

# KIC 010909367

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010909367-01	OBS	No	292.730001	277.060874	1755.4	14.324	15.2	6.2	0.51	3805	2.34	0.10
010909367-02	OBS	No	594.267355	242.249431	619.8	2.361	11.9	2.8	0.51	3805	1.42	0.04
010909367-03	OBS	No	317.505795	246.268738	1555.2	3.682	13.5	7.4	0.51	3805	2.02	0.09
010909367-04	OBS	No	170.935788	259.522269	4146.2	38.050	11.0	8.3	0.51	3805	4.08	0.21
010909367-05	OBS	No	167.388853	259.787514	1259.7	4.148	12.3	6.3	0.51	3805	1.88	0.22
010909367-06	OBS	No	103.302853	194.293093	833.5	3.459	11.7	6.8	0.51	3805	1.51	0.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010909367-01	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
010909367-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010909367-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
010909367-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
010909367-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
010909367-06	OBS	FP	0.01	1	0	0	0	LPP_DV—INCONSISTENT_TRANS

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

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

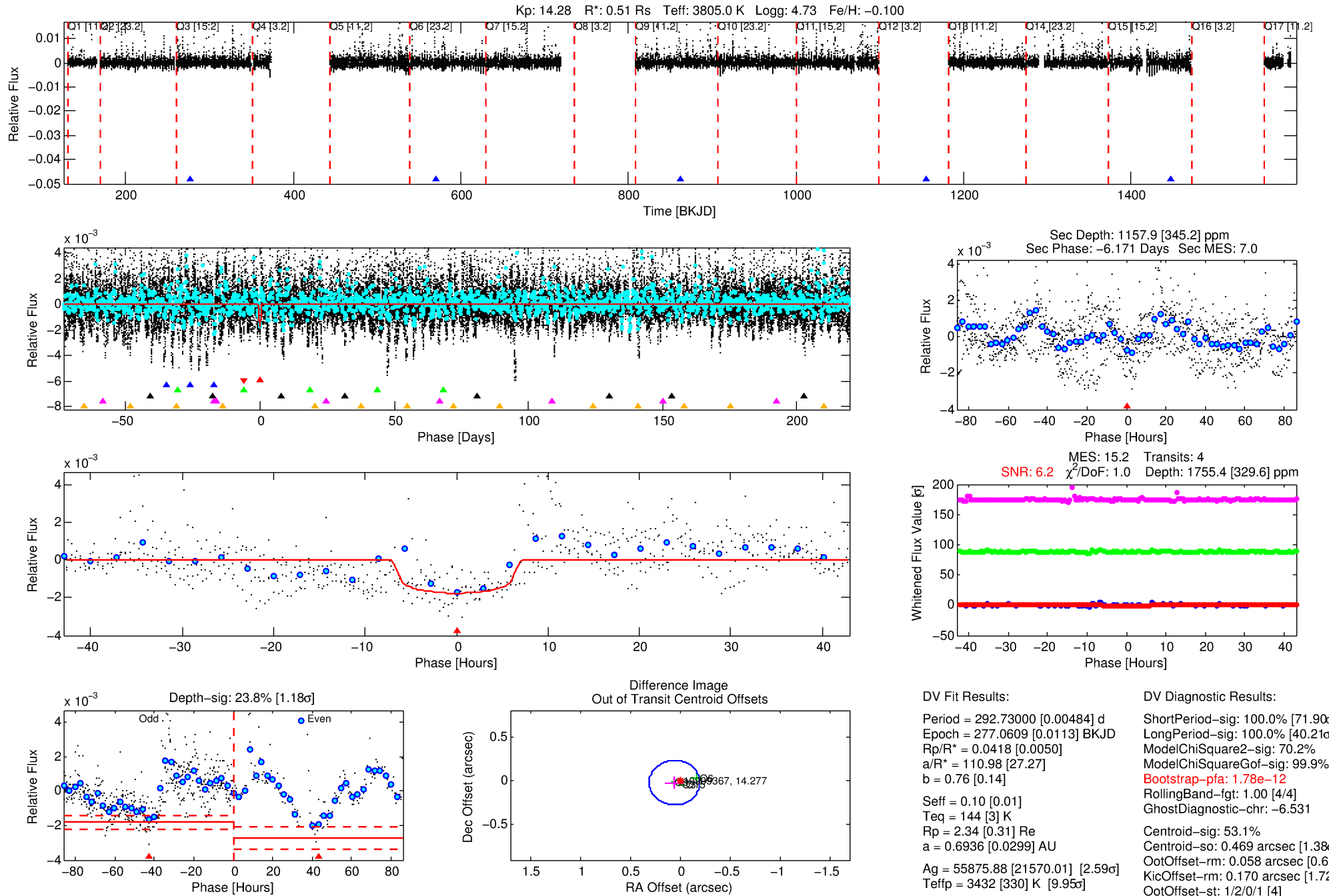
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010909367-01

No Significant Match Found

# DV One-Page Summary

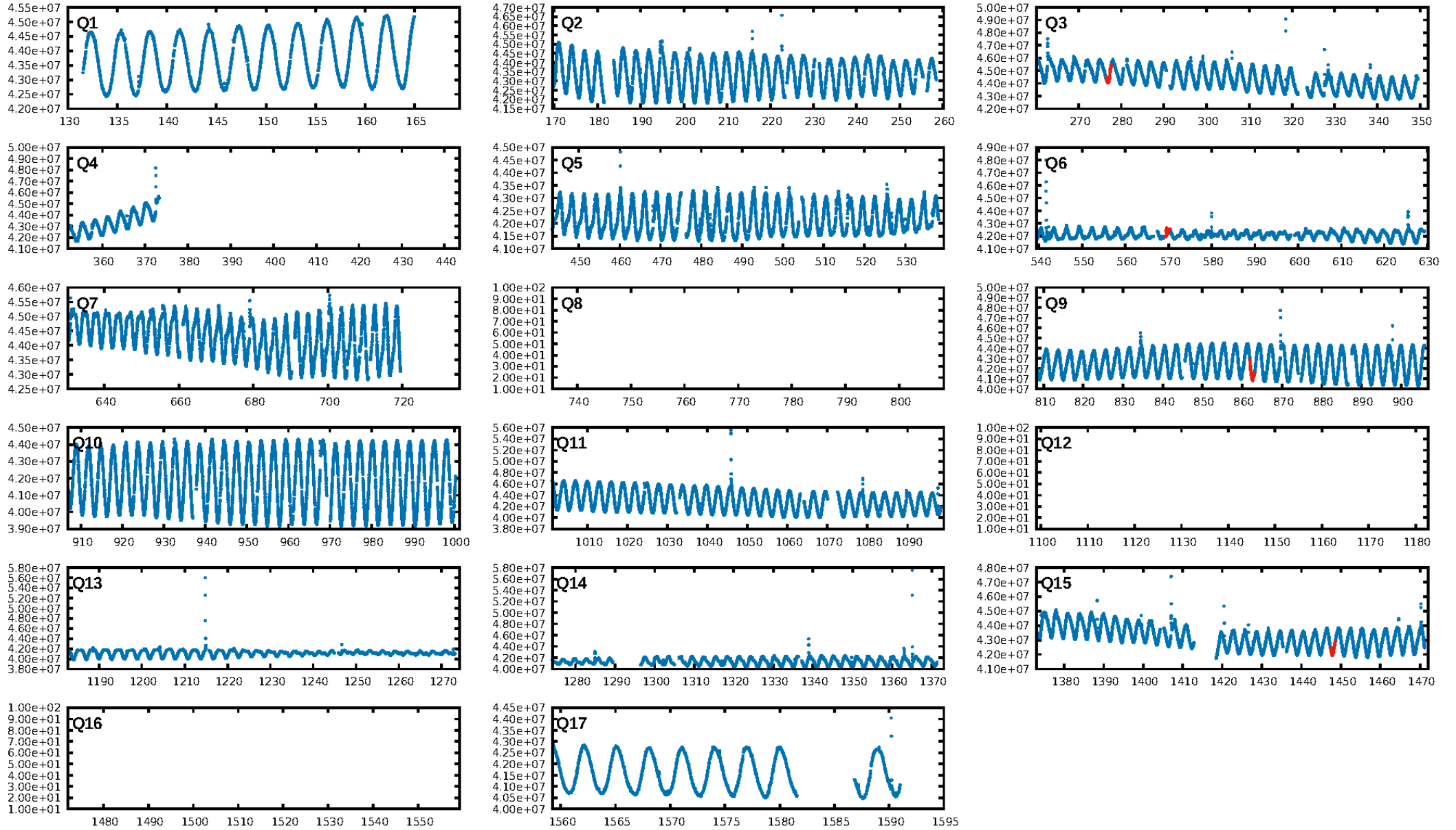
KIC: 10909367 Candidate: 1 of 6 Period: 292.730 d



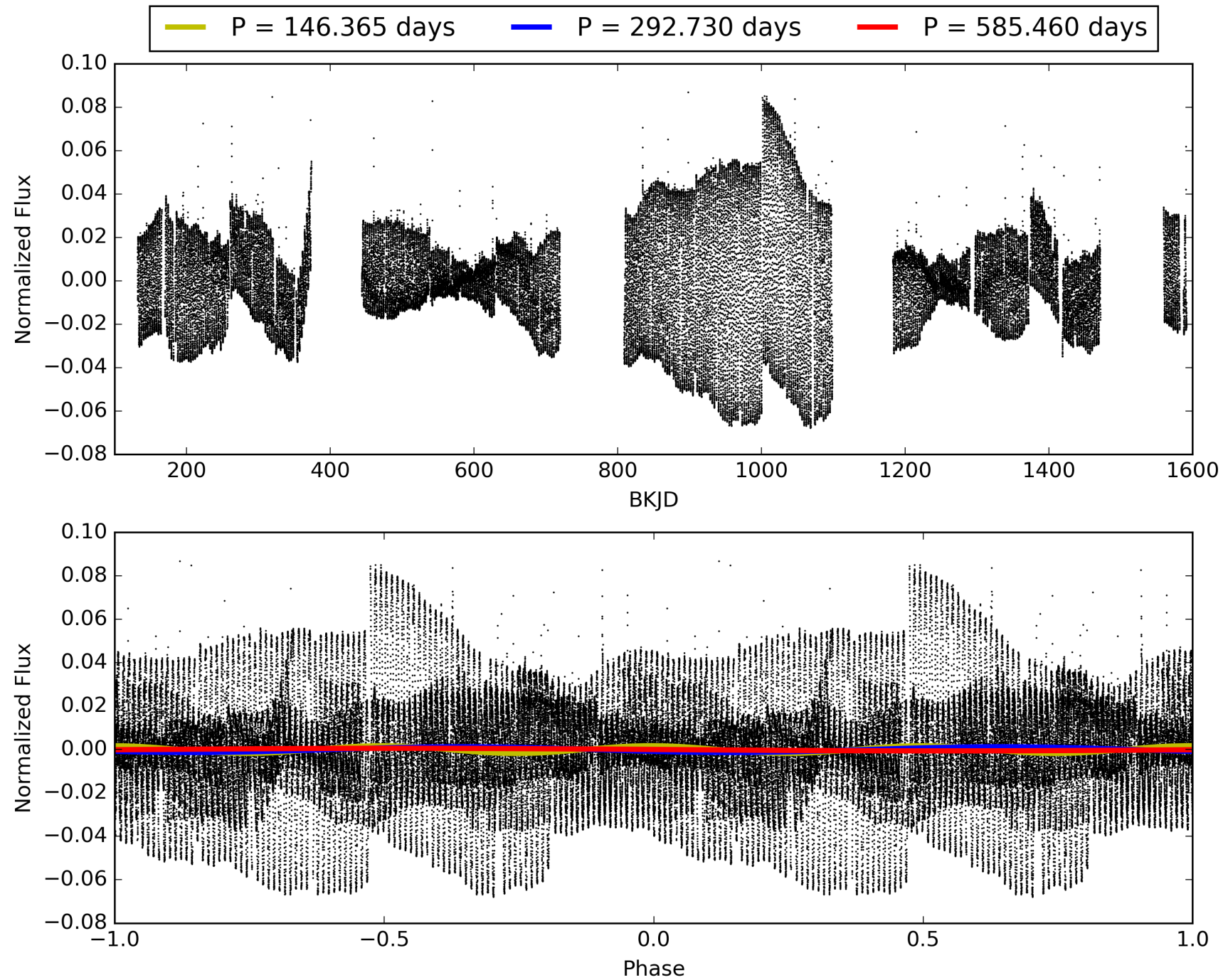
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:53:14 Z

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

# TCE 010909367-01, PDC Light Curves



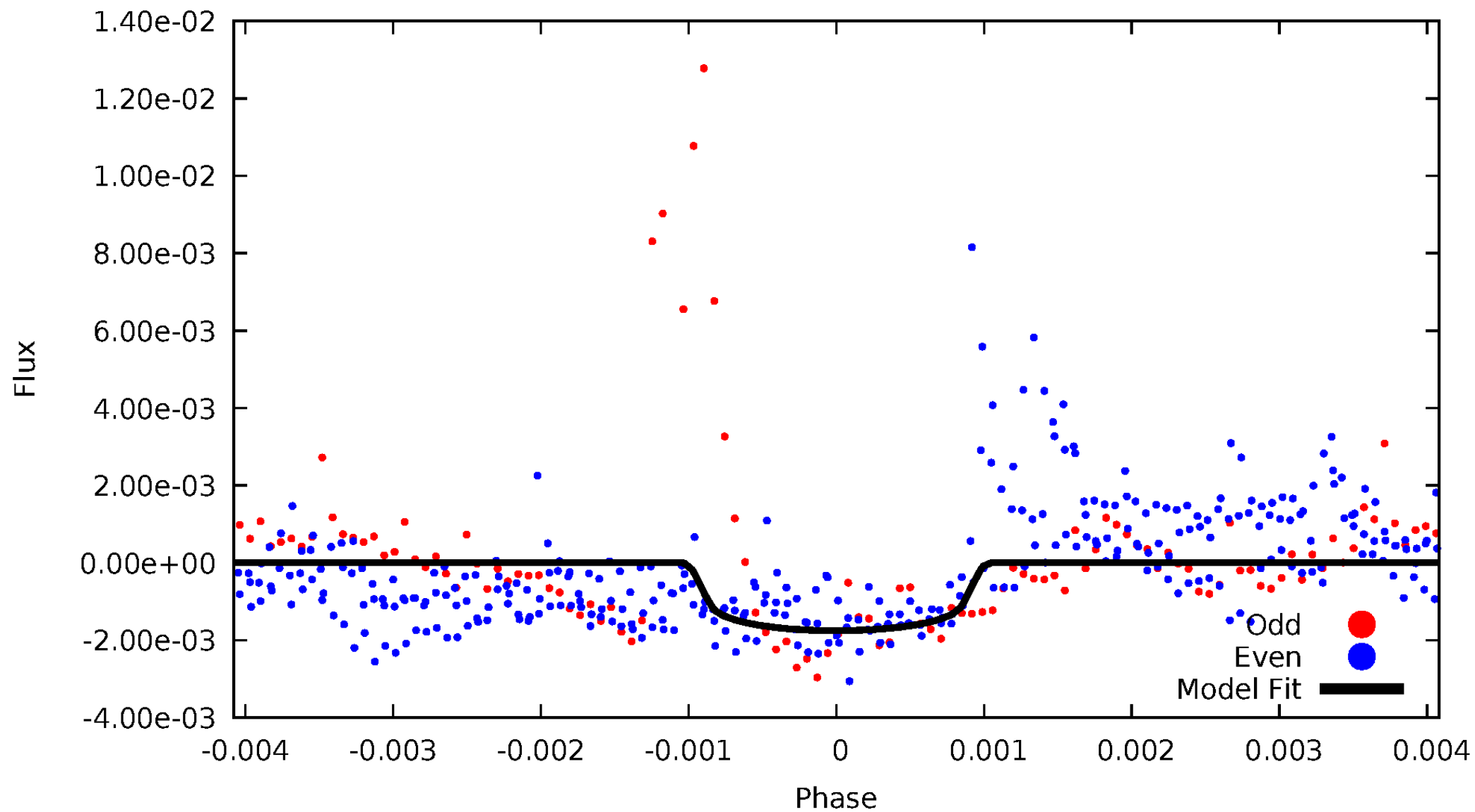
# TCE 010909367-01





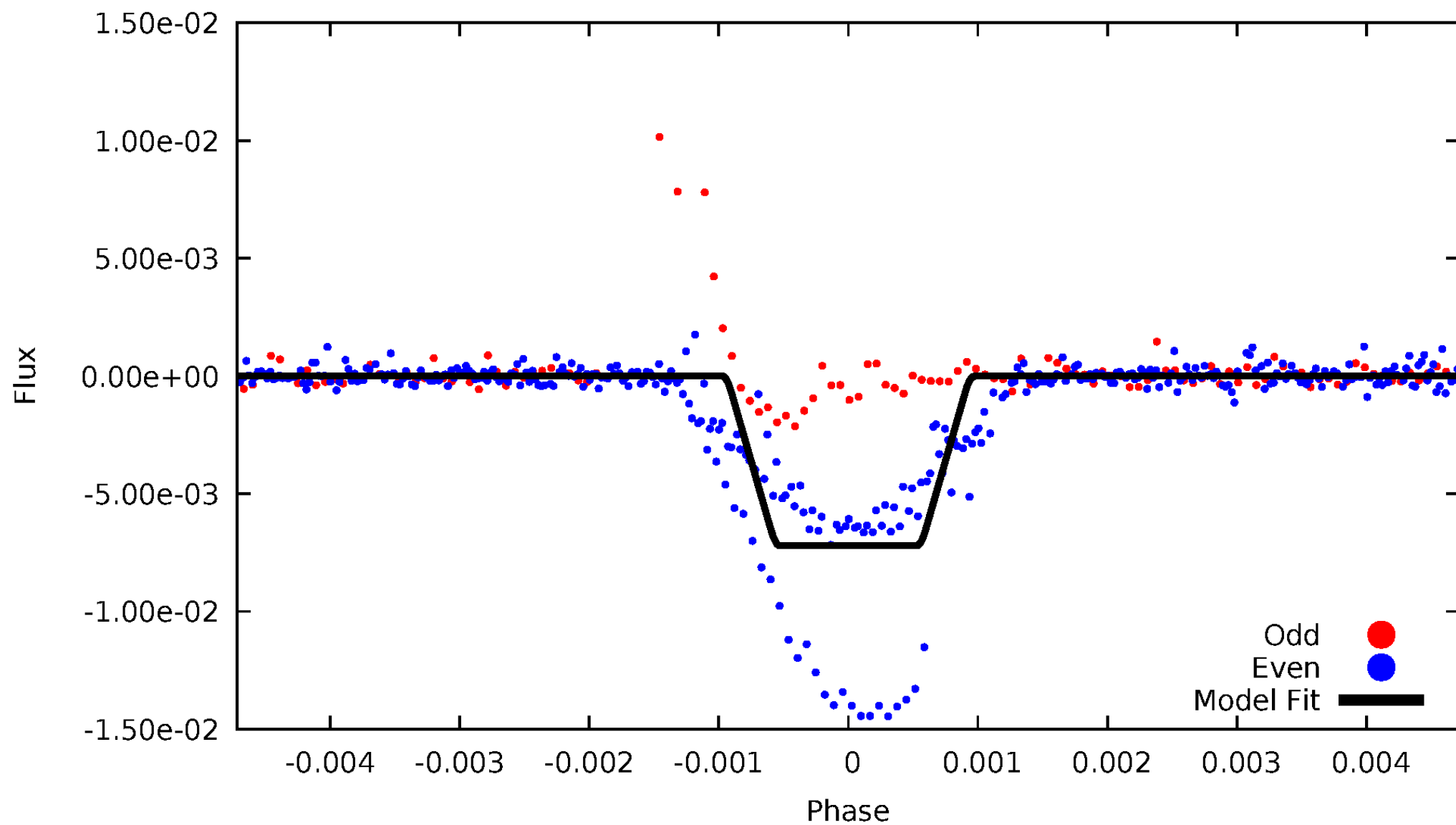
# DV Odd/Even

TCE 010909367-01



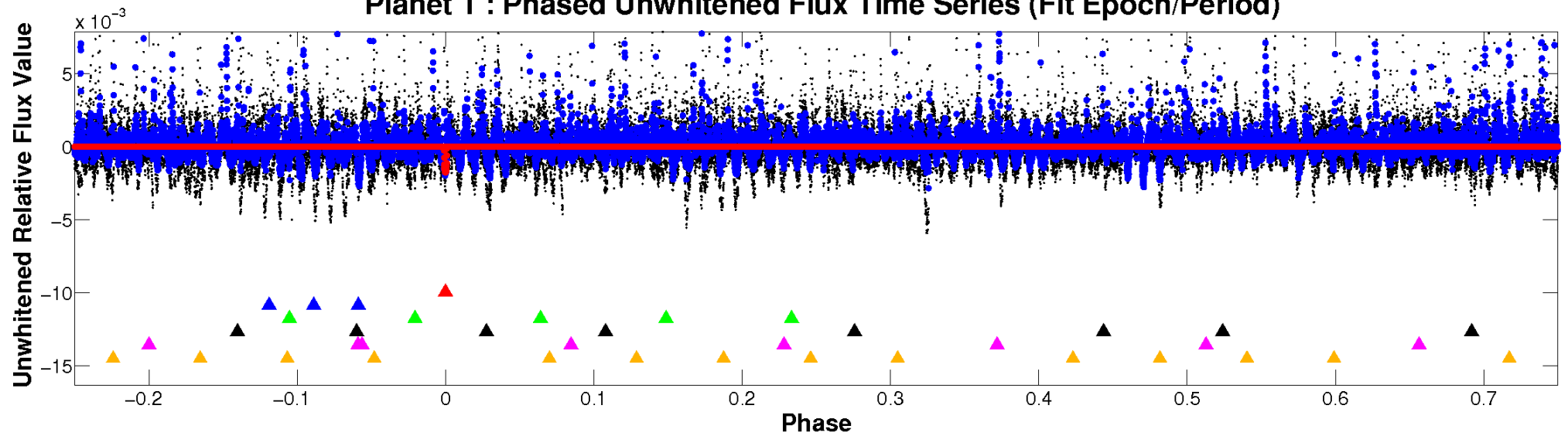
# ALT Odd/Even

TCE 010909367-01

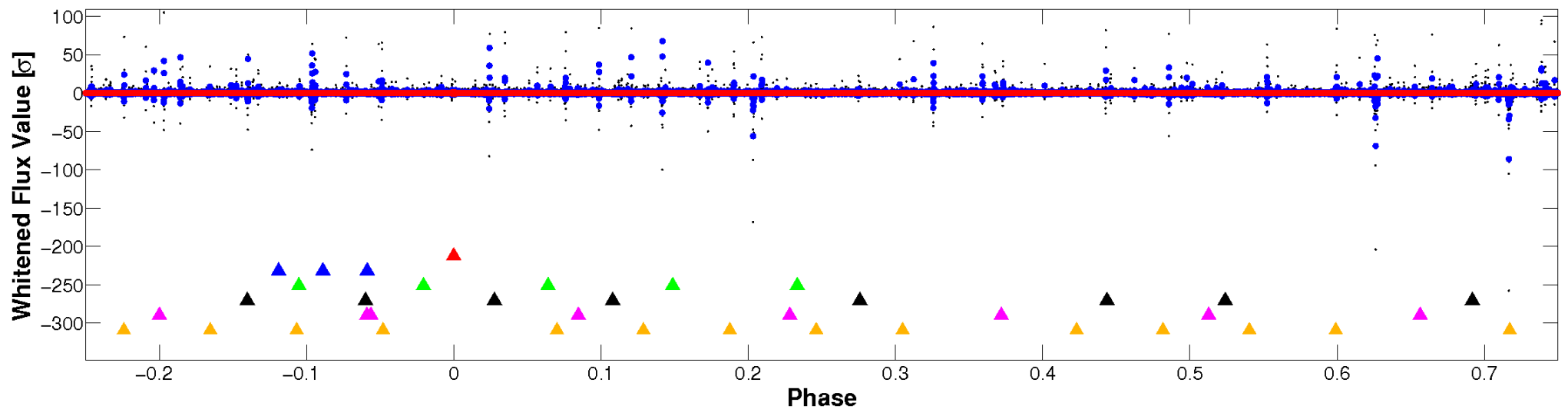


# Non-Whitened Vs. Whitened Light Curve

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

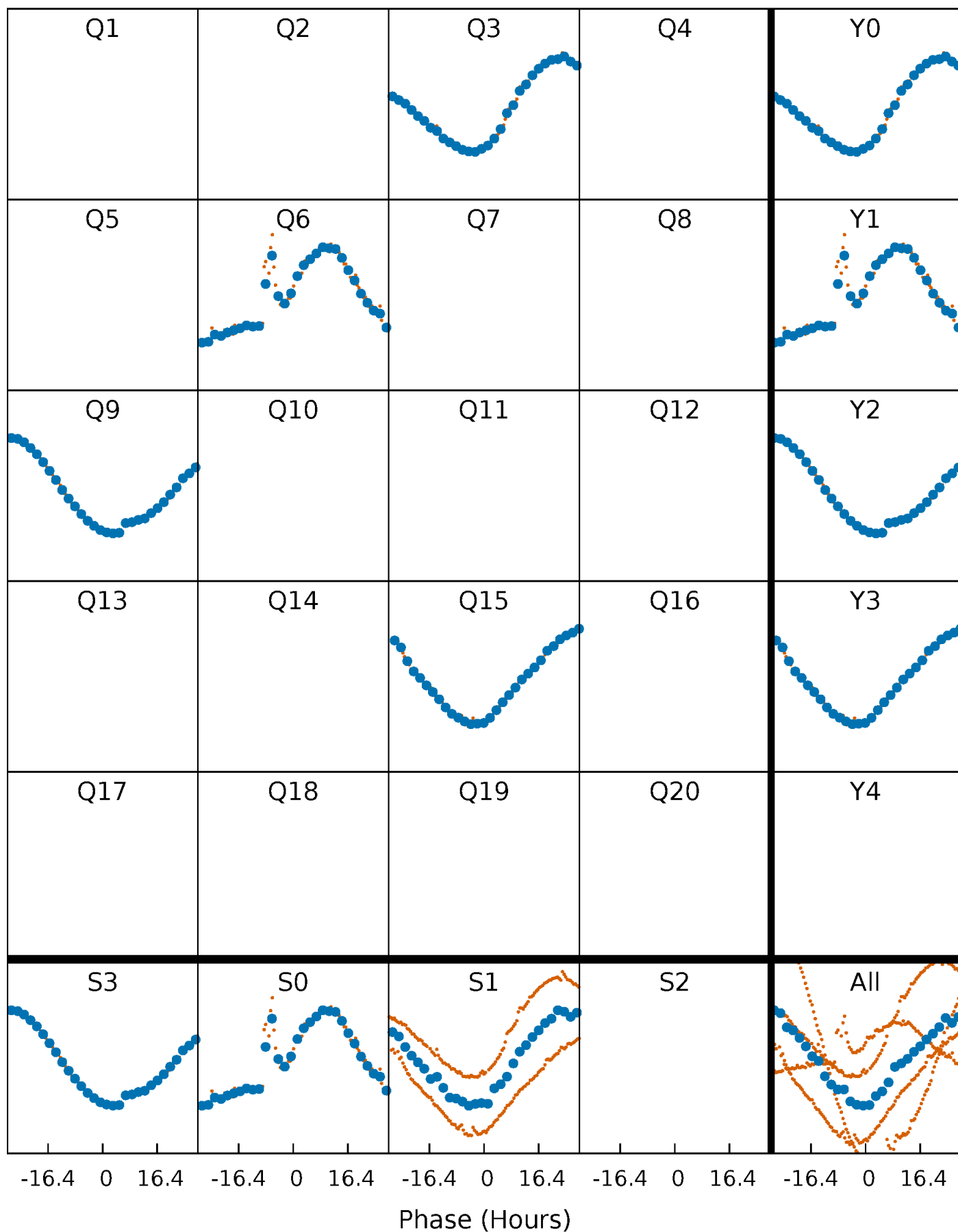


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



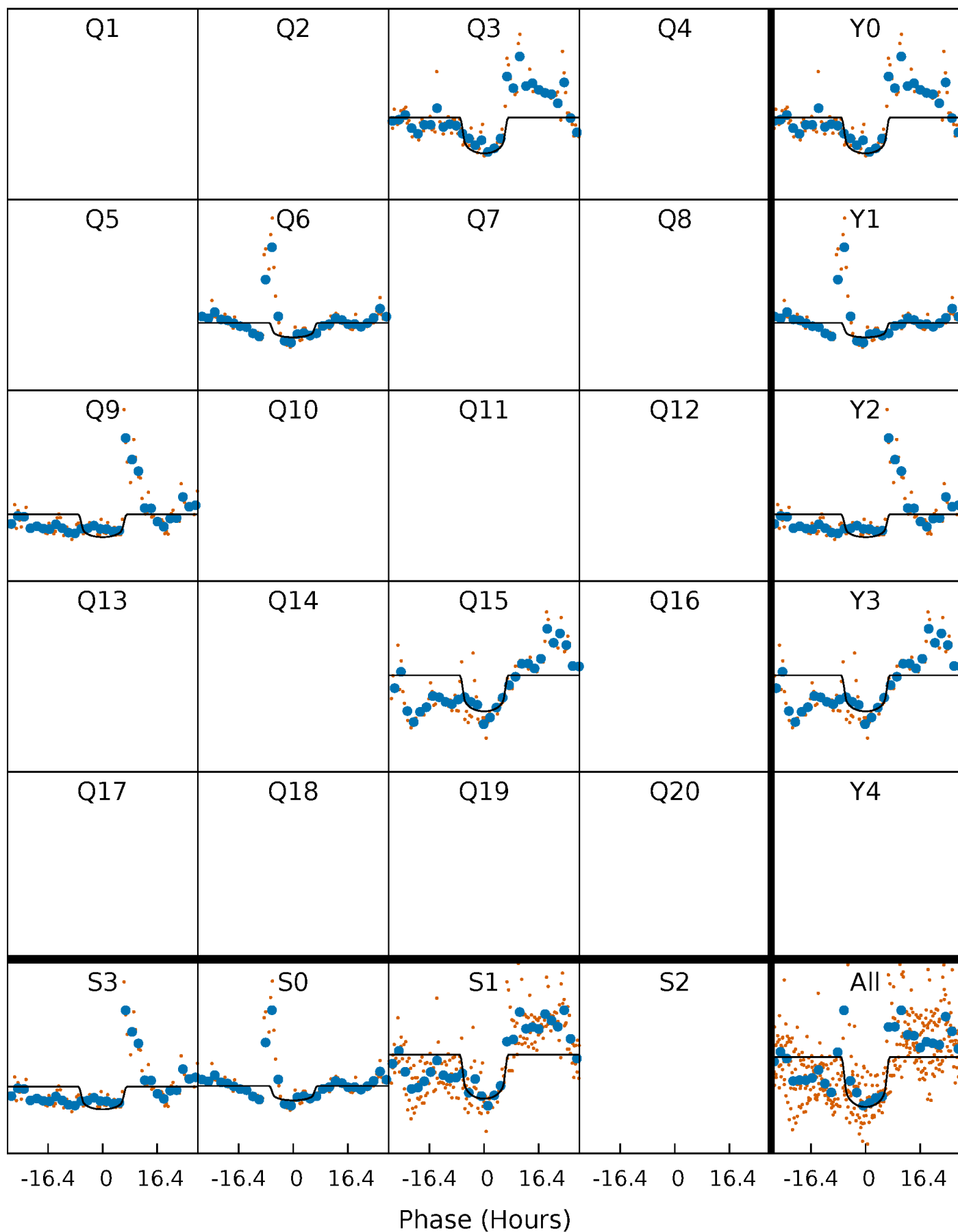
# PDC Quarter-Phased Transit Curves

TCE 010909367-01 P=292.730001 Days  $T_0=277.060874$  (BKJD)



# DV Quarter-Phased Transit Curves

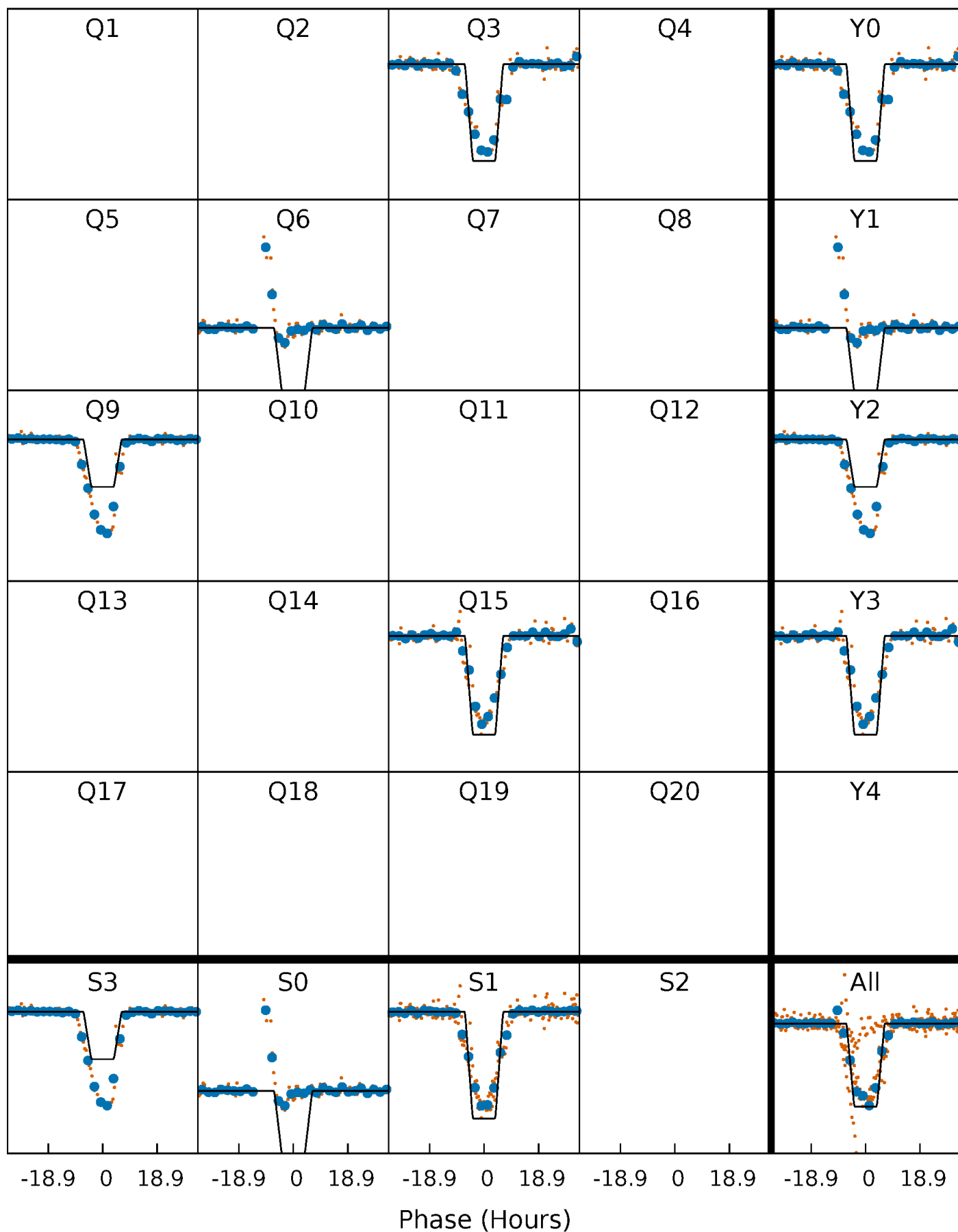
TCE 010909367-01 P=292.730001 Days  $T_0=277.060874$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

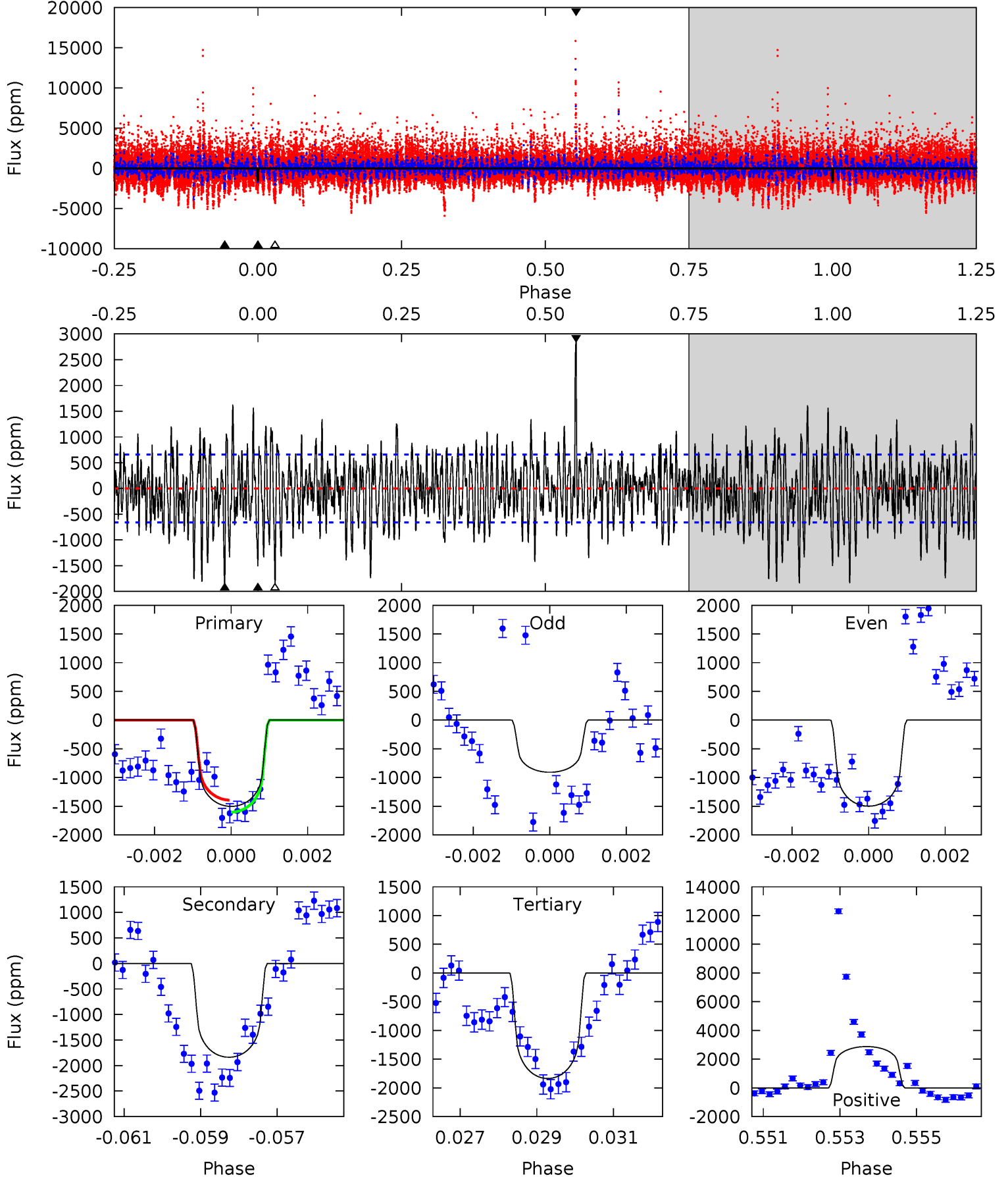
TCE 010909367-01 P=292.724369 Days  $T_0=277.148906$  (BKJD)



# DV Model-Shift Uniqueness Test

010909367-01, P = 292.730001 Days, E = 277.060874 Days

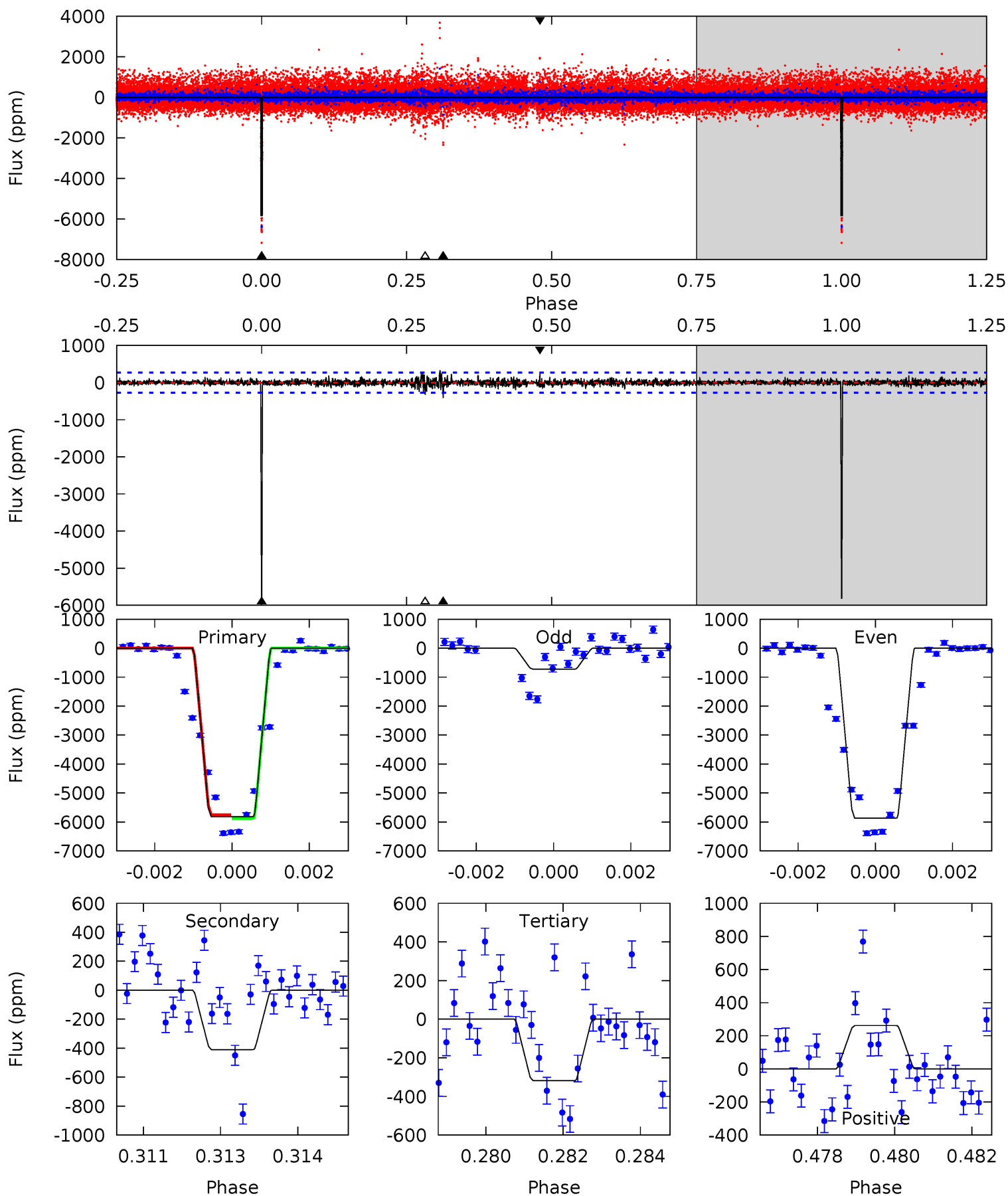
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
12.1	14.8	14.8	23.2	5.32	3.08	4.31	-2.69	-11.1	0.01	-8.39	1.09	1.06	0.61	0.84



# Alt Model-Shift Uniqueness Test

010909367-01, P = 292.724369 Days, E = 277.148906 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
114.0	8.04	6.24	5.13	5.34	3.10	0.95	107.8	108.9	1.80	2.91	40.2	1.08	0.05	1.24



### Stellar Parameters For KIC 010909367

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3805^{+45}_{-49}$	$4.733^{+0.030}_{-0.015}$	$-0.100^{+0.100}_{-0.100}$	$0.513^{+0.020}_{-0.028}$	$0.519^{+0.026}_{-0.021}$	$5.426^{+0.744}_{-0.384}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-5%	+5%/-4%	+14%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 010909367-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1837 \pm 124$	$2.33^{+0.32}_{-0.27}$	$201^{+3}_{-3}$	$3835^{+175}_{-162}$	$89516^{+25736}_{-20058}$
Alt.	$-410 \pm 51$	$4.76^{+0.27}_{-0.34}$	$201^{+3}_{-3}$	$2518^{+59}_{-59}$	$4865^{+917}_{-850}$

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

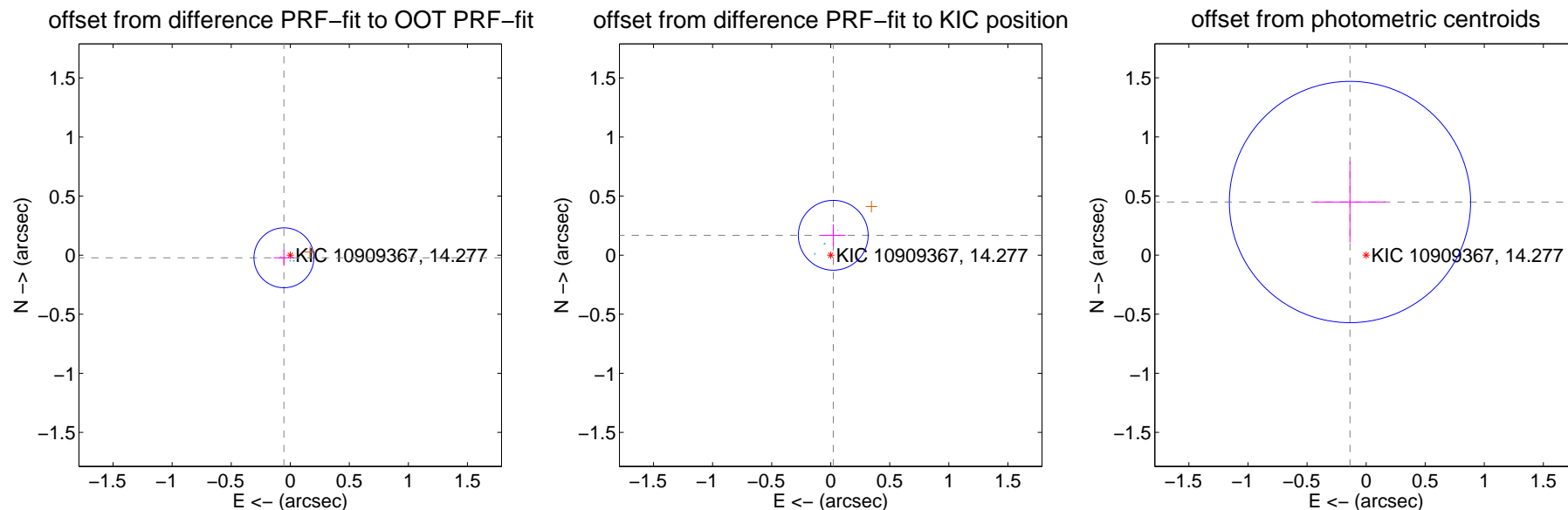
## DV Centroid Data

Supplemental centroid analysis for 010909367-01. Kepler magnitude: 14.28. Transit SNR 6.20

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

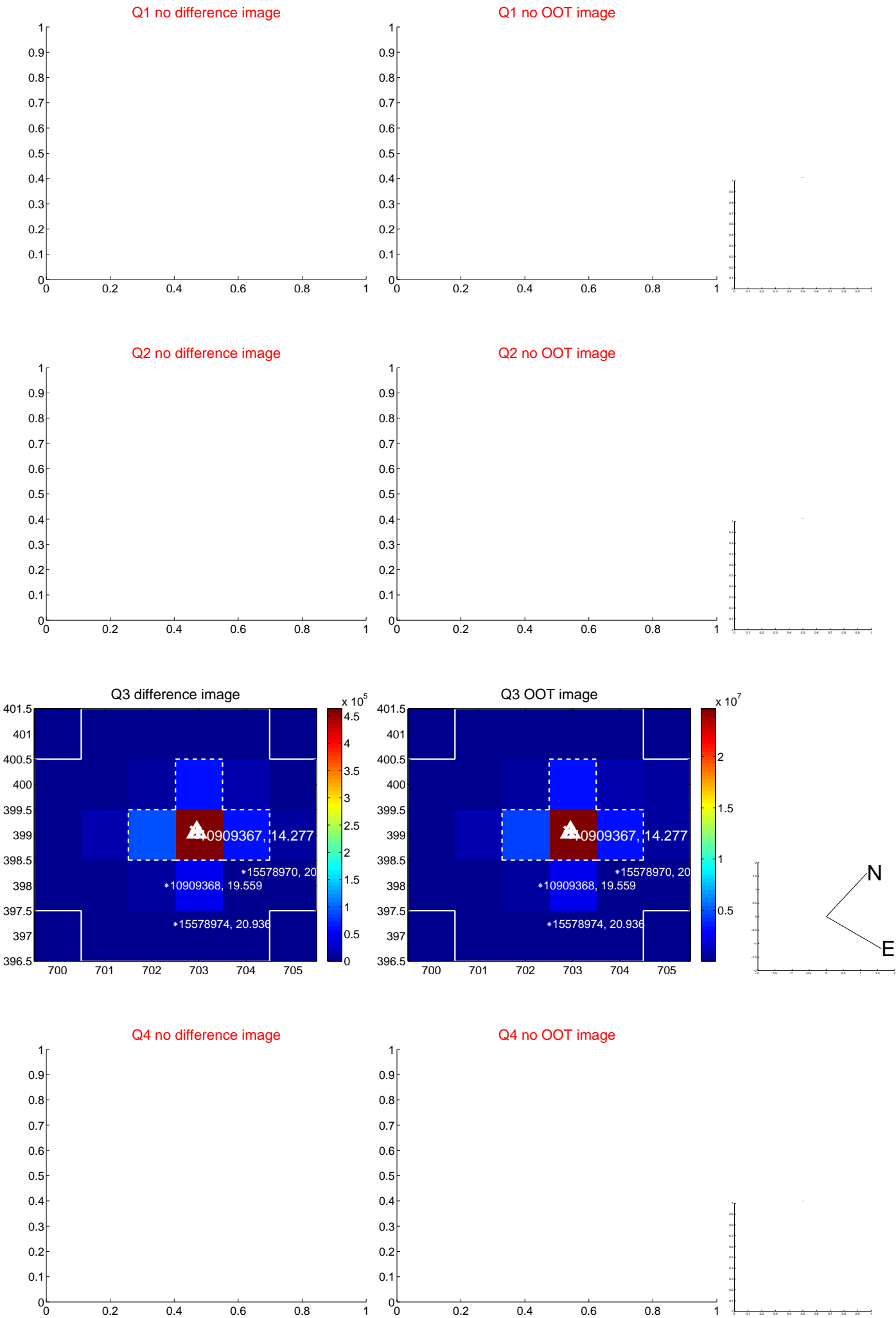
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.058 \pm 0.085$	0.69	$0.054 \pm 0.085$	$-0.022 \pm 0.068$
PRF-fit source offset from KIC position	$0.170 \pm 0.098$	1.72	$-0.021 \pm 0.105$	$0.168 \pm 0.092$
photometric centroid source offset	$0.47 \pm 0.34$	1.38	$0.14 \pm 0.30$	$0.45 \pm 0.34$



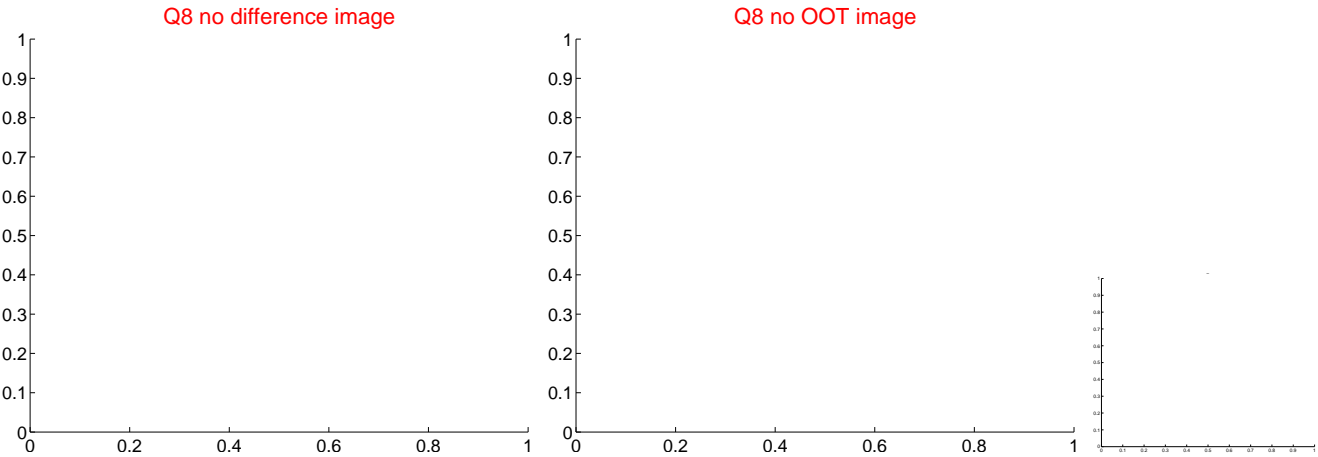
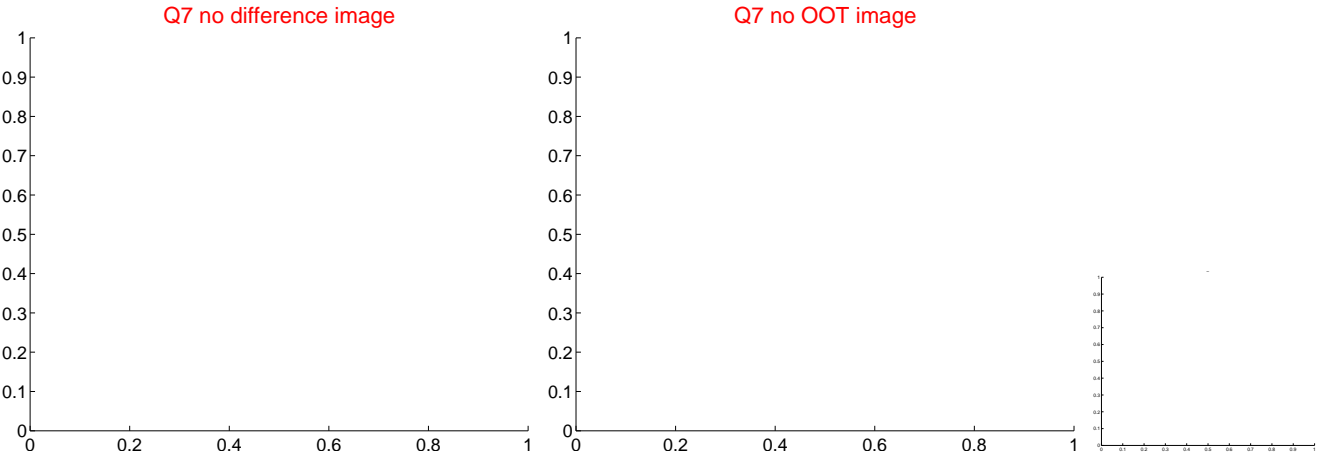
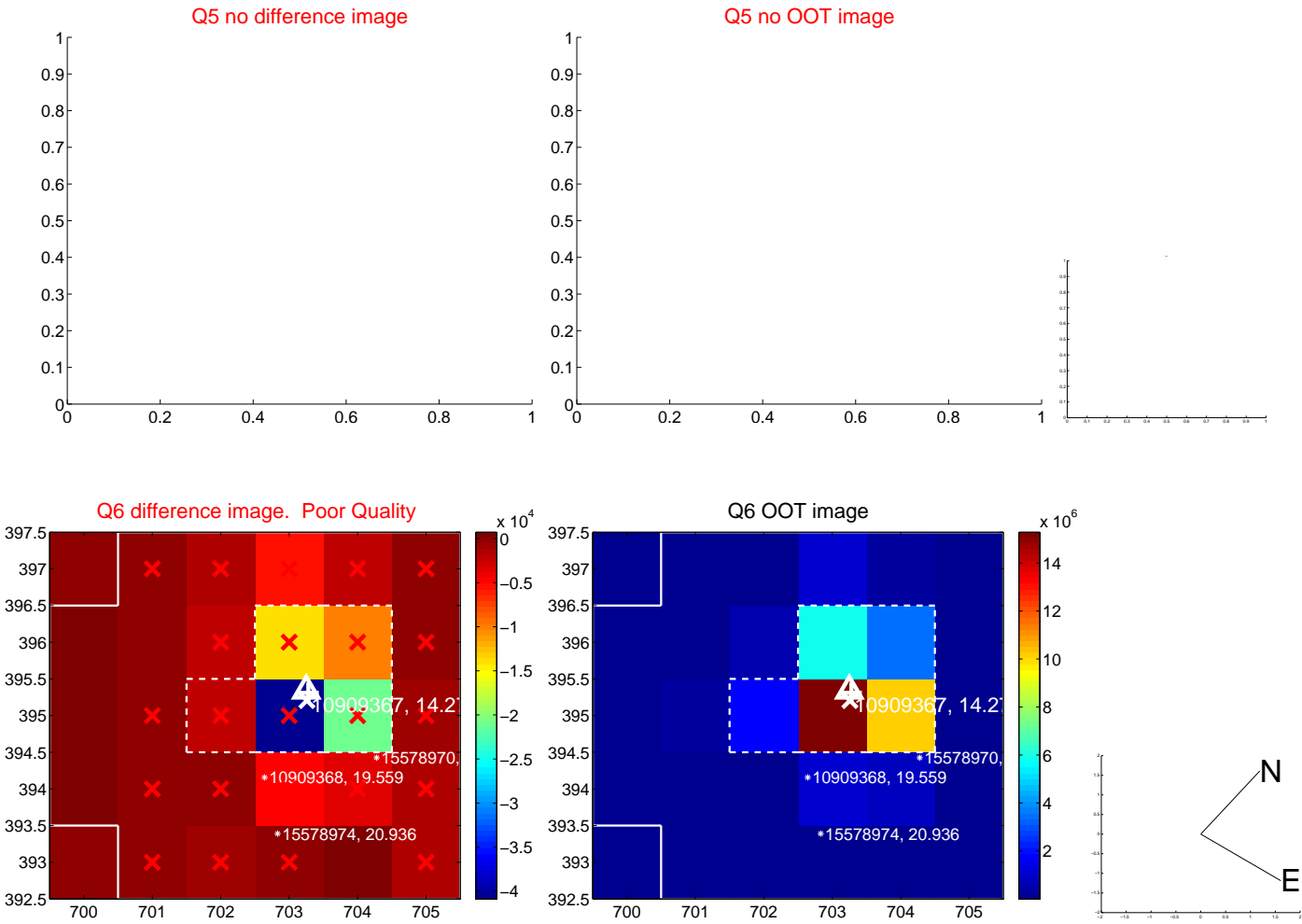
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



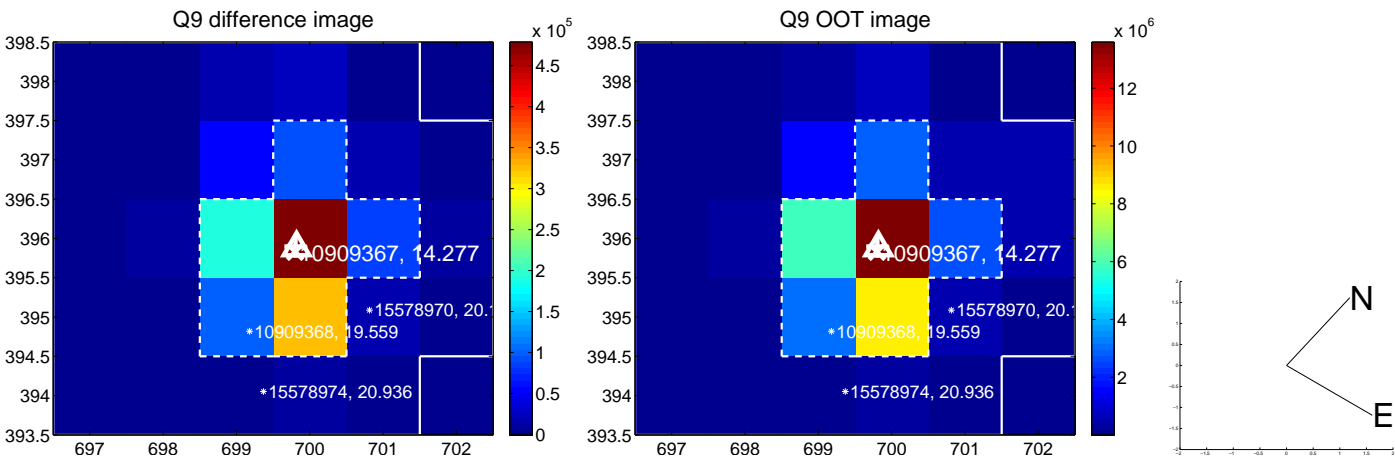
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



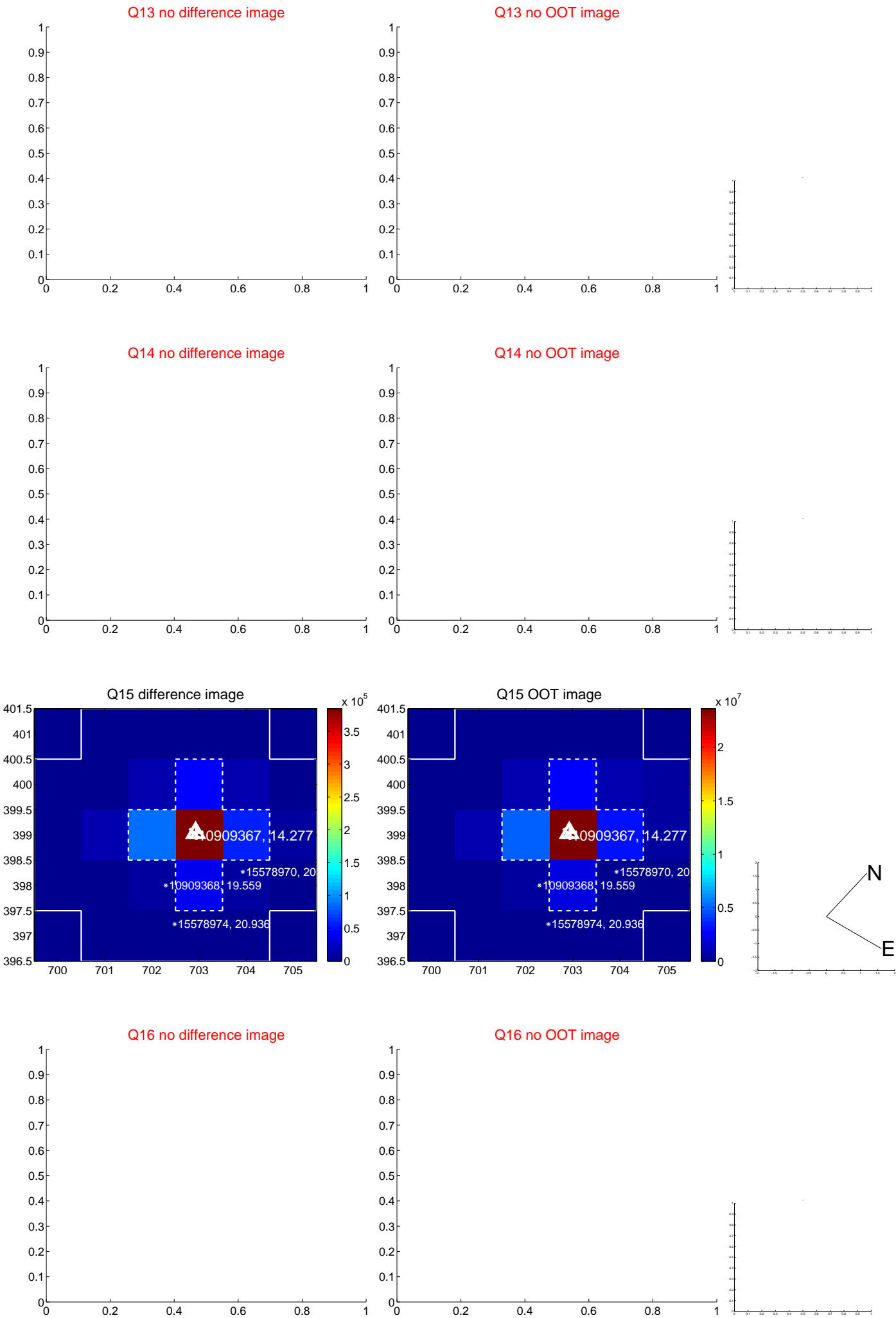
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



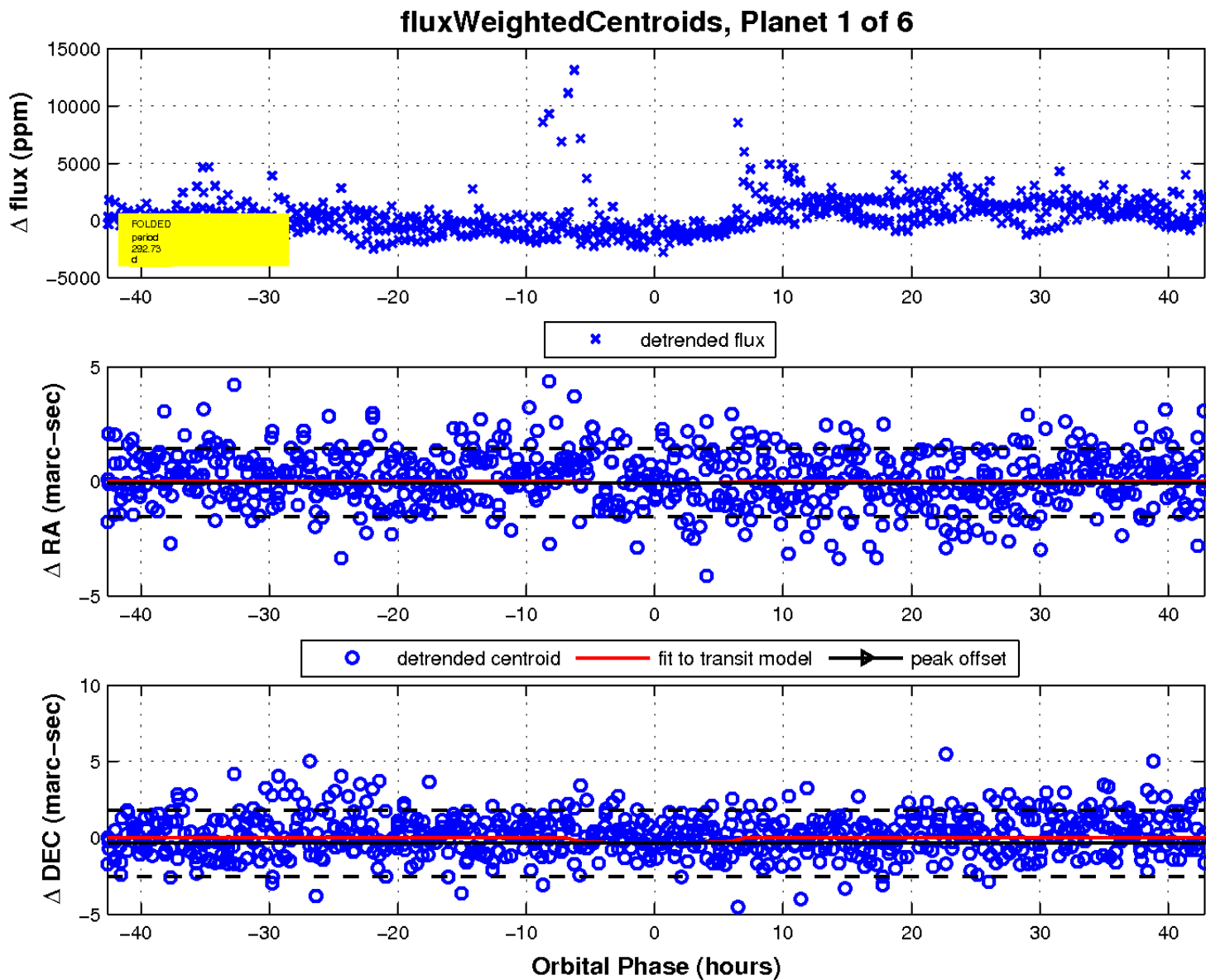
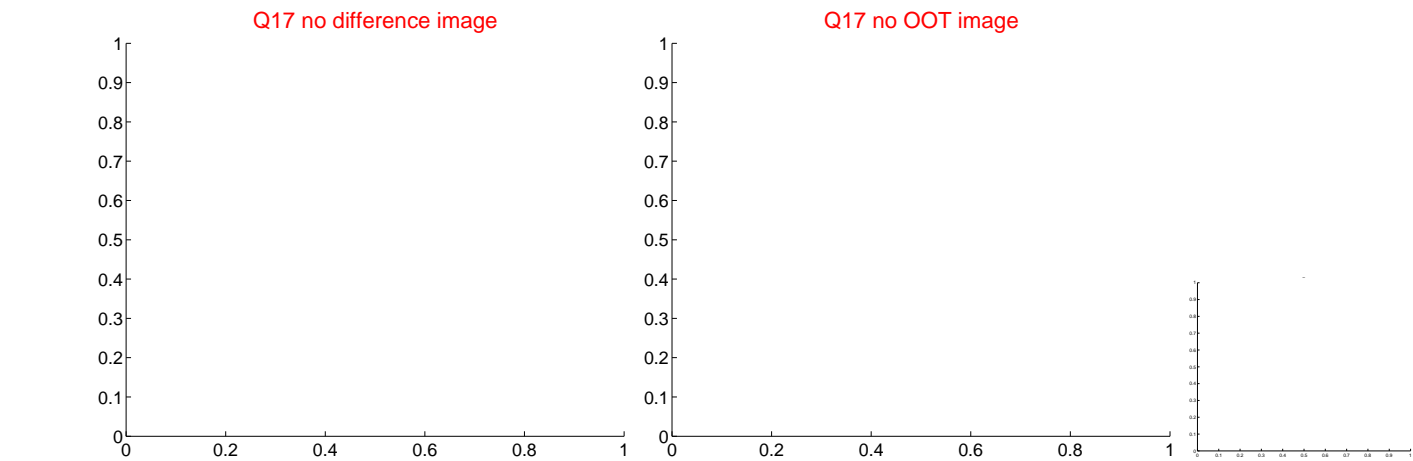
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white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



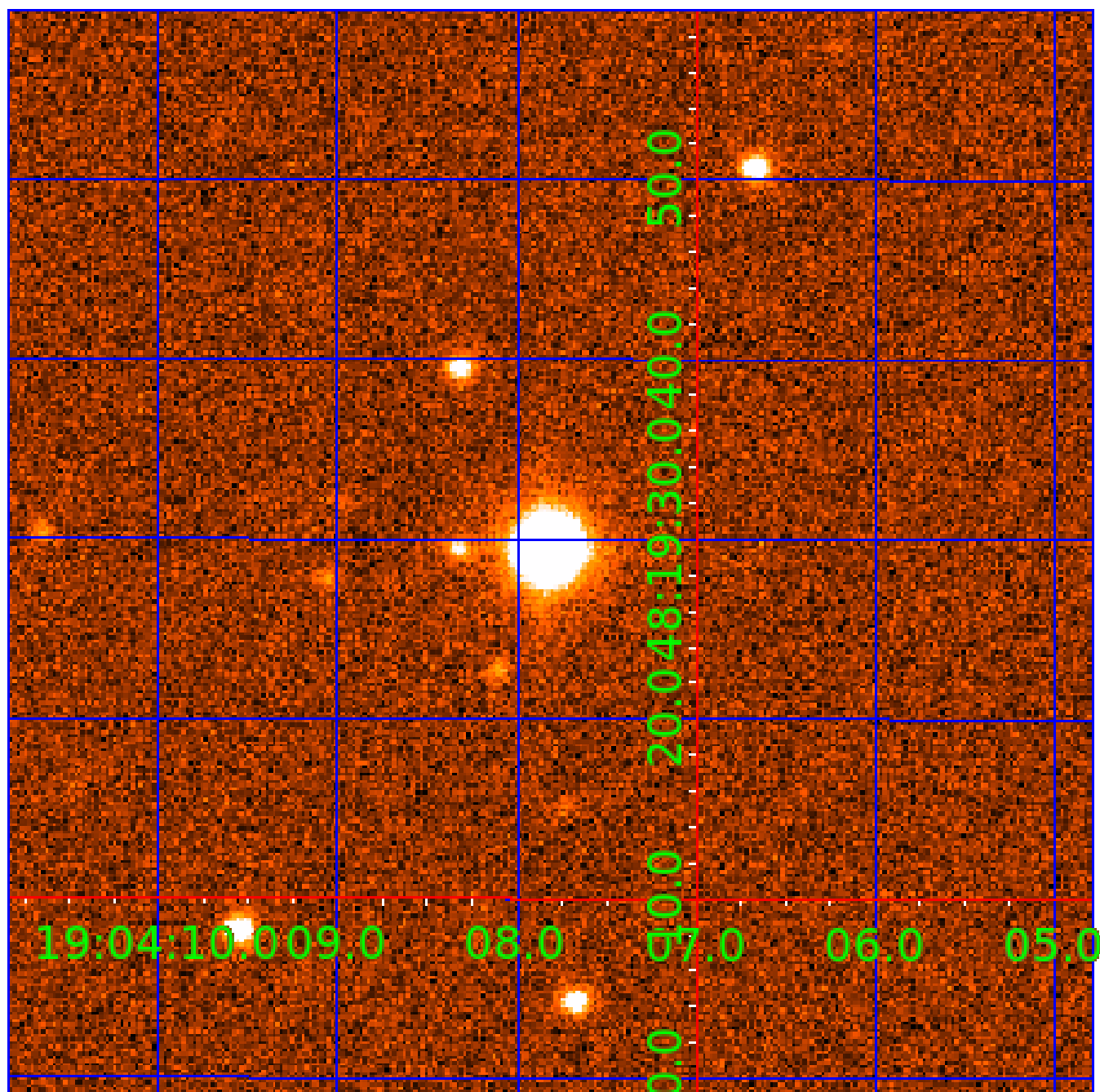
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 010909367

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
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010909367-05	OBS	No	167.388853	259.787514	1259.7	4.148	12.3	6.3	0.51	3805	1.88	0.22
010909367-06	OBS	No	103.302853	194.293093	833.5	3.459	11.7	6.8	0.51	3805	1.51	0.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010909367-01	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
010909367-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010909367-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
010909367-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
010909367-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
010909367-06	OBS	FP	0.01	1	0	0	0	LPP_DV—INCONSISTENT_TRANS

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

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

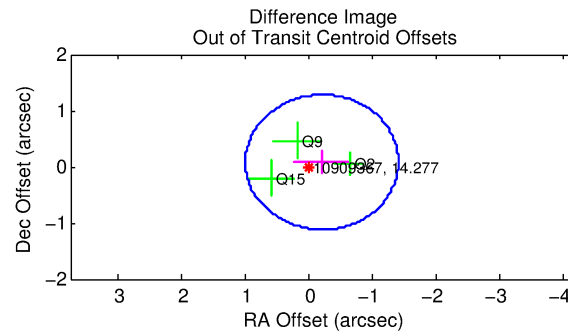
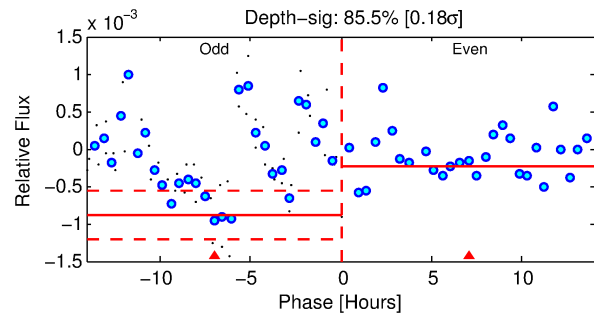
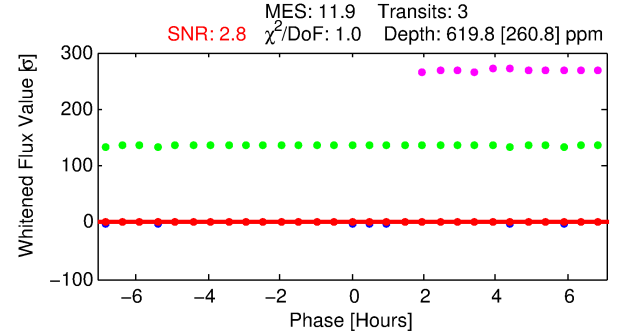
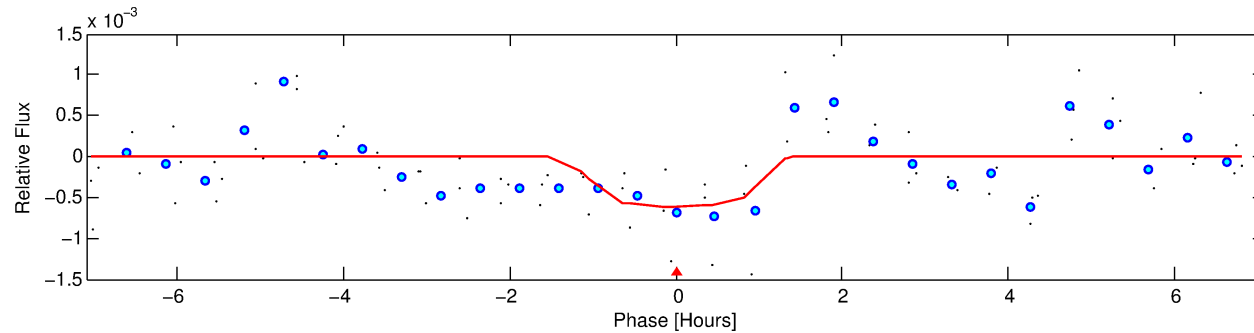
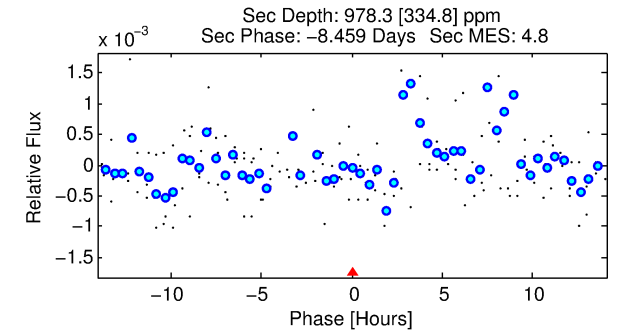
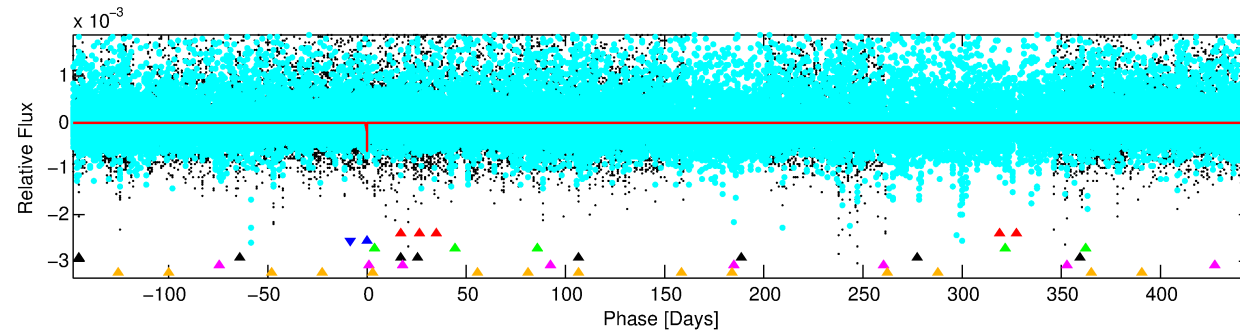
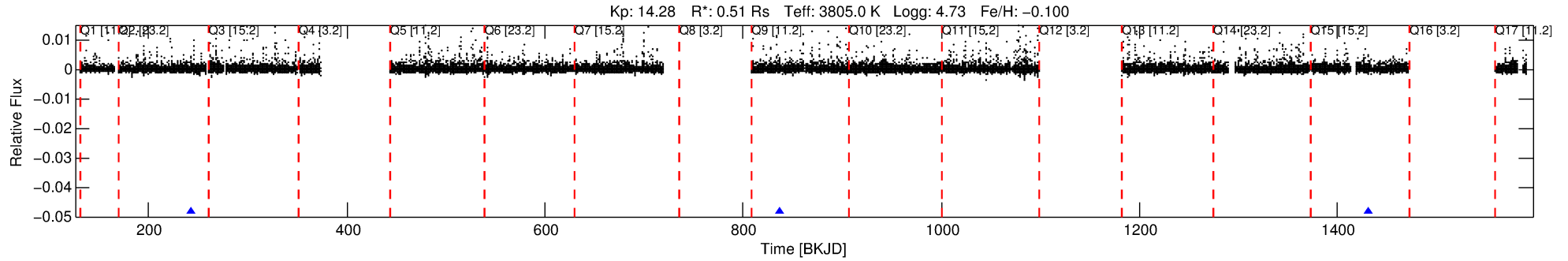
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010909367-02

No Significant Match Found

# DV One-Page Summary

KIC: 10909367 Candidate: 2 of 6 Period: 594.267 d



## DV Fit Results:

Period = 594.26736 [0.00870] d  
Epoch = 242.2494 [0.0136] BKJD  
Rp/R\* = 0.0253 [0.0462]  
a/R\* = 1243.75 [9799.06]  
b = 0.80 [3.68]  
Seff = 0.04 [0.00]  
Teq = 114 [2] K  
Rp = 1.41 [2.59] Re  
a = 1.1120 [0.0479] AU  
Ag = 332464.66 [1222132.67] [0.27σ]  
Teffp = 4233 [3890] K [1.06σ]

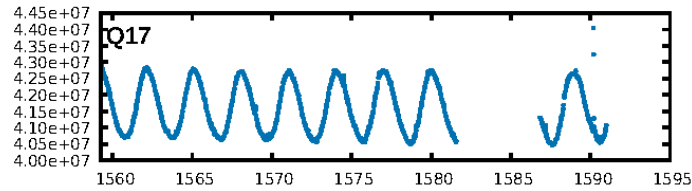
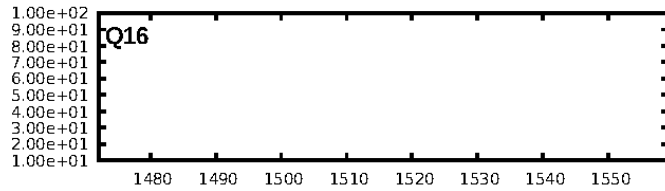
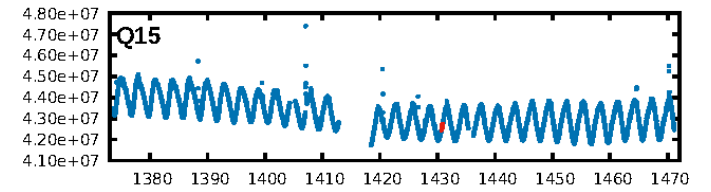
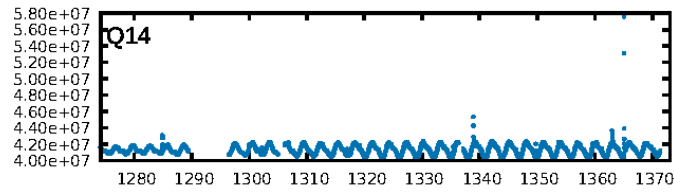
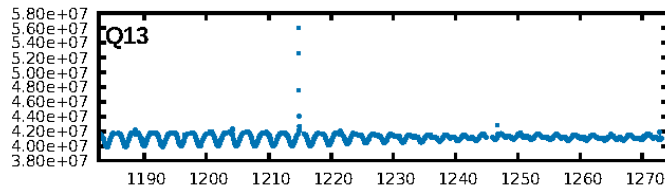
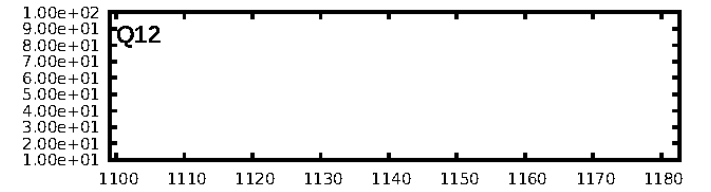
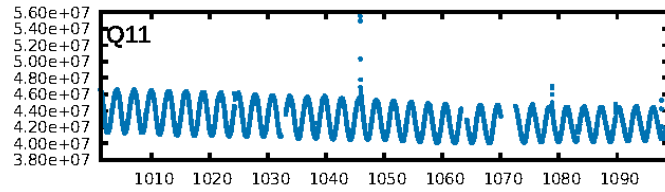
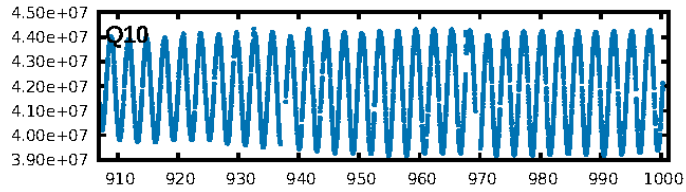
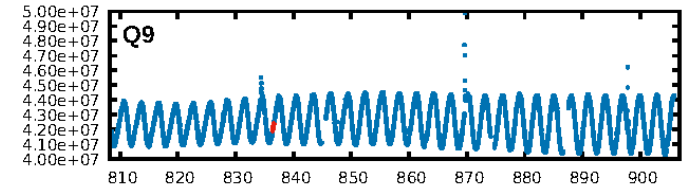
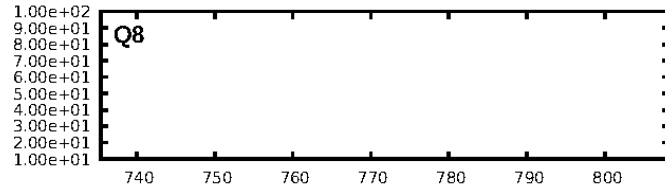
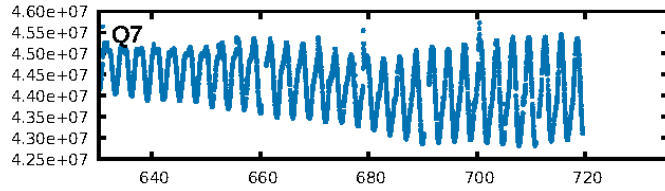
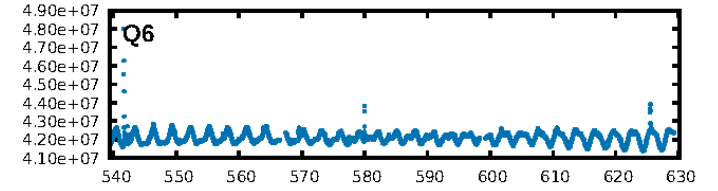
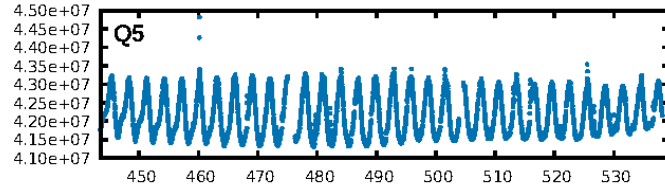
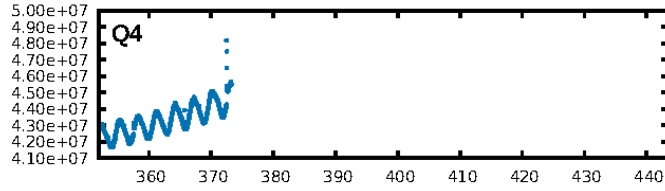
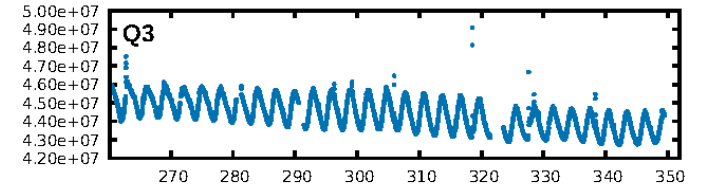
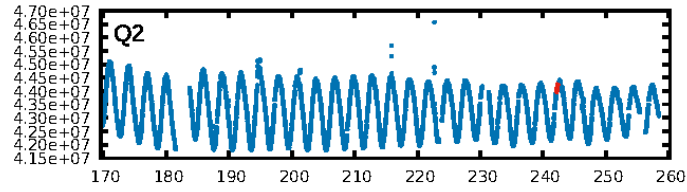
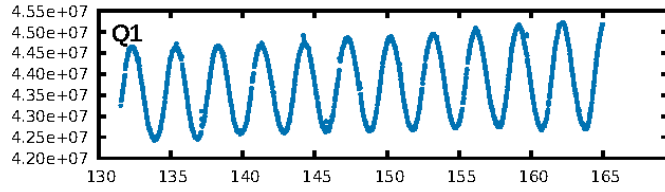
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1518.74σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 15.6%  
ModelChiSquareGof-sig: 98.7%  
**Bootstrap-pfa: 2.10e-08**  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: -0.5971**  
Centroid-sig: 58.5%  
Centroid-so: 1.250 arcsec [0.67σ]  
OotOffset-rm: 0.217 arcsec [0.54σ]  
KicOffset-rm: 0.417 arcsec [1.25σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

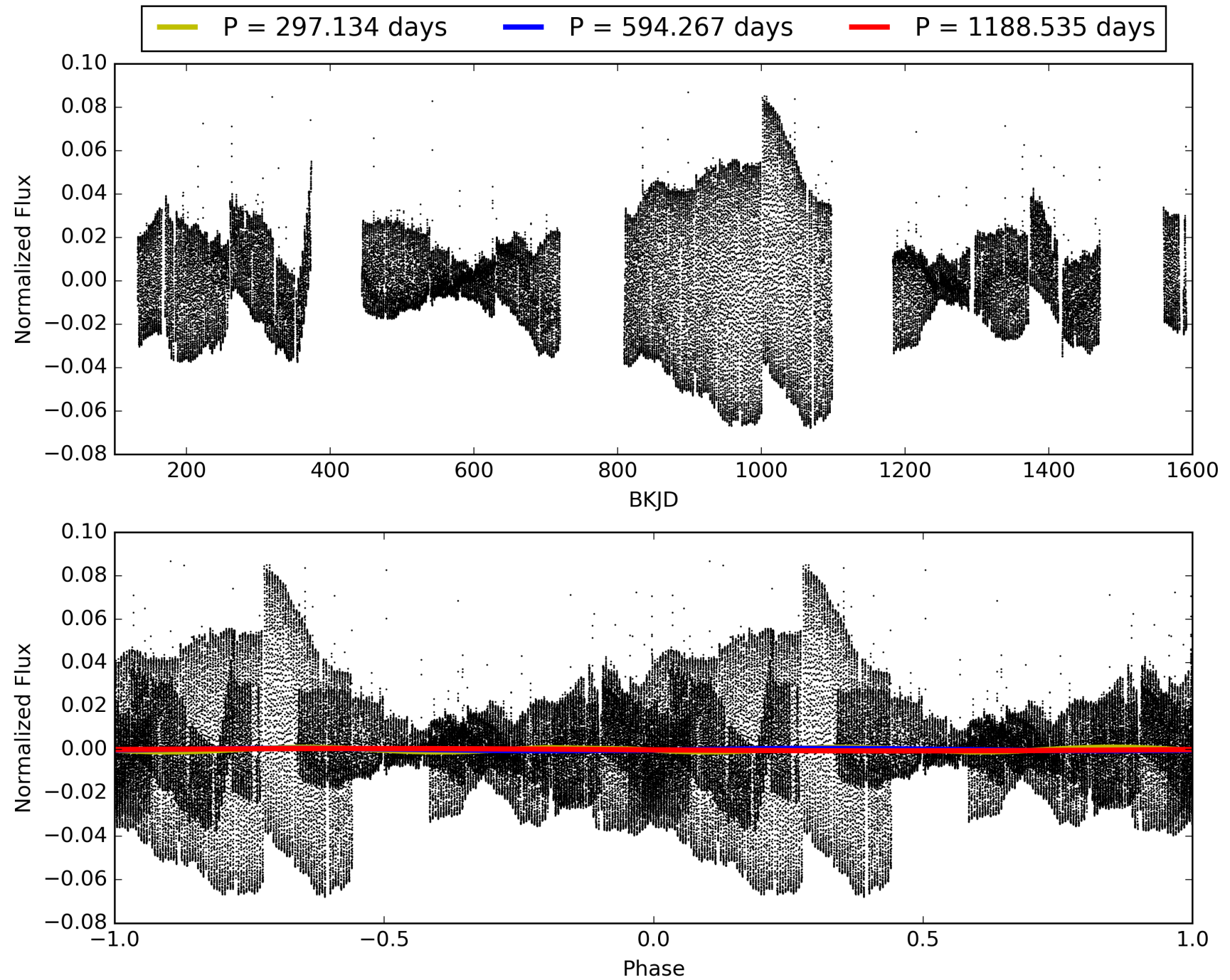
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:53:39 Z

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

# TCE 010909367-02, PDC Light Curves



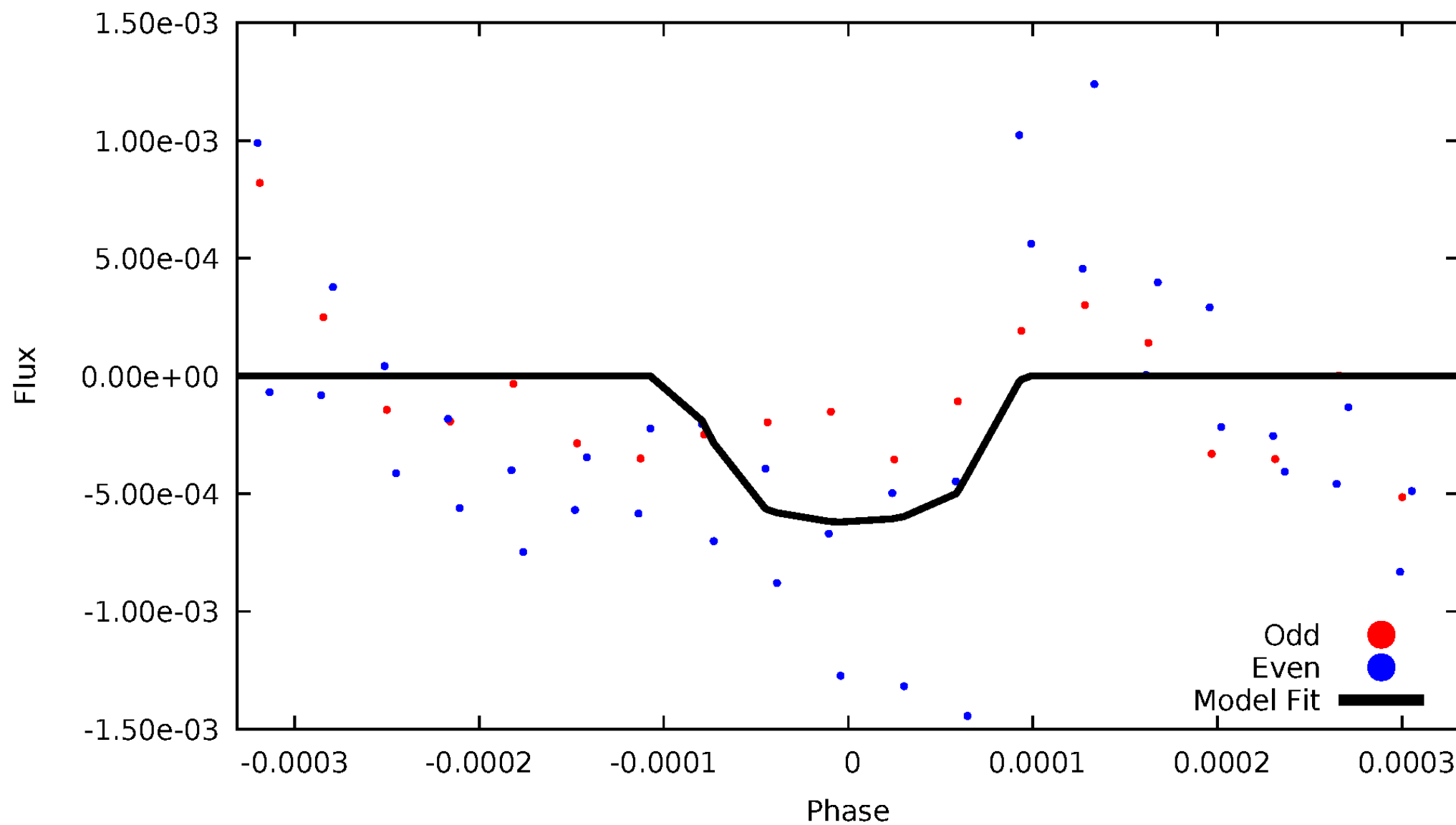
# TCE 010909367-02





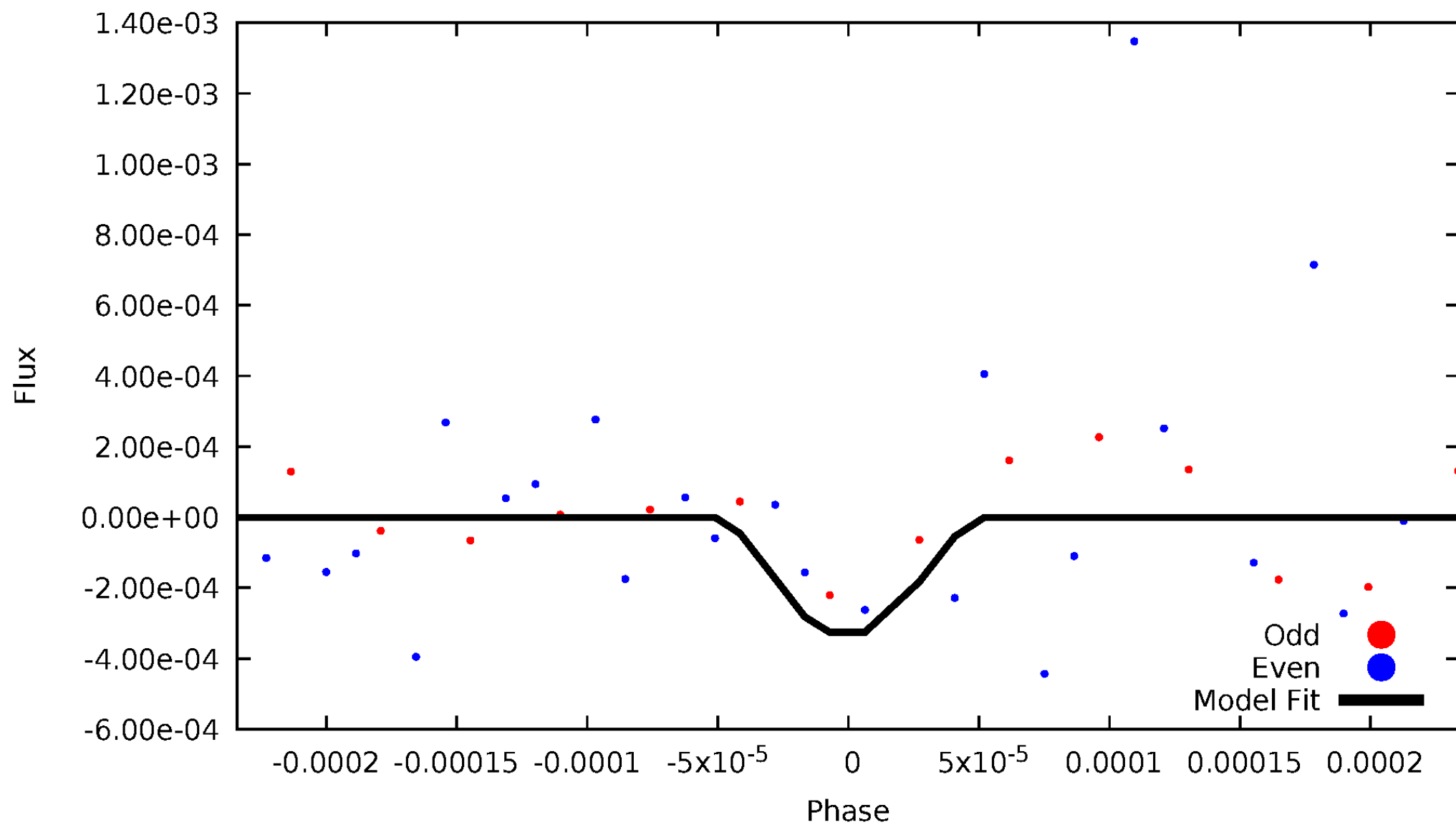
# DV Odd/Even

TCE 010909367-02



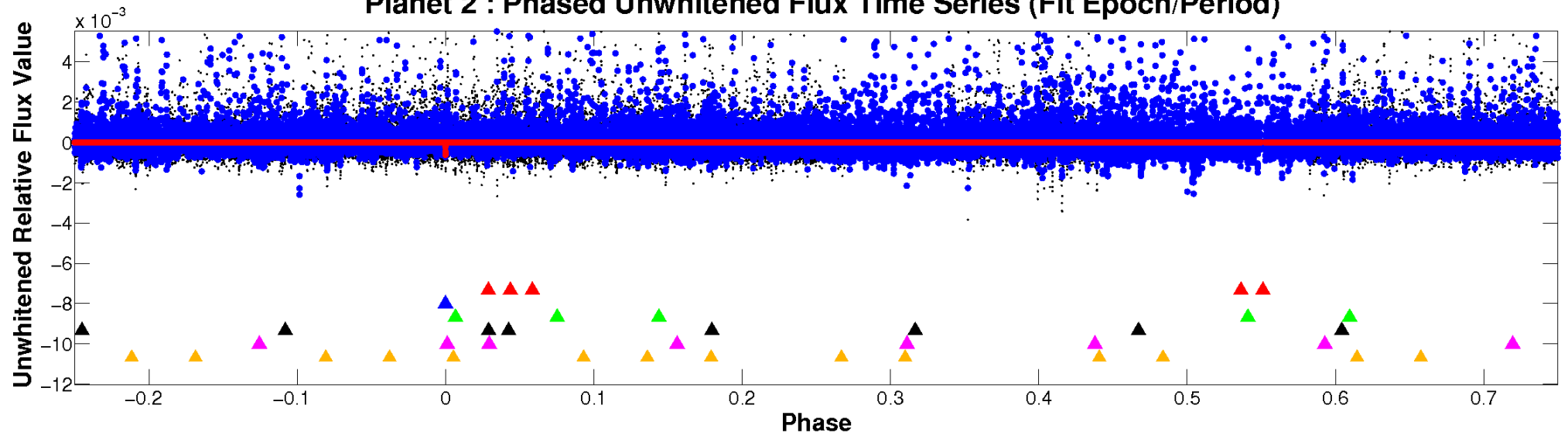
# ALT Odd/Even

TCE 010909367-02

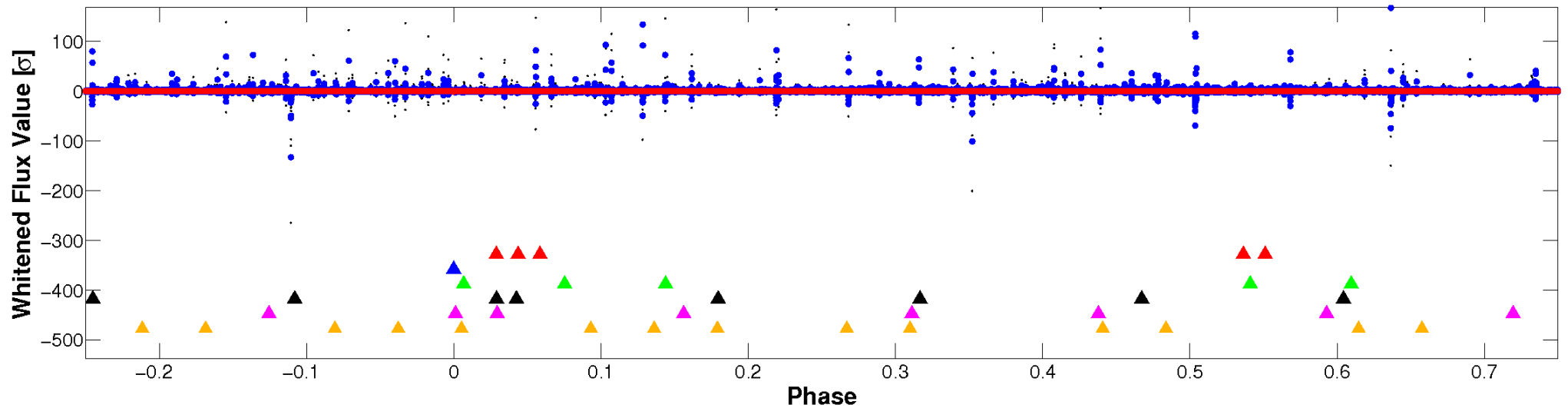


# Non-Whitened Vs. Whitened Light Curve

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

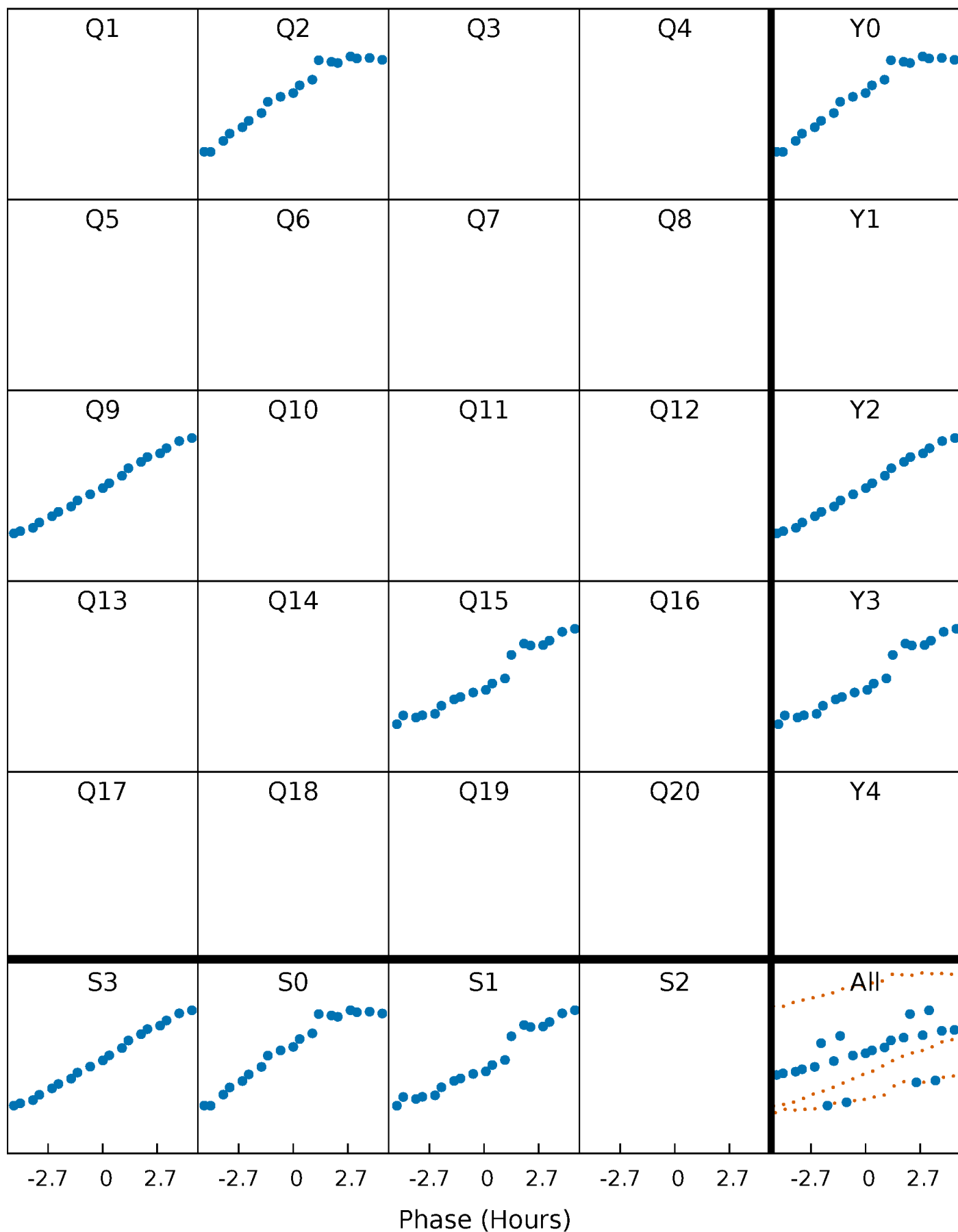


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



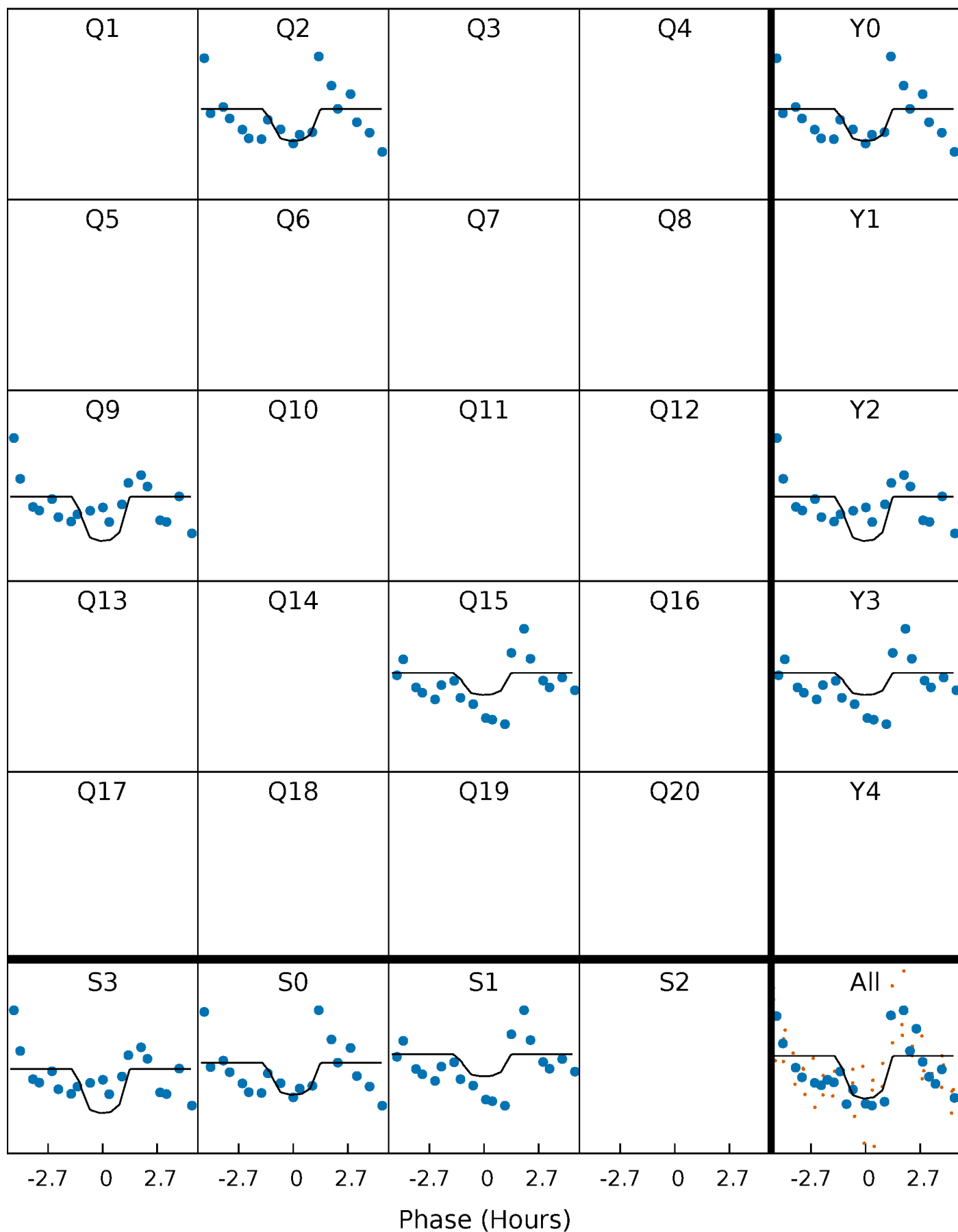
# PDC Quarter-Phased Transit Curves

TCE 010909367-02     $P=594.267355$  Days     $T_0=242.249431$  (BKJD)



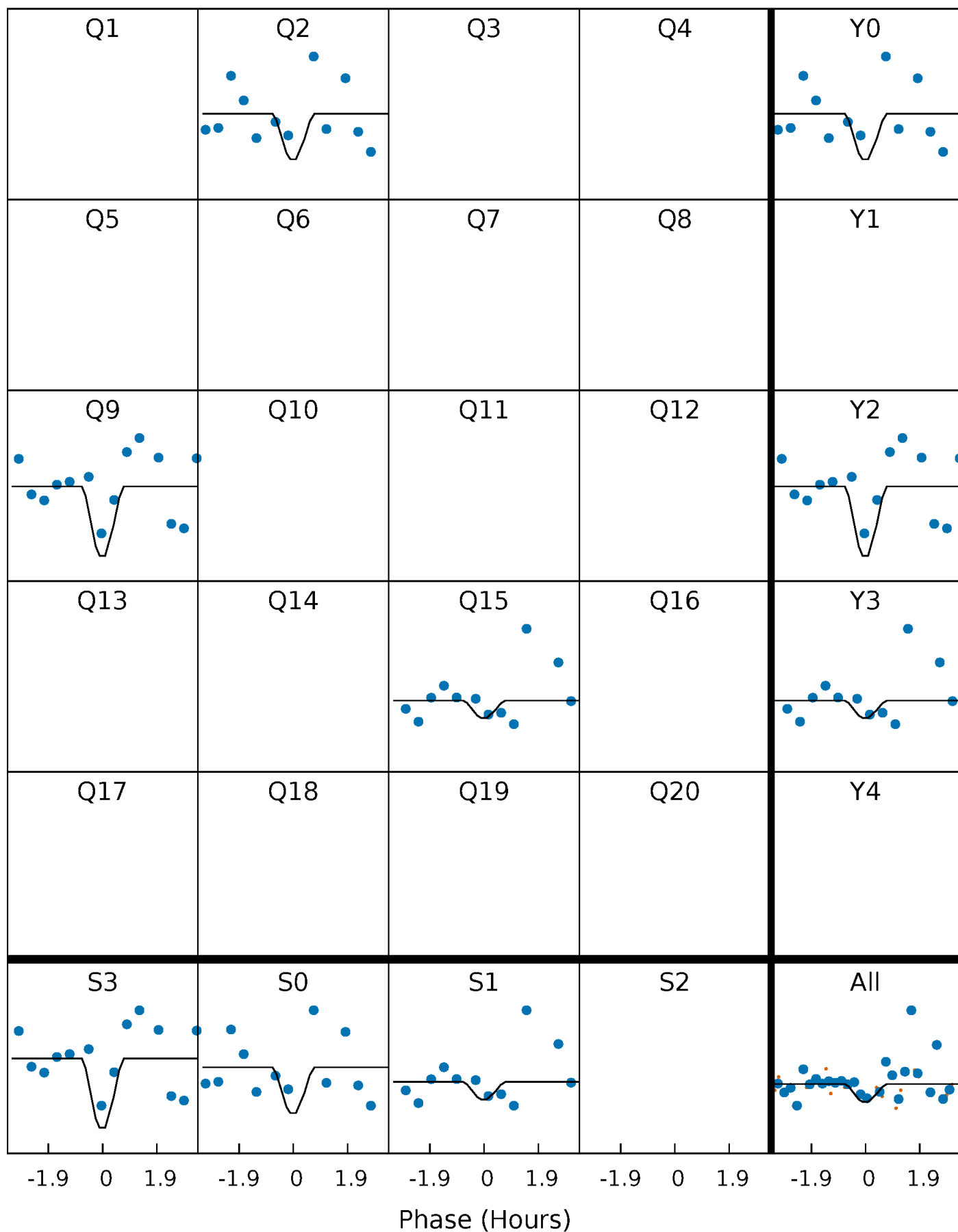
# DV Quarter-Phased Transit Curves

TCE 010909367-02     $P=594.267355$  Days     $T_0=242.249431$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

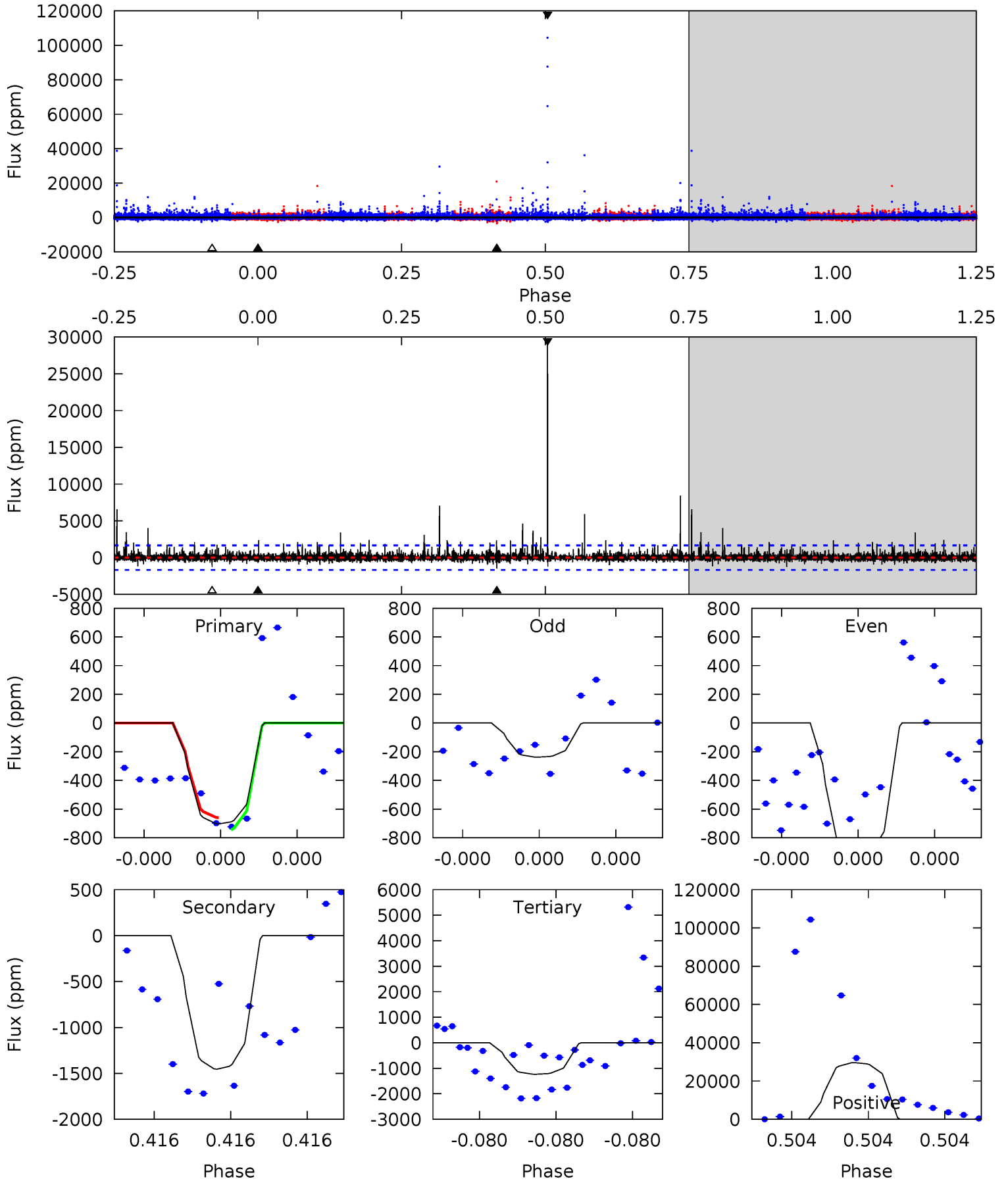
TCE 010909367-02 P=594.241981 Days  $T_0=242.293918$  (BKJD)



# DV Model-Shift Uniqueness Test

010909367-02, P = 594.267355 Days, E = 242.249431 Days

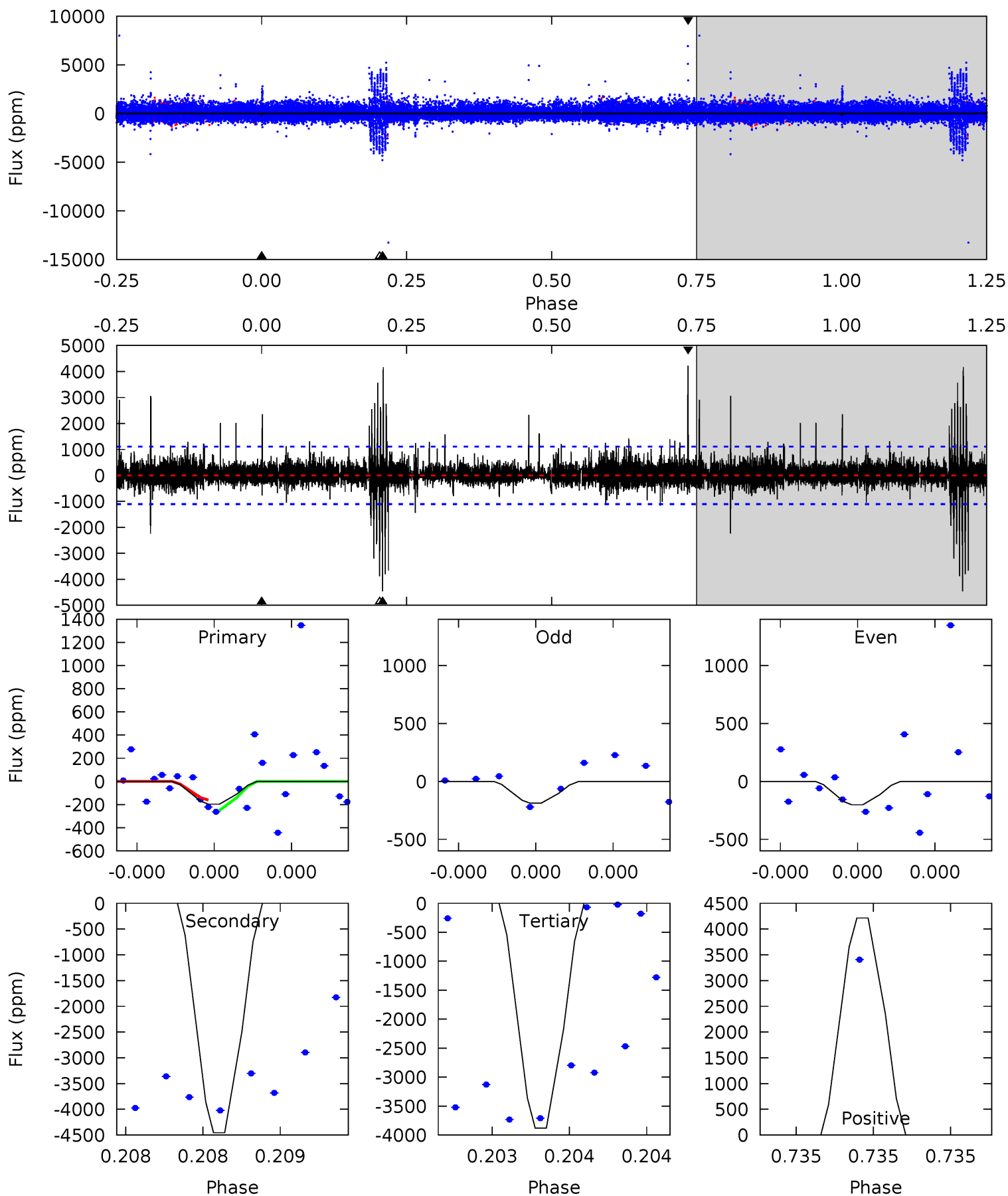
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.43	5.03	4.27	102.4	5.76	3.76	1.98	-1.83	-100.0	0.76	-97.4	0.47	1.31	0.95	0.15



# Alt Model-Shift Uniqueness Test

010909367-02, P = 594.241981 Days, E = 242.293918 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
1.04	23.5	20.5	22.3	5.86	3.91	1.68	-19.5	-21.2	3.03	1.26	0.03	1.00	0.49	0.24





### Stellar Parameters For KIC 010909367

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3805^{+45}_{-49}$	$4.733^{+0.030}_{-0.015}$	$-0.100^{+0.100}_{-0.100}$	$0.513^{+0.020}_{-0.028}$	$0.519^{+0.026}_{-0.021}$	$5.426^{+0.744}_{-0.384}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-5%	+5%/-4%	+14%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 010909367-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1455 \pm 290$	$2.33^{+2.29}_{-1.53}$	$159^{+2}_{-3}$	$3667^{+1878}_{-683}$	$178403^{+1294475}_{-133452}$
Alt.	$-4454 \pm 189$	$2.29^{+2.05}_{-1.52}$	$159^{+3}_{-2}$	$4550^{+3249}_{-957}$	$592109^{+4594672}_{-435248}$

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

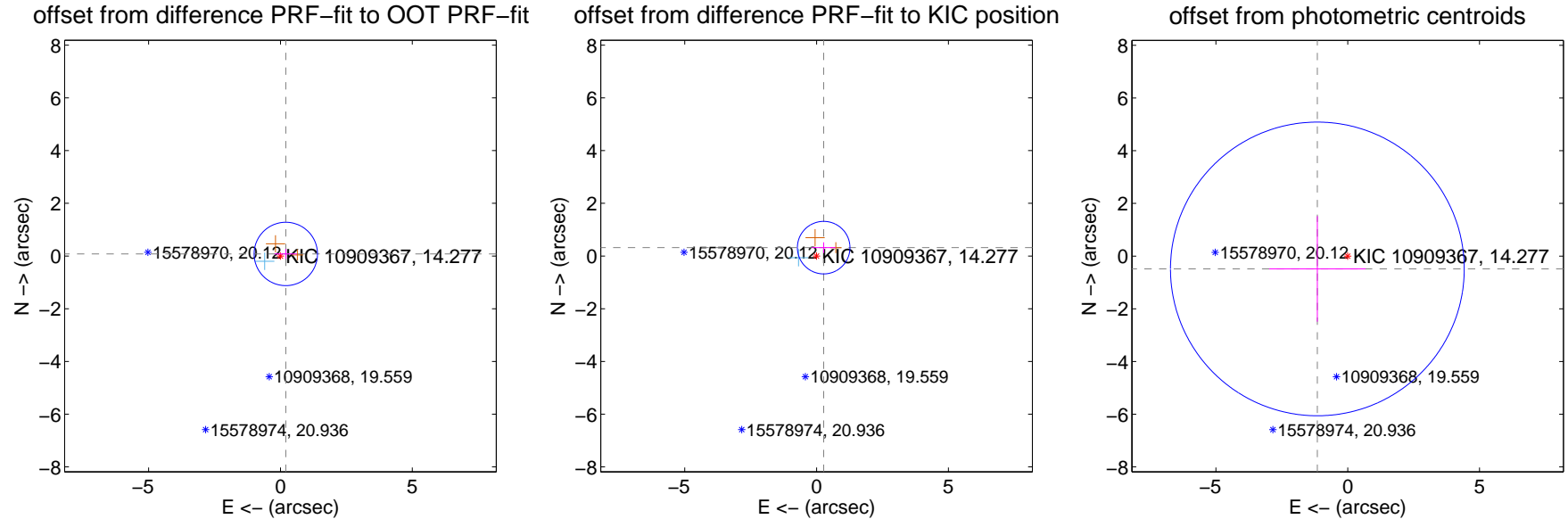
## DV Centroid Data

Supplemental centroid analysis for 010909367-02. Kepler magnitude: 14.28. Transit SNR 2.84

There are 1 quarters with good PRF difference image offsets

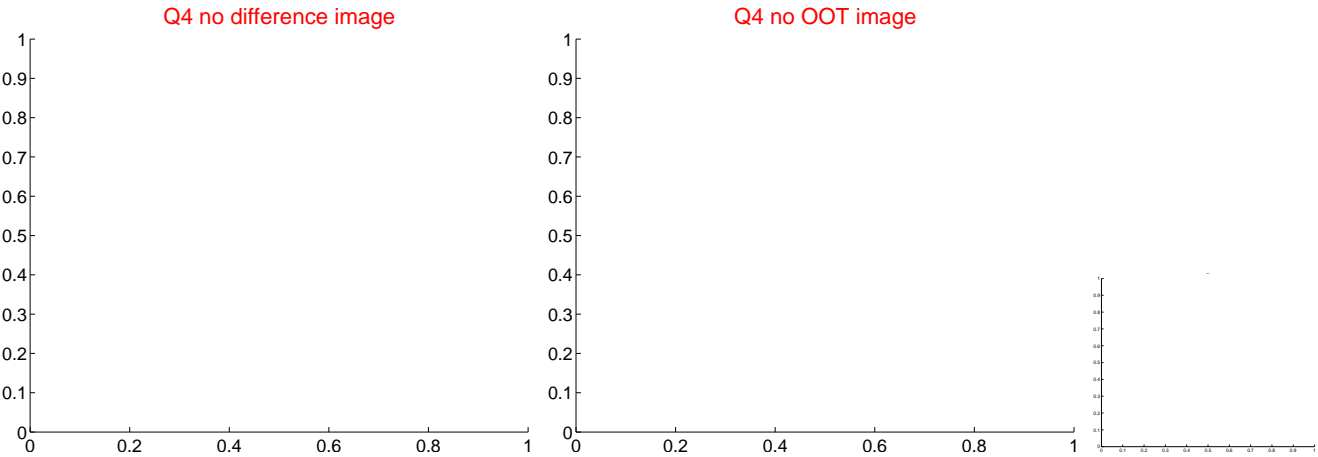
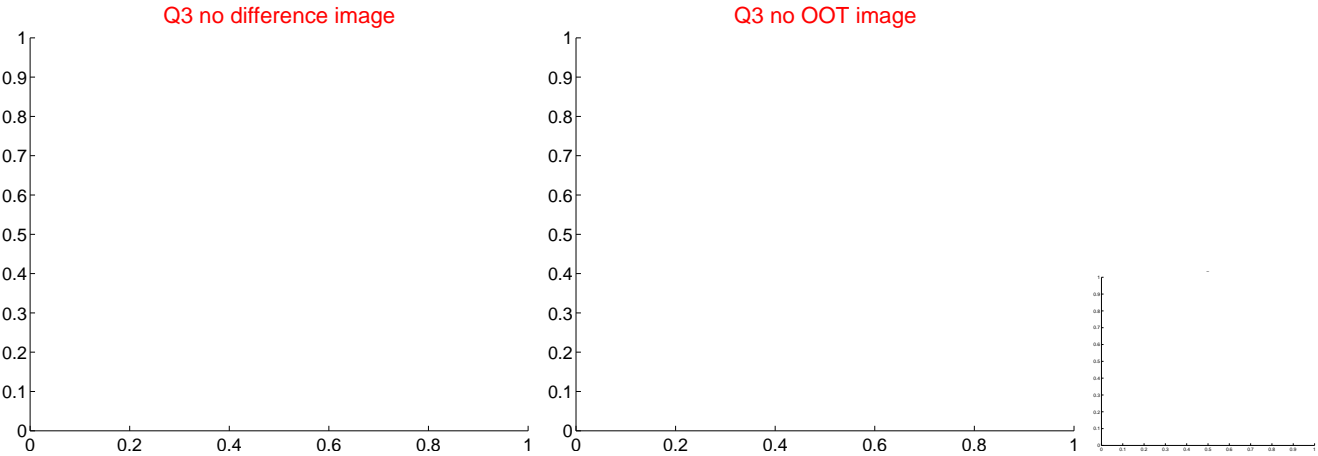
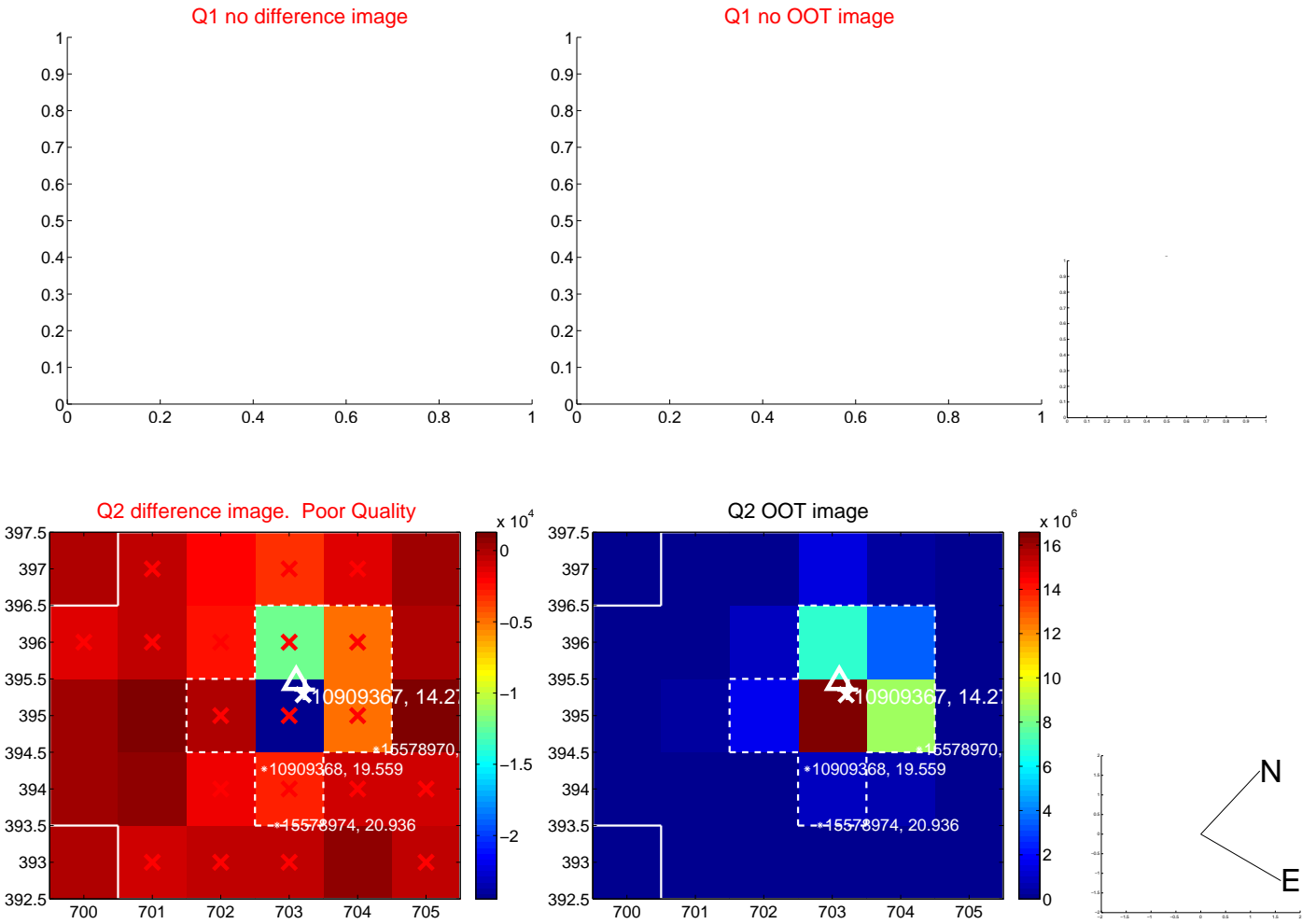
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.217 \pm 0.401$	0.54	$-0.203 \pm 0.424$	$0.079 \pm 0.190$
PRF-fit source offset from KIC position	$0.417 \pm 0.332$	1.25	$-0.269 \pm 0.455$	$0.318 \pm 0.204$
photometric centroid source offset	$1.25 \pm 1.86$	0.67	$1.15 \pm 1.83$	$-0.49 \pm 2.00$



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.

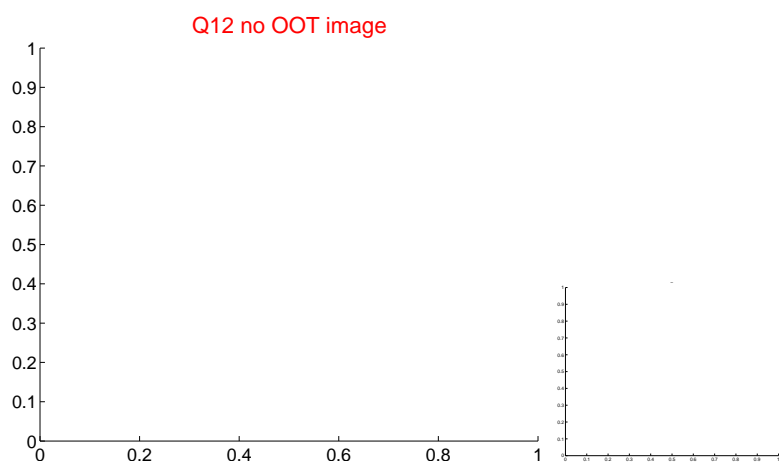
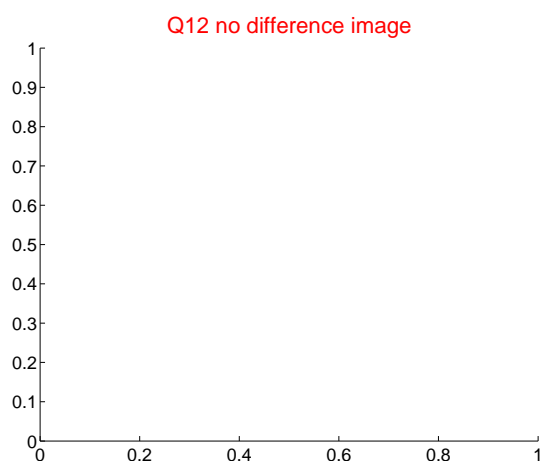
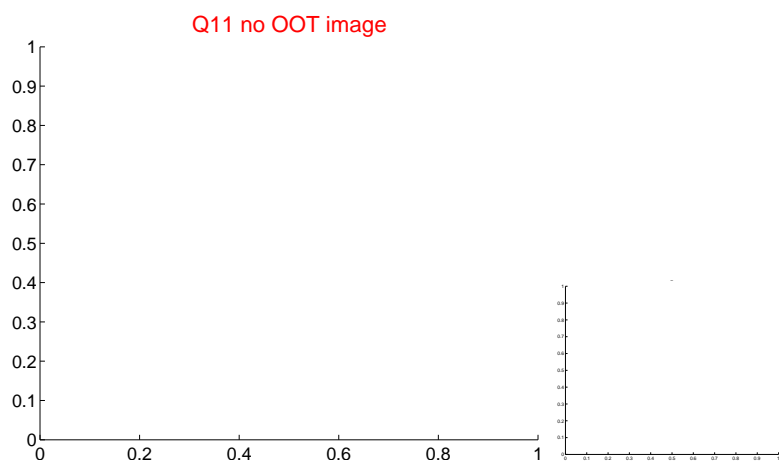
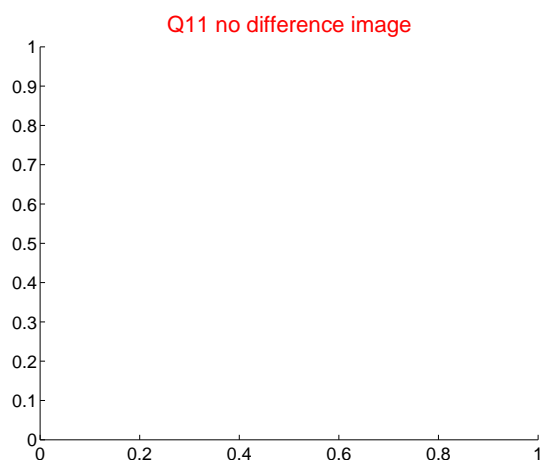
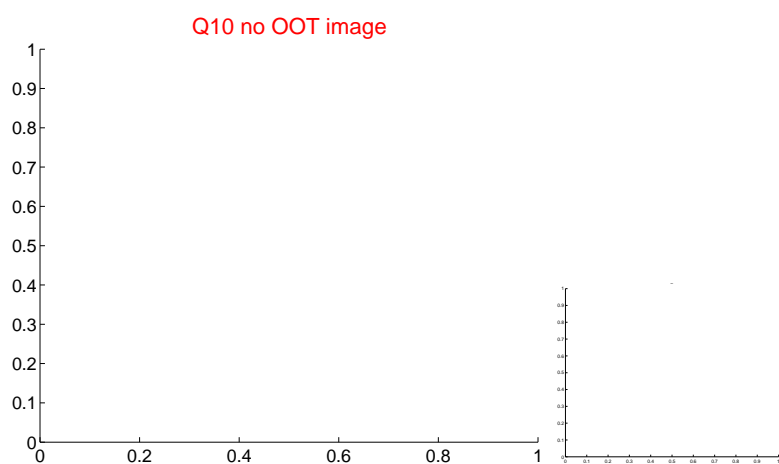
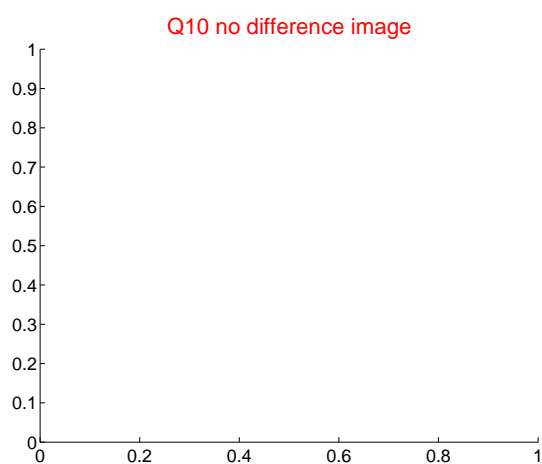
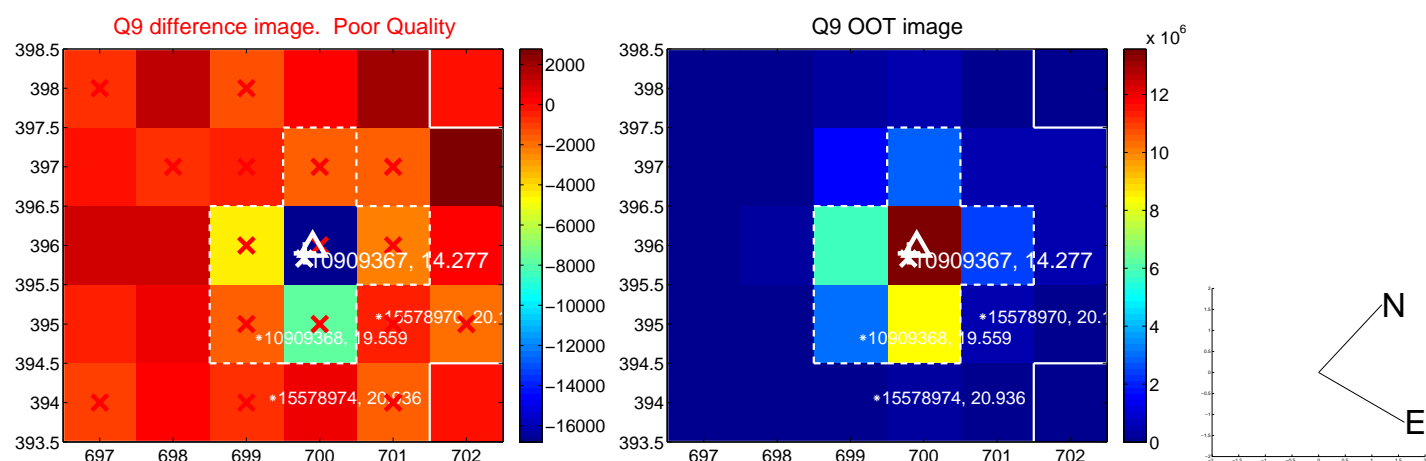
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



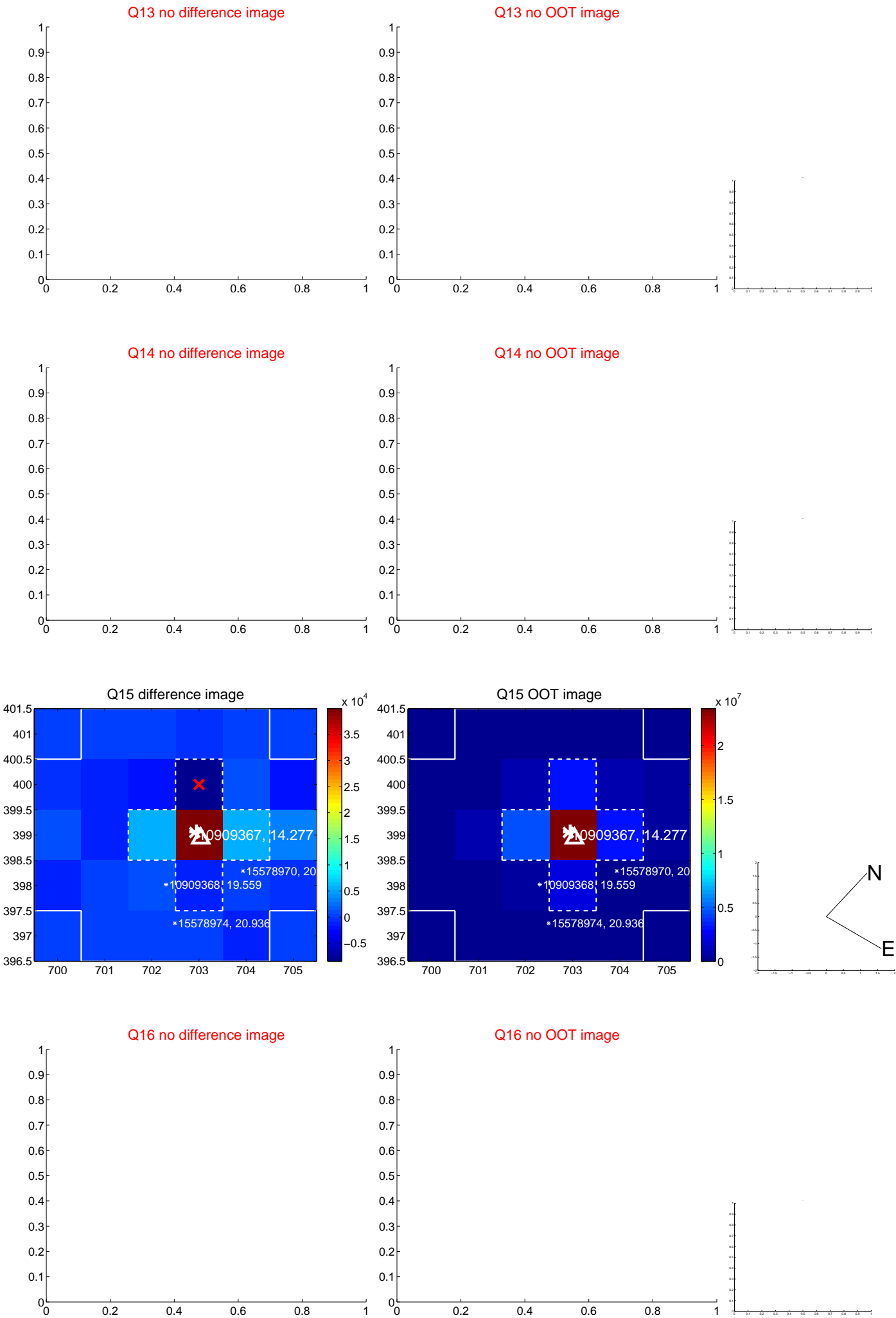
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



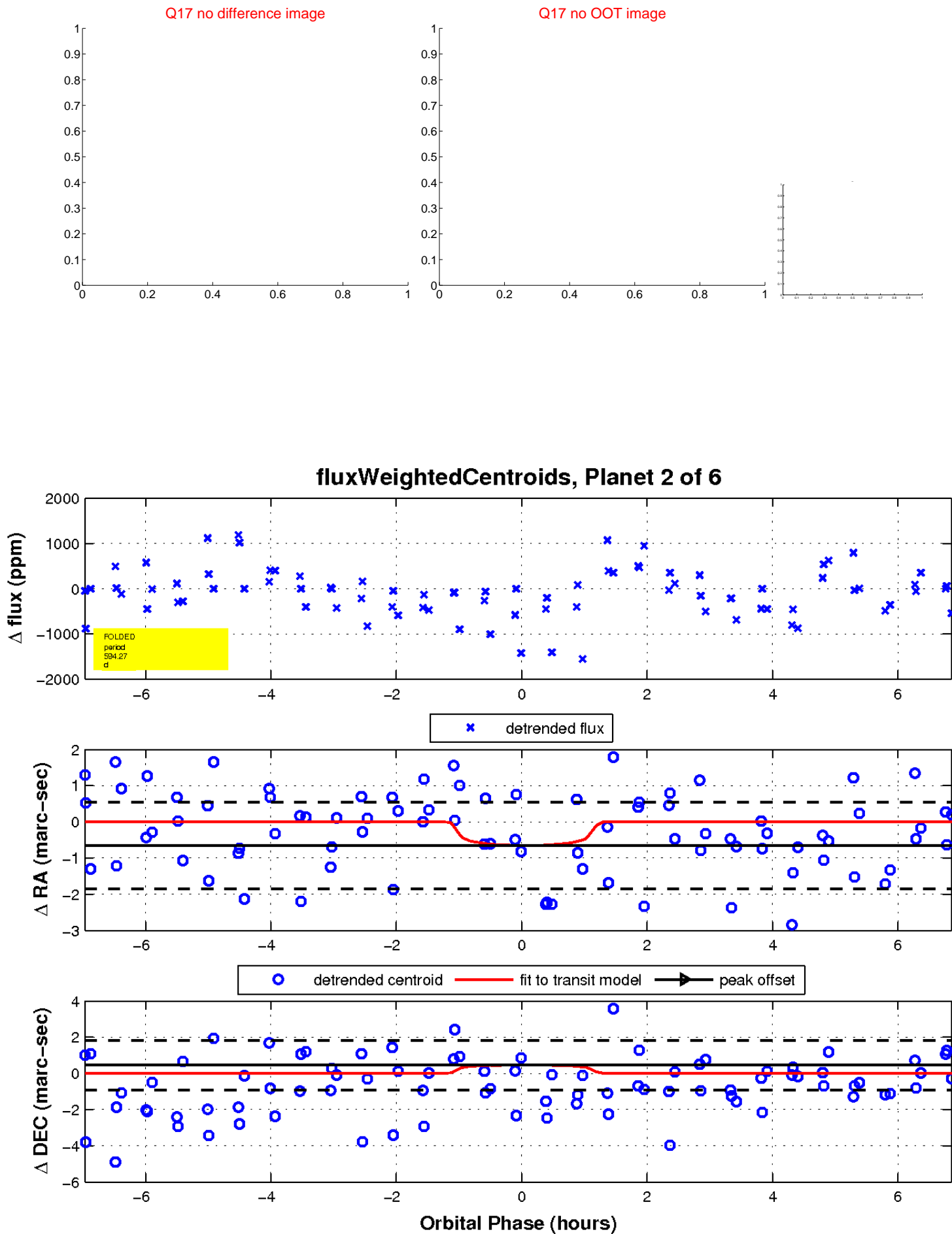
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

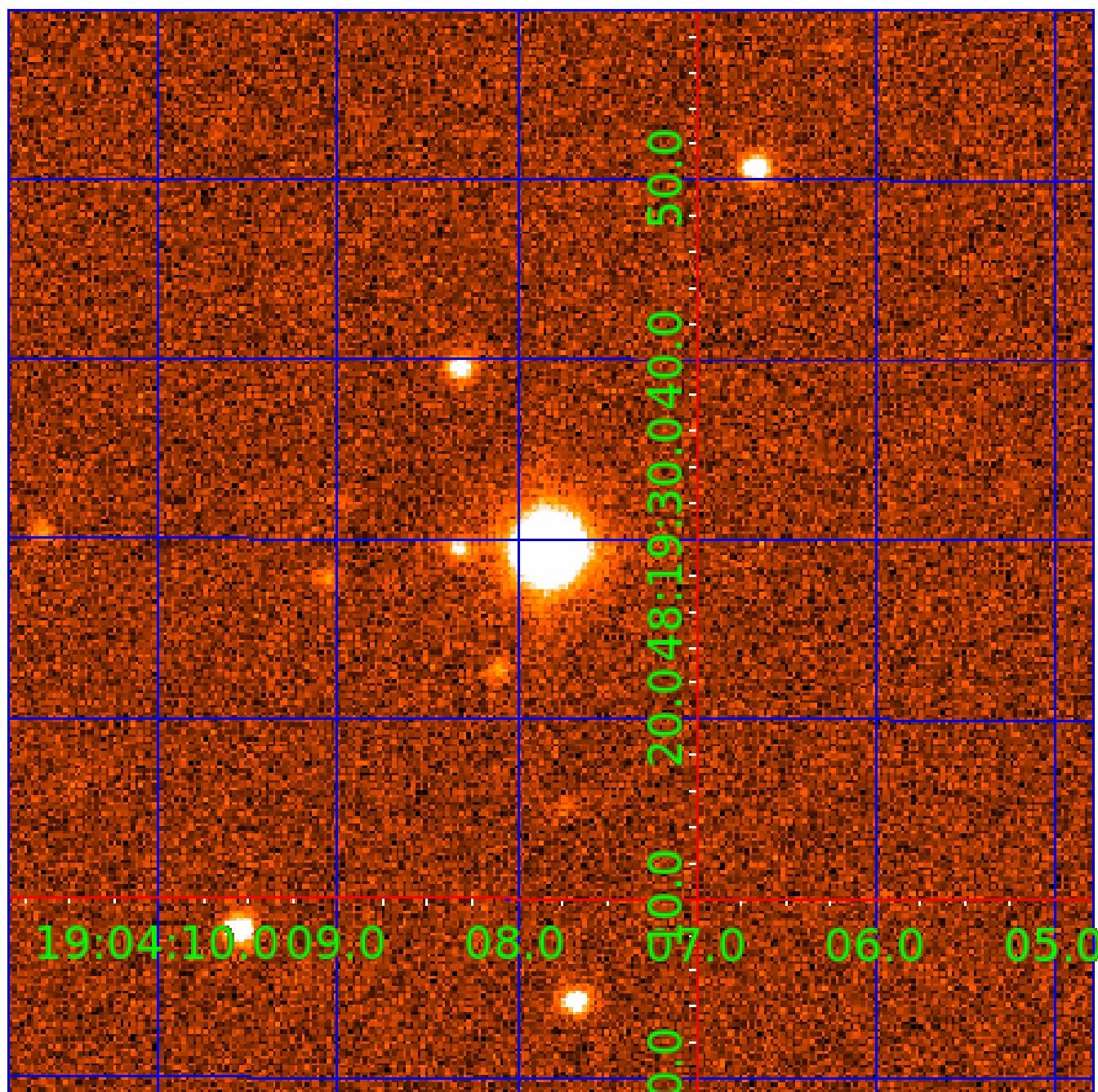


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010909367

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010909367-01	OBS	No	292.730001	277.060874	1755.4	14.324	15.2	6.2	0.51	3805	2.34	0.10
010909367-02	OBS	No	594.267355	242.249431	619.8	2.361	11.9	2.8	0.51	3805	1.42	0.04
010909367-03	OBS	No	317.505795	246.268738	1555.2	3.682	13.5	7.4	0.51	3805	2.02	0.09
010909367-04	OBS	No	170.935788	259.522269	4146.2	38.050	11.0	8.3	0.51	3805	4.08	0.21
010909367-05	OBS	No	167.388853	259.787514	1259.7	4.148	12.3	6.3	0.51	3805	1.88	0.22
010909367-06	OBS	No	103.302853	194.293093	833.5	3.459	11.7	6.8	0.51	3805	1.51	0.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010909367-01	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
010909367-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010909367-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
010909367-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
010909367-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
010909367-06	OBS	FP	0.01	1	0	0	0	LPP_DV—INCONSISTENT_TRANS

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

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

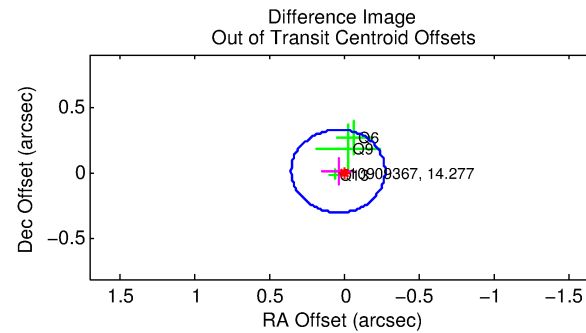
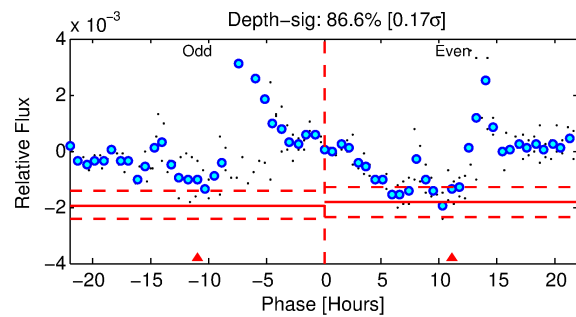
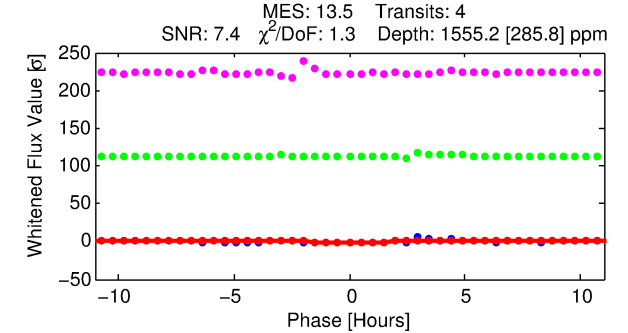
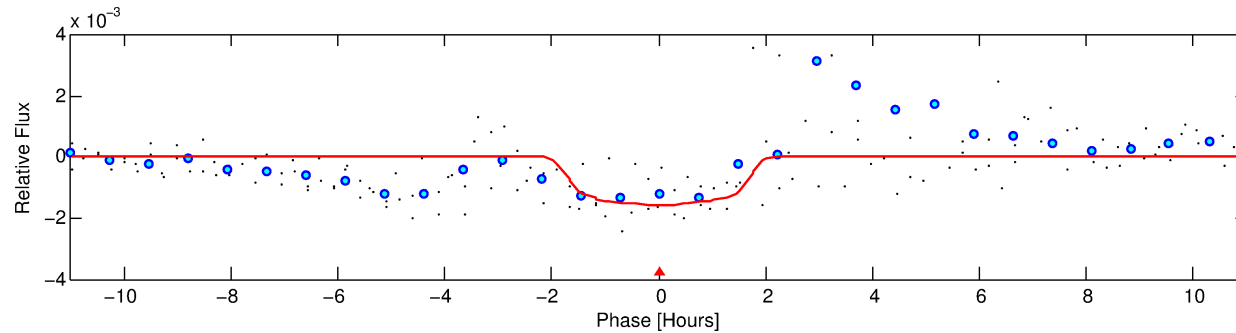
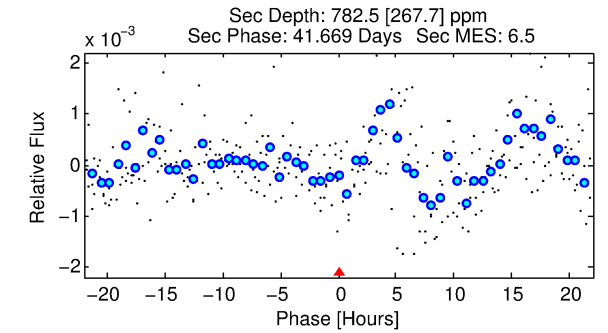
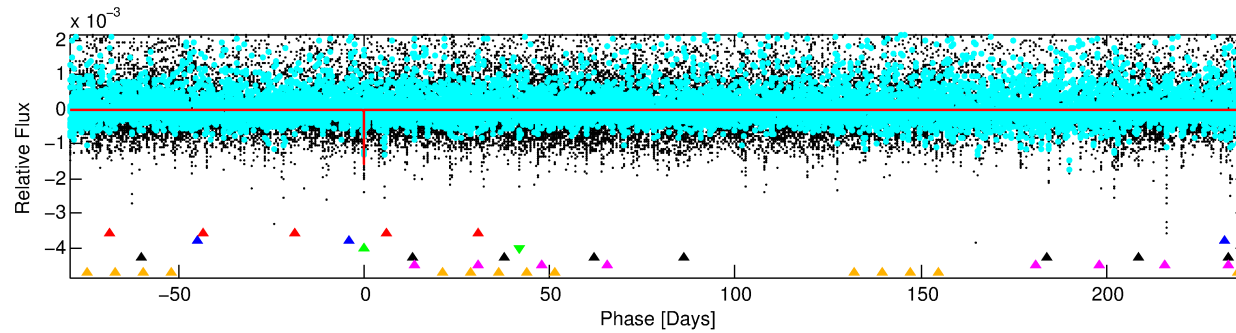
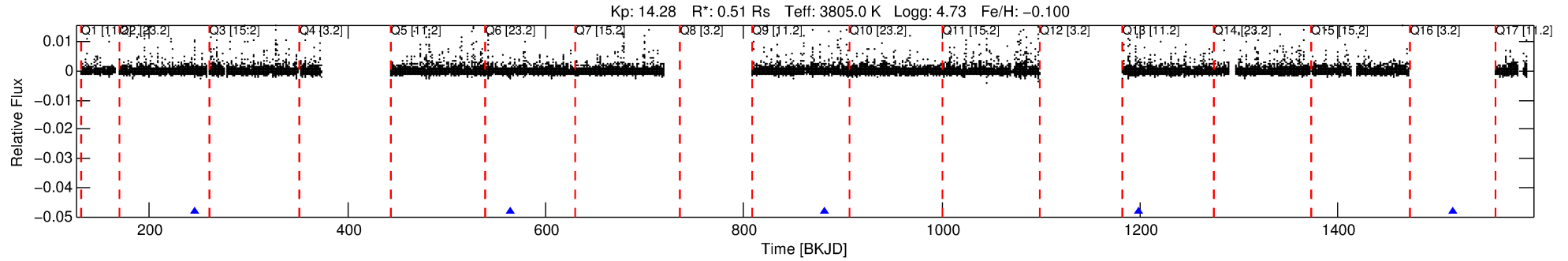
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010909367-03

No Significant Match Found

# DV One-Page Summary

KIC: 10909367 Candidate: 3 of 6 Period: 317.506 d



## DV Fit Results:

Period = 317.50580 [0.00407] d  
Epoch = 246.2687 [0.0085] BKJD  
Rp/R\* = 0.0361 [0.0711]  
a/R\* = 655.88 [5656.70]  
b = 0.29 [27.63]  
Seff = 0.09 [0.01]  
Teq = 141 [3] K  
Rp = 2.02 [3.98] Re  
a = 0.7322 [0.0315] AU  
Ag = 56538.47 [223485.93] [0.25σ]  
Teffp = 3350 [3310] K [0.97σ]

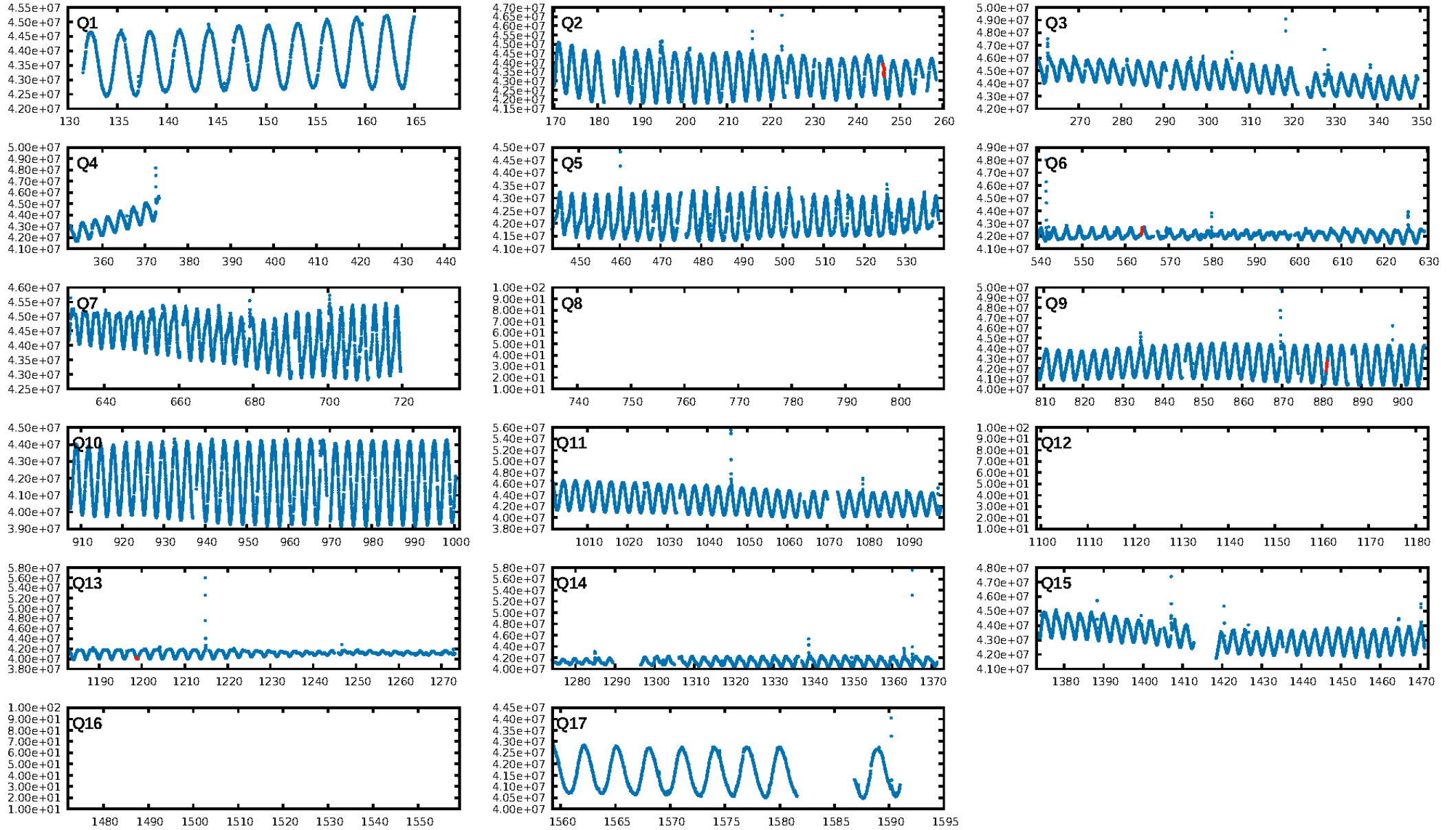
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [40.21σ]  
LongPeriod-sig: 100.0% [1518.74σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 61.2%  
Bootstrap-pfa: 1.03e-10  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -42.83  
Centroid-sig: 4.5%  
Centroid-so: 0.545 arcsec [0.93σ]  
OotOffset-rm: 0.041 arcsec [0.39σ]  
KicOffset-rm: 0.262 arcsec [2.48σ]  
OotOffset-st: 1/0/0/2 [3]  
KicOffset-st: 1/0/0/2 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

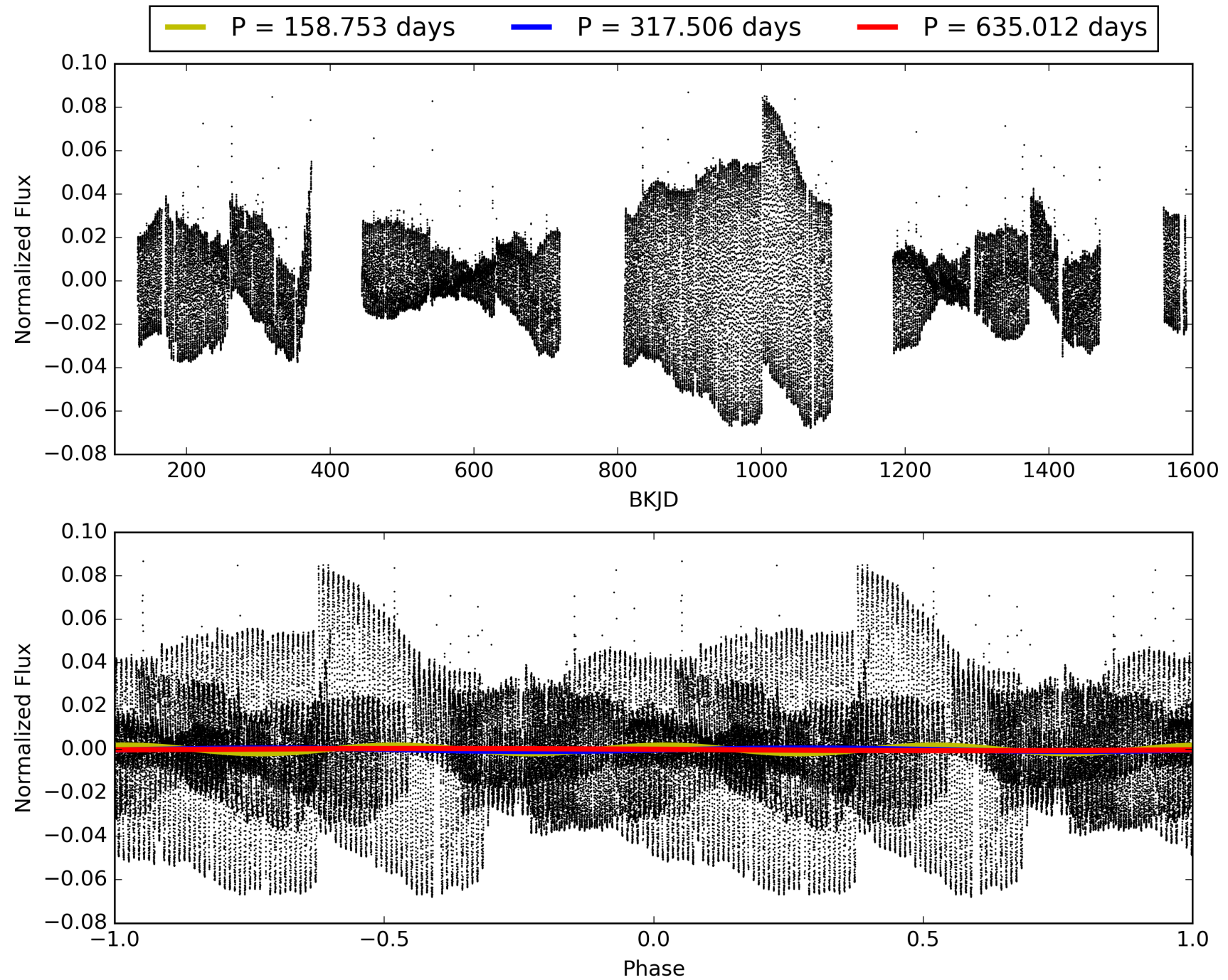
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:53:52 Z

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

# TCE 010909367-03, PDC Light Curves

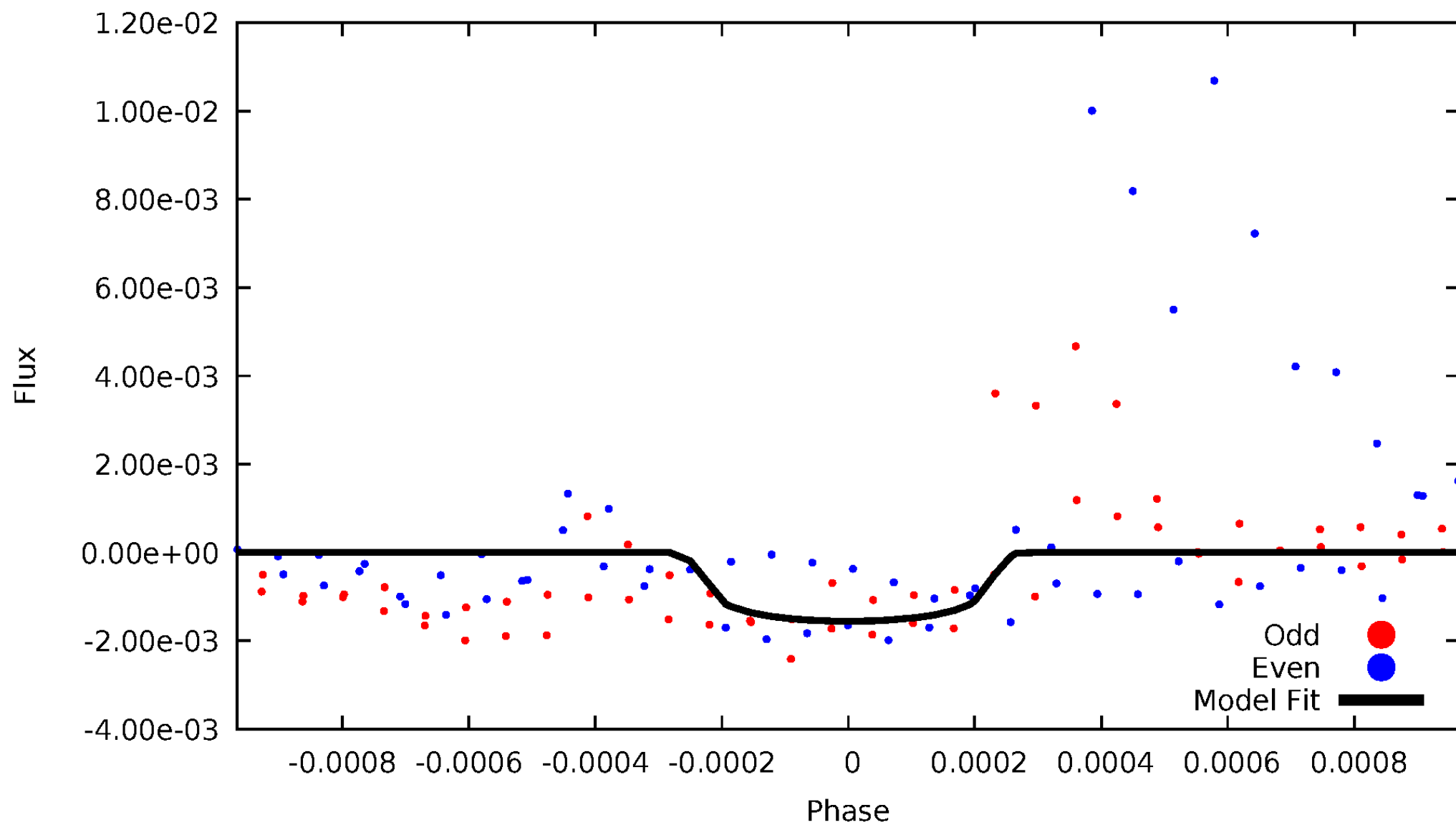


TCE 010909367-03



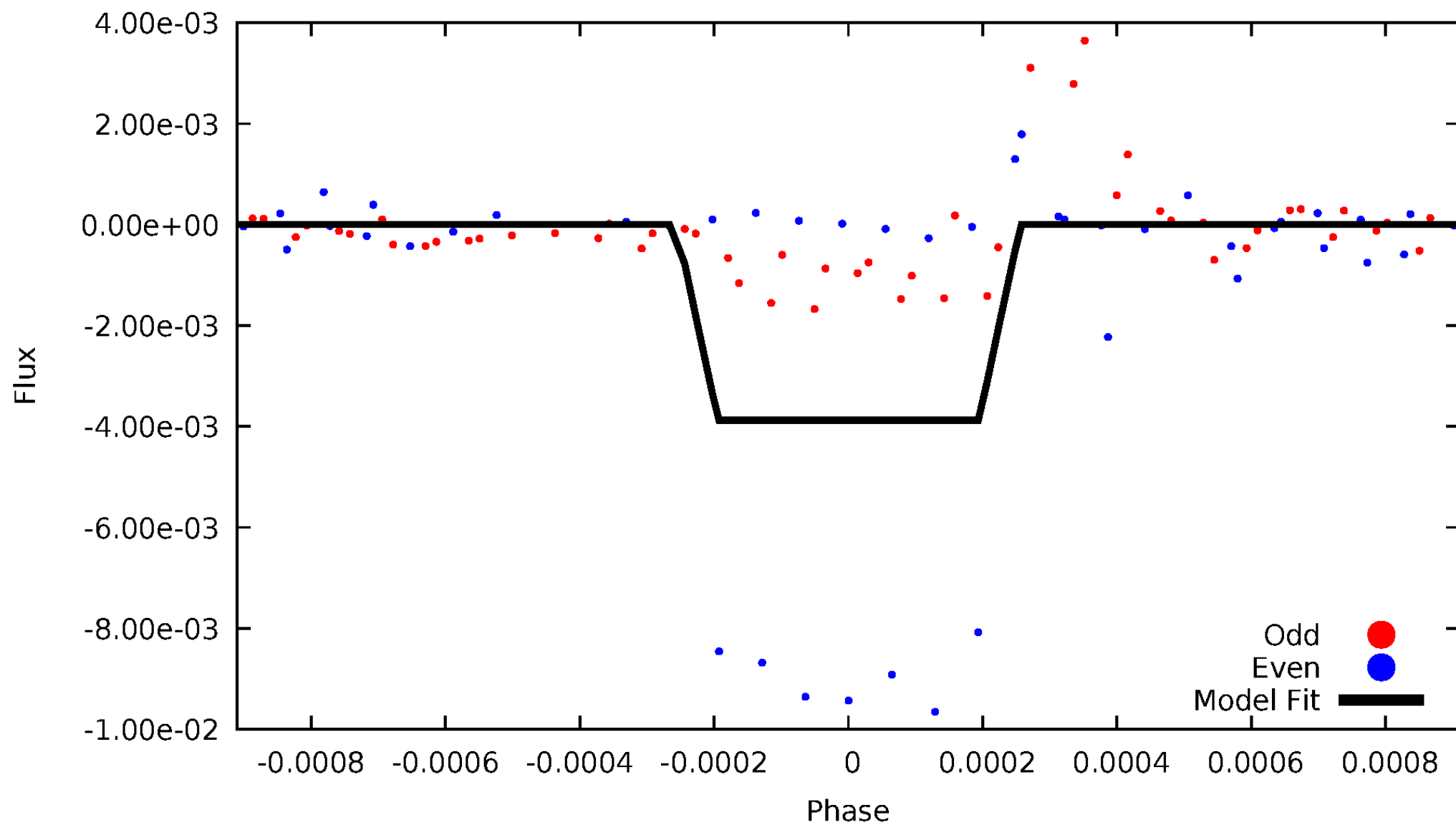
# DV Odd/Even

TCE 010909367-03



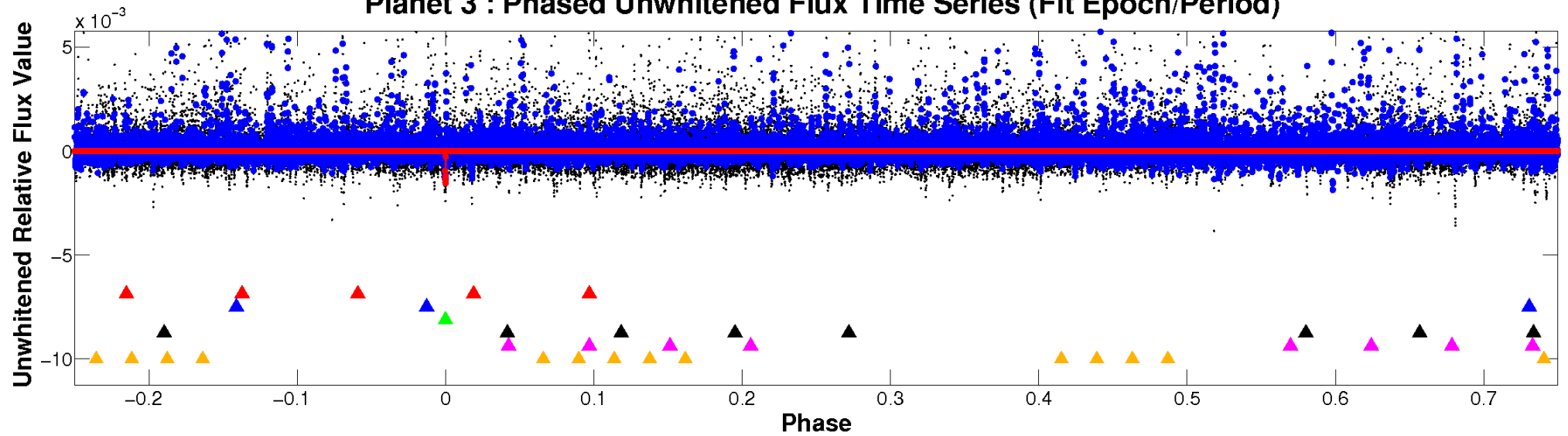
# ALT Odd/Even

TCE 010909367-03

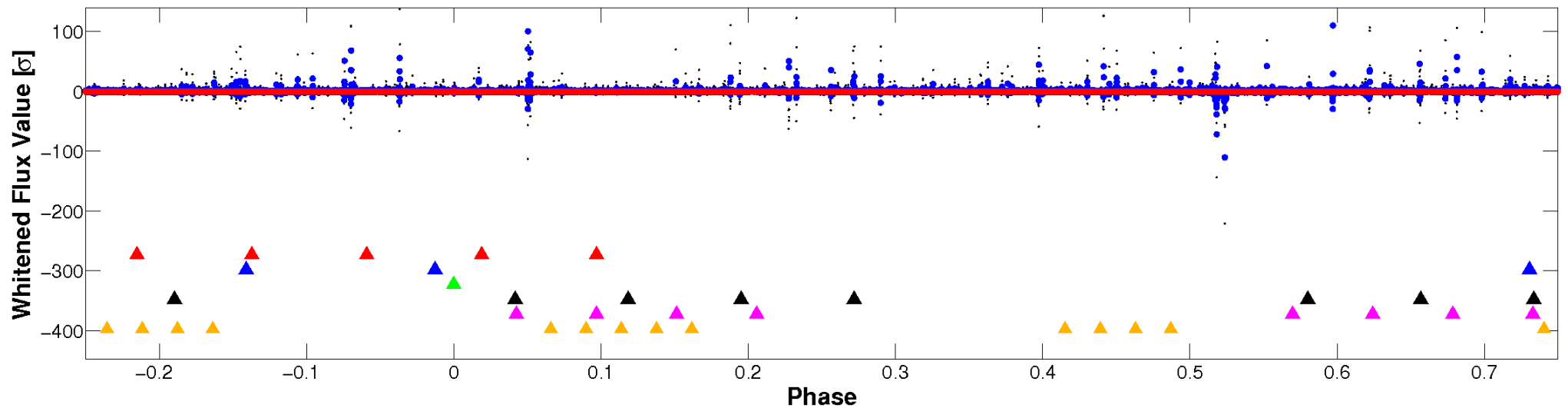


# Non-Whitened Vs. Whitened Light Curve

Planet 3 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

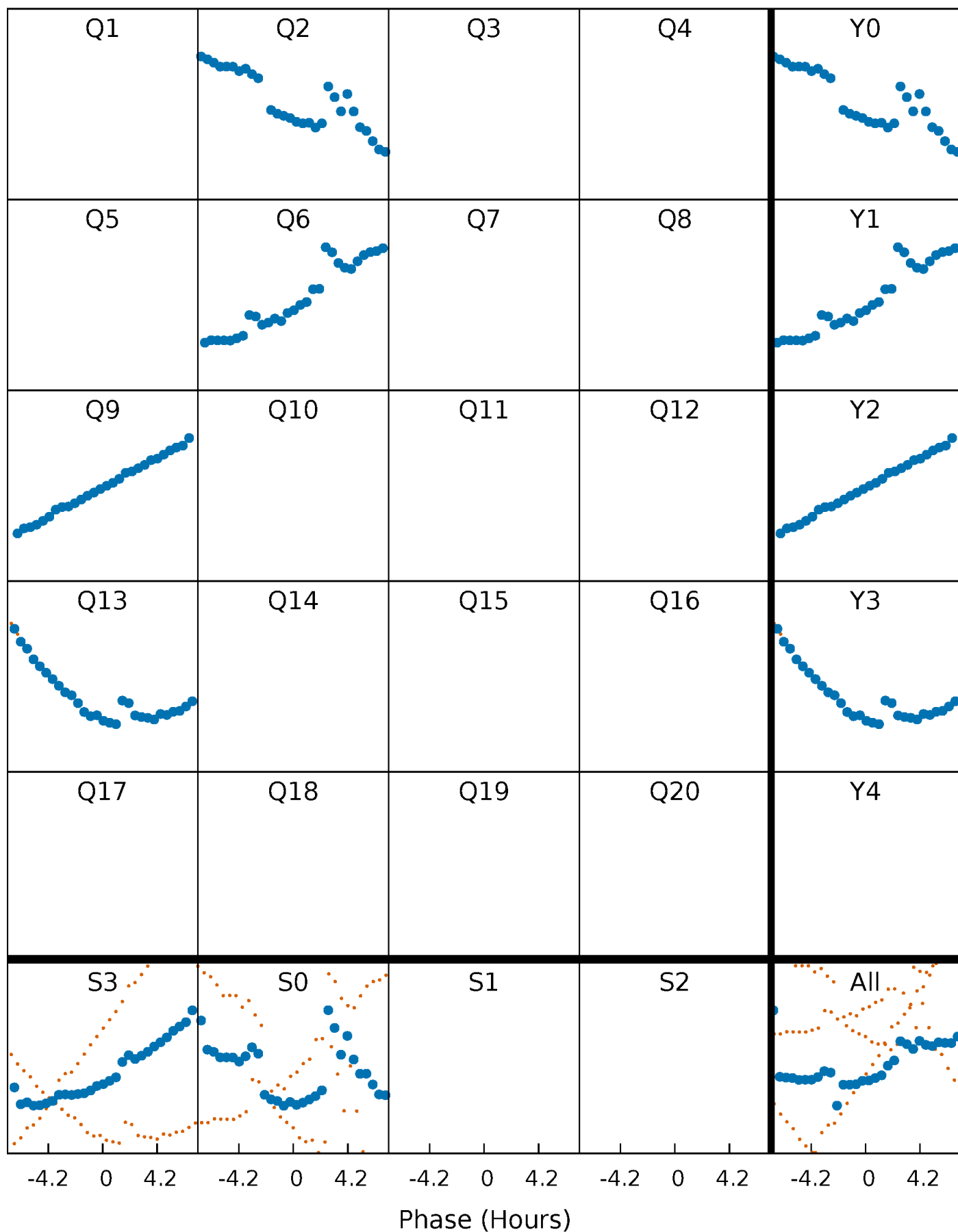


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

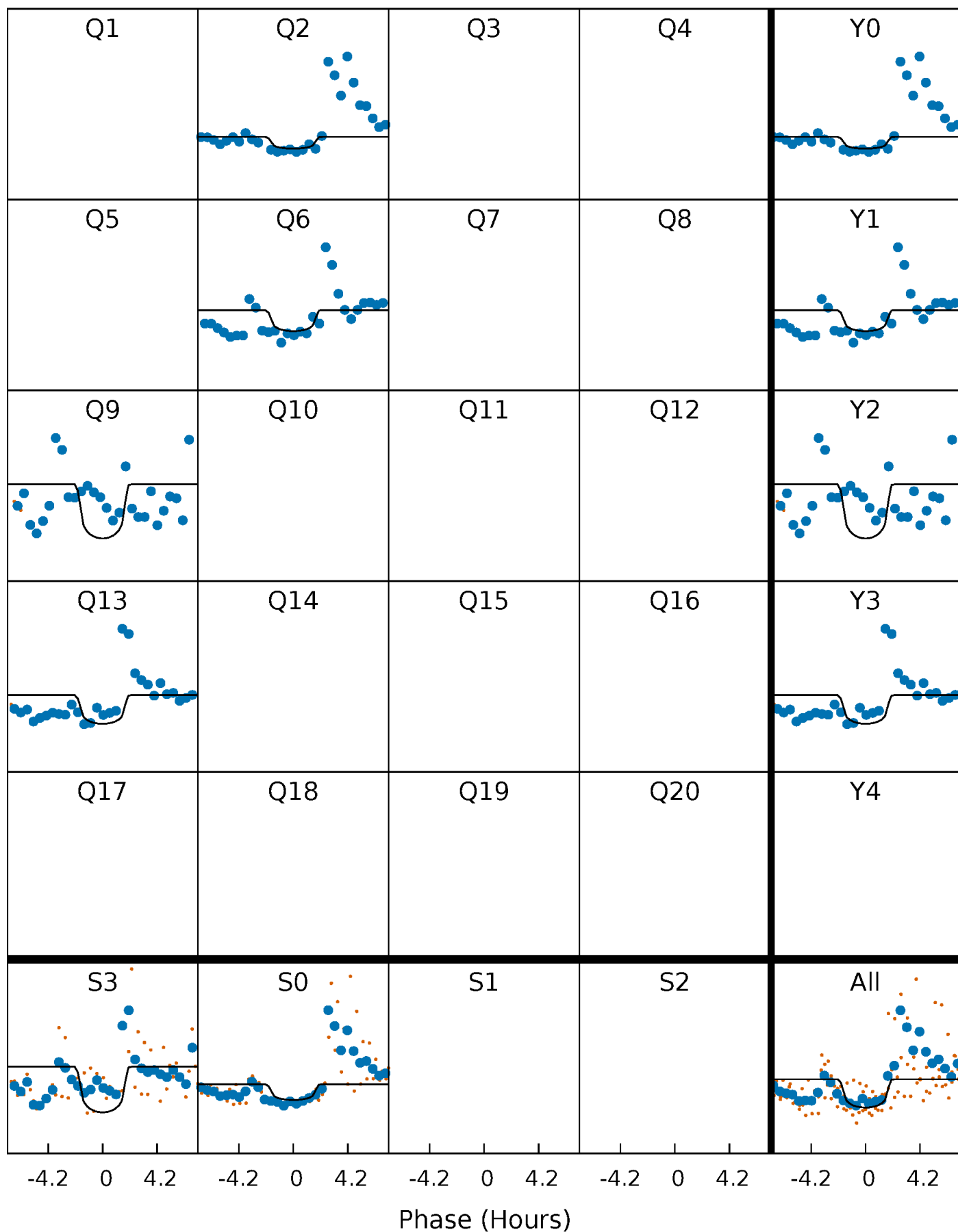
TCE 010909367-03     $P=317.505795$  Days     $T_0=246.268737$  (BKJD)





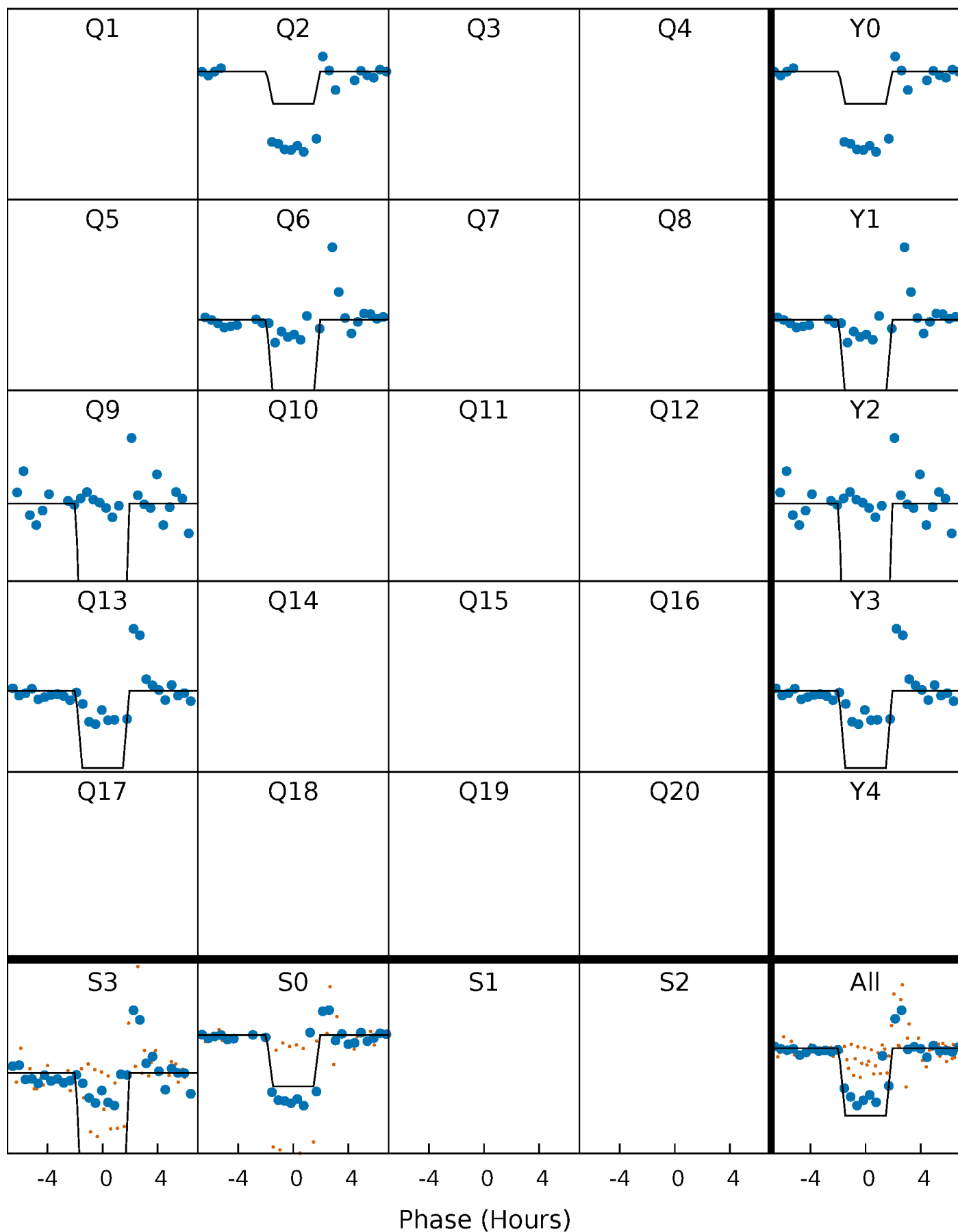
# DV Quarter-Phased Transit Curves

TCE 010909367-03     $P=317.505795$  Days     $T_0=246.268737$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

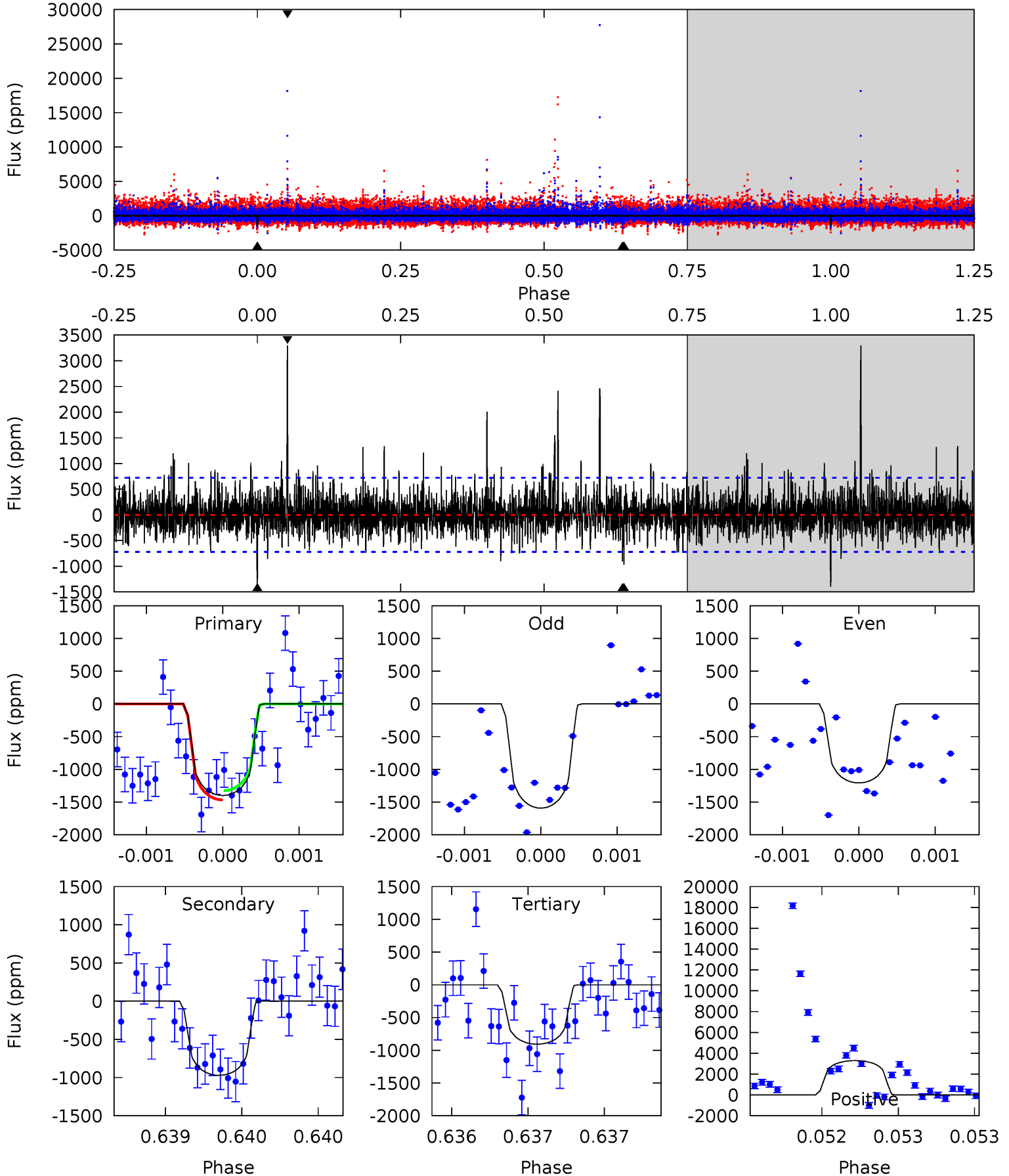
TCE 010909367-03 P=317.488176 Days  $T_0=246.309221$  (BKJD)



# DV Model-Shift Uniqueness Test

010909367-03, P = 317.505795 Days, E = 246.268737 Days

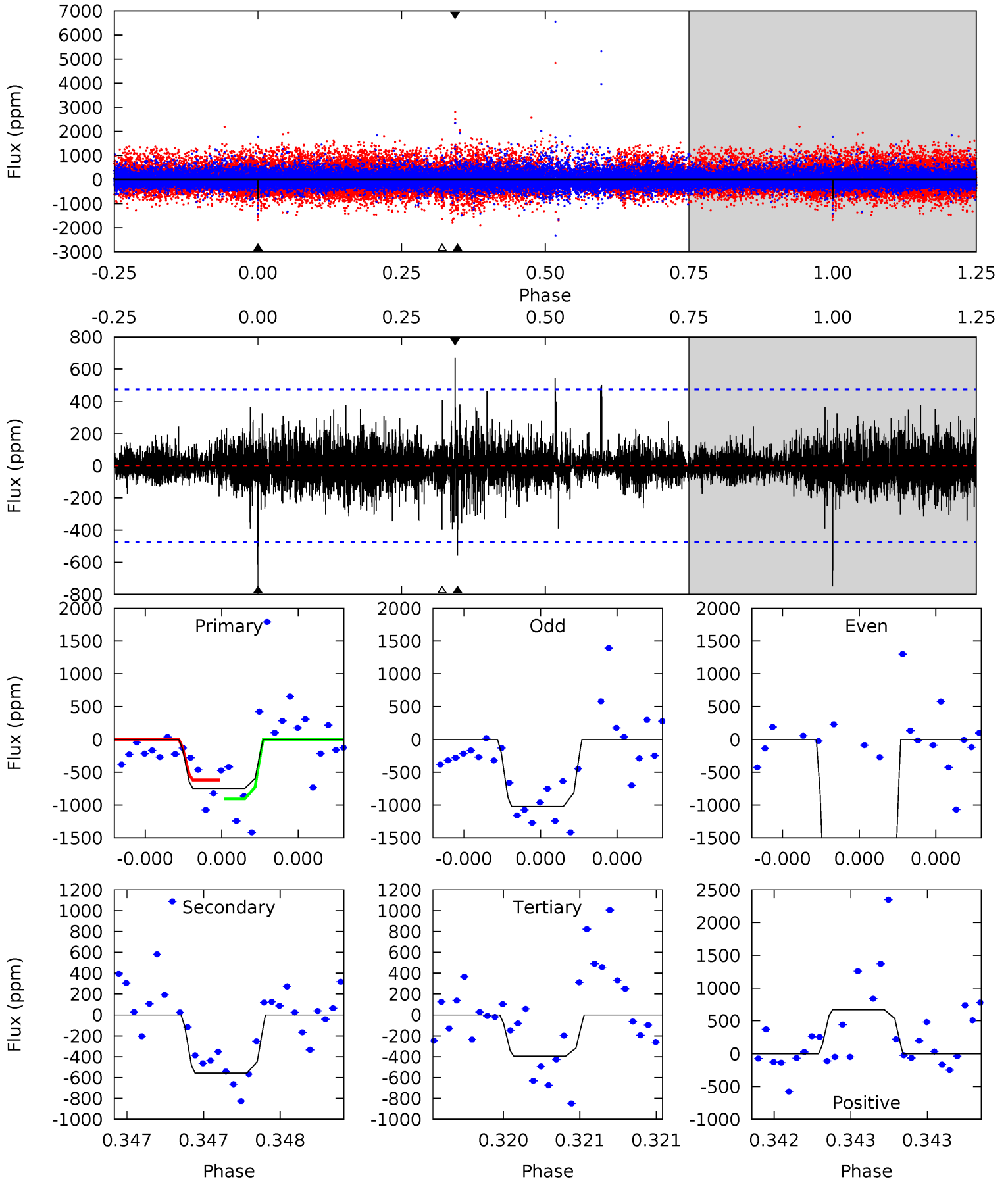
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.8	7.49	7.00	25.4	5.56	3.46	2.18	3.79	-14.6	0.49	-17.9	0.49	0.94	0.70	0.54



# Alt Model-Shift Uniqueness Test

010909367-03, P = 317.488176 Days, E = 246.309221 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
8.81	6.58	4.66	7.89	5.58	3.49	1.00	4.14	0.92	1.91	-1.31	14.0	2.69	0.47	1.71



### Stellar Parameters For KIC 010909367

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3805^{+45}_{-49}$	$4.733^{+0.030}_{-0.015}$	$-0.100^{+0.100}_{-0.100}$	$0.513^{+0.020}_{-0.028}$	$0.519^{+0.026}_{-0.021}$	$5.426^{+0.744}_{-0.384}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-5%	+5%/-4%	+14%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 010909367-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-971 \pm 130$	$3.55^{+3.34}_{-2.51}$	$196^{+3}_{-3}$	$3048^{+1542}_{-491}$	$22785^{+250479}_{-16860}$
Alt.	$-558 \pm 85$	$4.33^{+3.62}_{-2.83}$	$196^{+3}_{-3}$	$2671^{+984}_{-372}$	$8434^{+66338}_{-5943}$

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

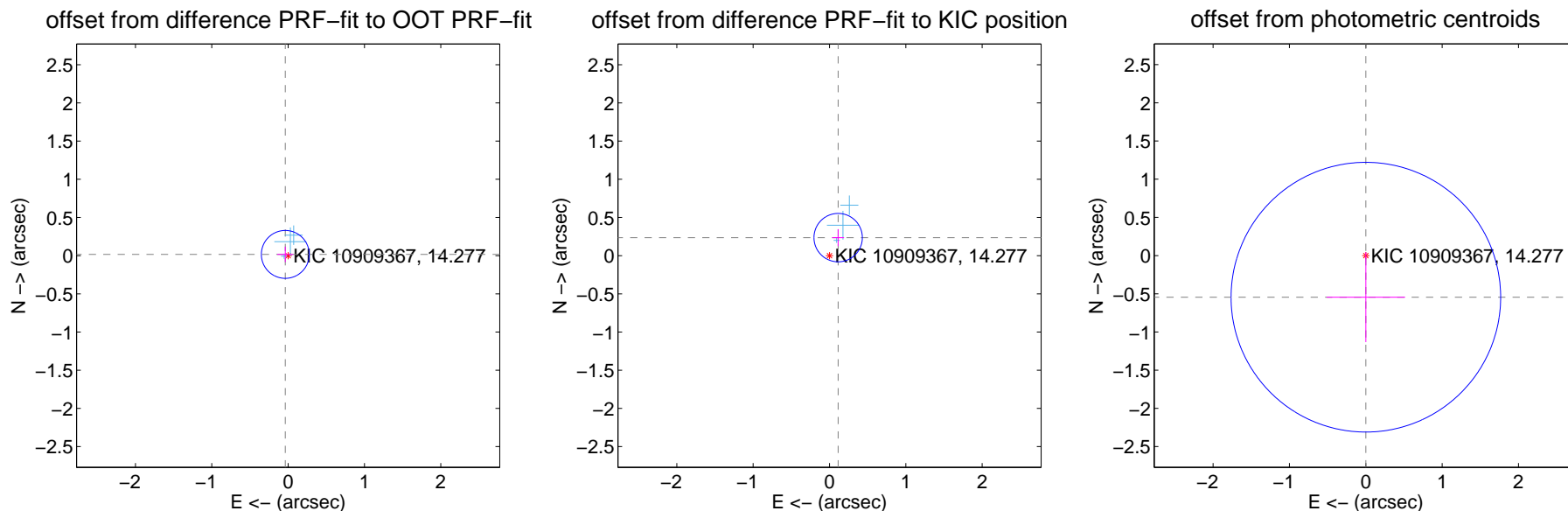
## DV Centroid Data

Supplemental centroid analysis for 010909367-03. Kepler magnitude: 14.28. Transit SNR 7.41

There are 3 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.25 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.041 \pm 0.105$	0.39	$0.037 \pm 0.105$	$0.017 \pm 0.101$
PRF-fit source offset from KIC position	$0.262 \pm 0.106$	2.48	$-0.114 \pm 0.077$	$0.236 \pm 0.111$
photometric centroid source offset	$0.54 \pm 0.59$	0.93	$-0.00 \pm 0.51$	$-0.54 \pm 0.59$

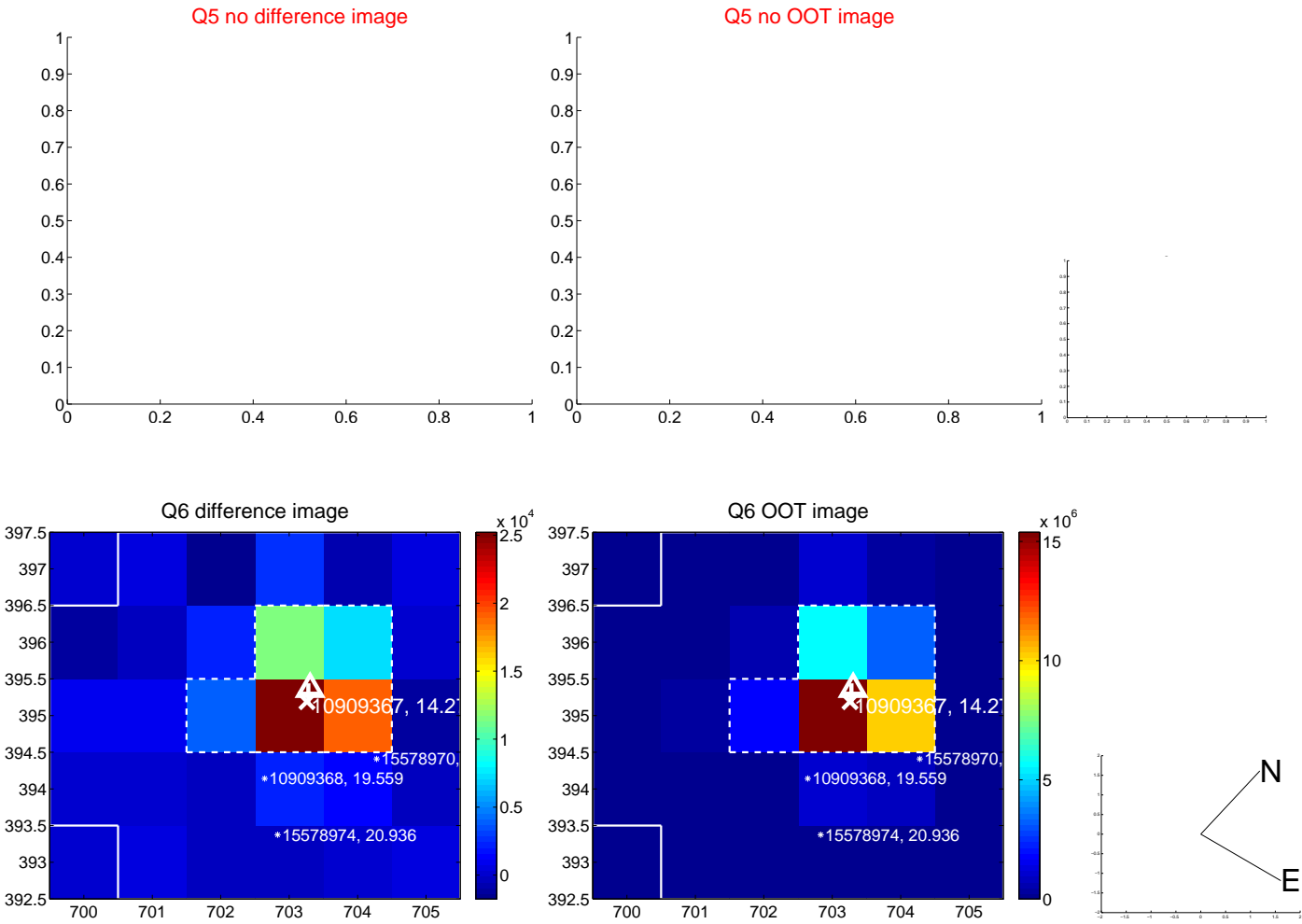


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

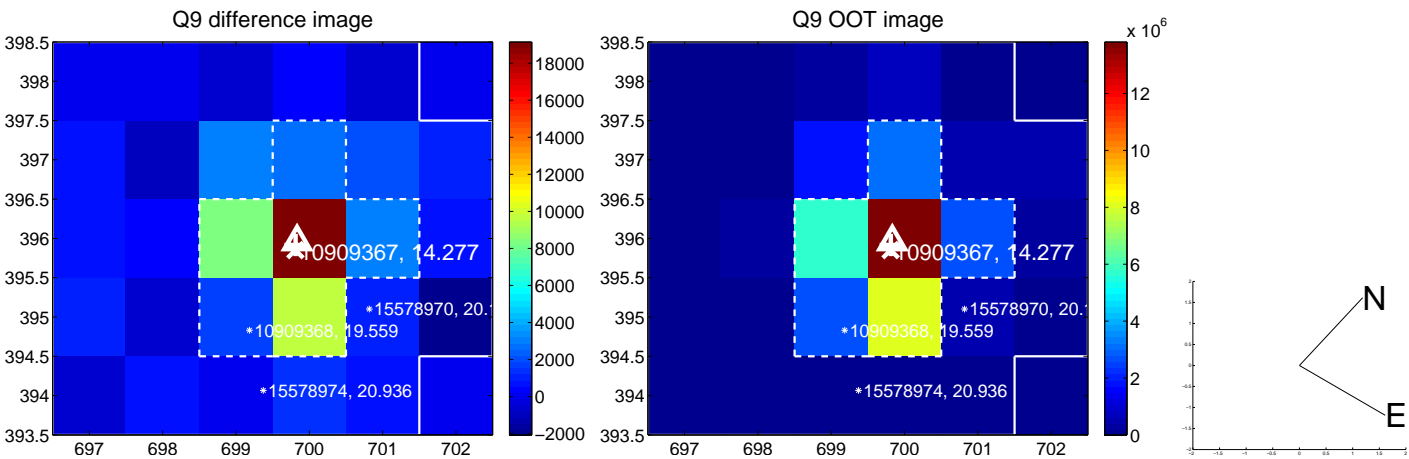


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

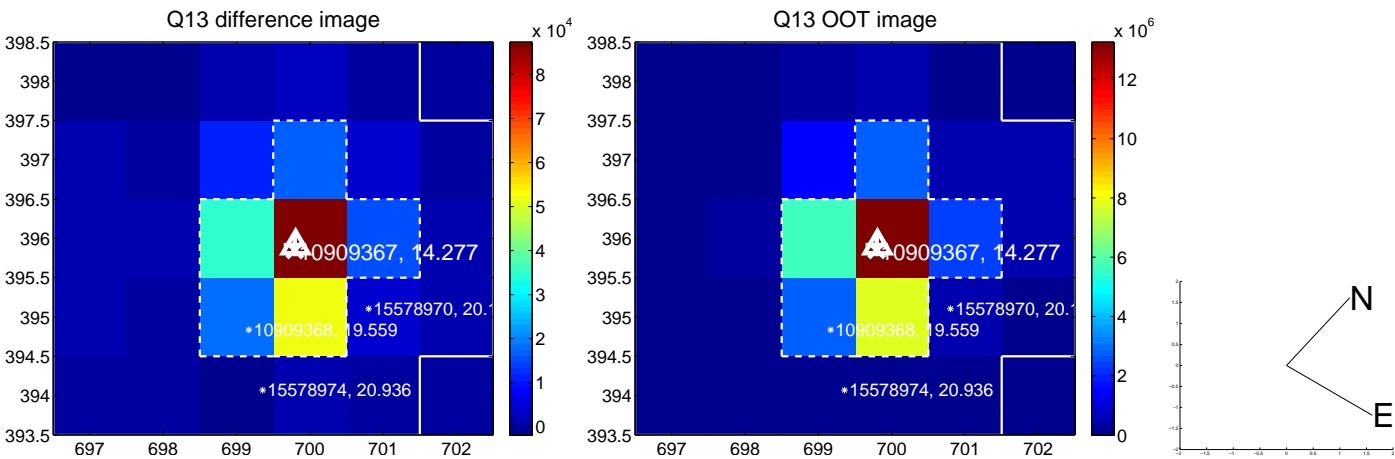




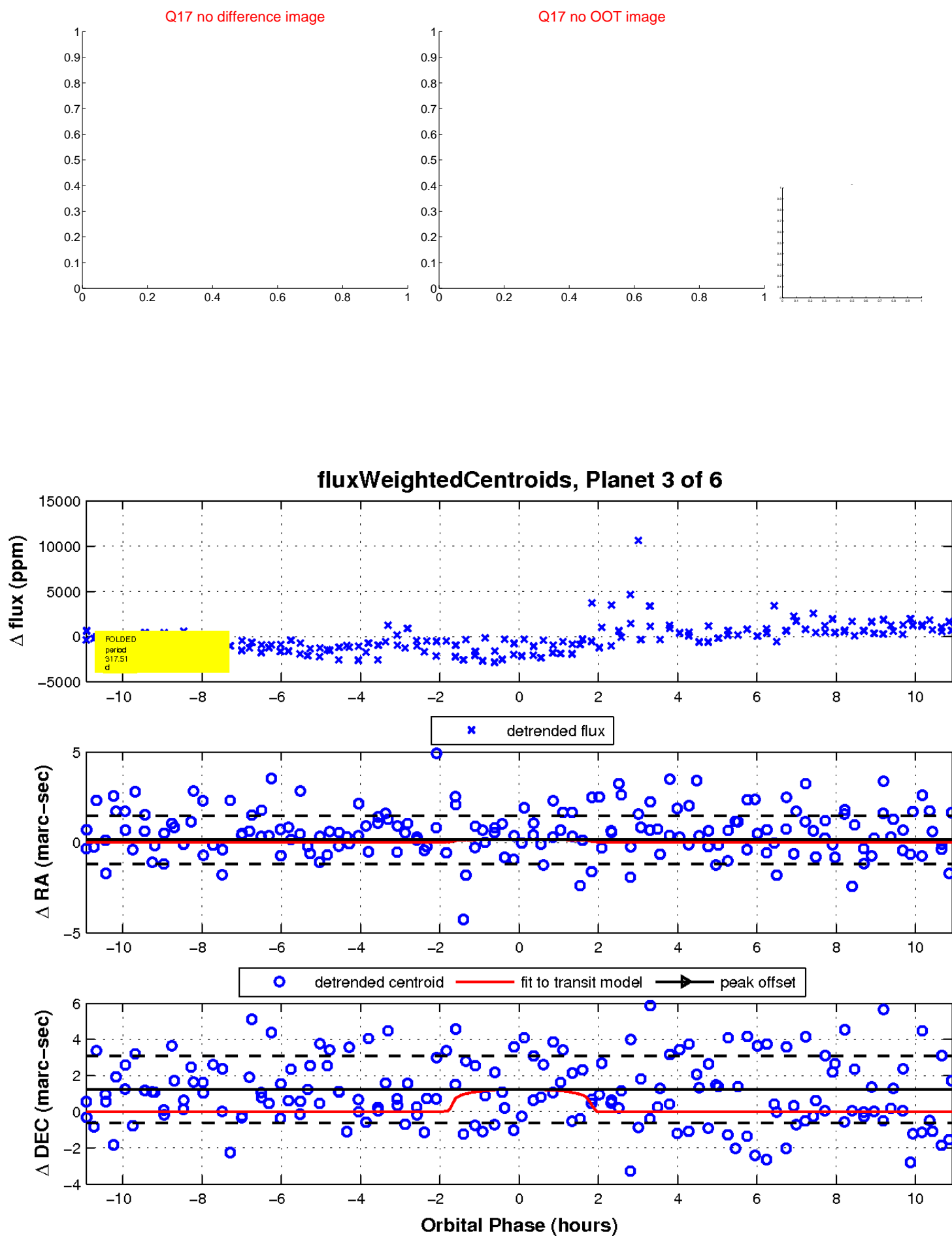
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

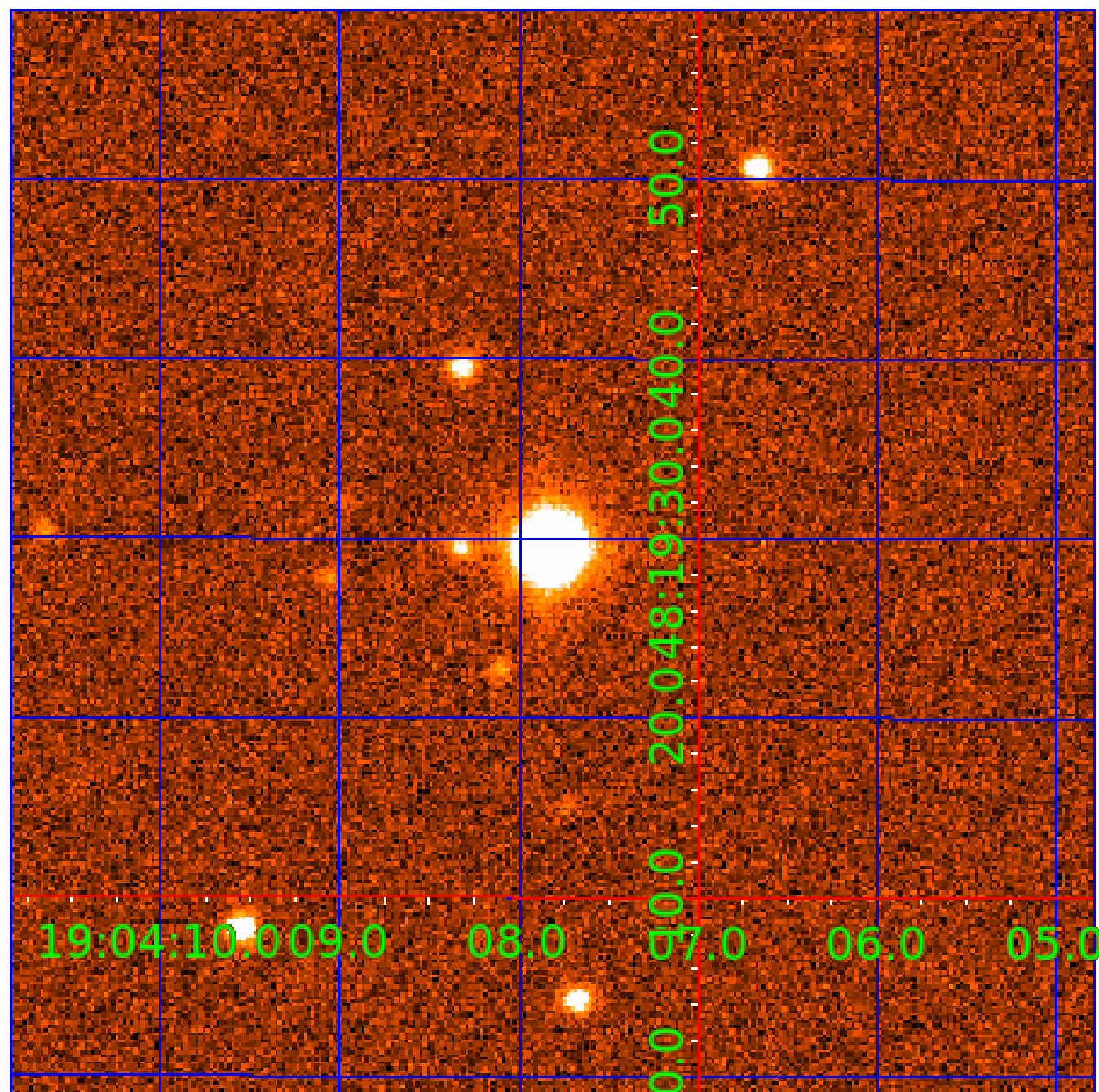


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010909367

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010909367-01	OBS	No	292.730001	277.060874	1755.4	14.324	15.2	6.2	0.51	3805	2.34	0.10
010909367-02	OBS	No	594.267355	242.249431	619.8	2.361	11.9	2.8	0.51	3805	1.42	0.04
010909367-03	OBS	No	317.505795	246.268738	1555.2	3.682	13.5	7.4	0.51	3805	2.02	0.09
010909367-04	OBS	No	170.935788	259.522269	4146.2	38.050	11.0	8.3	0.51	3805	4.08	0.21
010909367-05	OBS	No	167.388853	259.787514	1259.7	4.148	12.3	6.3	0.51	3805	1.88	0.22
010909367-06	OBS	No	103.302853	194.293093	833.5	3.459	11.7	6.8	0.51	3805	1.51	0.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010909367-01	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
010909367-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010909367-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
010909367-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
010909367-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
010909367-06	OBS	FP	0.01	1	0	0	0	LPP_DV—INCONSISTENT_TRANS

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

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

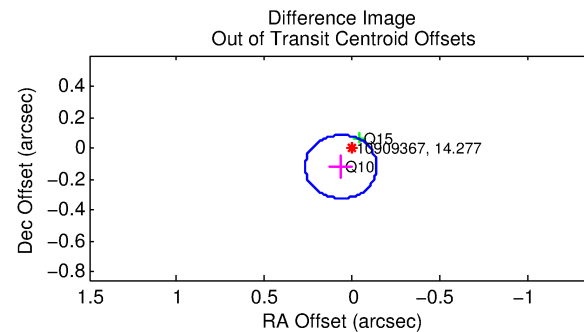
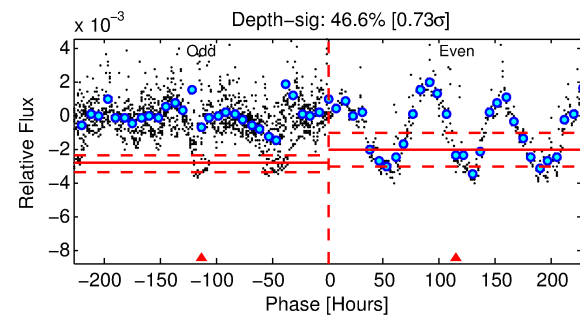
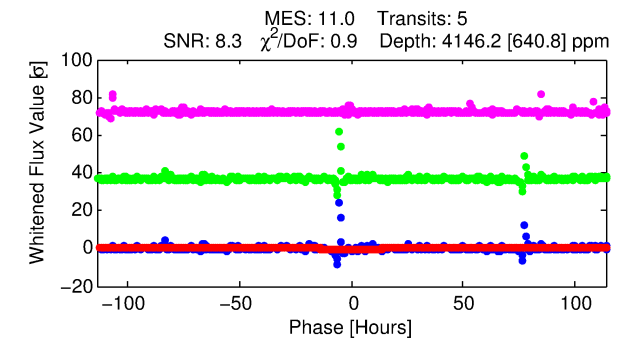
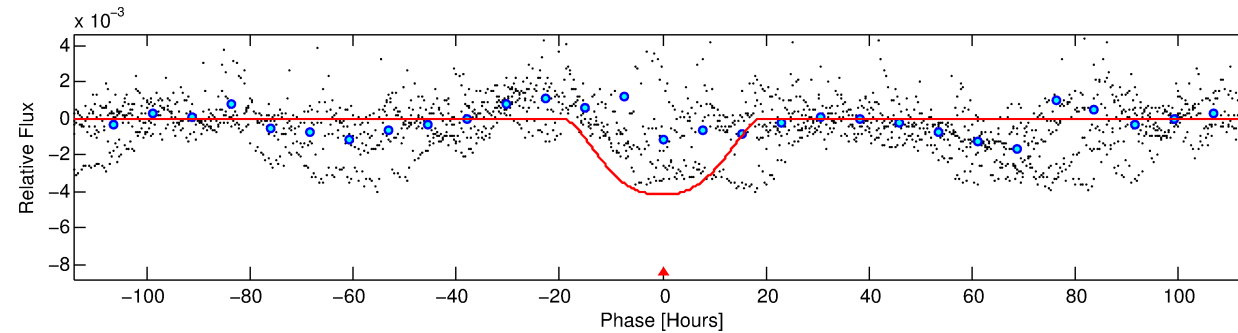
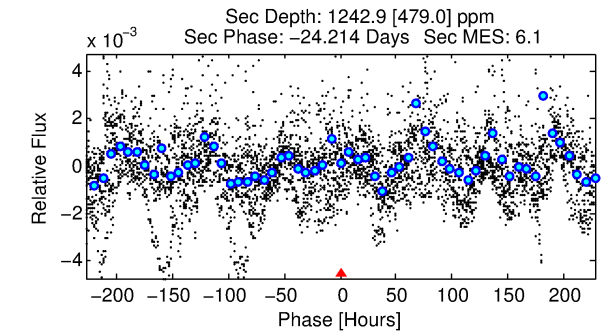
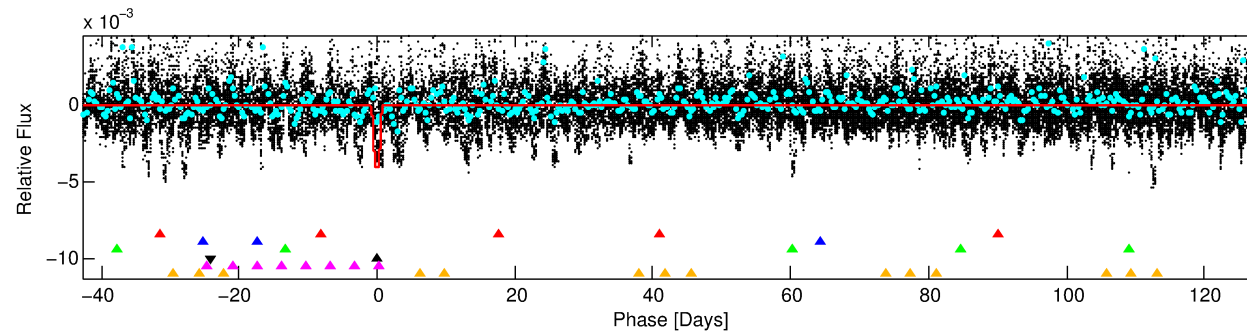
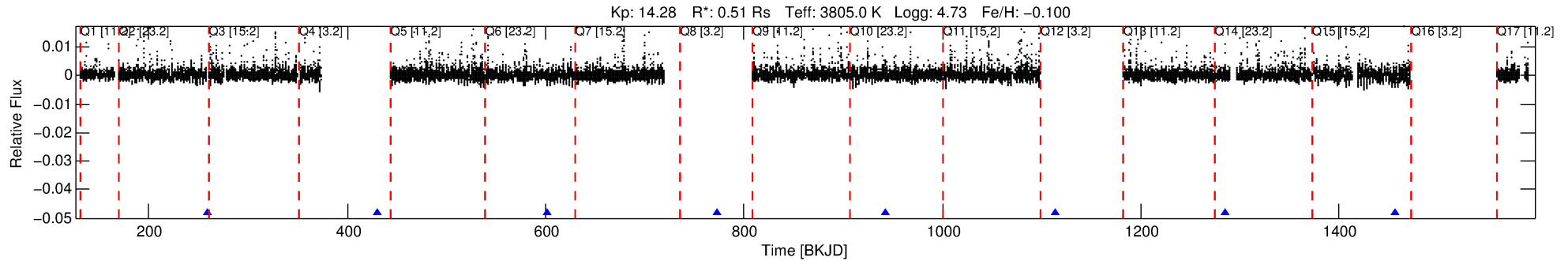
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010909367-04

No Significant Match Found

# DV One-Page Summary

KIC: 10909367 Candidate: 4 of 6 Period: 170.936 d



## DV Fit Results:

Period = 170.93579 [0.01411] d  
Epoch = 259.5223 [0.0695] BKJD  
Rp/R\* = 0.0729 [0.0068]  
a/R\* = 18.76 [1.40]  
b = 0.92 [0.02]  
Seff = 0.21 [0.02]  
Teq = 173 [3] K  
Rp = 4.08 [0.44] Re  
a = 0.4845 [0.0209] AU  
Ag = 9649.16 [4174.50] [2.31σ]  
Teffp = 2647 [286] K [8.66σ]

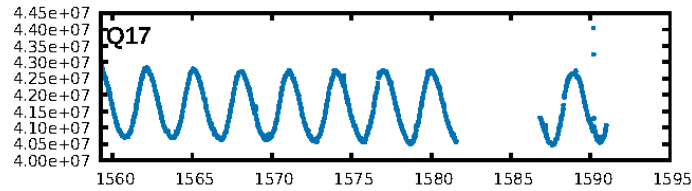
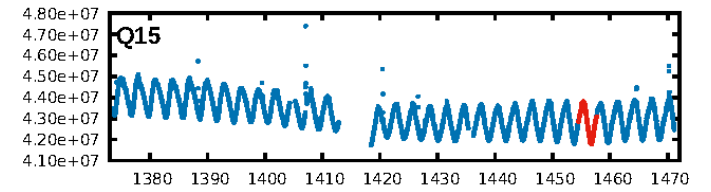
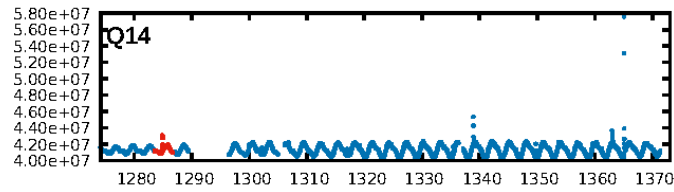
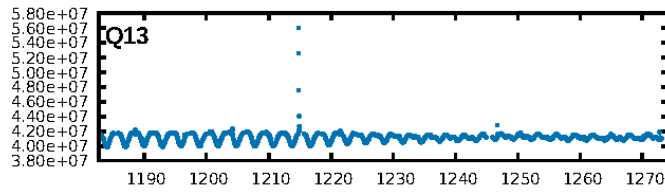
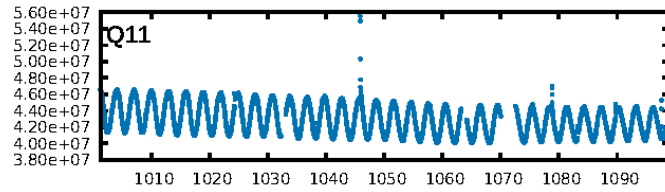
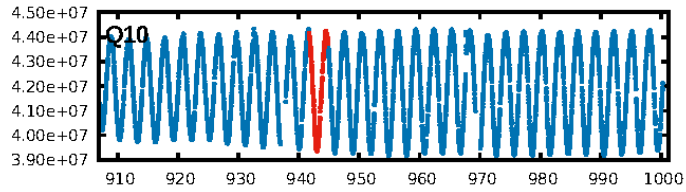
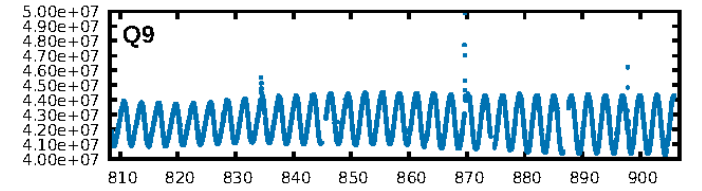
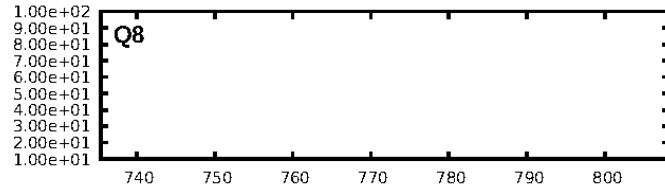
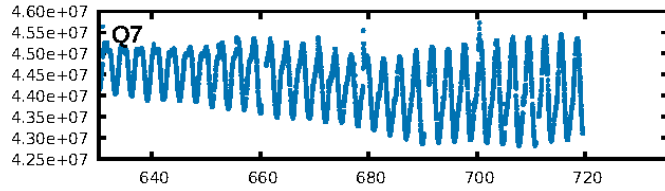
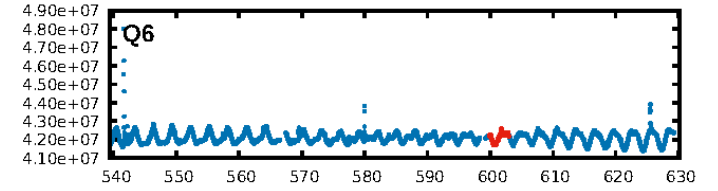
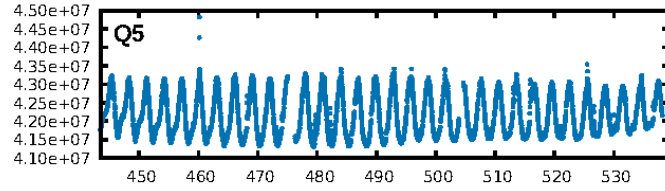
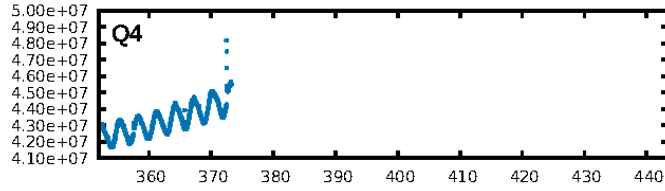
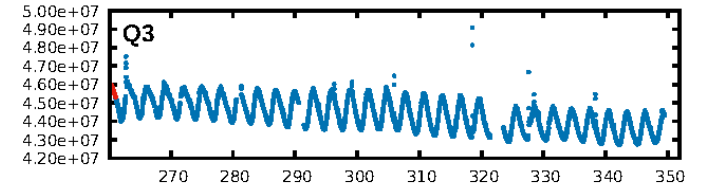
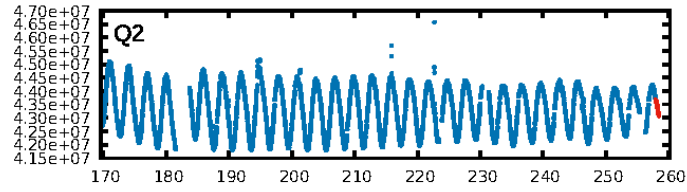
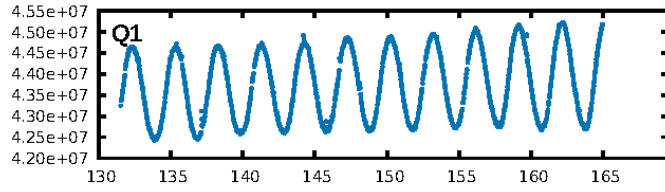
## DV Diagnostic Results:

ShortPeriod-sig: 97.4% [2.22σ]  
LongPeriod-sig: 100.0% [71.90σ]  
ModelChiSquare2-sig: 28.6%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 1.88e-09**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.346  
**Centroid-sig: 0.0%**  
Centroid-so: 0.273 arcsec [2.57σ]  
OotOffset-rm: 0.136 arcsec [1.99σ]  
**KicOffset-rm: 0.336 arcsec [3.72σ]**  
OotOffset-st: 1/1/0/0 [2]  
KicOffset-st: 1/1/0/0 [2]  
DiffImageQuality-fgm: 1.00 [2/2]  
DiffImageOverlap-fno: 1.00 [2/2]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:53:58 Z

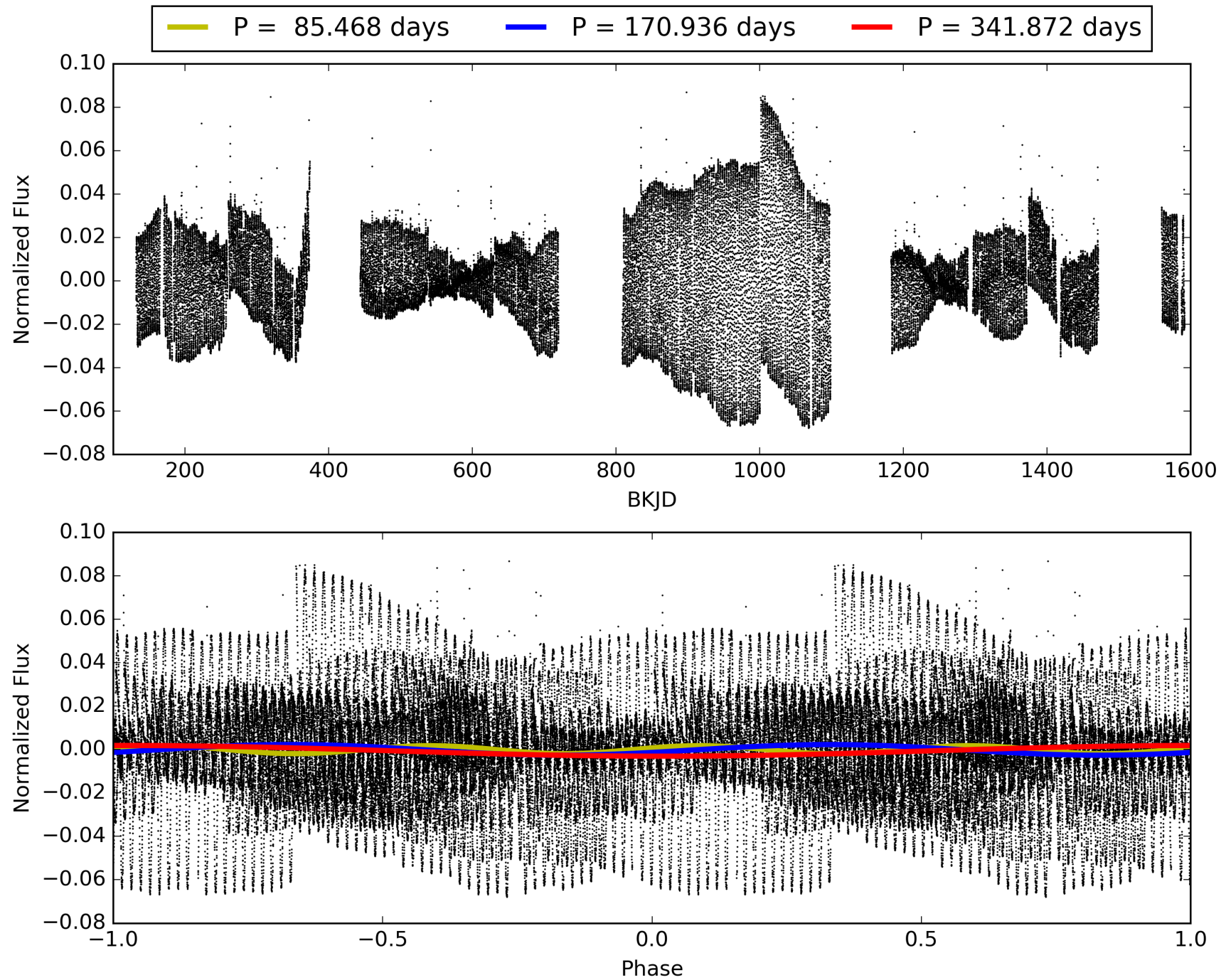
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010909367-04, PDC Light Curves





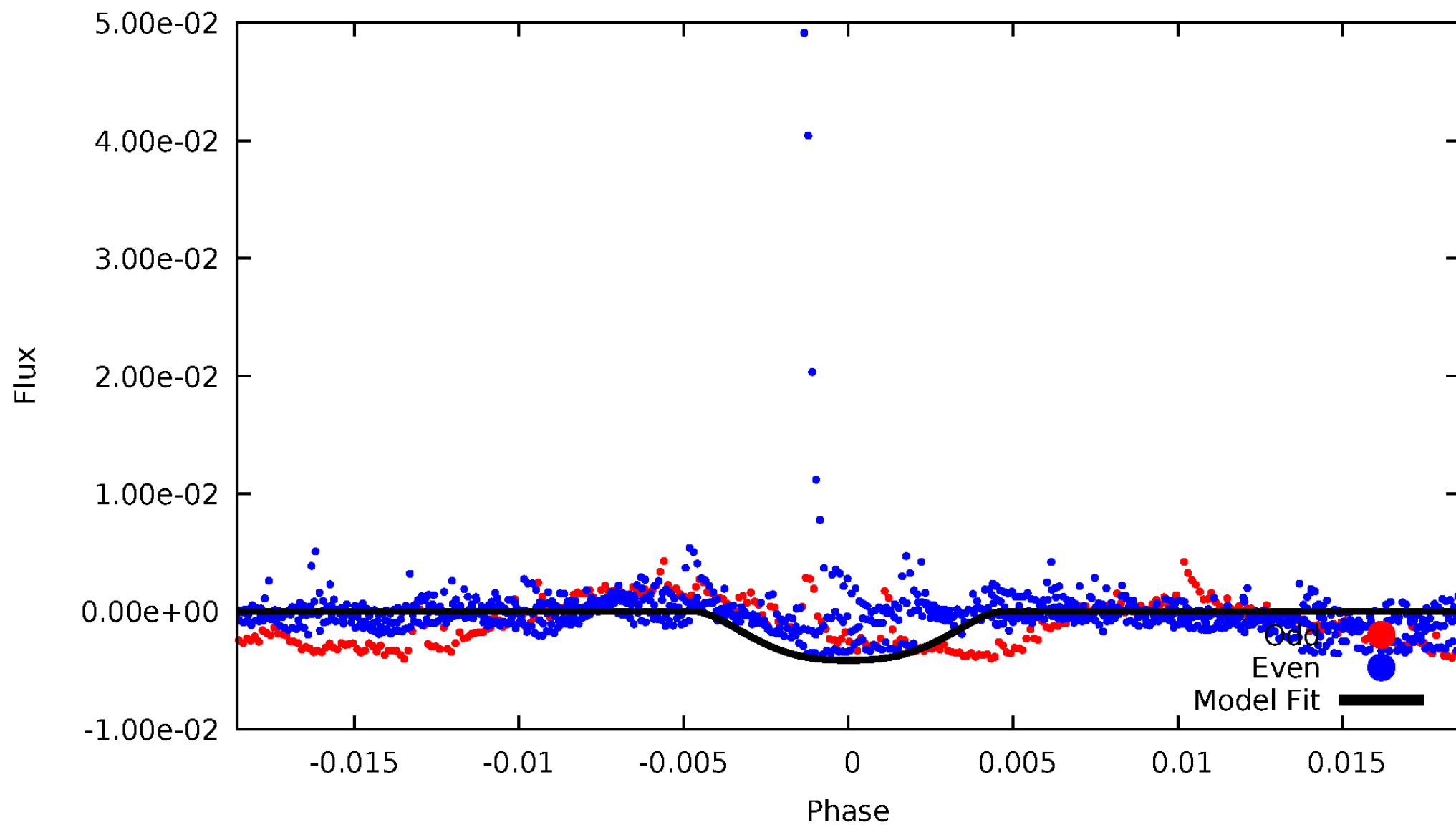
# TCE 010909367-04





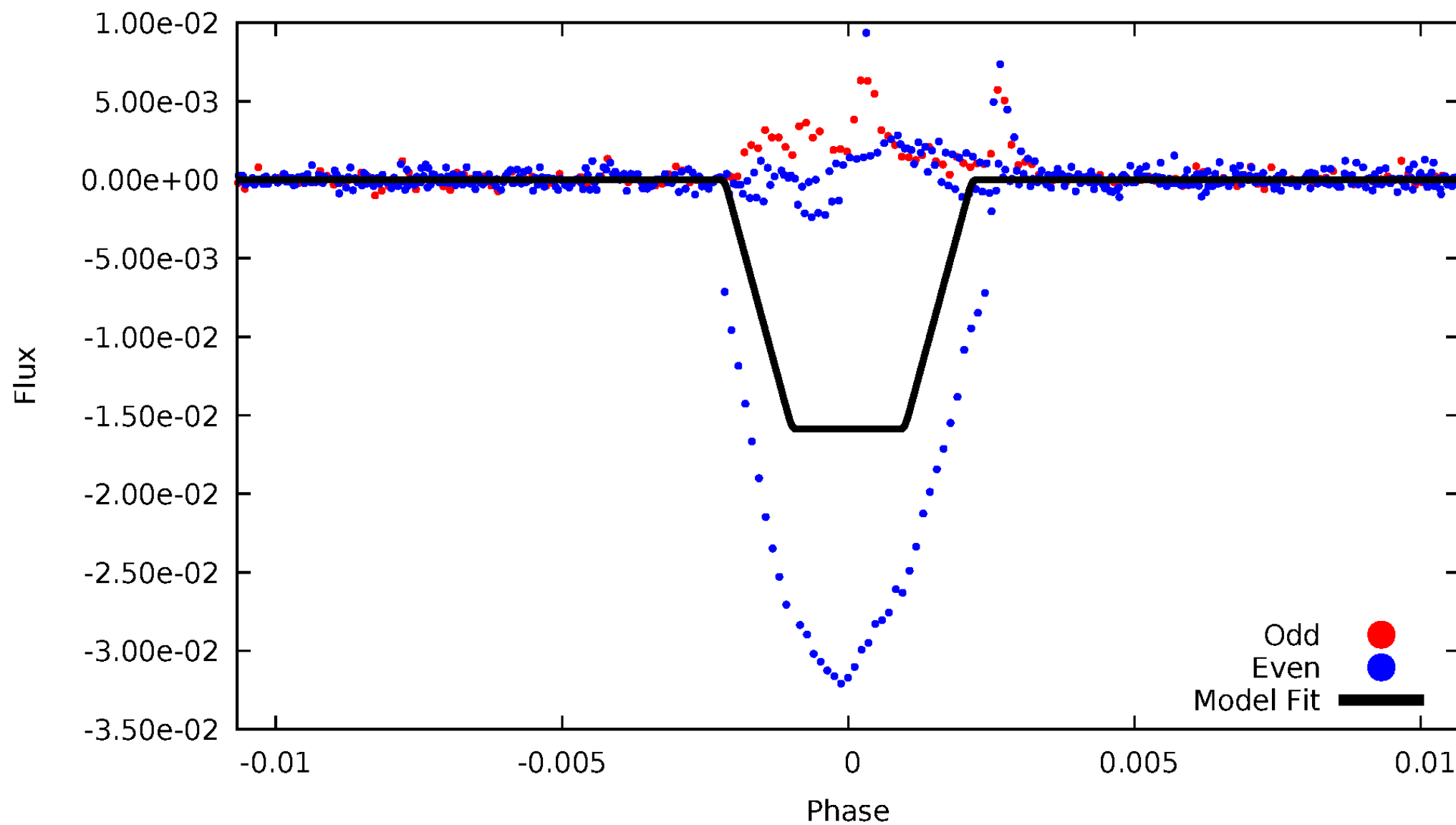
# DV Odd/Even

TCE 010909367-04



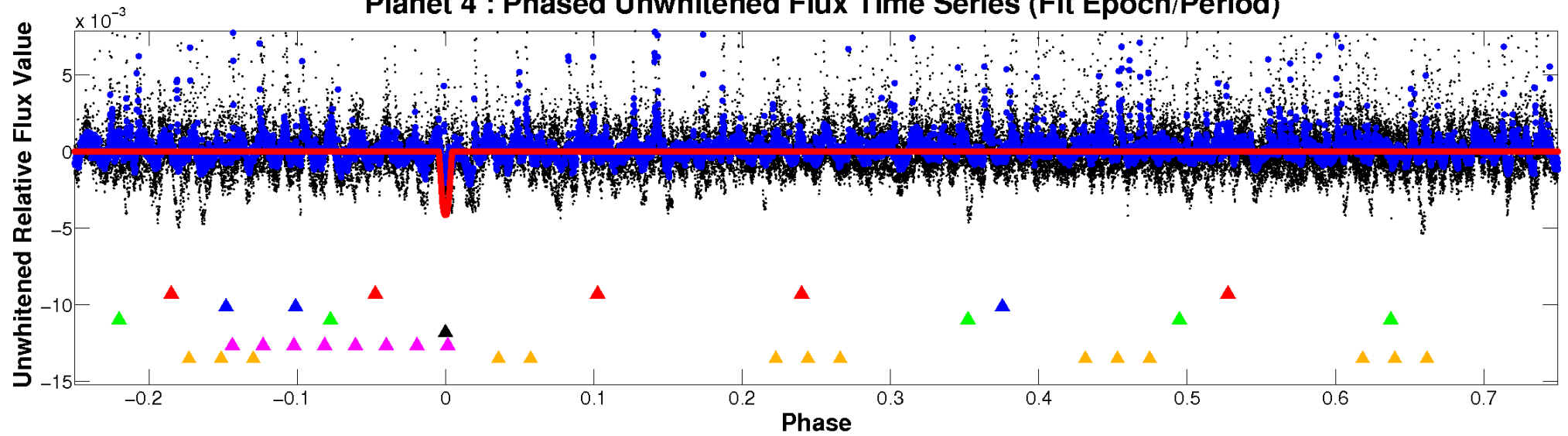
# ALT Odd/Even

TCE 010909367-04

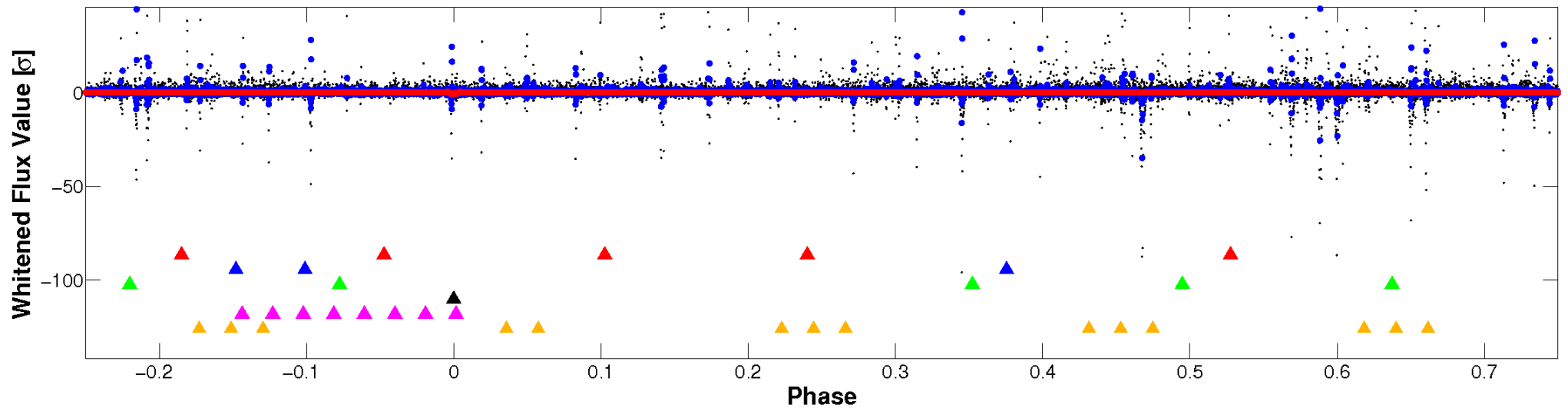


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

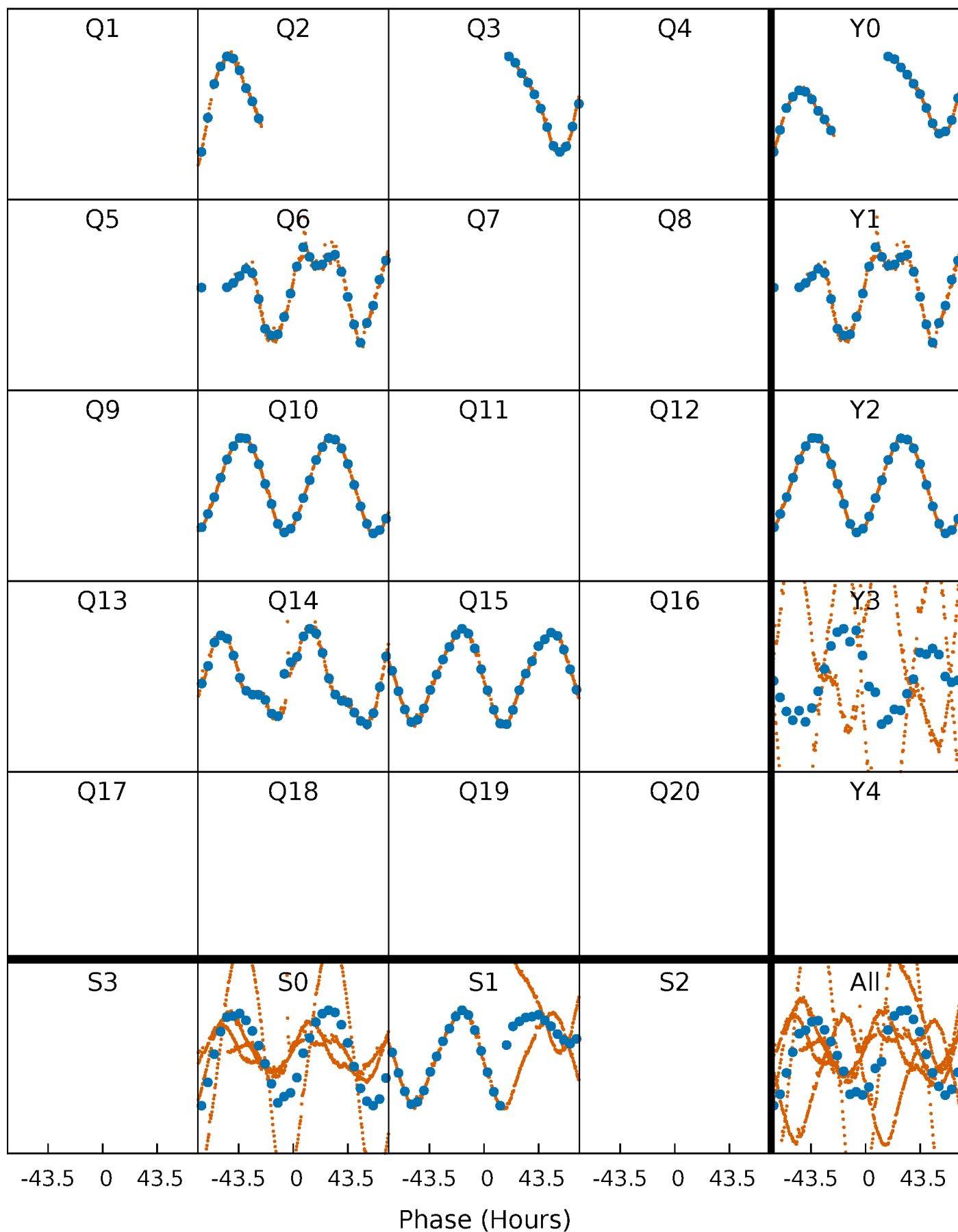


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



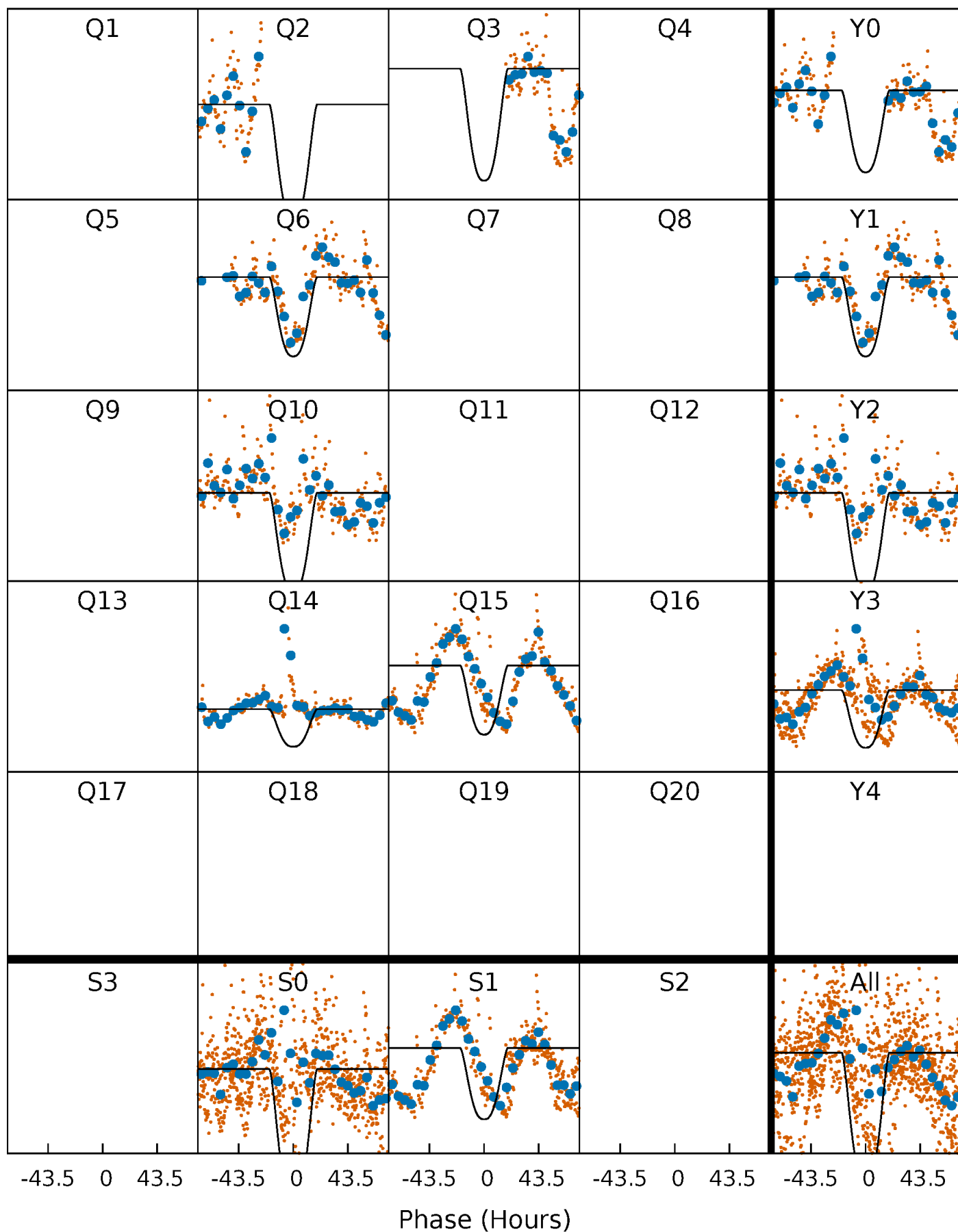
# PDC Quarter-Phased Transit Curves

TCE 010909367-04     $P=170.935788$  Days     $T_0=259.522269$  (BKJD)



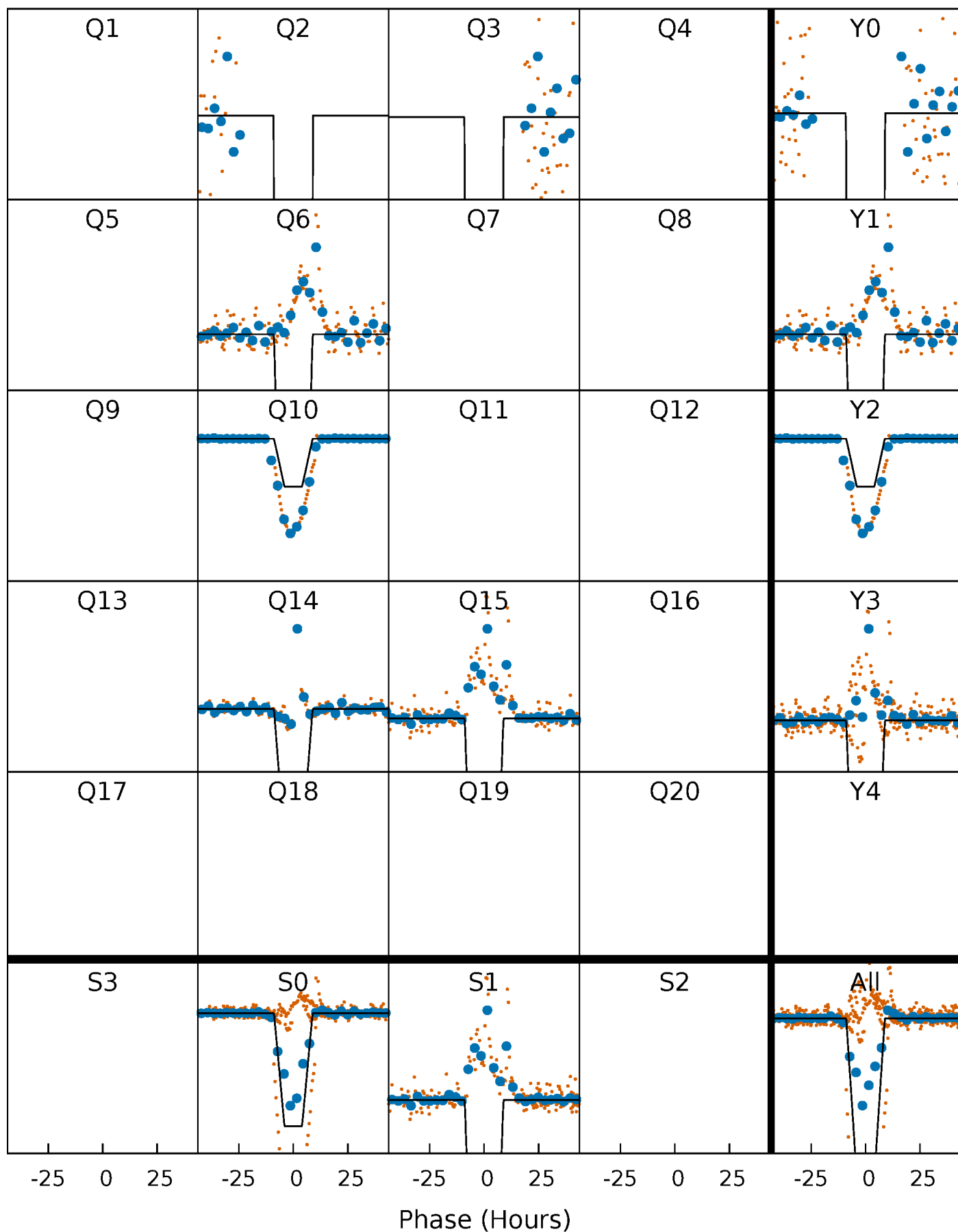
# DV Quarter-Phased Transit Curves

TCE 010909367-04 P=170.935788 Days  $T_0=259.522269$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

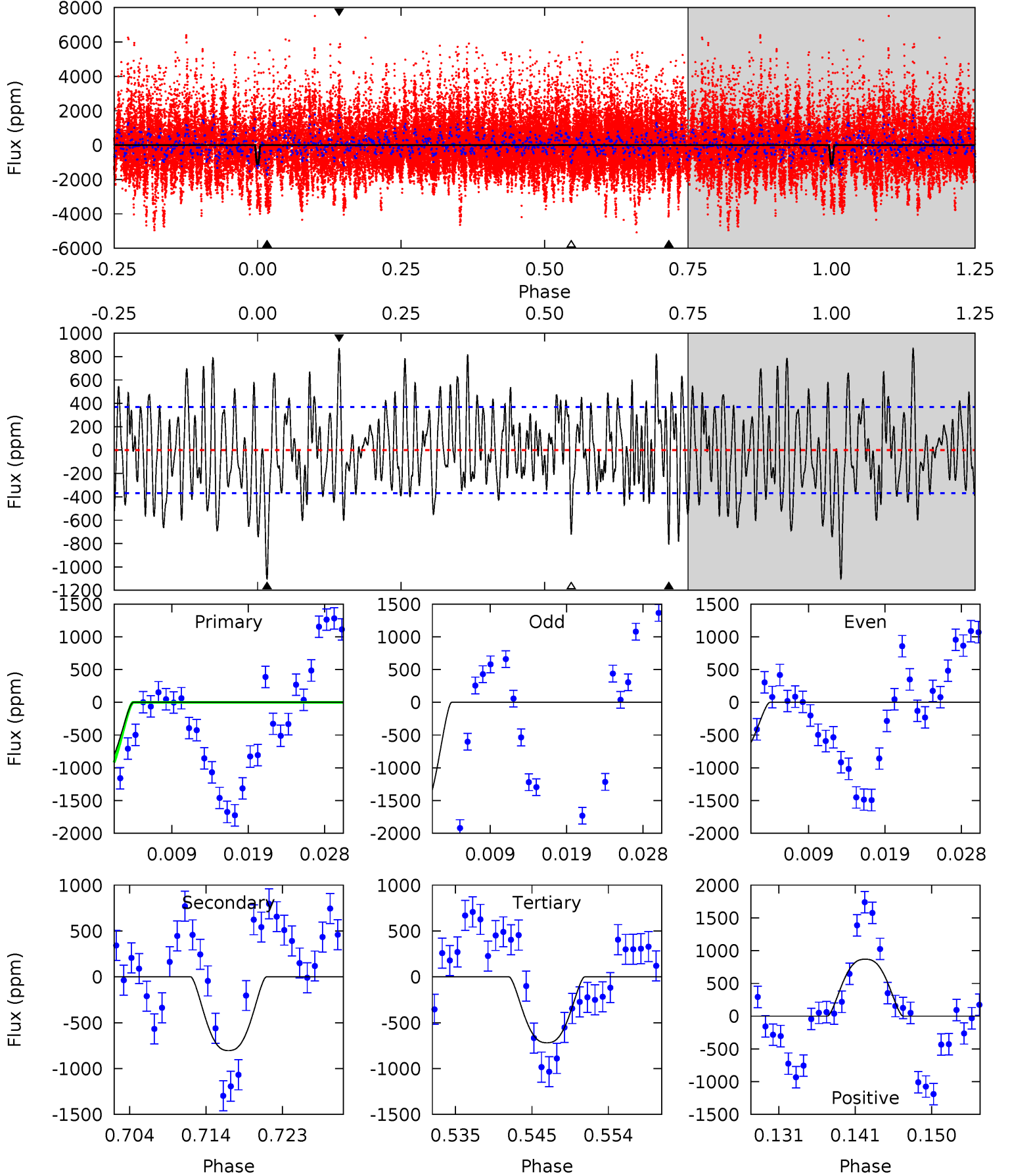
TCE 010909367-04     $P=170.899485$  Days     $T_0=259.519334$  (BKJD)



# DV Model-Shift Uniqueness Test

010909367-04, P = 170.935788 Days, E = 88.586481 Days

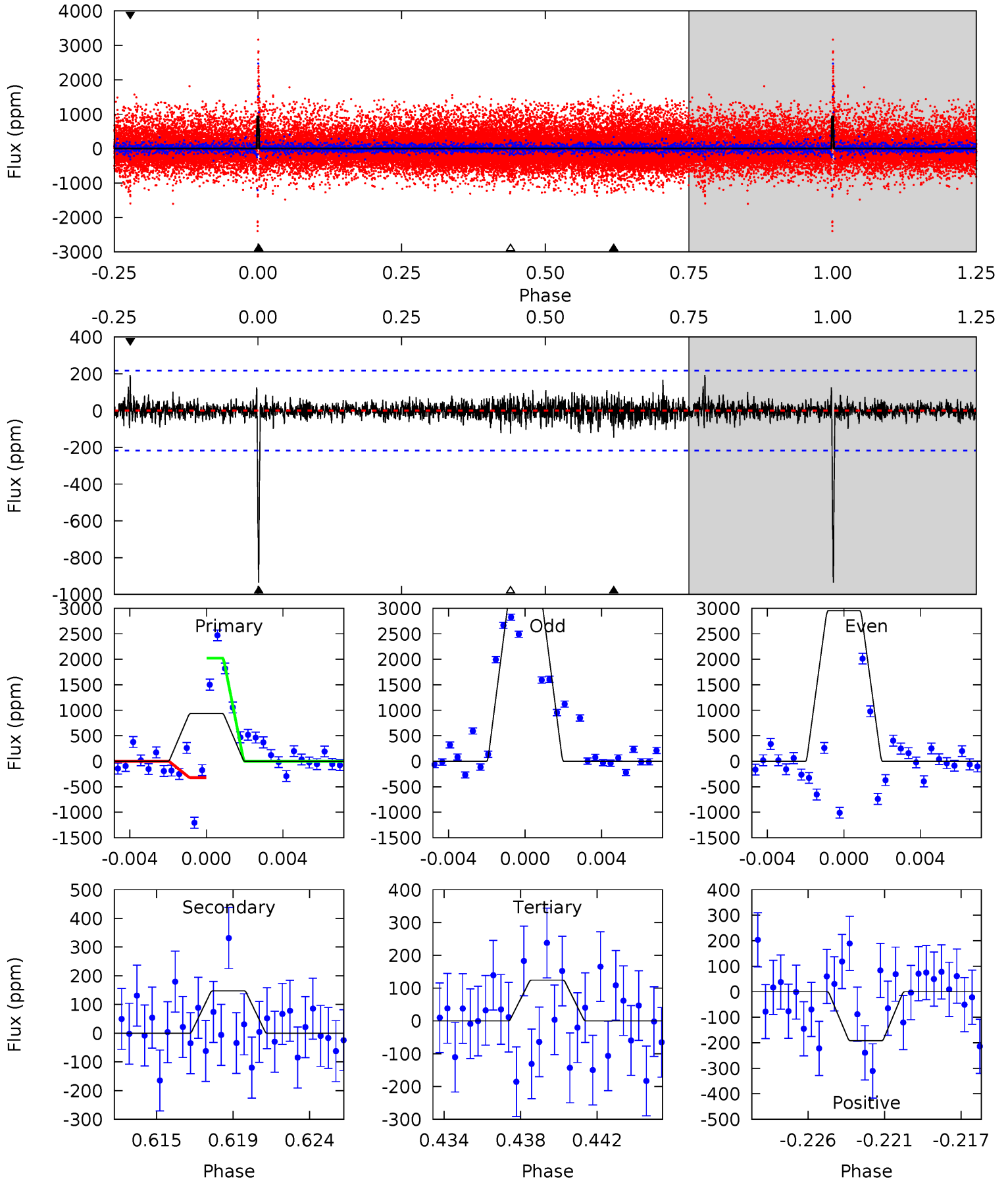
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
15.0	11.0	9.82	11.9	5.04	2.60	4.06	5.23	3.18	1.16	-0.89	5.20	0.55	0.44	2.22



# Alt Model-Shift Uniqueness Test

010909367-04, P = 170.899485 Days, E = 88.619849 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
22.2	3.51	2.96	4.56	5.18	2.85	0.78	19.3	17.7	0.55	-1.05	1.95	-9.02	0.17	0





### Stellar Parameters For KIC 010909367

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3805^{+45}_{-49}$	$4.733^{+0.030}_{-0.015}$	$-0.100^{+0.100}_{-0.100}$	$0.513^{+0.020}_{-0.028}$	$0.519^{+0.026}_{-0.021}$	$5.426^{+0.744}_{-0.384}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-5%	+5%/-4%	+14%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 010909367-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-804 \pm 73$	$4.07^{+0.43}_{-0.41}$	$241^{+3}_{-4}$	$2861^{+94}_{-83}$	$6335^{+1628}_{-1157}$
Alt.	$-147 \pm 42$	$7.04^{+0.41}_{-0.43}$	$241^{+3}_{-4}$	$2057^{+62}_{-67}$	$390^{+129}_{-106}$

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

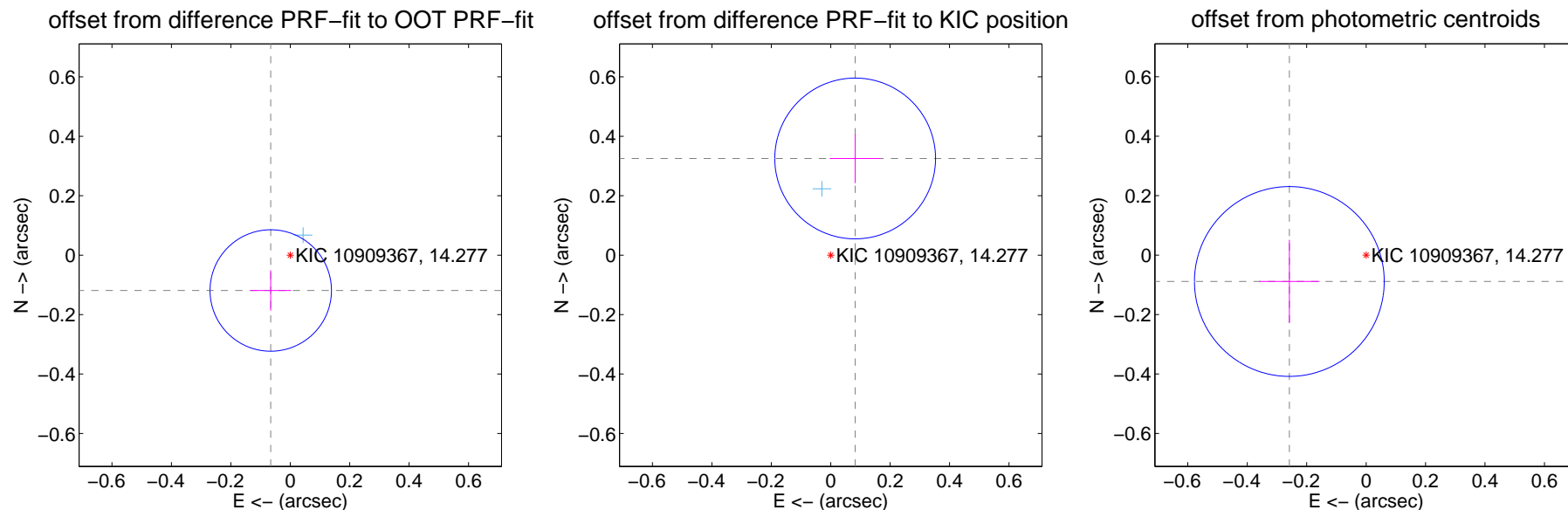
## DV Centroid Data

Supplemental centroid analysis for 010909367-04. Kepler magnitude: 14.28. Transit SNR 8.26

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	$0.136 \pm 0.068$	1.99	$0.066 \pm 0.068$	$-0.119 \pm 0.068$
PRF-fit source offset from KIC position	$0.336 \pm 0.090$	3.72	$-0.082 \pm 0.086$	$0.325 \pm 0.083$
photometric centroid source offset	$0.27 \pm 0.11$	2.57	$0.26 \pm 0.10$	$-0.09 \pm 0.14$



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.

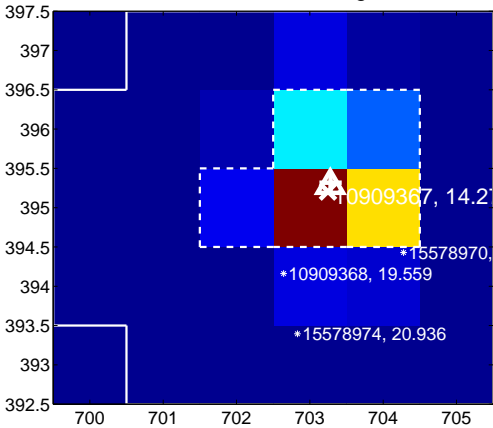
Q9 no difference image



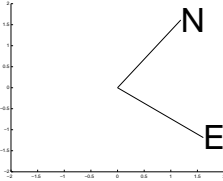
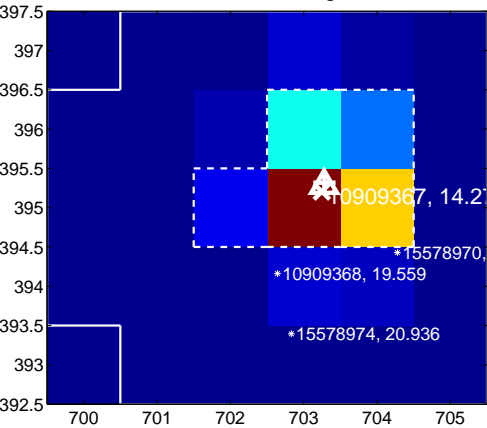
Q9 no OOT image



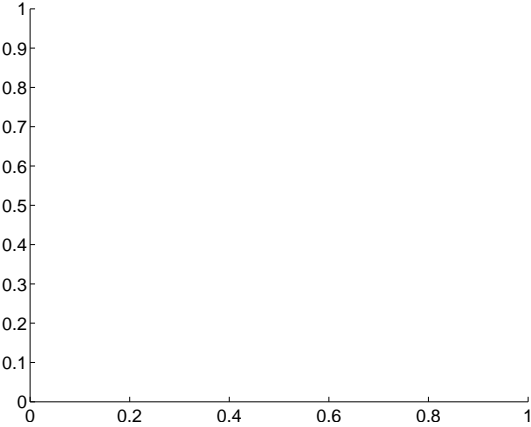
Q10 difference image



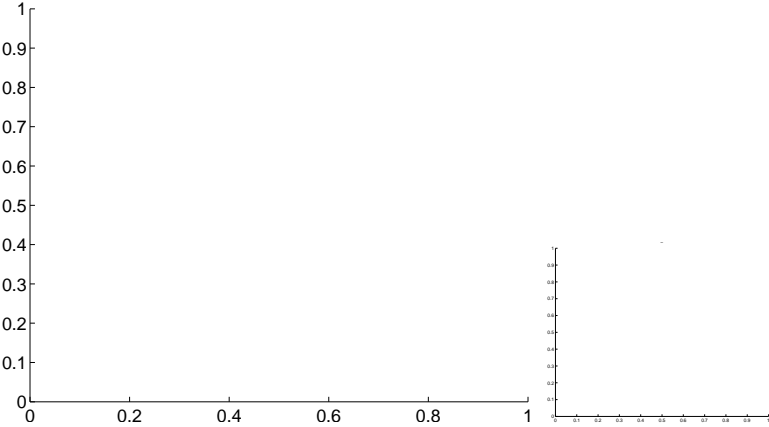
Q10 OOT image



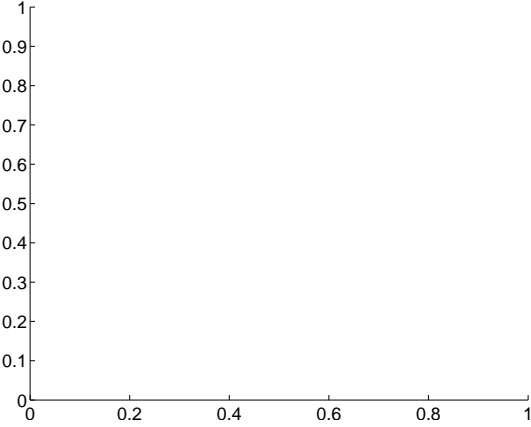
Q11 no difference image



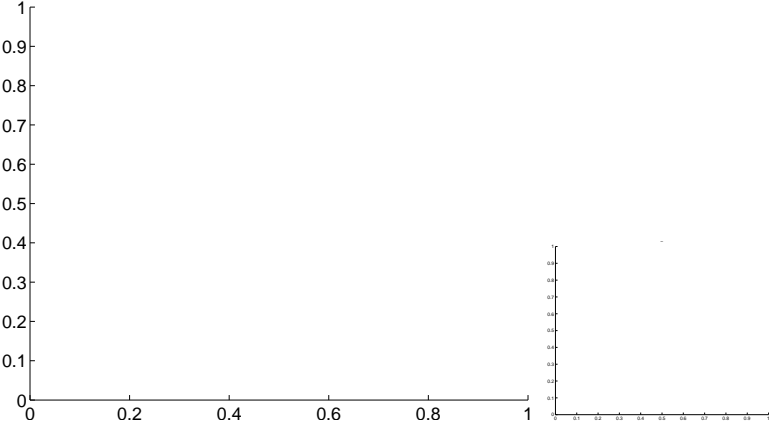
Q11 no OOT image



Q12 no difference image



Q12 no OOT image



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

Q13 no difference image



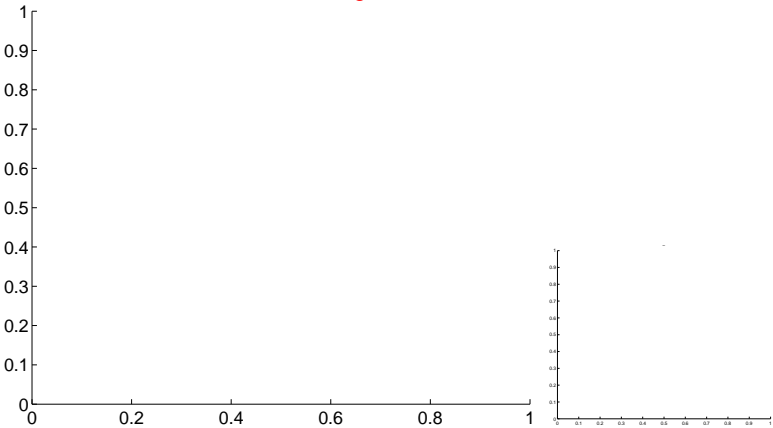
Q13 no OOT image



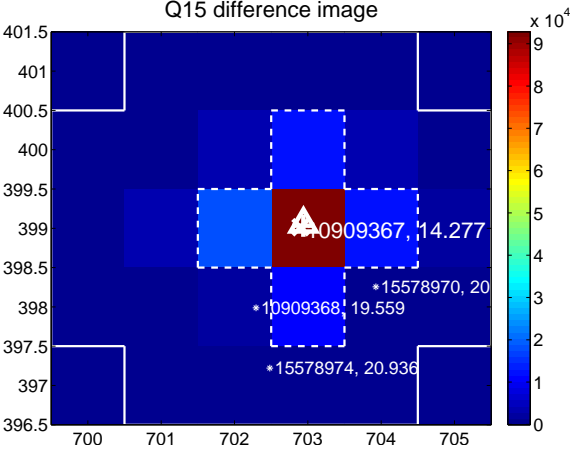
Q14 no difference image



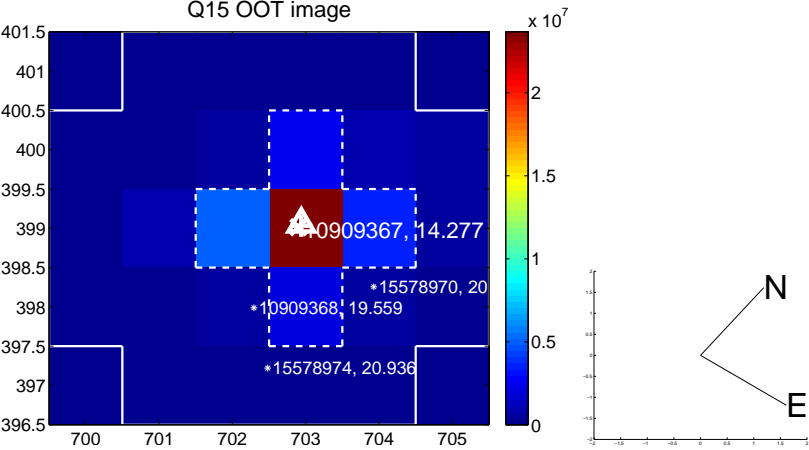
Q14 no OOT image



Q15 difference image



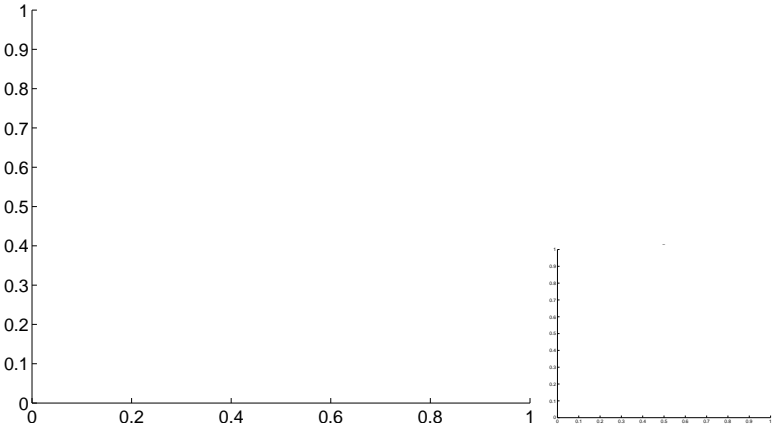
Q15 OOT image



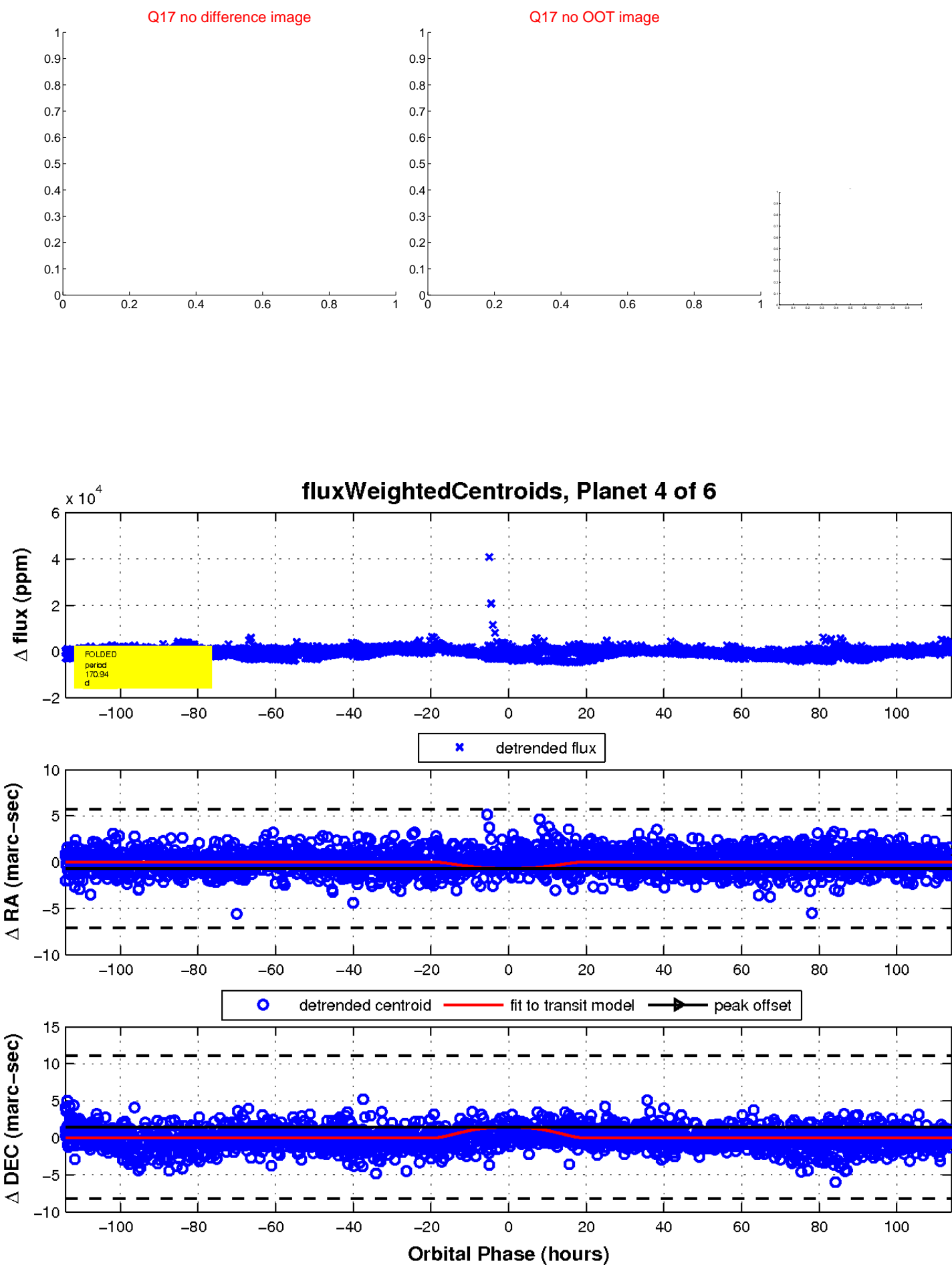
Q16 no difference image



Q16 no OOT image

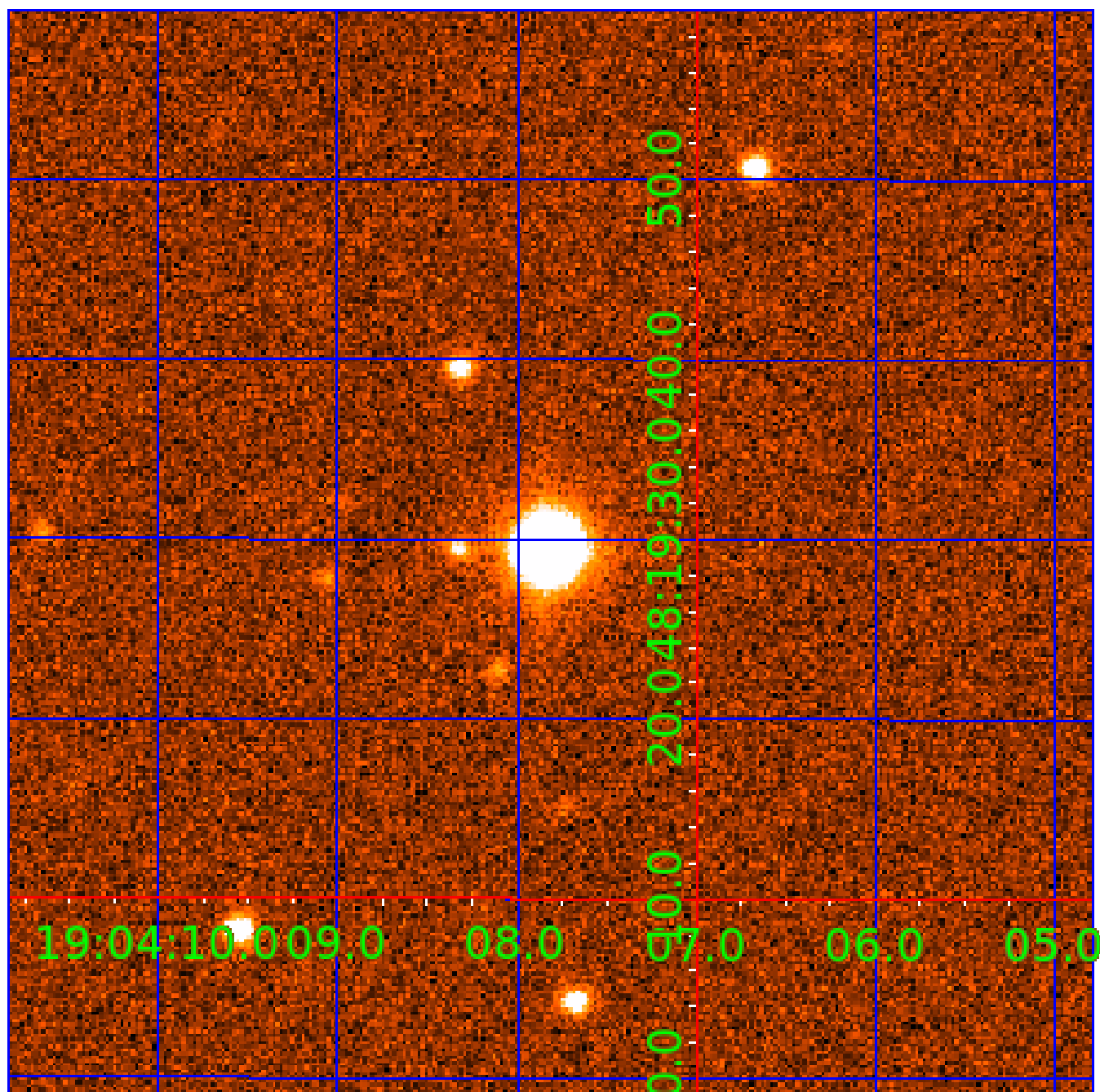


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010909367

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010909367-01	OBS	No	292.730001	277.060874	1755.4	14.324	15.2	6.2	0.51	3805	2.34	0.10
010909367-02	OBS	No	594.267355	242.249431	619.8	2.361	11.9	2.8	0.51	3805	1.42	0.04
010909367-03	OBS	No	317.505795	246.268738	1555.2	3.682	13.5	7.4	0.51	3805	2.02	0.09
010909367-04	OBS	No	170.935788	259.522269	4146.2	38.050	11.0	8.3	0.51	3805	4.08	0.21
010909367-05	OBS	No	167.388853	259.787514	1259.7	4.148	12.3	6.3	0.51	3805	1.88	0.22
010909367-06	OBS	No	103.302853	194.293093	833.5	3.459	11.7	6.8	0.51	3805	1.51	0.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010909367-01	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
010909367-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010909367-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
010909367-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
010909367-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
010909367-06	OBS	FP	0.01	1	0	0	0	LPP_DV—INCONSISTENT_TRANS

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

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

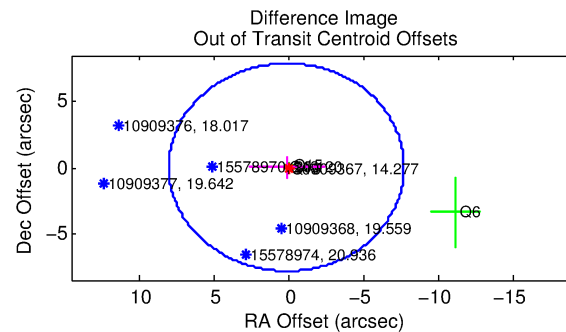
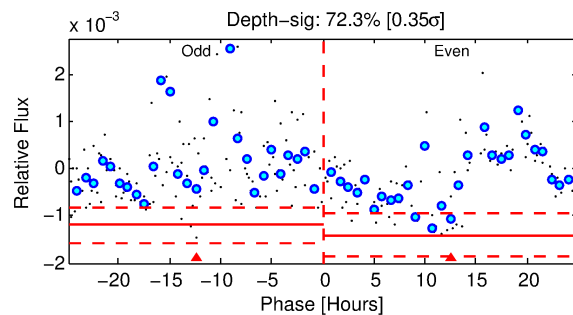
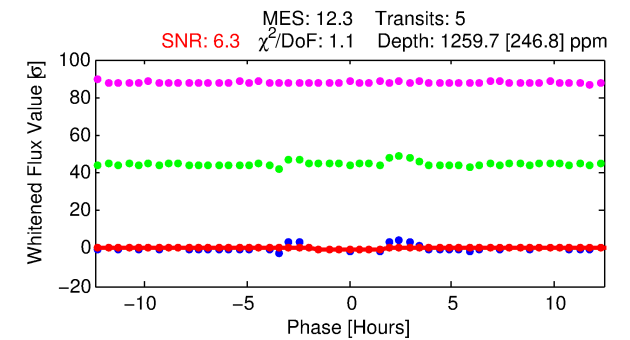
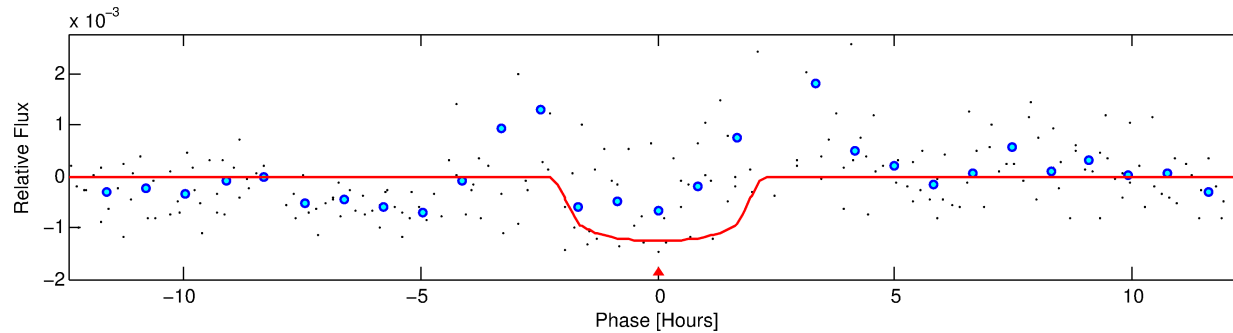
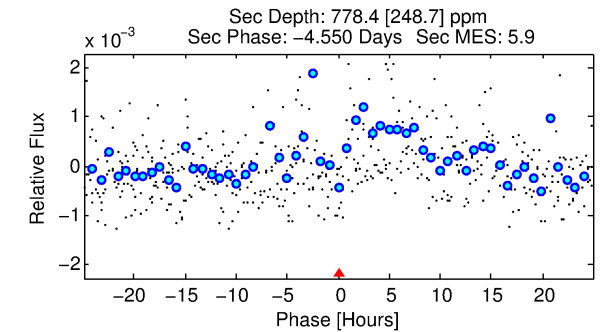
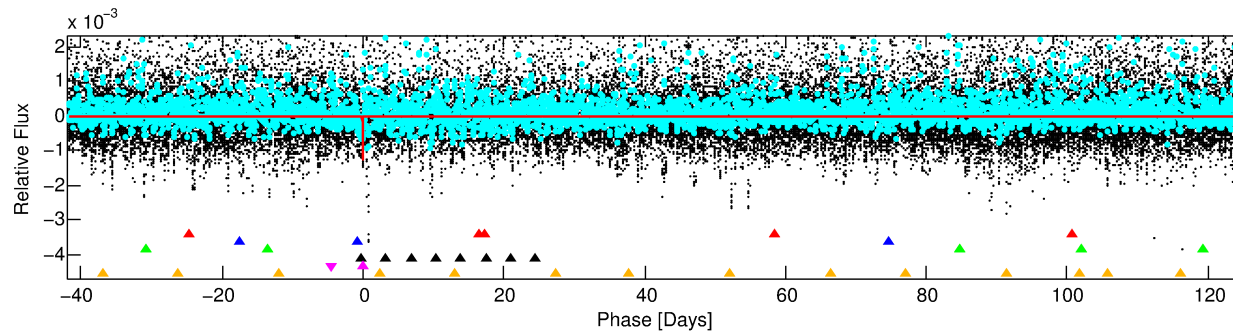
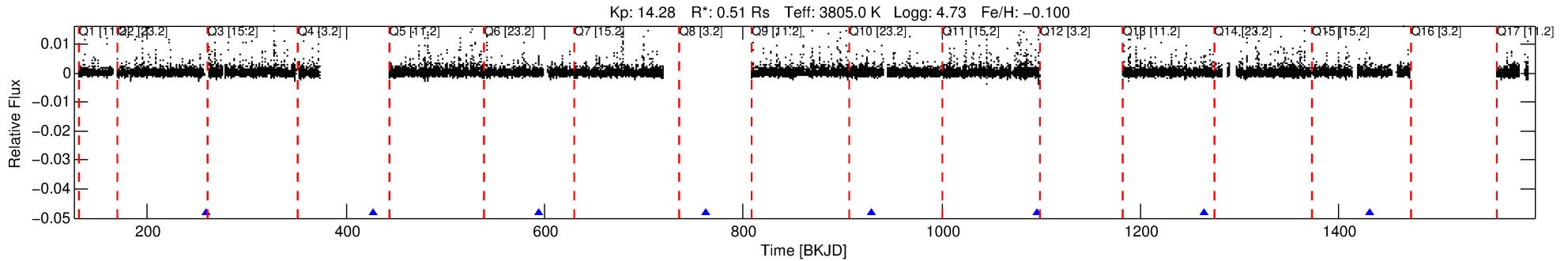
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010909367-05

No Significant Match Found

# DV One-Page Summary

KIC: 10909367 Candidate: 5 of 6 Period: 167.389 d



## DV Fit Results:

Period = 167.38885 [0.00290] d  
Epoch = 259.7875 [0.0140] BKJD  
Rp/R\* = 0.0336 [0.0530]  
a/R\* = 267.56 [1844.08]  
b = 0.56 [8.47]  
Seff = 0.22 [0.02]  
Teq = 174 [3] K  
Rp = 1.88 [2.97] Re  
a = 0.4778 [0.0206] AU  
Ag = 27693.51 [87991.23] [0.31σ]  
Teffp = 3469 [2756] K [1.20σ]

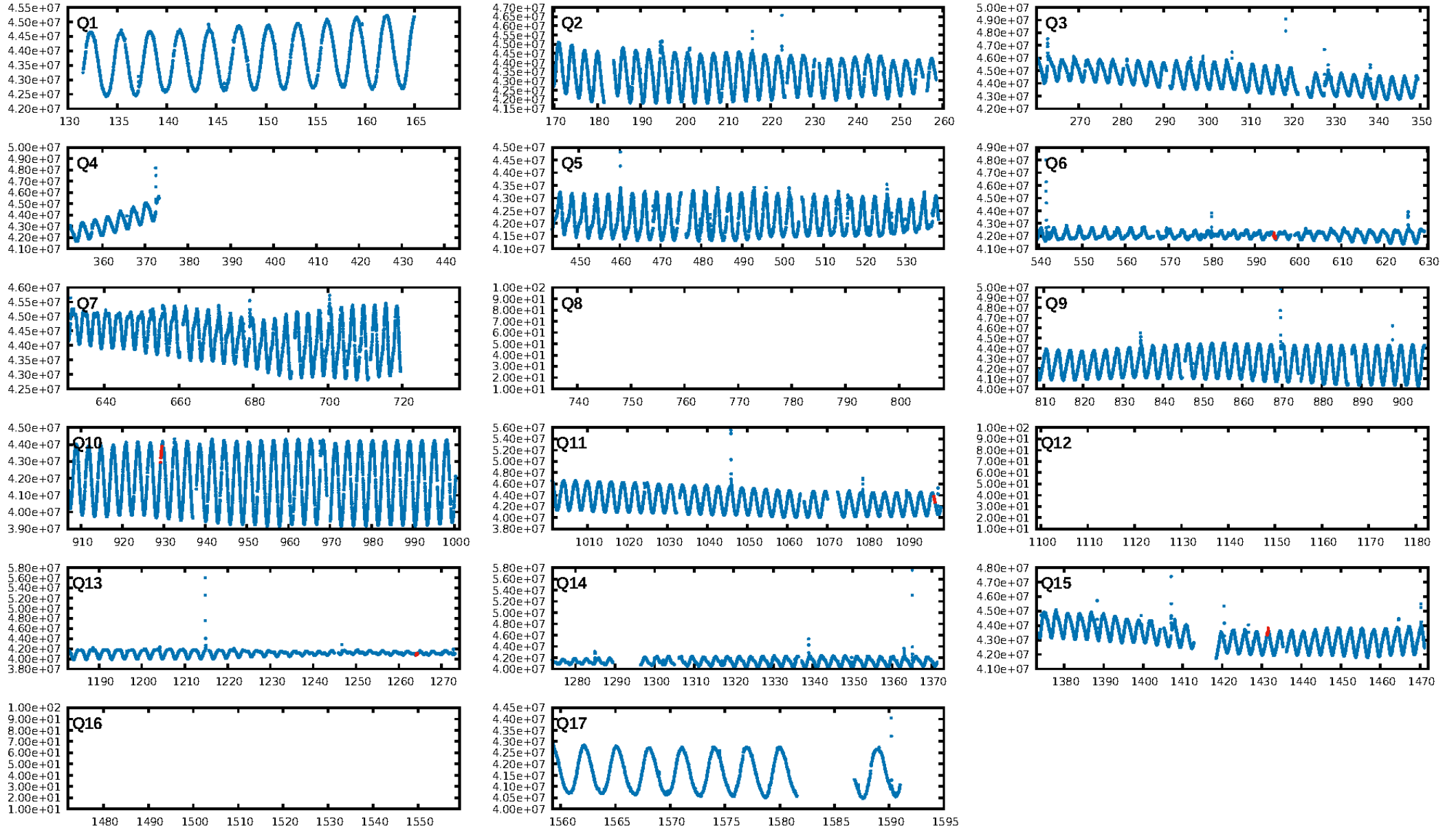
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [284.79σ]  
LongPeriod-sig: 97.4% [2.22σ]  
ModelChiSquare2-sig: 1.8%  
ModelChiSquareGof-sig: 94.7%  
**Bootstrap-pfa: 8.54e-11**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 1.122  
Centroid-sig: 11.4%  
Centroid-so: 0.357 arcsec [0.62σ]  
OotOffset-rm: 0.117 arcsec [0.04σ]  
KicOffset-rm: 0.342 arcsec [0.51σ]  
OotOffset-st: 2/1/0/1 [4]  
KicOffset-st: 2/1/0/1 [4]  
DiffImageQuality-fgm: 0.25 [1/4]  
DiffImageOverlap-fno: 1.00 [4/4]

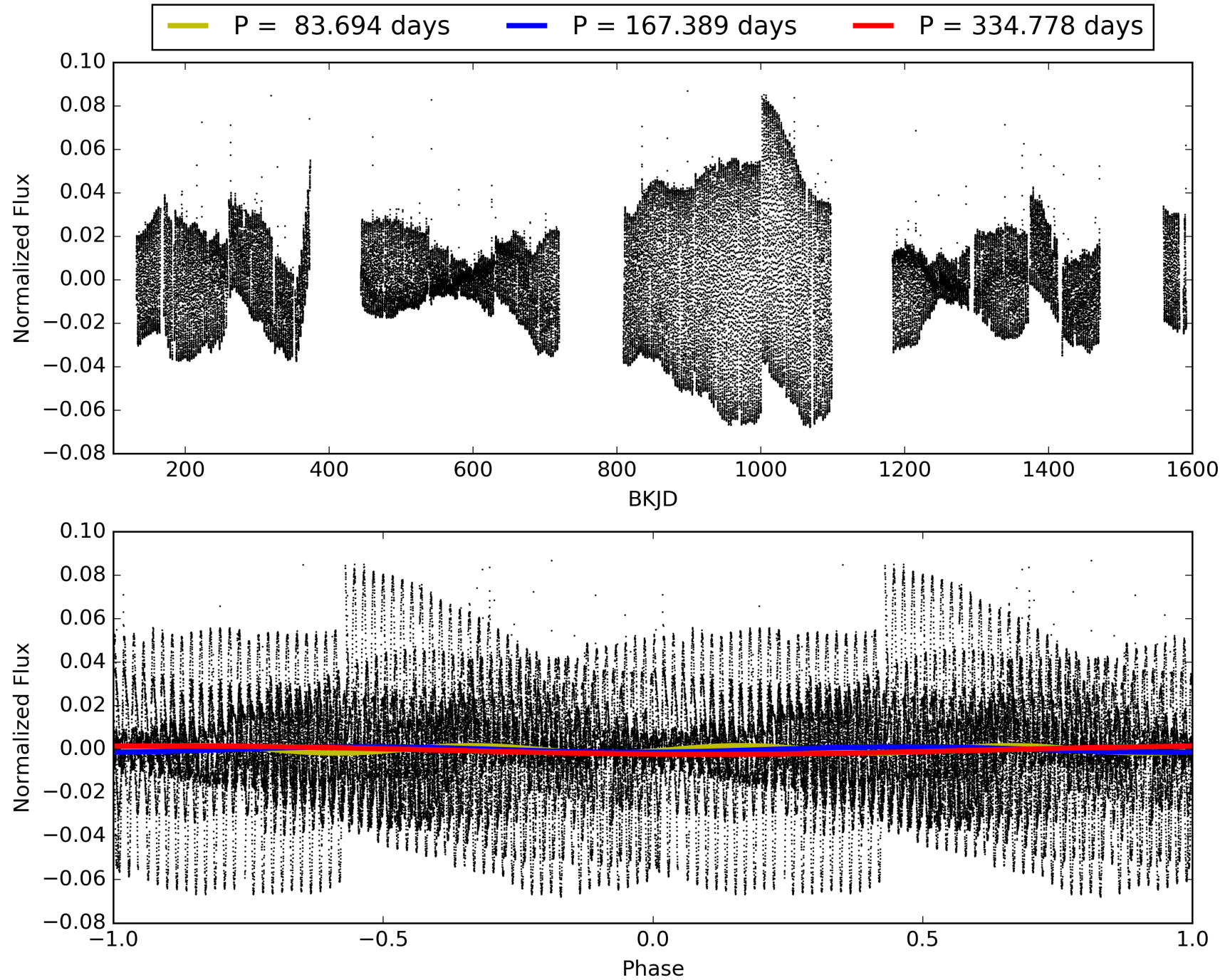
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 30-Jan-2016 04:54:06 Z

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

# TCE 010909367-05, PDC Light Curves

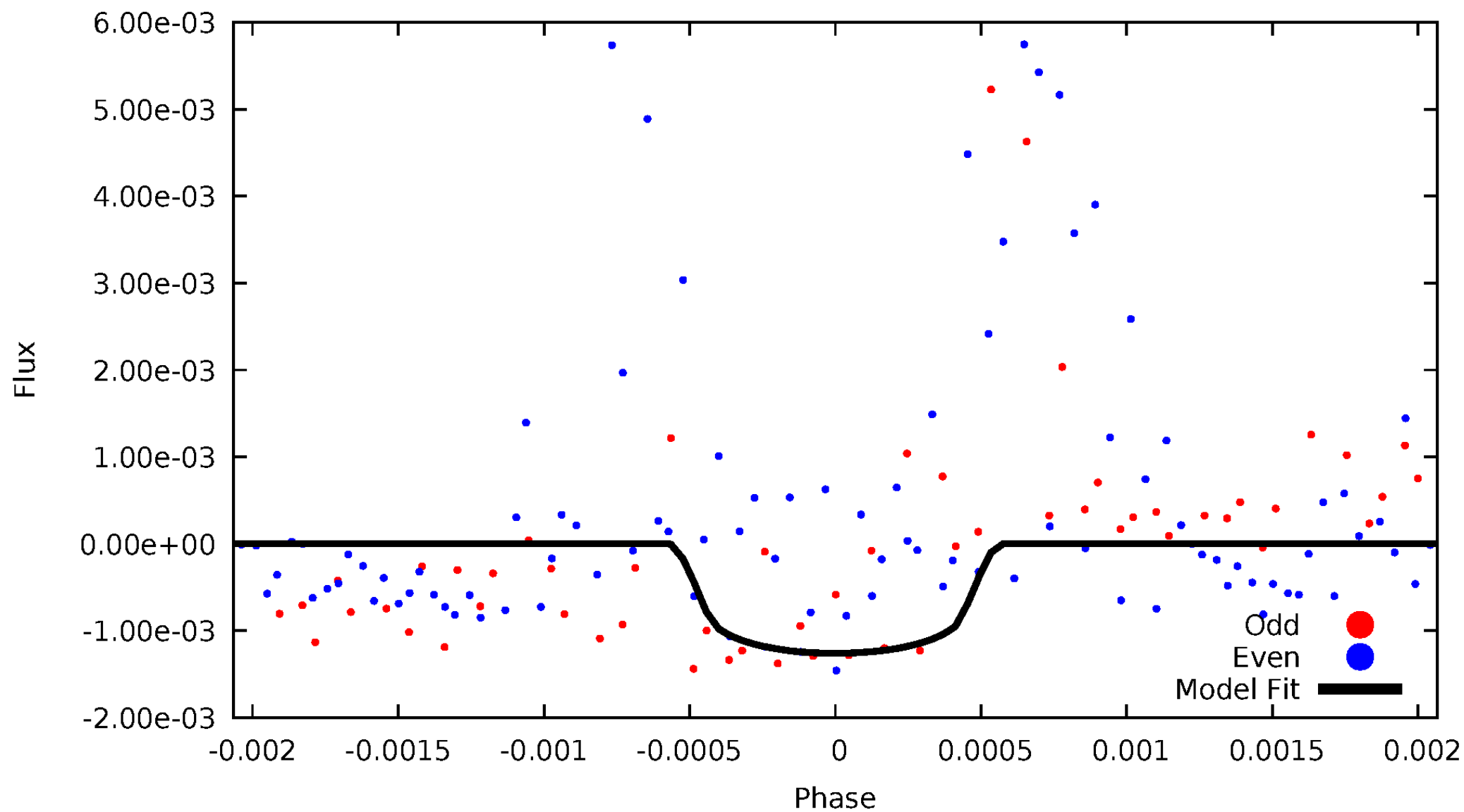


# TCE 010909367-05



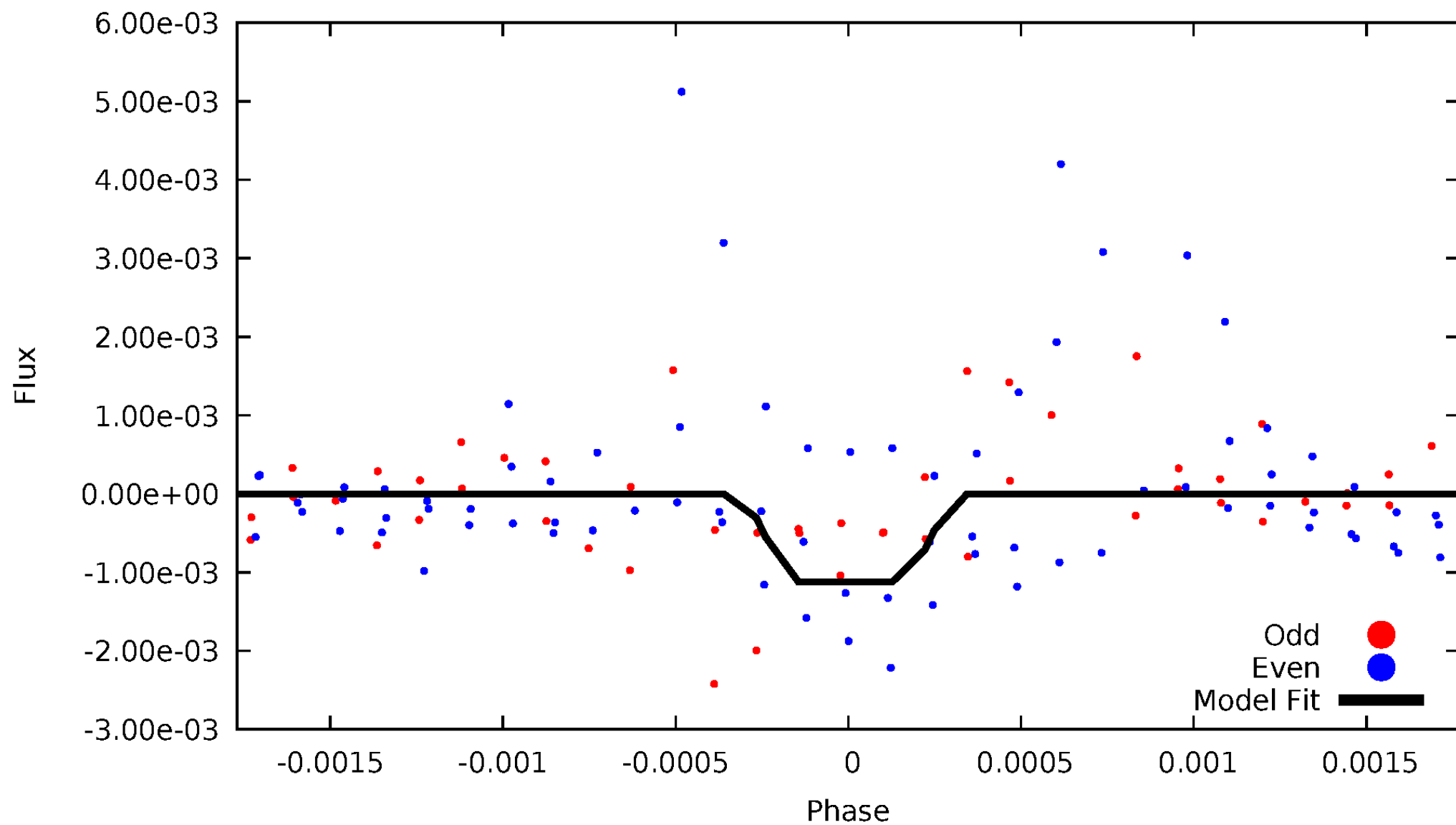
# DV Odd/Even

TCE 010909367-05



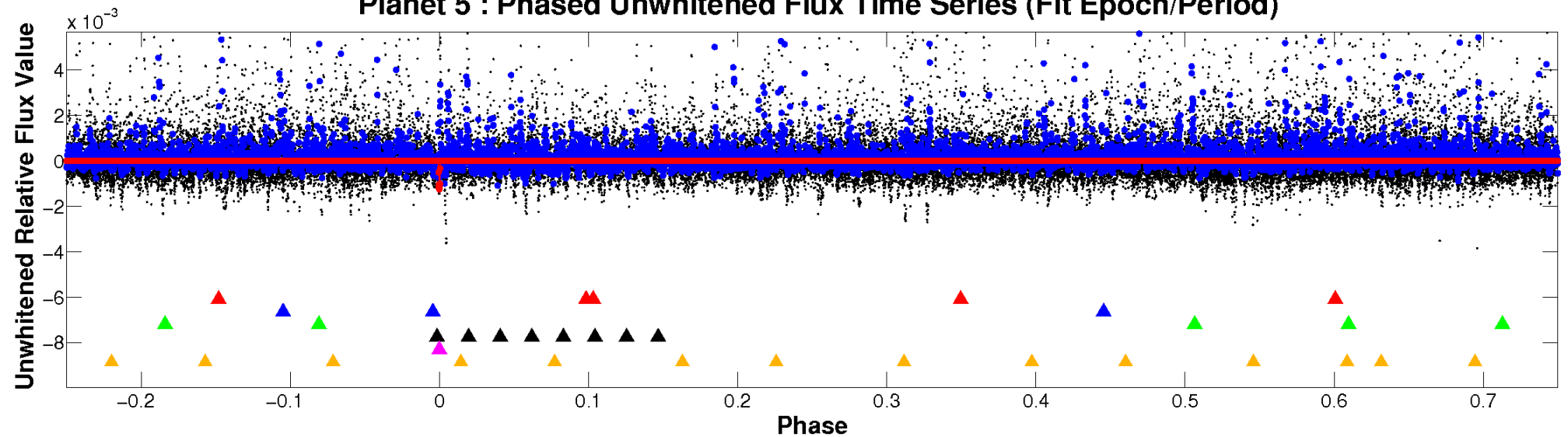
# ALT Odd/Even

TCE 010909367-05

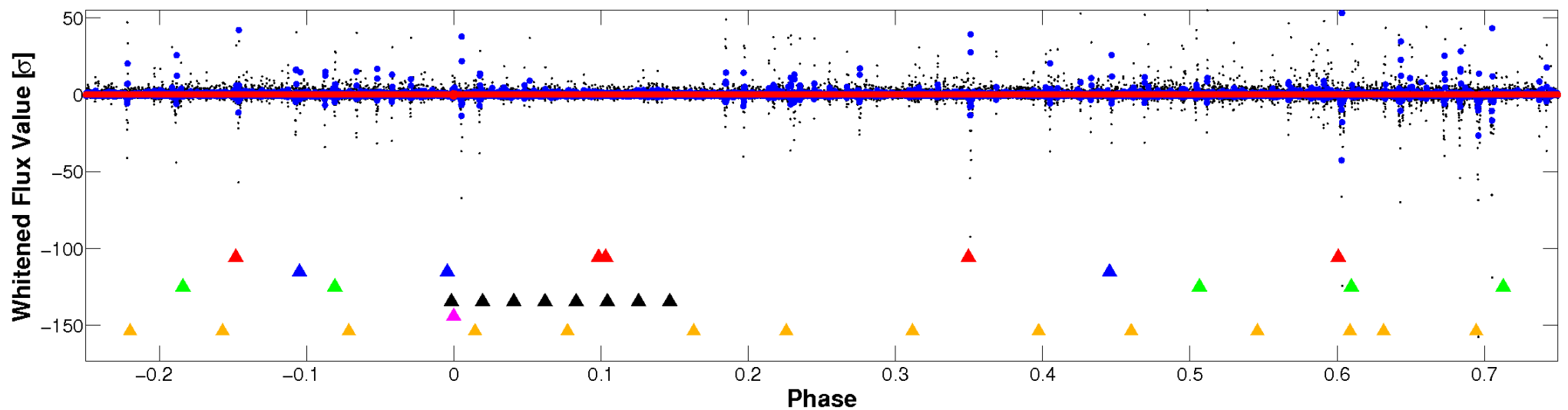


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

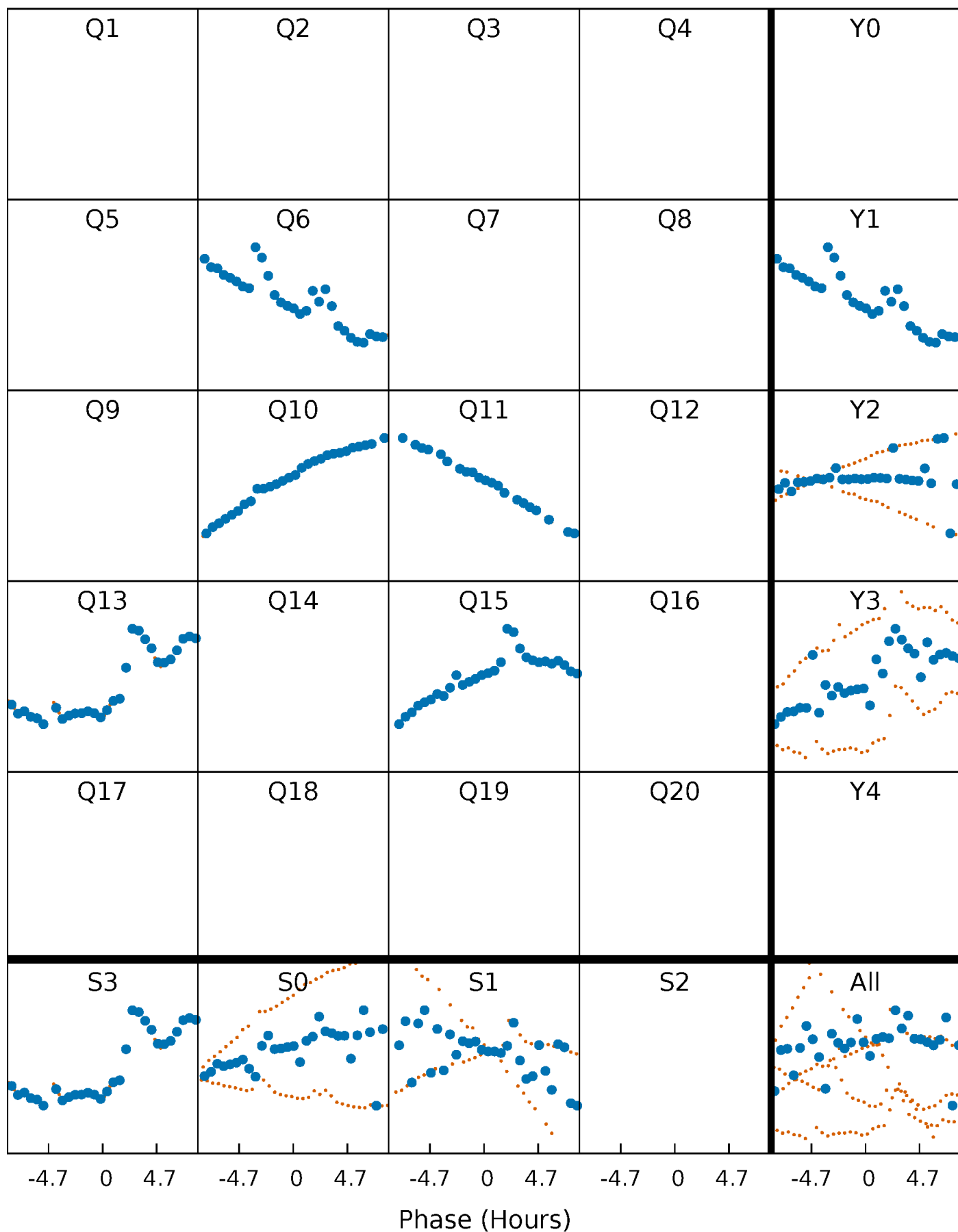


## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

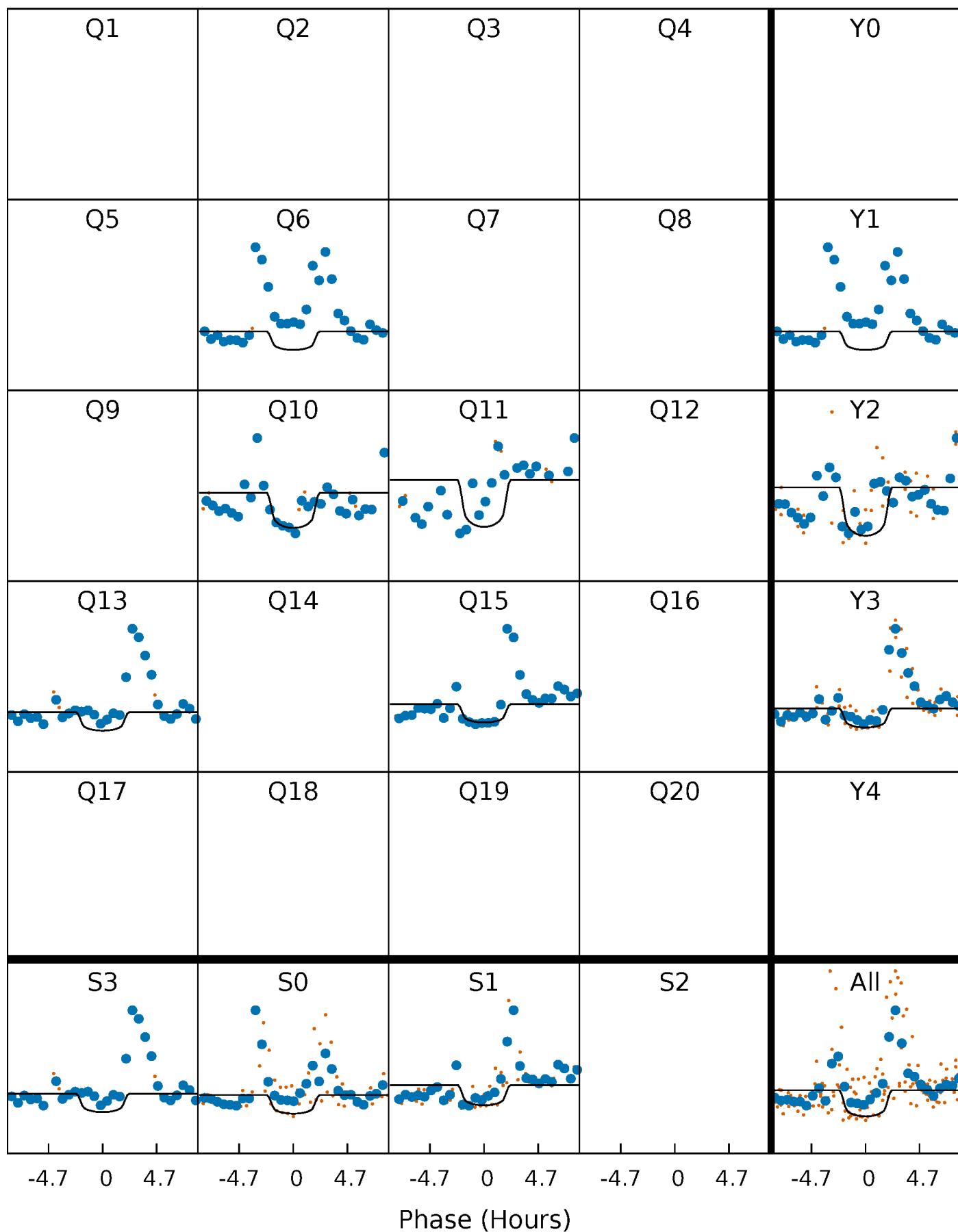
TCE 010909367-05     $P=167.388853$  Days     $T_0=259.787514$  (BKJD)





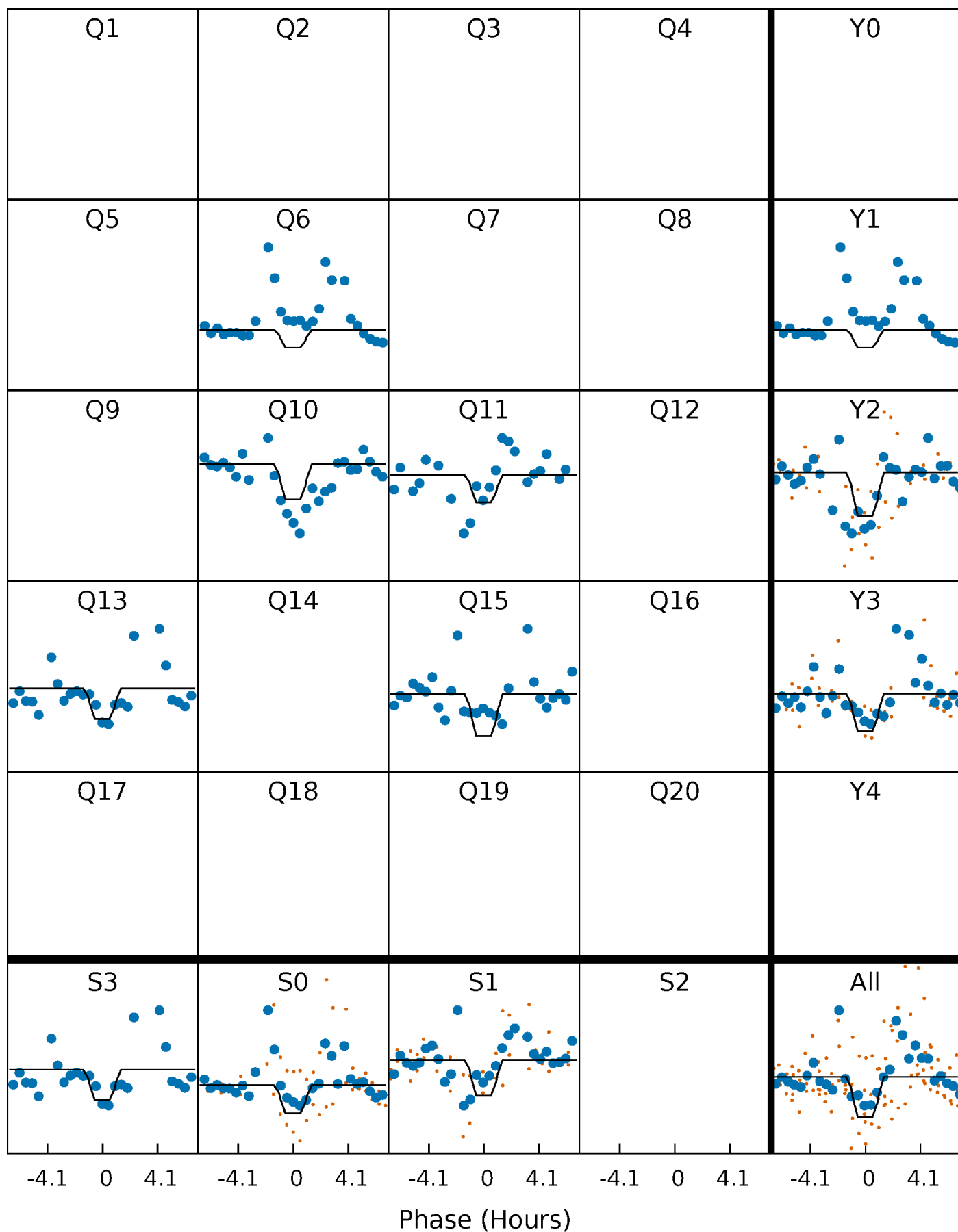
# DV Quarter-Phased Transit Curves

TCE 010909367-05     $P=167.388853$  Days     $T_0=259.787514$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

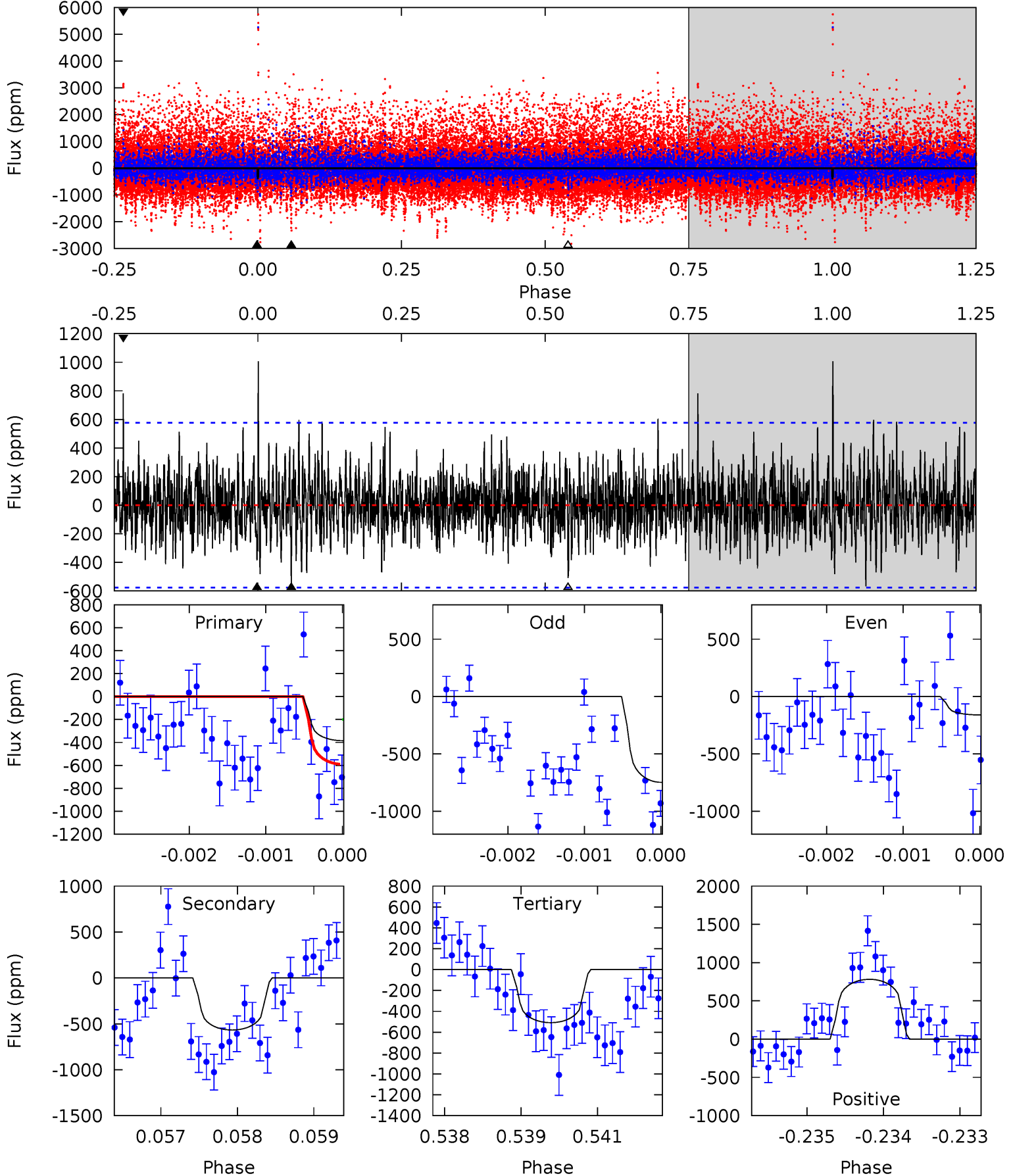
TCE 010909367-05     $P=167.392378$  Days     $T_0=259.753471$  (BKJD)



# DV Model-Shift Uniqueness Test

010909367-05,  $P = 167.388853$  Days,  $E = 92.398661$  Days

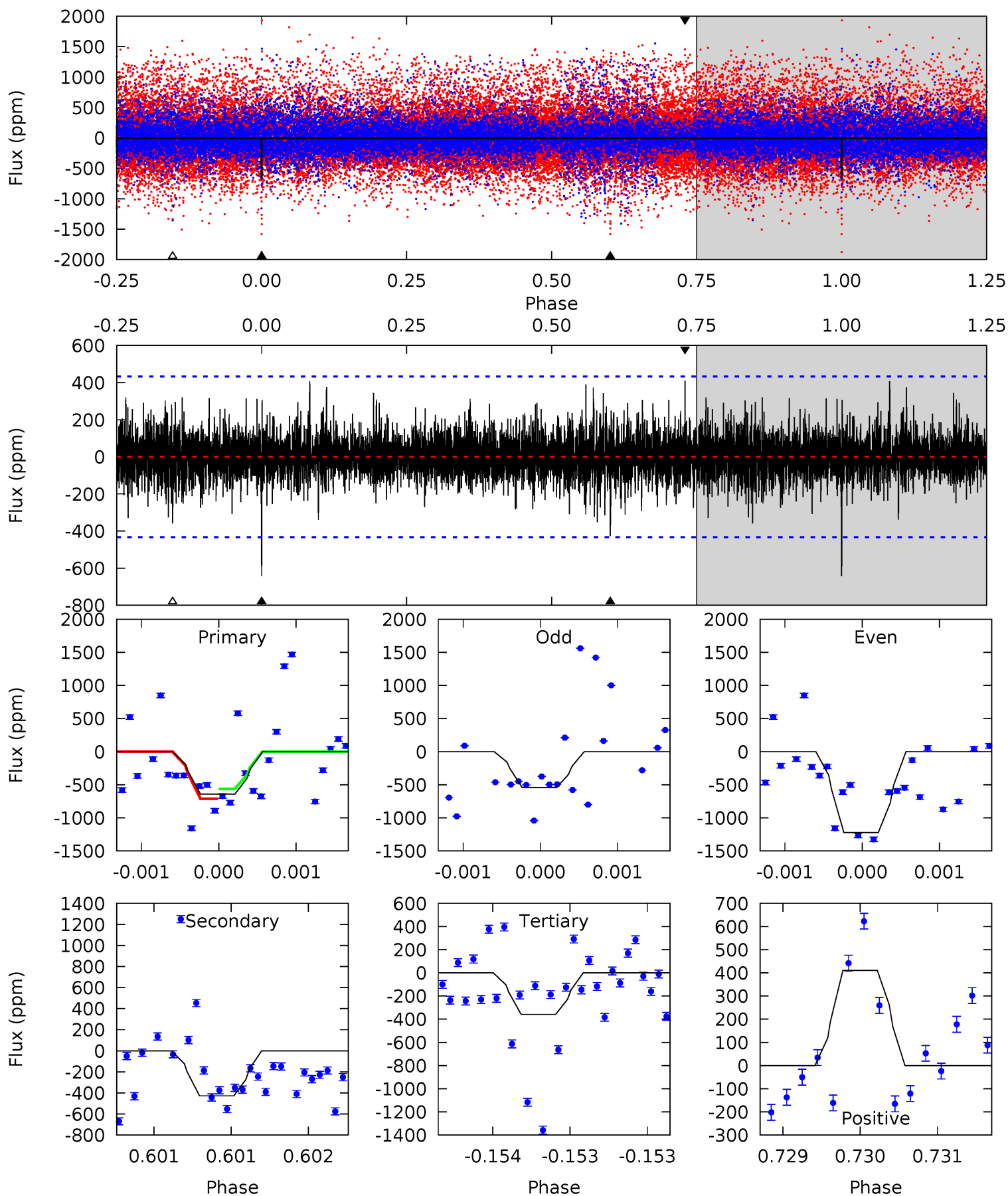
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
3.63	5.35	4.80	7.37	5.43	3.26	1.48	-1.17	-3.75	0.55	-2.02	1.83	1.08	0.64	1.86



# Alt Model-Shift Uniqueness Test

010909367-05, P = 167.392378 Days, E = 92.361093 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
8.20	5.46	4.59	5.25	5.54	3.43	1.16	3.61	2.95	0.86	0.21	4.06	1.05	0.39	0.98



### Stellar Parameters For KIC 010909367

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$3805^{+45}_{-49}$	$4.733^{+0.030}_{-0.015}$	$-0.100^{+0.100}_{-0.100}$	$0.513^{+0.020}_{-0.028}$	$0.519^{+0.026}_{-0.021}$	$5.426^{+0.744}_{-0.384}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-5%	+5%/-4%	+14%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 010909367-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-568 \pm 106$	$2.84^{+2.50}_{-1.97}$	$242^{+4}_{-4}$	$3014^{+1461}_{-474}$	$8967^{+87864}_{-6524}$
Alt.	$-427 \pm 78$	$2.76^{+2.85}_{-1.76}$	$242^{+4}_{-4}$	$2903^{+1113}_{-475}$	$6975^{+47685}_{-5251}$

$T_{max}$  = 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

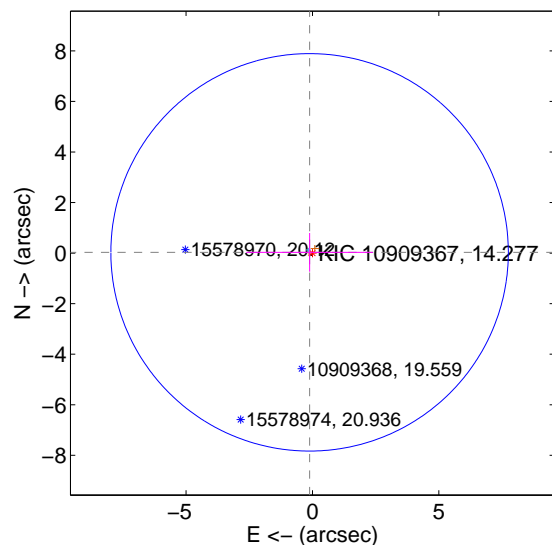
Supplemental centroid analysis for 010909367-05. Kepler magnitude: 14.28. Transit SNR 6.34

There are 1 quarters with good PRF difference image offsets

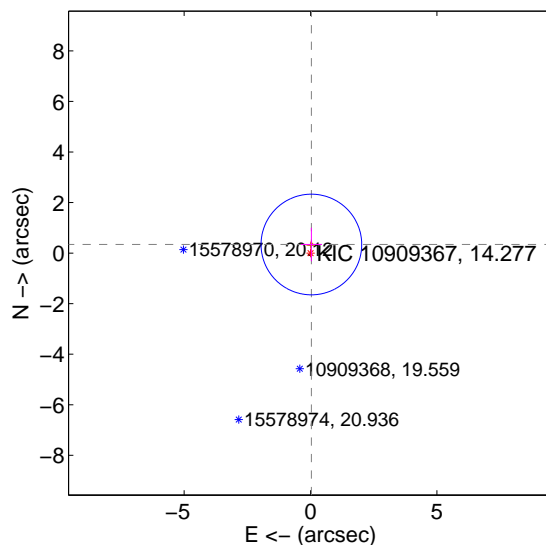
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.117 \pm 2.620$	0.04	$0.113 \pm 2.508$	$0.030 \pm 0.767$
PRF-fit source offset from KIC position	$0.342 \pm 0.664$	0.51	$-0.034 \pm 0.415$	$0.340 \pm 0.666$
photometric centroid source offset	$0.36 \pm 0.58$	0.62	$-0.07 \pm 0.54$	$-0.35 \pm 0.58$

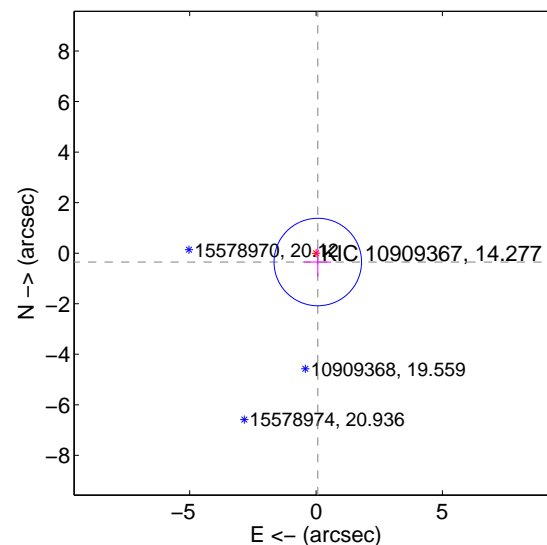
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

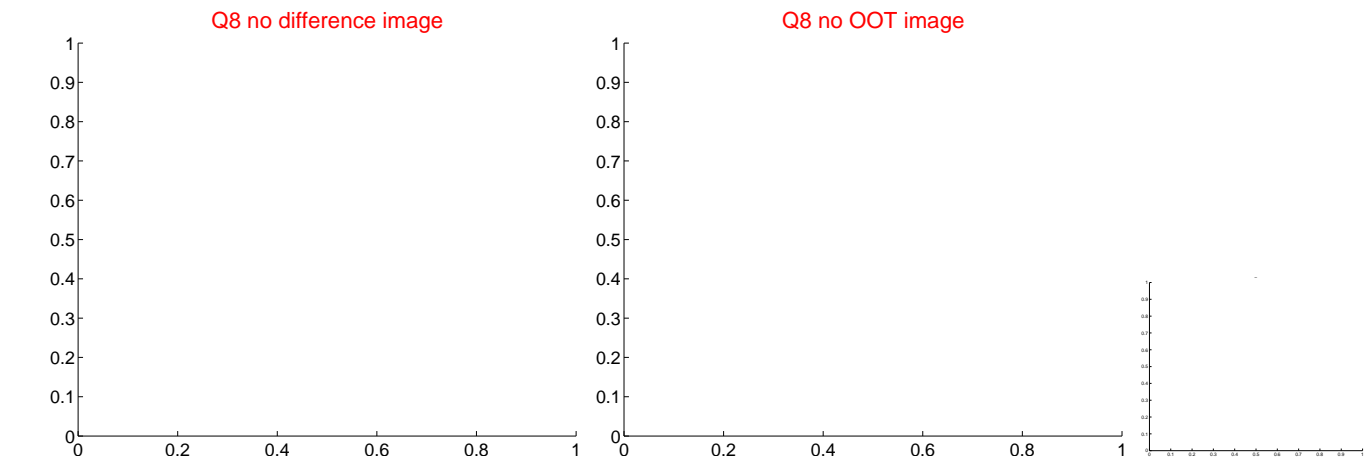
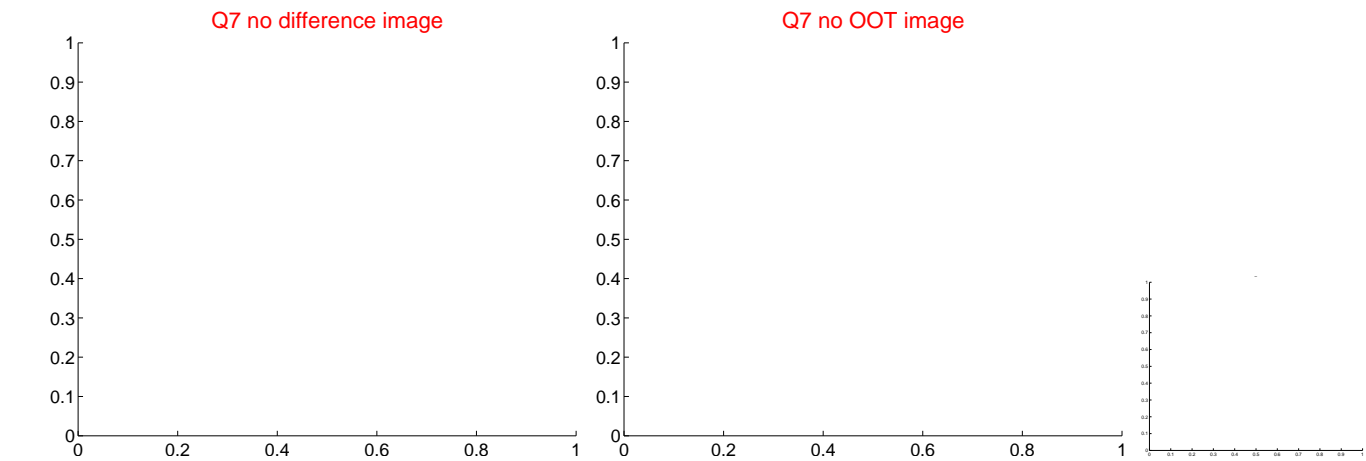
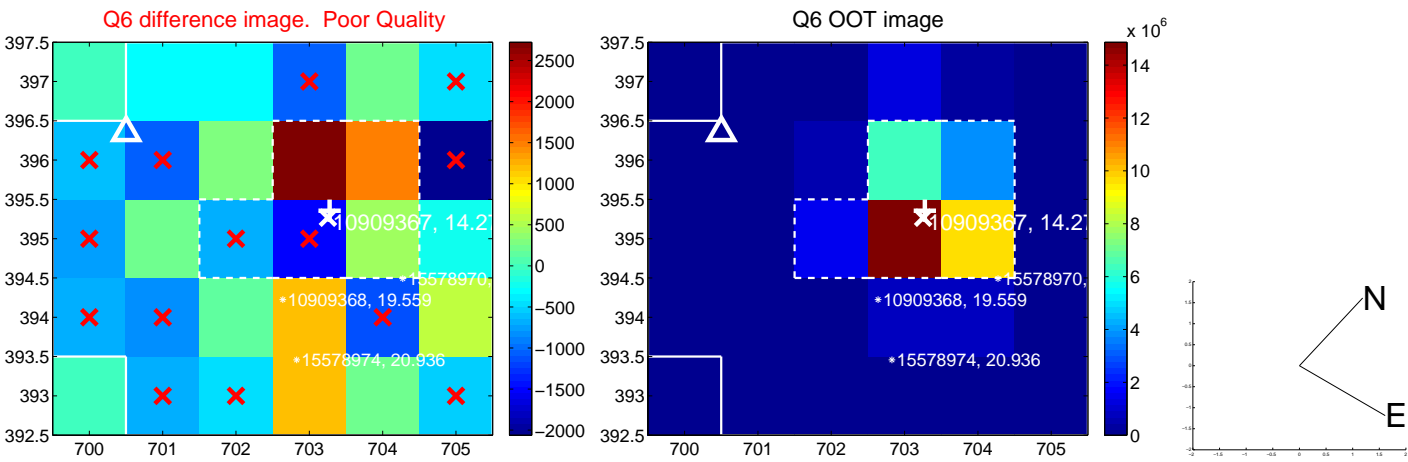
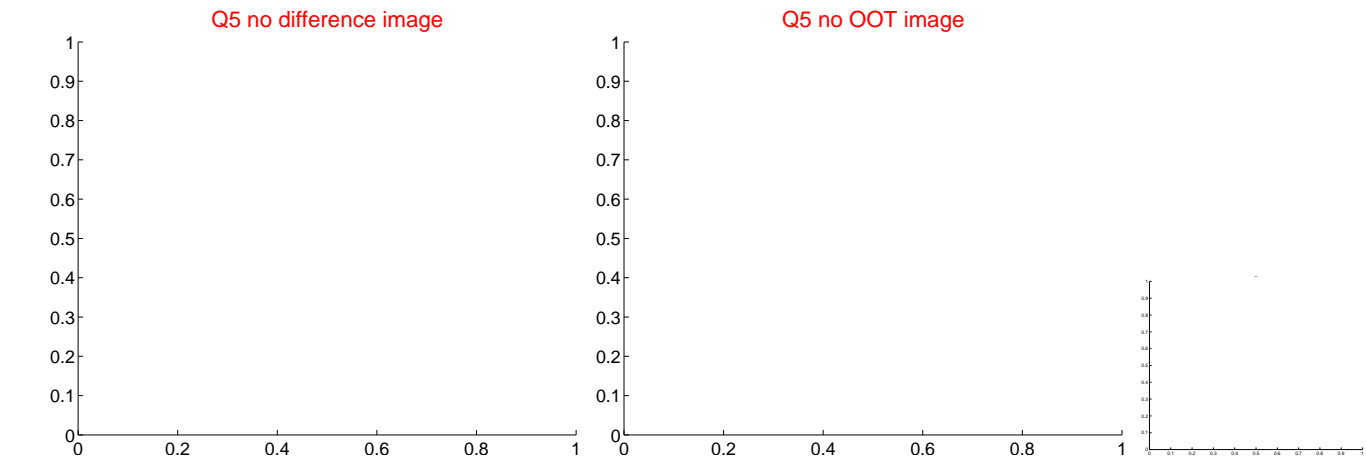


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

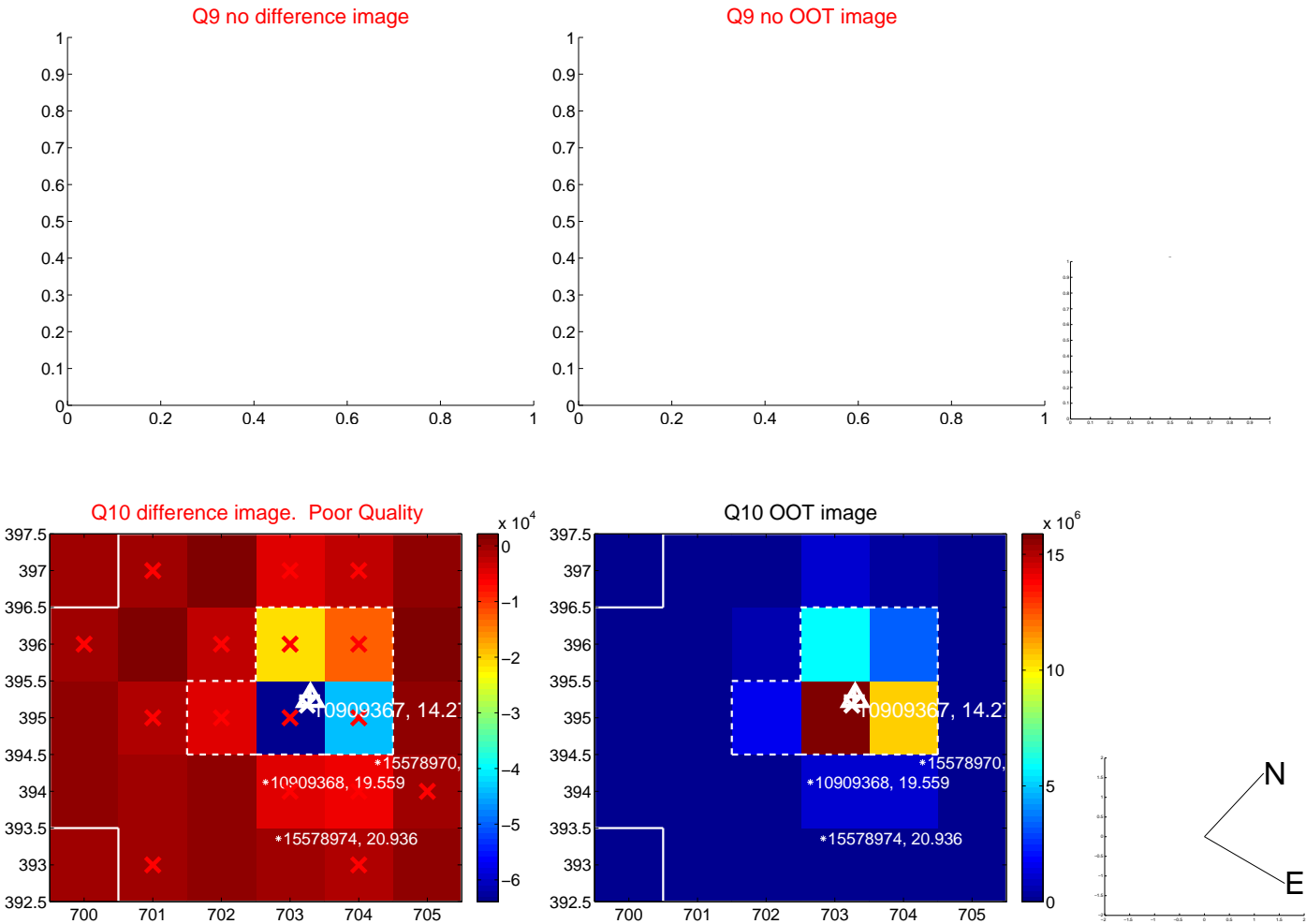


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

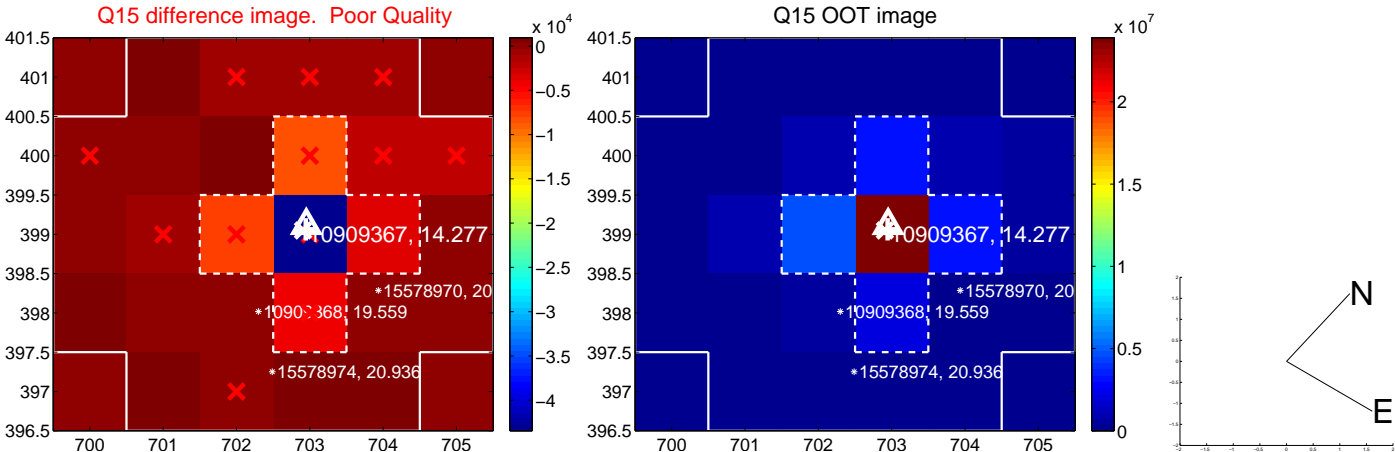
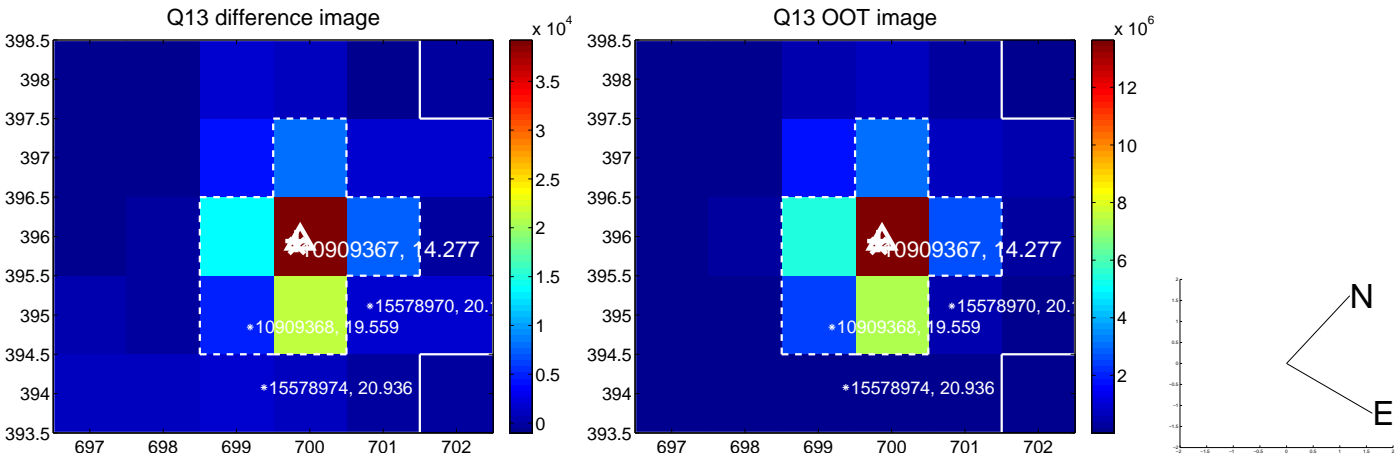




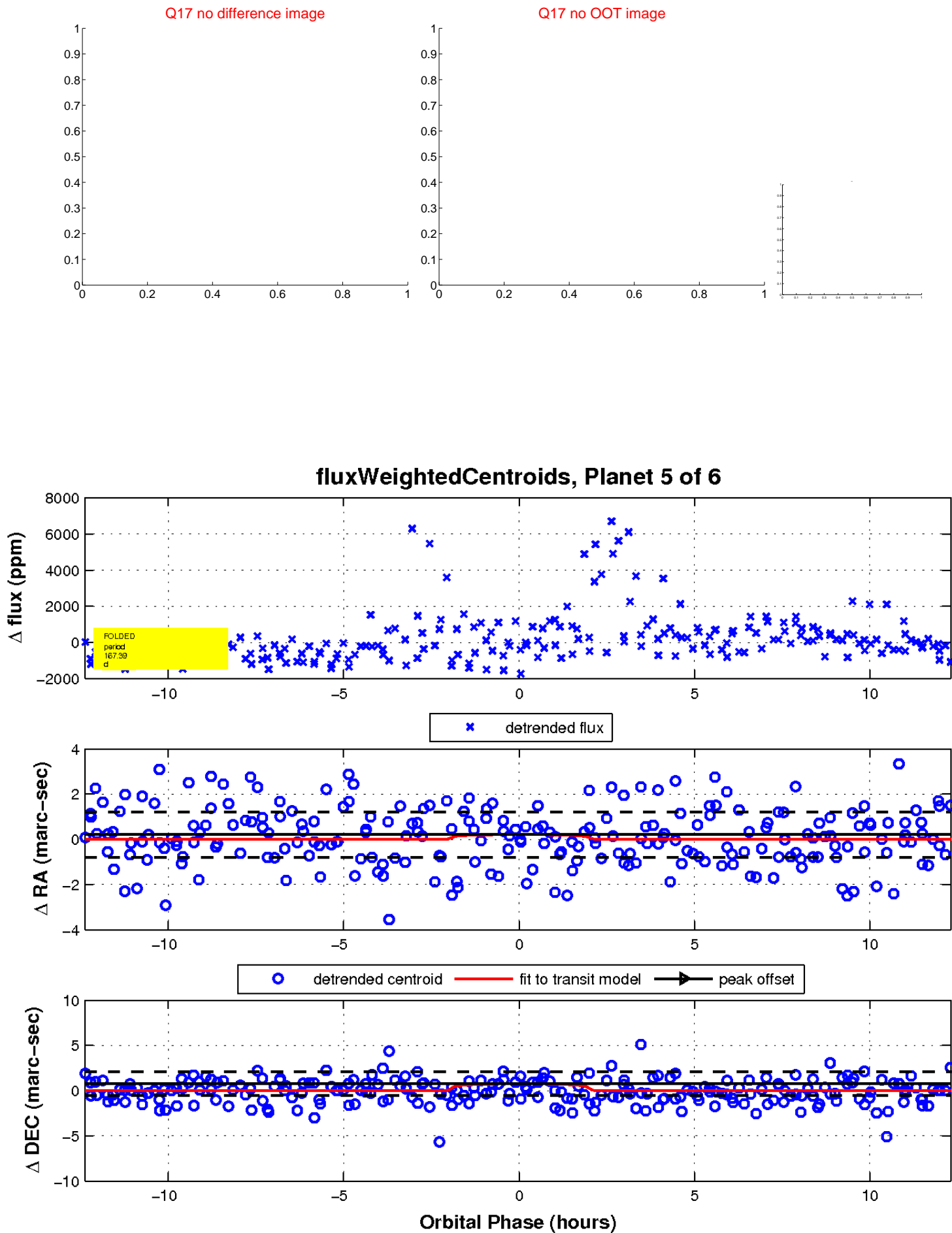
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

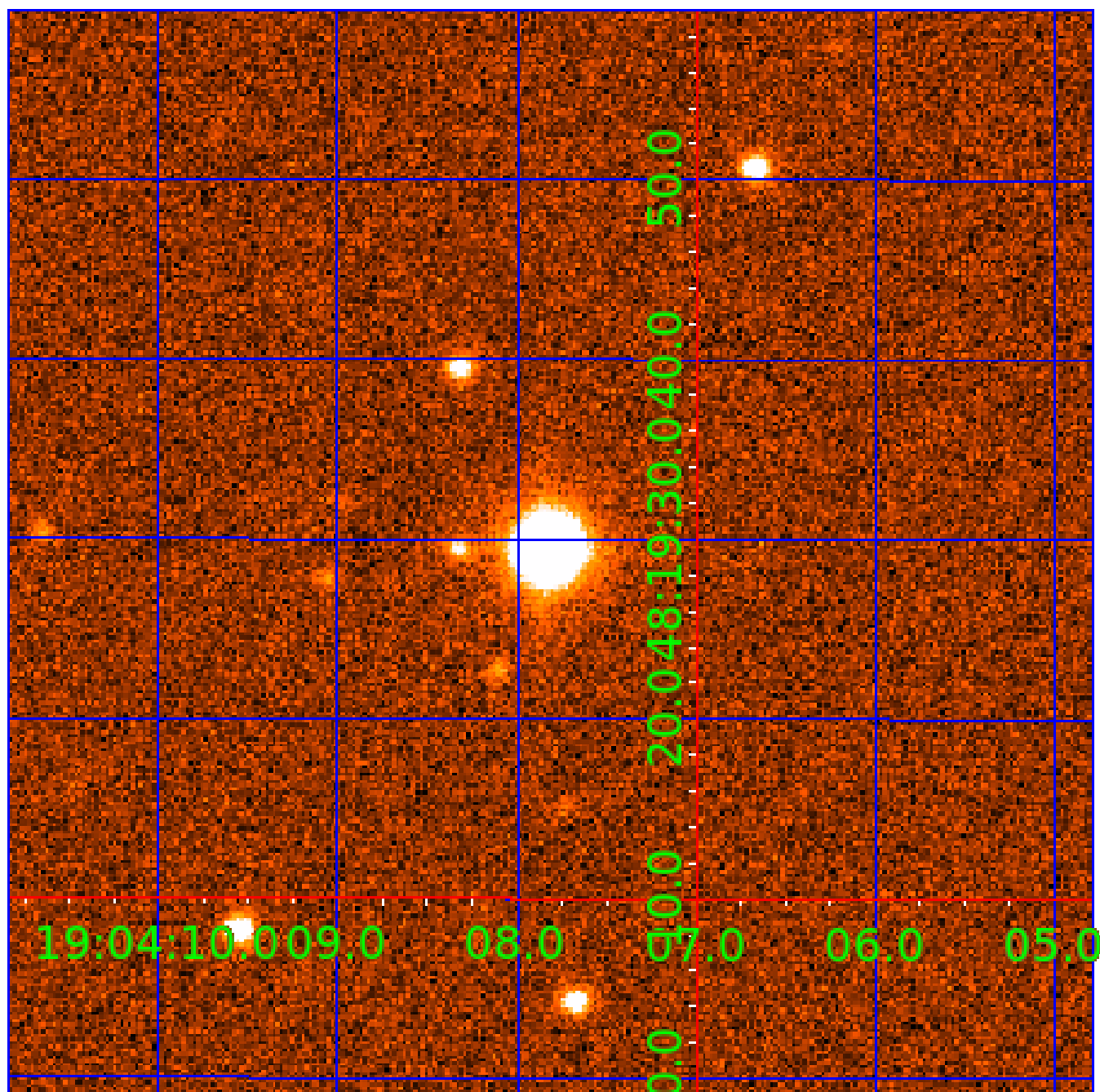


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010909367

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010909367-01	OBS	No	292.730001	277.060874	1755.4	14.324	15.2	6.2	0.51	3805	2.34	0.10
010909367-02	OBS	No	594.267355	242.249431	619.8	2.361	11.9	2.8	0.51	3805	1.42	0.04
010909367-03	OBS	No	317.505795	246.268738	1555.2	3.682	13.5	7.4	0.51	3805	2.02	0.09
010909367-04	OBS	No	170.935788	259.522269	4146.2	38.050	11.0	8.3	0.51	3805	4.08	0.21
010909367-05	OBS	No	167.388853	259.787514	1259.7	4.148	12.3	6.3	0.51	3805	1.88	0.22
010909367-06	OBS	No	103.302853	194.293093	833.5	3.459	11.7	6.8	0.51	3805	1.51	0.41

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010909367-01	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV
010909367-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—CENT_FEW_DIFFS
010909367-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_POS_ALT—INCONSISTENT_TRANS
010909367-04	OBS	FP	0.00	1	0	0	0	LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—CENT_FEW_DIFFS
010909367-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_ZUMA—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—CENT_FEW_DIFFS
010909367-06	OBS	FP	0.01	1	0	0	0	LPP_DV—INCONSISTENT_TRANS

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

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

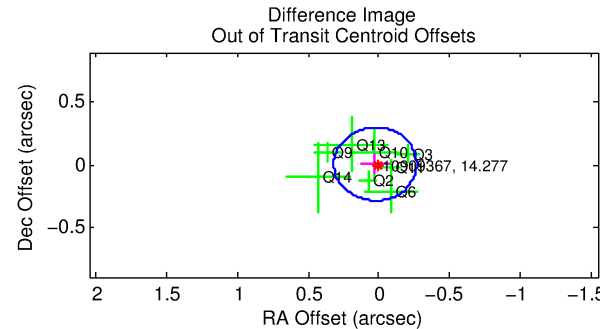
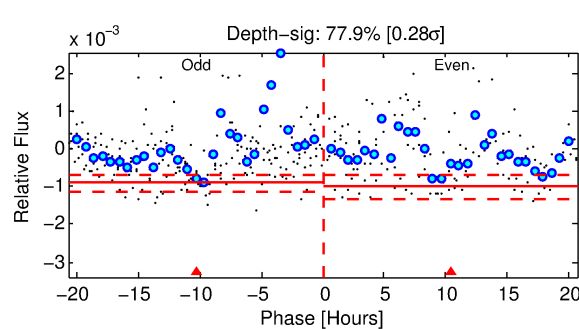
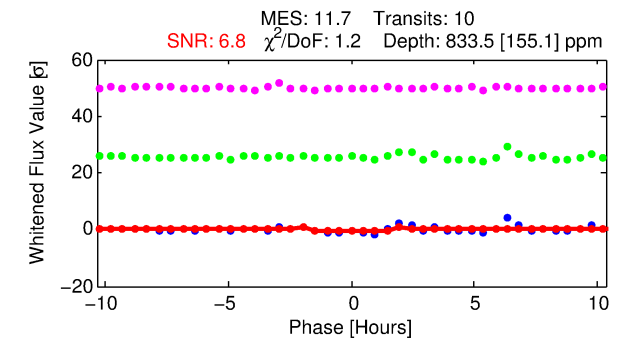
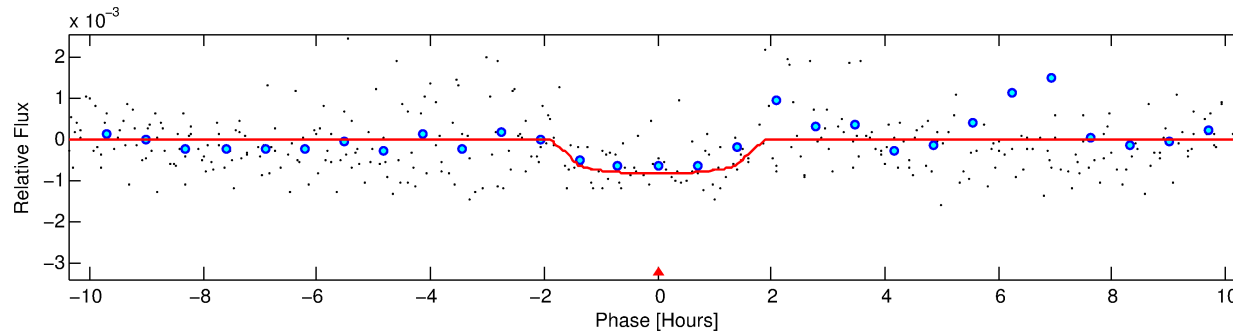
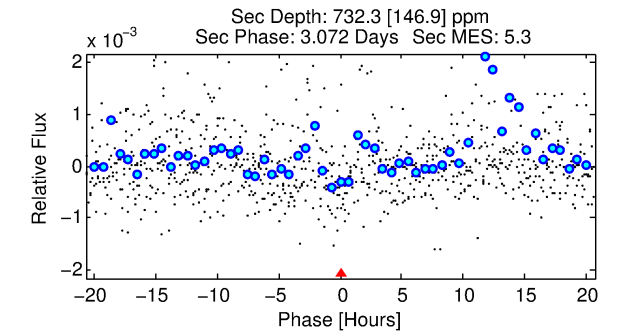
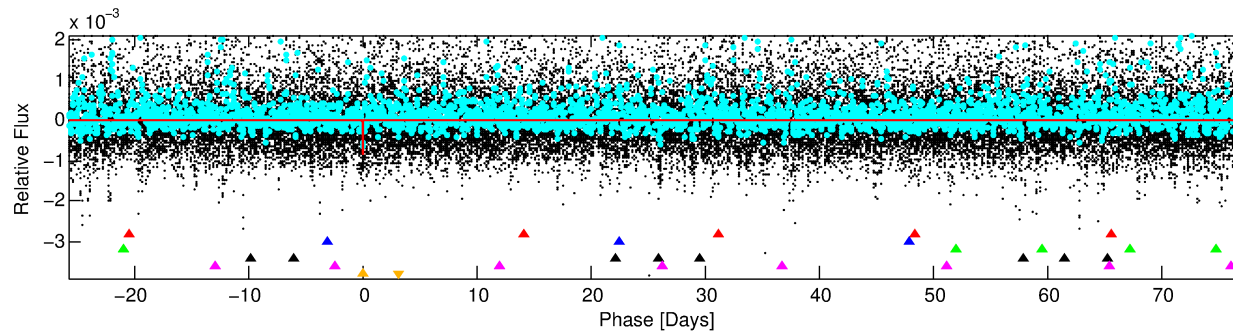
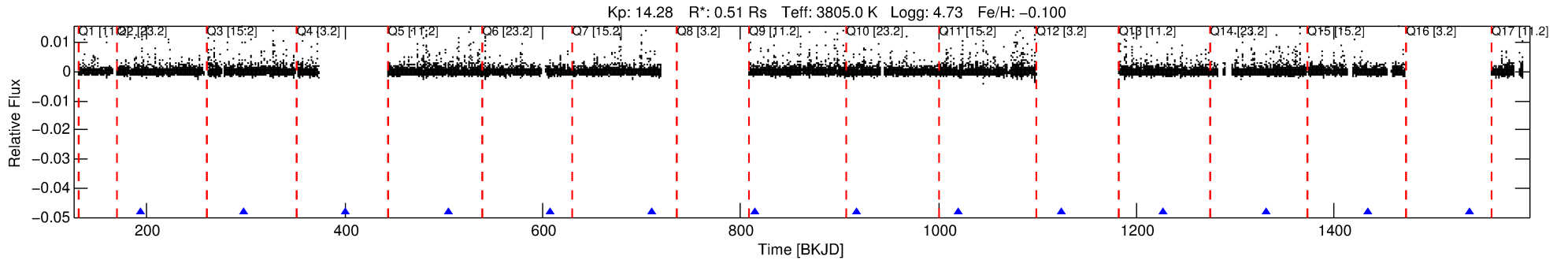
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 010909367-06

No Significant Match Found

# DV One-Page Summary

KIC: 10909367 Candidate: 6 of 6 Period: 103.303 d



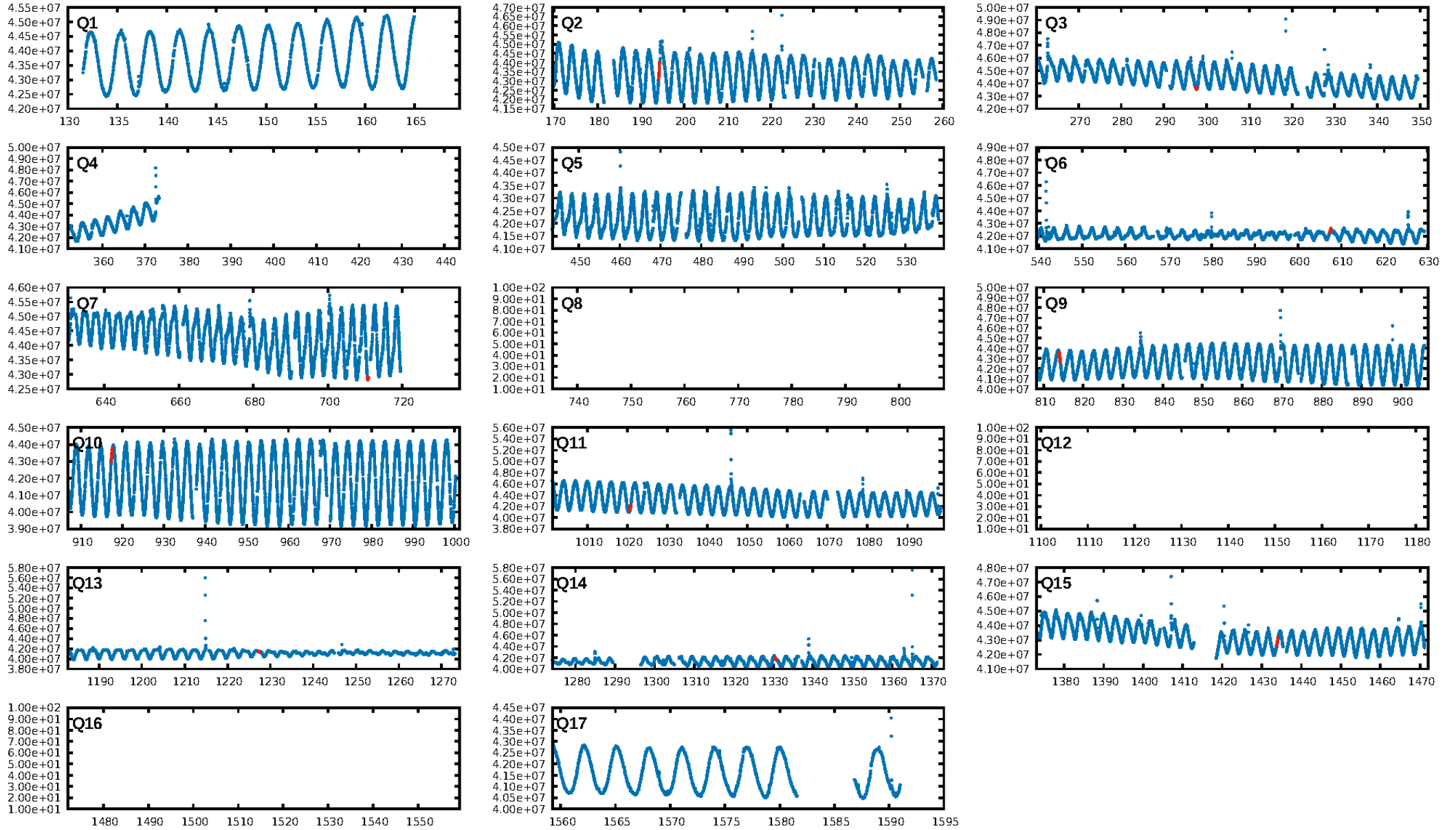
## DV Fit Results:

Period = 103.30285 [0.00089] d  
Epoch = 194.2931 [0.0071] BKJD  
Rp/R\* = 0.0269 [0.0429]  
a/R\* = 207.87 [1450.26]  
b = 0.47 [11.49]  
Seff = 0.41 [0.03]  
Teq = 204 [4] K  
Rp = 1.51 [2.40] Re  
a = 0.3464 [0.0149] AU  
Ag = 21267.30 [67919.00] [0.31σ]  
Teffp = 3814 [3045] K [1.19σ]

## DV Diagnostic Results:

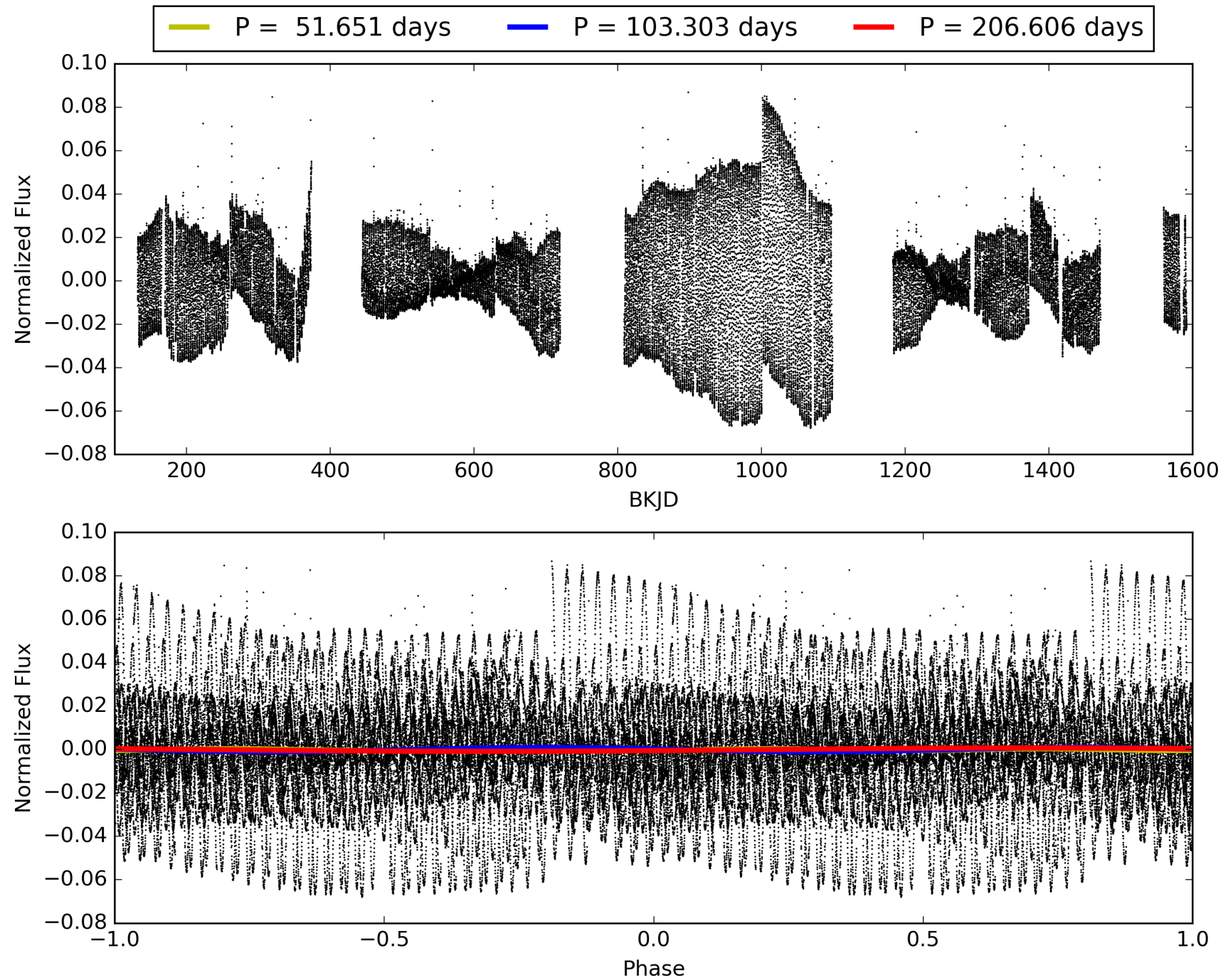
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [284.79σ]  
ModelChiSquare2-sig: 3.5%  
ModelChiSquareGof-sig: 95.5%  
**Bootstrap-pfa: 2.94e-11**  
RollingBand-fgt: 1.00 [10/10]  
**GhostDiagnostic-chr: 0.6078**  
Centroid-sig: 27.6%  
Centroid-so: 0.282 arcsec [0.44σ]  
OotOffset-rm: 0.026 arcsec [0.27σ]  
KicOffset-rm: 0.206 arcsec [2.33σ]  
OotOffset-st: 4/2/0/2 [8]  
KicOffset-st: 4/2/0/2 [8]  
DiffImageQuality-fgm: 0.62 [5/8]  
DiffImageOverlap-fno: 1.00 [9/9]

# TCE 010909367-06, PDC Light Curves





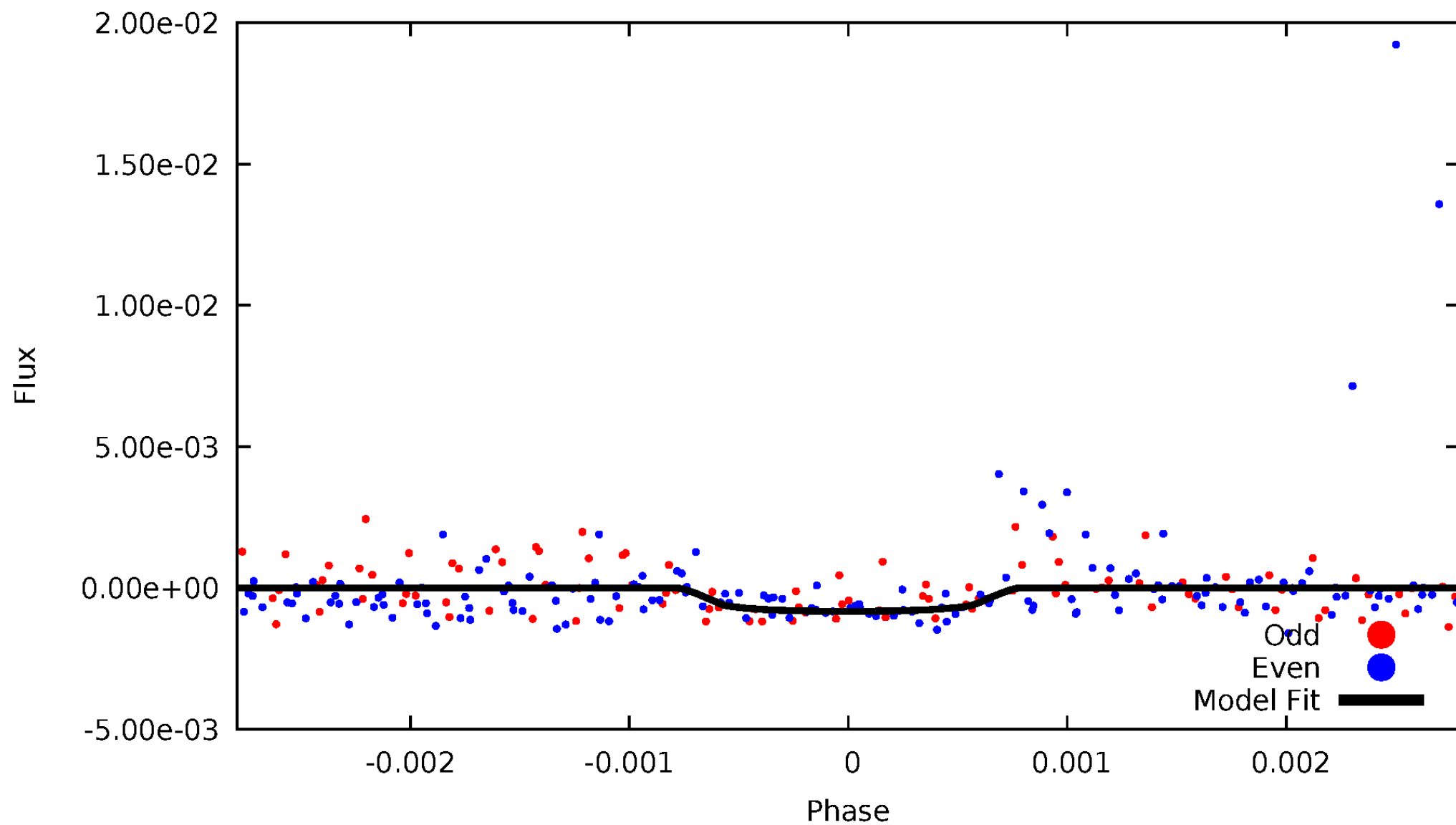
TCE 010909367-06





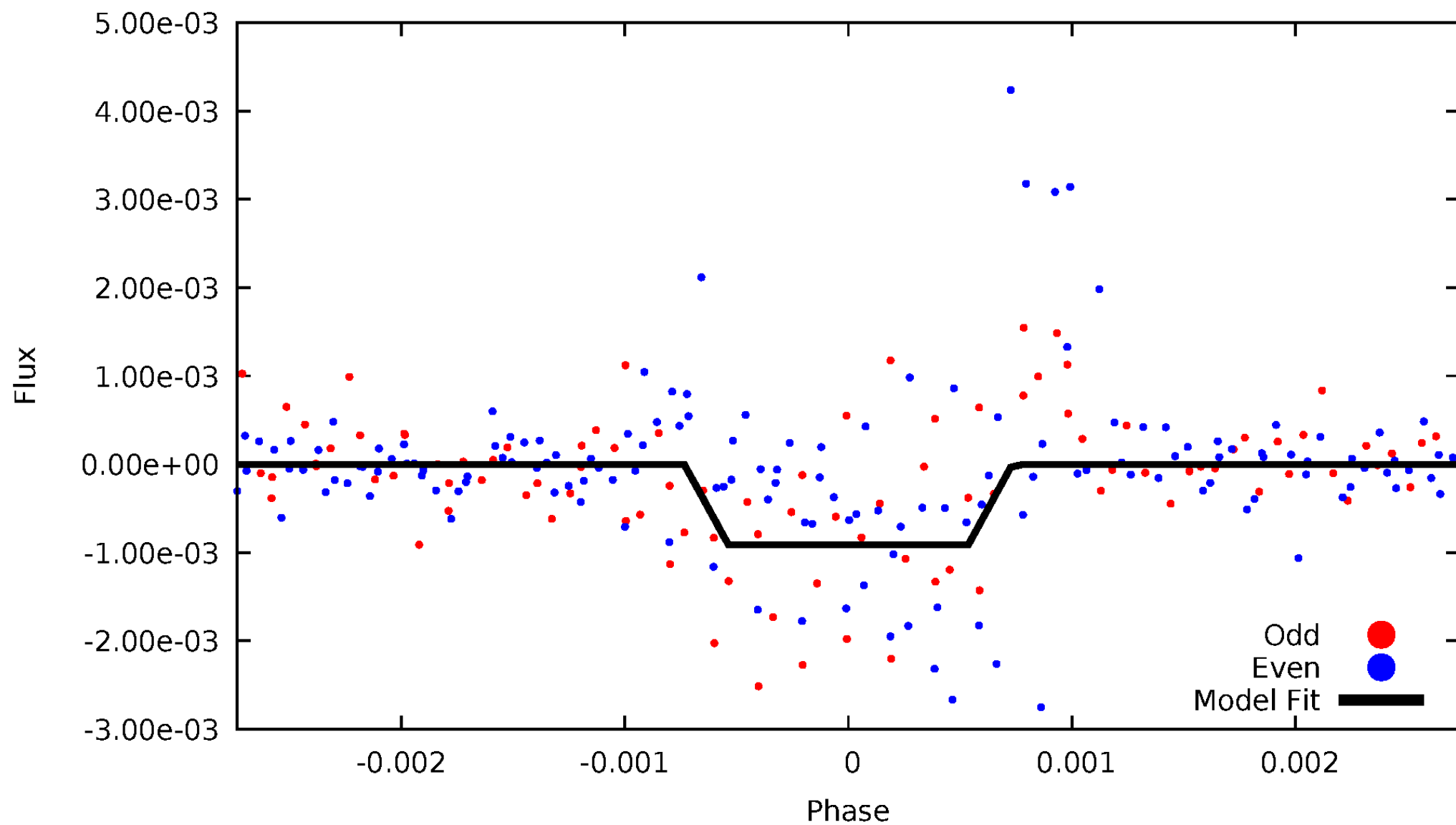
# DV Odd/Even

TCE 010909367-06



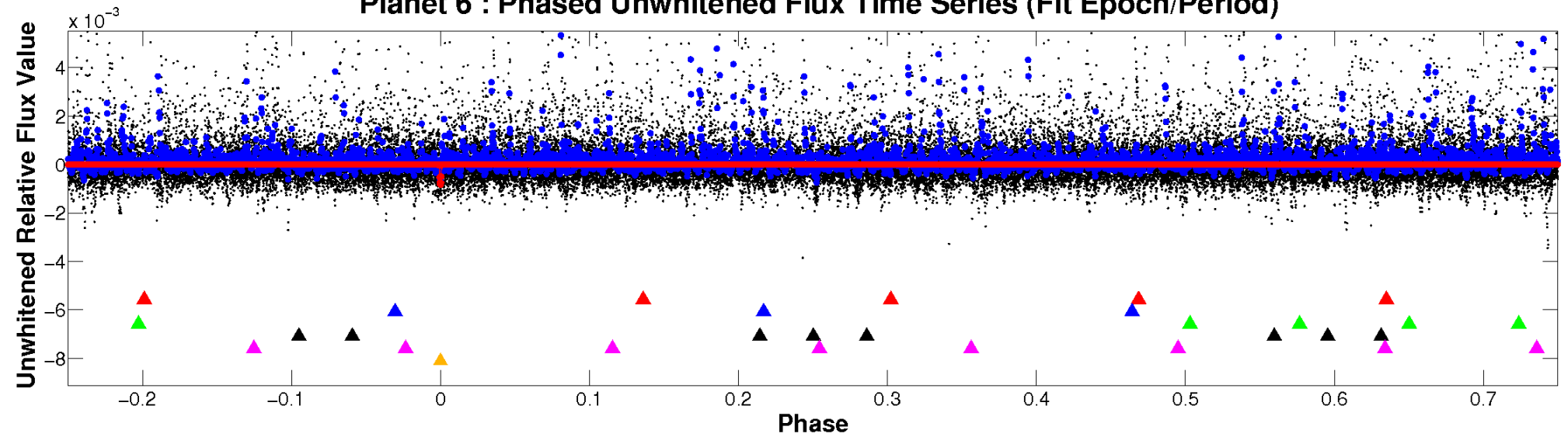
# ALT Odd/Even

TCE 010909367-06

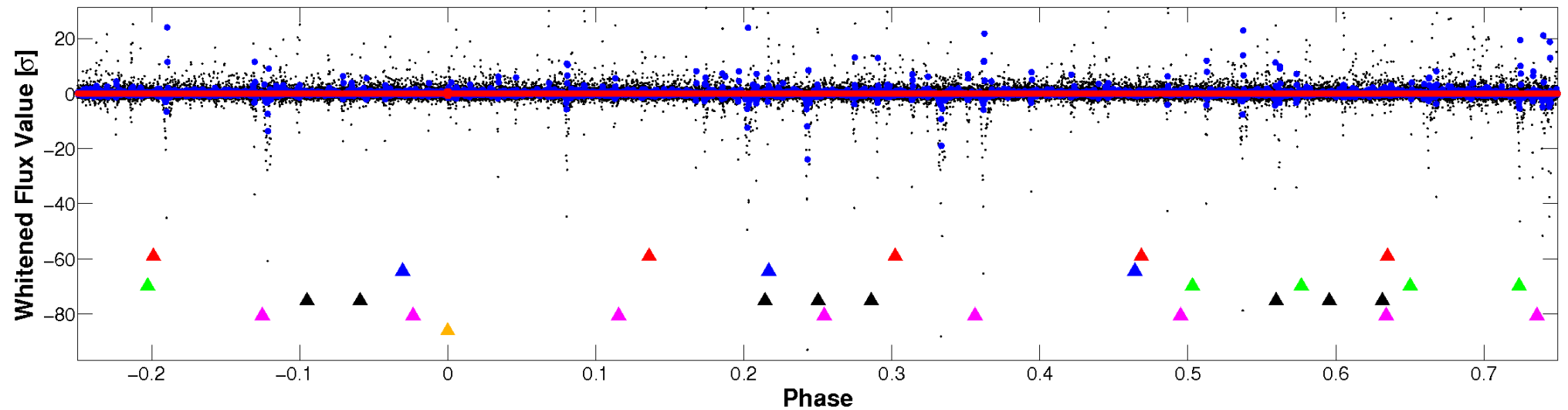


# Non-Whitened Vs. Whitened Light Curve

## Planet 6 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



## Planet 6 : Phased Whitened Flux Time Series (Fit Epoch/Period)



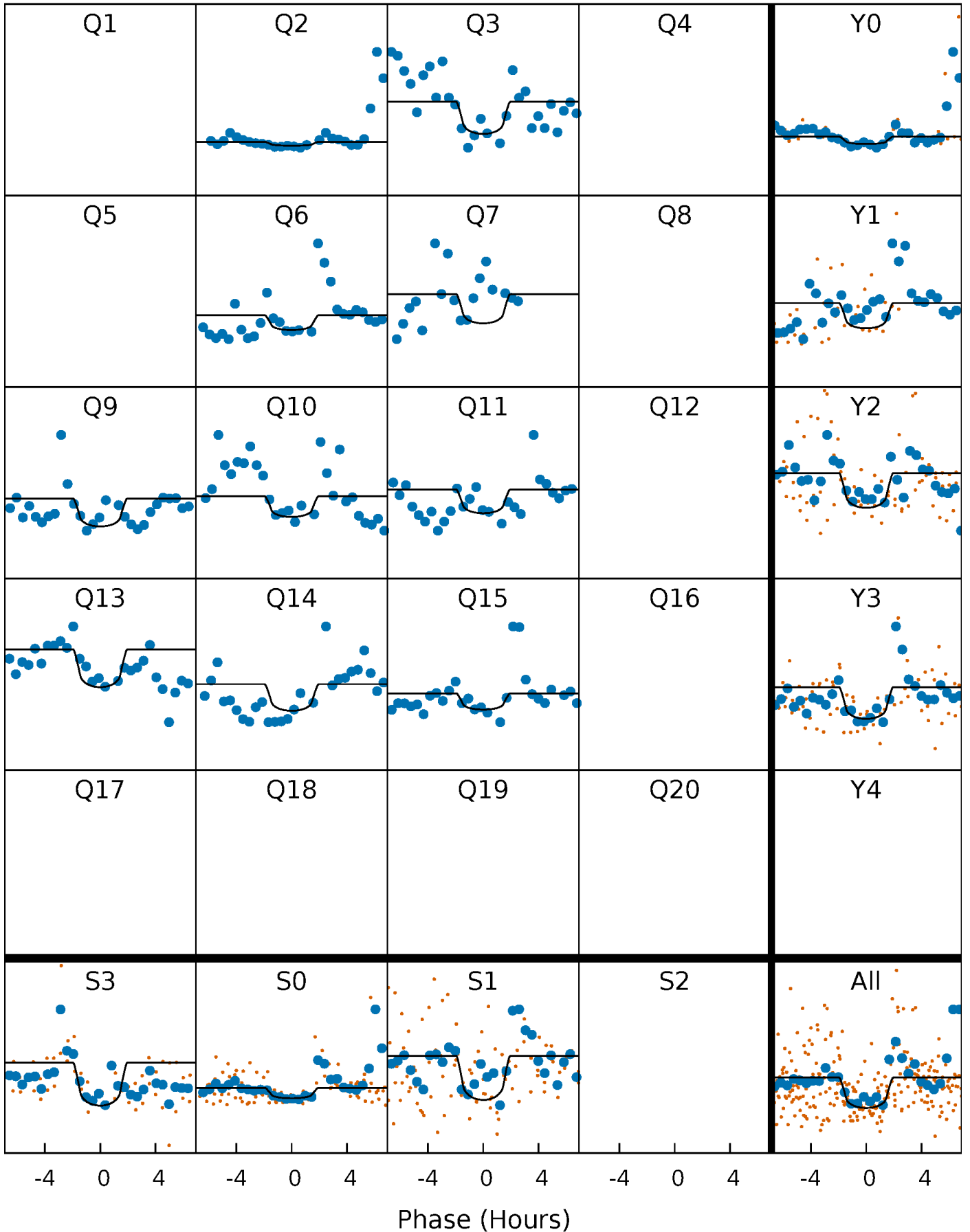
# PDC Quarter-Phased Transit Curves

TCE 010909367-06 P=103.302853 Days  $T_0=194.293093$  (BKJD)



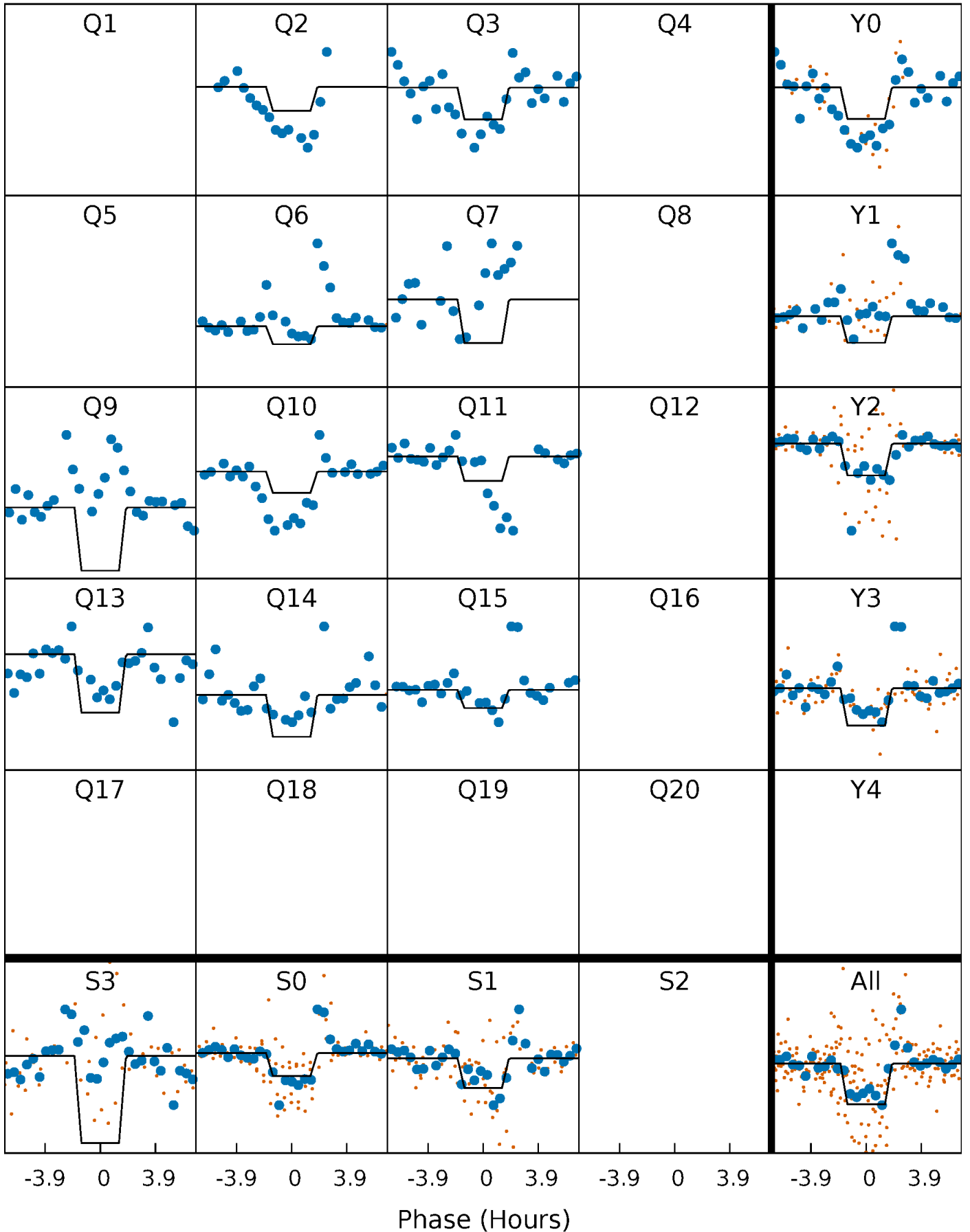
# DV Quarter-Phased Transit Curves

TCE 010909367-06 P=103.302853 Days  $T_0=194.293093$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

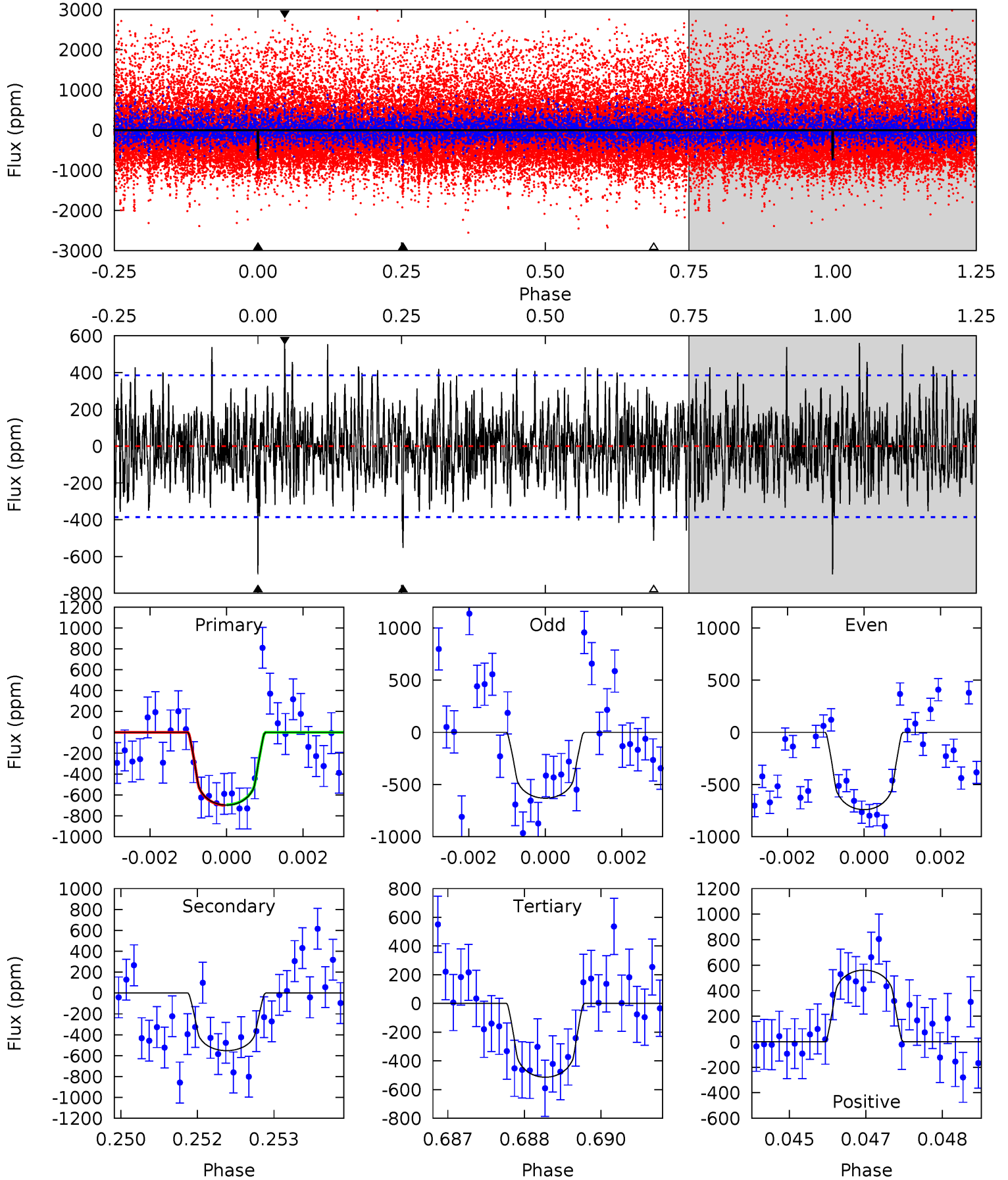
TCE 010909367-06 P=103.303435 Days  $T_0=194.286758$  (BKJD)



# DV Model-Shift Uniqueness Test

010909367-06,  $P = 103.302853$  Days,  $E = 90.990240$  Days

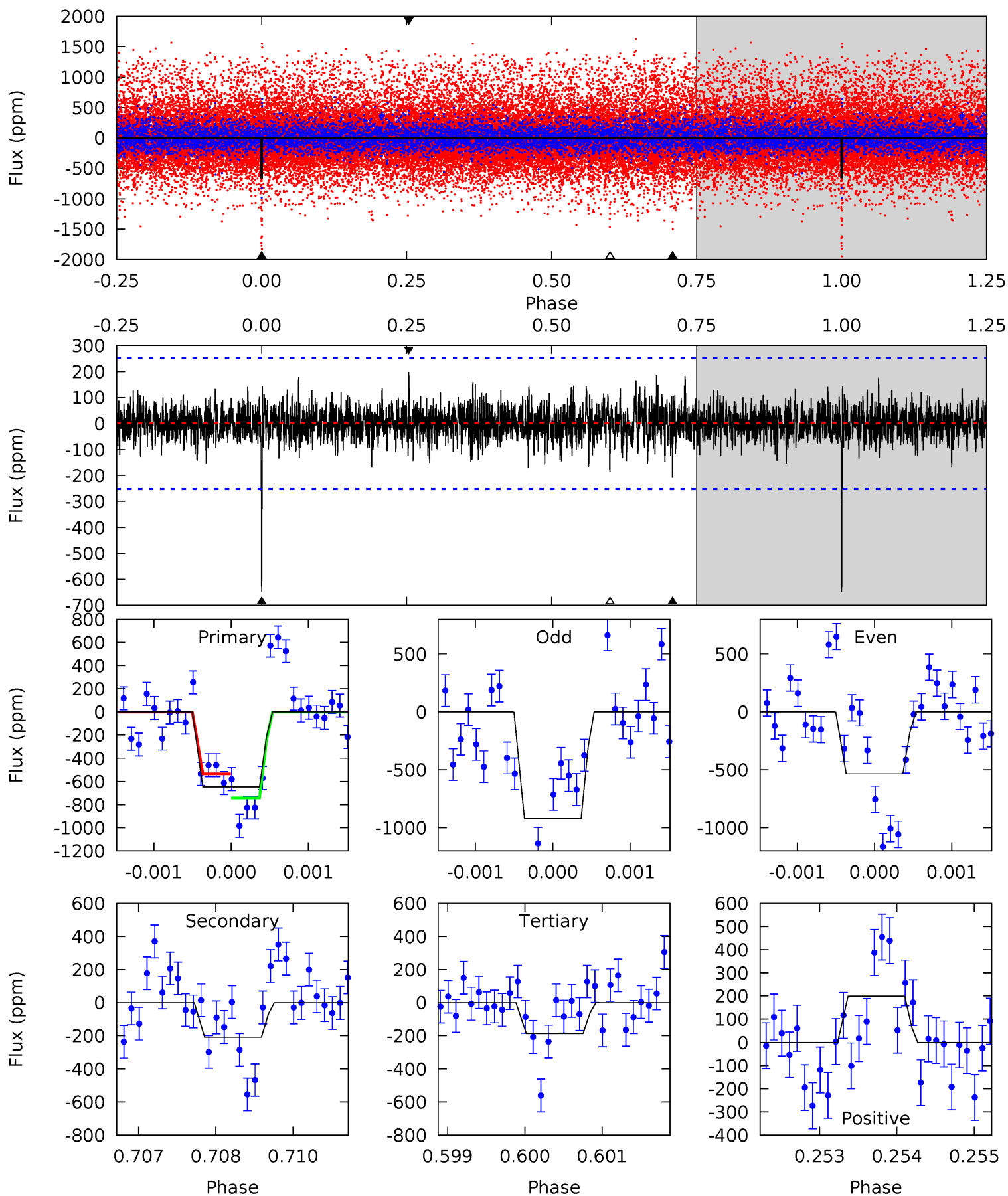
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.71	7.69	7.16	7.82	5.37	3.16	2.07	2.55	1.89	0.54	-0.13	0.73	1.00	0.45	0.04



# Alt Model-Shift Uniqueness Test

010909367-06,  $P = 103.303435$  Days,  $E = 90.983323$  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
13.8	4.45	3.97	4.23	5.38	3.18	1.06	9.84	9.58	0.48	0.22	4.13	1.18	0.23	0





### Stellar Parameters For KIC 010909367

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$3805^{+45}_{-49}$	$4.733^{+0.030}_{-0.015}$	$-0.100^{+0.100}_{-0.100}$	$0.513^{+0.020}_{-0.028}$	$0.519^{+0.026}_{-0.021}$	$5.426^{+0.744}_{-0.384}$
	+1%/-1%	+1%/-0%	+100%/-100%	+4%/-5%	+5%/-4%	+14%/-7%
Source	PHO2	PHO2	PHO2	DSEP		

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

### Secondary Eclipse Parameters for KIC 010909367-06 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-552 \pm 72$	$2.24^{+1.92}_{-1.53}$	$284^{+5}_{-5}$	$3218^{+1536}_{-505}$	$7487^{+64883}_{-5410}$
Alt.	$-209 \pm 47$	$2.42^{+2.09}_{-1.61}$	$284^{+4}_{-5}$	$2746^{+1003}_{-403}$	$2355^{+17695}_{-1681}$

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

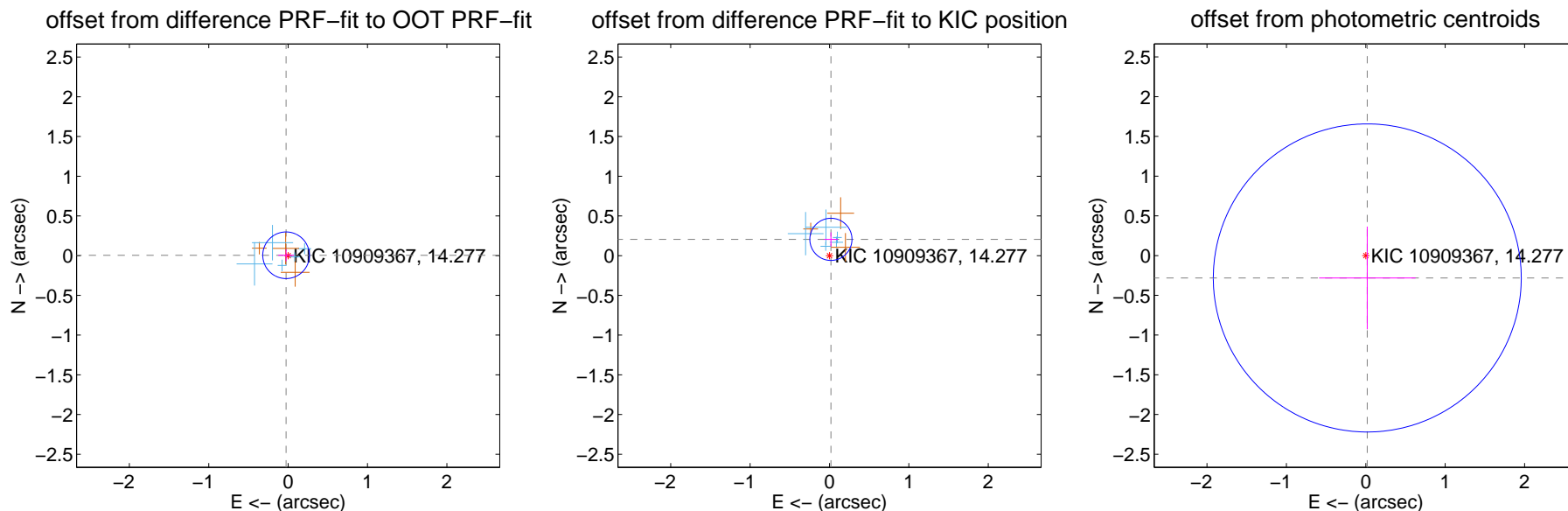
## DV Centroid Data

Supplemental centroid analysis for 010909367-06. Kepler magnitude: 14.28. Transit SNR 6.78

There are 5 quarters with good PRF difference image offsets

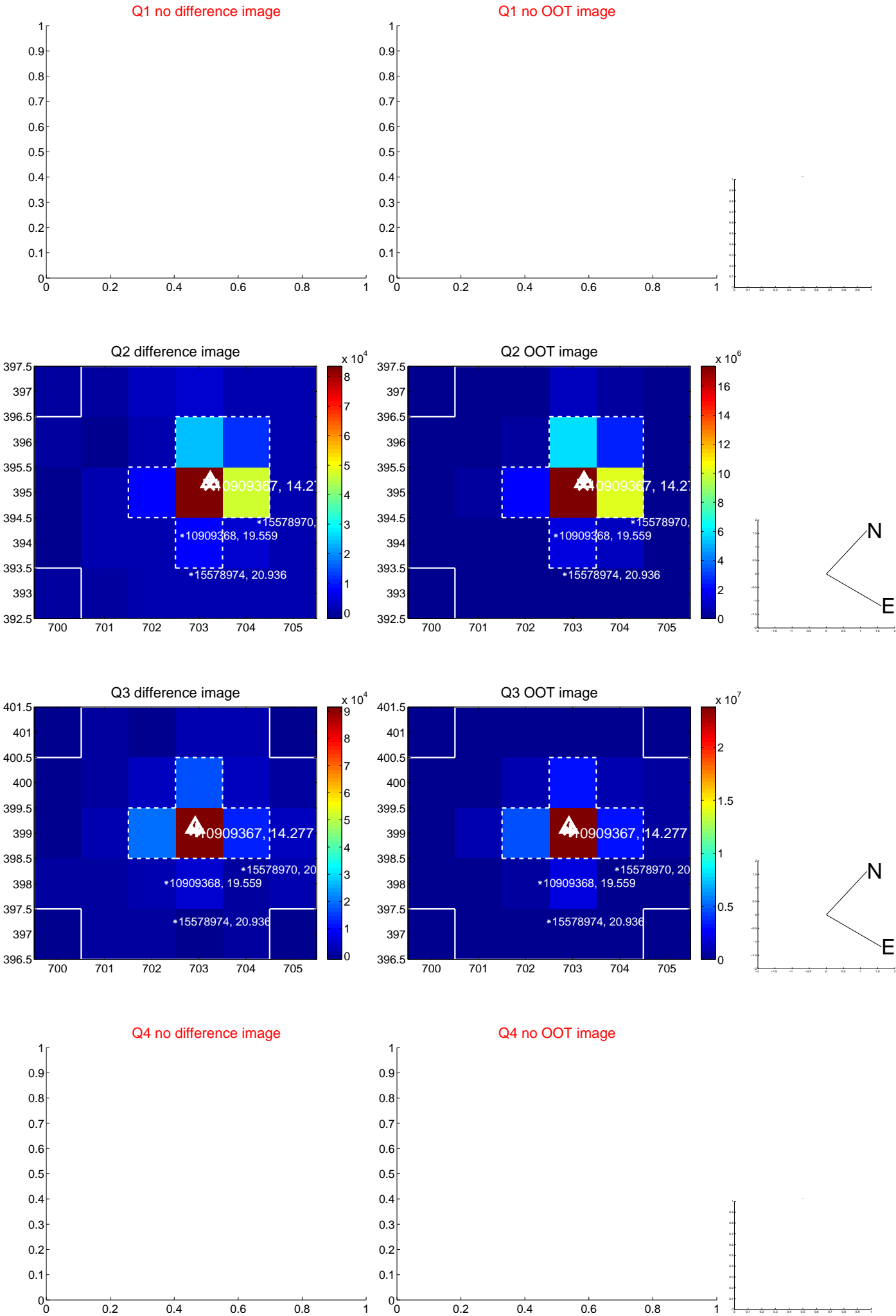
The direct PRF centroid is offset from the target star catalog position by about 0.40 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.026 \pm 0.098$	0.27	$0.026 \pm 0.099$	$0.005 \pm 0.077$
PRF-fit source offset from KIC position	$0.206 \pm 0.088$	2.33	$-0.018 \pm 0.087$	$0.205 \pm 0.088$
photometric centroid source offset	$0.28 \pm 0.65$	0.44	$-0.02 \pm 0.61$	$-0.28 \pm 0.65$

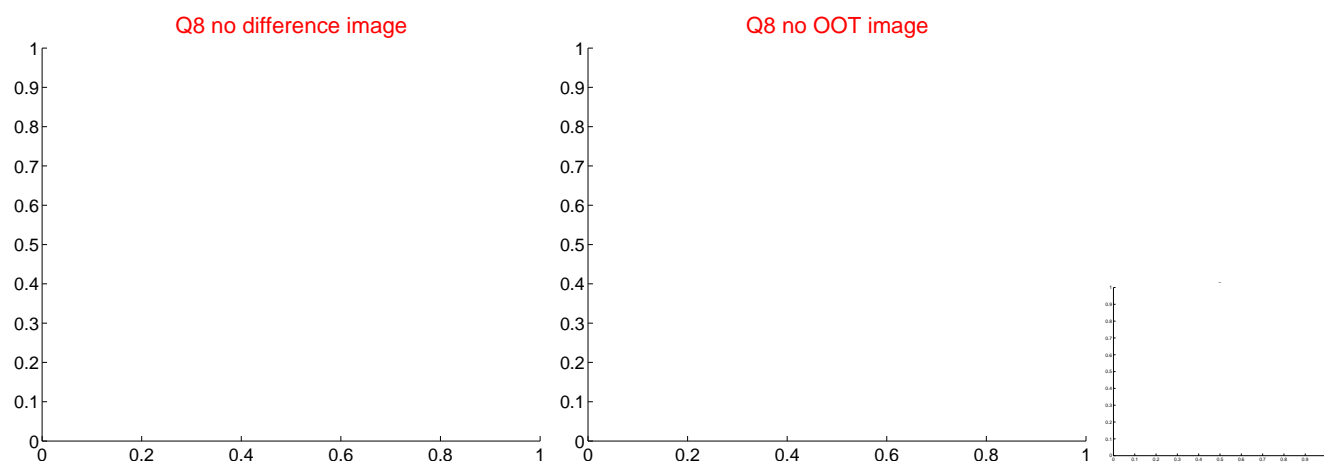
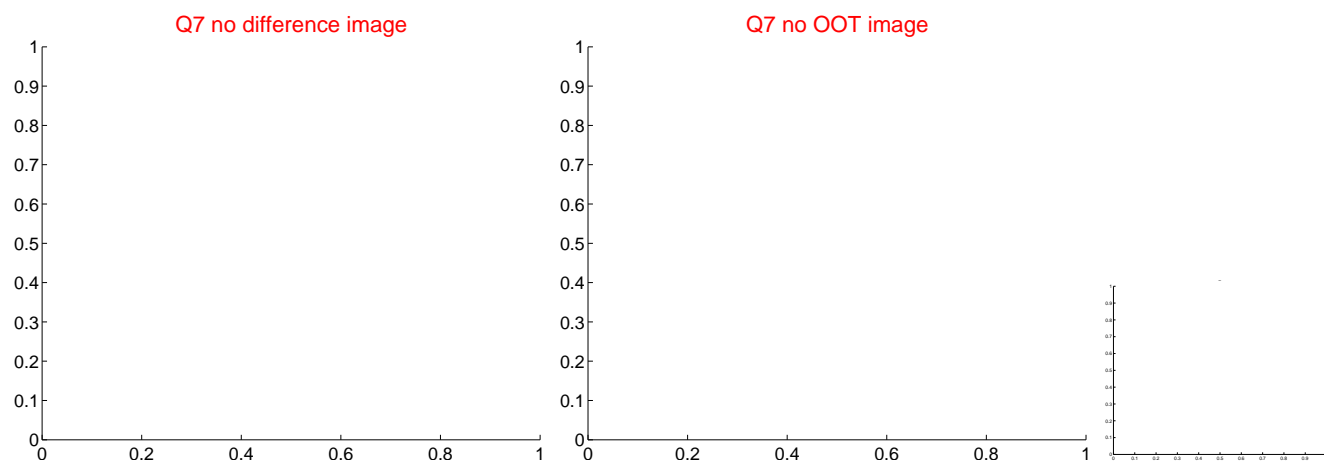
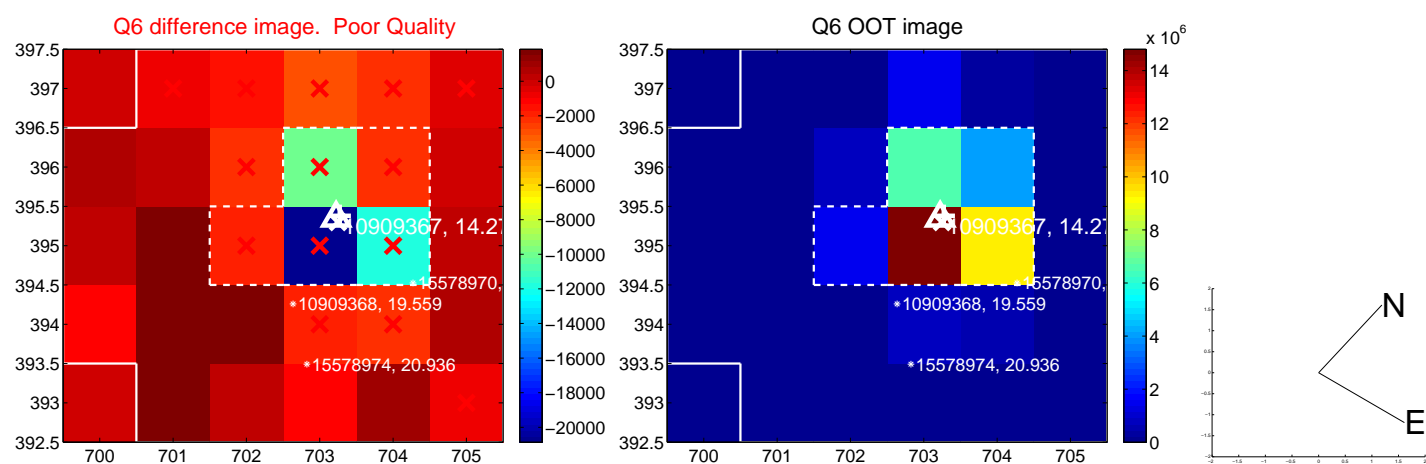
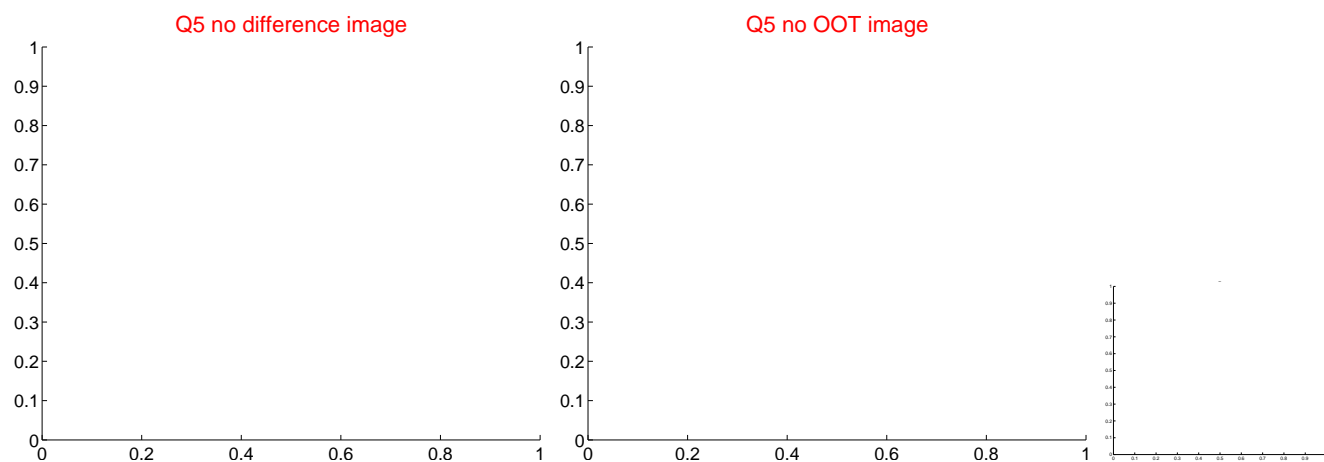


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

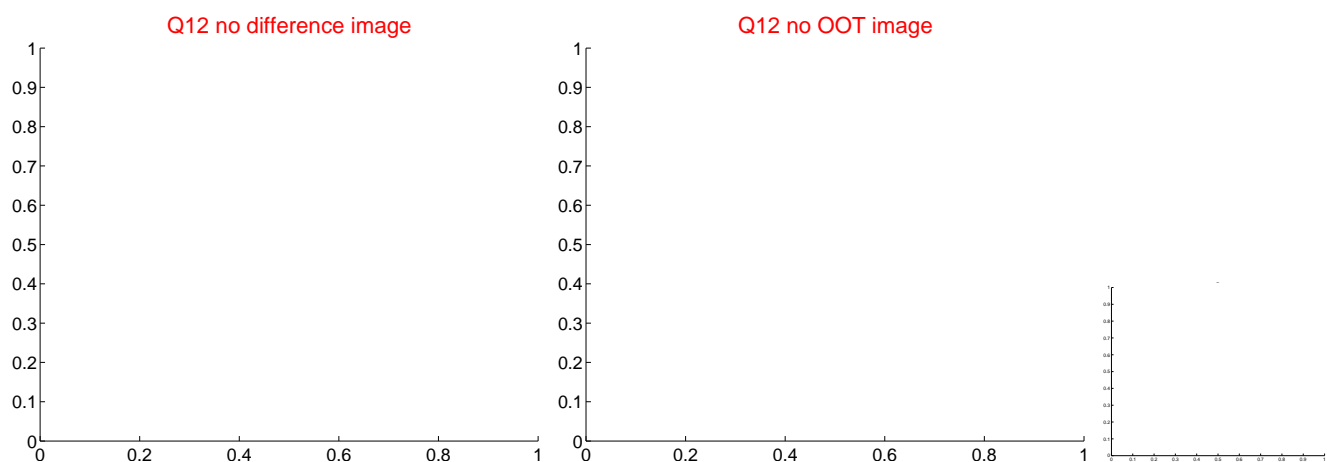
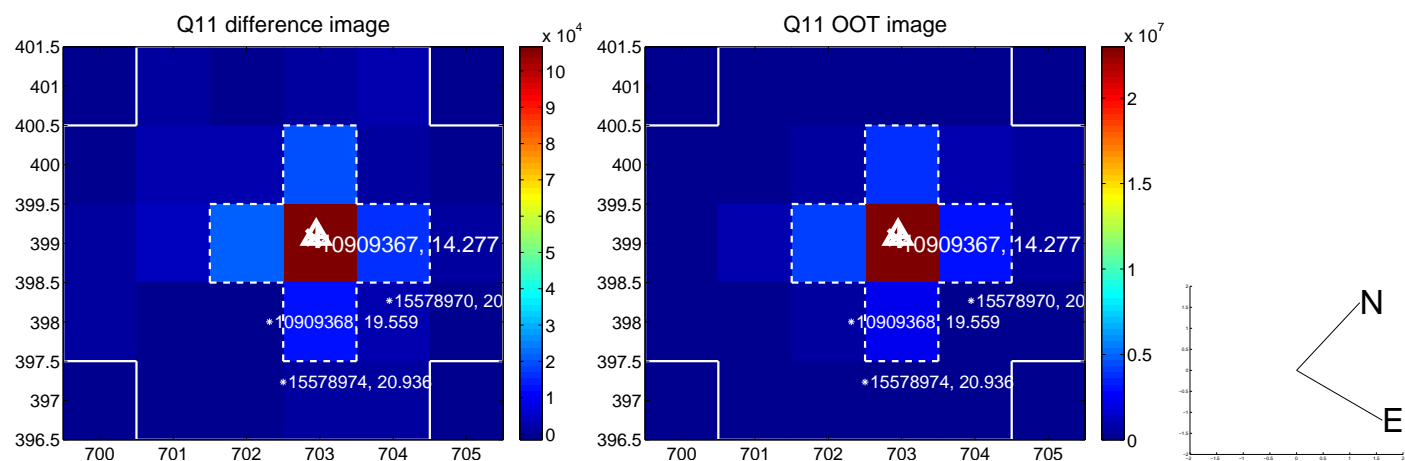
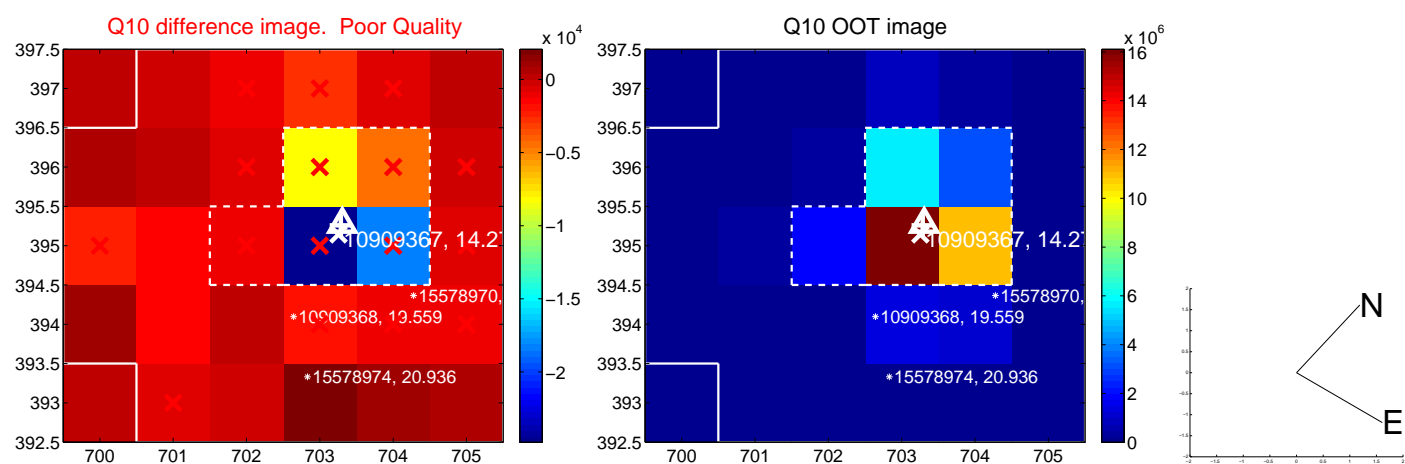
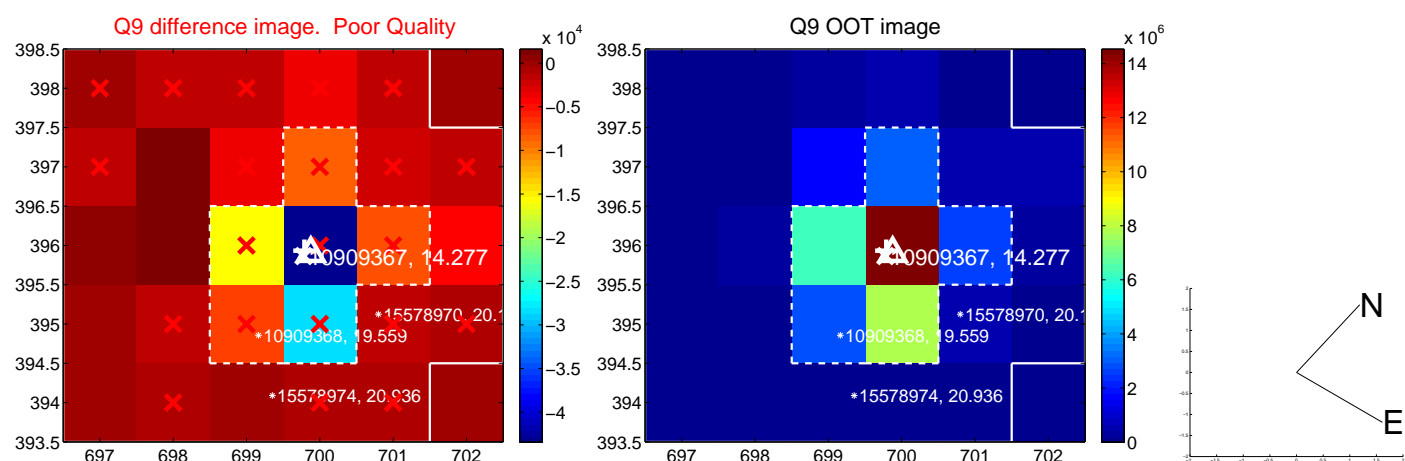
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



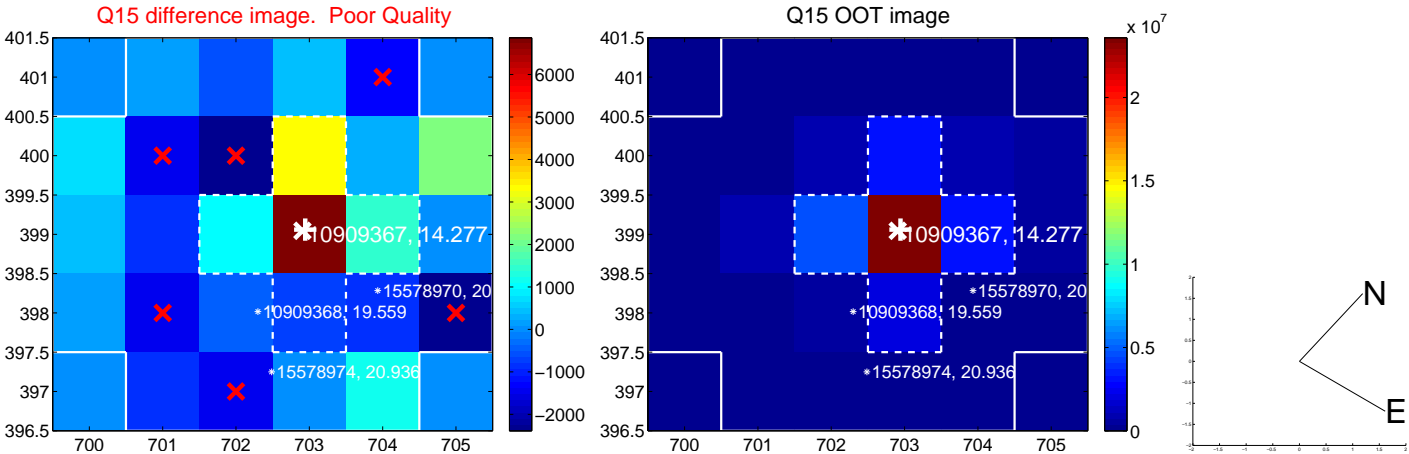
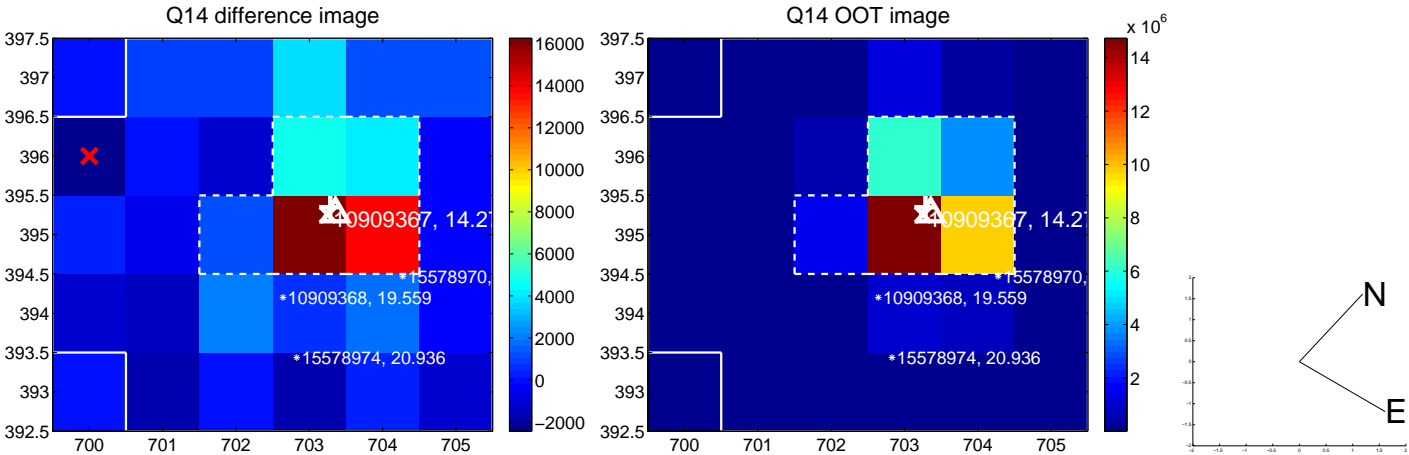
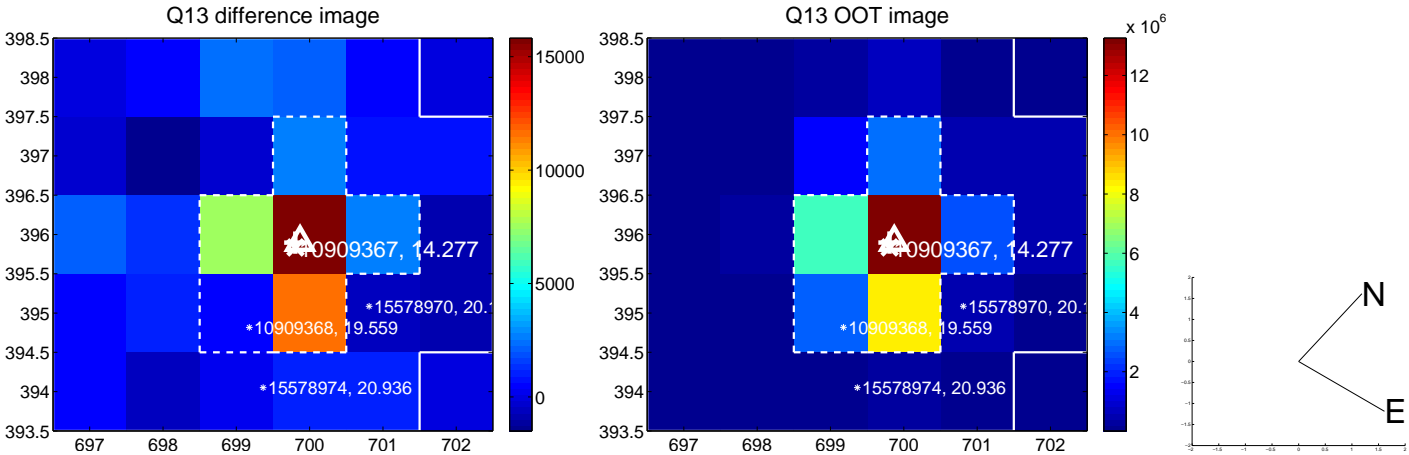
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



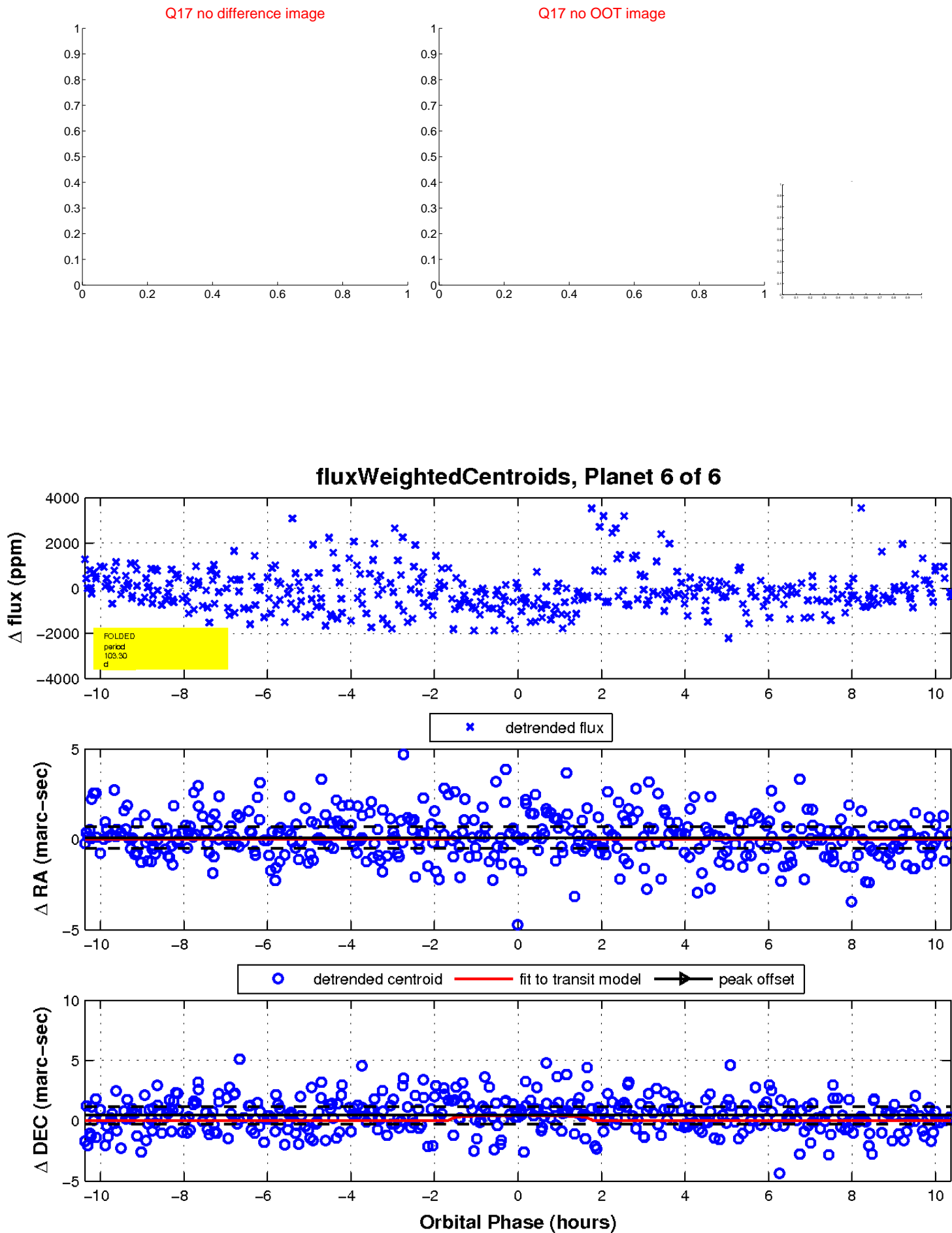
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

