

# KIC 012354328

## Q1-17 DR25 TCE Parameters

| TCE          | Run Type | KOI? | Period (Days) | Epoch (BKJD) | Depth (ppm) | Duration (Hours) | MES  | SNR  | $R_{\star}$ ( $R_{\odot}$ ) | $T_{\star}$ (K) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 012354328-01 | OBS      | No   | 532.957799    | 211.629507   | 4756.4      | 4.821            | 15.9 | 8.9  | 0.63                        | 5251            | 4.32                   | 0.23                   |
| 012354328-02 | OBS      | No   | 0.802884      | 132.328010   | 394.5       | 7.741            | 12.4 | 15.9 | 0.63                        | 5251            | 1.27                   | 1307.96                |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|--|
| 012354328-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS |
| 012354328-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—MOD_NONUNIQ_ALT   |

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

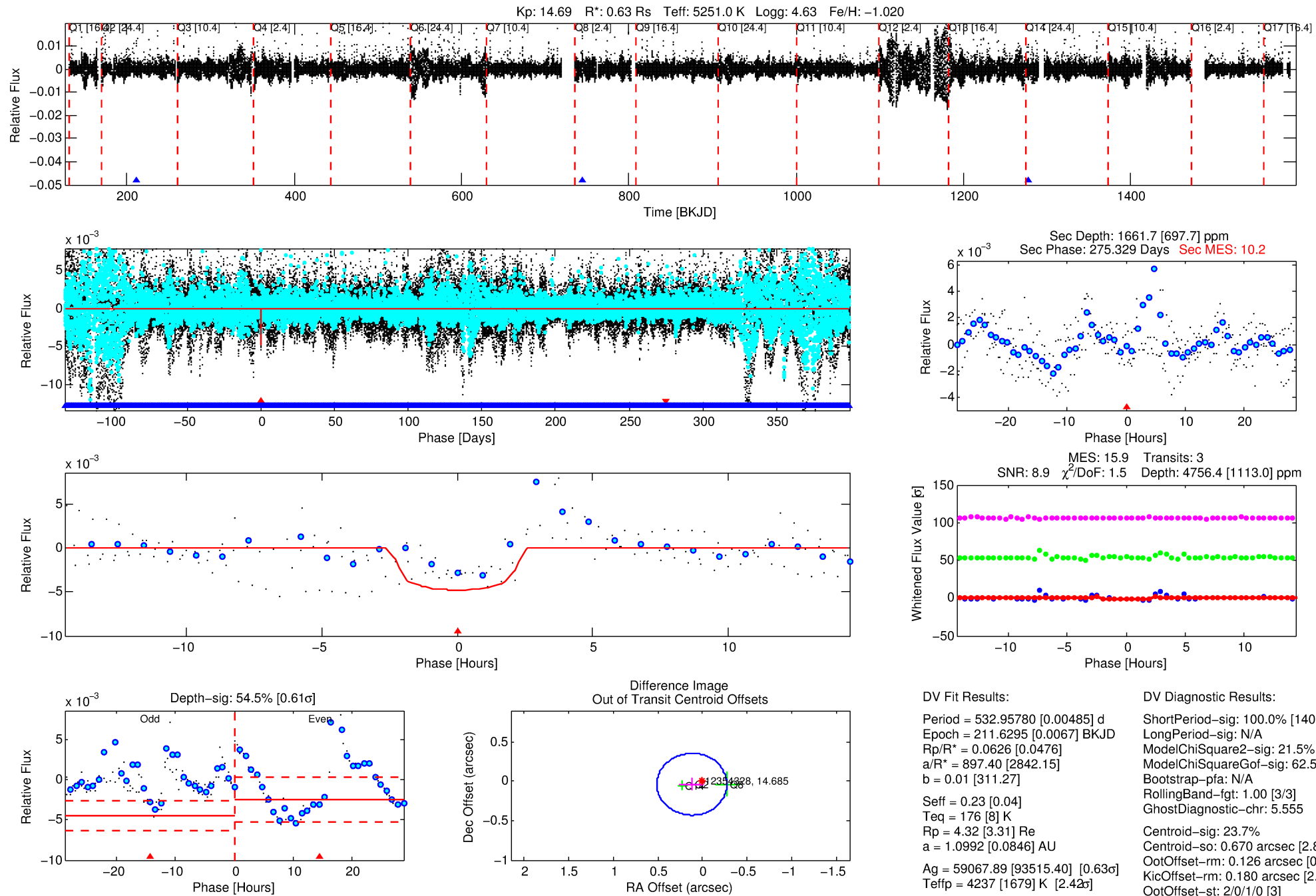
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012354328-01

No Significant Match Found

# DV One-Page Summary

KIC: 12354328 Candidate: 1 of 2 Period: 532.958 d



## DV Fit Results:

Period = 532.95780 [0.00485] d  
Epoch = 211.6295 [0.0067] BKJD  
Rp/R\* = 0.0626 [0.0476]  
a/R\* = 897.40 [2842.15]  
b = 0.01 [311.27]  
Seff = 0.23 [0.04]  
Teq = 176 [8] K  
Rp = 4.32 [3.31] Re  
a = 1.0992 [0.0846] AU  
Ag = 59067.89 [93515.40] [0.63σ]  
Teffp = 4237 [1679] K [2.42σ]

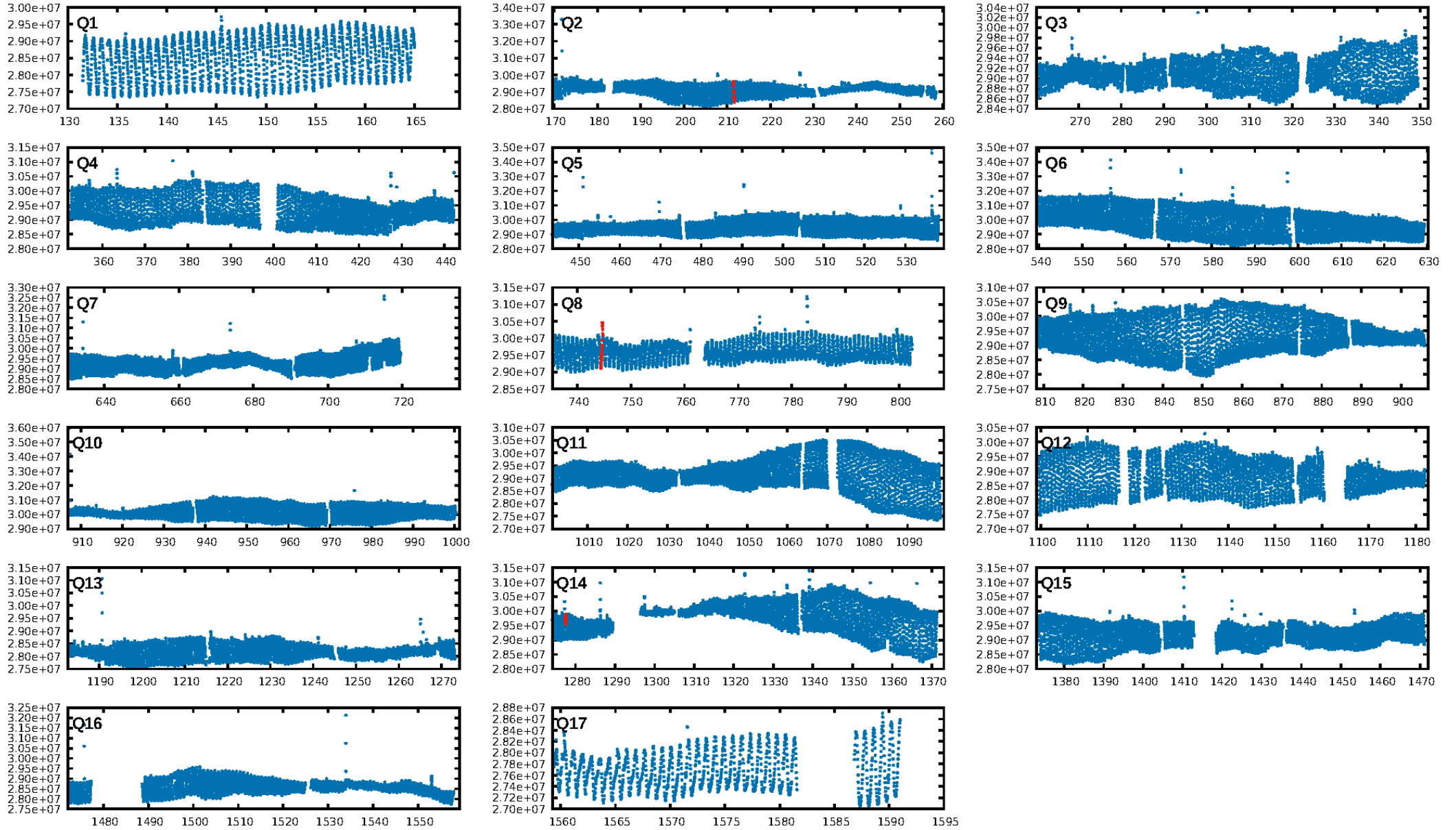
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1400.48σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 21.5%  
ModelChiSquareGof-sig: 62.5%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 5.555  
Centroid-sig: 23.7%  
Centroid-so: 0.670 arcsec [2.88σ]  
OotOffset-rm: 0.126 arcsec [0.96σ]  
KicOffset-rm: 0.180 arcsec [2.08σ]  
OotOffset-st: 2/0/1/0 [3]  
KicOffset-st: 2/0/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.00 [0/3]

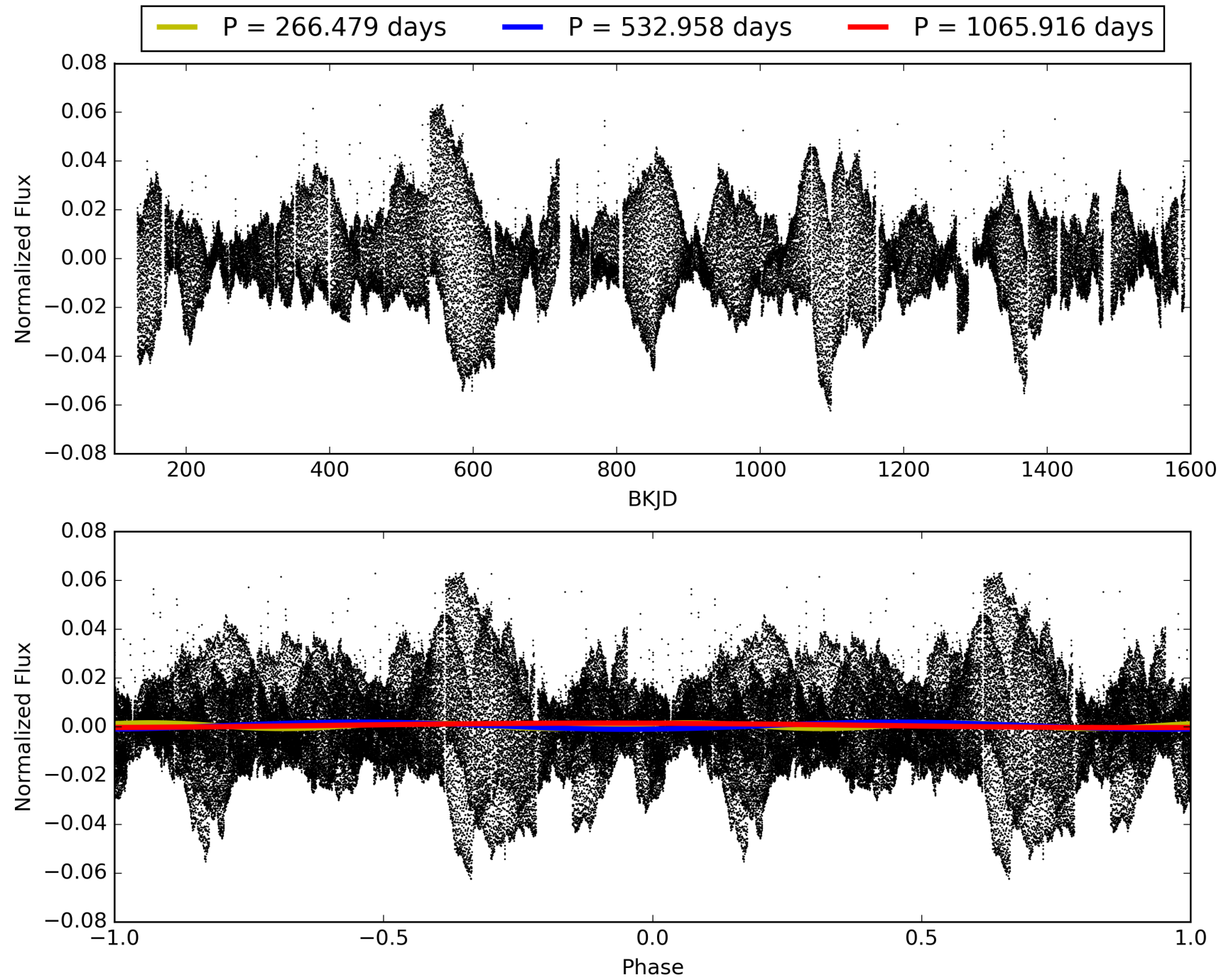
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:14:39 Z

This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 012354328-01, PDC Light Curves

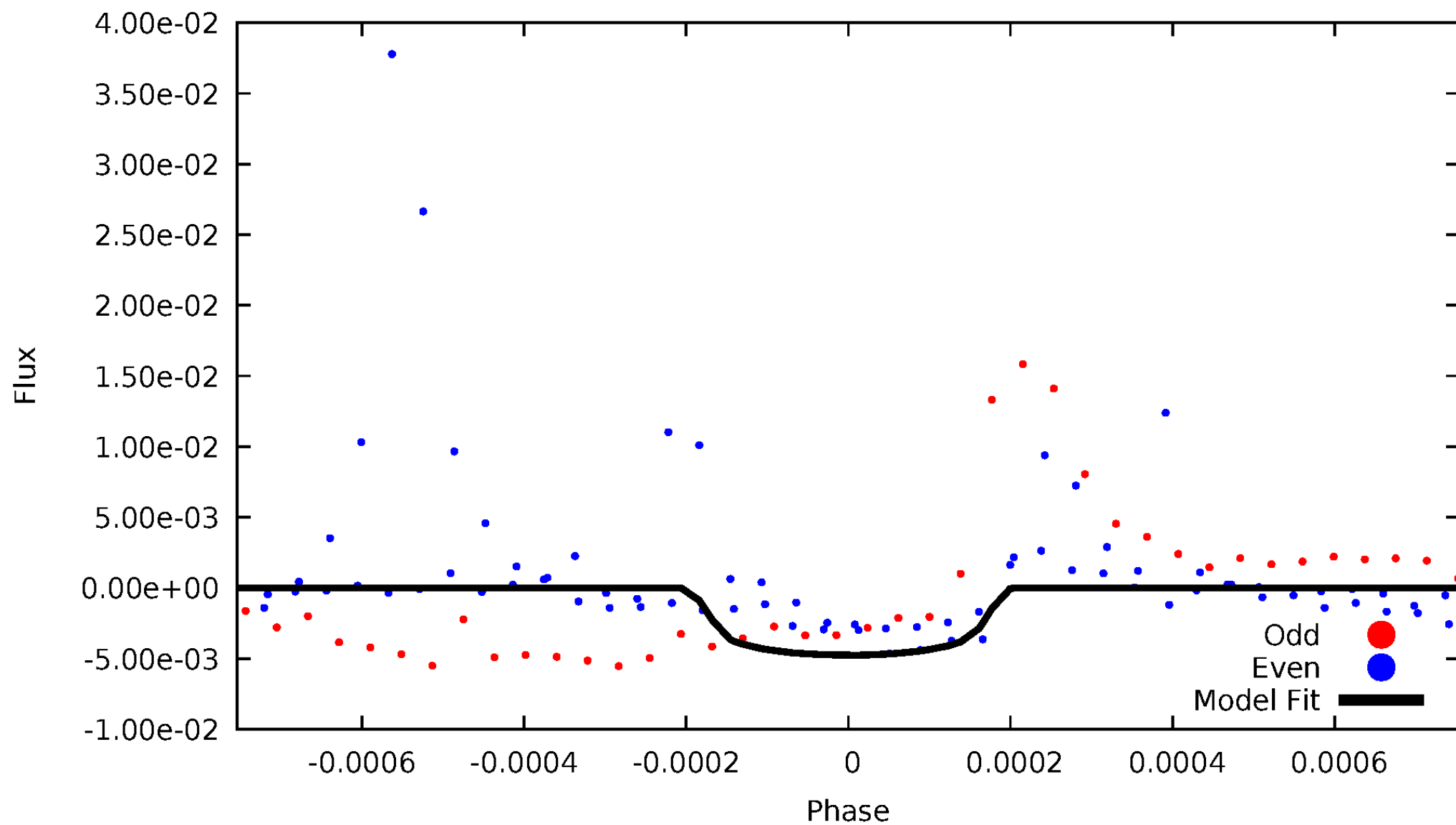


TCE 012354328-01



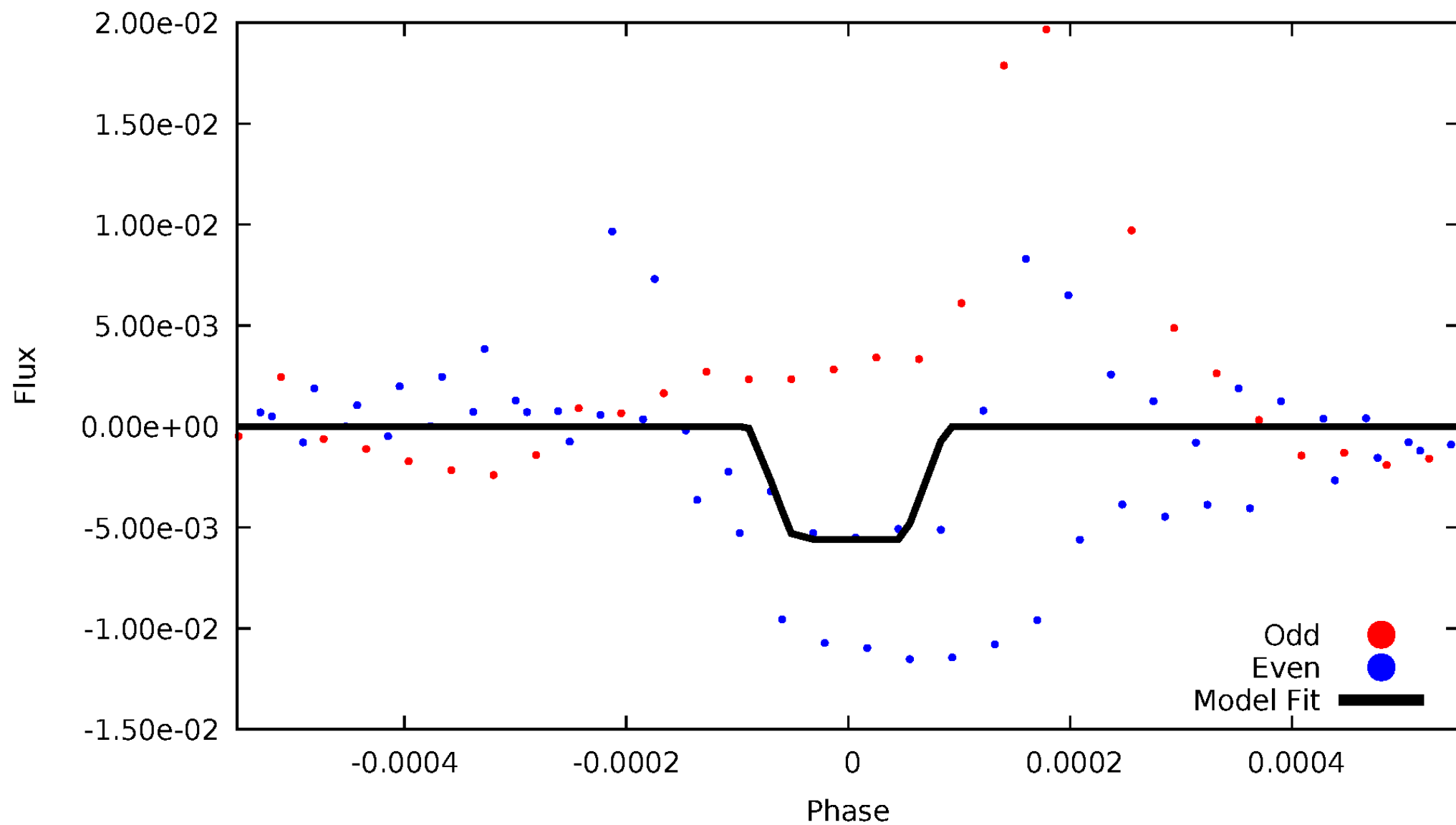
# DV Odd/Even

TCE 012354328-01



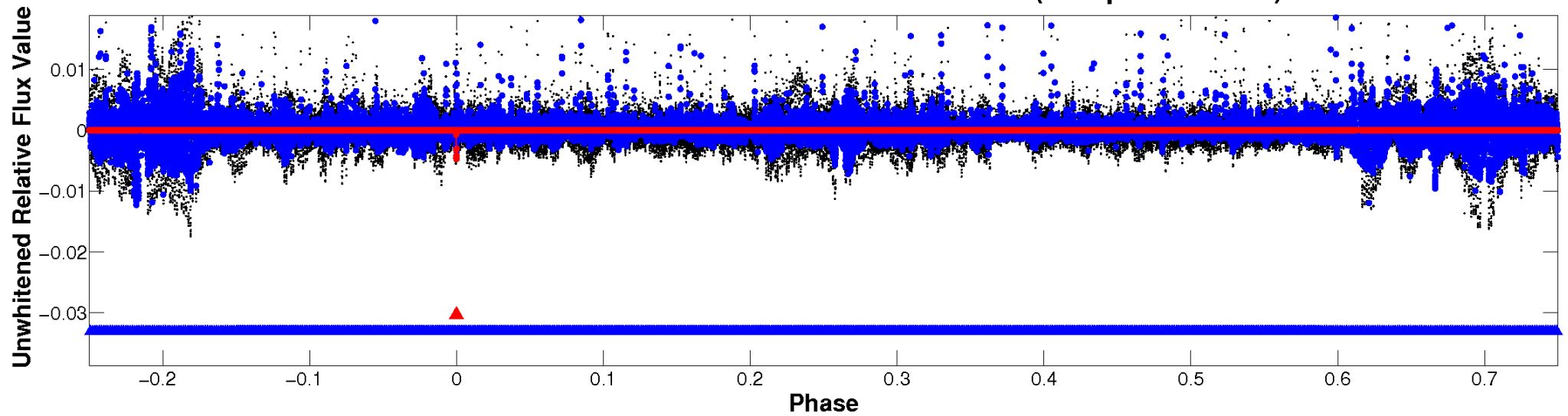
# ALT Odd/Even

TCE 012354328-01

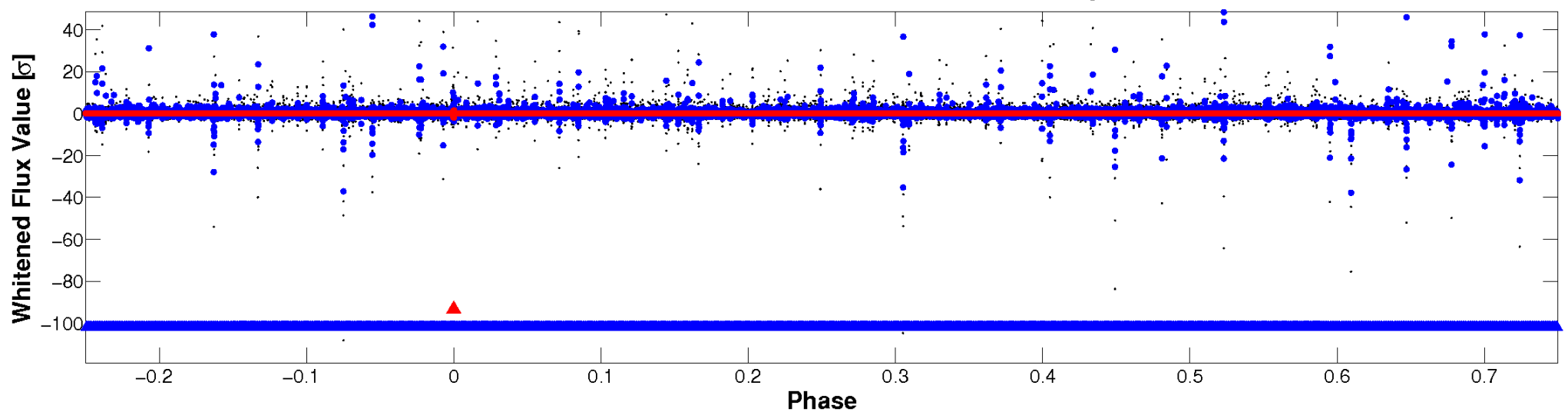


# Non-Whitened Vs. Whitened Light Curve

Planet 1 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

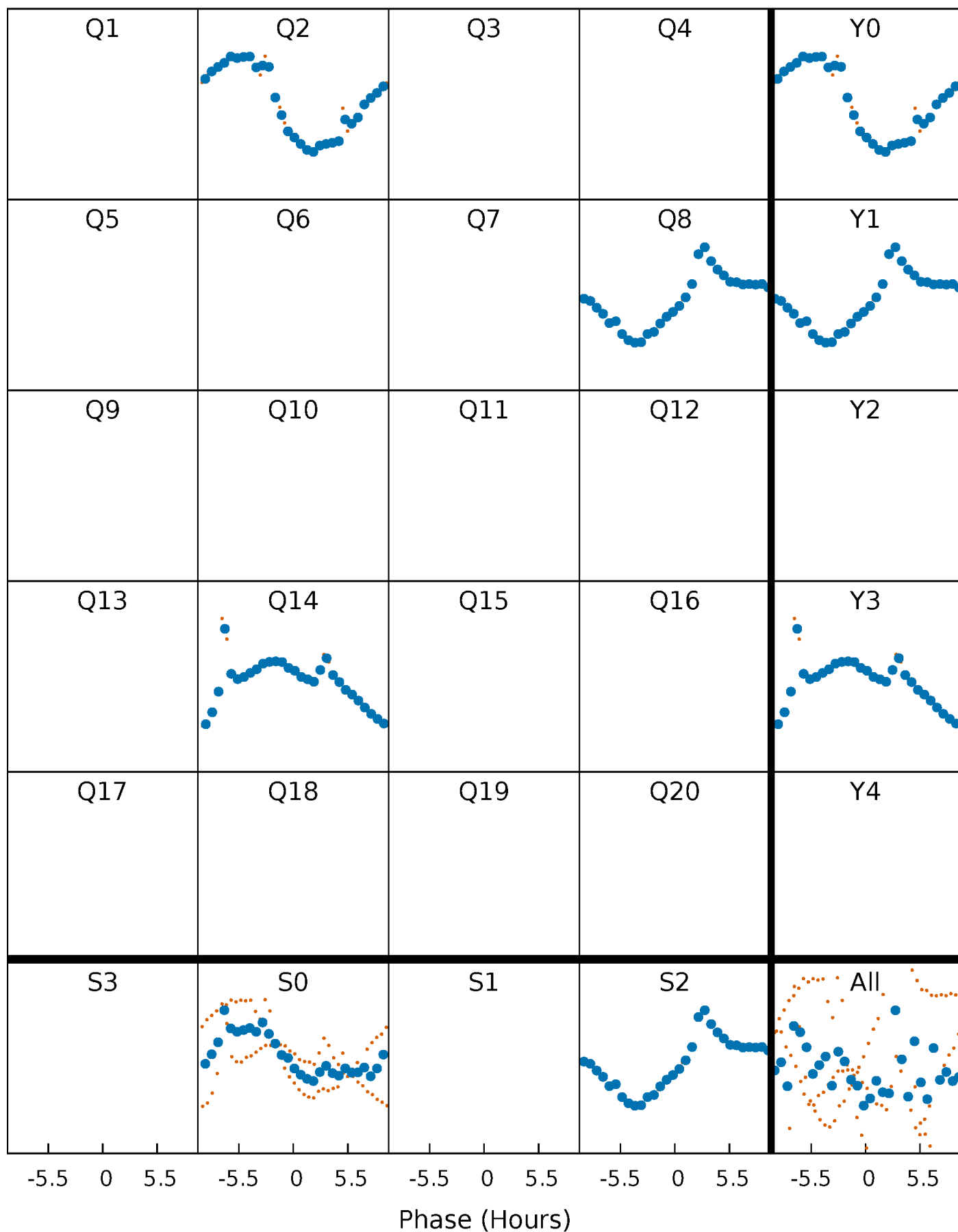


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

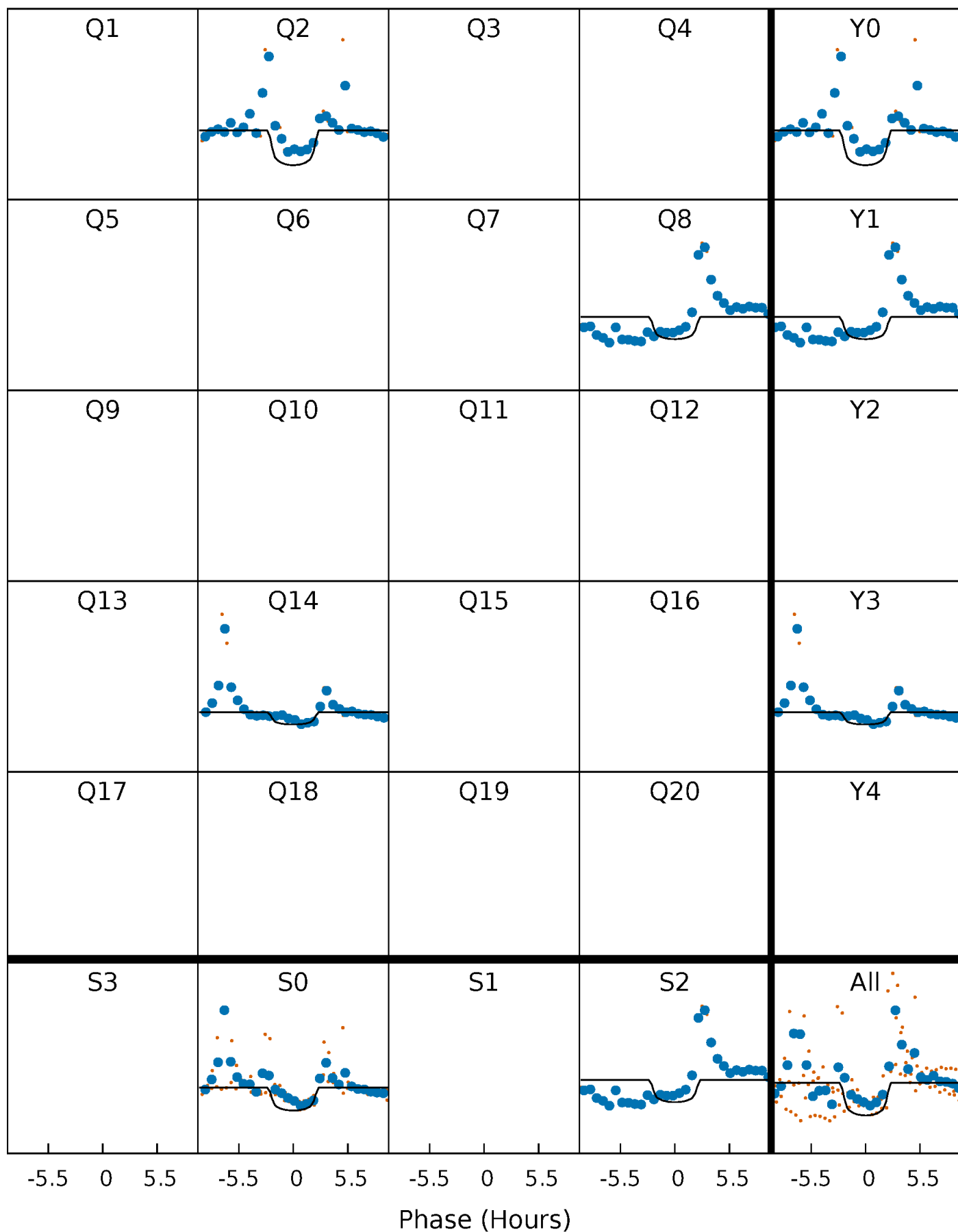
TCE 012354328-01 P=532.957799 Days  $T_0=211.629507$  (BKJD)





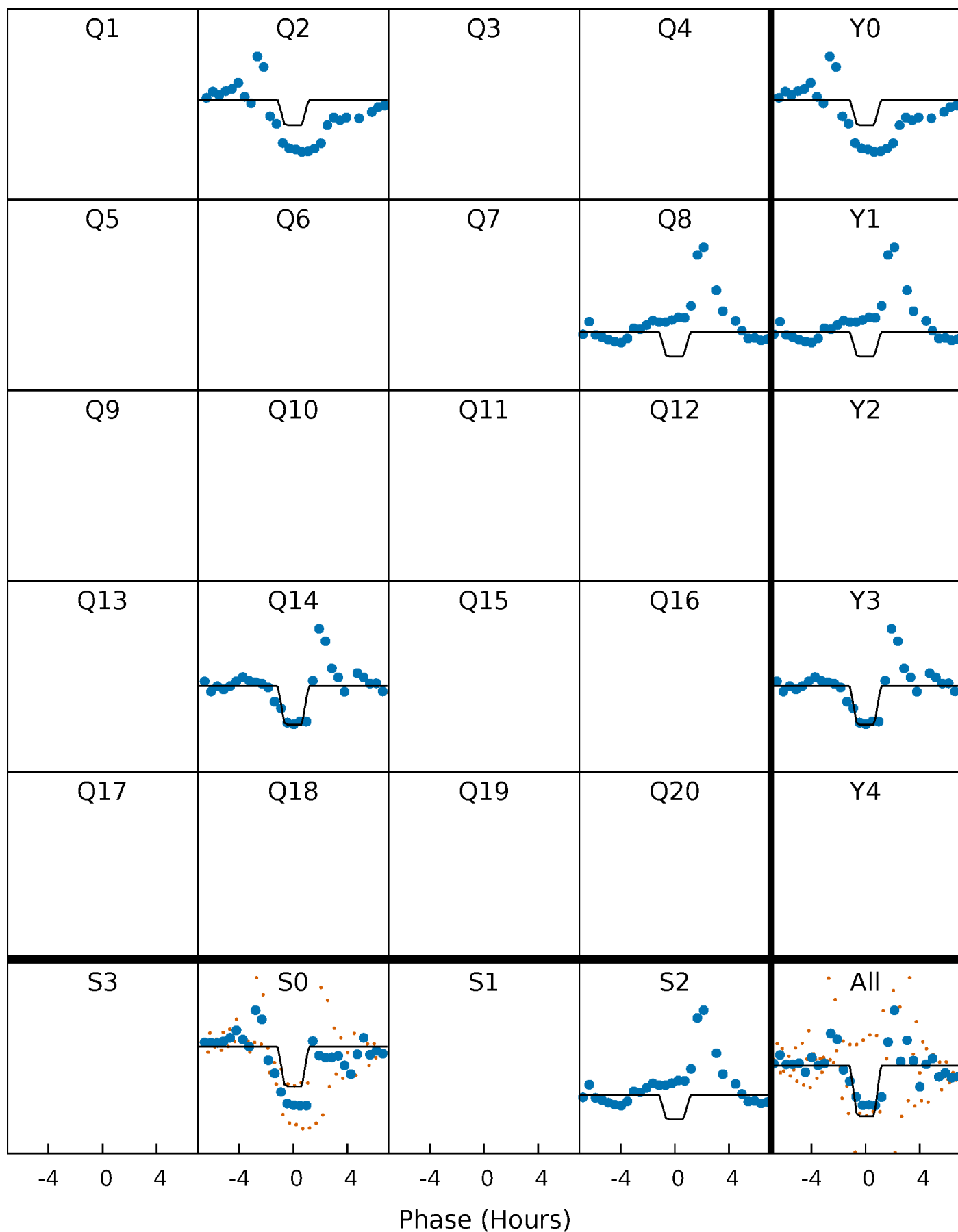
# DV Quarter-Phased Transit Curves

TCE 012354328-01 P=532.957799 Days  $T_0=211.629507$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

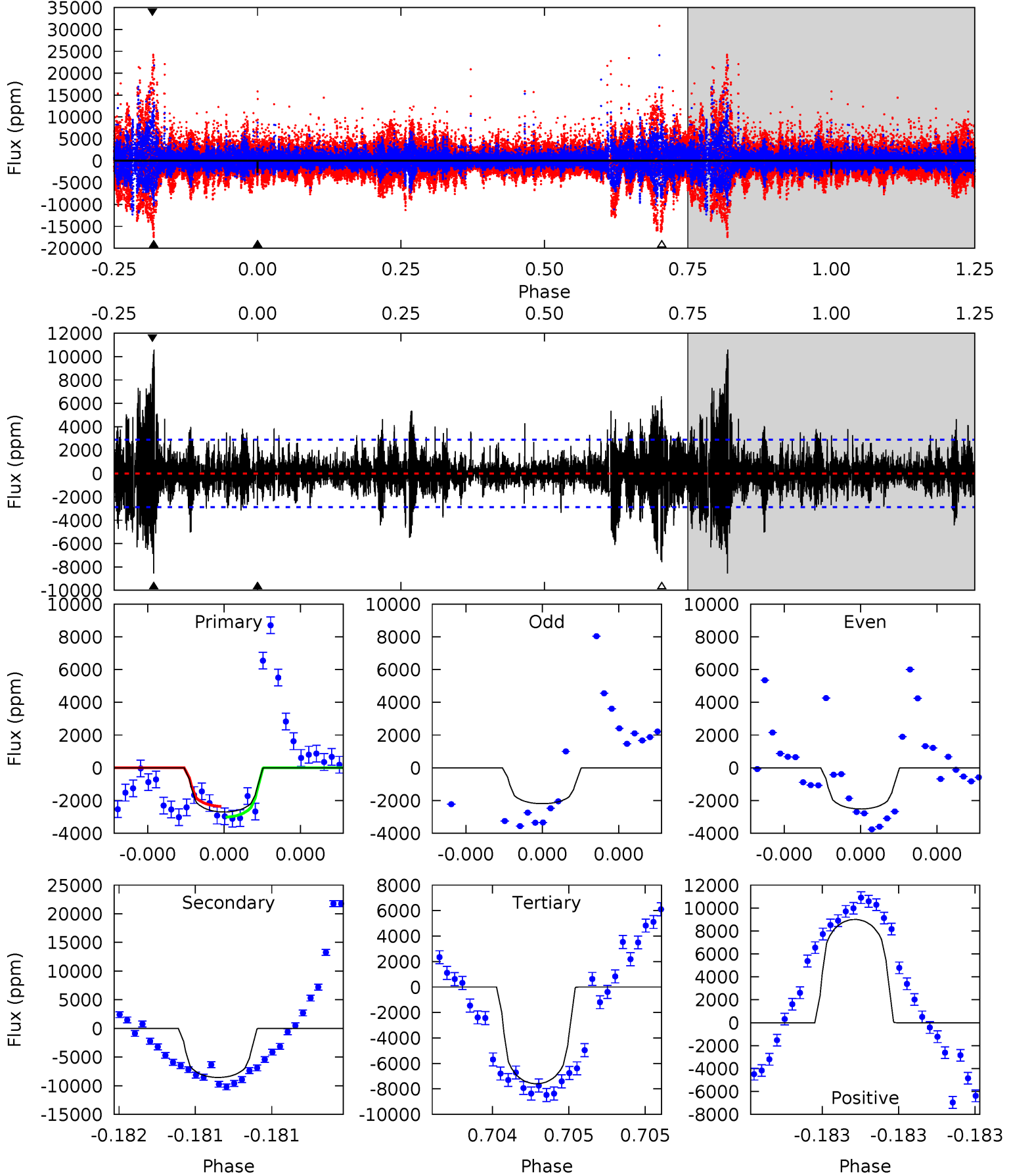
TCE 012354328-01 P=532.982168 Days  $T_0=211.624627$  (BKJD)



# DV Model-Shift Uniqueness Test

012354328-01, P = 532.957799 Days, E = 211.629507 Days

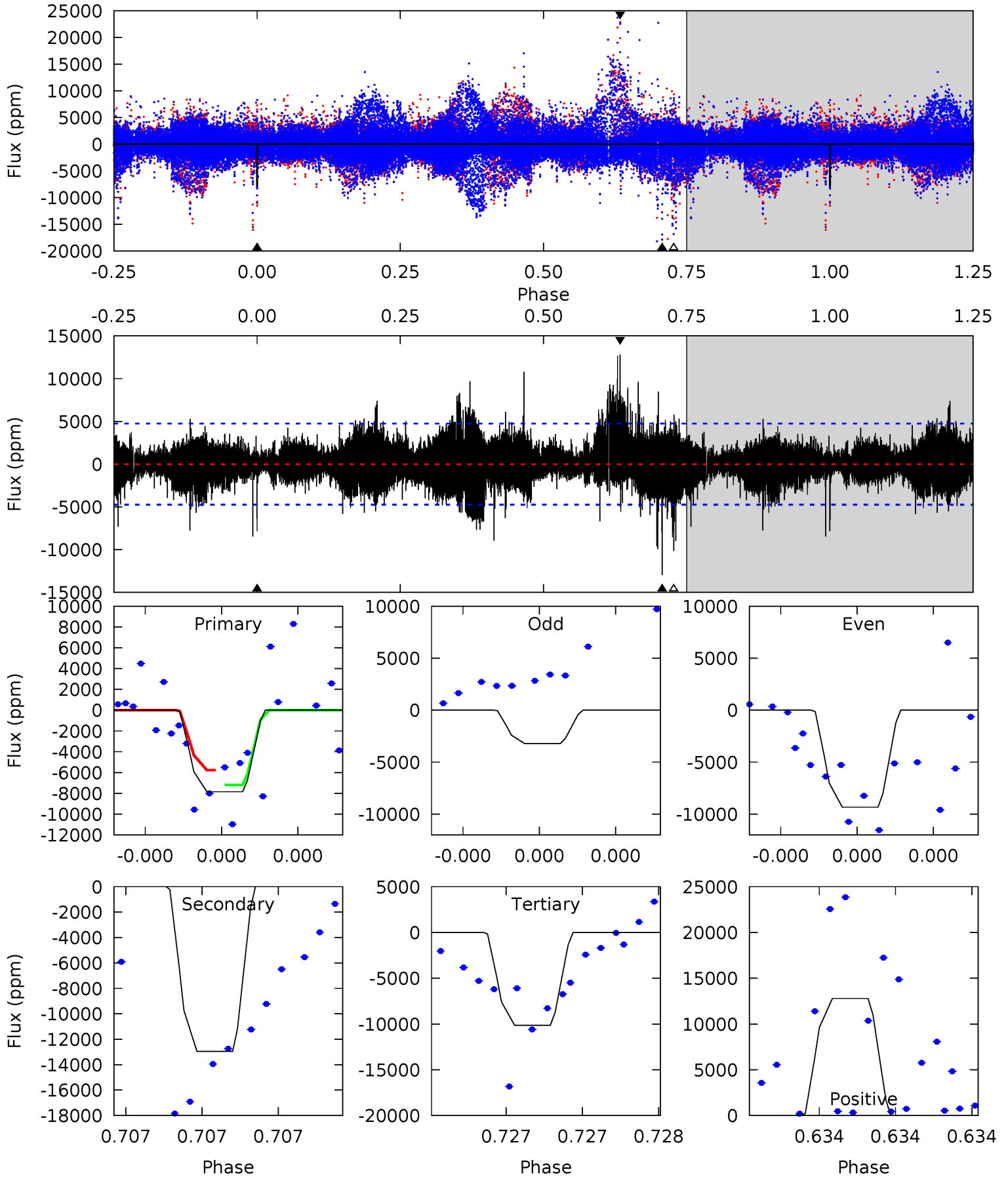
| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 5.26 | 16.7 | 14.8 | 17.5 | 5.61            | 3.54            | 2.91             | -9.53   | -12.3   | 1.87    | -0.87   | 0.26    | 1.10 | 0.55  | 0.61 |



# Alt Model-Shift Uniqueness Test

012354328-01, P = 532.982168 Days, E = 211.624627 Days

| Pri  | Sec  | Ter  | Pos  | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|------|------|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 9.53 | 15.7 | 12.3 | 15.5 | 5.76            | 3.77            | 2.25             | -2.79   | -6.01   | 3.43    | 0.21    | 3.32    | 0.84 | 0.50  | 0.90 |



### Stellar Parameters For KIC 012354328

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | [Fe/H]                     | $R$ ( $R_{\odot}$ )       | $M(M_{\odot})$            | $p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ ) |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5251^{+183}_{-183}$ | $4.630^{+0.066}_{-0.048}$ | $-1.020^{+0.300}_{-0.300}$ | $0.633^{+0.055}_{-0.050}$ | $0.624^{+0.060}_{-0.023}$ | $3.458^{+0.879}_{-0.584}$                     |
|        | +3%/-3%              | +1%/-1%                   | +29%/-29%                  | +9%/-8%                   | +10%/-4%                  | +25%/-17%                                     |
| Source | PHO1                 | KIC0                      | KIC0                       | DSEP                      |                           |   |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 012354328-01 / KOI

| Detrend | Depth (ppm)      | $R_p$ ( $R_{\oplus}$ ) | $T_{max}$ (K)     | $T_{obs}$ (K)          | $A_{obs}$                     |
|---------|------------------|------------------------|-------------------|------------------------|-------------------------------|
| DV      | $-8554 \pm 513$  | $4.58^{+3.42}_{-2.72}$ | $245^{+10}_{-11}$ | $6248^{+4216}_{-1517}$ | $279175^{+1341900}_{-186514}$ |
| Alt.    | $-12962 \pm 823$ | $5.47^{+3.27}_{-3.26}$ | $245^{+11}_{-10}$ | $6271^{+4646}_{-1256}$ | $301745^{+1424863}_{-185883}$ |

$T_{max}$  = Theoretical Maximum Planetary Temperature

$T_{obs}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{obs}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{obs} \gg T_{max}$  AND  $A_{obs} \gg 1.0$

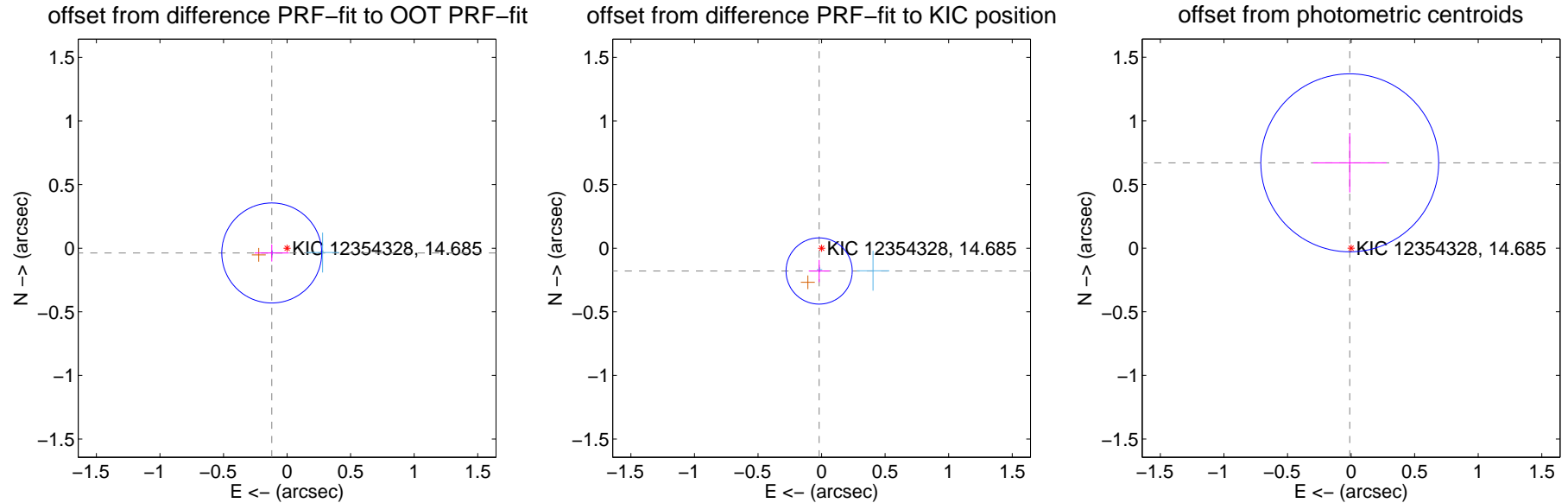
## DV Centroid Data

Supplemental centroid analysis for 012354328-01. Kepler magnitude: 14.69. Transit SNR 8.87

There are 2 quarters with good PRF difference image offsets

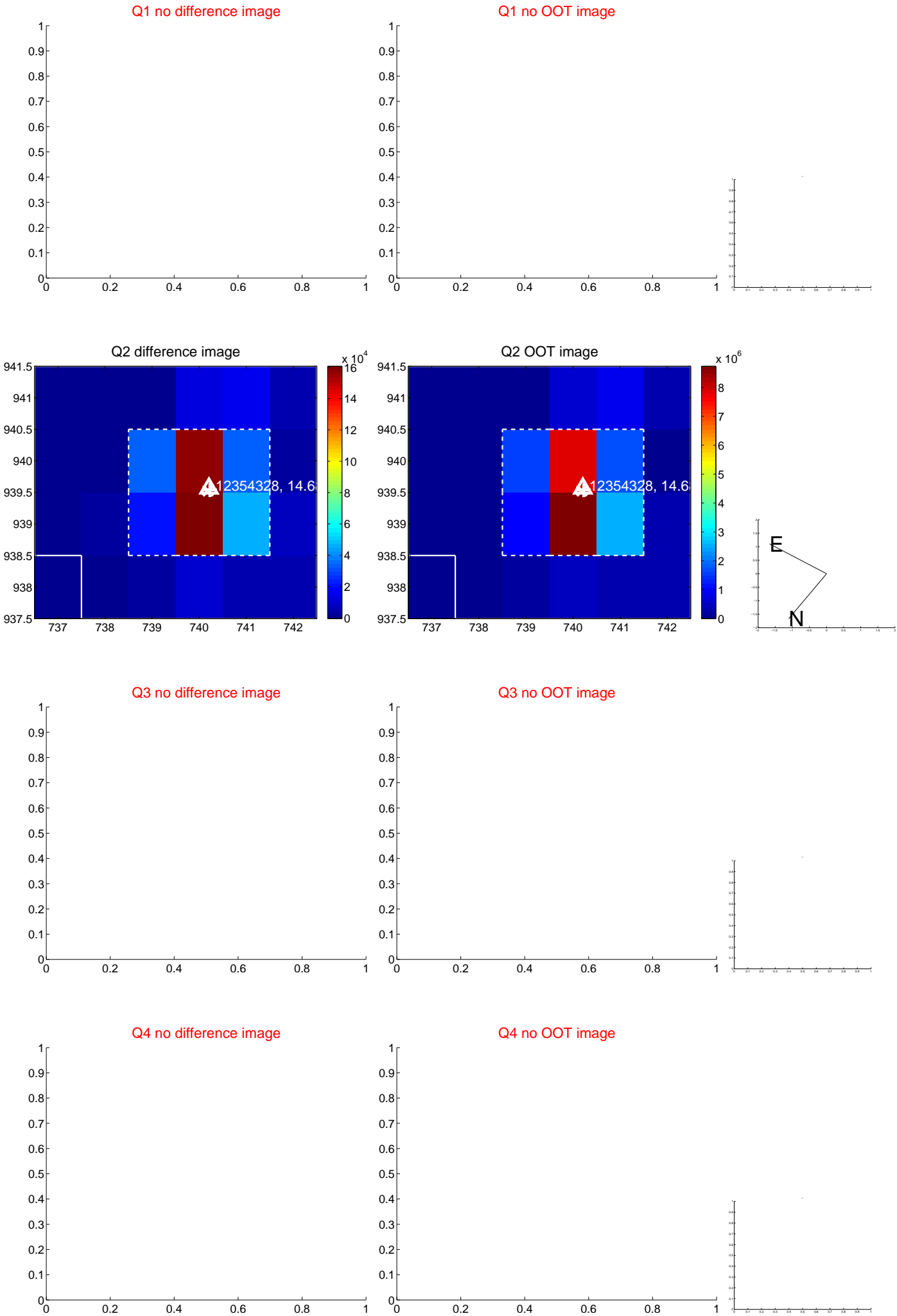
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA       | $\Delta$ Dec       |
|---|--------------------|---------------------|-------------------|--------------------|
| PRF-fit source offset from OOT          | $0.126 \pm 0.131$  | 0.96                | $0.120 \pm 0.135$ | $-0.038 \pm 0.067$ |
| PRF-fit source offset from KIC position | $0.180 \pm 0.087$  | 2.08                | $0.019 \pm 0.082$ | $-0.179 \pm 0.087$ |
| photometric centroid source offset      | $0.67 \pm 0.23$    | 2.88                | $0.01 \pm 0.29$   | $0.67 \pm 0.23$    |

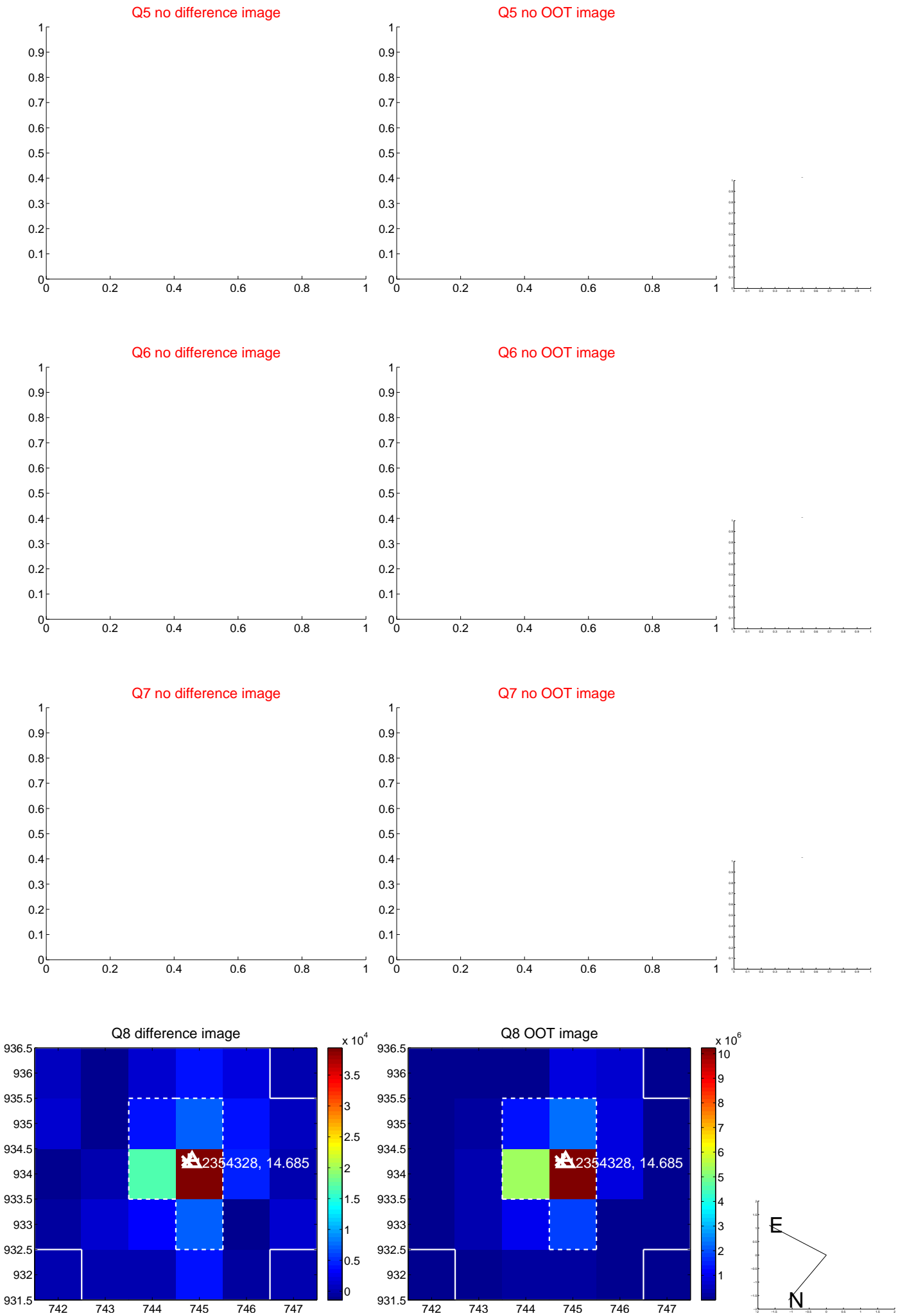


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

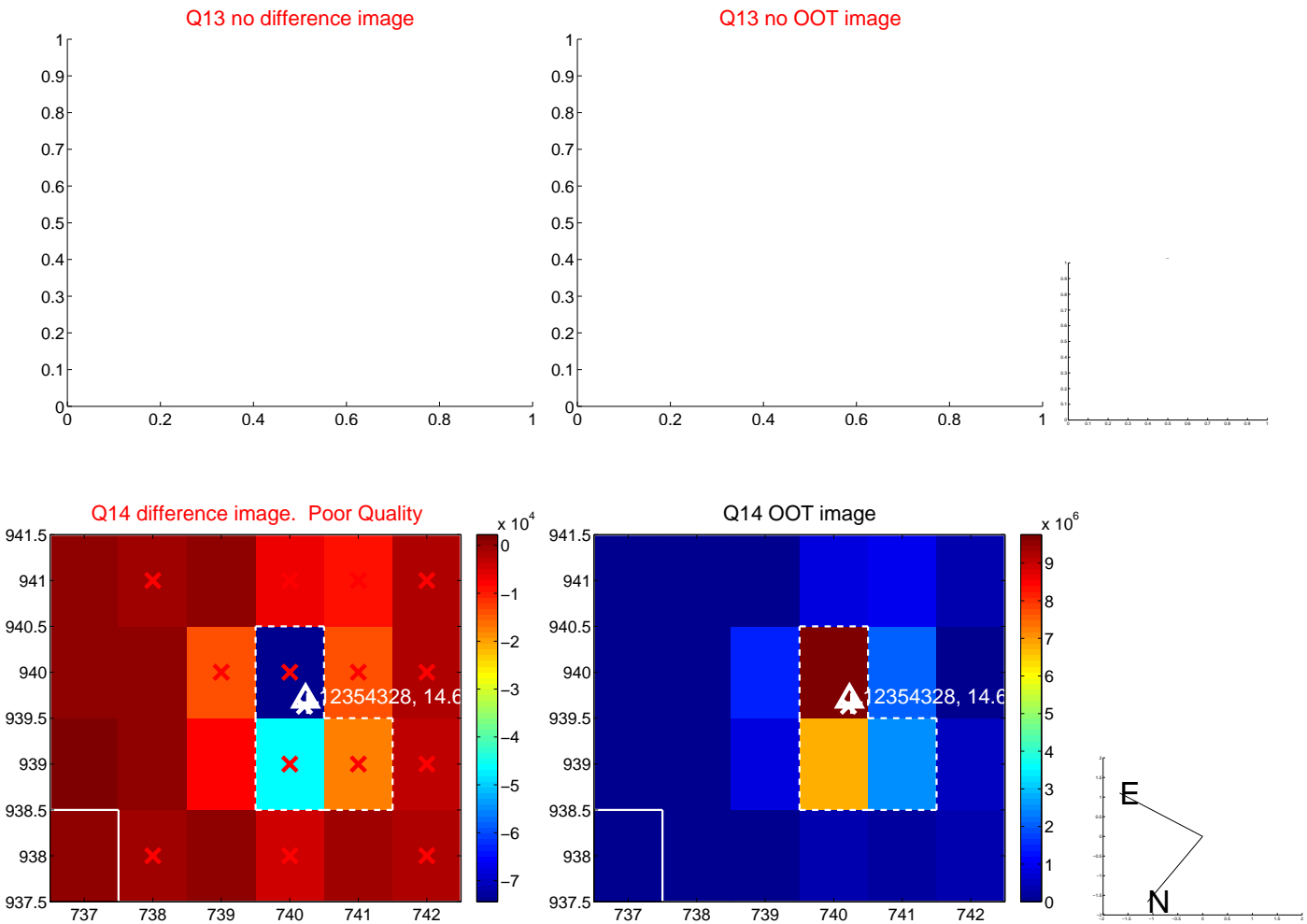




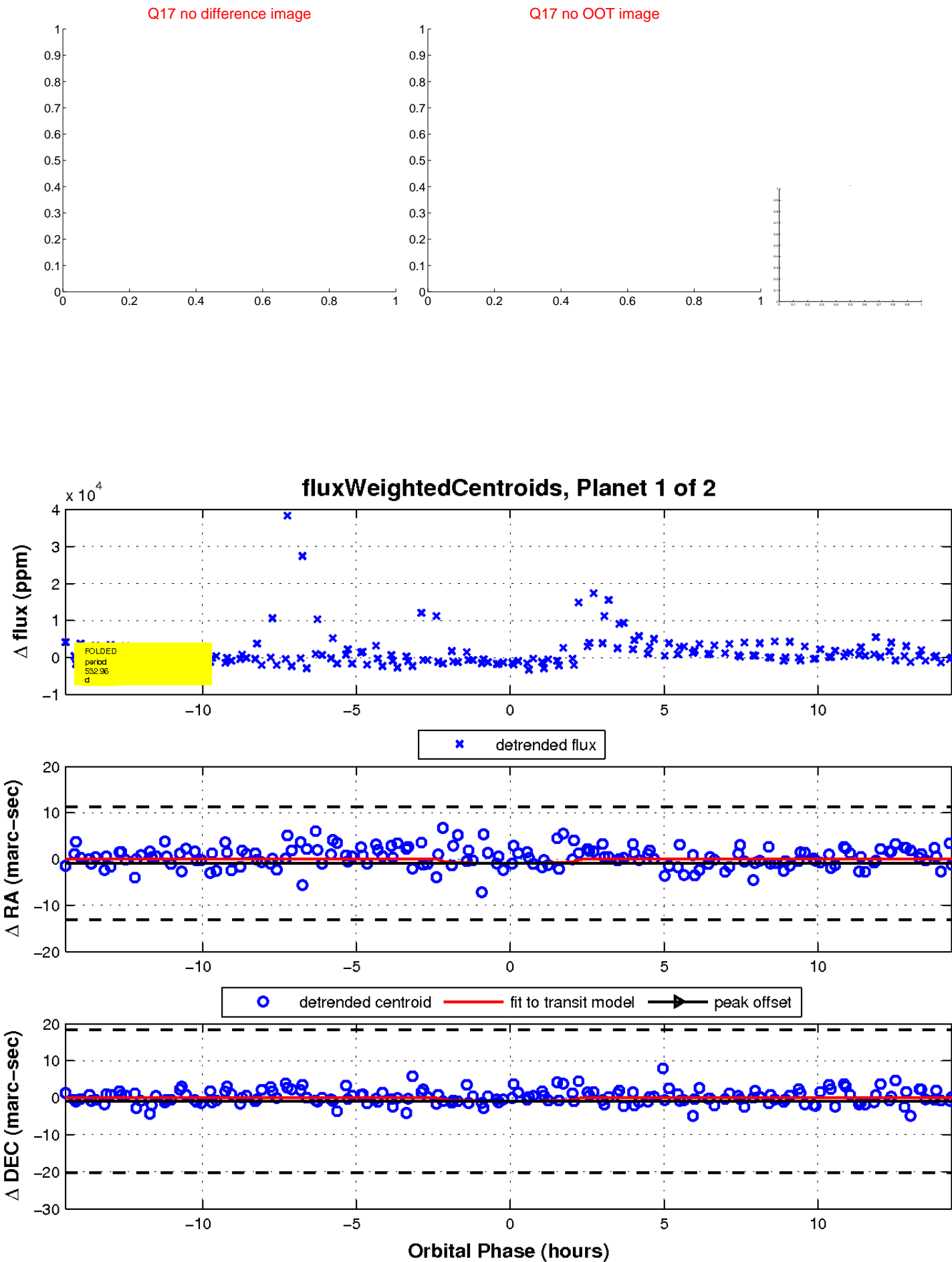
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

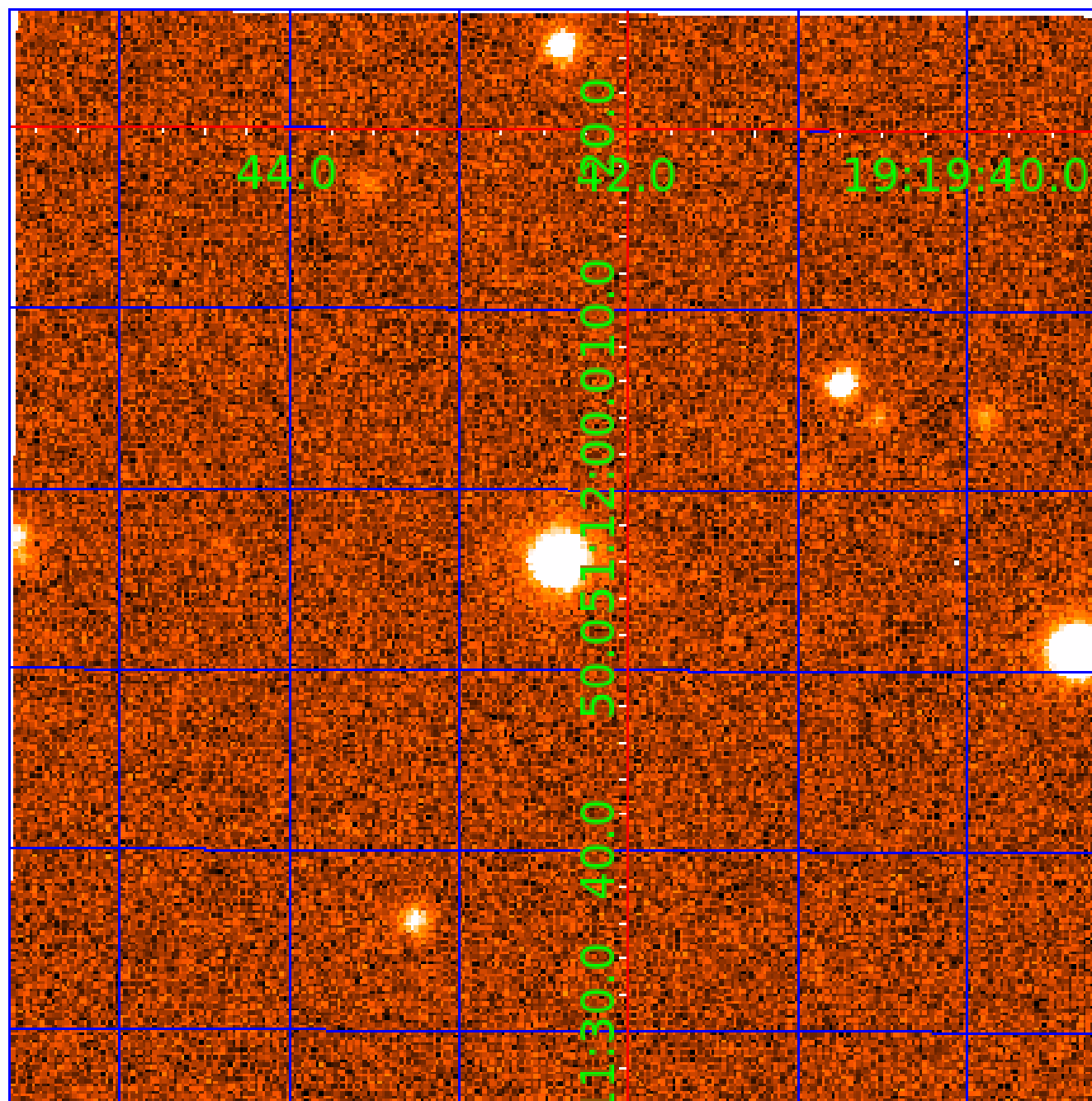


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination



# KIC 012354328

## Q1-17 DR25 TCE Parameters

| TCE          | Run Type | KOI? | Period (Days) | Epoch (BKJD) | Depth (ppm) | Duration (Hours) | MES  | SNR  | $R_{\star}$ ( $R_{\odot}$ ) | $T_{\star}$ (K) | $R_p$ ( $R_{\oplus}$ ) | $S_p$ ( $S_{\oplus}$ ) |
|--------------|----------|------|---------------|--------------|-------------|------------------|------|------|-----------------------------|-----------------|------------------------|------------------------|
| 012354328-01 | OBS      | No   | 532.957799    | 211.629507   | 4756.4      | 4.821            | 15.9 | 8.9  | 0.63                        | 5251            | 4.32                   | 0.23                   |
| 012354328-02 | OBS      | No   | 0.802884      | 132.328010   | 394.5       | 7.741            | 12.4 | 15.9 | 0.63                        | 5251            | 1.27                   | 1307.96                |

## Robovetter Results

| TCE          | Run Type | Disp | Score | N | S | C | E | Comments   |
|--------------|----------|------|-------|---|---|---|---|--|
| 012354328-01 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS |
| 012354328-02 | OBS      | FP   | 0.00  | 1 | 0 | 0 | 0 | SWEET_NTL—LPP_DV—MOD_NONUNIQ_ALT   |

**Notes:** OBS = Observed. INJ = Injected. INV = Inverted. SCR = Scrambled.

N = Not Transit-Like. S = Stellar Eclipse. C = Centroid Offset. E = Ephemeris Match.

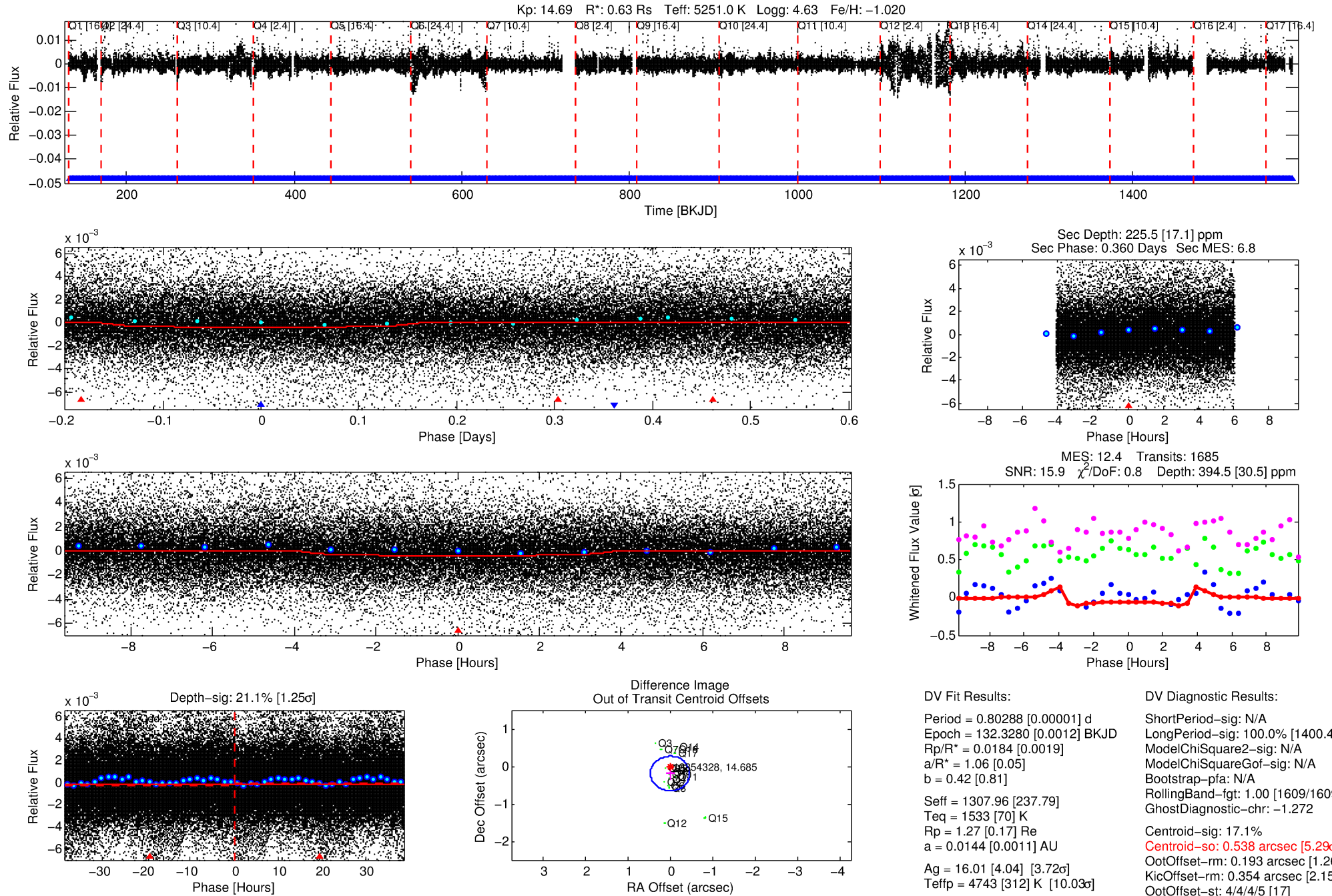
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 012354328-02

No Significant Match Found

# DV One-Page Summary

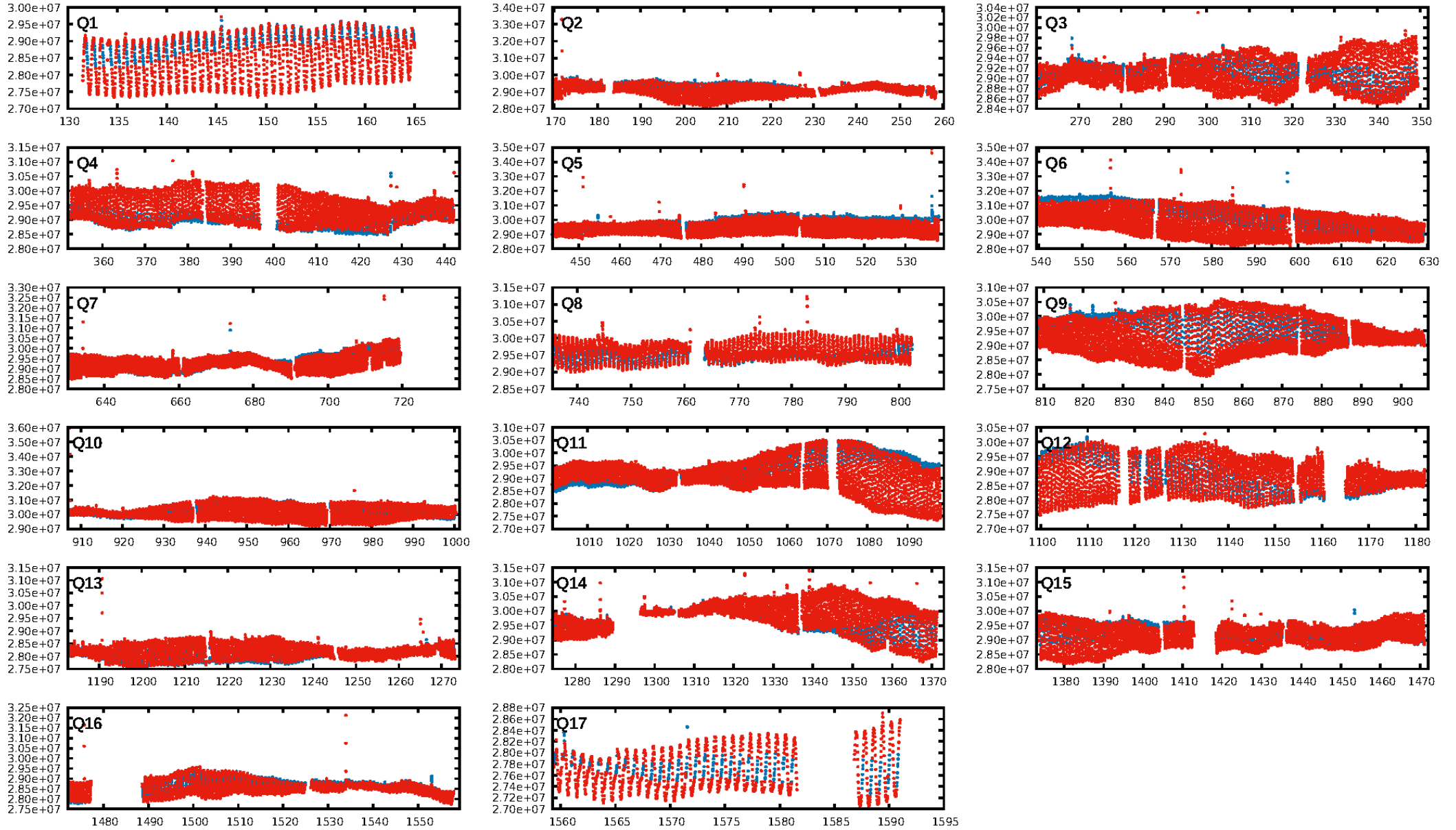
KIC: 12354328 Candidate: 2 of 2 Period: 0.803 d



Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 05:14:50 Z

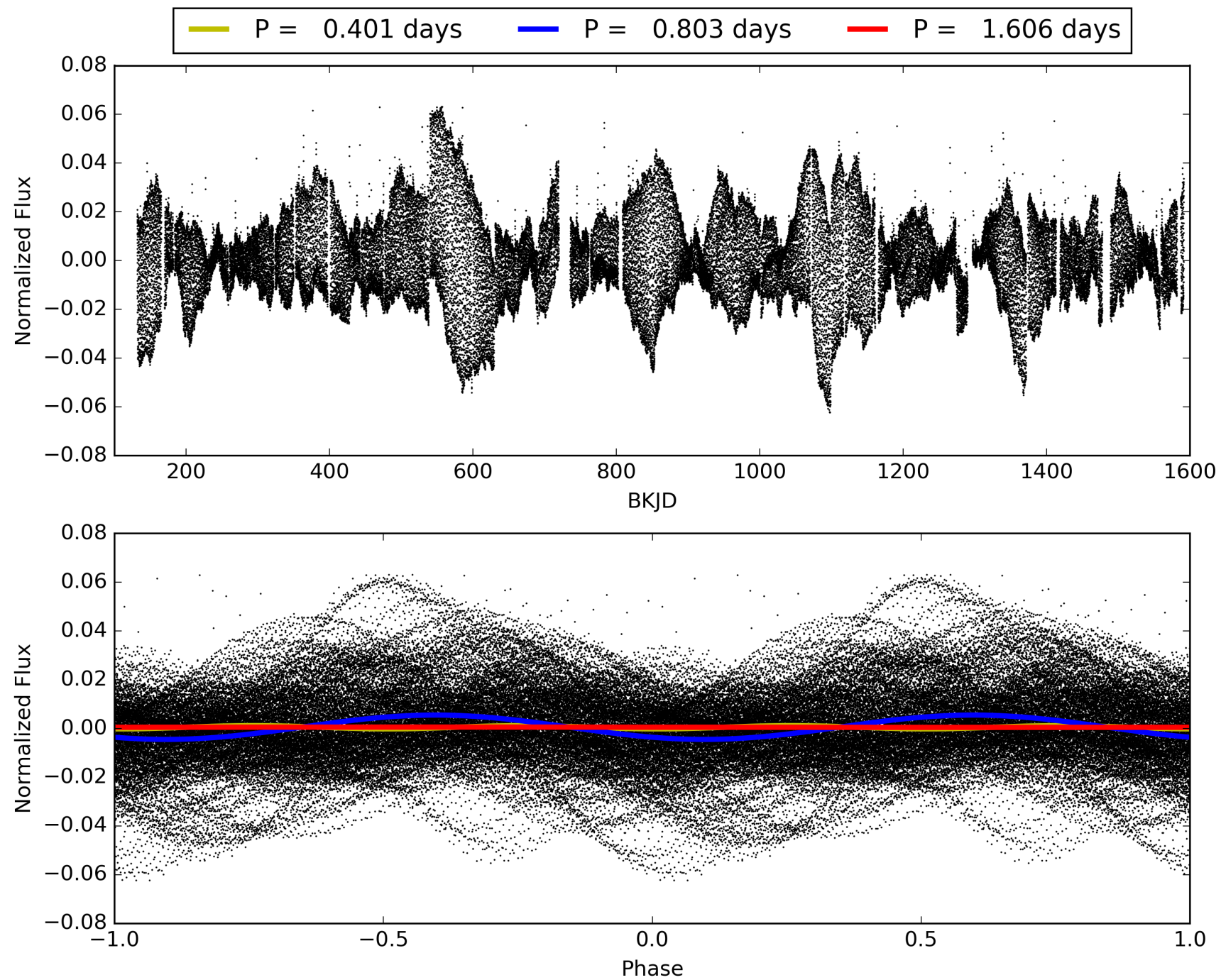
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 012354328-02, PDC Light Curves





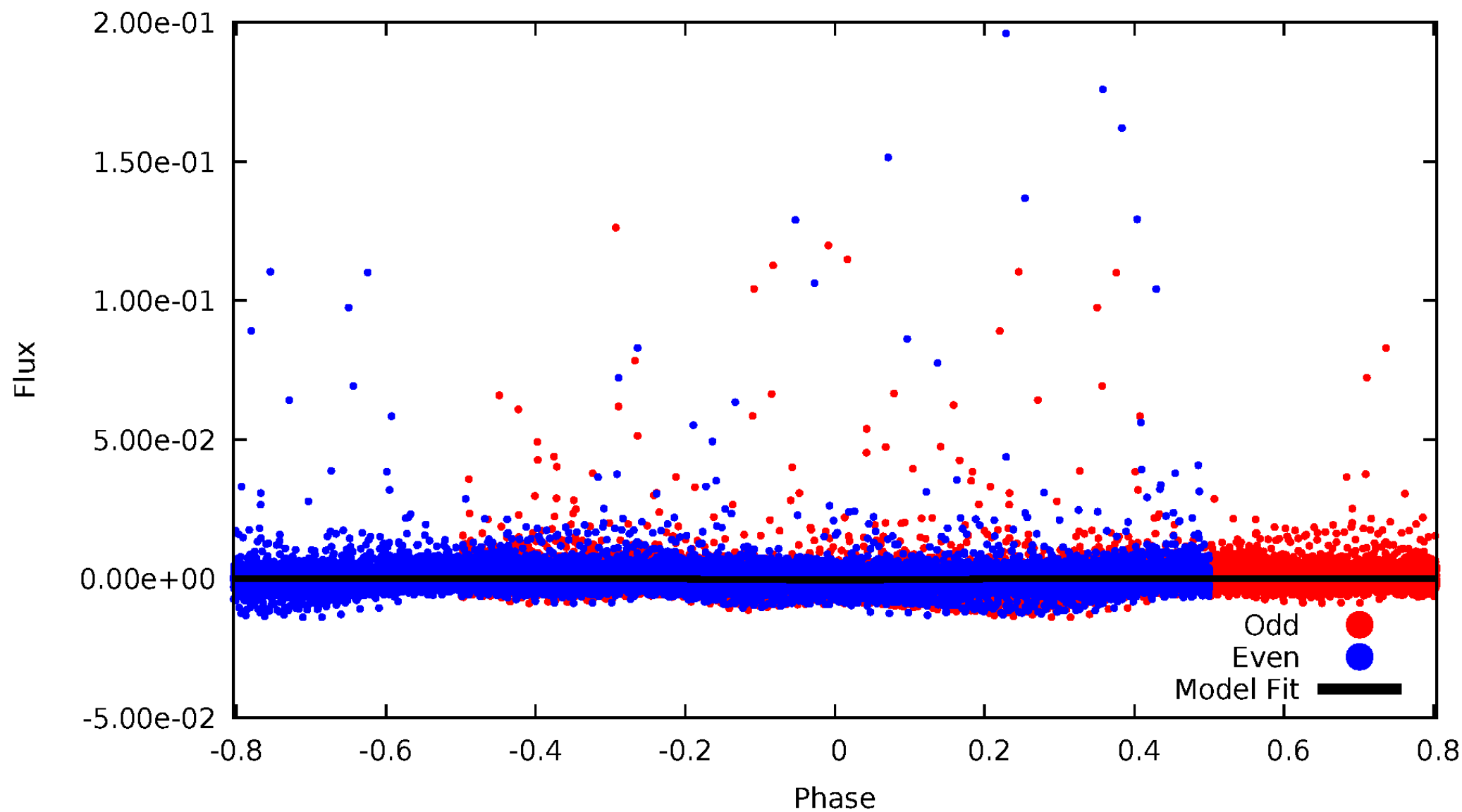
TCE 012354328-02





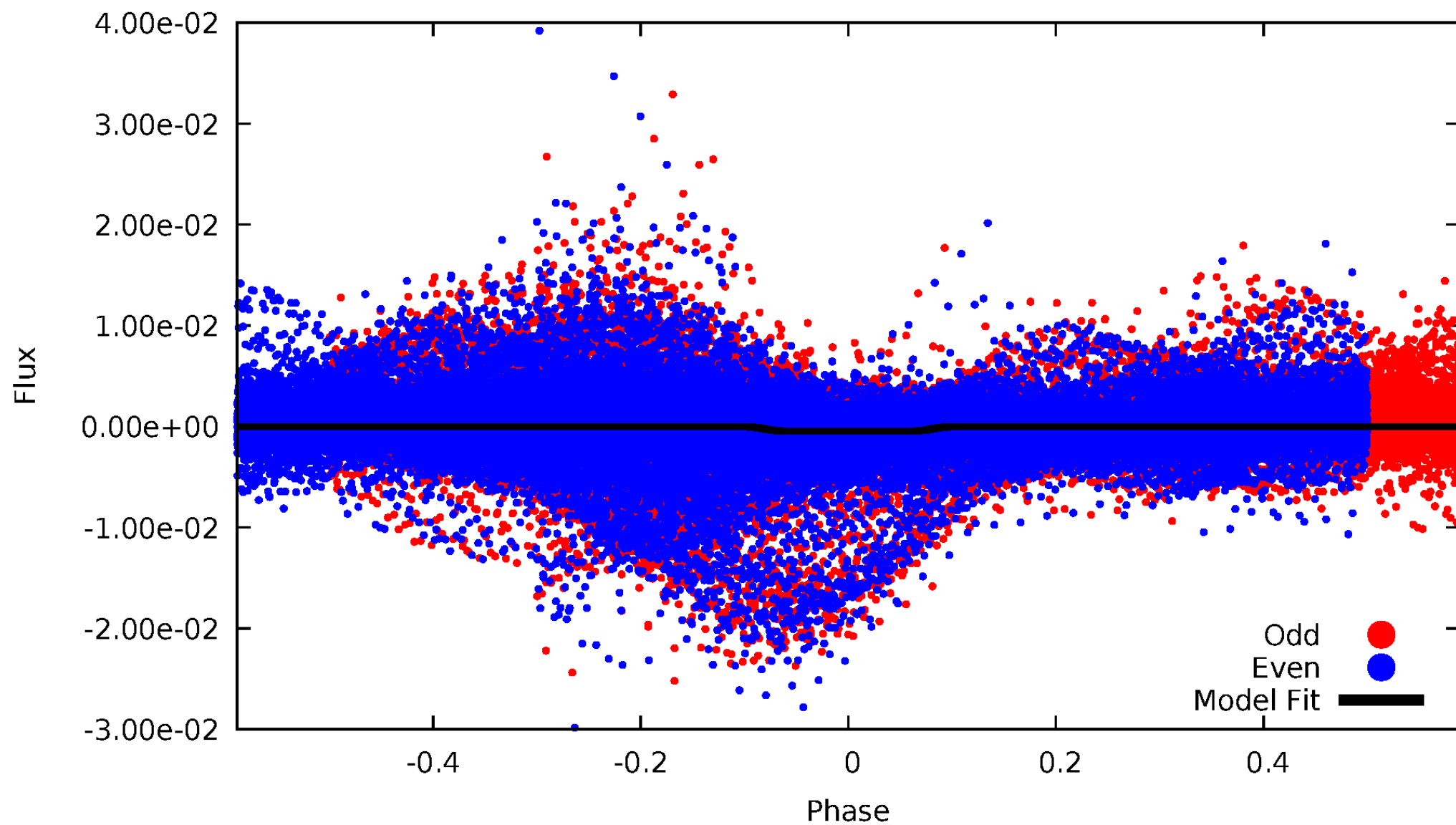
# DV Odd/Even

TCE 012354328-02



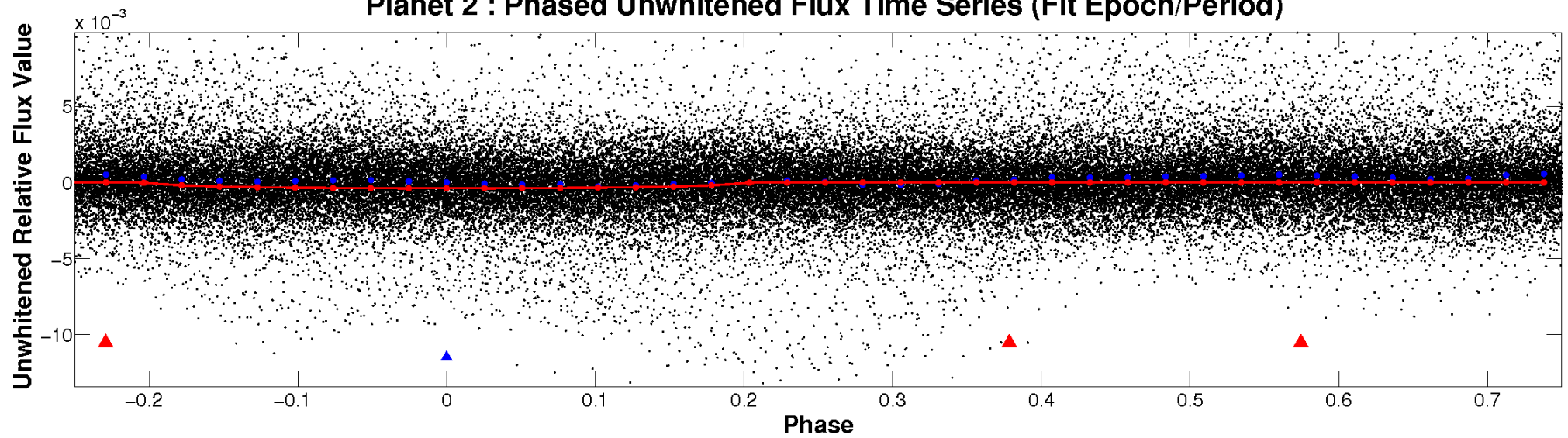
# ALT Odd/Even

TCE 012354328-02

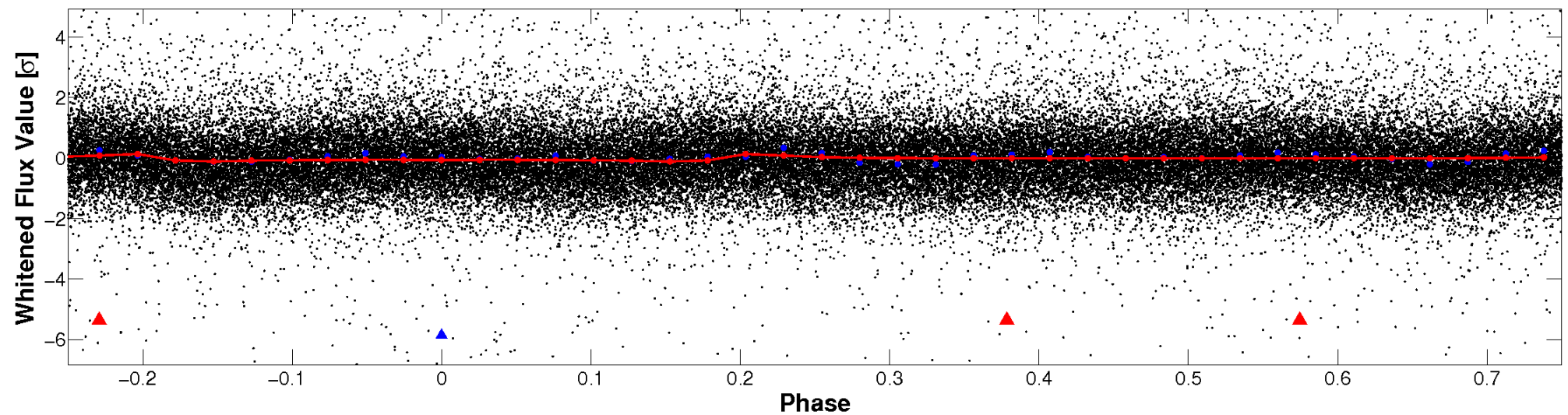


# Non-Whitened Vs. Whitened Light Curve

**Planet 2 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)**

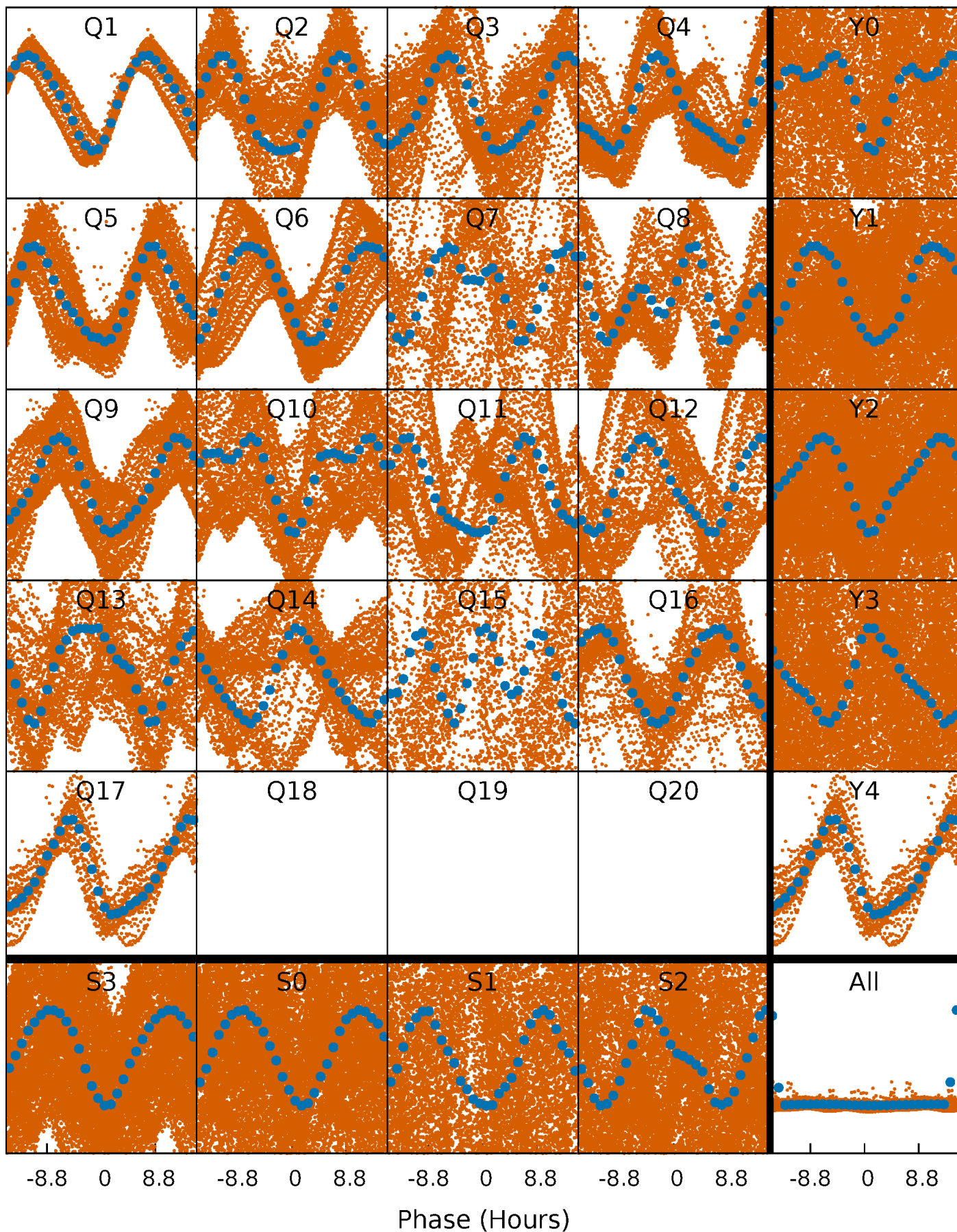


**Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

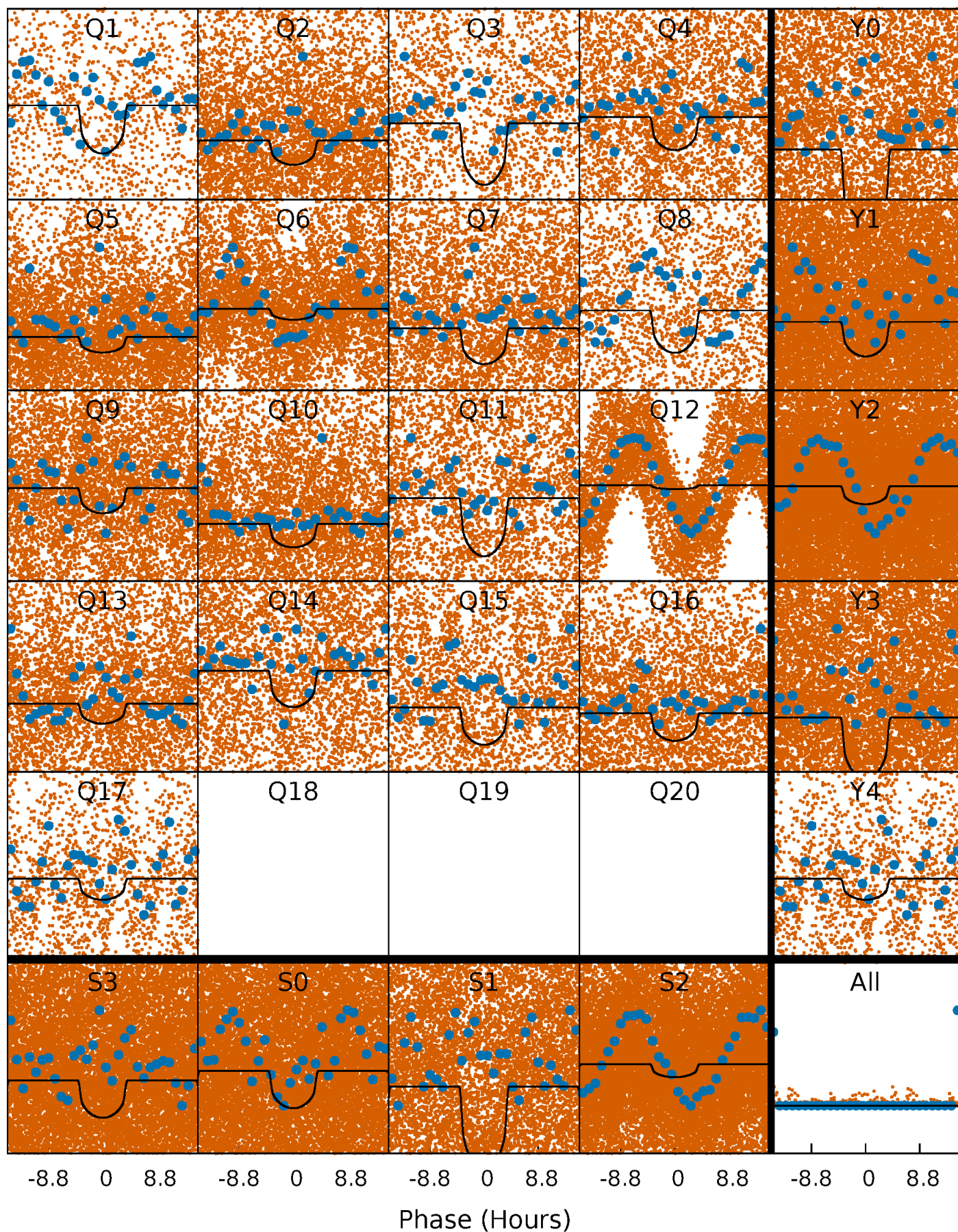
TCE 012354328-02   P= 0.802884 Days    $T_0=132.328010$  (BKJD)





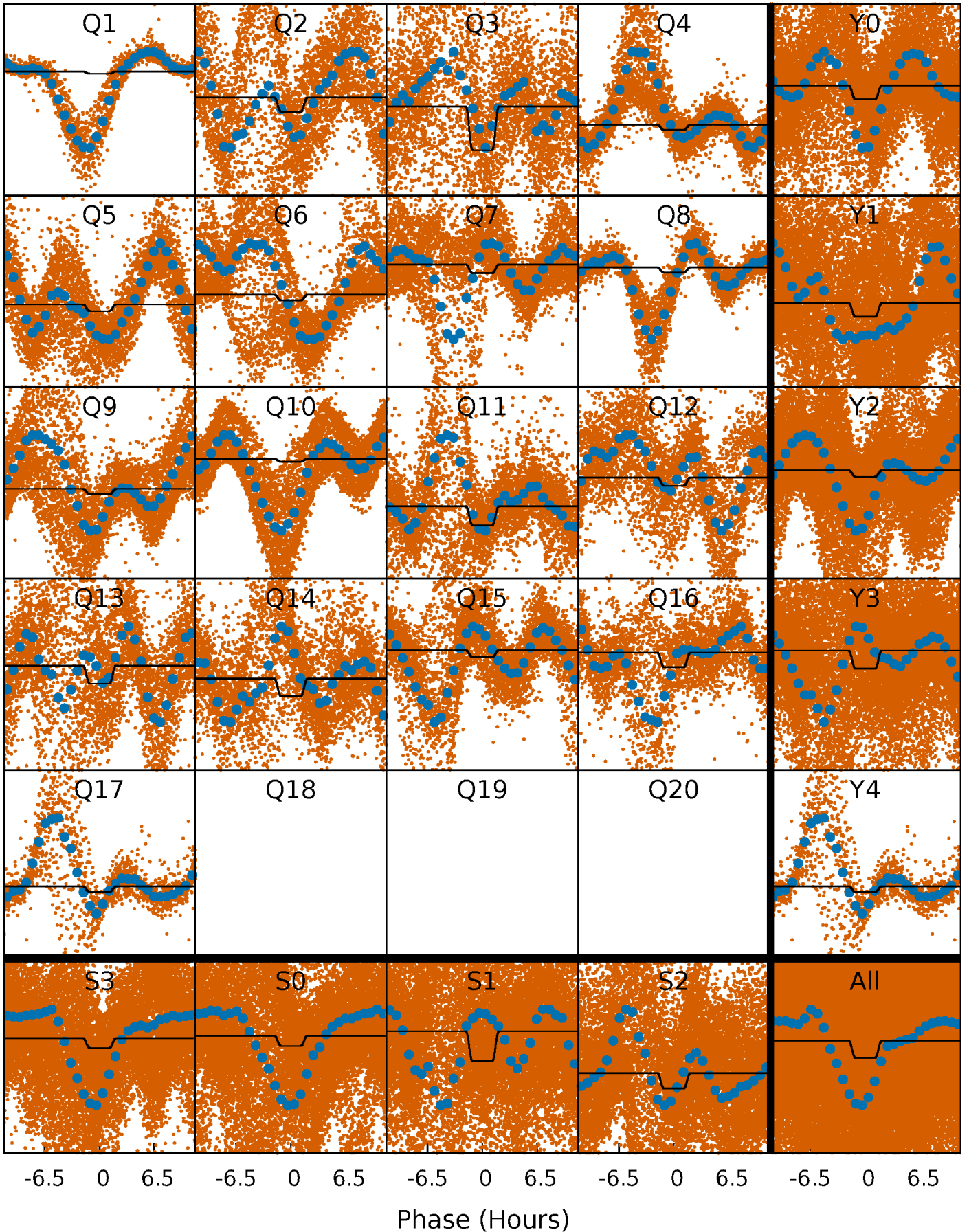
# DV Quarter-Phased Transit Curves

TCE 012354328-02    P= 0.802884 Days     $T_0=132.328010$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

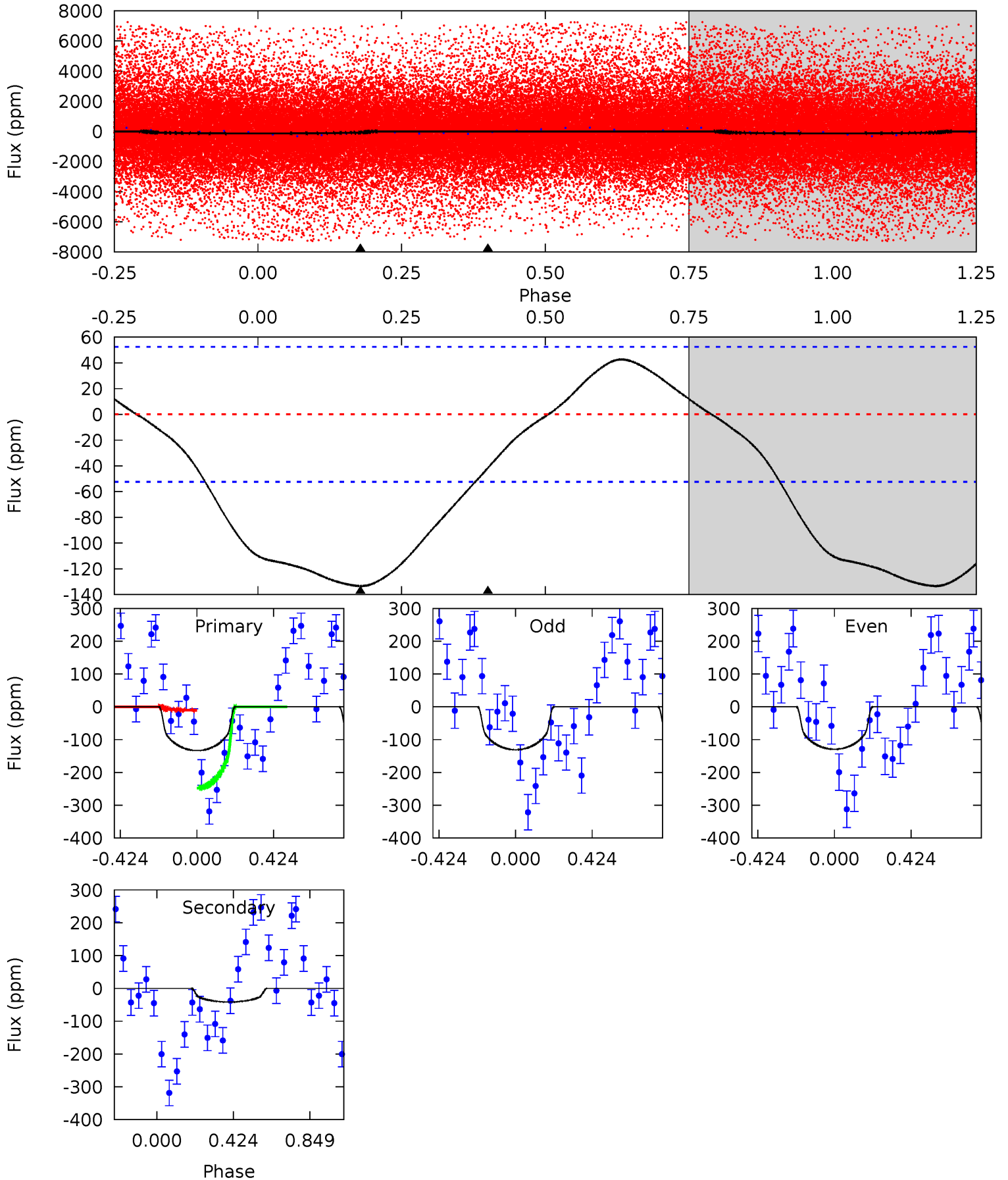
TCE 012354328-02    P= 0.802894 Days     $T_0=132.370243$  (BKJD)



# DV Model-Shift Uniqueness Test

012354328-02, P = 0.802884 Days, E = 130.722242 Days

| Pri  | Sec  | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 10.8 | 3.38 | 0   | 0   | 4.25            | 0.80            | 0.73             | 10.8    | 10.8    | 3.38    | 3.38    | 0.06    | 0.22 | 0.24  | 10.2 |

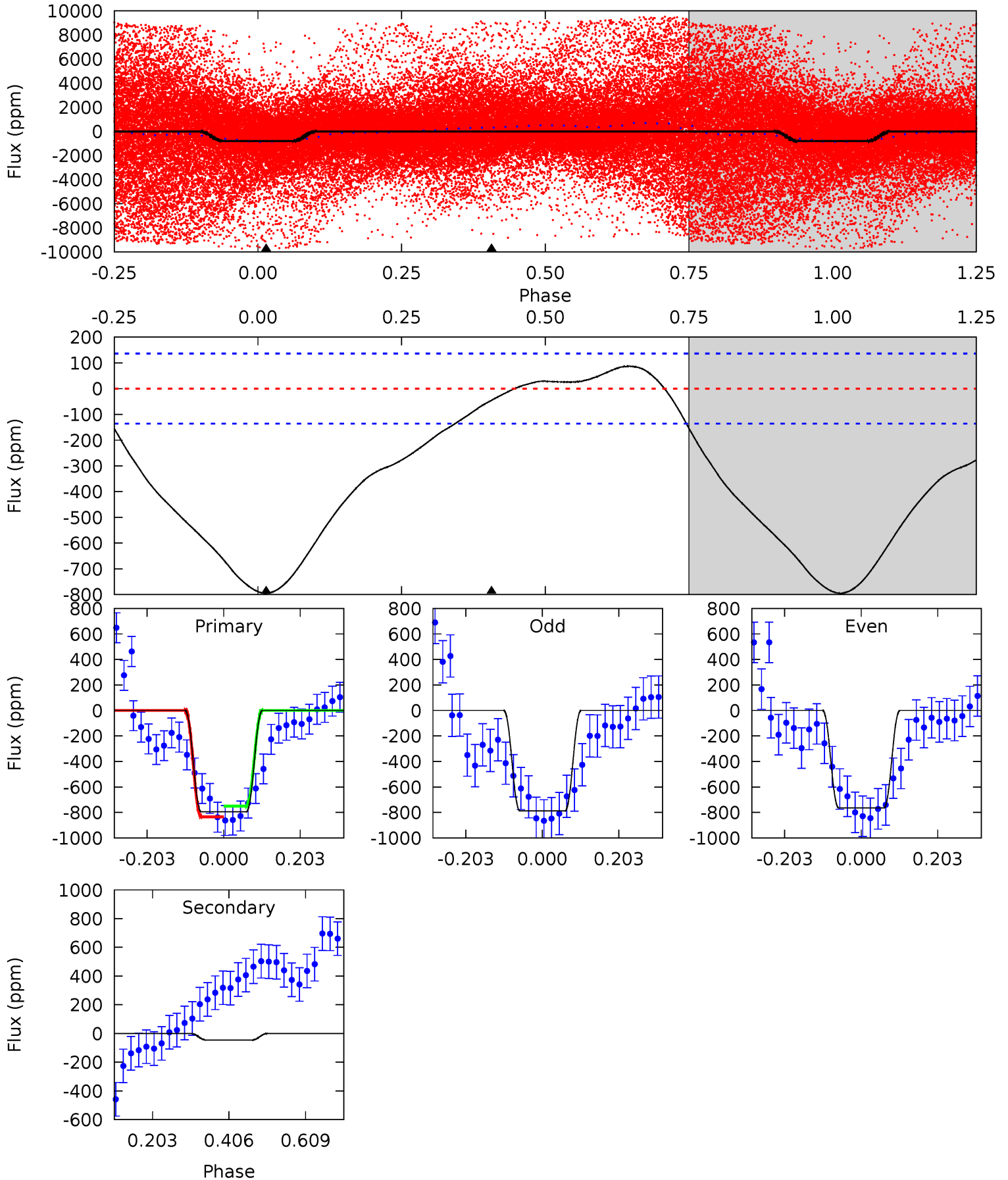




# Alt Model-Shift Uniqueness Test

012354328-02, P = 0.802894 Days, E = 130.764455 Days

| Pri  | Sec  | Ter | Pos | FA <sub>1</sub> | FA <sub>2</sub> | F <sub>Red</sub> | Pri-Ter | Pri-Pos | Sec-Ter | Sec-Pos | Odd-Evn | DMM  | Shape | TAT  |
|------|------|-----|-----|-----------------|-----------------|------------------|---------|---------|---------|---------|---------|------|-------|------|
| 25.8 | 1.48 | 0   | 0   | 4.41            | 1.27            | 4.80             | 25.8    | 25.8    | 1.48    | 1.48    | 0.38    | 2.78 | 0.10  | 1.37 |





### Stellar Parameters For KIC 012354328

|        | $T_{\text{eff}}(K)$  | $\log(g)$                 | $[\text{Fe}/\text{H}]$     | $R (R_{\odot})$           | $M(M_{\odot})$            | $p_{\star} (\text{g}\cdot\text{cm}^{-3})$ |
|--------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|---|
|        | $5251^{+183}_{-183}$ | $4.630^{+0.066}_{-0.048}$ | $-1.020^{+0.300}_{-0.300}$ | $0.633^{+0.055}_{-0.050}$ | $0.624^{+0.060}_{-0.023}$ | $3.458^{+0.879}_{-0.584}$                 |
|        | +3%/-3%              | +1%/-1%                   | +29%/-29%                  | +9%/-8%                   | +10%/-4%                  | +25%/-17%                                 |
| Source | PHO1                 | KIC0                      | KIC0                       | DSEP                      |                           |   |

KIC = Kepler Input Catalog; PHO = Photometry; SPE = Spectroscopy; AST = Asteroseismology  
 TRA = Transits; DESP = Dartmouth Models; MULT = Multiple Models

### Secondary Eclipse Parameters for KIC 012354328-02 / KOI

| Detrend | Depth (ppm)  | $R_p (R_{\oplus})$     | $T_{\text{max}} (K)$ | $T_{\text{obs}} (K)$ | $A_{\text{obs}}$          |
|---------|--------------|------------------------|----------------------|----------------------|---------------------------|
| DV      | $-42 \pm 12$ | $1.26^{+0.17}_{-0.13}$ | $2129^{+90}_{-83}$   | $3478^{+261}_{-248}$ | $3.044^{+1.290}_{-1.020}$ |
| Alt.    | $-46 \pm 31$ | $1.50^{+0.15}_{-0.14}$ | $2134^{+85}_{-87}$   | $3342^{+367}_{-534}$ | $2.397^{+1.793}_{-1.435}$ |

$T_{\text{max}}$  = Theoretical Maximum Planetary Temperature

$T_{\text{obs}}$  = Observed Planetary Temperature (Assuming  $A=0.3$ )

$A_{\text{obs}}$  = Observed Albedo (Assuming  $T=0$ )

If a secondary eclipse is present, the system is likely an EB if  $T_{\text{obs}} \gg T_{\text{max}}$  AND  $A_{\text{obs}} \gg 1.0$

## DV Centroid Data

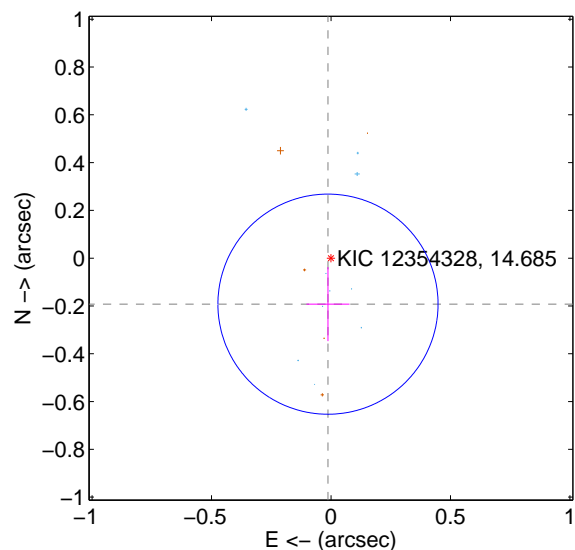
Supplemental centroid analysis for 012354328-02. Kepler magnitude: 14.69. Transit SNR 15.86

There are 10 quarters with good PRF difference image offsets

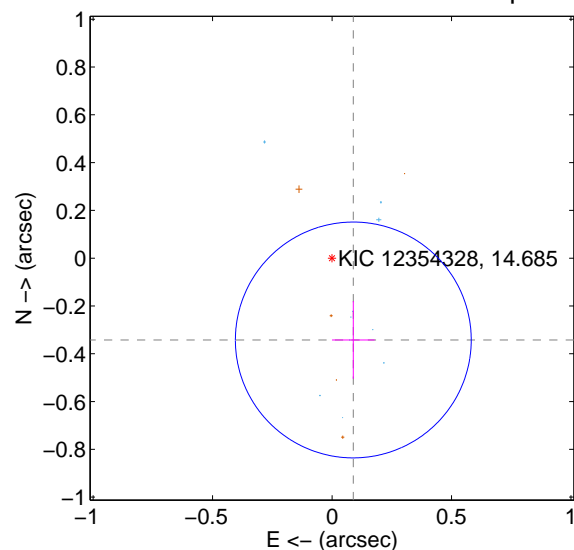
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

|   | Distance in arcsec | Distance / $\sigma$ | $\Delta$ RA        | $\Delta$ Dec       |
|---|--------------------|---------------------|--------------------|--------------------|
| PRF-fit source offset from OOT          | $0.193 \pm 0.154$  | 1.26                | $0.013 \pm 0.090$  | $-0.192 \pm 0.155$ |
| PRF-fit source offset from KIC position | $0.354 \pm 0.164$  | 2.15                | $-0.089 \pm 0.089$ | $-0.342 \pm 0.162$ |
| photometric centroid source offset      | $0.54 \pm 0.10$    | 5.29                | $-0.02 \pm 0.12$   | $0.54 \pm 0.10$    |

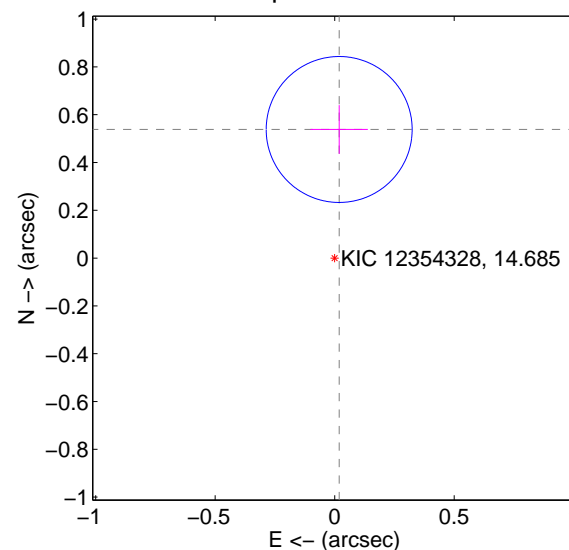
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

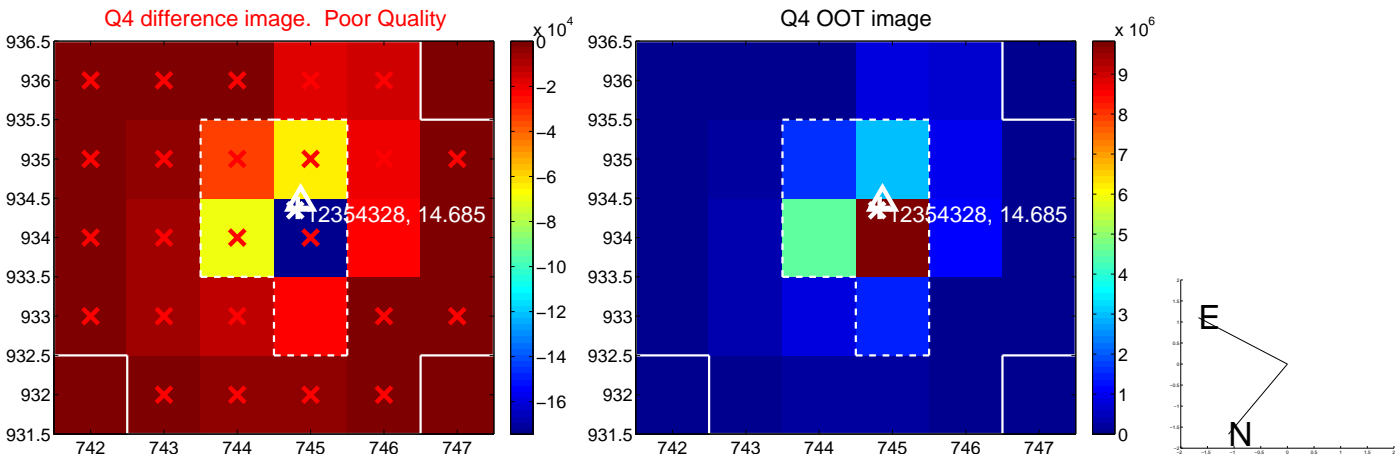
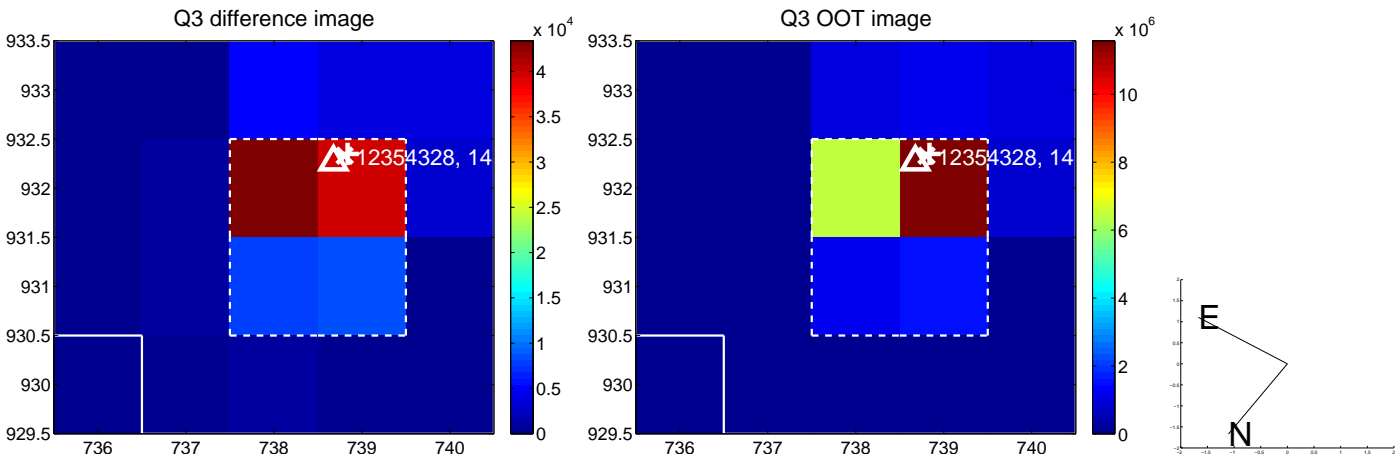
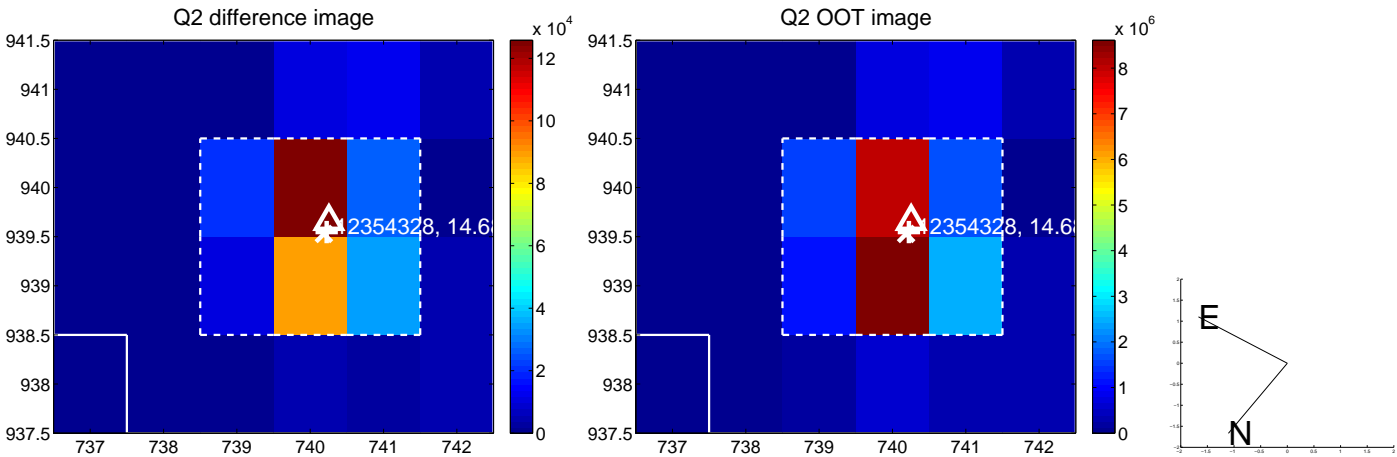
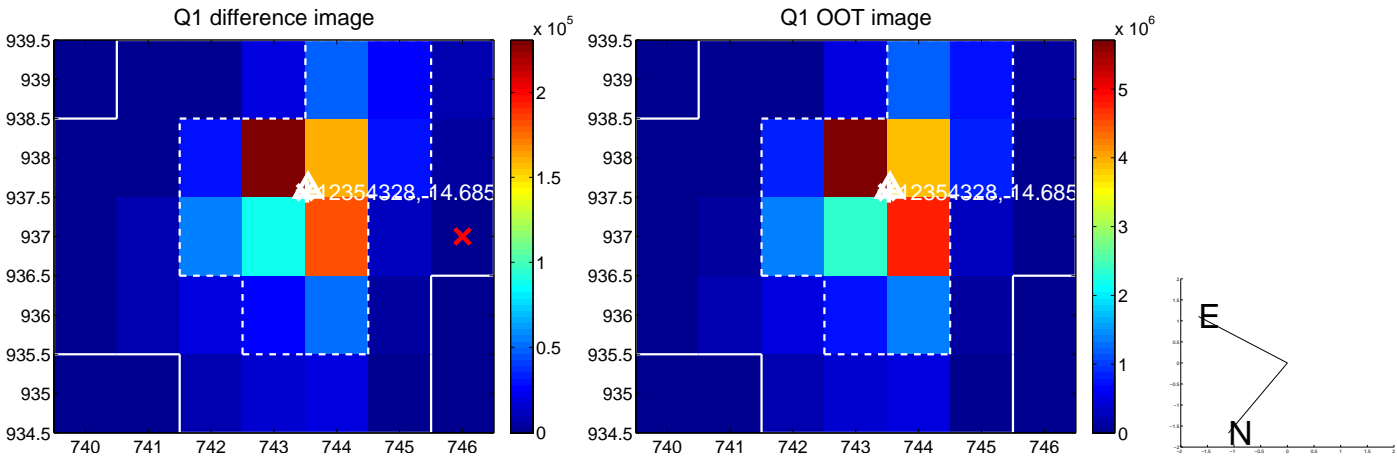


offset from photometric centroids

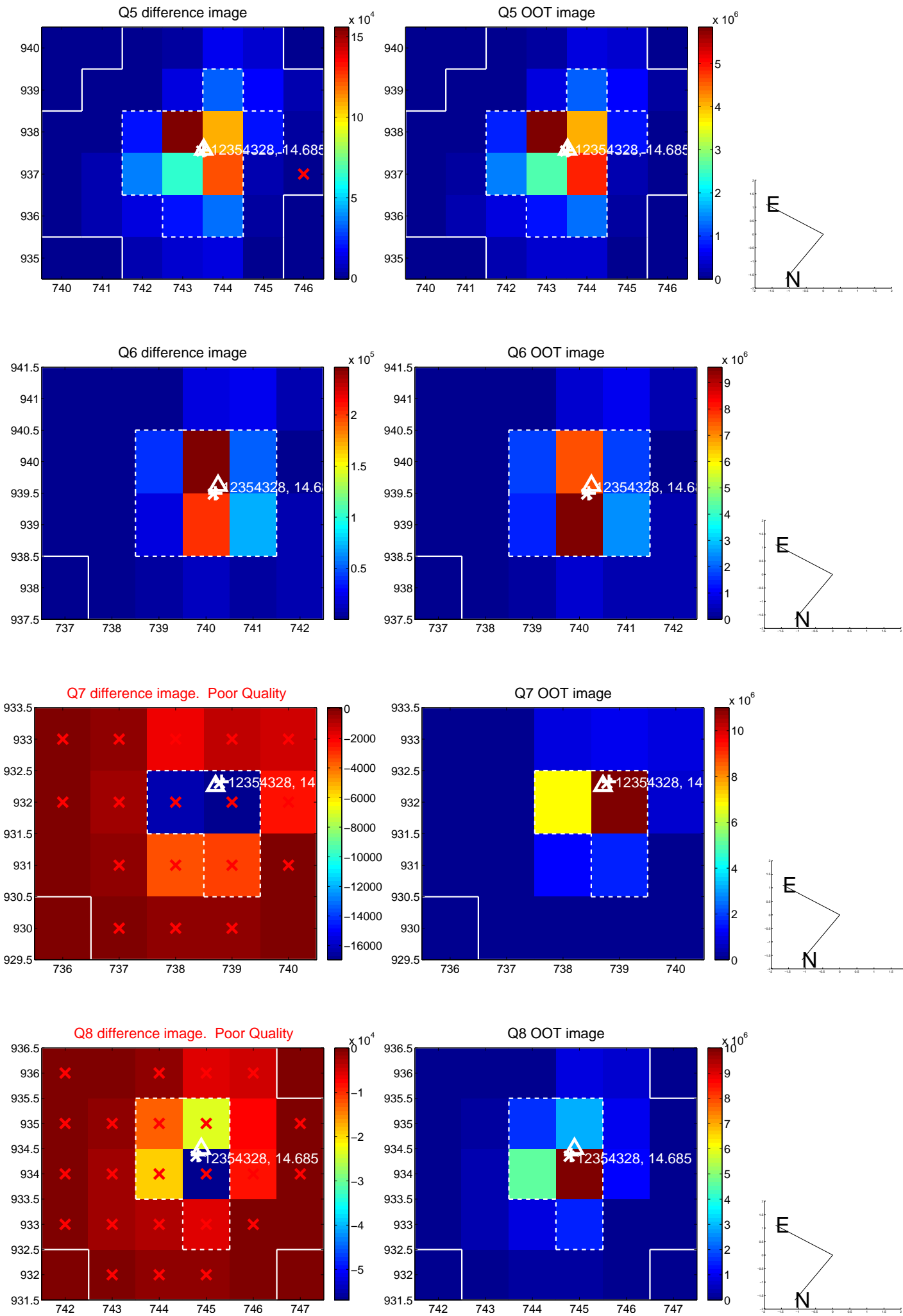


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

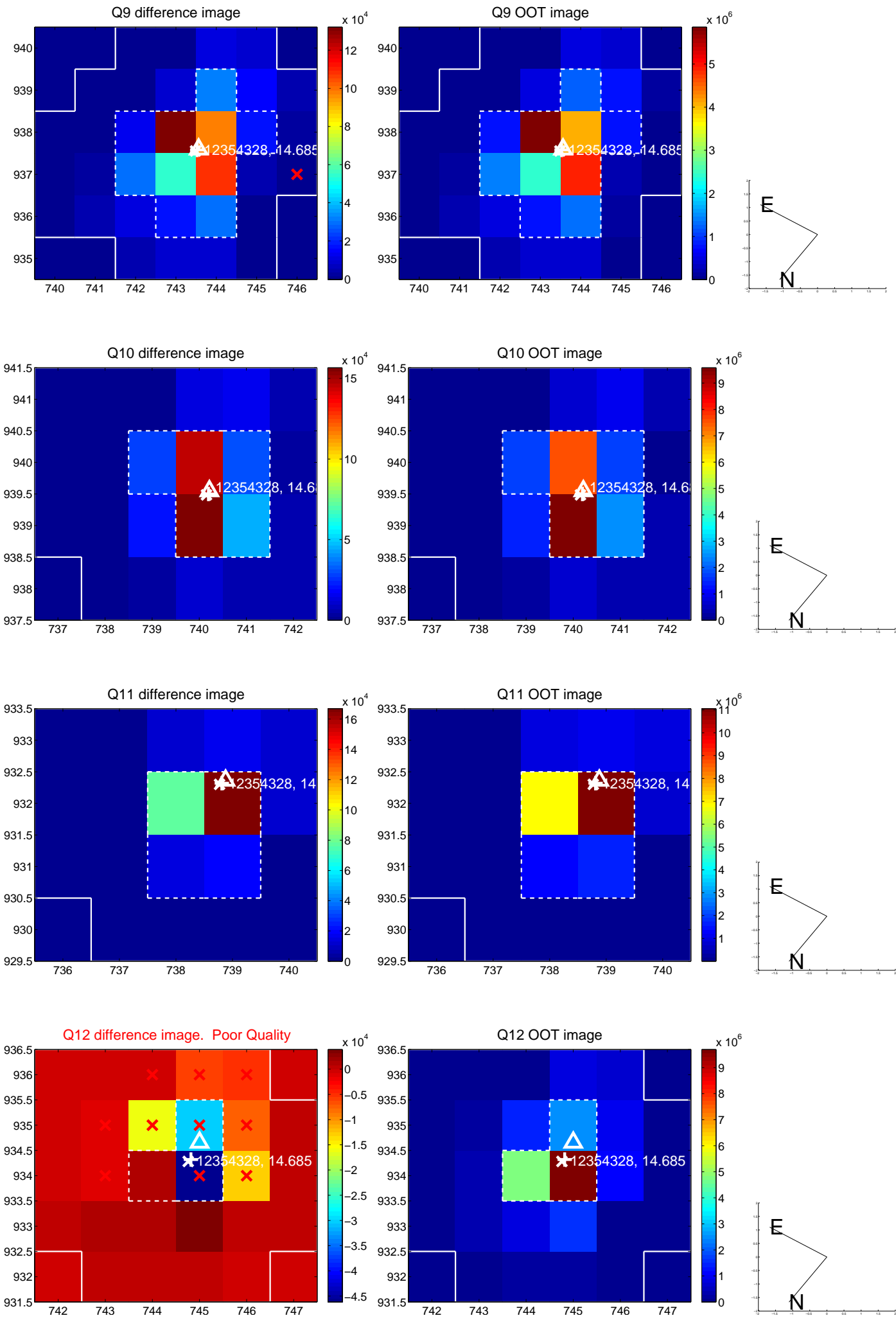
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



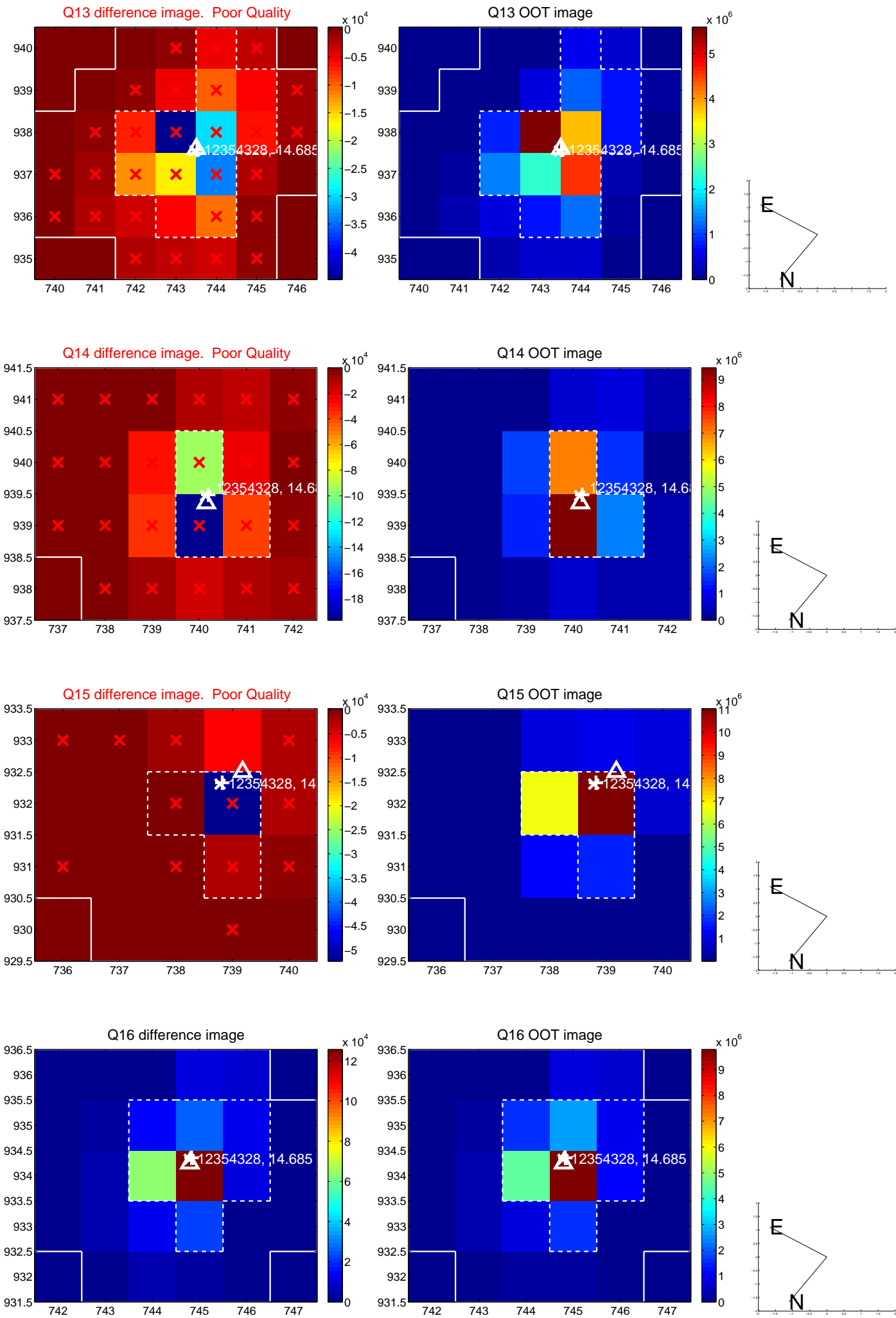
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



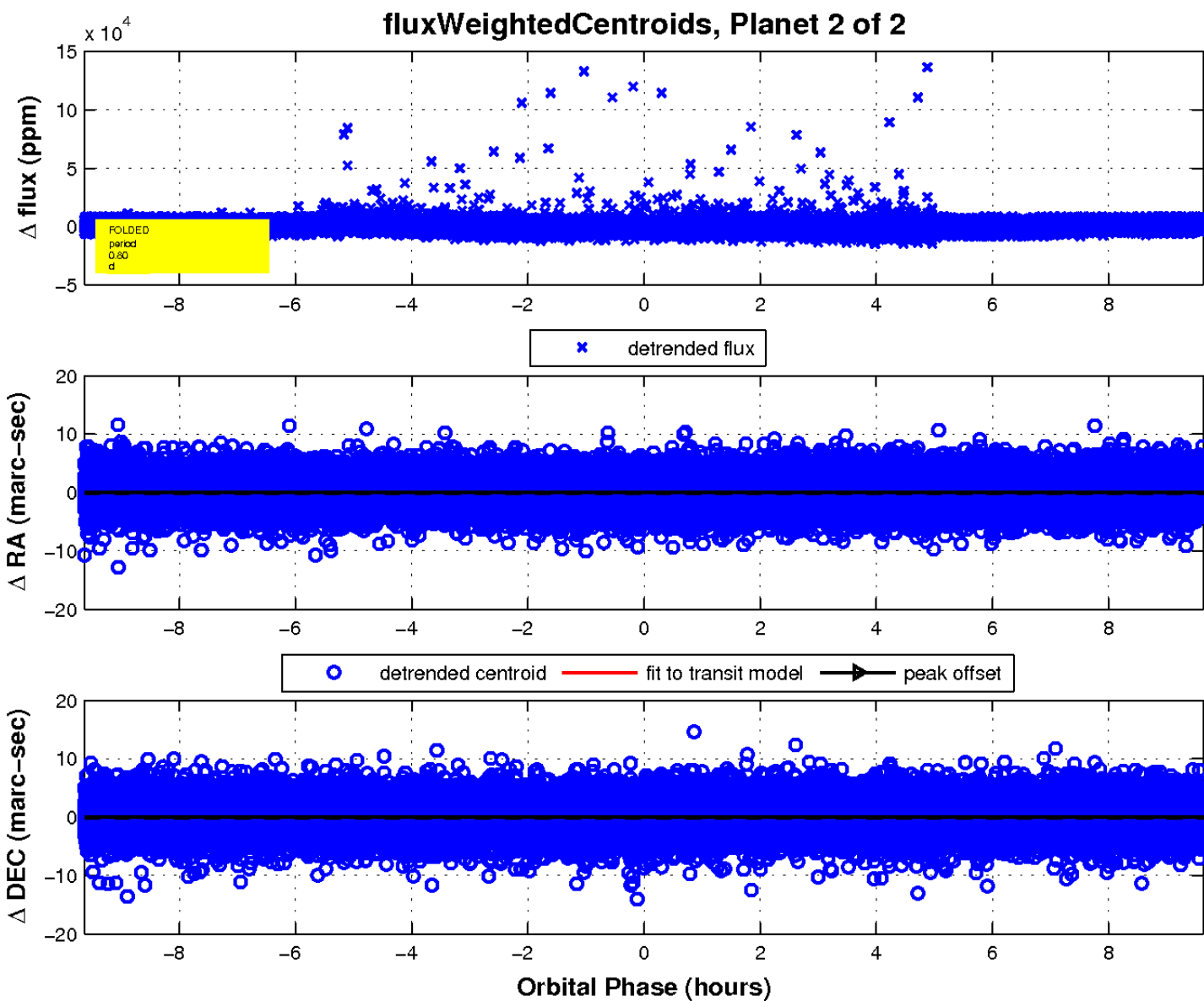
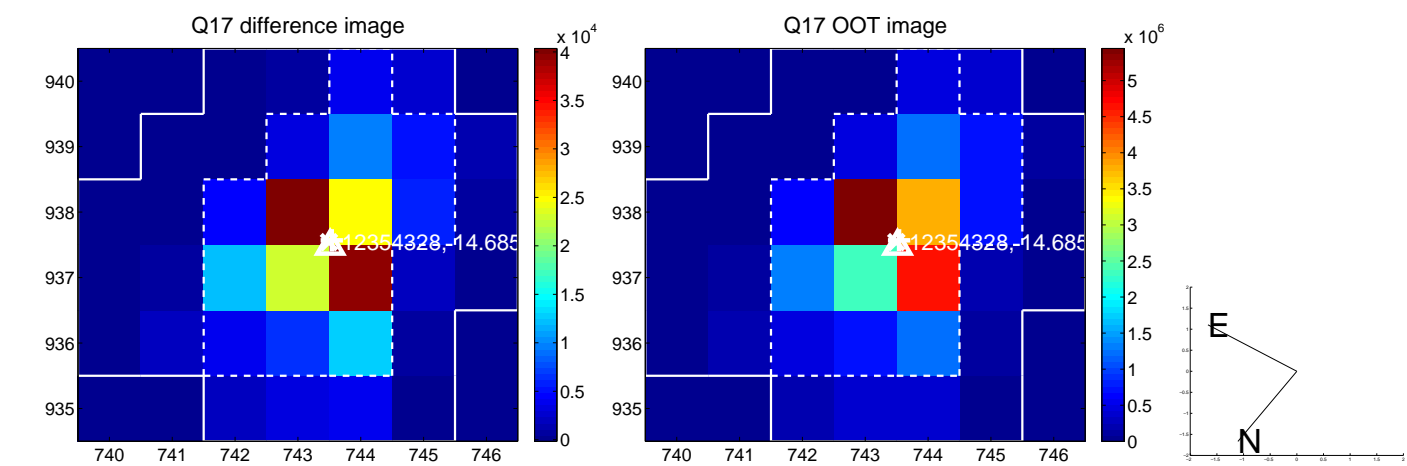
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



# UKIRT Image

Declination

