

# KIC 005784256

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005784256-01	OBS	No	516.728329	314.056963	1628.7	3.500	13.7	7.1	0.71	4973	2.79	0.21
005784256-02	OBS	No	598.460531	145.010299	1626.6	5.309	15.0	7.2	0.71	4973	2.77	0.17
005784256-03	OBS	No	416.429421	266.004468	1832.8	4.003	13.7	9.2	0.71	4973	3.10	0.28
005784256-04	OBS	No	411.244326	479.084467	2017.2	3.871	12.5	12.1	0.71	4973	3.35	0.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005784256-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005784256-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005784256-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
005784256-04	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—CENT_NOFITS

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

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

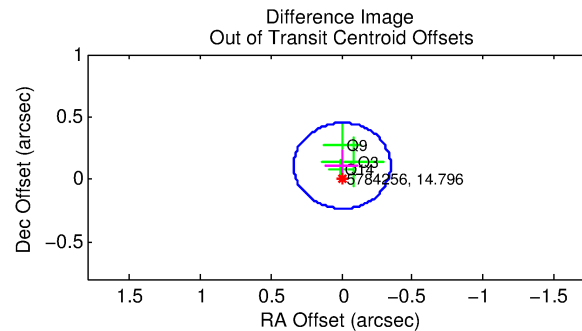
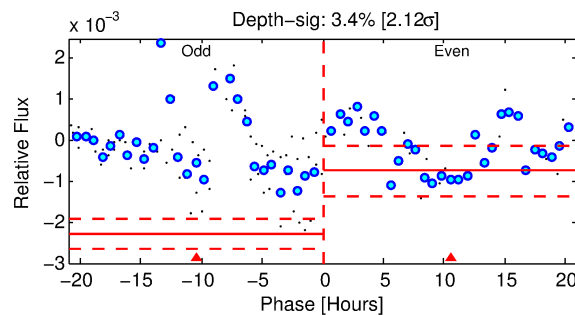
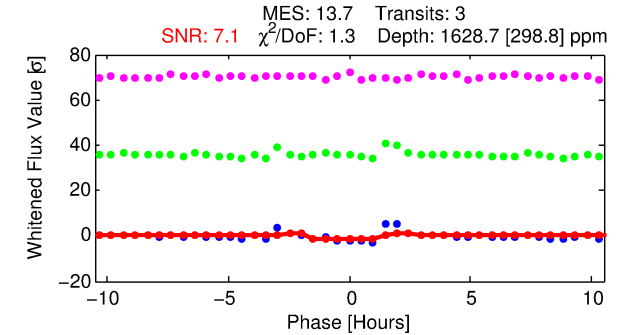
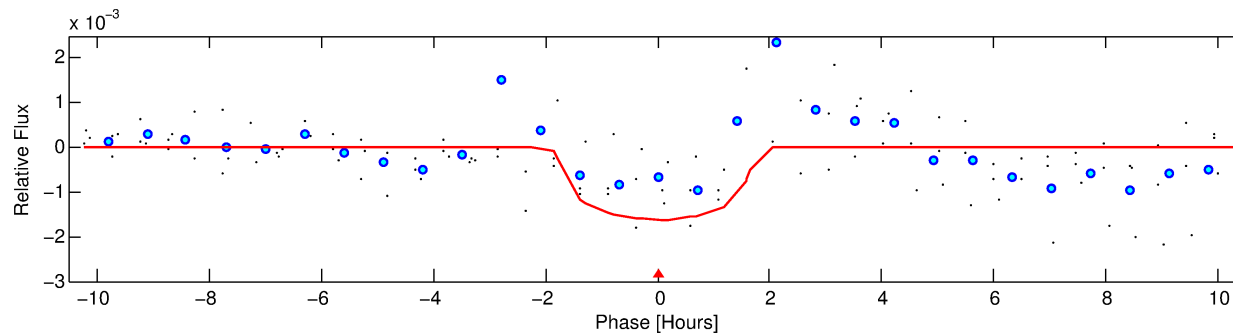
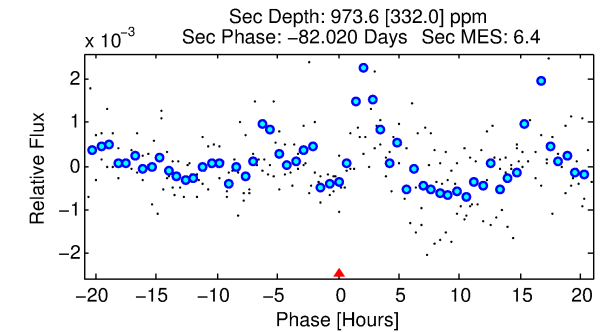
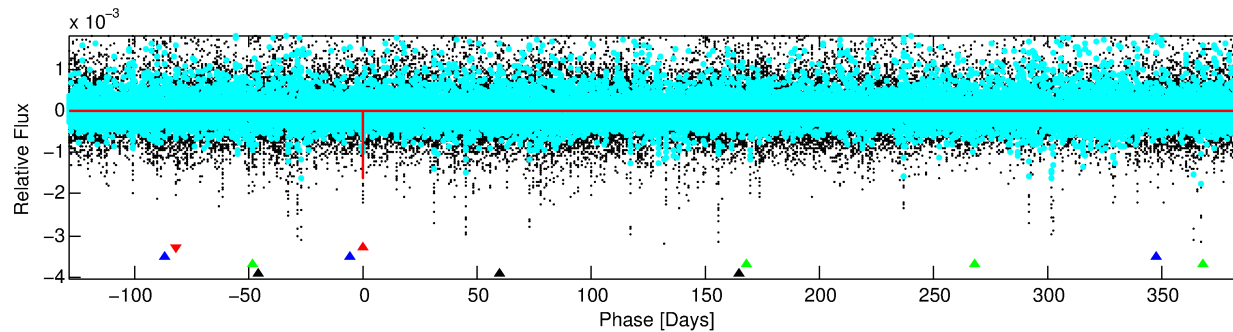
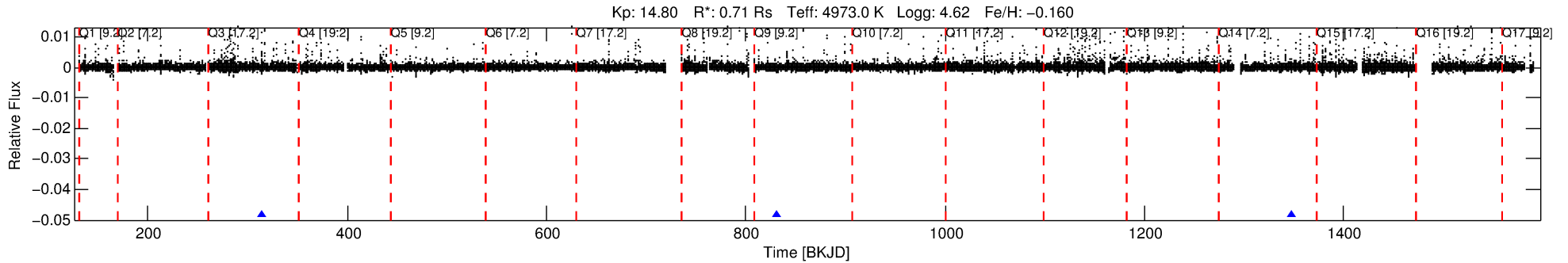
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 005784256-01

No Significant Match Found

# DV One-Page Summary

KIC: 5784256 Candidate: 1 of 4 Period: 516.728 d



## DV Fit Results:

Period = 516.72833 [0.00519] d  
Epoch = 314.0570 [0.0067] BKJD  
Rp/R\* = 0.0360 [0.1102]  
a/R\* = 1148.82 [12032.72]  
b = 0.19 [54.26]  
Seff = 0.21 [0.04]  
Teq = 172 [7] K  
Rp = 2.79 [8.55] Re  
a = 1.1580 [0.1016] AU  
Ag = 92202.83 [565211.49] [0.16σ]  
Teffp = 4628 [7093] K [0.63σ]

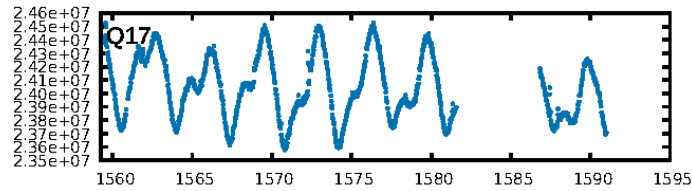
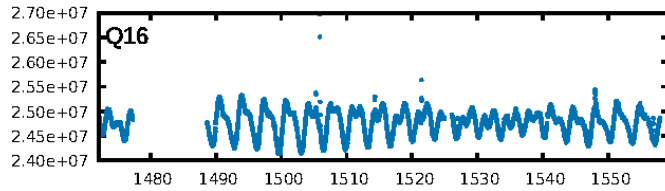
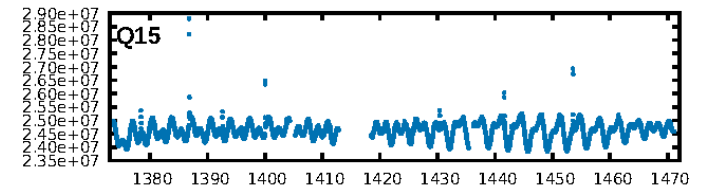
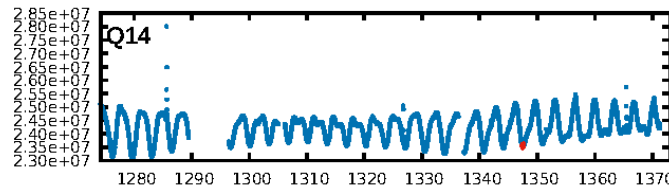
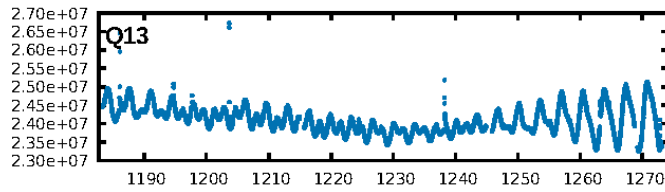
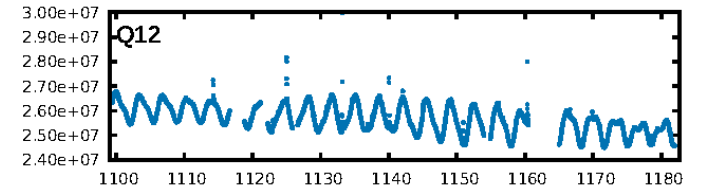
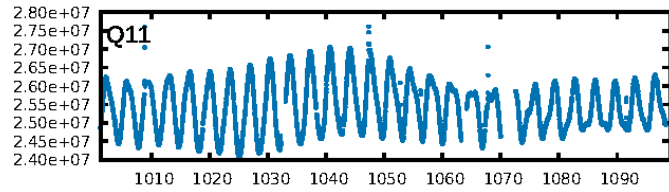
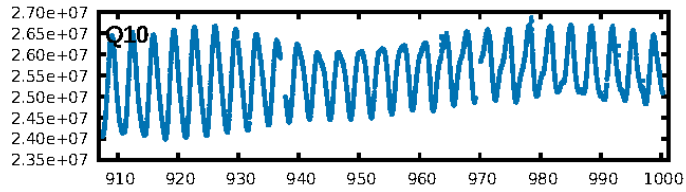
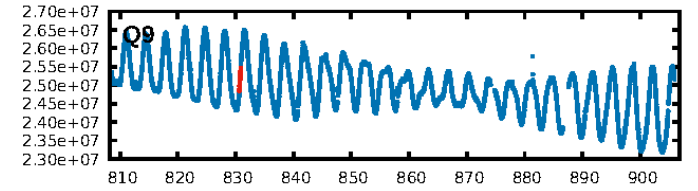
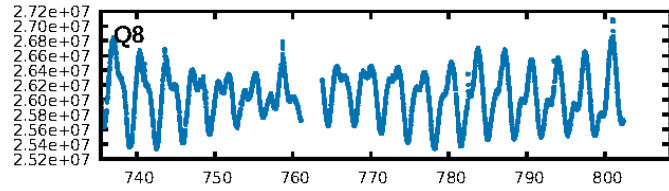
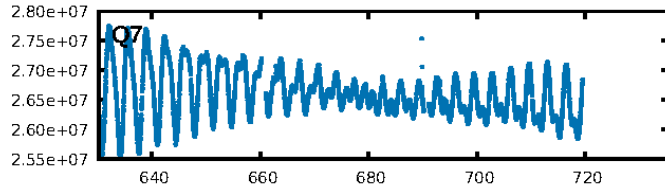
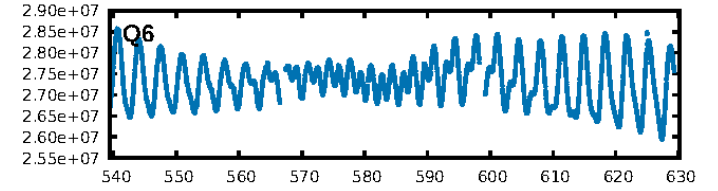
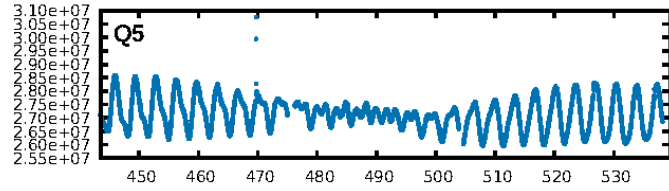
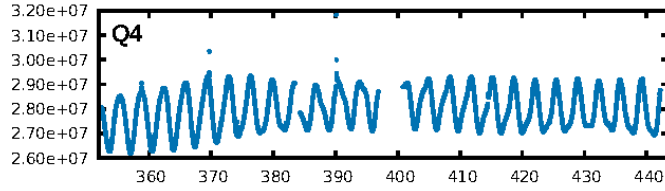
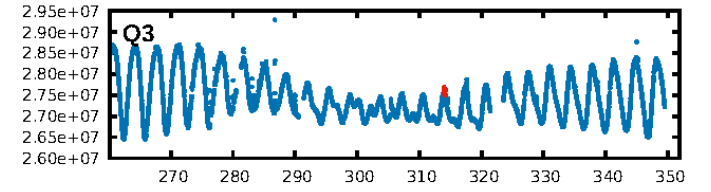
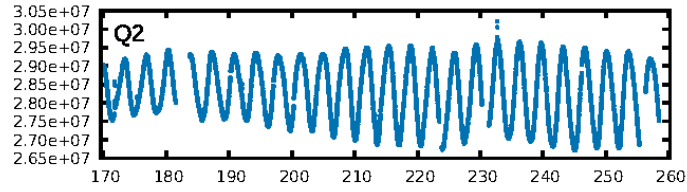
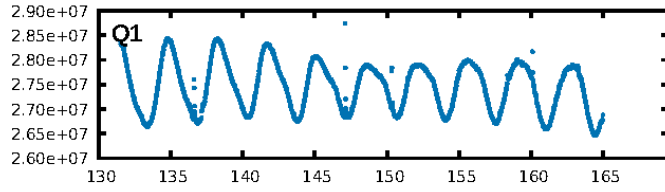
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [452.72σ]  
LongPeriod-sig: 100.0% [308.46σ]  
ModelChiSquare2-sig: 2.3%  
ModelChiSquareGof-sig: 80.9%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 3.959  
Centroid-sig: 10.4%  
Centroid-so: 1.048 arcsec [1.22σ]  
OotOffset-rm: 0.107 arcsec [0.94σ]  
KicOffset-rm: 0.125 arcsec [1.09σ]  
OotOffset-st: 1/1/0/1 [3]  
KicOffset-st: 1/1/0/1 [3]  
DiffImageQuality-fgm: 0.67 [2/3]  
DiffImageOverlap-fno: 1.00 [3/3]

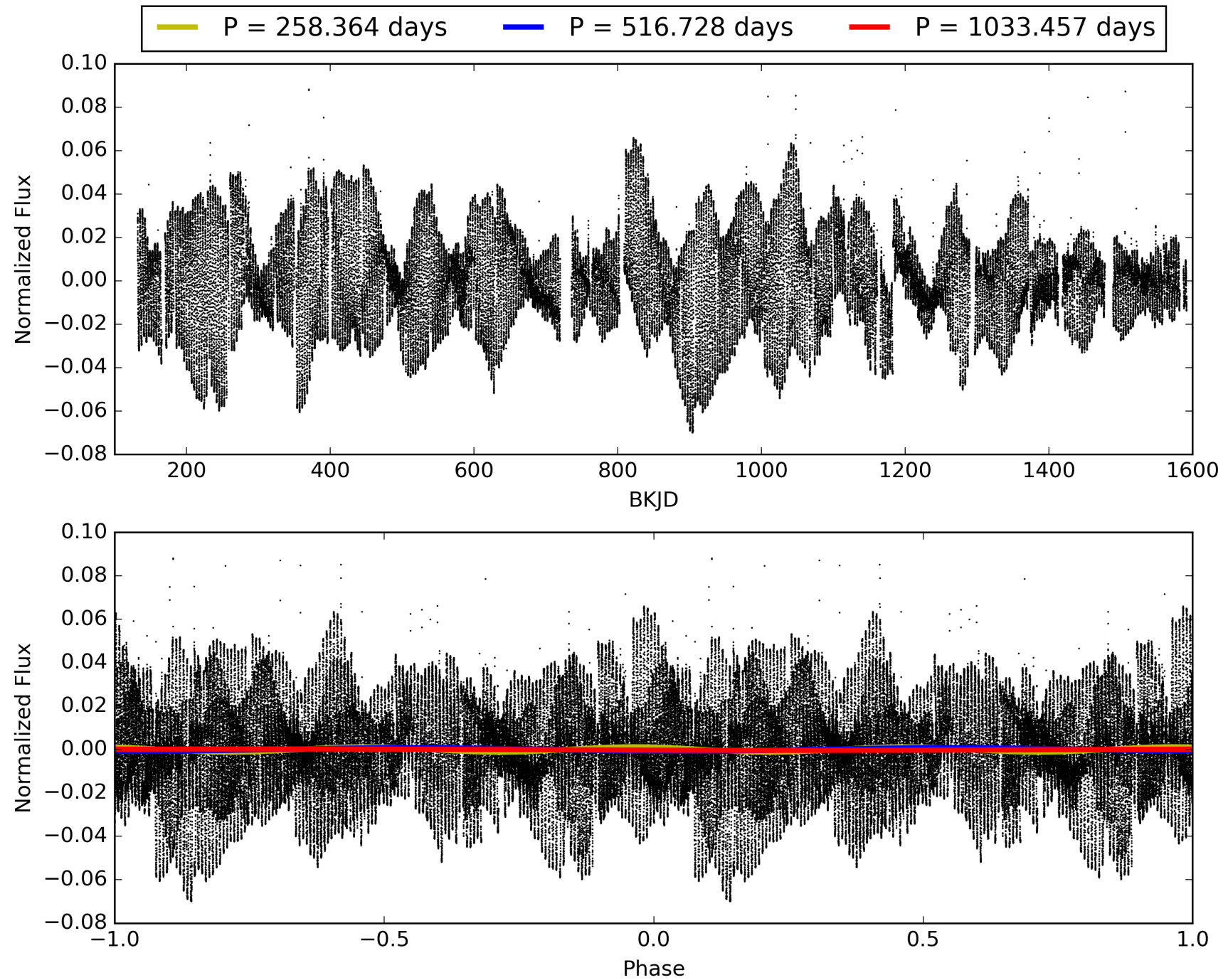
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:44:57 Z

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

# TCE 005784256-01, PDC Light Curves



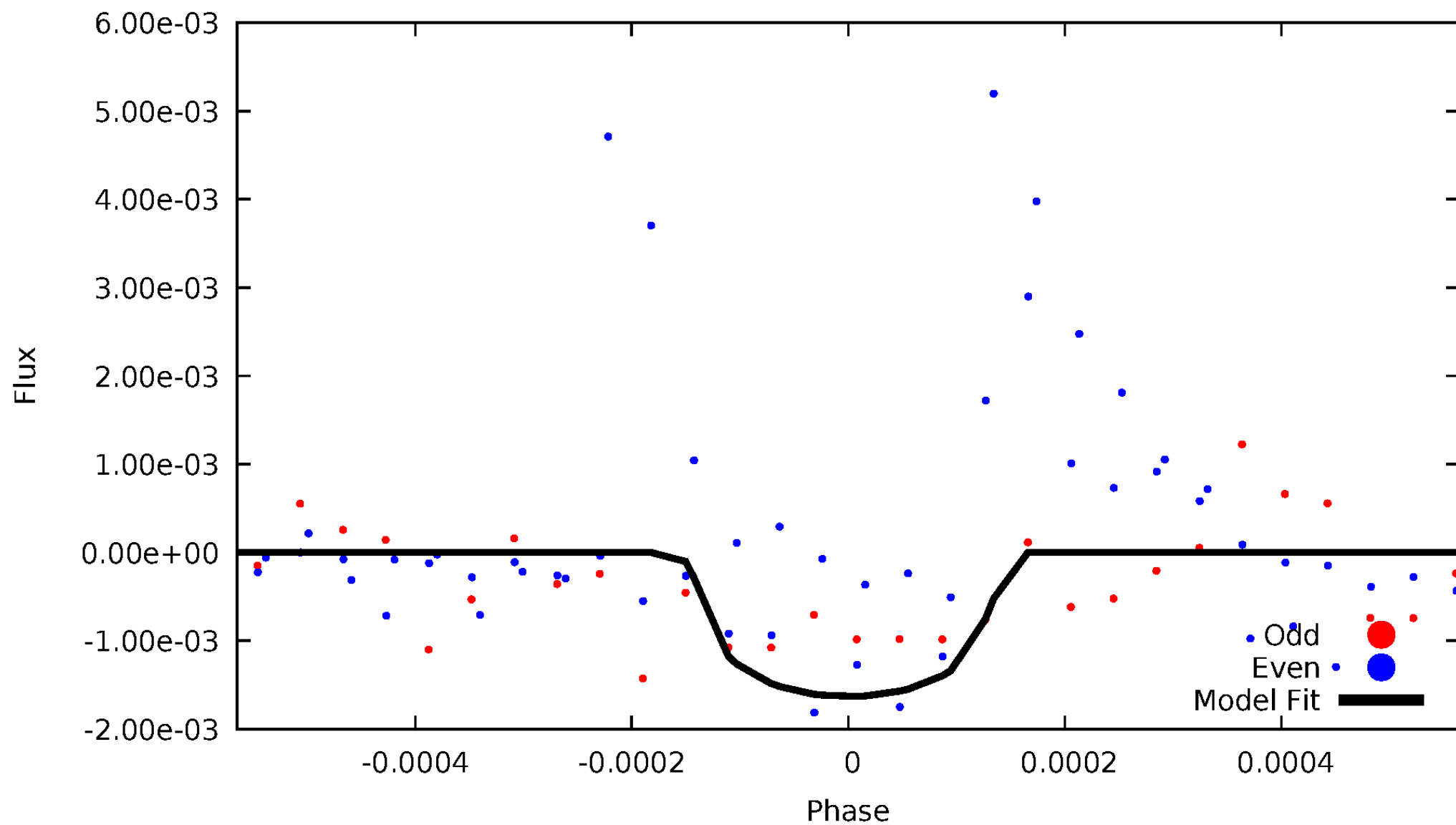
TCE 005784256-01





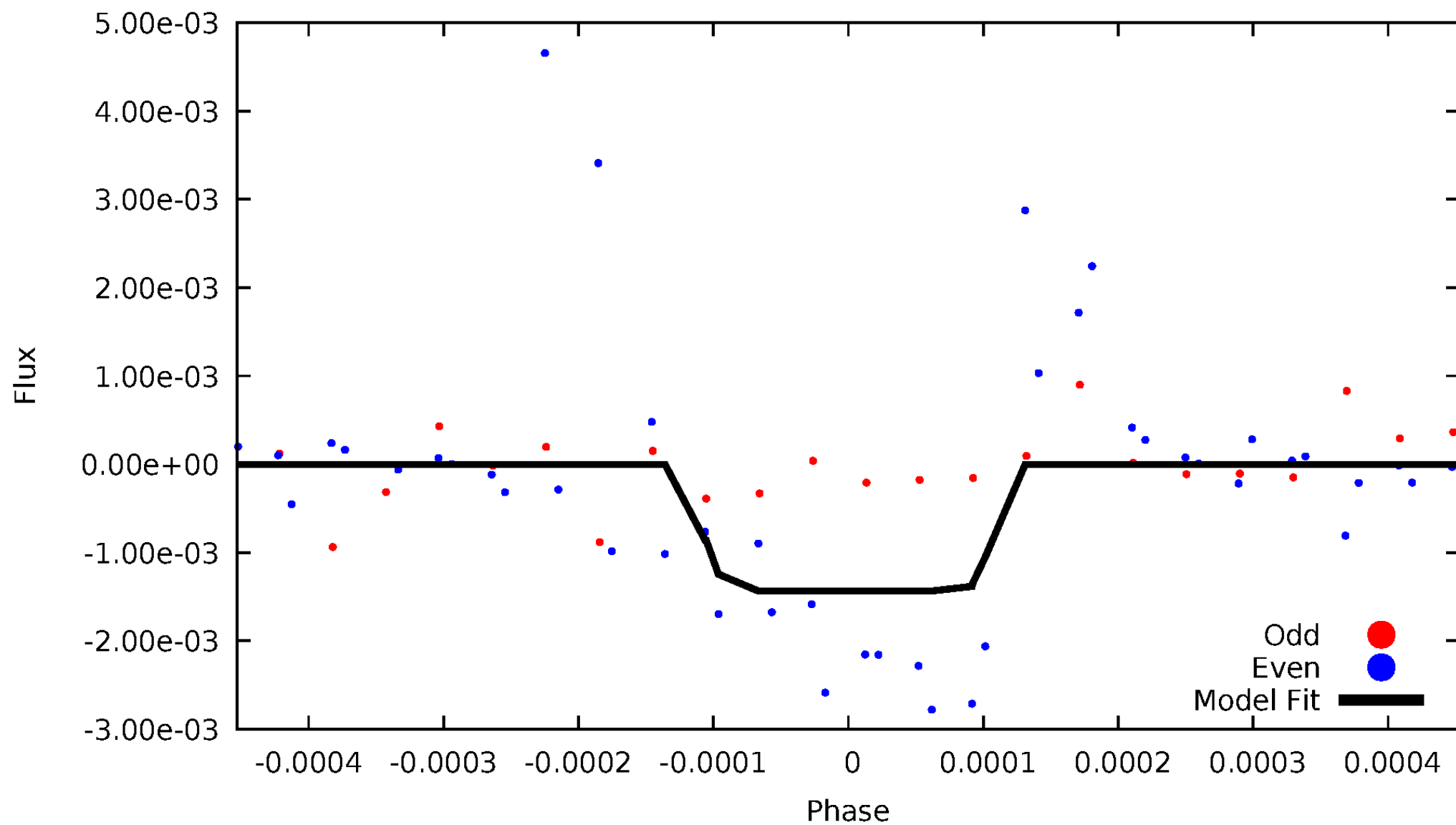
# DV Odd/Even

TCE 005784256-01



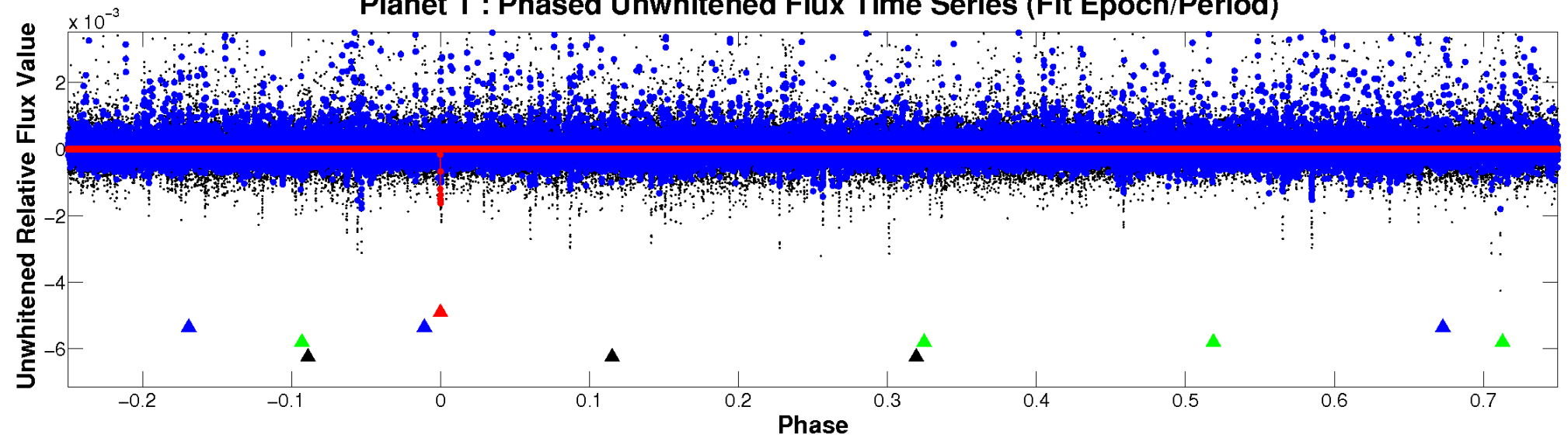
# ALT Odd/Even

TCE 005784256-01

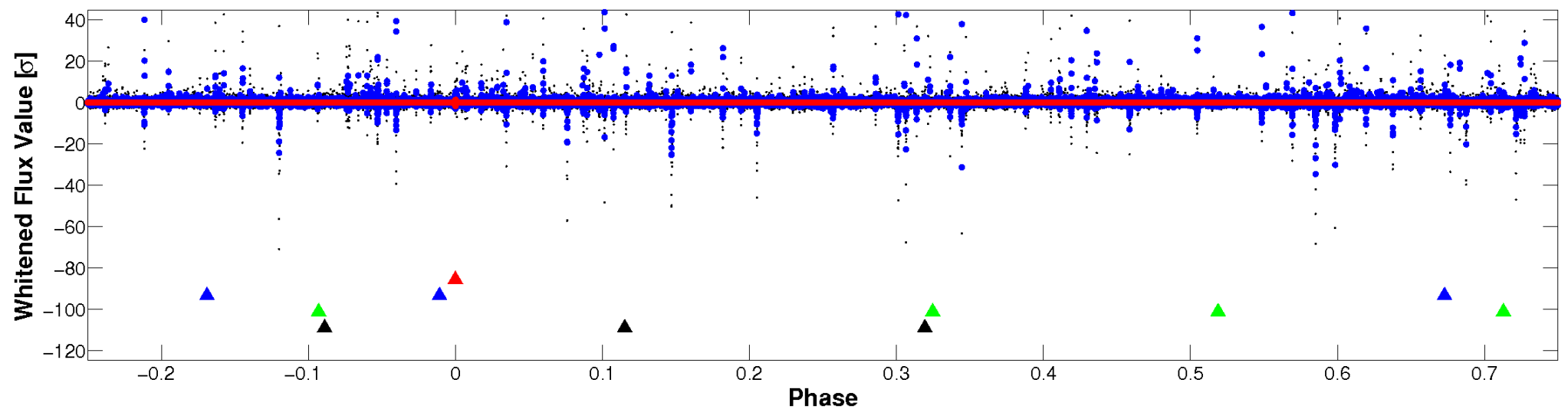


# Non-Whitened Vs. Whitened Light Curve

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

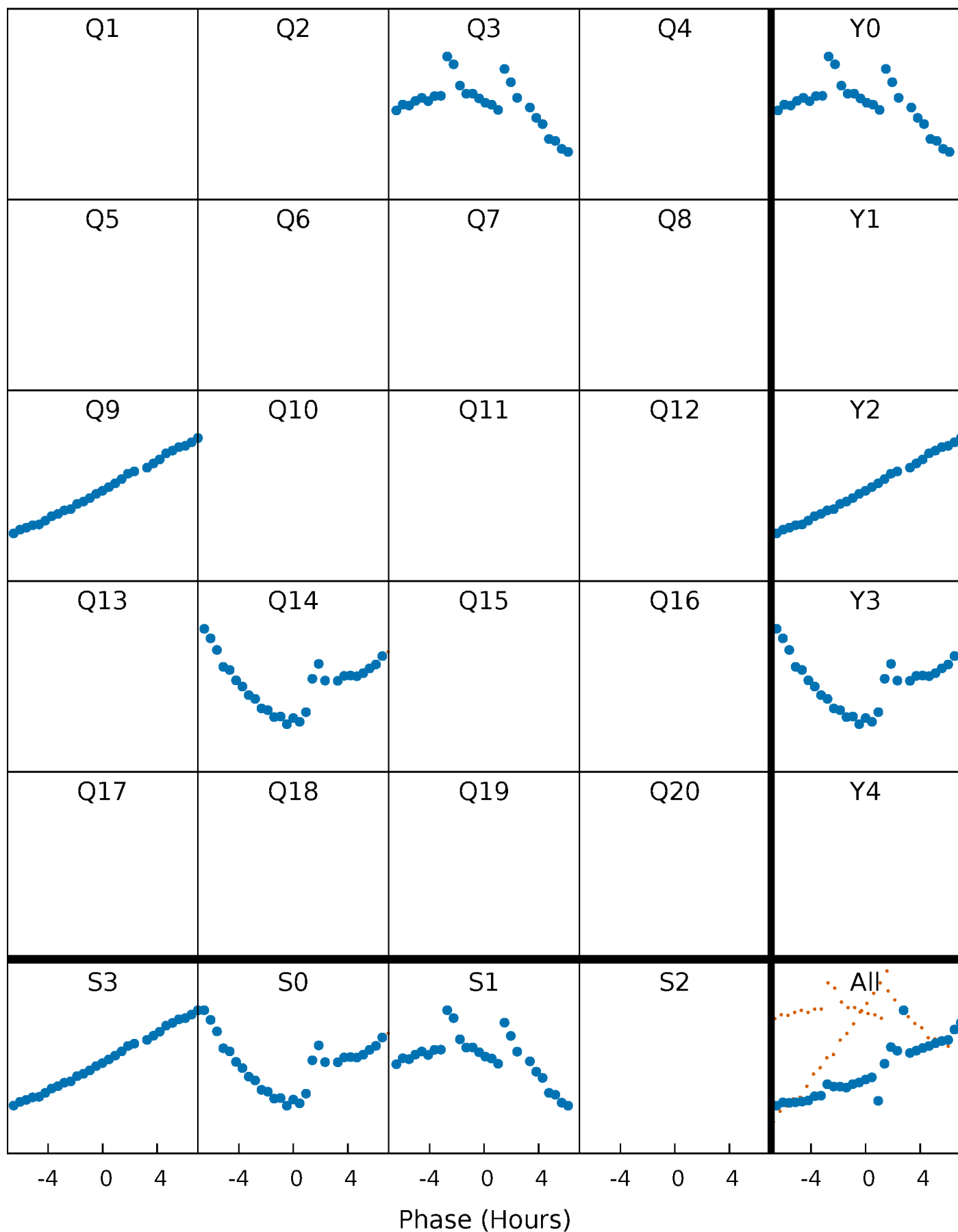


**Planet 1 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



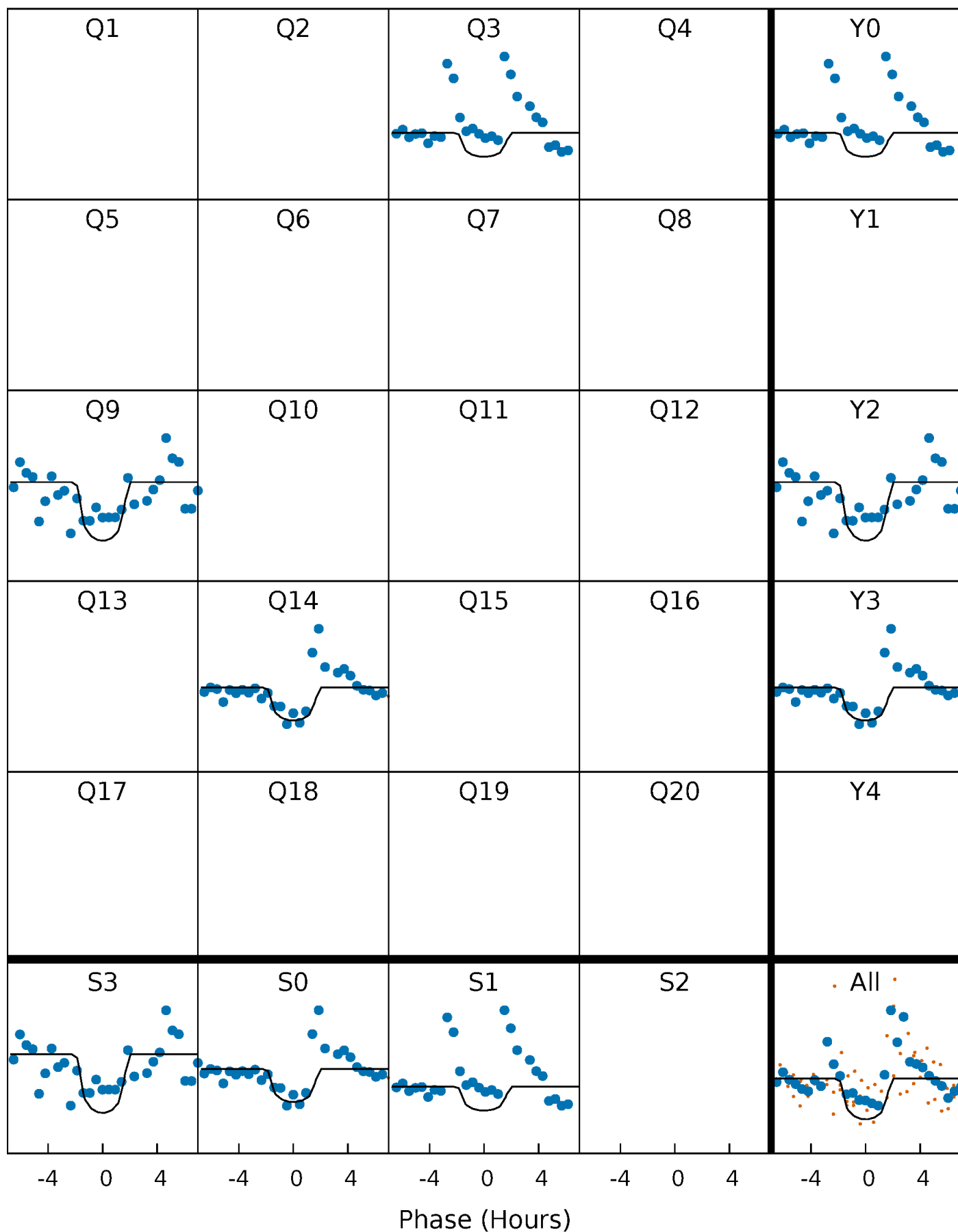
# PDC Quarter-Phased Transit Curves

TCE 005784256-01 P=516.728329 Days  $T_0=314.056963$  (BKJD)



# DV Quarter-Phased Transit Curves

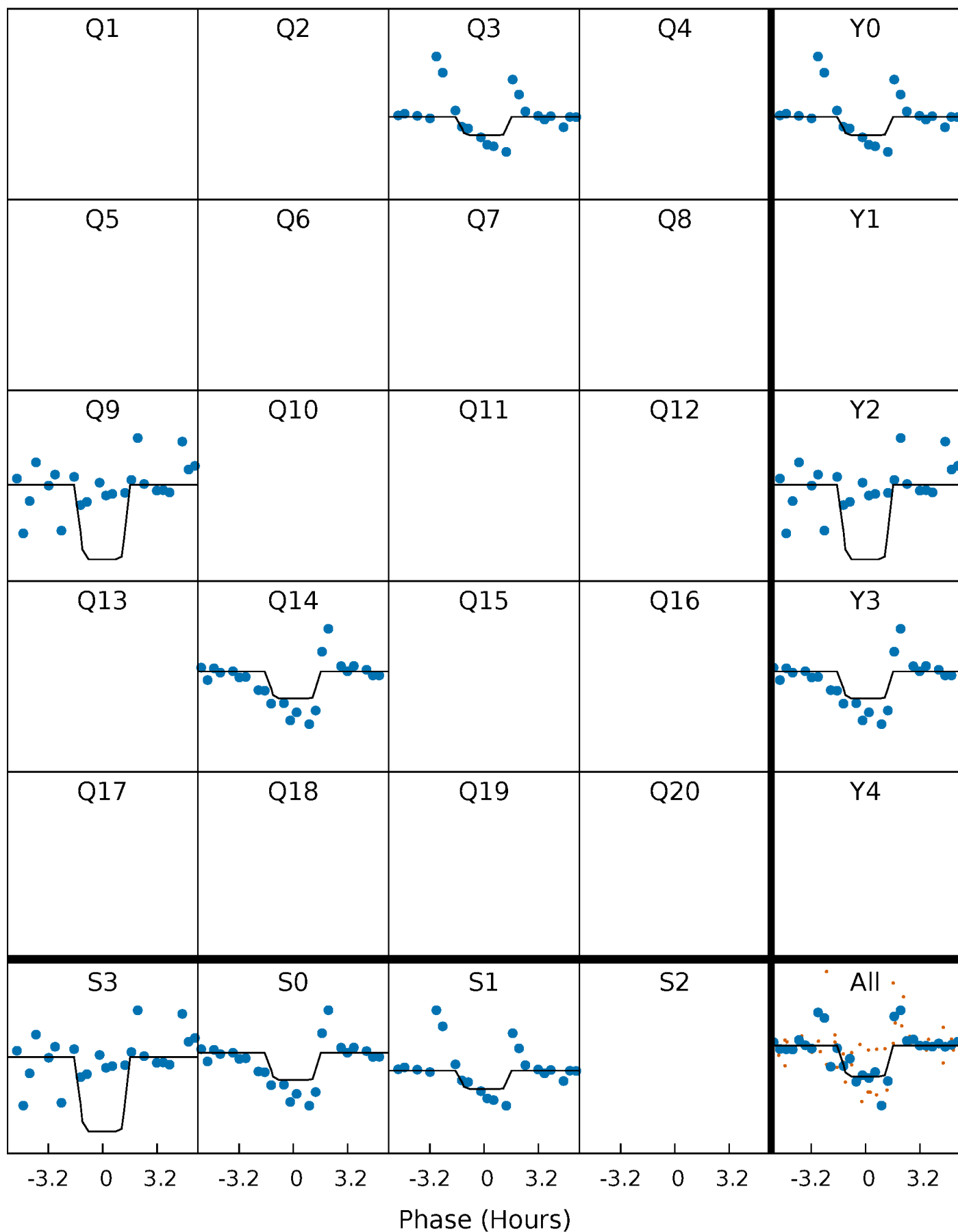
TCE 005784256-01 P=516.728329 Days  $T_0=314.056963$  (BKJD)





# Alt. Detrend Quarter-Phased Transit Curves

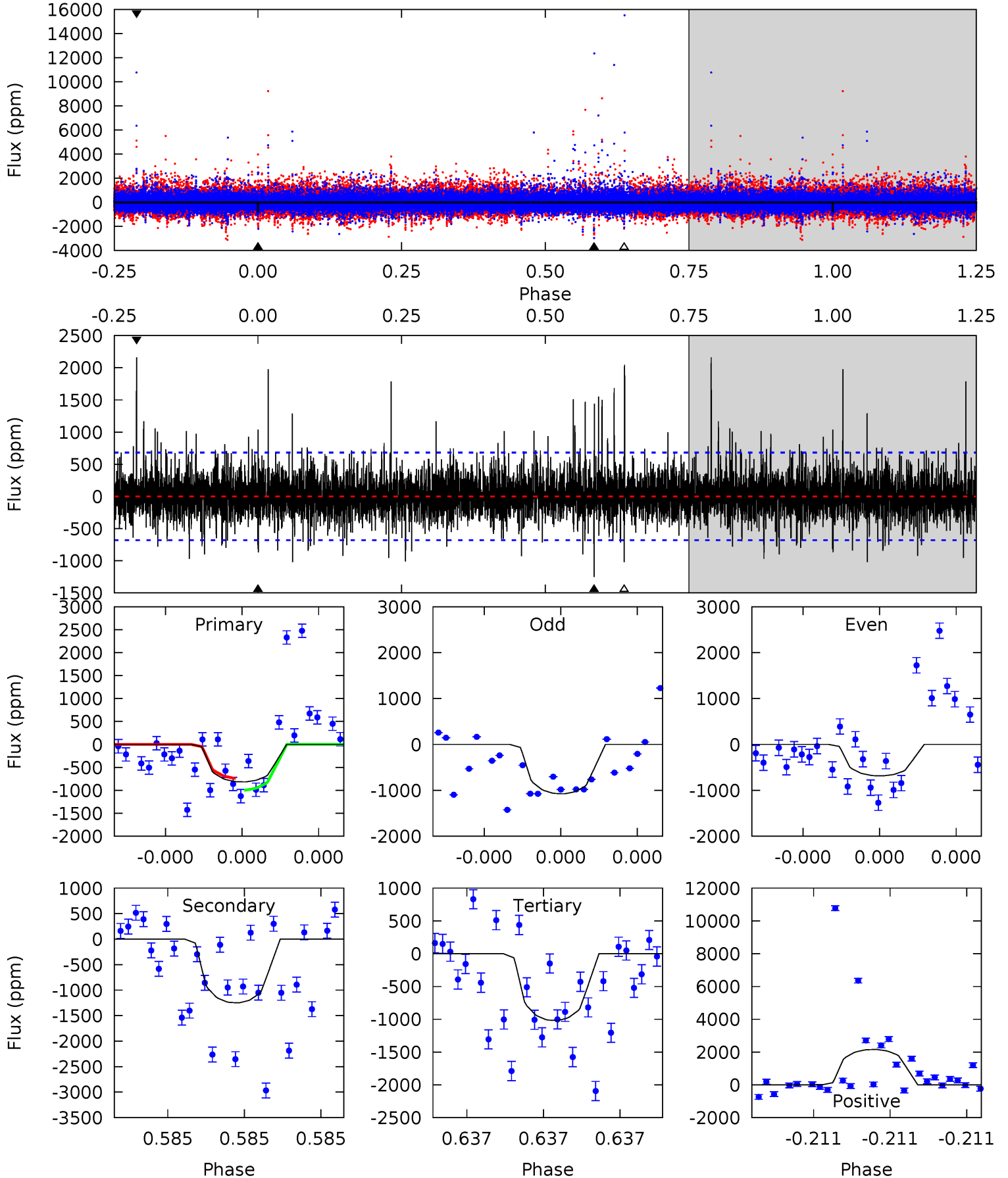
TCE 005784256-01 P=516.723865 Days  $T_0=314.058546$  (BKJD)



# DV Model-Shift Uniqueness Test

005784256-01, P = 516.728329 Days, E = 314.056963 Days

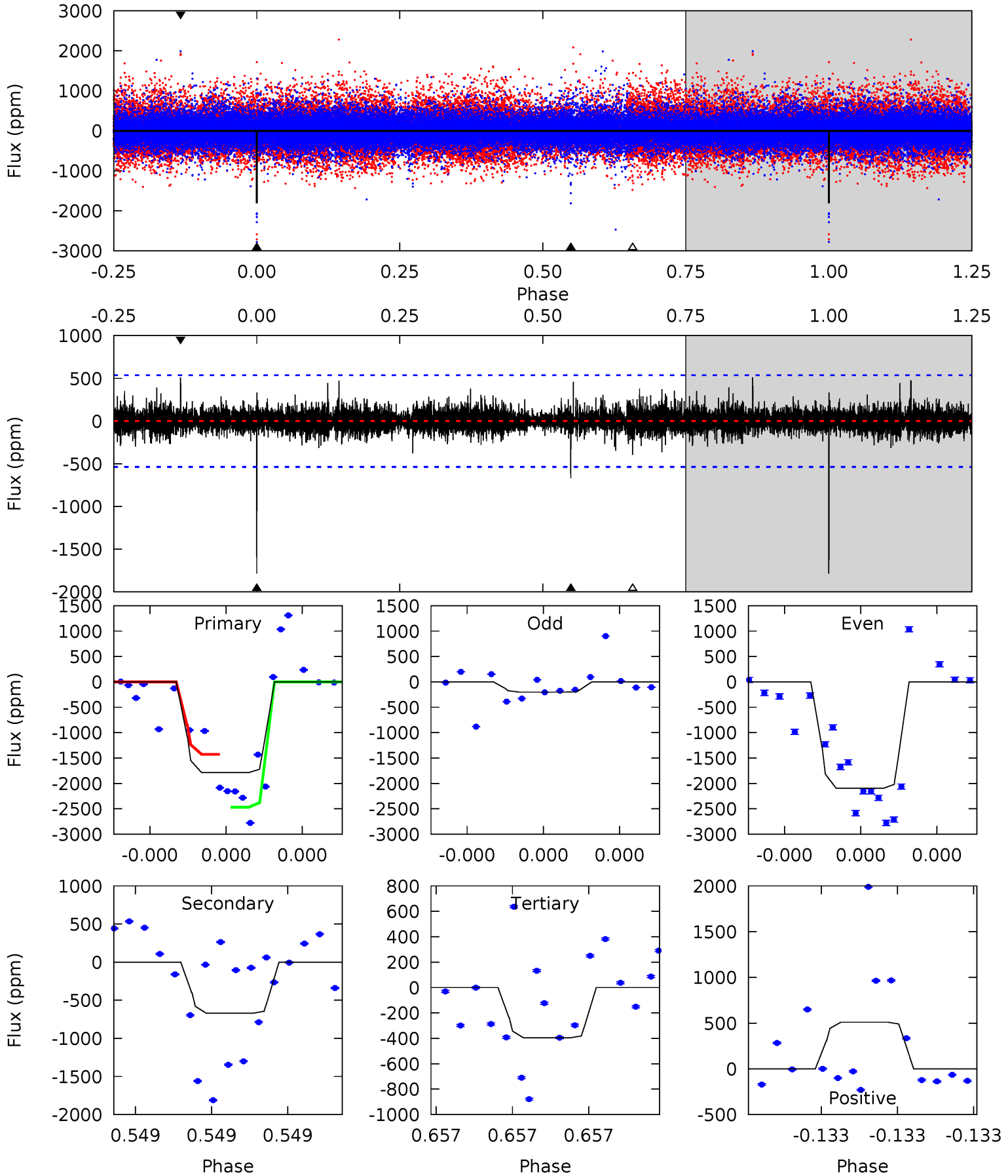
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
6.80	10.4	8.49	18.0	5.67	3.63	2.07	-1.69	-11.2	1.92	-7.56	0.88	0.65	0.63	1.05



# Alt Model-Shift Uniqueness Test

005784256-01, P = 516.723865 Days, E = 314.058546 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
19.0	7.13	4.22	5.44	5.72	3.71	0.80	14.8	13.6	2.92	1.70	11.1	0.78	0.22	5.29



### Stellar Parameters For KIC 005784256

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4973^{+151}_{-136}$	$4.625^{+0.031}_{-0.063}$	$-0.160^{+0.300}_{-0.300}$	$0.710^{+0.078}_{-0.058}$	$0.789^{+0.055}_{-0.095}$	$3.109^{+0.460}_{-0.703}$
	+3%/-3%	+1%/-1%	+188%/-188%	+11%/-8%	+7%/-12%	+15%/-23%
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 005784256-01 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1251 \pm 120$	$7.11^{+6.81}_{-5.04}$	$242^{+9}_{-9}$	$3506^{+2117}_{-588}$	$18258^{+194684}_{-13379}$
Alt.	$-669 \pm 94$	$6.98^{+7.05}_{-4.97}$	$242^{+8}_{-8}$	$3228^{+1813}_{-576}$	$10045^{+111538}_{-7644}$

$T_{\text{max}}$  = 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

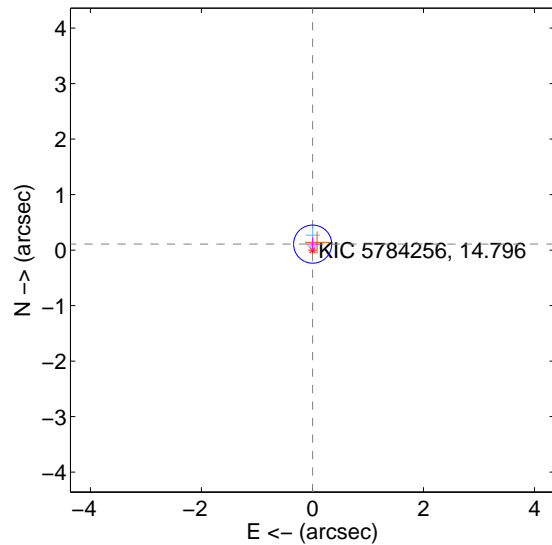
Supplemental centroid analysis for 005784256-01. Kepler magnitude: 14.80. Transit SNR 7.07

There are 2 quarters with good PRF difference image offsets

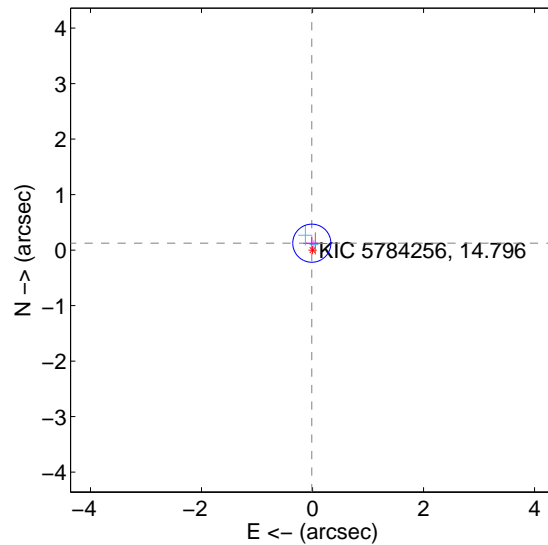
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.107 \pm 0.114$	0.94	$-0.004 \pm 0.111$	$0.107 \pm 0.114$
PRF-fit source offset from KIC position	$0.125 \pm 0.114$	1.09	$0.013 \pm 0.111$	$0.124 \pm 0.114$
photometric centroid source offset	$1.05 \pm 0.86$	1.22	$0.65 \pm 1.00$	$0.82 \pm 0.77$

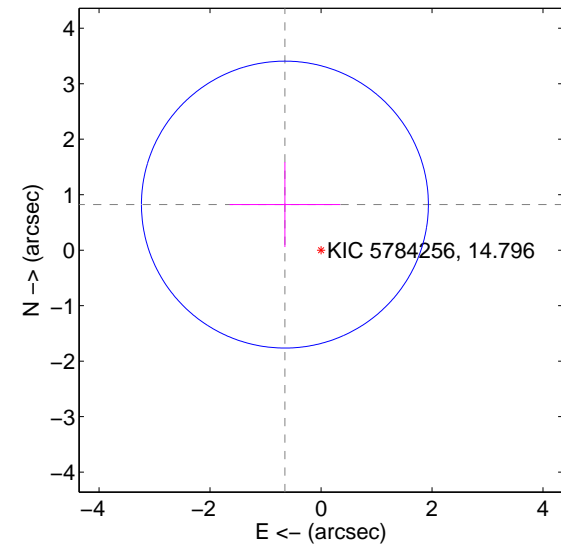
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



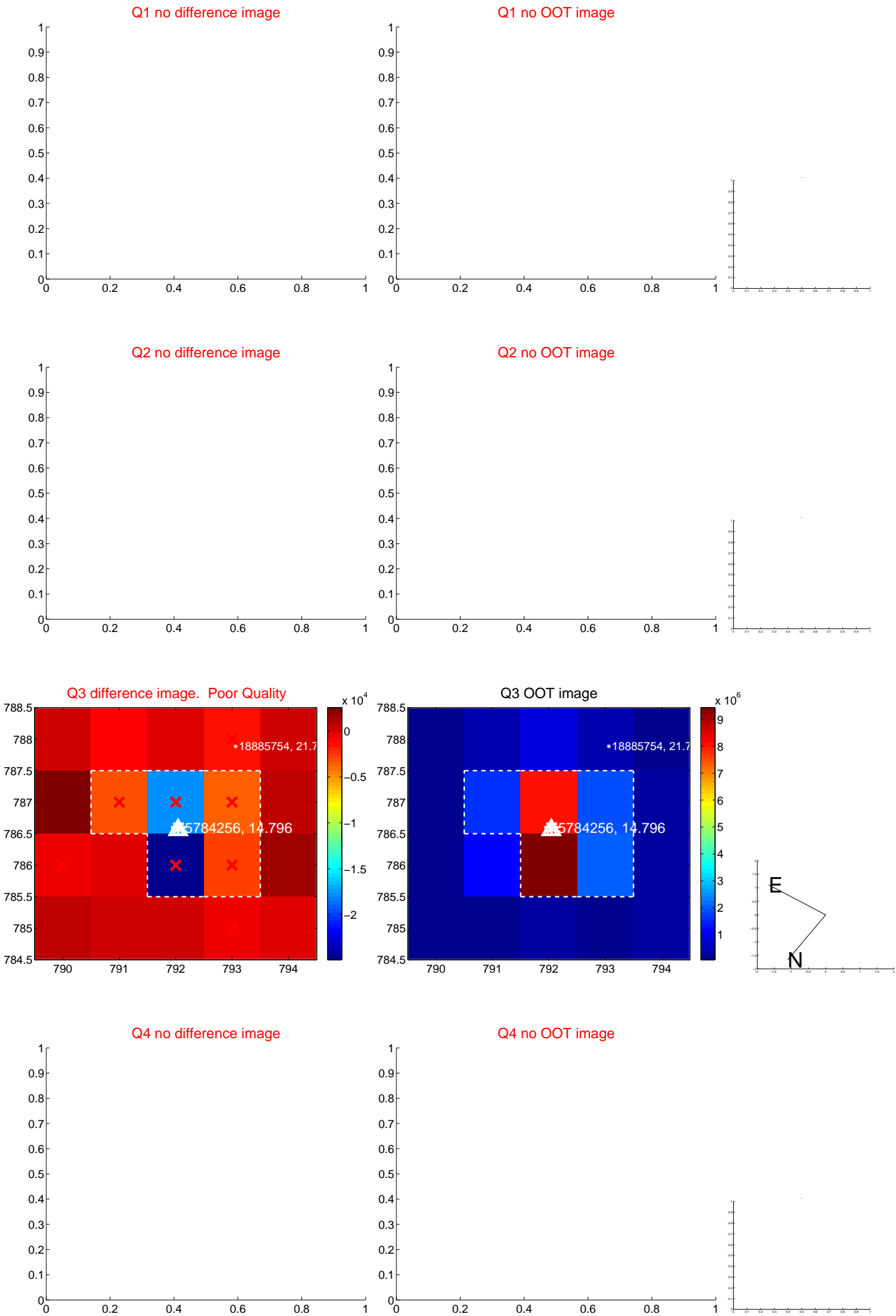
offset from photometric centroids



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.



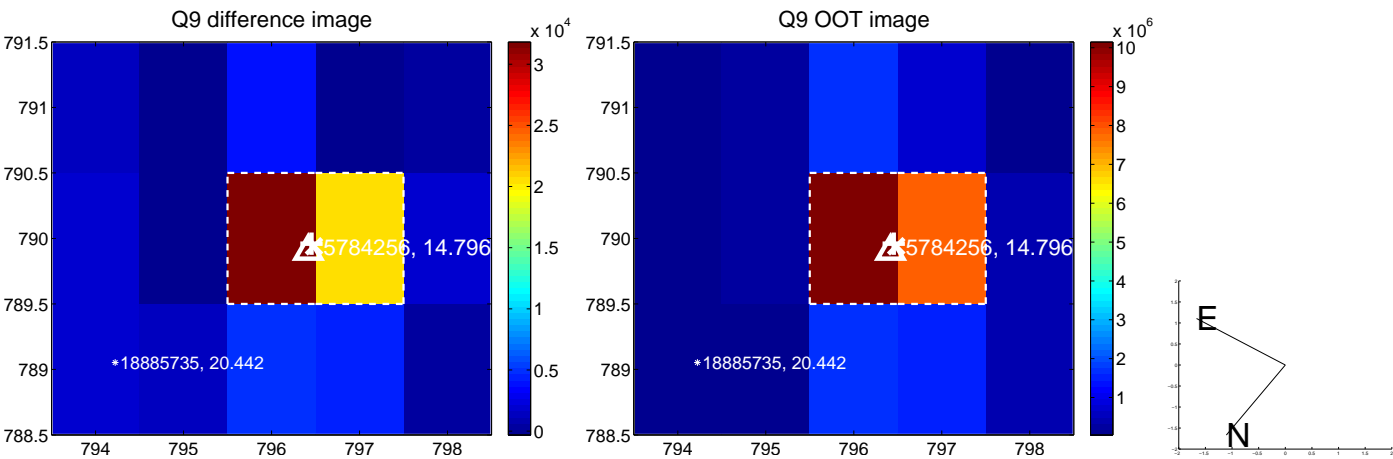
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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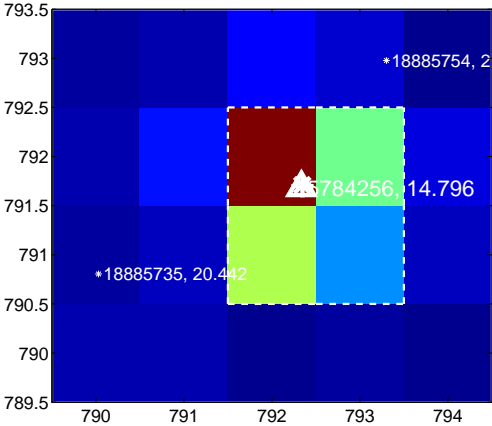
Q13 no difference image



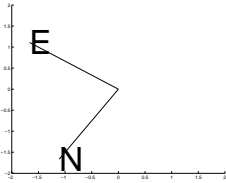
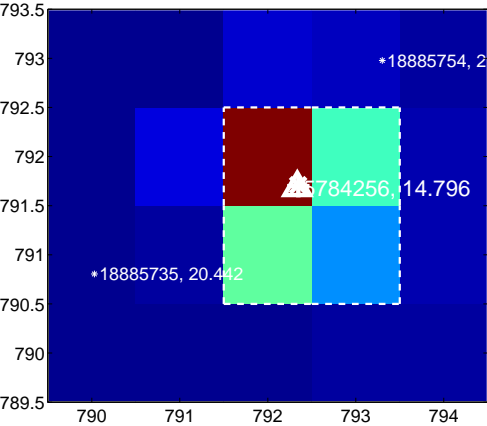
Q13 no OOT image



Q14 difference image



Q14 OOT image



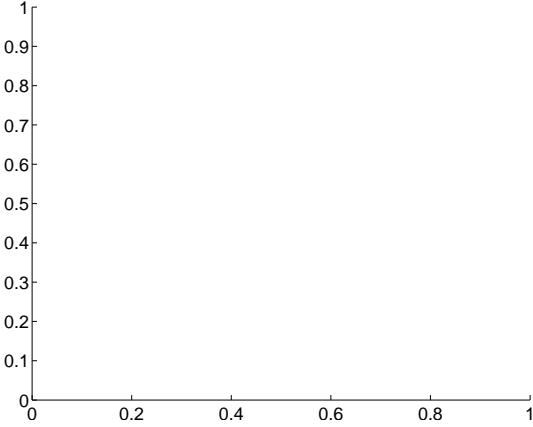
Q15 no difference image



Q15 no OOT image



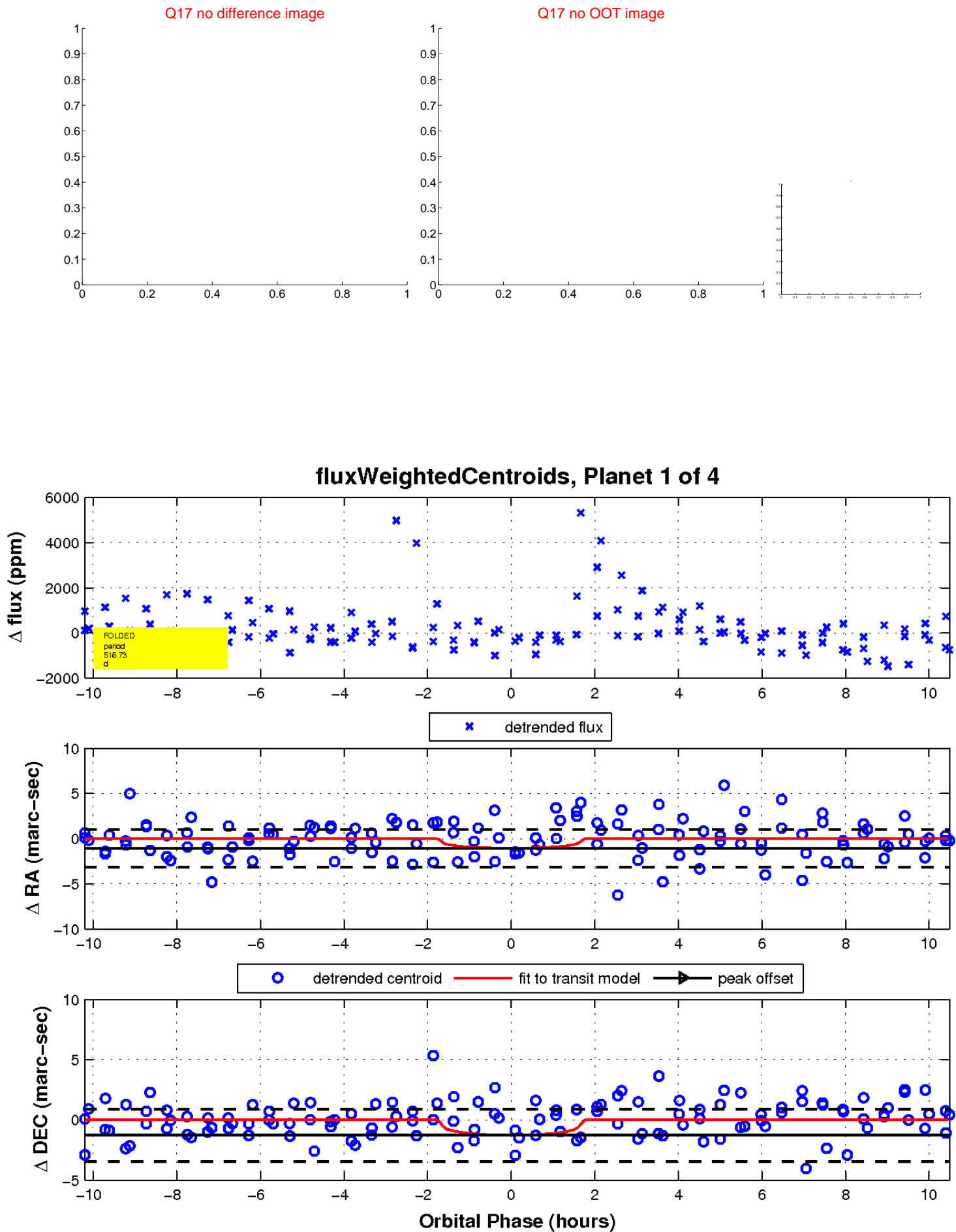
Q16 no difference image



Q16 no OOT image



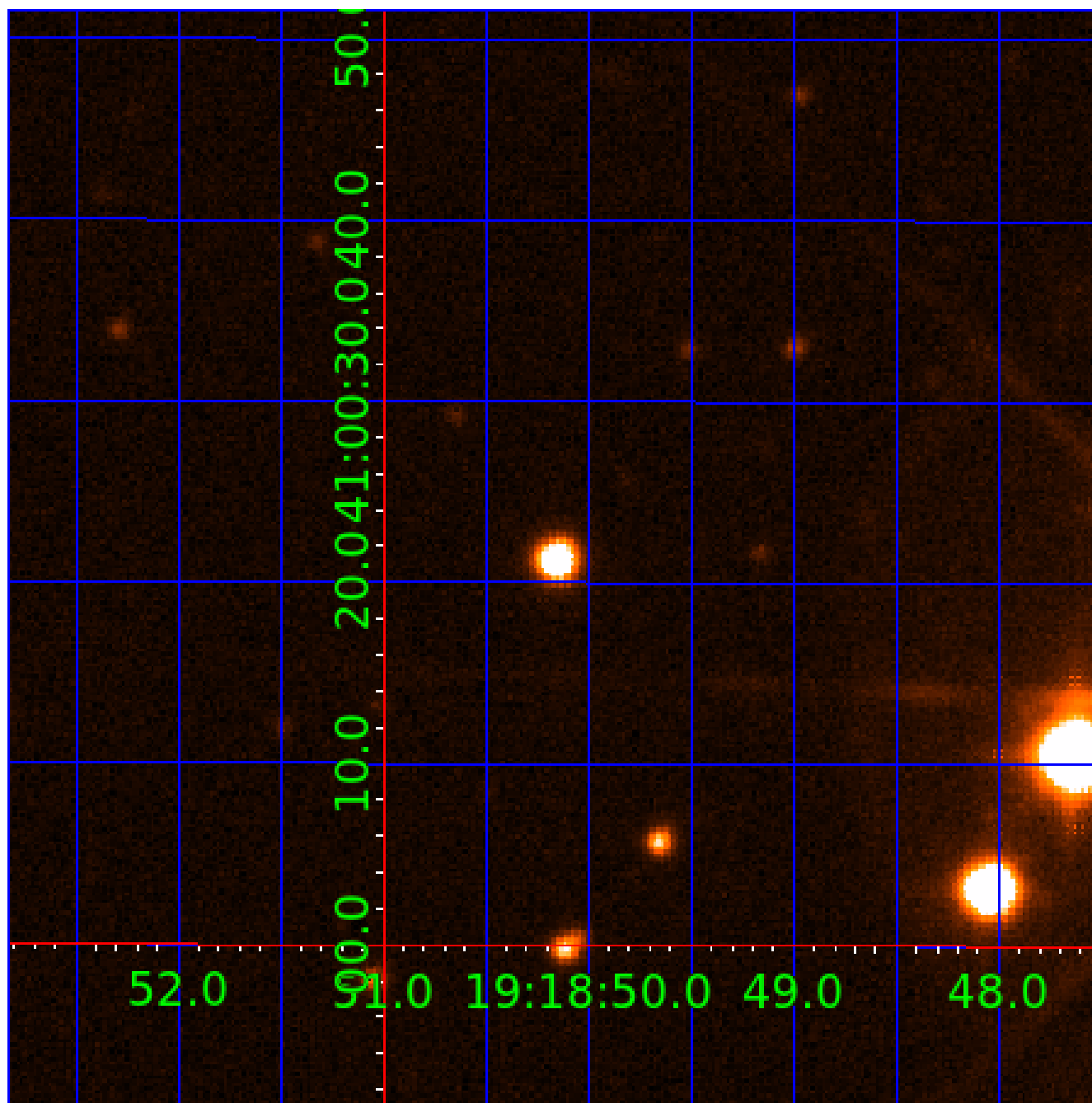
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.





UKIRT Image

Declination



# KIC 005784256

## Q1-17 DR25 TCE Parameters

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005784256-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
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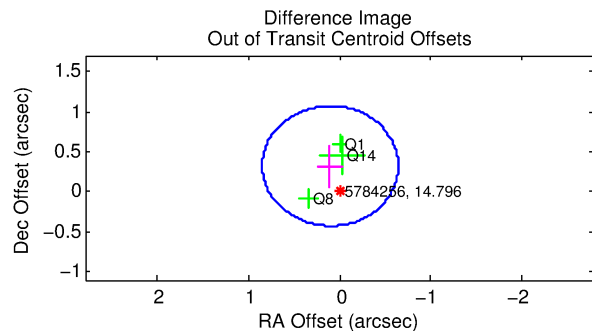
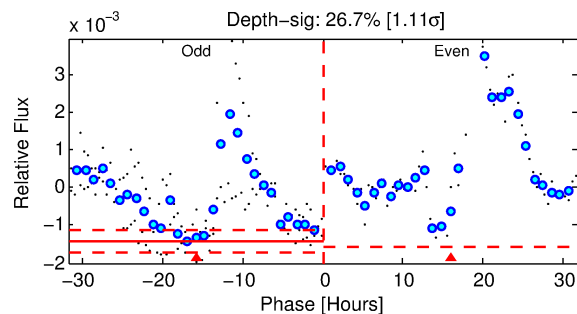
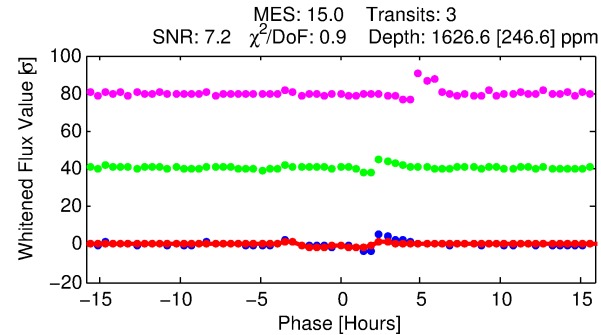
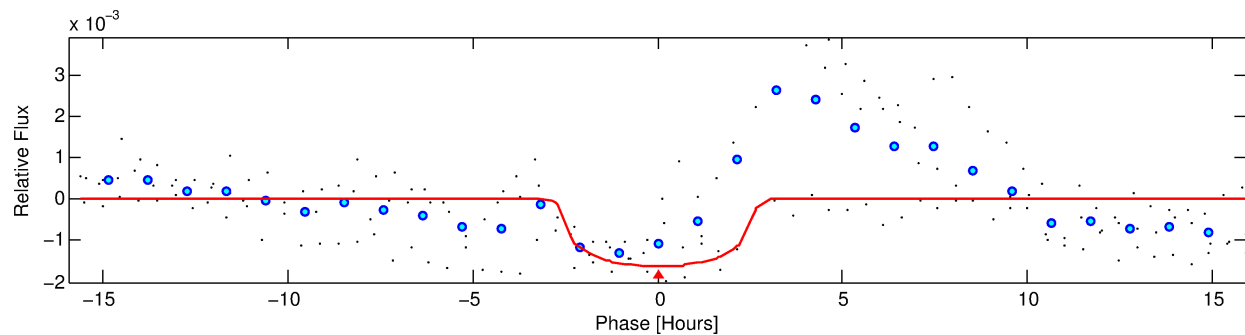
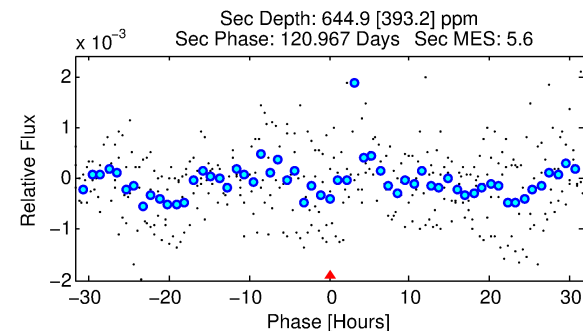
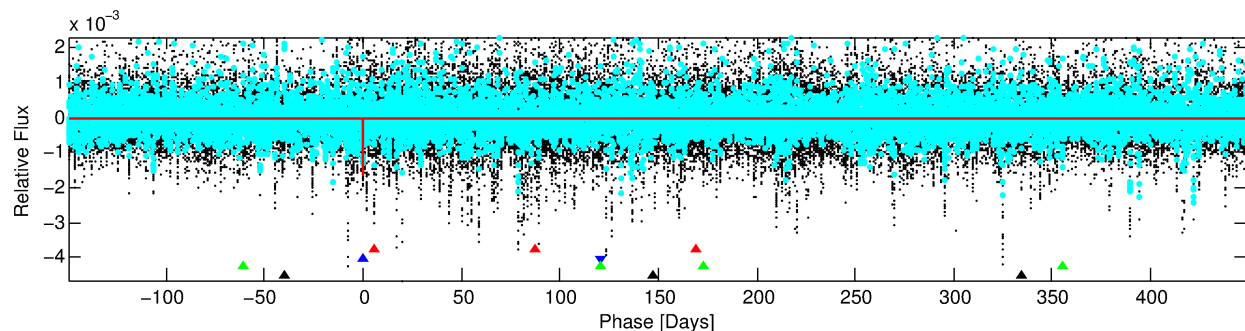
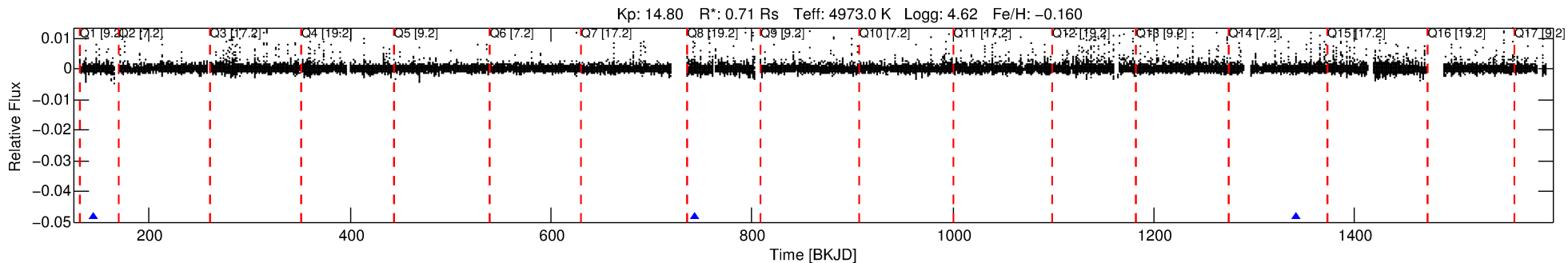
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005784256-02

No Significant Match Found

# DV One-Page Summary

KIC: 5784256 Candidate: 2 of 4 Period: 598.461 d



## DV Fit Results:

Period = 598.46053 [0.00538] d  
Epoch = 145.0103 [0.0066] BKJD  
Rp/R\* = 0.0358 [0.0581]  
a/R\* = 890.95 [4942.03]  
b = 0.05 [115.22]  
Seff = 0.17 [0.03]  
Teq = 164 [7] K  
Rp = 2.77 [4.51] Re  
a = 1.2771 [0.1121] AU  
Ag = 75236.74 [248485.16] [0.30σ]  
Teffp = 4189 [3459] K [1.16σ]

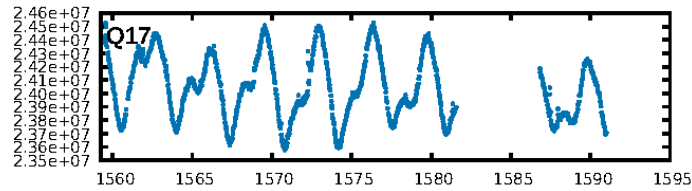
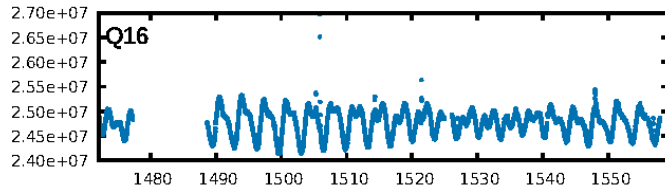
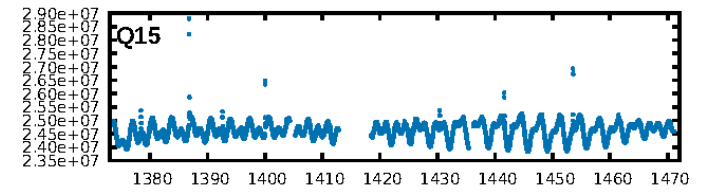
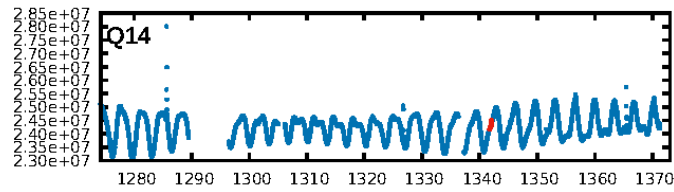
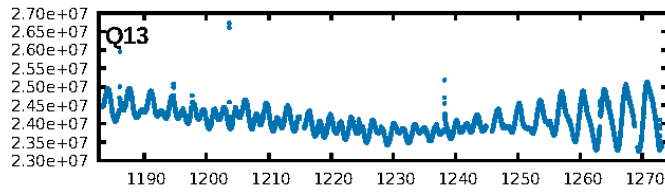
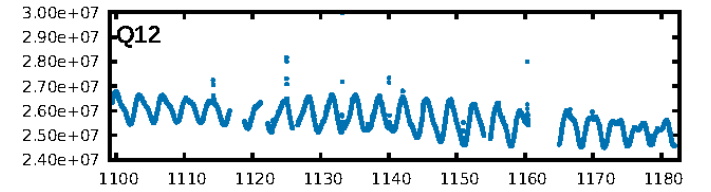
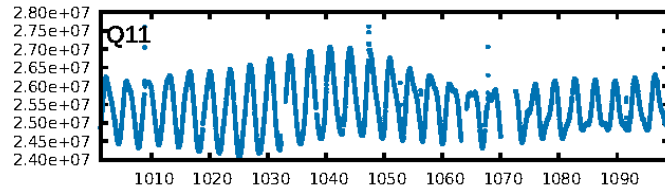
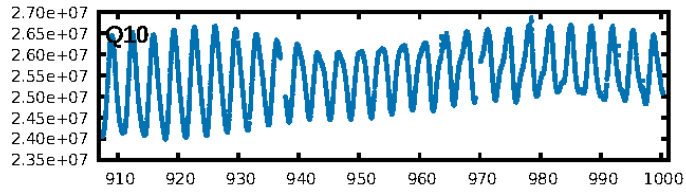
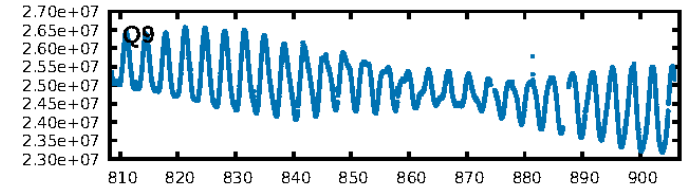
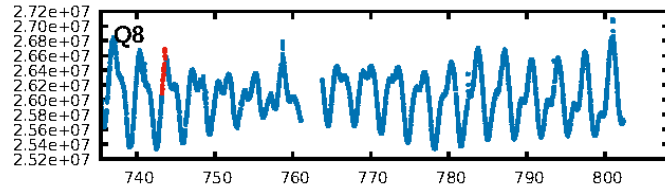
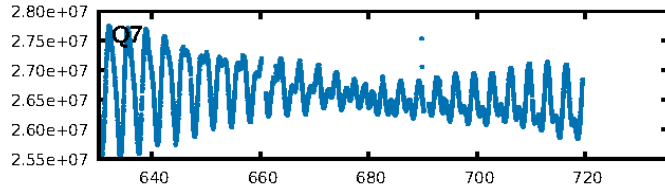
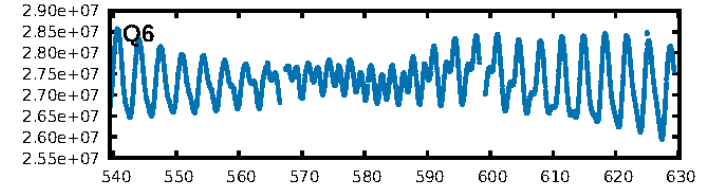
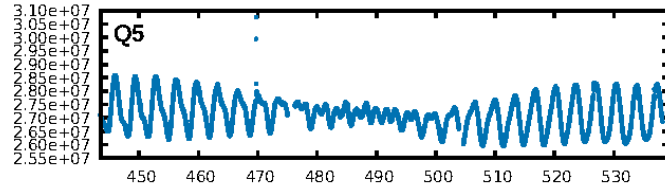
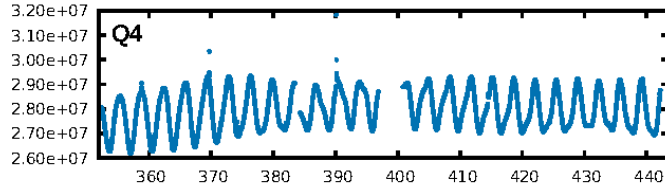
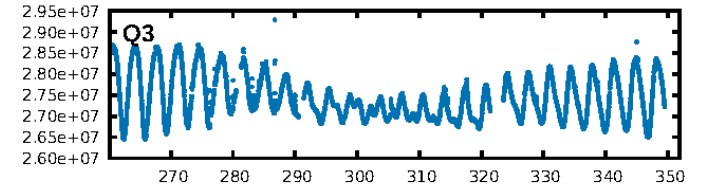
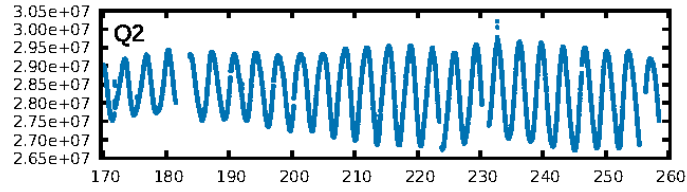
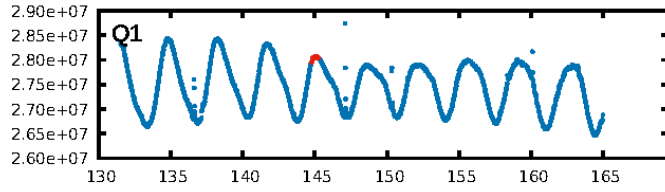
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [308.46σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 27.3%  
ModelChiSquareGof-sig: 95.1%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [2/2]  
GhostDiagnostic-chr: -0.7848  
Centroid-sig: 48.3%  
Centroid-so: 0.550 arcsec [0.75σ]  
OotOffset-rm: 0.337 arcsec [1.35σ]  
KicOffset-rm: 0.401 arcsec [1.87σ]  
OotOffset-st: 1/0/1/1 [3]  
KicOffset-st: 1/0/1/1 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

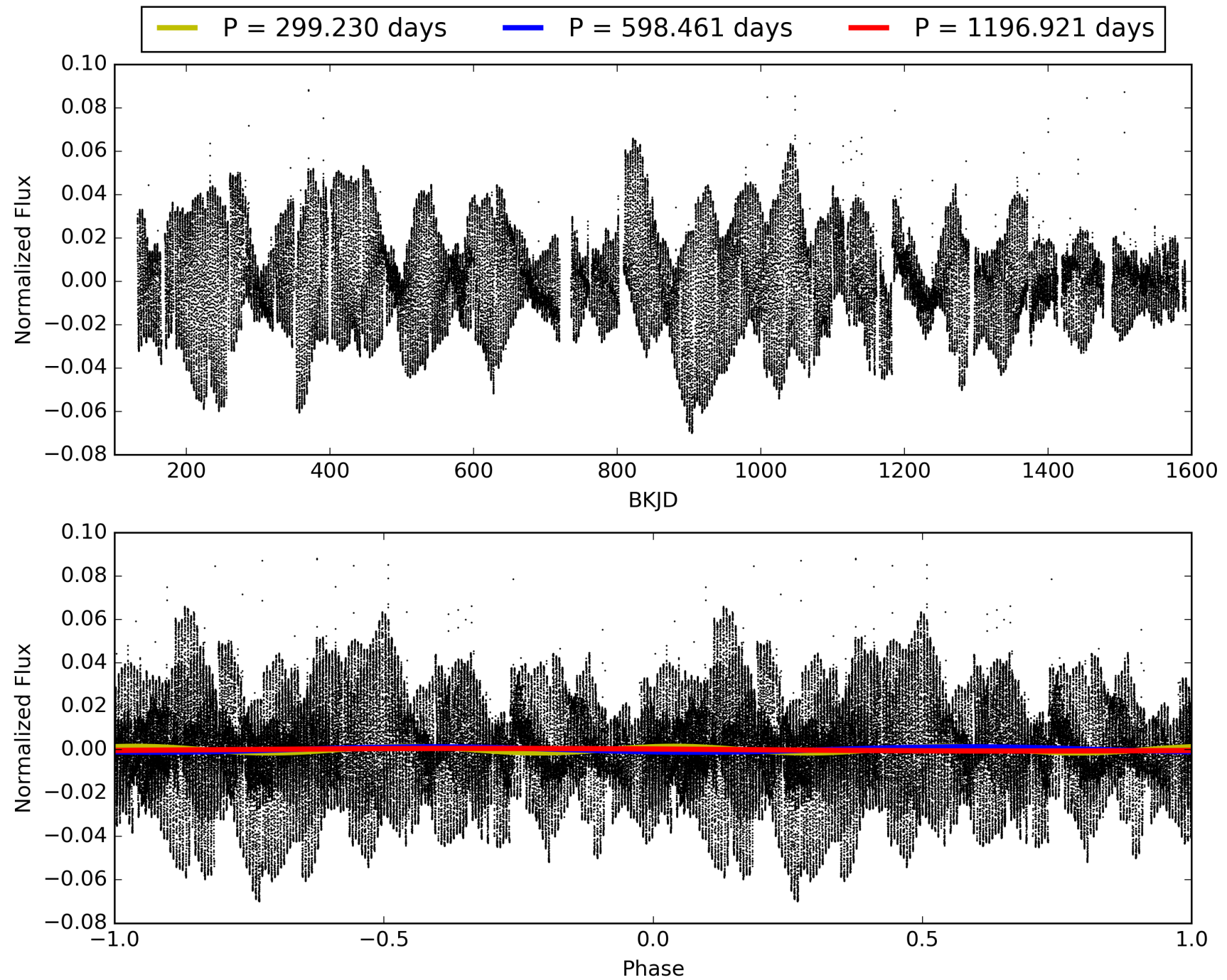
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:45:14 Z

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

# TCE 005784256-02, PDC Light Curves



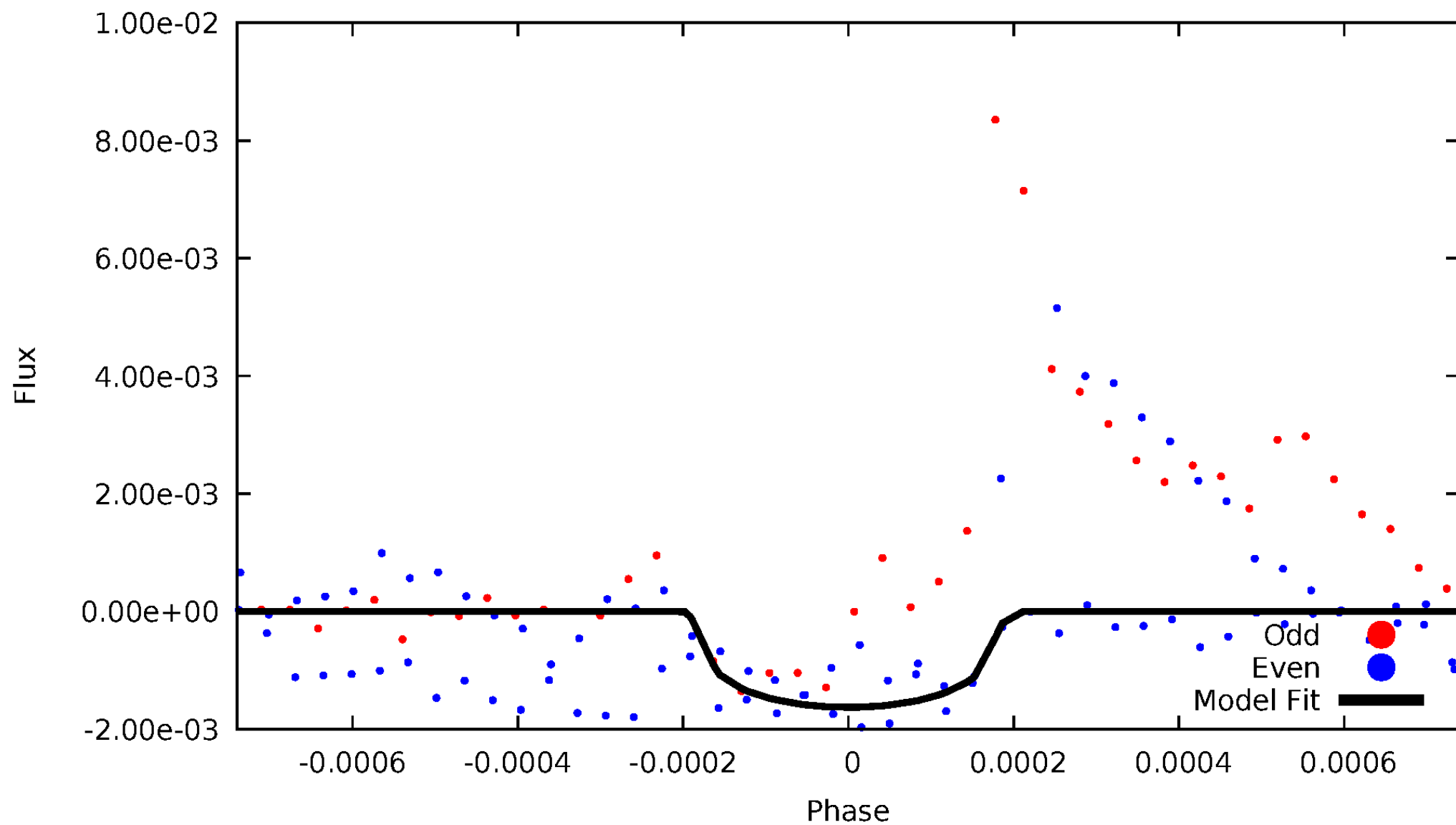
# TCE 005784256-02





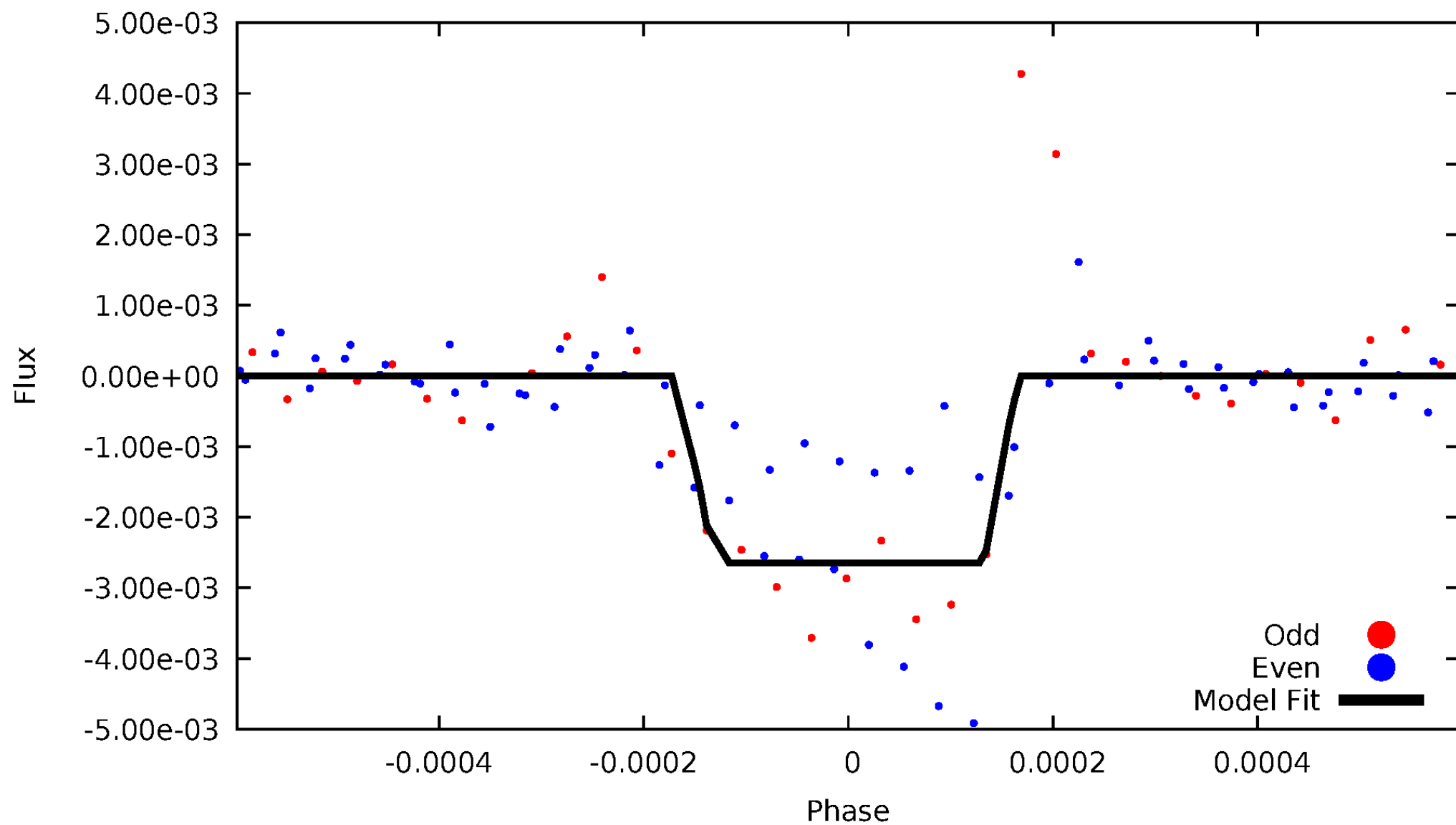
# DV Odd/Even

TCE 005784256-02



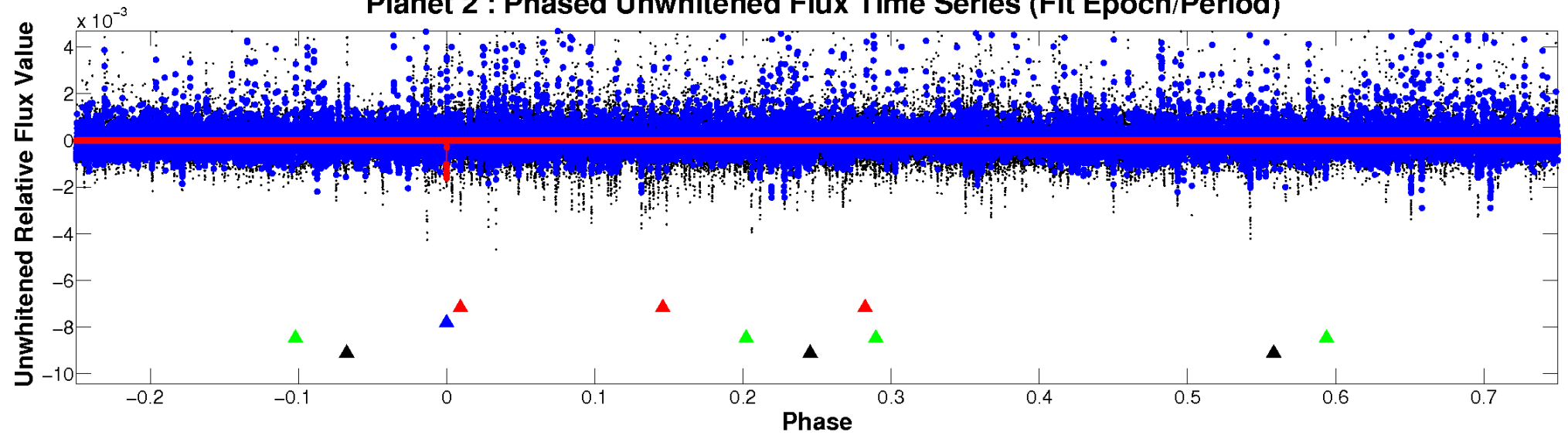
# ALT Odd/Even

TCE 005784256-02

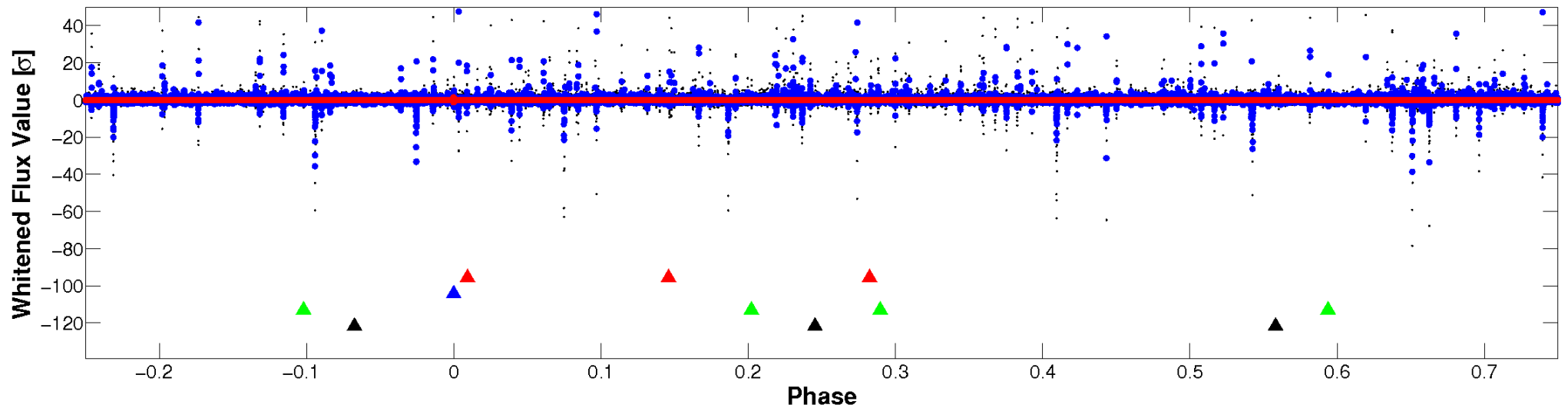


# Non-Whitened Vs. Whitened Light Curve

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

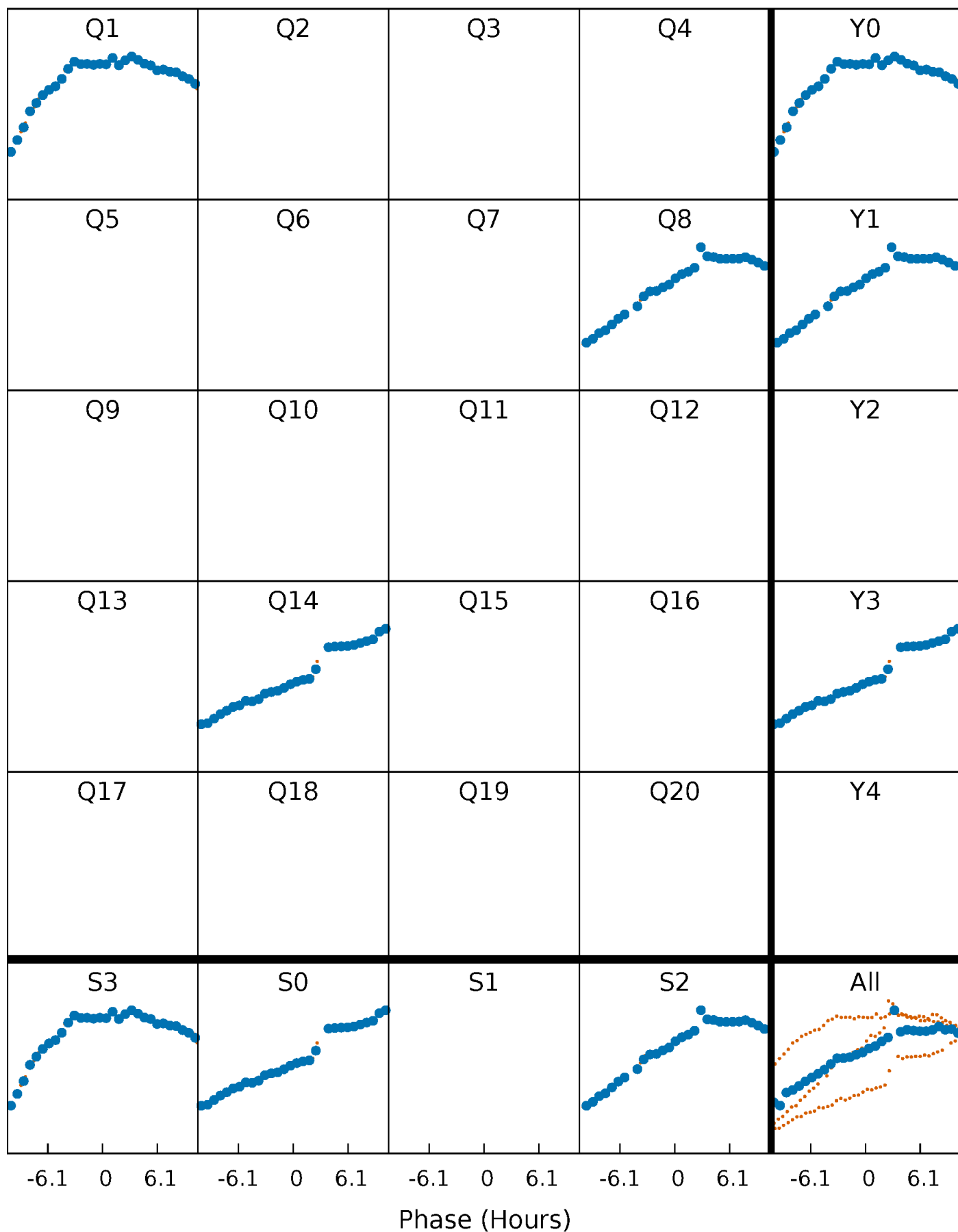


Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



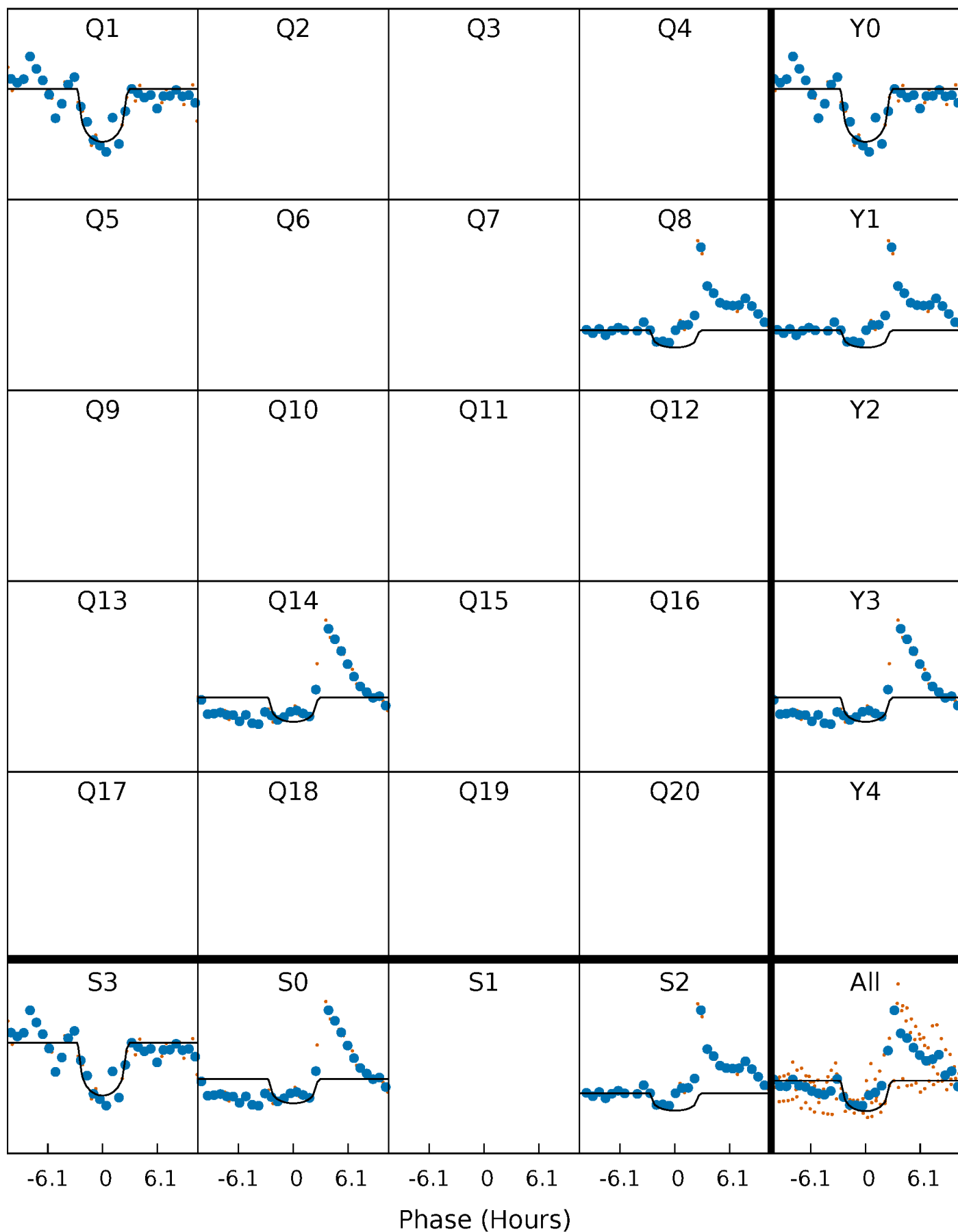
# PDC Quarter-Phased Transit Curves

TCE 005784256-02 P=598.460531 Days  $T_0=145.010299$  (BKJD)



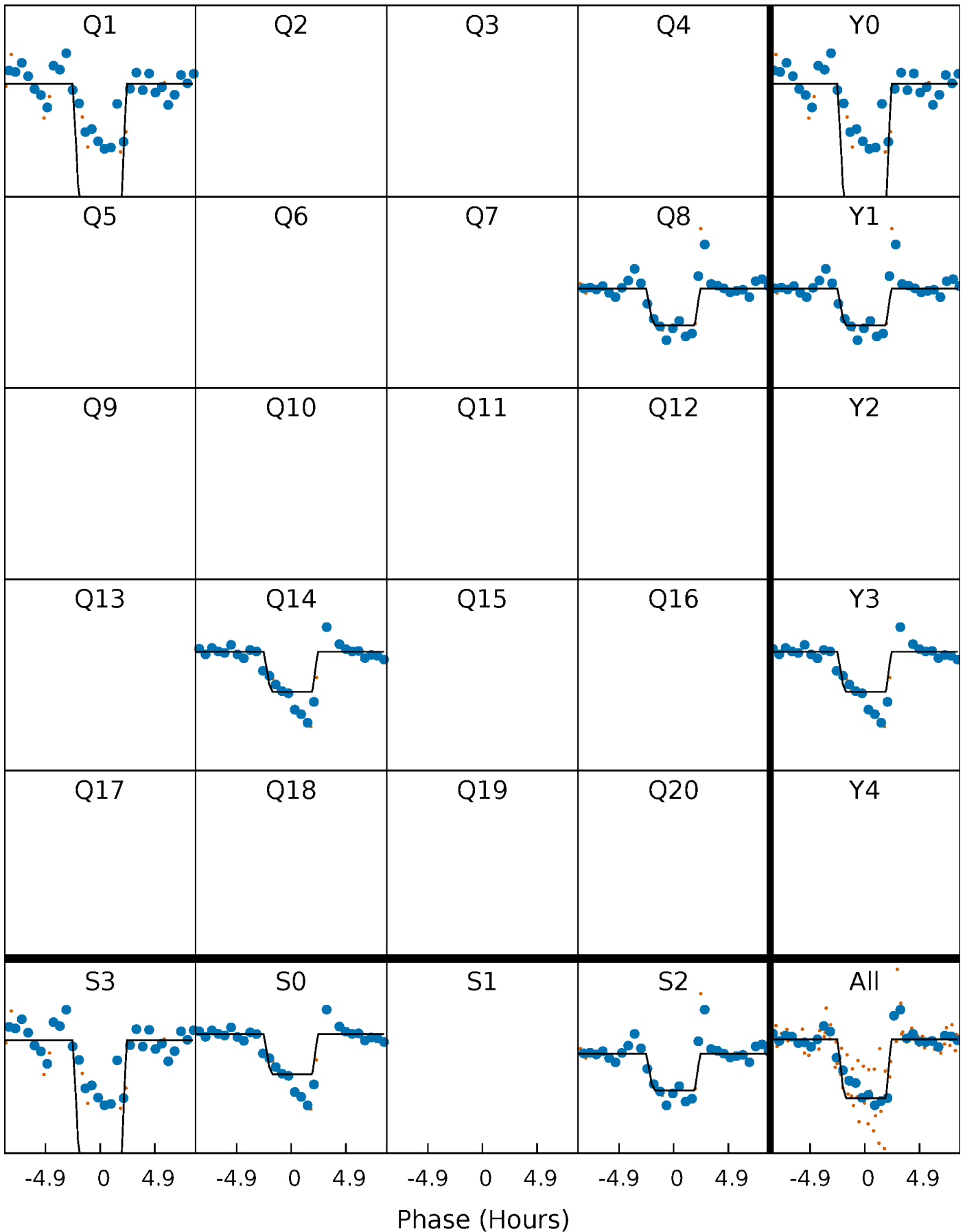
# DV Quarter-Phased Transit Curves

TCE 005784256-02 P=598.460531 Days  $T_0=145.010299$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

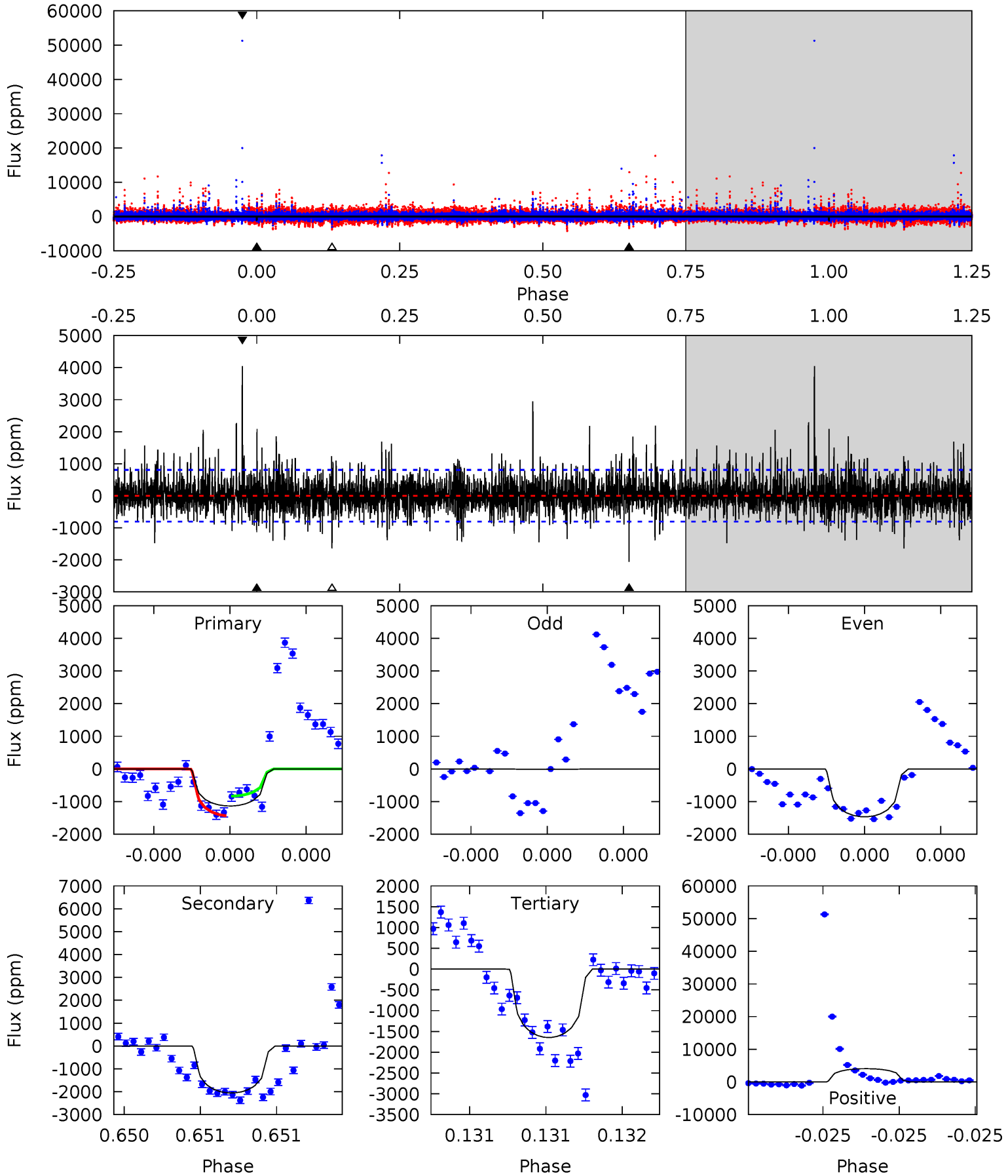
TCE 005784256-02 P=598.471728 Days  $T_0=145.004447$  (BKJD)



# DV Model-Shift Uniqueness Test

005784256-02, P = 598.460531 Days, E = 145.010299 Days

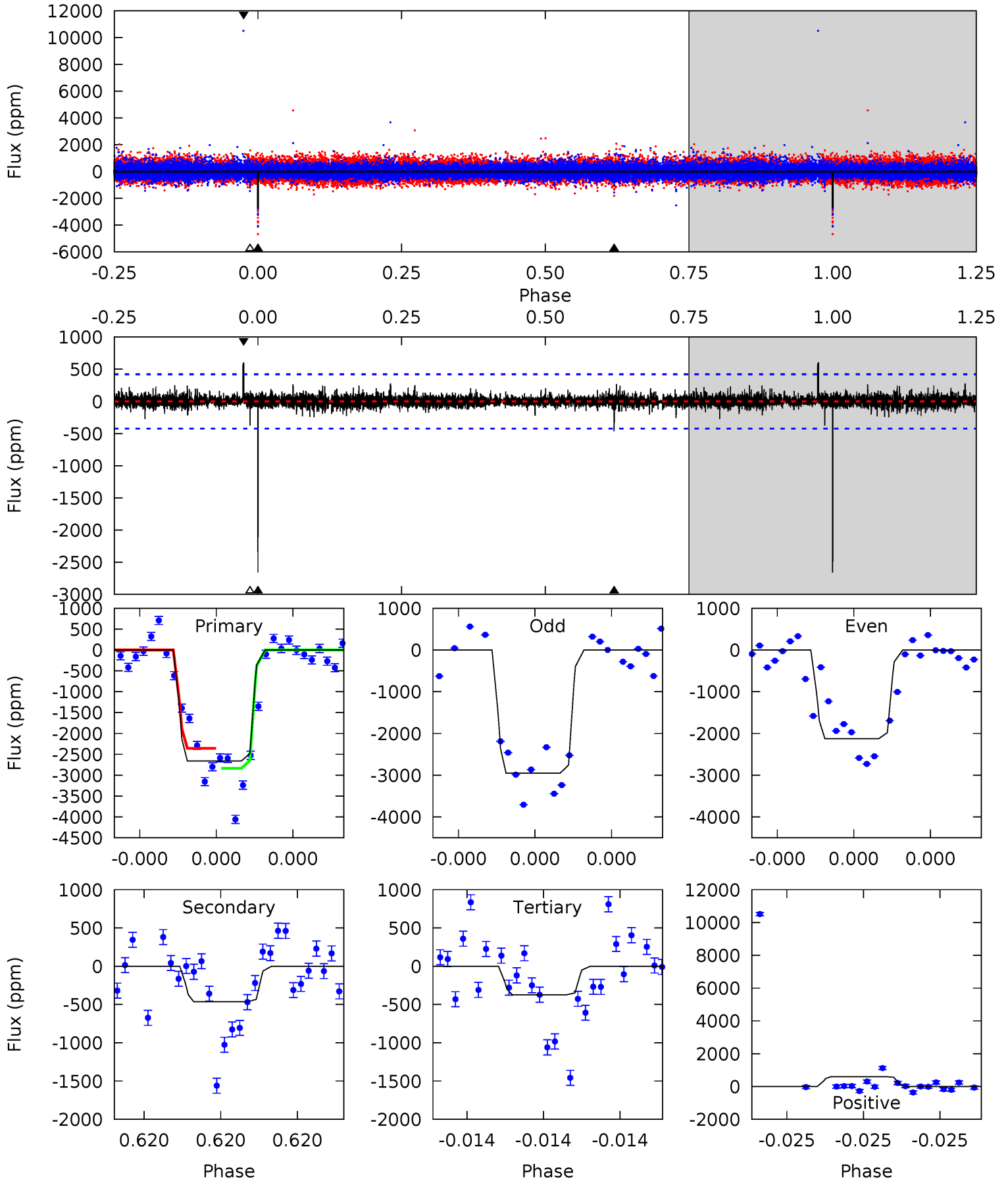
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
7.91	14.3	11.5	28.2	5.62	3.55	2.84	-3.57	-20.3	2.84	-13.9	3.18	0.77	0.66	2.10



# Alt Model-Shift Uniqueness Test

005784256-02, P = 598.471728 Days, E = 145.004447 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
35.7	6.22	5.02	8.14	5.66	3.61	0.67	30.7	27.6	1.20	-1.91	5.44	0.84	0.19	3.14





### Stellar Parameters For KIC 005784256

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4973^{+151}_{-136}$	$4.625^{+0.031}_{-0.063}$	$-0.160^{+0.300}_{-0.300}$	$0.710^{+0.078}_{-0.058}$	$0.789^{+0.055}_{-0.095}$	$3.109^{+0.460}_{-0.703}$
	+3%/-3%	+1%/-1%	+188%/-188%	+11%/-8%	+7%/-12%	+15%/-23%
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 005784256-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-2054 \pm 143$	$4.48^{+3.78}_{-2.94}$	$231^{+9}_{-8}$	$4573^{+3129}_{-933}$	$90834^{+713384}_{-63872}$
Alt.	$-464 \pm 74$	$5.01^{+3.98}_{-3.23}$	$230^{+8}_{-8}$	$3372^{+1459}_{-539}$	$16851^{+112102}_{-11868}$

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

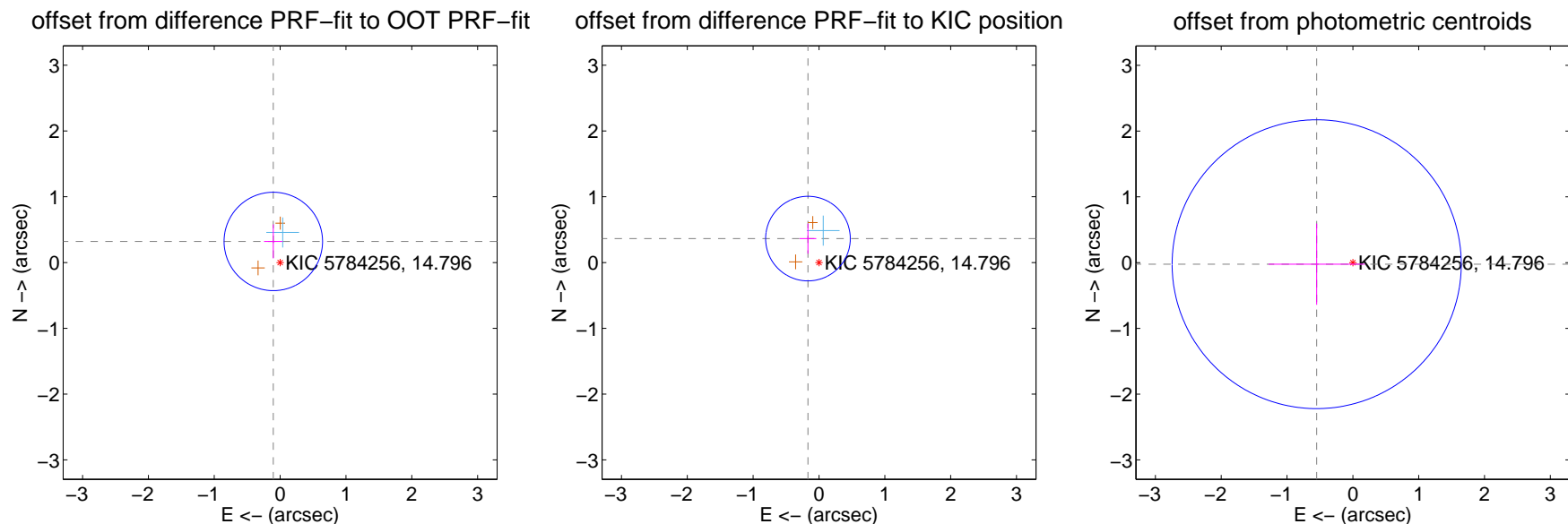
## DV Centroid Data

Supplemental centroid analysis for 005784256-02. Kepler magnitude: 14.80. Transit SNR 7.18

There are 1 quarters with good PRF difference image offsets

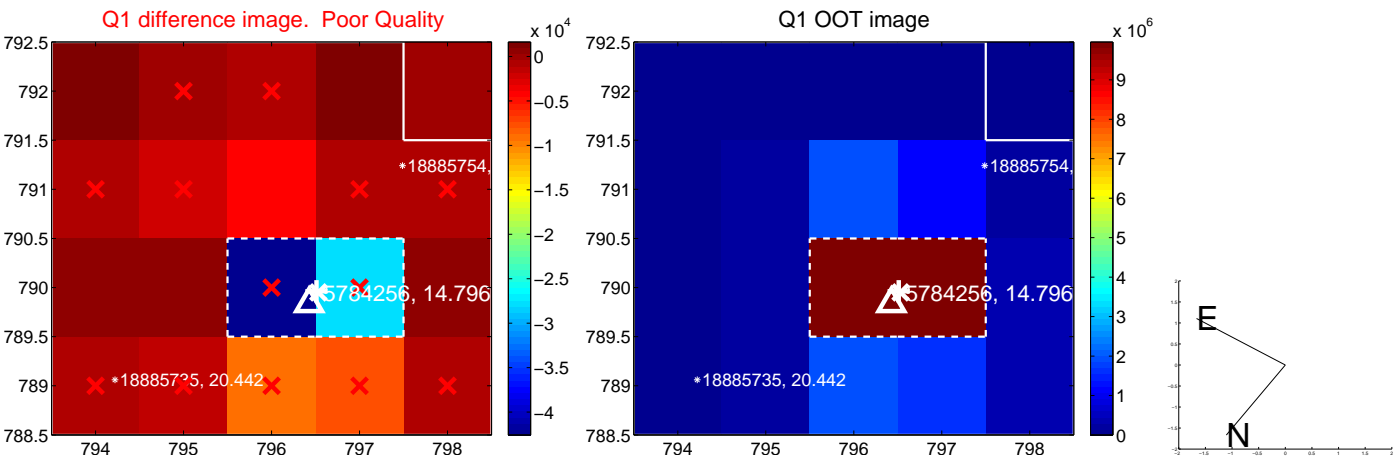
The direct PRF centroid is offset from the target star catalog position by about 0.04 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.337 \pm 0.249$	1.35	$0.103 \pm 0.140$	$0.321 \pm 0.258$
PRF-fit source offset from KIC position	$0.401 \pm 0.214$	1.87	$0.167 \pm 0.126$	$0.364 \pm 0.229$
photometric centroid source offset	$0.55 \pm 0.73$	0.75	$0.55 \pm 0.73$	$-0.02 \pm 0.62$

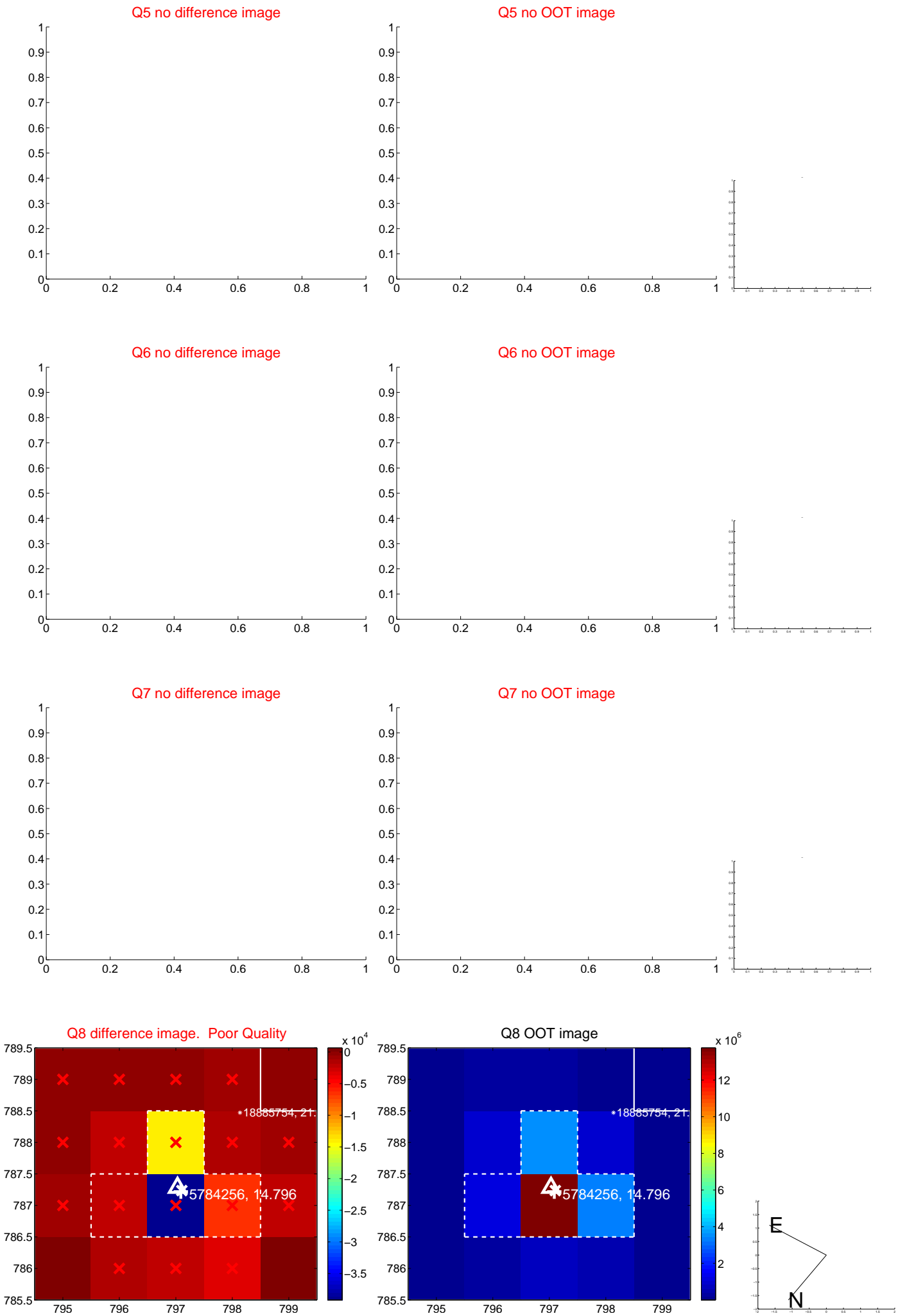


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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



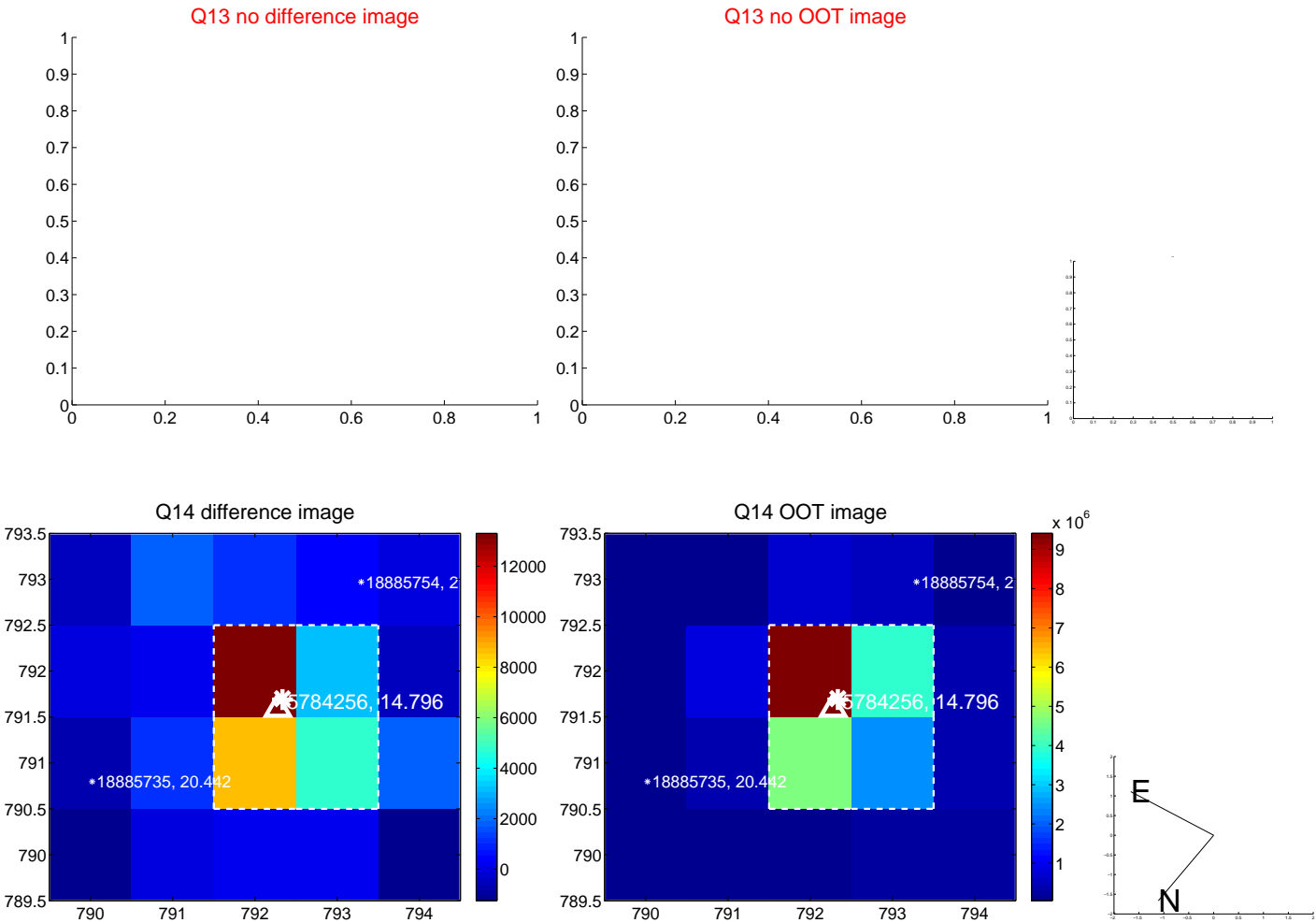
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



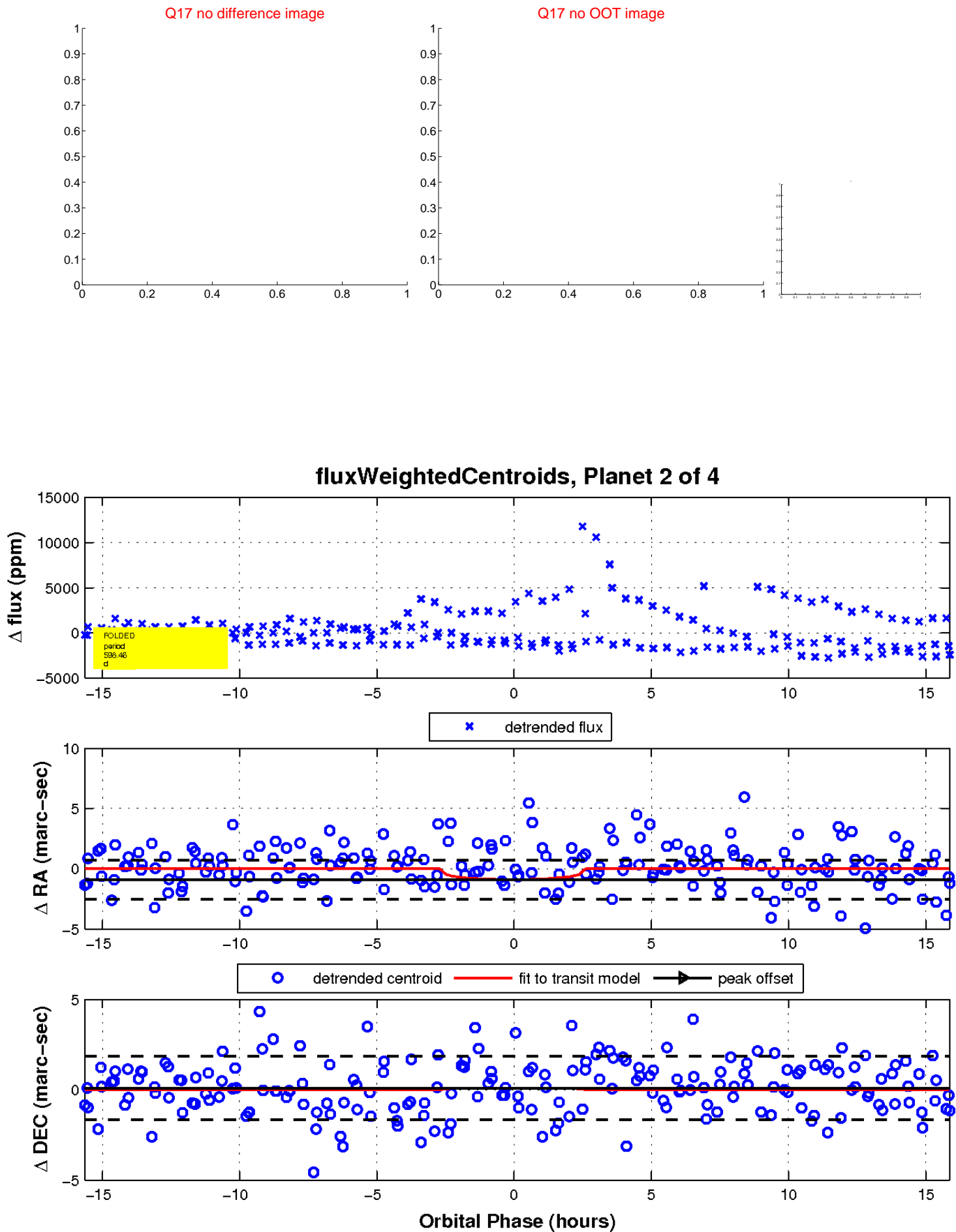
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

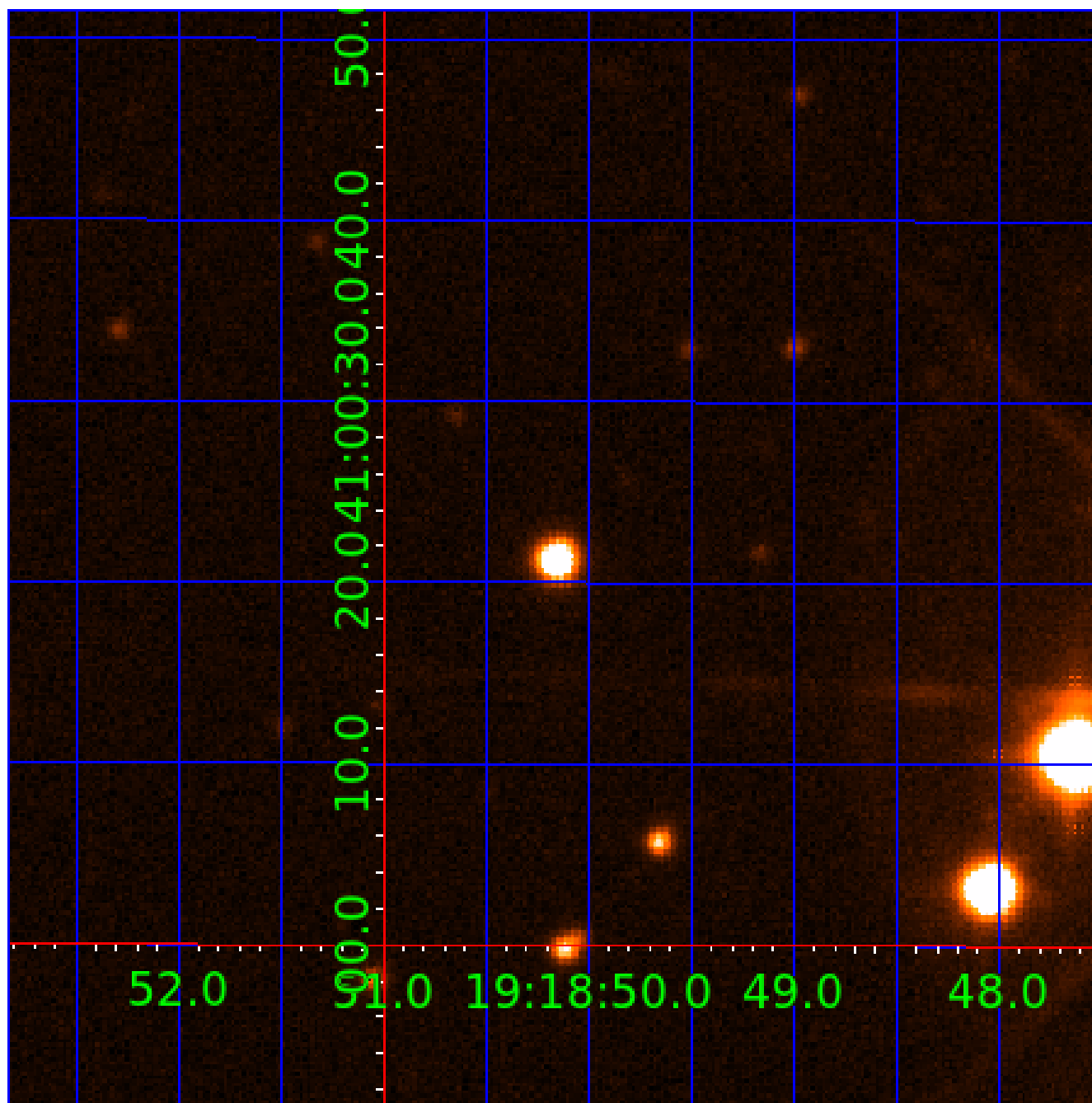


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 005784256

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005784256-01	OBS	No	516.728329	314.056963	1628.7	3.500	13.7	7.1	0.71	4973	2.79	0.21
005784256-02	OBS	No	598.460531	145.010299	1626.6	5.309	15.0	7.2	0.71	4973	2.77	0.17
005784256-03	OBS	No	416.429421	266.004468	1832.8	4.003	13.7	9.2	0.71	4973	3.10	0.28
005784256-04	OBS	No	411.244326	479.084467	2017.2	3.871	12.5	12.1	0.71	4973	3.35	0.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005784256-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005784256-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005784256-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
005784256-04	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—CENT_NOFITS

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

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

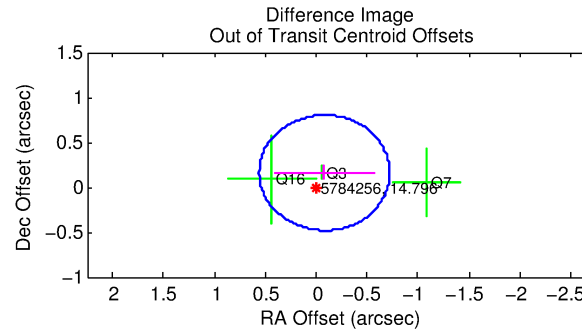
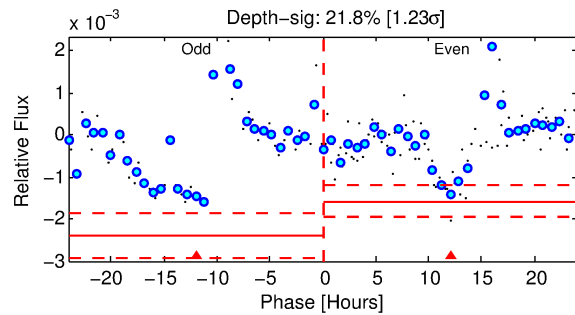
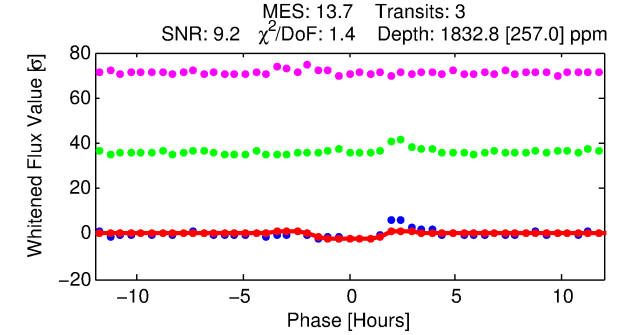
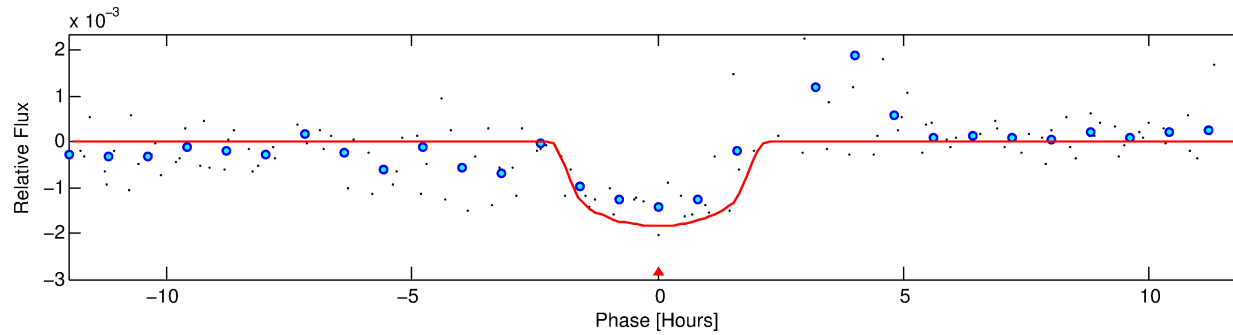
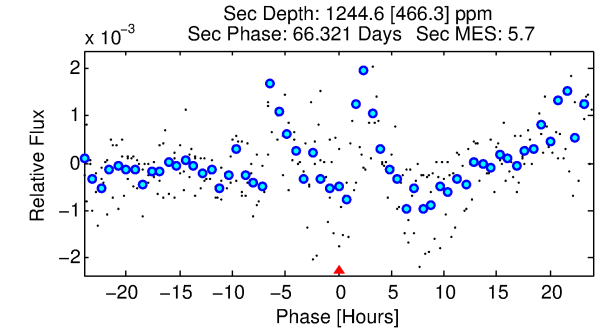
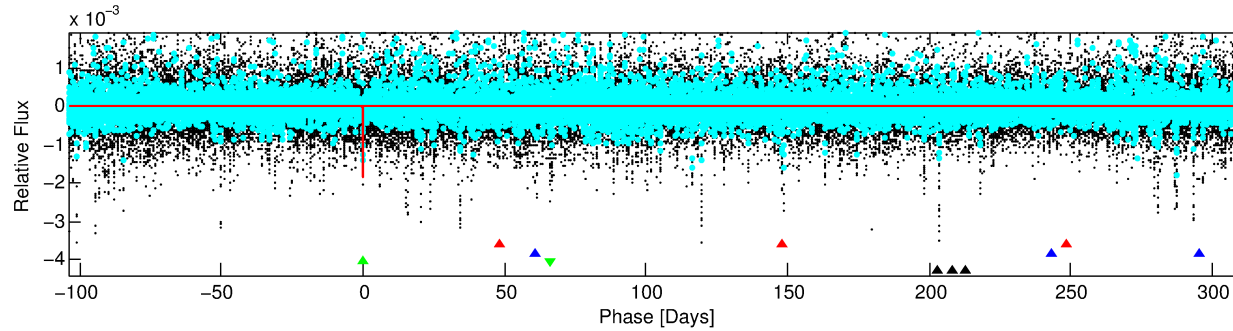
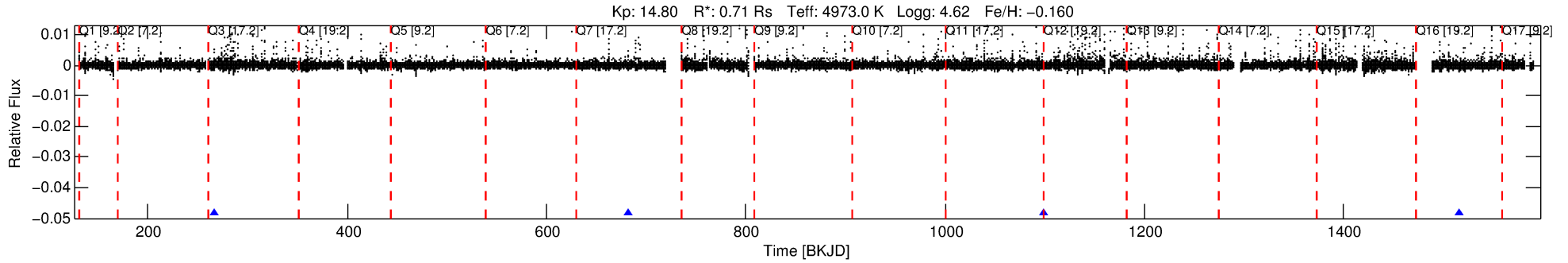
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

Ephemeris Match Information For 005784256-03

No Significant Match Found

# DV One-Page Summary

KIC: 5784256 Candidate: 3 of 4 Period: 416.429 d



## DV Fit Results:

Period = 416.42942 [0.00329] d  
Epoch = 266.0045 [0.0059] BKJD  
Rp/R\* = 0.0401 [0.0459]  
a/R\* = 699.14 [2735.22]  
b = 0.55 [4.97]  
Seff = 0.27 [0.05]  
Teq = 185 [8] K  
Rp = 3.10 [3.58] Re  
a = 1.0028 [0.0880] AU  
Ag = 71460.67 [166289.32] [0.43σ]  
Teffp = 4666 [2715] K [1.65σ]

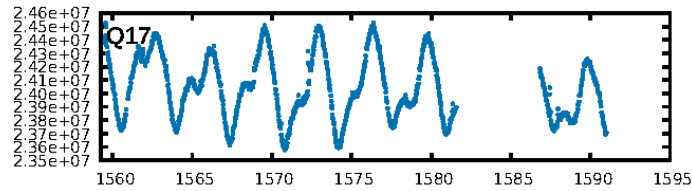
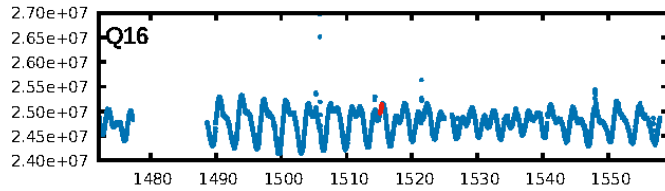
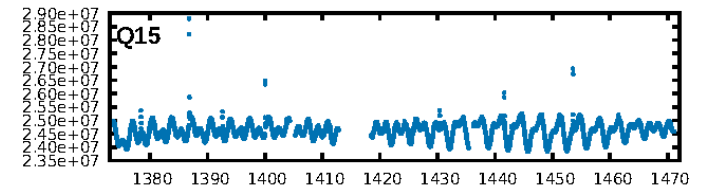
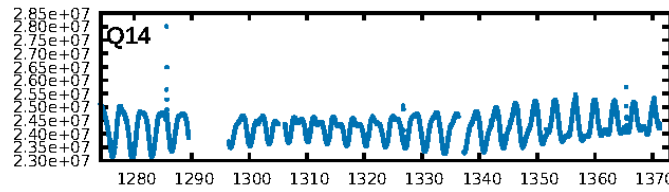
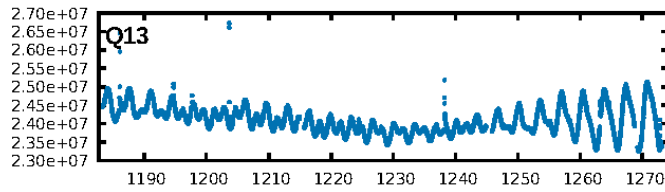
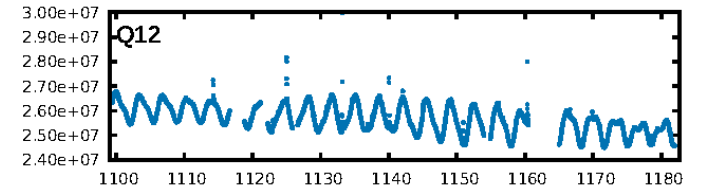
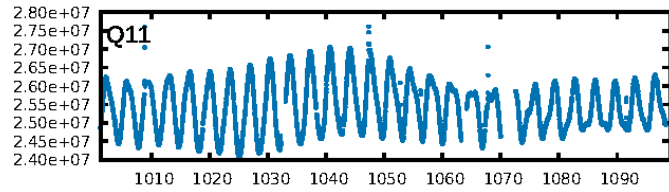
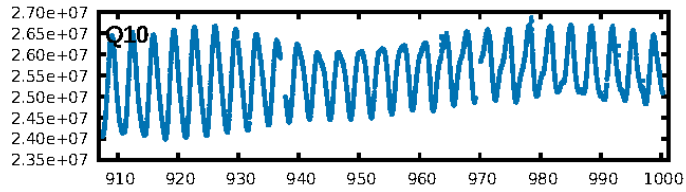
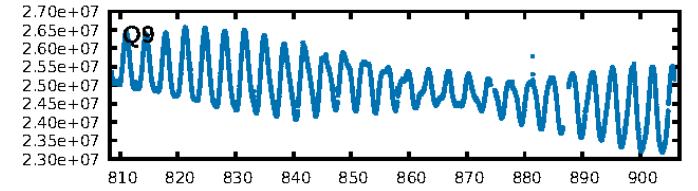
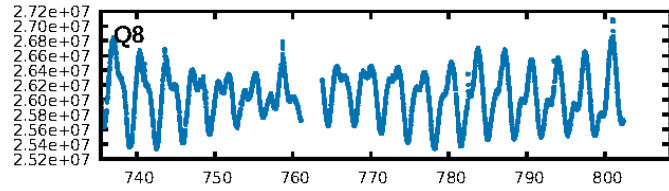
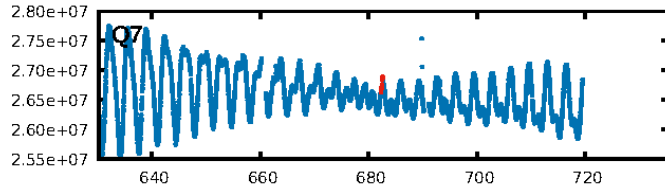
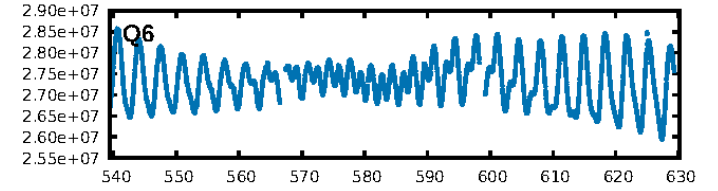
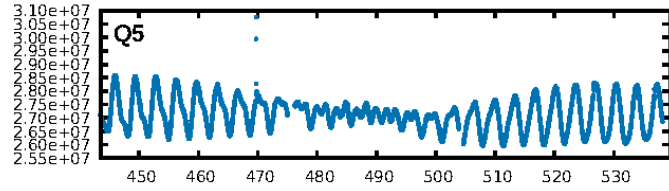
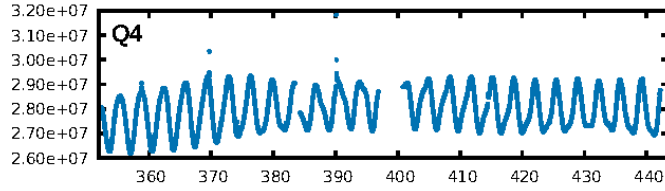
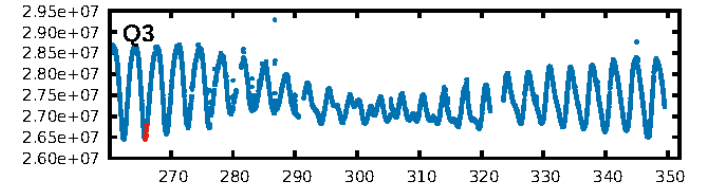
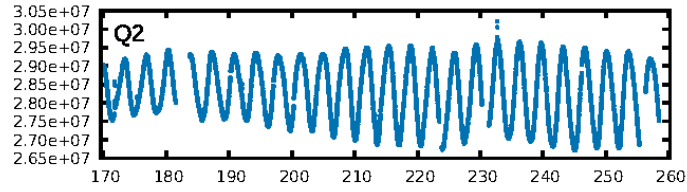
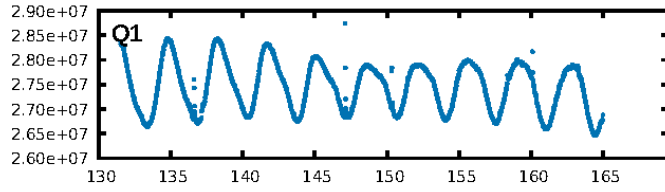
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [22.35σ]  
LongPeriod-sig: 100.0% [452.72σ]  
ModelChiSquare2-sig: 2.9%  
ModelChiSquareGof-sig: 39.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
**GhostDiagnostic-chr: 0.05038**  
Centroid-sig: 9.5%  
Centroid-so: 1.186 arcsec [1.34σ]  
OotOffset-rm: 0.179 arcsec [0.84σ]  
KicOffset-rm: 0.157 arcsec [0.47σ]  
OotOffset-st: 0/2/1/0 [3]  
KicOffset-st: 0/2/1/0 [3]  
DiffImageQuality-fgm: 0.33 [1/3]  
DiffImageOverlap-fno: 1.00 [3/3]

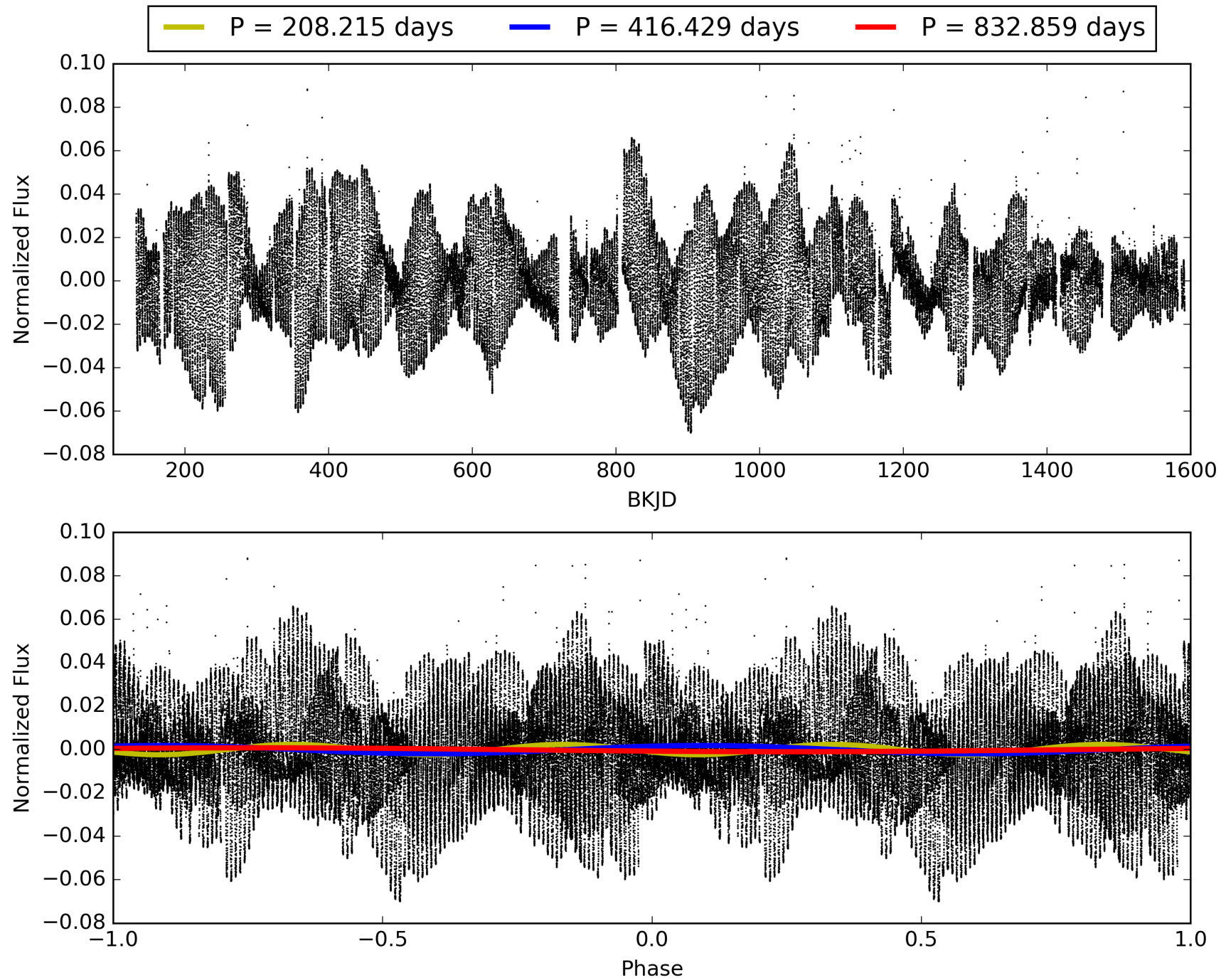
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:45:30 Z

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

# TCE 005784256-03, PDC Light Curves

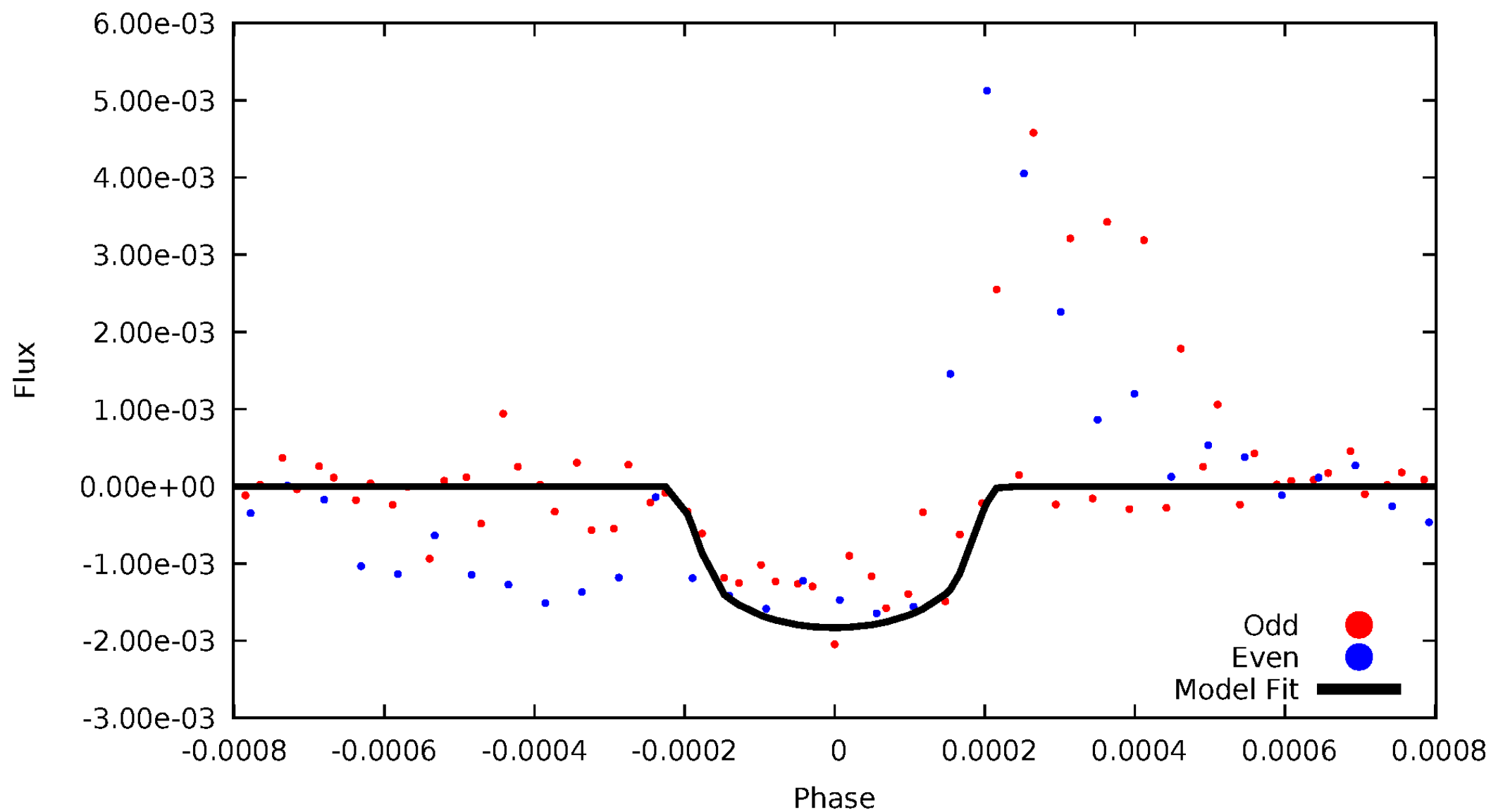


TCE 005784256-03



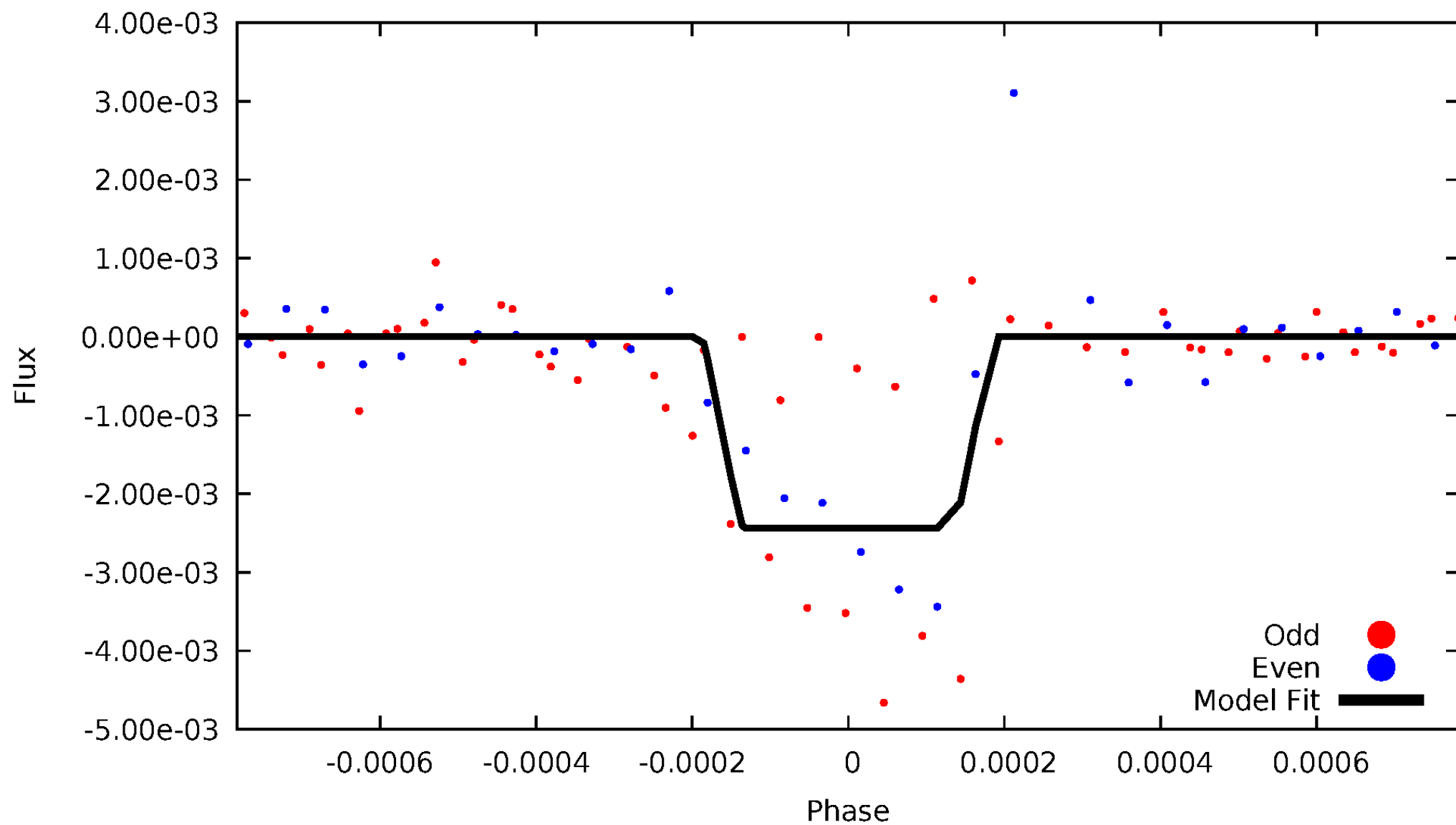
# DV Odd/Even

TCE 005784256-03



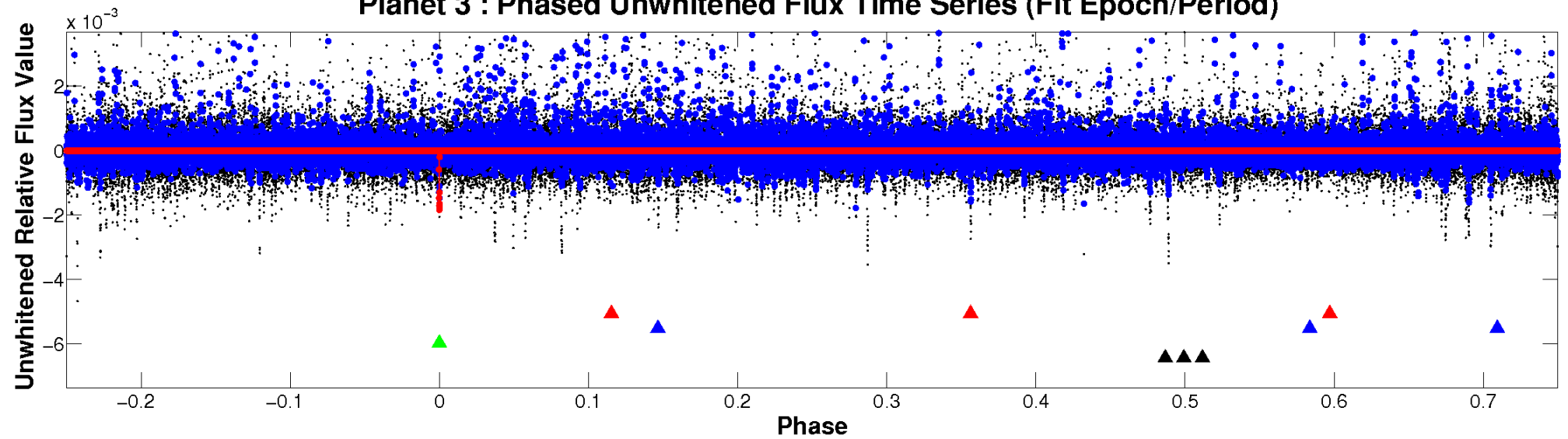
# ALT Odd/Even

TCE 005784256-03

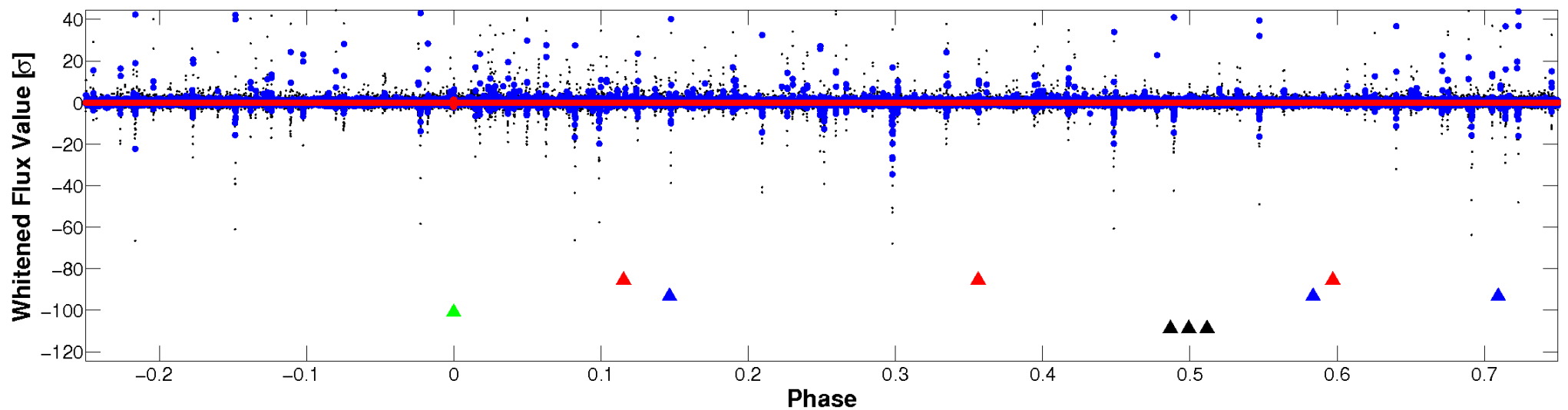


# Non-Whitened Vs. Whitened Light Curve

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

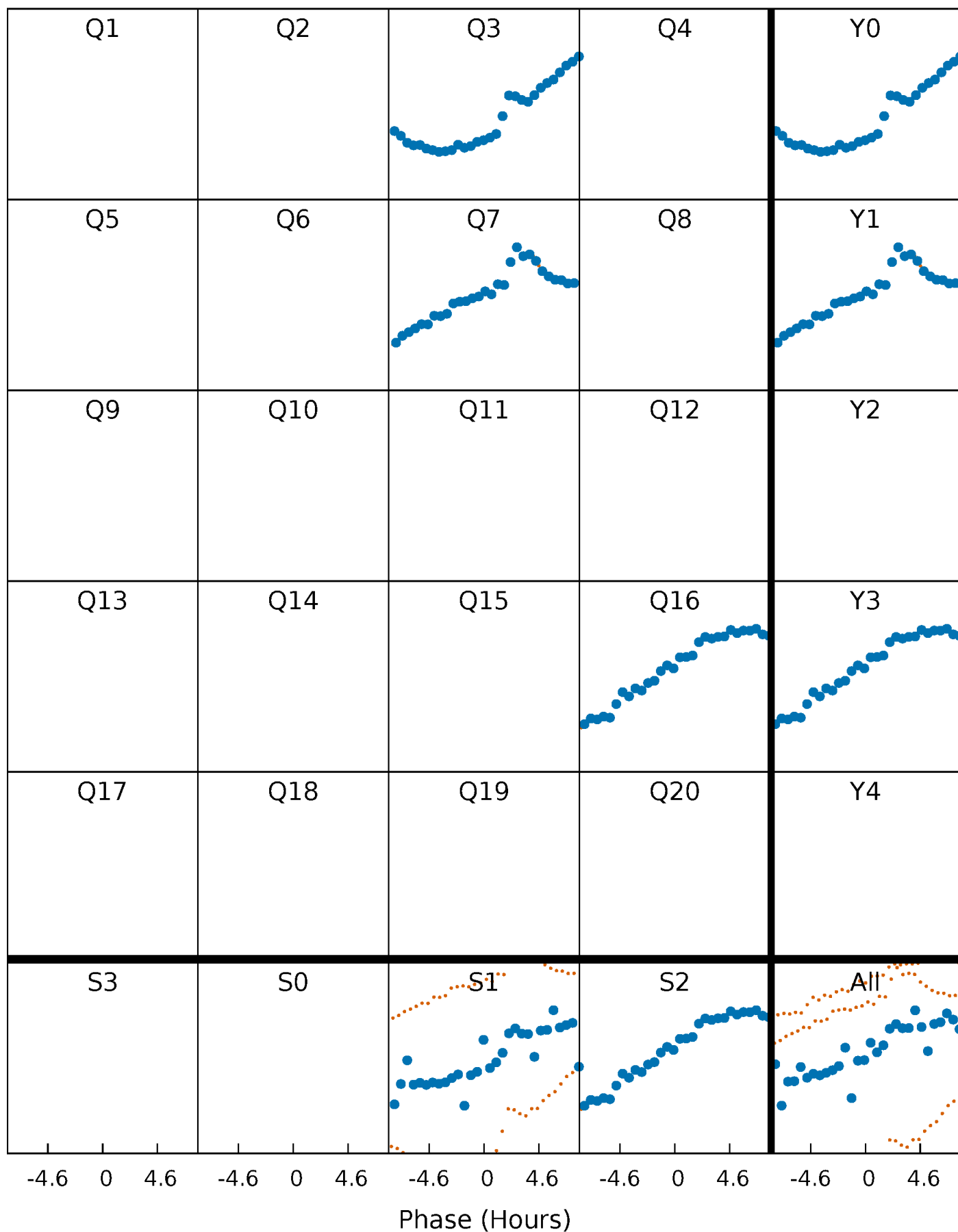


**Planet 3 : Phased Whitened Flux Time Series (Fit Epoch/Period)**



# PDC Quarter-Phased Transit Curves

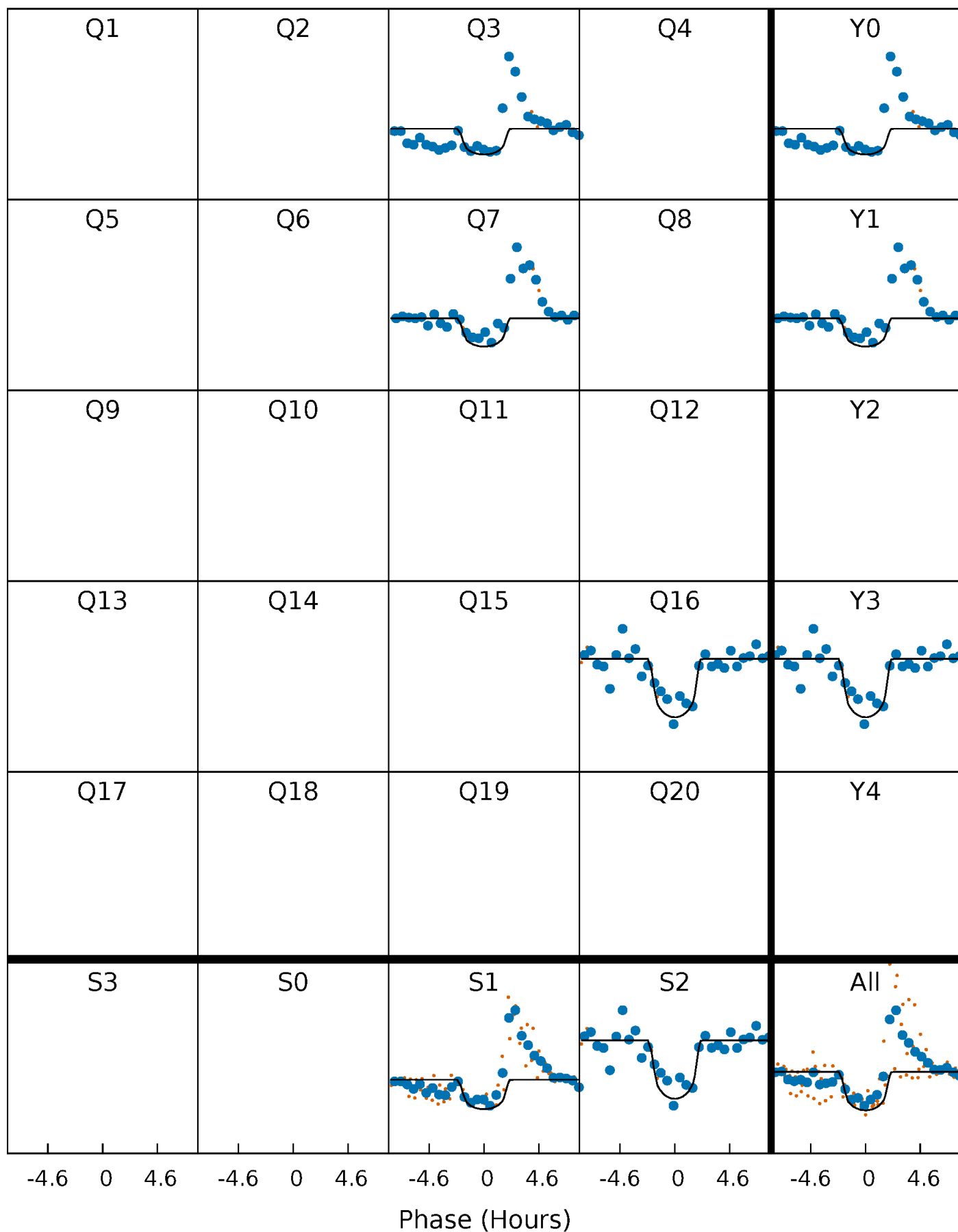
TCE 005784256-03     $P=416.429421$  Days     $T_0=266.004468$  (BKJD)





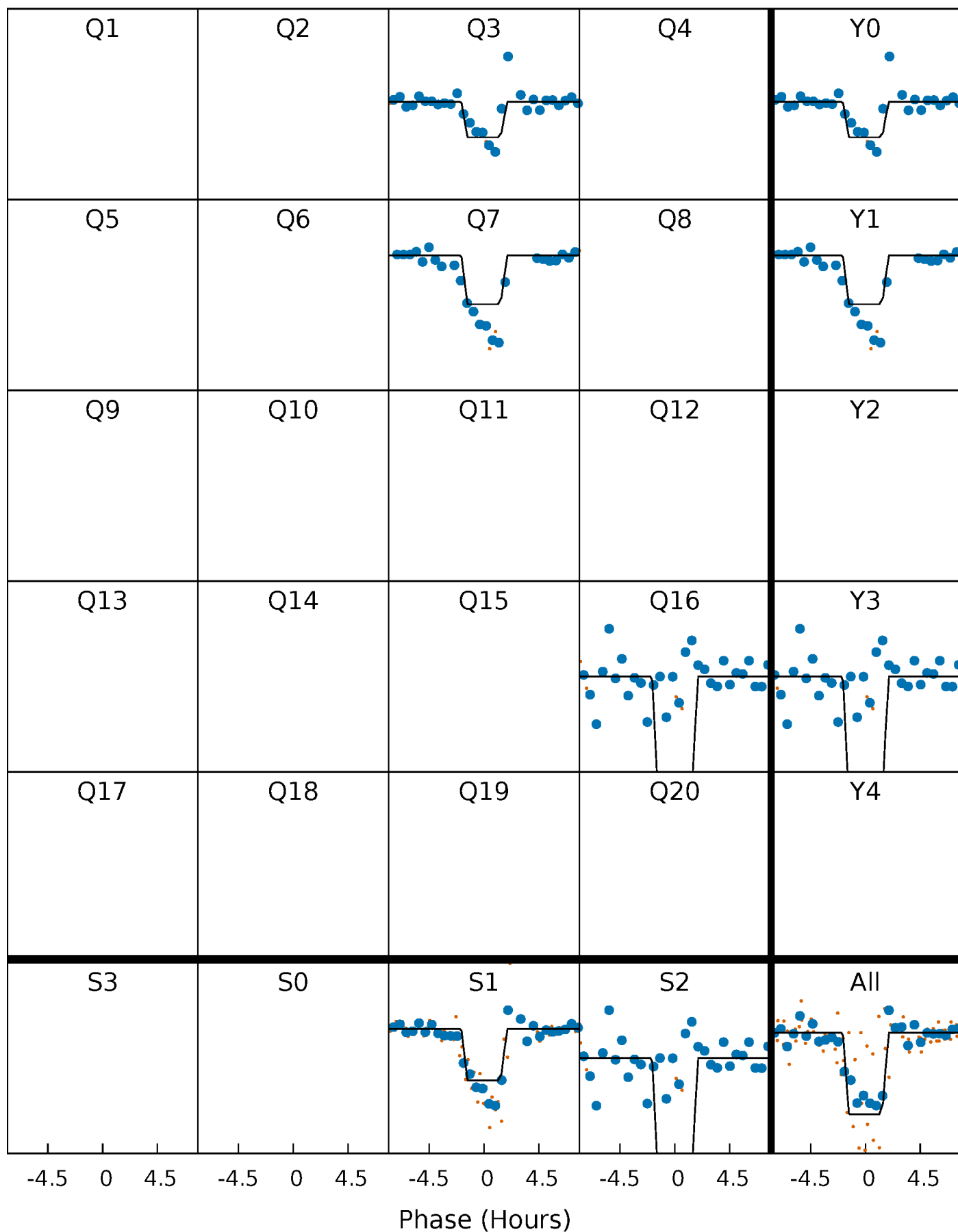
# DV Quarter-Phased Transit Curves

TCE 005784256-03     $P=416.429421$  Days     $T_0=266.004468$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

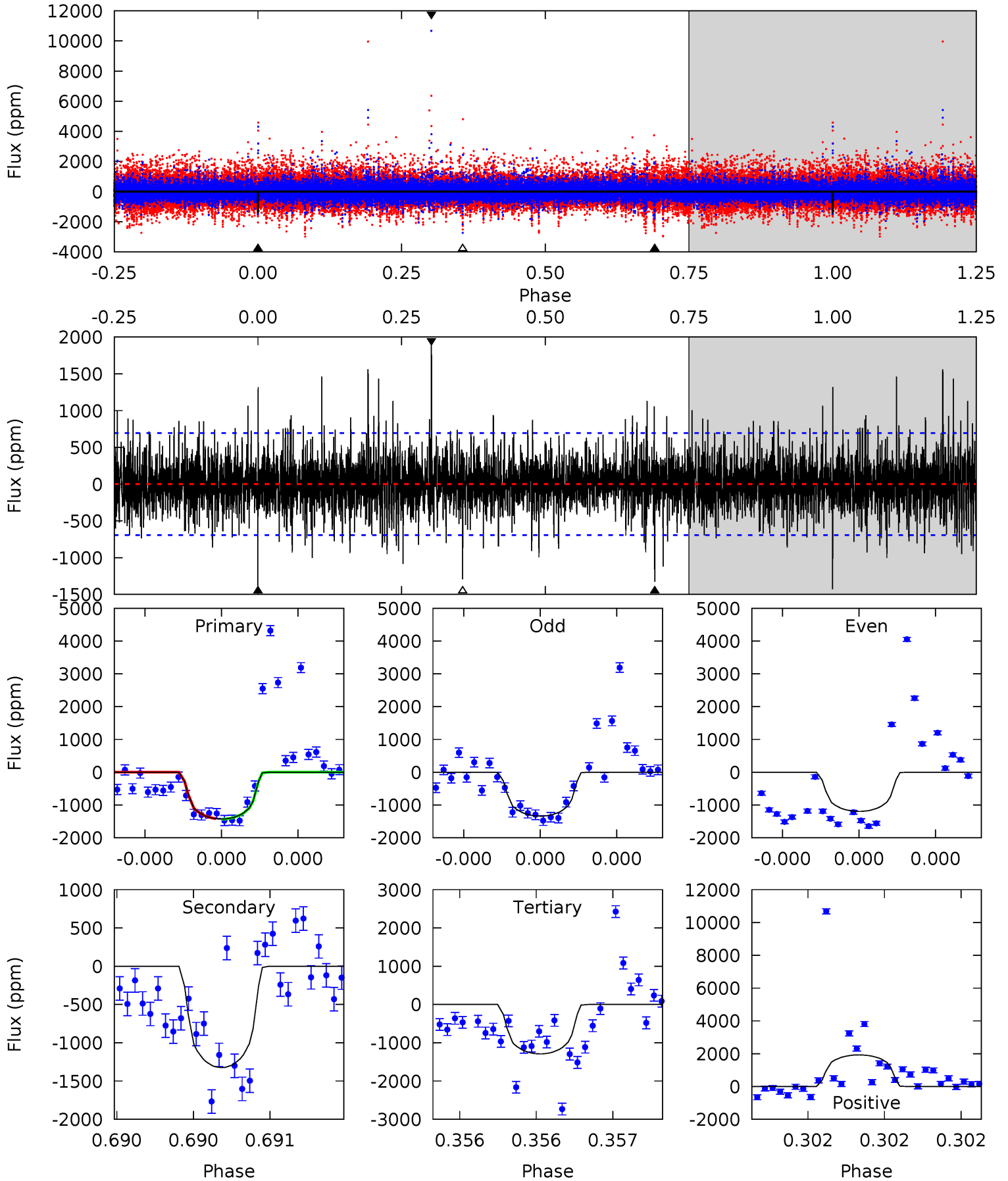
TCE 005784256-03     $P=416.442764$  Days     $T_0=266.000715$  (BKJD)



# DV Model-Shift Uniqueness Test

005784256-03, P = 416.429421 Days, E = 266.004468 Days

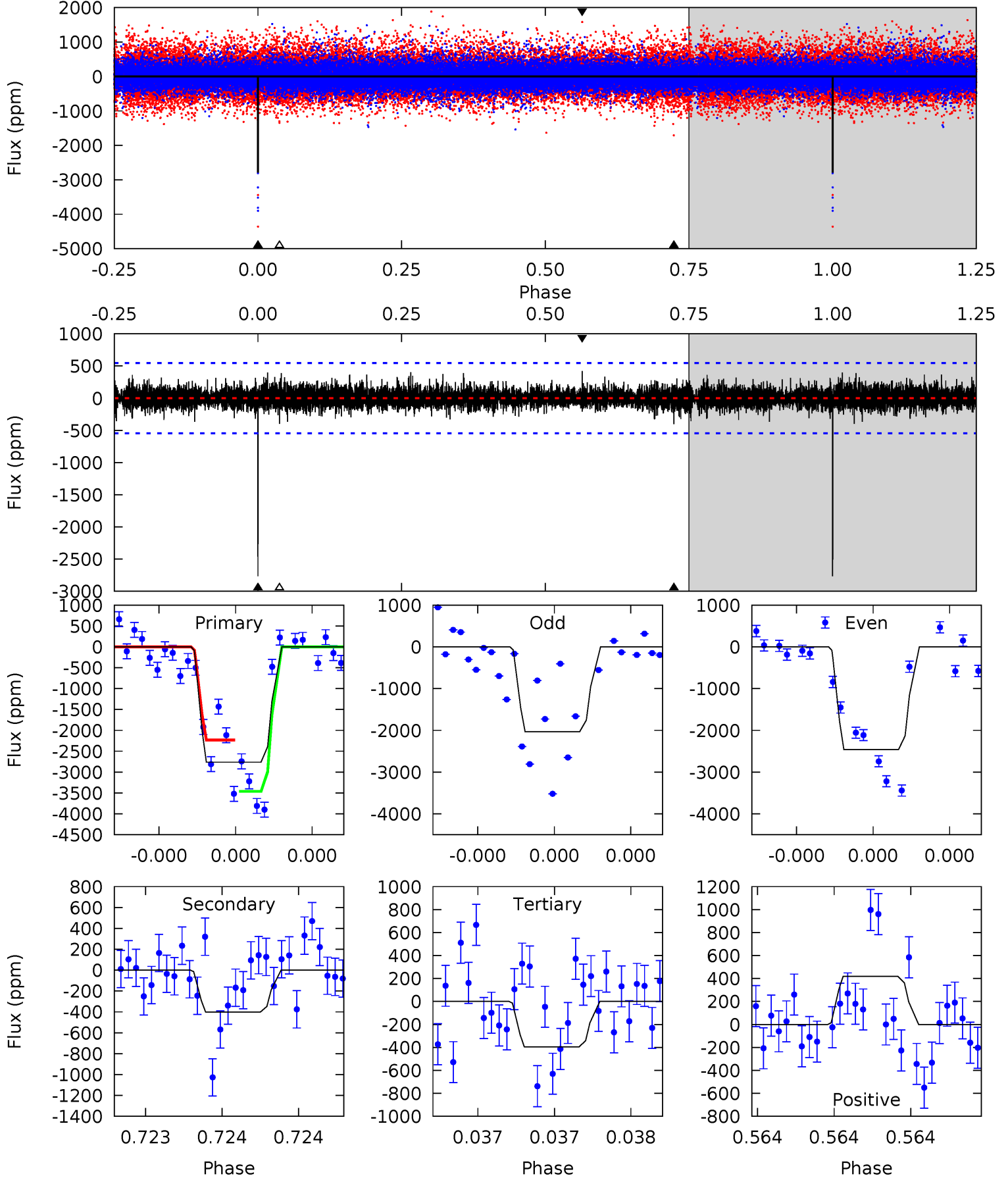
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
11.6	10.7	10.4	15.6	5.61	3.54	2.14	1.11	-4.04	0.27	-4.88	0.43	1.08	0.57	0.06



# Alt Model-Shift Uniqueness Test

005784256-03, P = 416.442764 Days, E = 266.000715 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
28.6	4.15	4.09	4.33	5.64	3.58	0.87	24.5	24.2	0.07	-0.18	2.51	0.87	0.13	6.25



### Stellar Parameters For KIC 005784256

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4973^{+151}_{-136}$	$4.625^{+0.031}_{-0.063}$	$-0.160^{+0.300}_{-0.300}$	$0.710^{+0.078}_{-0.058}$	$0.789^{+0.055}_{-0.095}$	$3.109^{+0.460}_{-0.703}$
	+3%/-3%	+1%/-1%	+188%/-188%	+11%/-8%	+7%/-12%	+15%/-23%
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 005784256-03 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1325 \pm 124$	$3.98^{+3.30}_{-2.59}$	$260^{+10}_{-9}$	$4384^{+2664}_{-839}$	$46388^{+332121}_{-32389}$
Alt.	$-402 \pm 97$	$4.48^{+3.40}_{-2.79}$	$260^{+9}_{-8}$	$3446^{+1271}_{-582}$	$11560^{+65984}_{-8156}$

$T_{\text{max}}$  = 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

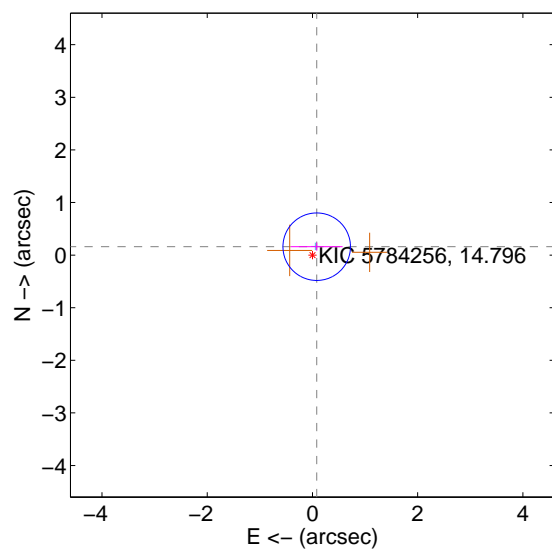
Supplemental centroid analysis for 005784256-03. Kepler magnitude: 14.80. Transit SNR 9.21

There are 1 quarters with good PRF difference image offsets

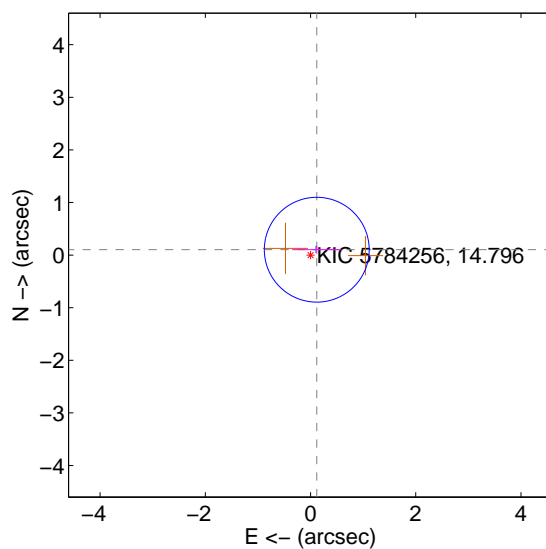
The direct PRF centroid is offset from the target star catalog position by about 0.06 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.179 \pm 0.214$	0.84	$-0.081 \pm 0.493$	$0.160 \pm 0.076$
PRF-fit source offset from KIC position	$0.157 \pm 0.332$	0.47	$-0.119 \pm 0.469$	$0.102 \pm 0.078$
photometric centroid source offset	$1.19 \pm 0.88$	1.34	$0.59 \pm 1.09$	$1.03 \pm 0.80$

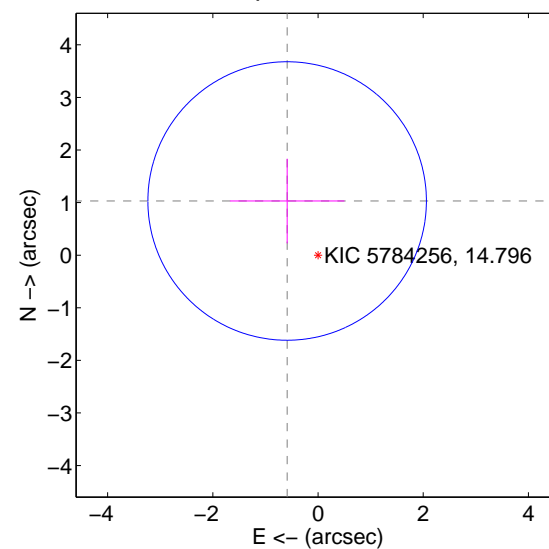
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position

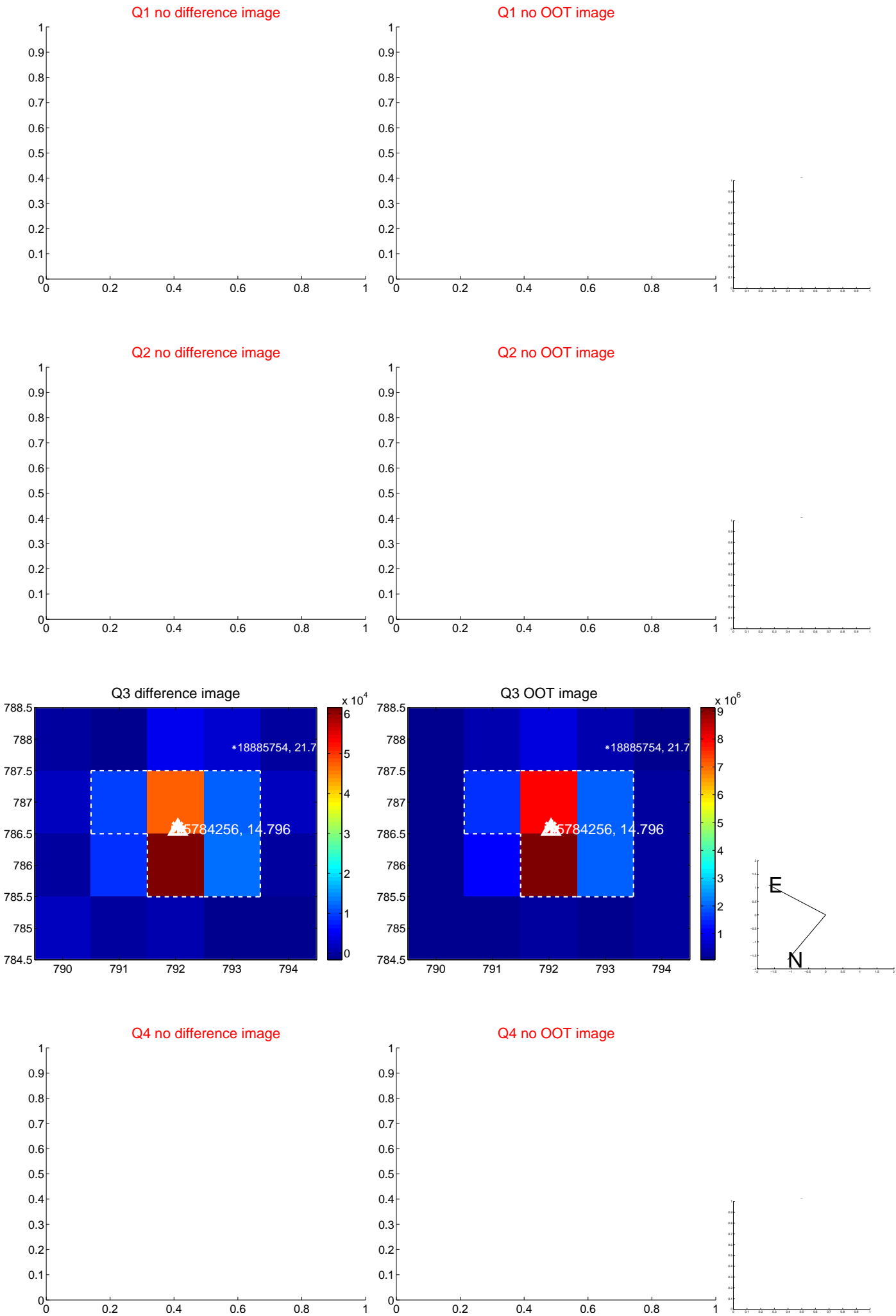


offset from photometric centroids

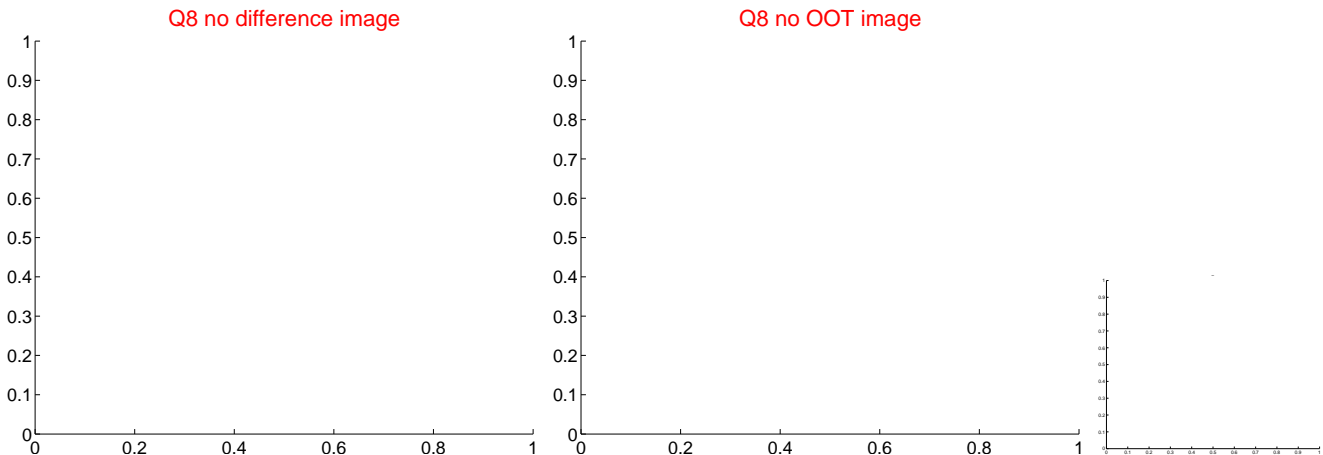
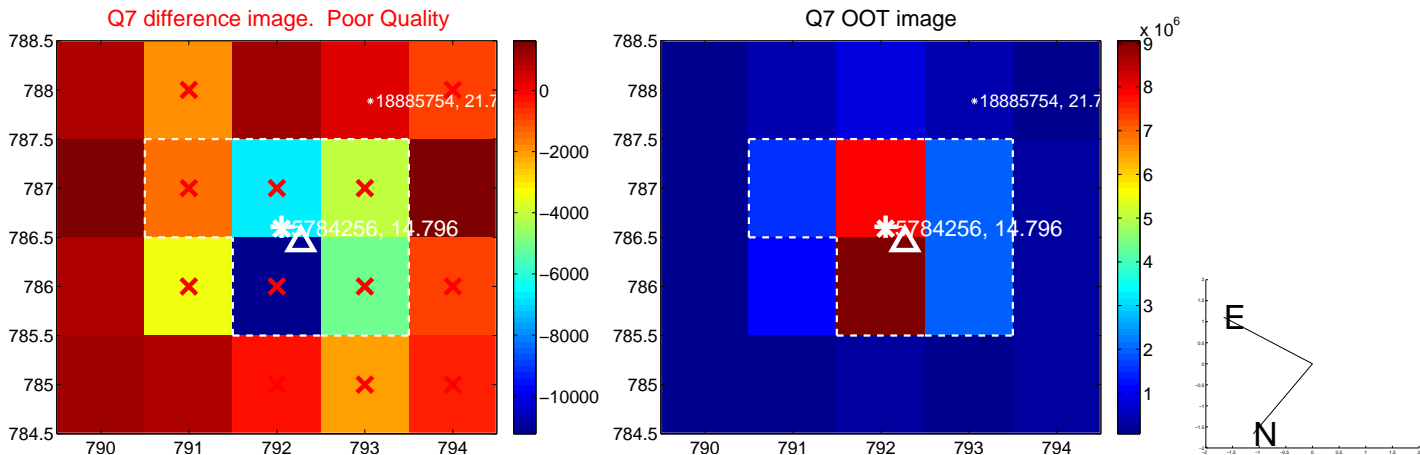


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

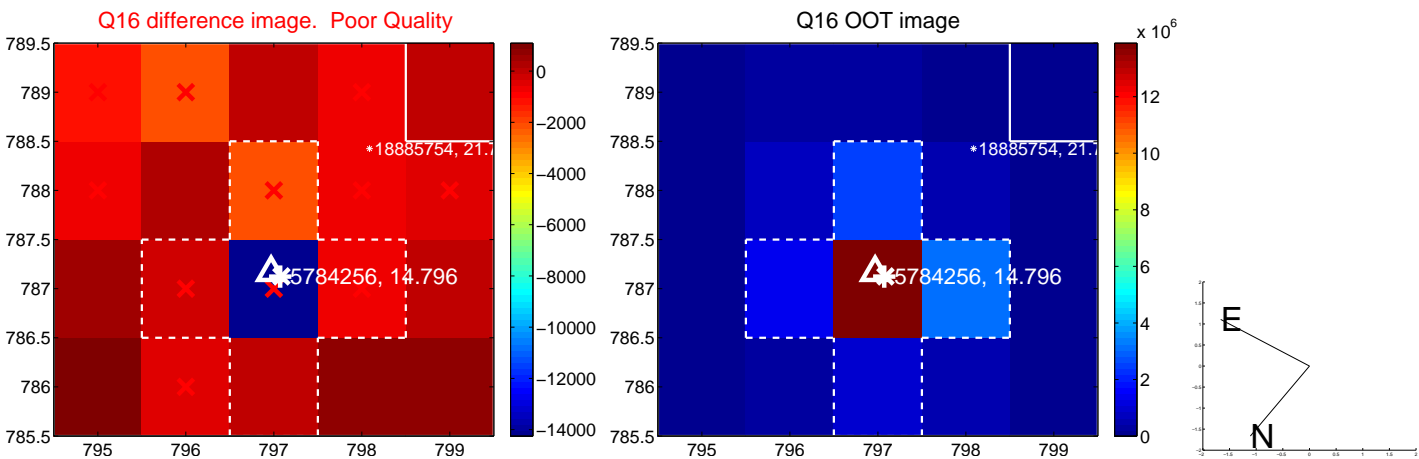
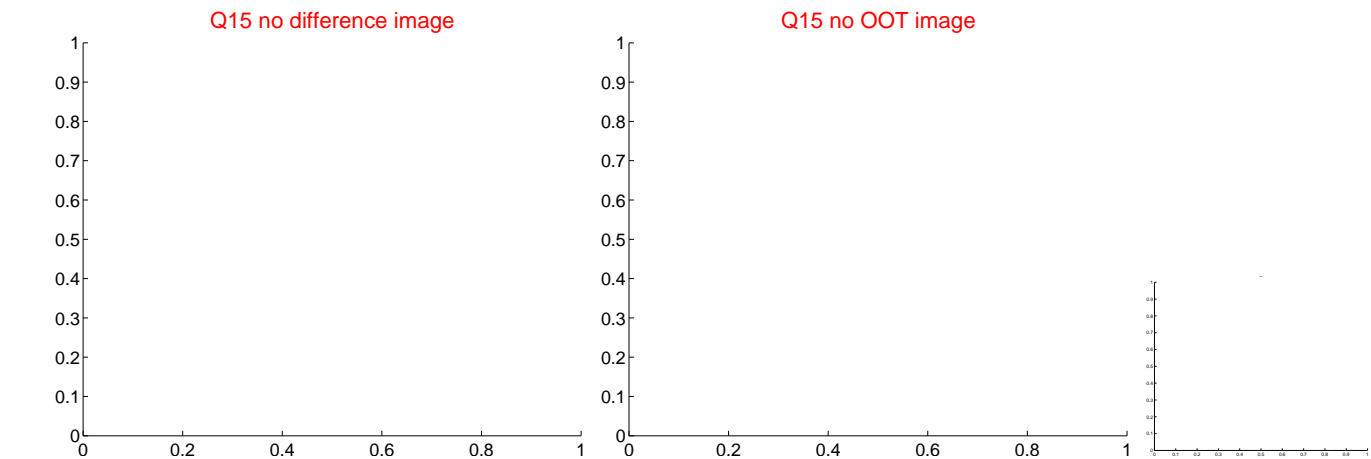
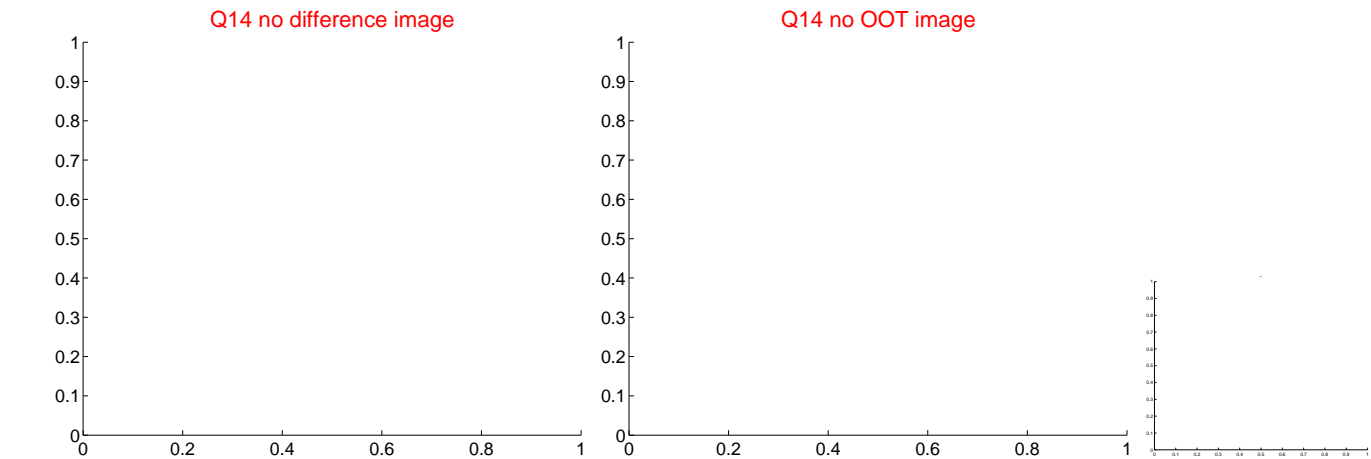
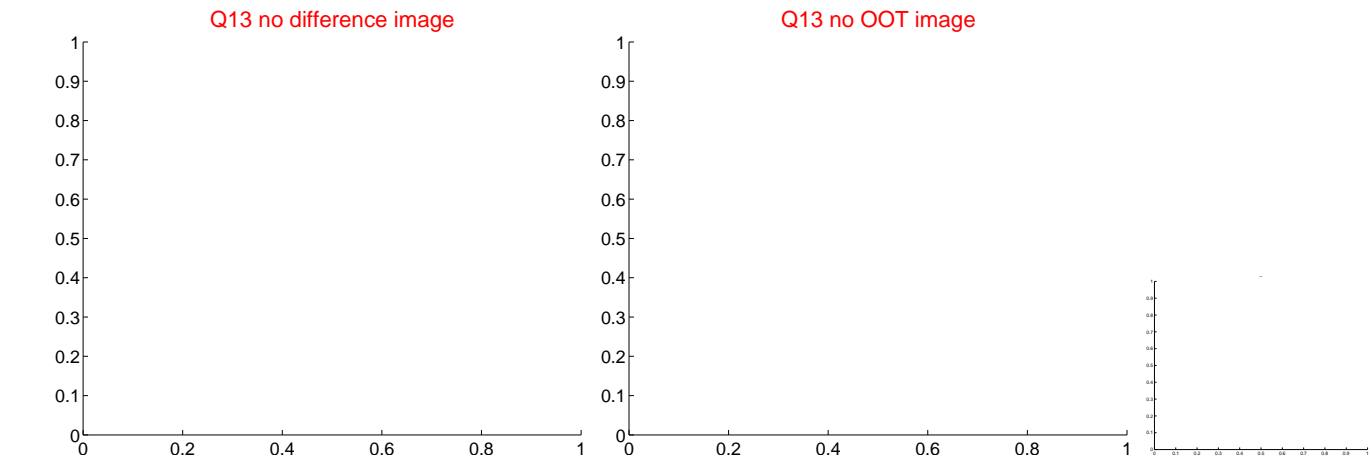




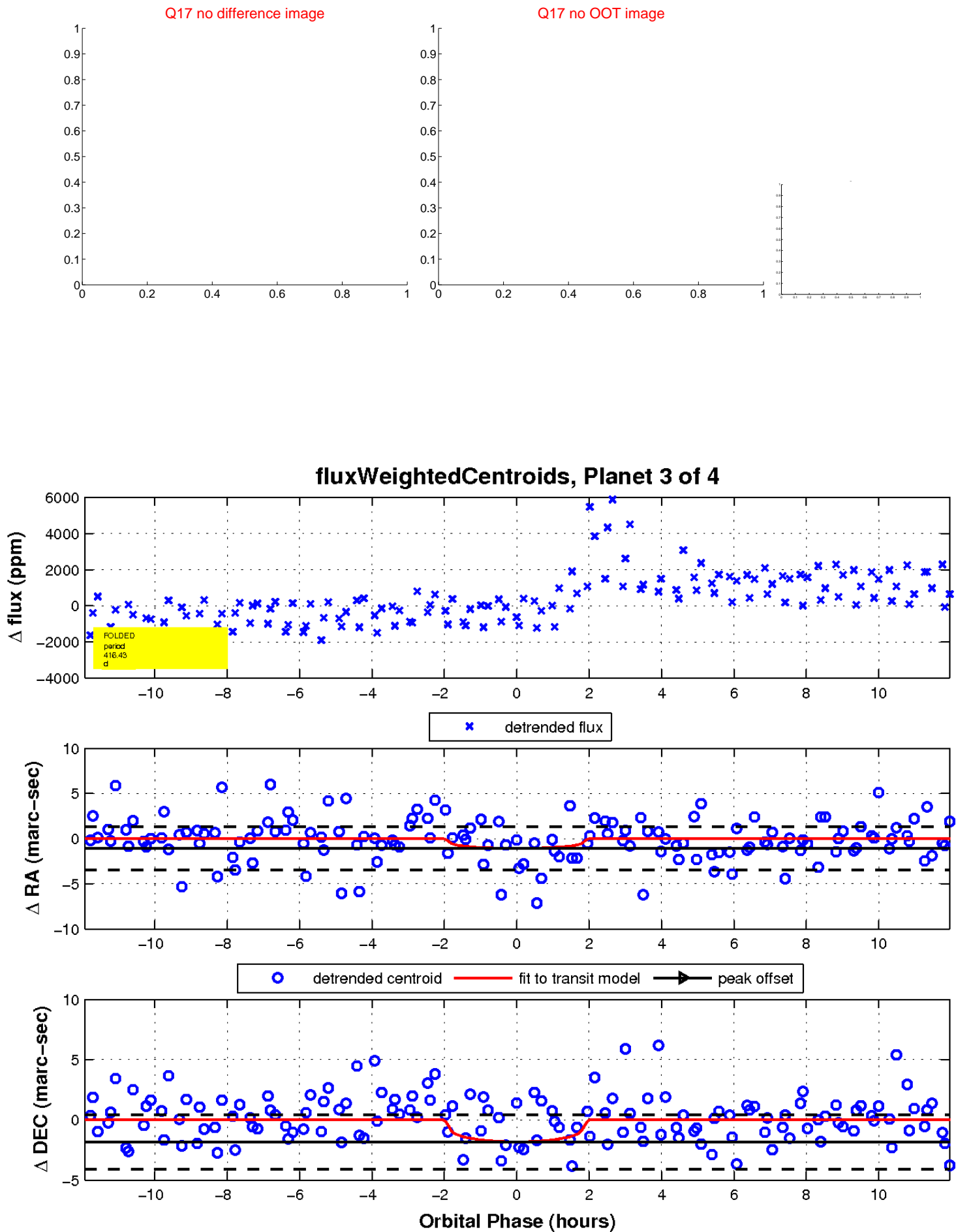
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

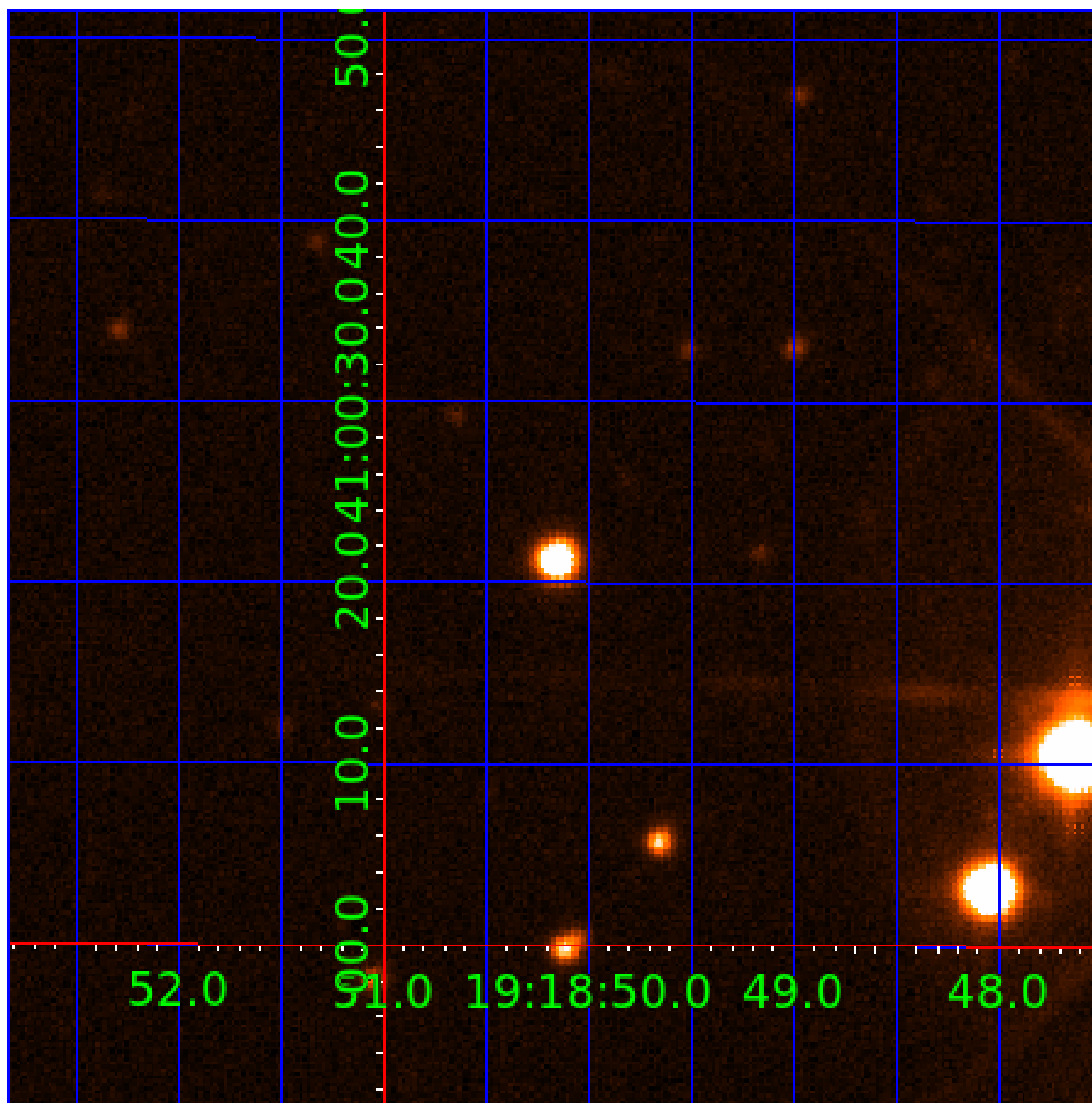


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 005784256

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
005784256-01	OBS	No	516.728329	314.056963	1628.7	3.500	13.7	7.1	0.71	4973	2.79	0.21
005784256-02	OBS	No	598.460531	145.010299	1626.6	5.309	15.0	7.2	0.71	4973	2.77	0.17
005784256-03	OBS	No	416.429421	266.004468	1832.8	4.003	13.7	9.2	0.71	4973	3.10	0.28
005784256-04	OBS	No	411.244326	479.084467	2017.2	3.871	12.5	12.1	0.71	4973	3.35	0.28

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
005784256-01	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005784256-02	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS
005784256-03	OBS	FP	0.00	1	0	1	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—ALL_TRANS_CHASES—MOD_TER_DV—MOD_POS_DV—INCONSISTENT_TRANS—CENT_FEW_DIFFS—HALO_GHOST
005784256-04	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—CENT_NOFITS

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

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

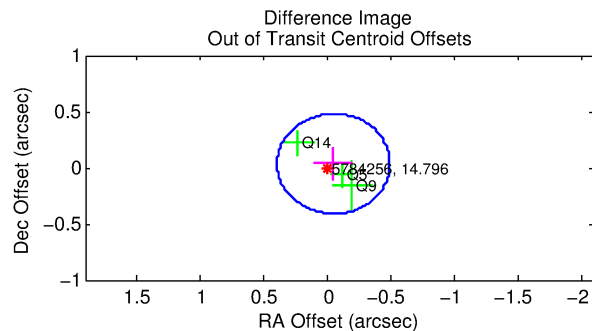
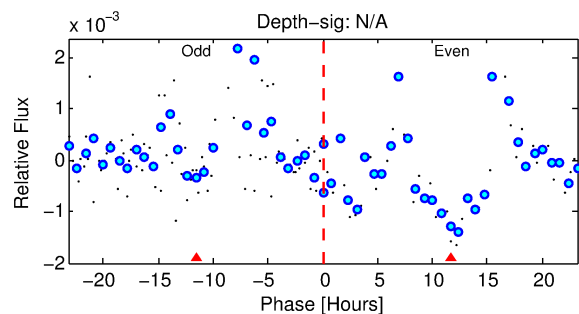
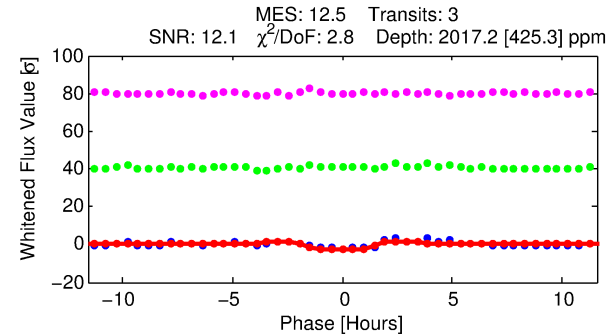
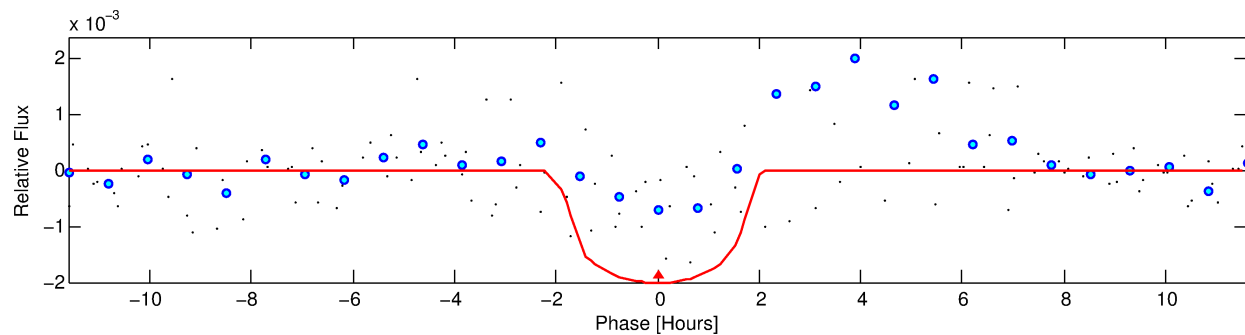
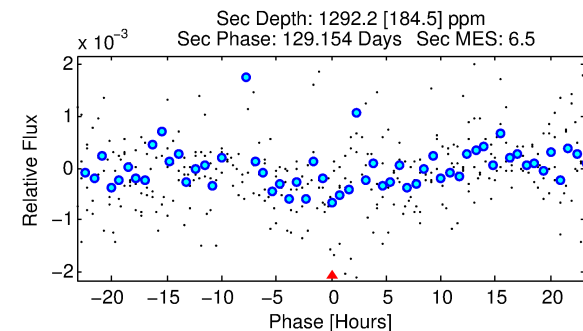
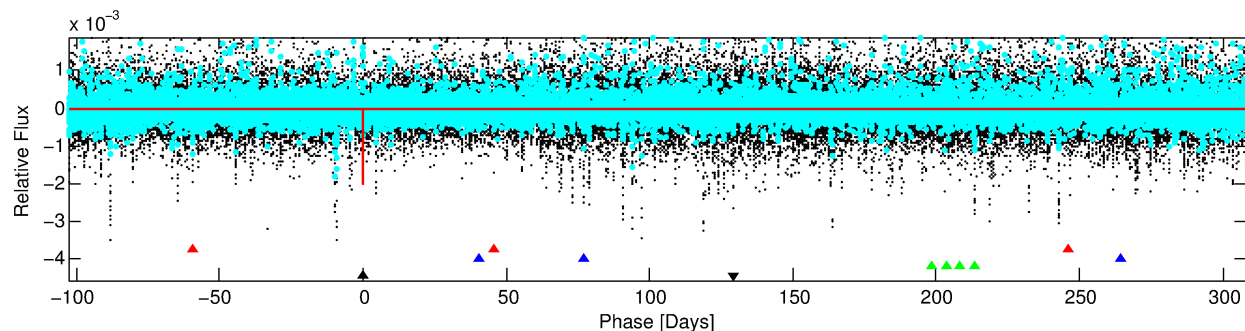
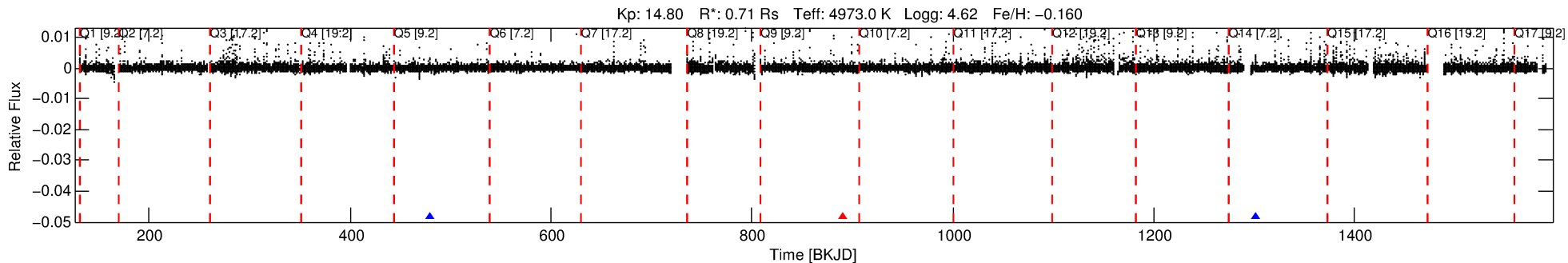
See [http://exoplanetarchive.ipac.caltech.edu/docs/API\\_kepcandidate\\_columns.html#proj\\_disp\\_col](http://exoplanetarchive.ipac.caltech.edu/docs/API_kepcandidate_columns.html#proj_disp_col) for comment definitions.

## Ephemeris Match Information For 005784256-04

No Significant Match Found

# DV One-Page Summary

KIC: 5784256 Candidate: 4 of 4 Period: 411.244 d



## DV Fit Results:

Period = 411.24433 [0.00533] d  
Epoch = 479.0845 [0.0070] BKJD  
Rp/R\* = 0.0432 [0.0556]  
a/R\* = 660.16 [2912.05]  
b = 0.65 [4.19]  
Seff = 0.28 [0.05]  
Teq = 185 [8] K  
Rp = 3.35 [4.32] Re  
a = 0.9945 [0.0873] AU  
Ag = 62759.87 [161851.93] [0.39σ]  
Teffp = 4536 [2925] K [1.49σ]

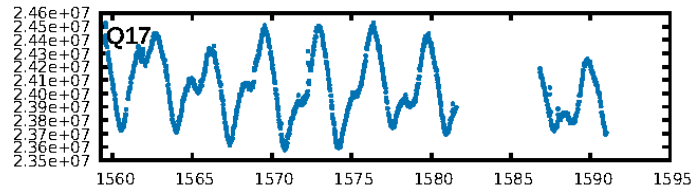
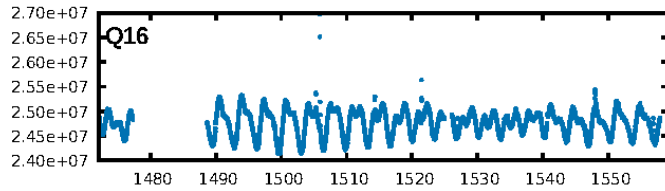
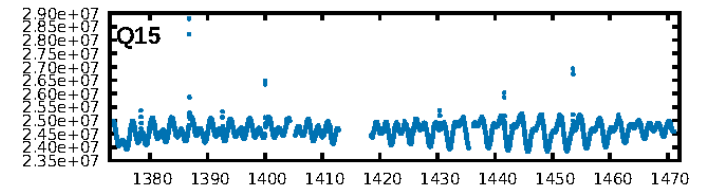
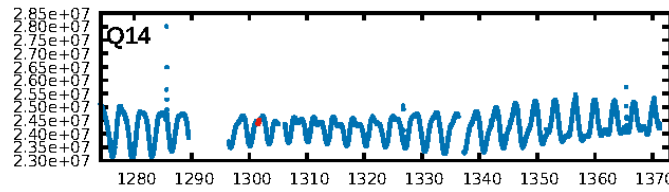
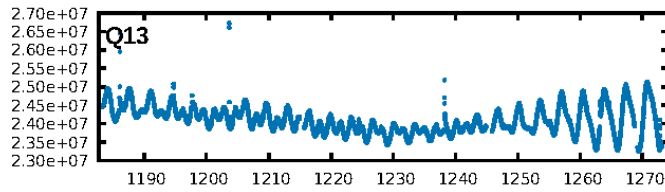
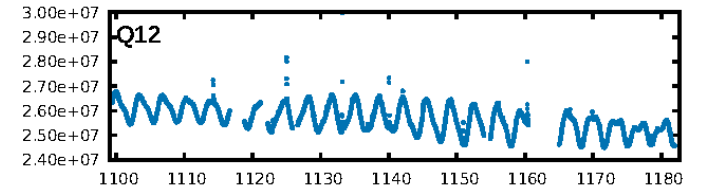
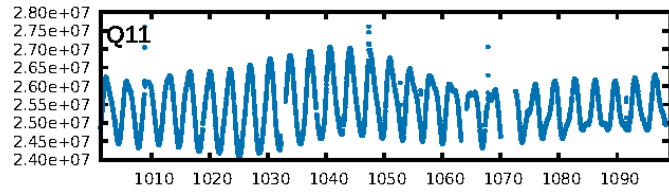
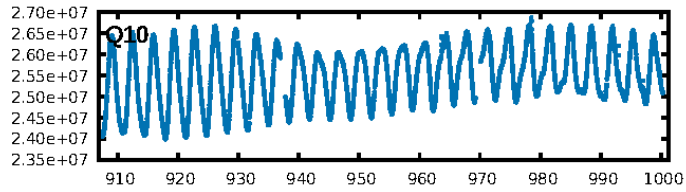
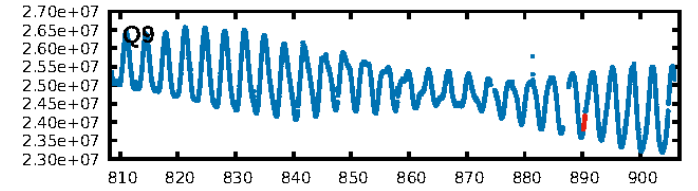
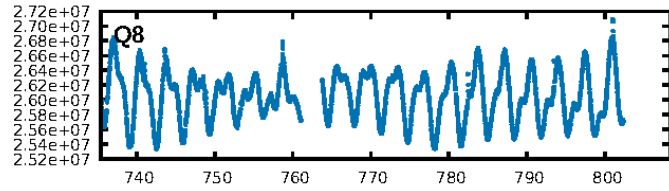
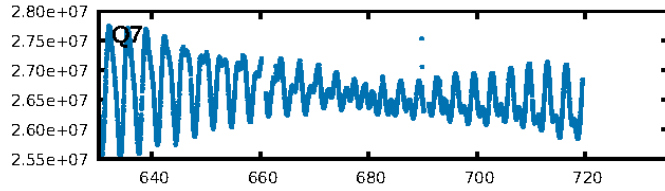
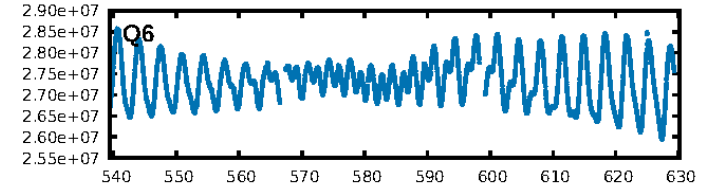
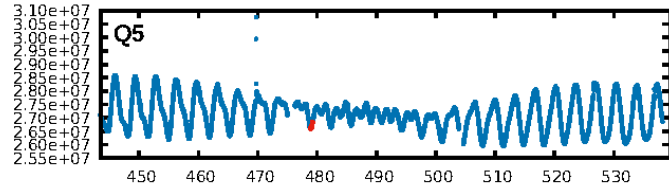
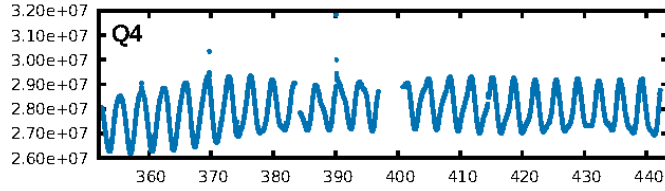
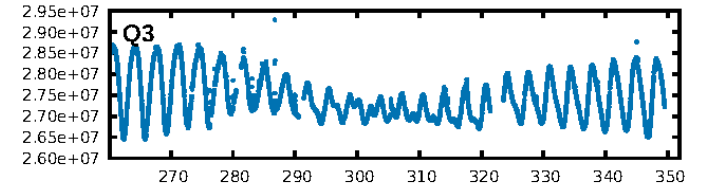
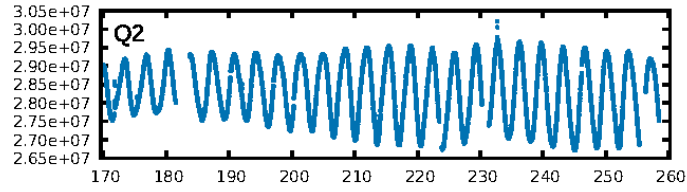
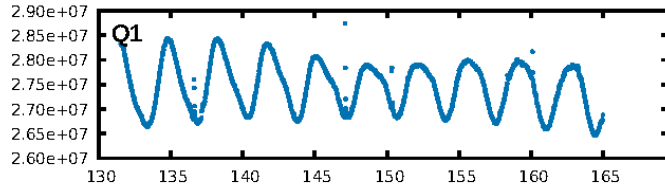
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [22.35σ]  
ModelChiSquare2-sig: 7.6%  
ModelChiSquareGof-sig: 0.2%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 0.67 [2/3]  
GhostDiagnostic-chr: 0.382  
Centroid-sig: 9.8%  
Centroid-so: 0.807 arcsec [1.34σ]  
OotOffset-rm: 0.063 arcsec [0.42σ]  
KicOffset-rm: 0.062 arcsec [0.47σ]  
OotOffset-st: 1/0/0/2 [3]  
KicOffset-st: 1/0/0/2 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [3/3]

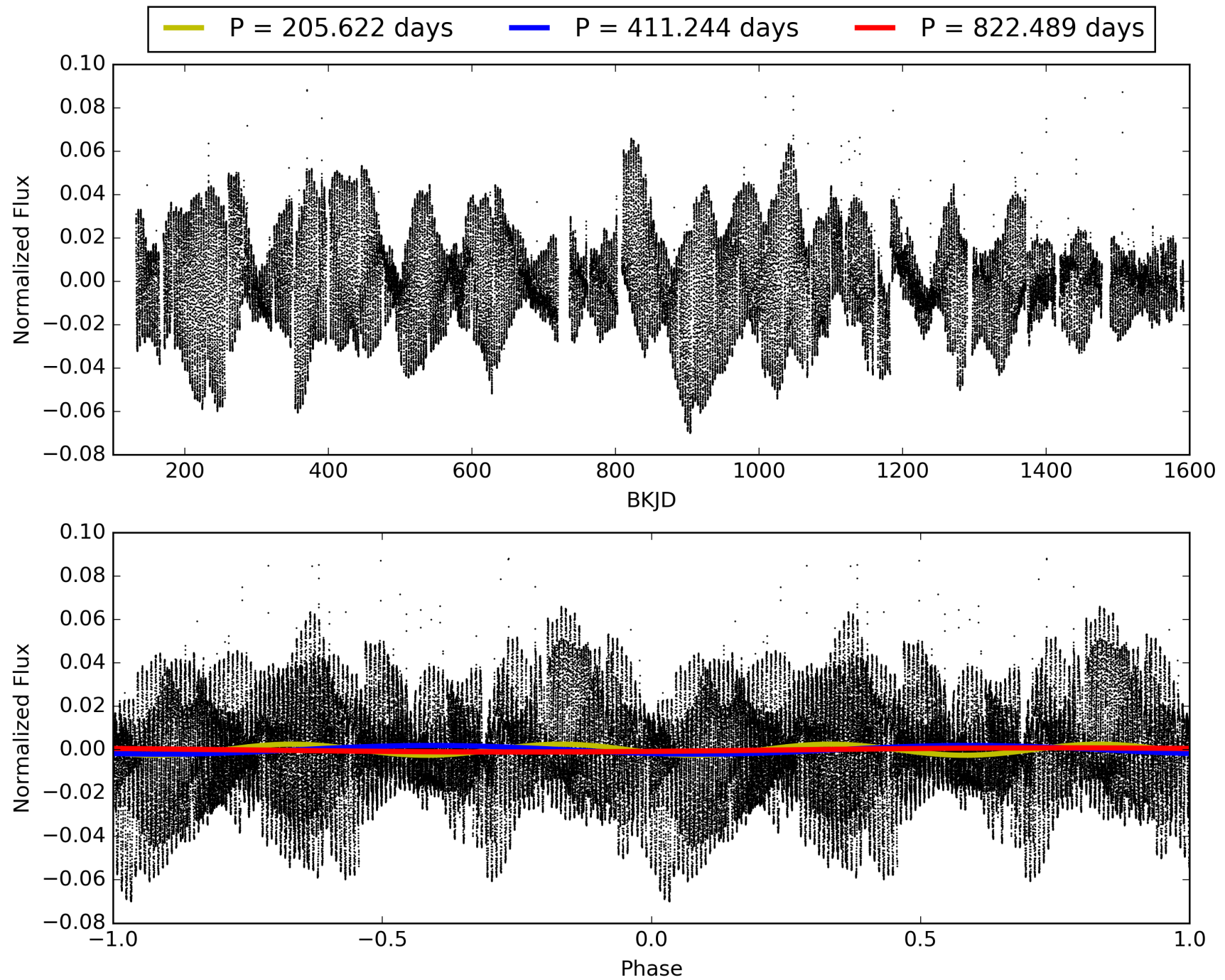
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 31-Jan-2016 00:45:47 Z

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

# TCE 005784256-04, PDC Light Curves



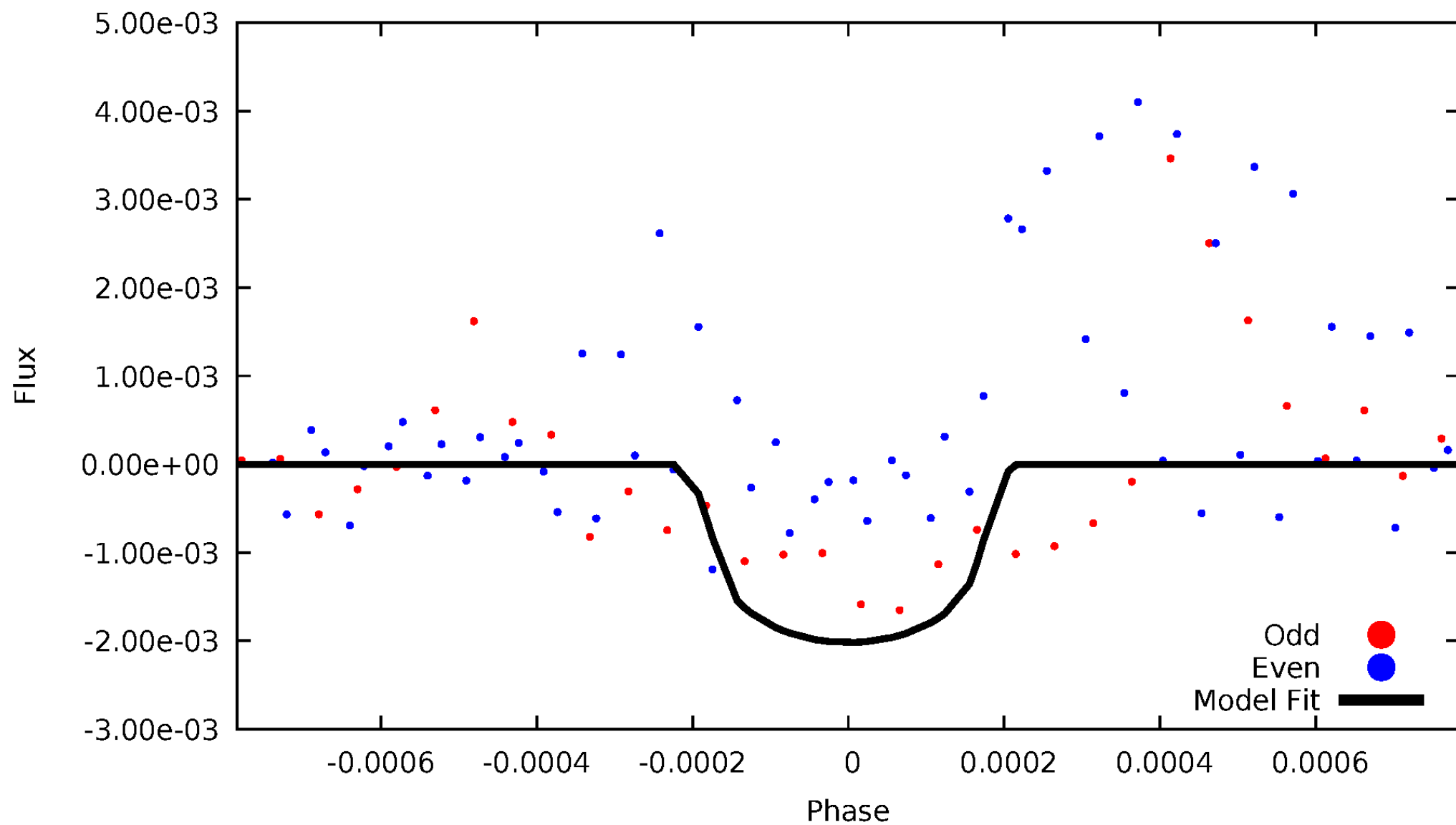
TCE 005784256-04





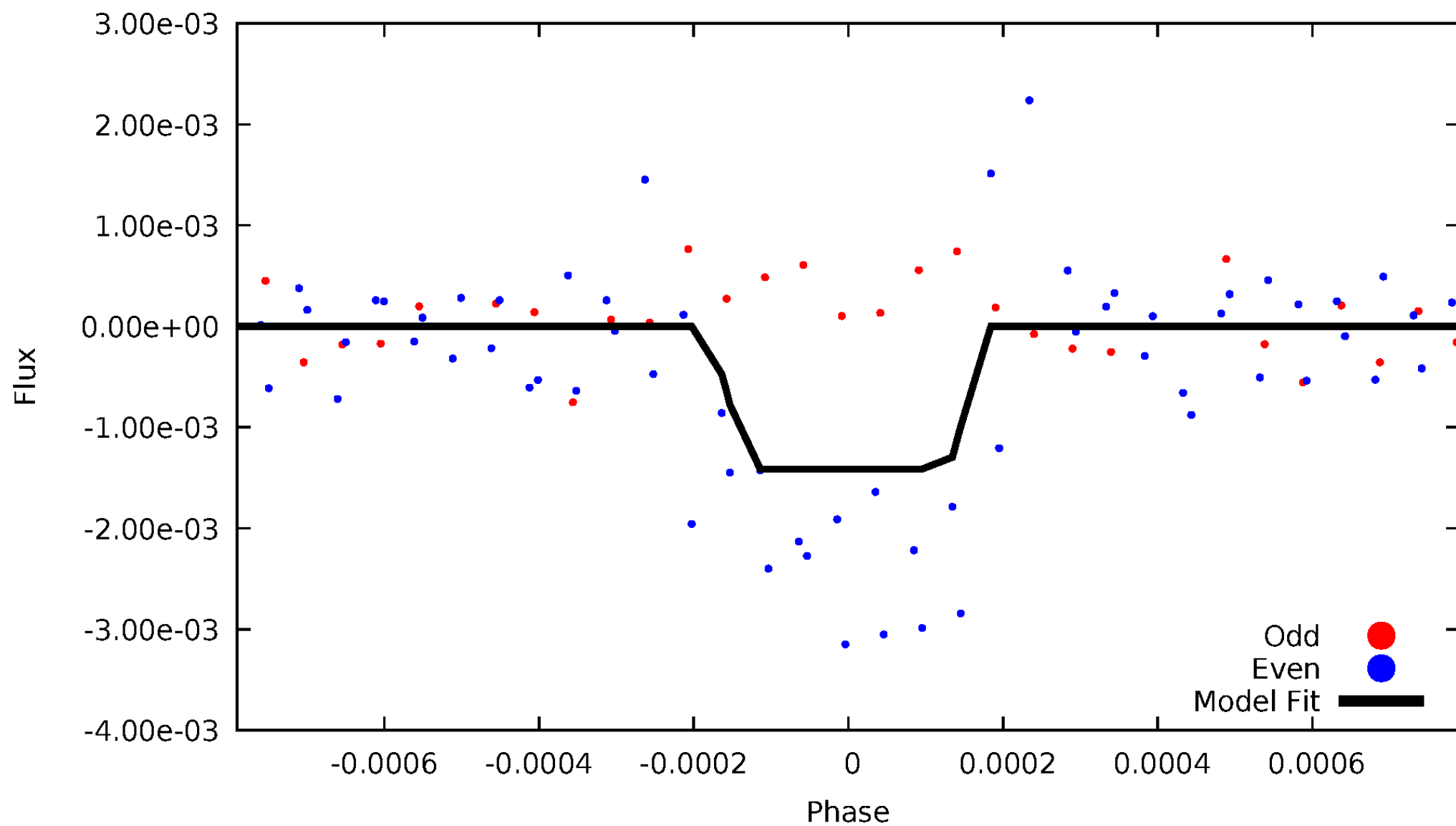
# DV Odd/Even

TCE 005784256-04



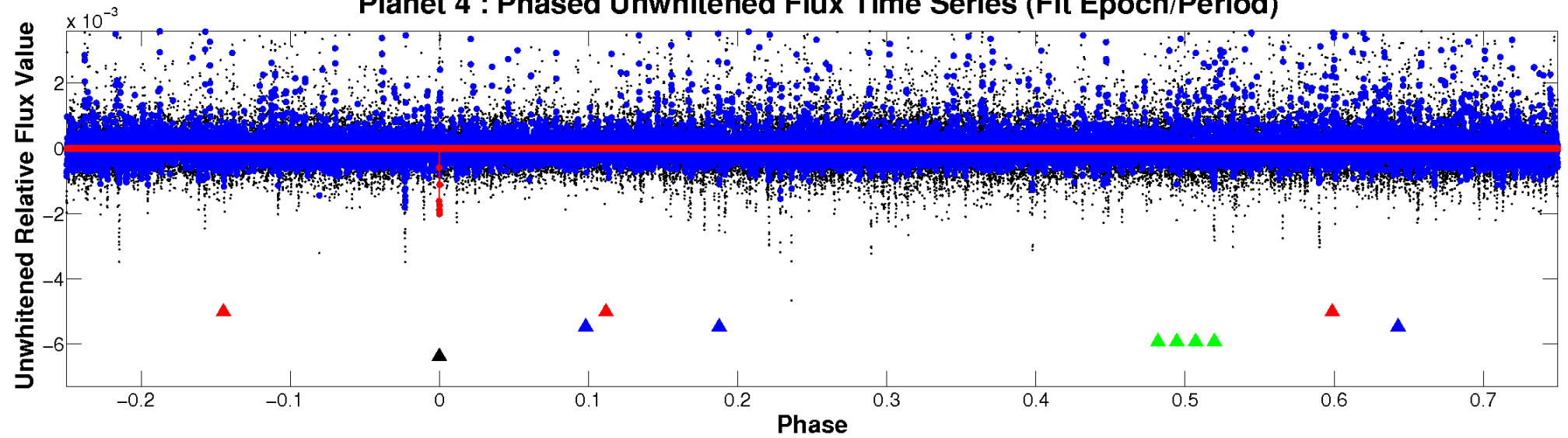
# ALT Odd/Even

TCE 005784256-04

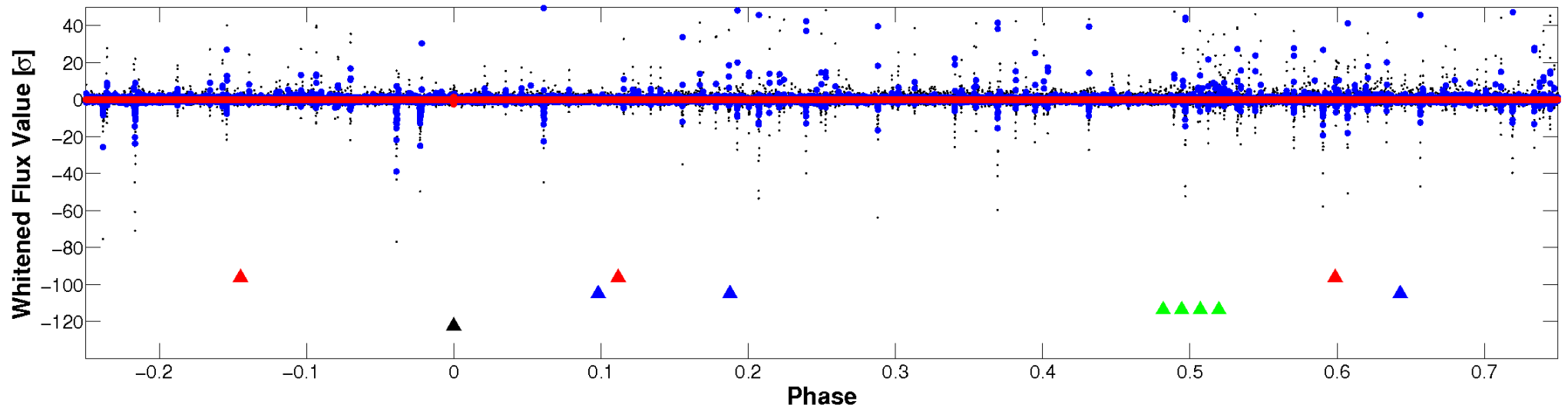


# Non-Whitened Vs. Whitened Light Curve

## Planet 4 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)

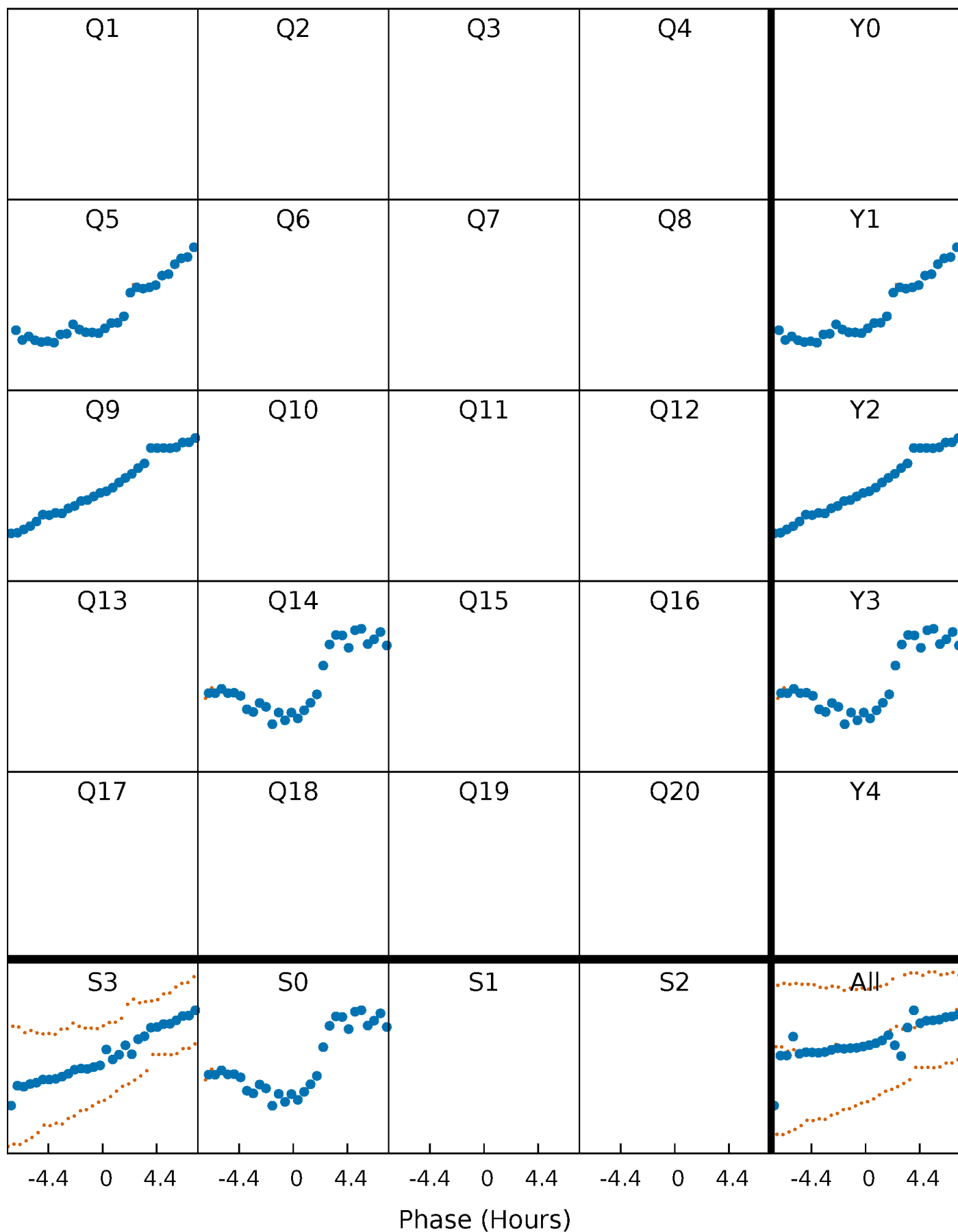


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



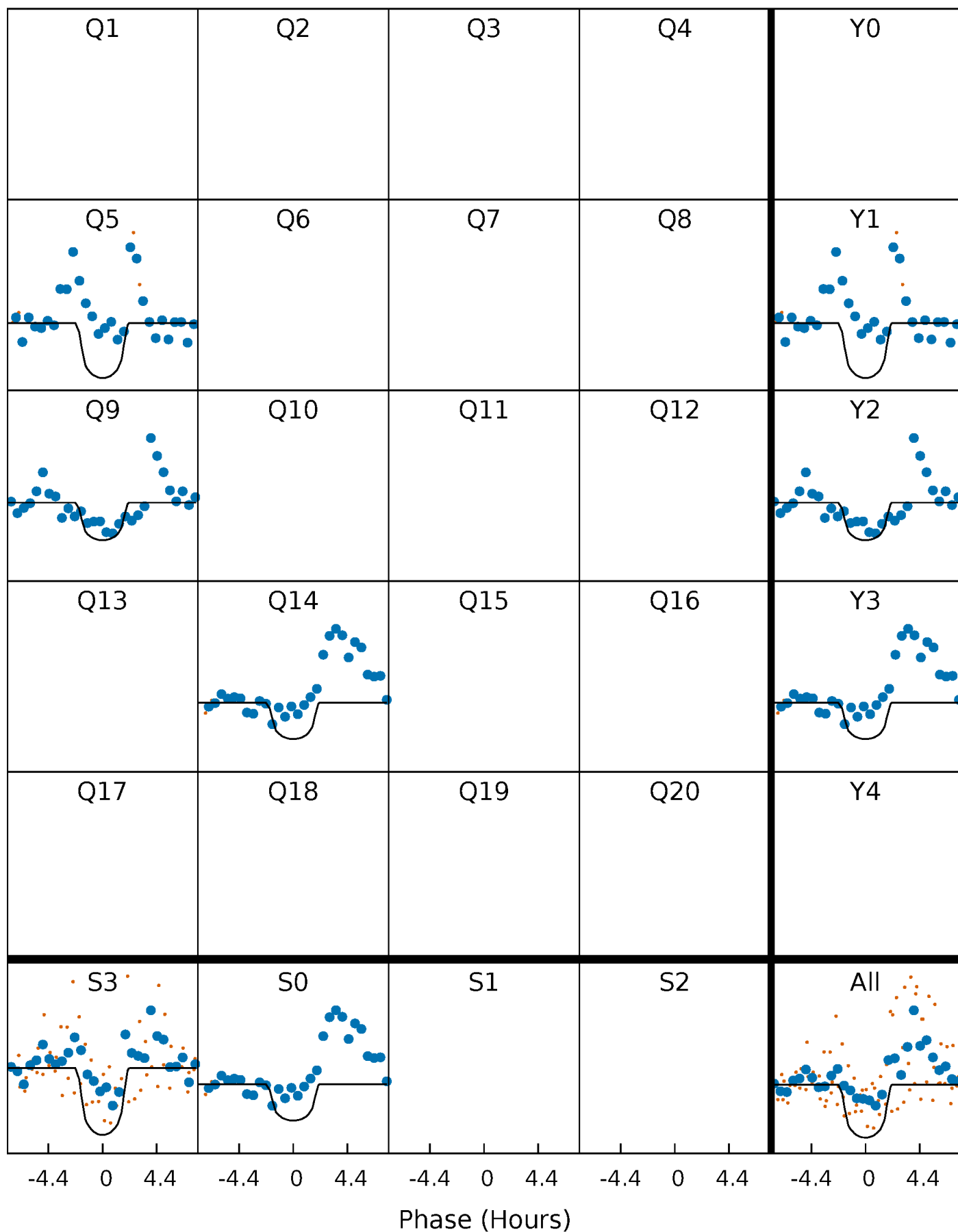
# PDC Quarter-Phased Transit Curves

TCE 005784256-04     $P=411.244326$  Days     $T_0=479.084467$  (BKJD)



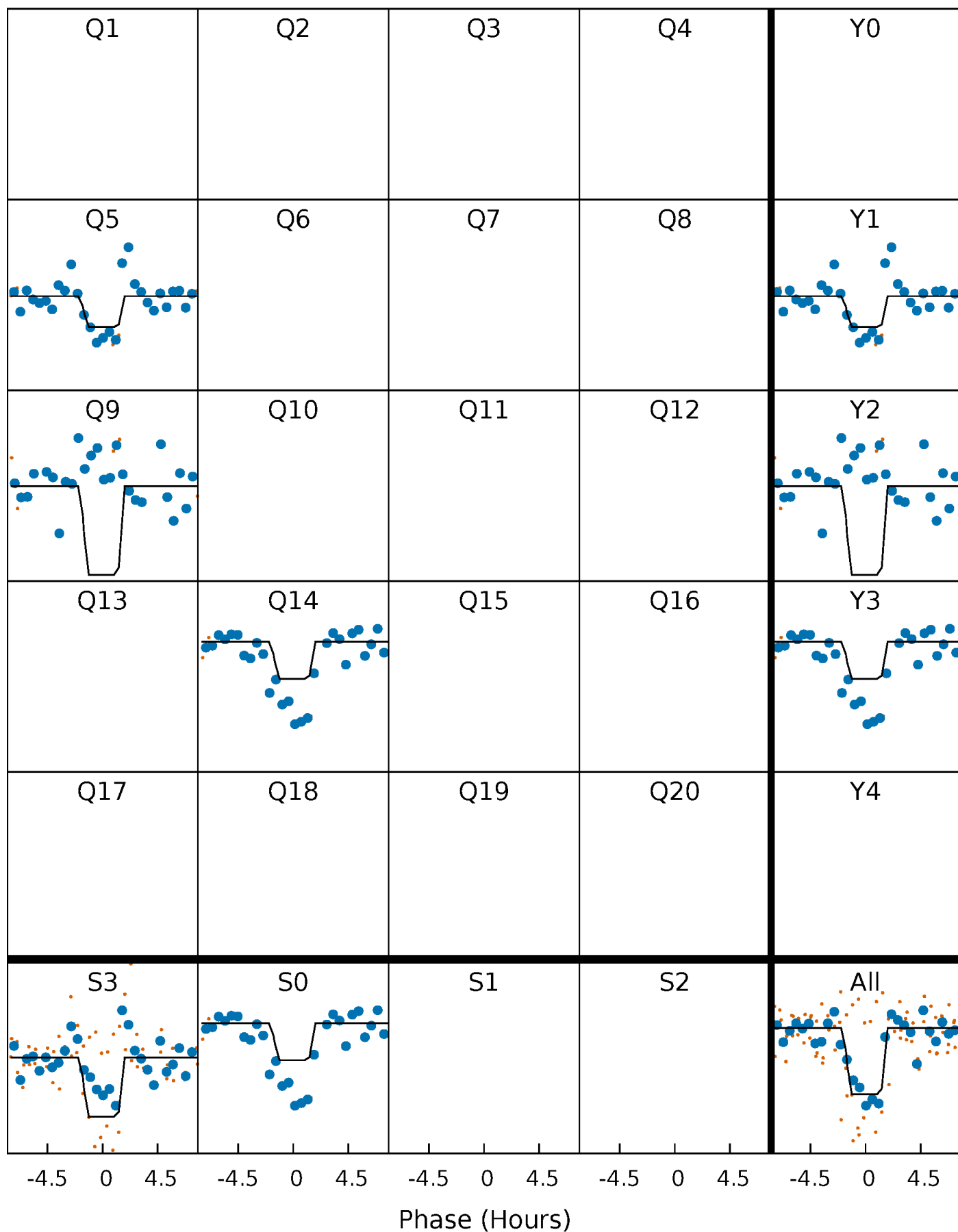
# DV Quarter-Phased Transit Curves

TCE 005784256-04     $P=411.244326$  Days     $T_0=479.084467$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

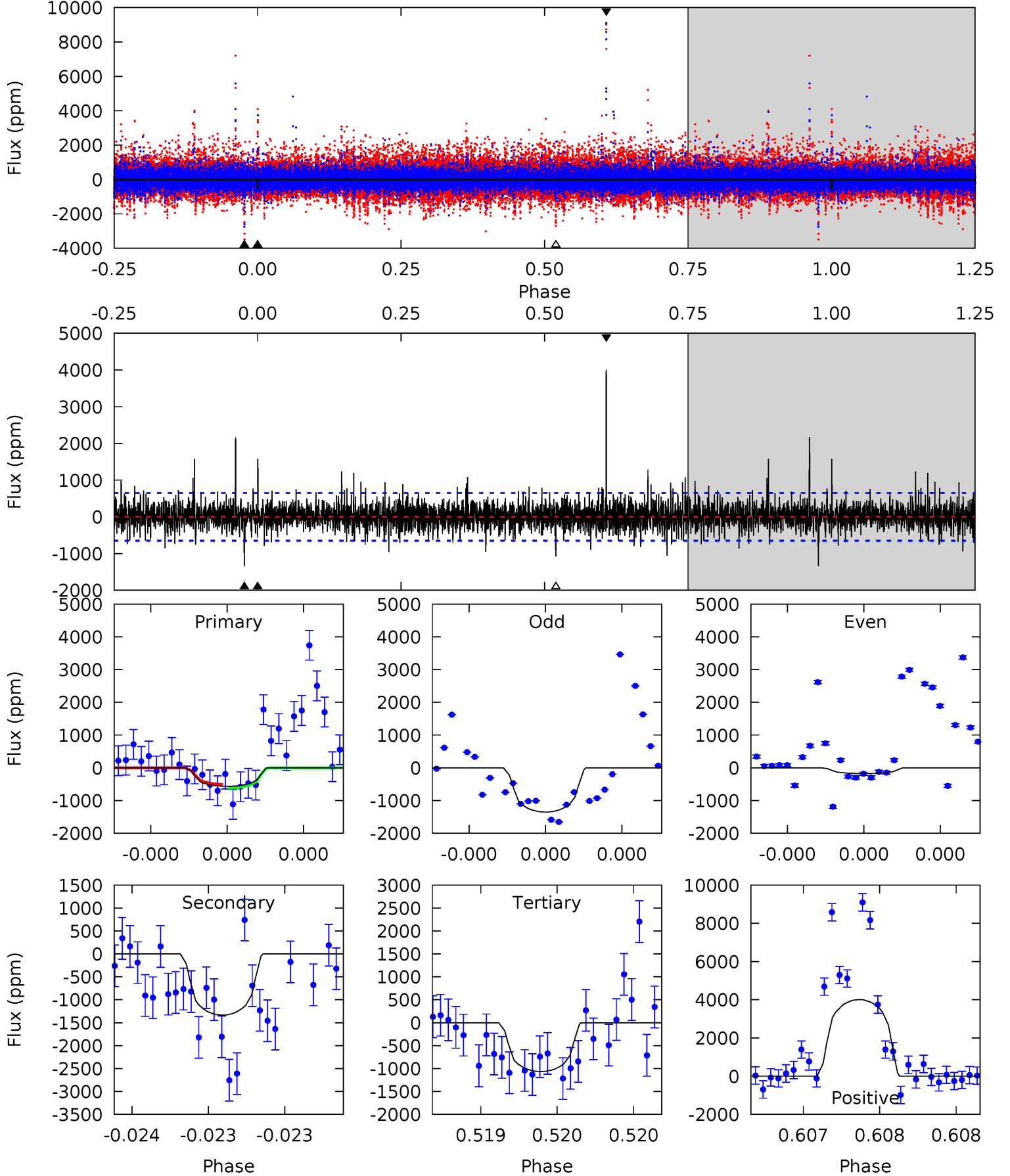
TCE 005784256-04     $P=411.245829$  Days     $T_0=479.093041$  (BKJD)



# DV Model-Shift Uniqueness Test

005784256-04, P = 411.244326 Days, E = 67.840141 Days

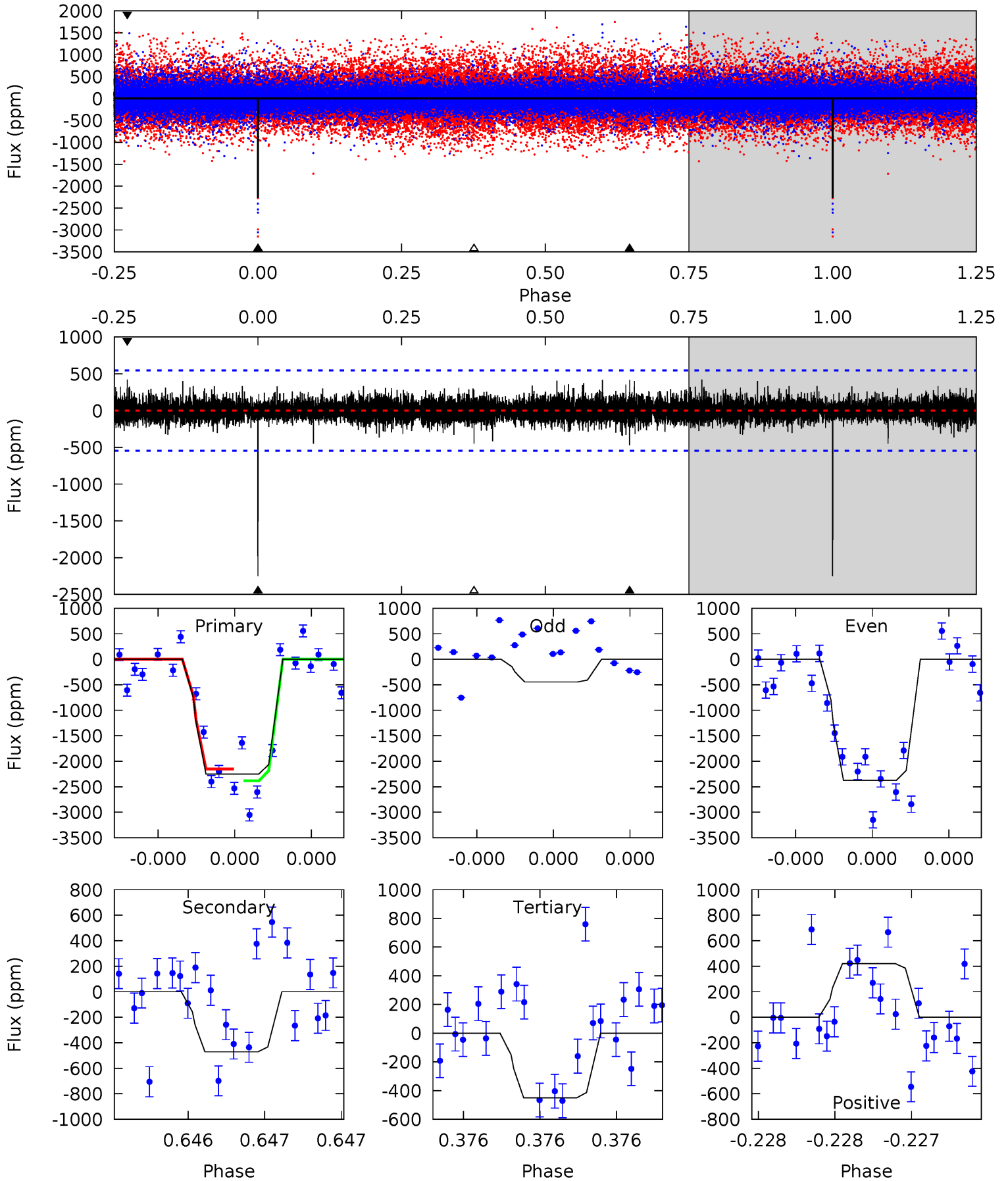
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
4.89	11.5	9.19	34.6	5.61	3.54	2.16	-4.30	-29.7	2.32	-23.1	3.70	1.74	0.75	0.45



# Alt Model-Shift Uniqueness Test

005784256-04, P = 411.245829 Days, E = 67.847212 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
23.3	4.89	4.68	4.36	5.66	3.61	0.87	18.7	19.0	0.21	0.53	11.5	0.76	0.16	1.20





### Stellar Parameters For KIC 005784256

	$T_{\text{eff}} (K)$	$\log(g)$	$[\text{Fe}/\text{H}]$	$R (R_{\odot})$	$M (M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$4973^{+151}_{-136}$	$4.625^{+0.031}_{-0.063}$	$-0.160^{+0.300}_{-0.300}$	$0.710^{+0.078}_{-0.058}$	$0.789^{+0.055}_{-0.095}$	$3.109^{+0.460}_{-0.703}$
	+3%/-3%	+1%/-1%	+188%/-188%	+11%/-8%	+7%/-12%	+15%/-23%
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 005784256-04 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-1335 \pm 116$	$4.71^{+3.76}_{-3.02}$	$261^{+10}_{-9}$	$4133^{+2215}_{-764}$	$33964^{+224444}_{-23857}$
Alt.	$-471 \pm 96$	$4.27^{+4.01}_{-2.86}$	$262^{+10}_{-9}$	$3568^{+1865}_{-649}$	$14165^{+120687}_{-10370}$

$T_{\text{max}}$  = 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

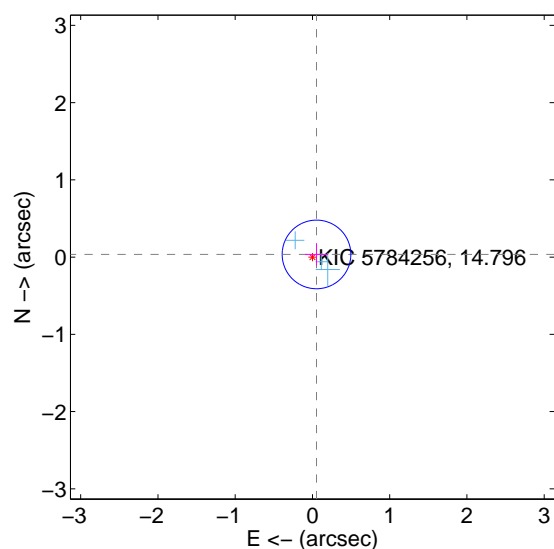
Supplemental centroid analysis for 005784256-04. Kepler magnitude: 14.80. Transit SNR 12.14

There are 3 quarters with good PRF difference image offsets

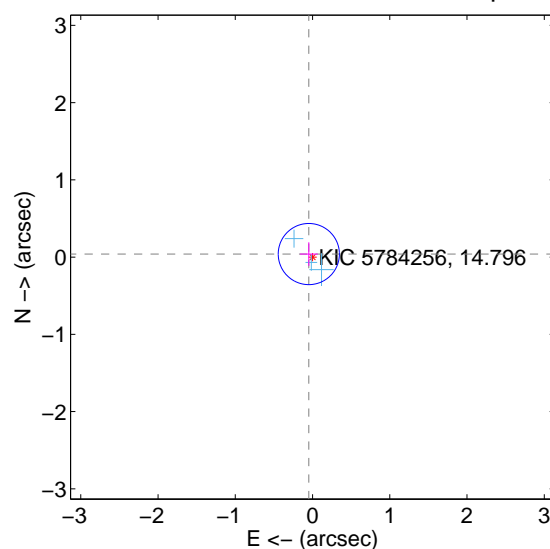
The direct PRF centroid is offset from the target star catalog position by about 0.03 arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$0.063 \pm 0.148$	0.42	$-0.053 \pm 0.150$	$0.035 \pm 0.144$
PRF-fit source offset from KIC position	$0.062 \pm 0.132$	0.47	$0.048 \pm 0.116$	$0.039 \pm 0.152$
photometric centroid source offset	$0.81 \pm 0.60$	1.34	$-0.38 \pm 0.64$	$0.71 \pm 0.59$

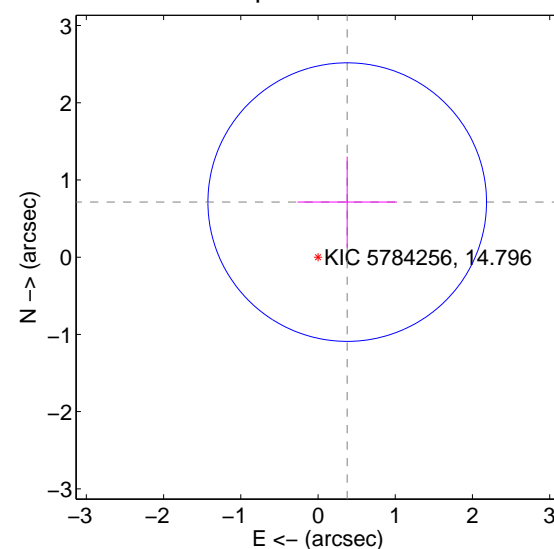
offset from difference PRF-fit to OOT PRF-fit



offset from difference PRF-fit to KIC position



offset from photometric centroids

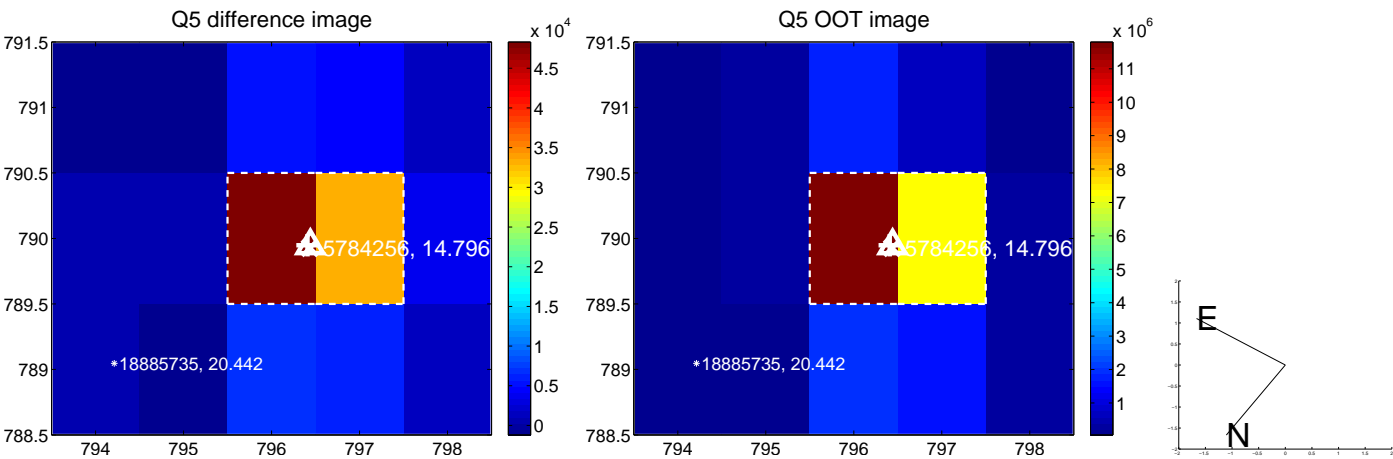


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: three-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

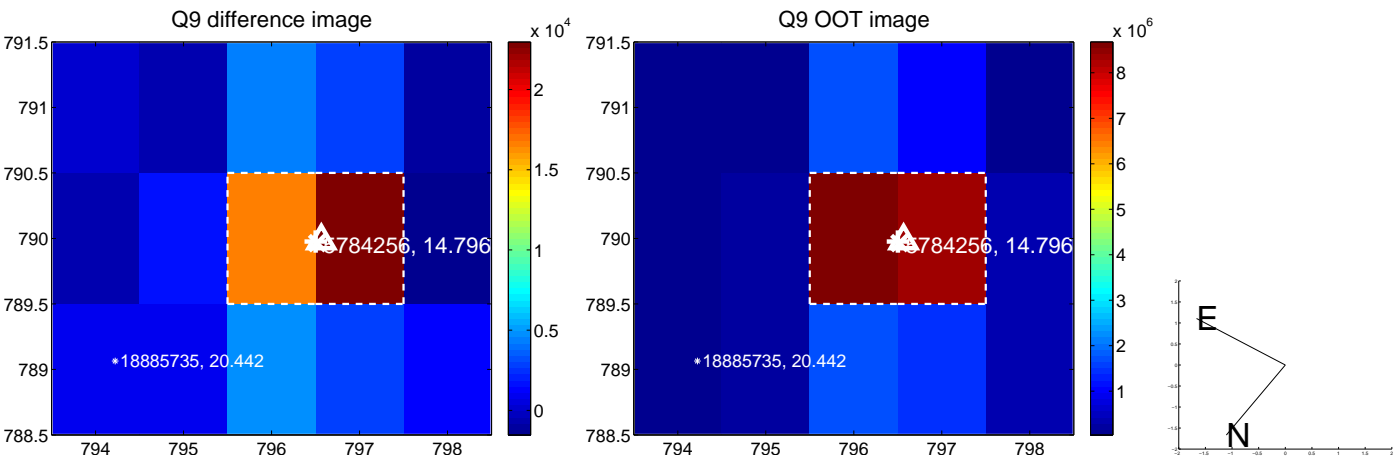
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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.

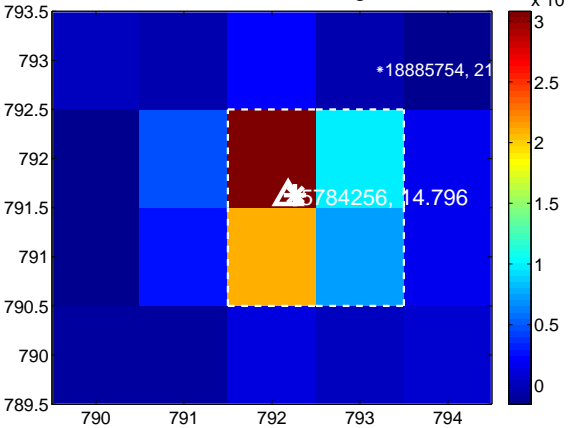
Q13 no difference image



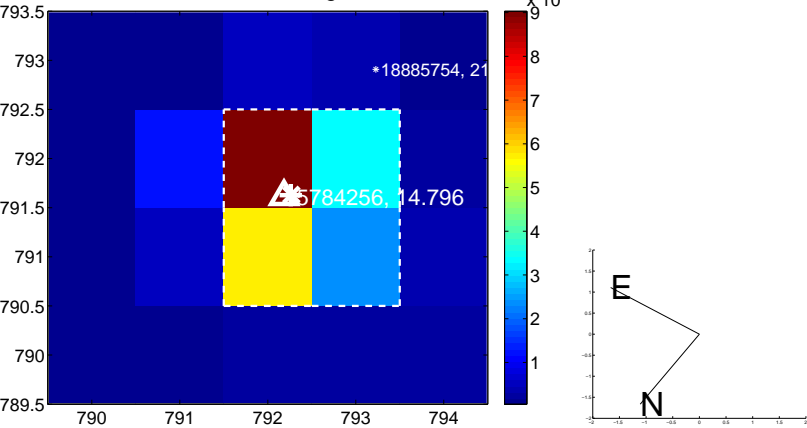
Q13 no OOT image



Q14 difference image



Q14 OOT image



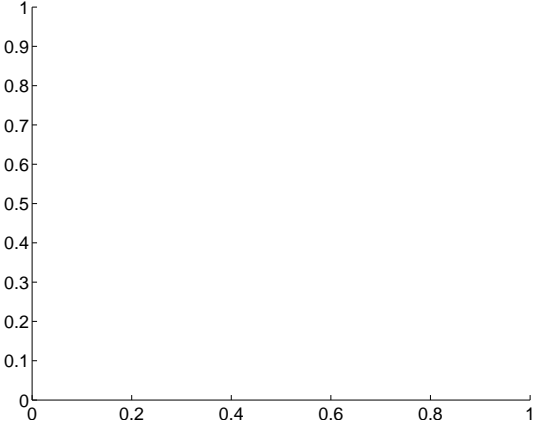
Q15 no difference image



Q15 no OOT image



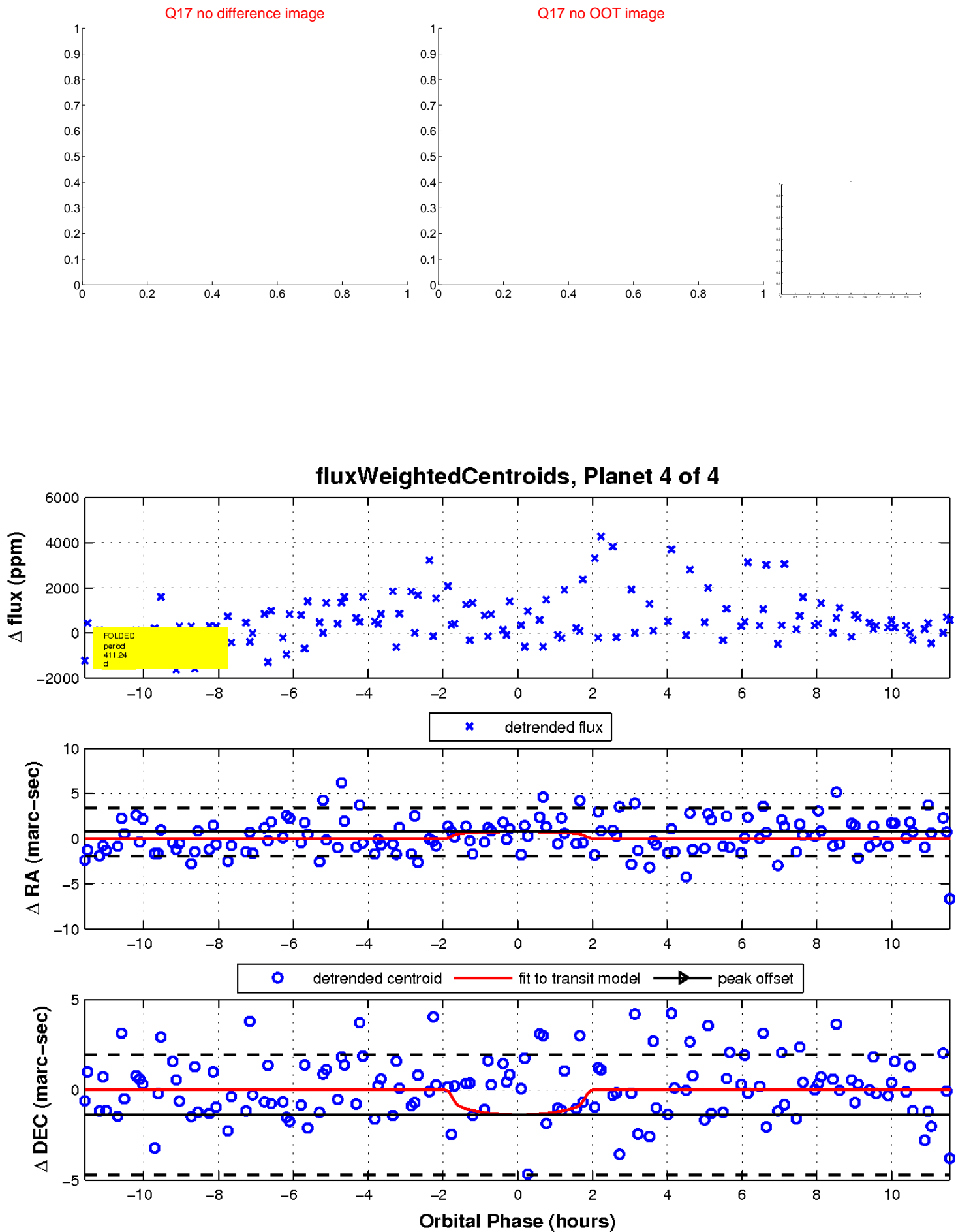
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

