

# KIC 009472134

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009472134-01	OBS	No	362.540142	316.810795	295.3	3.005	9.1	5.7	0.83	5450	1.66	0.57
009472134-02	OBS	No	369.711426	303.478384	250.3	17.311	9.5	6.9	0.83	5450	1.50	0.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009472134-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_TRACKER—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009472134-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—INCONSISTENT_TRANS—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.

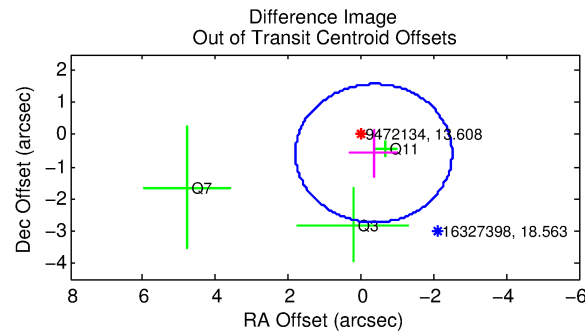
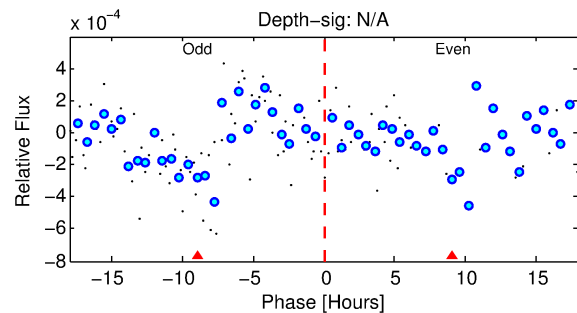
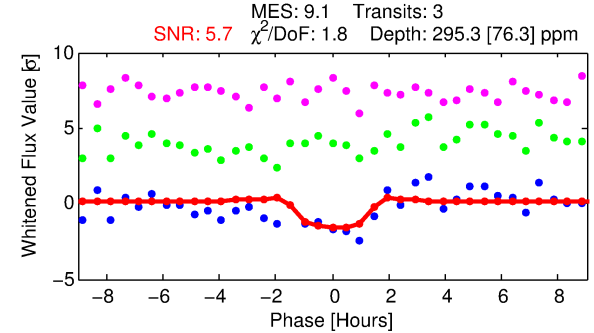
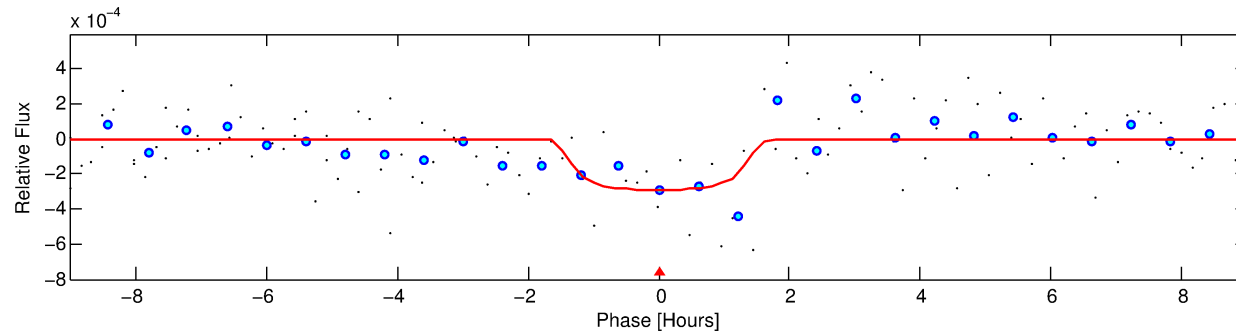
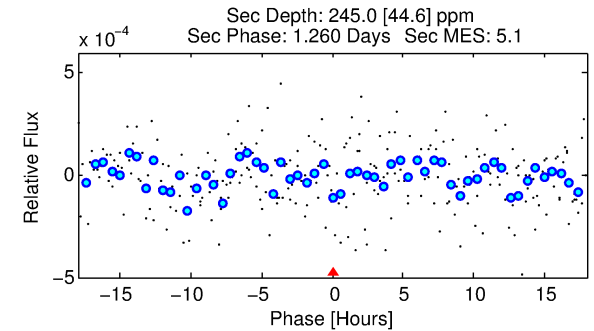
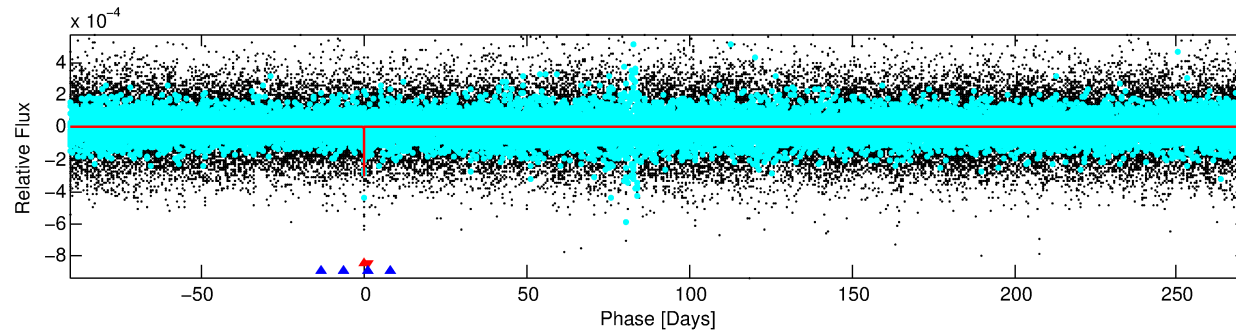
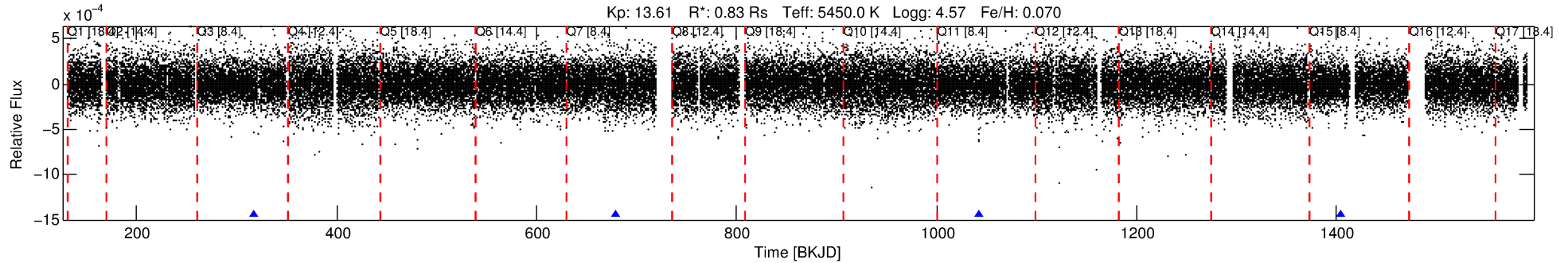
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009472134-01

No Significant Match Found

# DV One-Page Summary

KIC: 9472134 Candidate: 1 of 2 Period: 362.540 d



## DV Fit Results:

Period = 362.54014 [0.00942] d  
Epoch = 316.8108 [0.0113] BKJD  
Rp/R\* = 0.0183 [0.0281]  
a/R\* = 494.23 [3170.71]  
b = 0.87 [1.90]  
Seff = 0.57 [0.18]  
Teq = 222 [17] K  
Rp = 1.66 [2.58] Re  
a = 0.9750 [0.1896] AU  
Ag = 46427.22 [143318.64] [0.32σ]  
Teffp = 5035 [3871] K [1.24σ]

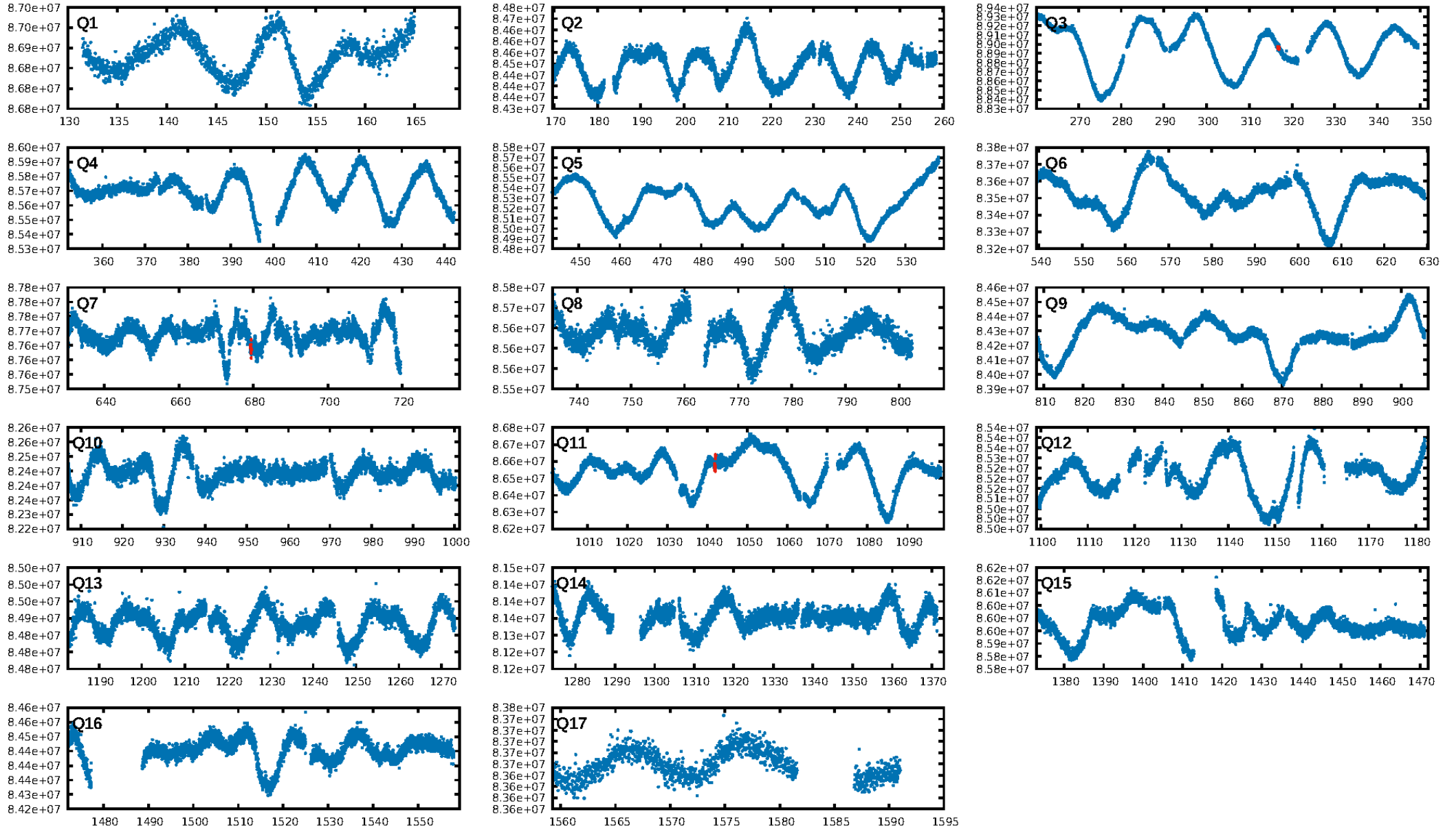
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [9.80σ]  
ModelChiSquare2-sig: 0.1%  
ModelChiSquareGof-sig: 17.5%  
Bootstrap-pfa: 7.78e-11  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.696  
Centroid-sig: 70.0%  
Centroid-so: 0.927 arcsec [0.57σ]  
OotOffset-rm: 0.681 arcsec [0.95σ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-rm: 0.627 arcsec [0.64σ]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

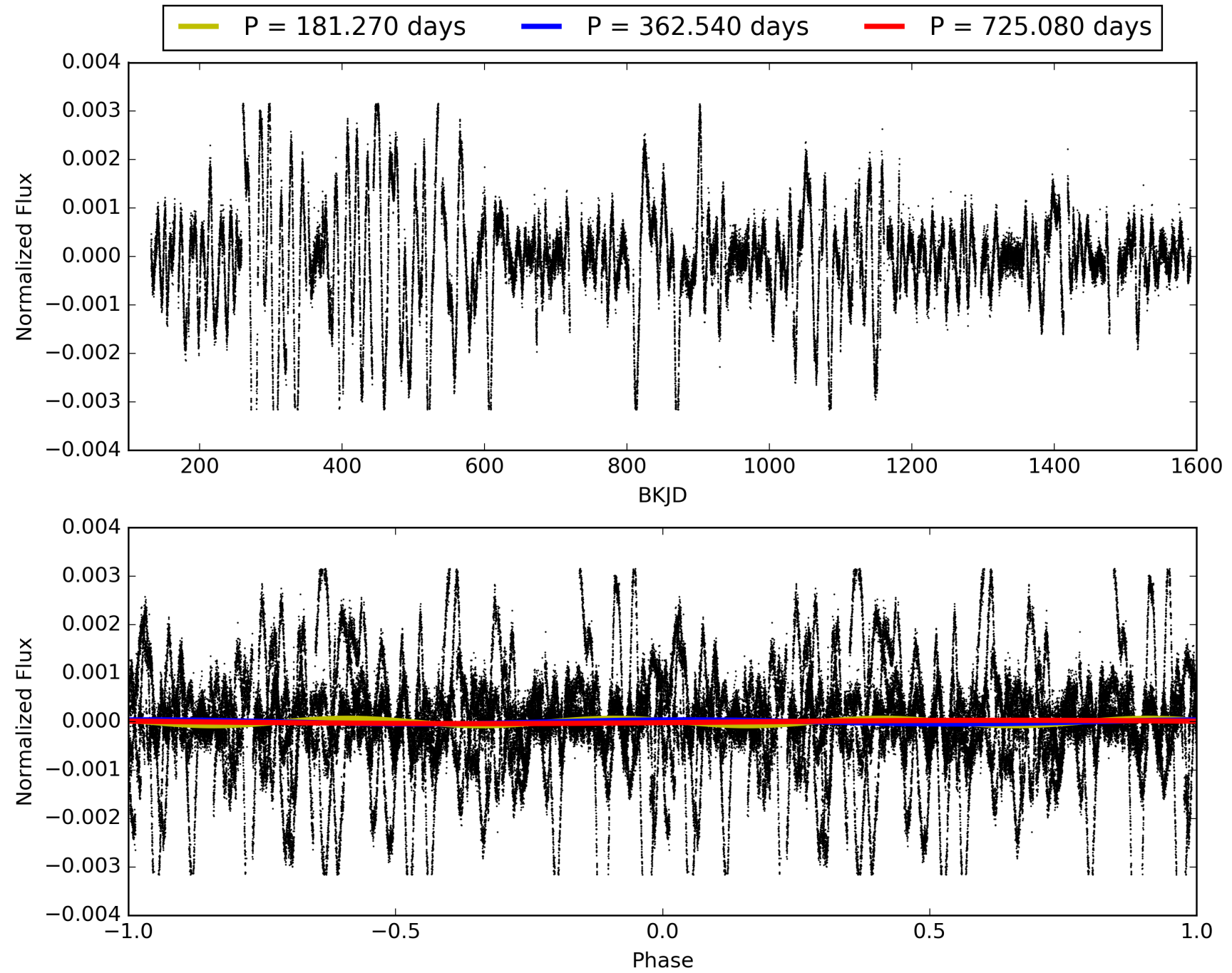
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 04:36:37 Z

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

# TCE 009472134-01, PDC Light Curves

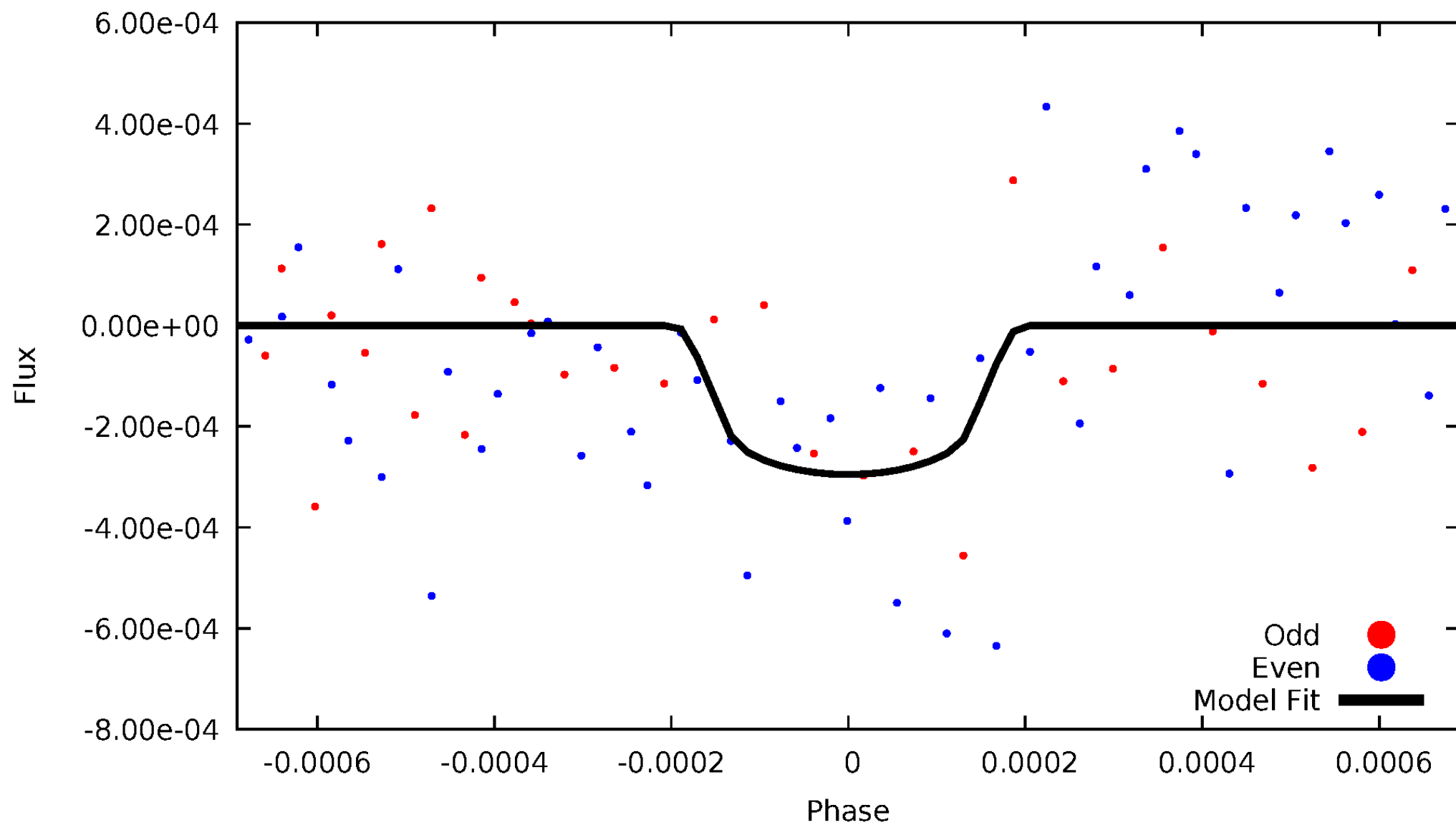


TCE 009472134-01



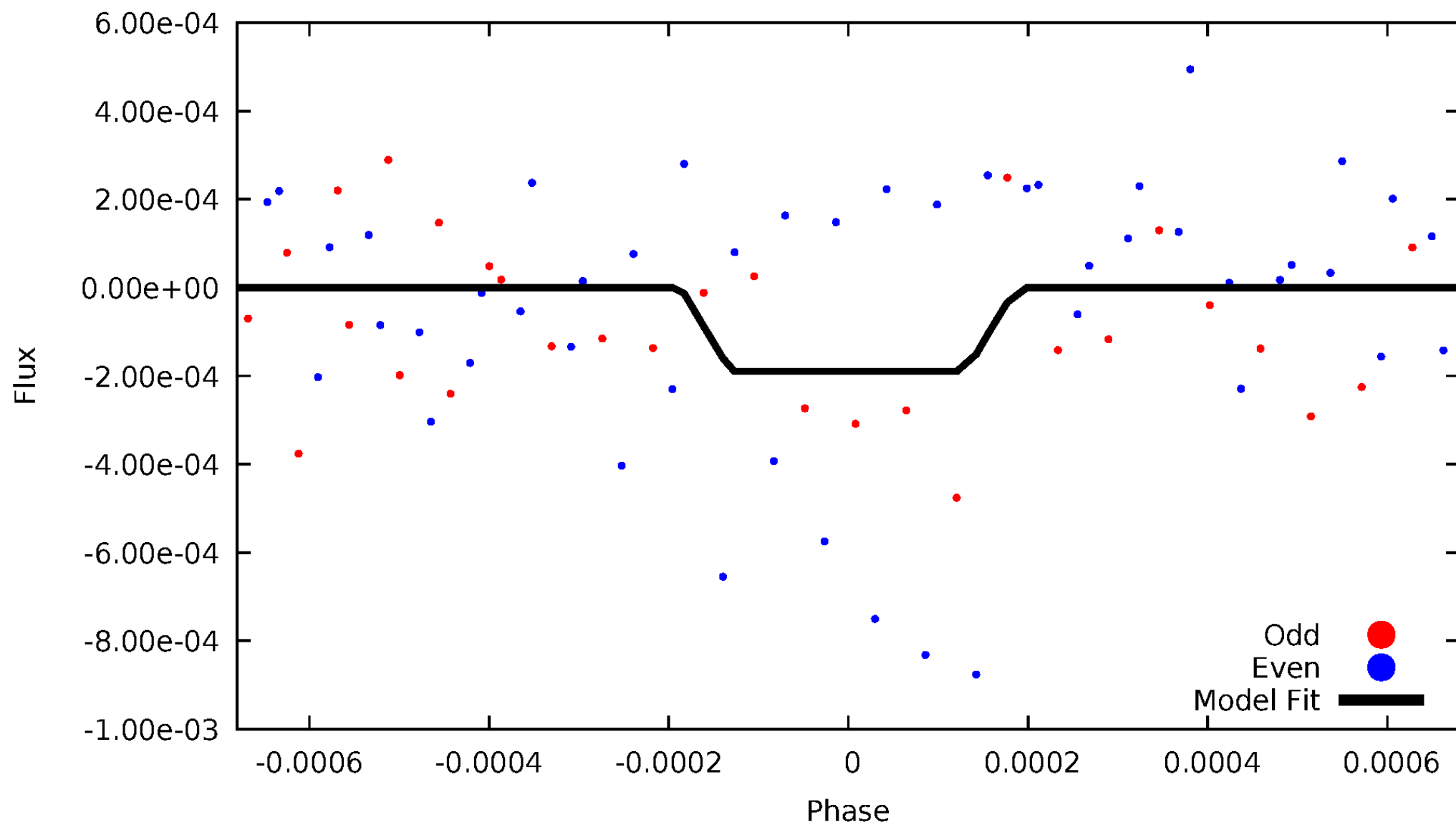
# DV Odd/Even

TCE 009472134-01



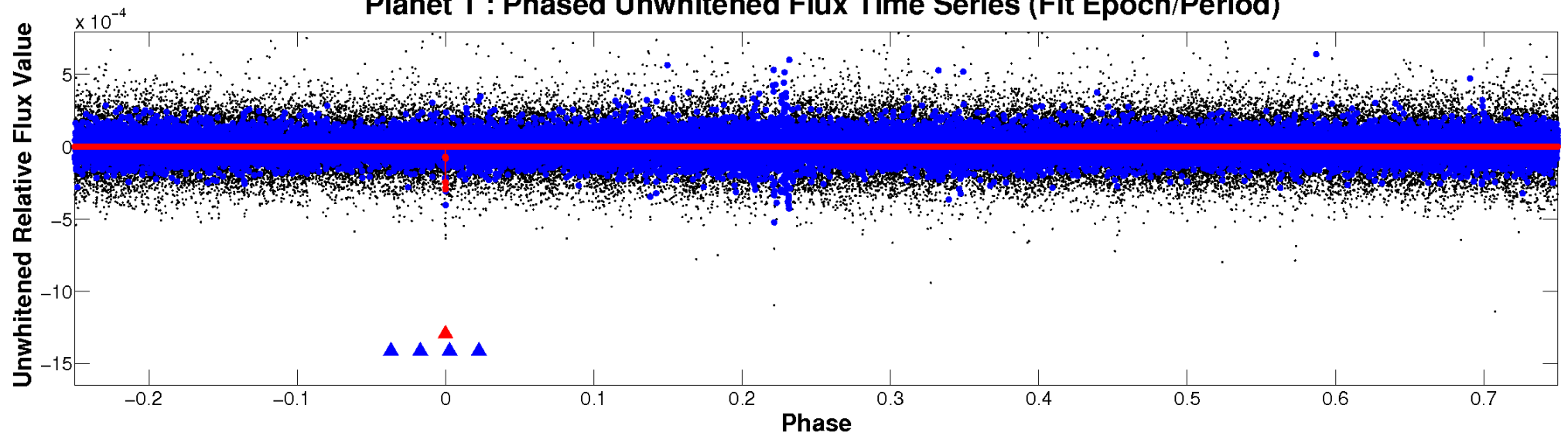
# ALT Odd/Even

TCE 009472134-01

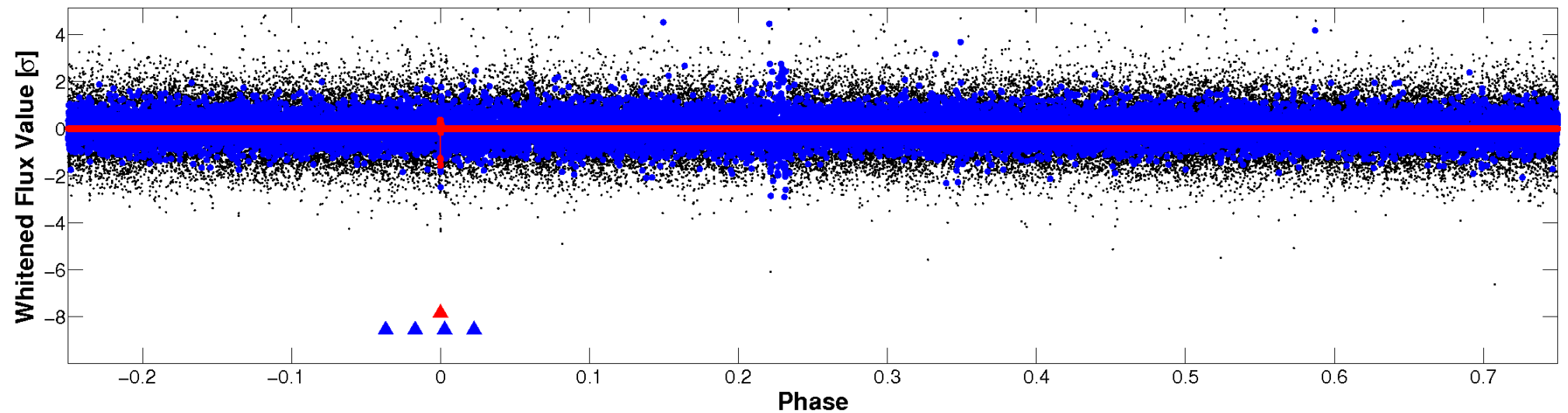


# Non-Whitened Vs. Whitened Light Curve

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

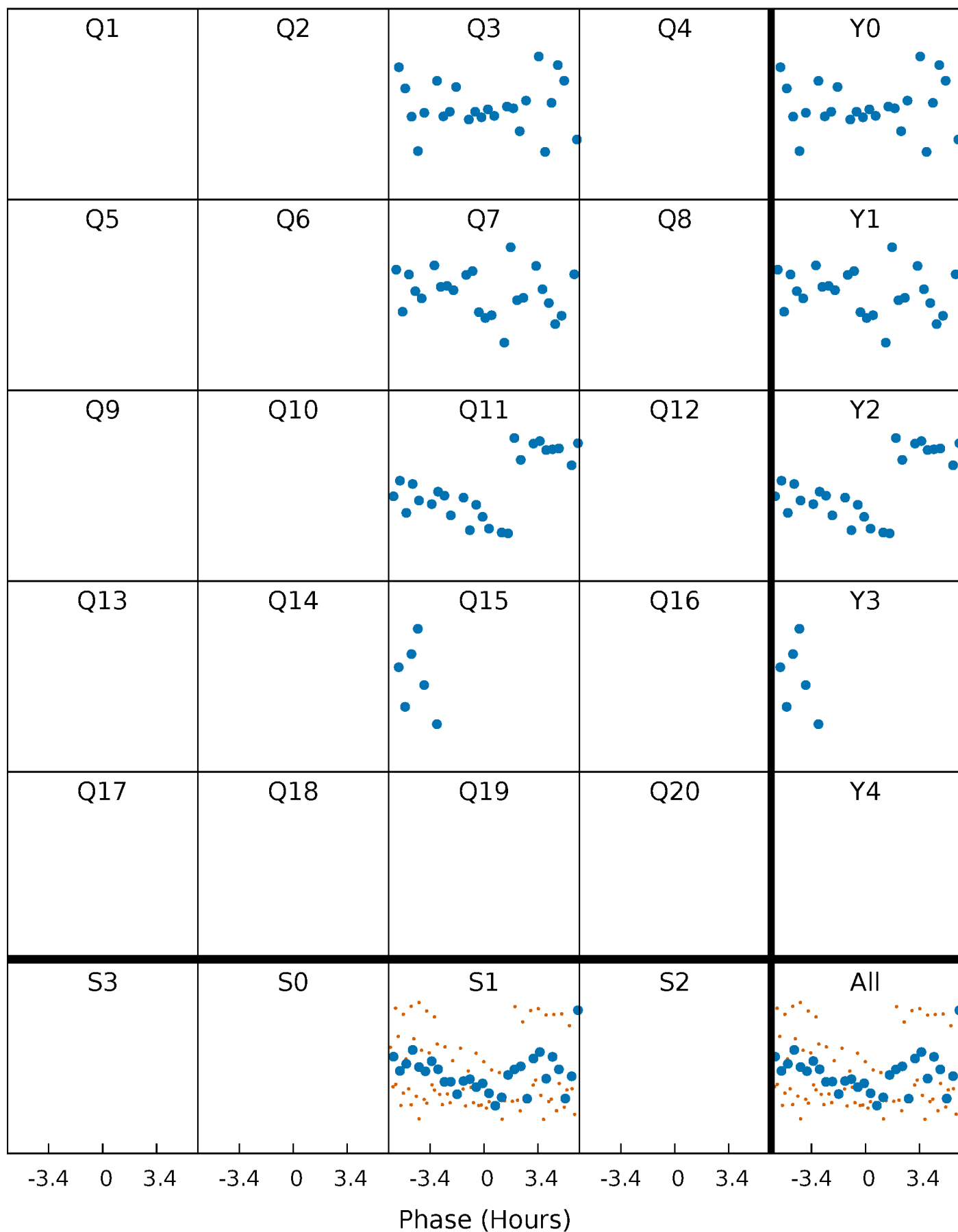


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

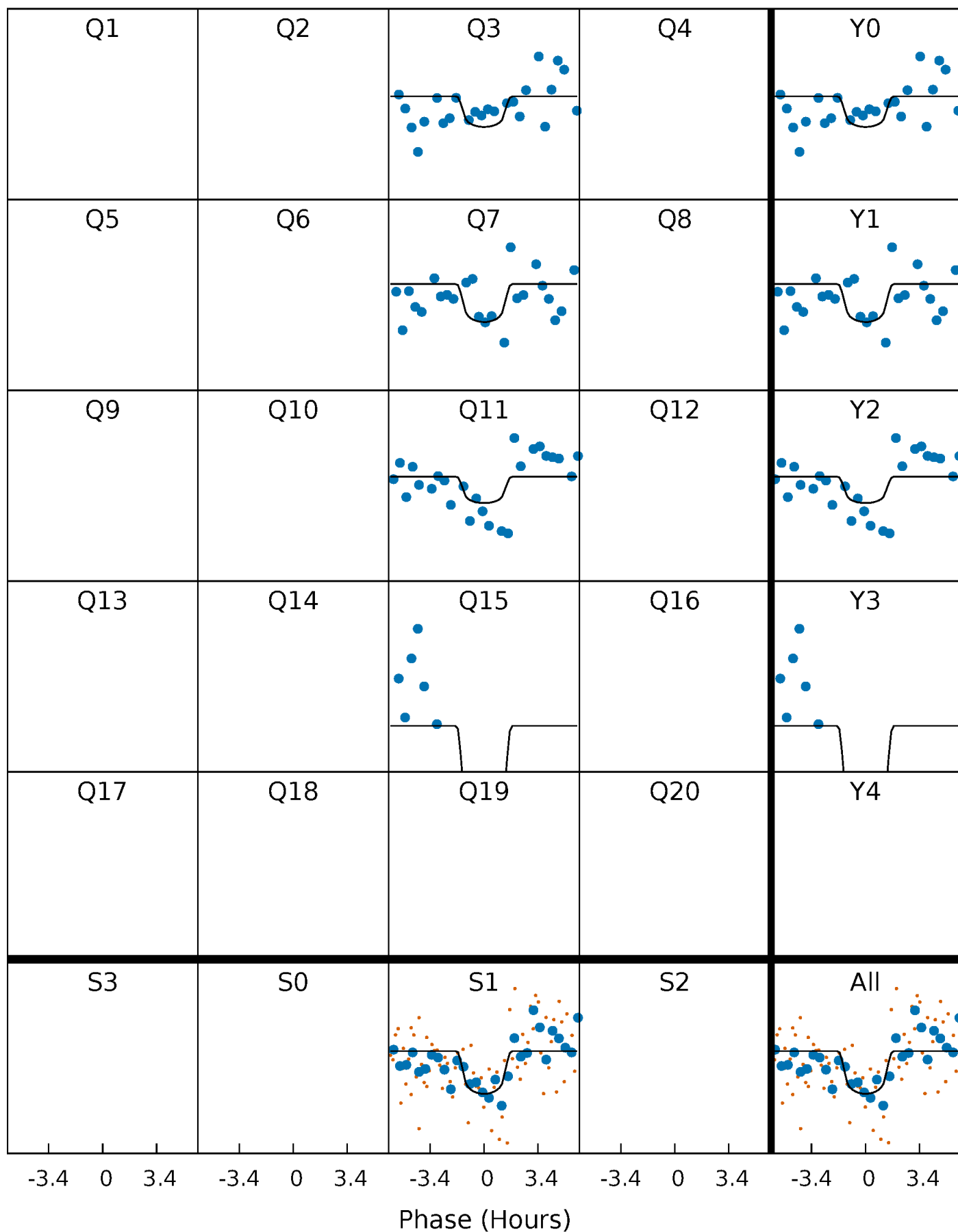
TCE 009472134-01 P=362.540142 Days  $T_0=316.810795$  (BKJD)





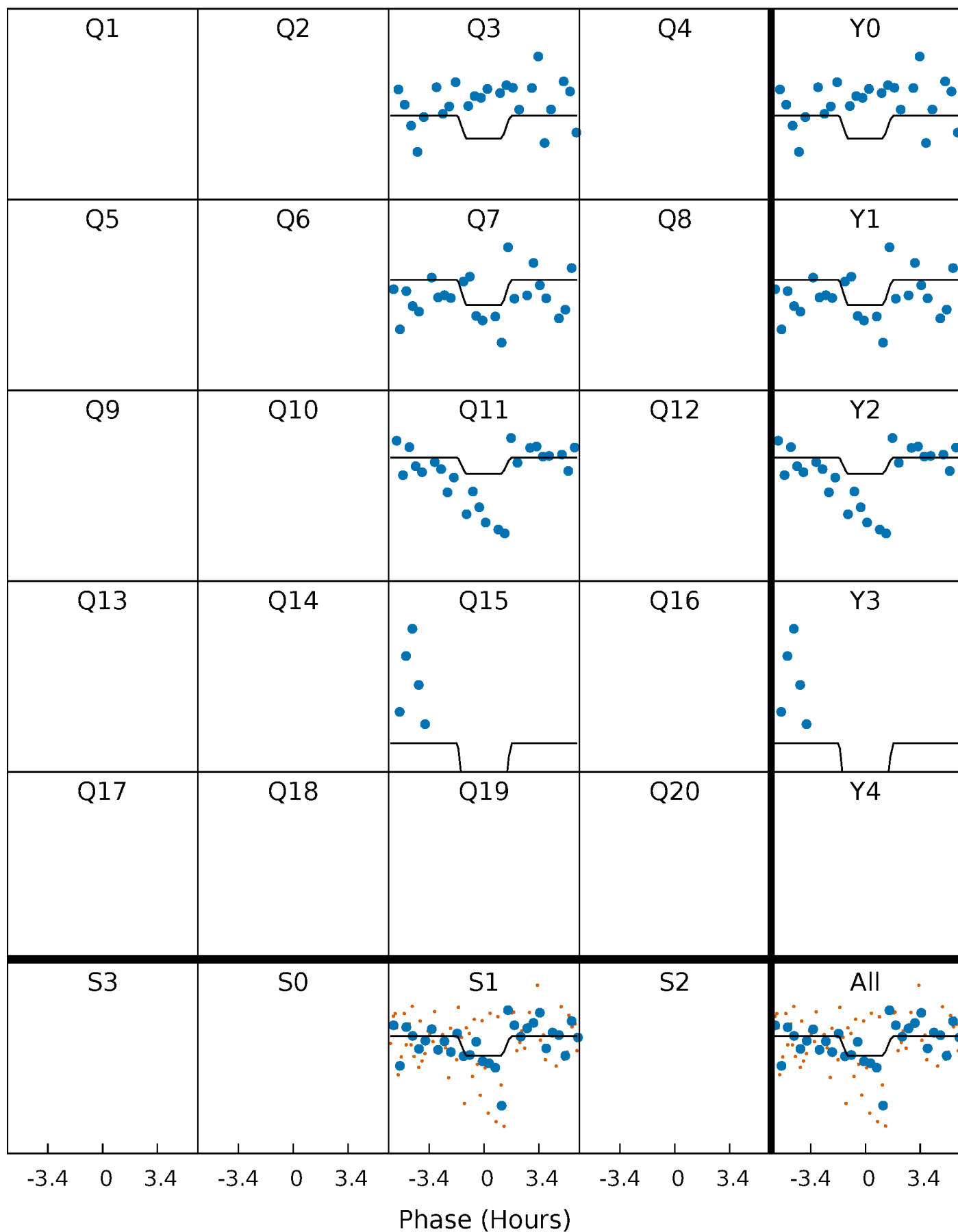
# DV Quarter-Phased Transit Curves

TCE 009472134-01 P=362.540142 Days  $T_0=316.810795$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

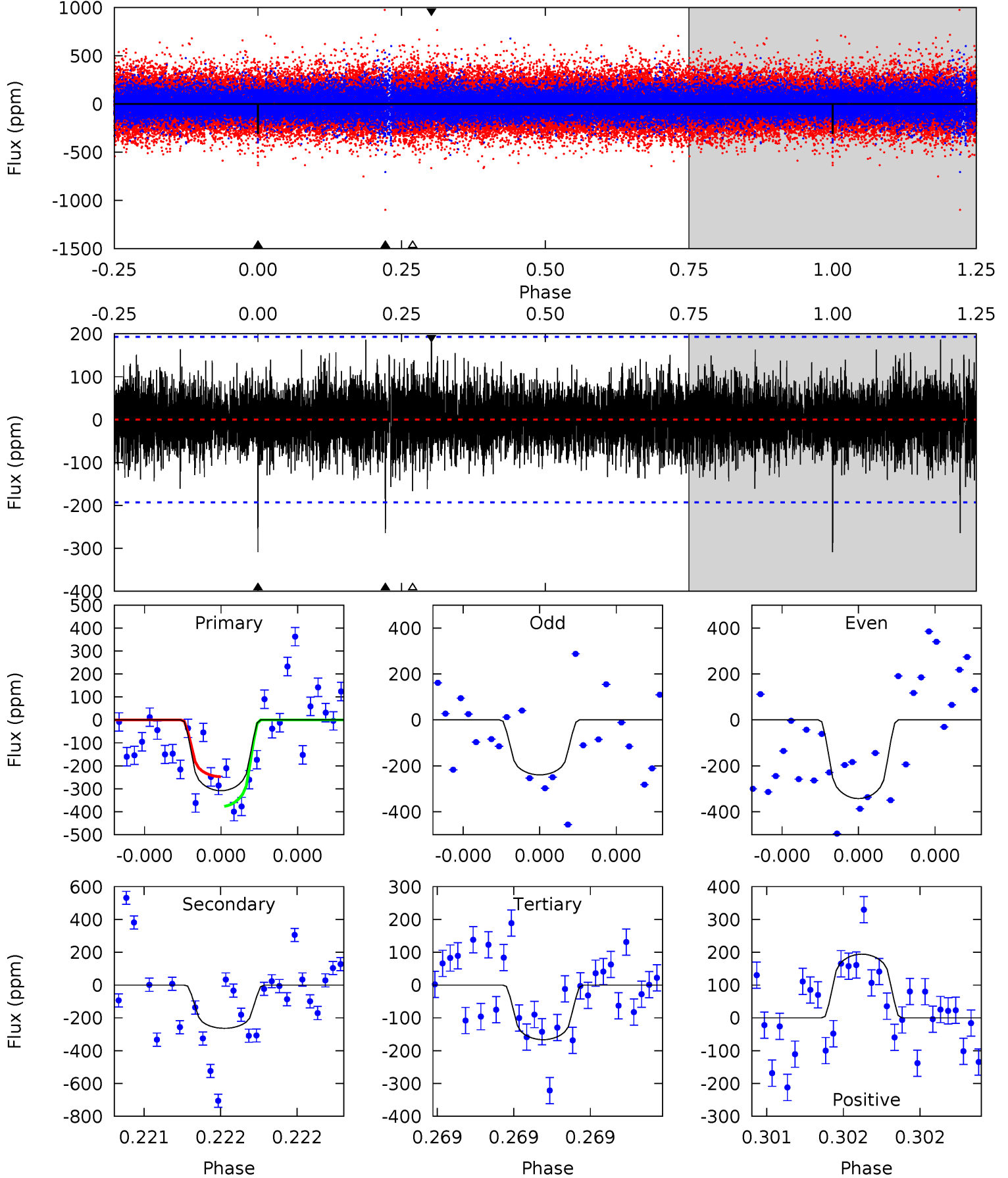
TCE 009472134-01 P=362.545844 Days  $T_0=316.808513$  (BKJD)



# DV Model-Shift Uniqueness Test

009472134-01, P = 362.540142 Days, E = 316.810795 Days

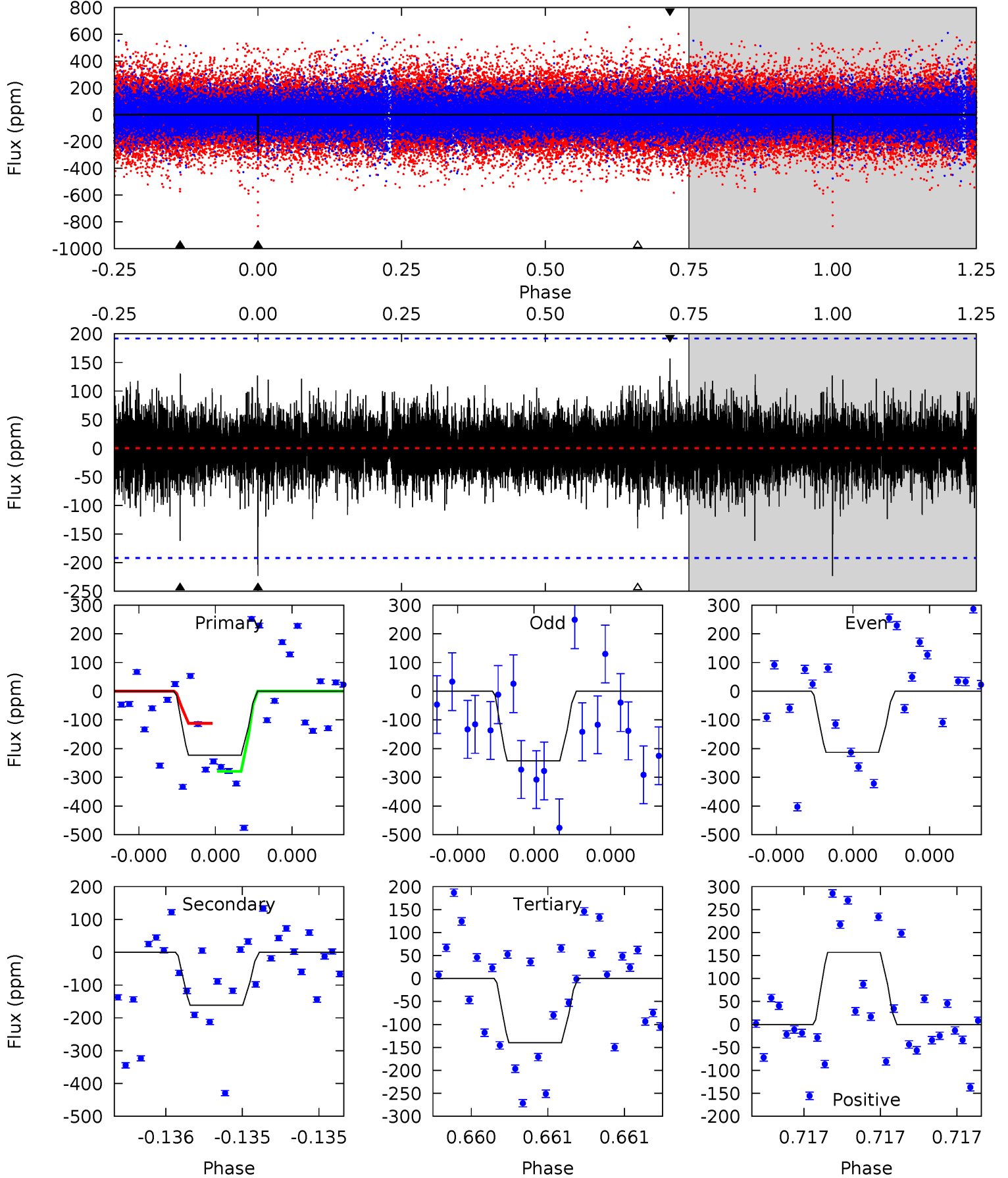
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
8.98	7.69	4.85	5.65	5.61	3.54	1.30	4.13	3.33	2.84	2.04	1.44	1.29	0.39	1.88



# Alt Model-Shift Uniqueness Test

009472134-01, P = 362.545844 Days, E = 316.808513 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
6.55	4.74	4.11	4.61	5.63	3.57	0.94	2.44	1.95	0.64	0.14	0.41	1.06	0.41	2.36



### Stellar Parameters For KIC 009472134

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5450^{+163}_{-146}$	$4.573^{+0.028}_{-0.161}$	$0.070^{+0.250}_{-0.300}$	$0.830^{+0.187}_{-0.062}$	$0.939^{+0.066}_{-0.100}$	$2.316^{+0.362}_{-1.025}$
	+3%/-3%	+1%/-4%	+357%/-429%	+23%/-7%	+7%/-11%	+16%/-44%
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 009472134-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-264 \pm 34$	$2.59^{+2.18}_{-1.67}$	$317^{+17}_{-12}$	$4368^{+2749}_{-803}$	$19714^{+139623}_{-13947}$
Alt.	$-162 \pm 34$	$2.33^{+2.28}_{-1.55}$	$317^{+18}_{-14}$	$4171^{+2448}_{-857}$	$15041^{+120668}_{-11165}$

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

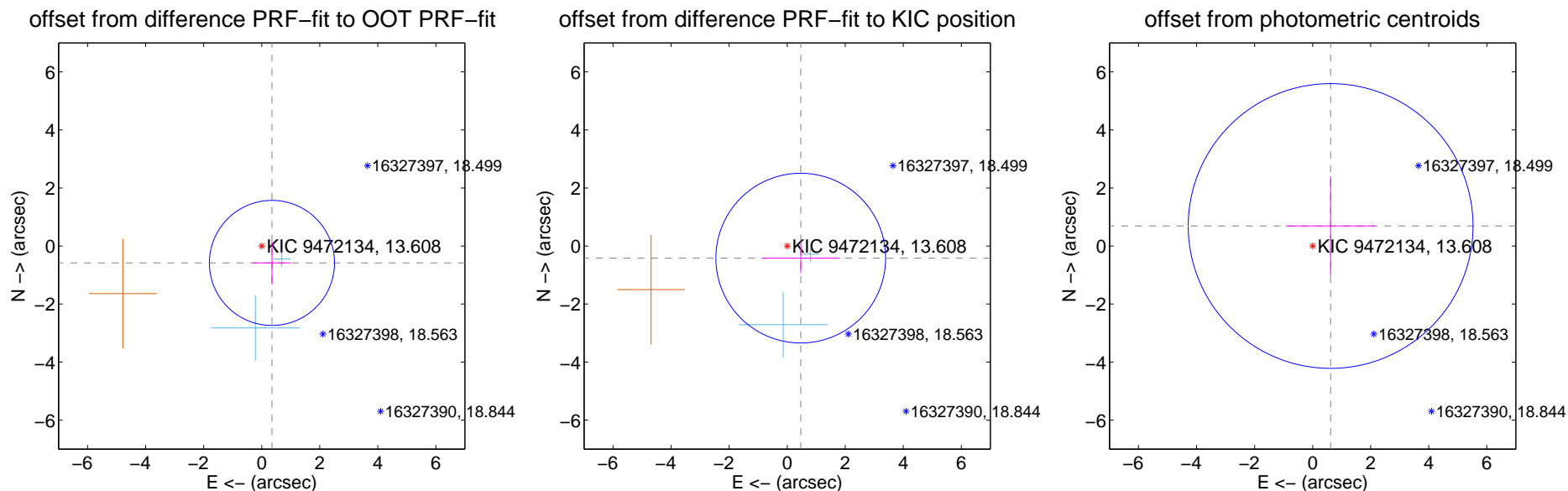
## DV Centroid Data

Supplemental centroid analysis for 009472134-01. Kepler magnitude: 13.61. Transit SNR 5.74

There are 2 quarters with good PRF difference image offsets

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

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.681 \pm 0.718$	0.95	$-0.352 \pm 0.651$	$-0.583 \pm 0.741$
PRF-fit source offset from KIC position	$0.627 \pm 0.975$	0.64	$-0.467 \pm 1.348$	$-0.418 \pm 0.518$
photometric centroid source offset	$0.93 \pm 1.64$	0.57	$-0.62 \pm 1.53$	$0.69 \pm 1.71$



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.

Q1 no difference image



Q1 no OOT image



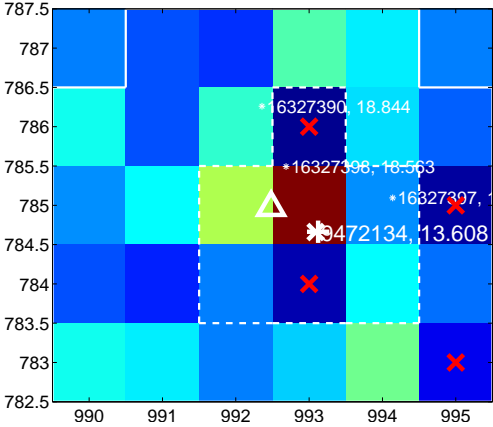
Q2 no difference image



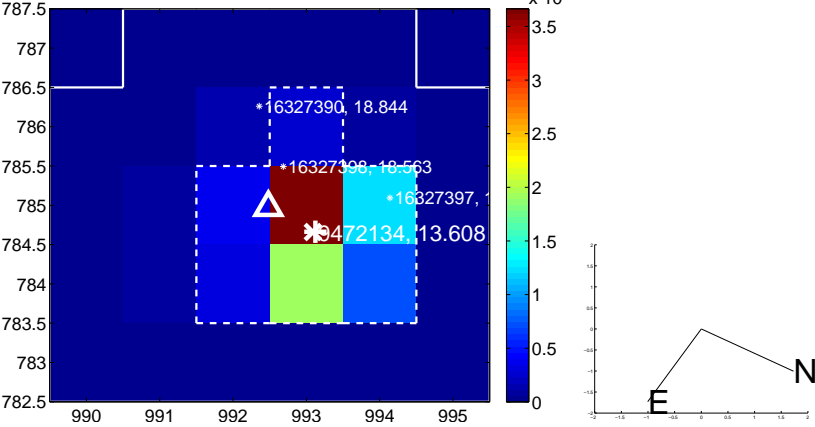
Q2 no OOT image



Q3 difference image



Q3 OOT image



Q4 no difference image



Q4 no OOT image



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

Q5 no difference image



Q5 no OOT image



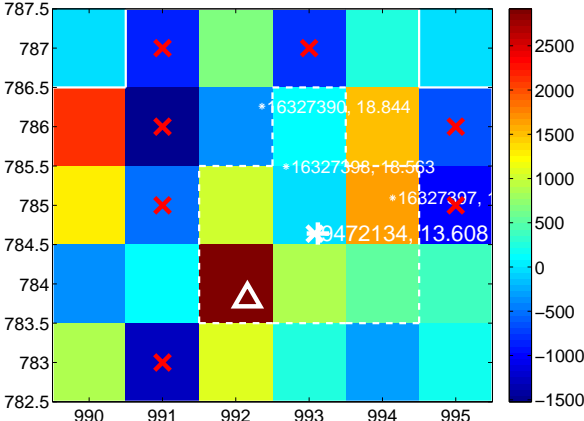
Q6 no difference image



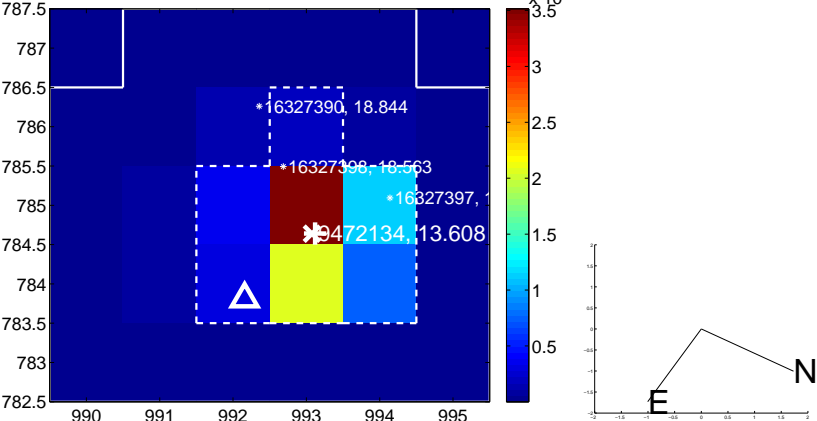
Q6 no OOT image



Q7 difference image. Poor Quality



Q7 OOT image



Q8 no difference image

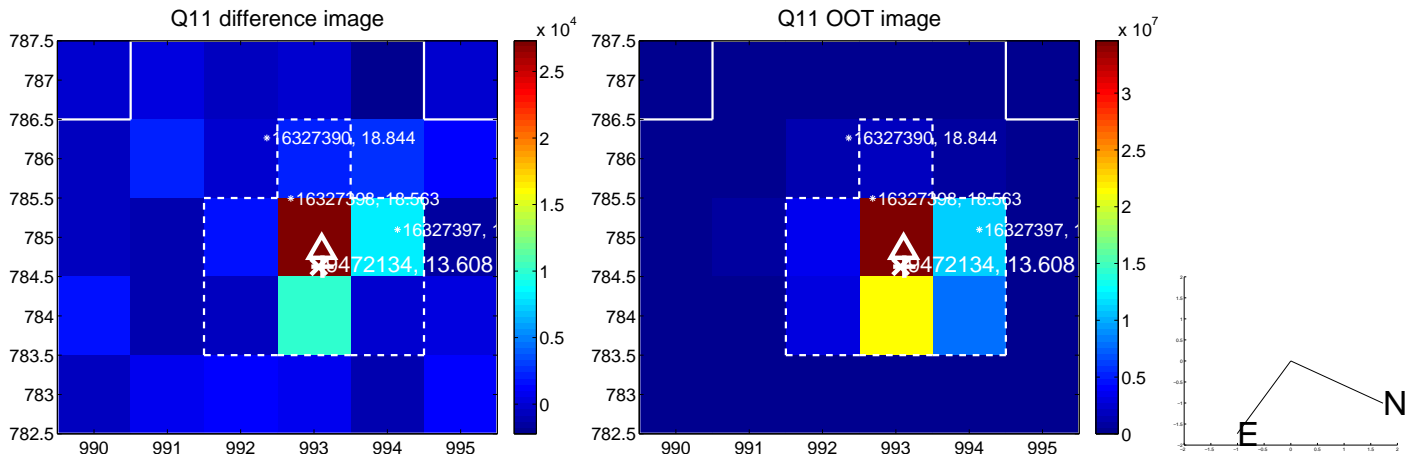


Q8 no OOT image





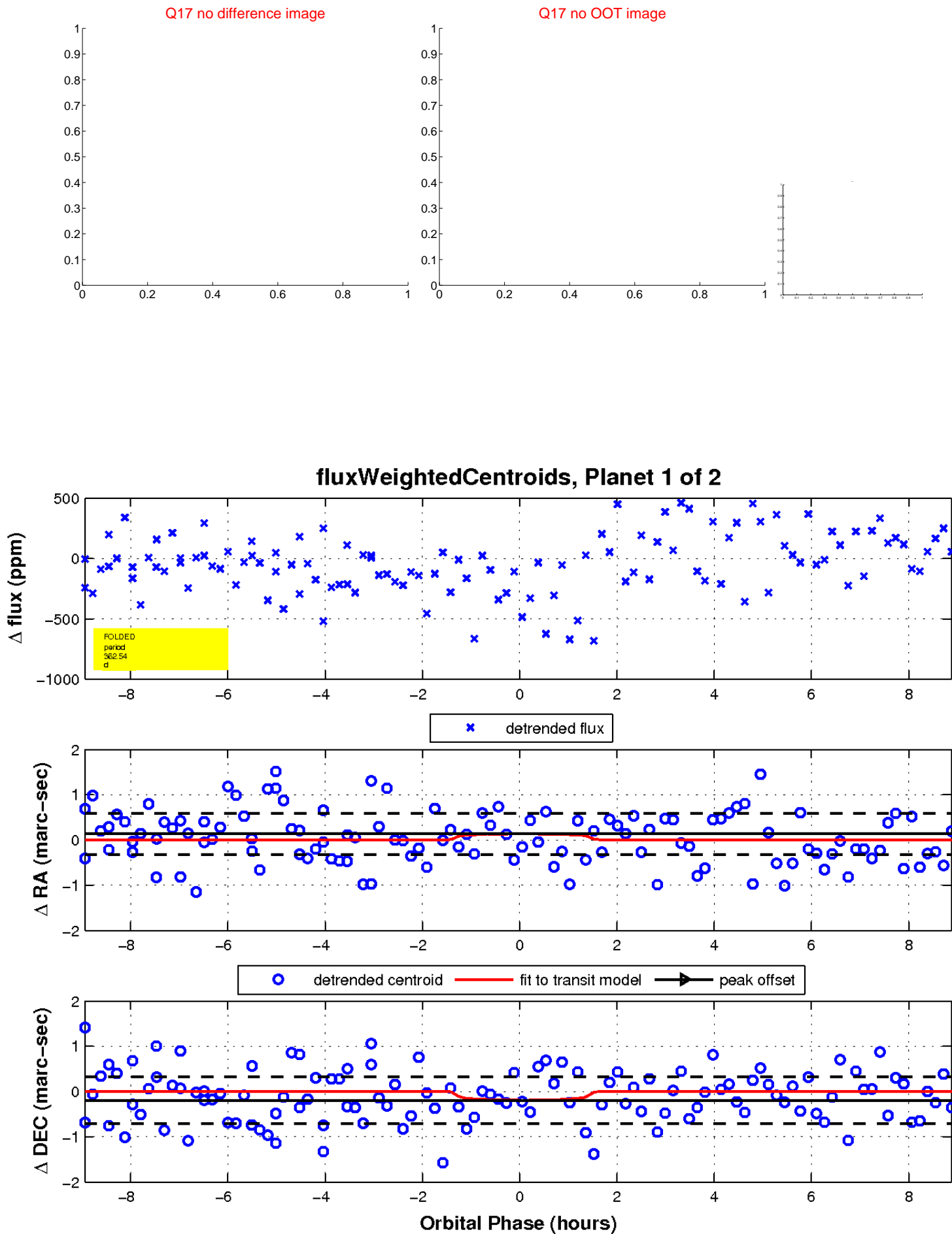
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

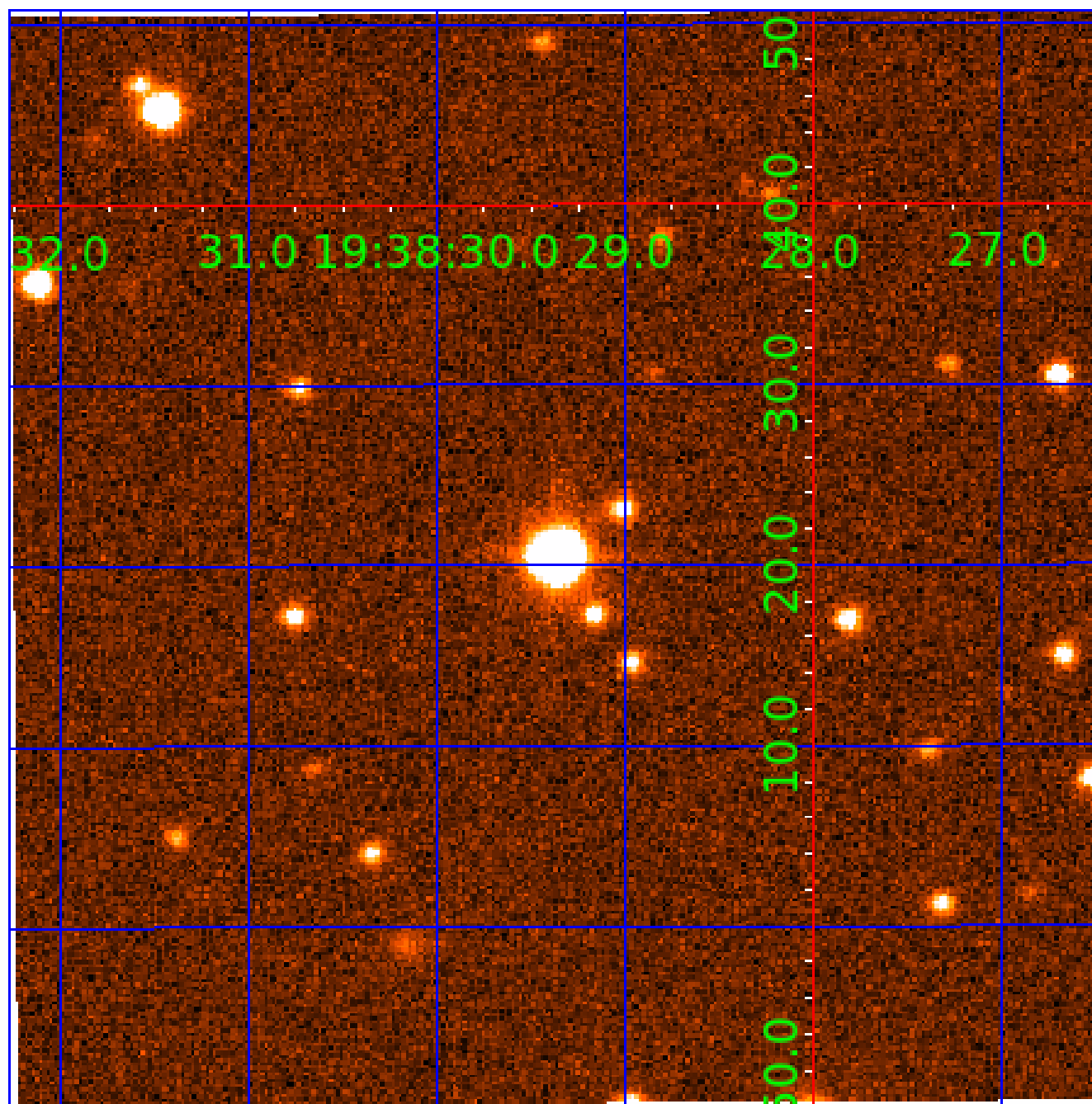


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009472134

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009472134-01	OBS	No	362.540142	316.810795	295.3	3.005	9.1	5.7	0.83	5450	1.66	0.57
009472134-02	OBS	No	369.711426	303.478384	250.3	17.311	9.5	6.9	0.83	5450	1.50	0.56

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009472134-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_TRACKER—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
009472134-02	OBS	FP	0.00	1	0	0	0	ALL_TRANS_CHASES—INCONSISTENT_TRANS—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.

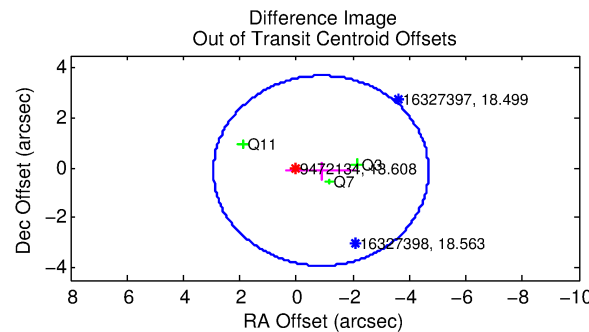
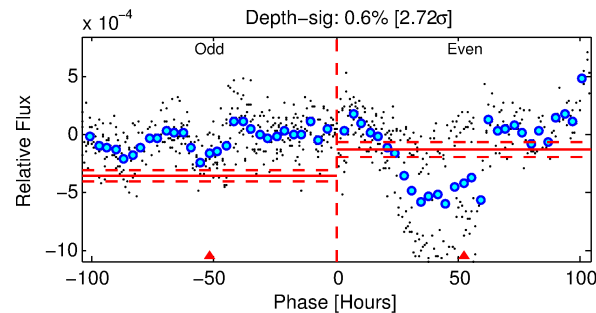
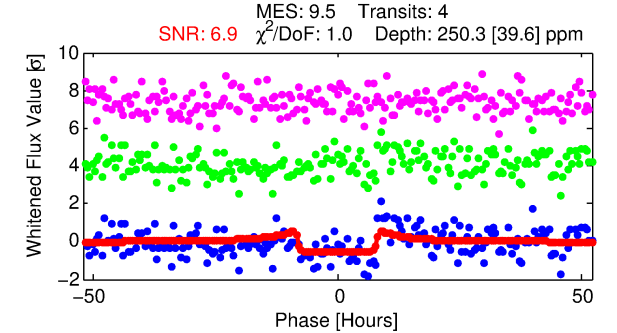
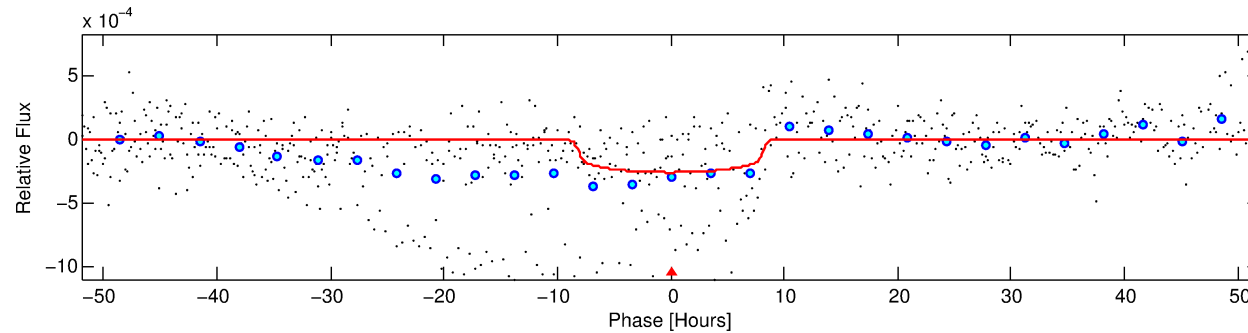
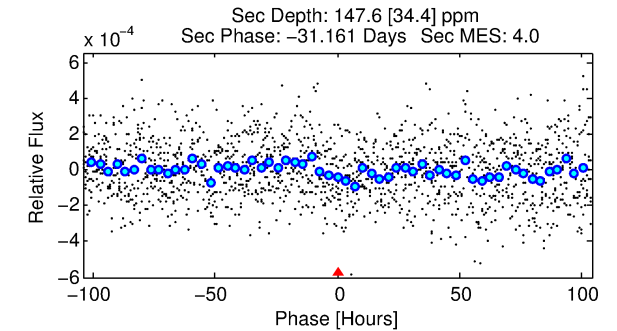
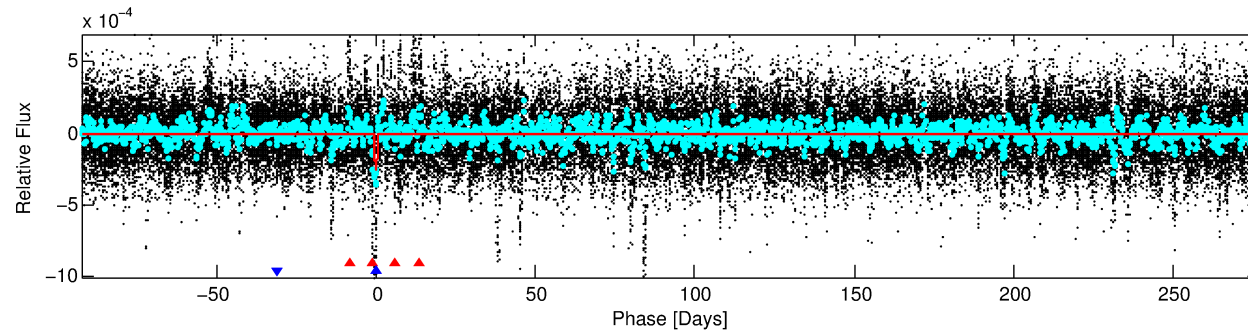
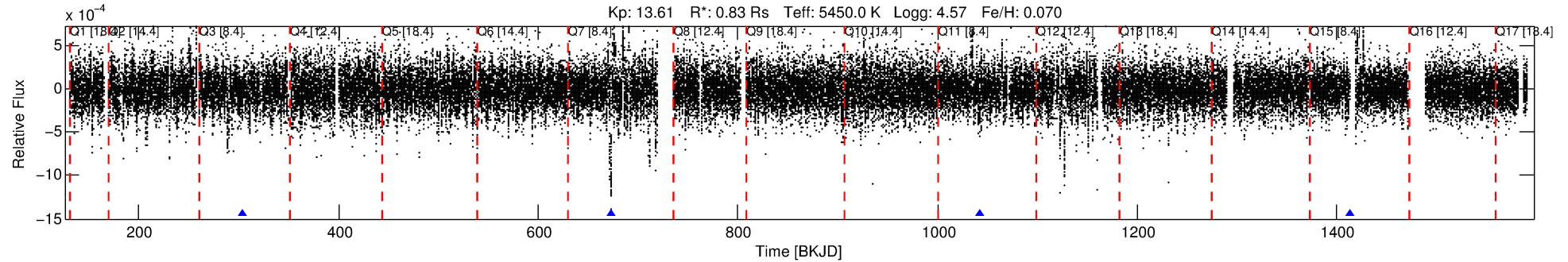
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009472134-02

No Significant Match Found

# DV One-Page Summary

KIC: 9472134 Candidate: 2 of 2 Period: 369.711 d



## DV Fit Results:

Period = 369.71143 [0.01129] d  
Epoch = 303.4784 [0.0185] BKJD  
Rp/R\* = 0.0166 [0.0031]  
a/R\* = 92.05 [62.53]  
b = 0.85 [0.23]  
Seff = 0.56 [0.17]  
Teq = 220 [17] K  
Rp = 1.50 [0.44] Re  
a = 0.9878 [0.1921] AU  
Ag = 34991.74 [18393.81] [1.90σ]  
Teffp = 4661 [530] K [8.37σ]

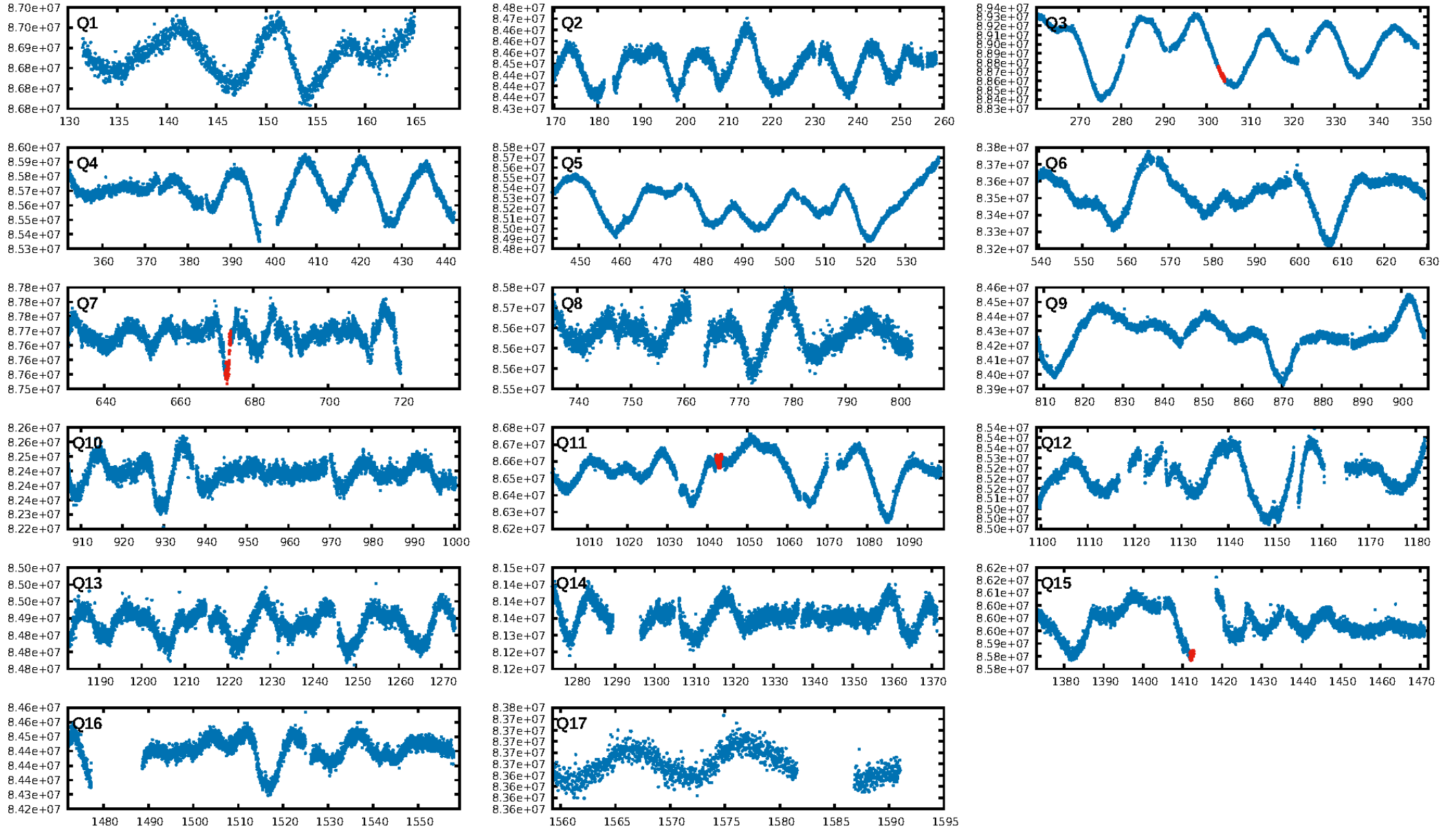
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [9.80σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 99.7%  
Bootstrap-pfa: 5.44e-11  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.097  
Centroid-sig: 3.0%  
Centroid-so: 1.127 arcsec [1.43σ]  
OotOffset-rm: 0.882 arcsec [0.70σ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-rm: 0.972 arcsec [0.88σ]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 0.67 [2/3]

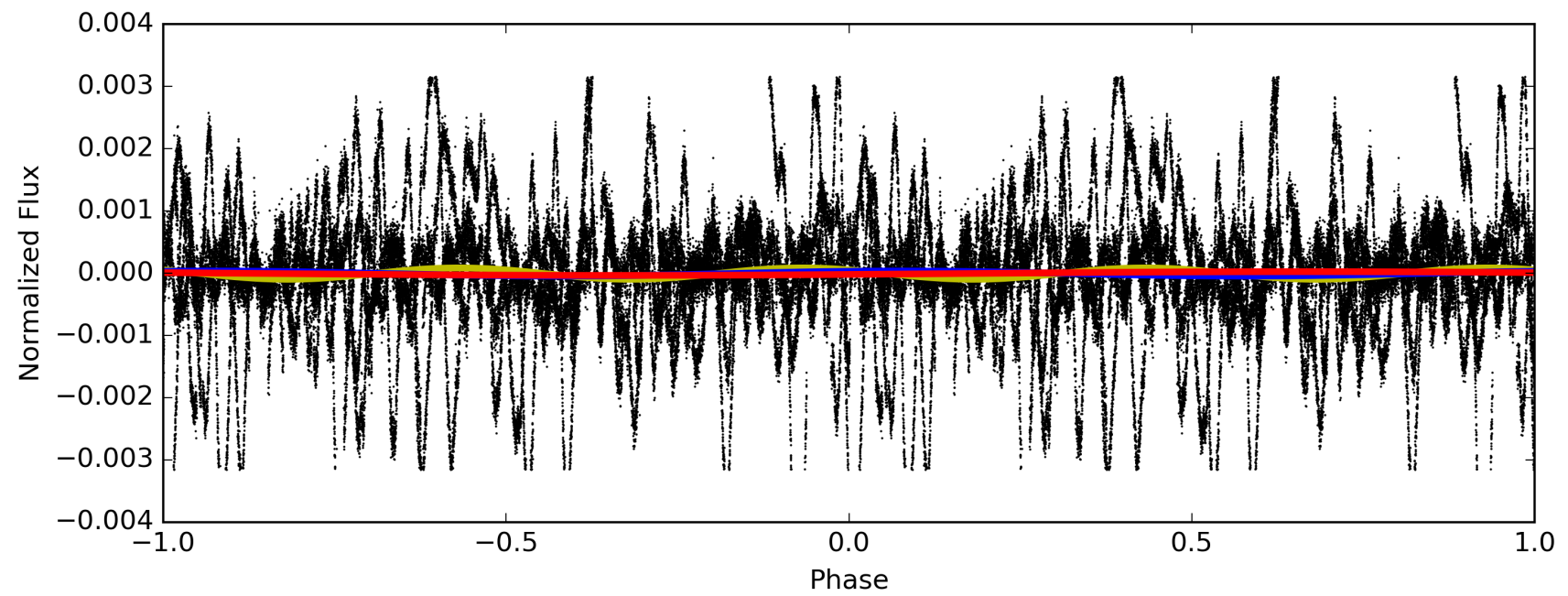
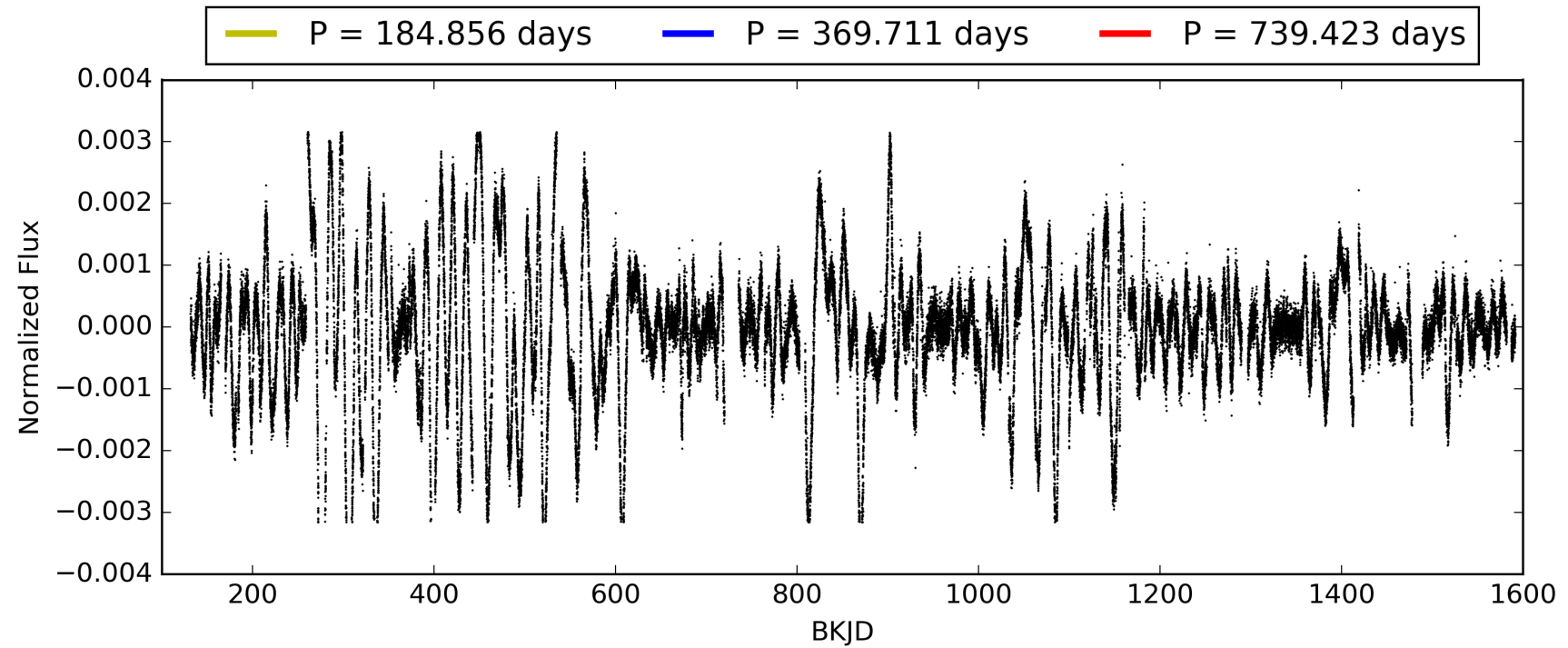
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 04:36:46 Z

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

# TCE 009472134-02, PDC Light Curves



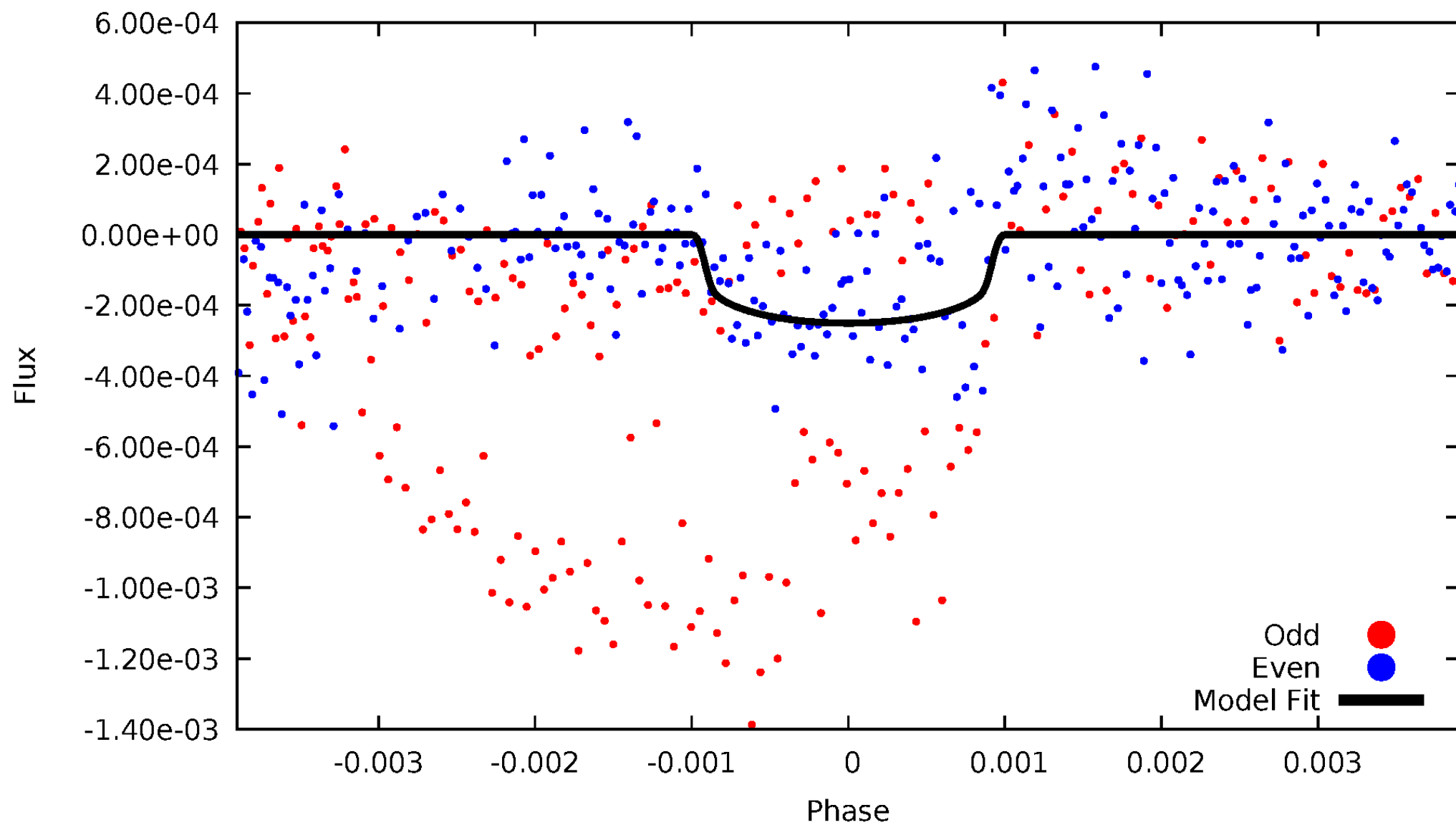
TCE 009472134-02





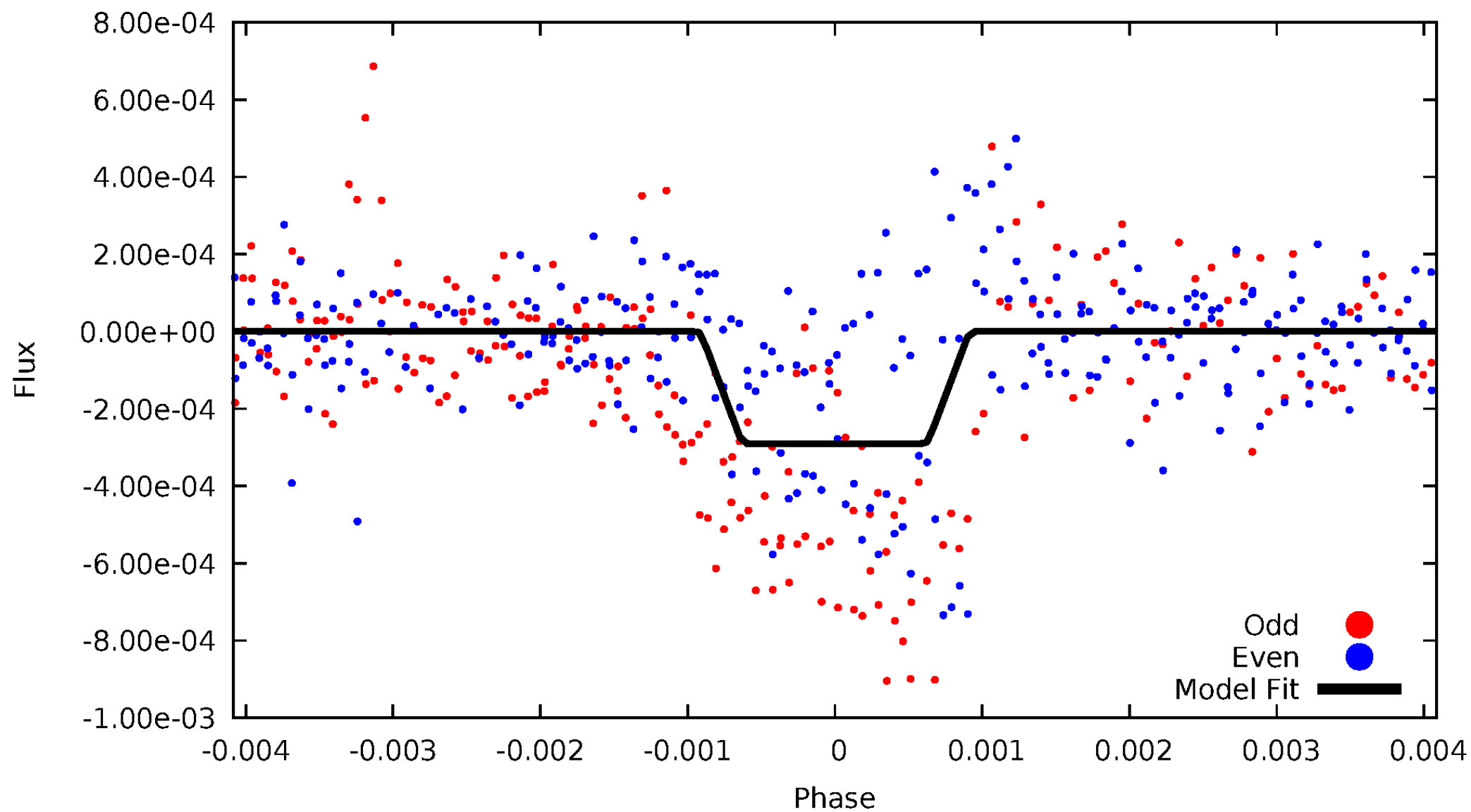
# DV Odd/Even

TCE 009472134-02



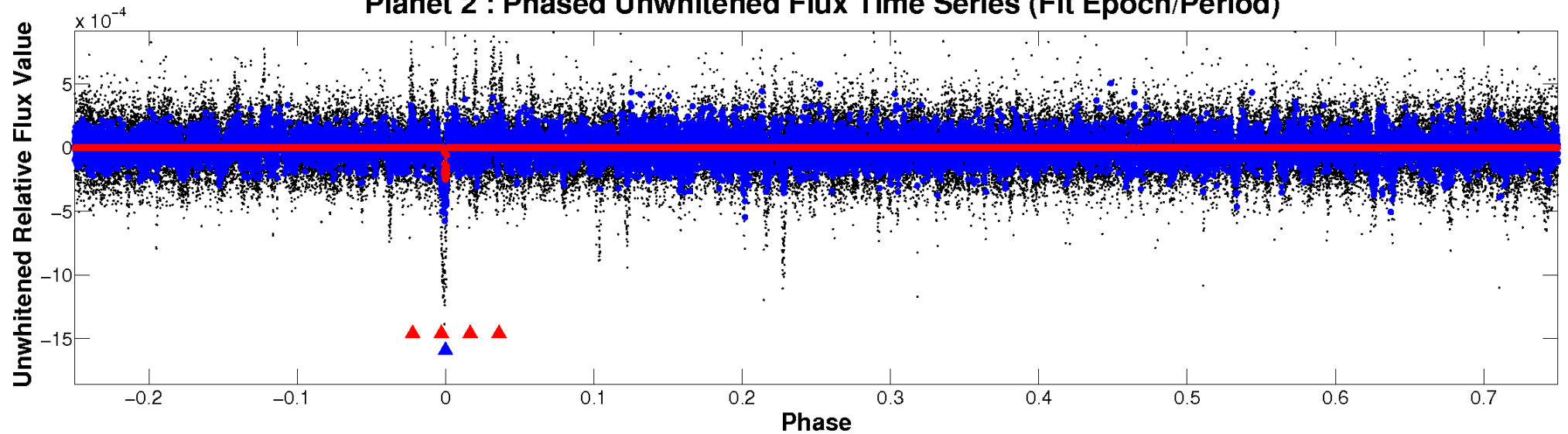
# ALT Odd/Even

TCE 009472134-02

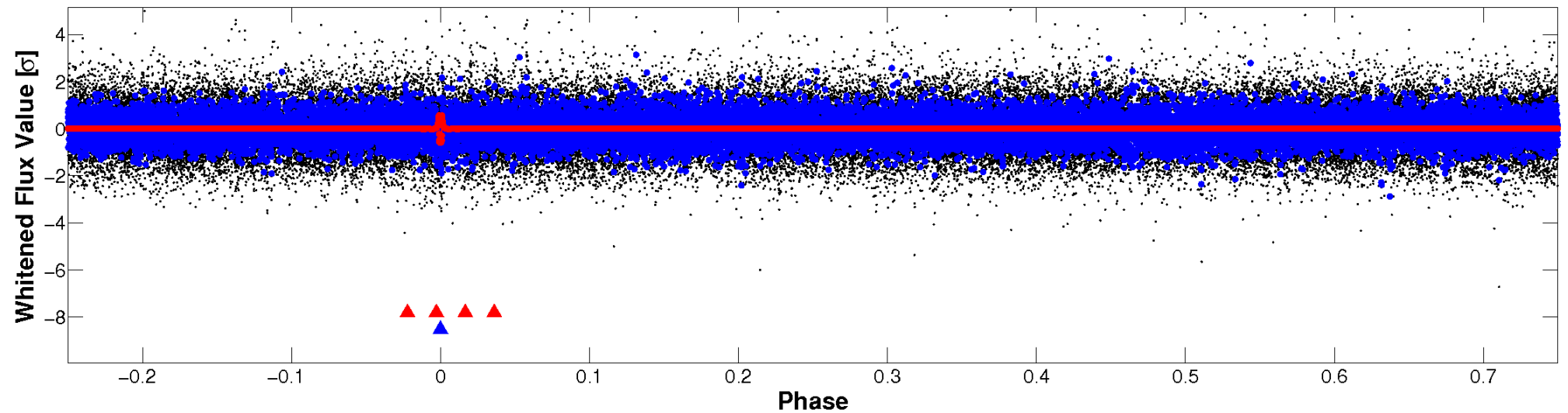


# Non-Whitened Vs. Whitened Light Curve

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

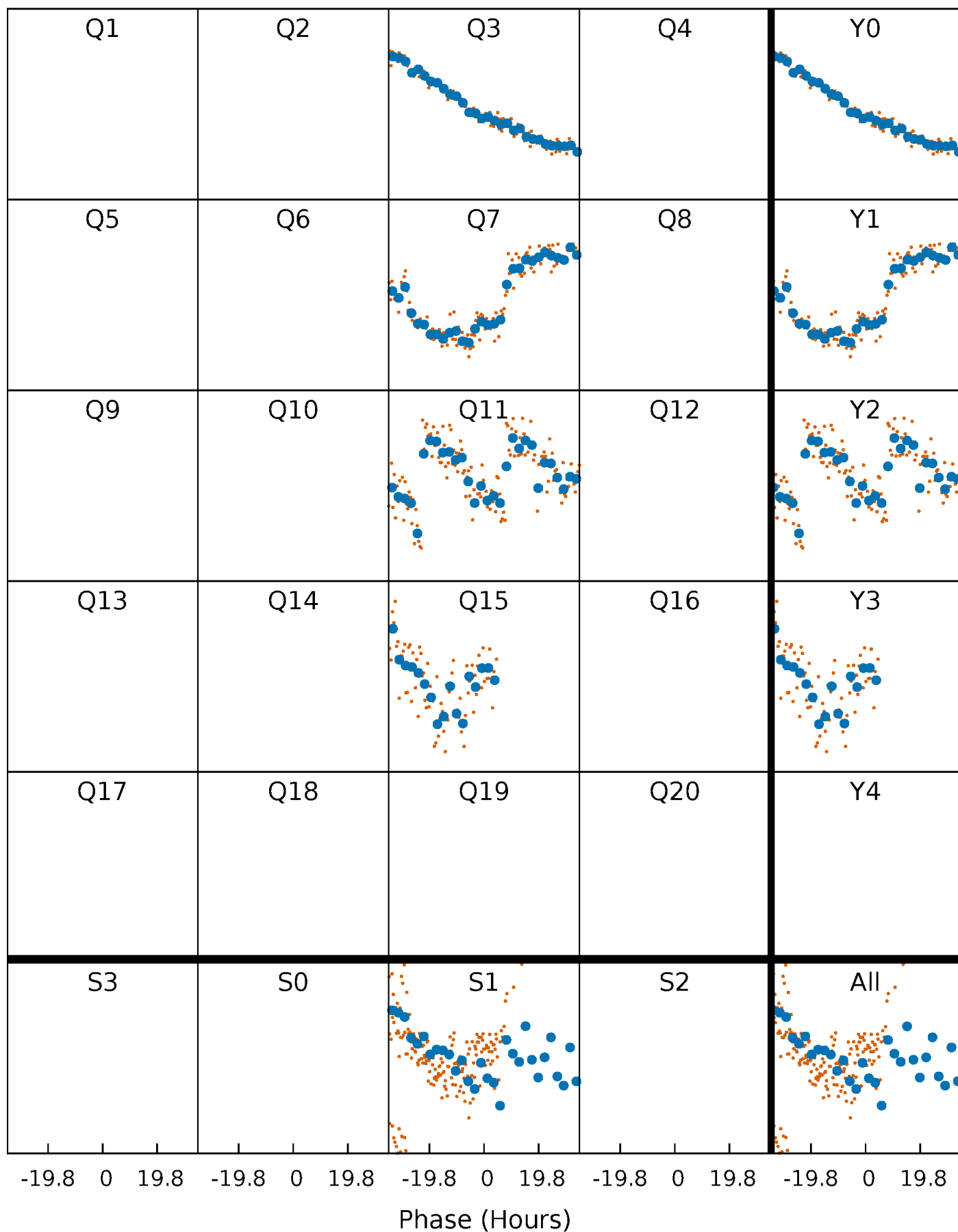


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



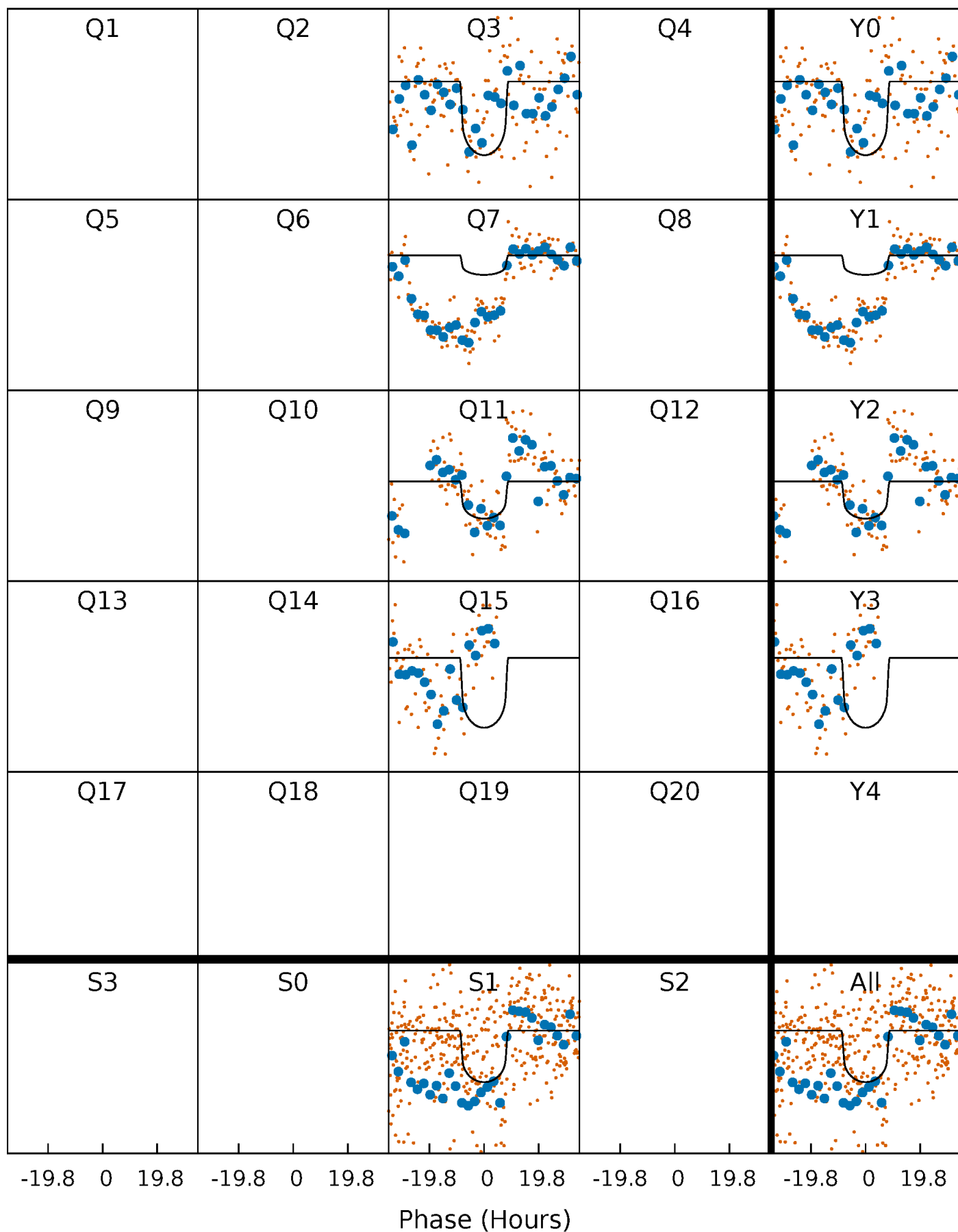
# PDC Quarter-Phased Transit Curves

TCE 009472134-02     $P=369.711427$  Days     $T_0=303.478384$  (BKJD)



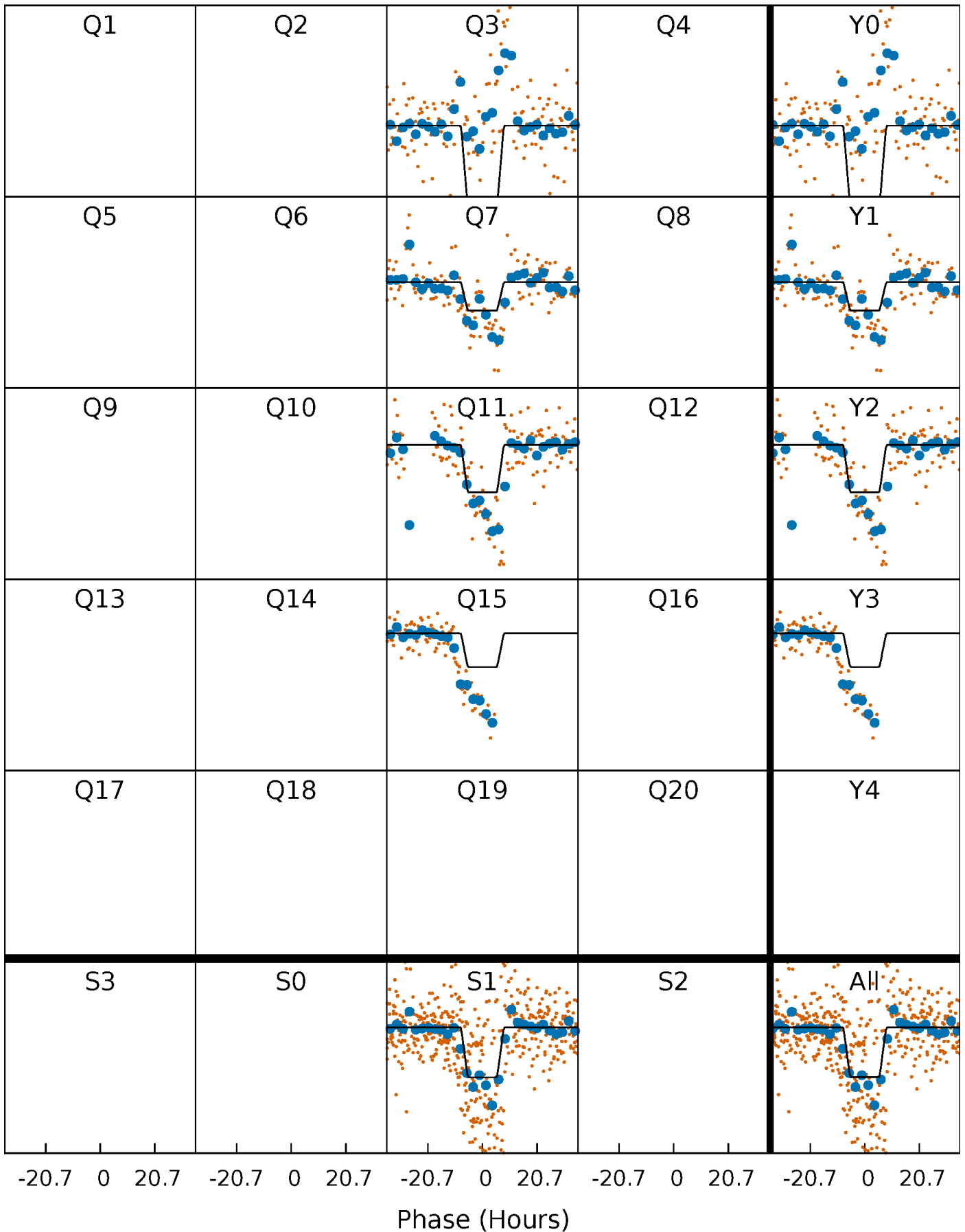
# DV Quarter-Phased Transit Curves

TCE 009472134-02     $P=369.711427$  Days     $T_0=303.478384$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

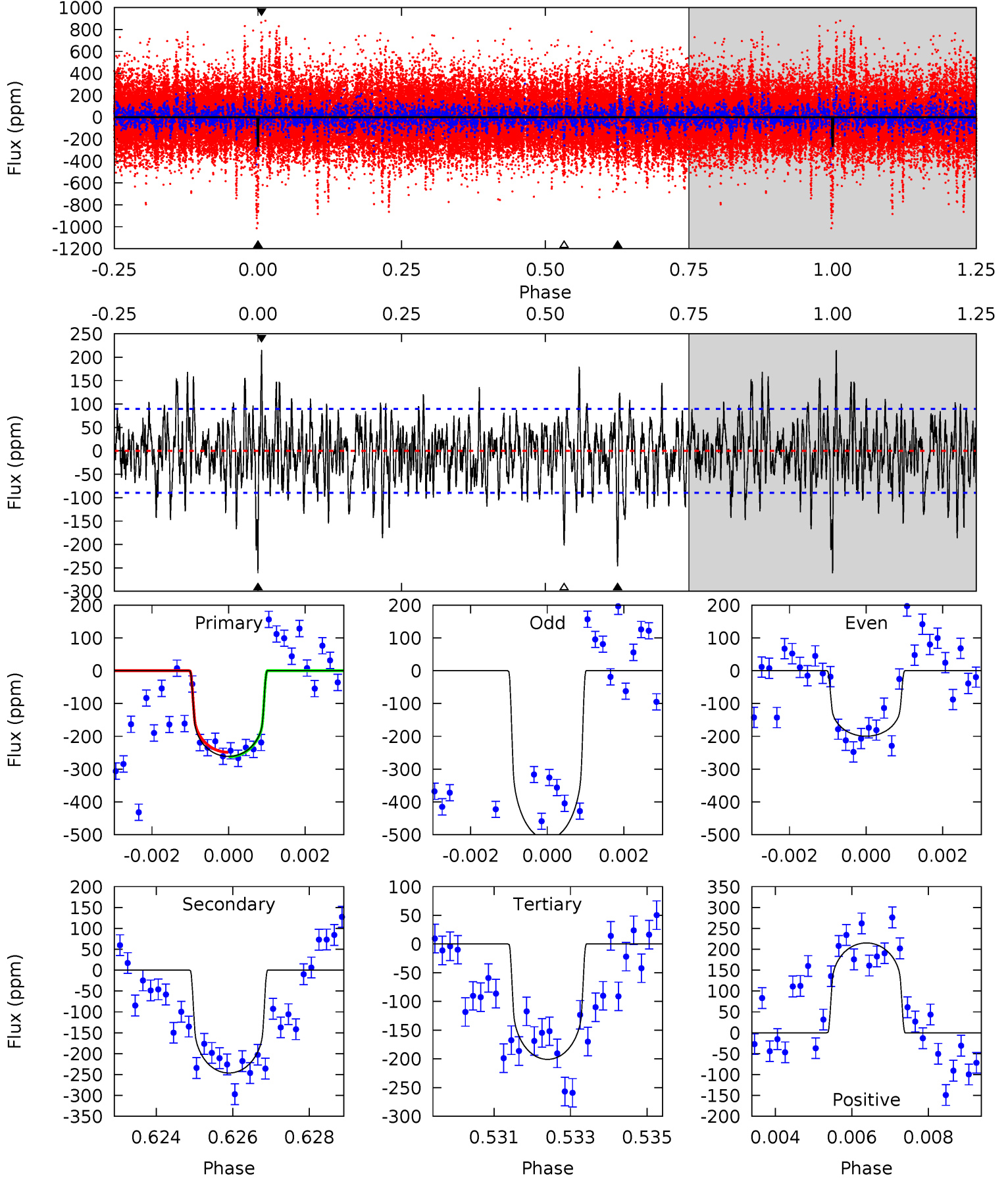
TCE 009472134-02     $P=369.724835$  Days     $T_0=303.435220$  (BKJD)



# DV Model-Shift Uniqueness Test

009472134-02, P = 369.711427 Days, E = 303.478384 Days

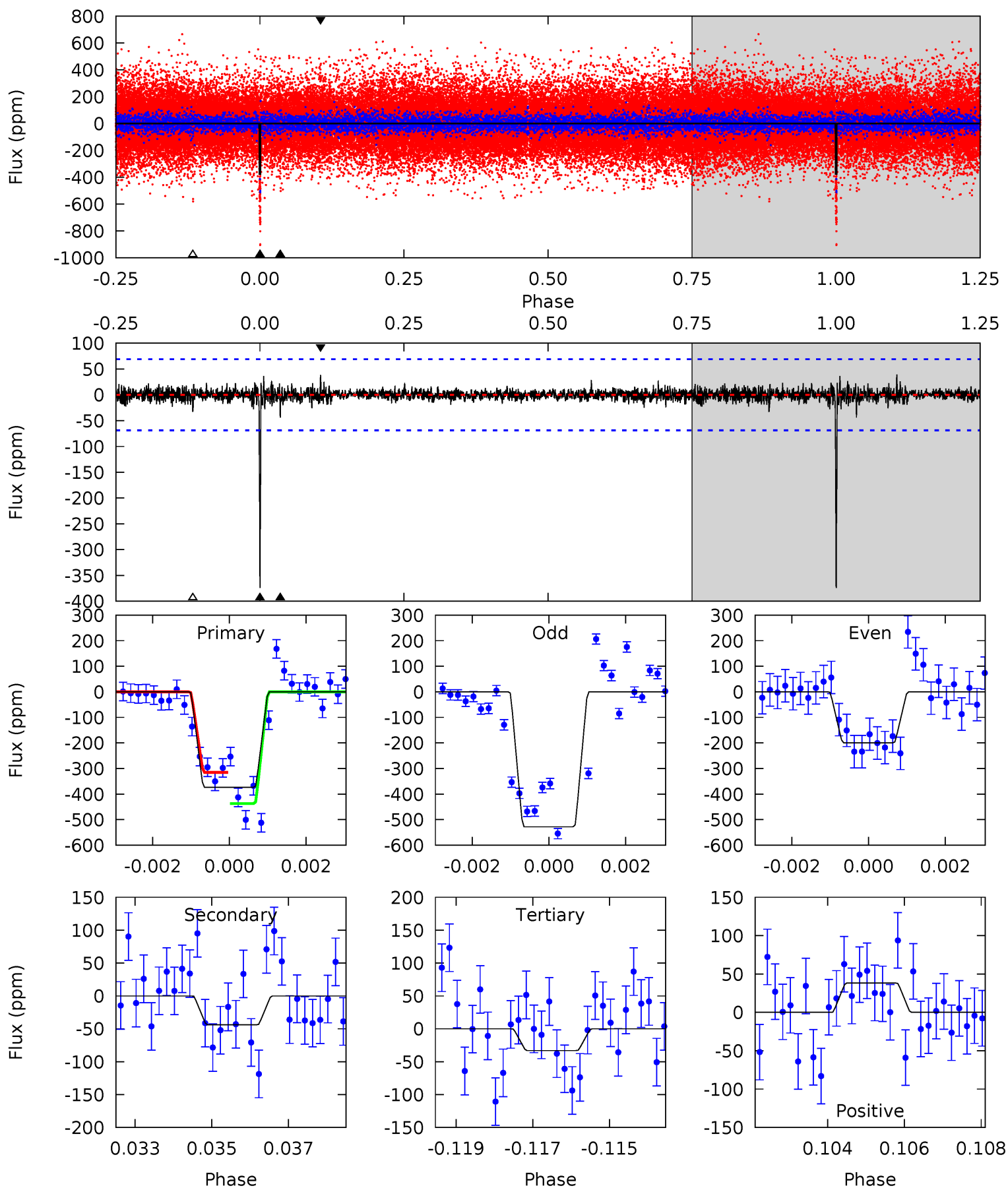
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.5	14.6	11.9	12.8	5.33	3.10	3.22	3.60	2.75	2.70	1.86	9.76	1.61	0.45	0.42



# Alt Model-Shift Uniqueness Test

009472134-02, P = 369.724835 Days, E = 303.435220 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
29.0	3.40	2.56	2.96	5.34	3.12	0.53	26.4	26.0	0.84	0.44	13.0	0.87	0.09	4.72





### Stellar Parameters For KIC 009472134

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5450^{+163}_{-146}$	$4.573^{+0.028}_{-0.161}$	$0.070^{+0.250}_{-0.300}$	$0.830^{+0.187}_{-0.062}$	$0.939^{+0.066}_{-0.100}$	$2.316^{+0.362}_{-1.025}$
	+3%/-3%	+1%/-4%	+357%/-429%	+23%/-7%	+7%/-11%	+16%/-44%
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 009472134-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-246 \pm 17$	$1.56^{+0.34}_{-0.31}$	$315^{+18}_{-13}$	$5324^{+536}_{-406}$	$52775^{+28045}_{-16961}$
Alt.	$-44 \pm 13$	$1.59^{+0.36}_{-0.30}$	$315^{+18}_{-13}$	$3784^{+317}_{-313}$	$9057^{+5534}_{-3976}$

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

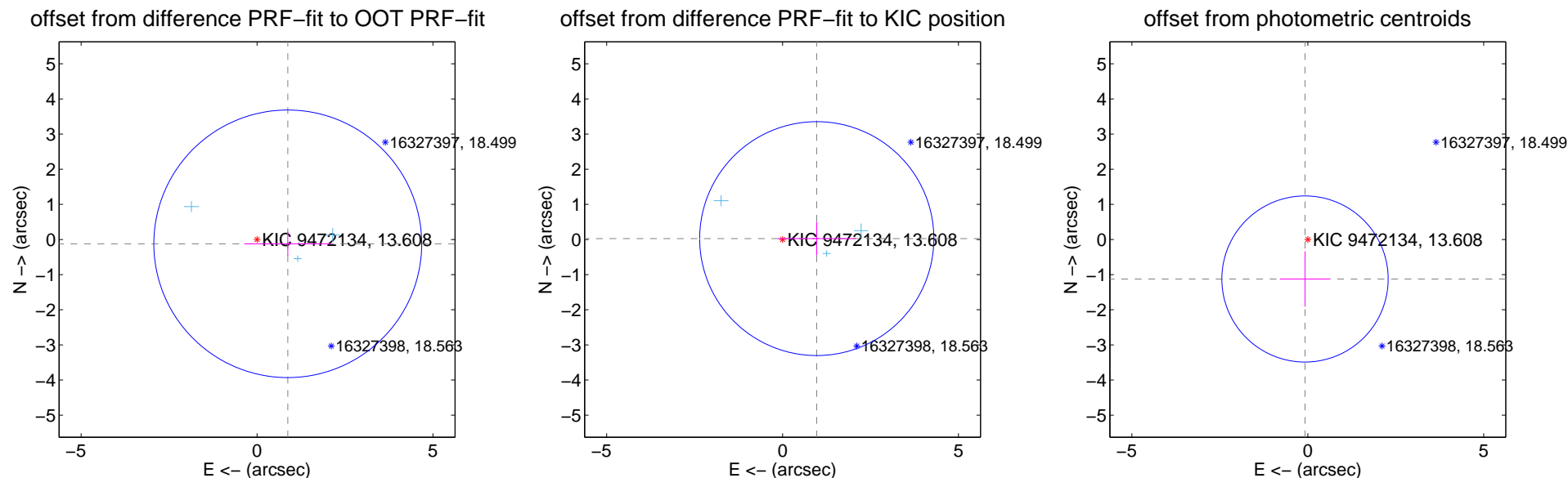
## DV Centroid Data

Supplemental centroid analysis for 009472134-02. Kepler magnitude: 13.61. Transit SNR 6.90

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.882 \pm 1.269$	0.70	$-0.874 \pm 1.240$	$-0.123 \pm 0.343$
PRF-fit source offset from KIC position	$0.972 \pm 1.109$	0.88	$-0.972 \pm 1.110$	$0.025 \pm 0.476$
photometric centroid source offset	$1.13 \pm 0.79$	1.43	$0.08 \pm 0.72$	$-1.12 \pm 0.79$



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.

Q1 no difference image



Q1 no OOT image



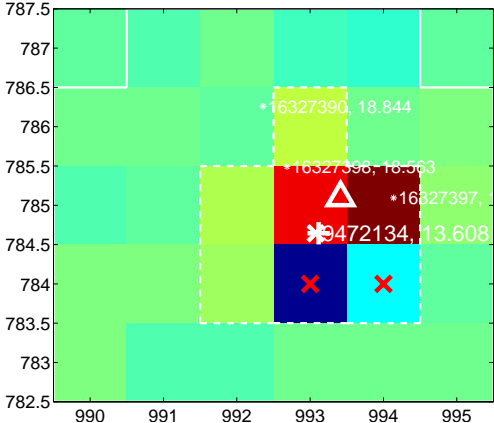
Q2 no difference image



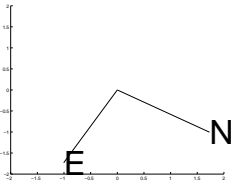
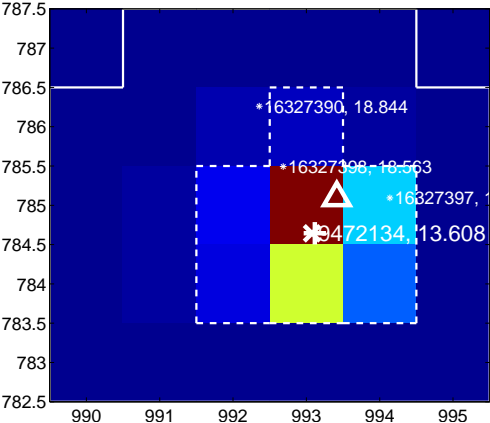
Q2 no OOT image



Q3 difference image



Q3 OOT image



Q4 no difference image



Q4 no OOT image



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

Q5 no difference image



Q5 no OOT image



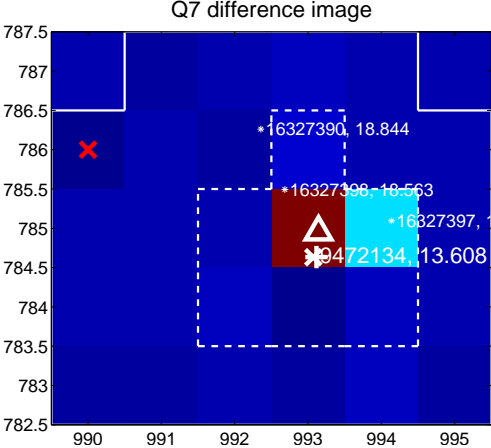
Q6 no difference image



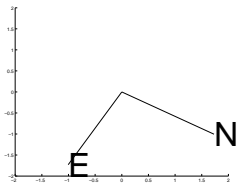
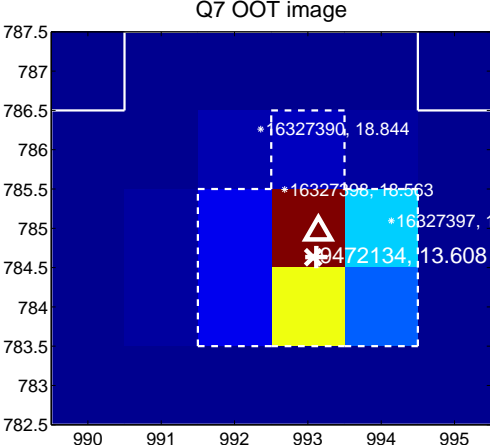
Q6 no OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image



Q8 no OOT image



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

Q9 no difference image



Q9 no OOT image



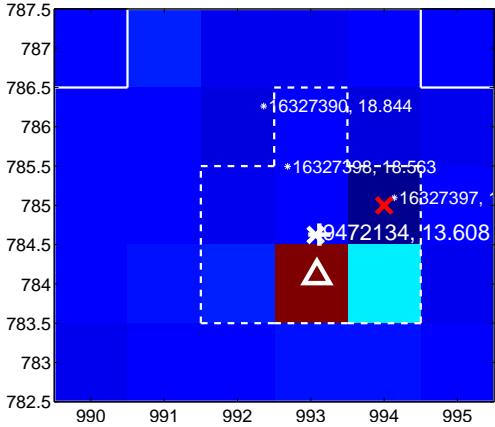
Q10 no difference image



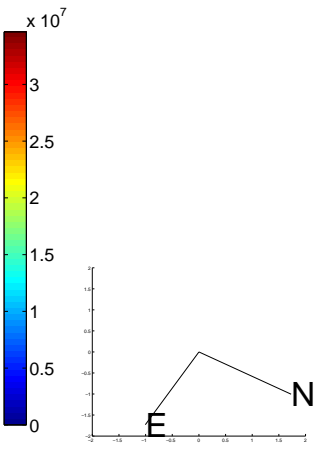
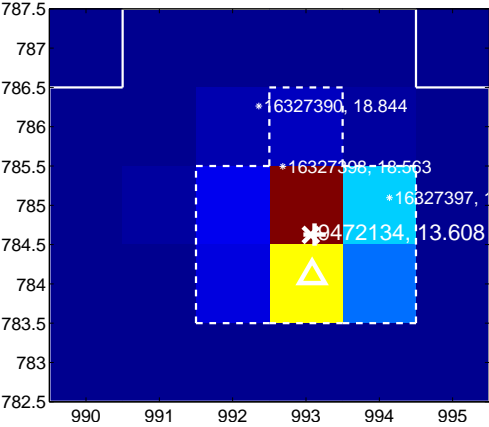
Q10 no OOT image



Q11 difference image



Q11 OOT image



Q12 no difference image



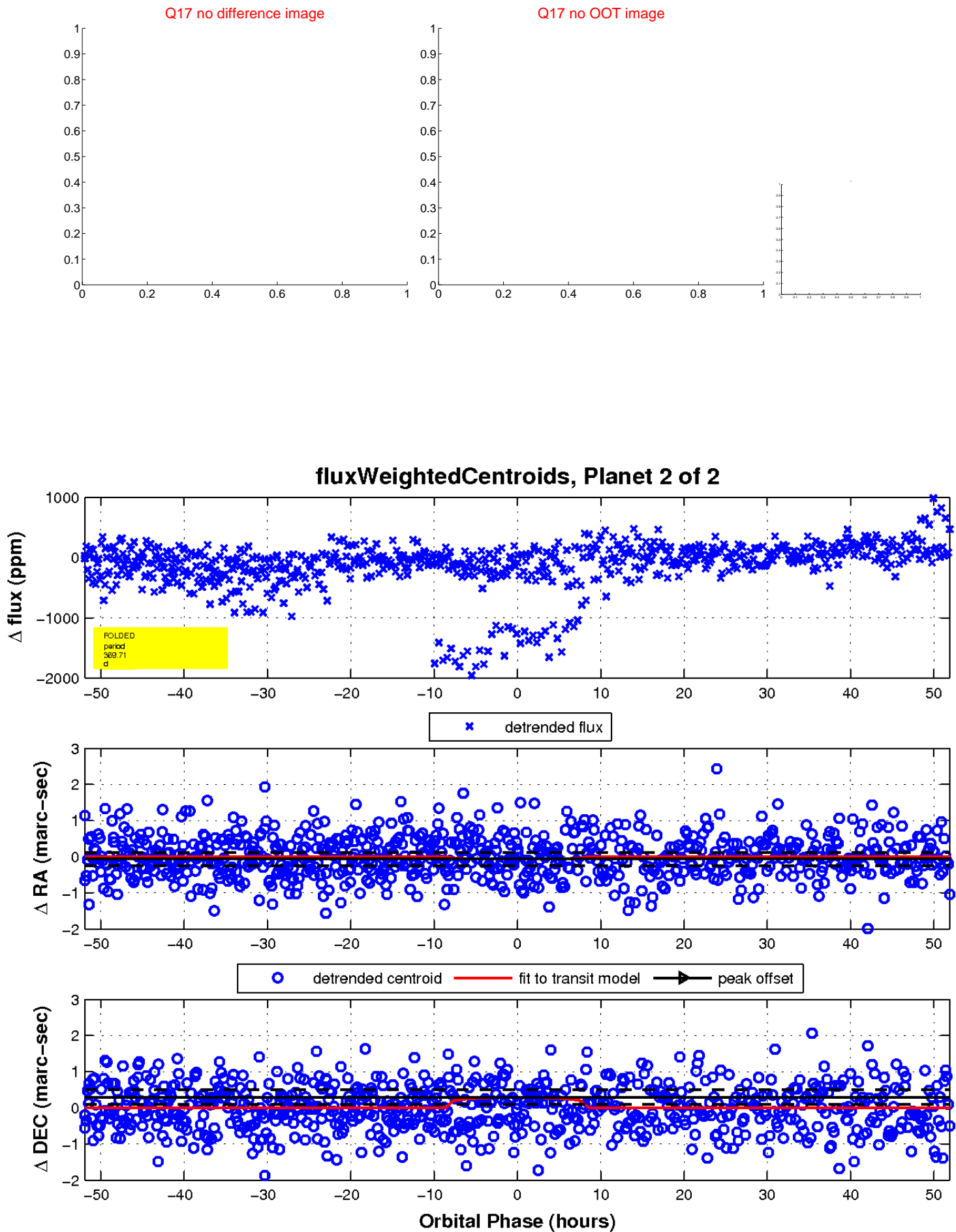
Q12 no OOT image



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

