

# Test Report

No. ES150202012CE

BOARDCON TECHNOLOGY LIMITED  
ROOM702, XINAN BUSINESS BUILDING, 45ZONE, BAOAN DISTRICT

(The Submitted Sample Said To Be)

Sample Name : MINI2416-III Computer on Module

Item/Style No. : COM

Country of Origin : CHINA

Sample Received Date : February 02, 2015

Testing Completed Date : February 09, 2015

Test Requested : As requested by client, to evaluate the compliance of the submitted sample with the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Test Method : 1. Review was performed for the sample and the related Bill of Material submitted by the Applicant.  
2. To refer to the standard IEC 62321:2008 Ed.1  
a) Screening by XRF Spectroscopy.  
b) Wet chemical test  
i) Determination of Lead, Cadmium and Mercury by ICP-OES / AAS.  
ii) Determination of Hexavalent Chromium by UV-VIS.  
iii) Determination of PBBs and PBDEs by GC/MS.

Test Results : Please refer to next page (s).

## Conclusion:

Basing on the test results obtained from the homogenous materials, the submitted sample **COMPLIES** with the requirements stated in the Annex II of RoHS Directive 2011/65/EU.

Signed for and on behalf of  
Shenzhen EMTEK Co., Ltd .



*Jason*

Manager  
February 09, 2015

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**TEST RESULTS:**

No.	Sample description	Restricted substances	Results of EDXRF <sup>(1)</sup>	Results of Chemical Testing <sup>(2)</sup> (mg/kg)	Remark
1	Black PCB	Cd	BL	PBBs: ND PBDEs: ND	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	X		
2	Silver metal	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	NA		
3	SMD capacitor	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
4	IC	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
5	IC	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
6	IC	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
7	SMD crystal oscillator	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	NA		

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No.	Sample description	Restricted substances	Results of EDXRF <sup>(1)</sup>	Results of Chemical Testing <sup>(2)</sup> (mg/kg)	Remark
8	Crystal oscillator	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	NA		
9	White glue	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
10	SMD resistor	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
11	IC	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
12	Copper metal	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	NA		
13	Grey solid	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
14	SMD capacitor	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		

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No.	Sample description	Restricted substances	Results of EDXRF <sup>(1)</sup>	Results of Chemical Testing <sup>(2)</sup> (mg/kg)	Remark
15	SMD capacitor	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
16	Black hard plastic	Cd	BL	PBBs: ND PBDEs: ND	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
17	Silver metal	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	NA		
18	SMD resistor	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
19	Silver metal	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	NA		
20	IC	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
21	SMD capacitor	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		

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No.	Sample description	Restricted substances	Results of EDXRF <sup>(1)</sup>	Results of Chemical Testing <sup>(2)</sup> (mg/kg)	Remark
22	SMD resistor	Cd	BL	Not Tested	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	BL		
23	SMD audion	Cd	BL	PBBs: ND PBDEs: ND	Non comment
		Pb	BL		
		Hg	BL		
		Cr	BL		
		Br	X		

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- Remark: (1) ① Results are obtained by XRF for primary screening, and further wet chemical testing by ICP-OES / AAS (for Cd, Pb, Hg), UV-VIS (for Cr(VI)) and GC/MS (for PBBs, PBDEs) is recommended to be performed, if an inconclusive result was found (as "X" in below table)(unit: mg/kg).
- ② OL = Over Limit, BL = Below Limit, X = Inconclusive, NA= Not Applicable.
- ③ The XRF screening test for RoHS elements – The reading may be different to the actual content in the sample be of non-uniformity composition.

Element	Polymer	Metal	Composite Materials
Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$LOD < X < (150+3\sigma) \leq OL$
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	$BL \leq (300-3\sigma) < X$	NA	$BL \leq (250-3\sigma) < X$
Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$

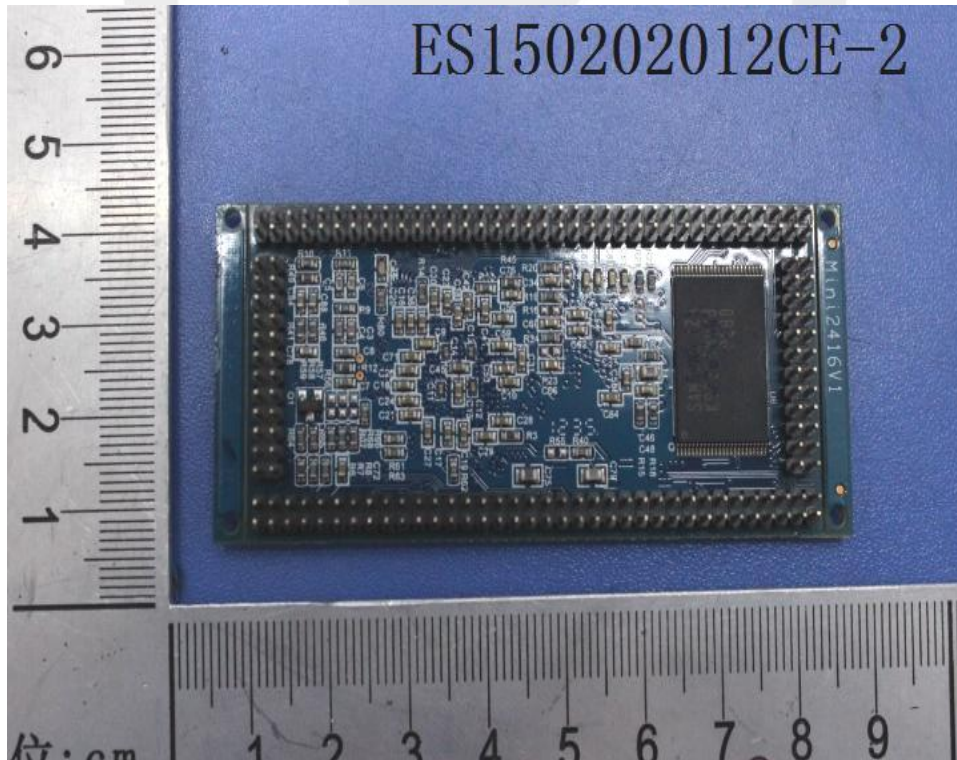
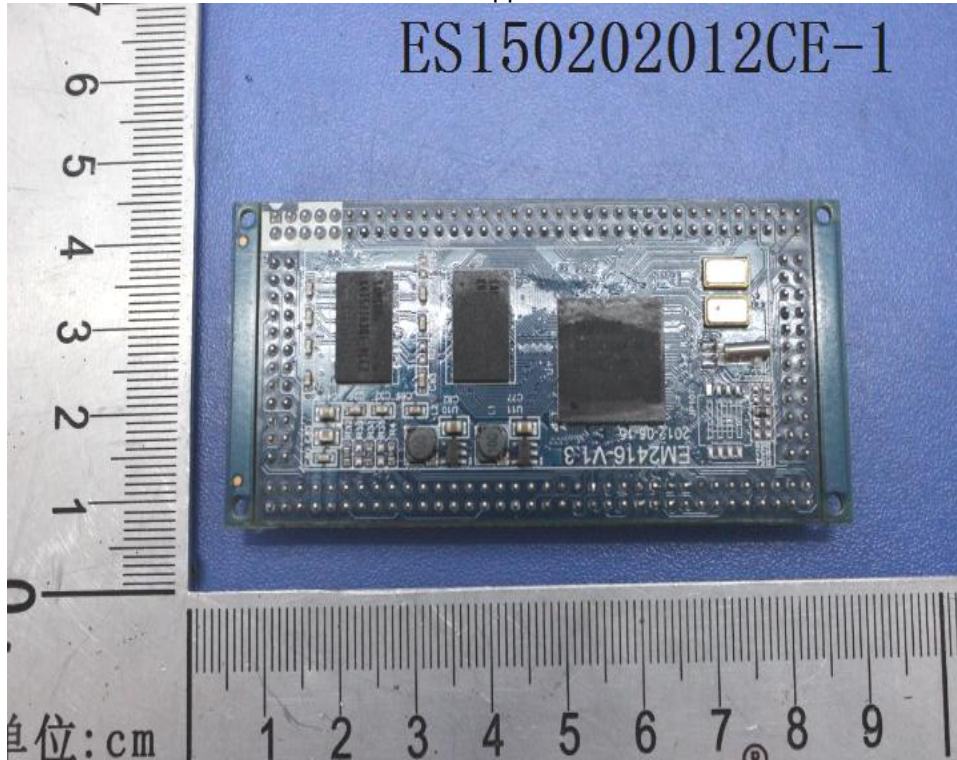
- (2) ① mg/kg = ppm = 0.0001%, ND = Not Detected (Less than method detection limit).  
 ② Unit and Method Detection Limit (MDL) in wet chemical test.

Test items	Pb	Cd	Hg	Cr <sup>6+</sup> (Non-metal)	PBBs(single)	PBDEs(single)
Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MDL	2	2	2	2	5	5

- ③ According to IEC 62321:2008, result on Cr<sup>6+</sup> for metal sample is shown as Positive/Negative. Negative = Absence of Cr<sup>6+</sup> coating, Positive = Presence of Cr<sup>6+</sup> coating. Storage condition and production date of the tested sample are unavailable and thus results of Cr<sup>6+</sup> represent status of the sample at the time of testing.

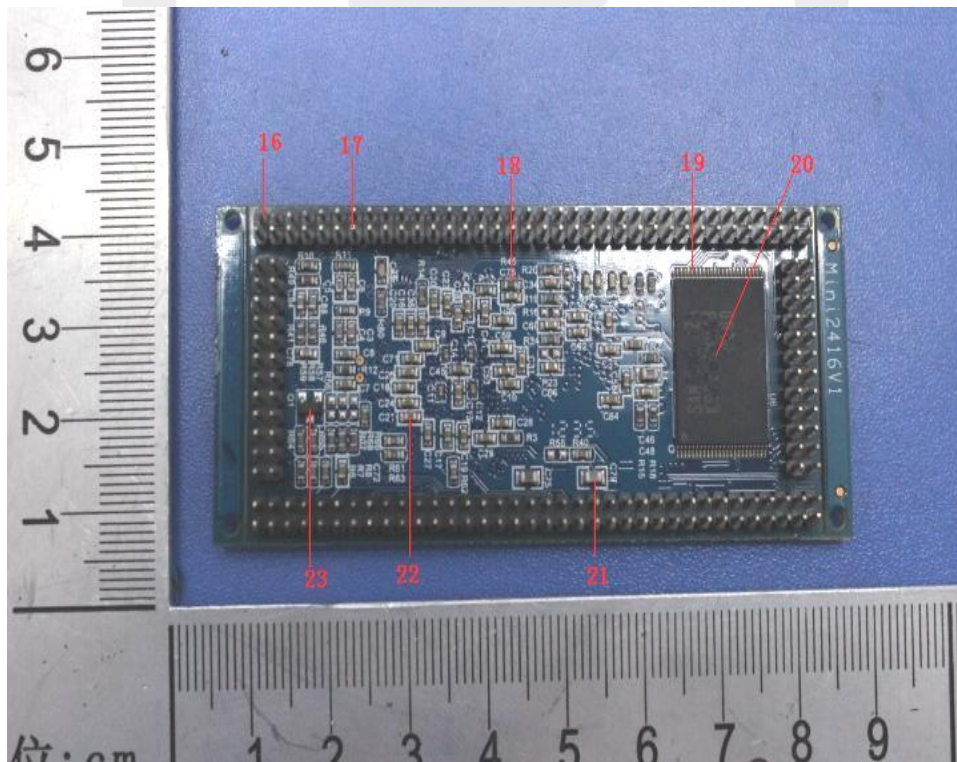
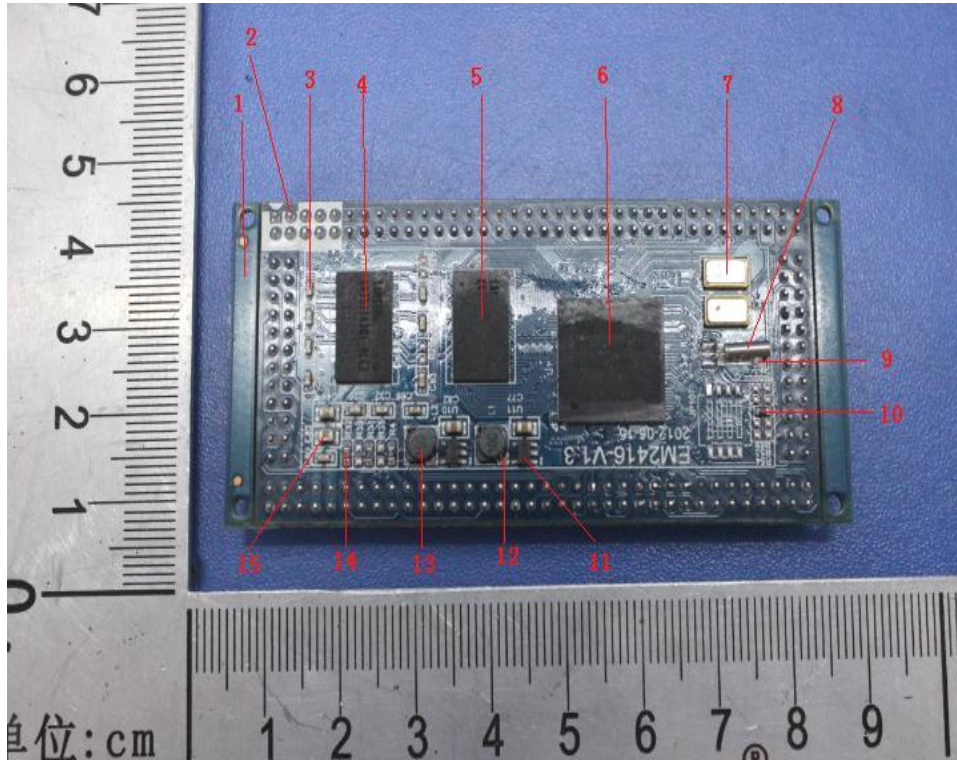
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Photo Appendix



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\* \* \* \* \* **The End** \* \* \* \* \*

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## ANNEX

### EXEMPTION LIST

- 1 Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):
  - 1(a) For general lighting purposes < 30W: 5mg (expires on 31 December 2011; 3.5mg may be used per burner after 31 December 2011 until 31 December 2012; 2.5mg shall be used per burner after 31 December 2012)
  - 1(b) For general lighting purposes  $\geq$  30W and <50W: 5mg (expires on 31 December 2011; 3.5mg may be used per burner after 31 December 2011)
  - 1(c) For general lighting purposes  $\geq$  50W and <150W: 5mg
  - 1(d) For general lighting purposes  $\geq$  150W: 15mg
  - 1(e) For general lighting purposes with circular or square structural shape and tube diameter  $\leq$  17mm (no limitation of use until 31 December 2011; 7mg may be used per burner after 31 December 2011)
  - 1(f) For special purposes: 5mg
- 2(a) Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):
  - 2(a)(1) Tri-band phosphor with normal lifetime and a tube diameter < 9mm (e.g. T2): 5mg (expires on 31 December 2011; 4mg may be used per lamp after 31 December 2011)
  - 2(a)(2) Tri-band phosphor with normal lifetime and a tube diameter  $\geq$  9mm and  $\leq$  17mm (e.g. T5): 5mg (expires on 31 December 2011; 3mg may be used per lamp after 31 December 2011)
  - 2(a)(3) Tri-band phosphor with normal lifetime and a tube diameter > 17mm and  $\leq$  28mm (e.g. T8): 5mg (expires on 31 December 2011; 3.5mg may be used per lamp after 31 December 2011)
  - 2(a)(4) Tri-band phosphor with normal lifetime and a tube diameter > 28mm (e.g. T12): 5mg (expires on 31 December 2012; 3.5mg may be used per lamp after 31 December 2012)
  - 2(a)(5) Tri-band phosphor with long lifetime ( $\geq$  25000h): 8mg (expires on 31 December 2011; 5mg may be used per lamp after 31 December 2011)
- 2(b) Mercury in other fluorescent lamps not exceeding (per lamp):
  - 2(b)(1) Linear halophosphate lamps with tube > 28mm (e.g. T10 and T12): 10mg (expires on 13 April 2012)
  - 2(b)(2) Non-linear halophosphate lamps (all diameters): 15mg (expires on 13 April 2016)
  - 2(b)(3) Non-linear tri-band phosphor lamps with tube diameter > 17mm (e.g. T9) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
  - 2(b)(4) Lamps for other general lighting and special purposes (e.g. induction lamps) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
- 3 Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):
  - 3(a) Short length ( $\leq$  500mm) (No limitation of use until 31 December 2011; 3.5mg may be used per lamp after 31 December 2011)
  - 3(b) Medium length (> 500mm and  $\leq$  1500mm) (No limitation of use until 31 December 2011; 5mg may be used per lamp after 31 December 2011)
  - 3(c) Long length (> 1500mm) (No limitation of use until 31 December 2011; 13mg may be used per lamp after 31 December 2011)
  - 4(a) Mercury in other low pressure discharge lamps (per lamp) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
  - 4(b) Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index Ra > 60:
    - 4(b)-I P  $\leq$  155W (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
    - 4(b)-II 155W < P  $\leq$  405W (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
    - 4(b)-III P > 405W (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
  - 4(c) Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner):
    - 4(c)-I P  $\leq$  155W (no limitation of use until 31 December 2011; 25mg may be used per burner after 31 December 2011)
    - 4(c)-II 155W < P  $\leq$  405W (no limitation of use until 31 December 2011; 30mg may be used per burner after 31 December 2011)
    - 4(c)-III P > 405W (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
  - 4(d) Mercury in High Pressure Mercury (vapour) lamps (HPMV) (expires on 13 April 2015)
  - 4(e) Mercury in metal halide lamps (MH)
  - 4(f) Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex
- 5(a) Lead in glass of cathode ray tubes
- 5(b) Lead in glass of fluorescent tubes not exceeding 0.2% by weight
- 6(a) Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by weight
- 6(b) Lead as an alloying element in aluminium containing up to 0.4% lead by weight
- 6(c) Copper alloy containing up to 4% lead by weight.
- 7(a) Lead in high melting temperature type solders (i.e. lead based alloys containing 85% by weight or more lead)
- 7(b) Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission, and network management for telecommunications
- 7(c)-I Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound
- 7(c)-II Lead in dielectric ceramic in capacitors for a rated voltage of 125V AC or 250V DC or higher

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## ANNEX

### EXEMPTION LIST

#### Continued

- 7(c)-III Lead in dielectric ceramic in capacitors for a rated voltage of less than 125V AC or 250V DC (expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013).
- 7(c)-IV Lead in PZT based dielectric ceramic materials for capacitors being part of integrated circuits or discrete semiconductors
- 8(a) Cadmium and its compounds in one shot pellet type thermal cut-offs (expires on 1 January 2012 and after that date may be used in spare parts for EEE placed on the market before 1 January 2012)
- 8(b) Cadmium and its compounds in electrical contacts
- 9 Hexavalent chromium as an anti-corrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by weight in the cooling solution
- 9(b) Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications
- 11(b) Lead used in other than C-press compliant pin connector systems (expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013)
- 13(a) Lead in white glasses used for optical applications
- 13(b) Cadmium and lead in filter glasses and glasses used for reflectance standards
- 14 Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80% and less than 85% by weight (expires on 1 January 2011 and after that date may be used in spare parts for EEE placed on the market before 1 January 2011)
- 15 Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages
- 16 Lead in linear incandescent lamps with silicate coated tubes (expires on 1 September 2013)
- 17 Lead halide as radiant agent in High Intensity Discharge (HID) lamps used for professional reprography applications
- 18(a) Lead as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as speciality lamps for diazo-printing reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS ((Sr,Ba)<sub>2</sub>MgSi<sub>2</sub>O<sub>7</sub>:Pb) (expires on 1 January 2011)
- 18(b) Lead as activator in the fluorescent powder (1% lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi<sub>2</sub>O<sub>5</sub>:Pb)
- 19 Lead with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and with PbSn-Hg as auxiliary amalgam in very compact Energy Saving Lamps (ESL) (expire on 1 June 2011)
- 20 Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs) (expires on 1 June 2011)
- 21 Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glass
- 24 Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors
- 25 Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring
- 26 Lead oxide in the glass envelope of Black Light Blue (BLB) lamps (expires on 1 June 2011)
- 29 Lead bound in crystal glass as defined in Annex 1 (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC
- 30 Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more
- 31 Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)
- 32 Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes
- 33 Lead in solders for the soldering of thin copper wires of 100 µm diameter and less in power transformers
- 34 Lead in cermet-based trimmer potentiometer elements
- 37 Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body
- 38 Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide
- 39 Cadmium in colour converting II-VI LEDs (< 10 µg Cd per mm<sup>2</sup> of light-emitting area) for use in solid state illumination or display systems (expires on 1 July 2014)
- 40 Cadmium in photoresistors for analogue optocouplers applied in professional audio equipment.