

ROYAL BANK OF CANADA  
Form 424B2  
July 23, 2018

RBC Capital Markets® Filed Pursuant to Rule 424(b)(2)  
Registration Statement No. 333-208507

Pricing Supplement  
Dated July 20, 2018 \$1,500,000  
To the Product Auto-Callable Contingent Coupon Barrier Notes  
Prospectus Supplement Linked to the Lesser Performing of Three Equity  
No. TP-1, the Prospectus Securities, Due July 23, 2020  
Supplement and the Royal Bank of Canada  
Prospectus, Each Dated  
January 8, 2016

Royal Bank of Canada is offering Auto-Callable Contingent Coupon Barrier Notes (the “Notes”) linked to the lesser performing of three equity securities (each, a “Reference Stock” and collectively, the “Reference Stocks”). The Notes offered are senior unsecured obligations of Royal Bank of Canada, will pay a quarterly Contingent Coupon at the rate and under the circumstances specified below, and will have the terms described in the documents described above, as supplemented or modified by this pricing supplement.

Reference Stocks and Reference Stock Issuers	Initial Stock Prices	Coupon Barriers and Trigger Prices*
Apple Inc. (“AAPL”)	\$191.44	\$124.44, which is 65% of its Initial Stock Price
Broadcom Inc. (“AVGO”)	\$210.33	\$136.71, which is 65% of its Initial Stock Price
Alphabet Inc. (“GOOGL”)	\$1,197.88	\$778.62, which is 65% of its Initial Stock Price

\* Rounded to two decimal places.

The Notes do not guarantee any return of principal at maturity. Any payments on the Notes are subject to our credit risk.

Investing in the Notes involves a number of risks. See “Risk Factors” beginning on page PS-5 of the product prospectus supplement dated January 8, 2016, on page S-1 of the prospectus supplement dated January 8, 2016, and “Selected Risk Considerations” beginning on page P-8 of this pricing supplement.

The Notes will not constitute deposits insured by the Canada Deposit Insurance Corporation, the U.S. Federal Deposit Insurance Corporation or any other Canadian or U.S. government agency or instrumentality.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of the Notes or determined that this pricing supplement is truthful or complete. Any representation to the contrary is a criminal offense.

Issuer:	Royal Bank of Canada	Stock Exchange Listing:	None
Trade Date:	July 20, 2018	Principal Amount:	\$1,000 per Note
Issue Date:	July 25, 2018	Maturity Date:	July 23, 2020
Observation Dates:	Quarterly, as set forth below.	Coupon Payment Dates:	Quarterly, as set forth below
Valuation Date:	July 20, 2020	Contingent Coupon Rate:	11.10% per annum
Contingent Coupon:	If the closing price of each Reference Stock is greater than or equal to its Coupon Barrier on the applicable Observation Date, we will pay the		

Contingent Coupon applicable to the corresponding Observation Date. You may not receive any Contingent Coupons during the term of the Notes.

If the Notes are not previously called, we will pay you at maturity an amount based on the Final Stock Price of the Lesser Performing Reference Stock: For each \$1,000 in principal amount, \$1,000 plus the Contingent Coupon at maturity, unless the Final Stock Price of the Lesser Performing Reference Stock is less than its Trigger Price.

Payment at Maturity (if held to maturity):

If the Final Stock Price of the Lesser Performing Reference Stock is less than its Trigger Price, then the investor will receive at maturity, for each \$1,000 in principal amount, a cash payment equal to:

$\$1,000 + (\$1,000 \times \text{Reference Stock Return of the Lesser Performing Reference Stock})$

Investors in the Notes could lose some or all of their principal amount if the Final Stock Price of the Lesser Performing Reference Stock is below its Trigger Price.

Lesser Performing Reference Stock:

The Reference Stock with the lowest Reference Stock Return.

Call Feature:

If the closing price of each Reference Stock is greater than or equal to its Initial Stock Price starting on October 22, 2018 and on any Observation Date thereafter, the Notes will be automatically called for 100% of their principal amount, plus the Contingent Coupon applicable to the corresponding Observation Date.

Call Settlement Dates:

The Coupon Payment Date corresponding to that Observation Date.

Final Stock Price:

For each Reference Stock, its closing price on the Valuation Date.

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	Per Note	Total
Price to public <sup>(1)</sup>	100.00%	\$1,500,000.00
Underwriting discounts and commissions <sup>(1)</sup>	2.25%	\$33,750.00
Proceeds to Royal Bank of Canada	97.75%	\$1,466,250.00

<sup>(1)</sup>Certain dealers who purchased the Notes for sale to certain fee-based advisory accounts may have foregone some or all of their underwriting discount or selling concessions. The public offering price for investors purchasing the Notes in these accounts may be between \$977.50 and \$1,000 per \$1,000 in principal amount.

The initial estimated value of the Notes as of the date of this pricing supplement is \$961.68 per \$1,000 in principal amount, which is less than the price to public. The actual value of the Notes at any time will reflect many factors, cannot be predicted with accuracy, and may be less than this amount. We describe our determination of the initial estimated value in more detail below.

RBC Capital Markets, LLC, which we refer to as RBCCM, acting as agent for Royal Bank of Canada, received a commission of \$22.50 per \$1,000 in principal amount of the Notes and used a portion of that commission to allow selling concessions to other dealers of up to \$22.50 per \$1,000 in principal amount of the Notes. The other dealers may forgo, in their sole discretion, some or all of their selling concessions. See "Supplemental Plan of Distribution (Conflicts of Interest)" below.

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Auto-Callable Contingent Coupon Barrier Notes  
 Linked to the Lesser Performing of Three  
 Equity Securities, Due July 23, 2020  
 Royal Bank of Canada

**SUMMARY**

The information in this “Summary” section is qualified by the more detailed information set forth in this pricing supplement, the product prospectus supplement, the prospectus supplement, and the prospectus.

General:	This pricing supplement relates to an offering of Auto-Callable Contingent Coupon Barrier Notes (the “Notes”) linked to the lesser performing of three equity securities (the “Reference Stocks”).
Issuer:	Royal Bank of Canada (“Royal Bank”)
Issue:	Senior Global Medium-Term Notes, Series G
Trade Date:	July 20, 2018
Issue Date:	July 25, 2018
Term:	Two (2) years
Denominations:	Minimum denomination of \$1,000, and integral multiples of \$1,000 thereafter.
Designated Currency:	U.S. Dollars
Contingent Coupon:	<p>We will pay you a Contingent Coupon during the term of the Notes, periodically in arrears on each Coupon Payment Date, under the conditions described below:</p> <ul style="list-style-type: none"> <li>· If the closing price of each Reference Stock is greater than or equal to its Coupon Barrier on the applicable Observation Date, we will pay the Contingent Coupon applicable to that Observation Date.</li> <li>· If the closing price of any of the Reference Stocks is less than its Coupon Barrier on the applicable Observation Date, we will not pay you the Contingent Coupon applicable to that Observation Date.</li> </ul> <p>You may not receive a Contingent Coupon for one or more quarterly periods during the term of the Notes.</p>
Contingent Coupon Rate:	11.10% per annum (2.775% per quarter).
Observation Dates:	Quarterly on October 22, 2018, January 22, 2019, April 22, 2019, July 22, 2019, October 21, 2019, January 21, 2020, April 20, 2020 and the Valuation Date.
Coupon Payment Dates:	The Contingent Coupon, if applicable, will be paid quarterly on October 25, 2018, January 25, 2019, April 25, 2019, July 25, 2019, October 24, 2019, January 24, 2020, April 23, 2020 and the Maturity Date.
Record Dates:	The record date for each Coupon Payment Date will be the date one business day prior to that scheduled Coupon Payment Date; provided, however, that any Contingent Coupon payable at maturity or upon a call will be payable to the person to whom the payment at maturity or upon the call, as the case may be, will be payable.

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Call Feature:	If, starting on October 22, 2018 and on any Observation Date thereafter, the closing price of each Reference Stock is greater than or equal to its Initial Stock Price, then the Notes will be automatically called.
Payment if Called:	If the Notes are automatically called, then, on the applicable Call Settlement Date, for each \$1,000 principal amount, you will receive \$1,000 plus the Contingent Coupon otherwise due on that Call Settlement Date.
Call Settlement Dates:	If the Notes are called on any Observation Date starting on October 22, 2018 or thereafter, the Call Settlement Date will be the Coupon Payment Date corresponding to that Observation Date.
Valuation Date:	July 20, 2020
Maturity Date:	July 23, 2020

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Initial Stock Price:	For each Reference Stock, its closing price on the Trade Date, as specified on the cover page of this pricing supplement.
Final Stock Price:	For each Reference Stock, its closing price on the Valuation Date.
Trigger Price and Coupon Barrier:	For each Reference Stock, 65.00% of its Initial Stock Price, as specified on the cover page of this pricing supplement.
Payment at Maturity (if not previously called and held to maturity):	<p>If the Notes are not previously called, we will pay you at maturity an amount based on the Final Stock Price of the Lesser Performing Reference Stock:</p> <ul style="list-style-type: none"> <li>· If the Final Stock Price of the Lesser Performing Reference Stock is greater than or equal to its Trigger Price, we will pay you a cash payment equal to the principal amount plus the Contingent Coupon otherwise due on the Maturity Date.</li> <li>· If the Final Stock Price of the Lesser Performing Reference Stock is below its Trigger Price, you will receive at maturity, for each \$1,000 in principal amount, a cash payment equal to:  <math>\\$1,000 + (\\$1,000 \times \text{Reference Stock Return of the Lesser Performing Reference Stock})</math>                      The amount of cash that you receive will be less than your principal amount, if anything, resulting in a loss that is proportionate to the decline of the Lesser Performing Reference Stock from the Trade Date to the Valuation Date. Investors in the Notes will lose some or all of their principal amount if the Final Stock Price of the Lesser Performing Reference Stock is less than its Trigger Price.</li> </ul>
Stock Settlement:	Not applicable. Payments on the Notes will be made solely in cash.
Reference Stock Return:	With respect to each Reference Stock: $\frac{\text{Final Stock Price} - \text{Initial Stock Price}}{\text{Initial Stock Price}}$
Lesser Performing Reference Stock:	The Reference Stock with the lowest Reference Stock Return.
Market Disruption Events:	The occurrence of a market disruption event (or a non-trading day) as to any of the Reference Stocks will result in the postponement of an Observation Date or the Valuation Date as to that Reference Stock, as described in the product prospectus supplement, but not to any non-affected Reference Stock.
Calculation Agent:	RBC Capital Markets, LLC (“RBCCM”)

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U.S. Tax Treatment:	By purchasing a Note, each holder agrees (in the absence of a change in law, an administrative determination or a judicial ruling to the contrary) to treat the Notes as a callable pre-paid cash-settled contingent income-bearing derivative contract linked to the Reference Stocks for U.S. federal income tax purposes. However, the U.S. federal income tax consequences of your investment in the Notes are uncertain and the Internal Revenue Service could assert that the Notes should be taxed in a manner that is different from that described in the preceding sentence. Please see the section below, “Supplemental Discussion of U.S. Federal Income Tax Consequences,” and the discussion (including the opinion of our counsel Morrison & Foerster LLP) in the product prospectus supplement dated January 8, 2016 under “Supplemental Discussion of U.S. Federal Income Tax Consequences,” which apply to the Notes.
Secondary Market:	RBCCM (or one of its affiliates), though not obligated to do so, may maintain a secondary market in the Notes after the Issue Date. The amount that you may receive upon sale of your Notes prior to maturity may be less than the principal amount.
Listing:	The Notes will not be listed on any securities exchange.
Settlement:	DTC global (including through its indirect participants Euroclear and Clearstream, Luxembourg as described under “Description of Debt Securities—Ownership and Book-Entry Issuance” in the prospectus dated January 8, 2016).

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Terms  
Incorporated in  
the Master  
Note:

All of the terms appearing above the item captioned “Secondary Market” on the cover page and pages P-2 and P-3 of this pricing supplement and the terms appearing under the caption “General Terms of the Notes” in the product prospectus supplement dated January 8, 2016, as modified by this pricing supplement. In addition to those terms, the following two sentences are also so incorporated into the master note: RBC confirms that it fully understands and is able to calculate the effective annual rate of interest applicable to the Notes based on the methodology for calculating per annum rates provided for in the Notes. RBC irrevocably agrees not to plead or assert Section 4 of the Interest Act (Canada), whether by way of defense or otherwise, in any proceeding relating to the Notes.

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#### ADDITIONAL TERMS OF YOUR NOTES

You should read this pricing supplement together with the prospectus dated January 8, 2016, as supplemented by the prospectus supplement dated January 8, 2016 and the product prospectus supplement dated January 8, 2016, relating to our Senior Global Medium-Term Notes, Series G, of which these Notes are a part. Capitalized terms used but not defined in this pricing supplement will have the meanings given to them in the product prospectus supplement. In the event of any conflict, this pricing supplement will control. The Notes vary from the terms described in the product prospectus supplement in several important ways. You should read this pricing supplement carefully.

This pricing supplement, together with the documents listed below, contains the terms of the Notes and supersedes all prior or contemporaneous oral statements as well as any other written materials including preliminary or indicative pricing terms, correspondence, trade ideas, structures for implementation, sample structures, brochures or other educational materials of ours. You should carefully consider, among other things, the matters set forth in “Risk Factors” in the prospectus supplement dated January 8, 2016 and in the product prospectus supplement dated January 8, 2016, as the Notes involve risks not associated with conventional debt securities. We urge you to consult your investment, legal, tax, accounting and other advisors before you invest in the Notes. You may access these documents on the Securities and Exchange Commission (the “SEC”) website at [www.sec.gov](http://www.sec.gov) as follows (or if that address has changed, by reviewing our filings for the relevant date on the SEC website):

Prospectus dated January 8, 2016:

<http://www.sec.gov/Archives/edgar/data/1000275/000121465916008810/j18160424b3.htm>

Prospectus Supplement dated January 8, 2016:

<http://www.sec.gov/Archives/edgar/data/1000275/000121465916008811/p14150424b3.htm>

Product Prospectus Supplement dated January 8, 2016:

<https://www.sec.gov/Archives/edgar/data/1000275/000114036116047446/form424b5.htm>

Our Central Index Key, or CIK, on the SEC website is 1000275. As used in this pricing supplement, “we,” “us,” or “our” refers to Royal Bank of Canada.

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#### HYPOTHETICAL EXAMPLES

The table set out below is included for illustration purposes only. The table illustrates the Payment at Maturity of the Notes (including the final Contingent Coupon, if payable) for a hypothetical range of performance for the Lesser Performing Reference Stock, assuming the following terms and that the Notes are not automatically called prior to maturity:

Hypothetical Initial Stock Price:	\$100.00*
Hypothetical Trigger Price and Coupon Barrier:	\$65.00, which is 65.00% of the hypothetical Initial Stock Price
Contingent Coupon Rate:	11.10% per annum (or 2.775% per quarter)
Contingent Coupon Amount:	\$27.75 per quarter
Observation Dates:	Quarterly
Principal Amount:	\$1,000 per Note

\* The hypothetical Initial Stock Price of \$100 used in the examples below has been chosen for illustrative purposes only and does not represent the actual Initial Stock Price of any Reference Stock. The actual Initial Stock Price for each Reference Stock is set forth on the cover page of this final pricing supplement. We make no representation or warranty as to which of the Reference Stocks will be the Lesser Performing Reference Stock. It is possible that the Final Stock Price of each Reference Stock will be less than its Initial Stock Price.

Hypothetical Final Stock Prices are shown in the first column on the left. The second column shows the Payment at Maturity for a range of Final Stock Prices on the Valuation Date. The third column shows the amount of cash to be paid on the Notes per \$1,000 in principal amount. If the Notes are called prior to maturity, the hypothetical examples below will not be relevant, and you will receive on the applicable Coupon Payment Date, for each \$1,000 principal amount, \$1,000 plus the Contingent Coupon otherwise due on the Notes.

Hypothetical Final Stock Price of the Lesser Performing Reference Stock	Payment at Maturity as Percentage of Principal Amount	Cash Payment Amount per \$1,000 in Principal Amount
\$150.00	102.775%*	\$1,027.75*
\$140.00	102.775%*	\$1,027.75*
\$125.00	102.775%*	\$1,027.75*
\$120.00	102.775%*	\$1,027.75*
\$110.00	102.775%*	\$1,027.75*
\$100.00	102.775%*	\$1,027.75*
\$90.00	102.775%*	\$1,027.75*
\$80.00	102.775%*	\$1,027.75*
\$70.00	102.775%*	\$1,027.75*
\$65.00	102.775%*	\$1,027.75*
\$64.99	64.99%	\$649.90
\$60.00	60.00%	\$600.00
\$50.00	50.00%	\$500.00

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\$40.00	40.00%	\$400.00
\$30.00	30.00%	\$300.00
\$20.00	20.00%	\$200.00
\$10.00	10.00%	\$100.00
\$0.00	0.00%	\$0.00

\*Including the final Contingent Coupon, if payable.

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#### Hypothetical Examples of Amounts Payable at Maturity

The following hypothetical examples illustrate how the payments at maturity set forth in the table above are calculated, assuming the Notes have not been called.

Example 1: The price of the Lesser Performing Reference Stock increases by 25% from the Initial Stock Price of \$100.00 to its Final Stock Price of \$125.00. Because the Final Stock Price of the Lesser Performing Reference Stock is greater than its Trigger Price and its Coupon Barrier, the investor receives at maturity, in addition to the final Contingent Coupon otherwise due on the Notes, a cash payment of \$1,000 per Note, despite the 25% appreciation in the price of the Lesser Performing Reference Stock.

Example 2: The price of the Lesser Performing Reference Stock decreases by 10% from the Initial Stock Price of \$100.00 to its Final Stock Price of \$90.00. Because the Final Stock Price of the Lesser Performing Reference Stock is greater than its Trigger Price and its Coupon Barrier, the investor receives at maturity, in addition to the final Contingent Coupon otherwise due on the Notes, a cash payment of \$1,000 per Note, despite the 10% decline in the price of the Lesser Performing Reference Stock.

Example 3: The price of the Lesser Performing Reference Stock decreases by 65% from the Initial Stock Price of \$100.00 to its Final Stock Price of \$35.00. Because the Final Stock Price of the Lesser Performing Reference Stock is less than its Trigger Price and its Coupon Barrier, the final Contingent Coupon will not be payable on the Maturity Date, and we will pay only \$350.00 for each \$1,000 in the principal amount of the Notes, calculated as follows:  
Principal Amount + (Principal Amount x Reference Stock Return of the Lesser Performing Reference Stock)  
= \$1,000 + (\$1,000 x -65.00%) = \$1,000 - \$650.00 = \$350.00

\* \* \*

The Payments at Maturity shown above are entirely hypothetical; they are based on prices of the Reference Stocks that may not be achieved on the Valuation Date and on assumptions that may prove to be erroneous. The actual market value of your Notes on the Maturity Date or at any other time, including any time you may wish to sell your Notes, may bear little relation to the hypothetical Payments at Maturity shown above, and those amounts should not be viewed as an indication of the financial return on an investment in the Notes.

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#### SELECTED RISK CONSIDERATIONS

An investment in the Notes involves significant risks. Investing in the Notes is not equivalent to investing directly in the Reference Stocks. These risks are explained in more detail in the section “Risk Factors” in the product prospectus supplement. In addition to the risks described in the prospectus supplement and the product prospectus supplement, you should consider the following:

**Principal at Risk** — Investors in the Notes could lose all or a substantial portion of their principal amount if there is a decline in the trading price of the Lesser Performing Reference Stock between the Trade Date and the Valuation Date. If the Notes are not automatically called and the Final Stock Price of the Lesser Performing Reference Stock on the Valuation Date is less than its Trigger Price, the amount of cash that you receive at maturity will represent a loss of your principal that is proportionate to the decline in the closing price of the Lesser Performing Reference Stock from the Trade Date to the Valuation Date. Any Contingent Coupons received on the Notes prior to the Maturity Date may not be sufficient to compensate for any such loss.

**The Notes Are Subject to an Automatic Call** — If on any Observation Date beginning in October 2018, the closing price of each Reference Stock is greater than or equal to its Initial Stock Price, then the Notes will be automatically called. If the Notes are automatically called, then, on the applicable Call Settlement Date, for each \$1,000 in principal amount, you will receive \$1,000 plus the Contingent Coupon otherwise due on the applicable Call Settlement Date. You will not receive any Contingent Coupons after the Call Settlement Date. You may be unable to reinvest your proceeds from the automatic call in an investment with a return that is as high as the return on the Notes would have been if they had not been called.

**You May Not Receive Any Contingent Coupons** — We will not necessarily make any coupon payments on the Notes. If the closing price of any of the Reference Stocks on an Observation Date is less than its Coupon Barrier, we will not pay you the Contingent Coupon applicable to that Observation Date. If the closing price of any of the Reference Stocks is less than its Coupon Barrier on each of the Observation Dates and on the Valuation Date, we will not pay you any Contingent Coupons during the term of, and you will not receive a positive return on your Notes. Generally, this non-payment of the Contingent Coupon coincides with a period of greater risk of principal loss on your Notes. Accordingly, if we do not pay the Contingent Coupon on the Maturity Date, you will also incur a loss of principal, because the Final Stock Price of the Lesser Performing Reference Stock will be less than its Trigger Price.

**The Notes Are Linked to the Lesser Performing Reference Stock, Even if the Other Reference Stocks Perform Better** — If any of the Reference Stocks has a Final Stock Price that is less than its Trigger Price, your return will be linked to the lesser performing of the three Reference Stocks. Even if the Final Stock Prices of the other Reference Stocks have increased compared to their respective Initial Stock Prices, or have experienced a decrease that is less than that of the Lesser Performing Reference Stock, your return will only be determined by reference to the performance of the Lesser Performing Reference Stock, regardless of the performance of the other Reference Stocks. Because each Reference Stock Issuer operates in the technology sector, they may each experience simultaneous and significant declines due to adverse conditions in that industry.

**Your Payment on the Notes Will Be Determined by Reference to Each Reference Stock Individually, Not to a Basket, and the Payment at Maturity Will Be Based on the Performance of the Lesser Performing Reference Stock** — The Payment at Maturity will be determined only by reference to the performance of the Lesser Performing Reference Stock, regardless of the performance of the other Reference Stocks. The Notes are not linked to a weighted basket, in which the risk may be mitigated and diversified among each of the basket components. For example, in the case of notes linked to a weighted basket, the return would depend on the weighted aggregate performance of the basket components reflected as the basket return. As a result, the depreciation of one basket component could be

mitigated by the appreciation of the other basket components, as scaled by the weighting of that basket component. However, in the case of the Notes, the individual performance of each of the Reference Stocks would not be combined, and the depreciation of one Reference Stock would not be mitigated by any appreciation of the other Reference Stocks. Instead, your return will depend solely on the Final Stock Price of the Lesser Performing Reference Stock.

**The Call Feature and the Contingent Coupon Feature Limit Your Potential Return** — The return potential of the Notes is limited to the pre-specified Contingent Coupon Rate, regardless of the appreciation of the Reference Stocks. In addition, the total return on the Notes will vary based on the number of Observation Dates on which the Contingent Coupon becomes payable prior to maturity or an automatic call. Further, if the Notes are called due to the Call Feature, you will not receive any Contingent Coupons or any other payment in respect of any Observation Dates after the applicable Call Settlement Date. Since the Notes could be called as early as October 2018, the total return on the Notes could be minimal. If the Notes are not called, you may be subject to the full downside performance of the Lesser

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Performing Reference Stock even though your potential return is limited to the Contingent Coupon Rate. As a result, the return on an investment in the Notes could be less than the return on a direct investment in the Reference Stocks.

**Your Return May Be Lower than the Return on a Conventional Debt Security of Comparable Maturity** — The return that you will receive on the Notes, which could be negative, may be less than the return you could earn on other investments. Even if your return is positive, your return may be less than the return you would earn if you bought a conventional senior interest bearing debt security of Royal Bank.

**Payments on the Notes Are Subject to Our Credit Risk, and Changes in Our Credit Ratings Are Expected to Affect the Market Value of the Notes** — The Notes are our senior unsecured debt securities. As a result, your receipt of any Contingent Coupons, if payable, and the amount due on any relevant payment date is dependent upon our ability to repay its obligations on the applicable payment dates. This will be the case even if the prices of the Reference Stocks increase after the Trade Date. No assurance can be given as to what our financial condition will be during the term of the Notes.

**There May Not Be an Active Trading Market for the Notes-Sales in the Secondary Market May Result in Significant Losses** — There may be little or no secondary market for the Notes. The Notes will not be listed on any securities exchange. RBCCM and our other affiliates may make a market for the Notes; however, they are not required to do so. RBCCM or any other affiliate of ours may stop any market-making activities at any time. Even if a secondary market for the Notes develops, it may not provide significant liquidity or trade at prices advantageous to you. We expect that transaction costs in any secondary market would be high. As a result, the difference between bid and asked prices for your Notes in any secondary market could be substantial.

**The Initial Estimated Value of the Notes Is Less than the Price to the Public** — The initial estimated value set forth on the cover page of this pricing supplement does not represent a minimum price at which we, RBCCM or any of our affiliates would be willing to purchase the Notes in any secondary market (if any exists) at any time. If you attempt to sell the Notes prior to maturity, their market value may be lower than the price you paid for them and the initial estimated value. This is due to, among other things, changes in the prices of the Reference Stocks, the borrowing rate we pay to issue securities of this kind, and the inclusion in the price to the public of the underwriting discount and the estimated costs relating to our hedging of the Notes. These factors, together with various credit, market and economic factors over the term of the Notes, are expected to reduce the price at which you may be able to sell the Notes in any secondary market and will affect the value of the Notes in complex and unpredictable ways. Assuming no change in market conditions or any other relevant factors, the price, if any, at which you may be able to sell your Notes prior to maturity may be less than your original purchase price, as any such sale price would not be expected to include the underwriting discount and the hedging costs relating to the Notes. In addition to bid-ask spreads, the value of the Notes determined by RBCCM for any secondary market price is expected to be based on the secondary rate rather than the internal funding rate used to price the Notes and determine the initial estimated value. As a result, the secondary price will be less than if the internal funding rate was used. The Notes are not designed to be short-term trading instruments. Accordingly, you should be able and willing to hold your Notes to maturity.

**The Initial Estimated Value of the Notes on the Cover Page of this Pricing Supplement Is an Estimate Only, Calculated as of the Time the Terms of the Notes Were Set** — The initial estimated value of the Notes is based on the value of our obligation to make the payments on the Notes, together with the mid-market value of the derivative embedded in the terms of the Notes. See “Structuring the Notes” below. Our estimate is based on a variety of assumptions, including our credit spreads, expectations as to dividends, interest rates and volatility, and the expected term of the Notes. These assumptions are based on certain forecasts about future events, which may prove to be incorrect. Other entities may value the Notes or similar securities at a price that is significantly different than we do.

The value of the Notes at any time after the Trade Date will vary based on many factors, including changes in market conditions, and cannot be predicted with accuracy. As a result, the actual value you would receive if you sold the Notes in any secondary market, if any, should be expected to differ materially from the initial estimated value of your Notes.

**Market Disruption Events and Adjustments** — The payment at maturity, each Observation Date and the Valuation Date are subject to adjustment as described in the product prospectus supplement. For a description of what constitutes a market disruption event as well as the consequences of that market disruption event, see “General Terms of the Notes—Market Disruption Events” in the product prospectus supplement.

**Our Business Activities May Create Conflicts of Interest** — We and our affiliates expect to engage in trading activities related to the Reference Stocks that are not for the account of holders of the Notes or on their behalf. These trading activities may present a conflict between the holders’ interests in the Notes and the interests we and our affiliates will have in their proprietary accounts, in facilitating transactions, including options and other derivatives transactions, for their customers and in accounts under their management. These trading activities, if they influence the share price of the

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Auto-Callable Contingent Coupon Barrier Notes  
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Reference Stocks, could be adverse to the interests of the holders of the Notes. We and one or more of our affiliates may, at present or in the future, engage in business with the Reference Stock Issuers, including making loans to or providing advisory services. These services could include investment banking and merger and acquisition advisory services. These activities may present a conflict between our or one or more of our affiliates' obligations and your interests as a holder of the Notes. Moreover, we and our affiliates may have published, and in the future expect to publish, research reports with respect to the Reference Stocks. This research is modified from time to time without notice and may express opinions or provide recommendations that are inconsistent with purchasing or holding the Notes. Any of these activities by us or one or more of our affiliates may affect the share price of the Reference Stocks, and, therefore, the market value of the Notes.

**Owning the Notes Is Not the Same as Owning the Reference Stocks** — The return on your Notes is unlikely to reflect the return you would realize if you actually owned shares of the Reference Stocks. For instance, you will not receive or be entitled to receive any dividend payments or other distributions on these securities during the term of your Notes. As an owner of the Notes, you will not have voting rights or any other rights that holders of these securities may have. Furthermore, the Reference Stocks may appreciate substantially during the term of the Notes, while your potential return will be limited to the applicable Contingent Coupon payments.

**You Must Rely on Your Own Evaluation of the Merits of an Investment Linked to the Reference Stocks** — In the ordinary course of their business, our affiliates may have expressed views on expected movements in the Reference Stocks, and may do so in the future. These views or reports may be communicated to our clients and clients of our affiliates. However, these views are subject to change from time to time. Moreover, other professionals who transact business in markets relating to any Reference Stock may at any time have significantly different views from those of our affiliates. For these reasons, you are encouraged to derive information concerning the Reference Stocks from multiple sources, and you should not rely solely on views expressed by our affiliates.

**There Is No Affiliation Between the Reference Stock Issuers and RBCCM, and RBCCM Is Not Responsible for any Disclosure by the Reference Stock Issuers** — We are not affiliated with the Reference Stock Issuers. However, we and our affiliates may currently, or from time to time in the future engage, in business with any Reference Stock Issuer. Nevertheless, neither we nor our affiliates assume any responsibilities for the accuracy or the completeness of any information that any other company prepares. You, as an investor in the Notes, should make your own investigation into the Reference Stocks.

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#### INFORMATION REGARDING THE REFERENCE STOCK ISSUERS

The Reference Stocks are registered under the Securities Exchange Act of 1934 (the “Exchange Act”). Companies with securities registered under that Act are required to file periodically certain financial and other information specified by the SEC. Information provided to or filed with the SEC can be inspected and copied at the public reference facilities maintained by the SEC or through the SEC’s website at [www.sec.gov](http://www.sec.gov). In addition, information regarding the Reference Stocks may be obtained from other sources including, but not limited to, press releases, newspaper articles and other publicly disseminated documents.

The following information regarding the Reference Stock Issuers is derived from publicly available information. We have not independently verified the accuracy or completeness of reports filed by the Reference Stock Issuers with the SEC, information published by it on its website or in any other format, information about it obtained from any other source or the information provided below.

We obtained the information regarding the historical performance of the Reference Stocks set forth below from Bloomberg Financial Markets.

We have not independently verified the accuracy or completeness of the information obtained from Bloomberg Financial Markets. The historical performance of the Reference Stocks should not be taken as an indication of their future performance, and no assurance can be given as to the market prices of any Reference Stock at any time during the term of the Notes. We cannot give you assurance that the performance of any Reference Stock will not result in the loss of all or part of your investment.

Apple Inc. (“AAPL”)

Apple Inc. designs, manufactures, and markets personal computers and related personal computing and mobile communication devices along with a variety of related software, services, peripherals, and networking solutions.

The company’s common stock is listed on the Nasdaq Global Select Market under the ticker symbol “AAPL.”

Broadcom Inc. (“AVGO”)

Broadcom Inc. designs, develops, and markets digital and analog semiconductors. The company offers wireless RF components, storage adapters, controllers, networking processors, switches, fiber optic modules, motion control encoders, and optical sensors.

The company’s ordinary shares are listed on the Nasdaq Global Select Market under the ticker symbol “AVGO.”

Alphabet Inc. (“GOOGL”)

Alphabet, Inc. operates as a holding company and is the parent company of Google Inc. (“Google”), The company, through its subsidiaries, provides web-based search, advertisements, maps, software applications, mobile operating systems, consumer content, enterprise solutions, commerce, and hardware products.

The company’s Class A common stock is listed on the Nasdaq Global Select Market under the ticker symbol “GOOGL.”

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#### HISTORICAL INFORMATION

The graphs below set forth the information relating to the historical performance of the Reference Stocks. In addition, below the graphs are tables setting forth the intra-day high, intra-day low and period-end closing prices of the Reference Stocks. The information provided in these tables is for the period from January 1, 2008 through July 20, 2018.

We obtained the information regarding the historical performance of the Reference Stocks in the graphs and tables below from Bloomberg Financial Markets.

We have not independently verified the accuracy or completeness of the information obtained from Bloomberg Financial Markets. The historical performance of any Reference Stock should not be taken as an indication of its future performance, and no assurance can be given as to the prices of the Reference Stocks at any time. We cannot give you assurance that the performance of the Reference Stocks will not result in the loss of all or part of your investment.

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Historical Information for Apple Inc. (“AAPL”)

Below is a table setting forth the intra-day high, intra-day low and period-end closing prices of this Reference Stock. The information provided in the table is for the period from January 1, 2008 through July 20, 2018.

Period-Start Date	Period-End Date	High Intra-Day Price of this Reference Stock (\$)	Low Intra-Day Price of this Reference Stock (\$)	Period-End Closing Price of this Reference Stock (\$)
1/1/2008	3/31/2008	28.60	16.49	20.50
4/1/2008	6/30/2008	27.46	20.65	23.92
7/1/2008	9/30/2008	25.84	14.37	16.24
10/1/2008	12/31/2008	16.63	11.31	12.19
1/1/2009	3/31/2009	15.70	11.17	15.02
4/1/2009	6/30/2009	20.91	14.84	20.35
7/1/2009	9/30/2009	26.98	19.20	26.48
10/1/2009	12/31/2009	30.56	25.82	30.12
1/1/2010	3/31/2010	33.93	27.18	33.56
4/1/2010	6/30/2010	39.86	28.48	35.93
7/1/2010	9/30/2010	42.10	33.65	40.54
10/1/2010	12/31/2010	46.66	39.68	46.08
1/1/2011	3/31/2011	52.13	46.41	49.78
4/1/2011	6/30/2011	50.71	44.38	47.95
7/1/2011	9/30/2011	60.41	47.75	54.45
10/1/2011	12/31/2011	60.96	50.61	57.86
1/1/2012	3/31/2012	88.77	58.43	85.64
4/1/2012	6/30/2012	92.00	75.53	83.43
7/1/2012	9/30/2012	100.72	81.43	95.32
10/1/2012	12/31/2012	96.68	71.61	76.15
1/1/2013	3/31/2013	79.29	59.86	63.23
4/1/2013	6/30/2013	66.53	55.01	56.58
7/1/2013	9/30/2013	73.39	57.32	68.11
10/1/2013	12/31/2013	82.16	68.33	80.16
1/1/2014	3/31/2014	80.02	70.51	76.68
4/1/2014	6/30/2014	95.05	73.05	92.93

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7/1/2014	9/30/2014	103.74	92.57	100.75
10/1/2014	12/31/2014	119.75	95.18	110.38
1/1/2015	3/31/2015	133.60	104.64	124.43
4/1/2015	6/30/2015	134.54	123.10	125.43
7/1/2015	9/30/2015	132.97	92.00	110.30
10/1/2015	12/31/2015	123.81	104.82	105.26
1/1/2016	3/31/2016	110.42	92.40	108.99
4/1/2016	6/30/2016	112.39	89.47	95.60
7/1/2016	9/30/2016	116.17	94.37	113.05
10/1/2016	12/31/2016	118.69	104.09	115.82
1/1/2017	3/31/2017	144.50	114.76	143.66
4/1/2017	6/30/2017	156.64	140.06	144.02
7/1/2017	9/30/2017	164.94	142.41	154.12
10/1/2017	12/31/2017	177.20	152.46	169.23
1/1/2018	3/31/2018	183.49	150.25	167.78
4/1/2018	6/30/2018	194.20	160.63	185.11
7/1/2018	7/20/2018	192.64	183.42	191.44

PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE RESULTS.

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Auto-Callable Contingent Coupon Barrier Notes  
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The graph below illustrates the performance of this Reference Stock from January 1, 2008 to July 20, 2018, reflecting its Initial Stock Price of \$191.44. The red line represents the Coupon Barrier and Trigger Price of \$124.44, which is equal to 65.00% of its Initial Stock Price, rounded to two decimal places.

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Historical Information for Broadcom Inc. (“AVGO”)

Below is a table setting forth the intra-day high, intra-day low and period-end closing prices of this Reference Stock. The information provided in the table is for the period from August 6, 2009 through July 20, 2018.

Period-Start Date	Period-End Date	High Intra-Day Price of this Reference Stock (\$)	Low Intra-Day Price of this Reference Stock (\$)	Period-End Closing Price of this Reference Stock (\$)
8/6/2009	9/30/2009	19.00	15.50	17.07
10/1/2009	12/31/2009	18.29	14.35	18.29
1/1/2010	3/31/2010	20.67	16.50	20.56
4/1/2010	6/30/2010	23.69	18.39	21.06
7/1/2010	9/30/2010	23.13	18.41	22.51
10/1/2010	12/31/2010	28.94	21.55	28.47
1/1/2011	3/31/2011	34.60	26.97	31.10
4/1/2011	6/30/2011	38.69	29.96	38.00
7/1/2011	9/30/2011	39.45	26.42	32.77
10/1/2011	12/31/2011	35.96	27.39	28.86
1/1/2012	3/31/2012	39.21	28.02	38.97
4/1/2012	6/30/2012	39.01	29.71	35.90
7/1/2012	9/30/2012	37.88	32.14	34.87
10/1/2012	12/31/2012	35.57	30.51	31.66
1/1/2013	3/31/2013	36.98	32.09	35.92
4/1/2013	6/30/2013	38.86	30.57	37.38
7/1/2013	9/30/2013	43.28	35.75	43.12
10/1/2013	12/31/2013	54.53	41.84	52.89
1/1/2014	3/31/2014	65.82	51.89	64.41
4/1/2014	6/30/2014	72.49	57.30	72.07
7/1/2014	9/30/2014	90.88	68.72	87.00
10/1/2014	12/31/2014	105.00	68.76	100.59
1/1/2015	3/31/2015	136.23	95.21	126.98
4/1/2015	6/30/2015	150.49	114.56	132.93
7/1/2015	9/30/2015	137.75	100.00	125.01
10/1/2015	12/31/2015	149.71	111.54	145.15

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1/1/2016	3/31/2016	157.37	114.25	154.50
4/1/2016	6/30/2016	165.98	139.23	155.40
7/1/2016	9/30/2016	179.40	147.16	172.52
10/1/2016	12/31/2016	183.98	160.65	176.77
1/1/2017	3/31/2017	227.49	173.50	218.96
4/1/2017	6/30/2017	256.78	208.46	233.05
7/1/2017	9/30/2017	259.33	228.22	242.54
10/1/2017	12/31/2017	285.68	237.77	256.90
1/1/2018	3/31/2018	274.26	225.00	235.65
4/1/2018	6/30/2018	271.78	222.00	242.64
7/1/2018	7/20/2018	251.80	197.50	210.33

PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE RESULTS.

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The graph below illustrates the performance of this Reference Stock from January 1, 2008 to July 20, 2018, reflecting its Initial Stock Price of \$210.33. The red line represents the Coupon Barrier and Trigger Price of \$136.71, which is equal to 65.00% of its Initial Stock Price, rounded to two decimal places.

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Historical Information for Alphabet Inc. (“GOOGL”)

Below is a table setting forth the intra-day high, intra-day low and period-end closing prices of this Reference Stock. The information provided in the table is for the period from January 1, 2008 through July 20, 2018.

Period-Start Date	Period-End Date	High Intra-Day Price of this Reference Stock (\$)	Low Intra-Day Price of this Reference Stock (\$)	Period-End Closing Price of this Reference Stock (\$)
1/1/2008	3/31/2008	349.02	206.26	220.45
4/1/2008	6/30/2008	301.52	220.71	263.46
7/1/2008	9/30/2008	278.07	190.57	200.45
10/1/2008	12/31/2008	208.60	123.77	153.97
1/1/2009	3/31/2009	190.69	141.51	174.20
4/1/2009	6/30/2009	223.89	170.47	211.00
7/1/2009	9/30/2009	253.75	198.19	248.17
10/1/2009	12/31/2009	313.25	241.53	310.29
1/1/2010	3/31/2010	315.06	260.25	283.78
4/1/2010	6/30/2010	299.21	222.58	222.69
7/1/2010	9/30/2010	268.64	217.03	263.15
10/1/2010	12/31/2010	315.71	259.68	297.27
1/1/2011	3/31/2011	321.65	275.94	293.39
4/1/2011	6/30/2011	297.88	236.74	253.44
7/1/2011	9/30/2011	314.00	245.67	257.44
10/1/2011	12/31/2011	323.69	240.62	323.26
1/1/2012	3/31/2012	335.45	282.60	320.93
4/1/2012	6/30/2012	326.89	278.55	290.32
7/1/2012	9/30/2012	382.79	281.37	377.62
10/1/2012	12/31/2012	387.54	318.33	355.03
1/1/2013	3/31/2013	422.41	348.10	397.40
4/1/2013	6/30/2013	460.70	381.04	440.61
7/1/2013	9/30/2013	464.45	423.20	438.38
10/1/2013	12/31/2013	561.04	421.90	560.90
1/1/2014	3/31/2014	615.04	542.03	557.79
4/1/2014	6/30/2014	589.60	511.04	584.67

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7/1/2014	9/30/2014	608.85	567.60	588.41
10/1/2014	12/31/2014	592.40	497.22	530.66
1/1/2015	3/31/2015	583.12	491.00	554.70
4/1/2015	6/30/2015	584.60	529.01	540.04
7/1/2015	9/30/2015	713.30	539.80	638.37
10/1/2015	12/31/2015	798.69	631.24	778.01
1/1/2016	3/31/2016	810.21	682.20	762.90
4/1/2016	6/30/2016	790.95	672.71	703.53
7/1/2016	9/30/2016	818.97	699.00	804.06
10/1/2016	12/31/2016	839.00	744.03	792.45
1/1/2017	3/31/2017	874.35	796.89	847.80
4/1/2017	6/30/2017	1,008.46	834.78	929.68
7/1/2017	9/30/2017	1,006.05	915.52	973.72
10/1/2017	12/31/2017	1,086.32	962.11	1,053.40
1/1/2018	3/31/2018	1,197.99	984.00	1,037.14
4/1/2018	6/30/2018	1,201.30	994.82	1,129.19
7/1/2018	7/20/2018	1,221.59	1,107.00	1,197.88

PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE RESULTS.

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The graph below illustrates the performance of this Reference Stock from January 1, 2008 to July 20, 2018, reflecting its Initial Stock Price of \$1,197.88. The red line represents the Coupon Barrier and Trigger Price of \$778.62, which is equal to 65.00% of its Initial Stock Price, rounded to two decimal places.

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#### SUPPLEMENTAL DISCUSSION OF U.S. FEDERAL INCOME TAX CONSEQUENCES

The following disclosure supplements, and to the extent inconsistent supersedes, the discussion in the product prospectus supplement dated January 8, 2016 under “Supplemental Discussion of U.S. Federal Income Tax Consequences.” The discussions below and in the accompanying product prospectus supplement do not address the tax consequences applicable to holders subject to Section 451(b) of the Code.

Under Section 871(m) of the Code, a “dividend equivalent” payment is treated as a dividend from sources within the United States. Such payments generally would be subject to a 30% U.S. withholding tax if paid to a non-U.S. holder. Under U.S. Treasury Department regulations, payments (including deemed payments) with respect to equity-linked instruments (“ELIs”) that are “specified ELIs” may be treated as dividend equivalents if such specified ELIs reference an interest in an “underlying security,” which is generally any interest in an entity taxable as a corporation for U.S. federal income tax purposes if a payment with respect to such interest could give rise to a U.S. source dividend. However, the IRS has issued guidance that states that the U.S. Treasury Department and the IRS intend to amend the effective dates of the U.S. Treasury Department regulations to provide that withholding on dividend equivalent payments will not apply to specified ELIs that are not delta-one instruments and that are issued before January 1, 2019. Based on our determination that the Notes are not delta-one instruments, non-U.S. holders should not be subject to withholding on dividend equivalent payments, if any, under the Notes. However, it is possible that the Notes could be treated as deemed reissued for U.S. federal income tax purposes upon the occurrence of certain events affecting the Reference Stocks or the Notes, and following such occurrence the Notes could be treated as subject to withholding on dividend equivalent payments. Non-U.S. holders that enter, or have entered, into other transactions in respect of the Reference Stocks or the Notes should consult their tax advisors as to the application of the dividend equivalent withholding tax in the context of the Notes and their other transactions. If any payments are treated as dividend equivalents subject to withholding, we (or the applicable withholding agent) would be entitled to withhold taxes without being required to pay any additional amounts with respect to amounts so withheld.

#### SUPPLEMENTAL PLAN OF DISTRIBUTION (CONFLICTS OF INTEREST)

Delivery of the Notes will be made against payment for the Notes on July 25, 2018, which is the third (3rd) business day following the Trade Date (this settlement cycle being referred to as “T+3”). See “Plan of Distribution” in the prospectus dated January 8, 2016. For additional information as to the relationship between us and RBCCM, please see the section “Plan of Distribution—Conflicts of Interest” in the prospectus dated January 8, 2016.

We will deliver the Notes on a date that is greater than two business days following the Trade Date. Under Rule 15c6-1 of the Exchange Act, trades in the secondary market generally are required to settle in two business days, unless the parties to any such trade expressly agree otherwise. Accordingly, purchasers who wish to trade the Notes more than two business days prior to the original issue date will be required to specify alternative arrangements to prevent a failed settlement.

In the initial offering of the Notes, they will be offered to investors at a purchase price equal to par, except with respect to certain accounts as indicated on the cover page of this document.

The value of the Notes shown on your account statement may be based on RBCCM’s estimate of the value of the Notes if RBCCM or another of our affiliates were to make a market in the Notes (which it is not obligated to do). That estimate will be based upon the price that RBCCM may pay for the Notes in light of then prevailing market conditions, our creditworthiness and transaction costs. For a period of approximately three months after the issue date of the Notes, the value of the Notes that may be shown on your account statement may be higher than RBCCM’s estimated value of the Notes at that time. This is because the estimated value of the Notes will not include the

underwriting discount and our hedging costs and profits; however, the value of the Notes shown on your account statement during that period may initially be a higher amount, reflecting the addition of RBCCM's underwriting discount and our estimated costs and profits from hedging the Notes. This excess is expected to decrease over time until the end of this period. After this period, if RBCCM repurchases your Notes, it expects to do so at prices that reflect their estimated value.

We may use this pricing supplement in the initial sale of the Notes. In addition, RBCCM or another of our affiliates may use this pricing supplement in a market-making transaction in the Notes after their initial sale. Unless we or our agent informs the purchaser otherwise in the confirmation of sale, this pricing supplement is being used in a market-making transaction.

No Prospectus (as defined in Directive 2003/71/EC (as amended, the "Prospectus Directive")) will be prepared in connection with the Notes. Accordingly, the Notes may not be offered to the public in any member state of the European Economic Area (the "EEA"), and any purchaser of the Notes who subsequently sells any of the Notes in any EEA member state must do so only in accordance with the requirements of the Prospectus Directive, as implemented in that member state.

The Notes are not intended to be offered, sold or otherwise made available to, and should not be offered, sold or otherwise made available to, any retail investor in the EEA. For these purposes, the expression "offer" includes the communication in any form and by any means of sufficient information on the terms of the offer and the Notes to be offered so as to enable an investor to decide to purchase or subscribe the Notes, and a "retail investor" means a person who is one (or more) of: (a) a retail client, as defined in point

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(11) of Article 4(1) of Directive 2014/65/EU (as amended, “MiFID II”); or (b) a customer, within the meaning of Insurance Distribution Directive 2016/97/EU, as amended, where that customer would not qualify as a professional client as defined in point (10) of Article 4(1) of MiFID II; or (c) not a qualified investor as defined in the Prospectus Directive. Consequently, no key information document required by Regulation (EU) No 1286/2014 (as amended, the “PRIIPs Regulation”) for offering or selling the Notes or otherwise making them available to retail investors in the EEA has been prepared, and therefore, offering or selling the Notes or otherwise making them available to any retail investor in the EEA may be unlawful under the PRIIPs Regulation.

#### STRUCTURING THE NOTES

The Notes are our debt securities, the return on which is linked to the performance of the Reference Stocks. As is the case for all of our debt securities, including our structured notes, the economic terms of the Notes reflect our actual or perceived creditworthiness at the time of pricing. In addition, because structured notes result in increased operational, funding and liability management costs to us, we typically borrow the funds under these Notes at a rate that is more favorable to us than the rate that we might pay for a conventional fixed or floating rate debt security of comparable maturity. Using this relatively lower implied borrowing rate rather than the secondary market rate, is a factor that reduced the initial estimated value of the Notes at the time their terms were set. Unlike the estimated value included in this pricing supplement, any value of the Notes determined for purposes of a secondary market transaction may be based on a different funding rate, which may result in a lower value for the Notes than if our initial internal funding rate were used.

In order to satisfy our payment obligations under the Notes, we may choose to enter into certain hedging arrangements (which may include call options, put options or other derivatives) on the issue date with RBCCM or one of our other subsidiaries. The terms of these hedging arrangements take into account a number of factors, including our creditworthiness, interest rate movements, the volatility of the Reference Stocks, and the tenor of the Notes. The economic terms of the Notes and their initial estimated value depend in part on the terms of these hedging arrangements.

The lower implied borrowing rate is a factor that reduced the economic terms of the Notes to you. The initial offering price of the Notes also reflects the underwriting commission and our estimated hedging costs. These factors resulted in the initial estimated value for the Notes on the Trade Date being less than their public offering price. See “Selected Risk Considerations—The Initial Estimated Value of the Notes Is Less than the Price to the Public” above.

#### VALIDITY OF THE NOTES

In the opinion of Norton Rose Fulbright Canada LLP, the issue and sale of the Notes has been duly authorized by all necessary corporate action of the Bank in conformity with the Indenture, and when the Notes have been duly executed, authenticated and issued in accordance with the Indenture and delivered against payment therefor, the Notes will be validly issued and, to the extent validity of the Notes is a matter governed by the laws of the Province of Ontario or Québec, or the laws of Canada applicable therein, and will be valid obligations of the Bank, subject to equitable remedies which may only be granted at the discretion of a court of competent authority, subject to applicable bankruptcy, to rights to indemnity and contribution under the Notes or the Indenture which may be limited by applicable law; to insolvency and other laws of general application affecting creditors’ rights, to limitations under applicable limitations statutes, and to limitations as to the currency in which judgments in Canada may be rendered, as prescribed by the Currency Act (Canada). This opinion is given as of the date hereof and is limited to the laws of the Provinces of Ontario and Québec and the federal laws of Canada applicable thereto. In addition, this opinion is subject to customary assumptions about the Trustee’s authorization, execution and delivery of the Indenture and the genuineness of signatures and certain factual matters, all as stated in the letter of such counsel dated January 8, 2016,

which has been filed as Exhibit 5.1 to Royal Bank's Form 6-K dated January 8, 2016.

In the opinion of Morrison & Foerster LLP, when the Notes have been duly completed in accordance with the Indenture and issued and sold as contemplated by the prospectus supplement and the prospectus, the Notes will be valid, binding and enforceable obligations of the Bank, entitled to the benefits of the Indenture, subject to applicable bankruptcy, insolvency and similar laws affecting creditors' rights generally, concepts of reasonableness and equitable principles of general applicability (including, without limitation, concepts of good faith, fair dealing and the lack of bad faith). This opinion is given as of the date hereof and is limited to the laws of the State of New York. This opinion is subject to customary assumptions about the Trustee's authorization, execution and delivery of the Indenture and the genuineness of signatures and to such counsel's reliance on the Bank and other sources as to certain factual matters, all as stated in the legal opinion dated January 8, 2016, which has been filed as Exhibit 5.2 to the Bank's Form 6-K dated January 8, 2016.

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