[6450-01-P]

DEPARTMENT OF ENERGY

[Case Number 2022-009; EERE-2023-BT-WAV-0010]

Energy Conservation Program: Notification of Petition for Waiver of Samsung HVAC America LLC from the Department of Energy Central Air Conditioners and Heat Pumps Test Procedure and Notification of Grant of Interim Waiver

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notification of petition for waiver and grant of an interim waiver; request for comments.

SUMMARY: This notification announces receipt of and publishes a petition for waiver and interim waiver from Samsung HVAC America LLC ("Samsung"), which seeks a waiver for specified basic models of central air conditioners ("CACs") and heat pumps ("HPs") (collectively, "CAC/HPs") from the U.S. Department of Energy ("DOE") test procedure used for determining the efficiency of CAC/HPs. DOE also gives notification of an Interim Waiver Order that requires Samsung to test and rate the specified CAC/HP basic models in accordance with the alternate test procedure set forth in the Interim Waiver Order. DOE solicits comments, data, and information concerning Samsung's petition and its suggested alternate test procedure to inform DOE's final decision on Samsung's waiver request.

DATES: Written comments and information are requested and will be accepted on or before **[INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *www.regulations.gov* under docket number EERE–2023–BT–WAV-0010. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2023–BT–WAV-0010, by any of the following methods:

(1) *Email: SamsungCAC2023WAV0010@ee.doe.gov.* Include the docket number EERE-2023-BT-WAV-0010 in the subject line of the message.

(2) *Postal Mail:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, Mailstop EE-5B, 1000 Independence Avenue, SW, Washington, DC, 20585-0121. Telephone: (202) 287-1445. If possible, please submit all items on a compact disc ("CD"), in which case it is not necessary to include printed copies.

(3) *Hand Delivery/Courier:* Appliance and Equipment Standards Program, U.S. Department of Energy, Building Technologies Office, 950 L'Enfant Plaza, SW, 6th Floor, Washington, DC, 20024. Telephone: (202) 287-1445. If possible, please submit all items on a CD, in which case it is not necessary to include printed copies.

No telefacsimiles ("faxes") will be accepted. For detailed instructions on submitting comments and additional information on this process, see the "**SUPPLEMENTARY INFORMATION**" section of this document.

Docket: The docket for this activity, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at *www.regulations.gov/docket?D=EERE-2023-BT-WAV-0010*. All documents in the docket are listed in the *www.regulations.gov* index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page contains instruction on how to access all documents, including public comments, in the docket. See the "**SUPPLEMENTARY INFORMATION**" section for information on how to submit comments through *www.regulations.gov*.

FOR FURTHER INFORMATION CONTACT: Ms. Julia Hegarty, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office,

Mailstop EE-5B, 1000 Independence Avenue, SW., Washington, DC 20585-0121. Telephone: (240) 597-6737. E-mail: *AS_Waiver_Request@ee.doe.gov*.

Mr. Nolan Brickwood, U.S. Department of Energy, Office of the General Counsel, Mail Stop GC-33, Forrestal Building, 1000 Independence Avenue, SW., Washington, DC 20585-0103. Telephone: (202) 586-4498. E-mail: *nolan.brickwood@hq.doe.gov.*

SUPPLEMENTARY INFORMATION: DOE is publishing Samsung's petition for waiver in its entirety, pursuant to 10 CFR 430.27(b)(1)(iv), absent any information for which petitioner requested treatment as confidential business information.[1] DOE is also publishing the Interim Waiver Order granted to Samsung, which serves as notification of DOE's determination regarding Samsung's petition for an interim waiver, pursuant to 10 CFR 430.27(e)(3). DOE invites all interested parties to submit in writing by [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***], comments and information on all aspects of the petition, including the alternate test procedure. Pursuant to 10 CFR 430.27(d), any person submitting written comments to DOE must also send a copy of such comments to the petitioner. The contact information for the petitioner is Chandra Gollapudi, *cg.gollapudi@samsunghvac.com*, Samsung HVAC America LLC, 776 Henrietta Creek Road, Suite 100, Roanoke, TX 76262.

Submitting comments via www.regulations.gov. The *www.regulations.gov* web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment

[1] The petition did not identify any of the information contained therein as confidential business information.

due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached to your comment. If this instruction is followed, persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to *www.regulations.gov* information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information ("CBI")). Comments submitted through *www.regulations.gov* cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through *www.regulations.gov* before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that *www.regulations.gov* provides after you have successfully uploaded your comment.

Submitting comments via email, hand delivery/courier, or postal mail. Comments and documents submitted via email, hand delivery/courier, or postal mail will also be posted to *www.regulations.gov*. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE. If you submit via postal mail or hand delivery/courier, please provide all items on a CD, if feasible, in which case it is not necessary to submit printed copies. Faxes will not be accepted.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

Campaign form letters. Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

Confidential Business Information. According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email, postal mail, or hand delivery/courier two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked "non-confidential" with the information believed to be confidential deleted. Submit these documents via email or on a CD, if feasible. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

Case Number 2022-009

Interim Waiver Order

I. Background and Authority

The Energy Policy and Conservation Act, as amended ("EPCA"),[2] authorizes the U.S. Department of Energy ("DOE") to regulate the energy efficiency of several consumer products and certain industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B[3] of EPCA, Pub. L. 94-163 (42 U.S.C. 6291-6309, as codified), established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency for certain types of consumer products. These products include CAC/HPs, the subject of this Interim Waiver Order. (42 U.S.C. 6292(a)(3))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA include definitions (42 U.S.C. 6291), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), energy conservation standards (42 U.S.C. 6295), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of that product (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the covered product complies with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

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[2] All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Pub. L. 116-260 (Dec. 27, 2020), which reflect the last statutory amendments that impact Parts A and A-1 of EPCA.
[3] For editorial reasons, upon codification in the U.S. Code, Part B was redesignated as Part A.

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE is required to follow when prescribing or amending test procedures for covered products. EPCA requires that any test procedures prescribed or amended under this section must be reasonably designed to produce test results which reflect the energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and requires that test procedures not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3)) The test procedure for CAC/HPs is contained in the Code of Federal Regulations ("CFR") at 10 CFR part 430, subpart B, appendix M1, *Uniform Test Method for Measuring the Energy Consumption of Central Air Conditioners and Heat Pumps* ("appendix M1").

Under 10 CFR 430.27, any interested person may submit a petition for waiver from DOE's test procedure requirements. DOE will grant a waiver from the test procedure requirements if DOE determines either that the basic model for which the waiver was requested contains a design characteristic that prevents testing of the basic model according to the prescribed test procedures, or that the prescribed test procedures evaluate the basic model in a manner so unrepresentative of its true energy consumption characteristics as to provide materially inaccurate comparative data. 10 CFR 430.27(f)(2). A petitioner must include in its petition any alternate test procedures known to the petitioner to evaluate the performance of the product type in a manner representative of the energy consumption characteristics of the basic model. 10 CFR 430.27(b)(1)(iii). DOE may grant the waiver subject to conditions, including adherence to alternate test procedures. 10 CFR 430.27(f)(2).

As soon as practicable after the granting of any waiver, DOE will publish in the *Federal Register* a notice of proposed rulemaking to amend its regulations so as to eliminate any need for the continuation of such waiver. 10 CFR 430.27(*l*) As soon thereafter as practicable, DOE will publish in the *Federal Register* a final rule to that effect. *Id*.

The waiver process also provides that DOE may grant an interim waiver if it appears likely that the underlying petition for waiver will be granted and/or if DOE determines that it

would be desirable for public policy reasons to grant immediate relief pending a determination on the underlying petition for waiver. 10 CFR 430.27(e)(3). Within one year of issuance of an interim waiver, DOE will either: (i) publish in the *Federal Register* a determination on the petition for waiver; or (ii) publish in the *Federal Register* a new or amended test procedure that addresses the issues presented in the waiver. 10 CFR 430.27(h)(1).

If the interim waiver test procedure methodology is different than the decision and order test procedure methodology, certification reports to DOE required under 10 CFR 429.12 and any representations must be based on either of the two methodologies until 180 days after the publication date of the decision and order. Thereafter, certification reports and any representations must be based on the decision and order test procedure methodology, unless otherwise specified by DOE. 10 CFR 430.27(i)(1). When DOE amends the test procedure to address the issues presented in a waiver, the waiver or interim waiver will automatically terminate on the date on which use of that test procedure is required to demonstrate compliance. 10 CFR 429.27(h)(3).

II. Samsung's Petition for Interim Waiver

On December 16, 2022, DOE received from Samsung a petition for waiver and interim waiver from the test procedure for CAC/HPs set forth at 10 CFR part 430 subpart B, appendix M1.[4] (Samsung, No. 1 at p. 2)[5] Pursuant to 10 CFR 430.27(e)(i), DOE posted the petition on the DOE website. The petition did not identify any of the information contained therein as confidential business information.

In its petition, Samsung noted that the minimum external static pressure ("ESP") requirement for ducted blower coil systems, including for the basic models subject to the

[4] The specific models for which the petition applies include Samsung Slim Duct CAC/HP outdoor models AC009BXADCH, AC012BXADCH, and AC018BXADCH, and indoor models AC009BNLDCH, AC012BNLDCH, and AC018BNLDCH. These models were provided by Samsung in its December 16, 2022 petition.

[5] A notation in this form provides a reference for information that is in the docket for this test procedure waiver. This notation indicates that the statement preceding the reference is document number 1 in the docket and appears at page 2 of that document.

petition, increased from appendix M to subpart B of 10 CFR part 430 ("appendix M") to appendix M1. (Samsung, No. 1 at p. 1) Specifically, appendix M required a minimum ESP of 0.1 to 0.2 inches of water column ("in. wc."), depending on the cooling capacity of the system, for systems other than small-duct high velocity; whereas, appendix M1 requires a minimum ESP of 0.5 in. wc. for all conventional ducted blower coil systems.[6] Samsung acknowledges that DOE increased the minimum ESP requirement for ducted systems in appendix M1 to better represent the ESP of homes with central ducted CAC/HP systems. *Id.* In its petition, Samsung asserts that the specified basic models cannot operate at the 0.5 in. wc. ESP requirement specified in appendix M1, as these models are not designed for use in a traditional central ducted home, but rather are designed for use with short ducts and low static pressures and, thus, have a maximum operating ESP of 0.24 in. wc. *Id.* Because the models listed in its petition cannot operate at the 0.5 in. wc. condition specified by the test procedure, Samsung seeks to use an alternative test procedure that specifies testing these basic models at 0.1 in. wc. ESP, and in conjunction, adjusts the fan power and the resulting change in heating and cooling capacity in order to be equivalent to testing at 0.5 in. wc. ESP. *Id.*

Samsung also requested an interim waiver from the existing DOE test procedure, asserting that the petition for waiver is likely to be granted. Samsung stated that without the granting of a waiver and interim waiver, Samsung would suffer economic hardship by needing to withdraw these products from the market, which would result in loss of sales and reduced customer choice. In such case, Samsung also stated that consumers would need to seek alternate products that are not optimized for low static, short duct applications, which would lead to increased energy consumption. (Samsung, No. 1 at p. 5)

DOE will grant an interim waiver if it appears likely that the petition for waiver will be granted, and/or if DOE determines that it would be desirable for public policy reasons to grant immediate relief pending a determination of the petition for waiver. 10 CFR 430.27(e)(3).

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[6] *See* Table 4 in section 3.1.4.1.1 of appendix M and Table 4 in section 3.1.4.1.1 for ducted blower coil systems.

III. Requested Alternate Test Procedure

EPCA requires that manufacturers use DOE test procedures when making representations about the energy consumption and energy consumption costs of covered products. (42 U.S.C. 6293(c)) Consistency is important when making representations about the energy efficiency of covered products, including when demonstrating compliance with applicable DOE energy conservation standards. Pursuant to 10 CFR 430.27, and after consideration of public comments on the petition, DOE may establish in a subsequent Decision and Order an alternate test procedure for the basic models addressed by the Interim Waiver Order.

As an alternate test procedure, Samsung seeks to test the specified basic models at 0.1 in. wc. ESP and to make proportional adjustments to fan power and capacity such that the results are equivalent to performance measured at 0.5 in. wc. ESP. (Samsung, No. 1 at p. 4)

Specifically, Samsung requests to use an alternate calculation of measured energy use. At all sections of appendix M1 where total cooling capacity, total heating capacity, sensible cooling capacity, and electrical power consumption is calculated, the measured indoor fan power would be increased by 87 watts per 1000 cubic feet per minute of standard air ("SCFM"). Samsung requests that for all tests the cooling capacity be decreased by the Btu/h equivalent of this fan power adjustment *(i.e*. 297 Btu/h per 1000 SCFM); and the heating capacity increased by the same Btu/h equivalent. The test would otherwise be performed consistent with the requirements of appendix M1.

Samsung stated that it determined the proposed adjusted values for fan power based on the similar adjustment in fan wattage for coil-only systems in appendix M as compared to appendix M1. Specifically, Samsung noted that in the January 5, 2017 final rule that established appendix M1 ("January 2017 Final Rule"), DOE had determined that increasing the ESP from 0.15 in. wc.[7] to 0.5 in. wc. corresponds to an increase in the indoor fan blower power of 76

[7] DOE interprets Samsung's reference to 0.15 in.wc. in appendix M as referring to the average of the range of 0.1 to 0.2 in. wc. minimum ESP requirements for ducted blower coil systems specified in Table 4 of appendix M.

watts/1000 SCFM. [8] (*See* 82 FR 1426, 1451-1453). On this basis, Samsung extrapolated that changing the ESP from 0.1 in. wc. to 0.5 in. wc. equates to an increase in indoor fan blower power of 87 watts/1000 SCFM. (Samsung, No. 1 at p. 4) Samsung asserted that because these estimates of indoor fan blower power are based on mostly fixed speed motors, and the basic models in consideration use more efficient variable speed motors, this is a conservative approach in estimating revised fan power. *Id*.

IV. Interim Waiver Order

DOE has reviewed Samsung's application for an interim waiver, the alternate test procedure requested by Samsung, publicly available specification sheets and installation manuals relevant to these basic models, and the additional materials Samsung provided in support of its petition.

In appendix A to its petition, Samsung provided a submittal for one of the basic models for which it seeks to use its requested alternate test procedure. (Samsung, No. 1 at p. 6) The submittal shows technical specifications that confirm to DOE the limited ESP operating range of 0.01-0.24 in. wc. used as grounds for waiver for the basic models subject to Samsung's petition. Additionally, Figure 1 of Samsung's petition provided the fan curves for the blower used in these basic models. (Samsung, No. 1 at p. 3) Figure 1 shows that at maximum speed of the motor of 1560 revolutions per minute and 0.5 in. wc. ESP (or 125 pascals) the air flow of these basic models is zero, and that, therefore, testing of the basic models with the appendix M1 test procedure is physically impossible. Samsung supported Figure 1 with the electrical and mechanical specifications of the indoor fan provided in appendix B to its petition. (Samsung, No. 1 at pp. 7-8)

For the basic models listed in Samsung's petition, DOE's review of technical specifications for the basic models subject to the petition indicates that the fan cannot operate at

[8] Appendix M specifies a default fan power of 365 watts/1000 SCFM; whereas appendix M1 specifies a default fan power of 441 watts/1000 SCFM, a difference of 76 watts/1000 SCFM.

the minimum ESP of 0.5 in. wc. required to be tested by appendix M1. Since these basic models are physically incapable of operating at the minimum ESP required by the test procedure, DOE tentatively agrees that testing these basic models instead at a minimum ESP of 0.1 in. wc. with adjustments to ensure results are equivalent to performance measured at 0.5 in. wc. ESP is appropriate. DOE tentatively agrees that the measured fan power, cooling capacity, and heating capacity should be adjusted to reflect performance equivalent to testing at 0.5 in. wc. ESP, as requested by Samsung. DOE also tentatively agrees that using the calculation methodology from the January 2017 Final Rule to determine the fan power adjustment for these basic models is appropriate, and DOE's analysis confirms that this methodology yields an adjustment increase of 87 watts per 1000 SCFM. DOE notes that Samsung's proposal to adjust cooling and heating capacity by the Btu/h equivalent of the fan power is consistent with fan power adjustments made for coil-only systems in appendix M1. (*See*, for example, Equation 3.3-5 in section 3.3.e.1 of appendix M1, in which the average total space cooling capacity, $Q_c^k(T)$, is decreased by the Btu/h equivalent of the default fan power coefficient $DFPC_C$, in watts, for non-mobile, non-space-constrained home ducted coil-only system tests).

Based on this review, DOE has initially determined that the alternate test procedure requested by Samsung is appropriate and appears to allow for the accurate measurement of the energy efficiency of the specified basic models, while alleviating the testing problems cited by Samsung in implementing the DOE test procedure for these basic models. Consequently, DOE has determined that Samsung's petition for waiver likely will be granted. Furthermore, DOE has determined that it is desirable for public policy reasons to grant Samsung immediate relief pending a determination of the petition for waiver, and that Samsung may be likely to suffer economic hardship otherwise.

To maintain consistent units of measurement with the other sections of appendix M1 (specifically, the sections relevant to coil-only systems), DOE has converted Samsung's suggested adjustments of cooling and heating capacities from units of Btu/h per watt of

incremental fan power to units of Btu/h per 1000 SCFM. Samsung's suggestions regarding adjustment of cooling and heating capacities correspond to decreasing cooling capacity by 297 Btu/h/1000 SCFM and increasing heating capacity by 297 Btu/h/1000 SCFM. These values are reflected in the alternate test procedure established by this notification.

For the reasons stated, it is **ORDERED** that:

(1) Samsung must test and rate the following CAC/HP basic models, which are comprised of the individual combinations listed below, using the alternate test procedure set forth in paragraph (2).

Brand Series Name	Outdoor Unit Model Number	Indoor Unit Model Number	Cooling Capacity (95F)
Samsung Slim Duct	AC009BXADCH	AC009BNLDCH	9000
	AC012BXADCH	AC012BNLDCH	12000
	AC018BXADCH	AC018BNLDCH	18000

(2) The alternate test procedure for the Samsung basic models identified in paragraph (1) of this Interim Waiver Order is the test procedure for CAC/HPs prescribed by DOE at 10 CFR part 430, subpart B, appendix M1, except that:

In 3.1.4, *Airflow Through the Indoor Coil*, test using a minimum external static pressure of 0.1 in. wc. rather than the 0.50 value listed in Table 4.

In 3.3, *Test Procedures for Steady-State Wet Coil Cooling Mode Tests (the A, A_2, A_1, B, B_2, B_1, E_V, and F_1 Tests)*, perform the following additional calculation:

g. For all steady-state wet coil tests (*i.e.*, the A_1, A_2, B_1, B_2, E_V, and F_1 tests), decrease $\dot{Q}_c^k(T)$ by the quantity calculated in Equation 3.3-9 to this appendix and increase $\dot{E}_c^k(T)$ by the quantity calculated in Equation 3.3-10 to this appendix.

Equation 3.3-9 $$\frac{297\ Btu/h}{1000\ scfm} * \dot{V}_S$$

Equation 3.3-10 $$\frac{87\ Watts}{1000\ scfm} * \dot{V}_S$$

Where:

$\dot{V}_S$ is the average measured indoor air volume rate expressed in units of cubic feet per minute of standard air (scfm).

In 3.5.1, *Procedures When Testing Ducted Systems*, perform the following additional calculation:

e. For all cyclic dry-coil tests (*i.e.*, the D, D_1, D_2, and I_1 tests), decrease $\dot{Q}_c^k(T)$ by the quantity calculated in Equation 3.5-10 to this appendix and increase $\dot{E}_c^k(T)$ by the quantity calculated in Equation 3.5-11 to this appendix.

Equation 3.5-10 $$\frac{297\ Btu/h}{1000\ scfm} * \dot{V}_S$$

Equation 3.5-11 $$\frac{87\ Watts}{1000\ scfm} * \dot{V}_S$$

Where:

$\dot{V}_S$ is the average measured indoor air volume rate expressed in units of cubic feet per minute of standard air (scfm).

In 3.7, *Test Procedures for Steady-State Maximum Temperature and High Temperature Heating Mode Tests (the $H0_1$, H1, $H1_2$, $H1_1$, and $H1_N$ tests)*, perform the following additional calculation:

g. For all steady-state maximum temperature and high temperature tests (*i.e.*, the $H0_1$, H1, $H1_2$, $H1_1$, and $H1_N$ tests), increase $\dot{Q}_h^k(T)$ by the quantity calculated in Equation 3.7-9 to this appendix and increase $\dot{E}_h^k(T)$ by the quantity calculated in Equation 3.7-10 to this appendix.

Equation 3.7-9 $$\frac{297\ Btu/h}{1000\ scfm} * \dot{V}_S$$

Equation 3.7-10 $$\frac{87\ Watts}{1000\ scfm} * \dot{V}_S$$

Where:

$\dot{V}_S$ is the average measured indoor air volume rate expressed in units of cubic feet per minute of standard air (scfm).

In 3.9.1, *Average Space Heating Capacity and Electrical Power Calculations*, under paragraph (b) perform the following additional calculation:

(3) For all frost accumulation tests (*i.e.*, the $H2_1$, $H2_2$, and $H2_V$ tests), increase $\dot{Q}_h^k(35)$ by the quantity calculated in Equation 3.9.1-9 to this appendix and increase $\dot{E}_h^k(35)$ by the quantity calculated in Equation 3.9.1-10 to this appendix.

Equation 3.9.1-9 $$\frac{297\ Btu/h}{1000\ scfm} * \dot{V}_S$$

Equation 3.9.1-10 $$\frac{87\ Watts}{1000\ scfm} * \dot{V}_S$$

Where:

$\dot{V}_S$ is the average measured indoor air volume rate expressed in units of cubic feet per minute of standard air (scfm).

(3) *Representations*. Samsung may not make representations about the efficiency of a basic model listed in paragraph (1) for compliance, marketing, or other purposes unless that basic model has been tested in accordance with the provisions set forth in this alternate test procedure and such representations fairly disclose the results of such testing.

(4) This Interim Waiver Order shall remain in effect according to the provisions of 10 CFR 430.27.

(5) This Interim Waiver Order is issued on the condition that the statements, representations, test data, and documentary materials provided by Samsung are valid. 10 CFR 430.27(k)(1). If Samsung makes any modifications to the controls or configurations of a basic model subject to this Interim Waiver Order, such modifications will render the waiver invalid with respect to that basic model, and Samsung will either be required to use the current Federal test method or submit a new application for a test procedure waiver. DOE may rescind or modify this waiver at any time if it determines the factual basis underlying the petition for the Interim Waiver Order is incorrect, or the results from the alternate test procedure are unrepresentative of the basic model's true energy consumption characteristics. *Id*. Likewise, Samsung may request that DOE rescind or modify the Interim Waiver Order if Samsung discovers an error in the information provided to DOE as part of its petition, determines that the interim waiver is no longer needed, or for other appropriate reasons. 10 CFR 430.27(k)(2).

(6) Issuance of this Interim Waiver Order does not release Samsung from the applicable requirements set forth at 10 CFR part 429.

DOE makes decisions on waivers and interim waivers for only those basic models specifically set out in the petition, not future models that may be manufactured by the petitioner. Samsung may submit a new or amended petition for waiver and request for grant of interim waiver, as appropriate, for additional basic models of CAC/HPs. Alternatively, if appropriate, Samsung may request that DOE extend the scope of a waiver or an interim waiver to include

additional basic models employing the same technology as the basic model(s) set forth in the original petition consistent with 10 CFR 430.27(g).

Signing Authority

This document of the Department of Energy was signed on May 30, 2023, by Francisco Alejandro Moreno, Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on May 30, 2023.

Treena V. Garrett.
Federal Register Liaison Officer,
U.S. Department of Energy.

Date: 12/16/2022

U.S. Department of Energy
Building Technologies Program
Test Procedure Waiver
1000 Independence Avenue, SW., Mailstop EE-5B
Washington, DC 20585-0121

Re: Petition for Waiver and Interim Waiver on Test Procedure for Certain Ducted Mini Split Heat Pumps

Dear Ms. Julia Hegarty,
Samsung HVAC America LLC ("Samsung") respectfully submits petitions for test procedure waiver and interim waiver to the Department of Energy ("DOE") from certain provisions in the future test procedure for central air conditioners and heat pumps set forth in Appendix M1 to Subpart B of 10 CFR Part 430 ("Appendix M1") applicable from January 1, 2023, specifically for certain ducted variable speed mini split heat pumps designed specifically for low static and short duct applications ("Low Static VSMSHP").

Samsung HVAC is a leading manufacturer of Variable-speed Mini-splits and Multi-splits (VSMS) and Variable Refrigerant Flow (VRF) heating and cooling systems. VRF and VSMS use inverter driven technology and hence are very efficient and save considerable amount of energy in air conditioning and space heating.

I. Introduction

While the current test procedure for Low Static VSMSHP specifies how to the set the external static pressure for ducted systems in Appendix M to Subpart B of 10 CFR Part 430 ("Appendix M") this test procedure is changing from 1 Jan 2023 when the effective test procedure changes to Appendix M1 to Subpart B of 10 CFR Part 430 ("Appendix M1"). The minimum external static pressure cited in Table 4 of section 3.1.4.1 of Appendix M1 for ducted blower coil systems is changing. While this change is appropriate for most ducted blower coil systems, for ducted Low Static VSMSHP basic models that are subject of this petition the external static pressure changes from 0.10 in. wc. (Appendix M) to 0.50 in. wc. (Appendix M1). This change in external static pressure creates a problem for the concerned basic models as they are designed for short ducts and low static pressures. These models have a maximum operating external pressure of 0.24 in. wc. and cannot operate at 0.5 in. wc. This design feature of the equipment prevents their operation at the new external static pressure required by Appendix M1 and thus these basic models cannot be tested as per Appendix M1. Without a waiver and interim waiver Samsung's Low Static VSMSHP basic models cannot be manufactured after 1 Jan, 2023.

DOE increased the minimum static pressure requirement for ducted systems in Appendix M1 to better align with higher static pressure in central ducted homes. However, the Low Static VSMSHP in scope of this waiver petition is not used in traditional central ducted homes. These products are specifically designed for short duct and low static applications. Samsung is proposing as alternate test procedure in this petition to continue to test at 0.1 in. wc. external static pressure but adjust the fan power and the resulting heating and cooling But/h from fan power change to be equivalent to 0.5 in. wc. external static pressure.

This change allows to the subject basic models to be continued to be offered to consumer and not create an undue advantage over conventional ducted blower coil systems tested at 0.5 in. wc. external static pressure.

II. Models for which Waiver and interim waiver is requested

The basic models for which the test procedure waiver and interim waiver is requested are Samsung's Low Static VSMS products branded as Slim Duct product line presented in Table 1 of this section. The Slim Duct indoors are only 7-7/8 inches tall allowing for installation in tight spaces and reduces ceiling height loss. They are single zone systems that can be installed with or without ducts. Ducted applications are designed for short ducts with low static capability ranging from 0.01-0.24 inches of water. The submittals with technical specification is included in Appendix A for all Basic Models included in this petition.

Table 1: Basic Models for which waiver is sought

Brand Series Name	Outdoor Unit Model	Indoor Unit Model	Cooling Capacity (95F)
Samsung Slim Duct	AC009BXADCH	AC009BNLDCH	9000
Samsung Slim Duct	AC012BXADCH	AC012BNLDCH	12000
Samsung Slim Duct	AC018BXADCH	AC018BNLDCH	18000

III. Grounds for Petition of Waiver

Samsung requests test procedure waiver for the basic models in Table 1, on the grounds that the change in test procedure to Appendix M1 makes it impossible to test these basic models. This is explained in detail in the following paragraphs. The minimum external static pressure used to set the Full Load Cooling Air Flow changed in Appendix M1 for all ducted systems. While this change was a recommendation in the ASRAC term sheet[1] to better represent the real external static pressure for ducted units in central air conditioning systems, the change also had the unintended consequence affecting the ducted Low Static VSMSHP, which are designed to operate in short low static ducted applications and by design cannot operate at 0.5 in. wc. external static pressure.

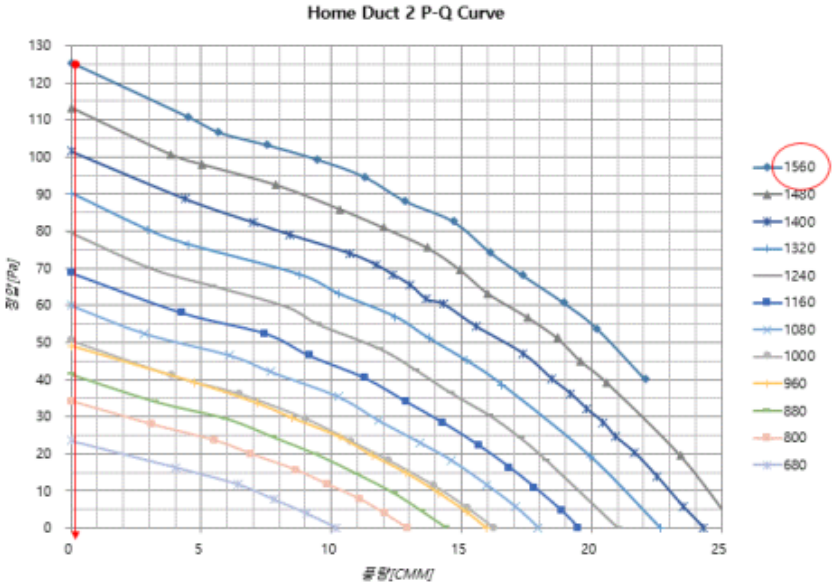
The minimum external static pressure to set the Cooling Full-Load air volume in current test procedure is specified in 10 CFR Part 430 Appendix M Section 3.1.4.1.1, Table 4. Appendix M, Table 4 requires the minimum external static pressure for the basic models in scope of this petition to be tested at min. of 0.1 inches of Water. However, starting 1 Jan, 2023, the test procedure is changing to Appendix M1. The minimum external static pressure is specified in Appendix M1 Table 4. This table specifies the required minimum external static pressure based on Product Variety as defined in Section 1.2 of Appendix M1. As per these definitions the Basic Models in Table 1 are classified as "Conventional" and these models are

[1] 2016 ASRAC Working Group Term Sheet for CAC and HP - https://www.regulations.gov/document/EERE-2013-BT-NOC-0005-0070

to be tested with a minimum external static pressure of 0.5 in. wc. However, 0.5 in. wc. external static pressure is outside the operating envelop of the Basic Models in Table 1. Appendix A of this petition shows the operating range of the Basic Models. The operating range of external static pressure of these models is 0.01-0.24 inches of water.

Figure 1 shows the fan curves for the blower used in the basic models. The graph shows that at maximum speed of the motor of 1560 rpm and 0.5 in water external static pressure or 125Pa the air flow is zero. The indoor fan electrical and mechanical specification is provided in Appendix B.

Figure 1: Blower Curves



This design feature prevents the testing of the basic models with Appendix M1 test procedure. 10 CFR 430.27 paragraph (a) (1) [2] allows submitting a request for waiver upon the grounds that one or more design features does not allow testing of the basic model according to the prescribed test procedure. We believe we have sufficiently explained in this paragraph how the design features of the Basic Models prohibit testing as per Appendix M1, whereby, we meet the requirements for grounds for waiver in 10 CFR 430.27 (b) (1) (i)[3].

Low Static VSMS products meet specific customer needs in applications where the conditioned space may have space constraints and a short duct is required to locate the indoor unit in a suitable location in proximity. These products provide a unique solution that is a compromise between central ducted system and ductless systems. Without a waiver and interim waiver to test these basic models to meet

[2] https://www.ecfr.gov/current/title-10/section-430.27#p-430.27(a)(1)
[3] https://www.ecfr.gov/current/title-10/section-430.27#p-430.27(b)(1)(i)

efficiency standards as per 10 CFR 430.32, they will have to be discontinued. If these systems are discontinued customers will have to adopt non optimized solutions that will increase the energy consumption causing undue burden to consumers and loss of sales to Samsung.

As alternate test procedure Samsung is proposing test at 0.1 in. wc. and adjust the calculations to estimate performance at 0.5 in. wc. external static pressure. In the Jan 2017 Final Rule[4] DOE ascertained that increasing the external static pressure from 0.15 in. wc. to 0.5 in. wc. will result in the indoor fan blower watts to increase by 76 Watts per1000 SCFM. Thus, changing external static from 0.1 in. wc. to 0.5 in. wc. equates to an increase of 87 watts per 1000 SCFM. Considering that this data is based on mostly fixed speed motors and the basic models in consideration use more efficient variable speed motors this is a very conservative approach in estimating revised fan power. Similarly, DOE determined that the added heat capacity from the additional fan motor power is calculated at 3.142 Btu/h power per watt.
Based on Jan 2017 Test Procedure Final Rule, Samsung would like to propose as the alternate test procedure to test the basic models at 0.1 in. wc. external static pressure and make proportional adjustment to fan power and capacity for estimated performance at 0.5 in. wc. For all test conditions in Appendix M1 test procedure the Indoor Fan Power shall be increased by 87 Watts/1000 SCFM, the cooling capacity shall be decreased by 3.412 Btu/h per watt of incremental fan power, and the heating capacity shall be increased by 3.412 Btu/h per watt of incremental fan power.

IV. Proposed Alternate Test Procedure

10 CFR 430 Appendix M1 Table 4 - Minimum External Static Pressure for Ducted Blower Coil Systems shall not apply to the basic models subject of this petition. Applicable Min. External Static Pressure for the basic models in lieu of Table 1 shall be 0.1 in. wc. This value will be used wherever appendix M1 Table 4 min. external static pressure is referenced.

In all sections of Appendix M1 where Total Cooling Capacity $\dot{Q}_c^k(T)$, Sensible Cooling Capacity $\dot{Q}_{sc}^k(T)$, and Electrical Power Consumption $\dot{E}_c^k(T)$ is calculated make the following adjustments;

For all tests increase the Electrical Power Consumption as follows;

$$\text{Indoor Fan Electric Power - } E_{fan,s} = E_{fan,\,m} + (87 \text{ Watts}) * V_s / (1000 \text{ SCFM})$$

Where, $E_{fan,s}$ is adjusted Indoor Fan blower Watts, $E_{fan,\,m}$ is the measured Indoor Fan blower Watts, V_s is the measured air flow rate in SCFM

For all tests the Cooling Capacity (Btu/h) shall be decreased by

$$(E_{fan,s} - E_{fan,\,m}) * 3.412$$

[4] 2017-01-05 Energy Conservation Program: Test Procedures for Central Air Conditioners and Heat Pumps; Final Rule

For all tests the Heating Capacity (Btu/h) shall be increased by

$$(E_{fan,s} - E_{fan,m}) * 3.412$$

Except for the above changes all provisions of 10 CFR 430 Appendix M1 shall be applicable without modification.

V. Petition for Interim Waiver

Pursuant to 10 C.F.R. Part 430.27(b)(2), Samsung also hereby applies for an interim waiver of the applicable test procedure requirements for the models listed in Table 1 of this petition. This petition for Interim Waiver is in reference to the petition for waiver covered by Section I through IV of this petition.
Samsung believes the petition for waiver is likely to be granted, as evidenced in Section I and Section III of this document. Without waiver Samsung will be forced to withdraw these products from the market which were legally allowed under the current test procedure. This results in loss of sales to Samsung and will also lead to reduced customer choice. Consumer will be forced to use non optimized alternate solutions for low static short duct applications that will lead to increased energy consumption contrary to DOE goals and EPCA direction. This adequately proves the economic disadvantage and hardship caused by non-approval of the interim waiver as required by 10 CFR 430.27 (b) (2).

VI. List of Manufacturers

As required by 10 CFR 430.27 (b)(ii), Samsung is providing in Appendix C of this petition, a list of manufacturers, known to us, that offer products like those that are subject of the petition in the United States.

VII. Conclusion

Samsung understands that the new external static pressure in Table 4 of Appendix M1 is from the term sheet of ASRAC working group and it seems that this product type was overlooked. However, as described in this petition these products meet unique needs of consumers and without an approval of this petition for waiver and interim waiver this product type will be eliminated from the market because of the change in test procedure. Samsung requests DOE to approve the petition for test procedure waiver and interim waiver. If you have any questions or require follow up information, we will be happy to work with DOE for an expeditious resolution.

Sincerely,

Chandra Gollapudi
Regulatory Affairs and Compliance Manager
Cg.gollapudi@samsunghvac.com

Appendix A: Submittal of the 18K Model

SAMSUNG

SUBMITTAL AC018BNLDCH/AA / AC018BXADCH/AA (CNH18LDB / CXH18ADB)

Samsung Slim Duct, Single Zone Duct, Split System

Job Name _____ Location _____

Purchaser _____ Engineer _____

Submitted to _____ Reference ☐ Approval ☐ Construction ☐

Unit Designation _____ Schedule # _____

Specifications

Model	Indoor Unit Model Number (US Code)		AC018BNLDCH/AA (CNH18LDB)
	Outdoor Unit Model Number (US Code)		AC018BXADCH/AA (CXH18ADB)
Performance [1]	Nominal Capacity	Cooling / Heating (Btu/h)	18,000 / 20,000
	Capacity Range	Cooling (Btu/h)	5,500 ~ 22,000
		Heating (Btu/h)	3,000 ~ 25,000
	SEER / EER		19.8 / 12.10
	COP (nominal heating)		3.2
	HSPF		9.0
	AHRI Certification Number		207465450
Power	Voltage	a / V / Hz	1 / 208-230 / 60
	Working Voltage Range (VAC)		178 - 254 (max. 3% deviation from each)
	Operating Current (min. / std. / max.)	Cooling (A)	2.4 / 6.7 / 10.8
		Heating (A)	1.8 / 8.2/ 16.0
	Max. Breaker	Amps	25
	Min. Circuit Ampacity (A)		19.1
Dimensions	W X H X D (in.)	Indoor Unit	43 5/16 X 7 13/16 X 15 3/4
		Outdoor Unit	34 5/8 X 31 7/16 X 12 3/16
	Duct Connections (W X H)	Supply (in.)	33 7/8 X 6
		Return (ID, in.)	38 1/2 X 6 5/8
	Weight (lbs.)	Indoor Unit	49.4
		Outdoor Unit	118.4
Sound Pressure Level	Indoor Unit dB(A)	L / M / H	28 / 32/ 35
	Outdoor Unit dB(A)	Cooling / Heating (high)	48 / 48
Operating Temperatures	Outdoor	Cooling	23 ~ 122°F (-5 ~ 50°C)
			0 ~ 122°F (-18 ~ 50°C) w/ baffle
		Heating	-4 ~ 75°F (-20 ~ 24°C)
	Indoor	Cooling	61 ~ 90°F (16 ~ 32°C)
		Heating	T ≤ 80°F (27°C)
Pipe Connections	Indoor & Outdoor	High side (flare)	1/4"
		Low side (flare)	1/2"
	Maximum (ft.)		164
	Maximum Vertical Separation (ft.)		98.4
	Condensate Connection (with included adapter)		1 1/16" ID for 3/4" PVC
Refrigerant	Type		R410A
	Control Method		Electronic Expansion Valve
	Factory Charge	lbs.	2.6
	Charged for		24.6 ft
	Additional Refrigerant		0.11 oz/ft over 24.6 ft
Compressor	Manufacturer		Samsung
	Type		Inverter Driven, BLDC Rotary
	RLA	Amps	12.7
Evaporator Fan	Type		BLDC (1) With Sirocco Fan (2)
	Air Volume	CFM (L/M/H)	353 / 459 / 600 (at standard ESP)
	Output (W) / FLA (A)		84 W / 1.06 A
	Static Pressure	Standard ("WC)	0.10
		Min. / Max. ("WC)	0.01 - 0.24
Condenser Fan	Motor		BLDC With Axial Type Fan (1)
	FLA / Watts / CFM (max.)		1.25 A / 125 W / 1,060 CFM
Safety	Certifications		ETL (UL 1995)
	Devices: PCB fuses, indoor unit terminal block thermal fuse, current transformer, over-voltage protection, crankcase heating, temperature limit protection logic, compressor overload sensing		

[1] Certified in accordance with the AHRI Unitary Small Air-Source Heat Pumps (USHP) Certification Program which is based on the latest edition of AHRI Standard 210/240.

Samsung HVAC maintains a policy of ongoing development, specifications are subject to change without notice. Refer to www.AHRIdirectory.org for current reference numbers.

General Information
- The outdoor unit shall supply power to indoor unit via 14 AWG X 3 power wire
- High-voltage terminal block temperature sensor to disable unit in the event of power connection overheating
- Integral condensate pump with maximum 29" lift from bottom of the unit with check valve and float switch that disables indoor should condensate overflow be detected.
- Auto-restart after power loss
- Soft-start compressor minimizing current inrush
- All heat exchangers shall be mechanically bonded aluminum fin to copper tube
- The condensing unit heat exchanger salt spray test method: ASTM-B117-18 - the heat exchanger showed no unusual rust or corrosion development to 2,280hours.
- Base pan heaters equipped as standard

Option settings
- The outdoor unit shall have snow accumulation prevention option setting to prevent snow drifting against an idle outdoor unit.
- Night-time Quiet Mode: reduction of operational sound during *(automatic or manual activation)*.
- Emergency Temperature Output (ETO) function: when indoor unit is in error status or when room temperature exceeds configurable temperature level, the system outputs a signal to an external source, e.g., backup system, building management system, alert device (ex: status light, warning lamp, buzzer).
- System can be set up as heating/cooling, cooling only, or heating only via outdoor unit option setting.
- Maximum Current Control configurable from 50% - 100% via outdoor unit, wired controller or central control

Indoor Fan
- Indoor fan is sirocco type
- Three fan speed settings and auto setting
- Washable filter as standard

Construction
- Outdoor unit shall be galvanized steel with a baked-on powder coated finish for durability
- Indoor Unit: Insulated, galvanized steel.

Controls
- Control wiring shall be 2 X 16 AWG wire
- No additional interface modules/adapters are required when connecting to Samsung central control options.
- The unit shall be operated via a wireless or wired remote control with DDC type signal
- Dual set temperature support when connected to MWR-WG00UN Advanced Wired Controller or central control options.
- Wired or wireless controllers must be purchased separately

Refrigerant System
- The compressor shall be hermetically sealed, inverter-controlled BLDC rotary type.
- Refrigerant flow shall be controlled by an electronic expansion valve at outdoor unit

Warranty
10 Years compressor, 10 years parts, 1 year limited labor when registered

ATTENTION
This air handling unit is intended for free-air discharge or for connection to a duct supplying only one room. Improper installation could contribute to the spread of smoke or flame in the event of a fire.

SHA-CAD-01132022

www.SamsungHVAC.com

AHRI CERTIFIED c ETL us Intertek

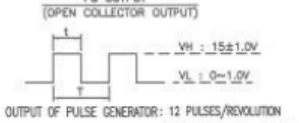
Appendix B: Indoor Fan Motor Specification for 18K Model

전 동 기 사 양 서
MOTOR SPECIFICATION
MODEL:DL-89824SSBB

1. (주)SPG 모델명 : DL-89824SSBB
   MOTOR MODEL
2. 적용범위
   APPLICATION
   본 사양서는 (주)삼성전자에 (주)에스피지가 제조,공급하는
   에어컨에 적용되는 고전압 DC BRUSHLESS MOTOR로
   (주)삼성전자와 도면의 차이가 있는 경우에는 (주)삼성전자에서
   승인한 (주)에스피지 도면을 우선으로 한다. 또한, (주)삼성전자와 사전 승인없이
   내부 또는 외부의 구조변경 및 재질 변경등을 하지 않는다.
   THE APPROVAL SHEET BEING SPECIFIED ABOUT THE HIGH VOLTAGE DC BRUSHLESS MOTOR,
   WHICH [redacted] MANUFACTURES AND SUPPLIES TO BE USED FOR A PART OF THE AIR CONDITIONER OF SAN
   IN CASE OF ANY DISCREPANCIES BETWEEN THE DRAWING OF [redacted] AND SAMSUNG, THE DRAWING OF
   [redacted] AS THE PRIORITY TO BE APPLIED TO THE PRODUCTION. ANY OF REVISIONS OR CHANGES ON
   THE INTERNAL/EXTERNAL STRUCTURE, OR MATERIAL WITHOUT ANY CONSENT OF SAMSUNG ARE NOW ALLOWED.
3. 형 식
   TYPE
   1) BUYER 모델 : DB31-00671A
      CUSTOMER'S P/N
   2) 구동제어방식 : 3상 전파방식 BRUSHLESS DC MOTOR
      DRIVE CONTROL METHOD : 3PHASE BIPOLAR DRIVE, DC BRUSHLESS MOTOR
   3) MAGNET 극수 : 8POLES
      NUMBER OF MAGNET POLES
   4) 회전방향 : LEAD WIRE 방향에서 보았을때 반시계방향(C.C.W)
      ROTATION DIRECTION : C.C.W DIRECTION WHEN VIEWED FROM THE LEAD WIRE
   5) FG 출력 : 12 (PULSES/REV)
      REVOLUTION SIGNAL FG OUTPUT
   6) 사용자세 : 출력축 수평
      POSTURE : OUTPUT SHAFT HORIZONTAL
4. 전기적 사양
   ELECTRIC SPECIFICATION
   1) 무부하특성
      NO LOAD CHARACTERISTICS

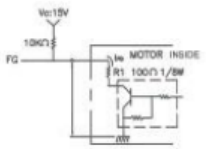
NO	항 목 ITEM	규 격 STANDARD	비 고 NOTE
A	정격전압 RATED VOLTAGE	VM = DC310 [V] Vcc = DC15 [V] Vsp = DC0~5.4 [V]	
B	무부하 회전수 NO LOAD SPEED	1000±20 [r/min]	참고치 NORMAL
C	무부하 입력 NO LOAD INPUT	20+10% [W]	참고치 NORMAL

FG OUTPUT
(OPEN COLLECTOR OUTPUT)



OUTPUT OF PULSE GENERATOR: 12 PULSES/REVOLUTION
: VH= 15±1.0V, VL=0~1.0V
: DUTY[t/T]=0.4~0.6

TURN SIGNAL OUTPUT CIRCUIT



[FIG.1]

APPROVAL
승 인
2021.11.02
(주)에스피지

[redacted](REV 01)

(주) 에 스 피 지

Rohs

ER OF SAMSUNG.

LLOWED.

2) 정격부하특성
RATED LOAD CHARACTERISTICS

NO	항 목 ITEM	규 격 STANDARD	비 고 NOTE
A	정격전압 RATED VOLTAGE	VM = DC310 [V] Vcc = DC15 [V] Vsp = DC4.2±0.3 [V]	참고치 NORMAL
B	사용전압범위 SUPPLY VOLTAGE RANGE	VM = DC280~DC340 [V] Vcc = DC13.5~16.5 [V] Vsp = DC0~5.4 [V]	참고치 NORMAL 6[V]MAX
C	정격부하 RATED LOAD	5.5 [kg.cm]	참고치 NORMAL
D	정격회전수 RATED SPEED	1500±50 [r/min]	참고치 NORMAL
E	정격전류 RATED CURRENT	360±30 [mA]	참고치 NORMAL
F	정격의 종류 RATED OPERATING	CONTINUOUS	
G	절연등급 INSULATION CLASS	CLASS E	
H	정격출력 RATED OUTPUT	84 [W]	참고치 NORMAL

3) 전기적특성
ELECTRIC CHARACTERISTICS

NO	항 목 ITEM	규 격 STANDARD	비 고 NOTE
A	전류 CURRENT	IM = 360±30 [mA]	5.5[kgf.cm] VM=310[V] Vcc=15[V] Vsp=4.7[V]
B	회전수 SPEED	1500±50 [r/min]	
C	전류한정 CURRENT LIMIT	0.89 [A]MAX	참고치 NORMAL
D	회전신호검출(FG) REVOLUTION SIGNAL (FG) OUTPUT	12 [PULSES/REV] (NUMBER OF OUTPUT PULSES)	[그림 1] [FIG. 1]
E	Vsp 최소 동작 전압 THE MINIMUN OPERATING VOLTAGE (Vsp)	Vsp = 0.5 [V]	참고치 NORMAL

ROVAL 인 1.11.02 스피치

	날 짜 DATE	서 명 SIGN	변 경 내 용 NOTE	변 경 이 유 REVISION
△				
△				
△	21.11.02	이 정 원	SHAFT 접착 => 압입, AL WASHER(0.2t) 및 END 규격 추가, PCB 변경	품질개선(2021-11-0367)

재 질 MATERIAL		표면 처리 SURFACE FINISH		척 도 SCALE	/	공 차 TOLERANCE	+ −
제 도 DRAWN	설 계 DESIGN	검 도 CHECK	승 인 APPR.	도 명 NAME	MOTOR SPECIFICATION (1/5) DL-89824SSBB		
이 정 원 21.11.02							
[redacted]				작성일 DATE	21.11.02	도 번 DWG NO.	7-189-0132-G0

스피치 A3(420*297)

Appendix C: List of Manufacturers

Manufacturers of single zone ducted mini splits registered on AHRI are below;

Carrier Corporation

Daikin Manufacturing Company, L.P.

Fujitsu General America, Inc.

GD Midea Air-Conditioning Equipment Co., Ltd.

Gree Electric Appliances, Inc. of Zhuhai

Haier US Appliance Solutions, Inc, d/b/a GE Appliances, a Haier Company

Hisense (Guangdong) Air Conditioning Co., Ltd.

LG Electronics, Inc.

Mitsubishi Electric Cooling & Heating

Panasonic Corporation of North America

Qingdao Haier Air-conditioning Electronic Co.,Ltd

Samsung Electronics Co., Ltd.

TCL Air Conditioner (ZhongShan) Co.,Ltd.

[FR Doc. 2023-11791 Filed: 6/2/2023 8:45 am; Publication Date: 6/5/2023]