

# KIC 010417984

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010417984-01	OBS	No	254.767379	132.346802	1686.1	3.590	10.0	5.9	0.55	4673	2.19	0.31
010417984-02	OBS	No	253.919473	304.170668	917.6	3.575	10.1	4.3	0.55	4673	1.65	0.31
010417984-03	OBS	No	315.007731	278.865649	1806.6	4.315	8.8	7.4	0.55	4673	4.59	0.23
010417984-04	OBS	No	248.604735	371.149955	1526.5	4.659	10.1	6.3	0.55	4673	2.14	0.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010417984-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010417984-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
010417984-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010417984-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

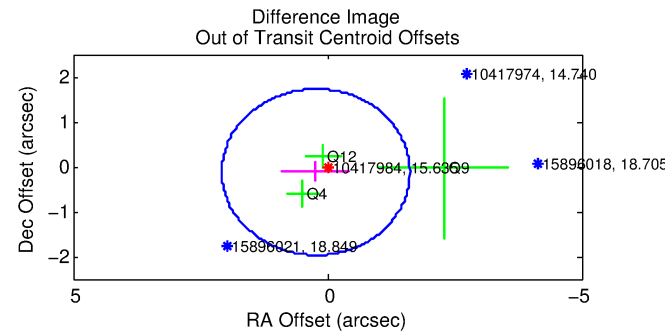
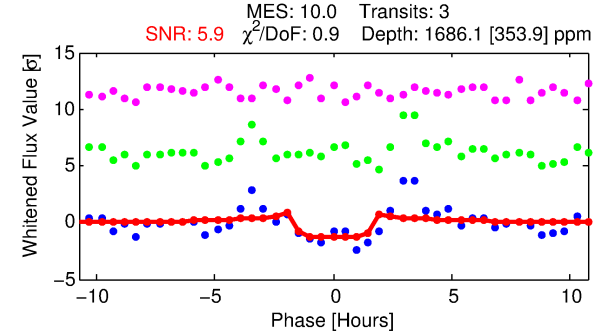
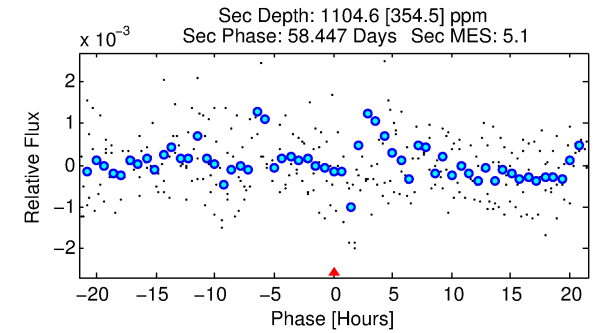
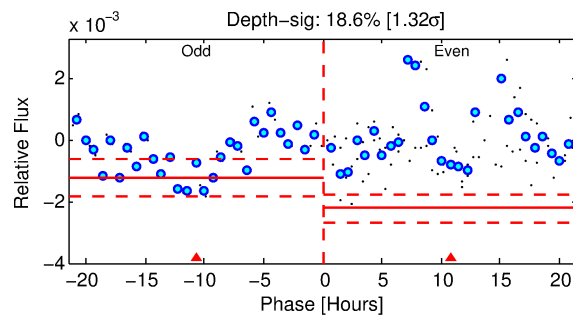
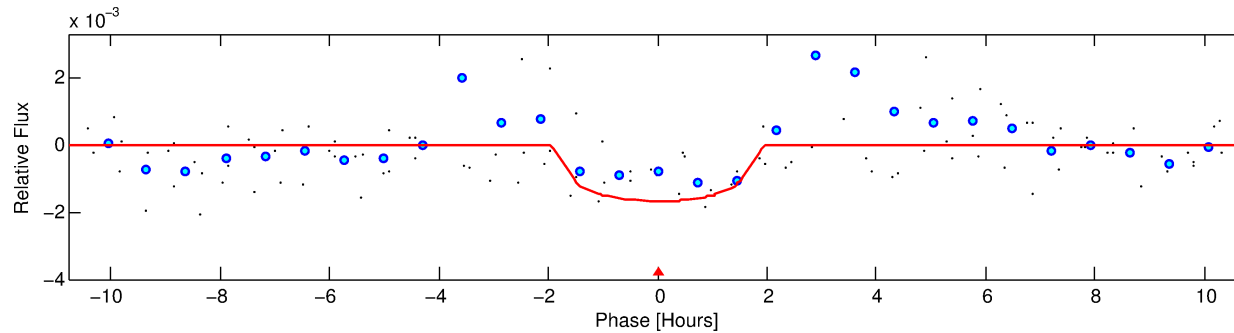
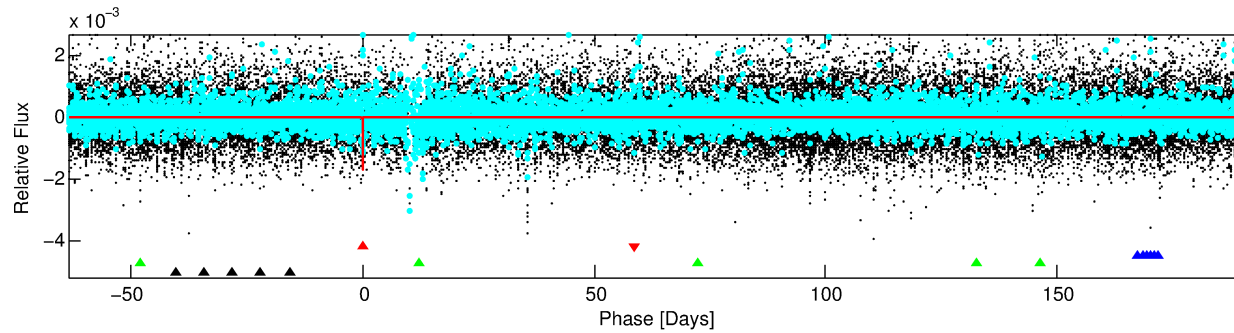
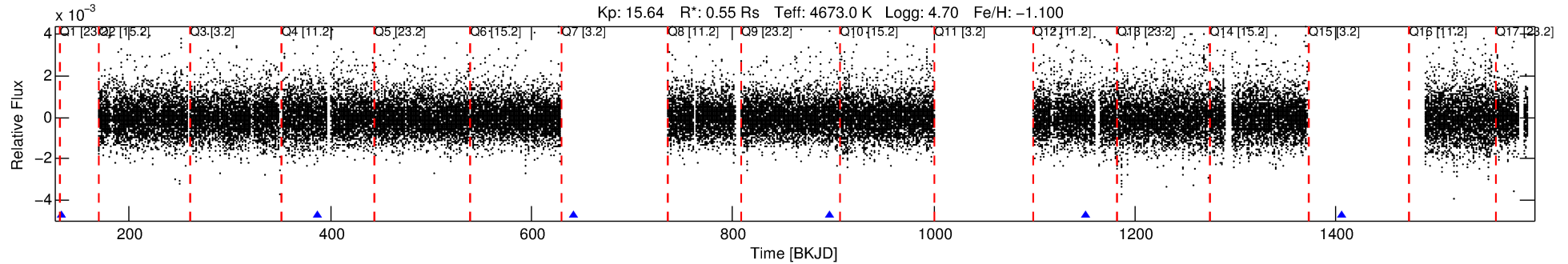
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## Ephemeris Match Information For 010417984-01

No Significant Match Found

# DV One-Page Summary

KIC: 10417984 Candidate: 1 of 4 Period: 254.767 d



DV Fit Results:

- Period = 254.76738 [0.00440] d
- Epoch = 132.3468 [0.0133] BKJD
- Rp/R\* = 0.0367 [0.0733]
- a/R\* = 561.09 [4156.09]
- b = 0.06 [122.09]
- Seff = 0.31 [0.05]
- Teq = 190 [7] K
- Rp = 2.19 [4.37] Re
- a = 0.6431 [0.0375] AU
- Ag = 52514.76 [210341.87] [0.25σ]
- Teffp = 4446 [4453] K [0.96σ]

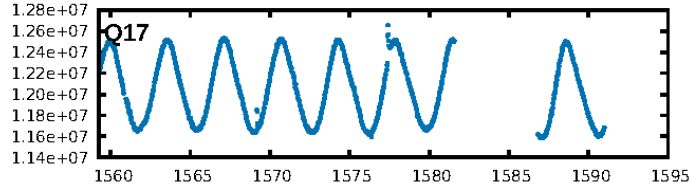
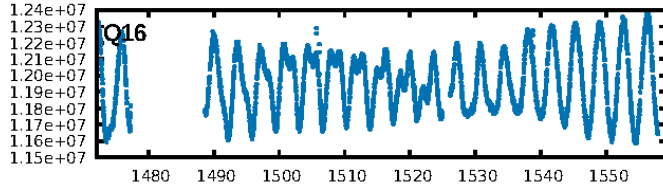
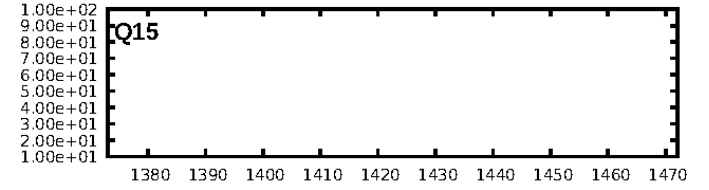
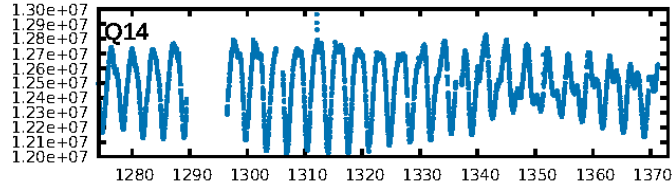
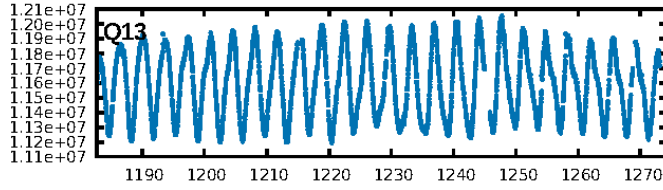
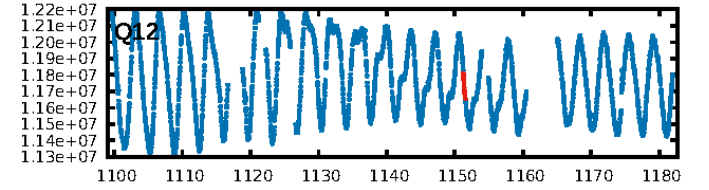
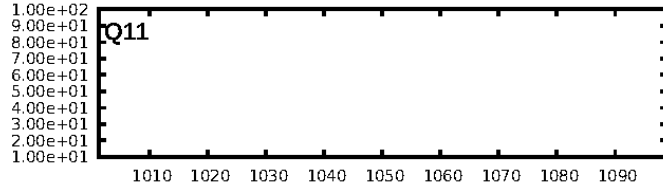
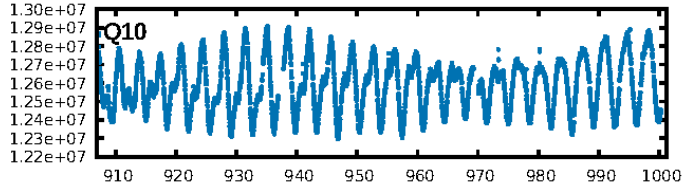
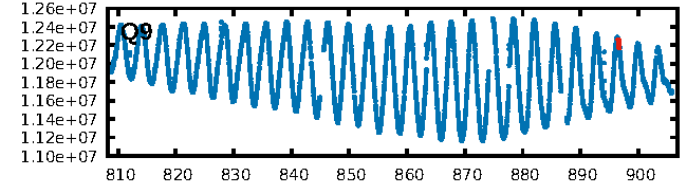
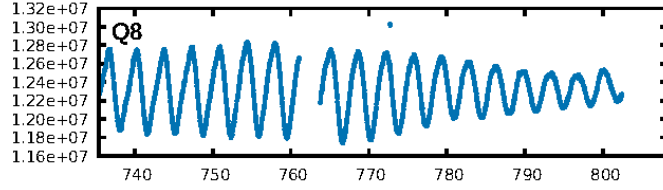
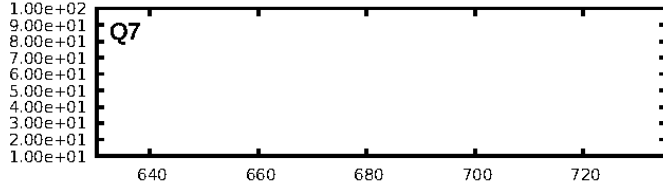
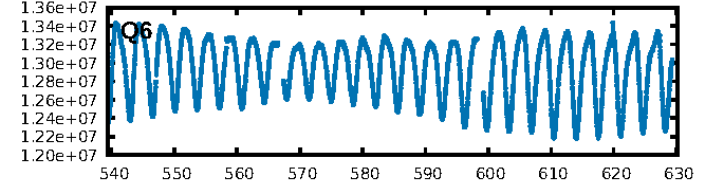
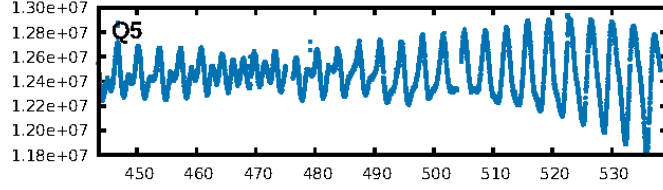
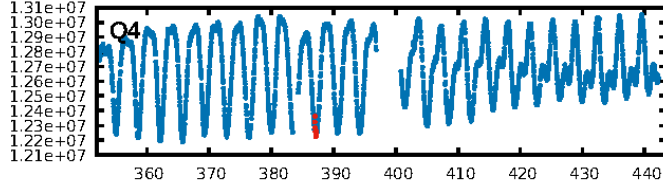
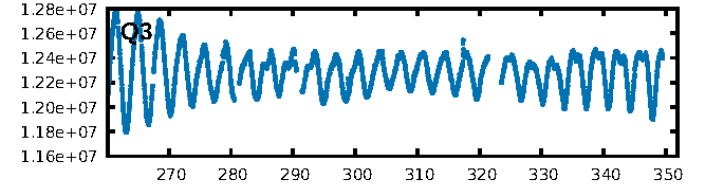
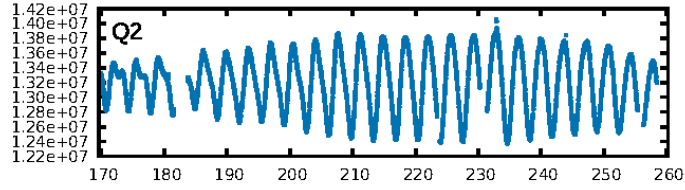
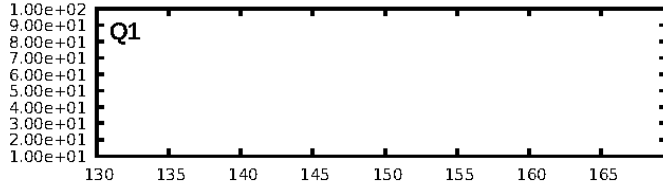
DV Diagnostic Results:

- ShortPeriod-sig: 100.0% [4.02σ]
- LongPeriod-sig: 100.0% [257.58σ]
- ModelChiSquare2-sig: 94.3%
- ModelChiSquareGof-sig: 99.3%
- Bootstrap-pfa: 2.42e-11
- RollingBand-fgt: 1.00 [3/3]
- GhostDiagnostic-chr: -1.206
- Centroid-sig: 40.0%
- Centroid-so: 0.861 arcsec [0.65σ]
- OotOffset-rm: 0.258 arcsec [0.42σ]
- KicOffset-rm: 0.029 arcsec [0.05σ]
- OotOffset-st: 0/0/2/1 [3]
- KicOffset-st: 0/0/2/1 [3]
- DiffImageQuality-fgm: 0.67 [2/3]
- DiffImageOverlap-fno: 1.00 [3/3]

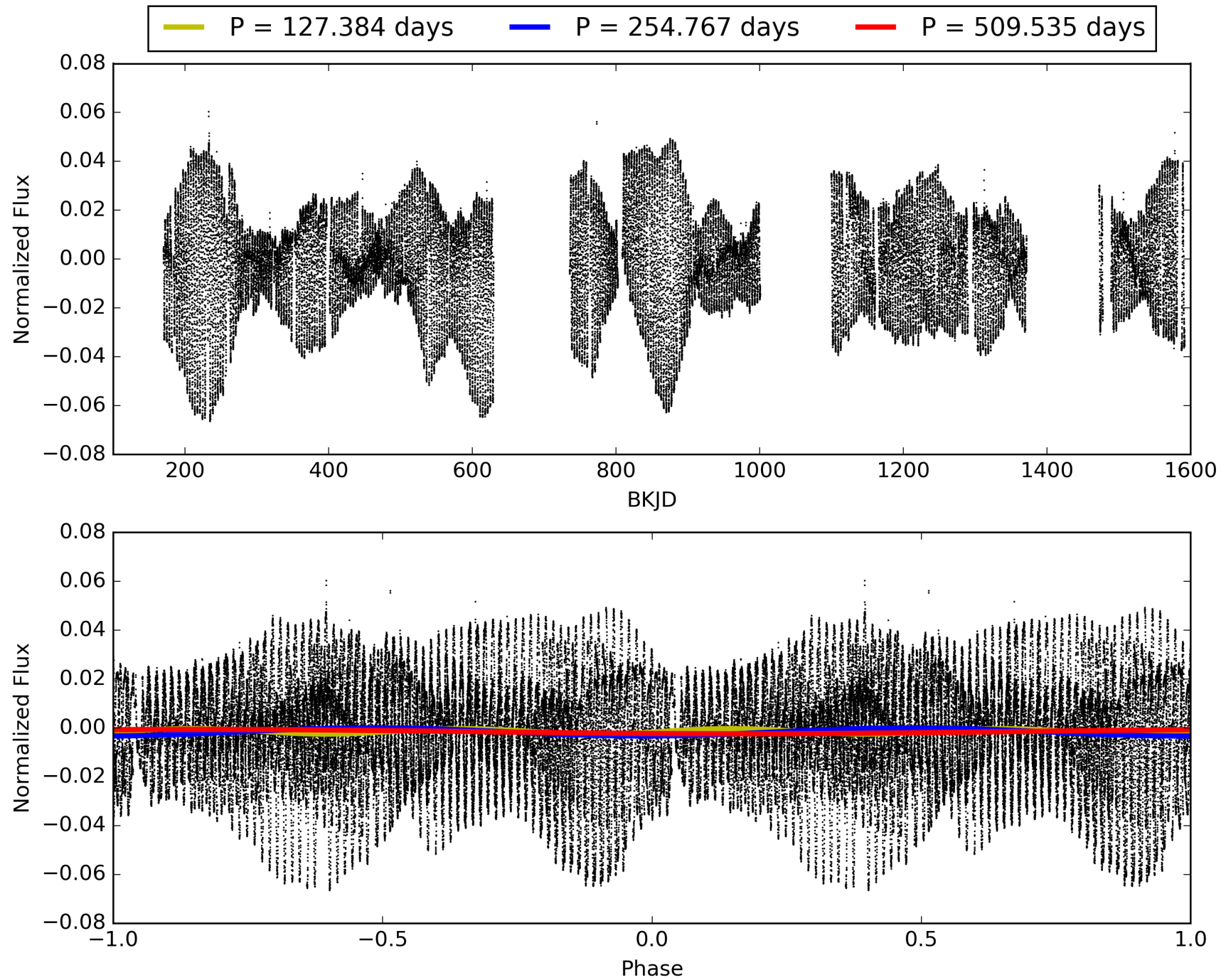
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This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010417984-01, PDC Light Curves



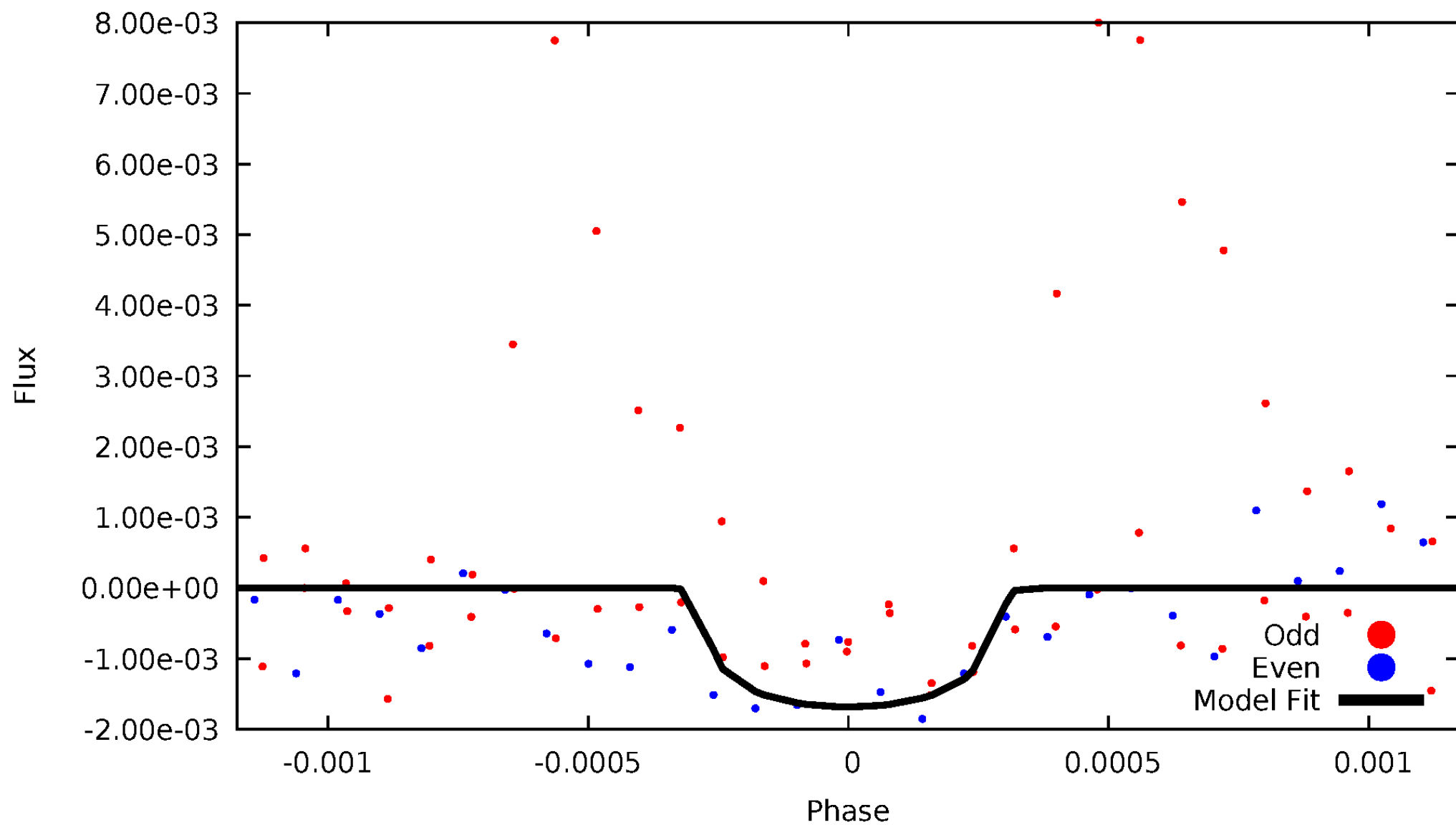
# TCE 010417984-01





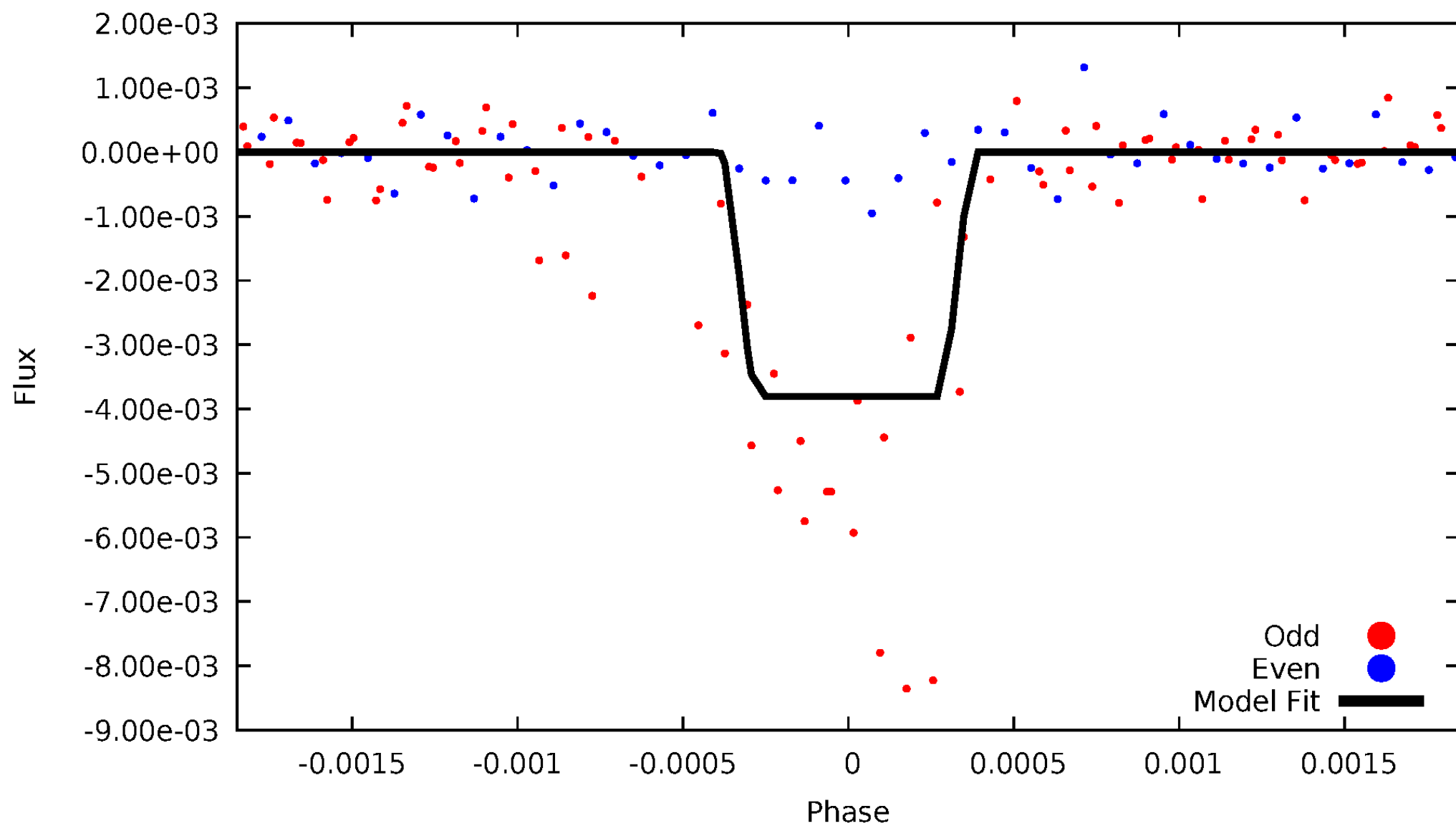
# DV Odd/Even

TCE 010417984-01

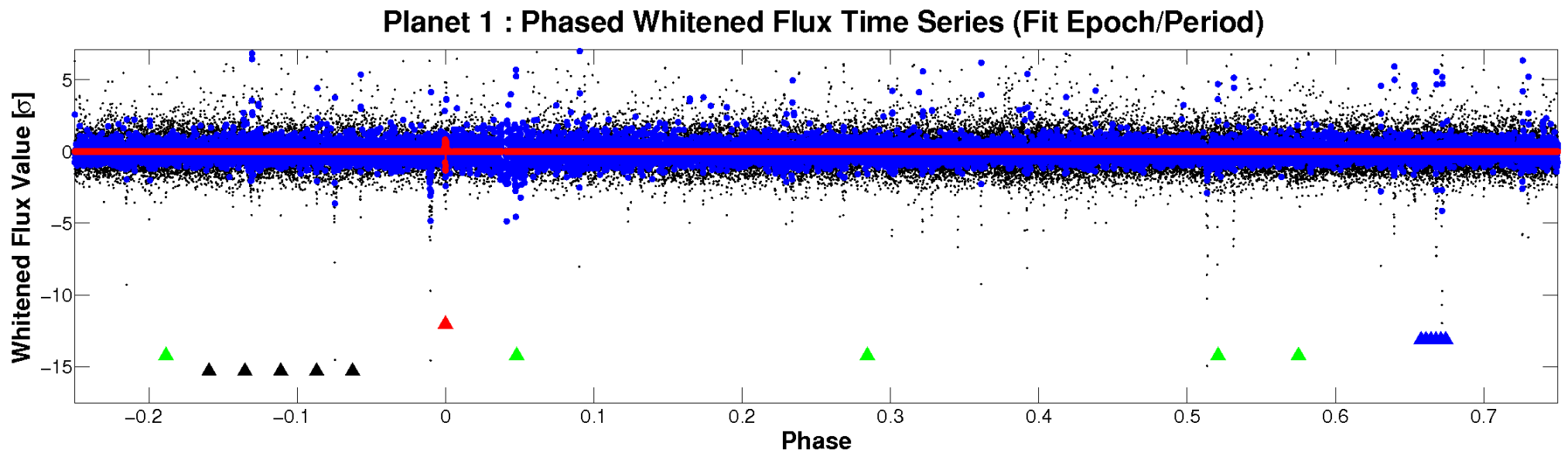
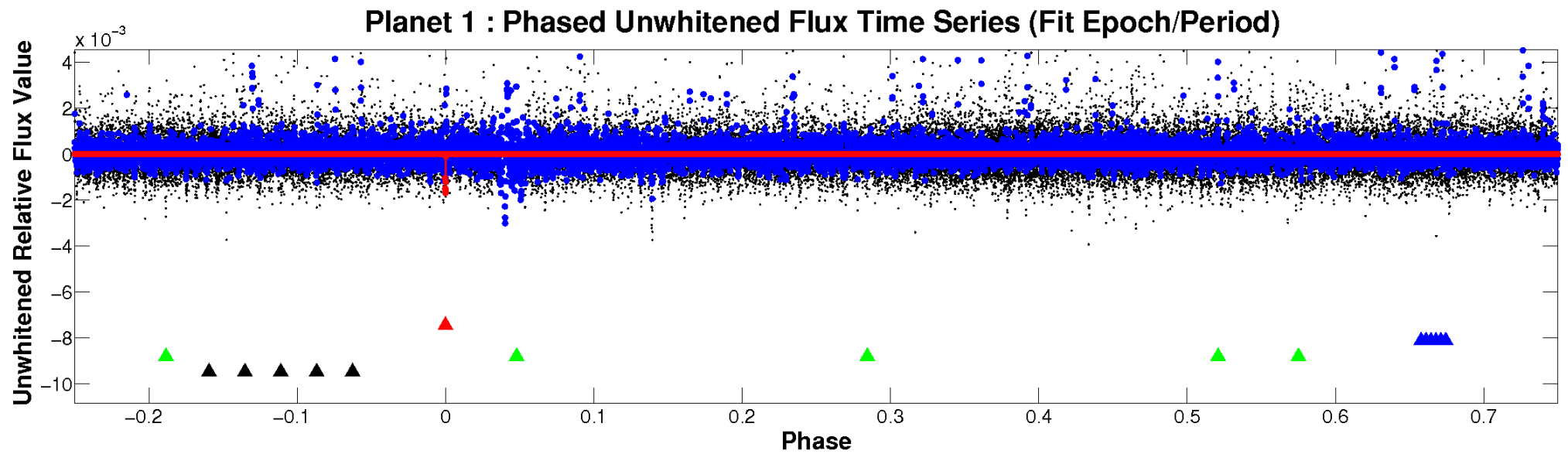


# ALT Odd/Even

TCE 010417984-01

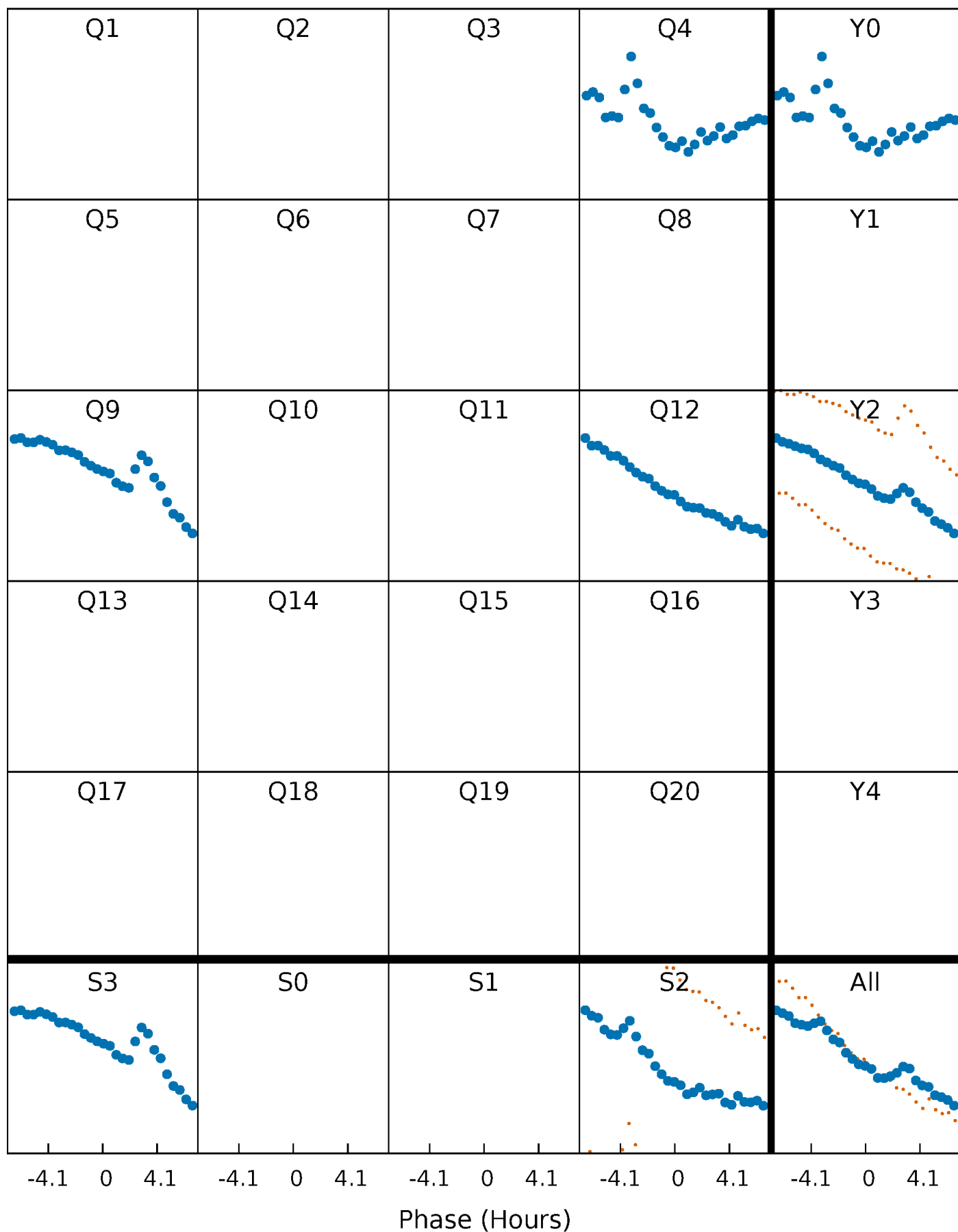


# Non-Whitened Vs. Whitened Light Curve



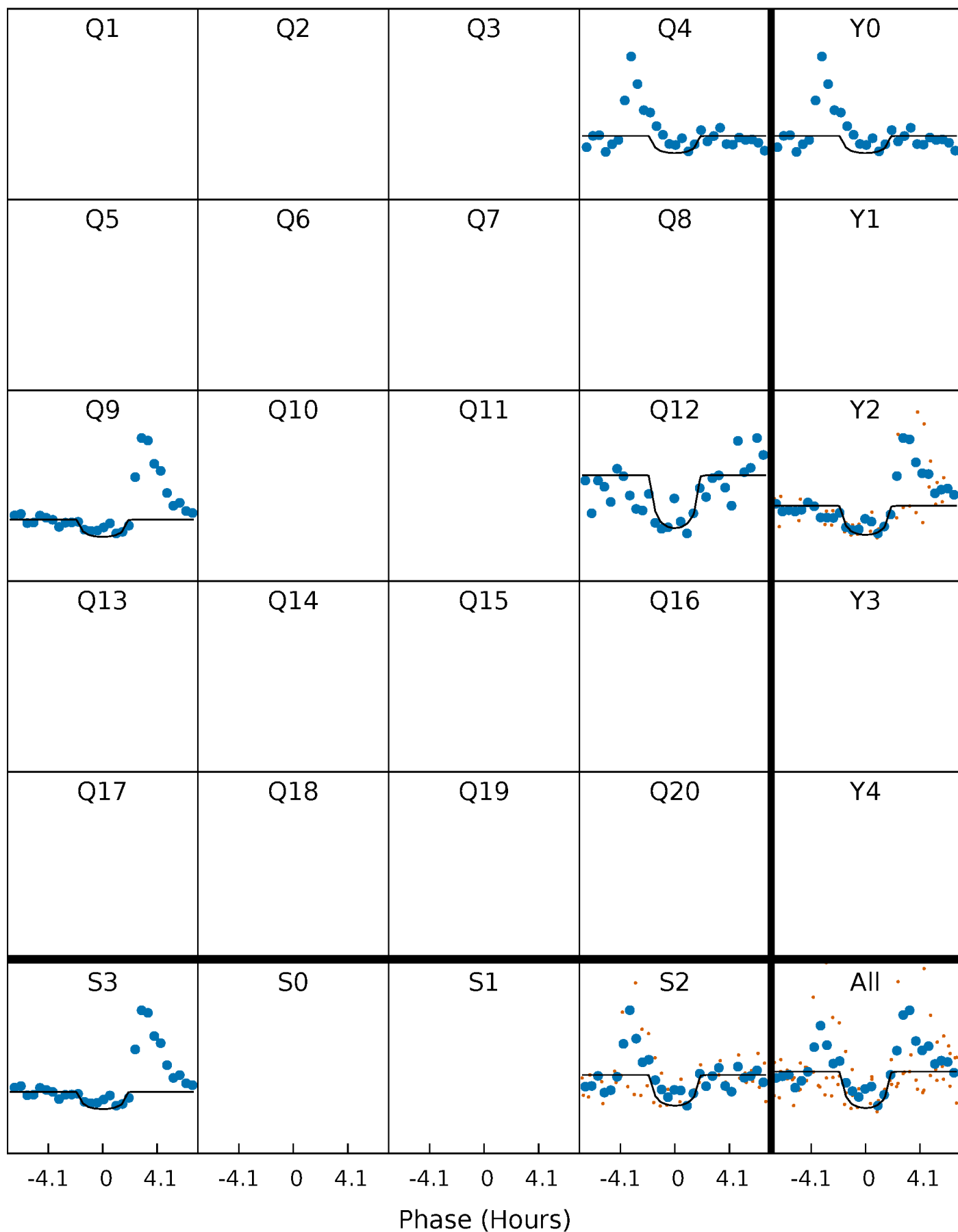
# PDC Quarter-Phased Transit Curves

TCE 010417984-01 P=254.767379 Days  $T_0=132.346802$  (BKJD)



# DV Quarter-Phased Transit Curves

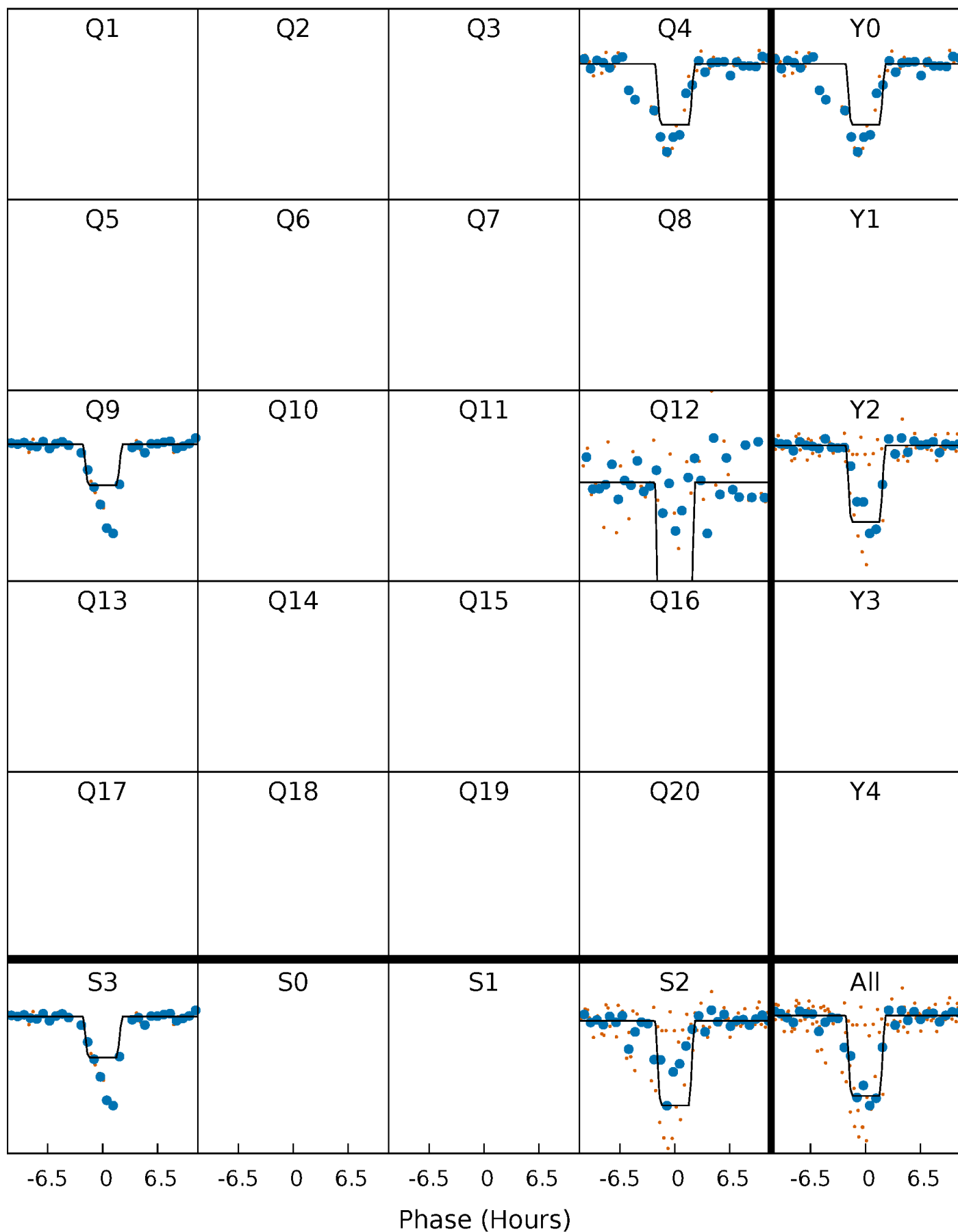
TCE 010417984-01 P=254.767379 Days  $T_0=132.346802$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

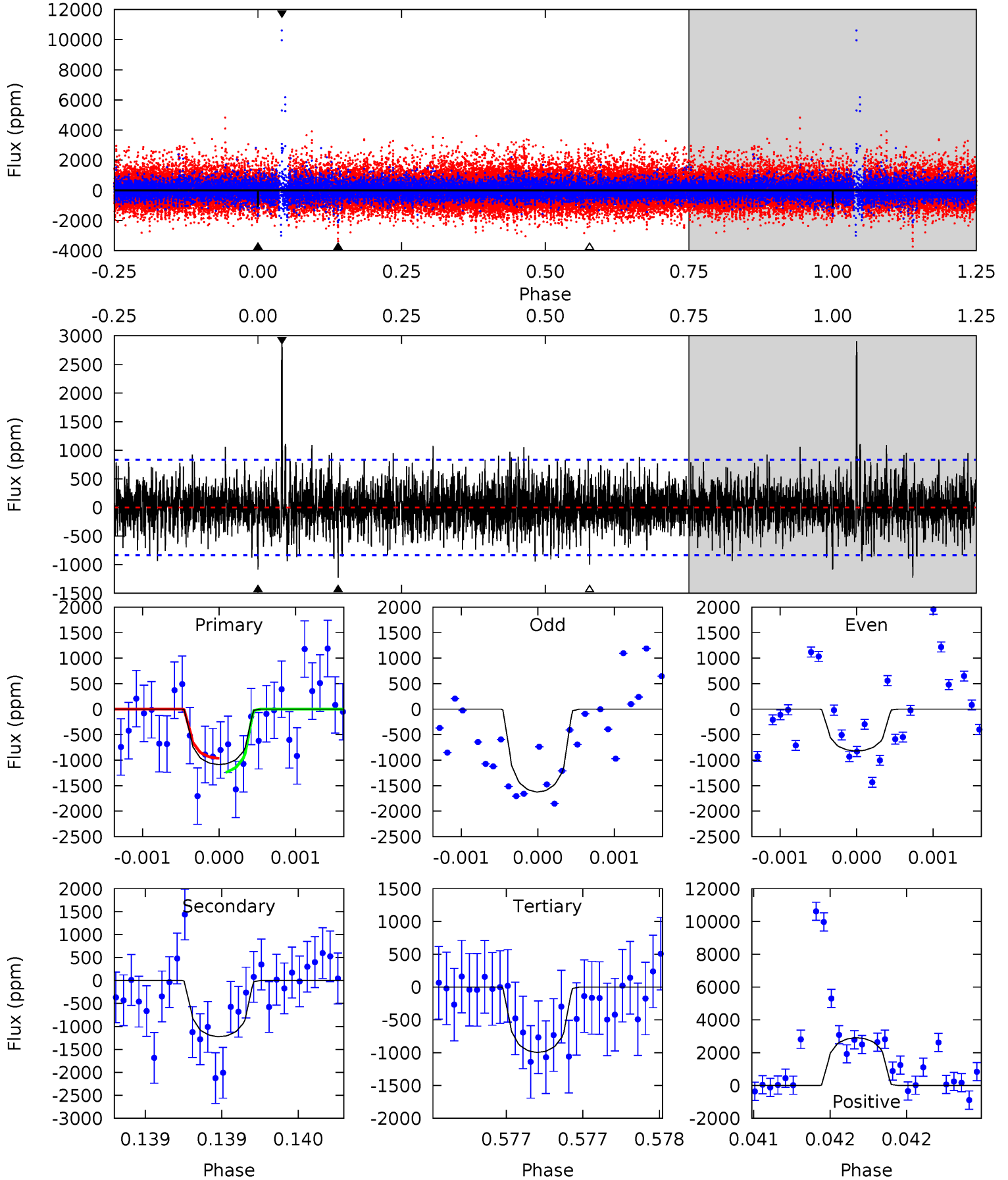
TCE 010417984-01 P=254.769193 Days  $T_0=132.357595$  (BKJD)



# DV Model-Shift Uniqueness Test

010417984-01, P = 254.767379 Days, E = 132.346802 Days

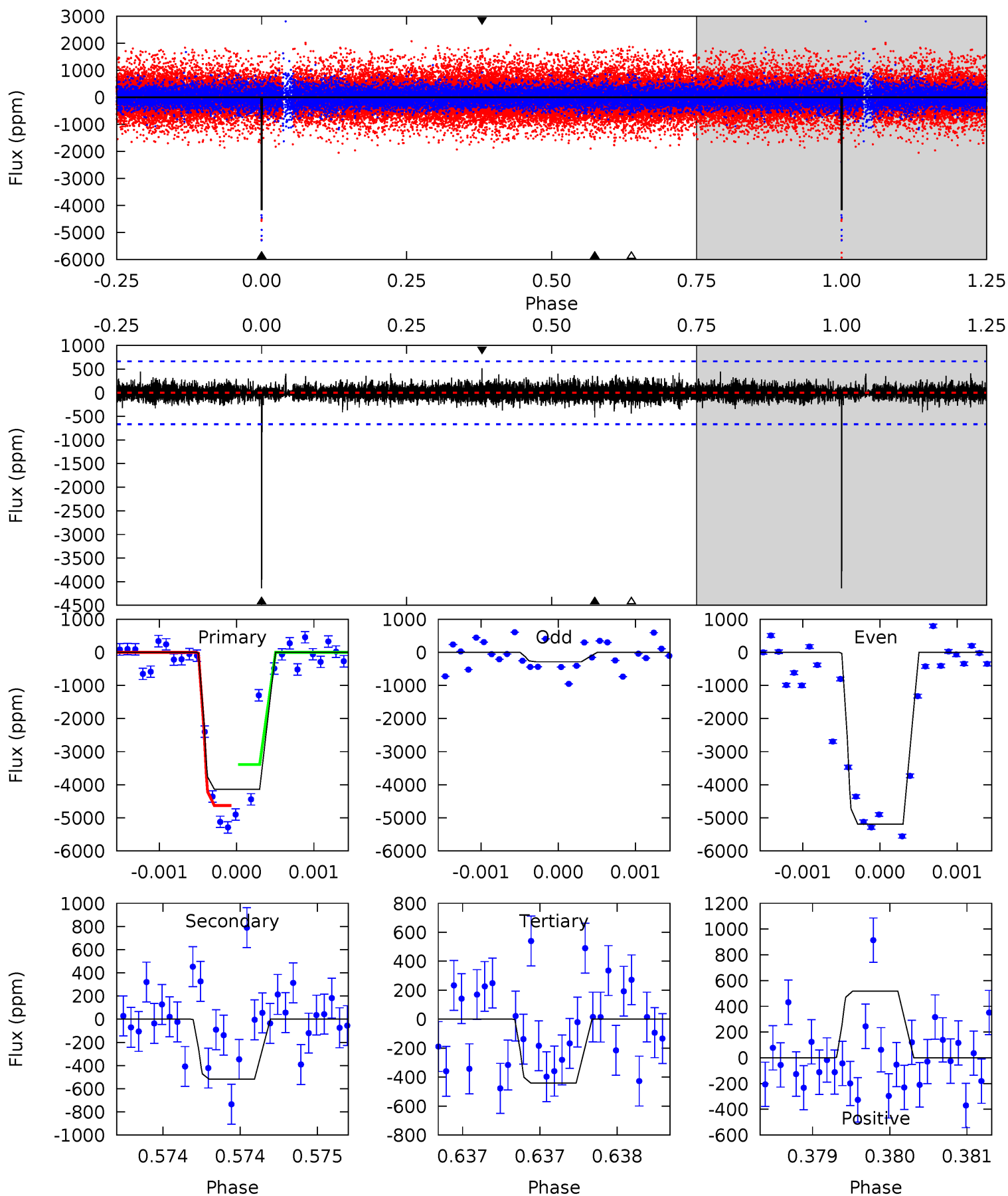
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.18	8.09	6.59	19.2	5.51	3.39	1.88	0.60	-12.0	1.50	-11.1	2.39	1.01	0.70	0.91



# Alt Model-Shift Uniqueness Test

010417984-01,  $P = 254.769193$  Days,  $E = 132.357595$  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
34.2	4.28	3.64	4.27	5.50	3.36	0.79	30.5	29.9	0.64	0.01	25.4	0.84	0.11	0



### Stellar Parameters For KIC 010417984

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4673^{+139}_{-139}$	$4.701^{+0.048}_{-0.028}$	$-1.100^{+0.300}_{-0.300}$	$0.546^{+0.037}_{-0.037}$	$0.547^{+0.044}_{-0.024}$	$4.725^{+0.928}_{-0.594}$
	+3%/-3%	+1%/-1%	+27%/-27%	+7%/-7%	+8%/-4%	+20%/-13%
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 010417984-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1223 \pm 151$	$3.71^{+3.65}_{-2.45}$	$264^{+9}_{-9}$	$3792^{+2143}_{-744}$	$20490^{+162867}_{-15455}$
Alt.	$-519 \pm 121$	$4.77^{+3.93}_{-3.14}$	$264^{+8}_{-9}$	$3058^{+1279}_{-470}$	$5156^{+39325}_{-3692}$

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

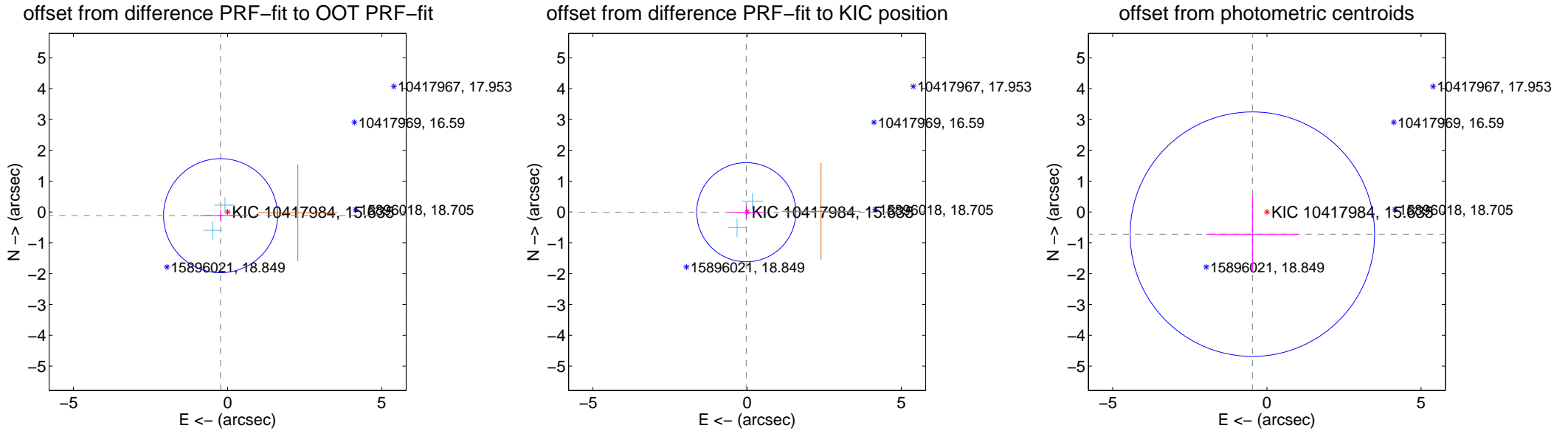
## DV Centroid Data

Supplemental centroid analysis for 010417984-01. Kepler magnitude: 15.63. Transit SNR 5.92

There are 2 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

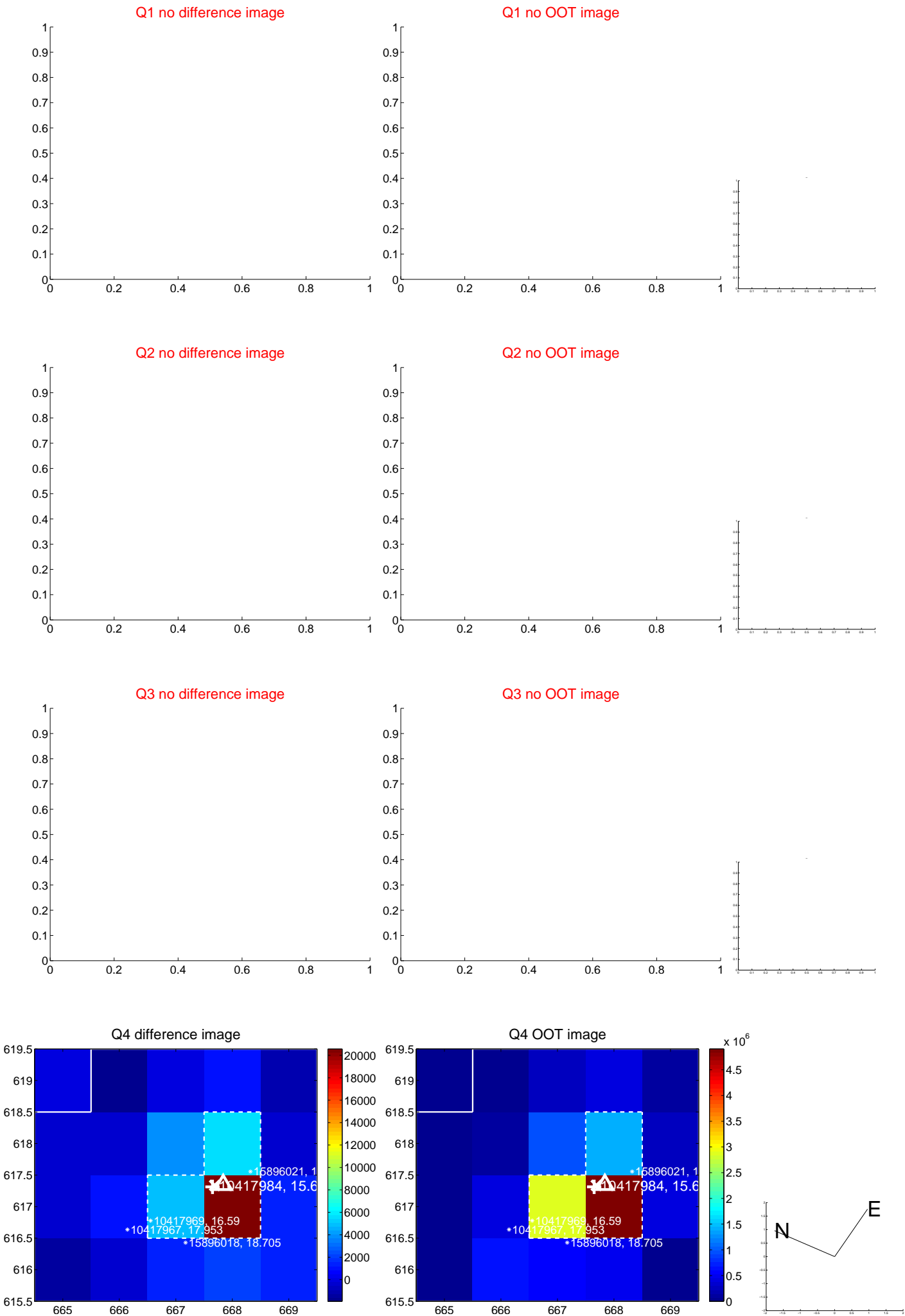
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.258 \pm 0.616$	0.42	$0.228 \pm 0.666$	$-0.121 \pm 0.208$
PRF-fit source offset from KIC position	$0.029 \pm 0.536$	0.05	$0.027 \pm 0.550$	$-0.009 \pm 0.200$
photometric centroid source offset	$0.86 \pm 1.32$	0.65	$0.47 \pm 1.50$	$-0.72 \pm 1.24$



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.



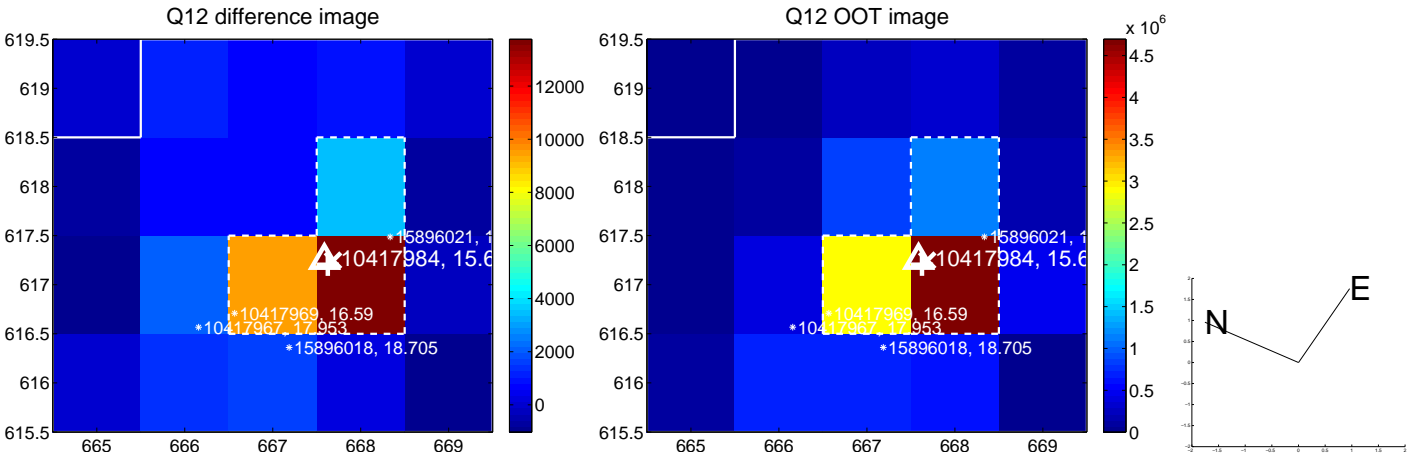
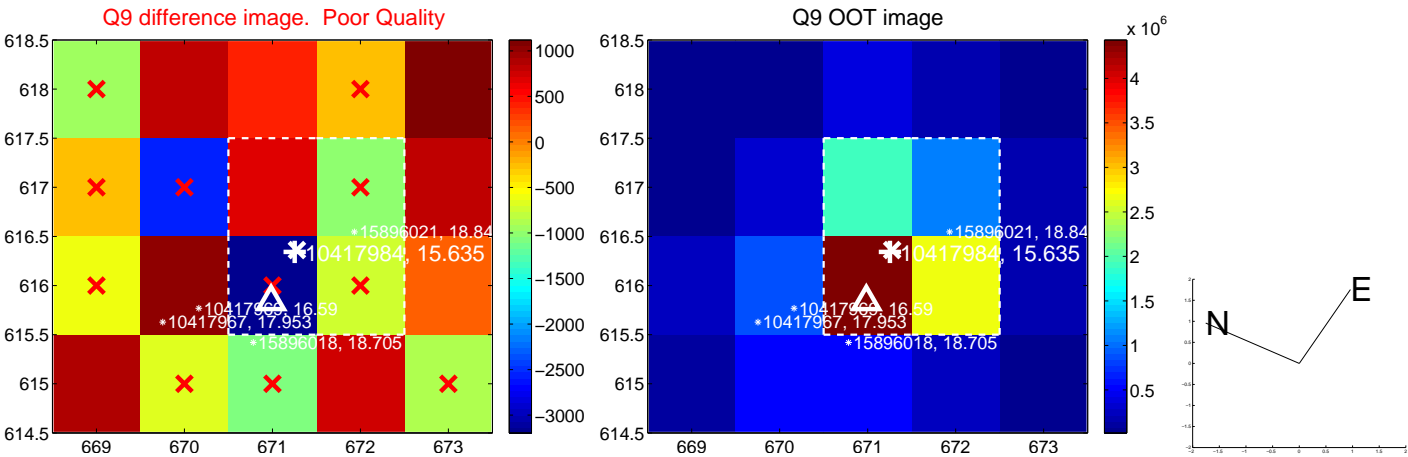
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



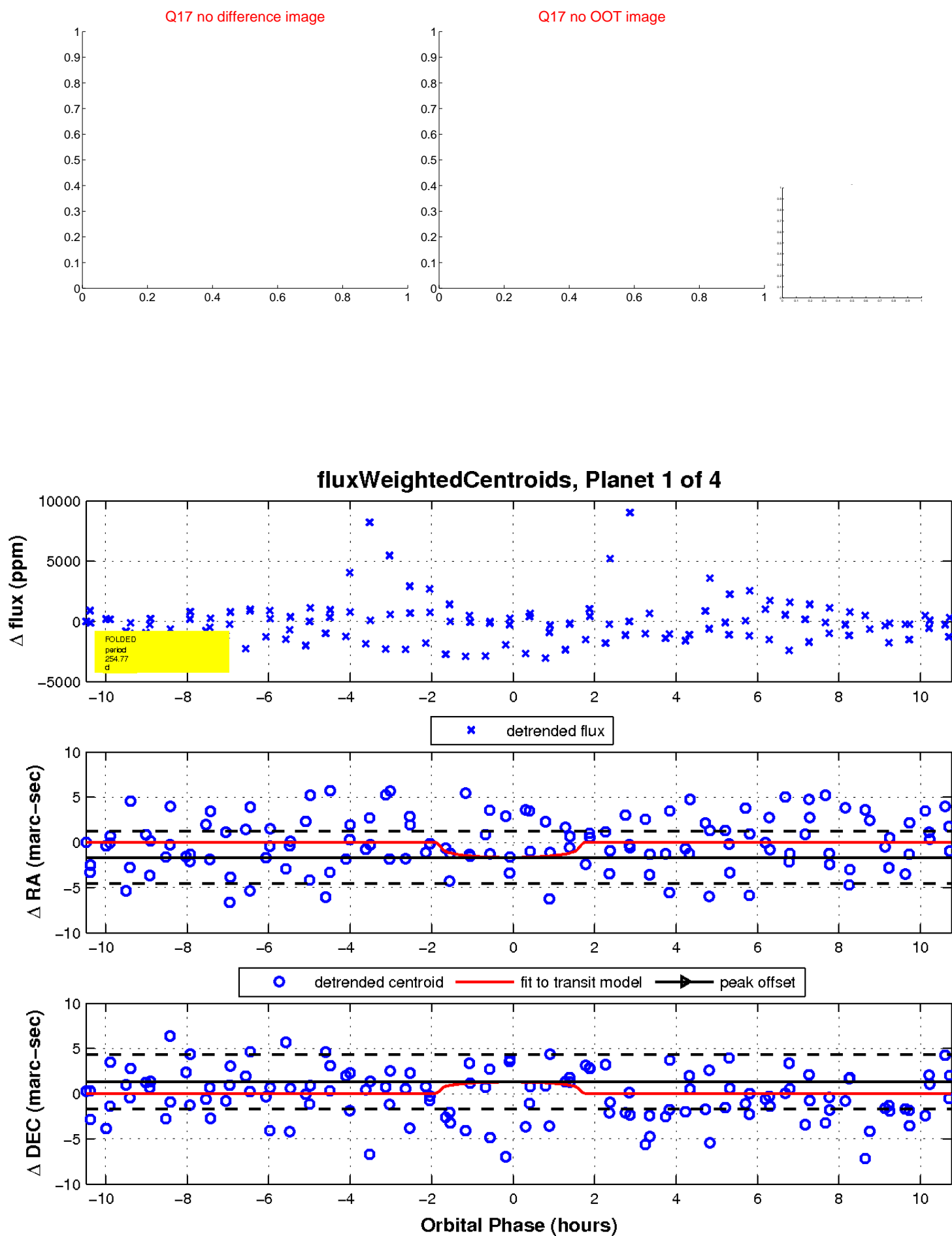
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



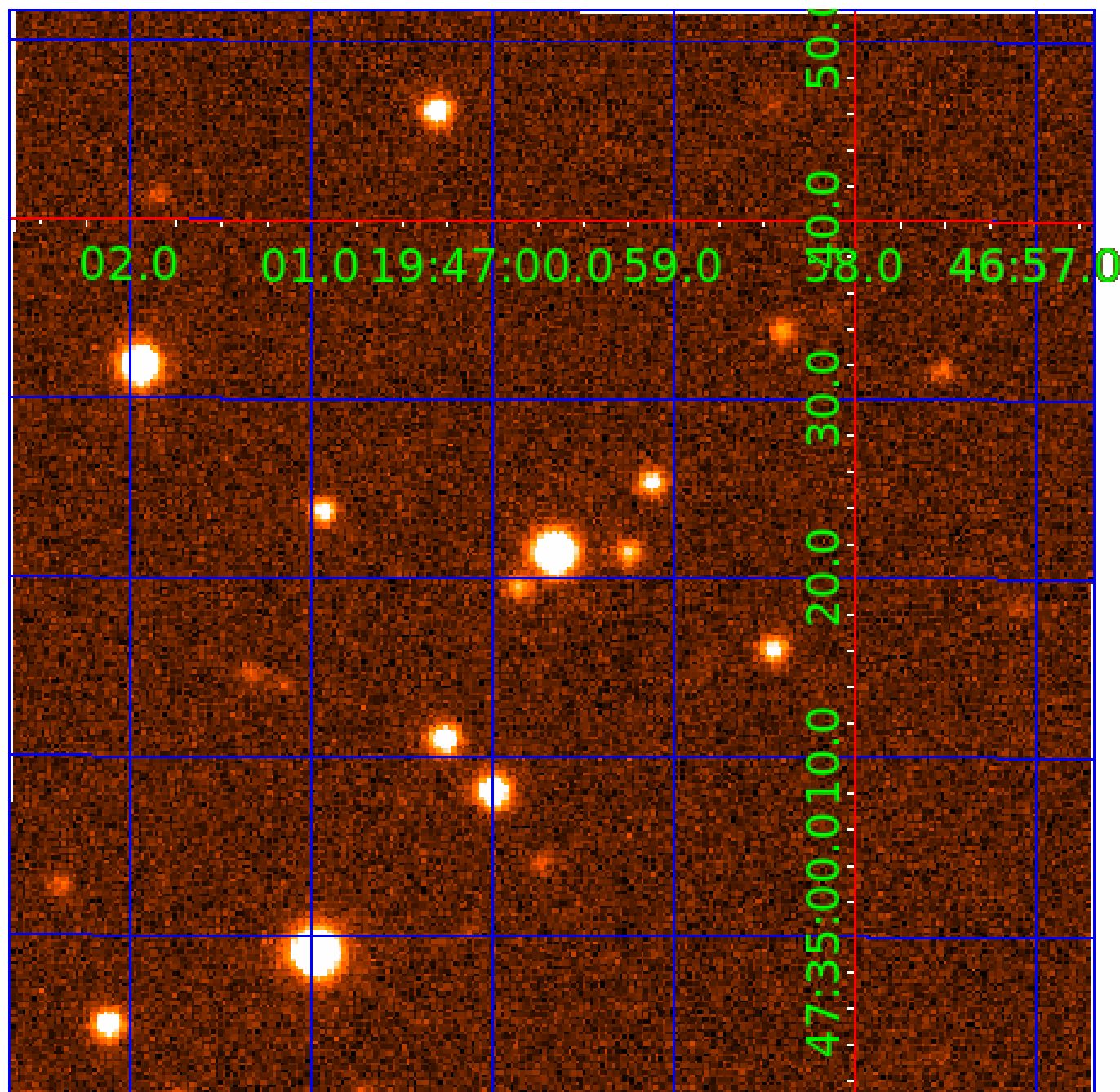
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 010417984

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010417984-01	OBS	No	254.767379	132.346802	1686.1	3.590	10.0	5.9	0.55	4673	2.19	0.31
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010417984-03	OBS	No	315.007731	278.865649	1806.6	4.315	8.8	7.4	0.55	4673	4.59	0.23
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## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010417984-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010417984-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
010417984-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010417984-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

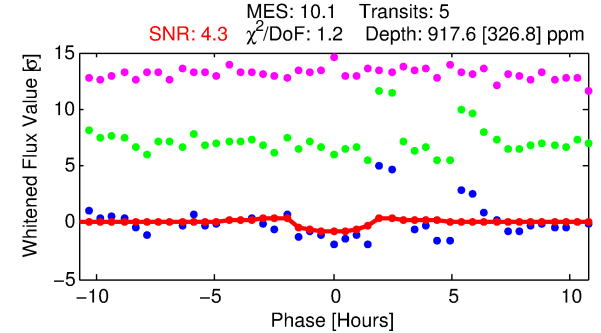
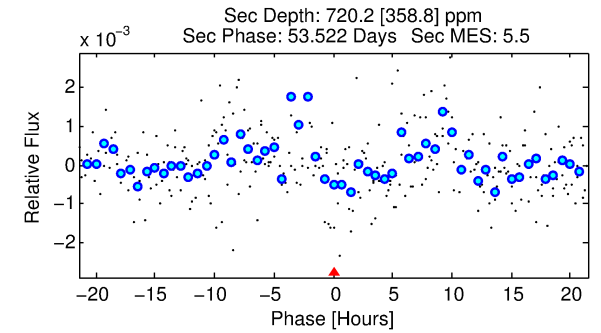
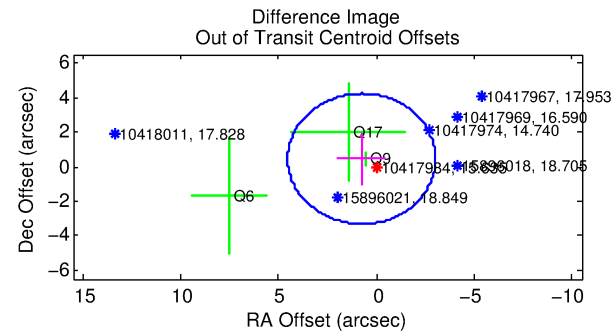
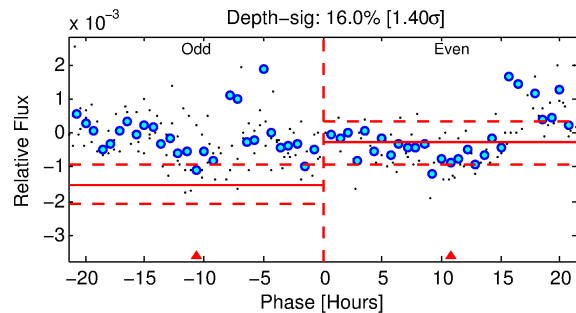
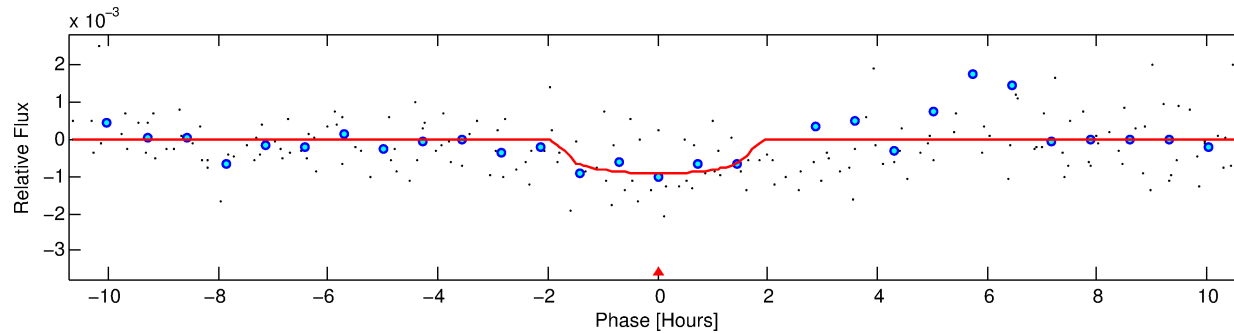
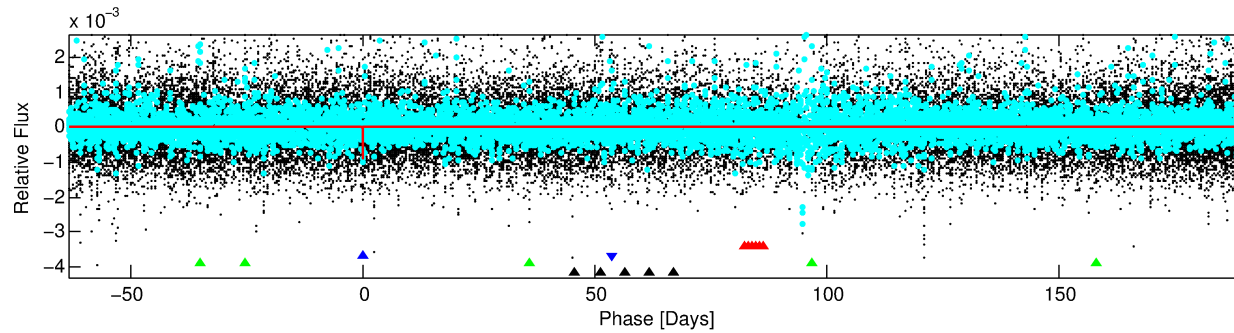
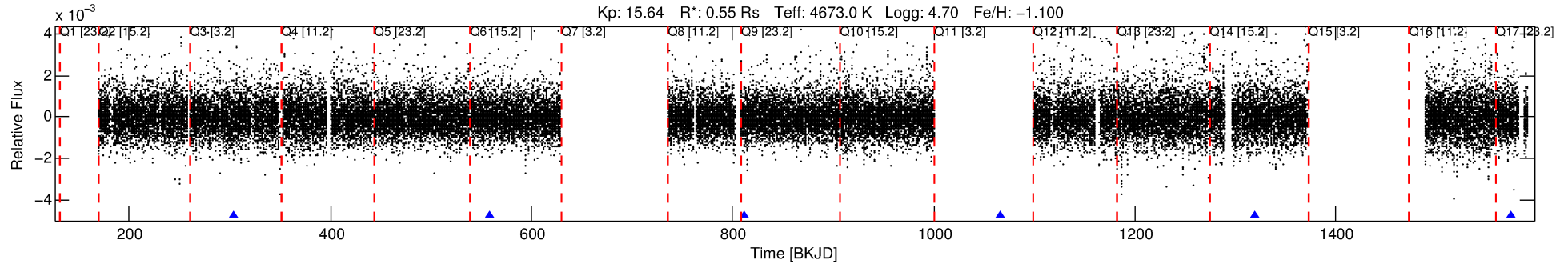
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010417984-02

No Significant Match Found

# DV One-Page Summary

KIC: 10417984 Candidate: 2 of 4 Period: 253.919 d



## DV Fit Results:

Period = 253.91947 [0.00481] d  
Epoch = 304.1707 [0.0143] BKJD  
Rp/R\* = 0.0277 [0.1521]  
a/R\* = 516.21 [10512.98]  
b = 0.39 [45.00]  
Seff = 0.31 [0.05]  
Teq = 190 [7] K  
Rp = 1.65 [9.06] Re  
a = 0.6416 [0.0374] AU  
Ag = 60059.10 [661080.22] [0.09σ]  
Teffp = 4603 [12667] K [0.35σ]

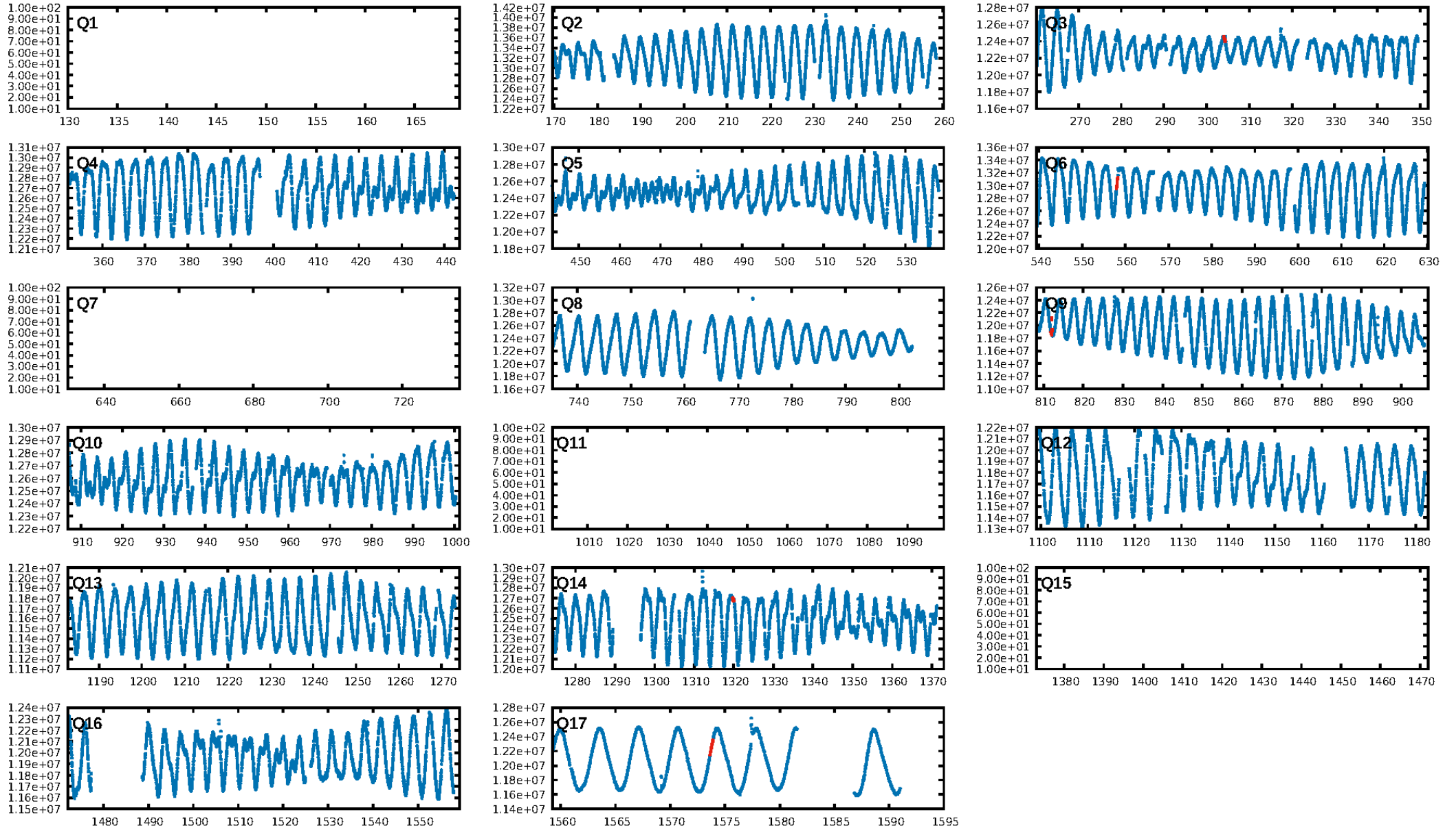
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [21.72σ]  
LongPeriod-sig: 100.0% [4.02σ]  
ModelChiSquare2-sig: 1.7%  
ModelChiSquareGof-sig: 95.1%  
Bootstrap-pfa: 3.76e-12  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.06414  
Centroid-sig: 50.0%  
Centroid-so: 1.124 arcsec [0.57σ]  
OotOffset-rm: 0.885 arcsec [0.70σ]  
OotOffset-st: 1/0/0/2 [3]  
KicOffset-rm: 0.774 arcsec [0.59σ]  
KicOffset-st: 1/0/0/2 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [5/5]

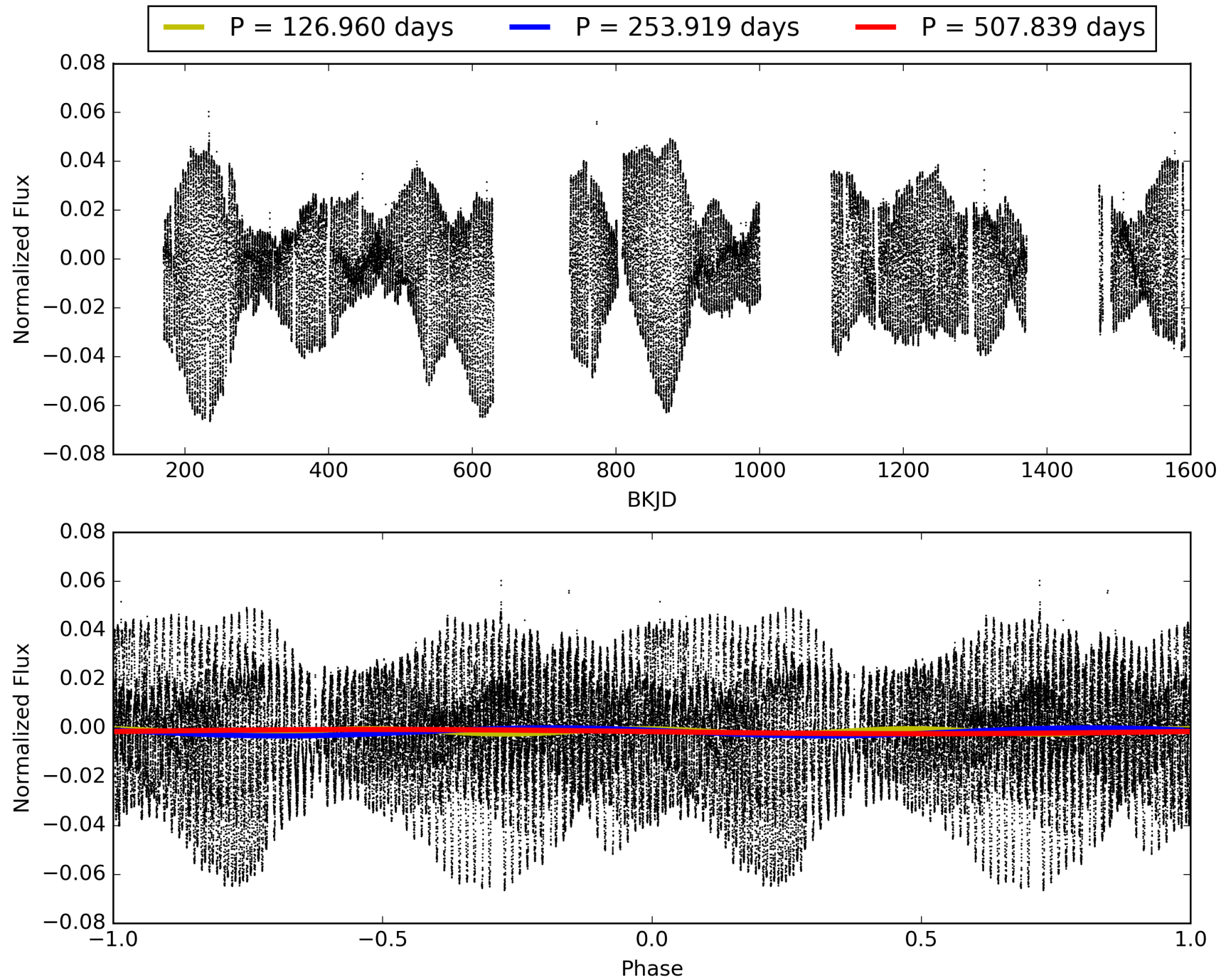
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 17:17:11 Z

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

# TCE 010417984-02, PDC Light Curves



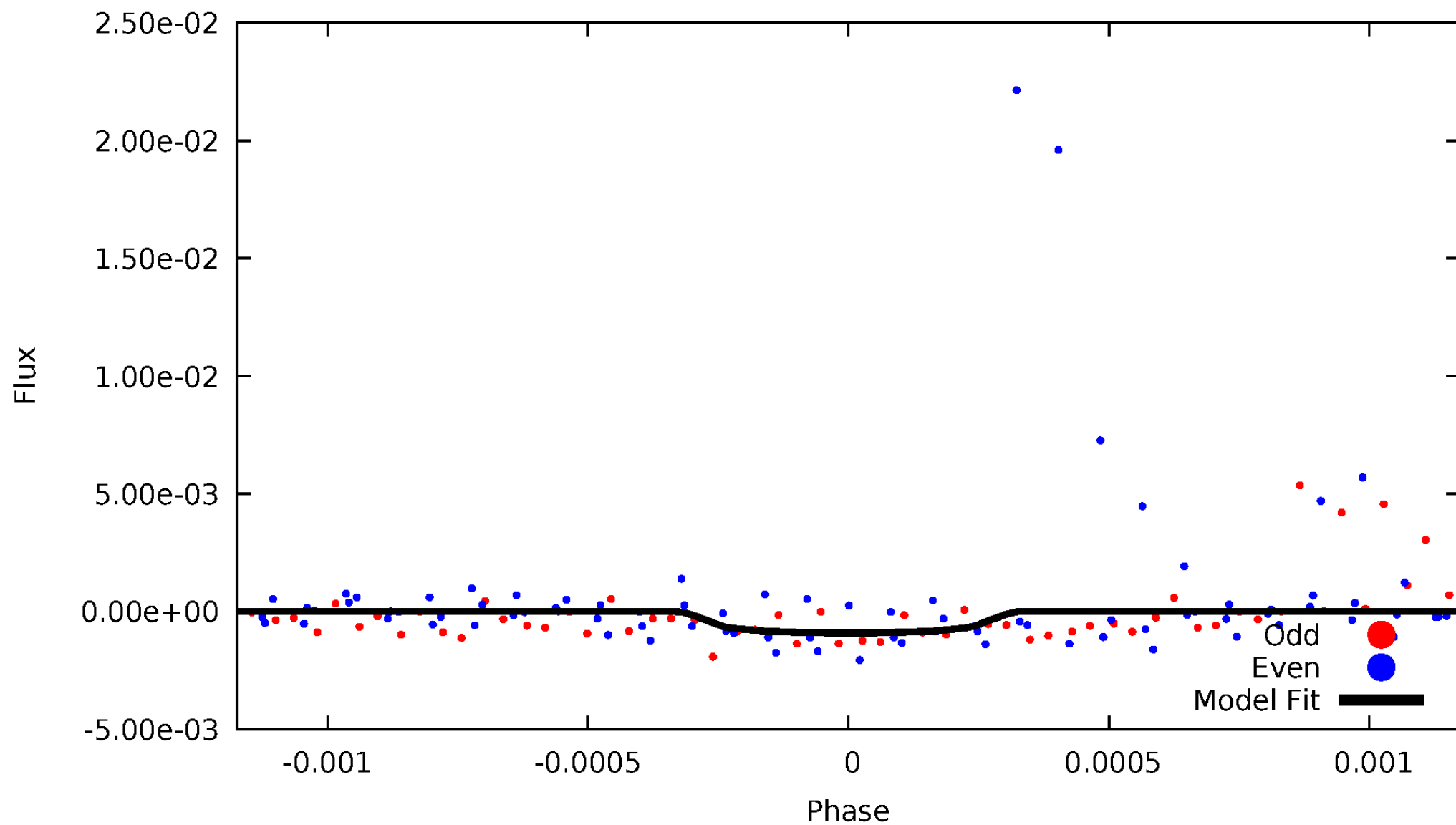
# TCE 010417984-02





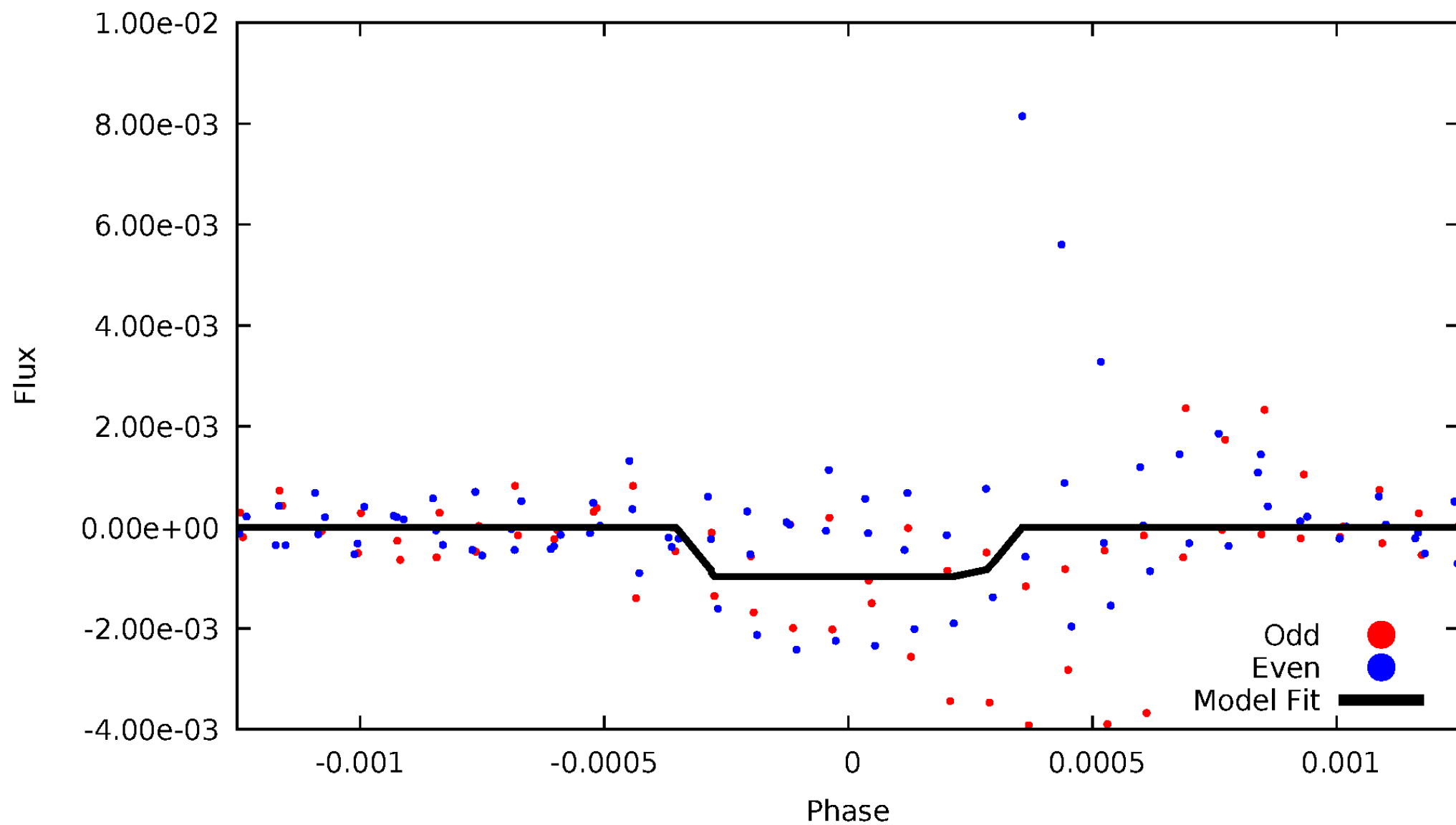
# DV Odd/Even

TCE 010417984-02



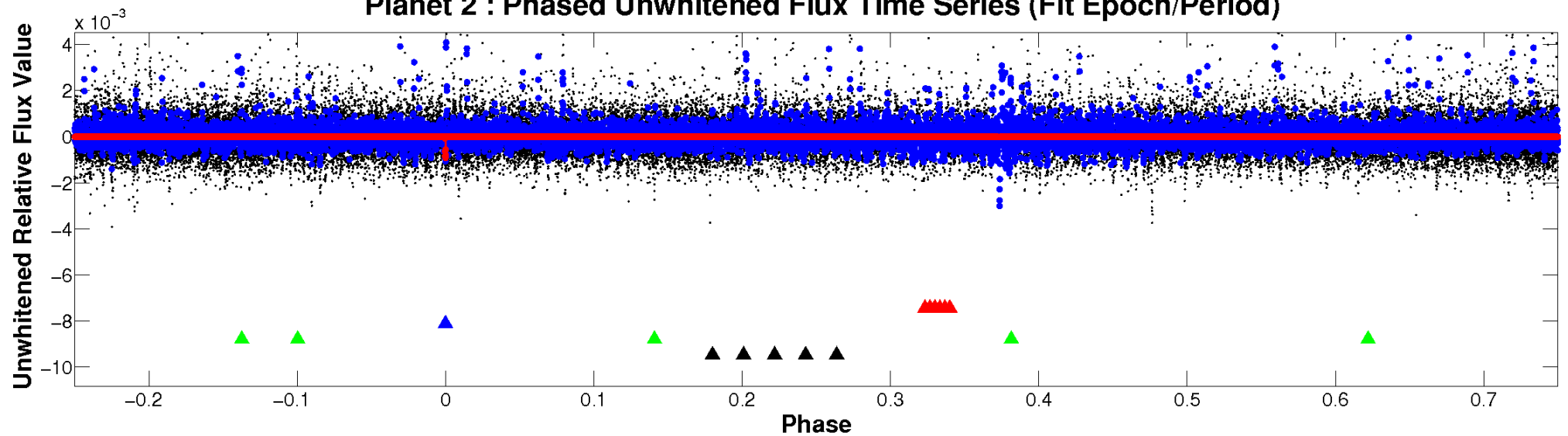
# ALT Odd/Even

TCE 010417984-02

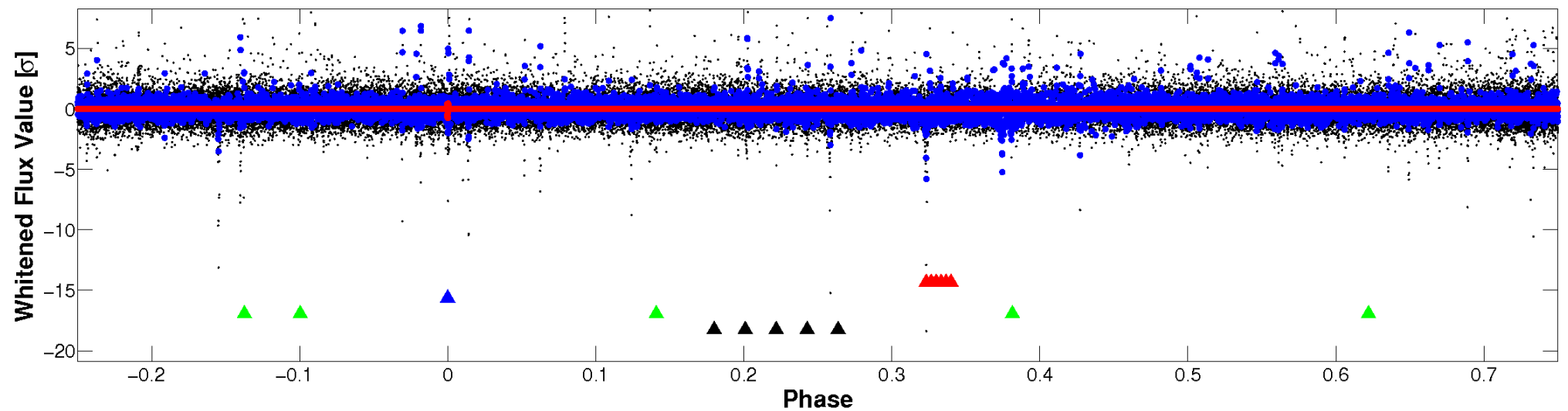


# Non-Whitened Vs. Whitened Light Curve

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

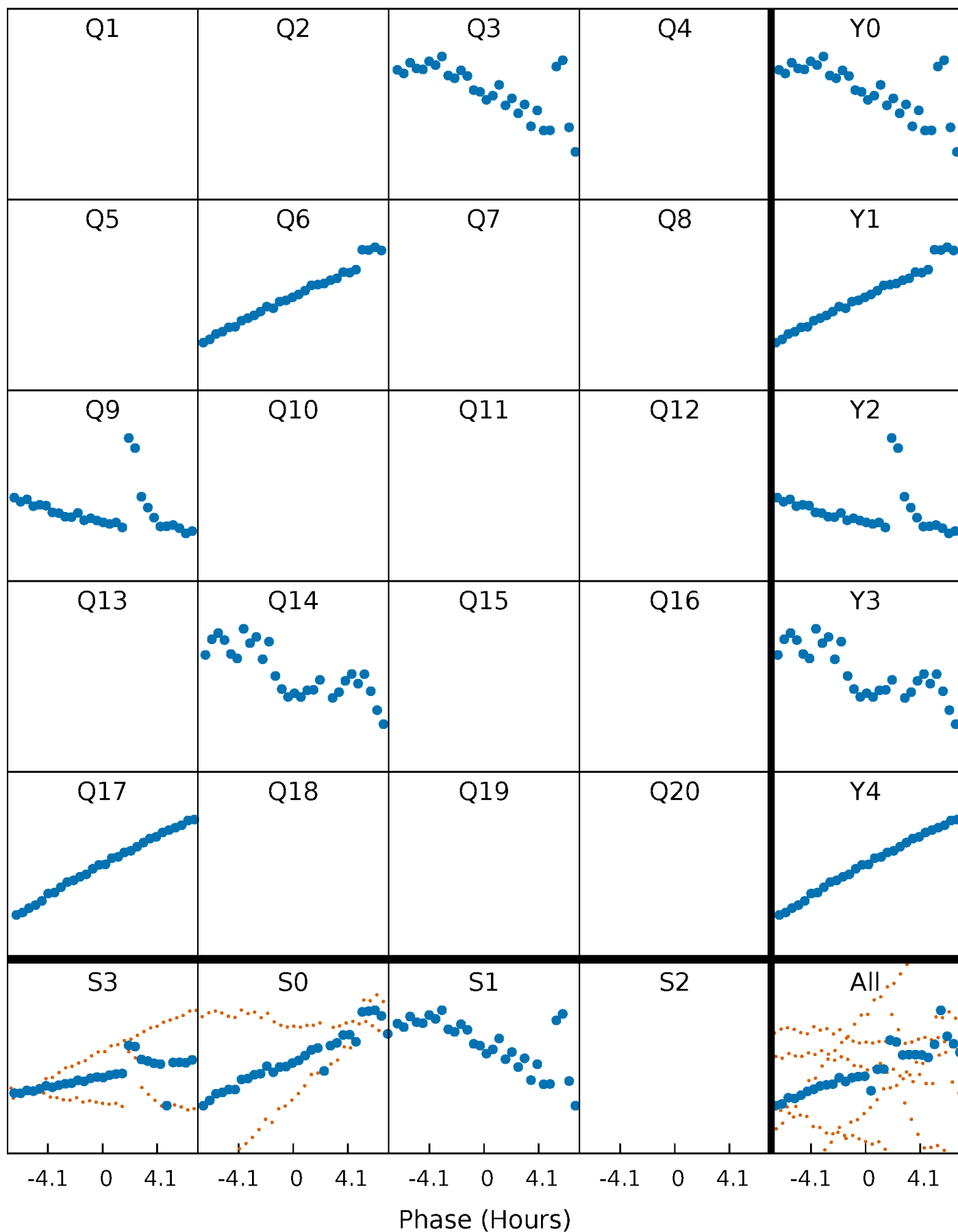


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



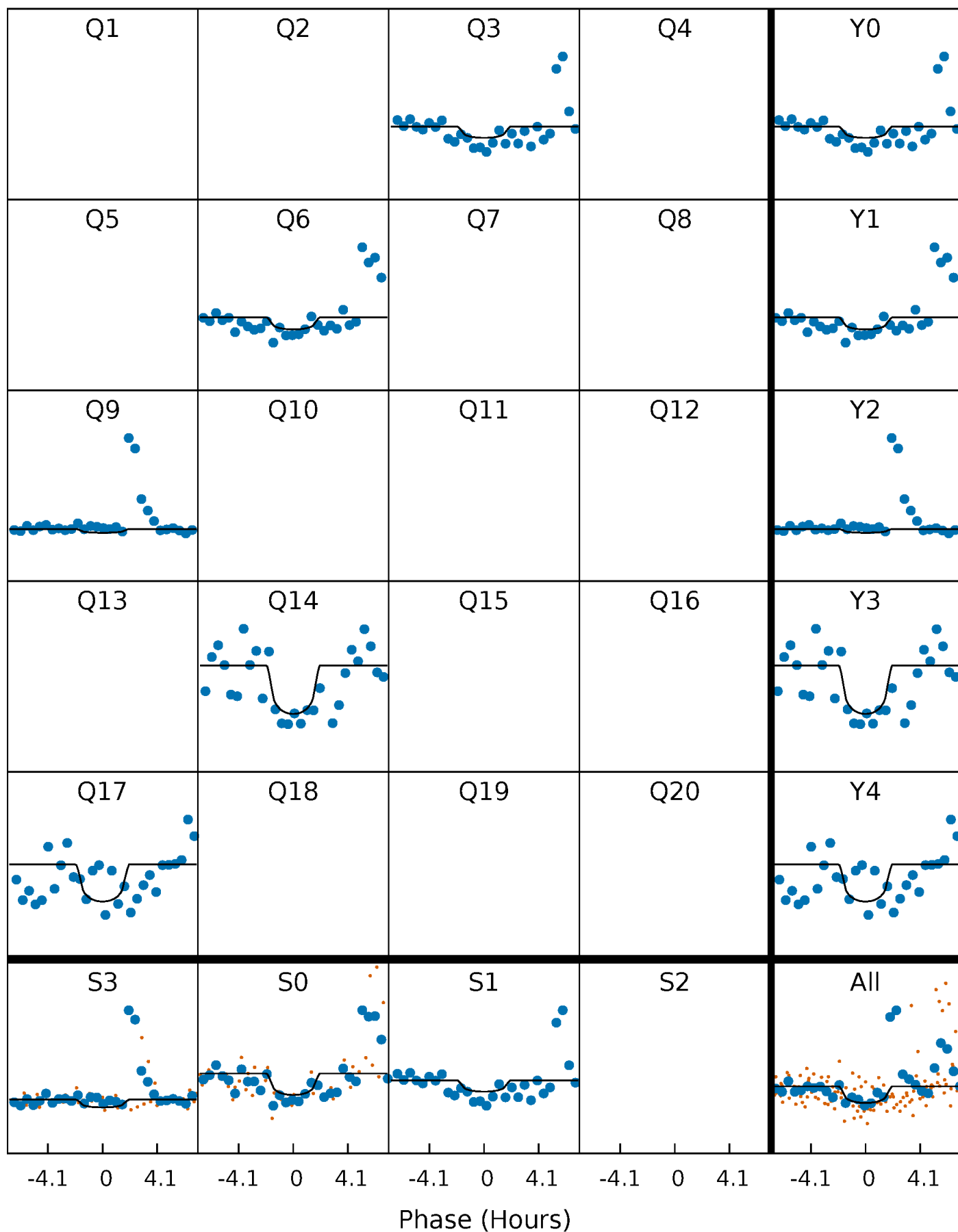
# PDC Quarter-Phased Transit Curves

TCE 010417984-02     $P=253.919473$  Days     $T_0=304.170668$  (BKJD)



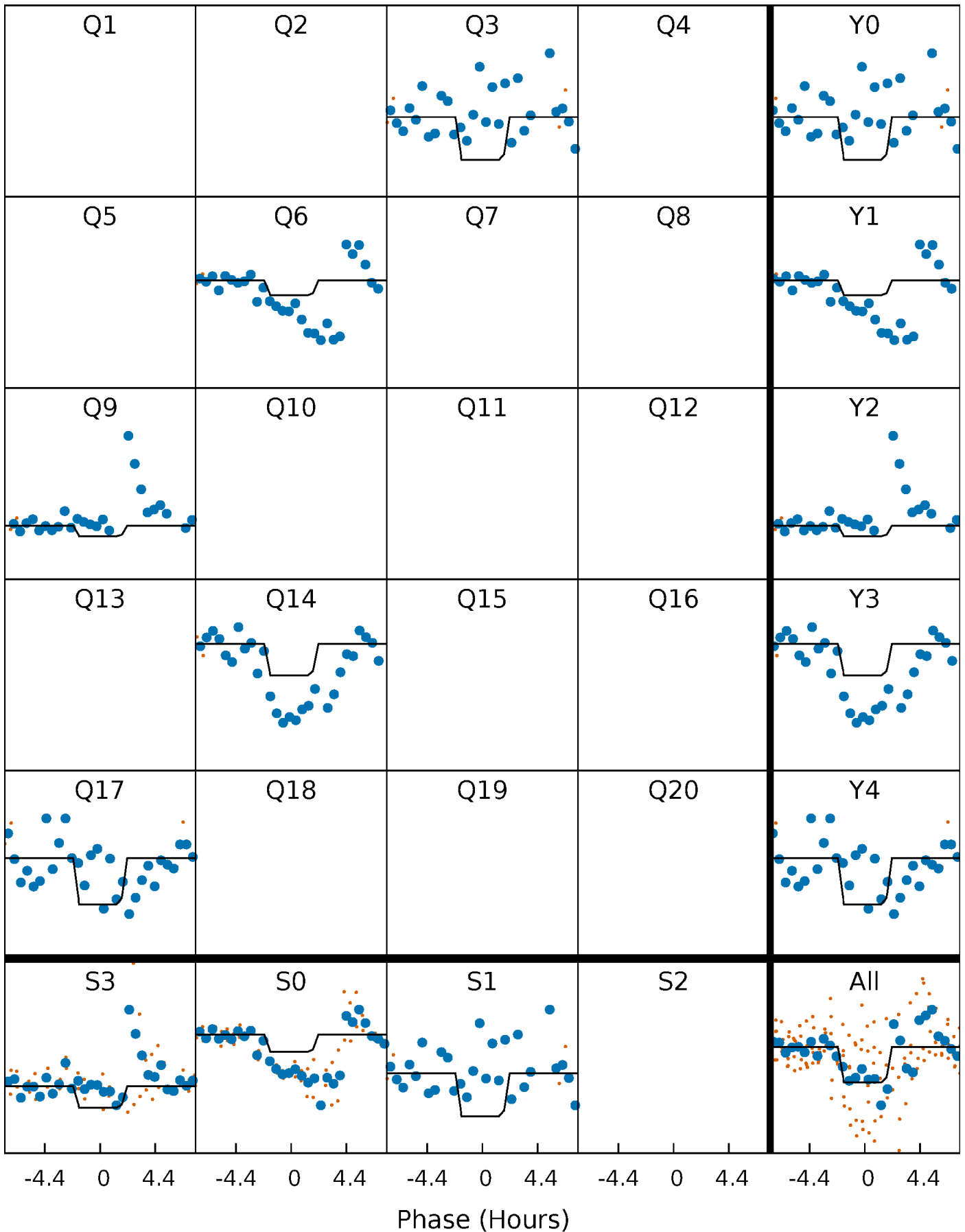
# DV Quarter-Phased Transit Curves

TCE 010417984-02     $P=253.919473$  Days     $T_0=304.170668$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

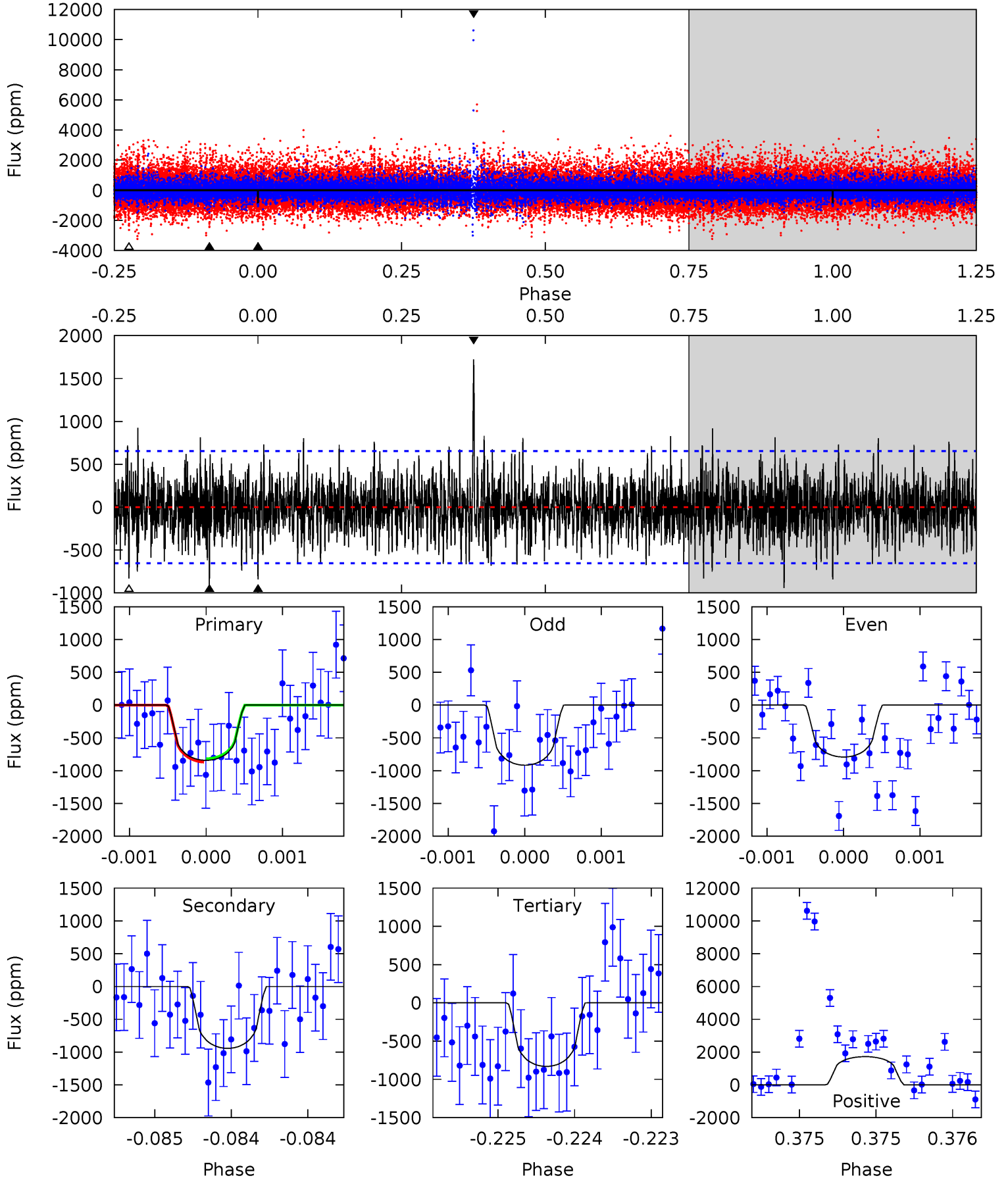
TCE 010417984-02 P=253.907417 Days  $T_0=304.227215$  (BKJD)



# DV Model-Shift Uniqueness Test

010417984-02, P = 253.919473 Days, E = 50.251195 Days

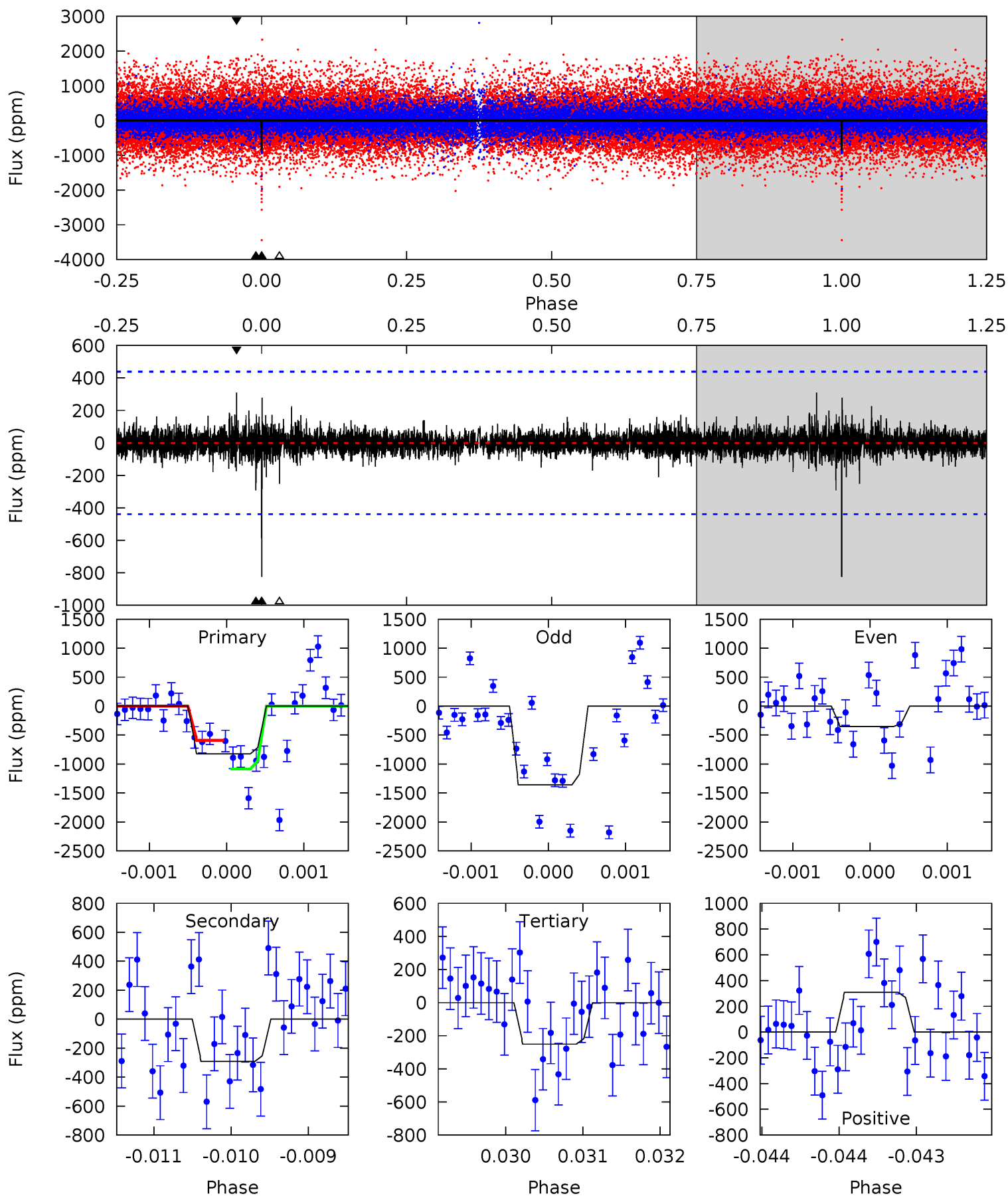
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.12	7.98	7.02	14.6	5.53	3.41	1.96	0.10	-7.43	0.95	-6.57	0.50	0.77	0.65	0.22



# Alt Model-Shift Uniqueness Test

010417984-02,  $P = 253.907417$  Days,  $E = 50.319798$  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
10.4	3.67	3.15	3.88	5.51	3.39	0.55	7.21	6.48	0.52	-0.21	6.26	2.38	0.27	3.13





### Stellar Parameters For KIC 010417984

	$T_{\text{eff}}(K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$4673^{+139}_{-139}$	$4.701^{+0.048}_{-0.028}$	$-1.100^{+0.300}_{-0.300}$	$0.546^{+0.037}_{-0.037}$	$0.547^{+0.044}_{-0.024}$	$4.725^{+0.928}_{-0.594}$
	+3%/-3%	+1%/-1%	+27%/-27%	+7%/-7%	+8%/-4%	+20%/-13%
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 010417984-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-943 \pm 118$	$6.86^{+6.92}_{-4.94}$	$264^{+9}_{-9}$	$2986^{+1516}_{-486}$	$4586^{+51947}_{-3440}$
Alt.	$-292 \pm 80$	$6.86^{+7.04}_{-4.63}$	$265^{+9}_{-9}$	$2576^{+970}_{-396}$	$1417^{+11948}_{-1063}$

$T_{\text{max}}$  = 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

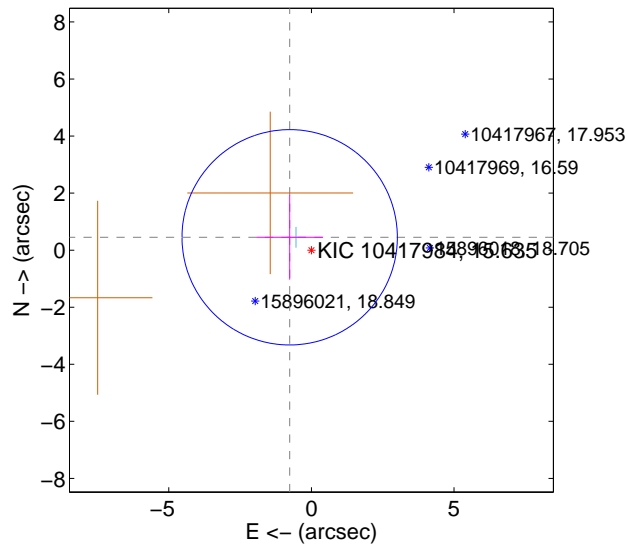
Supplemental centroid analysis for 010417984-02. Kepler magnitude: 15.63. Transit SNR 4.25

There are 1 quarters with good PRF difference image offsets

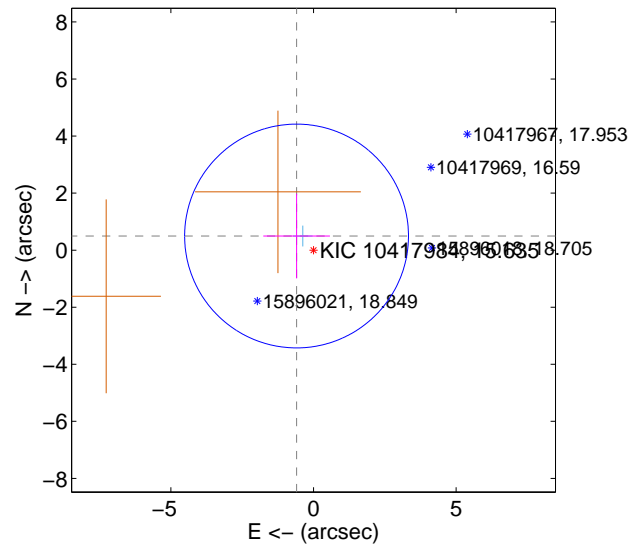
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.885 \pm 1.258$	0.70	$0.761 \pm 1.168$	$0.451 \pm 1.484$
PRF-fit source offset from KIC position	$0.774 \pm 1.307$	0.59	$0.594 \pm 1.168$	$0.496 \pm 1.484$
photometric centroid source offset	$1.12 \pm 1.98$	0.57	$0.79 \pm 2.13$	$-0.80 \pm 1.83$

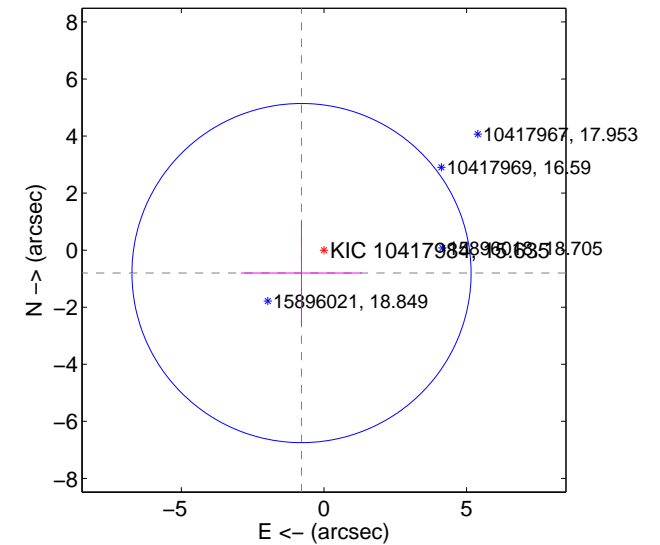
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

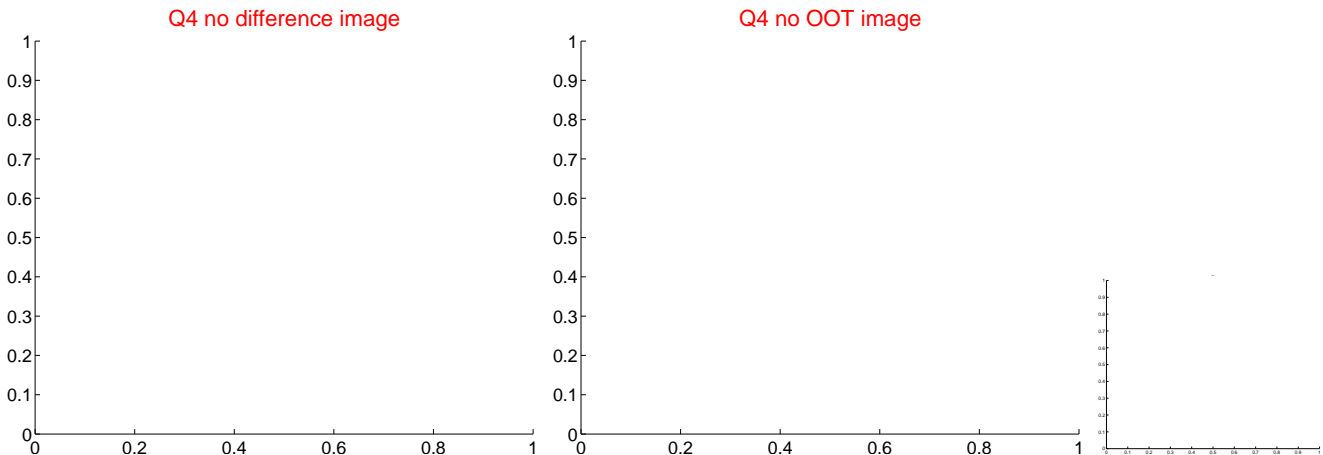
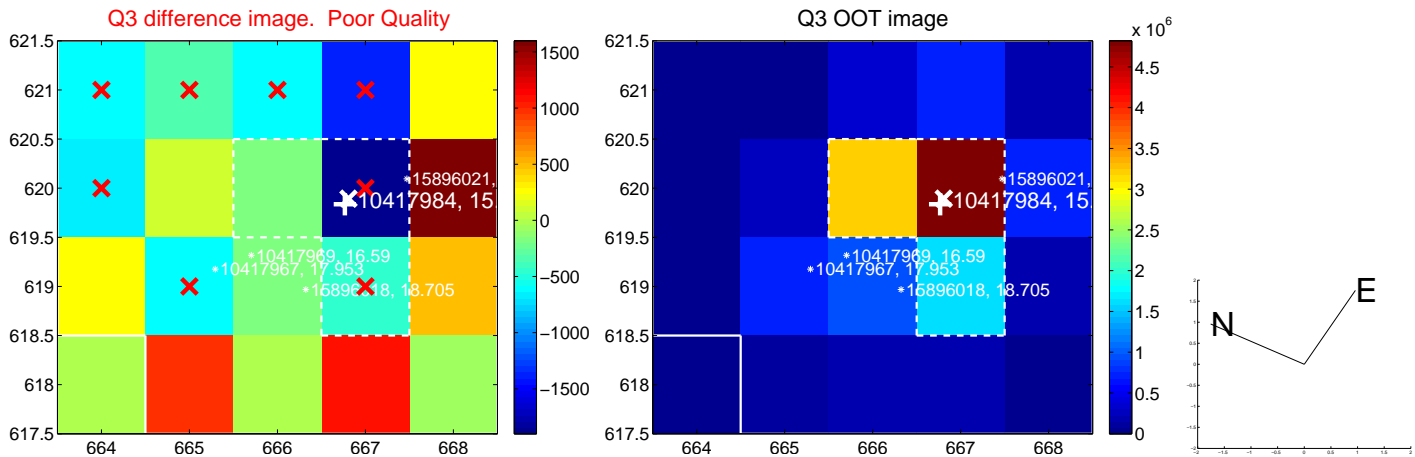


offset from photometric centroids

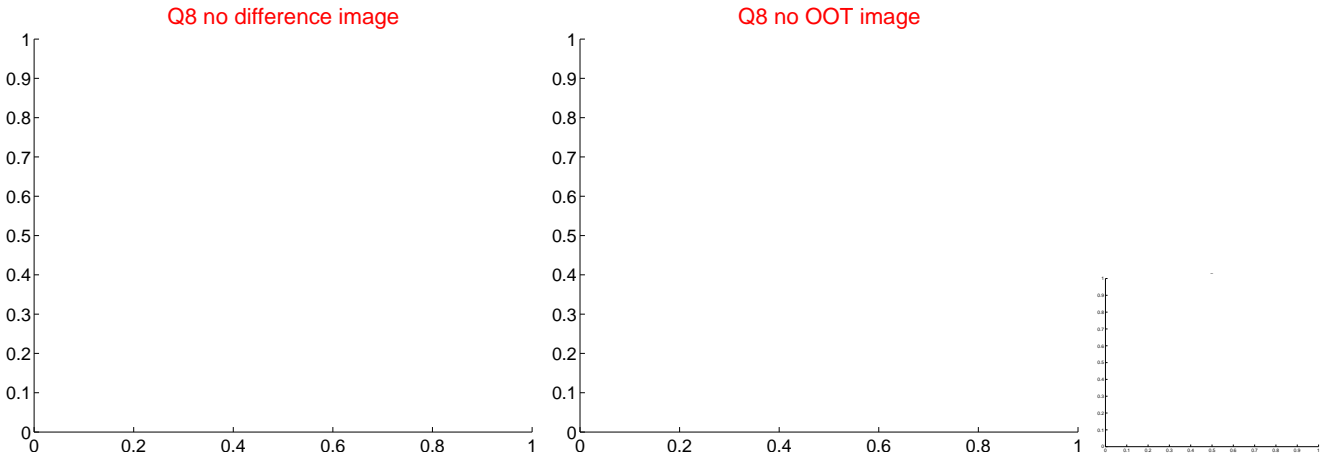
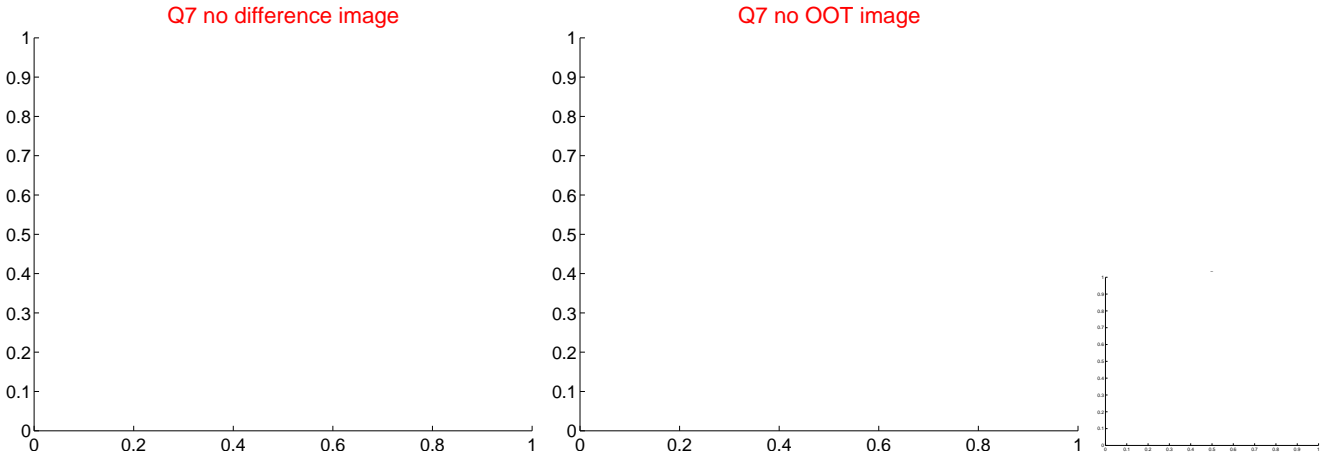
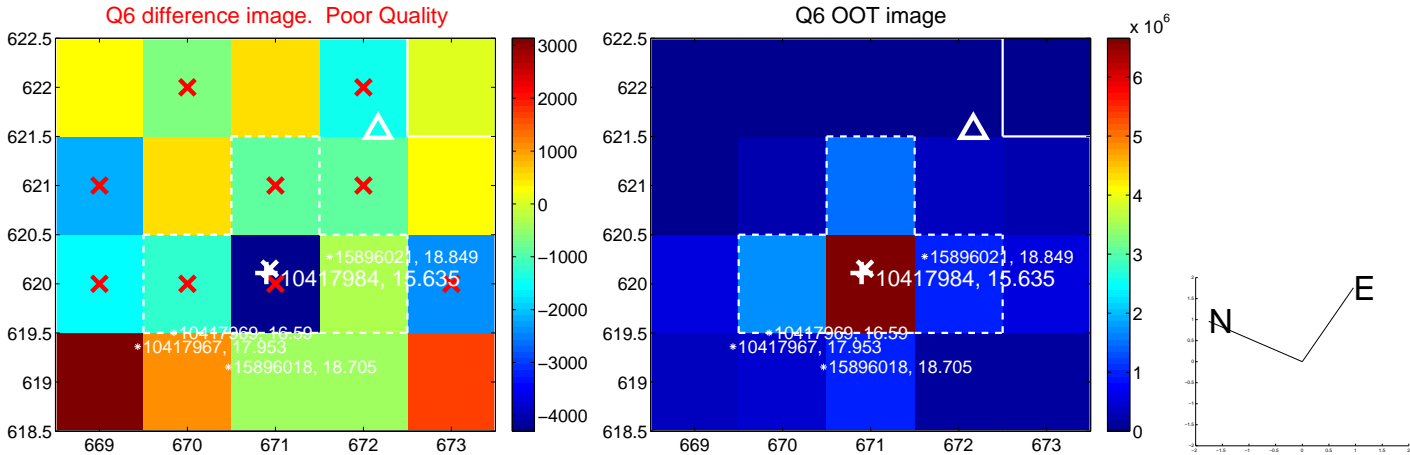
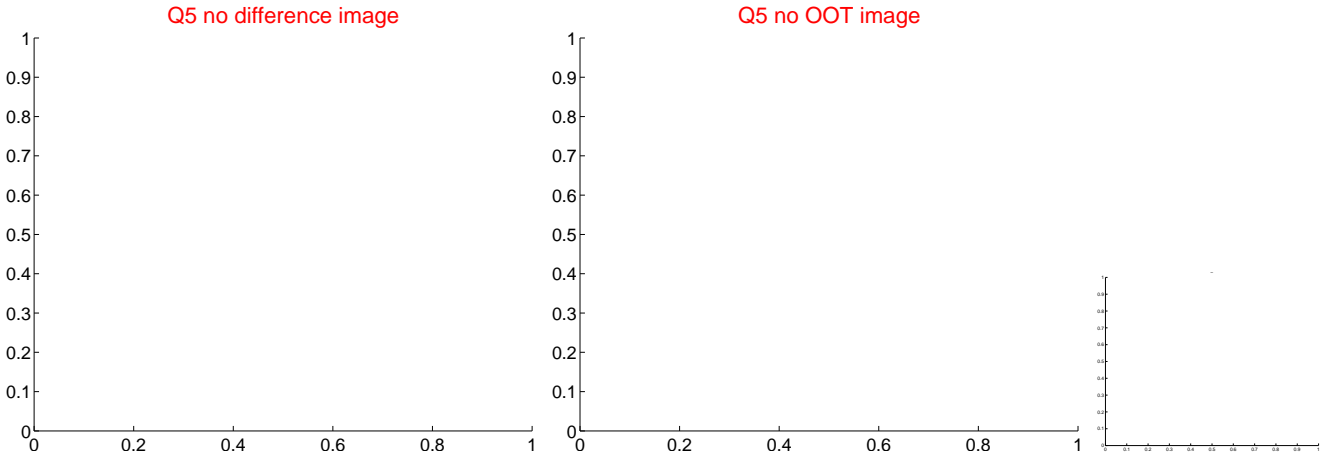


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

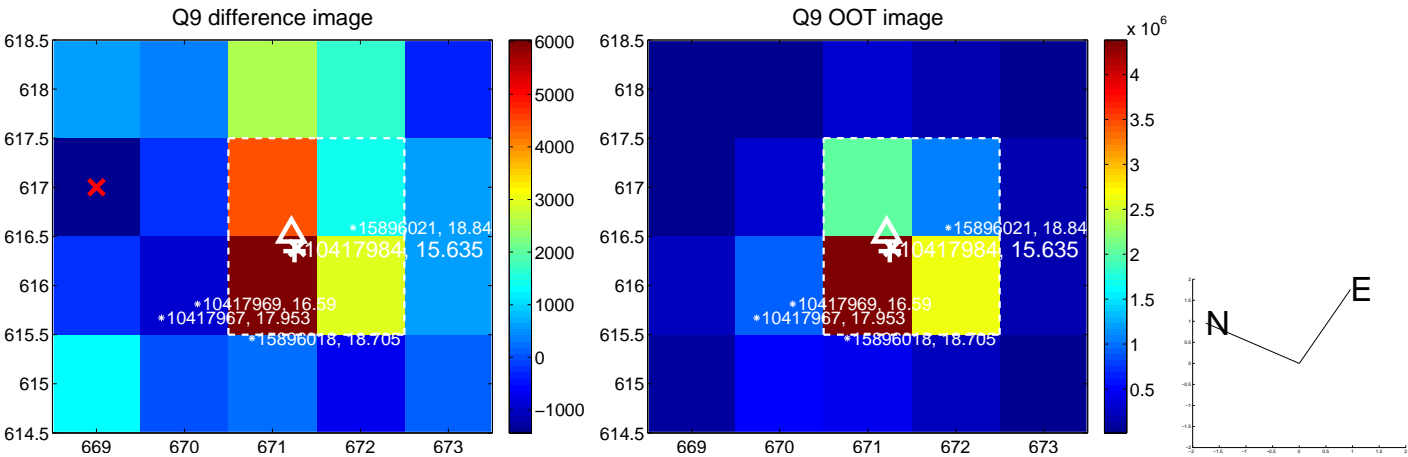
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



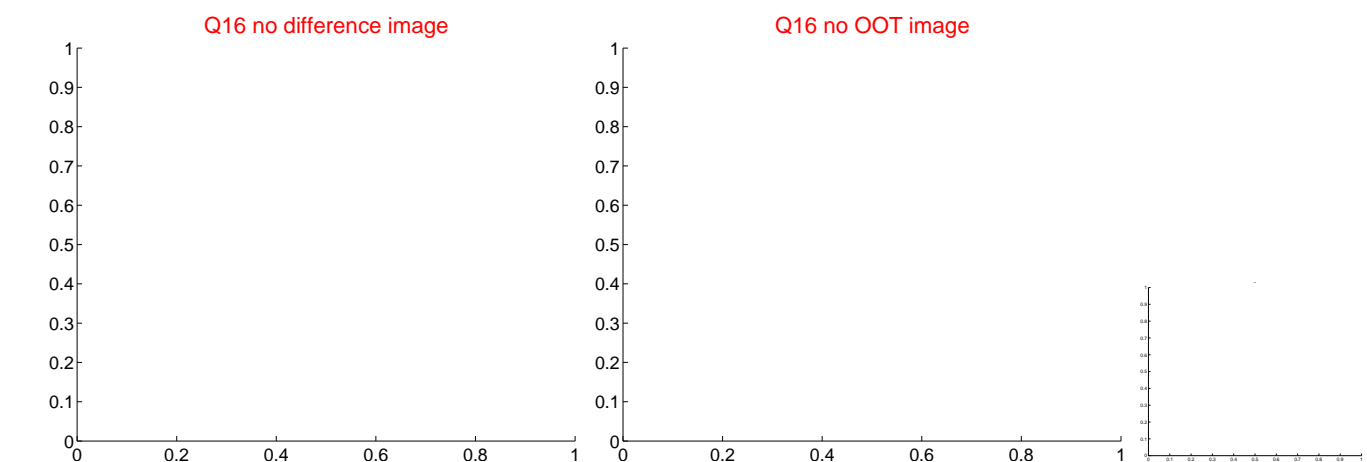
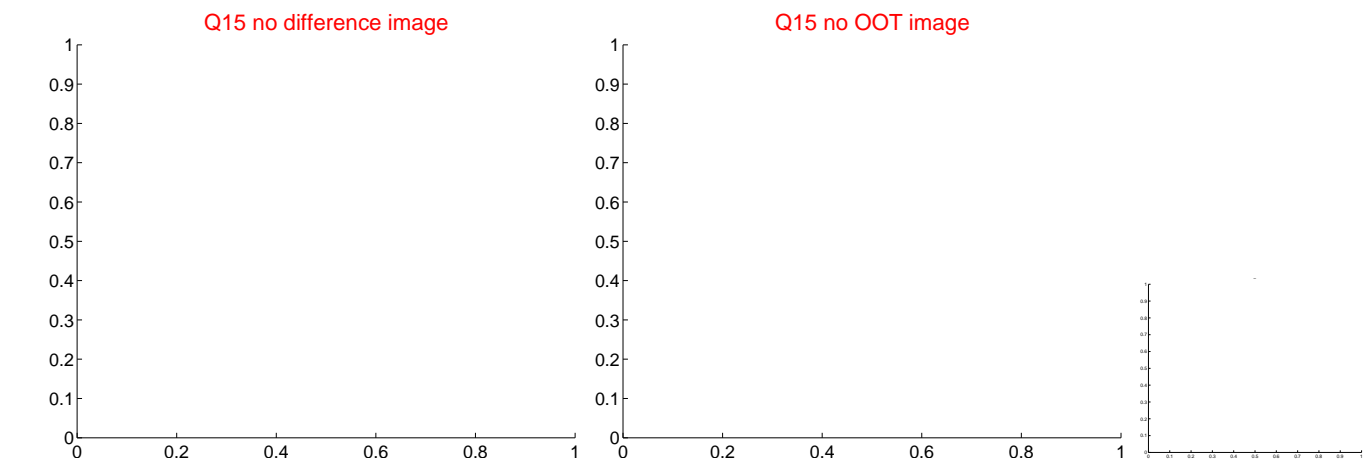
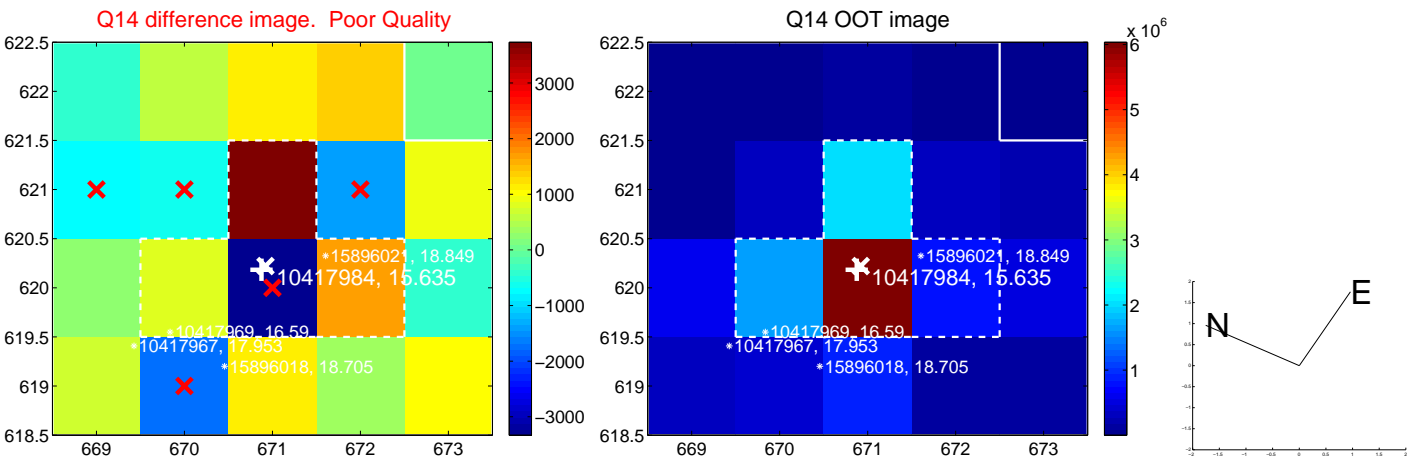
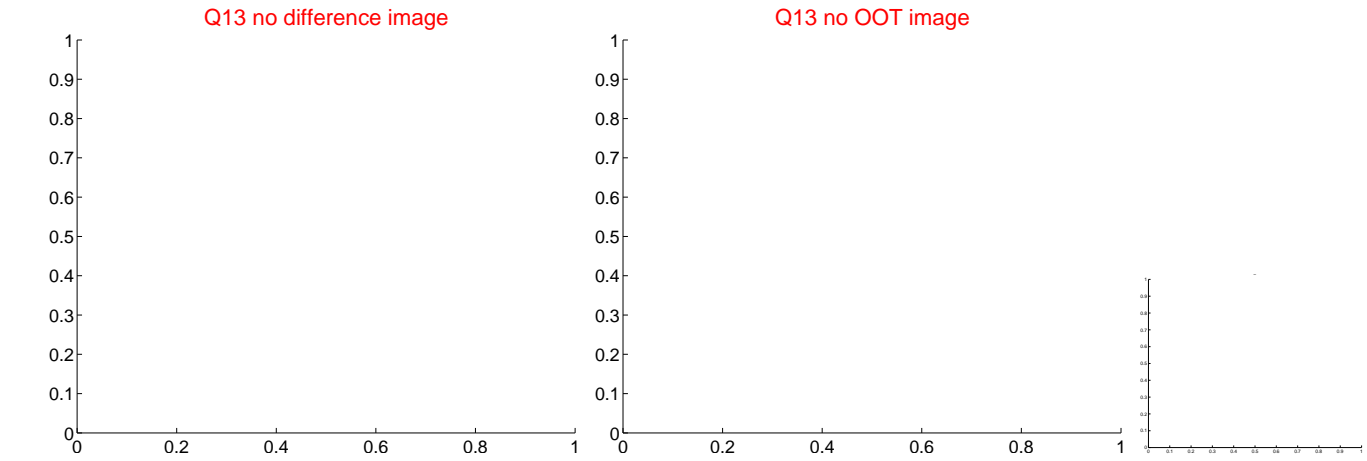
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



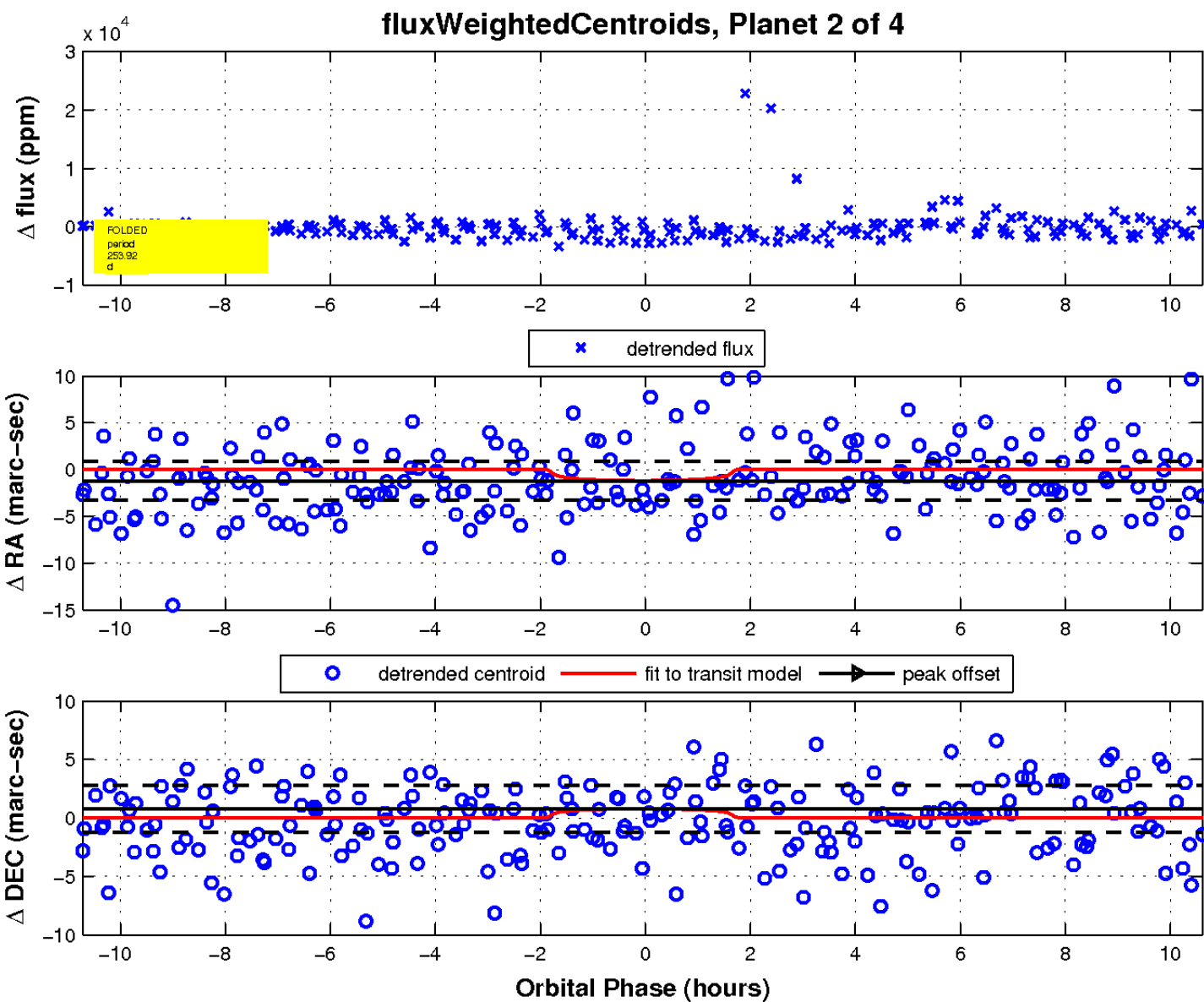
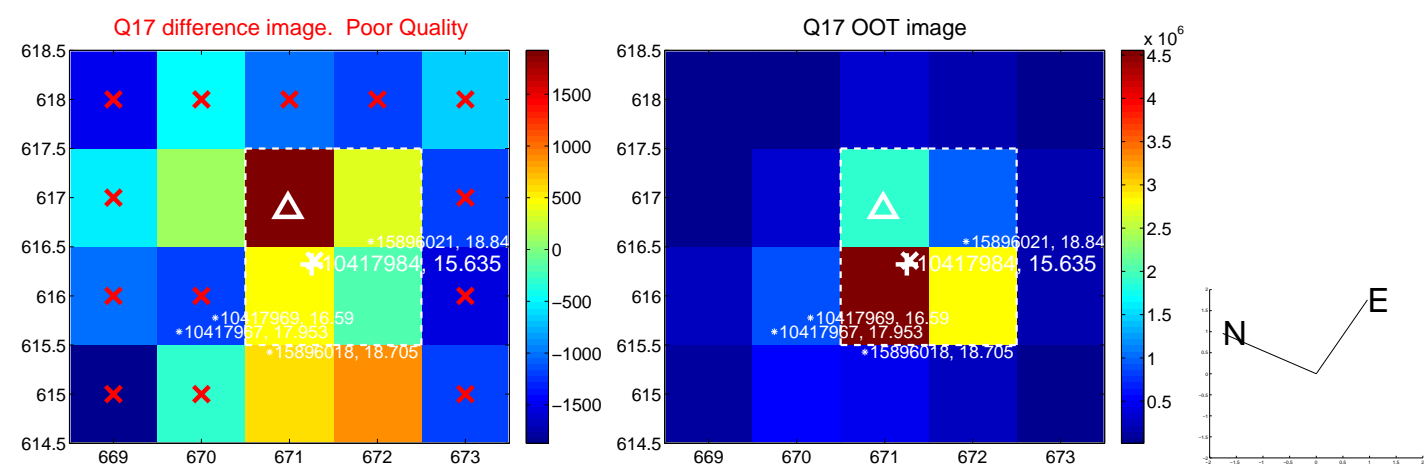
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

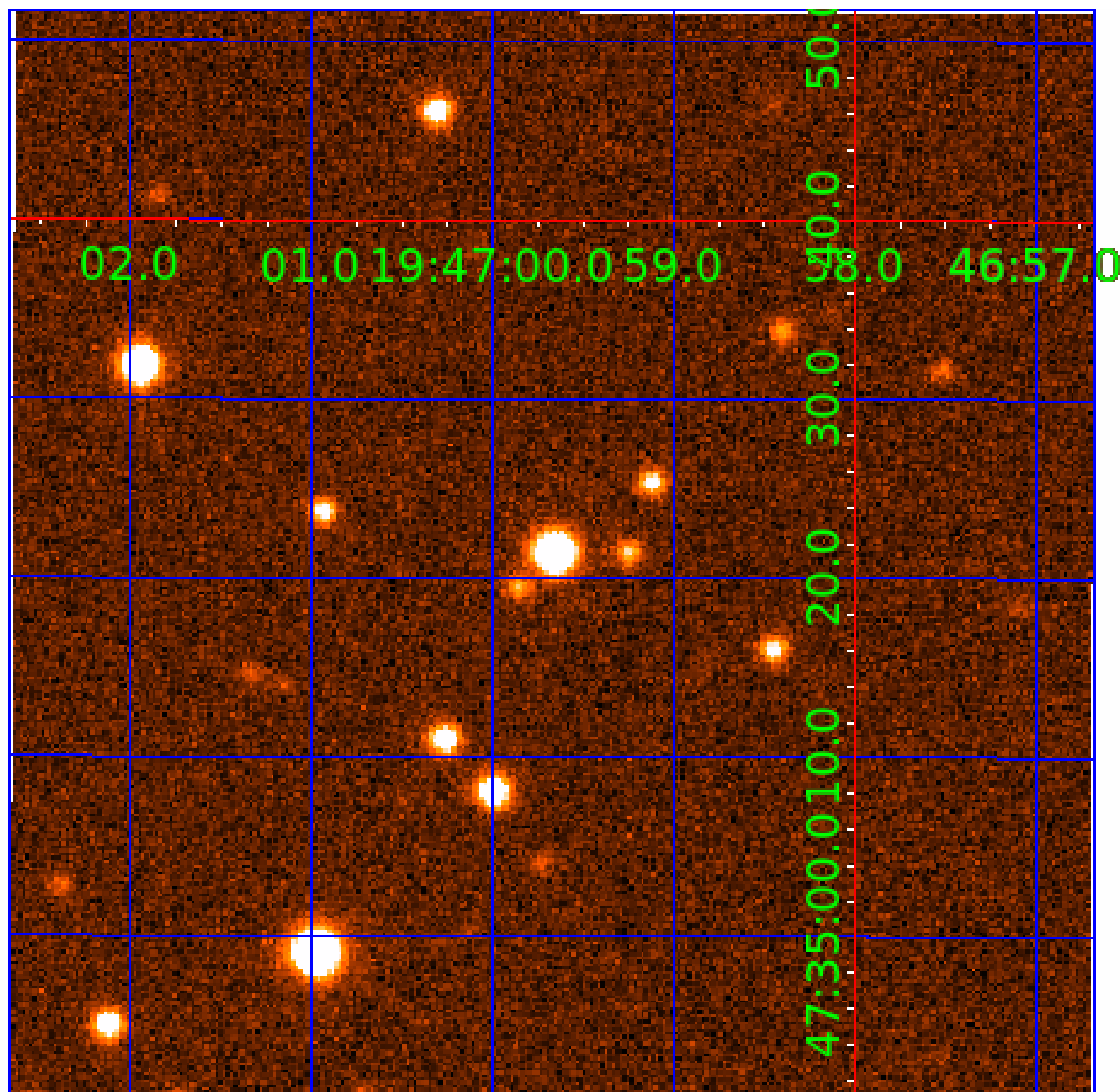


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 010417984

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010417984-01	OBS	No	254.767379	132.346802	1686.1	3.590	10.0	5.9	0.55	4673	2.19	0.31
010417984-02	OBS	No	253.919473	304.170668	917.6	3.575	10.1	4.3	0.55	4673	1.65	0.31
010417984-03	OBS	No	315.007731	278.865649	1806.6	4.315	8.8	7.4	0.55	4673	4.59	0.23
010417984-04	OBS	No	248.604735	371.149955	1526.5	4.659	10.1	6.3	0.55	4673	2.14	0.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010417984-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010417984-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
010417984-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010417984-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

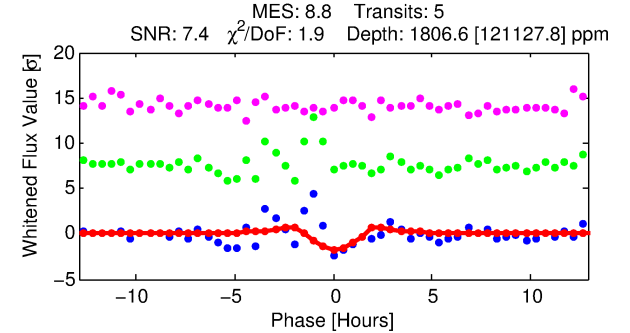
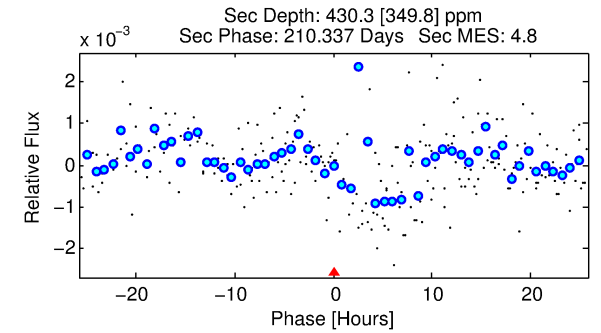
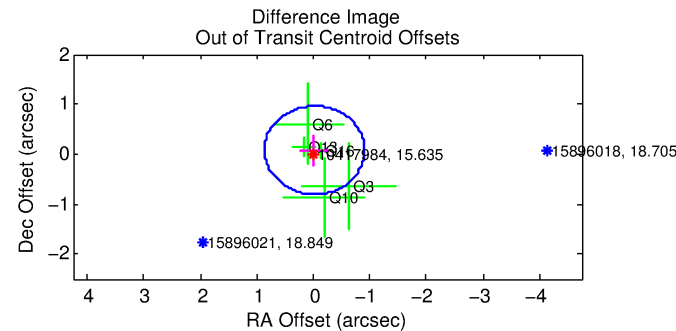
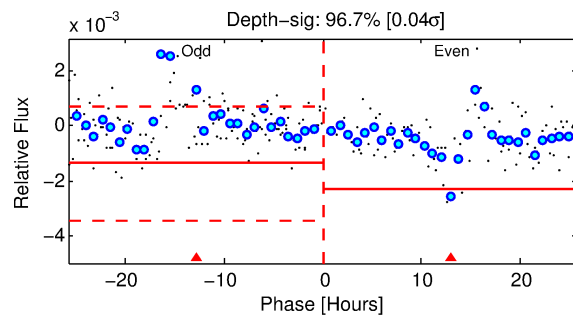
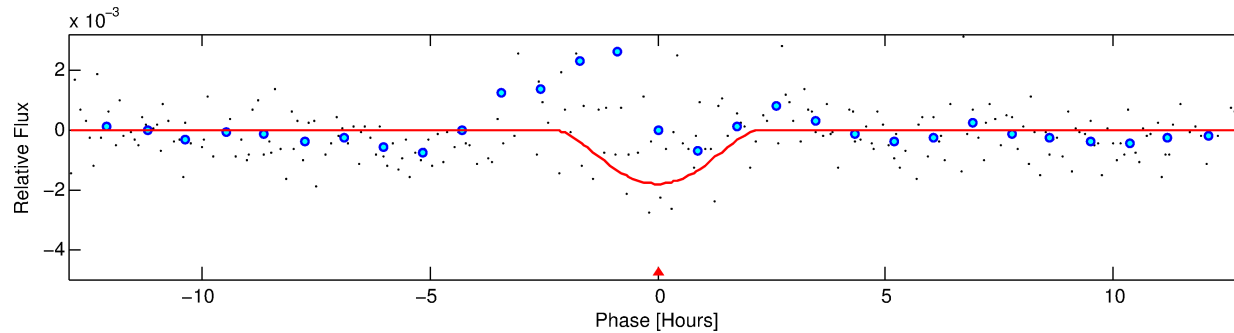
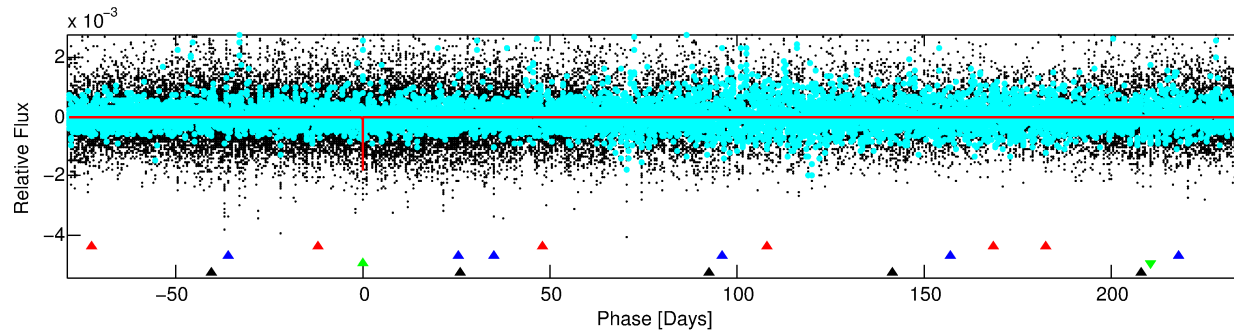
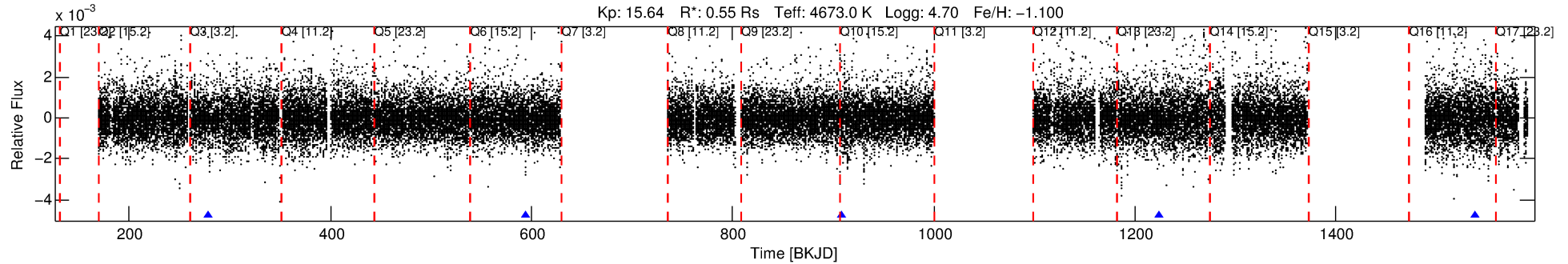
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010417984-03

No Significant Match Found

# DV One-Page Summary

KIC: 10417984 Candidate: 3 of 4 Period: 315.008 d



## DV Fit Results:

Period = 315.00773 [0.00673] d  
Epoch = 278.8656 [0.0150] BKJD  
Rp/R\* = 0.0771 [0.5384]  
a/R\* = 223.14 [336.07]  
b = 1.00 [2.61]  
Seff = 0.23 [0.03]  
Teq = 177 [7] K  
Rp = 4.59 [32.08] Re  
a = 0.7408 [0.0432] AU  
Ag = 6162.68 [86261.03] [0.07 $\sigma$ ]  
Teffp = 2424 [8484] K [0.26 $\sigma$ ]

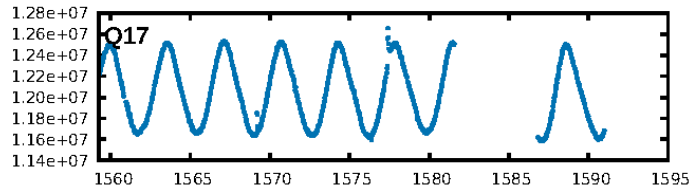
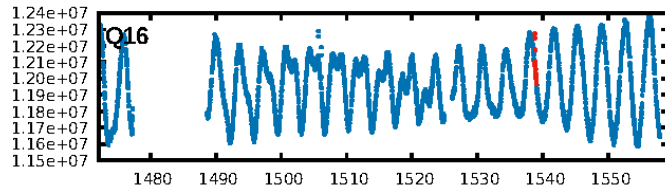
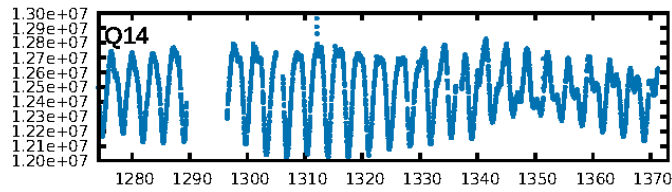
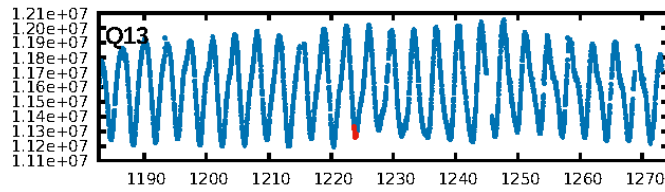
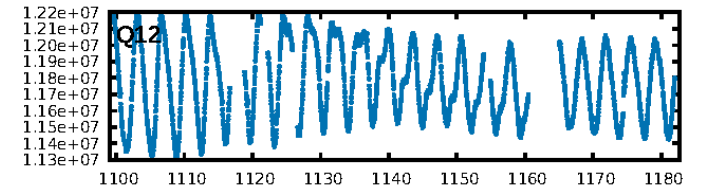
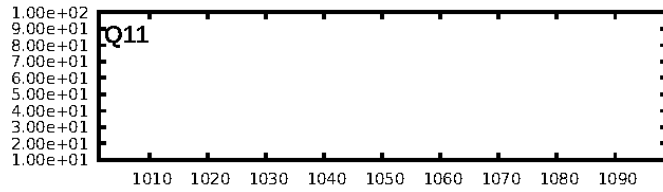
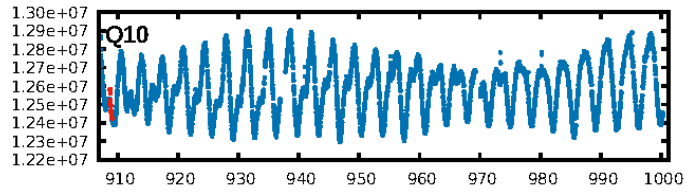
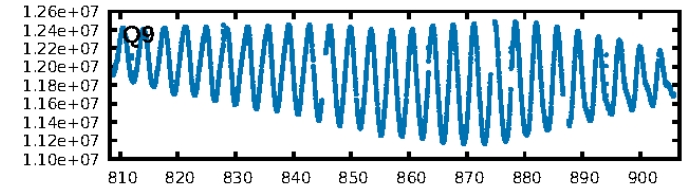
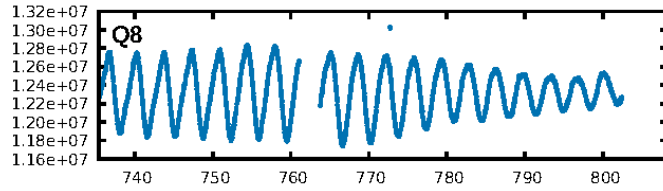
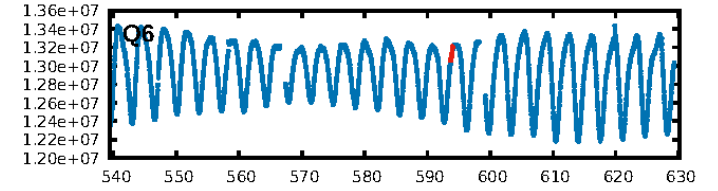
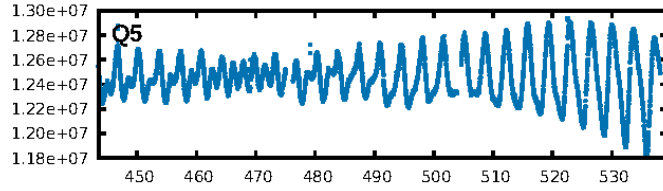
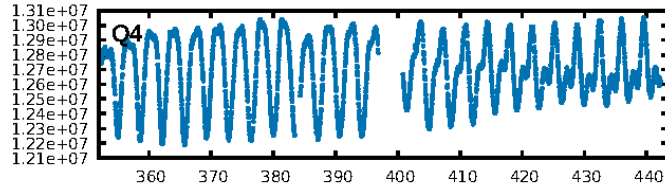
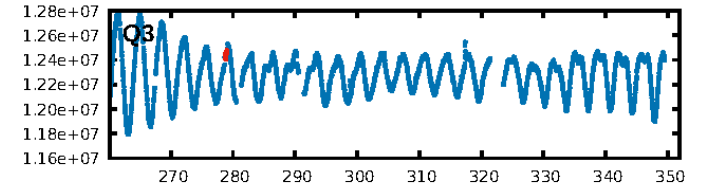
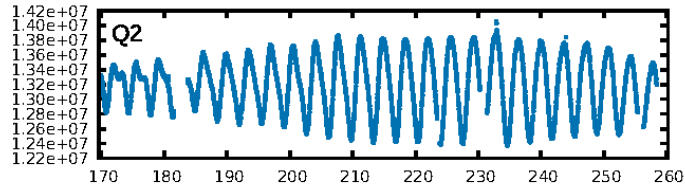
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [257.58 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 27.0%  
ModelChiSquareGof-sig: 44.0%  
**Bootstrap-pfa: 1.09e-09**  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: -0.9807  
Centroid-sig: 40.2%  
Centroid-so: 0.864 arcsec [0.79 $\sigma$ ]  
OotOffset-rm: 0.082 arcsec [0.28 $\sigma$ ]  
KicOffset-rm: 0.292 arcsec [1.05 $\sigma$ ]  
OotOffset-st: 2/1/1/1 [5]  
KicOffset-st: 2/1/1/1 [5]  
DiffImageQuality-fgm: 0.40 [2/5]  
DiffImageOverlap-fno: 1.00 [5/5]

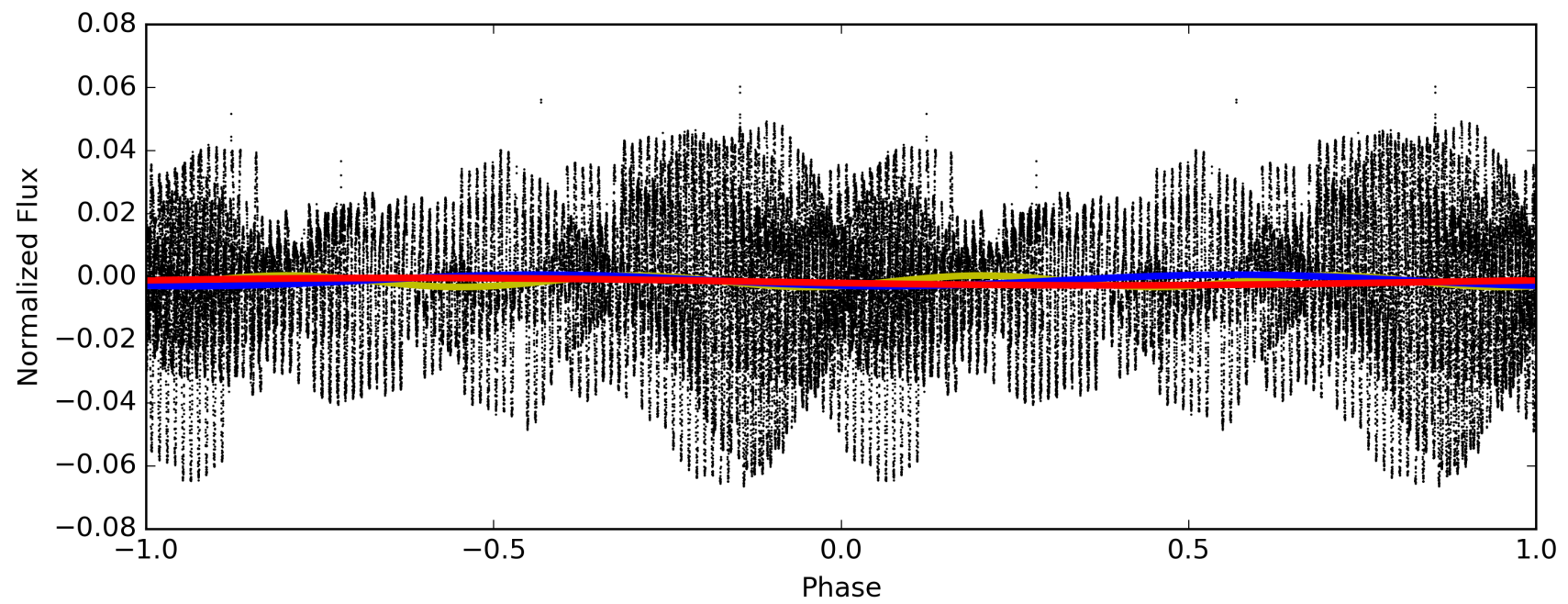
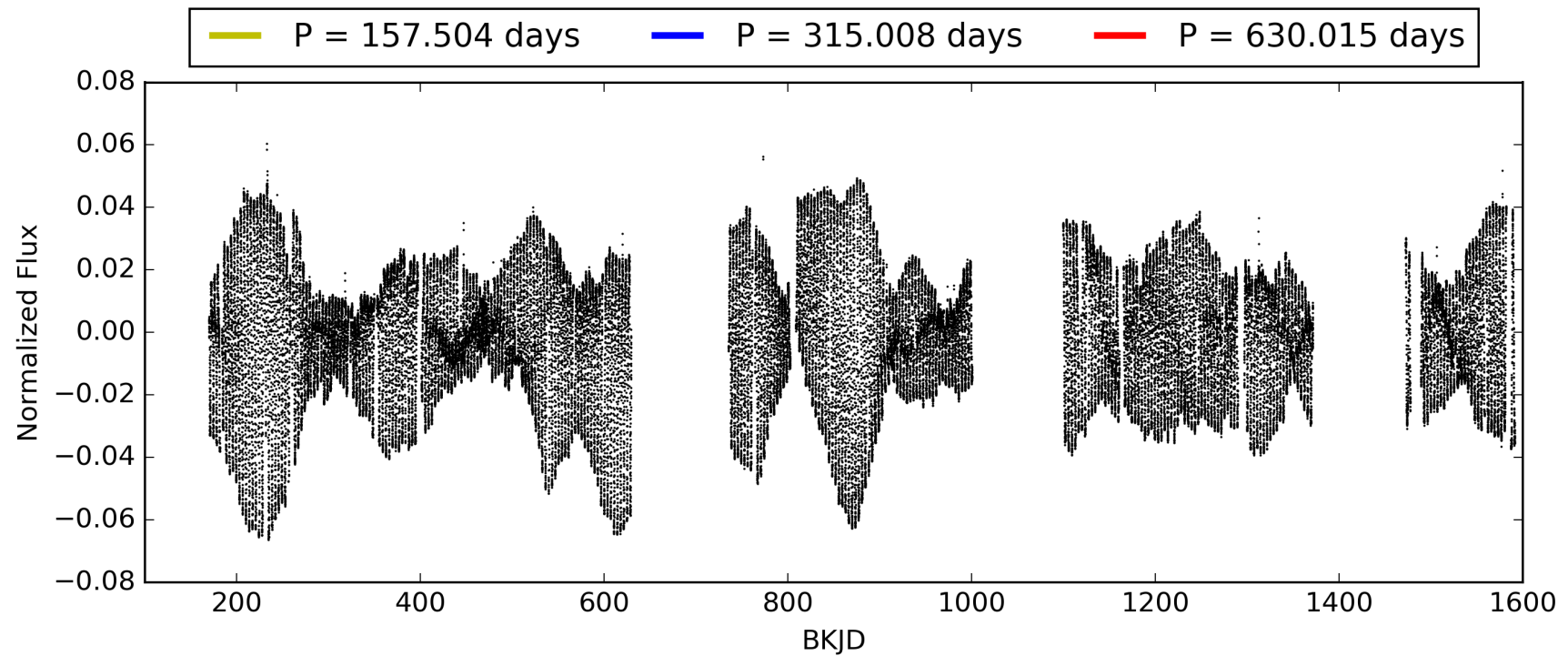
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 17:17:22 Z

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

# TCE 010417984-03, PDC Light Curves

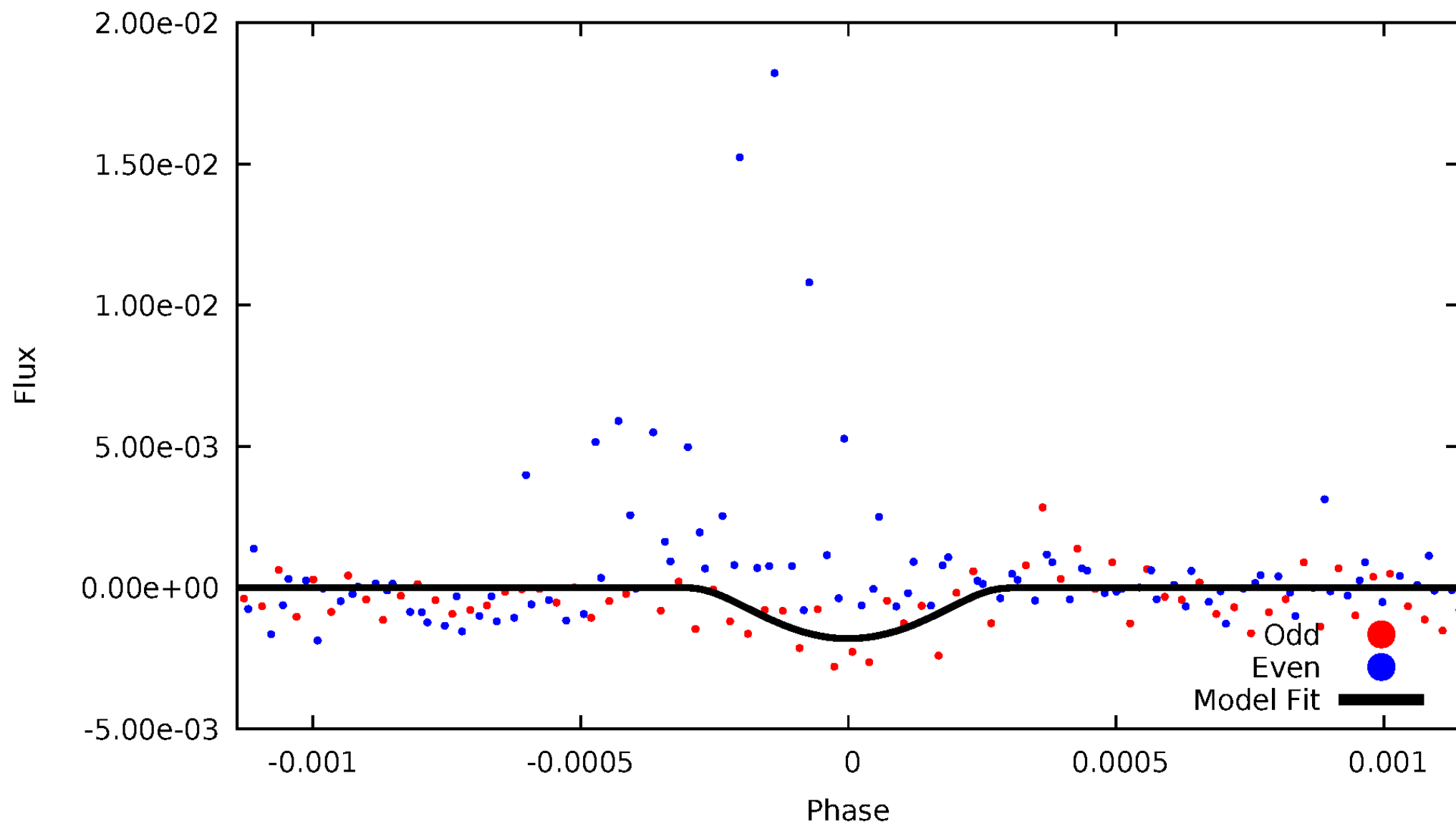


TCE 010417984-03



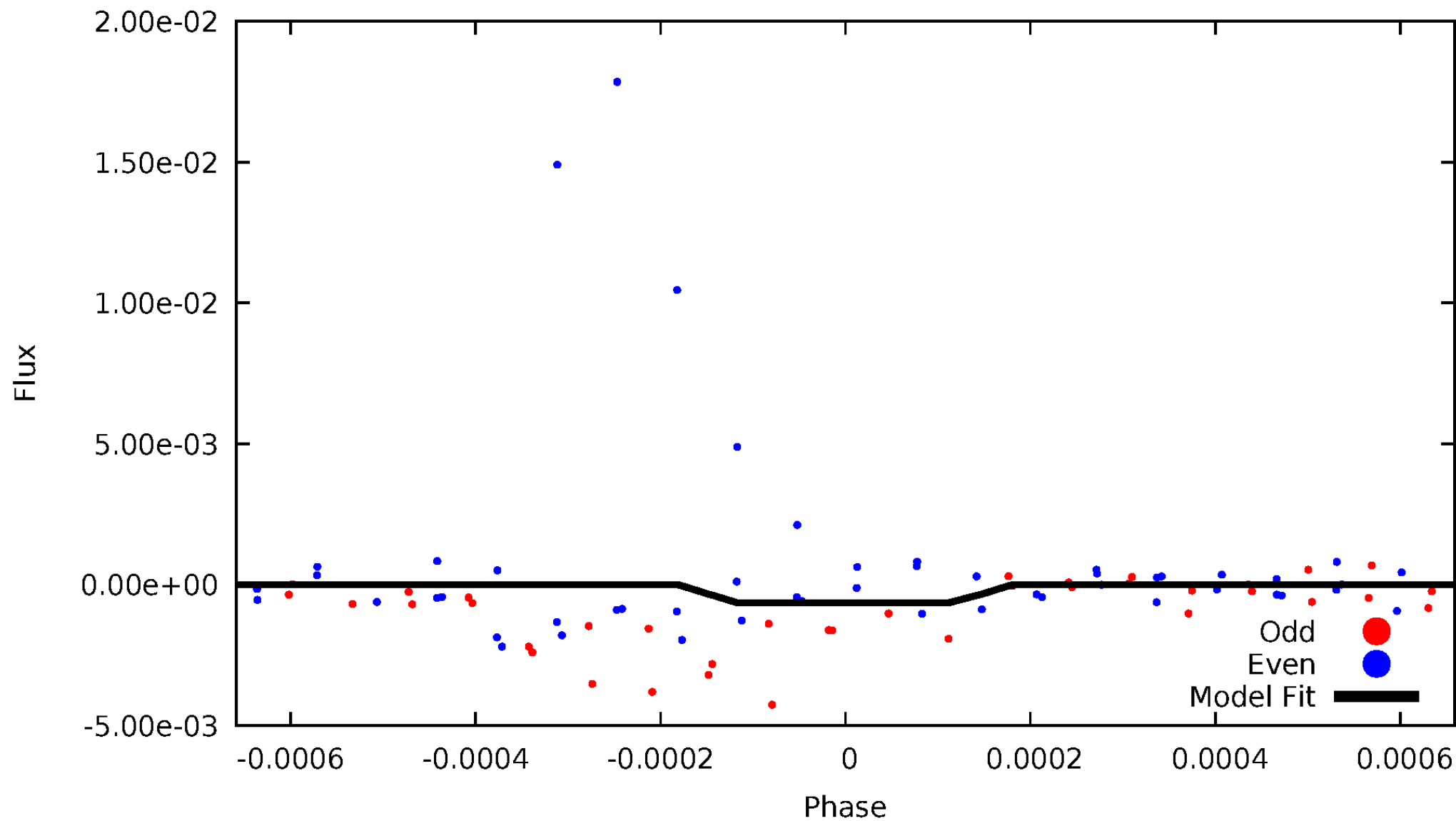
# DV Odd/Even

TCE 010417984-03



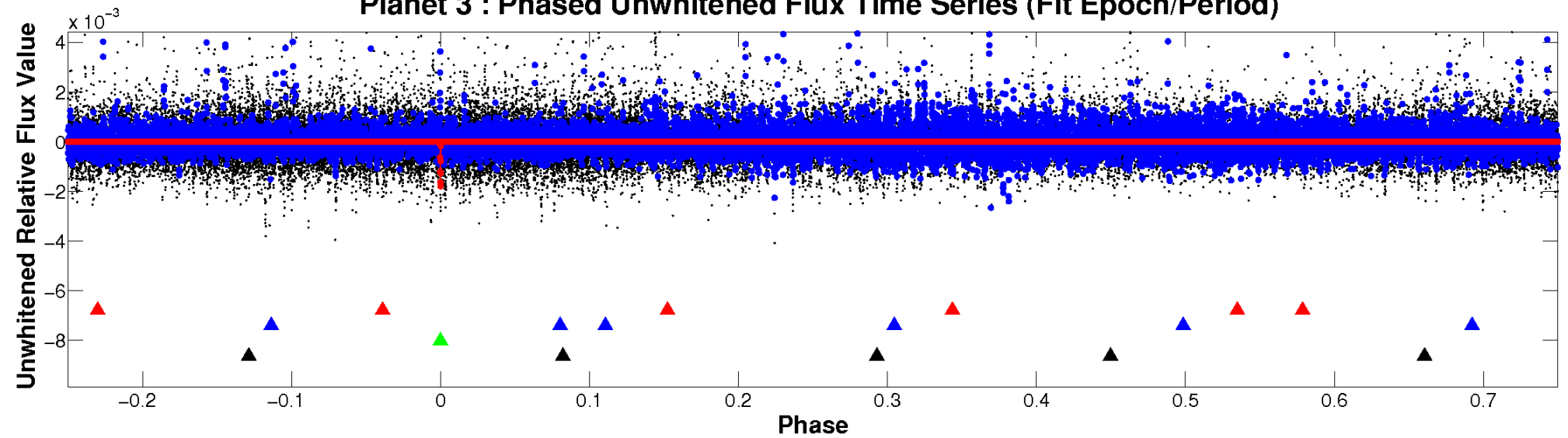
# ALT Odd/Even

TCE 010417984-03

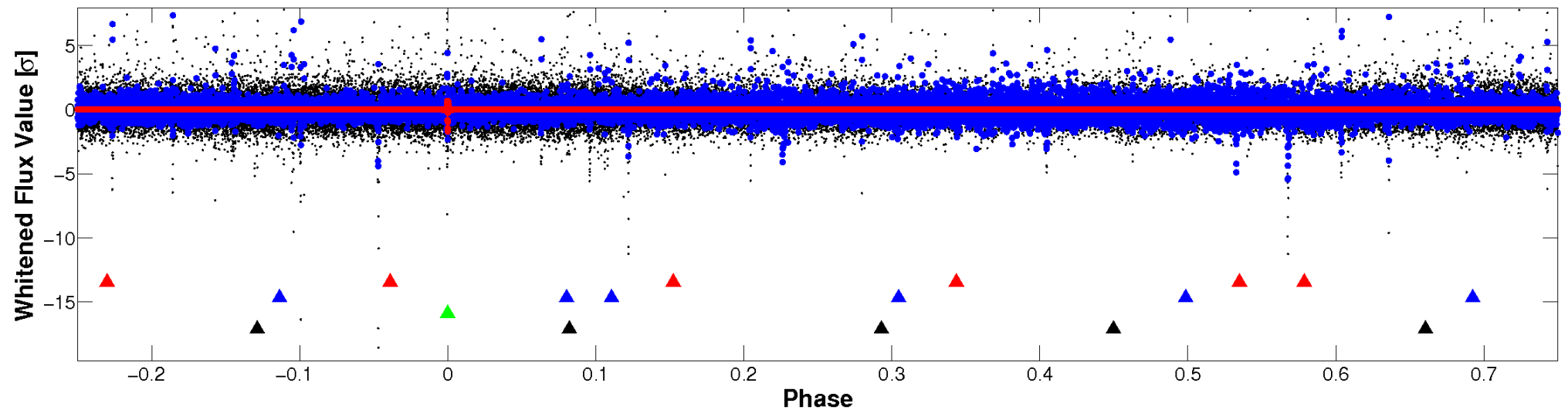


# Non-Whitened Vs. Whitened Light Curve

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

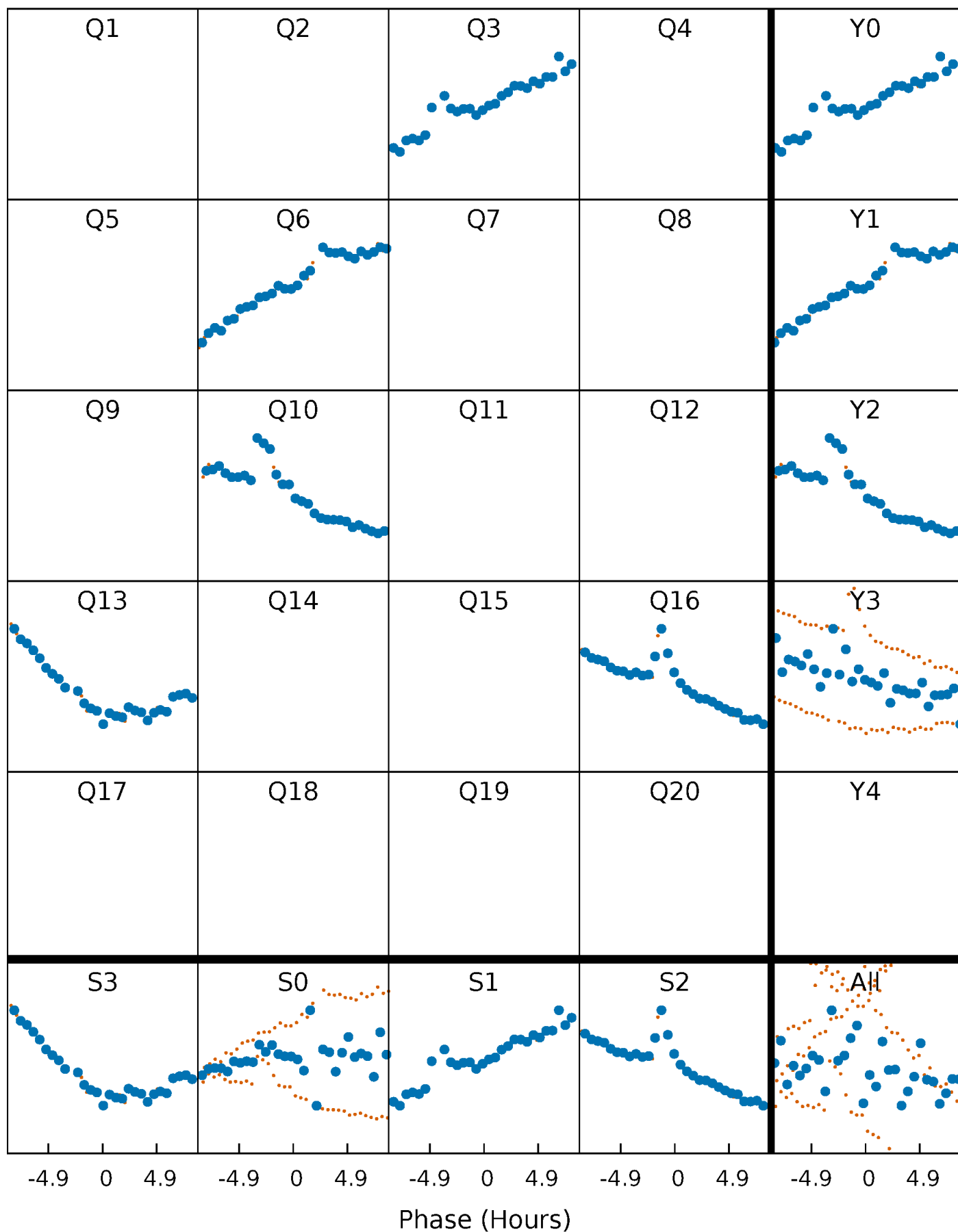


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

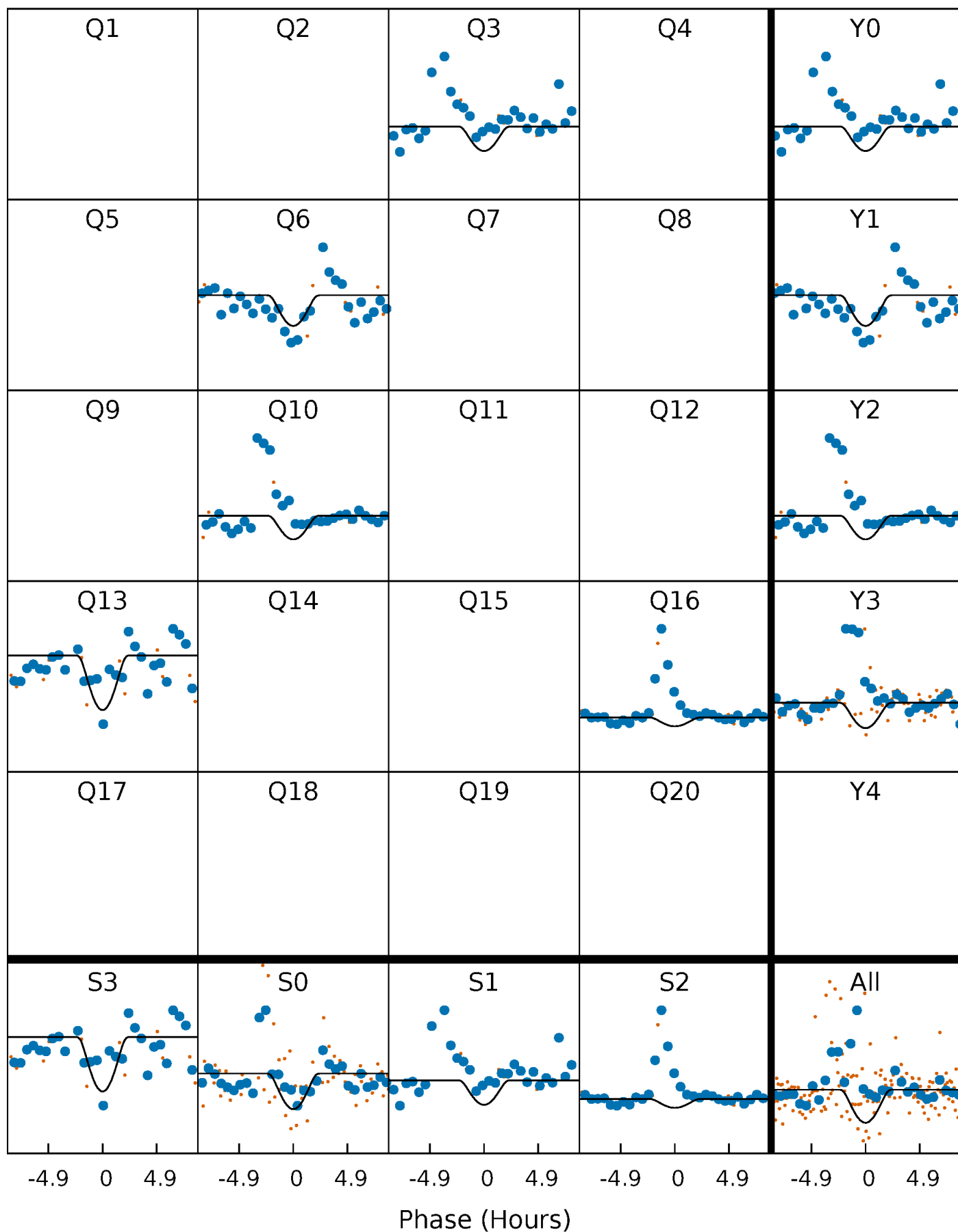
TCE 010417984-03 P=315.007731 Days  $T_0=278.865649$  (BKJD)





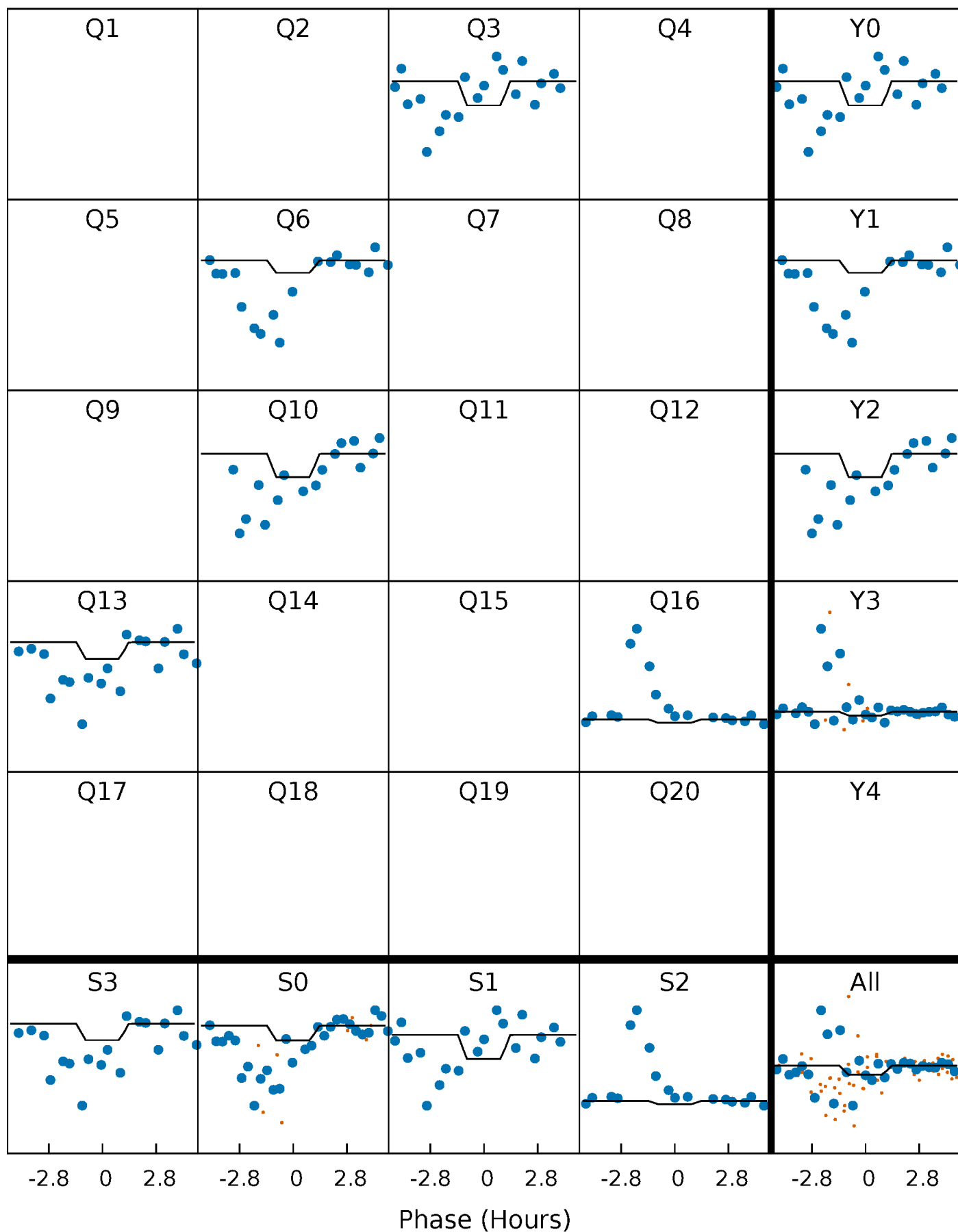
# DV Quarter-Phased Transit Curves

TCE 010417984-03     $P=315.007731$  Days     $T_0=278.865649$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

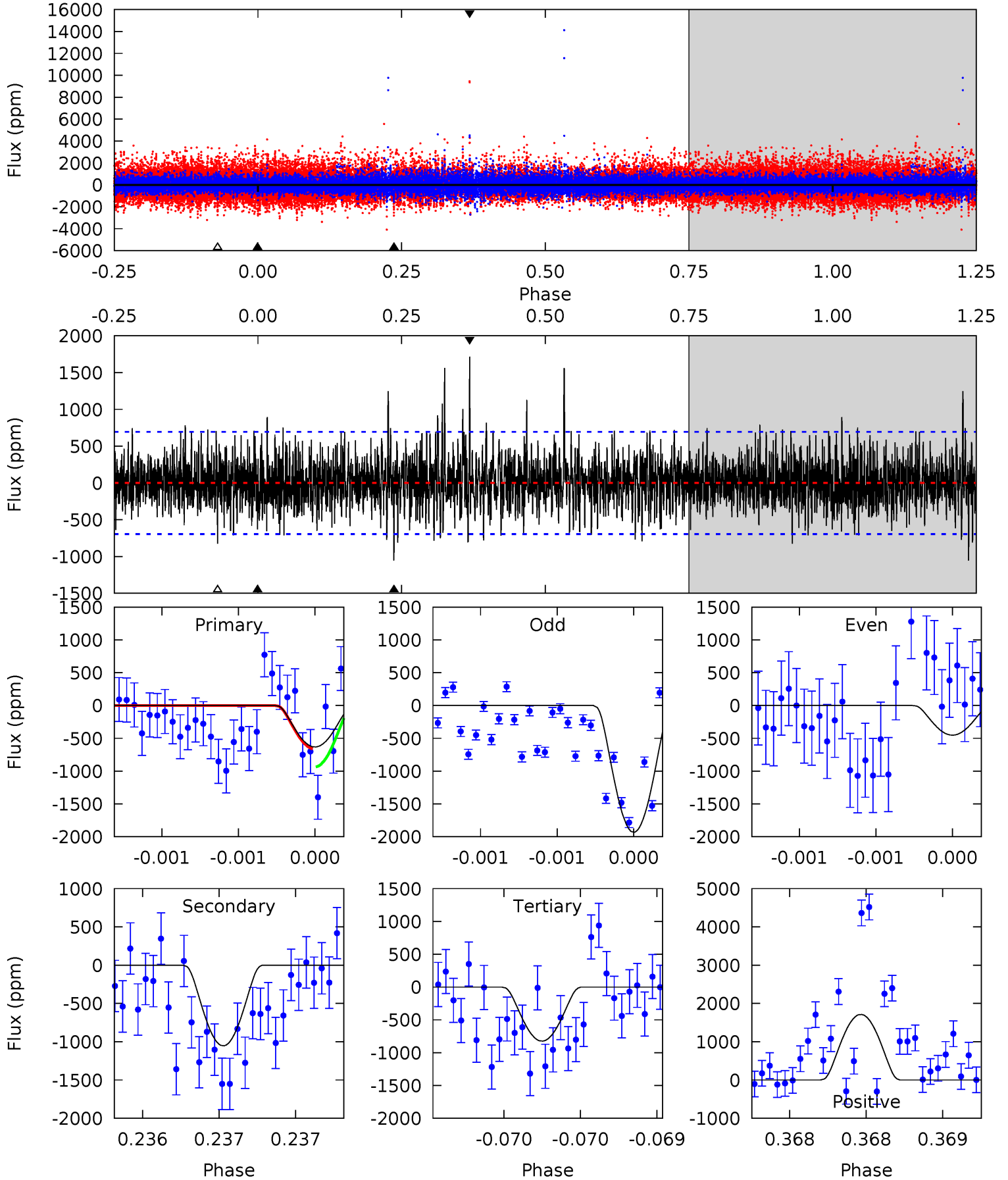
TCE 010417984-03 P=314.993175 Days  $T_0=278.958230$  (BKJD)



# DV Model-Shift Uniqueness Test

010417984-03, P = 315.007731 Days, E = 278.865649 Days

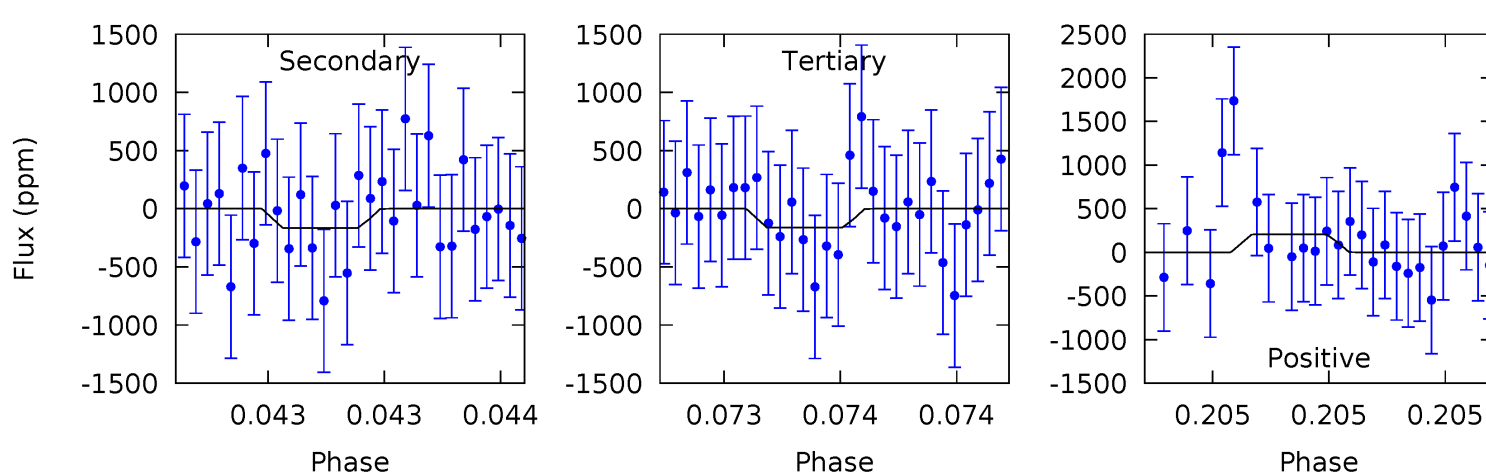
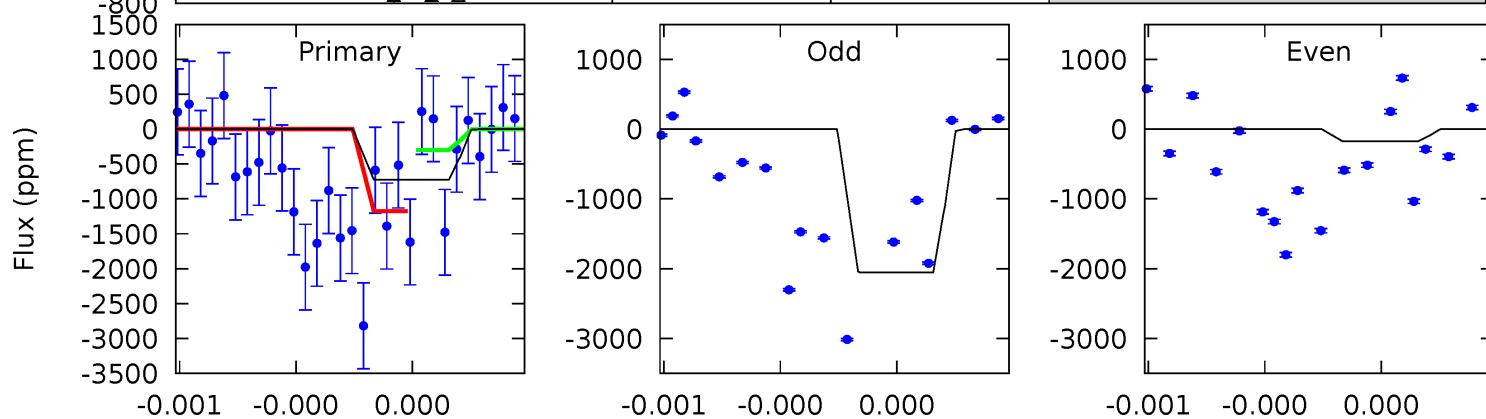
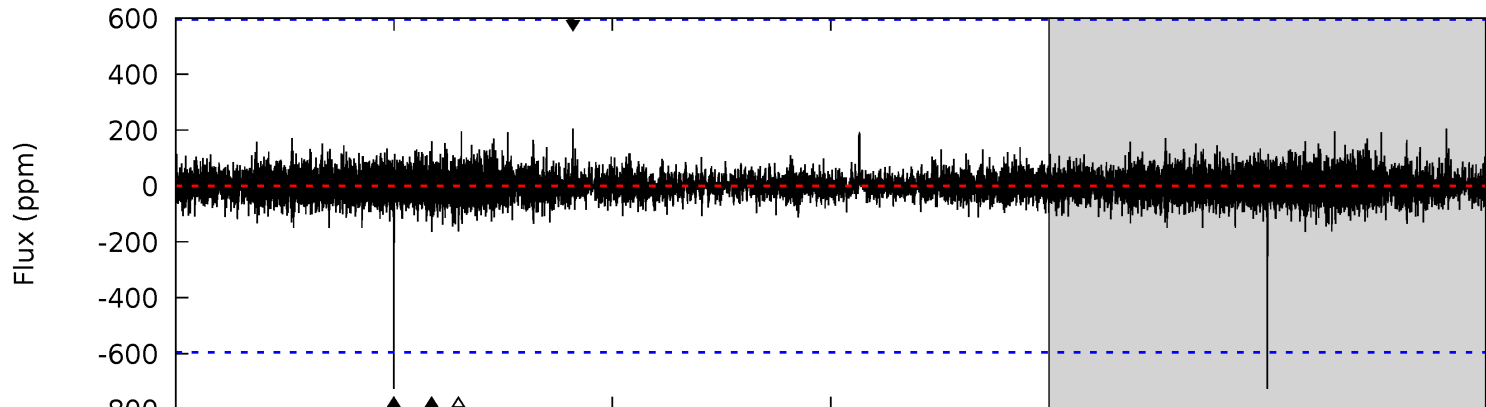
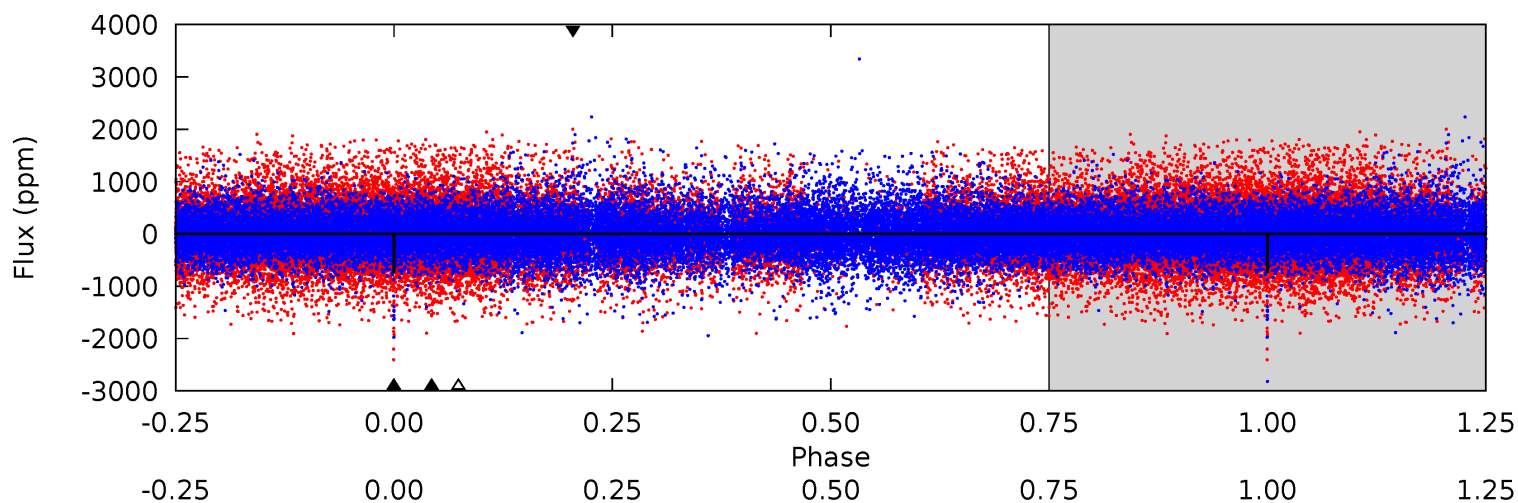
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
5.04	8.40	6.57	13.7	5.54	3.43	2.09	-1.53	-8.62	1.83	-5.26	5.58	-33.0	0.62	0



# Alt Model-Shift Uniqueness Test

010417984-03, P = 314.993175 Days, E = 278.958230 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
6.87	1.56	1.54	1.93	5.63	3.57	0.35	5.33	4.94	0.02	-0.37	8.45	0.73	0.22	4.11



### Stellar Parameters For KIC 010417984

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4673^{+139}_{-139}$	$4.701^{+0.048}_{-0.028}$	$-1.100^{+0.300}_{-0.300}$	$0.546^{+0.037}_{-0.037}$	$0.547^{+0.044}_{-0.024}$	$4.725^{+0.928}_{-0.594}$
	+3%/-3%	+1%/-1%	+27%/-27%	+7%/-7%	+8%/-4%	+20%/-13%
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 010417984-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1053 \pm 125$	$24.02^{+25.04}_{-16.32}$	$246^{+8}_{-8}$	$2225^{+749}_{-309}$	$553^{+4850}_{-422}$
Alt.	$-165 \pm 106$	$20.83^{+23.98}_{-13.69}$	$246^{+9}_{-8}$	$1840^{+519}_{-282}$	$88^{+867}_{-74}$

$T_{\text{max}}$  = 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

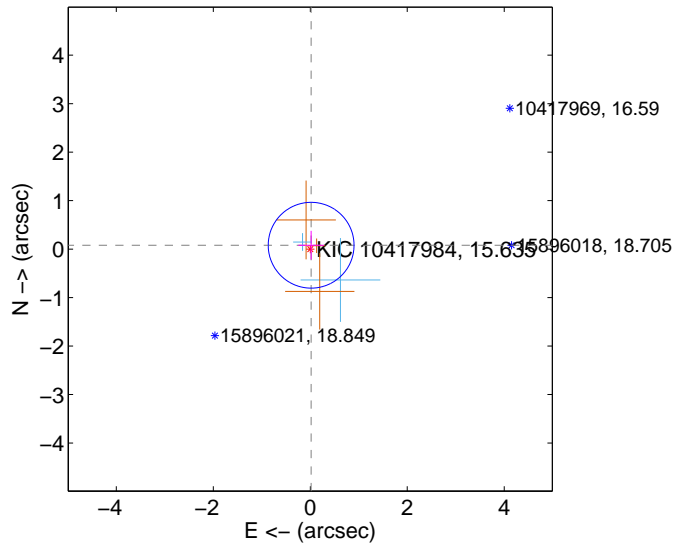
Supplemental centroid analysis for 010417984-03. Kepler magnitude: 15.63. Transit SNR 7.35

There are 2 quarters with good PRF difference image offsets

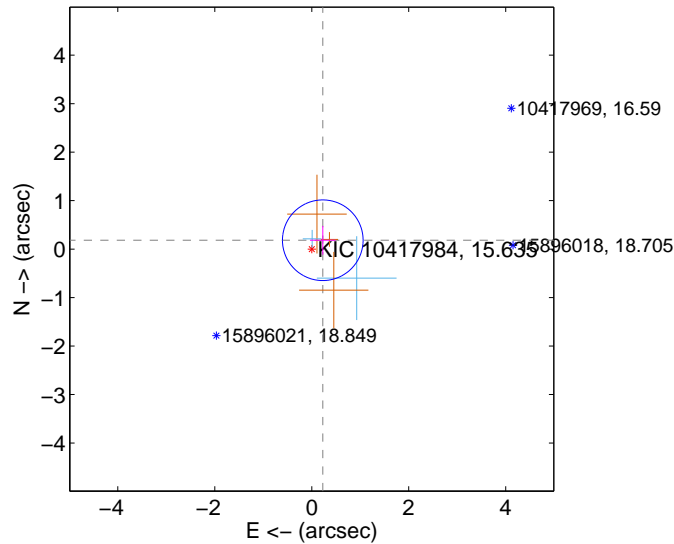
The direct PRF centroid is offset from the target star catalog position by about 0.27 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.082 \pm 0.295$	0.28	$-0.018 \pm 0.264$	$0.080 \pm 0.296$
PRF-fit source offset from KIC position	$0.292 \pm 0.277$	1.05	$-0.227 \pm 0.264$	$0.183 \pm 0.296$
photometric centroid source offset	$0.86 \pm 1.10$	0.79	$-0.49 \pm 1.06$	$-0.71 \pm 1.12$

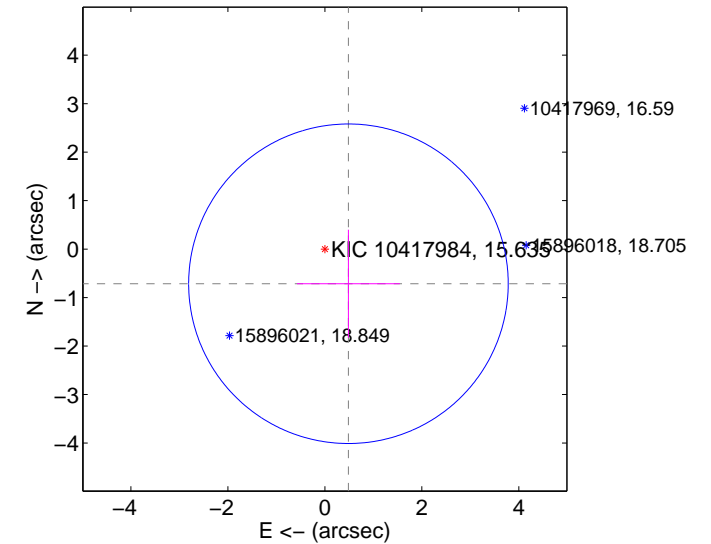
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

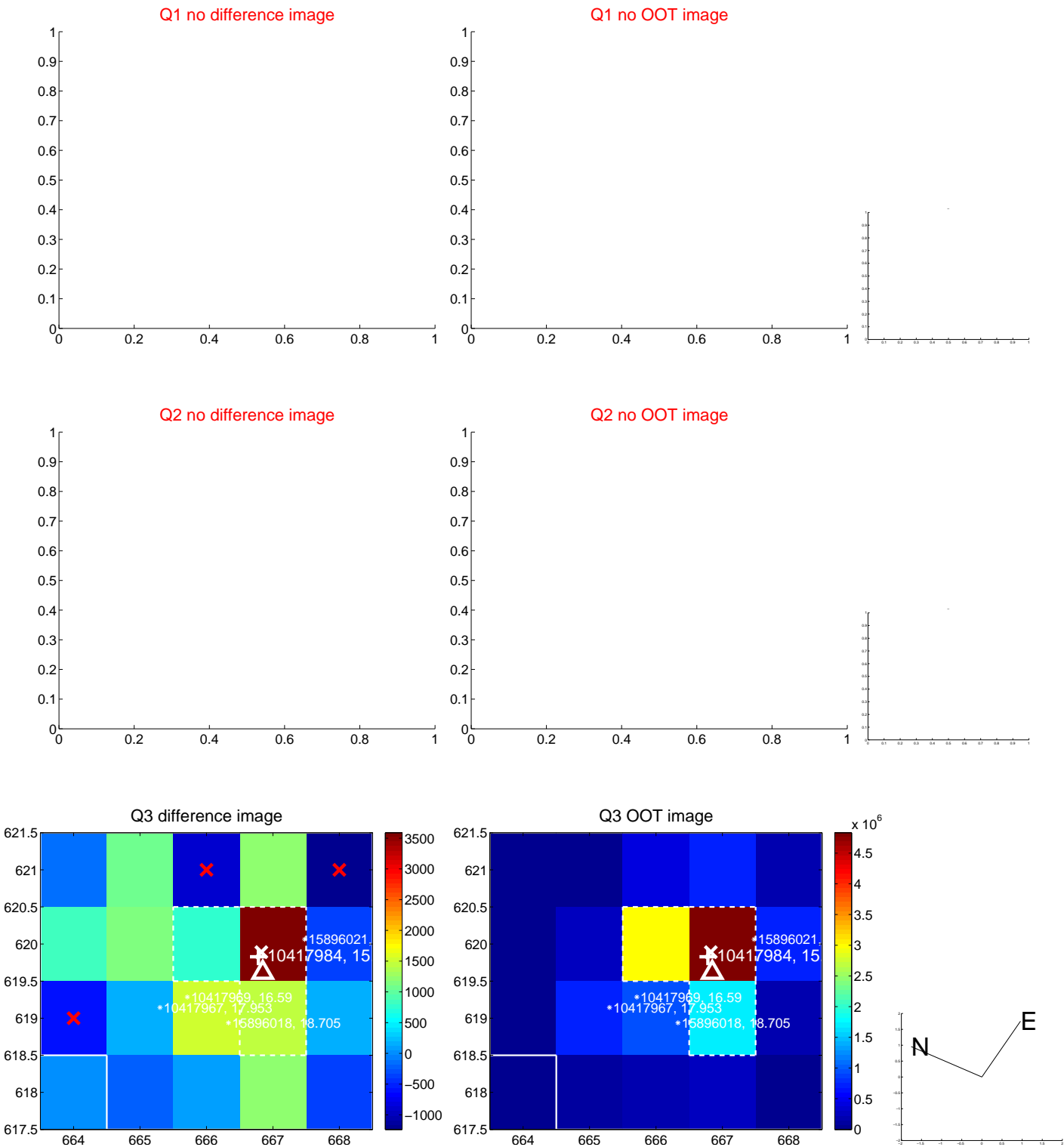


offset from photometric centroids

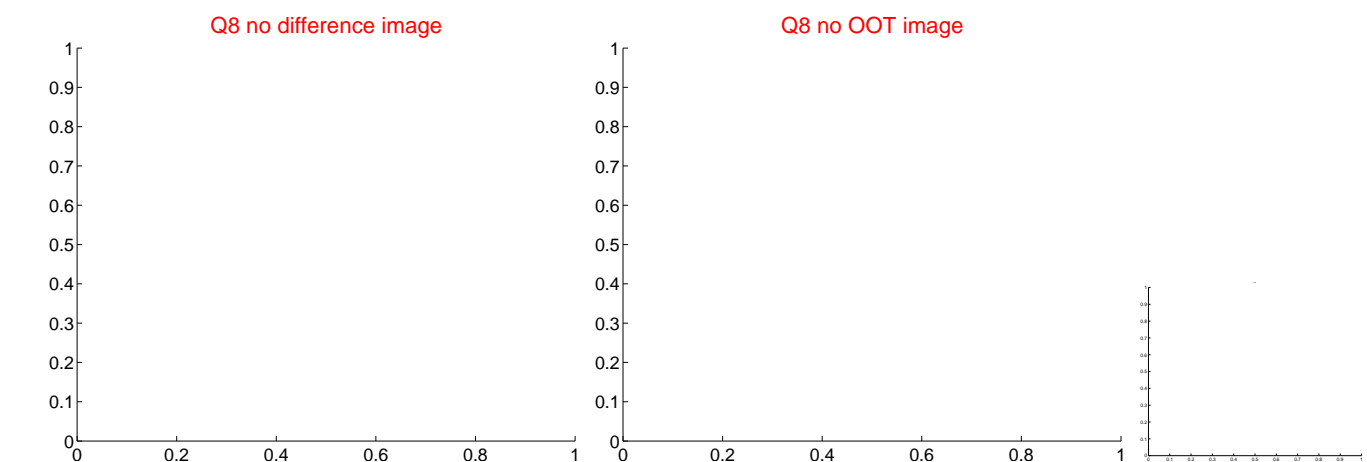
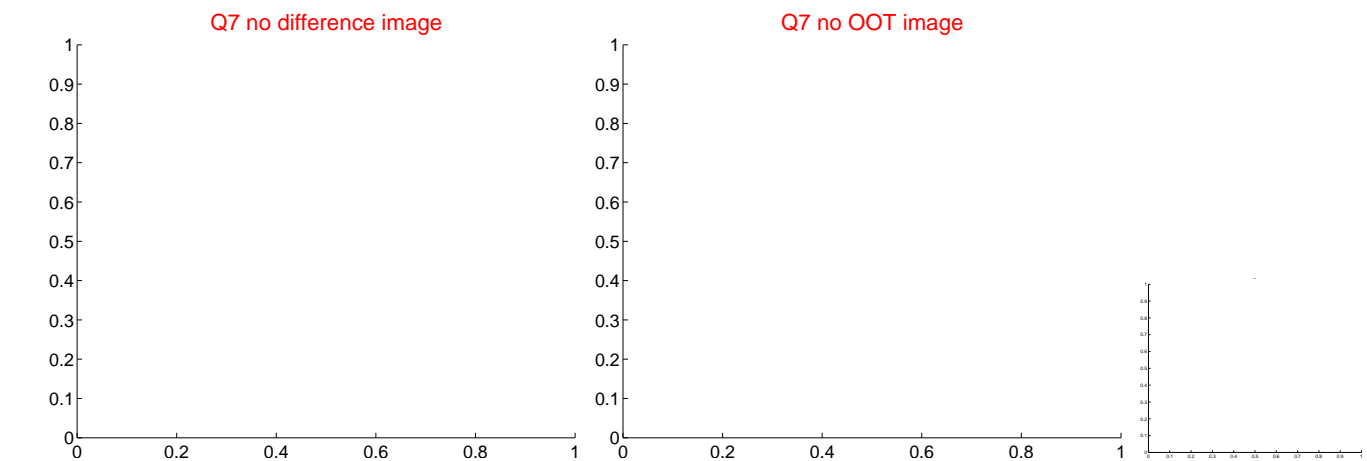
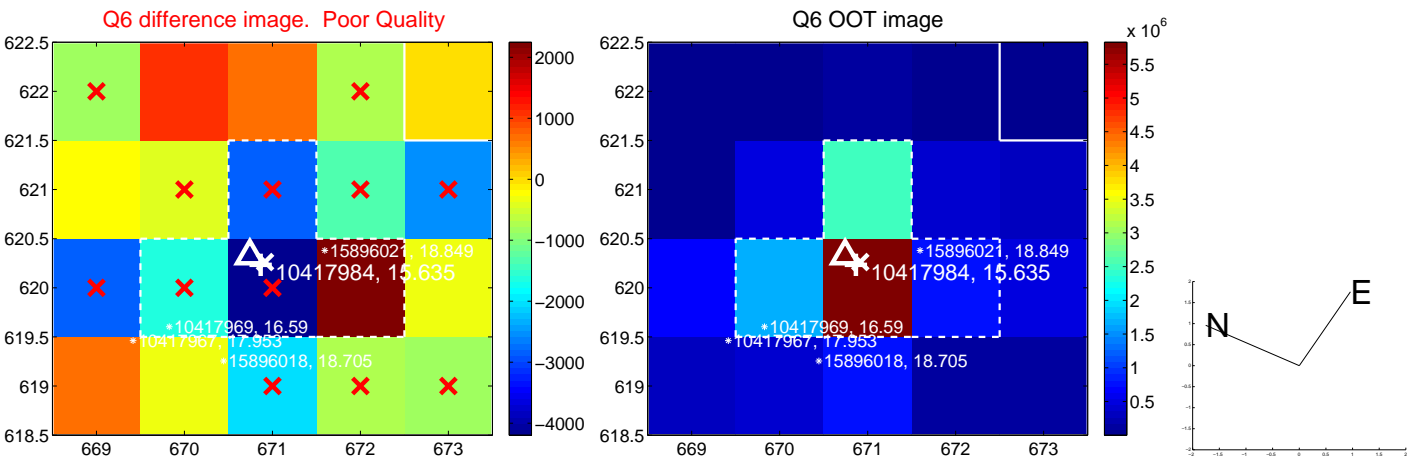
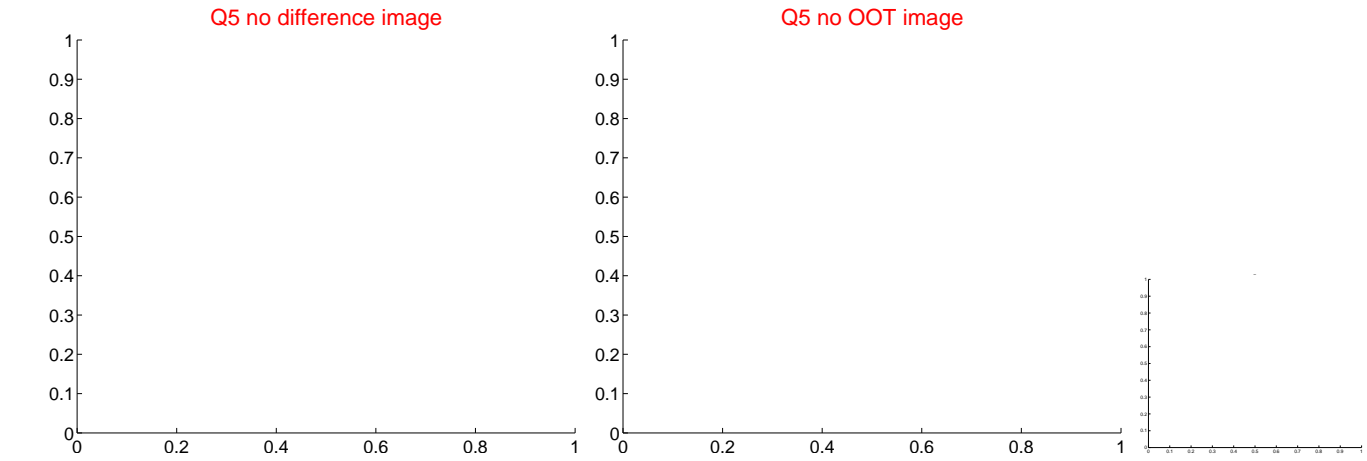


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

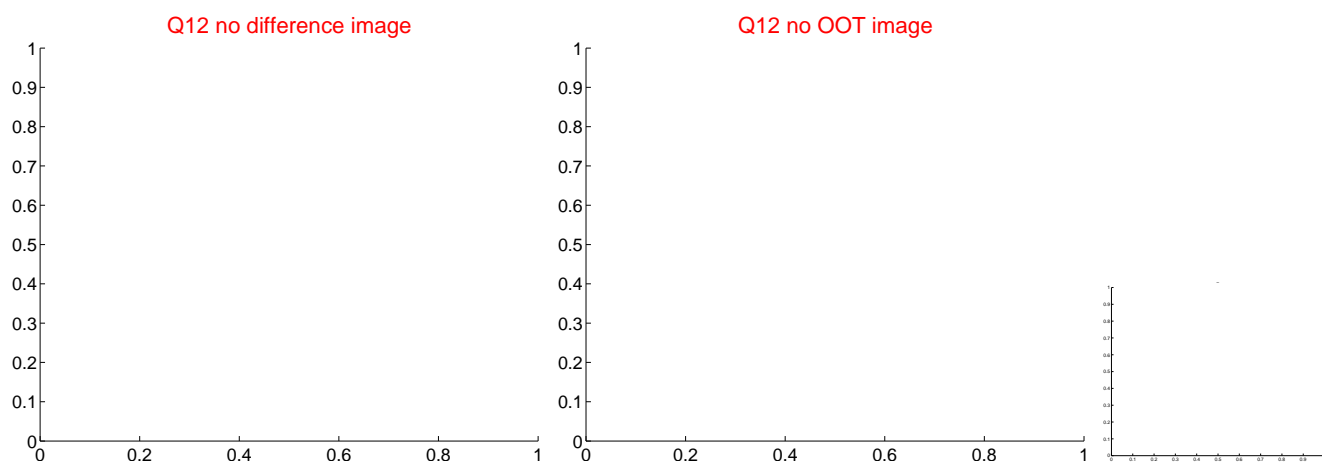
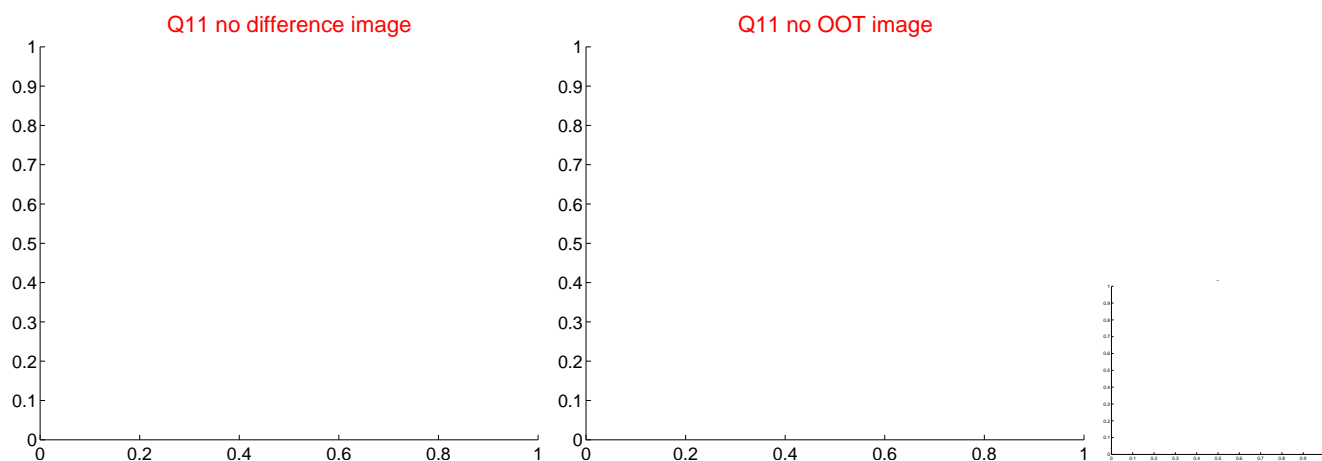
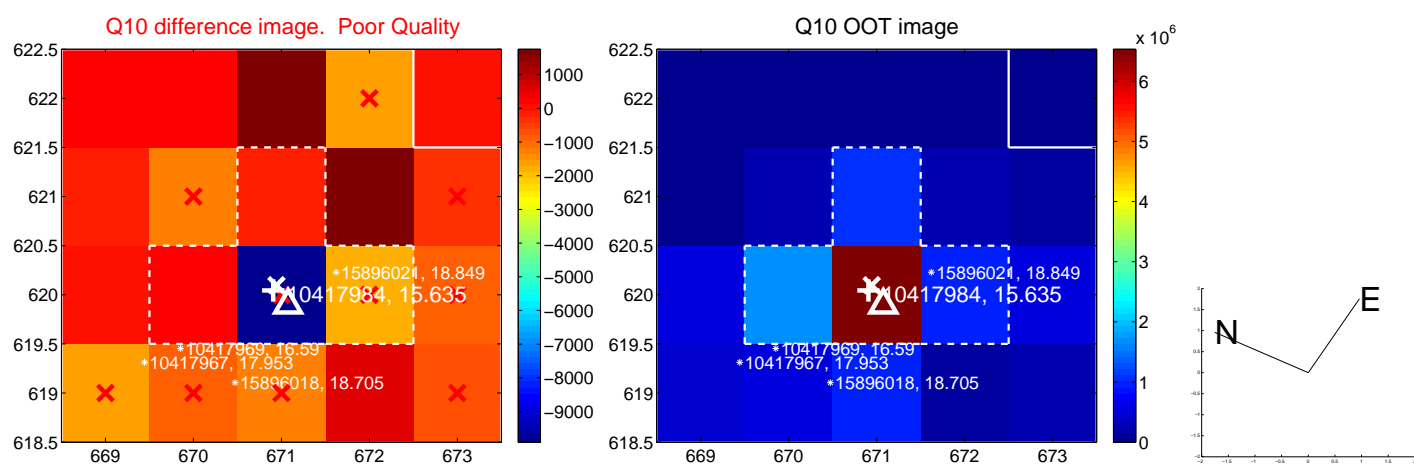
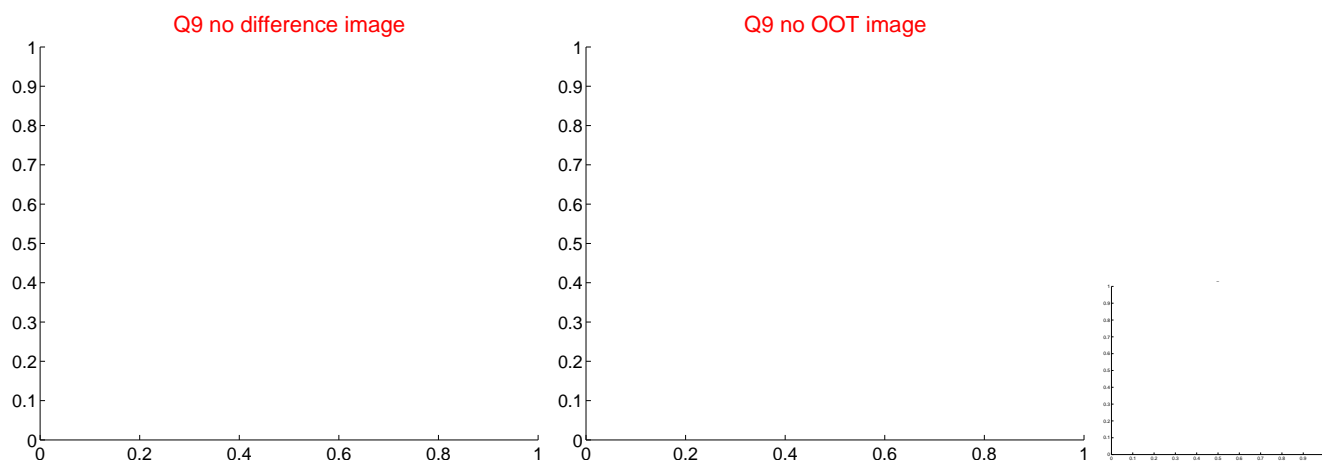


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

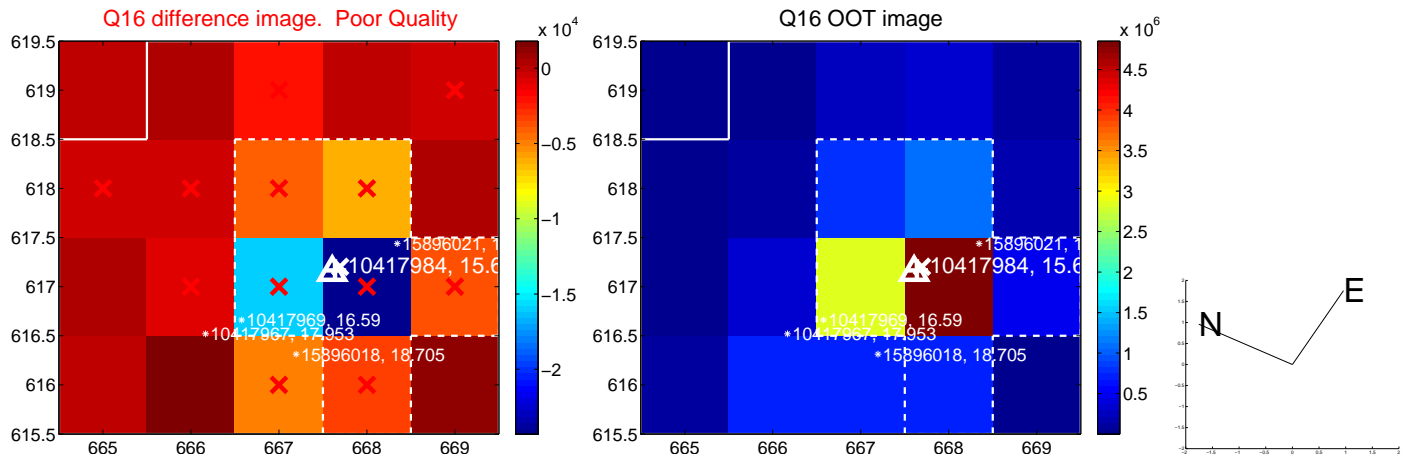
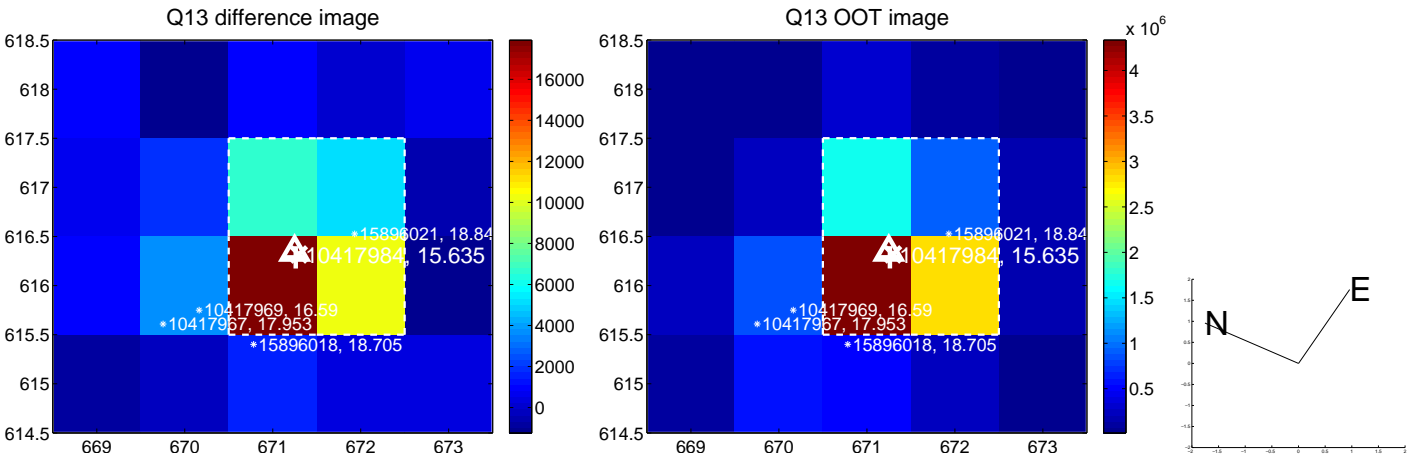




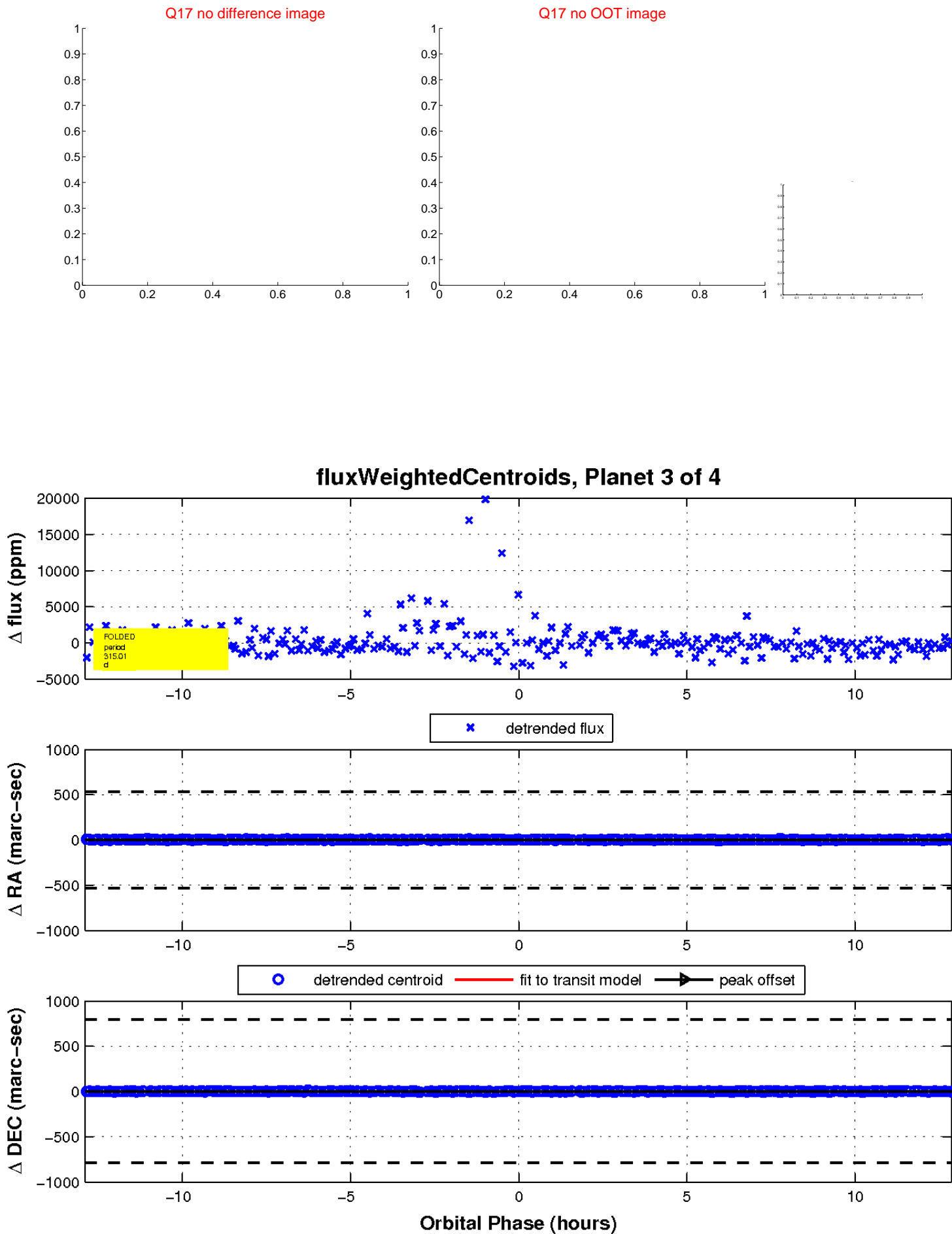
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



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

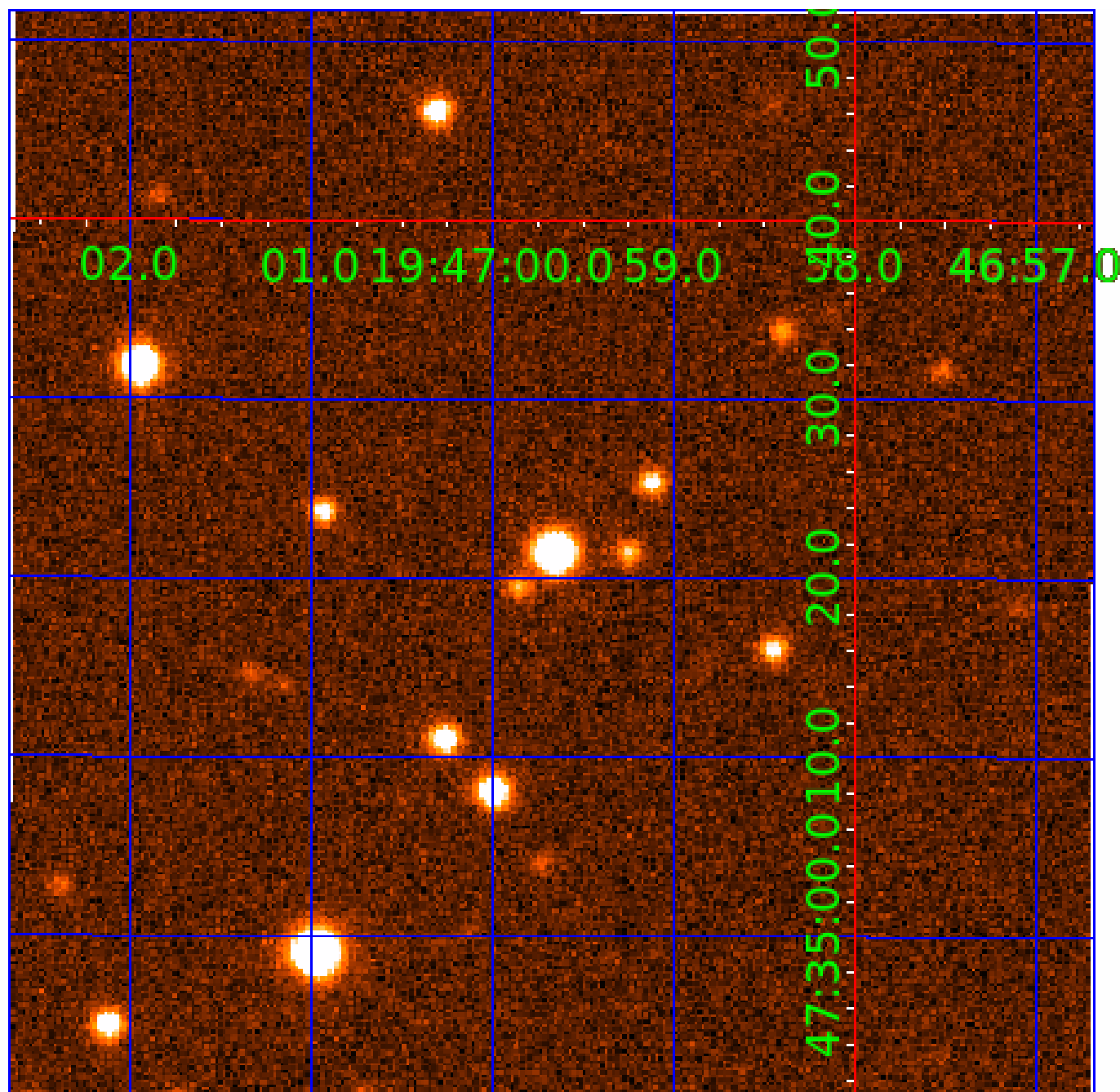


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 010417984

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010417984-01	OBS	No	254.767379	132.346802	1686.1	3.590	10.0	5.9	0.55	4673	2.19	0.31
010417984-02	OBS	No	253.919473	304.170668	917.6	3.575	10.1	4.3	0.55	4673	1.65	0.31
010417984-03	OBS	No	315.007731	278.865649	1806.6	4.315	8.8	7.4	0.55	4673	4.59	0.23
010417984-04	OBS	No	248.604735	371.149955	1526.5	4.659	10.1	6.3	0.55	4673	2.14	0.32

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010417984-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010417984-02	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL_TRACKER—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
010417984-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010417984-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—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.

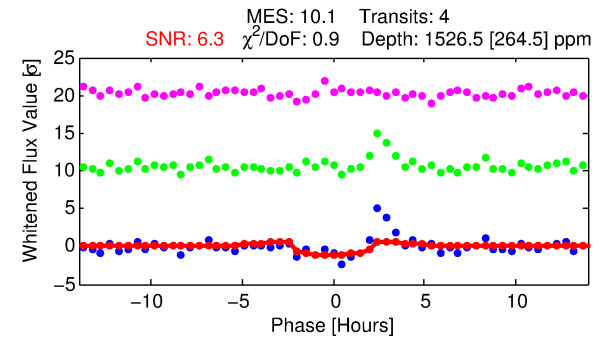
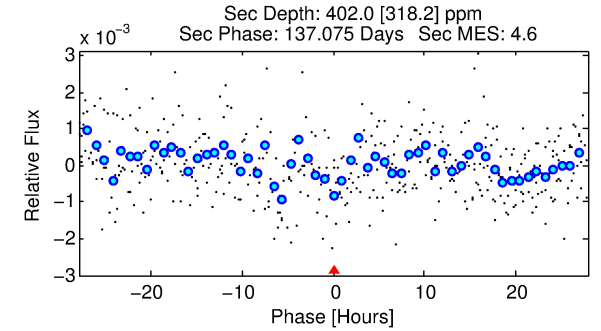
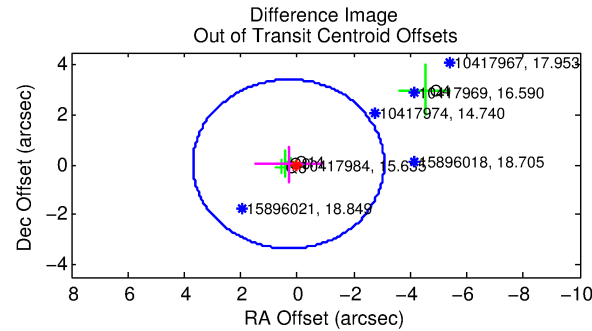
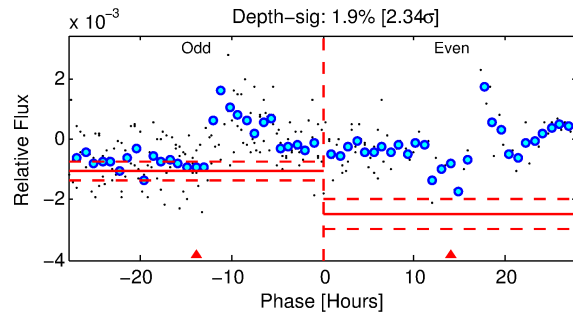
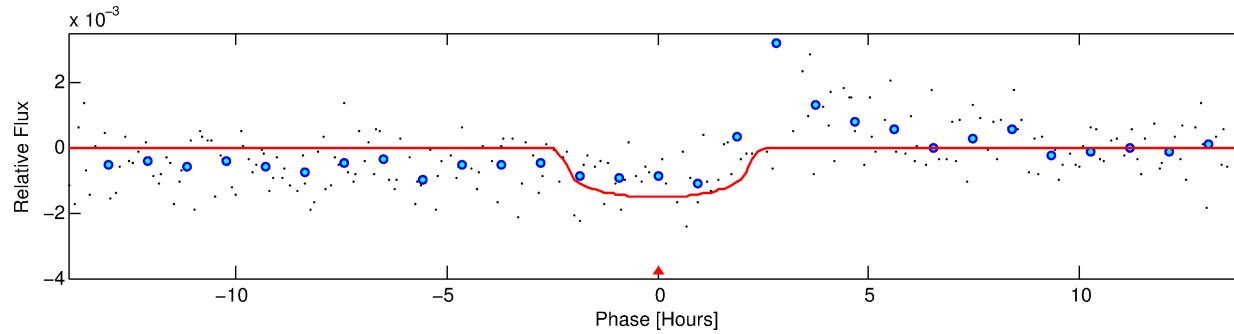
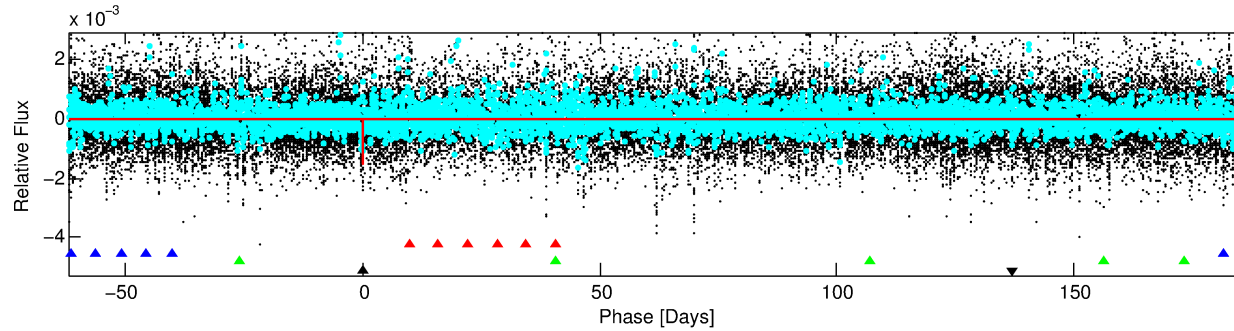
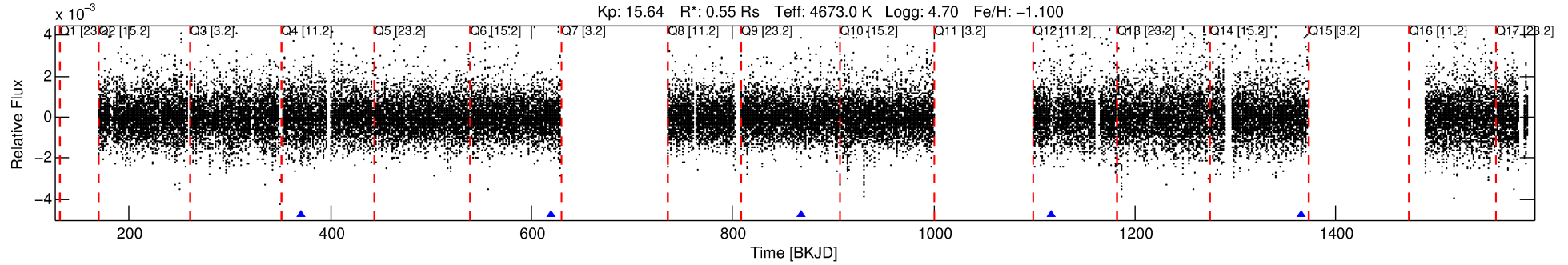
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010417984-04

No Significant Match Found

# DV One-Page Summary

KIC: 10417984 Candidate: 4 of 4 Period: 248.605 d



## DV Fit Results:

Period = 248.60474 [0.00371] d  
Epoch = 371.1500 [0.0091] BKJD  
Rp/R\* = 0.0360 [0.0494]  
a/R\* = 380.30 [1911.48]  
b = 0.45 [9.01]  
Seff = 0.32 [0.05]  
Teq = 192 [7] K  
Rp = 2.14 [2.94] Re  
a = 0.6327 [0.0369] AU  
Ag = 19278.62 [55094.87] [0.35 $\sigma$ ]  
Teffp = 3489 [2494] K [1.32 $\sigma$ ]

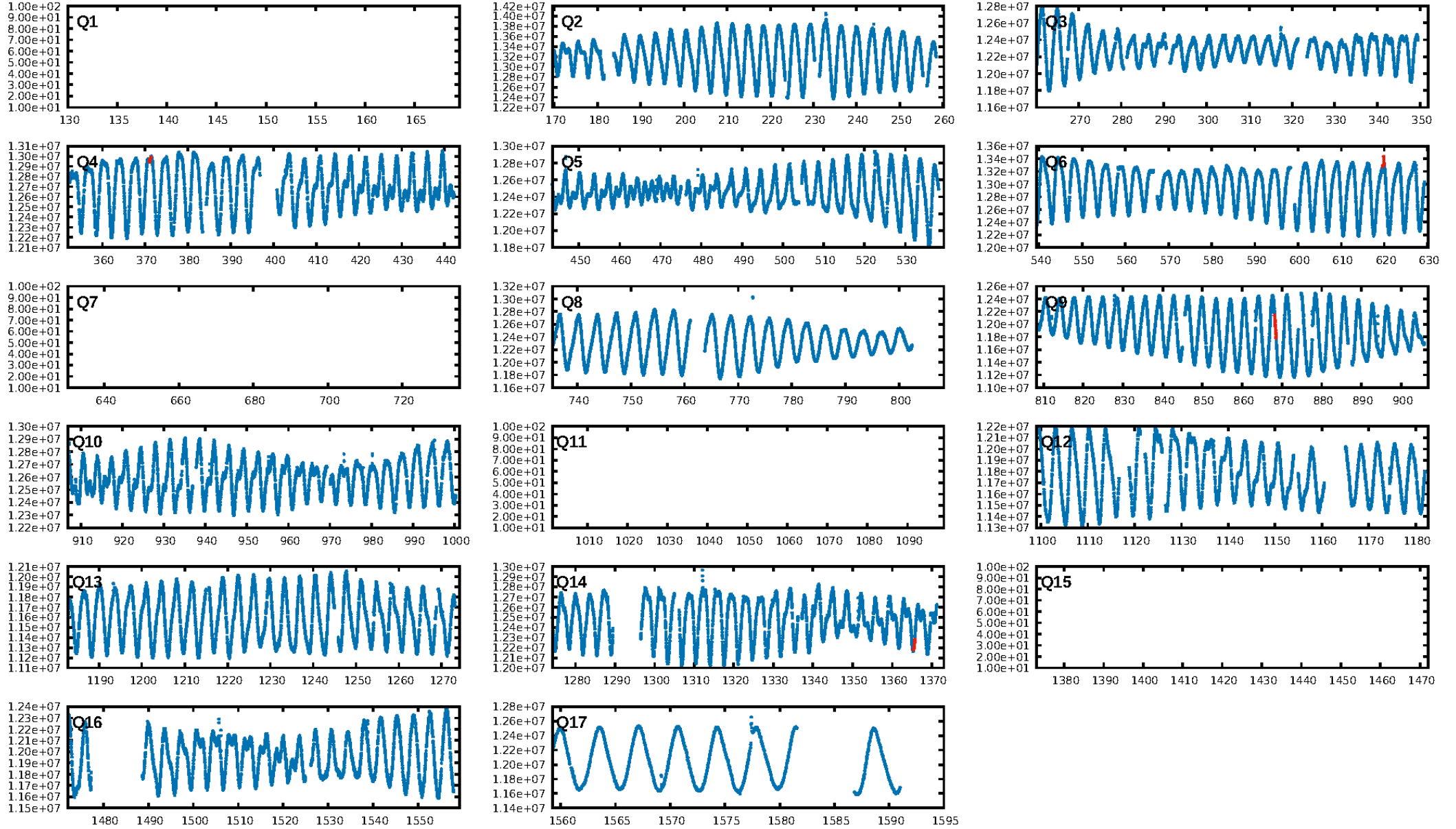
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [21.72 $\sigma$ ]  
ModelChiSquare2-sig: 1.4%  
ModelChiSquareGof-sig: 93.0%  
**Bootstrap-pfa: 6.58e-11**  
RollingBand-fgt: 1.00 [4/4]  
**GhostDiagnostic-chr: 0.4375**  
Centroid-sig: 87.2%  
Centroid-so: 0.796 arcsec [0.62 $\sigma$ ]  
OotOffset-rm: 0.311 arcsec [0.28 $\sigma$ ]  
OotOffset-st: 2/0/1/1 [4]  
KicOffset-rm: 0.238 arcsec [0.62 $\sigma$ ]  
KicOffset-st: 2/0/1/1 [4]  
DiffImageQuality-fgm: 0.50 [2/4]  
DiffImageOverlap-fno: 1.00 [4/4]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 29-Jan-2016 17:17:32 Z

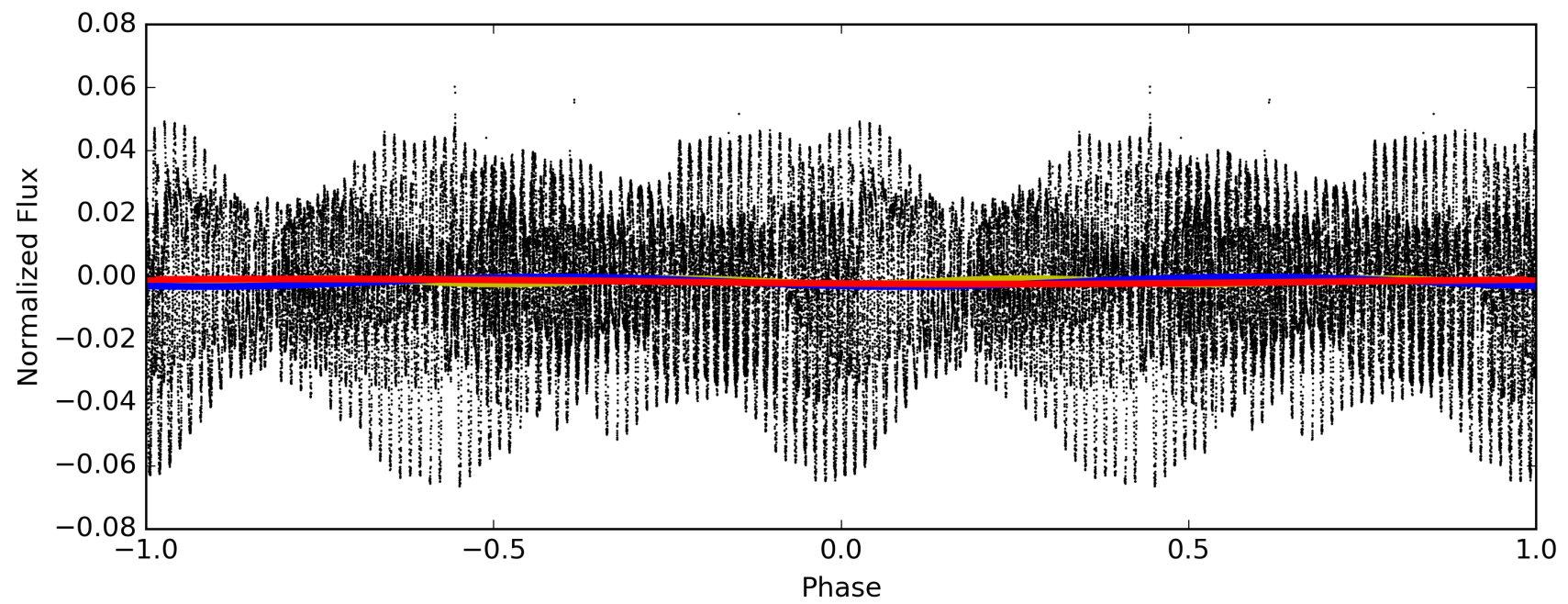
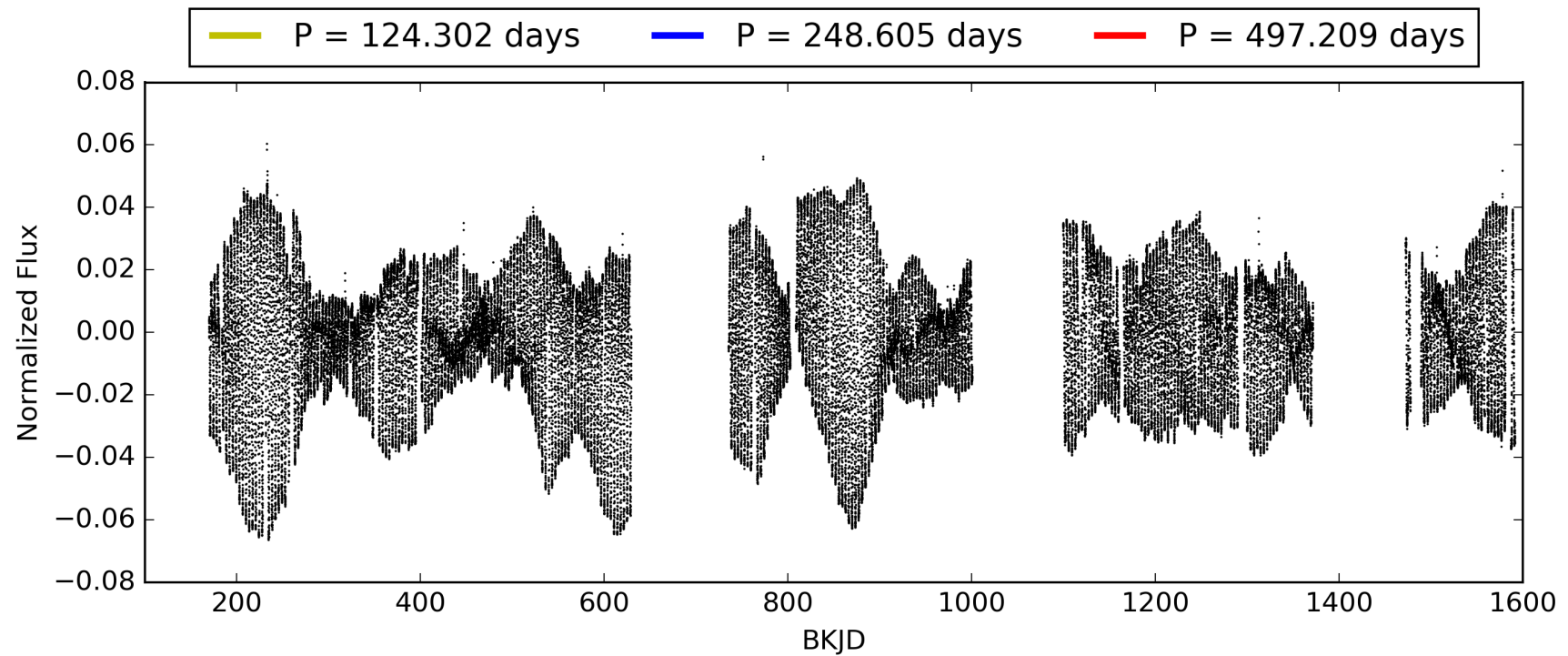
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center

# TCE 010417984-04, PDC Light Curves





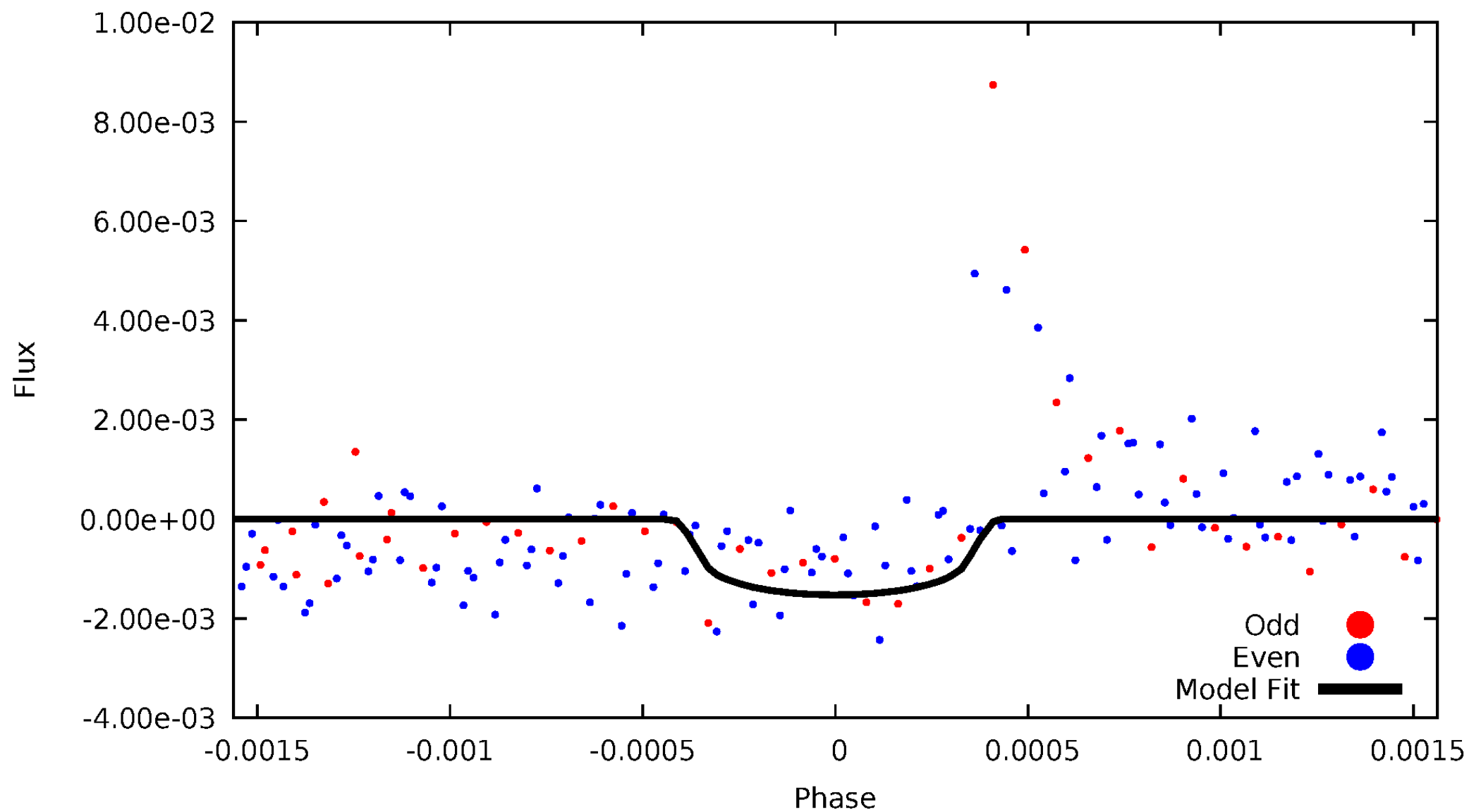
TCE 010417984-04





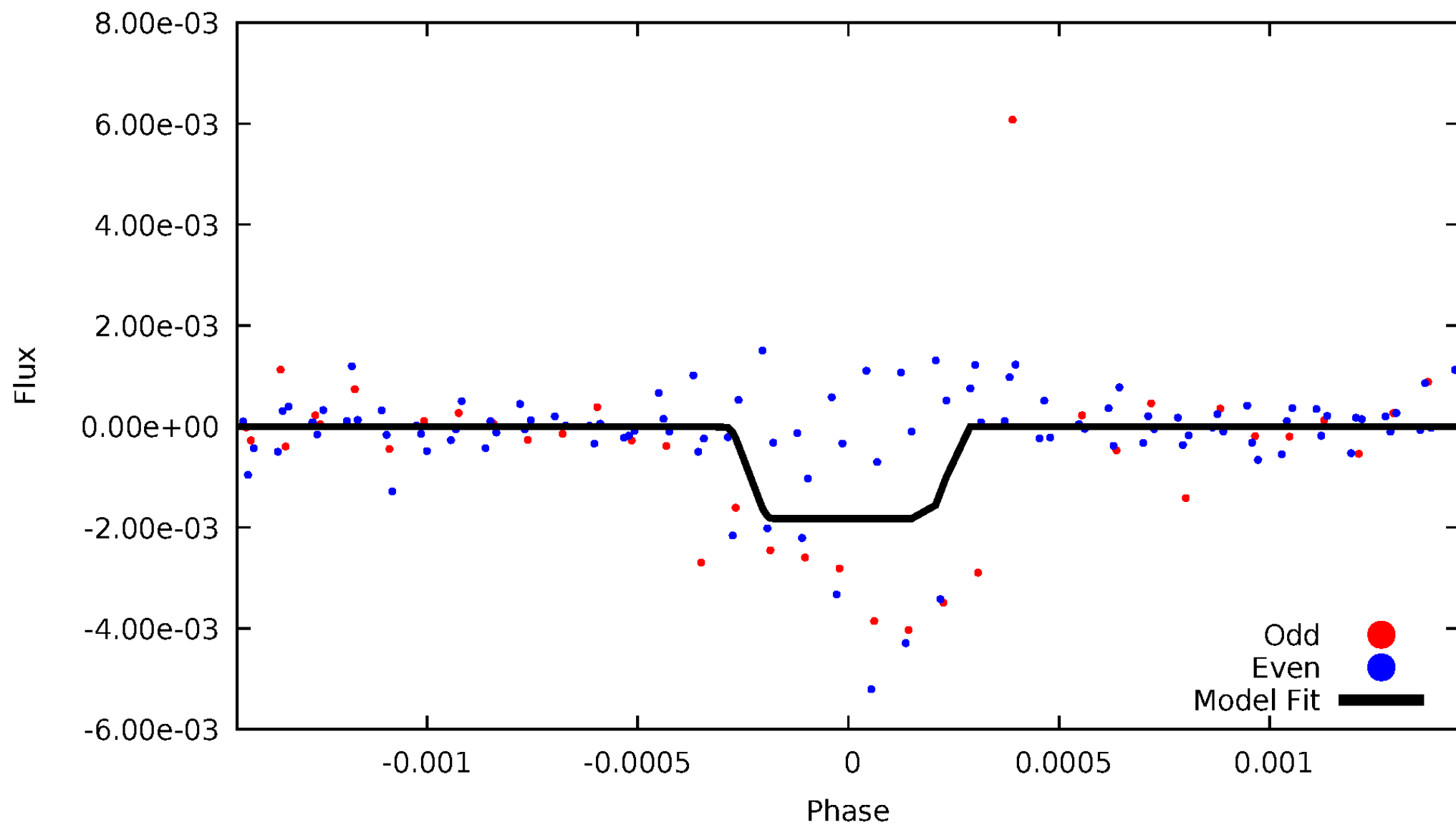
# DV Odd/Even

TCE 010417984-04



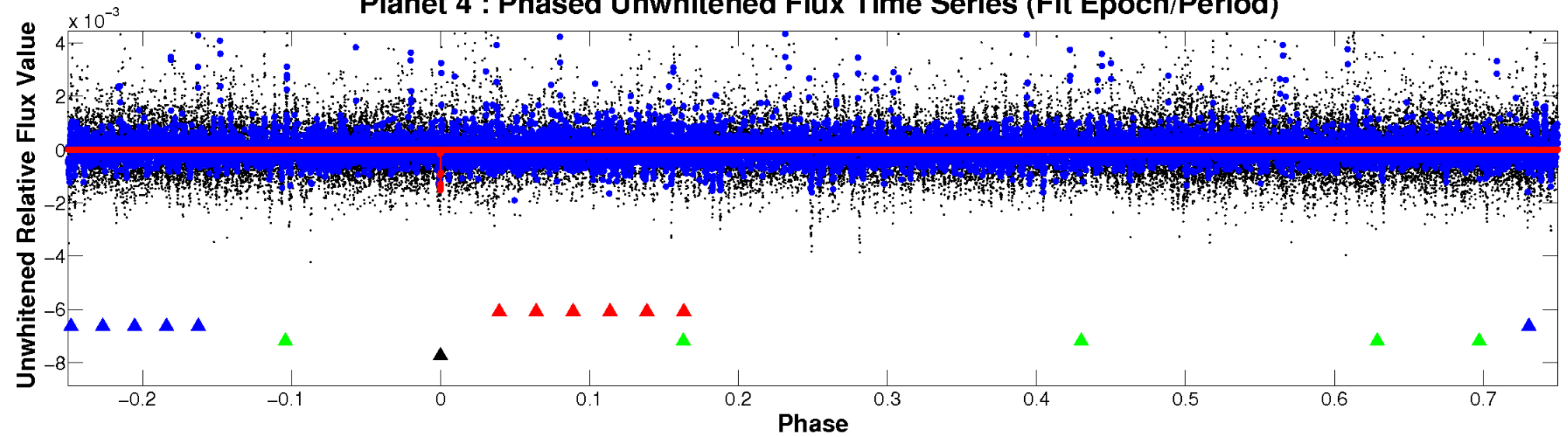
# ALT Odd/Even

TCE 010417984-04

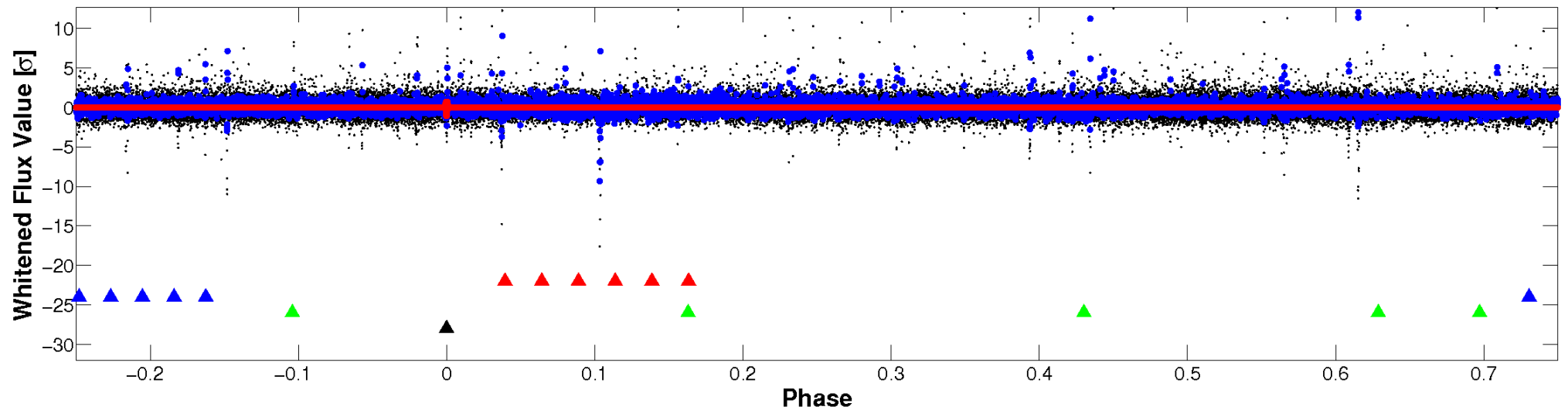


# Non-Whitened Vs. Whitened Light Curve

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

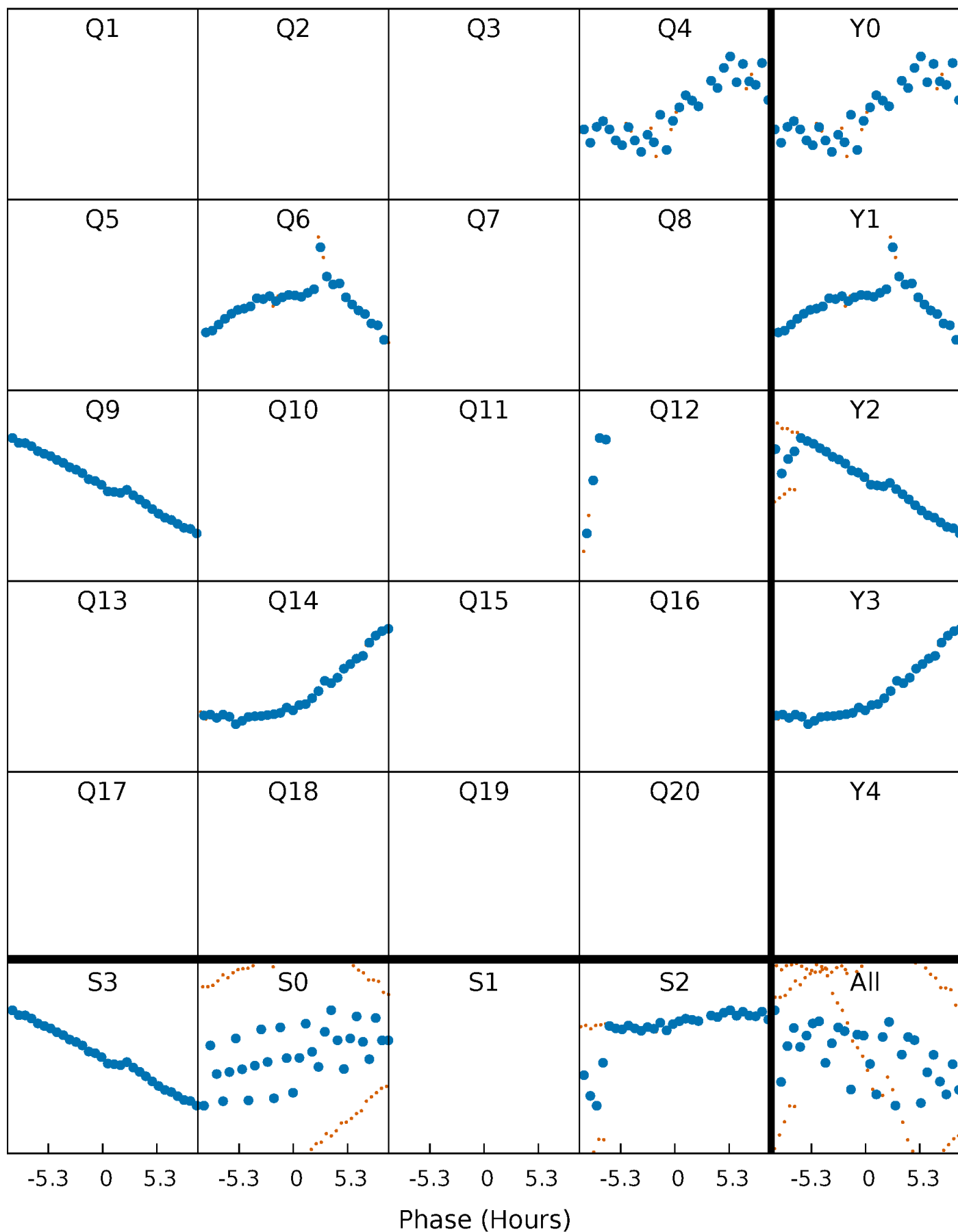


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



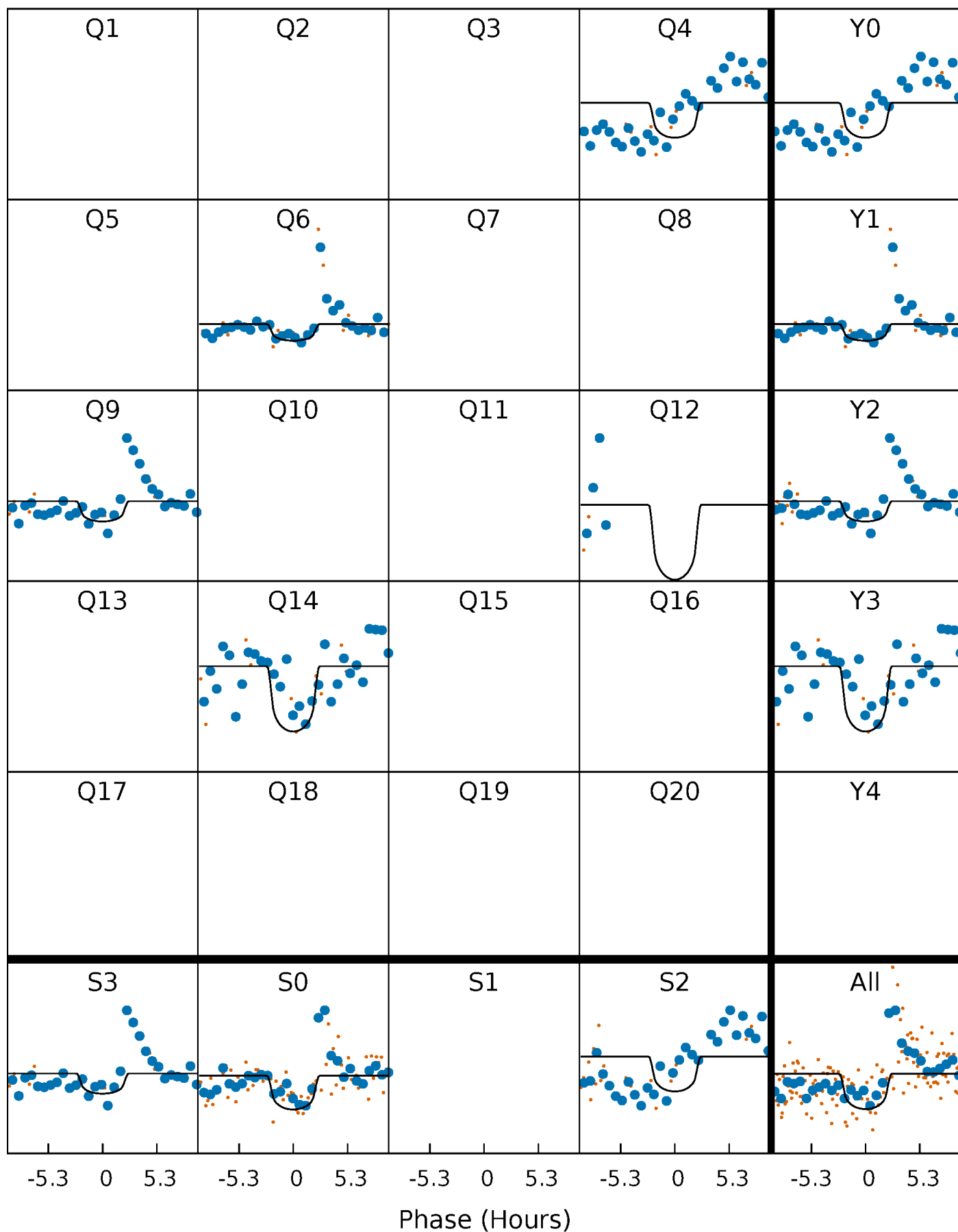
# PDC Quarter-Phased Transit Curves

TCE 010417984-04 P=248.604735 Days  $T_0=371.149955$  (BKJD)



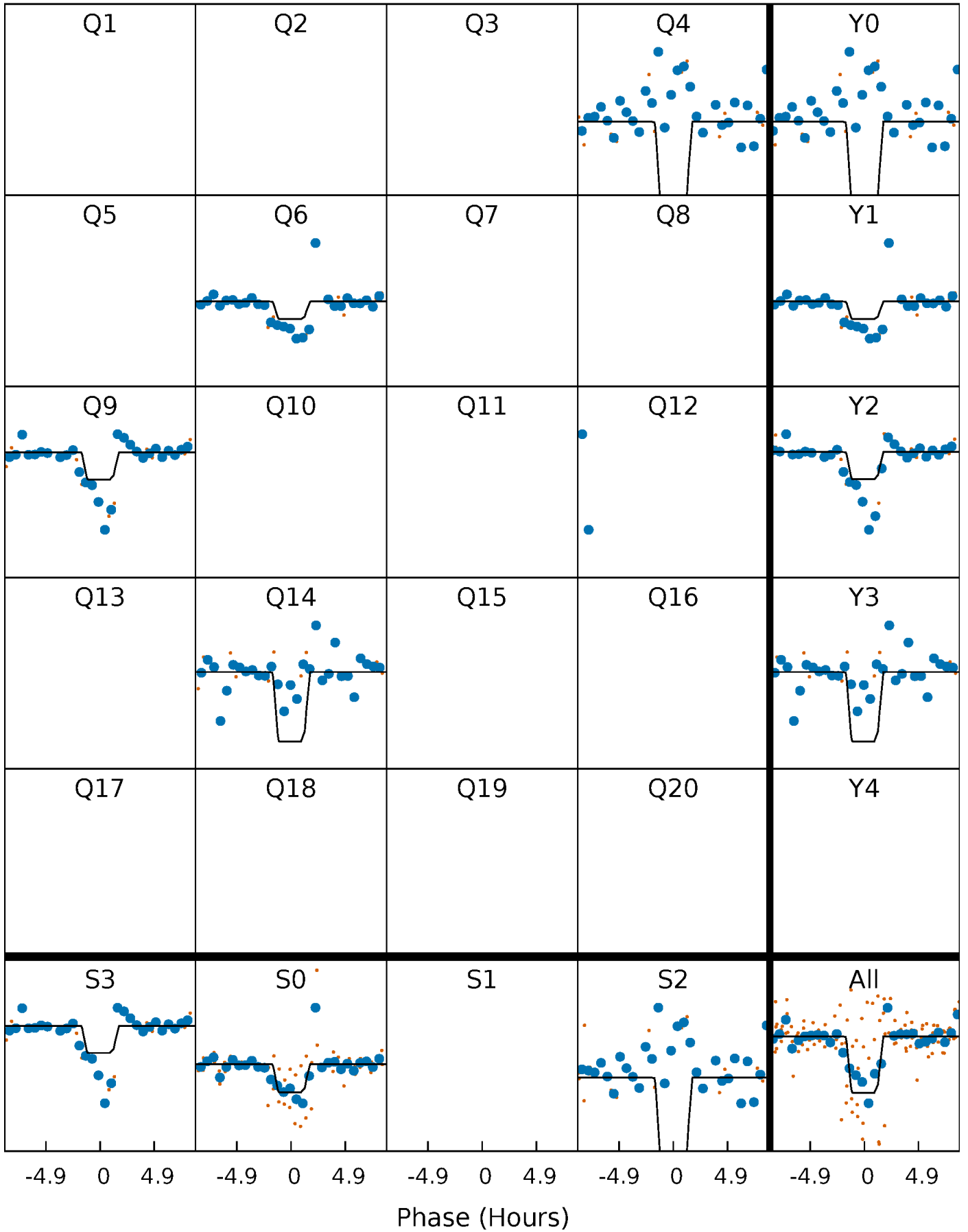
# DV Quarter-Phased Transit Curves

TCE 010417984-04     $P=248.604735$  Days     $T_0=371.149955$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

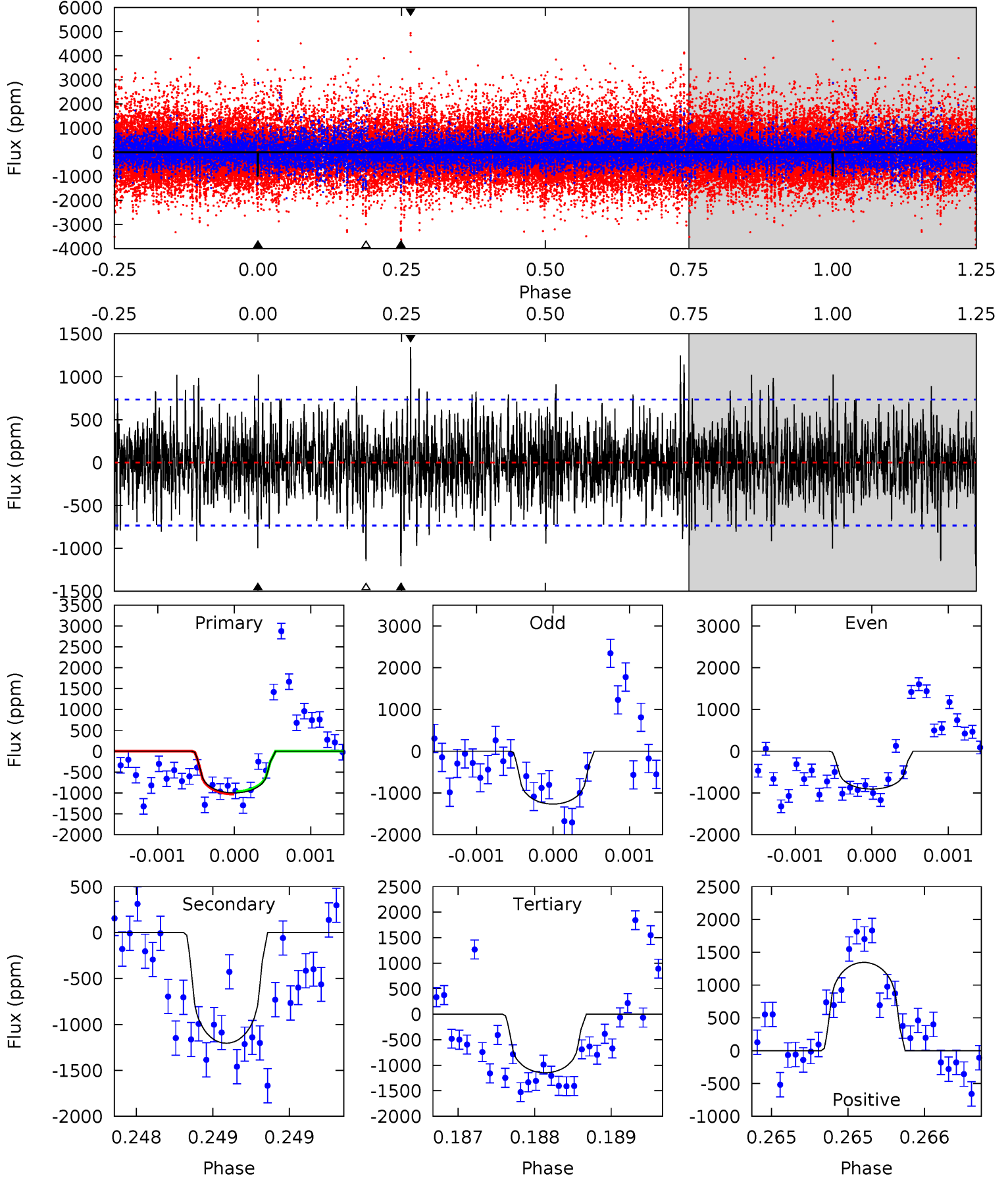
TCE 010417984-04 P=248.615025 Days  $T_0=371.144496$  (BKJD)



# DV Model-Shift Uniqueness Test

010417984-04,  $P = 248.604735$  Days,  $E = 122.545220$  Days

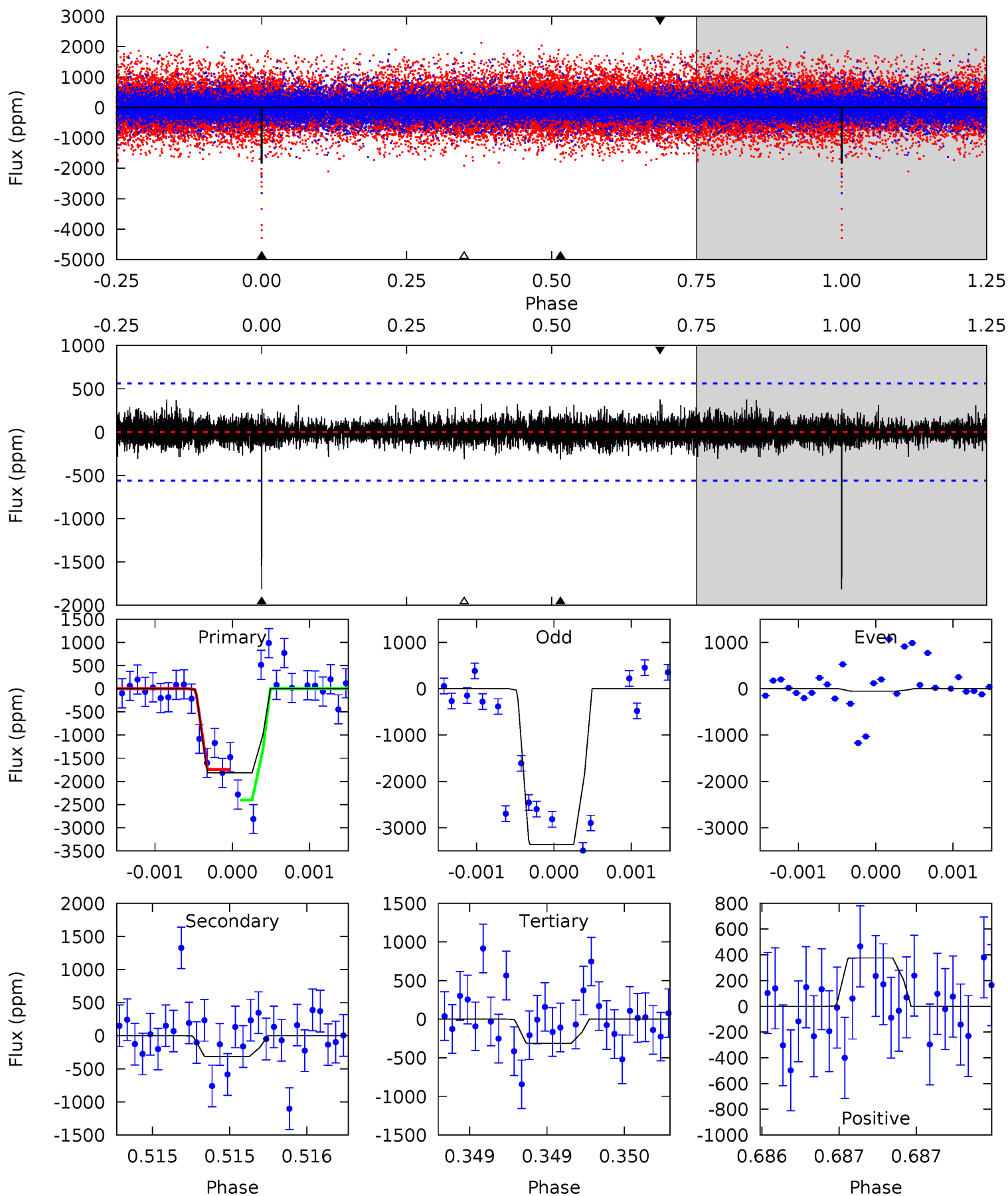
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.47	9.00	8.57	10.1	5.49	3.35	2.19	-1.10	-2.59	0.43	-1.06	1.11	1.09	0.53	0.22



# Alt Model-Shift Uniqueness Test

010417984-04, P = 248.615025 Days, E = 122.529471 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
17.9	3.10	3.09	3.71	5.55	3.44	0.77	14.8	14.2	0.01	-0.61	15.5	0.86	0.17	3.05





### Stellar Parameters For KIC 010417984

	$T_{\text{eff}} (K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$4673^{+139}_{-139}$	$4.701^{+0.048}_{-0.028}$	$-1.100^{+0.300}_{-0.300}$	$0.546^{+0.037}_{-0.037}$	$0.547^{+0.044}_{-0.024}$	$4.725^{+0.928}_{-0.594}$
	+3%/-3%	+1%/-1%	+27%/-27%	+7%/-7%	+8%/-4%	+20%/-13%
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 010417984-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1204 \pm 134$	$2.96^{+2.64}_{-1.96}$	$267^{+9}_{-9}$	$4075^{+2478}_{-776}$	$30777^{+245074}_{-22307}$
Alt.	$-314 \pm 101$	$3.30^{+2.69}_{-2.14}$	$267^{+9}_{-9}$	$3144^{+1289}_{-493}$	$6033^{+44119}_{-4259}$

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

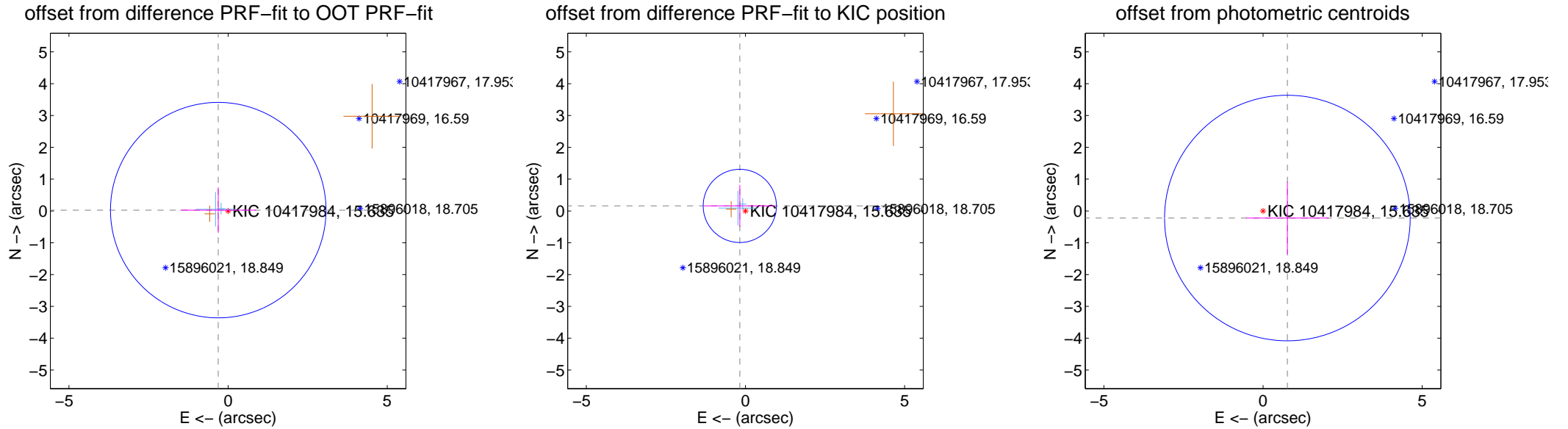
## DV Centroid Data

Supplemental centroid analysis for 010417984-04. Kepler magnitude: 15.63. Transit SNR 6.28

There are 2 quarters with good PRF difference image offsets

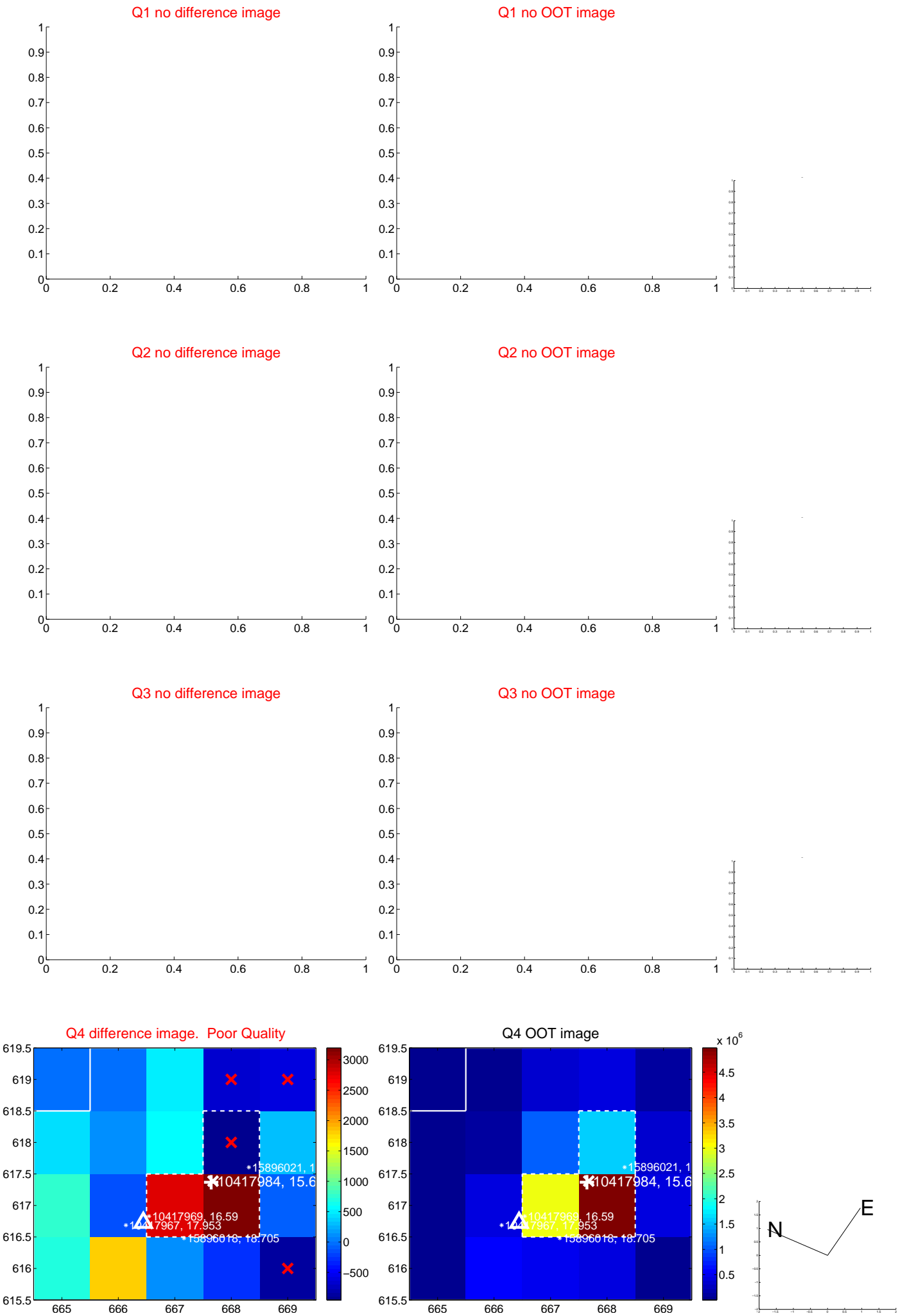
The direct PRF centroid is offset from the target star catalog position by about 0.19 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.311 \pm 1.129$	0.28	$0.310 \pm 1.192$	$0.026 \pm 0.714$
PRF-fit source offset from KIC position	$0.238 \pm 0.383$	0.62	$0.177 \pm 1.096$	$0.159 \pm 0.658$
photometric centroid source offset	$0.80 \pm 1.29$	0.62	$-0.76 \pm 1.30$	$-0.22 \pm 1.14$

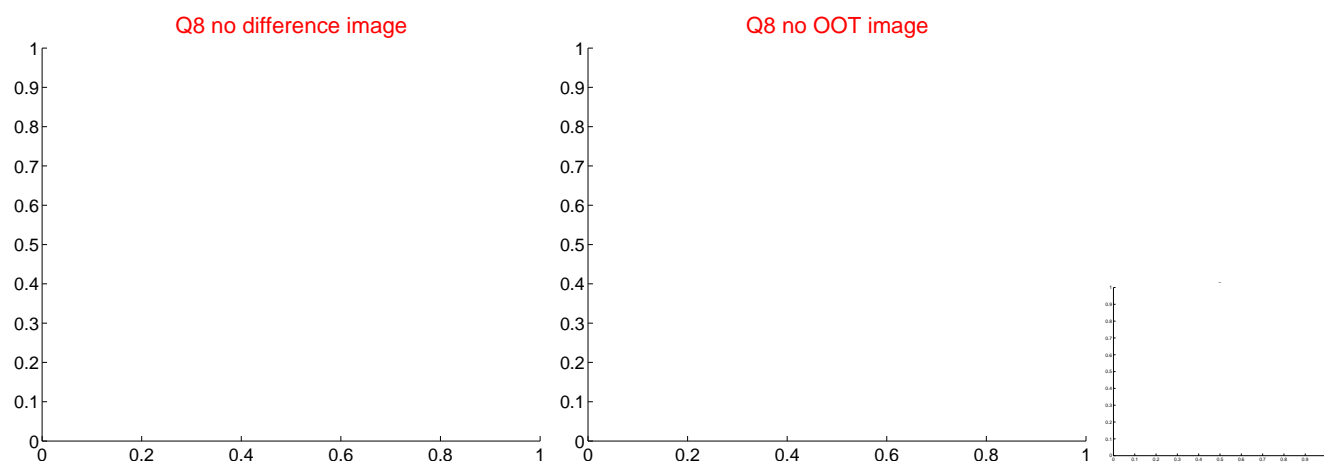
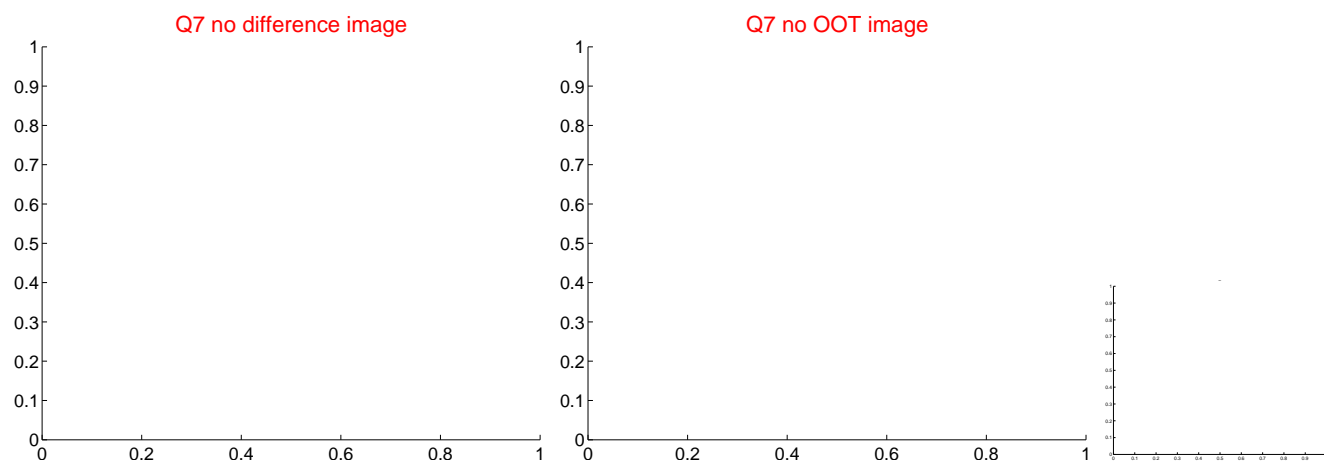
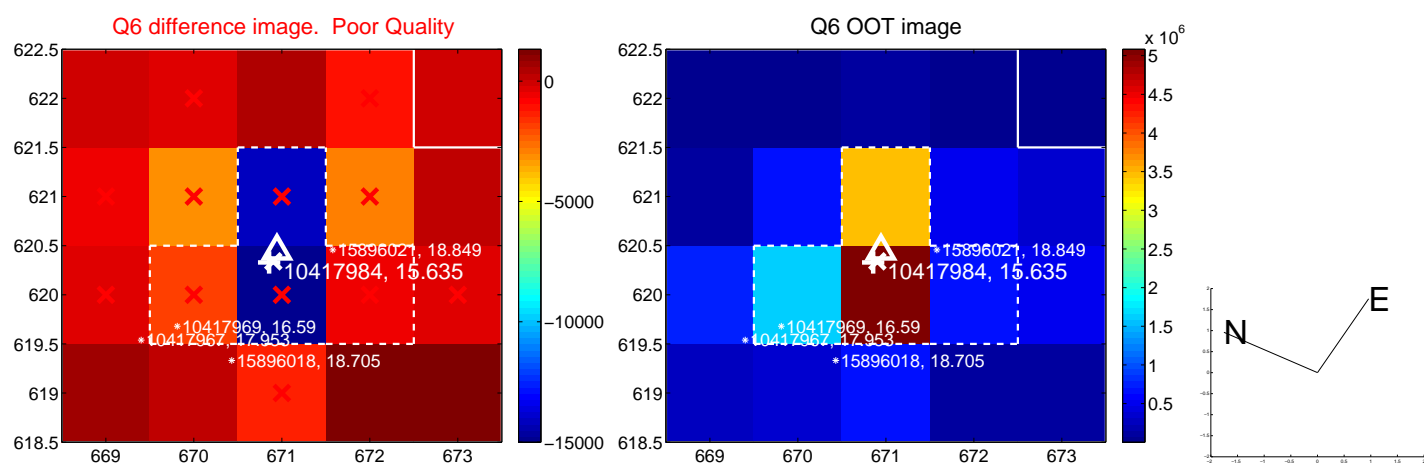
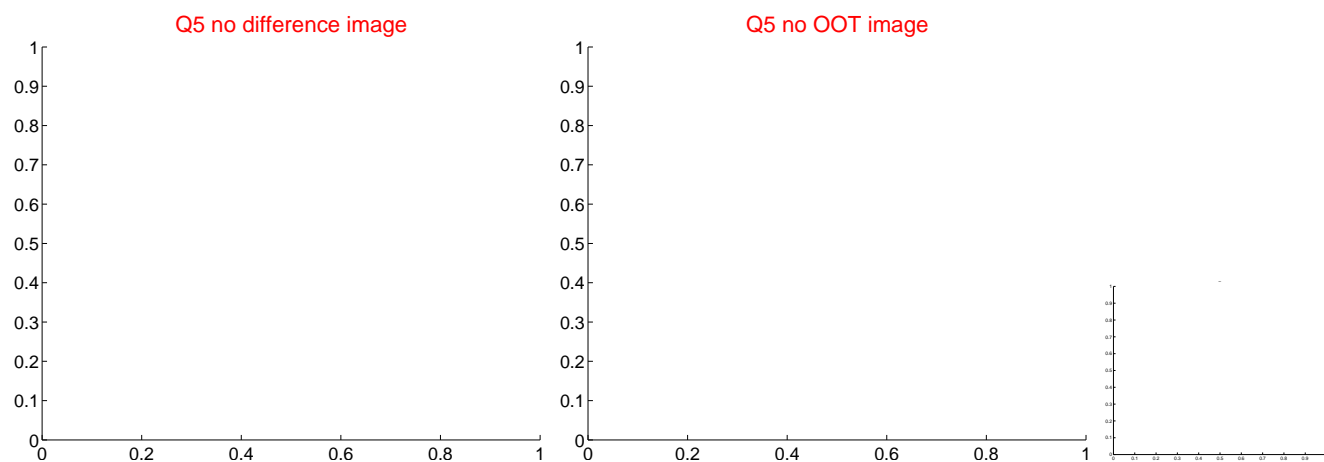


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

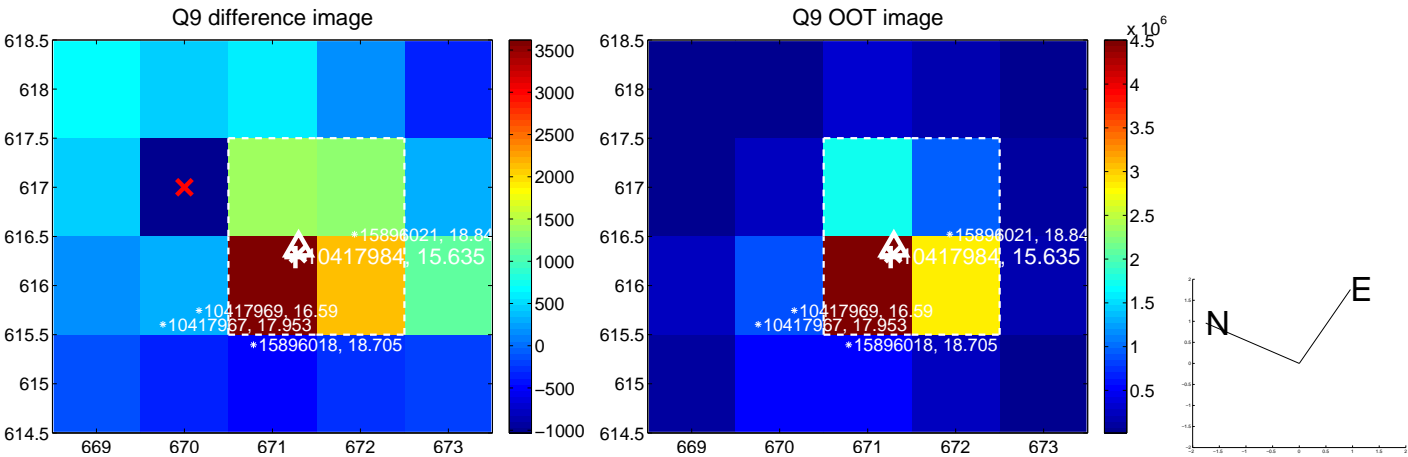
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



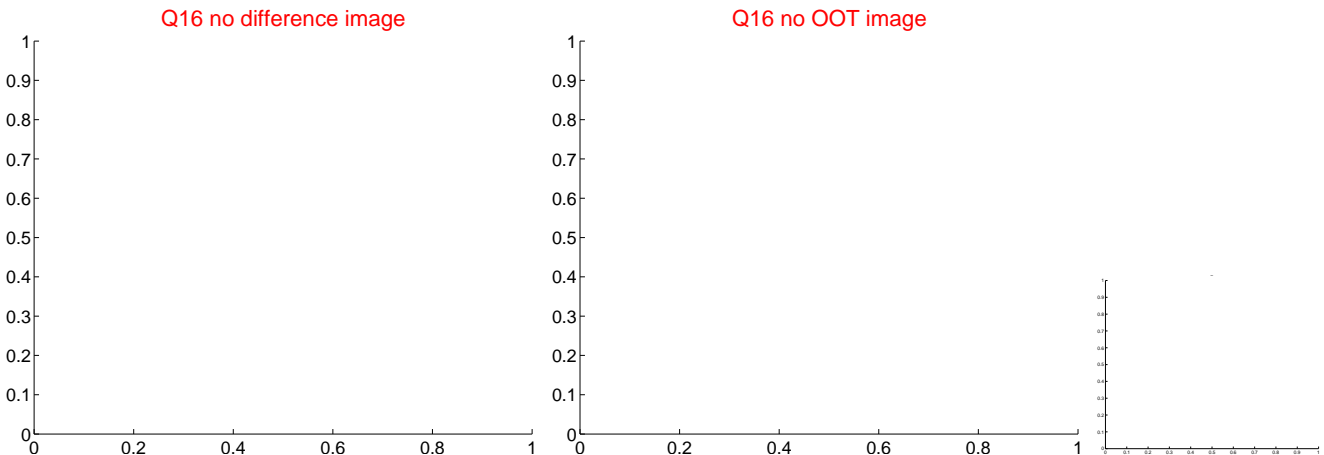
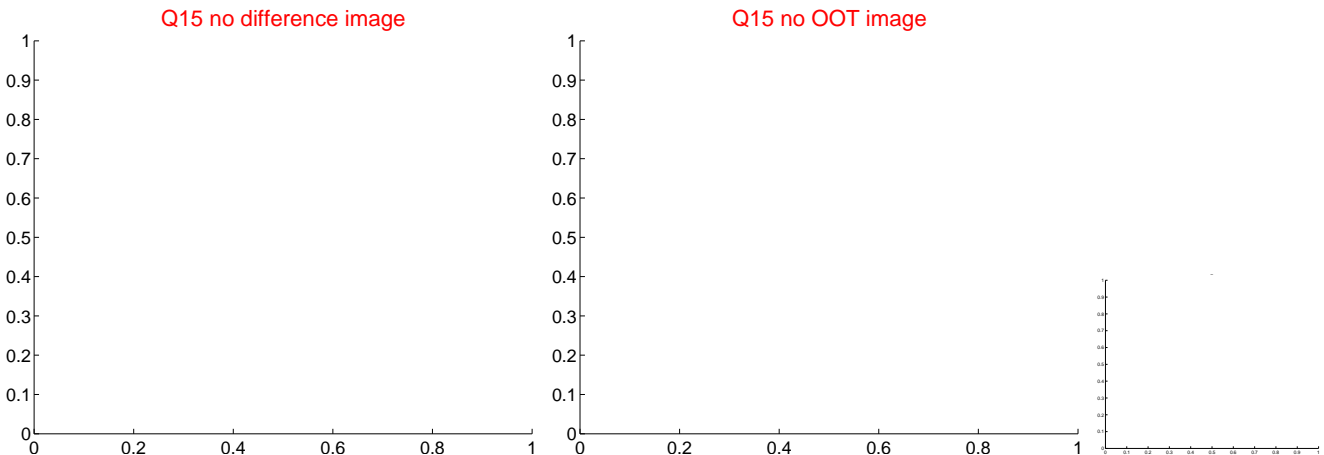
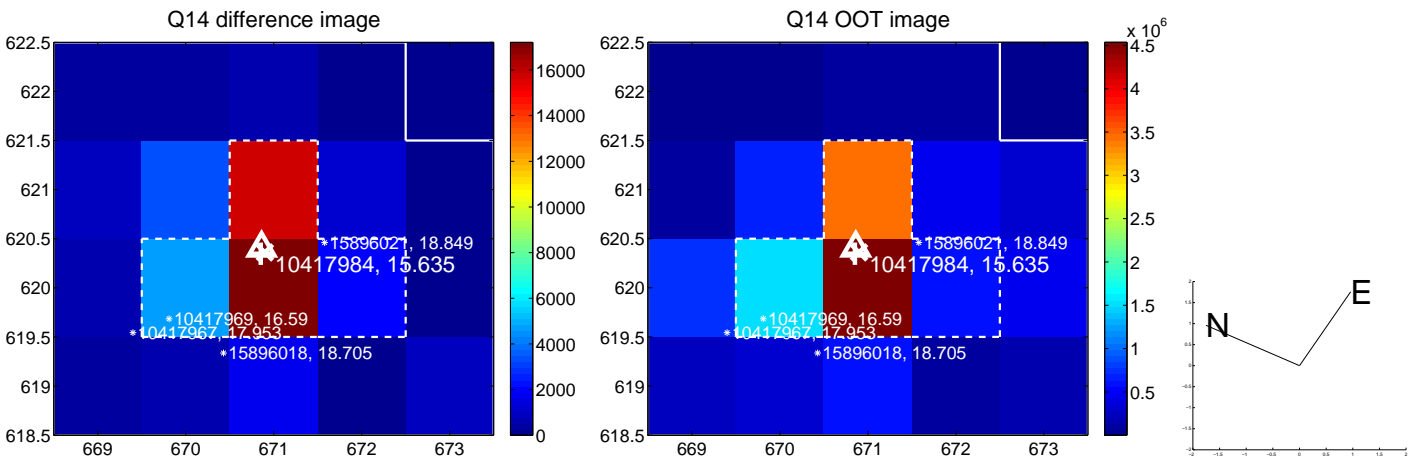
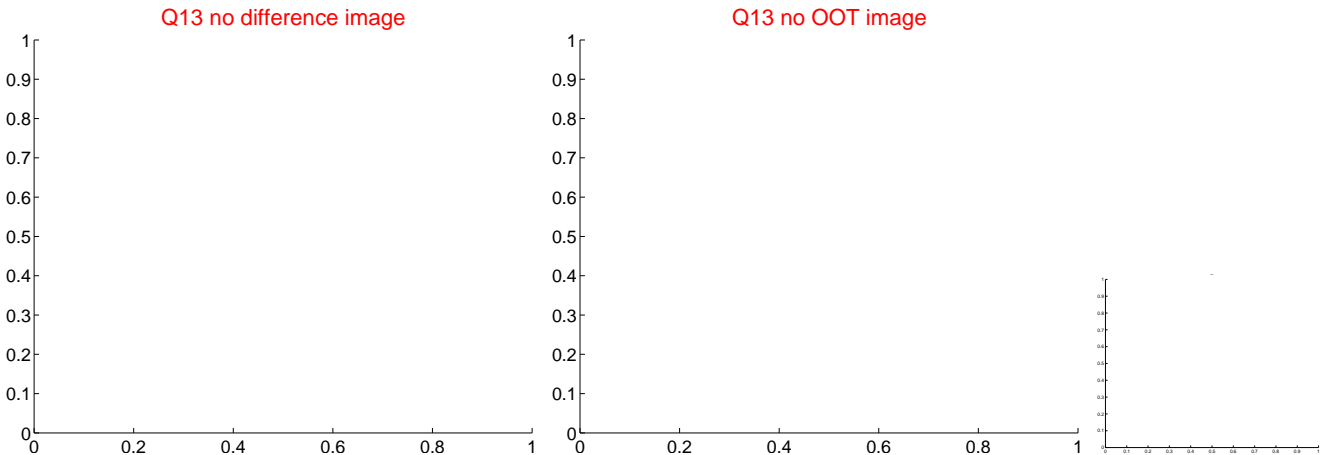
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value



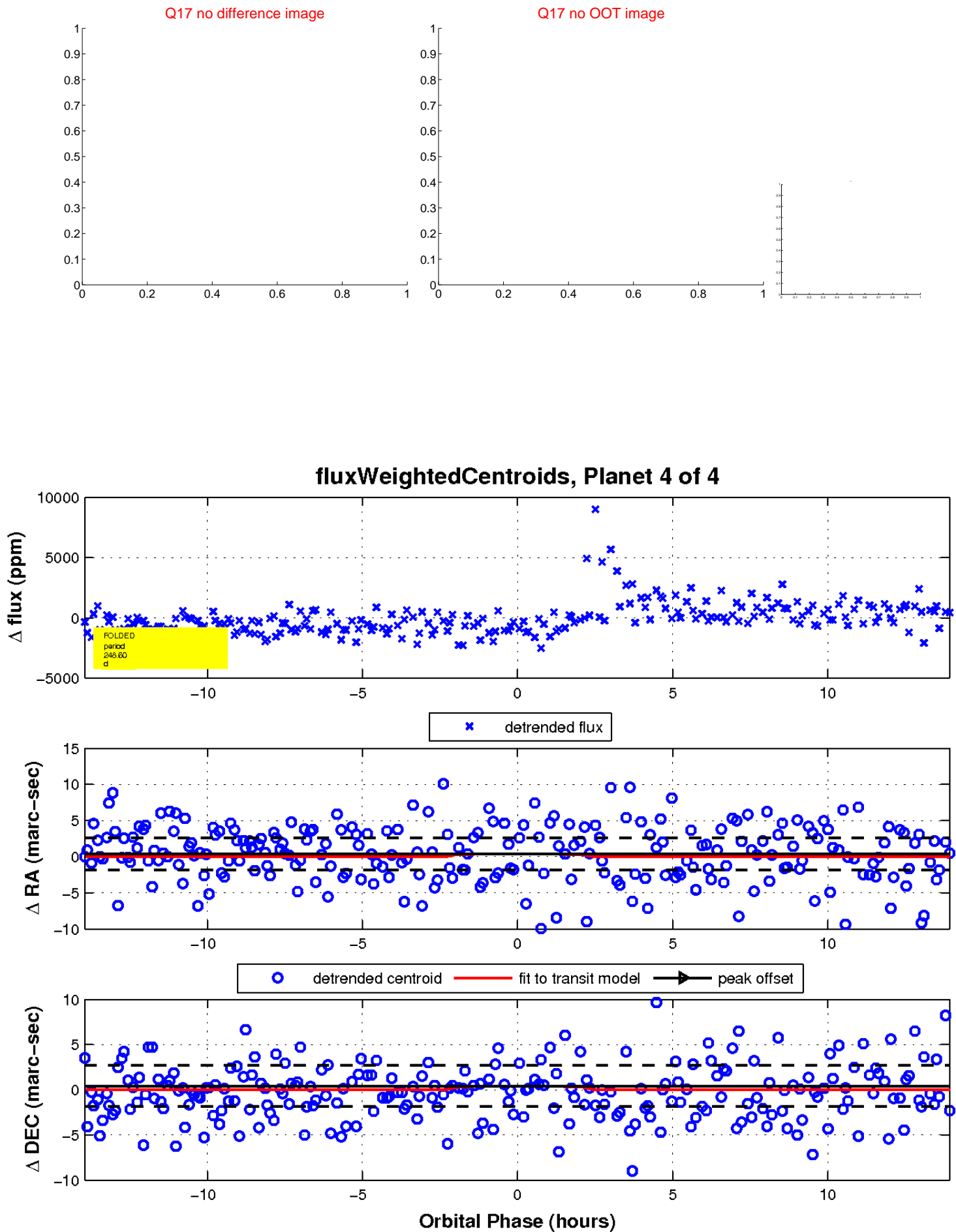
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

