

# KIC 004349452

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004349452-01	OBS	0244.01	12.720370	140.367164	1174.2	2.882	422.2	414.9	1.26	6267	5.00	180.41
004349452-02	OBS	0244.02	6.238540	134.274400	401.3	3.797	222.5	221.6	1.26	6267	2.94	466.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004349452-01	OBS	PC	1.00	0	0	0	0	CENT_SATURATED
004349452-02	OBS	PC	1.00	0	0	0	0	CENT_SATURATED

**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.

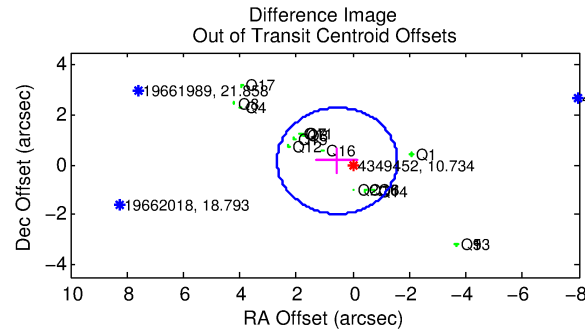
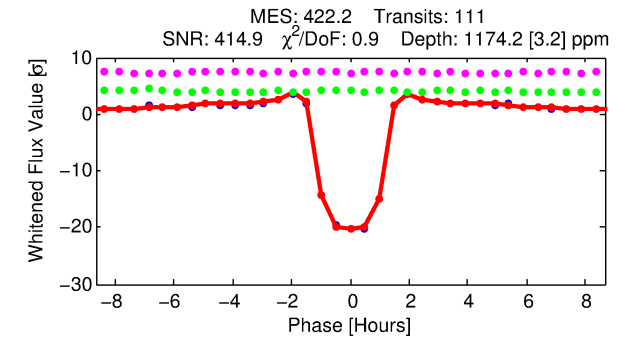
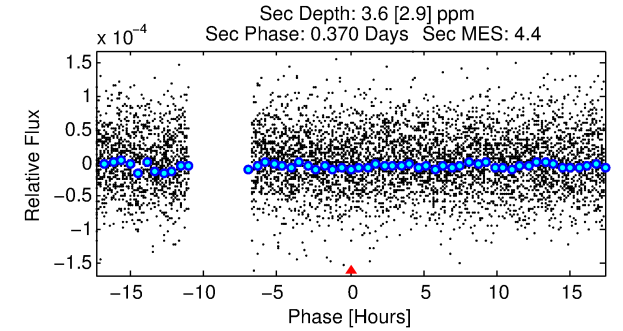
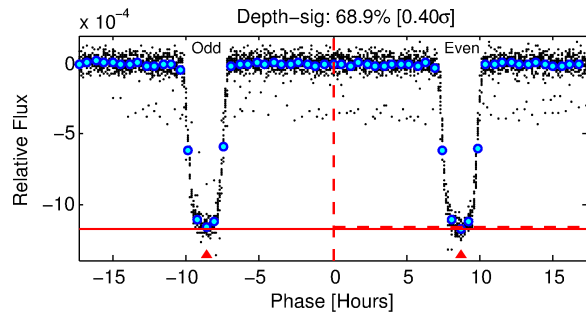
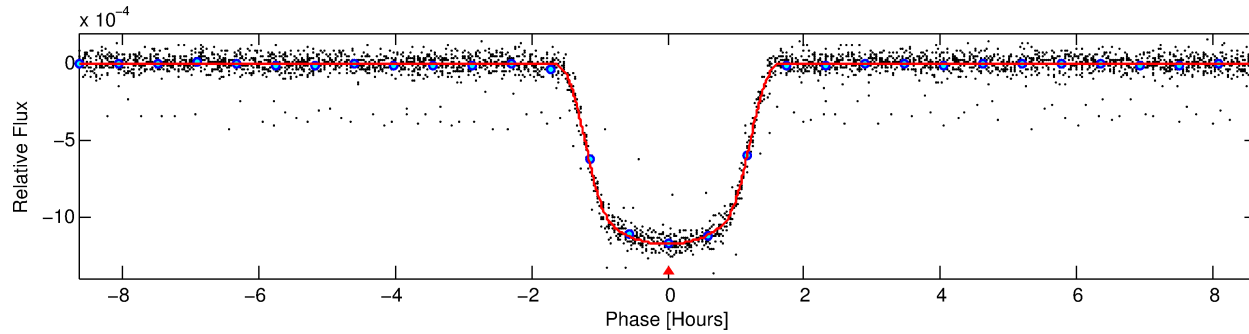
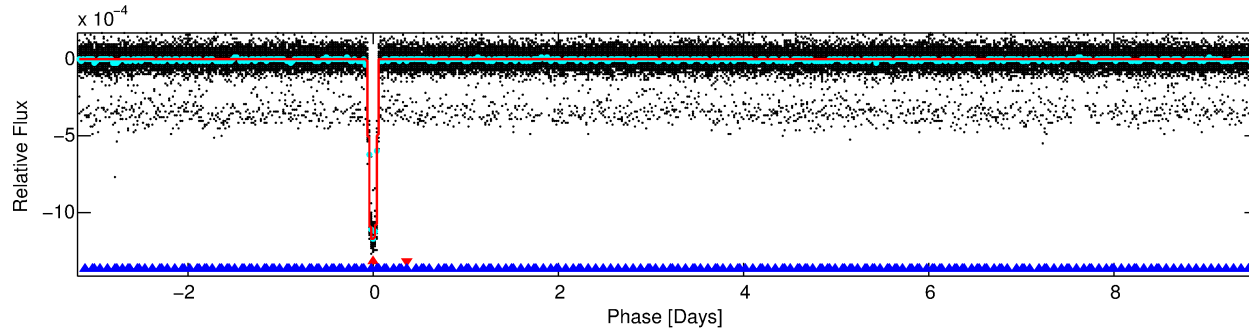
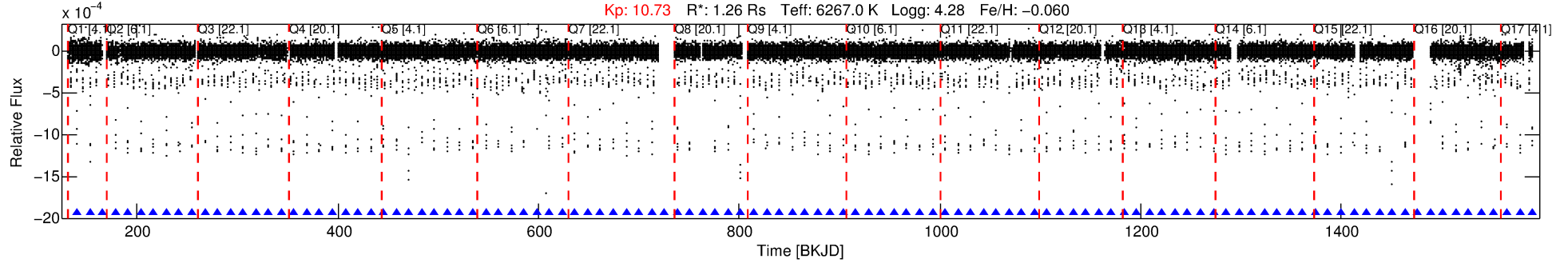
## Ephemeris Match Information For 004349452-01

No Significant Match Found

# DV One-Page Summary

KIC: 4349452 Candidate: 1 of 2 Period: 12.720 d  
KOI: K00244.01 Name: Kepler-25c Corr: 0.949

Kp: 10.73 R\*: 1.26 Rs Teff: 6267.0 K Logg: 4.28 Fe/H: -0.060



## DV Fit Results:

Period = 12.72037 [0.00000] d  
Epoch = 140.3672 [0.0001] BKJD  
Rp/R\* = 0.0364 [0.0002]  
a/R\* = 18.32 [0.38]  
b = 0.88 [0.01]  
Seff = 180.41 [14.76]  
Teq = 935 [19] K  
Rp = 5.00 [0.29] Re  
a = 0.1101 [0.0050] AU  
Ag = 0.97 [0.78] [-0.04σ]  
Teffp = 1433 [288] K [1.73σ]

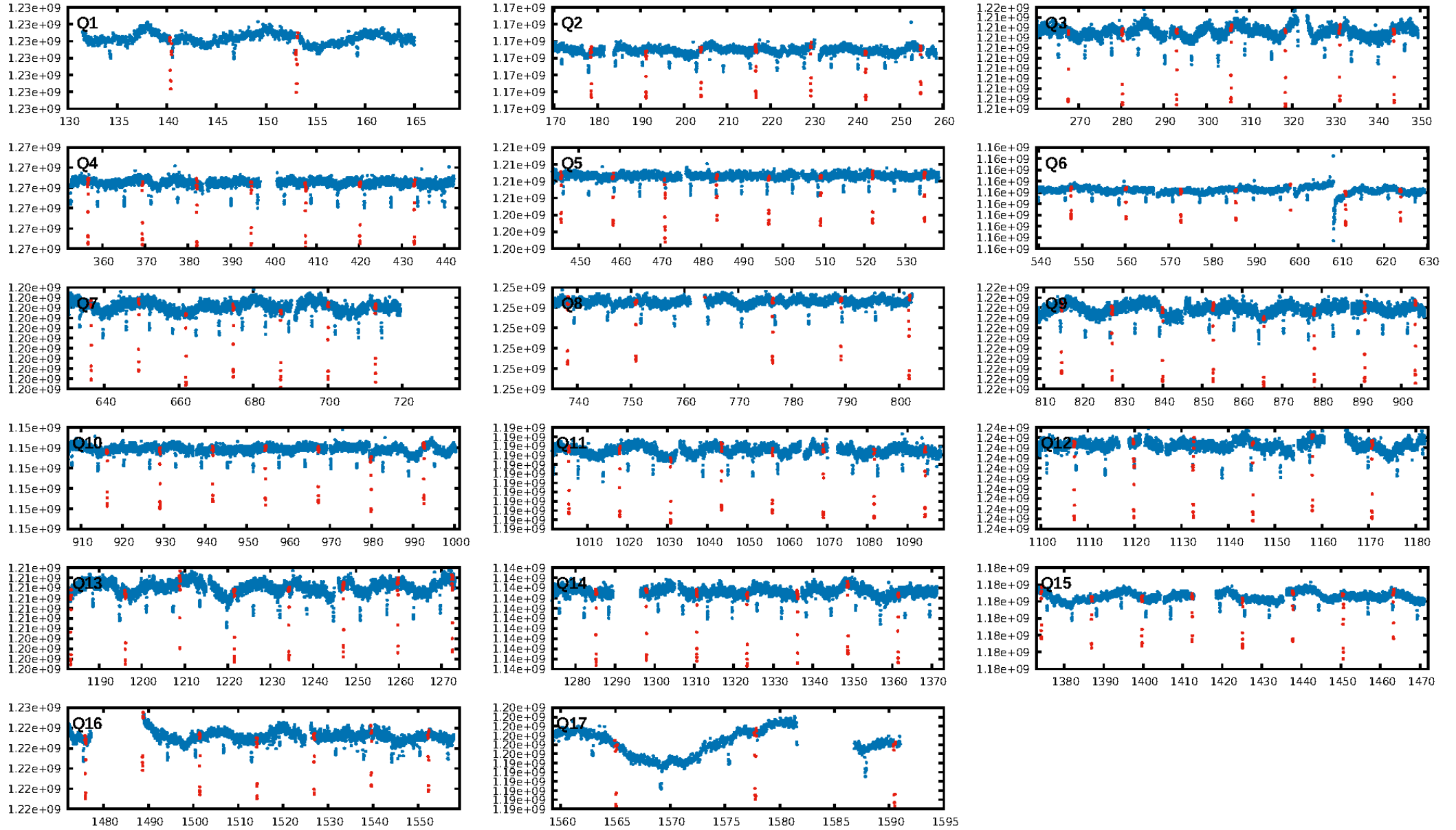
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [32.63σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 52.4%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [106/106]  
GhostDiagnostic-chr: 22.23  
Centroid-sig: 0.0%  
Centroid-so: 0.545 arcsec [13.76σ]  
OotOffset-rm: 0.575 arcsec [0.81σ]  
KicOffset-rm: 0.961 arcsec [1.26σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.59 [10/17]  
DiffImageOverlap-fno: 0.94 [16/17]

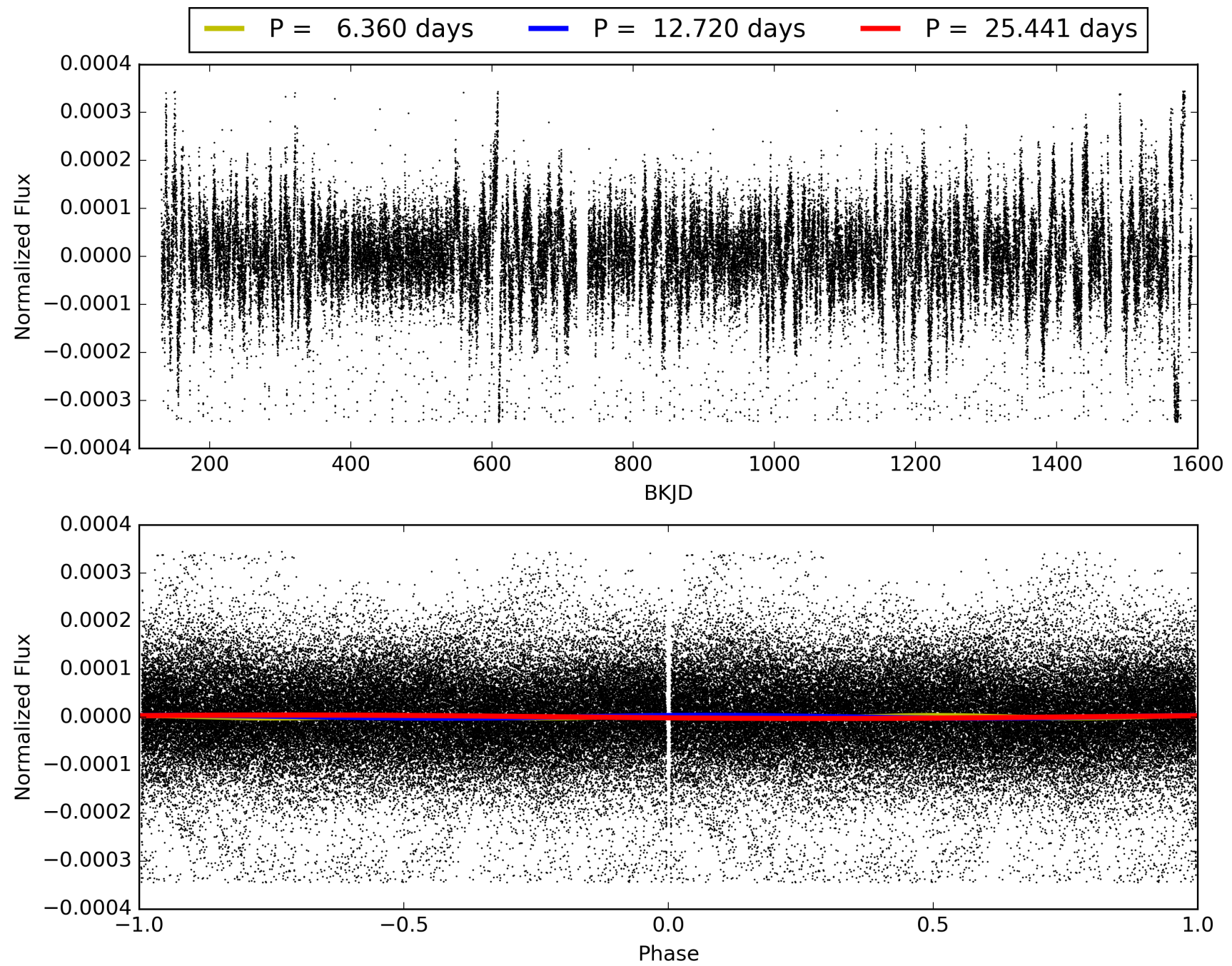
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:17:59 Z

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

# TCE 004349452-01, PDC Light Curves

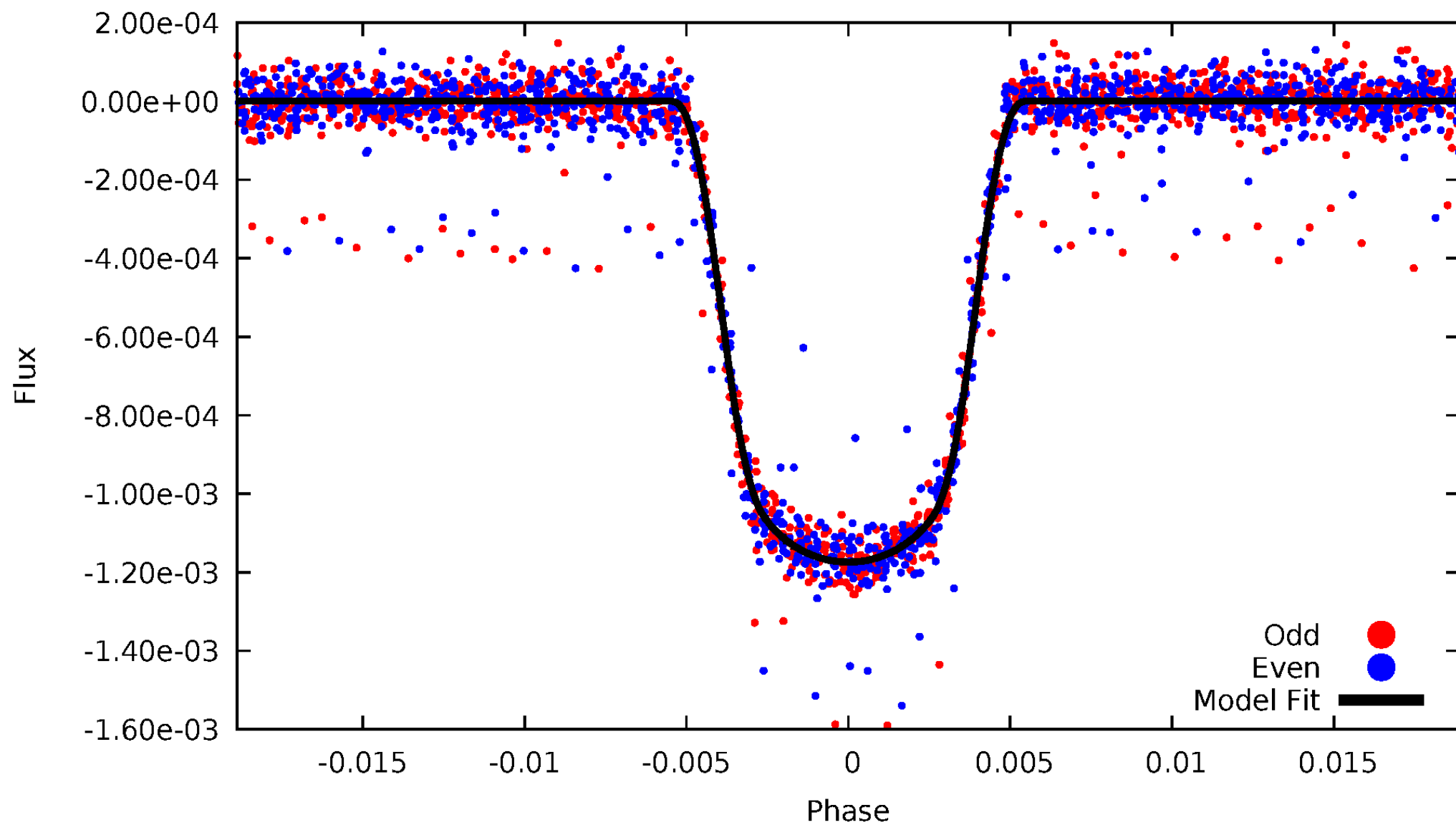


TCE 004349452-01



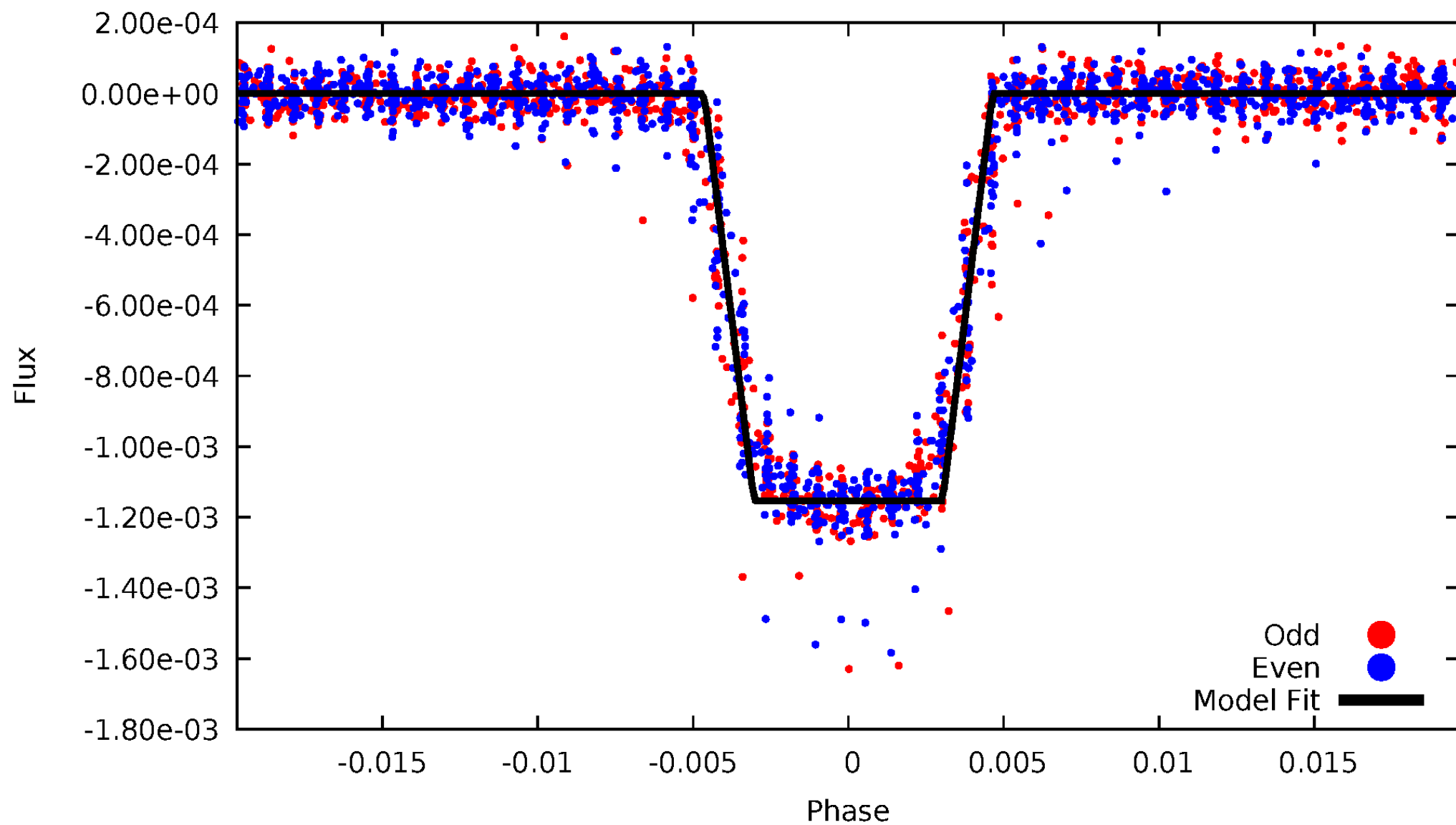
# DV Odd/Even

TCE 004349452-01



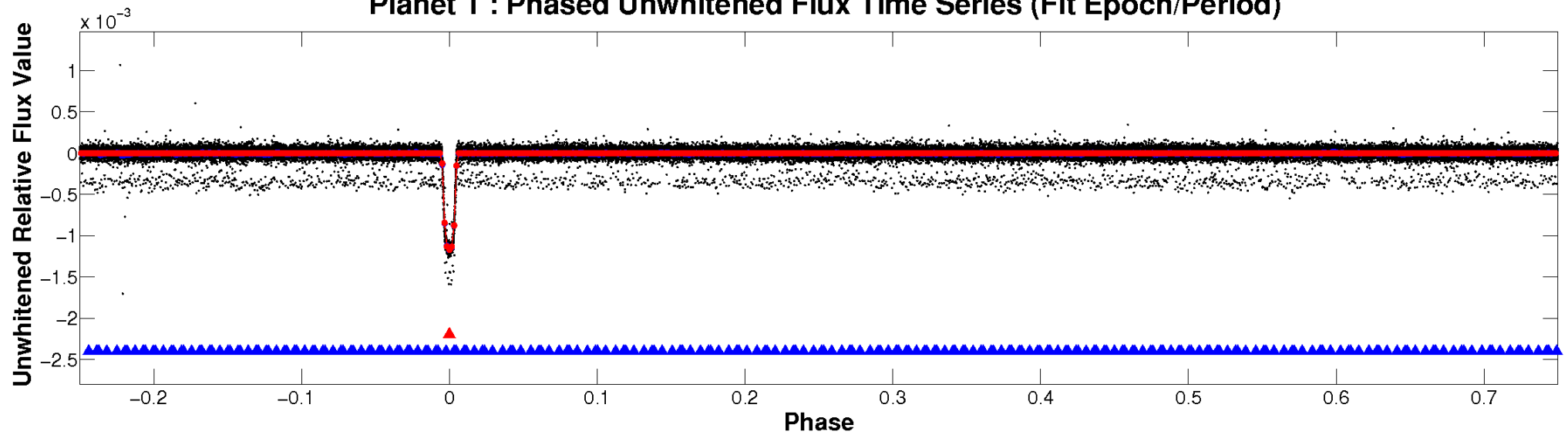
# ALT Odd/Even

TCE 004349452-01

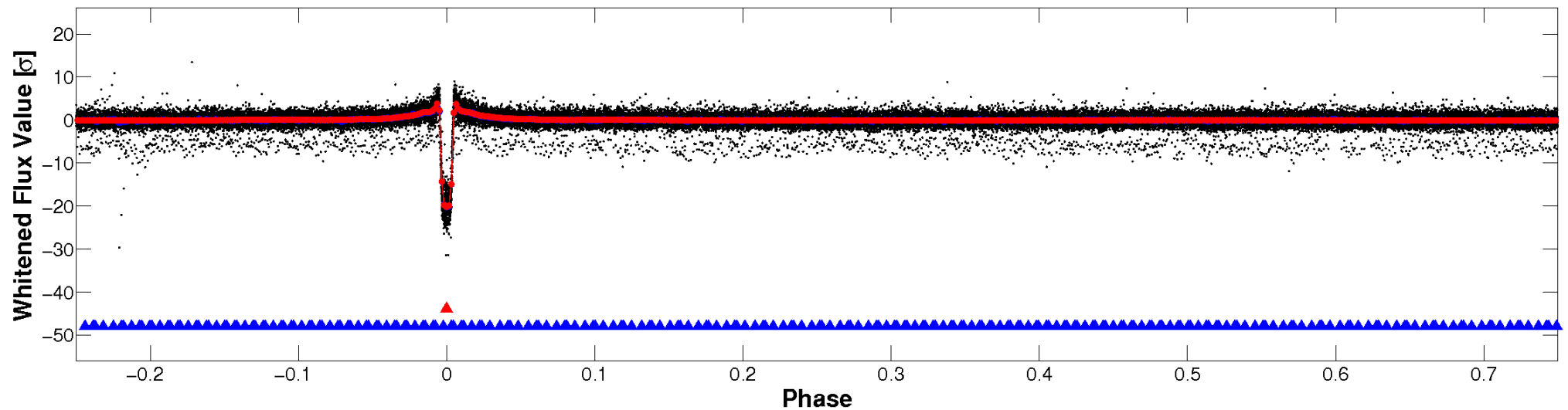


# Non-Whitened Vs. Whitened Light Curve

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



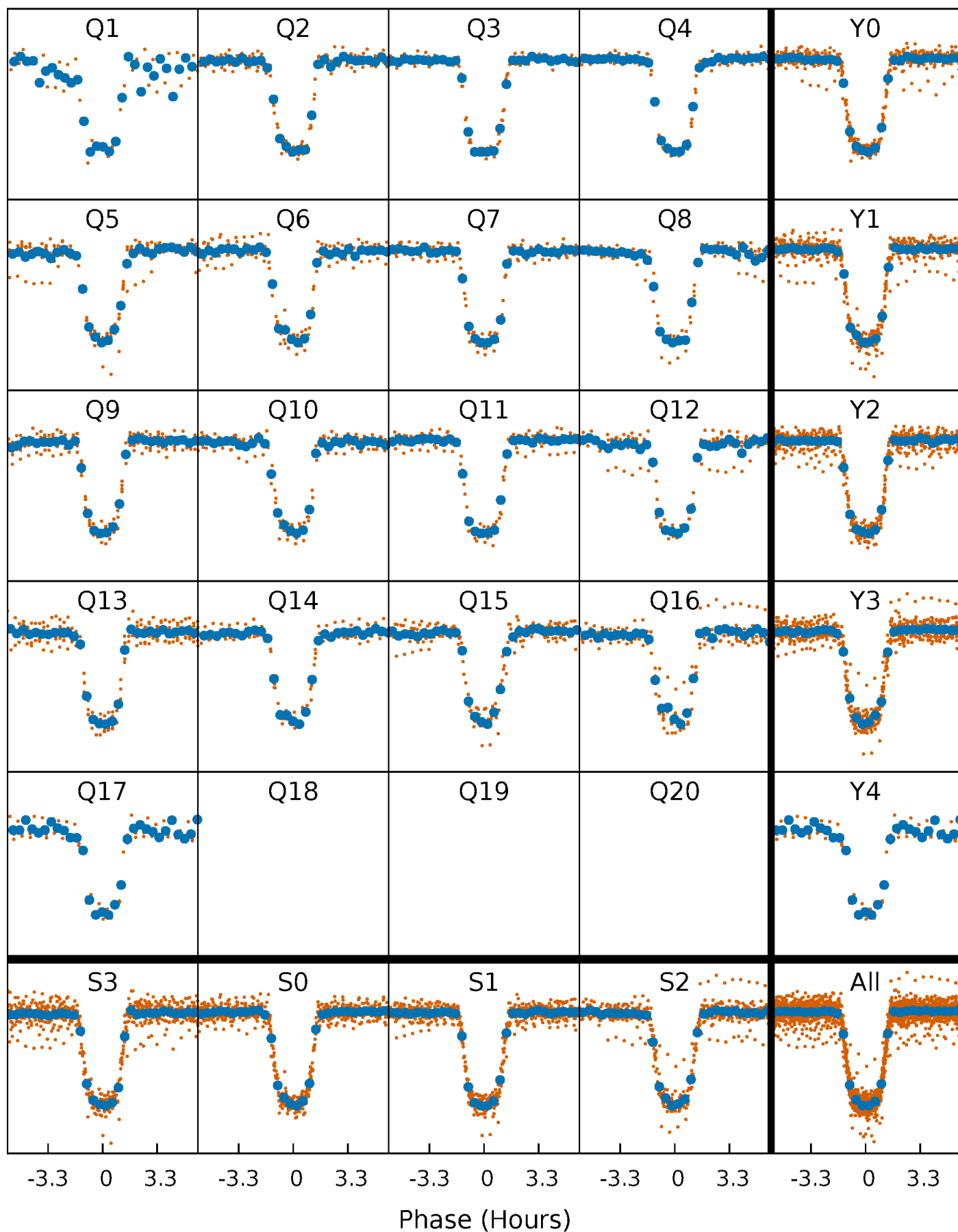
**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**





# PDC Quarter-Phased Transit Curves

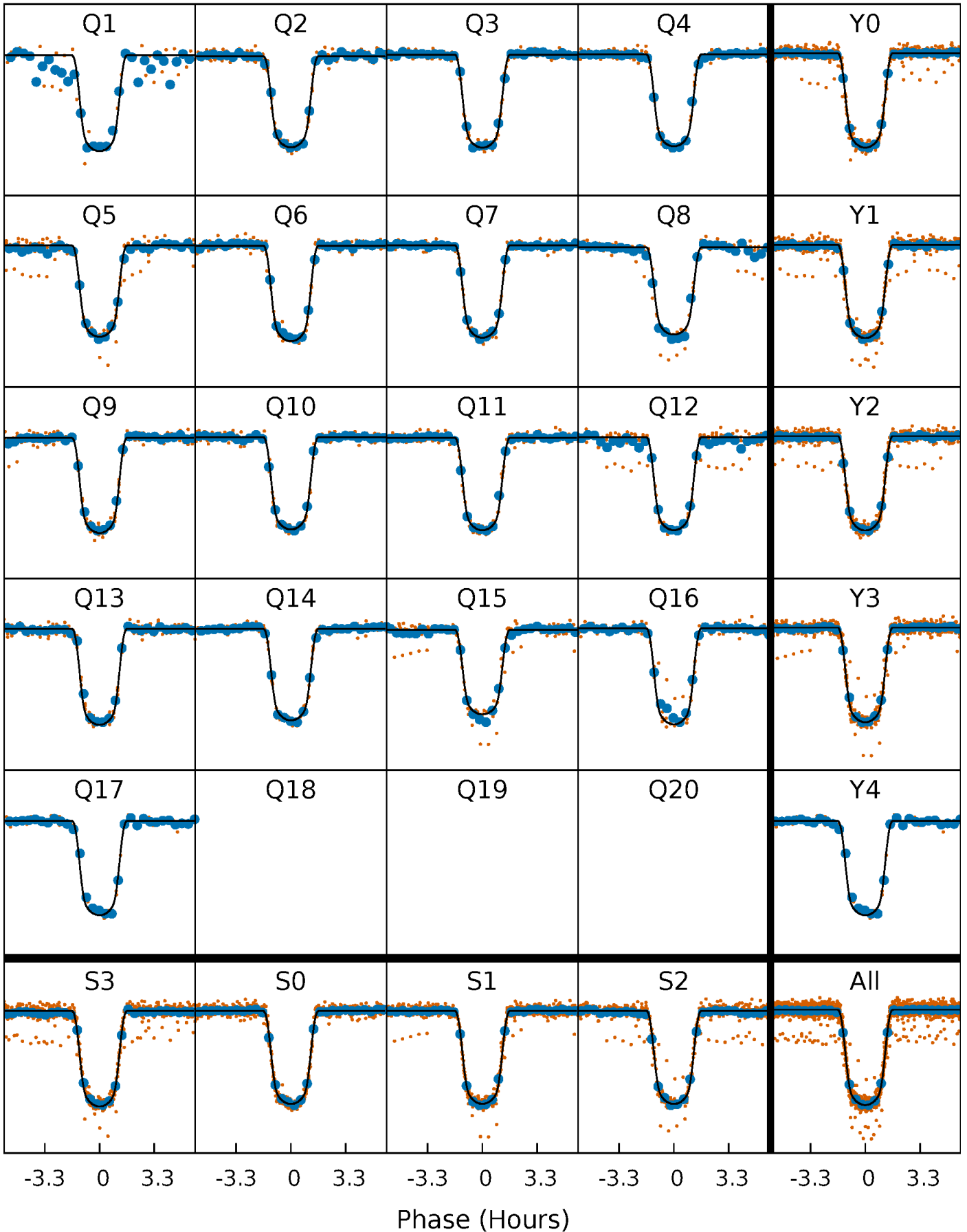
TCE 004349452-01 P= 12.720370 Days  $T_0=140.367164$  (BKJD)





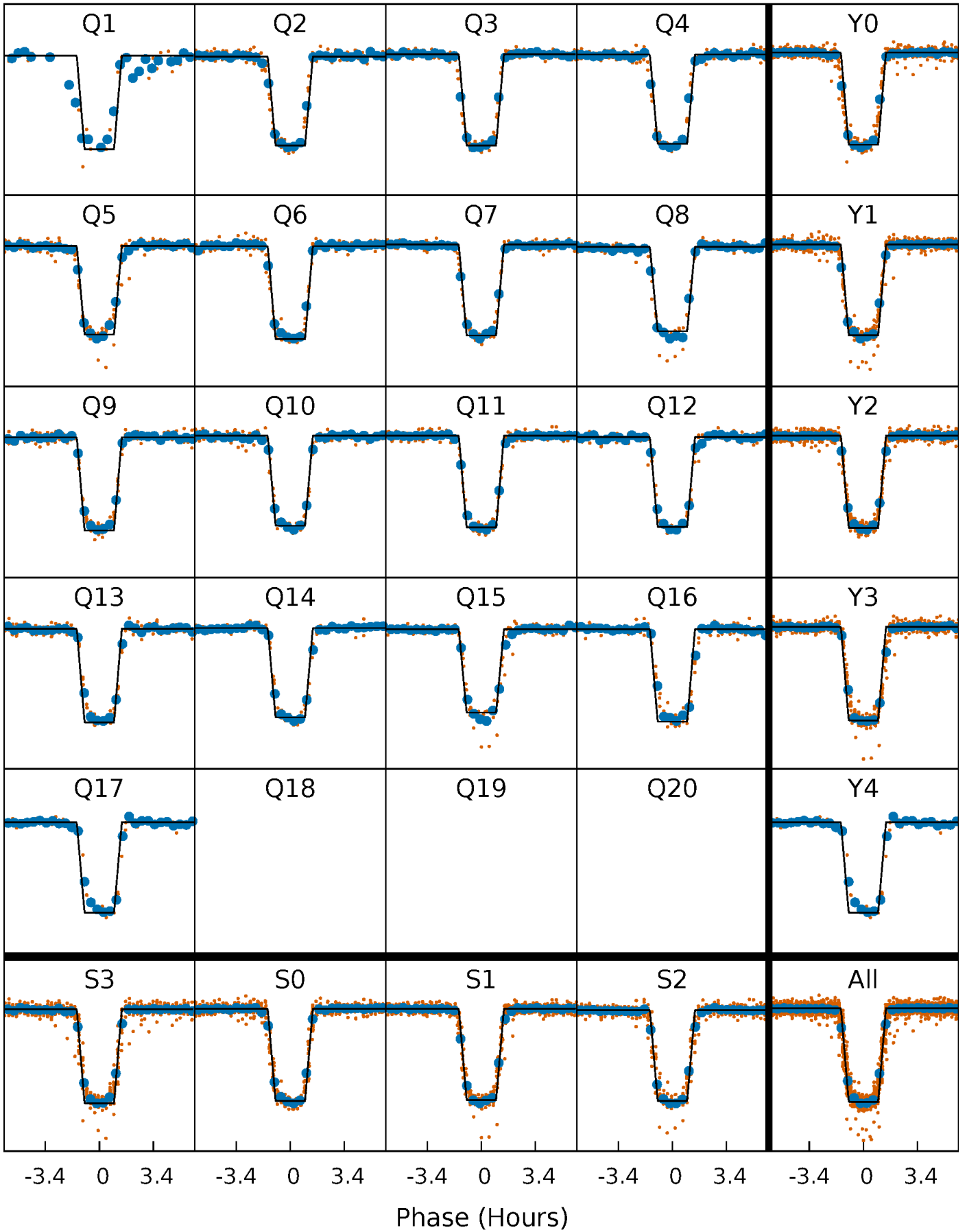
# DV Quarter-Phased Transit Curves

TCE 004349452-01 P= 12.720370 Days  $T_0=140.367164$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

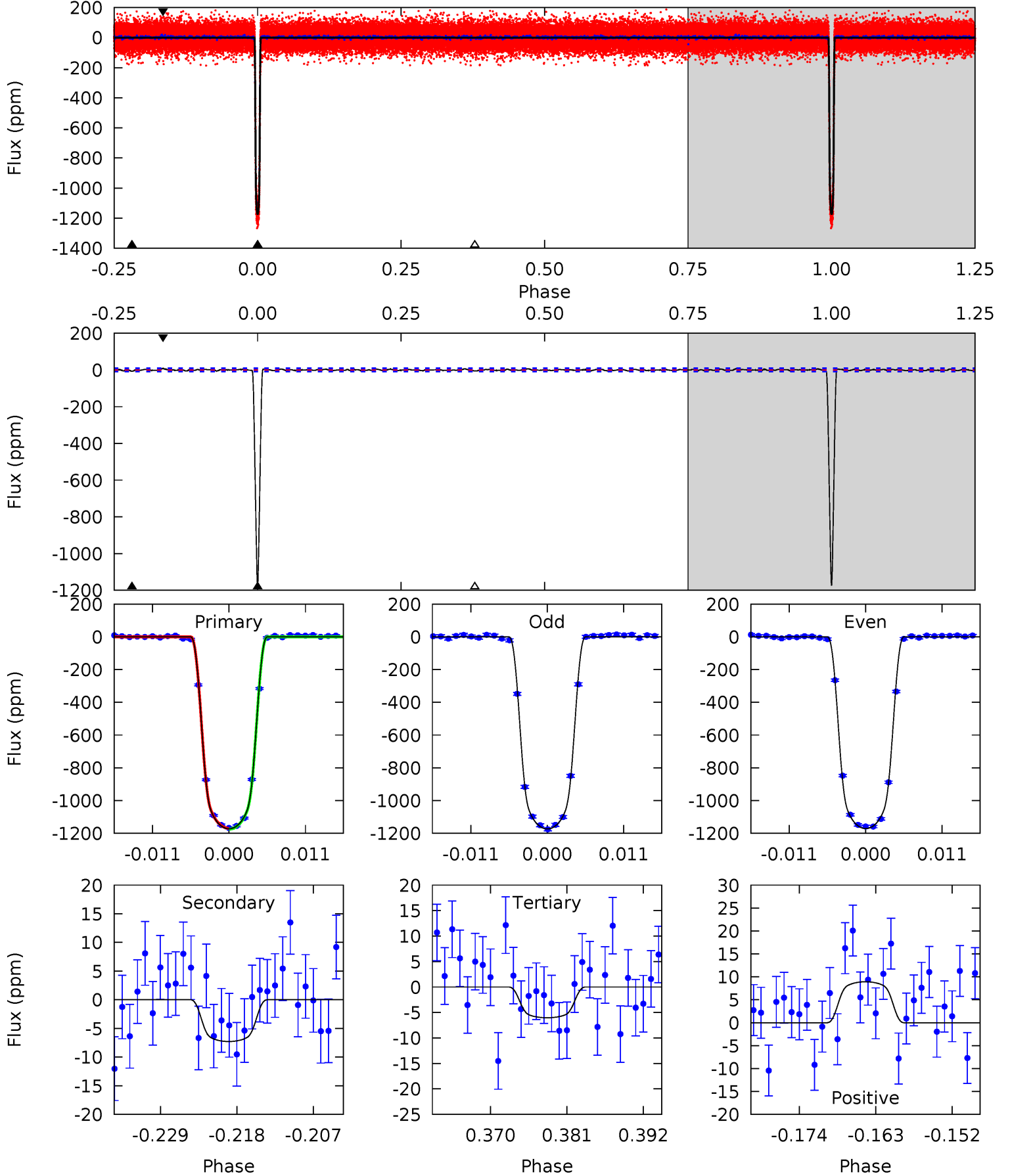
TCE 004349452-01 P= 12.720254 Days  $T_0=140.373781$  (BKJD)



# DV Model-Shift Uniqueness Test

004349452-01, P = 12.720370 Days, E = 127.646794 Days

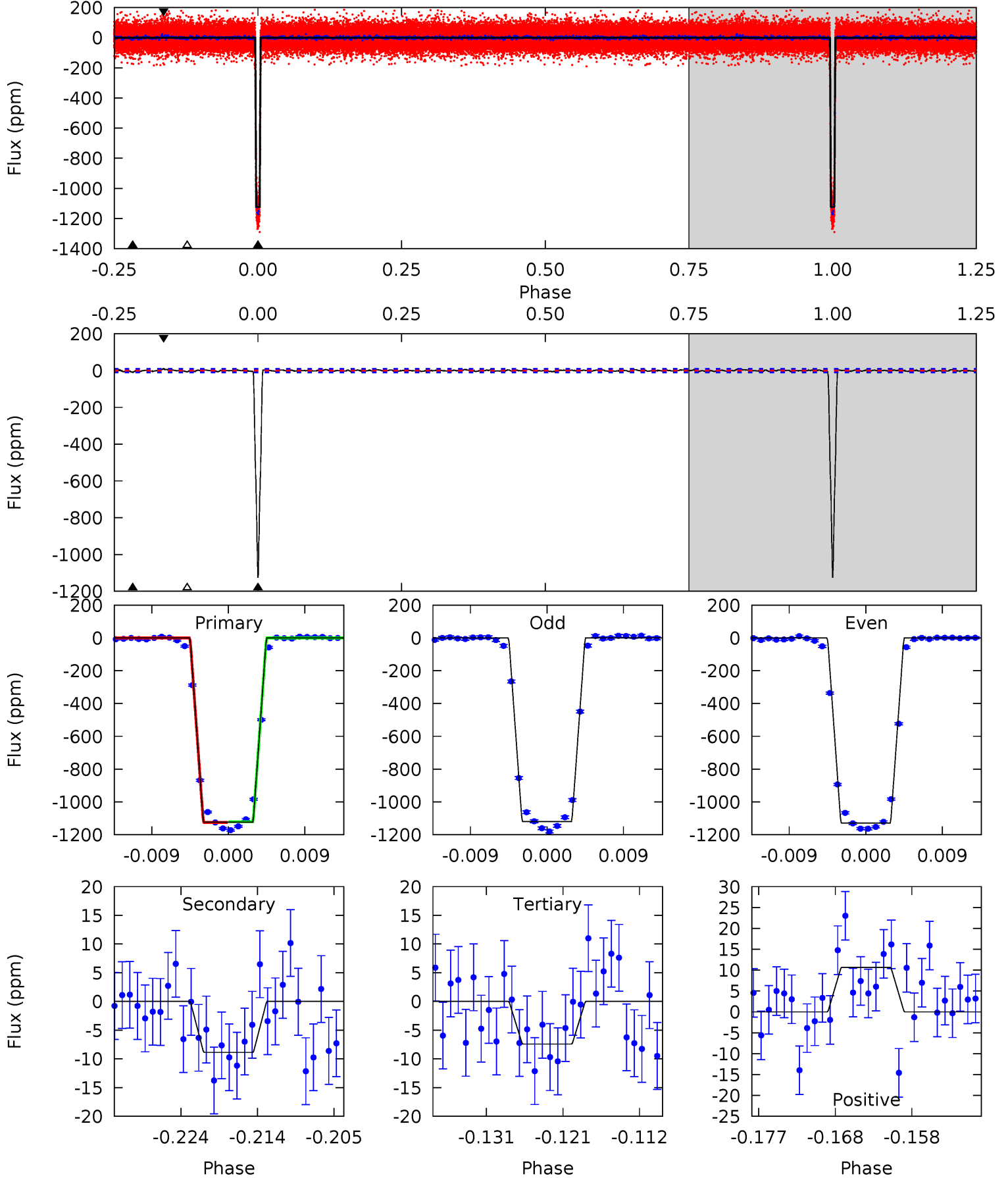
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
697.4	4.33	3.59	5.31	5.01	2.55	1.43	693.8	692.1	0.75	-0.97	0.63	1.00	0.01	1.41



# Alt Model-Shift Uniqueness Test

004349452-01, P = 12.720254 Days, E = 127.653527 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
582.0	4.60	3.84	5.53	5.04	2.60	1.27	578.1	576.4	0.75	-0.93	2.32	1.01	0.01	1.17



### Stellar Parameters For KIC 004349452

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6267^{+81}_{-75}$	$4.280^{+0.033}_{-0.030}$	$-0.060^{+0.150}_{-0.100}$	$1.258^{+0.072}_{-0.059}$	$1.097^{+0.093}_{-0.059}$	$0.776^{+0.094}_{-0.084}$
	+1%/-1%	+1%/-1%	+250%/-167%	+6%/-5%	+8%/-5%	+12%/-11%
Source	SPE8	AST8	SPE8	DSEP		

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

### Secondary Eclipse Parameters for KIC 004349452-01 / KOI 0244.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-7 \pm 2$	$4.99^{+0.19}_{-0.13}$	$1306^{+22}_{-23}$	$2502^{+76}_{-92}$	$1.974^{+0.484}_{-0.459}$
Alt.	$-9 \pm 2$	$4.65^{+0.17}_{-0.13}$	$1305^{+22}_{-22}$	$2618^{+82}_{-98}$	$2.738^{+0.617}_{-0.626}$

$T_{\text{max}}$  = 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

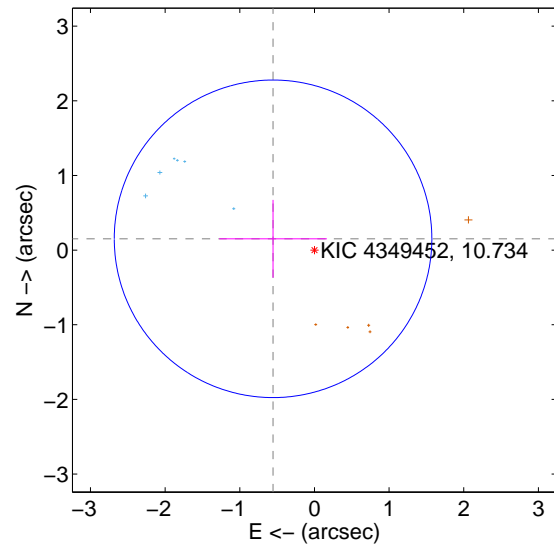
Supplemental centroid analysis for 004349452-01. **Kepler magnitude: 10.73.** Transit SNR 414.93

There are 10 quarters with good PRF difference image offsets

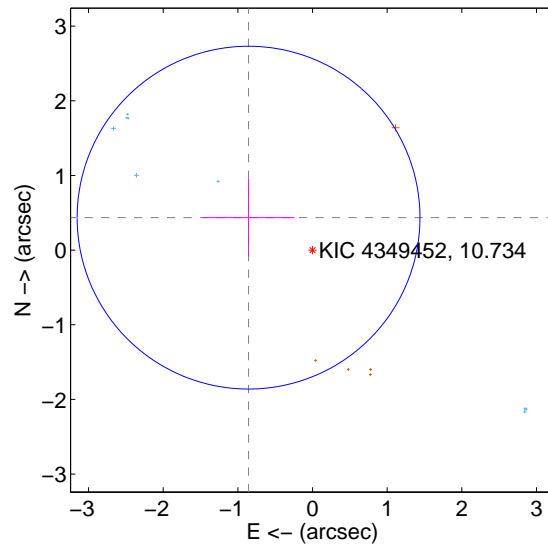
The direct PRF centroid is offset from the target star catalog position by about 1.23 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.575 \pm 0.709$	0.81	$0.554 \pm 0.721$	$0.151 \pm 0.521$
PRF-fit source offset from KIC position	$0.961 \pm 0.765$	1.26	$0.857 \pm 0.613$	$0.435 \pm 0.521$
photometric centroid source offset	$0.55 \pm 0.04$	<b>13.76</b>	$0.40 \pm 0.04$	$0.37 \pm 0.03$

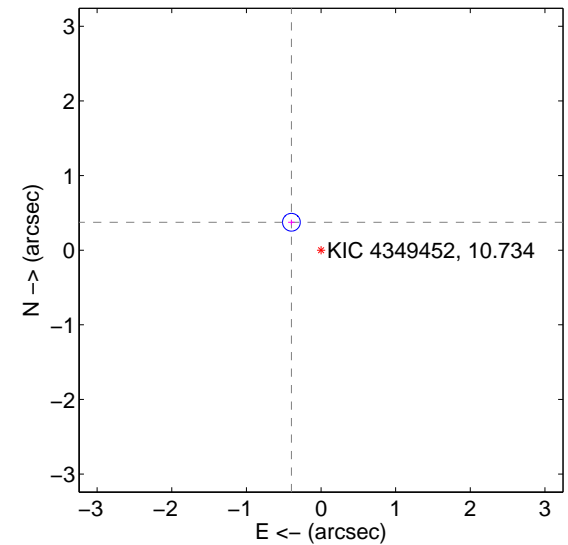
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

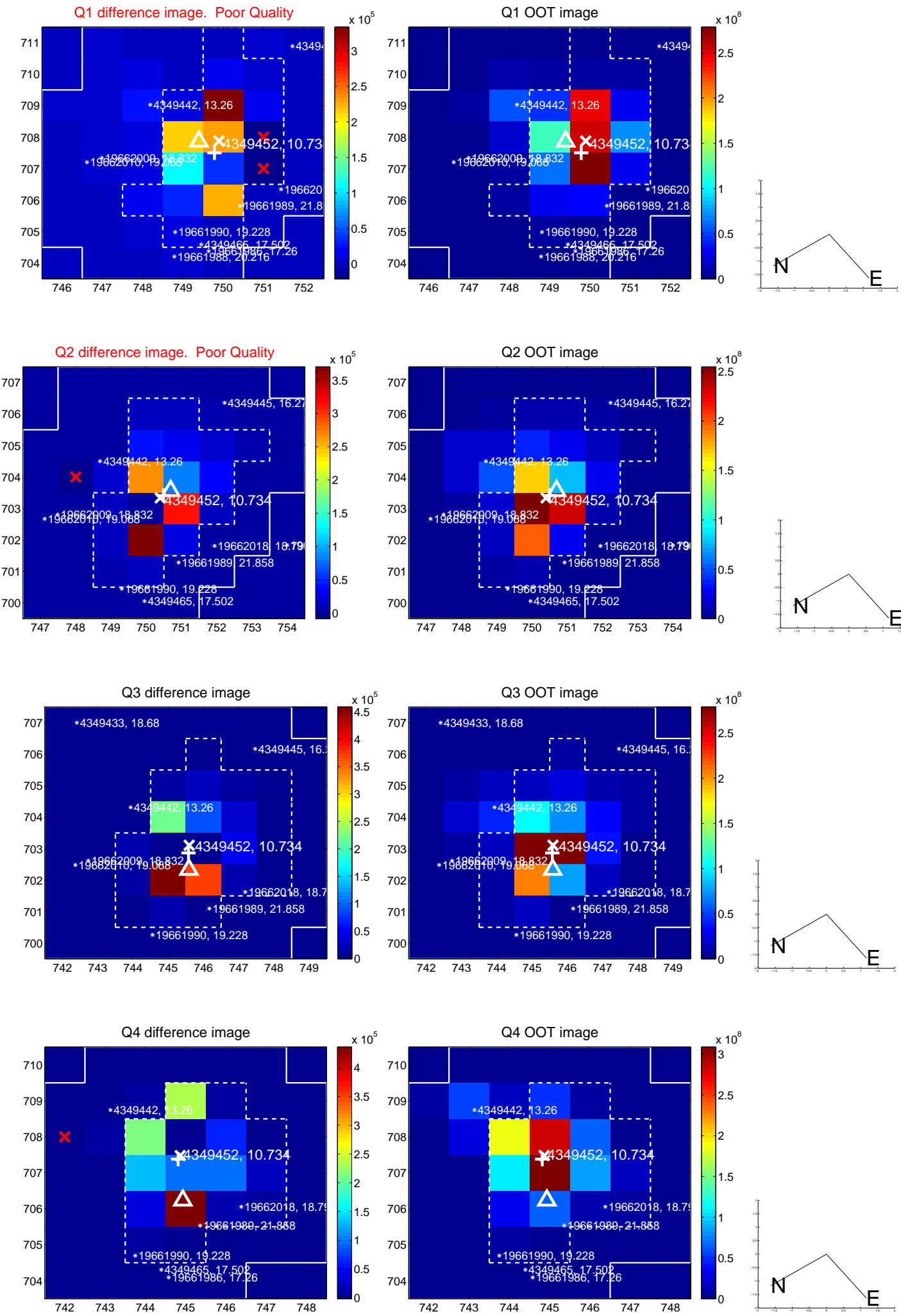


offset from photometric centroids



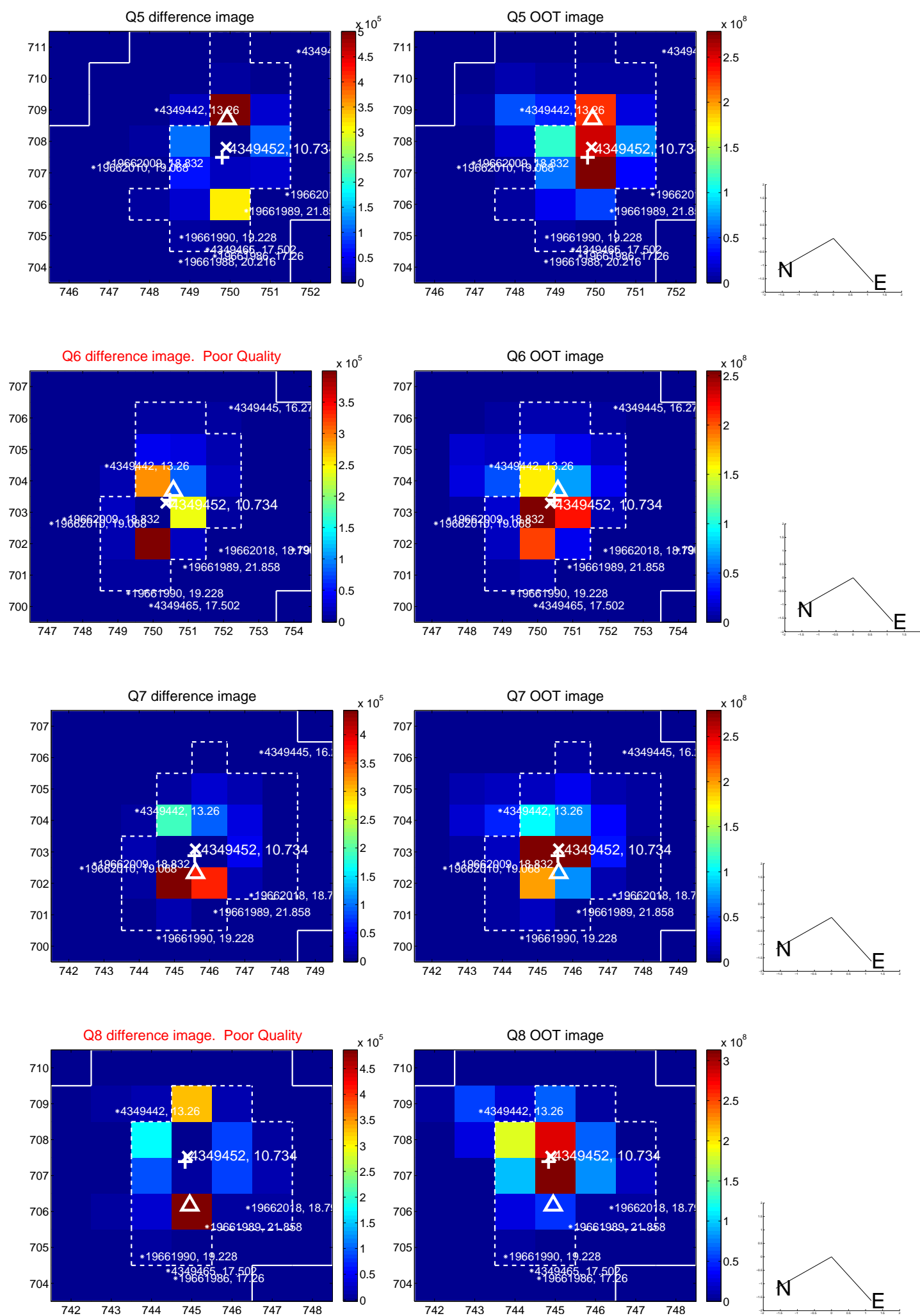
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

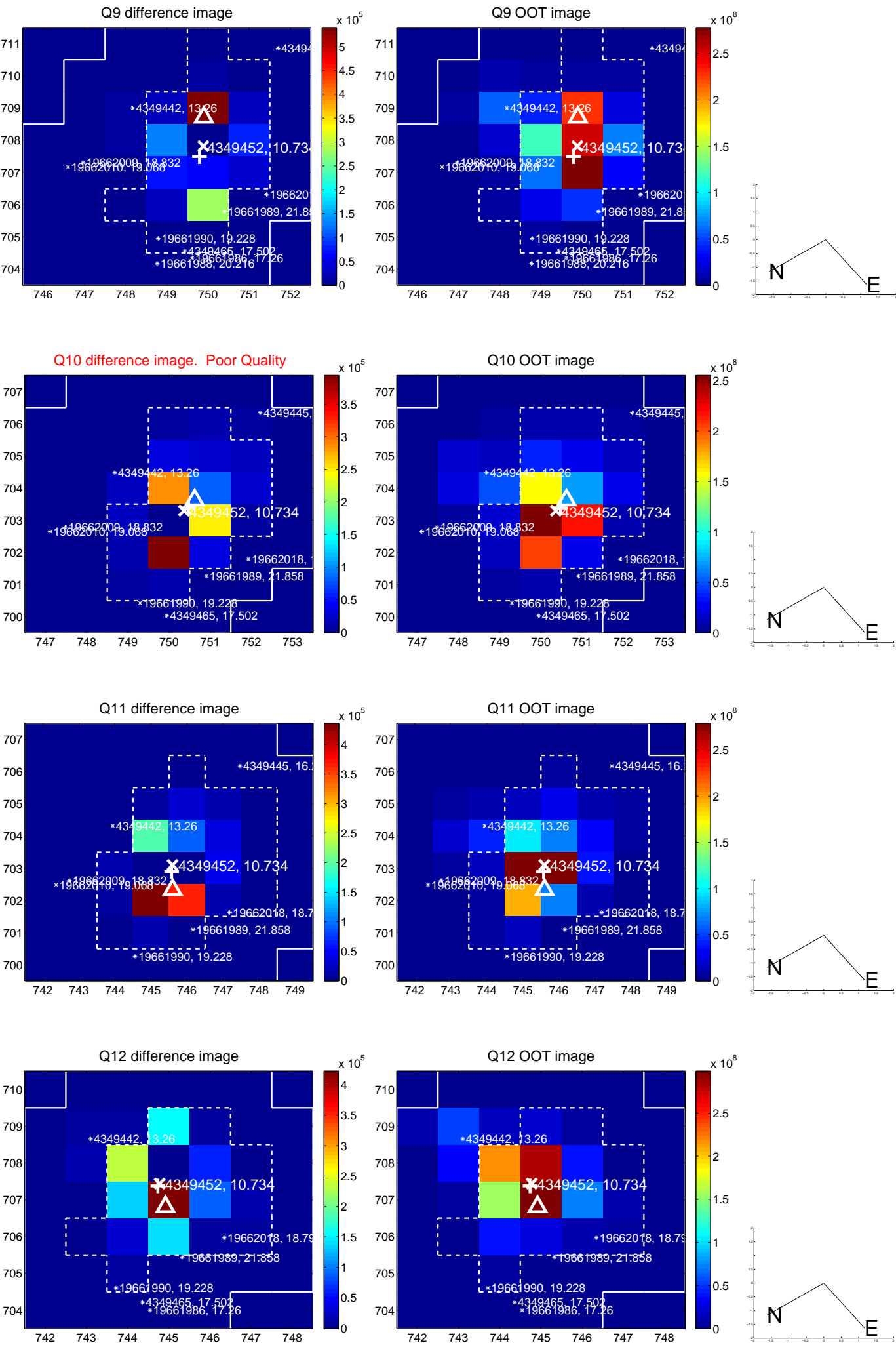




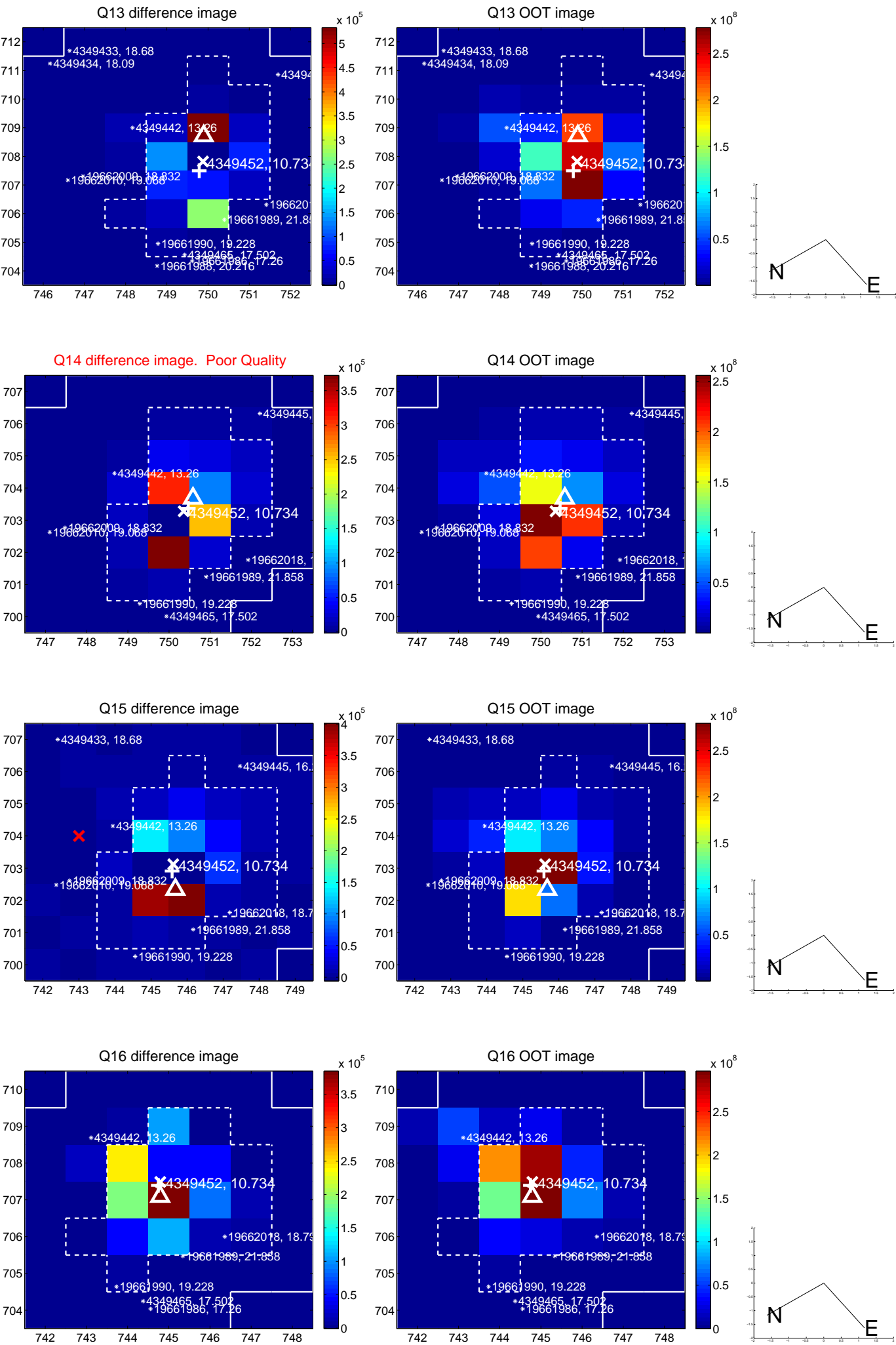
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



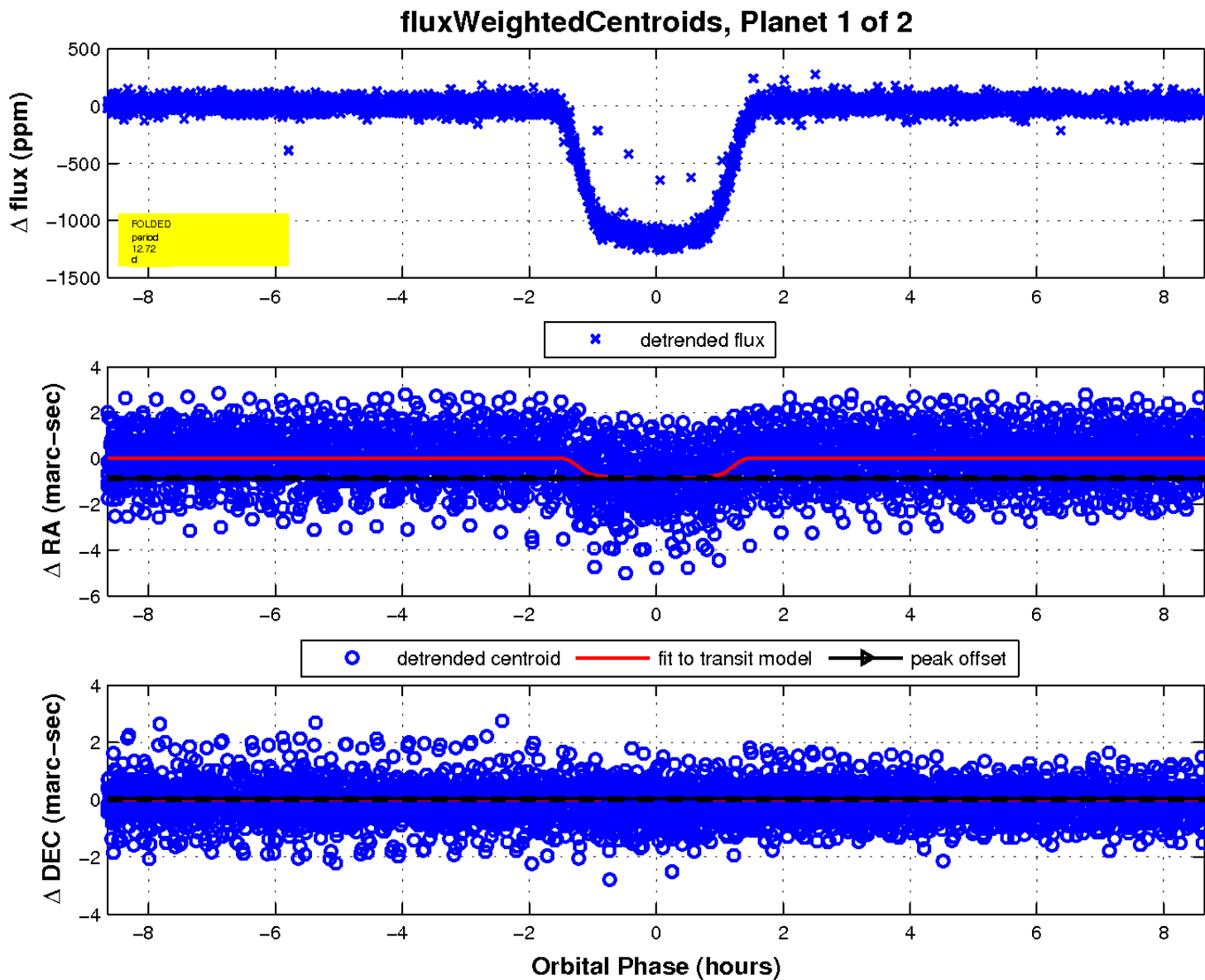
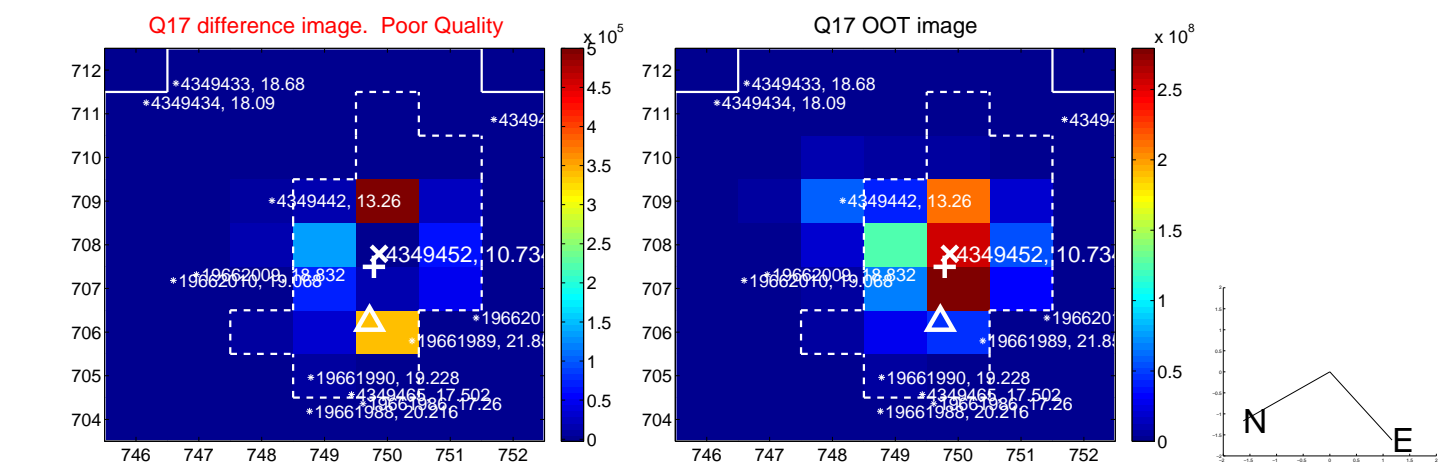
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



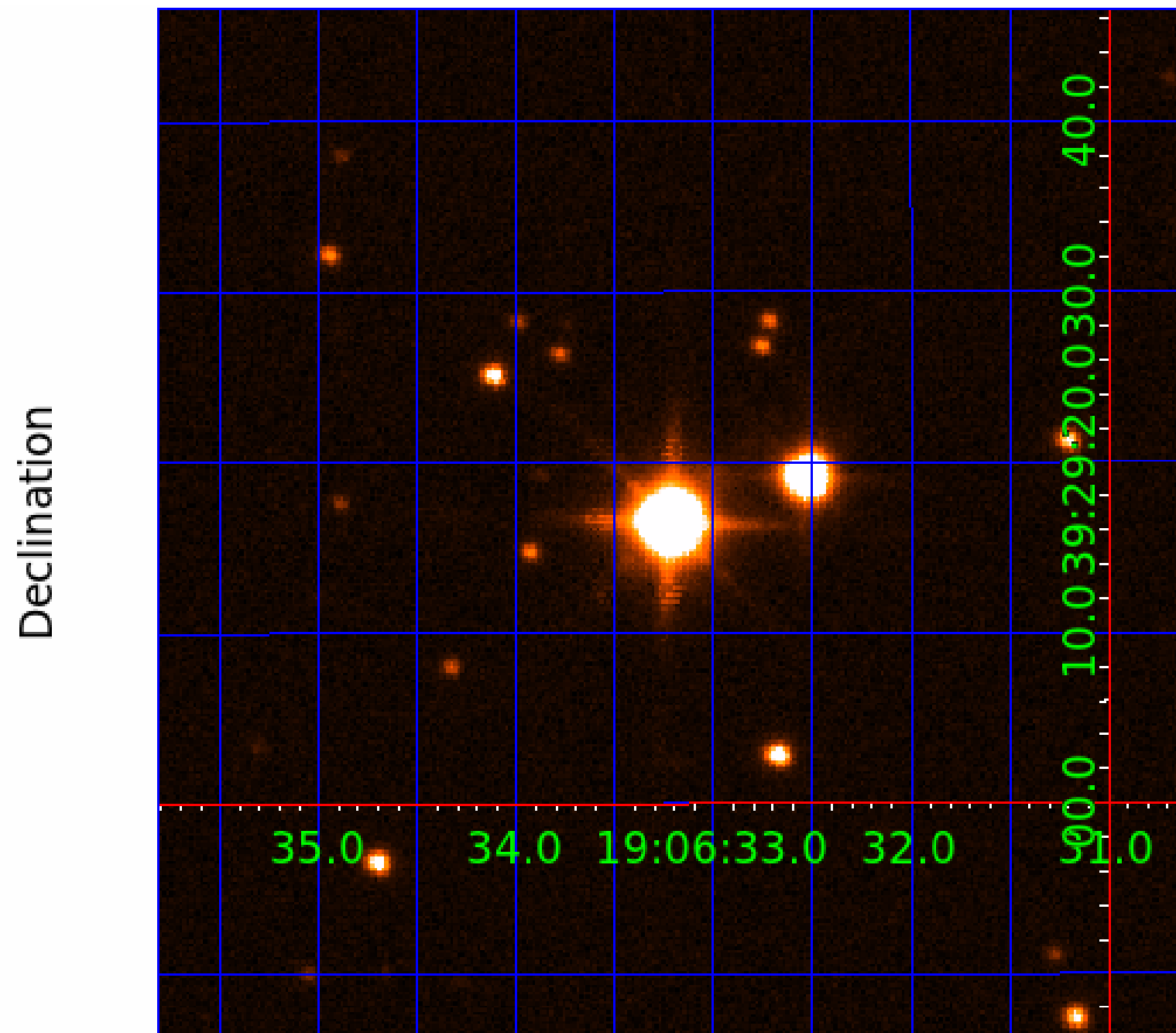
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



UKIRT Image



# KIC 004349452

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004349452-01	OBS	0244.01	12.720370	140.367164	1174.2	2.882	422.2	414.9	1.26	6267	5.00	180.41
004349452-02	OBS	0244.02	6.238540	134.274400	401.3	3.797	222.5	221.6	1.26	6267	2.94	466.45

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004349452-01	OBS	PC	1.00	0	0	0	0	CENT_SATURATED
004349452-02	OBS	PC	1.00	0	0	0	0	CENT_SATURATED

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

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

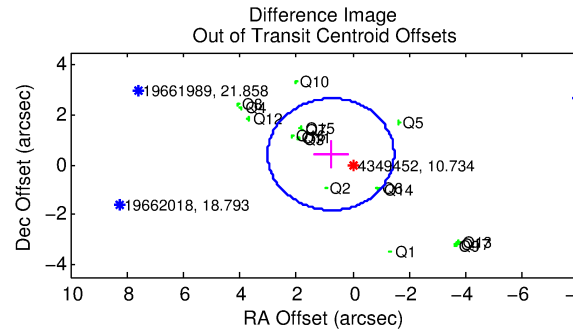
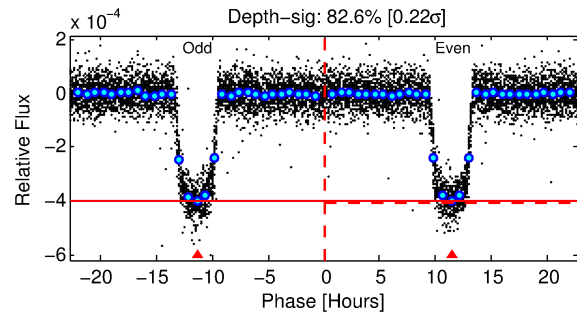
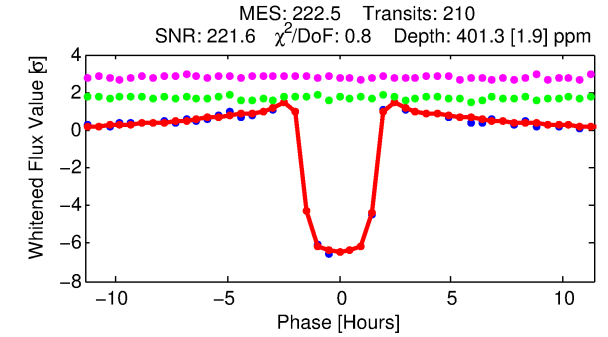
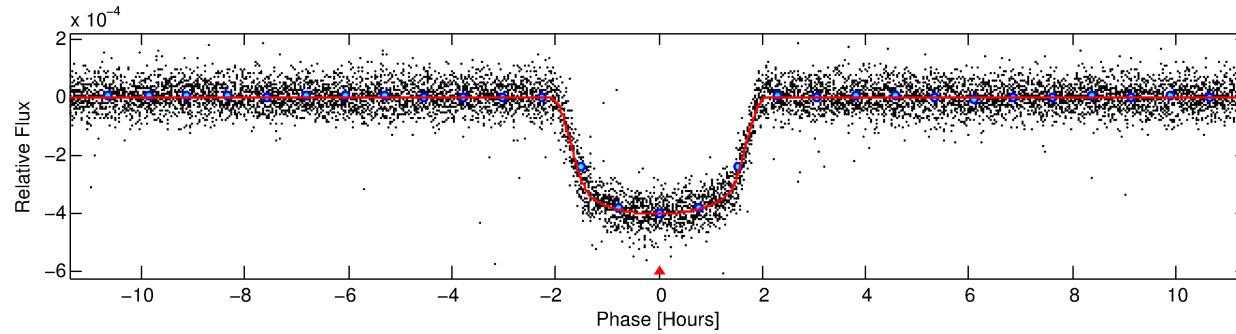
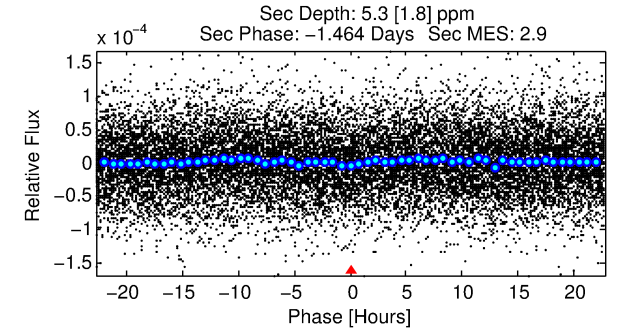
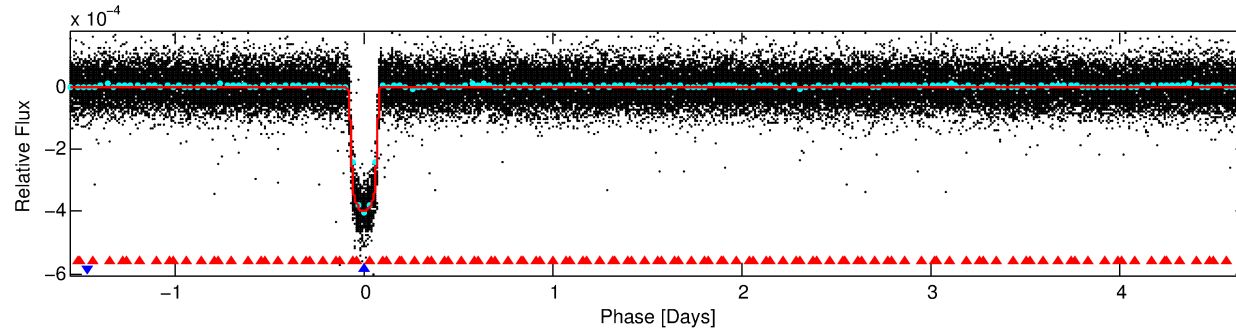
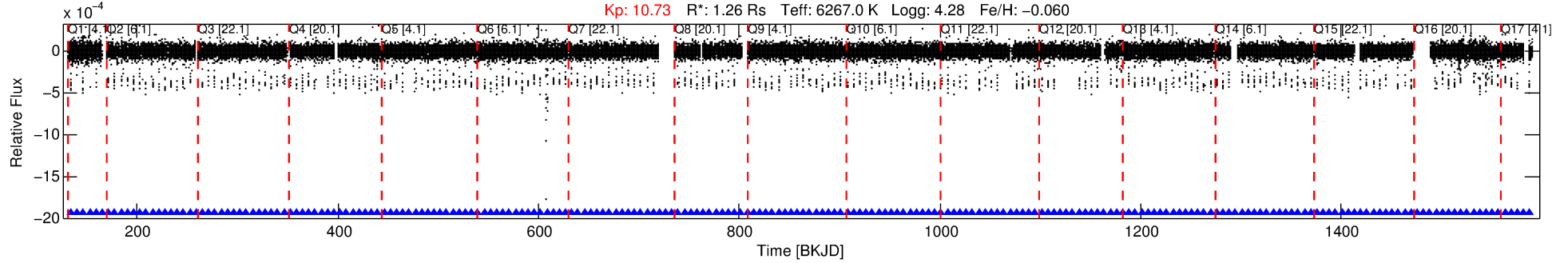
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004349452-02

No Significant Match Found

# DV One-Page Summary

KIC: 4349452 Candidate: 2 of 2 Period: 6.239 d  
KOI: K00244.02 Name: Kepler-25b Corr: 0.966



## DV Fit Results:

Period = 6.23854 [0.00000] d  
Epoch = 134.2744 [0.0003] BKJD  
 $R_p/R^* = 0.0214$  [0.0002]  
 $a/R^* = 6.27$  [0.32]  
 $b = 0.89$  [0.01]  
 $S_{\text{eff}} = 466.45$  [38.17]  
 $T_{\text{eq}} = 1185$  [24] K  
 $R_p = 2.94$  [0.17]  $R_{\text{e}}$   
 $a = 0.0685$  [0.0031] AU  
 $A_g = 1.58$  [0.54] [1.07σ]  
 $T_{\text{eff}} = 2053$  [175] K [4.92σ]

## DV Diagnostic Results:

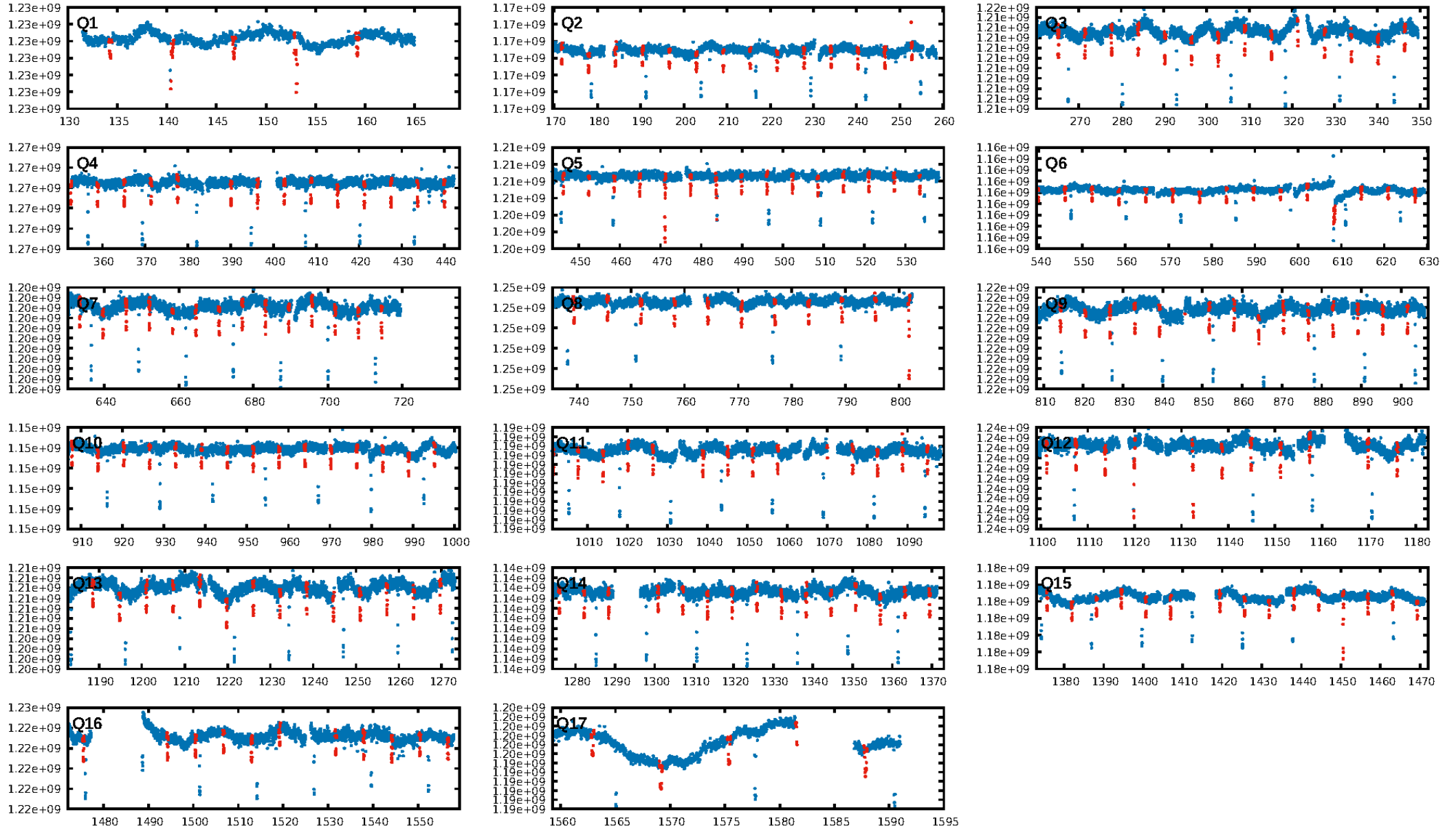
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [32.63σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [201/201]  
GhostDiagnostic-chr: 15.8  
Centroid-sig: 0.0%  
Centroid-so: 0.516 arcsec [7.37σ]  
OotOffset-rm: 0.878 arcsec [1.18σ]  
KicOffset-rm: 1.358 arcsec [1.90σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 0.76 [13/17]  
DiffImageOverlap-fno: 1.00 [17/17]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 11:18:05 Z

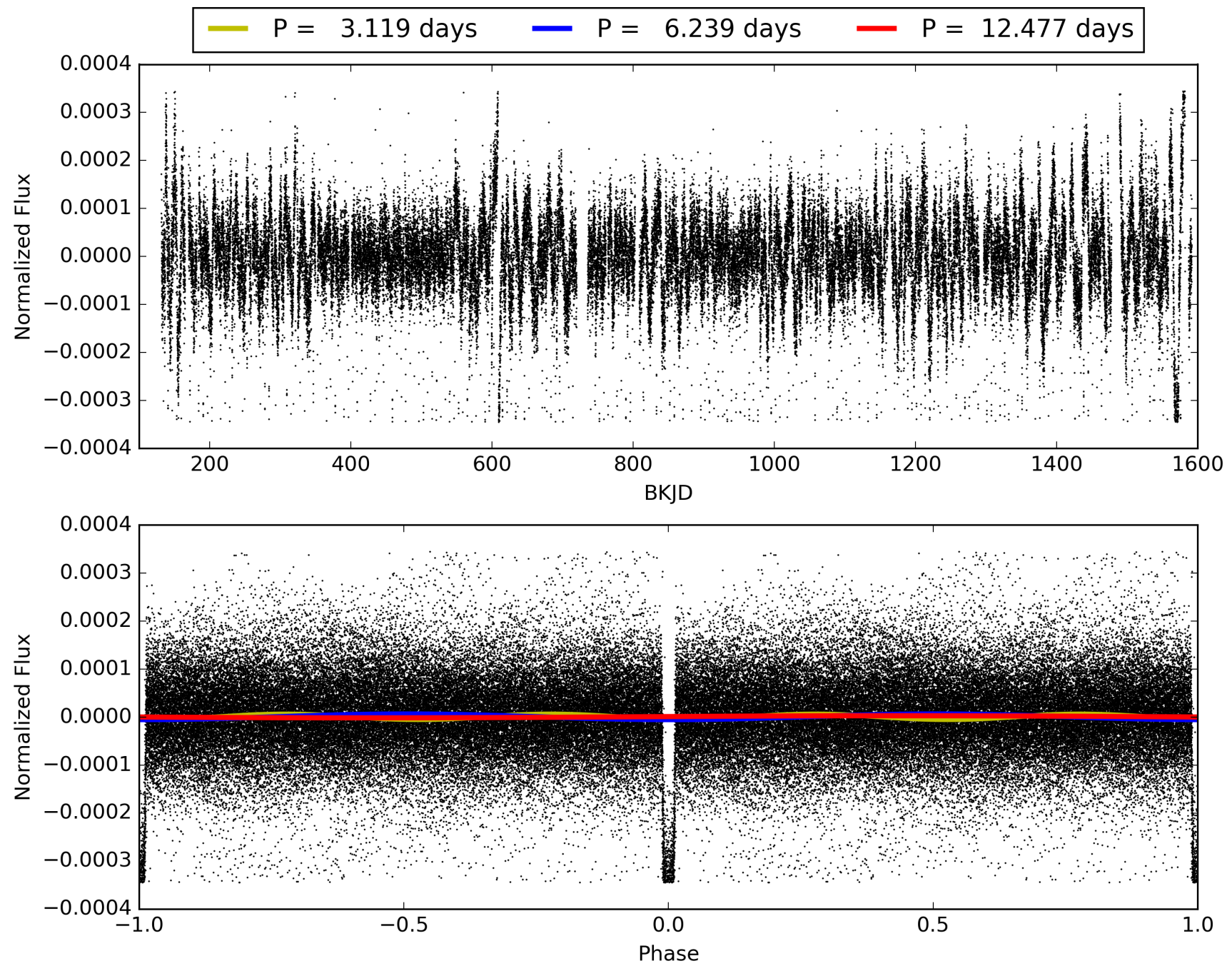
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 004349452-02, PDC Light Curves

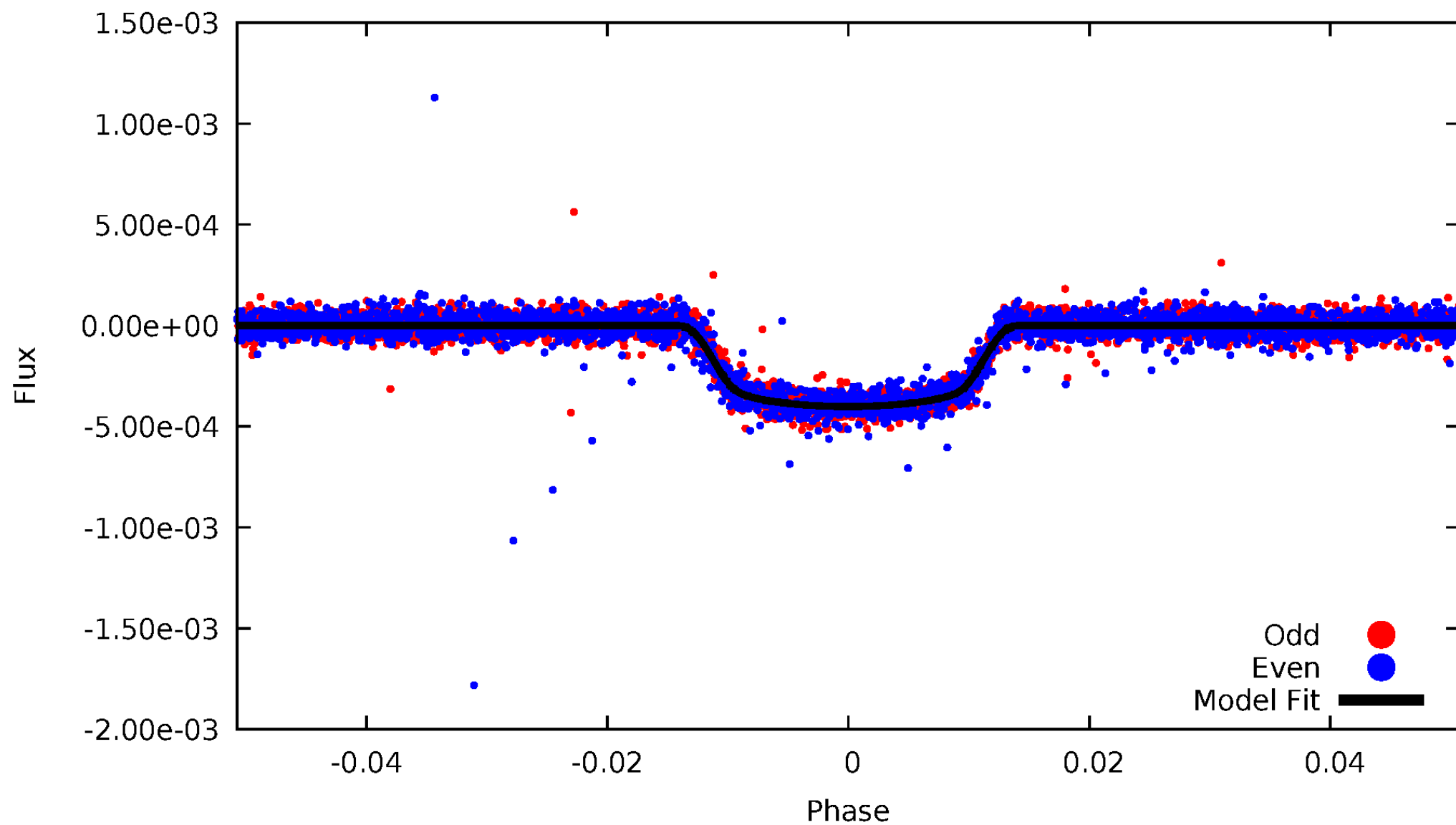


TCE 004349452-02



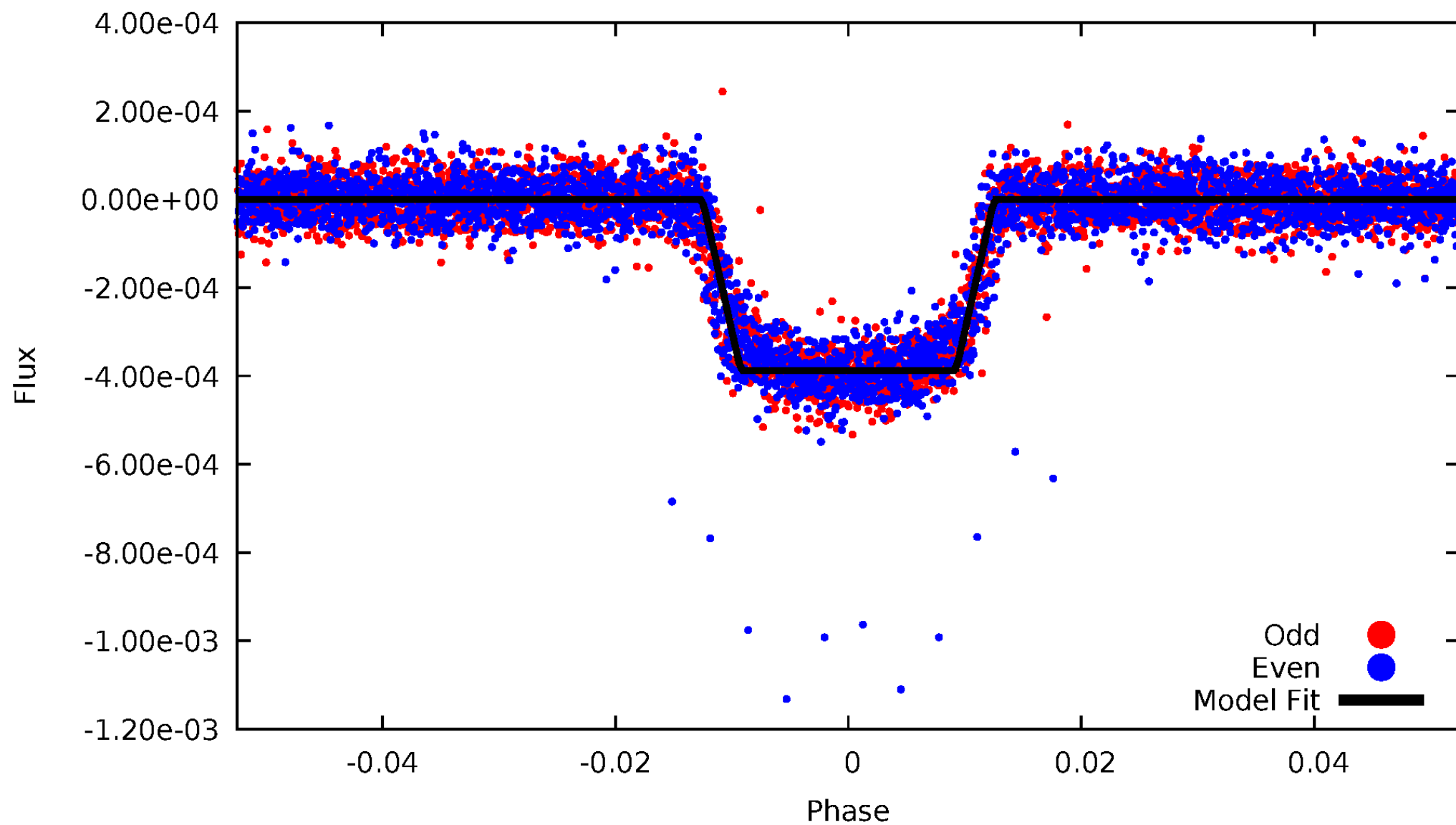
# DV Odd/Even

TCE 004349452-02



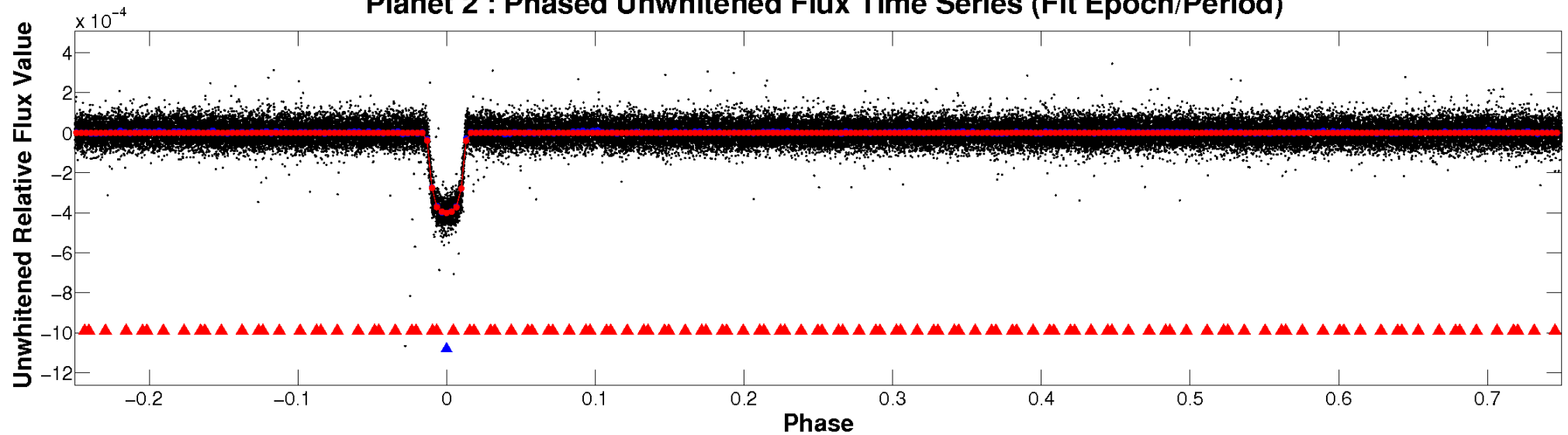
# ALT Odd/Even

TCE 004349452-02

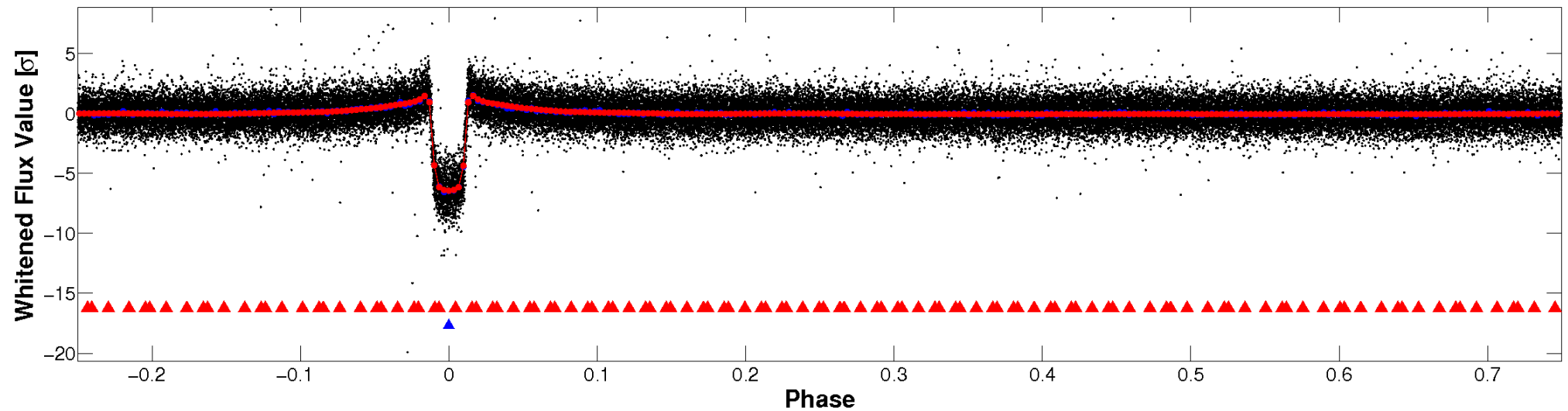


# Non-Whitened Vs. Whitened Light Curve

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

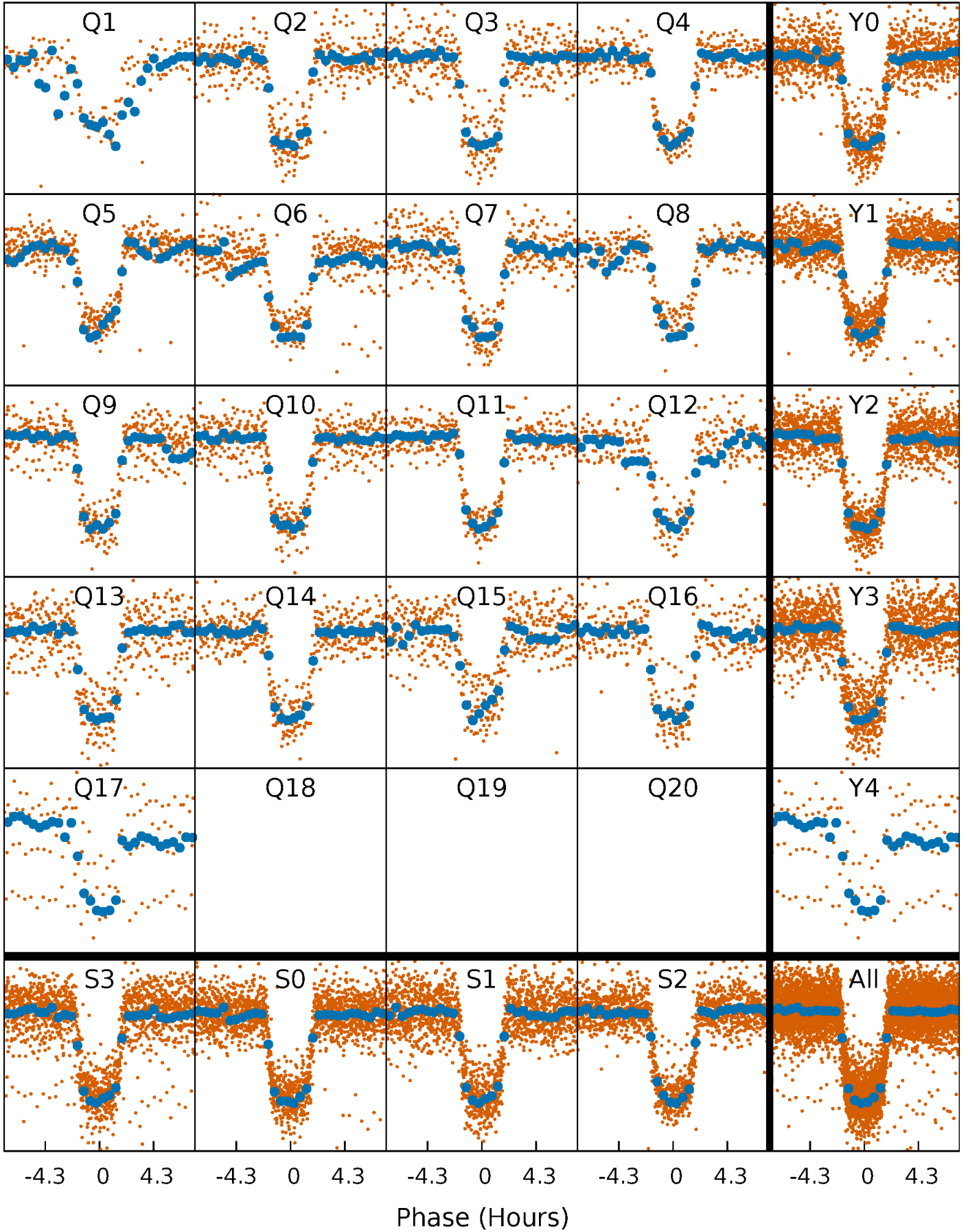


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

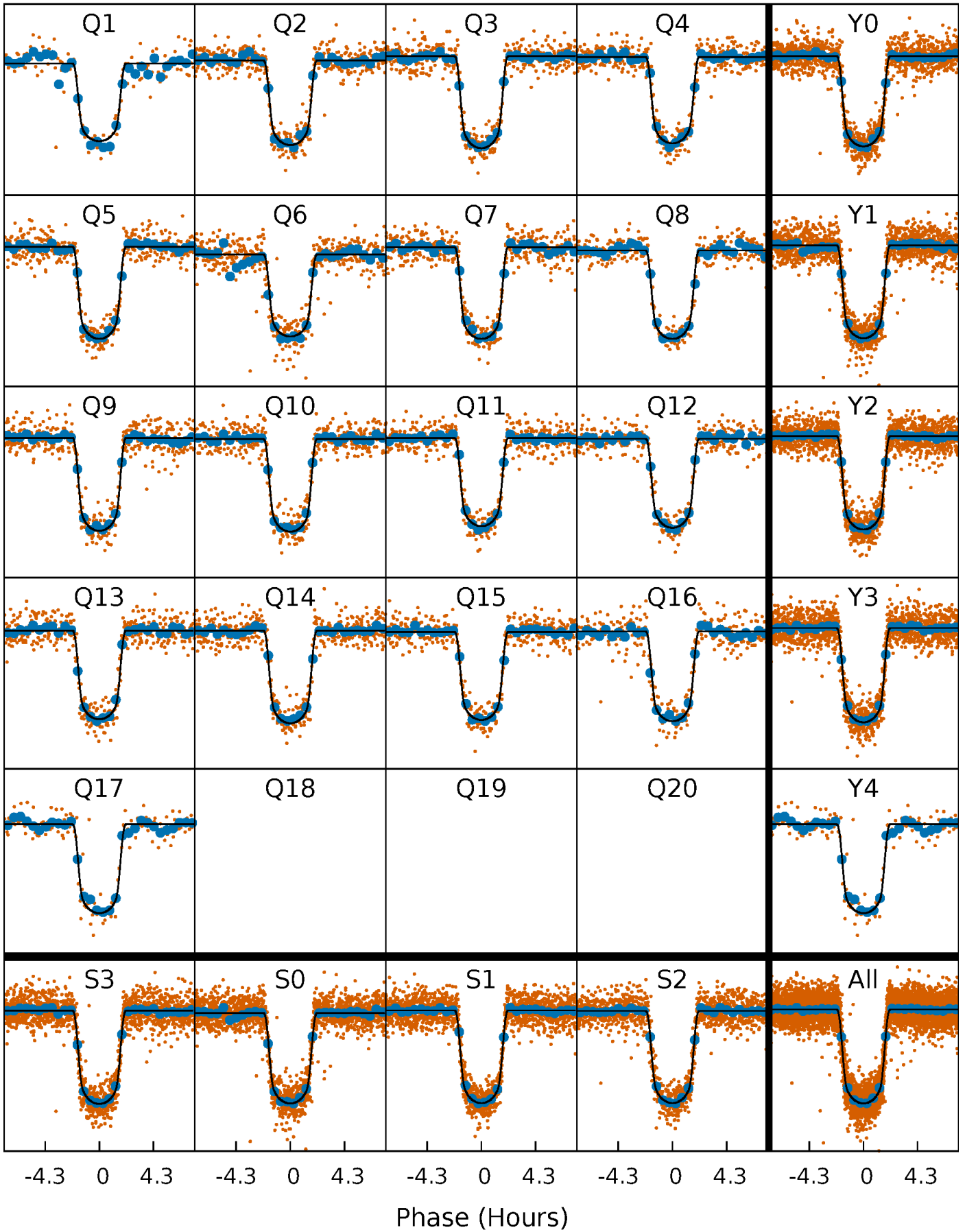
TCE 004349452-02     $P = 6.238540$  Days     $T_0 = 134.274400$  (BKJD)





# DV Quarter-Phased Transit Curves

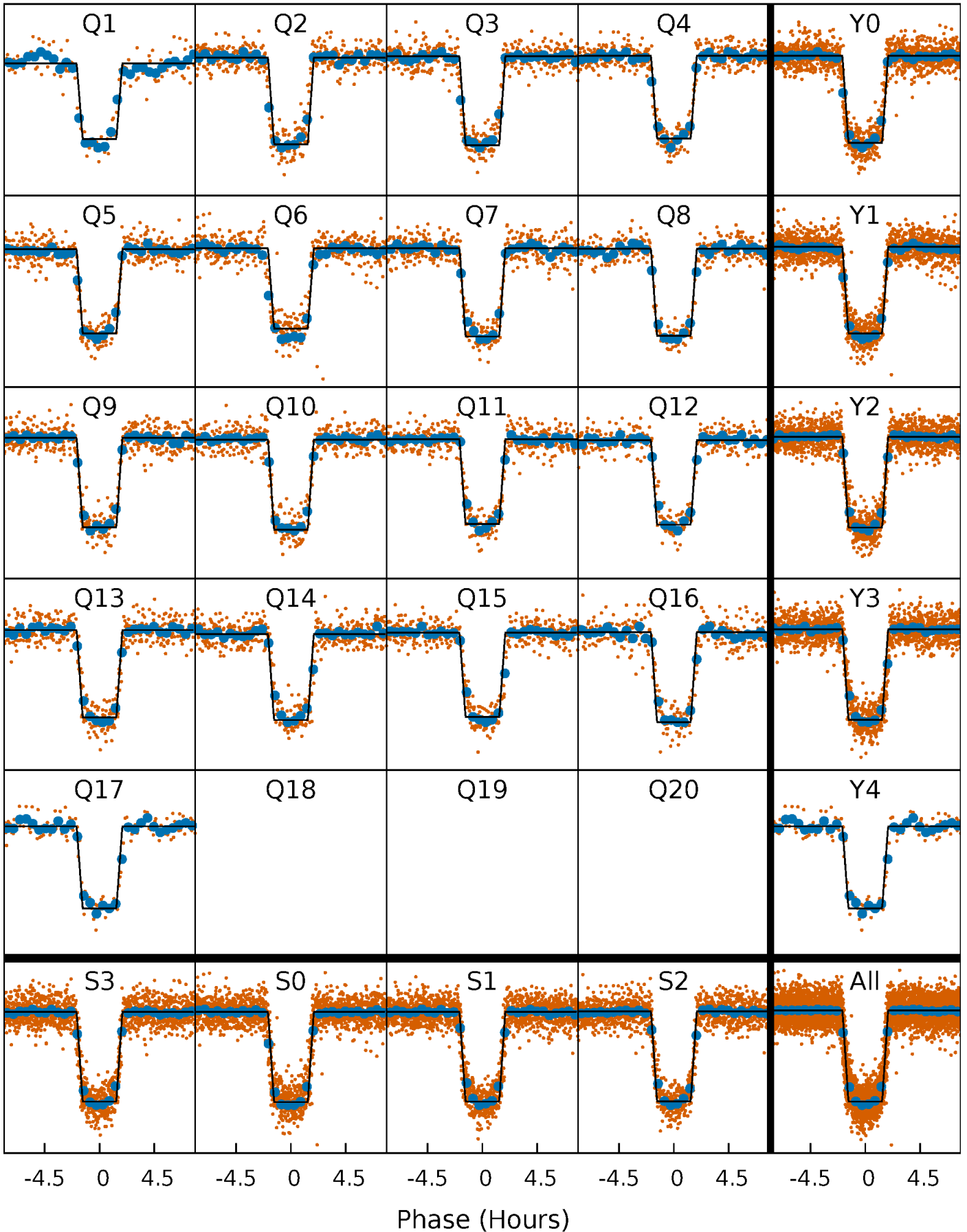
TCE 004349452-02     $P = 6.238540$  Days     $T_0 = 134.274400$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

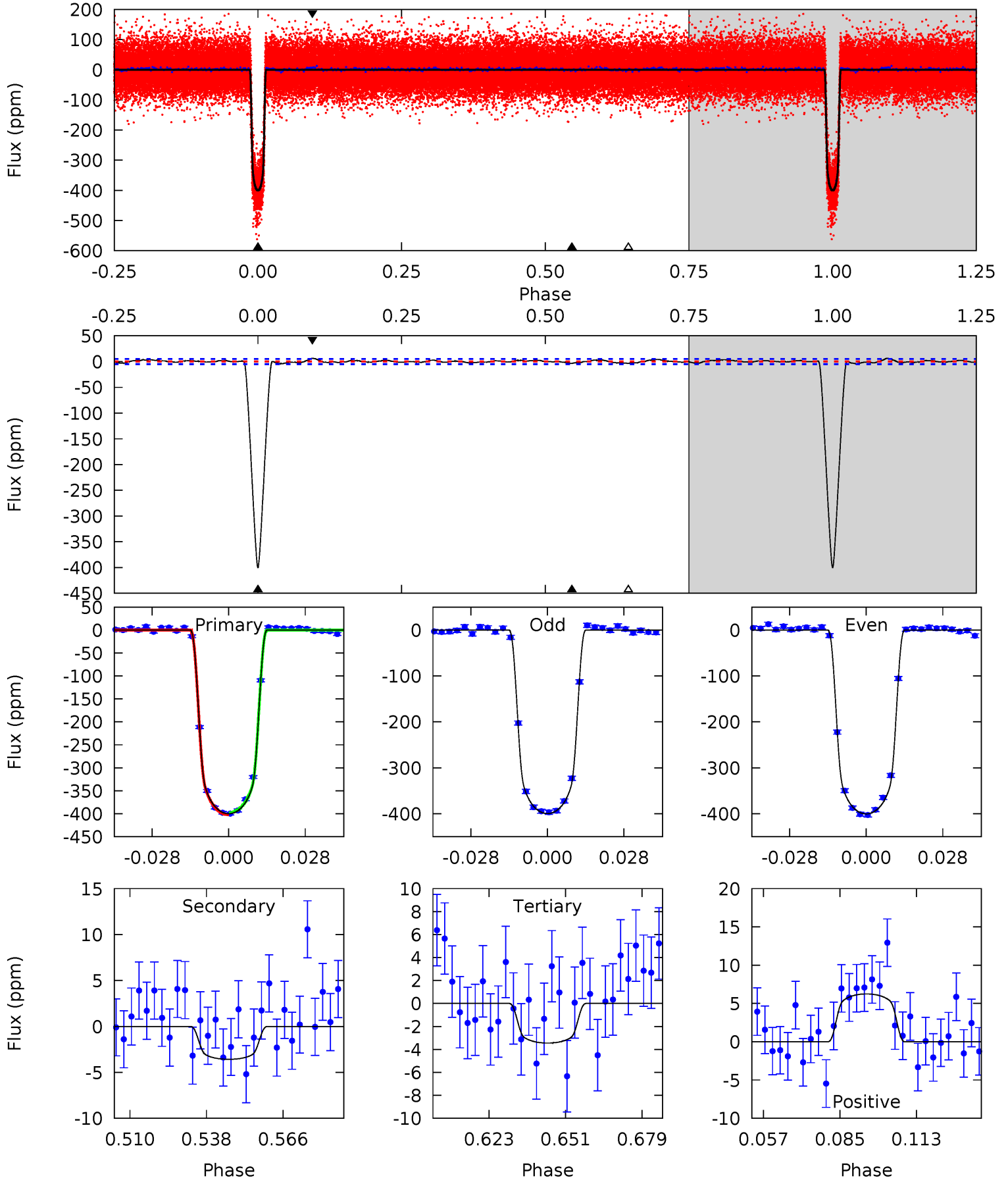
TCE 004349452-02     $P = 6.238472$  Days     $T_0 = 134.282332$  (BKJD)



# DV Model-Shift Uniqueness Test

004349452-02, P = 6.238540 Days, E = 128.035860 Days

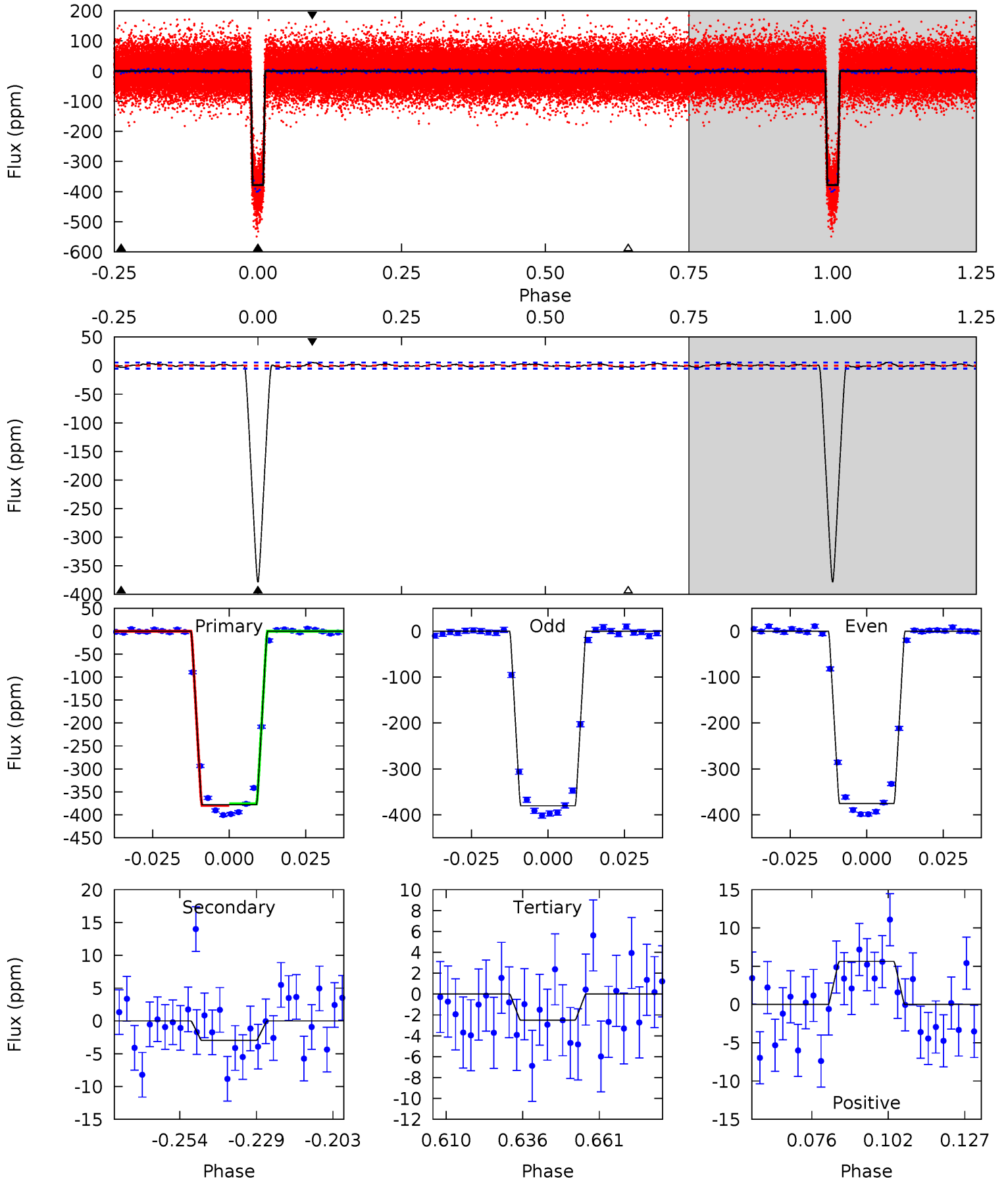
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
375.1	3.36	3.24	5.86	4.82	2.19	1.72	371.9	369.3	0.12	-2.50	0.33	1.00	0.02	1.87



# Alt Model-Shift Uniqueness Test

004349452-02, P = 6.238472 Days, E = 128.043860 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
338.3	2.67	2.23	5.04	4.84	2.23	1.42	336.0	333.2	0.44	-2.37	2.31	1.01	0.01	1.65



### Stellar Parameters For KIC 004349452

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6267^{+81}_{-75}$	$4.280^{+0.033}_{-0.030}$	$-0.060^{+0.150}_{-0.100}$	$1.258^{+0.072}_{-0.059}$	$1.097^{+0.093}_{-0.059}$	$0.776^{+0.094}_{-0.084}$
	+1%/-1%	+1%/-1%	+250%/-167%	+6%/-5%	+8%/-5%	+12%/-11%
Source	SPE8	AST8	SPE8	DSEP		

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

### Secondary Eclipse Parameters for KIC 004349452-02 / KOI 0244.02

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-4 \pm 1$	$2.94^{+0.11}_{-0.10}$	$1656^{+28}_{-28}$	$2548^{+121}_{-166}$	$1.056^{+0.343}_{-0.321}$
Alt.	$-3 \pm 1$	$2.70^{+0.11}_{-0.09}$	$1655^{+29}_{-30}$	$2544^{+142}_{-207}$	$1.050^{+0.396}_{-0.385}$

$T_{\text{max}}$  = 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

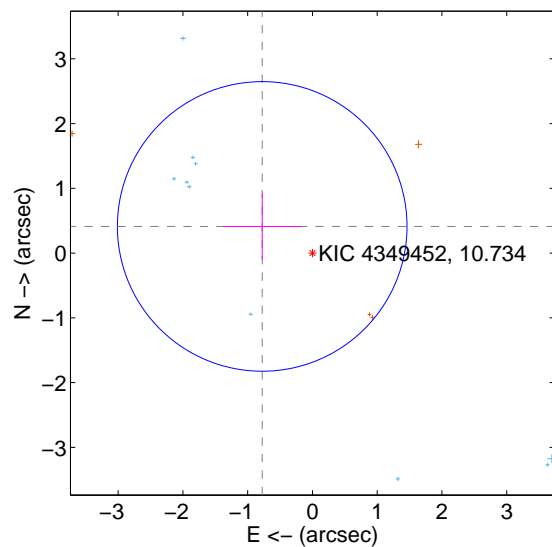
Supplemental centroid analysis for 004349452-02. **Kepler magnitude: 10.73.** Transit SNR 221.64

There are 13 quarters with good PRF difference image offsets

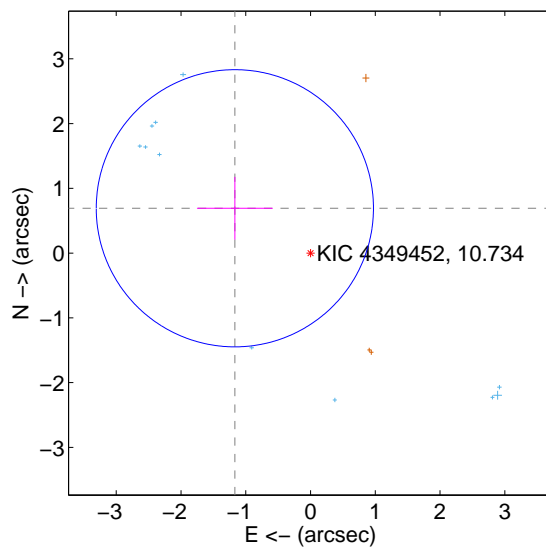
The direct PRF centroid is offset from the target star catalog position by about 1.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.878 \pm 0.745$	1.18	$0.776 \pm 0.606$	$0.412 \pm 0.508$
PRF-fit source offset from KIC position	$1.358 \pm 0.713$	1.90	$1.168 \pm 0.584$	$0.692 \pm 0.484$
photometric centroid source offset	$0.52 \pm 0.07$	<b>7.37</b>	$0.21 \pm 0.09$	$0.47 \pm 0.07$

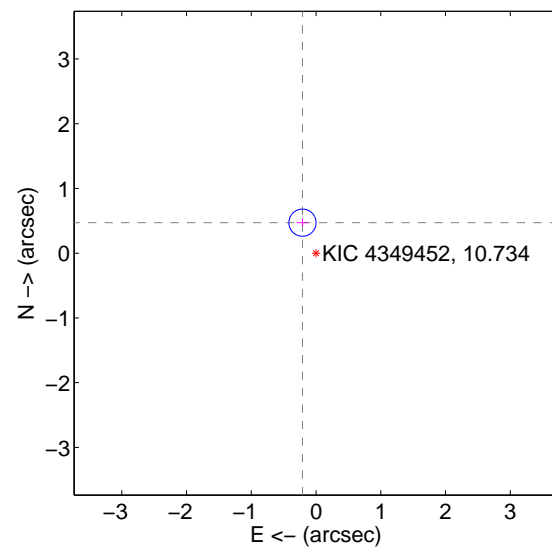
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

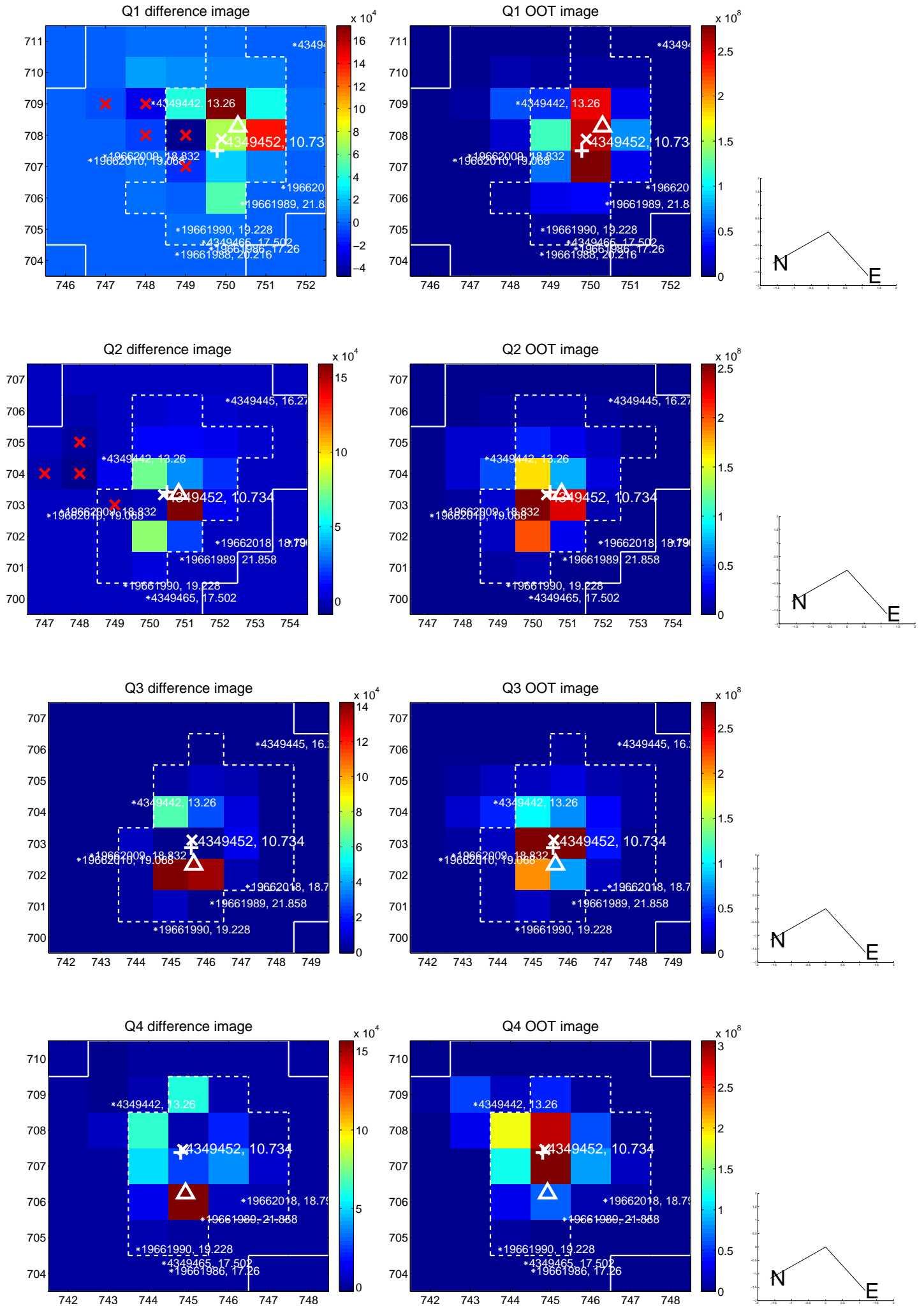


offset from photometric centroids

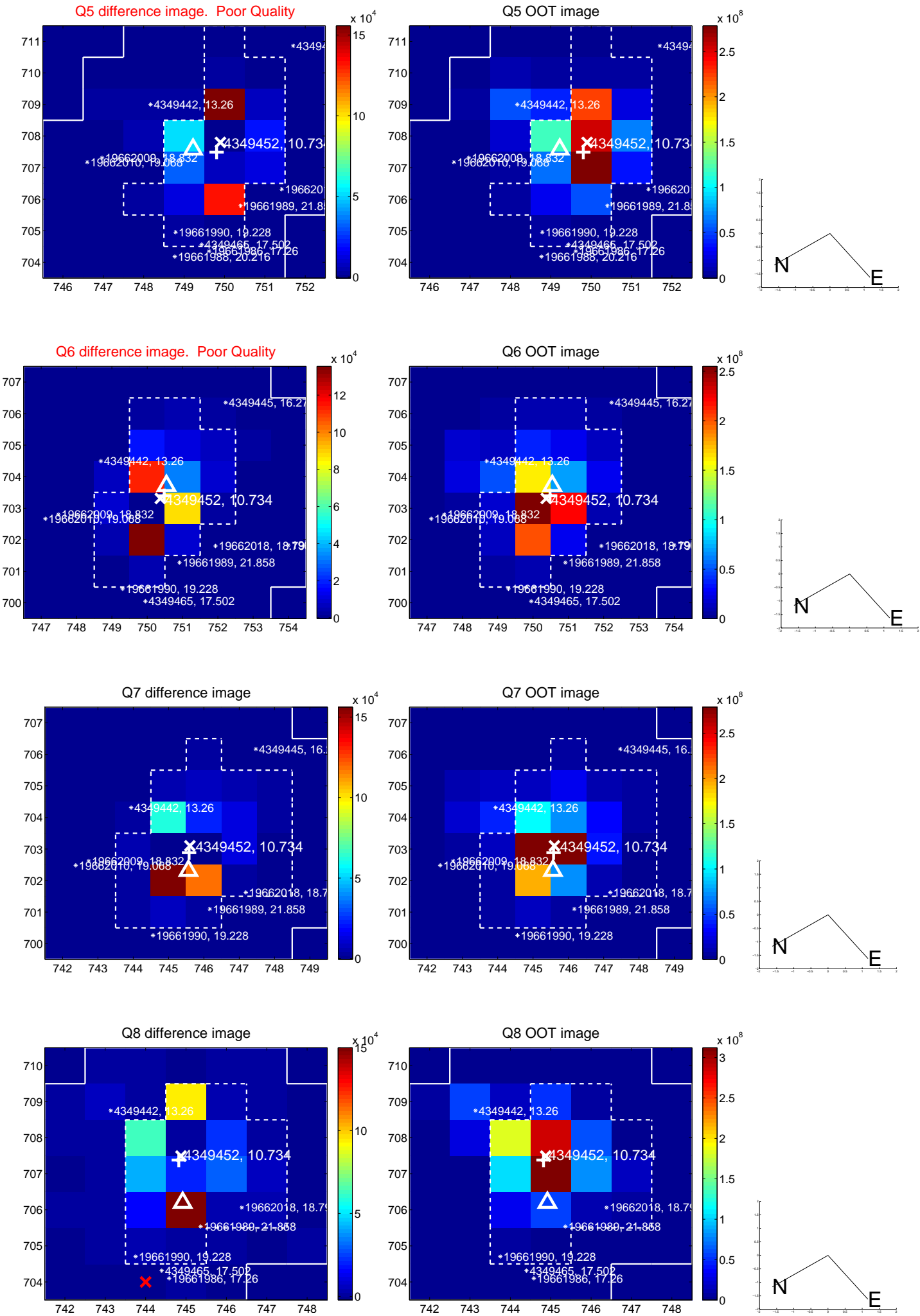


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: 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.

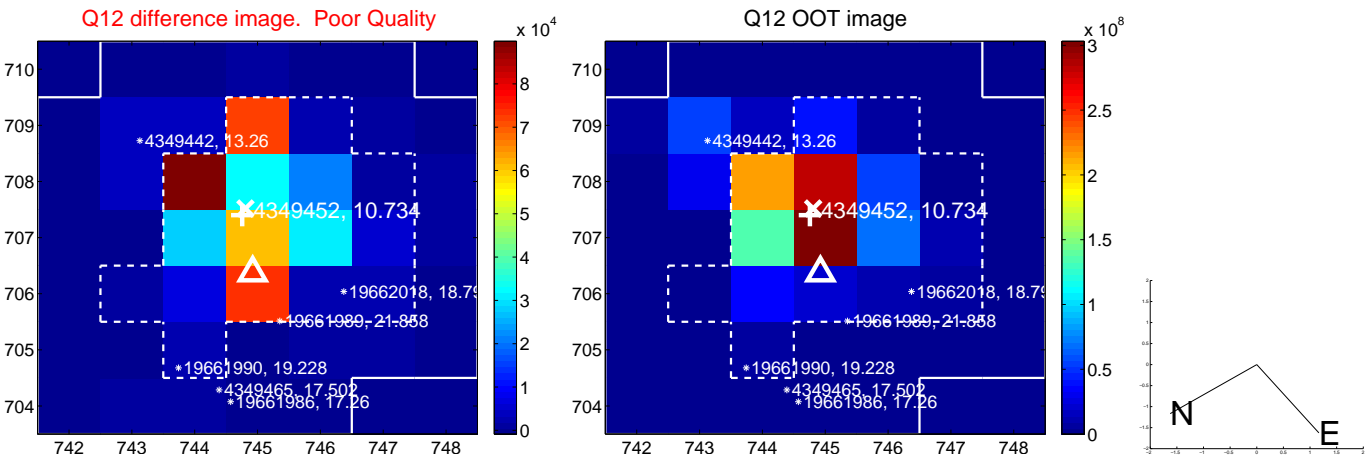
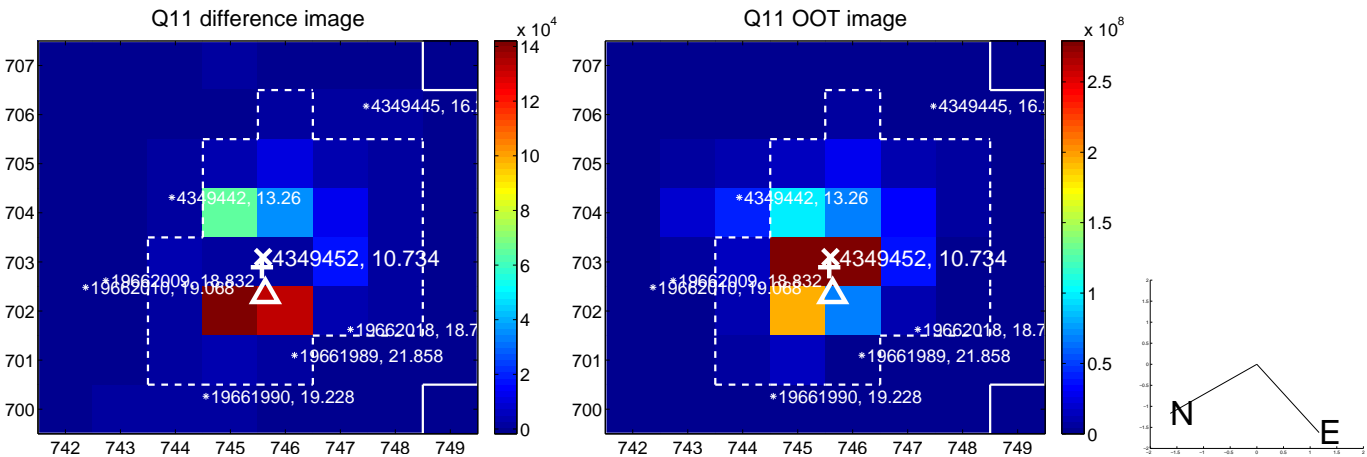
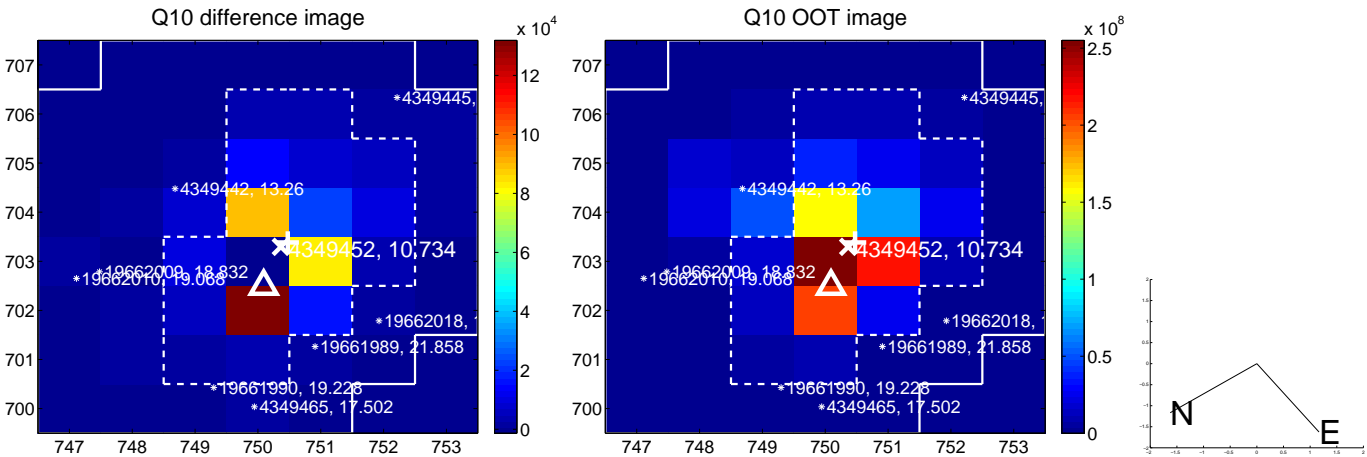
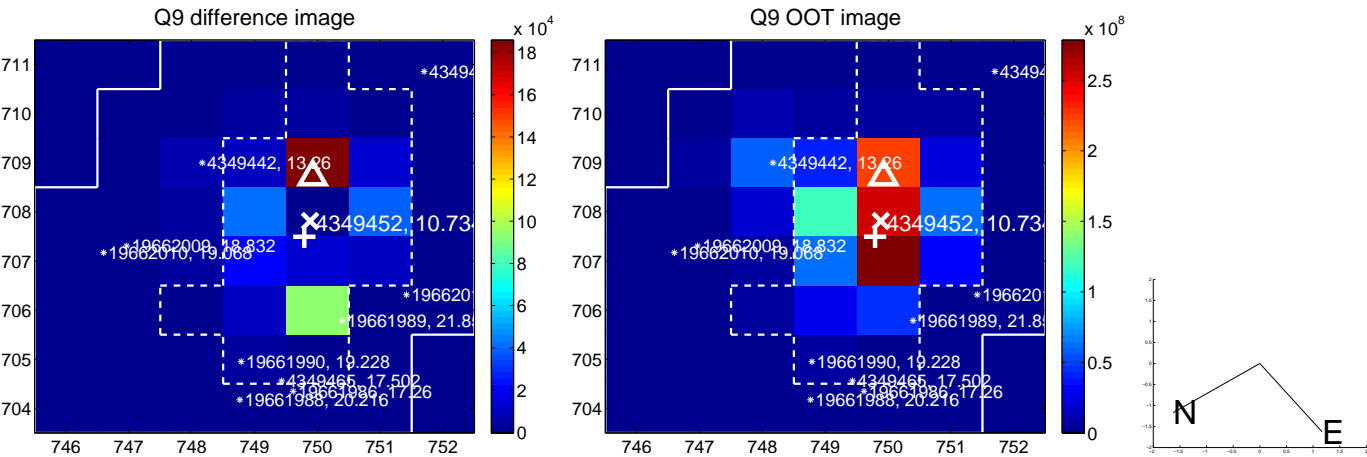


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

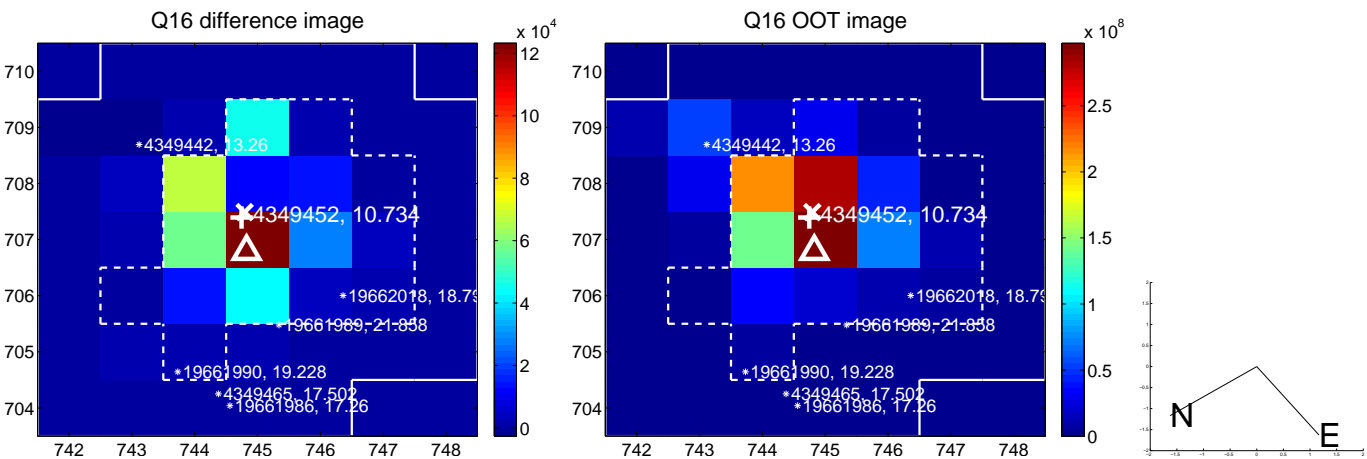
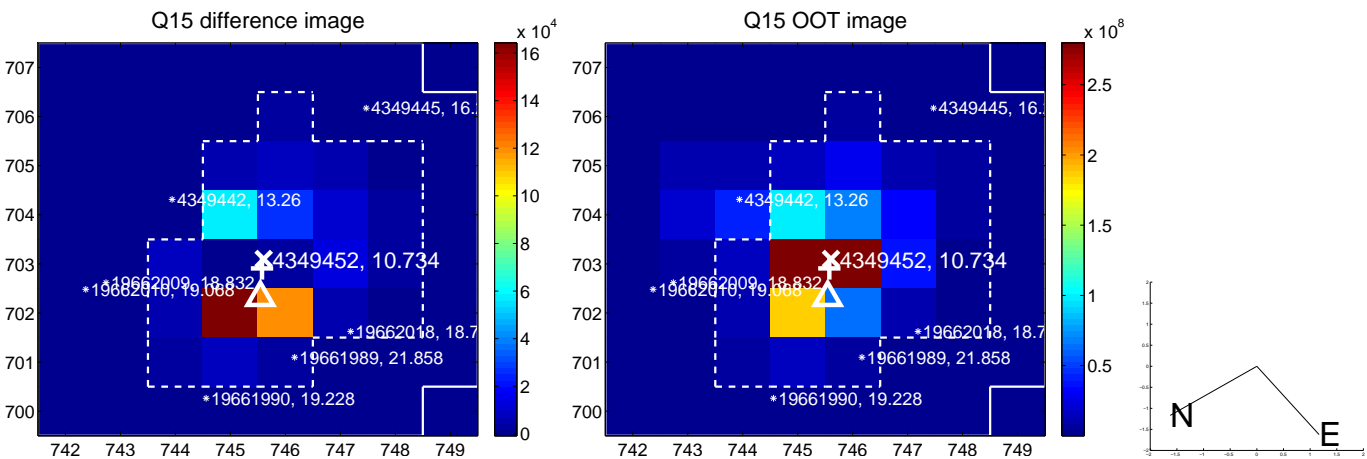
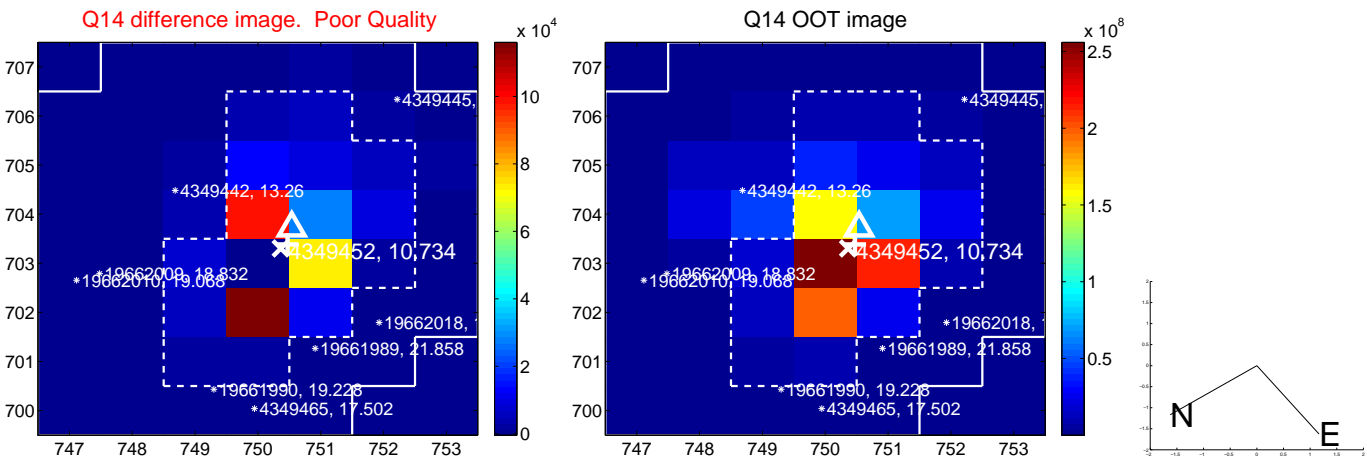
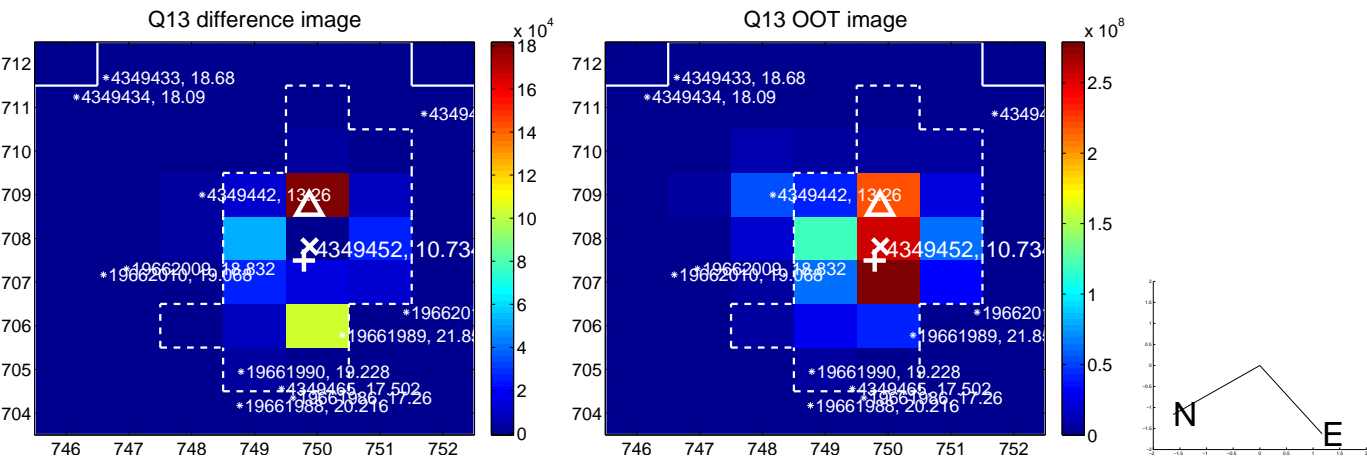




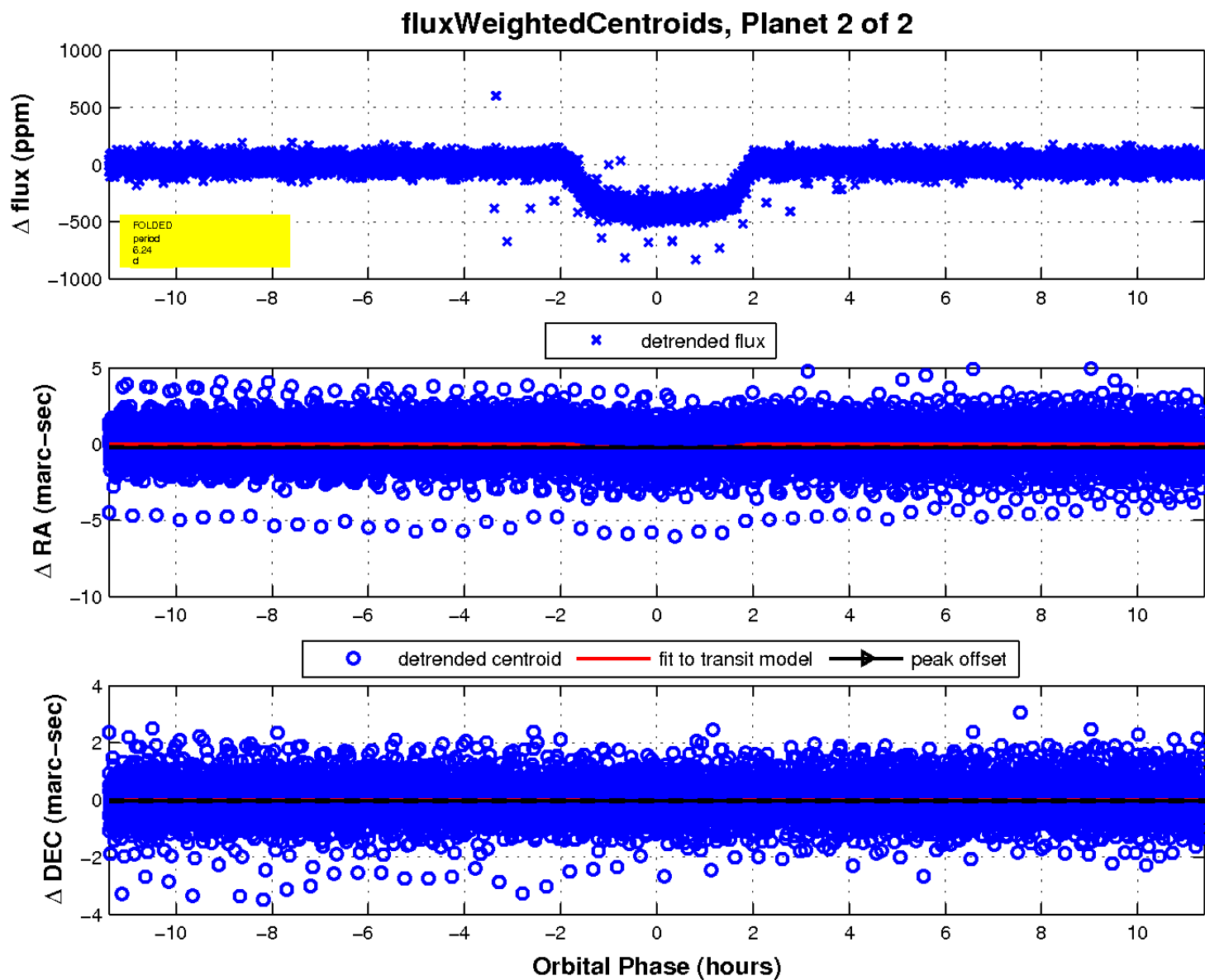
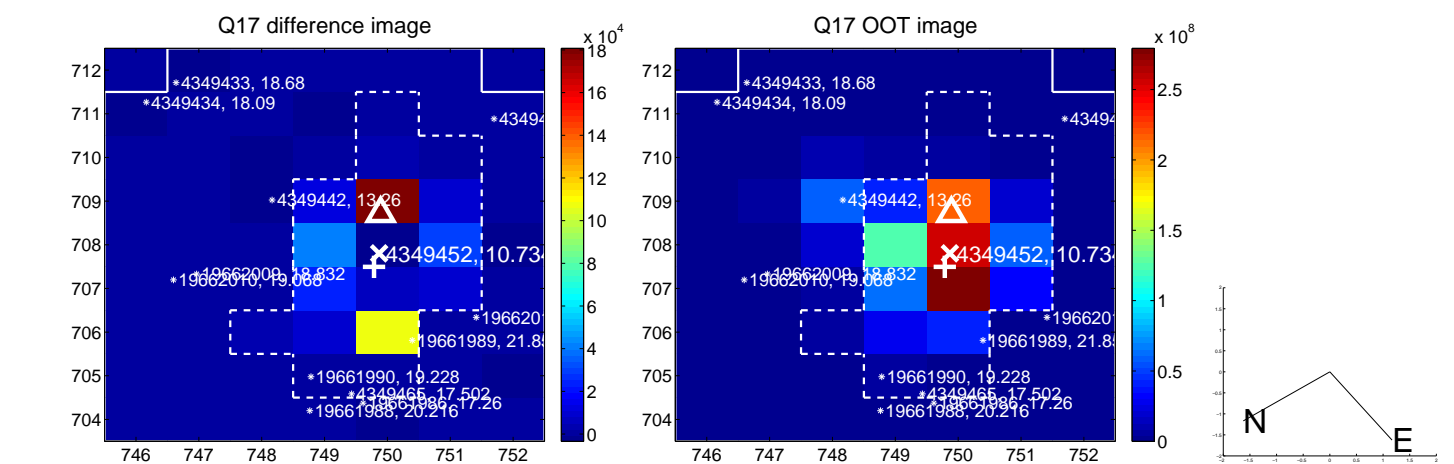
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

