



Exhibit A

Infringement of U.S. Patent No. 9,590,608 (the '608 patent)

Pursuant to Section 4.2 of this Court's Default Standard for Discovery, this chart sets forth where in the Accused Product(s) each element of claims 1, 2, 6, 11, 12, 15, and 16 of U.S. Patent No. 9,590,608 ("the '608 Patent") are found. The Accused Products include, but are not limited to, Reed Semiconductor's point-of-load (POL) power converter products (e.g., RS and RSM series), which is described as "a comprehensive power solution for . . . high-performance computing applications, including . . . [POL] regulators." (See generally https://www.reedsemi.com/product_detail.php?id=63) (describing high-performance solutions for high-power converter applications). The POLs include, for example, RS series (e.g., RS53317¹, RS53319, RS53328, and RS53355) (see, e.g., REED1155_0000033–164); and RSM series (e.g., RSM3319). (See generally Reed Semiconductor datasheets for respective products) (describing bootstrap circuit technology for power converters) and any substantially similar variants thereof that implement a bootstrap refresh control circuit. The chart of claims 1, 2, 6, 11, 12, 15, and 16 is against exemplary RS53319. Because of the structural similarities in the hardware of the POLs, the analysis against RS53319 has been provided as a representative of all of the Accused Products. This chart is also representative of any downstream product that incorporates one or more of the Accused Products, which MPS also accuses of infringement.

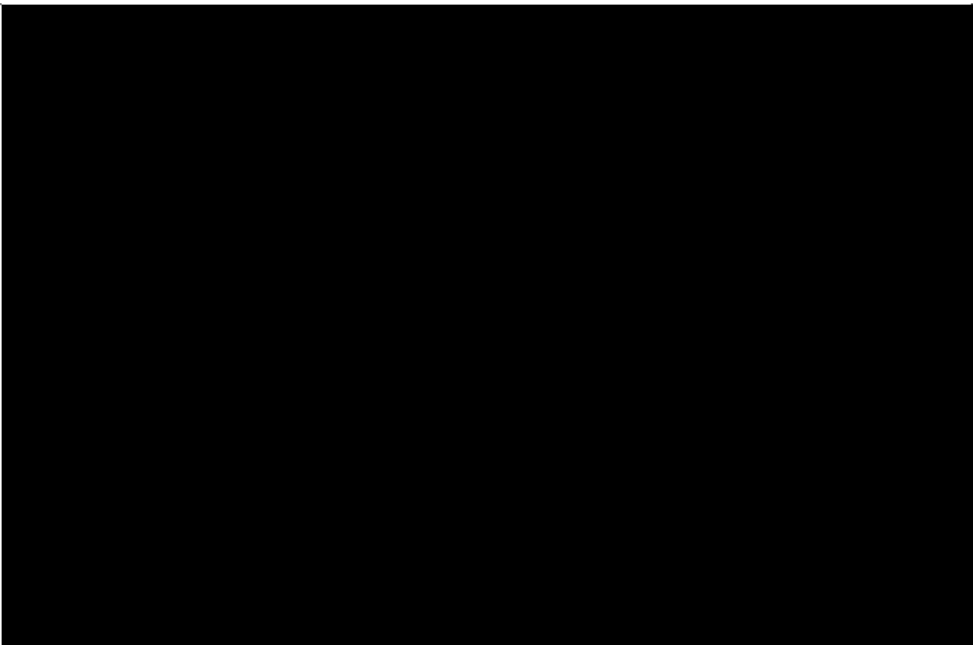
Annotations and identification of elements in this chart are a part of the Plaintiff's Initial Infringement Contentions, are not final, nor are they intended to limit Plaintiff's identification of claim elements in Reed's infringing products. Plaintiff reserves the right to identify additional products and claims and identify further representative products. Plaintiff reserves the right to amend, supplement, expand, modify, or narrow its identifications in the Accused Products as it develops facts during discovery, based on the Court's claim constructions, or for any other allowable purpose in this action.

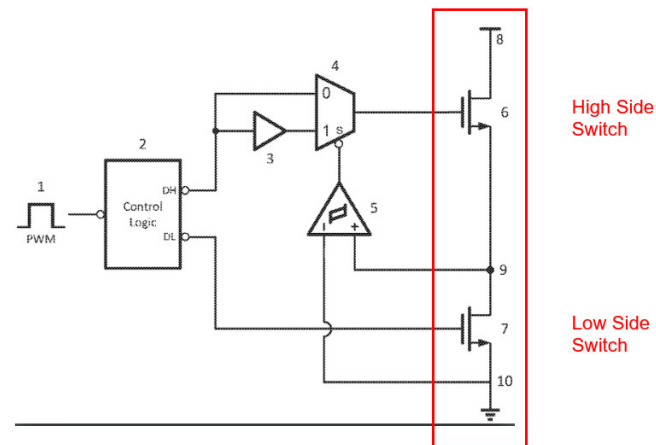
¹ The listing includes variant types. For instance, the listing includes L, H, and any other variants of the identified chips.



U.S. PATENT NO. 9,590,608	RS53319
1. A bootstrap refresh control circuit for a voltage converter, wherein the voltage converter comprises a high side switch, a low side switch and a bootstrap capacitor for providing a bootstrap voltage signal to supply a high side driver of the high side switch, and wherein the voltage converter is configured to receive an input voltage at an input terminal and to provide an output voltage at an output terminal based on driving the high side switch and the low side switch to switch on and off, and wherein the bootstrap refresh control circuit comprising:	To the extent the preamble is limiting, the RS53319 satisfies this limitation and/or Reed induces others to incorporate the RS53319 into infringing circuits and/or there is no substantially non-infringing uses of the RS53319 outside of the infringing circuits. The RS53319 is a bootstrap control circuit for a voltage converter. (<i>See generally</i> RS53319 Datasheet at REED1155_0000035–0000036, REED1155_0000092–0000117.) According to the datasheet, the RS53319 has both input and output voltages: “Input Voltage Range: 2.85V to 16V with external bias, or 4V to 16V with internal bias Output Voltage Range: 0.6V to 6.0V for RS53317L. 0.9V to 6.0V for RS53317H” (REED1155_0000092) The RS53319 has a high side (HS) switch and a low side (LS) switch (annotated in red below), and a BST pin (annotated in blue below) for coupling a bootstrap capacitor to provide a bootstrap voltage (V_{BST}). The V_{BST} is across the BST pin and the SW pin. From RS53319 Datasheet (REED1155_0000096) The HS Driver, Anti-Cross, and the LS Driver (annotated in dashed magenta box below) drive the LS switch and HS switch.

[REDACTED]

	 RS53319 Datasheet at REED1155_0000104 The additional discovery comports with opinions presented formerly, in the First Amended Complaint (FAC), as seen below in red.
--	---



(U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))

The HS switch and a LS switch are configured to provide a signal at its SW pin based on driving the HS switch and the LS switch to switch on and off.

V_{BST} across the BST and SW pins is provided via C_{Boot} (annotated in purple below) to supply a HS driver (annotated in pink above) of the HS switch.

The RS53319 has a VIN pin to receive an input voltage, and a SW pin for coupling an inductor L to provide an output voltage (annotated in green below).

	From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092. The bootstrap refresh control circuit comprises each of the following claimed limitations described below.
<u>1a.</u> a bootstrap refresh module, wherein the bootstrap refresh module comprises a first comparing module having a first input terminal,	The RS53319 contains a bootstrap refresh module that comprises the claimed limitations. The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot regulation circuitry is internal (within RS53319) as part of the bootstrap refresh module.

a second input terminal and

an output terminal, and wherein

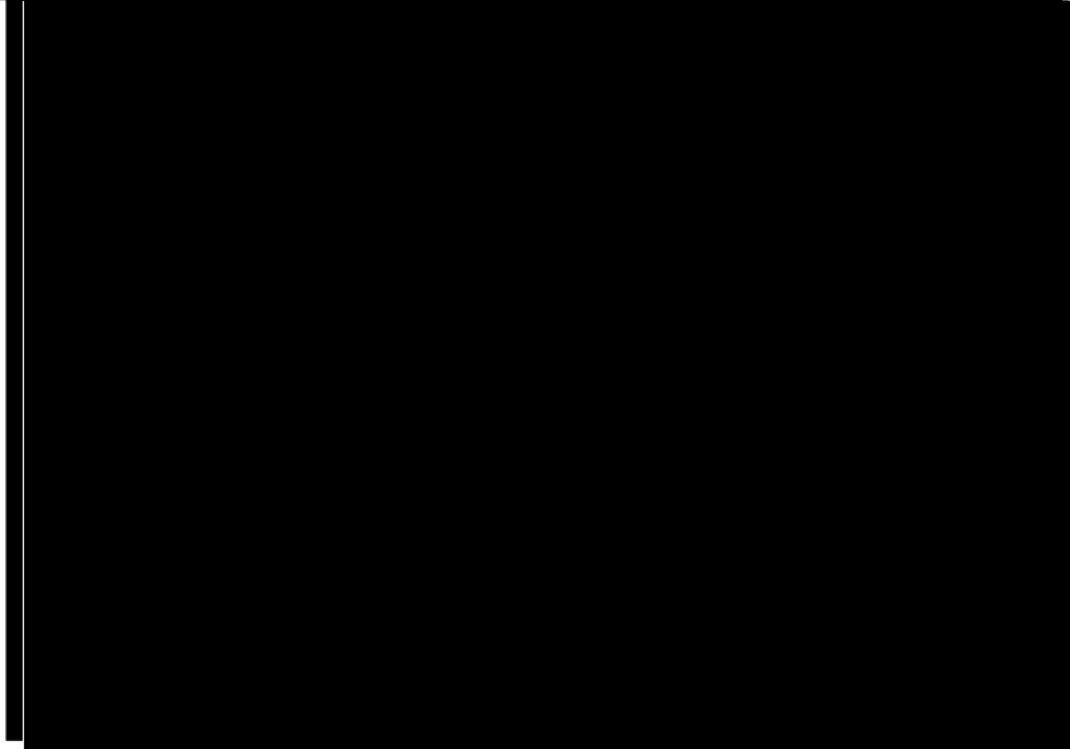
the first input terminal of the first comparing module is configured to receive the bootstrap voltage signal,

the second input terminal of the first comparing module is configured to receive a bootstrap refresh threshold, and

the first comparing module is configured to compare the bootstrap voltage signal with the bootstrap refresh threshold to provide a first comparing signal having a first logic state and a second logic state at the output terminal, and wherein

the first comparing signal has the first logic state when the bootstrap voltage signal is lower than the bootstrap refresh threshold, and wherein

the first comparing signal has the second logic state when the bootstrap voltage signal is larger than the bootstrap refresh threshold; and



From RS53319 Datasheet at REED1155_0000104.

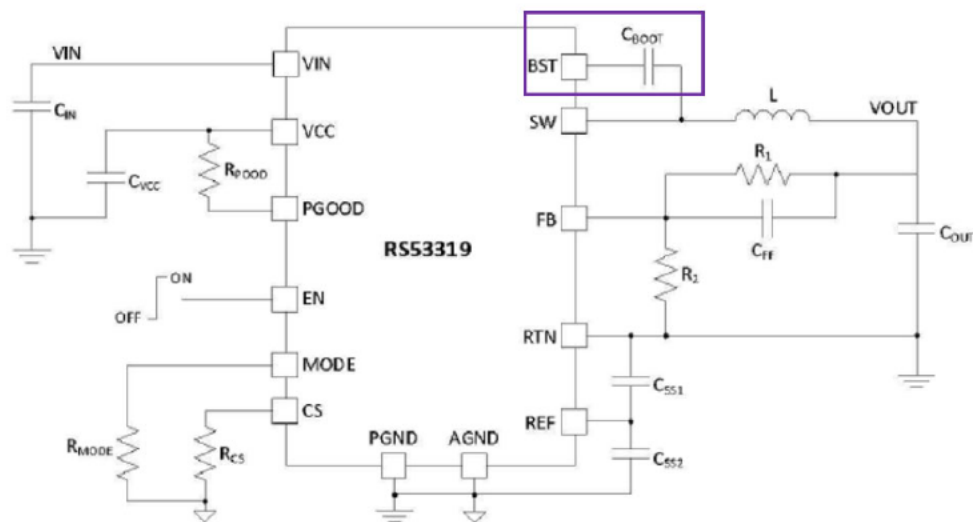
The RS53319 has a bootstrap refresh module (annotated above in light green), including a first comparing module (*see* schematic from REED1155_0002194 below), which compares V_{BST} with a threshold voltage (2.3V), and turns on the LS switch to charge the bootstrap capacitor when V_{BST} is lower than that threshold. Thus, the first comparing module contains a first and second input terminal and an output terminal with the further claimed limitations.

[REDACTED]

	[REDACTED] REED1155_0002194.
--	--

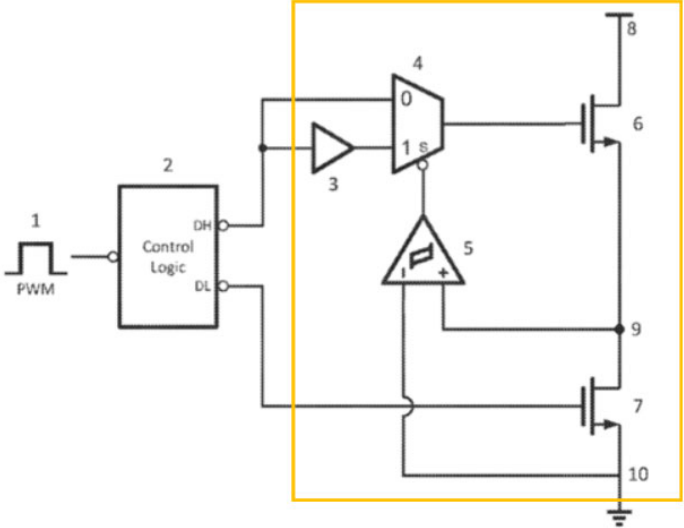
From RS53319 Datasheet at REED1155_0000108.

The RS53319 receives the bootstrap voltage signal, where the voltage across the bootstrap capacitor (C_{Boot}) is the bootstrap voltage (annotated in purple below). C_{Boot} is used for boosting the output signal. RS53319 is designed by making C_{Boot} a necessary component, although C_{Boot} is added externally to the BST pin of RS53319.



From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

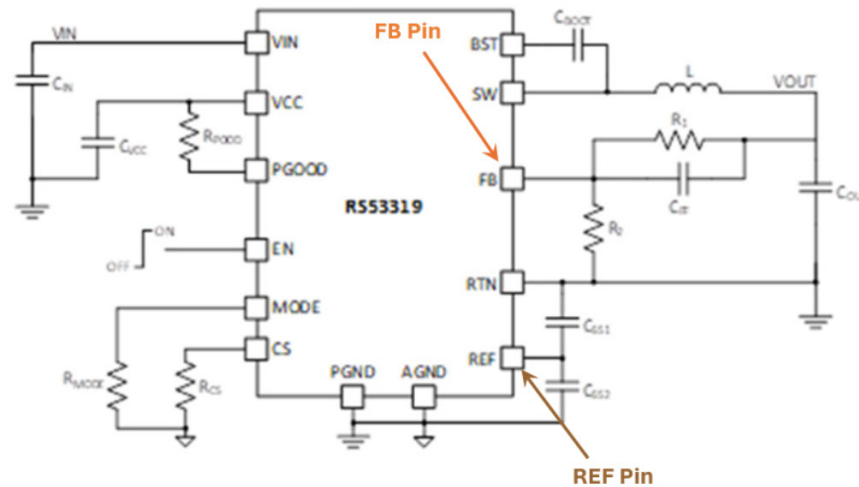
The comparing module is configured to compare the V_{BST} with a bootstrap refresh threshold to

	provide a first comparing signal. The additional discovery comports with opinions presented formerly, in the FAC, as seen below in gold.  (U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))
<u>1b.</u> a voltage difference module having a first input terminal, a second input terminal and an output terminal,	The RS53319 contains a voltage difference module having a first input terminal, a second input terminal, and an output terminal that satisfies the claimed limitations. The RS53319 has an FB pin (annotated in orange below) and a REF pin (annotated in brown below).

wherein the first input terminal of the voltage difference module is configured to receive a feedback signal representing the output voltage of the voltage converter,

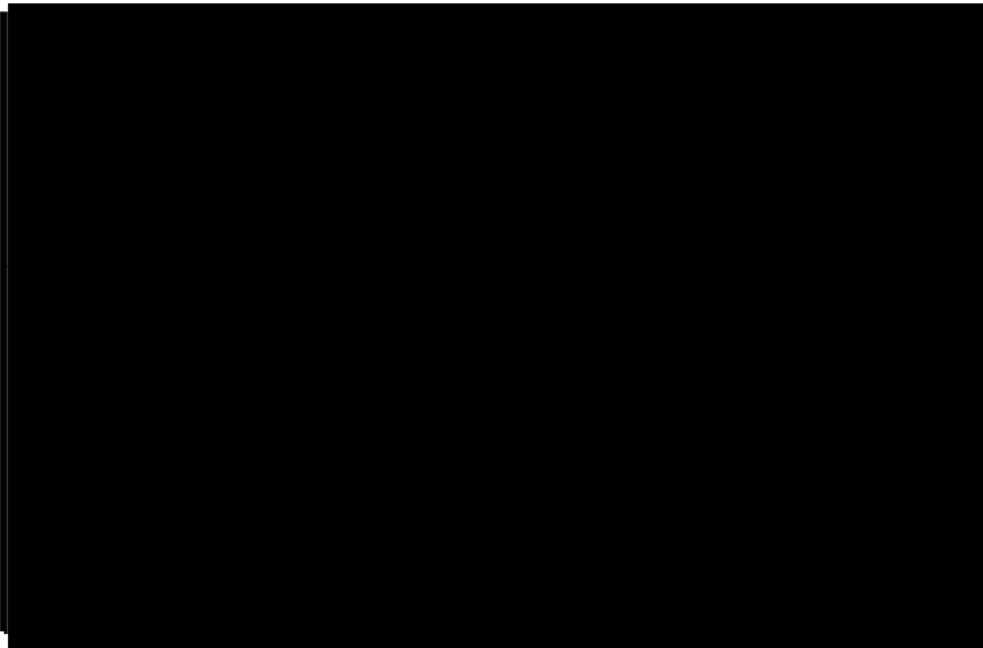
the second input terminal of the voltage difference module is configured to receive a reference voltage signal representing a desired value of the output voltage of the voltage converter,

the voltage difference module is configured to compare the feedback signal with the reference voltage signal so as to provide a difference signal at the output terminal;



From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

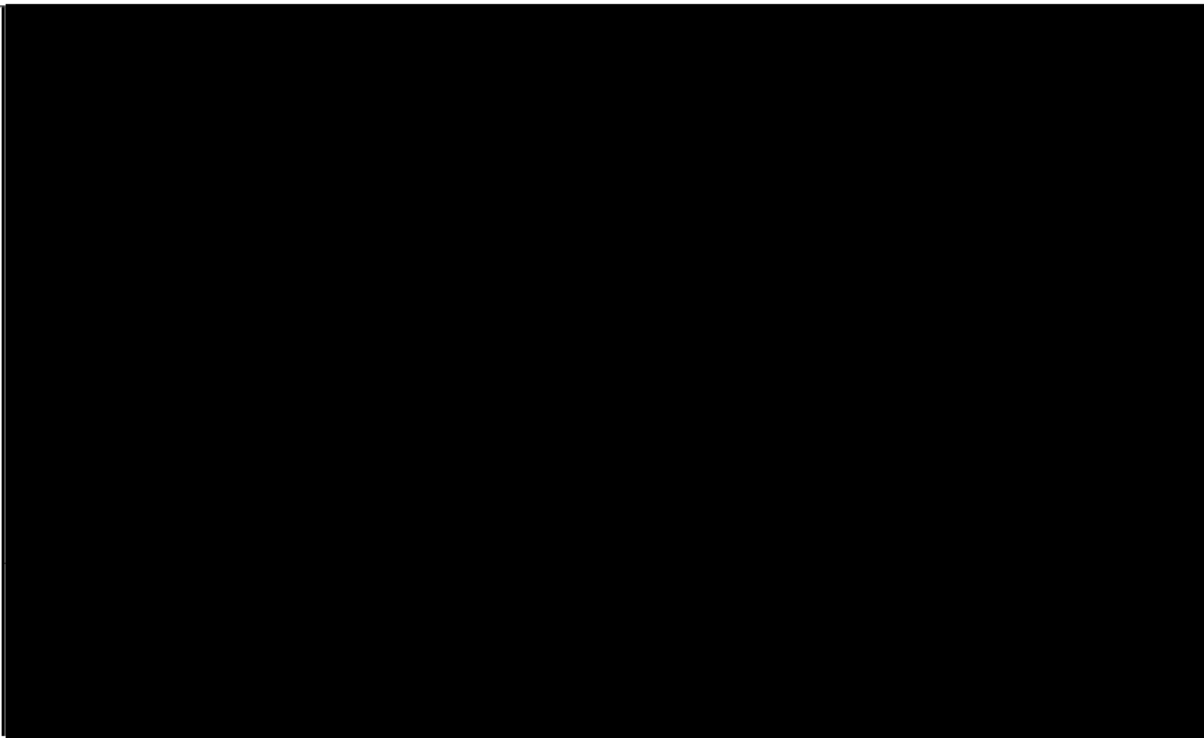
The RS53319 has a voltage difference module (annotated in pink below) including an error amplifier with a first input terminal (annotated in orange below), a second input terminal (annotated in brown below), and an output terminal (annotated in teal below).



RS53319 Datasheet at REED1155_0000104

The first input terminal is configured to receive a feedback signal (V_{FB}) from the FB pin, representing the output voltage of the voltage converter. Further, the error amplifier provides a difference signal at the output terminal. (REED1155_0000104). *See also* REED1155_0002199.



	 Schematic from REED1155_0002199. The RS53319 is also configured to receive a reference voltage signal V_{ref} (into the second input terminal) from a Soft-start and Ref Circuit, which is coupled to REF pin (annotated in brown). The output signal from the error amplifier is provided to a PWM comparator and compared with a sum of the feedback signal and an internal ramp, to generate a difference signal. This functions as the “voltage difference module” (annotated in pink).
--	---

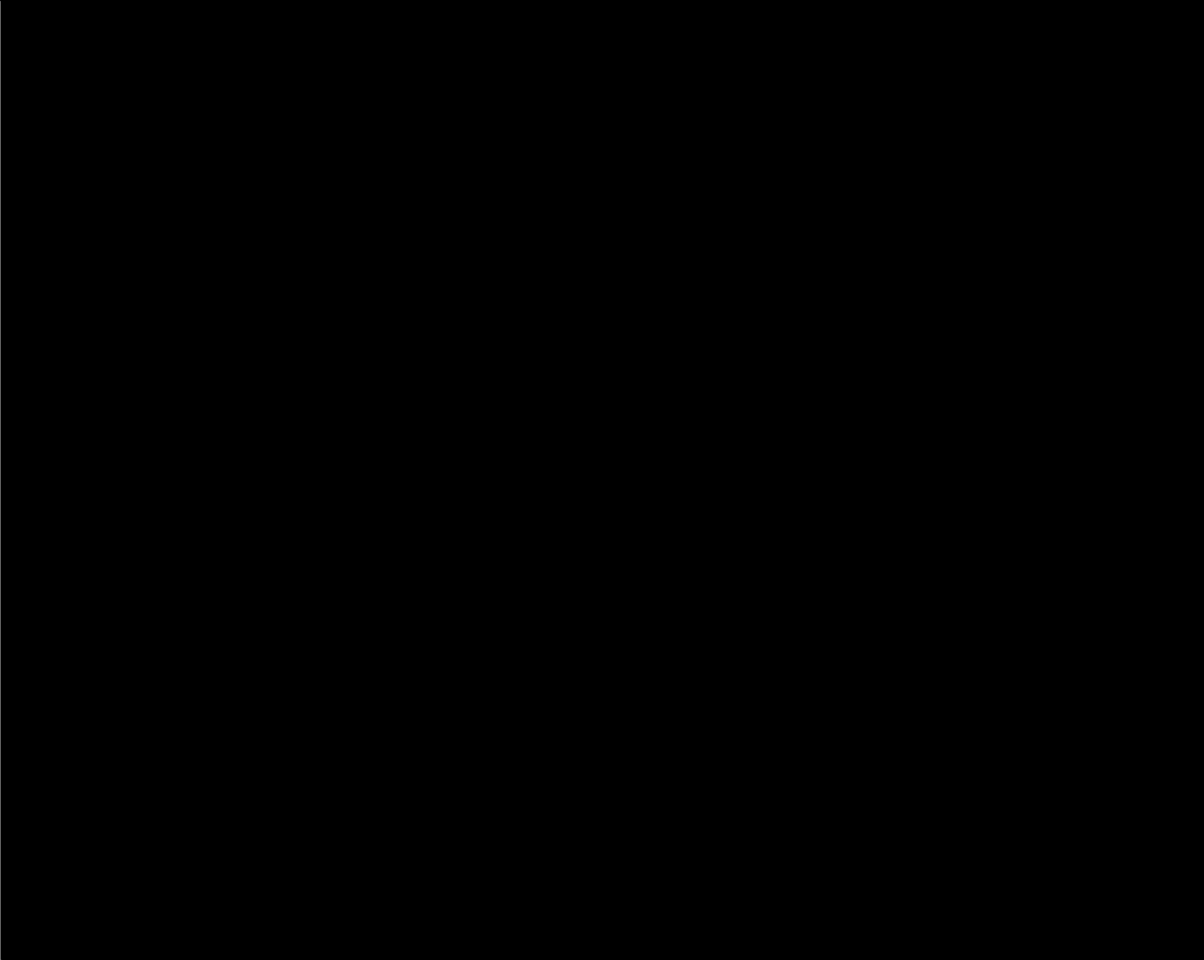


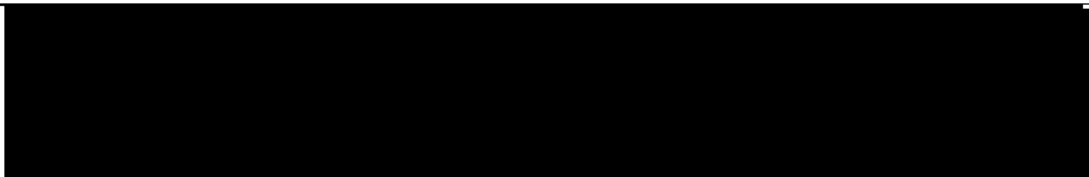
	 From RS53319 Datasheet at REED1155_0000107.
<u>1c.</u> and wherein when the first comparing signal has the first logic state, the bootstrap refresh module is configured to decrease the output voltage of the voltage converter;	In the RS53319, the first comprising signal has the first logic state, and the bootstrap refresh module is configured to decrease the output voltage of the voltage converter. The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot regulation circuitry is internal (within RS53319) as part of the bootstrap refresh module.



	A large black rectangular block used for redaction, covering the upper portion of the right-hand table cell. From RS53319 Datasheet at REED1155_0000104. The bootstrap refresh module of RS53319 is configured to decrease the output voltage of the voltage converter when the first comparing signal has the first logic state using a comparing circuit.
--	--

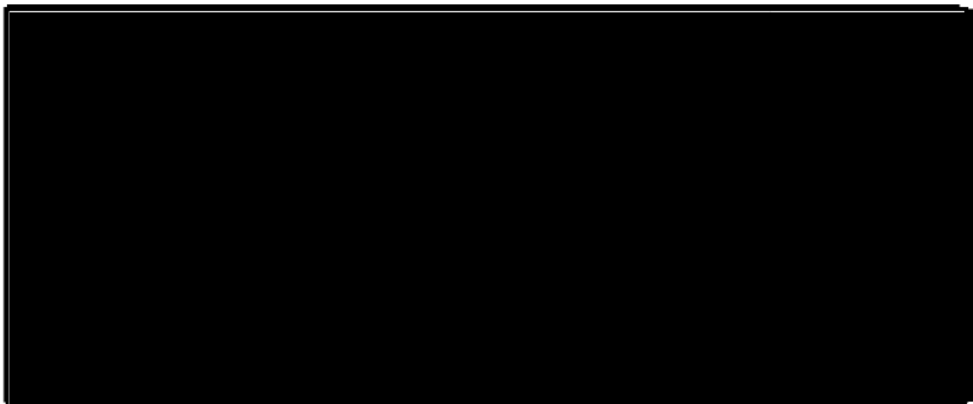


	 Schematic from REED1155_0002194. During Prebias Startup, when V_{BST} is lower than the threshold voltage (2.3V), the LS switch is turned on to charge the bootstrap capacitor (C_{BT}), and the output voltage V_{OUT} is decreased.
--	---



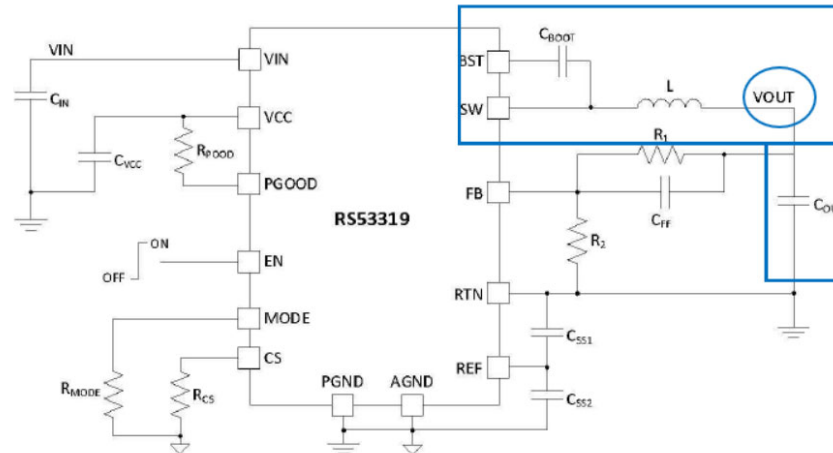
From RS53319 Datasheet at REED115_0000108.

When the V_{FB} is smaller than the reference voltage signal (V_{ref}) generated by the Soft-start and Ref Circuit, RS53319 is configured to control the HS switch and the LS switch to switch on and off based on the difference signal. This will charge the C_{BT} for V_{BST} .



From RS53319 Datasheet at REED1155_0000107.

The result of the limitation (i.e. decreasing the output voltage) is illustrated below in dark blue.

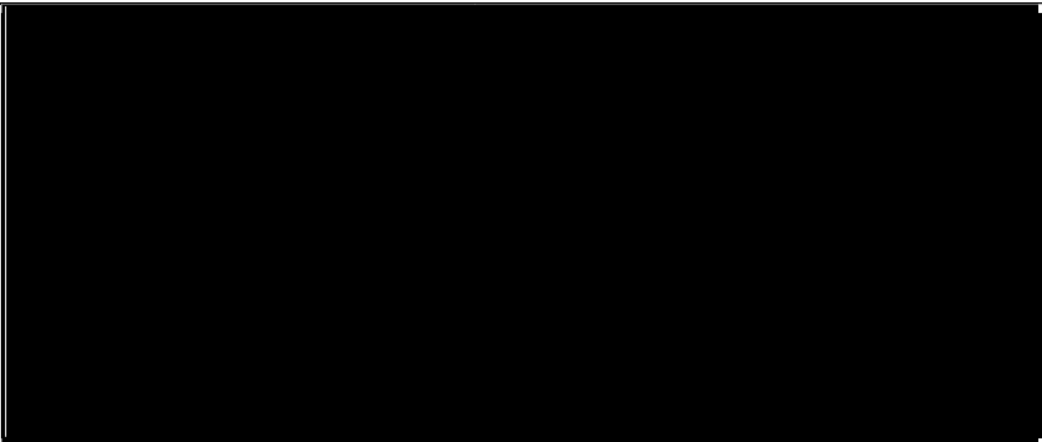


From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

The additional discovery comports with opinions presented formerly, in the FAC, as seen below in light blue.



	(U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))
<u>1d.</u> and wherein when the feedback signal is smaller than the reference voltage signal, the bootstrap refresh control circuit is configured to control the high side switch and the low side switch to switch on and off based on the difference signal so as to charge the bootstrap capacitor for refreshing the bootstrap voltage signal.	In the RS53319, the feedback signal is smaller than the reference voltage signal, the bootstrap refresh control circuit is configured to control the high side switch and the low side switch to switch on and off based on the difference signal so as to charge the bootstrap capacitor for refreshing the bootstrap voltage signal. When V_{FB} is smaller than V_{REF} the RS53319 has the bootstrap refresh control circuit configured to control the HS switch and the LS switch to switch on and off, based on the difference signal, so as to charge the bootstrap capacitor for refreshing the bootstrap voltage signal. The V_{REF} generated by the Soft-Start and Ref Circuit.



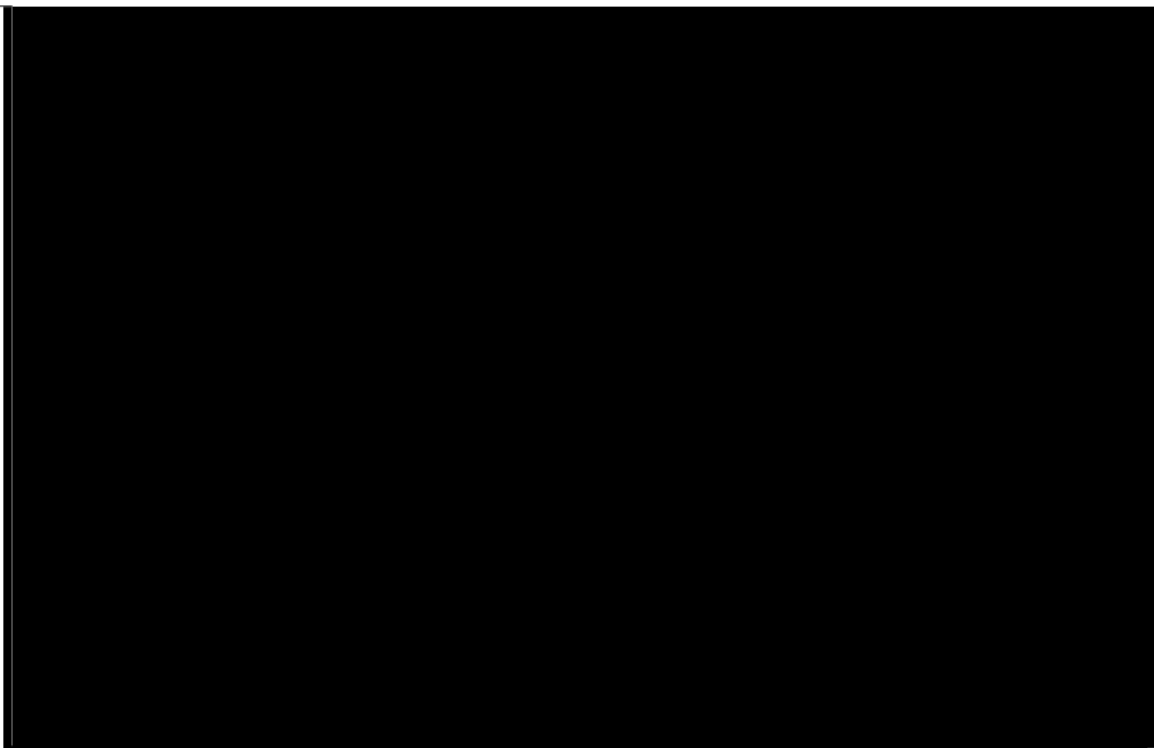
From RS53319 Datasheet at REED1155_0000107.

The RS53319 is configured to have a Pulse Skip mode, during which when V_{BST} is lower than V_{REF} , the converter will turn on the LS switch to charge the bootstrap capacitor, and the output voltage V_{OUT} is decreased.



From RS53319 Datasheet at REED1155_0000105.

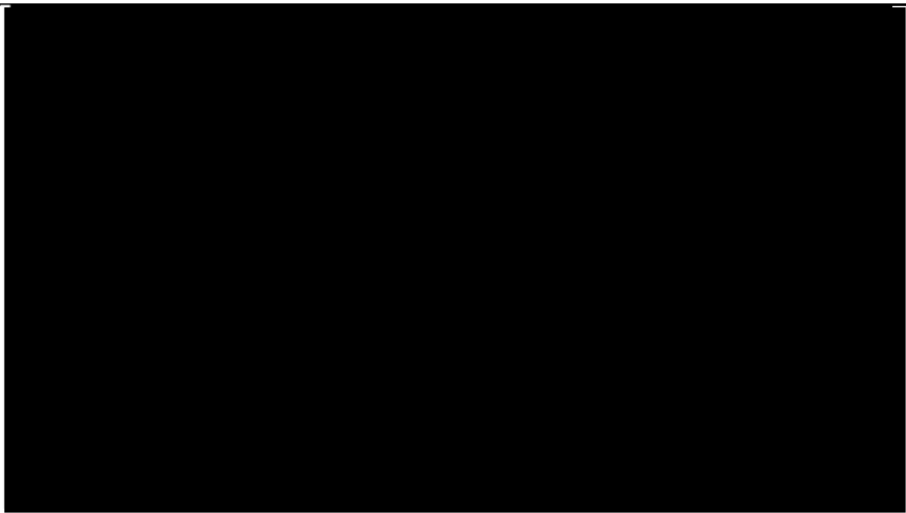
The difference signal if from the Voltage Difference Module (annotated in pink below).



From RS53319 Datasheet at REED1155_0000104.

The HS switch is turned off and the LS switch is turned on after a time period (Ton). This is determined by the Ton Generator (annotated in dark red). The HS switch and the LS switch (annotated in red) are switched on and off based on the difference signal, resulting in the charging of the bootstrap capacitor for V_{BST} .

[REDACTED]

	 From RS53319 Datasheet at REED1155_0000104. The additional discovery comports with opinions presented formerly, in the FAC, as seen below.
--	--



	U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))
2. The bootstrap refresh control circuit of claim 1, wherein the bootstrap refresh threshold comprises a first threshold and a second threshold, wherein the first threshold is higher than a ground potential and lower than the second threshold; and	To the extent the preamble is limiting, the representative RS53319 satisfies this limitation and/or Reed induces others to incorporate the RS53319 into infringing circuits and/or there is not substantially non-infringing uses of the RS53319 outside of the infringing circuits. The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot regulation circuitry is internal (within RS53319) as part of the bootstrap refresh module.



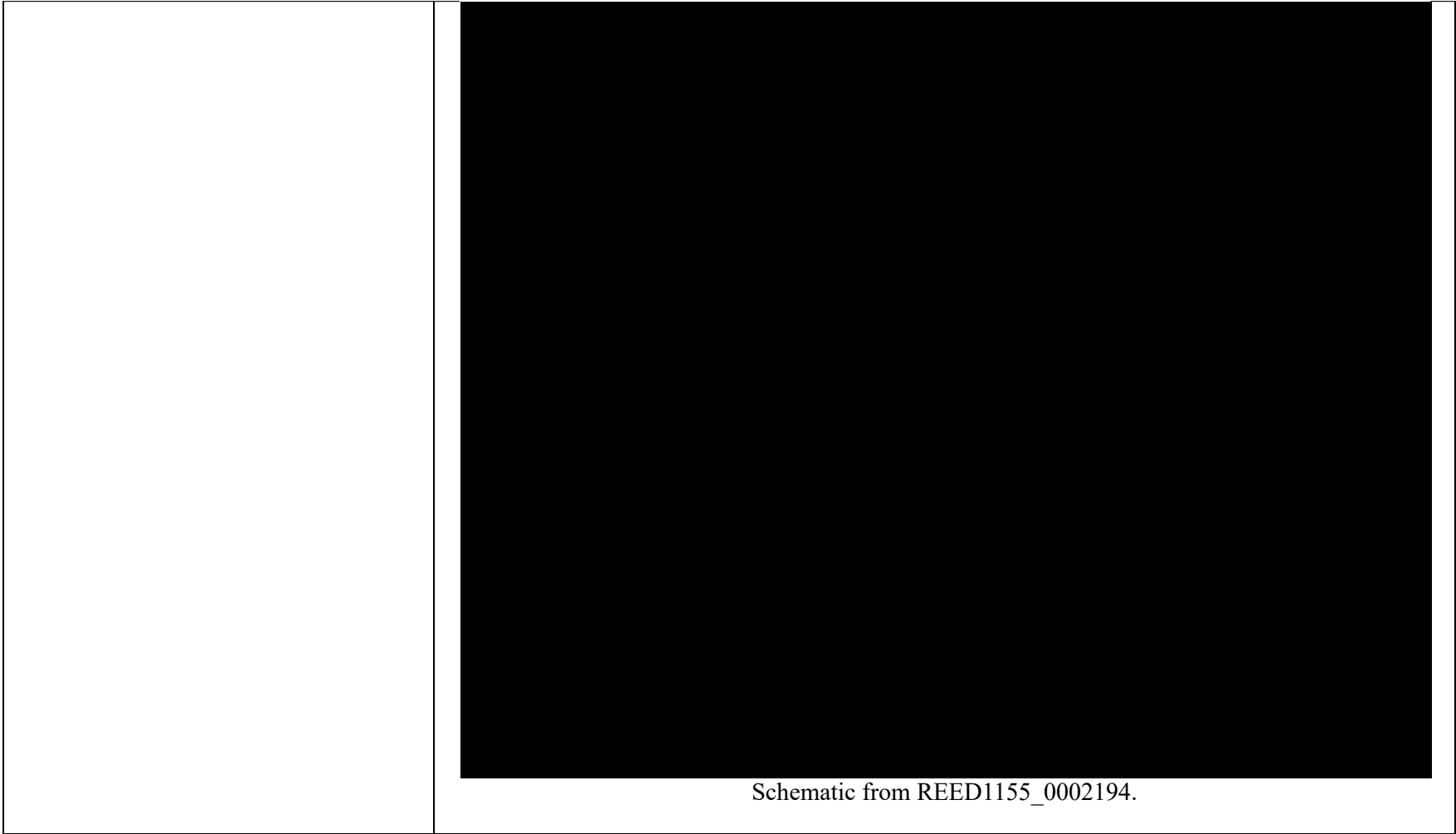
	A large black rectangular area used for redaction, likely covering a technical diagram or figure. From RS53319 Datasheet at REED1155_0000104. The bootstrap refresh module in RS53319 has a first comparing module with a bootstrap refresh threshold, comprising of a first threshold voltage and a second threshold voltage (<i>see</i> REED1155_0002194). The bootstrap refresh module is further configured with the first threshold voltage being higher than a ground potential and lower than the second threshold voltage.
--	--



Schematic from REED1155_0002194.

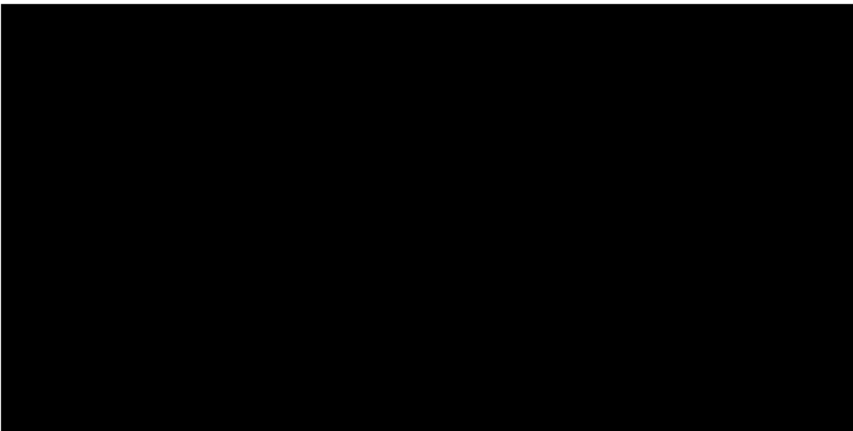


<u>2b.</u> wherein the first comparing signal has the first logic state when the bootstrap voltage signal is lower than the first threshold, and wherein the first comparing signal has the second logic state when the bootstrap voltage signal is larger than the second threshold.	In the RS53319, the first comparing signal has the first logic state when the bootstrap voltage signal is lower than the first threshold, and wherein the first comparing signal has the second logic state when the bootstrap voltage signal is larger than the second threshold. The first comparing module (<i>see</i> REED1155_0002194) in the bootstrap refresh module of RS53319 includes a hysteresis comparator, where there is a first comparing signal with a first logic state when V_{BST} is lower than a first threshold voltage. Further the first comparing signal also has a second logic state where V_{BST} is larger than the second threshold voltage.
--	---

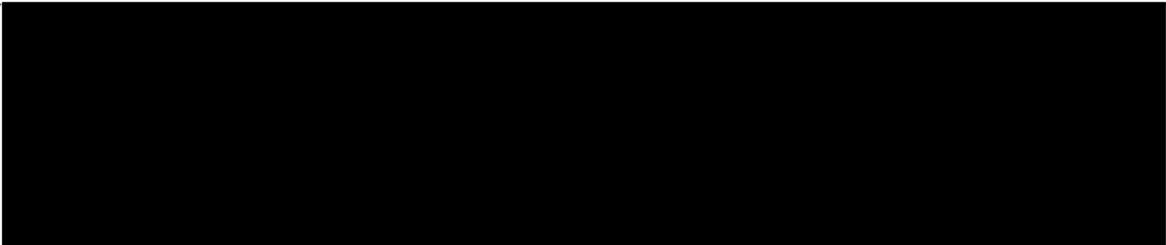


Schematic from REED1155_0002194.

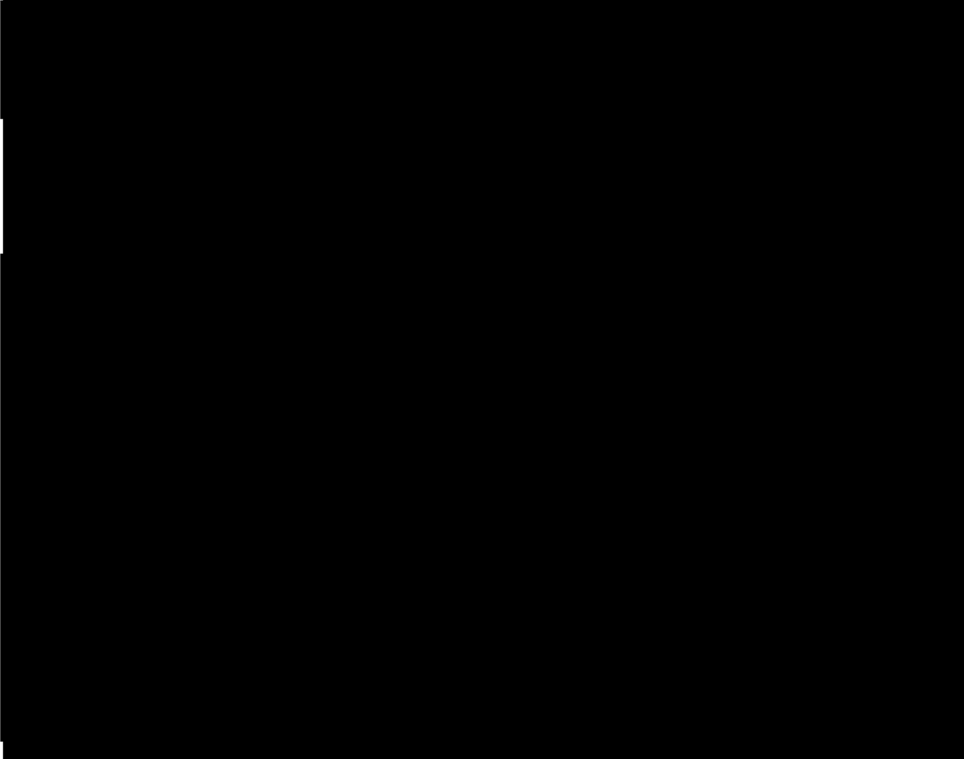


	 From RS53319 Datasheet at REED1155_0000104.
6. The bootstrap refresh control circuit of claim 1, wherein the bootstrap refresh module further comprises:	The bootstrap refresh control circuit of RS53319 further satisfies this claim. <i>See claim 1.</i>
6a. a Constant On Time circuit configured to provide a COT control signal having a first logic state and a second logic state so as to set a constant on time for the low side switch, wherein the COT control signal has the first logic state during the constant on time, and wherein the COT control signal has the second logic state beyond the constant on time;	The RS53319 includes a Constant On Time circuit configured to provide a COT control signal having a first logic state and a second logic state so as to set a constant on time for the low side switch, wherein the COT control signal has the first logic state during the constant on time, and wherein the COT control signal has the second logic state beyond the constant on time. The bootstrap refresh module of RS53319 includes a Constant On Time (COT) circuit configured to provide a COT control signal with a first logic state and a second logic state. The COT circuit sets a COT for the LS switch during constant on time and the COT control signal for the second logic state is beyond the constant on time.

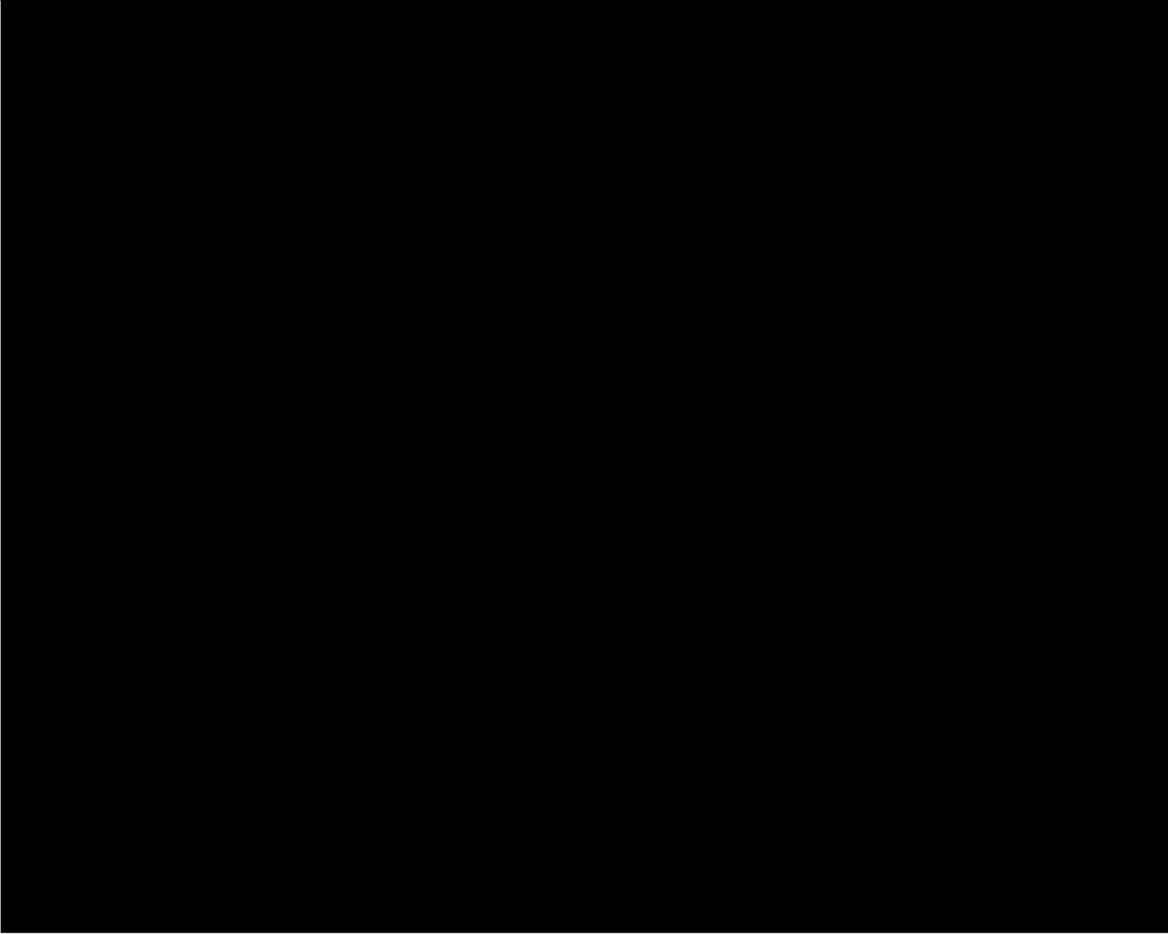


	 From RS53319 Datasheet at REED1155_0000104.
<u>6b.</u> and a first logic module having a first input terminal, a second input terminal and an output terminal, wherein the first input terminal of the first logic module is configured to receive the first comparing signal, the second input terminal of the first logic module is configured to receive the COT control signal, and the first logic module is configured to conduct a logic operation to the first comparing signal and the COT control signal for providing a bootstrap refresh signal having a first logic state and a second logic state at the output terminal;	The RS53319 includes a first logic module having a first input terminal, a second input terminal and an output terminal, wherein the first input terminal of the first logic module is configured to receive the first comparing signal, the second input terminal of the first logic module is configured to receive the COT control signal, and the first logic module is configured to conduct a logic operation to the first comparing signal and the COT control signal for providing a bootstrap refresh signal having a first logic state and a second logic state at the output terminal. The bootstrap refresh module of RS53319 includes a first logic module, with a first input terminal, a second input terminal, and an output terminal comprised in schematic REED1155_0002194 that further meets this limitation.

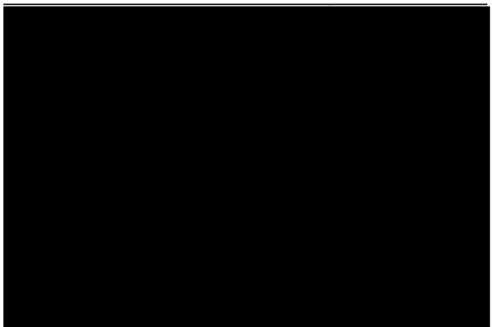


	 Schematic from REED1155_0002194.
<u>6c.</u> and wherein the bootstrap refresh signal has the first logic state when the first comparing signal has a first logic state so as to turn the low side switch on, and the bootstrap refresh signal has a second logic state when the COT control signal has a second logic state so as to turn the low side switch off.	In the RS53319, the bootstrap refresh signal has the first logic state when the first comparing signal has a first logic state so as to turn the low side switch on, and the bootstrap refresh signal has a second logic state when the COT control signal has a second logic state so as to turn the low side switch off. The first logic state occurs when the first comparing signal has a first logic state, so as to turn on the LS switch. The second logic state occurs when the COT control signal has a second logic state, so as to turn off the LS switch. (See REED1155_0002194).



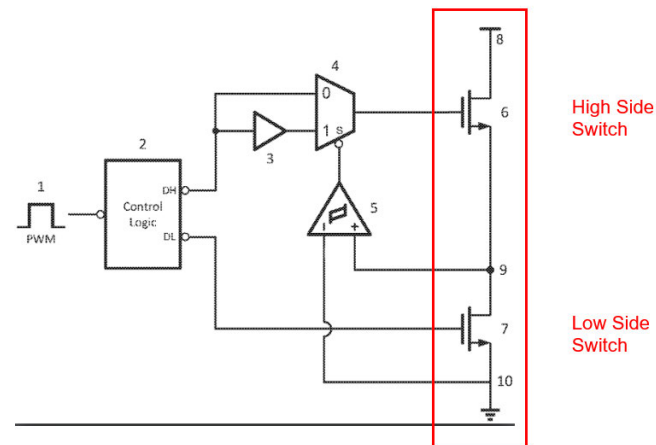
	 Schematic from REED1155_0002194.
11. A voltage converter, comprising:	To the extent the preamble is limiting, Reed directly infringes Claim 11 when it tests RS53319 using an evaluation board. Further, Reed also shares application scenarios for RS53319 encouraging and/or motivates an individual to add a capacitor, without the use of other methods.



	The RS53319 is a bootstrap control circuit for a voltage converter. (See generally RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.)  From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092
<u>11a.</u> a switching circuit having a high side switch and a low side switch, wherein the switching circuit is configured to receive an input voltage, and further configured to provide an output voltage based on switching the high side switch and the low side switch on and off;	The RS53319 includes a switching circuit having a high side switch and a low side switch, wherein the switching circuit is configured to receive an input voltage, and further configured to provide an output voltage based on switching the high side switch and the low side switch on and off. According to the datasheet, RS53319 has both input and output voltages: “Input Voltage Range: 2.85V to 16V with external bias, or 4V to 16V with internal bias Output Voltage Range: 0.6V to 6.0V for RS53317L. 0.9V to 6.0V for RS53317H” (REED1155_0000092) The RS53319 has a high side switch, a low side switch (annotated in red below), and a BST pin (annotated in blue below) for coupling a bootstrap capacitor to provide a bootstrap voltage (V_{bst}). The V_{bst} is across the BST pin and the SW pin.



	A solid black horizontal bar within the table cell, likely redacting a header or title. From RS53319 Datasheet (REED1155_0000096) A large solid black rectangular area within the table cell, likely redacting the main content of the document. RS53319 Datasheet at REED1155_0000104
--	---



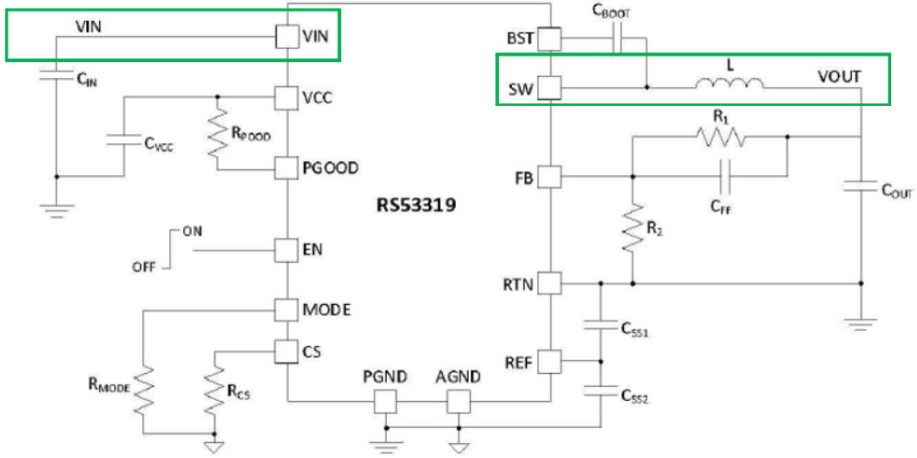
(U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))

The high side (HS) switch and a low side (LS) switch, are configured to provide a signal at its SW pin based on driving the HS switch and the LS switch to switch on and off.

V_{BST} across the BST and SW pins is used to supply a HS driver (annotated in pink above) of the HS switch.

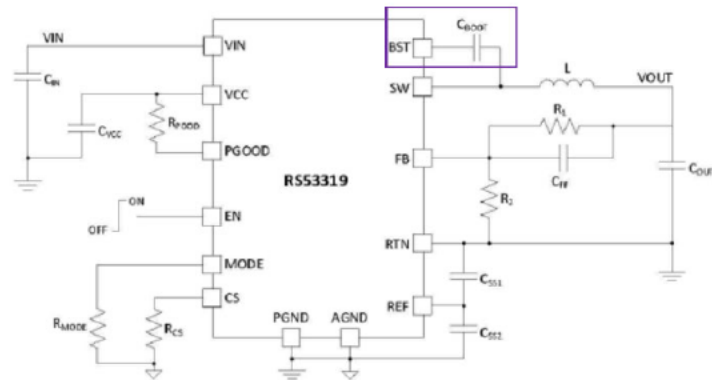
The RS53319 has a VIN pin to receive an input voltage, and a SW pin for coupling an inductor L to provide an output voltage (annotated in green below).



	 From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.
11b. a bootstrap circuit comprising a bootstrap capacitor, wherein the bootstrap capacitor is charged for providing a bootstrap voltage signal for the high side switch;	The RS53319 has a bootstrap circuit (annotated in light green below) comprising a bootstrap capacitor, where the bootstrap capacitor is charged for providing a bootstrap voltage signal (V_{BST}) for the HS switch. (See generally RS53319 Datasheet at REED1155_0000035–0000036, REED1155_0000092–0000117.)



	From RS53319 Datasheet at REED1155_0000104. The RS53319 receives the bootstrap voltage signal, where the voltage across the bootstrap capacitor (C_{Boot}) is the bootstrap voltage (annotated in purple below). C_{Boot} is used for boosting the output signal. RS53319 is designed by making C_{Boot} a necessary component, although C_{Boot} is added externally to the BST pin of RS53319.
--	---

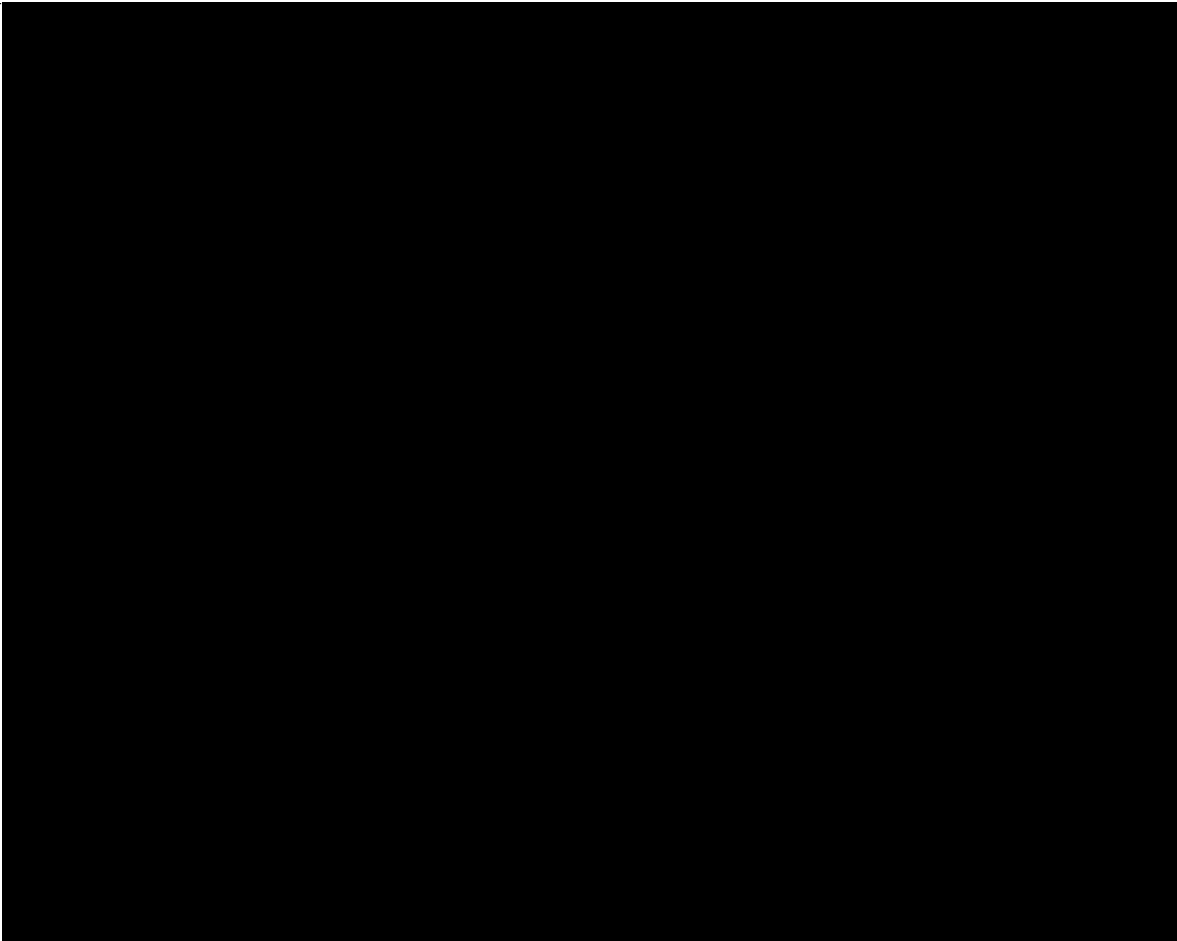


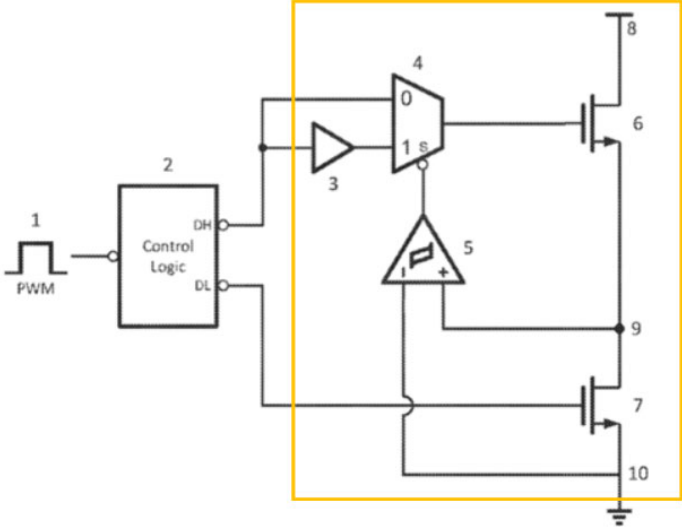
From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

The RS53317 has a bootstrap refresh module, including a comparing module (*see* REED1155_0002194), which compares V_{BST} with a threshold voltage, and turns on the LS switch to charge the bootstrap capacitor to provide V_{BST} to the HS.

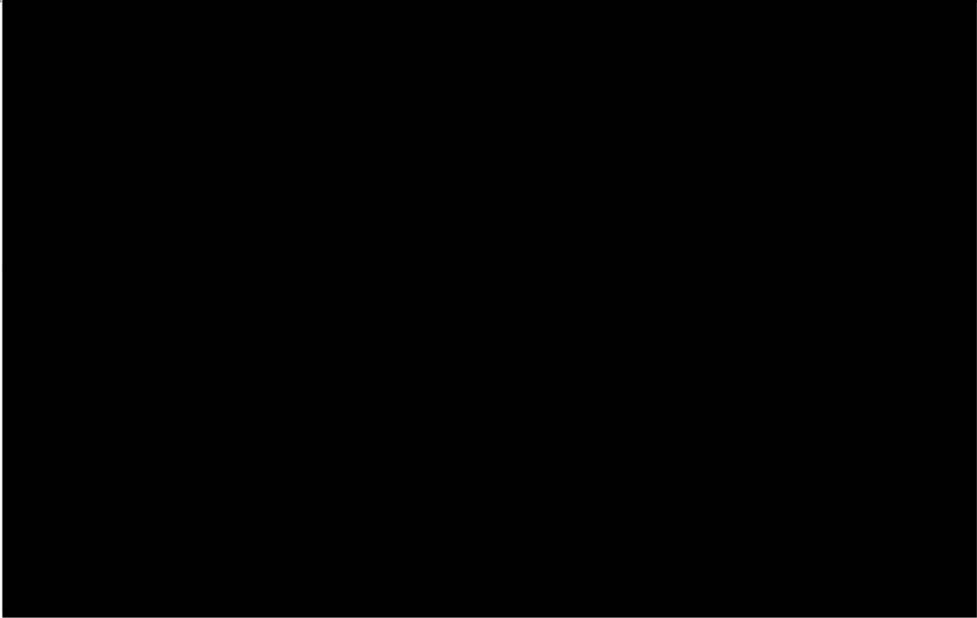
From RS53319 Datasheet at REED1155_0000108.



	 Schematic from REED1155_0002194. The comparing module is configured to compare the V_{BST} with a bootstrap refresh threshold to provide a first comparing signal.
--	--

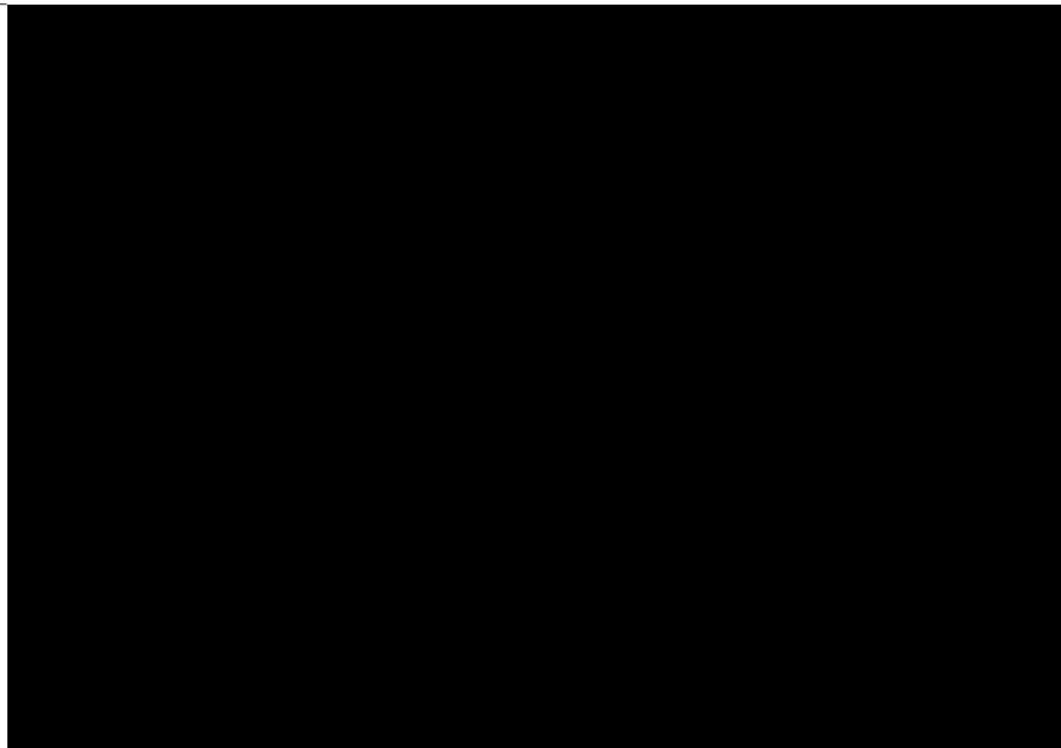
	The additional discovery comports with opinions presented formerly, in the FAC, as seen below in gold.  (U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021)))
<u>11c.</u> a bootstrap refresh control circuit comprising:	The RS53319 includes a bootstrap refresh control circuit.



	 From RS53319 Datasheet at REED1155_0000104.
<u>11d.</u> a bootstrap refresh module, wherein the bootstrap refresh module comprises a first comparing module having a first input terminal, a second input terminal and an output terminal, and wherein the first input terminal of the first comparing module is configured to receive the bootstrap voltage signal, the second input terminal of the first comparing module is configured to receive a bootstrap refresh	The RS53319 includes a bootstrap refresh module that satisfies this limitation. The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot regulation circuitry is internal (within RS53319) as part of the bootstrap refresh module.



threshold, and the first comparing module is configured to compare the bootstrap voltage signal with the bootstrap refresh threshold to provide a first comparing signal having a first logic state and a second logic state at the output terminal, and wherein the first comparing signal has the first logic state when the bootstrap voltage signal is lower than the bootstrap refresh threshold, and the first comparing signal has the second logic state when the bootstrap voltage signal is larger than the bootstrap refresh threshold;



From RS53319 Datasheet at REED1155_0000104.

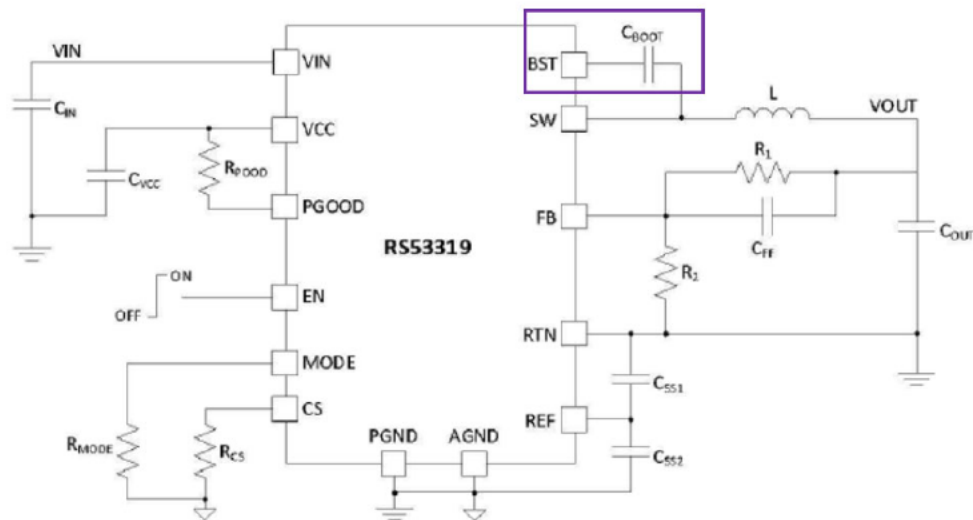
The RS53319 has a bootstrap refresh module (annotated above in Light green), including a comparing module (*see* schematic from REED1155_0002194 below), which compares V_{BST} with a threshold voltage (2.3V), and turns on the LS switch to charge the bootstrap capacitor when V_{BST} is lower than that threshold.



Schematic from REED1155_0002194.

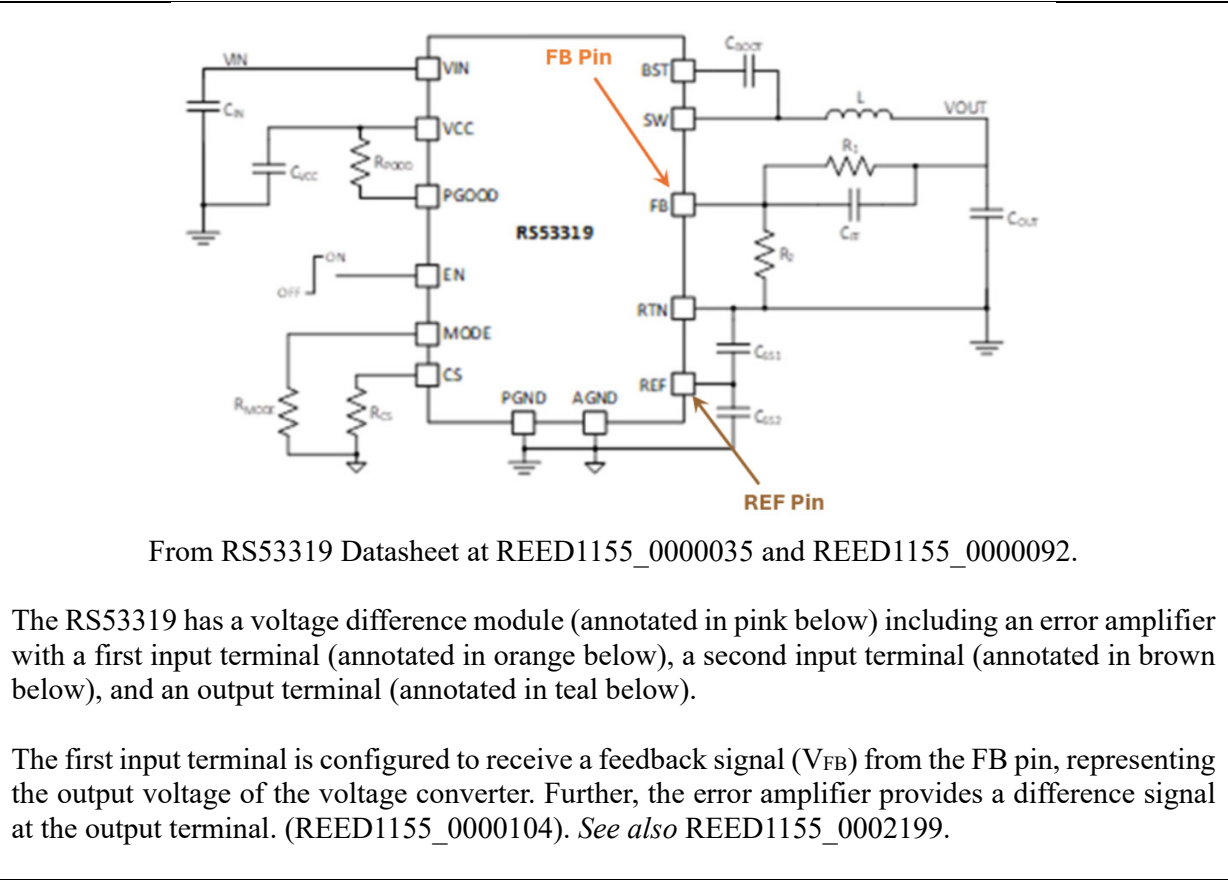
From RS53319 Datasheet at REED1155_0000108.

The RS53319 receives the bootstrap voltage signal, where the voltage across the bootstrap capacitor (C_{Boot}) is the bootstrap voltage (annotated in purple below). C_{Boot} is used for boosting the output signal. RS53319 is designed by making C_{Boot} a necessary component, although C_{Boot} is added externally to the BST pin of RS53319.



From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

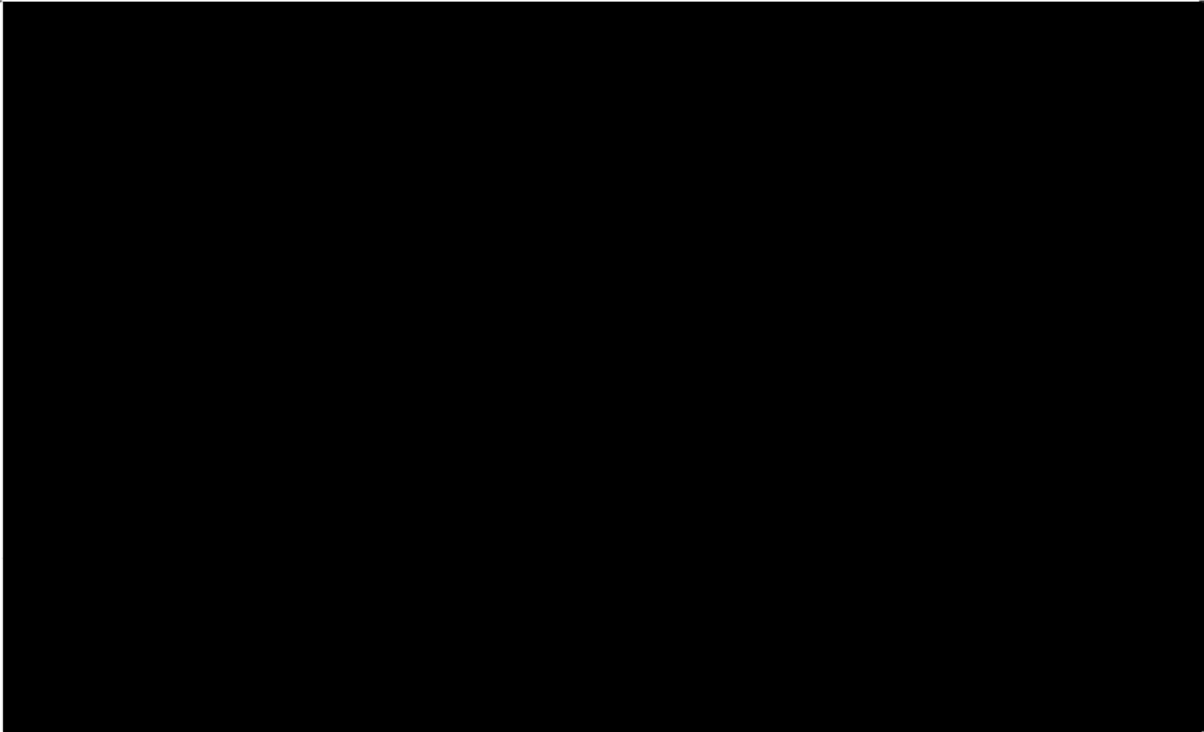
The comparing module is configured to compare the V_{BST} with a bootstrap refresh threshold to



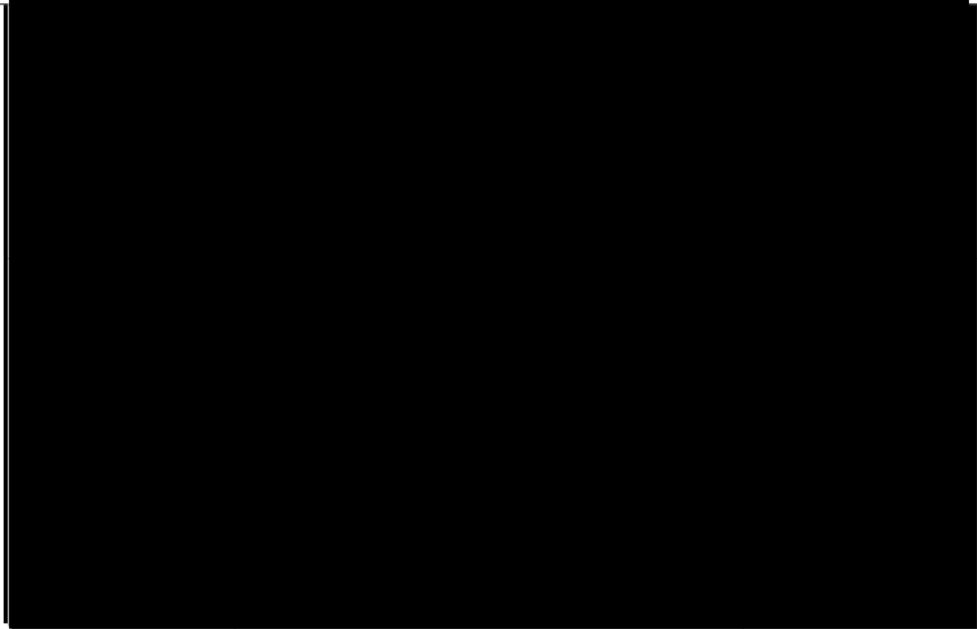
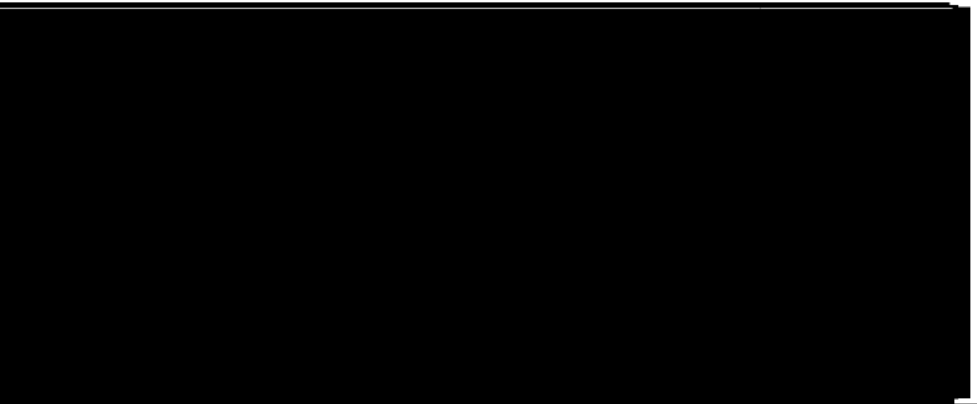
The RS53319 has a voltage difference module (annotated in pink below) including an error amplifier with a first input terminal (annotated in orange below), a second input terminal (annotated in brown below), and an output terminal (annotated in teal below).

The first input terminal is configured to receive a feedback signal (V_{FB}) from the FB pin, representing the output voltage of the voltage converter. Further, the error amplifier provides a difference signal at the output terminal. (REED1155 0000104). *See also* REED1155 0002199.



	 Schematic from REED1155_0002199. The RS53319 is also configured to receive a reference voltage signal V_{ref} (into the second input terminal) from a Soft-start and Ref Circuit, which is coupled to REF pin (annotated in brown). The output signal from the error amplifier is provided to a PWM comparator and compared with a sum of the feedback signal and an internal ramp, to generate a difference signal. This functions as the “voltage difference module” (annotated in pink).
--	---

[Redacted]

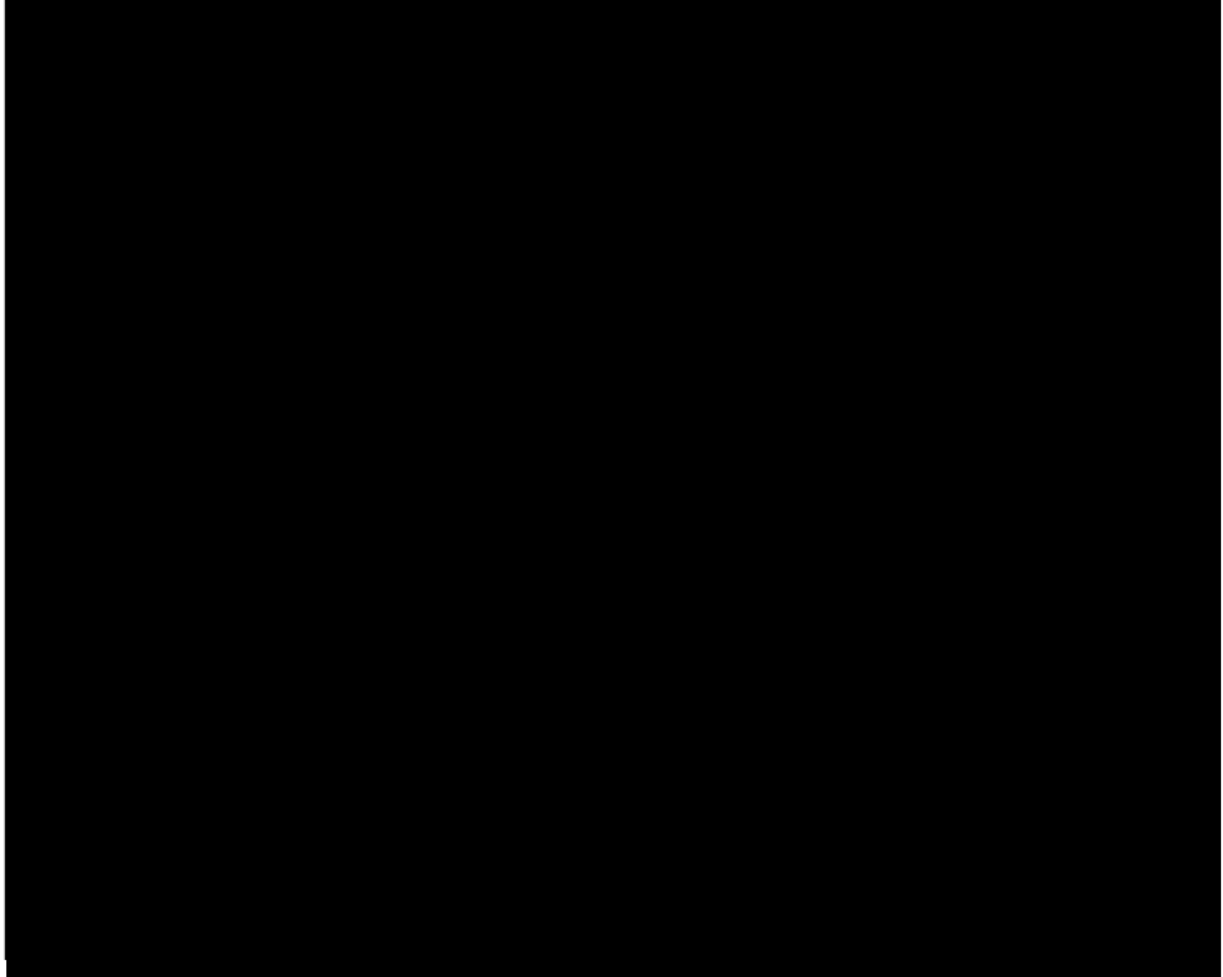
			
		RS53319 Datasheet at REED1155_0000104 	



	From RS53319 Datasheet at REED1155_0000107.
11f. and wherein when the first comparing signal has the first logic state, the bootstrap refresh module is configured to decrease the output voltage of the voltage converter;	In the RS53319, when the first comparing signal has the first logic state, the bootstrap refresh module is configured to decrease the output voltage of the voltage converter. The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot regulation circuitry is internal (within RS53319) as part of the bootstrap refresh module.  From RS53319 Datasheet at REED1155_0000104. The bootstrap refresh module of RS53319 is configured to decrease the output voltage of the voltage



converter when the first comparing signal has the first logic state using a comparing circuit.



Schematic from REED1155_0002194.

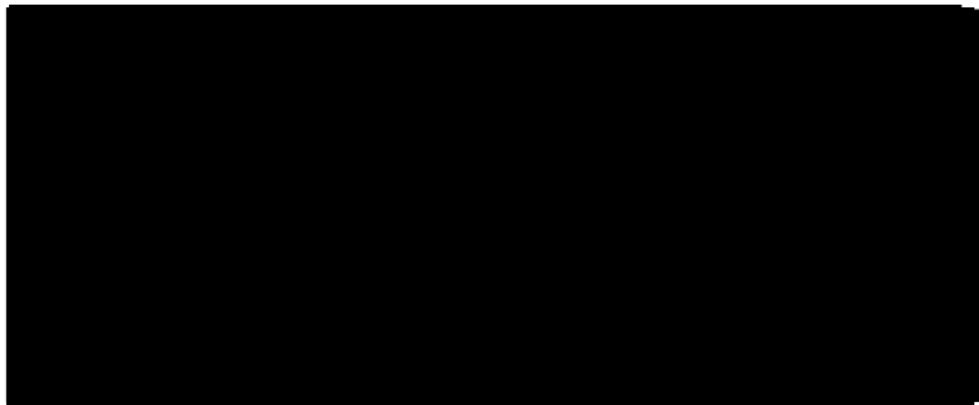


During Prebias Startup, when V_{BST} is lower than the threshold voltage (2.3V), the LS switch is turned on to charge the bootstrap capacitor (C_{BT}), and the output voltage V_{OUT} is decreased.



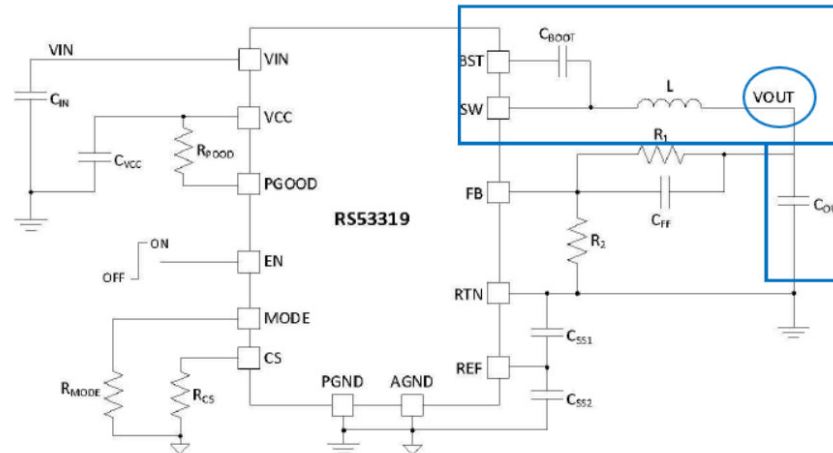
From RS53319 Datasheet at REED115_0000108.

When the V_{FB} is smaller than the reference voltage signal (V_{ref}) generated by the Soft-start and Ref Circuit, RS53319 is configured to control the HS switch and the LS switch to switch on and off based on the difference signal. This will charge the C_{BT} for V_{BST} .



From RS53319 Datasheet at REED115_0000107.

The result of the limitation (i.e. decreasing the output voltage) is illustrated below in dark blue.

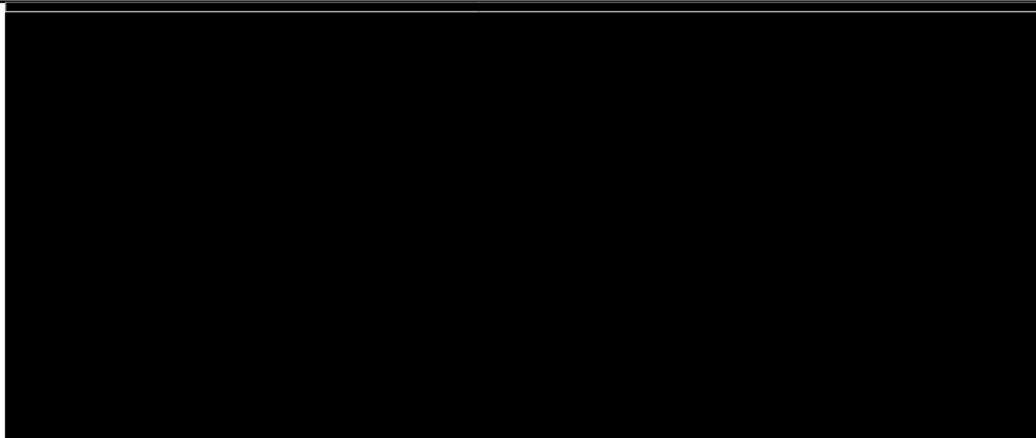


From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

The additional discovery comports with opinions presented formerly, in the FAC, as seen below in light blue.

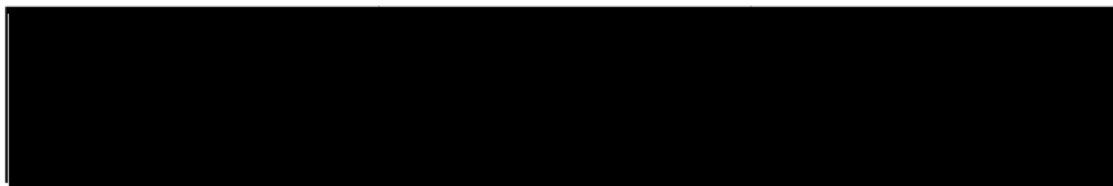


	(U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))
<u>11g.</u> and wherein when the feedback signal is smaller than the reference voltage signal, the bootstrap refresh control circuit is configured to control the high side switch and the low side switch to switch on and off based on the difference signal so as to charge the bootstrap capacitor for refreshing the bootstrap voltage signal.	In the RS53319, when the feedback signal is smaller than the reference voltage signal, the bootstrap refresh control circuit is configured to control the high side switch and the low side switch to switch on and off based on the difference signal so as to charge the bootstrap capacitor for refreshing the bootstrap voltage signal. When V_{FB} is smaller than V_{REF} the RS53319 has the bootstrap refresh control circuit configured to control the HS switch and the LS switch to switch on and off, based on the difference signal , so as to charge the bootstrap capacitor for refreshing the bootstrap voltage signal. The V_{REF} generated by the Soft-Start and Ref Circuit.



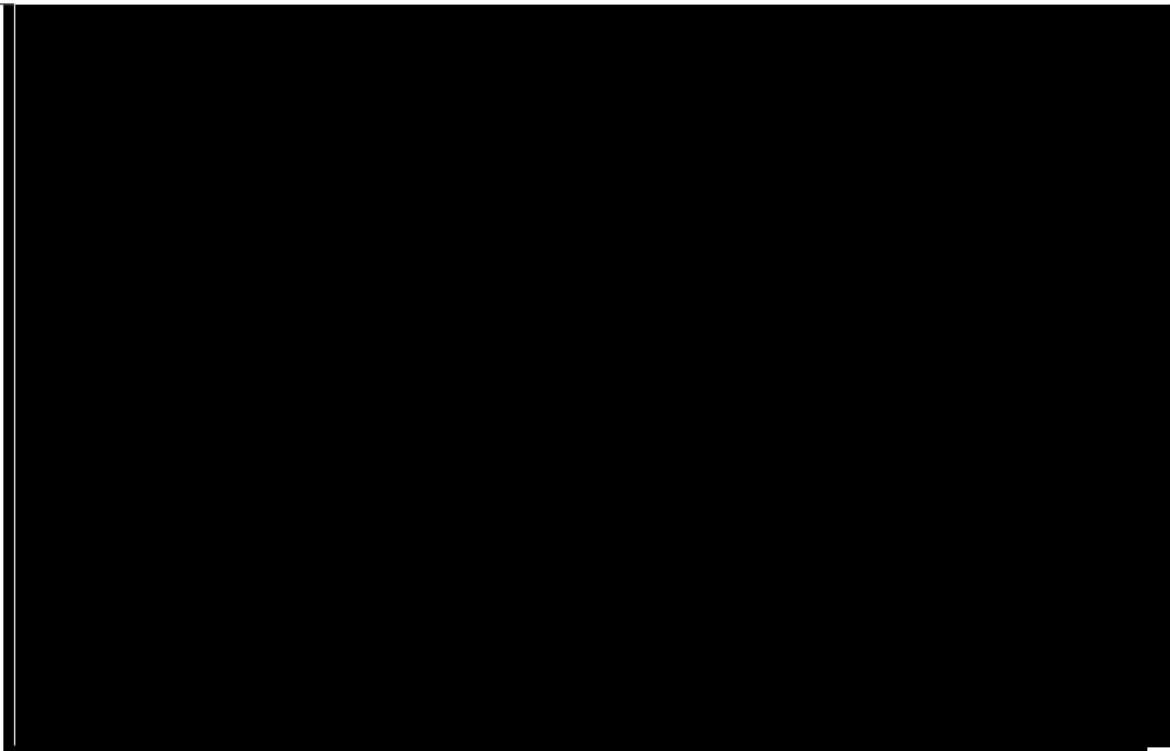
From RS53319 Datasheet at REED1155_0000107.

The RS53319 is configured to have a Pulse Skip mode, during which when V_{BST} is lower than V_{REF} , the converter will turn on the LS switch to charge the bootstrap capacitor, and the output voltage V_{OUT} is decreased.



From RS53319 Datasheet at REED1155_0000105.

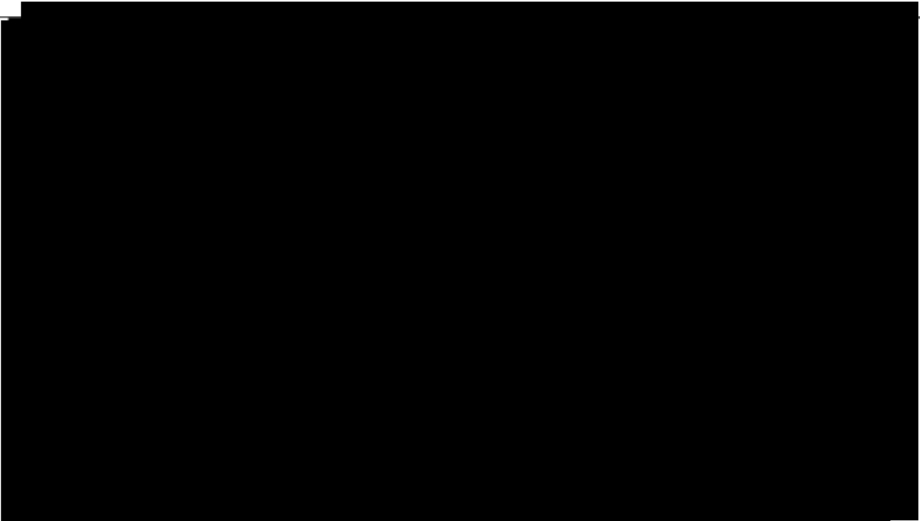
The difference signal if from the Voltage Difference Module (annotated in pink below).



From RS53319 Datasheet at REED1155_0000104.

The HS switch is turned off and the LS switch is turned on after a time period (Ton). This is determined by the Ton Generator (annotated in dark red). The HS switch and the LS switch (annotated in red) are switched on and off based on the difference signal, resulting in the charging of the bootstrap capacitor for V_{BST} .

[REDACTED]

	 From RS53319 Datasheet at REED1155_0000104. The additional discovery comports with opinions presented formerly, in the FAC, as seen below.
--	---

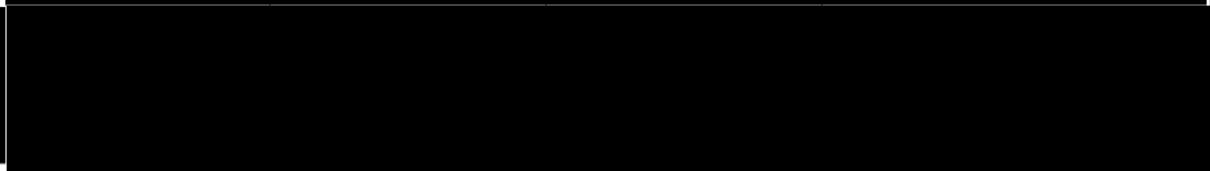


12. A bootstrap refresh control method for a voltage converter, wherein the voltage converter comprises a high side switch, a low side switch and a bootstrap capacitor for providing a bootstrap voltage signal to supply a high side driver of the high side switch, and wherein the voltage converter is configured to receive an input voltage and to provide an output voltage based on driving the high side switch and the low side switch to switch on and off,	To the extent the preamble is limiting, the RS53319 satisfies this limitation and/or Reed induces others to incorporate the RS53319 into infringing circuits and/or there is no substantially non-infringing uses of the RS53319 outside of the infringing circuits. The RS53319 is a bootstrap control circuit for a voltage converter. (<i>See generally</i> RS53319 Datasheet at REED1155_0000035–0000036, REED1155_0000092–0000117.) According to the datasheet, the RS53319 has both input and output voltages: “Input Voltage Range: 2.85V to 16V with external bias, or 4V to 16V with internal bias Output Voltage Range: 0.6V to 6.0V for RS53317L. 0.9V to 6.0V for RS53317H” (REED1155 0000092)



and wherein the bootstrap refresh control method comprising:

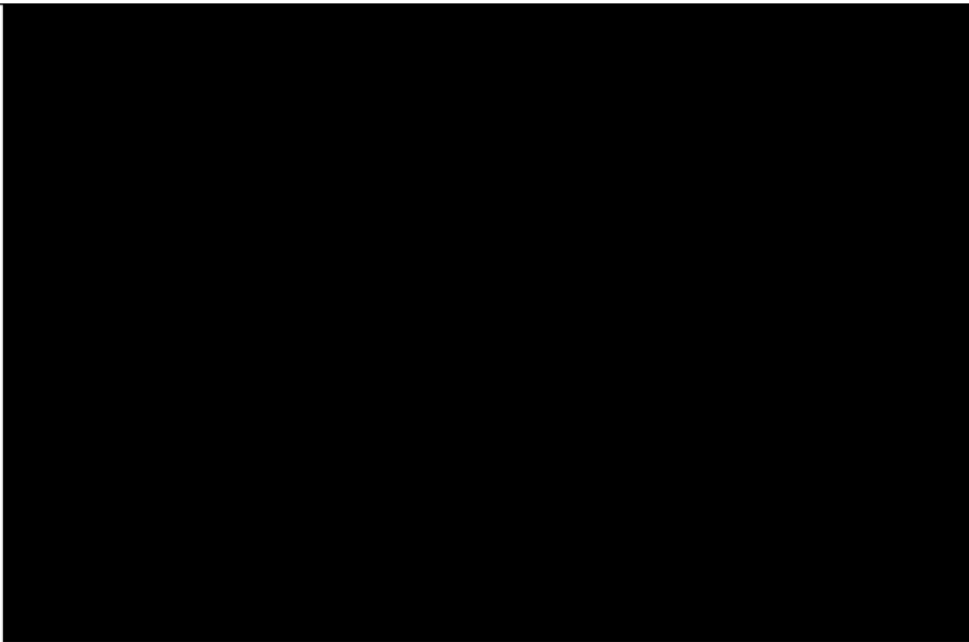
The RS53319 has a high side (HS) switch and a low side (LS) switch (annotated in red below), and a BST pin (annotated in blue below) for coupling a bootstrap capacitor to provide a bootstrap voltage (V_{BST}). The V_{BST} is across the BST pin and the SW pin.

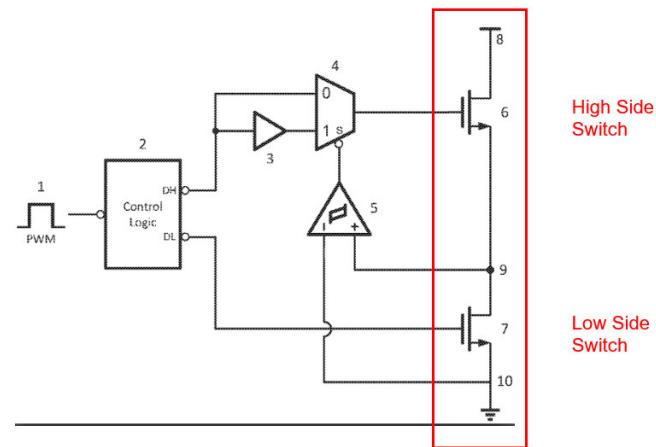


From RS53319 Datasheet (REED1155_0000096)

The HS Driver, Anti-Cross, and the LS Driver (annotated in dashed magenta box below) drive the LS switch and HS switch.

[REDACTED]

	 RS53319 Datasheet at REED1155_0000104 The additional discovery comports with opinions presented formerly, in the FAC, as seen below in red.
--	---



(U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))

The HS switch and a LS switch are configured to provide a signal at its SW pin based on driving the HS switch and the LS switch to switch on and off.

V_{BST} across the BST and SW pins is provided via C_{Boot} (annotated in purple below) to supply a HS driver (annotated in pink above) of the HS switch.

The RS53319 has a VIN pin to receive an input voltage, and a SW pin for coupling an inductor L to provide an output voltage (annotated in green below).



	From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092. The bootstrap refresh control circuit comprises each of the following claimed limitations described below.
<u>12a.</u> sensing the bootstrap voltage signal of the voltage converter;	The RS53319 senses the bootstrap voltage signal of the voltage converter. The RS53319 is configured to sense V_{BST} of the voltage converter as annotated in gray.



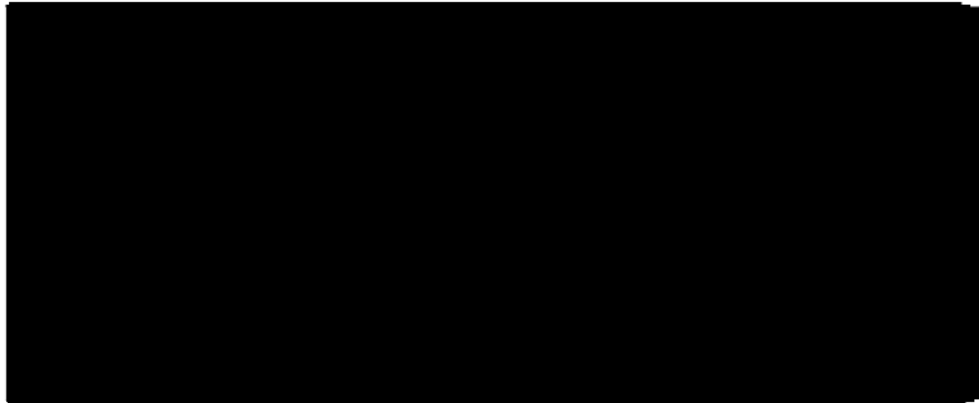
	 From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.
<u>12b.</u> comparing the bootstrap voltage with a bootstrap refresh threshold to provide a first comparing signal, wherein the first comparing signal has a first logic state and a second logic state, and wherein the first comparing signal has the first logic state when the bootstrap voltage is lower than the bootstrap refresh threshold, and wherein the first comparing signal has the second logic state when the bootstrap voltage signal is larger than the bootstrap refresh threshold;	The RS53319 compares the bootstrap voltage with a bootstrap refresh threshold to provide a first comparing signal, wherein the first comparing signal has a first logic state and a second logic state, and wherein the first comparing signal has the first logic state when the bootstrap voltage is lower than the bootstrap refresh threshold, and wherein the first comparing signal has the second logic state when the bootstrap voltage signal is larger than the bootstrap refresh threshold. The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot Regulation Circuitry is internal (within RS53319) as part of the bootstrap refresh module.



	From RS53319 Datasheet at REED1155_0000104. During Prebias Startup, when V_{BST} is lower than the threshold voltage, the LS switch is turned on to charge the bootstrap capacitor (C_{BOOT}). From RS53319 Datasheet at REED115_0000108. When the V_{FB} is smaller than the reference voltage signal (V_{ref}) generated by the Soft-start and Ref Circuit, RS53319 is configured to control the HS switch and the LS switch to switch on and off based
--	--



on the difference signal. This will charge the C_{BT} for V_{BST} .

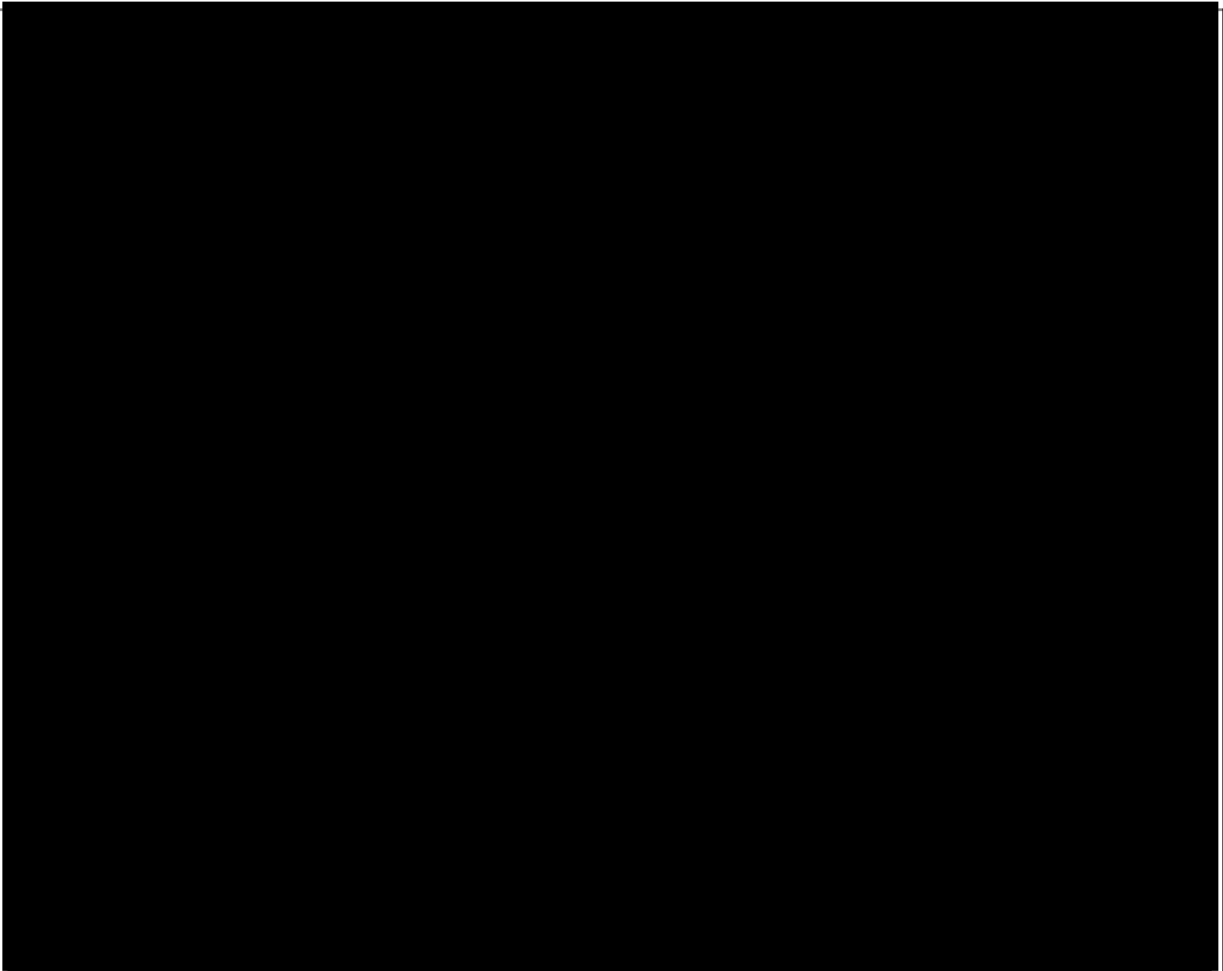
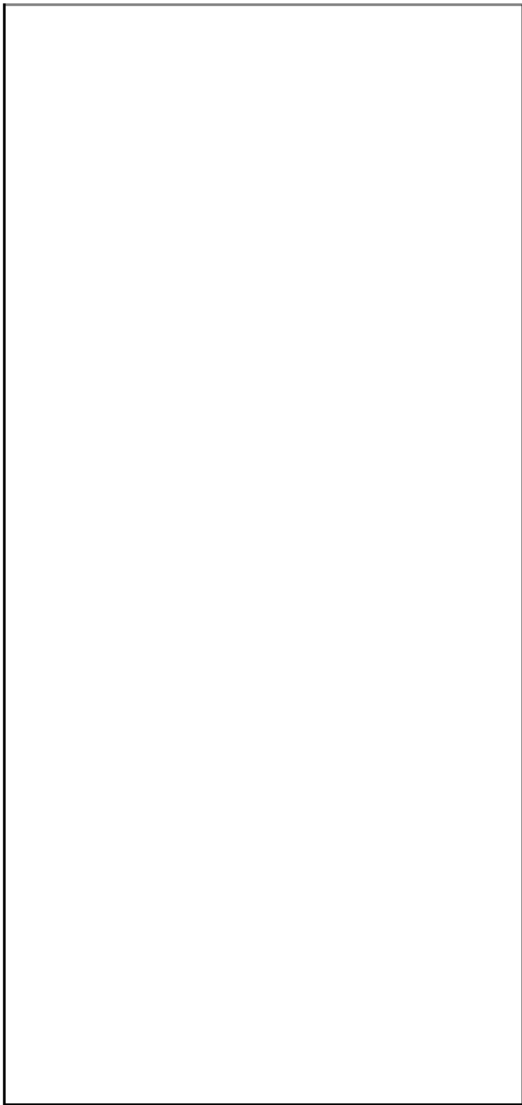


From RS53319 Datasheet at REED1155_0000107.

The RS53319 is configured to operate by comparing the bootstrap voltage with a bootstrap refresh threshold to provide a first comparing signal.

Where the first comparing signal has a first logic state and a second logic state (*See* REED1155_0002199), and where the first comparing signal has the first logic state when the bootstrap voltage is lower than the bootstrap refresh threshold.

Further, the first comparing signal has the second logic state when the bootstrap voltage signal is larger than the bootstrap refresh threshold.

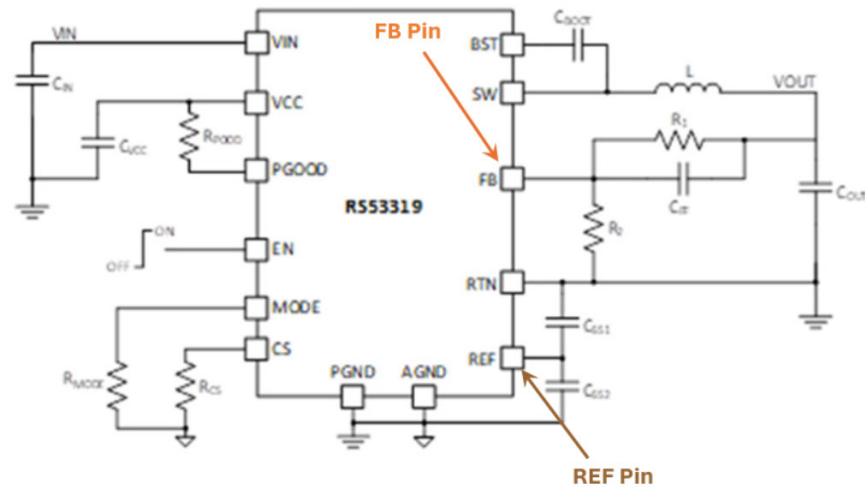


Schematic from REED1155_0002194.

The additional discovery comports with opinions presented formerly, in the FAC, as seen below in



	light blue. (U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))
<u>12c.</u> determining whether the bootstrap voltage signal is smaller than the bootstrap refresh threshold or not; and	The RS53319 determines whether the bootstrap voltage signal is smaller than the bootstrap refresh threshold or not. The RS53319 has an FB pin (annotated in orange below) and a REF pin (annotated in brown below).



From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

The RS53319 is configured to have an error amplifier to receive a feedback signal (V_{FB}) from the FB pin, representing the output voltage of the voltage converter. Further, the error amplifier provides a difference signal at the output terminal. (REED1155_0000104).

The RS53319 is also configured to receive a reference voltage signal V_{ref} from a Soft-start and Ref Circuit, which is coupled to REF pin (annotated in brown).

The output signal from the error amplifier is provided to a PWM comparator and compared with a sum of the feedback signal and an internal ramp, to generate a difference signal. This functions as the “voltage difference module” (annotated in orange).

[Redacted]

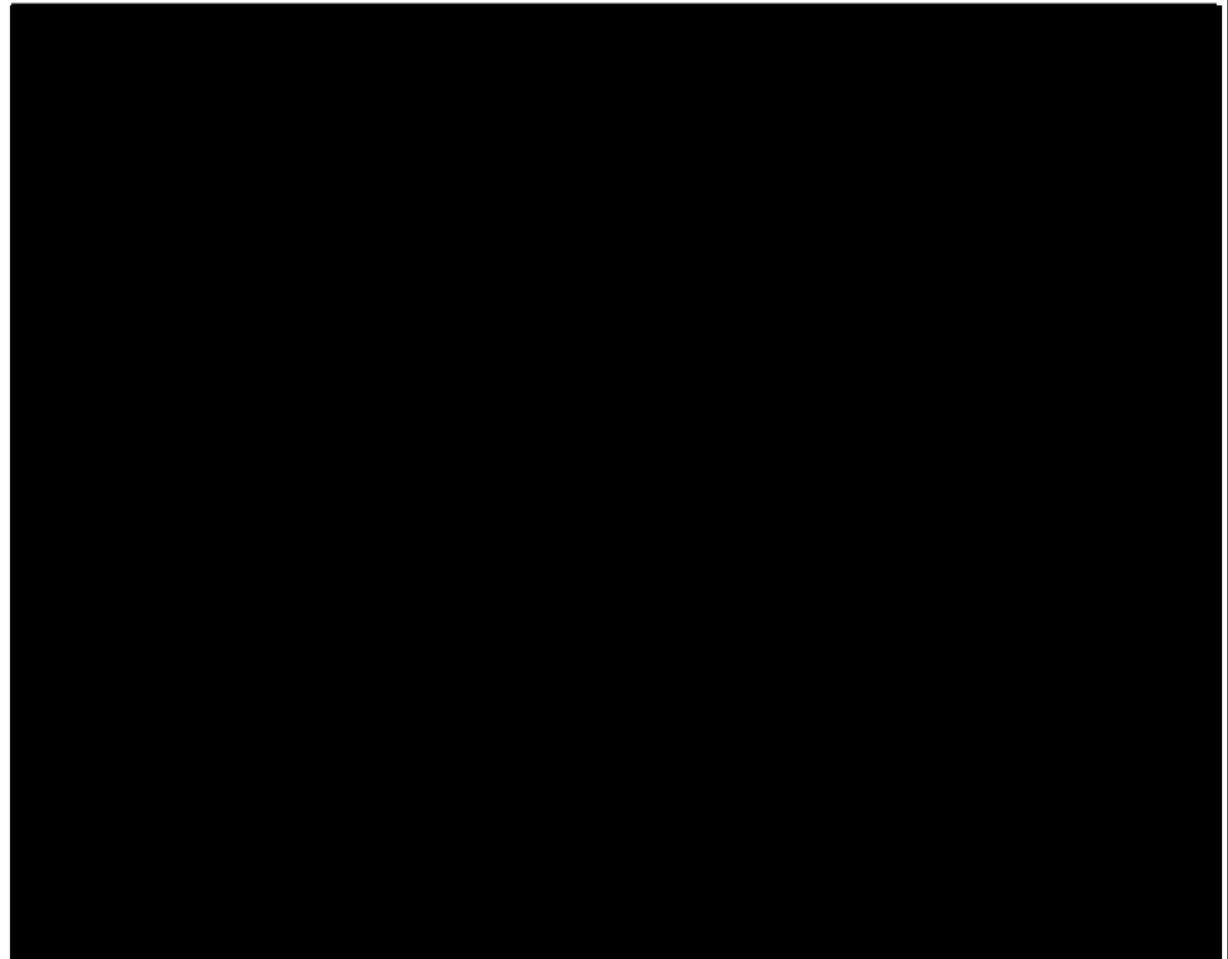
	[Redacted] RS53319 Datasheet at REED1155_0000104 [Redacted]
--	--



	From RS53319 Datasheet at REED1155_0000107.
<u>12d.</u> decreasing the output voltage of the voltage converter by a bootstrap refresh circuit once the bootstrap voltage signal is determined to have dropped to be smaller than the bootstrap refresh threshold;	The RS53319 decreases the output voltage of the voltage converter by a bootstrap refresh circuit once the bootstrap voltage signal is determined to have dropped to be smaller than the bootstrap refresh threshold. The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot regulation circuitry is internal (within RS53319) as part of the bootstrap refresh module.  From RS53319 Datasheet at REED1155_0000104.



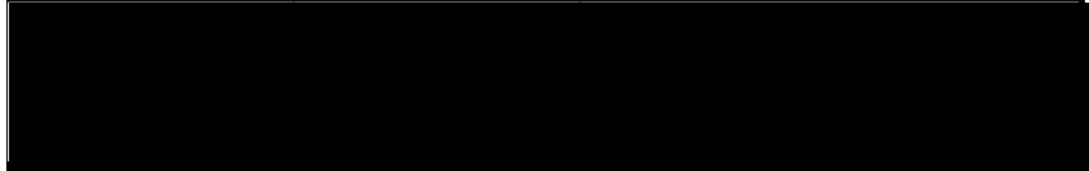
The bootstrap refresh module of RS53319 is configured to decrease the output voltage of the voltage converter when the first comparing signal has the first logic state using a comparing circuit.



Schematic from REED1155 0002194.

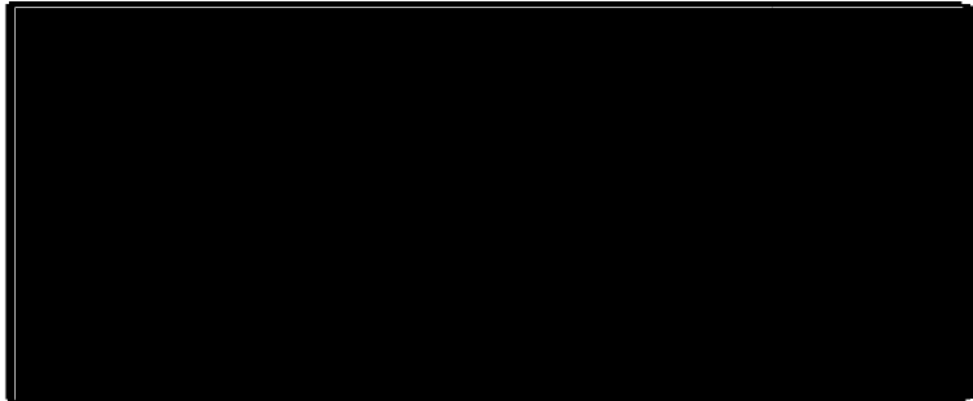


During Prebias Startup, when V_{BST} is lower than the threshold voltage (2.3V), the LS switch is turned on to charge the bootstrap capacitor (C_{BT}), and the output voltage V_{OUT} is decreased.



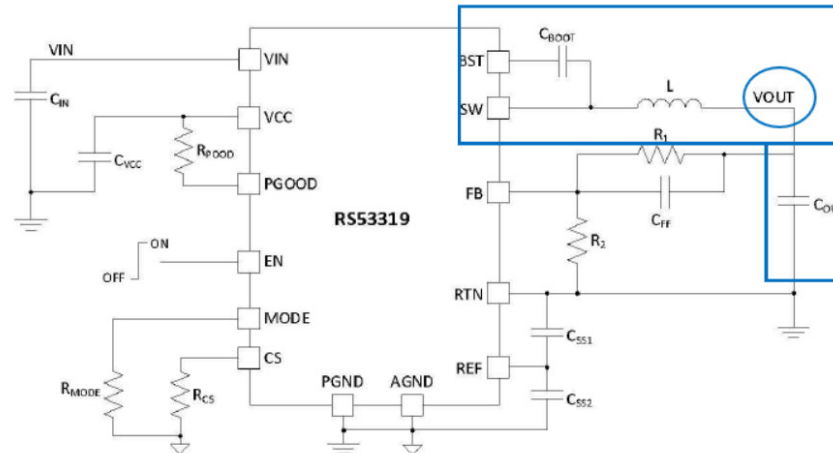
From RS53319 Datasheet at REED115_0000108.

When the V_{FB} is smaller than the reference voltage signal (V_{ref}) generated by the Soft-start and Ref Circuit, RS53319 is configured to control the HS switch and the LS switch to switch on and off based on the difference signal. This will charge the C_{BT} for V_{BST} .



From RS53319 Datasheet at REED1155_0000107.

The result of the limitation (i.e. decreasing the output voltage) is illustrated below in dark blue.

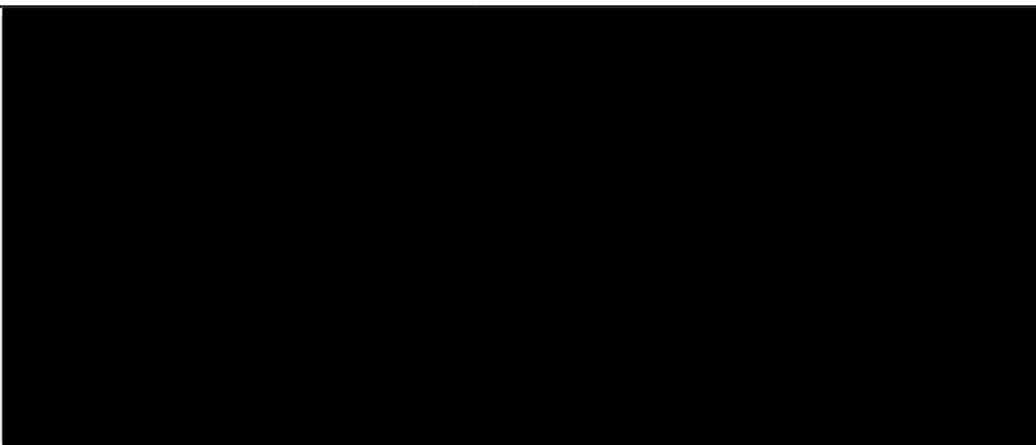


From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.

The additional discovery comports with opinions presented formerly, in the FAC, as seen below in light blue.

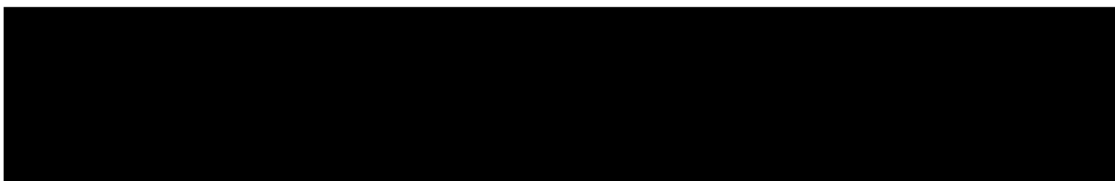


	(U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))
<u>12e.</u> and wherein when the output voltage of the voltage converter is decreased, switching the high side switch and the low side switch on and off so as to refresh the bootstrap voltage signal.	In the RS53319, when the output voltage of the voltage converter is decreased, switching the high side switch and the low side switch on and off so as to refresh the bootstrap voltage signal. When the output voltage of the voltage converter is decreased, the HS switch and the LS switch on and off so as to refresh V_{BST}. The V_{REF} generated by the Soft-Start and Ref Circuit.



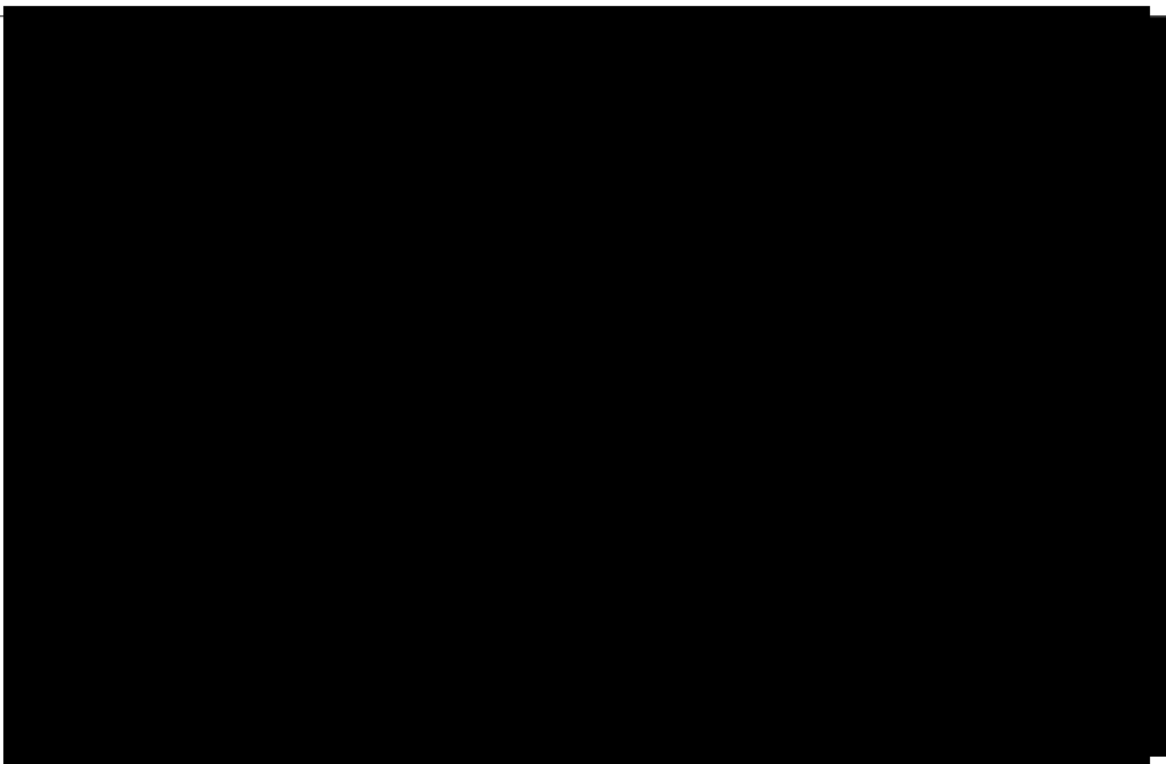
From RS53319 Datasheet at REED1155_0000107.

The RS53319 is configured to have a Pulse Skip mode, during which when V_{BST} is lower than V_{REF} , the converter will turn on the LS switch to charge the bootstrap capacitor, and the output voltage V_{OUT} is decreased.



From RS53319 Datasheet at REED1155_0000105.

The difference signal if from the Voltage Difference Module (annotated in pink below).

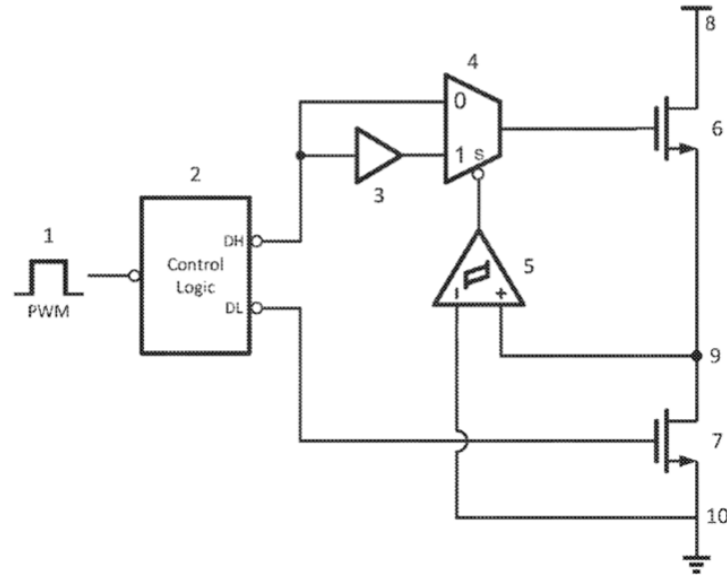


From RS53319 Datasheet at REED1155_0000104.

The HS switch is turned off and the LS switch is turned on after a time period (T_{on}). This is determined by the Ton Generator (annotated in dark red). The HS switch and the LS switch (annotated in red) are switched on and off based on the difference signal, resulting in the charging of the bootstrap capacitor for V_{BST} .



	A large black rectangular area used for redaction, covering the majority of the right-hand cell. From RS53319 Datasheet at REED1155_0000104. The additional discovery comports with opinions presented formerly, in the FAC, as seen below.
--	--



U.S. Pat. 11,716,024 at Fig. 1 (Assignee: Reed Semiconductor, filed Dec. 29, 2021))

15. The bootstrap refresh control method of claim 12, wherein decreasing the output voltage of the voltage converter by a bootstrap refresh circuit comprising:

The RS53319 performs decreasing the output voltage of the voltage converter by a bootstrap refresh circuit.

See claim 12.

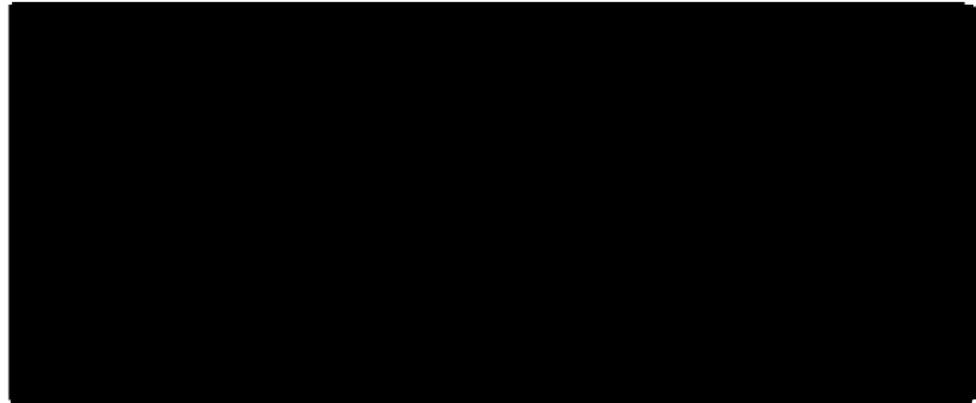
The bootstrap refresh control of RS53319 will decrease the output voltage of the voltage converter by a bootstrap refresh circuit.

RS53319 includes a bootstrap refresh module (as annotated in light green).



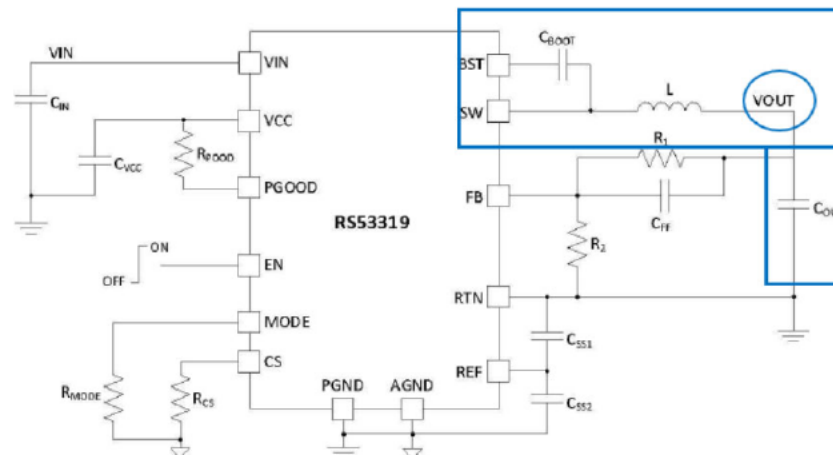
	From RS53319 Datasheet at REED1155_0000104. During Prebias Startup, when V_{BST} is lower than the threshold voltage (2.3V), the LS switch is turned on to charge the bootstrap capacitor (C_{BT}), and the output voltage V_{OUT} is decreased. From RS53319 Datasheet at REED115_0000108. When the V_{FB} is smaller than the reference voltage signal (V_{ref}) generated by the Soft-start and Ref Circuit, RS53319 is configured to control the HS switch and the LS switch to switch on and off based
--	---

on the difference signal. This will charge the C_{BT} for V_{BST} .

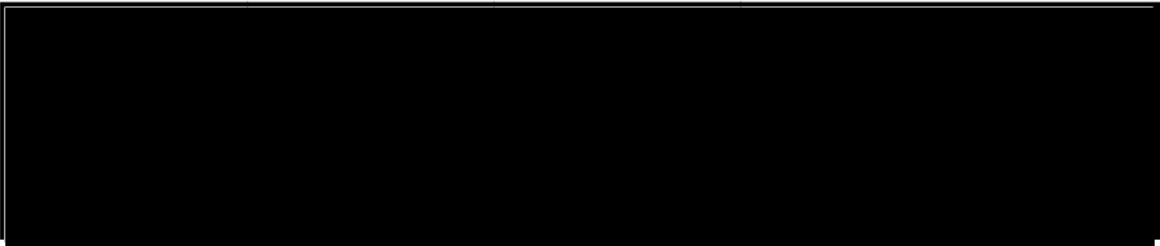


From RS53319 Datasheet at REED1155_0000107.

The result of the limitation (i.e. decreasing the output voltage) is illustrated below in dark blue.



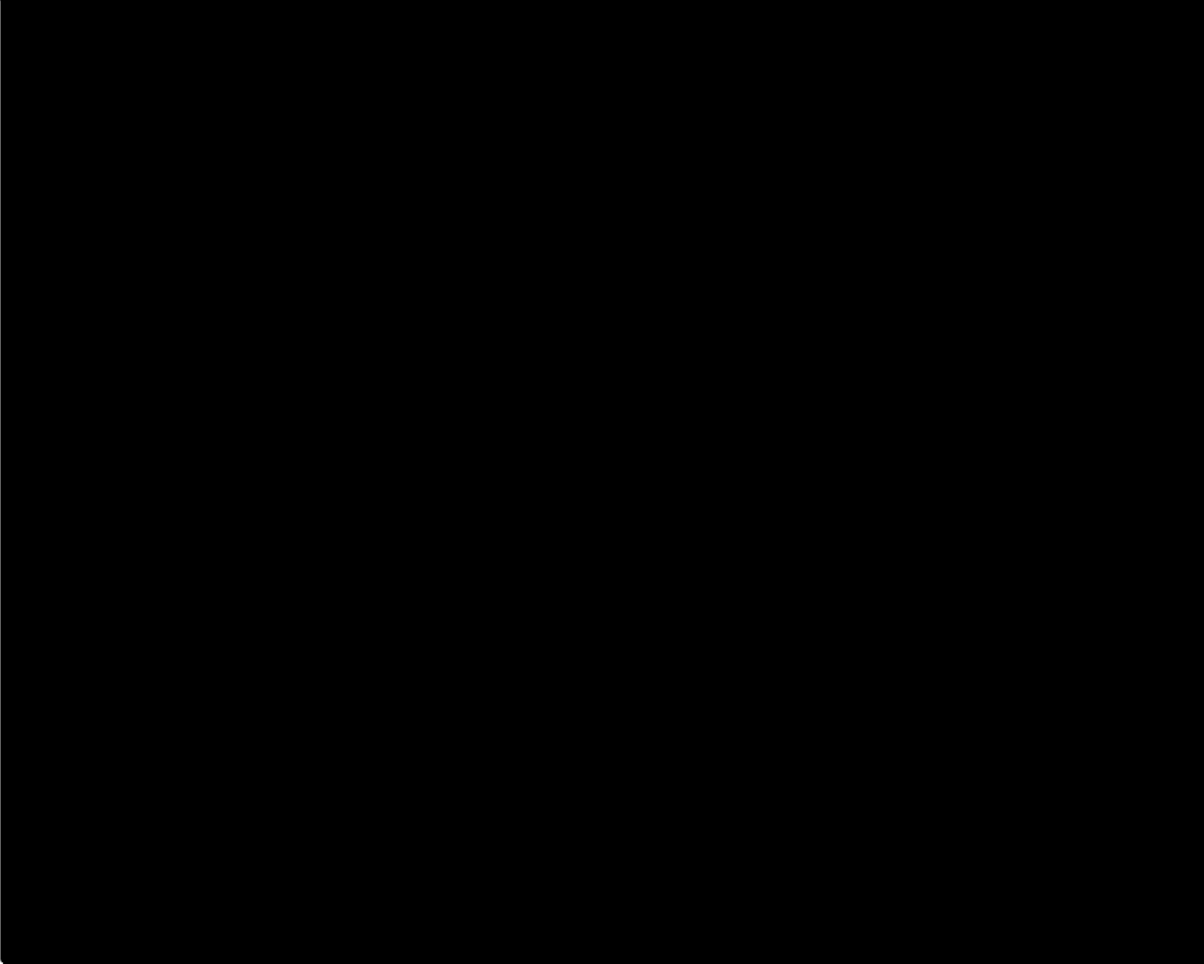


	From RS53319 Datasheet at REED1155_0000035 and REED1155_0000092.
<u>15a.</u> providing a Constant On Time control signal to set a constant on time for the low side switch, wherein the Constant On Time control signal has a first logic state and a second logic state, and wherein the Constant On Time control signal has the first logic state during the constant on time, and wherein the Constant On Time control signal has the second logic state beyond the constant on time;	The RS53319 provides a Constant On Time control signal to set a constant on time for the low side switch, wherein the Constant On Time control signal has a first logic state and a second logic state, and wherein the Constant On Time control signal has the first logic state during the constant on time, and wherein the Constant On Time control signal has the second logic state beyond the constant on time. The bootstrap refresh module of RS53319 includes a Constant On Time (COT) circuit configured to provide a COT control signal with a first logic state and a second logic state. The COT circuit sets a COT for the LS switch during constant on time and the COT control signal for the second logic state is beyond the constant on time.  From RS53319 Datasheet at REED1155_0000104.
<u>15b.</u> providing a bootstrap refresh signal based on the first comparing signal and the constant on time control signal, wherein the bootstrap refresh signal has a first logic state and a second logic state, and wherein the bootstrap refresh signal has the first logic state when the first comparing signal has the first logic state, and wherein the bootstrap refresh signal has the second logic state when the Constant On Time control signal has the second logic state;	The RS53319 provides a bootstrap refresh signal based on the first comparing signal and the constant on time control signal, wherein the bootstrap refresh signal has a first logic state and a second logic state, and wherein the bootstrap refresh signal has the first logic state when the first comparing signal has the first logic state, and wherein the bootstrap refresh signal has the second logic state when the Constant On Time control signal has the second logic state. The bootstrap refresh module of RS53319 includes a first logic module, with a first input terminal, a second input terminal, and an output terminal.



signal has the second logic state when the Constant On Time control signal has the second logic state;	The first input terminal of the first logic module is configured to receive the first comparing signal from the comparing module and the second input terminal of the first logic module is configured to receive the COT control signal. The first logic module is further configured to conduct a logic operation to the first comparing signal and the COT control signal. The bootstrap refresh signal with a first logic state and a second logic state is produced at the output terminal of the first logic module.
--	---

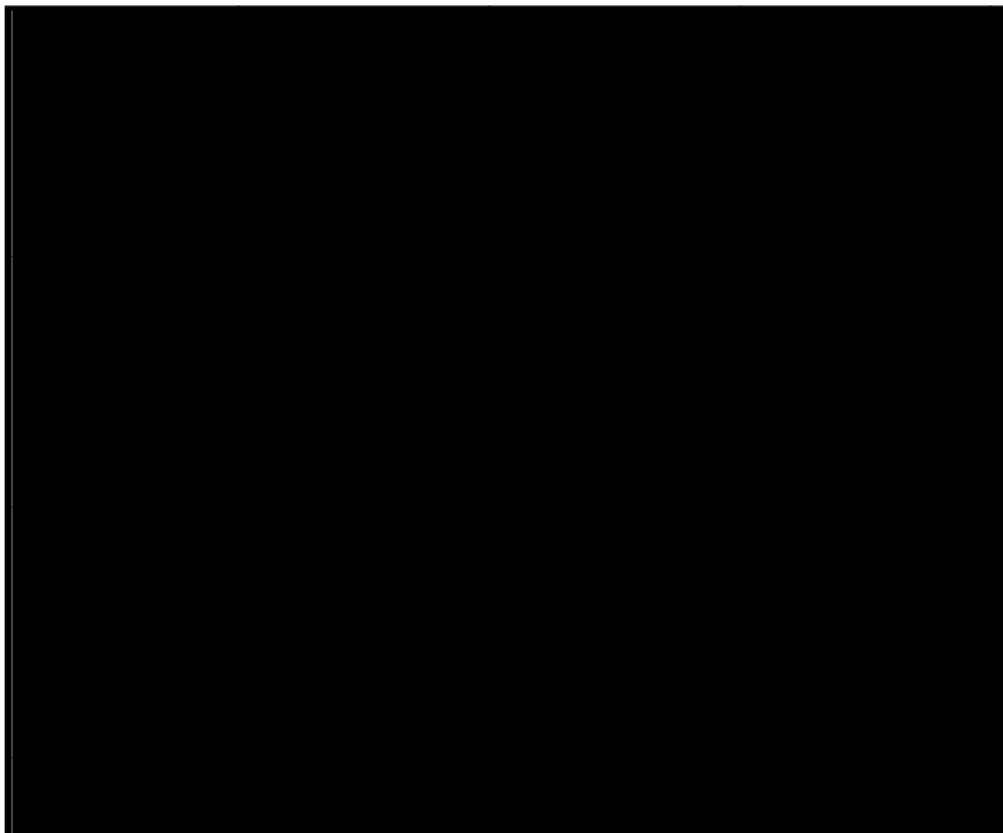


	 Schematic from REED1155_0002194.
<u>15c.</u> and switching the low side switch on and off based on the bootstrap	The RS53319 switches the low side switch on and off based on the bootstrap refresh signal so as to decrease the output voltage.



refresh signal so as to decrease the output voltage;

The bootstrap refresh signal has a first logic state and a second logic state to control the low side switch to switch on and off.



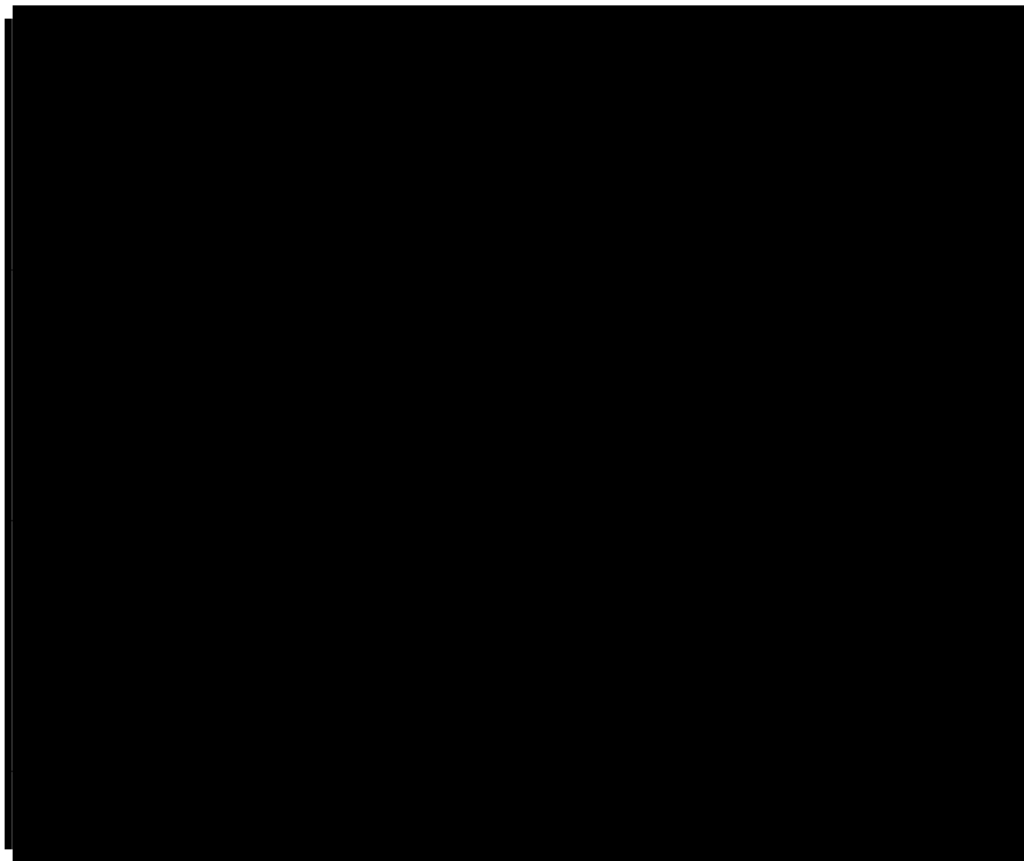
Schematic from REED1155_0002193.



15c. and wherein the low side switch is switched on in response to the first logic state of the bootstrap refresh signal;

In the RS53319, the low side switch is switched on in response to the first logic state of the bootstrap refresh signal.

The bootstrap refresh signal has a first logic state and a second logic state. When the first comparing signal has a first logic state, the low-side switch is turned on.



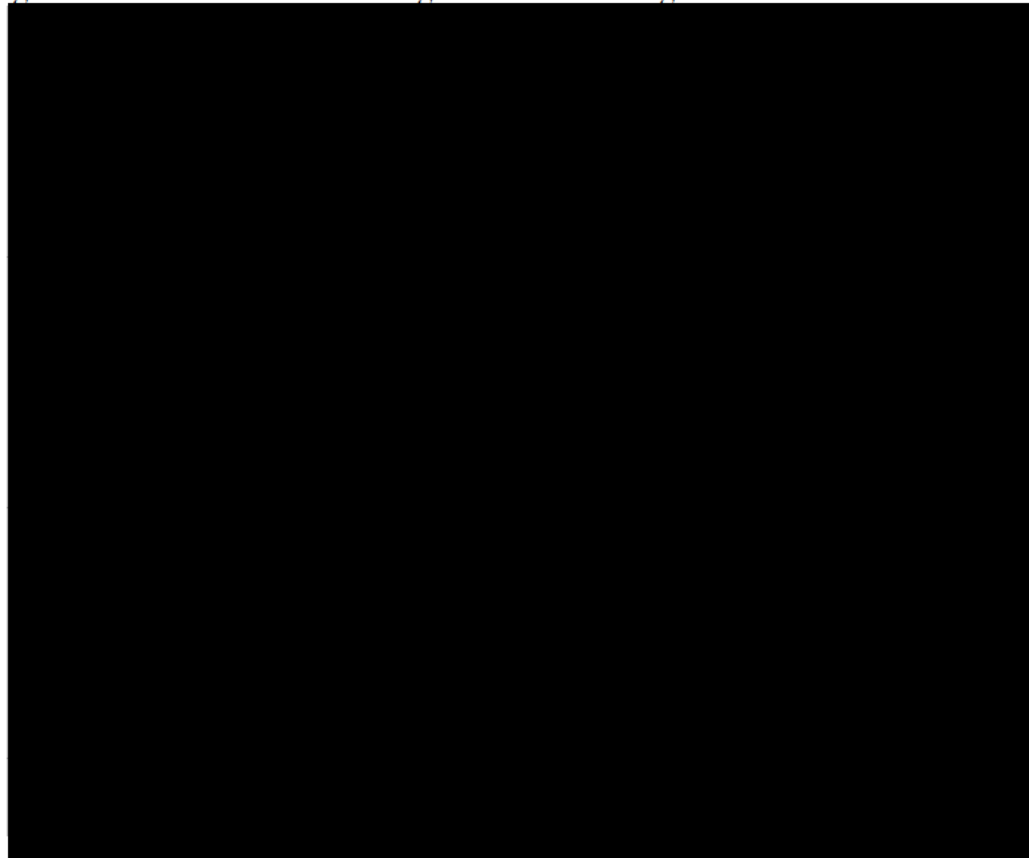
Schematic from REED1155_0002193.



15c. and wherein the low side switch is switched off in response to the second logic state of the bootstrap refresh signal.

In the RS53319, the low side switch is switched off in response to the second logic state of the bootstrap refresh signal.

The bootstrap refresh signal has a first logic state and a second logic state. When the first comparing signal has a first logic state, the LS switch is turned on. The bootstrap refresh signal has a second logic state when the COT control signal has a second logic state and turned the LS switch off.

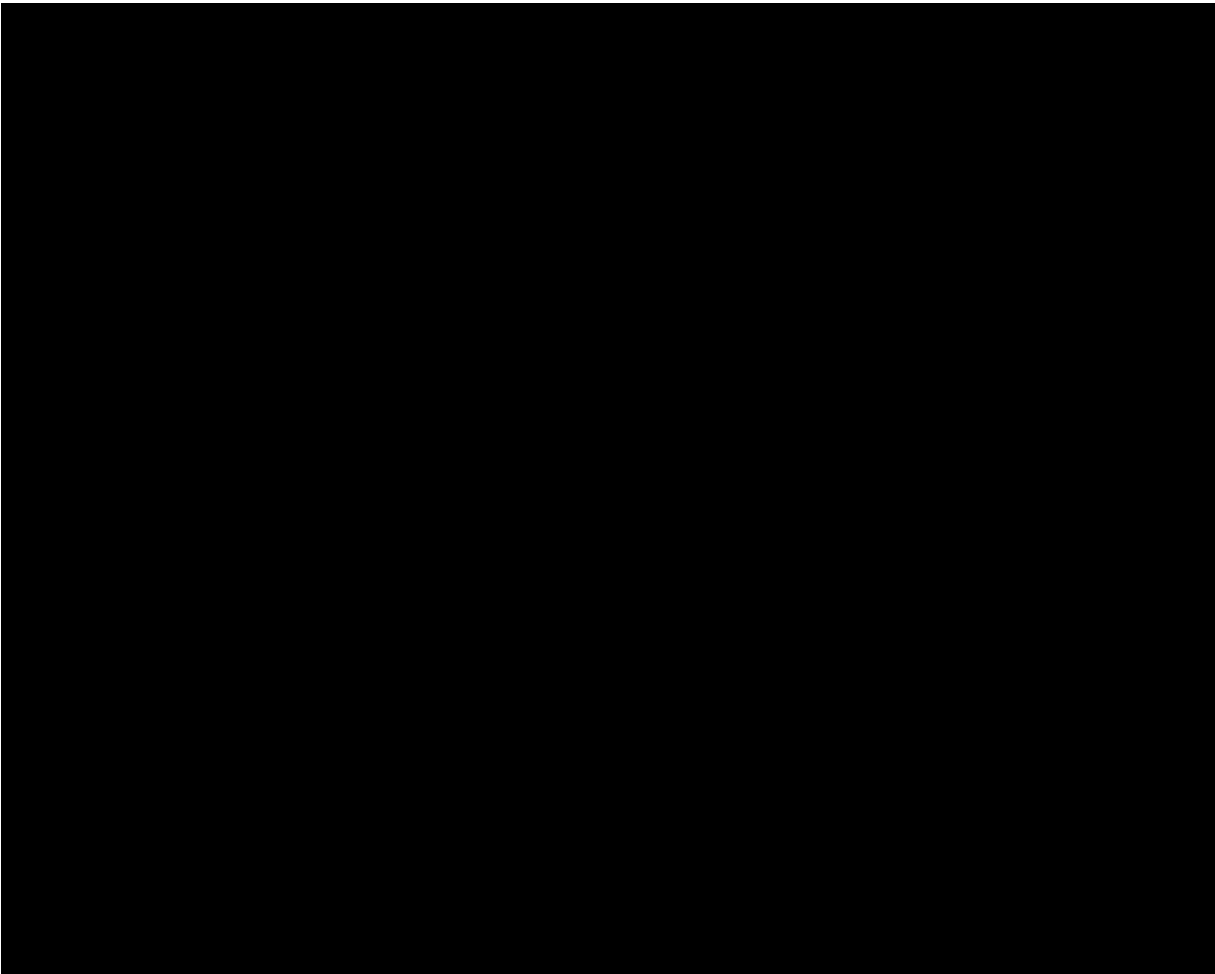


Schematic from REED1155_0002193.



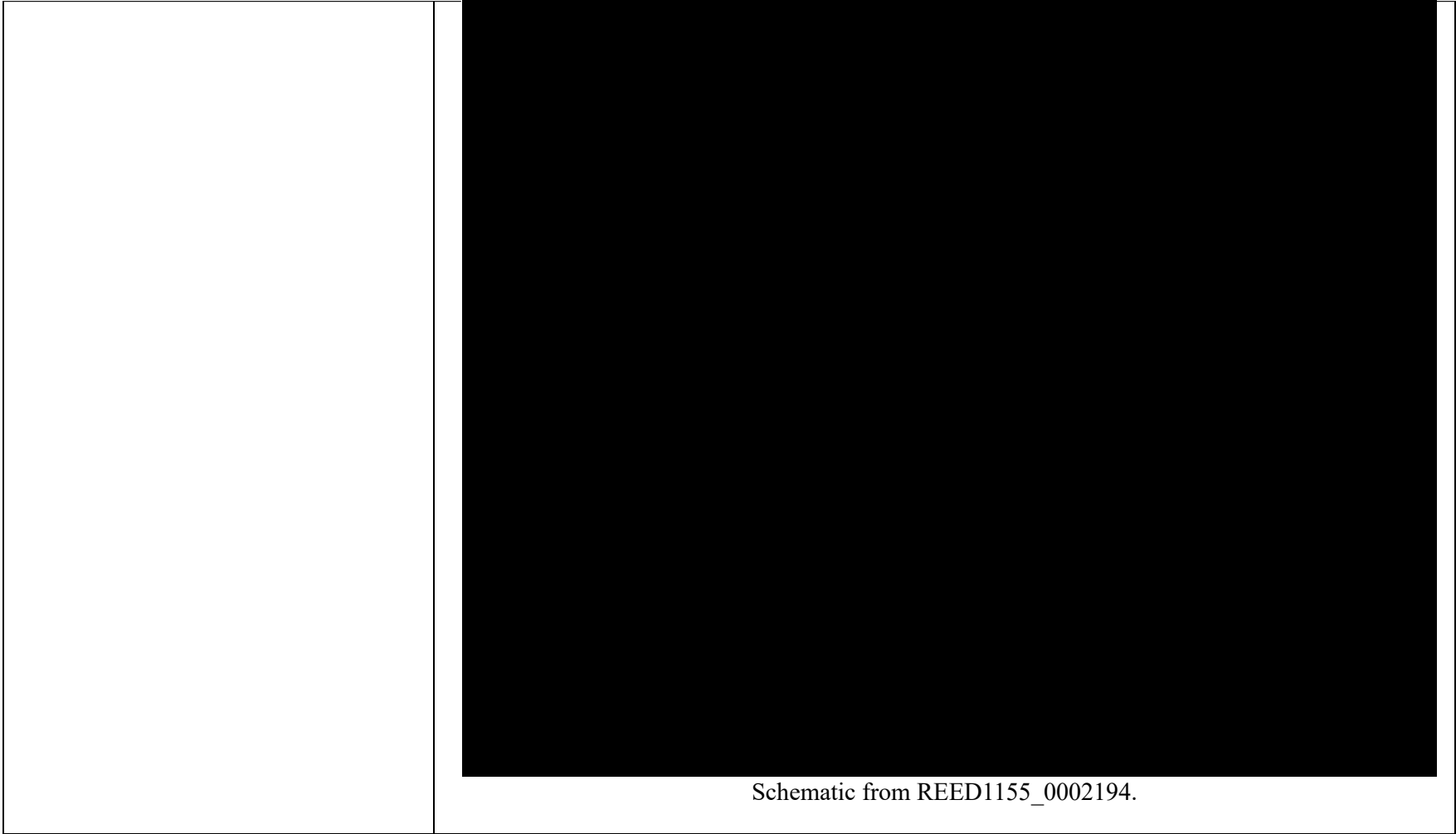
16. The bootstrap refresh control circuit of claim 12, wherein the bootstrap refresh threshold comprises a first threshold and a second threshold, and wherein the first threshold is higher than a ground potential and lower than the second threshold;	The bootstrap refresh control circuit of the RS53319 comprises a first threshold and a second threshold, and wherein the first threshold is higher than a ground potential and lower than the second threshold. <i>See claim 12.</i> The RS53319 has a bootstrap refresh module (annotated in light green below) that includes the Ton Generator and Boot Regulation circuitry. The Boot regulation circuitry is internal (within RS53319) as part of the bootstrap refresh module. From RS53319 Datasheet at REED1155_0000104. The bootstrap refresh module in RS53319 has a first comparing module with a bootstrap refresh
---	--



	threshold, comprising of a first threshold voltage and a second threshold voltage (<i>see</i> REED1155_0002194). The bootstrap refresh module is further configured with the first threshold voltage being higher than a ground potential and lower than the second threshold voltage.  A large black rectangular area covering the majority of the right-hand column, indicating that the content has been redacted.
--	---



	Schematic from REED1155_0002194.
<u>16b.</u> and wherein the first comparing signal has the first logic state when the bootstrap voltage signal is lower than the first threshold, and wherein the first comparing signal has the second logic state when the bootstrap voltage signal is higher than the second threshold.	In the RS53319, the first comparing signal has the first logic state when the bootstrap voltage signal is lower than the first threshold, and wherein the first comparing signal has the second logic state when the bootstrap voltage signal is higher than the second threshold The comparing module (<i>see</i> REED1155_0002194) in the bootstrap refresh module of RS53319 includes a hysteresis comparator, where there is a first comparing signal with a first logic state when V_{BST} is lower than a first threshold voltage. Further the first comparing signal also has a second logic state where V_{BST} is larger than the second threshold voltage.



Schematic from REED1155_0002194.



	A large black rectangular redaction box covering the main content of the table cell. From RS53319 Datasheet at REED1155_0000104.
--	---