

# CERTIFICATE OF COMPLIANCE

**Certificate Number** 20180104-E360332  
**Report Reference** E360332-20170902  
**Issue Date** 2019-08-23

**Issued to:** LG ELECTRONICS INC  
168 Suchul-daero  
Gumi-si Gyeongsangbuk-do 39368 KOREA

**This is to certify that representative samples of** COMPONENT - STATIC INVERTERS AND CONVERTERS FOR USE IN INDEPENDENT POWER SYSTEMS  
Model LM320UE-A2

Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.

**Standard(s) for Safety:** UL 1741, Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741, Second Edition, dated January 28, 2010. Including the requirements in UL 1741 Supplement SA, sections as noted in the Technical considerations.  
IEEE 1547, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems.  
IEEE 1547.1, IEEE Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems.

**Additional Information:** See the UL Online Certifications Directory at [www.ul.com/database](http://www.ul.com/database) for additional information

Only those products bearing the UL Certification Mark should be considered as being covered by UL's Certification and Follow-Up Service.

The UL Recognized Component Mark generally consists of the manufacturer's identification and catalog number, model number or other product designation as specified under "Marking" for the particular Recognition as published in the appropriate UL Directory. As a supplementary means of identifying products



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that have been produced under UL's Component Recognition Program, UL's Recognized Component Mark: , may be used in conjunction with the required Recognized Marks. The Recognized Component Mark is required when specified in the UL Directory preceding the recognitions or under "Markings" for the individual recognitions.

Recognized components are incomplete in certain constructional features or restricted in performance capabilities and are intended for use as components of complete equipment submitted for investigation rather than for direct separate installation in the field. The final acceptance of the component is dependent upon its installation and use in complete equipment submitted to UL LLC.

Look for the UL Certification Mark on the product.


Standards for Safety:

UL 1741, Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, UL 1741, Second Edition, dated January 28, 2010. Including the requirements in UL 1741 Supplement SA, sections as noted in the Technical considerations.

IEEE 1547, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems. IEEE 1547.1, IEEE Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems.

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Component power Inverters, intended for use in utility Interactive, single-phase, distributed resource power system: Model LM320UE-A2, which is intended for use in an AC module, DC input from PV module.



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Firmware information that was evaluated to the requirements of UL 1741 Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources - Edition 2 - Revision date 2016/09/07, Including UL 1741 Supplement SA - Grid Support Utility Interactive Inverters And Converters and evaluated to the requirements of UL1741 the Construction Requirement Decision Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources, 2nd Edition dated January 28, 2010

Checksum	0x02FD02BD
Firm ware version	A320UD260C

Firmware information that was evaluated to the requirements of UL 1741 Standard for Safety for Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources - Edition 2 - Revision date 2018/02/15, Including UL 1741 Supplement SA - Grid Support Utility Interactive Inverters And Converters and evaluated to the requirements of UL1741 the Construction Requirement Decision Standard for Inverters, Converters, Controllers and Interconnection System Equipment for Use with Distributed Energy Resources, 2nd Edition dated February 15, 2018

Checksum	0x021892B6
Firm ware version	A320UD3005



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The component covered by this certificate provides functionality in compliance with UL 1741 Supplement A (SA) when used in a UL Listed end product which has been evaluated by UL for its intended purpose. Compliance testing was conducted on samples of the products according to the test methods in the following sections of UL 1741 with compliant results:


Certified functions. Cross Reference table – UL 1741 SA to SRD	Source Requirement Document(s)	Test Standard(s) and Section(s)	Report Date
ANTI-ISLANDING PROTECTION - UNINTENTIONAL ISLANDING WITH GRID SUPPORT FUNCTIONS ENABLED	Electric Rule No. 21 Hh.1a	UL 1741 SA 8	2017-09-02
LOW/HIGH VOLTAGE RIDETHROUGH	Electric Rule No. 21 Table Hh.1	UL 1741 SA 9	2017-09-02
LOW/HIGH FREQUENCY RIDETHROUGH	Electric Rule No. 21 Table Hh.2	UL 1741 SA 10	2017-09-02
RAMP RATES	Electric Rule No. 21 Hh.2k	UL 1741 SA 11	2017-09-02
RECONNECT BY "SOFT START"	Electric Rule No. 21 Hh.2k	UL 1741 SA 11	2017-09-02
SPECIFIED POWER FACTOR	Electric Rule No. 21 Hh.2i	UL 1741 SA 12	2017-09-02
DYNAMIC VOLT/VAR OPERATIONS	Electric Rule No. 21 Hh.2J	UL 1741 SA 13	2017-09-02
FREQUENCY-WATT	Electric Rule No. 21 Hh.2.l	UL 1741 SA 14	2017-09-02
VOLT-WATT	Electric Rule No. 21 Hh.2.m	UL 1741 SA 15	2017-09-02

Testing conducted to the requirements of UL 1741 SA corresponds to the minimum requirements for CA Rule 21, 2015.

An enumeration of functions tested, including complete ratings, and available certified settings for the Grid Support functions, are recorded in the appendix to this document. Test data and detailed results of compliance testing are retained in the complete UL Report for this product.

Report prepared by :

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Project Engineer



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## Appendix

Detailed Testing Summary	Test Standard(s) and Section(s)	Fixed / Adjustable	Pass / Fail
UNINTENTIONAL ISLANDING WITH GRID SUPPORT FUNCTIONS ENABLED	UL 1741 SA 8	Adjustable	Pass
HIGH VOLTAGE RIDE-THROUGH DURATION	UL 1741 SA 9.1	Adjustable	Pass
HIGH VOLTAGE RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA 9.2	Adjustable	Pass
HIGH VOLTAGE MUST TRIP CLEARING TIMES	UL 1741 SA 9.2	Adjustable	Pass
LOW VOLTAGE RIDE-THROUGH DURATION	UL 1741 SA 9.1	Adjustable	Pass
LOW VOLTAGE RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA 9.2	Adjustable	Pass
LOW VOLTAGE MUST TRIP CLEARING TIMES	UL 1741 SA 9.2	Adjustable	Pass
HIGH FREQUENCY RIDE-THROUGH DURATION	UL 1741 SA10.1	Adjustable	Pass
HIGH FREQUENCY RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA10.2	Adjustable	Pass
HIGH FREQUENCY MUST TRIP CLEARING TIMES	UL 1741 SA10.2	Adjustable	Pass
LOW FREQUENCY RIDE-THROUGH DURATION	UL 1741 SA10.1	Adjustable	Pass
LOW FREQUENCY RIDE-THROUGH / MUST TRIP MAGNITUDES	UL 1741 SA10.2	Adjustable	Pass
LOW FREQUENCY MUST TRIP CLEARING TIMES	UL 1741 SA10.2	Adjustable	Pass
NORMAL RAMP RATE	UL 1741 SA 11.2	Adjustable	Pass
"SOFT START" RAMP RATE	UL 1741 SA 11.4	Adjustable	Pass
SPECIFIED POWER FACTOR	UL 1741 SA 12	Adjustable	Pass
VOLT/VAR MODE (Q(V))	UL 1741 SA 13	Adjustable	Pass
FREQUENCY-WATT (FW)	UL 1741 SA 14	Adjustable	Pass
VOLT-WATT (VW)	UL 1741 SA 15	Adjustable	Pass



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Inverter Firmware Version:		
UL 1998	Date	Version/Revision
No	2017-04-20	A320UD260C
No	2019-07-20	A320UD3005

Inverter Ratings - Output	All models, with individual differences as shown	
Output phase configuration	1-phase	1-phase
Nominal (line to line) output voltage V ac	240V	208V
Operating voltage range V ac	211~264V	183~229V
Line Synchronization Characteristics	Type 2	Type 2
Normal out frequency Hz	60Hz	60Hz
Rated output current (A ac)	1.33A	1.54A
Rated output power, (kW)	0.32kW	0.32kW
Max. Branch Circuit overcurrent protection (A ac)	20A	20A
Maximum Air Ambient (°C)	65°C	65°C

Other ratings:	
Max. output fault current (A) / duration (ms)	65A/40.9ms
Max. utility backfeed current to PV input (A)	134mA
Line Synchronization Characteristics / In-rush current	Type 2
Limits of accuracy of voltage measurement	+/- 2.5%
Limits of accuracy of frequency measurement	+ /- 0.1Hz
Manufacturers stated accuracy of time response for voltage trips	0.2~1sec
Manufacturers stated accuracy of time response for frequency trips	0.05~0.2sec
Enclosure Ratings	Type 6

INTERCONNECTION INTEGRITY TEST CATEGORIES:	
C62.42.2 Ring Wave Surge Category	Custom Levels
C62.42.2 Combination Wave Surge Category	Custom Levels
C37.90.1 RF Immunity - compliance	Yes
C37.90.2 Communication circuit - compliance	N/A



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Magnitude and time Limits - Utility interconnection voltage magnitude limits, Ride Through time limits and trip times:						
Nominal voltage	Single/Split phase					
UL 1741 SA9:	Magnitudes (% of nominal)		Ride Through (Seconds) (+)		Must Trip (Seconds)	
Boundary designation (++)	Min	Max	Min	Max	Min	Max
HV2	114	120	0	0	0.16	0.16
HV1	104	115	0.82	21	0.90	22
LV1	83	92	19	21	20	22
LV2	67	73	9	21	10	22
LV3	50	53	N/A	1.05	0.16	1.55

Magnitude and time Limits - Utility interconnection Frequency magnitude limits, Ride Through time limits and trip times:						
Nominal Frequency:	60 Hz					
UL 1741 SA10:	Magnitudes (Frequency)		Ride Through (Seconds) (+)		Must Trip (Seconds)	
Boundary designation	Min	Max	Min	Max	Min	Max
HF3	N/A	N/A	N/A	N/A	N/A	N/A
HF2	60.1	65	0	0	0.16	0.16
HF1	60.1	65	19	299	20	300
LF1	55	59.9	19	299	20	300
LF2	50	59	0	0	0.16	0.16
LF3	N/A	N/A	N/A	N/A	N/A	N/A

SA11 Ramp Rate test ratings (RR/SSRR)		
Minimum <b>normal</b> ramp-up rate	0.1	%I <sub>rated</sub> /SEC
Maximum <b>normal</b> ramp-up rate	100	%I <sub>rated</sub> /SEC
Minimum <b>soft start</b> ramp-up rate	0.1	%I <sub>rated</sub> /SEC
Maximum <b>soft start</b> ramp-up rate	100	%I <sub>rated</sub> /SEC



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SA12 SPF Specified Power Factor (INV3)	
Minimum Inductive (Underexcited) Power Factor (<0)	-0.8
Minimum Capacitive (Overexcited) Power Factor (>0)	+0.8

SA13 Volt/Var Mode (VV) extent of curve range settings				
Settings		Qmax Values - Maximums	Qmin Values - Minimums	Units
Reactive power production setting	Q <sub>1</sub>	192	0	VAR
Reactive power absorption setting at the left edge of the deadband	Q <sub>2</sub>	0	0	VAR
Reactive power absorption setting at the right edge of the deadband	Q <sub>3</sub>	0	0	VAR
Reactive power absorption setting	Q <sub>4</sub>	0	-192	VAR

Settings		Maximum	Minimum	Units
The voltage at Q <sub>1</sub>	V <sub>1</sub>	96.67	91.67	%Vnom
The voltage at Q <sub>2</sub>	V <sub>2</sub>	97.50	92.50	%Vnom
The voltage at Q <sub>3</sub>	V <sub>3</sub>	107.50	102.50	%Vnom
The voltage at Q <sub>4</sub>	V <sub>4</sub>	108.33	103.33	%Vnom



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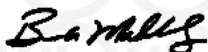


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SA14 Frequency-Watt (FW) extent of curve range settings				
Settings	Frequency		Power level	
	Low end of the adjustment range of the start of the curtailment function - Overfrequency	F <sub>start_min</sub>	60.036	320
High end of the adjustment range of the start of the curtailment function- Overfrequency	F <sub>start_max</sub>	65.0	0	Watts
Low end of the adjustment range of the endpoint of the curtailment function- Overfrequency	F <sub>stop_min</sub>	61.036	320	Watts
High end of the adjustment range of the endpoint of the curtailment function- Overfrequency	F <sub>stop_max</sub>	65.0	0	Watts
Low end of the adjustment range of the start of the curtailment function-Underfrequency	F <sub>start_min</sub>	50	320	Watts
High end of the adjustment range of the start of the curtailment function-Underfrequency	F <sub>start_max</sub>	59.964	0	Watts
Low end of the adjustment range of the endpoint of the curtailment function-Underfrequency	F <sub>stop_min</sub>	50	320	Watts
High end of the adjustment range of the endpoint of the curtailment function-Underfrequency	F <sub>stop_max</sub>	58.964	0	Watts

SA15 Volt-Watt (VW) extent of curve range settings				
Settings	Volts		Power level	
	Low end of the adjustment range of the start of the curtailment function	V <sub>start_min</sub>	125	320
High end of the adjustment range of the start of the curtailment function	V <sub>start_max</sub>	144	0	Watts
Low end of the adjustment range of the endpoint of the curtailment function	V <sub>stop_min</sub>	126	320	Watts
High end of the adjustment range of the endpoint of the curtailment function	V <sub>stop_max</sub>	144	0	Watts



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