

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOLAREEDGE TECHNOLOGIES LTD.,
Petitioner,

v.

KOOLBRIDGE SOLAR, INC.,
Patent Owner.

IPR2022-00015
Patent 10,784,710 B2

Before THU A. DANG, BRIAN J. McNAMARA, and
PATRICK M. BOUCHER, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314(a)

SolarEdge Technologies Ltd. (“Petitioner”) filed a Petition pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–17 of U.S. Patent No. 10,784,710 B2 (Ex. 1201, “the ’710 patent”). Paper 2 (“Pet.”). Koolbridge Solar, Inc. (“Patent Owner”) filed a Preliminary

Response. Paper 7 (“Prelim. Resp.”). With our authorization, Petitioner filed a Reply and Patent Owner filed a Sur-reply. Papers 8 (“Reply”), 9 (“Sur-reply”).

We have jurisdiction under 35 U.S.C. § 314 and 37 C.F.R. § 42.4. For the reasons set forth below, we exercise our discretion under 35 U.S.C. § 314(a) and decline to institute an *inter partes* review.

I. BACKGROUND

A. The ’710 Patent

The ’710 patent “relates generally to DC-to-AC convertors for electric power systems, and in particular to a transformerless inverter operative to approximate an AC output by selectively switching the positive, negative, or zero values of a plurality of differently-valued DC sources and summing the switch outputs.” Ex. 1201, 1:18–23. Figure 1 of the ’710 patent is reproduced below.

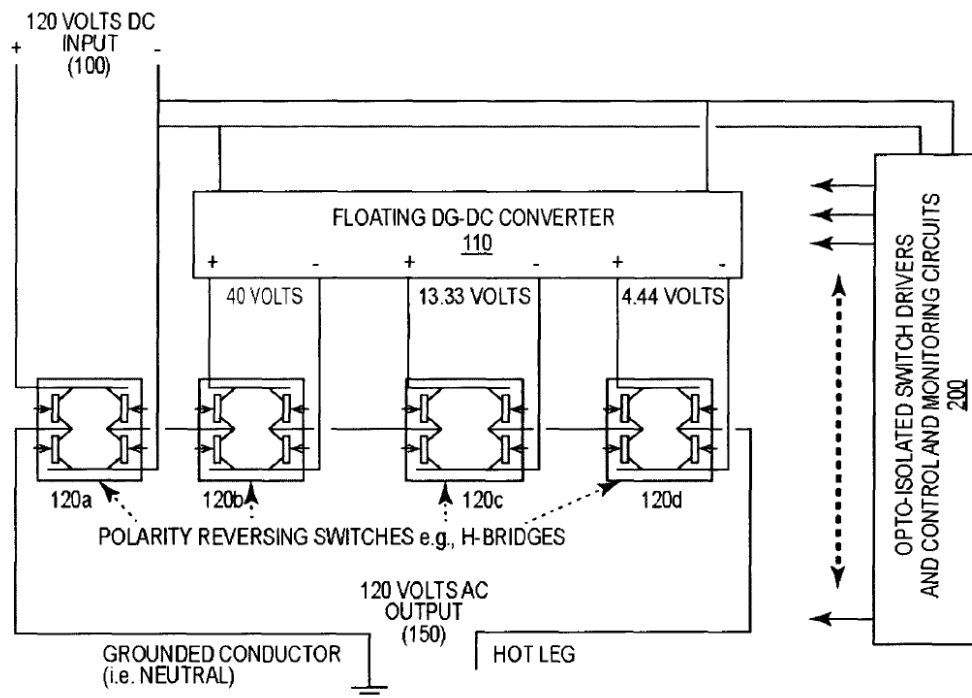


FIG. 1

Figure 1 is a block diagram of a DC-to-AC load converter. *Id.* at 5:66–67. The DC-to-AC converter has input 100 for a floating DC power source and a pair of output terminals 150 for the AC output. *Id.* at 6:65–7:7. Bidirectional DC-DC converter 110 converts DC input 100 to a number of floating DC output voltages applied to a set of reversing switches 120, controlled by opto-isolated driver circuit 200. *Id.* Each switch 120 can be controlled based on an n-ary control signal to apply a multiplier to the input voltage. *Id.* at 7:23–28, 7:51–54. The outputs of switches 120 are connected in series to AC output 150 to generate a sum voltage, depending on the state of the n-ary control signals for each switch 120. *Id.* at 7:60–65. By appropriate control switches 120, any voltage within a certain range can be produced at specific steps. *Id.* at 8:5–7.

The '710 patent illustrates this by focusing on a ternary system with four switches 120, such that each numerical sample value is expressed with

four digits in the ternary number system, e.g. (T4, T3, T2, T1). *See id.* at 7:23–31. Each digit T_i ($i = 1, 2, 3, \text{ or } 4$) can only take on one of the three values $-1, 0, \text{ or } +1$, such that the voltage provided by each switch is bypassed or is contributed in either positive or negative polarity to the sum voltage. *Id.* For such a ternary system, the floating DC output voltages are generated with the ratios $1:\frac{1}{3}:\frac{1}{9}:\frac{1}{27}$, in correspondence with the place significance of the different ternary digits. *Id.* at 7:28–31.

The '710 patent provides further illustration with a specific numerical example in which input 100 provides 120 volts DC from ten 12-volt rechargeable batteries connected in series. *See id.* at 6:65–7:7. In such a case, floating DC supplies generated by converter 100 are therefore 40 V ($\frac{1}{3} \times 120 \text{ V}$), 13.33 V ($\frac{1}{9} \times 120 \text{ V}$), and 4.44 V ($\frac{1}{27} \times 120 \text{ V}$). *Id.* at 7:31–35. The peak voltage that could be generated at AC output 150 occurs when $T_1 = T_2 = T_3 = T_4 = 1$, and is $120 + 40 + 13.33 + 4.44 = 177.77 \text{ V}$, which corresponds to a useful sine wave output voltage of 125.7 V RMS. *Id.* at 7:35–39; *see id.* at 7:65–67. More generally, the voltage generated at AC output 150 may take any of the $3^4 = 81$ values of $120T_4 + 40T_3 + 13.33T_2 + 4.44T_1 \text{ V}$ that result from the three possible values of T_i , in steps of 4.44 V between -177.77 V and $+177.77 \text{ V}$. *Id.* at 7:60–65, 8:5–7. For instance, if T_1 is instead set to 0, the voltage at AC output 150 would be 173.33 V; if T_1 is instead set to -1 , the voltage at AC output 150 would be 168.88 V; and so on. *Id.* at 7:65–8:5.

“In order to generate a 60 Hz step-approximation to a 125.7 volt rms sinewave, the switches are controlled to selected sequentially among the $3^4 = 81$ possible voltage levels from $-[1]77.77 \text{ V}$ to $+177.77 \text{ V}$ and back again,

repetitively in the proper sequence and at the proper times.” *Id.* at 8:21–25. This is illustrated with Figure 12 of the ’710 patent, which is reproduced below.

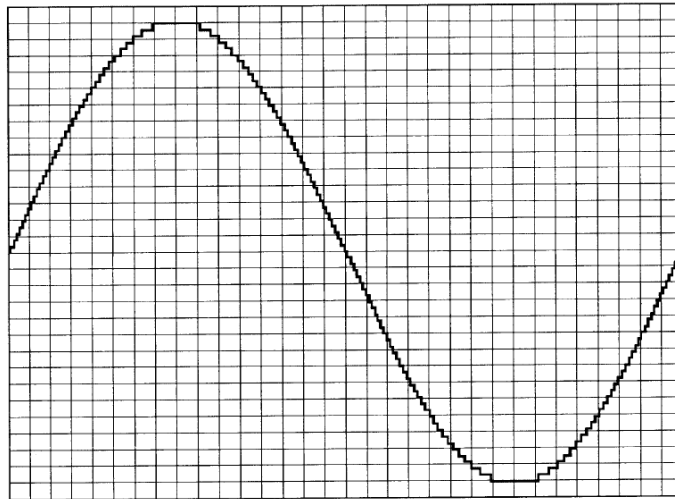


FIG. 12

Figure 12 “shows the output sinusoidal waveform from the converter produced by controlling the switches in the proper sequence.” *Id.* at 10:31–35.

B. Illustrative Claim

Independent claim 1 (the ’710 patent’s only independent claim) is illustrative of the challenged claims and is reproduced below.

1. A DC to AC converter having a transformerless output, and operative to convert DC power to an AC power having a desired voltage and waveform, and to output the AC power between hot and neutral output terminals, the DC to AC converter comprising:

a plurality of controlled switches, each having a power input connection operative to accept DC power from an associated DC power source at an associated DC voltage, and each controlled switch further having a power output connection operative to output a selected one of: (a) the

associated DC voltage, (b) the associated DC voltage having an inverted polarity, and (c) zero voltage, in response to an associated ternary-valued selection signal representing the multiplier values +1, -1, or 0 respectively, the power output connections of the plurality of switches being directly connected in series to output a sum voltage approximating the desired AC output voltage and waveform.

Ex. 1201, 42:50–67.

C. Evidence

Petitioner relies on the following references:

Iwata	US 2008/0192519 A1	Aug. 14, 2008	Ex. 1204
Mori '265	WO 2010/082265 A1	July 22, 2010	Ex. 1207 ¹
Flanagan	US 5,400,237	Mar. 21, 1995	Ex. 1208
Tracy	US 7,088,601 B2	Aug. 8, 2006	Ex. 1209
Bower	US 6,750,391 B2	June 15, 2004	Ex. 1211
Koyama	WO 2010/055713 A1	May 20, 2010	Ex. 1213 ²
Nishimura	US 2009/0086520 A1	Apr. 2, 2009	Ex. 1214
Phadke	US 8,576,591 B2	Nov. 5, 2013	Ex. 1215
Bowles	US 5,757,633	May 26, 1998	Ex. 1232
Lipo	US 6,005,788	Dec. 21, 1999	Ex. 1233

K. H. Ahmed, S. J. Finney, and B. W. Williams, *Passive Filter Design for Three-Phase Inverter Interfacing in Distributed Generation*, CPE 2007 (IEEE 2007) (Ex. 1212)

In addition, Petitioner relies on a Declaration by R. Jacob Baker, Ph.D., P.E. Ex. 1202.

¹ Exhibit 1207 is a certified English translation of WO 2010/082265 A1. The original Japanese version of the reference was filed into the record by Petitioner as Exhibit 1216.

² Exhibit 1213 is a certified English translation of WO 2010/055713 A1. The original Japanese version of the reference was filed into the record by Petitioner as Exhibit 1217.

D. Asserted Grounds of Unpatentability

Petitioner challenges claims 1–17 on the following grounds. Pet. 22.

Claim(s) Challenged	35 U.S.C. §³	References
1, 7, 8	102	Bowles
2, 4, 5, 12	103(a)	Bowles, Lipo
3	103(a)	Bowles, Bower
6	103(a)	Bowles, Mori '265
9	103(a)	Bowles, Flanagan
10, 11	103(a)	Bowles, Iwata
10, 11	103(a)	Bowles, Iwata, Tracy
10, 11	103(a)	Bowles, Iwata, Nishimura
10, 11	103(a)	Bowles, Iwata, Tracy, Nishimura
13	103(a)	Bowles, Iwata, Koyama
13	103(a)	Bowles, Iwata, Tracy, Koyama
14, 15	103(a)	Bowles, Lipo, Iwata, Koyama, Ahmed
14, 15	103(a)	Bowles, Lipo, Iwata, Tracy, Koyama, Ahmed
16	103(a)	Bowles, Iwata, Ahmed
17	103(a)	Bowles, Phadke

E. Real Parties in Interest

The parties identify only themselves as real parties in interest. Pet. 1; Paper 5, 2.

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C § 103(a). Petitioner contends that “[t]he earliest priority date for the ’710 patent claims is the filing date of U.S Patent Application No. 13/103,070, May 8, 2011. Pet. 8 (citing Ex. 1202 ¶ 116). Patent Owner does not contest that the pre-AIA version of § 103(a) accordingly applies.

F. Related Matters

Both parties identify *Koolbridge Solar, Inc. v. SolarEdge Technologies, Inc.*, No. 1:20-cv-01374 (D. Del.), which has been dismissed without prejudice, as involving the '710 patent. Pet. 1; Paper 5, 2.

The '710 patent is also challenged by Petitioner in IPR2022-00013 and IPR2022-00014. In addition, Petitioner challenges U.S. Patent No. 8,937,822 B2, owned by Patent Owner, in each of IPR2022-00007, IPR2022-00008, IPR2022-00009, IPR2022-00010, IPR2022-00011, and IPR2022-00012.

II. DISCRETION UNDER 35 U.S.C. § 314(a)

As noted above, the instant Petition is one of three petitions filed by Petitioner challenging the claims of the '710 patent. Patent Owner urges us to exercise our discretion under 35 U.S.C. § 314(a) to “reject all three petitions as duplicative and insufficiently tailored to meet the standards of institution.” Prelim. Resp. 2.

“Based on the Board’s experience, one petition should be sufficient to challenge the claims of a patent in most situations.” Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), 59, *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated> (“Trial Practice Guide”). The Board recognizes that there may be “rare” circumstances in which two petitions by a petitioner may be needed, but “finds it unlikely that circumstances will arise where three or more petitions by a petitioner with respect to a particular patent will be appropriate.” *Id.* Accordingly, the Board asks a petitioner who files two or more petitions challenging the same patent to

identify: (1) a ranking of the petitions in the order in which it wishes the Board to consider the merits, . . . and (2) a succinct explanation of the differences between the petitions, why the issues addressed by the differences are material, and why the Board should exercise its discretion to institute additional petitions if it identifies one petition that satisfies petitioner's burden under 35 U.S.C. § 314(a).

Id. Petitioner provides the following ranking of its three petitions. Paper 3, 1.

Rank	Petition	Primary Reference(s)
A	IPR2022-00013 (Petition 1)	Iwata-Bower
B	IPR2022-00014 (Petition 2)	Suzuki
C	IPR2022-00015 (Petition 3)	Bowles

Petitioner summarizes its above ranking: “Petition 1 (IPR2022-00013) primarily relies on the Iwata reference, in combination with Bower. Petition 2 (IPR2022-00014) primarily relies on the Suzuki reference. Petition 3 (IPR2022-00015) primarily relies on the Bowles reference.” *Id.*

Petitioner provides three bases that it contends justify granting multiple petitions challenging the same claims of the same patent: (1) it is “possible” that Patent Owner could attempt to antedate certain references, *id.* at 1–2; (2) the prior-art combinations in the various petitions meet the claims limitations “in different ways,” *id.* at 2–3; and (3) certain references, such as the Tolbert journal article, “may be the subject of disputes with respect to the date of publication that are not an issue in the other petitions,” *id.* at 4. We are not persuaded that any of these bases provides sufficient justification to warrant institution of three proceedings.

The first and third bases, i.e. the possibility of antedating or publication-date disputes, are speculative, in that Petitioner has not provided

evidence of any actual dispute between the parties on those issues. As such, those bases are unlike the example provided in the Trial Practice Guide “when there *is* a dispute about priority date requiring arguments under multiple prior art references.” *See* Trial Practice Guide 59 (emphasis added).

For the second basis, meeting the claim limitations “in different ways,” Petitioner explains that “[t]he Bowles reference is anticipatory of certain claims (1, 7, 8), whereas Iwata-Bower and Suzuki are set forth as rendering those claims obvious, alone or in combination with other references.” Paper 3, 2. In addition, Petitioner notes that, in the different challenges, certain dependent claims rely on a reference alone for obviousness or rely on a combination with additional references. *Id.* at 2–3. We find that the variations described by Petitioner on this record do not meet the “rare” exceptions contemplated by the Trial Practice Guide.

Although we are thus not persuaded that Petitioner has provided sufficient justification for instituting trial based on three petitions, we also are not persuaded by Patent Owner that we should exercise our discretion to deny all three petitions. In arguing that we should do so, Patent Owner contends that “Petitioner’s Ranking does not justify consideration of two—much less three—petitions challenging the same sole independent claim and its dependents.” Prelim. Resp. 9. While we agree with such a position for the reasons expressed above, Patent Owner provides insufficient reason to support its assertion that “[a]ll three petitions should be denied institution,” rather than considering the merits of Petitioner’s highest-ranked petition. *See id.* We recognize that Patent Owner additionally argues that the Petition is deficient in articulating Petitioner’s claim-construction positions and

improperly incorporates declarant testimony by reference. *See id.* at 10–16. But these are contentions that bear on the sufficiency of the Petition rather than on whether we should deny the Petition as a matter of discretion. We accordingly address those issues in a concurrently issued decision in IPR2022-00013, where we institute review of the ’710 patent after determining that Petitioner’s highest-ranked petition demonstrates a reasonable likelihood of prevailing on the merits.⁴

But for the reasons expressed above, we otherwise exercise our discretion under 35 U.S.C. § 314(a) to deny the instant petition.

III. ORDER

In consideration of the foregoing, it is

ORDERED that the Petition is *denied*, and no trial is instituted.

⁴ Addressing certain remarks made in the Trial Practice Guide, Patent Owner additionally argues that we should not institute review in all three proceedings because “there is no parallel litigation between the parties” and because “Petitioner gives no indication that any priority dispute requires the filing of multiple petitions.” Prelim. Resp. 4–5. Although Petitioner disputes certain aspects of these arguments, we need not address those disputes in detail because, even if we credited Patent Owner’s arguments fully, we would not find that they provide sufficient reason to exercise discretion to deny *all* the petitions rather than holding Petitioner to consideration of a single petition on its merits. *See* Reply 3 (Petitioner contending that “the threat of litigation continues”); Sur-reply 2 (Patent Owner contending that “Petitioner builds its reply arguments from a false premise”).

IPR2022-00015
Patent 10,784,710 B2

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