*1
55 nm	MX25L25645G	38	0	39	0
	MX25U51245G	*1	*1	*1	*1
45 nm	MX25L51245J	38	0	*1	*1
36 nm	MX30LF1G18AC	*1	*1	*1	*1
19 nm	MX30LMBGX8AA	*1	*1	39	0
	MX30LF2G28AD	38	0	39	0
	MX30UF4G28AD	*1	*1	*1	*1

*1: Means the test is “on going”. The results will be updated next quarter.

2-3. Data Retention:

Tech.	EPN Code	LTDDR@25°C 500hrs		PCHTDR@125°C 100hrs	
		SS	Reject	SS	Reject
130 nm	MX29LV160D	38	0	39	0
110 nm	MX25L6445E	38	0	39	0
	MX25L3206E	38	0	39	0
	MX25U1635E	*1	*1	*1	*1
75 nm	MX25L12833F	*1	*1	39	0
	MX25L12835F	*1	*1	39	0
	MX25R8035F	*1	*1	*1	*1
	MX25U12832F	*1	*1	*1	*1
	MX25S6433F	*1	*1	*1	*1
55 nm	MX25L25645G	*1	*1	*1	*1
	MX25U51245G	*1	*1	*1	*1
45 nm	MX25L51245J	*1	*1	*1	*1
36 nm	MX30LF1G18AC	*1	*1	*1	*1
19 nm	MX30LMBGX8AA	*1	*1	39	0
	MX30LF2G28AD	38	0	39	0
	MX30UF4G28AD	*1	*1	*1	*1

*1: Means the test is “on going”. The results will be updated next quarter.



2-4. Non-Volatile Memory Program/ Erase Endurance, Data Retention and Operation Life (For Automotive Product)

a. High Temperature

Tech.	EPN Code	EDR@125°C		HTDR@150°C 500hrs		HTOL@125°C 1000hrs	
		SS	Reject	SS	Reject	SS	Reject
110 nm	MX25L6445E	154	0	77	0	*1	*1
	MX25L3235E	154	0	77	0	77	0
75 nm	MX25L12833F	154	0	*1	*1	*1	*1
	MX25L3233F	154	0	*1	*1	*1	*1
	MX25V1635F	154	0	77	0	*1	*1
	MX25U12832F	*1	*1	*1	*1	*1	*1
55 nm	MX25L25645G	*1	*1	*1	*1	*1	*1
	MX25U51245G	154	0	77	0	*1	*1

Tech.	EPN Code	EDR @105°C		HTDR@150°C 500hrs		HTOL@125°C 1000hrs	
		SS	Reject	SS	Reject	SS	Reject
110 nm	MX25U3235E	154	0	*1	*1	*1	*1

Tech.	EPN Code	EDR@105°C		HTDR@150°C 100hrs		HTOL@125°C 1000hrs	
		SS	Reject	SS	Reject	SS	Reject
36 nm	MX30LF4G18AC	154	0	*1	*1	*1	*1

*1: Means the test is “on going”. The results will be updated next quarter.

b. Low Temperature

Tech.	EPN Code	EDR@25°C		LTDR@25°C 1000hrs	
		SS	Reject	SS	Reject
110 nm	MX25L6445E	77	0	*1	*1
	MX25L3235E	77	0	77	0
	MX25U3235E	77	0	*1	*1
75 nm	MX25L12833F	*1	*1	*1	*1
	MX25L3233F	77	0	*1	*1
	MX25V1635F	77	0	*1	*1
	MX25U12832F	*1	*1	*1	*1
55 nm	MX25L25645G	*1	*1	*1	*1
	MX25U51245G	77	0	*1	*1
36 nm	MX30LF4G18AC	77	0	*1	*1

*1: Means the test is “on going”. The results will be updated next quarter.



2-5. High Temperature Operating Life and High Temperature Storage Life:

Tech.	EPN Code	HTOL 1000hrs		HTSL 1000hrs	
		SS	Reject	SS	Reject
150 nm	MX29LV400C	*1	*1	*1	*1
130 nm	MX29LV160D	77	0	77	0
110 nm	MX25L6445E	77	0	77	0
	MX25L3206E	77	0	77	0
	MX25U1635E	*1	*1	*1	*1
75 nm	MX25L12833F	77	0	77	0
	MX25L12835F	77	0	77	0
	MX25R8035F	*1	*1	*1	*1
	MX25U12832F	*1	*1	77	0
	MX25S6433F	*1	*1	*1	*1
55 nm	MX25L25645G	*1	*1	*1	*1
	MX25U51245G	*1	*1	*1	*1
45 nm	MX25L51245J	*1	*1	*1	*1
36 nm	MX30LF1G18AC	*1	*1	*1	*1
19 nm	MX30LMBGX8AA	*1	*1	*1	*1
	MX30LF2G28AD	77	0	77	0
	MX30UF4G28AD	*1	*1	*1	*1

*1: Means the test is “on going”. The results will be updated next quarter.

2-6. Pre-Condition / Autoclave / Temperature Cycling / Highly Accelerated Temperature and Humidity Stress:

Tech.	EPN Code	PC		TC 500cycles		AC 96hrs		HAST 96hrs	
		SS	Reject	SS	Reject	SS	Reject	SS	Reject
150 nm	MX29LV400C	231	0	77	0	77	0	*1	*1
130 nm	MX29LV160D	231	0	77	0	77	0	77	0
110 nm	MX25L6445E	231	0	77	0	77	0	77	0
	MX25L3206E	231	0	77	0	77	0	77	0
	MX25U1635E	*1	*1	*1	*1	*1	*1	*1	*1
75 nm	MX25L12833F	231	0	77	0	77	0	77	0
	MX25L12835F	231	0	77	0	77	0	77	0
	MX25R8035F	*1	*1	*1	*1	*1	*1	*1	*1
	MX25U12832F	231	0	77	0	77	0	77	0
	MX25S6433F	*1	*1	*1	*1	*1	*1	*1	*1



55 nm	MX25L25645G	231	0	77	0	77	0	77	0
	MX25U51245G	231	0	*1	*1	*1	*1	*1	*1
45 nm	MX25L51245J	462	0	154	0	154	0	154	0
36 nm	MX30LF1G18AC	*1	*1	*1	*1	*1	*1	*1	*1
19 nm	MX30LMBGX8AA	231	0	*1	*1	*1	*1	*1	*1
	MX30LF2G28AD	231	0	77	0	77	0	77	0
	MX30UF4G28AD	*1	*1	*1	*1	*1	*1	*1	*1

*1: Means the test is “on going”. The results will be updated next quarter.