```r
library(dplyr)
```

```
##
## Caricamento pacchetto: 'dplyr'

## I seguenti oggetti sono mascherati da 'package:stats':
##
##     filter, lag

## I seguenti oggetti sono mascherati da 'package:base':
##
##     intersect, setdiff, setequal, union
```

```r
library(ggplot2)
library(moments)
options(scipen = 999)
```

```r
houses = read.csv("house_price.csv", stringsAsFactors = TRUE)
dim(houses)
```

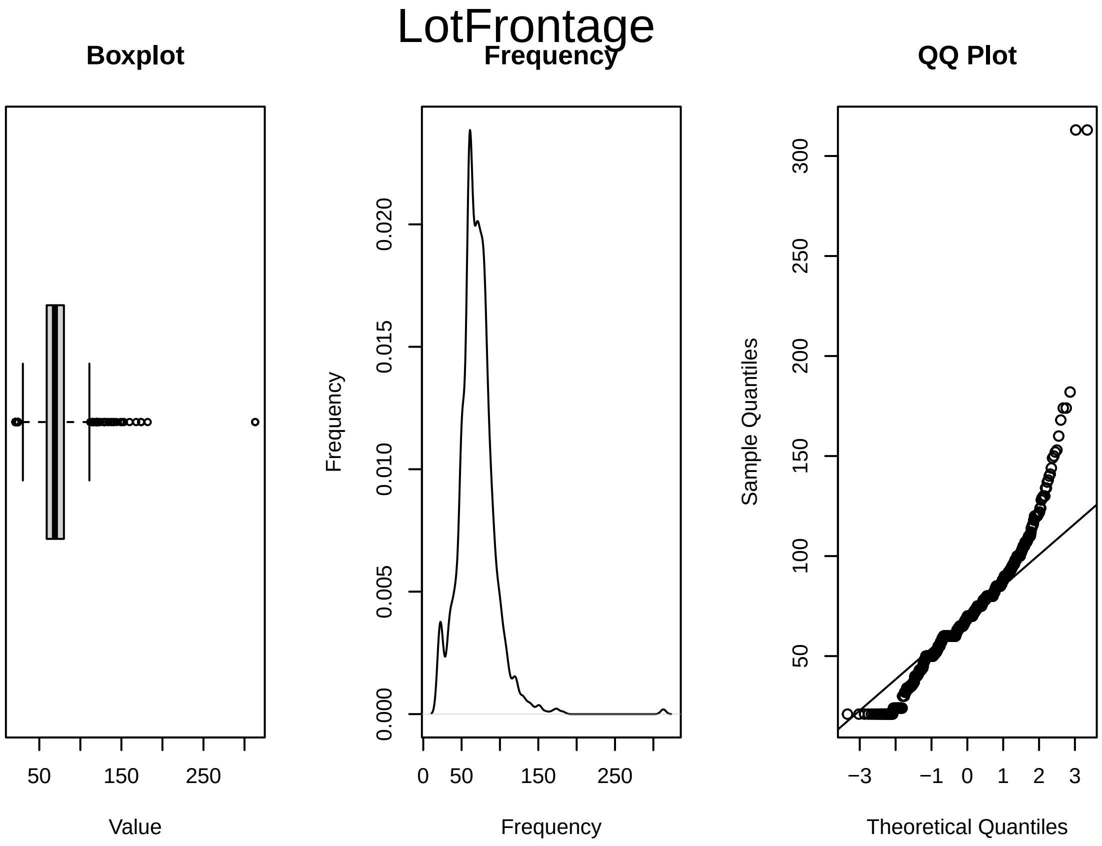
```
## [1] 1460   81
```

```r
# Operazioni preliminari:
# 1. Verifico quali righe e colonne hanno troppi valori mancanti
# 2. Rimuovo righe e colonne con troppi valori mancanti
# 3. Divido il dataset in due parti: una con le variabili numeriche e una con le variabili categoriche

quant_cont_cols = c("LotFrontage", "LotArea", "MasVnrArea", "BsmtFinSF1", "BsmtFinSF2", "BsmtUnfSF", "T
qual_cols = c("MSSubClass", "MSZoning", "Street", "LotShape", "LandContour", "Utilities", "LotConfig",
quant_disc_cols = c("BsmtFullBath", "BsmtHalfBath", "FullBath", "HalfBath", "BedroomAbvGr", "KitchenAbv
year_cols = c("YearBuilt", "YearRemodAdd", "GarageYrBlt")
mark_cols = c("OverallQual", "OverallCond")

houses[, qual_cols[1]] = as.factor(houses[, qual_cols[1]])

quant_cont_vars = houses[, quant_cont_cols]
qual_vars = houses[, qual_cols]
quant_discr_vars = houses[, quant_disc_cols]
year_vars = houses[, year_cols]
mark_vars = houses[, mark_cols]
```

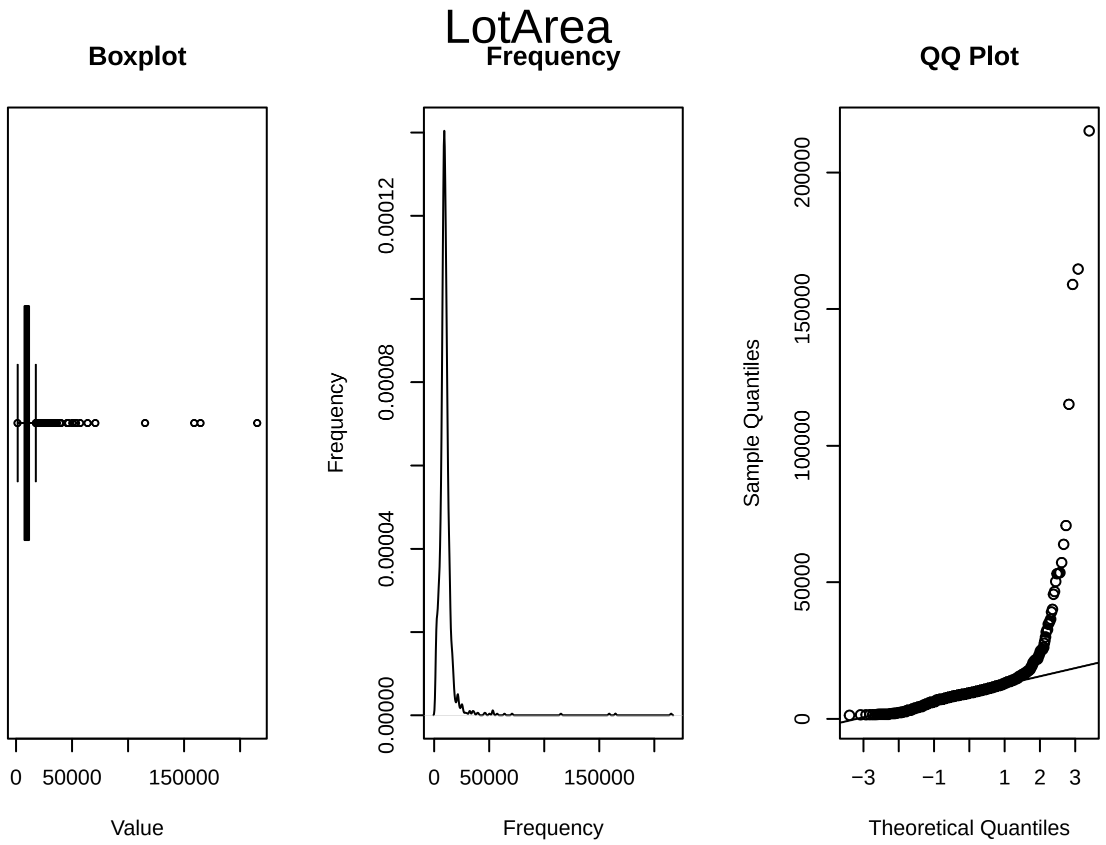
```r
cont_info = function (x, i) {
  if (colnames(quant_cont_vars[i]) != "LotFrontage" & colnames(quant_cont_vars[i]) != "LotArea") {
    x = x[x != 0]
  }
  print(colnames(quant_cont_vars[i]))
  print(summary(x))
  print("Skewness")
  print(skewness(x, na.rm = TRUE))
  print("Curtosi")
  print(kurtosis(x, na.rm = TRUE))
  par(mfrow = (c(1, 3)))
  boxplot(x, main = "Boxplot", xlab = "Value", horizontal = TRUE)
  plot(density(x, na.rm = T), main="Frequency", xlab = "Frequency", ylab = "Frequency")
  qqnorm(x, main = "QQ Plot")
  qqline(x)
  mtext(text=colnames(quant_cont_vars[i]), line = -1.75, outer = T, cex = 1.5)
}

disc_info = function(x, i) {
  print(colnames(quant_discr_vars[i]))
  print(summary(x, na.rm = T))
  par(mfrow = (c(1, 1)))
  barplot(prop.table(table(x)), main = colnames(quant_discr_vars[i]), xlab = "Value", ylab = "Frequency
}

year_info = function(x, i) {
  par(mfrow = (c(1, 1)))
  print("Minimo")
  print(min(x, na.rm=T))
  print("Massimo")
  print(max(x, na.rm=T))
  print("Quantili")
  print(quantile(x, na.rm=T))
  hist(x, main = colnames(year_vars[i]), xlab = "Value", ylab = "Frequency")
}


mark_info = function(x, i) {
  par(mfrow = (c(1, 1)))
  print(colnames(mark_vars[i]))
  print("Minimo")
  print(min(x, na.rm=T))
  print("Massimo")
  print(max(x, na.rm=T))
  print("Quantili")
  print(quantile(x, na.rm=T))
  barplot(prop.table(table(x)), main = colnames(mark_vars[i]), xlab = "Value", ylab = "Frequency")
}


qual_info = function (x, i) {
  print(colnames(quant_cont_vars[i]))
  print(table(x))
  print(prop.table(table(x)))
  par(mfrow = (c(1, 2)))
  barplot(table(x), main = "Frequenze assolute", xlab = "Value", ylab = "Frequenze")
  barplot(prop.table(table(x)), main = "Frequenze relative", xlab = "Value", ylab = "Frequenze")
  mtext(text=colnames(quant_cont_vars[i]), line = -1.75, outer = T, cex = 1.5)
}
```

```r
for (i in seq_along(quant_cont_vars)) {
  cont_info(quant_cont_vars[, i], i)
}
```

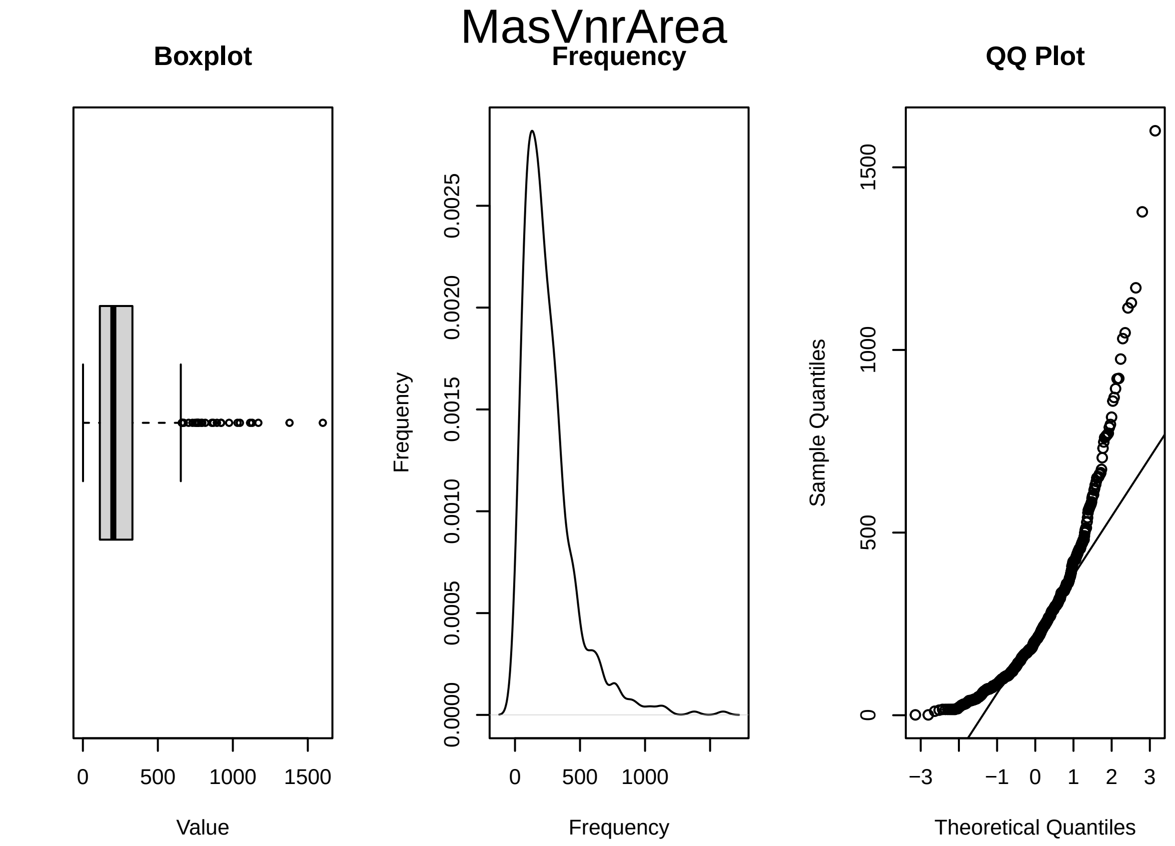
```
## [1] "LotFrontage"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   21.00   59.00   69.00   70.05   80.00  313.00     259
## [1] "Skewness"
## [1] 2.160866
## [1] "Curtosi"
## [1] 20.3753
```



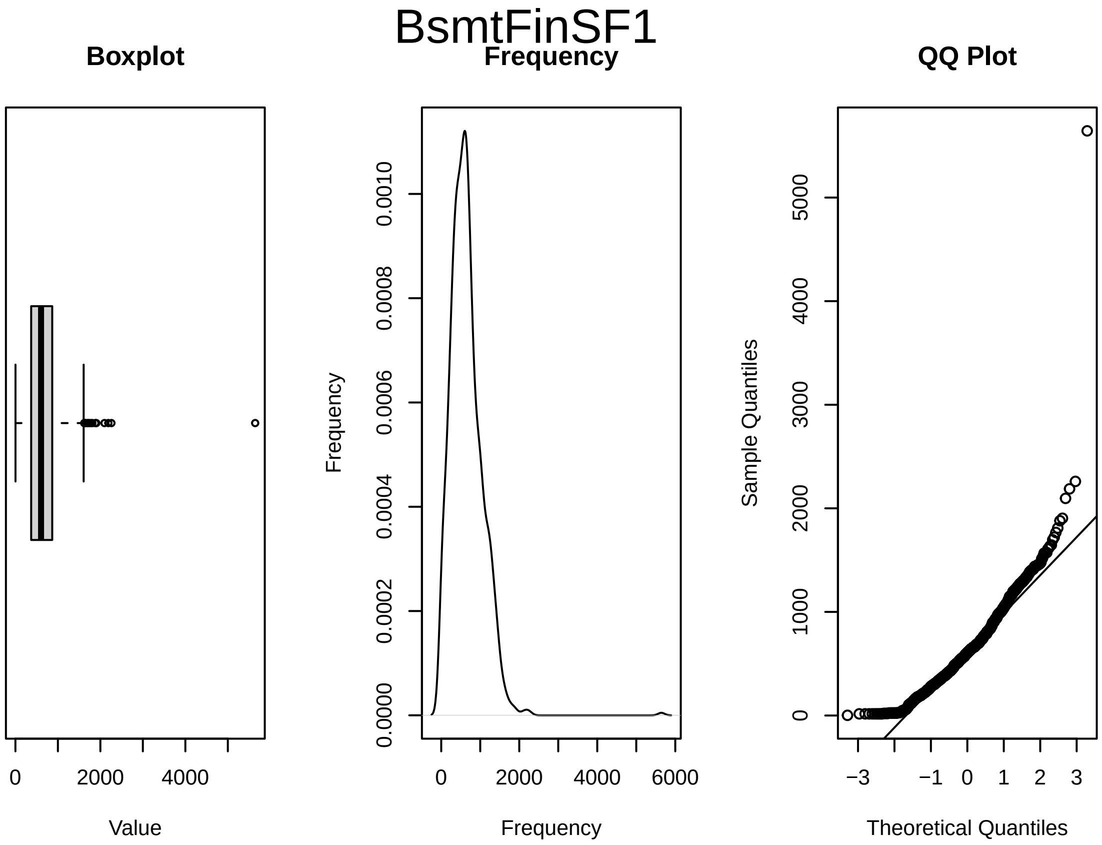
```
## [1] "LotArea"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    1300    7554    9478   10517   11602  215245
## [1] "Skewness"
## [1] 12.19514
## [1] "Curtosi"
## [1] 205.5438
```



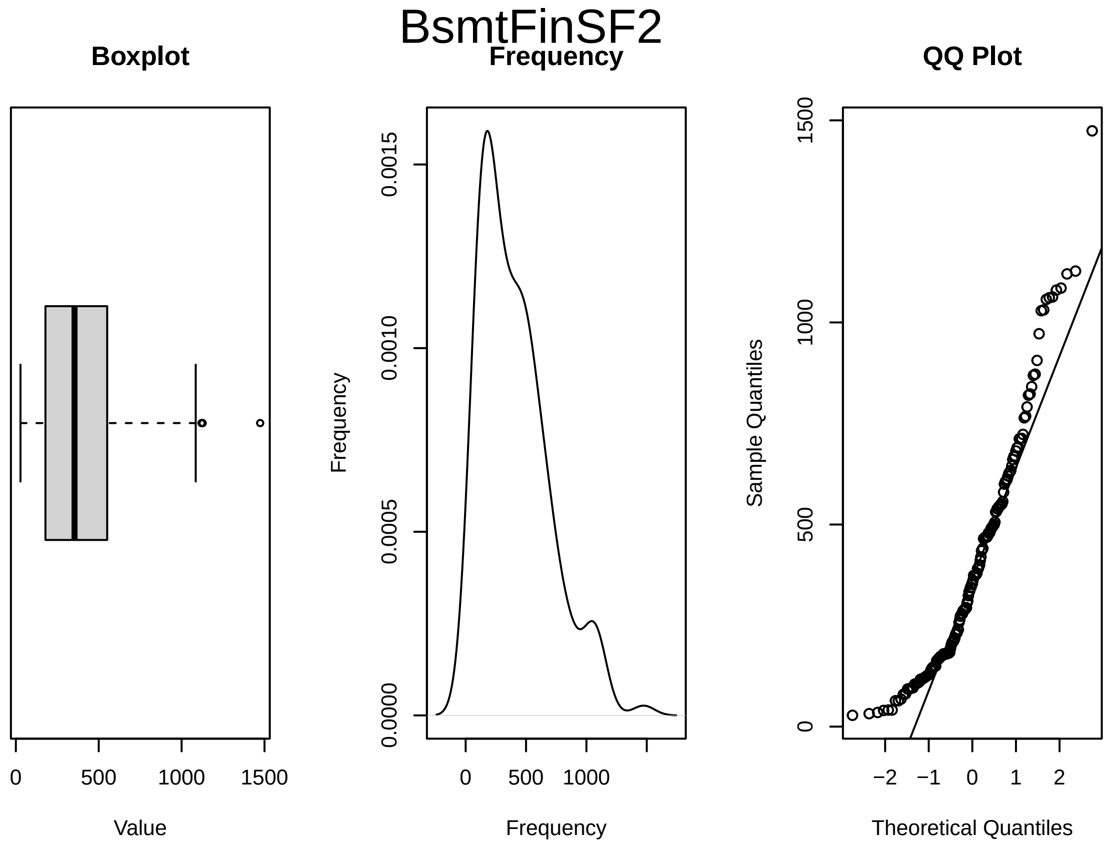
```
## [1] "MasVnrArea"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##     1.0   113.0   203.0   254.7   330.5  1600.0       8
## [1] "Skewness"
## [1] 2.088559
## [1] "Curtosi"
## [1] 9.682093
```



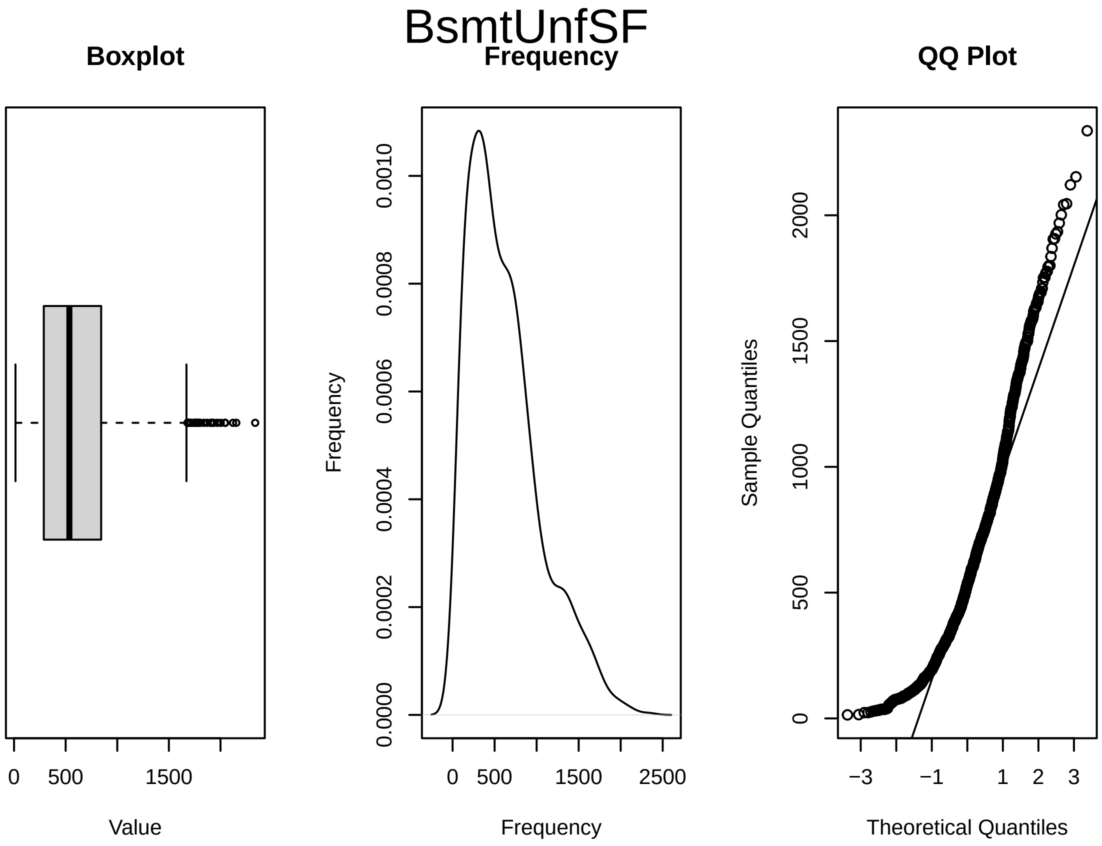
```
## [1] "BsmtFinSF1"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
##     2.0   371.0   604.0   652.3   867.0  5644.0 
## [1] "Skewness"
## [1] 2.298795
## [1] "Curtosi"
## [1] 24.21043
```



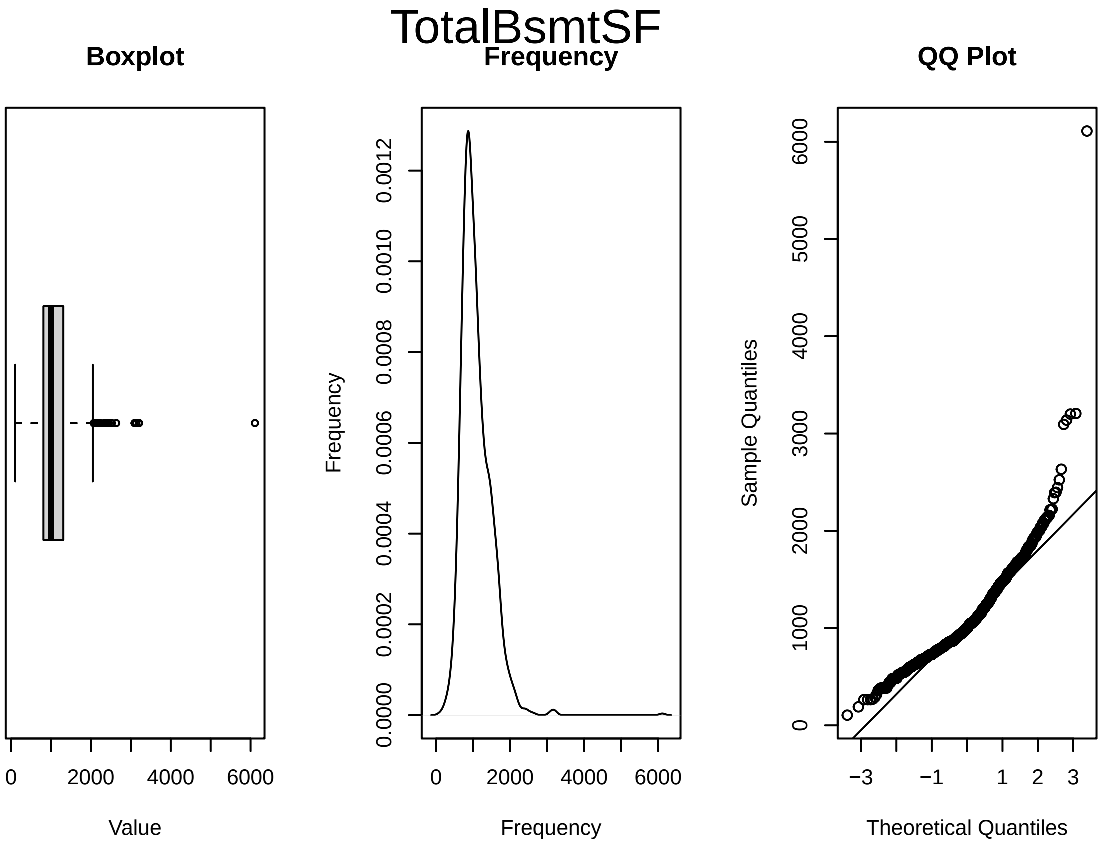
```
## [1] "BsmtFinSF2"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    28.0   178.5   354.0   407.0   551.0  1474.0
## [1] "Skewness"
## [1] 0.9852846
## [1] "Curtosi"
## [1] 3.668218
```



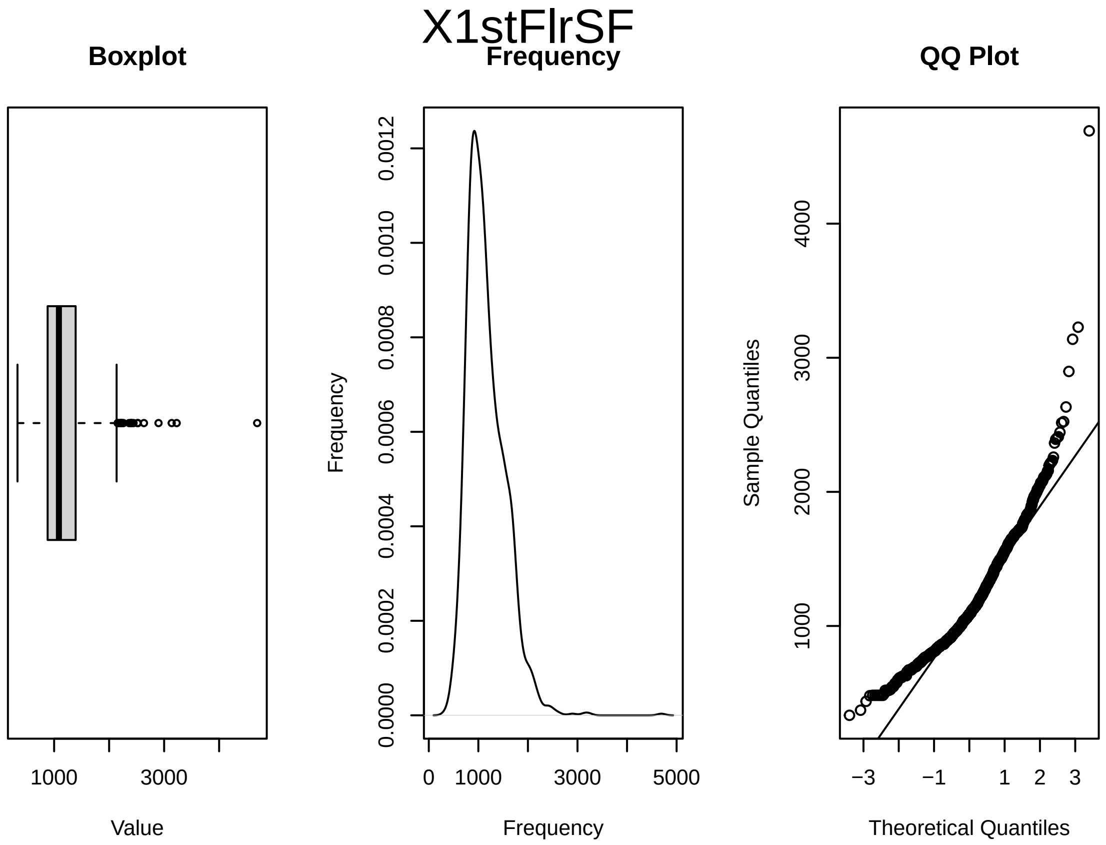
```
## [1] "BsmtUnfSF"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    14.0   288.0   536.0   617.1   843.2  2336.0
## [1] "Skewness"
## [1] 0.9695924
## [1] "Curtosi"
## [1] 3.549353
```



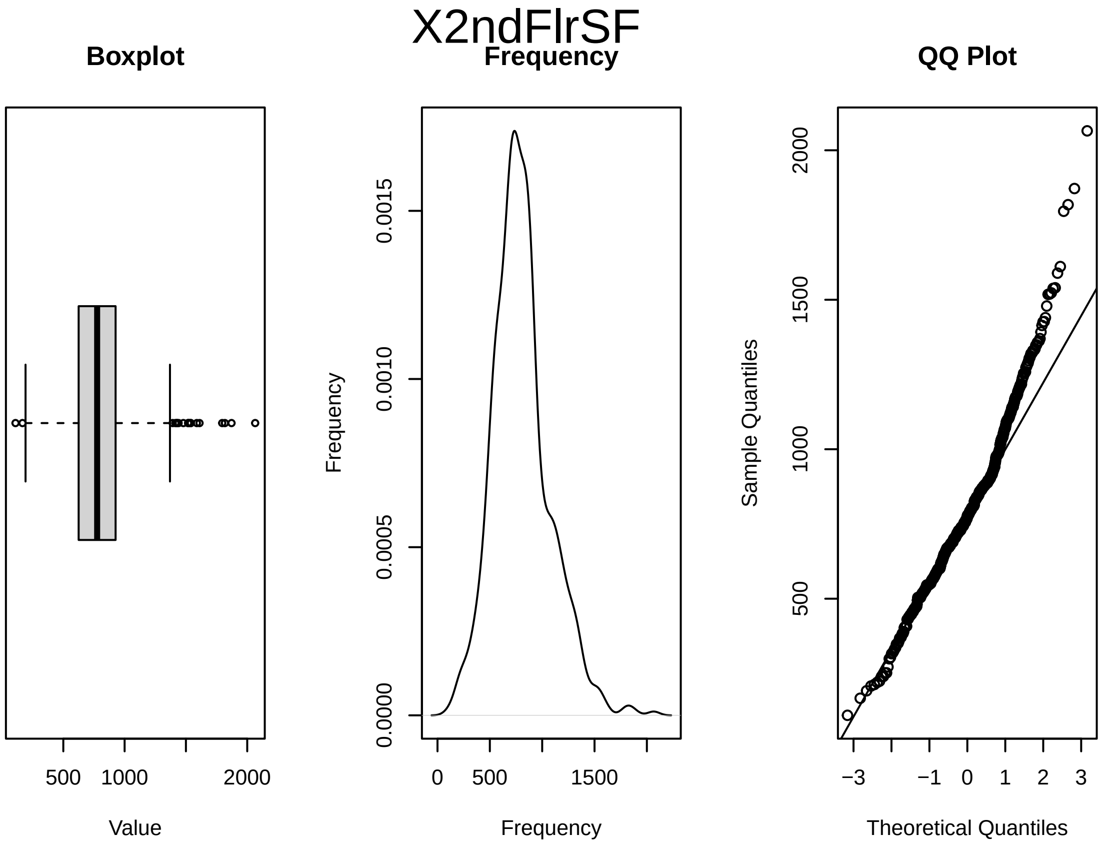
```
## [1] "TotalBsmtSF"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   105.0   810.5  1004.0  1084.9  1309.5  6110.0
## [1] "Skewness"
## [1] 2.168831
## [1] "Curtosi"
## [1] 20.14677
```



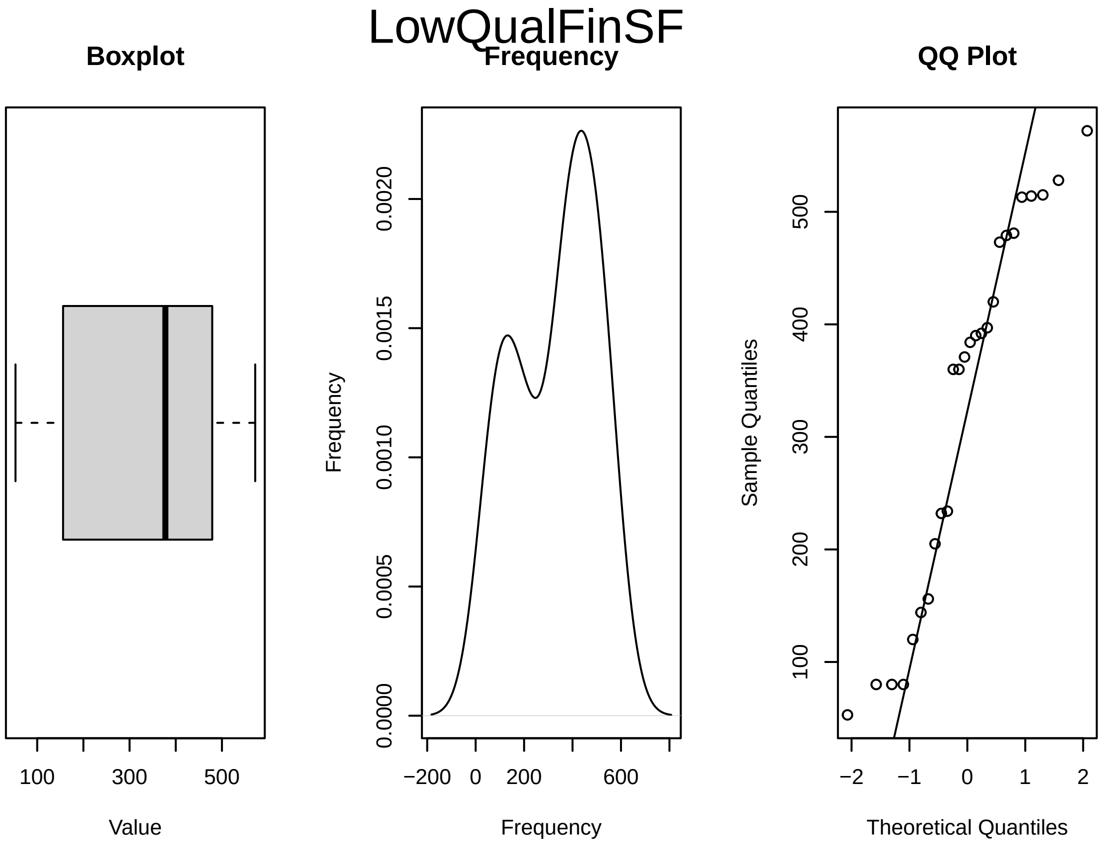
```
## [1] "X1stFlrSF"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     334     882    1087    1163    1391    4692
## [1] "Skewness"
## [1] 1.375342
## [1] "Curtosi"
## [1] 8.722076
```



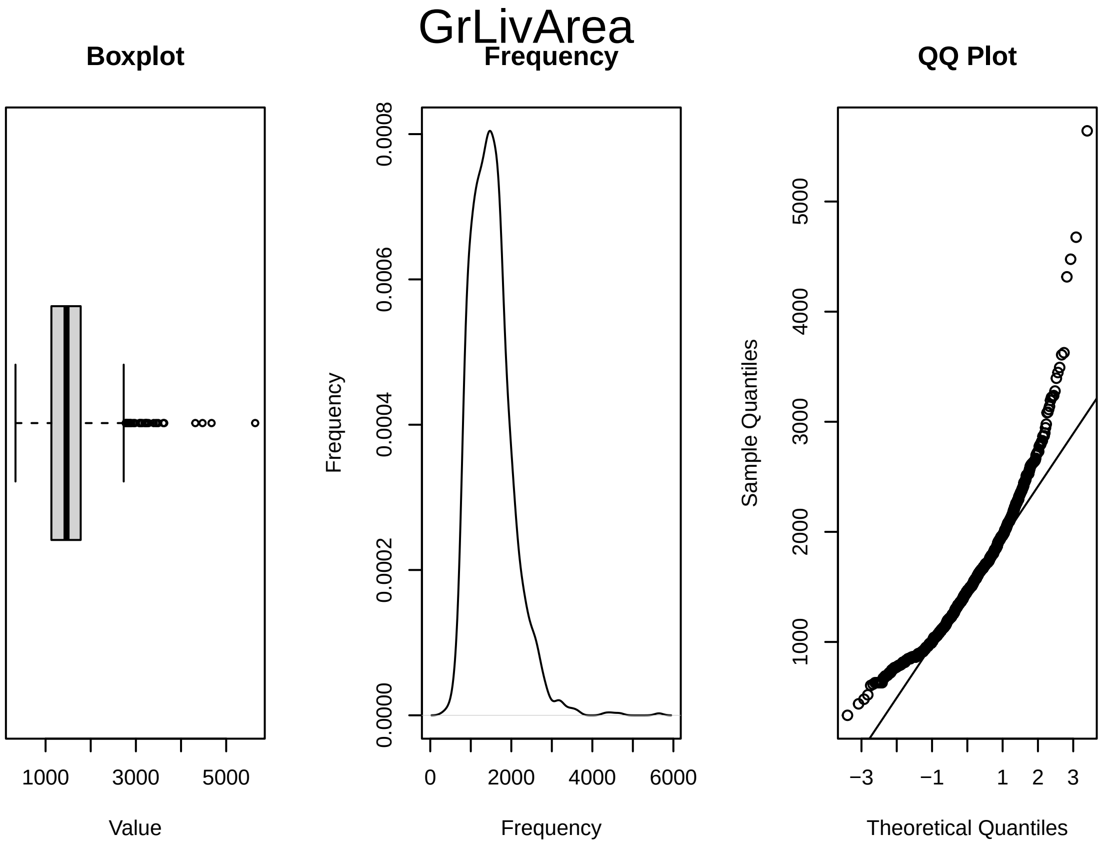
```
## [1] "X2ndFlrSF"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   110.0   625.0   776.0   802.9   926.5  2065.0
## [1] "Skewness"
## [1] 0.7011031
## [1] "Curtosi"
## [1] 4.273049
```



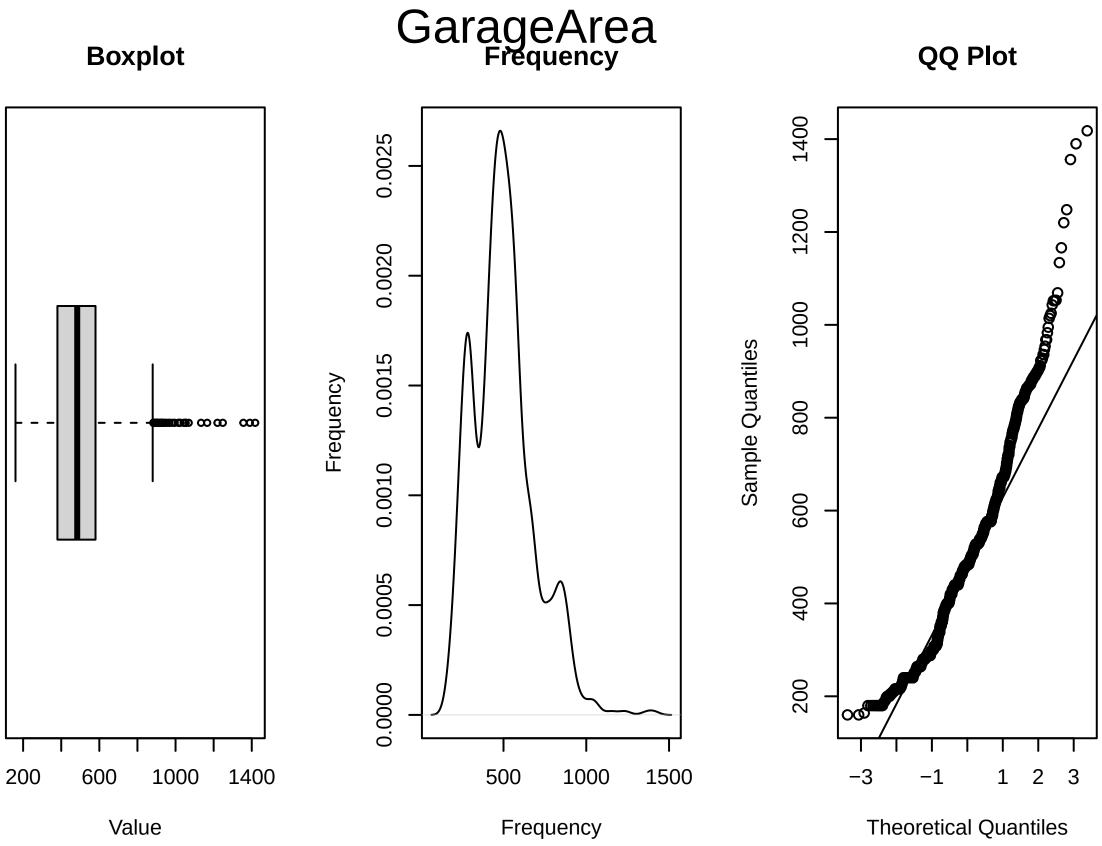
```
## [1] "LowQualFinSF"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    53.0   168.2   377.5   328.2   477.5   572.0
## [1] "Skewness"
## [1] -0.3231395
## [1] "Curtosi"
## [1] 1.691515
```



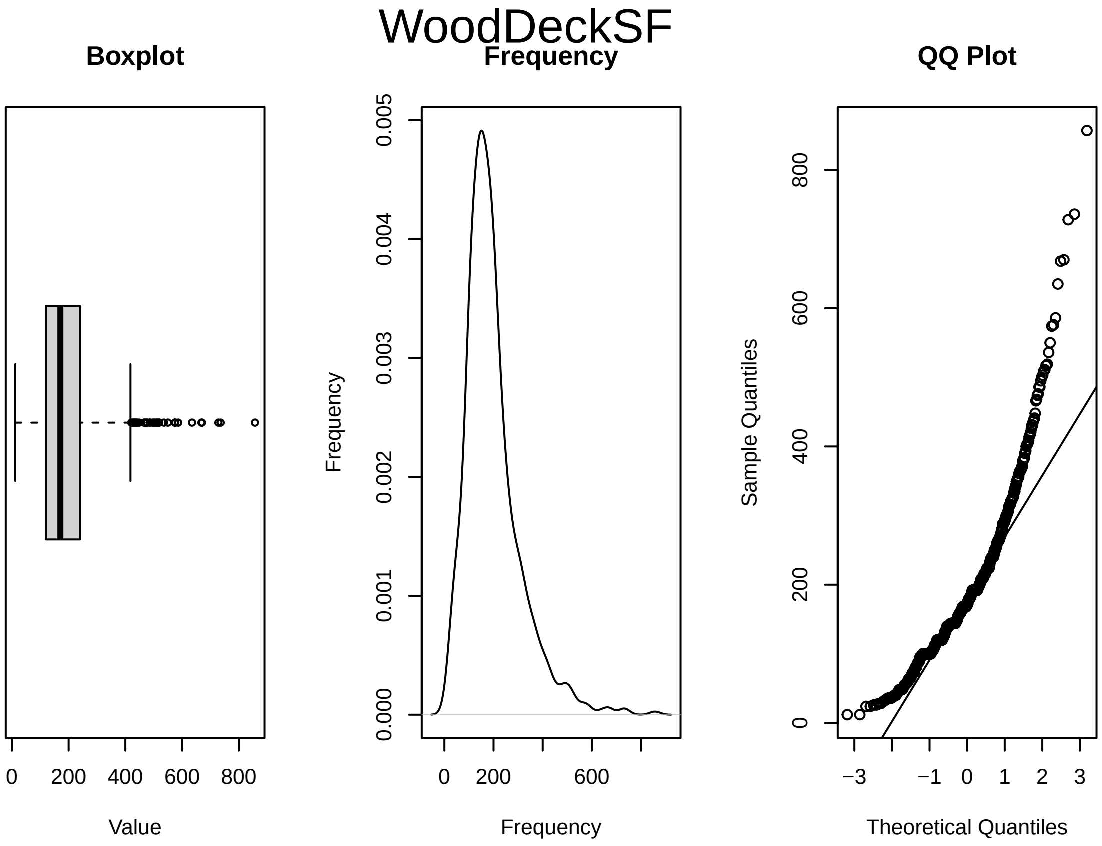
```
## [1] "GrLivArea"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##     334    1130    1464    1515    1777    5642
## [1] "Skewness"
## [1] 1.365156
## [1] "Curtosi"
## [1] 7.874266
```



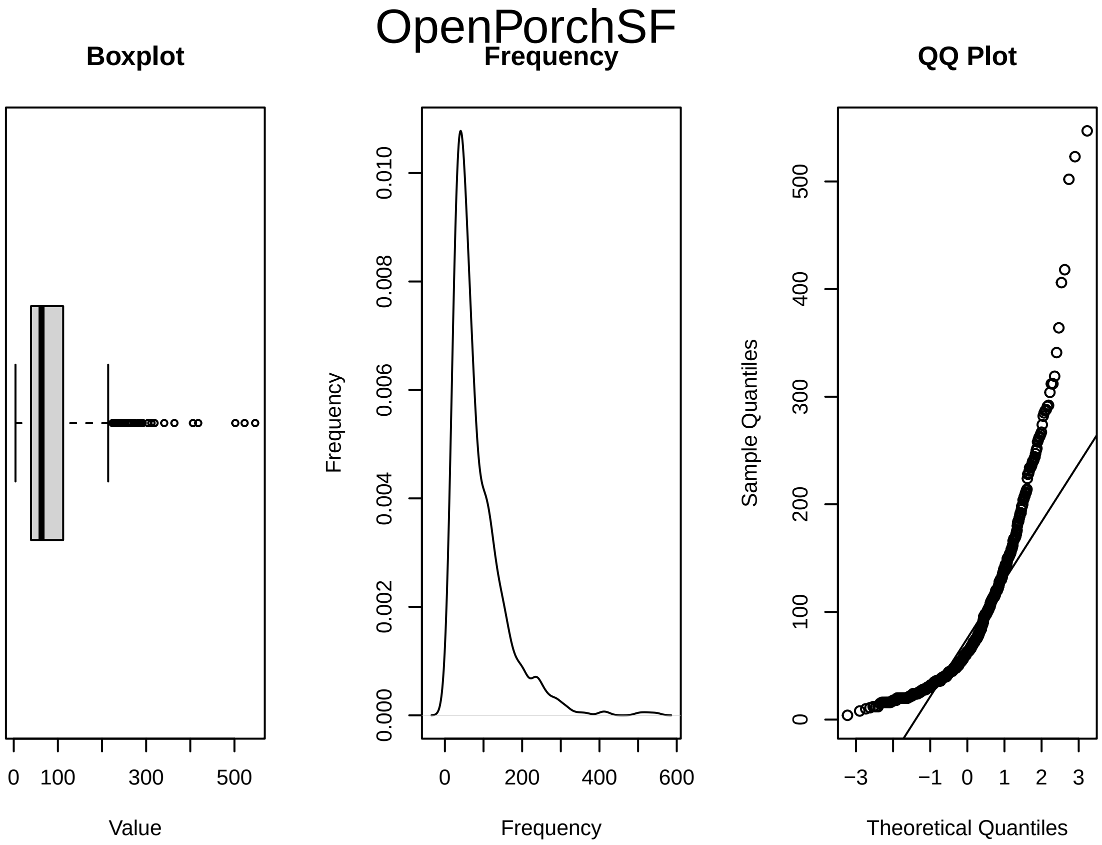
```
## [1] "GarageArea"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   160.0   380.0   484.0   500.8   580.0  1418.0
## [1] "Skewness"
## [1] 0.8101544
## [1] "Curtosi"
## [1] 4.18098
```



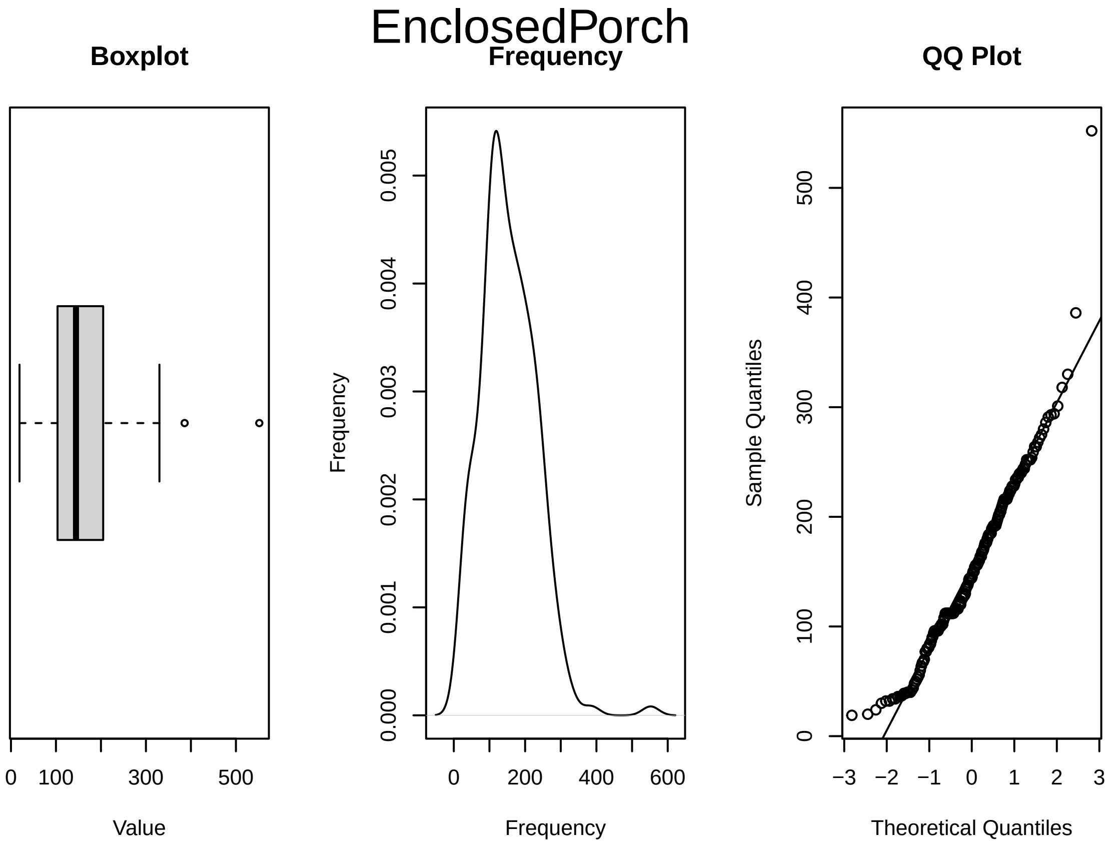
```
## [1] "WoodDeckSF"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    12.0   120.0   171.0   196.8   240.0   857.0
## [1] "Skewness"
## [1] 1.614144
## [1] "Curtosi"
## [1] 7.247074
```



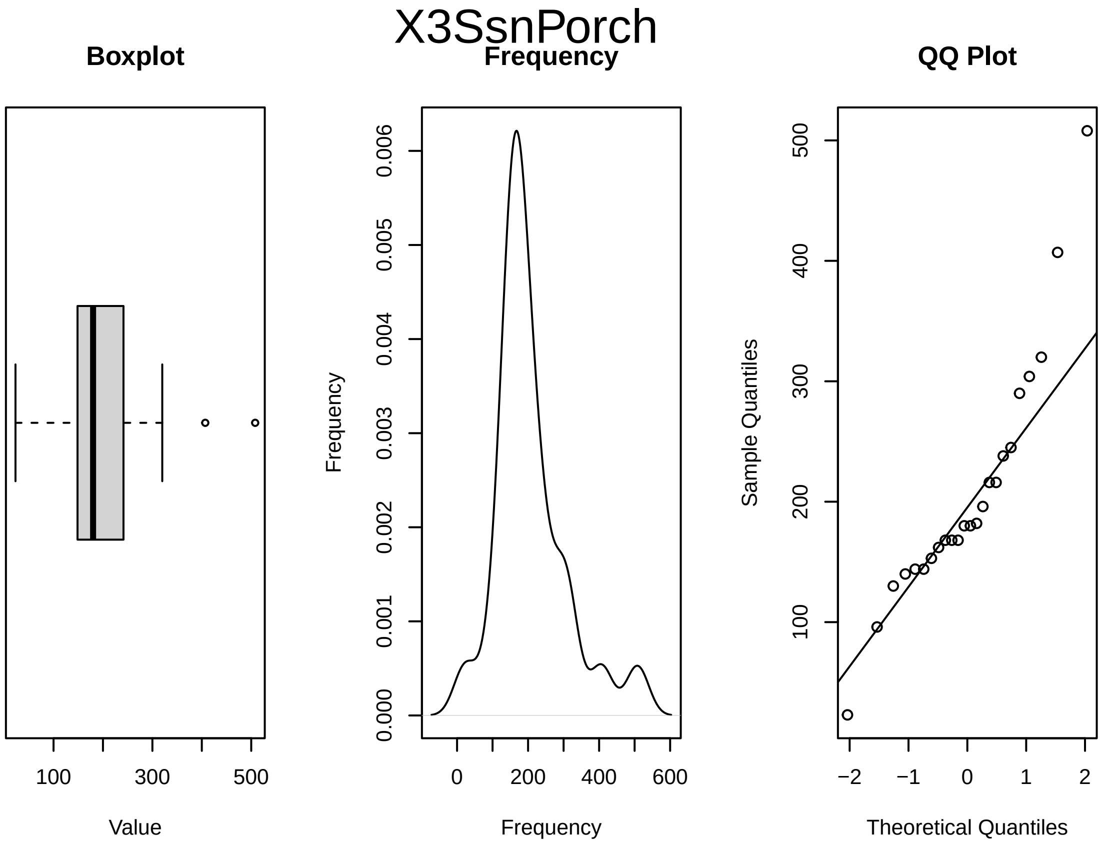
```
## [1] "OpenPorchSF"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    4.00   39.00   63.00   84.73  112.00  547.00
## [1] "Skewness"
## [1] 2.244353
## [1] "Curtosi"
## [1] 10.75368
```



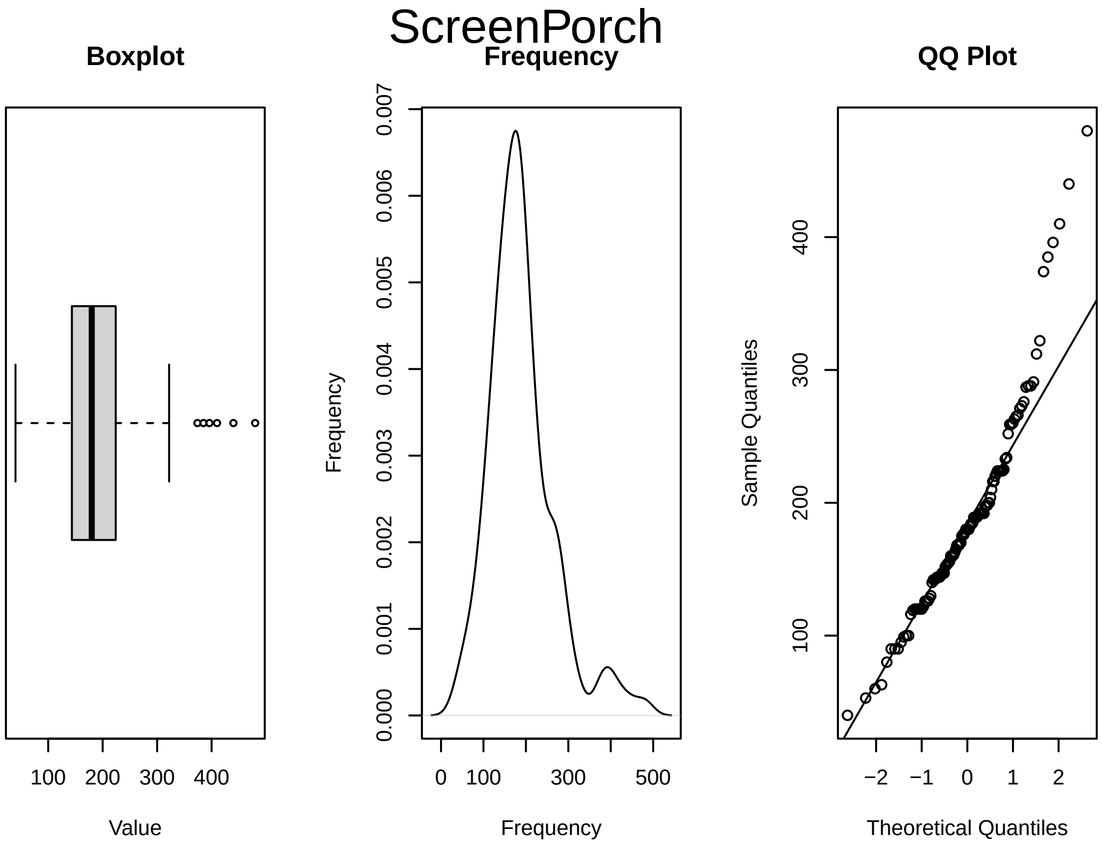
```
## [1] "EnclosedPorch"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    19.0   104.2   144.5   154.1   205.0   552.0
## [1] "Skewness"
## [1] 0.8582936
## [1] "Curtosi"
## [1] 5.552907
```



```
## [1] "X3SsnPorch"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##    23.0   150.8   180.0   207.4   239.8   508.0
## [1] "Skewness"
## [1] 1.205196
## [1] "Curtosi"
## [1] 4.839964
```



```
## [1] "ScreenPorch"
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max. 
##    40.0   143.8   180.0   189.6   224.0   480.0 
## [1] "Skewness"
## [1] 1.171071
## [1] "Curtosi"
## [1] 5.116482
```


ScreenPorch
Boxplot
100
200
300
400
Value
Frequency
Frequency
0.000
0.001
0.002
0.003
0.004
0.005
0.006
0.007
0
100
300
500
Frequency
QQ Plot
Sample Quantiles
100
200
300
400
−2
−1
0
1
2
Theoretical Quantiles