

# KIC 004827723

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004827723-01	OBS	0632.01	7.238603	135.023062	266.0	3.298	42.1	46.0	0.83	5411	1.62	104.76
004827723-02	OBS	No	523.353592	330.165654	383.0	3.769	14.1	7.6	0.83	5411	1.75	0.35

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004827723-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
004827723-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

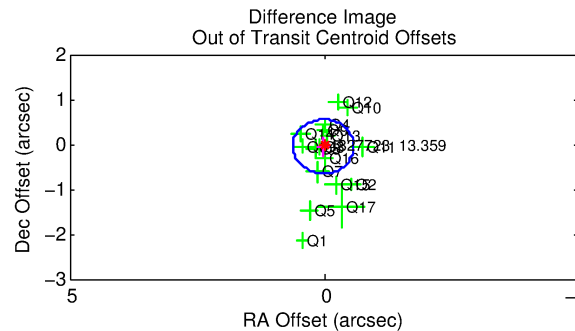
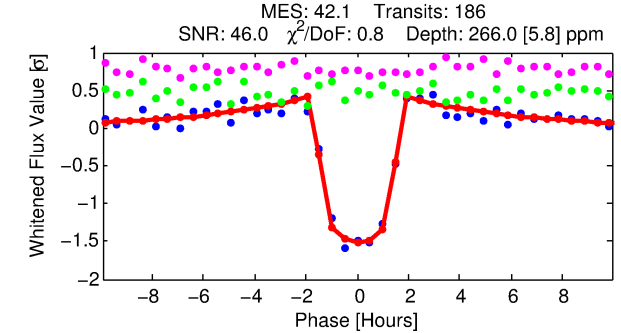
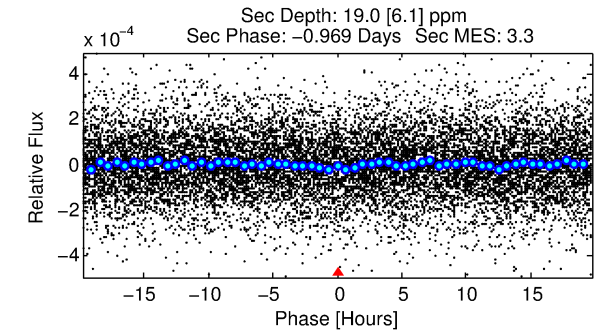
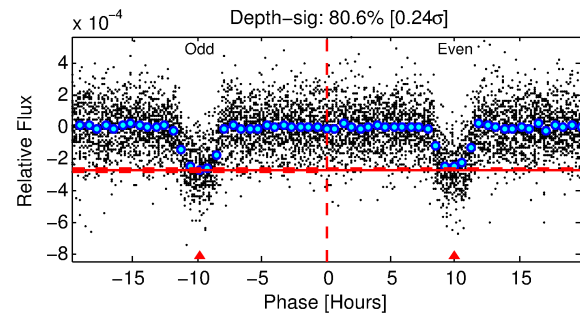
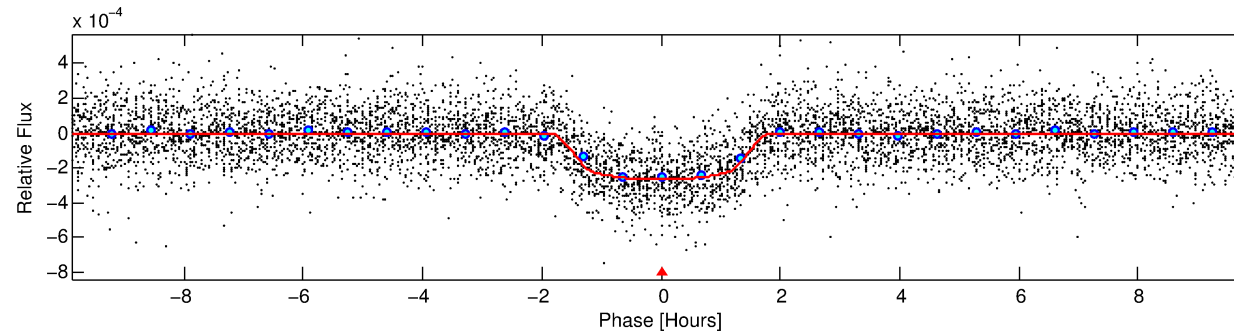
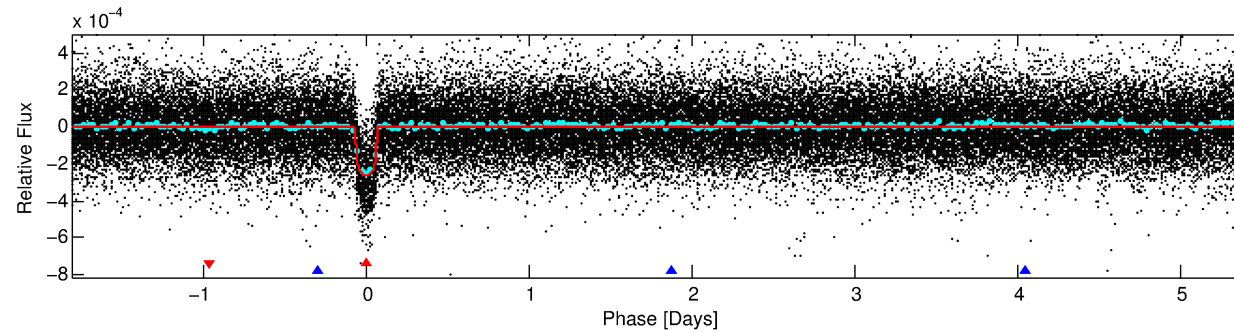
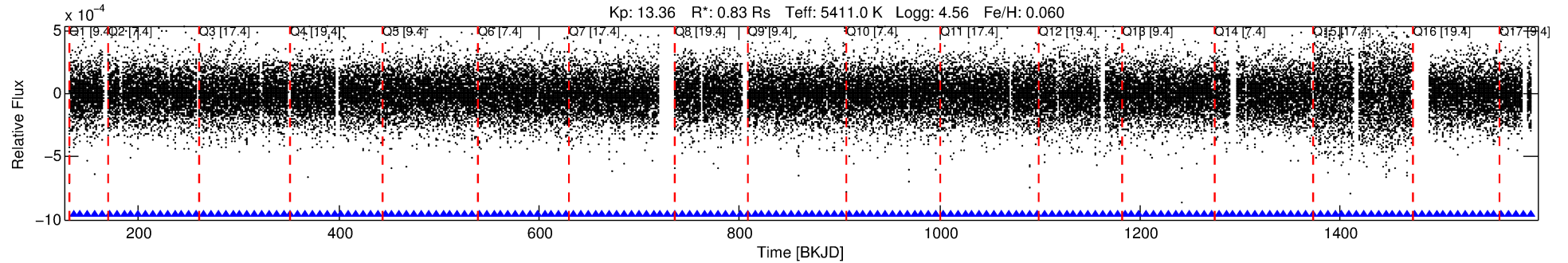
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004827723-01

No Significant Match Found

# DV One-Page Summary

KIC: 4827723 Candidate: 1 of 2 Period: 7.239 d  
KOI: K00632.01 Corr: 0.971



## DV Fit Results:

Period = 7.23860 [0.00001] d  
Epoch = 135.0231 [0.0012] BKJD  
Rp/R\* = 0.0179 [0.0018]  
a/R\* = 8.16 [3.41]  
b = 0.90 [0.10]  
Seff = 104.76 [19.71]  
Teq = 816 [38] K  
Rp = 1.62 [0.25] Re  
a = 0.0712 [0.0076] AU  
Ag = 20.09 [8.30] [2.30σ]  
Teffp = 2670 [259] K [7.08σ]

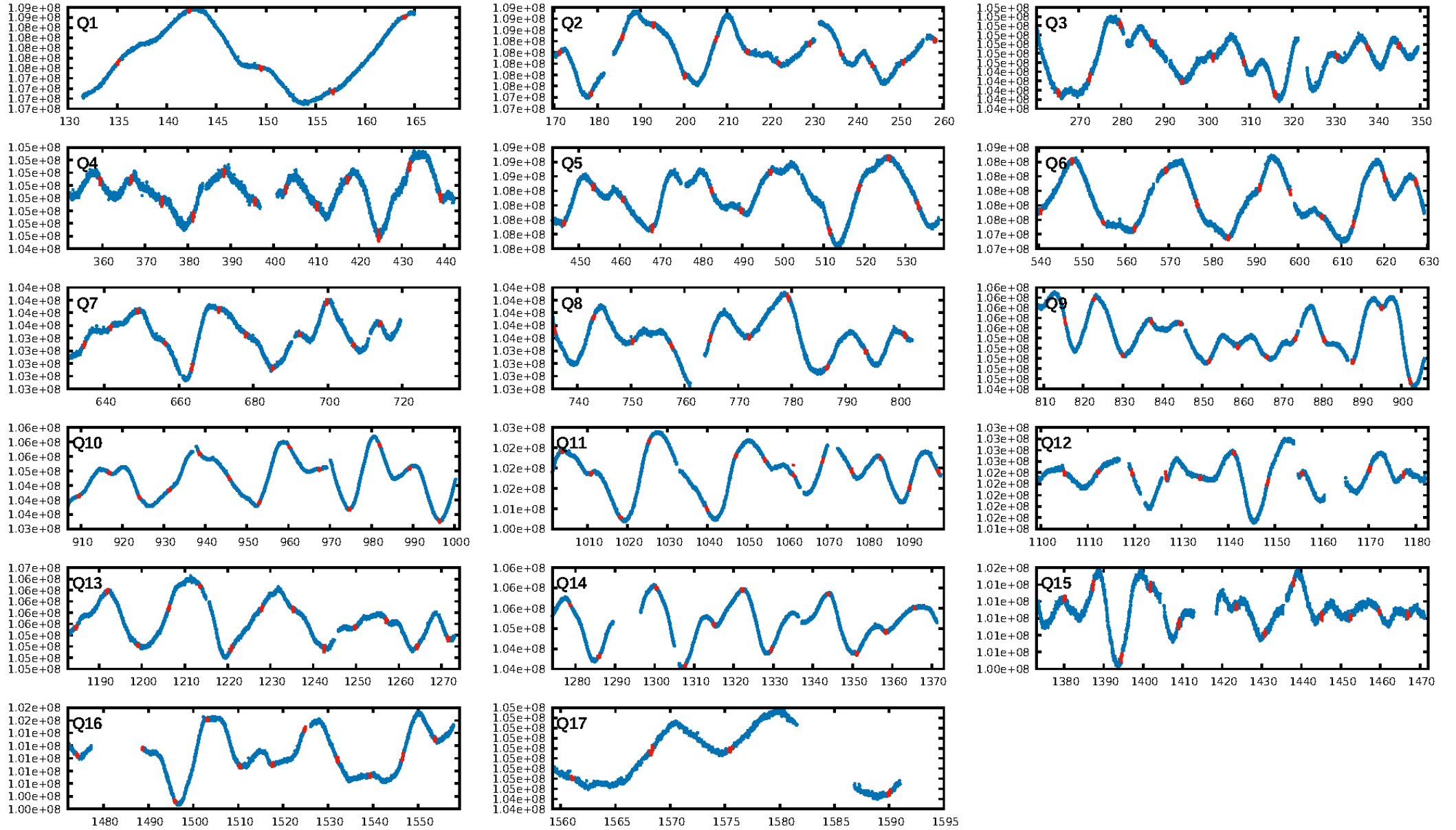
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [2473.07σ]  
ModelChiSquare2-sig: 99.9%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-igt: 1.00 [177/177]  
GhostDiagnostic-chr: 4.77  
Centroid-sig: 0.3%  
Centroid-so: 0.503 arcsec [2.39σ]  
OotOffset-rm: 0.055 arcsec [0.27σ]  
OotOffset-st: 4/4/4/5 [17]  
KicOffset-rm: 0.240 arcsec [1.66σ]  
KicOffset-st: 4/4/4/5 [17]  
DiffImageQuality-fgm: 1.00 [17/17]  
DiffImageOverlap-fno: 1.00 [17/17]

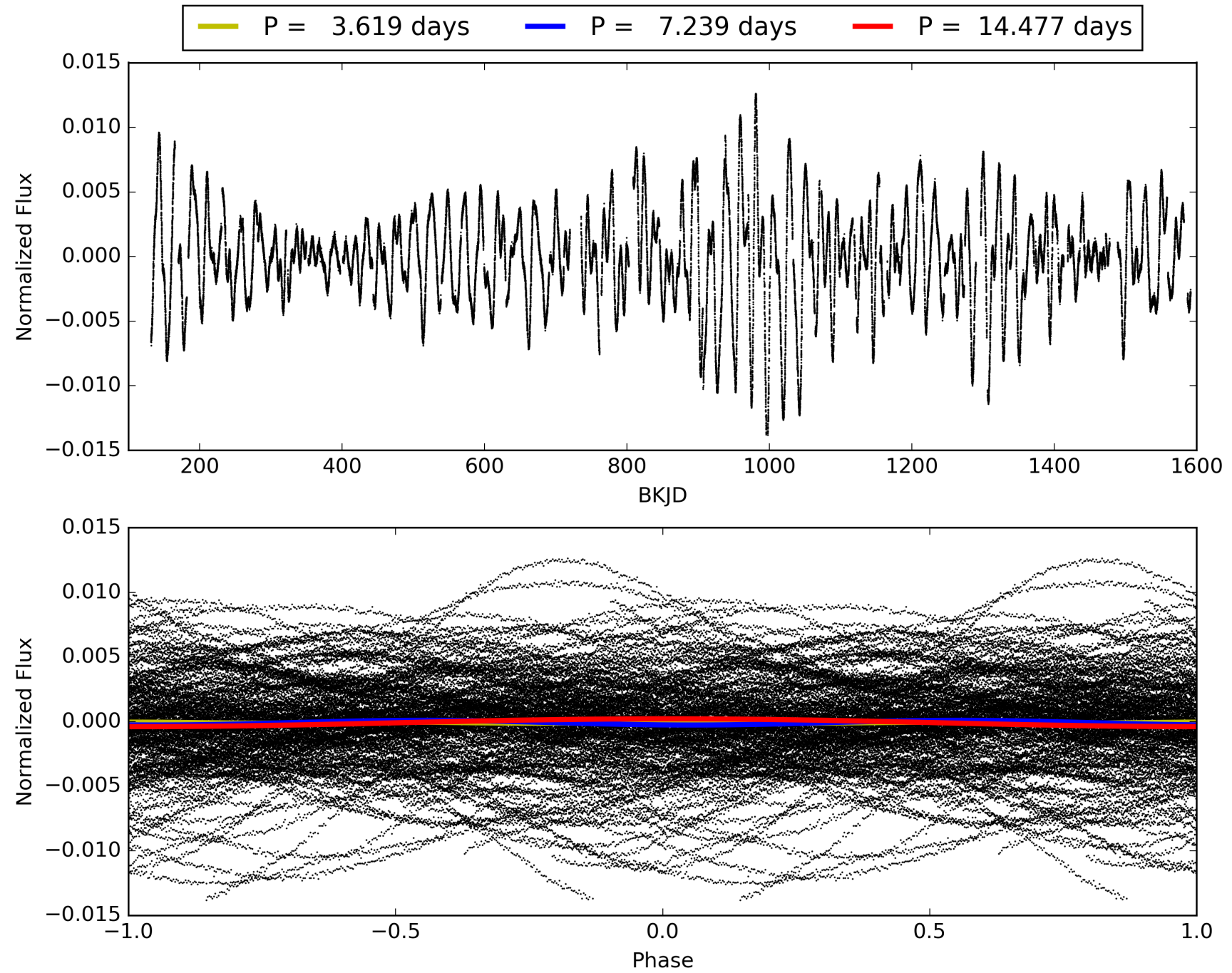
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 03:33:07 Z

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

# TCE 004827723-01, PDC Light Curves

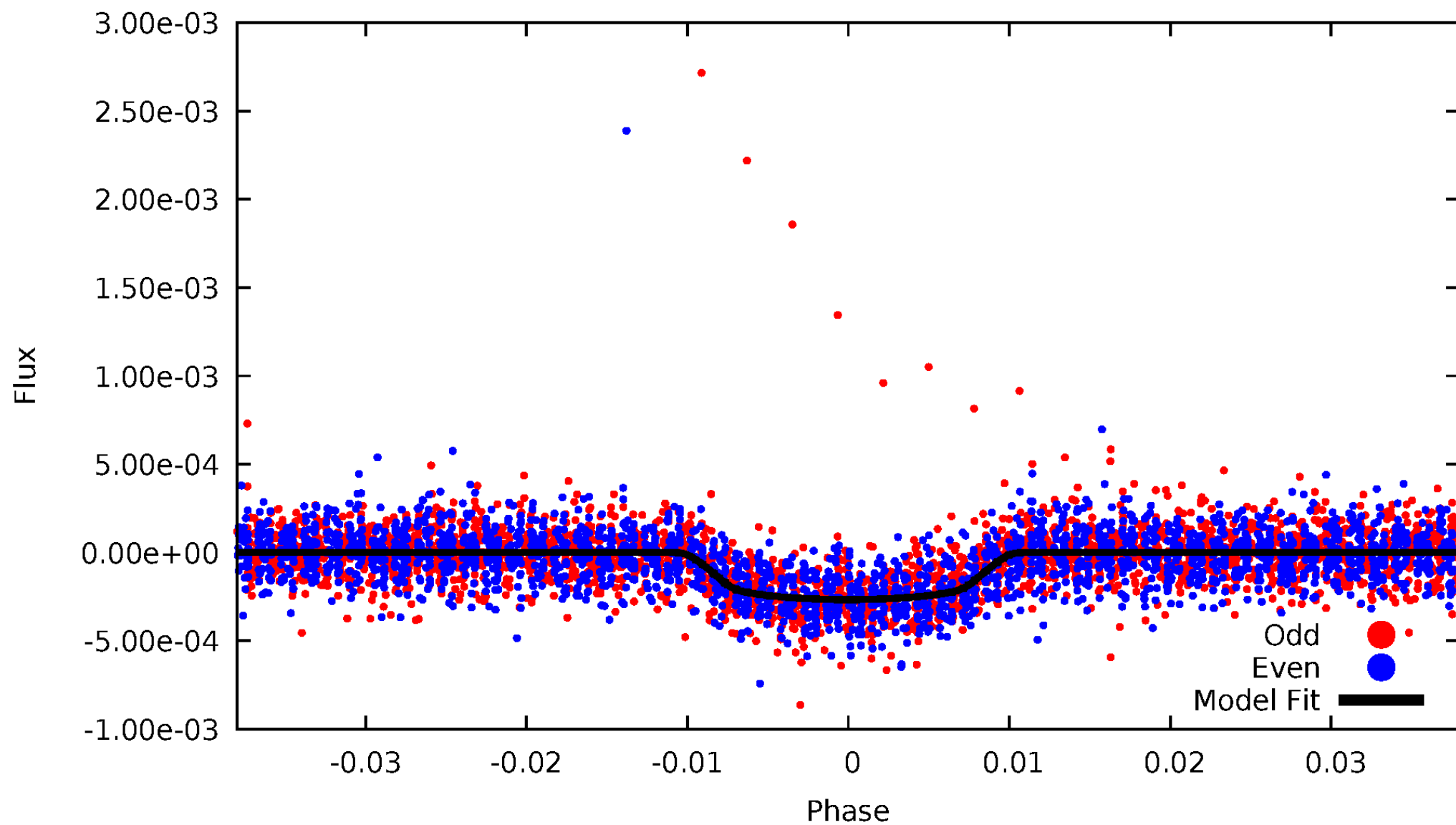


TCE 004827723-01



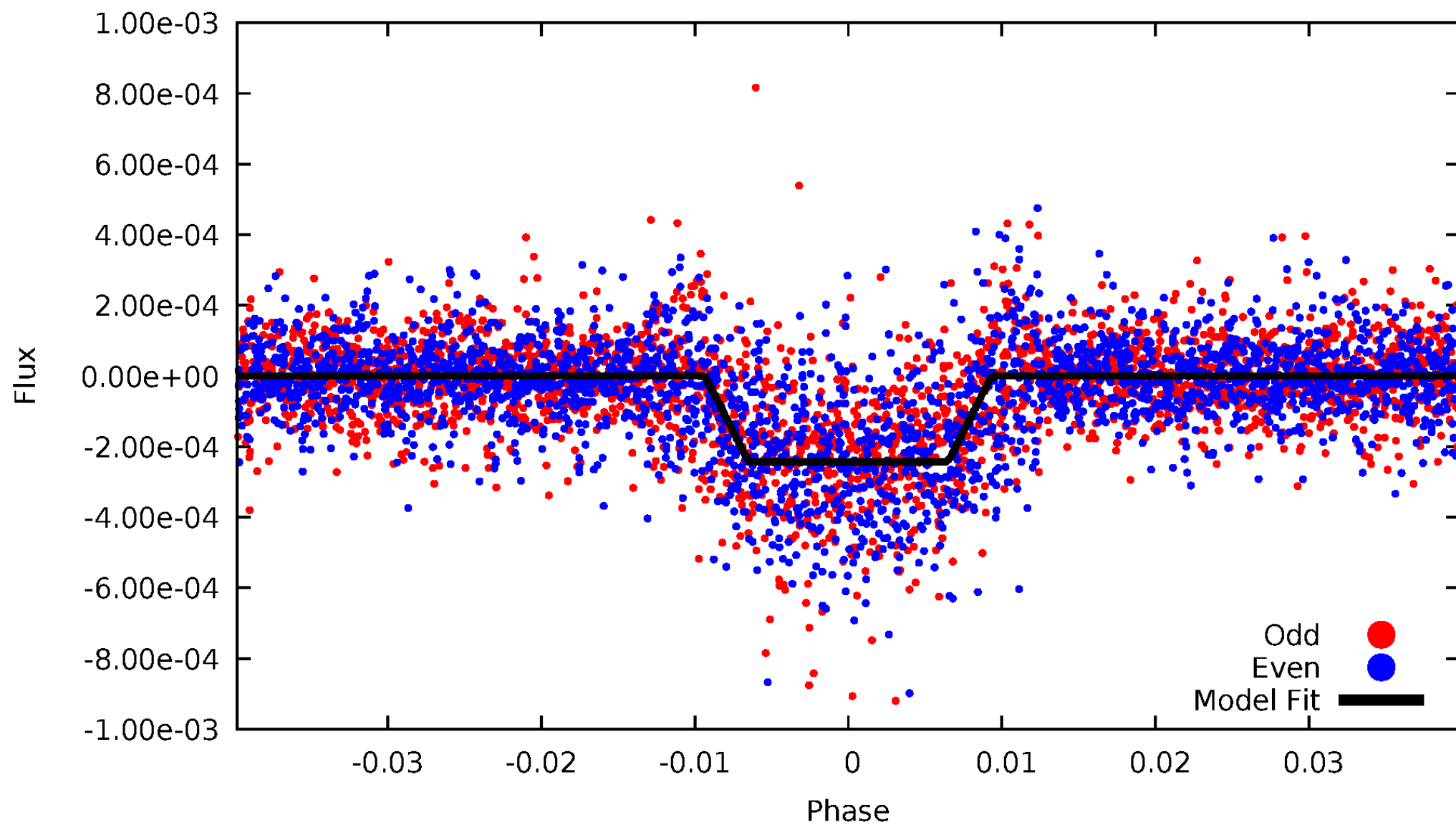
# DV Odd/Even

TCE 004827723-01



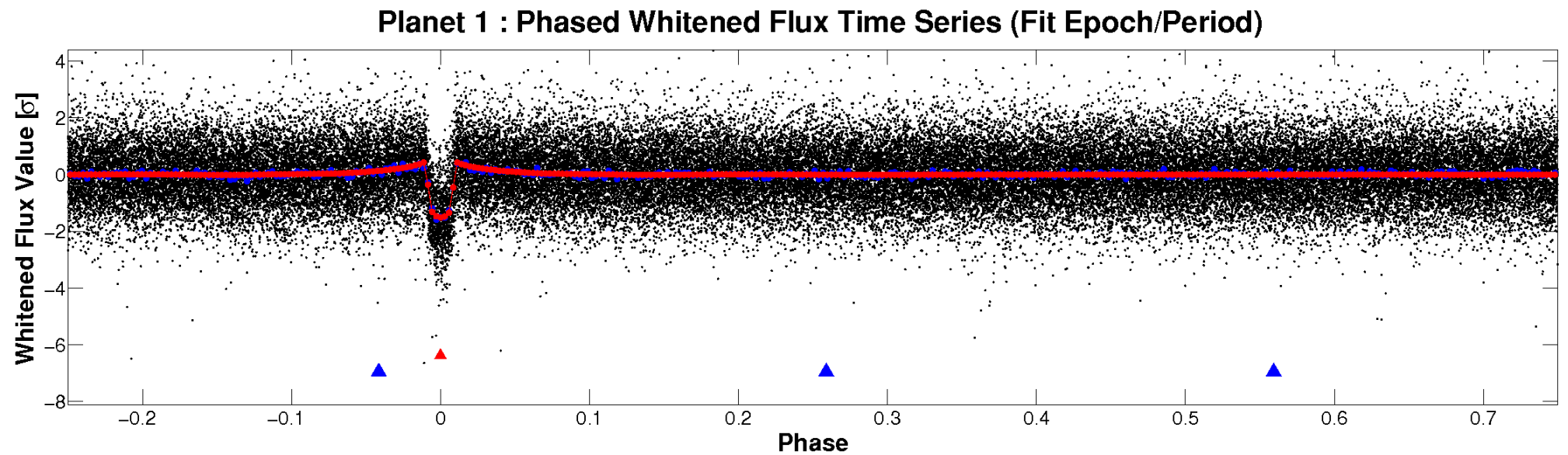
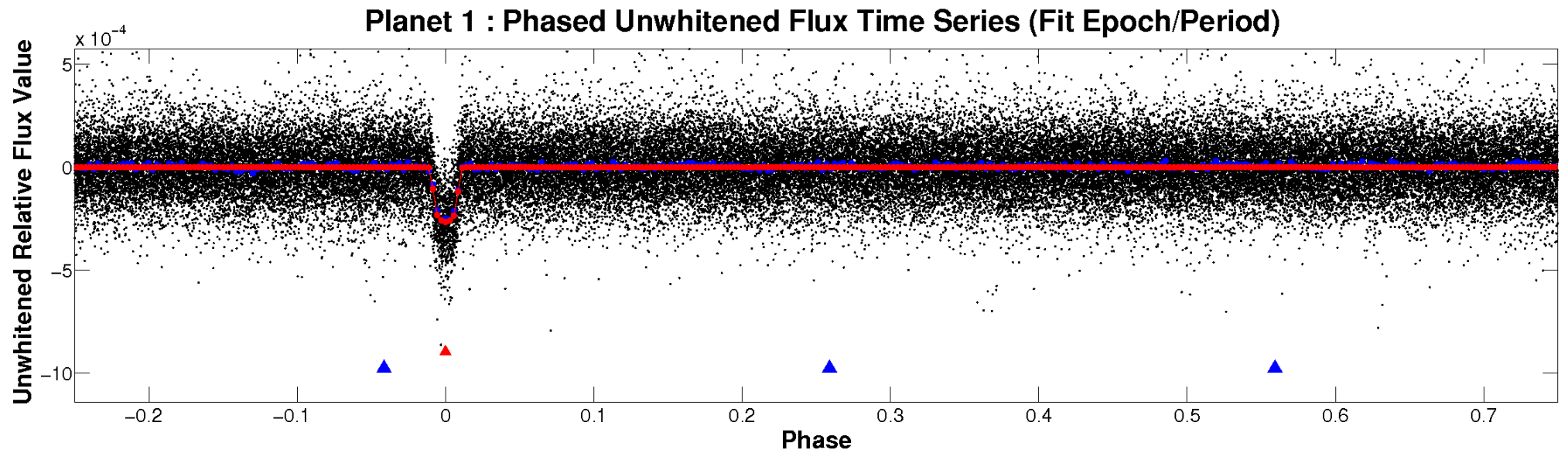
# ALT Odd/Even

TCE 004827723-01



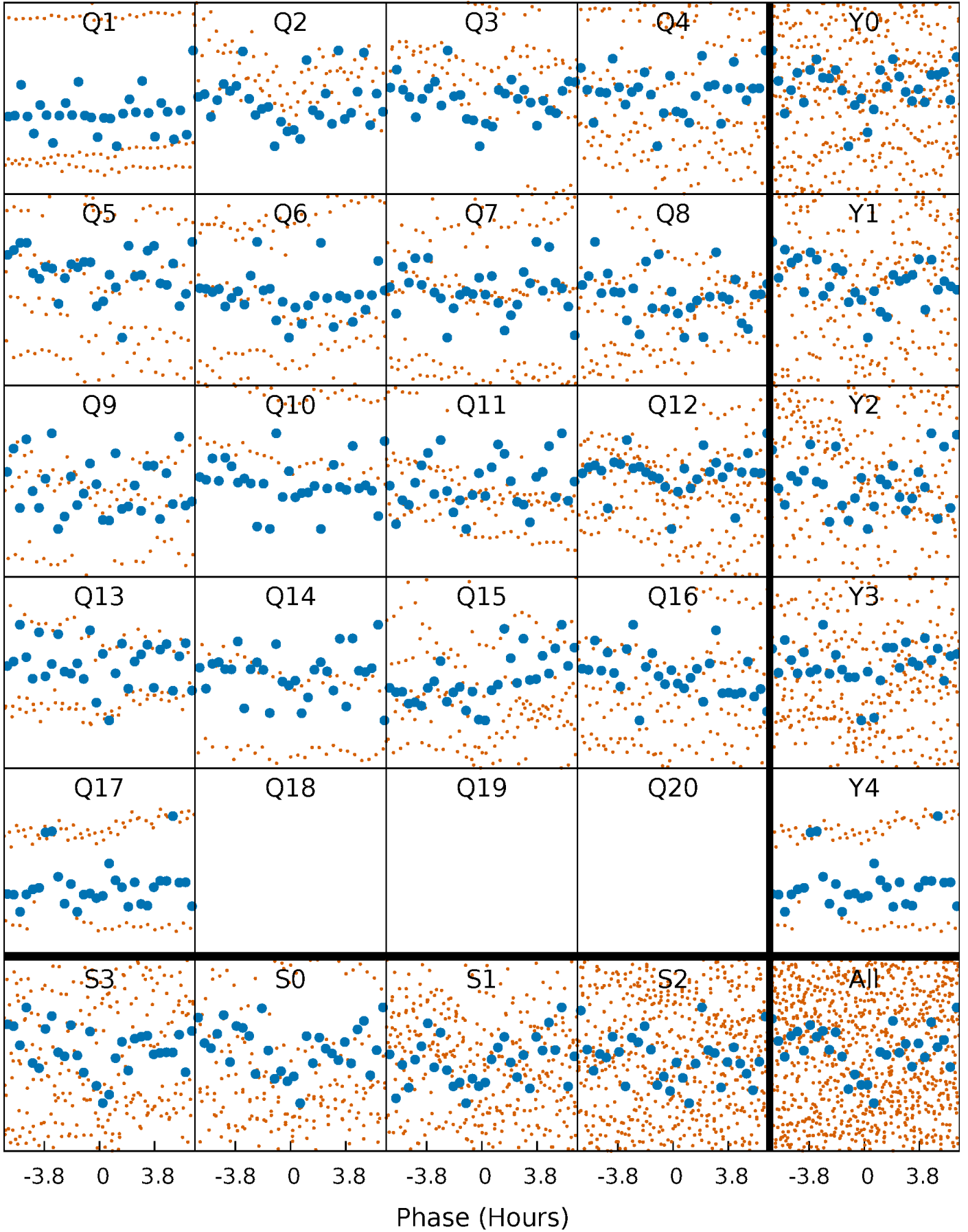


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

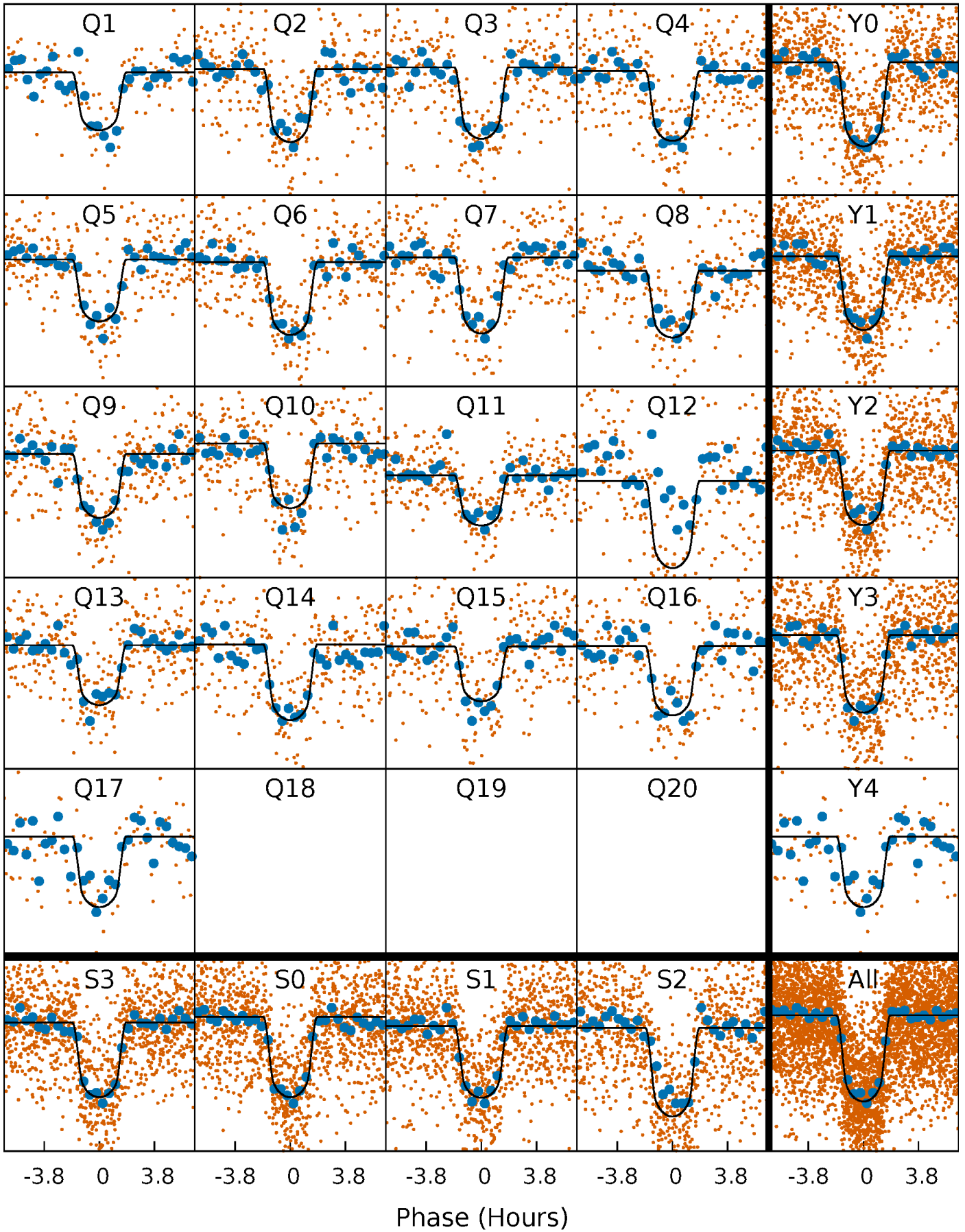
TCE 004827723-01   P= 7.238603 Days    $T_0=135.023062$  (BKJD)





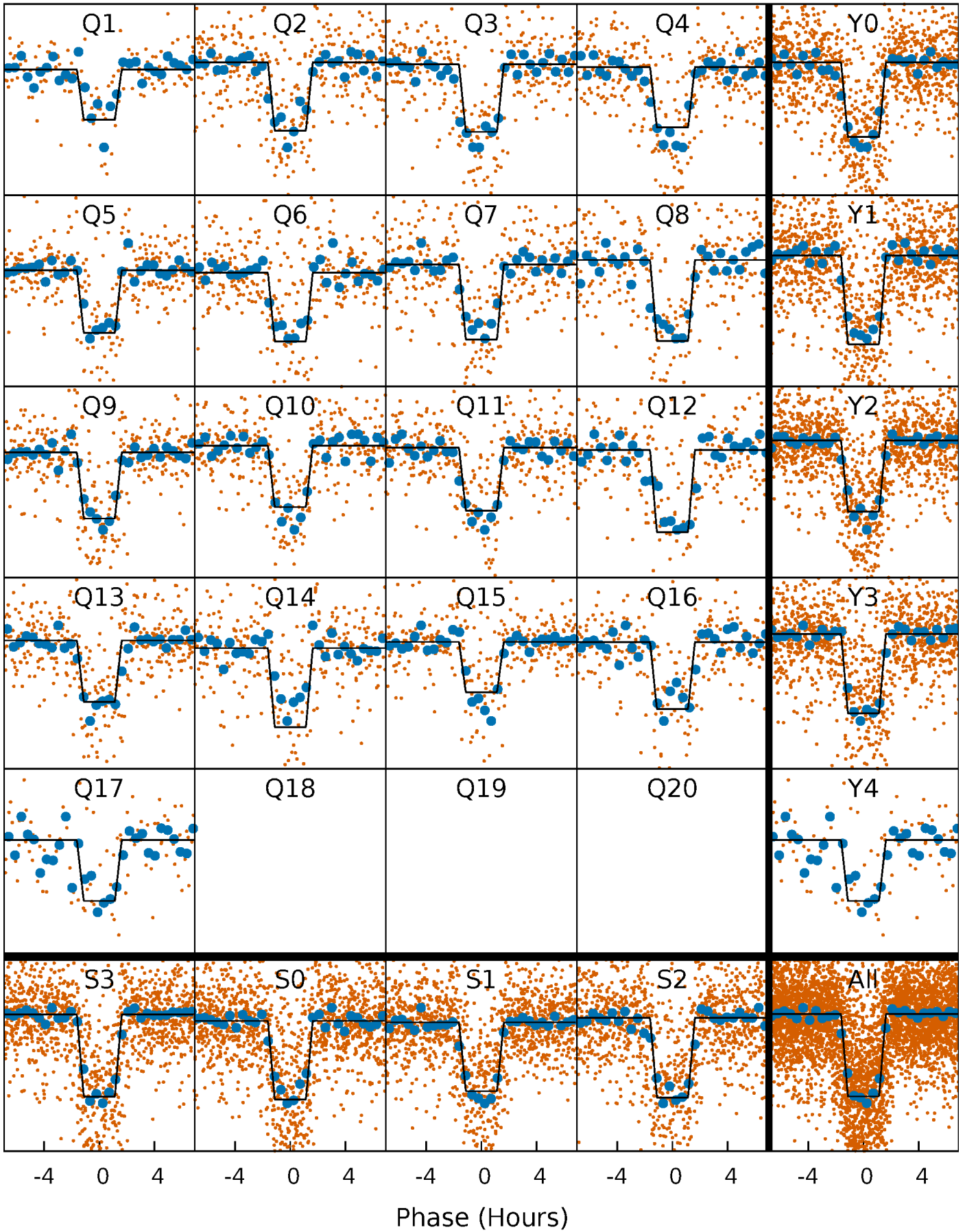
# DV Quarter-Phased Transit Curves

TCE 004827723-01 P= 7.238603 Days  $T_0=135.023062$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

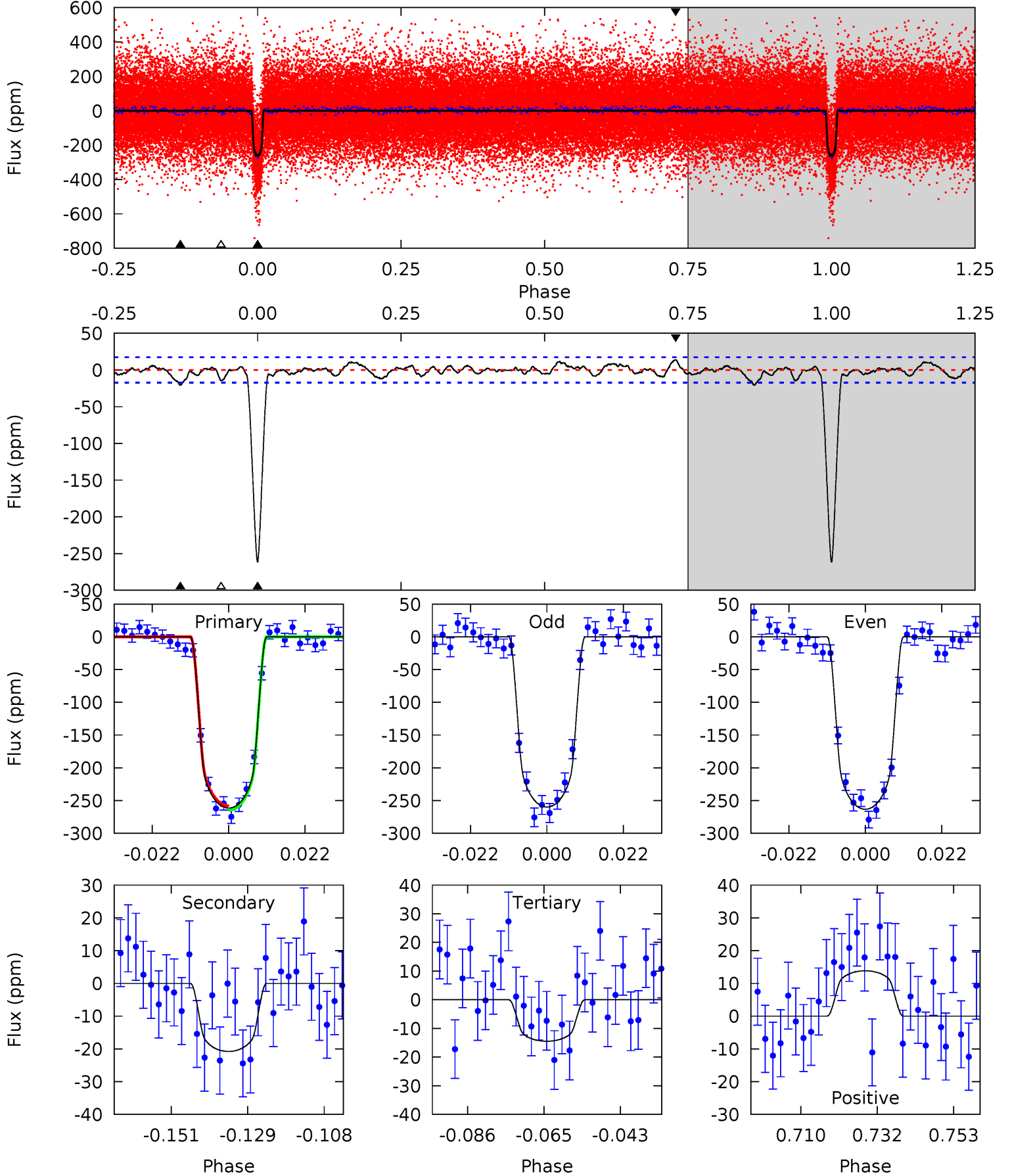
TCE 004827723-01 P= 7.238531 Days  $T_0=135.030991$  (BKJD)



# DV Model-Shift Uniqueness Test

004827723-01, P = 7.238603 Days, E = 127.784459 Days

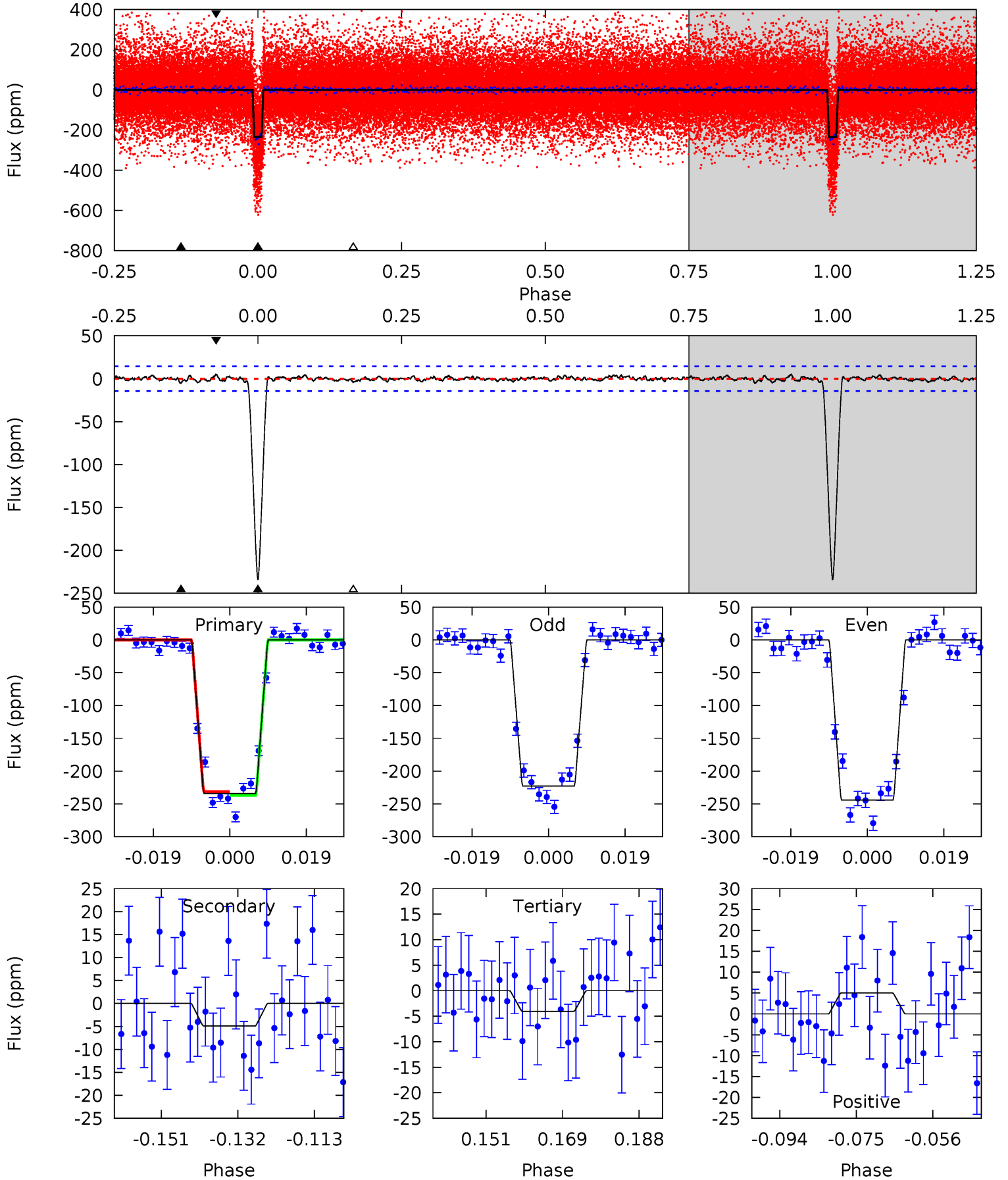
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
74.0	5.88	4.10	3.92	4.88	2.30	1.41	69.9	70.1	1.79	1.97	0.48	0.96	0.05	0.93



# Alt Model-Shift Uniqueness Test

004827723-01, P = 7.238531 Days, E = 127.792460 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
80.1	1.68	1.39	1.71	4.90	2.35	0.56	78.7	78.4	0.29	-0.03	3.67	1.05	0.02	0.98



### Stellar Parameters For KIC 004827723

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5411^{+96}_{-118}$	$4.561^{+0.018}_{-0.096}$	$0.060^{+0.150}_{-0.150}$	$0.831^{+0.097}_{-0.039}$	$0.917^{+0.038}_{-0.070}$	$2.250^{+0.194}_{-0.634}$
	+2%/-2%	+0%/-2%	+250%/-250%	+12%/-5%	+4%/-8%	+9%/-28%
Source	SPE59	SPE59	SPE59	DSEP		

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

### Secondary Eclipse Parameters for KIC 004827723-01 / KOI 0632.01

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-21 \pm 4$	$1.67^{+0.17}_{-0.19}$	$1154^{+39}_{-30}$	$3268^{+140}_{-140}$	$20^{+7}_{-5}$
Alt.	$-5 \pm 3$	$1.45^{+0.18}_{-0.18}$	$1155^{+36}_{-32}$	$2742^{+229}_{-371}$	$6.237^{+4.587}_{-4.131}$

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

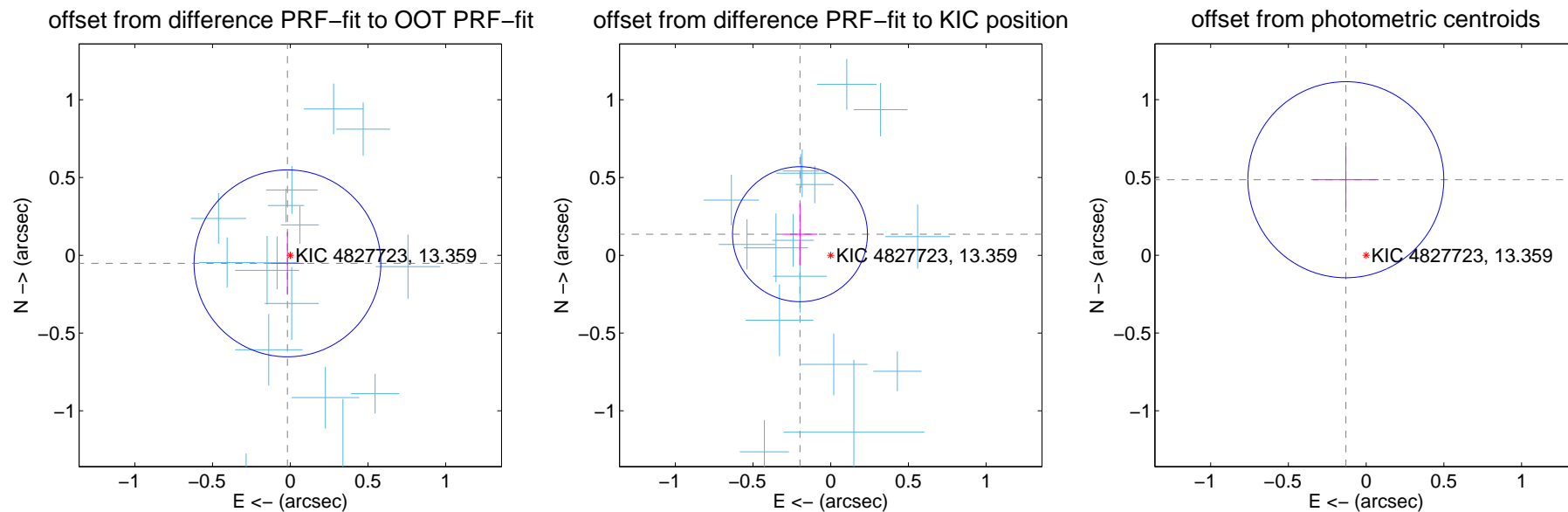
## DV Centroid Data

Supplemental centroid analysis for 004827723-01. Kepler magnitude: 13.36. Transit SNR 45.97

There are 17 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.32 arcsec

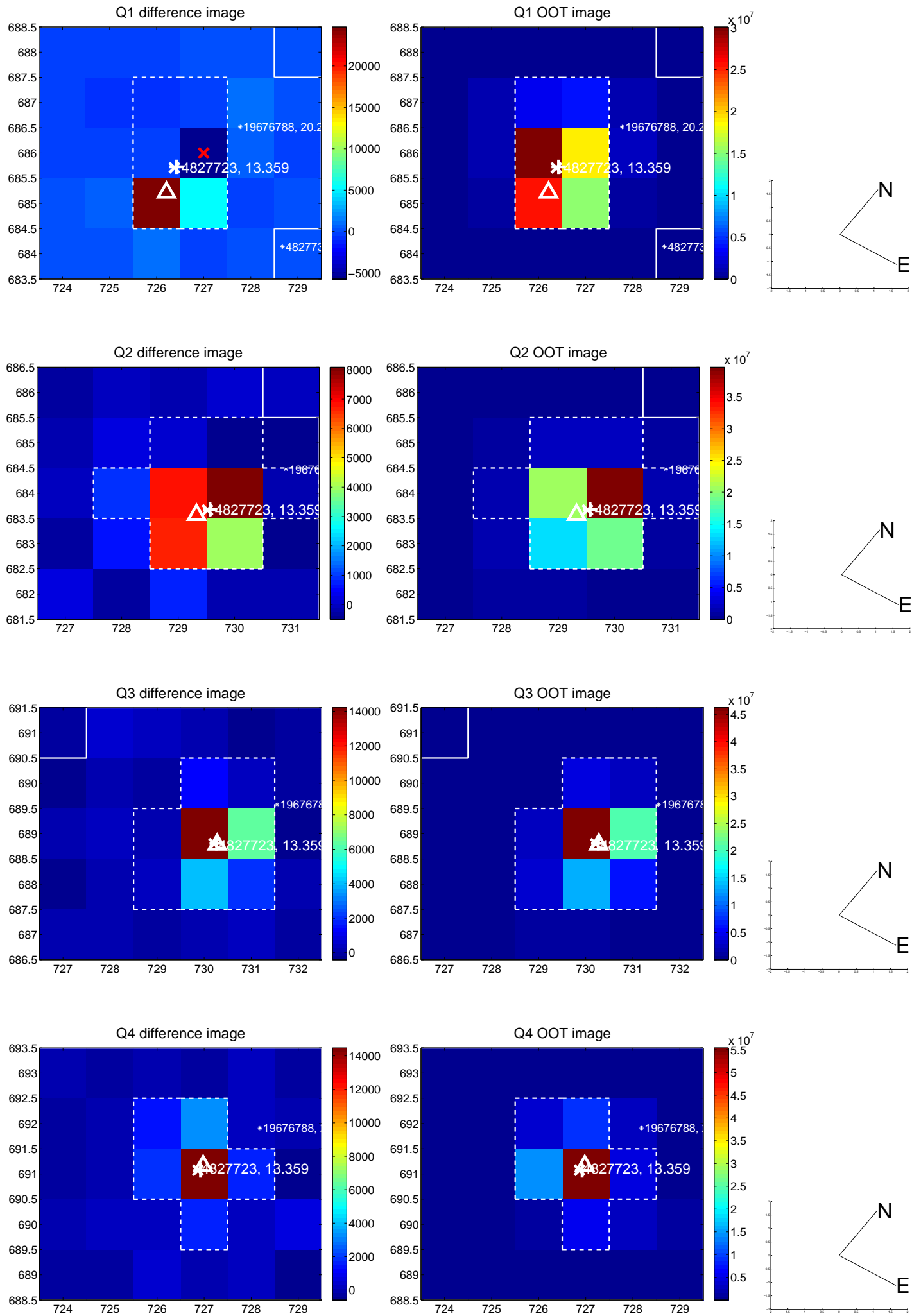
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.055 \pm 0.200$	0.27	$0.018 \pm 0.107$	$-0.052 \pm 0.202$
PRF-fit source offset from KIC position	$0.240 \pm 0.145$	1.66	$0.198 \pm 0.111$	$0.136 \pm 0.199$
photometric centroid source offset	$0.50 \pm 0.21$	2.39	$0.13 \pm 0.21$	$0.49 \pm 0.21$



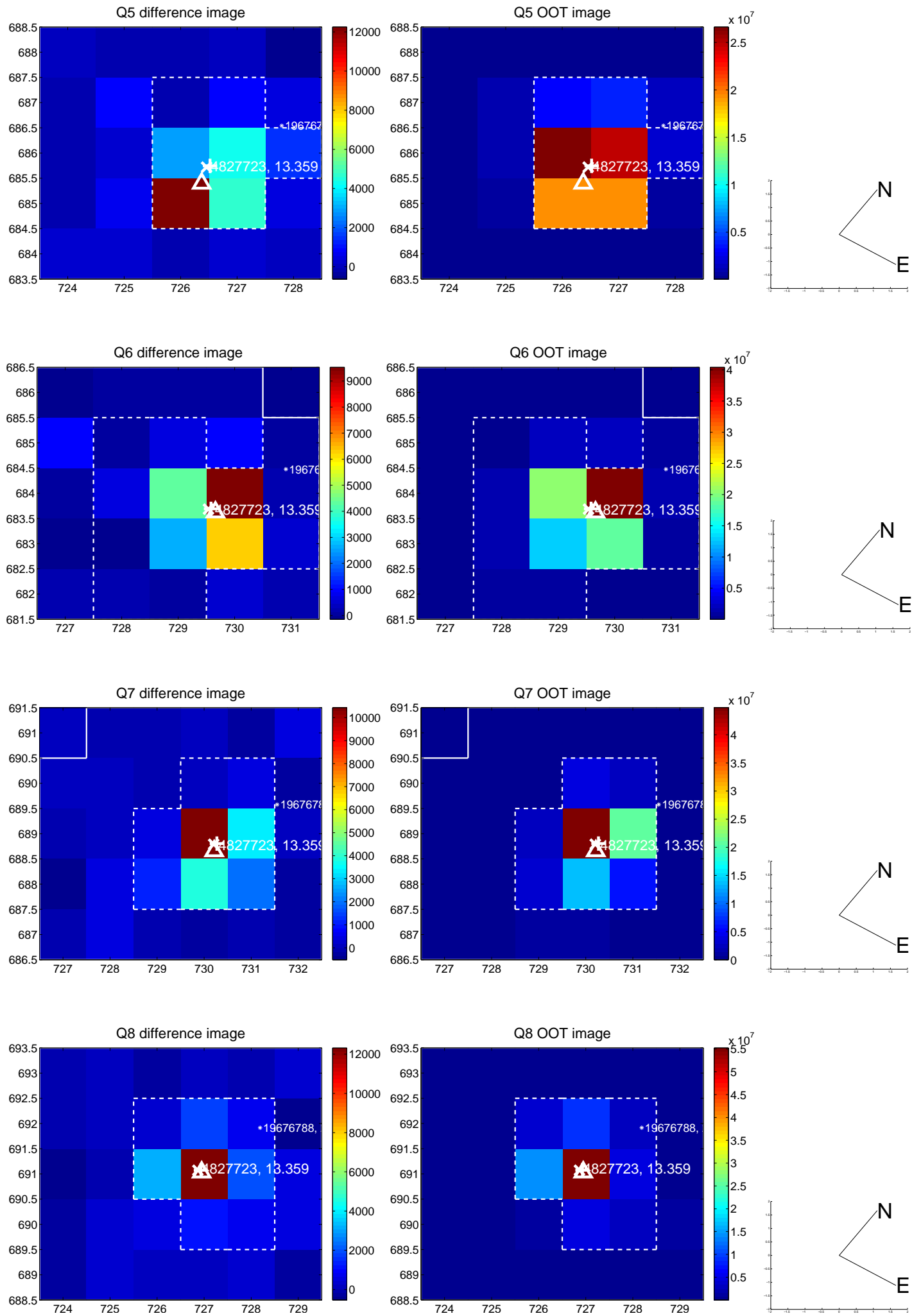
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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



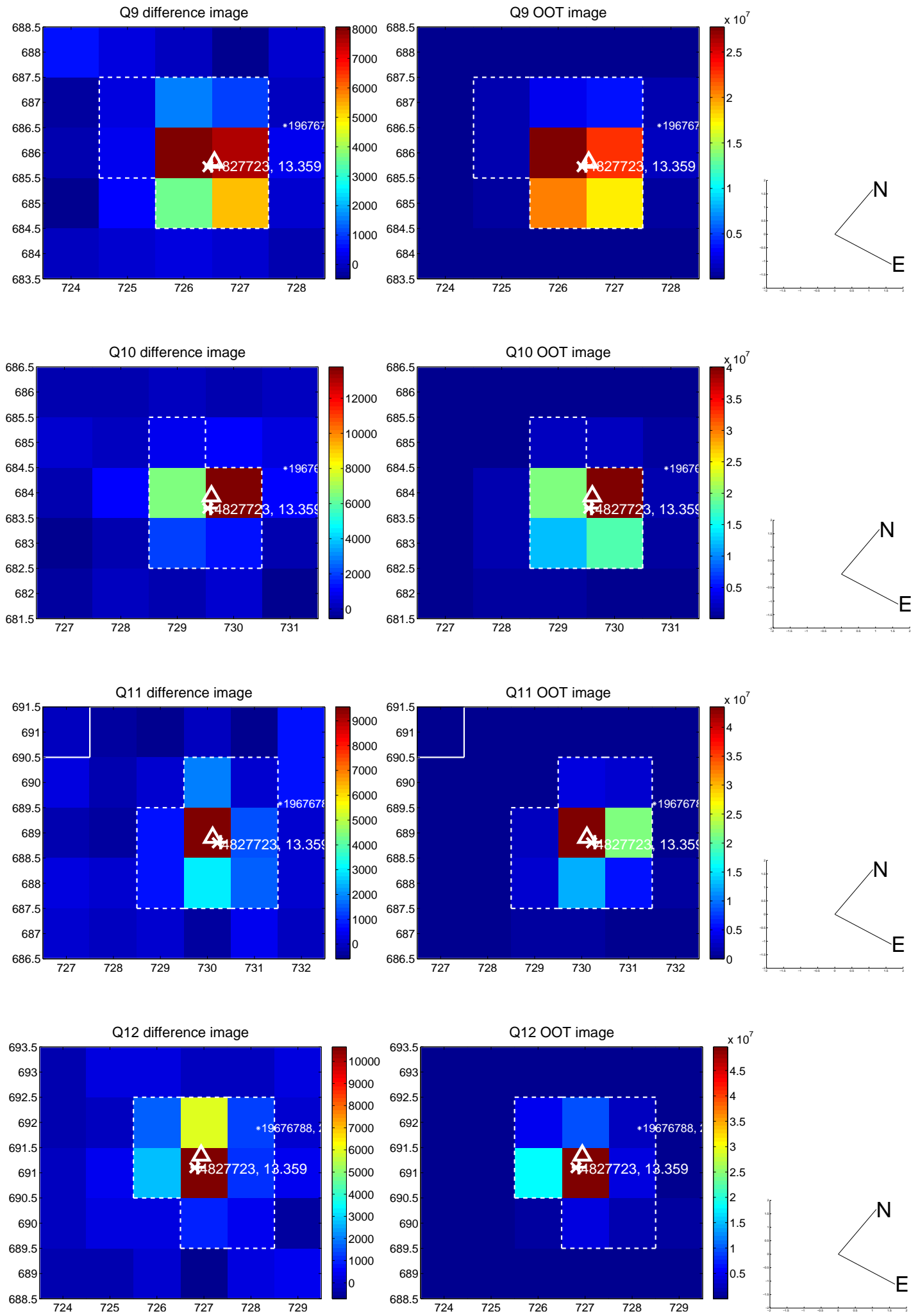
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



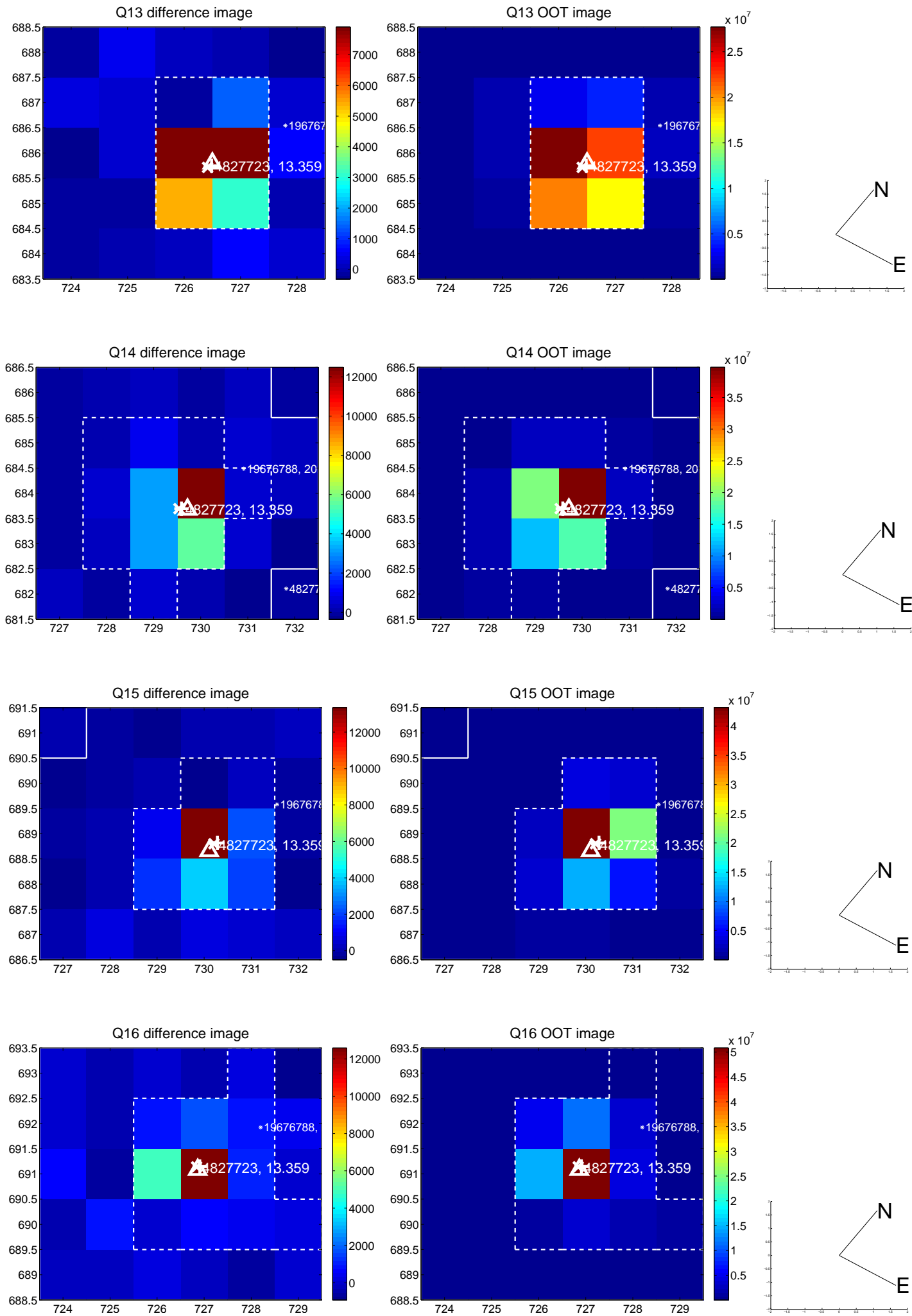
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



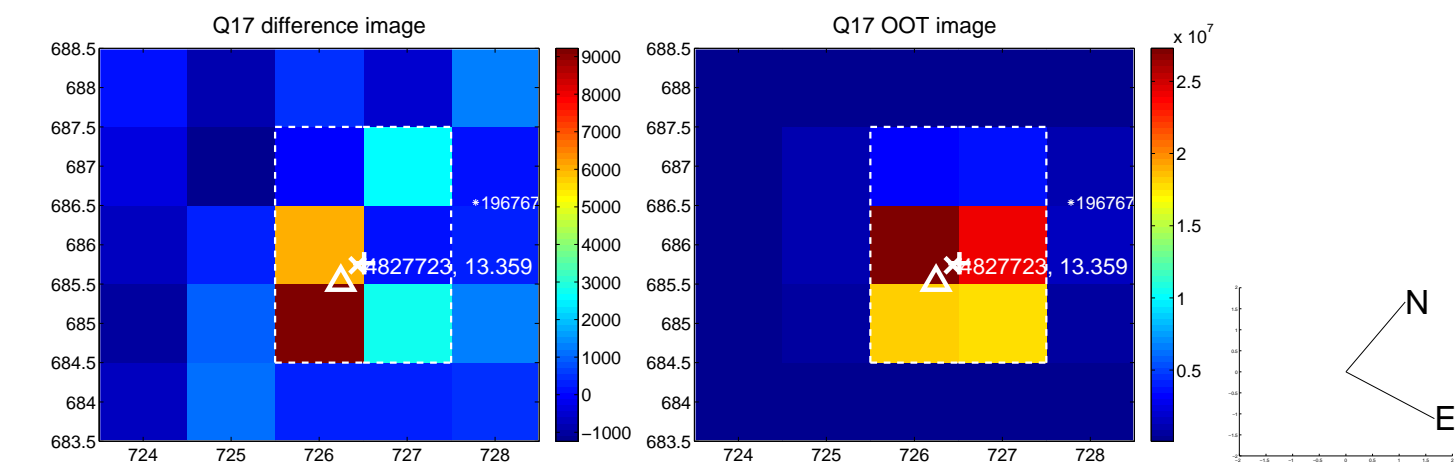
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



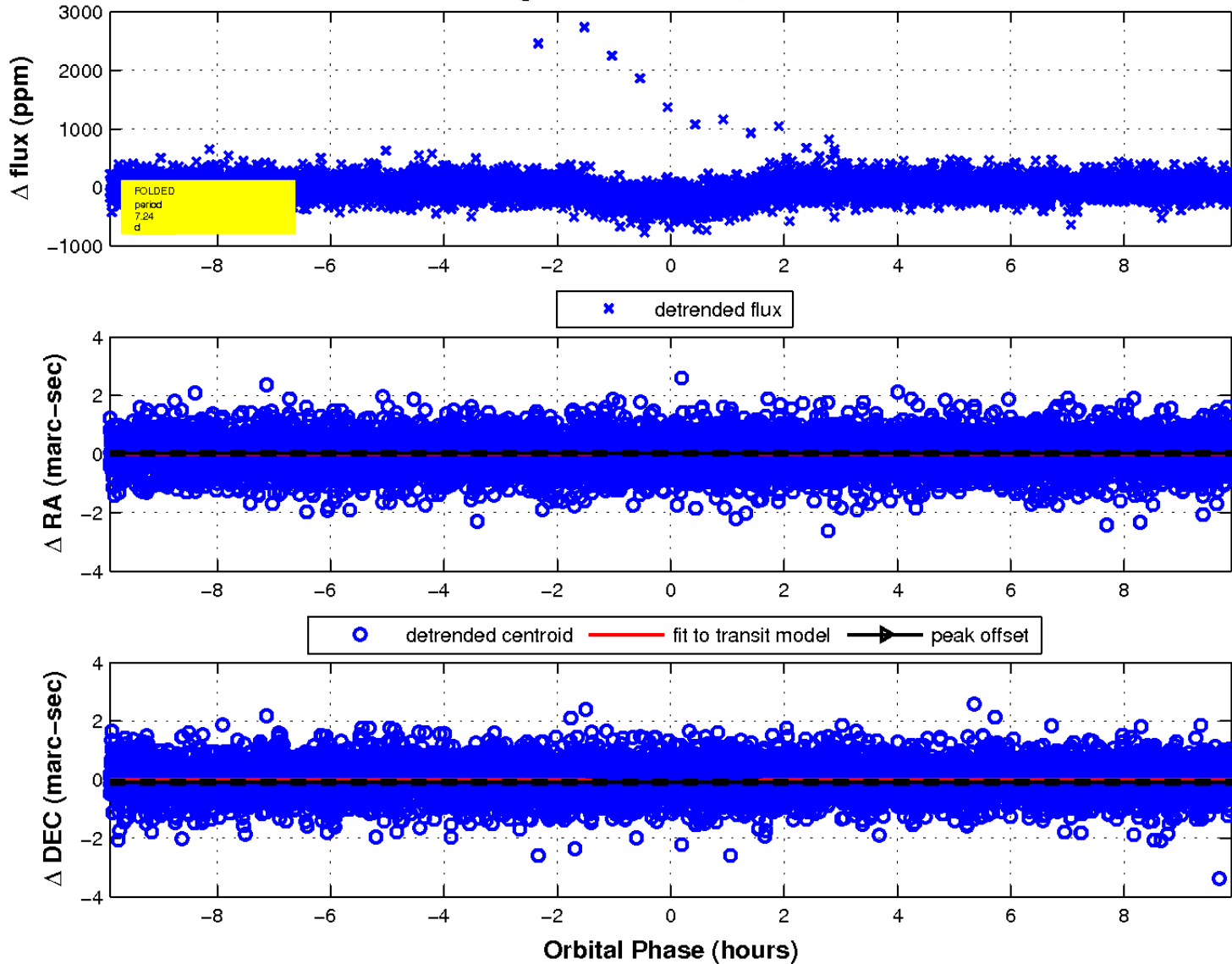
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

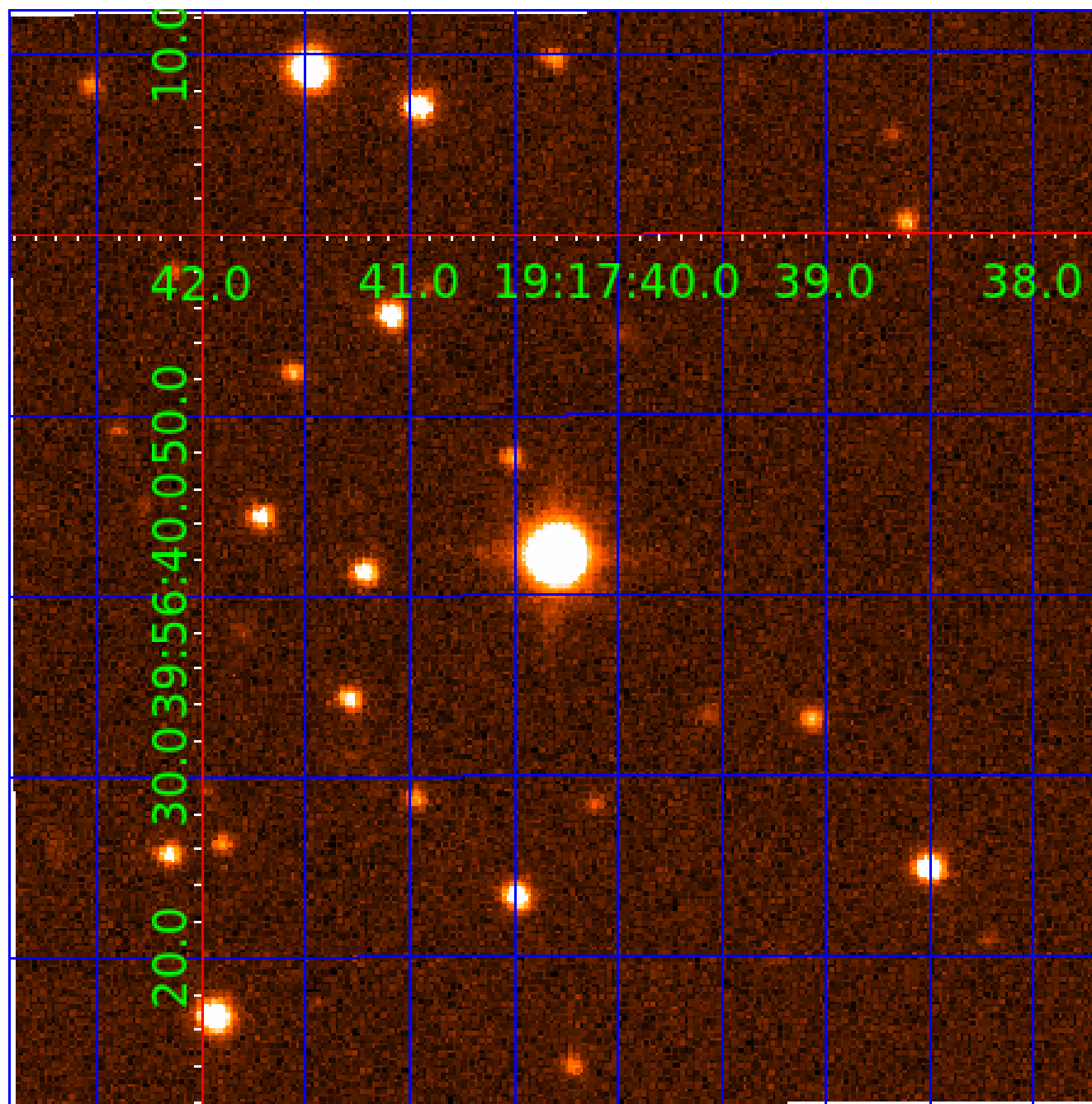


fluxWeightedCentroids, Planet 1 of 2



UKIRT Image

Declination





# KIC 004827723

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004827723-01	OBS	0632.01	7.238603	135.023062	266.0	3.298	42.1	46.0	0.83	5411	1.62	104.76
004827723-02	OBS	No	523.353592	330.165654	383.0	3.769	14.1	7.6	0.83	5411	1.75	0.35

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004827723-01	OBS	PC	1.00	0	0	0	0	NO_COMMENT
004827723-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_ALT—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS

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

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

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

## Ephemeris Match Information For 004827723-02

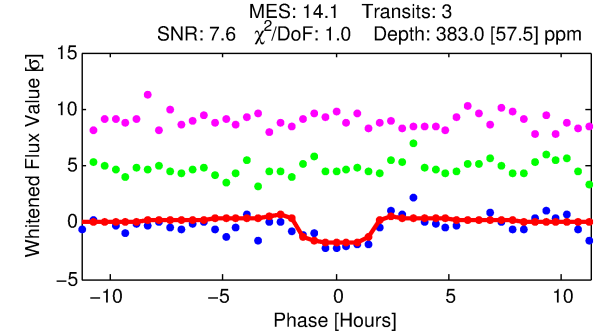
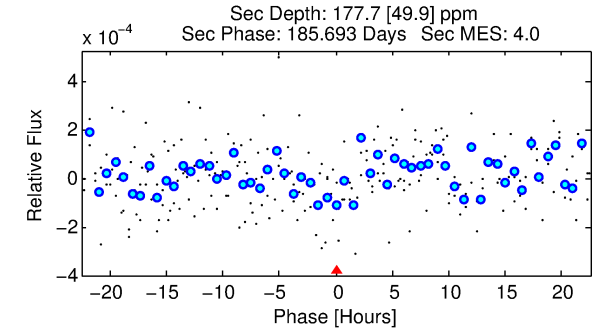
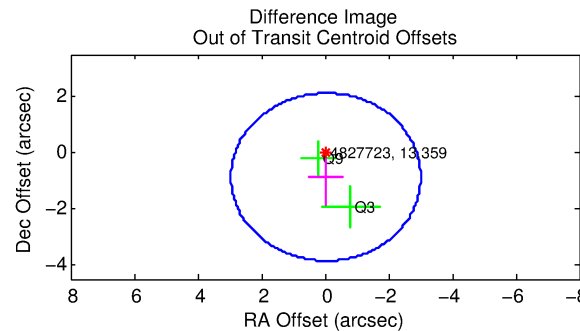
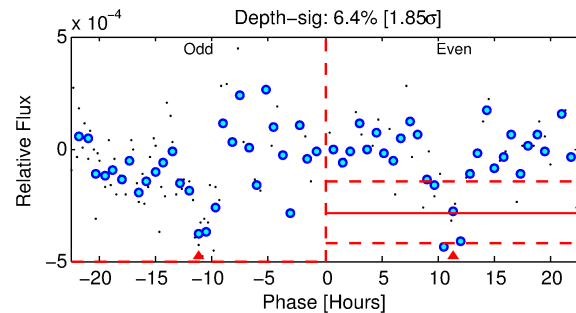
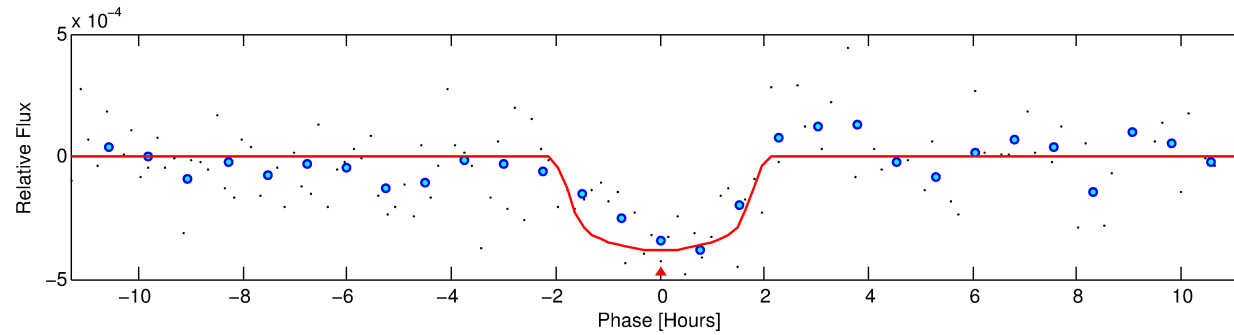
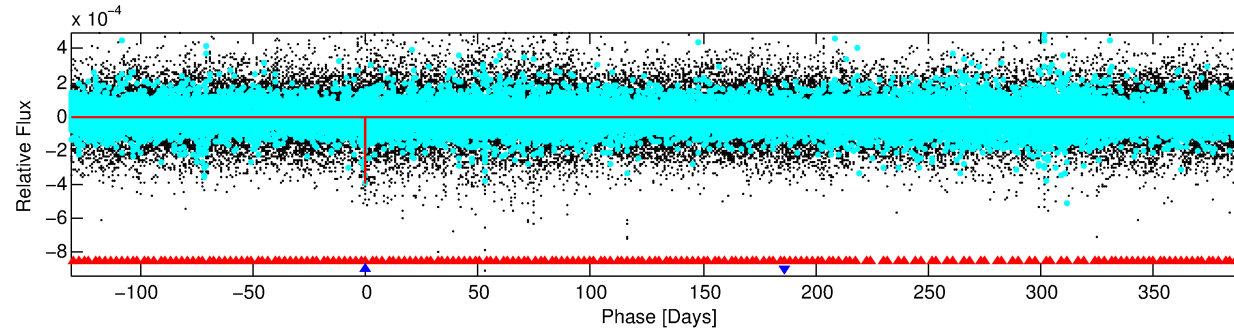
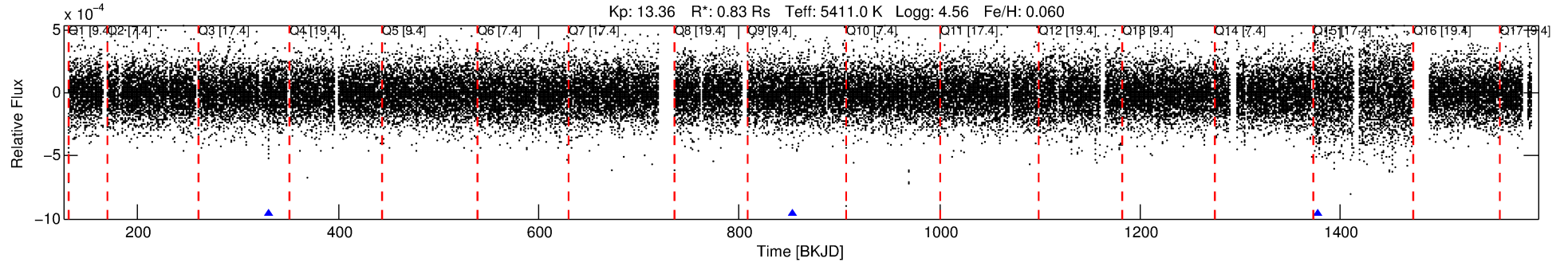
No Significant Match Found

# DV One-Page Summary

KIC: 4827723 Candidate: 2 of 2 Period: 523.354 d

KOI: K00632 Corr: No Ephemeris Match

Kp: 13.36 R\*: 0.83 Rs Teff: 5411.0 K Logg: 4.56 Fe/H: 0.060



## DV Fit Results:

Period = 523.35359 [0.00695] d  
Epoch = 330.1657 [0.0087] BKJD  
Rp/R\* = 0.0193 [0.0382]  
a/R\* = 763.30 [5926.43]  
b = 0.72 [5.26]  
Seff = 0.35 [0.07]  
Teq = 196 [9] K  
Rp = 1.75 [3.47] Re  
a = 1.2349 [0.1323] AU  
Ag = 48715.52 [193474.76] [0.25σ]  
Teffp = 4498 [4463] K [0.96σ]

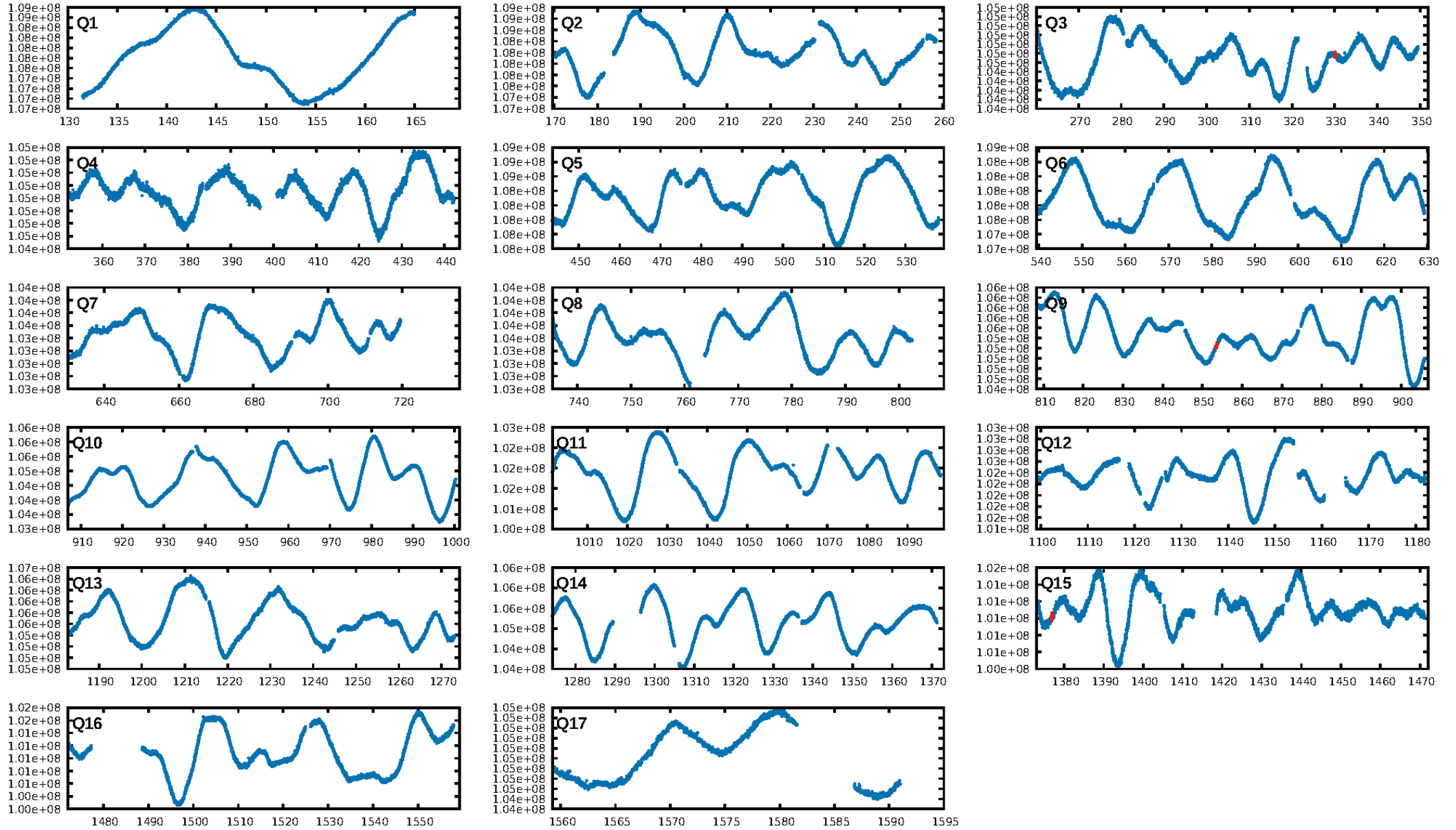
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [2473.07σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.2%  
ModelChiSquareGof-sig: 91.5%  
Bootstrap-pfa: 2.62e-20  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.791  
Centroid-sig: 2.2%  
Centroid-so: 1.512 arcsec [1.42σ]  
OotOffset-rm: 0.872 arcsec [0.88σ]  
KicOffset-rm: 0.695 arcsec [0.68σ]  
OotOffset-st: 0/1/0/1 [2]  
KicOffset-st: 0/1/0/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 0.67 [2/3]

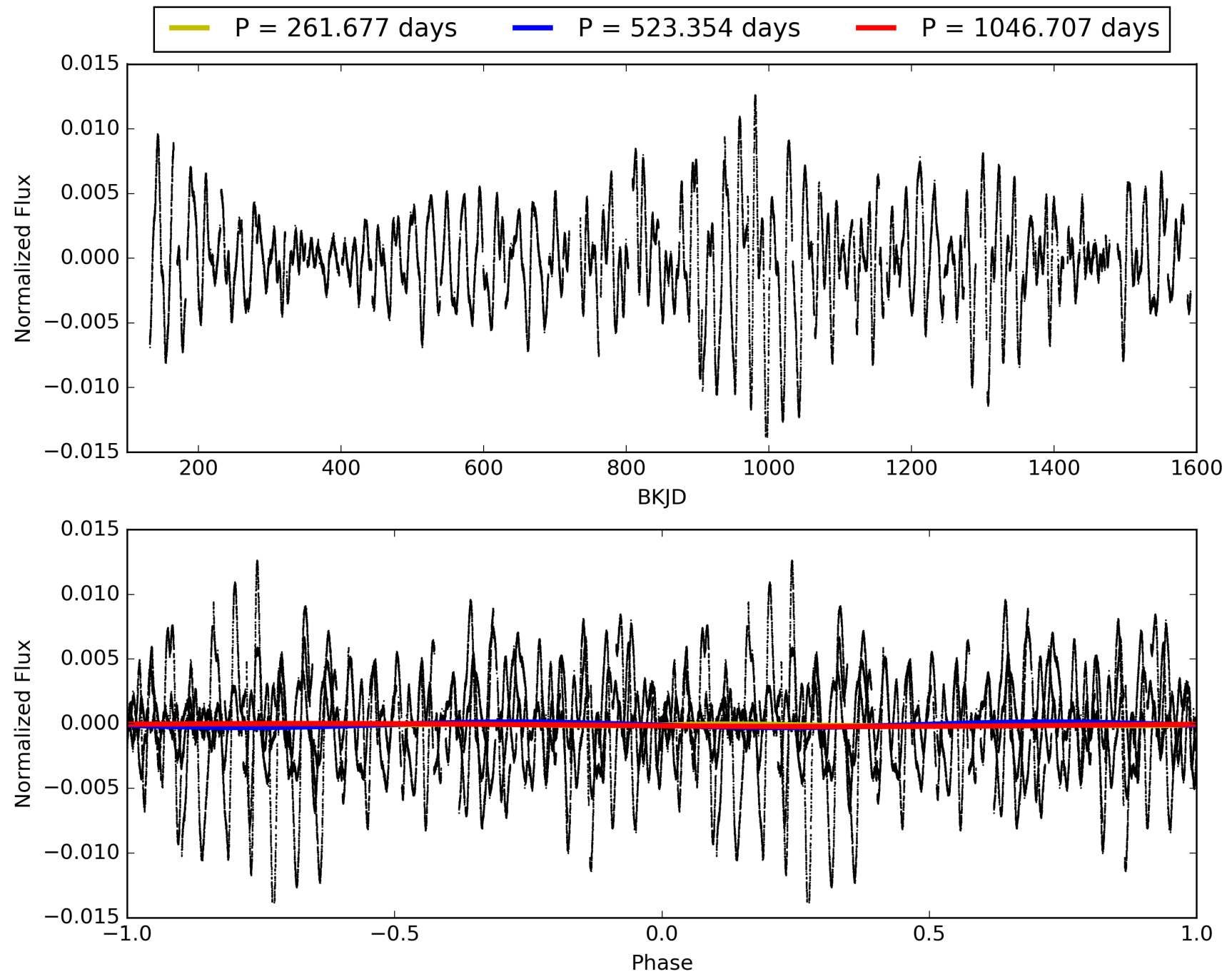
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 03:33:26 Z

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

# TCE 004827723-02, PDC Light Curves

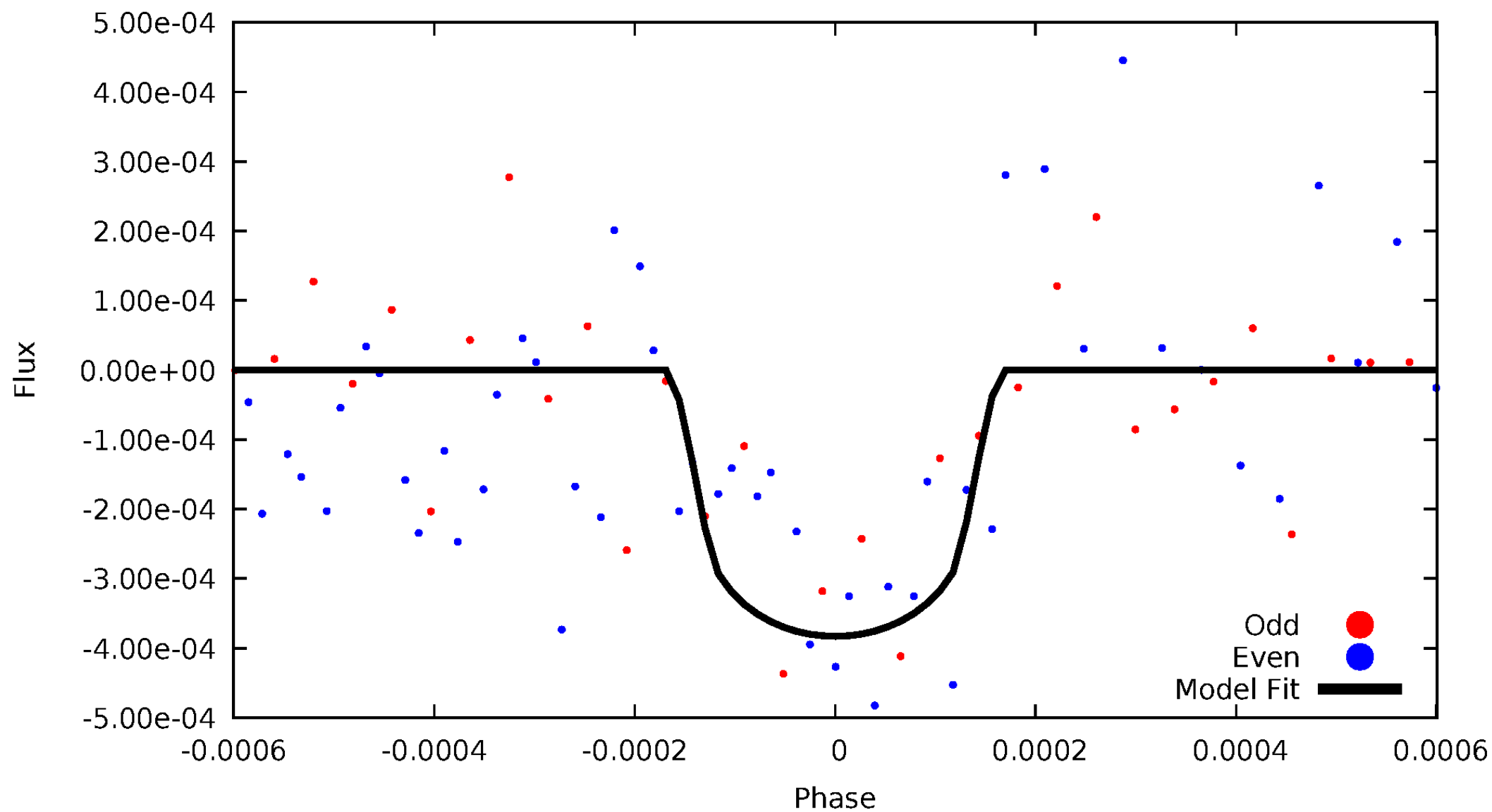


TCE 004827723-02



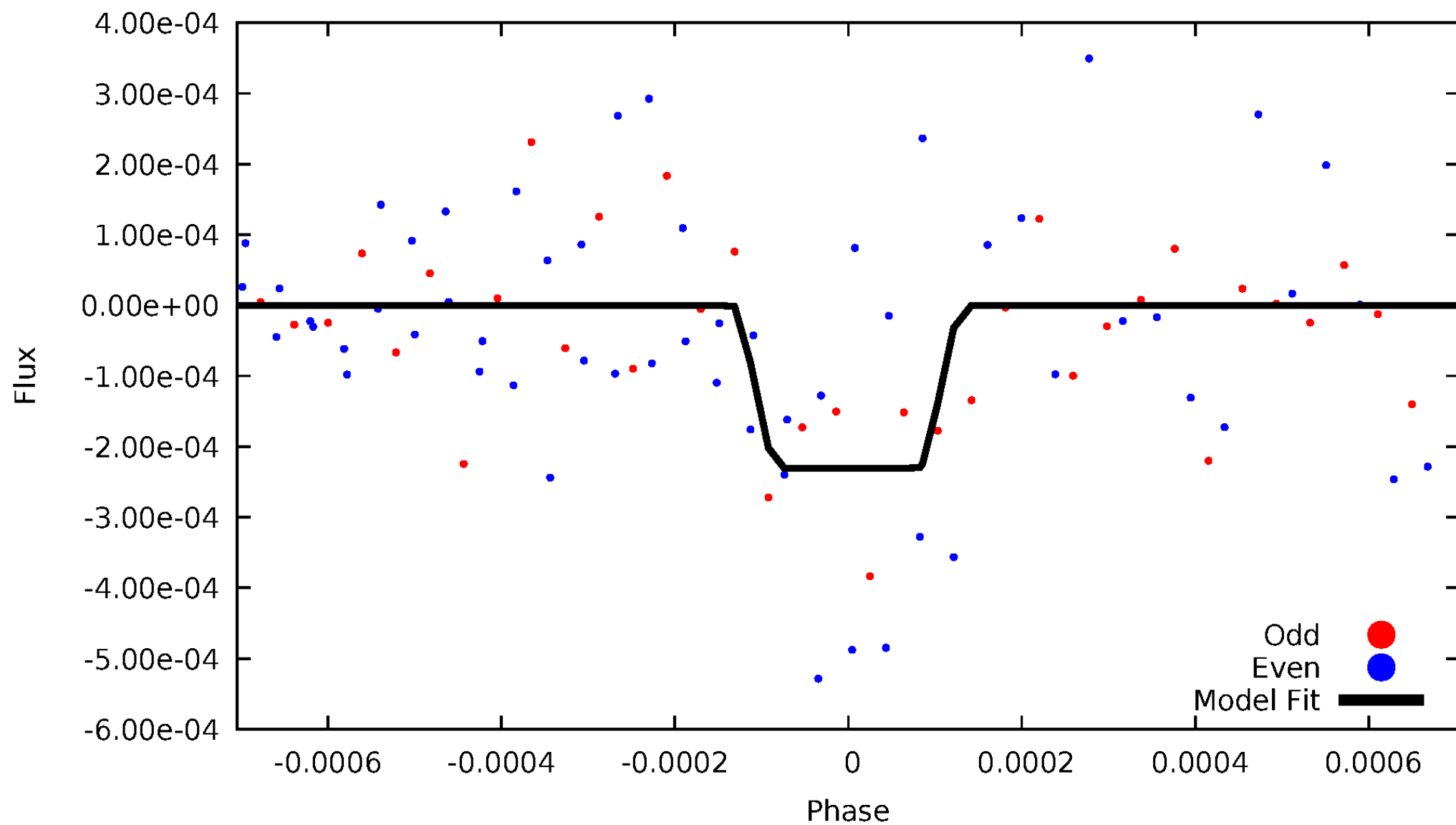
# DV Odd/Even

TCE 004827723-02



# ALT Odd/Even

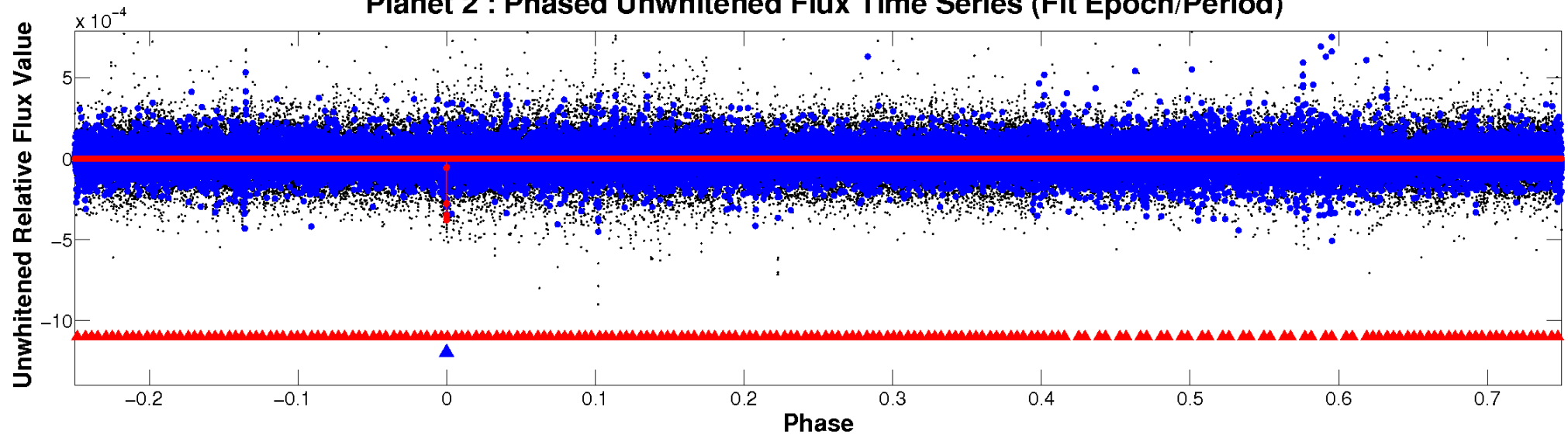
TCE 004827723-02



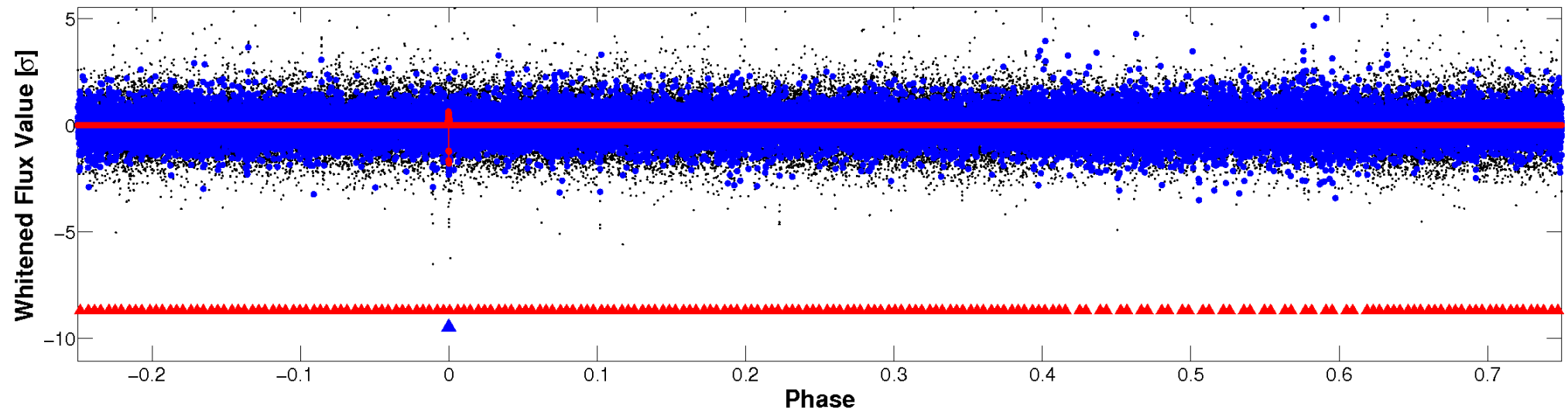


# Non-Whitened Vs. Whitened Light Curve

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

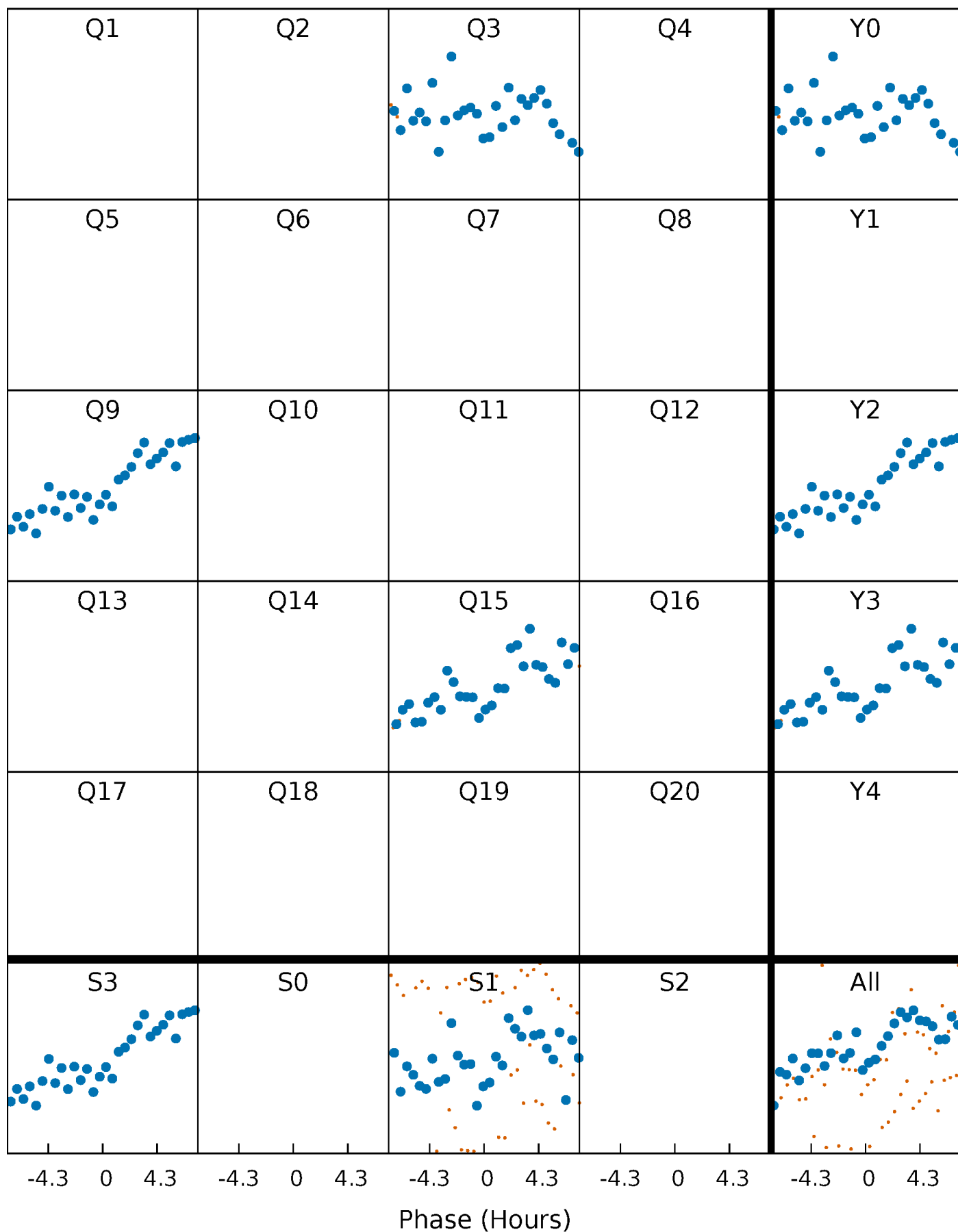


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



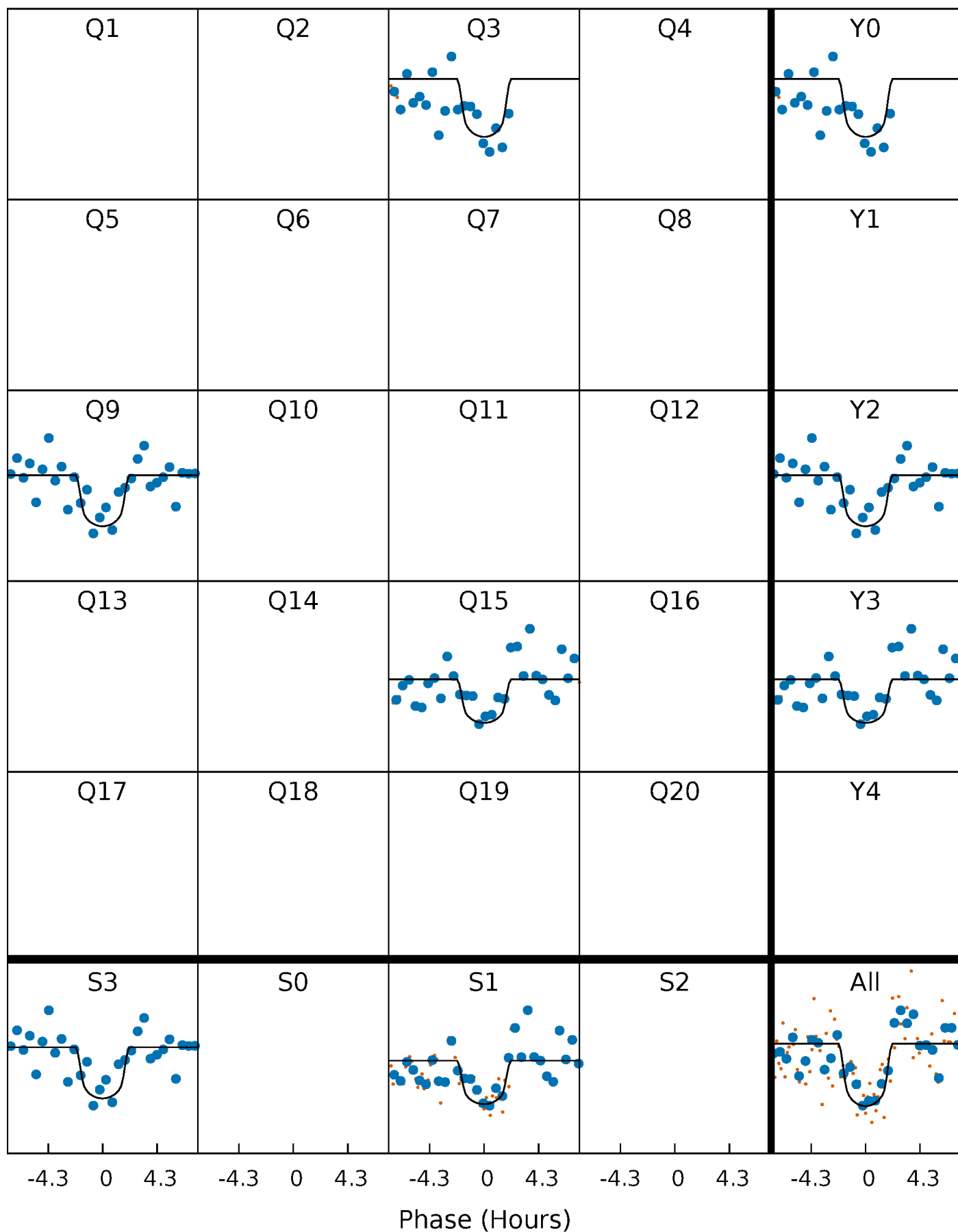
# PDC Quarter-Phased Transit Curves

TCE 004827723-02     $P=523.353592$  Days     $T_0=330.165654$  (BKJD)



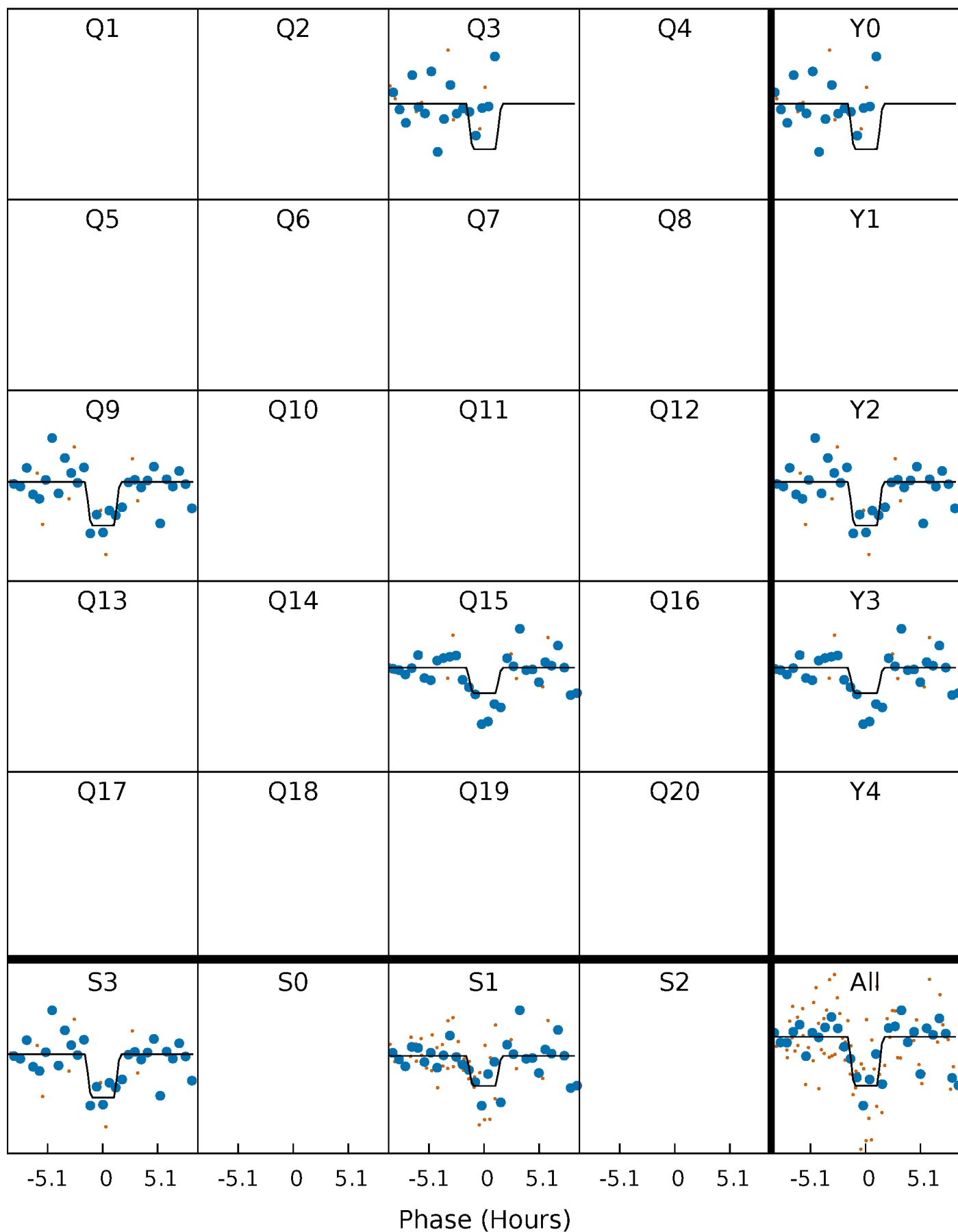
# DV Quarter-Phased Transit Curves

TCE 004827723-02     $P=523.353592$  Days     $T_0=330.165654$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

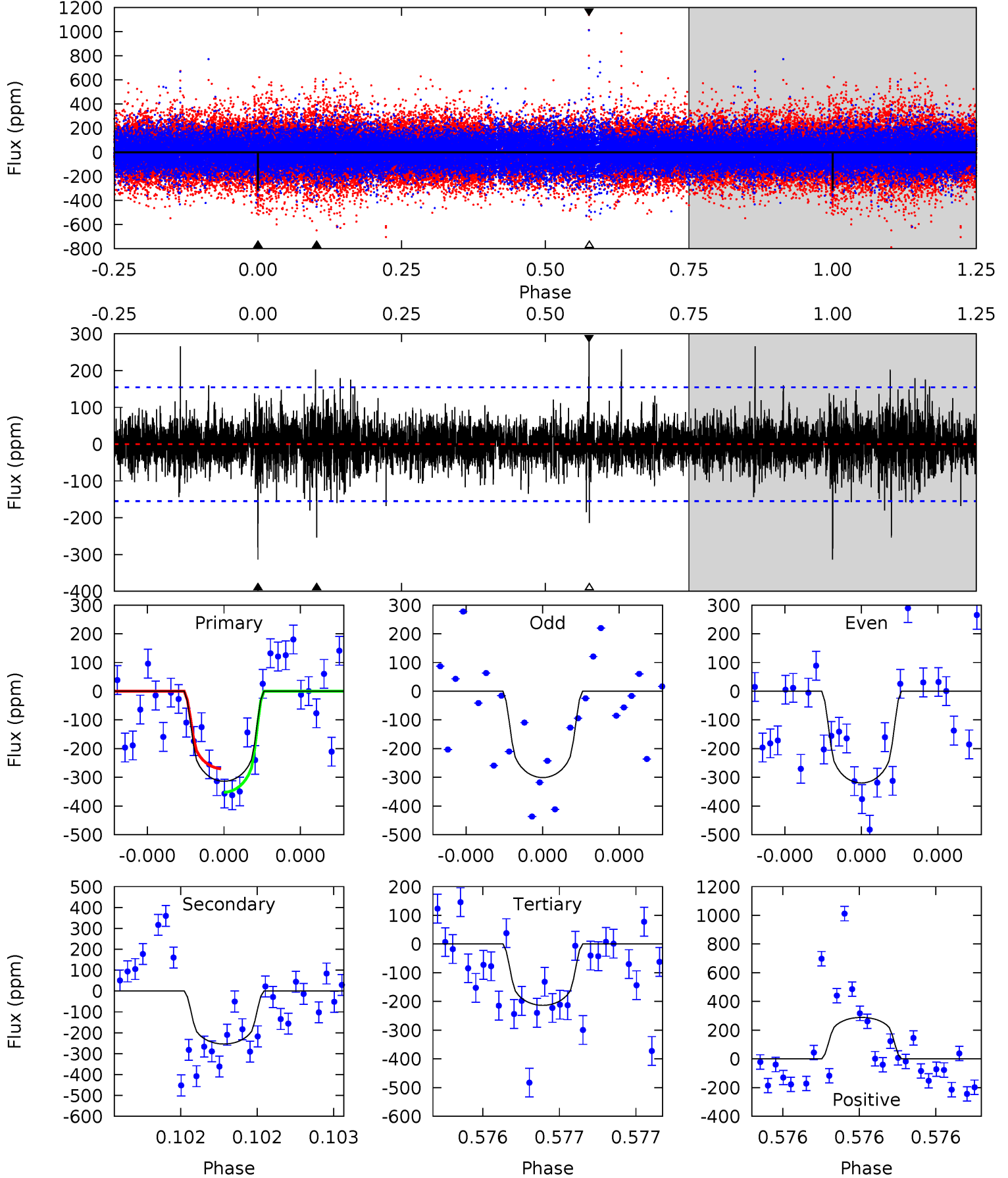
TCE 004827723-02 P=523.337527 Days  $T_0=330.202797$  (BKJD)



# DV Model-Shift Uniqueness Test

004827723-02, P = 523.353592 Days, E = 330.165654 Days

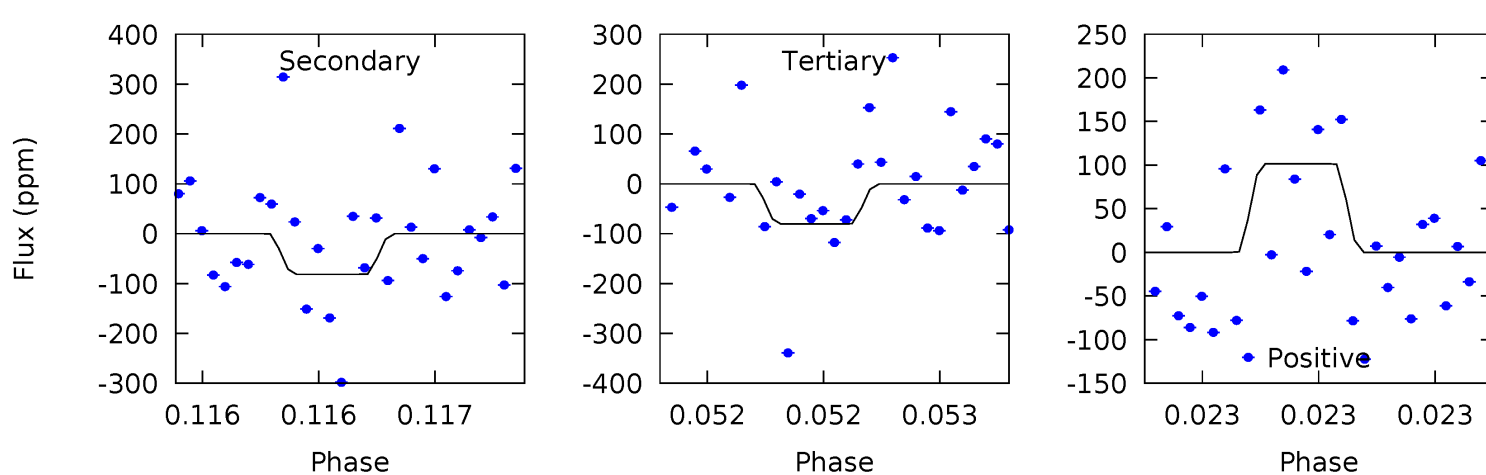
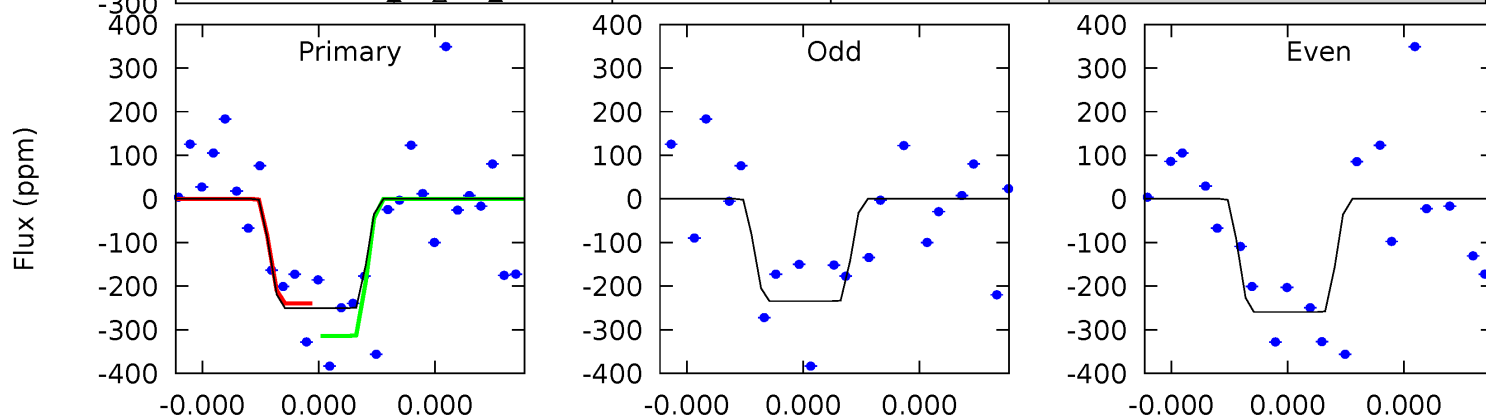
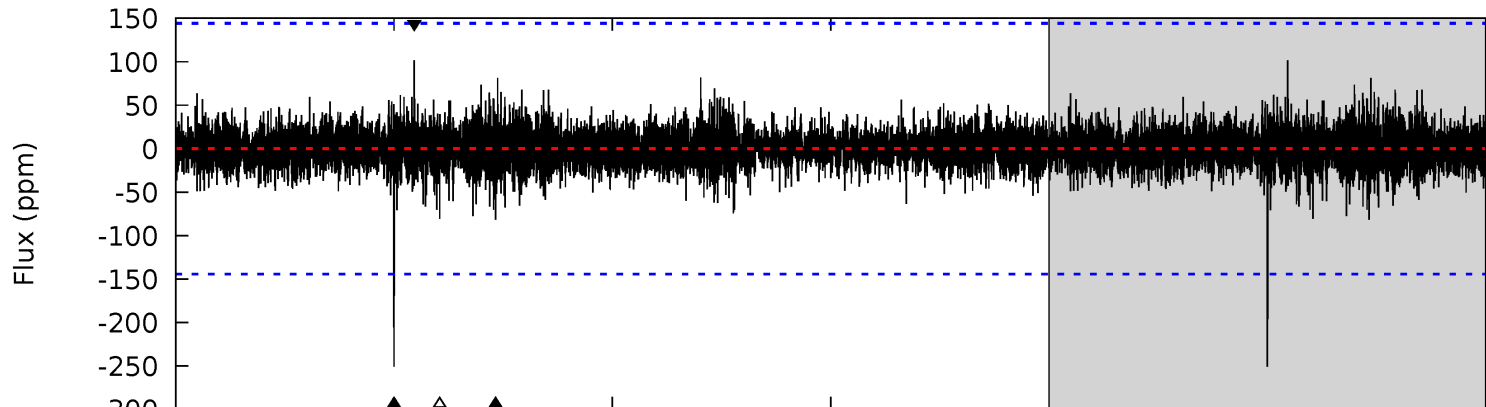
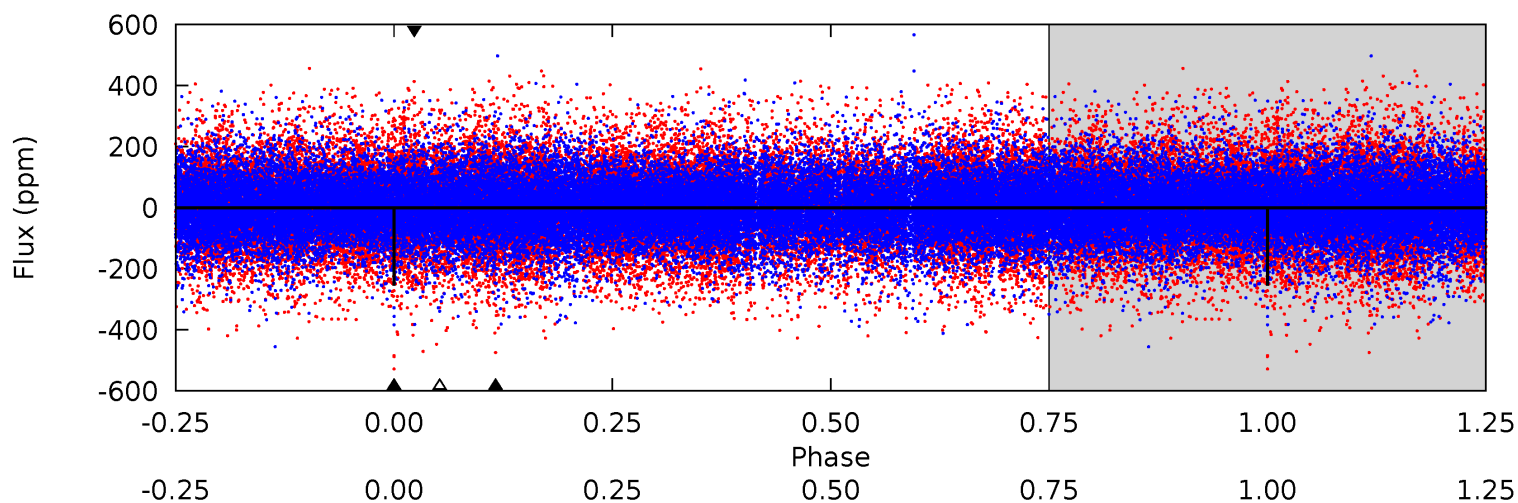
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.5	9.27	7.80	10.5	5.65	3.59	1.43	3.66	0.91	1.47	-1.28	0.33	1.04	0.48	1.49



# Alt Model-Shift Uniqueness Test

004827723-02, P = 523.337527 Days, E = 330.202797 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
9.88	3.22	3.18	4.00	5.69	3.66	0.61	6.71	5.88	0.04	-0.79	0.48	0.94	0.29	1.43



### Stellar Parameters For KIC 004827723

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (g \cdot \text{cm}^{-3})$
	$5411^{+96}_{-118}$	$4.561^{+0.018}_{-0.096}$	$0.060^{+0.150}_{-0.150}$	$0.831^{+0.097}_{-0.039}$	$0.917^{+0.038}_{-0.070}$	$2.250^{+0.194}_{-0.634}$
	+2%/-2%	+0%/-2%	+250%/-250%	+12%/-5%	+4%/-8%	+9%/-28%
Source	SPE59	SPE59	SPE59	DSEP		

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

### Secondary Eclipse Parameters for KIC 004827723-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-254 \pm 27$	$3.34^{+3.08}_{-2.18}$	$277^{+9}_{-7}$	$3924^{+2176}_{-746}$	$19164^{+143379}_{-14047}$
Alt.	$-82 \pm 25$	$2.99^{+3.02}_{-1.97}$	$277^{+8}_{-8}$	$3369^{+1529}_{-643}$	$7525^{+55402}_{-5885}$

$T_{max}$  = 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

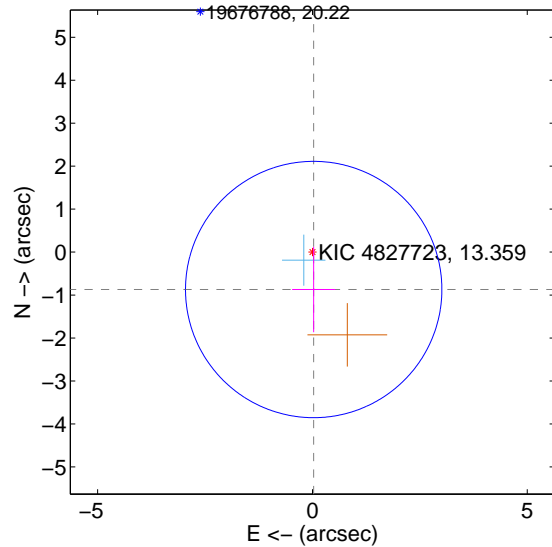
Supplemental centroid analysis for 004827723-02. Kepler magnitude: 13.36. Transit SNR 7.64

There are 1 quarters with good PRF difference image offsets

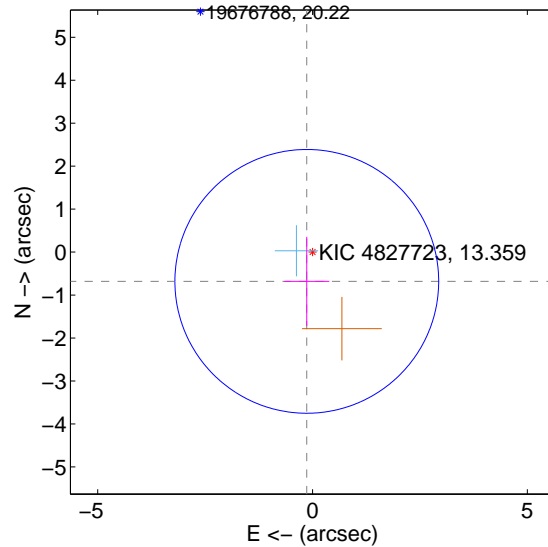
The direct PRF centroid is offset from the target star catalog position by about 0.28 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.872 \pm 0.995$	0.88	$-0.029 \pm 0.502$	$-0.871 \pm 0.995$
PRF-fit source offset from KIC position	$0.695 \pm 1.023$	0.68	$0.134 \pm 0.524$	$-0.682 \pm 1.038$
photometric centroid source offset	$1.51 \pm 1.06$	1.42	$-0.84 \pm 1.03$	$-1.25 \pm 1.07$

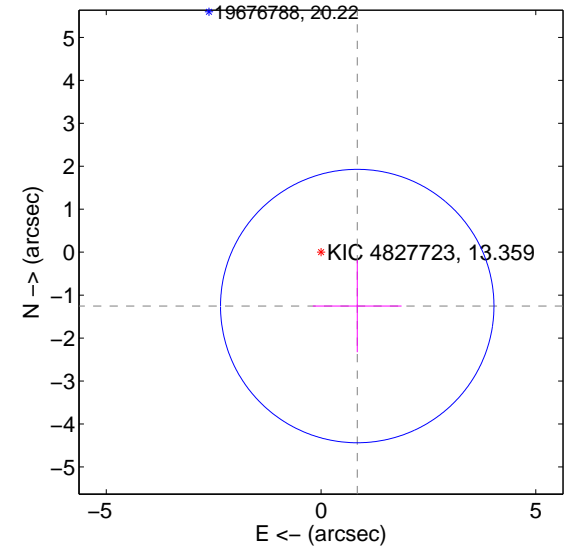
offset from difference PRF-fit to OOT PRF-fit



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.

Q1 no difference image



Q1 no OOT image



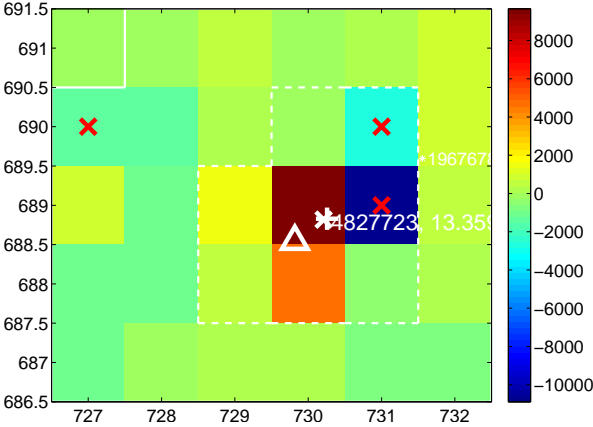
Q2 no difference image



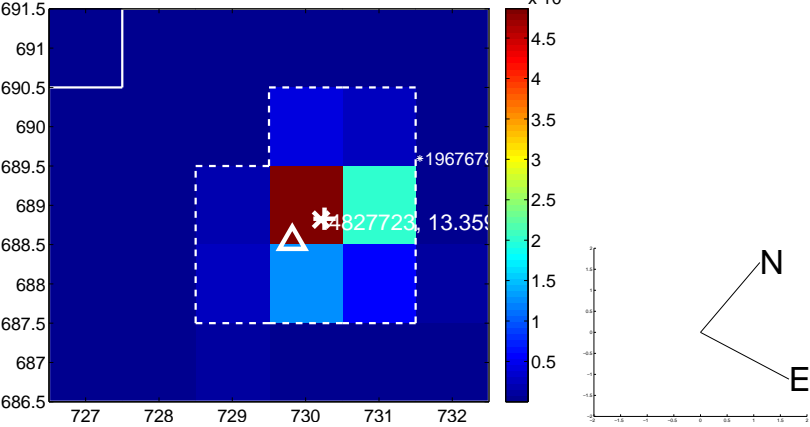
Q2 no OOT image



Q3 difference image. Poor Quality



Q3 OOT image



Q4 no difference image



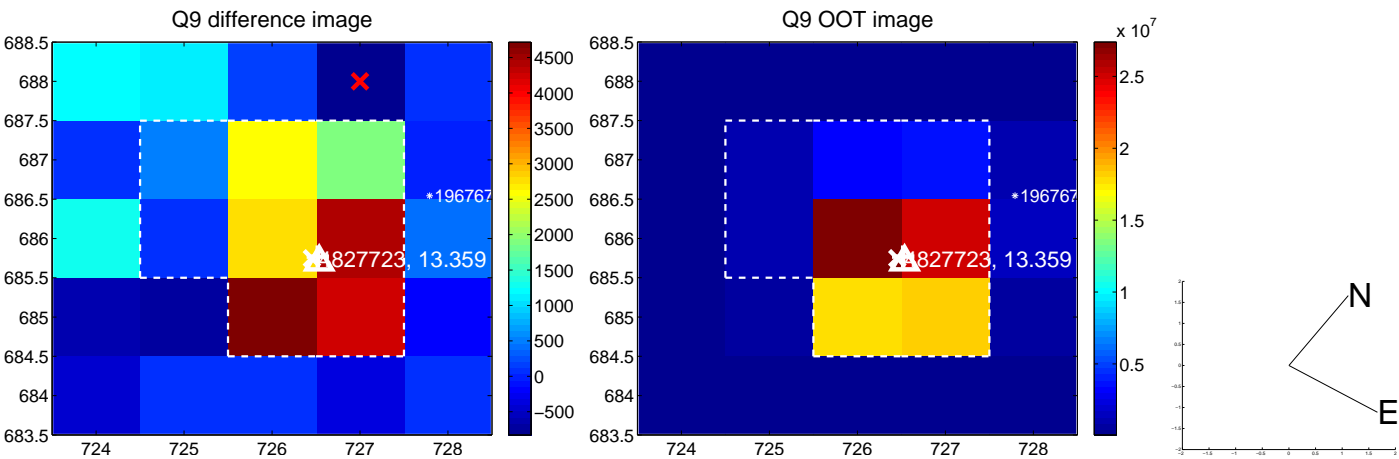
Q4 no OOT image



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



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.

Q13 no difference image



Q13 no OOT image



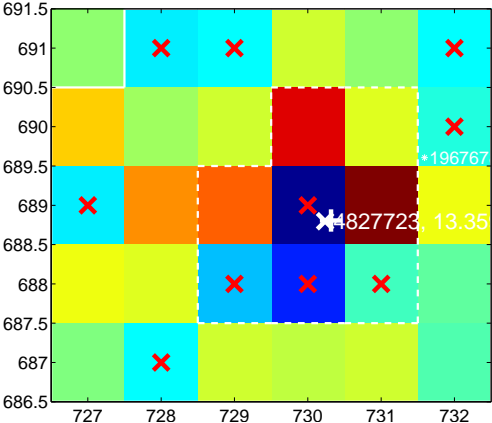
Q14 no difference image



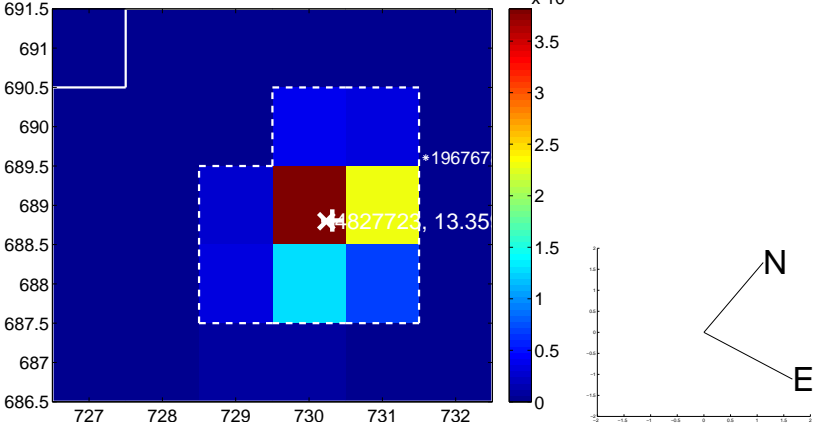
Q14 no OOT image



Q15 difference image. Poor Quality



Q15 OOT image



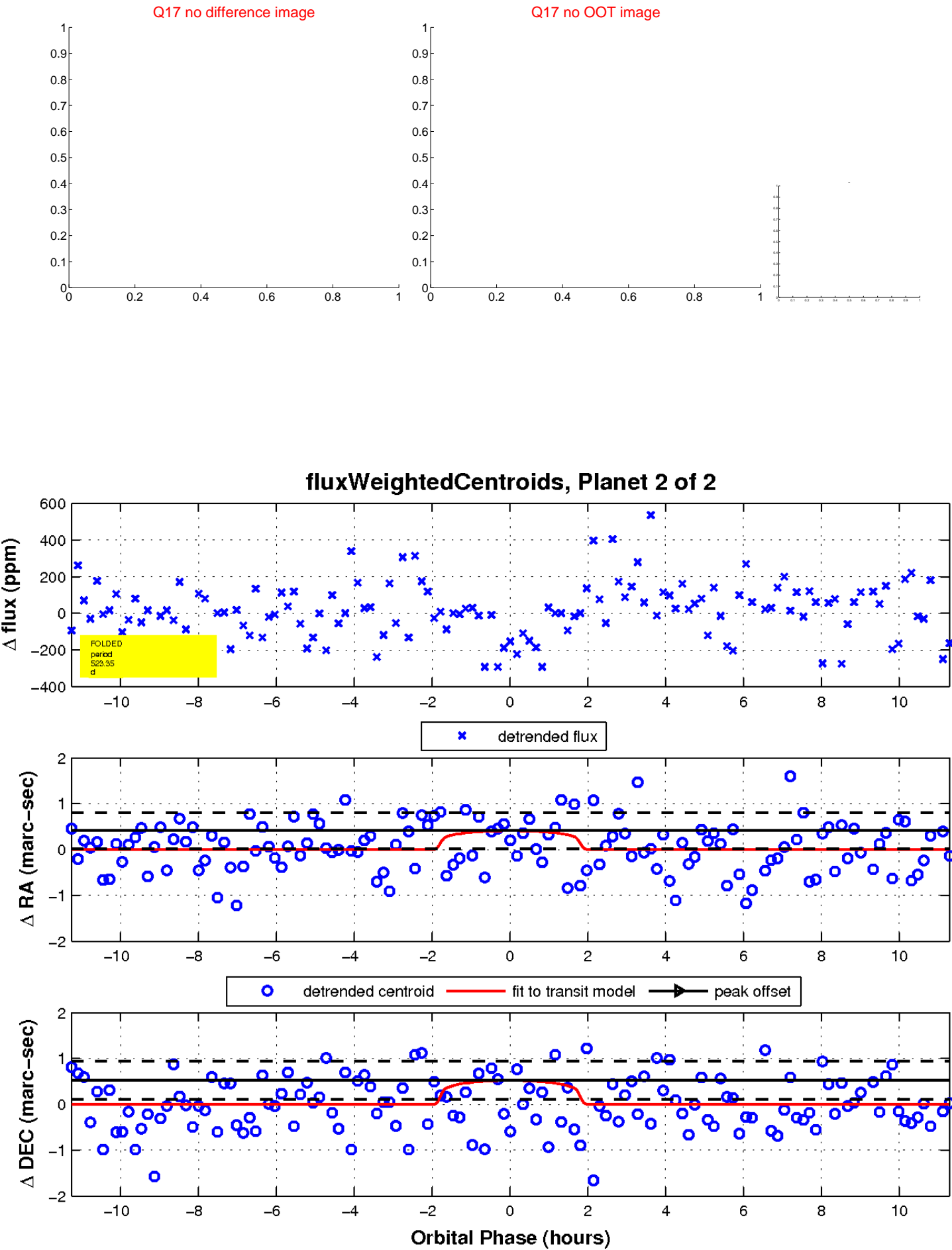
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

