

# KIC 008374321

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008374321-01	OBS	No	357.287893	235.774636	1782.1	15.124	10.2	9.9	0.96	6215	4.08	1.24
008374321-02	OBS	No	368.214808	234.040637	2908.4	26.001	11.8	14.8	0.96	6215	9.48	1.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008374321-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008374321-02	OBS	FP	0.00	1	0	0	1	INDIV_TRANS_SKYE—LPP_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—EPHEM_MATCH

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

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

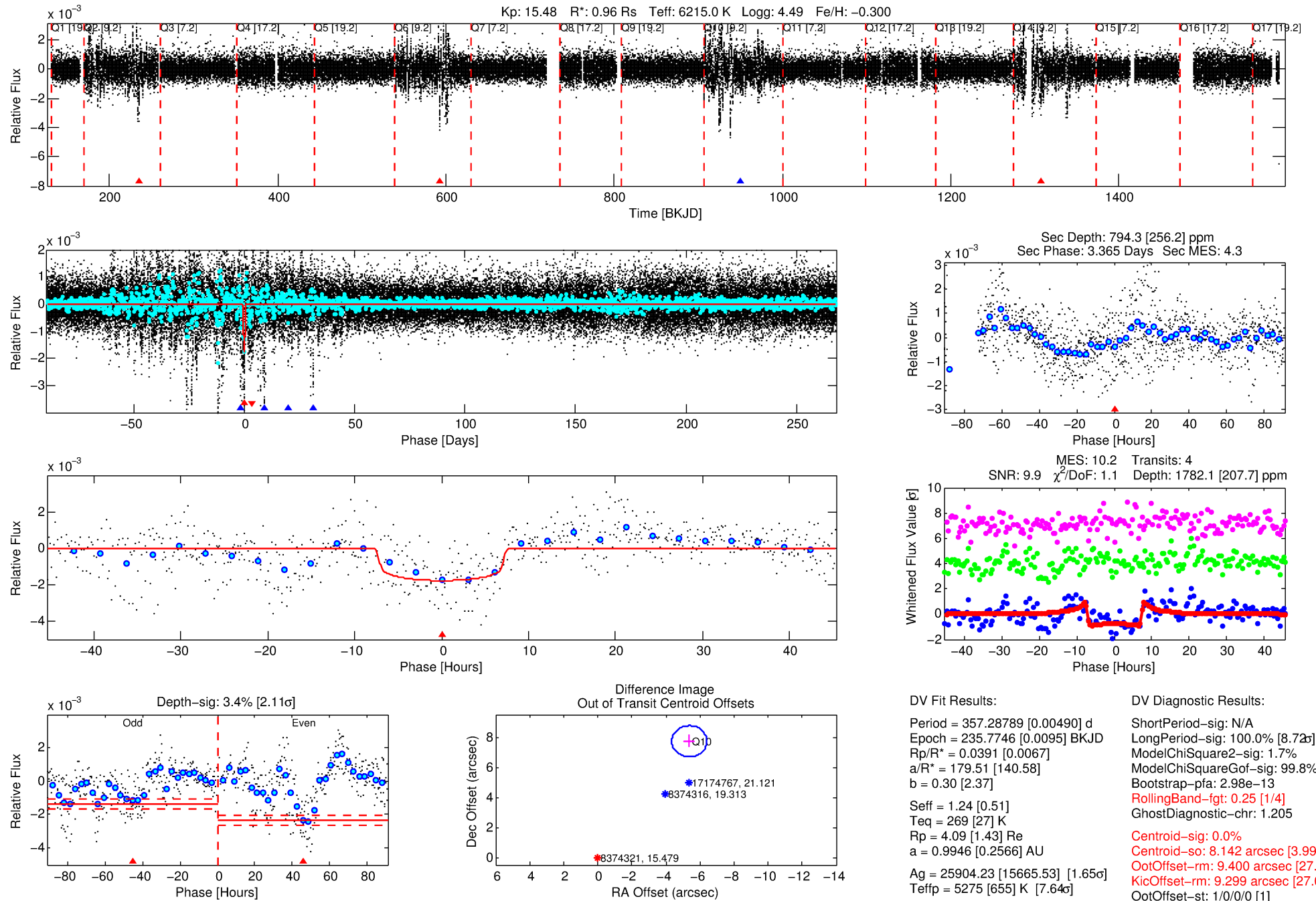
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008374321-01

No Significant Match Found

# DV One-Page Summary

KIC: 8374321 Candidate: 1 of 2 Period: 357.288 d



## DV Fit Results:

Period = 357.28789 [0.00490] d  
Epoch = 235.7746 [0.0095] BKJD  
Rp/R\* = 0.0391 [0.0067]  
a/R\* = 179.51 [140.58]  
b = 0.30 [2.37]  
Seff = 1.24 [0.51]  
Teq = 269 [27] K  
Rp = 4.09 [1.43] Re  
a = 0.9946 [0.2566] AU  
Ag = 25904.23 [15665.53] [1.65σ]  
Teff = 5275 [655] K [7.64σ]

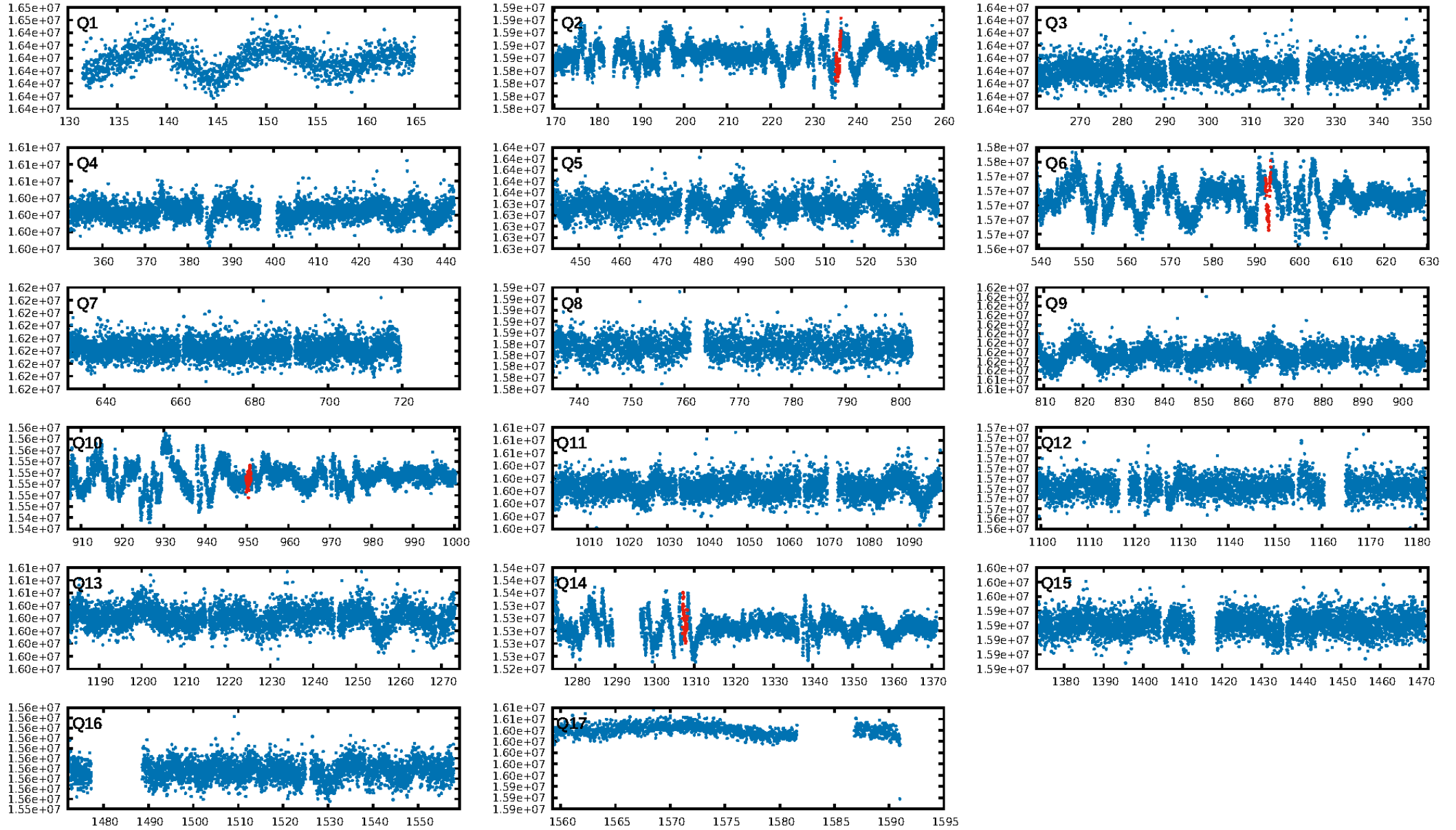
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [8.72σ]  
ModelChiSquare2-sig: 1.7%  
ModelChiSquareGoF-sig: 99.8%  
Bootstrap-pfa: 2.98e-13  
RollingBand-fgt: 0.25 [1/4]  
GhostDiagnostic-chr: 1.205  
Centroid-sig: 0.0%  
Centroid-so: 8.142 arcsec [3.99σ]  
OotOffset-rm: 9.400 arcsec [27.33σ]  
KicOffset-rm: 9.299 arcsec [27.05σ]  
OotOffset-st: 1/0/0/0 [1]  
KicOffset-st: 1/0/0/0 [1]  
DiffImageQuality-fgm: 0.00 [0/1]  
DiffImageOverlap-fno: 1.00 [3/3]

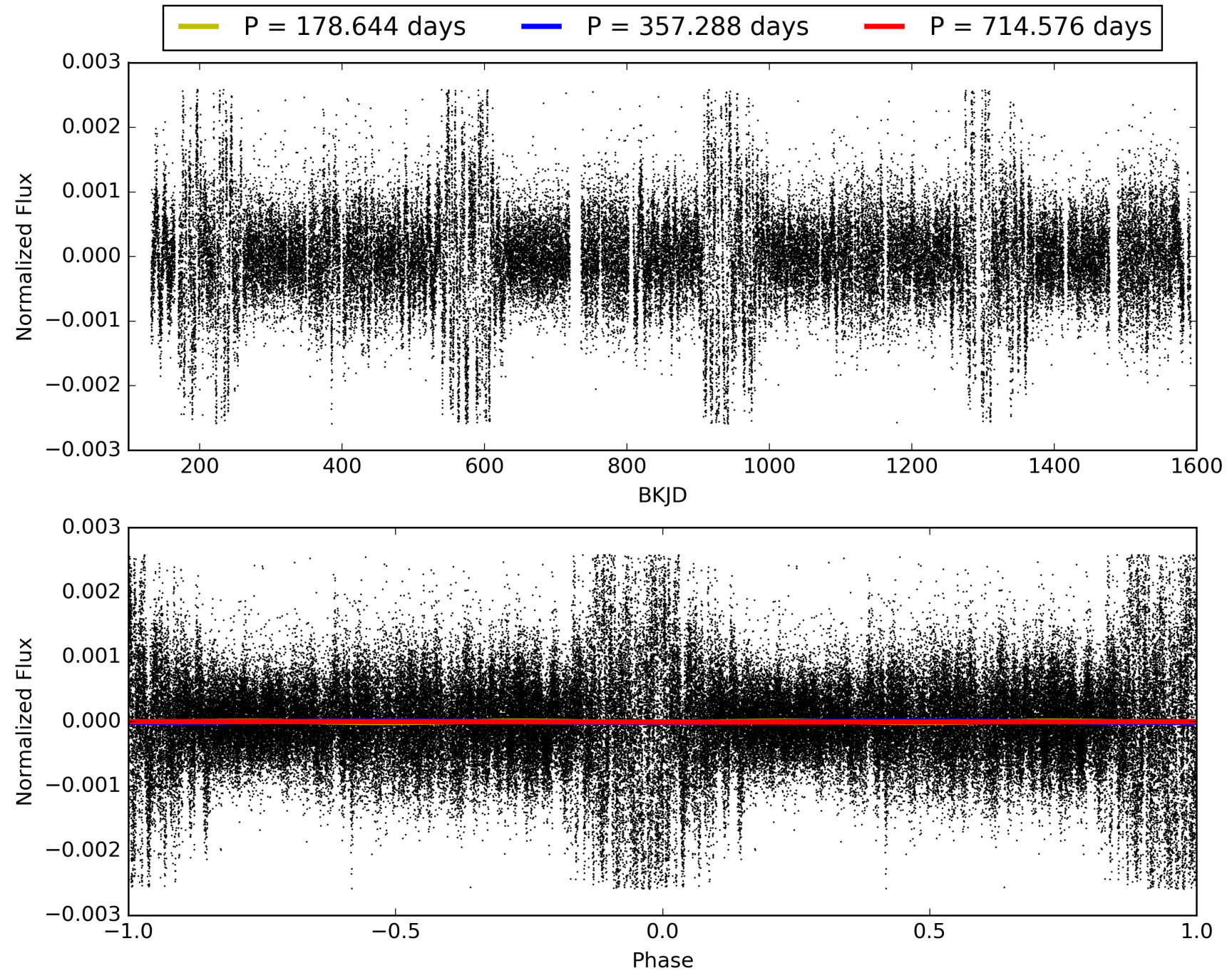
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:43:42 Z

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

# TCE 008374321-01, PDC Light Curves

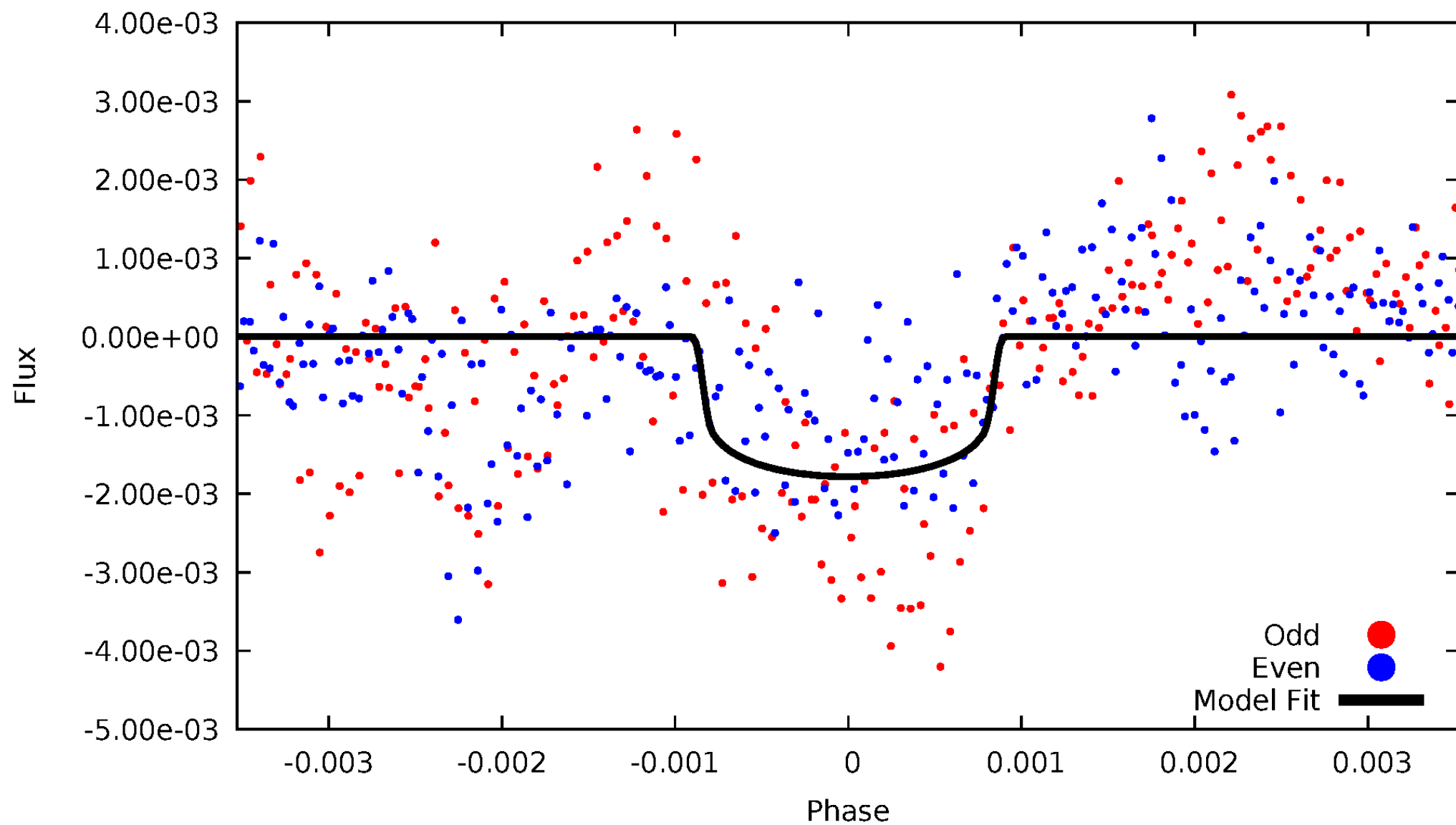


TCE 008374321-01



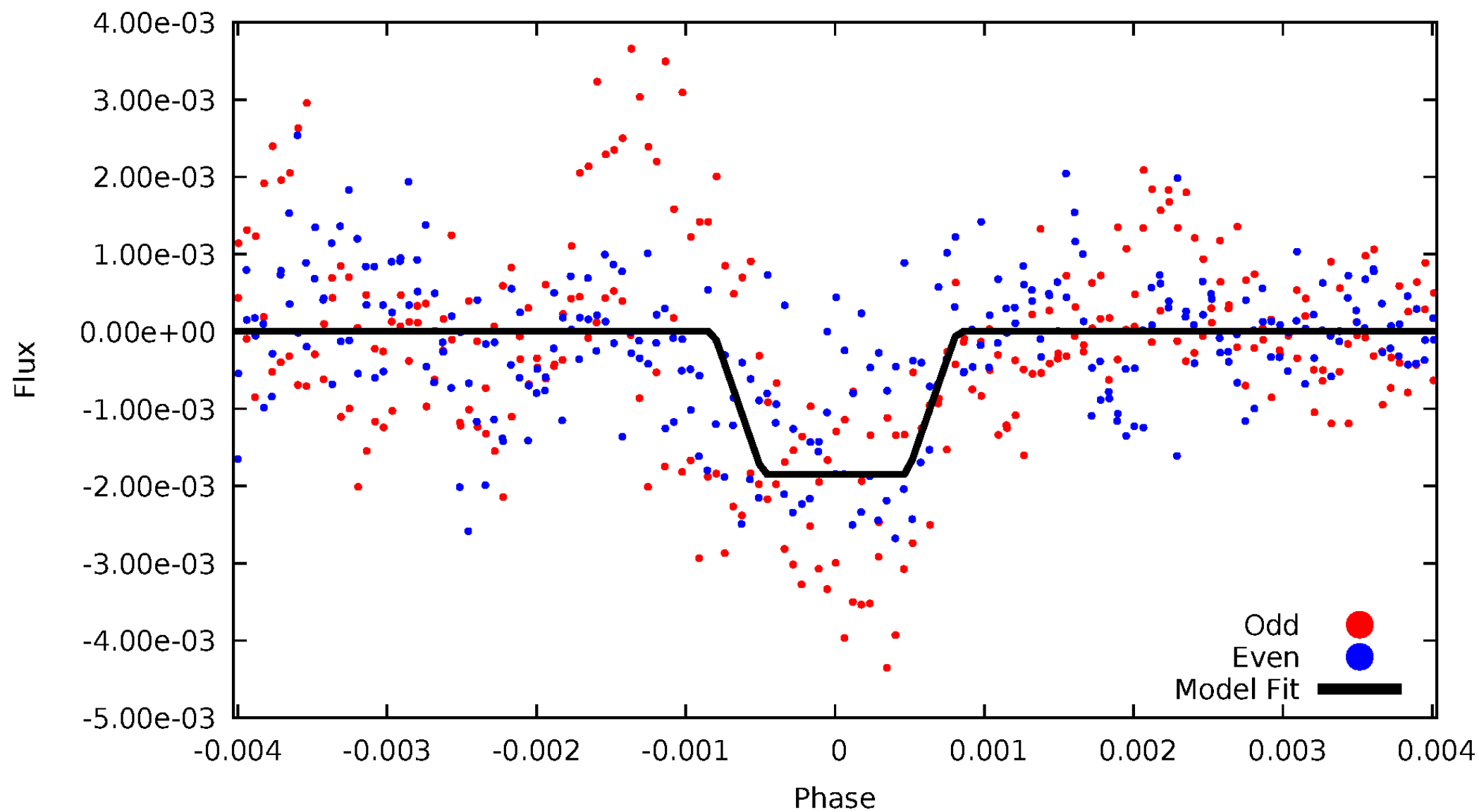
# DV Odd/Even

TCE 008374321-01



# ALT Odd/Even

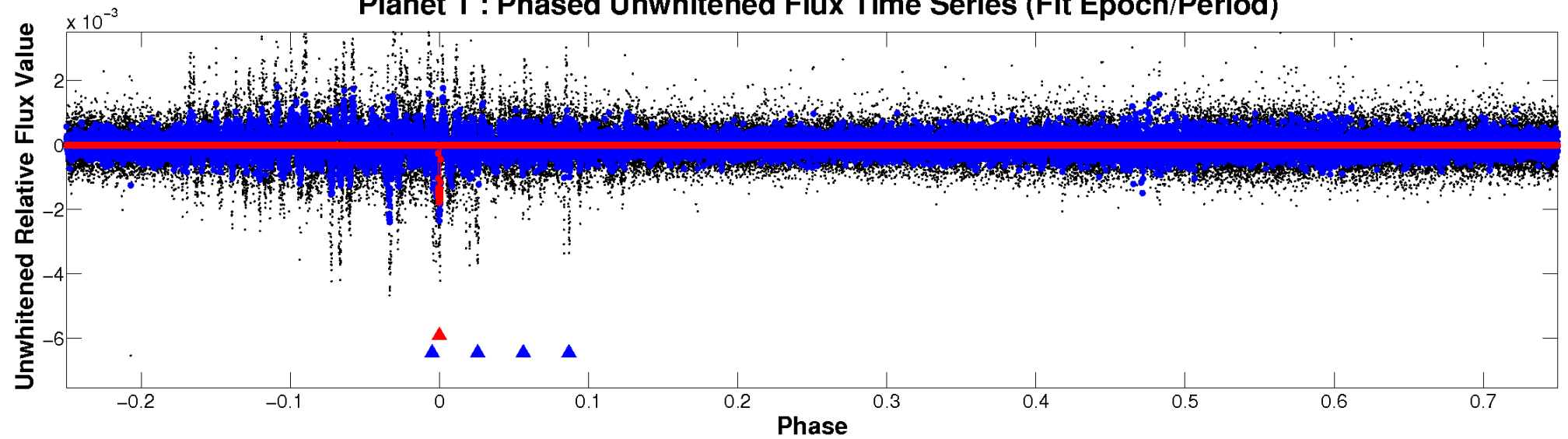
TCE 008374321-01



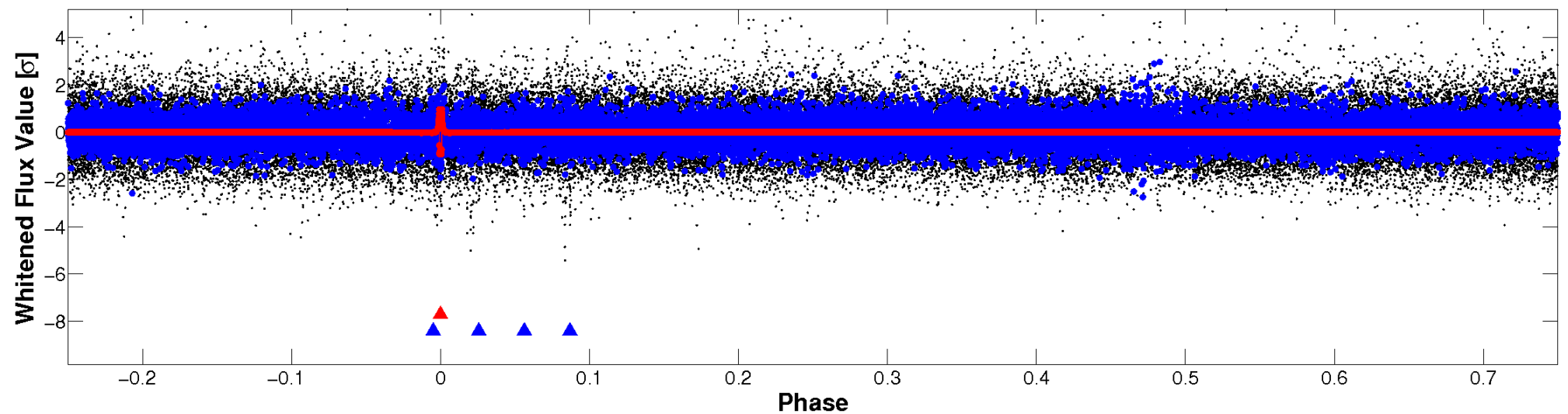


# Non-Whitened Vs. Whitened Light Curve

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

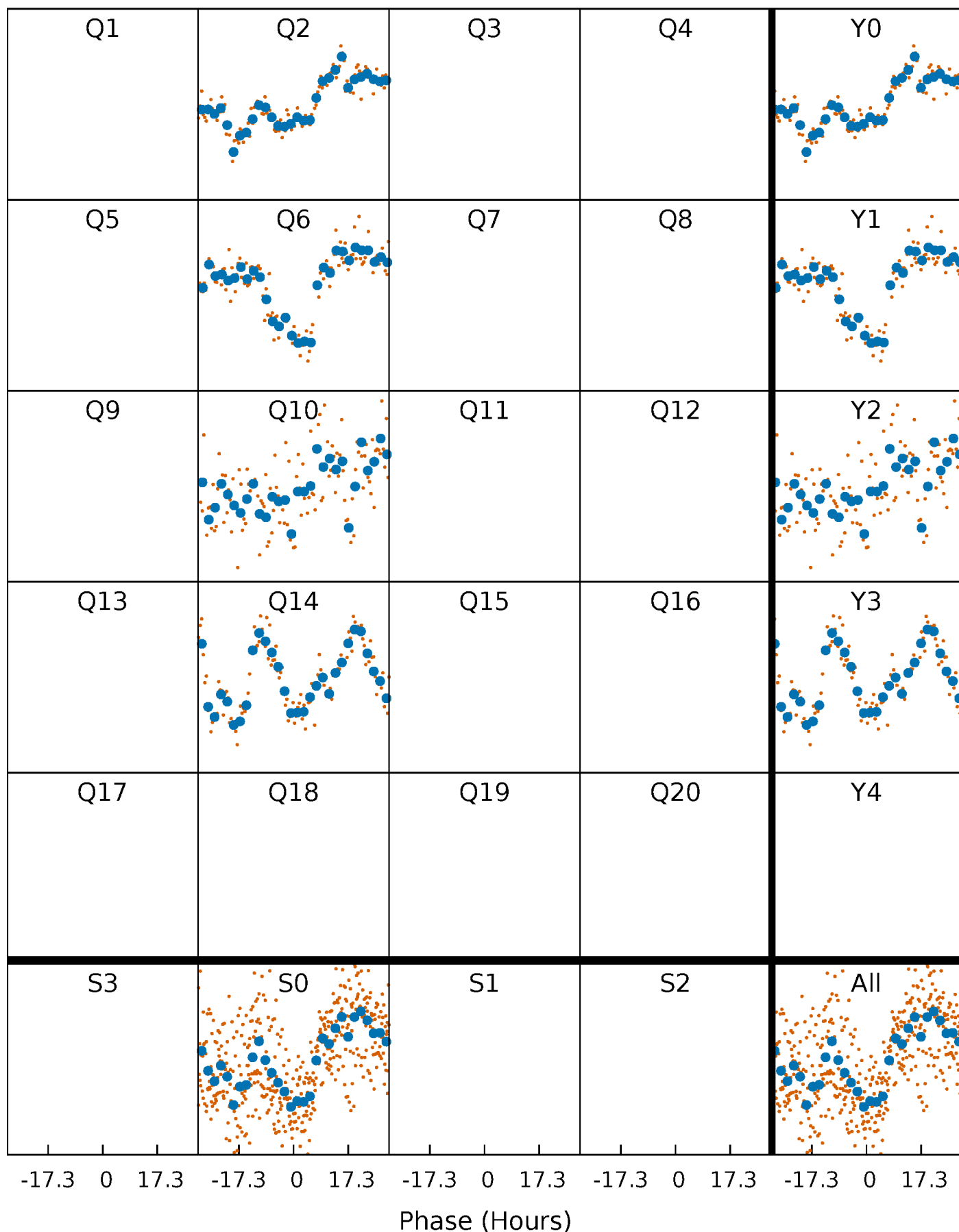


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

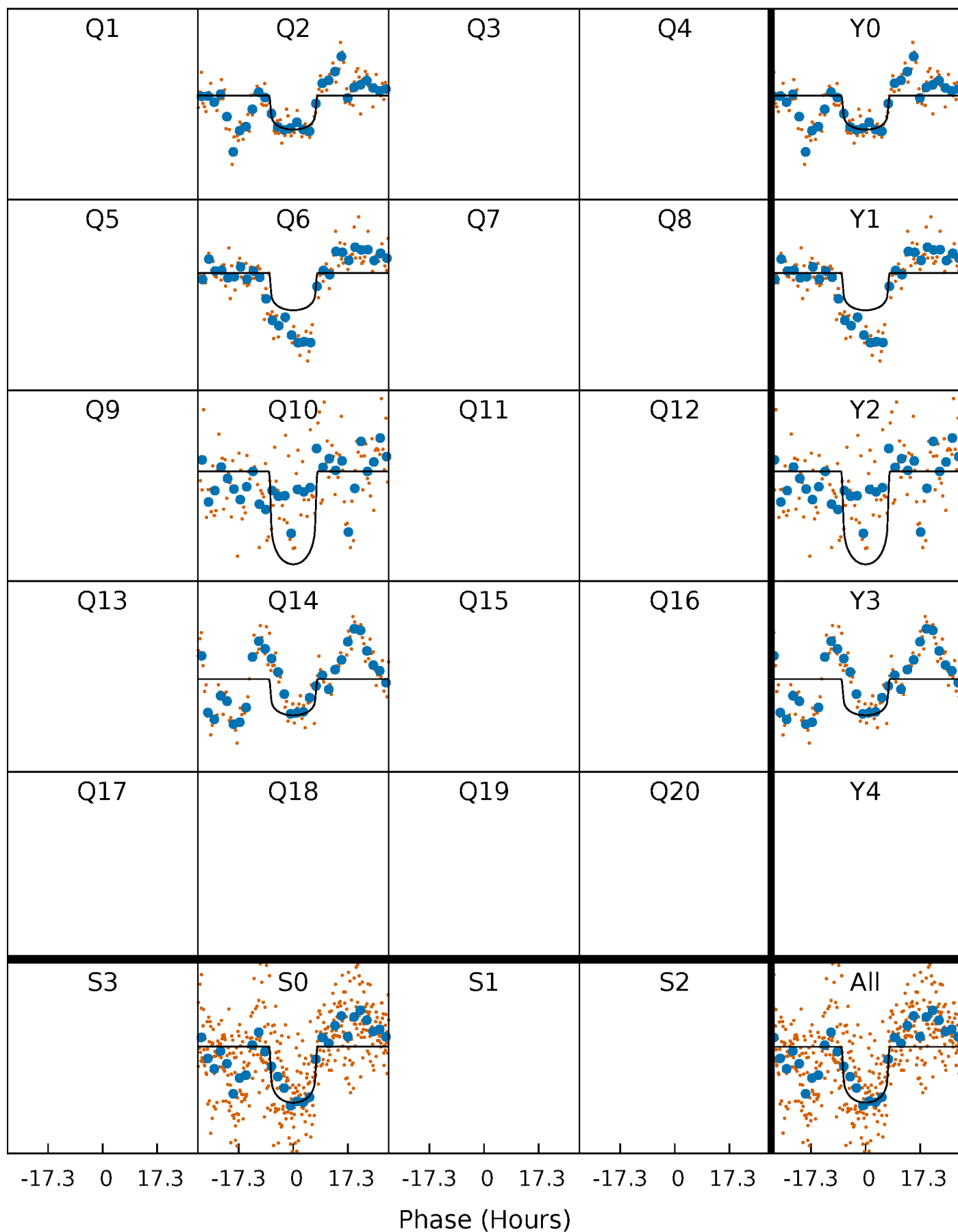
TCE 008374321-01 P=357.287893 Days  $T_0=235.774636$  (BKJD)





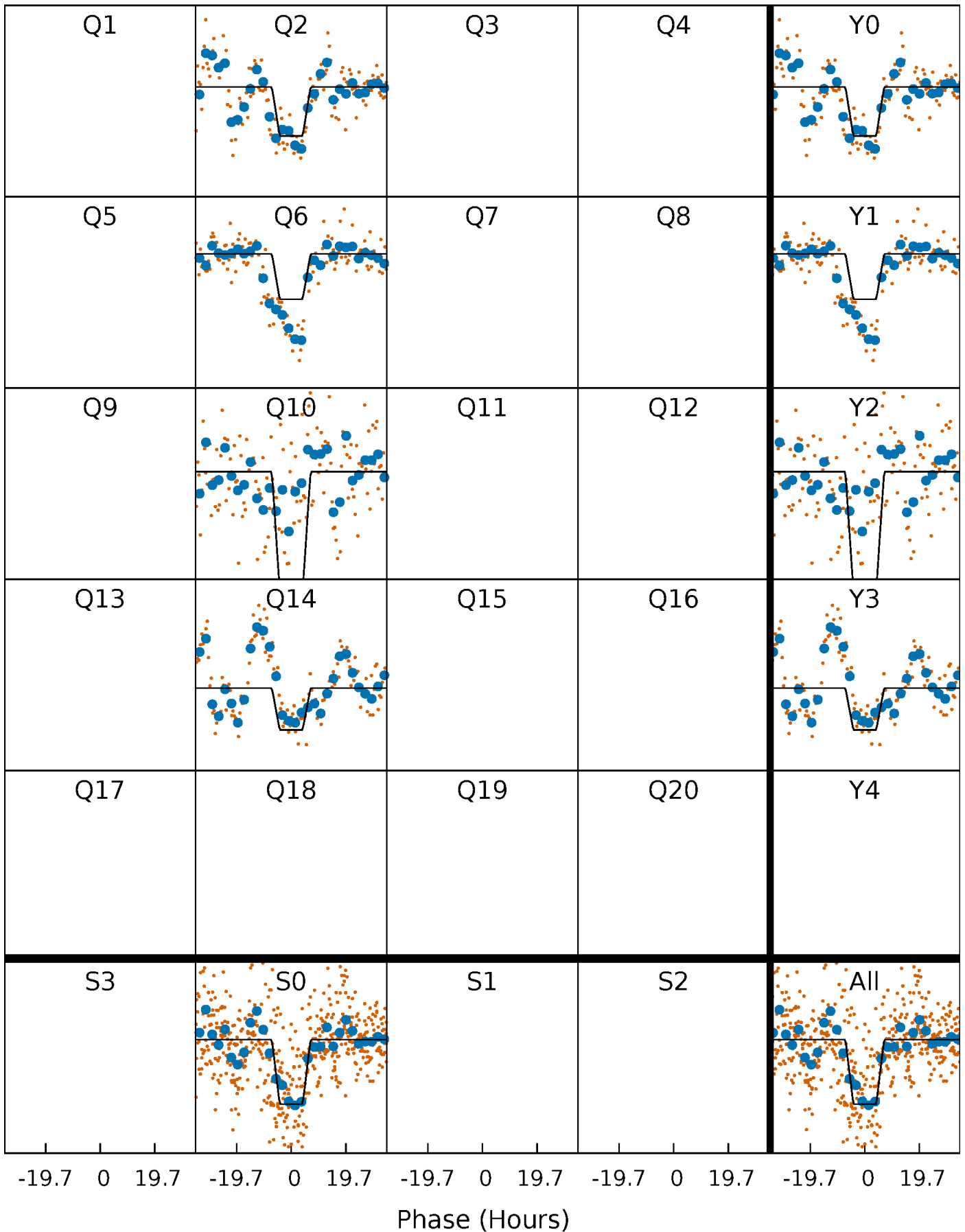
# DV Quarter-Phased Transit Curves

TCE 008374321-01 P=357.287893 Days  $T_0=235.774636$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

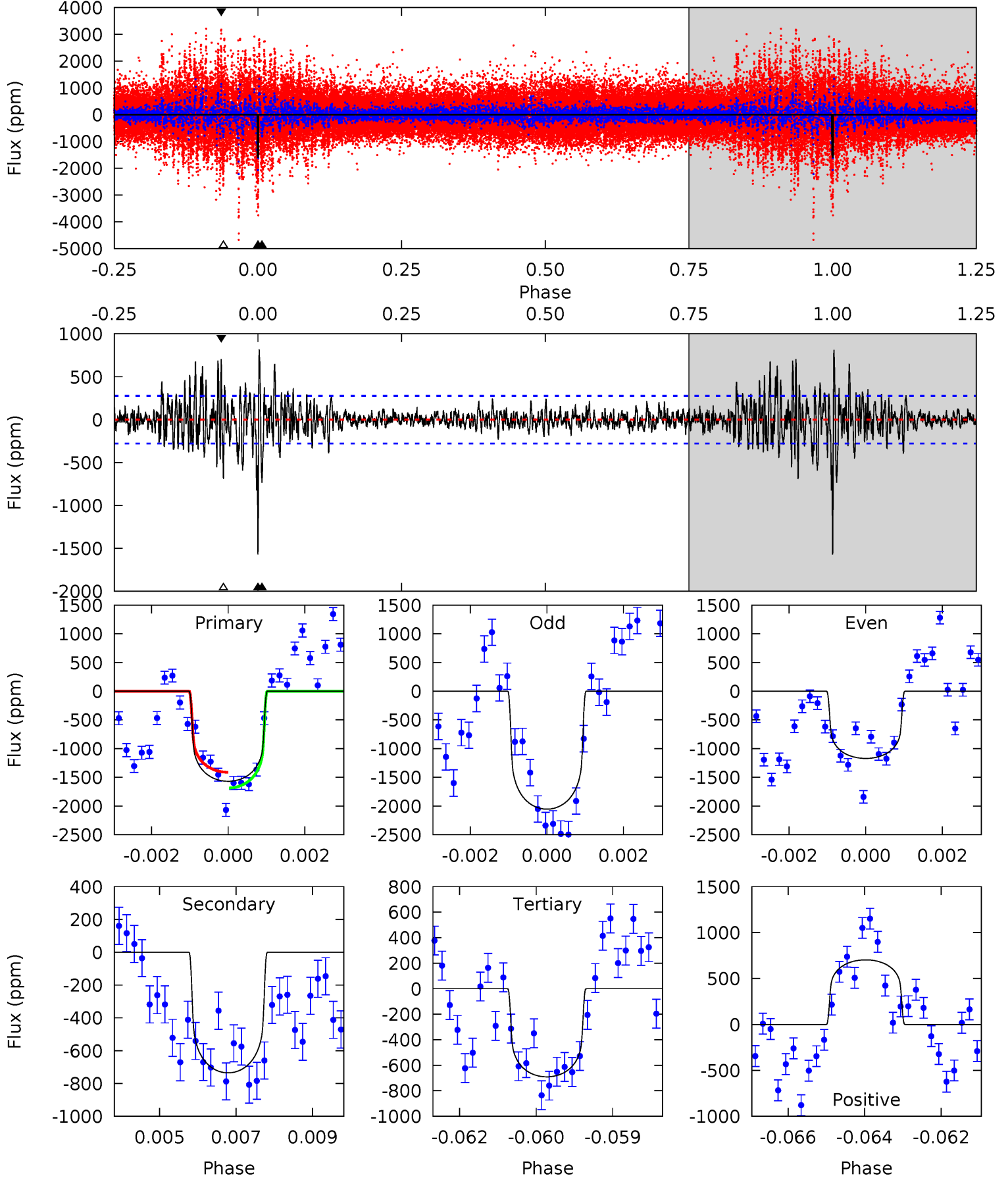
TCE 008374321-01 P=357.280797 Days  $T_0=235.847274$  (BKJD)



# DV Model-Shift Uniqueness Test

008374321-01, P = 357.287893 Days, E = 235.774636 Days

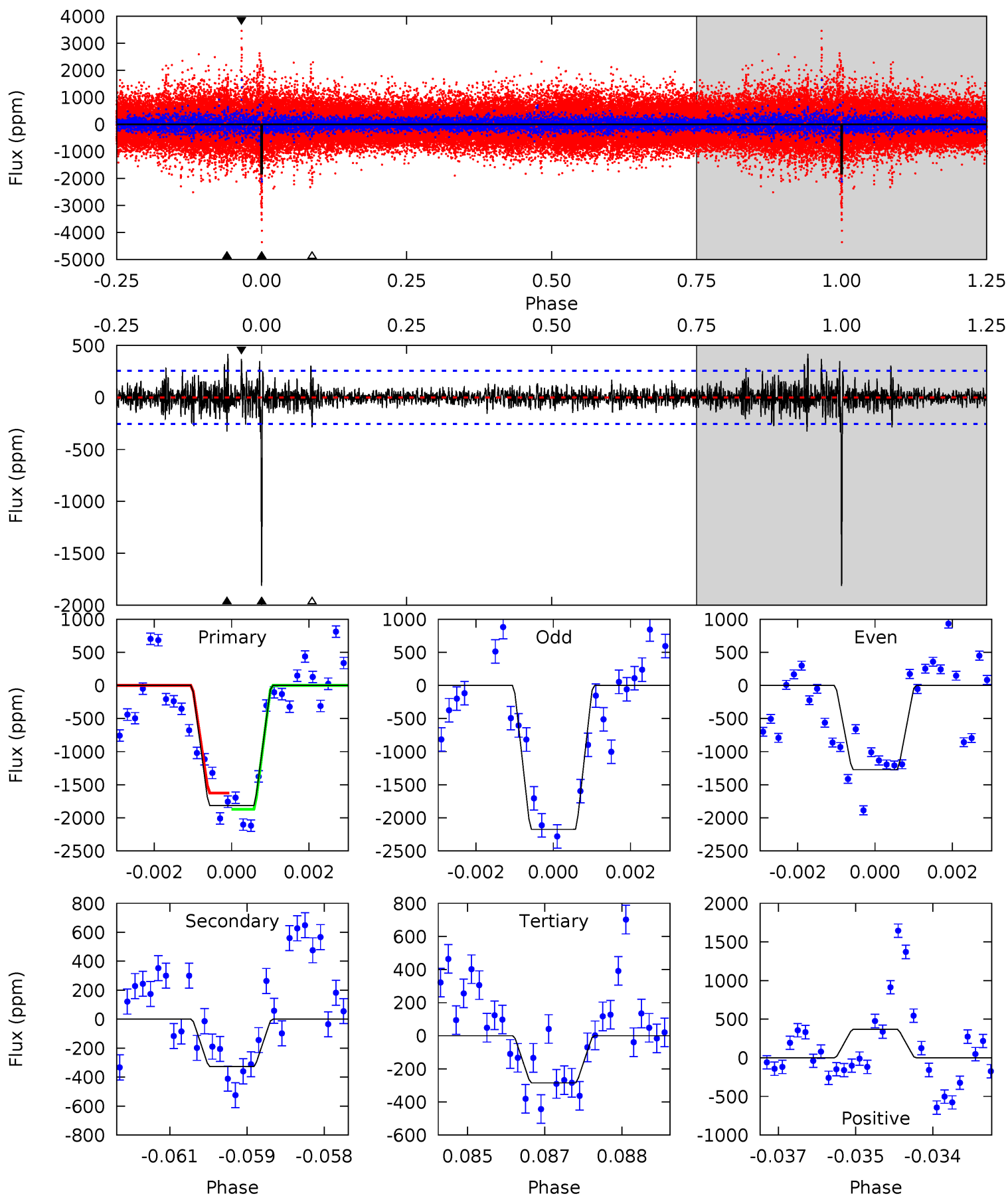
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
30.2	14.1	13.3	13.5	5.35	3.13	2.70	16.9	16.7	0.85	0.62	8.30	1.14	0.34	2.63



# Alt Model-Shift Uniqueness Test

008374321-01, P = 357.280797 Days, E = 235.847274 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
38.0	6.86	5.98	7.74	5.37	3.15	1.31	32.1	30.3	0.88	-0.88	9.69	1.05	0.19	2.57



### Stellar Parameters For KIC 008374321

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6215^{+175}_{-241}$	$4.488^{+0.052}_{-0.208}$	$-0.300^{+0.300}_{-0.300}$	$0.957^{+0.291}_{-0.097}$	$1.027^{+0.129}_{-0.144}$	$1.652^{+0.464}_{-0.866}$
	+3%/-4%	+1%/-5%	+100%/-100%	+30%/-10%	+13%/-14%	+28%/-52%
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 008374321-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-735 \pm 52$	$4.25^{+0.96}_{-0.81}$	$383^{+27}_{-18}$	$5225^{+476}_{-367}$	$21855^{+10786}_{-7226}$
Alt.	$-327 \pm 48$	$4.68^{+1.08}_{-0.82}$	$382^{+27}_{-20}$	$4242^{+327}_{-273}$	$7877^{+3711}_{-2709}$

$T_{max}$  = 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

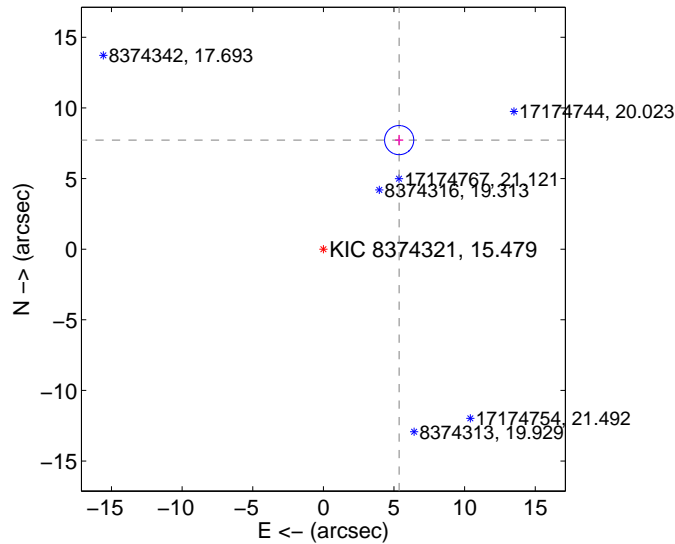
Supplemental centroid analysis for 008374321-01. Kepler magnitude: 15.48. Transit SNR 9.93

There are 0 quarters with good PRF difference image offsets

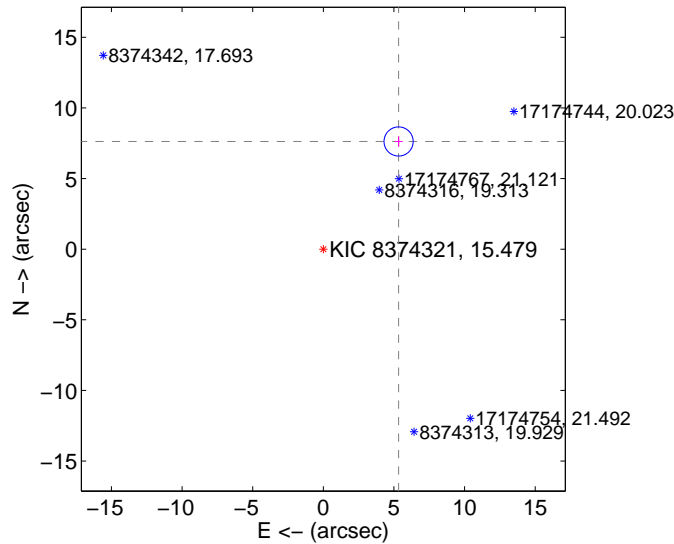
The direct PRF centroid is offset from the target star catalog position by about 0.10 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$9.400 \pm 0.344$	27.33	$-5.364 \pm 0.287$	$7.719 \pm 0.368$
PRF-fit source offset from KIC position	$9.299 \pm 0.344$	27.05	$-5.328 \pm 0.287$	$7.621 \pm 0.368$
photometric centroid source offset	$8.14 \pm 2.04$	3.99	$-1.97 \pm 1.68$	$7.90 \pm 2.06$

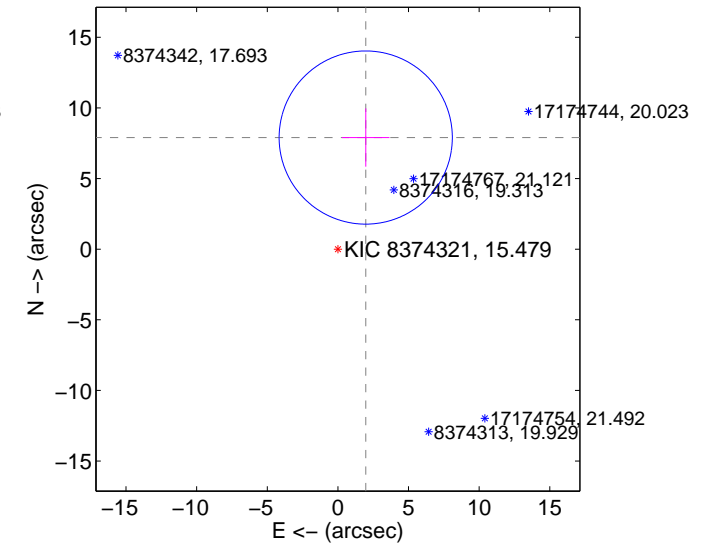
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

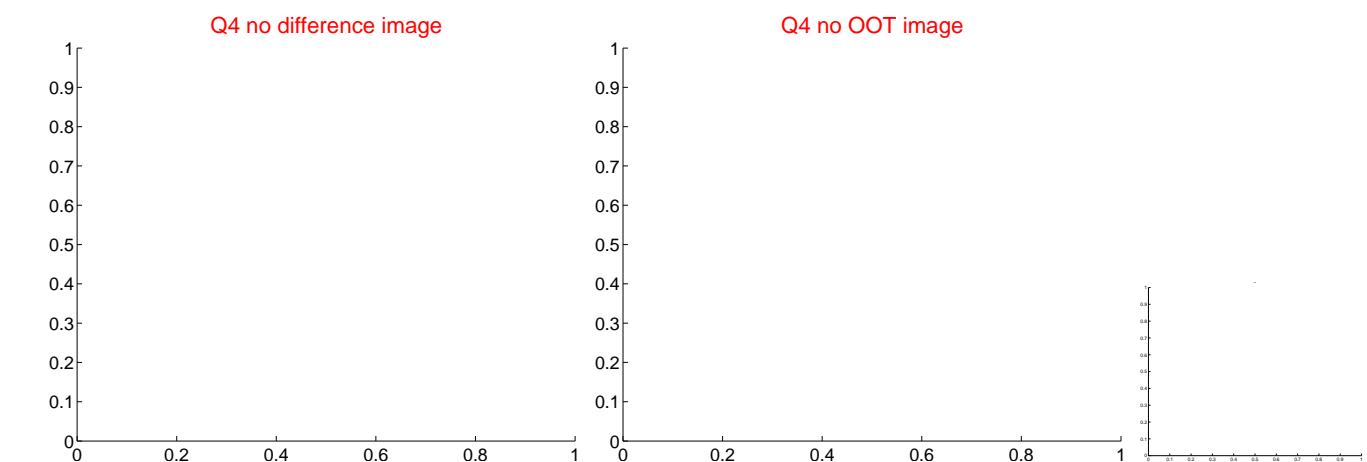
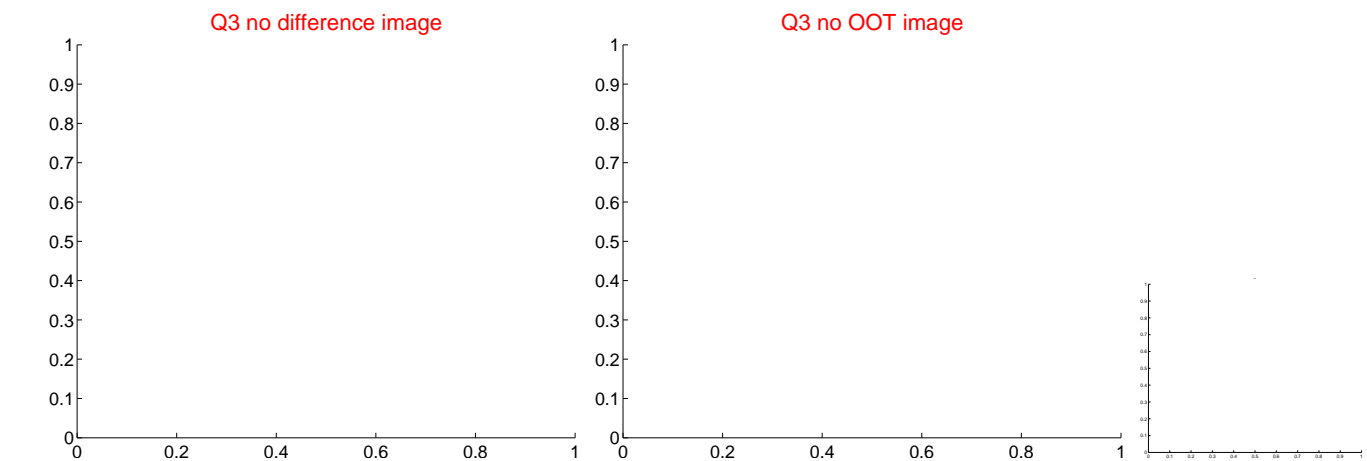
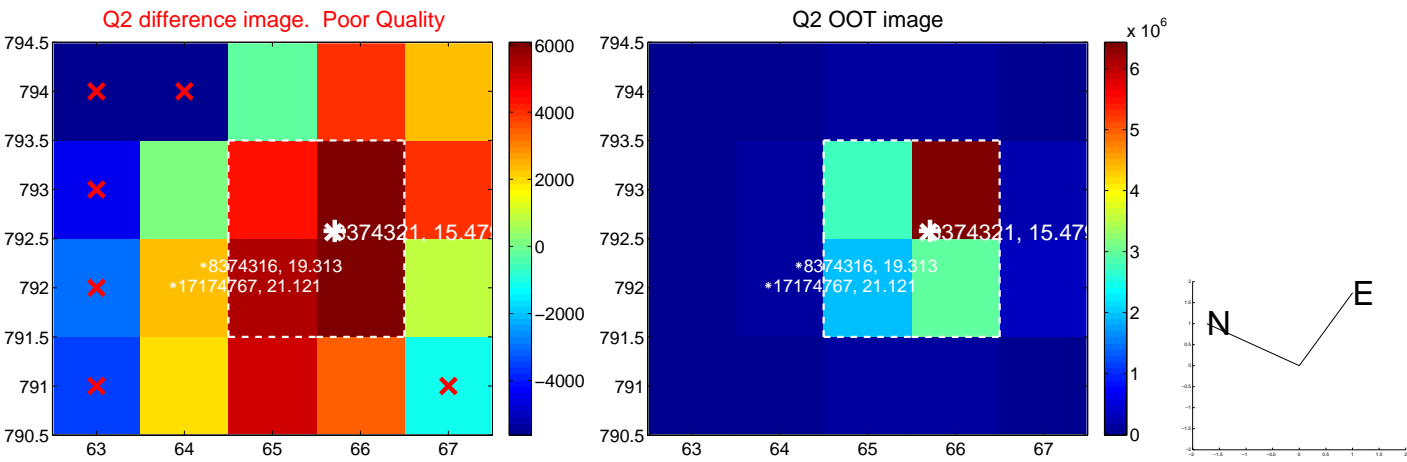
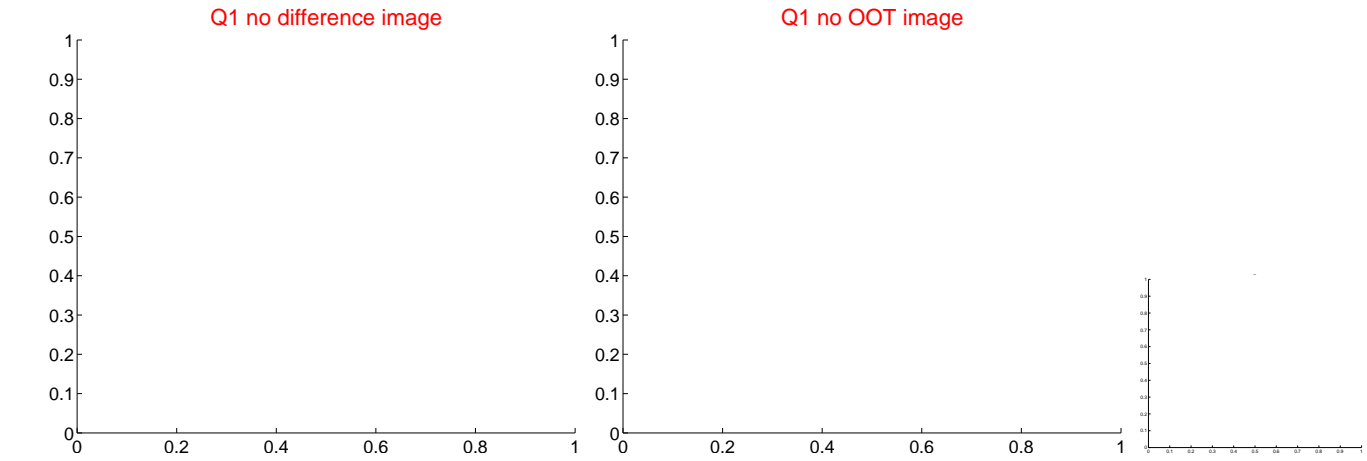


offset from photometric centroids



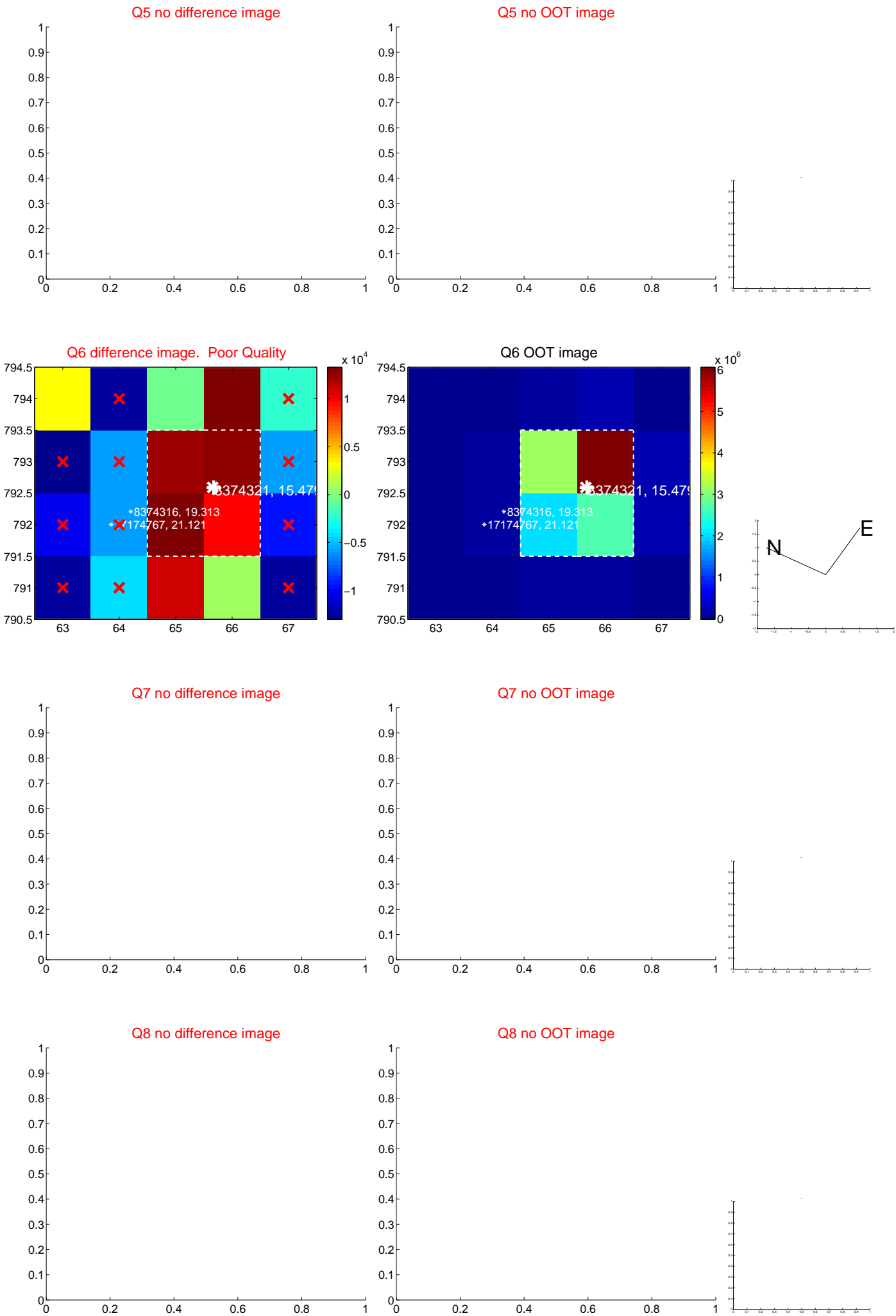
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

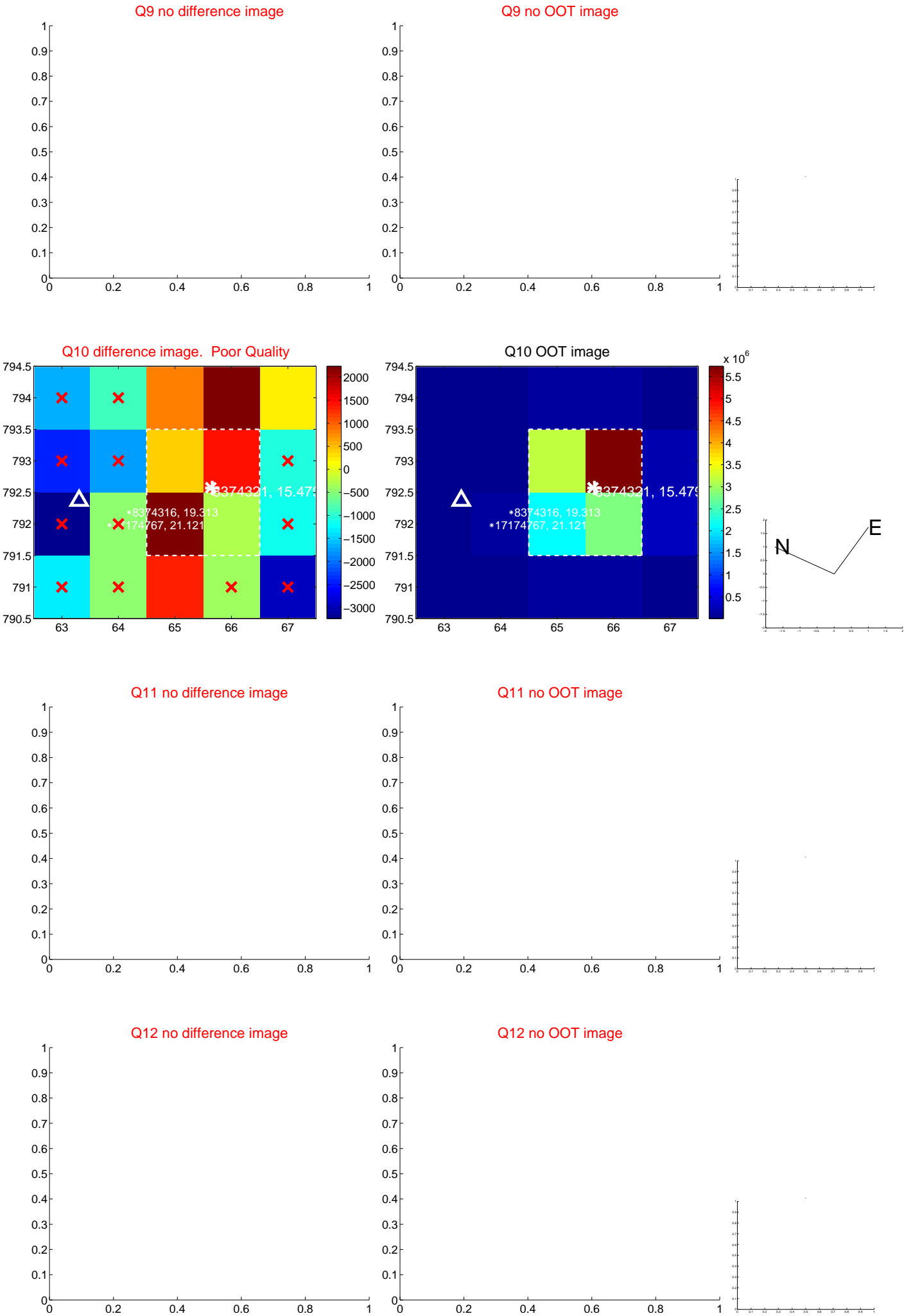




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



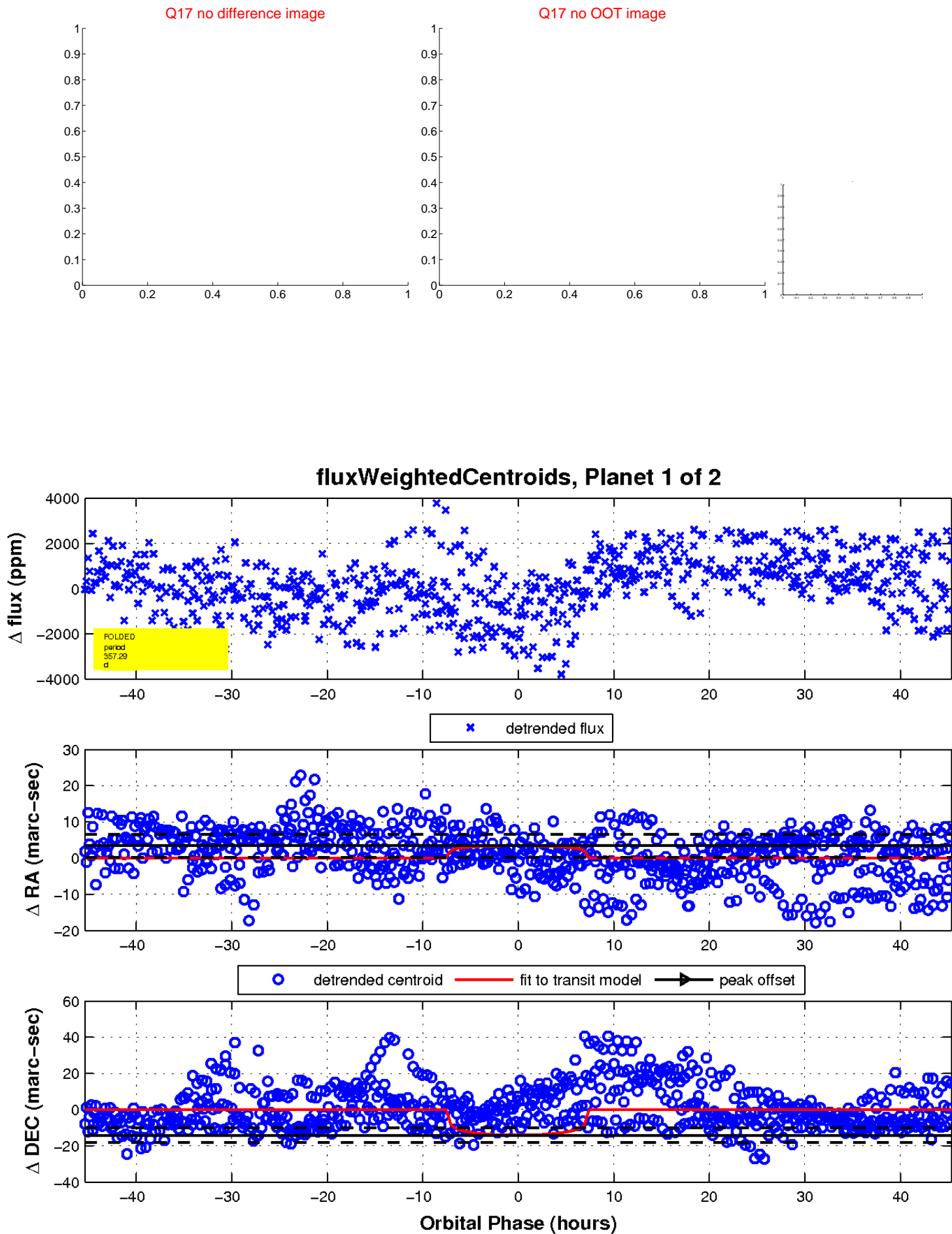
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

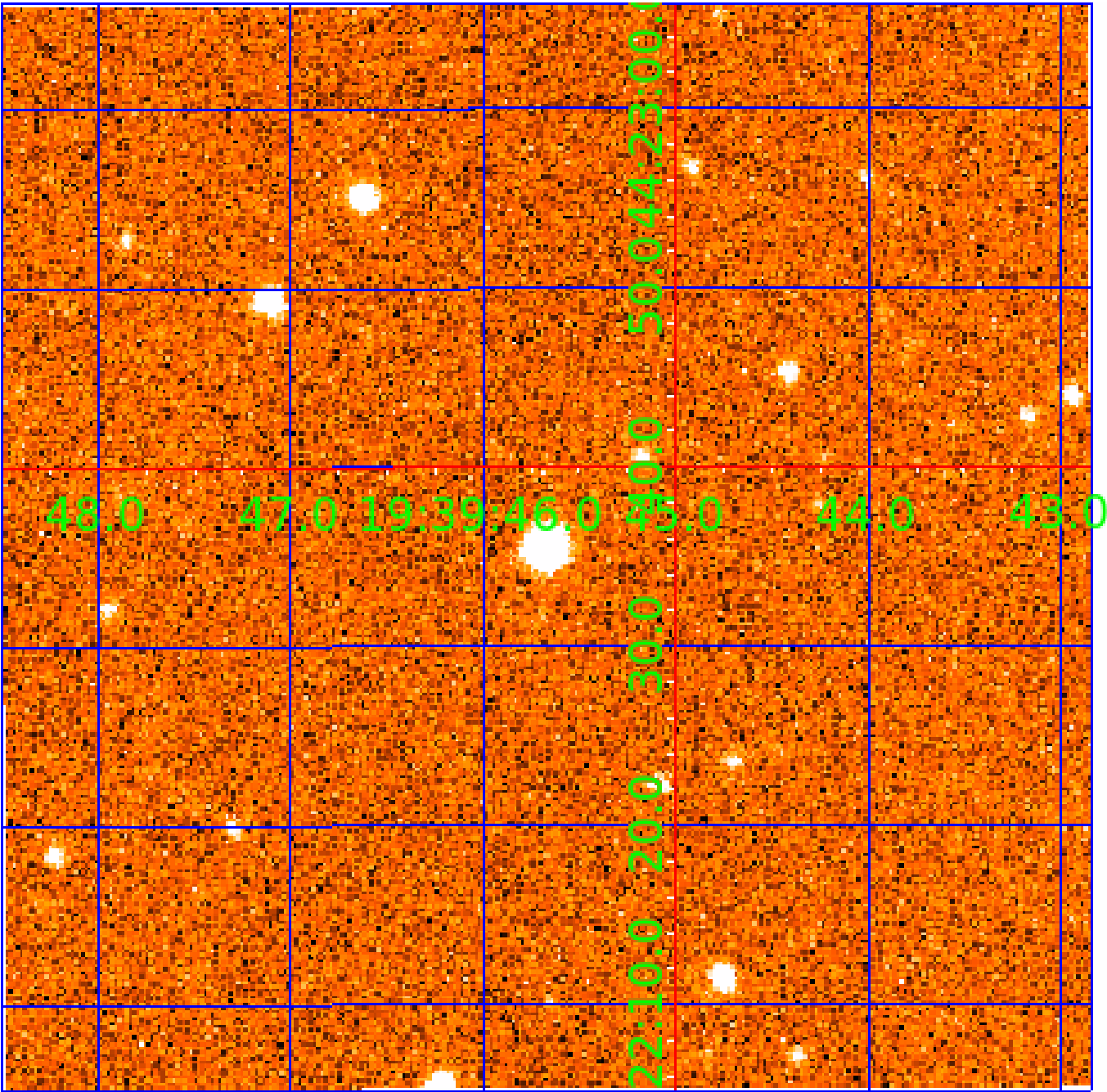


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008374321

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008374321-01	OBS	No	357.287893	235.774636	1782.1	15.124	10.2	9.9	0.96	6215	4.08	1.24
008374321-02	OBS	No	368.214808	234.040637	2908.4	26.001	11.8	14.8	0.96	6215	9.48	1.19

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008374321-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
008374321-02	OBS	FP	0.00	1	0	0	1	INDIV_TRANS_SKYE—LPP_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—EPHEM_MATCH

**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.

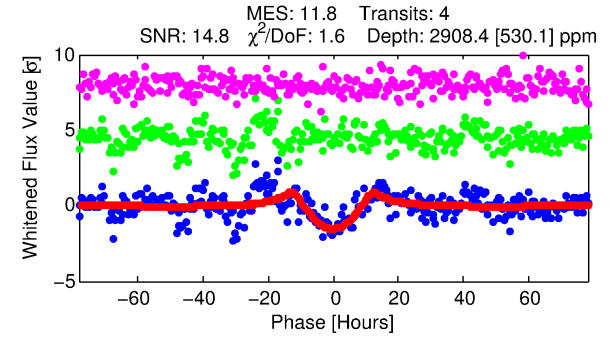
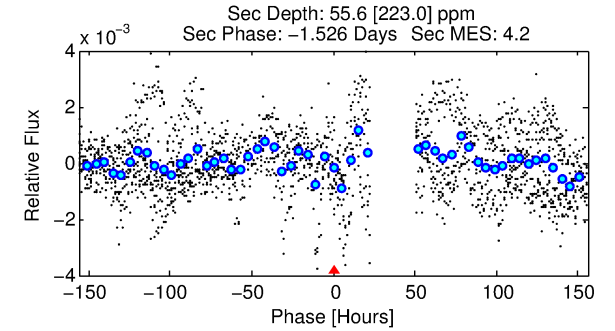
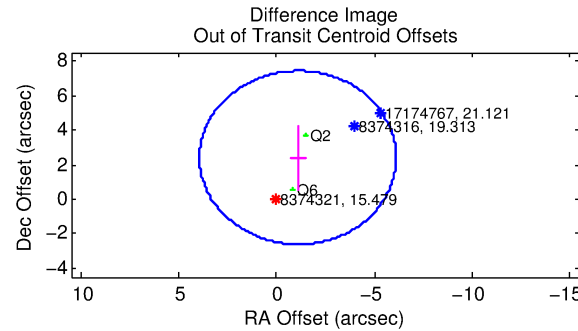
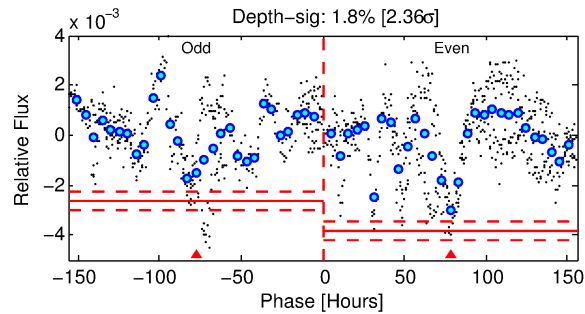
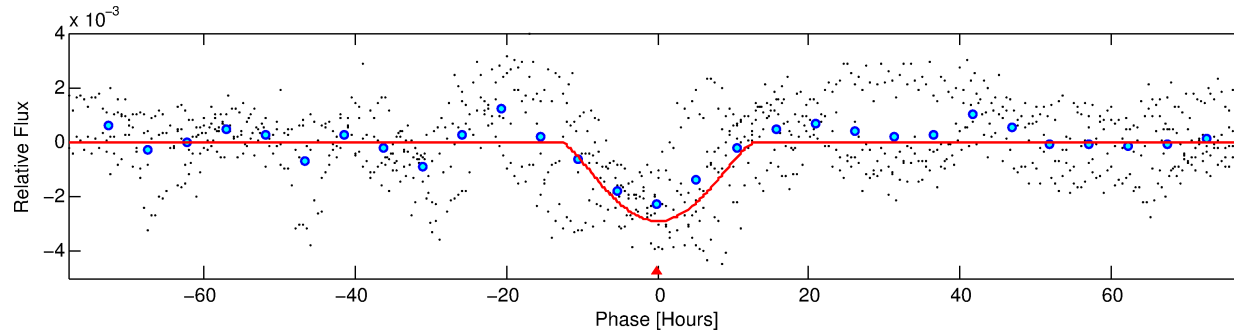
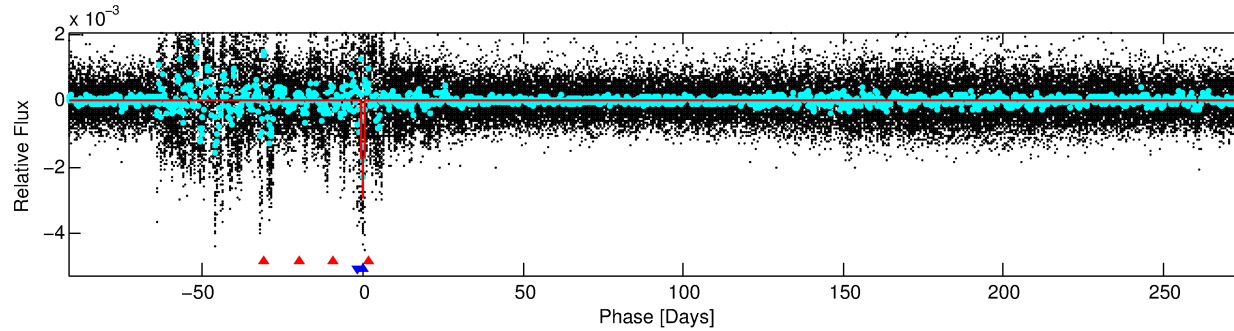
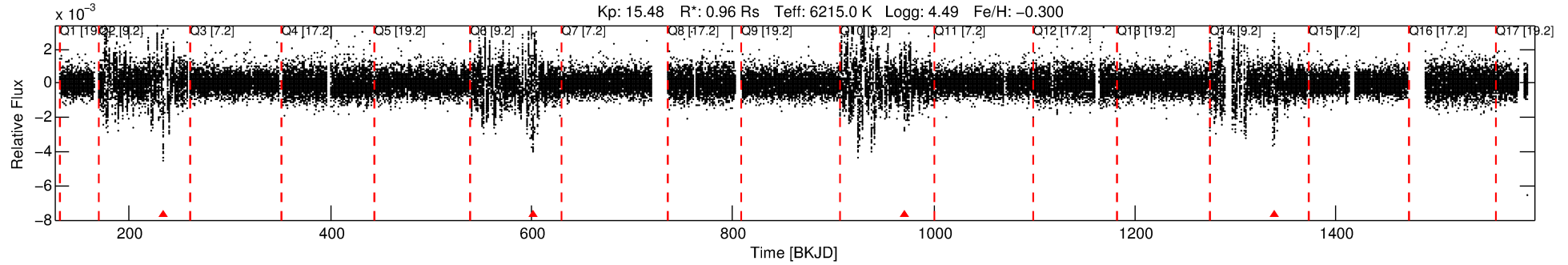
## Ephemeris Match Information For 008374321-02

TCE (1)	KIC	Parent (2)	Parent KIC	$P_1:P_2$	Dist ( $''$ )	$\Delta$ Row	$\Delta$ Col	$m_2$	$m_1$	$D_2/D_1$	Mechanism	Flag	$\sigma_P$	$\sigma_T$
008374321-02	8374321	008240915-01	8240915	1:1	1354.0	340	-3	15.72	15.48	0.59	Col-Anomaly	1	1.03	4.25

**Notes:**  $P_1:P_2$  is the period ratio. Dist is the distance in arcseconds.  $\Delta$ Row and  $\Delta$ Col are the number of pixels apart in row and column.  $m_2$  and  $m_1$  are the magnitudes of the parent and child.  $D_2/D_1$  is the parent's transit depth divided by the child's.  $\sigma_P$  and  $\sigma_T$  are the significance of the match in period and epoch. For a match to be considered significant  $\sigma_P < 5.0$  and  $\sigma_T < 5.0$ . Matches which have  $\sigma_P$  and  $\sigma_T$  very close to this cutoff should receive extra scrutiny, especially if the period ratio is very large.

# DV One-Page Summary

KIC: 8374321 Candidate: 2 of 2 Period: 368.215 d



## DV Fit Results:

Period = 368.21481 [0.01649] d  
Epoch = 234.0406 [0.0347] BKJD  
Rp/R\* = 0.0908 [0.1488]  
a/R\* = 47.18 [16.08]  
b = 1.00 [0.20]  
Seff = 1.19 [0.49]  
Teq = 266 [27] K  
Rp = 9.48 [15.81] Re  
a = 1.0148 [0.2618] AU  
Ag = 350.38 [1819.39] [0.19 $\sigma$ ]  
Teffp = 1781 [2307] K [0.66 $\sigma$ ]

## DV Diagnostic Results:

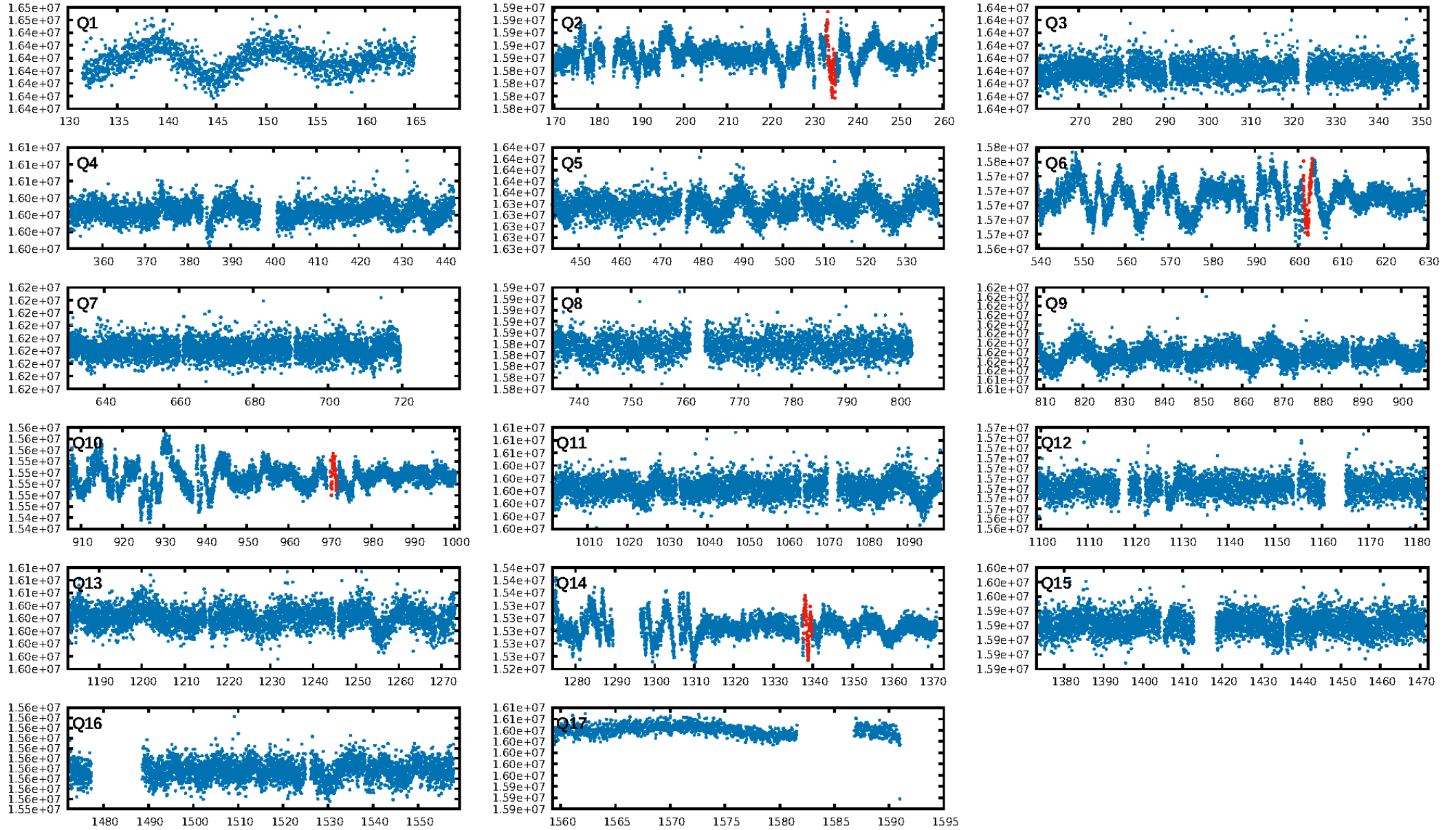
ShortPeriod-sig: 100.0% [8.72 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 13.7%  
Bootstrap-pfa: 2.70e-16  
RollingBand-fgt: 0.00 [0/4]  
GhostDiagnostic-chr: 4.361  
Centroid-sig: 13.2%  
Centroid-so: 2.310 arcsec [1.33 $\sigma$ ]  
OotOffset-rm: 2.638 arcsec [1.58 $\sigma$ ]  
KicOffset-rm: 2.581 arcsec [1.51 $\sigma$ ]  
OotOffset-st: 2/0/0/0 [2]  
KicOffset-st: 2/0/0/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 0.50 [1/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 05:43:50 Z

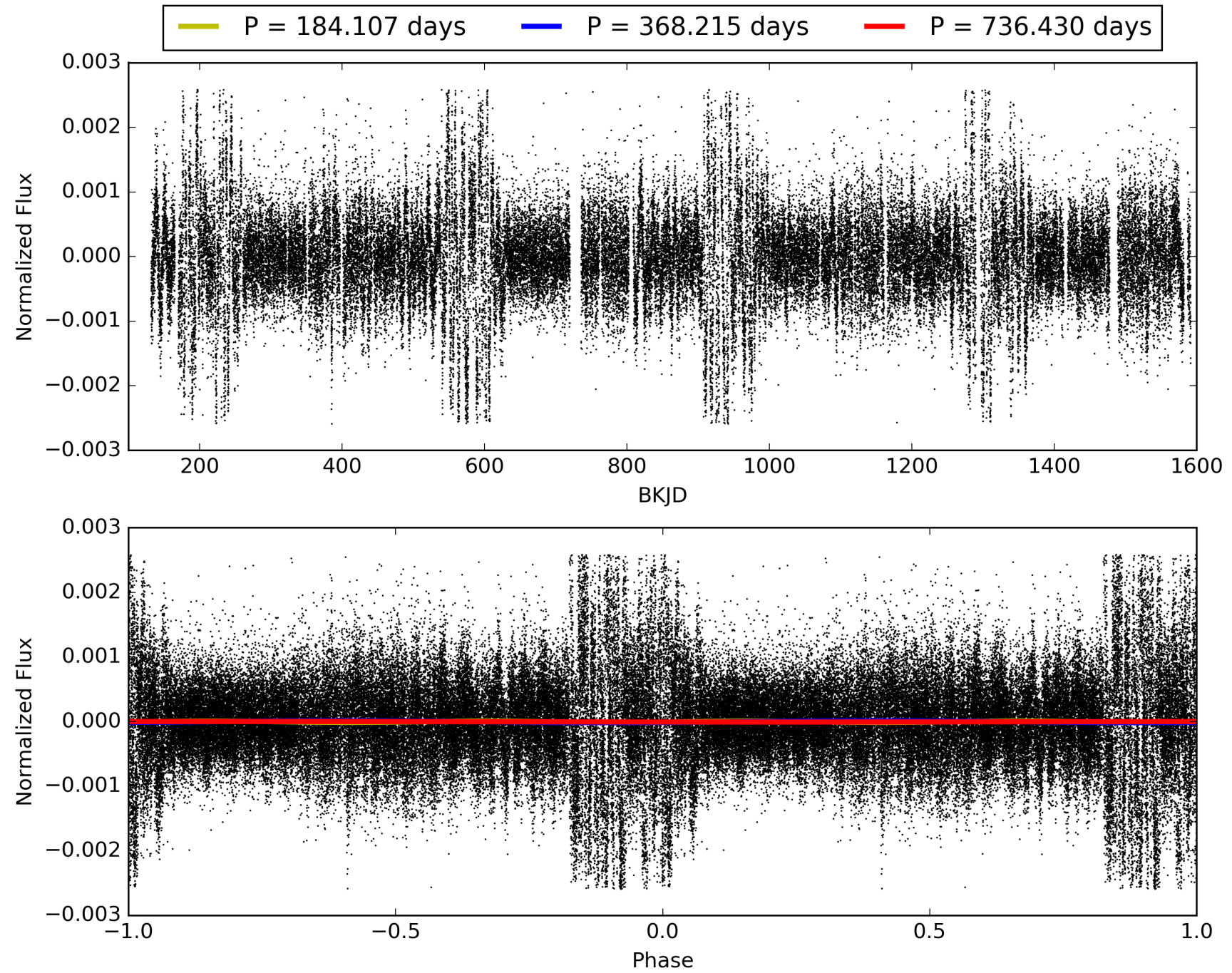
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008374321-02, PDC Light Curves

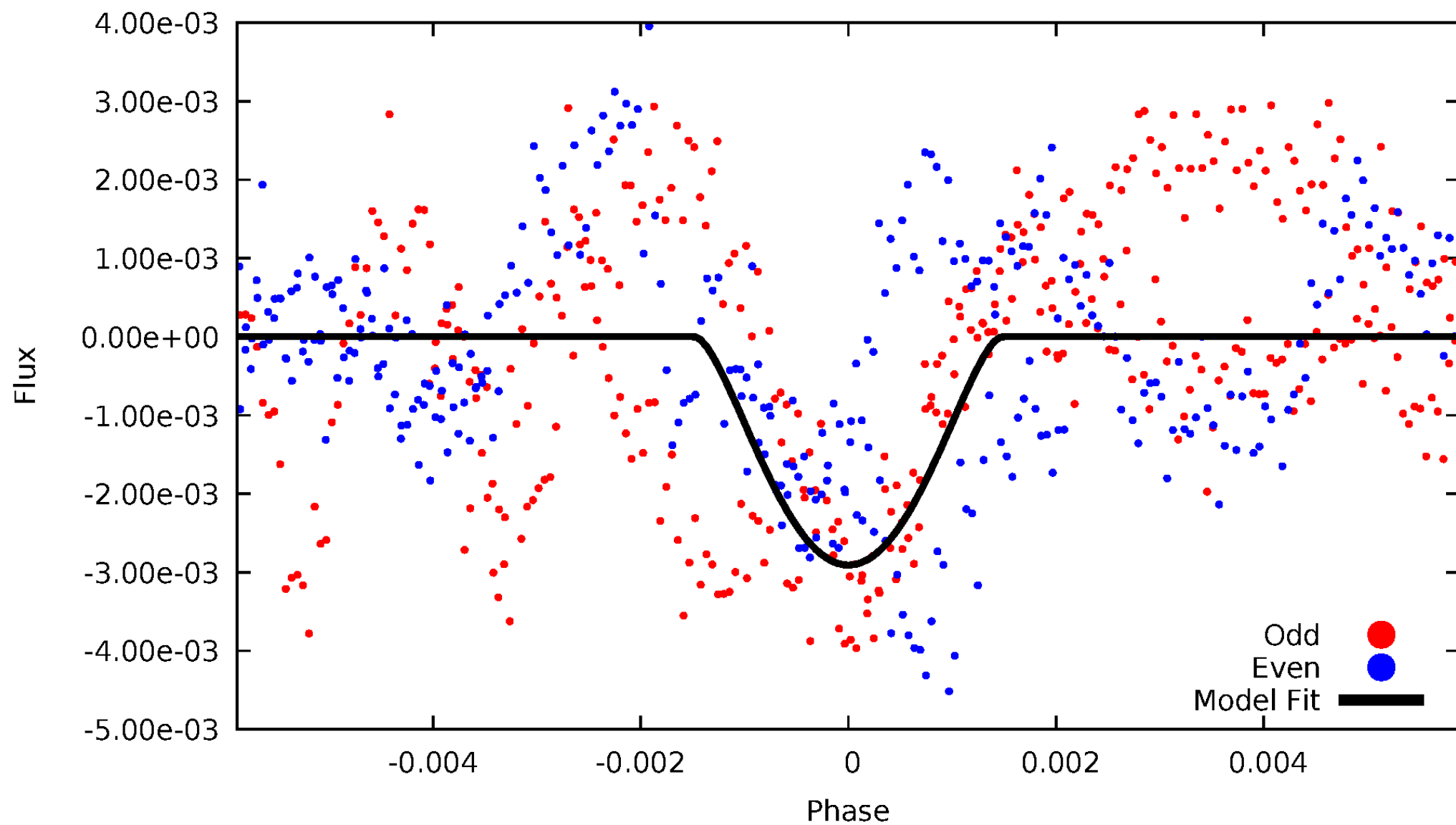


TCE 008374321-02



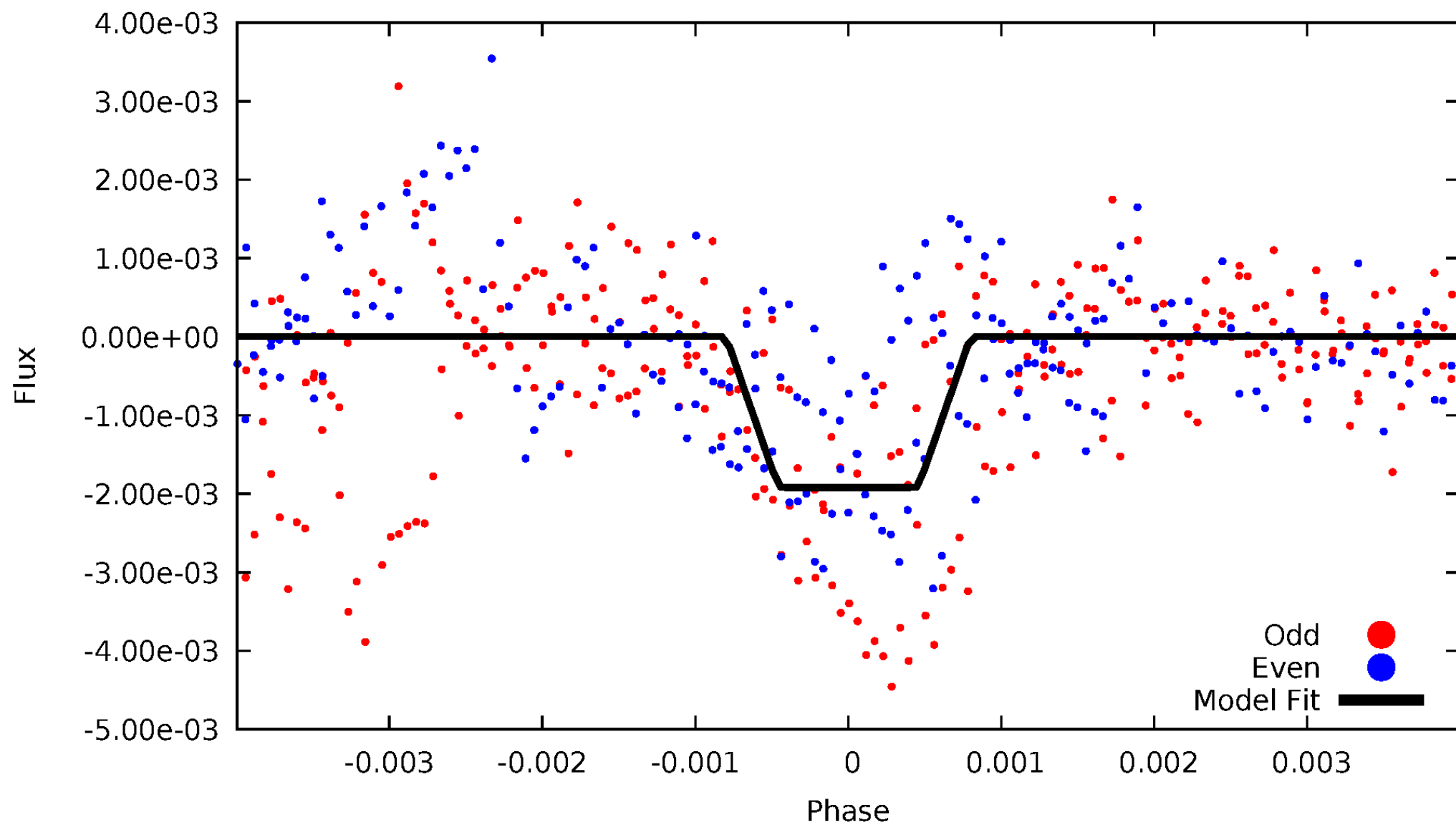
# DV Odd/Even

TCE 008374321-02



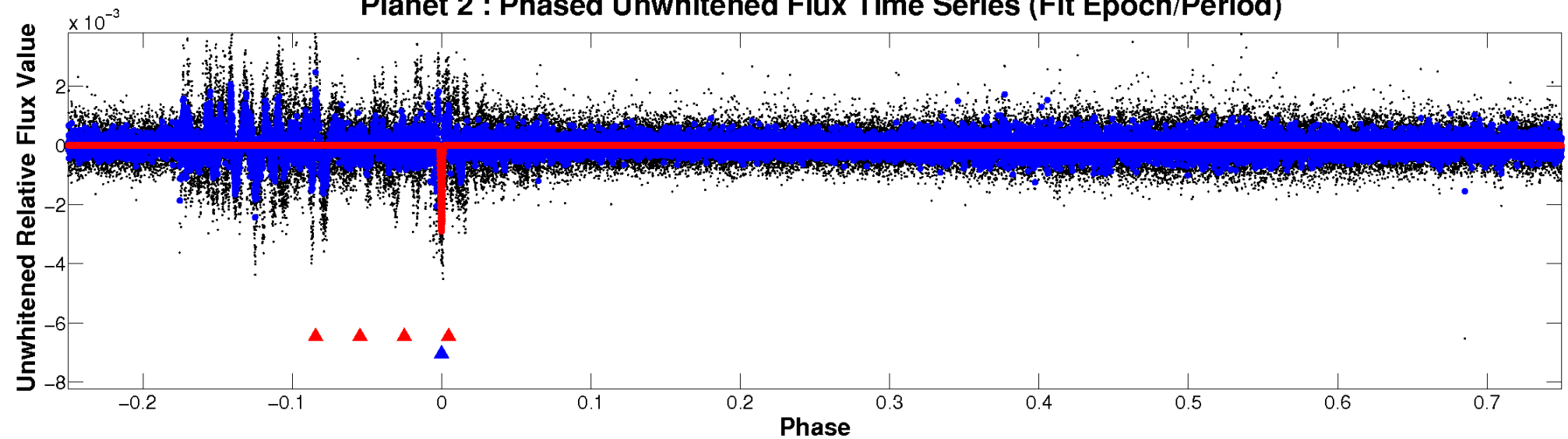
# ALT Odd/Even

TCE 008374321-02

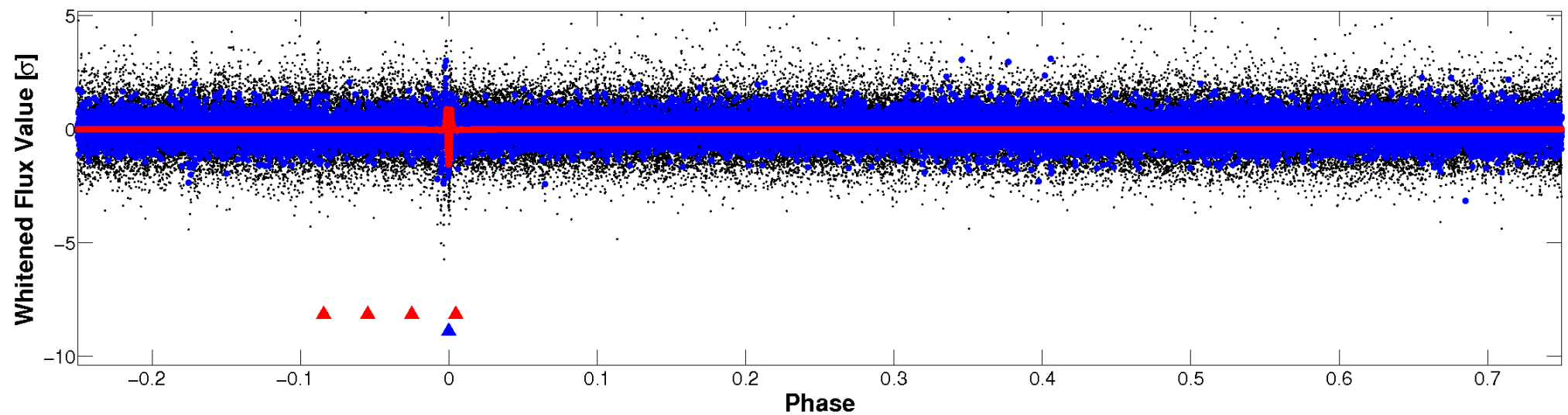


# Non-Whitened Vs. Whitened Light Curve

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



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



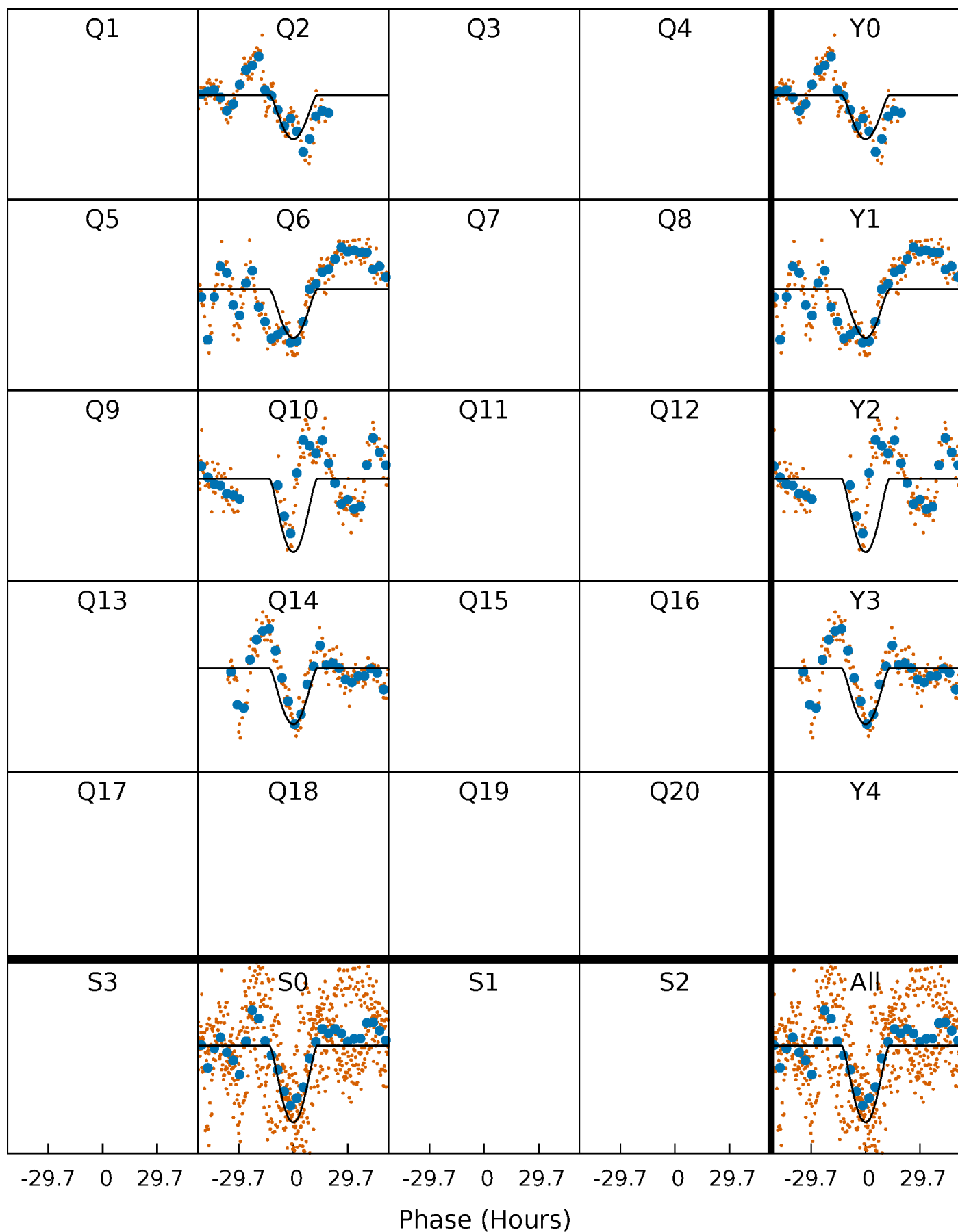
# PDC Quarter-Phased Transit Curves

TCE 008374321-02     $P=368.214808$  Days     $T_0=234.040637$  (BKJD)



# DV Quarter-Phased Transit Curves

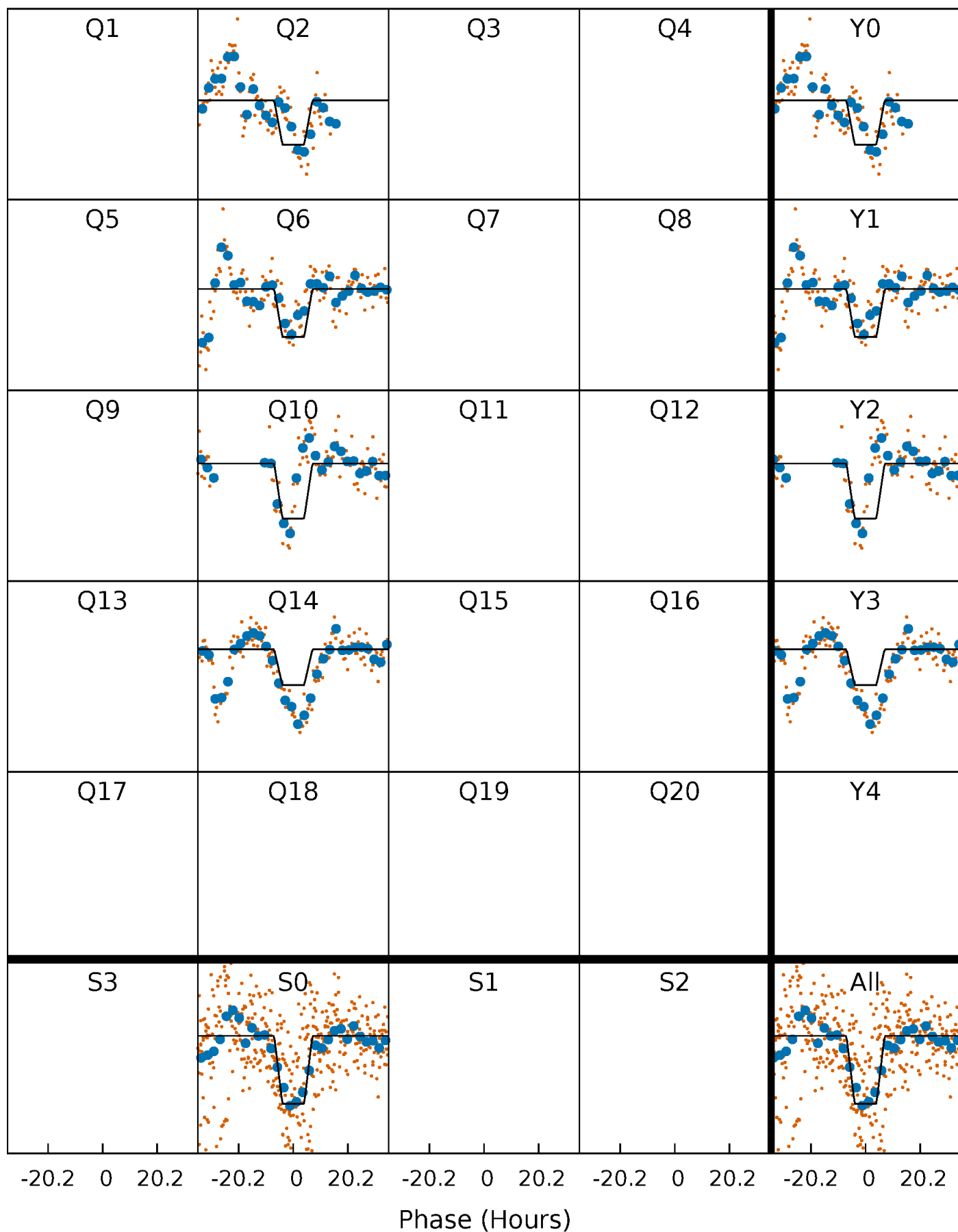
TCE 008374321-02 P=368.214808 Days  $T_0=234.040637$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

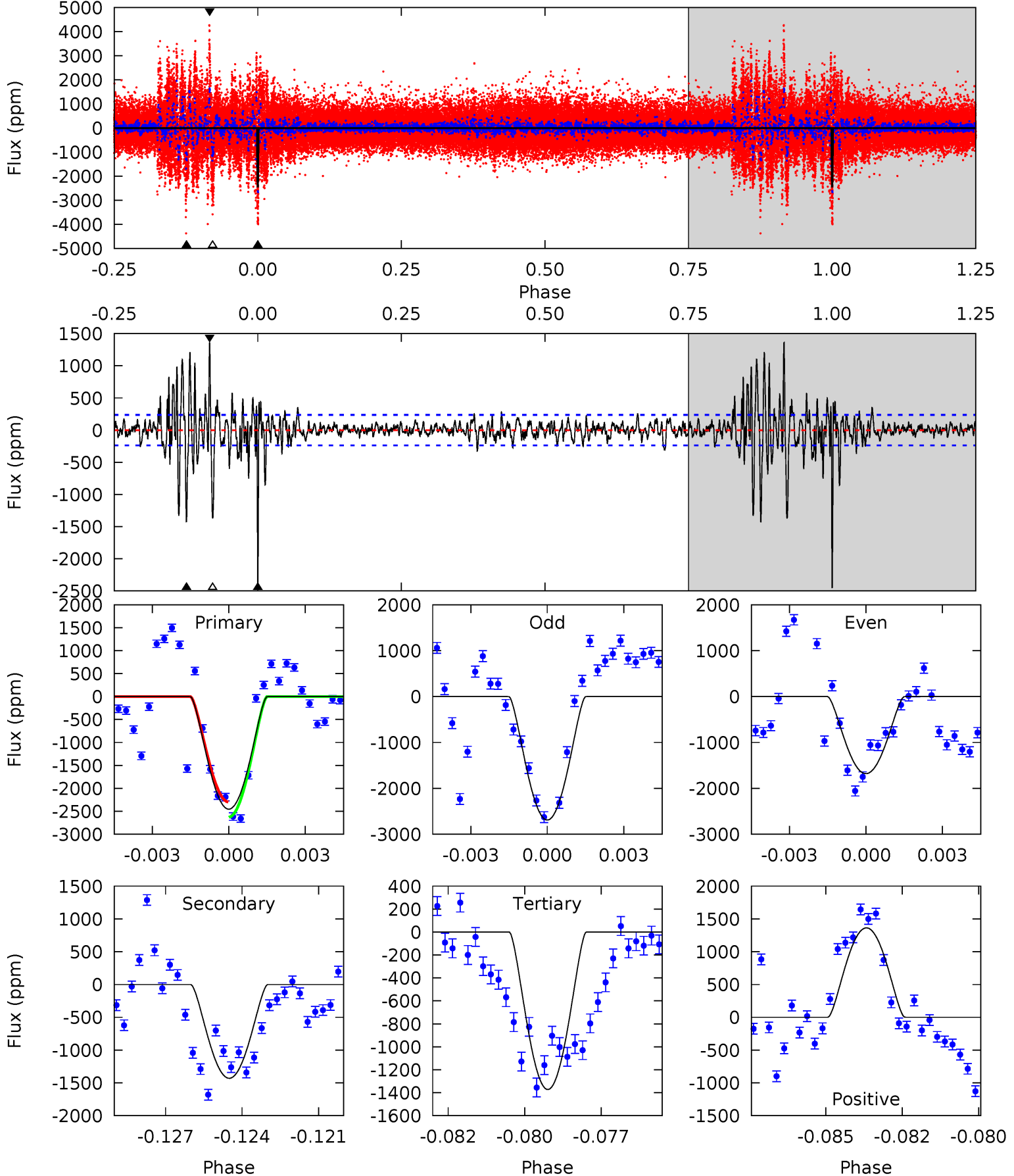
TCE 008374321-02 P=368.151451 Days  $T_0=234.193245$  (BKJD)



# DV Model-Shift Uniqueness Test

008374321-02, P = 368.214808 Days, E = 234.040637 Days

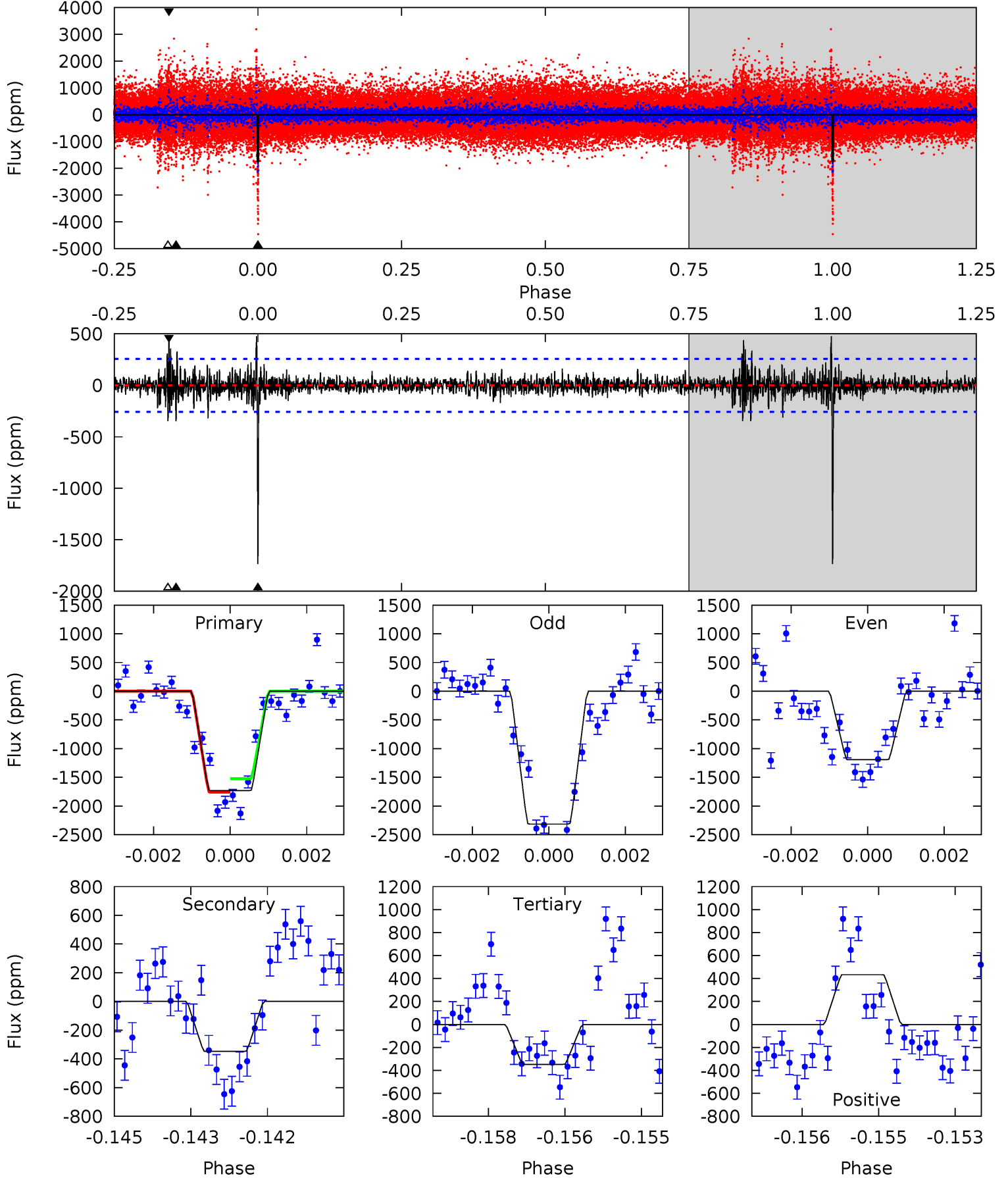
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
54.2	31.6	30.3	30.1	5.26	2.97	4.53	23.9	24.1	1.28	1.48	11.4	0.88	0.36	3.58



# Alt Model-Shift Uniqueness Test

008374321-02, P = 368.151451 Days, E = 234.193245 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
36.2	7.26	7.26	9.05	5.37	3.15	1.22	29.0	27.2	0.00	-1.79	12.1	1.37	0.22	2.43



### Stellar Parameters For KIC 008374321

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6215^{+175}_{-241}$	$4.488^{+0.052}_{-0.208}$	$-0.300^{+0.300}_{-0.300}$	$0.957^{+0.291}_{-0.097}$	$1.027^{+0.129}_{-0.144}$	$1.652^{+0.464}_{-0.866}$
	+3%/-4%	+1%/-5%	+100%/-100%	+30%/-10%	+13%/-14%	+28%/-52%
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 008374321-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1430 \pm 45$	$14.67^{+14.59}_{-9.22}$	$379^{+27}_{-20}$	$3702^{+1847}_{-707}$	$3689^{+23679}_{-2765}$
Alt.	$-348 \pm 48$	$12.76^{+13.95}_{-8.57}$	$381^{+27}_{-20}$	$3090^{+1399}_{-543}$	$1138^{+9655}_{-876}$

$T_{max}$  = 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  $A_{obs} \gg 1.0$

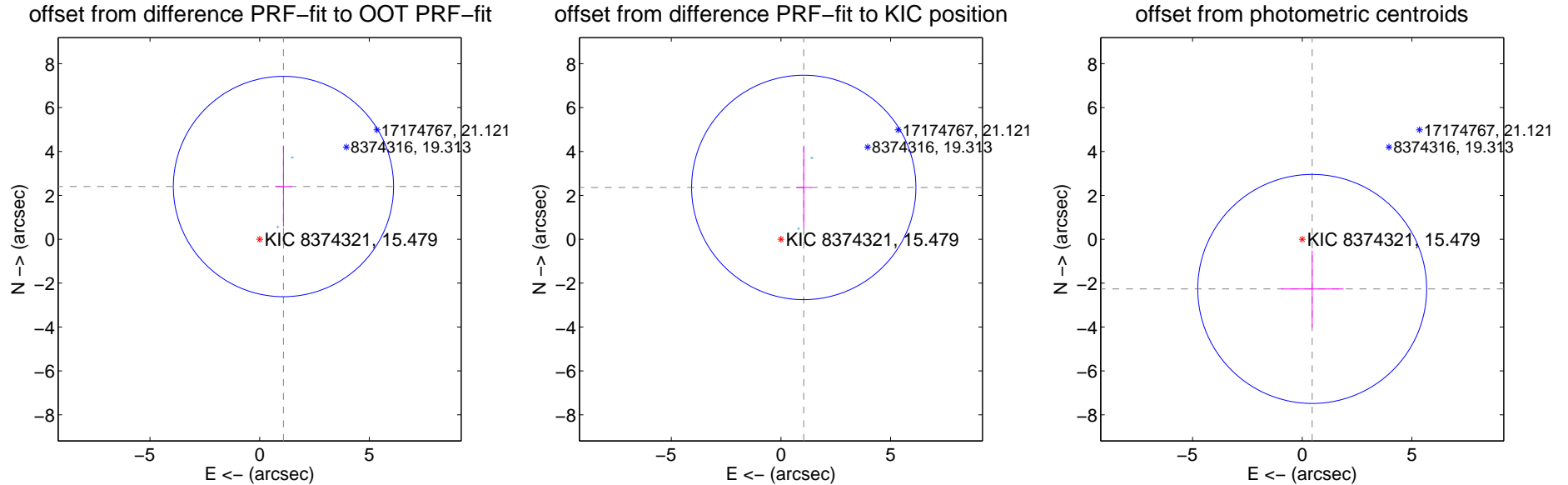
## DV Centroid Data

Supplemental centroid analysis for 008374321-02. Kepler magnitude: 15.48. Transit SNR 14.75

There are 2 quarters with good PRF difference image offsets

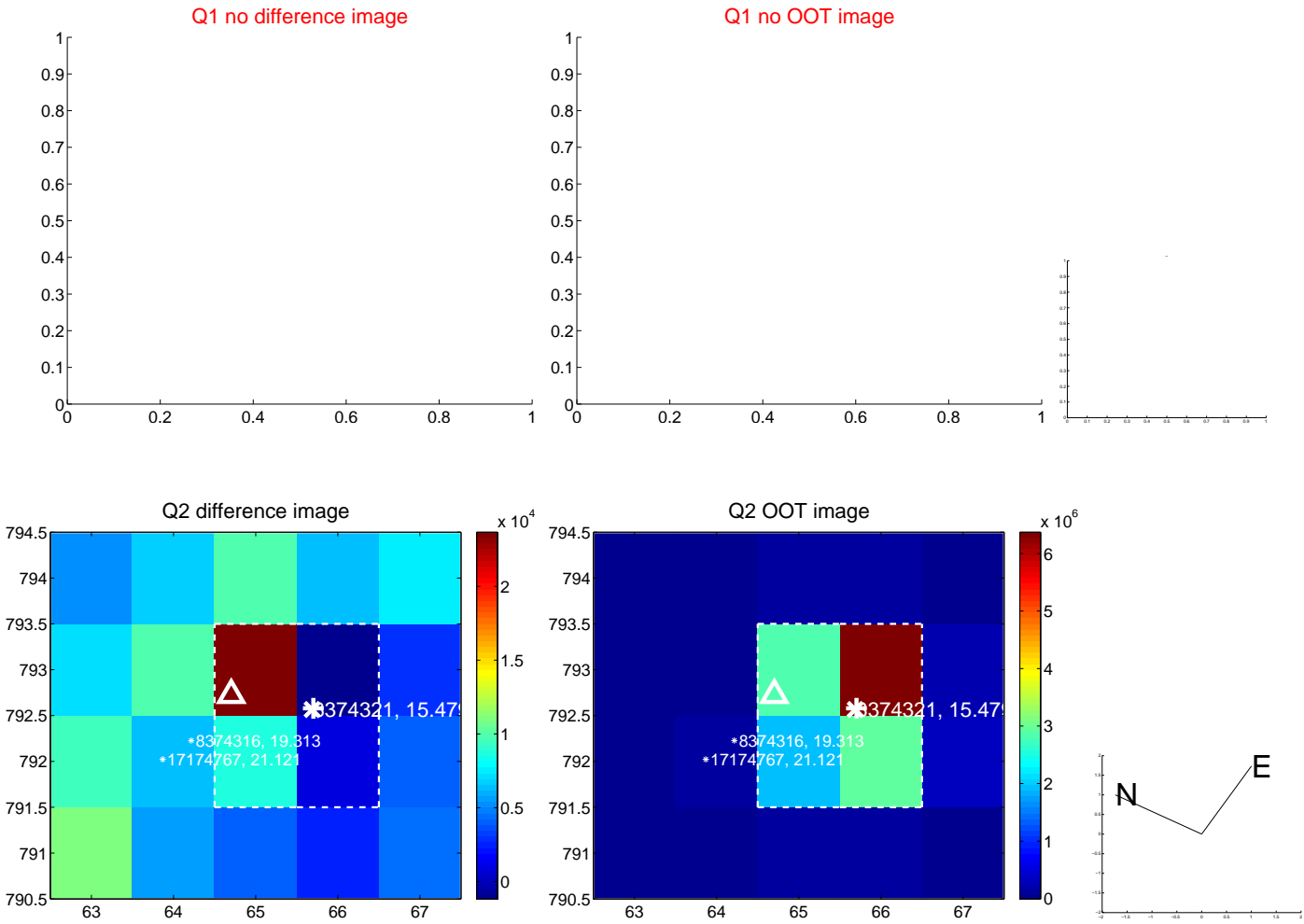
The direct PRF centroid is offset from the target star catalog position by about 0.07 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.638 \pm 1.674$	1.58	$-1.086 \pm 0.380$	$2.403 \pm 1.829$
PRF-fit source offset from KIC position	$2.581 \pm 1.705$	1.51	$-1.041 \pm 0.353$	$2.362 \pm 1.856$
photometric centroid source offset	$2.31 \pm 1.74$	1.33	$-0.46 \pm 1.42$	$-2.26 \pm 1.75$

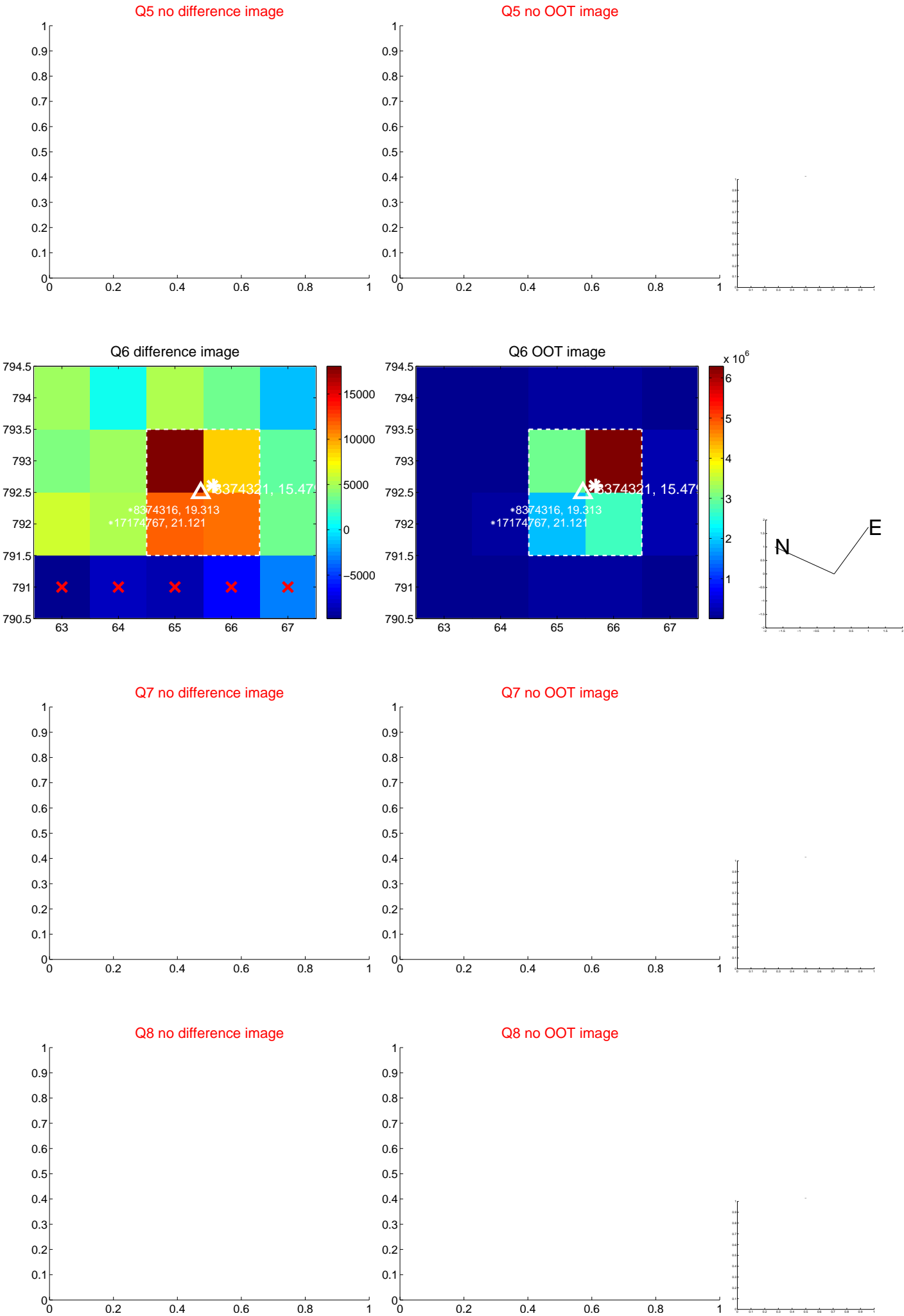


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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





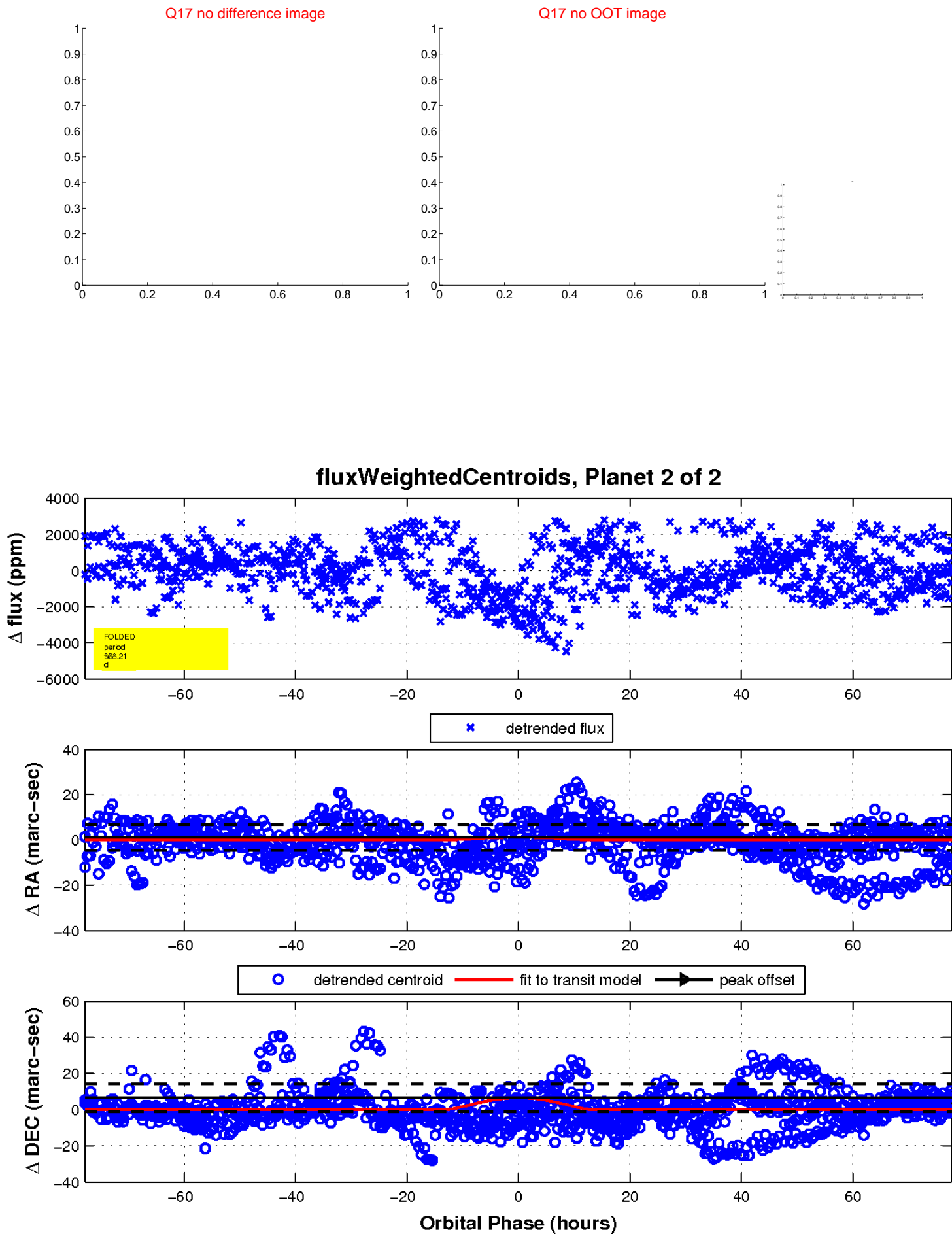
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

