

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SILICON LABORATORIES, INC.,
Petitioner,

v.

CRESTA TECHNOLOGY CORPORATION,
Patent Owner.

Case IPR2014-00809
Patent 7,265,792 B2

Before PHILLIP J. KAUFFMAN, GREGG I. ANDERSON, and
PATRICK M. BOUCHER, *Administrative Patent Judges*.

ANDERSON, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

On May 23, 2014, Silicon Laboratories, Inc. (“Petitioner”) filed a petition (Paper 1) pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–17, 26, and 27 of US Patent No. 7,265,792 B2 (“the ’792 patent”), filed July 1, 2004. Cresta Technology Corporation (“Patent Owner”) filed a preliminary response (Paper 8) on August 22, 2014. Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we institute an *inter partes* review of claims 1, 2, and 4–17. We decline to institute *inter partes* review of claims 3, 26, and 27. The Board has not made a final determination of the patentability of any claim.

I. BACKGROUND

A. *The ’792 patent (Ex. 1001)*

The ’792 patent is directed towards “a broadband television signal receiver for receiving multi-standard analog television signals and digital television signals.” Ex. 1001, 1:7–10. A dual-format television receiver includes a signal input terminal for receiving incoming radio frequency (“RF”) signal. *Id.* at 3:57–59. A frequency conversion circuit converts the input RF signal to an intermediate frequency (IF) signal. *Id.* at 4:55–57. The analog IF signal generated by the frequency conversion circuit is converted to digital signal that digitizes an IF circuit. *Id.* at 5:22–23. The receiver processes the digitized signal entirely in the digital domain. *Id.* at 5:23–25.

Figure 1 of the '792 patent is reproduced below.

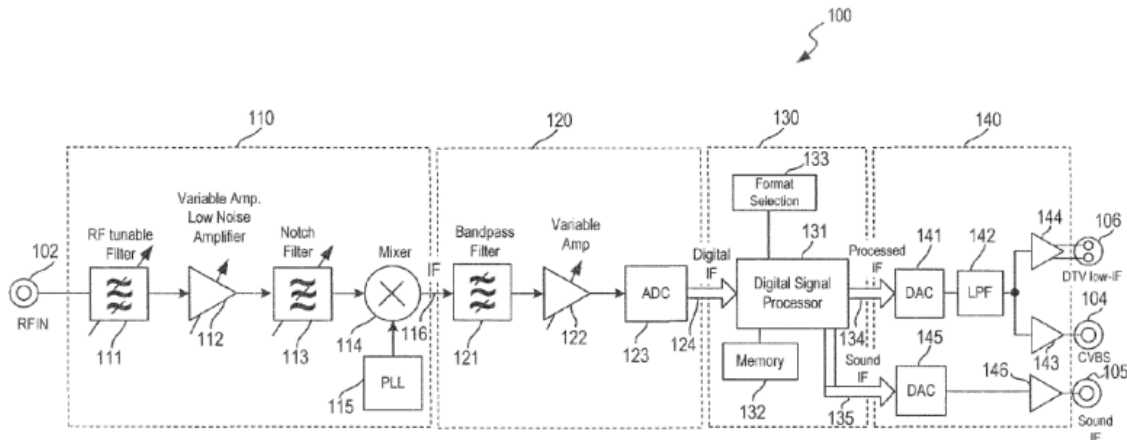


Fig. 1

Figure 1 depicts a schematic diagram of a dual-format television receiver. As shown in Figure 1, in addition to frequency conversion circuit 110 and digitizing IF circuit 120, receiver 100 includes digital signal processor (DSP) circuit 130 and signal output circuit 140. *Id.* at 4:49–52. “By applying ... the appropriate signal processing functions at DSP circuit **130**, receiver **100** can handle television signals in any format (analog or digital) and in any standard (e.g. NTSC, PAL, SECAM, DVB or ATSC).” *Id.* at 5:25–29.

The receiver disclosed in the '792 patent processes all signals in the digital domain and it therefore eliminates the need for analog components like a Surface Acoustic Wave (SAW) filter. *Id.* at 1:55–56; 3:32–35. In addition, a single signal processing path is used to process television signals in either the analog format or the digital format. *Id.* at 3:45–49.

B. Illustrative claim

Claim 1 is the only independent claim of the '792 patent and is illustrative of the claims at issue:

1. A television receiver comprising:
 - a frequency conversion circuit for receiving an input RF signal and for converting the input RF signal to an intermediate frequency signal having an intermediate frequency (IF), the input RF signal encoding information in one of a plurality of television signal formats;
 - an analog-to-digital converter for sampling the intermediate frequency signal and generating a digital representation thereof;
 - a signal processor for processing the digital representation of the intermediate frequency signal in accordance with the television signal format of the input RF signal, the signal processor generating digital output signals indicative of information encoded in the input RF signal, wherein the signal processor applies one of a plurality of finite impulse response filters to the digital representation of the intermediate frequency signal, each of the plurality of finite impulse response corresponding to a format of the input RF signal; and
 - a signal output circuit for receiving the digital output signals from the signal processor and for providing one or more output signals corresponding to the digital output signals.

Ex. 1001, 10:51–11:6.

C. References relied upon

Petitioner relies on the following references.

Thomson	EP 0696854 A1	Feb. 14, 1996	Ex. 1004
Favrat	US 2004/0061804 A1	Apr. 1, 2004	Ex. 1007

Balaban	US 6,369,857 B1	Apr. 9, 2002	Ex. 1008
Kerth	US 6,804,497 B2	Oct. 12, 2004	Ex. 1011
Oku	US 2002/0057366 A1	May 16, 2002	Ex. 1018
Gunter	US 4,782,385	Nov. 1, 1988	Ex. 1022
Patel	US 6,124,898	Sept. 26, 2000	Ex. 1023

Clay Olmstead and Mike Petrowski, *A Digital Tuner for Wideband Receivers*, DSP Applications Magazine (Sept. 1992) (Ex. 1005) (“Harris”).

Al Lovrich and Ray Simar, Jr., *Implementation of FIR/IIR Filters with the TMS32010/TMS32020*, Application Report: SPRA003A (Texas Instruments, 1989) (Ex. 1006) (“TI App Note”).

Cirrus Logic, Product Bulletin CS92288 (2002) (Ex. 1015).

Cirrus Logic, Data Sheet CS4223/CS4224 (April 2000) (Ex. 1016).

Cirrus Logic, Data Sheet CS4954/CS4955 (April 1999) (Ex. 1017)¹.

D. Asserted grounds of unpatentability

Petitioner challenges claims 1–17, 26, and 27 of the ’792 patent on the following grounds. Pet. 4–6.

Reference(s)	Basis	Claim(s) Challenged
Thomson and Harris	§ 103(a)	1, 2, 4, 10, 11, and 26
Thomson and TI App Note	§ 103(a)	1, 2, 4, 10, 11, and 26
Thomson, Harris, and Gunter/Thomson, TI App Note, and Gunter ²	§ 103(a)	3

¹ Exhibits 1015–1017 are collectively referred to as “Cirrus Logic.”

² Petitioner presents alternative grounds, which follow the virgule (“/”), substituting TI App Note for Harris.

Reference(s)	Basis	Claim(s) Challenged
Thomson, Harris, and Cirrus Logic/Thomson, TI App Note, and Cirrus Logic	§ 103(a)	5 and 6
Thomson, Harris and Kerth/Thomson, TI App Note, and Kerth	§ 103(a)	7 and 12
Thomson, Harris, Oku, and Kerth/Thomson, TI App Note, Oku, and Kerth	§ 103(a)	13–17
Thomson, Harris, Kerth and Cirrus Logic/Thomson, TI App Note, Kerth, and Cirrus Logic	§ 103(a)	8 and 9
Thomson, Harris, and Balaban/Thomson, TI App Note, and Balaban	§ 103(a)	26 and 27
Patel	§ 102	1

E. Related proceedings

Patent Owner has asserted the '792 patent against Petitioner in the following two actions: *Cresta Technology Corporation v. Maxlinear, Inc. et al.*, 1:14-cv-00079-RGA (D.Del.); and *Certain Television Sets, Television Receivers, Television Tuners, and Components Thereof*, Investigation No. 337-TA-910 (ITC). Pet. 1.

F. Claim construction

Consistent with the statute and legislative history of the Leahy-Smith America Invents Act, Pub. L. 112-29, 125 Stat. 284, 329 (2011), the Board interprets claims using the broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see*

also Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).

1. “*RF signals*”

Neither party offers a specific construction of “RF signals.” The specification of the ’792 patent defines “RF” as an abbreviation for “radio frequency” (Ex. 1001, 1:36), which *The Authoritative Dictionary of IEEE Standards Terms* identifies as a frequency roughly between 10 kHz and 100 GHz. Ex. 3001, p. 912. We construe “RF signals” as signals having a frequency between 10 kHz and 100 GHz.

2. “*format*”

Independent claim 1 recites that the input RF signals encode information “in one of a plurality of formats.” The specification draws a distinction between “formats” and “standards”: “Television signals are transmitted in analog or digital *formats* and in accordance with a variety of *standards*.” Ex. 1001, 1:18–20 (emphasis added).

Patent Owner contends that “the broadest reasonable construction of ‘format’ in light of the specification is: one or more characteristics of the input RF signal corresponding to the television transmission standard.” Prelim. Resp. 12. Petitioner does not proffer an explicit construction of “format.”

We disagree with Patent Owner’s proposed construction because its reference to a corresponding television transmission standard is narrower than suggested by the claims and specification. For example, dependent

claim 2 depends from claim 1 and recites, as an additional limitation, “wherein the plurality of television signal formats comprises an analog television format and a digital television format.” The specification expressly states “the television signal formats include an analog television format and a digital television format.” Ex. 1001, 2:46–47.

Accordingly, we construe “format” such that analog and digital signals are examples of distinct formats.

3. “*signal processor*”

Independent claim 1 recites a “signal processor.” Petitioner asserts that this term is not a means-plus-function limitation under 35 U.S.C. § 112, ¶ 6. *See* Pet. 13. Patent Owner does not respond or discuss the issue. We agree that claim 1’s recitation of a signal processor does not require construction under 35 U.S.C. § 112, ¶ 6.

Petitioner proposes that “the broadest reasonable construction of ‘signal processor’ in light of the specification is: any device that processes an input or output.” Pet. 12. Petitioner cites to extrinsic evidence (Exs. 1009 and 1014) in support of its proposed construction. “Patent Owner contends that the broadest reasonable construction of ‘signal processor’ in light of the specification is: a digital module that processes television signals in the digital domain.” Prelim. Resp. 11. Patent Owner cites to the ’792 patent specification for support. *Id.*

As to “signal processor,” both parties cite to the ’792 patent’s description of a “DSP 131 [that] processes the digital IF signal according to

the television format and standard to which the input RF signal is encoded.” Pet. 12; Prelim. Resp. 11 (citing Ex. 1001, 5:48–52). Accordingly, “signal processor” need not be limited to a module that processes *television* signals, as opposed to other signals, like digital IF signals. Claim 1 requires that the signal processor process the digital representation of the intermediate frequency signal, and consequently the signal processor processes signals in the digital domain. Accordingly, we construe “signal processor” as a digital module that processes signals in the digital domain.

4. “baseband signal”

Claims 4, 5, 8, and 14 use the claim term “baseband signal(s).” Neither party proposes a construction of this term. *The Authoritative Dictionary of IEEE Standards Terms* defines “baseband signaling” as “[t]he transmission of a signal at its original frequency, that is, not changed by modulation. *Note:* It can be an analog or a digital signal.” Ex. 3001, p. 87. We discern nothing in the ’792 specification inconsistent with this ordinary meaning. Accordingly, we construe “baseband signal” as a signal without transmission modulation.

II. ANALYSIS

A. Thomson

Thomson describes a broadcast receiver. Ex. 1004, 1:3–4.

Figure 1 of Thomson is reproduced below.

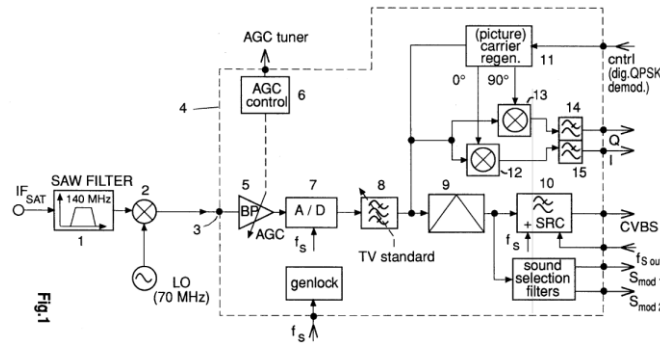


Figure 1 is a block diagram showing components of the broadcast receiver, which may receive incoming signal IF_{SAT} from an outdoor station. *Id.* at 2:24–26, 30–31. Incoming signal IF_{SAT} results from the outdoor station supplying satellite channels already down-converted in a frequency band covering 950–1750 MHz. *Id.* at 1:56–2:1. Incoming signal IF_{SAT} is, therefore, an “RF signal” as we have construed the term. Thomson teaches that the “proposed architecture allows a digitising of the Sat-IF signals no matter that they are analog or digital ones.” *Id.* at 1:42–43.

Incoming signal IF_{SAT} is down-converted by SAW filter 1 and mixer 2, which respectively suppress adjacent channel components and achieve a “frequency transposition into an IF signal of around 75 MHz.” *Id.* at 2:56–57; *see also id.* at 2:30–33, 47–57. AGC amplifier 5 includes “an internal bandpass limitation” (*id.* at 2:58–59) that prevents aliasing when A/D converter 7 digitizes the IF signal at a sampling frequency. *Id.* at 3:1–14. Bandpass filter 8 applies “an adaptively controlled bandwidth [to] select[] the desired signal with a minimal remainder of the adjacent channel signals.” *Id.* at 3:17–19. FM demodulator 9 and low-pass filter 10 output a CVBS

(“composite video baseband signal”), and synchronous demodulators 12 and 13 effect QPSK (“quadrature phase shift keying”) demodulation to provide quadrature (“Q”) and in-phase (“I”) signals. *Id.* at 2:37–44.

1. Obviousness over Thomson and Harris

a. claims 1 and 2

Petitioner contends that claims 1 and 2 of the ’792 patent are obvious under 35 U.S.C. § 103 over Thomson and Harris. Pet. 13–22. To support this position, Petitioner presents the testimony of Dr. Douglas Holberg. Ex. 1009 ¶¶ 16–36.

The invention of the ’792 patent includes a frequency conversion circuit, an analog-to-digital converter, a signal processor, and a signal output circuit. Ex. 1001, Fig. 1 (elements 110, 120, 130, and 140). These elements are each recited in independent claim 1 and will be addressed in order.

Preliminarily, the preamble of claim 1 recites “[a] television receiver.” We agree with Petitioner that the preamble is not limiting because the body of the claim fully and intrinsically sets forth all limitations of the claimed invention. *See Pitney Bowes, Inc. v. Hewlett Packard Co.*, 182 F.3d 1293, 1305 (Fed. Cir. 1999). Regardless, Petitioner points out that Thomson discloses a tuner for receiving television signals. Pet. 13 (citing Ex. 1004 1:3–4, 1:55–2:19).

The first element recited in claim 1 is a “frequency conversion circuit.” Petitioner argues the element is taught by Thomson’s teaching of a circuit for converting incoming satellite signals at a frequency of about 2

GHz to a lower frequency. Pet. 14 (citing Ex. 1004, 1, 2:30–33; Ex. 1009 ¶ 17).

The “frequency conversion circuit” is “for receiving an input RF signal and for converting the input RF signal to an intermediate frequency signal having an intermediate frequency (IF).” *Id.* Figure 1 of Thomson teaches the IF_{SAT} received satellite signal is down-converted to 140 MHz at SAW filter 1. Ex. 1004, 2:17–19. At mixer stage 2 the received signal is down-converted to around 75 MHz. *Id.*, 2:53–57, Figs. 2d and 2e. The disclosure of Figure 1 and associated description above are relied on by Petitioner to teach converting the RF signal to an intermediate frequency. Pet. 14 (citing Ex. 1009 ¶ 18).

We disagree with Patent Owner’s contention that “Thomson does not teach... receiving... RF signal[s]” and that “Thomson only teaches receiving an IF input.” Prelim. Resp. 12–13. Although Thomson labels the input signal as “IF_{SAT}” to reflect that satellite channels have already been down-converted when received by the broadcast receiver, IF_{SAT} is disclosed as having a radio frequency and is therefore an “RF signal.” *See In re Gleave*, 530 F.3d 1331, 1334 (Fed. Cir. 2009) (although a reference must disclose each and every limitation in a claim to anticipate the claim, the reference need not satisfy an *ipsissimis verbis* test).

Claim 1 further requires that the “input RF signal encod[e] information in one of a plurality of television signal formats.” Thomson discloses the “multi-standard tuner” can receive RF signals in a plurality of

formats, including “analog or digital ones.” Ex. 1004, 1:30, 1:42–43. Petitioner cites to Thomson’s disclosure of receiving both analog and digital signals as teaching two different formats. Pet. 14.

Patent Owner again argues Thomson only teaches receiving an IF input and not RF signals. Prelim. Resp. 14. As we determined above, the IF frequency disclosed in Thomson falls within our construction of “RF.” Patent Owner further argues Thomson discloses no structure beyond Figure 1. Patent Owner does not explain why that is important and we will not speculate about why it might be.

The second element recited in claim 1 is an “analog-to-digital converter for sampling the intermediate frequency signal and generating a digital representation thereof.” Petitioner cites to analog-to-digital converter (“A/D”) 7 shown in Figure 1 of Thomson as teaching the limitation. Pet. 15. Figure 1 of Thomson also shows a sampling frequency “ f_s ” of about 100 MHz. *Id.* (citing Ex. 1004, 4:14–16, Fig. 1, Ex. 1009 ¶ 20).

Patent Owner argues the signal in Thomson is not the same intermediate frequency signal claimed because it passes through the SAW filter before being received by the A/D converter. Prelim. Resp. 14–15. Patent Owner’s argument improperly imposes a requirement that is not recited in the claim. The intermediate signal of Thomson is sampled at the A/D converter regardless of whether it has been previously filtered and processed at the SAW filter. *See* Prelim. Resp. 15–16.

The third element of claim 1 recites, in pertinent part, “a signal processor for *processing* digitized intermediate frequency signal in accordance with the format of the input RF signal” (emphasis added).

Thomson’s bandpass filter teaches passing analog or digital TV encoded information based on “TV standard” input. Ex. 1004, 3:16–25. Petitioner argues that the bandpass filter is an adaptive filter which selects either an analog or digital signal format. Pet. 15–16. An adaptive filter would be understood to be a signal processor by a person of ordinary skill in the art. *Id.* at 16 (citing Ex. 1009 ¶¶ 21–22). Alternatively, Petitioner contends “it would have been obvious to a POSITA [person of ordinary skill in the art] to implement the Thomson adaptive filter using a digital signal processor as taught by Harris.” *Id.* at 16–17 (citing Ex. 1005, Ex. 1009 ¶ 23).

The third element of claim 1 further recites “the signal processor *generating* digital output signals . . . each of the plurality of *finite impulse response filters* [“FIR”] corresponding to a format of the input RF signal.” (emphasis added).

Petitioner argues “Harris discloses a signal processor that implements a FIR filter. This element is rendered obvious by incorporating the FIR filter of Harris into the adaptive filter of Thomson.” Pet. 17. Petitioner relies on Harris’ disclosure of “finite response filter” and the testimony of Dr. Holberg. *Id.* at 17–21 (citing Ex. 1005, 4; Ex. 1009 ¶¶ 27–28).

We are not persuaded by Patent Owner's contention that the "Thomson bandpass-filter 8 does not perform all of the 'processing' and 'generating' in the digital domain as required" by claim 1. Prelim. Resp. 17. Although it is true that some processing of signals is performed in the analog domain by at least SAW filter 1 in Thomson, nothing in the claim precludes such earlier processing. Instead, the claim requires only that processing and generating be performed in the digital domain on signals that have been digitized. Because the processing and generating performed by bandpass-filter 8 occurs after digitization, Petitioner has made an adequate showing.

Neither are we persuaded by Patent Owner's argument that "the Harris FIR filters do not teach or suggest the signal processor as required by claim 1 of the '792 patent." Prelim. Resp. 20. As discussed above, the "processing" and "generating" functions claimed are performed by Thomson's bandpass filter. Harris further teaches using RAM to store coefficient information for the FIR filter, as described in the '792 patent. Ex. 1005, 4; Ex. 1001, 5:59–53. Harris also discloses plural filters to support various operational modes. Ex. 1005, 5. Petitioner has also provided rational underpinnings for combining Harris's FIR filter with the adaptive filter of Thomson. *See* Ex. 1009 ¶ 28.

The fourth element recited in claim 1 is "a signal output circuit . . . providing one or more output signals corresponding to the digital output signals." Petitioner relies on Thomson's disclosure of a plurality of demodulators which receive the output signals from the bandpass filter, i.e.,

signal processor. Pet. 21 (citing Ex. 1004, Fig.1, demodulators 9, 12, and 13). The demodulated signals include both analog and digital encoded TV signals. *Id.* at 21–22 (citing Ex. 1004, 4:10–11). Thus, I/Q output signals are received from the processor and the signals that are output correspond to received digital television signals. *Id.* (citing Ex. 1009 ¶ 29).

Claim 2 depends from claim 1 and recites as an additional limitation that “the plurality of television signal formats comprises an analog television format and a digital television format.” As discussed above, Thomson disclosed receipt and processing of both analog and digital television signals. Patent Owner again argues Thomson teaches an IF input signal and not the claimed RF input signal. Prelim. Resp. 24–25. We addressed this argument previously and found it unpersuasive.

b. claims 4, 10, and 11

Petitioner contends that claims 4, 10, and 11 of the '792 patent are obvious under 35 U.S.C. § 103 over Thomson and Harris. Pet. 23–25. Claims 4, 10, and 11 all depend from claim 1. We have reviewed the evidence and arguments submitted by Petitioner and the testimony of Dr. Holberg (Ex. 1009 ¶¶ 32–34). Petitioner has made a sufficient showing as to claims 4, 10, and 11. Patent Owner does not present any counter arguments for our consideration.

c. Summary

Based on the foregoing, we conclude that Petitioner has demonstrated a reasonable likelihood of prevailing on its challenge of claims 1, 2, 4, 10, and 11 as obvious under 35 U.S.C. § 103 over Thomson and Harris.

*2. Obviousness of claims 5 and 6 over
Thomson, Harris and Cirrus Logic*

Petitioner contends that claims 5 and 6 of the '792 patent are obvious under 35 U.S.C. § 103 over Thomson, Harris and Cirrus Logic. Pet. 31–35. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 43–47.

Claim 5 depends from claim 4, which depends from claim 1, and recites as an additional limitation “a *first decoder circuit* . . . for providing video display signals corresponding to the analog television format; and a *second decoder circuit* . . . for providing audio signals corresponding to the analog television format” (emphasis added).

Petitioner cites to Cirrus Logic product CS92288, a USB-DVR 2.0 reference design, for its teaching of an “audio/video encoder/decoder (CODEC).” Pet. 32 (citing Ex. 1015, 4). The USB-DVR 2.0 design is further described in Exhibits 1016, a CODEC circuit which outputs audio at baseband, and 1017, a CODEC circuit which outputs video at baseband. *Id.* at 32–33 (citing Ex. 1016, 1, Ex. 1017, 1).

We disagree with Patent Owner’s argument that there is no reason to combine the Cirrus Logic Exhibits 1015–1017. *See* Prelim. Resp. 35. All the Cirrus logic exhibits relate to the CS92288 product, a USB-DVR 2.0

reference design. *See* Ex. 1009 ¶¶ 43–47 (citing Ex. 1016, 1, Ex. 1017, 1). Further, Dr. Holberg has articulated rational underpinnings to combine Cirrus Logic with Thomson and Harris. *See* Ex. 1009 ¶ 46.

Claim 6 depends from claim 5 and recites, “wherein the first decoder circuit comprises a PAL/SECAM/NTSC decoder circuit.” Petitioner cites to Exhibit 1017 as describing an NTSC and PAL decoder. Pet. 35 (citing Ex. 1017, 1; *see also* Ex. 1009 ¶ 47). Patent Owner provides no factual or legal justification for its argument that “PAL/SECAM/NTSC” should be interpreted in the conjunctive, as opposed to the disjunctive, as “/” is defined.³ *See* Prelim. Resp. 37. Accordingly, Cirrus Logic teaches one of the claimed standards, which is all that is required by the claim.

Based on the foregoing, we conclude that Petitioner has demonstrated a reasonable likelihood of prevailing on its challenge of claims 5 and 6 as obvious under 35 U.S.C. § 103 over Thomson, Harris and Cirrus Logic.

3. Obviousness of claims 7 and 12 over Thomson, Harris and Kerth

Petitioner contends that claims 7 and 12 of the ’792 patent are obvious under 35 U.S.C. § 103(b) over Thomson, Harris and Kerth. Pet. 35–38. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 48–51.

Claim 7 depends from claim 1 and recites, “wherein the signal output circuit provides a *first output signal* and a *second output signal*”

³ Virgule. “A diagonal mark (/) used especially to separate alternatives, as in *and/or*.” *The American Heritage Dictionary of the English Language*, 1431 (1981). Ex. 3002.

corresponding to the digital output signals, the first output signal and the second output signal being *differential output signals* corresponding to a digital television format.” (emphasis added).

Petitioner argues the limitation is taught by Kerth’s disclosure of “differential I and Q components capable of carrying video and audio using a well-known quadrature demodulation technique. (Ex. 1011, 14:58–15:7; Ex. 1009, ¶ 49).” Pet. 36. In further support, Petitioner points to first and second differential output signals (RX-I 448 and RX-Q 451 of Figs. 1 and 8) of Kerth’s digital-to-analog converter (DAC) circuitry. *Id.*; Ex. 1011, 8:63.

Patent Owner argues that Petitioner relies on Thomson’s disclosure of outputs S_{mod1} and S_{mod2} as digital television outputs. *See* Prelim. Resp. 37–38. Patent Owner is mistaken. Petitioner cites to the output of FM-demodulator 9 and its CVBS video and S_{mod1} and S_{mod2} signals as teaching analog video and digital outputs in connection with claim 4. *See* Ex. 1009 ¶ 32. Claim 7, and digital outputs, is under consideration here. Petitioner cites to the differential I and Q digital outputs. Pet. 36; Ex. 1009 ¶ 49.

Patent Owner argues Kerth is directed to “interference reduction techniques and not to the problem the ’792 patent is solving, namely, providing a television receiver for providing television reception for a plurality of television signal formats.” Prelim. Resp. 39. Thomson, not Kerth, is relied on to show receiving different television formats. Kerth teaches that a differential output is one of two possible output circuits. Ex.

1011, 8:57–60. Petitioner has articulated adequate rational underpinnings for the combination. *See* Ex. 1009 ¶ 50.

Claim 12 depends from claim 1 and recites, “wherein the signal output circuit comprises one or more output terminals, each of the one or more output terminals of the signal output circuit comprises *a single-ended output terminal or a differential output terminal.*” (emphasis added). Claim 1 was discussed above.

Petitioner relies on the teachings of Thomson of a single output terminal and Kerth regarding differential output terminal, as discussed above. Pet. 37–38; Ex. 1009 ¶ 59. Patent Owner argues neither Thomson nor Kerth teach a single-ended output terminal. Prelim. Resp. 41. However, Kerth discusses both single-ended and differential outputs. Ex. 1011, 8:57–60.

Based on the foregoing, we conclude that Petitioner has demonstrated a reasonable likelihood of prevailing on its challenge of claims 7 and 12 as obvious under 35 U.S.C. § 103 over Thomson, Harris and Kerth.

*4. Obviousness over Thomson,
Harris, Kerth, and Oku
a. claim 13*

Petitioner contends that claim 13 of the ’792 patent is obvious under 35 U.S.C. § 103 over Thomson, Harris, Kerth, and Oku. Pet. 38–41. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 52–56.

Claim 13 depends from claim 1 and recites as a first additional limitation first and second “digital-to-analog converter[s]” . . . coupled to receive digital output signals from the signal processor and convert the digital output signals to analog output signals.” First, second and third driver circuits that drive analog output signals to output terminals are also recited. Ultimately, claim 13 recites:

wherein the first and second output terminals provide signals *indicative of video and audio information* encoded in the input RF signal and the third output terminal provides signals *indicative of audio information* encoded in the input RF signal. (emphasis added).

Figure 4 of Oku is reproduced below.

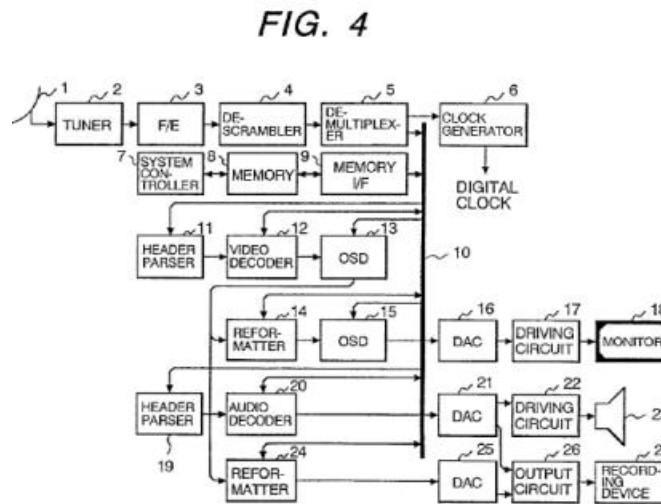


Figure 4 of Oku is a block diagram of a digital broadcasting receiver. Ex. 1018 ¶ 22. Petitioner argues Figure 4 discloses first and second digital-to-analog converters (“DAC”) 16 and 21 and first, second, and third driver

circuits 22, 26, and 17. Pet. 38–39. As discussed above, Kerth is cited by Petitioner as teaching first and second outputs from a DAC. *Id.* at 39. Oku also discloses an audio output 23 and driving circuit from DAC 21. *Id.* at 40. Oku also teaches a video output. Ex. 1018, Fig. 4, element 18. Citing to the preceding disclosures from Figure 4 of Oku, Petitioner alleges “[i]t would have been obvious to one of ordinary skill in the art to combine the teachings of Kerth and Oku for any receiver where multiple outputs from a DAC was desired or required.” Pet. 39.

Patent Owner argues Oku does not teach that the output terminals provide signals indicative of *both* audio and video signals. Prelim. Resp. 43. This argument is not persuasive because Kerth shows first and second outputs for digital television signals, i.e., both audio and video. *See* Ex. 1011, 14:58–15:7 (two differential I and Q components each capable of carrying video and audio).

Patent Owner acknowledges Kerth teaches both audio and video outputs but argues there is no reason to make the combination. Prelim. Resp. 43–44. On this record, we are persuaded that Oku, Thomson, and Harris all address a similar problem, namely a digital receiver for receiving and processing both analog and digital television signals for display and that combining the cited references with Oku and Kerth renders this claim obvious. Pet. 40–41 (citing Ex. 1009 ¶ 57).

b. claims 14–17

Petitioner contends that claims 14–17 of the '792 patent are obvious under 35 U.S.C. § 103 over Thomson, Harris, Kerth, and Oku. Pet. 41–44. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 58–63. Claims 14–17 all depend from claim 13 which was discussed above.

Patent Owner argues Oku does not disclose output of “baseband signals” as recited in claim 14. Prelim. Resp. 45. We are persuaded that one of ordinary skill would know the Oku outputs are at baseband, as we have interpreted the term, in order to be viewable to a user. *See* Ex. 1009 ¶ 58.

c. Summary

Based on the foregoing, we conclude that Petitioner has demonstrated a reasonable likelihood of prevailing on its challenge of claims 13–17 as obvious under 35 U.S.C. § 103 over Thomson, Harris, Kerth, and Oku.

*5. Obviousness over Thomson,
Harris, Kerth and Cirrus Logic*

a. claim 8

Petitioner contends that claims 8 and 9 of the '792 patent are obvious under 35 U.S.C. § 103 over Thomson, Harris, Kerth and Cirrus Logic. Pet. 45–48. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 64–68.

Claim 8 depends from claim 7, which depends from claim 1, and recites as a first limitation a “demodulator circuit” to demodulate the first and second output signals to video and audio baseband signals

corresponding to the input RF signal. As a second limitation, claim 8 recites “a decoder circuit coupled to decode the video and audio baseband signals for providing video and audio display signals corresponding to the digital television format.”

As addressed above, Petitioner cites to Thomson’s output circuit with a demodulator to teach the first limitation. Pet. 45 (citing Ex. 1009 ¶ 64); *see* Ex. 1004, Fig.1, elements 9, 12, and 14. As to the second limitation, Petitioner relies on the decoder circuits taught by Cirrus Logic (Exs. 1015–1017). *Id.* Petitioner argues the person of ordinary skill in the art would be motivated to combine Thomson’s digital TV signals, which would be encoded in MPEG, with the MPEG circuitry of Cirrus Logic, which decodes both audio (Ex. 1016) and video (Ex. 1017) signals.

Patent Owner argues that Petitioner’s showing that a person of ordinary skill in the art “would have been motivated to combine” Thomson, Harris, Kerth, and Cirrus Logic is inadequate. Prelim. Resp. 46–47. Contrary to Patent Owner’s assertion, Petitioner provides rational underpinnings for the combination, in addition to design choice. *See* Ex. 1009 ¶¶ 65–66.

b. claim 9

Claim 9 depends from claim 8 and additionally recites that the video and audio baseband signals are an MPEG data stream and the decoder circuit is an MPEG decoder circuit. Petitioner cites to the above discussion of MPEG regarding MPEG circuitry. Pet. 47–48. Beyond the arguments

regarding the combination made above, Patent Owner does not present any argument in response.

c. Summary

Based on the foregoing, we conclude that Petitioner has demonstrated a reasonable likelihood of prevailing on its challenge of claims 8 and 9 as obvious under 35 U.S.C. § 103 over Thomson, Harris, Kerth, and Cirrus Logic.

6. Obviousness of claim 26 over Thomson and Harris

Petitioner contends that claim 26 of the '792 patent is obvious under 35 U.S.C. § 103 over Thomson and Harris. Pet. 25–27, 29. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 35–36.

Claim 26 depends from claim 1 and recites, in pertinent part, “*a format/standard selection circuit coupled to the signal processor, the format/standard selection circuit generating a select signal indicative of a format of the input RF signal*” (emphasis added).

Petitioner argues the person of ordinary skill would understand that a circuit in Thomson generates the TV standard signal, as opposed to the signal being directly received. Pet. 25. Petitioner then cites to Scarpa (Ex. 1036) as showing a selection circuit. *Id.* Dr. Holberg testifies that the “standard selection circuit” is obvious over Thomson and Scarpa or Balaban. Ex. 1009 ¶ 35.

We agree with Patent Owner that “Petitioner is improperly putting forth an additional ground relying on the combination of Thomson, Harris and Scarpa.” *See* Prelim. Resp. 26. Petitioner’s argument and evidence rely on Thomson in combination with Scarpa or Balaban. *See* Ex. 1009 ¶ 35. Dr. Holberg’s additional statement that “[i]n my opinion, Thomson teaches this element” (Ex. 1009 ¶ 35) is both conclusory and at odds with his prior statement.

Based on the foregoing, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing on its challenge of claim 26 as obvious under 35 U.S.C. § 103 over Thomson and Harris.

*7. Obviousness of claims 26 and 27
over Thomson, Harris, and Balaban*

Petitioner also contends that claims 26 and 27 of the ’792 patent are obvious under 35 U.S.C. § 103(b) over Thomson, Harris, and Balaban. Pet. 48–49. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 69–70.

Claim 26 is discussed above. Claim 27 depends from claim 26 and recites, “wherein the format/standard selection circuit generates the select signal in response to an input signal from a user.”

Petitioner relies on Balaban to show the “selection circuit” required in claim 27. Pet. 48 (citing Ex. 1008 at 7:66–8:5, 12:16–28). Petitioner’s position on claim 26 is not set forth. If Petitioner is relying on Thomson to teach the limitations of claim 26, then the showing made is insufficient for reasons set forth in our analysis of that ground. *See* II.A.6.

“The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon.” 37 C.F.R. § 42.104(b)(4). Having made no showing with respect to claim 26, Petitioner has not met its burden. Claim 27 depends from claim 26 and as such there is an insufficient showing as to claim 27 as well.

Based on the foregoing, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing on its challenge of claims 26 and 27 as obvious under 35 U.S.C. § 103 over Thomson, Harris, and Balaban.

8. Obviousness of Claims Substituting TI App Note for Harris

All of Petitioner’s challenges include an alternative ground in which TI App Note is substituted for Harris. *See I.D., supra*. TI App Note discloses a programmable digital device that Petitioner contends may implement the functionality of the adaptive filter of Thomson. *See Pet. 27–30*. We decline to institute an *inter partes* review on grounds that substitute TI App Note for Harris. *See 37 C.F.R. § 42.108(a)*

9. Obviousness of claim 3 over Thomson, Harris, and Gunter

Petitioner contends that claim 3 of the ’792 patent is obvious under 35 U.S.C. § 103 over Thomson, Harris, and Gunter. *Pet. 29–31*. To support this position, Petitioner presents the testimony of Dr. Holberg. *Ex. 1009 ¶¶ 41–42*.

Claim 3 depends from claim 1 and recites, “wherein the television receiver is formed as a *monolithic integrated circuit*.” (emphasis added).

Petitioner relies on Gunter (Ex. 1022) to teach the “monolithic integrated circuit” limitation. Pet. 29 (citing Ex. 1022, Abstract, 2:10–17, claim 1; Ex. 1009 ¶ 41). None of the citations relied on mention “monolithic integrated circuit” nor is any explanation offered beyond conclusory statements as to why what is described in Gunter teaches the limitation. Indeed, Dr. Holberg cites to another reference, Arambepola (Ex. 1021), as teaching a “digital TV receiver embodied as a monolithic IC.” *Id.* Unlike Gunter, Arambepola does expressly state “[t]he receiver is embodied as one or more monolithic integrated circuits and the filters **7** and **8** are integrated therein as any suitable implementation.” Ex. 1021, 4:2–5. It is Petitioner’s burden to show how the prior art teaches the claim limitation and the ground asserted relying on Gunter fails to teach a “monolithic integrated circuit.” 37 C.F.R. § 42.104(b)(4).

Based on the foregoing, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing on its challenge of claim 3 as obvious under 35 U.S.C. § 103 over Thomson, Harris, and Gunter.

B. Patel

Patel discloses a digital television signal receiver in a television set or in a digital video recorder. Ex. 1023, Abstract. A received digital television signal is digitized and converted to a final intermediate frequency band close to baseband. *Id.*

1. Anticipation of claim 1 by Patel

Petitioner contends that claim 1 of the '792 patent is anticipated under 35 U.S.C. § 102(b) by Patel. Pet. 50–53. To support this position, Petitioner presents the testimony of Dr. Holberg. Ex. 1009 ¶¶ 71–78.

Claim 1 recites in pertinent part:

a frequency conversion circuit for receiving an input RF signal and for converting the input RF signal to an intermediate frequency signal having an intermediate frequency (IF), the input RF signal encoding information in *one of a plurality of television signal formats*. (emphasis added).

Applying the plain meaning to “plurality,” claim 1 requires more than one “television signal format.”

Petitioner states: “The digital television receiver in Patel receives digital television signals according to the ATSC standard (Ex. 1023 at 1:11–17; 6:32–41) and *also analog television signals* (*Id.* at 3:34–36).” Pet. 51. (emphasis added). Petitioner’s citations in Patel are insufficient to disclose the limitation at issue. The disclosure at column 1, lines 11 to 17, of Patel merely states the invention relates to digital television receivers. Contrary to Petitioner’s representation, column 3, lines 34 to 36, of Patel does not disclose “analog television signals.” We have also reviewed Dr. Holberg’s testimony on the limitation at issue and find it is identical to what is argued in the Petition and adds nothing new. *See* Ex. 1009 ¶ 74.

2. *Summary*

Based on the foregoing, we conclude that Petitioner has not demonstrated a reasonable likelihood of prevailing on its challenge of claim 1 as anticipated under 35 U.S.C. § 102(b) by Patel.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that *inter partes* review is *instituted* with respect to the following grounds of unpatentability:

(1) claims 1, 2, 4, 10, and 11 as obvious over Thomson and Harris under 35 U.S.C. § 103;

(2) claims 5 and 6 as obvious over Thomson, Harris and Cirrus Logic under 35 U.S.C. § 103;

(3) claims 7 and 12 as obvious over Thomson, Harris, and Kerth under 35 U.S.C. § 103;

(4) claims 13–17 as obvious over Thomson, Harris, Kerth and Oku under 35 U.S.C. § 103;

(5) claims 8 and 9 as obvious over Thomson, Harris, Kerth, and Cirrus Logic under 35 U.S.C. § 103;

FURTHER ORDERED that *inter partes* review is *not instituted* with respect to any other ground of unpatentability; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '792 patent is hereby instituted commencing on the

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entry date of this Order, and pursuant to 35 U.S.C. § 314(c) and 37 C.F.R.
§ 42.4, notice is hereby given of the institution of a trial.

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PETITIONER

Peter Ayers
peter@leehayes.com

Brian Mangum
brianm@leehayes.com

PATENT OWNER

Michael Fleming
mfleming@neifeld.com

Robert Hahl
rhahl@neifeld.com

Robert Mihail
rmihail@neifeld.com