

## Test Report

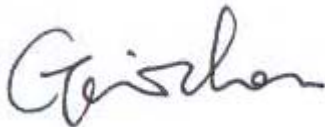
Report No.: GNBZ200325166EN

Date: 2020-04-14

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Applicant : YUEQING DAIER ELECTRON CO., LTD  
Address : No.1636 Liuhuang Road, Xirendang Industrial Zone, Liushi Town, Yueqing City, Zhejiang Province, China  
Sample Name : PUSH BUTTON SWITCH  
Tested Model : GQ-8H-10EL  
Model/Type reference : GQ-8H-10EM, GQ-8B, GQ-10H-10, GQ12F-10, GQ16F1-10, GQ19F1-10, LAS3-19, LAS3-22, LAS3-25, GQ40  
Exported to : Europe  
Sample Receiving date : 2020-03-25  
Test period : 2020-03-25 – 2020-04-10  
Test Requirement : The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, RoHS Directive 2011/65/EU and its amendment Directive (EU) 2015/863.  
Test Method : Please refer to next page(s).  
Test result : Please refer to next page(s).  
Conclusion : Based on the verification results of the submitted sample(s), the results of Lead(Pb), Cadmium(Cd), Mercury(Hg), Hexavalent Chromium(CrVI), Polybrominated biphenyls(PBBs), Polybrominated diphenyl ethers(PBDEs), Dibutyl phthalate(DBP), Butyl benzyl phthalate(BBP), Di-2-ethylhexyl phthalate(DEHP) and Di-iso-butyl phthalate(DIBP) content comply with the requirements as set by RoHS Directive 2011/65/EU and its amendment Directive (EU) 2015/863.  
Note : The test results are related only to the tested items.

Authorized signature



Lab Manager: Gavin Zhou



2020-04-14

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**A. Pb, Cd, Cr(VI), Hg, PBBs&PBDEs****Test Method:**

1. Disassembly, disjointment and mechanical sample preparation
  - Ref. to IEC 62321-2:2013, Disassembly, disjointment and mechanical sample preparation.
2. With reference to IEC 62321-1:2013, tests were performed for the samples indicated by the photos in this report.
  - (1) Screening – Lead, mercury, cadmium, total chromium and total bromine
    - Ref. to IEC 62321-3-1:2013, Screening for Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry.
  - (2) Wet chemical test method
    - a. Total Lead, Cadmium, Chromium and Mercury content
      - Ref. to IEC 62321-4:2013+A1:2017, determination of Mercury in polymers, metals and electronics by ICP-OES.
      - Ref. to IEC 62321-5:2013, determination of Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by ICP-OES.
    - b. Chromium (VI) content
      - For Colourless and coloured corrosion-protected coatings on metals, Ref. to IEC 62321-7-1:2015, determination of presence of hexavalent chromium (Cr(VI)) in colourless and coloured corrosion-protected coatings on metals by the colorimetric method.
      - For polymers and electronics, Ref. to IEC 62321-7-2:2017, determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method.
    - c. PBBs, PBDEs
      - Ref. to IEC 62321-6:2015, determination of polybrominated biphenyls and polybrominated diphenyl ethers in polymers by gas chromatography -mass spectrometry (GC-MS).

**Test result(s):**

Part No.	Part Description	Results of EDXRF					Chemical confirmation results (mg/kg)	Conclusion
		Pb	Cd	Hg	Cr	Br		
1	Gold metal (terminal)	BL	BL	BL	BL	---	---	Pass
2	Blue plastic support	BL	BL	BL	BL	IN	PBBs: N.D. PBDEs: N.D.	Pass
3 <sup>*1</sup>	Silvery metal shell	OL	BL	BL	BL	---	Pb: 22772 <sup>(^4)</sup> Cd: 23	Pass
4	White plastic	BL	BL	BL	BL	BL	---	Pass
5	Transparent plastic	BL	BL	BL	BL	BL	---	Pass
6	Silvery metal	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
7	Gold metal	OL	BL	BL	BL	---	Pb: 28310 <sup>(^4)</sup> Cd: 17	Pass
8	Metal (spring)	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
9	Transparent plastic	BL	BL	BL	BL	BL	---	Pass
10	Copper metal	BL	BL	BL	BL	---	---	Pass
11	Silvery metal	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
12	Transparent silica gel	BL	BL	BL	BL	BL	---	Pass

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**Remark:**

(^1) “---” = Not Applicable;

(^2) (a) It is the result on total Br while test item on restricted substances is PBBs/PBDEs. It is the result on total Cr while test item on restricted substances is Cr(VI).

(b) The XRF screening test for RoHS elements-The reading may be different to the actual content in the sample be of non-uniformity composition.

(c) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP-OES (for Pb, Cd, Hg), UV-VIS (for Cr(VI)) and GC/MSD (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1: 2013.

Attached table 1, XRF screening limits in mg/kg for regulated elements in various matrices:

Element	Polymer Materials	Metallic Materials	Electronics
Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$LOD < X < (250+3\sigma) \leq OL$
Pb	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Hg	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
Br	$BL \leq (300-3\sigma) < X$	N.A.	$BL \leq (250-3\sigma) < X$
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$

Note: ① BL “below limit” = the result less than the limit.

② OL “over limit” = the result greater than the limit.

③ IN = inconclusive, the region where need further chemical testing by ICP-OES (for Pb, Cd, Hg), UV-VIS (for Cr(VI)) and GC/MSD (for PBBs, PBDEs).

 ④  $3\sigma$  = Repeability of the analyser at the action level.

⑤ LOD = Limit of detection.

(^3) (a) mg/kg = ppm = 0.0001%;

(b) N.D. = Not detected (lower than RL);

(c) Reporting Limit (RL) and Limit of Directive 2011/65/EU.

Parameter	Unit	Limit	Reporting Limit (RL)
Lead (Pb)	mg/kg	1000	10
Cadmium (Cd)	mg/kg	100	10
Mercury (Hg)	mg/kg	1000	10
Chromium VI (Cr VI)	mg/kg	1000	R1
Group PBBs	mg/kg	1000	R2
Group PBDEs	mg/kg	1000	R2

 R1: Cr(VI) for metal sample, the reporting limit (RL) = Method Detection Limit (MDL) =  $0.10 \mu\text{g}/\text{cm}^2$ .

The reporting limit (RL) of Cr(VI) for polymers and electronics is 10mg/kg.

R2: The reporting limit (RL) for single compound of PBBs &amp; PBDEs is 50mg/kg.

(d) According to IEC 62321-7-1:2015, result on Cr(VI) for metal sample is shown as Negative, Inconclusive or Positive: Negative = Absence of Cr(VI), Inconclusive = Maybe exist Cr(VI), Positive = Presence of Cr(VI).

Colorimetric result (Cr(VI) concentration)	Qualitative result
The sample solution is < the 0.10 ug/cm <sup>2</sup> equivalent comparison standard solution	The sample is negative for Cr(VI)-The Cr(VI) concentration is below the limit of quantification. The coating is considered a non-Cr(VI) based coating.
The sample solution is ≥ the 0.10 ug/cm <sup>2</sup> and ≤ the 0.13 ug/cm <sup>2</sup> equivalent comparison standard solutions	The result is considered to be inconclusive – Unavoidable coating variations may influence the determination. Recommendation: if addition samples are available, perform a total of 3 trials to increase sampling surface area. Use the averaged result of the 3 trials for the final determination.
The sample solution is > the 0.13 ug/cm <sup>2</sup> equivalent comparison standard solution	The sample is positive for Cr(VI)-The Cr(VI) concentration is above the limit of quantification and the statistical margin of error. The sample coating is considered to contain Cr(VI).

(^4) Lead (Pb) was exempted by RoHS Directive 2011/65/EU based on Annex III/6(c): Copper alloy containing up to 4% lead by weight.

(\*1) The samples were resubmitted on Apr.10, 2020.

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**B. Phthalates—DBP, BBP, DEHP & DIBP****Test Method:** Ref. to IEC 62321-8: 2017

Determination of Phthalates in polymers by Gas Chromatography-Mass Spectrometry (GC-MS)

**Test result:**

Test item	DBP	BBP	DEHP	DIBP
Maximum Permissible Limit (mg/kg)	1000	1000	1000	1000

Part No.	Test item (mg/kg)				Conclusion
	DBP	BBP	DEHP	DIBP	
2+4	N.D.	N.D.	N.D.	N.D.	Pass
5+9	N.D.	N.D.	N.D.	N.D.	Pass
12	N.D.	N.D.	N.D.	N.D.	Pass

Remark: 1. Reporting Limit (RL) for DBP, BBP, DEHP, DIBP = 50mg/kg.  
2. N.D. = Not Detected (<RL).

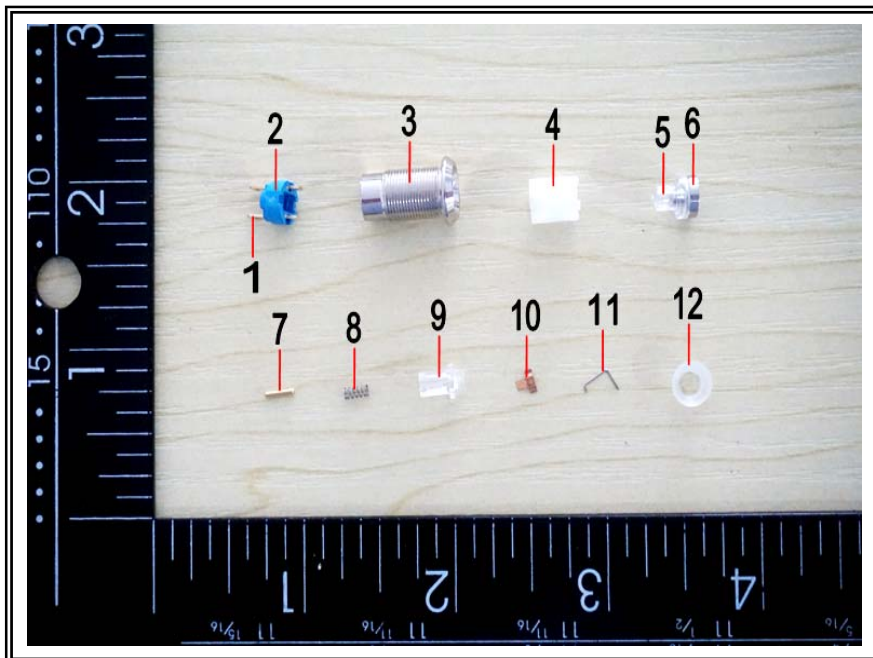
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Sample photo(s):



Test item: PUSH BUTTON SWITCH

Tested Model No.: GQ-8H-10EL



GIG authenticate the photo(s) on original report only

**\*\*\*End of Report\*\*\***

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