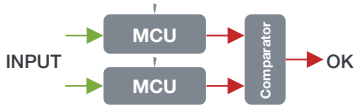
Ultra-Reliable MCUs

Why Ultra-Reliable Processors Matter

Freescale's portfolio of ultra-reliable processors is the broadest in the industry and is ideal for challenging environments found in industrial, infrastructure, automation, communications, transportation and medical applications. It offers best-in-class quality, reliability and safety for applications that need to perform in the harshest environments.

Why Safety Matters

- Eliminate risks due to hazards caused by malfunctioning of electronic systems
- Avoid random failures, main impairment to safety

Single Point Failure Immediate potential for hazard	**Latent Failure** Danger with second fault	**Common Cause Failure** Annul redundancy-based measures
		
Freescale Solution • Structure redundancy [Core, DMA] • Information redundancy [E2E, ECC, EDC]	**Freescale Solution** • Hardware self test [memory, logic] • 90% stuck-at-fault	**Freescale Solution** • Delayed checker core • Clock, temp, power monitor • Independent safety clock

What Makes an MCU Ultra-Reliable?

Features	Ultra-Reliable	Consumer	Traditional Industrial	Reliable
Dielectric Lifetime (TDDB)	• < 1ppm • Auto-specific model • Voltage limit checking	• < 1000 ppm • Standard model • Subset voltage limit checking	• < 1000 ppm • Industrial model / standard model • Subset voltage limit checking	• < 10 ppm • Auto-specific model • Voltage limit checking
Transistor Aging (HCI, BTI)	• Circuit use-profile • Custom-aged model	• Limited margining	• Limited margining	• Circuit use-profile • Custom-aged model
Metalization Reliability (Electromigration)	• < 1 ppm • Current mode/ profile specific	• < 1000 ppm • Current mode/ profile specific	• < 1000 ppm • Current mode/ profile specific	• < 10 ppm • Current mode/ profile specific
Metalization Reliability (Stress Migration)	• Zero failure in stress • Geometry specific design rules	• Zero failure in stress • Geometry specific design rules	• Zero failure in stress • Geometry specific design rules	• Zero failure in stress • Geometry specific design rules
Metalization Dielectric Lifetime (TDDB)	• < 1 ppm • Auto-specific model • Geometry / use condition design rules	• < 1000 ppm • Standard model • Subset voltage limit checking	• < 1000 ppm • Industrial model /standard model • Subset voltage limit checking	• < 10 ppm • Auto-specific model • Geometry / use condition design rules
Radiation Immunity (SER / SEL)	• SER: < 1 FIT • SEL: < 0.1 FIT	• SER: < 100000 FIT • SEL: < 1000 FIT	• SER: < 1000 FIT • SEL: < 10 FIT	• SER: < 1000 FIT • SEL: < 10 FIT

For more information, visit freescale.com/UltraReliableMCUs