

CX8576Q

Product Quality Analysis Report

AEC-Q100 Grade 2 Automotive Qualification

Rrport No. QR22120001

1 、 Introduction:

- 1.0 The AEC-Q100 eligibility test was performed on CX8576Q;
- 1.1 Product testing is designed to conform to the AEC-Q100 Rev.H standard.
- 1.2 Applicable ambient operating temperature grade:Grade2(-40C to 105C).
- 1.3 The products are founded at Nuvoton Technology Corp.
- 1.4 The products are assembled at Hua Tian Technology(Xi'an)Co.,Ltd

2 、 Product Description

- 2.1 CX8576Q is a step-down DC-DC converter with input voltage of 40V and accurate constant voltage and two-way constant current.
- 2.2 CX8576Q built-in 15mQ high-side NMOS and 12mQ low-side NMOS, 4.8A continuous output current output voltage adjustable, up to 95% duty cycle support.
- 2.3 CX8576Q does not need external compensation to make the chip has good lin voltage adjustment rate and load adjustment rate, and the peripheral design is flexible.
- 2.4 CX8576Q is a simple application, excellent performance, stable and reliable constant voltage and constant current step-down DC-DC converter chip.

Product characteristics

The input voltage can reach 4.75V-40V;

Built-in 15mQ High-side NMOS;

Built-in 12mQ Low-side NMOS;

Support 4.8 a continuous output current; Can support 95% duty cycle

Output voltage and current can be set (3.0V-20V); Constant current accuracy $\pm 8\%$;

Constant voltage accuracy $\pm 2\%$ (VFB=1.0V);

Cable compensation voltage drop

Short Circuit Protection (SCP), overheat protection (OTP), over voltage protection (OVP) .

Built-in SW periodic detection mode to avoid RSENT current limiting resistance short circuit damage products.

QFN20L-5 \times 5 package

Application:

Car Charger;

Lighting;

Power Supply For Portable Equipment;

3、 Testing Information:

3.1 Table 1 below shows the carried out qualification tests that are on the AEC-Q100 Rev.H Automotive Qualification Standard;

Test Item	ABV	Reference standard	Conditions/Requirement	Sample size	Results
Accelerated environmental stress testing					
preconditioning	PC	JEDEC J-STD-020 JESD22-A113	MSL 3 soak condition (30C,60%RH,192 hours), three cycles of reflow at 260C	3lots* 308ea	0fail
Temperature Humidity-Bias	THB	JEDEC JESD222-A101/ A110	85C,85%RH, 1000 hours with bias	3lots* 77ea	0fail
Temperature	AC	JEDEC	121C,15 psig, 96		

Humidity		JESD222-A102/ A118 / A101	hours	3lots* 77ea	0fail
Temperature Cycling	TC	JEDEC JESD222-A104	-65C to 150C for 1000 cycles	3lots* 77ea	0fail
High Temperature Storage Life	HTSL	JEDEC JESD222-A103	150C for 1000 hours	1lotsx45ea	0fail

Accelerated Life Test

High Temperature Operating Life	HTOL	JEDC JESD222-A108	105C Ta with maximum VCC for 1000 hours	3lots*77ea	0fail
Early Life Failure Rate	ELFR	AEC-Q100-008	105C Ta with maximum VCC for 48hours	3 lots *800ea	0fail

Package Assembly Integration Test

Wire bond Shear	WBS	AEC-Q100-001 AEC Q003	CPK>1.67	30 bonds from 5 devices	Pass
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Wire Bond Pull	WBP	MIL-STD883 Method 2011 AEC Q003	0fail	30 bonds from 5 devices	Pass
Solderability	SD	JEDEC JESD22-B102	> 95% lead coverage	1 lot *15ea	Pass
Physical Dimensions	PD	JEDEC JESD22-B100 And B108 AEC Q003	CPK>1.67	3 lot *10ea	Pass

Verification test of electrical characteristics					
Electrostatic Discharge Human Body Mode	HBM	AEC Q100-002	HBM>2000V	1lot	Pass
Electrostatic Discharge Charged Device	CDM	AEC Q100-011	750V Corner Pins, 500V other Pins	1lot	Pass

Mode					
Latch-Up	LU	AEC Q100-004	+/-150mA	1lot	Pass

3.2 Table 2as following summarizes the testing result of performing qualification tests according to AEC-Q100 Rev. H Automotive Qualification Standard.

Test Item	ABV	AXSSH2231	AXSSH2239	AXSSH2241	Results
Accelerated environmental stress testing					
preconditioning	PC	0 fail/308ea	0 fail/308ea	0 fail/308ea	pass
Temperature Humidity-Bias	THB	0 fail / 77ea	0 fail / 77ea	0 fail / 77ea	pass
Temperature Humidity	AC	0 fail / 77ea	0 fail / 77ea	0 fail / 77ea	pass
Temperature Cycling	TC	0 fail / 77ea	0 fail / 77ea	0 fail / 77ea	pass
High Temperature Storage Life	HTSL	0 fail / 77ea	0 fail / 77ea	0 fail / 77ea	pass
Accelerated Life Test					

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High Temperature Operating Life	HTOL	0 fail / 77ea	0 fail / 77ea	0 fail / 77ea	pass
Early Life Failure Rate	ELFR	0 fail / 800ea	0 fail / 800ea	0fail/800ea	pass
Package Assembly Integration Test					
Wire bond Shear	WBS	/	/	CPK=2.03	pass
Wire Bond Pull	WBP	/	/	0fail/30bonds	Pass
Solderability	SD	/	/	15ea	Pass
Physical Dimensions	PD	10ea	10ea	10ea	CPK>1.67
Verification test of electrical characteristics					

Electrostatic Discharge Human Body Mode	HBM	/	/	passed2000V	Pass
Electrostatic Discharge Charged Device Mode	CDM	/	/	750V Corner Pins, 500V other Pins	Pass
Latch-Up	LU	/	+/-150mA	/	Pass

4、Conclusions:

Based on the successful completion of product qualification, the CS8576Q meets the requirement of AEC-Q100 Rev.H and now are AECQ-100 Grade 2 qualified product.

Accessories 1 : test description

test name	description	purpose
Die Oriented		
HTOL High temperature operating life	The device is stressed in static or dynamic configuration ,approaching the operative max. absolute ratingsin terms of junction temperature and bias condition	To determine the effects of bias conditions and temperature on solid sate devices over time . It simulates the devices' operating condition in an accelerated way. The typical failure modes are related to , silicon degradation, wire-bonds degradation, oxide faults
HTSL High temperature storage life	The device is stored in unbiased condition at the max. temperature allowed by the package materials , sometimes higher than the max . operative temperature.	To investigate the failure mechanisms activated by high temperature , typically wire-bonds solder joint ageing,data retention faults , metal stresss-voiding
Package Oriented		
PC Preconditioning	The device is submitted to typical temperature profile for surface mounting device , after a controlled moisture absorption	As stand-alone test: to investigate the moisture sensitivity level. As preconditioning before other reliability tests : to verify that the surface mounting stress does mot impact on the subsequent reliability performance. The typical failure modes are “pop corn” effect and delamination.
AC Auto clave (Pressure pot)	The device is stored in saturated steam, at fixe and controlled conditions of pressure and temperature.	To investigate corrosion phenomena affecting die or package materials, related to chemical contamination and package hermeticity
TC Temperature cycling	The device is submitted to cycled temperature excursions, between a hot and a cold chamber in air atmosphere.	To investigate failuremodes related to the thermo-mechanical stress induced by the different thermal expansion of the materials interacting in the die-package system . Typical failure modes are linked to metal displacement, dielectric cracking , molding compound delamination , wire-bonds failure , die-attach layer degradation.
THB Temperature Humidity bias	The device is biased in static configuration minimizing its internal power dissipation , and stored at controlled conditions of ambient temperature and relative humidity.	To evaluate the package moisture resistance with electrical field applied, both electrolytic and galvanic corrosion are put in evidence.

Accessories 2 : Classification Reflow Profile

Package thickness	V mm ₃ < 350	V mm ₃ : 350~2 000	V mm ₃ ≥20 00
<1.6mm	260+0°C	260+0°C	260+0°C
1.6mm~2.5mm	260+0°C	250+0°C	245+0°C
≥2.5mm	250+0°C	245+0°C	245+0°C