

# KIC 008737568

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008737568-01	OBS	No	452.026092	363.583727	125.7	18.930	9.8	10.7	1.42	6422	1.85	2.29
008737568-02	OBS	No	385.576823	483.421702	81.6	10.754	8.2	8.6	1.42	6422	1.43	2.83

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008737568-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_SATURATED
008737568-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED

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

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

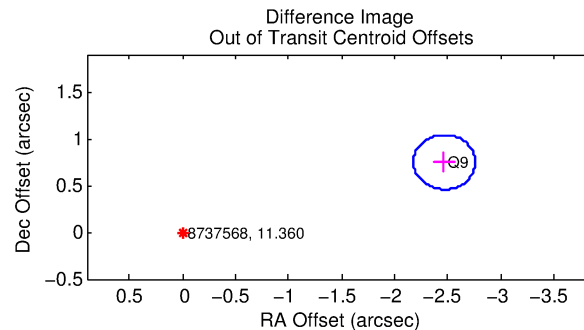
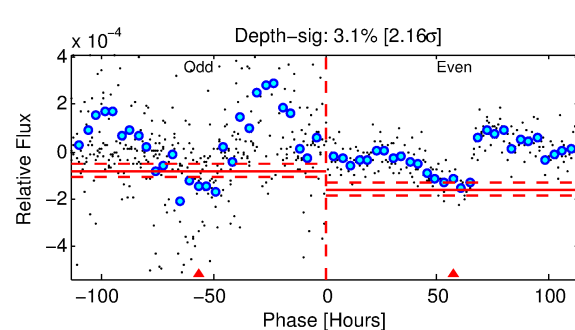
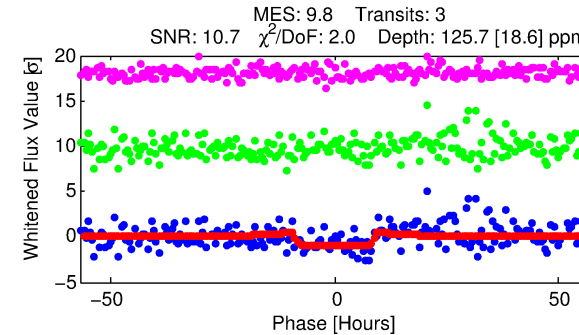
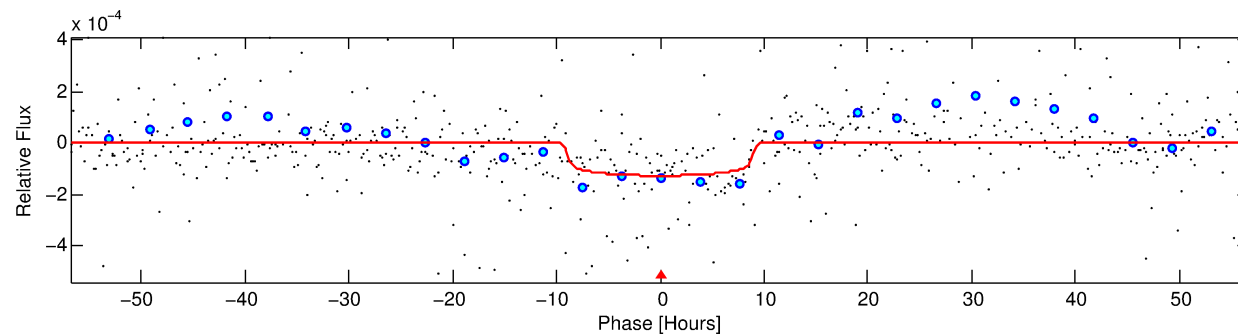
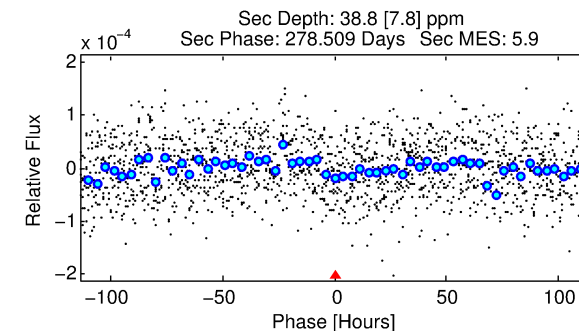
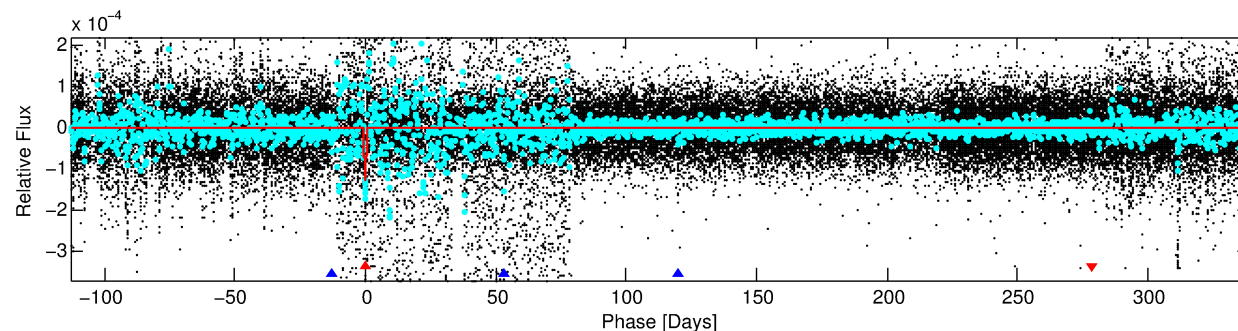
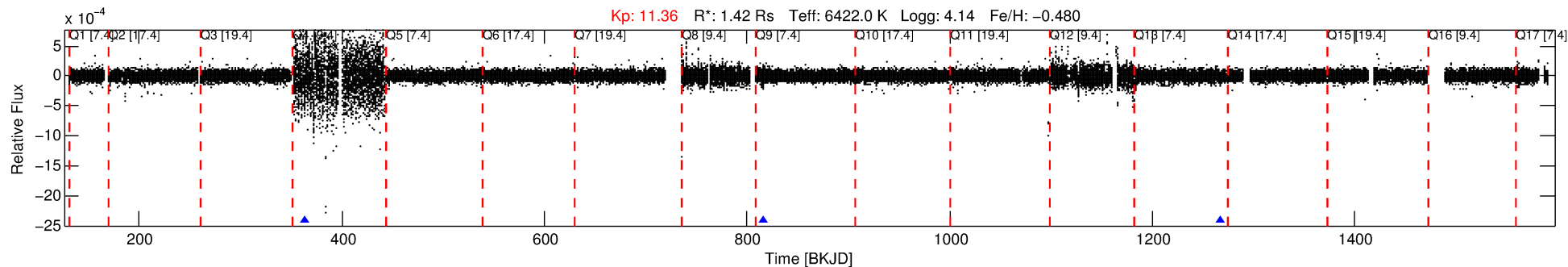
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008737568-01

No Significant Match Found

# DV One-Page Summary

KIC: 8737568 Candidate: 1 of 2 Period: 452.026 d



## DV Fit Results:

Period = 452.02609 [0.02333] d  
Epoch = 363.5837 [0.0335] BKJD  
Rp/R\* = 0.0119 [0.0018]  
a/R\* = 87.34 [64.70]  
b = 0.89 [0.17]  
Seff = 2.29 [1.10]  
Teq = 314 [38] K  
Rp = 1.85 [0.58] Re  
a = 1.1609 [0.3277] AU  
Ag = 8395.40 [4988.47] [1.68σ]  
Teffp = 4644 [445] K [9.70σ]

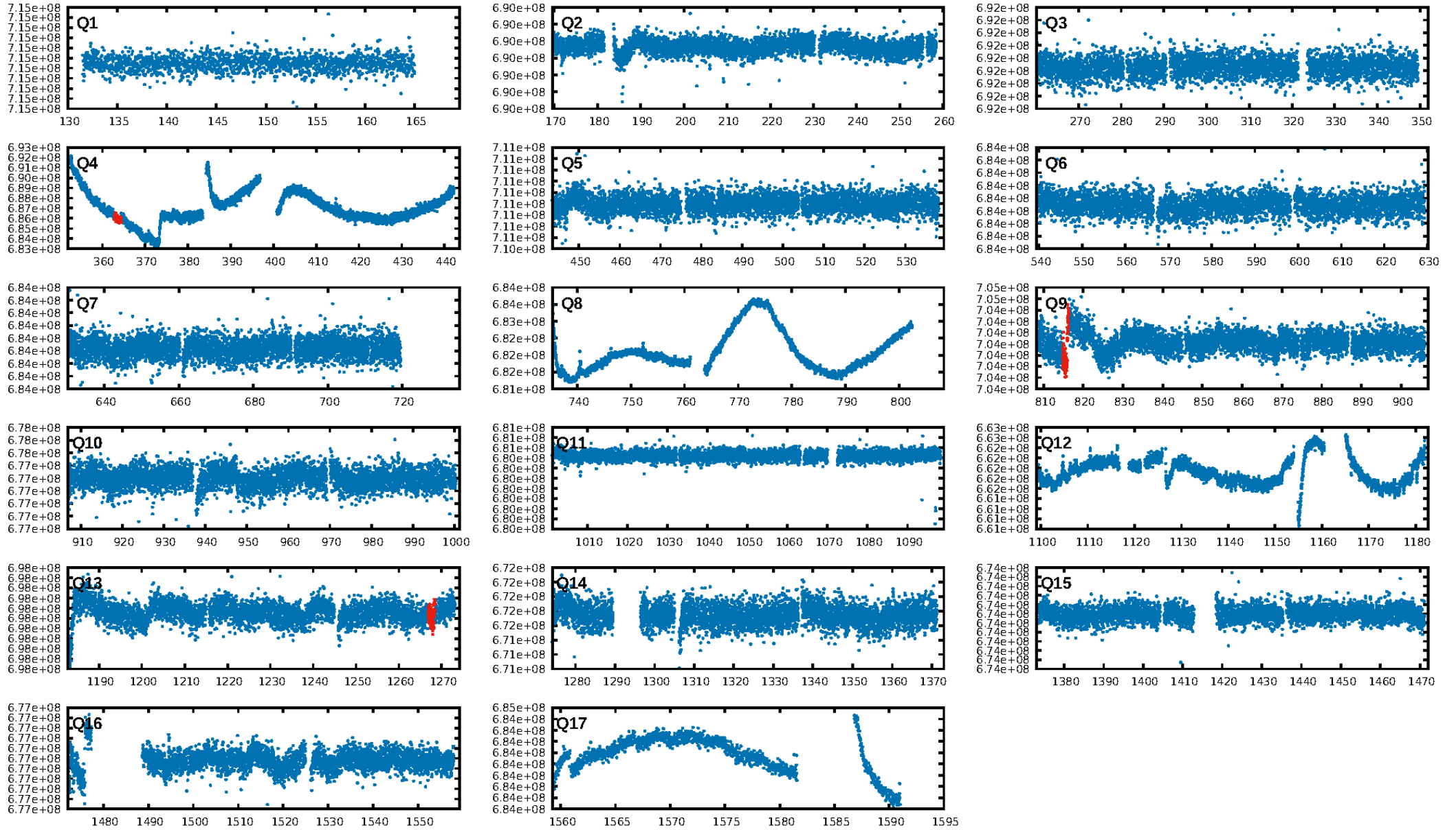
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [73.25σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 6.6%  
Bootstrap-pfa: 1.54e-07  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 2.174  
Centroid-sig: N/A  
Centroid-so: 2.628 arcsec [1.22σ]  
OotOffset-rm: 2.579 arcsec [26.53σ]  
KicOffset-rm: 2.783 arcsec [28.57σ]  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [2/2]

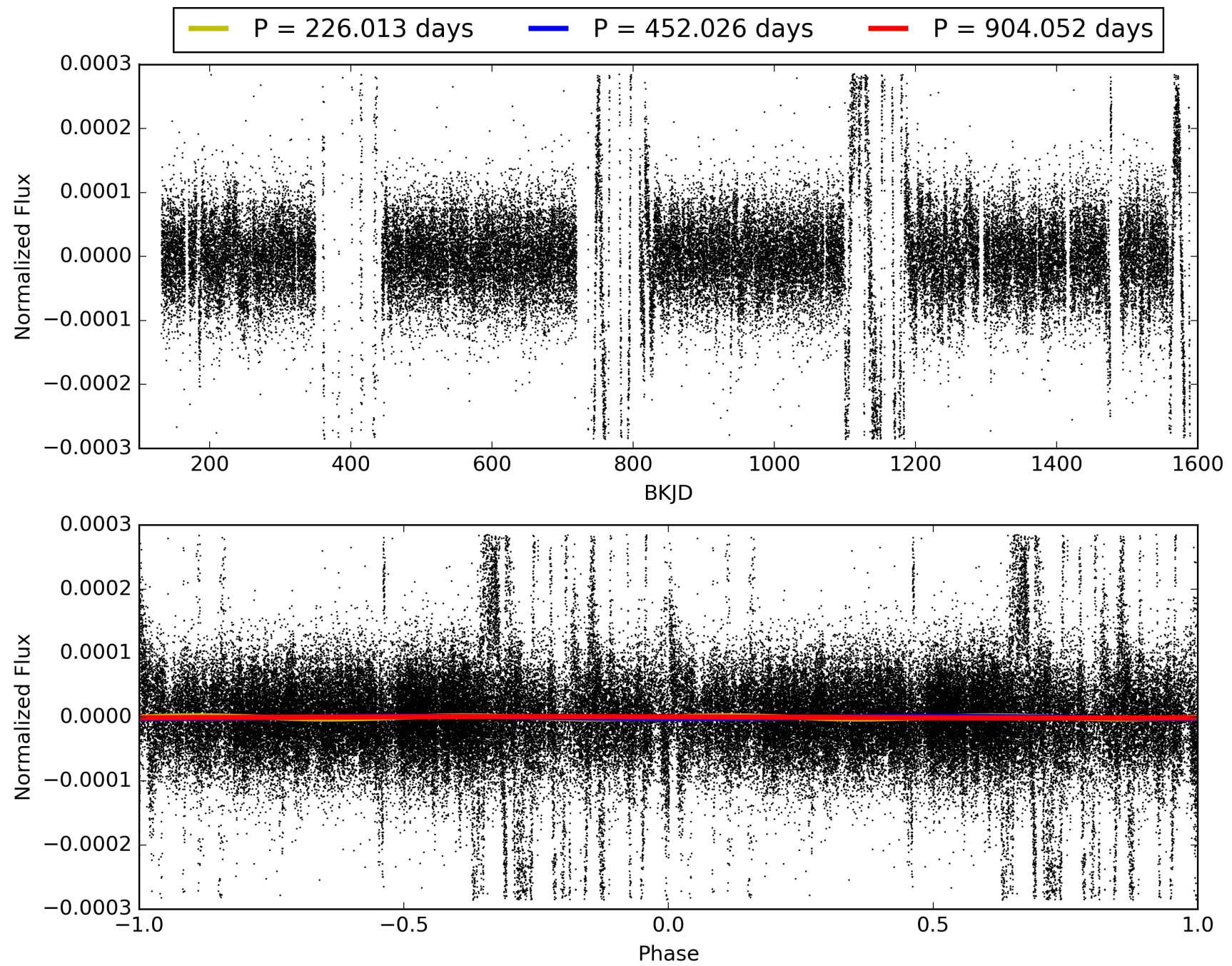
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:07:26 Z

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

# TCE 008737568-01, PDC Light Curves

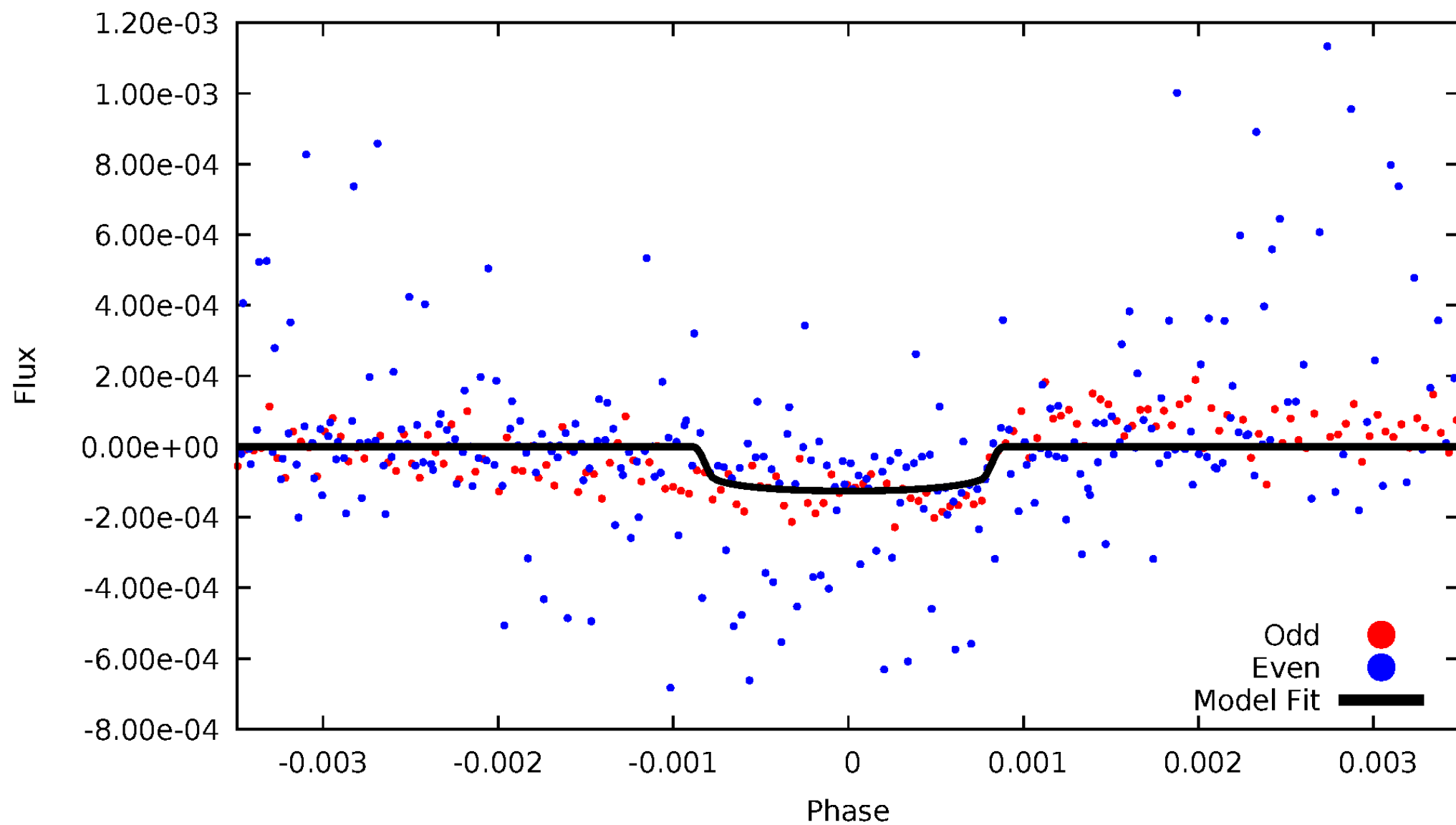


TCE 008737568-01



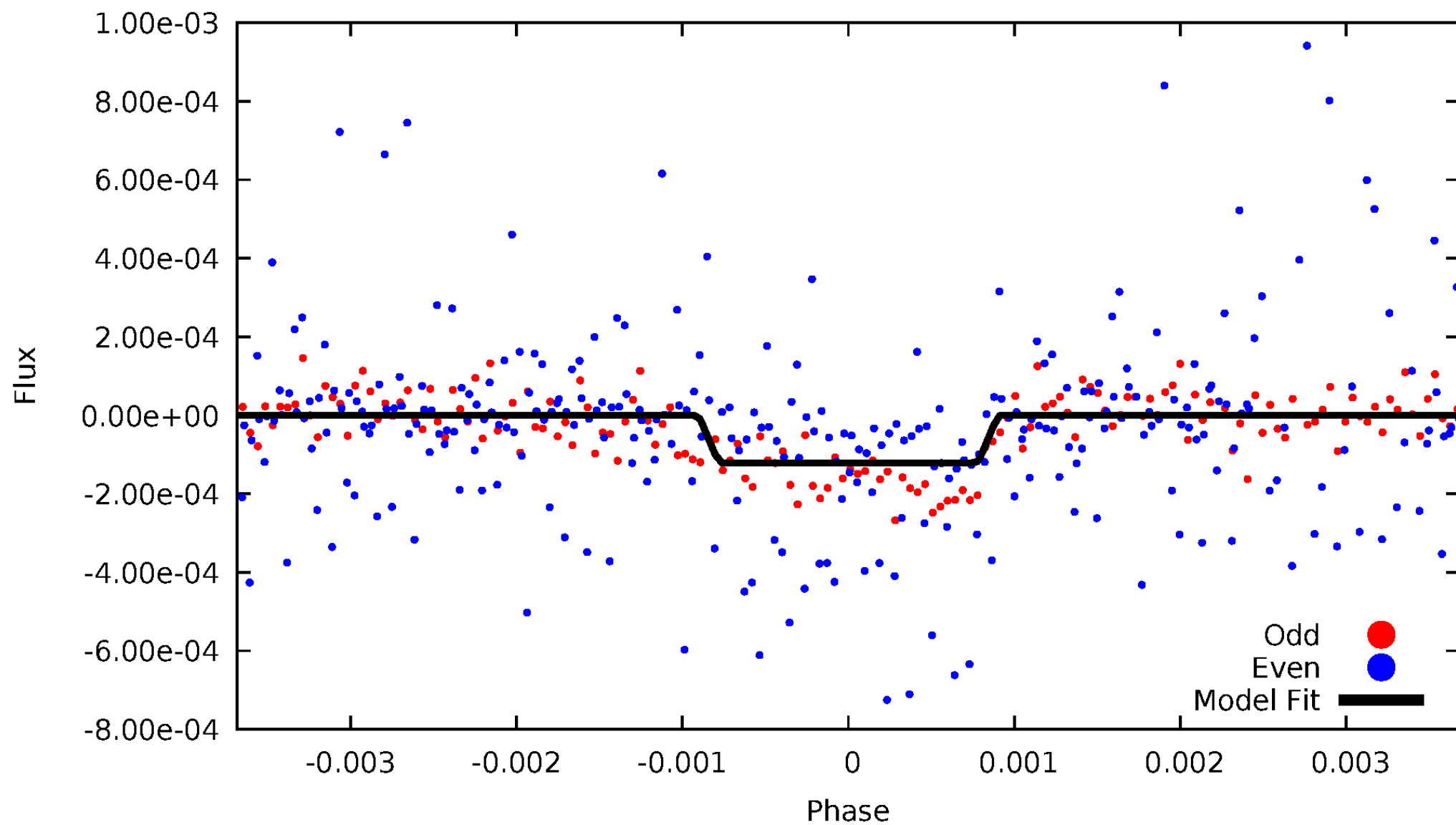
# DV Odd/Even

TCE 008737568-01



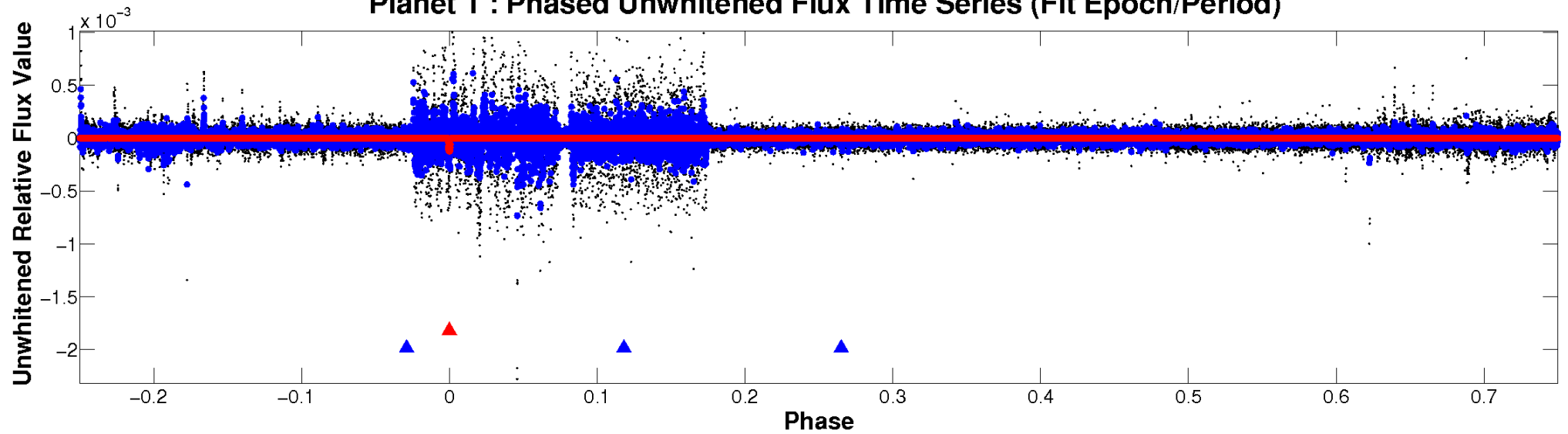
# ALT Odd/Even

TCE 008737568-01

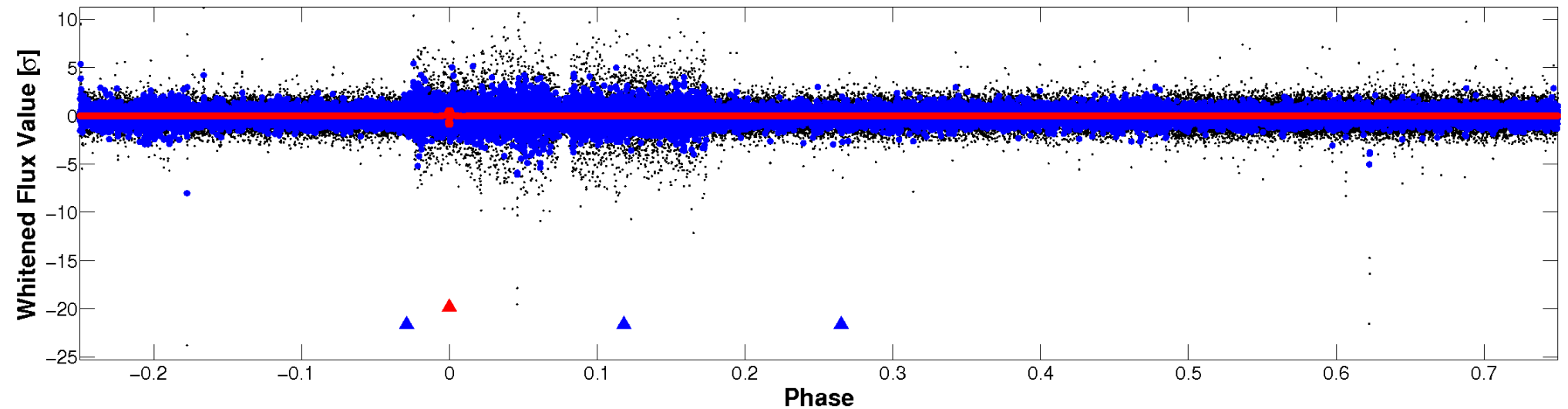


# Non-Whitened Vs. Whitened Light Curve

**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

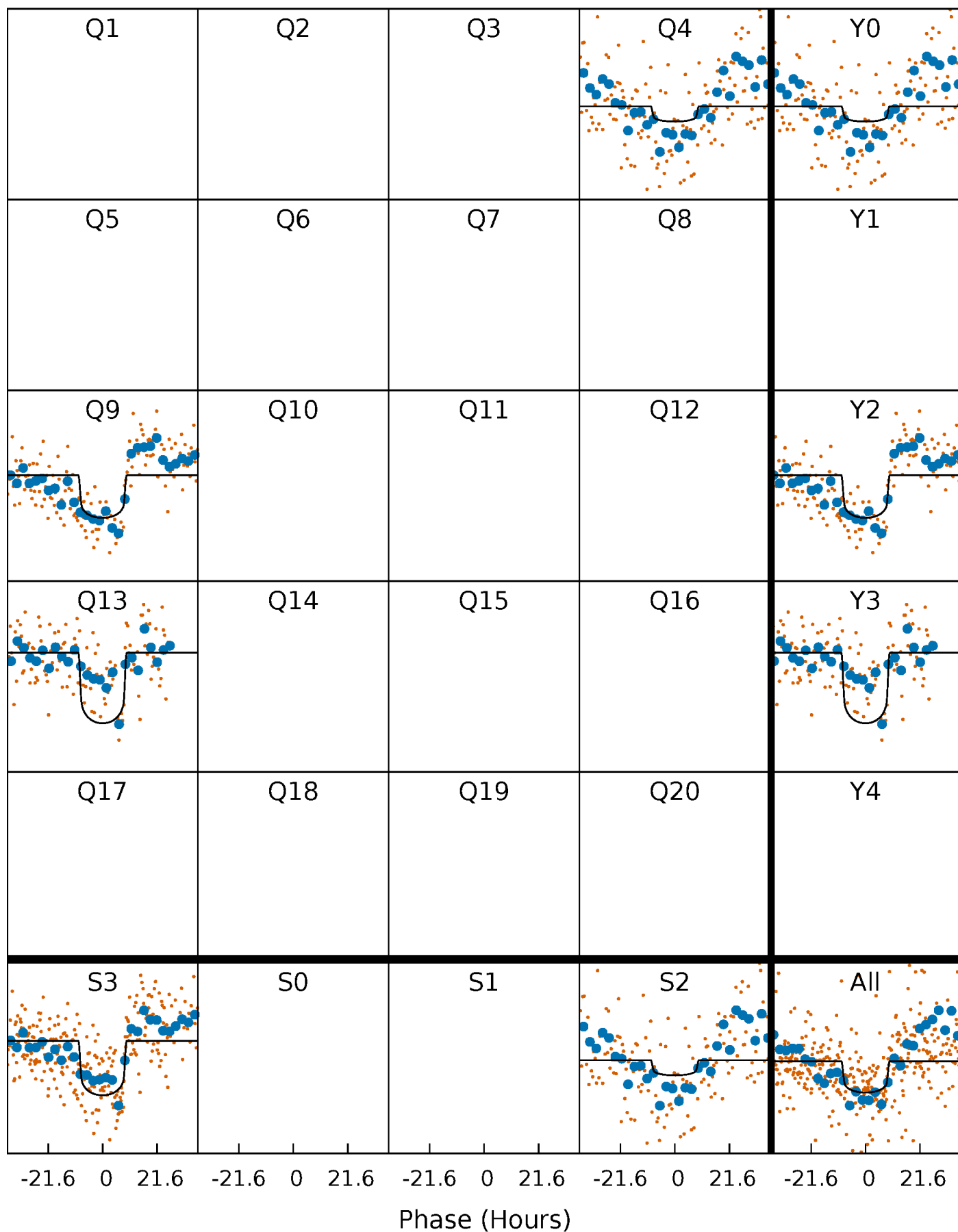
TCE 008737568-01 P=452.026092 Days  $T_0=363.583727$  (BKJD)





# DV Quarter-Phased Transit Curves

TCE 008737568-01     $P=452.026092$  Days     $T_0=363.583727$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

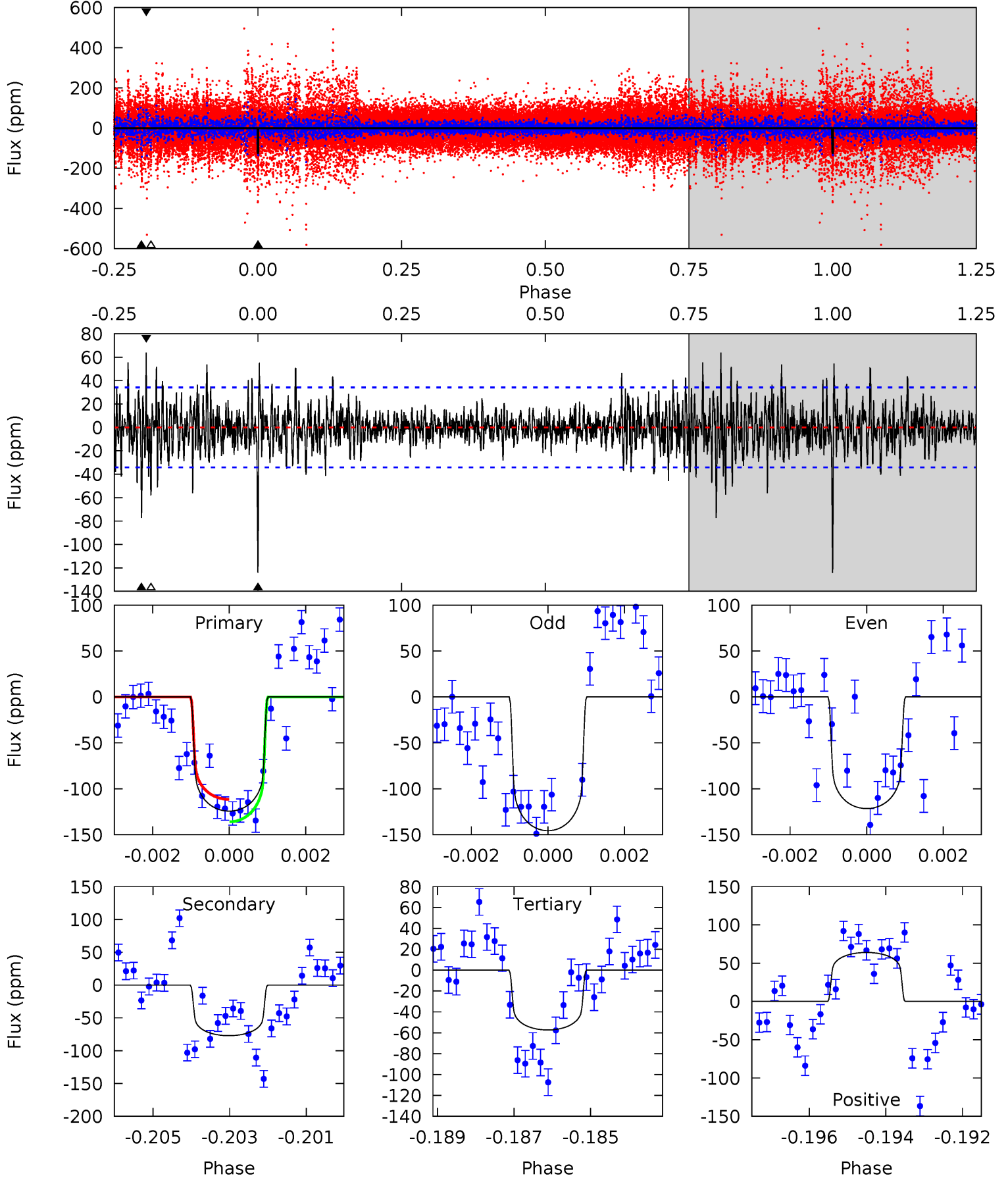
TCE 008737568-01 P=452.031214 Days  $T_0=363.570761$  (BKJD)



# DV Model-Shift Uniqueness Test

008737568-01, P = 452.026092 Days, E = 363.583727 Days

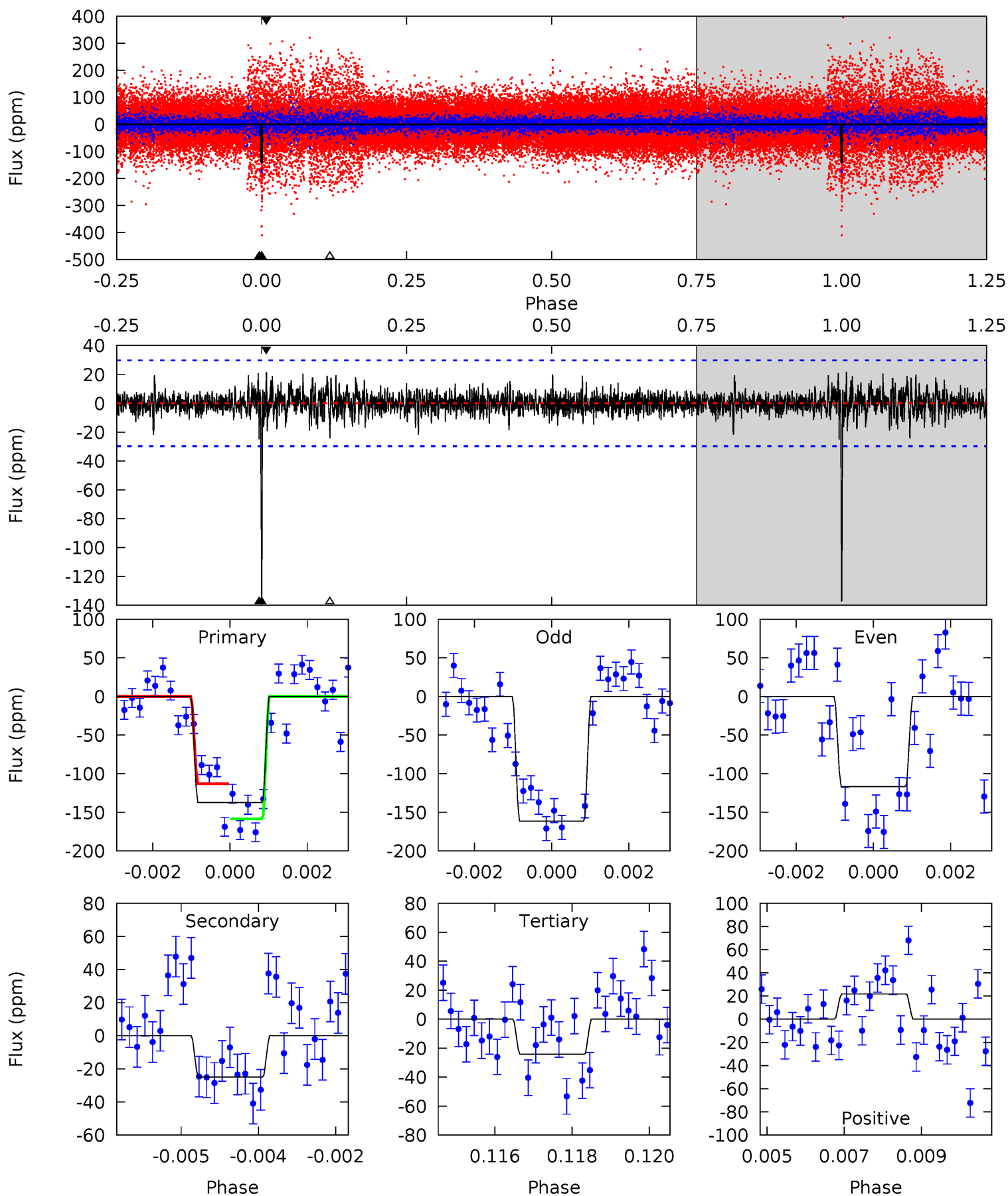
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
19.5	12.1	8.99	10.0	5.35	3.13	2.02	10.5	9.46	3.11	2.06	1.80	1.12	0.34	1.93



# Alt Model-Shift Uniqueness Test

008737568-01, P = 452.031214 Days, E = 363.570761 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
24.7	4.47	4.36	3.91	5.34	3.12	0.93	20.3	20.8	0.11	0.56	4.09	1.05	0.14	4.07



### Stellar Parameters For KIC 008737568

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6422^{+144}_{-176}$	$4.140^{+0.280}_{-0.151}$	$-0.480^{+0.300}_{-0.300}$	$1.424^{+0.391}_{-0.391}$	$1.021^{+0.144}_{-0.131}$	$0.498^{+0.786}_{-0.237}$
	+2%/-3%	+7%/-4%	+62%/-62%	+27%/-27%	+14%/-13%	+158%/-48%
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 008737568-01 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-77 \pm 6$	$1.77^{+0.41}_{-0.36}$	$430^{+33}_{-35}$	$5535^{+518}_{-379}$	$18359^{+10790}_{-5800}$
Alt.	$-25 \pm 6$	$1.65^{+0.41}_{-0.37}$	$432^{+33}_{-36}$	$4488^{+397}_{-318}$	$6717^{+4785}_{-2622}$

$T_{max}$  = 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

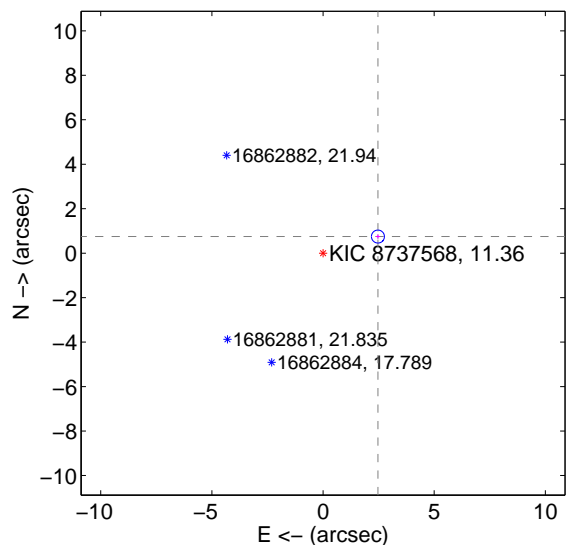
Supplemental centroid analysis for 008737568-01. **Kepler magnitude: 11.36.** Transit SNR 10.72

**There are 1 quarters with good PRF difference image offsets**

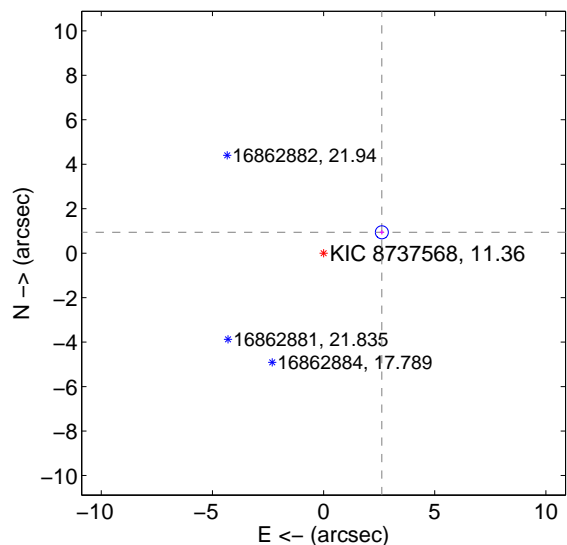
The direct PRF centroid is offset from the target star catalog position by about 0.24 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>2.579 \pm 0.097</math></b>	<b>26.53</b>	$-2.469 \pm 0.097$	$0.748 \pm 0.103$
PRF-fit source offset from KIC position	<b><math>2.783 \pm 0.097</math></b>	<b>28.57</b>	$-2.620 \pm 0.097$	$0.939 \pm 0.103$
photometric centroid source offset	$2.63 \pm 2.15$	1.22	$2.12 \pm 2.23$	$-1.55 \pm 1.99$

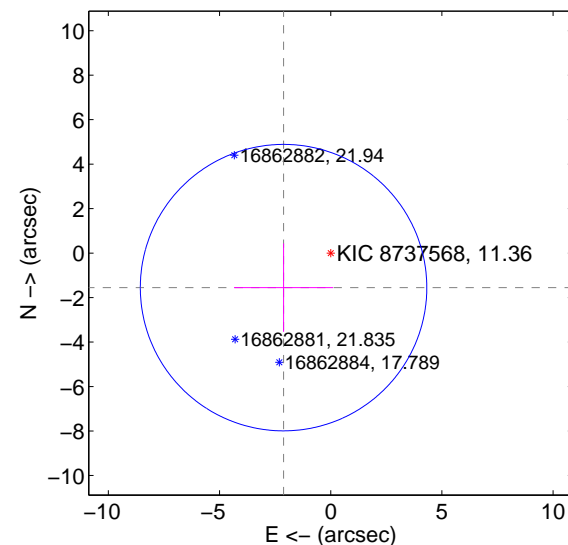
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

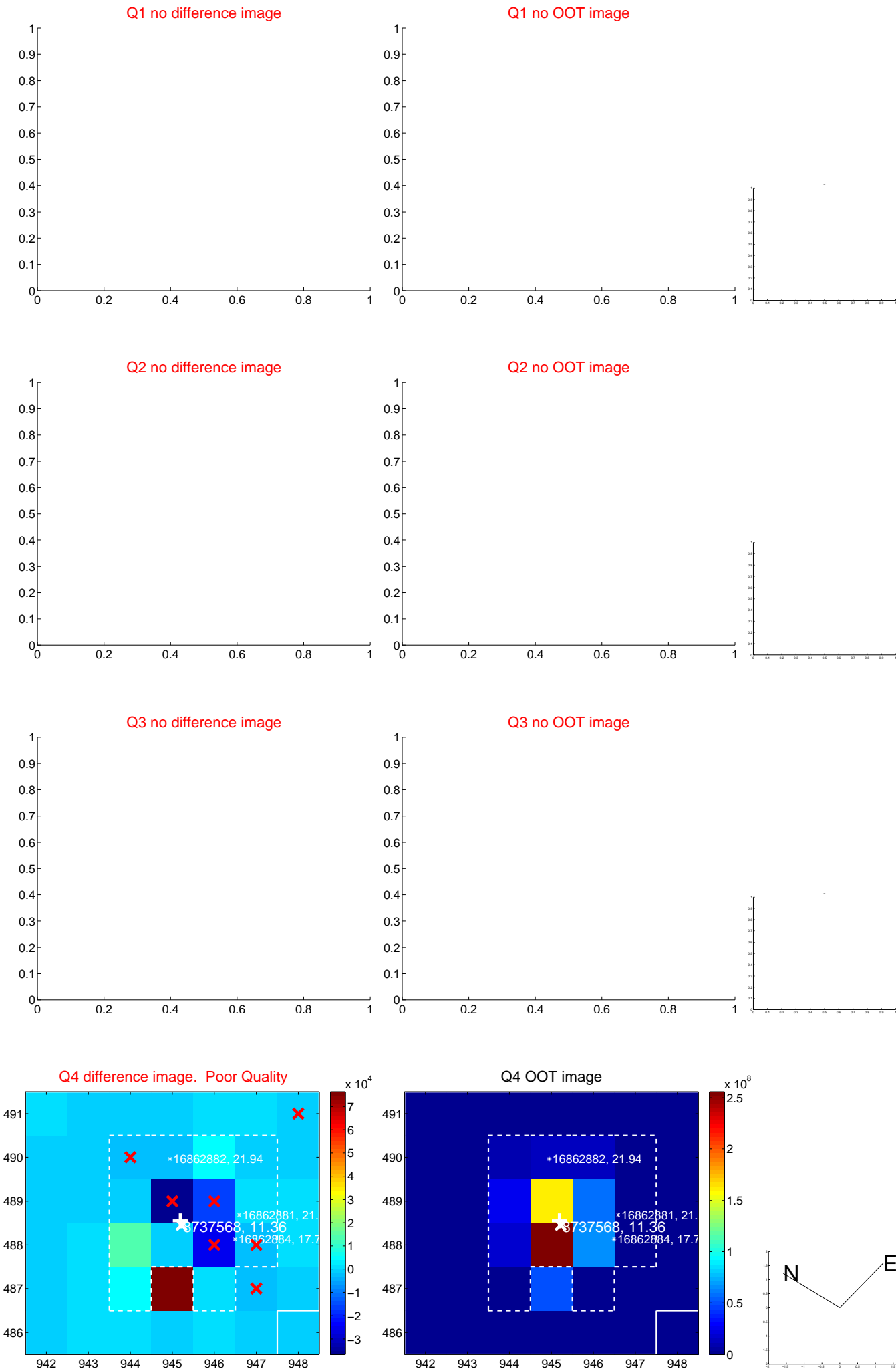


offset from photometric centroids



Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

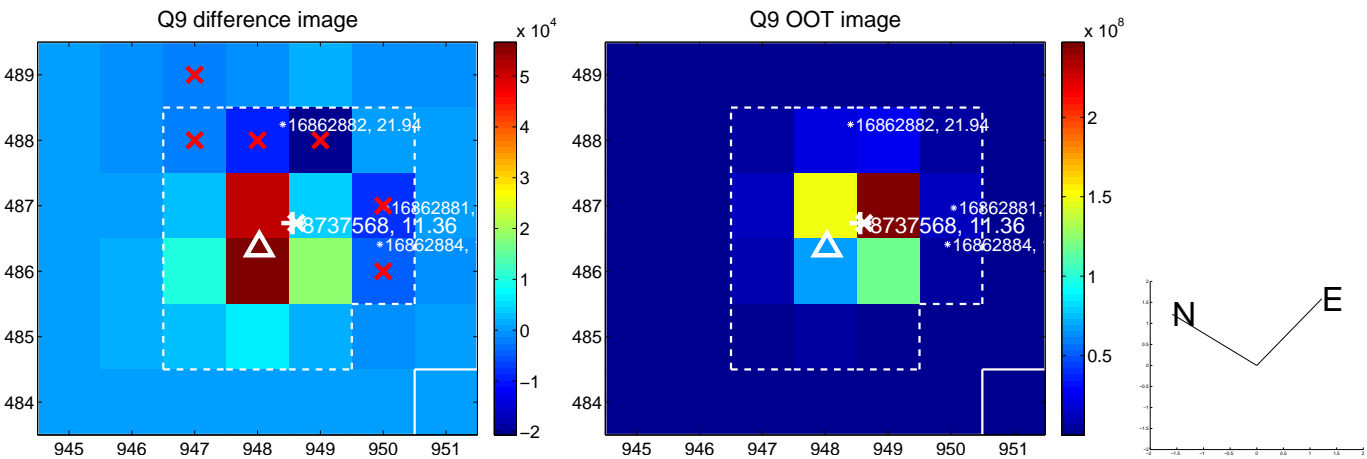




white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



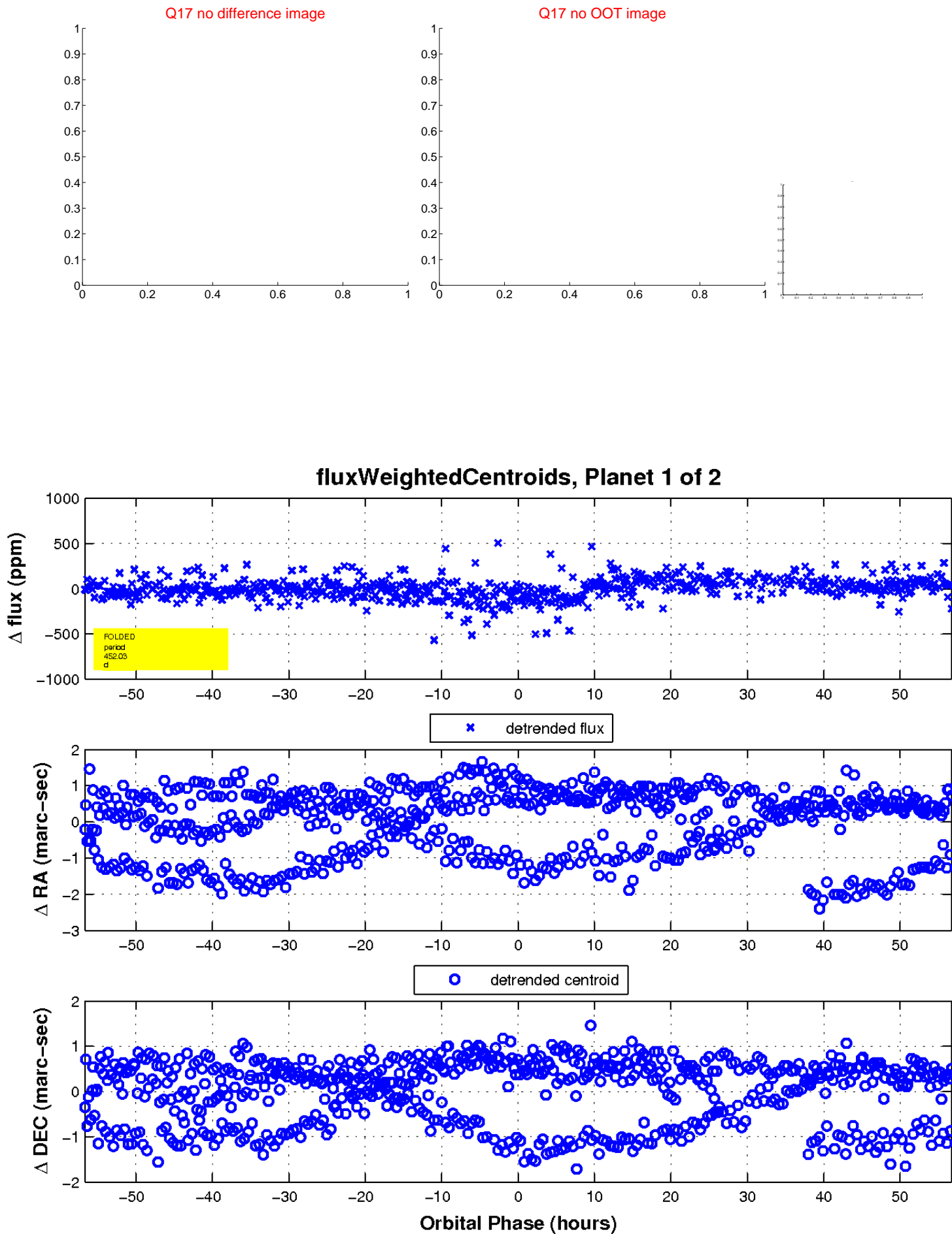
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

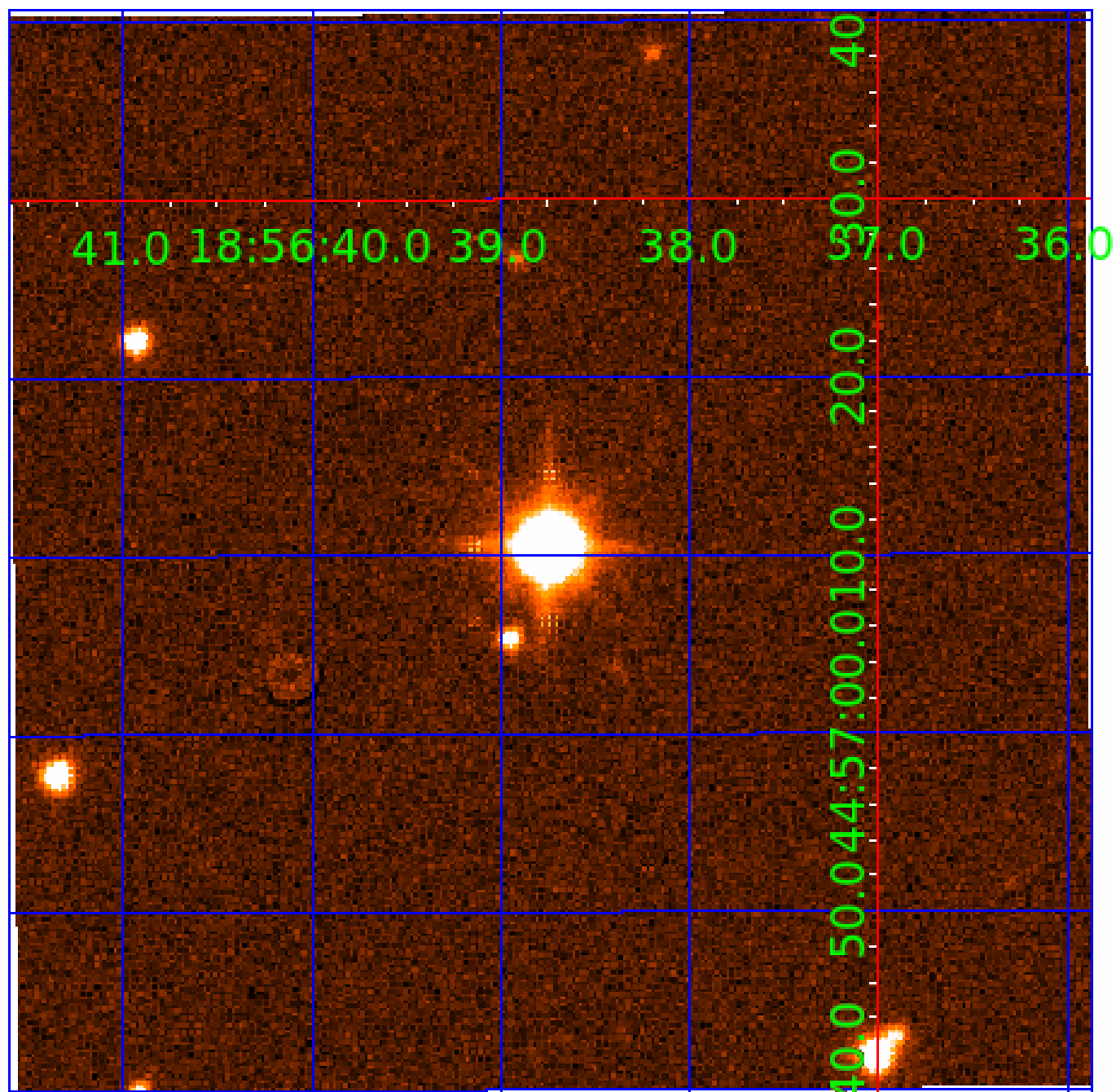


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 008737568

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
008737568-01	OBS	No	452.026092	363.583727	125.7	18.930	9.8	10.7	1.42	6422	1.85	2.29
008737568-02	OBS	No	385.576823	483.421702	81.6	10.754	8.2	8.6	1.42	6422	1.43	2.83

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
008737568-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_SATURATED
008737568-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_SATURATED

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

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

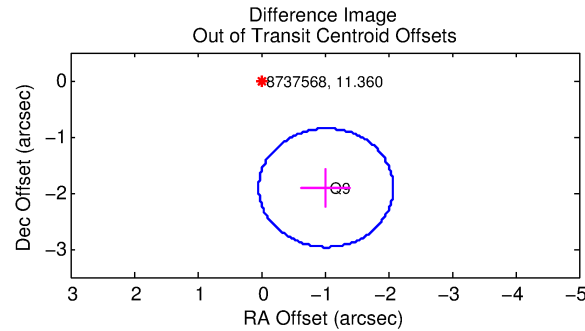
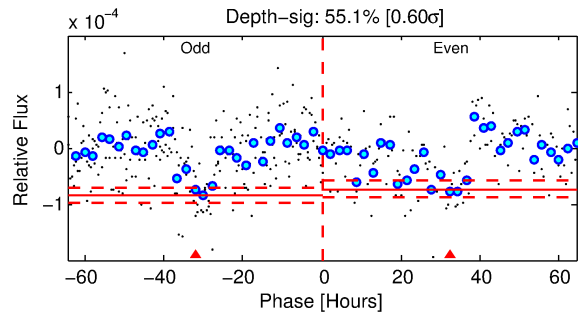
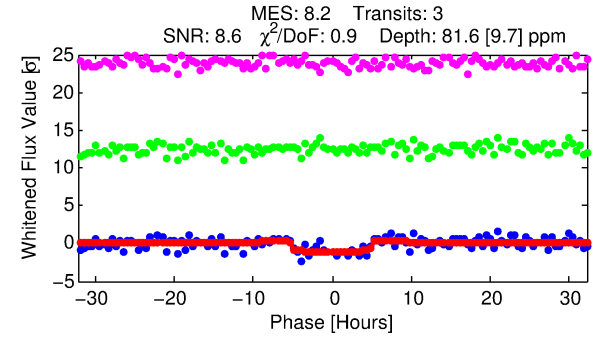
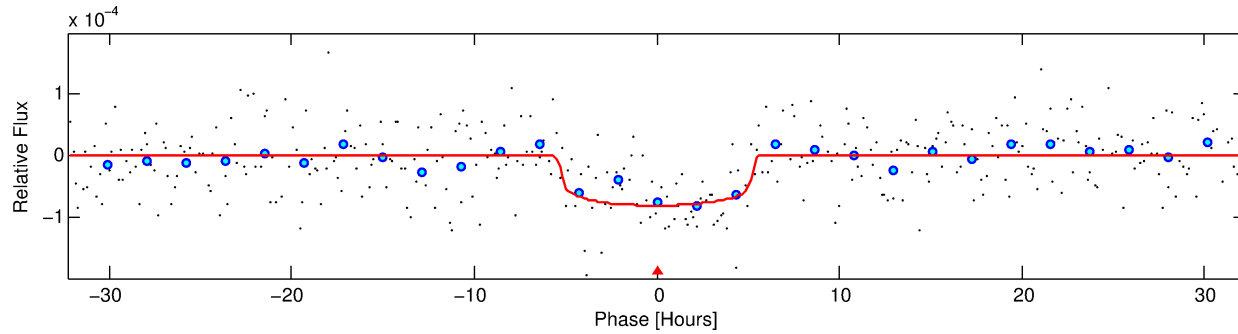
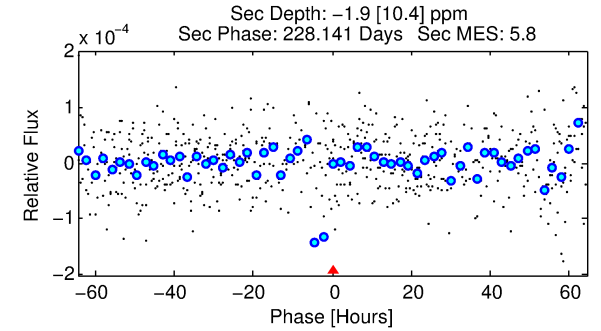
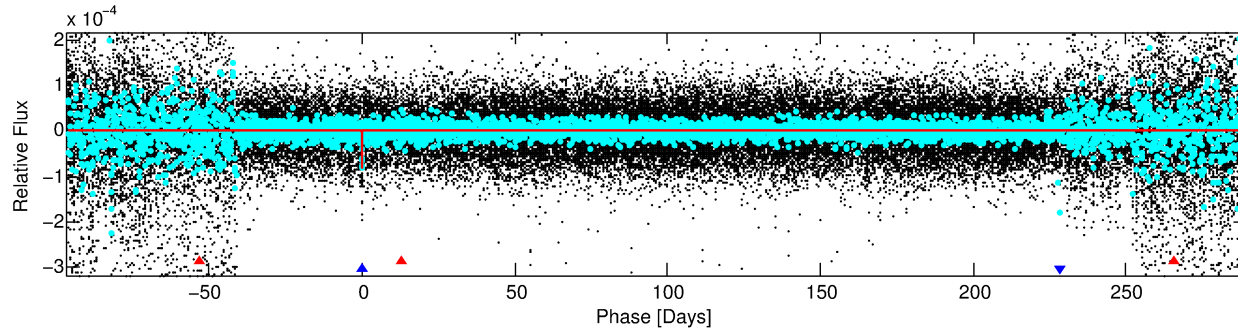
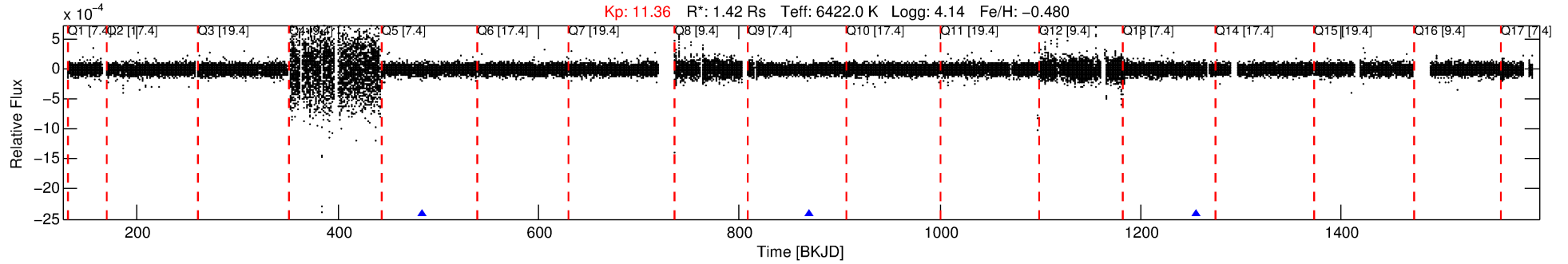
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 008737568-02

No Significant Match Found

# DV One-Page Summary

KIC: 8737568 Candidate: 2 of 2 Period: 385.577 d



## DV Fit Results:

Period = 385.57682 [0.00930] d  
Epoch = 483.4217 [0.0130] BKJD  
Rp/R\* = 0.0092 [0.0036]  
a/R\* = 164.37 [361.45]  
b = 0.81 [0.93]  
Seff = 2.83 [1.36]  
Teq = 331 [40] K  
Rp = 1.43 [0.69] Re  
a = 1.0442 [0.2948] AU  
Ag = N/A  
Teffp = N/A

## DV Diagnostic Results:

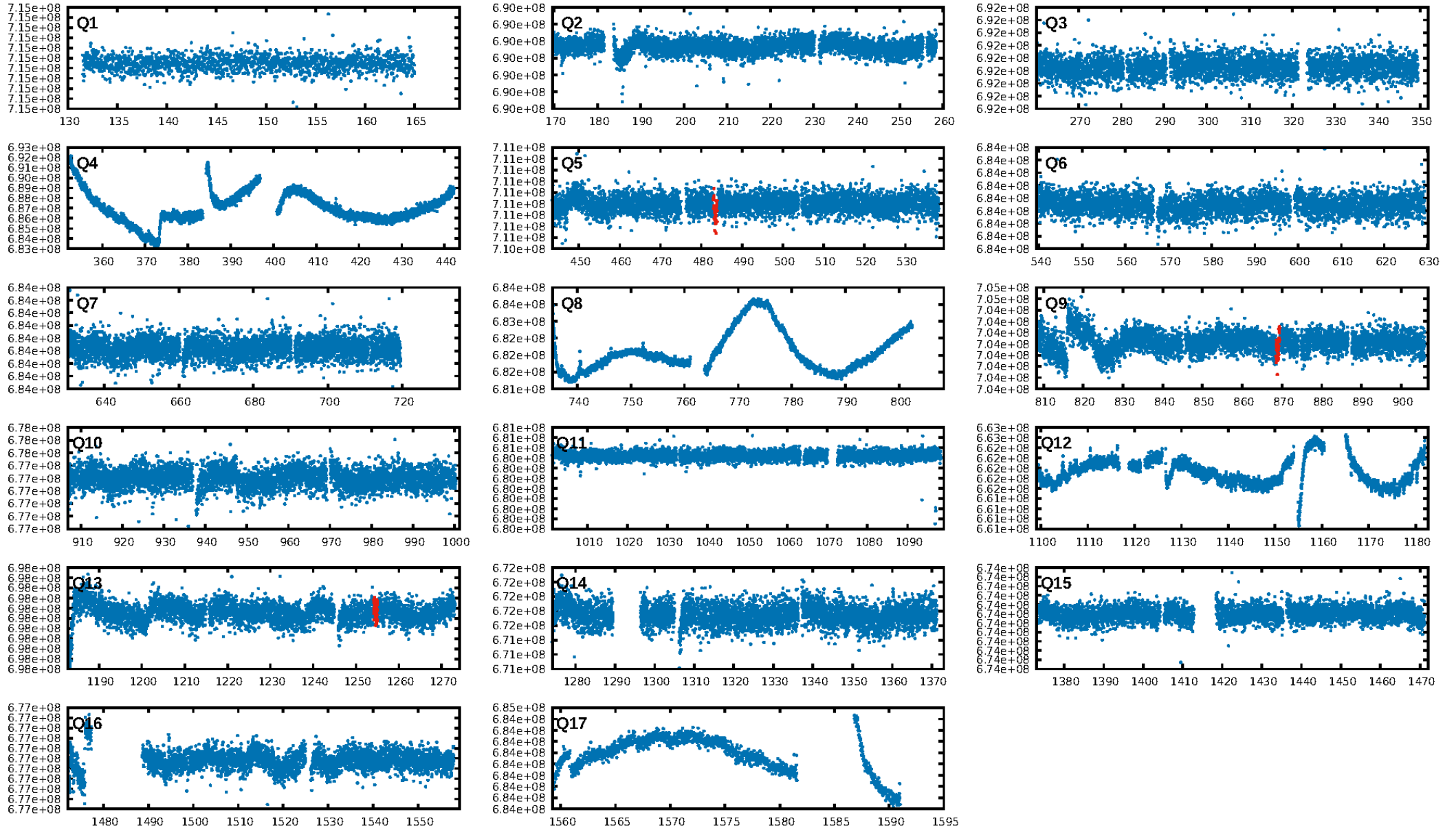
ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [73.25σ]  
ModelChiSquare2-sig: 7.8%  
ModelChiSquareGof-sig: 100.0%  
**Bootstrap-pfa: 5.44e-07**  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 12.41  
Centroid-sig: N/A  
Centroid-so: 7.499 arcsec [2.30σ]  
**OotOffset-rm: 2.167 arcsec [6.15σ]**  
**KicOffset-rm: 2.076 arcsec [5.83σ]**  
OotOffset-st: 0/0/0/1 [1]  
KicOffset-st: 0/0/0/1 [1]  
DiffImageQuality-fgm: 1.00 [1/1]  
DiffImageOverlap-fno: 1.00 [3/3]

Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:07:35 Z

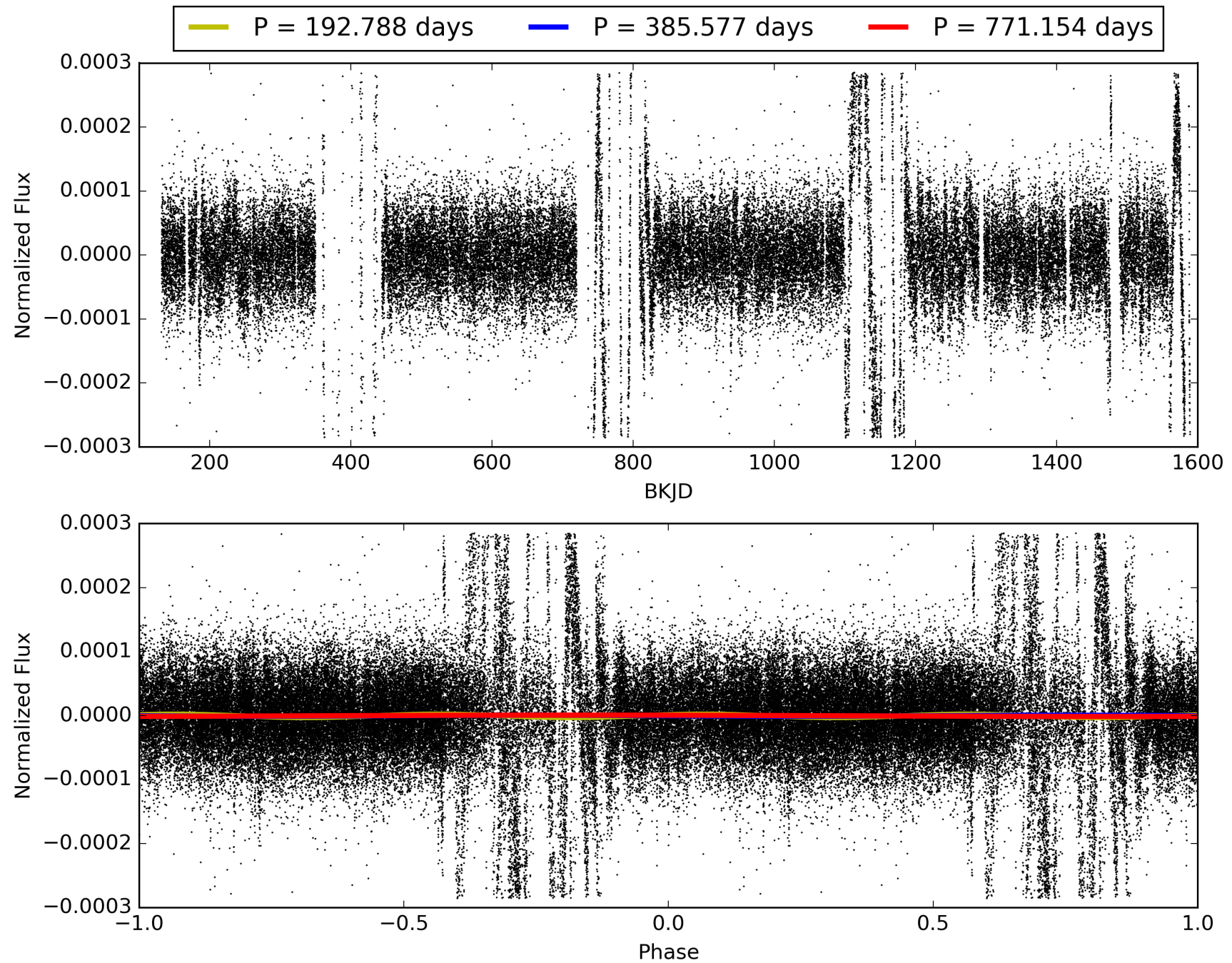
This Data Validation Report Summary was produced in the Kepler Science Operations Center Pipeline at NASA Ames Research Center



# TCE 008737568-02, PDC Light Curves

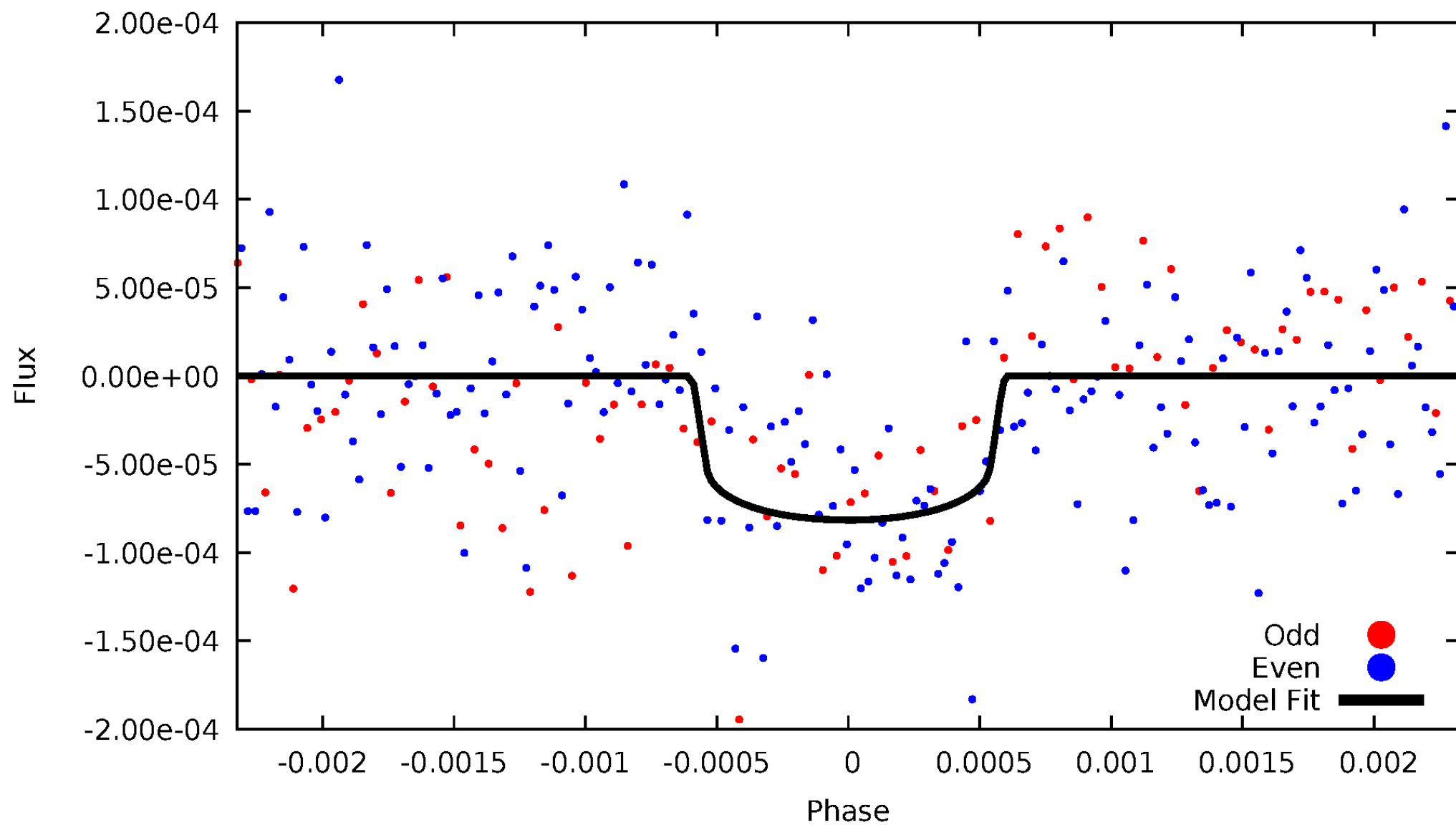


# TCE 008737568-02



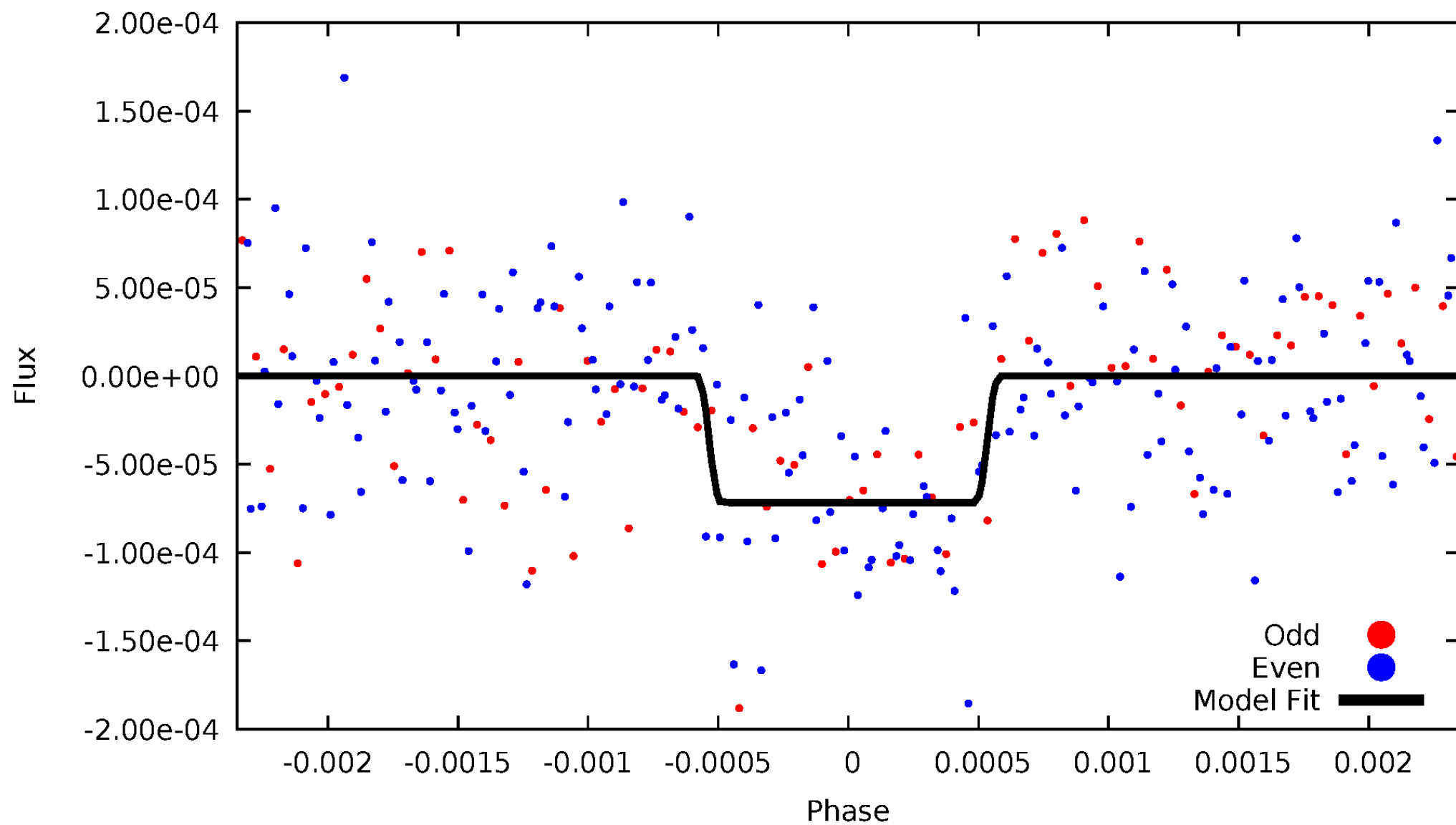
# DV Odd/Even

TCE 008737568-02



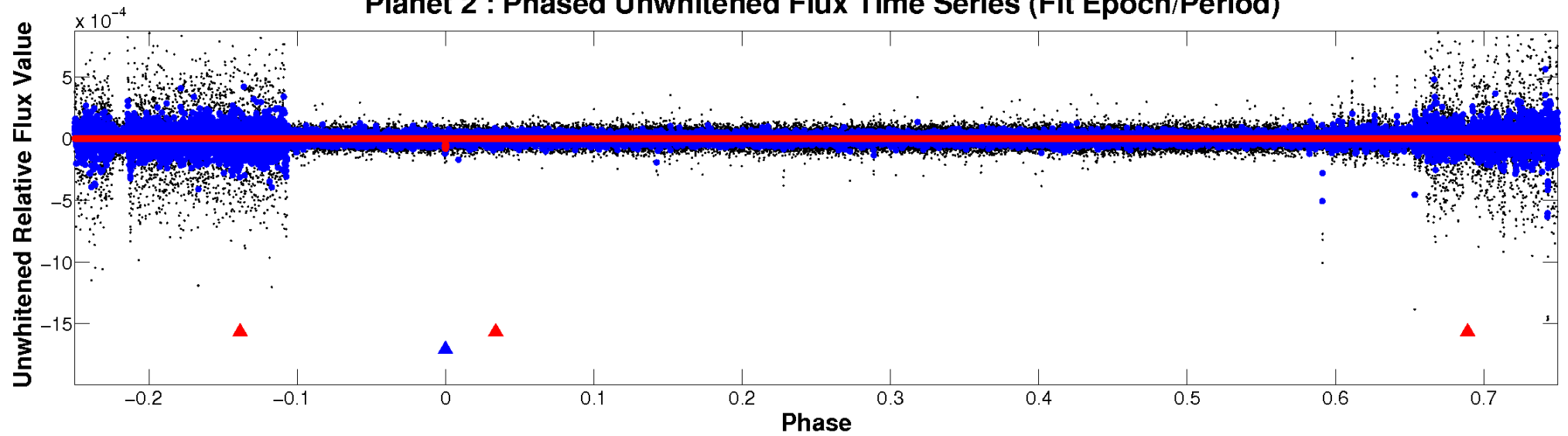
# ALT Odd/Even

TCE 008737568-02

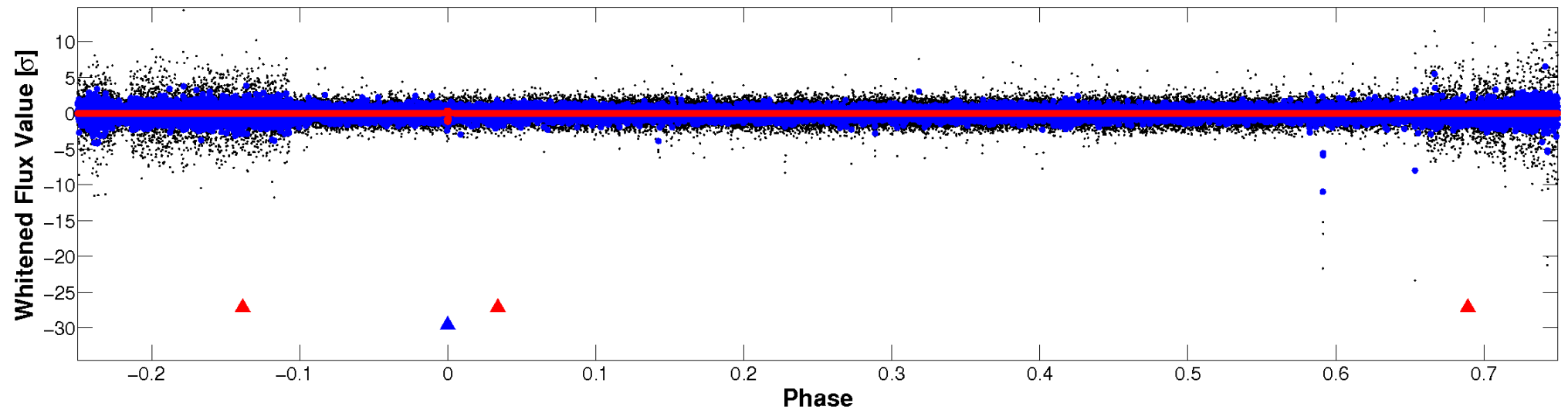


# Non-Whitened Vs. Whitened Light Curve

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

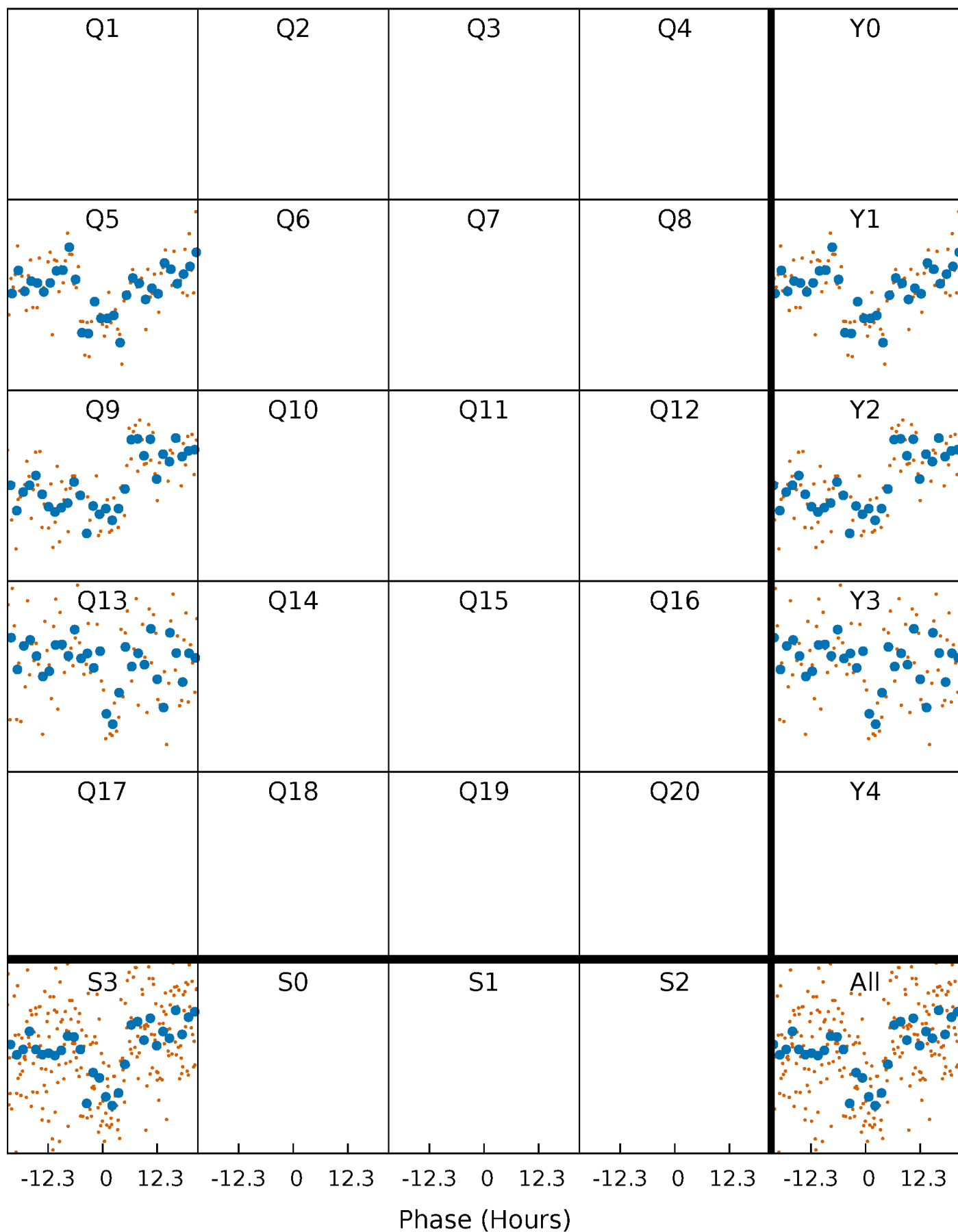


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



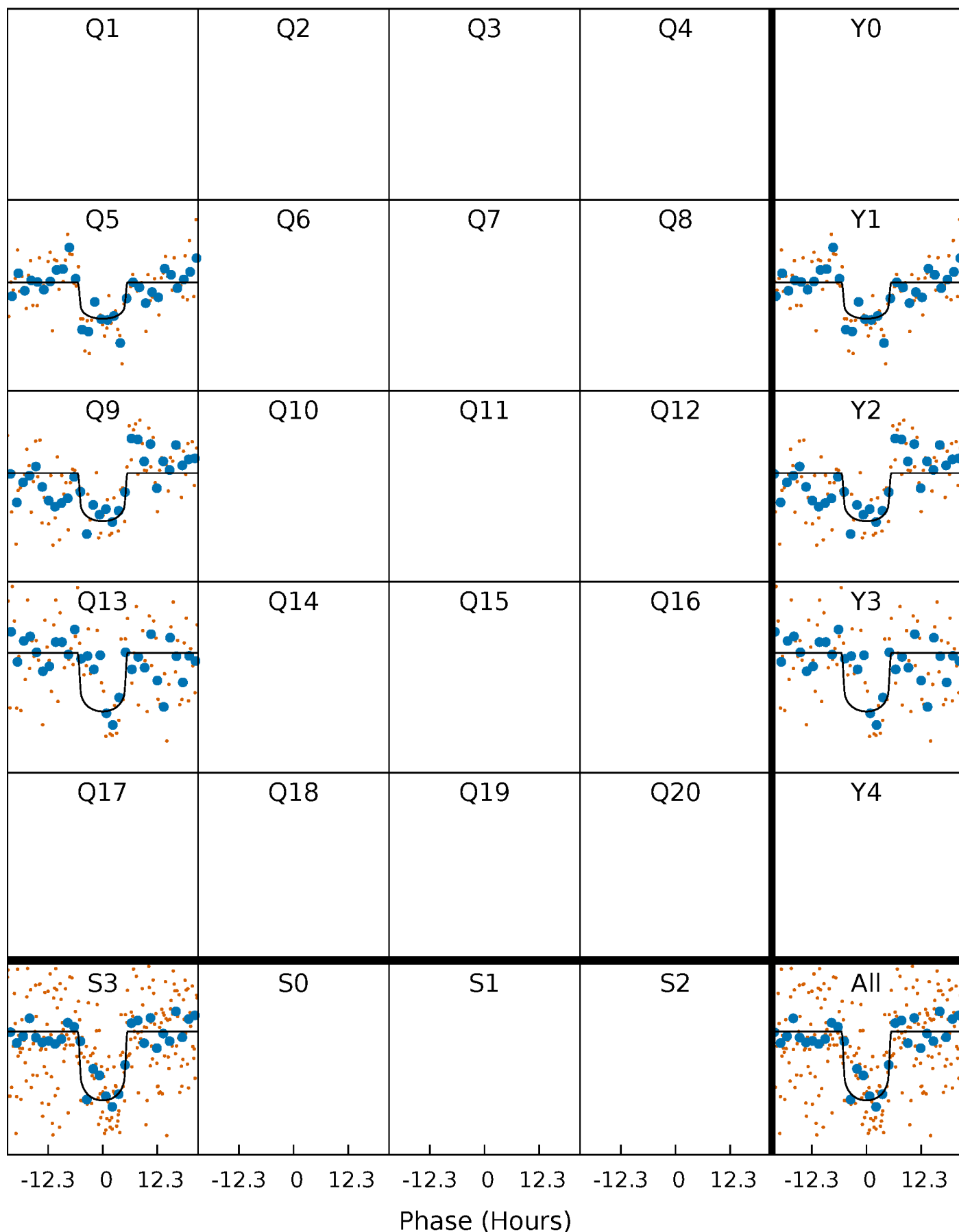
# PDC Quarter-Phased Transit Curves

TCE 008737568-02     $P=385.576823$  Days     $T_0=483.421702$  (BKJD)



# DV Quarter-Phased Transit Curves

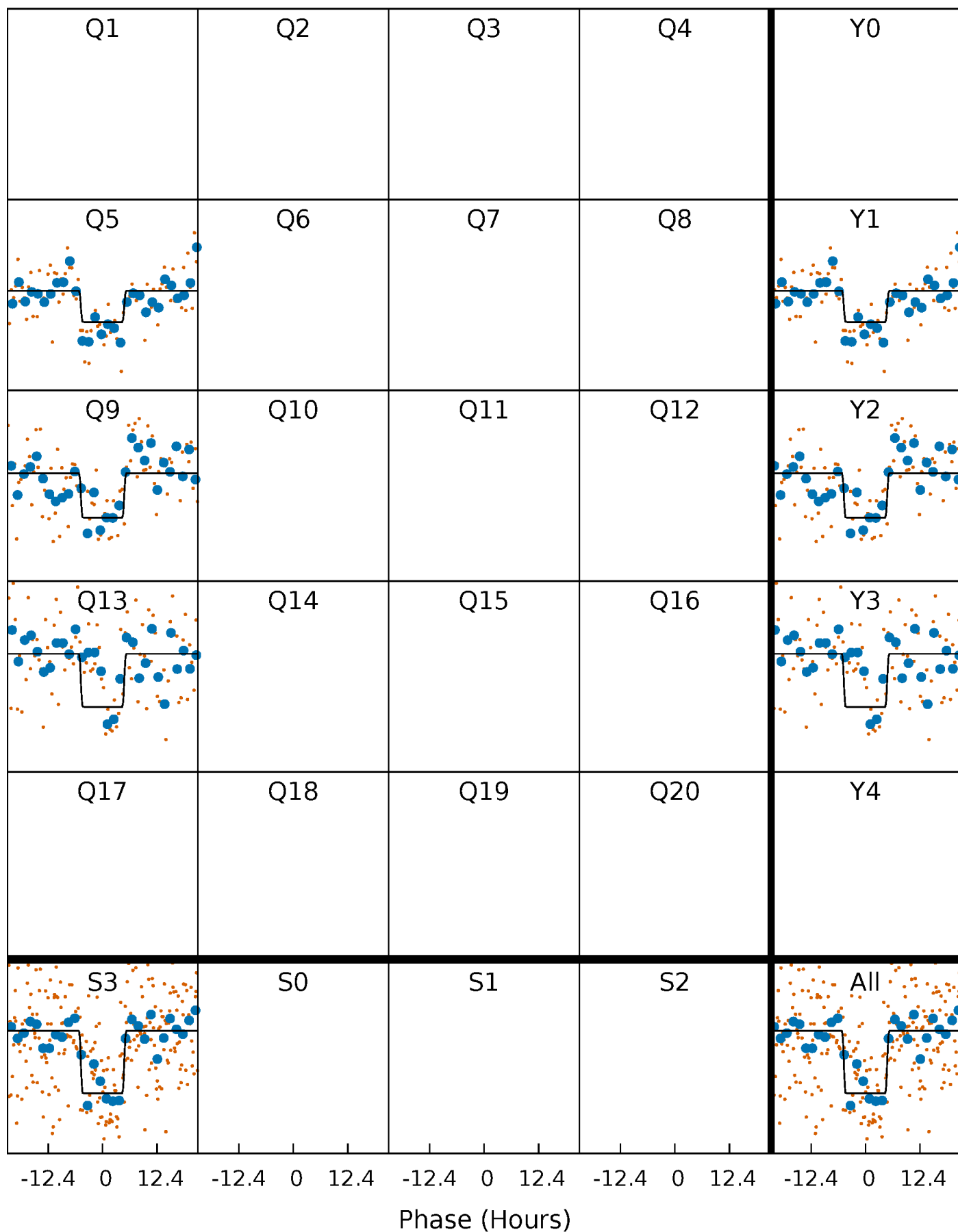
TCE 008737568-02     $P=385.576823$  Days     $T_0=483.421702$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

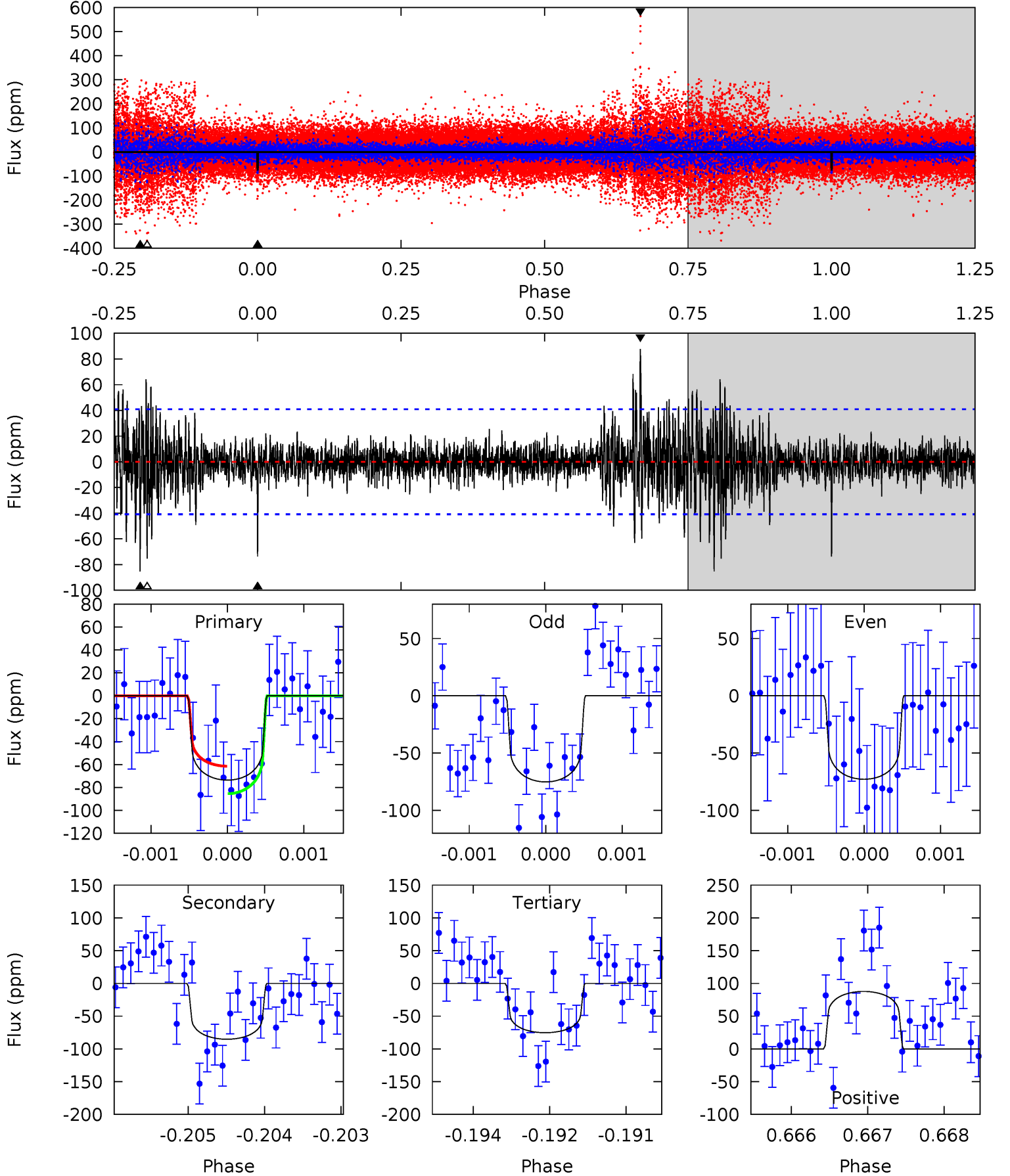
TCE 008737568-02     $P=385.574466$  Days     $T_0=483.425804$  (BKJD)



# DV Model-Shift Uniqueness Test

008737568-02, P = 385.576823 Days, E = 97.844879 Days

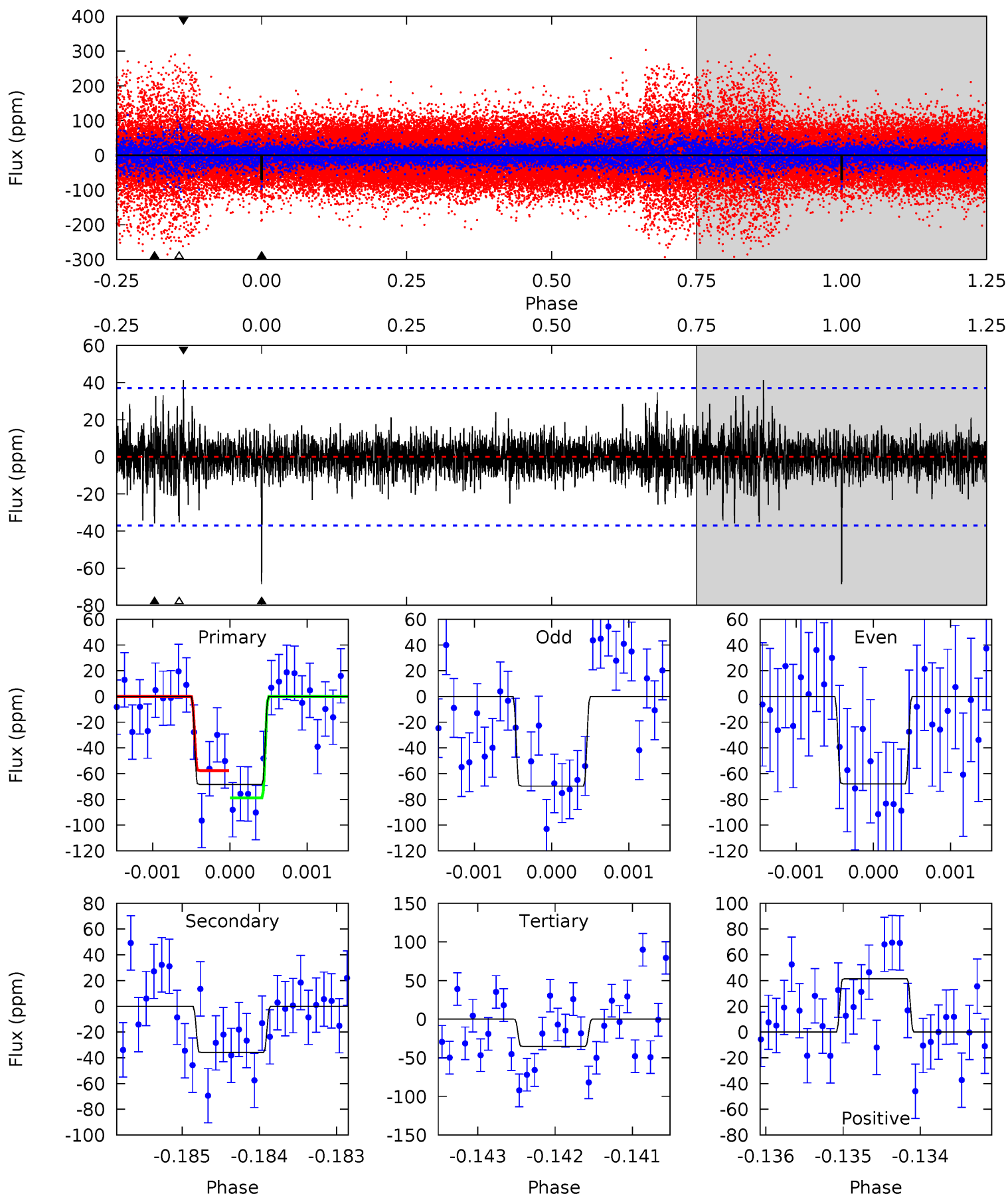
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.77	11.3	9.99	11.6	5.42	3.25	1.77	-0.22	-1.86	1.32	-0.32	0.14	0.98	0.51	1.51



# Alt Model-Shift Uniqueness Test

008737568-02,  $P = 385.574466$  Days,  $E = 97.851338$  Days

Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
10.0	5.26	5.16	6.07	5.42	3.25	1.06	4.89	3.97	0.10	-0.81	0.12	0.98	0.38	1.51



### Stellar Parameters For KIC 008737568

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$6422^{+144}_{-176}$	$4.140^{+0.280}_{-0.151}$	$-0.480^{+0.300}_{-0.300}$	$1.424^{+0.391}_{-0.391}$	$1.021^{+0.144}_{-0.131}$	$0.498^{+0.786}_{-0.237}$
	+2%/-3%	+7%/-4%	+62%/-62%	+27%/-27%	+14%/-13%	+158%/-48%
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 008737568-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{\text{max}}$ (K)	$T_{\text{obs}}$ (K)	$A_{\text{obs}}$
DV	$-85 \pm 8$	$1.37^{+0.58}_{-0.56}$	$458^{+35}_{-37}$	$6519^{+2259}_{-1017}$	$27073^{+52482}_{-13621}$
Alt.	$-36 \pm 7$	$1.24^{+0.63}_{-0.57}$	$455^{+33}_{-36}$	$5442^{+1931}_{-818}$	$14023^{+33480}_{-8013}$

$T_{\text{max}}$  = 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

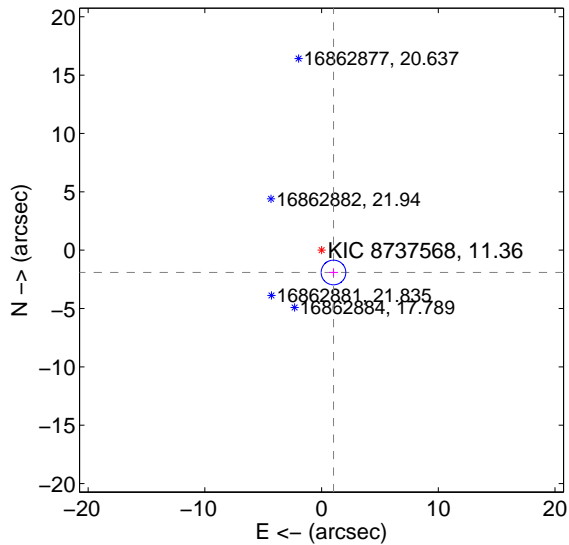
Supplemental centroid analysis for 008737568-02. **Kepler magnitude: 11.36.** Transit SNR 8.58

**There are 1 quarters with good PRF difference image offsets**

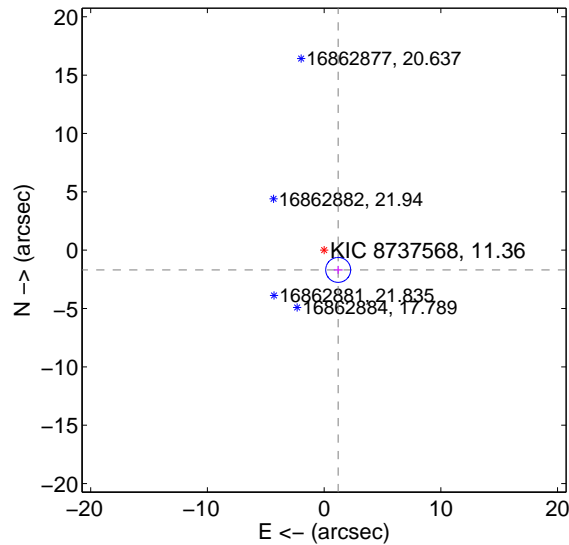
The direct PRF centroid is offset from the target star catalog position by about 0.29 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b><math>2.167 \pm 0.352</math></b>	<b>6.15</b>	$-1.021 \pm 0.378$	$-1.912 \pm 0.345$
PRF-fit source offset from KIC position	<b><math>2.076 \pm 0.356</math></b>	<b>5.83</b>	$-1.205 \pm 0.378$	$-1.690 \pm 0.345$
photometric centroid source offset	$7.50 \pm 3.26$	2.30	$7.26 \pm 3.27$	$1.88 \pm 3.09$

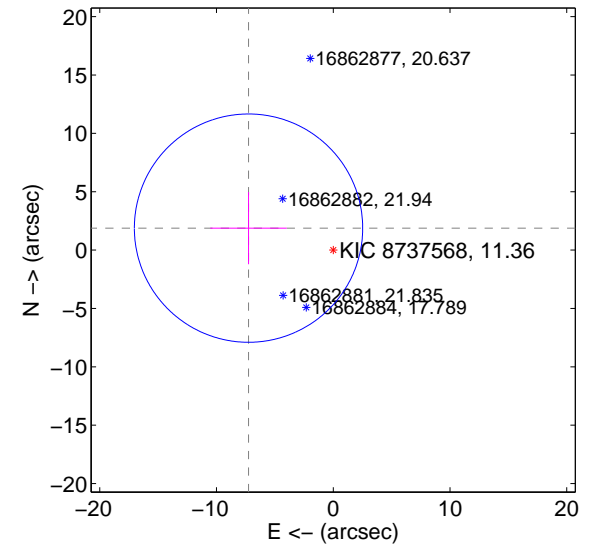
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

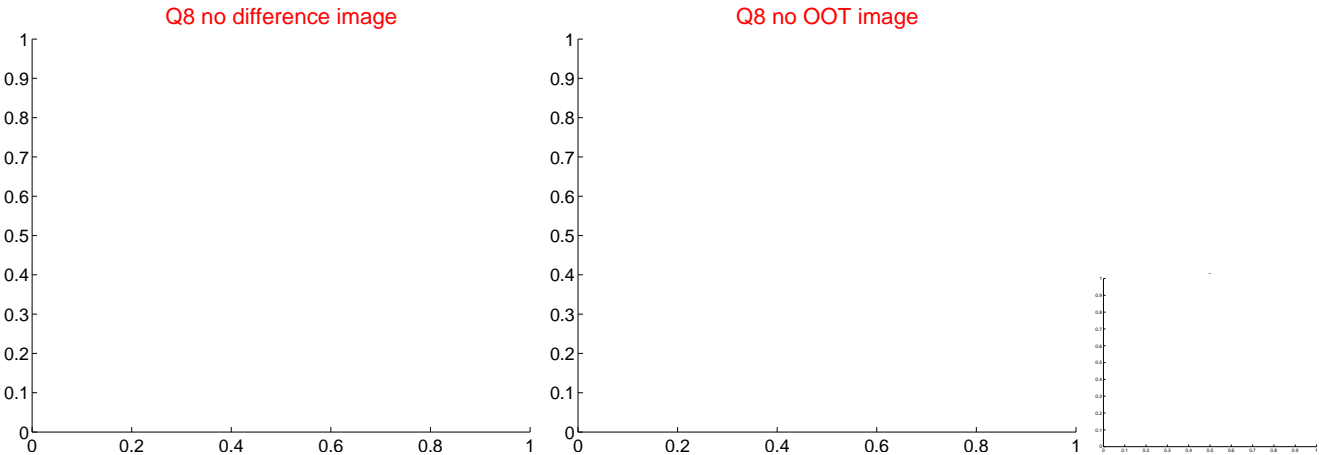
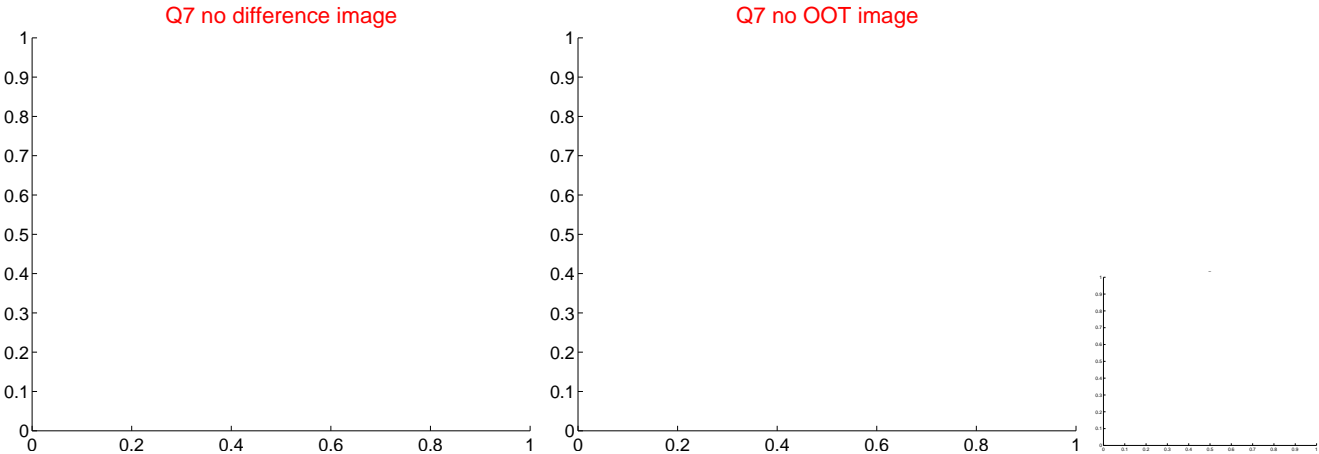
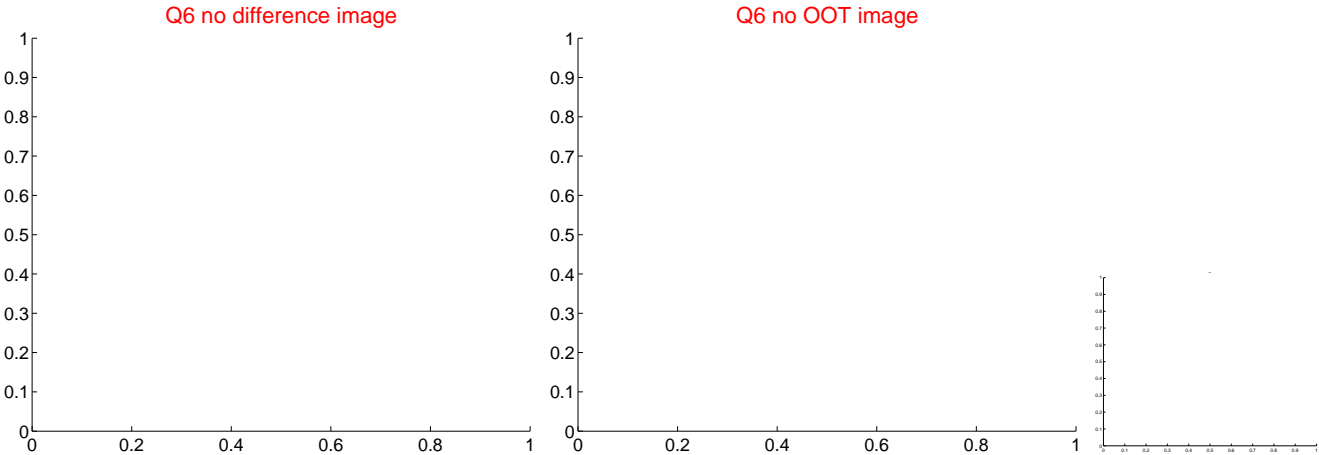
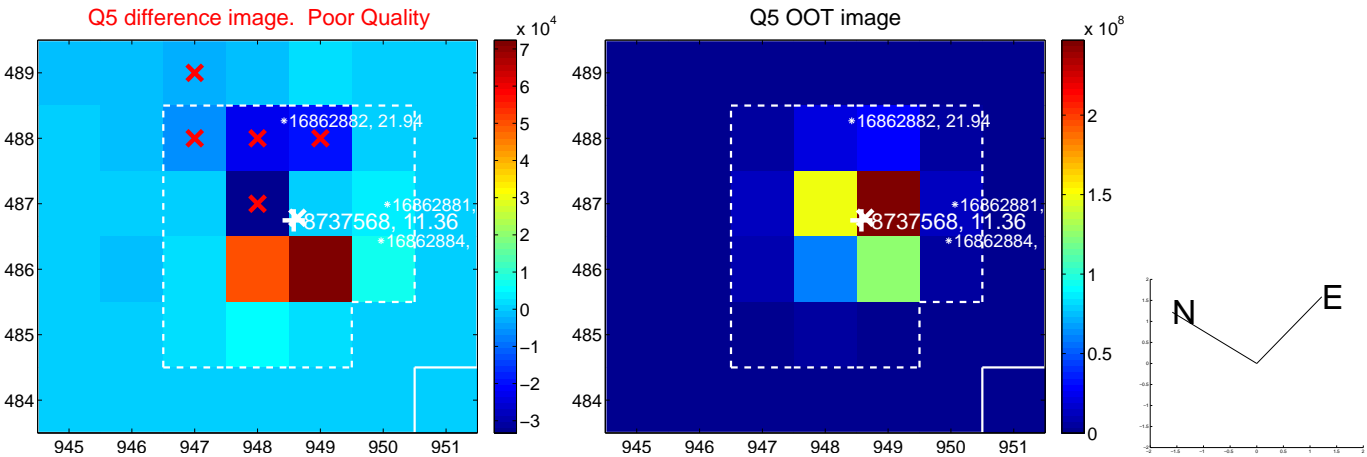


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets;** magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three- $\sigma$ . Red \*: target star. Blue \*: Other stars. Text next to a star gives its KIC ID and kepmag. KIC IDs > 15,000,000 are from the UKIRT catalog.

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

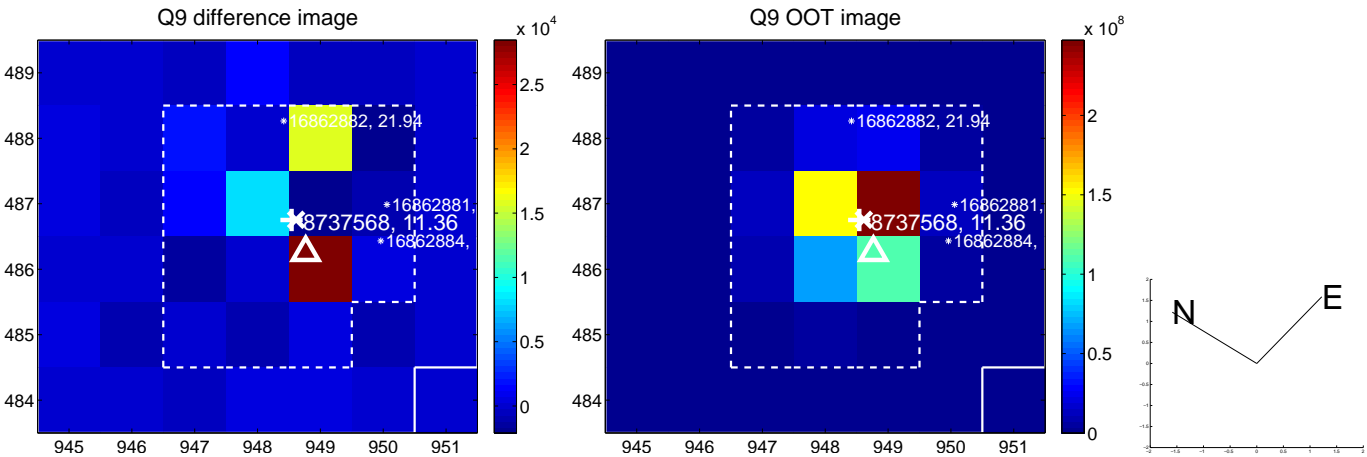


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

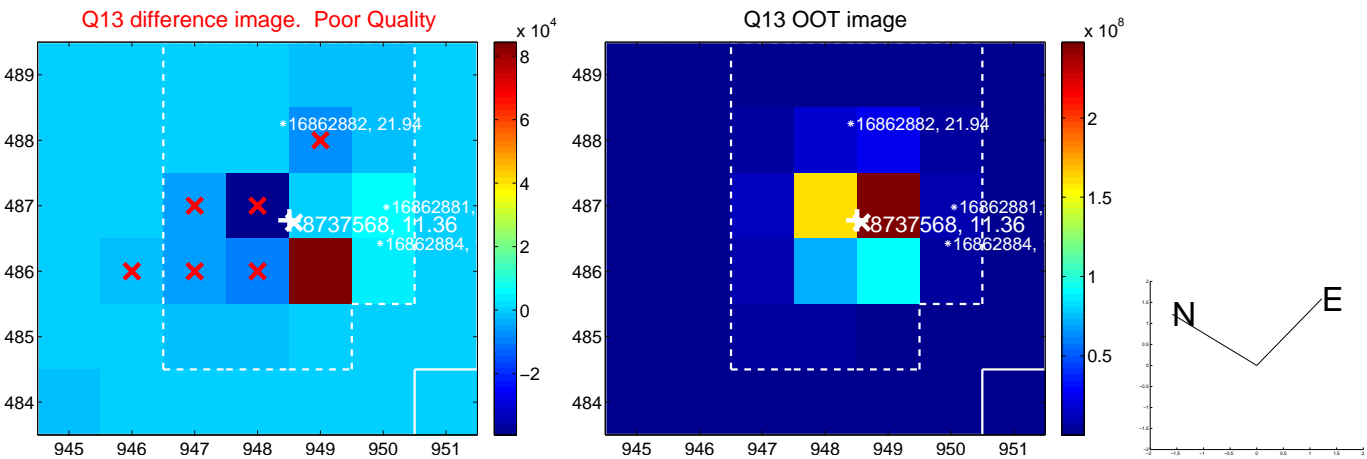




white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



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

