www.SeCosGmbH.com

Headquarter Address:
8F.No.33, Lane 155, Sec.3, Bei-Shen Rd.,
Shen Keng Dist, New Taipei City, Taiwan
TEL: +886-2-26620988
FAX: +886-2-26620488

Product/Process Change Notification

PCN#	Effective Date	Issue Date
2017-05-25C-02	2017/8/25	2017/5/25

PCN Classification	Product Category
Major	Transistor

Subject

Production process change from lead free to halogen free.

Affected Product(s)

MMBT3904

Description of Change(s)

To meet EU environment requirement, we implement halogen free to our products.

Content of Change(s)

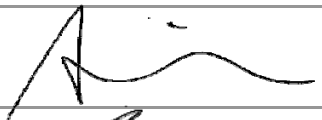
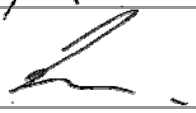
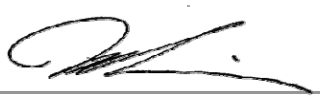
Adding “-C” to part number.

Impact(s)

N/A

Attachment(s)

SGS report. Reliability report.

Approval		
Issue by	Alice Lai	e-mail: alice@secosgmbh.com
Development Engineer		Alice Lai
QA Manager		Peter Yang
General Manger		Mathew Liu

For more information, please contact us directly or visit our website http://www.secosgmbh.com

Test Report

REPORT NO. : **CRSSA/23019-2/16**
CRS REF. : **CRSSA/16/2277/Hitachi**
DATE REPORTED : 07th Oct., 2016
PAGE : 1 of 6

Hitachi Chemical (Selangor) Sdn. Bhd.
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

The following merchandise was (were) submitted and identified by the client as:

Sample Description	:	EPOXY MOLDING COMPOUND
Item No	:	GE-200 series
Sample Receiving Date	:	29/09/2016
Testing Period	:	29/09/2016 to 07/10/2016

Test Result : Please see the next page

Analyst : Shirley Then

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/23019-2/16**
CRS REF. : **CRSSA/16/2277/Hitachi**
DATE REPORTED : 07th Oct., 2016
PAGE : 2 of 6

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test result:

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 series

Optional: RoHS Directive 2011/65/EU, priority substances

Test Item(s):	Unit	Test Method	Results	MDL	Limit
Hexabromocyclododecane (HBCDD) (Cas#25637-99-4 & 3194-55-6)	mg/kg	Based on IEC 62321:2008 (Determination of HBCDD by GC-MS)	N.D.	10	-

Note:

(a) Reference Information: Directive 2011/65/EU recasting RoHS directive 2002/95/EC: Hexabromo-cyclododecane (HBCDD), Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP) and Dibutyl phthalate (DBP) are considered as a priority for risk evaluation and substance restriction.
(b) - = not regulated
(c) N.D. = Not Detected
(d) Testing is based on original basis

Analyst: Shirley Then

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/23019-2/16**
CRS REF. : **CRSSA/16/2277/Hitachi**
DATE REPORTED : 07th Oct., 2016
PAGE : 3 of 6

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test result:

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 series

RoHS Directive 2011/65/EU Annex II (amended by Directive (EU) 2015/863)

Test Item(s):	Unit	Test Method	Results	MDL	Limit
Bis (2-ethylhexyl) phthalate (DEHP) (CAS No. 117-81-7)	mg/kg	Based on EN 14372:2004 (Determination of DEHP by GC-MS)	N.D.	30	1000
Butyl benzyl phthalate (BBP) (CAS No. 85-68-7)	mg/kg	Based on EN 14372:2004 (Determination of BBP by GC-MS)	N.D.	30	1000
Dibutyl phthalate (DBP) (CAS No. 84-74-2)	mg/kg	Based on EN 14372:2004 (Determination of DBP by GC-MS)	N.D.	30	1000
Diisobutyl phthalate (DIBP) (CAS No. 84-69-5)	mg/kg	Based on EN 14372:2004 (Determination of DIBP by GC-MS)	N.D.	30	1000

Note : (a) mg/kg = ppm ; (0.1wt% = 1000ppm)
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) - = Not regulated
(e) Testing is based on original basis

Analyst: Shirley Then

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

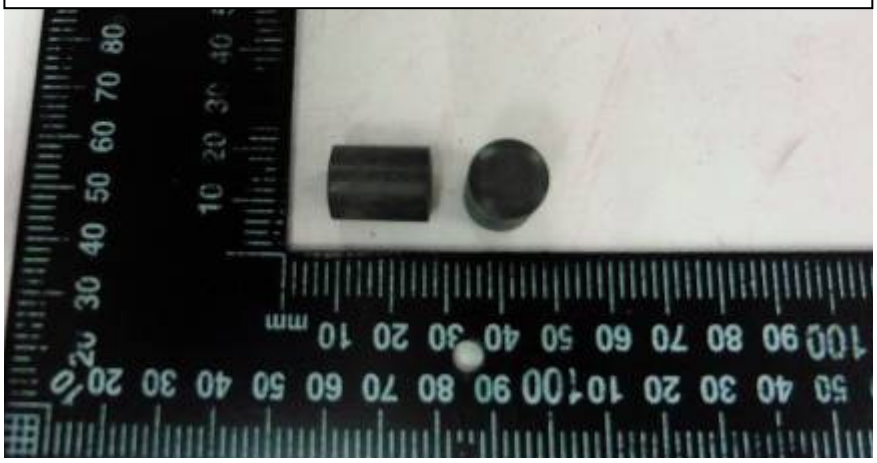
REPORT NO. : **CRSSA/23019-2/16**
CRS REF. : **CRSSA/16/2277/Hitachi**
DATE REPORTED : 07th Oct., 2016
PAGE : 4 of 6

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test Result

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 series

Hitachi Chemical (Selangor) Sdn. Bhd.
CRSSA/23019-2/16



SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

DETERMINATION OF HBCDD CONTENT

Sample Preparation

↓

Weight sample (0.5-4.0g) into extraction thimble

↓

Soxhlet Extraction with Toluene

↓

Filter through 0.45 um membrane filter

↓

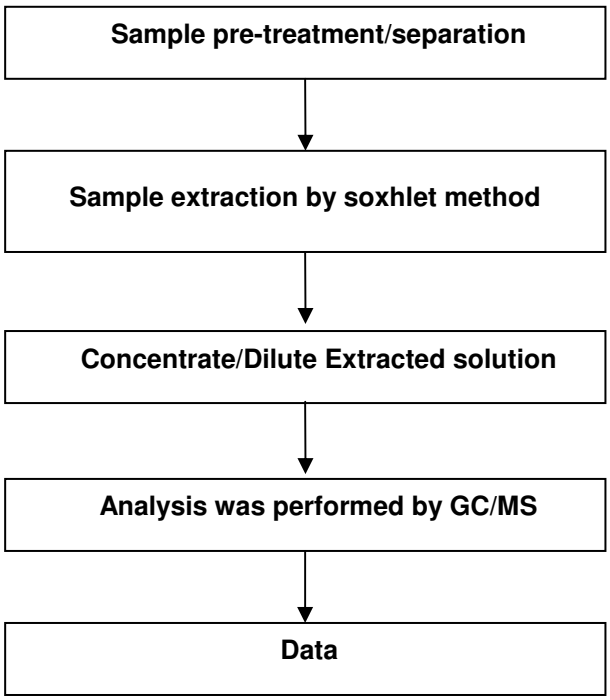
Analyses by GC-MS (with appropriate dilution)

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

Analytical flow chart of Phthalates Content



SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/17198-1/16**
CRS REF. : **CRSSA/16/1653/Hitachi**
DATE REPORTED : 26th July, 2016
PAGE : 1 of 5

Hitachi Chemical (Selangor) Sdn. Bhd.
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

The following merchandise was (were) submitted and identified by the client as:

Sample Description	:	EPOXY MOLDING COMPOUND
Item No	:	GE-200 SERIES
Sample Receiving Date	:	20/07/2016
Testing Period	:	20/07/2016 to 26/07/2016

Test Result : Please see the next page

Analysts : Tan Mei Ann & Shirley Then

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/17198-1/16**
CRS REF. : **CRSSA/16/1653/Hitachi**
DATE REPORTED : 26th July, 2016
PAGE : 2 of 5

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test Result

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 SERIES

Test Item (s) :	Unit	Method	Instrument	MDL	Results	Limit
Chromium VI (Cr6+)	ppm	IEC 62321 : 2008 Annex C	UV Vis - Spectrophotometer	2	N.D.	1000
Cadmium (Cd)	ppm	IEC 62321-5 : 2013	ICP OES	2	N.D.	100
Mercury (Hg)	ppm	IEC 62321-4 : 2013	ICP OES	2	N.D.	1000
Lead (Pb)	ppm	IEC 62321-5 : 2013	ICP OES	2	N.D.	1000

NOTE: (a) N.D. = Not detected (<MDL)
(b) ppm = mg/kg
(c) MDL= Method Detection Limit
(d) Testing is based on original basis

Analyst: Tan Mei Ann

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/17198-1/16**
CRS REF. : **CRSSA/16/1653/Hitachi**
DATE REPORTED : 26th July, 2016
PAGE : 3 of 5

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test Result

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 SERIES

Test Item (s) :	Unit	Method	Instrument	MDL	Result	Limit
PBBs (Polybrominated Biphenyls)						
Monobromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	1000
Dibromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Tribromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Tetrabromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Pentabromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Hexabromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Heptabromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Octabromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Nonabromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Decabromo Biphenyl	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
PBDEs (Polybrominated Diphenyl ethers)						1000
Monobromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Dibromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Tribromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Tetrabromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Pentabromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Hexabromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Heptabromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Octabromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Nonabromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	
Decabromo Diphenyl Ether	ppm	GCMS as per IEC 62321- 6: 2015	GCMS	5	N.D.	

NOTE: (a) N.D. = Not detected (<MDL)
(b) MDL = Method Detection Limit
(c) Testing is based on original basis

Analyst : Shirley Then

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

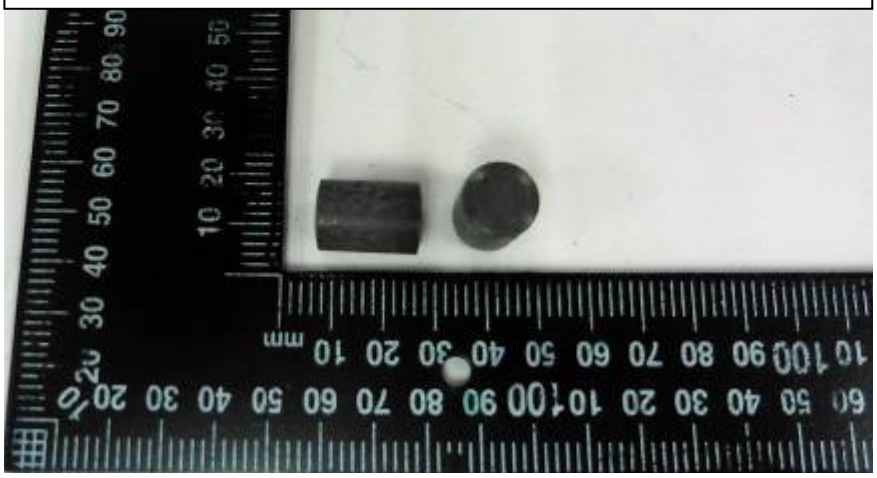
REPORT NO. : **CRSSA/17198-1/16**
CRS REF. : **CRSSA/16/1653/Hitachi**
DATE REPORTED : 26th July, 2016
PAGE : 4 of 5

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test Result

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 SERIES

Hitachi Chemical (Selangor) Sdn. Bhd.
CRSSA/17198-1/16



SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/17198-1/16**
CRS REF. : **CRSSA/16/1653/Hitachi**
DATE REPORTED : 26th July, 2016
PAGE : 5 of 5

1. DETERMINATION OF CADMIUM CONTENT BY IEC 62321-5 2013

Sample Receiving and Registration
↓
Sample Preparation
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (Microwave)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

2. DETERMINATION OF LEAD CONTENT BY IEC 62321-5 2013

Sample Receiving and Registration
↓
Sample Preparation
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (Microwave)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

3. DETERMINATION OF MERCURY CONTENT BY IEC 62321-4 2013

Sample Receiving and Registration
↓
Sample Preparation
↓
Weight sample (0.1-0.5g) into digestion vessel
↓
Acid digestion (Microwave)
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

4. DETERMINATION OF HEXAVALENT CHROMIUM BY IEC 62321 2008

Sample Preparation
↓
Add colour-developing reagent
↓
Acidify with H_2SO_4
↓
Let stand for 5-10 min
↓
Analyses by UV- Spectrophotometer (540 nm)

5. DETERMINATION OF PBB/PBDE WITH GC-MS BY IEC 62321-6 2015

Sample Preparation
↓
Weight sample (0.5-4.0g) into extraction thimble
↓
Soxhlet Extraction with Toluene
↓
Filter through 0.45 um membrane filter
↓
Analyses by GC-MS (with appropriate dilution)

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/22293/16**
CRS REF. : **CRSSA/16/2163/Hitachi**
DATE REPORTED : 22nd Sept., 2016
PAGE : 1 of 4

Hitachi Chemical (Selangor) Sdn. Bhd.
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

The following merchandise was (were) submitted and identified by the client as:

Sample Description	:	EPOXY MOLDING COMPOUND
Item No	:	GE-200 series
Sample Receiving Date	:	15/09/2016
Testing Period	:	15/09/2016 to 22/09/2016

Test Result : Please see the next page

Analysts : Tan Mei Ann & Leong Ryh Cherng

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/22293/16**
CRS REF. : **CRSSA/16/2163/Hitachi**
DATE REPORTED : 22nd Sept., 2016
PAGE : 2 of 4

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test Result

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 series

Test Item (s) :	Unit	Method	Results	MDL
Antimony (Sb)	mg/kg	ICP-OES as per US EPA 3052 (acid digestion method)	N.D.	2
Halogen	---	---	---	---
Halogen-Fluorine (F)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Fluorine content.	N.D	50
Halogen-Chlorine (Cl)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Chlorine content.	105	50
Halogen-Bromine (Br)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Bromine content.	N.D	50
Halogen-Iodine (I)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Iodine content.	N.D	50

Note : (a) mg/kg = ppm
(b) N.D. = Not Detected
(c) MDL = Method Detection Limit
(d) --- = Not Conducted
(e) Testing is based on original basis

Analysts: Tan Mei Ann & Leong Ryh Cherng

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/22293/16**
CRS REF. : **CRSSA/16/2163/Hitachi**
DATE REPORTED : 22nd Sept., 2016
PAGE : 3 of 4

Company : **Hitachi Chemical (Selangor) Sdn. Bhd.**
No. 2, Persiaran Budiman, Seksyen 23,
40300 Shah Alam, Selangor Darul Ehsan

Test Result

Sample Description : EPOXY MOLDING COMPOUND
Item No : GE-200 series

Hitachi Chemical (Selangor) Sdn. Bhd.
CRSSA/22293/16

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

Test Report

REPORT NO. : **CRSSA/22293/16**
CRS REF. : **CRSSA/16/2163/Hitachi**
DATE REPORTED : 22nd Sept., 2016
PAGE : 4 of 4

1. MICROWAVE ASSISTED ACID DIGESTION OF SILICEOUS AND ORGANICALLY BASED METRICES (US EPA 3052)

Sample Preparation
↓
Weight sample (0.2-0.5g) into digestion vessel
↓
Acid digestion (HF and HNO_3) – Microwave
↓
"Totally Dissolved"
↓
Filtration
↓
Analyses by ICP

2. DETERMINATION OF HALOGEN CONTENT

Sample pretreatment
↓
Weighting and putting sample in cell
↓
Combustion / Absorption
↓
Dilution to fixed volume
↓
Analyses by IC

SGS (MALAYSIA) SDN. BHD.

TAY SIAM PINE
B.Sc.(HONS) MMIC
ASSISTANT LAB MANAGER

SeCoS Corporation

Reliability Testing Summary Report

Date: 2017/05/12 Document No.: SK17 -05- 201

Test Item	P/N	Test Condition	(LTPD)	Sample Numbers	Allow Fall Numbers	Fall Numbers	Result
HTRB High Temp Reverse Bias	MMBT3904-C	150℃ ± 5℃, 80%VR, T = 1000 hrs		77	0	0	ACC
HTSL High Temperature Storage Life	MMBT3904-C	150℃, T = 1000 hrs		77	0	0	ACC
PCT Pressure Cooker Test	MMBT3904-C	121℃, 29.7PSIG, 168 hrs		77	0	0	ACC
TCT Temperature Cycle Test	MMBT3904-C	-55℃/30min, 150℃/30min, For 1000 Cycle		77	0	0	ACC
THT High Temperature High Humidity Test	MMBT3904-C	85 ± 2℃, RH=85±5%, 1000 hrs		77	0	0	ACC
H3TRB High Temper High Humidity Reverse Bies Test	MMBT3904-C	85 ± 2℃, RH=85±5%, 80%VR, 1000 hrs		77	0	0	ACC
Resistance to Solder Heat Test	MMBT3904-C	270℃±5℃, 7Sec +2/-0Sec		77	0	0	ACC

Judgment:

■ **qualified** □ **unqualified**

Testing Start Date: 2017.03.20 Testing End Date: 2017.05.12

Tester: King Huang Approval: Peter Yang

SeCoS Corporation

High Temperature Reverse Bias Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 150℃ ± 5℃, 80%VR, T = 1000 hrs
Test Date: 2017.03.20 ~ 2017.05.02
Test Standard : JESD22 STANDARD Method-A108
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
1	54.77V	217.3	120.6mV	53.80V	199.9	121.2mV
2	55.03V	208.2	128.3mV	52.55V	194.7	118.2mV
3	54.15V	201.0	123.2mV	52.55V	196.3	114.8mV
4	52.85V	219.7	133.6mV	53.29V	214.6	123.9mV
5	54.06V	210.6	123.7mV	54.97V	206.2	129.6mV
6	54.25V	198.3	131.7mV	53.79V	205.5	125.0mV
7	53.01V	203.6	113.1mV	55.56V	199.8	126.0mV
8	52.63V	196.7	123.6mV	54.48V	198.7	124.5mV
9	53.45V	220.7	132.5mV	54.80V	219.0	124.6mV
10	52.71V	215.1	132.0mV	54.08V	209.6	118.2mV
11	52.62V	207.8	134.2mV	53.08V	201.9	127.8mV
12	54.23V	207.7	127.8mV	53.91V	207.7	119.7mV
13	55.33V	201.4	131.6mV	55.42V	202.0	129.9mV
14	55.03V	205.0	112.5mV	52.69V	195.2	130.2mV
15	54.37V	201.7	124.5mV	53.19V	194.7	121.5mV
16	53.39V	195.1	111.3mV	53.02V	195.7	130.4mV
17	54.18V	210.3	116.3mV	54.92V	208.4	117.6mV
18	52.68V	205.5	133.8mV	54.80V	193.9	126.5mV
19	55.43V	204.4	128.2mV	52.88V	212.4	108.5mV
20	52.97V	210.3	118.7mV	54.67V	203.9	127.4mV
21	52.80V	212.8	113.9mV	52.91V	194.8	120.5mV
22	54.79V	200.5	125.6mV	52.81V	209.1	120.0mV
23	55.30V	197.3	133.4mV	55.17V	219.0	125.8mV
24	55.41V	198.1	111.4mV	52.59V	200.5	112.8mV
25	54.89V	193.9	118.6mV	53.81V	210.3	119.5mV
26	53.54V	210.4	119.4mV	54.08V	210.4	113.4mV
27	54.03V	209.2	129.6mV	54.10V	204.0	109.5mV
28	53.39V	216.4	118.9mV	53.16V	195.5	128.0mV
29	52.94V	207.2	126.8mV	53.80V	205.6	117.9mV

SeCoS Corporation

High Temperature Reverse Bias Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 150℃ ± 5℃, 80%VR, T = 1000 hrs
Test Date: 2017.03.20 ~ 2017.05.02
Test Standard : JESD22 STANDARD Method-A108
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
30	53.75V	194.9	120.5mV	55.55V	213.4	111.5mV
31	55.49V	221.0	128.8mV	54.01V	214.5	112.8mV
32	54.44V	210.1	113.9mV	52.96V	204.7	118.2mV
33	55.59V	219.6	127.8mV	55.20V	202.0	120.9mV
34	53.78V	198.1	128.3mV	53.22V	197.9	122.5mV
35	52.57V	202.8	113.9mV	53.03V	216.0	108.7mV
36	54.13V	219.7	131.2mV	55.34V	220.7	117.3mV
37	53.85V	194.9	108.7mV	53.00V	196.5	116.5mV
38	52.57V	206.5	129.9mV	53.67V	209.7	129.2mV
39	54.43V	206.3	129.6mV	53.09V	220.0	130.4mV
40	54.75V	213.6	121.9mV	54.28V	192.9	110.4mV
41	55.38V	200.4	127.1mV	52.70V	216.4	113.7mV
42	52.93V	219.6	129.9mV	53.09V	210.8	123.1mV
43	52.90V	214.6	108.9mV	55.51V	211.2	128.5mV
44	52.91V	211.0	115.4mV	54.03V	217.4	115.2mV
45	55.20V	207.6	119.5mV	52.85V	200.1	111.5mV
46	54.47V	205.6	134.0mV	54.86V	213.6	126.7mV
47	54.94V	212.1	113.0mV	55.65V	212.0	113.9mV
48	55.13V	200.0	129.5mV	53.44V	207.7	112.3mV
49	52.76V	214.2	119.1mV	53.06V	218.9	114.5mV
50	53.05V	199.8	121.2mV	53.71V	193.9	129.1mV
51	54.39V	206.5	117.4mV	53.94V	203.6	113.9mV
52	53.82V	216.3	115.2mV	54.86V	212.2	121.9mV
53	53.13V	210.8	112.7mV	55.68V	208.8	131.9mV
54	53.52V	198.7	115.0mV	53.81V	194.5	125.5mV
55	52.43V	201.6	111.2mV	53.96V	217.3	115.5mV
56	55.64V	197.3	120.6mV	54.53V	206.4	118.8mV
57	54.33V	206.1	131.4mV	54.93V	201.6	110.0mV
58	52.53V	196.1	122.3mV	54.25V	200.7	112.9mV

SeCoS Corporation

High Temperature Reverse Bias Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 150℃ ± 5℃, 80%VR, T = 1000 hrs
Test Date: 2017.03.20 ~ 2017.05.02
Test Standard : JESD22 STANDARD Method-A108
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
59	54.38V	201.4	123.5mV	54.38V	218.1	122.9mV
60	53.27V	208.7	113.5mV	53.33V	210.0	110.2mV
61	54.96V	202.9	129.0mV	54.17V	220.2	133.7mV
62	55.35V	212.7	130.1mV	52.83V	198.8	113.7mV
63	54.64V	208.1	119.5mV	54.97V	210.2	118.1mV
64	53.90V	213.9	133.6mV	55.03V	217.9	114.6mV
65	53.22V	207.5	116.8mV	53.25V	210.1	114.9mV
66	53.29V	195.4	119.1mV	54.60V	205.3	123.3mV
67	53.69V	220.9	124.1mV	53.15V	213.4	116.5mV
68	53.02V	200.6	130.5mV	55.44V	199.4	119.2mV
69	52.53V	217.8	110.5mV	55.04V	214.1	130.1mV
70	53.81V	213.4	116.6mV	53.90V	207.3	132.3mV
71	52.96V	196.7	109.8mV	53.87V	194.6	130.2mV
72	55.60V	202.2	123.6mV	54.37V	208.5	127.0mV
73	55.25V	215.7	131.0mV	54.30V	204.4	112.1mV
74	53.39V	203.5	111.3mV	52.93V	209.7	113.8mV
75	55.02V	195.0	119.2mV	52.44V	198.3	122.2mV
76	54.62V	210.6	126.9mV	54.40V	220.2	133.6mV
77	54.35V	216.5	111.5mV	53.09V	220.3	115.8mV

Made By: King Huang

Approval: Peter Yang

SeCoS Corporation

High Temperature Storage Life Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 150℃, 1000Hrs
Test Date: 2017.03.20 ~ 2017.05.02
Test Standard : JESD22 STANDARD Method-A103
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
1	53.78V	218.6	111.2mV	54.53V	192.9	117.9mV
2	55.52V	198.8	115.8mV	54.67V	219.0	131.4mV
3	54.37V	203.7	128.2mV	53.78V	206.8	109.9mV
4	55.30V	199.3	118.6mV	55.27V	195.5	134.2mV
5	54.72V	208.2	127.8mV	53.61V	215.5	129.4mV
6	53.16V	215.5	117.1mV	54.12V	212.3	109.7mV
7	55.11V	213.5	108.4mV	54.30V	199.8	119.2mV
8	52.46V	205.8	120.2mV	55.20V	215.1	116.1mV
9	53.57V	216.9	109.0mV	52.74V	203.8	122.9mV
10	52.92V	215.8	111.1mV	52.45V	205.3	117.6mV
11	55.56V	194.0	130.0mV	54.33V	213.1	131.9mV
12	53.72V	206.0	113.0mV	53.82V	215.5	112.5mV
13	54.29V	199.9	124.3mV	53.50V	213.4	129.8mV
14	54.10V	196.9	129.8mV	53.52V	218.8	109.7mV
15	55.41V	218.0	124.1mV	53.69V	194.0	118.1mV
16	54.93V	195.9	128.5mV	53.43V	196.2	116.8mV
17	54.53V	202.7	120.2mV	52.50V	217.1	123.5mV
18	53.08V	220.1	126.1mV	52.97V	199.2	119.2mV
19	53.02V	201.8	124.7mV	52.69V	208.9	121.0mV
20	53.40V	193.2	116.4mV	53.25V	209.3	117.8mV
21	54.75V	207.7	113.3mV	53.10V	212.7	111.7mV
22	54.70V	212.3	123.5mV	55.12V	198.9	126.2mV
23	54.79V	212.7	118.6mV	55.22V	204.0	111.5mV
24	55.19V	212.1	129.6mV	52.47V	214.7	130.7mV
25	55.03V	218.1	125.9mV	53.94V	219.3	123.9mV
26	53.71V	220.4	114.9mV	55.50V	203.7	108.4mV
27	55.39V	220.3	127.9mV	54.54V	217.9	119.3mV
28	52.93V	219.7	115.2mV	55.41V	218.9	132.9mV
29	55.70V	192.8	121.5mV	55.68V	211.6	133.5mV

SeCoS Corporation

High Temperature Storage Life Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 150℃, 1000Hrs
Test Date: 2017.03.20 ~ 2017.05.02
Test Standard : JESD22 STANDARD Method-A103
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
30	53.86V	209.2	112.7mV	54.40V	217.4	121.2mV
31	54.14V	218.2	112.4mV	52.58V	213.1	127.4mV
32	55.10V	196.5	130.7mV	55.02V	200.5	125.7mV
33	53.83V	202.1	119.1mV	55.47V	200.5	120.5mV
34	53.01V	218.6	121.3mV	52.73V	218.2	133.2mV
35	54.13V	196.4	130.3mV	54.92V	214.2	118.1mV
36	54.68V	213.8	110.9mV	53.71V	211.2	116.9mV
37	55.40V	212.1	110.4mV	54.84V	193.8	109.7mV
38	52.74V	207.2	118.1mV	54.54V	196.8	118.0mV
39	55.43V	203.6	117.9mV	54.00V	205.4	117.6mV
40	52.98V	198.5	112.7mV	53.36V	192.6	118.1mV
41	53.18V	201.5	113.2mV	55.53V	217.0	123.1mV
42	55.21V	208.5	126.3mV	53.52V	197.1	124.3mV
43	55.12V	218.5	116.0mV	55.23V	195.2	122.0mV
44	52.45V	206.3	112.9mV	52.70V	211.3	116.9mV
45	55.67V	218.4	125.2mV	53.24V	197.3	131.0mV
46	55.67V	215.8	112.7mV	54.83V	209.1	127.1mV
47	52.40V	195.1	124.5mV	53.37V	210.3	110.2mV
48	53.89V	202.7	133.4mV	55.09V	217.3	114.0mV
49	52.86V	213.1	108.6mV	52.52V	197.7	124.4mV
50	55.01V	203.1	115.5mV	53.16V	209.5	122.1mV
51	52.71V	207.3	126.8mV	53.07V	208.2	126.0mV
52	55.24V	212.6	113.7mV	53.49V	206.0	116.1mV
53	55.47V	218.0	127.7mV	52.53V	206.1	109.4mV
54	54.81V	199.4	121.1mV	52.65V	196.4	112.3mV
55	55.54V	200.9	122.5mV	53.17V	215.4	117.6mV
56	52.47V	216.1	110.3mV	54.35V	220.9	123.1mV
57	55.33V	201.5	116.9mV	53.24V	195.7	121.9mV
58	54.05V	207.9	131.8mV	54.69V	201.5	132.0mV

SeCoS Corporation

High Temperature Storage Life Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 150℃, 1000Hrs
Test Date: 2017.03.20 ~ 2017.05.02
Test Standard : JESD22 STANDARD Method-A103
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
59	55.63V	217.4	118.5mV	52.42V	213.6	110.0mV
60	53.06V	209.9	131.8mV	55.02V	217.8	119.1mV
61	54.14V	208.9	128.8mV	55.20V	195.3	127.1mV
62	54.45V	215.3	130.0mV	55.21V	214.5	119.6mV
63	54.87V	216.2	111.5mV	54.04V	218.5	130.0mV
64	53.77V	218.5	113.2mV	54.03V	202.5	123.6mV
65	52.59V	205.1	123.2mV	53.57V	198.2	129.3mV
66	55.01V	216.0	120.3mV	52.59V	205.0	118.6mV
67	53.22V	213.5	115.8mV	53.45V	207.8	109.4mV
68	54.81V	207.9	133.3mV	53.16V	217.5	134.2mV
69	53.53V	205.7	119.7mV	55.48V	206.2	128.1mV
70	54.97V	220.1	130.9mV	52.40V	217.0	116.2mV
71	54.90V	212.4	132.7mV	52.54V	220.9	118.2mV
72	52.72V	195.3	132.7mV	54.89V	206.1	122.1mV
73	52.95V	206.8	120.5mV	54.29V	206.4	129.7mV
74	55.16V	204.5	122.3mV	53.63V	218.6	126.5mV
75	52.72V	212.7	132.4mV	52.74V	211.2	116.3mV
76	53.24V	203.6	129.2mV	55.58V	220.0	122.9mV
77	54.17V	196.5	123.2mV	53.23V	195.0	124.5mV

Made By: King Huang

Approval: Peter Yang

SeCoS Corporation

Pressure Cooker Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 121℃, 100%RH, 29.7PSIG, 168Hrs
Test Date: 2017.03.20 ~ 2017.03.28
Test Standard : JESD22 STANDARD Method-A102
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
1	55.34V	210.3	128.7mV	52.96V	192.9	122.0mV
2	53.62V	193.8	112.4mV	54.94V	194.9	116.7mV
3	53.90V	208.8	119.6mV	55.52V	194.6	129.7mV
4	53.87V	198.4	112.7mV	52.56V	207.0	133.6mV
5	52.50V	204.8	113.2mV	53.34V	197.4	118.5mV
6	52.57V	202.7	124.1mV	53.45V	215.7	134.0mV
7	55.27V	194.6	127.0mV	52.63V	196.8	130.6mV
8	55.01V	205.3	118.1mV	53.74V	208.3	112.5mV
9	53.00V	203.0	121.8mV	53.04V	207.4	134.4mV
10	52.41V	201.8	126.1mV	55.23V	220.3	109.7mV
11	55.51V	209.9	132.1mV	53.28V	206.0	133.4mV
12	55.42V	217.1	134.3mV	55.08V	207.4	130.7mV
13	53.13V	209.0	112.8mV	52.82V	218.3	113.3mV
14	54.12V	204.2	116.3mV	53.07V	218.3	133.7mV
15	54.13V	193.0	120.6mV	55.54V	200.7	122.4mV
16	54.53V	206.7	118.8mV	53.13V	212.0	116.6mV
17	54.72V	193.1	127.8mV	55.49V	195.5	113.3mV
18	53.98V	195.4	113.0mV	54.44V	205.7	123.4mV
19	53.50V	204.0	112.8mV	55.06V	197.7	112.3mV
20	55.00V	207.5	122.4mV	54.13V	200.9	113.9mV
21	53.10V	216.2	125.1mV	55.21V	201.2	123.6mV
22	53.03V	218.1	117.3mV	52.64V	196.5	123.6mV
23	53.60V	212.9	133.7mV	53.40V	217.2	113.8mV
24	55.40V	214.8	116.7mV	53.80V	207.6	133.2mV
25	54.56V	196.1	128.0mV	54.46V	205.9	110.3mV
26	55.57V	195.1	115.2mV	55.41V	209.3	113.5mV
27	53.38V	193.2	126.2mV	52.81V	208.9	121.8mV
28	52.74V	212.0	123.7mV	54.12V	218.3	111.4mV
29	54.85V	210.7	121.4mV	53.03V	195.4	123.0mV

SeCoS Corporation

Pressure Cooker Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 121℃, 100%RH, 29.7PSIG, 168Hrs
Test Date: 2017.03.20 ~ 2017.03.28
Test Standard : JESD22 STANDARD Method-A102
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
30	52.98V	210.3	123.6mV	54.52V	219.2	124.5mV
31	55.00V	207.4	120.6mV	54.25V	209.5	128.9mV
32	52.69V	207.3	130.8mV	55.62V	201.7	109.3mV
33	53.26V	198.9	126.3mV	52.50V	204.1	130.8mV
34	53.97V	213.8	128.3mV	55.41V	194.9	134.0mV
35	52.72V	210.9	121.4mV	54.95V	220.6	121.6mV
36	53.38V	213.9	129.4mV	53.10V	220.3	111.0mV
37	52.90V	200.8	129.3mV	53.97V	209.3	110.8mV
38	53.06V	219.1	114.7mV	54.67V	202.9	124.8mV
39	55.11V	201.6	116.6mV	54.88V	205.2	118.3mV
40	53.48V	216.6	116.9mV	52.72V	215.9	111.7mV
41	55.05V	205.8	132.8mV	53.33V	203.8	119.3mV
42	54.51V	199.3	131.6mV	52.75V	200.9	110.2mV
43	55.31V	217.6	117.1mV	54.73V	213.3	124.3mV
44	54.25V	197.2	110.2mV	54.78V	203.2	114.7mV
45	53.89V	215.7	111.5mV	54.14V	194.0	131.2mV
46	52.98V	207.3	132.9mV	53.42V	198.0	133.7mV
47	54.74V	209.5	129.4mV	53.82V	200.2	123.0mV
48	53.77V	194.9	112.8mV	54.28V	214.8	120.8mV
49	53.59V	205.8	127.4mV	53.96V	208.2	124.4mV
50	55.29V	198.5	116.3mV	54.29V	208.1	125.7mV
51	54.50V	217.2	133.0mV	55.69V	218.7	109.6mV
52	53.62V	217.5	121.0mV	54.45V	218.5	133.2mV
53	53.49V	211.8	118.3mV	52.61V	219.1	114.8mV
54	55.02V	219.5	123.2mV	55.44V	194.3	109.6mV
55	54.62V	207.5	110.1mV	55.60V	205.4	109.8mV
56	54.11V	220.1	125.2mV	53.49V	200.0	132.6mV
57	55.24V	210.0	109.6mV	53.46V	204.4	114.3mV
58	53.32V	202.3	118.1mV	53.14V	217.8	110.9mV

SeCoS Corporation

Pressure Cooker Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 121℃, 100%RH, 29.7PSIG, 168Hrs
Test Date: 2017.03.20 ~ 2017.03.28
Test Standard : JESD22 STANDARD Method-A102
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
59	52.87V	202.3	129.2mV	54.23V	210.3	119.9mV
60	53.80V	203.3	109.8mV	52.71V	200.3	110.4mV
61	53.81V	220.4	109.0mV	54.11V	201.2	122.1mV
62	55.25V	209.3	126.9mV	54.30V	195.0	120.4mV
63	54.08V	204.9	121.6mV	55.02V	198.7	132.1mV
64	52.97V	209.4	110.3mV	55.33V	216.7	130.4mV
65	53.35V	197.2	129.9mV	54.24V	216.0	125.8mV
66	53.15V	213.6	130.3mV	53.24V	203.9	122.5mV
67	54.33V	206.3	108.8mV	54.90V	192.8	127.4mV
68	54.59V	195.8	130.4mV	52.85V	192.5	110.4mV
69	54.48V	218.2	121.9mV	55.11V	216.3	120.5mV
70	55.45V	195.1	126.2mV	54.07V	193.0	116.6mV
71	53.61V	213.5	121.5mV	53.15V	200.9	125.5mV
72	52.55V	196.3	111.0mV	52.49V	218.8	109.9mV
73	53.73V	195.0	129.3mV	53.89V	214.0	113.1mV
74	53.62V	199.7	110.6mV	54.21V	214.6	118.3mV
75	54.71V	205.7	130.8mV	53.05V	200.2	119.7mV
76	54.77V	196.6	124.9mV	55.03V	204.8	128.2mV
77	55.67V	220.6	120.7mV	53.63V	212.8	130.5mV

Made By: King Huang

Approval: Peter Yang

SeCoS Corporation

Temperature Cycle Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: -55℃/30min, 150℃/30min, for1000 Cycle
Test Date: 2017.03.21 ~ 2017.05.12
Test Standard : JESD22 STANDARD Method-A104
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
1	54.58V	197.8	122.4mV	53.46V	200.5	120.8mV
2	54.94V	201.2	122.1mV	53.22V	217.8	130.8mV
3	54.66V	208.2	115.3mV	53.23V	200.2	119.8mV
4	55.59V	199.0	117.4mV	53.88V	194.7	109.3mV
5	54.91V	220.5	134.3mV	53.21V	208.5	122.7mV
6	52.93V	201.0	125.8mV	53.84V	208.5	118.6mV
7	54.85V	216.9	134.0mV	54.60V	194.1	119.4mV
8	53.85V	195.5	127.6mV	52.63V	192.7	116.2mV
9	55.11V	218.5	117.2mV	54.22V	216.1	119.0mV
10	54.75V	192.5	120.7mV	55.41V	220.4	114.2mV
11	52.78V	211.6	124.6mV	54.89V	198.8	118.0mV
12	54.26V	202.9	115.0mV	53.62V	194.1	128.5mV
13	53.64V	198.9	115.2mV	53.91V	193.7	132.4mV
14	52.53V	220.7	132.7mV	54.71V	212.4	114.3mV
15	54.35V	198.7	120.7mV	53.10V	200.1	131.3mV
16	55.14V	208.5	115.9mV	54.80V	210.3	134.1mV
17	53.89V	209.2	114.9mV	55.64V	203.7	129.9mV
18	53.48V	197.9	110.9mV	55.62V	215.4	121.2mV
19	55.04V	211.7	118.1mV	55.09V	214.9	134.0mV
20	55.05V	201.9	116.5mV	52.45V	218.3	116.6mV
21	54.75V	214.2	129.9mV	52.76V	204.7	110.3mV
22	53.38V	197.3	128.8mV	53.57V	219.6	126.8mV
23	55.18V	213.9	120.4mV	53.15V	210.8	121.7mV
24	52.45V	207.9	119.0mV	55.67V	212.0	126.4mV
25	54.50V	194.9	116.5mV	52.63V	213.3	129.4mV
26	55.10V	210.6	130.4mV	55.30V	194.4	111.5mV
27	54.80V	216.8	132.3mV	52.75V	211.4	111.9mV
28	52.52V	201.8	129.4mV	53.34V	217.8	121.6mV
29	54.00V	200.3	129.5mV	53.03V	201.0	123.4mV

SeCoS Corporation

Temperature Cycle Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: -55℃/30min, 150℃/30min, for1000 Cycle
Test Date: 2017.03.21 ~ 2017.05.12
Test Standard : JESD22 STANDARD Method-A104
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
30	53.58V	197.2	129.4mV	52.50V	193.3	109.1mV
31	55.61V	215.1	112.7mV	54.39V	209.5	120.2mV
32	54.59V	206.8	114.7mV	53.03V	194.7	111.9mV
33	55.45V	220.1	117.0mV	53.53V	209.9	116.3mV
34	53.80V	197.1	113.3mV	55.27V	211.9	125.6mV
35	52.44V	193.5	110.0mV	54.91V	219.3	115.6mV
36	53.75V	196.1	130.9mV	54.05V	219.5	116.8mV
37	53.05V	218.8	113.4mV	53.26V	195.9	127.0mV
38	55.51V	210.8	112.0mV	54.44V	218.5	131.5mV
39	54.33V	220.4	127.6mV	54.17V	201.0	115.1mV
40	53.70V	219.2	129.5mV	53.24V	200.2	122.9mV
41	54.46V	205.5	126.1mV	54.63V	208.8	128.3mV
42	52.73V	200.4	124.9mV	52.71V	202.0	109.6mV
43	53.18V	194.3	119.7mV	53.67V	195.1	113.5mV
44	55.60V	192.7	126.7mV	55.50V	211.8	113.3mV
45	52.61V	207.4	115.2mV	53.99V	197.3	132.3mV
46	54.81V	203.0	130.2mV	54.79V	197.3	127.5mV
47	53.30V	203.5	124.4mV	52.62V	194.0	122.7mV
48	54.13V	220.6	125.7mV	53.68V	217.1	129.2mV
49	53.22V	204.6	128.2mV	55.63V	202.5	121.0mV
50	52.68V	217.2	130.4mV	53.82V	214.5	109.9mV
51	55.23V	214.2	129.5mV	53.27V	200.4	131.6mV
52	53.50V	217.7	132.1mV	54.86V	197.3	114.4mV
53	53.70V	212.4	113.1mV	55.59V	198.8	108.9mV
54	55.68V	196.6	129.6mV	53.18V	200.7	110.0mV
55	54.56V	202.1	124.2mV	54.74V	212.2	115.2mV
56	55.00V	204.0	128.3mV	54.51V	194.7	130.3mV
57	54.04V	200.0	121.1mV	53.08V	203.6	132.0mV
58	54.43V	193.3	116.0mV	54.01V	209.7	128.1mV

SeCoS Corporation

Temperature Cycle Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: -55℃/30min, 150℃/30min, for1000 Cycle
Test Date: 2017.03.21 ~ 2017.05.12
Test Standard : JESD22 STANDARD Method-A104
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
59	52.95V	213.9	133.5mV	52.67V	214.3	126.5mV
60	52.97V	214.3	127.2mV	55.48V	199.7	109.7mV
61	52.75V	196.1	109.2mV	54.73V	196.6	116.5mV
62	52.70V	216.1	118.9mV	54.66V	218.2	122.3mV
63	53.00V	215.5	113.2mV	52.74V	208.1	126.8mV
64	55.35V	218.7	128.8mV	52.45V	221.0	120.6mV
65	53.72V	207.5	129.3mV	55.04V	196.3	121.9mV
66	55.50V	201.1	110.0mV	55.27V	220.2	116.5mV
67	52.49V	213.5	124.8mV	54.52V	201.7	116.2mV
68	54.26V	200.1	120.7mV	53.91V	220.2	109.9mV
69	54.88V	220.7	130.2mV	54.08V	210.3	125.0mV
70	54.15V	196.2	109.2mV	54.94V	218.0	122.3mV
71	54.74V	200.7	114.0mV	54.85V	200.0	114.8mV
72	54.62V	202.3	133.1mV	52.86V	218.1	111.8mV
73	52.80V	205.0	124.8mV	53.58V	219.5	131.4mV
74	53.43V	207.8	122.3mV	52.88V	194.2	124.1mV
75	53.26V	218.5	112.3mV	53.28V	207.2	118.0mV
76	54.37V	214.5	125.5mV	55.10V	209.2	109.8mV
77	55.70V	194.6	114.9mV	55.17V	216.4	119.9mV

Made By: King Huang

Approval: Peter Yang

SeCoS Corporation

High Temperature High Humidity Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 85±2℃, 85±5%RH, 1000Hrs
Test Date: 2017.03.28 ~ 2017.05.10
Test Standard : JESD22 STANDARD Method-A101
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
1	55.39V	213.7	110.0mV	55.36V	209.6	117.5mV
2	53.70V	197.8	115.8mV	55.62V	210.9	121.2mV
3	55.53V	210.1	123.1mV	55.06V	218.1	130.9mV
4	53.40V	199.2	130.4mV	53.84V	194.7	120.4mV
5	55.19V	203.1	134.3mV	55.02V	208.2	123.6mV
6	53.99V	216.9	116.7mV	55.10V	216.4	124.5mV
7	54.60V	212.7	110.0mV	52.90V	195.2	127.3mV
8	53.94V	217.1	128.2mV	53.94V	215.5	116.1mV
9	54.82V	197.5	116.8mV	54.21V	218.9	131.0mV
10	53.90V	220.5	113.7mV	55.27V	218.1	129.6mV
11	53.19V	208.4	111.9mV	54.20V	195.0	132.2mV
12	52.46V	202.9	127.3mV	53.27V	214.2	127.1mV
13	53.68V	219.1	128.7mV	54.87V	194.6	117.5mV
14	54.86V	215.5	110.2mV	52.46V	213.4	117.5mV
15	52.80V	204.7	121.5mV	53.24V	220.2	128.3mV
16	54.03V	195.1	111.5mV	54.26V	193.1	119.9mV
17	53.74V	217.4	116.7mV	53.18V	213.0	125.6mV
18	54.42V	215.5	108.6mV	54.98V	202.1	110.5mV
19	54.80V	195.2	121.1mV	53.58V	217.5	123.0mV
20	54.22V	200.1	125.8mV	54.88V	203.1	112.9mV
21	55.33V	204.5	131.8mV	53.60V	211.7	113.1mV
22	53.89V	199.0	133.8mV	55.59V	199.3	108.8mV
23	54.74V	201.5	109.5mV	54.76V	198.0	112.6mV
24	54.92V	200.6	117.0mV	54.51V	207.3	113.4mV
25	52.85V	213.3	133.2mV	53.54V	211.3	117.5mV
26	52.92V	210.1	133.5mV	54.82V	197.3	114.5mV
27	54.38V	214.3	133.8mV	52.93V	218.4	114.9mV
28	54.40V	197.8	110.2mV	53.89V	194.7	129.3mV
29	53.80V	219.5	131.5mV	52.73V	198.8	130.8mV

SeCoS Corporation

High Temperature High Humidity Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 85±2℃, 85±5%RH, 1000Hrs
Test Date: 2017.03.28 ~ 2017.05.10
Test Standard : JESD22 STANDARD Method-A101
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
30	55.08V	204.6	115.3mV	52.56V	200.6	131.6mV
31	54.78V	208.7	131.5mV	54.94V	200.5	129.3mV
32	53.77V	212.8	123.3mV	53.24V	194.9	125.5mV
33	52.62V	200.0	129.4mV	54.59V	217.4	123.7mV
34	55.11V	210.4	113.4mV	54.88V	198.0	109.1mV
35	53.82V	194.0	126.4mV	53.20V	212.3	119.2mV
36	52.45V	197.8	118.5mV	54.02V	203.2	115.2mV
37	53.02V	196.0	128.1mV	54.19V	196.3	128.3mV
38	54.18V	196.4	119.0mV	53.77V	219.4	122.3mV
39	53.34V	218.8	121.8mV	54.44V	194.5	122.6mV
40	55.58V	218.8	116.0mV	55.03V	193.6	118.5mV
41	52.69V	209.9	111.2mV	53.13V	218.9	112.9mV
42	52.58V	209.6	128.2mV	53.08V	194.9	120.8mV
43	53.72V	192.8	123.2mV	52.97V	216.8	127.6mV
44	53.61V	192.9	129.5mV	53.11V	220.0	129.5mV
45	53.36V	208.1	118.9mV	54.57V	200.8	132.1mV
46	53.83V	216.3	119.5mV	54.34V	207.3	128.5mV
47	54.46V	199.2	111.1mV	53.21V	219.9	125.6mV
48	54.82V	208.0	116.5mV	55.46V	203.4	122.2mV
49	55.28V	213.5	131.7mV	54.15V	210.1	112.8mV
50	53.57V	203.5	109.8mV	55.22V	196.9	134.3mV
51	55.34V	212.7	110.2mV	53.09V	211.5	120.9mV
52	54.76V	211.0	130.7mV	54.79V	202.3	130.8mV
53	53.88V	217.9	127.2mV	53.28V	195.4	122.8mV
54	54.80V	202.7	116.5mV	53.74V	192.7	120.4mV
55	52.91V	192.6	120.5mV	53.68V	196.5	117.2mV
56	53.42V	212.4	113.9mV	55.67V	207.3	108.7mV
57	53.93V	210.7	109.8mV	52.78V	205.8	125.2mV
58	53.01V	194.8	131.6mV	54.24V	201.4	120.3mV

SeCoS Corporation

High Temperature High Humidity Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 85±2℃, 85±5%RH, 1000Hrs
Test Date: 2017.03.28 ~ 2017.05.10
Test Standard : JESD22 STANDARD Method-A101
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
59	55.62V	200.0	127.9mV	54.57V	219.6	111.3mV
60	53.78V	208.5	129.3mV	54.77V	195.3	114.7mV
61	54.64V	205.5	131.5mV	52.67V	218.2	110.6mV
62	52.93V	203.3	122.1mV	55.15V	193.2	117.5mV
63	54.27V	201.5	119.4mV	52.86V	216.7	132.1mV
64	52.41V	192.6	130.6mV	54.63V	212.5	112.2mV
65	54.06V	217.5	126.3mV	54.11V	217.5	124.2mV
66	55.40V	203.4	113.8mV	55.48V	217.5	109.2mV
67	53.87V	216.8	122.6mV	54.46V	201.7	118.1mV
68	55.05V	214.2	113.4mV	53.71V	218.6	116.8mV
69	52.90V	196.8	121.8mV	53.91V	199.0	123.1mV
70	54.19V	221.0	118.8mV	53.90V	201.4	131.8mV
71	55.24V	198.5	108.8mV	53.33V	195.5	119.6mV
72	54.81V	207.4	125.2mV	52.87V	213.9	117.5mV
73	52.90V	208.3	111.6mV	53.46V	215.1	118.1mV
74	52.56V	204.4	130.4mV	55.23V	203.3	123.9mV
75	52.52V	214.5	112.7mV	55.51V	204.8	131.7mV
76	54.87V	195.7	108.8mV	52.98V	219.2	132.5mV
77	53.82V	216.3	132.9mV	54.70V	212.5	117.1mV

Made By: King Huang

Approval: Peter Yang

SeCoS Corporation

High Temper High Humidity Reverse Bies Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 85±2℃, 85±5%RH, 80%VR, 1000Hrs
Test Date: 2017.03.28 ~ 2017.05.10
Test Standard : JESD22 STANDARD Method-A101
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
1	54.03V	214.5	132.5mV	53.58V	202.4	109.2mV
2	54.30V	217.2	109.6mV	52.57V	197.6	134.5mV
3	52.56V	210.7	110.9mV	54.40V	208.9	132.7mV
4	53.00V	204.4	109.6mV	54.78V	199.9	122.3mV
5	53.18V	216.3	134.4mV	53.31V	196.9	109.9mV
6	55.40V	200.5	129.0mV	53.67V	200.4	133.5mV
7	55.09V	213.5	124.2mV	53.98V	199.1	122.8mV
8	53.30V	196.8	130.3mV	55.14V	200.2	109.6mV
9	53.25V	217.1	127.8mV	54.45V	198.9	121.4mV
10	53.65V	204.6	126.0mV	54.33V	196.8	114.5mV
11	53.06V	198.9	113.3mV	54.89V	215.4	116.8mV
12	55.64V	218.3	110.1mV	53.16V	210.7	114.3mV
13	54.72V	204.2	127.2mV	53.94V	204.3	119.7mV
14	54.61V	219.9	134.2mV	55.03V	206.5	124.6mV
15	54.32V	199.8	125.3mV	52.73V	196.1	118.6mV
16	54.55V	196.8	125.9mV	54.48V	200.1	128.5mV
17	53.74V	220.8	121.9mV	53.54V	211.5	109.0mV
18	55.33V	220.9	129.5mV	55.09V	213.4	109.6mV
19	54.43V	215.2	115.1mV	54.96V	196.9	112.8mV
20	53.56V	215.1	126.1mV	55.23V	195.1	127.9mV
21	53.62V	214.2	120.6mV	53.35V	212.9	125.5mV
22	55.65V	213.6	126.7mV	54.91V	214.0	116.1mV
23	52.68V	200.7	132.7mV	52.69V	209.2	123.6mV
24	53.77V	200.4	133.6mV	55.03V	217.0	129.3mV
25	53.48V	209.5	109.2mV	54.15V	220.8	130.5mV
26	55.53V	219.6	132.2mV	55.48V	194.7	132.1mV
27	54.23V	216.9	131.7mV	53.12V	204.2	122.9mV
28	54.48V	210.7	122.8mV	54.38V	199.4	128.8mV
29	53.86V	213.0	114.3mV	54.74V	212.0	116.9mV

SeCoS Corporation

High Temper High Humidity Reverse Bies Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 85±2℃, 85±5%RH, 80%VR, 1000Hrs
Test Date: 2017.03.28 ~ 2017.05.10
Test Standard : JESD22 STANDARD Method-A101
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
30	54.60V	218.8	119.6mV	52.86V	200.0	131.0mV
31	54.26V	200.5	109.7mV	52.40V	198.1	122.5mV
32	54.68V	200.6	119.6mV	55.21V	203.1	128.8mV
33	54.89V	218.6	123.1mV	54.89V	209.9	110.6mV
34	55.42V	214.3	134.4mV	54.45V	215.8	120.1mV
35	55.40V	200.7	120.7mV	52.71V	218.5	119.6mV
36	53.08V	214.6	117.9mV	55.09V	209.6	131.3mV
37	54.96V	209.8	133.1mV	53.65V	217.2	114.2mV
38	54.40V	206.0	114.1mV	54.32V	214.1	131.6mV
39	53.82V	198.7	117.7mV	53.13V	208.0	112.4mV
40	53.61V	216.9	108.8mV	53.52V	217.0	115.0mV
41	53.84V	203.5	126.5mV	54.88V	219.3	126.7mV
42	55.39V	207.1	127.9mV	53.70V	211.0	109.2mV
43	55.34V	194.8	134.3mV	54.25V	201.9	113.3mV
44	54.21V	202.3	113.1mV	54.76V	211.7	108.5mV
45	54.01V	193.9	124.5mV	54.64V	205.0	126.4mV
46	55.55V	216.7	131.9mV	54.69V	214.8	126.6mV
47	55.62V	198.4	124.6mV	52.91V	193.1	123.0mV
48	54.13V	206.4	116.8mV	53.21V	206.4	115.0mV
49	52.92V	210.2	114.1mV	55.13V	207.0	110.0mV
50	54.79V	204.5	120.4mV	52.43V	195.2	113.6mV
51	53.05V	216.9	121.5mV	54.20V	208.5	131.1mV
52	55.07V	208.0	128.8mV	55.29V	193.5	117.3mV
53	55.14V	206.0	124.3mV	53.36V	205.1	124.7mV
54	52.66V	212.1	123.9mV	52.75V	217.5	113.5mV
55	54.49V	206.5	126.4mV	54.81V	212.2	125.6mV
56	53.93V	216.1	117.6mV	54.50V	194.4	124.1mV
57	54.78V	211.1	126.1mV	53.31V	215.4	115.1mV
58	54.56V	214.6	114.3mV	55.54V	196.5	116.1mV

SeCoS Corporation

High Temper High Humidity Reverse Bies Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 85±2℃, 85±5%RH, 80%VR, 1000Hrs
Test Date: 2017.03.28 ~ 2017.05.10
Test Standard : JESD22 STANDARD Method-A101
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
59	53.12V	207.4	119.9mV	54.26V	215.6	127.6mV
60	52.59V	195.6	132.9mV	54.65V	207.5	110.4mV
61	54.79V	217.5	124.3mV	54.51V	197.9	109.1mV
62	52.60V	202.8	119.1mV	53.77V	212.6	120.8mV
63	54.20V	218.5	114.3mV	54.30V	206.9	121.0mV
64	54.53V	198.8	134.2mV	53.57V	196.6	133.6mV
65	53.61V	202.0	132.4mV	52.89V	202.7	133.3mV
66	55.47V	218.9	130.3mV	54.06V	212.5	125.6mV
67	55.14V	220.1	132.4mV	54.31V	204.1	112.9mV
68	54.17V	210.7	118.5mV	55.06V	208.4	114.5mV
69	52.92V	204.3	116.7mV	53.94V	200.1	121.6mV
70	52.80V	214.8	125.0mV	54.83V	194.1	132.6mV
71	52.46V	211.6	116.8mV	53.75V	217.0	122.4mV
72	55.07V	192.8	133.2mV	54.68V	220.3	119.8mV
73	55.60V	194.4	109.0mV	55.70V	210.4	118.9mV
74	54.42V	206.9	134.2mV	53.78V	215.9	109.7mV
75	54.46V	208.7	130.9mV	55.41V	210.2	118.9mV
76	52.82V	206.0	123.1mV	54.32V	212.7	128.7mV
77	55.26V	213.1	117.5mV	54.22V	201.9	116.7mV

Made By: King Huang

Approval: Peter Yang

SeCoS Corporation

Resistance to Solder Heat Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 270℃ ± 5℃, 7Sec + 2Sec/-0Sec
Test Date: 2017.05.12
Test Standard : JESD22 STANDARD Method-B106
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
1	54.09V	220.8	130.9mV	52.86V	216.8	122.6mV
2	54.15V	209.0	125.2mV	53.20V	215.0	121.3mV
3	55.19V	213.2	132.0mV	53.02V	193.0	126.3mV
4	54.68V	210.1	120.2mV	54.72V	196.4	130.4mV
5	55.67V	196.9	109.7mV	52.54V	214.3	128.8mV
6	54.09V	209.4	129.5mV	54.92V	211.7	131.1mV
7	53.74V	219.7	126.3mV	54.81V	216.7	132.8mV
8	52.40V	219.6	111.3mV	53.65V	220.2	134.3mV
9	55.41V	218.7	112.6mV	53.61V	219.6	134.1mV
10	55.51V	216.0	121.3mV	54.97V	216.6	116.1mV
11	55.60V	197.6	108.5mV	54.40V	204.4	120.3mV
12	55.23V	217.9	116.8mV	52.47V	215.9	119.8mV
13	52.91V	198.4	125.5mV	53.89V	195.3	113.3mV
14	53.08V	199.6	120.7mV	55.06V	192.9	133.0mV
15	55.65V	208.3	125.4mV	55.09V	213.4	109.8mV
16	53.46V	211.8	132.8mV	54.08V	216.7	119.3mV
17	54.48V	205.4	108.7mV	53.40V	219.4	108.7mV
18	52.97V	203.0	125.8mV	53.20V	200.9	111.3mV
19	54.17V	205.4	129.7mV	53.09V	209.3	121.4mV
20	53.42V	196.7	130.1mV	55.50V	202.3	120.8mV
21	54.29V	217.1	133.3mV	54.80V	198.6	112.9mV
22	55.00V	206.3	115.5mV	52.85V	205.9	112.9mV
23	55.18V	217.3	131.0mV	52.98V	206.1	130.7mV
24	54.23V	197.1	113.1mV	53.60V	209.8	114.6mV
25	54.06V	214.6	125.7mV	55.59V	197.7	117.8mV
26	52.85V	194.8	122.3mV	52.73V	209.4	119.8mV
27	54.25V	219.8	125.3mV	52.79V	219.8	131.5mV
28	55.59V	218.7	110.1mV	55.22V	207.4	127.6mV
29	55.02V	213.6	120.3mV	52.69V	217.4	120.5mV

SeCoS Corporation

Resistance to Solder Heat Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 270℃ ± 5℃, 7Sec + 2Sec/-0Sec
Test Date: 2017.05.12
Test Standard : JESD22 STANDARD Method-B106
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
30	53.11V	194.1	115.3mV	55.36V	199.1	122.3mV
31	55.63V	201.4	130.5mV	52.83V	204.3	109.1mV
32	52.60V	209.1	115.3mV	54.58V	204.4	124.1mV
33	53.25V	197.2	115.3mV	53.44V	217.3	134.1mV
34	54.91V	201.4	115.2mV	53.19V	207.5	114.3mV
35	52.52V	202.6	114.7mV	54.41V	205.6	127.8mV
36	54.98V	219.7	127.5mV	53.74V	215.3	129.0mV
37	54.03V	220.8	112.7mV	53.07V	200.9	134.0mV
38	55.30V	196.5	119.4mV	54.95V	200.1	109.8mV
39	52.79V	203.9	116.4mV	54.54V	198.1	120.8mV
40	53.82V	210.5	133.6mV	54.52V	198.3	132.9mV
41	53.56V	204.7	127.3mV	55.05V	201.5	129.2mV
42	54.11V	197.5	124.9mV	52.58V	220.8	112.4mV
43	54.25V	206.4	129.1mV	52.79V	210.6	122.2mV
44	53.78V	202.1	120.0mV	52.85V	214.8	118.7mV
45	54.58V	219.0	111.5mV	55.15V	193.9	110.7mV
46	55.01V	198.0	133.1mV	53.78V	203.0	131.6mV
47	53.39V	220.1	129.6mV	55.30V	202.7	120.2mV
48	52.64V	216.4	111.2mV	53.03V	210.1	133.4mV
49	53.96V	200.1	121.0mV	53.29V	205.1	110.4mV
50	55.45V	201.8	133.9mV	53.02V	193.5	132.8mV
51	53.43V	194.0	113.4mV	53.41V	203.7	114.3mV
52	53.77V	211.6	131.8mV	54.12V	210.9	123.2mV
53	55.56V	194.2	114.8mV	53.84V	219.3	132.3mV
54	52.67V	194.4	122.4mV	55.06V	194.3	115.6mV
55	55.22V	193.5	111.6mV	54.94V	207.3	128.4mV
56	52.98V	196.6	114.3mV	55.00V	205.3	122.0mV
57	54.73V	216.3	110.0mV	54.75V	205.2	124.4mV
58	55.38V	199.3	131.8mV	52.77V	204.9	123.3mV

SeCoS Corporation

Resistance to Solder Heat Test Data

Report No : T170512-201
Part No : MMBT3904-C
Test Equipment: JUNO Test System DTS-1000
Test Condition : V(BR)CEO > 40V@IC=1mA, IB=0 ； 100 < hFE < 300@VCE=1V, IC=10mA
VCE(sat) < 300mV@IC=50mA, IB=5mA
Test Condition: 270℃ ± 5℃, 7Sec + 2Sec/-0Sec
Test Date: 2017.05.12
Test Standard : JESD22 STANDARD Method-B106
Operator: Leo Hsia

Test Result: PASS

	Before			After		
No	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)	$V_{(BR)CEO}$ (V)	h_{FE}	$V_{CE(sat)}$ (mV)
59	52.74V	218.3	115.1mV	54.32V	198.1	125.1mV
60	54.41V	193.0	113.6mV	54.01V	218.7	114.7mV
61	53.17V	219.0	111.7mV	53.63V	208.8	117.3mV
62	55.08V	207.3	128.9mV	55.09V	200.7	113.2mV
63	52.56V	219.8	125.8mV	54.13V	201.3	132.0mV
64	52.99V	202.2	122.1mV	54.80V	202.6	126.1mV
65	54.33V	210.6	127.0mV	52.50V	196.6	134.2mV
66	54.21V	212.6	118.1mV	53.25V	200.4	111.7mV
67	53.21V	200.7	117.3mV	53.83V	202.9	118.1mV
68	53.92V	195.9	128.6mV	53.46V	201.7	125.6mV
69	52.69V	219.9	134.1mV	53.31V	209.8	120.2mV
70	54.50V	193.6	108.6mV	52.85V	193.8	114.3mV
71	55.52V	207.0	126.9mV	53.79V	215.6	114.1mV
72	54.56V	220.9	110.4mV	54.19V	198.3	124.9mV
73	54.58V	198.2	126.4mV	55.64V	220.7	132.3mV
74	54.82V	199.5	114.8mV	54.56V	216.1	129.2mV
75	54.60V	200.4	126.9mV	53.57V	200.6	122.5mV
76	52.53V	218.2	128.7mV	55.68V	209.9	113.8mV
77	52.94V	211.7	122.0mV	55.60V	213.9	120.7mV

Made By: King Huang

Approval: Peter Yang