

# KIC 010024862

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010024862-01	OBS	No	259.438100	359.692558	8559.6	15.000	50.4	-1.0	1.24	6572	11.52	3.40
010024862-02	OBS	No	567.957336	357.858633	1516.2	21.202	17.7	17.4	1.24	6572	5.77	1.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010024862-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—INCONSISTENT_TRANS—CENT_NOFITS
010024862-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—CENT_FEW_DIFFS

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

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

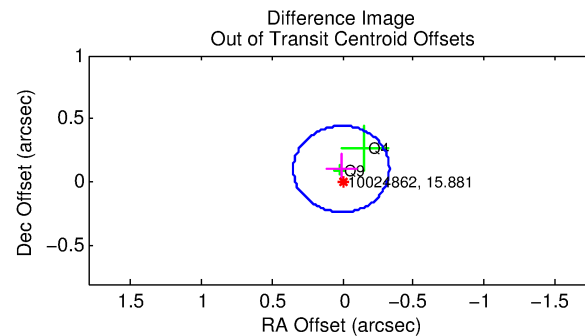
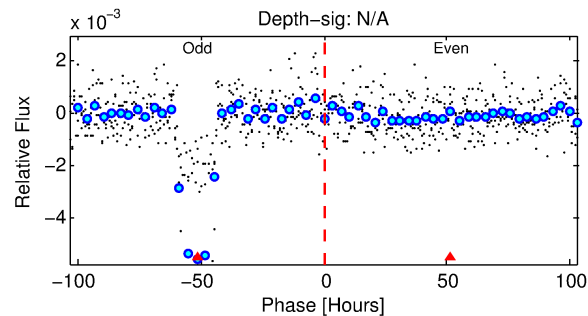
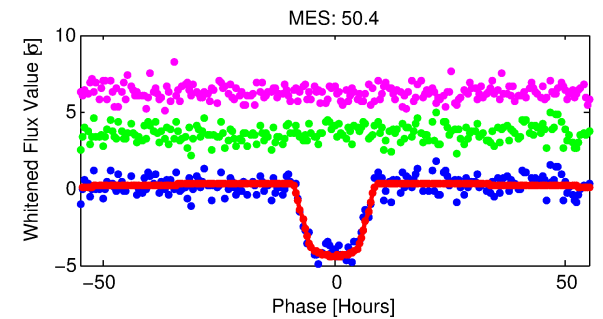
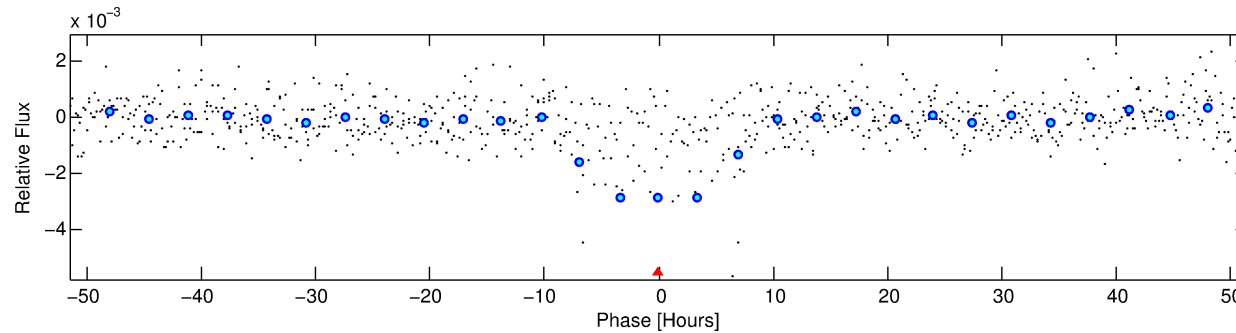
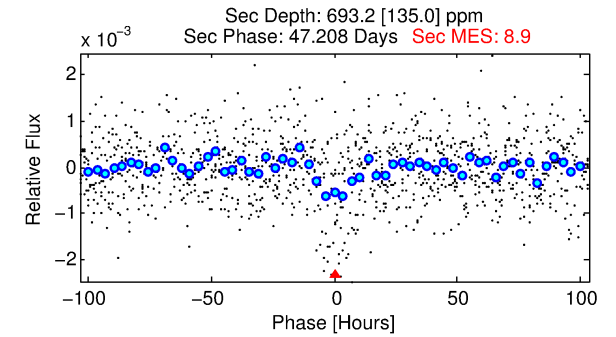
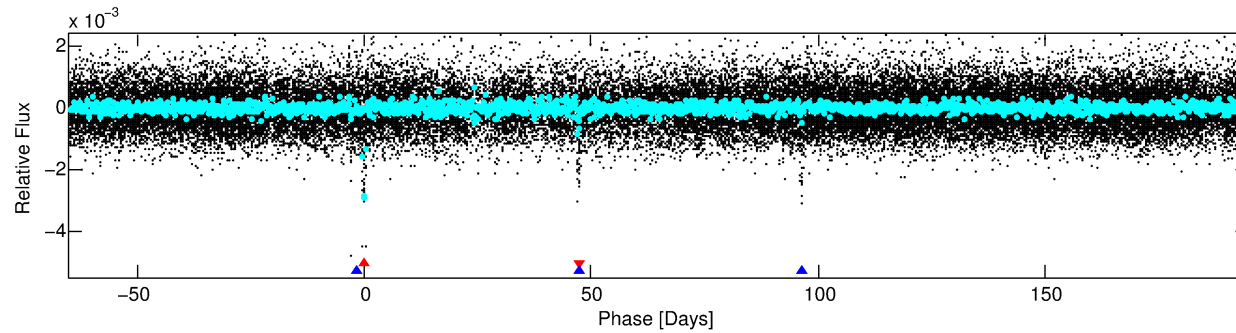
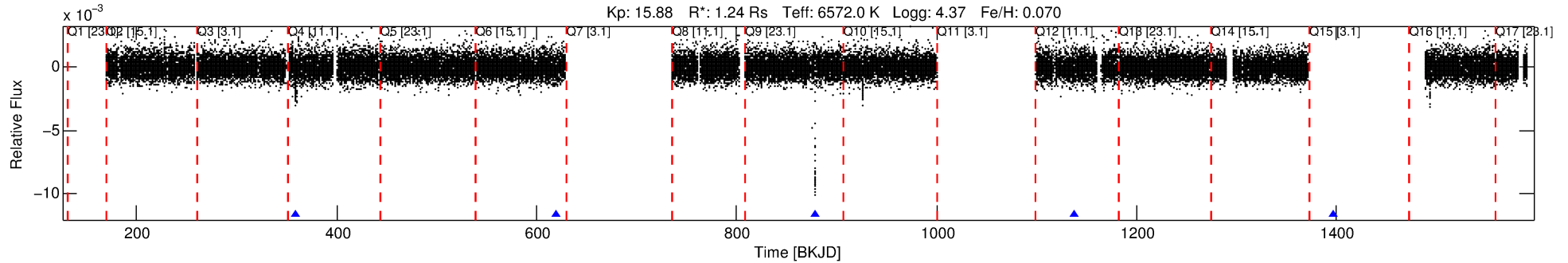
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010024862-01

No Significant Match Found

# DV One-Page Summary

KIC: 10024862 Candidate: 1 of 2 Period: 259.438 d



## TPS TCE Results:

Period = 259.43810 d  
Epoch = 359.6926 BKJD

DV fit results are unavailable

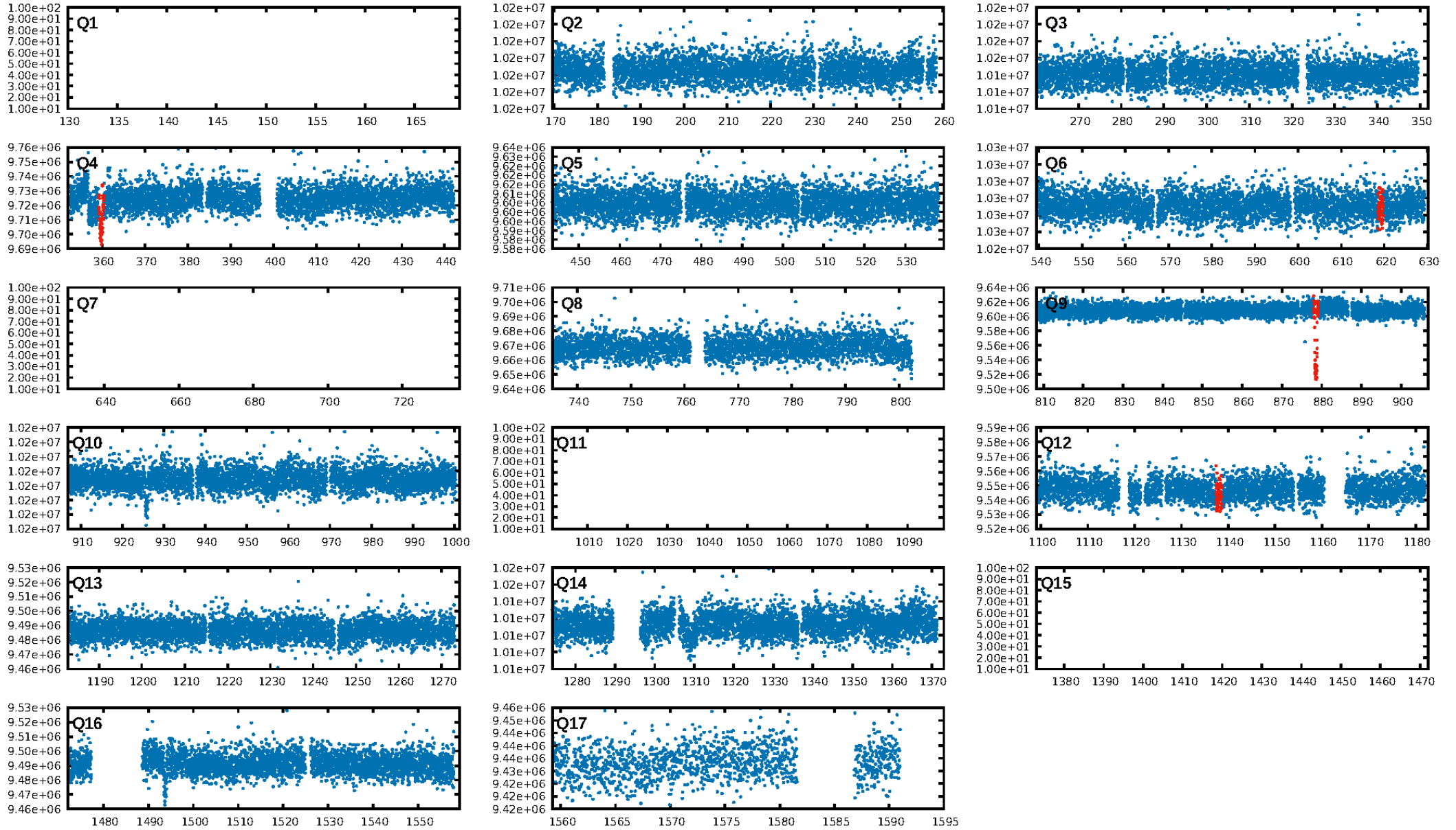
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [285.10 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.31  
Centroid-sig: 0.4%  
Centroid-so: 0.685 arcsec [1.73 $\sigma$ ]  
OotOffset-rm: 0.106 arcsec [0.93 $\sigma$ ]  
KicOffset-rm: 0.273 arcsec [2.42 $\sigma$ ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [4/4]

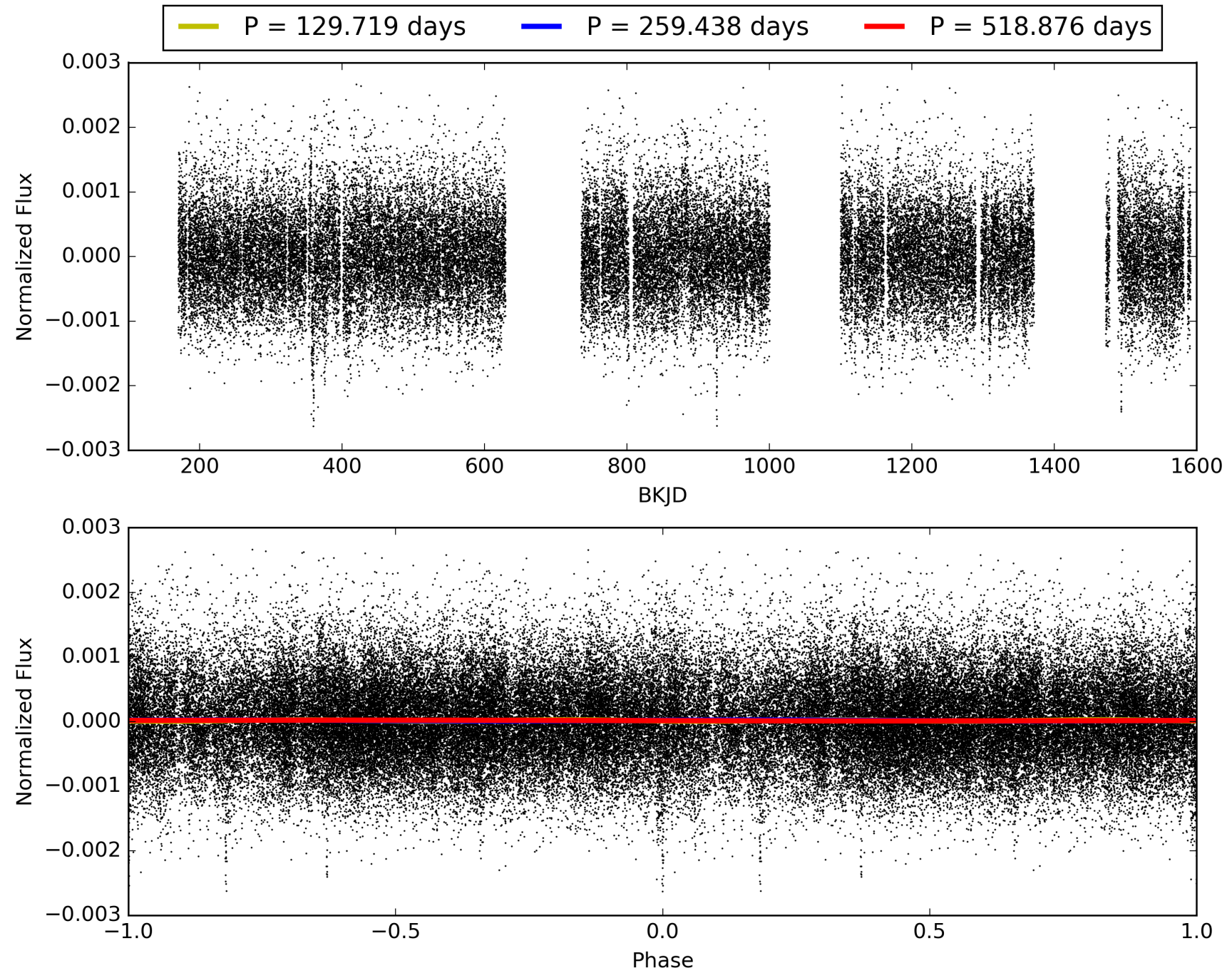
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 01:42:52 Z

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

# TCE 010024862-01, PDC Light Curves

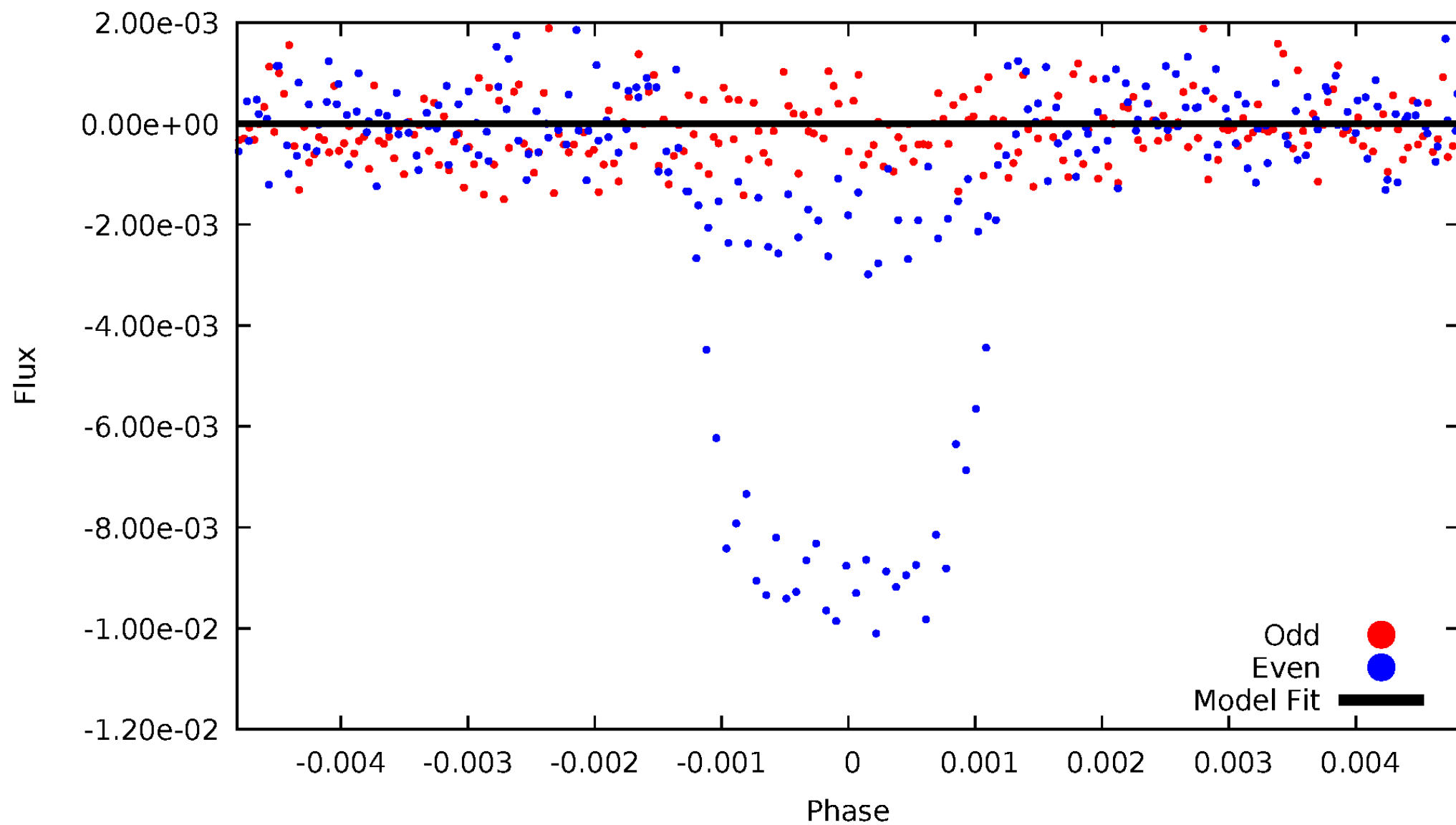


TCE 010024862-01



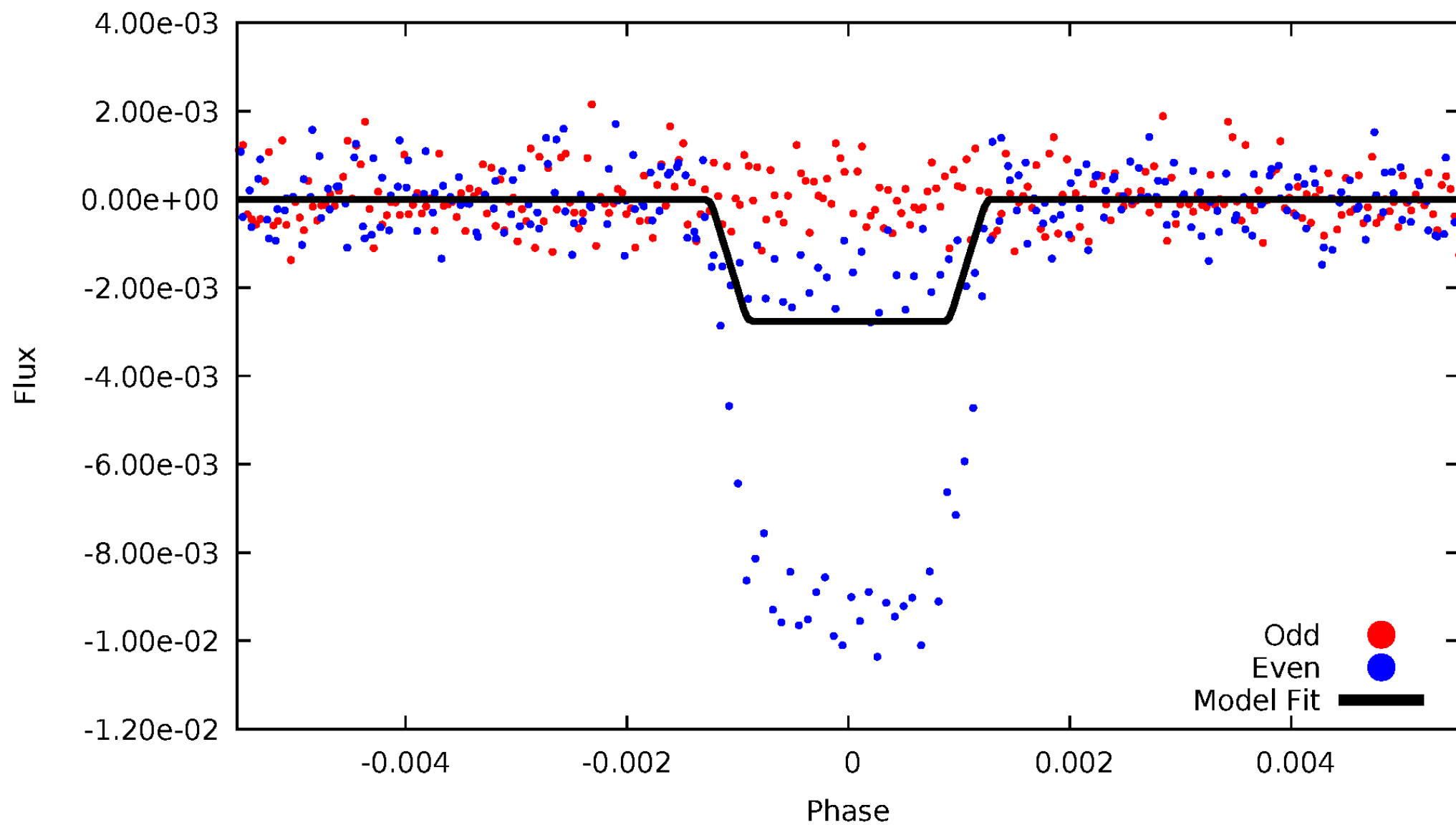
# DV Odd/Even

TCE 010024862-01

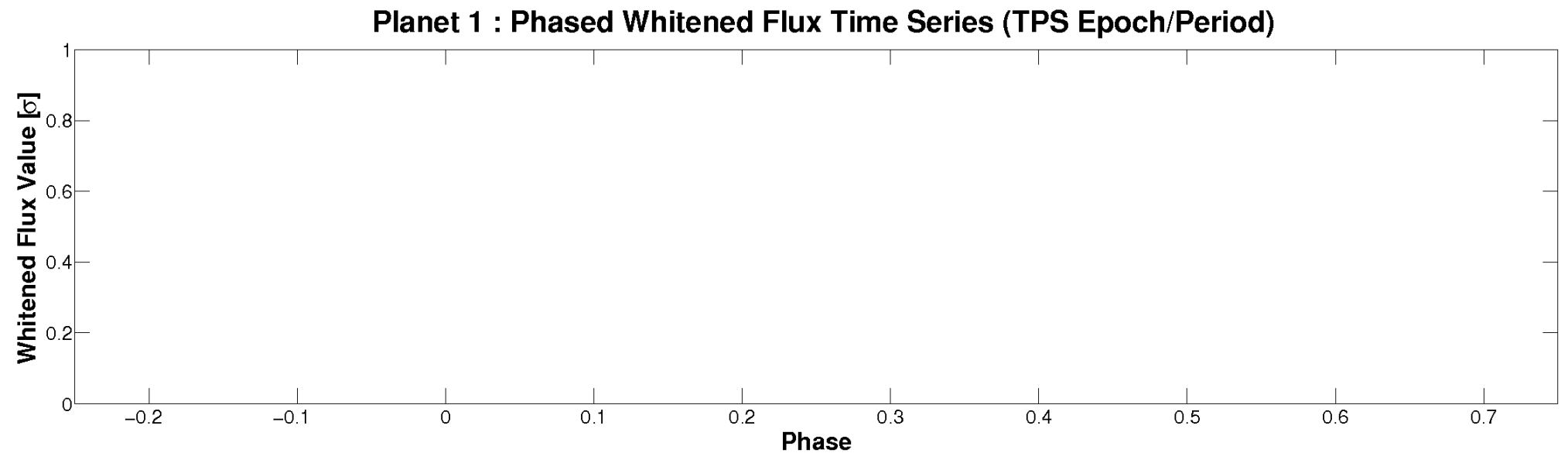
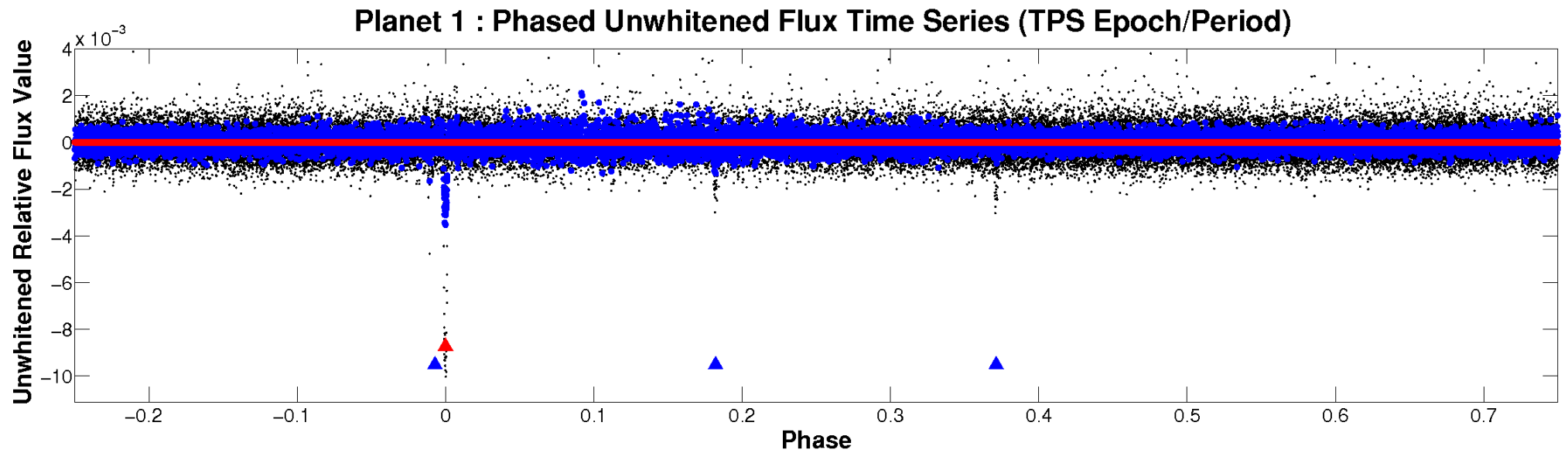


# ALT Odd/Even

TCE 010024862-01

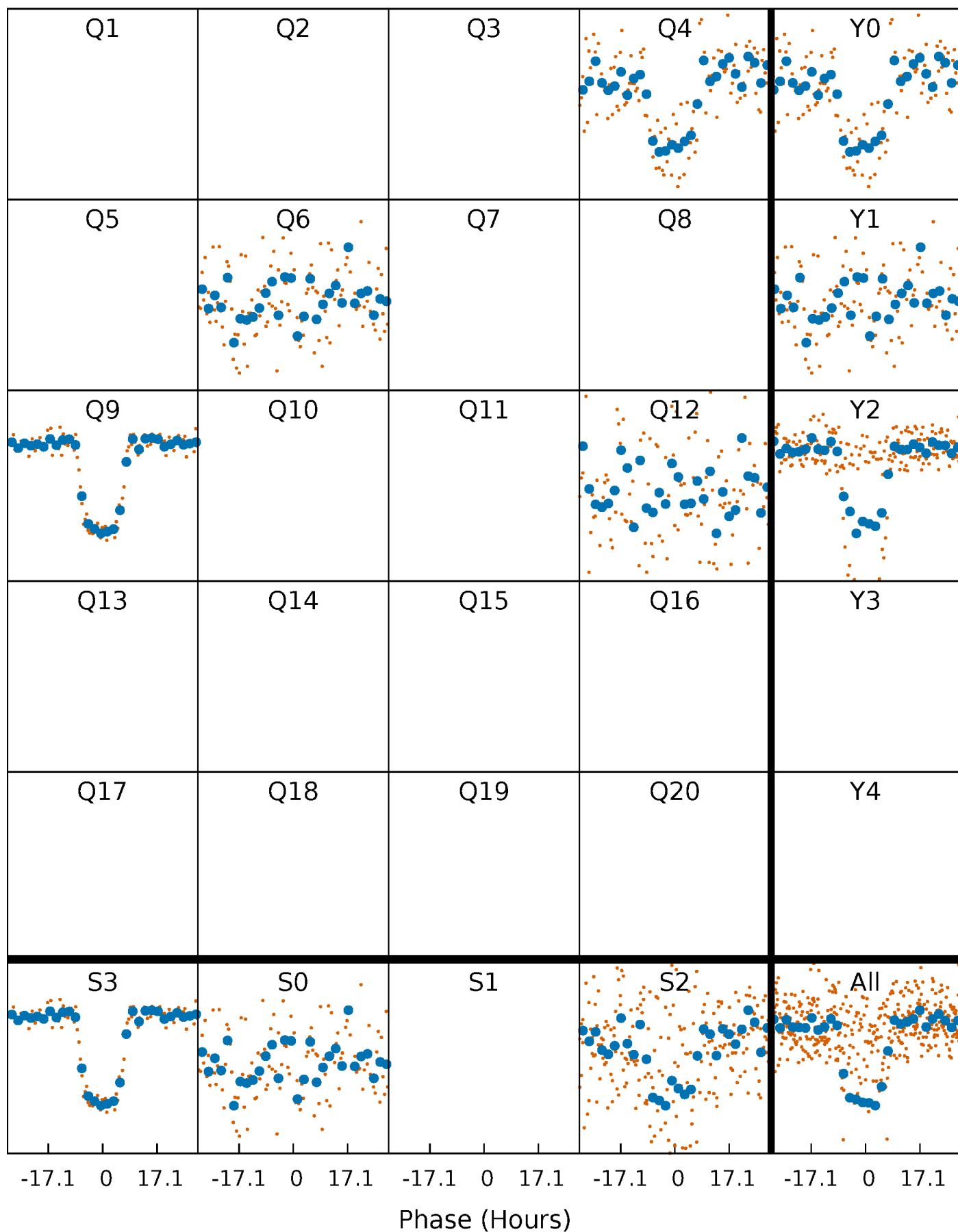


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

TCE 010024862-01 P=259.438100 Days  $T_0=359.692558$  (BKJD)





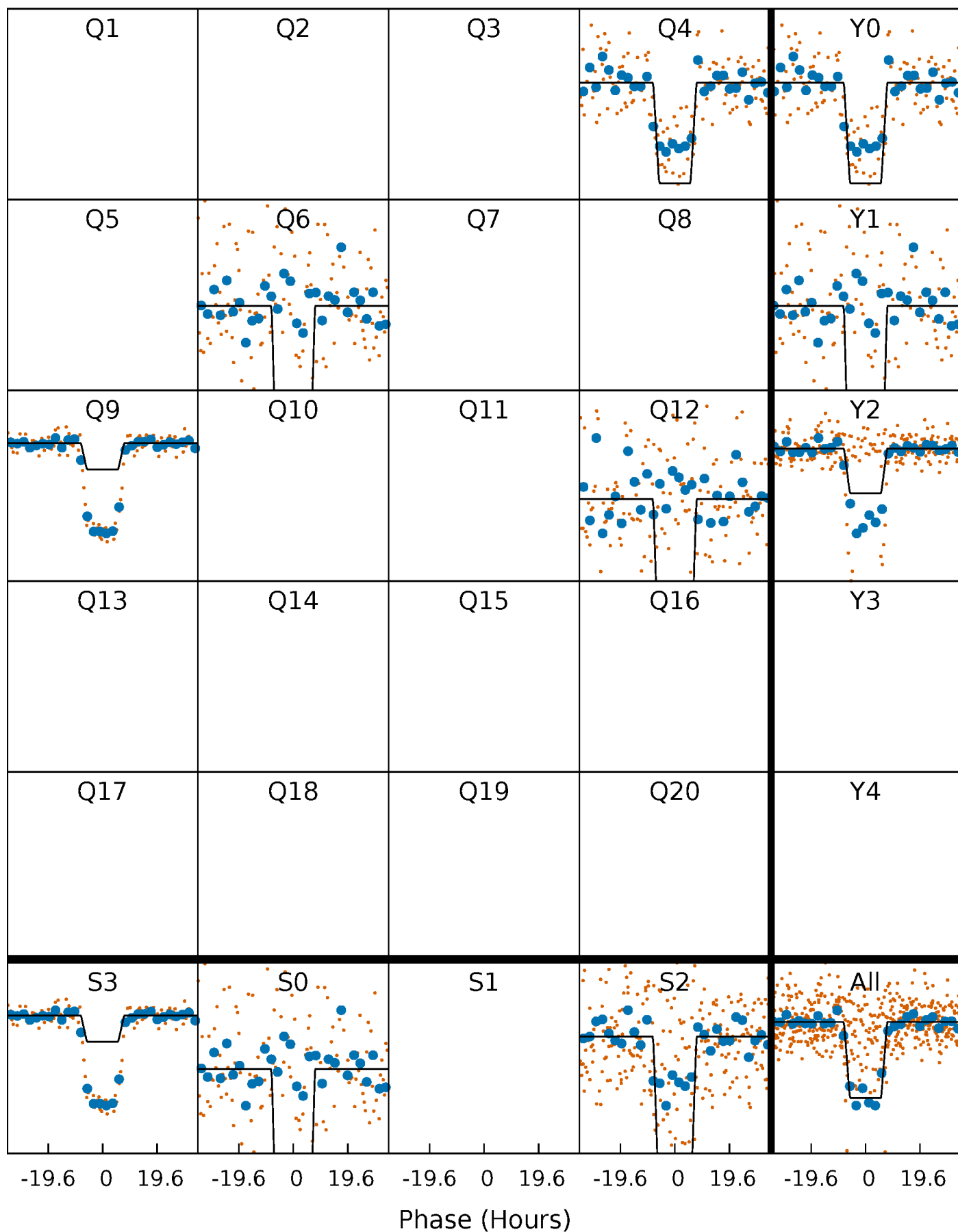
# DV Quarter-Phased Transit Curves

TCE 010024862-01 P=259.438100 Days  $T_0=359.692558$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

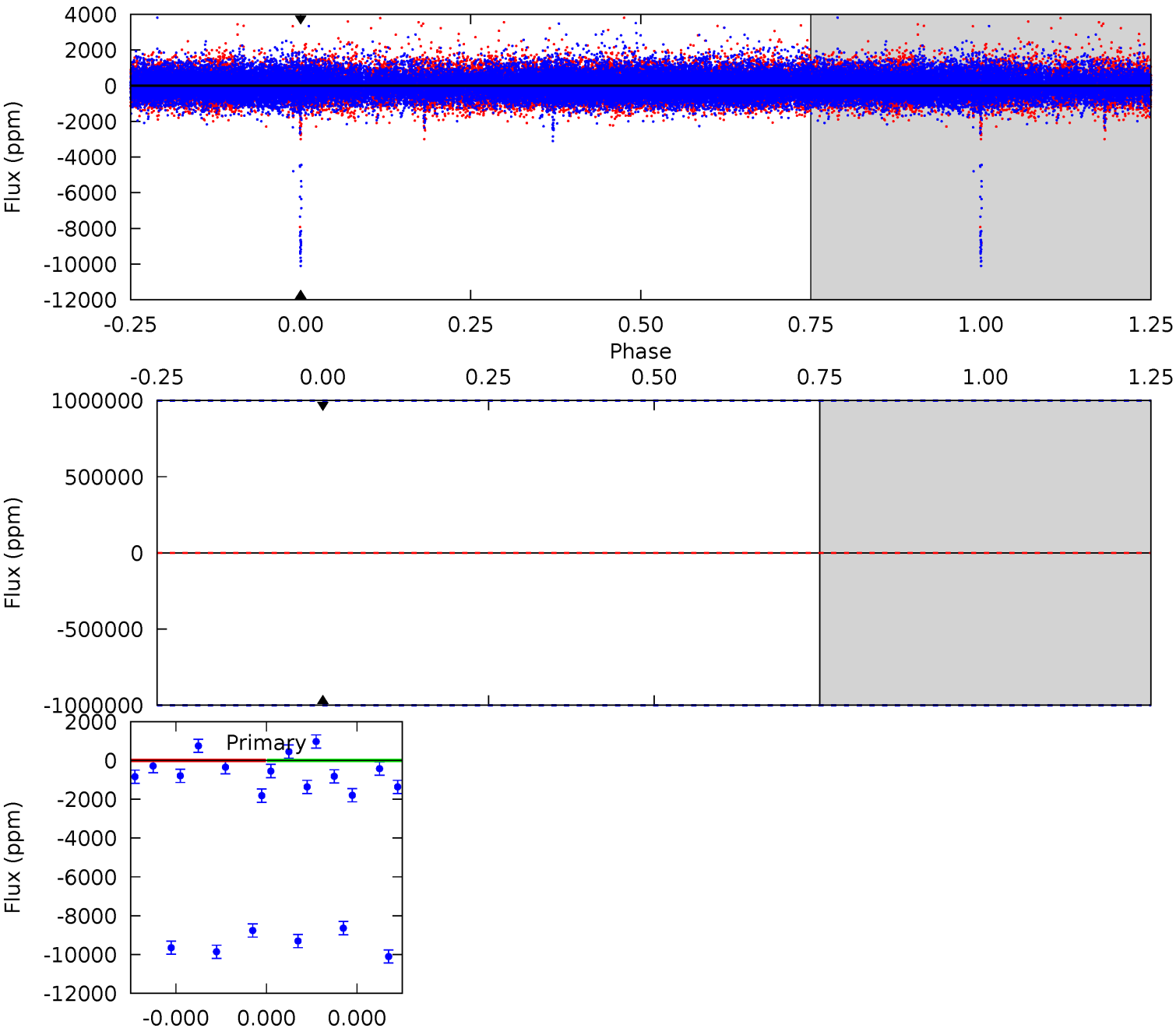
TCE 010024862-01 P=259.438100 Days  $T_0=359.681370$  (BKJD)



# DV Model-Shift Uniqueness Test

010024862-01, P = 259.438100 Days, E = 100.254458 Days

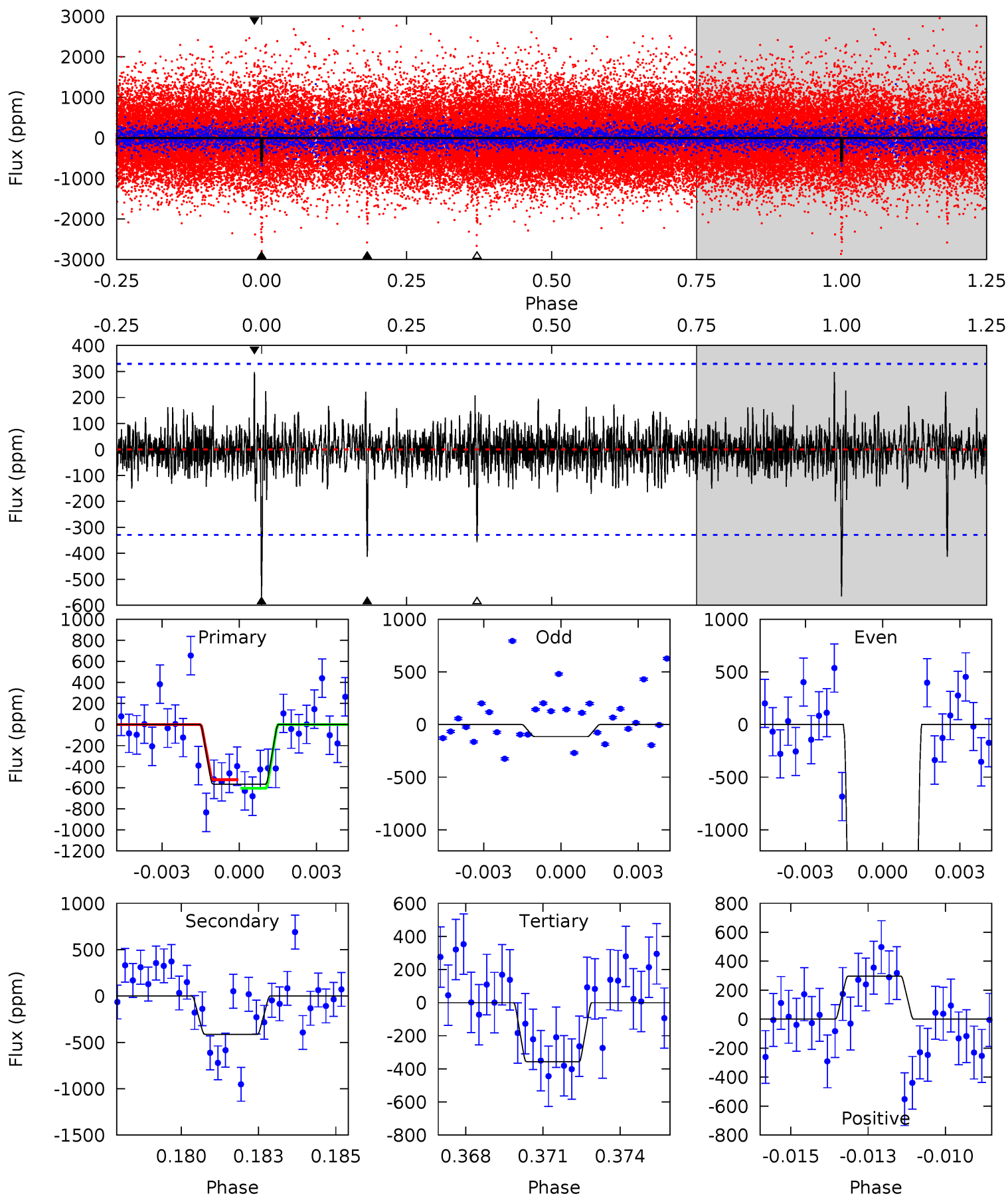
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

010024862-01, P = 259.438100 Days, E = 100.243270 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
9.08	6.64	5.74	4.78	5.28	3.02	0.91	3.34	4.30	0.90	1.86	49.0	3.06	0.34	0.66



### Stellar Parameters For KIC 010024862

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6572^{+187}_{-281}$	$4.365^{+0.065}_{-0.195}$	$0.070^{+0.250}_{-0.350}$	$1.238^{+0.391}_{-0.168}$	$1.298^{+0.168}_{-0.206}$	$0.964^{+0.275}_{-0.484}$
	+3%/-4%	+1%/-4%	+357%/-500%	+32%/-14%	+13%/-16%	+28%/-50%
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 010024862-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$16.21^{+12.35}_{-10.31}$	$491^{+37}_{-27}$	$4171^{+12886}_{-21046}$	$2404^{+290198}_{-278858}$
Alt.	$-413 \pm 62$	$12.84^{+12.19}_{-8.45}$	$492^{+37}_{-27}$	$3523^{+1829}_{-617}$	$968^{+7835}_{-697}$

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

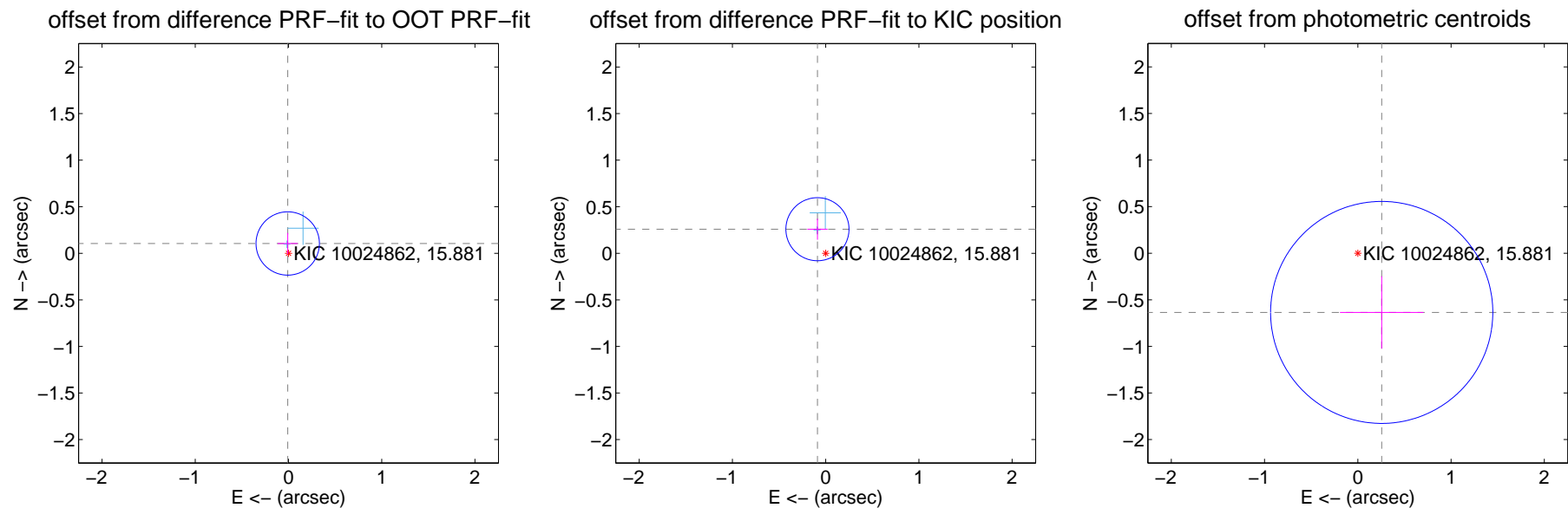
## DV Centroid Data

Supplemental centroid analysis for 010024862-01. Kepler magnitude: 15.88. Transit SNR -1.00

There are 2 quarters with good PRF difference image offsets

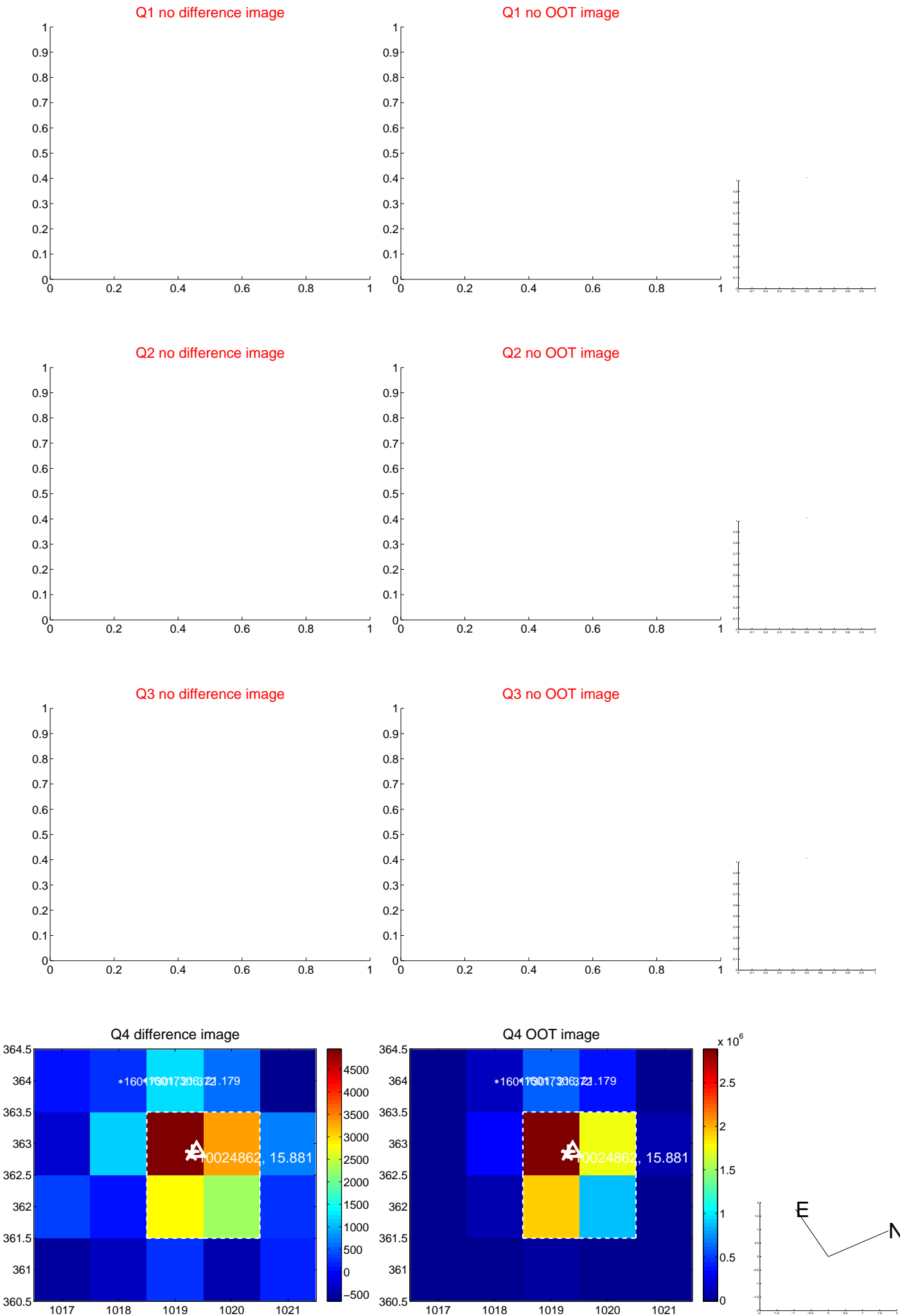
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.106 \pm 0.113$	0.93	$0.008 \pm 0.109$	$0.105 \pm 0.113$
PRF-fit source offset from KIC position	$0.273 \pm 0.113$	2.42	$0.088 \pm 0.109$	$0.258 \pm 0.113$
photometric centroid source offset	$0.69 \pm 0.40$	1.73	$-0.26 \pm 0.45$	$-0.64 \pm 0.39$

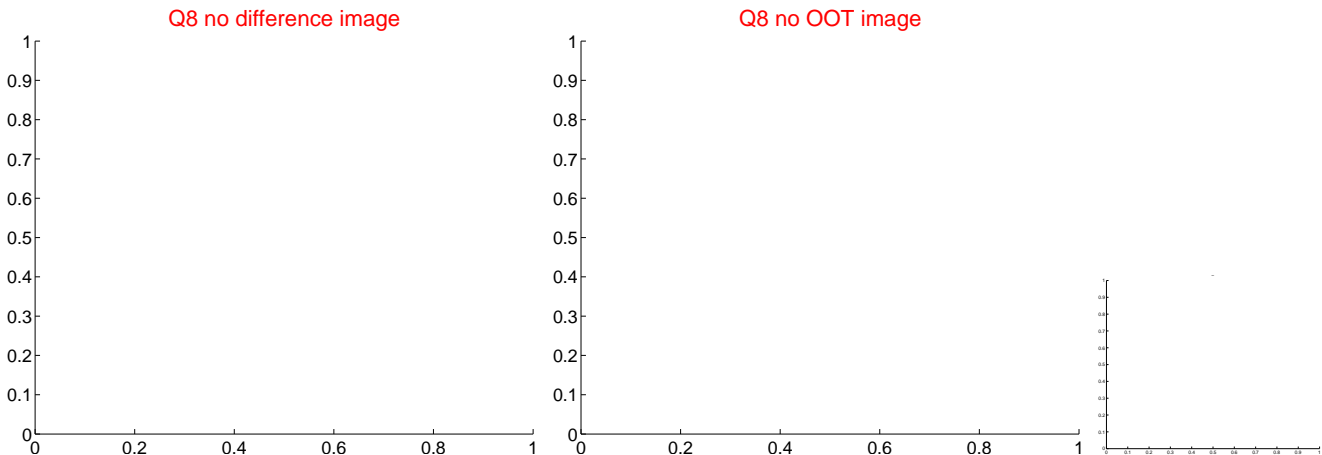
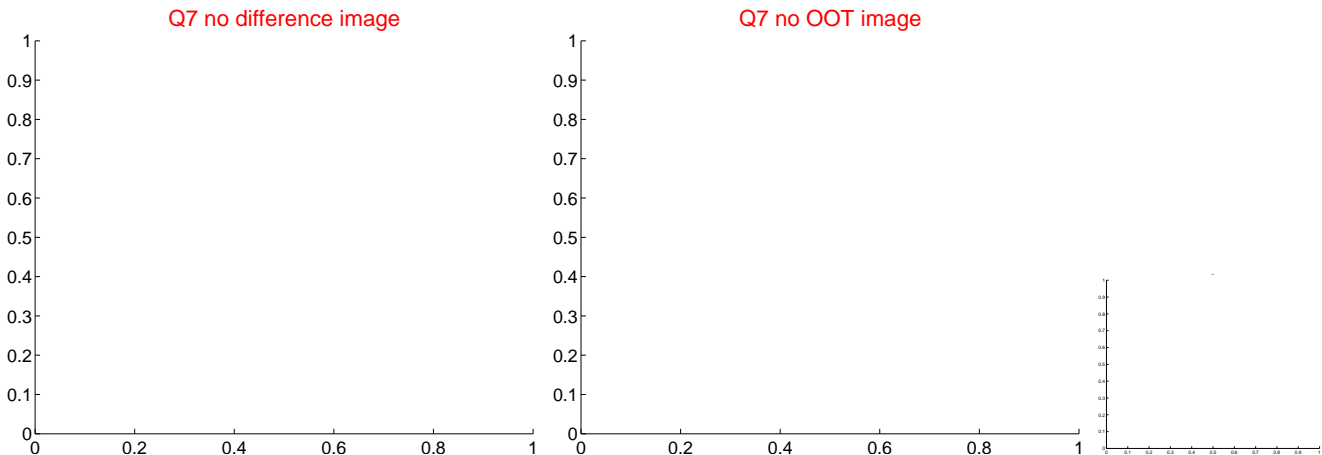
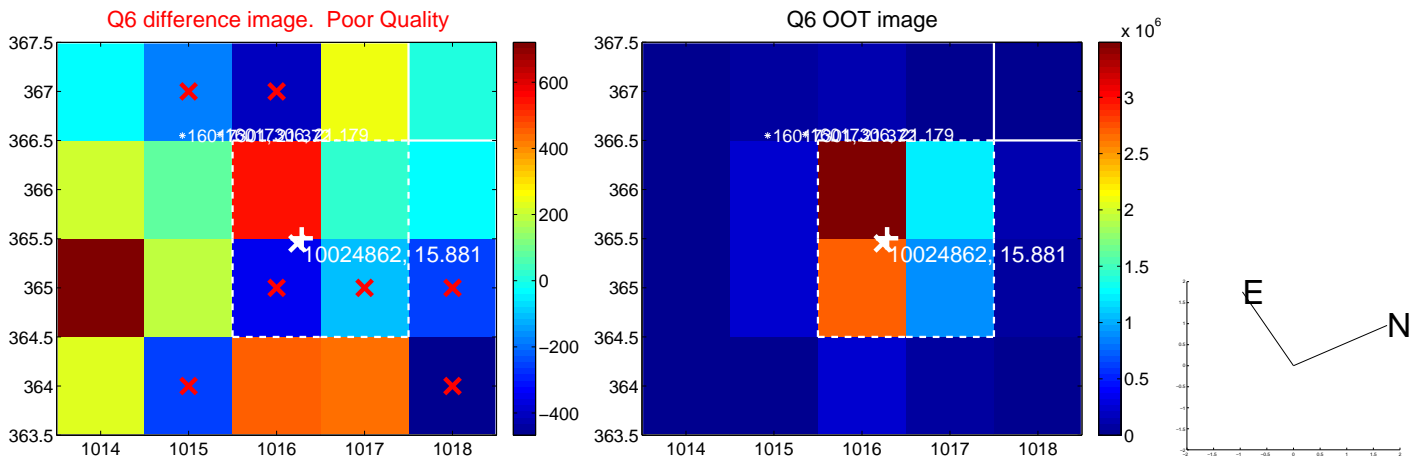
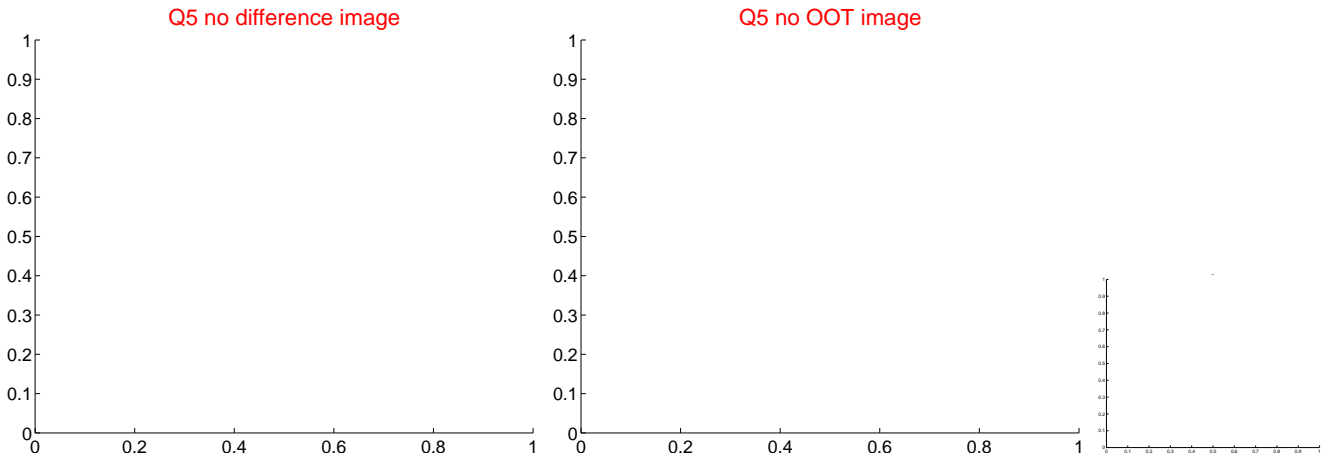


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

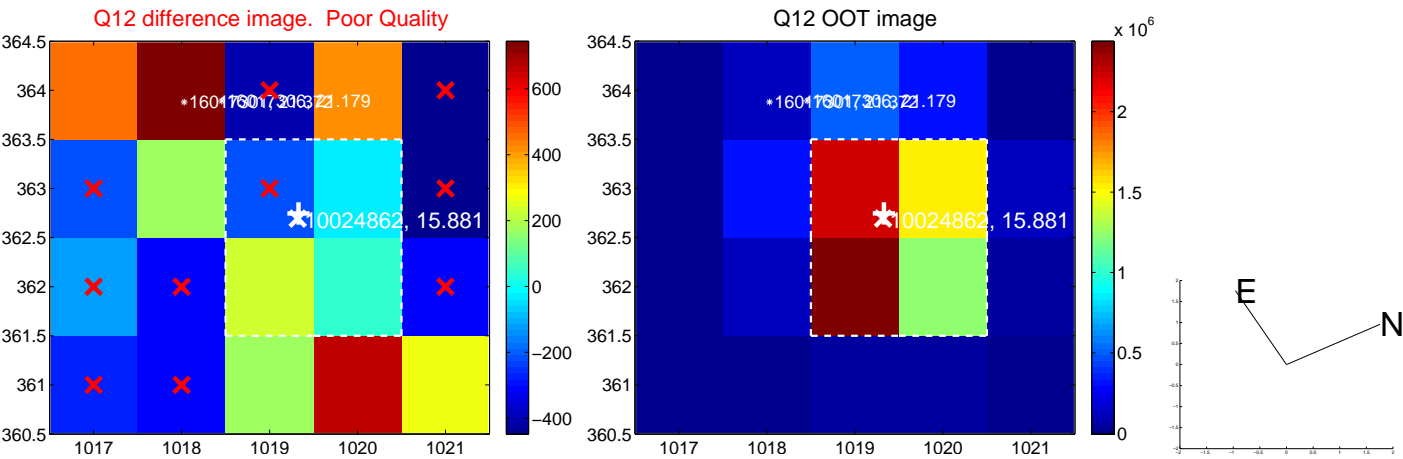
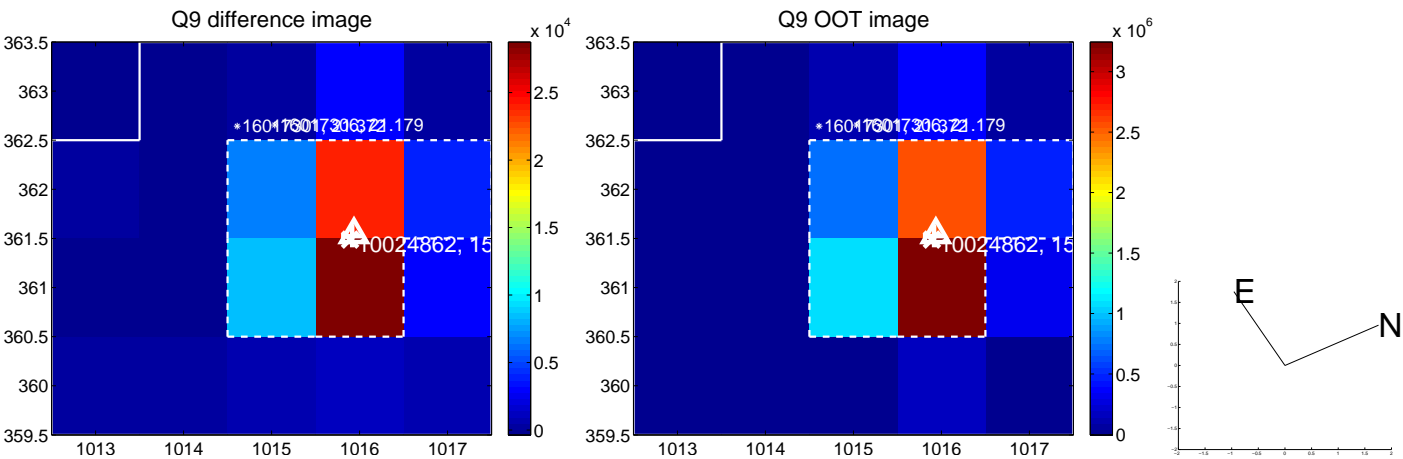


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value





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.



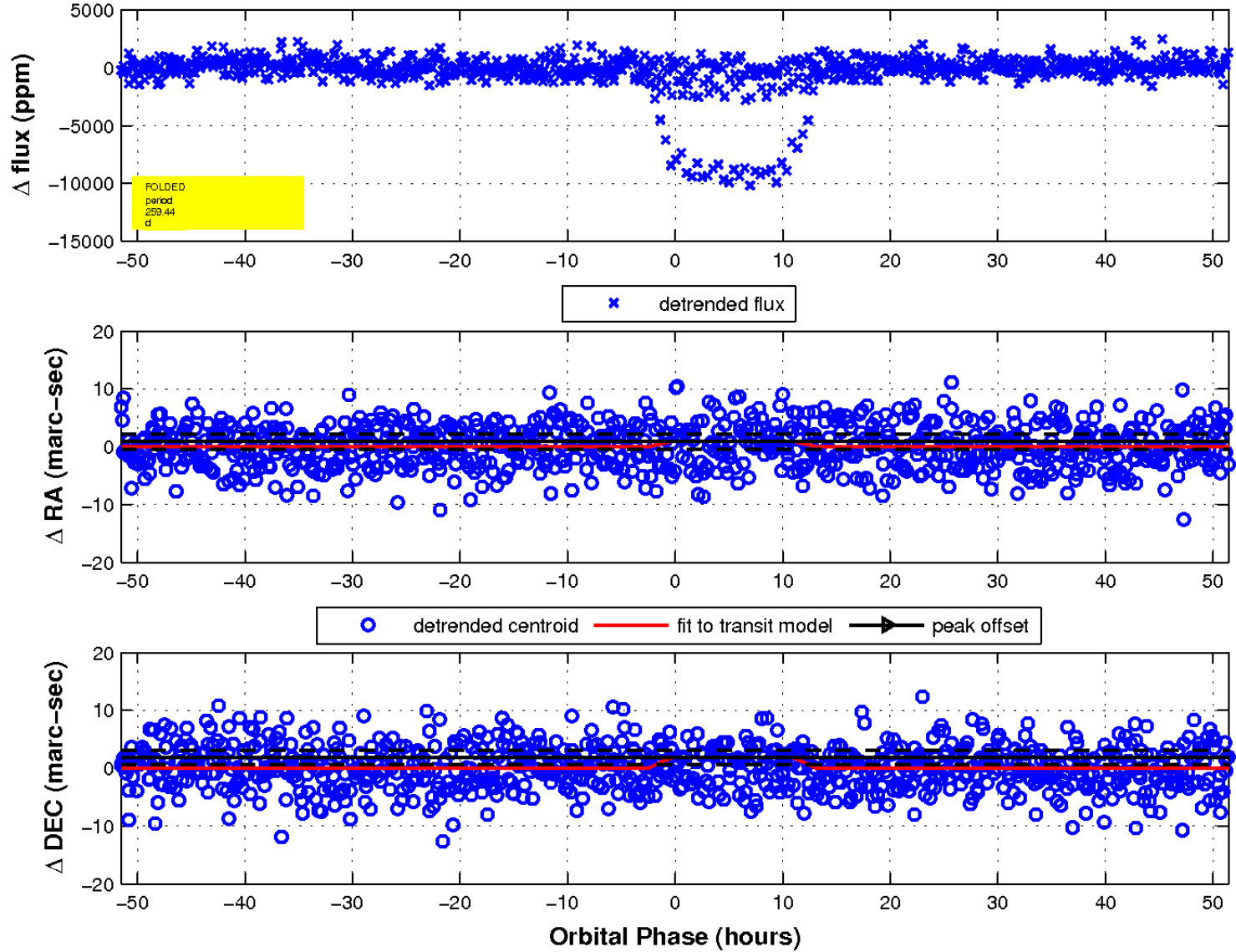
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

Q17 no difference image

Q17 no OOT image

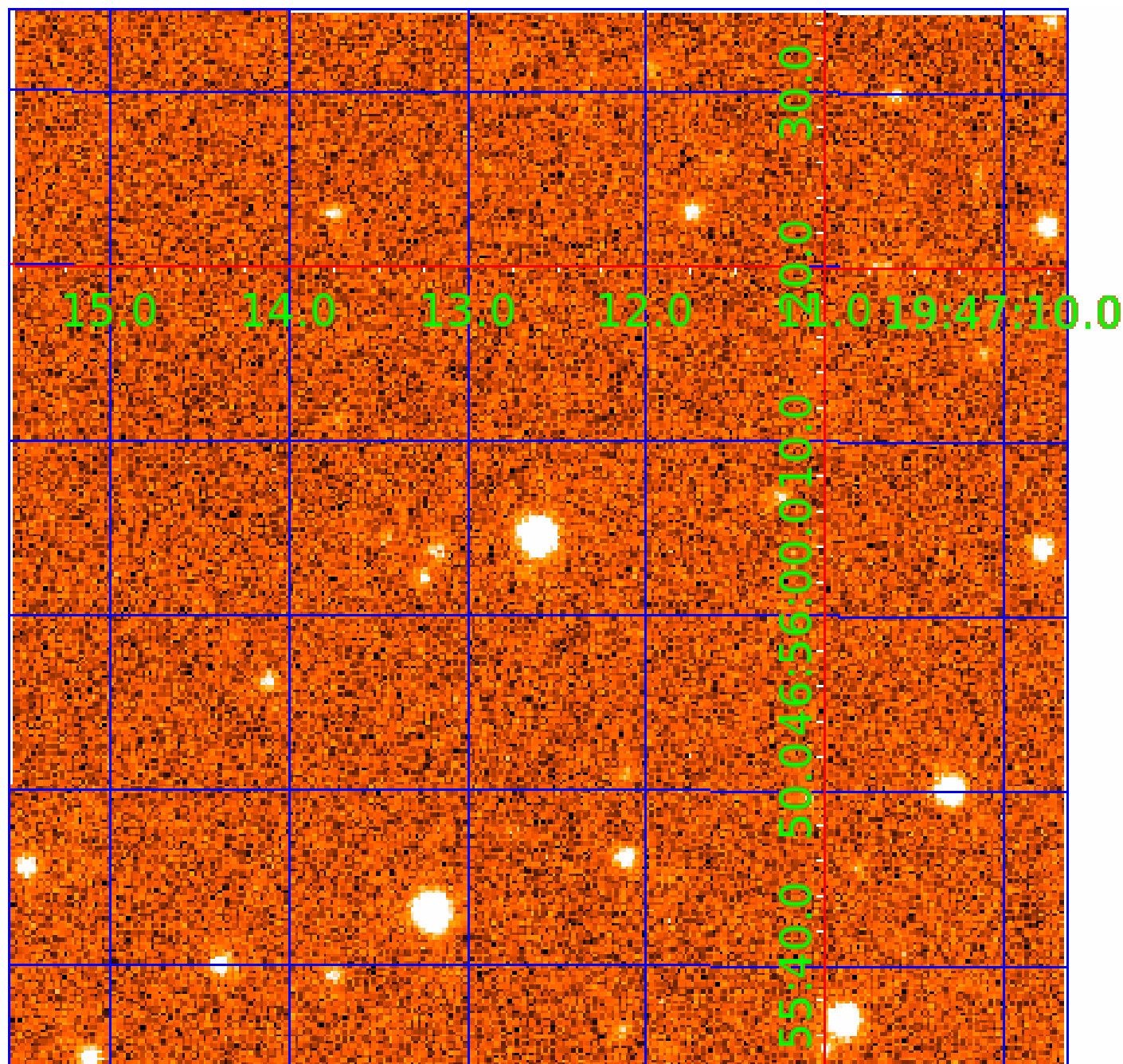


fluxWeightedCentroids, Planet 1 of 2



# UKIRT Image

Declination



# KIC 010024862

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010024862-01	OBS	No	259.438100	359.692558	8559.6	15.000	50.4	-1.0	1.24	6572	11.52	3.40
010024862-02	OBS	No	567.957336	357.858633	1516.2	21.202	17.7	17.4	1.24	6572	5.77	1.20

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010024862-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—INCONSISTENT_TRANS—CENT_NOFITS
010024862-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—CENT_FEW_DIFFS

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

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

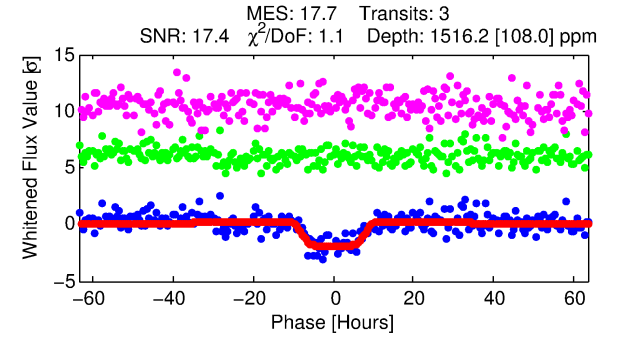
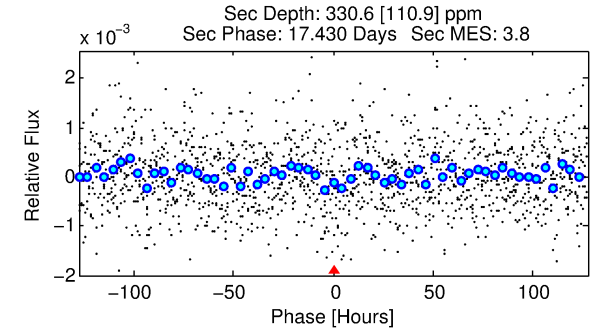
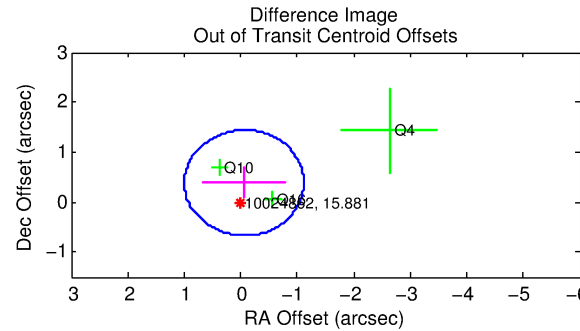
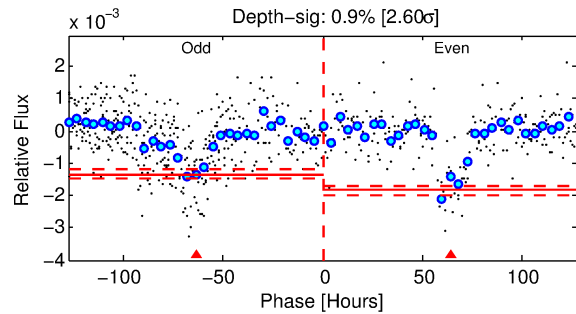
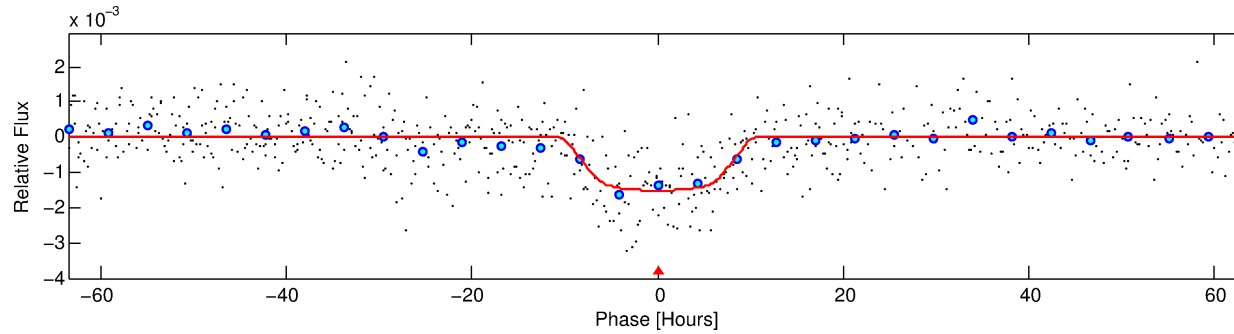
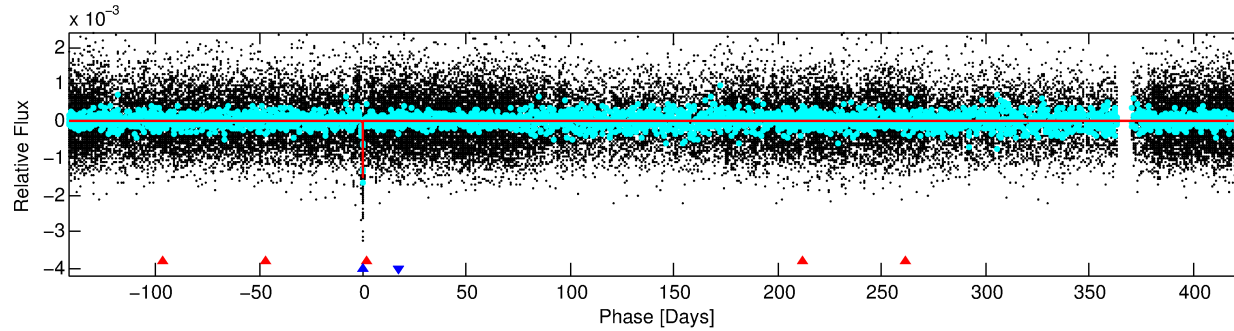
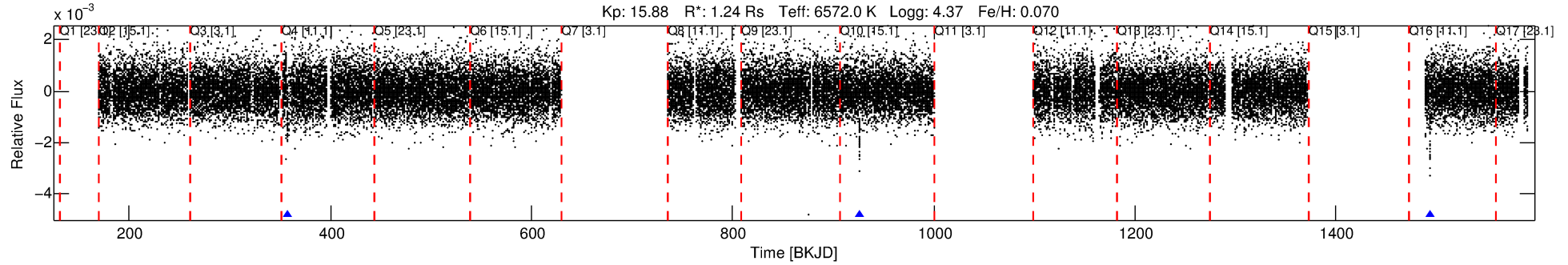
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010024862-02

No Significant Match Found

# DV One-Page Summary

KIC: 10024862 Candidate: 2 of 2 Period: 567.957 d



## DV Fit Results:

Period = 567.95734 [0.01898] d  
Epoch = 357.8586 [0.0252] BKJD  
Rp/R\* = 0.0427 [0.0024]  
a/R\* = 99.34 [17.30]  
b = 0.92 [0.03]  
Seff = 1.20 [0.48]  
Teq = 267 [27] K  
Rp = 5.77 [1.85] Re  
a = 1.4635 [0.3781] AU  
Ag = 11703.61 [5951.28] [1.97 $\sigma$ ]  
Teffp = 4288 [421] K [9.54 $\sigma$ ]

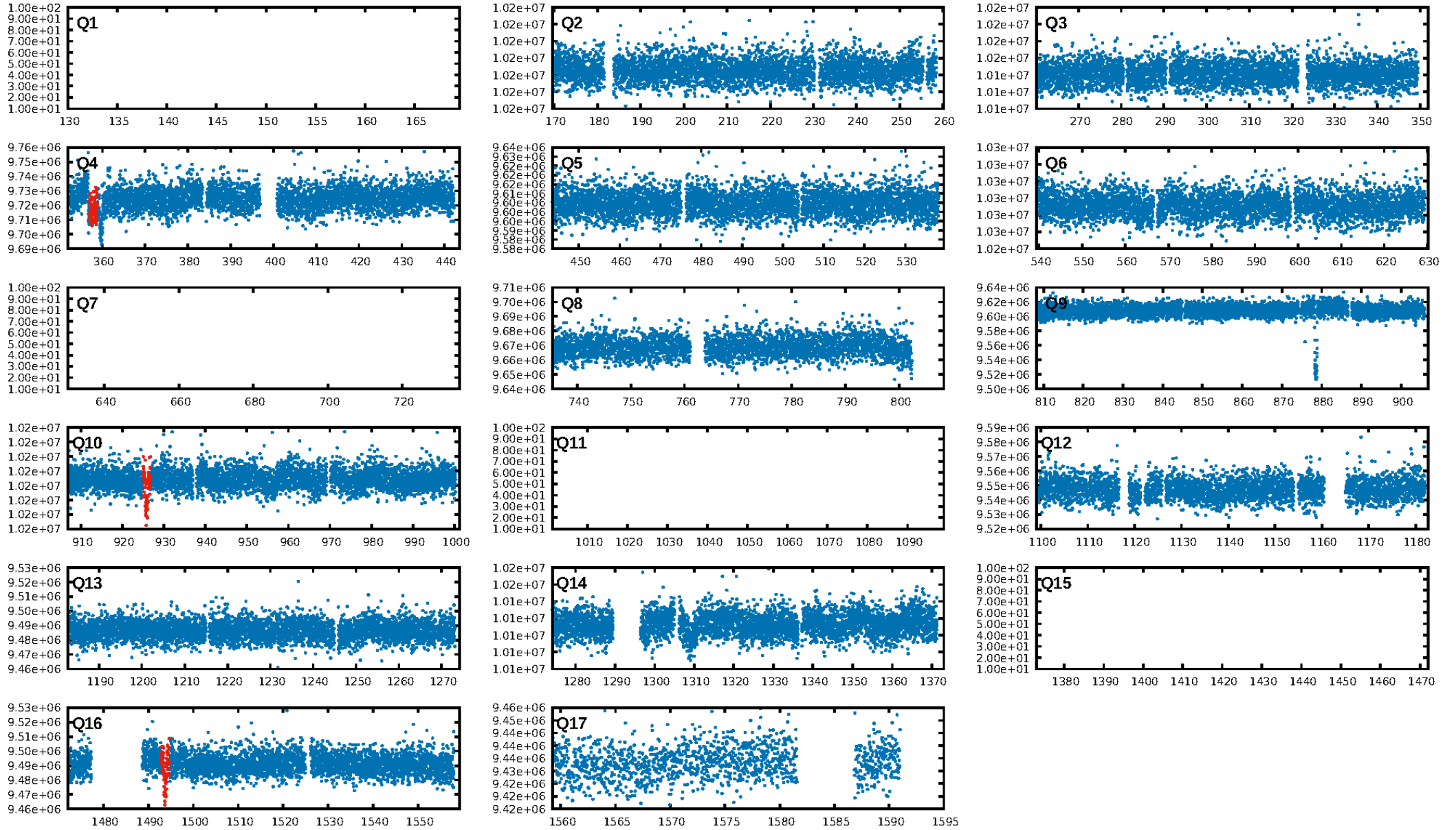
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [285.10 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 97.3%  
Bootstrap-pfa: 1.84e-67  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 5.608  
Centroid-sig: 0.3%  
Centroid-so: 1.710 arcsec [2.06 $\sigma$ ]  
OotOffset-rm: 0.389 arcsec [1.11 $\sigma$ ]  
KicOffset-rm: 0.586 arcsec [1.48 $\sigma$ ]  
OotOffset-st: 1/0/2/0 [3]  
KicOffset-st: 1/0/2/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 01:42:59 Z

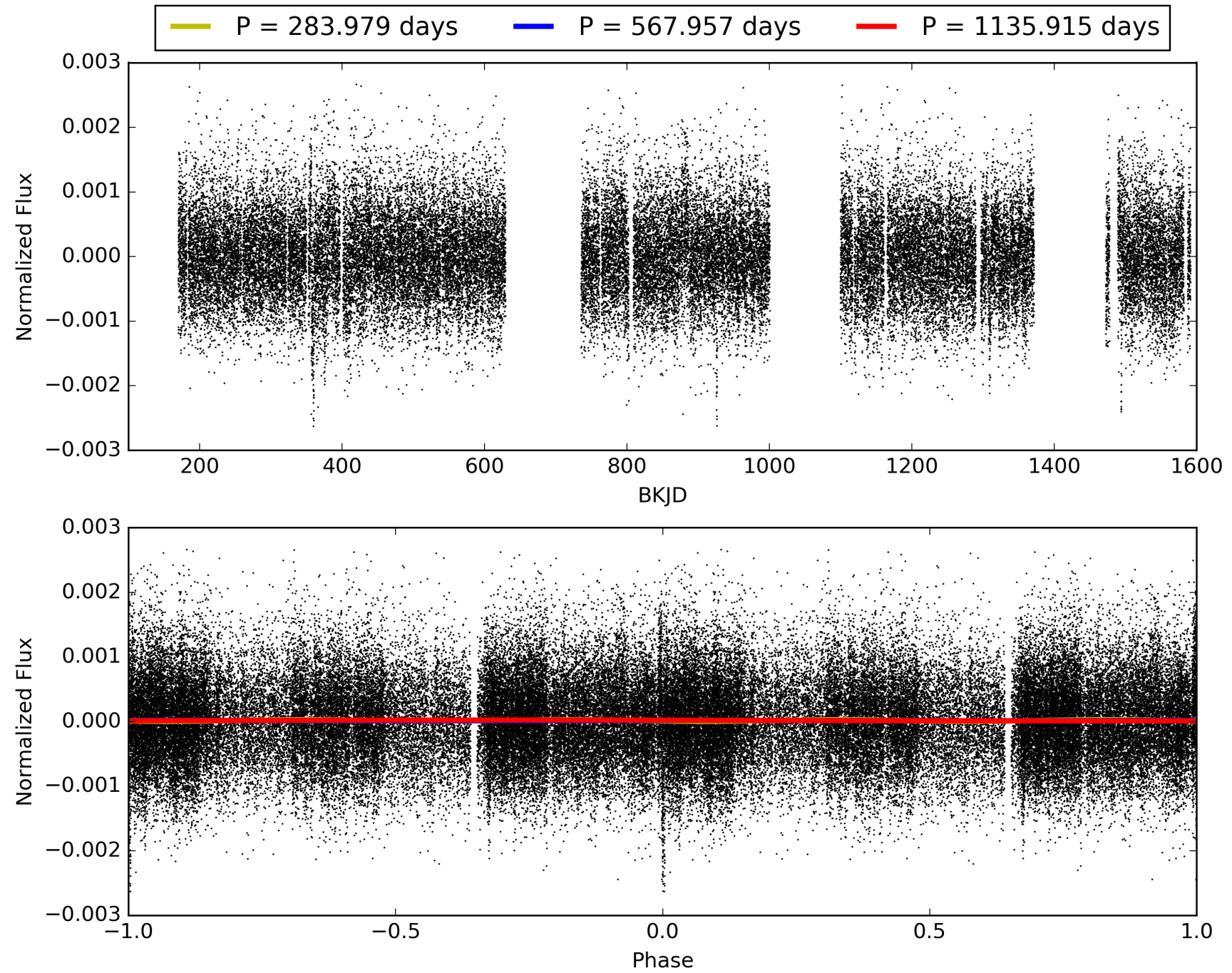
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010024862-02, PDC Light Curves





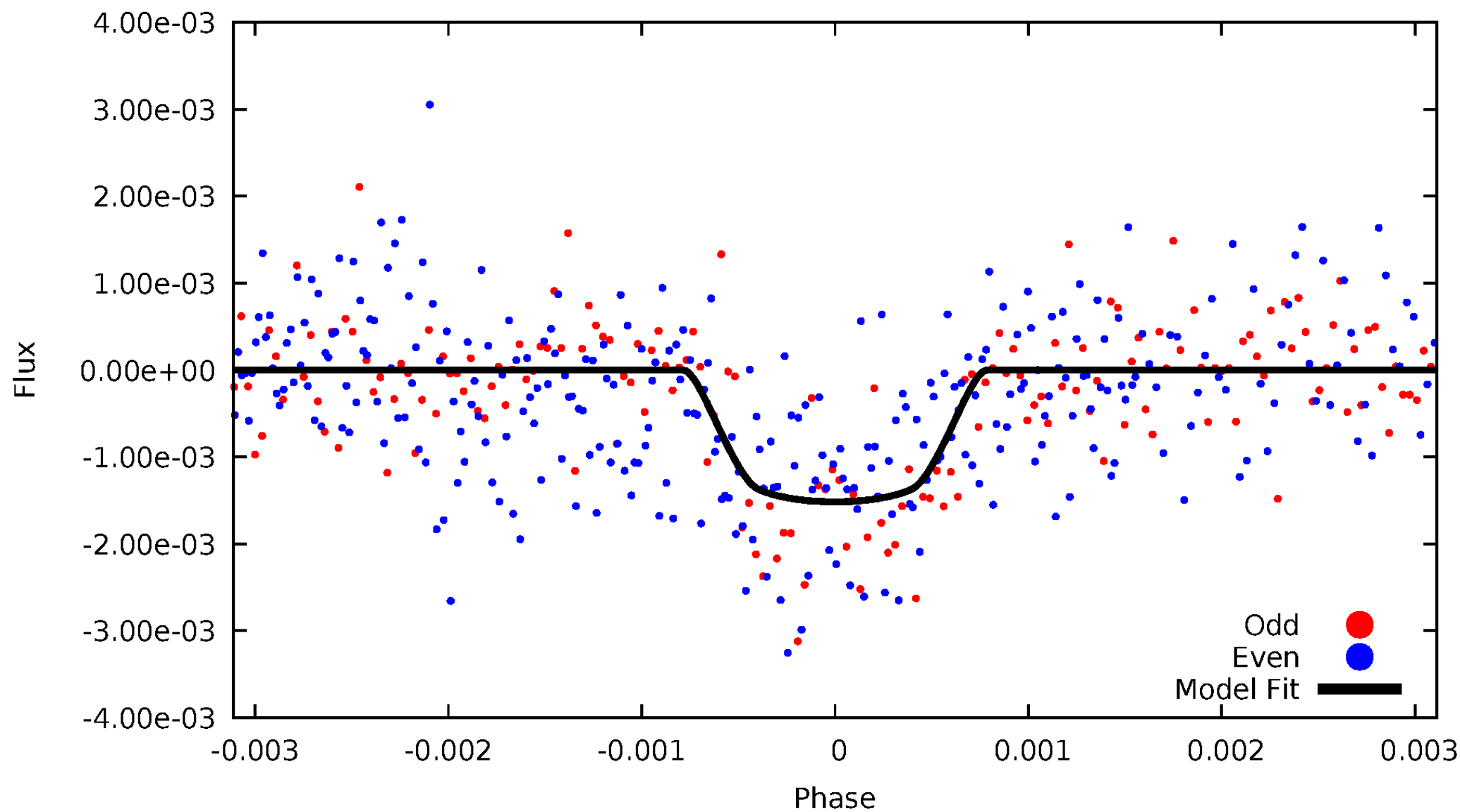
TCE 010024862-02





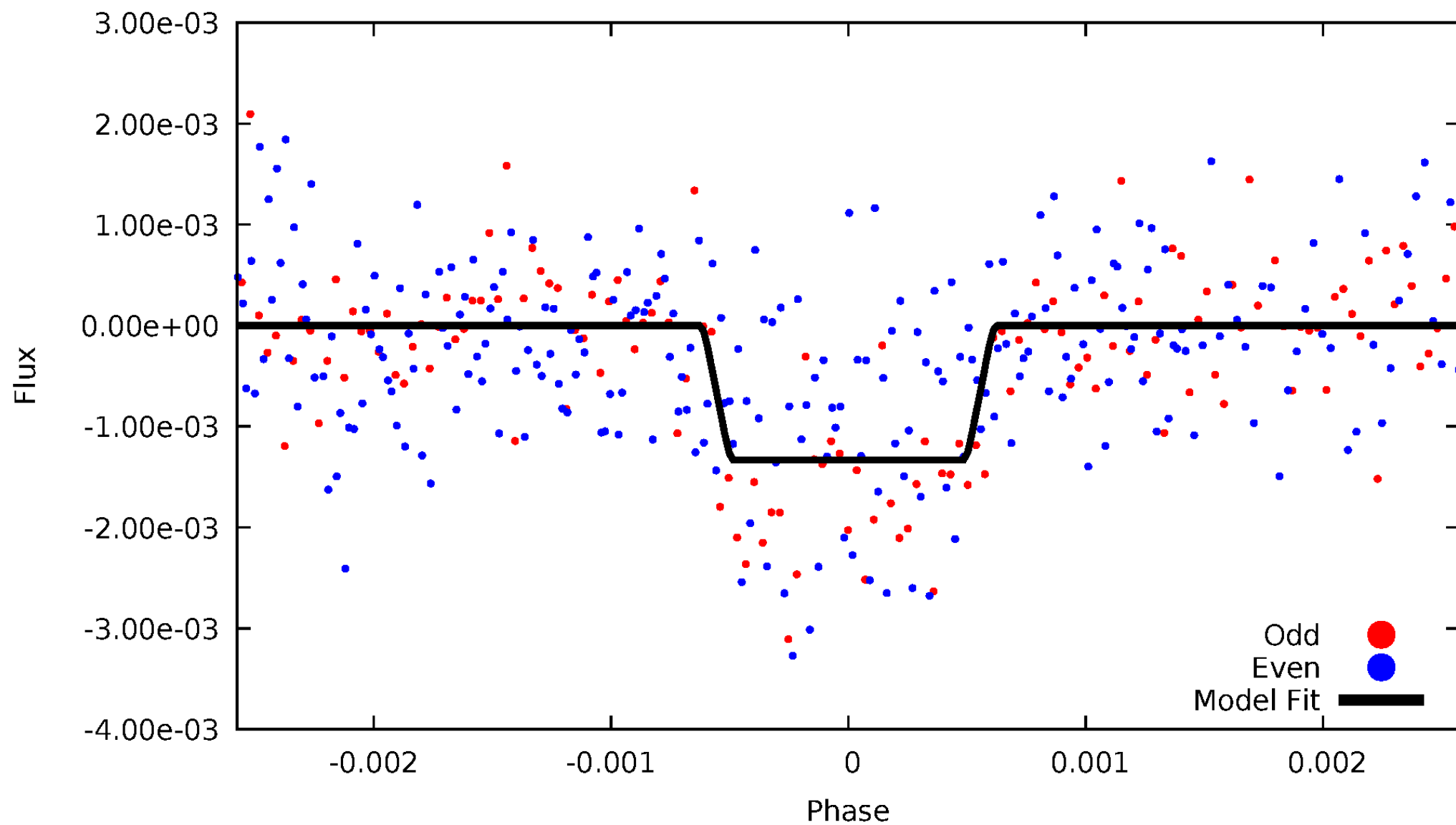
# DV Odd/Even

TCE 010024862-02



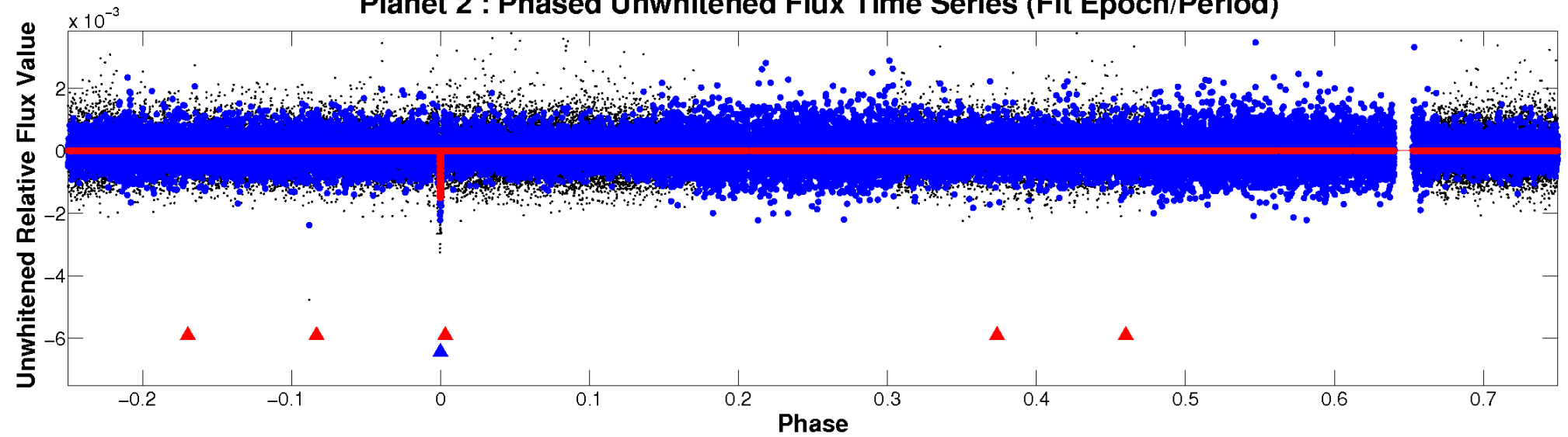
# ALT Odd/Even

TCE 010024862-02

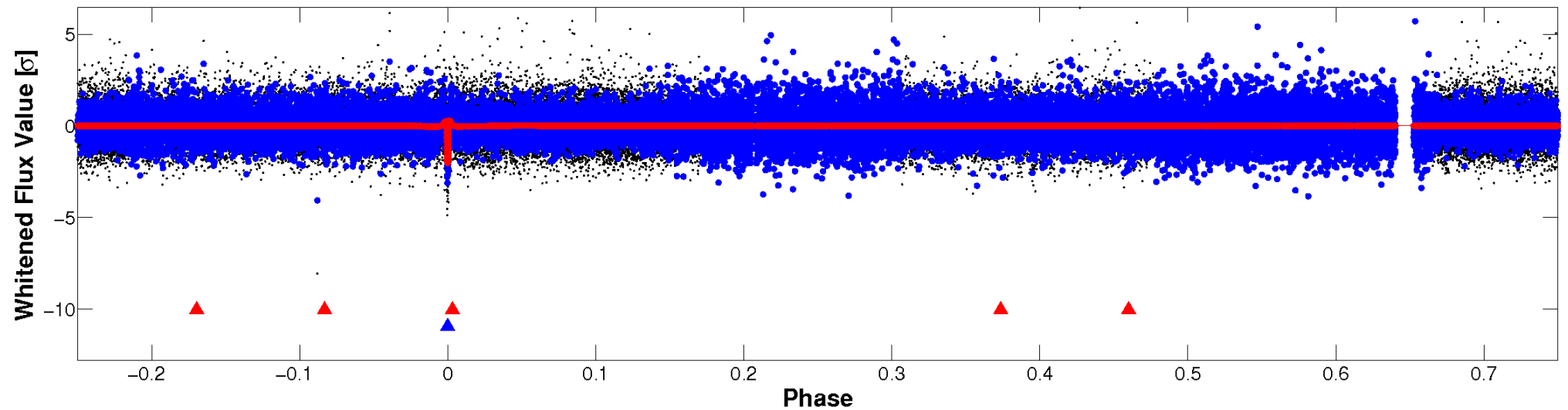


# Non-Whitened Vs. Whitened Light Curve

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

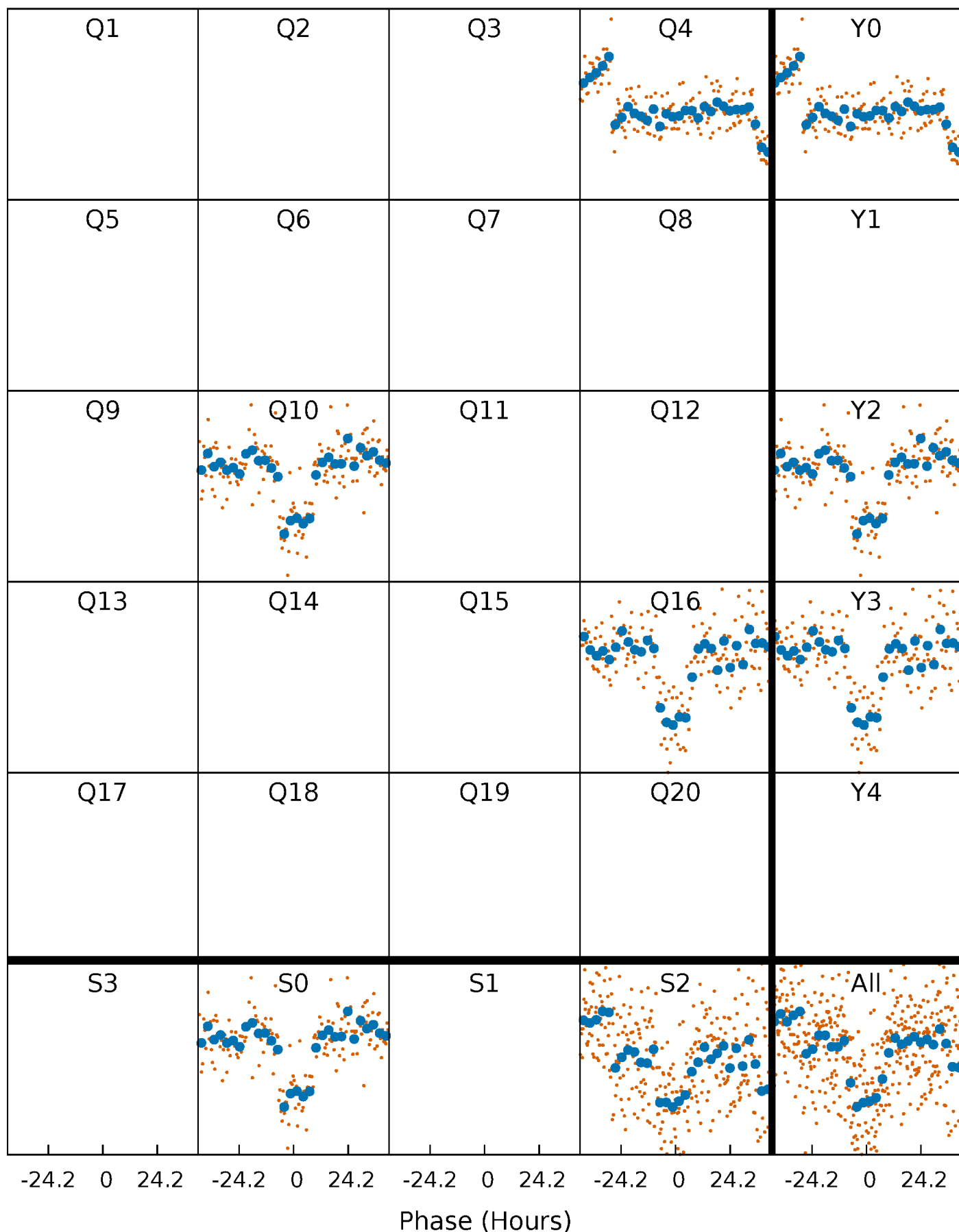


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



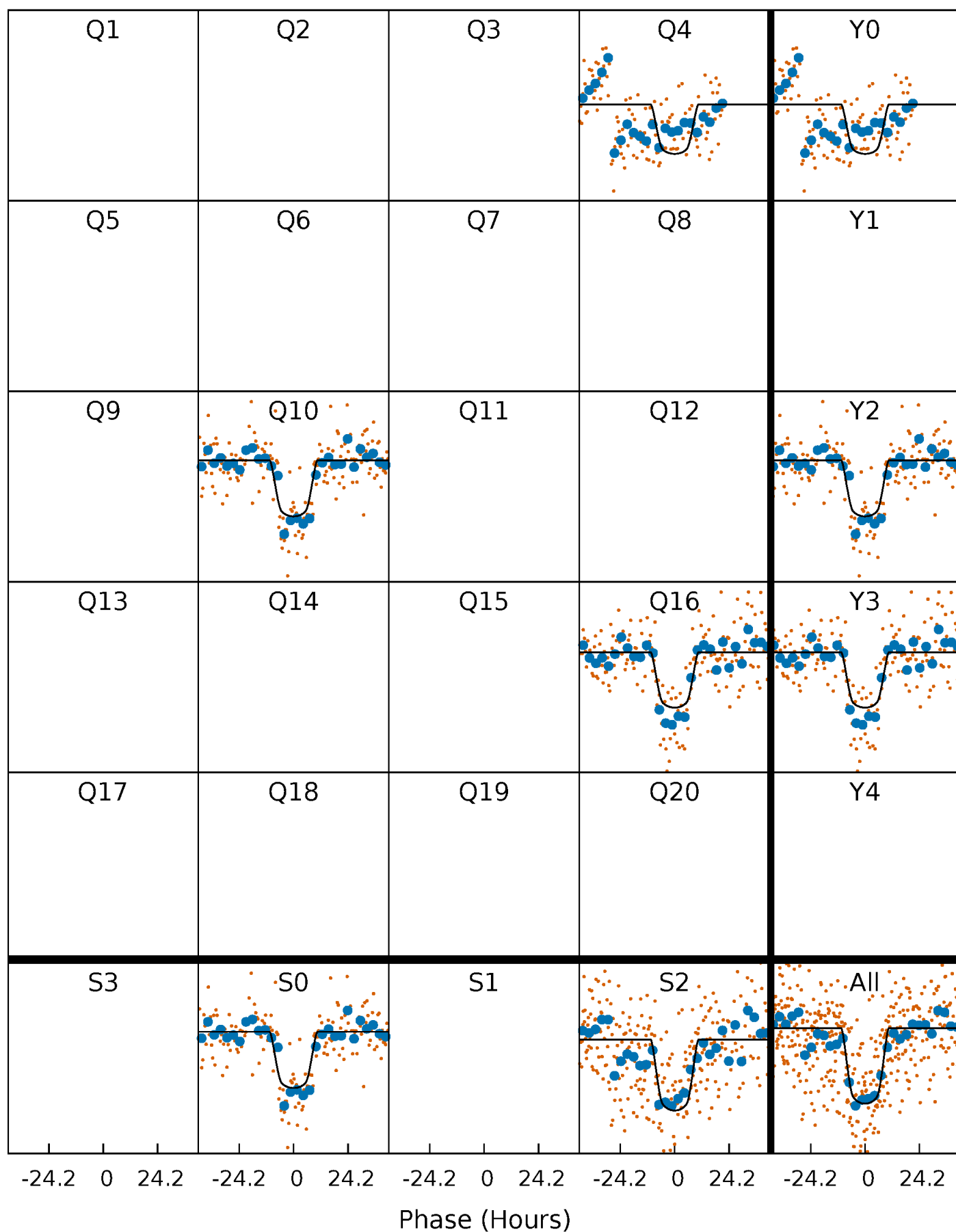
# PDC Quarter-Phased Transit Curves

TCE 010024862-02     $P=567.957336$  Days     $T_0=357.858633$  (BKJD)



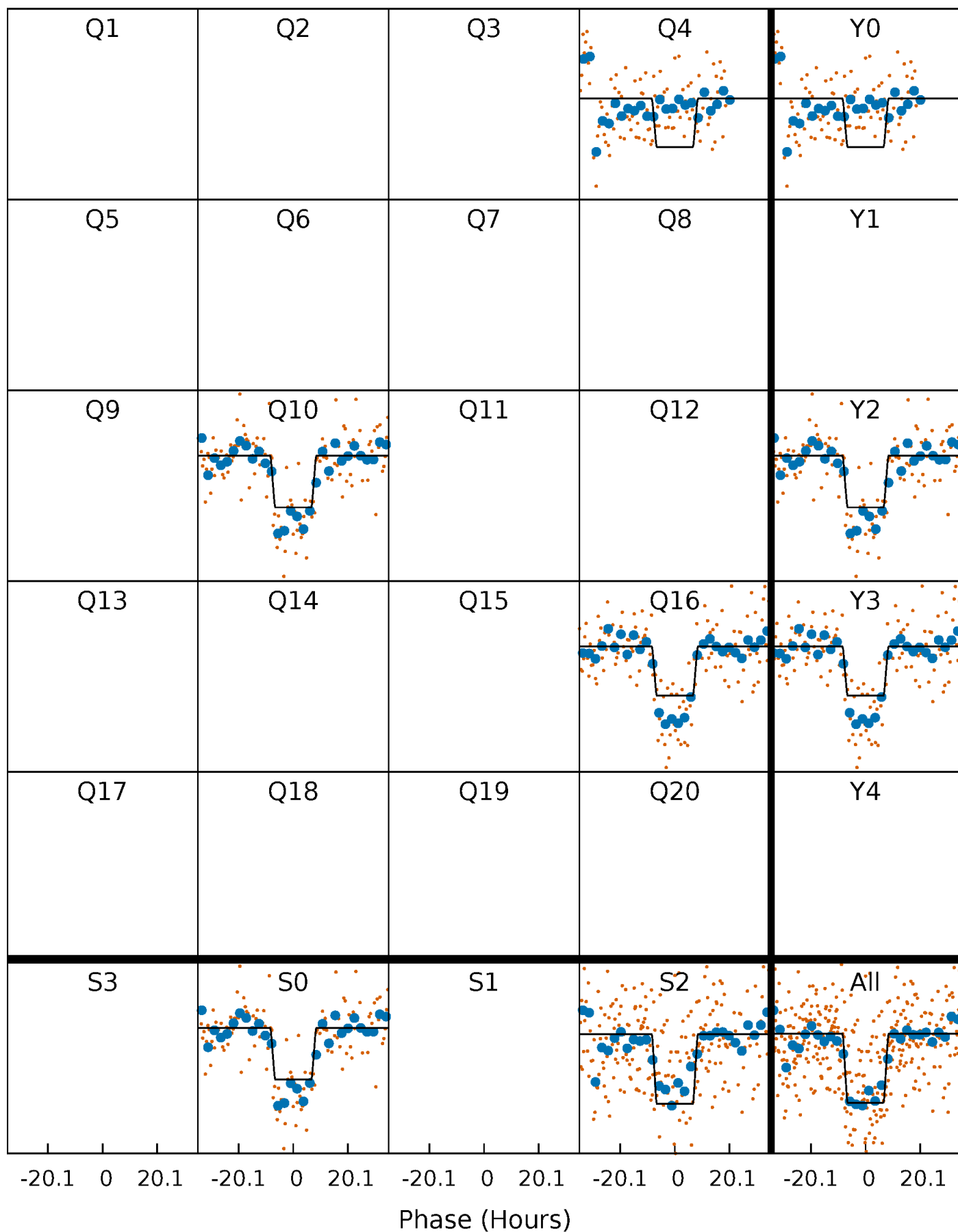
## DV Quarter-Phased Transit Curves

TCE 010024862-02    P=567.957336 Days     $T_0=357.858633$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

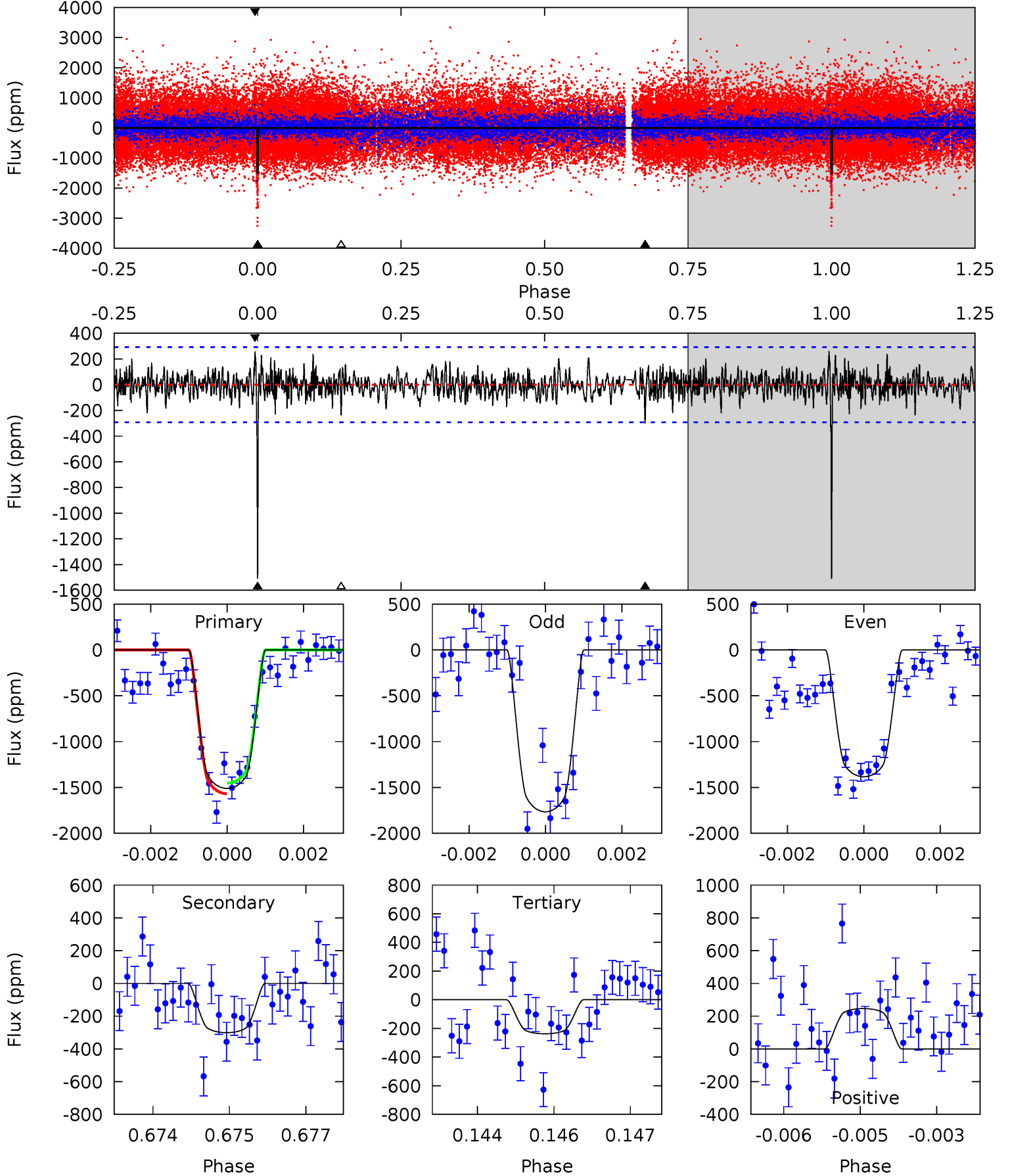
TCE 010024862-02 P=567.916744 Days  $T_0=357.933057$  (BKJD)



# DV Model-Shift Uniqueness Test

010024862-02,  $P = 567.957336$  Days,  $E = 357.858633$  Days

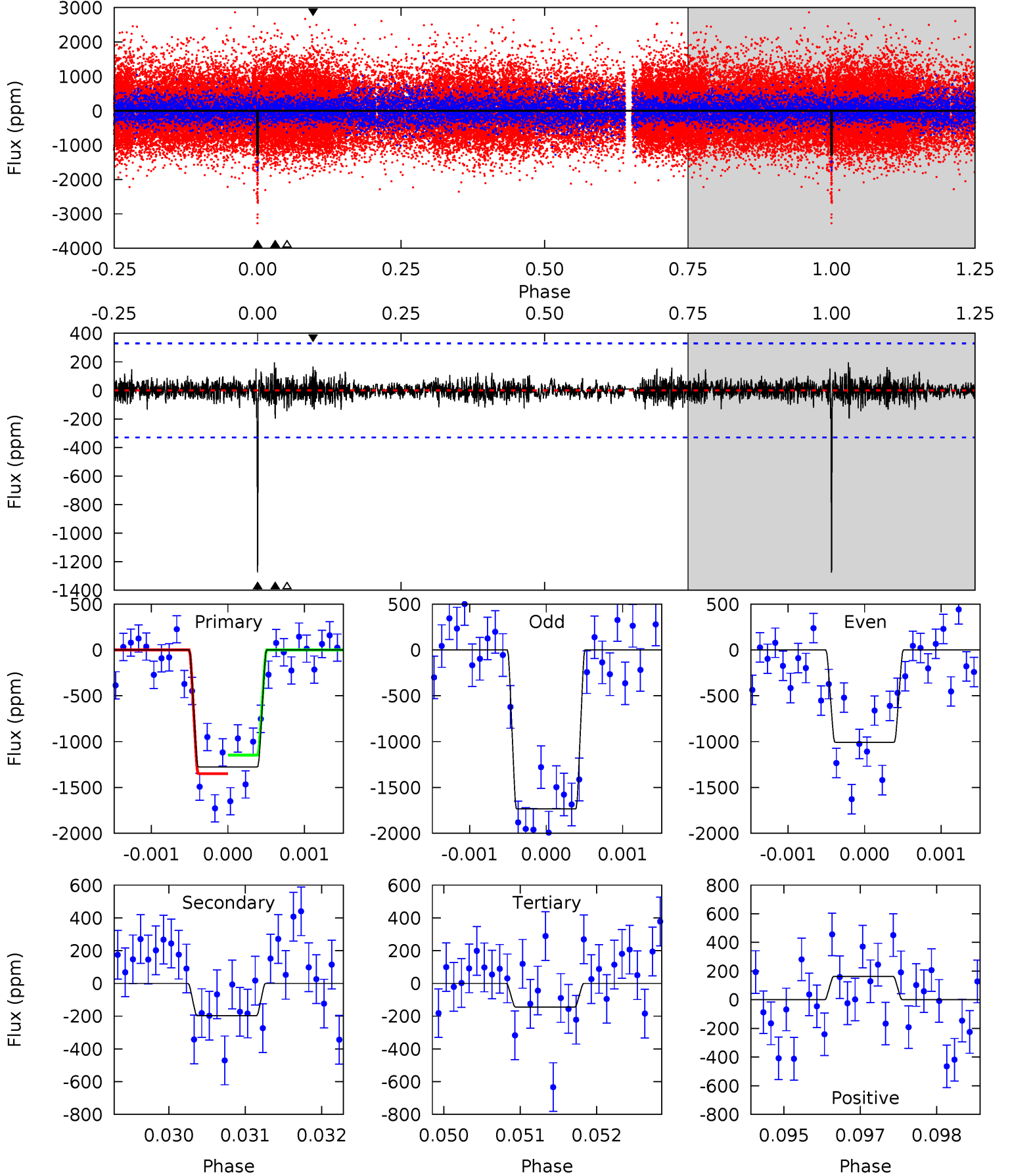
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
27.8	5.53	4.37	4.53	5.37	3.16	1.29	23.4	23.2	1.17	1.00	3.30	0.86	0.15	1.07



# Alt Model-Shift Uniqueness Test

010024862-02, P = 567.916744 Days, E = 357.933057 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
21.0	3.24	2.37	2.68	5.41	3.23	0.67	18.6	18.3	0.87	0.56	5.66	0.72	0.13	1.67





### Stellar Parameters For KIC 010024862

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6572^{+187}_{-281}$	$4.365^{+0.065}_{-0.195}$	$0.070^{+0.250}_{-0.350}$	$1.238^{+0.391}_{-0.168}$	$1.298^{+0.168}_{-0.206}$	$0.964^{+0.275}_{-0.484}$
	+3%/-4%	+1%/-4%	+357%/-500%	+32%/-14%	+13%/-16%	+28%/-50%
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 010024862-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-301 \pm 54$	$5.90^{+0.98}_{-0.61}$	$378^{+26}_{-20}$	$4377^{+206}_{-225}$	$9614^{+3127}_{-2706}$
Alt.	$-197 \pm 61$	$5.06^{+0.86}_{-0.59}$	$379^{+24}_{-21}$	$4264^{+314}_{-290}$	$8458^{+4145}_{-3144}$

$T_{max}$  = 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

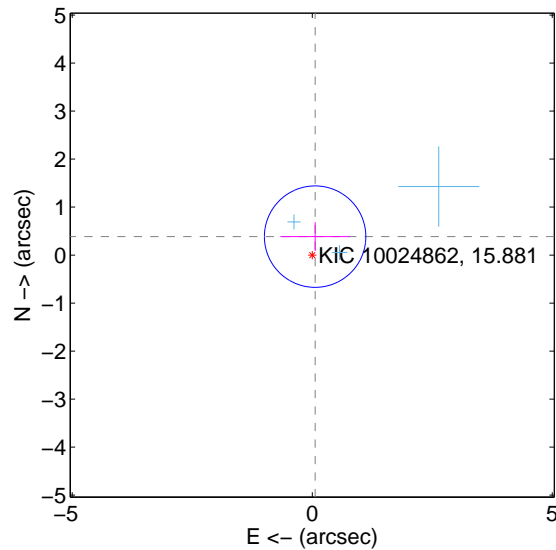
Supplemental centroid analysis for 010024862-02. Kepler magnitude: 15.88. Transit SNR 17.37

There are 3 quarters with good PRF difference image offsets

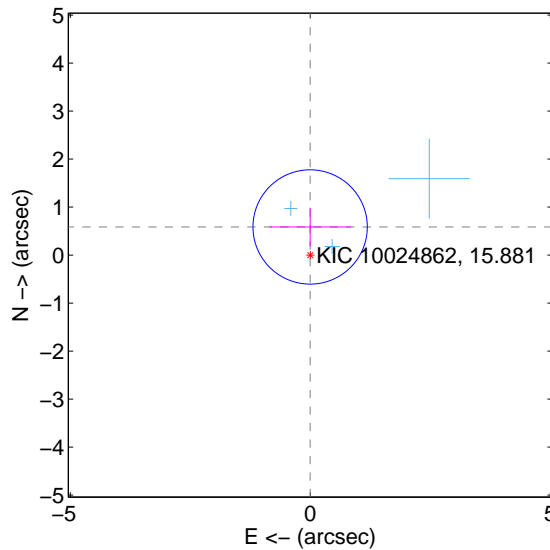
The direct PRF centroid is offset from the target star catalog position by about 0.17 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.389 \pm 0.352$	1.11	$-0.060 \pm 0.725$	$0.385 \pm 0.301$
PRF-fit source offset from KIC position	$0.586 \pm 0.397$	1.48	$0.004 \pm 0.854$	$0.586 \pm 0.400$
photometric centroid source offset	$1.71 \pm 0.83$	2.06	$-1.01 \pm 0.87$	$1.38 \pm 0.81$

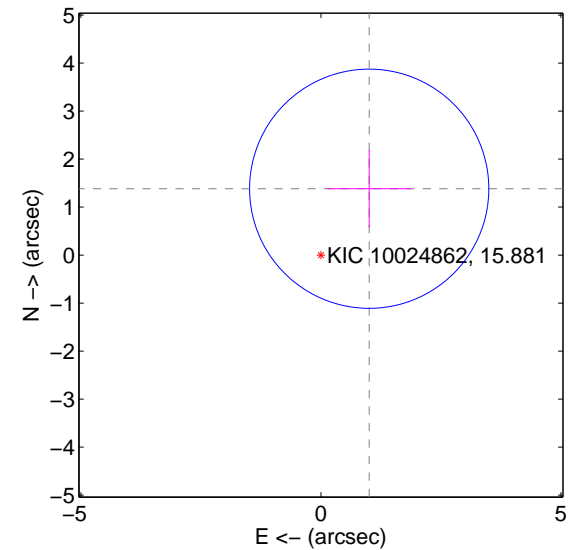
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

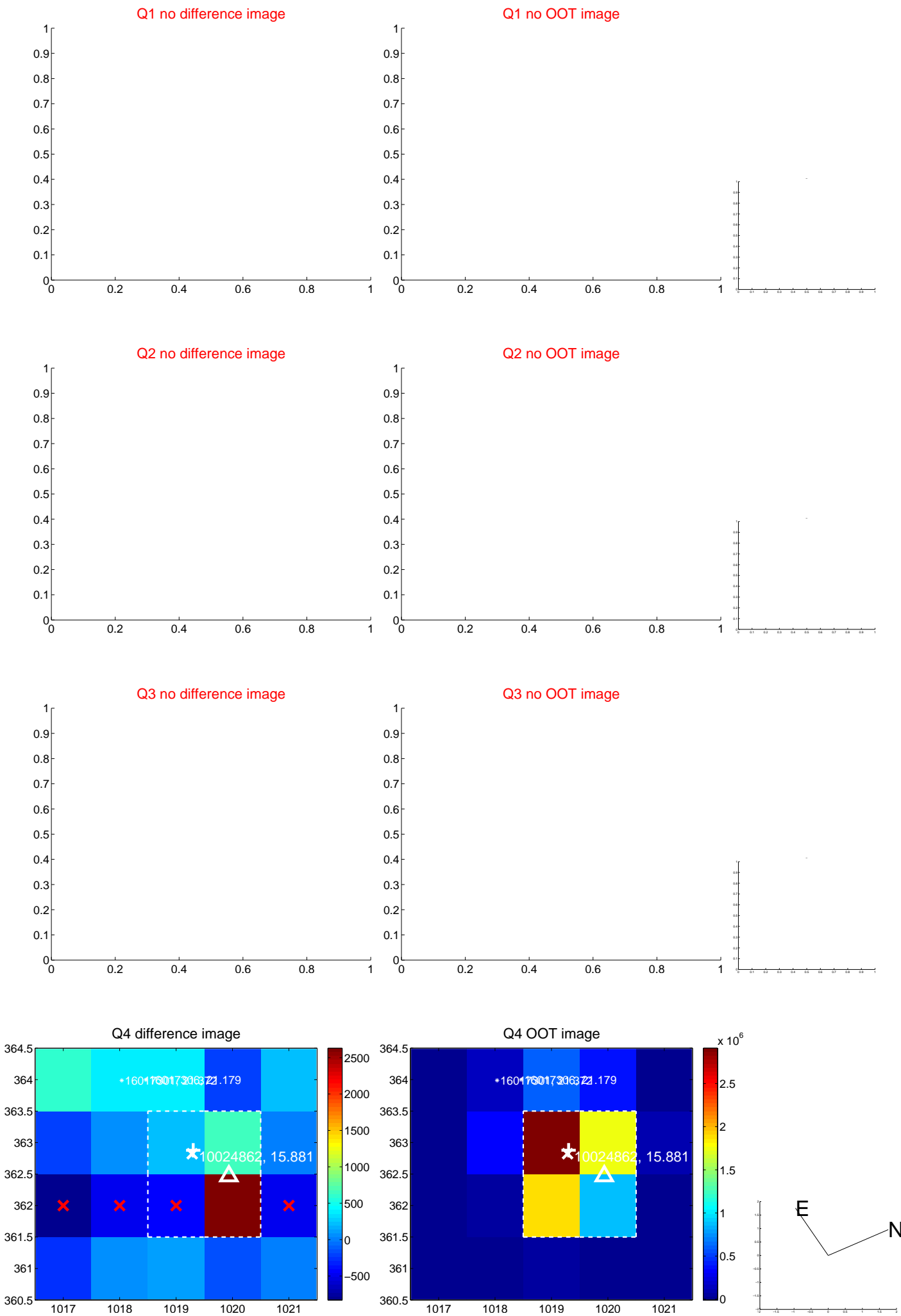


offset from photometric centroids



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.

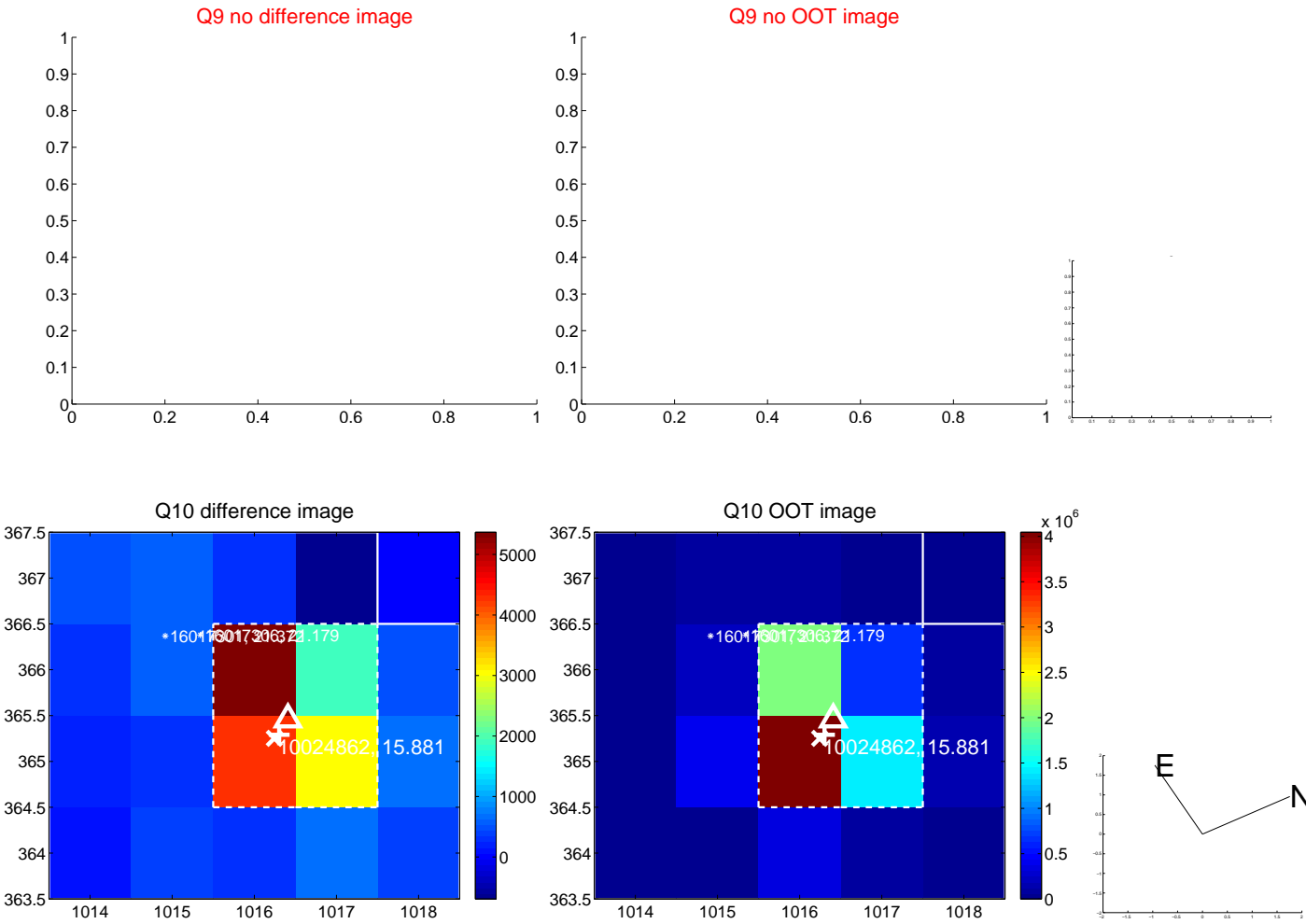
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



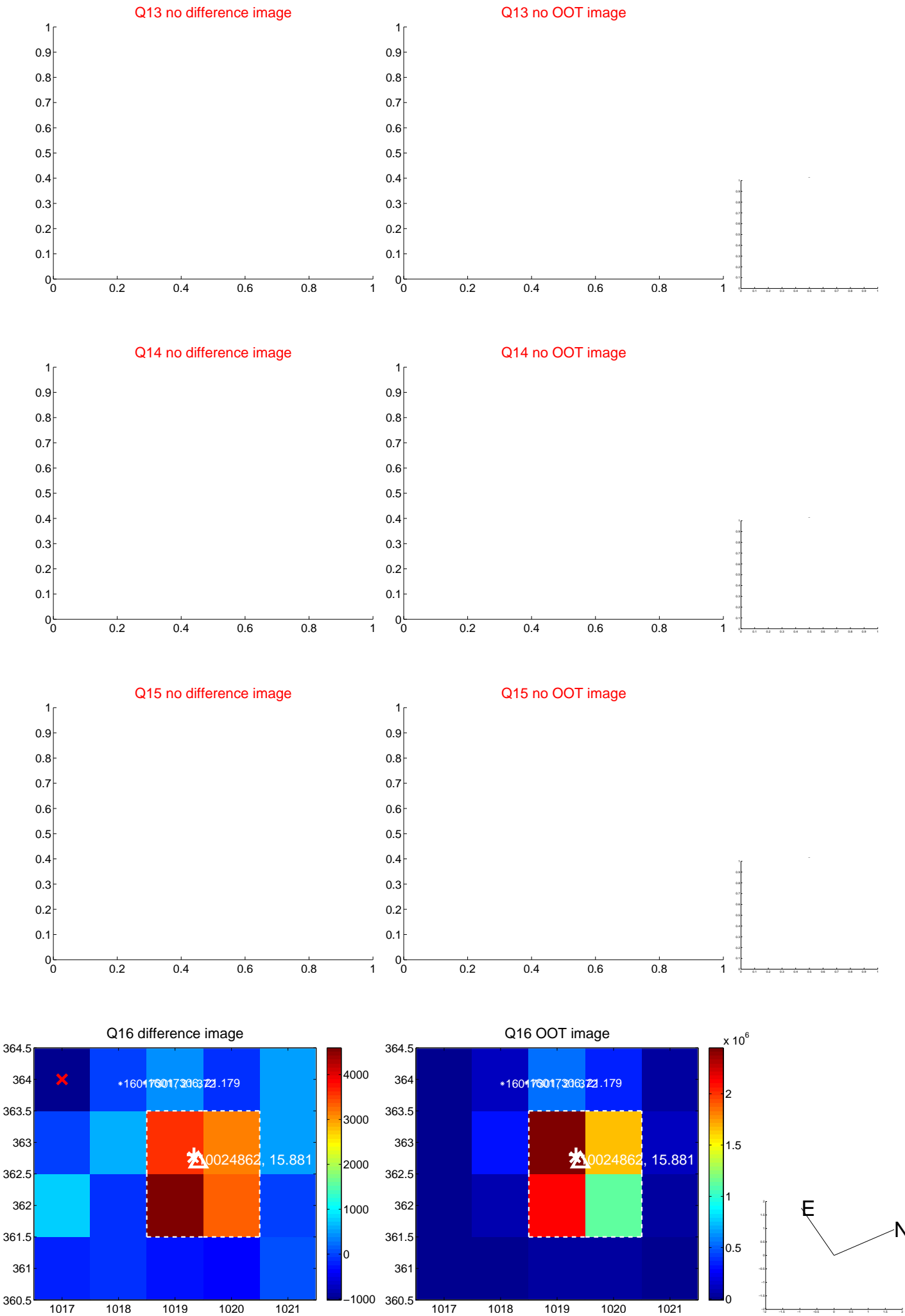
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



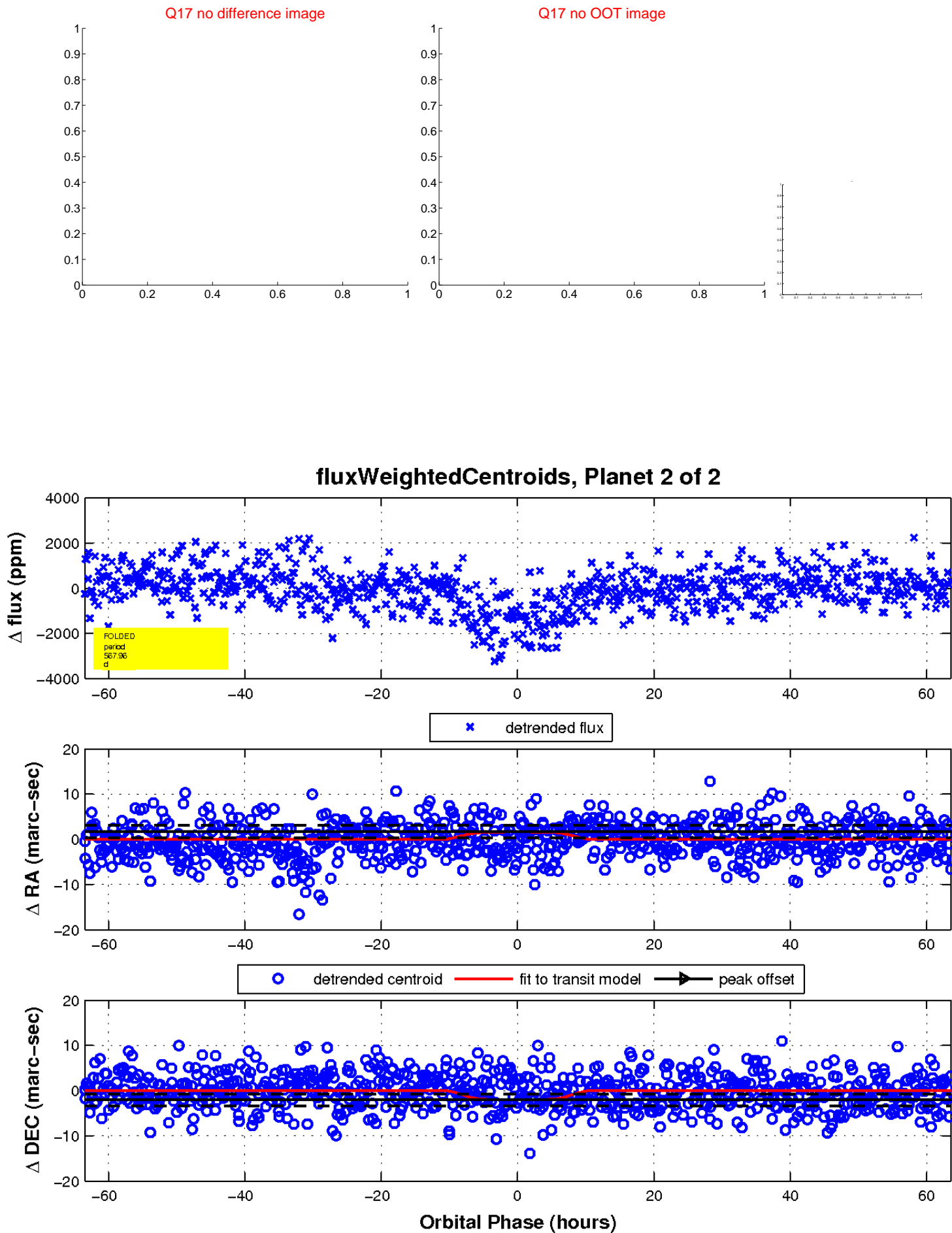
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.



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

