Technical Report No. 713203936

dated 2021-05-18

Client:	Texas Instruments Incorporated 12500 TI Boulevard Dallas TX 75243 USA
Manufacturing place:	Texas Instruments Incorporated 12500 TI Boulevard Dallas TX 75243 USA
Test subject:	Product: Reinforced Isolated Delta-Sigma Modulators Type: AMC1306. AMC1336, AMC1303
Test specification:	IEC 61800-5-1:2007/AMD1:2016, EN 61800-5-1:2007, UL 61800-5-1:2012/R:2018-06 Chapter 4.3.6.8 Solid insulation Chapter 5.2.2.1 Clearances and creepage distances Chapter 5.2.3.1 Impulse voltage test Chapter 5.2.3.2 A.C. or d.c. voltage test
Purpose of examination:	• Test according to the test specification
Test result:	The test results show that the presented product AMC1306, AMC1336, AMC1303 are in compliance with the isolation requirements set forth in the IEC/UL/EN 61800-5-1 standard.

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1 DESCRIPTION OF THE TEST SUBJECT

1.1 Function

The AMC1306, AMC1336 and AMC1303 are a precision, delta-sigma (ΔΣ) modulators with the output separated from the input circuitry by a capacitive reinforced isolated barrier that is highly resistant to magnetic interference.

1.2 Consideration of the foreseeable misuse

☒ not applicable

☐ covered through the applied standard

☐ covered by the following comment

☐ covered by attached risk analysis

1.3 Technical Data

Trade Mark:

Power-supply voltage:	-0.3 V to 6.5 V
Digital output voltage	V(DOUT) = DGND -0.3 V to DVDD +0.3 V
Operation temperature:	-40 °C to 125 °C

1.4 Conditions of acceptability

- The Device under shall be supplied with the specified rated voltages according to the user manual.
- The Device under Test fulfils the requirements of the tested standards only if it is operated according to the user manual.

2 ORDER

2.1 Date of Purchase Order, Customer's Reference

2020-12-10, 4514144158

2.2 Receipt of Test Sample, Location

2020-12-17

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2.3 Date of Testing

2021-01-26

2.4 Location of Testing

TÜV SÜD Product Service GmbH, Ridlerstr. 65, 80339 München / Munich, Germany

3 TEST RESULTS

The Devices under Tests meets the requirements for the EN/IEC/UL 61800-5-1 Chapter 4.3.6.8 “Solid insulation”, Chapter 5.2.2.1 “Clearances and creepage distances”, Chapter 5.2.3.1 “Impulse voltage test” and Chapter 5.2.3.2 “A.C. or d.c. voltage test”.

4 REMARK

The manufacturer information’s has been examined according to the minimum requirements described in the product standard. The manufacturer is responsible for the accuracy of further particulars as well as of the composition and layout

The assembly of the product has to comply with the documentation. Before the implementation of safety relevant modifications to the product into the ongoing production the product must be retested for assessment. The results must be implemented to the documentation.

The SiO2-based capacitive isolation barrier used in the AMC1306, AMC1336 and AMC1303 devices is one implementation of "solid insulation".

The mentioned devices comply to the relevant VDE0884-11 and UL1577 standards (certificate can be provided if needed) and therefore do not need to be evaluated separately. Specifically clause 4.3.6.8.3.3 *Material thickness less than 0,2 mm* that states “Reinforced insulation consisting of a single layer of material is not permitted”, does not apply.

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5 TESTS PERFORMED

5.2.2.1	General selection and information of supply earthing systems for clearance distances									-
Power systems	TN-S, TN-C, TN-CS, TT (not corner earthed, center earthed)		TN-S, TT (corner earthed)		TN-C (middle point earthed		IT (not corner earthed)		IT (corner earthed)	
Rated voltage (V)	-		-		-		-		-	
Max. altitude (m)	2000		-		-		-		-	
System voltage	300 VAC with OVC I-IV 600 VAC with OVC I-III 1000 OVC with I-III (only functional isolation)		-		-		-		-	
	B/S	D/R	B/S	D/R	B/S	D/R	B/S	D/R	B/S	D/R
Rated Impulse voltage (kV)	6	8	-	-	-	-	-	-	-	-
Temporary overvoltage (V)	2 550 / 1 800	2 550 / 1 800	-	-	-	-	-	-	-	-
Clearance (mm)	5.5	8	-	-	-	-	-	-	-	-
Test impulse voltage for clearance (kV)	6	8	-	-	-	-	-	-	-	-
IT corner earthed, simulated impedance (MΩ) ..... :					TN-S, TT – System and not IT					

Supplementary information:
No differences in Rate Impulse Voltage for 300 VAC with OVC I-IV and 600 VAC with OVC I-III

The values listed are minimum requirements for reinforced isolation stated in the IEC61800-5-1 standard on the basis of a OVC III frequency converter design. The AMC1306, AMC1336 and AMC1303 exceed these minimum values.

Functional isolation refers to the isolation level in respect to the IEC61800-5-1 equipment standard, not the VDE 0884-11 or UL1577 device standard.

Measuring Equipment used: None

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5.2.2.1	TABLE: Clearances and creepage distances							P
clearance cl and creepage distance cr at/between:	PWB layer	CTI (V)	U peak (V)	U rms (V)	Req. cl (mm)	Meas. cl (mm)	Req. cr (mm)	Meas. cr (mm)
Sub-assembly / PWB / part								
Reinforced insulation								
AVDD, AINP, AINN, AGND to DGND, DOUT, CLKIN, DVDD	-	> 100	--	600	8	8*	8	8*
Supplementary information: The values listed are minimum requirements for reinforced isolation stated in the IEC61800-5-1 standard on the basis of a OVC III frequency converter design. The AMC1306, AMC1336 and AMC1303 exceed these minimum values. * The 7.5mm does not take the height of the package or the spreading of the leads into account. In combination, this results in an air and creepage distance of 8 mm. Measuring Equipment used: TM 8907@2021-01-26								

4.3.6.8 5.2.3.1 5.2.3.2	TABLE:	Solid insulation Impulse voltage test A.C. or d.c. voltage test				P
Test voltage applied between:		DTI (µm)	Impulse test (kV, circuit)	Electric strength test (60 s)	Partial discharge test (V)	Result
Reinforced insulation						
AVDD, AINP, AINN, AGND to DGND, DOUT, CLKIN, DVDD		≥ 0.021	8	5090 VDC / 3600 VAC	---	P
Supplementary information: The values listed are minimum requirements for reinforced isolation stated in the IEC61800-5-1 standard on the basis of a OVC III frequency converter design. The AMC1306, AMC1336 and AMC1303 exceed these minimum values. Measuring Equipment used: TM 148, TM 9609, TM 151, TM 8009 @2021-01-26						

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6 PHOTO DOCUMENTATION

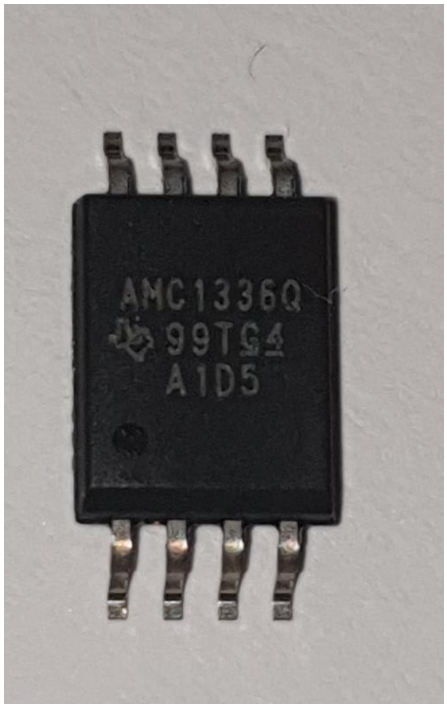

Figure 1 Device under Test, all test samples has the same package size

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Figure 2 Measuring of Clearance and Creepage

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7 SUMMARY OF TESTING

The test results show that the presented product is in compliance with the specified requirements.

The following test conditions were considered for the tests:

Power systems	**TN-S, TN-C, TN-CS, TT (not corner earthed, center earthed)**
Rated voltage (V)	**---**
Max. altitude (m)	**2000**
System voltage	**300 VAC with OVC I-IV** **600 VAC with OVC I-III** **1000 OVC with I-III (only functional isolation)**
	D/R
Rated Impulse voltage (kV)	**8**
Temporary overvoltage (V)	**2 550 / 1 800**
Clearance (mm)	**8**
Test impulse voltage for clearance (kV)	**8**

Test results are valid only for the tested equipment. This test report can be reproduced only in whole. All tests were carried out with the AMC1306, AMC1336 and AMC1303.

If not extra mentioned only worst-case test results are mentioned and only outer clearances and creepage distances were considered.

The equipment under test was submitted and tested for use at the ambient temperature permitted by the manufacturer´s specification of: 25 °C.

The operation altitude of the equipment is specified for 2000 m.

The maximum temperature range of the equipment is specified for -40 °C to 125 °C.

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