

Relatório de Ensaio

No. BR2301142 Rev. 0

Pag.1 de 4

HT MICRON SEMICONDUTORES S.A.
AVENIDA UNISINOS
1550
SAO LEOPOLDO, RS 93022750
BRAZIL

SGS Ordem No. : 400000004463
Nome da amostra: iMCP SiP LoRa-BLE (HTLRBL32L)
Total de Amostras Recebidas : 216 Amostras

As amostra(s) e informações acima foram fornecidas pelo cliente.

Número da Proposta : C&P PR23-326228 rev.01
Data de Recebimento da Amostra: 10 Abr 2023
Período de análise : 11 Abr 2023 - 27 Abr 2023
Teste Solicitado : Teste(s) selecionado(s) conforme solicitado pelo cliente.
Método de ensaio : Consulte a(s) página(s) seguinte(s).
Resultados dos Ensaio(s) : Consulte a(s) página(s) seguinte(s).
Responsabilidade Técnica : Alessandra Shimizu - Gerente de Laboratório CRQ 04245592

AVISO: As opiniões e interpretações expressas abaixo são baseadas nos resultados obtidos a partir do item ensaiado, aplicáveis somente para os ensaios em que os parâmetros de especificação estão inclusos nesse relatório.

Opiniões e Interpretações :

Baseado nos testes executados na amostra, o resultado **atende** aos requisitos estabelecidos pela Diretiva RoHS (UE) 2015/863 e emenda Anexo II da Diretiva 2011/65/UE, para os ensaios realizados.

Resumo de Resultados :

Teste Solicitado :	Método de Ensaio	Avaliação
Determinação de Chumbo, Cádmiio, Cromo e Mercúrio em Polímeros, Metais e Eletrônicos por ICP-OES	Referenciado nas IEC 62321-4:2013+A1:2017 e IEC 62321-5:2013, análise realizada por ICP-OES.	Atende
Determinação de Cromo Hexavalente em Polímeros e Eletrônicos por Método Colorimétrico	Referenciado na IEC 62321-7-2:2017; análise realizada por UV-VIS.	Atende
Determinação de PBB e PBDE em Polímeros por GC-MS	Referenciado na IEC 62321-6:2015, análise realizada por GC-MS.	Atende

Relatório de Ensaios

No. BR2301142 Rev. 0

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Assina em nome da
SGS do Brasil Ltda.



Alessandra Shimizu
Gerente de Laboratório CRQ 04245592

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Relatório de Ensaios

No. BR2301142 Rev. 0

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Resultados dos Ensaios :

Descrição das Amostras

Specimen No.	SGS ID Amostra	Descrição
1	BR2301142.001	iMCP SiP LoRa-BLE (HTLRBL32L)

Nota :

- (1) MQL = Limite de Quantificação do Método
 (2) ND = Não Detectado (< MQL)
 (3) "-" = Análises em Processo
 (4) 1 mg/kg = 0,0001%
 (5) mg/kg = ppm

Determinação de Chumbo, Cádmiu, Cromo e Mercúrio em Polímeros, Metais e Eletrônicos por ICP-OES

Metodologia Referenciado nas IEC 62321-4:2013+A1:2017 e IEC 62321-5:2013, análise realizada por ICP-OES.

Item(s) de Teste	Limite	Unid.	MQL	Incerteza	001
Chumbo (Pb)	Max. 1000,00	mg/kg	12,50	NA	ND
Cádmiu (Cd)	Max. 100,00	mg/kg	12,50	NA	ND
Mercúrio (Hg)	Max. 1000,00	mg/kg	62,50	NA	ND

- As incertezas expandidas foram calculadas considerando k=2 e intervalo de confiança de ±95%.

Determinação de Cromo Hexavalente em Polímeros e Eletrônicos por Método Colorimétrico

Metodologia Referenciado na IEC 62321-7-2:2017; análise realizada por UV-VIS.

Item(s) de Teste	Limite	Unid.	MQL	Incerteza	001
Cromo Hexavalente - CrVI	Max. 1000,00	mg/kg	10,00	NA	ND

- As incertezas expandidas foram calculadas considerando k=2 e intervalo de confiança de ±95%.

Determinação de PBB e PBDE em Polímeros por GC-MS

Metodologia Referenciado na IEC 62321-6:2015, análise realizada por GC-MS.

Item(s) de Teste	Limite	Unid.	MQL	Incerteza	001
Monobromobifenil	-	mg/kg	35,00	NA	ND
Dibromobifenil	-	mg/kg	35,00	NA	ND
Tribromobifenil	-	mg/kg	35,00	NA	ND
Tetrabromobifenil	-	mg/kg	35,00	NA	ND
Pentabromobifenil	-	mg/kg	35,00	NA	ND
Hexabromobifenil	-	mg/kg	35,00	NA	ND
Heptabromobifenil	-	mg/kg	35,00	NA	ND
Octabromobifenil	-	mg/kg	35,00	NA	ND
Nonabromobifenil	-	mg/kg	35,00	NA	ND
Decabromobifenil	-	mg/kg	35,00	NA	ND
Soma dos PBBs	Max. 1000,00	mg/kg	-	NA	ND

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Relatório de Ensaio

No. BR2301142 Rev. 0

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<u>Item(s) de Teste</u>	<u>Limite</u>	<u>Unid.</u>	<u>MQL</u>	<u>Incerteza</u>	<u>001</u>
Monobromodifenil Eter	-	mg/kg	50,00	NA	ND
DiBromoDifenil Eter	-	mg/kg	50,00	NA	ND
Tribromodifenil Eter	-	mg/kg	50,00	NA	ND
Tetrabromobifenil Eter	-	mg/kg	50,00	NA	ND
Pentabromodifenil Eter	-	mg/kg	50,00	NA	ND
Hexabromodifenil Eter	-	mg/kg	50,00	NA	ND
Hexabromodifenil Eter	-	mg/kg	50,00	NA	ND
Heptabromodifenil Eter	-	mg/kg	50,00	NA	ND
Octabromodifenil Eter	-	mg/kg	125,00	NA	ND
Nonabromodifenil Eter	-	mg/kg	125,00	NA	ND
Nonabromodifenil Eter	-	mg/kg	125,00	NA	ND
Nonabromodifenil Eter	-	mg/kg	125,00	NA	ND
Decabromodifenil Eter	-	mg/kg	125,00	NA	ND
Soma dos PBDEs	Max. 1000,00	mg/kg	-	NA	ND

- As incertezas expandidas foram calculadas considerando k=2 e intervalo de confiança de $\pm 95\%$.

Observações :

Os resultados reportados referem-se somente às amostras submetidas aos ensaios. A SGS não se responsabiliza pelas informações a respeito da composição da amostra e seus dados de fabricação. As mesmas são de responsabilidade exclusiva do cliente e não fazem parte do escopo de serviço da SGS do Brasil LTDA.

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A Regra de decisão definida pela SGS estabelece que a incerteza de medição não será considerada no Veredicto (declaração de conformidade) quando indicado no relatório de ensaio.

*** Final do Relatório ***

Os ensaios foram realizados no laboratório SGS do Brasil, localizado no endereço citado no rodapé deste relatório.

Relatório de Ensaios

No. BR2301142-01 Rev. 0

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HT MICRON SEMICONDUTORES S.A.
 AVENIDA UNISINOS
 1550
 SAO LEOPOLDO, RS 93022750
 BRAZIL

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 Responsabilidade Técnica : Alessandra Shimizu - Gerente de Laboratório CRQ 04245592

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Resumo de Resultados :

Teste Solicitado :	Método de Ensaio	Avaliação
Ftalatos	Referenciado na IEC 62321-8:2017 análise realizada por GC-MS.	Atende

Assina em nome da
 SGS do Brasil Ltda.



Alessandra Shimizu
 Gerente de Laboratório CRQ 04245592

Relatório de Ensaios

No. BR2301142-01 Rev. 0

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Resultados dos Ensaios :

Descrição das Amostras

Specimen No.	SGS ID Amostra	Descrição
1	BR2301142-01.001	iMCP SiP LoRa-BLE (HTLRBL32L)

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- (4) 1 mg/kg =0,0001%
- (5) mg/kg = ppm

Ftalatos

Metodologia Referenciado na IEC 62321-8:2017 análise realizada por GC-MS.

<u>Item(s) de Teste</u>	<u>CAS NO.</u>	<u>Limite</u>	<u>Unid.</u>	<u>MQL</u>	<u>Incerteza</u>	<u>001</u>
Di(2-etilhexil) Ftalato (DEHP)	117-81-7	Max. 0,100	%	0,005	NA	ND
Benzil butil Ftalato (BBP)	85-68-7	Max. 0,100	%	0,005	NA	ND
Ftalato de di-n-butilo (DBP)	84-74-2	Max. 0,100	%	0,005	NA	ND
Di-isobutil Ftalato (DIBP)	84-69-5	Max. 0,100	%	0,005	NA	ND

- As incertezas expandidas foram calculadas considerando k=2 e intervalo de confiança de $\pm 95\%$.

Observações :

Os resultados reportados referem-se somente às amostras submetidas aos ensaios. A SGS não se responsabiliza pelas informações a respeito da composição da amostra e seus dados de fabricação. As mesmas são de responsabilidade exclusiva do cliente e não fazem parte do escopo de serviço da SGS do Brasil LTDA.

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A Regra de decisão definida pela SGS estabelece que a incerteza de medição não será considerada no Veredicto (declaração de conformidade) quando indicado no relatório de ensaio.

*** Final do Relatório ***

Os ensaios foram realizados no laboratório SGS do Brasil, localizado no endereço citado no rodapé deste relatório.

Test Report

No. HKTEC2301746501

Date: 26 Apr 2023

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HT MICRON SEMICONDUTORES S.A.

AVENIDA UNISINOS, 1550,
CRISTO REI - SÃO LEOPOLDO - RIO GRANDE DO SUL

The following sample(s) was/were submitted and identified on behalf of the clients as : IMCP SIP LORA-BLE (HTLRBL32L) BR2301142EXT

SGS Job No. : 5211719 - HK
Date of Sample Received : 20 Apr 2023
Testing Period : 20 Apr 2023 - 25 Apr 2023
Test Requested : Selected test(s) as requested by client.
Test Method : Please refer to next page(s).
Test Results : Please refer to next page(s).
Conclusion : The test results of submitted sample(s) do not exceed the reference limit.

Signed for and on behalf of
SGS Hong Kong Limited.



Lam Ka Yung, Allen
Senior Chemist

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Test Report

No. HKTEC2301746501

Date: 26 Apr 2023

Page 2 of 5

Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
1	HKT23-017465.001	Black plastic w/ coppery metal w/ chip

Remarks :

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

Halogen

Test Method : With reference to EN 14582:2016, analysis was performed by IC.

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Fluorine (F)	-	mg/kg	50	ND
Chlorine (Cl)	-	mg/kg	50	ND
Bromine (Br)	-	mg/kg	50	ND
Iodine (I)	-	mg/kg	50	ND

Notes :

- (1) The measurement report of the expanded uncertainty with confident level 95% by coverage factor k=2, is 20% for each analyte of halogen.

IEC61249-2-21 - Halogen

Test Method : With reference to EN 14582: 2016, determination by Ion Chromatograph (IC) method. (Decision Rule: please refer to appendix 1: Category 1)

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Chlorine (Cl)	900	mg/kg	50	ND
Bromine (Br)	900	mg/kg	50	ND
Chlorine (Cl)+Bromine (Br)	1,500	mg/kg	100	ND

Conclusion

PASS

Notes :

The reference limit is referred from IEC61249-2-21.

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Appendix 1

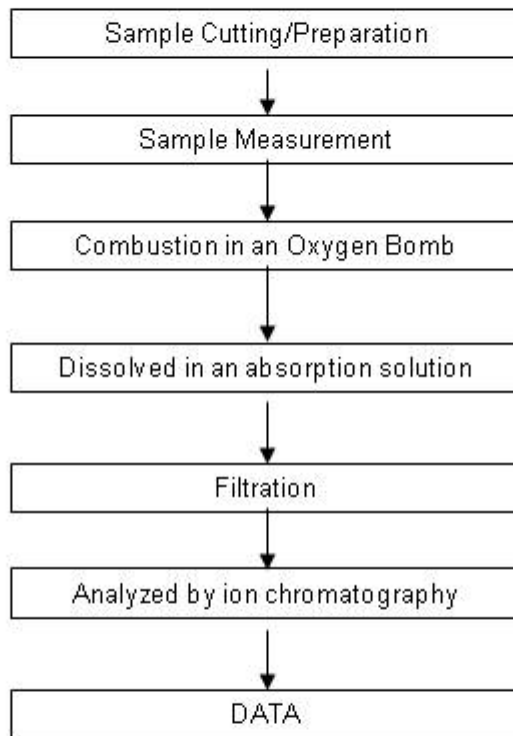
Category	Decision Rule Statement
1	The decision rule for conformity reporting is based on the non-binary statement with guard band (is equal to the expanded measurement uncertainty with a 95% coverage probability, $w = U95$) in ILAC-G8:09/2019 Clause 4.2.3. A. "Pass - the measured value is within (or below / above) the acceptance limit, where the acceptance limit is below / above to the guard band." or "Pass - The measured values were observed in tolerance at the points tested. The specific false accept risk is up to 2.5%." B. "Conditional Pass - The measured values were observed in tolerance at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values exceeded / out of tolerance. When the measured result is close to the tolerance, the specific false accept risk is up to 50%." C. "Conditional Fail - One or more measured values were observed out of tolerance at the points tested. However, a portion of the expanded measurement uncertainty intervals about one or more measured values were in tolerance. When the measured result is close to the tolerance, the specific false reject risk is up to 50%." D. "Fail - the measured value is out of (or below / above) the tolerance limit added / subtracted to the guard band." or "Fail - One or more measured values were observed out of tolerance at the points tested". The specific false reject risk is up to 2.5%.
2	The decision rule for conformity reporting is based on BS EN 1811:2011+A1:2015: Reference test method for release of nickel from all post assemblies which are inserted into pierced parts of the human body and articles intended to come into direct and prolonged contact with the skin in Section 9.2 interpretation of results.
3	The decision rule for conformity reporting is based on the general consideration of simple acceptance as stated in ISO/IEC Guide 98-3: "Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM 1995)", and more specifically for analytical measurements to the EURACHEM/CITAC Guide 2012 "Quantifying Uncertainty in Analytical Measurement".
4	The decision rule for conformity reporting is according to the IEC 62321-7-1 Edition 1.0 2015-09 Section 7: Table 1-(comparison to standard and interpretation of result)
5	The decision rule for conformity reporting is according to the IEC 62321-3-1 Edition 1.0 2013-06 Annex A.3 interpretation of result.
6	The decision rule for conformity reporting is according to the GB/T 26125-2011 Annex A to H
7	The decision rule for conformity reporting is according to the requested specification or standard (ASTM F963-17 section 4.3.5)
8	The decision rule for conformity reporting is according to the requested specification or standard (AS/NZS ISO 8124 Part 3 section 4.2)
Remark	If the decision rule is not feasible to be used and the uncertainty of the result is able to be provided, the uncertainty range of the result will be shown in the report. Otherwise, only result will be shown in the report.

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Flowchart for Halogen Free Test

Method: BS EN14582:2016

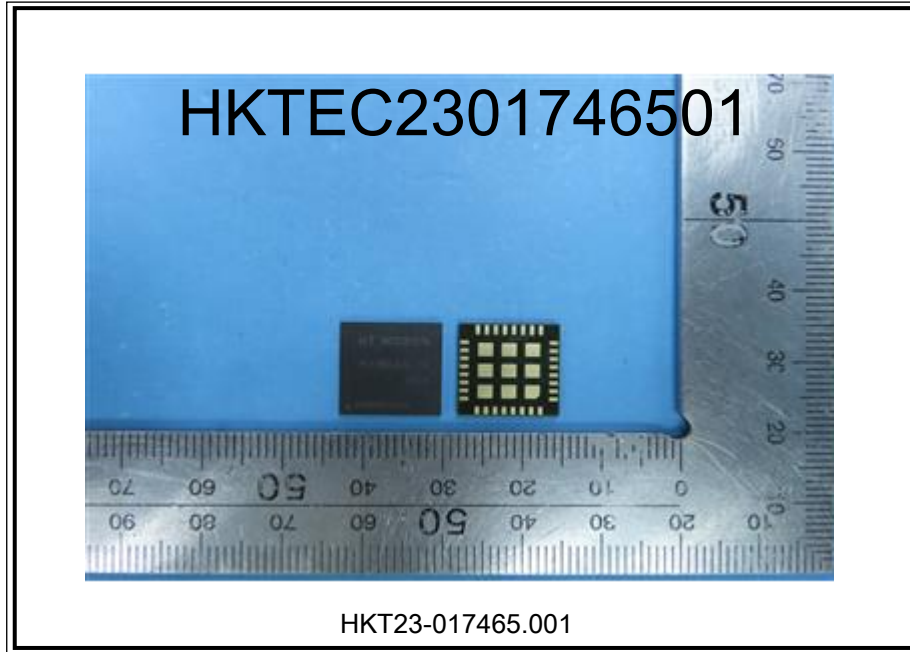


Operator: Tang Ying Sam
 Supervisor: Chan Chun Kit (Dickson)

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Sample photo:



SGS authenticate the photo on original report only

*** End of Report ***

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Relatório de Ensaios

No. BR2301142-02 Rev. 0

Data: Barueri, 02 Maio 2023

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AVENIDA UNISINOS
1550
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BRAZIL

SGS Ordem No. : 400000004463

SGS ID Amostra BR2301142-02.001
Descrição iMCP SiP LoRa-BLE (HTLRBL32L)

Total de Amostras Recebidas : 216 Amostras

As informações acima foram fornecidas pelo cliente ou em seu nome.

Número da Proposta : C&P PR23-326228 rev.01
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Responsabilidade Técnica : Alessandra Shimizu - Gerente de Laboratório CRQ 04245592

Assina em nome da
SGS do Brasil Ltda.



Alessandra Shimizu
Gerente de Laboratório CRQ 04245592

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Resultados dos Ensaios :

Descrição das Amostras :

Item No.	SGS ID Amostra	Descrição
1	BR2301142.001	iMCP SiP LoRa-BLE (HTLRBL32L)

Metais Pesados

Método de ensaio : Referenciado na US EPA 3052:1996, análise foi realizada por ICP-OES.

Item(s) de Teste	Limite	MQL	Unid.	001
Antimônio (Sb)	-	12,50	mg/kg	ND

Ácido Perfluorooctanico (PFOA) e Ácido Heptadecafluorooctano Sulfônico (PFOS)

Método de ensaio : Método In House 2364/12. Análise realizada por LC-MS.

Item(s) de Teste	CAS NO.	Limite	MQL	Unid.	001
Ácido perfluorooctanóico (PFOA)	335-67-1	-	1,000	µg/m ²	ND
Perfluorooctanosulfonatos (PFOS)	1763-23-1	-	1,000	µg/m ²	ND

Nota :

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Observações :

Os resultados reportados referem-se somente às amostras submetidas aos ensaios. A SGS não se responsabiliza pelas informações a respeito da composição da amostra e seus dados de fabricação. As mesmas são de responsabilidade exclusiva do cliente e não fazem parte do escopo de serviço da SGS do Brasil LTDA.

Este documento não pode ser reproduzido, exceto na íntegra, sem aprovação prévia por escrito da SGS.

A Regra de decisão definida pela SGS estabelece que a incerteza de medição não será considerada no Veredicto (declaração de conformidade) quando indicado no relatório de ensaio.

Opiniões e Interpretações :

*** Final do Relatório ***

Os ensaios foram realizados no laboratório SGS do Brasil, localizado no endereço citado no rodapé deste relatório.