

Report Prepared On: 07/30/13

**Structured Product Details**

**Name** Buffered Return Optimization Securities linked to Apple, Inc.

**Issue Size** \$3.31 million  
**Issue Price** \$10  
**Term** 24 Months  
**Annualized Coupon** 0.00%

**Pricing Date** March 6, 2013  
**Issue Date** March 11, 2013  
**Valuation Date** March 4, 2015  
**Maturity Date** March 10, 2015

**Issuer** Royal Bank of Canada  
**CDS Rate** 107.43 bps  
**Swap Rate** 0.38%

**Reference Asset** Apple, Inc.'s stock

**Initial Level** \$425.65  
**Dividend Rate** 1.85%  
**Implied Volatility** 31.04%  
**Delta<sup>1</sup>** 0.61

**Fair Price at Issue** \$9.42

**CUSIP** 78008D281  
**SEC Link** [www.sec.gov/Archives/edgar/data/1000275/000121465913001303/a37131424b2.htm](http://www.sec.gov/Archives/edgar/data/1000275/000121465913001303/a37131424b2.htm)

**Related Research**

**Research Papers:**  
[www.slcg.com/research.php](http://www.slcg.com/research.php)

- "Are Structured Products Suitable for Retail Investors?" December 2006.
- "Structured Products in the Aftermath of Lehman Brothers," November 2009.
- "What TiVo and JP Morgan Teach Us about Reverse Convertibles," June 2010.

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**Buffered Return Optimization Securities linked to Apple, Inc.**

**Description**

Royal Bank of Canada issued \$3.31 million of Buffered Return Optimization Securities linked to Apple, Inc. on March 11, 2013 at \$10 per note.

These notes are Royal Bank of Canada-branded Buffered PLUS securities that do not pay periodic coupons, but instead pay a single amount at maturity depending on the final level of Apple, Inc.'s stock.

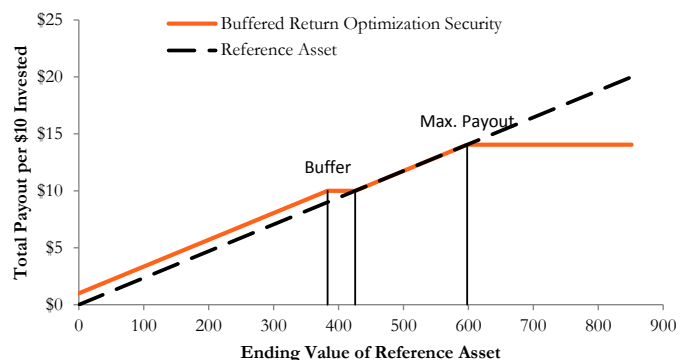
If on March 4, 2015 Apple, Inc.'s stock price is higher than \$425.65, but lower than \$598.04, the notes pay a return equal to the percentage increase in Apple, Inc.'s stock, up to a cap of 40.50%. If on March 4, 2015 the refe is below \$425.65 but not below \$383.09, investors receive \$10 face value per note. If Apple, Inc.'s stock price on March 4, 2015 is lower than \$383.09, investors receive face value per note reduced by the amount the reference asset is below \$383.09 as a percent of the initial level, \$425.65.

**Valuation**

This product can be valued as a combination of a note from Royal Bank of Canada, one short out-of-the-money put option, one long at-the-money call option, and one short out-of-the-money call option. For reasonable valuation inputs this note was worth \$9.42 when it was issued on March 11, 2013 because the value of the options investors gave Royal Bank of Canada plus the interest investors would have received on Royal Bank of Canada's straight debt was worth \$0.58 more than the options investors received from Royal Bank of Canada.

There is no active secondary market for most structured products. Structured products, including this note, therefore are much less liquid than simple stocks, bonds, notes and mutual funds. Investors are likely to receive less than the structured product's estimated market value if they try to sell the structured product prior to maturity. Our valuations do not incorporate this relative lack of liquidity and therefore should be considered an upper bound on the value of the structured product.

**Payoff Curve at Maturity**

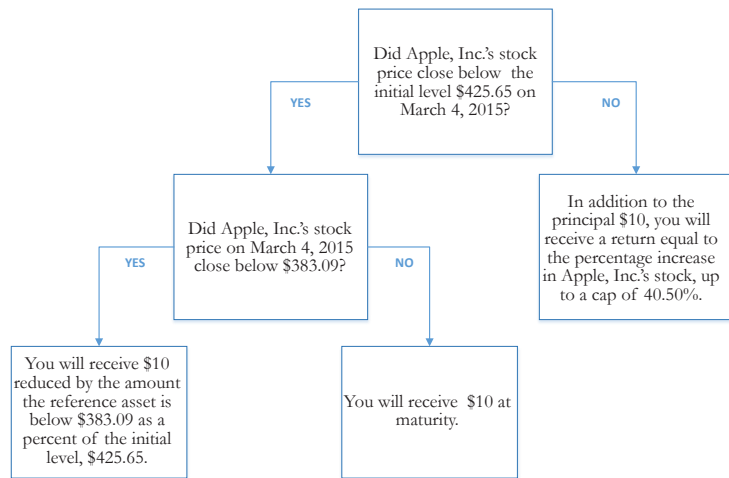


The payoff diagram shows the final payoff of this note given Apple, Inc.'s stock price (horizontal axis). For comparison, the dashed line shows the payoff if you invested in Apple, Inc.'s stock directly.

**Principal Payback Table**

Apple, Inc.'s Stock	Note Payoff
\$0.00	\$1.00
\$42.57	\$2.00
\$85.13	\$3.00
\$127.70	\$4.00
\$170.26	\$5.00
\$212.83	\$6.00
\$255.39	\$7.00
\$297.96	\$8.00
\$340.52	\$9.00
\$383.09	\$10.00
<b>\$425.65</b>	<b>\$10.00</b>
\$468.22	\$11.00
\$510.78	\$12.00
\$553.35	\$13.00
\$595.91	\$14.00
\$638.48	\$14.05

**Maturity Payoff Diagram**

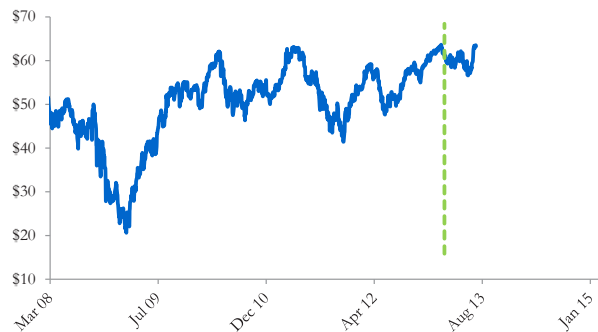


*The contingent payoffs of this Buffered Return Optimization Security.*

**Analysis**

This Buffered Return Optimization Security pays investors the increase in Apple, Inc.'s stock capped at 40.50%, but if Apple, Inc.'s stock declines over the term of the note, investors will suffer losses equal to the percentage decline in Apple, Inc.'s stock. In addition, investors bear the credit risk of Royal Bank of Canada. Investors purchasing this Buffered Return Optimization Security effectively sell at-the-money put and out-of-the-money call options to Royal Bank of Canada, buy at-the-money call options, and a zero-coupon note from Royal Bank of Canada. This Buffered Return Optimization Security is fairly priced if and only if the market value of the options investors received from Royal Bank of Canada equals the market value of the options investors gave Royal Bank of Canada plus the interest investors would have received on Royal Bank of Canada's straight debt.

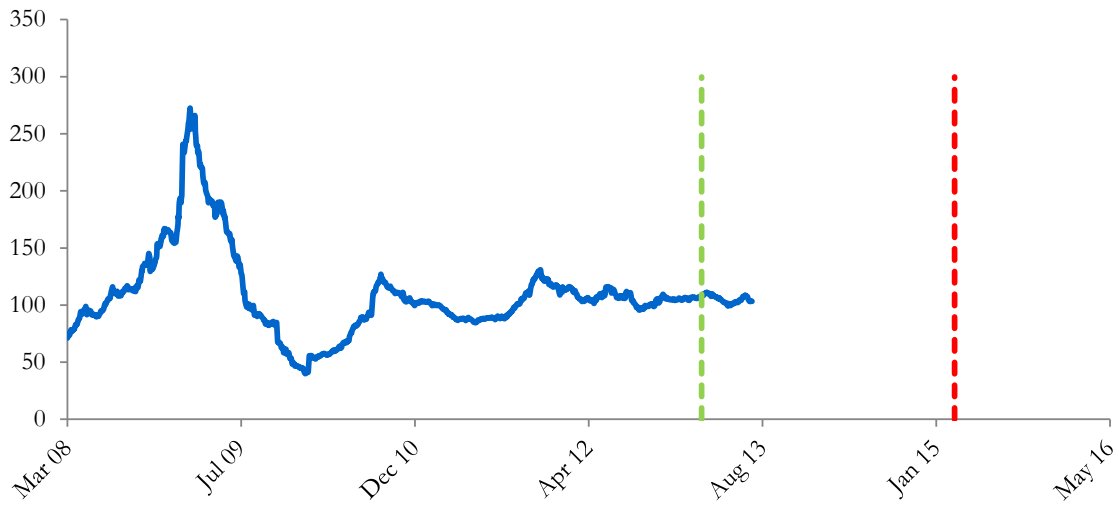
**Royal Bank of Canada's Stock Price**



*The graph above shows the adjusted closing price of the issuer Royal Bank of Canada for the past several years. The stock price of the issuer is an indication of the financial strength of Royal Bank of Canada. The adjusted price shown above incorporates any stock split, reverse stock split, etc.*

### Royal Bank of Canada's CDS Rate

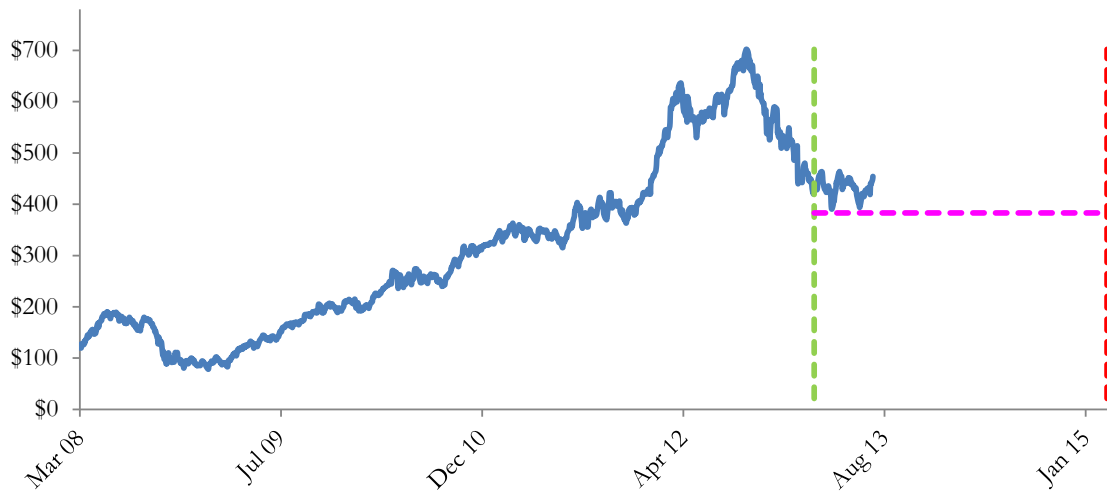
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Credit default swap (CDS) rates are the market price that investors require to bear credit risk of an issuer such as Royal Bank of Canada. CDS rates are usually given in basis points (bps). One basis point equals 0.01%. Higher CDS rates reflect higher perceived credit risk, higher required yields, and therefore lower market value of Royal Bank of Canada's debt, including outstanding Buffered Return Optimization Security. Fluctuations in Royal Bank of Canada's CDS rate impact the market value of the notes in the secondary market.

### Apple, Inc.'s Stock Price

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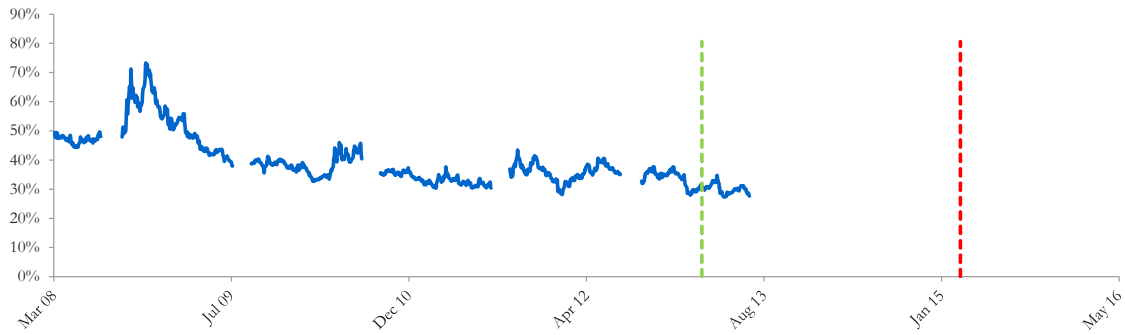
The graph above shows the historical levels of Apple, Inc.'s stock for the past several years. The final payoff of this note is determined by Apple, Inc.'s stock price at maturity. Higher fluctuations in Apple, Inc.'s stock price correspond to a greater uncertainty in the final payout of this Buffered Return Optimization Security.

### Realized Payoff

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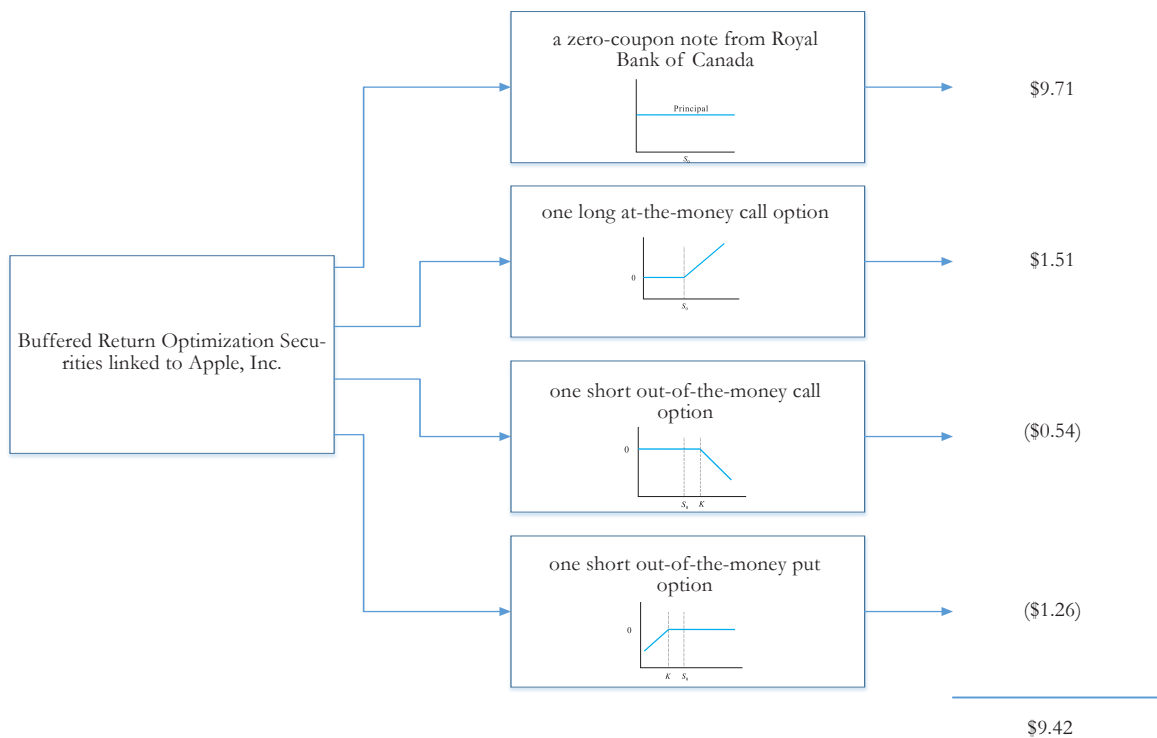
This product will mature on March 10, 2015.

## Reference Asset Apple, Inc.'s Stock's Implied Volatility



The annualized implied volatility of Apple, Inc.'s stock on March 6, 2013 was 31.04%, meaning that options contracts on Apple, Inc.'s stock were trading at prices that reflect an expected annual volatility of 31.04%. The higher the implied volatility, the larger the expected fluctuations of Apple, Inc.'s stock price and of the Note's market value during the life of the Notes.

## Decomposition of this Buffered Return Optimization Security



This note can be decomposed into different components, and each component can be valued separately. The chart above shows the value of each component of this Buffered Return Optimization Security.

1. Delta measures the sensitivity of the price of the note to the Apple, Inc.'s stock price on March 6, 2013.
2. CDS rates can be considered a measure of the probability that an issuer will default over a certain period of time and the likely loss given a default. The lower the CDS rate, the lower the default probability. CDS rate is given in basis points (1 basis point equals 0.01%), and is considered as a market premium, on top of the risk-free rate, that investors require to insure against a potential default.
3. Fair price evaluation is based on the Black-Scholes model of the Apple, Inc.'s stock on March 6, 2013.
4. Calculated payout at maturity is only an approximation, and may differ from actual payouts at maturity.
5. Our evaluation does not include any transaction fees, broker commissions, or liquidity discounts on the notes.