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Test Report

No. : CE/2018/C4967A Date : 2019/01/19

TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

The following samples was/were submitted and identified by/on behalf of the applicant as :

Sample Submitted By	:	TOWERJAZZ SEMICONDUCTOR
Sample Description	:	SILICON WAFERS
Style/Item No.	:	0.18µ 8INCH TOWERJAZZ MH FAB3 (CA18, CS18)
Sample Receiving Date	:	2018/12/27
Testing Period	:	2018/12/27 to 2019/01/07 and 2019/01/17 to 2019/01/19

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Test Requested :

(1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).

(2) Please refer to next pages for the other item(s).

Test Result(s) : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

* This report is added testing and combined with CE/2018/C4967 *

Troy Chang / Manager - Tech
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei

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Test Result(s)

PART NAME No.1 : SILICON WAFERS

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5 (2013) and performed by ICP-AES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4 (2013) and performed by ICP-AES.	2	n.d.	1000
Hexavalent Chromium Cr(VI) (◆)	mg/kg	With reference to IEC 62321-7-2 (2017) and performed by UV-VIS. ; With reference to IEC 62321-5 (2013) and performed by ICP-AES.	8	n.d.	1000
Sum of PBBs	mg/kg	With reference to IEC 62321-6 (2015) and performed by GC/MS.	-	n.d.	1000
Monobromobiphenyl	mg/kg		5	n.d.	-
Dibromobiphenyl	mg/kg		5	n.d.	-
Tribromobiphenyl	mg/kg		5	n.d.	-
Tetrabromobiphenyl	mg/kg		5	n.d.	-
Pentabromobiphenyl	mg/kg		5	n.d.	-
Hexabromobiphenyl	mg/kg		5	n.d.	-
Heptabromobiphenyl	mg/kg		5	n.d.	-
Octabromobiphenyl	mg/kg		5	n.d.	-
Nonabromobiphenyl	mg/kg		5	n.d.	-
Decabromobiphenyl	mg/kg		5	n.d.	-
Sum of PBDEs	mg/kg		-	n.d.	1000
Monobromodiphenyl ether	mg/kg		5	n.d.	-
Dibromodiphenyl ether	mg/kg		5	n.d.	-
Tribromodiphenyl ether	mg/kg		5	n.d.	-
Tetrabromodiphenyl ether	mg/kg		5	n.d.	-
Pentabromodiphenyl ether	mg/kg		5	n.d.	-
Hexabromodiphenyl ether	mg/kg		5	n.d.	-
Heptabromodiphenyl ether	mg/kg		5	n.d.	-
Octabromodiphenyl ether	mg/kg		5	n.d.	-
Nonabromodiphenyl ether	mg/kg		5	n.d.	-
Decabromodiphenyl ether	mg/kg		5	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Polychlorinated Biphenyls (PCBs) (CAS No.: 1336-36-3)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.5	n.d.	-
Polychlorinated Terphenyls (PCTs)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.5	n.d.	-
Polychlorinated Naphthalene (PCNs)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	5	n.d.	-
Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 85535-84-8)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	100	n.d.	-
Asbestos					
Chrysotile (CAS No.: 12001-29-5)	%	With reference to EPA 600/R-93/116 (1993). Analysis was performed by Stereo Microscope (SM), Dispersion Staining Polarized Light Microscope (DS-PLM) and X-ray Diffraction Spectrometer (XRD).	-	Negative	-
Amosite (CAS No.: 12172-73-5)	%		-	Negative	-
Crocidolite (CAS No.: 12001-28-4)	%		-	Negative	-
Anthophyllite (CAS No.: 77536-67-5)	%		-	Negative	-
Tremolite (CAS No.: 77536-68-6)	%		-	Negative	-
Actinolite (CAS No.: 77536-66-4)	%		-	Negative	-
AZO					
1): 4-AMINODIPHENYL (CAS No.: 92-67-1)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
2): BENZIDINE (CAS No.: 92-87-5)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
3): 4-CHLORO-O-TOLUIDINE (CAS No.: 95-69-2)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
4): 2-NAPHTHYLAMINE (CAS No.: 91-59-8)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
5): O-AMINOAZOTOLUENE (CAS No.: 97-56-3)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
6): 2-AMINO-4-NITROTOLUENE (CAS No.: 99-55-8)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
7): P-CHLOROANILINE (CAS No.: 106-47-8)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
8): 2,4-DIAMINOANISOLE (CAS No.: 615-05-4)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
9): 4,4'-DIAMINODIPHENYLMETHANE (CAS No.: 101-77-9)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
10): 3,3'-DICHLOROBENZIDINE (CAS No.: 91-94-1)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
11): 3,3'-DIMETHOXYBENZIDINE (CAS No.: 119-90-4)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
12): 3,3'-DIMETHYLBENZIDINE (CAS No.: 119-93-7)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
13): 3,3'-DIMETHYL-4,4'-DIAMINODIPHENYLMETHANE (CAS No.: 838-88-0)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
14): P-CRESIDINE (2-METHOXY-5-METHYLANILINE) (CAS No.: 120-71-8)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
15): 4,4'-METHYLENE-BIS- (2-CHLOROANILINE) (CAS No.: 101-14-4)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
16): 4,4'-OXYDIANILINE (CAS No.: 101-80-4)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
17): 4,4'-THIODIANILINE (CAS No.: 139-65-1)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
18): O-TOLUIDINE (CAS No.: 95-53-4)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
19): 2,4-TOLUYLENEDIAMINE (CAS No.: 95-80-7)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
20): 2,4,5-TRIMETHYLANILINE (CAS No.: 137-17-7)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
21): O-ANISIDINE (CAS No.: 90-04-0)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
22): 4-AMINOAZOBENZENE (CAS No.: 60-09-3)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
23): 2,4-XYLIDINE (CAS No.: 95-68-1)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
24): 2,6-XYLIDINE (CAS No.: 87-62-7)	mg/kg	With reference to LFGB 82.02-2 (2013). Analysis was performed by GC/MS.	3	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-AES.	2	n.d.	-
Arsenic (As)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-AES.	2	n.d.	-
Arsenic trioxide (As_2O_3)	mg/kg	Calculated from the result of Arsenic.	2 (▲)	n.d.	-
Diarsenic pentaoxide (As_2O_5)	mg/kg	Calculated from the result of Arsenic.	2 (▲)	n.d.	-
Formaldehyde (CAS No.: 50-00-0)	mg/kg	With reference to ISO 17226-1(2008). Analysis was performed by HPLC/DAD.	3	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	With reference to IEC 62321 (2008). Analysis was performed by GC/MS.	5	n.d.	-
Perchlorate (CAS No.: 14797-73-0)	mg/kg	Analysis was performed by IC.	0.1	n.d.	-
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by LC/MS.	10	n.d.	-
2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320) (CAS No.: 3846-71-7)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	5	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	1000
Tributyl Tin (TBT)	mg/kg	With reference to ISO 17353 (2004). Analysis was performed by GC/FPD.	0.03	n.d.	-
Diphenyltin	mg/kg	With reference to ISO 17353 (2004). Analysis was performed by GC/FPD.	0.03	n.d.	-
Bis(tributyltin)oxide (TBTO) (CAS No.: 56-35-9)	mg/kg	With reference to ISO 17353 (2004). Analysis was performed by GC/FPD. Calculated from the result of Tributyl Tin (TBT).	0.03 (▲)	n.d.	-
Dibutyl Tin (DBT)	mg/kg	With reference to ISO 17353 (2004). Analysis was performed by GC/FPD.	0.03	n.d.	-
Dioctyl Tin (DOT)	mg/kg	With reference to ISO 17353 (2004). Analysis was performed by GC/FPD.	0.03	n.d.	-
Bromomethane (CAS No.: 74-83-9)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Dimethyl Fumarate (CAS No.: 624-49-7)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.1	n.d.	-
Cobalt dichloride (CAS No.: 7646-79-9)	mg/kg	SGS In-House method-RSTS-EE-SVHC-007. Analyzed by ICP-AES.	50	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Cobalt (Co)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-AES.	2	20.1	-
Hexavalent Chromium Cr(VI)	mg/kg	SGS In-House method-RSTS-EE-SVHC-007. Analyzed by UV-Vis.	50	n.d.	-
Lead (Pb)	mg/kg	SGS In-House method-RSTS-EE-SVHC-007. Analyzed by ICP-AES.	50	n.d.	-
Tris (2-chloroethyl) phosphate (TCEP) (CAS No.: 115-96-8)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	5	n.d.	-
Boron (B) (※2)	mg/kg	SGS In-House method-RSTS-EE-SVHC-007. Analyzed by ICP-AES.	50	n.d.	-
DIHP (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (CAS No.: 71888-89-6)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DHNUP (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters) (CAS No.: 68515-42-4)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg	With reference to IEC 62321-8 (2017). Analysis was performed by GC/MS.	50	n.d.	-
Bis(2-methoxyethyl) ether (CAS No.: 111-96-6)	mg/kg	SGS In-House method-RSTS-EE-SVHC-007. Analyzed by GC/MS.	500	n.d.	-
N,N-dimethylacetamide (DMAC) (CAS No.: 127-19-5)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	10	n.d.	-
4-(1,1,3,3-tetramethylbutyl) phenol, (4-tert-Octylphenol) (CAS No.: 140-66-9)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	50	n.d.	-
Beryllium (Be)	mg/kg	With reference to US EPA 3052 (1996). Analysis was performed by ICP-AES.	2	n.d.	-
Hexabromobenzene	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	5	n.d.	-
Brominated styrene	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	5	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	mg/kg	With reference to Global SOP RSTS-E&E-121 (2012). Analysis was performed by LC/MS.	10	n.d.	-
TBBP-A-bis (CAS No.: 21850-44-2)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	5	n.d.	-
Monomethyl dibromodiphenyl methane (DBBT) (CAS No.: 99688-47-8)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.5	n.d.	-
Monomethyl dichlorodiphenyl methane (Ugilec121) (CAS No.: 81161-70-8)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.5	n.d.	-
Monomethyl tetrachlorodiphenyl methane (Ugilec141)	mg/kg	With reference to US EPA 3550C (2007). Analysis was performed by GC/MS.	0.5	n.d.	-
PVC	**	Analysis was performed by FTIR and FLAME Test.	-	Negative	-
Halogen					
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	688	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	n.d.	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg	With reference to BS EN 14582 (2016). Analysis was performed by IC.	50	n.d.	-
Aluminosilicate, Refractory Ceramic Fibres【oxides of aluminium and silicon are the main components present (in the fibres) within variable concentration ranges】	mg/kg	SGS In-House method-RSTS-EE-SVHC-007. Analyzed by gravimetric method, ICP-AES.	500	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Zirconia Aluminosilicate, Refractory Ceramic Fibres 【oxides of aluminium, silicon and zirconium are the main components present (in the fibres) within variable concentration ranges】	mg/kg	SGS In-House method-RSTS-EE-SVHC-007. Analyzed by gravimetric method, ICP-AES.	500	n.d.	-
CFC's (Chlorofluorocarbons)					
Group I					
Chlorofluorocarbon-11 (CAS No.: 75-69-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-12 (CAS No.: 75-71-8)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-113 (CAS No.: 76-13-1)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-114 (CAS No.: 76-14-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-115 (CAS No.: 76-15-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Group III					
Chlorofluorocarbon-13 (CAS No.: 75-72-9)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-111 (CAS No.: 354-56-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-112 (CAS No.: 76-12-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-211 (CAS No.: 422-78-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-212 (CAS No.: 3182-26-1)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-213 (CAS No.: 2354-06-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-214 (CAS No.: 29255-31-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Chlorofluorocarbon-215 (CAS No.: 4259-43-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-216 (CAS No.: 661-97-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chlorofluorocarbon-217 (CAS No.: 422-86-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFCs (Hydrochlorofluorocarbons)					
HCFC-21 (CAS No.: 75-43-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-22 (CAS No.: 75-45-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-31 (CAS No.: 593-70-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-121 (CAS No.: 354-14-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-122 (CAS No.: 354-21-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-123 (CAS No.: 306-83-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-124 (CAS No.: 2837-89-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-131 (CAS No.: 359-28-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-132b (CAS No.: 1649-08-7)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-133a (CAS No.: 75-88-7)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-141b (CAS No.: 1717-00-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-142b (CAS No.: 75-68-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-221 (CAS No.: 422-26-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
HCFC-222 (CAS No.: 422-49-1)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-223 (CAS No.: 422-52-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-224 (CAS No.: 422-54-8)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-225ca (CAS No.: 422-56-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-225cb (CAS No.: 507-55-1)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-226 (CAS No.: 431-87-8)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-231 (CAS No.: 421-94-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-232 (CAS No.: 460-89-9)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-233 (CAS No.: 7125-84-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-234 (CAS No.: 425-94-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-235 (CAS No.: 460-92-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-241 (CAS No.: 666-27-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-242 (CAS No.: 460-63-9)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-243 (CAS No.: 460-69-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-244	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-251 (CAS No.: 421-41-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-252 (CAS No.: 819-00-1)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
HCFC-253 (CAS No.: 460-35-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-261 (CAS No.: 420-97-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-262 (CAS No.: 421-02-03)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HCFC-271 (CAS No.: 430-55-7)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Halons					
Halon-1211 (CAS No.: 353-59-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Halon-1301 (CAS No.: 75-63-8)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Halon-2402 (CAS No.: 124-73-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFCs (Hydrobromofluorocarbons)					
HBFC-21B2 (CHFBr2) (CAS No.: 1868-53-7)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-22B1 (CHF2Br) (CAS No.: 1511-62-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-31B1 (CH2FBr) (CAS No.: 373-52-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-121B4 (C2HFBr4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-122B3 (C2HF2Br3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-123B2 (C2HF3Br2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-124B1 (C2HF4Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-131B3 (C2H2FBr3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
HBFC-132B2 (C2H2F2Br2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-133B1 (C2H2F3Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-141B2 (C2H3FBr2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-142B1 (C2H3F2Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-151B1 (C2H4FBr)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-221B6 (C3HFBr6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-222B5 (C3HF2Br5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-223B4 (C3HF3Br4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-224B3 (C3HF4Br3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-225B2 (C3HF5Br2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-226B1 (C3HF6Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-231B5 (C3H2FBr5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-232B4 (C3H2F2Br4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-233B3 (C3H2F3Br3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-234B2 (C3H2F4Br2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-235B1 (C3H2F5Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-241B4 (C3H3FBr4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
HBFC-242B3 (C3H3F2Br3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-243B2 (C3H3F3Br2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-244B1 (C3H3F4Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-251B3 (C3H4FBr3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-252B2 (C3H4F2Br2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-253B1 (C3H4F3Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-261B2 (C3H5FBr2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-262B1 (C3H5F2Br)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HBFC-271B1 (C3H6FBr)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFCs (Hydrofluorocarbon)					
HFC-23 (CHF3) (CAS No.: 75-46-7)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-32 (CH2F2) (CAS No.: 75-10-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-41 (CH3F) (CAS No.: 593-53-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-43-10mee (C5H2F10)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-125 (C2HF5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-134 (C2H2F4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-134a (CH2FCF3) (CAS No.: 811-97-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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Test Item(s)	Unit	Method	MDL	Result No.1	Limit
HFC-143 (CH3F3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-143a (CH3F3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-152a (C2H4F2) (CAS No.: 75-37-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-227ea (C3HF7) (CAS No.: 431-89-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-236fa (C3H2F6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-236ea (C3H2F6) (CAS No.: 431-63-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-245ca (C3H3F5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-245fa (C3H3F5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
HFC-365mfc (C4H5F5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
PFCs (Perfluorocarbon)					
F14 (CAS No.: 75-73-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Fluorocarbon 116 (CAS No.: 76-16-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Freon 218 (CAS No.: 76-19-7)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Decafluorobutane (CAS No.: 355-25-9)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Freon C318 (CAS No.: 115-25-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Perfluor-1-butene (CAS No.: 357-26-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
perfluorisobutene (CAS No.: 382-21-8)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
1,4-dihydrooctafluorobutane (CAS No.: 377-36-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Nonafluor-2- (trifluoromethyl) butane (CAS No.: 594-91-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Perfluoro-n-pentane (CAS No.: 678-26-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
2-perfluoromethylpentane (CAS No.: 355-04-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Perfluorohexane (CAS No.: 355-42-0)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
CHCs (Chlorinate hydrocarbon)					
1,1,1,2-Tetrachloroethane (CAS No.: 630-20-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,1,1-Trichloroethane (CAS No.: 71-55-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,1,2,2-Tetrachloroethane (CAS No.: 79-34-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,1,2-Trichloroethane (CAS No.: 79-00-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,1-Dichloroethane (CAS No.: 75-34-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,1-Dichloroethene (CAS No.: 75-35-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,1-Dichloropropene (CAS No.: 563-58-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,2,3-Trichloropropane (CAS No.: 96-18-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,2-Dichloroethane (CAS No.: 107-06-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,2-Dichloropropane (CAS No.: 78-87-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
1,3-Dichloropropane (CAS No.: 142-28-9)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
2,2-Dichloropropane (CAS No.: 594-20-7)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Carbon tetrachloride (CAS No.: 56-23-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chloroethane (CAS No.: 75-00-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chloroform (CAS No.: 67-66-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Chloromethane (CAS No.: 74-87-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
cis-1,2-Dichloroethene (CAS No.: 156-59-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
cis-1,3-Dichloropropene (CAS No.: 10061-01-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Hexachlorobutadiene (CAS No.: 87-68-3)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Methylene Chloride (CAS No.: 75-09-2)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Tetrachloroethene (CAS No.: 127-18-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
trans-1,2-Dichloroethene (CAS No.: 156-60-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
trans-1,3-Dichloropropene (CAS No.: 10061-02-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Trichloroethylene (CAS No.: 79-01-6)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Bromochloromethane (CAS No.: 74-97-5)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Sulfur Hexafluoride (SF6) (CAS No.: 2551-62-4)	mg/kg	With reference to US EPA 5021A (2014). Analysis was performed by GC/MS.	1	n.d.	-
Red phosphorus	**	Analysis was performed by Pyrolyzer-GC/MS.	-	Negative	-

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Test Item(s)	Unit	Method	MDL	Result No.1	Limit
Caesium (Cs) (Radioactive element) (CAS No.: 7440-46-2)	mg/kg	With reference to US EPA 3052 (1996) & 6020B (2014). Analysis was performed by ICP-MS.	1	n.d.	-
Strontium (Sr) (Radioactive element) (CAS No.: 7440-24-6)	mg/kg	With reference to US EPA 3052 (1996) & 6020B (2014). Analysis was performed by ICP-MS.	1	n.d.	-
Thorium (Th) (Radioactive element) (CAS No.: 7440-29-1)	mg/kg	With reference to US EPA 3052 (1996) & 6020B (2014). Analysis was performed by ICP-MS.	1	n.d.	-
Uranium (U) (Radioactive element) (CAS No.: 7440-61-1)	mg/kg	With reference to US EPA 3052 (1996) & 6020B (2014). Analysis was performed by ICP-MS.	1	n.d.	-

Note：

1. mg/kg = ppm；0.1wt% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected = less than MDL
4. " - " = Not Regulated
5. ** = Qualitative analysis (No Unit)
6. Negative = Undetectable / Positive = Detectable
7. Testing range of asbestos qualitative analysis is from less than 0.1% to 100%. The judgment criterion: asbestos fibers being found is shown as "Positive"; asbestos fibers not being found is shown as "Negative".
8. (◆)：The result of Cr(VI) is "n.d." as the result of Chromium (Cr) is less than the MDL of Cr(VI), and confirmation test of Cr(VI) is not required. If the Chromium (Cr) content is not less than the MDL of Cr(VI), confirmation test of Cr(VI) is required.
9. (▲)：The MDL was evaluated for element / tested substance.
   Conversion Formula：AX ＝ A × F

AX	A	F
Diarsenic pentaoxide	Arsenic	1.5339
Diarsenic trioxide	Arsenic	1.3203
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.024

10. (※2): The extracted soluble Boron is detected by ICP-AES.

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

PFOS Reference Information : POPs - (EU) 757/2010

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1μg/m².

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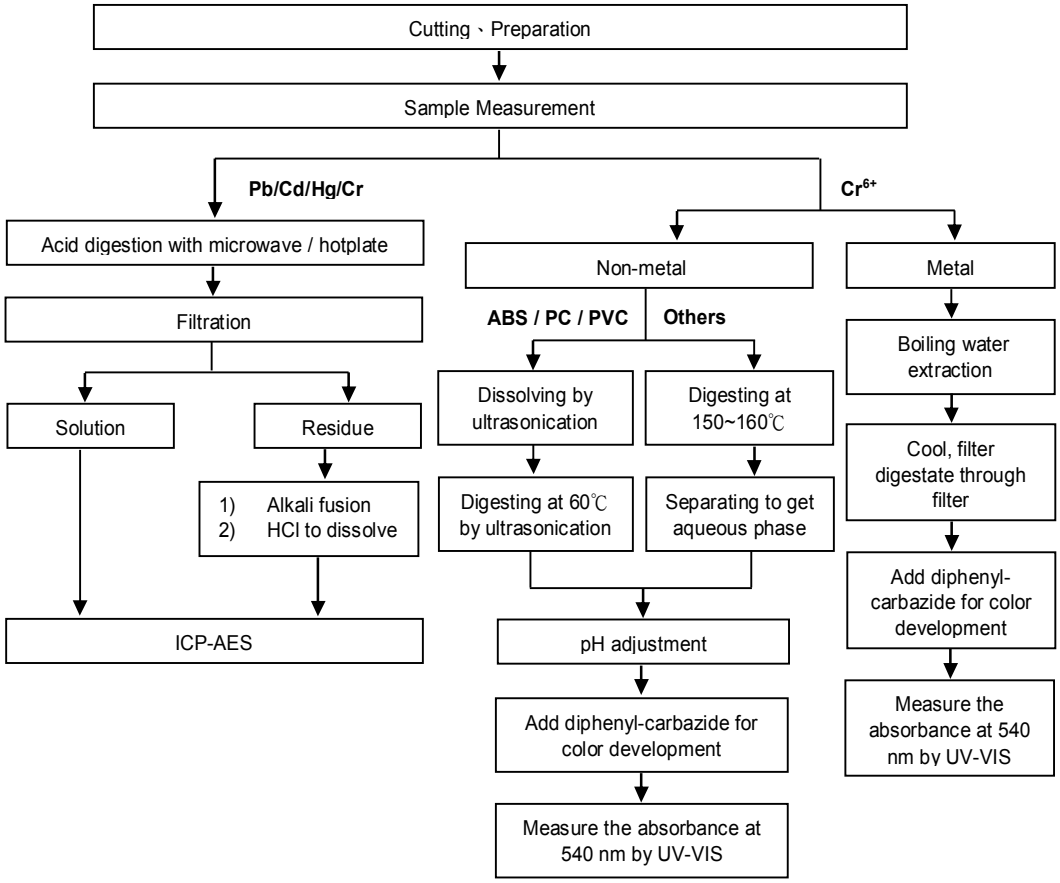
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart.（Cr^{6+} test method excluded）

- Technician : Rita Chen
- Supervisor: Troy Chang



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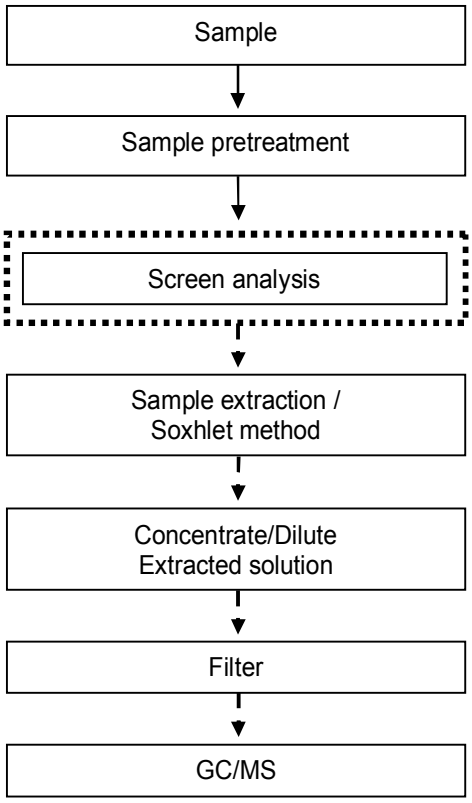
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart – PBB / PBDE

- Technician : Yaling Tu
- Supervisor: Troy Chang

First testing process →
Optional screen process ▪▪▪▪
Confirmation process – · ▸



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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - PCBs

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction / Ultrasonic method
↓
Concentrate/Dilute Extracted solution
↓
Filter
↓
Analysis was performed by GC/MS
↓
Data

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - PCTs

- Technician: Barry Tseng
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction / Ultrasonic method
↓
Concentrate/Dilute Extracted solution
↓
Filter
↓
Analysis was performed by GC/MS
↓
Data

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - PCNs

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction / Ultrasonic method
↓
Concentrate/Dilute Extracted solution
↓
Filter
↓
Analysis was performed by GC/MS
↓
Data

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Chlorinated Paraffins

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction / Ultrasonic method
↓
Concentrate/Dilute Extracted solution
↓
Filter
↓
Analysis was performed by GC/MS
↓
Data

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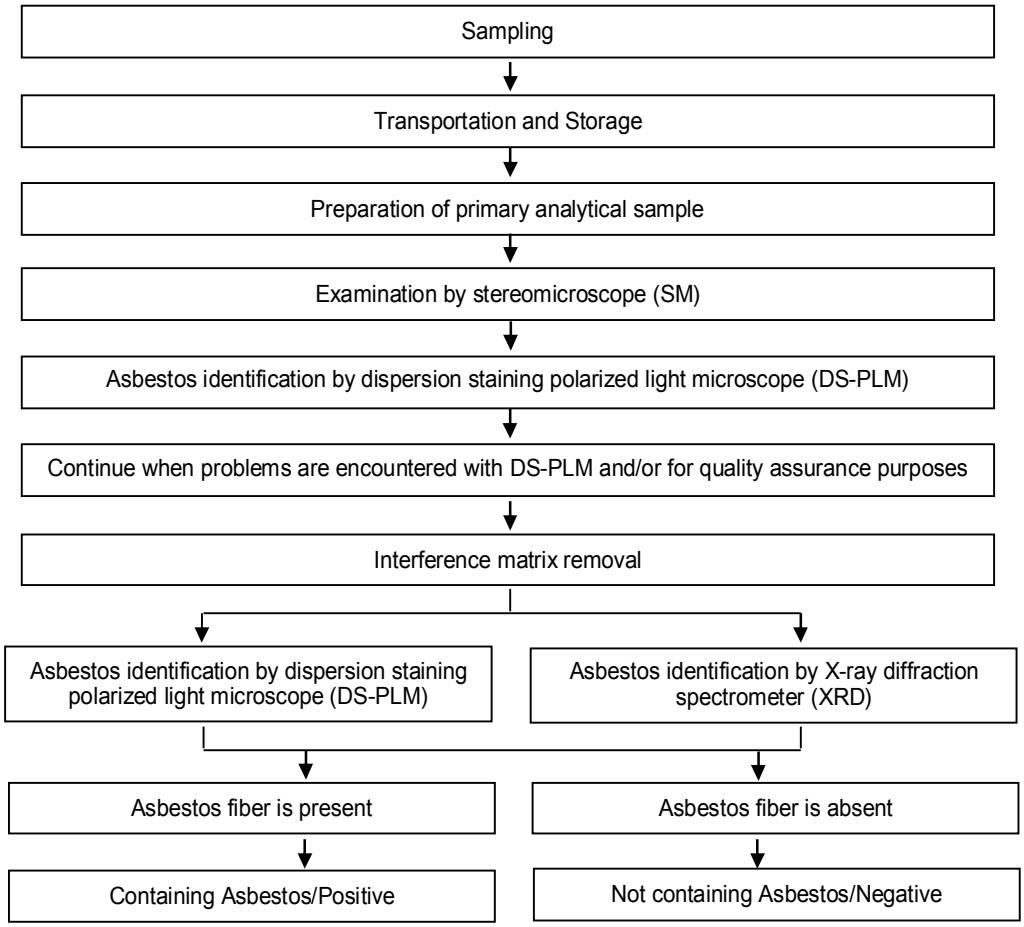
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analysis flow chart for determination of Asbestos

- Technician: Victor Kao
- Supervisor: Wendy Wei

【Reference method: EPA 600/R-93/116】



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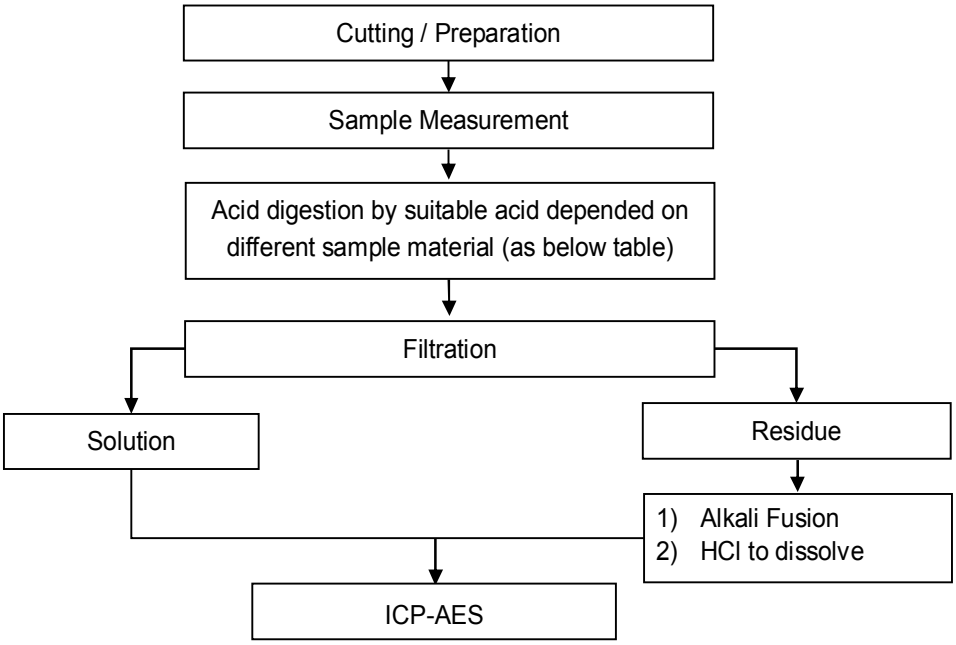
These samples were dissolved totally by pre-conditioning method according to below flow chart.

- Technician: Rita Chen
- Supervisor: Troy Chang

Flow Chart of digestion for the elements analysis performed by ICP-AES



Steel, copper, aluminum, solder	Aqua regia, HNO_3, HCl, HF, H_2O_2
Glass	HNO_3/HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO_3
Plastic	H_2SO_4, H_2O_2, HNO_3, HCl
Others	Added appropriate reagent to total digestion

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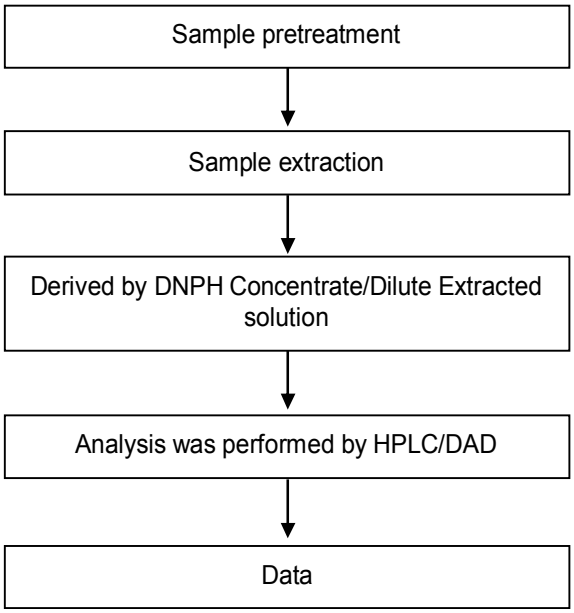
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Formaldehyde

- Technician: Yaling Tu
- Supervisor: Troy Chang



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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - HBCDD

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction / Ultrasonic method
↓
Concentrate/Dilute Extracted solution
↓
Filter
↓
Analysis was performed by GC/MS
↓
Data

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - PFOA/PFOS

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment

↓

Sample extraction by Ultrasonic extraction
(Reference method: US EPA 3550C)

↓

Concentrate/Dilute Extracted solution

↓

Analysis was performed by LC/MS

↓

Data

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Phthalate

- Technician: Yaling Tu
- Supervisor: Troy Chang

【Test method: IEC 62321-8】

Sample pretreatment/separation

↓

Sample dissolved/extracted by THF

↓

Dilute Extracted solution

↓

Analysis was performed by GC/MS

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Organic-Tin

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction by organic solvent
↓
Derived by Sodium tetraethylborate
↓
Concentrate/Dilute Extracted solution
↓
Analysis was performed by GC/FPD
↓
Data

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - volatile organic compounds (VOCs)

- Technician：Chun Wu
- Supervisor：Shinjyh Chen

【Reference method：US EPA 5021, 5021A】

Sample pretreatment

↓

Take sample and put it into headspace glassware and seal.

↓

Bake the sample in the oven

↓

Emitted gas was performed by GC/MS

↓

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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Dimethyl Fumarate

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction / Ultrasonic method
↓
Concentrate/Dilute Extracted solution
↓
Filter
↓
Analysis was performed by GC/MS
↓
Data

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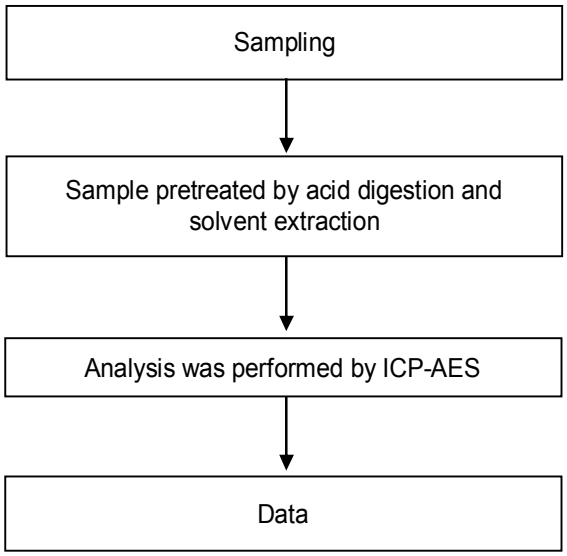
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Cobalt dichloride

- Technician: Rita Chen
- Supervisor: Troy Chang



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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - TBBP-A

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction by Ultrasonic extraction
↓
Concentrate/Dilute Extracted solution
↓
Analysis was performed by LC/MS
↓
Data

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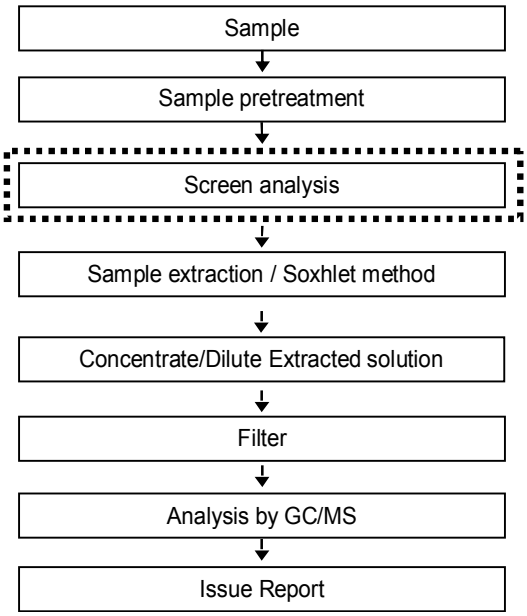
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - TBBP-A-bis

- Technician: Yaling Tu
- Supervisor: Troy Chang

First testing process
Optional screen process
Confirmation process



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TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - DBBT

- Technician: Yaling Tu
- Supervisor: Troy Chang

Sample pretreatment
↓
Sample extraction / Ultrasonic method
↓
Concentrate / Dilute Extracted solution
↓
Filter
↓
Analysis was performed by GC/MS
↓
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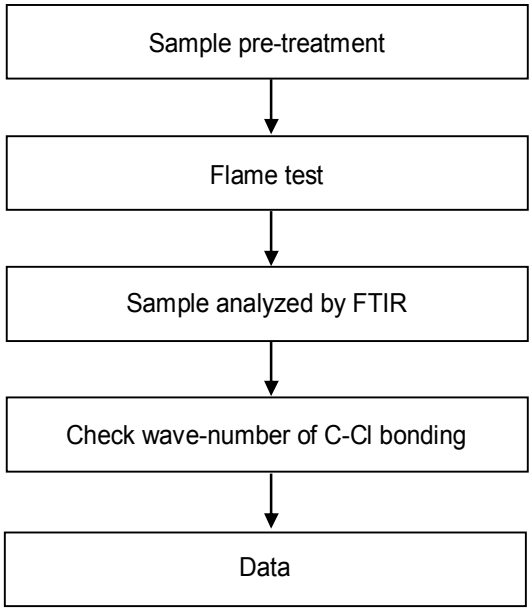
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analysis flow chart - PVC

- Technician: Yaling Tu
- Supervisor: Troy Chang



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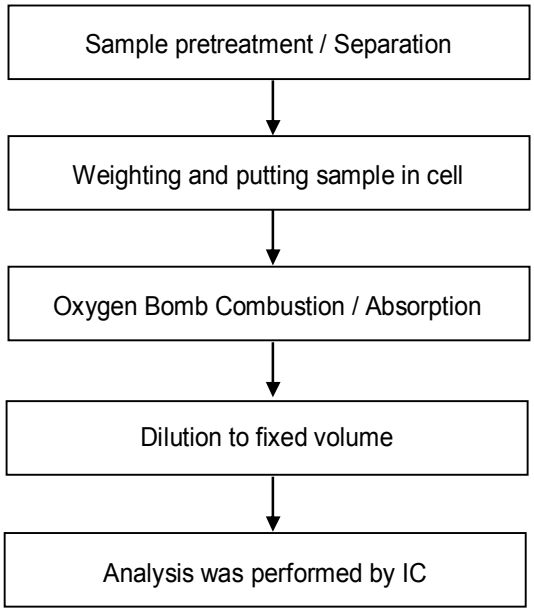
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Halogen

- Technician: Rita Chen
- Supervisor: Troy Chang



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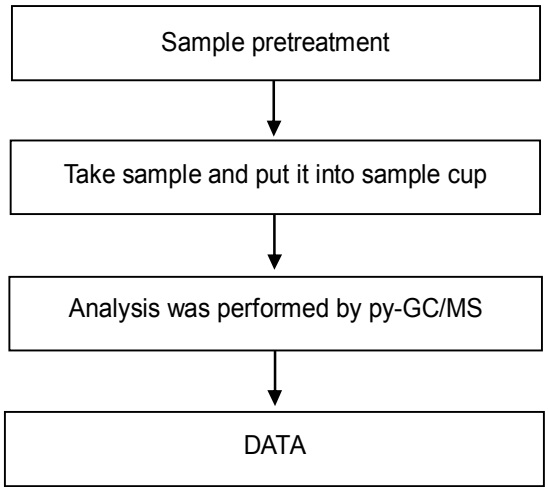
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

Analytical flow chart - Red phosphorus

- Technician: Yaling Tu
- Supervisor: Troy Chang



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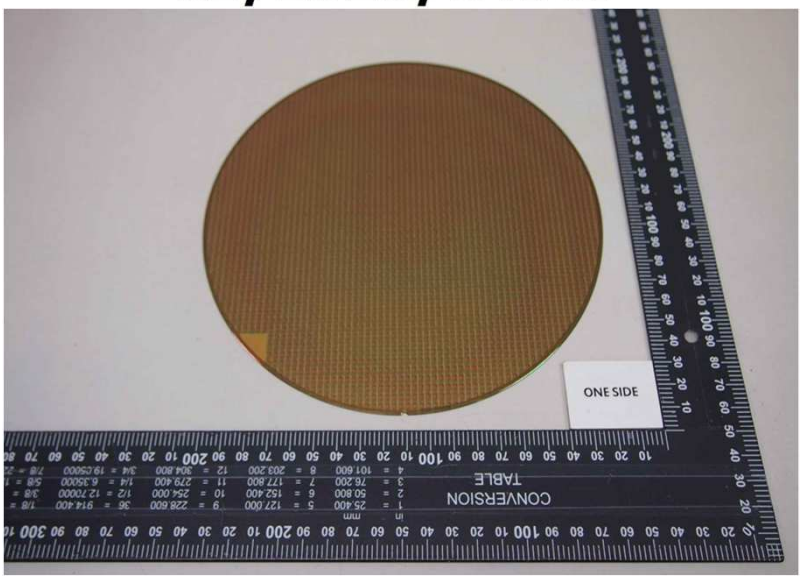
TOWERJAZZ SEMICONDUCTOR
RAMAT GAVRIEL INDUSTRIAL AREA MIGDAL HAEMEK ISRAEL 23105

*** The tested sample / part is marked by an arrow if it's shown on the photo. ***

CE/2018/C4967



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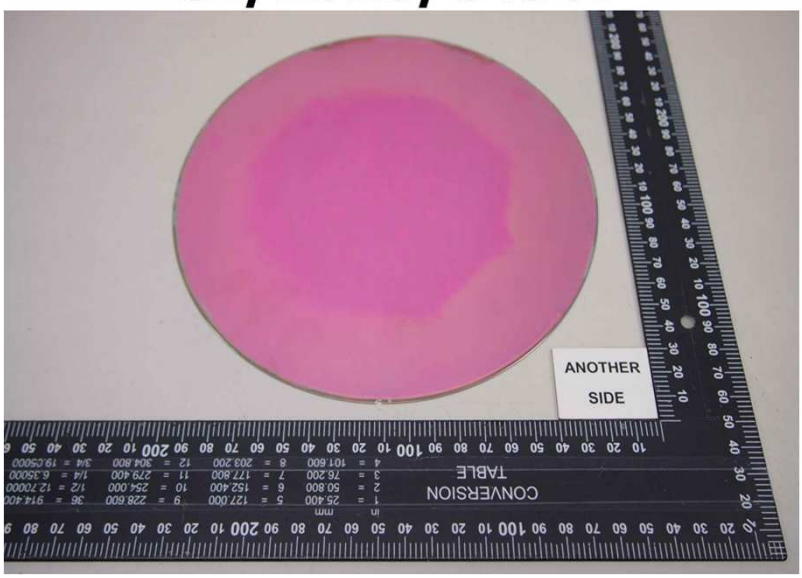

** End of Report **

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