

PTK8756B
8 Bit Micro-controller Data Sheet

DEC 15, 2008 – Ver1.1

Features

- * 1024 Word ROM
- * 25 Bytes RAM
- * 8 bits Data Bus
- * 14 Instruction Bit
- * 2 Level Stacks
- * 1 Watch Dog Timer
- * 1 Real Time Clock Counter (8 bit)
- * Package: DIP18/SOP18
- * CMOS Technology
- * High Noise Immunity
- * Wide Range Operation Voltage: 2.4V to 6.0V
- * Max. Operation Frequency up to 20MHz
- * Sleep Mode Current Consumption < 1uA
- * I/O Programmable Pull-up/down Resistor
- * Oscillator Type: LP/RC/XT/HS

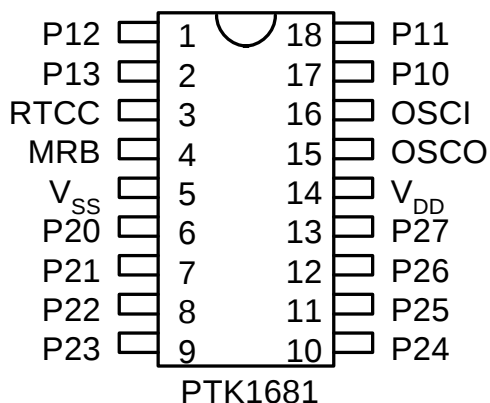
Description

The PTK8756B is COMS LSI designed technology combining high speeds and smaller size with the low power and high noise immunity of micro-controller. On chip memory system includes 1024 bytes of ROM and 25 bytes of RAM. The PTK8756B can be used simple device, shorten the customer to develop product time and let the customer reach biggest benefits with least external devices. However, the PTK8756B is very convenient of micro-controller IC.

Application

The application areas of the PTK8756B are suitable range for motor control, high speed automotive, low power remote transmitters and receivers, chargers, toy, automobile, sound, PC peripheral, assistant tool ... etc.

Pin Assignment



Pin Description

PTK8756B		
Name	I/O	Function Description
P10 to P13	I/O	Port1 I/O
P20 to P27	I/O	Port2 I/O
RTCC	I	Real Time Clock Input
MRB	I	MCU Reset Input. Built-in 50K Ω Pull-high Resistor.
OSCI	I	Oscillator Input
OSCO	O	Oscillator Output
V _{DD}	-	Positive Power
V _{SS}	-	Negative Power

Register Map

Address	Name
00h	IAR
01h	RTCC
02h	PC
03h	STACR
04h	FSR
05h	Port1
06h	Port2
07h	Port3

Address	Name
08h ~ 0Fh	General Register
10h ~ 1Fh	General Register

Register Description

IAR -

Address	Description
00h	Indirect Address Register

- Addressing IAR will call for the contents of the FSR to be used to point a data register.

RTCC -

Address	Description
01h	Real Time Clock Counter Register

- ❶. Its contents can be incremented by the internal cycle clock, or by the external clock source RTCC pin.
- ❷. It can be read and loaded by program as the other data registers.
- ❸. An 8-bits prescaler can be assigned to the RTCC.

PC -

Address	Description
02h	Program Counter Register

- ❶. This register will be set to all ones upon a reset condition. PC [7 : 0] = A [7 : 0]
- ❷. It is automatically incremented with each instruction unless following condition:
 1. Execute instruction "GOTO": bit7 ~ bit0 of the instruction word are loaded into PC.
 2. Execute instruction "CALL": bit7 ~ bit0 of the instruction word are loaded into PC.
 3. Execute instruction "RETLW": pop the top of stack contents into PC.

STR -

Address	Description
03h	Status Register, Default Value = 00011XXX

Bit Number	Name	Function Description
7	-	General Read/Write Bit.
6	-	General Read/Write Bit.
5	PA0	Page Select
4	TMOF	Time overflow flag bit. Description: ❶. WDT Time Out, TMOF = 0 ❷. Handle "CLRWDT", TMOF = 1 PCDF = 1
3	PCDF	Power Down Flag Bit Description: Handle "SLEEP", PCDF = 0 TMOF = 1
2	ZF	Zero Flag. 0 MCU Calculate Result $\neq$ 0. 1 MCU Calculate Result = 0.
1	DCF	Half Carry / Half Borrow Flag. 0 MCU Calculate Result of bit4 is not carry or borrows.

		1	MCU Calculate Result of bit4 is carry or borrows.
0	CF	Carry Flag.	
		0	MCU Calculate Result is not carry or borrows.
		1	MCU Calculate Result is carry or borrows.

FSR –

Address	Description
04h	File Select Register

- ❶. In the indirect addressing pointer is for data memory.
- ❷. Bit7 ~ bit5 of the FSR select the data memory bank.
- ❸. Bit4 ~ bit0 select one register of the current data memory bank.

PORT1 –

Address	Description
05h	PORT1 I/O Register

- ❶. All amount have 4 I/O register (P10 ~ P13). Read P14~P17 will be “0000xxxx”.
- ❷. Internal pull-low or pull-high resistor is software Programmable.

PORT2 –

Address	Description
05h	PORT1 I/O Register

- ❶. All amount have 8 I/O register (P10 ~ P17).
- ❷. Internal pull-low or pull-high resistor is software Programmable.

PORT3 –

Address	Description
06h	PORT3 I/O Register

- ❶. P30 is I/O. P31 is only input and built-in internal pull-high resistor.
- ❷. Internal pull-low or pull-high resistor is software Programmable.

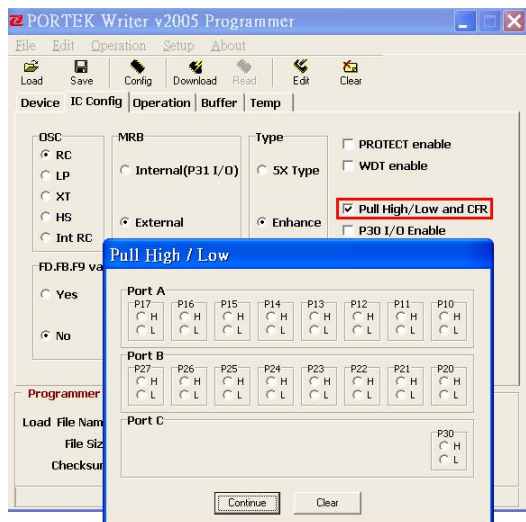
OPTION –

Function Description
Default Value = “11111111” (This register is only Write.)

Bit Number	Name	Function Description	
7	-	Reserved! Don't be writing 0.	
6	-	Reserved! Don't be writing 0.	
5	TCSS	Timer Source	
		0	System Clock
		1	RTCC pin
4	TECES	Timer Edge Select	
		0	Rising Edge Trigger
		1	Falling Edge Trigger
3	TPSA	Assign Timer Prescaler	
		0	Assign to RTCC
		1	Assign to WDT
Bit2 ⇕ Bit0	T1PS2-0	Function: Timer Prescaler Rate Control Bit Description: RTCC or WDT register will just add automatically “1” when X counts after clock source.	
			Timer1 Prescaler (1 : X) WDT Prescaler (1 : X)
		000	1 : 2
		001	1 : 4
		010	1 : 8
		011	1 : 16
		100	1 : 32
		101	1 : 64
		110	1 : 128
		111	1 : 256

Pull-low/high Resistor and Others Description

The PTK burner-software sets up the internal pull-low/high resistor function.

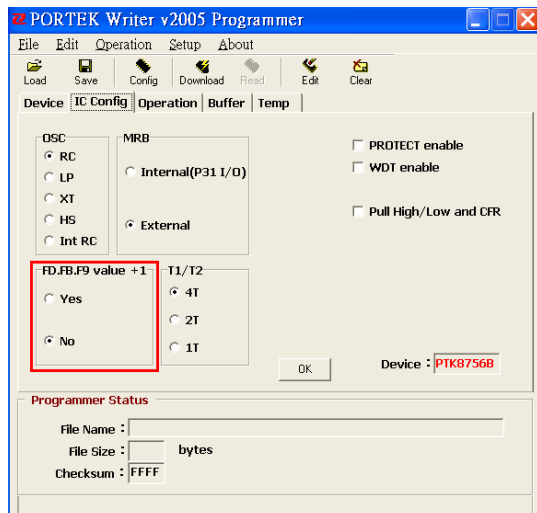


- ①. Select "Pull High/Low and CFR" (left diagram red frame)
- ②. Select P10~P17/P20~P27/P30 "H"/"L"
(H: Pull-high / L: Pull-low)
- ③. Set up ok, select "Continue".
- ④. Address from 01h to 1Ch instruction would be unconditioned replaced. Therefore, instruction is must "NOP".

Pull-low resistor and pull-high resistor is operation method in program.

Program Line	Instruction	Description
00h	Any instruction	
01h	NOP	Set pull-low/pull-high resistor code.
02h	NOP	
...	NOP ... NOP	
0Eh	NOP	
0Fh	NOP	
10h	NOP	Set CFR1 code.
11h	NOP	
12h	NOP	
...	NOP ... NOP	
1Bh	NOP	
1Ch	NOP	
1Dh	Any instruction	
...	Any instruction	
Nh	CALL 01h	← "CALL" pull-low/high R subroutine.
...	Any instruction	
Mh	MOVLW xxh	← Moving value to W register and "CALL" set CFR1 subroutine.
(M+1)h	CALL 10h	
...	Any instruction	

“FDh.FBh.F9h value +1” function :



- ①. Select “FDh.FBh.F9h value +1”. (left diagram red frame)
- ②. Address “F9h” would be adding 1 when burner is writing success. Address of “FBh” would be adding 1 when address of F9h is overflow (value from FFh change to 00h). Address of “FDh” would be adding 1 when address of FBh is overflow.
- ③. 00001-IC(F9h,FBh,FDh)=(01h,00h,07h)
00002-IC(F9h,FBh,FDh)=(02h,00h,07h)
00003-IC(F9h,FBh,FDh)=(03h,00h,07h)
.....
00255-IC(F9h,FBh,FDh)=(FFh,00h,07h)
00256-IC(F9h,FBh,FDh)=(00h,01h,07h)
.....
65535-IC(F9h,FBh,FDh)=(FFh,FFh,07h)
65536-IC(F9h,FBh,FDh)=(00h,00h,08h)
.....

Program Line	Instruction	Description
00h	Any instruction	
...	Any instruction	
0F8h	Any instruction	
0F9h	MOVLW xxh	
0FAh	Any instruction	Suggestion is “MOVWF” instruction
0FBh	MOVLW yyh	
0FCh	Any instruction	Suggestion is “MOVWF” instruction
0FDh	MOVLW zzh	
0FEh	Any instruction	Suggestion is “MOVWF” instruction
0FFh	Any instruction	Suggestion is “RETLW” instruction
100h	Any instruction	
...	Any instruction	
Nh	CALL F9h	xx, yy and zz is get.
...	Any instruction	

Note : xxh, yyh and zzh are any value.

Instruction Description

Operands	Function	Operation	Status
XORLW B	Exclusive or literal with W	$B \oplus W \rightarrow B$	Z
ANDLW B	AND literal and W	$B \cap W \rightarrow B$	Z
IORLW B	Inclusive OR literal with W	$B \cup W \rightarrow B$	Z
MOVLW B	Move literal to W	$B \rightarrow W$	None
GOTO A	Unconditional Branch	Jump A	None
RETLW B	Return literal to W	Load W Return	None
CALL B	Subroutine call	Jump Subroutine	None
BTFSS A, B	Bit test, skip if set	Skip if A (B) = 1	None
BTFSC A, B	Bit test, skip if clear	Skip if A (B) = 0	None
BSF A, B	Bit set A	Set A (B) = 1	None
BCF A, B	Bit clear A	Set A (B') = 0	None
INCFSZ A, B	Increment A, skip if 0	$A+1 \rightarrow A$ or W	None
SWAPF A, B	Swap A	$A(0\sim3) \leftrightarrow A(4\sim7) \rightarrow A$ or W	None
RLF A, B	Rotate left A through carry	$A(n) \rightarrow A(n+1)$, $C \rightarrow A(0)$, $A(7) \rightarrow C$	C
RRF A, B	Rotate right A through carry	$A(n) \rightarrow A(n-1)$, $C \rightarrow A(7)$, $A(0) \rightarrow C$	C
DECFSZ A, B	Decrement f, skip if 0	$A-1 \rightarrow W$ or A	None
INCF A, B	Increment A	$A+1 \rightarrow W$ or A	Z
COMF A, B	Complement A	$\neg A \rightarrow W$ or A	Z
MOVF A, B	Move A	$A \rightarrow W$ or A	Z
ADDWF A, B	ADD W to A	$W + A \rightarrow W$ or A	C, DC, Z
XORWF A, B	Exclusive OR W with A	$W \oplus A \rightarrow W$ or A	Z
ANDWF A, B	AND W with A	$W \cap A \rightarrow W$ or A	C, DC, Z
IORWF A, B	Inclusive OR W with A	$W \cup A \rightarrow W$ or A	Z
DECf A, B	Decrement A	$A - 1 \rightarrow W$ or A	Z
SUBWF A, B	Subtract W from A	$W - 1 \rightarrow W$ or A	C, DC, Z
CLRF A	Clear A and clear	$0 \rightarrow A$	Z
CLRW	Clear W register	$0 \rightarrow W$	Z
MOVWF A	Move W to A	$W \rightarrow A$	None
TRIS 05H	Load W to 05H register	$W \rightarrow \text{TRIS}_{05H}$	None
TRIS 06H	Load W to 06H register	$W \rightarrow \text{TRIS}_{06H}$	None
TRIS 07H	Load W to 07H register	$W \rightarrow \text{TRIS}_{07H}$	None
CLRWDt	Clear watchdog timer	$0 \rightarrow \text{WDT}$	TO, PD

SLEEP	Sleep mode	0 → WDT , stop OSC	TO, PD
OPTION	Load W to option register	W → Option	None
NOP	No operation	None	None

Absolute Maximum Ratings

(Temperature=25 °C)

Parameter	Symbol	Minimum	Maximum	Unit
Supply Voltage	V _{DD}	- 0.3	+ 6.0	Volt.
Input Voltage	V _{IN}	V _{SS} - 0.3	V _{DD} + 0.3	Volt.
Storage Temperature	T _{STG}	- 35	+ 125	°C
Operating Temperature	T _{OP}	- 25	+ 80	°C

DC Electrical Characteristics

(Temperature=25 °C)

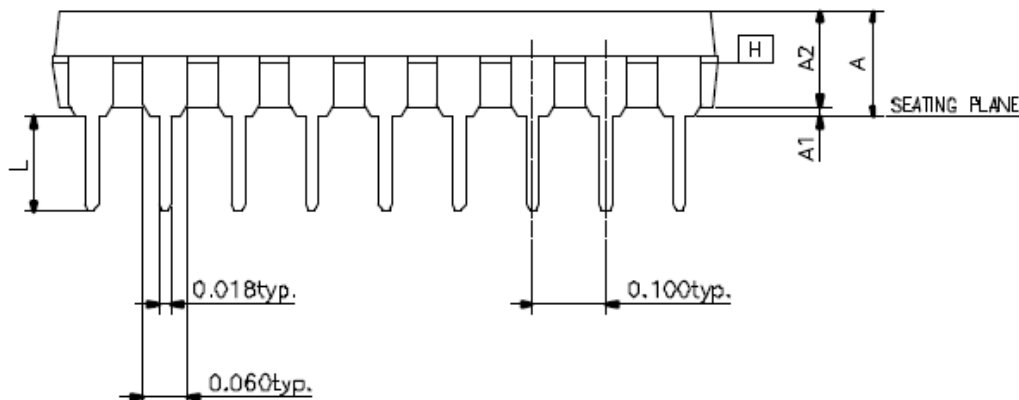
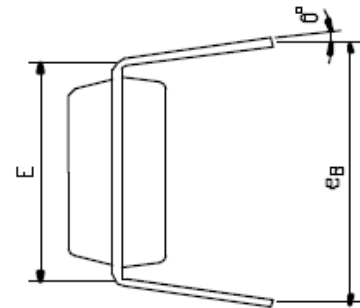
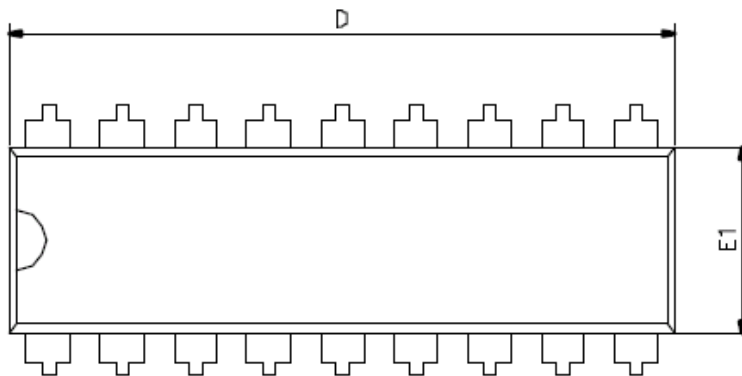
Symbol	Parameter	Test Condition		MIN	TYP	MAX	Unit
		V _{DD}	Condition				
V _{DD}	Operating Voltage	-	-	2.5	-	6.0	Volt.
I _{DD}	Operating Current	5V	4MHz/No Load	-	-	1	mA
I _{LEAKL}	Input Low Level Leakage	5V	V _{IN} = V _{SS}	-	-	1	uA
I _{LEAKH}	Input High Level Leakage	5V	V _{IN} = V _{DD}	-	-	1	uA
V _{ILV}	Low Level Input Voltage	5V	-	-	2.1	-	Volt.
V _{IHV}	High Level Input Voltage	5V	-	-	2.1	-	Volt.
V _{ILVR}	Low Level Reset Voltage	5V	-	-	2.1	-	Volt.
V _{IHVR}	High Level Reset Voltage	5V	-	-	2.3	-	Volt.
V _{OL}	Low Level Output Current	5V	V _O = 5V	-	40	-	mA
V _{OH}	High Level Output Current	5V	V _O = 0V	-	-20	-	mA
R _{PL}	Port Pull-low Resistance	5V	V _O = 5V	-	50	-	KΩ
R _{PH}	Port Pull-high Resistance	5V	V _O = 0	-	50	-	KΩ
T _{WDT}	Max WDT Time out	5V	-	-	-	2.2	Sec

Package Size

DIP-18 :

(Unit: INCH)

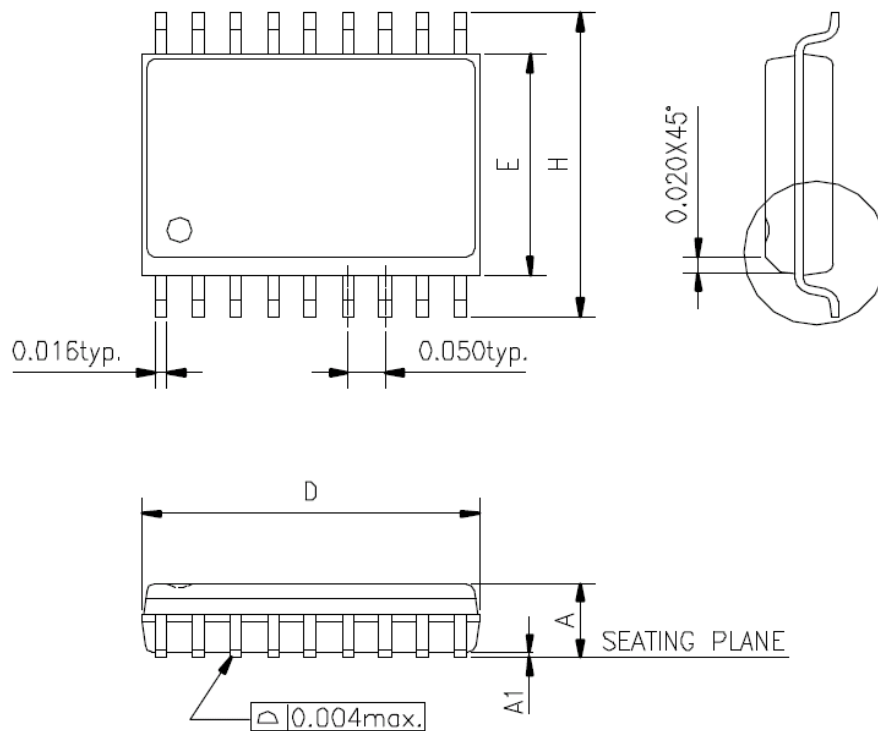
Symbols	MIN.	NOR.	MAX.
A	-	-	0.210
A1	0.015	-	-
A2	0.125	0.130	0.135
D	0.880	0.900	0.920
E	0.300 BSC.		
E1	0.115	0.130	0.150
L	0.115	0.130	0.150
e _B	0.335	0.355	0.375
θ°	0	7	15



SOP-18 :

(Unit: INCH)

Symbols	MIN.	MAX.
A	0.093	0.104
A1	0.004	0.012
D	0.447	0.463
E	0.291	0.299
H	0.394	0.419
L	0.016	0.050
θ°	0	8





Test Report

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ASM HK
4F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG

The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description : A194 ALLOY
Lot No. : 080002
Style/Item No. : BROWN FOR Cu ALLOY
Color : COPPER
Sample Receiving Date : 2008/01/15
Testing Period : 2008/01/15 TO 2008/1/25

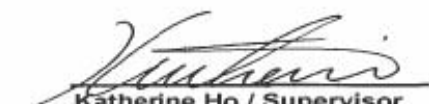
Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321, Ed.1 111/54/CDV
Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products

: (1) Determination of Cadmium by ICP-AES.
(2) Determination of Mercury by ICP-AES.
(3) Determination of Lead by ICP-AES.
(4) Determination of Hexavalent Chromium for metallic samples by Spot test / Colorimetric Method.
(5) Determination of PBB and PBDE by GC/MS.

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

Conclusion : Based on the performed tests on submitted samples, the result **comply with** the RoHS Directive 2002/95/EC and its subsequent amendments.


Katherine Ho / Supervisor
Signed for and on behalf of
SGS Taiwan Limited

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ASM HK

4F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG

Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result	MDL	RoHS Limit
		No.1		
Cadmium (Cd)	(1)	n.d.	2	100
Mercury (Hg)	(2)	n.d.	2	1000
Lead (Pb)	(3)	14.5	2	1000
Hexavalent Chromium Cr(VI) by Spot test / boiling water extraction	(4)	Negative	See Note 5	#
Sum of PBBs	(5)	n.d.	-	1000
Monobromobiphenyl		n.d.	5	-
Dibromobiphenyl		n.d.	5	-
Tri bromobiphenyl		n.d.	5	-
Tetrabromobiphenyl		n.d.	5	-
Pentabromobiphenyl		n.d.	5	-
Hexabromobiphenyl		n.d.	5	-
Heptabromobiphenyl		n.d.	5	-
Octabromobiphenyl		n.d.	5	-
Nonabromobiphenyl		n.d.	5	-
Decabromobiphenyl		n.d.	5	-
Sum of PBDEs (Mono to Nona)(Note 4)		n.d.	-	1000
Monobromobiphenyl ether		n.d.	5	-
Dibromobiphenyl ether		n.d.	5	-
Tri bromobiphenyl ether		n.d.	5	-
Tetrabromobiphenyl ether		n.d.	5	-
Pentabromobiphenyl ether		n.d.	5	-
Hexabromobiphenyl ether		n.d.	5	-
Heptabromobiphenyl ether		n.d.	5	-
Octabromobiphenyl ether		n.d.	5	-
Nonabromobiphenyl ether		n.d.	5	-
Decabromobiphenyl ether		n.d.	5	-
Sum of PBDEs (Mono to Deca)		n.d.	-	-

TEST PART DESCRIPTION:

NO.1

: A194 ALLOY

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20001



Test Report

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ASM HK

4F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG

- Note :
1. mg/kg = ppm
 2. n. d. = Not Detected
 3. MDL = Method Detection Limit
 4. According to 2005/717/EC DecaBDE s exempt.
 5. Spot-test:
Negative = Absence of Cr(VI) coating / surface layer, Positive = Presence of Cr(VI) coating / surface
(The tested sample should be further verified by boiling-water-extraction method if the
spot test result cannot be confirmed.)
Boiling-water-extraction:
Negative = Absence of Cr(VI) coating / surface layer,
Positive = Presence of Cr(VI) coating / surface layer the detected concentration in
boiling-water-extraction solution is equal or greater than 0.02 mg/kg
with 50 cm² sample surface area.
 6. # : Positive indicates the presence of Hexavalent Chromium on the tested areas
and result be regarded as not comply with RoHS requirement.
Negative indicates the absence of Hexavalent Chromium on the tested areas
and result be regarded as comply with RoHS requirement.
 7. " - " = Not Regulated

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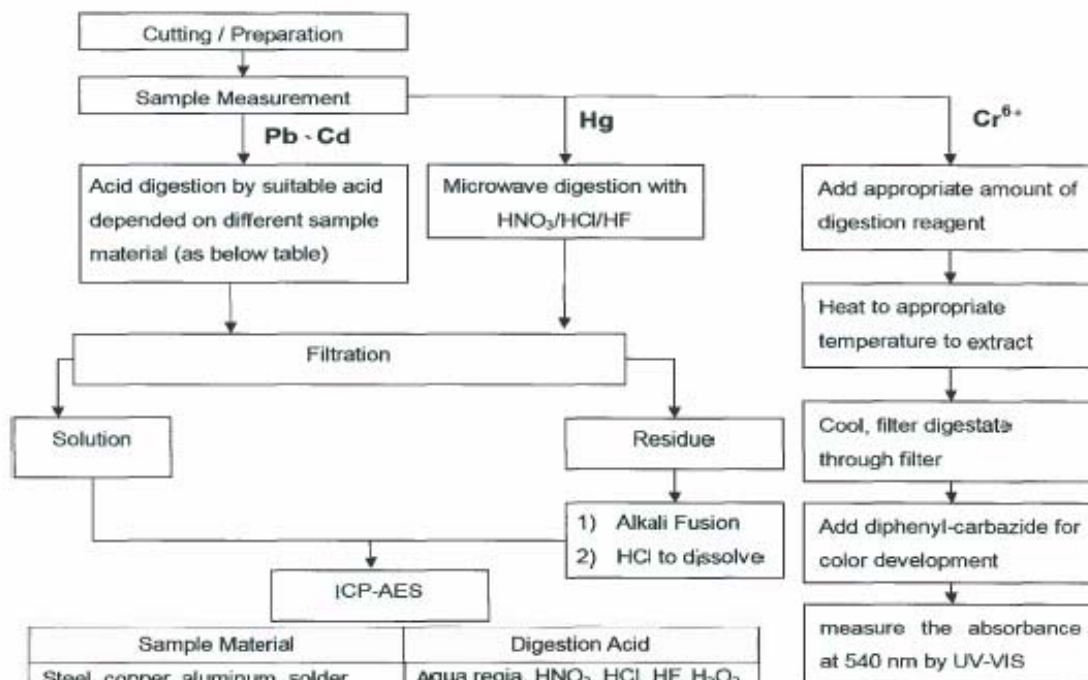
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ASM HK
4F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr6+ test method excluded)
- 2) Name of the person who made measurement: Hungming Li
- 3) Name of the person in charge of measurement: George Huang



Sample Material	Digestion Acid
Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Any acid to total digestion

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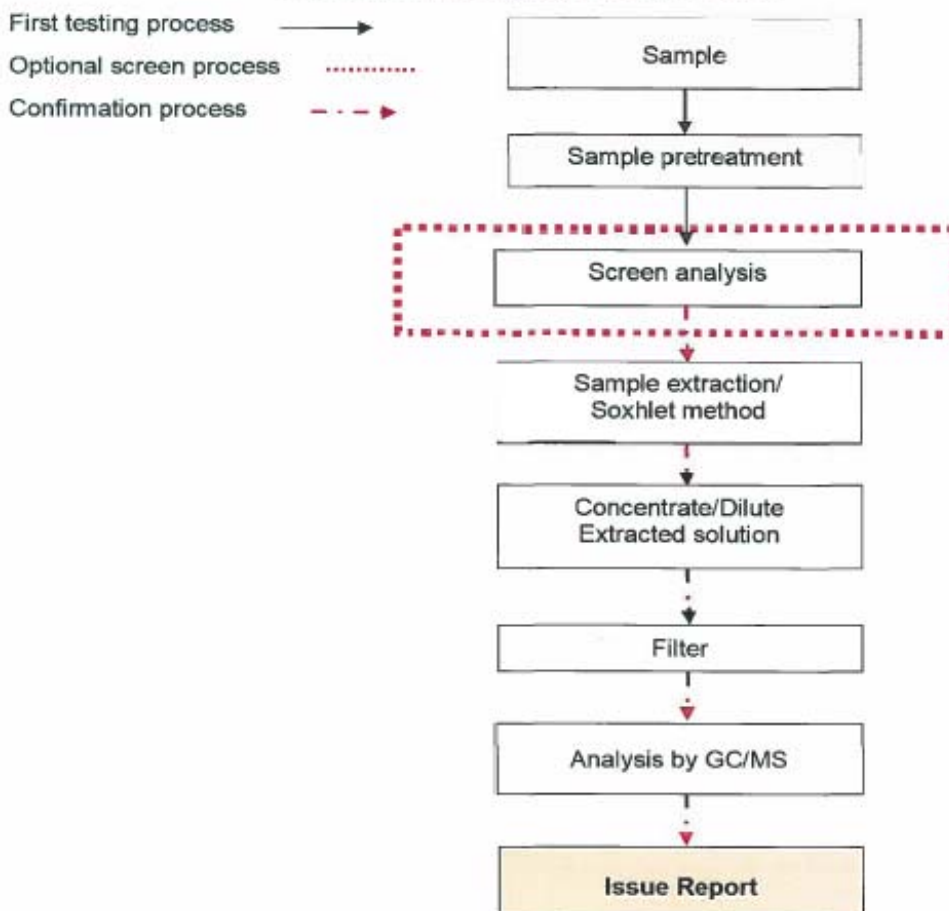
Test Report

No.: KA/2008/10990A-01 Date: 2008/01/25 Page: 5 of 6



ASM HK
4F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG

PBB/PBDE analytical FLOW CHART



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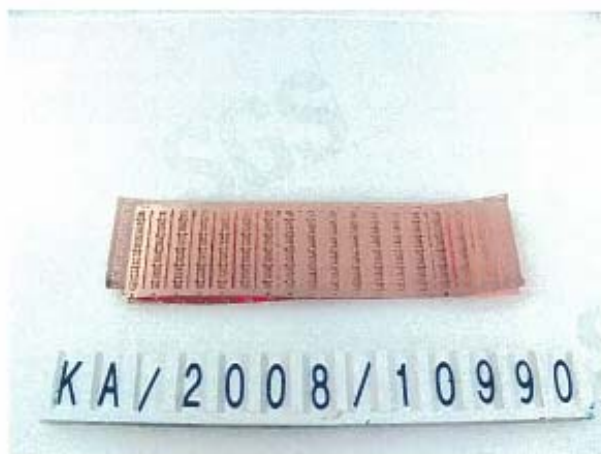
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Test Report

No. :KA/2008/10990A-01 Date: 2008/01/25 Page: 6 of 6



ASM HK
4F, WATSON CENTRE, 16 KUNG YIP ST., KWAI CHUNG, HONG KONG



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Test Report

No. : CE/2008/11713C Date : 2008/01/11 Page : 1 of 5

MK ELECTRON CO., LTD.
316-2, KUMEU-RI, POGOK-MYUN, YONGIN CITY, KYUNGGI-DO, KOREA



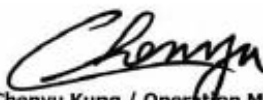
The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description : GOLD WIRE
Style/Item No. : 4N
Sample Receiving Date : 2008/01/07
Testing Period : 2008/01/07 TO 2008/01/11

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : (1) With reference to BS EN 1122:2001, Method B for Cadmium Content. Analysis was performed by ICP-AES.
(2) With reference to US EPA Method 3050B for Lead Content. Analysis was performed by ICP-AES.
(3) With reference to US EPA Method 3052 for Mercury Content. Analysis was performed by ICP-AES.
(4) With reference to US EPA Method 3060A & 7196A for Hexavalent Chromium. Analysis was performed by UV/Vis Spectrometry.
(5) With reference to US EPA 3540C for PBBs/PBDEs Content. Analysis was performed by GC/MS.

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


Chenyu Kung / Operation Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory – Taipei

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Test Report

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MK ELECTRON CO., LTD.
316-2, KUMEU-RI, POGOK-MYUN, YONGIN CITY, KYUNGGI-DO, KOREA



Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result	MDL
		No.1	
Cadmium (Cd)	(1)	n.d.	2
Lead (Pb)	(2)	n.d.	2
Mercury (Hg)	(3)	n.d.	2
Hexavalent Chromium Cr(VI)	(4)	n.d.	2
Sum of PBBs	(5)	n.d.	-
Monobromobiphenyl		n.d.	5
Dibromobiphenyl		n.d.	5
Tri bromobiphenyl		n.d.	5
Tetrabromobiphenyl		n.d.	5
Pentabromobiphenyl		n.d.	5
Hexabromobiphenyl		n.d.	5
Heptabromobiphenyl		n.d.	5
Octabromobiphenyl		n.d.	5
Nonabromobiphenyl		n.d.	5
Decabromobiphenyl		n.d.	5
Sum of PBDEs (Mono to Nona) (Note 4)		n.d.	-
Monobromobiphenyl ether		n.d.	5
Dibromobiphenyl ether		n.d.	5
Tri bromobiphenyl ether		n.d.	5
Tetrabromobiphenyl ether		n.d.	5
Pentabromobiphenyl ether		n.d.	5
Hexabromobiphenyl ether		n.d.	5
Heptabromobiphenyl ether		n.d.	5
Octabromobiphenyl ether		n.d.	5
Nonabromobiphenyl ether		n.d.	5
Decabromobiphenyl ether		n.d.	5
Sum of PBDEs (Mono to Deca)		n.d.	-

TEST PART DESCRIPTION:

NO.1 : GOLDEN COLORED WIRE

Note : 1. mg/kg = ppm

2. n.d. = Not Detected

3. MDL = Method Detection Limit

4. According to 2005/717/EC DecaBDE is exempt.

5. "-" = Not Regulated

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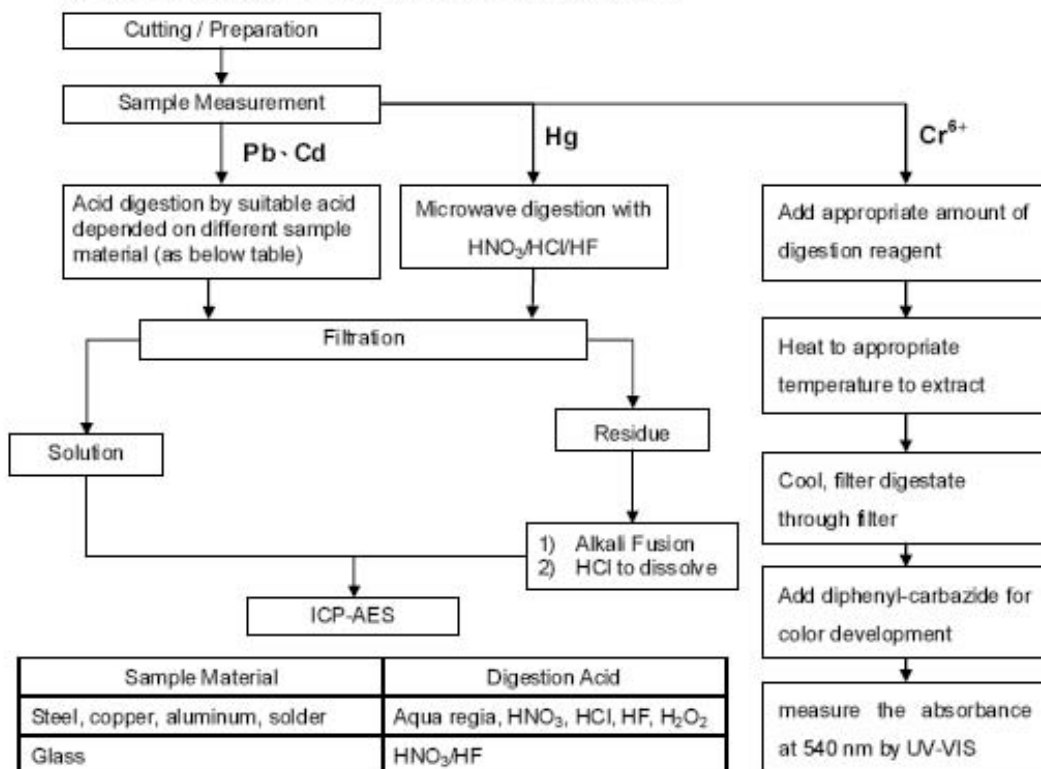


Test Report

No. : CE/2008/11713C Date : 2008/01/11 Page : 3 of 5

MK ELECTRON CO., LTD.
316-2, KUMEU-RI, POGOK-MYUN, YONGIN CITY, KYUNGGI-DO, KOREA

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: Troy Chang
- 3) Name of the person in charge of measurement: Chenyu Kung



Sample Material	Digestion Acid
Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Any acid to total digestion

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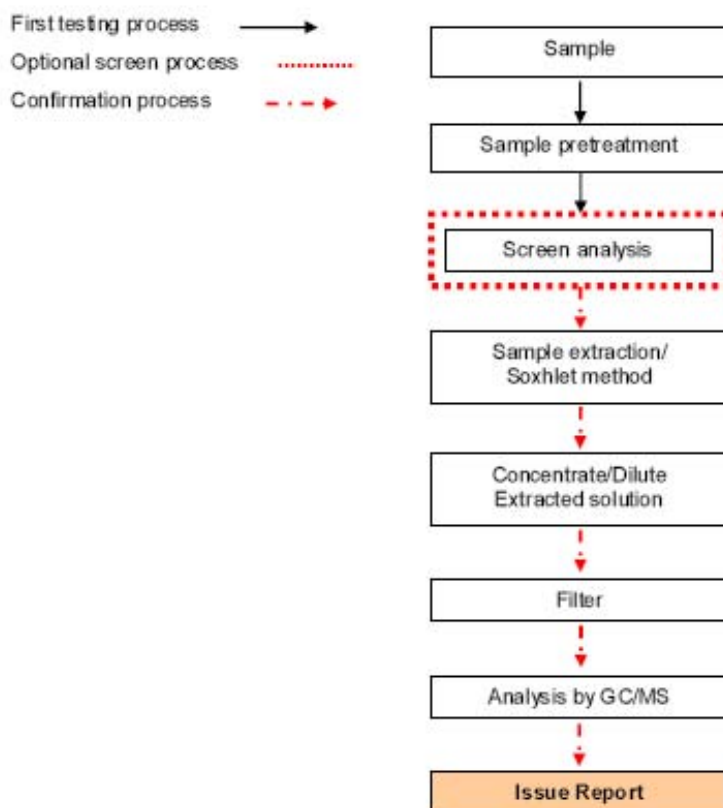
No. : CE/2008/11713C Date : 2008/01/11

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MK ELECTRON CO., LTD.
316-2, KUMEU-RI, POGOK-MYUN, YONGIN CITY, KYUNGGI-DO, KOREA



PBB/PBDE analytical FLOW CHART



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Test Report

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MK ELECTRON CO., LTD.
316-2, KUMEU-RI, POGOK-MYUN, YONGIN CITY, KYUNGGI-DO, KOREA



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Test Report

No. :KA/2008/52222A-01

Date: 2008/06/22 Page: 1 of 5

SUMITOMO BAKELITE CO., LTD.
20-7 KIYOHARA-INDUSTRIAL PARK, UTSUNOMIYA-CITY,
TOCHIGI-PREFECTURE, 321-3231 JAPAN.



The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description	: SIL8ER GRAY PASTE
Style/Item No.	: CRM-1076DJ-G
Color	: SILVER GRAY
Sample Receiving Date	: 2008/05/29
Testing Period	: 2008/05/29 TO 2008/06/05

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321, Ed.1 111/54/CDV
Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products

: (1) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 11. Determination of Cadmium by ICP-AES.
(2) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 11. Determination of Lead by ICP-AES.
(3) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 10. Determination of Mercury by ICP-AES.
(4) With reference to IEC 62321, Ed.1 111/54/CDV-Section 9. Determination of Hexavalent Chromium for non-metallic samples by UV/vis Spectrometry.
(5) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 7. Determination of PBBs and PBDEs by GC/MS.

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


Katherine Ho / Supervisor
Signed for and on behalf of
SGS Taiwan Limited

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Date: 2008/06/22 Page: 2 of 5

SUMITOMO BAKELITE CO., LTD.
20-7 KIYOHARA-INDUSTRIAL PARK, UTSUNOMIYA-CITY,
TOCHIGI-PREFECTURE, 321-3231 JAPAN.



Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result	MDL	RoHS Limit
		No.1		
Cadmium (Cd)	(1)	n.d.	2	100
Lead (Pb)	(2)	n.d.	2	1000
Mercury (Hg)	(3)	n.d.	2	1000
Hexavalent Chromium Cr(VI) by alkaline extraction	(4)	n.d.	2	1000
Sum of PBBs		n.d.	-	1000
Monobromobiphenyl		n.d.	5	-
Dibromobiphenyl		n.d.	5	-
Tribromobiphenyl		n.d.	5	-
Tetrabromobiphenyl		n.d.	5	-
Pentabromobiphenyl		n.d.	5	-
Hexabromobiphenyl		n.d.	5	-
Heptabromobiphenyl		n.d.	5	-
Octabromobiphenyl		n.d.	5	-
Nonabromobiphenyl		n.d.	5	-
Decabromobiphenyl		n.d.	5	-
Sum of PBDEs (Mono to Nona)(Note 4)	(5)	n.d.	-	1000
Monobromobiphenyl ether		n.d.	5	-
Dibromobiphenyl ether		n.d.	5	-
Tribromobiphenyl ether		n.d.	5	-
Tetrabromobiphenyl ether		n.d.	5	-
Pentabromobiphenyl ether		n.d.	5	-
Hexabromobiphenyl ether		n.d.	5	-
Heptabromobiphenyl ether		n.d.	5	-
Octabromobiphenyl ether		n.d.	5	-
Nonabromobiphenyl ether		n.d.	5	-
Decabromobiphenyl ether		n.d.	5	-
Sum of PBDEs (Mono to Deca)		n.d.	-	-

TEST PART DESCRIPTION:

NO.1

: SILVER GRAY PASTE

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No. :KA/2008/52222A-01

Date: 2008/06/22 Page: 3 of 5

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20-7 KIYOHARA-INDUSTRIAL PARK, UTSUNOMIYA-CITY,
TOCHIGI-PREFECTURE, 321-3231 JAPAN.



- Note :
1. mg/kg = ppm
 2. n.d. = Not Detected
 3. MDL = Method Detection Limit
 4. According to 2005/717/EC DecaBDE is exempt.
 5. " - " = Not Regulated

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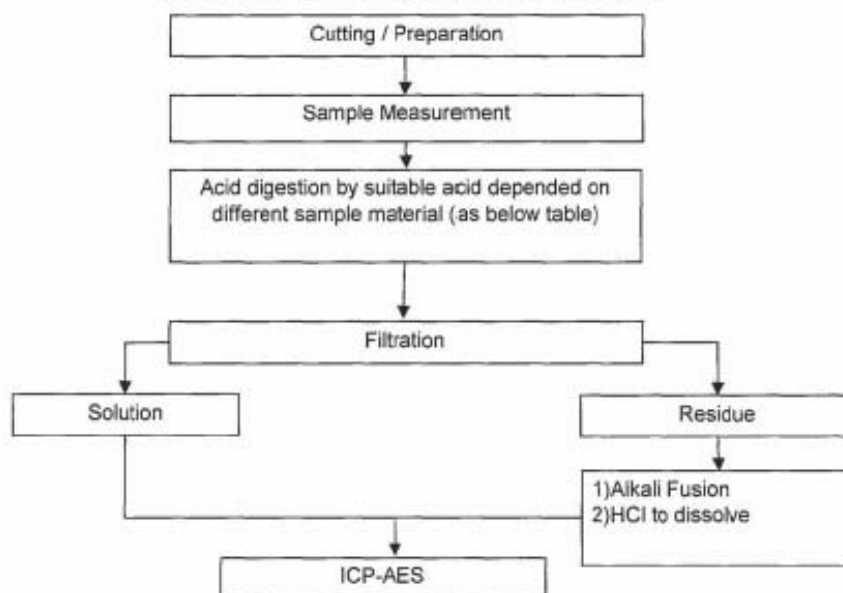
No. :KA/2008/52222A-01 Date: 2008/06/22 Page: 4 of 5

SUMITOMO BAKELITE CO., LTD.
20-7 KIYOHARA-INDUSTRIAL PARK, UTSUNOMIYA-CITY,
TOCHIGI-PREFECTURE, 321-3231 JAPAN.



- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
- 2) Name of the person who made measurement: Hungming Li
- 3) Name of the person in charge of measurement: George Huang

Method 1: Flow Chart of Digestion for Cd, Pb analysis



Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Any acid to total digestion

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Test Report

No. :KA/2008/52222A-01

Date: 2008/06/22 Page: 5 of 5

SUMITOMO BAKELITE CO., LTD.
20-7 KIYOHARA-INDUSTRIAL PARK, UTSUNOMIYA-CITY,
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Test Report

No. :KA/2008/70396A-02

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SUMITOMO BAKELITE CO., LTD.
NO.1, HUASI RD., DALIAO TOWNSHIP, KAOHSIUNG COUNTY 831,
TAIWAN (R.O.C.)



The following sample(s) was/were submitted and identified by/on behalf of the client as :

Sample Description : EPOXY MOLDING COMPOUND
Style/Item No. : G600F
Sample Receiving Date : 2008/07/05
Testing Period : 2008/07/05 TO 2008/07/12

Test Requested : In accordance with the RoHS Directive 2002/95/EC, and its amendment directives.

Test Method : With reference to IEC 62321, Ed.1 111/54/CDV
Procedures for the Determination of Levels of Regulated Substances in Electrotechnical Products

- : (1) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 11. Determination of Cadmium by ICP-AES.
- : (2) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 11. Determination of Lead by ICP-AES.
- : (3) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 10. Determination of Mercury by ICP-AES.
- : (4) With reference to IEC 62321, Ed.1 111/54/CDV-Section 9. Determination of Hexavalent Chromium for non-metallic samples by UV/Vis Spectrometry.
- : (5) With reference to IEC 62321, ED.1 (111/54/CDV)-Section 7. Determination of PBBs and PBDEs by GC/MS.

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

Conclusion : Based on the performed tests on submitted samples, the result **comply with** the RoHS Directive 2002/95/EC and its subsequent amendments.


Katherine Ho / Supervisor
Signed for and on behalf of
SGS Taiwan Limited

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SUMITOMO BAKELITE CO., LTD.
NO.1, HUASI RD., DALIAO TOWNSHIP, KAOHSIUNG COUNTY 831,
TAIWAN (R.O.C.)



Test results by chemical method (Unit: mg/kg)

Test Item (s):	Method (Refer to)	Result	MDL	RoHS Limit
		No.1		
Cadmium (Cd)	(1)	n.d.	2	100
Lead (Pb)	(2)	n.d.	2	1000
Mercury (Hg)	(3)	n.d.	2	1000
Hexavalent Chromium Cr(VI) by alkaline extraction	(4)	n.d.	2	1000
Sum of PBBs		n.d.	-	1000
Monobromobiphenyl		n.d.	5	-
Dibromobiphenyl		n.d.	5	-
Tri bromobiphenyl		n.d.	5	-
Tetrabromobiphenyl		n.d.	5	-
Pentabromobiphenyl		n.d.	5	-
Hexabromobiphenyl		n.d.	5	-
Heptabromobiphenyl		n.d.	5	-
Octabromobiphenyl		n.d.	5	-
Nonabromobiphenyl		n.d.	5	-
Decabromobiphenyl		n.d.	5	-
Sum of PBDEs (Mono to Nona)(Note 4)	(5)	n.d.	-	1000
Monobromobiphenyl ether		n.d.	5	-
Dibromobiphenyl ether		n.d.	5	-
Tri bromobiphenyl ether		n.d.	5	-
Tetrabromobiphenyl ether		n.d.	5	-
Pentabromobiphenyl ether		n.d.	5	-
Hexabromobiphenyl ether		n.d.	5	-
Heptabromobiphenyl ether		n.d.	5	-
Octabromobiphenyl ether		n.d.	5	-
Nonabromobiphenyl ether		n.d.	5	-
Decabromobiphenyl ether		n.d.	5	-
Sum of PBDEs (Mono to Deca)		n.d.	-	-

TEST PART DESCRIPTION:

NO.1

: EPOXY MOLDING COMPOUND

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SUMITOMO BAKELITE CO., LTD.
NO.1, HUASI RD., DALIAO TOWNSHIP, KAOHSIUNG COUNTY 831,
TAIWAN (R.O.C.)

- Note :
1. mg/kg = ppm
 2. n.d. = Not Detected
 3. MDL = Method Detection Limit
 4. According to 2005/717/EC DecaBDE is exempt.
 5. " - " = Not Regulated
 6. This is the additional test report of KA/2008/70396 which was issued on 2008/07/12.
Please refer to KA/2008/70396 for original information.

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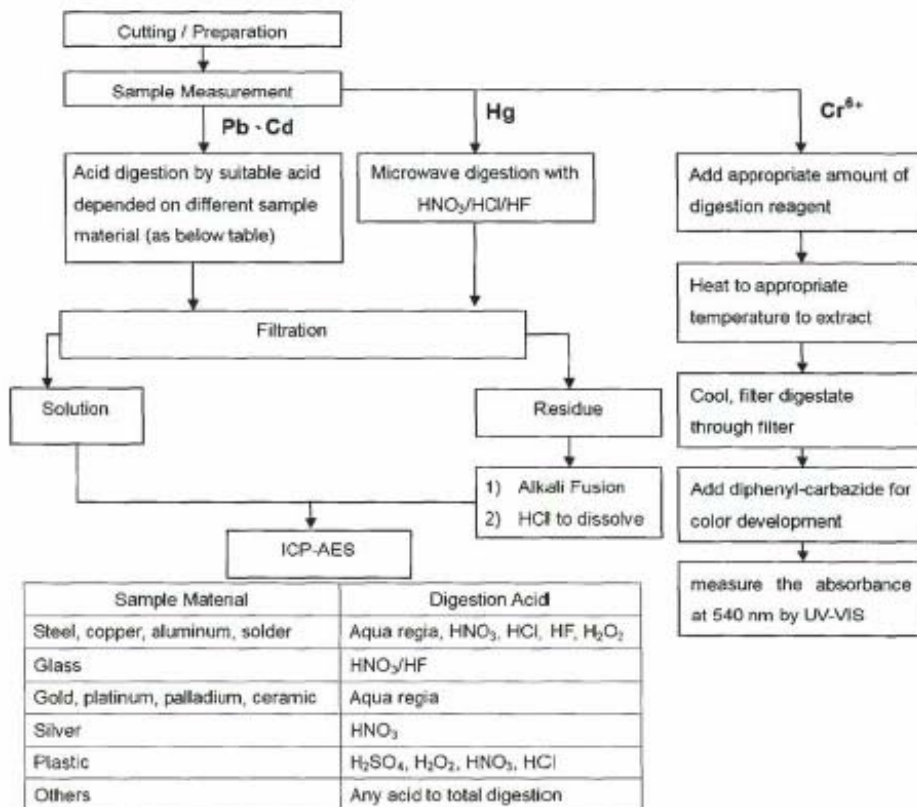
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SUMITOMO BAKELITE CO., LTD.
NO.1, HUASI RD., DALIAO TOWNSHIP, KAOHSIUNG COUNTY 831,
TAIWAN (R.O.C.)

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr6+ test method excluded)
- 2) Name of the person who made measurement: Hungming Li
- 3) Name of the person in charge of measurement: George Huang



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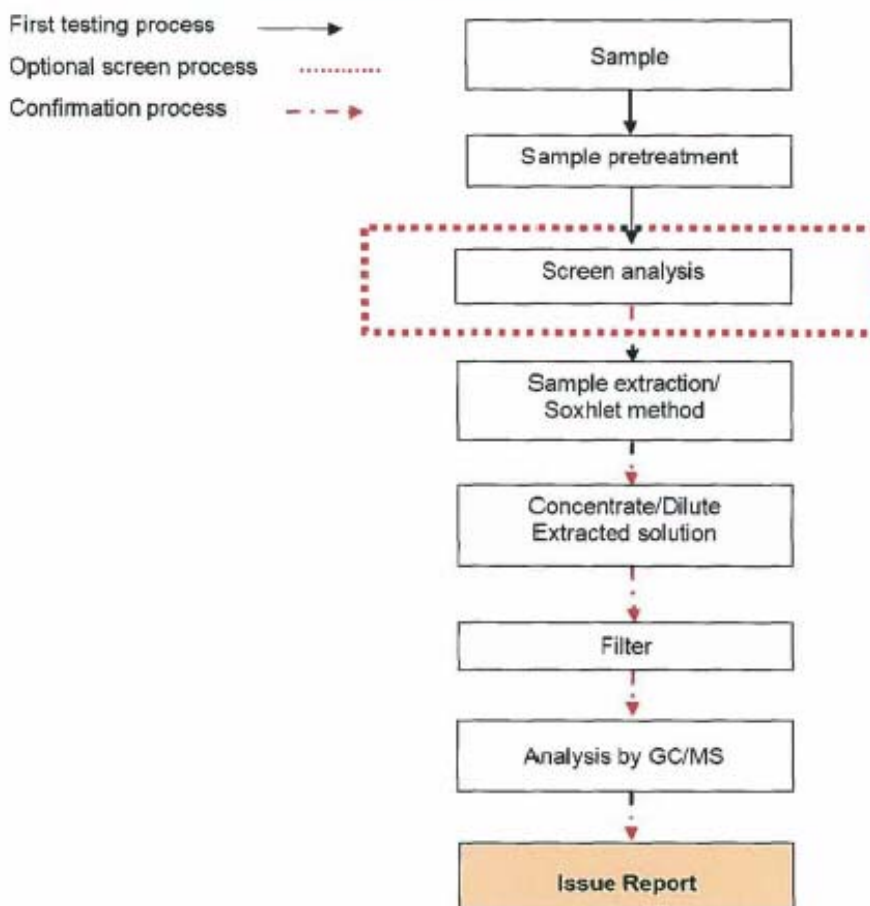
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PBB/PBDE analytical FLOW CHART



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