

# KIC 004366923

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004366923-01	OBS	5059.01	323.144105	234.150434	58710.0	5.374	788.6	1139.8	1.78	6582	43.40	5.12
004366923-02	OBS	No	646.277132	280.726300	2104.0	57.795	13.8	36.3	1.78	6582	14.49	2.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004366923-01	OBS	FP	0.00	1	0	1	0	INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
004366923-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—SAME_NTL_PERIOD—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.

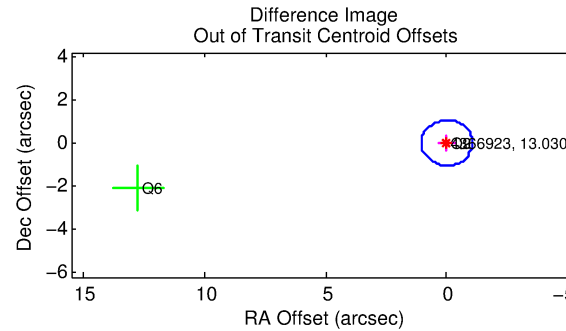
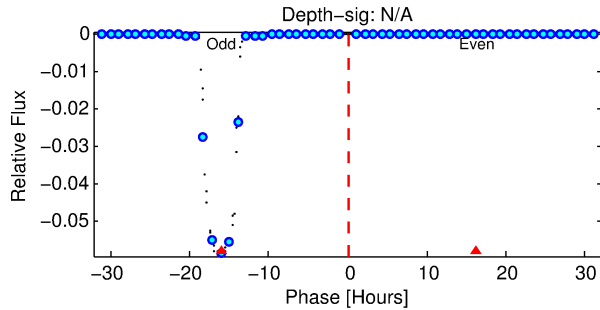
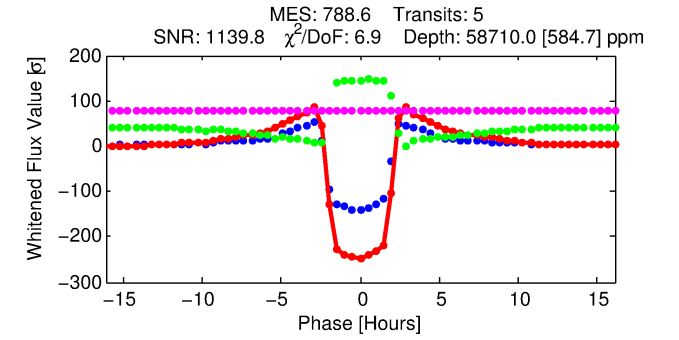
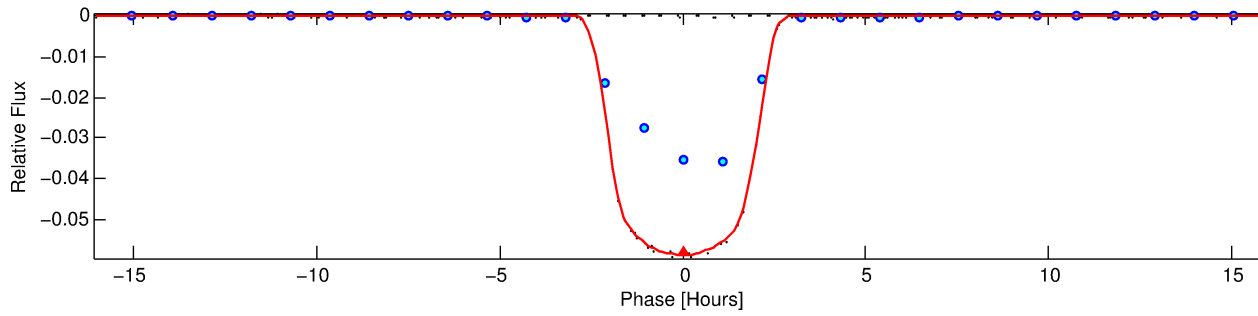
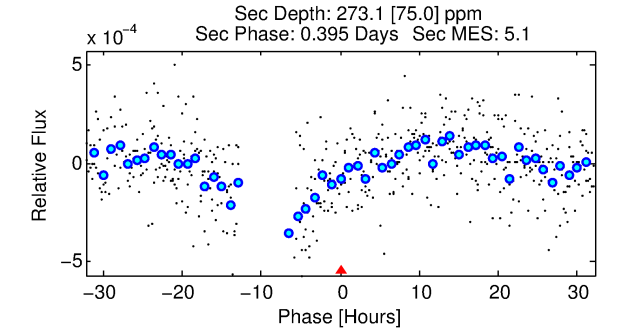
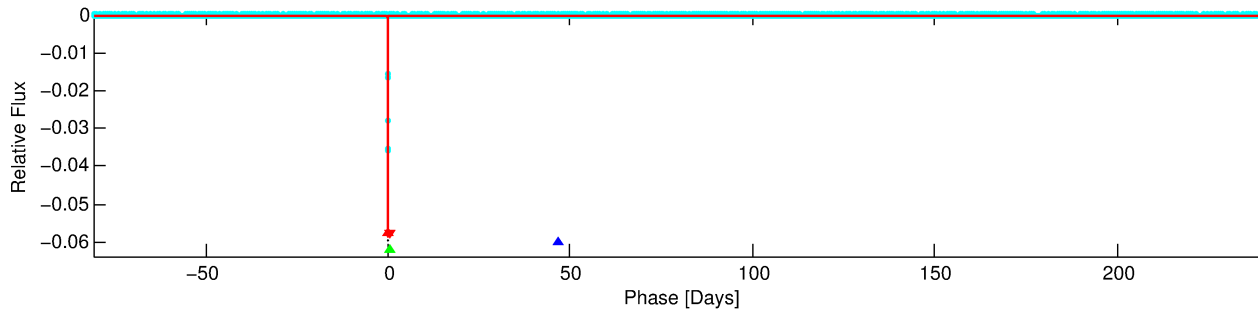
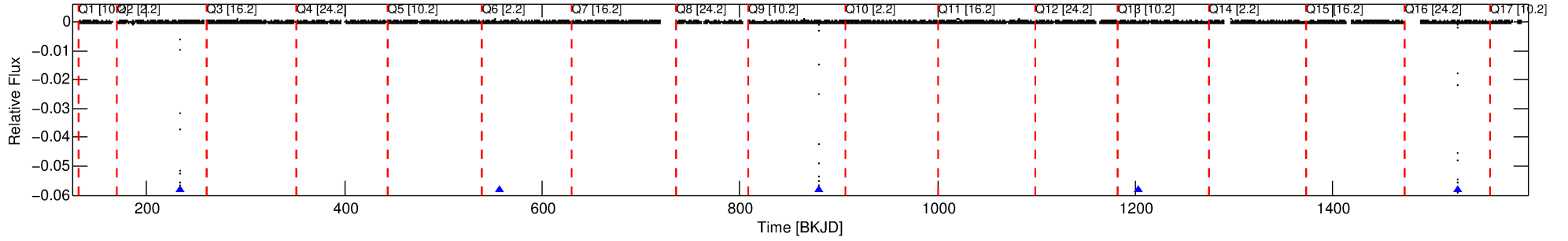
## Ephemeris Match Information For 004366923-01

No Significant Match Found

# DV One-Page Summary

KIC: 4366923 Candidate: 1 of 3 Period: 323.144 d  
KOI: K05059.01 Corr: 0.776

Kp: 13.03 R\*: 1.78 Rs Teff: 6582.0 K Logg: 4.07 Fe/H: -0.120



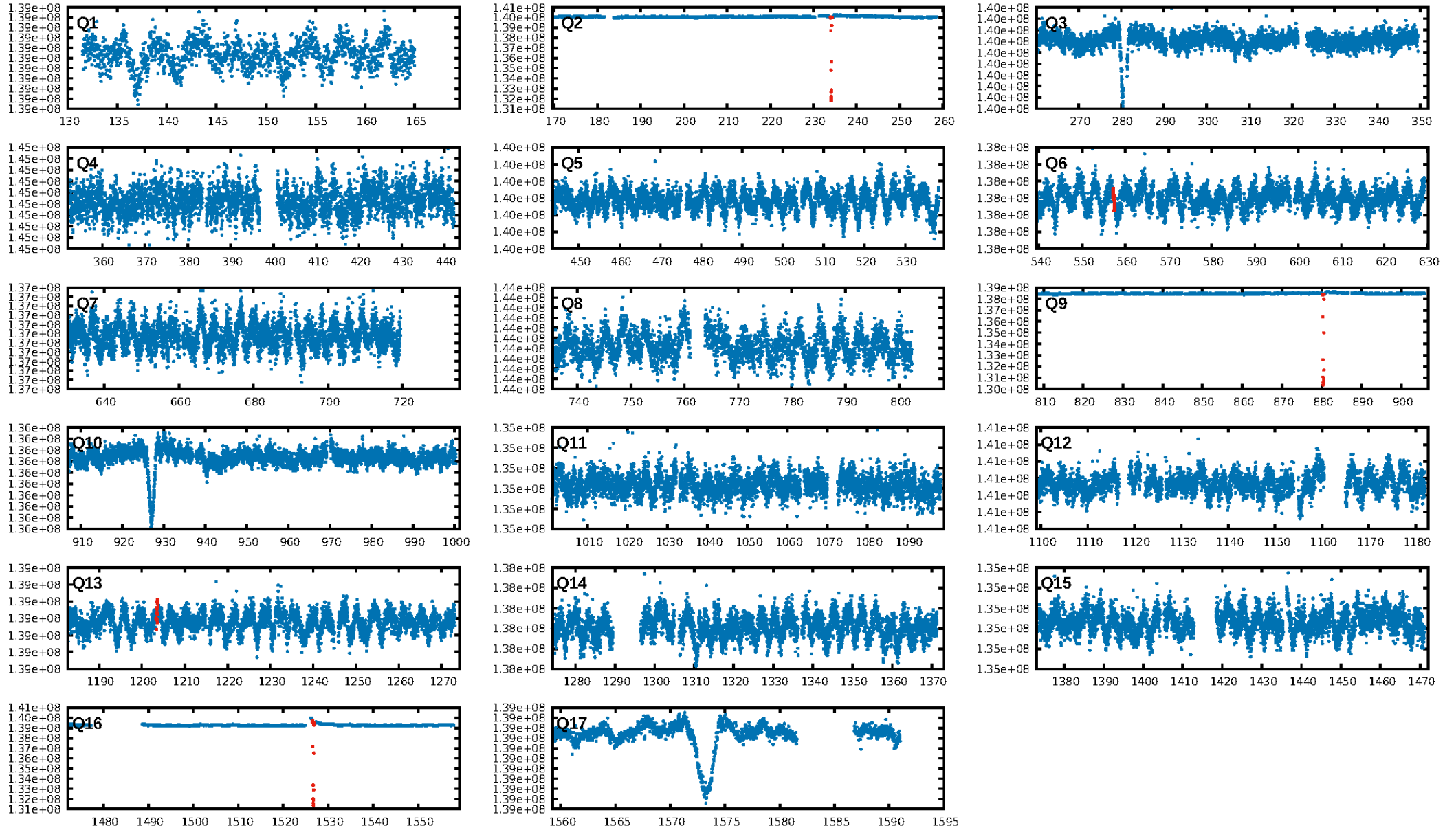
## DV Fit Results:

Period = 323.14411 [0.00031] d  
Epoch = 234.1504 [0.0007] BKJD  
Rp/R\* = 0.2238 [0.0018]  
a/R\* = 562.16 [14.67]  
b = 0.00 [100.89]  
Seff = 5.12 [1.70]  
Teq = 383 [32] K  
Rp = 43.40 [10.31] Re  
a = 1.0188 [0.2182] AU  
Ag = 82.76 [35.50] [2.30σ]  
Teffp = 1788 [125] K [10.89σ]

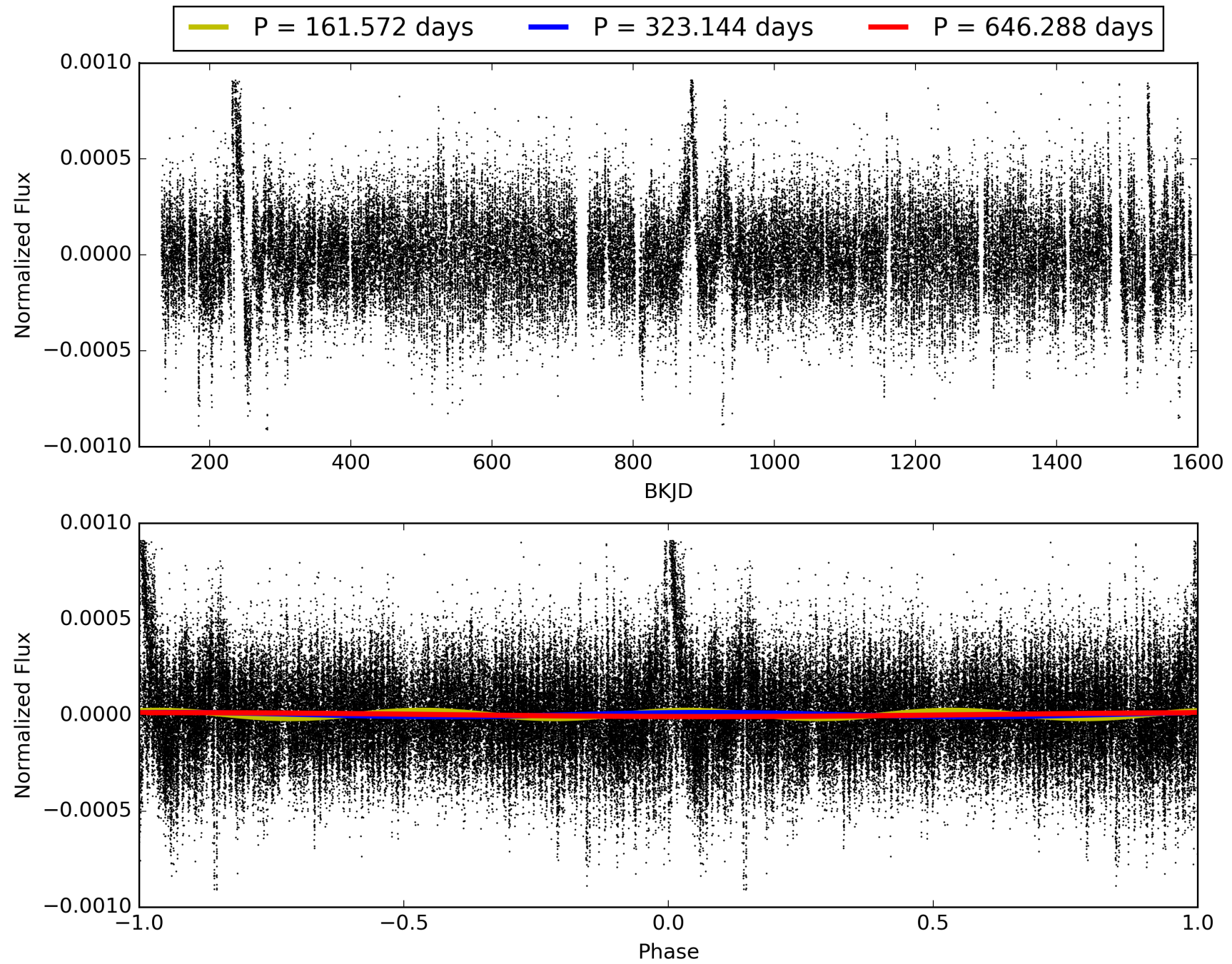
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [133.61σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: 0.00e+00  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 0.1024  
Centroid-sig: 15.7%  
Centroid-so: 0.122 arcsec [22.84σ]  
OotOffset-rm: 0.016 arcsec [0.04σ]  
KicOffset-rm: 0.042 arcsec [0.08σ]  
OotOffset-st: 2/0/0/1 [3]  
KicOffset-st: 2/0/0/1 [3]  
DiffImageQuality-figm: 0.67 [2/3]  
DiffImageOverlap-fno: 0.50 [2/4]

# TCE 004366923-01, PDC Light Curves

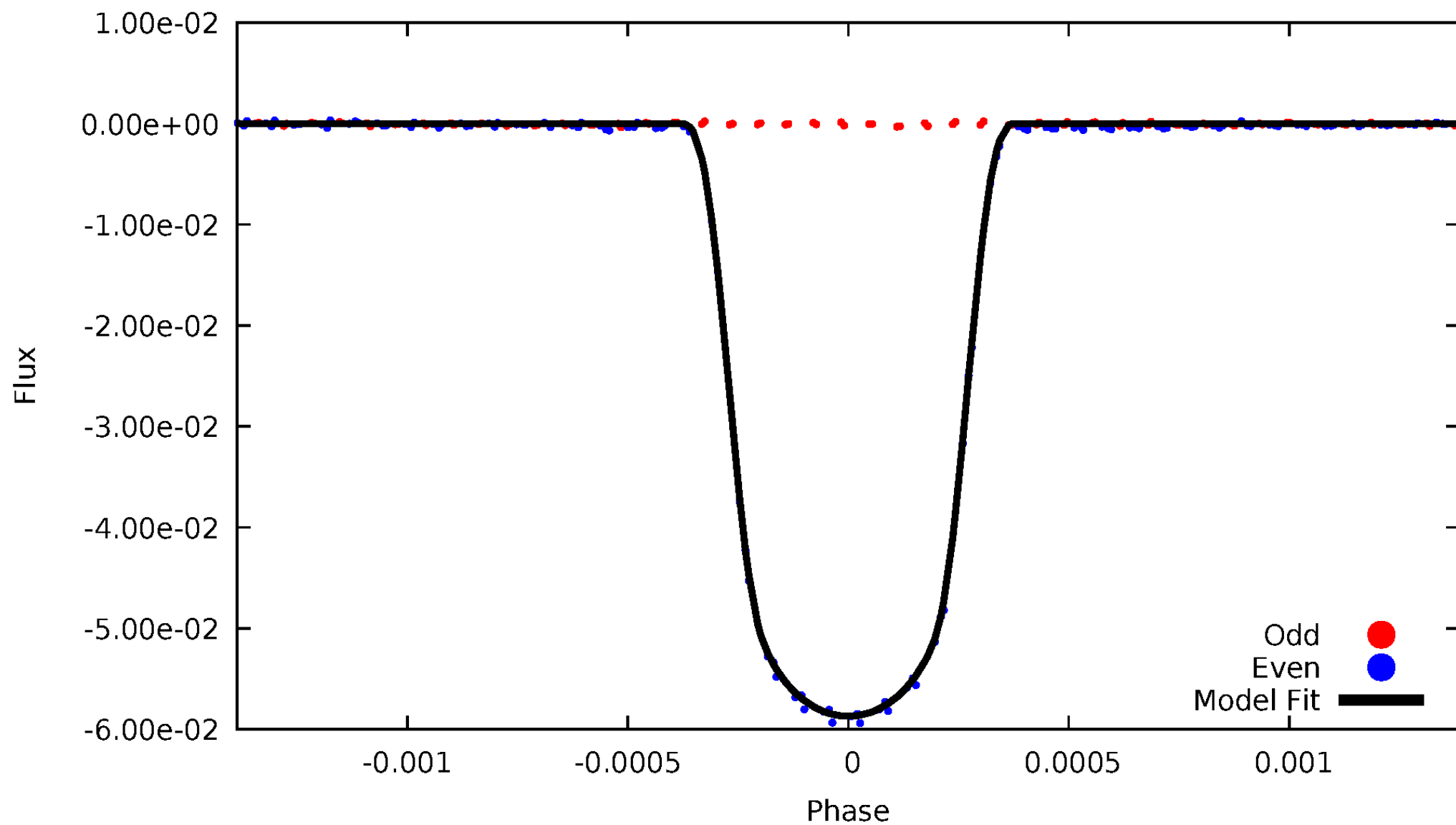


TCE 004366923-01



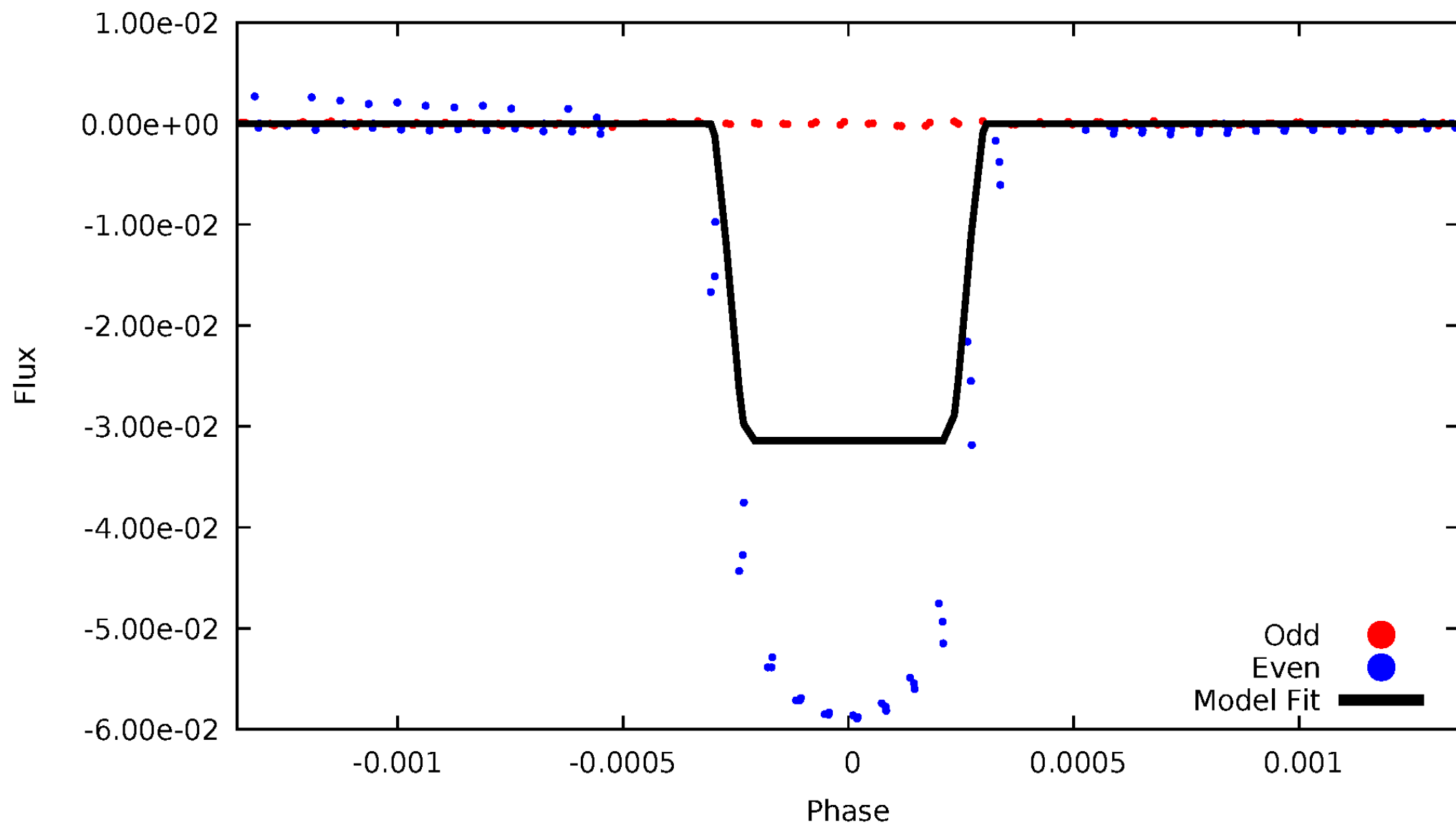
# DV Odd/Even

TCE 004366923-01



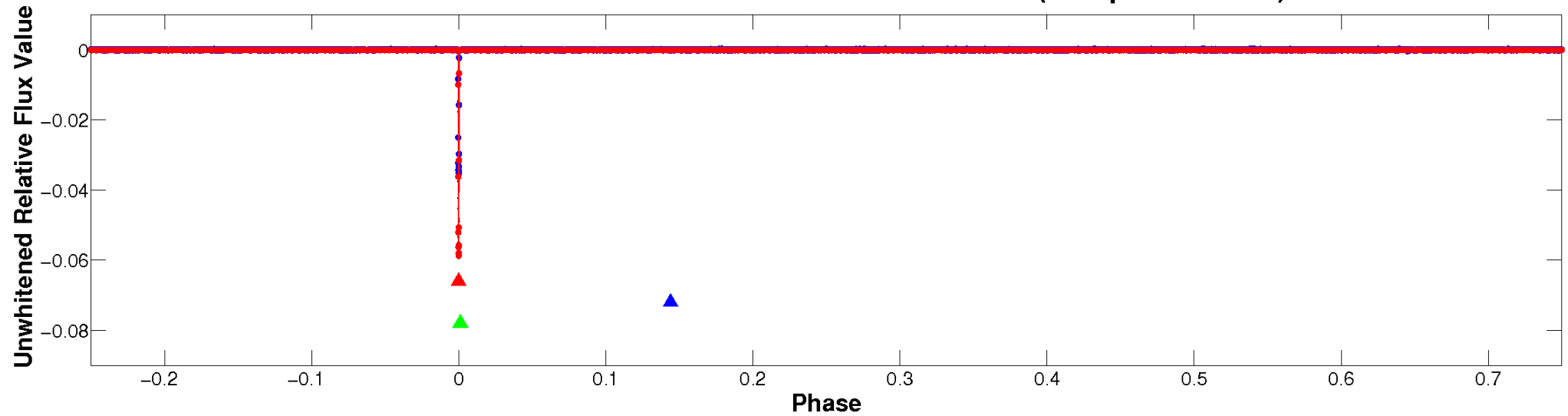
# ALT Odd/Even

TCE 004366923-01

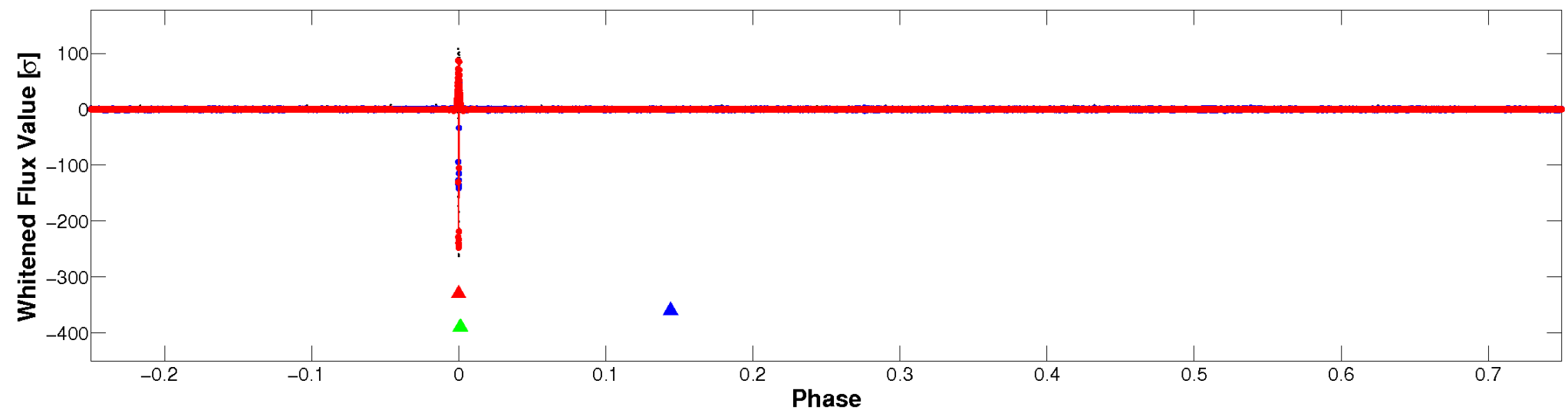


# Non-Whitened Vs. Whitened Light Curve

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

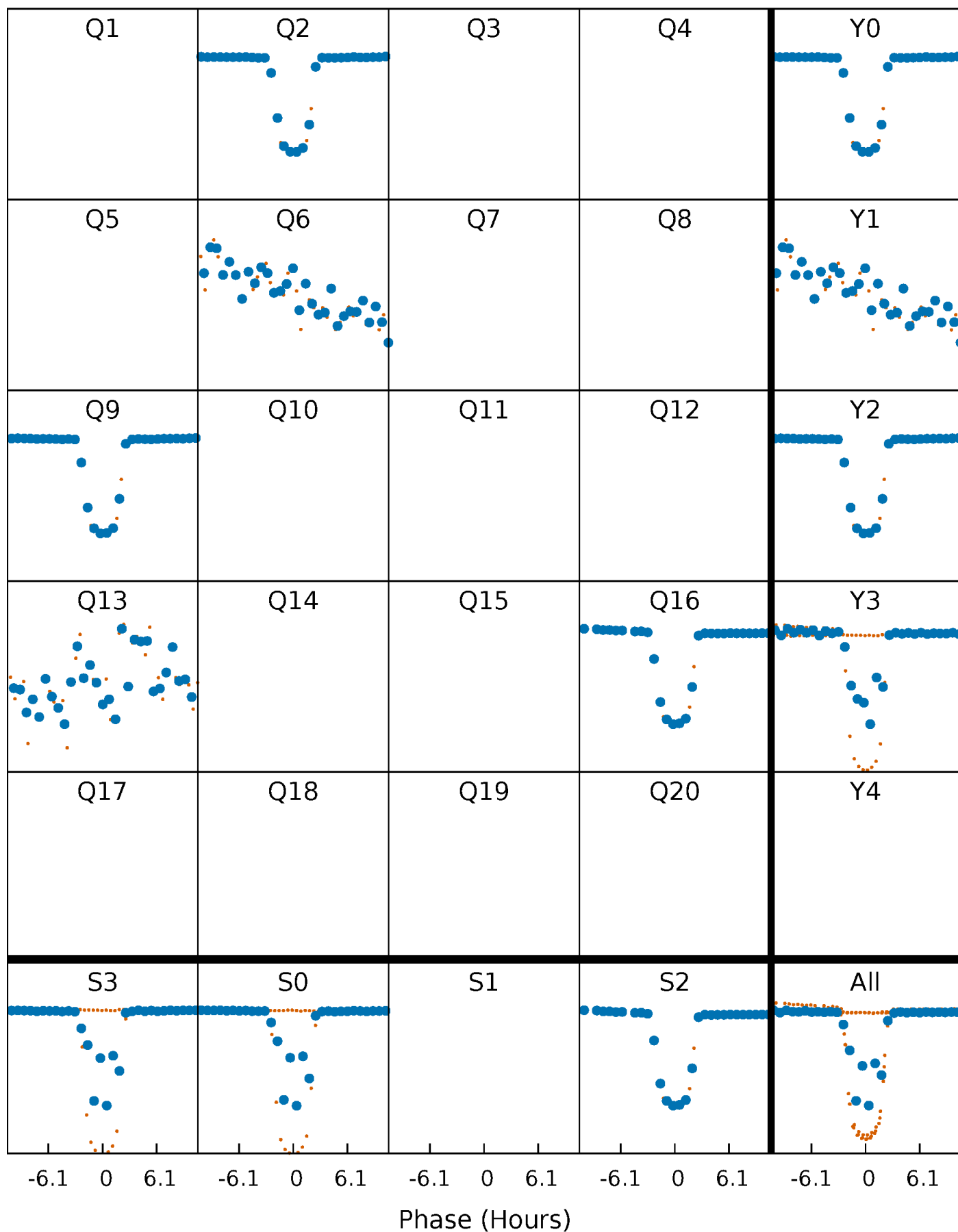


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

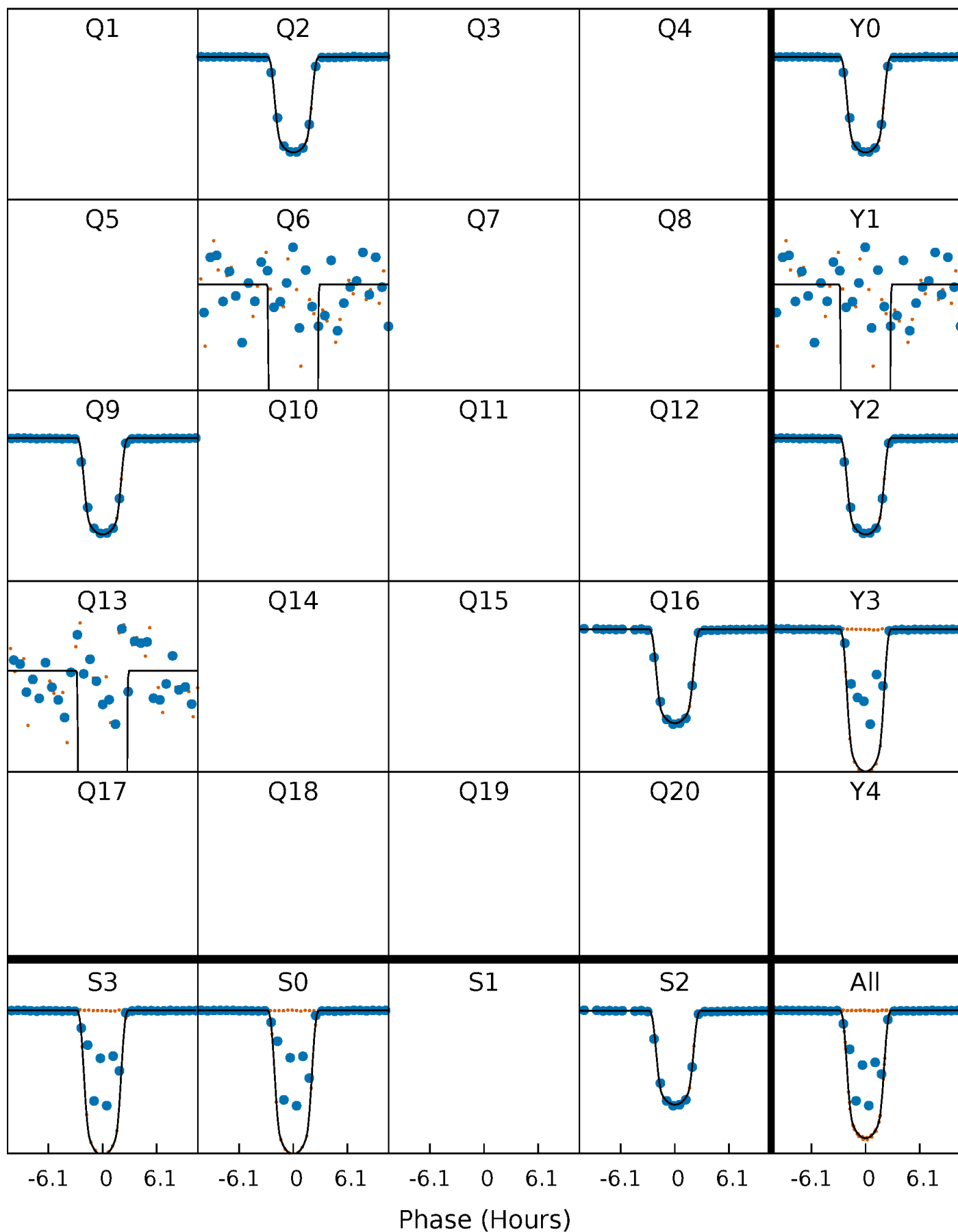
TCE 004366923-01 P=323.144105 Days  $T_0=234.150434$  (BKJD)





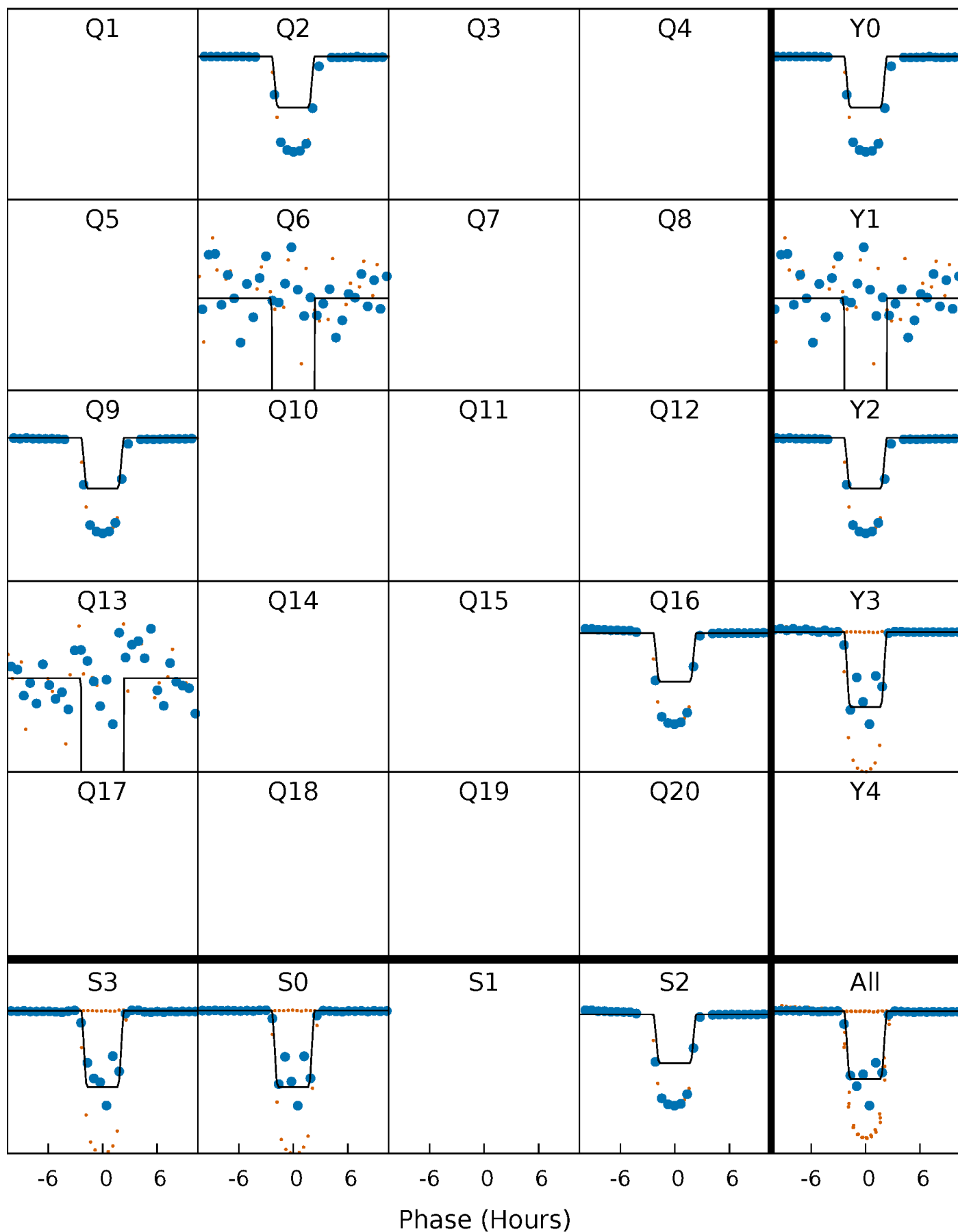
# DV Quarter-Phased Transit Curves

TCE 004366923-01 P=323.144105 Days  $T_0=234.150434$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

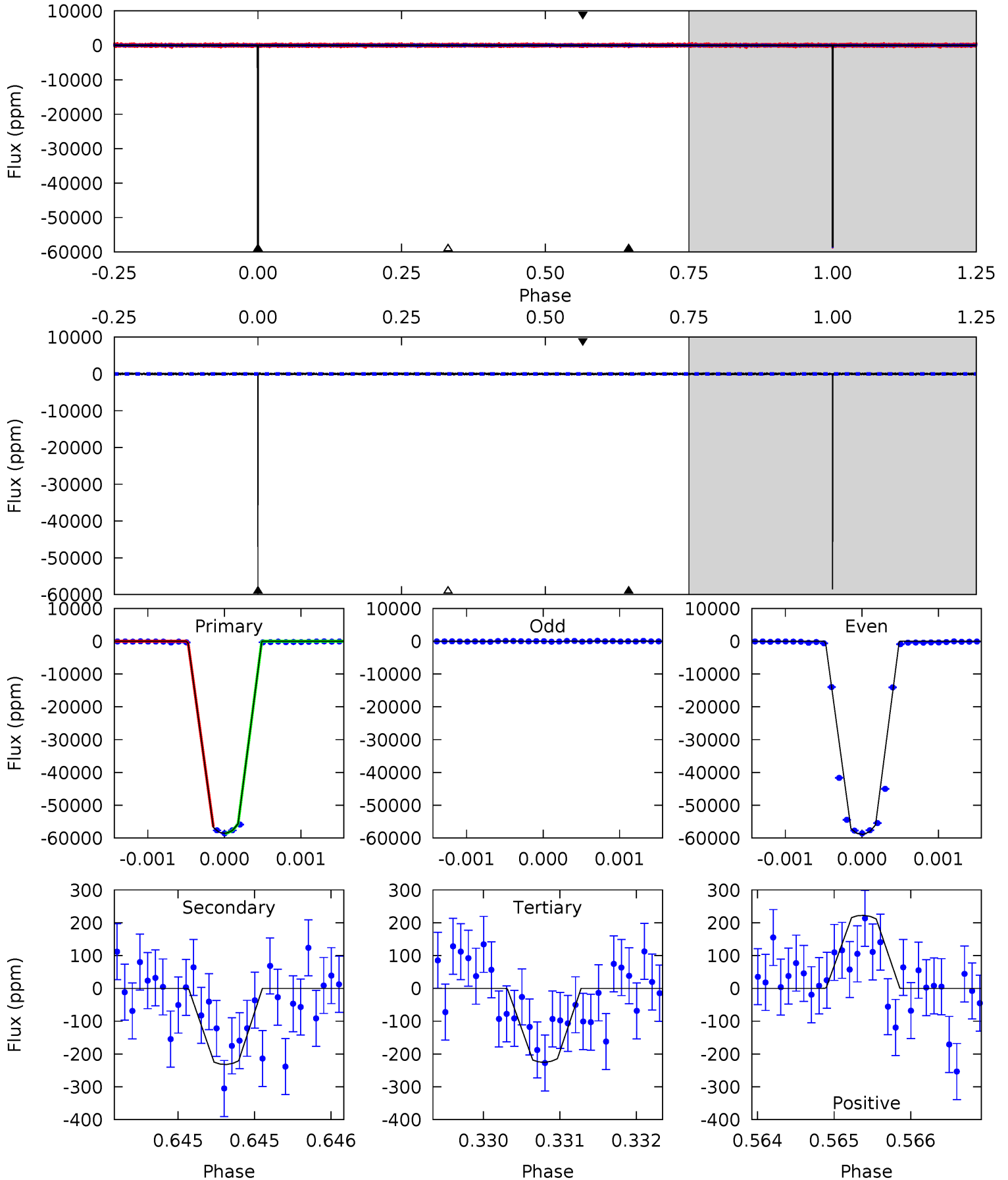
TCE 004366923-01 P=323.146570 Days  $T_0=234.145716$  (BKJD)



# DV Model-Shift Uniqueness Test

004366923-01, P = 323.144105 Days, E = 234.150434 Days

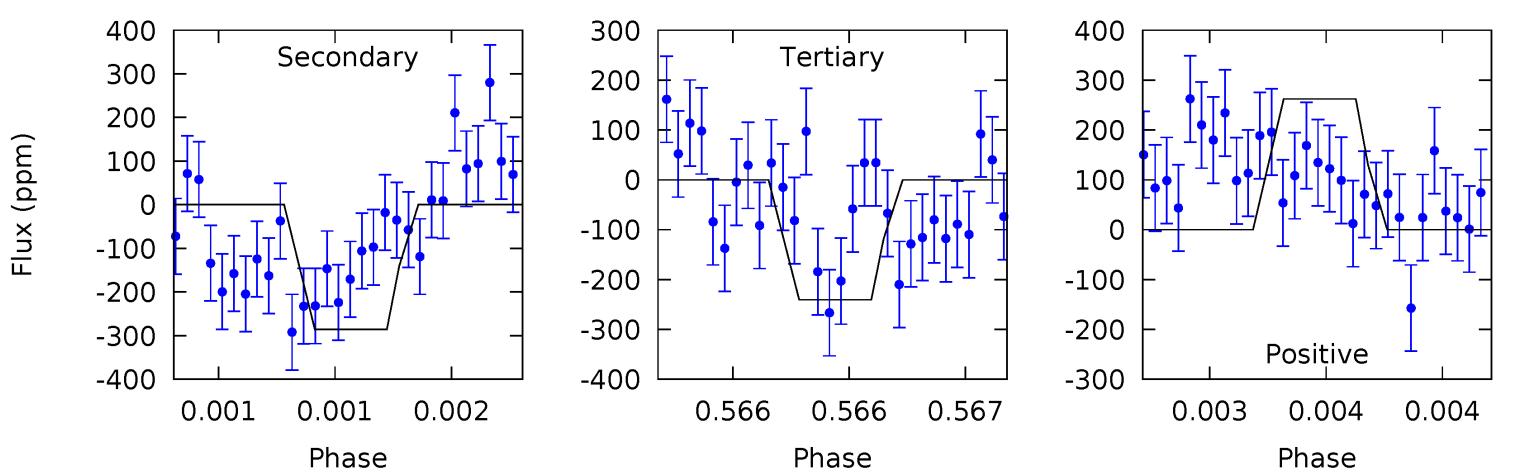
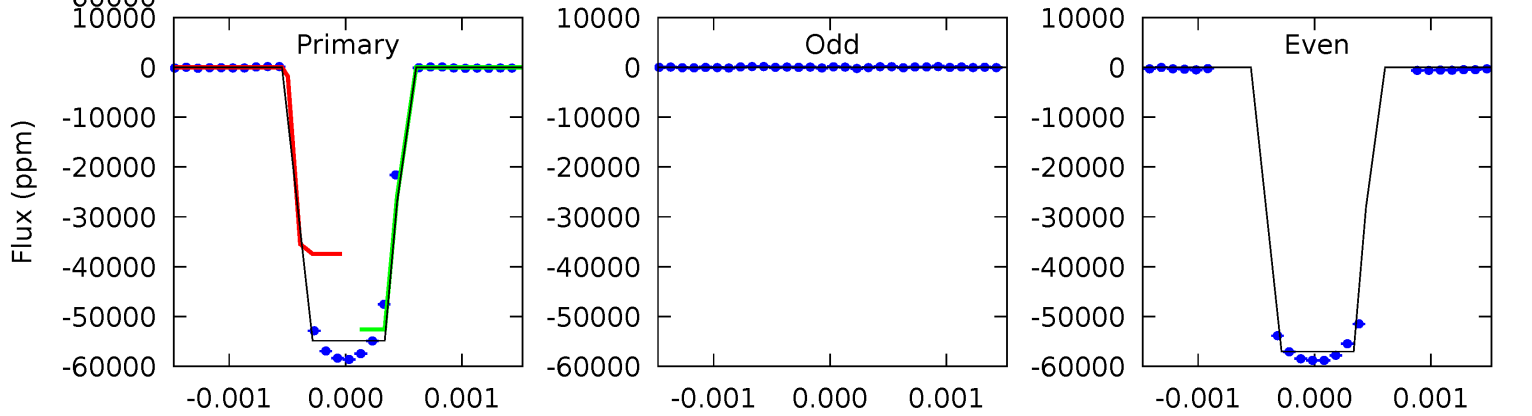
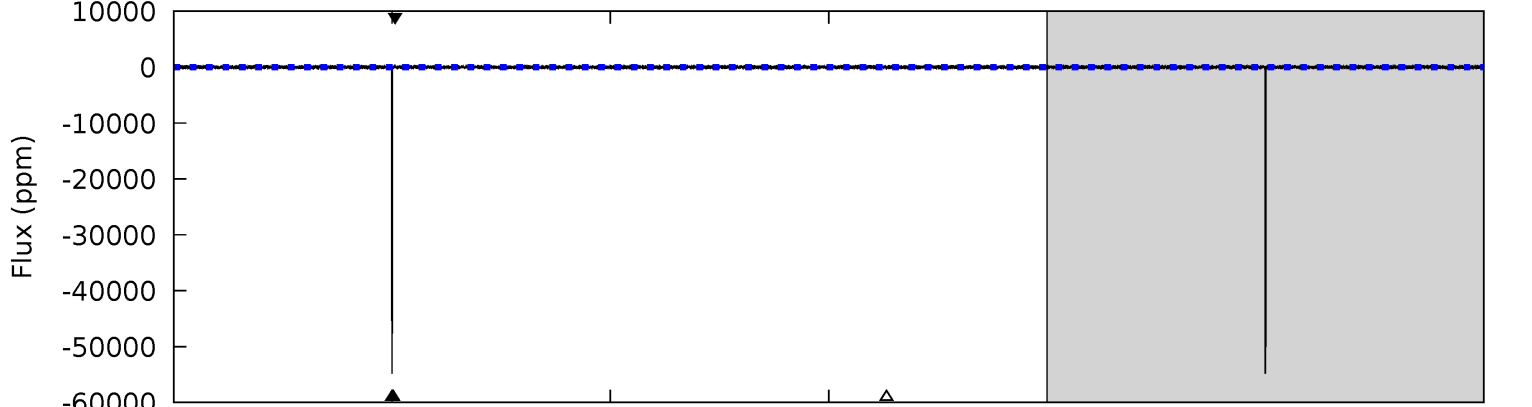
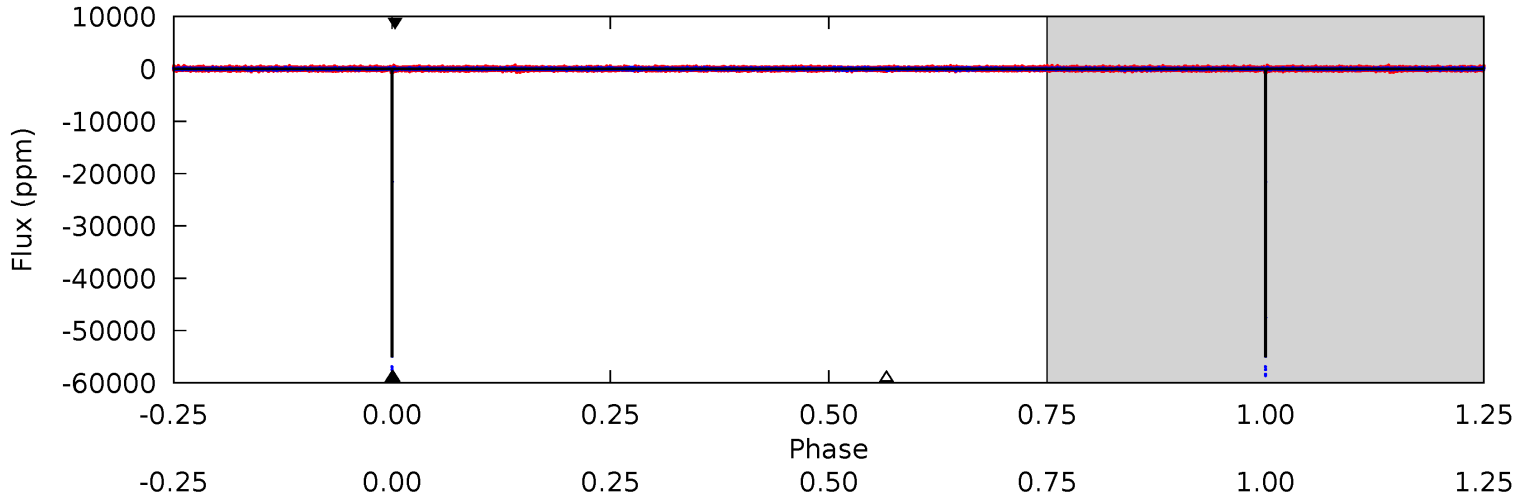
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1366	5.41	5.25	5.19	5.50	3.37	1.33	1361	1361	0.15	0.22	1522	0.61	0.00	0



# Alt Model-Shift Uniqueness Test

004366923-01, P = 323.146570 Days, E = 234.145716 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
1111	5.78	4.87	5.31	5.54	3.43	1.16	1106	1106	0.91	0.47	1120	0.60	0.01	0



### Stellar Parameters For KIC 004366923

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6582^{+71}_{-84}$	$4.069^{+0.188}_{-0.116}$	$-0.120^{+0.150}_{-0.150}$	$1.777^{+0.317}_{-0.422}$	$1.357^{+0.096}_{-0.165}$	$0.341^{+0.307}_{-0.119}$
	+1%/-1%	+5%/-3%	+125%/-125%	+18%/-24%	+7%/-12%	+90%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 004366923-01 / KOI 5059.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-232 \pm 43$	$43.09^{+4.53}_{-5.51}$	$533^{+25}_{-32}$	$2546^{+60}_{-64}$	$71^{+26}_{-18}$
Alt.	$-285 \pm 49$	$34.24^{+3.45}_{-4.38}$	$535^{+25}_{-33}$	$2779^{+58}_{-65}$	$140^{+45}_{-35}$

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

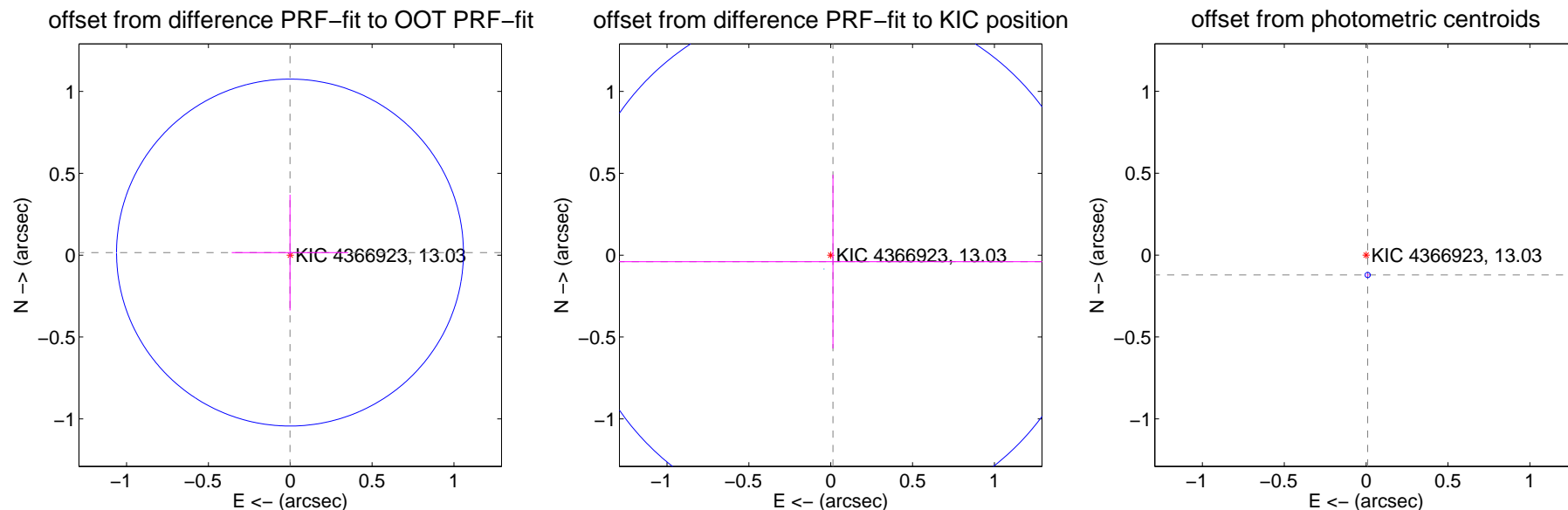
## DV Centroid Data

Supplemental centroid analysis for 004366923-01. Kepler magnitude: 13.03. Transit SNR 1139.82

There are 2 quarters with good PRF difference image offsets

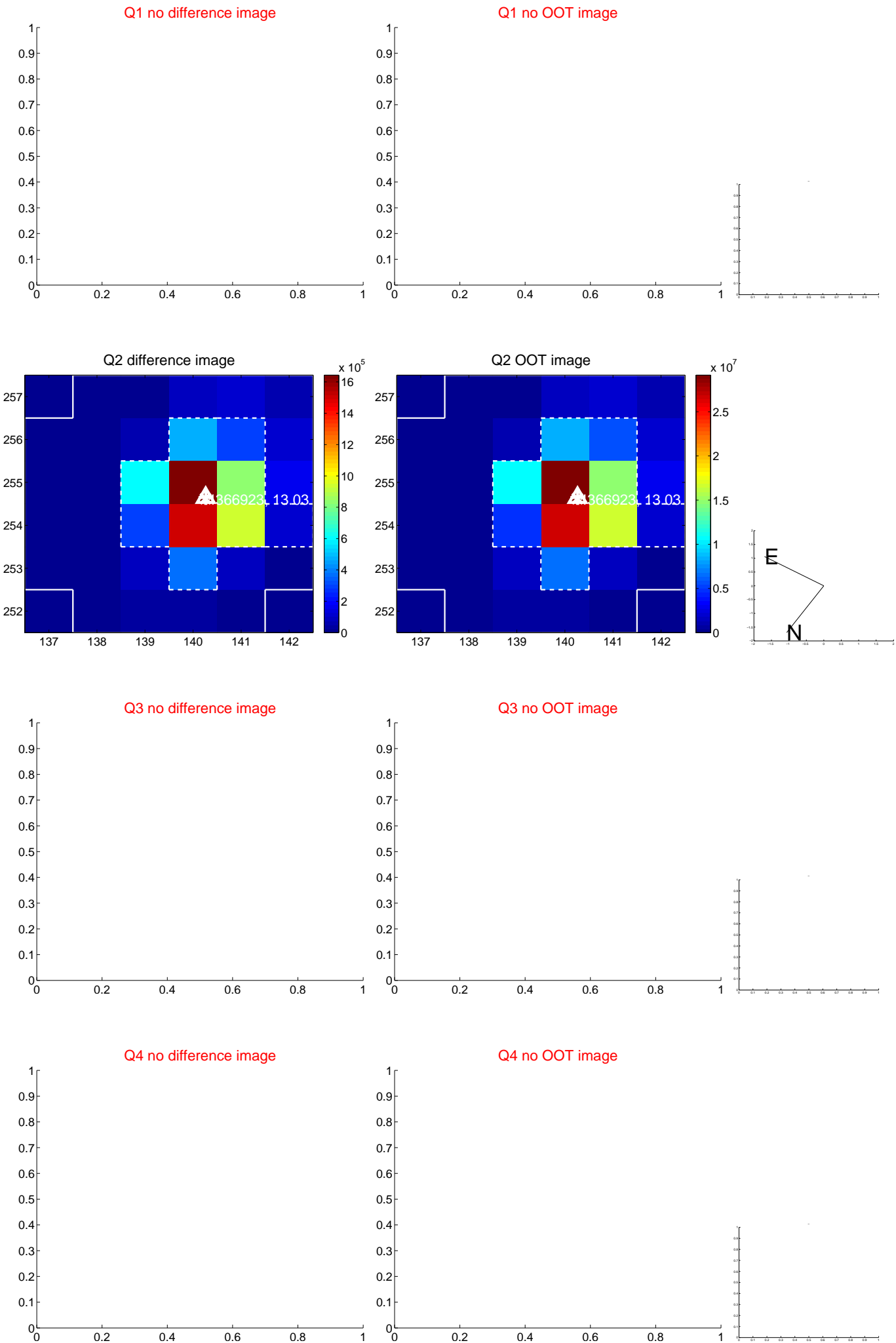
The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.016 \pm 0.353$	0.04	$0.002 \pm 0.356$	$0.016 \pm 0.353$
PRF-fit source offset from KIC position	$0.042 \pm 0.530$	0.08	$-0.014 \pm 3.095$	$-0.040 \pm 0.531$
photometric centroid source offset	$0.12 \pm 0.01$	22.84	$-0.01 \pm 0.01$	$-0.12 \pm 0.01$

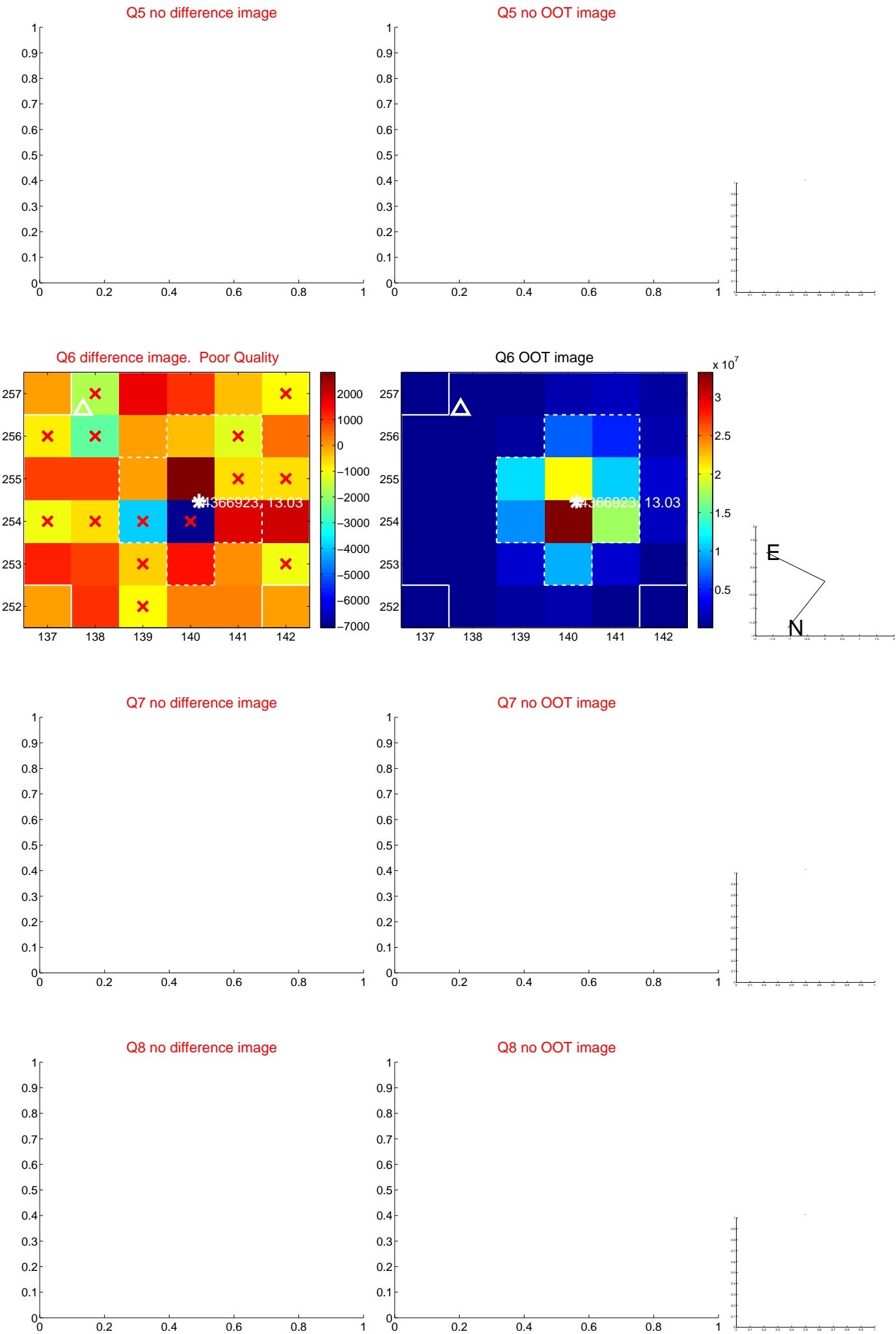


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

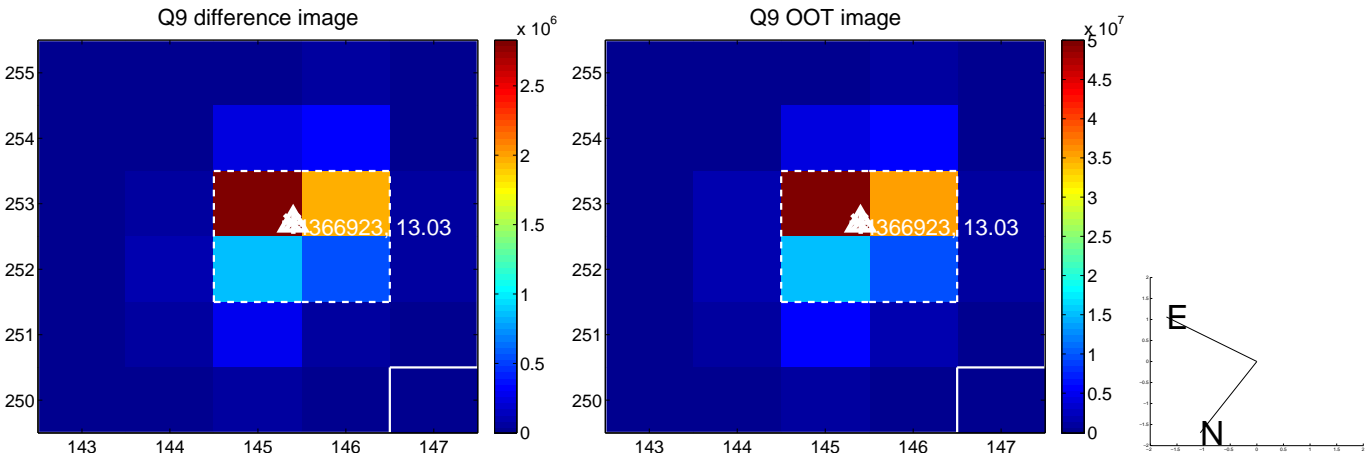


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

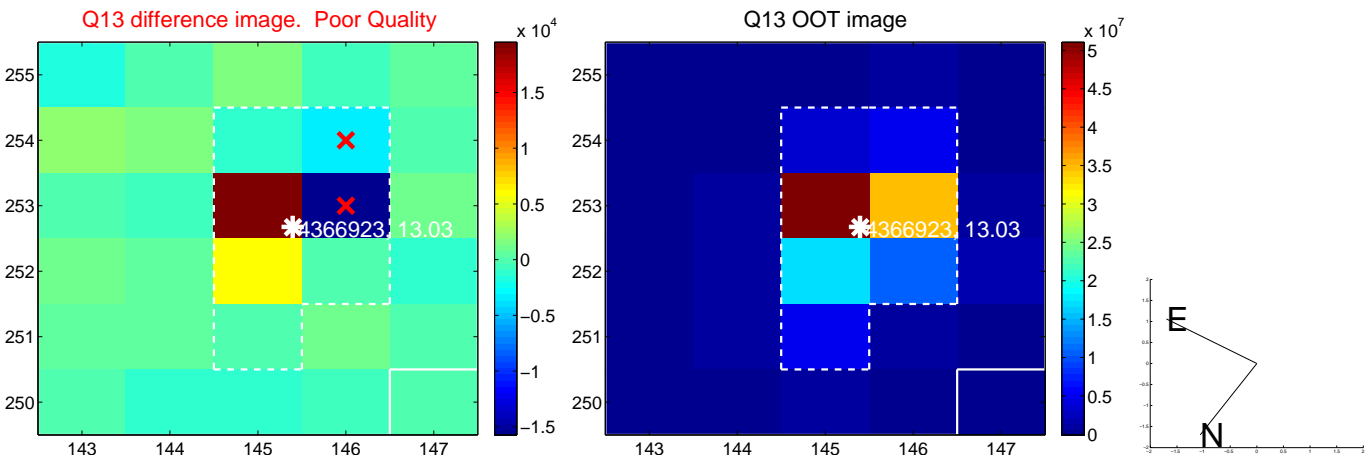




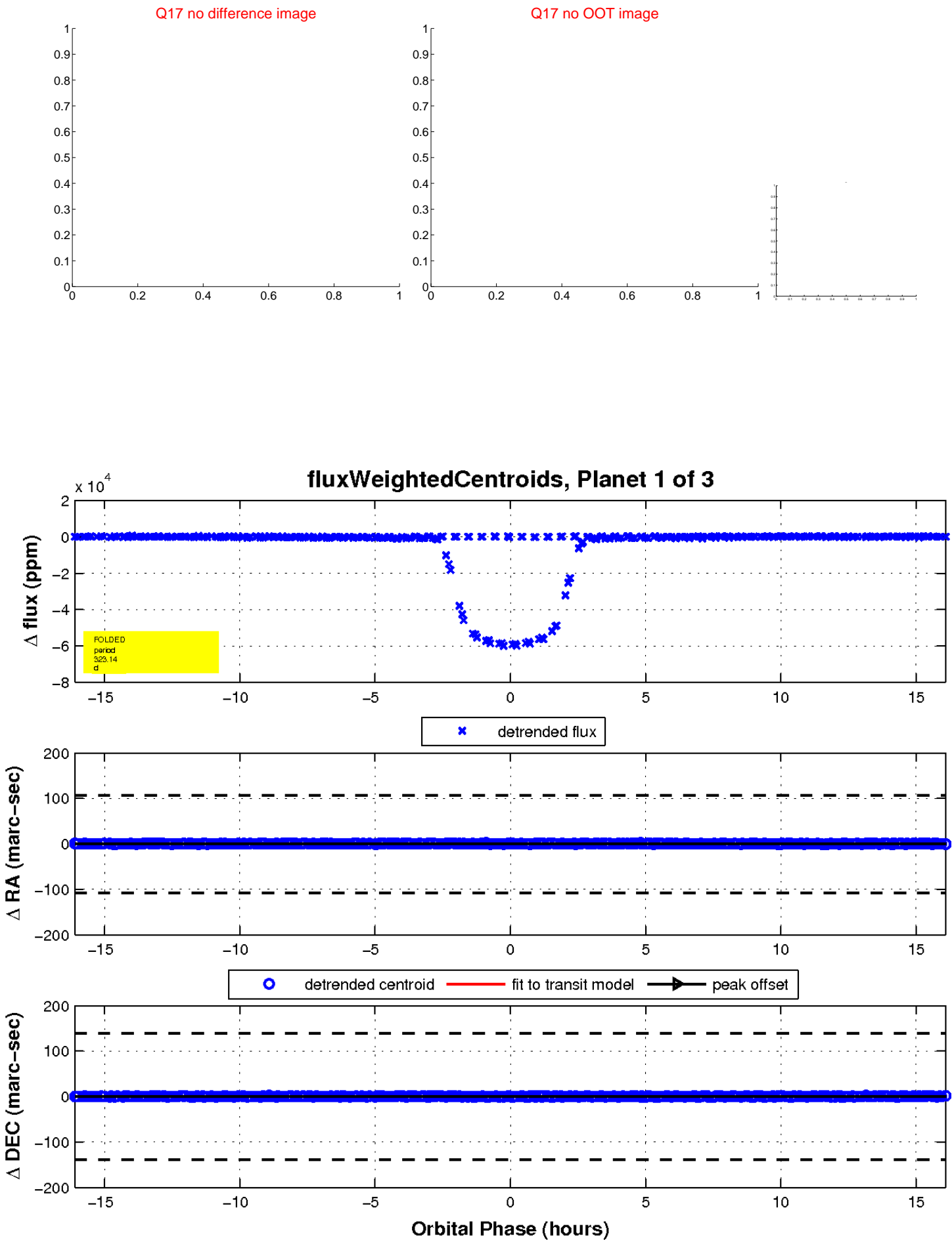
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

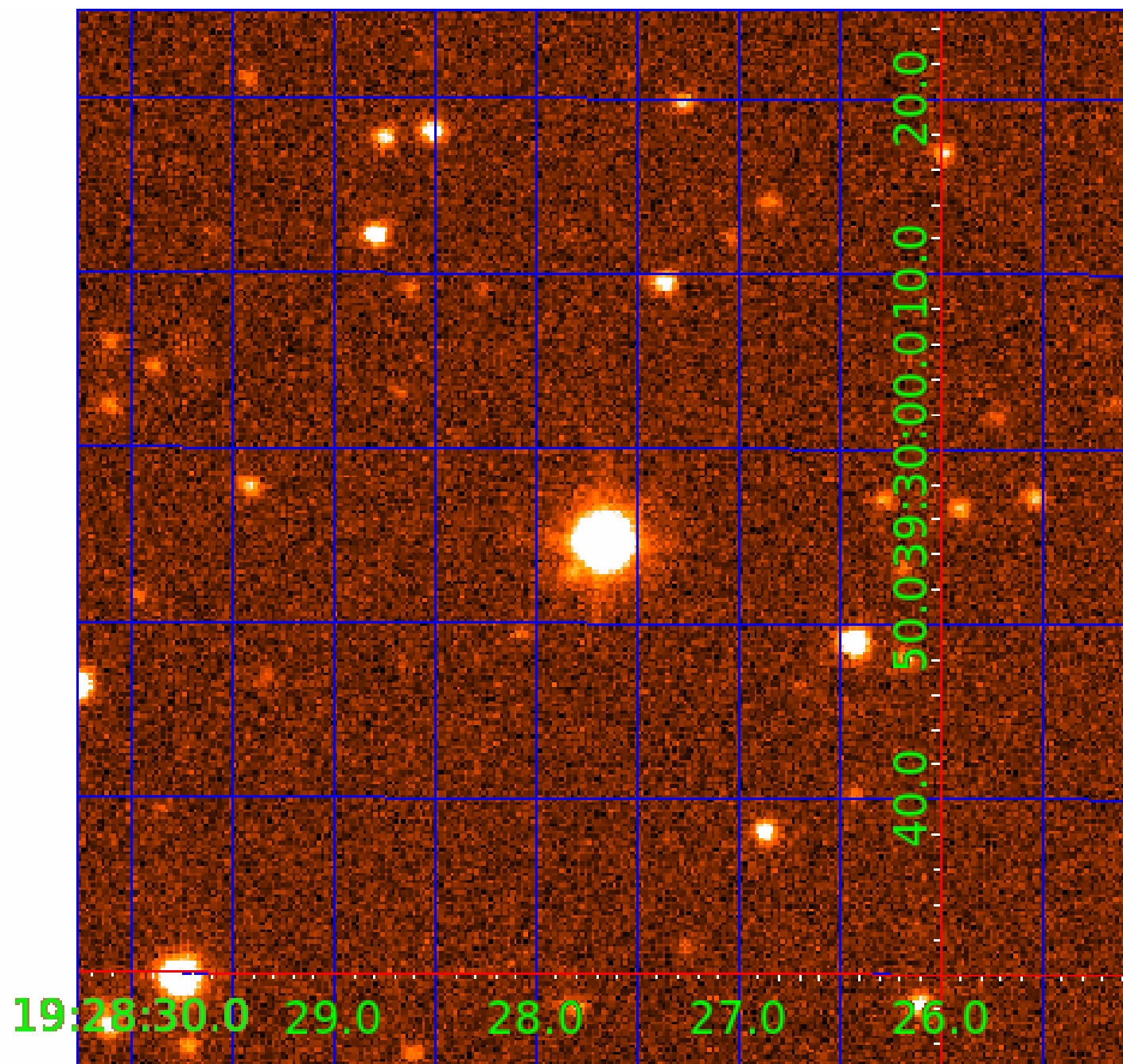


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 004366923

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
004366923-01	OBS	5059.01	323.144105	234.150434	58710.0	5.374	788.6	1139.8	1.78	6582	43.40	5.12
004366923-02	OBS	No	646.277132	280.726300	2104.0	57.795	13.8	36.3	1.78	6582	14.49	2.03

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
004366923-01	OBS	FP	0.00	1	0	1	0	INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
004366923-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—SAME_NTL_PERIOD—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.

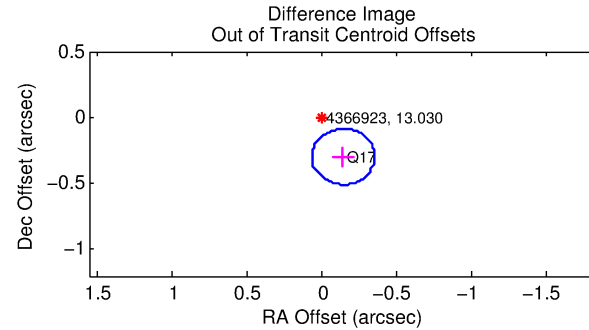
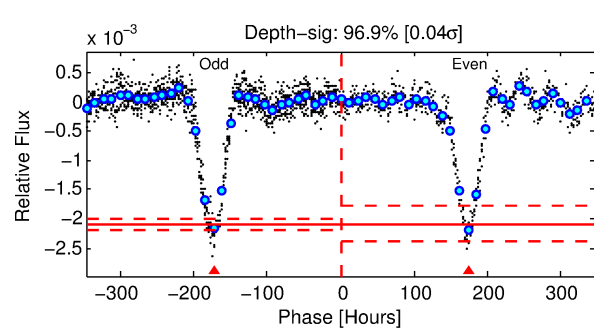
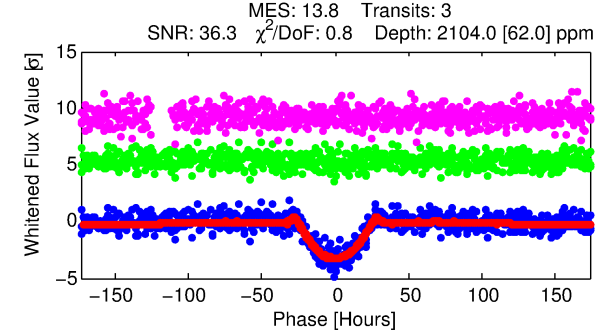
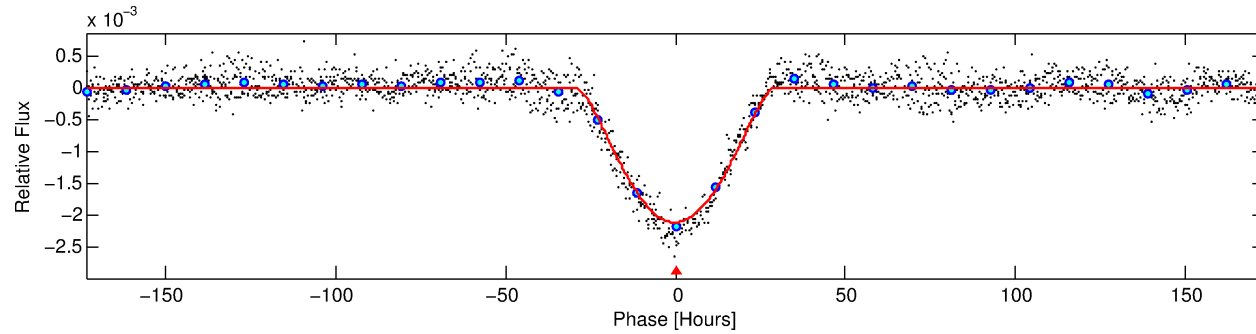
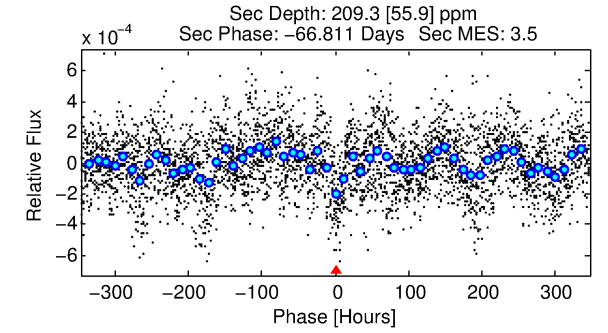
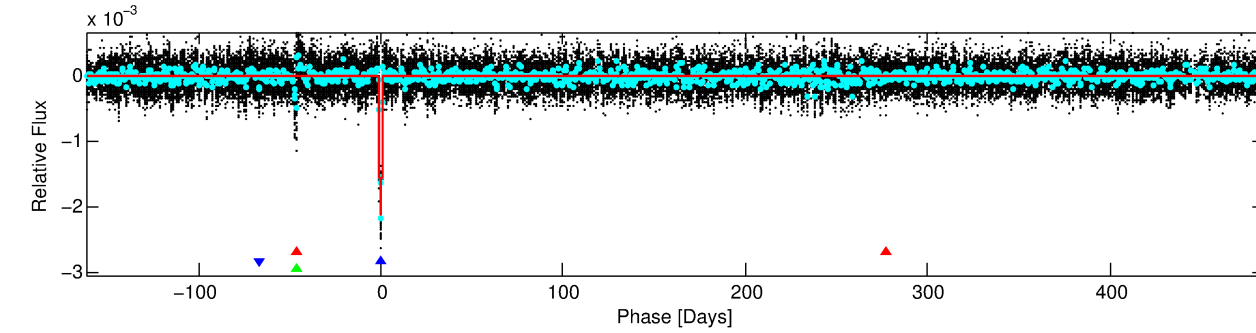
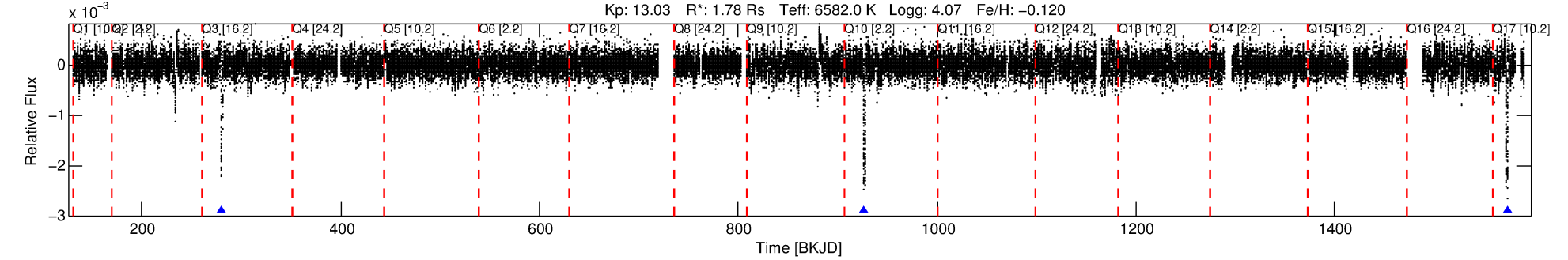
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 004366923-02

No Significant Match Found

# DV One-Page Summary

KIC: 4366923 Candidate: 2 of 3 Period: 646.277 d  
KOI: K05059 Corr: No Ephemeris Match



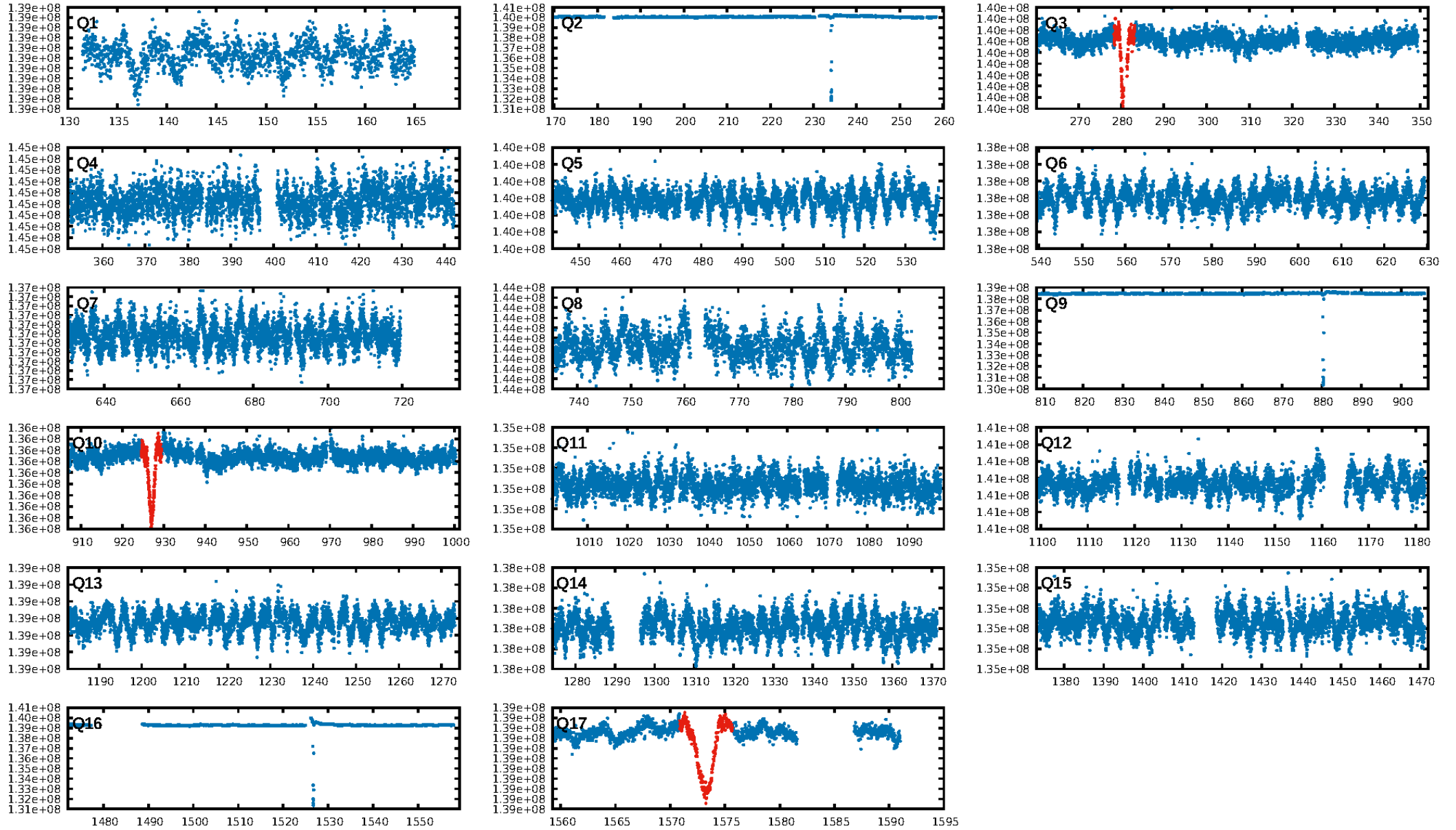
## DV Fit Results:

Period = 646.27713 [0.01907] d  
Epoch = 280.7263 [0.0232] BKJD  
Rp/R\* = 0.0747 [0.0359]  
a/R\* = 34.52 [3.56]  
b = 1.00 [0.05]  
Seff = 2.03 [0.68]  
Teq = 304 [25] K  
Rp = 14.49 [7.76] Re  
a = 1.6172 [0.3464] AU  
Ag = 1433.28 [1503.81] [0.95 $\sigma$ ]  
Teffp = 2896 [722] K [3.59 $\sigma$ ]

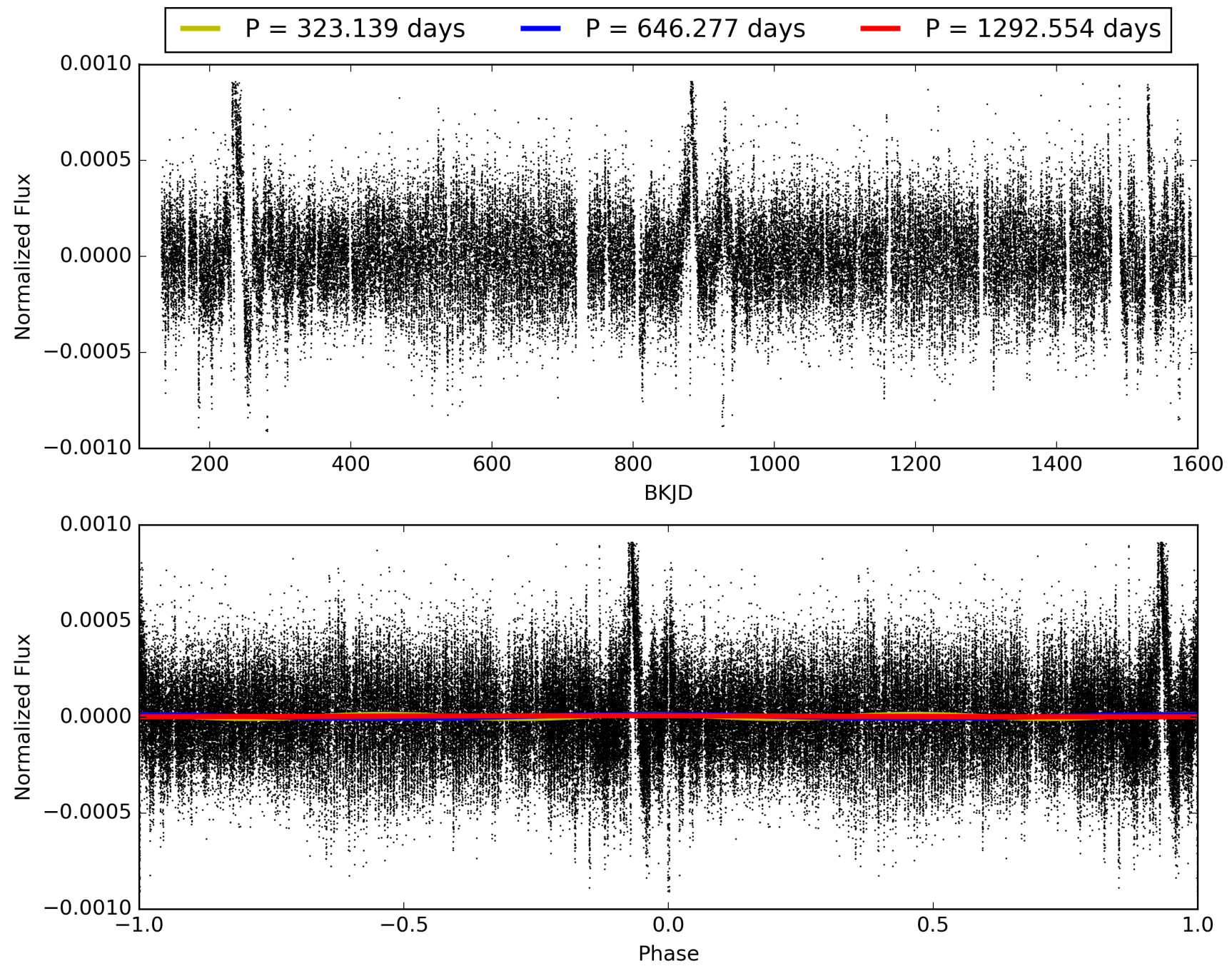
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [133.61 $\sigma$ ]  
LongPeriod-sig: 2.6% [0.03 $\sigma$ ]  
ModelChiSquare2-sig: 79.8%  
ModelChiSquareGof-sig: 100.0%  
Bootstrap-pfa: 2.46e-43  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: 1.717  
Centroid-sig: 13.7%  
Centroid-so: 0.190 arcsec [1.87 $\sigma$ ]  
OotOffset-rm: 0.333 arcsec [4.75 $\sigma$ ]  
KicOffset-rm: 0.341 arcsec [4.85 $\sigma$ ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [1/1]

# TCE 004366923-02, PDC Light Curves



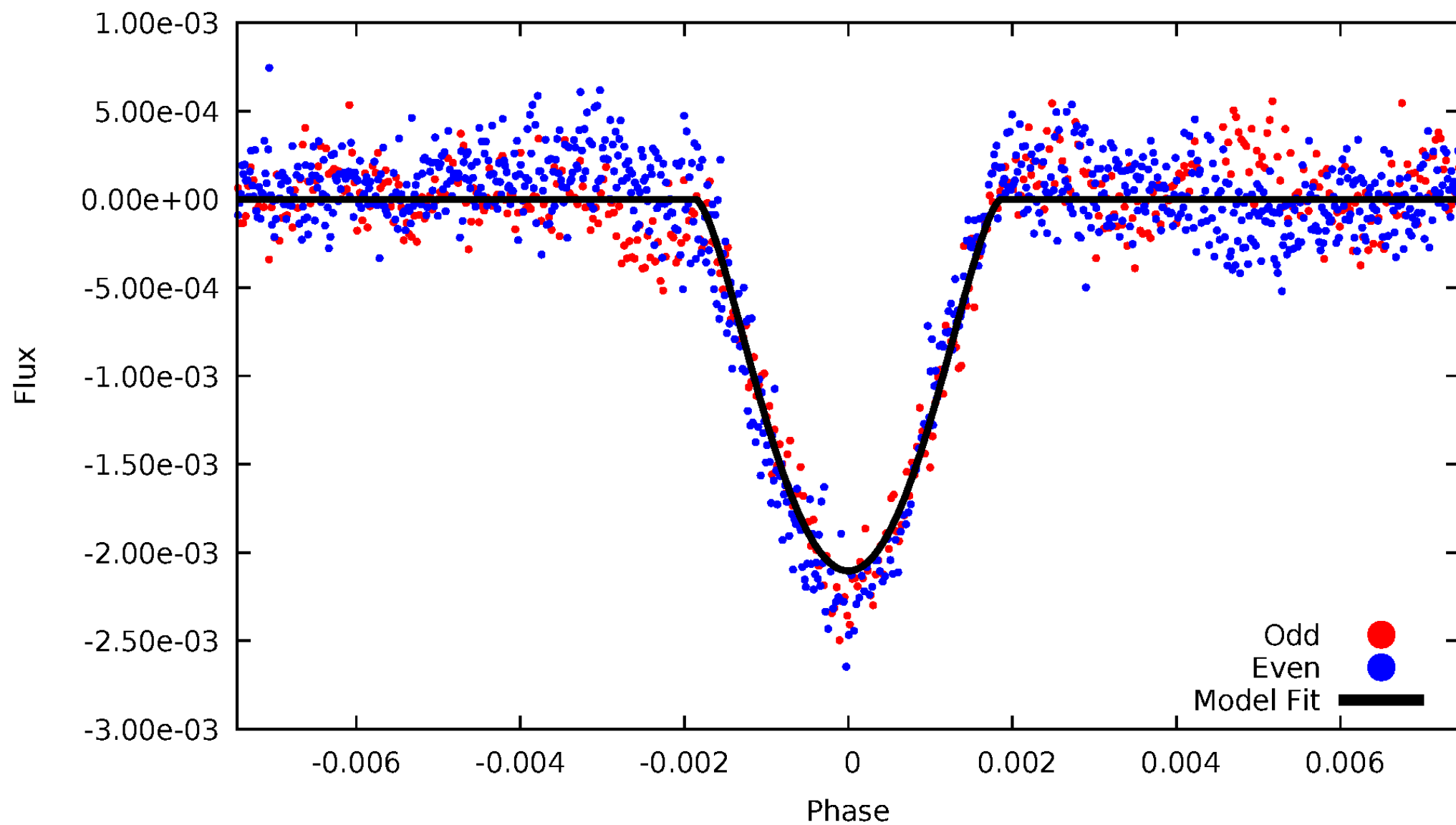
TCE 004366923-02





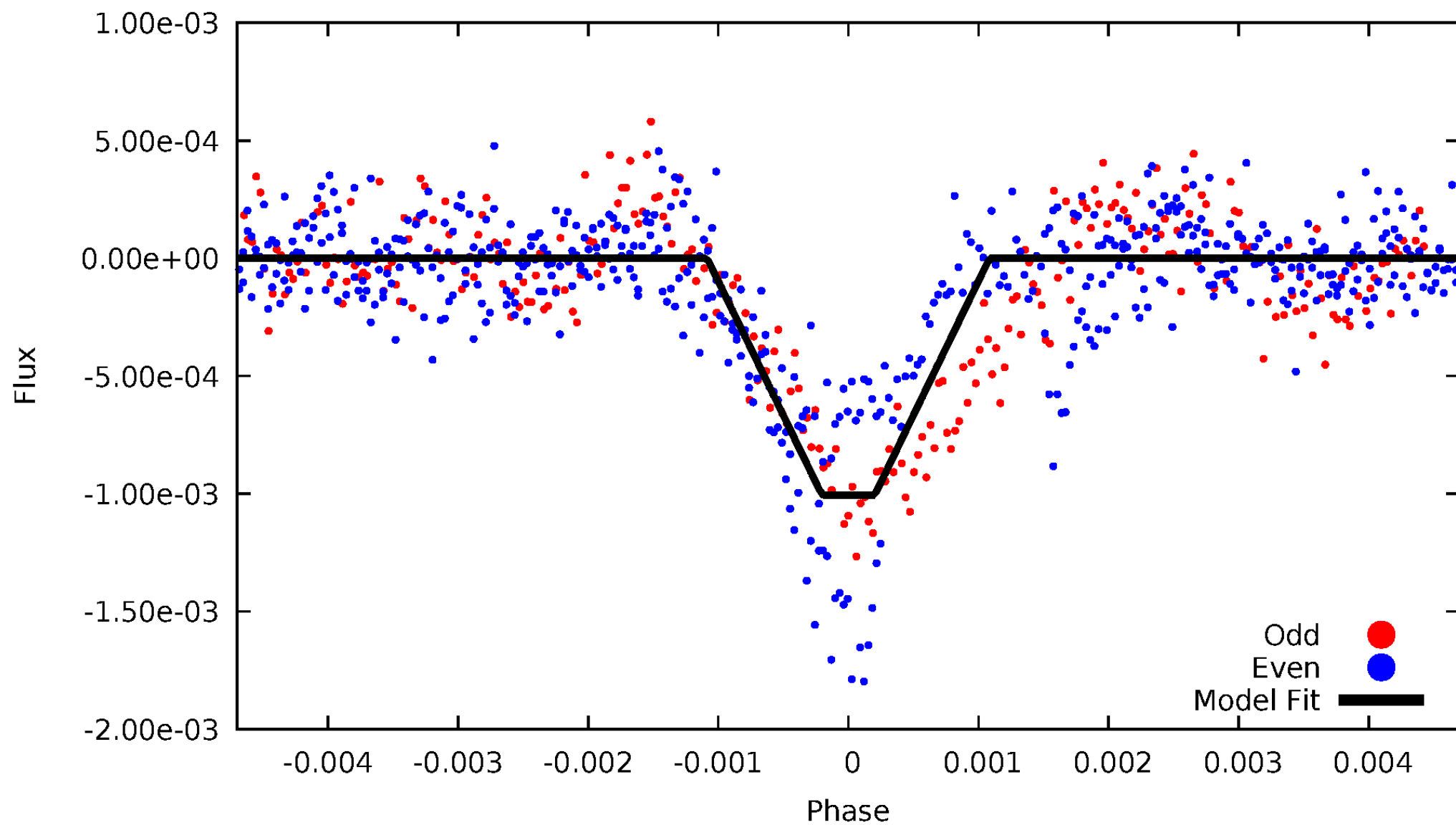
# DV Odd/Even

TCE 004366923-02



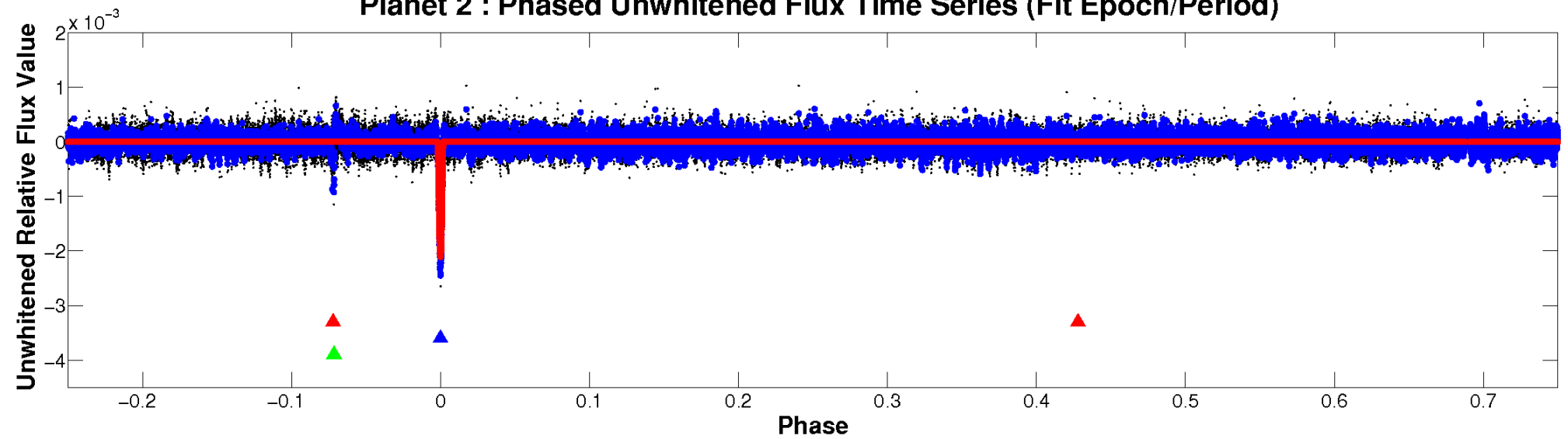
# ALT Odd/Even

TCE 004366923-02

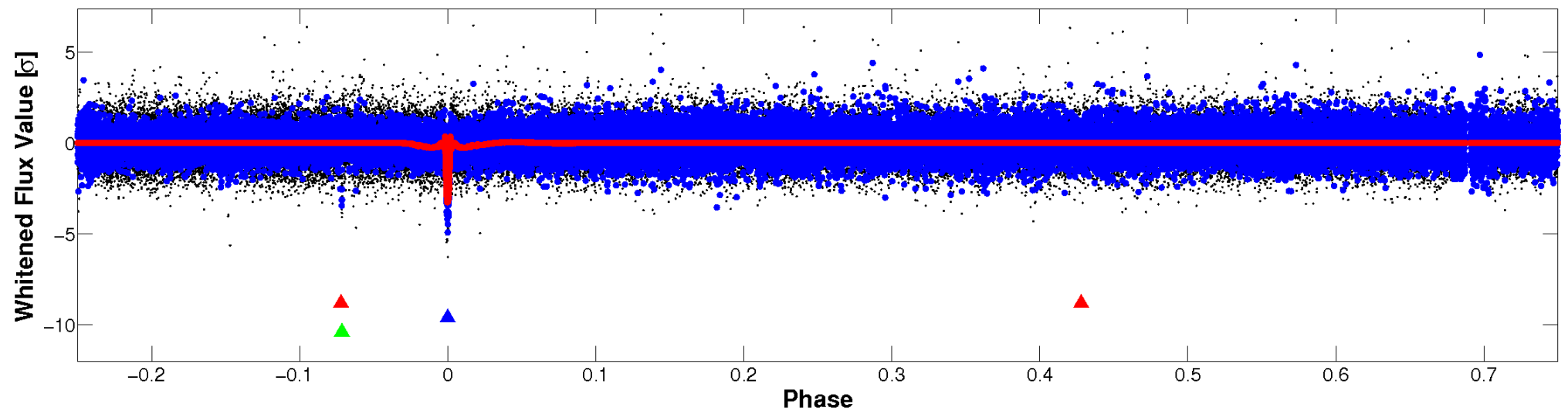


# Non-Whitened Vs. Whitened Light Curve

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

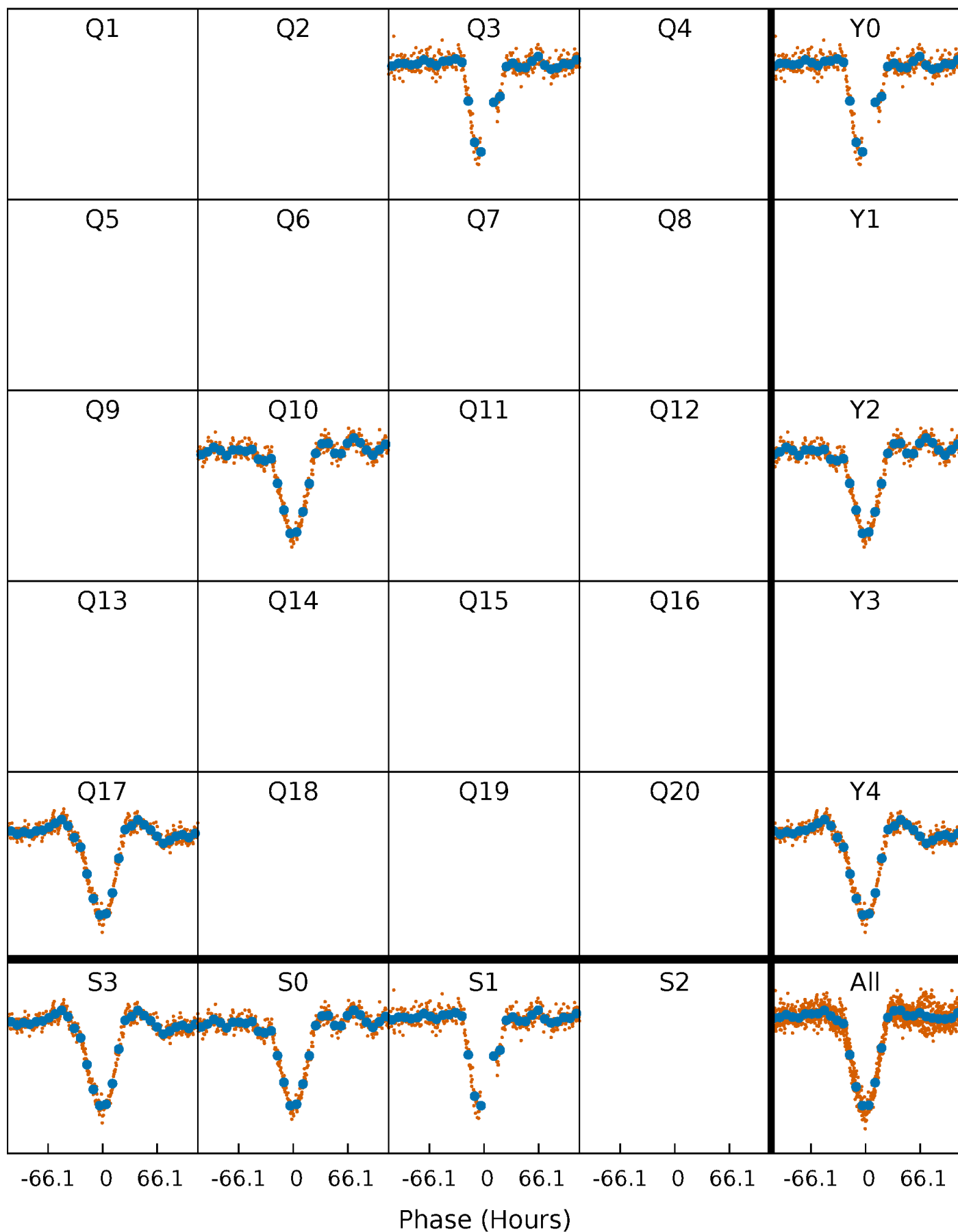


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



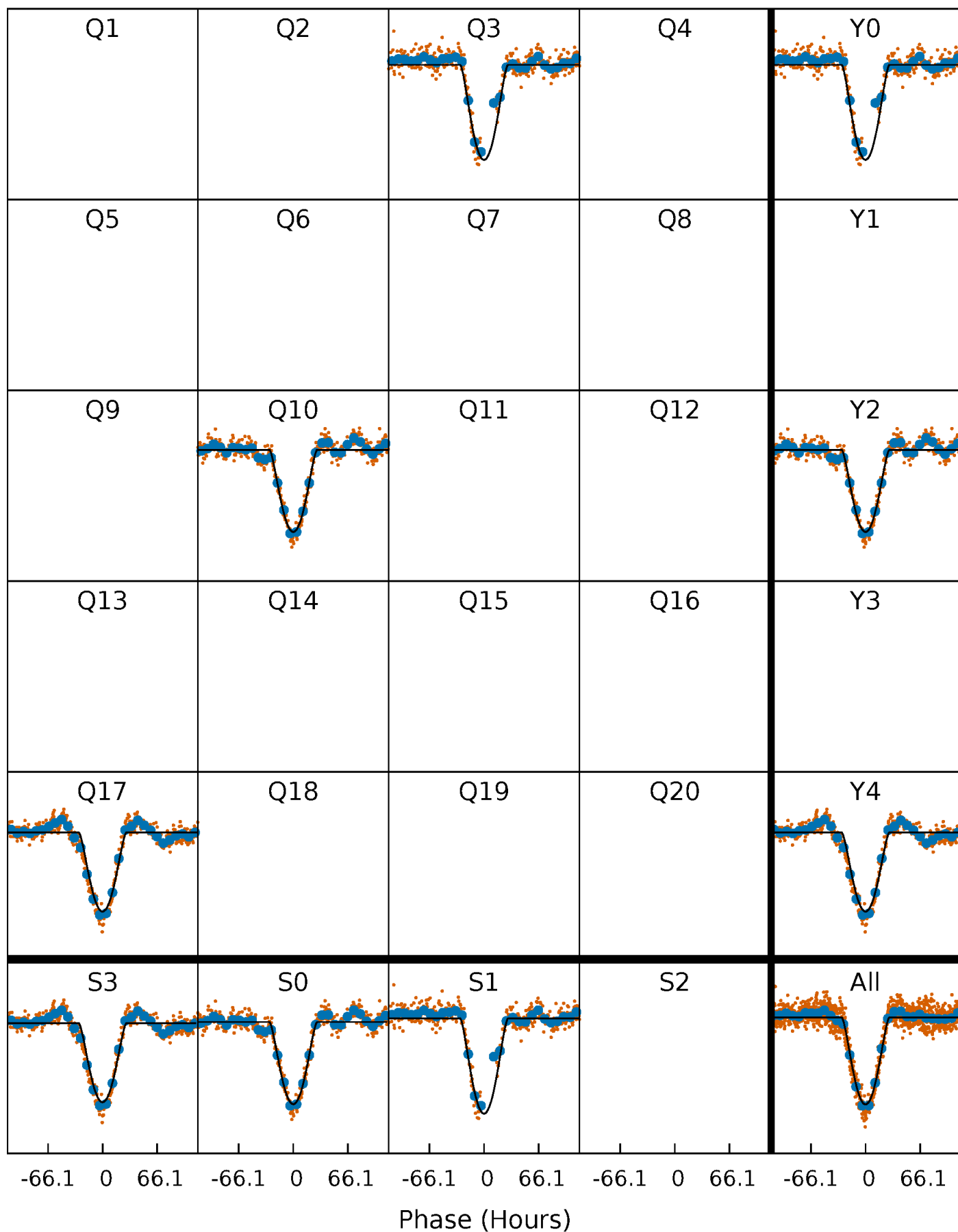
# PDC Quarter-Phased Transit Curves

TCE 004366923-02 P=646.277132 Days  $T_0=280.726300$  (BKJD)



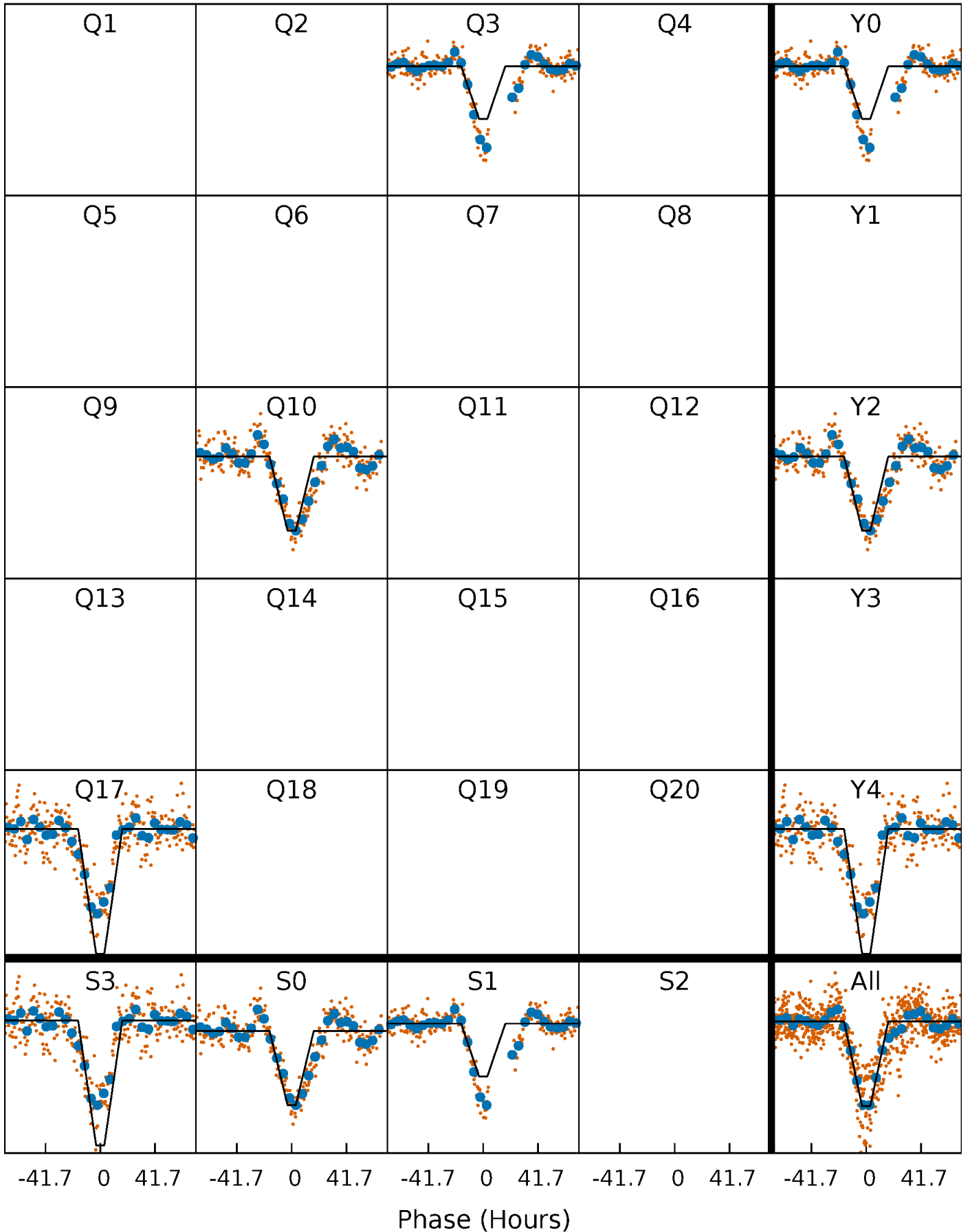
# DV Quarter-Phased Transit Curves

TCE 004366923-02 P=646.277132 Days  $T_0=280.726300$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

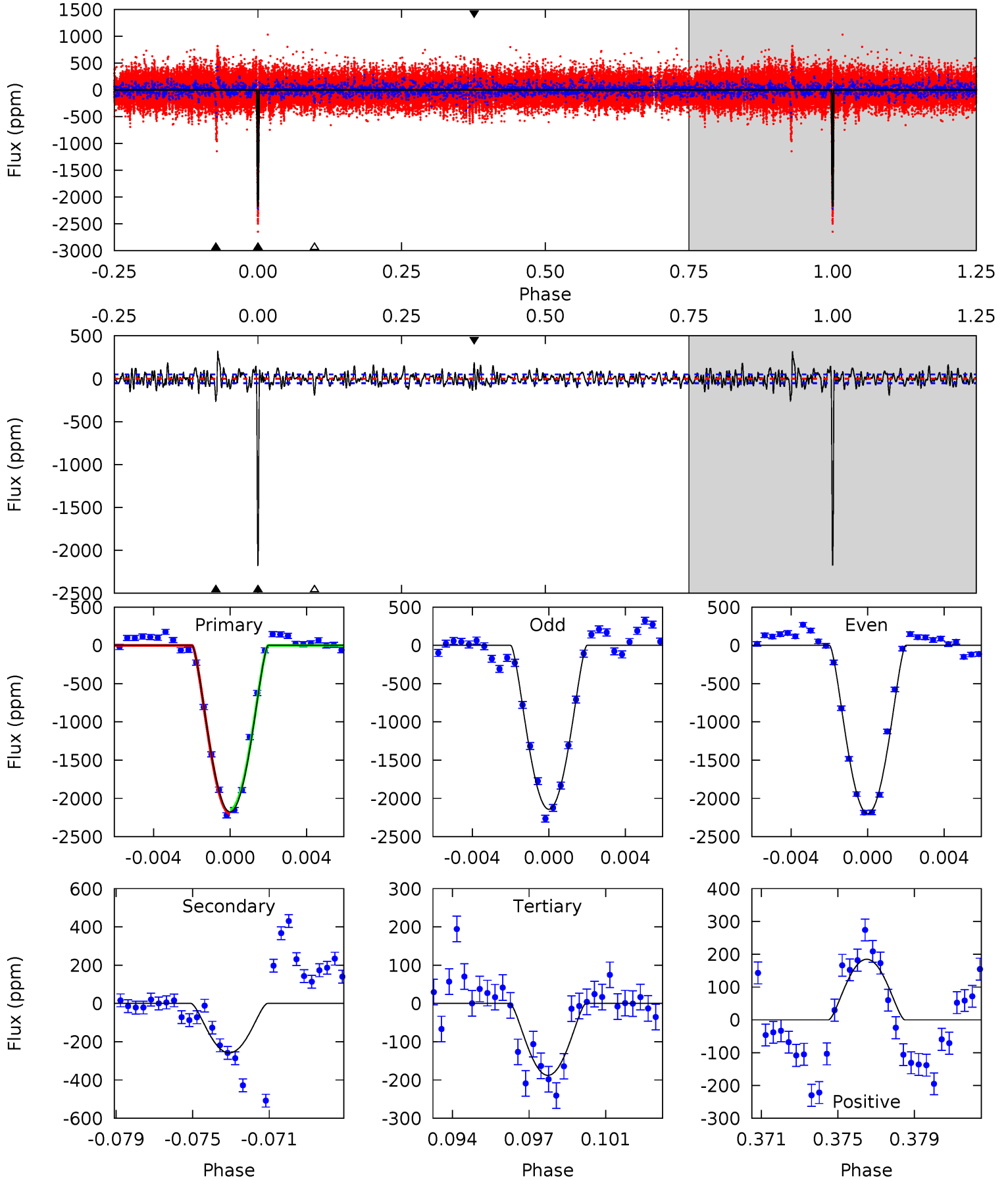
TCE 004366923-02 P=646.517838 Days  $T_0=280.374831$  (BKJD)



# DV Model-Shift Uniqueness Test

004366923-02, P = 646.277132 Days, E = 280.726300 Days

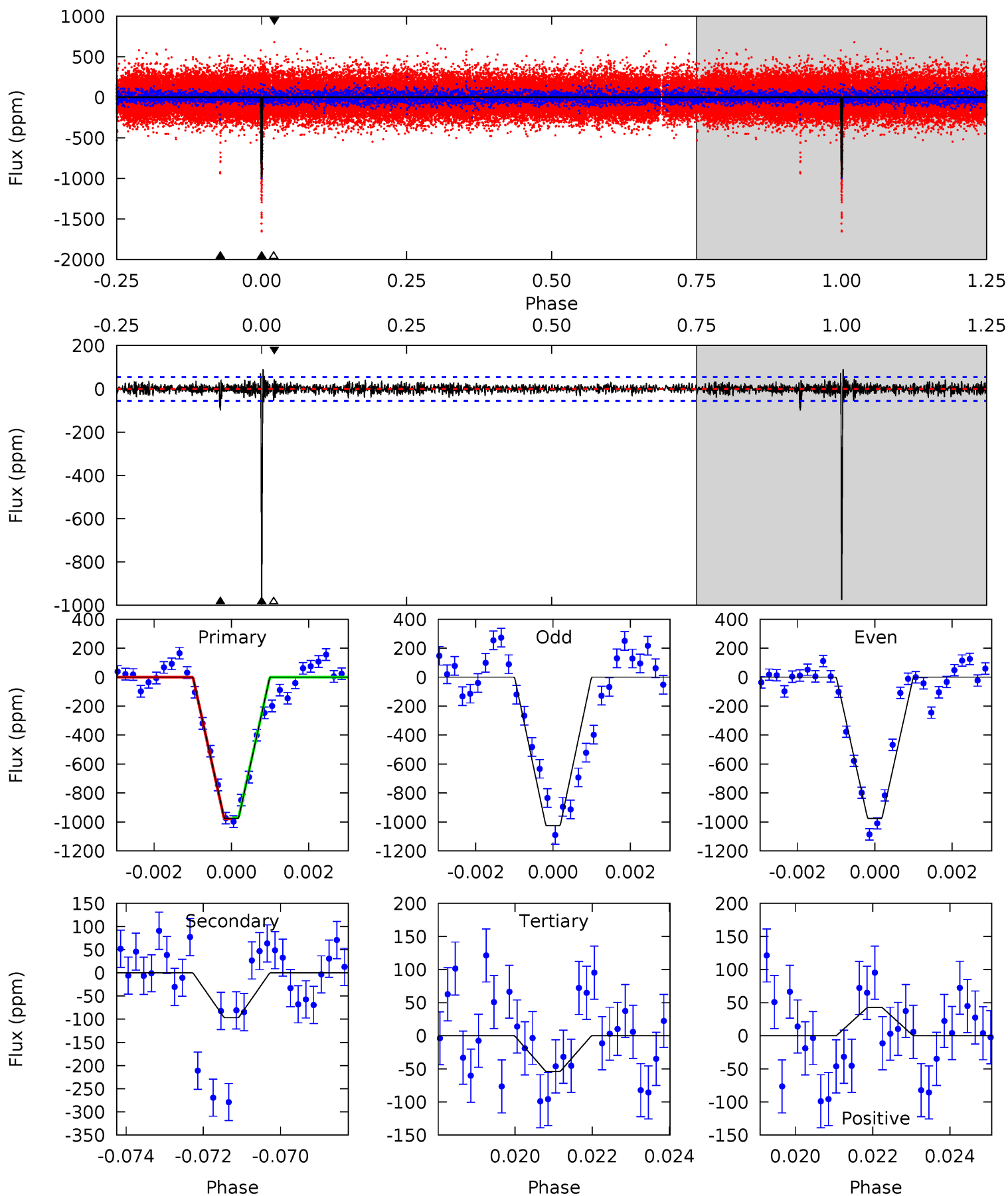
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
222.4	26.4	19.2	18.9	5.21	2.90	5.85	203.2	203.5	7.21	7.52	2.82	1.00	0.13	2.64



# Alt Model-Shift Uniqueness Test

004366923-02, P = 646.517838 Days, E = 280.374831 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
94.1	9.34	5.21	4.15	5.31	3.06	1.25	88.9	90.0	4.13	5.20	2.35	1.02	0.08	0.36





### Stellar Parameters For KIC 004366923

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$6582^{+71}_{-84}$	$4.069^{+0.188}_{-0.116}$	$-0.120^{+0.150}_{-0.150}$	$1.777^{+0.317}_{-0.422}$	$1.357^{+0.096}_{-0.165}$	$0.341^{+0.307}_{-0.119}$
	+1%/-1%	+5%/-3%	+125%/-125%	+18%/-24%	+7%/-12%	+90%/-35%
Source	SPE68	SPE68	SPE68	DSEP		

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

### Secondary Eclipse Parameters for KIC 004366923-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-258 \pm 10$	$14.33^{+6.98}_{-6.96}$	$424^{+22}_{-26}$	$3506^{+900}_{-385}$	$1783^{+5284}_{-965}$
Alt.	$-97 \pm 10$	$7.47^{+6.34}_{-4.86}$	$424^{+21}_{-30}$	$3695^{+1785}_{-631}$	$2543^{+17393}_{-1801}$

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

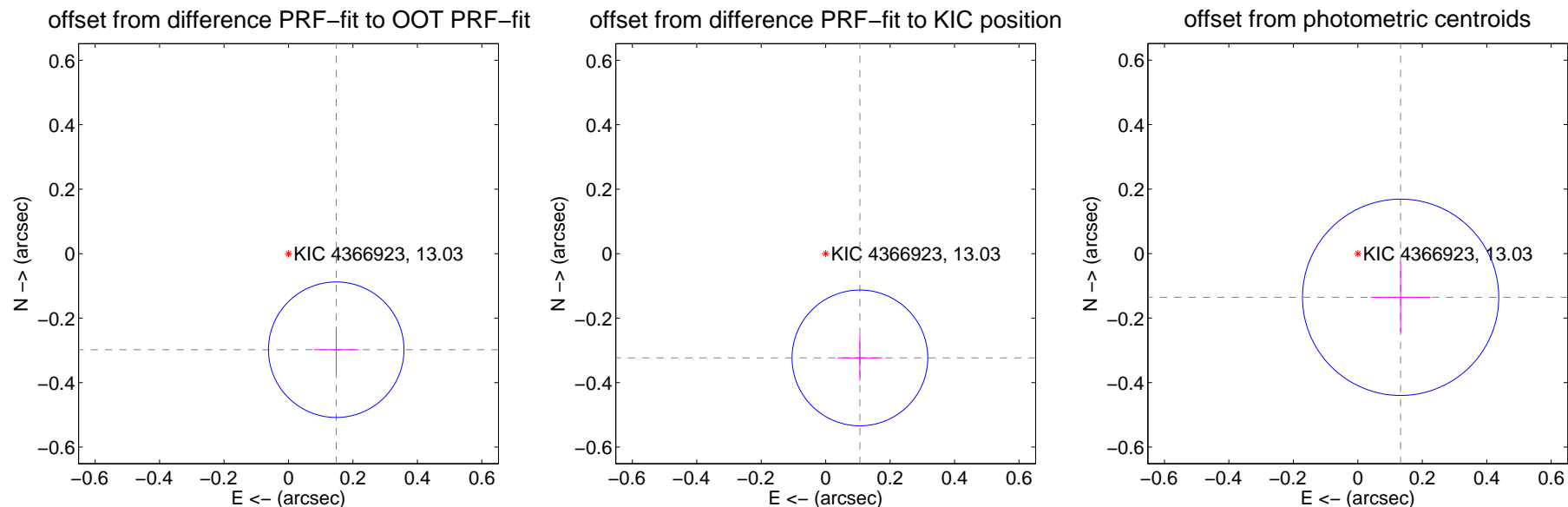
## DV Centroid Data

Supplemental centroid analysis for 004366923-02. Kepler magnitude: 13.03. Transit SNR 36.32

There are 1 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.05 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.333 \pm 0.070$	4.75	$-0.148 \pm 0.069$	$-0.298 \pm 0.070$
PRF-fit source offset from KIC position	$0.341 \pm 0.070$	4.85	$-0.106 \pm 0.069$	$-0.323 \pm 0.070$
photometric centroid source offset	$0.19 \pm 0.10$	1.87	$-0.13 \pm 0.09$	$-0.14 \pm 0.11$



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.

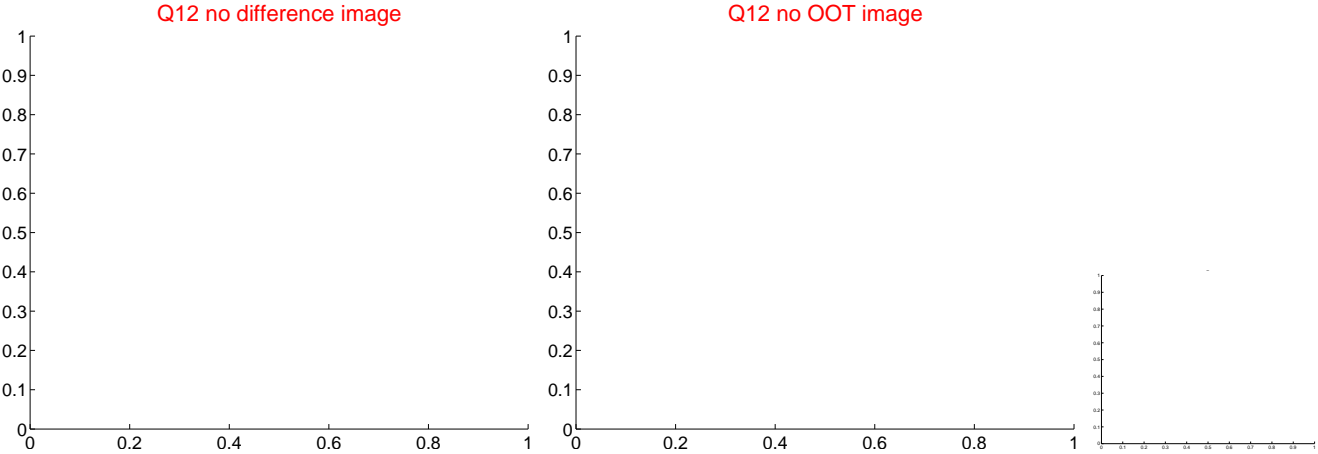
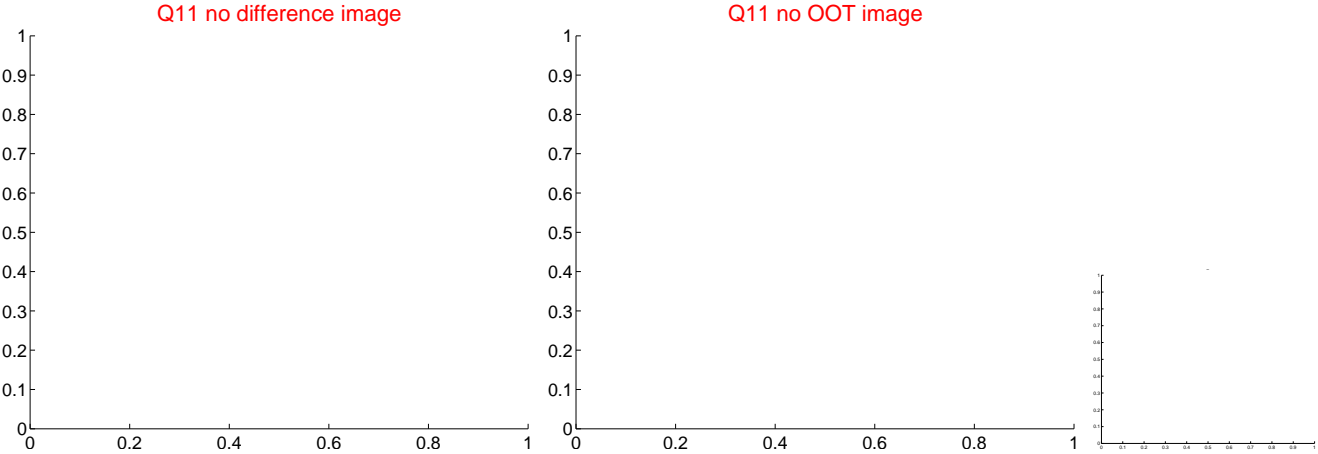
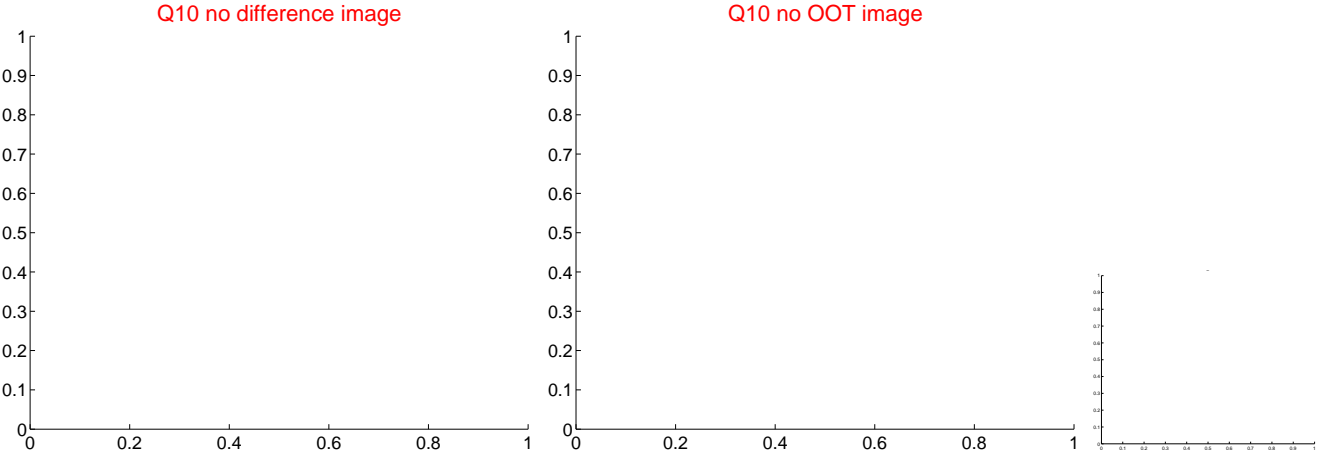
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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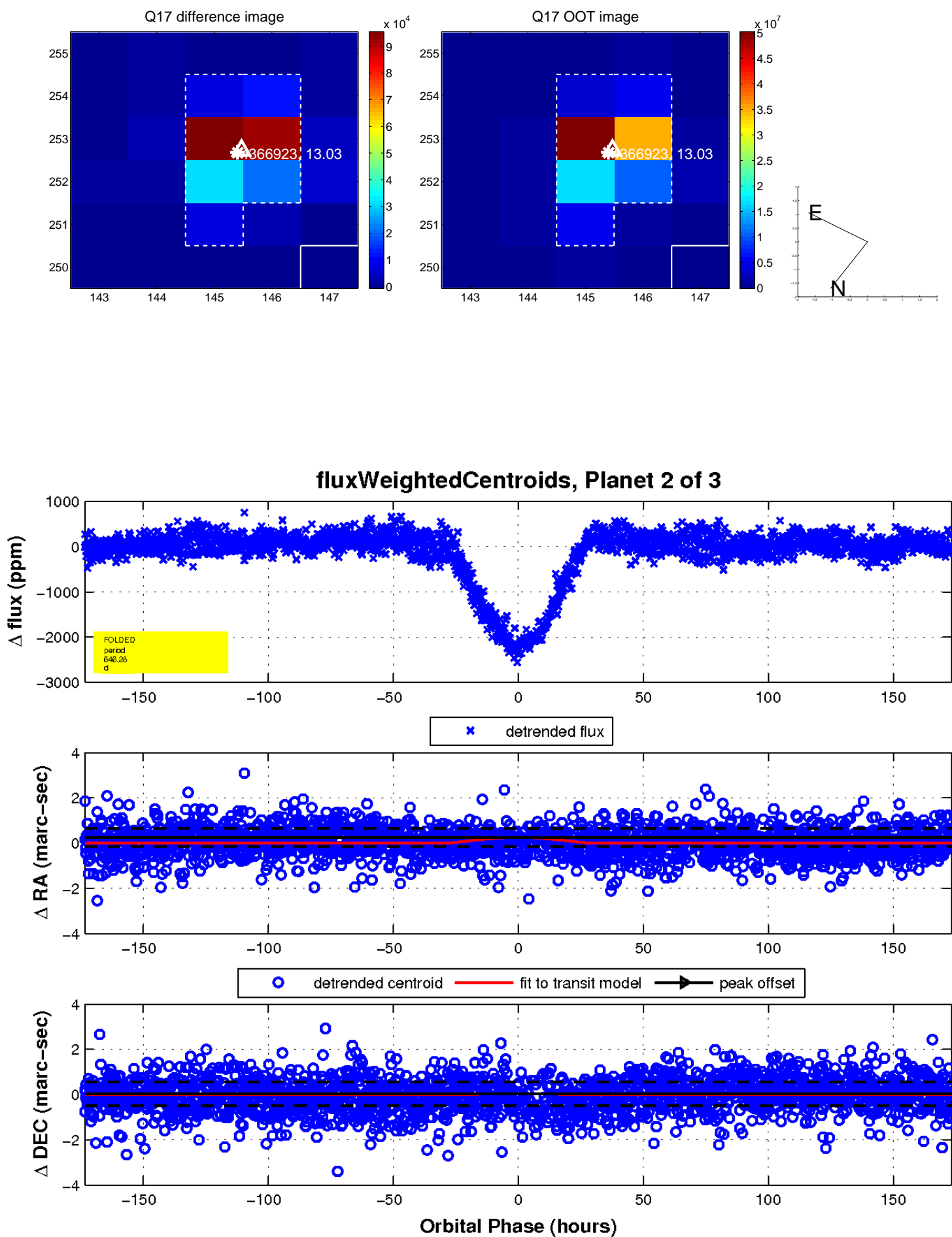
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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UKIRT Image

Declination

