

# KIC 010422252

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010422252-01	OBS	No	368.156193	255.000817	570.0	5.386	15.4	4.3	0.84	5279	2.02	0.58
010422252-02	OBS	No	224.038859	336.006427	1343.0	9.465	14.6	7.8	0.84	5279	3.07	1.12
010422252-03	OBS	No	450.655822	227.643175	1425.0	3.812	14.4	8.1	0.84	5279	3.14	0.44
010422252-04	OBS	No	254.490660	194.782042	793.5	3.000	13.5	-1.0	0.84	5279	2.32	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010422252-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010422252-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010422252-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—CENT_FEW_DIFFS
010422252-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

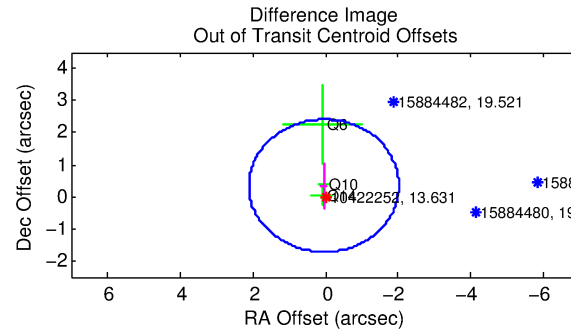
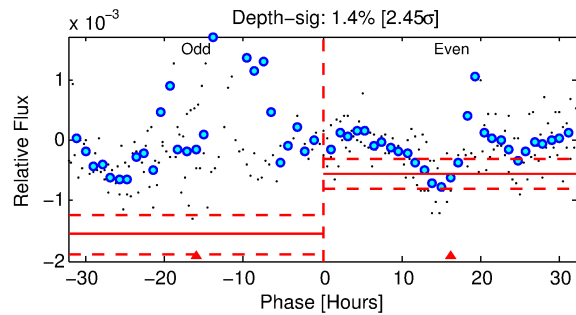
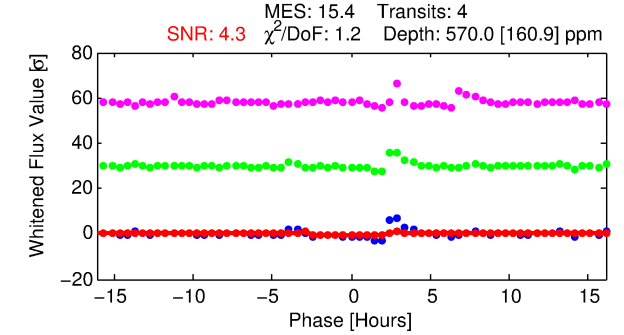
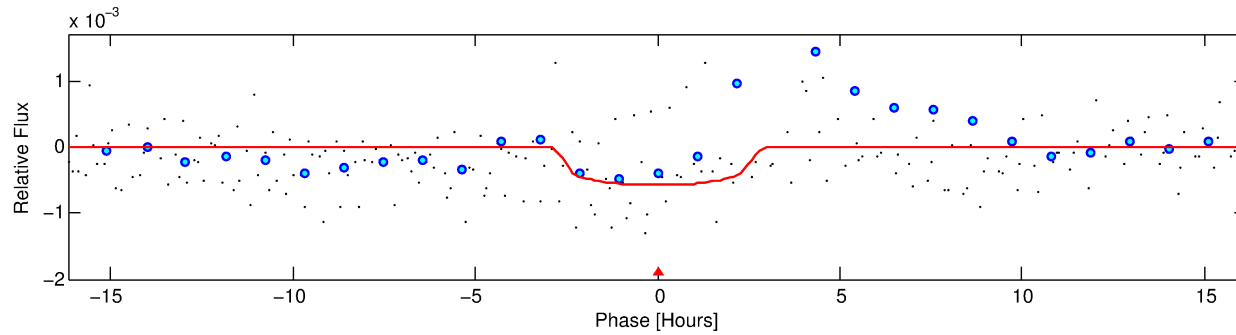
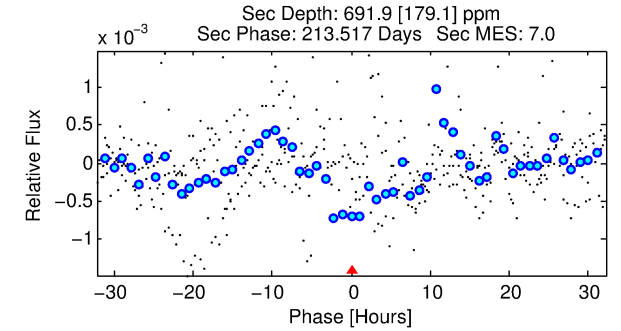
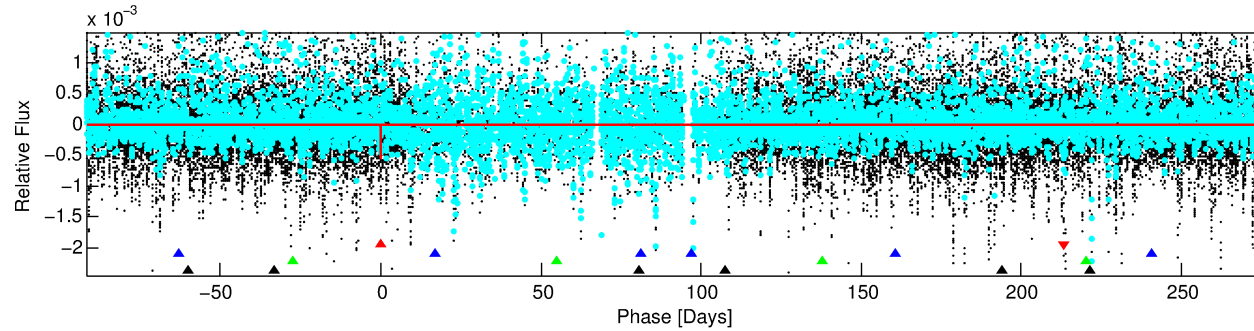
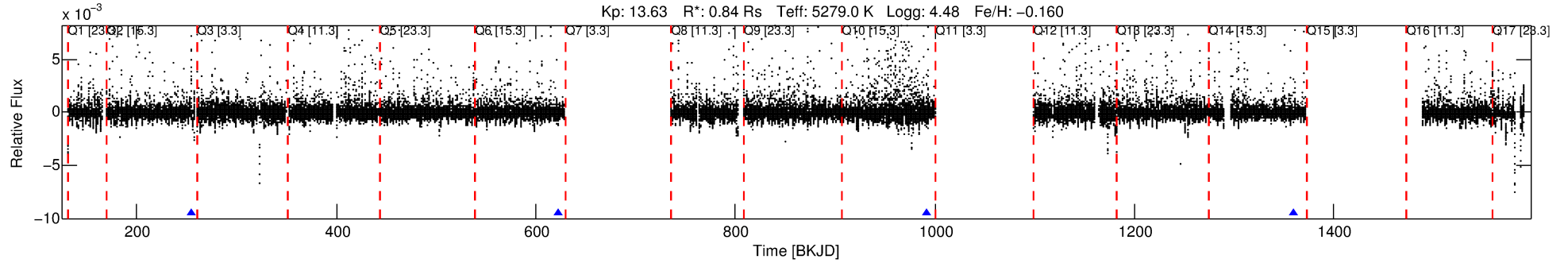
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010422252-01

No Significant Match Found

# DV One-Page Summary

KIC: 10422252 Candidate: 1 of 4 Period: 368.156 d



## DV Fit Results:

Period = 368.15619 [0.00566] d  
Epoch = 255.0008 [0.0115] BKJD  
Rp/R\* = 0.0220 [0.0510]  
a/R\* = 478.28 [4235.78]  
b = 0.45 [15.71]  
Seff = 0.58 [0.25]  
Teff = 222 [24] K  
Rp = 2.02 [4.69] Re  
a = 0.9217 [0.2193] AU  
Ag = 79285.60 [369182.85] [0.21σ]  
Teffp = 5768 [6690] K [0.83σ]

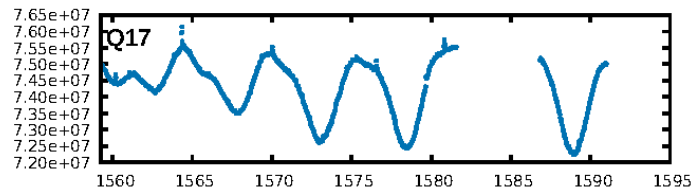
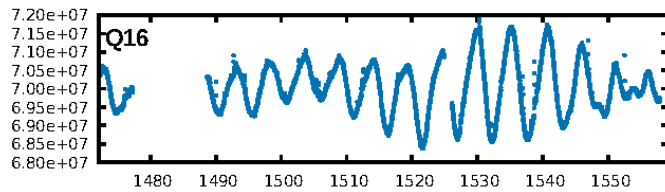
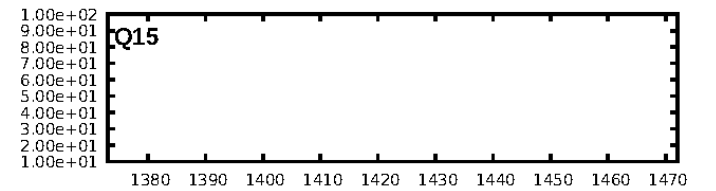
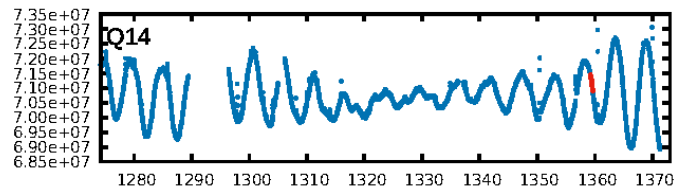
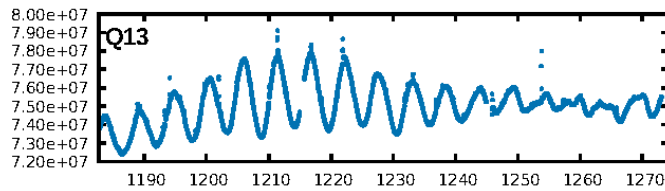
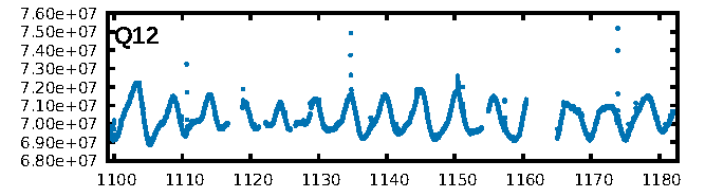
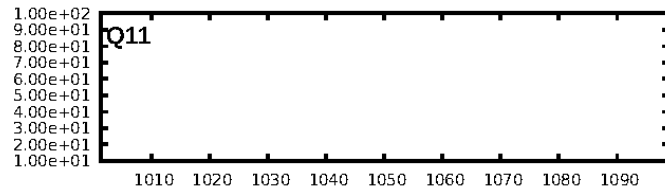
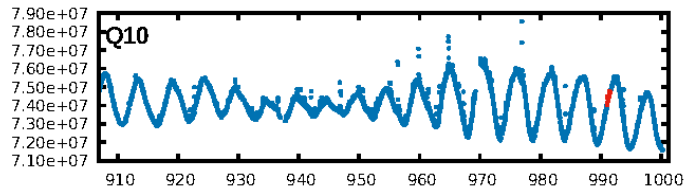
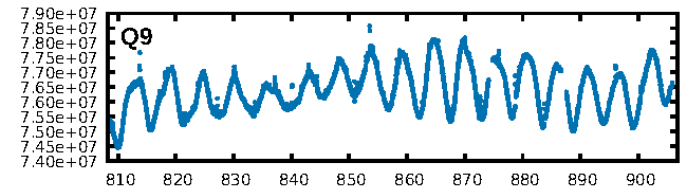
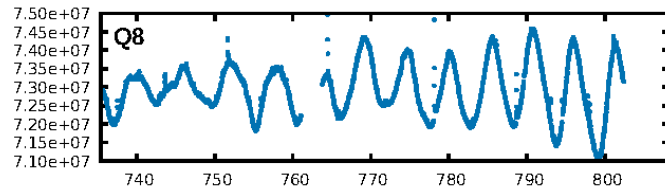
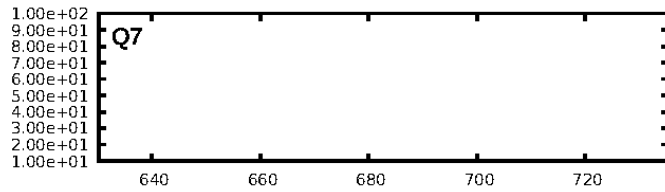
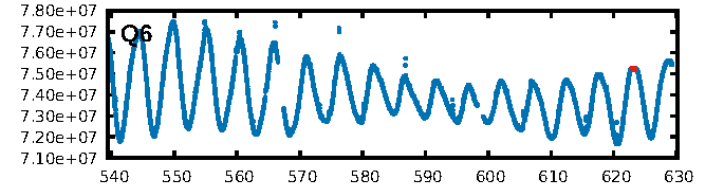
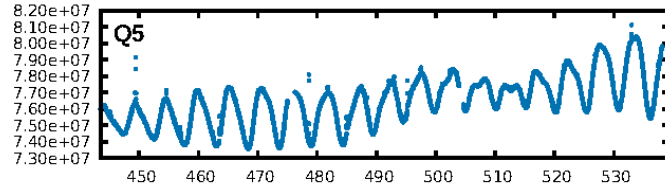
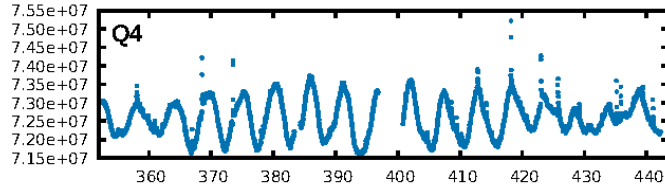
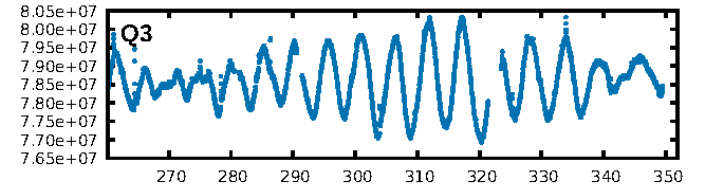
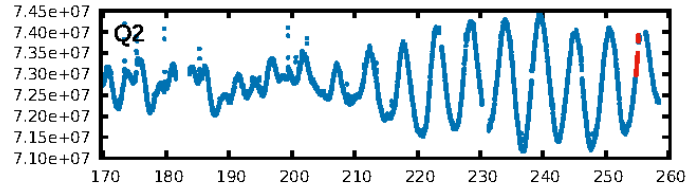
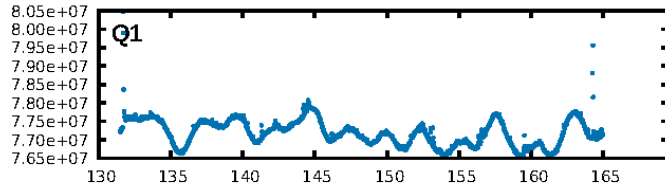
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [442.51σ]  
LongPeriod-sig: 100.0% [300.07σ]  
ModelChiSquare2-sig: 37.4%  
ModelChiSquareGof-sig: 92.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -0.82  
Centroid-sig: 2.2%  
Centroid-so: 1.611 arcsec [1.48σ]  
OotOffset-rm: 0.346 arcsec [0.50σ]  
OotOffset-st: 3/0/0/0 [3]  
KicOffset-rm: 0.310 arcsec [0.56σ]  
KicOffset-st: 3/0/0/0 [3]  
DiffImageQuality-fgm: 0.00 [0/3]  
DiffImageOverlap-fno: 1.00 [3/3]

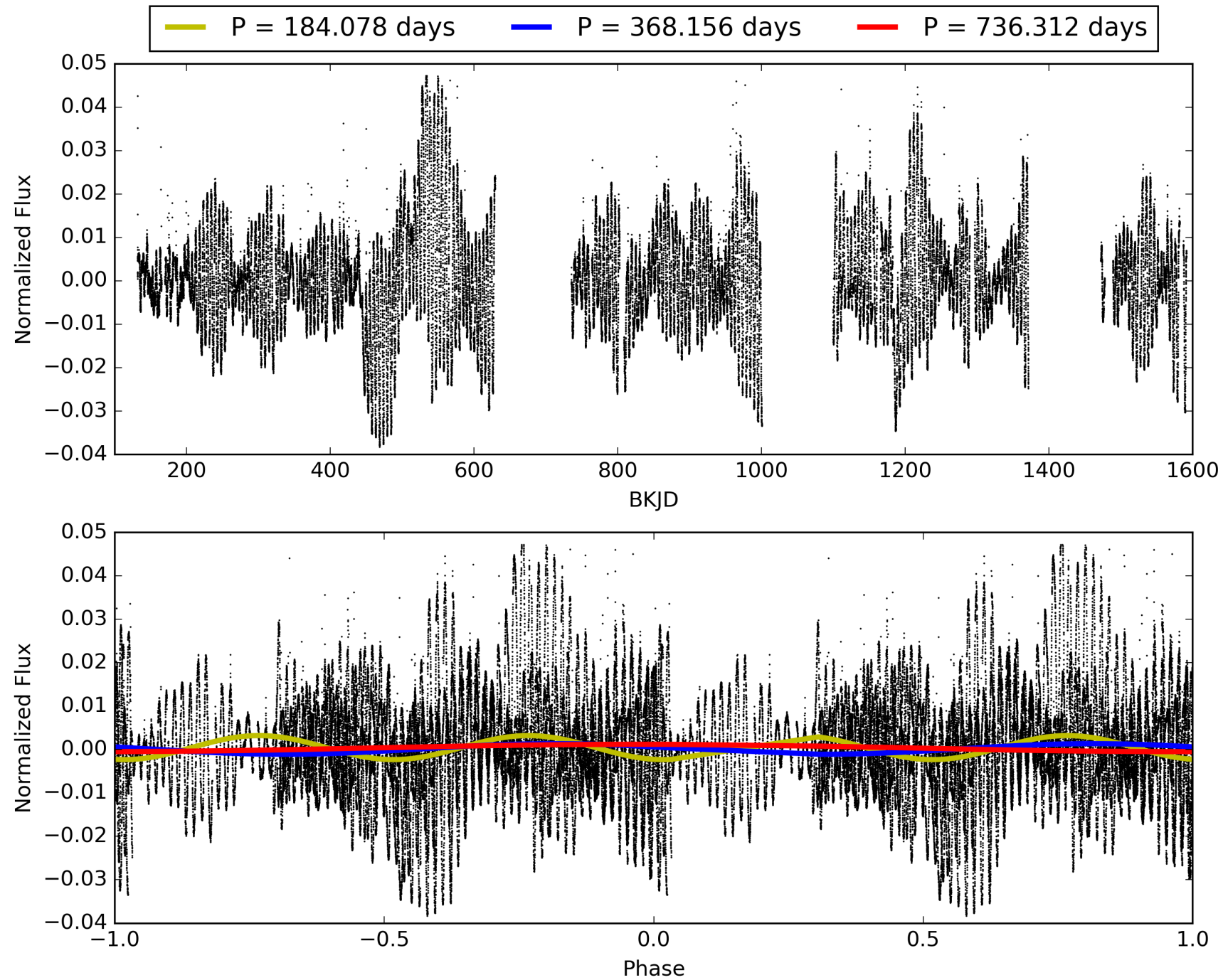
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:00:39 Z

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

# TCE 010422252-01, PDC Light Curves



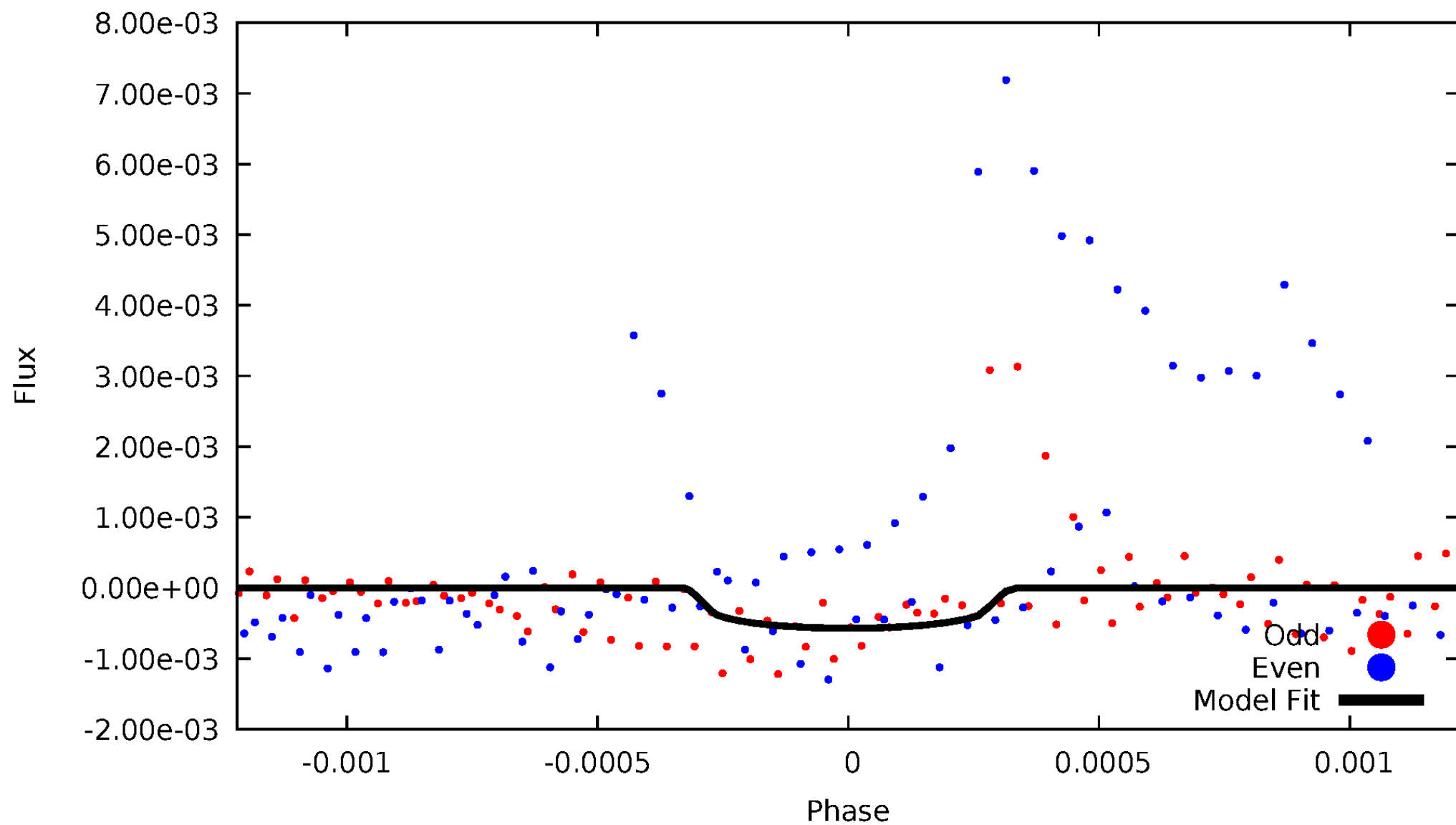
TCE 010422252-01





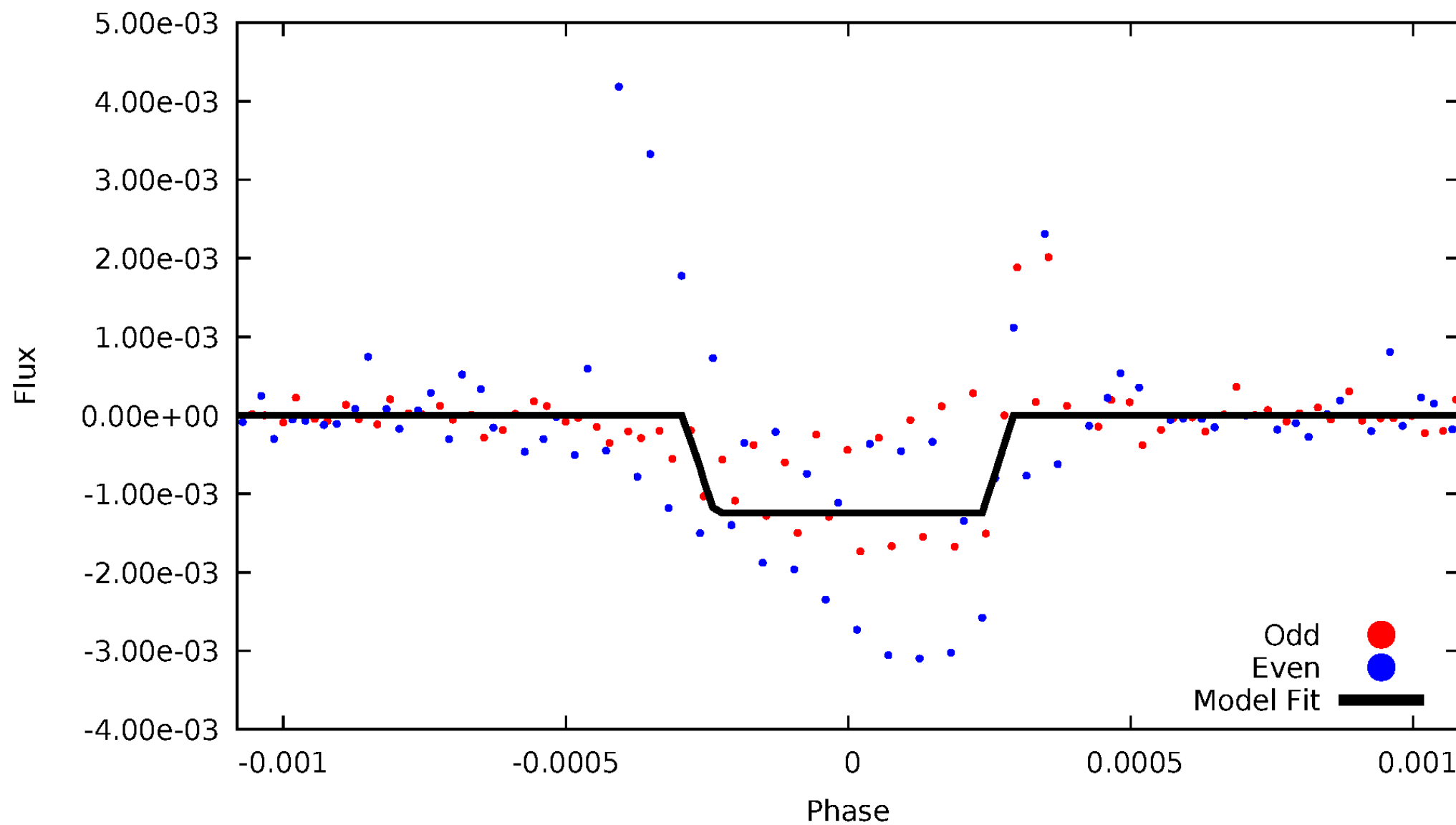
# DV Odd/Even

TCE 010422252-01

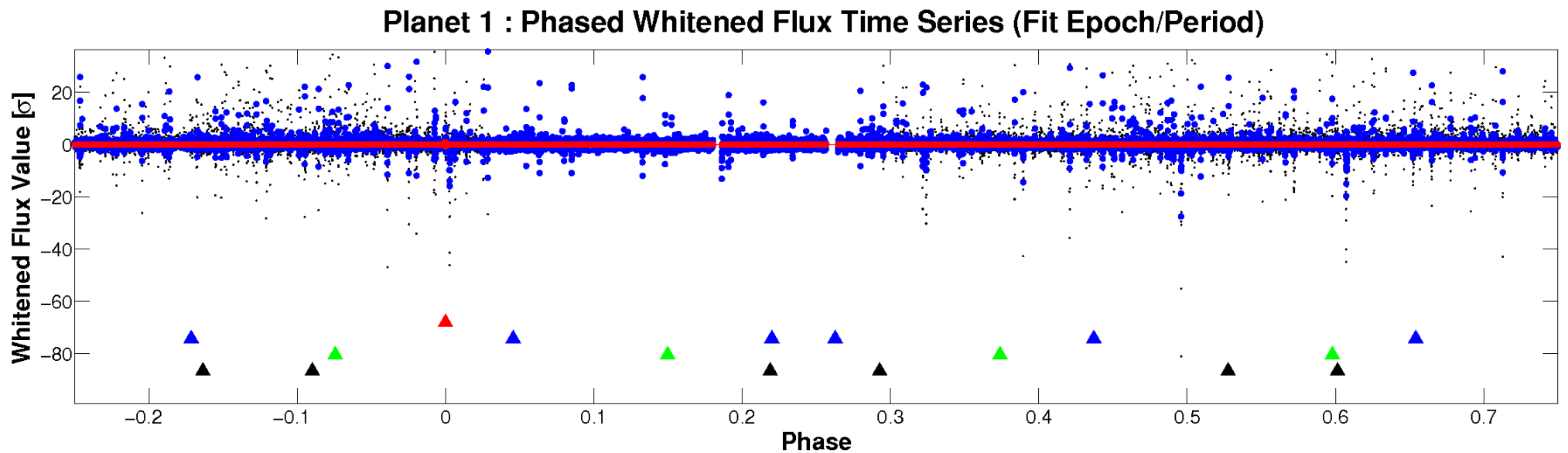
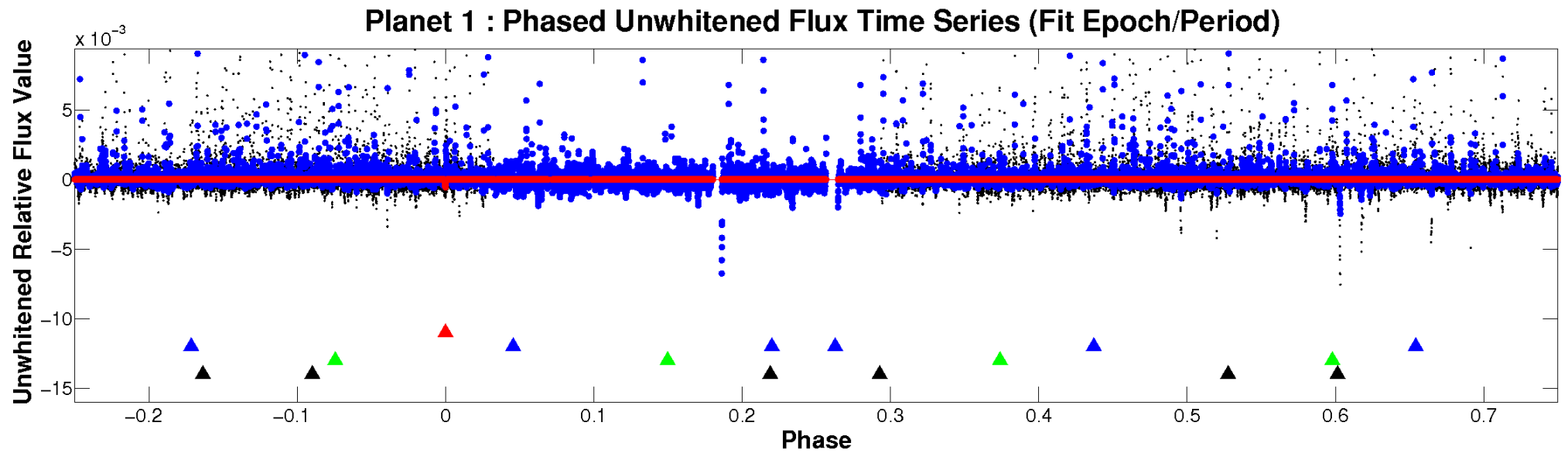


# ALT Odd/Even

TCE 010422252-01

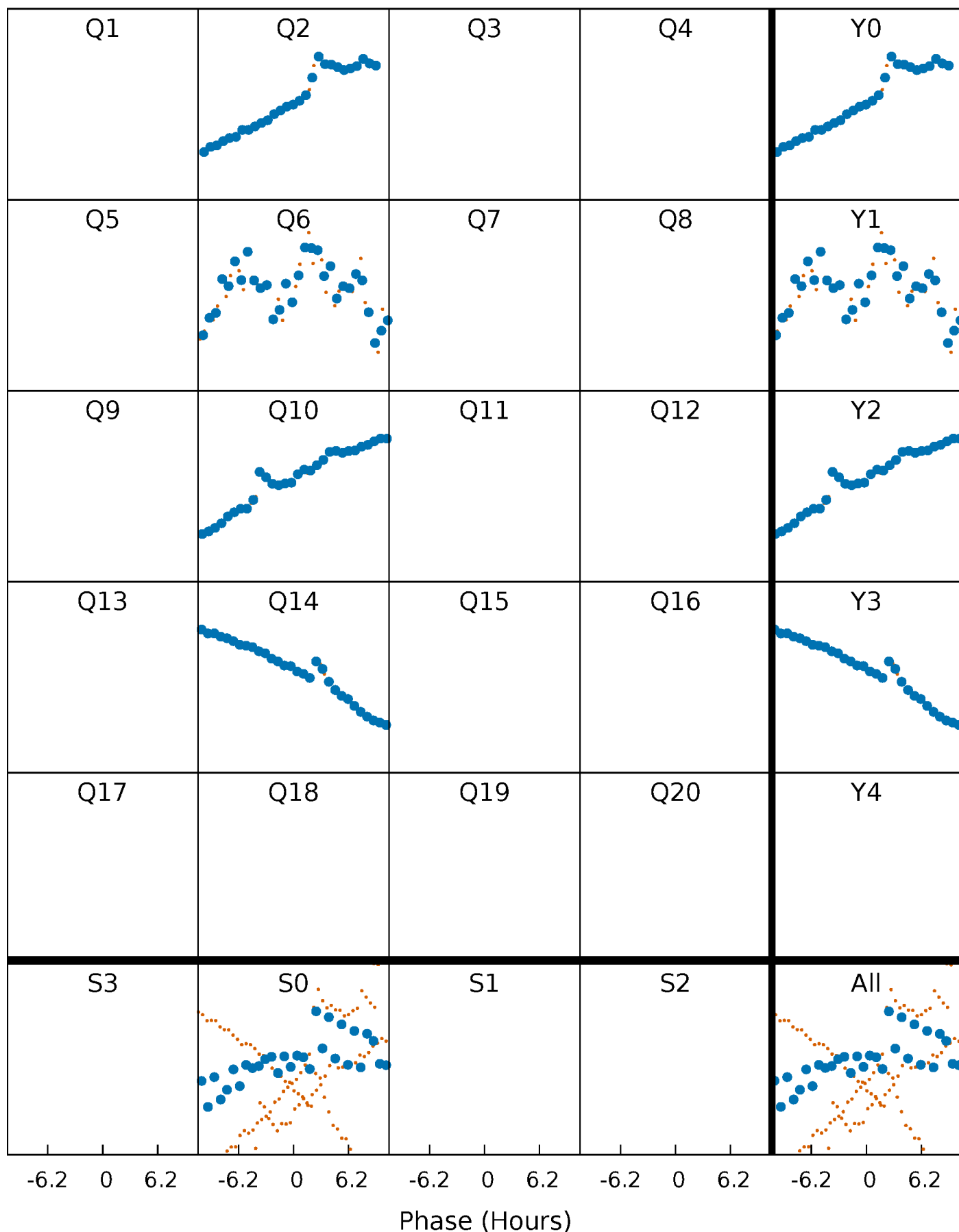


# Non-Whitened Vs. Whitened Light Curve



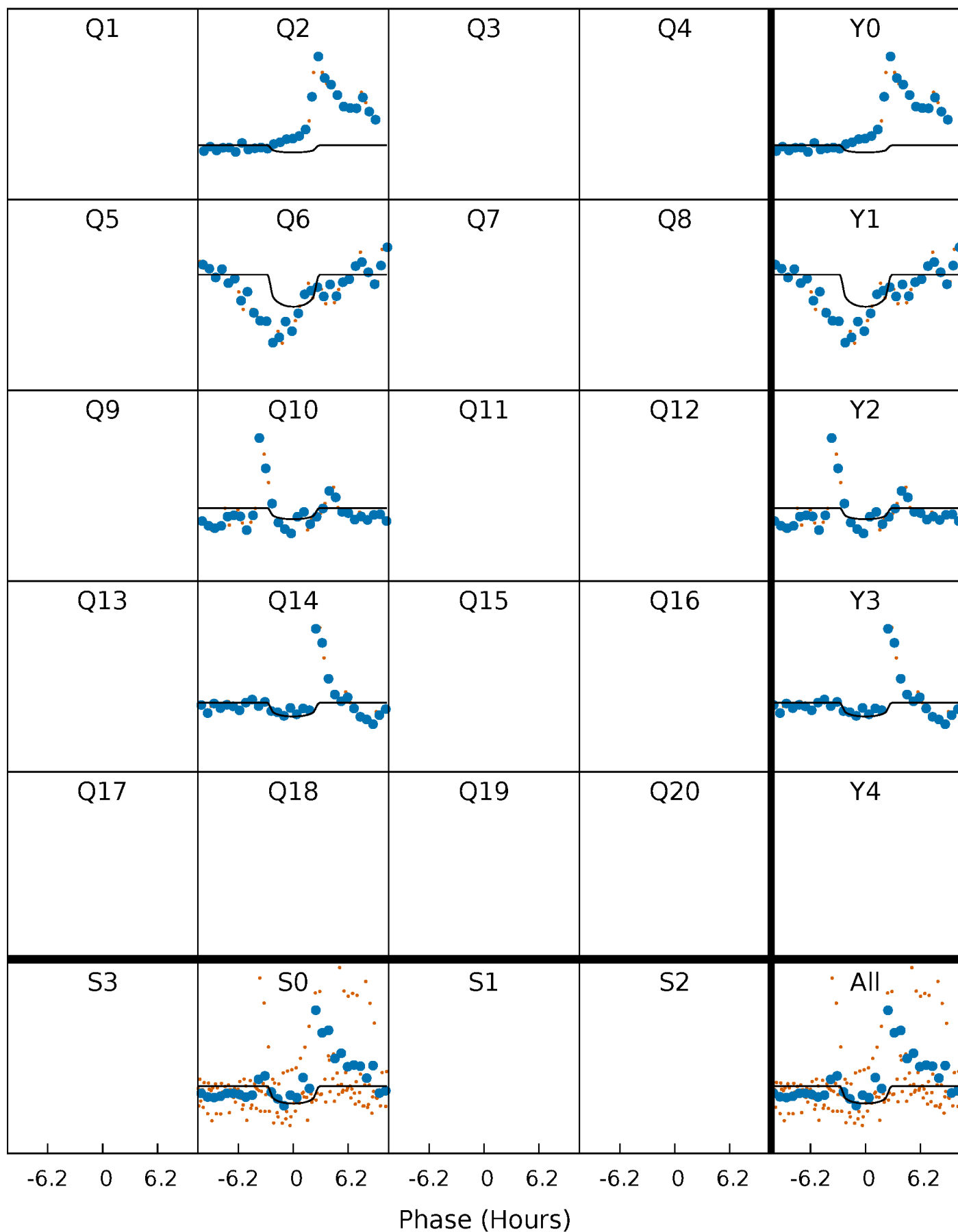
# PDC Quarter-Phased Transit Curves

TCE 010422252-01 P=368.156193 Days  $T_0=255.000818$  (BKJD)



# DV Quarter-Phased Transit Curves

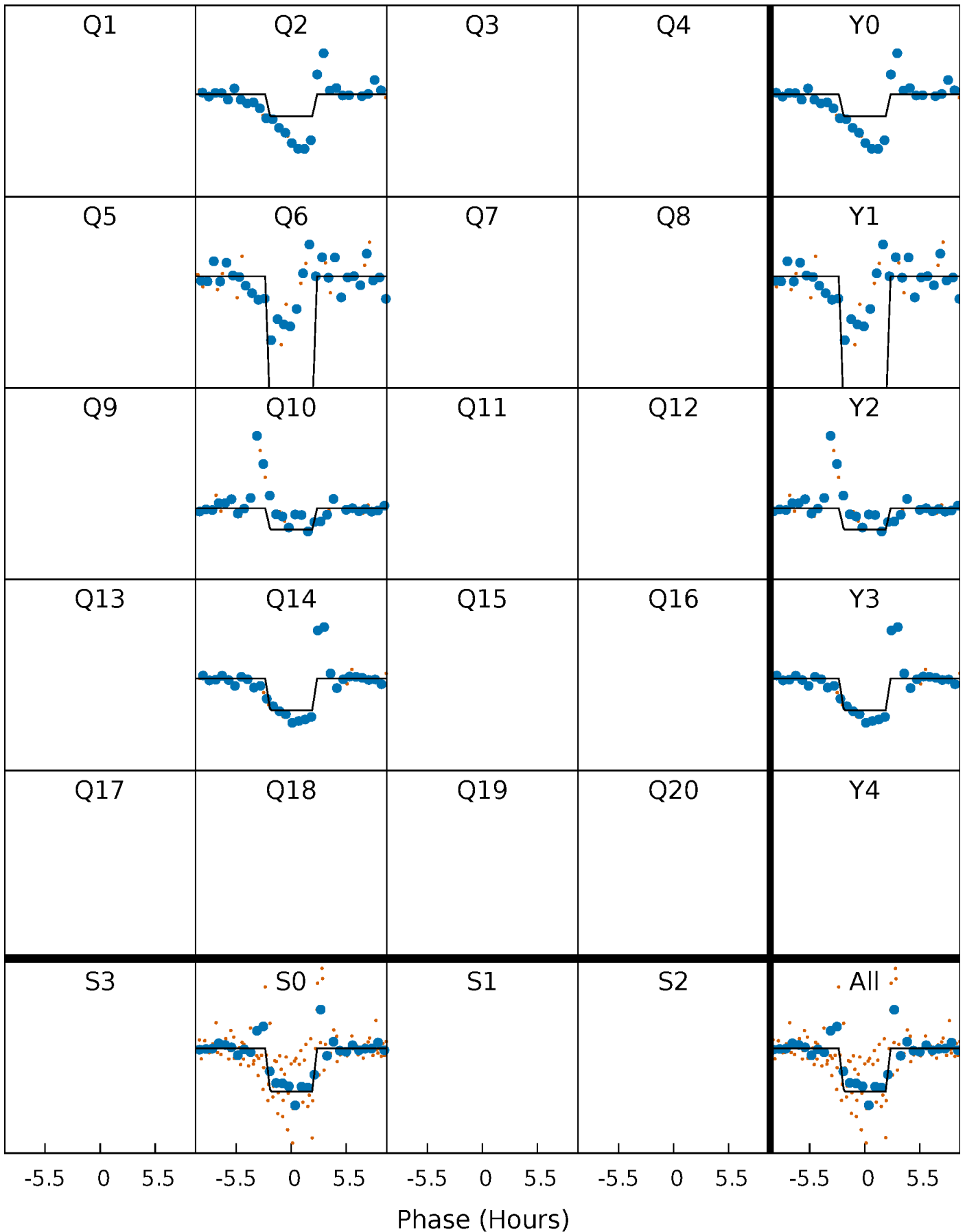
TCE 010422252-01 P=368.156193 Days  $T_0=255.000818$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

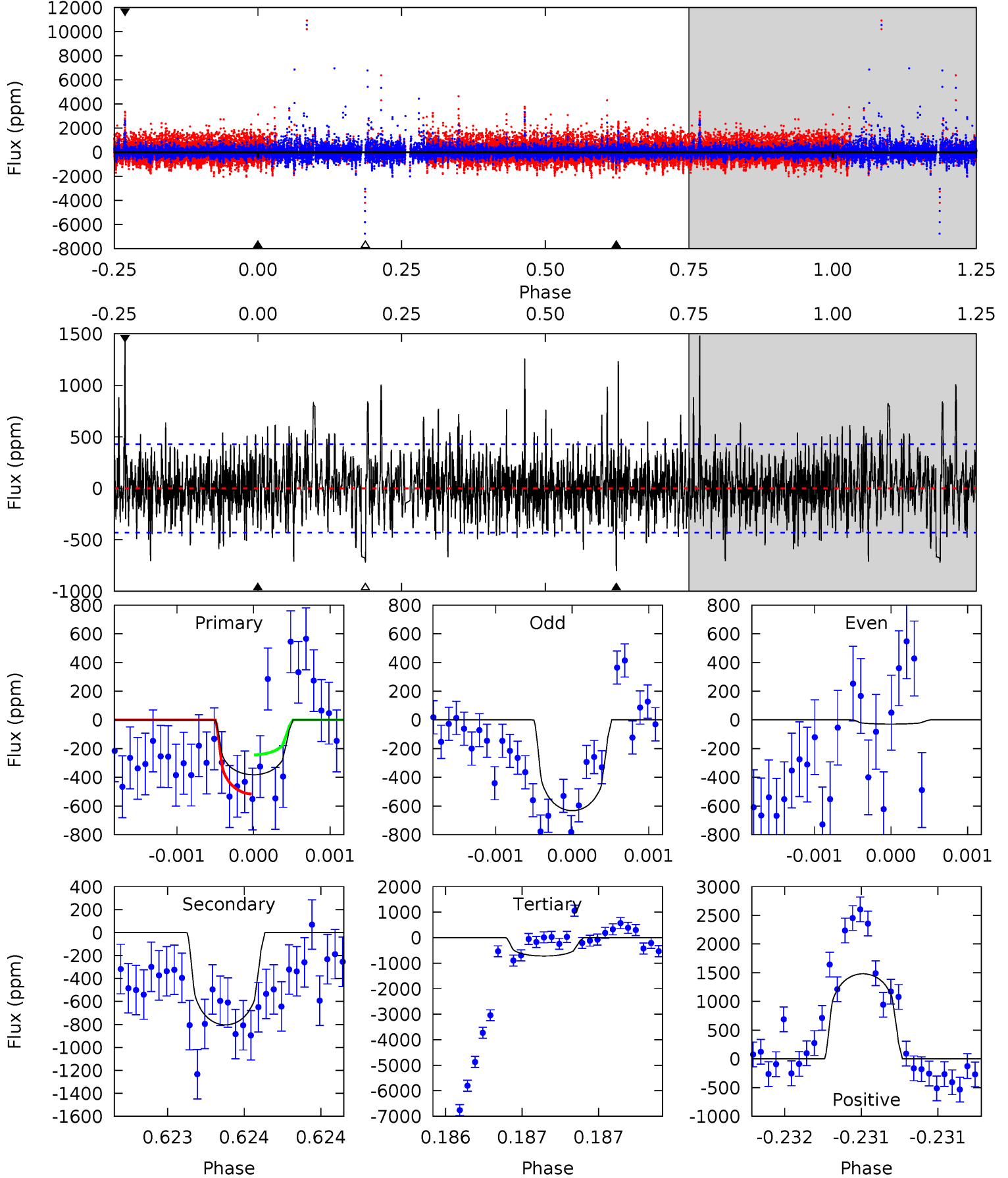
TCE 010422252-01 P=368.158262 Days  $T_0=254.988549$  (BKJD)



# DV Model-Shift Uniqueness Test

010422252-01, P = 368.156193 Days, E = 255.000818 Days

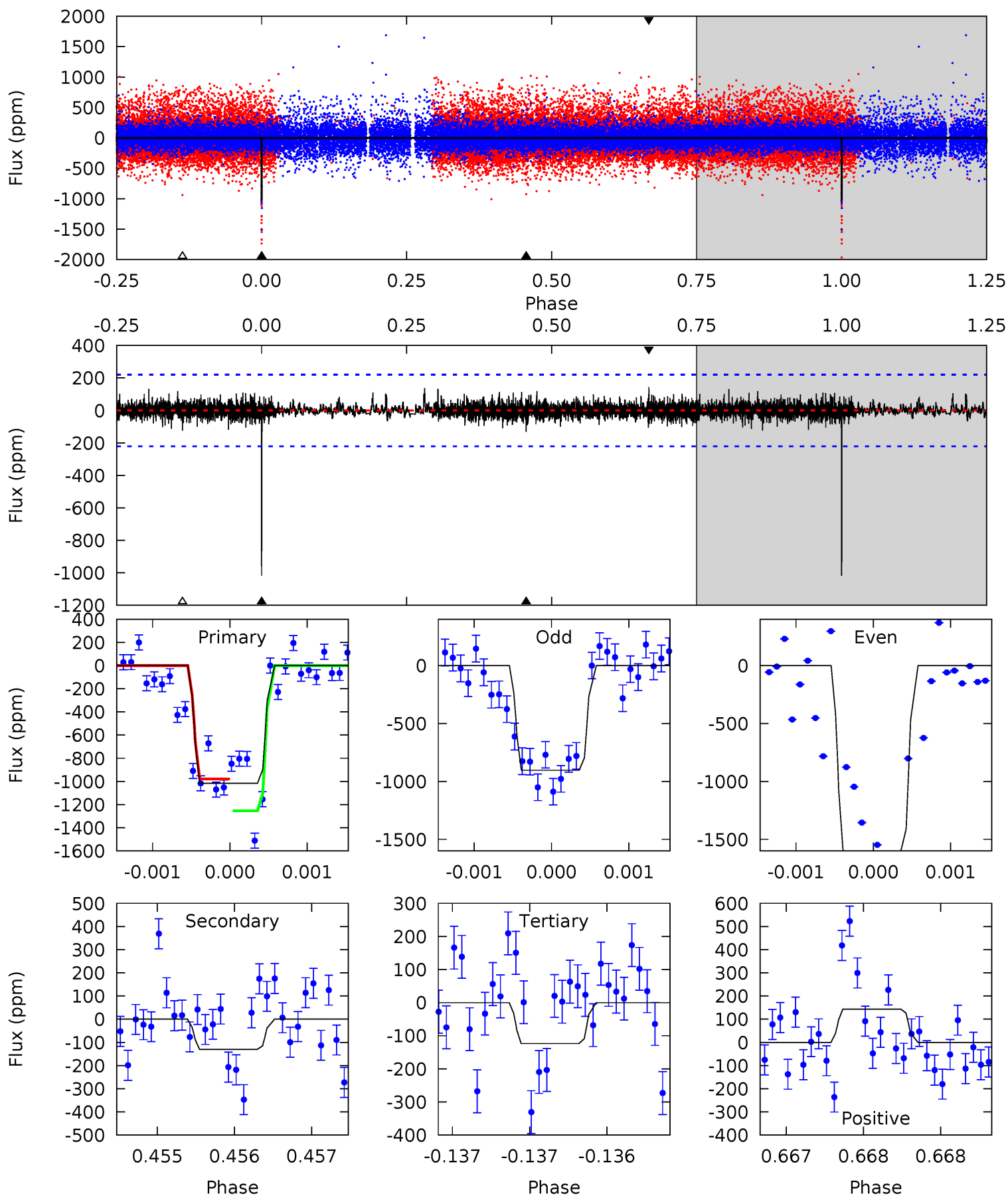
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.92	10.3	9.27	19.1	5.53	3.41	2.69	-4.35	-14.2	1.08	-8.73	3.21	0.28	0.65	1.75



# Alt Model-Shift Uniqueness Test

010422252-01, P = 368.158262 Days, E = 254.988549 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
25.6	3.27	3.11	3.61	5.55	3.44	0.73	22.5	22.0	0.16	-0.34	9.32	1.17	0.12	3.20



### Stellar Parameters For KIC 010422252

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5279^{+158}_{-142}$	$4.476^{+0.112}_{-0.256}$	$-0.160^{+0.350}_{-0.300}$	$0.840^{+0.169}_{-0.112}$	$0.772^{+0.121}_{-0.060}$	$1.833^{+0.886}_{-0.865}$
	+3%/-3%	+3%/-6%	+219%/-188%	+20%/-13%	+16%/-8%	+48%/-47%
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 010422252-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-804 \pm 78$	$4.45^{+4.08}_{-2.98}$	$316^{+21}_{-17}$	$4345^{+3037}_{-868}$	$19232^{+163480}_{-13969}$
Alt.	$-130 \pm 40$	$4.90^{+4.25}_{-3.19}$	$315^{+21}_{-17}$	$3057^{+1373}_{-457}$	$2419^{+19699}_{-1756}$

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

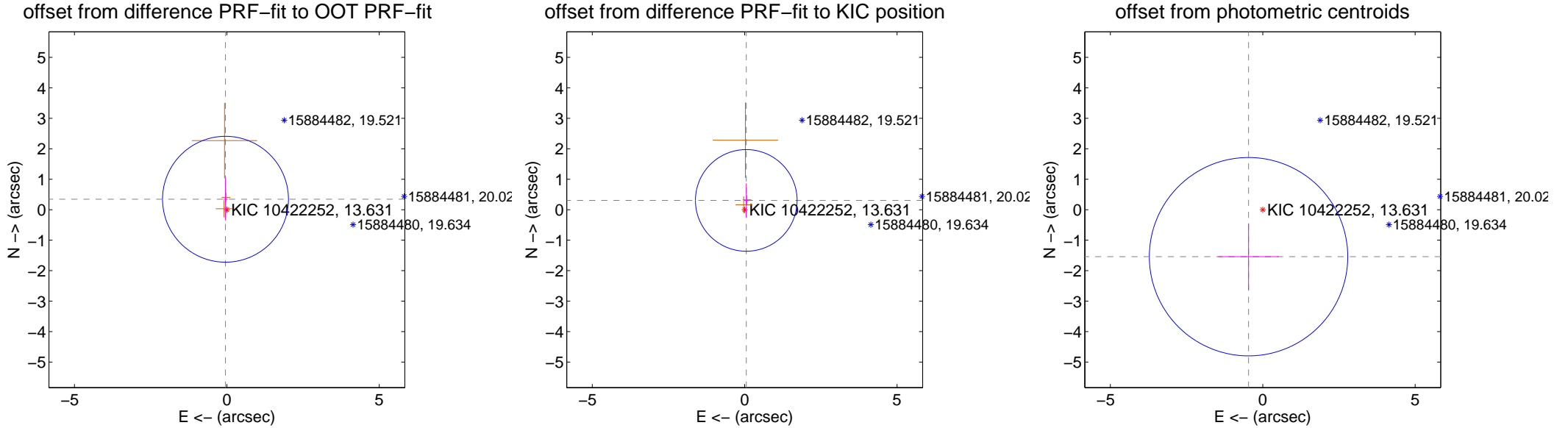
## DV Centroid Data

Supplemental centroid analysis for 010422252-01. Kepler magnitude: 13.63. Transit SNR 4.28

There are 0 quarters with good PRF difference image offsets

The direct PRF centroid is offset from the target star catalog position by about 0.14 arcsec

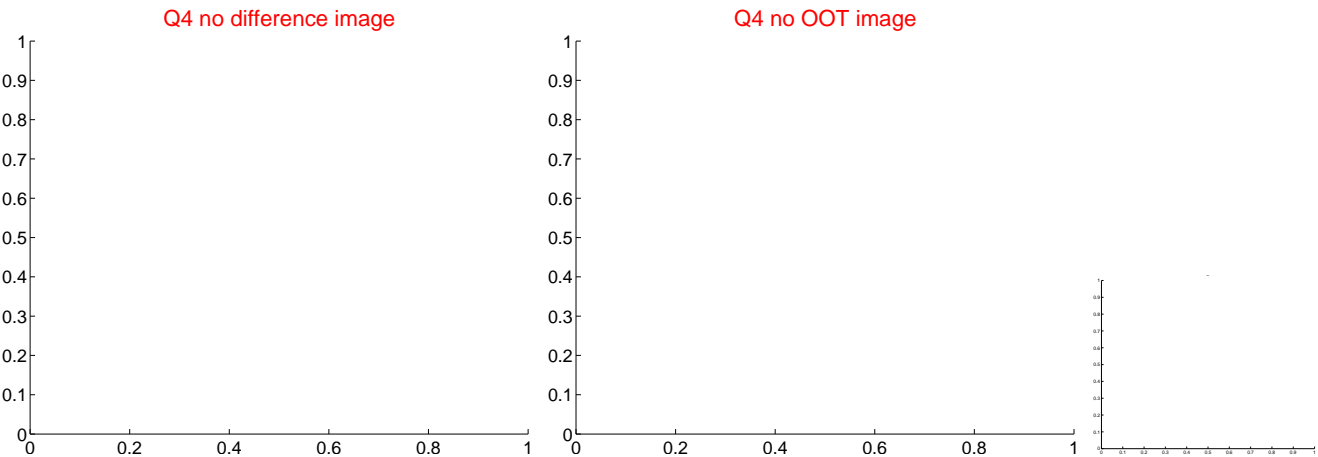
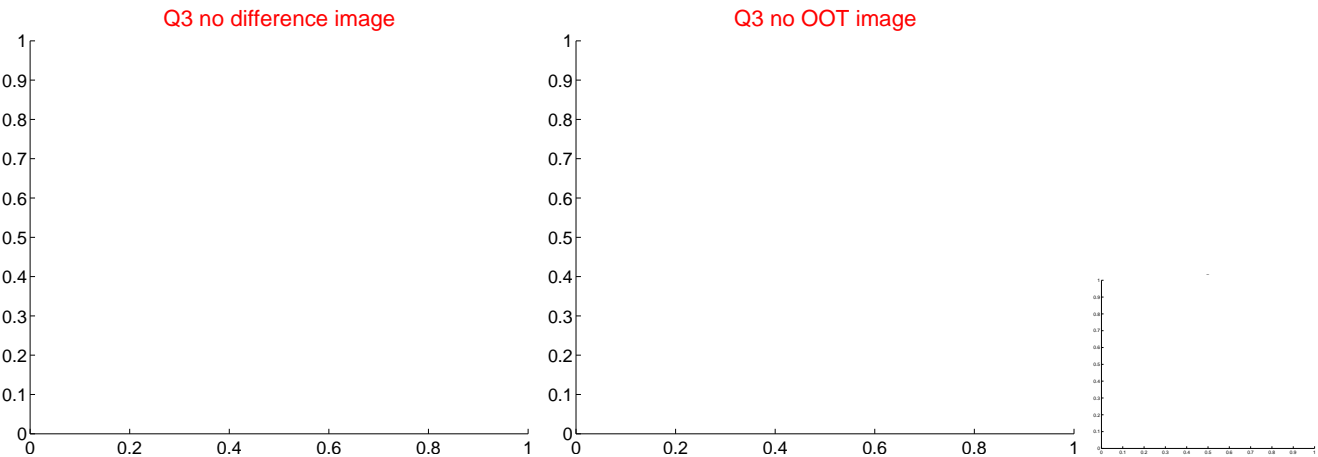
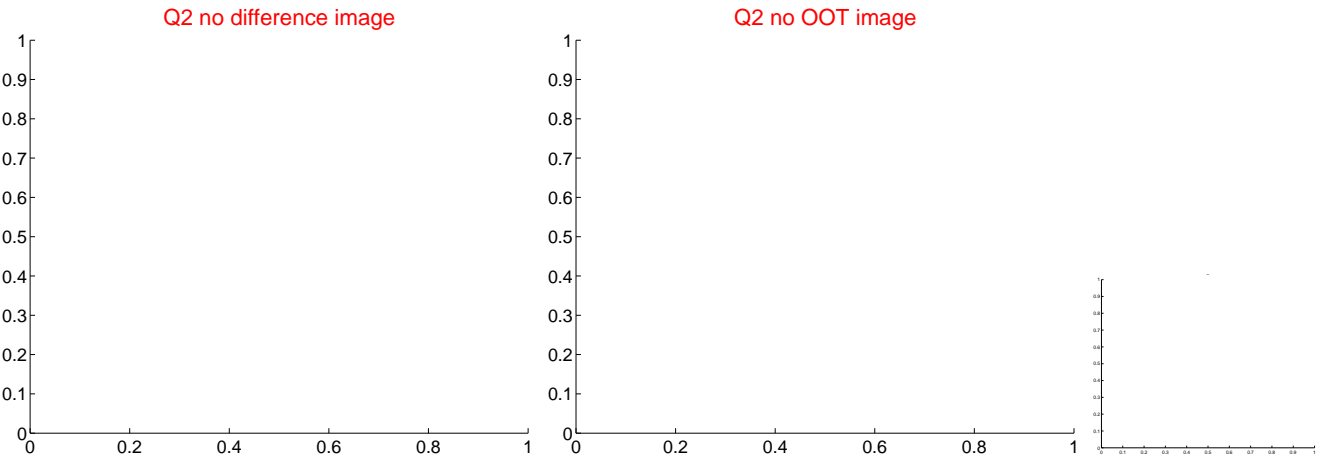
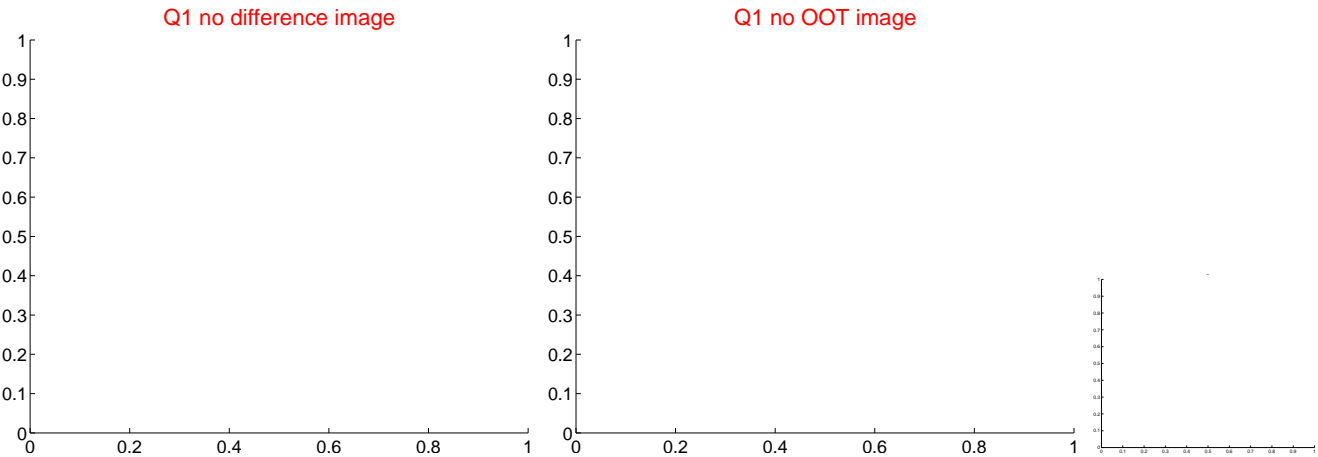
	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.346 \pm 0.689$	0.50	$0.044 \pm 0.069$	$0.343 \pm 0.693$
PRF-fit source offset from KIC position	$0.310 \pm 0.556$	0.56	$-0.053 \pm 0.071$	$0.305 \pm 0.561$
photometric centroid source offset	$1.61 \pm 1.09$	1.48	$0.47 \pm 0.99$	$-1.54 \pm 1.09$



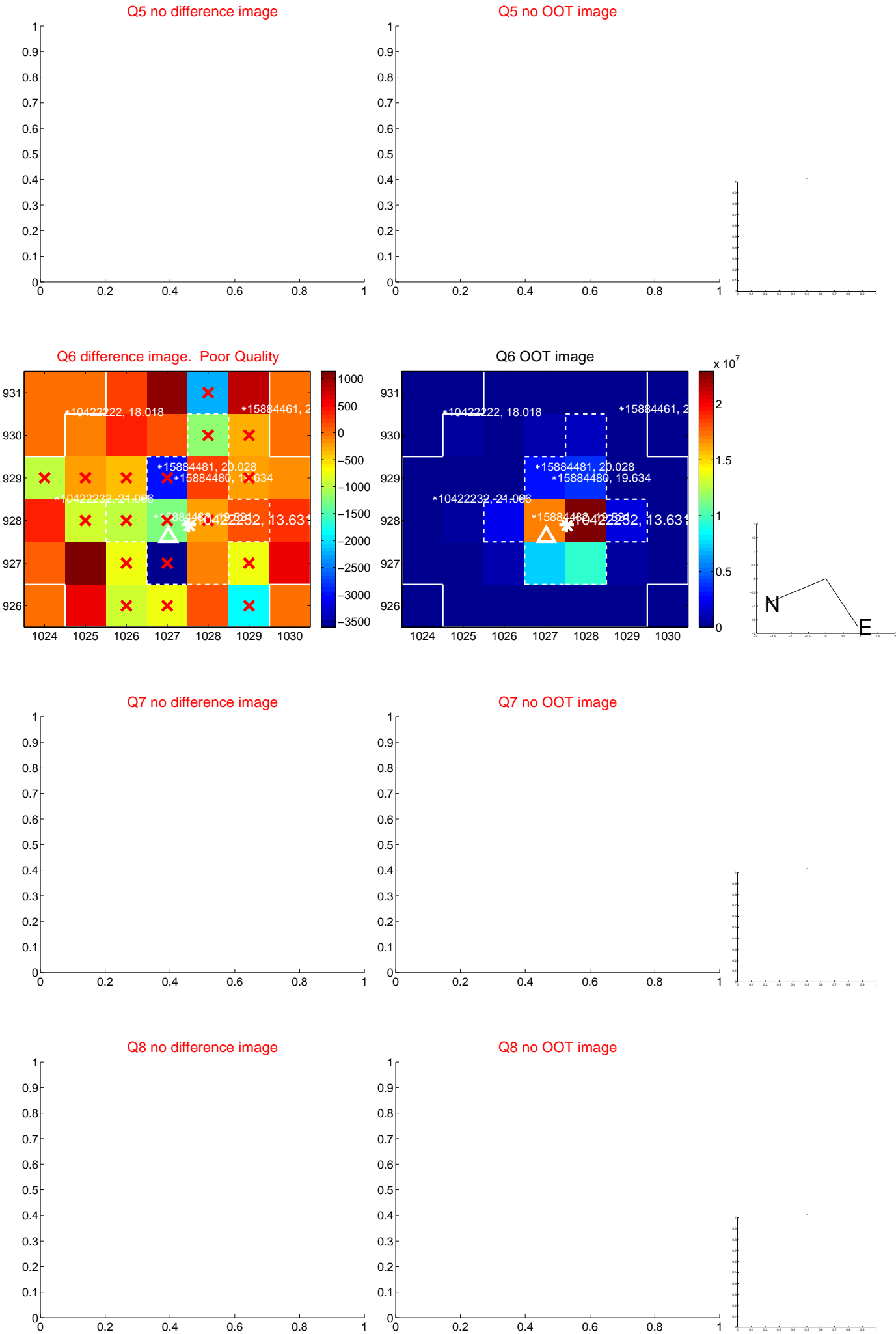
Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

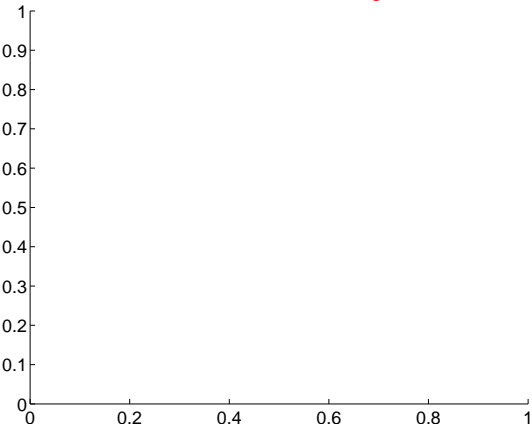


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ×: large negative pixel value.

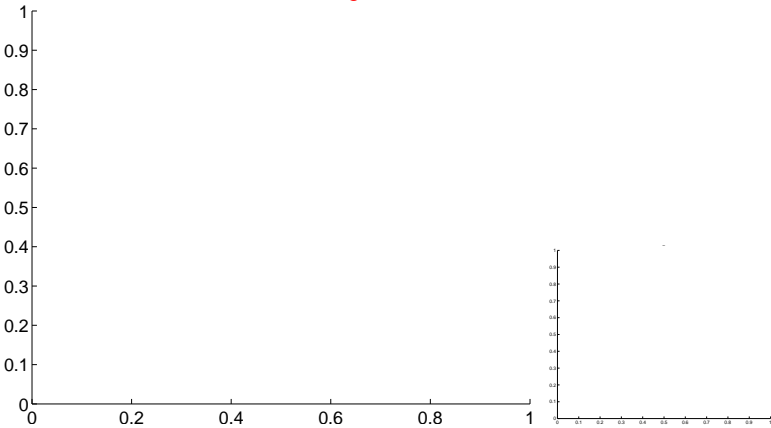


white ×: KIC target position; +: OOT centroid; △: difference centroid. red ✕: large negative pixel value.

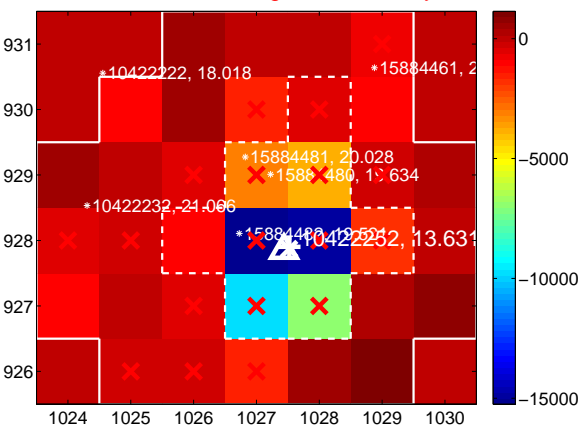
Q9 no difference image



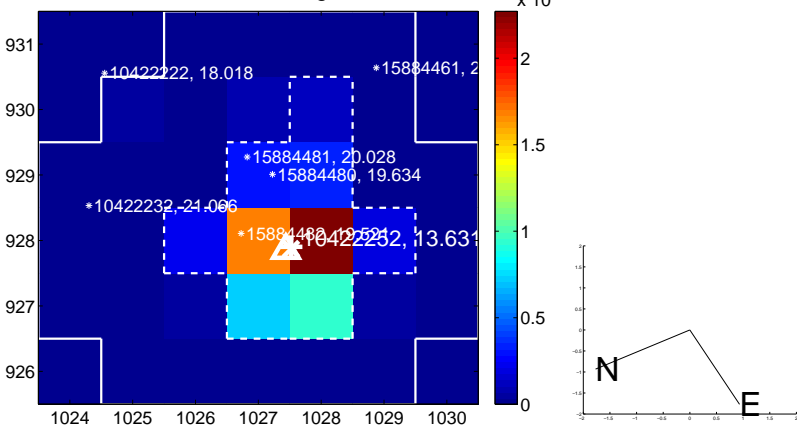
Q9 no OOT image



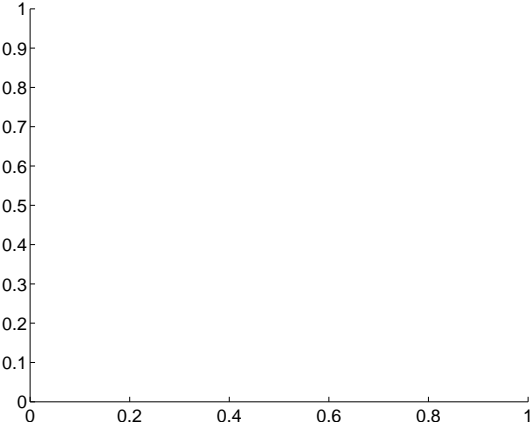
Q10 difference image. Poor Quality



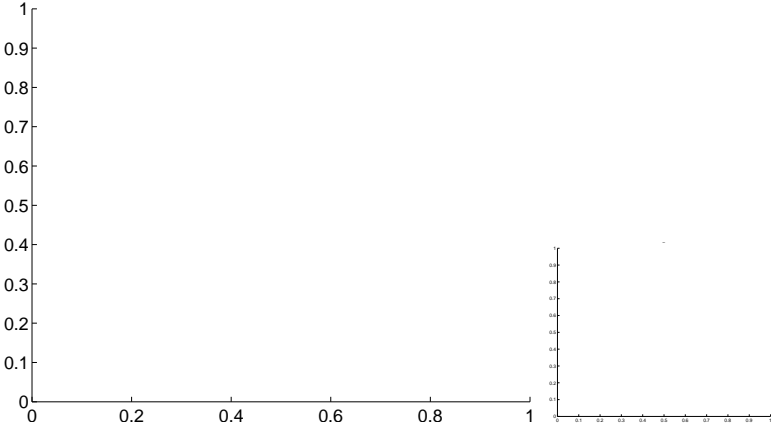
Q10 OOT image



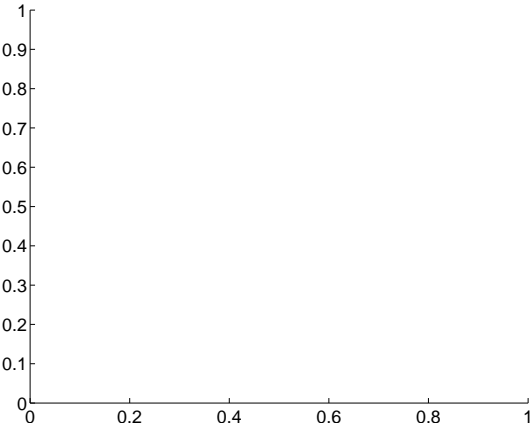
Q11 no difference image



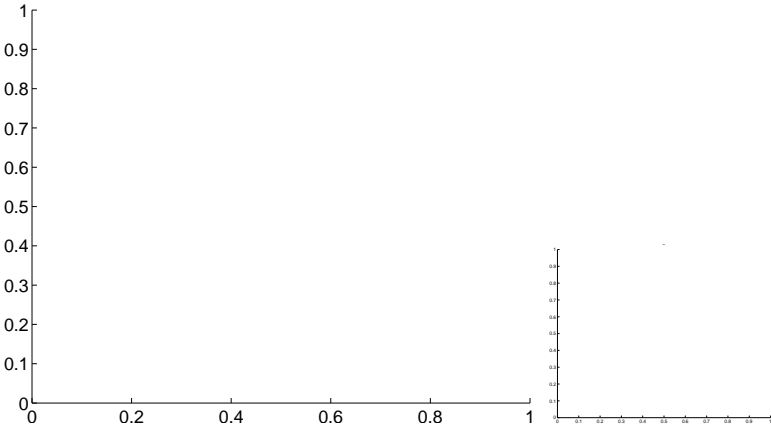
Q11 no OOT image



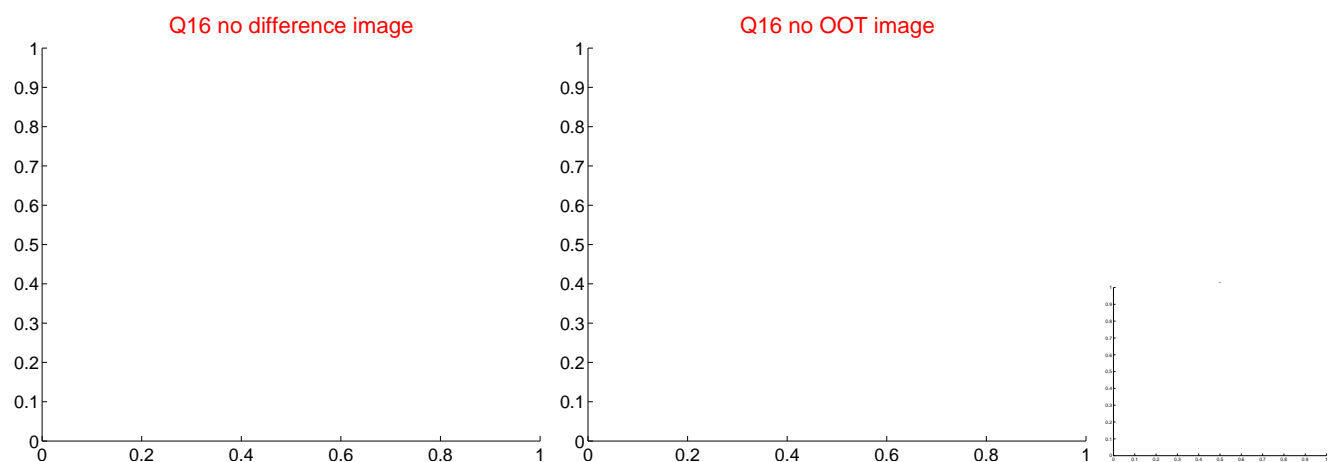
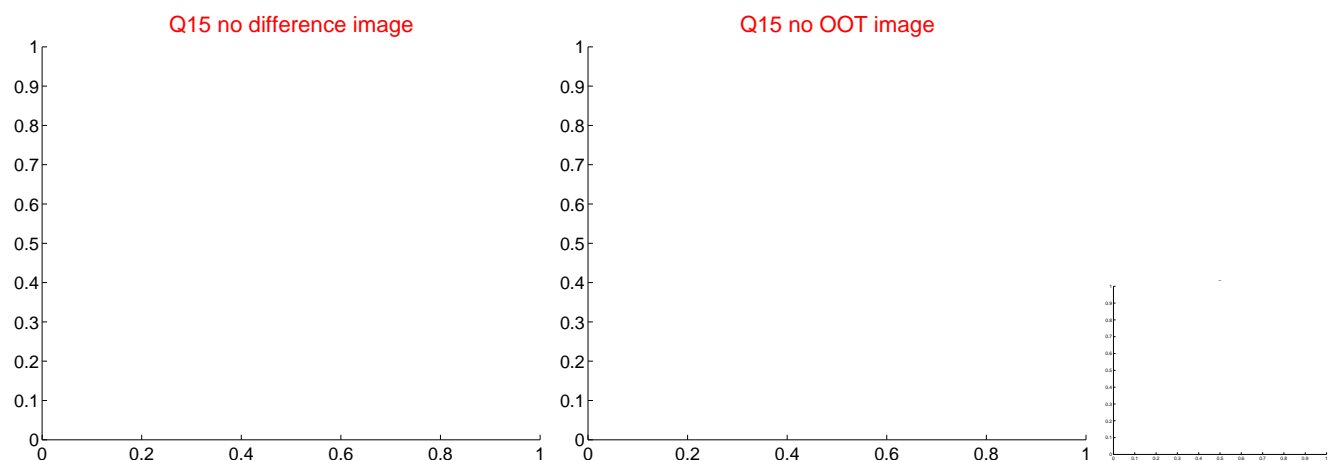
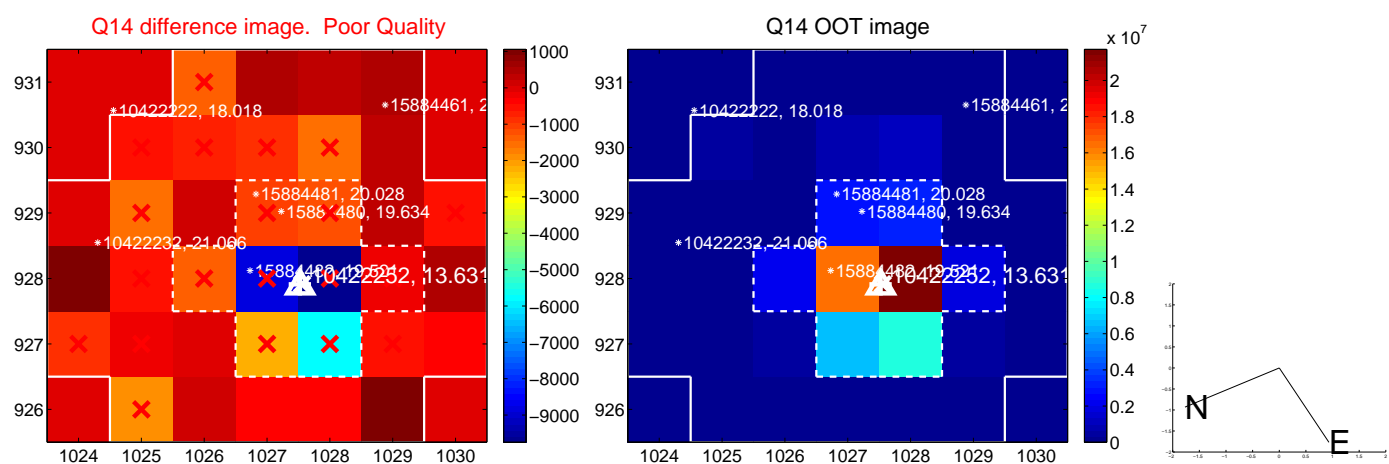
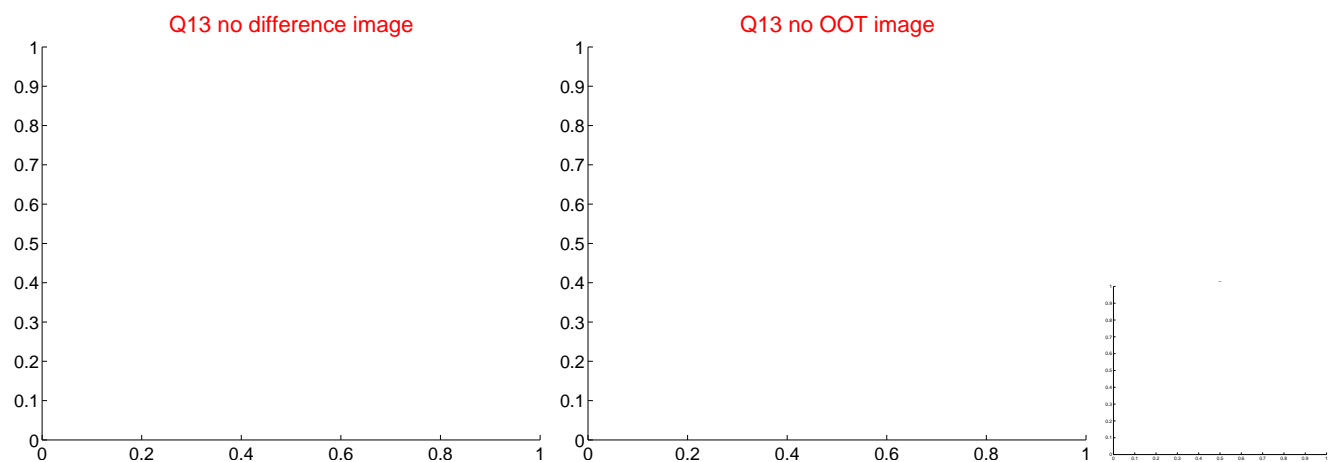
Q12 no difference image



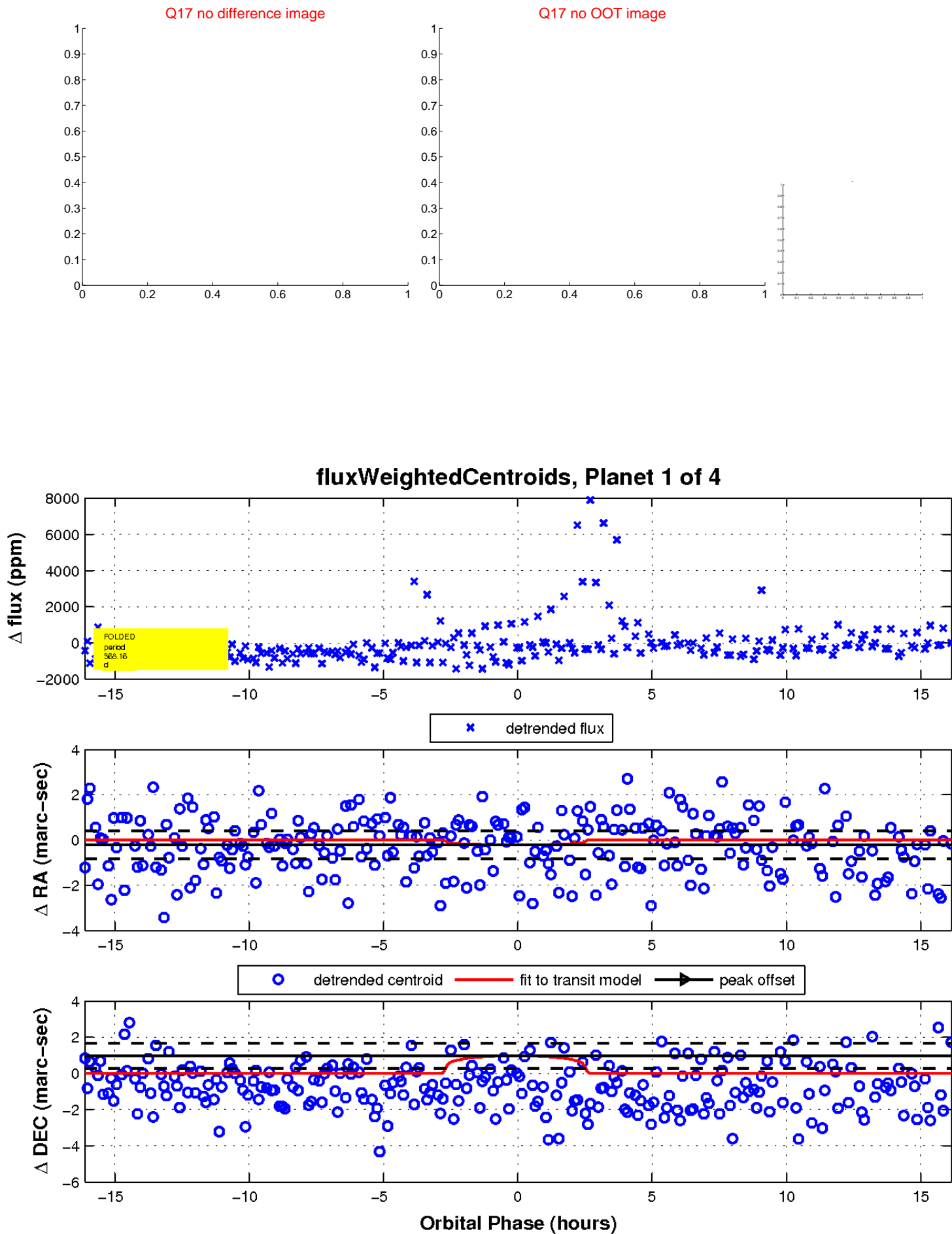
Q12 no OOT image



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

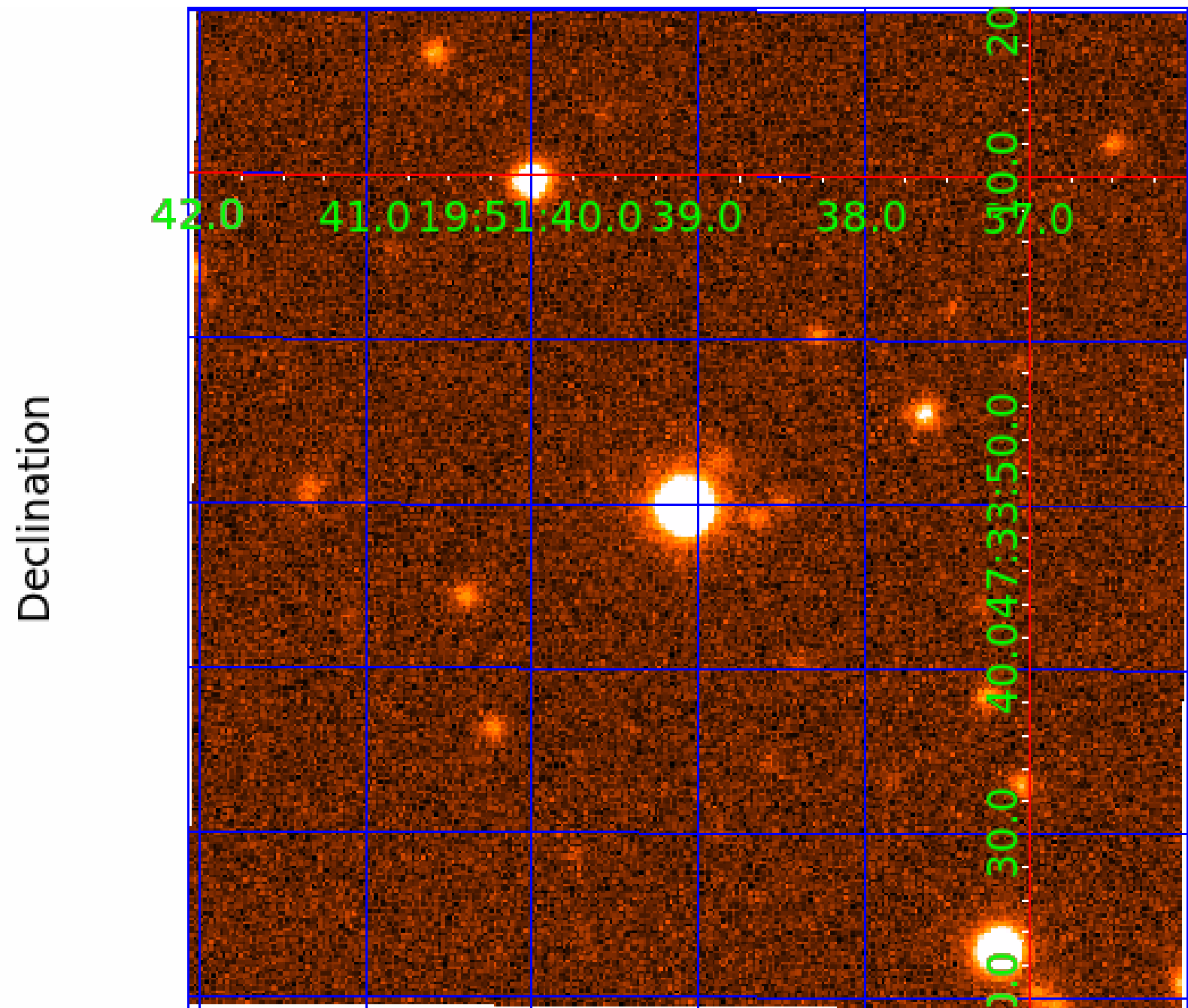


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image



# KIC 010422252

## Q1-17 DR25 TCE Parameters

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## Robovetter Results

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010422252-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010422252-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—CENT_FEW_DIFFS
010422252-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

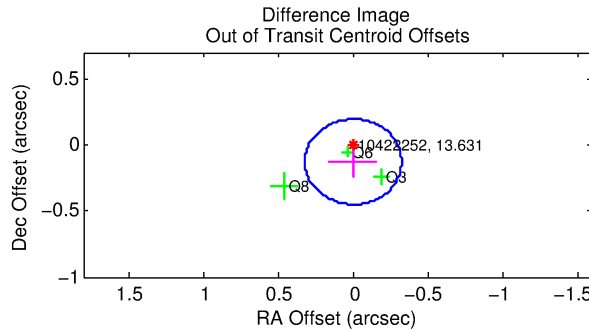
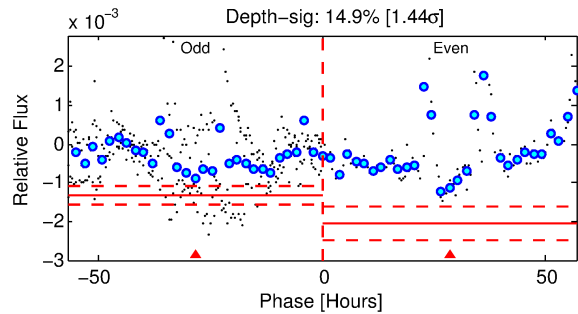
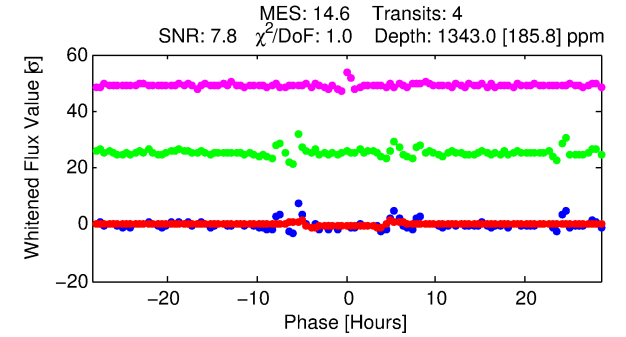
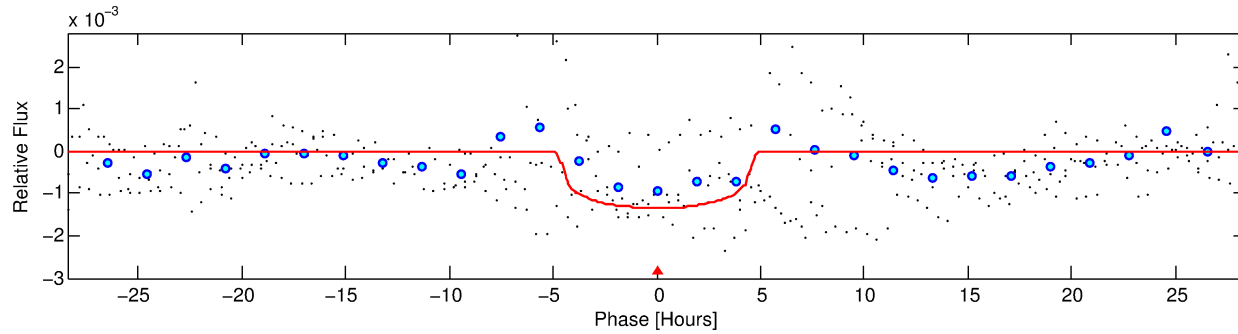
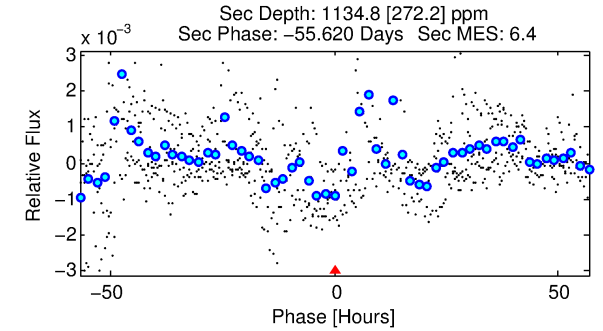
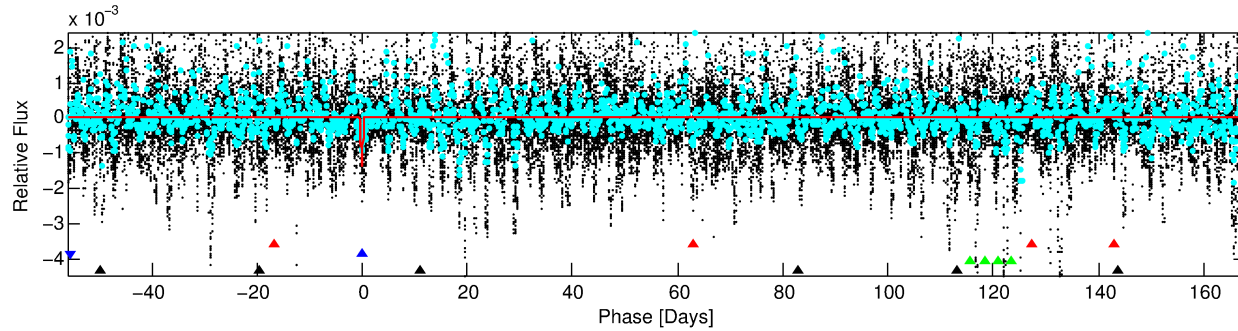
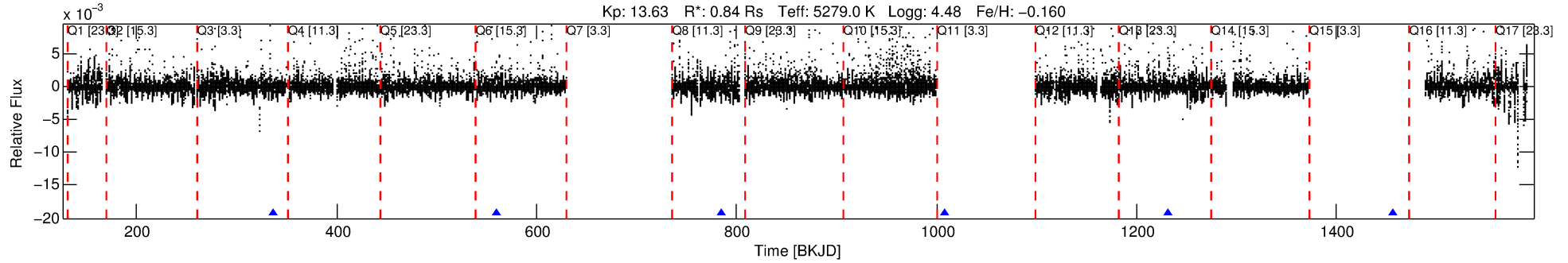
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010422252-02

No Significant Match Found

# DV One-Page Summary

KIC: 10422252 Candidate: 2 of 4 Period: 224.039 d



## DV Fit Results:

Period = 224.03886 [0.00236] d  
Epoch = 336.0064 [0.0061] BKJD  
Rp/R\* = 0.0335 [0.0113]  
a/R\* = 173.51 [210.21]  
b = 0.38 [2.71]  
Seff = 1.12 [0.48]  
Teq = 262 [28] K  
Rp = 3.07 [1.21] Re  
a = 0.6619 [0.1575] AU  
Ag = 29005.79 [24014.35] [1.21 $\sigma$ ]  
Teffp = 5294 [961] K [5.23 $\sigma$ ]

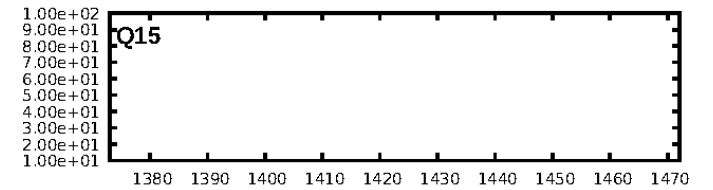
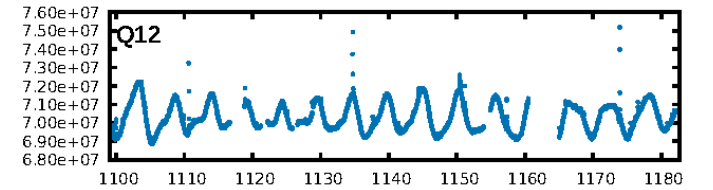
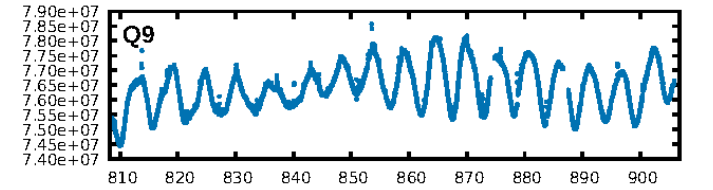
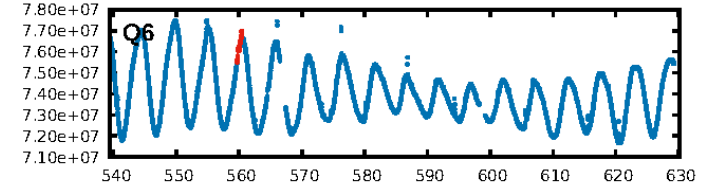
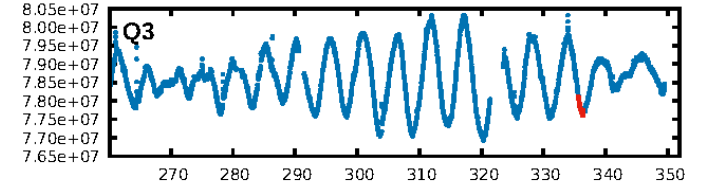
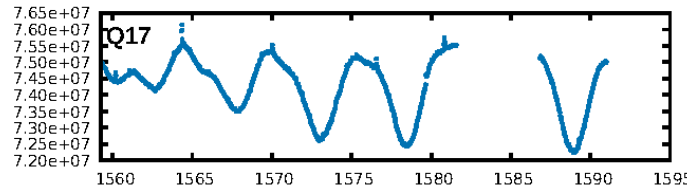
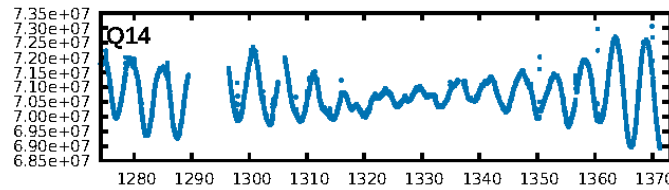
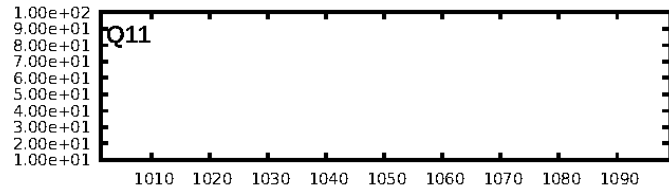
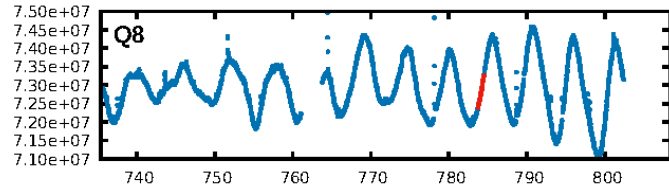
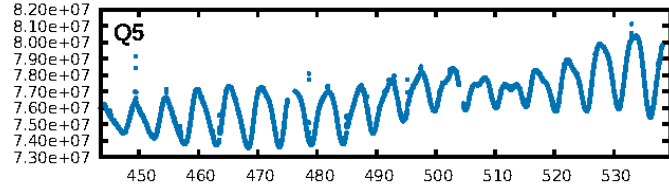
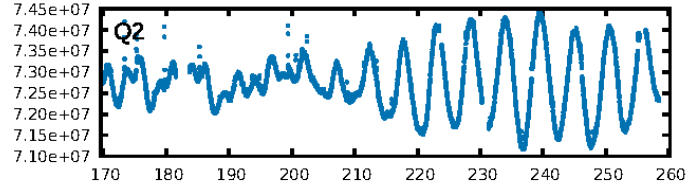
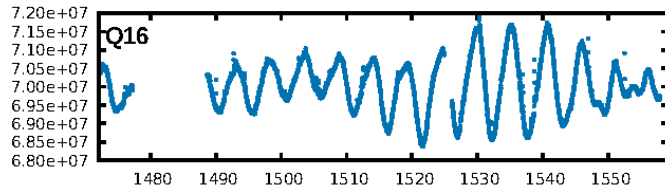
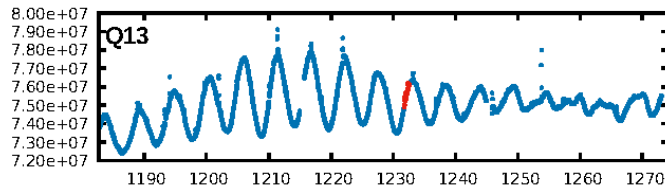
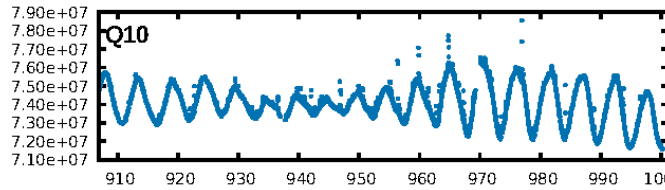
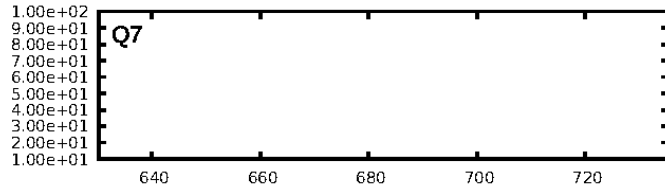
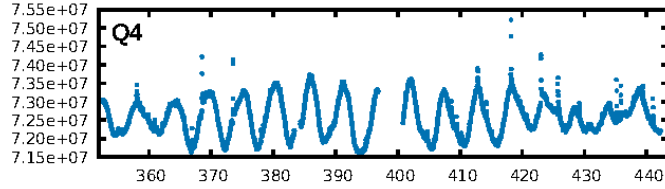
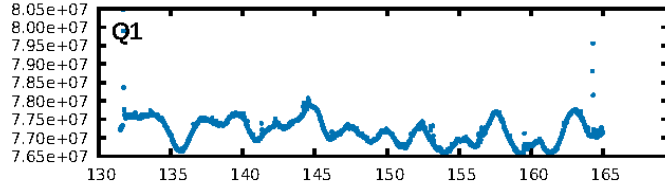
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [73.61 $\sigma$ ]  
ModelChiSquare2-sig: 2.5%  
ModelChiSquareGof-sig: 96.8%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 9.342  
Centroid-sig: 11.8%  
Centroid-so: 0.620 arcsec [1.66 $\sigma$ ]  
OotOffset-rm: 0.129 arcsec [1.20 $\sigma$ ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-rm: 0.072 arcsec [0.55 $\sigma$ ]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

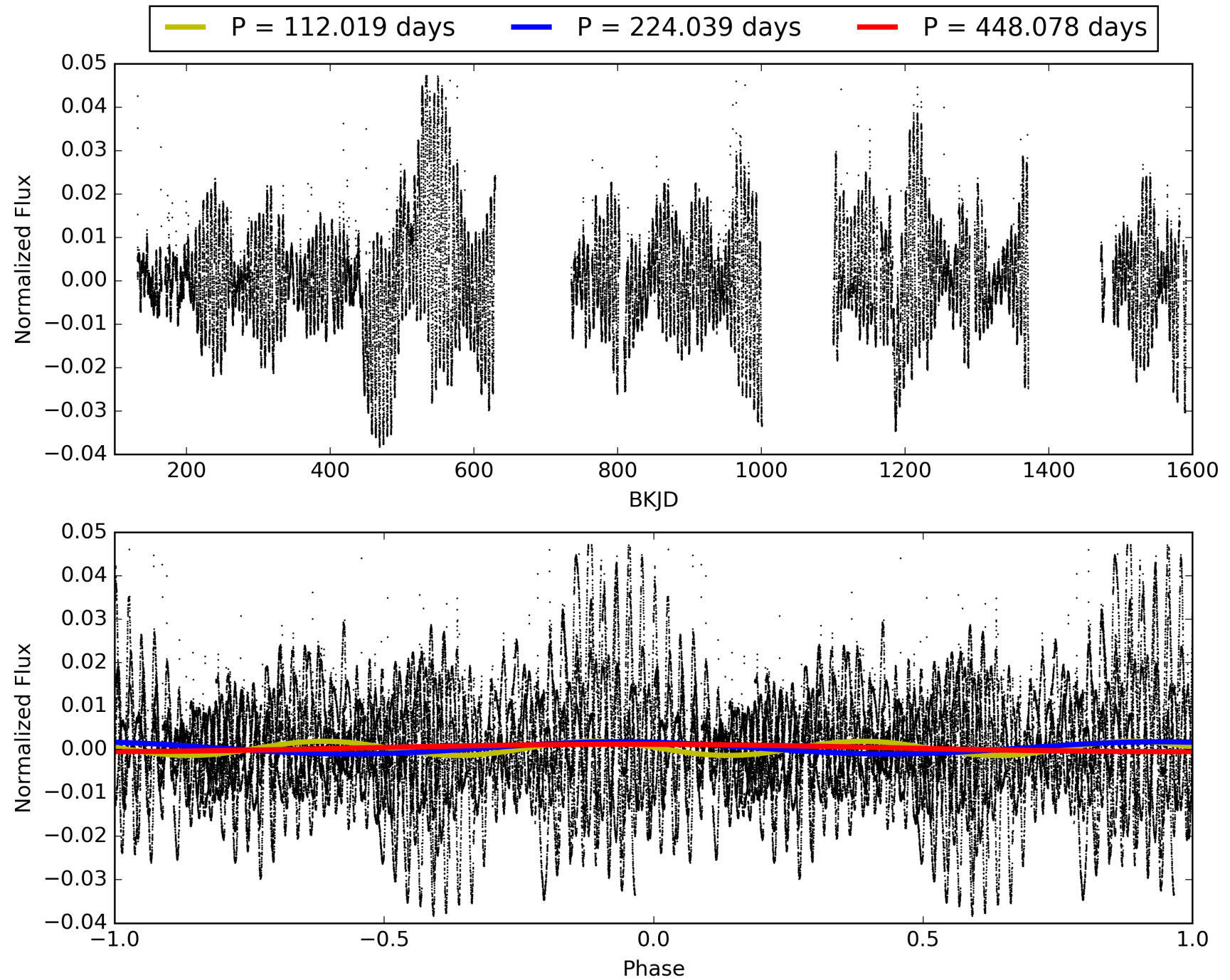
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:00:46 Z

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

# TCE 010422252-02, PDC Light Curves



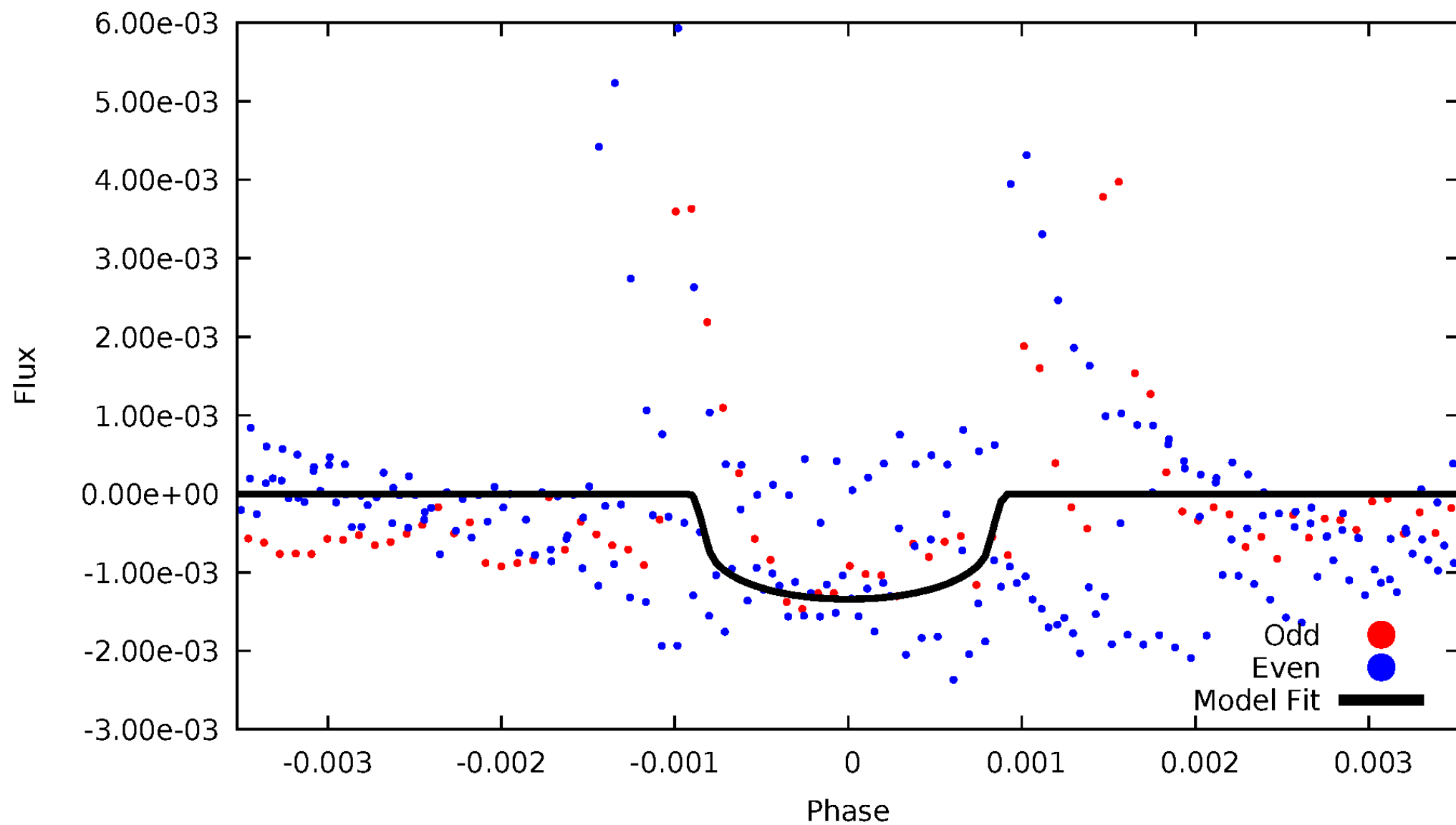
# TCE 010422252-02





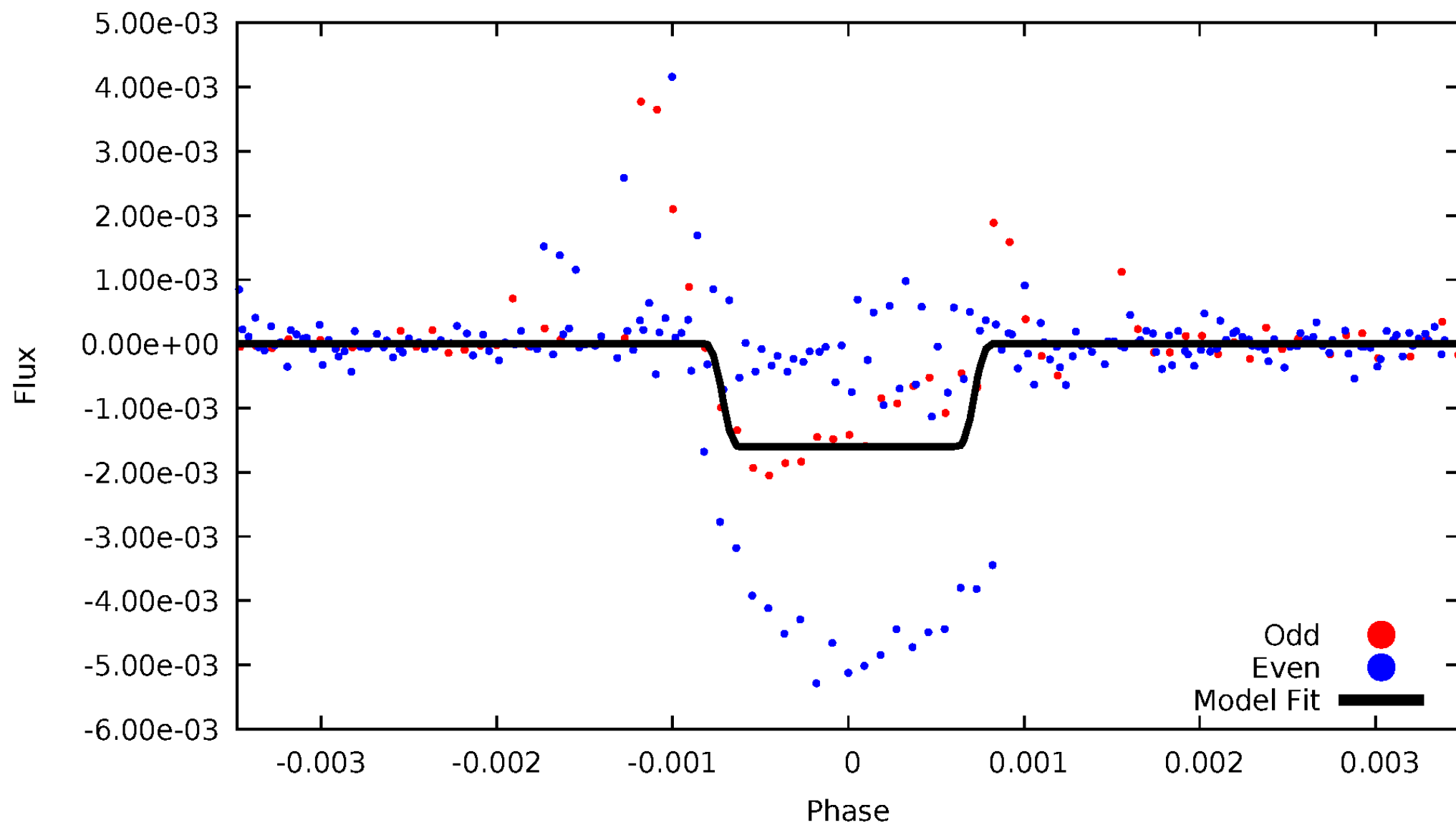
# DV Odd/Even

TCE 010422252-02



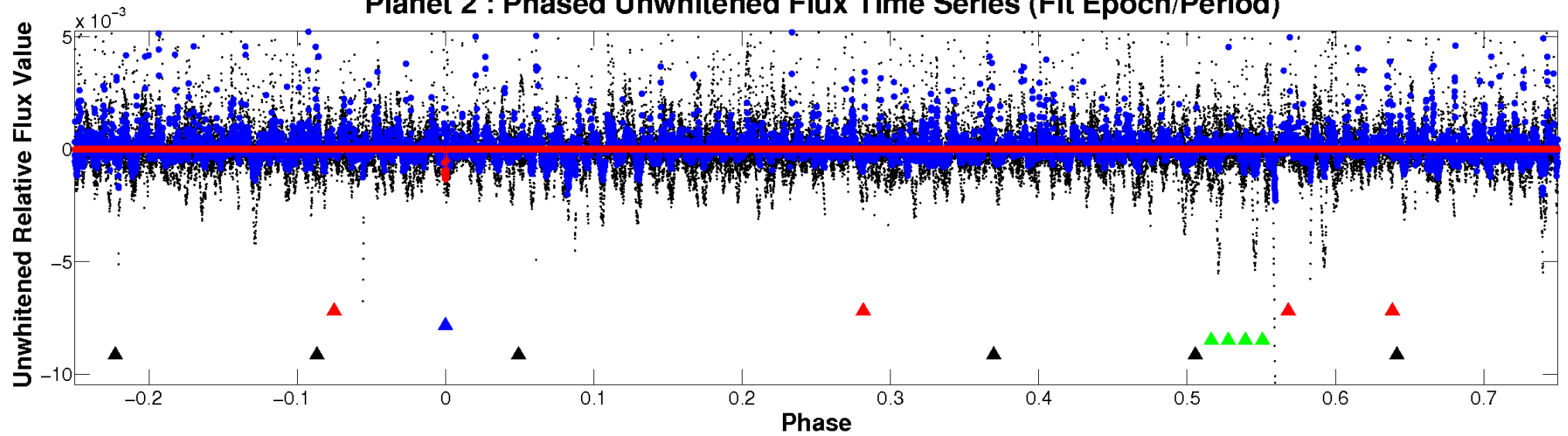
# ALT Odd/Even

TCE 010422252-02

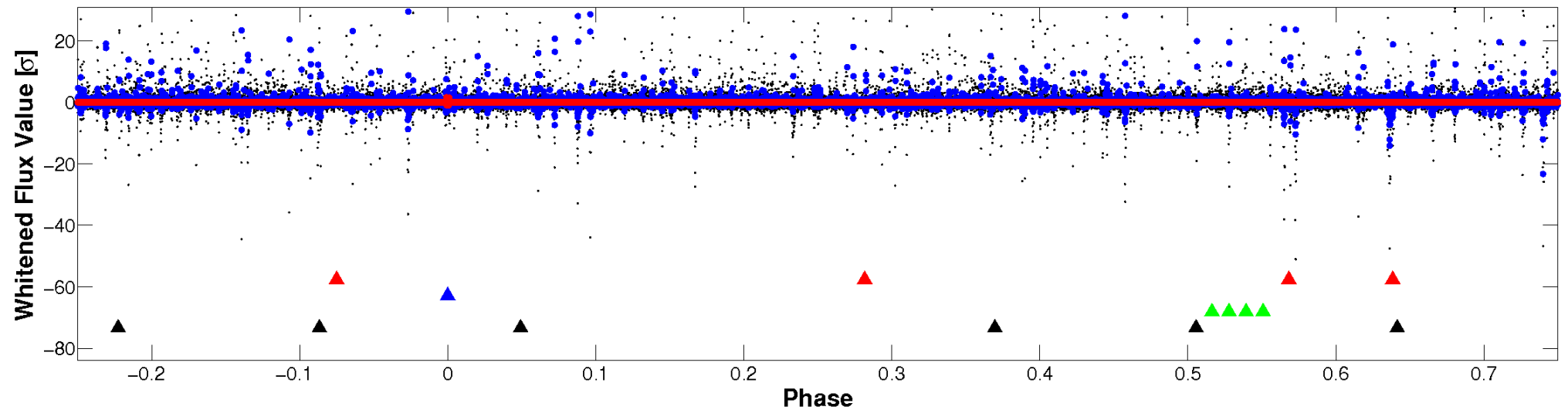


# Non-Whitened Vs. Whitened Light Curve

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

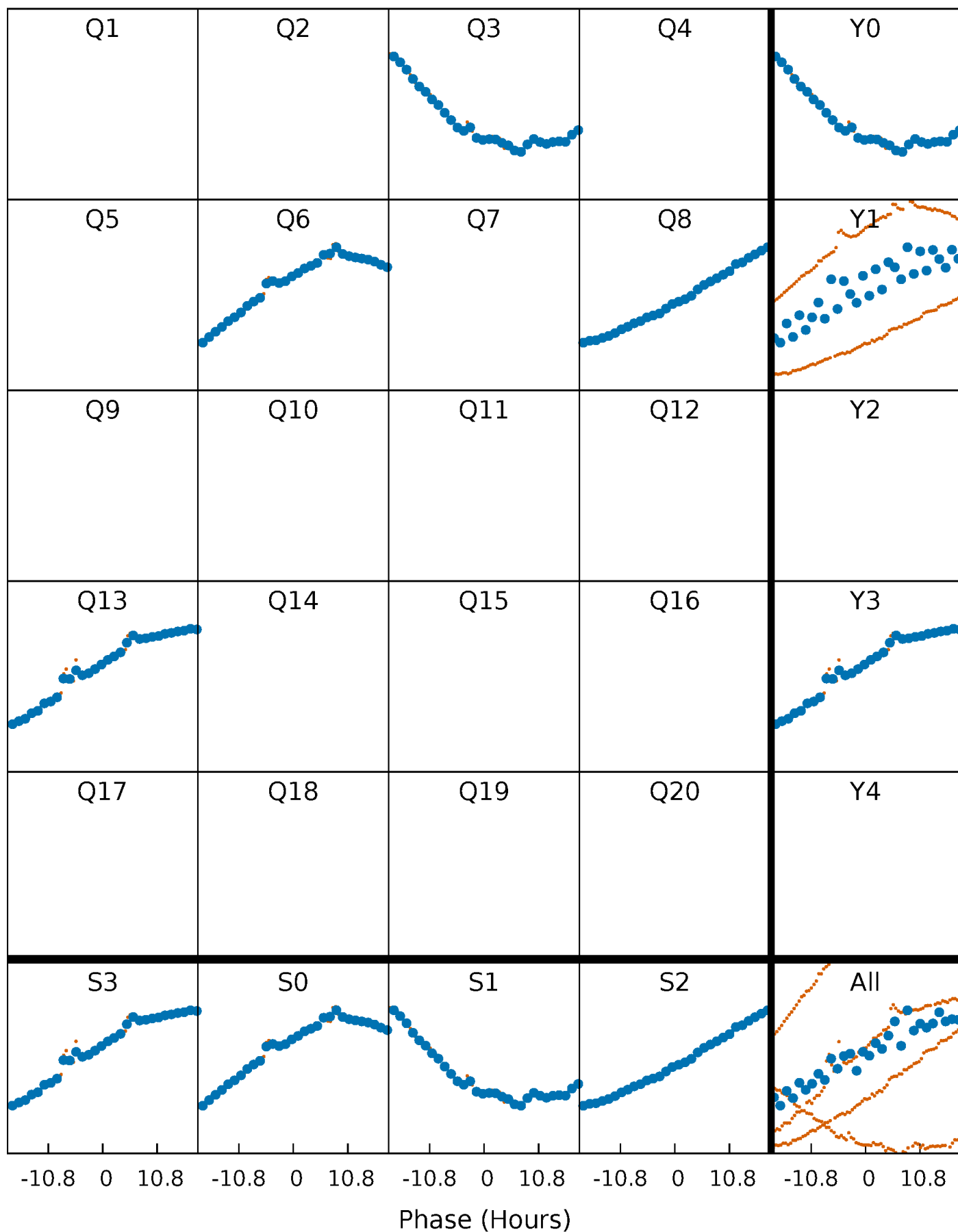


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



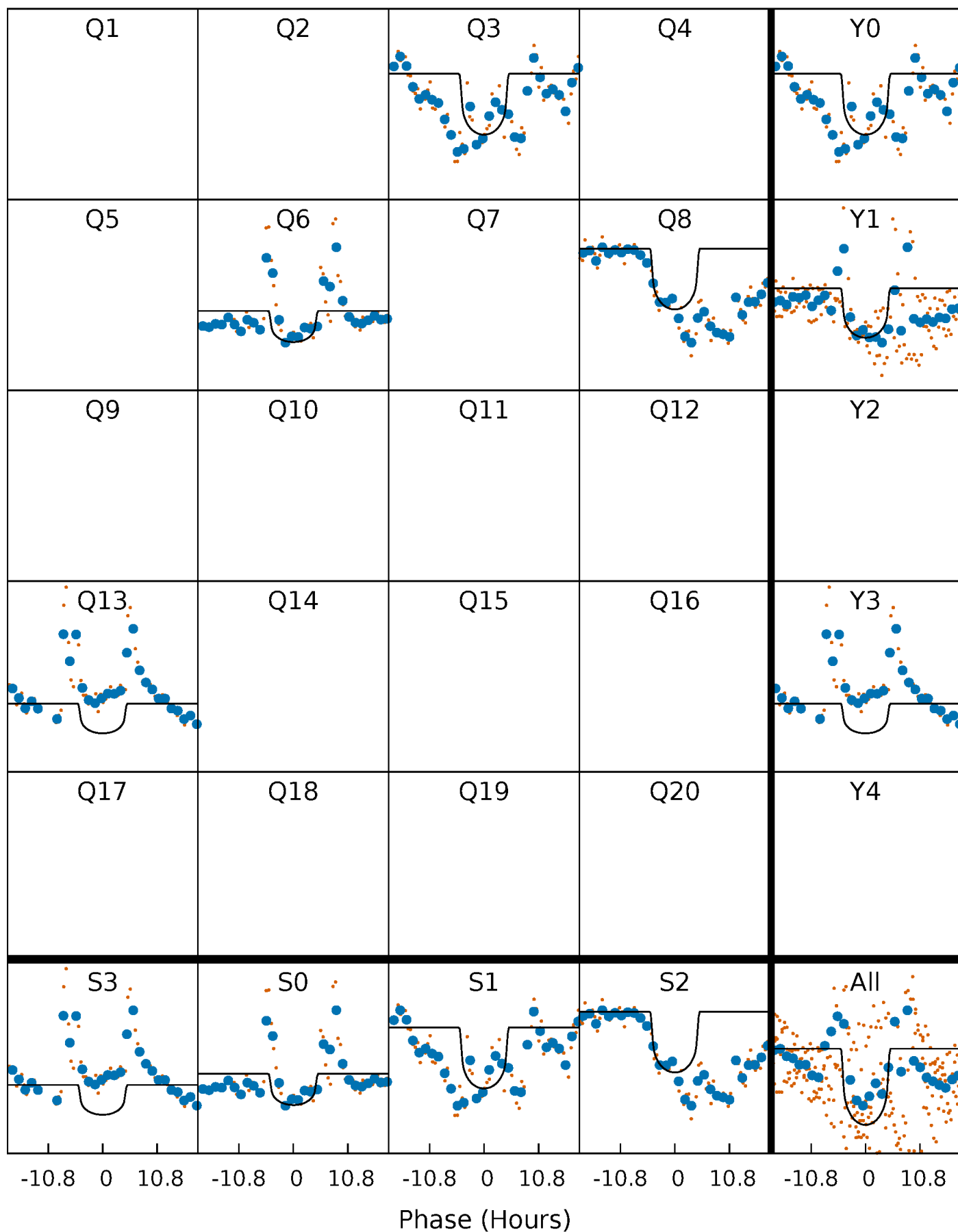
# PDC Quarter-Phased Transit Curves

TCE 010422252-02     $P=224.038859$  Days     $T_0=336.006427$  (BKJD)



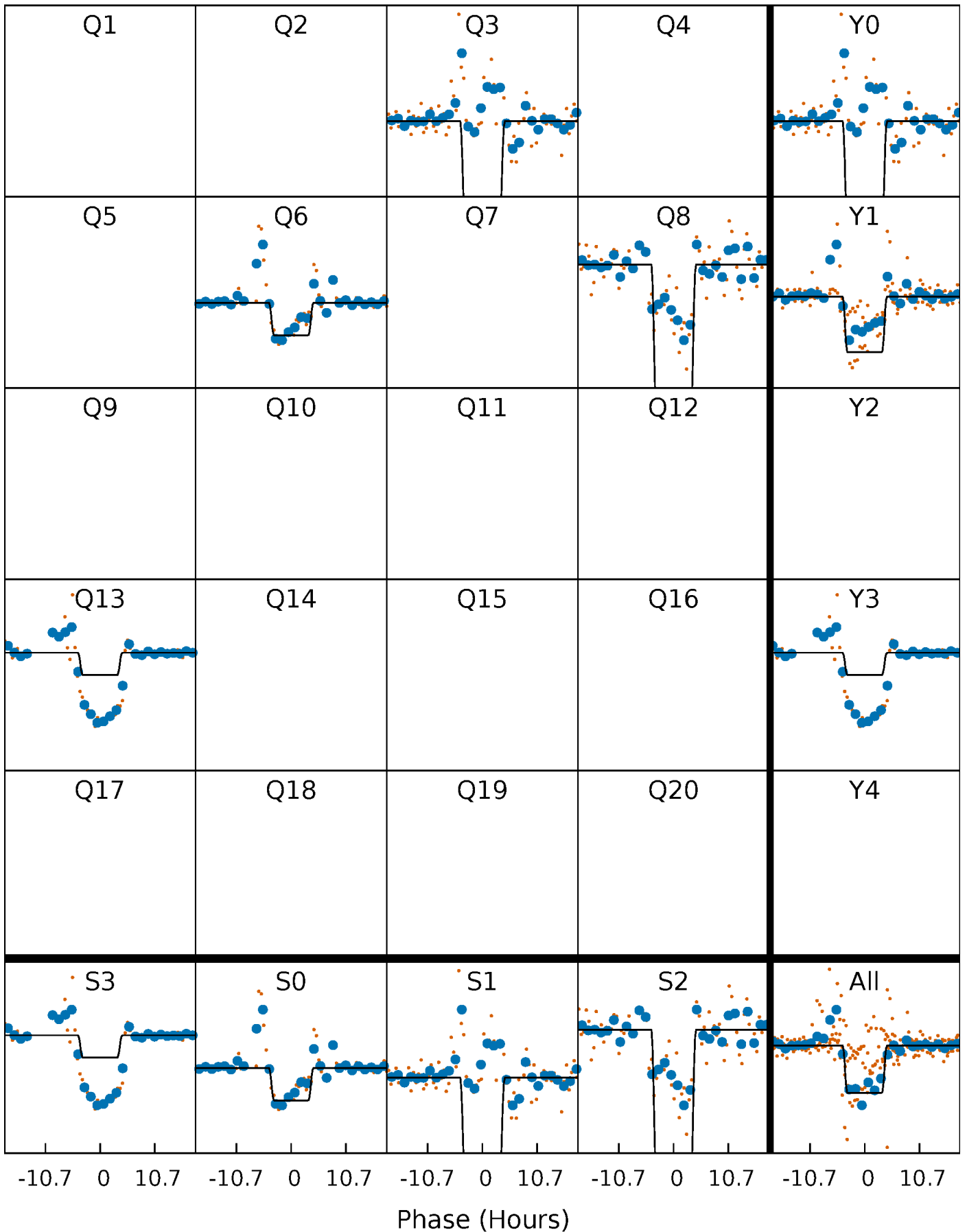
# DV Quarter-Phased Transit Curves

TCE 010422252-02     $P=224.038859$  Days     $T_0=336.006427$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

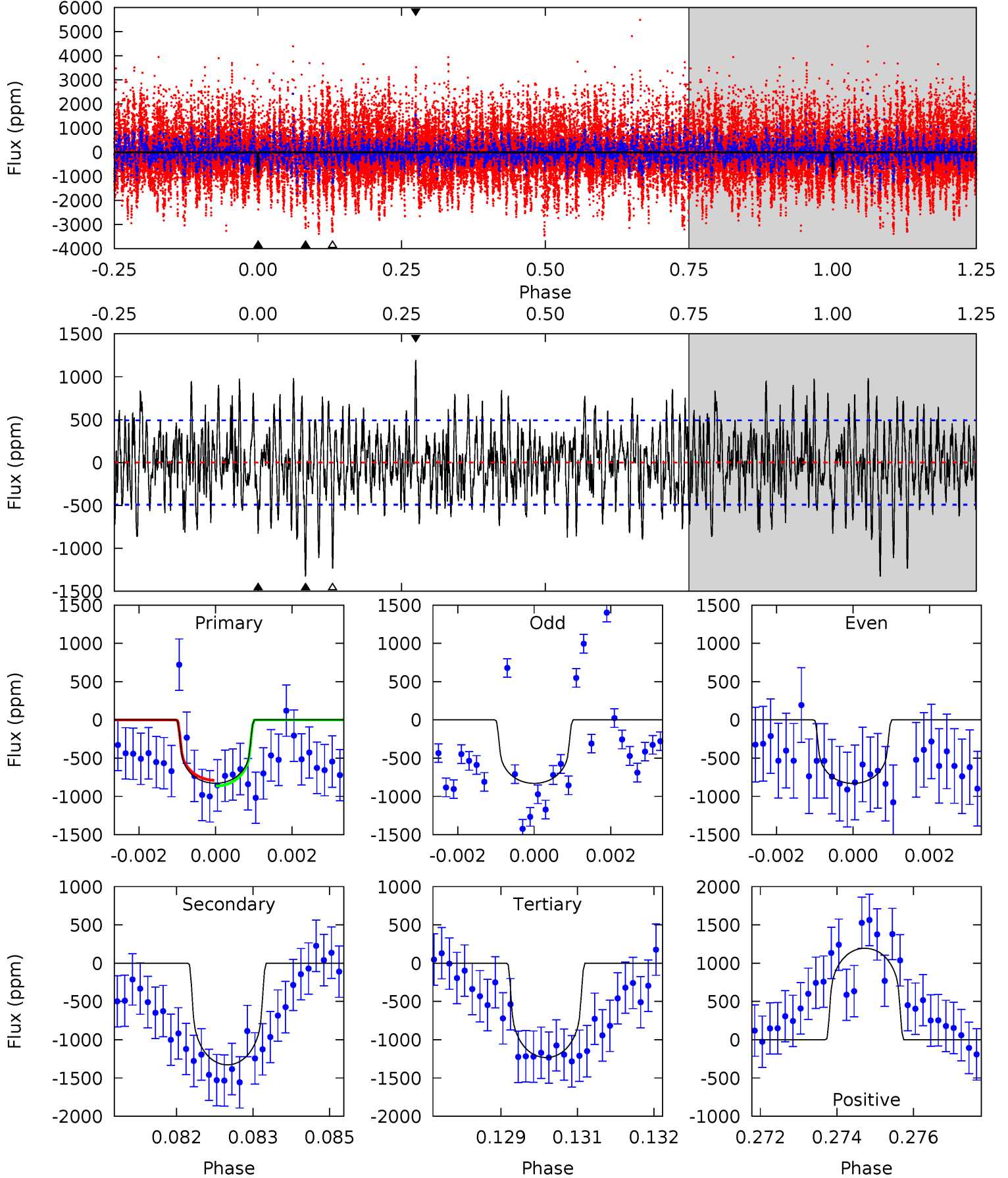
TCE 010422252-02 P=224.026741 Days  $T_0=336.059985$  (BKJD)



# DV Model-Shift Uniqueness Test

010422252-02, P = 224.038859 Days, E = 111.967568 Days

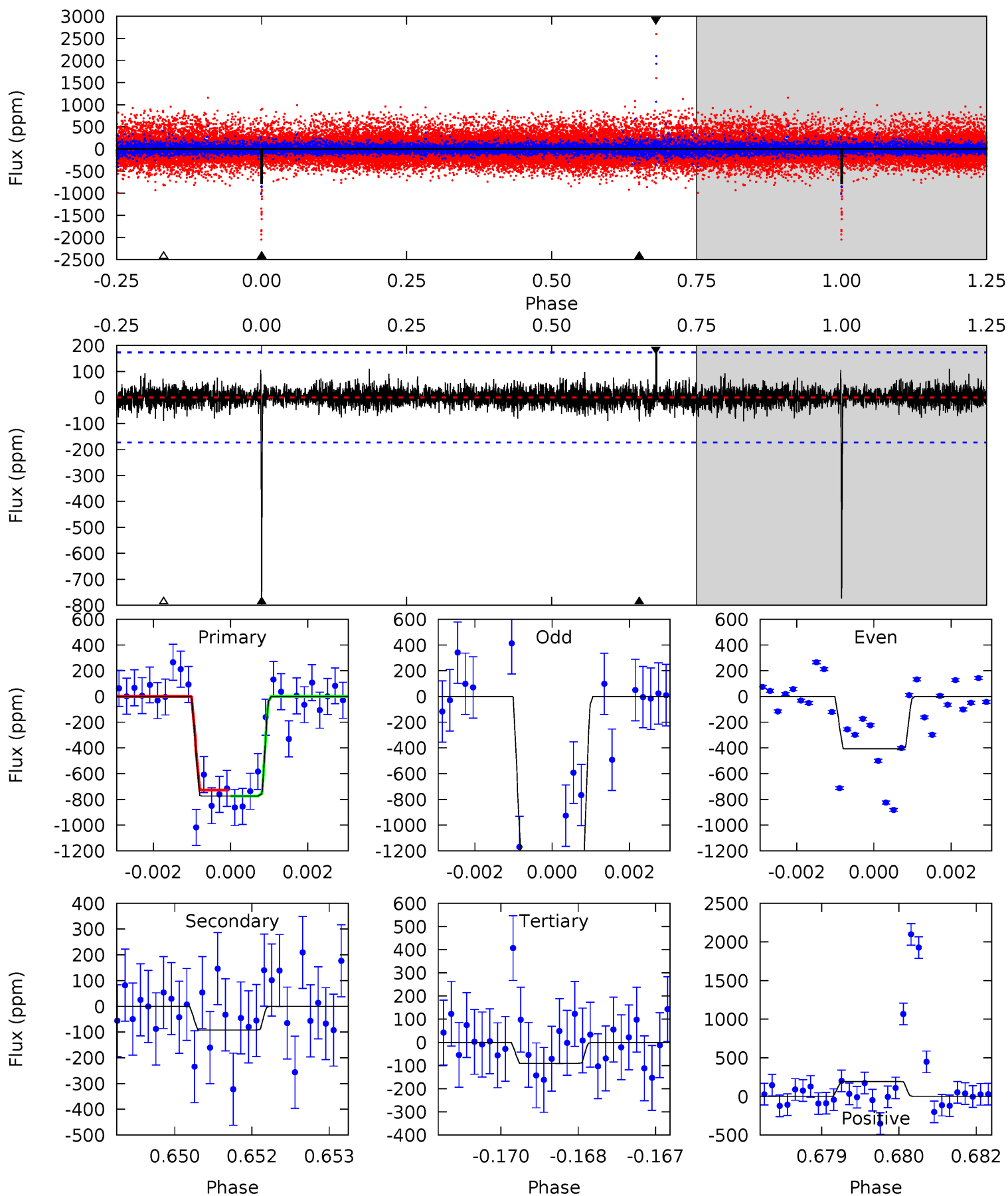
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.01	14.5	13.4	13.0	5.34	3.12	3.60	-4.40	-3.99	1.04	1.45	0.00	0.81	0.47	0.41



# Alt Model-Shift Uniqueness Test

010422252-02, P = 224.026741 Days, E = 112.033244 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
24.0	2.86	2.82	6.00	5.37	3.16	0.72	21.2	18.0	0.04	-3.15	13.1	1.63	0.20	0.69





### Stellar Parameters For KIC 010422252

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5279^{+158}_{-142}$	$4.476^{+0.112}_{-0.256}$	$-0.160^{+0.350}_{-0.300}$	$0.840^{+0.169}_{-0.112}$	$0.772^{+0.121}_{-0.060}$	$1.833^{+0.886}_{-0.865}$
	+3%/-3%	+3%/-6%	+219%/-188%	+20%/-13%	+16%/-8%	+48%/-47%
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 010422252-02 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-1328 \pm 92$	$3.27^{+1.16}_{-1.08}$	$373^{+24}_{-21}$	$5447^{+1184}_{-657}$	$30635^{+37676}_{-13861}$
Alt.	$-92 \pm 32$	$3.88^{+1.12}_{-1.18}$	$372^{+27}_{-19}$	$3170^{+381}_{-297}$	$1518^{+1740}_{-745}$

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

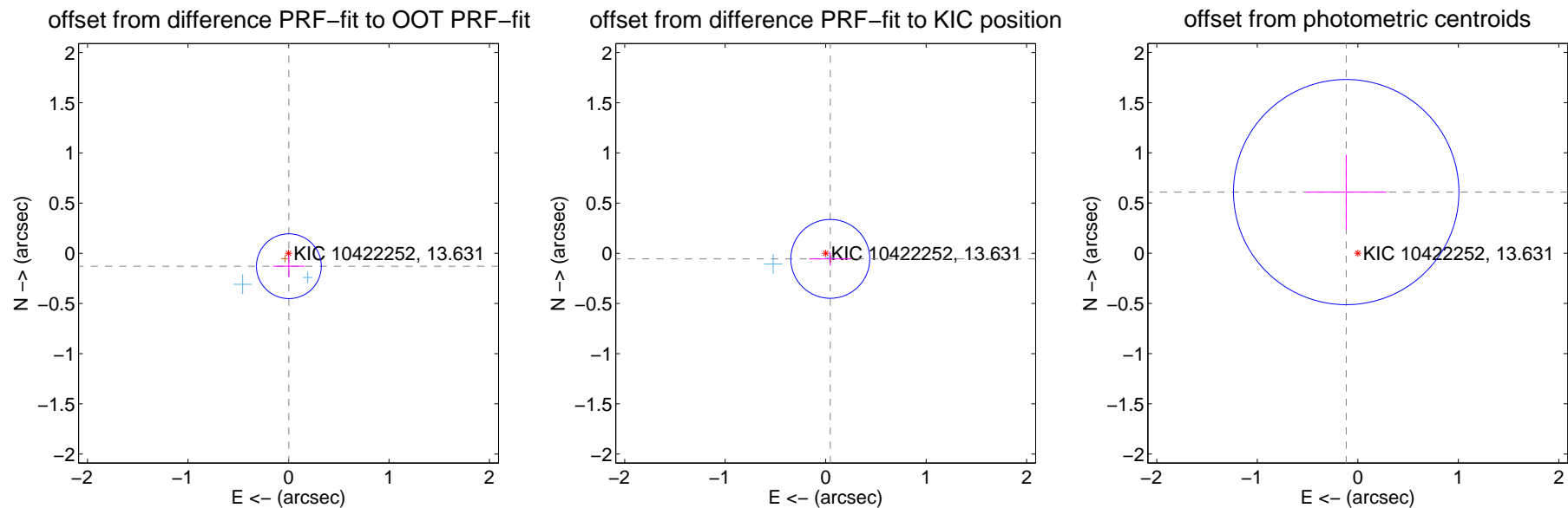
## DV Centroid Data

Supplemental centroid analysis for 010422252-02. Kepler magnitude: 13.63. Transit SNR 7.84

There are 2 quarters with good PRF difference image offsets

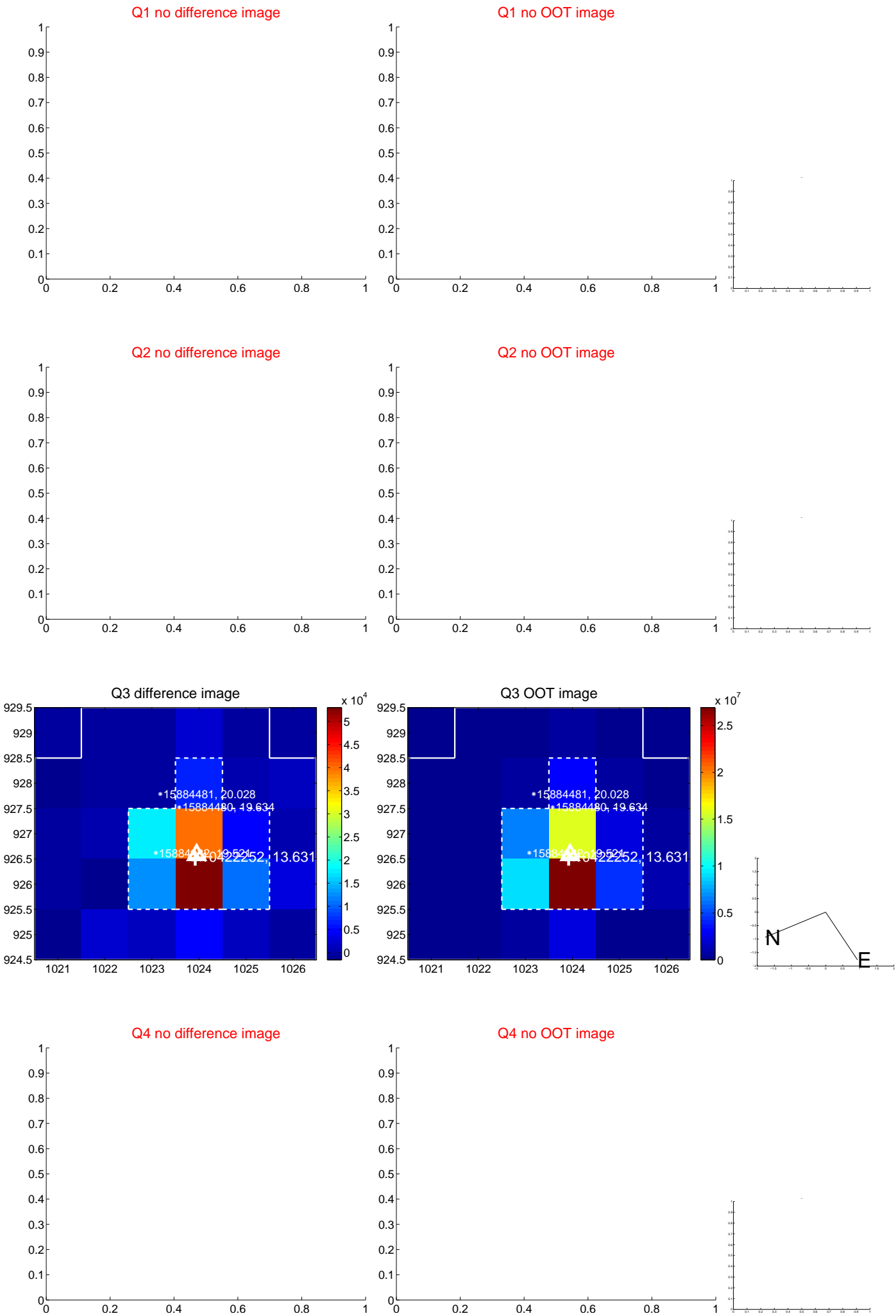
The direct PRF centroid is offset from the target star catalog position by about 0.21 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.129 \pm 0.108$	1.20	$-0.004 \pm 0.157$	$-0.129 \pm 0.108$
PRF-fit source offset from KIC position	$0.072 \pm 0.131$	0.55	$-0.046 \pm 0.211$	$-0.056 \pm 0.069$
photometric centroid source offset	$0.62 \pm 0.37$	1.66	$0.12 \pm 0.40$	$0.61 \pm 0.37$

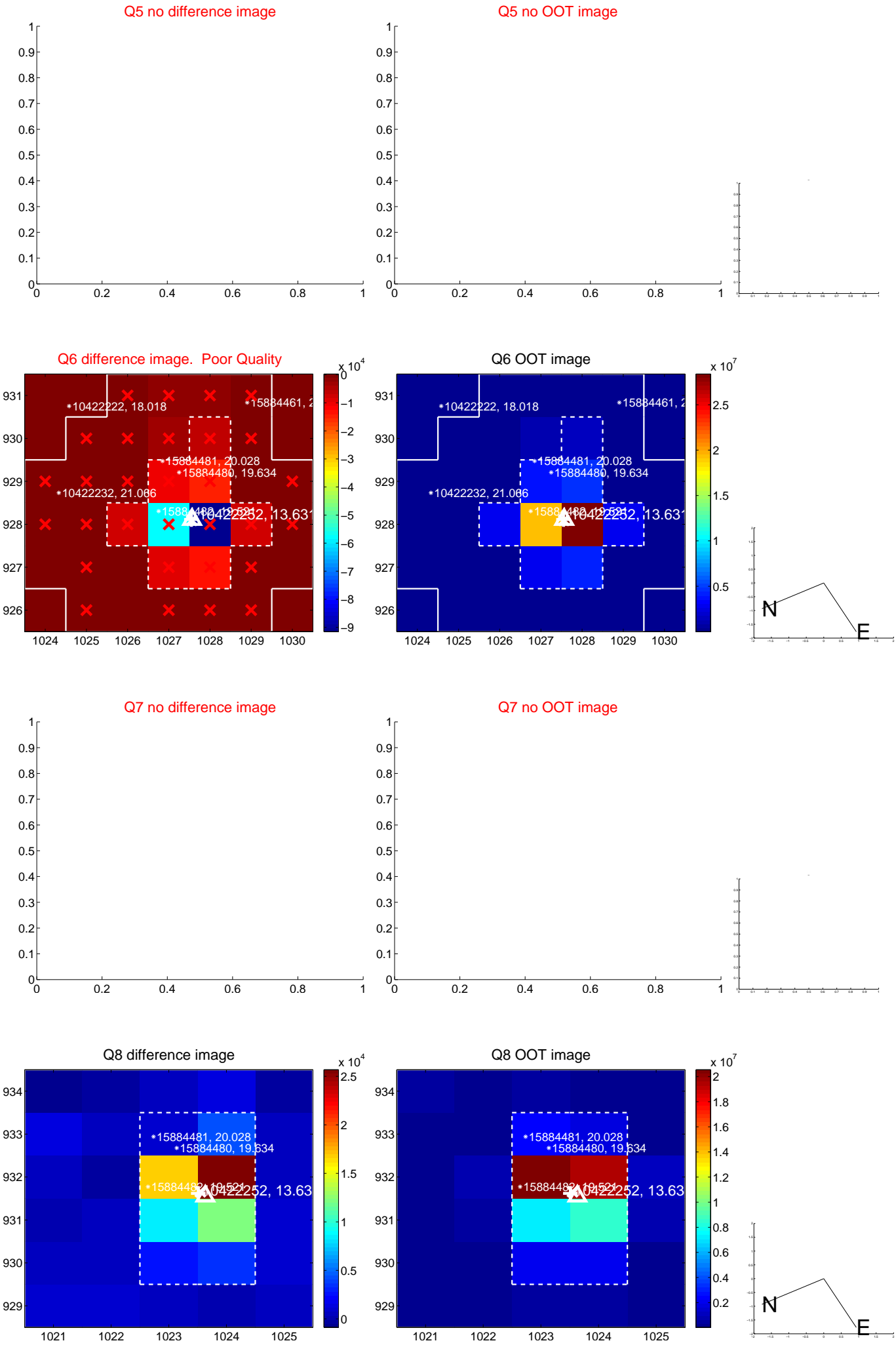


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

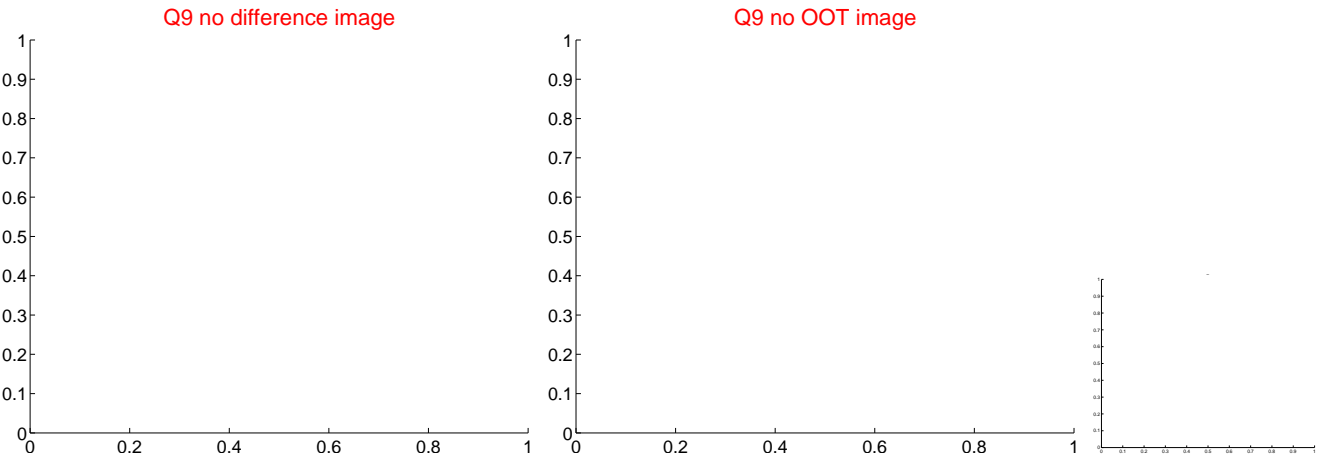
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



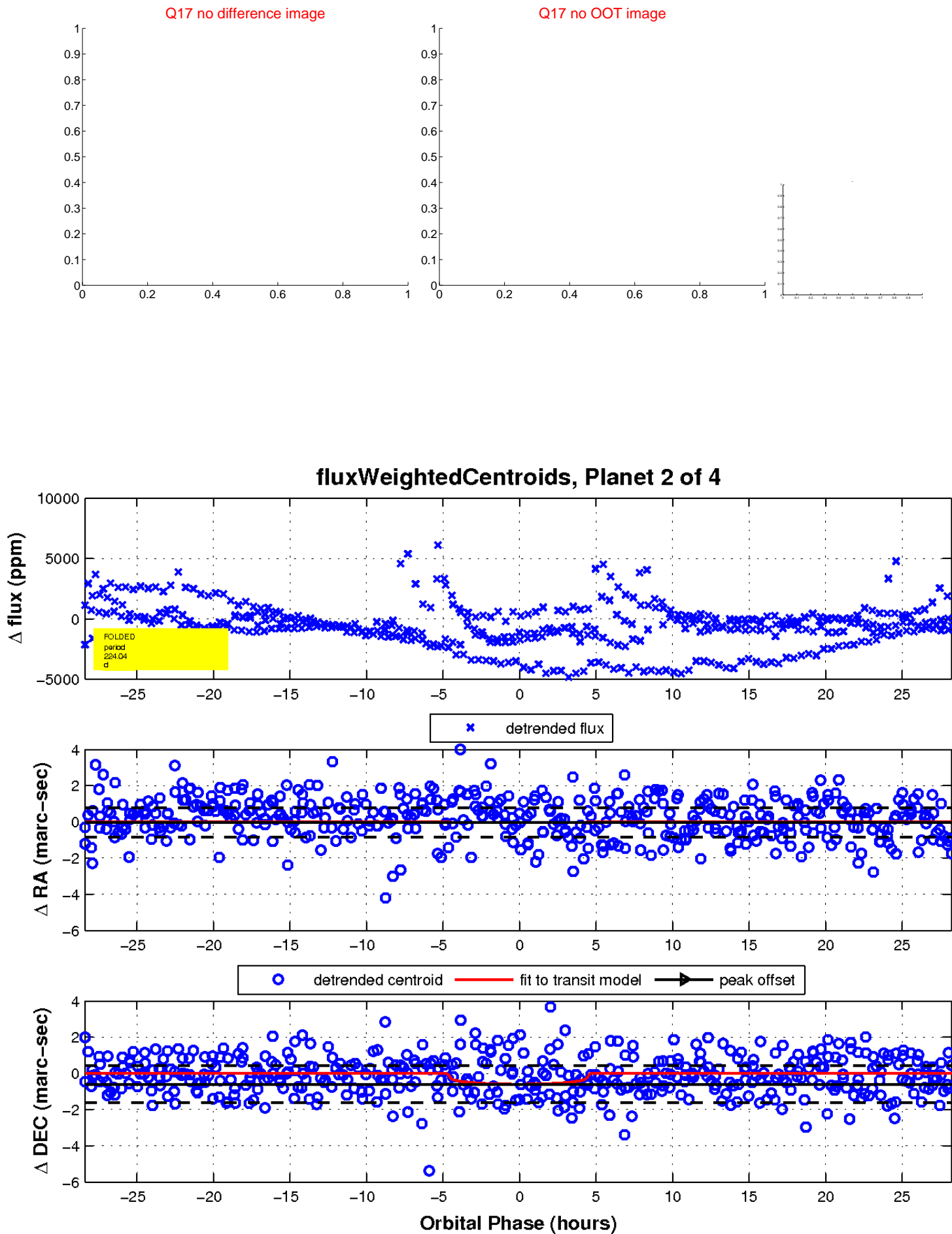
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.



This panel shows a deep-field astronomical image of a star field. A blue grid is overlaid on the image, with green text labels indicating coordinates. The labels include '2.0', '41.0', '19:51:40.0', '39.0', '38.0', '50.0', '47.0', '40:047:33:50.0', '30.0', and '0.0'. The image displays numerous stars of varying brightness against a dark background.

This panel shows a deep-field astronomical image of a star field. A blue grid is overlaid on the image, with green text labels indicating coordinates. The labels include '2.0', '41.0', '19:51:40.0', '39.0', '38.0', '50.0', '47.0', '40:047:33:50.0', '30.0', and '0.0'. The image displays numerous stars of varying brightness against a dark background.



# KIC 010422252

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010422252-01	OBS	No	368.156193	255.000817	570.0	5.386	15.4	4.3	0.84	5279	2.02	0.58
010422252-02	OBS	No	224.038859	336.006427	1343.0	9.465	14.6	7.8	0.84	5279	3.07	1.12
010422252-03	OBS	No	450.655822	227.643175	1425.0	3.812	14.4	8.1	0.84	5279	3.14	0.44
010422252-04	OBS	No	254.490660	194.782042	793.5	3.000	13.5	-1.0	0.84	5279	2.32	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010422252-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010422252-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010422252-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—CENT_FEW_DIFFS
010422252-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

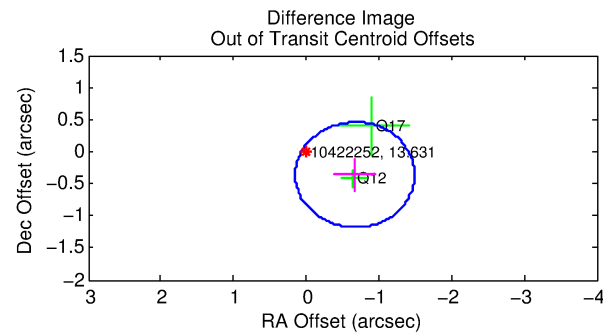
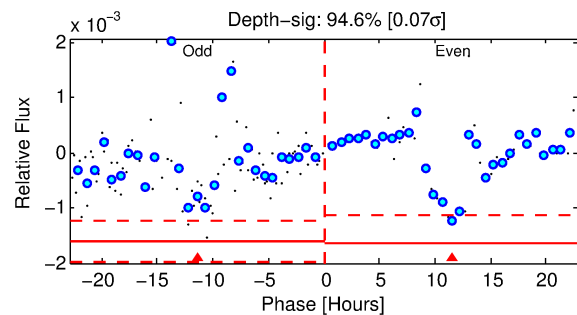
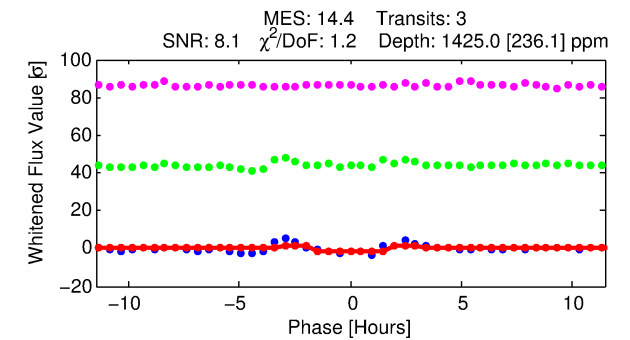
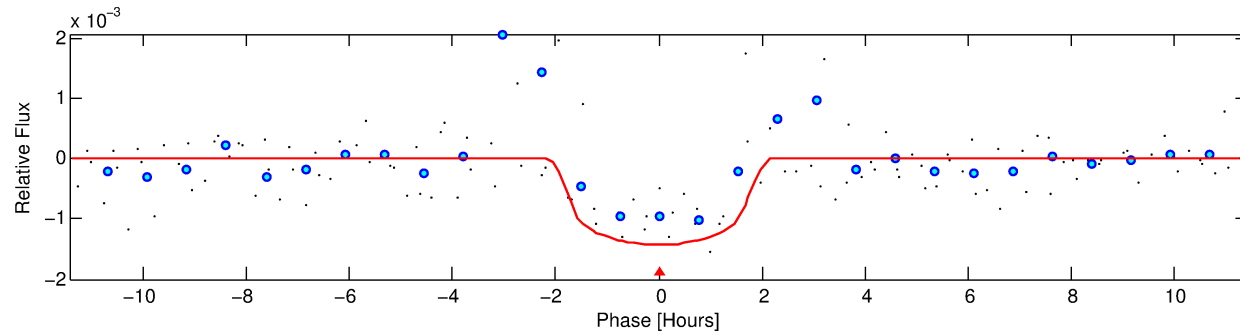
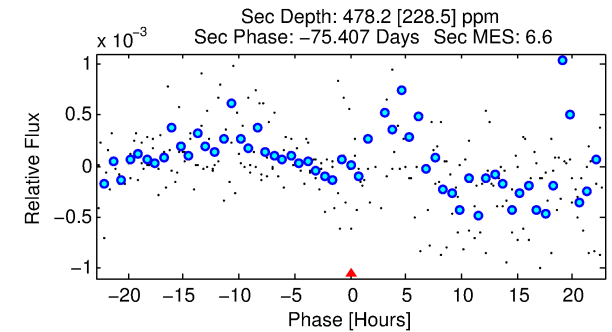
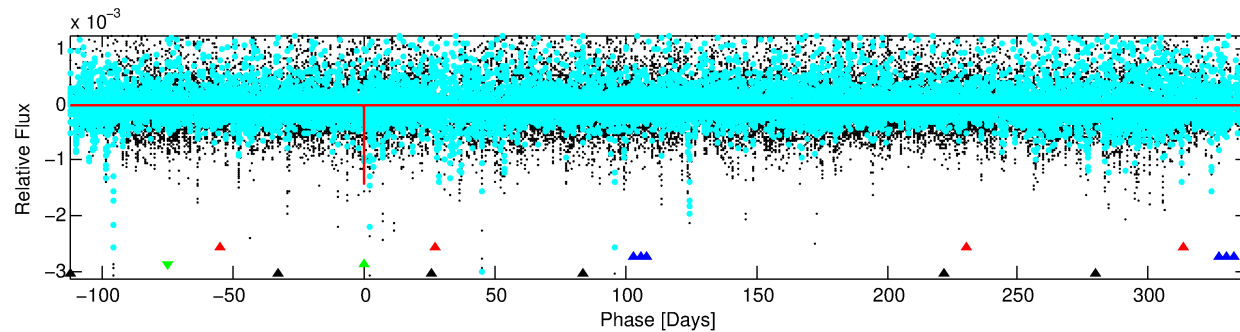
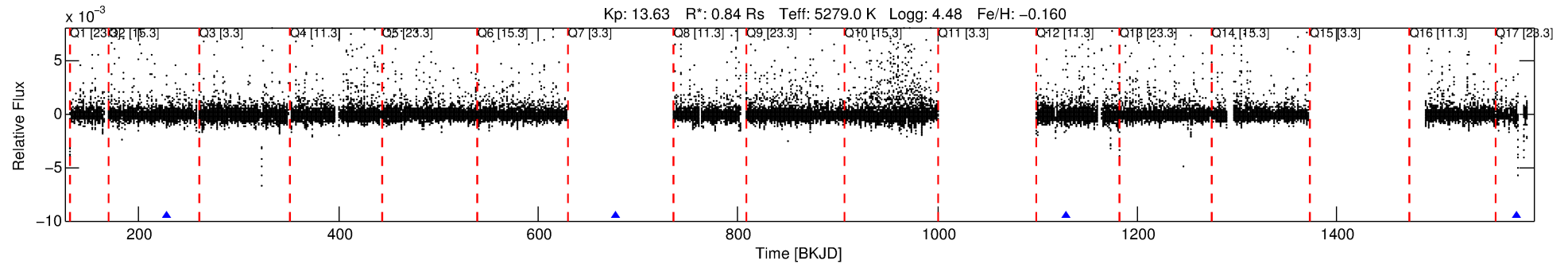
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010422252-03

No Significant Match Found

# DV One-Page Summary

KIC: 10422252 Candidate: 3 of 4 Period: 450.656 d



## DV Fit Results:

Period = 450.65582 [0.00260] d  
Epoch = 227.6432 [0.0059] BKJD  
Rp/R\* = 0.0343 [0.0937]  
a/R\* = 888.57 [9192.26]  
b = 0.32 [29.61]  
Seff = 0.44 [0.19]  
Teq = 208 [22] K  
Rp = 3.14 [8.61] Re  
a = 1.0547 [0.2509] AU  
Ag = 29610.07 [162821.30] [0.18 $\sigma$ ]  
Teffp = 4215 [5780] K [0.69 $\sigma$ ]

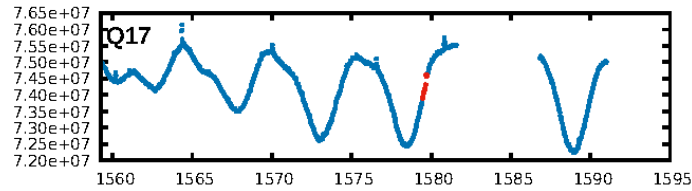
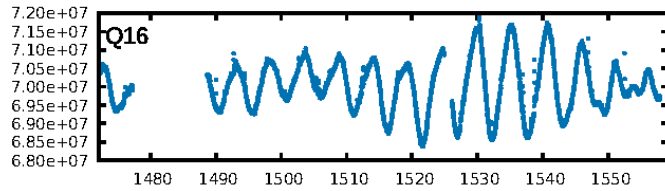
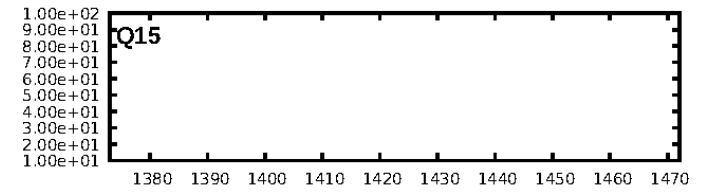
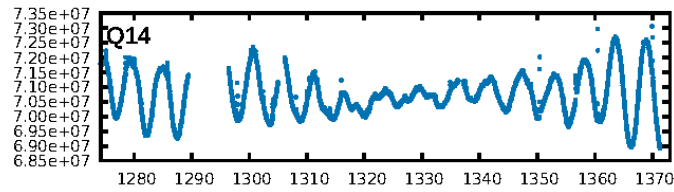
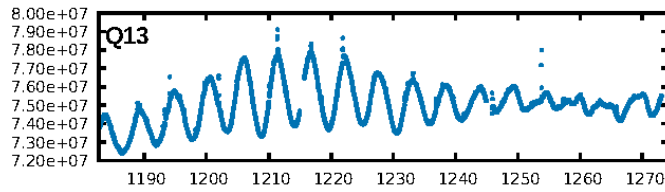
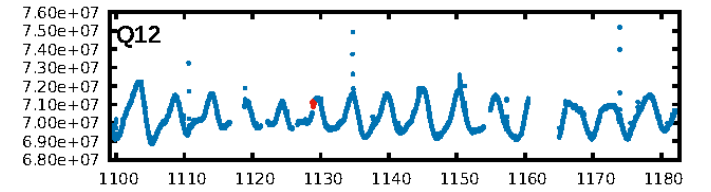
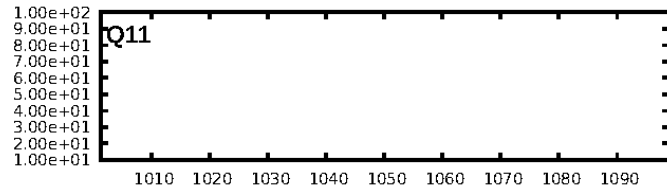
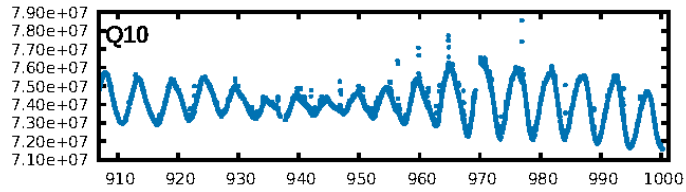
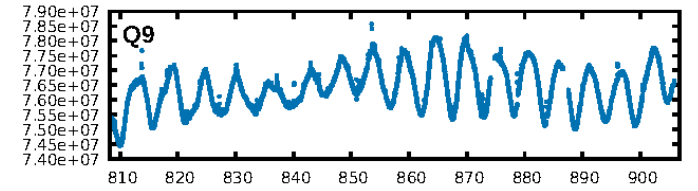
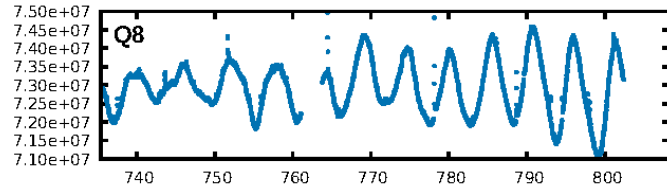
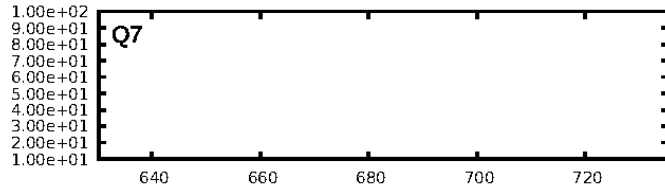
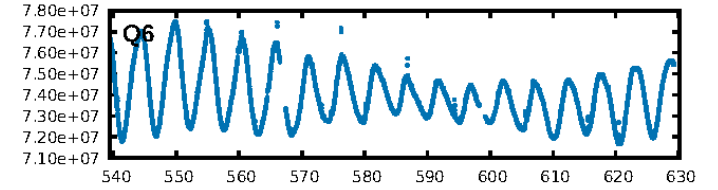
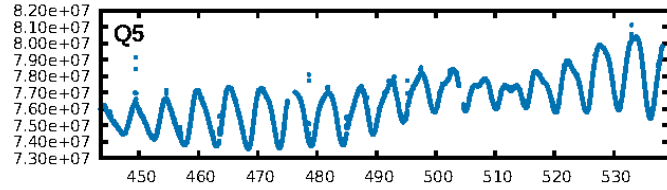
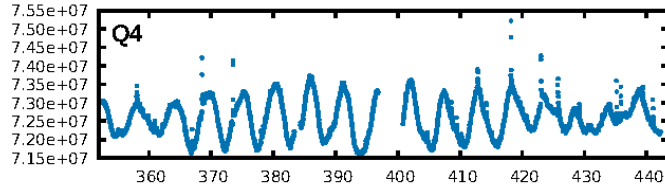
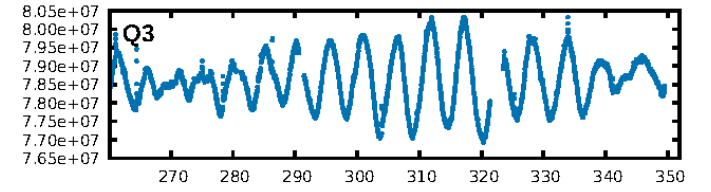
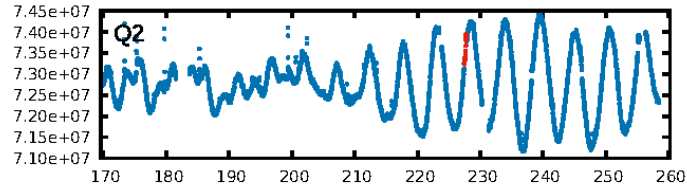
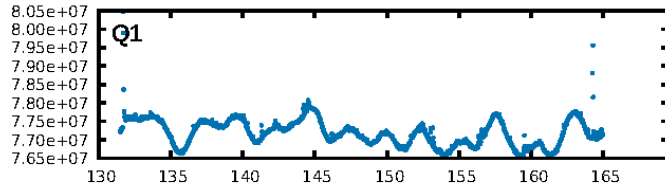
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [300.07 $\sigma$ ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 54.9%  
ModelChiSquareGof-sig: 74.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
**GhostDiagnostic-chr: 0.9371**  
Centroid-sig: 6.5%  
Centroid-so: 0.809 arcsec [1.72 $\sigma$ ]  
OotOffset-rm: 0.761 arcsec [2.78 $\sigma$ ]  
OotOffset-st: 0/0/1/1 [2]  
KicOffset-rm: 0.663 arcsec [2.36 $\sigma$ ]  
KicOffset-st: 0/0/1/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

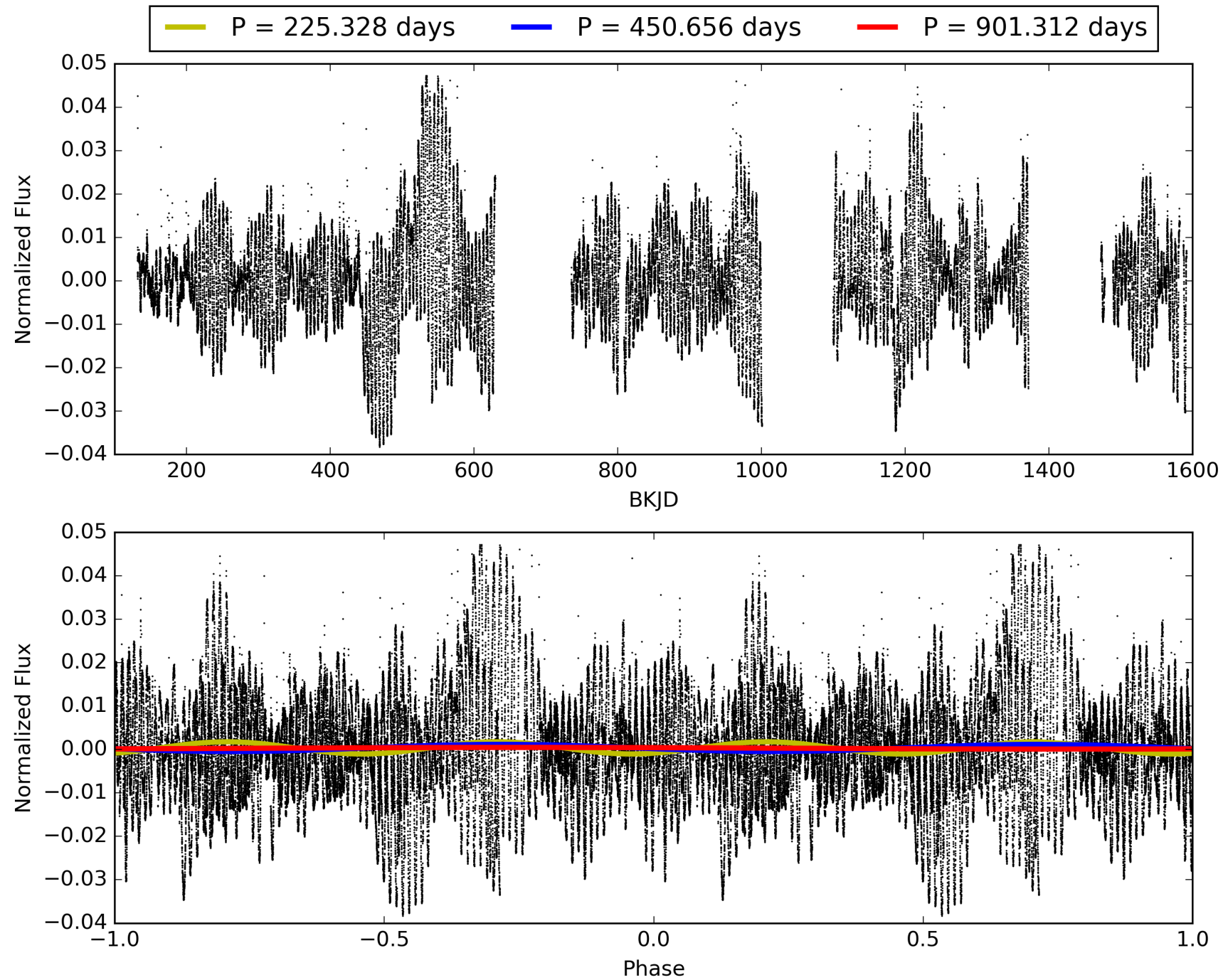
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:01:00 Z

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

# TCE 010422252-03, PDC Light Curves

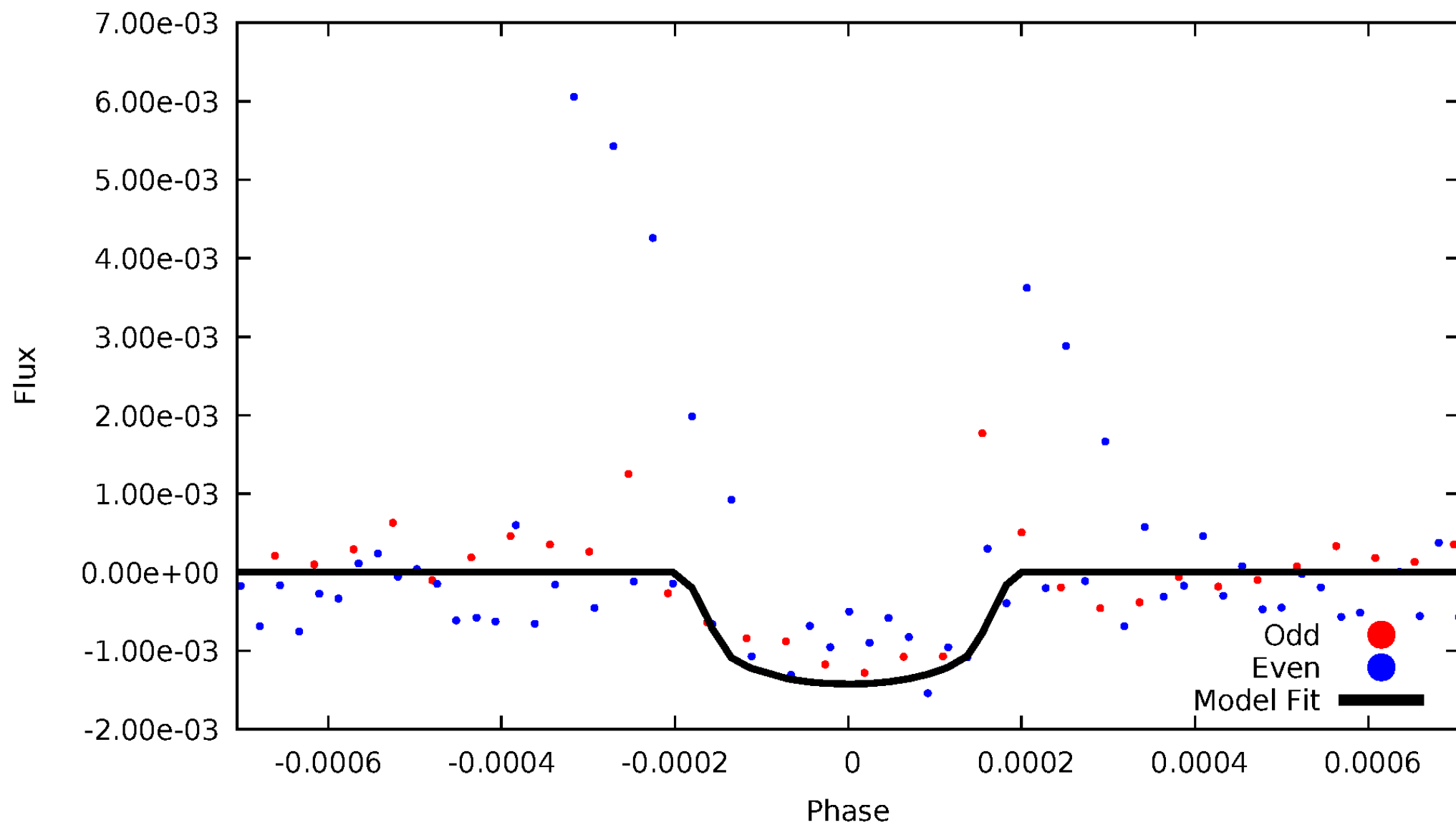


# TCE 010422252-03



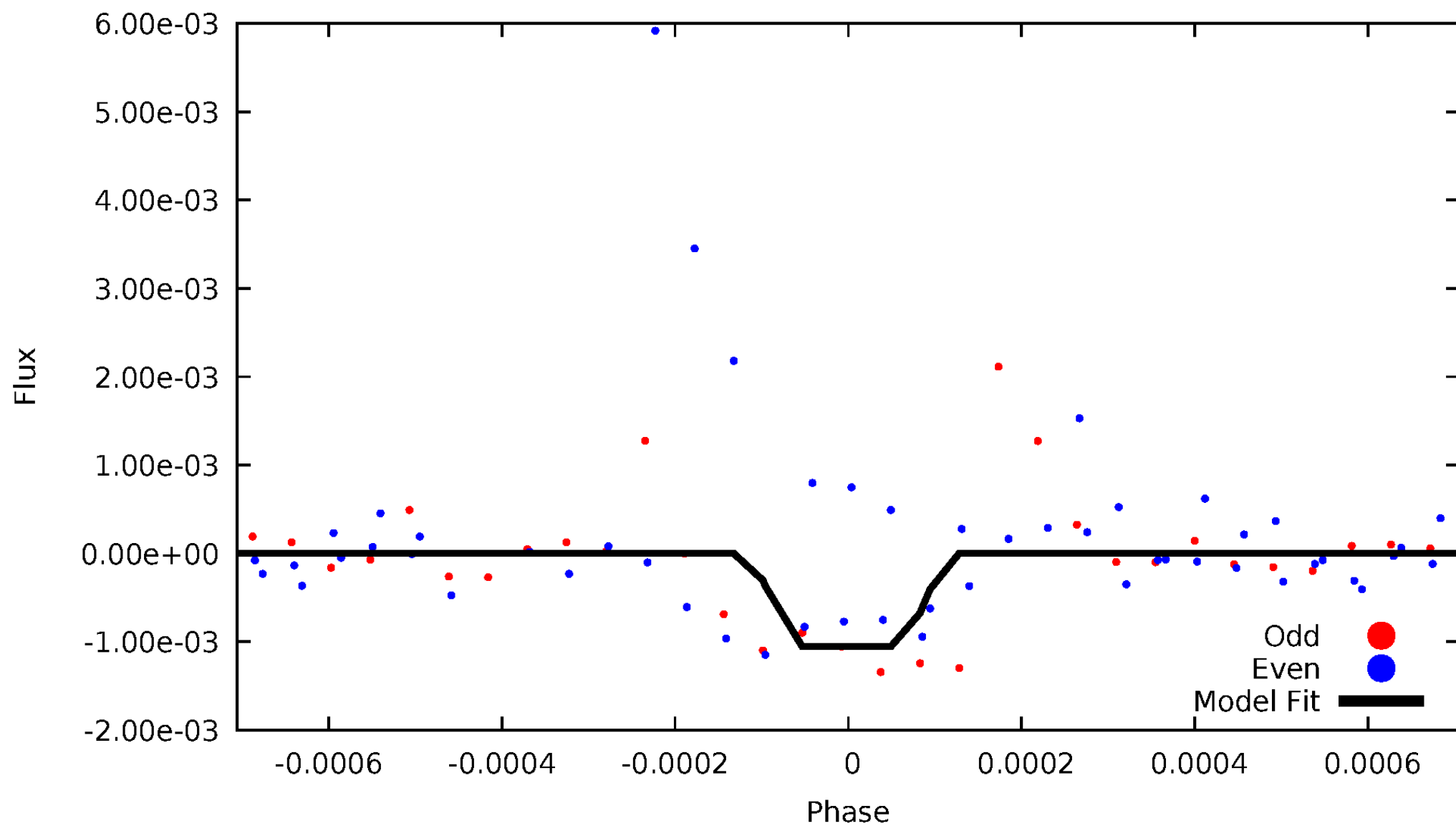
# DV Odd/Even

TCE 010422252-03



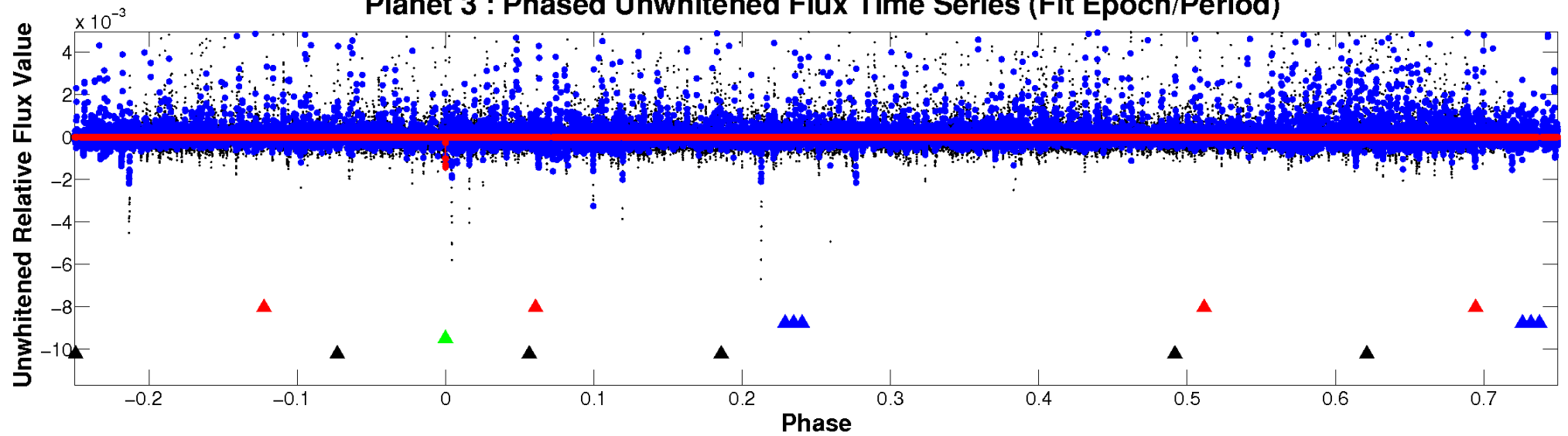
# ALT Odd/Even

TCE 010422252-03

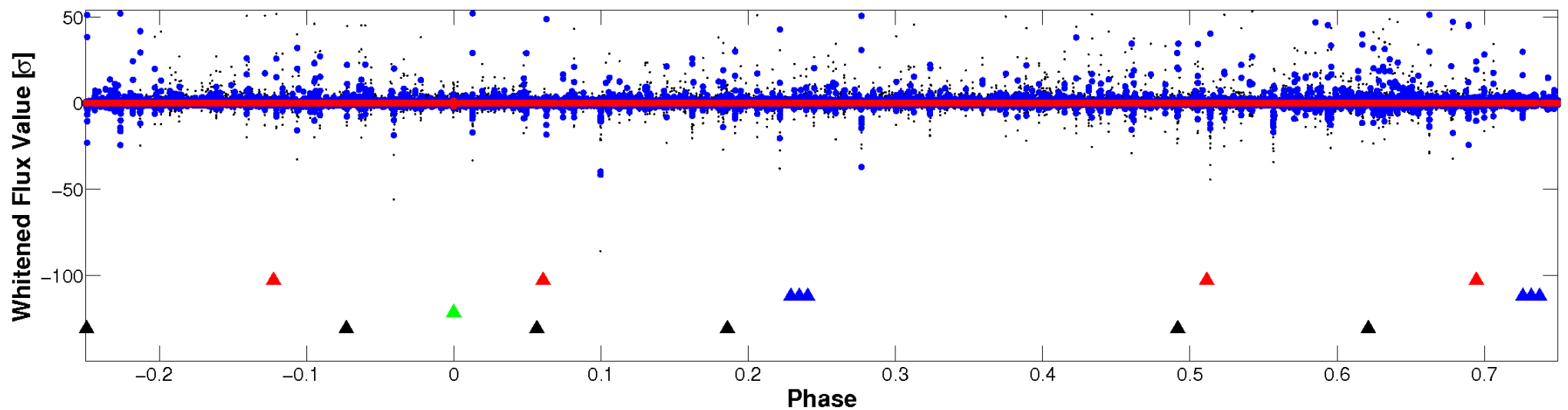


# Non-Whitened Vs. Whitened Light Curve

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

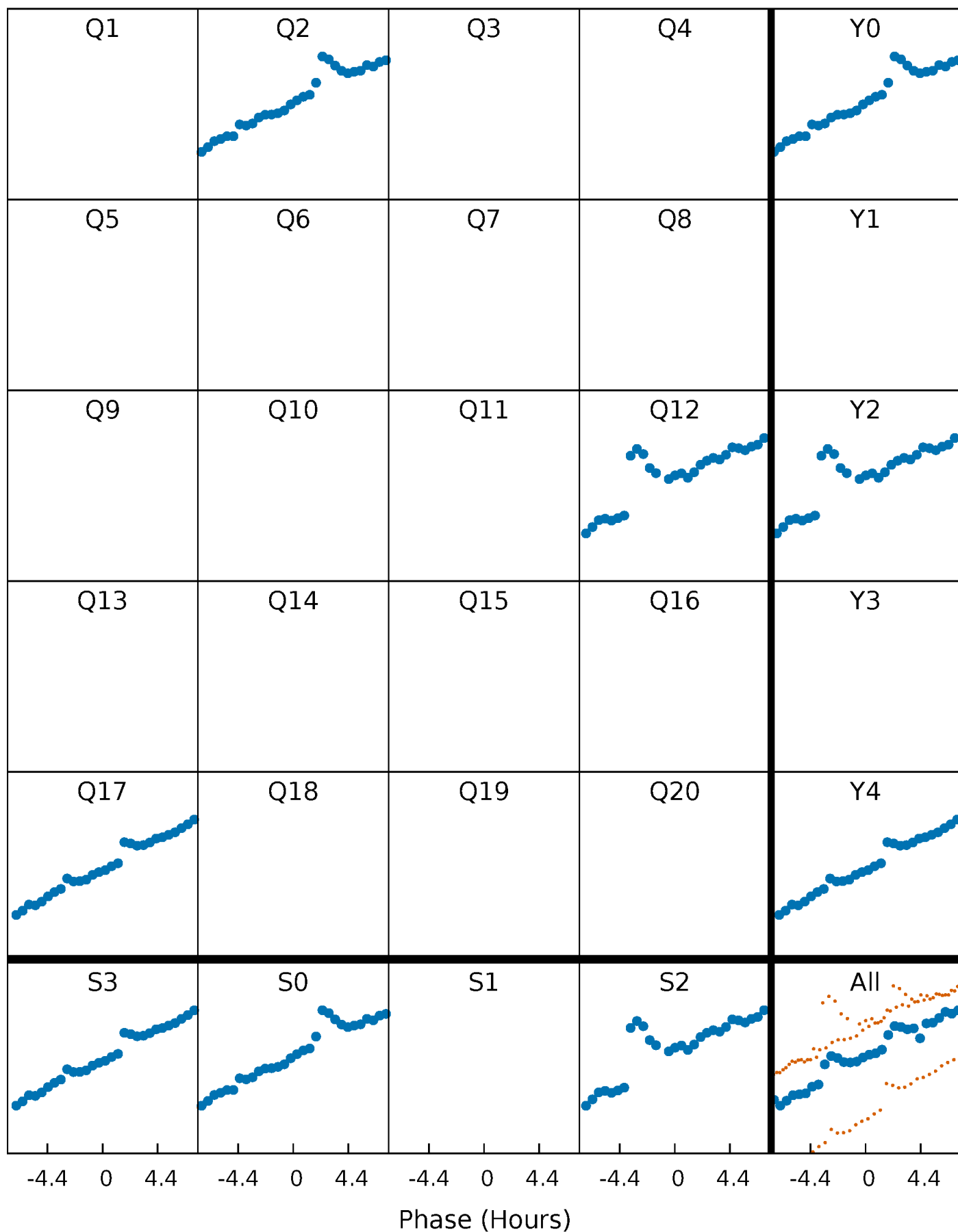


Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

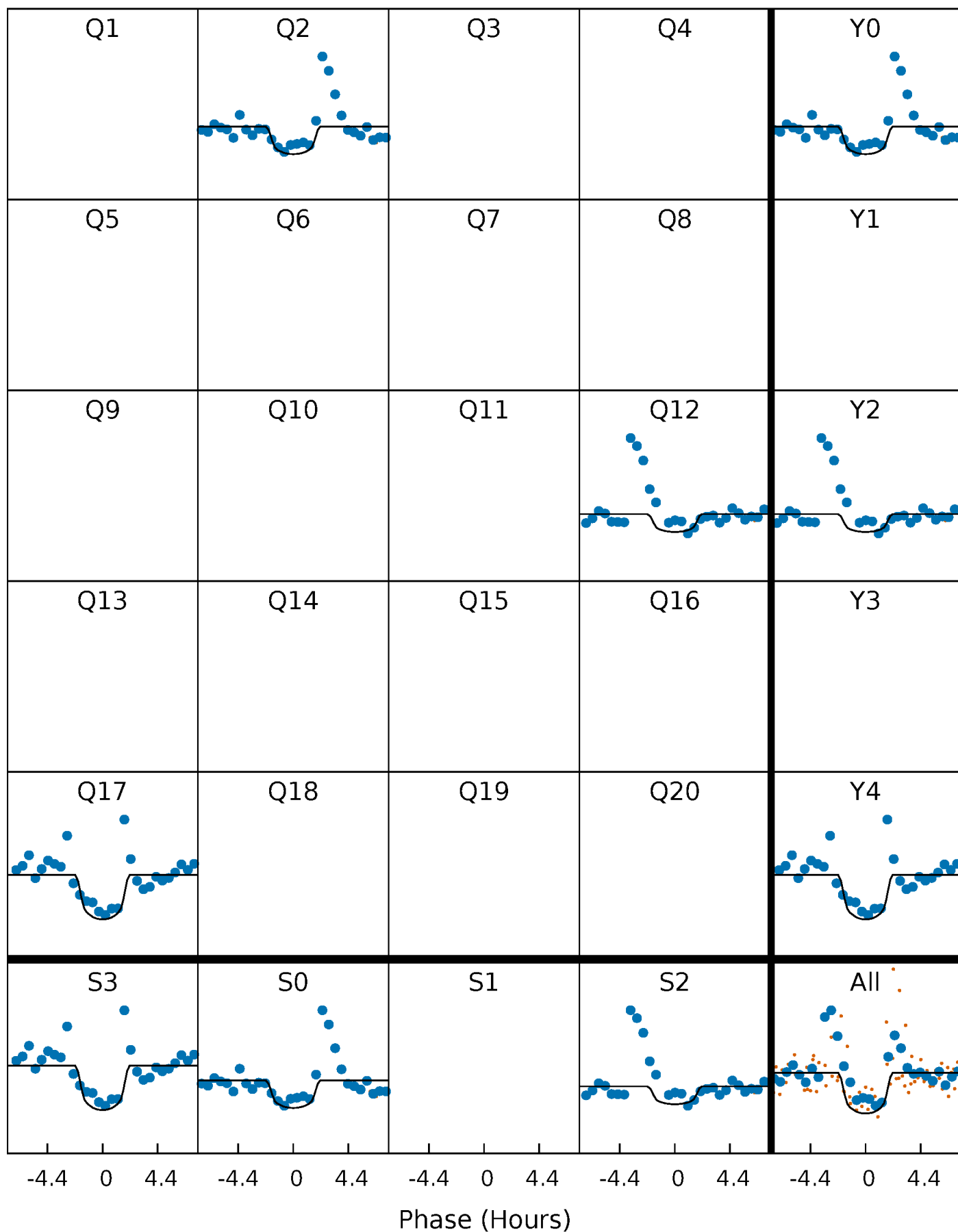
TCE 010422252-03 P=450.655822 Days  $T_0=227.643175$  (BKJD)





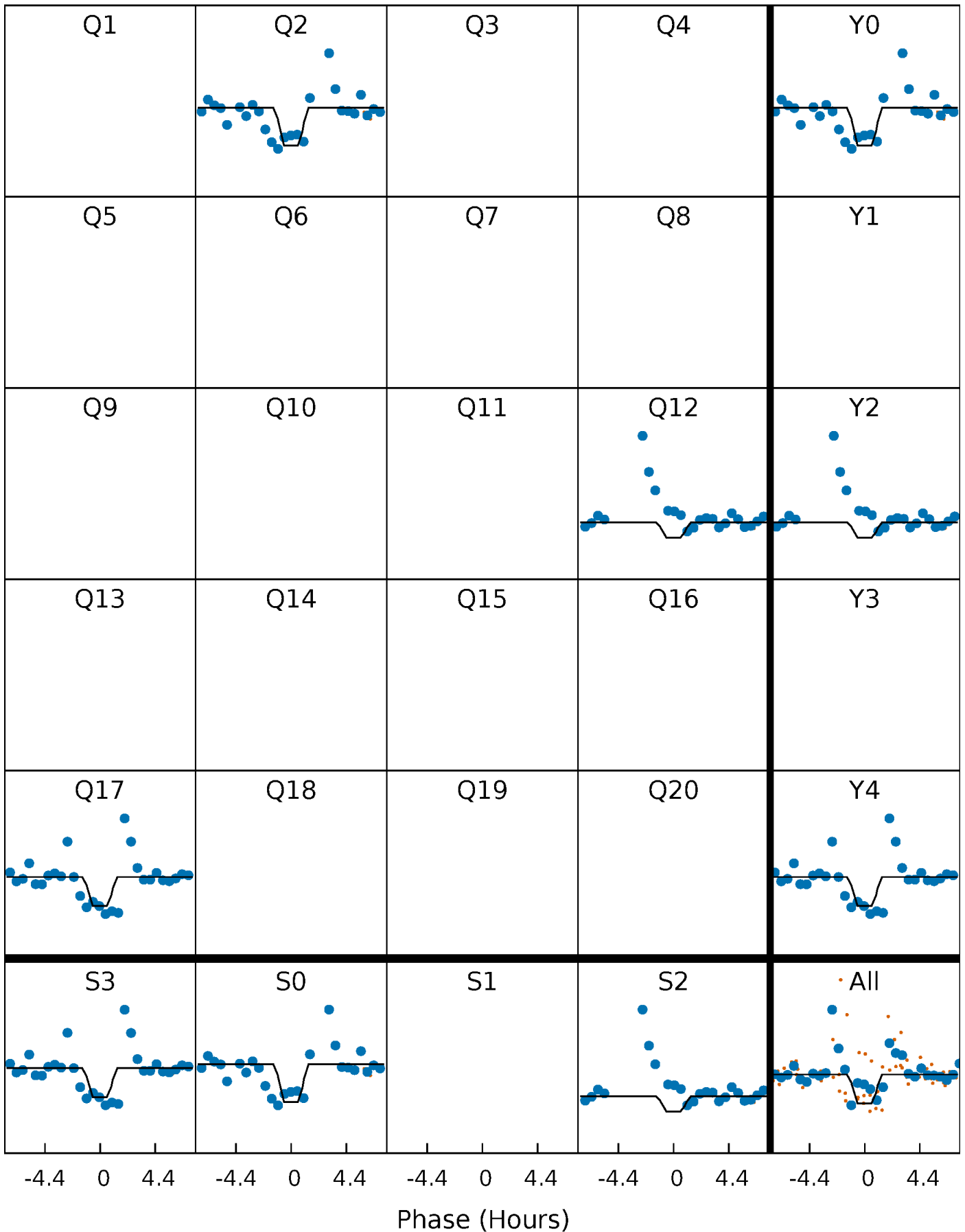
# DV Quarter-Phased Transit Curves

TCE 010422252-03 P=450.655822 Days  $T_0=227.643175$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

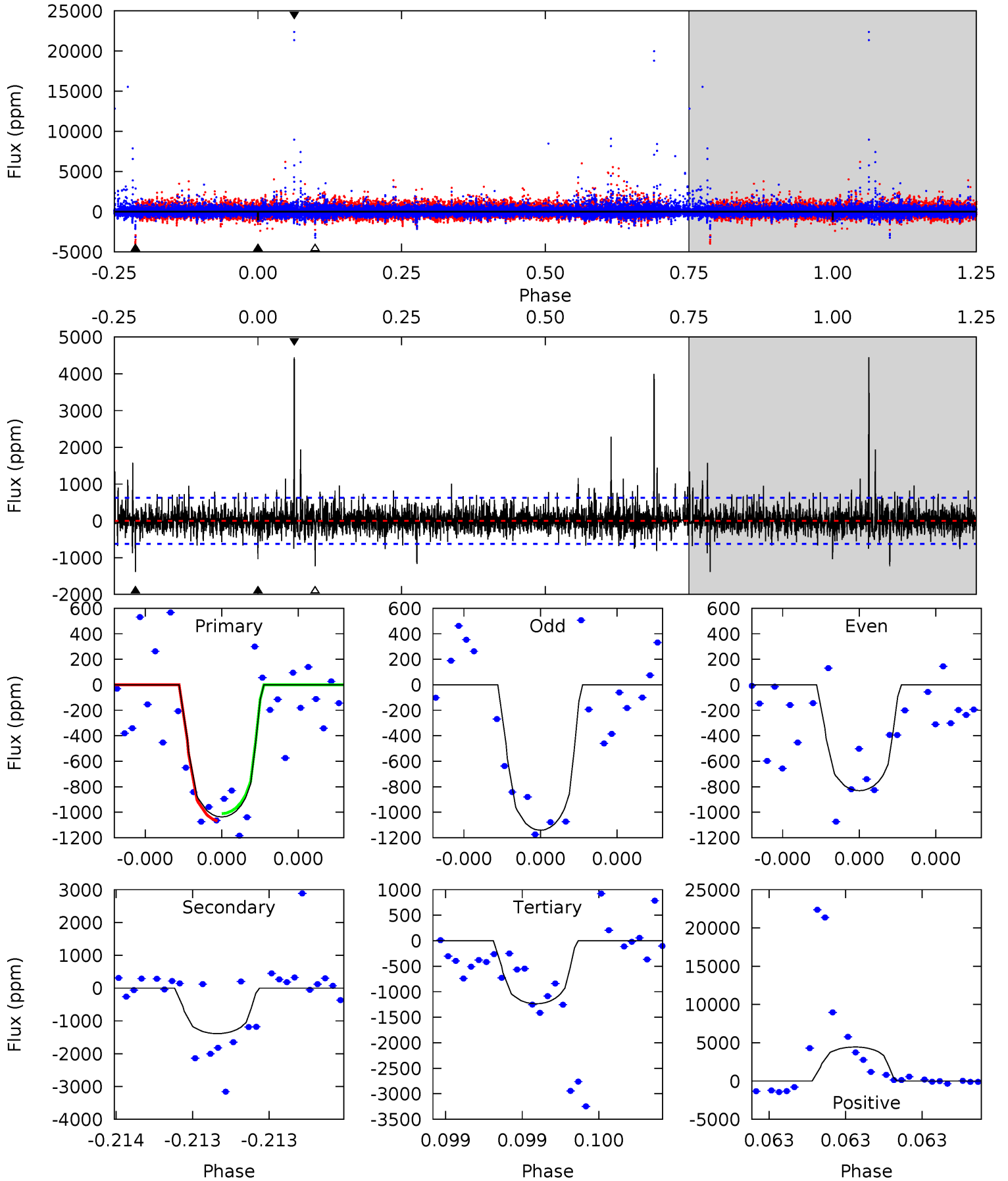
TCE 010422252-03 P=450.648543 Days  $T_0=227.656532$  (BKJD)



# DV Model-Shift Uniqueness Test

010422252-03, P = 450.655822 Days, E = 227.643175 Days

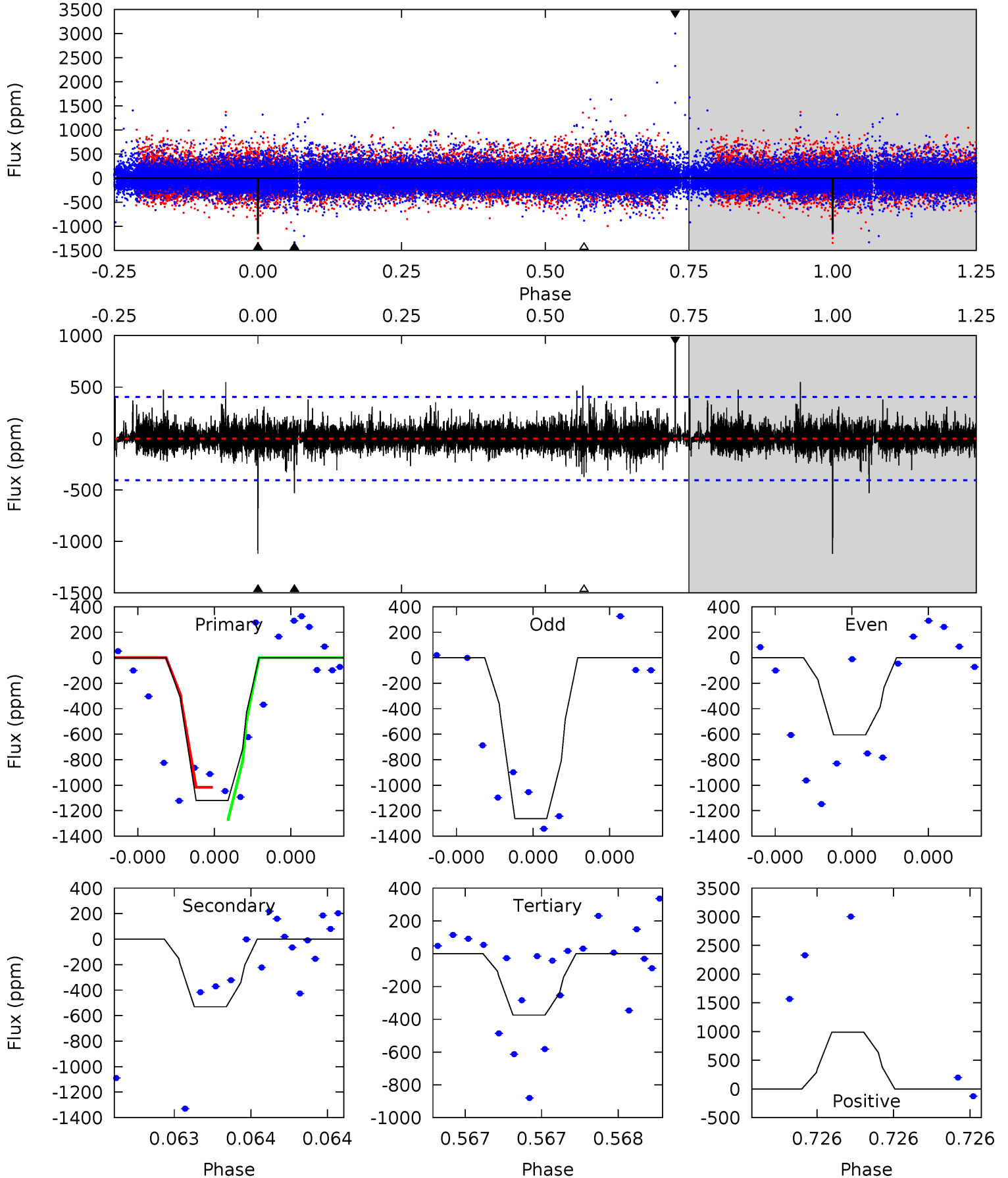
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
9.31	12.5	11.1	39.9	5.63	3.57	2.16	-1.78	-30.6	1.37	-27.5	0.84	0.93	0.76	0.25



# Alt Model-Shift Uniqueness Test

010422252-03, P = 450.648543 Days, E = 227.656532 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
15.8	7.49	5.29	14.0	5.71	3.69	1.02	10.5	1.83	2.20	-6.48	4.31	0.57	0.47	1.77



### Stellar Parameters For KIC 010422252

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5279^{+158}_{-142}$	$4.476^{+0.112}_{-0.256}$	$-0.160^{+0.350}_{-0.300}$	$0.840^{+0.169}_{-0.112}$	$0.772^{+0.121}_{-0.060}$	$1.833^{+0.886}_{-0.865}$
	+3%/-3%	+3%/-6%	+219%/-188%	+20%/-13%	+16%/-8%	+48%/-47%
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 010422252-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$-1388 \pm 111$	$7.37^{+7.16}_{-5.16}$	$296^{+19}_{-16}$	$3954^{+2794}_{-777}$	$15861^{+167802}_{-11877}$
Alt.	$-530 \pm 71$	$7.21^{+7.46}_{-5.05}$	$295^{+20}_{-15}$	$3426^{+1800}_{-630}$	$6531^{+60939}_{-5025}$

$T_{max}$  = 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

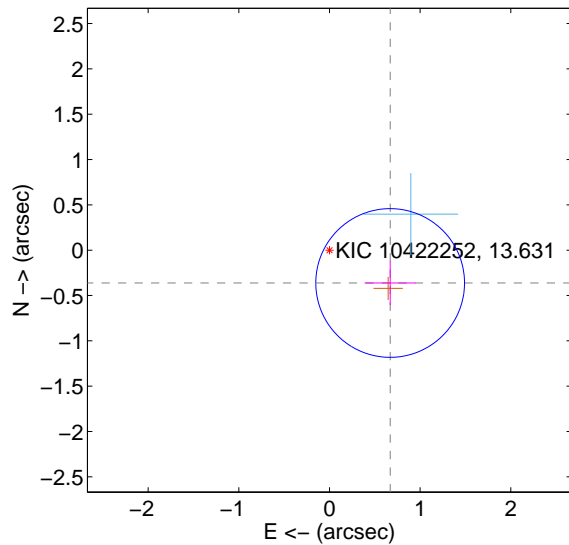
Supplemental centroid analysis for 010422252-03. Kepler magnitude: 13.63. Transit SNR 8.11

There are 1 quarters with good PRF difference image offsets

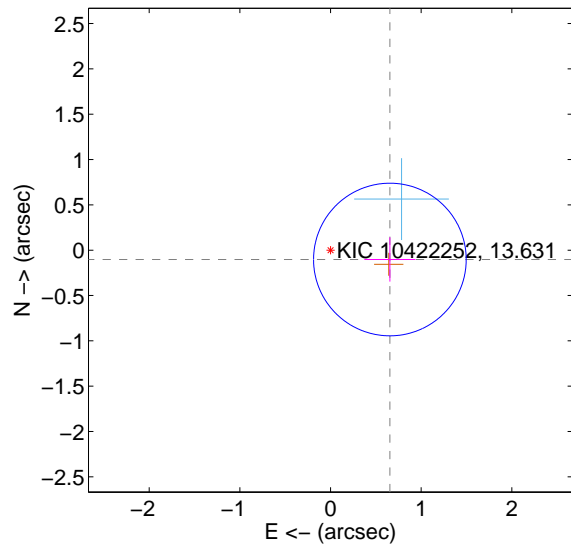
The direct PRF centroid is offset from the target star catalog position by about 0.20 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.761 \pm 0.273$	2.78	$-0.669 \pm 0.281$	$-0.362 \pm 0.244$
PRF-fit source offset from KIC position	$0.663 \pm 0.281$	2.36	$-0.655 \pm 0.281$	$-0.103 \pm 0.244$
photometric centroid source offset	$0.81 \pm 0.47$	1.72	$0.46 \pm 0.49$	$0.67 \pm 0.46$

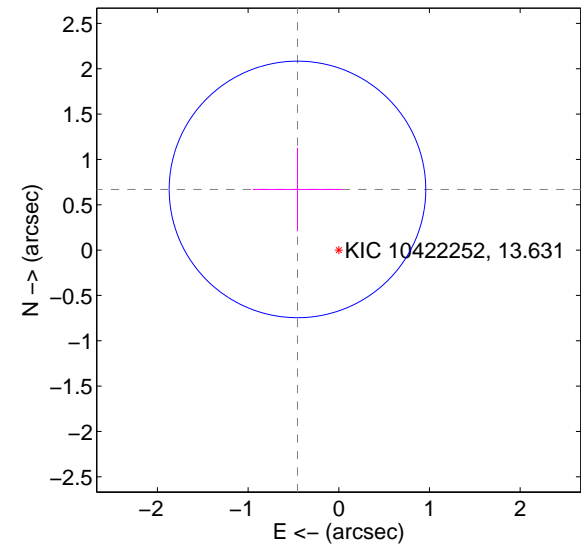
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

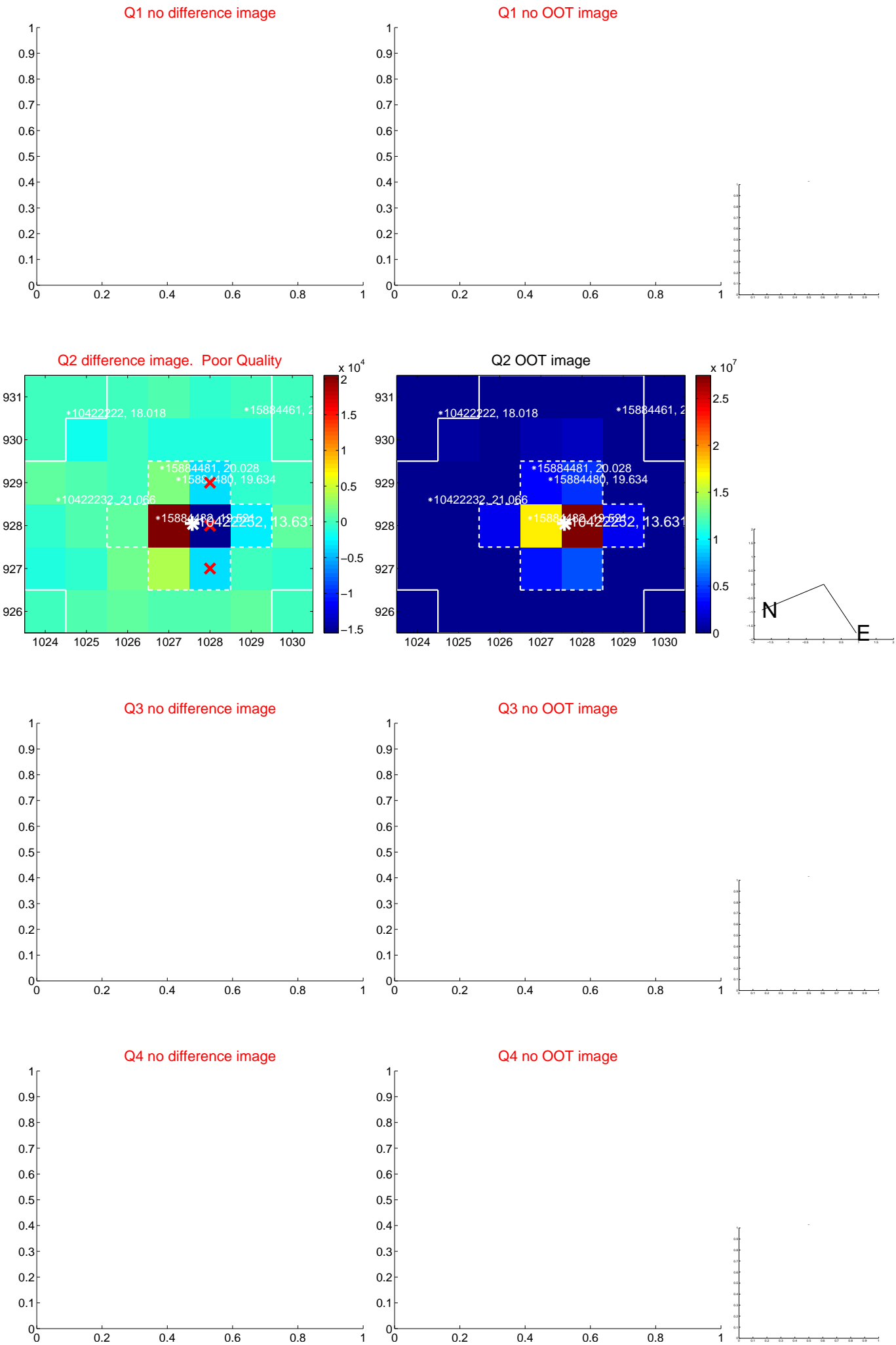


offset from photometric centroids



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

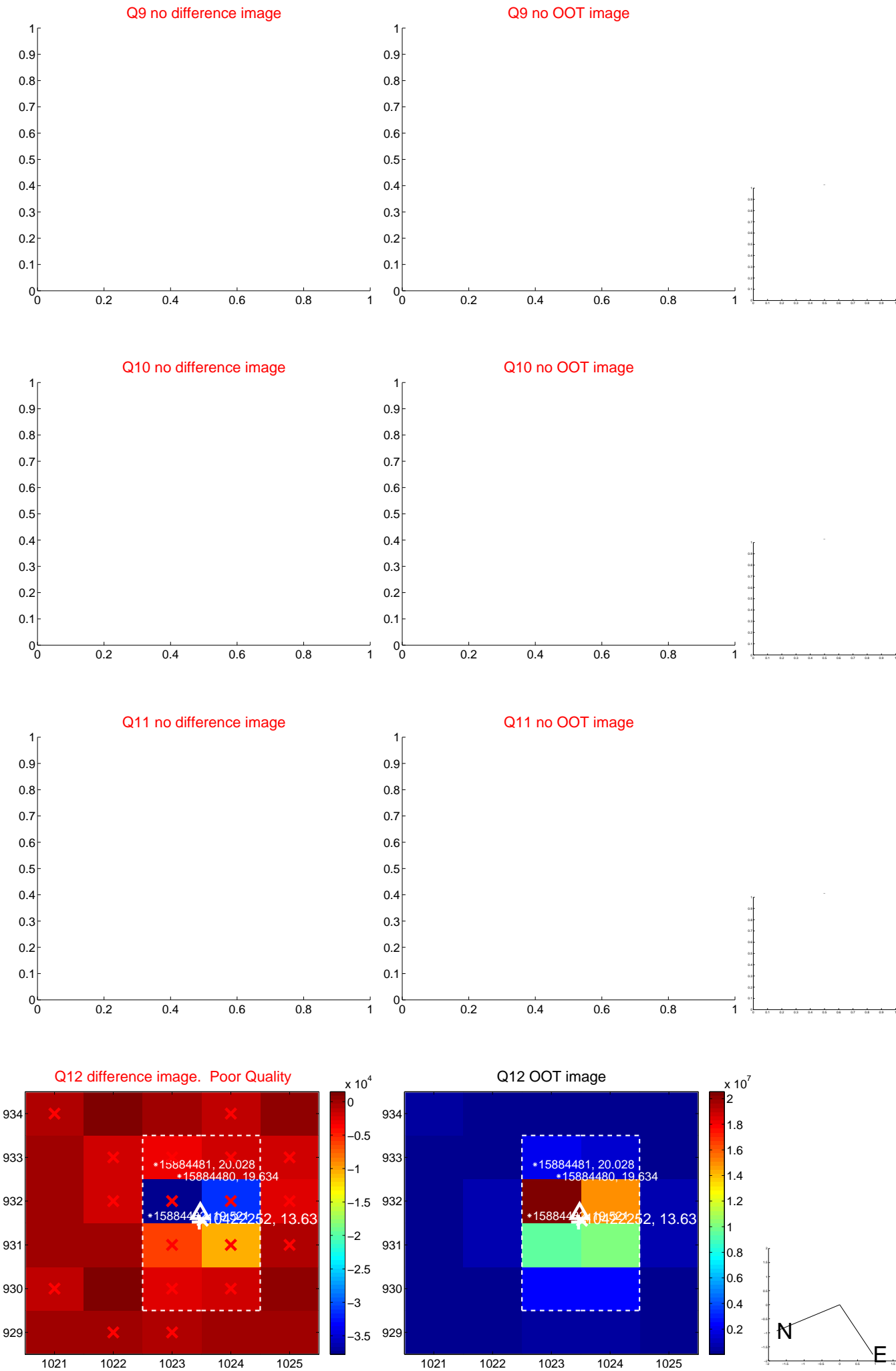


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





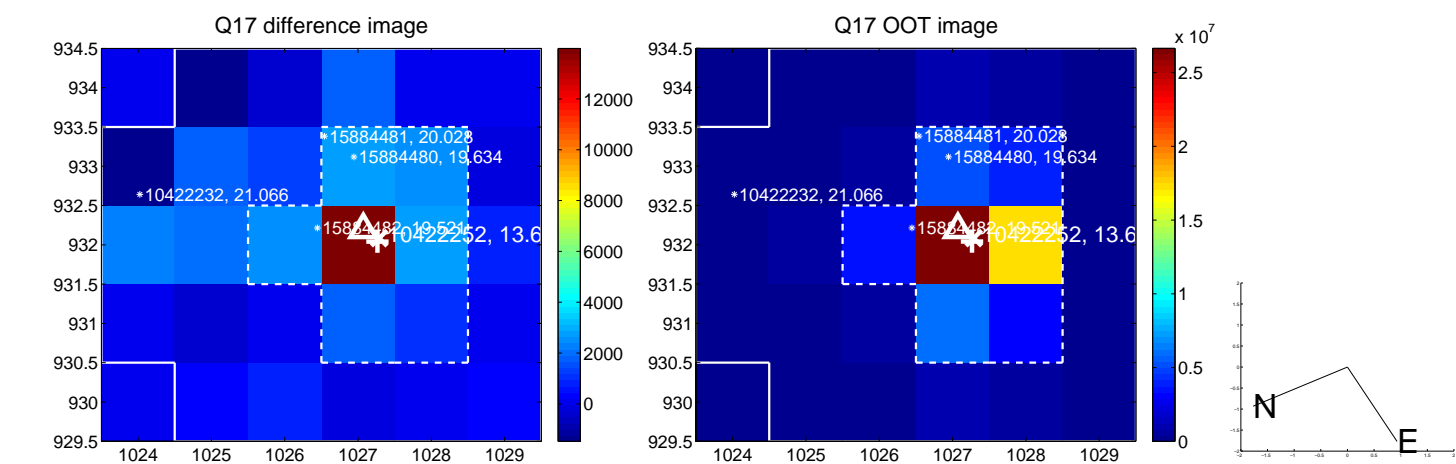
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



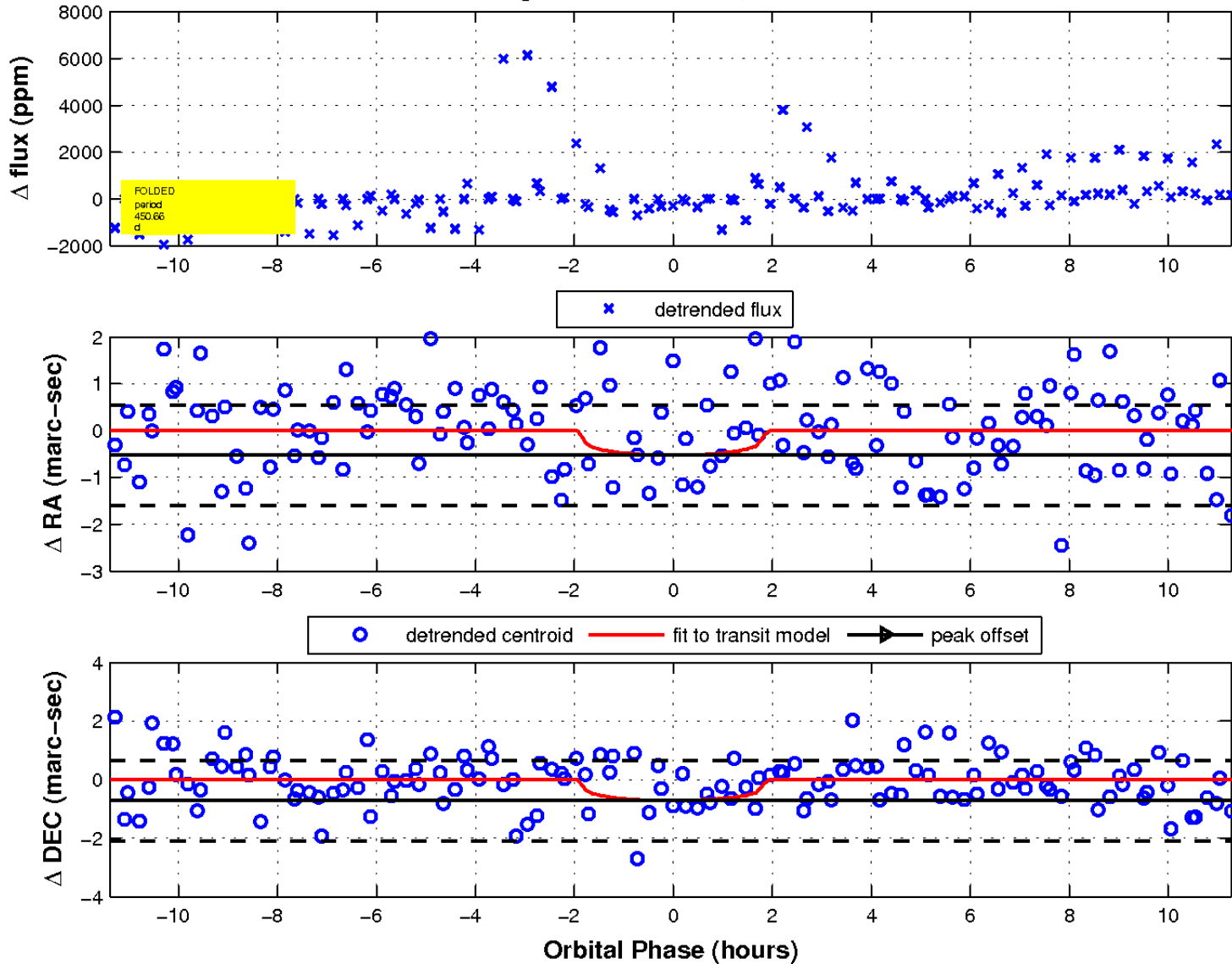
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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



fluxWeightedCentroids, Planet 3 of 4



This panel shows a deep-field astronomical image of a star field. A blue grid is overlaid on the image, with green text labels indicating coordinates. The labels are: 2.0, 41.0, 19:51:40.0, 39.0, 38.0, 57.0, 20.0, 40:047:33:50.0, 30.0, and 0.0. The image shows several stars of varying brightness, with a prominent bright star near the center.

Declination

# KIC 010422252

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
010422252-01	OBS	No	368.156193	255.000817	570.0	5.386	15.4	4.3	0.84	5279	2.02	0.58
010422252-02	OBS	No	224.038859	336.006427	1343.0	9.465	14.6	7.8	0.84	5279	3.07	1.12
010422252-03	OBS	No	450.655822	227.643175	1425.0	3.812	14.4	8.1	0.84	5279	3.14	0.44
010422252-04	OBS	No	254.490660	194.782042	793.5	3.000	13.5	-1.0	0.84	5279	2.32	0.95

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
010422252-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—CENT_FEW_DIFFS
010422252-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_ZUMA—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
010422252-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_POS_ALT—CENT_FEW_DIFFS
010422252-04	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—CENT_NOFITS

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

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

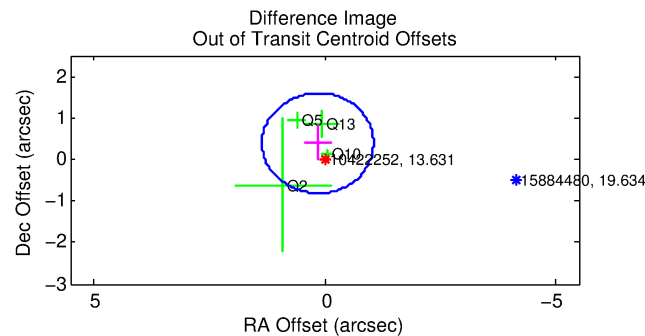
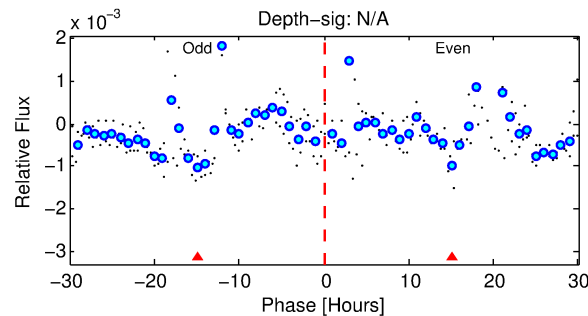
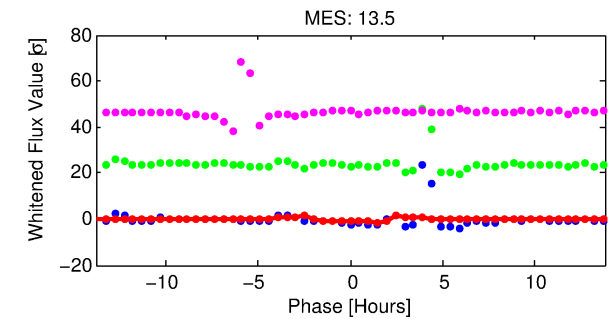
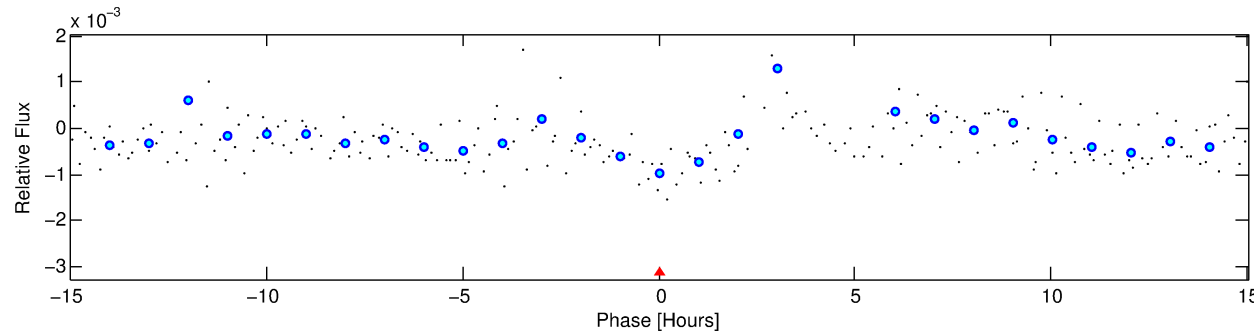
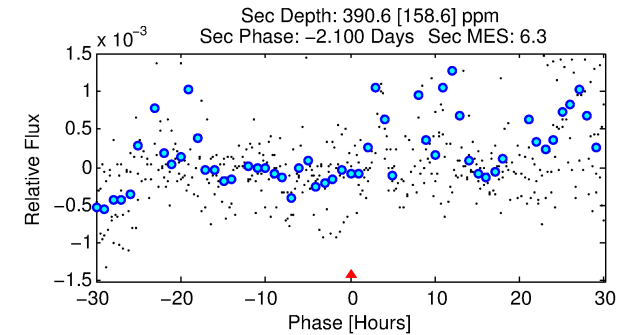
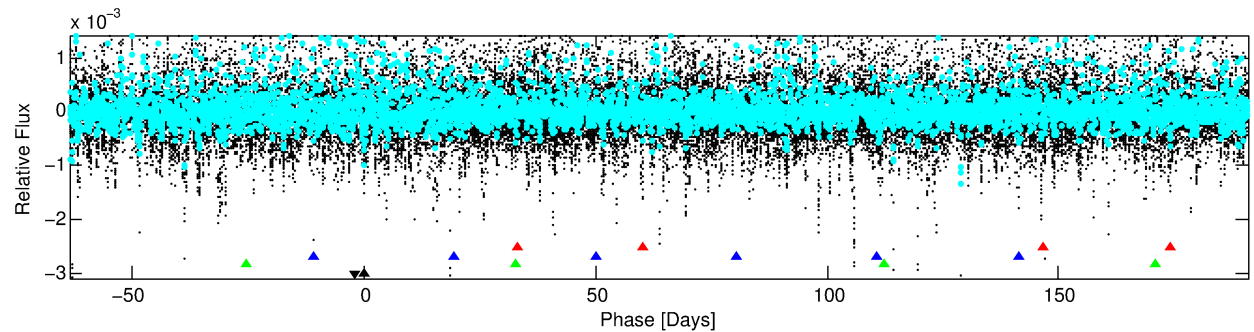
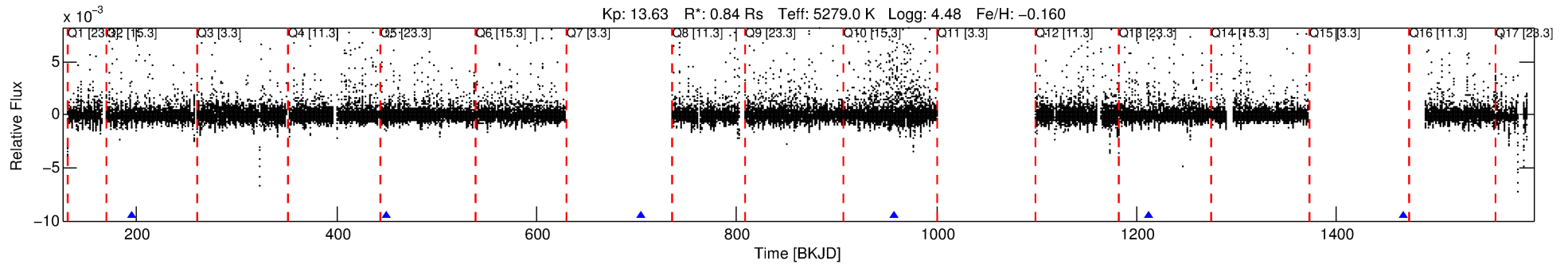
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 010422252-04

No Significant Match Found

# DV One-Page Summary

KIC: 10422252 Candidate: 4 of 4 Period: 254.491 d



## TPS TCE Results:

Period = 254.49066 d  
Epoch = 194.7820 BKJD

DV fit results are unavailable

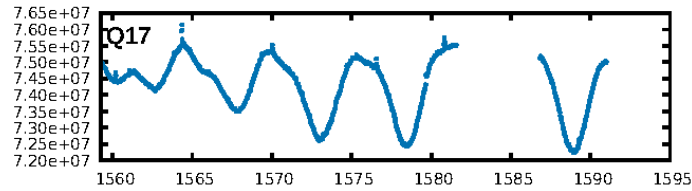
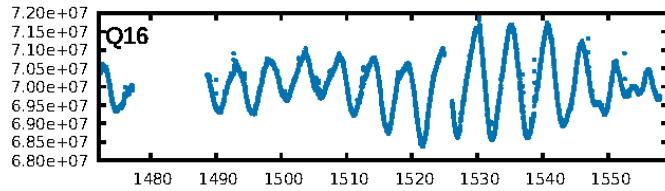
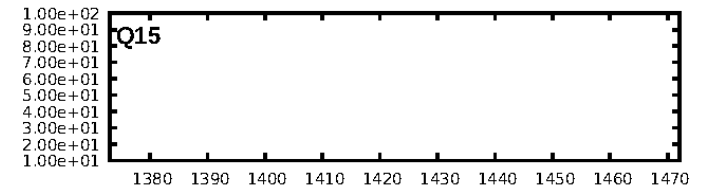
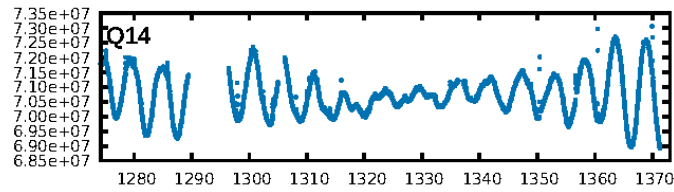
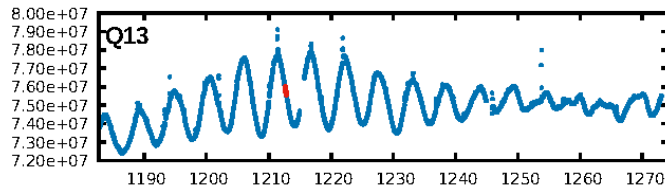
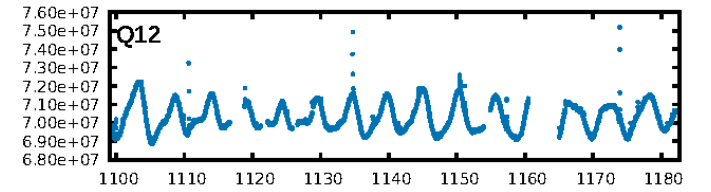
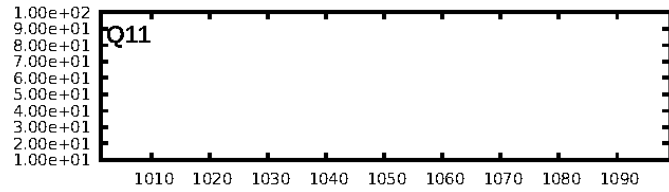
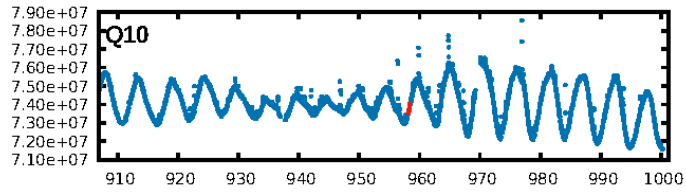
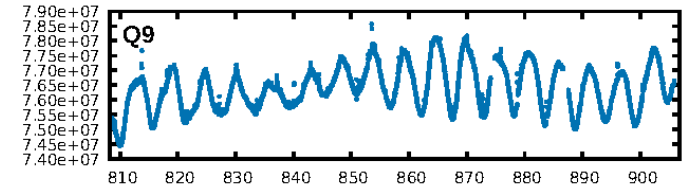
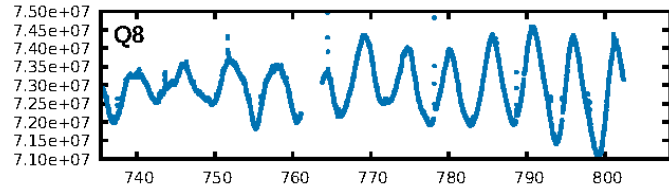
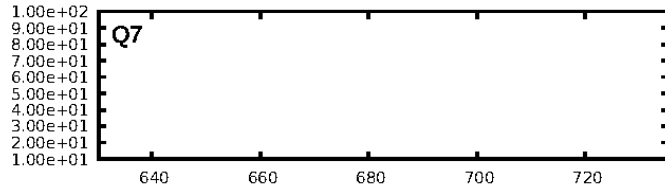
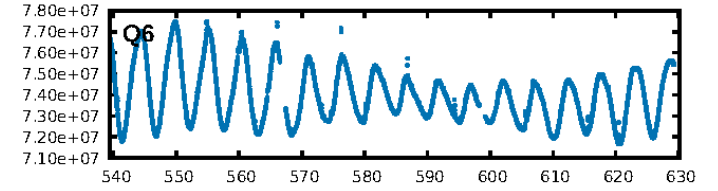
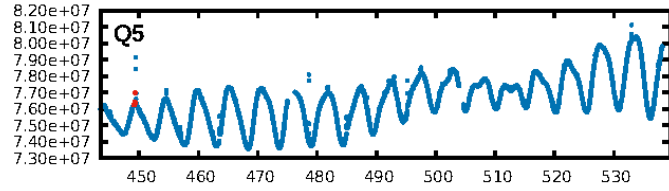
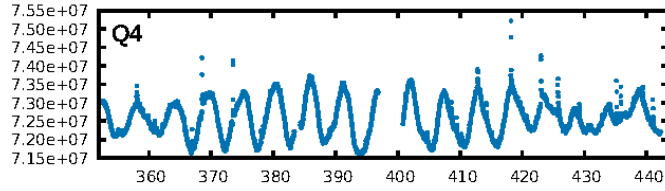
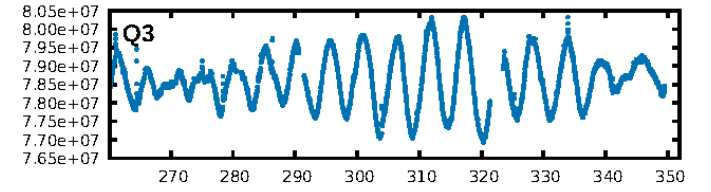
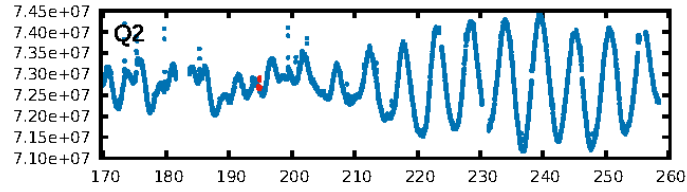
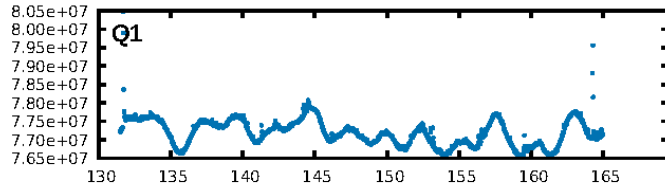
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [73.61 $\sigma$ ]  
LongPeriod-sig: 100.0% [442.51 $\sigma$ ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 2.616  
Centroid-sig: 63.3%  
Centroid-so: 0.396 arcsec [0.76 $\sigma$ ]  
OotOffset-rm: 0.418 arcsec [1.04 $\sigma$ ]  
KicOffset-rm: 0.424 arcsec [1.04 $\sigma$ ]  
OotOffset-st: 2/0/0/2 [4]  
KicOffset-st: 2/0/0/2 [4]  
DiffImageQuality-fgm: 0.75 [3/4]  
DiffImageOverlap-fno: 1.00 [4/4]

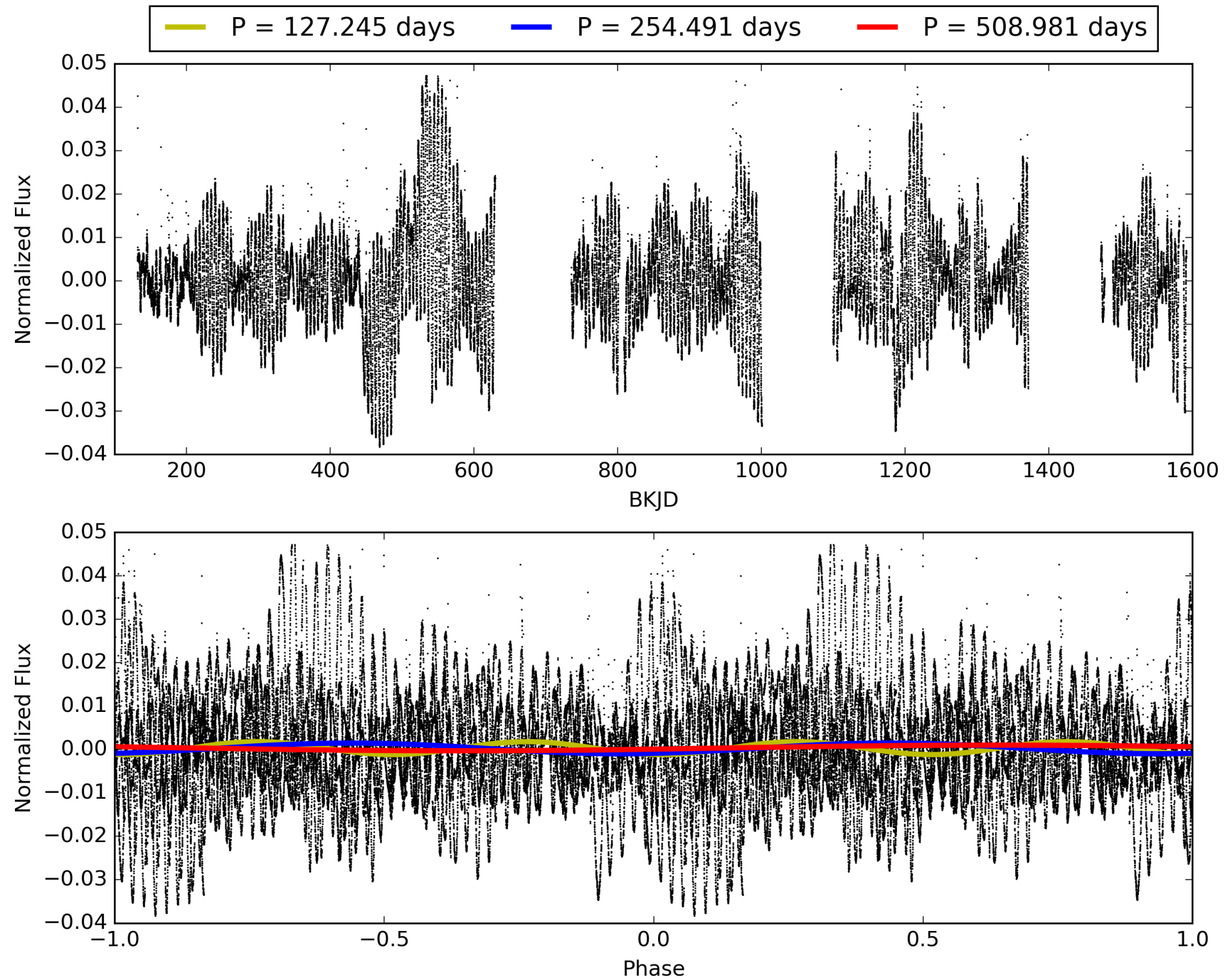
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 01-Feb-2016 10:01:09 Z

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

# TCE 010422252-04, PDC Light Curves



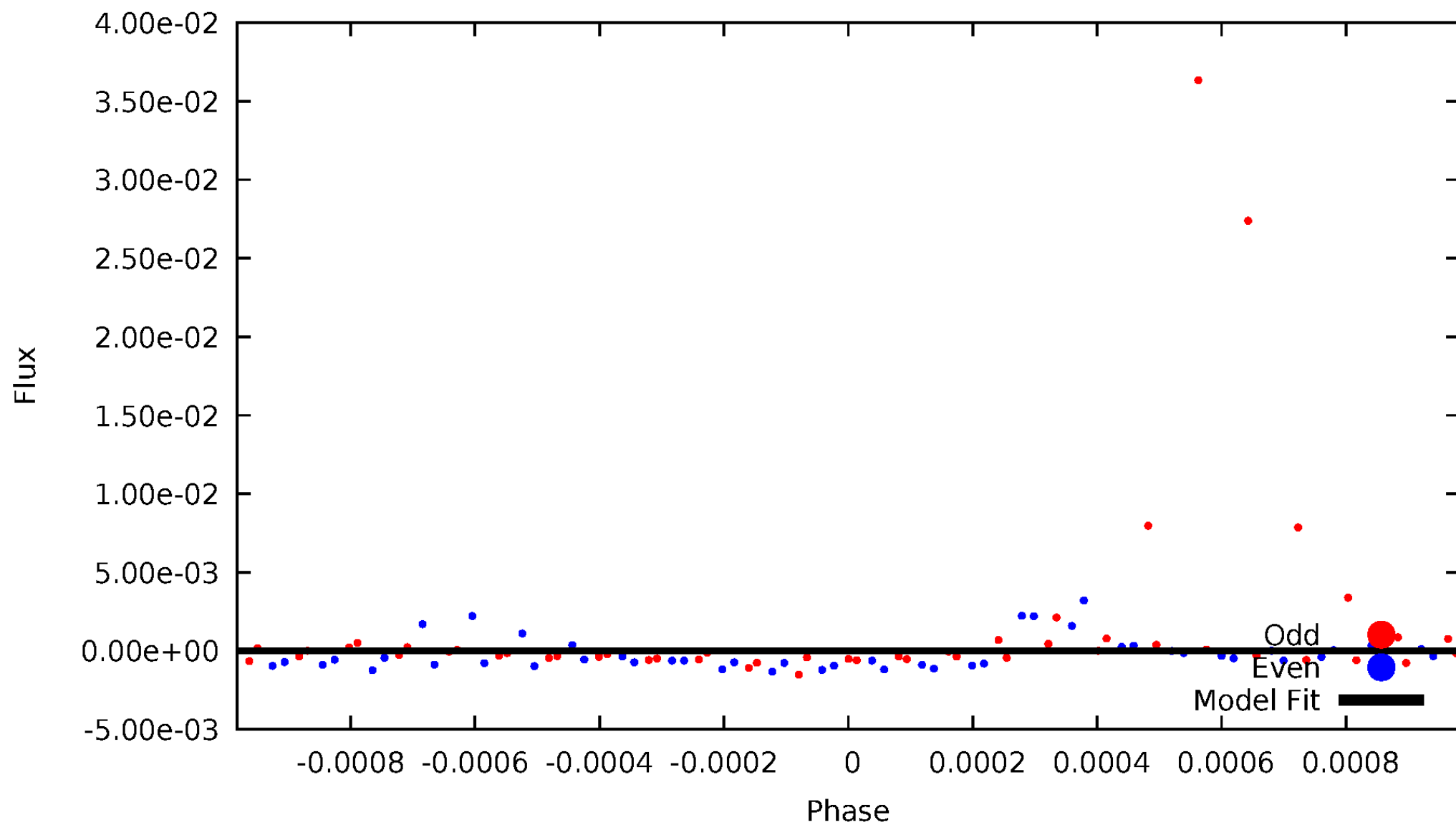
# TCE 010422252-04





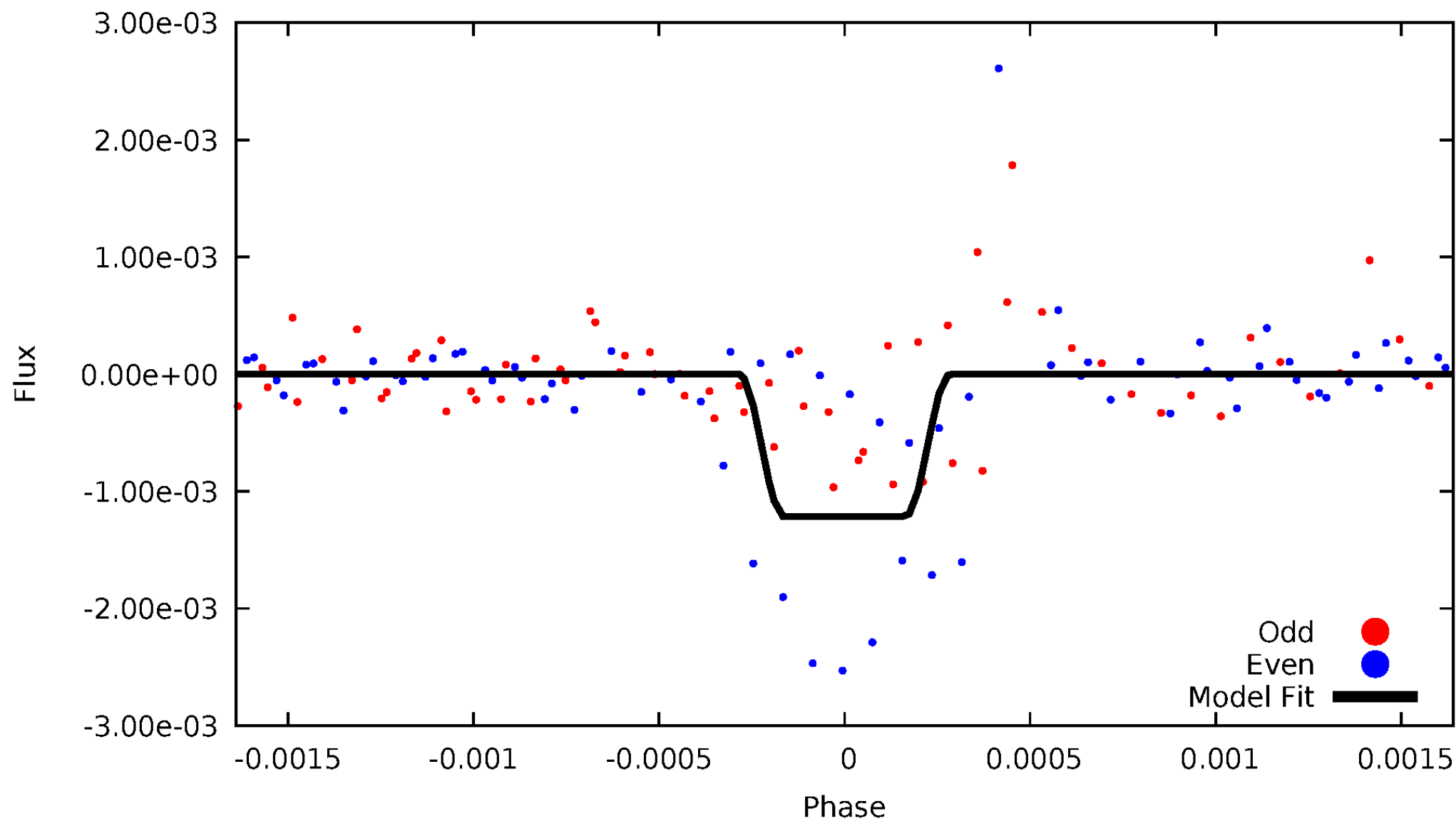
# DV Odd/Even

TCE 010422252-04



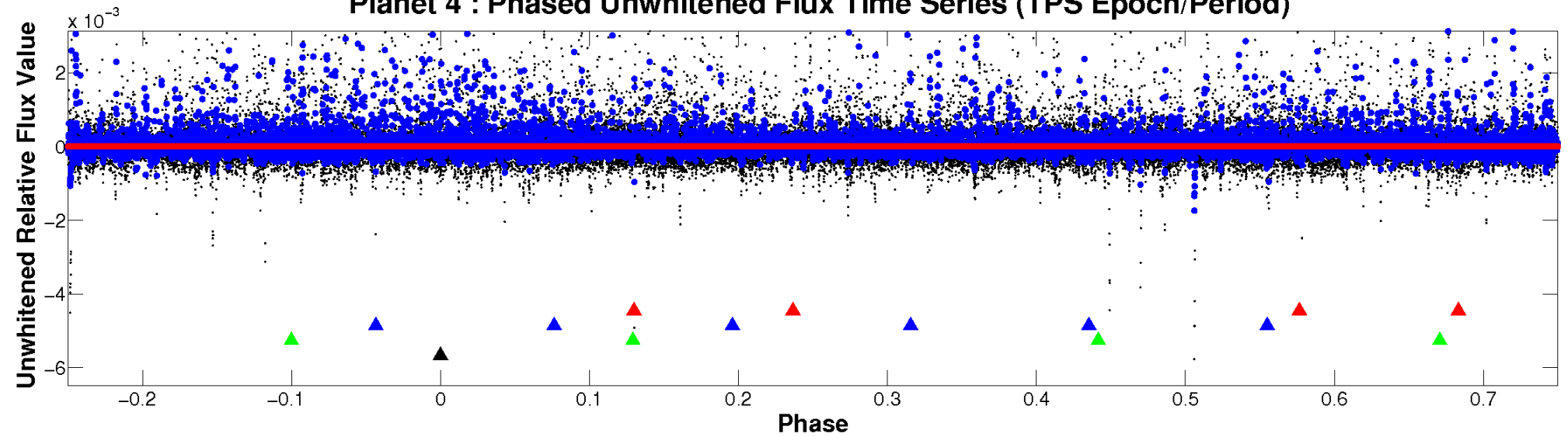
# ALT Odd/Even

TCE 010422252-04

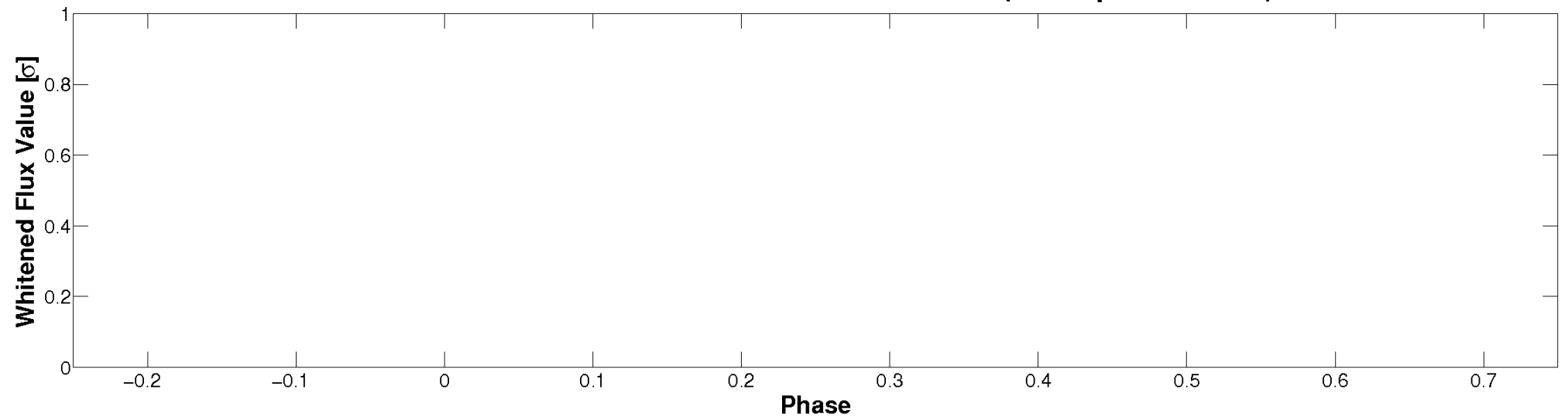


# Non-Whitened Vs. Whitened Light Curve

**Planet 4 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

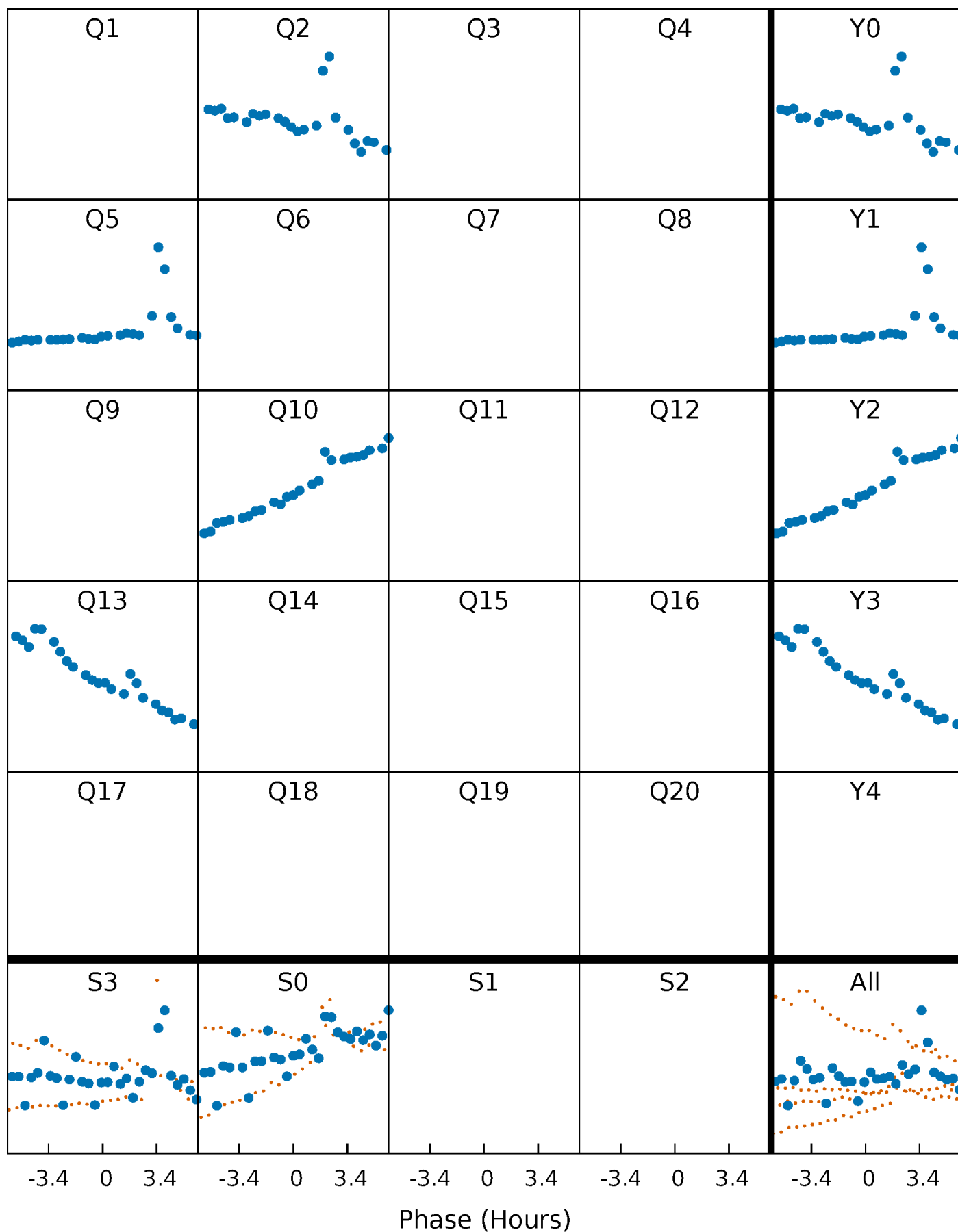


**Planet 4 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



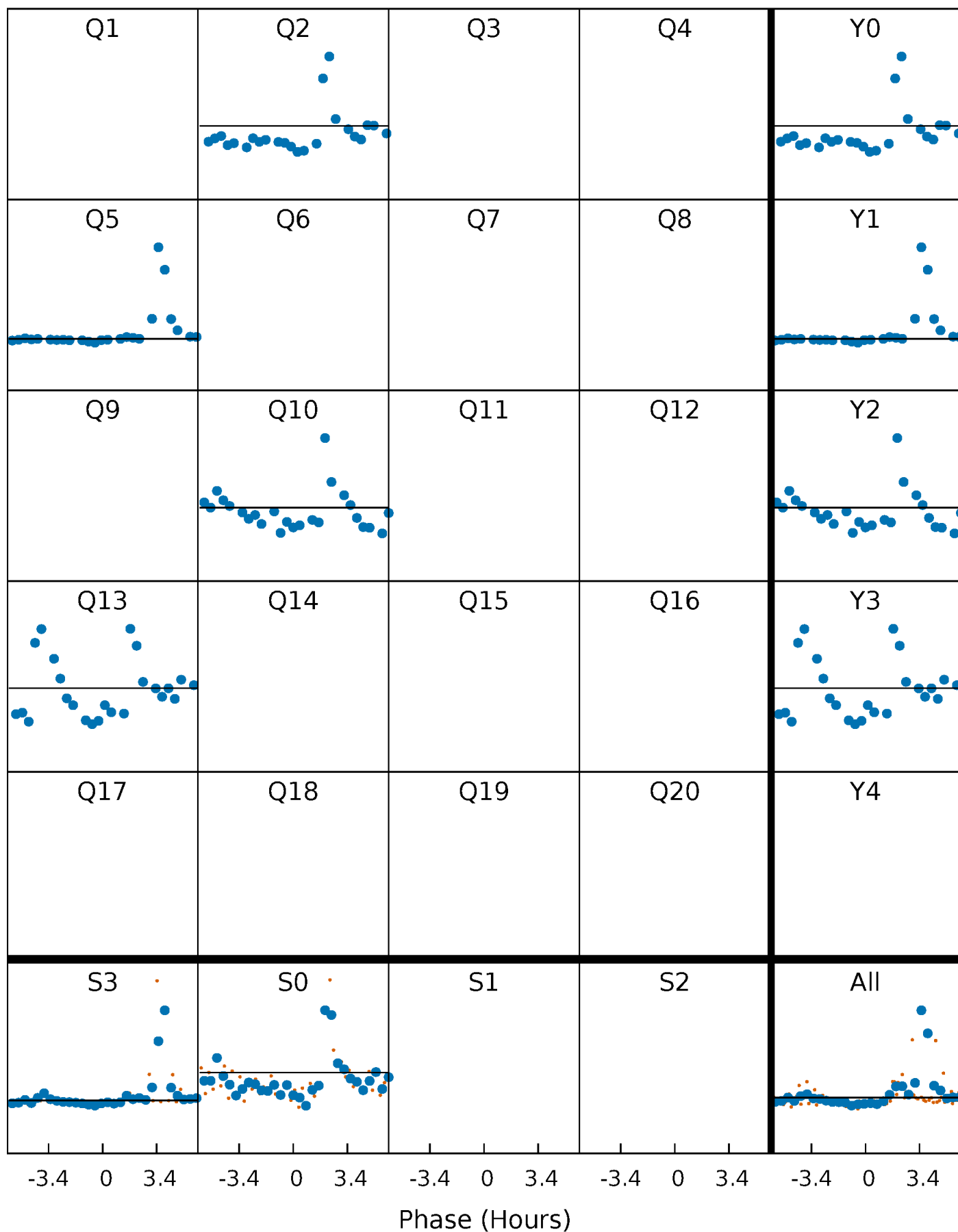
# PDC Quarter-Phased Transit Curves

TCE 010422252-04     $P=254.490660$  Days     $T_0=194.782042$  (BKJD)



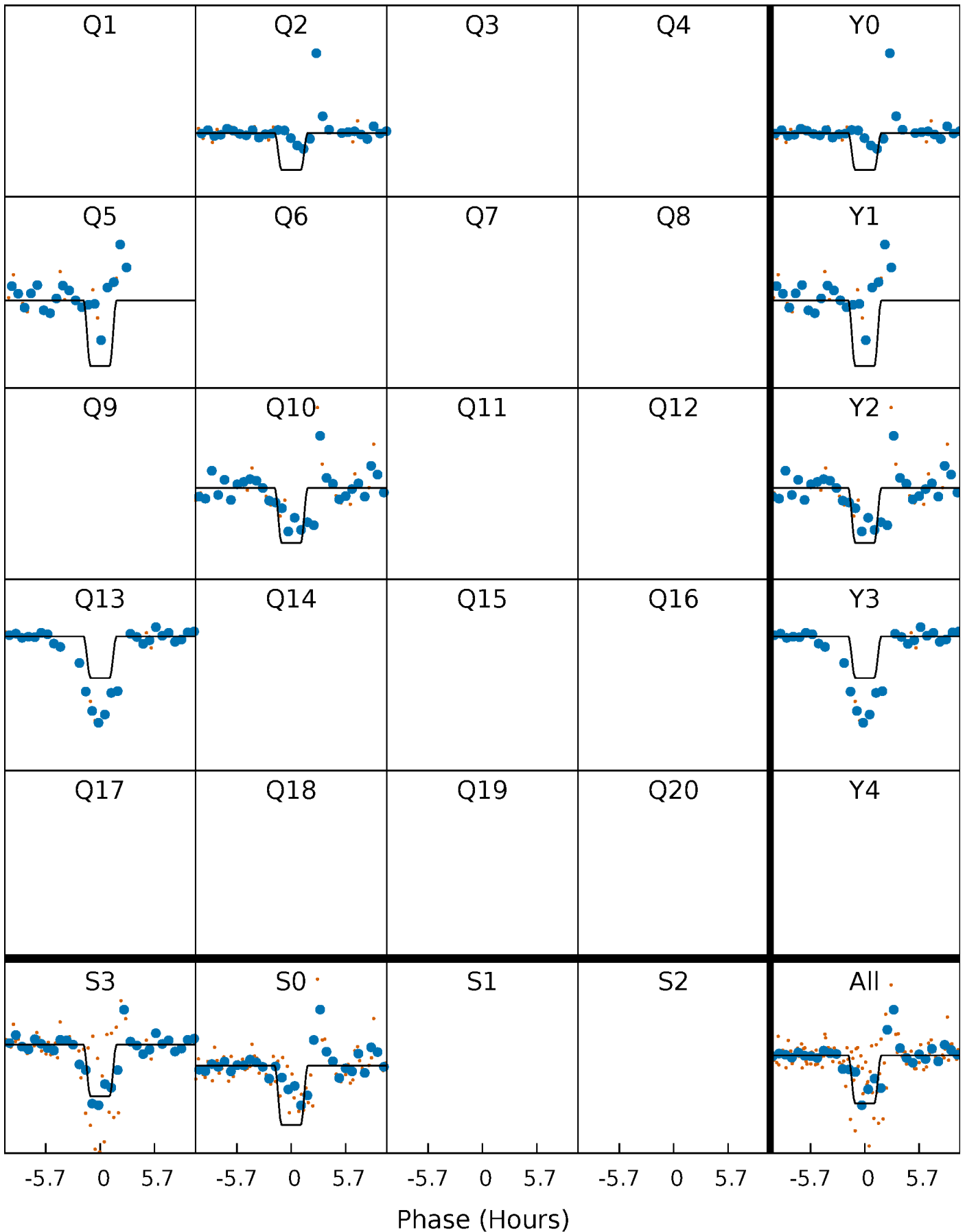
# DV Quarter-Phased Transit Curves

TCE 010422252-04     $P=254.490660$  Days     $T_0=194.782042$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

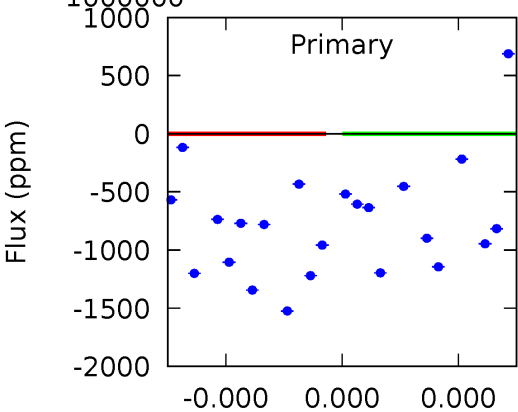
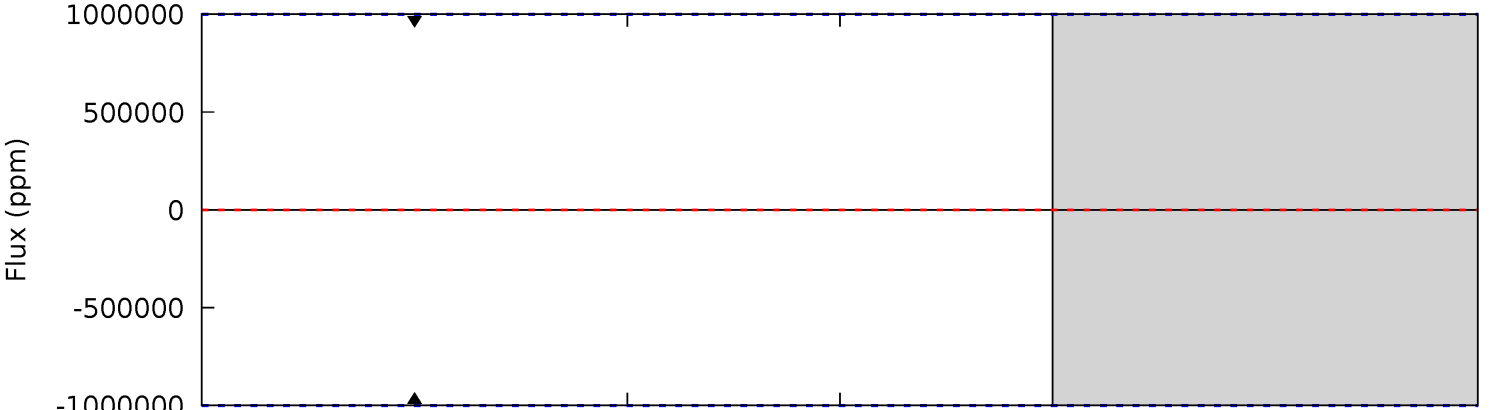
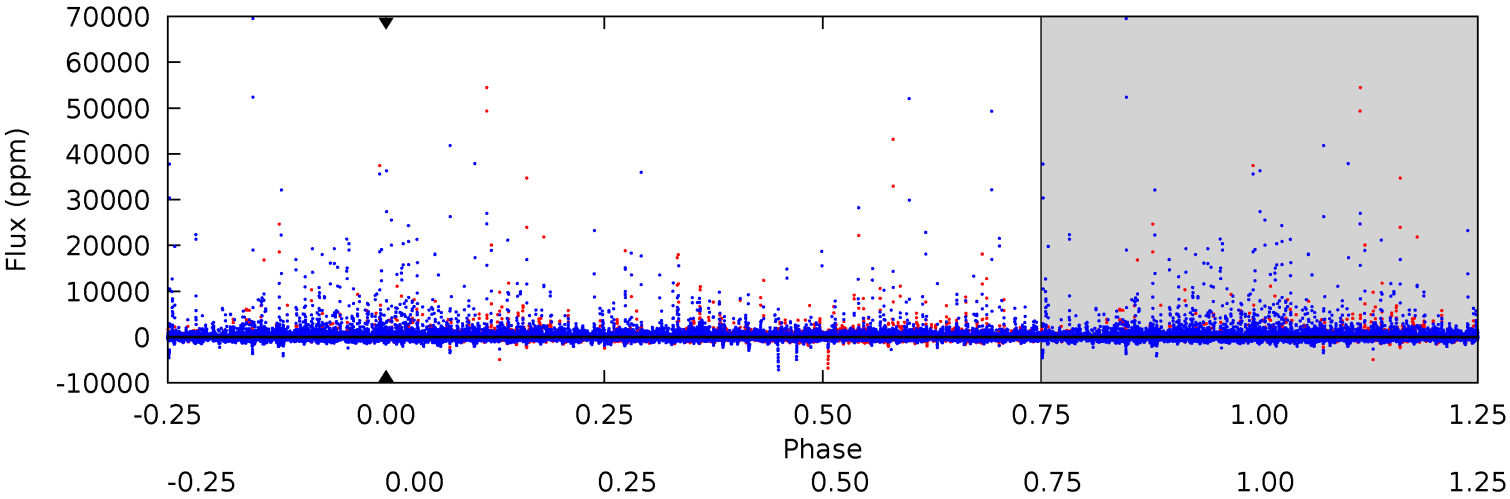
TCE 010422252-04     $P=254.490660$  Days     $T_0=194.752235$  (BKJD)



# DV Model-Shift Uniqueness Test

010422252-04, P = 254.490660 Days, E = 194.782042 Days

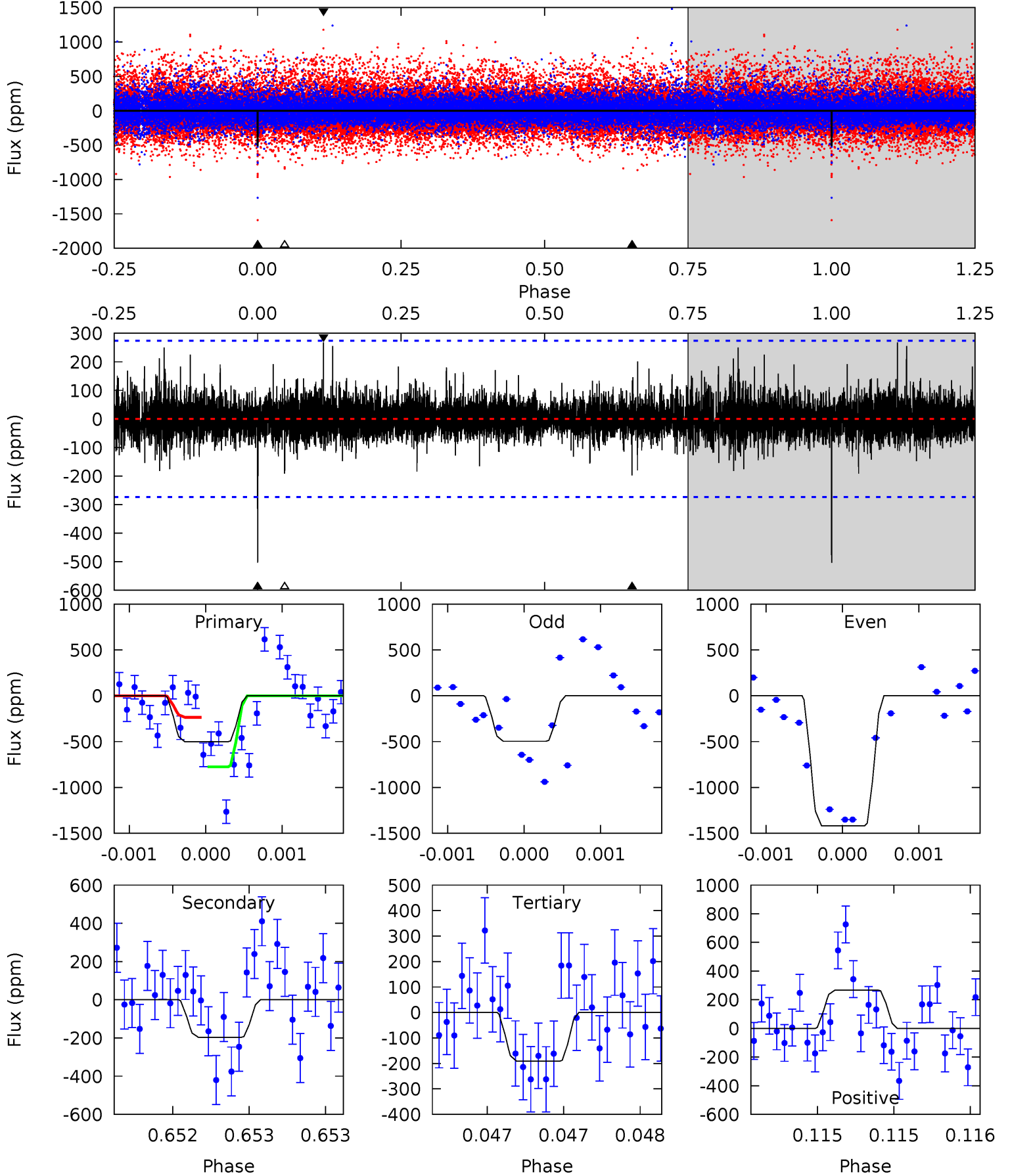
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

010422252-04, P = 254.490660 Days, E = 194.752235 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
10.2	3.99	3.88	5.44	5.56	3.46	0.87	6.33	4.77	0.11	-1.45	9.23	1.72	0.35	0





### Stellar Parameters For KIC 010422252

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M$ ( $M_{\odot}$ )	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5279^{+158}_{-142}$	$4.476^{+0.112}_{-0.256}$	$-0.160^{+0.350}_{-0.300}$	$0.840^{+0.169}_{-0.112}$	$0.772^{+0.121}_{-0.060}$	$1.833^{+0.886}_{-0.865}$
	+3%/-3%	+3%/-6%	+219%/-188%	+20%/-13%	+16%/-8%	+48%/-47%
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 010422252-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$7.50^{+7.19}_{-5.18}$	$357^{+24}_{-20}$	$4654^{+13522}_{-18960}$	$15090^{+1145297}_{-709231}$
Alt.	$-197 \pm 49$	$7.60^{+8.29}_{-5.35}$	$357^{+25}_{-20}$	$2902^{+1430}_{-530}$	$972^{+10883}_{-760}$

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

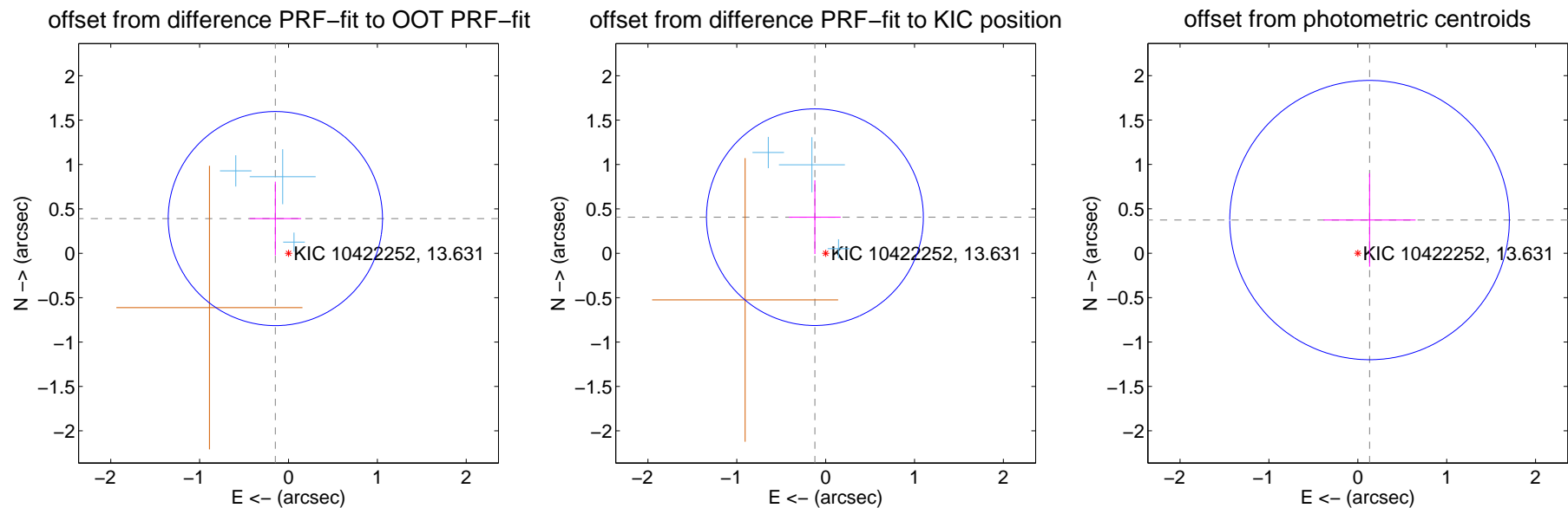
## DV Centroid Data

Supplemental centroid analysis for 010422252-04. Kepler magnitude: 13.63. Transit SNR -1.00

There are 3 quarters with good PRF difference image offsets

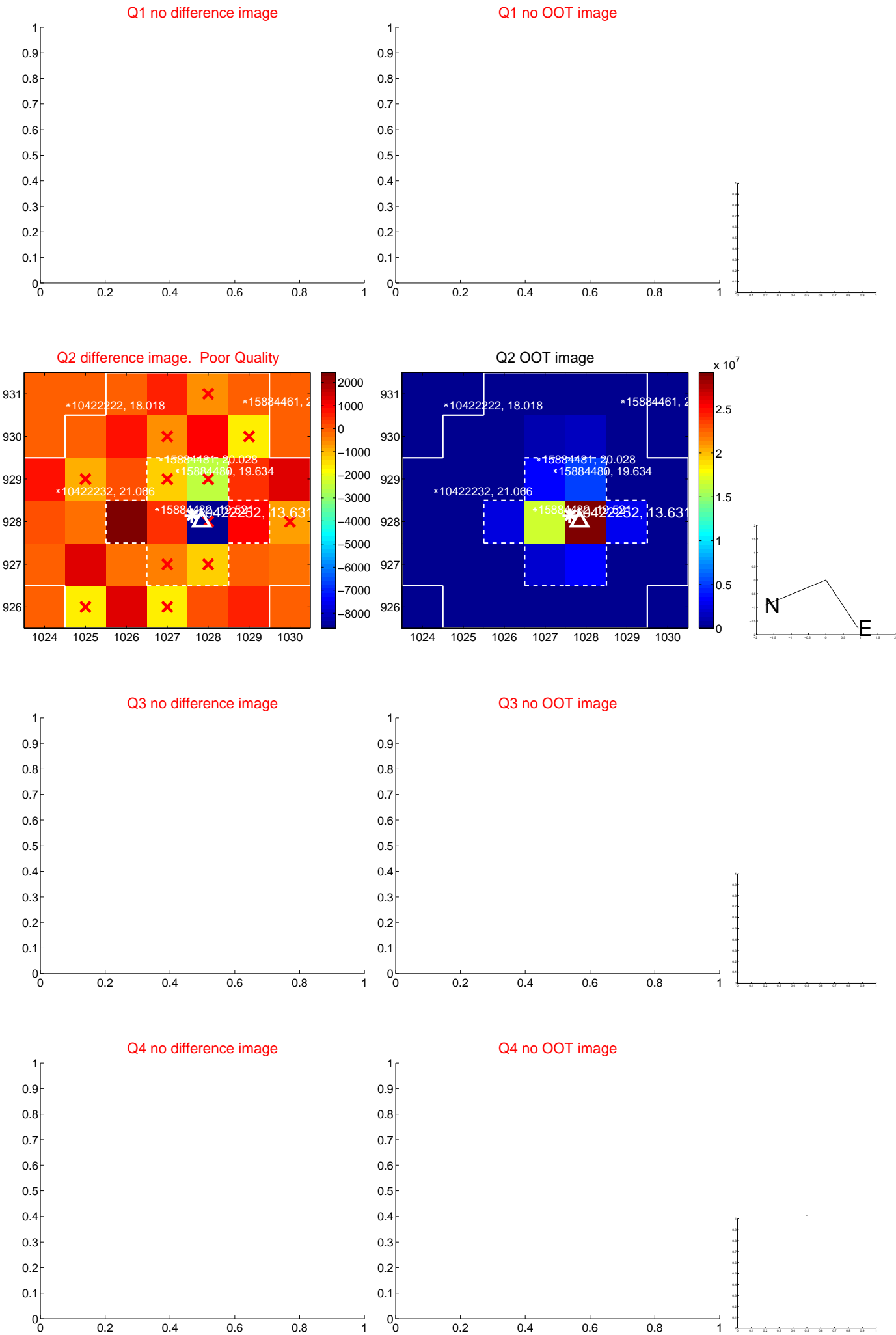
The direct PRF centroid is offset from the target star catalog position by about 0.16 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.418 \pm 0.402$	1.04	$0.148 \pm 0.291$	$0.391 \pm 0.415$
PRF-fit source offset from KIC position	$0.424 \pm 0.407$	1.04	$0.121 \pm 0.291$	$0.407 \pm 0.415$
photometric centroid source offset	$0.40 \pm 0.52$	0.76	$-0.13 \pm 0.52$	$0.37 \pm 0.52$

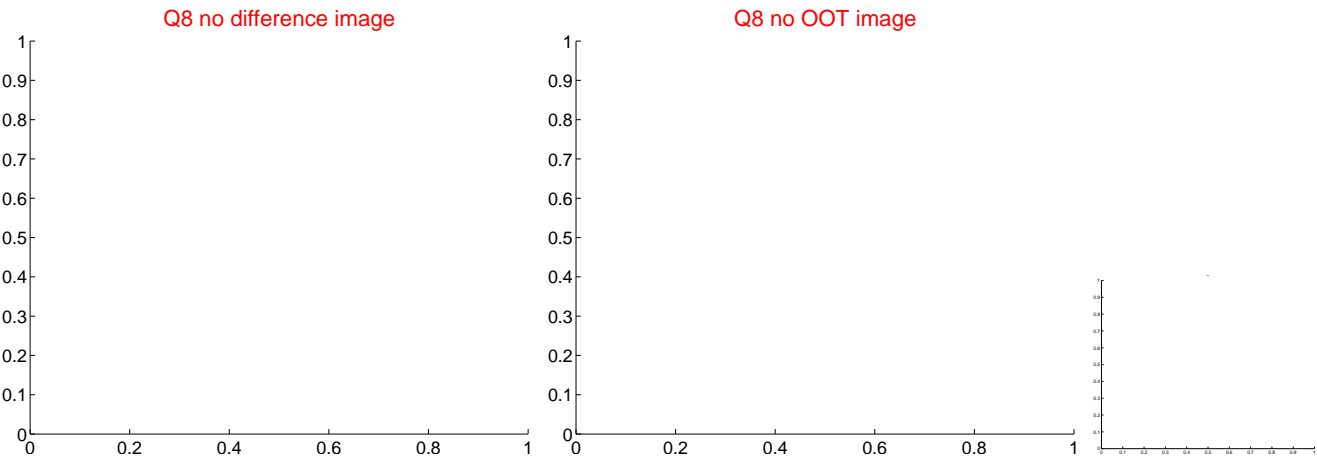
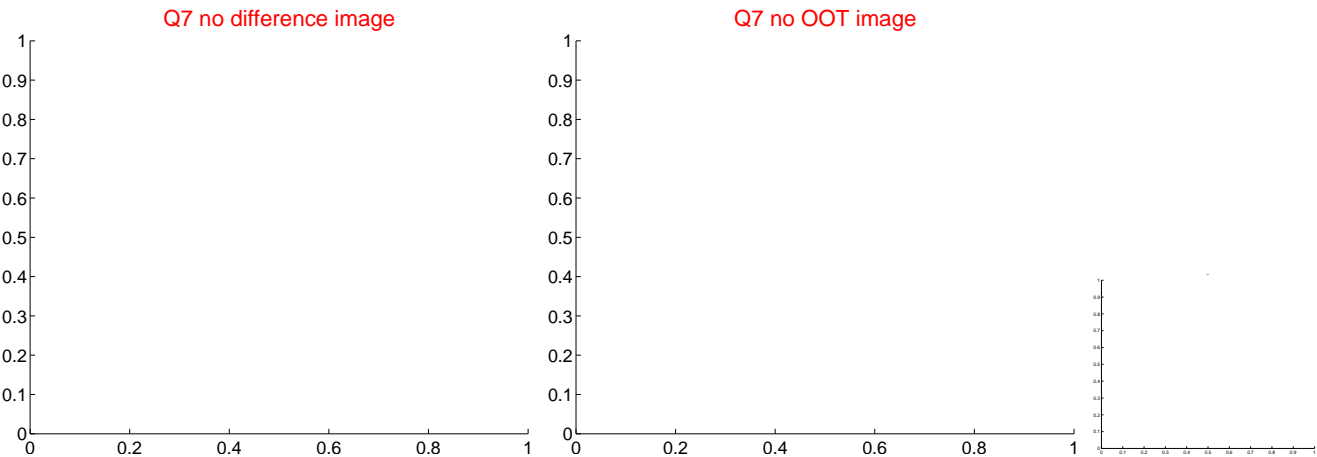
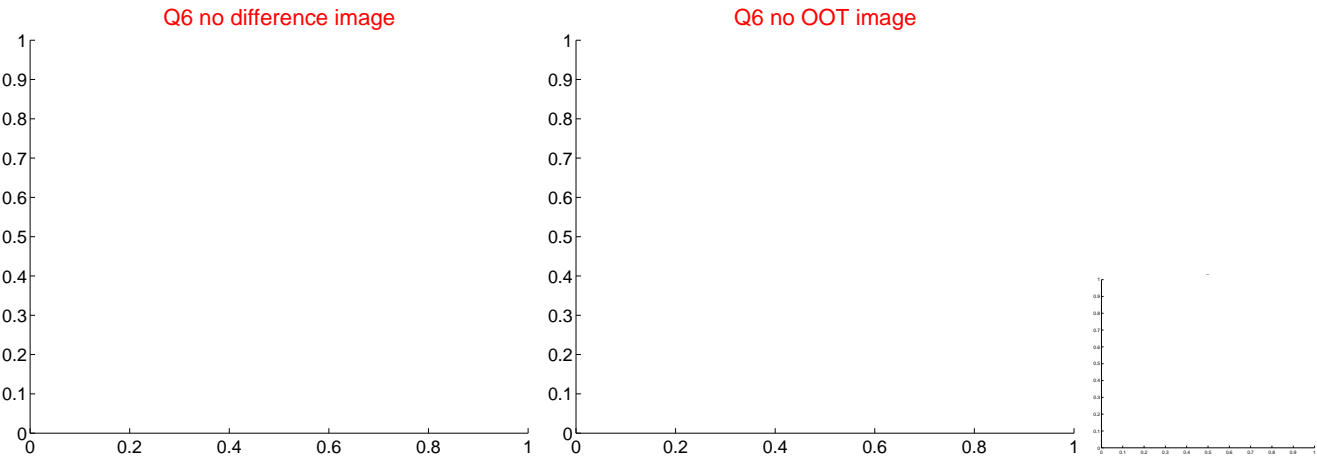
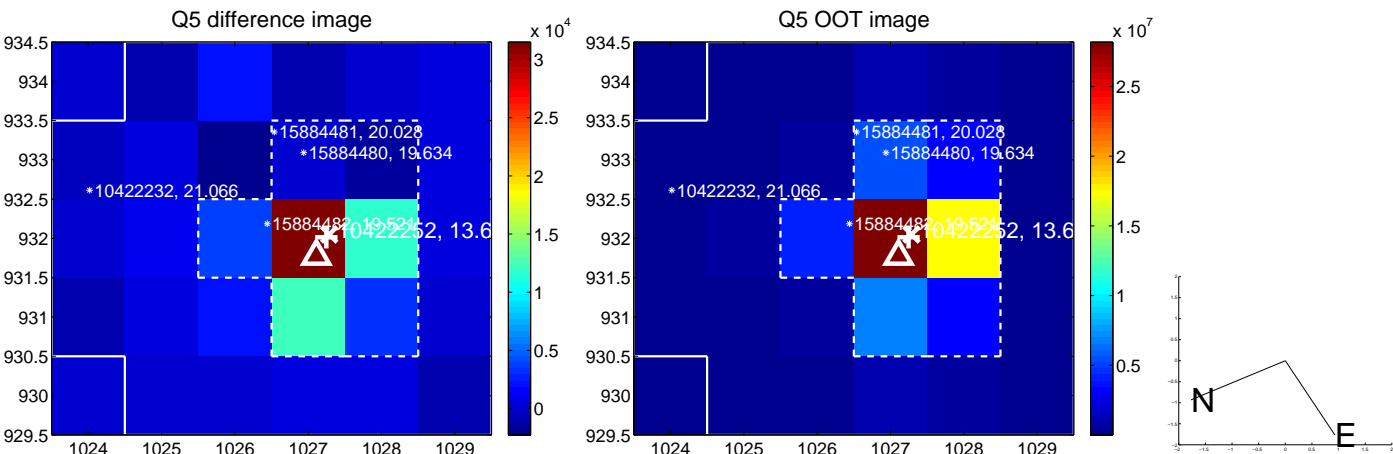


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

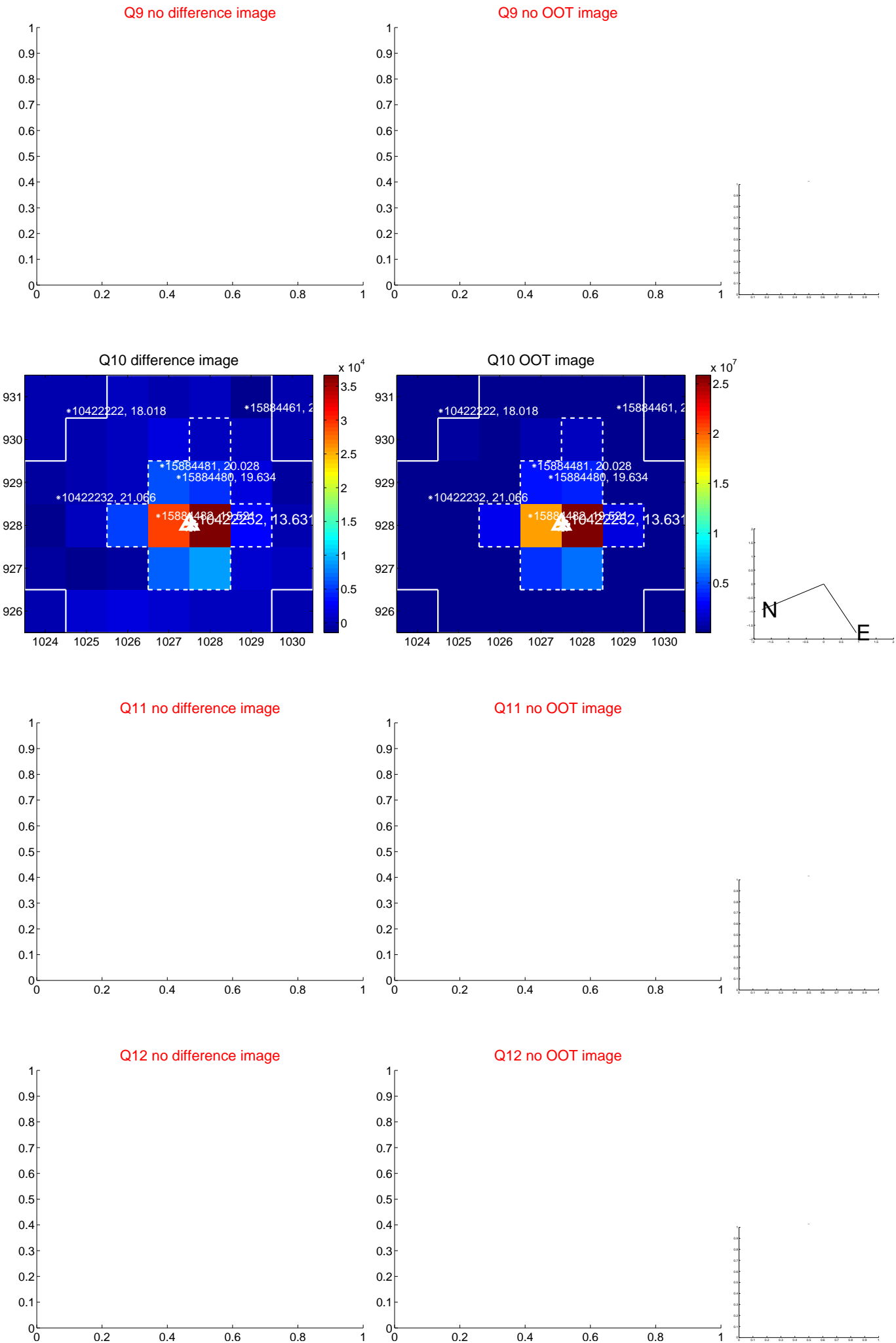
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



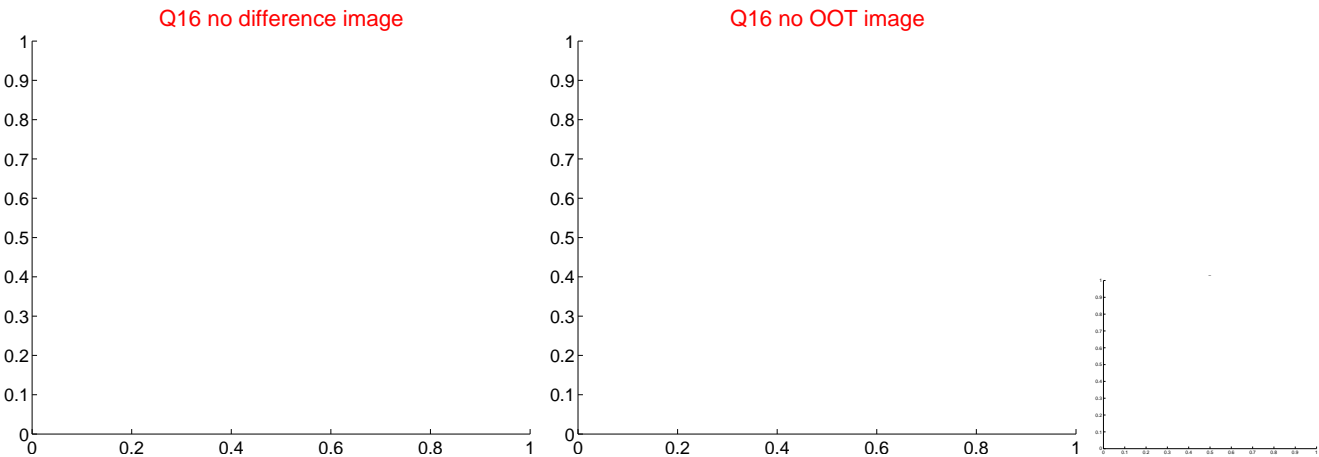
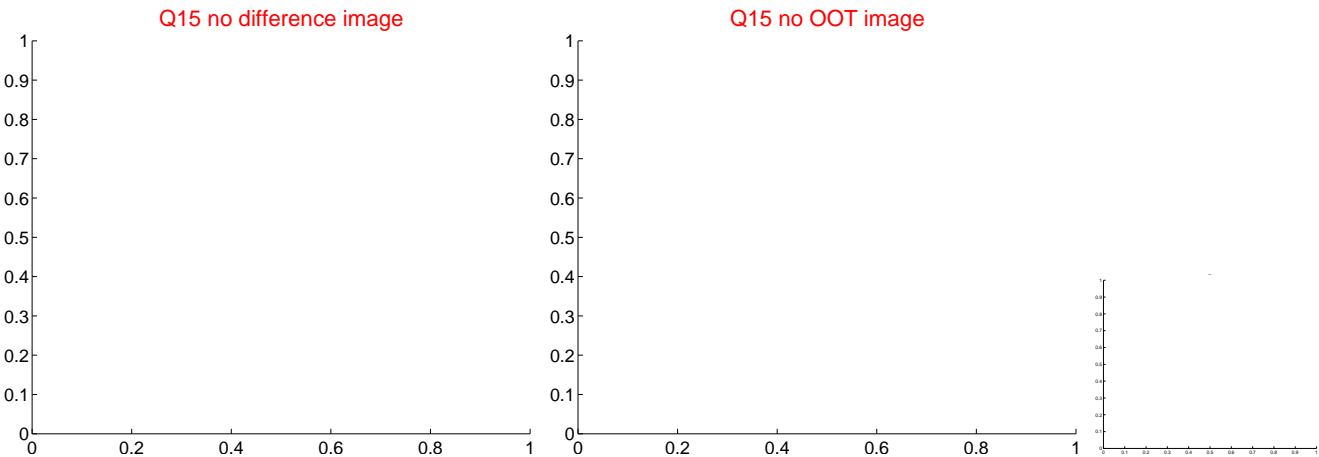
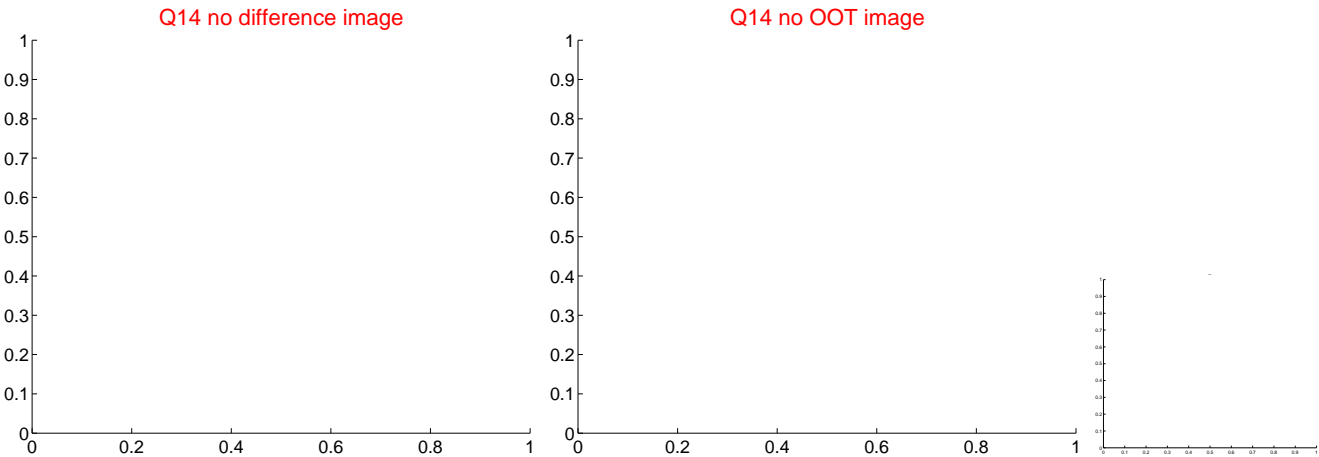
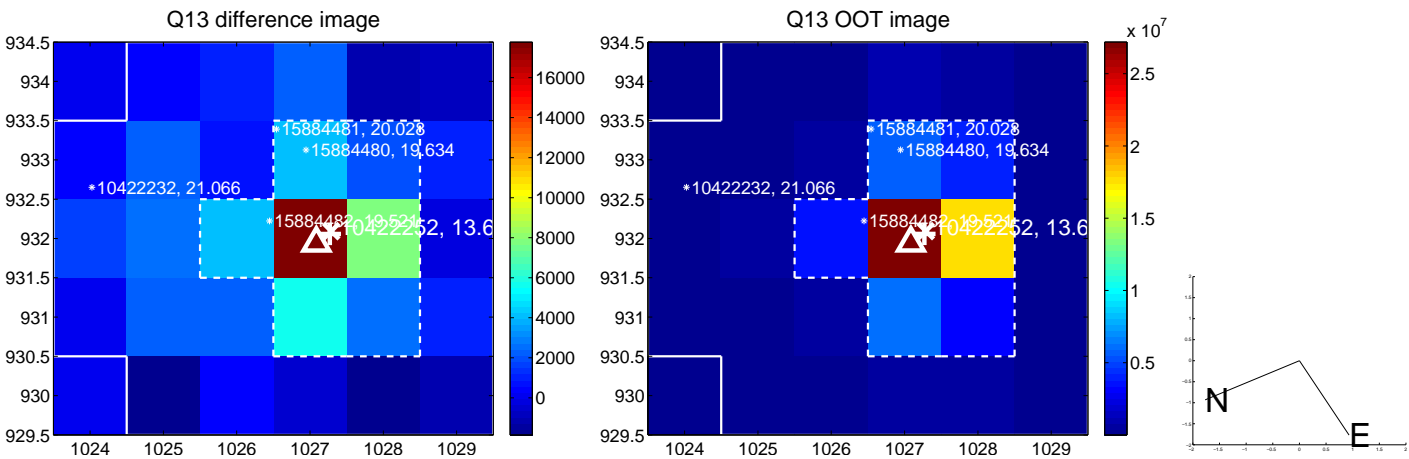
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



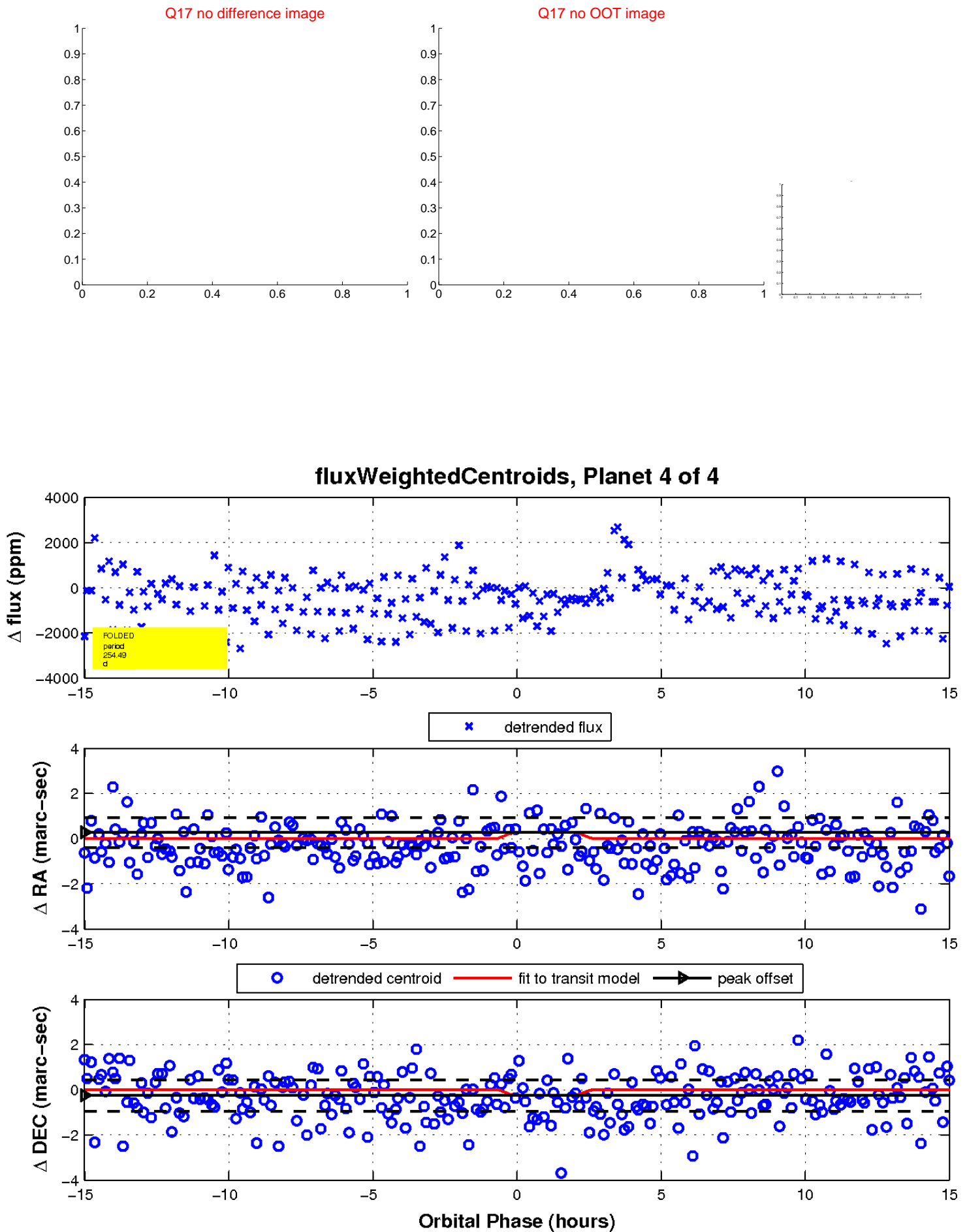
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

