

# KIC 009084222

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009084222-01	OBS	No	387.903882	277.505856	1067.2	2.776	10.5	6.3	0.81	5017	2.77	0.41
009084222-02	OBS	No	455.804518	194.624539	1036.4	5.926	9.5	7.5	0.81	5017	2.99	0.33
009084222-03	OBS	No	99.257541	224.726965	552.5	3.666	7.7	5.7	0.81	5017	1.92	2.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009084222-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_MEAS
009084222-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS
009084222-03	OBS	FP	0.03	1	0	0	0	LPP_DV

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

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

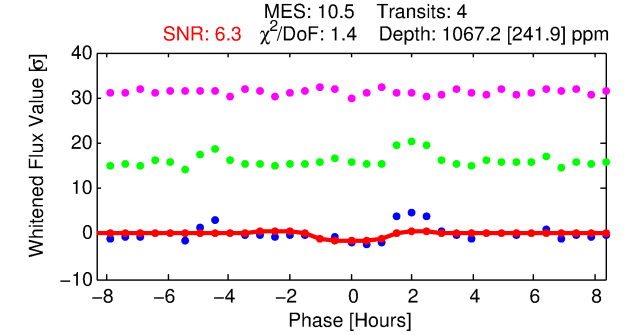
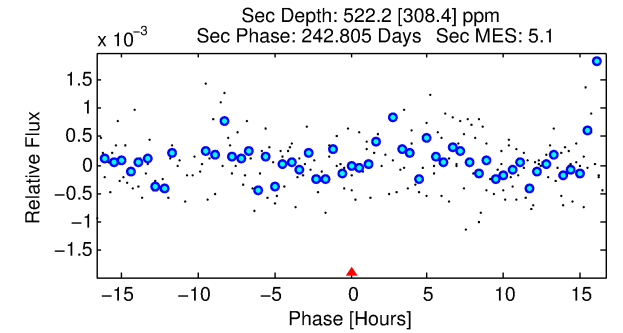
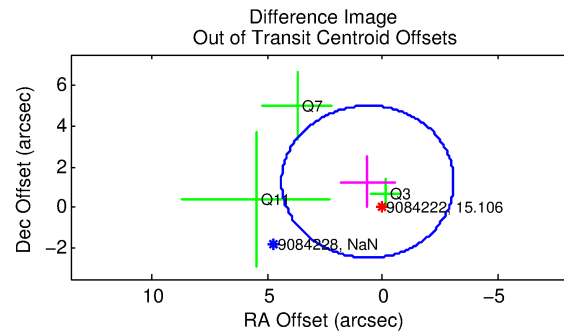
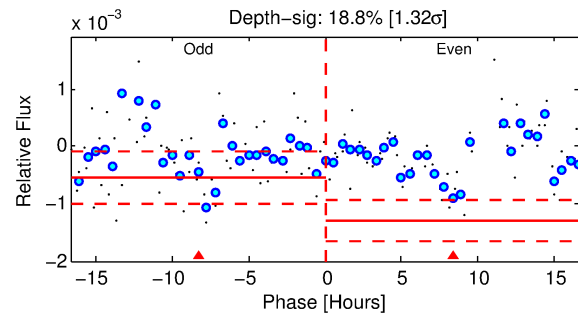
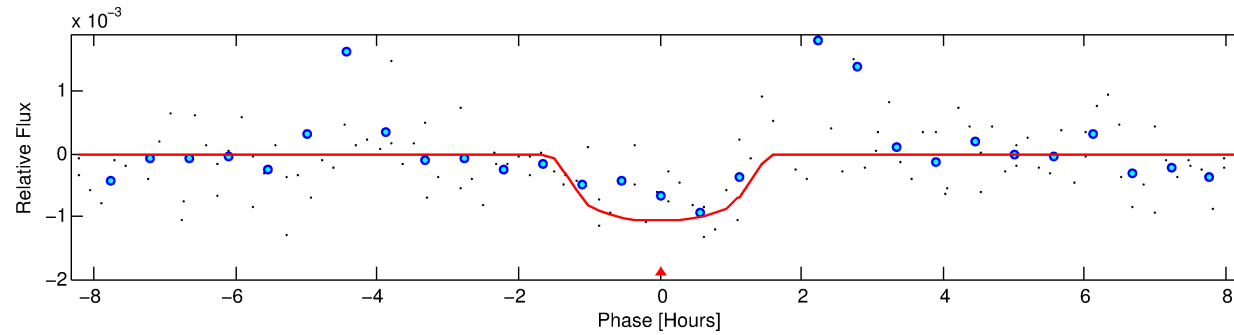
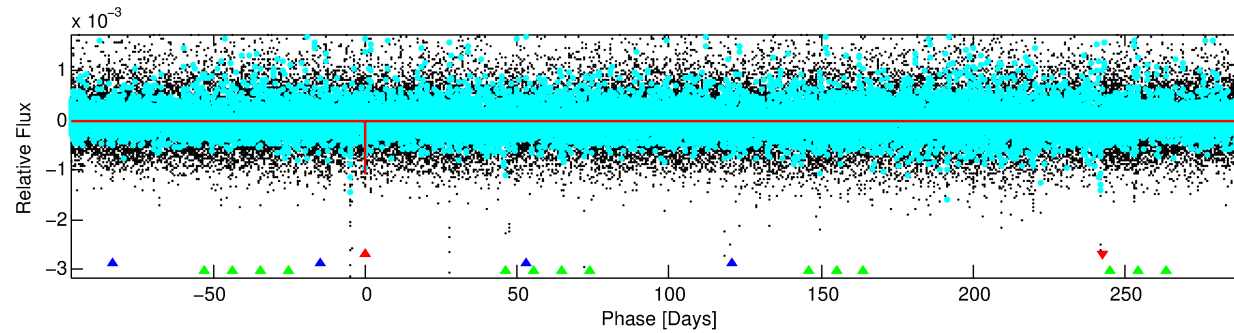
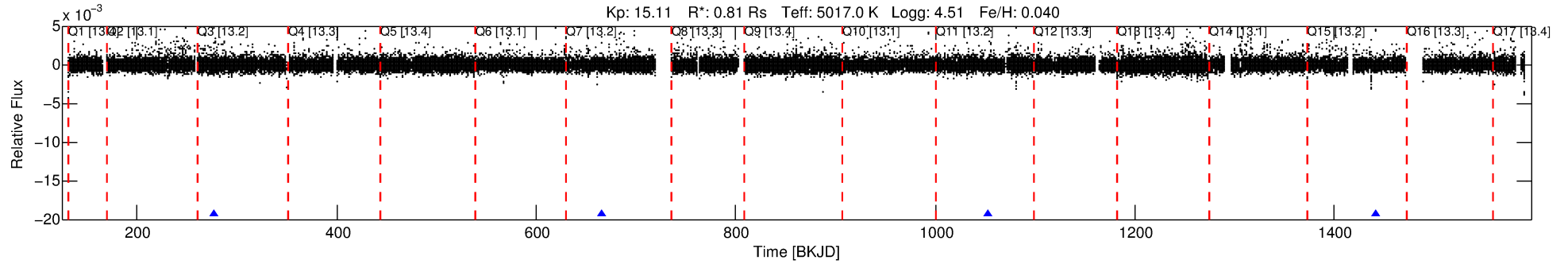
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009084222-01

No Significant Match Found

# DV One-Page Summary

KIC: 9084222 Candidate: 1 of 3 Period: 387.904 d



## DV Fit Results:

Period = 387.90388 [0.00513] d  
Epoch = 277.5059 [0.0096] BKJD  
Rp/R\* = 0.0313 [0.0883]  
a/R\* = 859.69 [8262.20]  
b = 0.64 [8.94]  
Seff = 0.41 [0.08]  
Teq = 204 [10] K  
Rp = 2.77 [7.82] Re  
a = 0.9554 [0.0940] AU  
Ag = 34076.77 [193206.32] [0.18 $\sigma$ ]  
Teffp = 4284 [6071] K [0.67 $\sigma$ ]

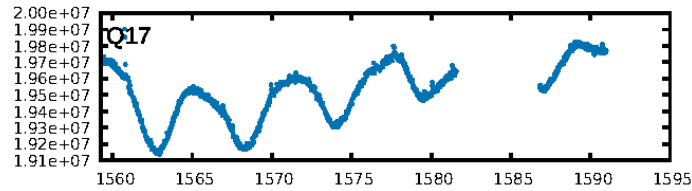
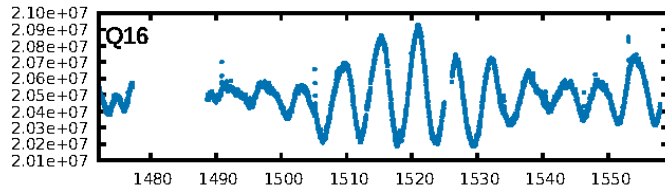
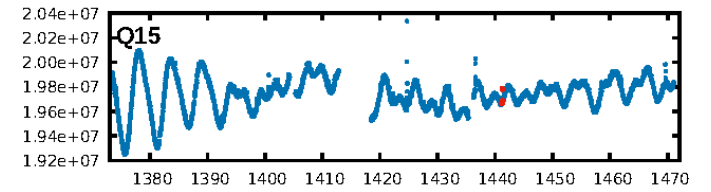
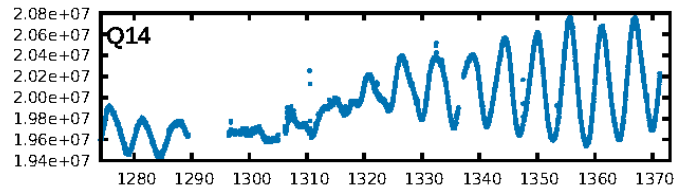
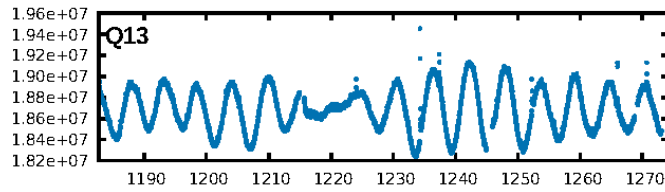
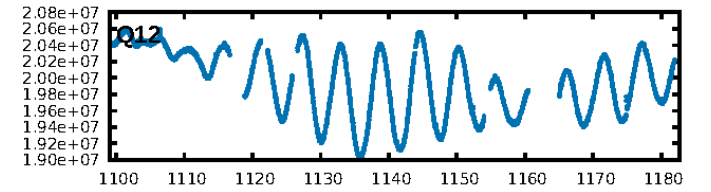
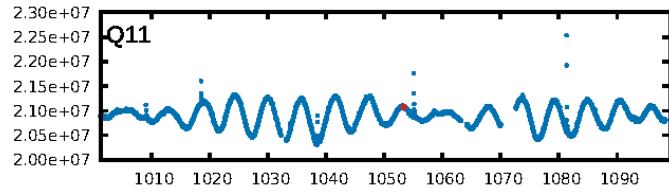
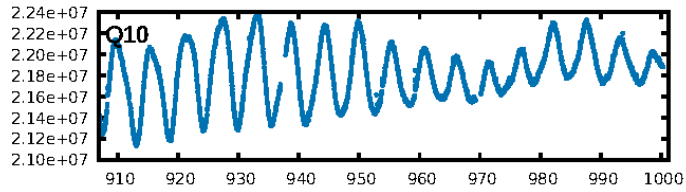
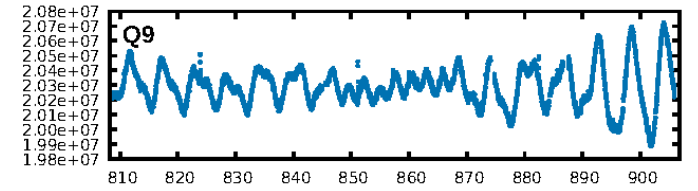
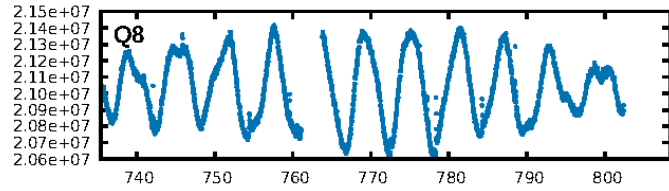
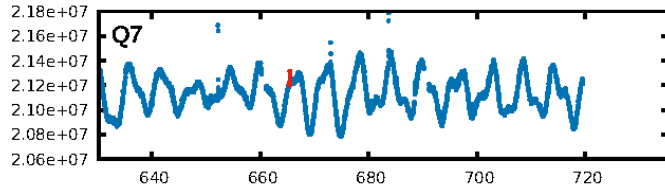
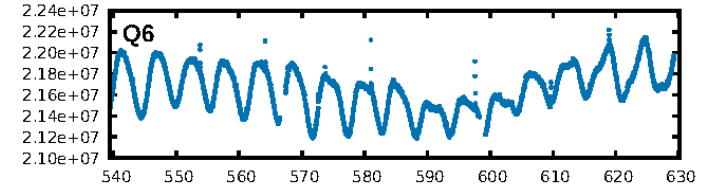
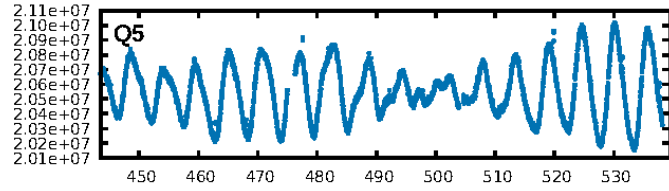
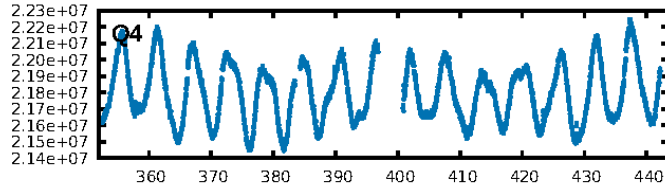
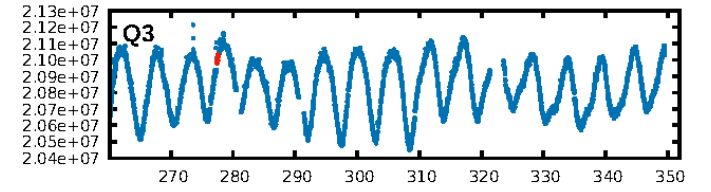
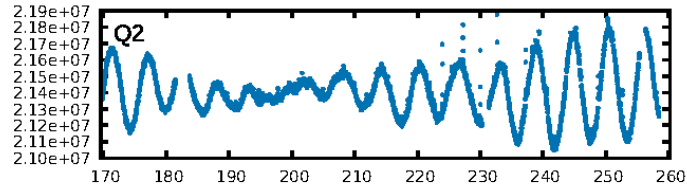
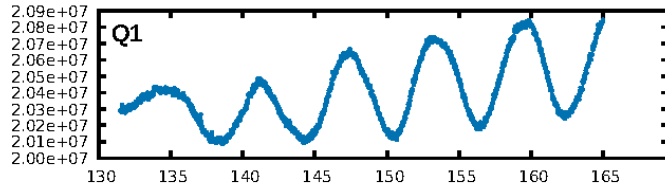
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [1506.33 $\sigma$ ]  
LongPeriod-sig: 100.0% [249.01 $\sigma$ ]  
ModelChiSquare2-sig: 10.6%  
ModelChiSquareGof-sig: 34.9%  
**Bootstrap-pfa: 4.20e-09**  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 1.453  
Centroid-sig: 3.4%  
Centroid-so: 1.955 arcsec [1.58 $\sigma$ ]  
OotOffset-rm: 1.417 arcsec [1.14 $\sigma$ ]  
OotOffset-st: 0/3/0/0 [3]  
KicOffset-rm: 1.605 arcsec [1.27 $\sigma$ ]  
KicOffset-st: 0/3/0/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [4/4]

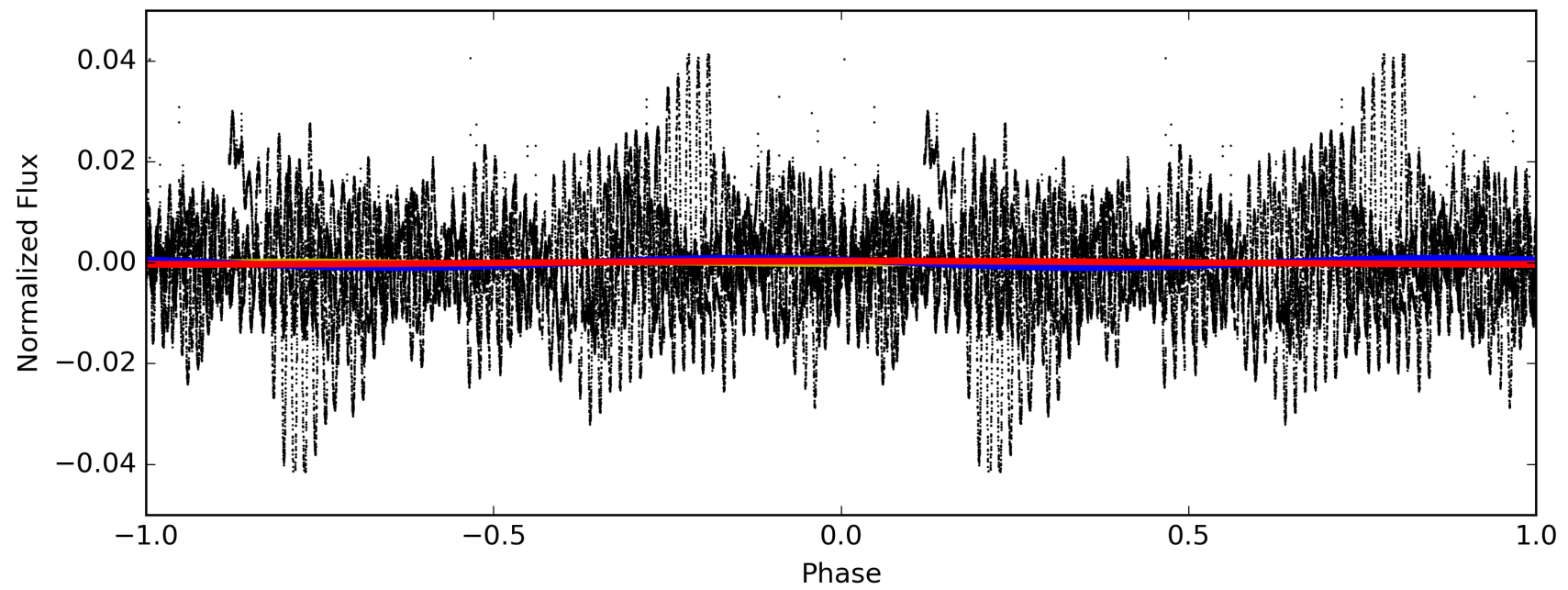
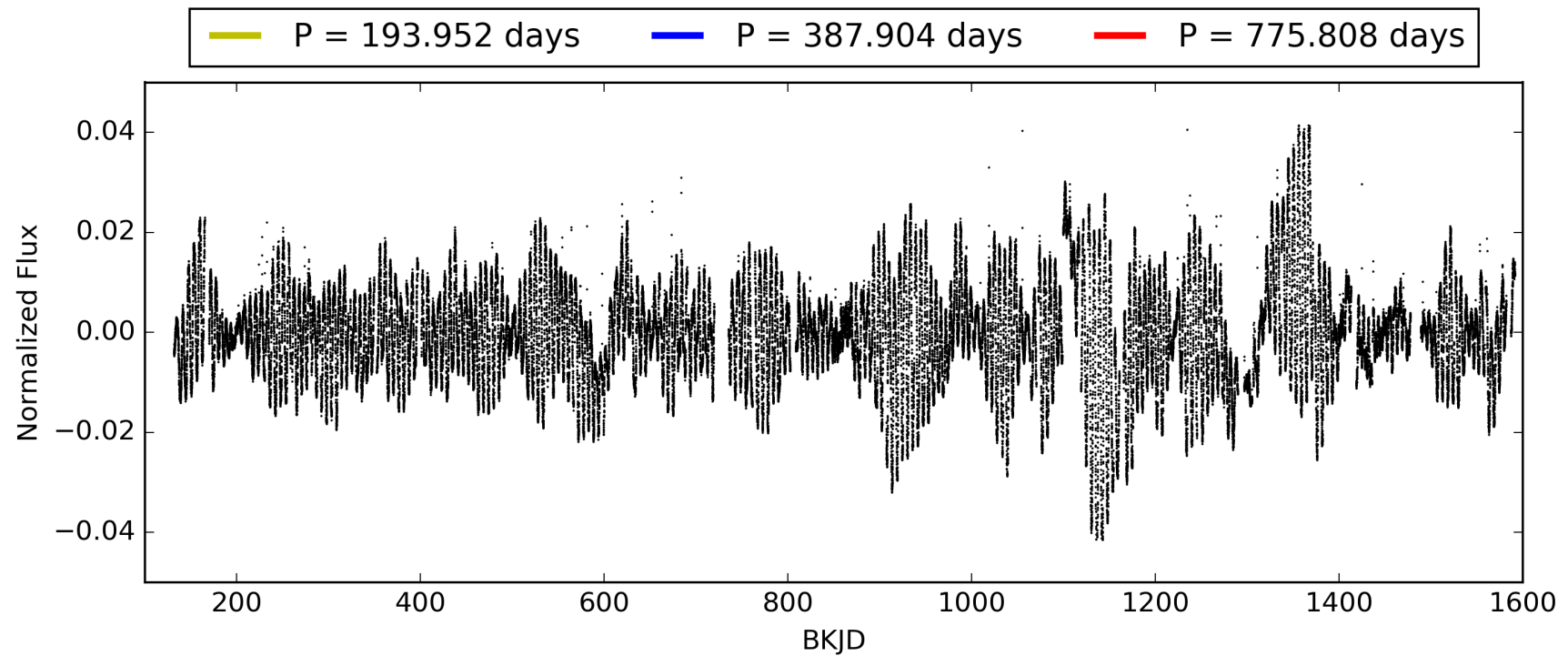
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 09:34:25 Z

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

# TCE 009084222-01, PDC Light Curves

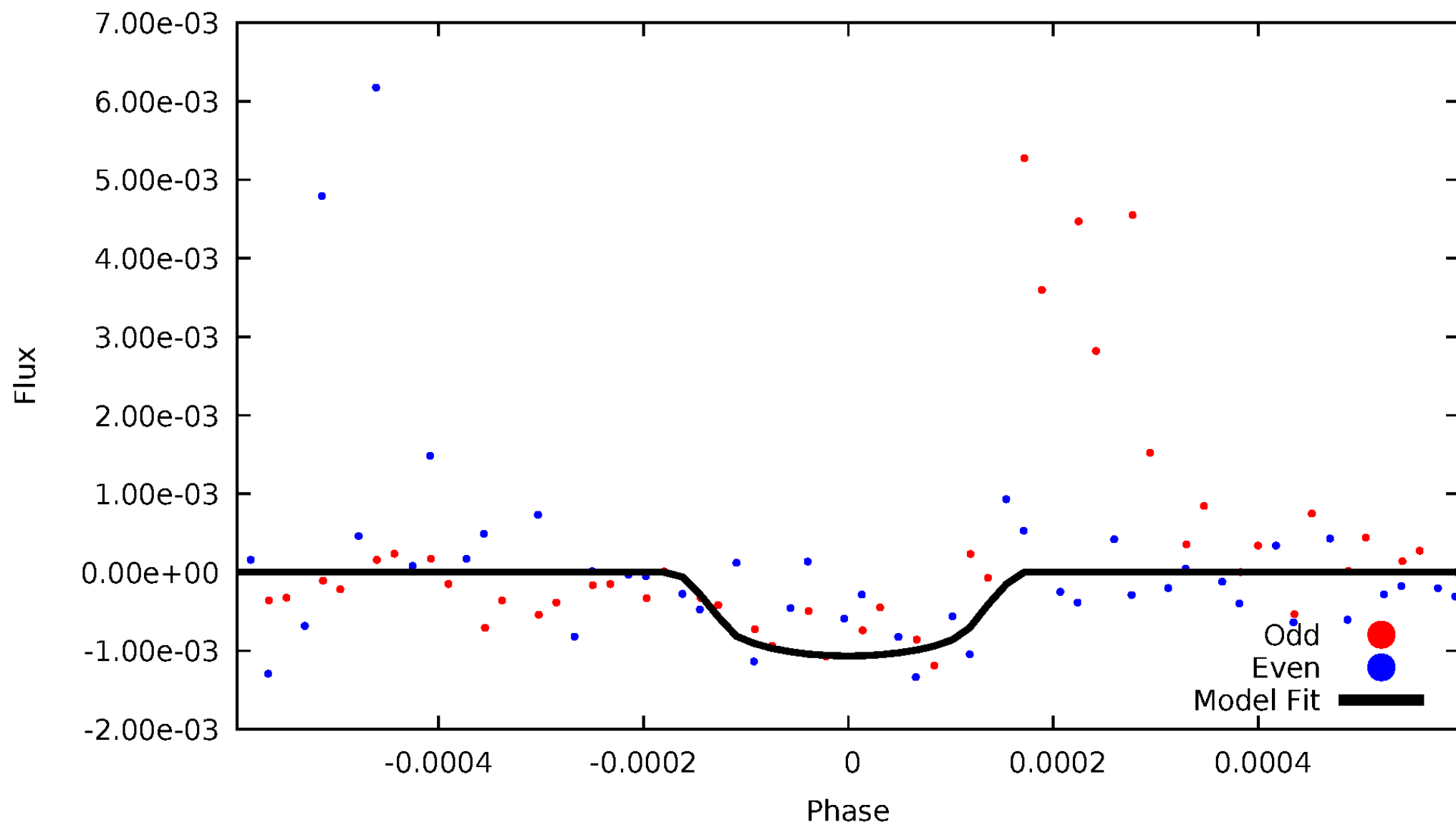


TCE 009084222-01



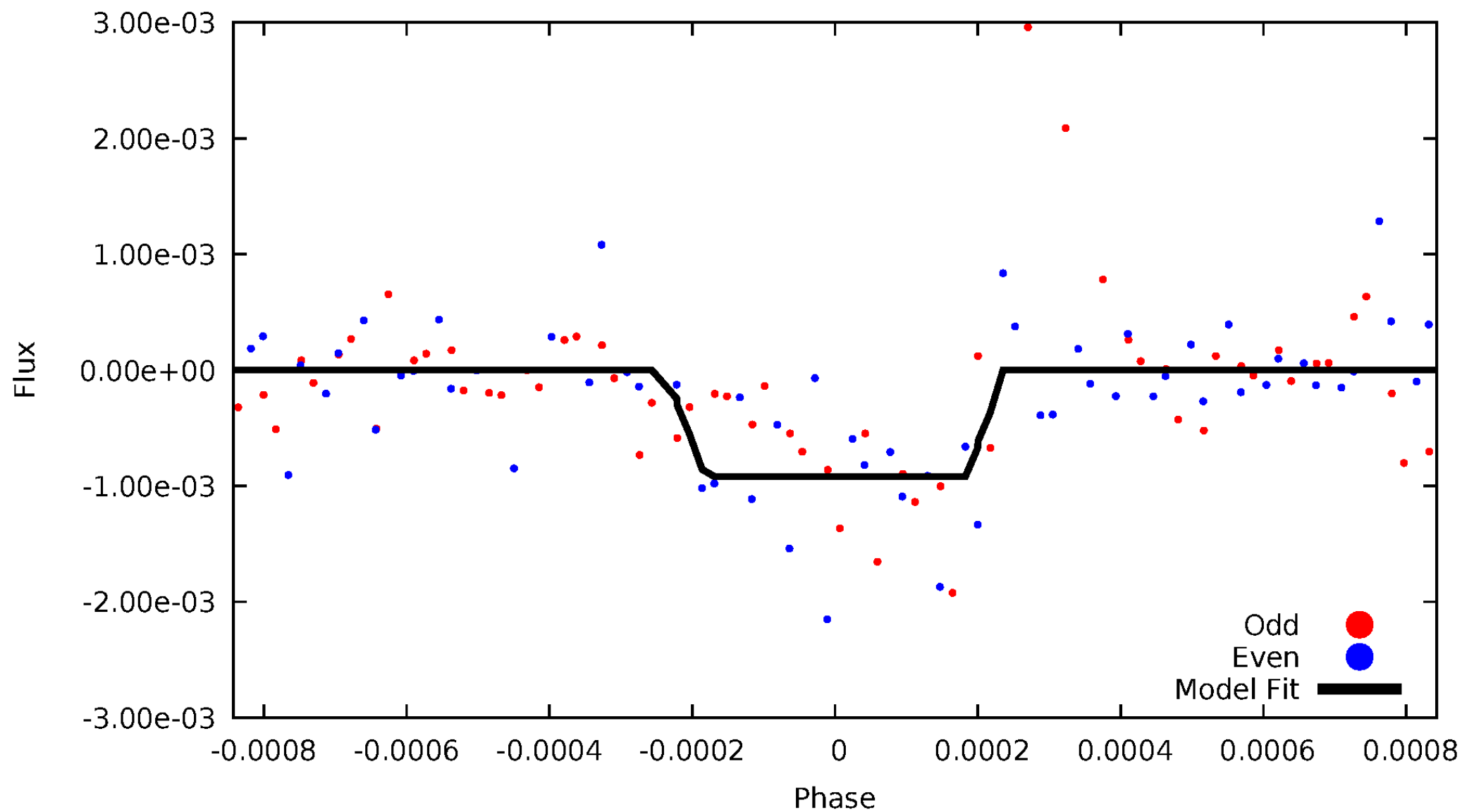
# DV Odd/Even

TCE 009084222-01



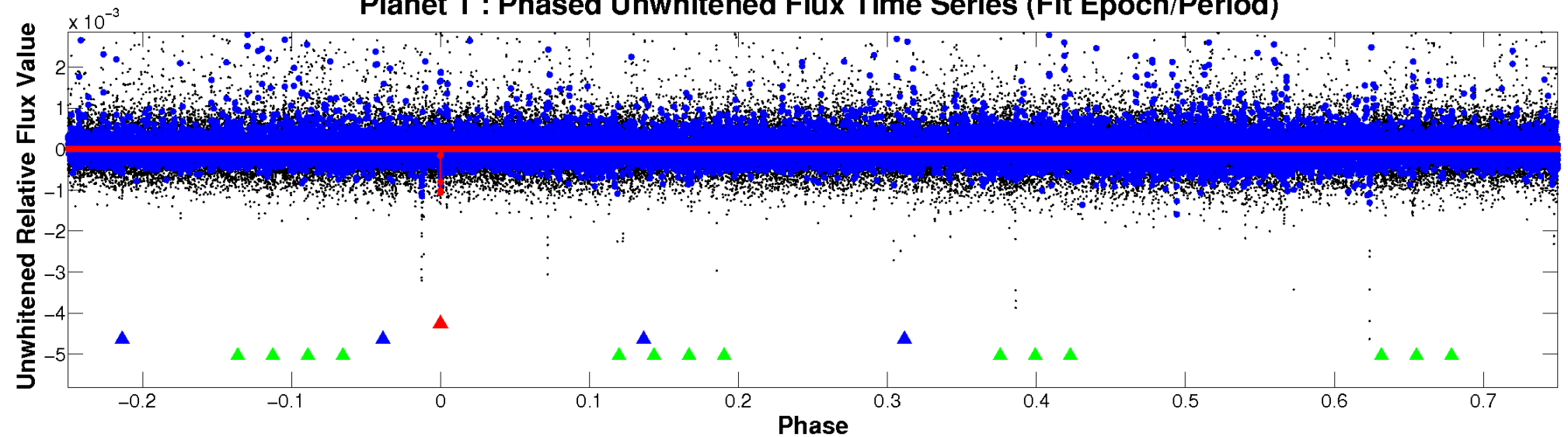
# ALT Odd/Even

TCE 009084222-01

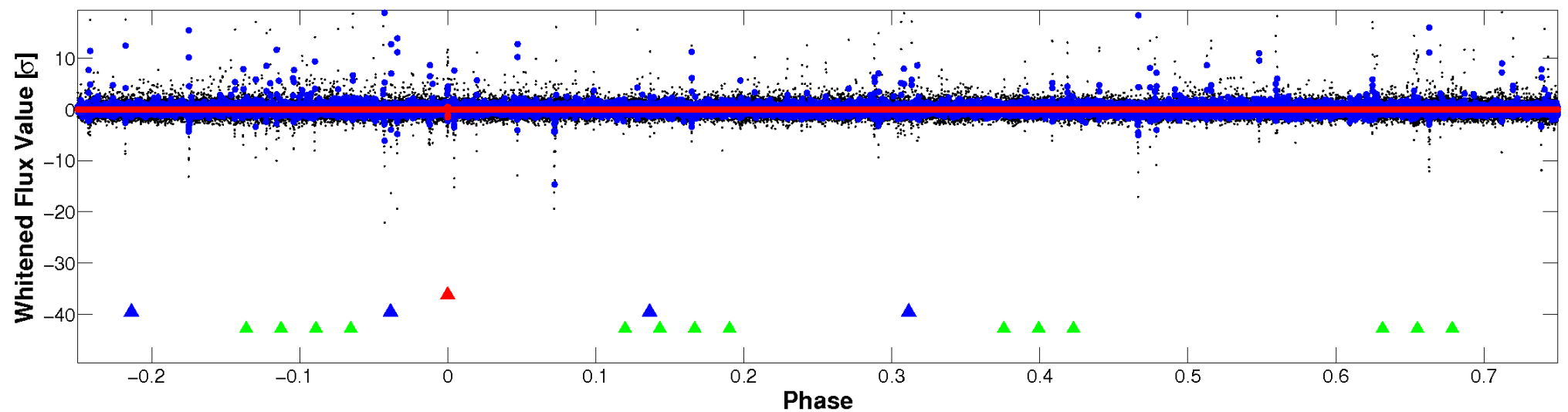


# Non-Whitened Vs. Whitened Light Curve

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

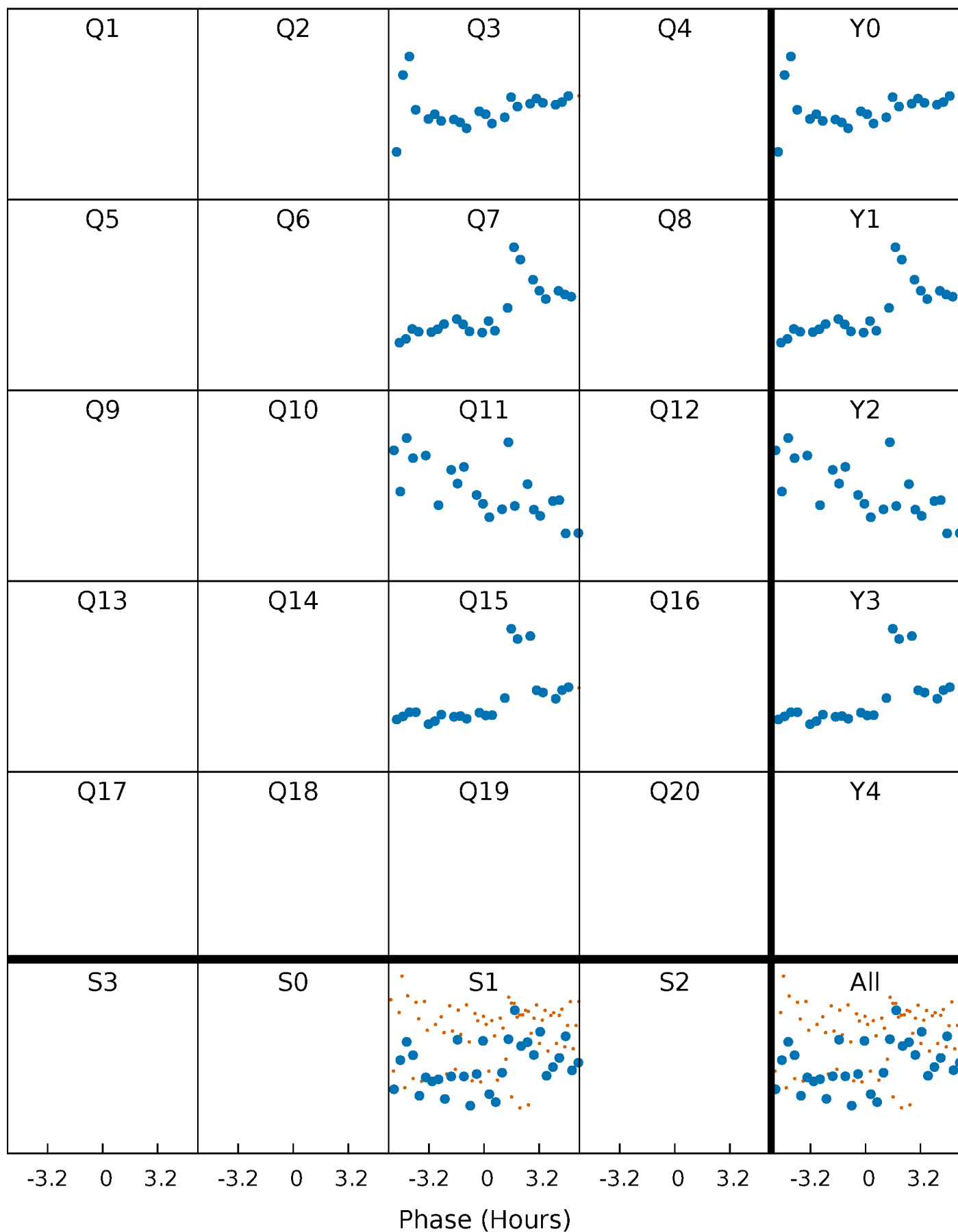


Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

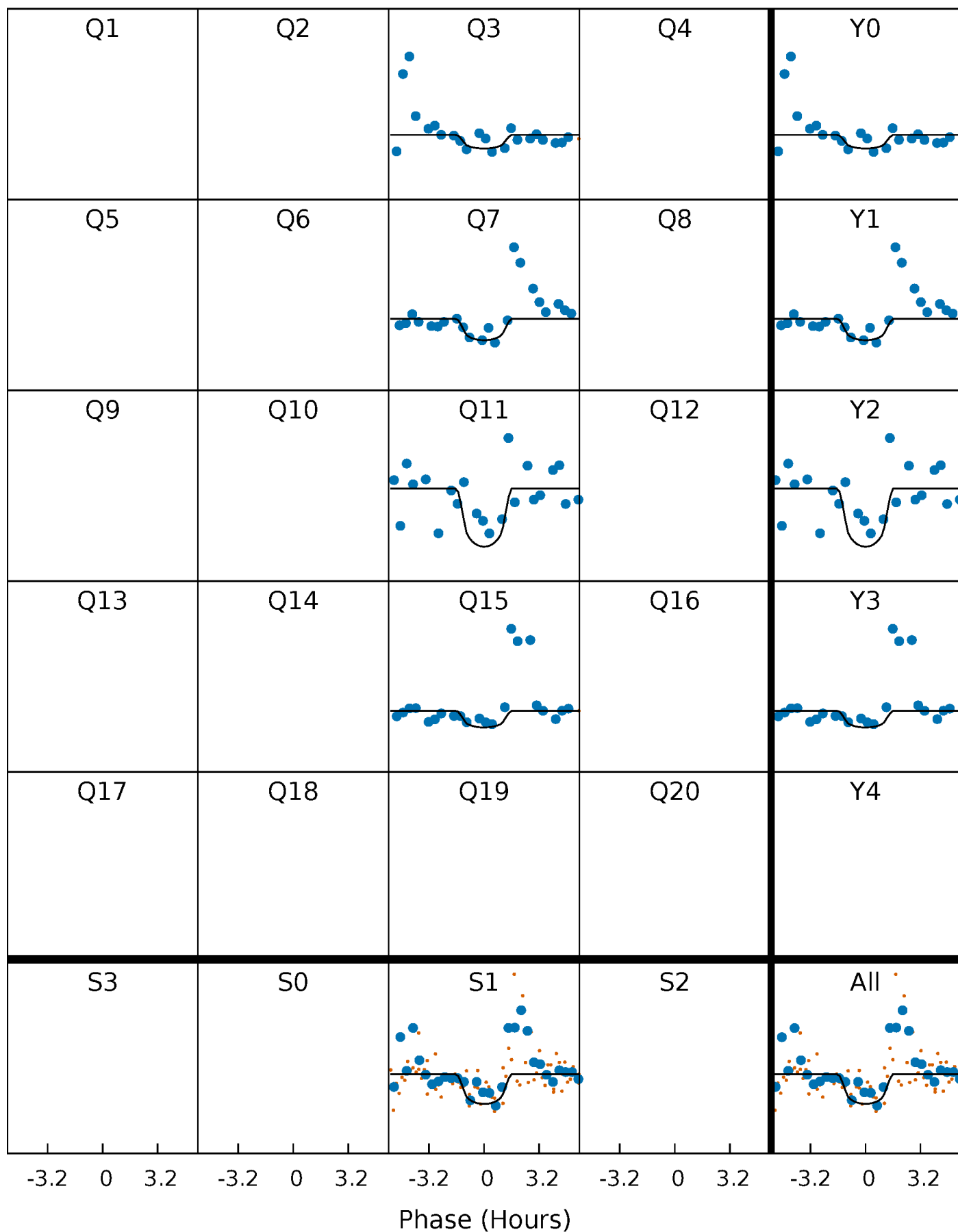
TCE 009084222-01 P=387.903882 Days  $T_0=277.505856$  (BKJD)





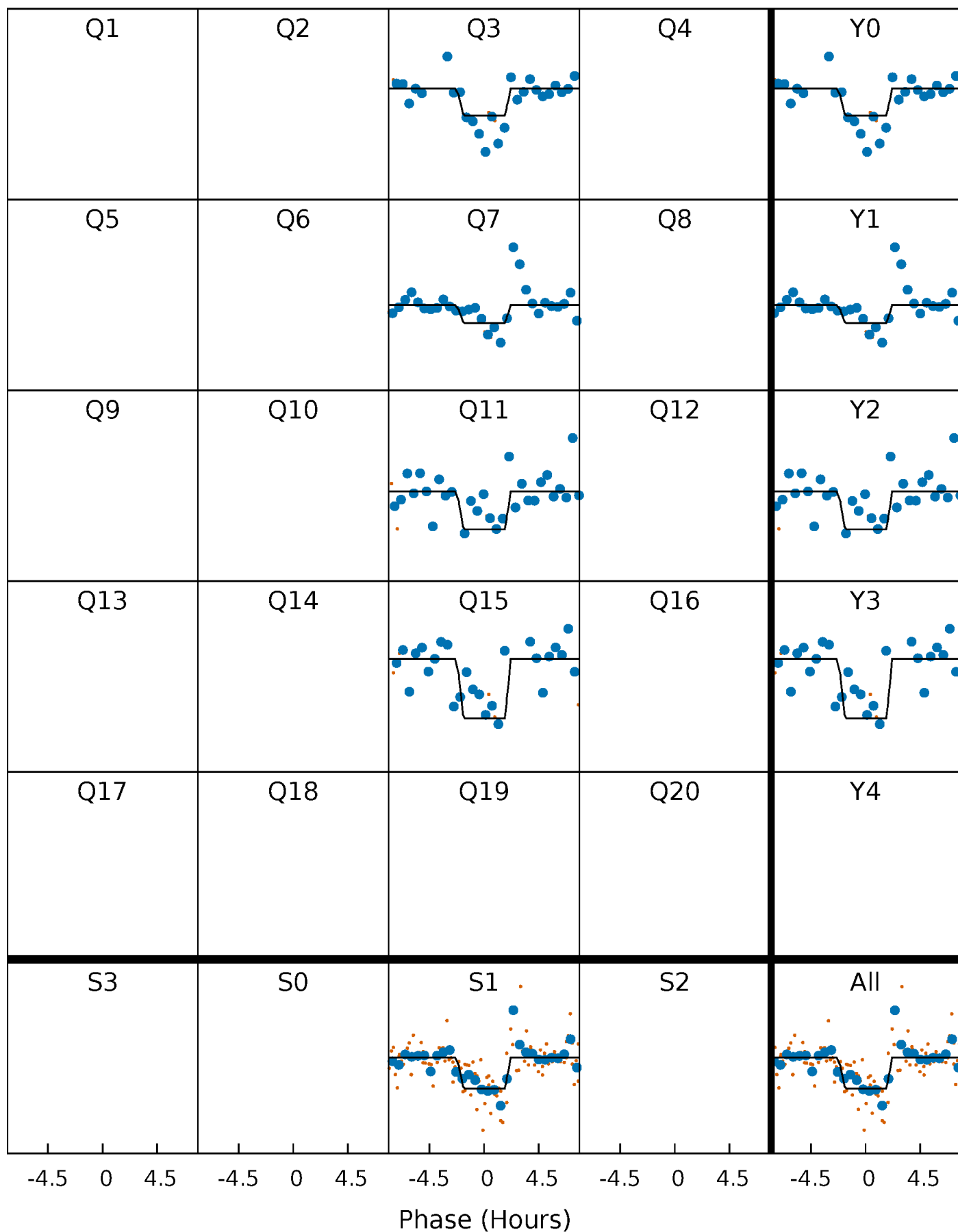
# DV Quarter-Phased Transit Curves

TCE 009084222-01     $P=387.903882$  Days     $T_0=277.505856$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

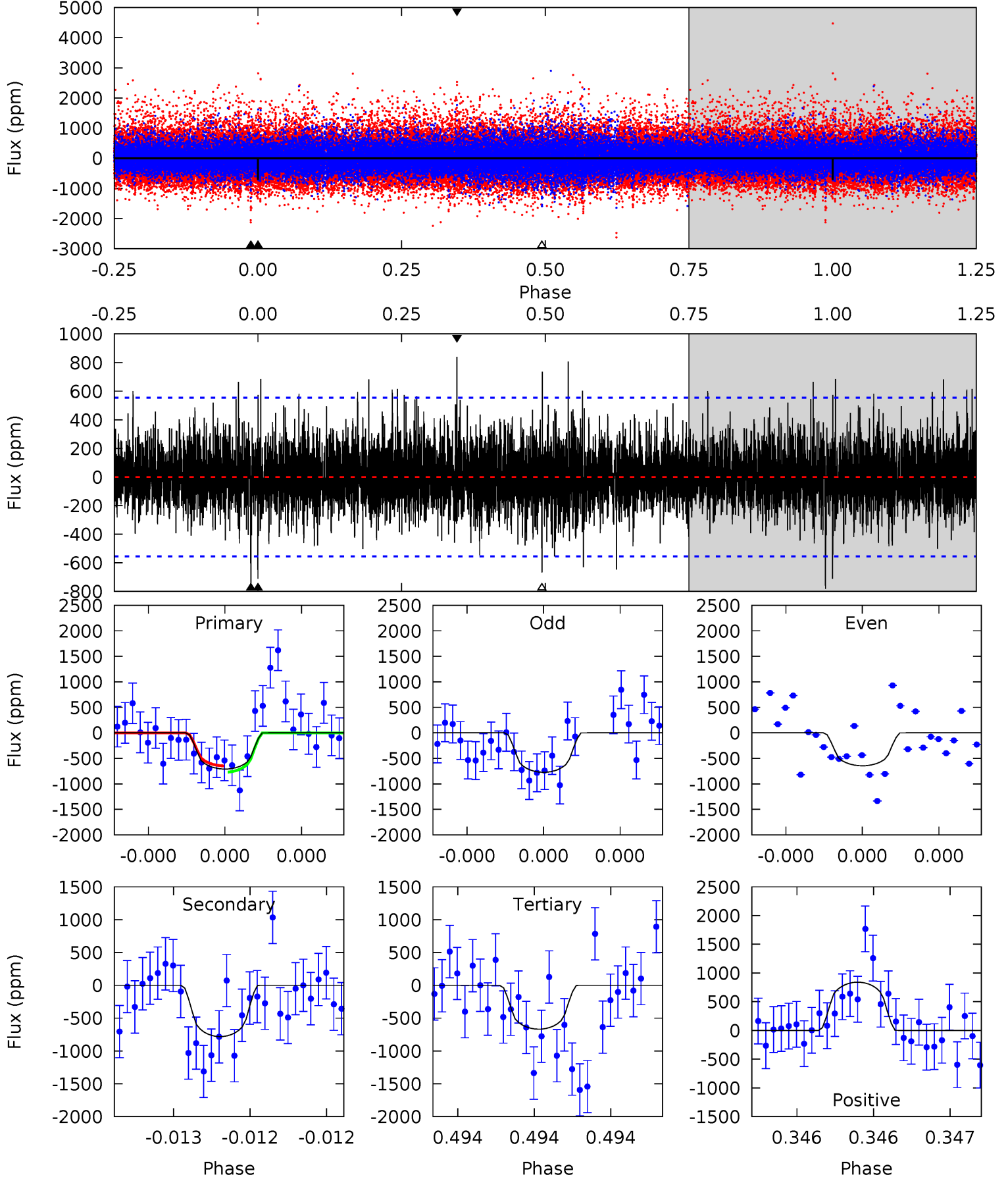
TCE 009084222-01 P=387.903892 Days  $T_0=277.474371$  (BKJD)



# DV Model-Shift Uniqueness Test

009084222-01, P = 387.903882 Days, E = 277.505856 Days

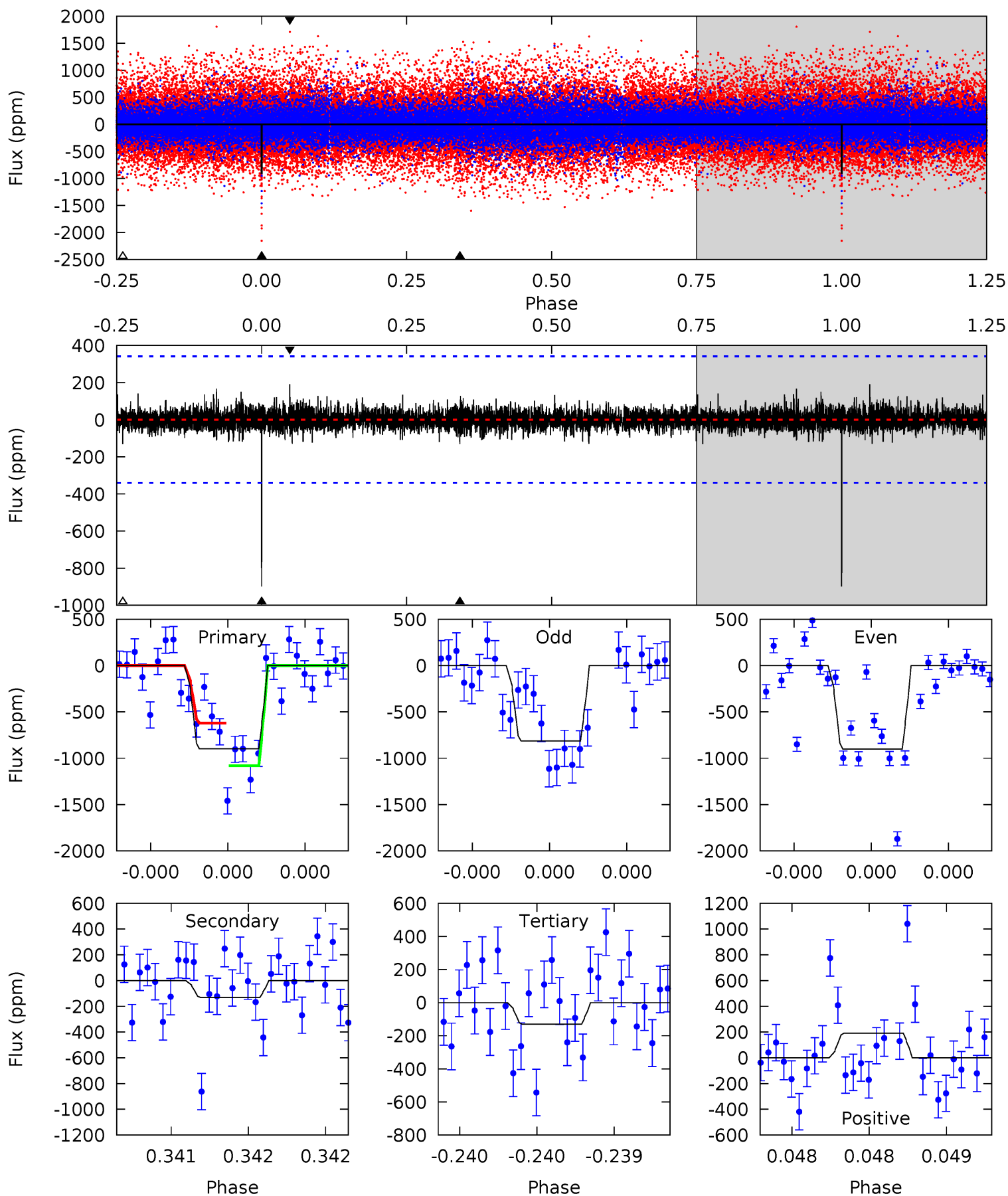
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.22	7.95	6.79	8.55	5.63	3.57	1.57	0.42	-1.33	1.15	-0.60	0.61	1.00	0.52	0.62



# Alt Model-Shift Uniqueness Test

009084222-01, P = 387.903892 Days, E = 277.474371 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
14.7	2.14	2.14	3.12	5.59	3.50	0.52	12.6	11.6	0.00	-0.98	0.71	1.11	0.18	3.73



### Stellar Parameters For KIC 009084222

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5017^{+151}_{-136}$	$4.508^{+0.088}_{-0.064}$	$0.040^{+0.250}_{-0.300}$	$0.811^{+0.071}_{-0.087}$	$0.772^{+0.085}_{-0.057}$	$2.037^{+0.697}_{-0.394}$
	+3%/-3%	+2%/-1%	+625%/-750%	+9%/-11%	+11%/-7%	+34%/-19%
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 009084222-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-782 \pm 98$	$6.62^{+6.54}_{-4.41}$	$285^{+11}_{-11}$	$3476^{+1709}_{-608}$	$8671^{+68529}_{-6379}$
Alt.	$-131 \pm 61$	$6.04^{+6.42}_{-4.21}$	$285^{+12}_{-11}$	$2756^{+1209}_{-513}$	$1671^{+18184}_{-1345}$

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

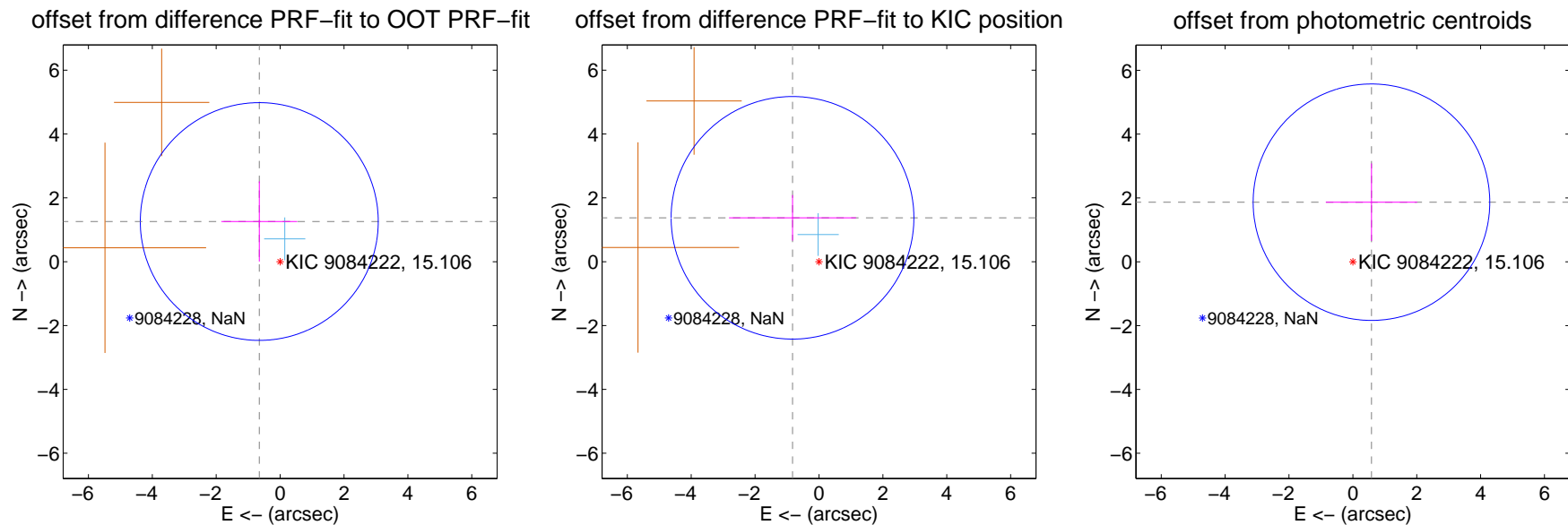
## DV Centroid Data

Supplemental centroid analysis for 009084222-01. Kepler magnitude: 15.11. Transit SNR 6.31

There are 1 quarters with good PRF difference image offsets

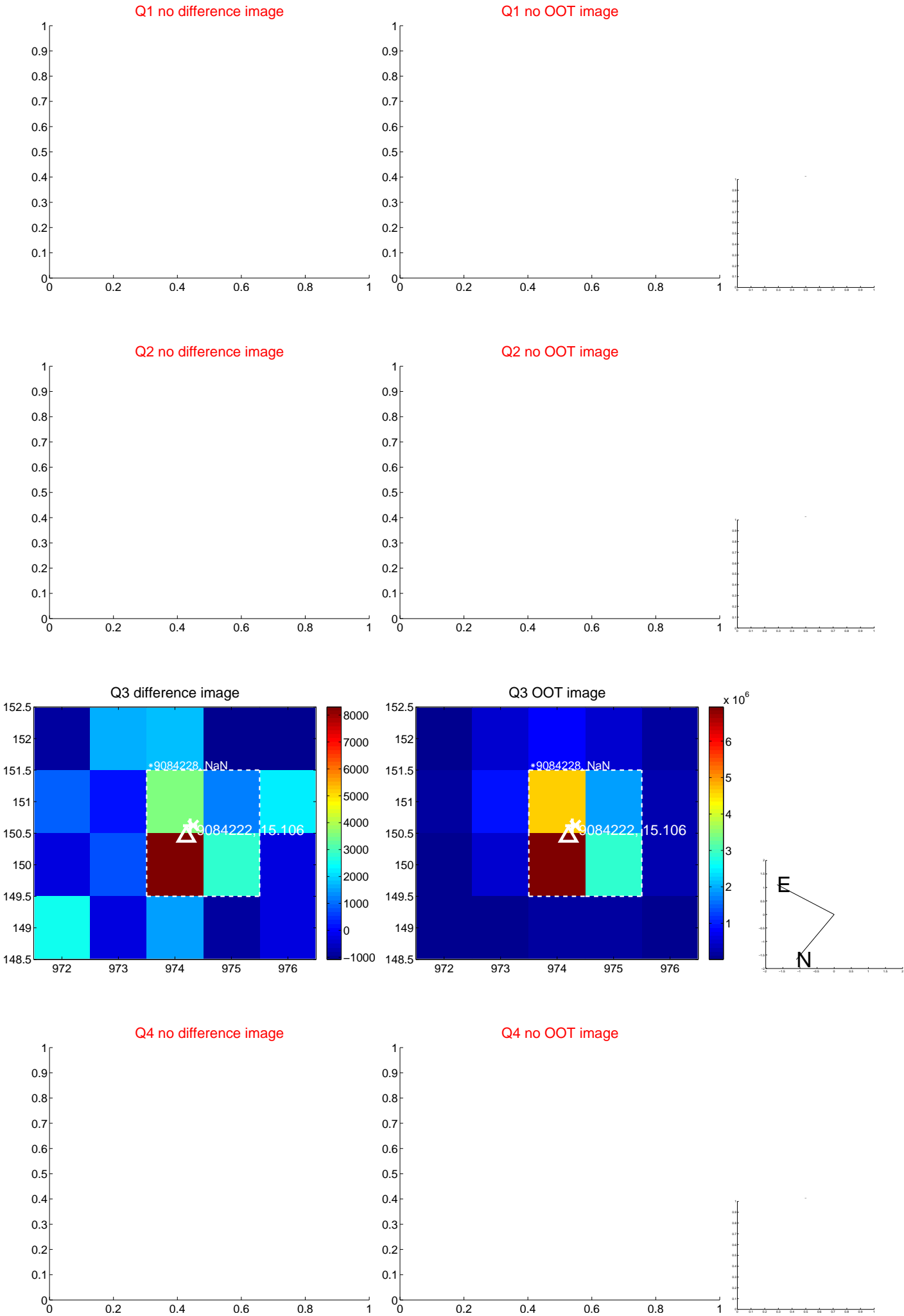
The direct PRF centroid is offset from the target star catalog position by about 0.18 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$1.417 \pm 1.241$	1.14	$0.652 \pm 1.188$	$1.258 \pm 1.255$
PRF-fit source offset from KIC position	$1.605 \pm 1.266$	1.27	$0.829 \pm 1.988$	$1.375 \pm 0.714$
photometric centroid source offset	$1.96 \pm 1.23$	1.58	$-0.58 \pm 1.43$	$1.87 \pm 1.21$

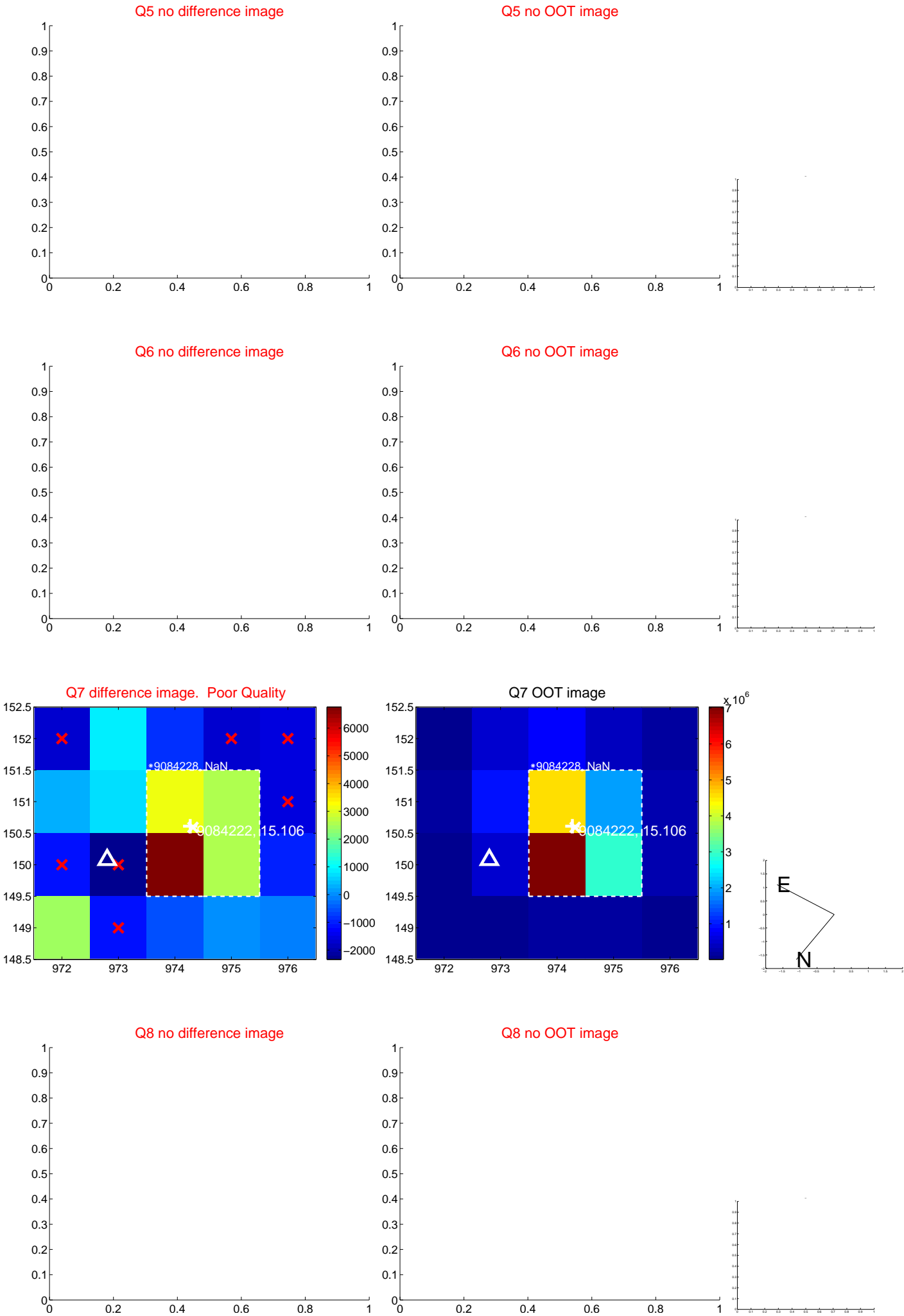


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . 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 ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.





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

Q9 no difference image



Q9 no OOT image



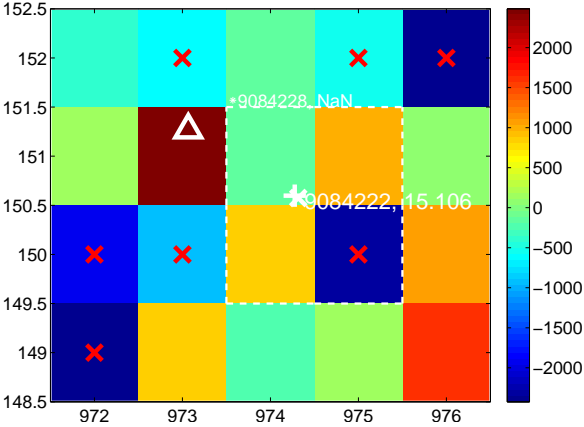
Q10 no difference image



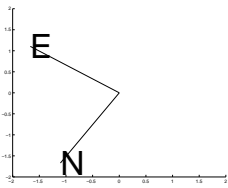
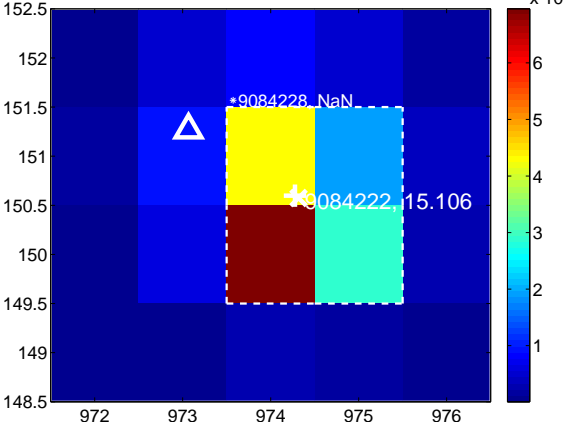
Q10 no OOT image



Q11 difference image. Poor Quality



Q11 OOT image



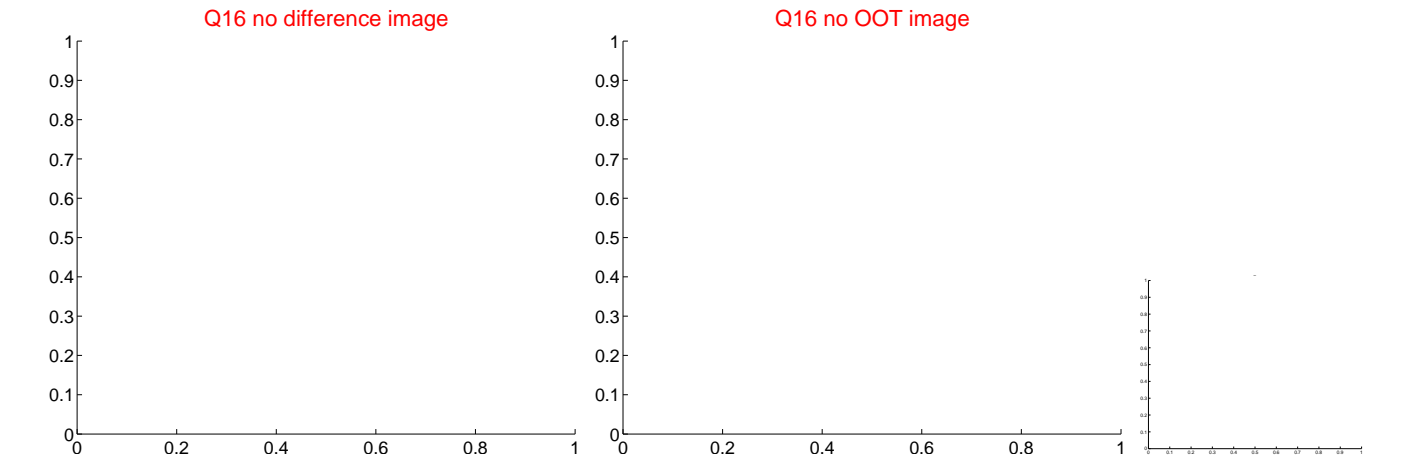
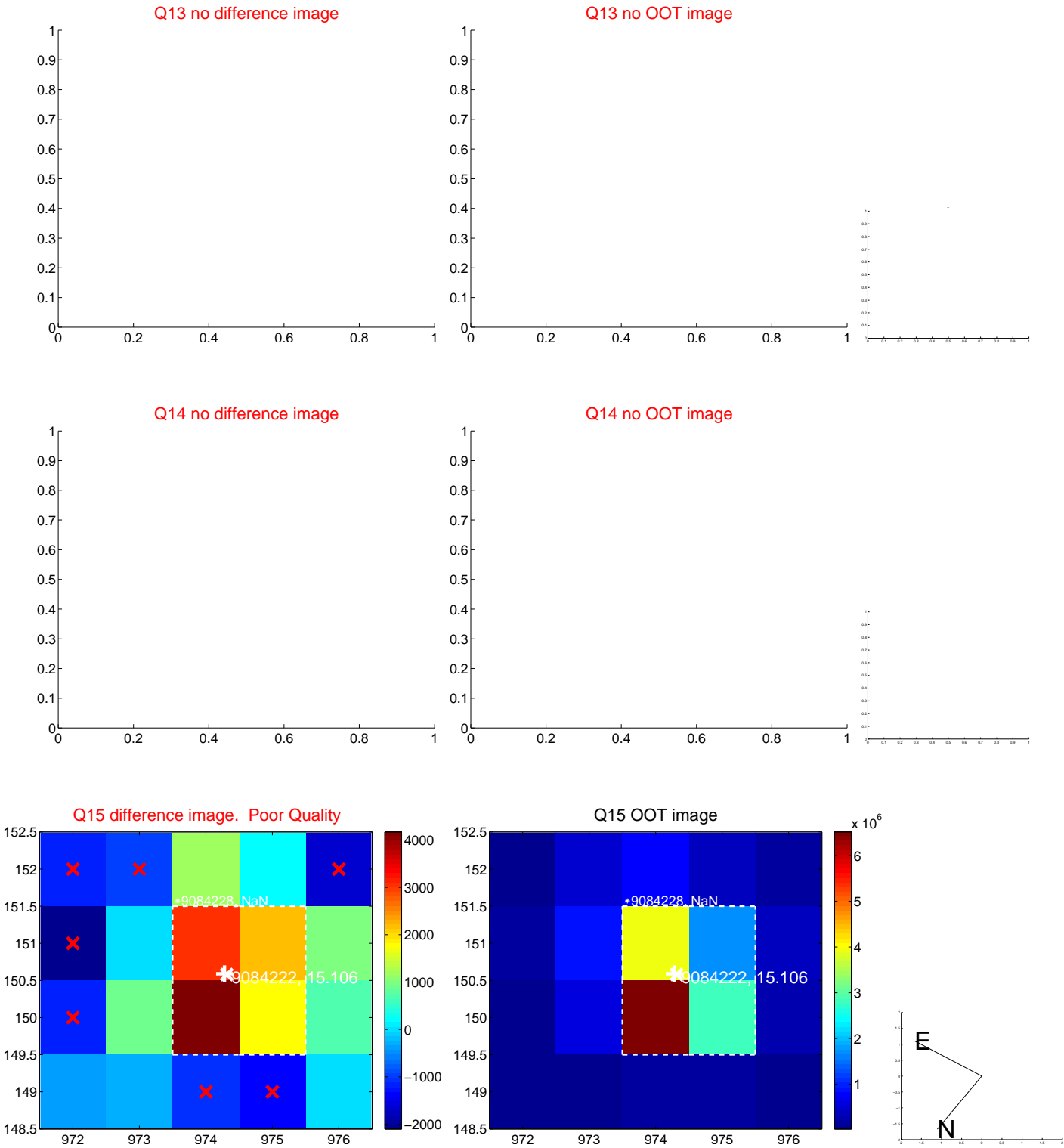
Q12 no difference image



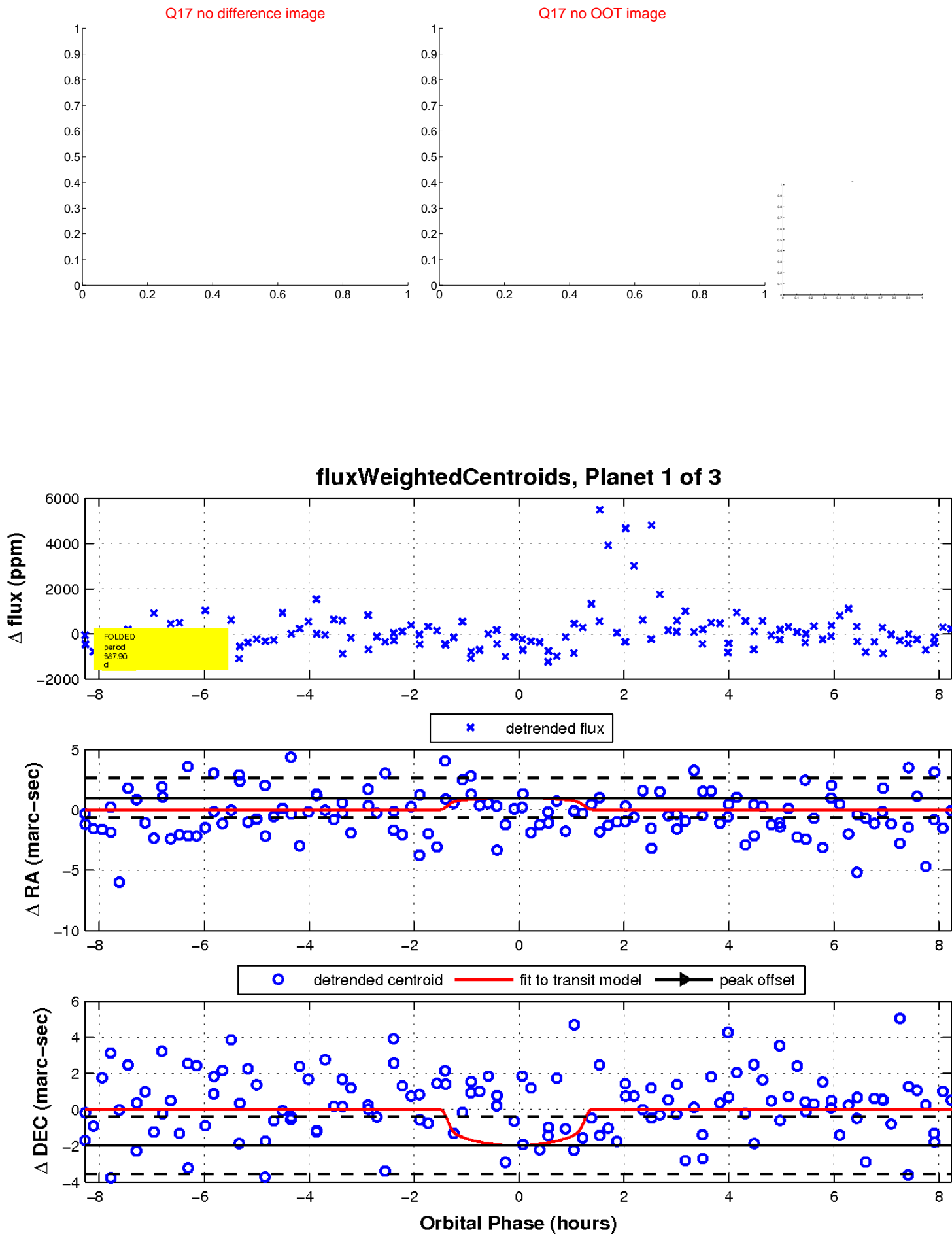
Q12 no OOT image



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

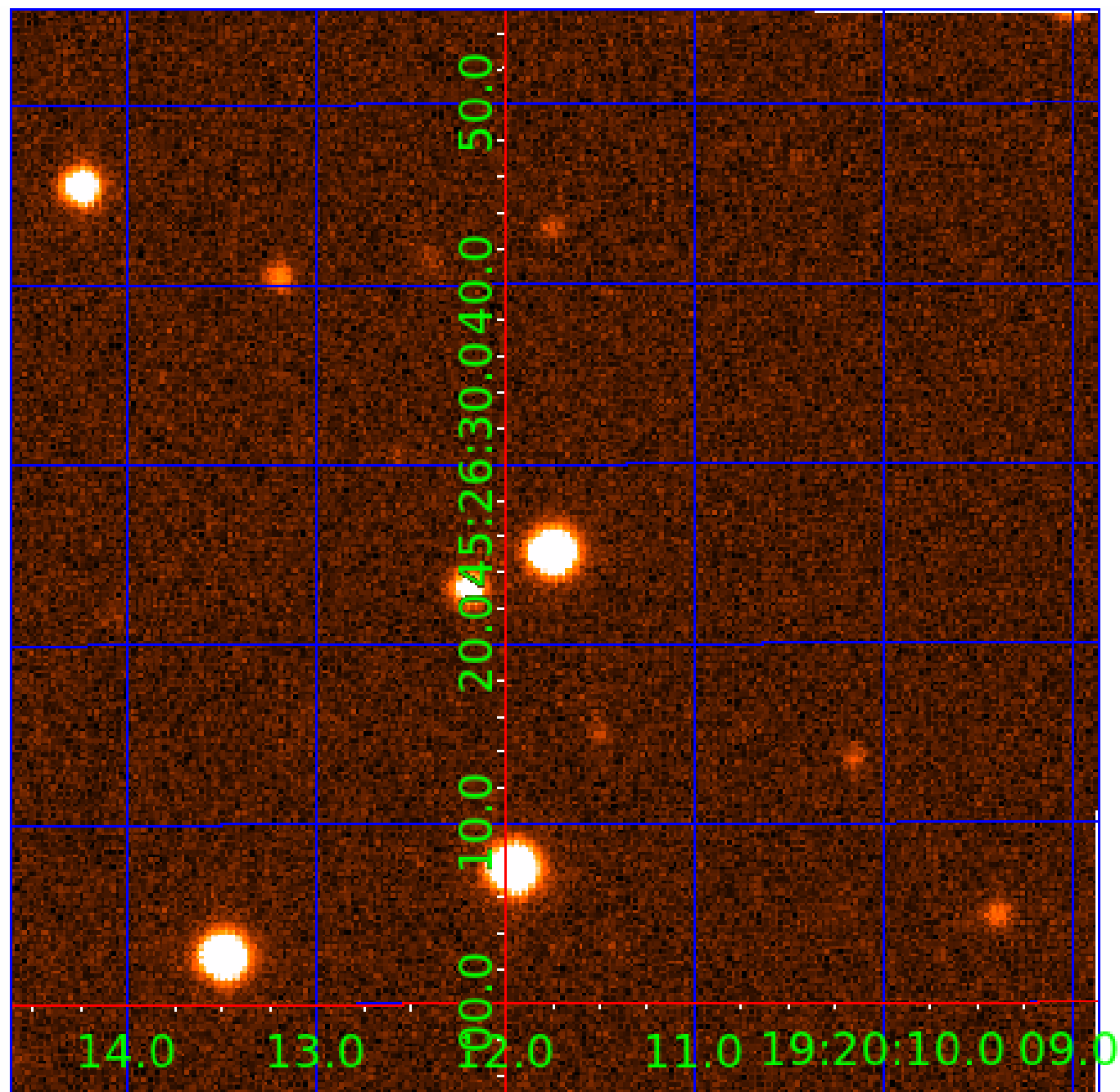


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 009084222

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009084222-01	OBS	No	387.903882	277.505856	1067.2	2.776	10.5	6.3	0.81	5017	2.77	0.41
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009084222-03	OBS	No	99.257541	224.726965	552.5	3.666	7.7	5.7	0.81	5017	1.92	2.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009084222-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_MEAS
009084222-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS
009084222-03	OBS	FP	0.03	1	0	0	0	LPP_DV

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

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

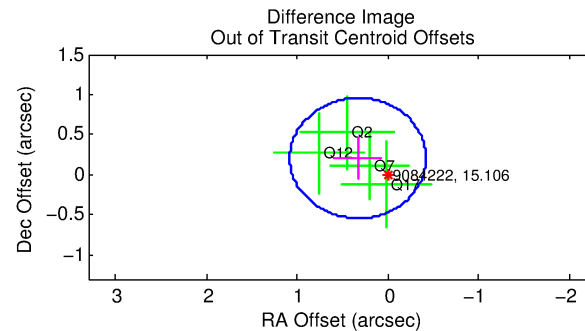
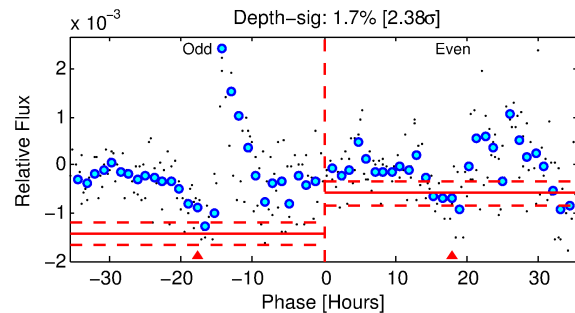
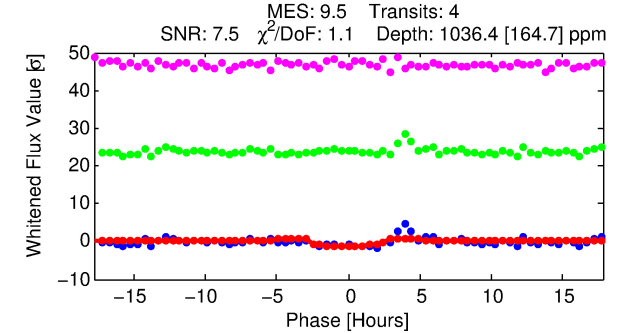
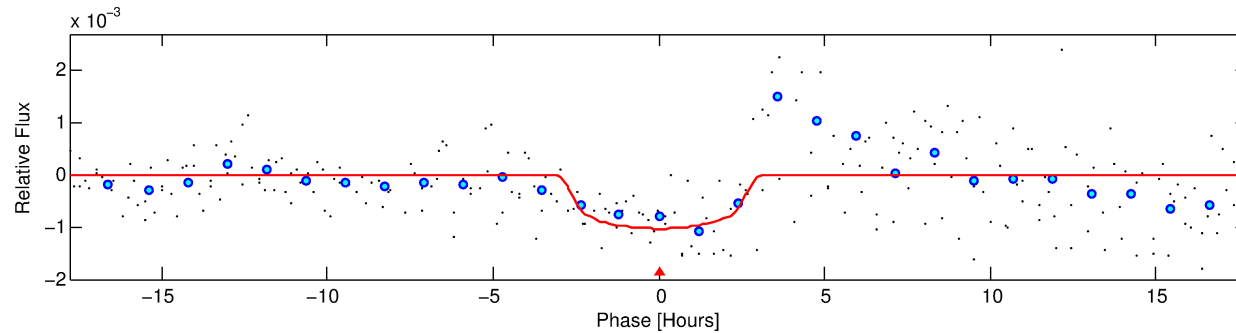
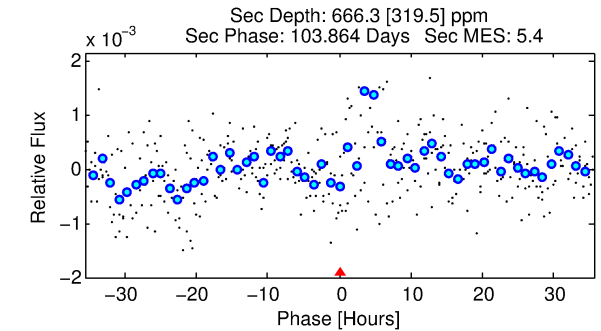
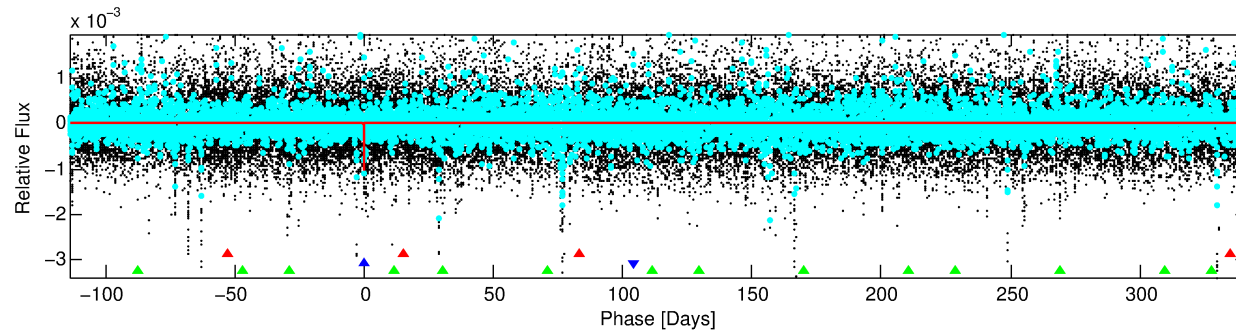
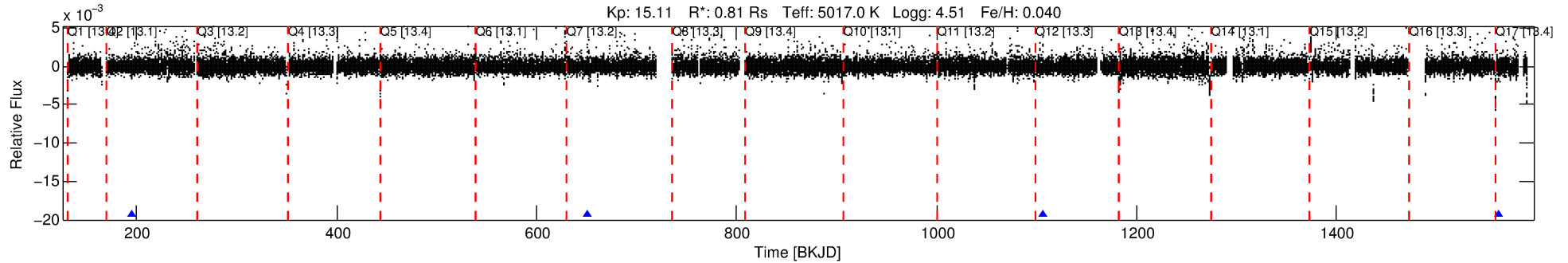
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 009084222-02

No Significant Match Found

# DV One-Page Summary

KIC: 9084222 Candidate: 2 of 3 Period: 455.805 d



## DV Fit Results:

Period = 455.80452 [0.00583] d  
Epoch = 194.6245 [0.0108] BKJD  
Rp/R\* = 0.0338 [0.0103]  
a/R\* = 360.66 [374.85]  
b = 0.83 [0.40]  
Seff = 0.33 [0.06]  
Teq = 193 [9] K  
Rp = 2.99 [0.97] Re  
a = 1.0639 [0.1047] AU  
Ag = 46484.00 [36764.13] [1.26 $\sigma$ ]  
Teffp = 4387 [861] K [4.87 $\sigma$ ]

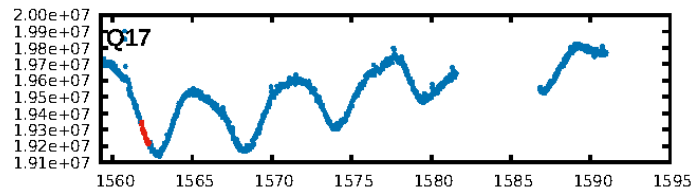
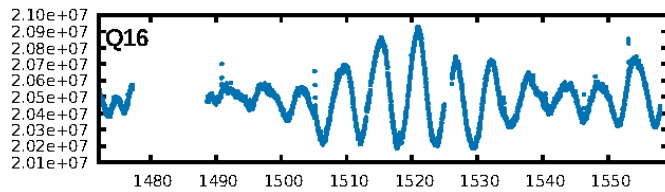
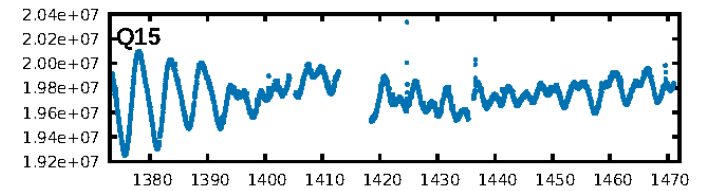
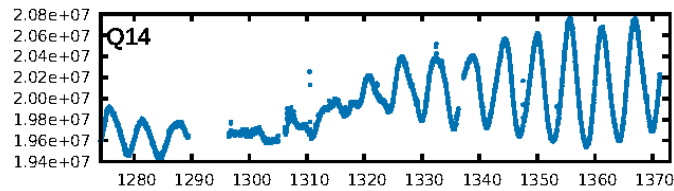
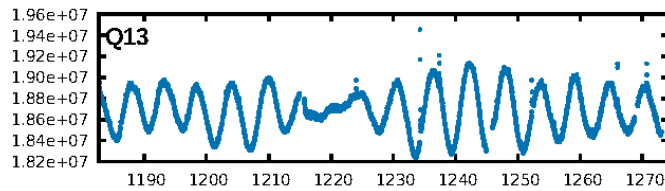
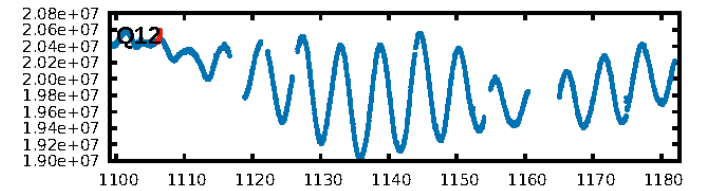
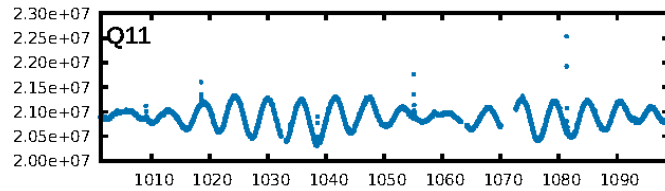
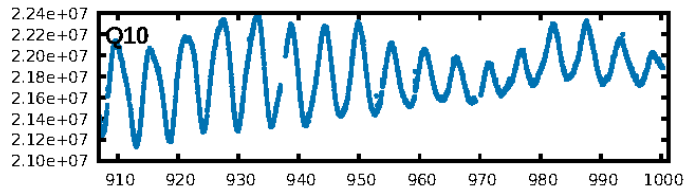
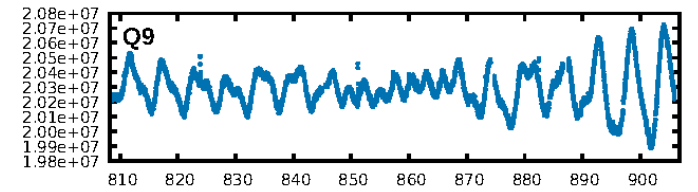
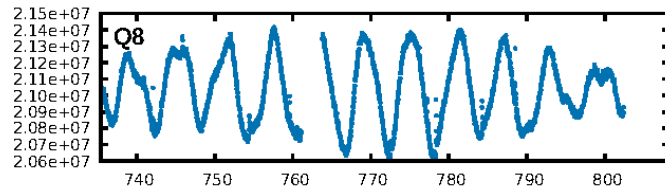
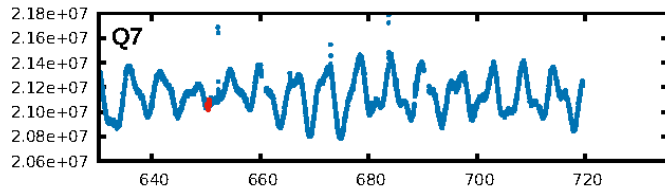
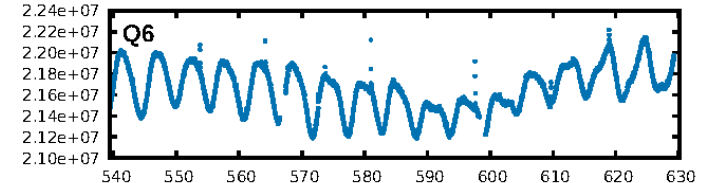
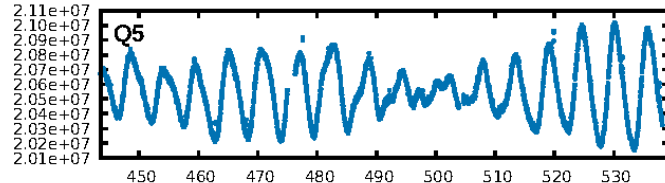
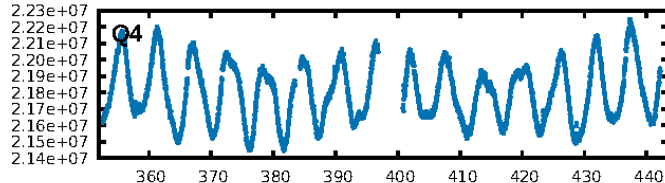
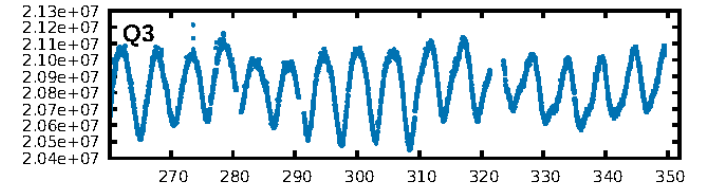
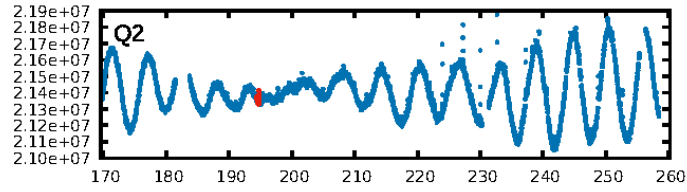
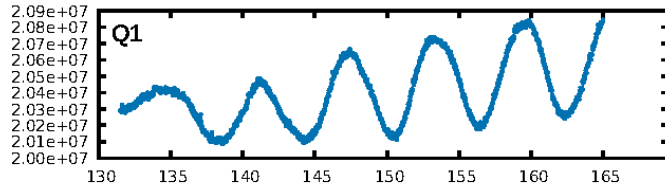
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [249.01 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 2.7%  
ModelChiSquareGof-sig: 98.6%  
**Bootstrap-pfa: 8.10e-09**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.609  
Centroid-sig: 95.4%  
Centroid-so: 0.457 arcsec [0.38 $\sigma$ ]  
OotOffset-rm: 0.391 arcsec [1.57 $\sigma$ ]  
KicOffset-rm: 0.630 arcsec [2.52 $\sigma$ ]  
OotOffset-st: 1/1/1/1 [4]  
KicOffset-st: 1/1/1/1 [4]  
DiffImageQuality-fgm: 1.00 [4/4]  
DiffImageOverlap-fno: 1.00 [4/4]

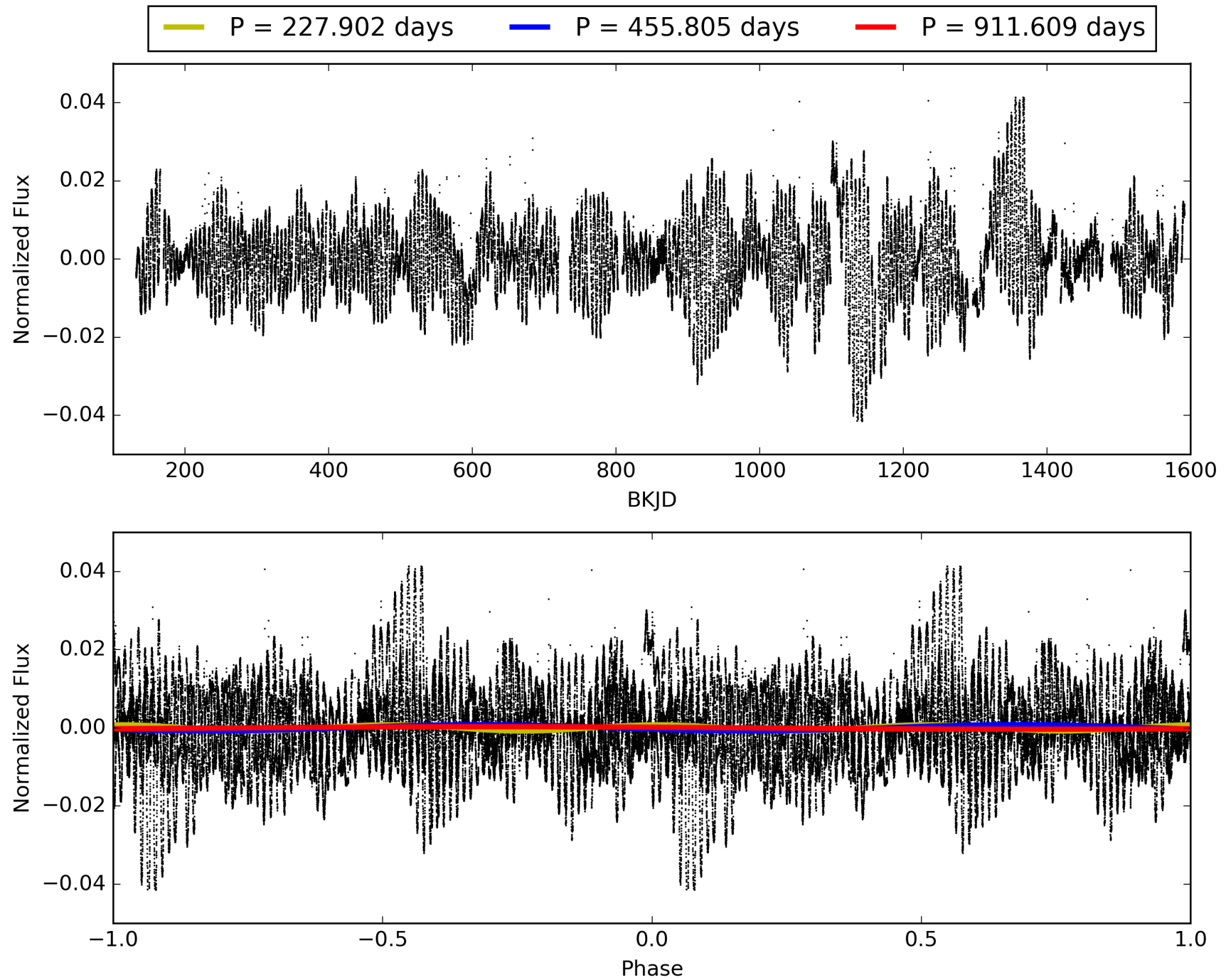
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 09:34:39 Z

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

# TCE 009084222-02, PDC Light Curves



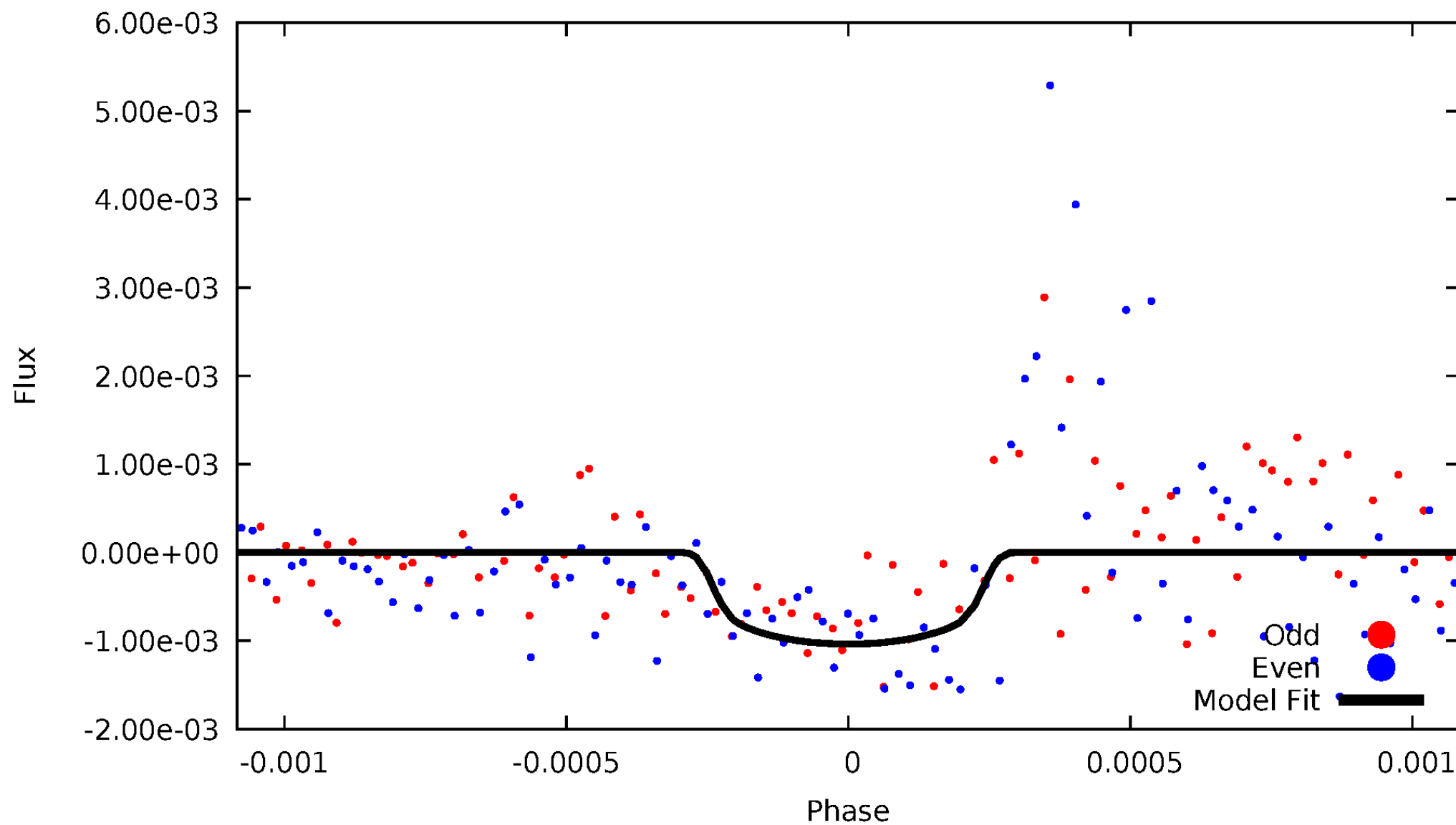
TCE 009084222-02





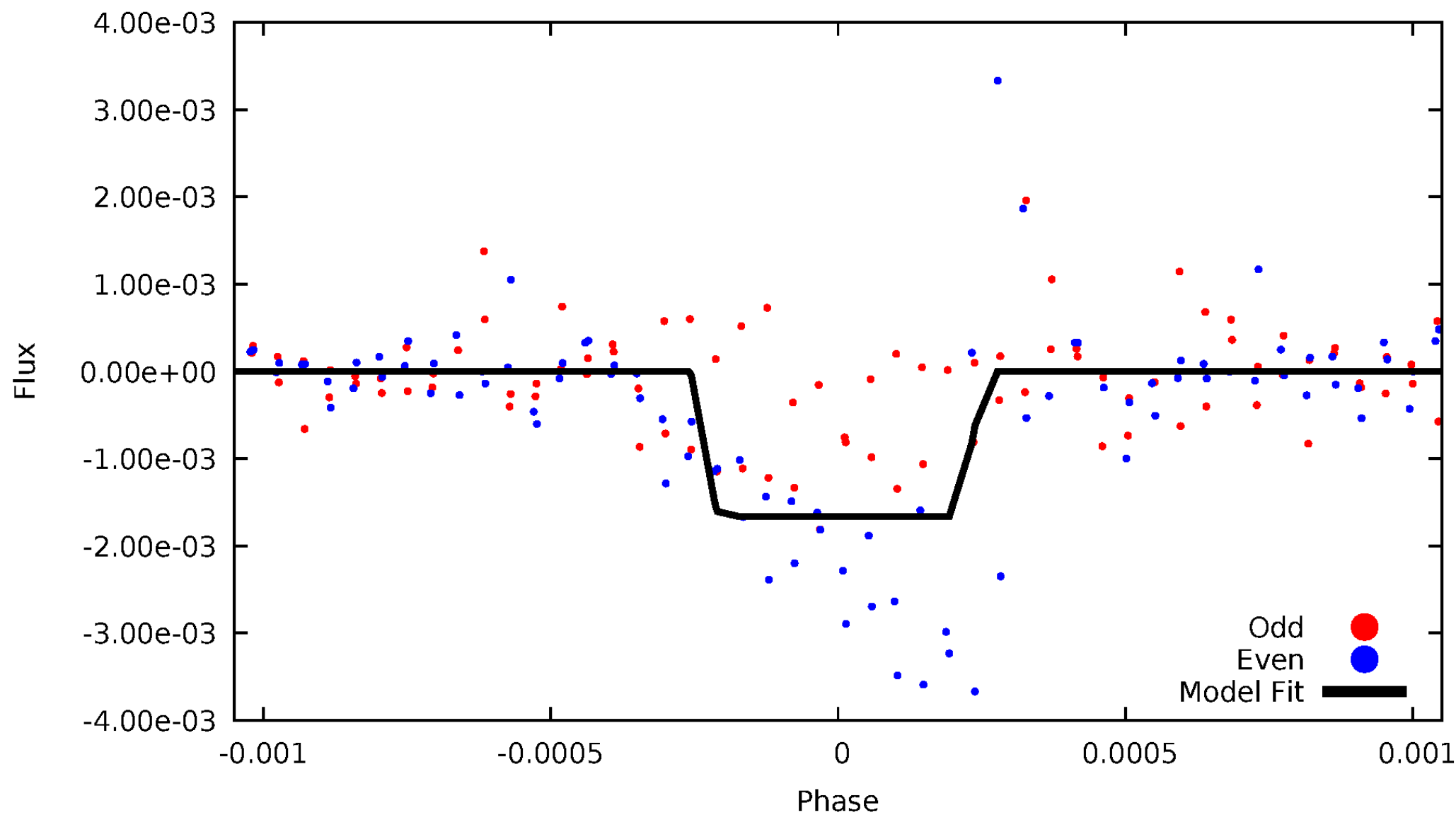
# DV Odd/Even

TCE 009084222-02



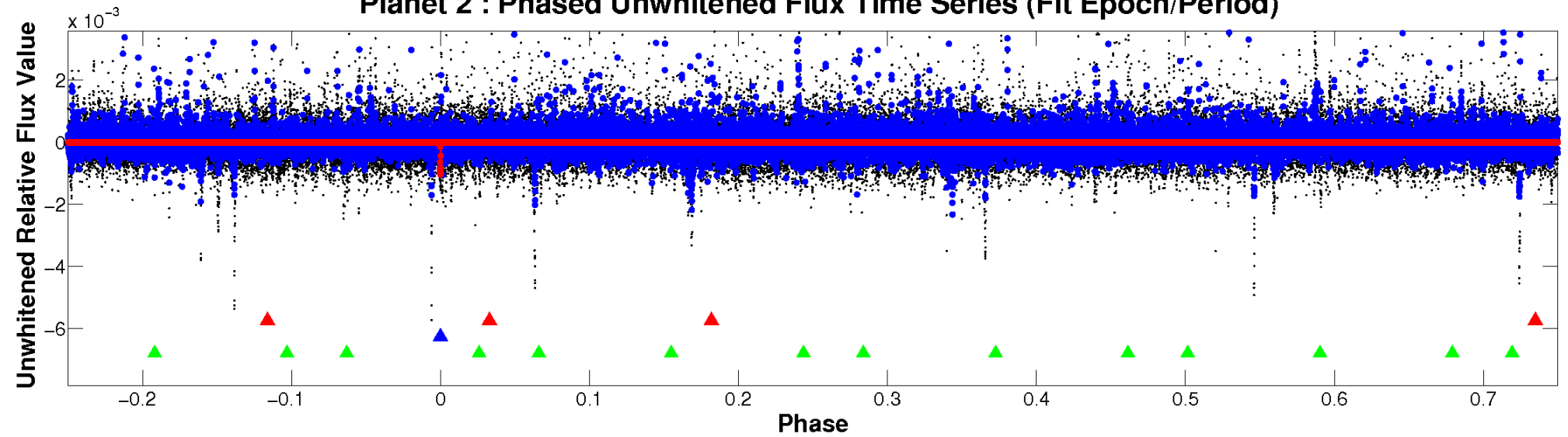
# ALT Odd/Even

TCE 009084222-02

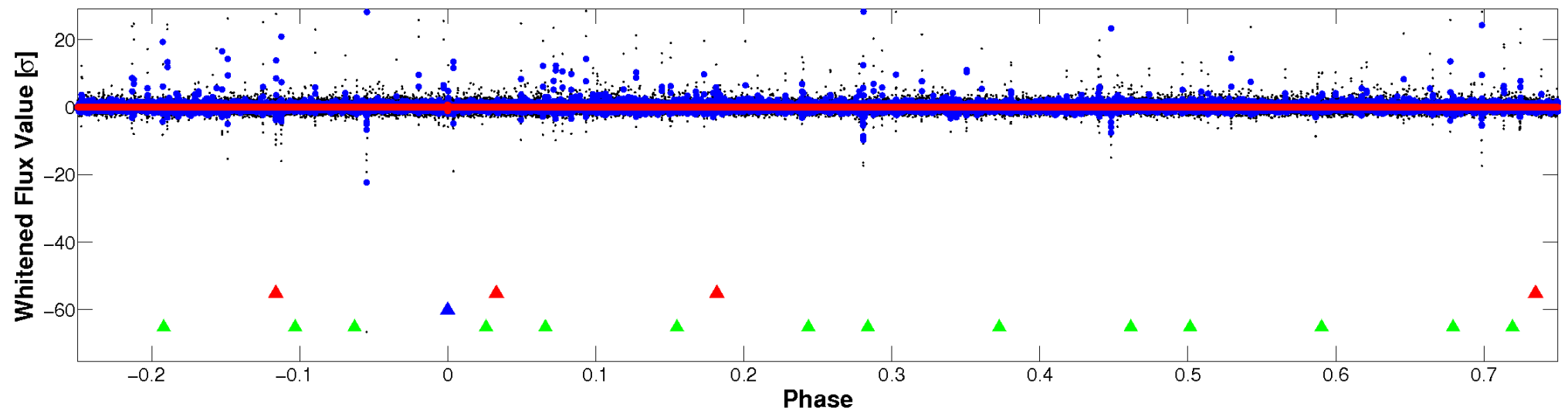


# Non-Whitened Vs. Whitened Light Curve

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

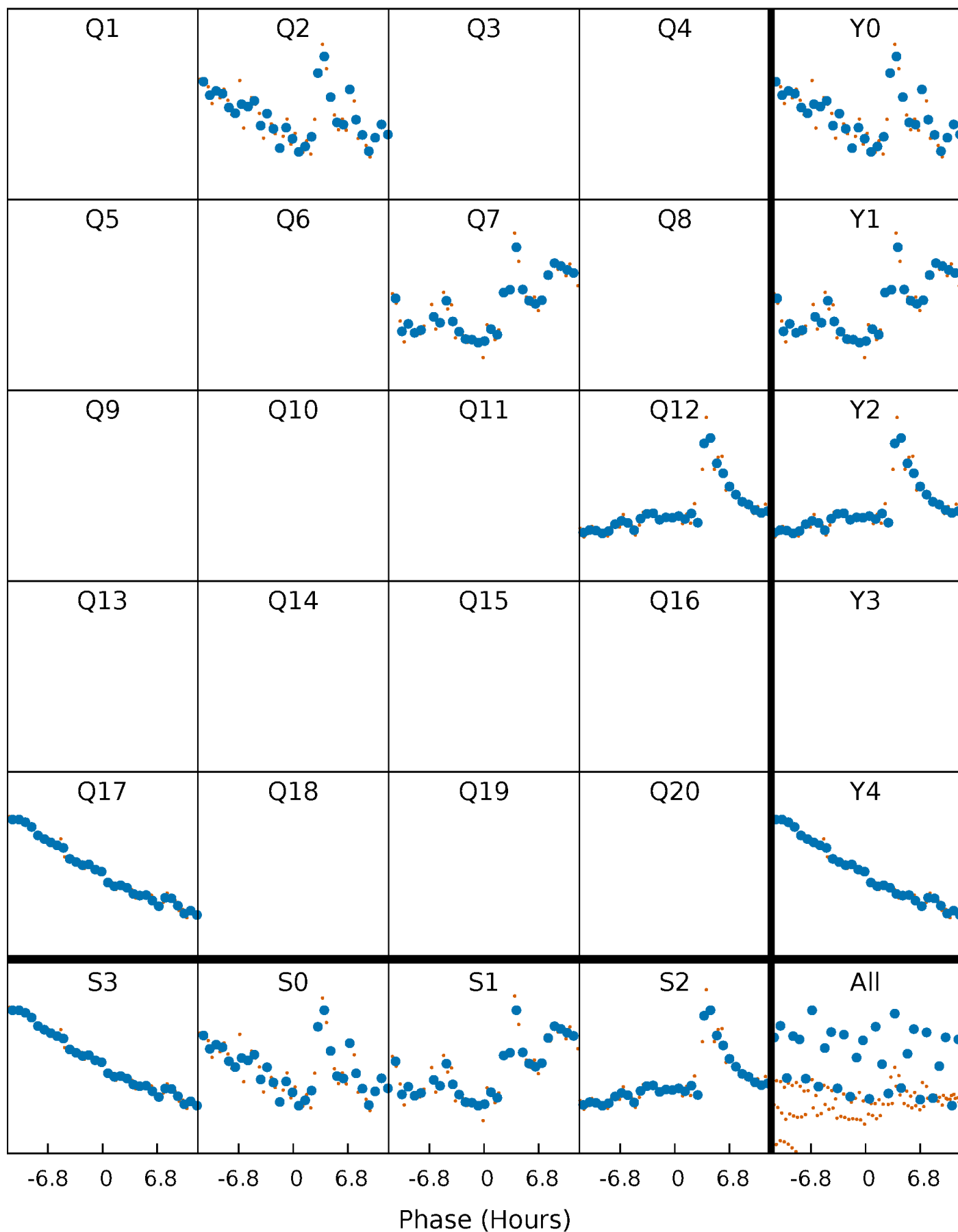


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



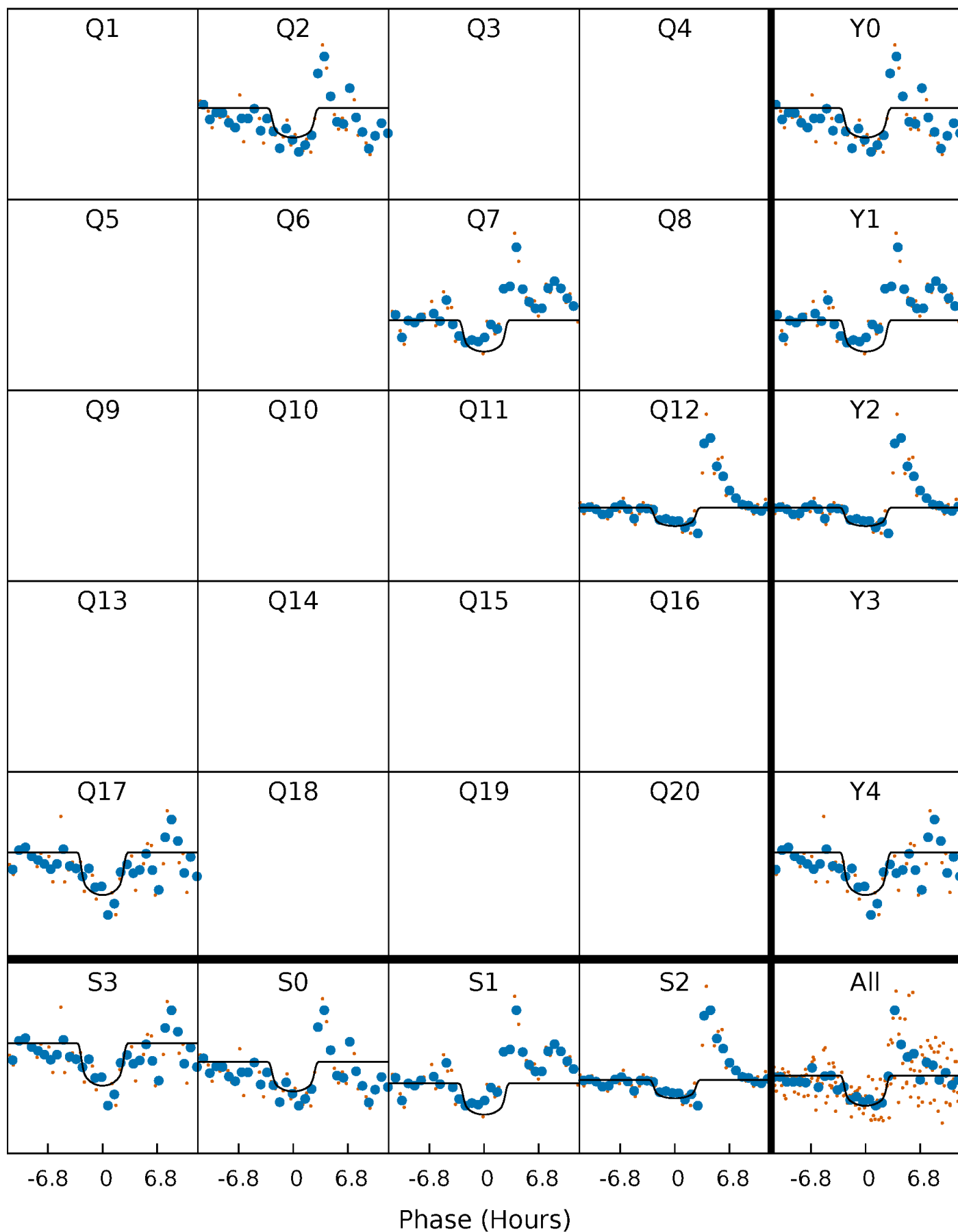
# PDC Quarter-Phased Transit Curves

TCE 009084222-02     $P=455.804518$  Days     $T_0=194.624539$  (BKJD)



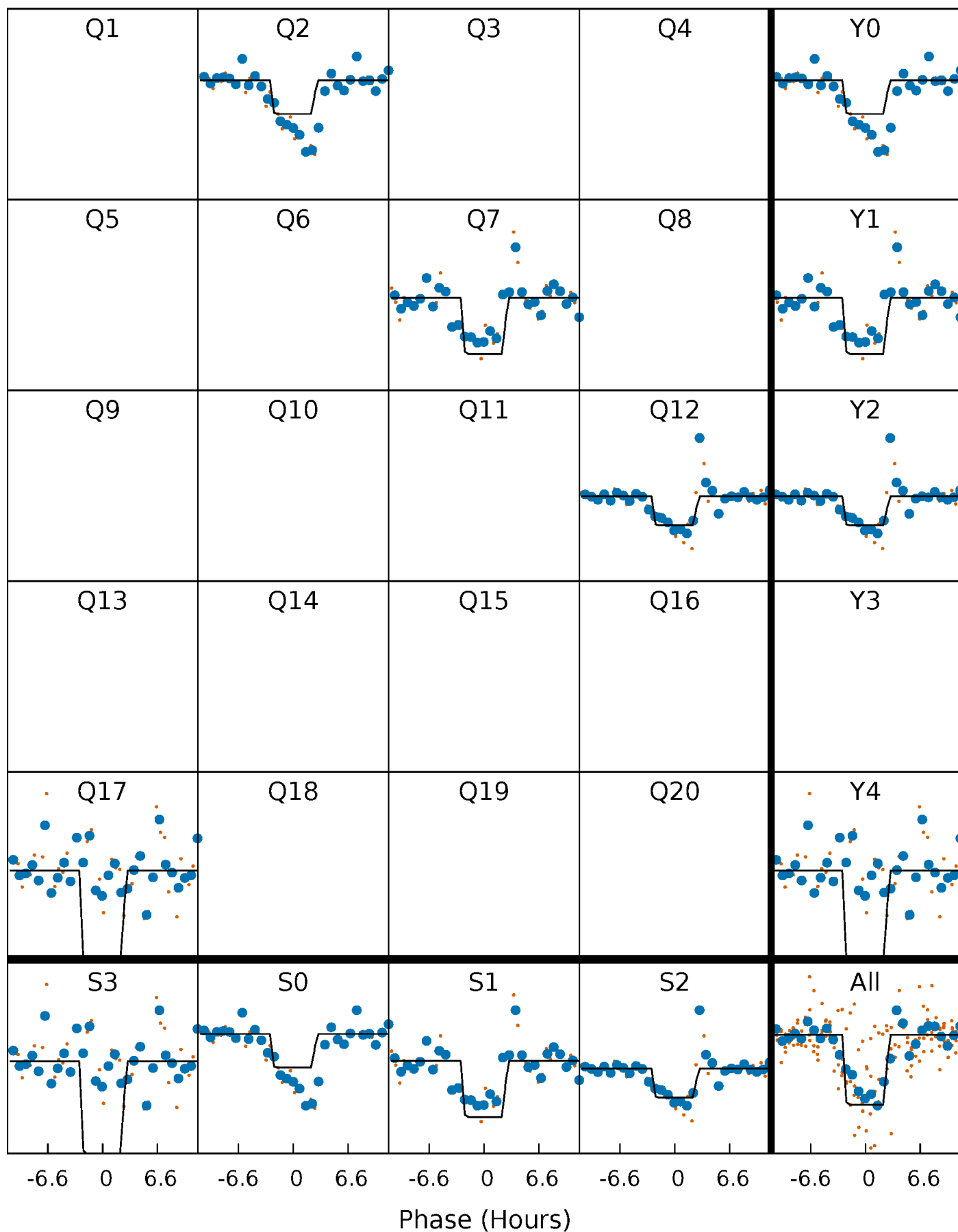
# DV Quarter-Phased Transit Curves

TCE 009084222-02 P=455.804518 Days  $T_0=194.624539$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

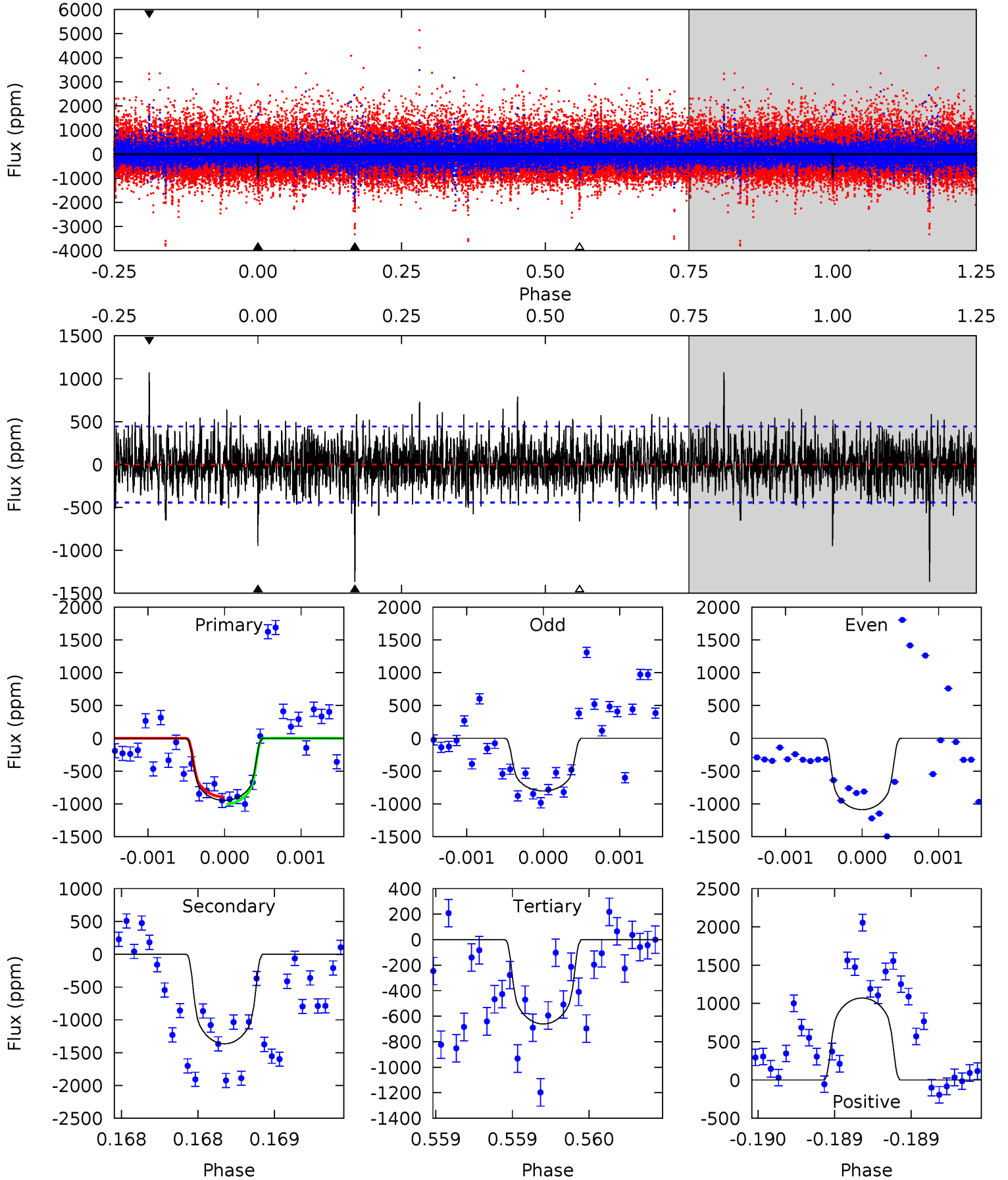
TCE 009084222-02 P=455.831857 Days  $T_0=194.606577$  (BKJD)



# DV Model-Shift Uniqueness Test

009084222-02, P = 455.804518 Days, E = 194.624539 Days

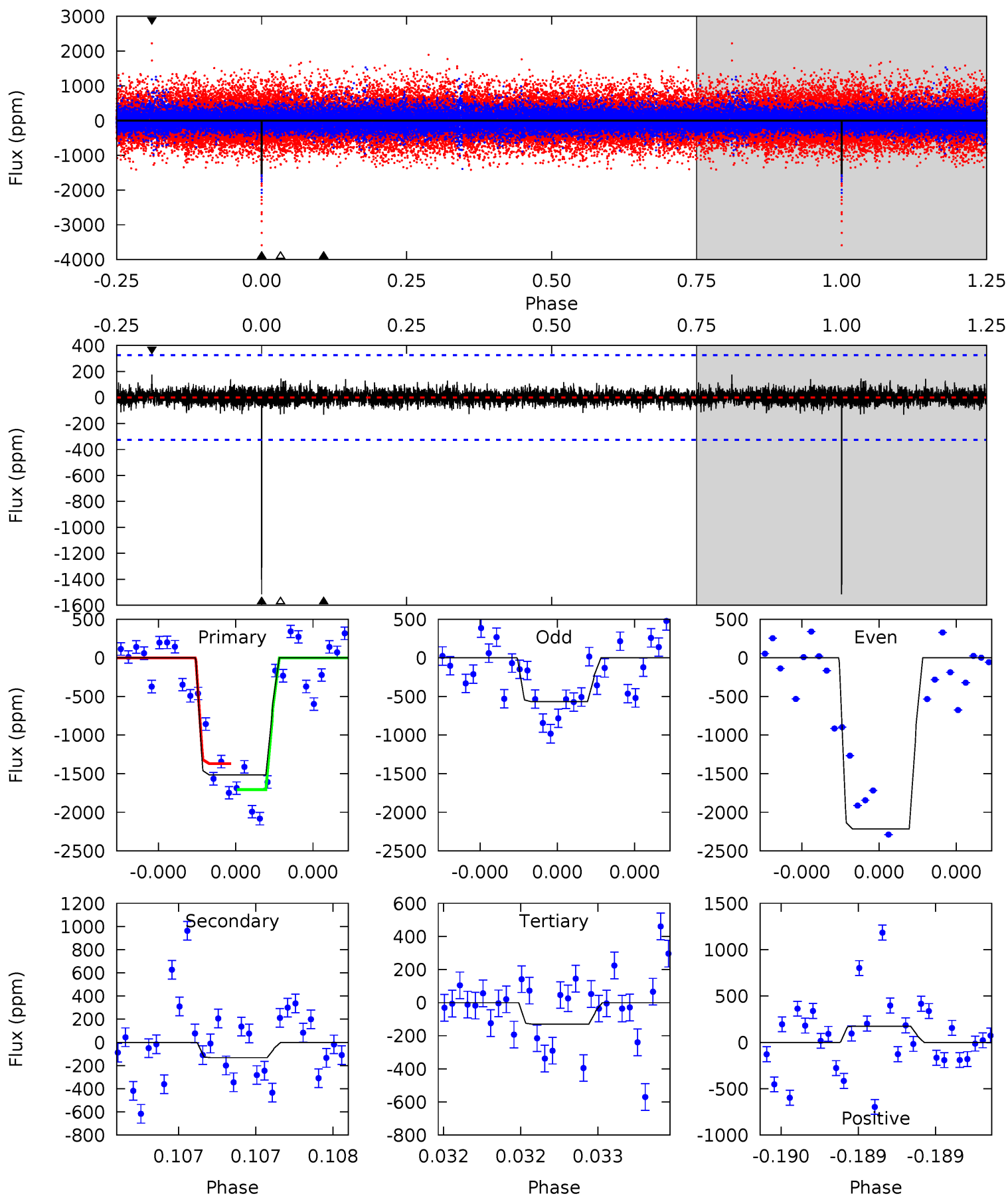
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.9	17.1	8.27	13.4	5.55	3.44	2.34	3.60	-1.54	8.81	3.67	1.42	0.98	0.44	0.69



# Alt Model-Shift Uniqueness Test

009084222-02, P = 455.831857 Days, E = 194.606577 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
25.9	2.25	2.22	2.98	5.57	3.48	0.53	23.7	22.9	0.03	-0.73	14.8	0.94	0.10	2.79





### Stellar Parameters For KIC 009084222

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5017^{+151}_{-136}$	$4.508^{+0.088}_{-0.064}$	$0.040^{+0.250}_{-0.300}$	$0.811^{+0.071}_{-0.087}$	$0.772^{+0.085}_{-0.057}$	$2.037^{+0.697}_{-0.394}$
	+3%/-3%	+2%/-1%	+625%/-750%	+9%/-11%	+11%/-7%	+34%/-19%
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 009084222-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1364 \pm 80$	$2.96^{+0.97}_{-0.86}$	$269^{+11}_{-11}$	$5200^{+1003}_{-563}$	$97714^{+96246}_{-41962}$
Alt.	$-132 \pm 59$	$3.64^{+0.90}_{-0.91}$	$269^{+10}_{-11}$	$3172^{+357}_{-321}$	$6023^{+5910}_{-3221}$

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

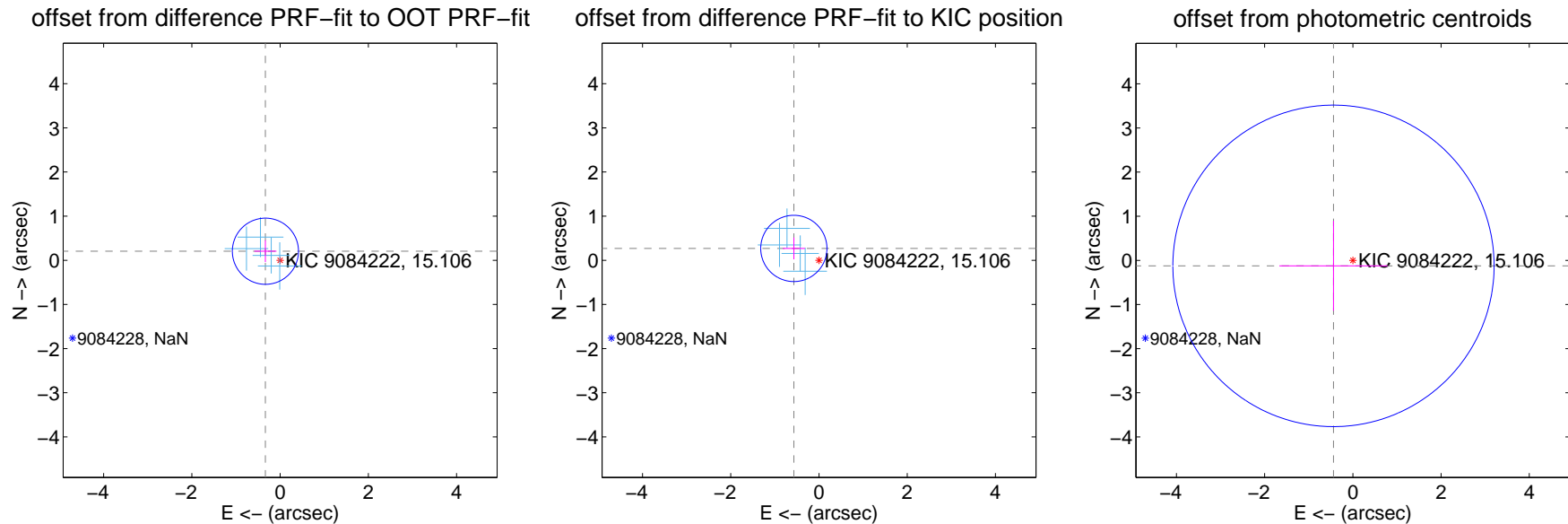
## DV Centroid Data

Supplemental centroid analysis for 009084222-02. Kepler magnitude: 15.11. Transit SNR 7.48

There are 4 quarters with good PRF difference image offsets

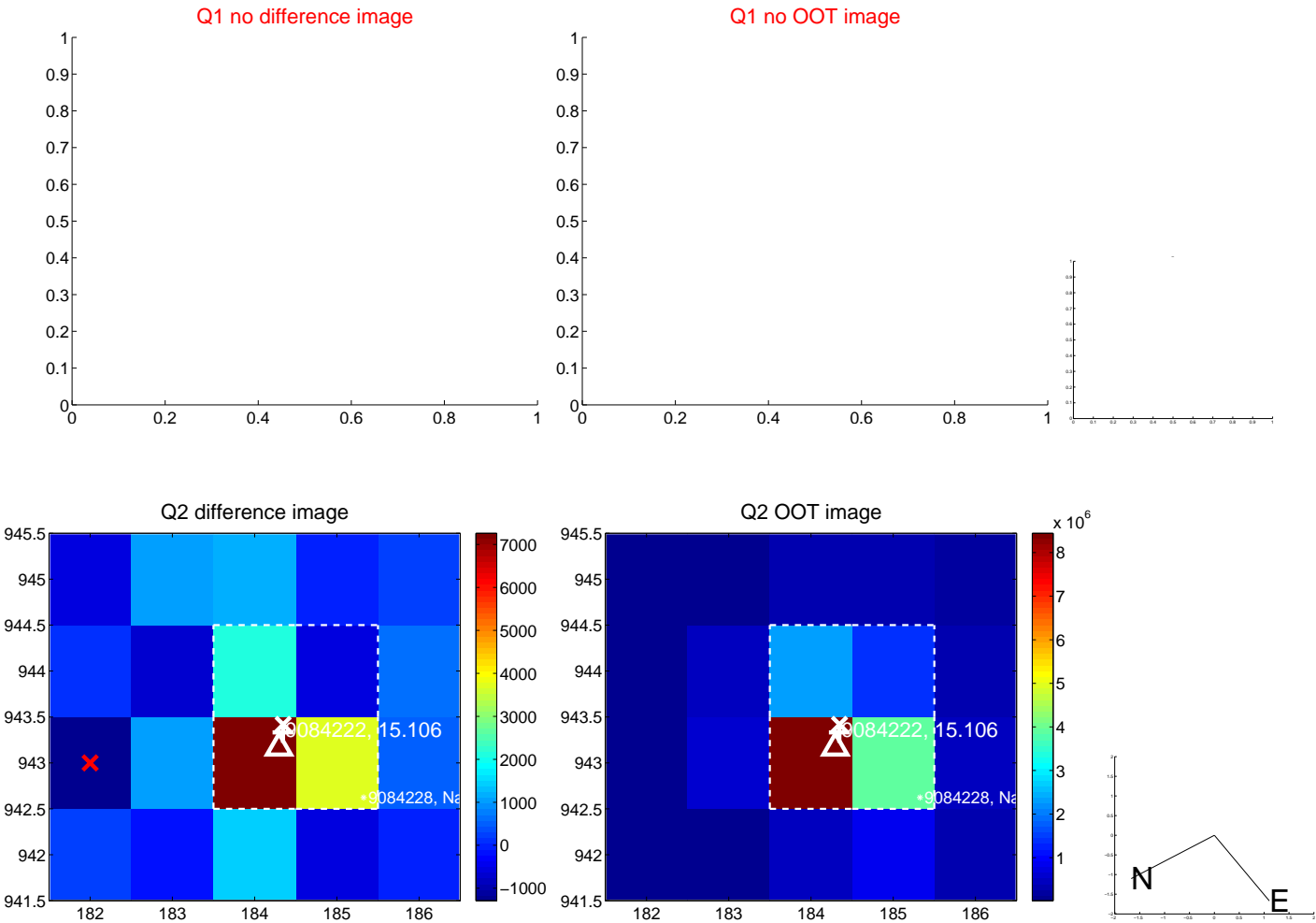
The direct PRF centroid is offset from the target star catalog position by about 0.33 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.391 \pm 0.250$	1.57	$0.333 \pm 0.251$	$0.205 \pm 0.247$
PRF-fit source offset from KIC position	$0.630 \pm 0.250$	2.52	$0.570 \pm 0.251$	$0.269 \pm 0.247$
photometric centroid source offset	$0.46 \pm 1.21$	0.38	$0.44 \pm 1.23$	$-0.12 \pm 1.02$

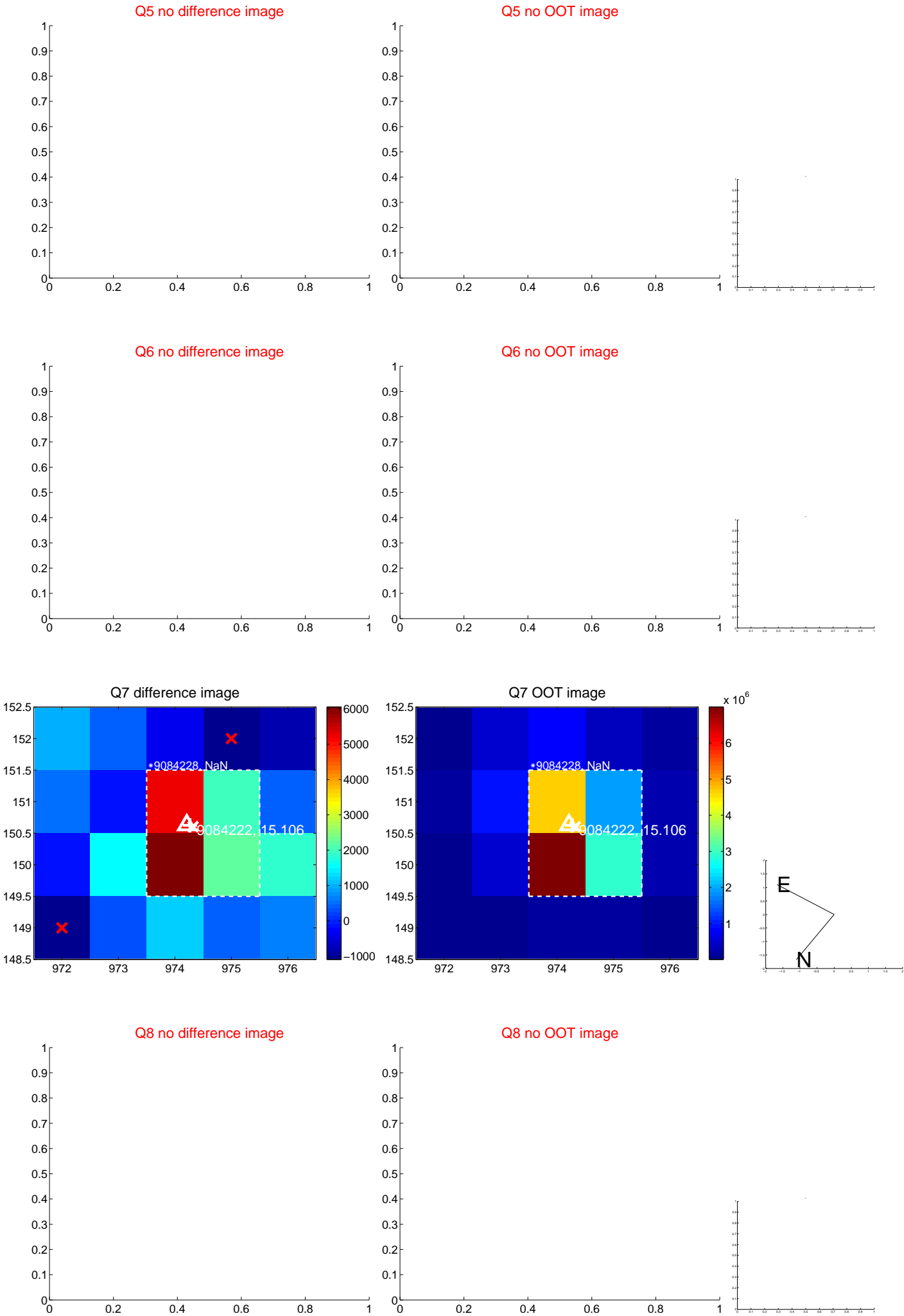


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses:** good quarterly centroid offsets; **Vermillion crosses:** bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

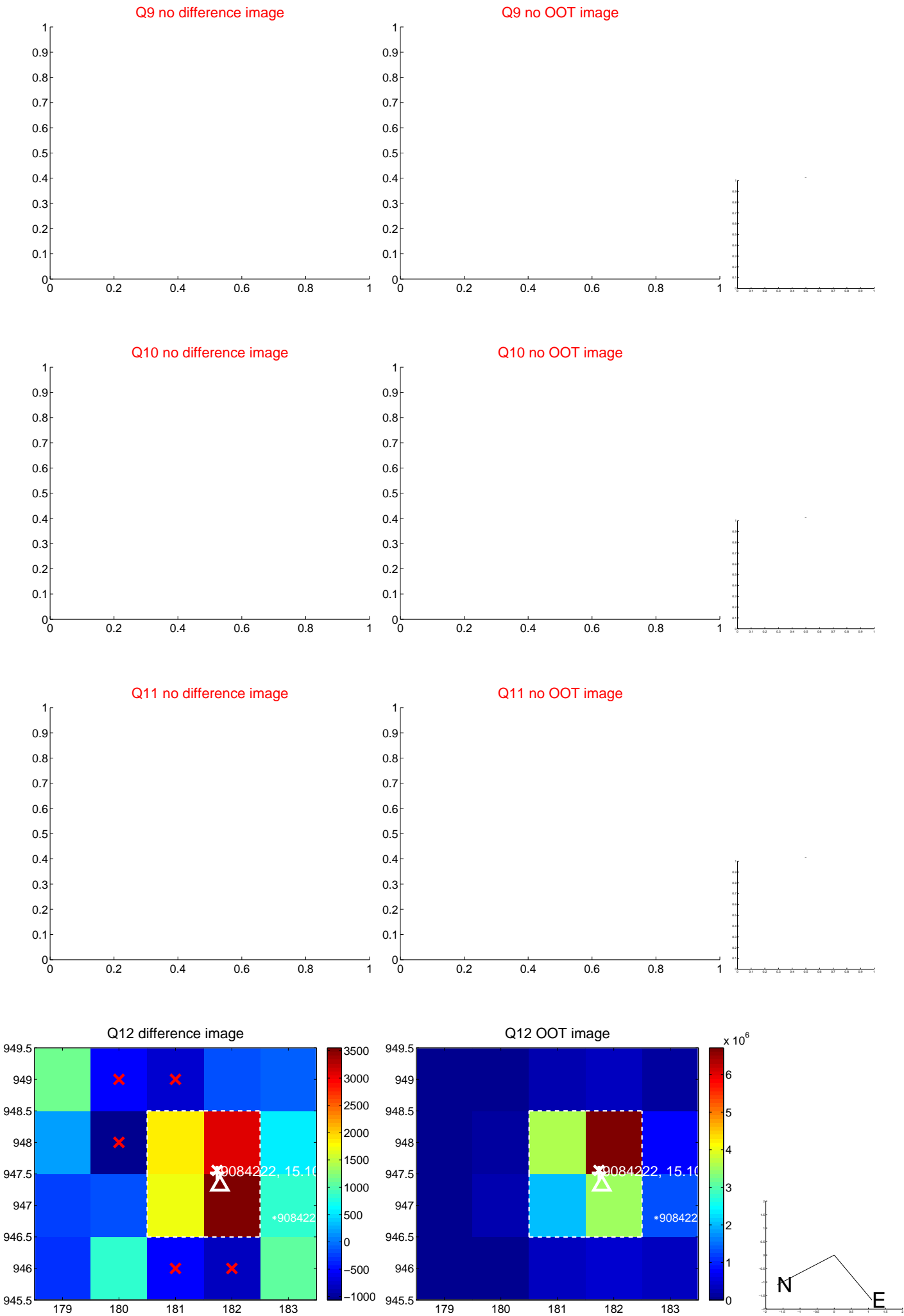
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



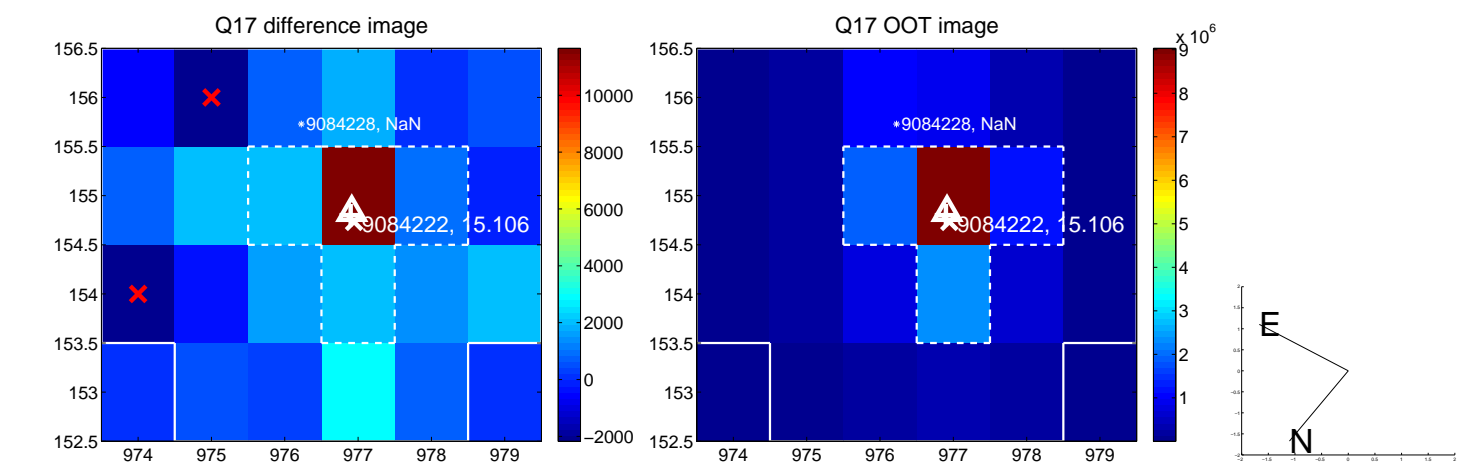
white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.



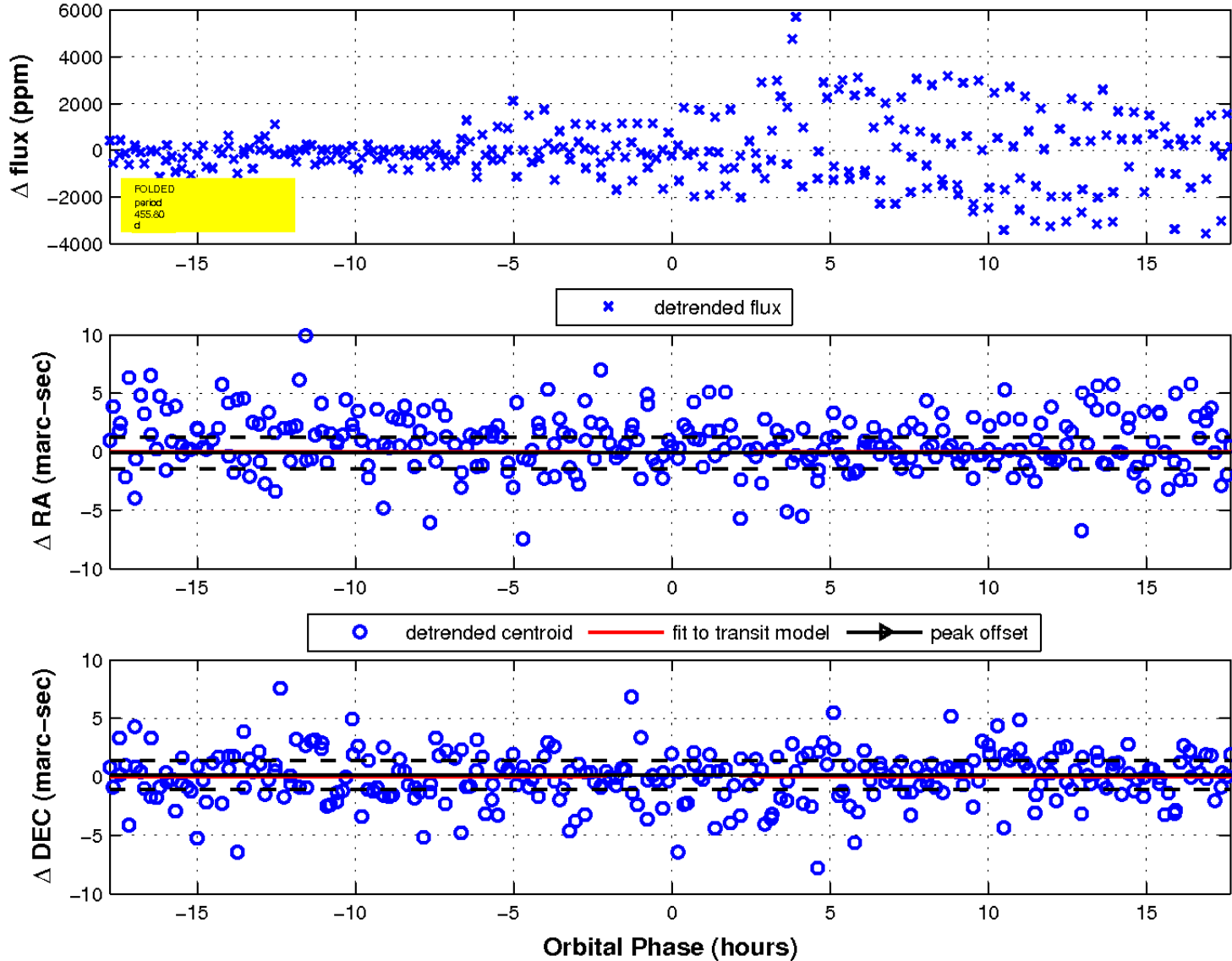
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

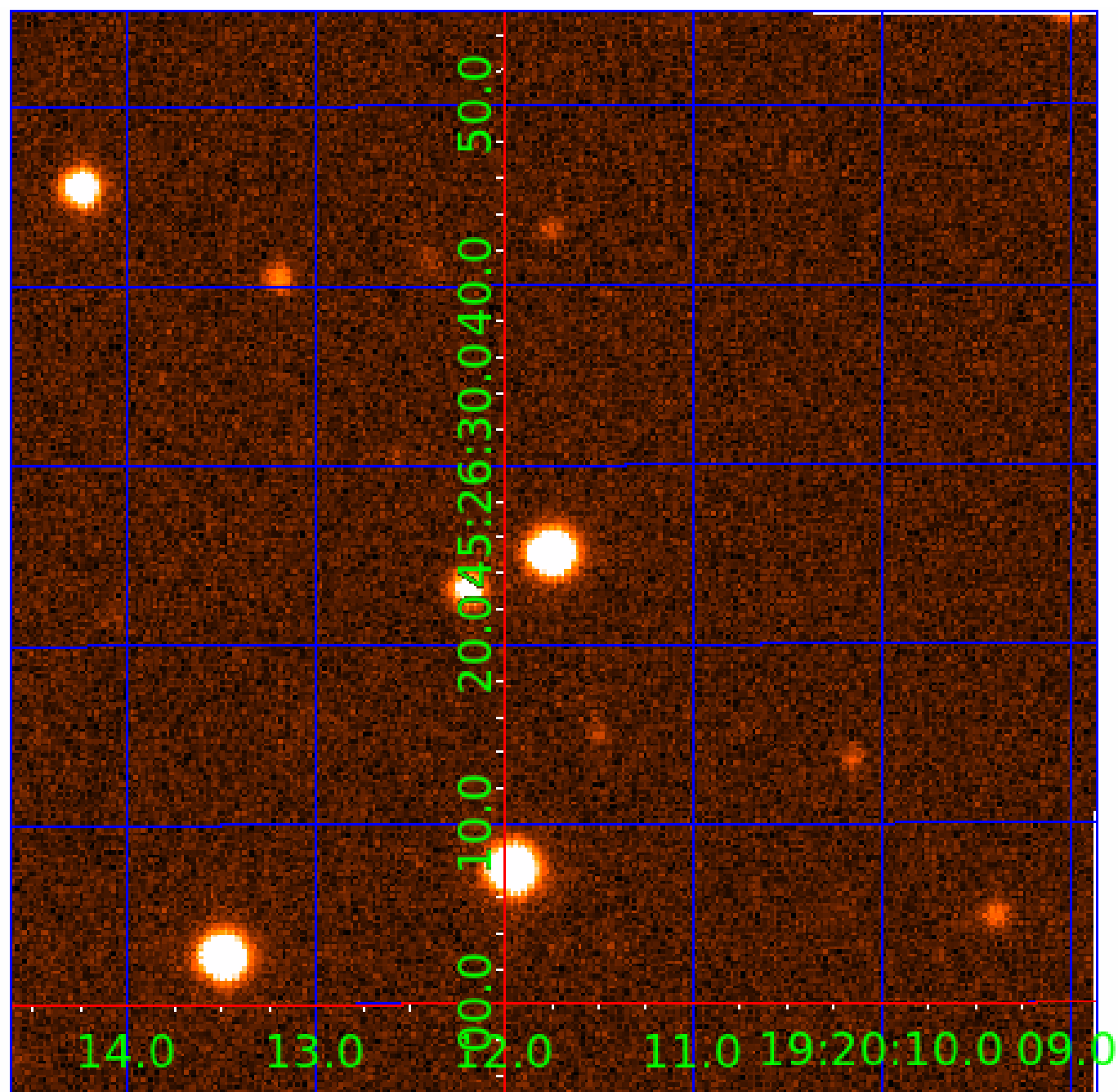


fluxWeightedCentroids, Planet 2 of 3



UKIRT Image

Declination





# KIC 009084222

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
009084222-01	OBS	No	387.903882	277.505856	1067.2	2.776	10.5	6.3	0.81	5017	2.77	0.41
009084222-02	OBS	No	455.804518	194.624539	1036.4	5.926	9.5	7.5	0.81	5017	2.99	0.33
009084222-03	OBS	No	99.257541	224.726965	552.5	3.666	7.7	5.7	0.81	5017	1.92	2.52

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
009084222-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_MEAS
009084222-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_POS_DV—INCONSISTENT_TRANS
009084222-03	OBS	FP	0.03	1	0	0	0	LPP_DV

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

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

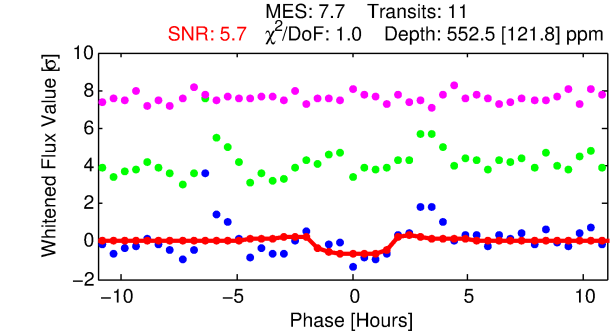
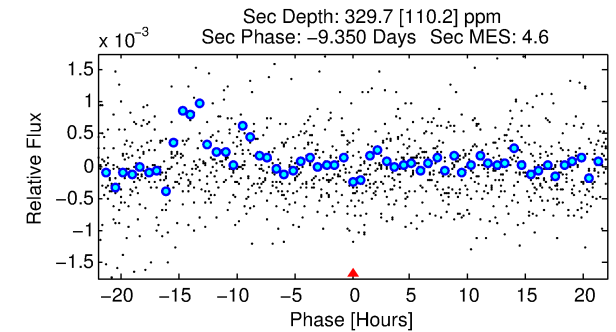
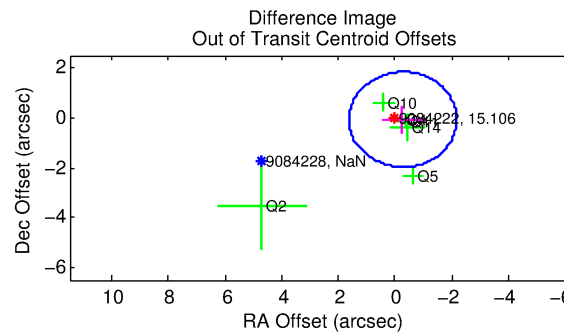
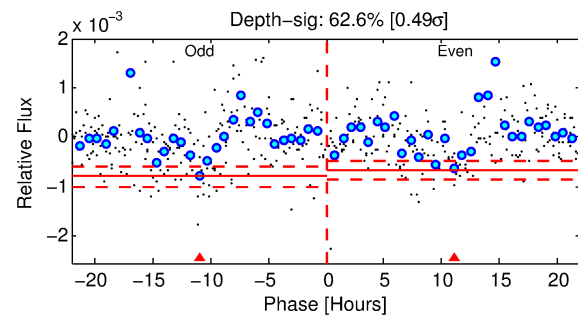
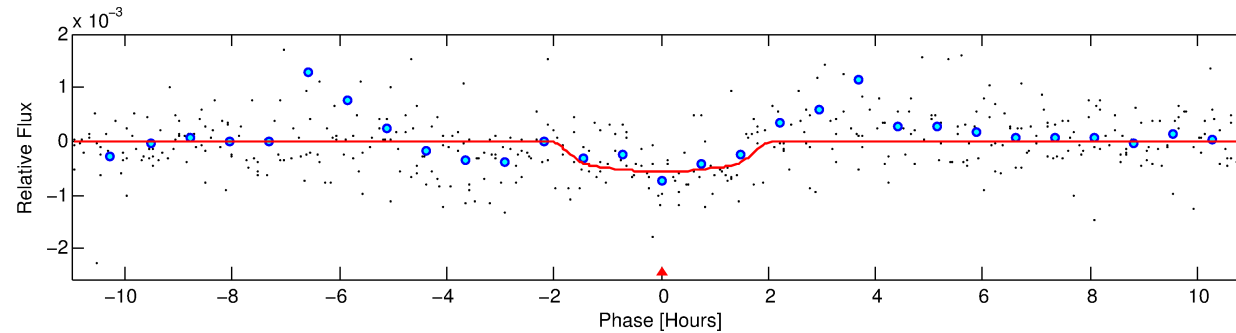
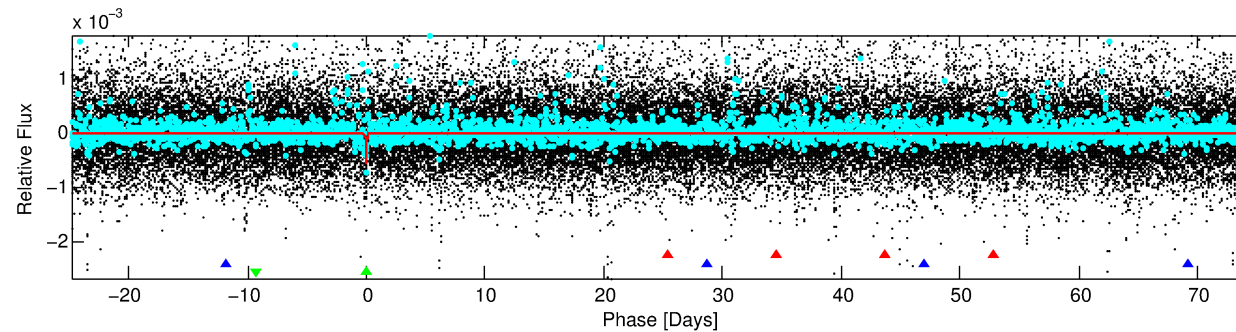
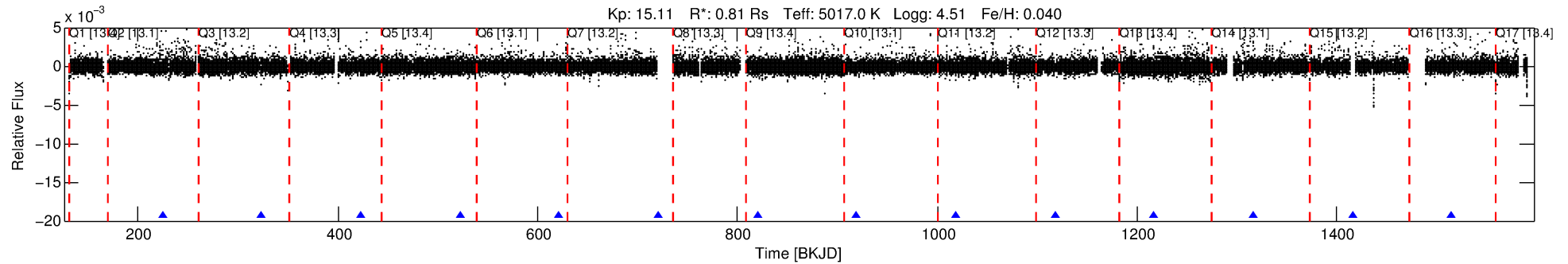
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 009084222-03

No Significant Match Found

# DV One-Page Summary

KIC: 9084222 Candidate: 3 of 3 Period: 99.258 d



## DV Fit Results:

Period = 99.25754 [0.00144] d  
Epoch = 224.7270 [0.0109] BKJD  
Rp/R\* = 0.0216 [0.0536]  
a/R\* = 186.78 [1565.96]  
b = 0.48 [13.83]  
Seff = 2.52 [0.49]  
Teq = 321 [16] K  
Rp = 1.92 [4.74] Re  
a = 0.3851 [0.0379] AU  
Ag = 7332.87 [36395.63] [0.20σ]  
Teffp = 4596 [5701] K [0.75σ]

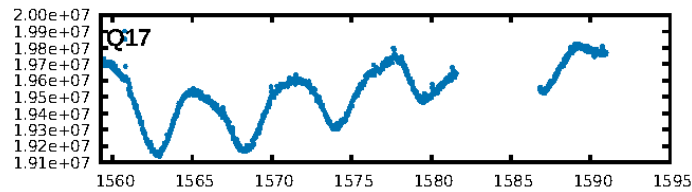
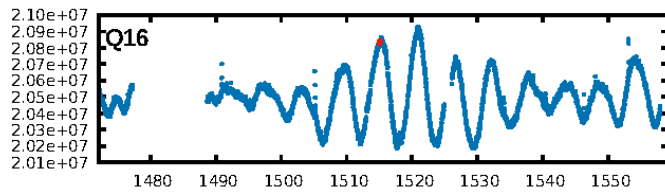
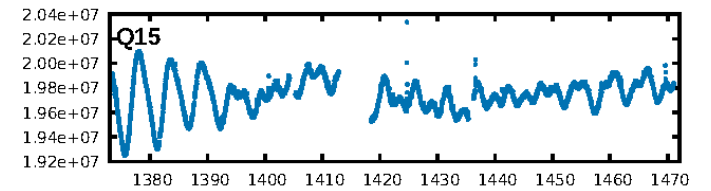
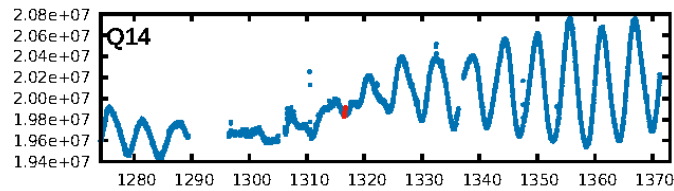
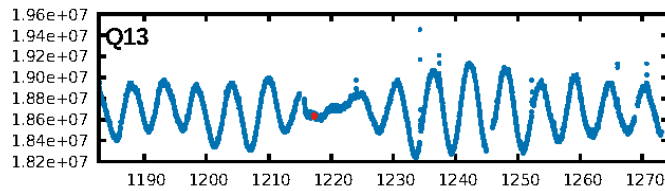
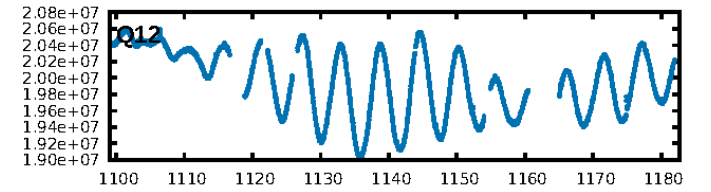
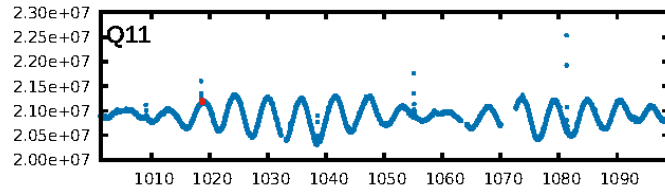
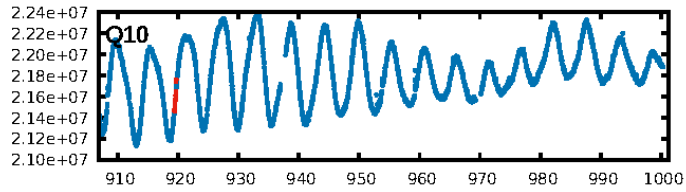
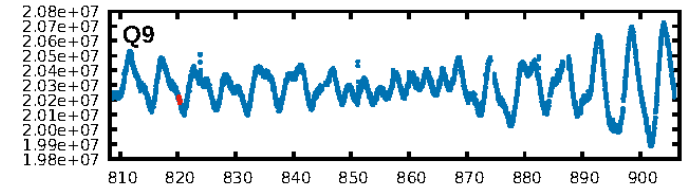
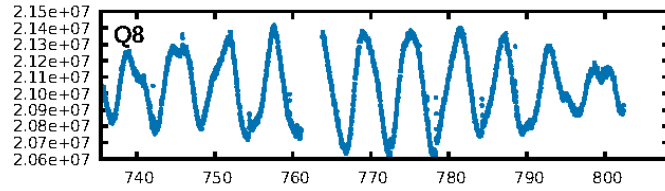
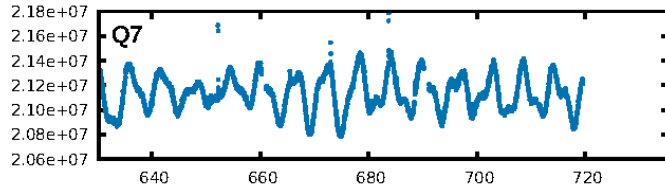
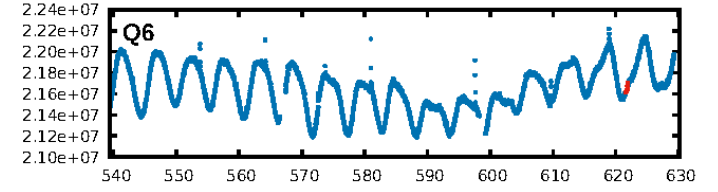
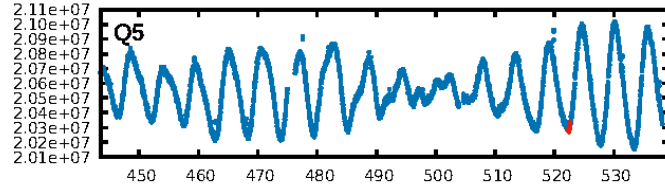
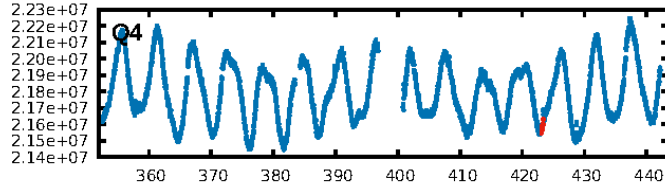
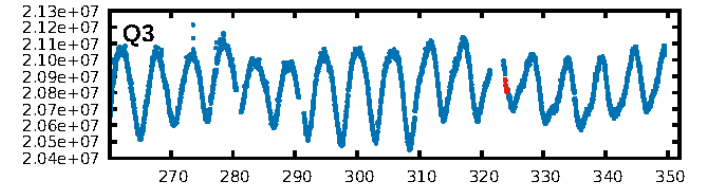
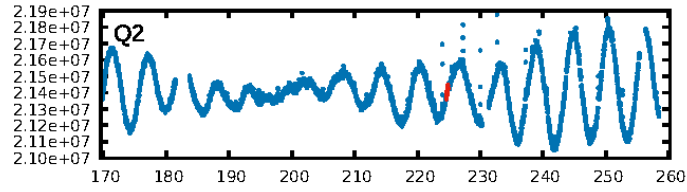
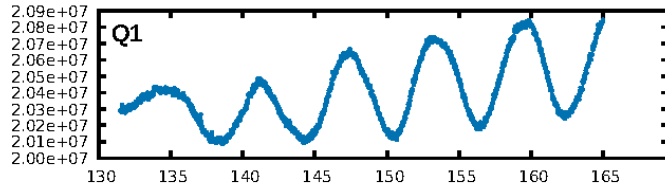
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [1506.33σ]  
ModelChiSquare2-sig: 56.7%  
ModelChiSquareGof-sig: 99.3%  
**Bootstrap-pfa: 2.95e-09**  
RollingBand-fgt: 1.00 [11/11]  
**GhostDiagnostic-chr: 0.6569**  
Centroid-sig: 6.2%  
Centroid-so: 1.781 arcsec [1.29σ]  
OotOffset-rm: 0.284 arcsec [0.45σ]  
OotOffset-st: 3/1/1/1 [6]  
KicOffset-rm: 0.146 arcsec [0.19σ]  
KicOffset-st: 3/1/1/1 [6]  
DiffImageQuality-fgm: 0.83 [5/6]  
DiffImageOverlap-fno: 1.00 [9/9]

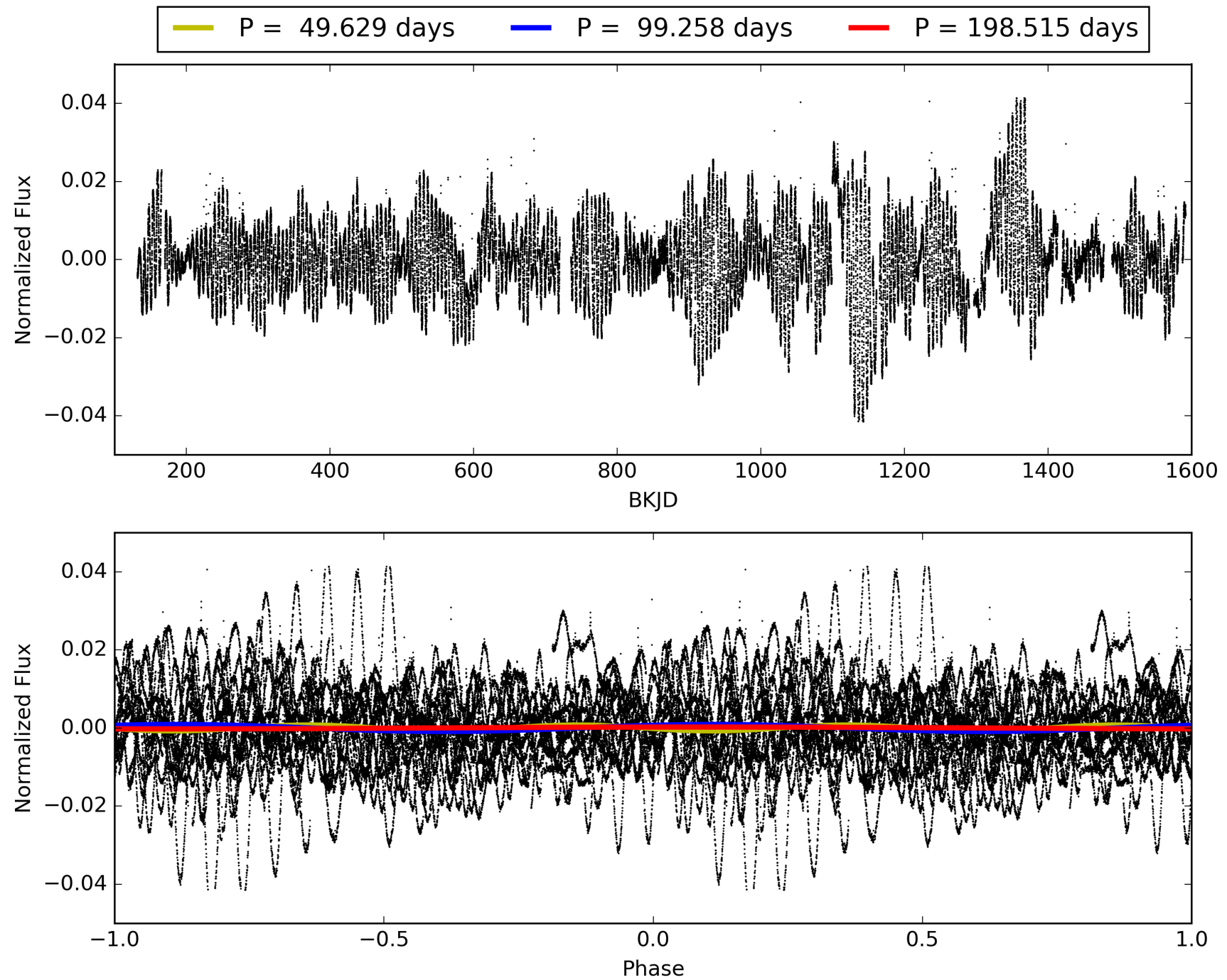
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 09:34:47 Z

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

# TCE 009084222-03, PDC Light Curves

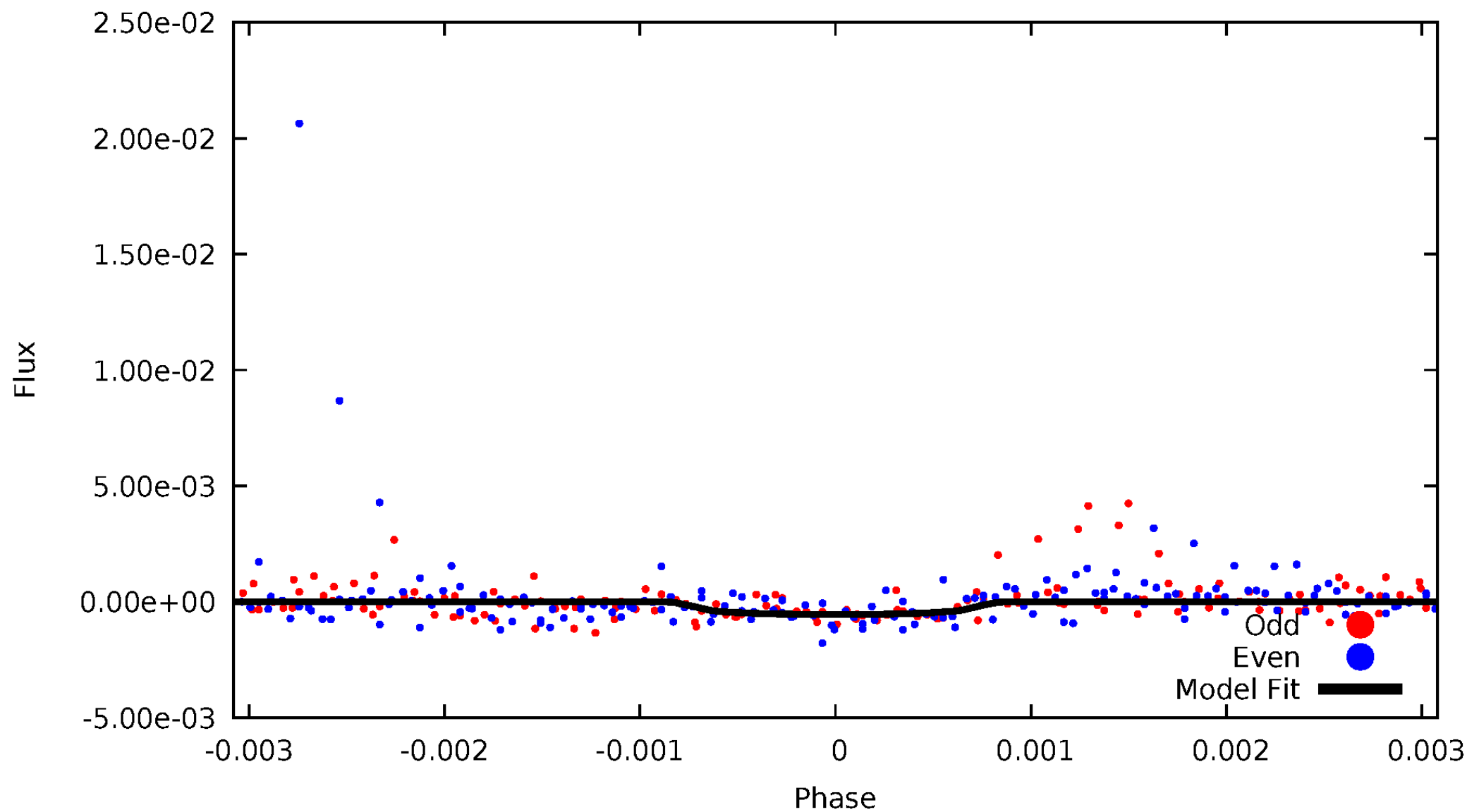


TCE 009084222-03



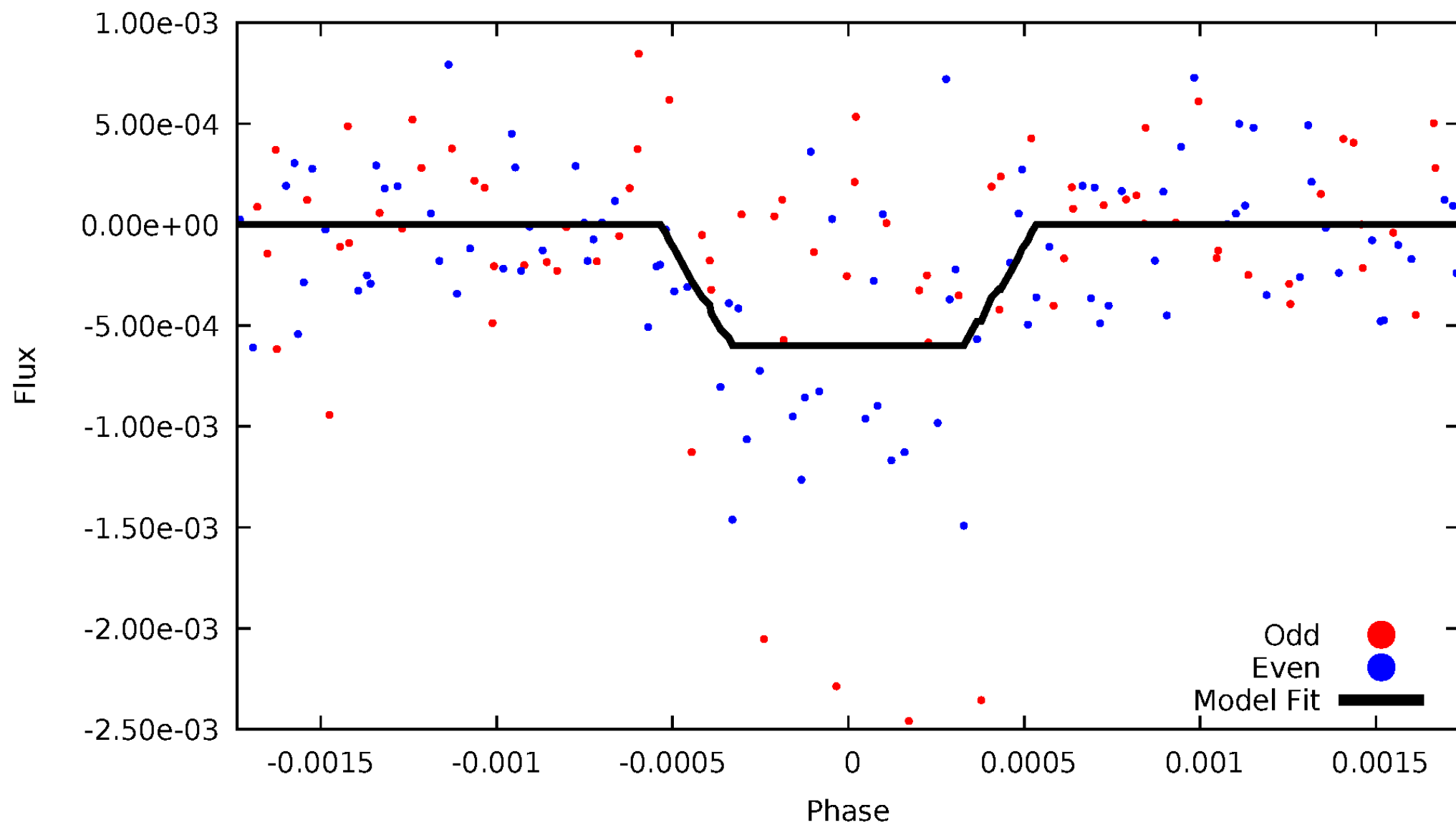
# DV Odd/Even

TCE 009084222-03



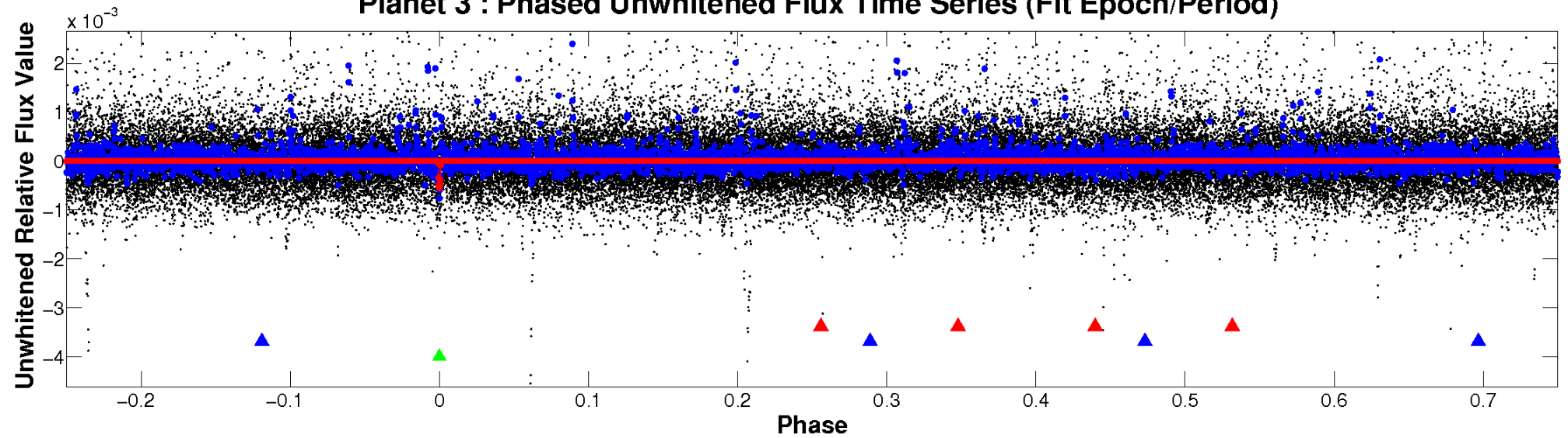
# ALT Odd/Even

TCE 009084222-03

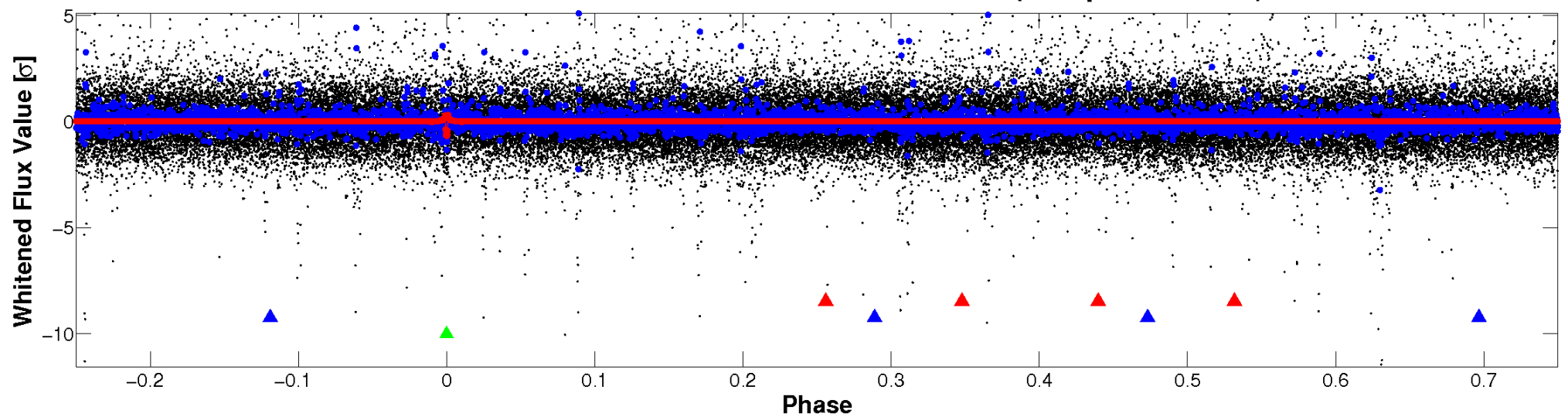


# Non-Whitened Vs. Whitened Light Curve

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

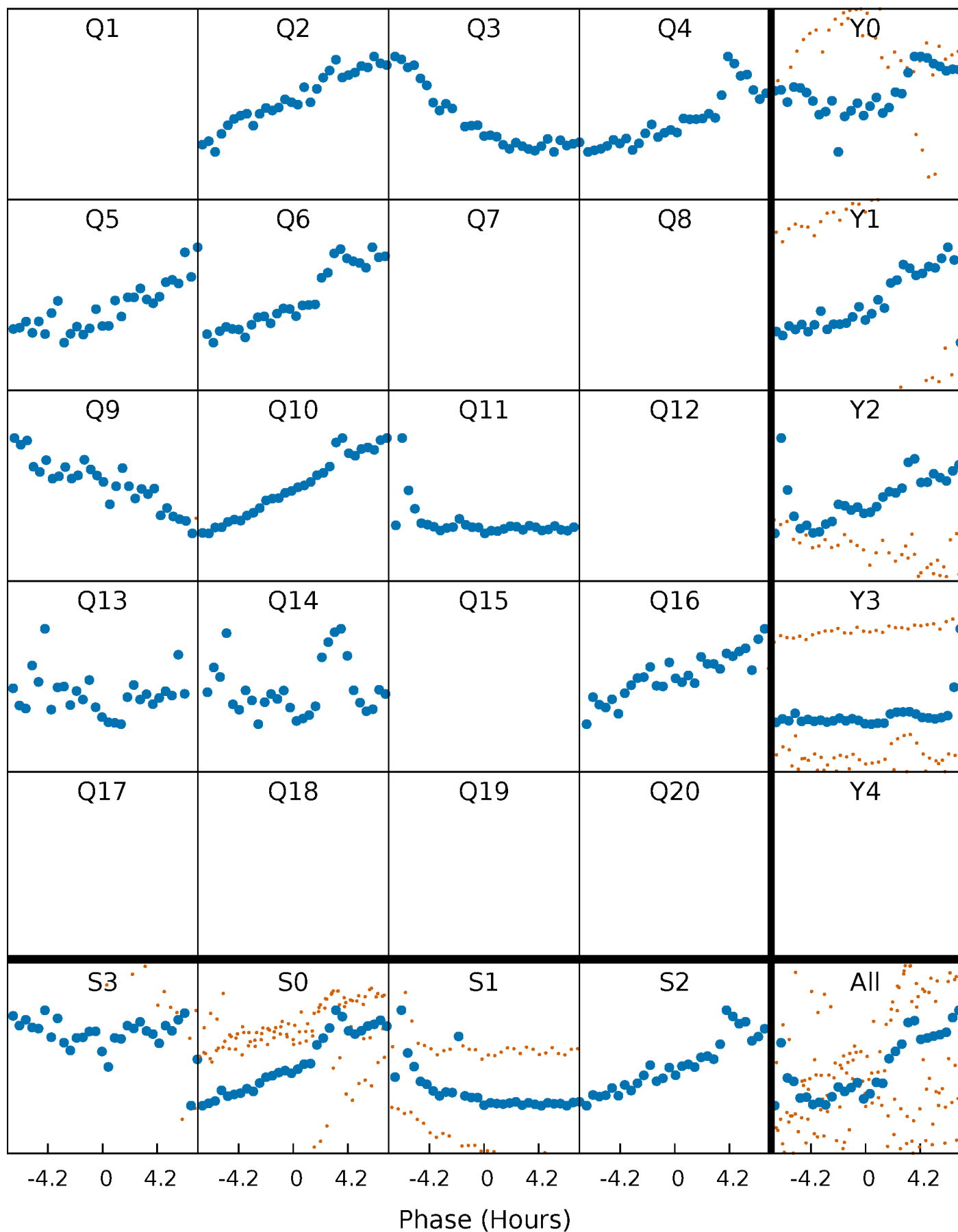


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

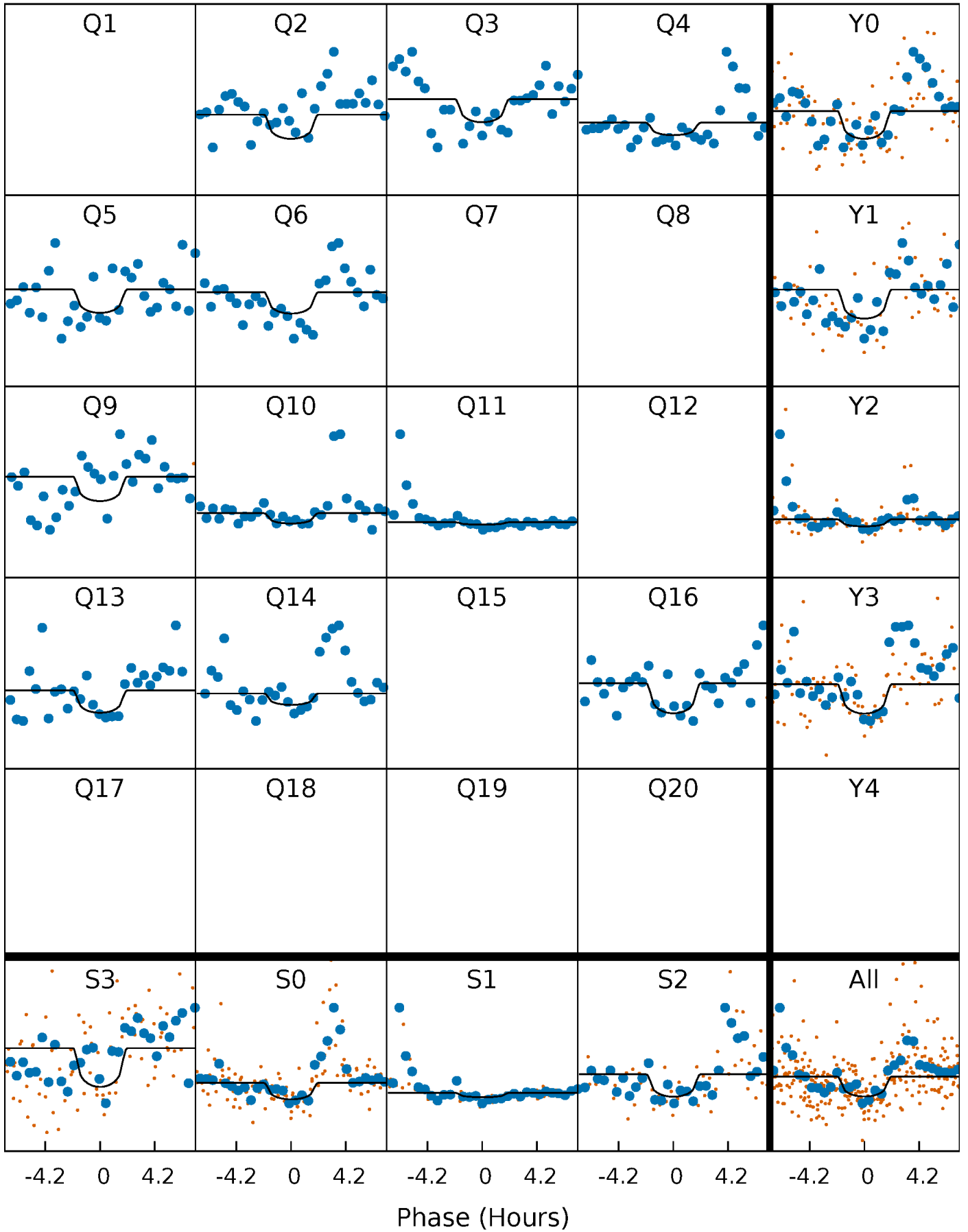
TCE 009084222-03 P= 99.257541 Days  $T_0=224.726965$  (BKJD)





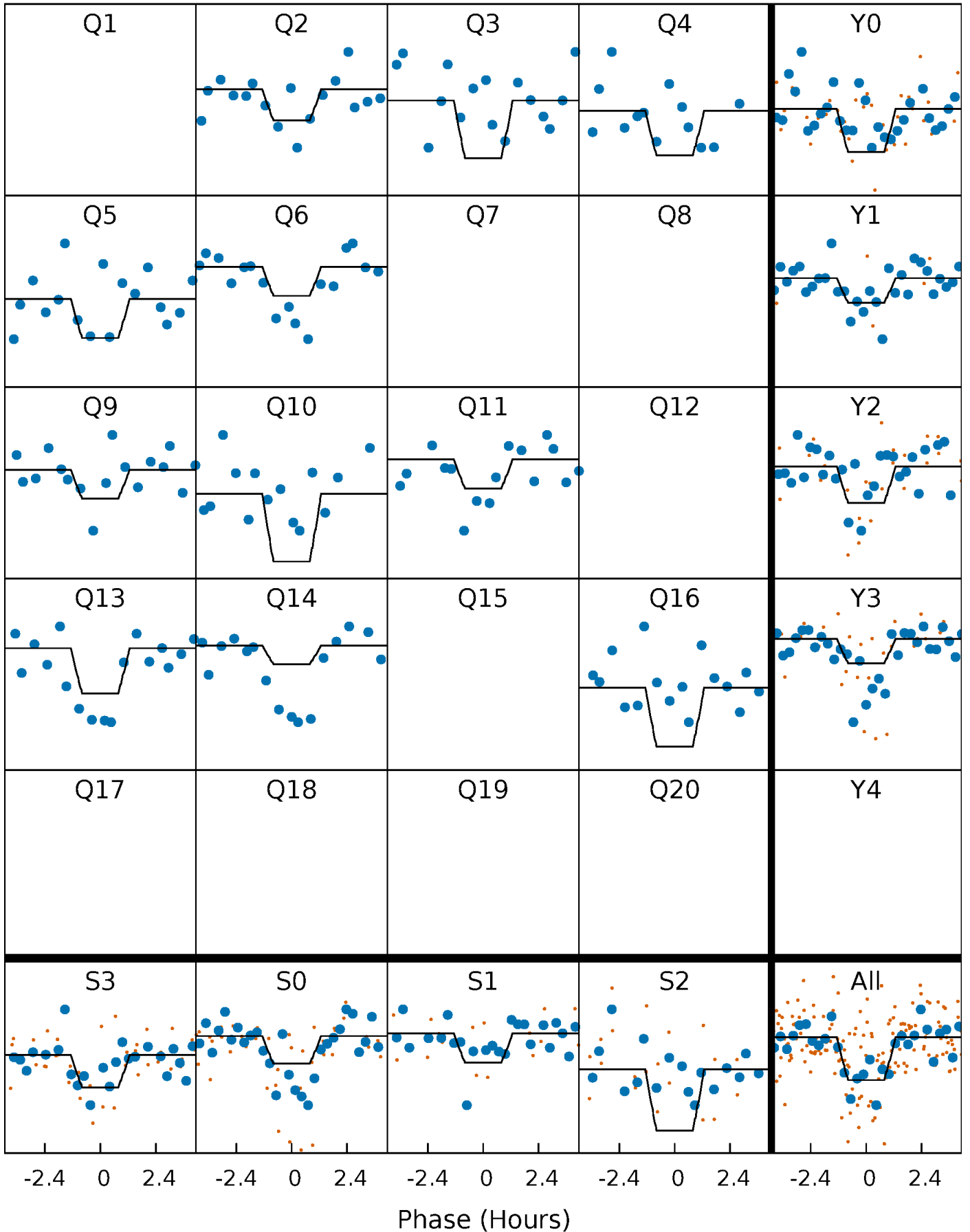
# DV Quarter-Phased Transit Curves

TCE 009084222-03   P= 99.257541 Days    $T_0=224.726965$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

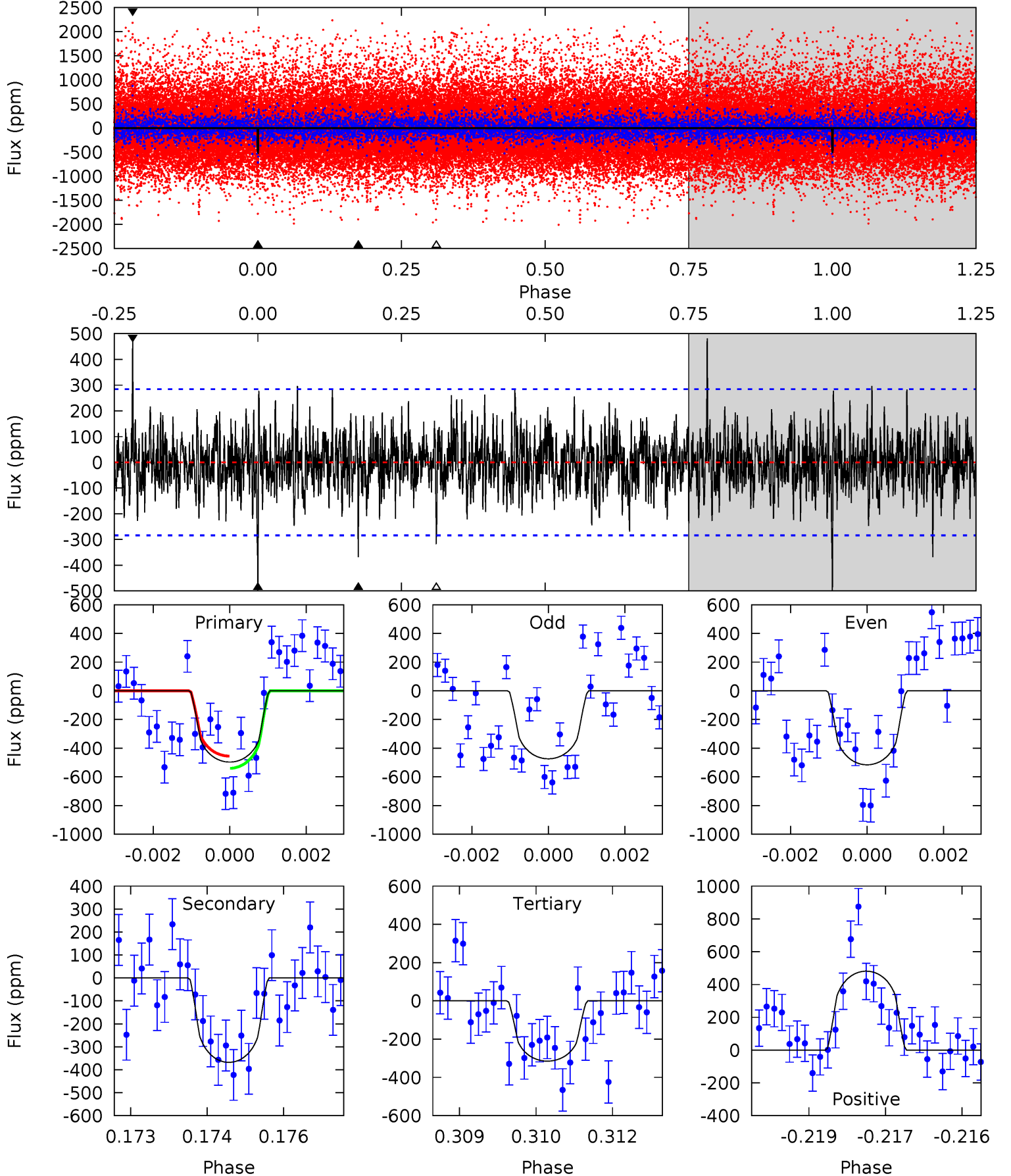
TCE 009084222-03 P= 99.257026 Days  $T_0=224.757169$  (BKJD)



# DV Model-Shift Uniqueness Test

009084222-03, P = 99.257541 Days, E = 125.469424 Days

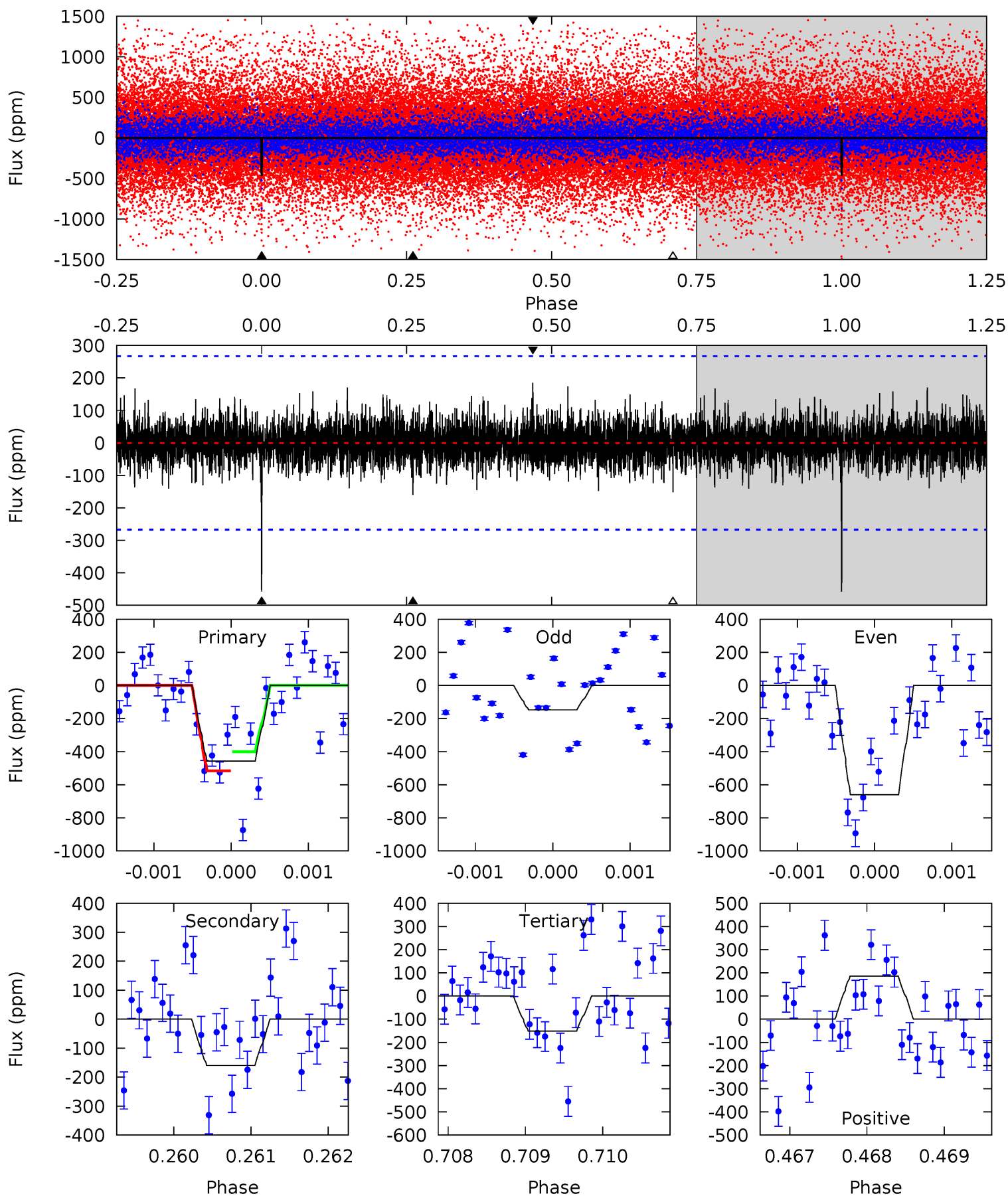
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.38	6.94	5.94	9.08	5.36	3.15	1.64	3.44	0.30	1.00	-2.14	0.39	1.11	0.49	0.81



# Alt Model-Shift Uniqueness Test

009084222-03, P = 99.257026 Days, E = 125.500143 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
9.32	3.26	3.09	3.78	5.44	3.28	0.91	6.23	5.55	0.17	-0.52	5.21	2.08	0.29	1.17



### Stellar Parameters For KIC 009084222

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5017^{+151}_{-136}$	$4.508^{+0.088}_{-0.064}$	$0.040^{+0.250}_{-0.300}$	$0.811^{+0.071}_{-0.087}$	$0.772^{+0.085}_{-0.057}$	$2.037^{+0.697}_{-0.394}$
	+3%/-3%	+2%/-1%	+625%/-750%	+9%/-11%	+11%/-7%	+34%/-19%
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 009084222-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-368 \pm 53$	$4.10^{+4.02}_{-2.63}$	$449^{+16}_{-18}$	$3597^{+1779}_{-635}$	$1746^{+12431}_{-1278}$
Alt.	$-160 \pm 49$	$4.36^{+3.73}_{-2.84}$	$449^{+18}_{-19}$	$3126^{+1296}_{-515}$	$693^{+4458}_{-512}$

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

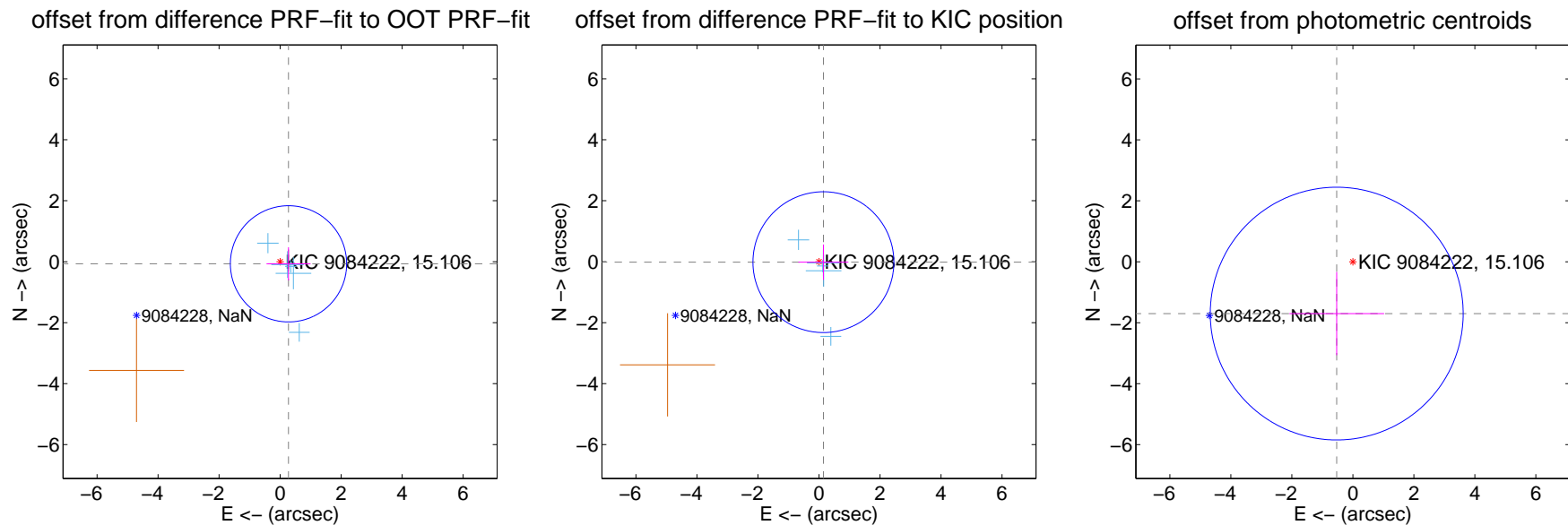
## DV Centroid Data

Supplemental centroid analysis for 009084222-03. Kepler magnitude: 15.11. Transit SNR 5.66

There are 5 quarters with good PRF difference image offsets

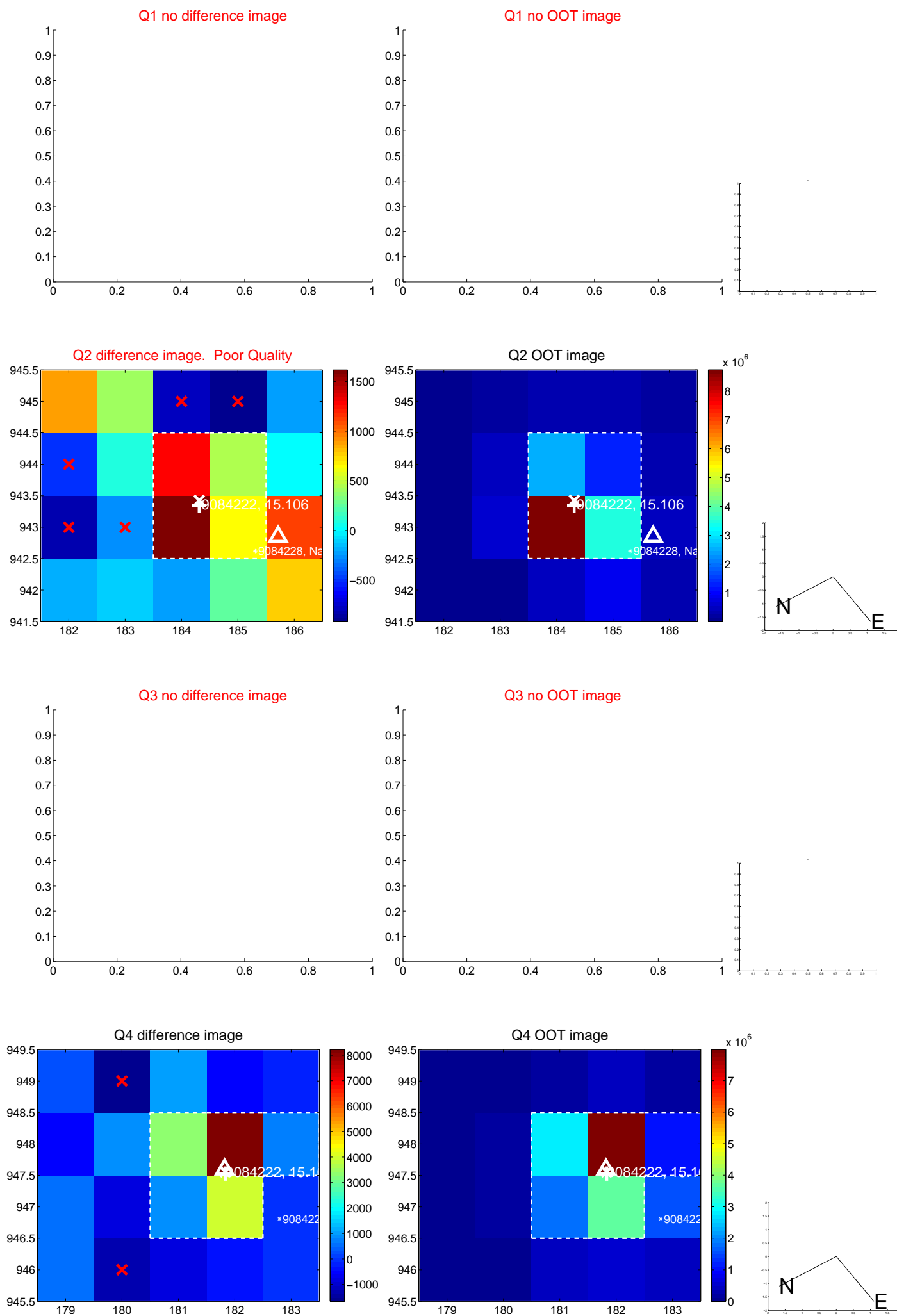
The direct PRF centroid is offset from the target star catalog position by about 0.30 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.284 \pm 0.635$	0.45	$-0.276 \pm 0.721$	$-0.070 \pm 0.544$
PRF-fit source offset from KIC position	$0.146 \pm 0.770$	0.19	$-0.145 \pm 0.820$	$-0.015 \pm 0.579$
photometric centroid source offset	$1.78 \pm 1.38$	1.29	$0.53 \pm 1.55$	$-1.70 \pm 1.36$

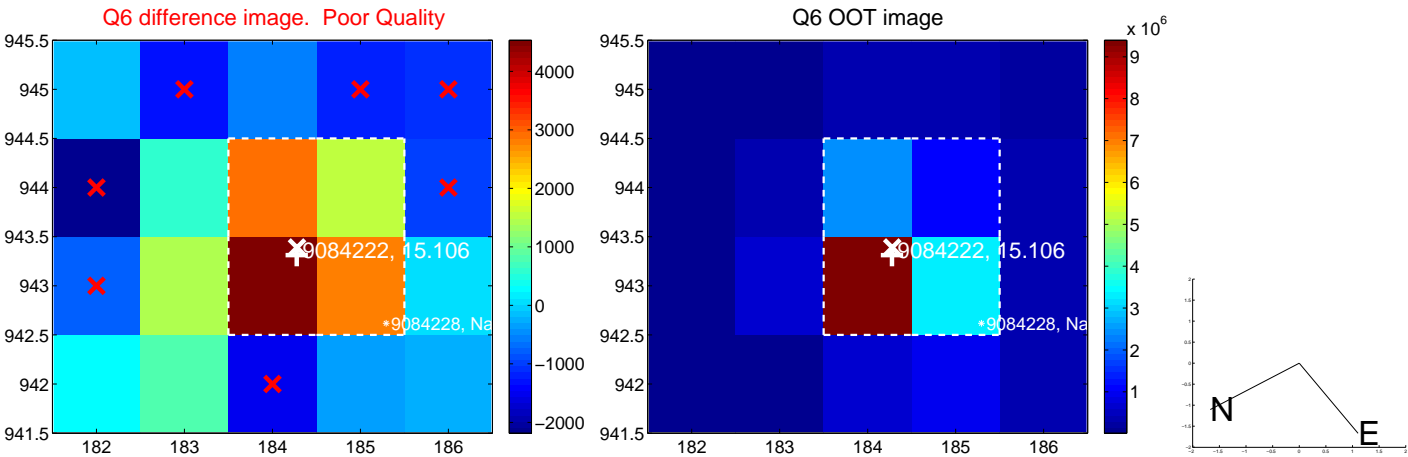
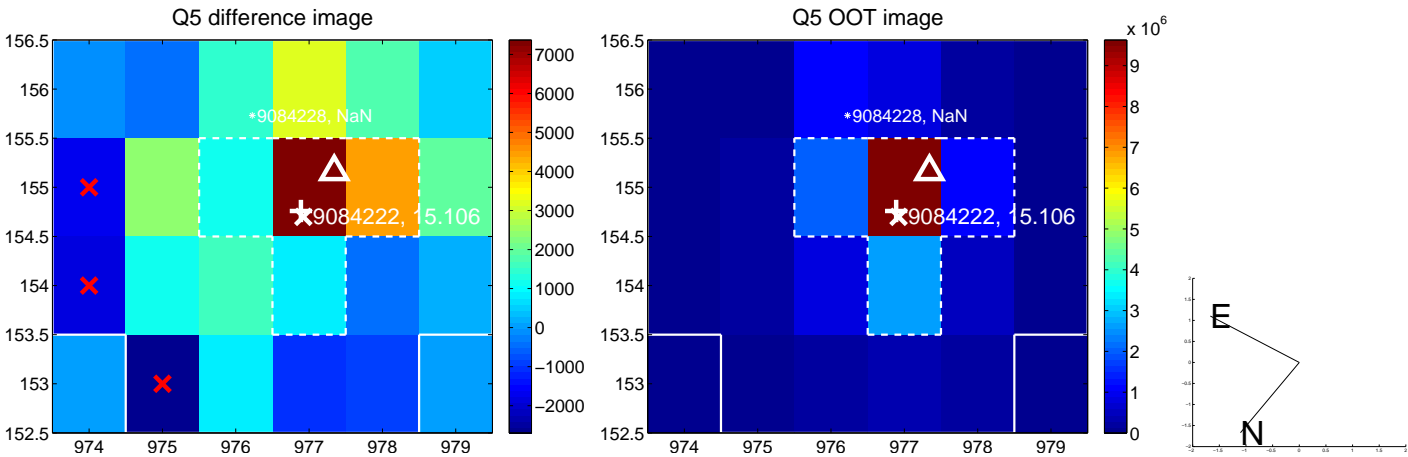


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

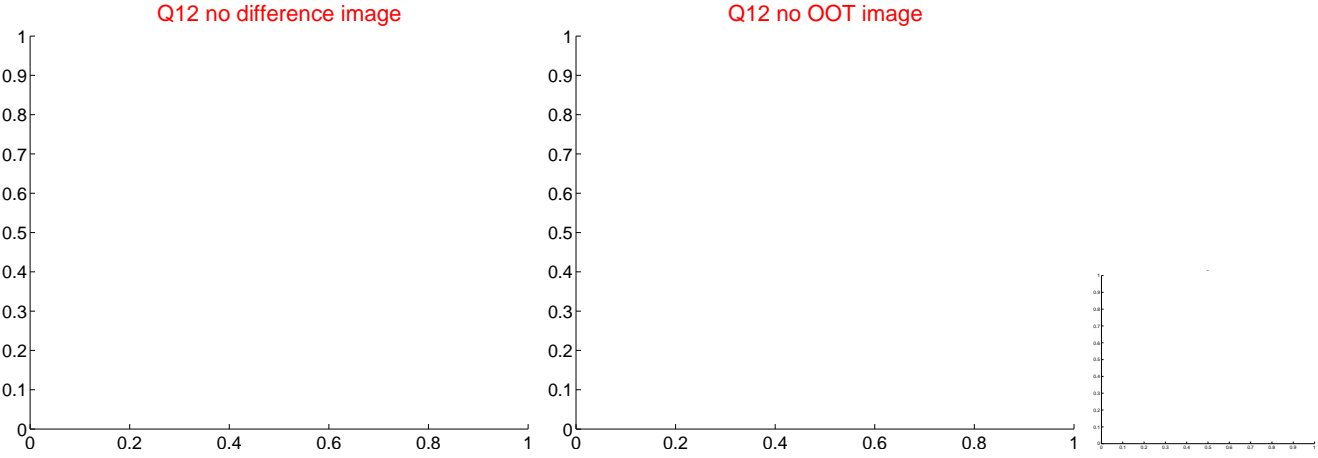
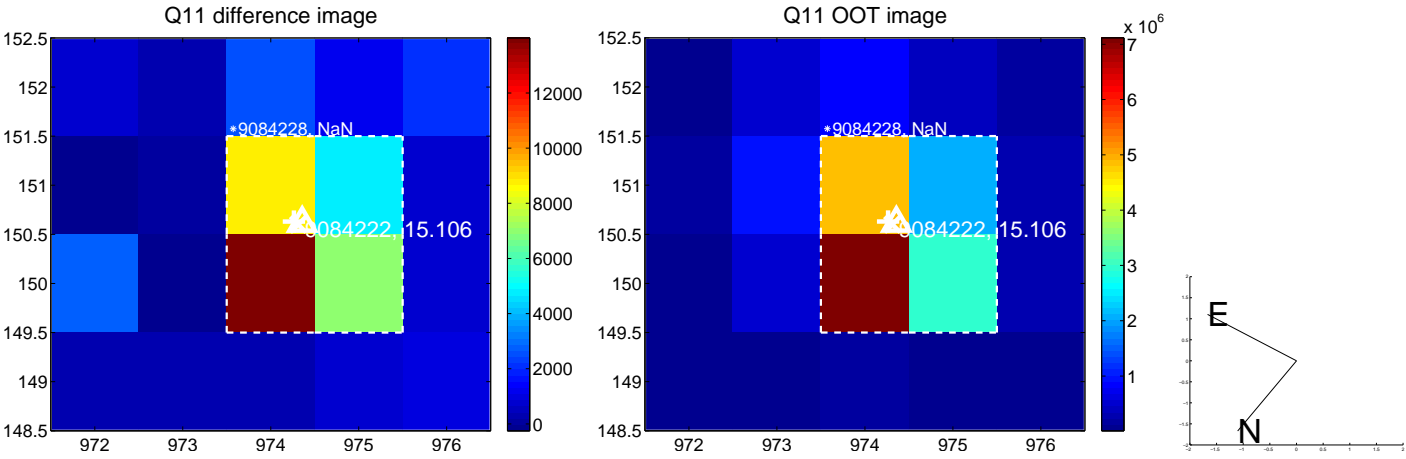
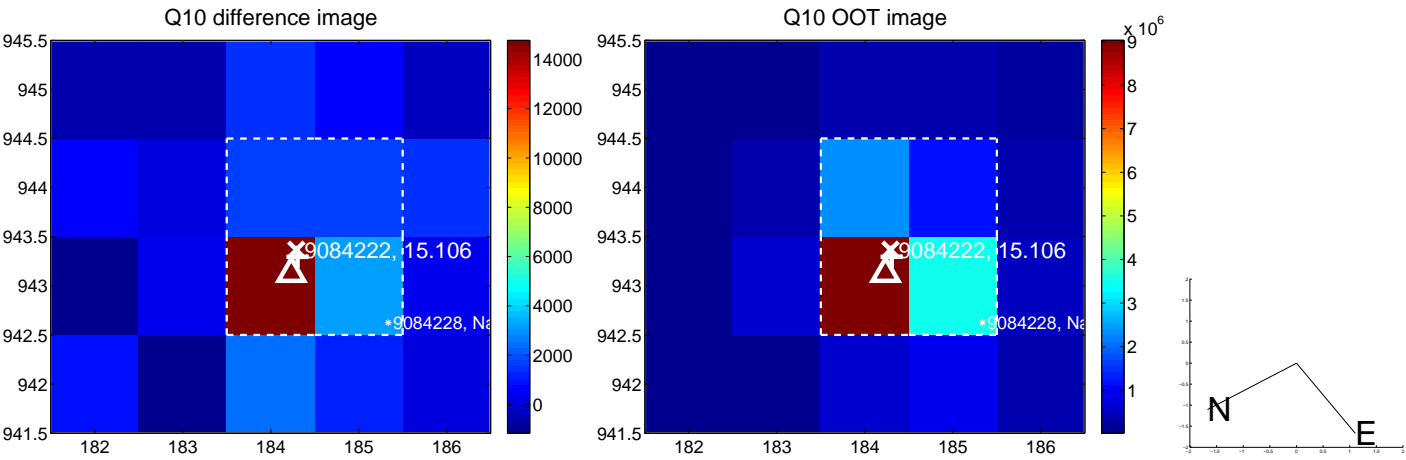
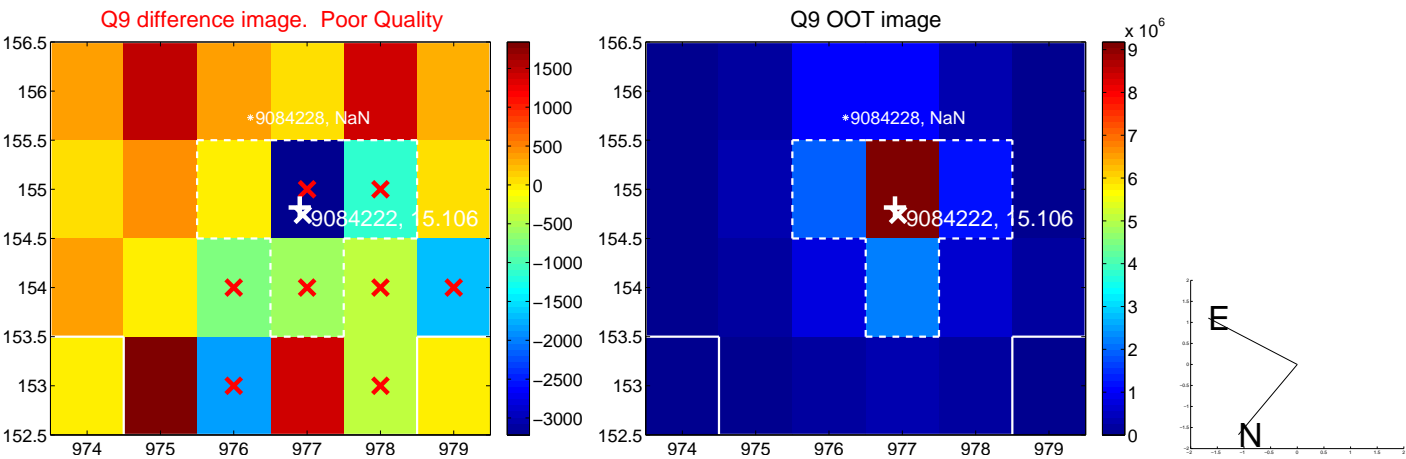


white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

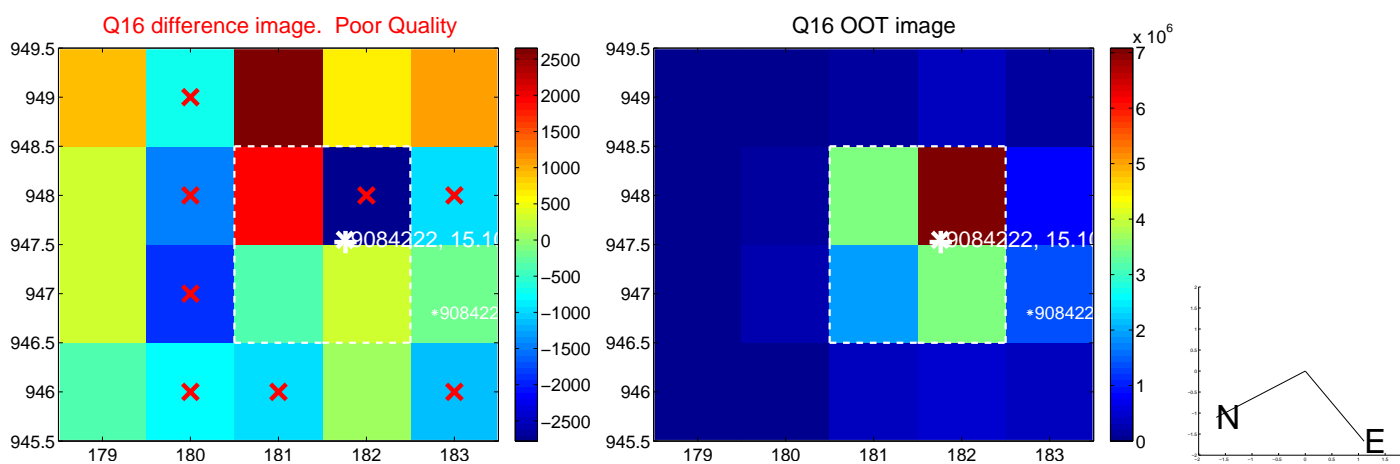
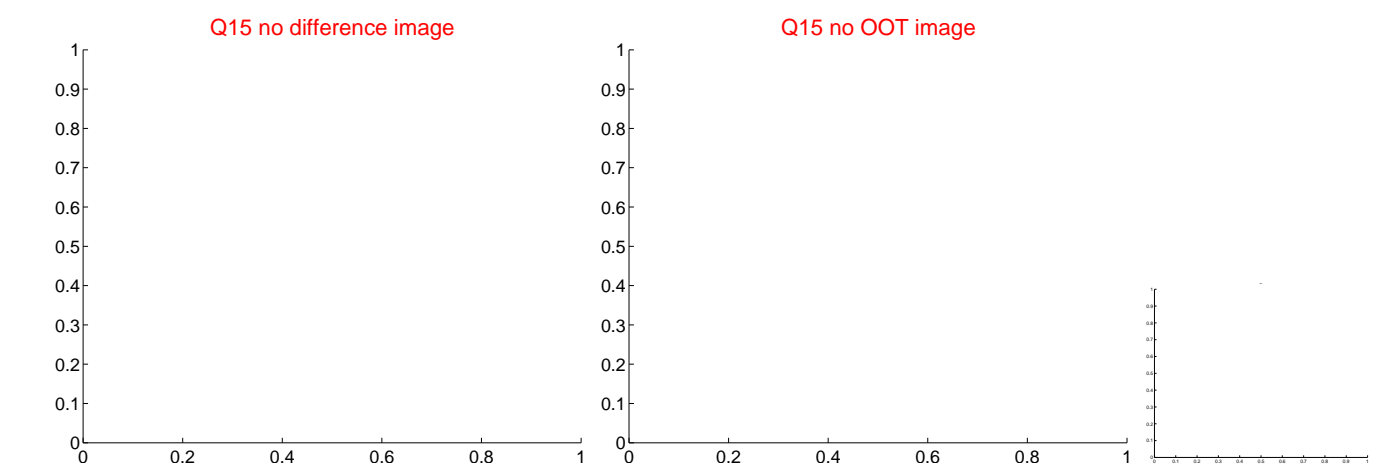
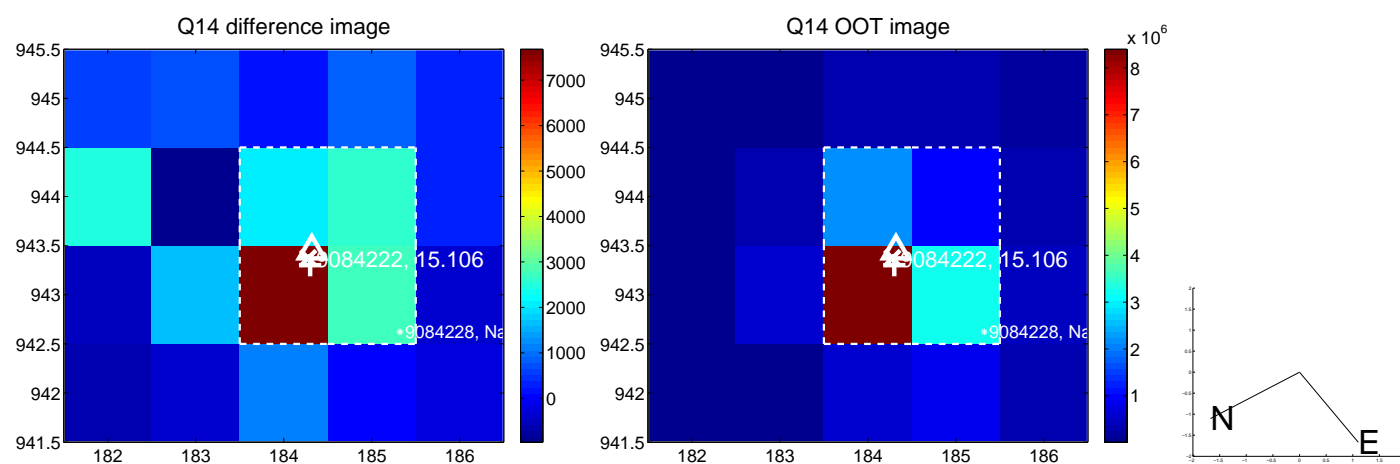
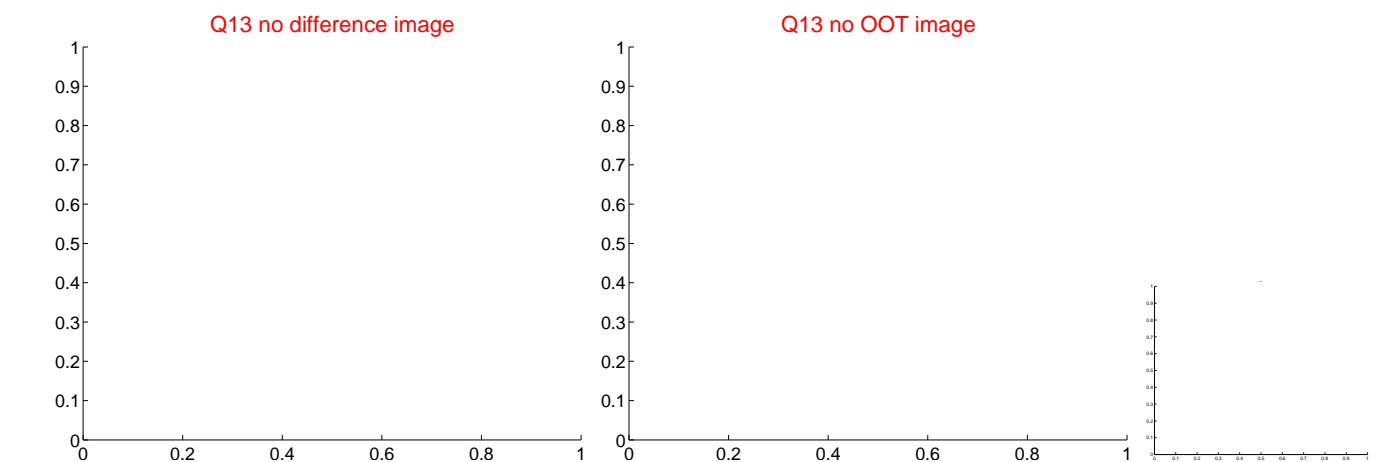




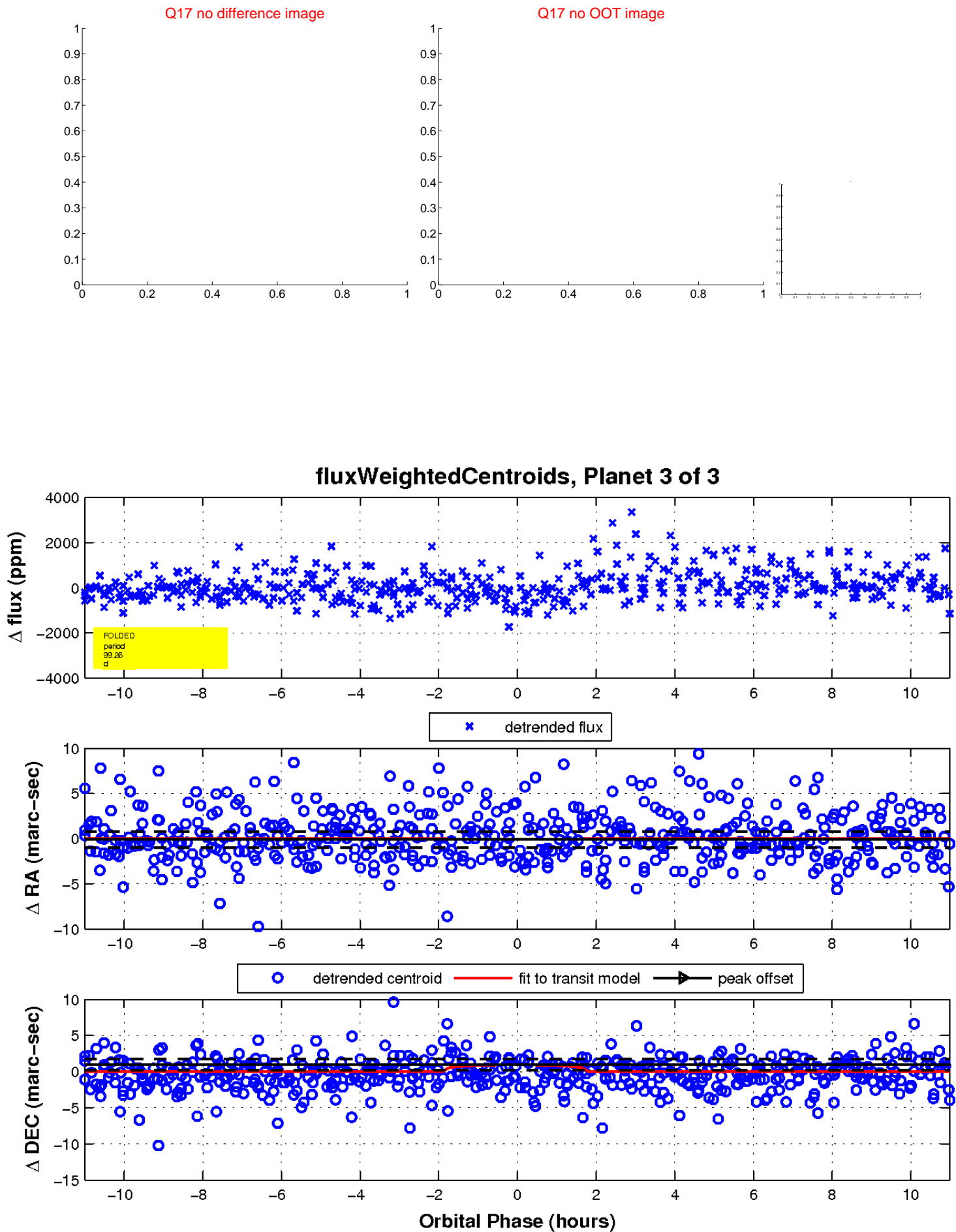
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

