

# KIC 007456521

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007456521-01	OBS	6880.01	276.418388	207.809907	201230.6	12.500	2534.0	-1.0	0.93	5956	34.12	1.64
007456521-02	OBS	No	276.430042	362.865365	53710.2	16.269	717.2	706.4	0.93	5956	35.89	1.64
007456521-03	OBS	No	225.444119	353.002631	6050.6	1.675	45.2	43.3	0.93	5956	13.34	2.15
007456521-04	OBS	No	369.571723	198.783464	13725.0	74.217	28.5	50.0	0.93	5956	19.14	1.11
007456521-05	OBS	No	296.620153	425.062593	422.4	0.565	13.3	1.7	0.93	5956	2.24	1.49
007456521-06	OBS	No	296.599935	425.427321	778.9	15.000	12.5	-1.0	0.93	5956	2.60	1.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007456521-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_NOFITS
007456521-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD—CENT_KIC_POS
007456521-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-04	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—SAME_NTL_PERIOD—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 007456521-01

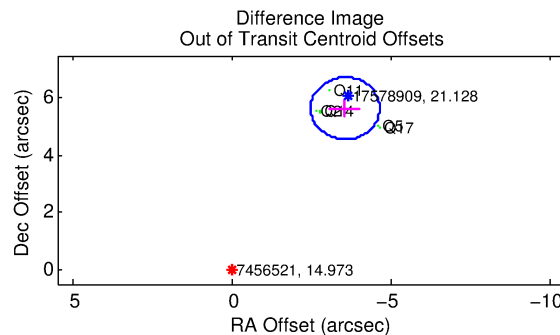
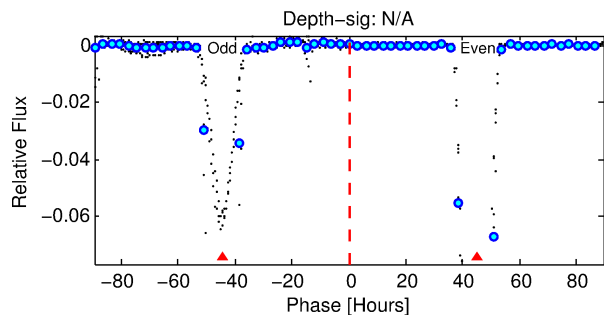
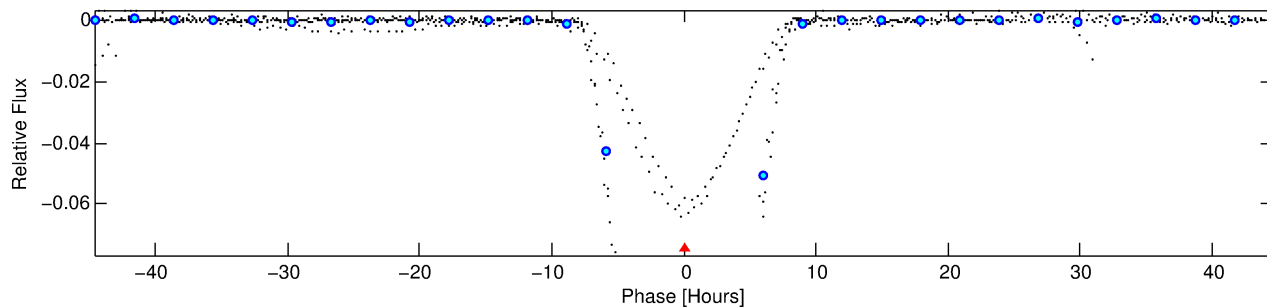
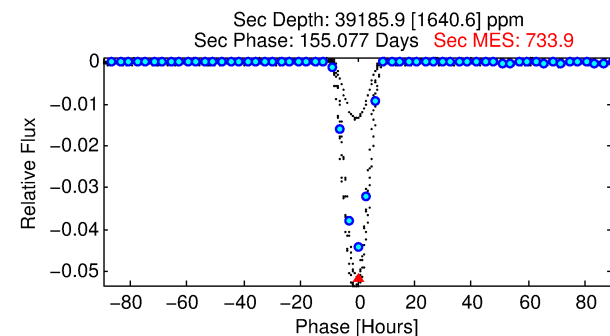
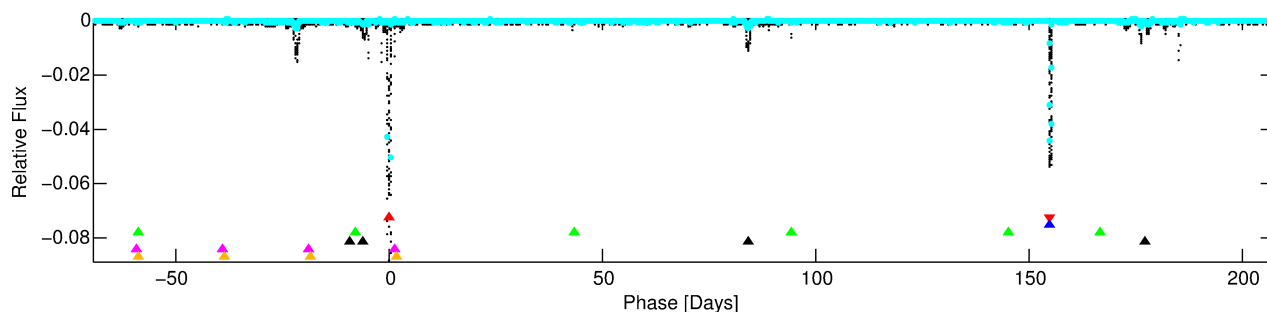
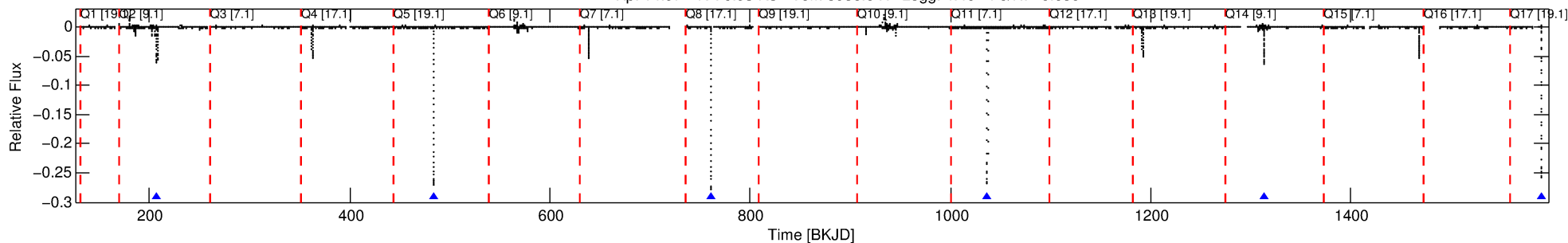
No Significant Match Found

# DV One-Page Summary

KIC: 7456521 Candidate: 1 of 6 Period: 276.418 d

KOI: K06880 Corr: No Ephemeris Match

Kp: 14.97 R\*: 0.93 Rs Teff: 5956.0 K Logg: 4.40 Fe/H: -0.680



## TPS TCE Results:

Period = 276.41839 d  
Epoch = 207.8099 BKJD

DV fit results are unavailable

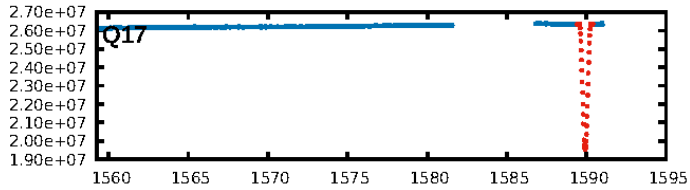
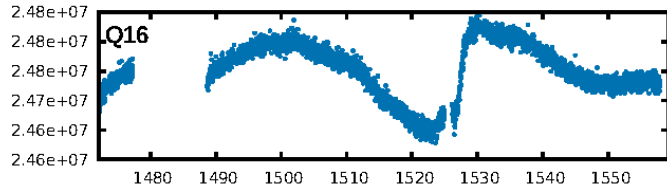
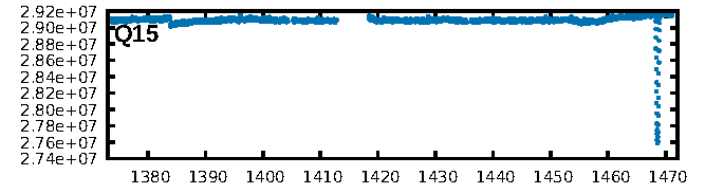
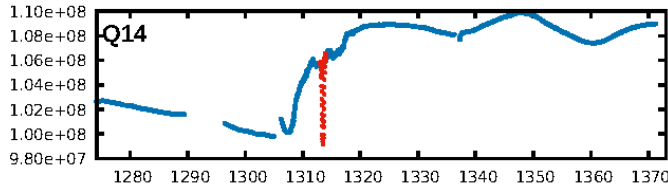
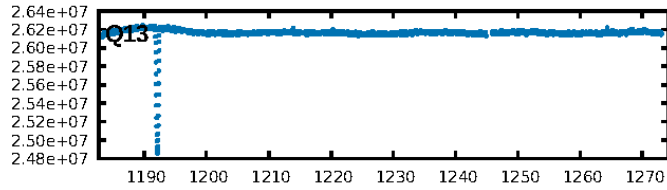
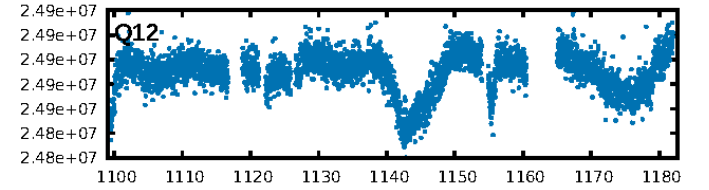
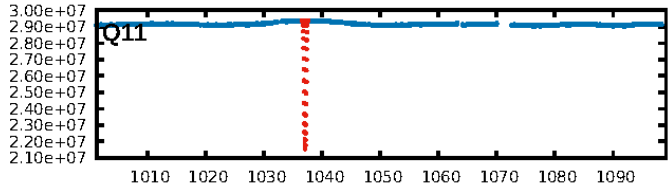
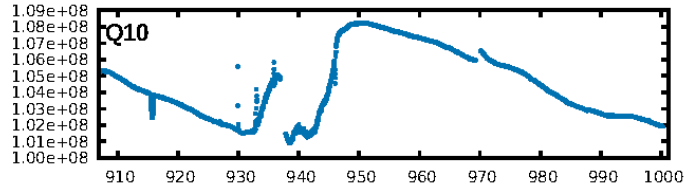
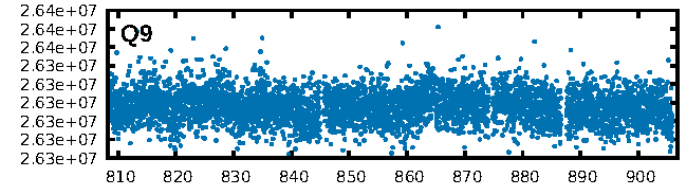
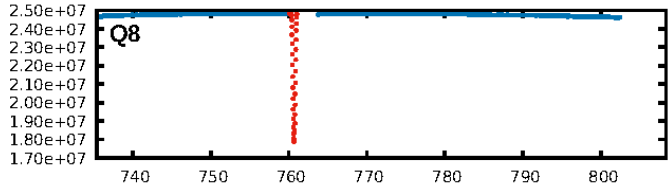
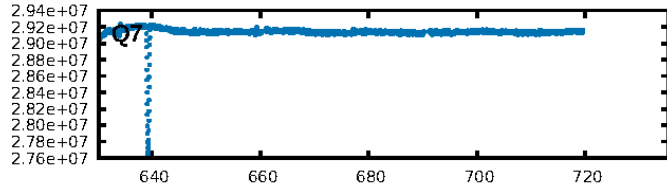
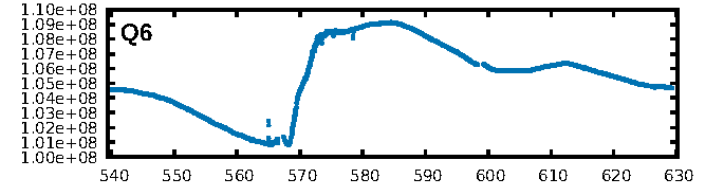
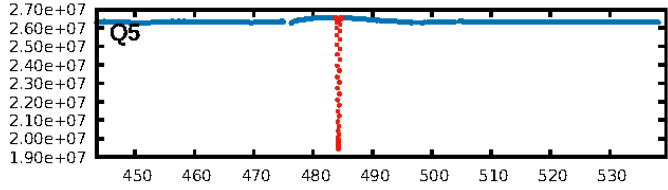
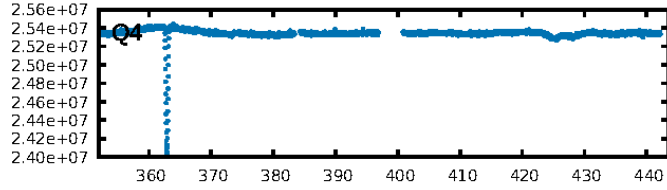
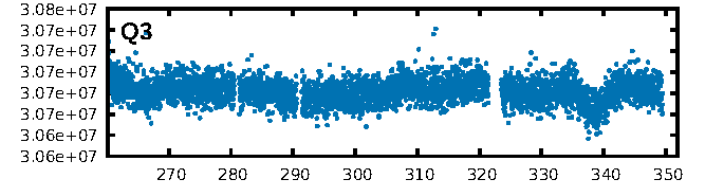
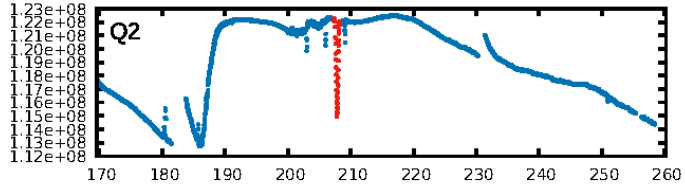
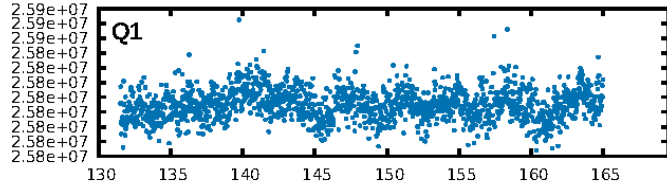
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [97.00σ]  
LongPeriod-sig: 1.1% [0.01σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 11.55  
Centroid-sig: N/A  
Centroid-so: 4.015 arcsec [3110.89σ]  
OotOffset-rm: 6.672 arcsec [18.43σ]  
KicOffset-rm: 0.214 arcsec [2.46σ]  
OotOffset-st: 2/1/0/2 [5]  
KicOffset-st: 2/1/0/2 [5]  
DiffImageQuality-fgm: 0.80 [4/5]  
DiffImageOverlap-fno: 1.00 [5/5]

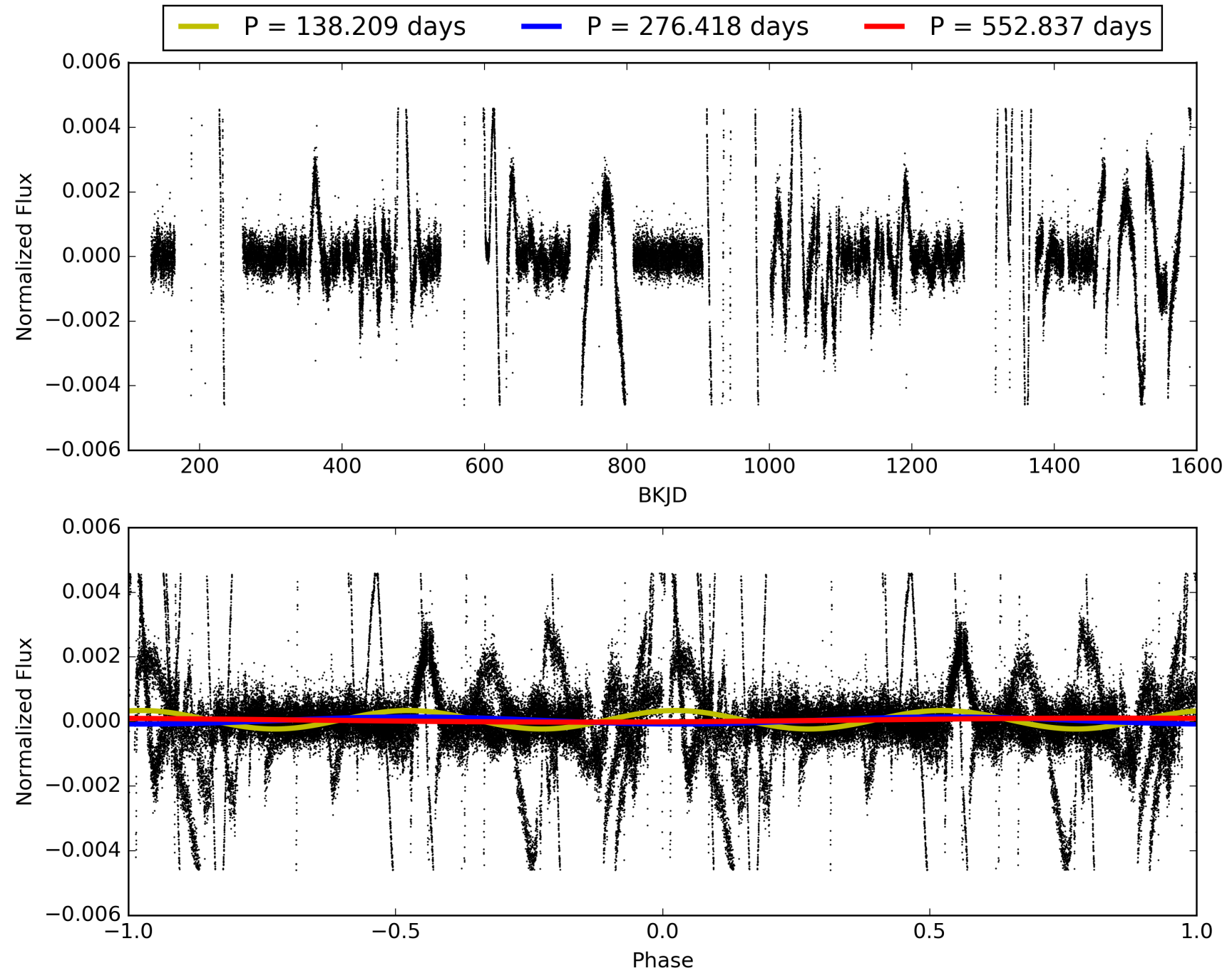
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:18:08 Z

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

## TCE 007456521-01, PDC Light Curves



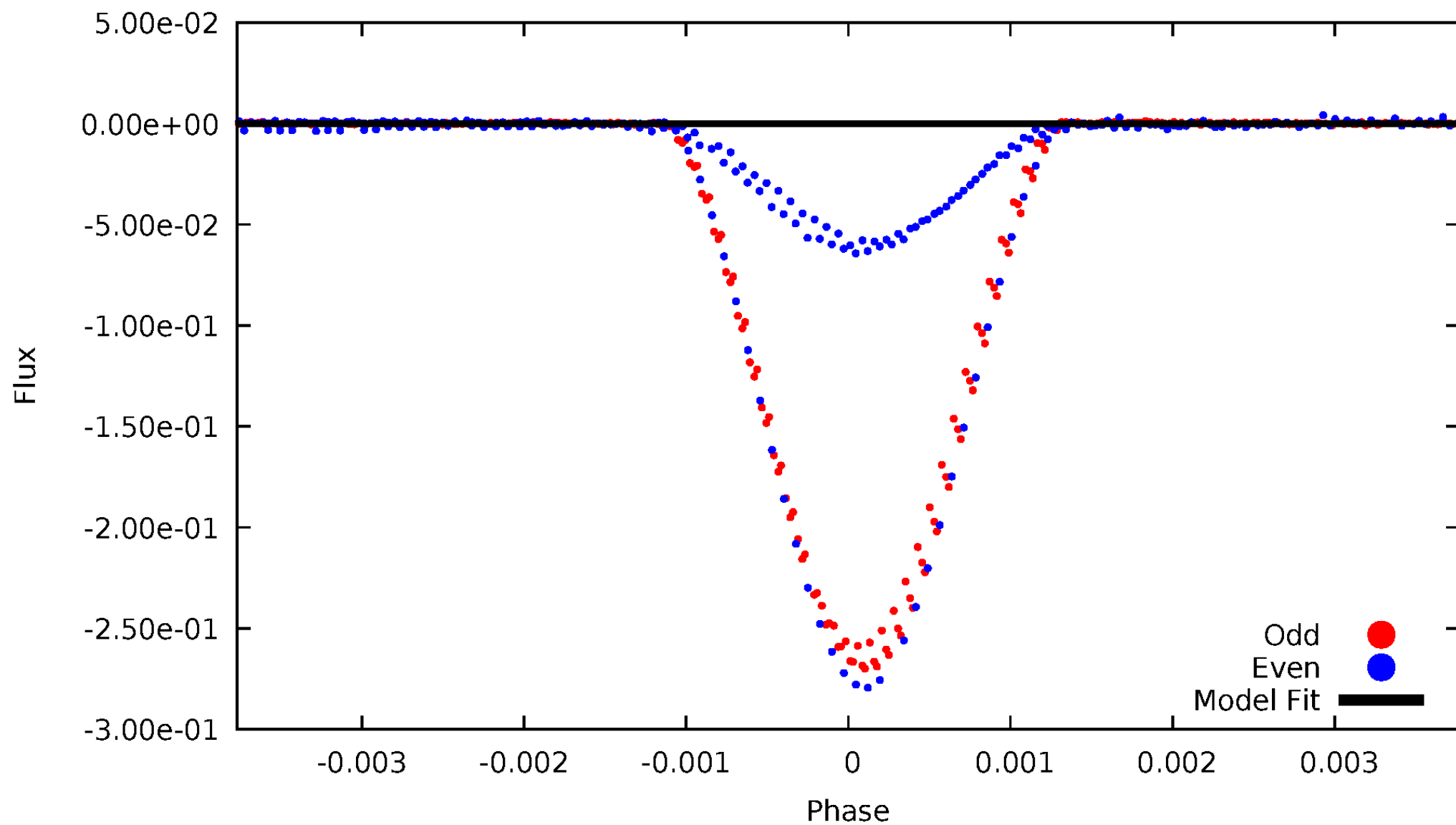
TCE 007456521-01





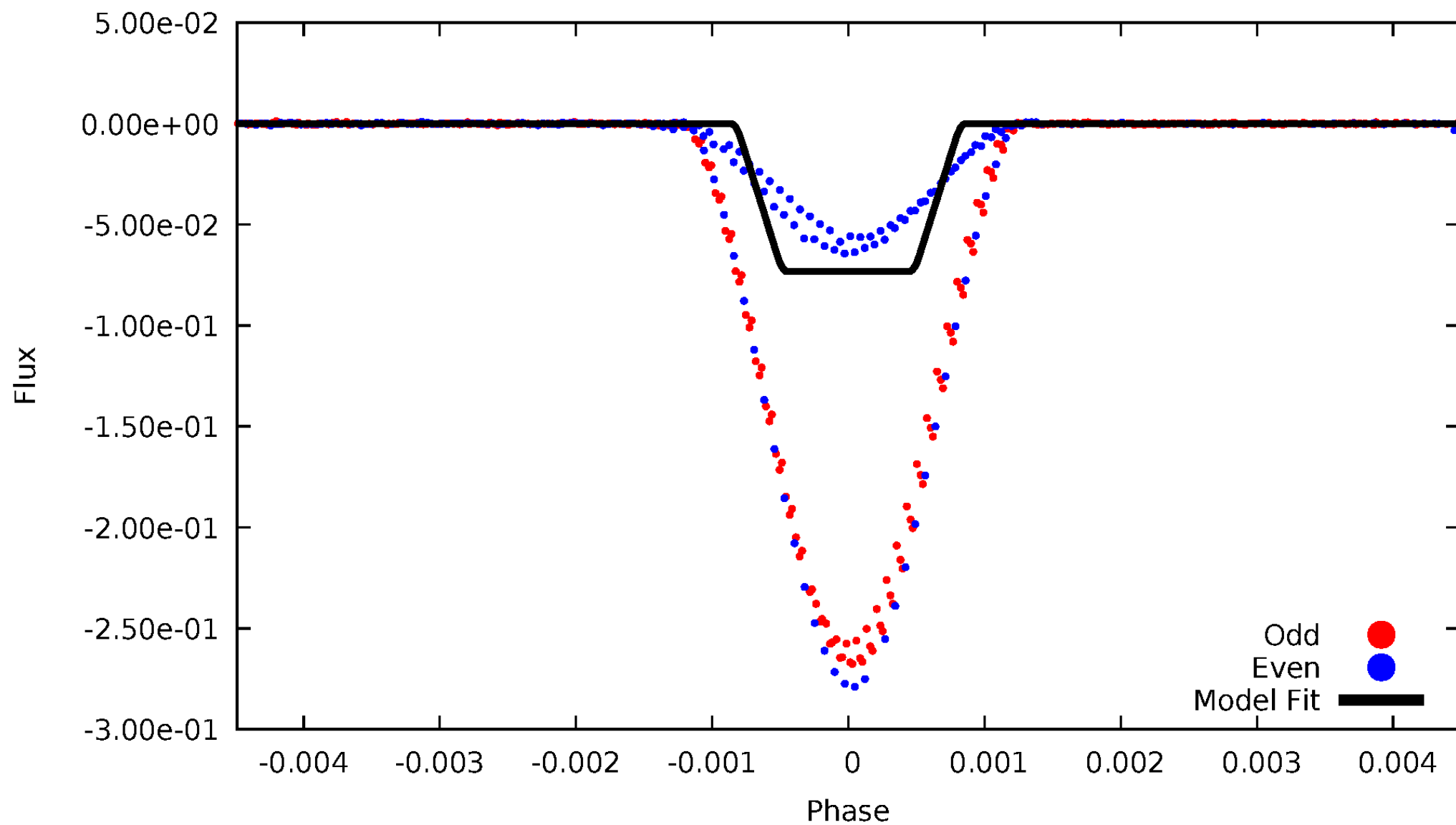
# DV Odd/Even

TCE 007456521-01



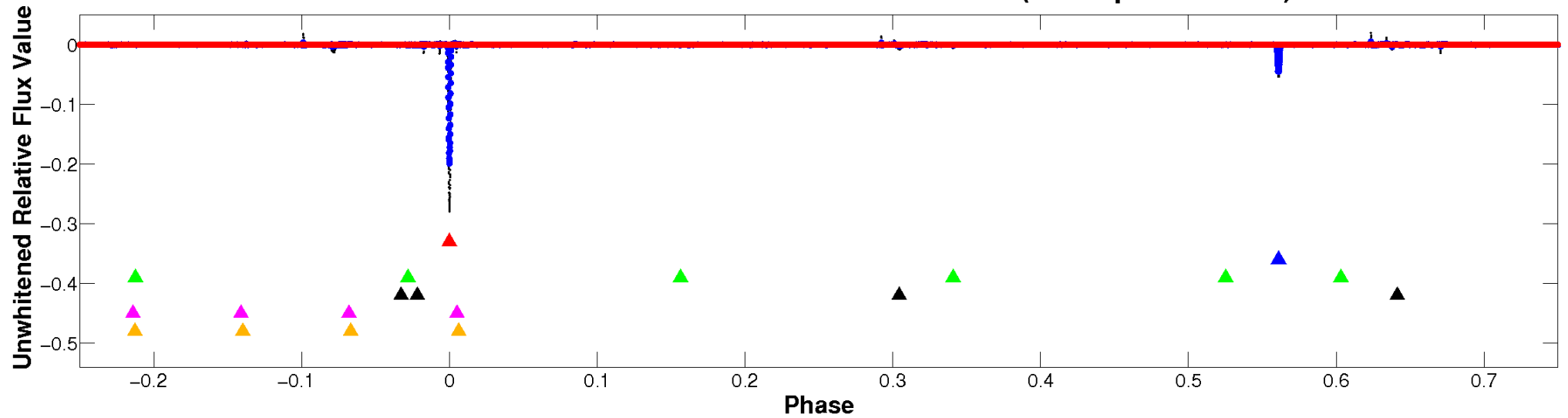
# ALT Odd/Even

TCE 007456521-01



# Non-Whitened Vs. Whitened Light Curve

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

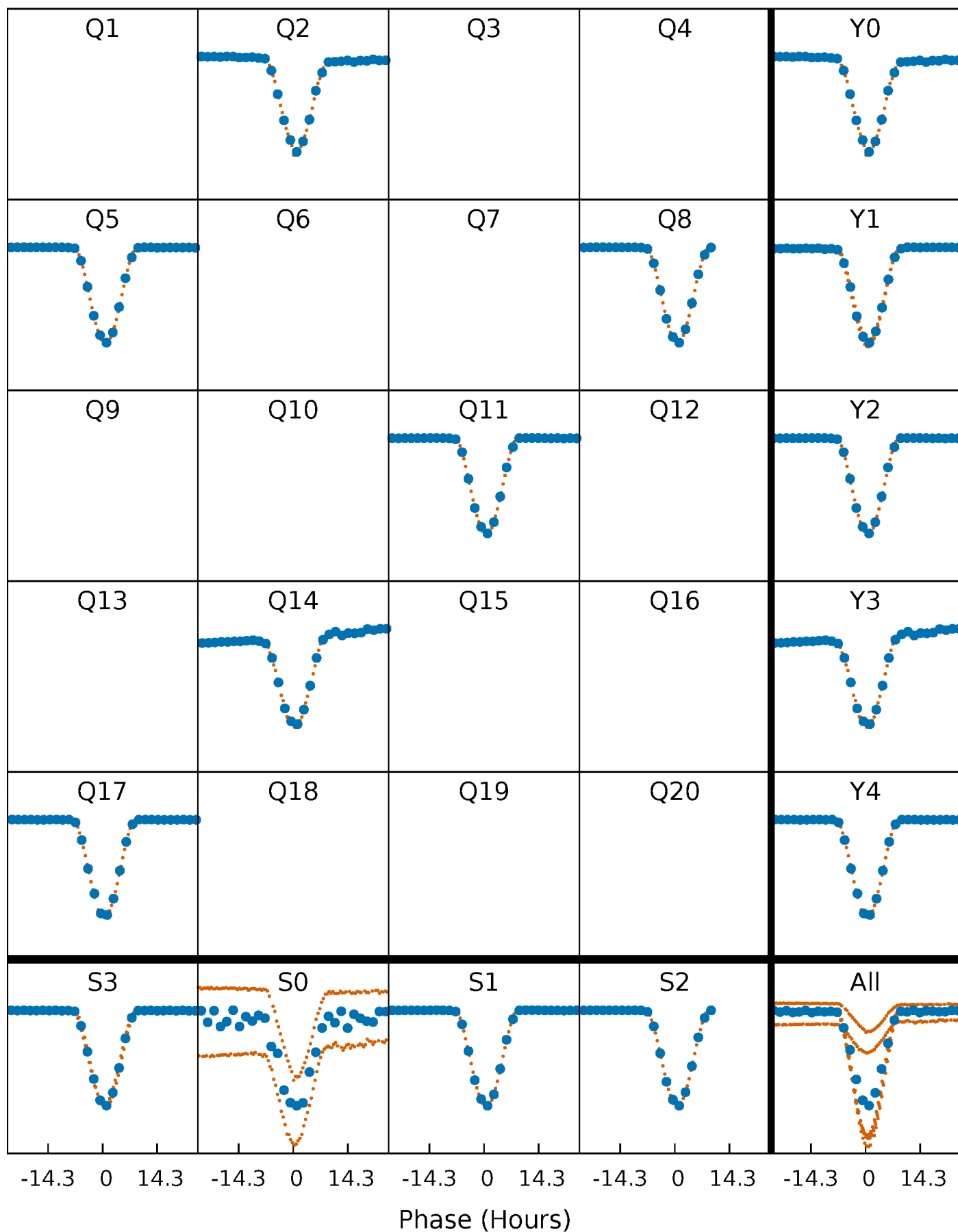


Planet 1 : Phased Whitened Flux Time Series (TPS Epoch/Period)



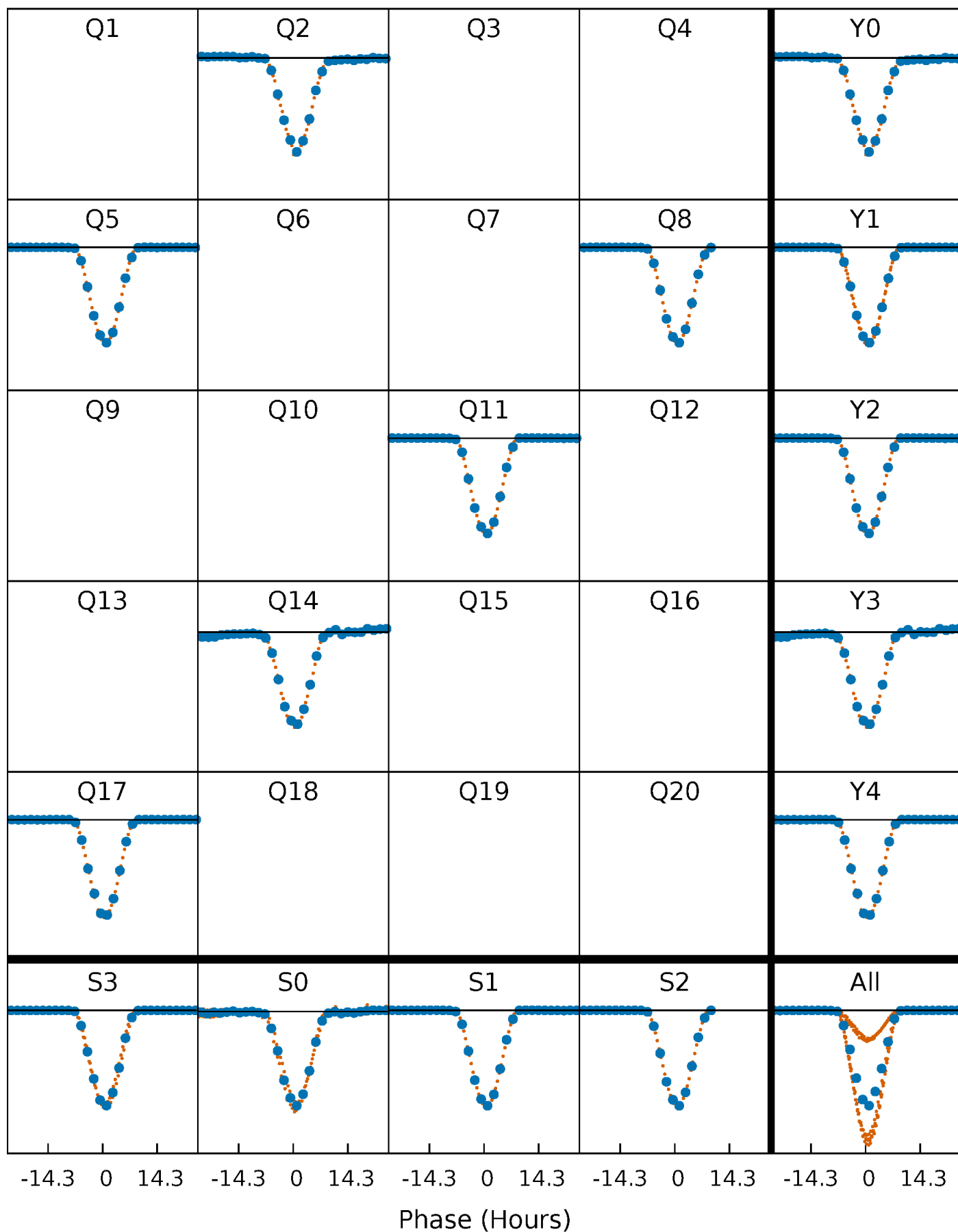
# PDC Quarter-Phased Transit Curves

TCE 007456521-01 P=276.418388 Days  $T_0=207.809907$  (BKJD)



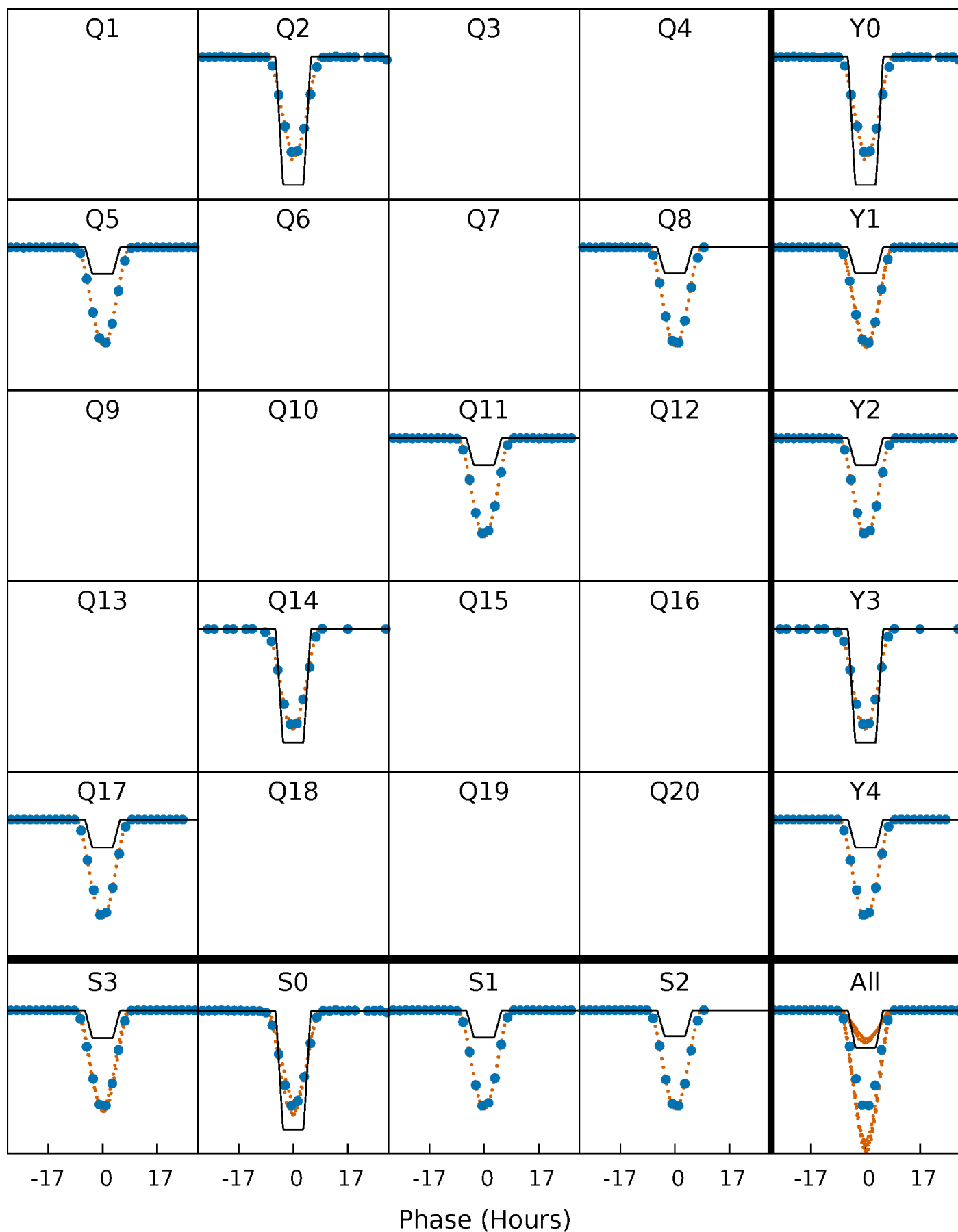
# DV Quarter-Phased Transit Curves

TCE 007456521-01 P=276.418388 Days  $T_0=207.809907$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

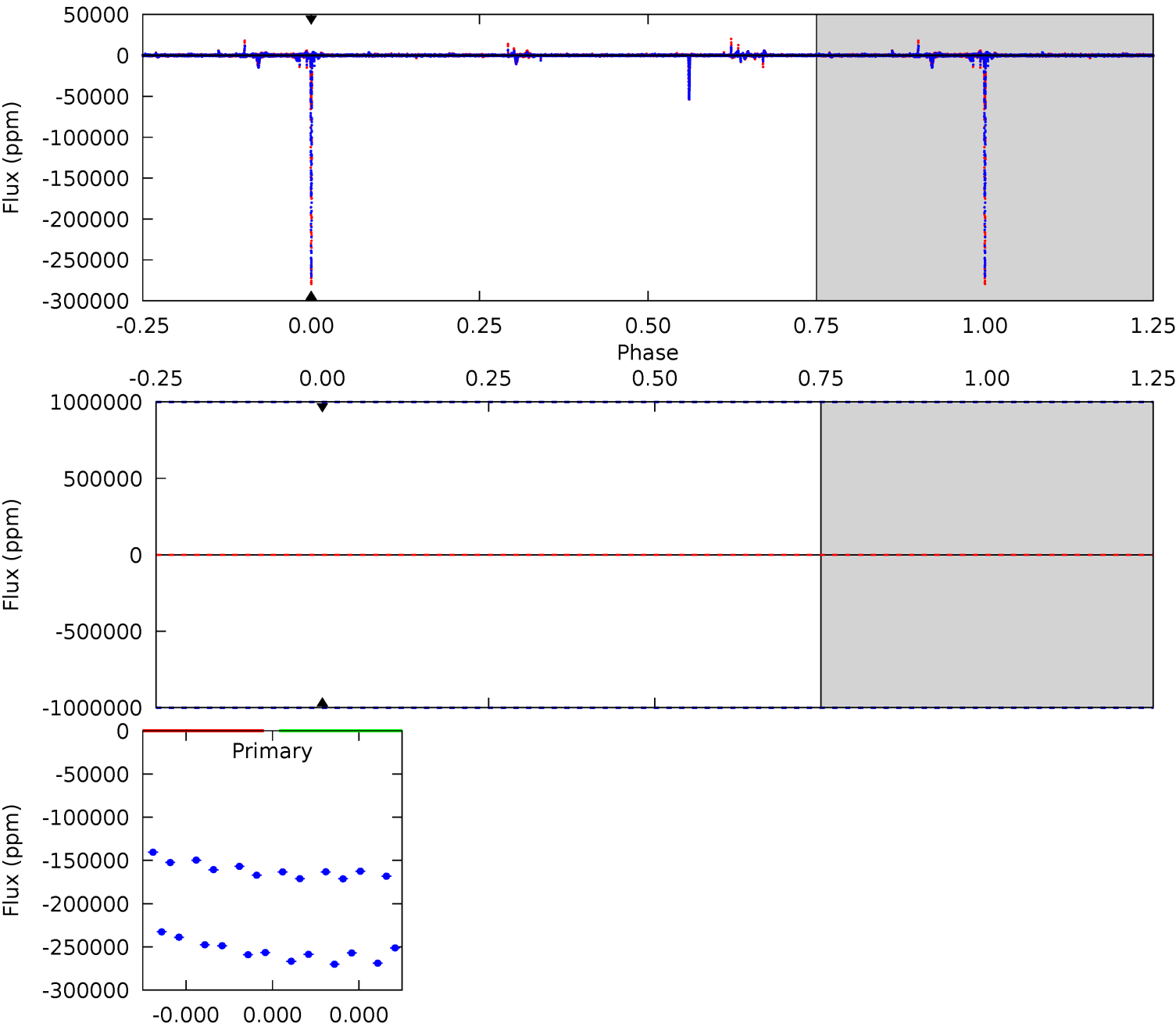
TCE 007456521-01 P=276.418388 Days  $T_0=207.830047$  (BKJD)



# DV Model-Shift Uniqueness Test

007456521-01, P = 276.418388 Days, E = 207.809907 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

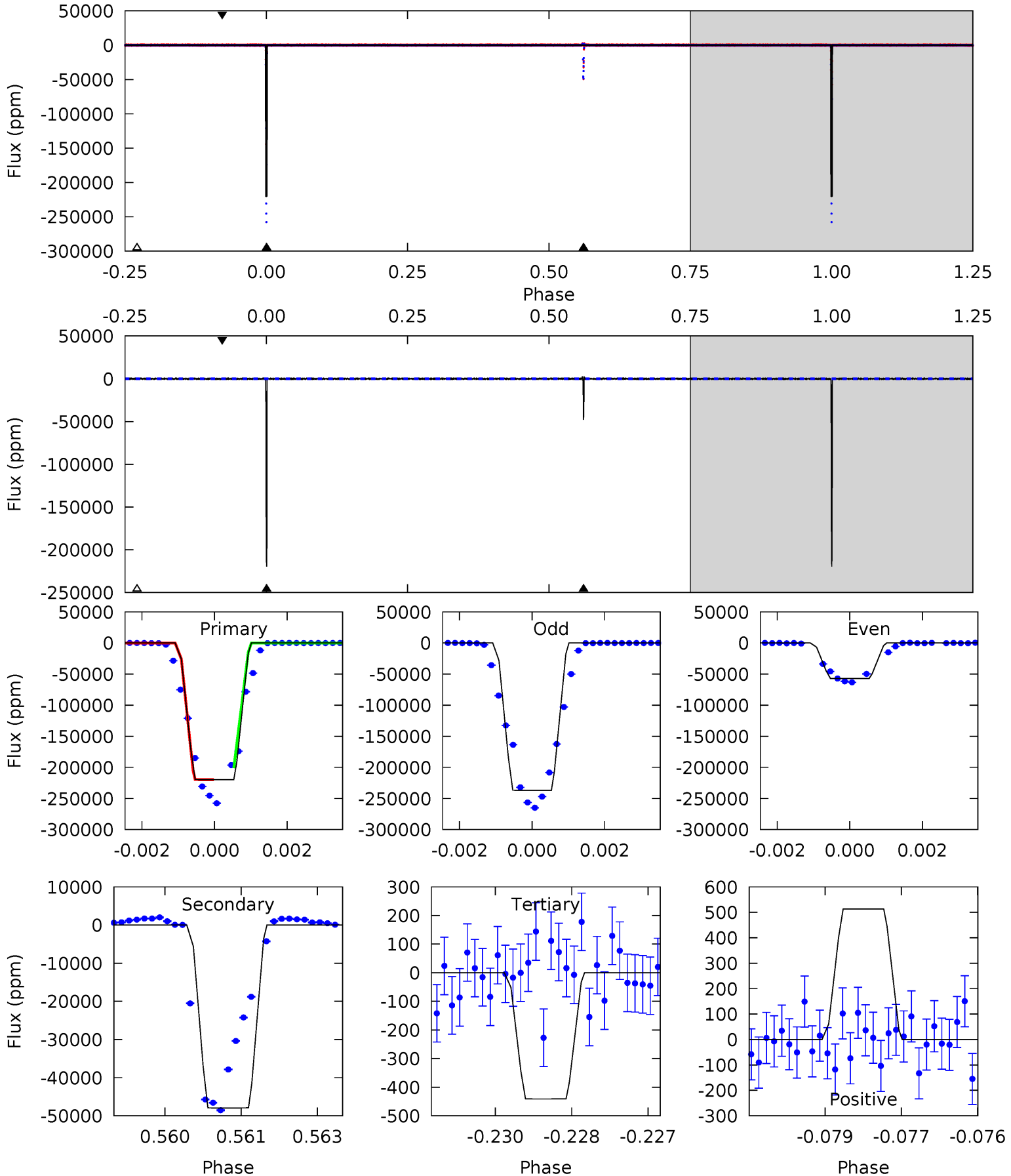




# Alt Model-Shift Uniqueness Test

007456521-01, P = 276.418388 Days, E = 207.830047 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
2626	573.2	5.27	6.14	5.35	3.14	1.36	2621	2620	567.9	567.0	1917	0.76	0.01	56.9



### Stellar Parameters For KIC 007456521

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$p_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5956^{+179}_{-179}$	$4.403^{+0.149}_{-0.182}$	$-0.680^{+0.300}_{-0.300}$	$0.929^{+0.233}_{-0.155}$	$0.797^{+0.102}_{-0.055}$	$1.398^{+0.955}_{-0.653}$
	+3%/-3%	+3%/-4%	+44%/-44%	+25%/-17%	+13%/-7%	+68%/-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 007456521-01 / KOI 6880.01

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{max} (K)$	$T_{obs} (K)$	$A_{obs}$
DV	$0 \pm 1000000$	$34.21^{+12.63}_{-10.06}$	$406^{+28}_{-25}$	$2979^{+3253}_{-8749}$	$743^{+35518}_{-27247}$
Alt.	$-47914 \pm 84$	$28.10^{+10.98}_{-10.37}$	$404^{+30}_{-25}$	$5430^{+1405}_{-706}$	$21171^{+32248}_{-10493}$

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

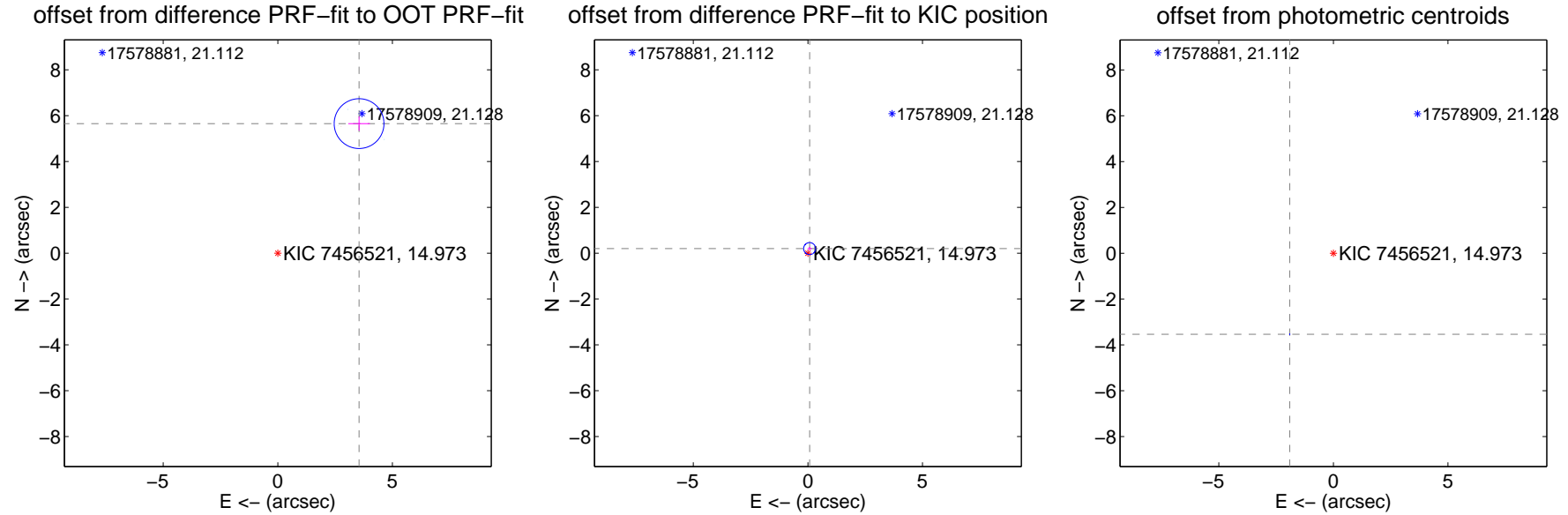
## DV Centroid Data

Supplemental centroid analysis for 007456521-01. Kepler magnitude: 14.97. Transit SNR -1.00

There are 4 quarters with good PRF difference image offsets

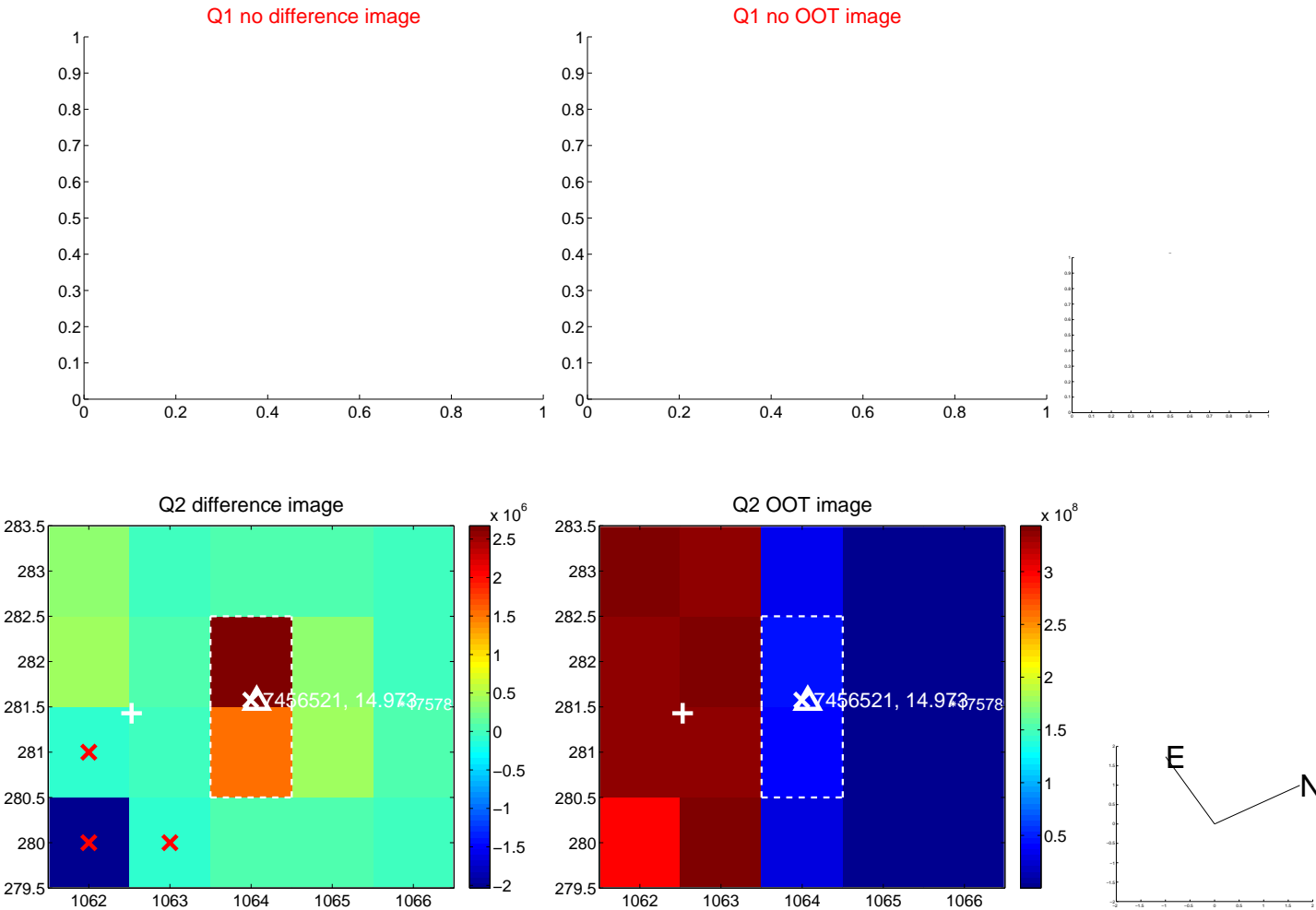
The OOT PRF centroid is offset from the target star catalog position by about 6.67 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	<b>6.672 <math>\pm</math> 0.362</b>	<b>18.43</b>	-3.545 $\pm$ 0.470	5.652 $\pm$ 0.309
PRF-fit source offset from KIC position	0.214 $\pm$ 0.087	2.46	-0.076 $\pm$ 0.092	0.201 $\pm$ 0.078
photometric centroid source offset	<b>4.02 <math>\pm</math> 0.00</b>	<b>3110.90</b>	1.91 $\pm$ 0.00	-3.53 $\pm$ 0.00

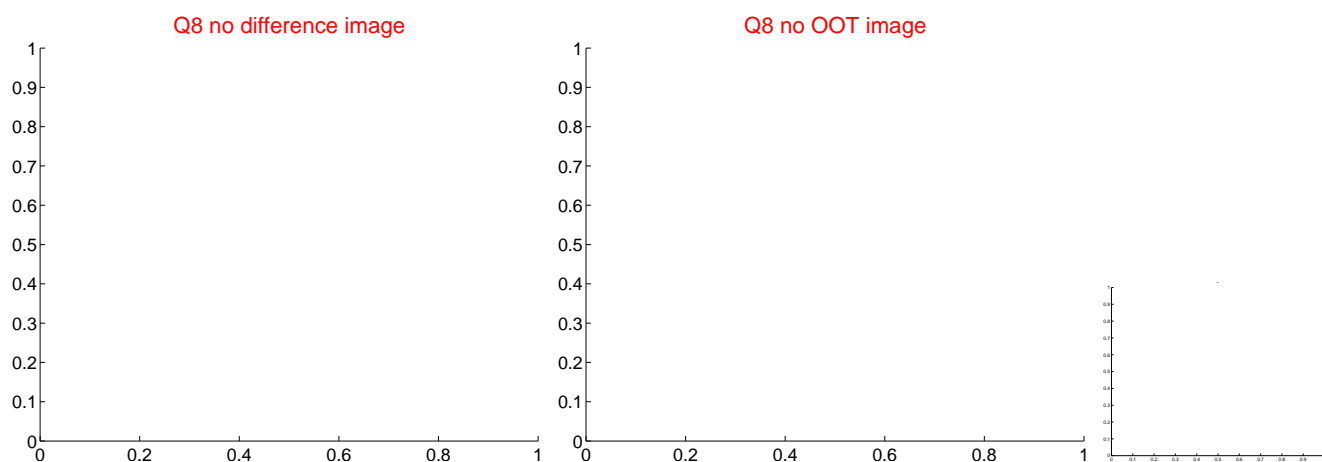
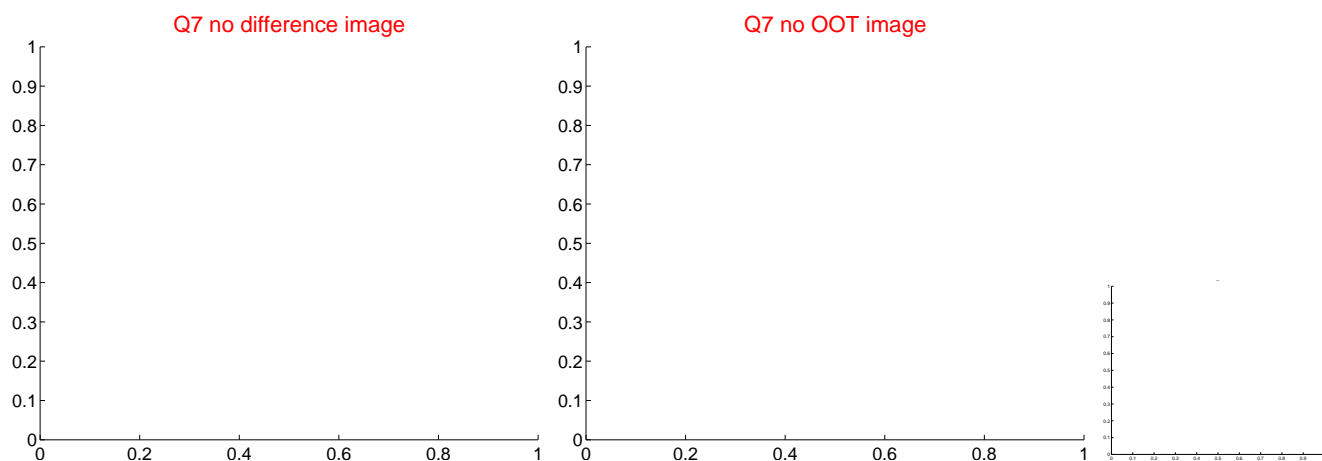
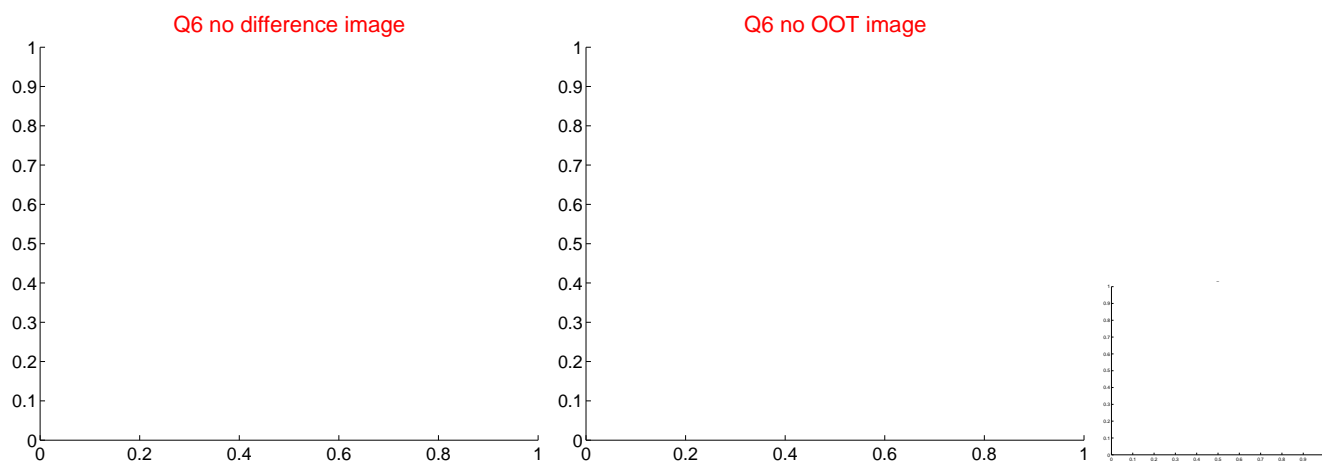
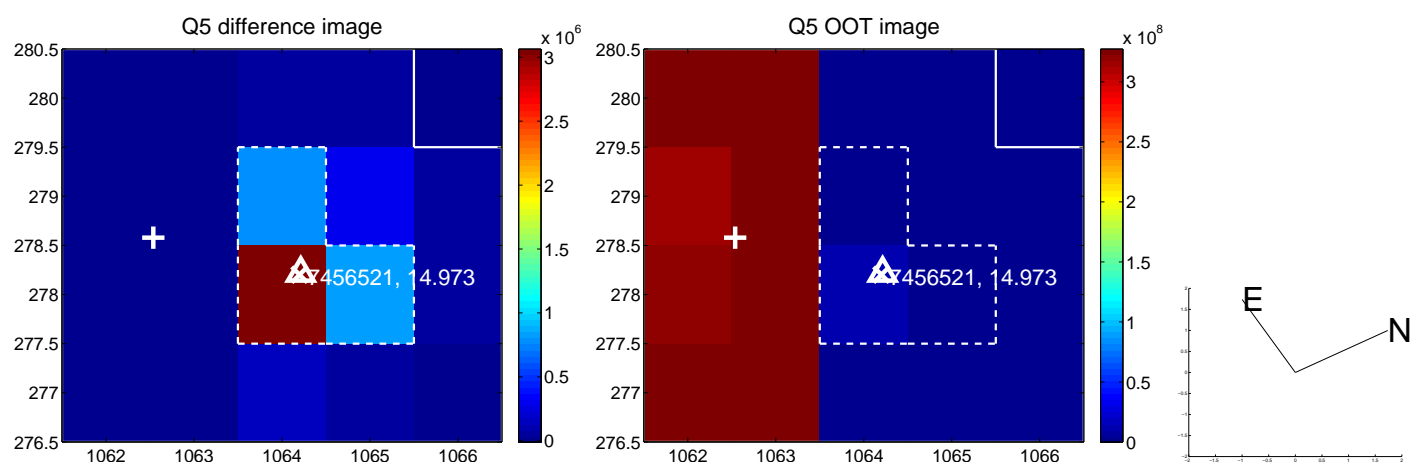


Centroid source offsets from the target star reconstructed from PRF and photometric centroids. **Sky blue crosses: good quarterly centroid offsets; Vermillion crosses: bad quarterly centroid offsets**; magenta cross: average over quarters. Length of the crosses: one- $\sigma$  uncertainty. Blue circle: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

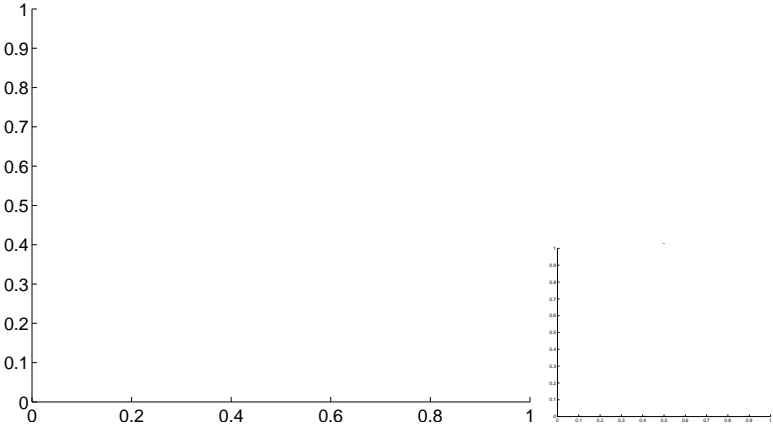


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

Q9 no difference image



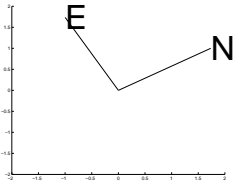
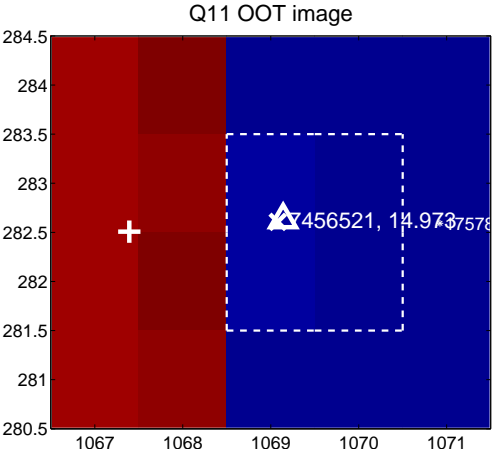
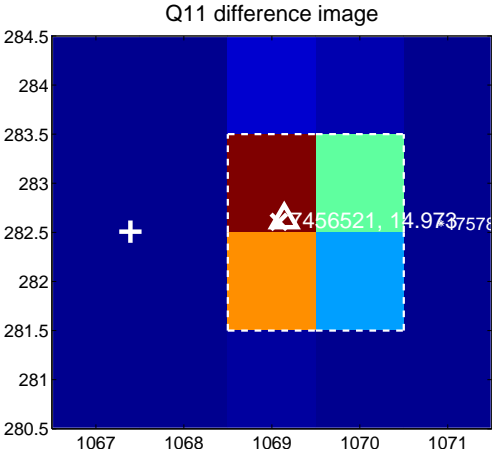
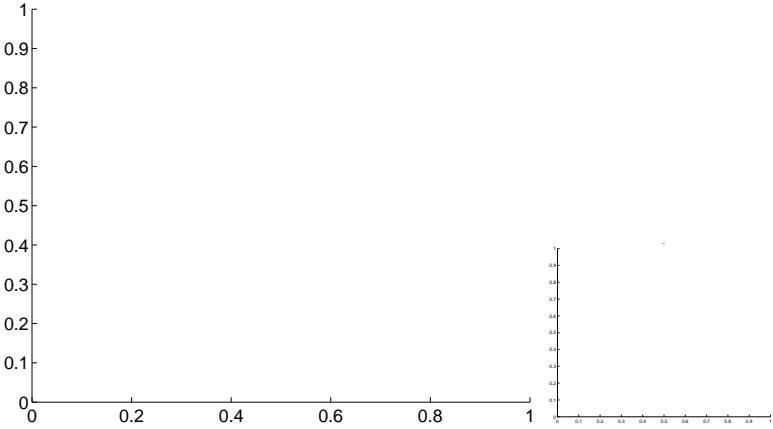
Q9 no OOT image



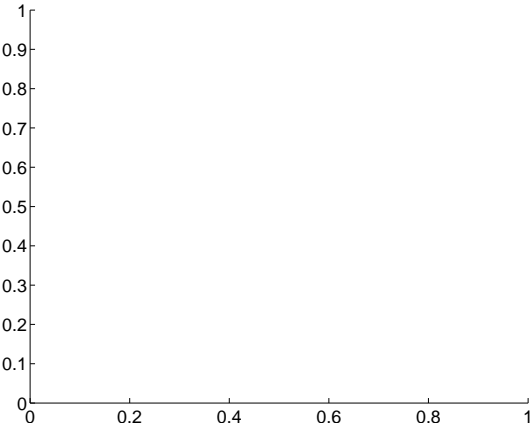
Q10 no difference image



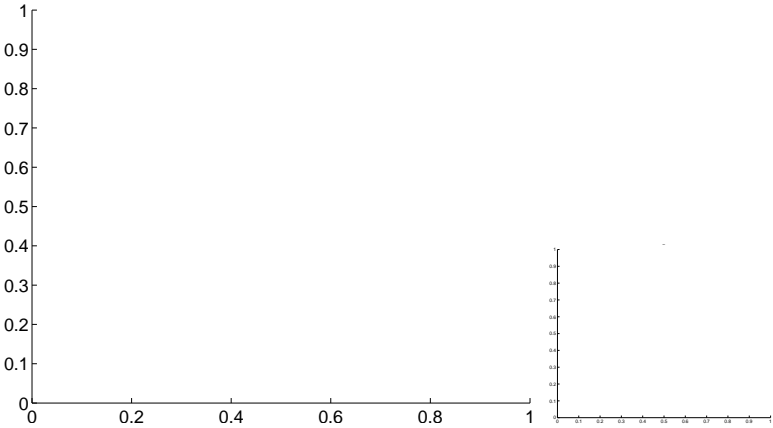
Q10 no OOT image



Q12 no difference image

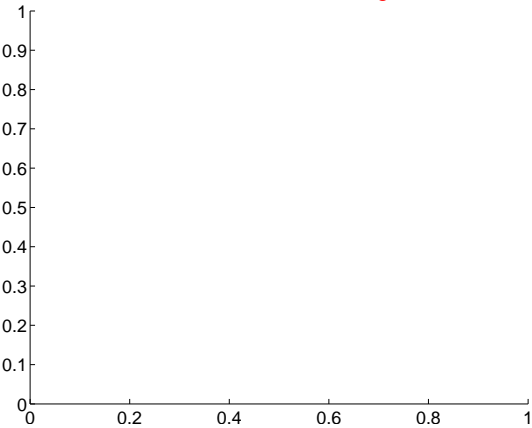


Q12 no OOT image

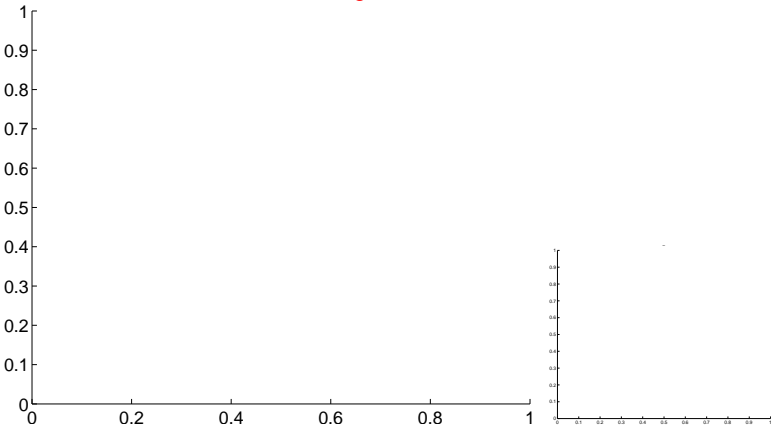


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

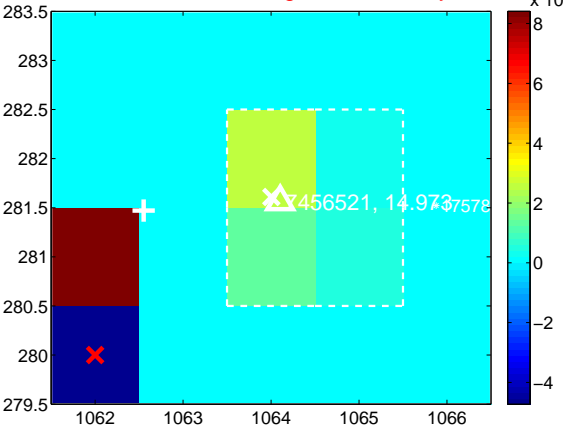
Q13 no difference image



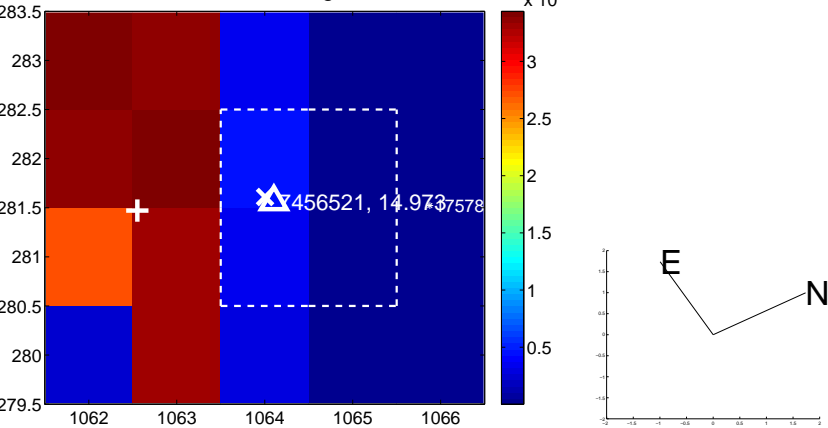
Q13 no OOT image



Q14 difference image. Poor Quality



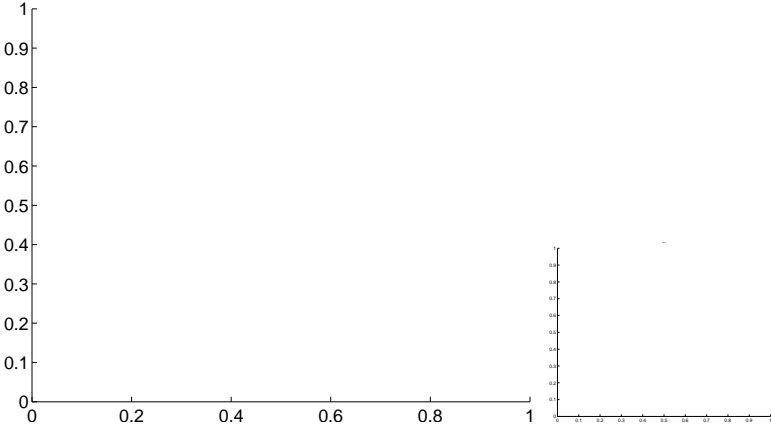
Q14 OOT image



Q15 no difference image



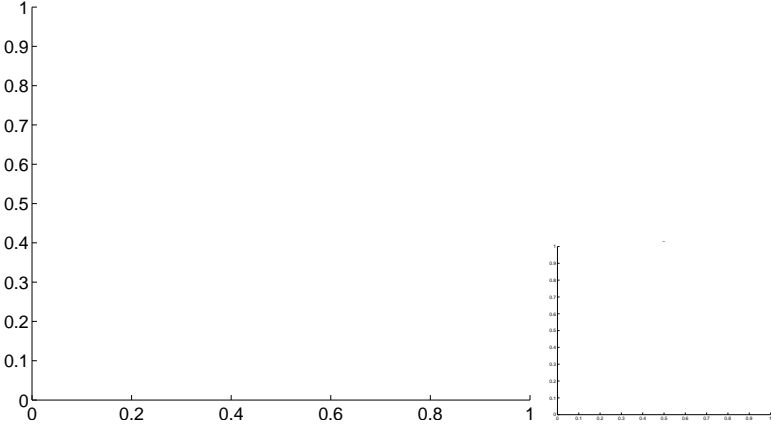
Q15 no OOT image



Q16 no difference image

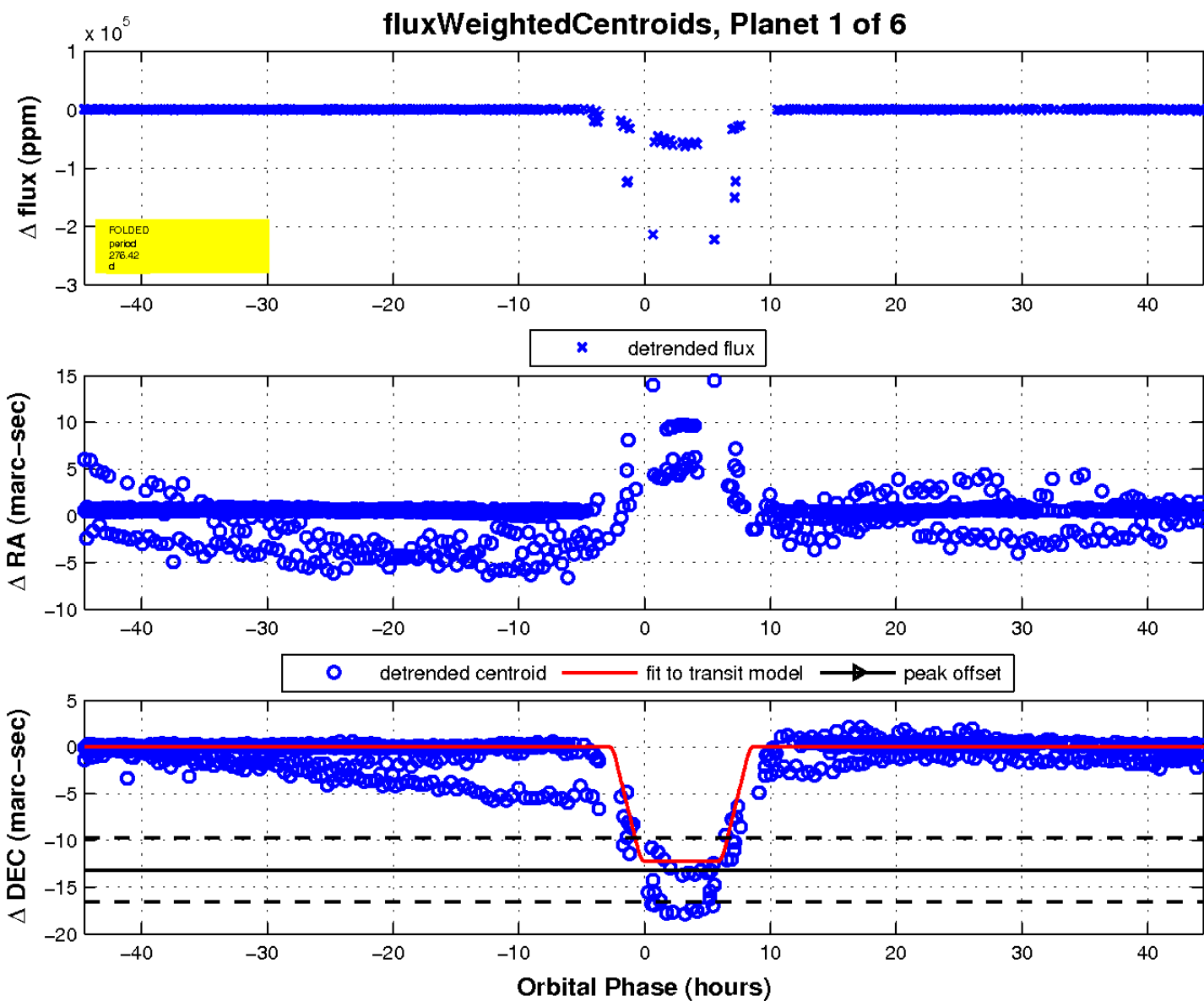
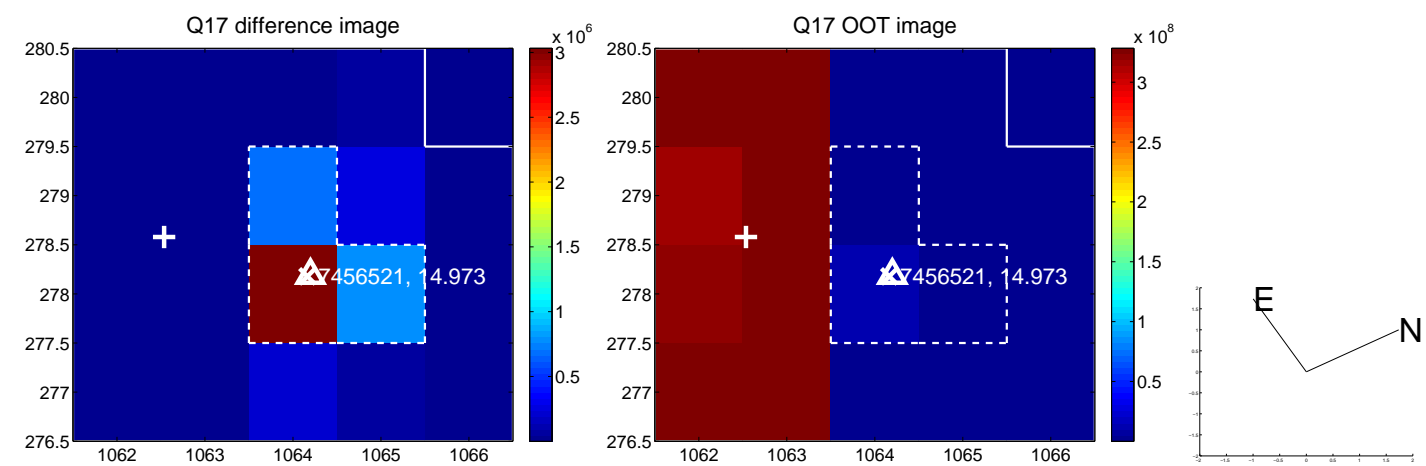


Q16 no OOT image



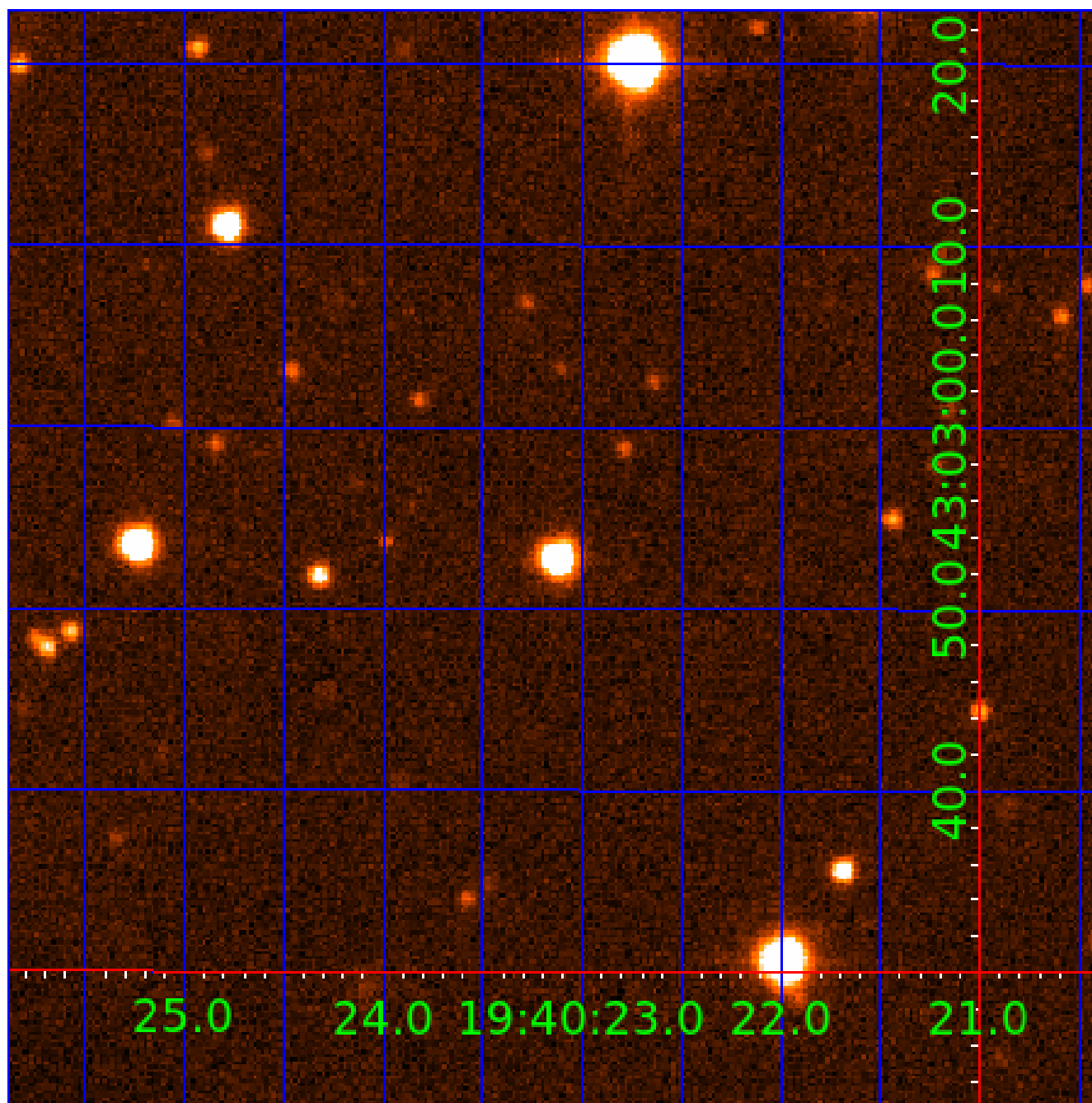


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007456521

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007456521-01	OBS	6880.01	276.418388	207.809907	201230.6	12.500	2534.0	-1.0	0.93	5956	34.12	1.64
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007456521-04	OBS	No	369.571723	198.783464	13725.0	74.217	28.5	50.0	0.93	5956	19.14	1.11
007456521-05	OBS	No	296.620153	425.062593	422.4	0.565	13.3	1.7	0.93	5956	2.24	1.49
007456521-06	OBS	No	296.599935	425.427321	778.9	15.000	12.5	-1.0	0.93	5956	2.60	1.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007456521-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_NOFITS
007456521-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD—CENT_KIC_POS
007456521-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-04	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—SAME_NTL_PERIOD—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 007456521-02

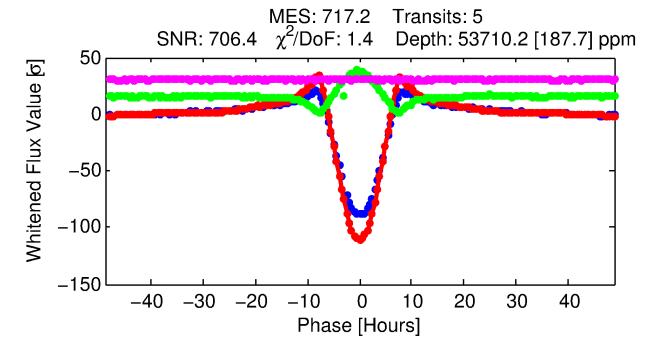
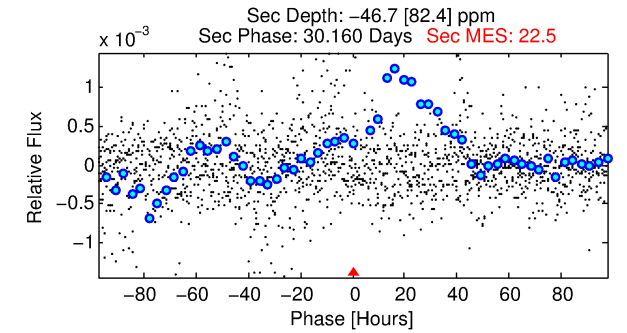
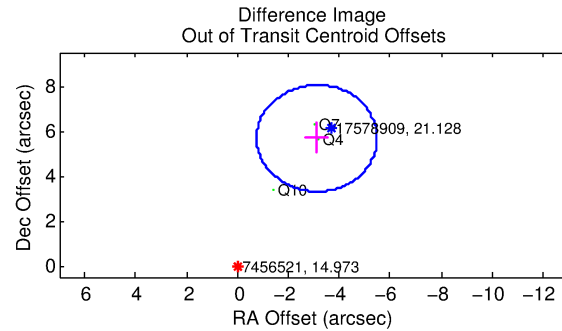
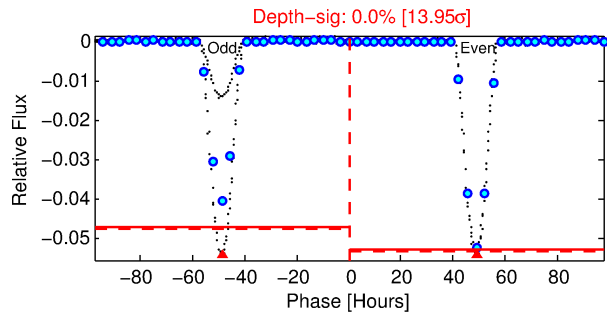
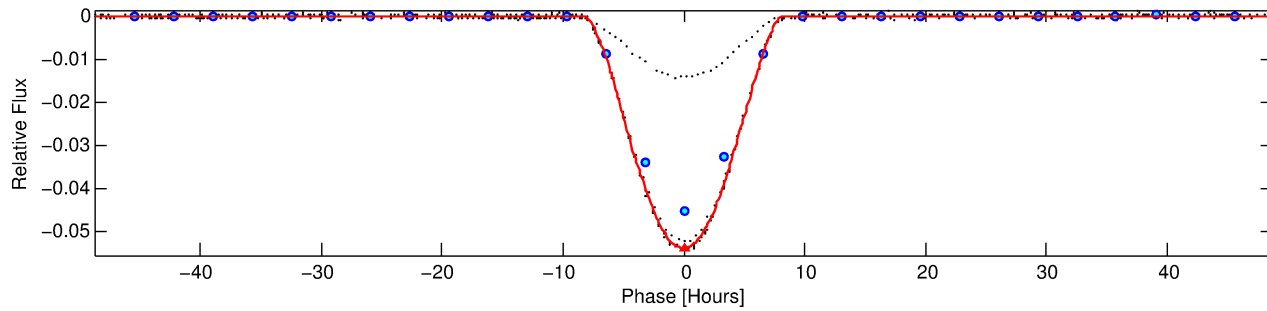
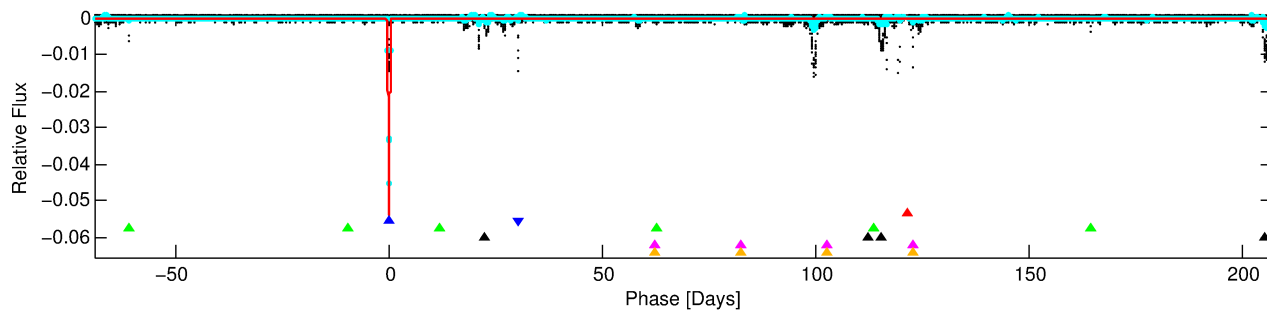
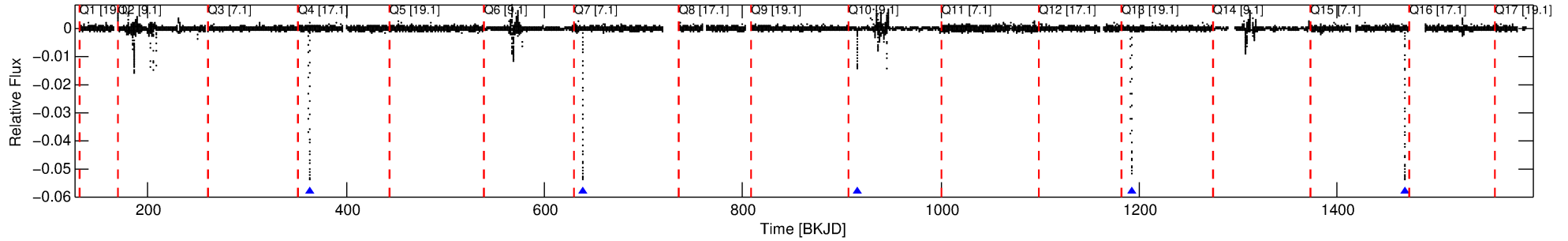
No Significant Match Found

# DV One-Page Summary

KIC: 7456521 Candidate: 2 of 6 Period: 276.430 d

KOI: K06880 Corr: No Ephemeris Match

Kp: 14.97 R\*: 0.93 Rs Teff: 5956.0 K Logg: 4.40 Fe/H: -0.680



## DV Fit Results:

Period = 276.43004 [0.00029] d  
Epoch = 362.8654 [0.0007] BKJD  
Rp/R\* = 0.3541 [0.0452]  
a/R\* = 120.06 [0.30]  
b = 0.99 [0.06]  
Seff = 1.64 [0.57]  
Teff = 289 [25] K  
Rp = 35.89 [10.10] Re  
a = 0.7699 [0.1677] AU  
Ag = N/A  
Teffp = N/A

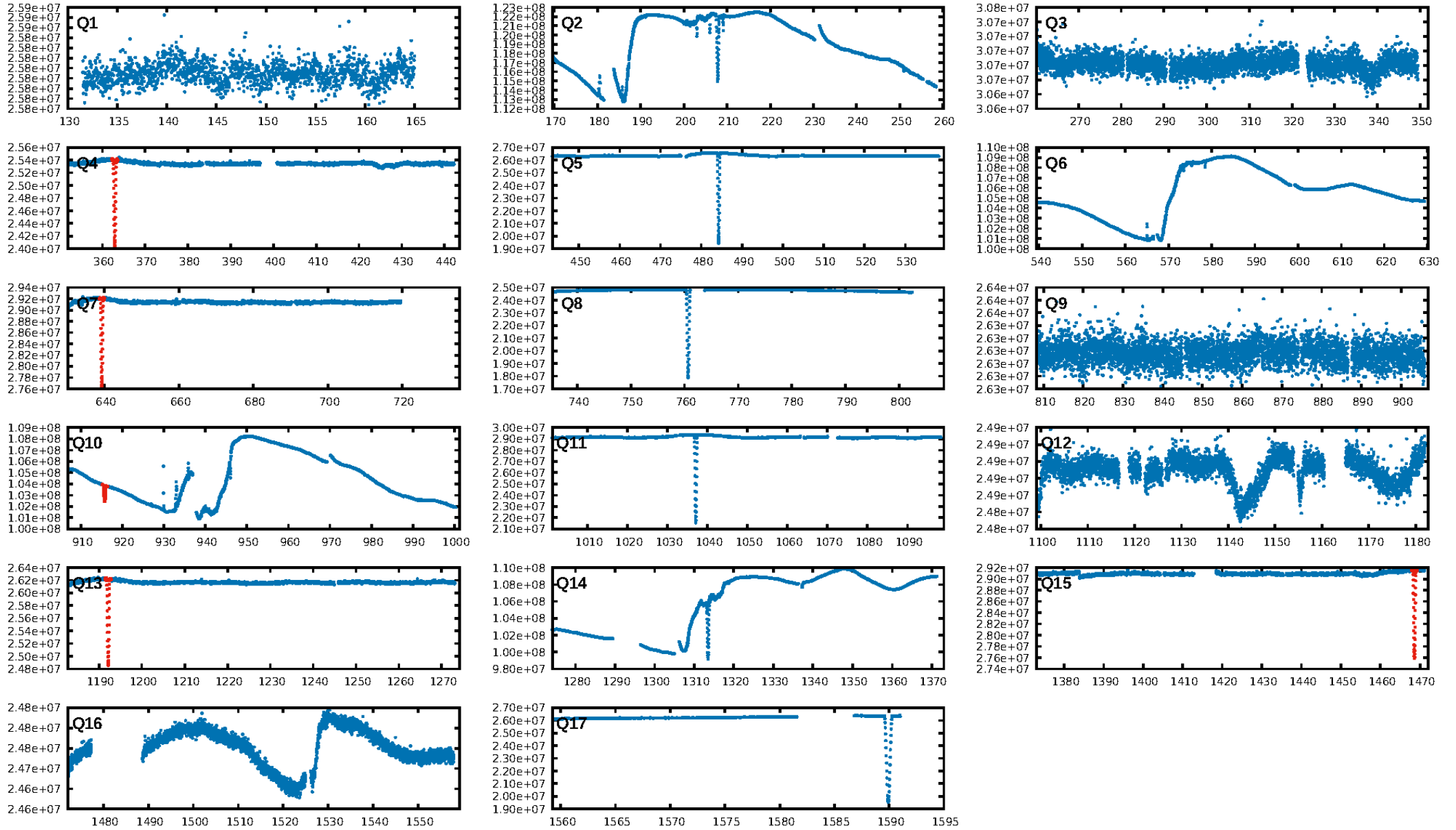
## DV Diagnostic Results:

ShortPeriod-sig: 1.1% [0.01σ]  
LongPeriod-sig: 100.0% [21.88σ]  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 1.6%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [5/5]  
GhostDiagnostic-chr: 4.751  
Centroid-sig: N/A  
Centroid-so: 4.160 arcsec [3117.33σ]  
OotOffset-rm: 6.478 arcsec [8.21σ]  
KicOffset-rm: 0.165 arcsec [1.69σ]  
OotOffset-st: 1/1/1/0 [3]  
KicOffset-st: 1/1/1/0 [3]  
DiffImageQuality-fgm: 1.00 [3/3]  
DiffImageOverlap-fno: 1.00 [4/4]

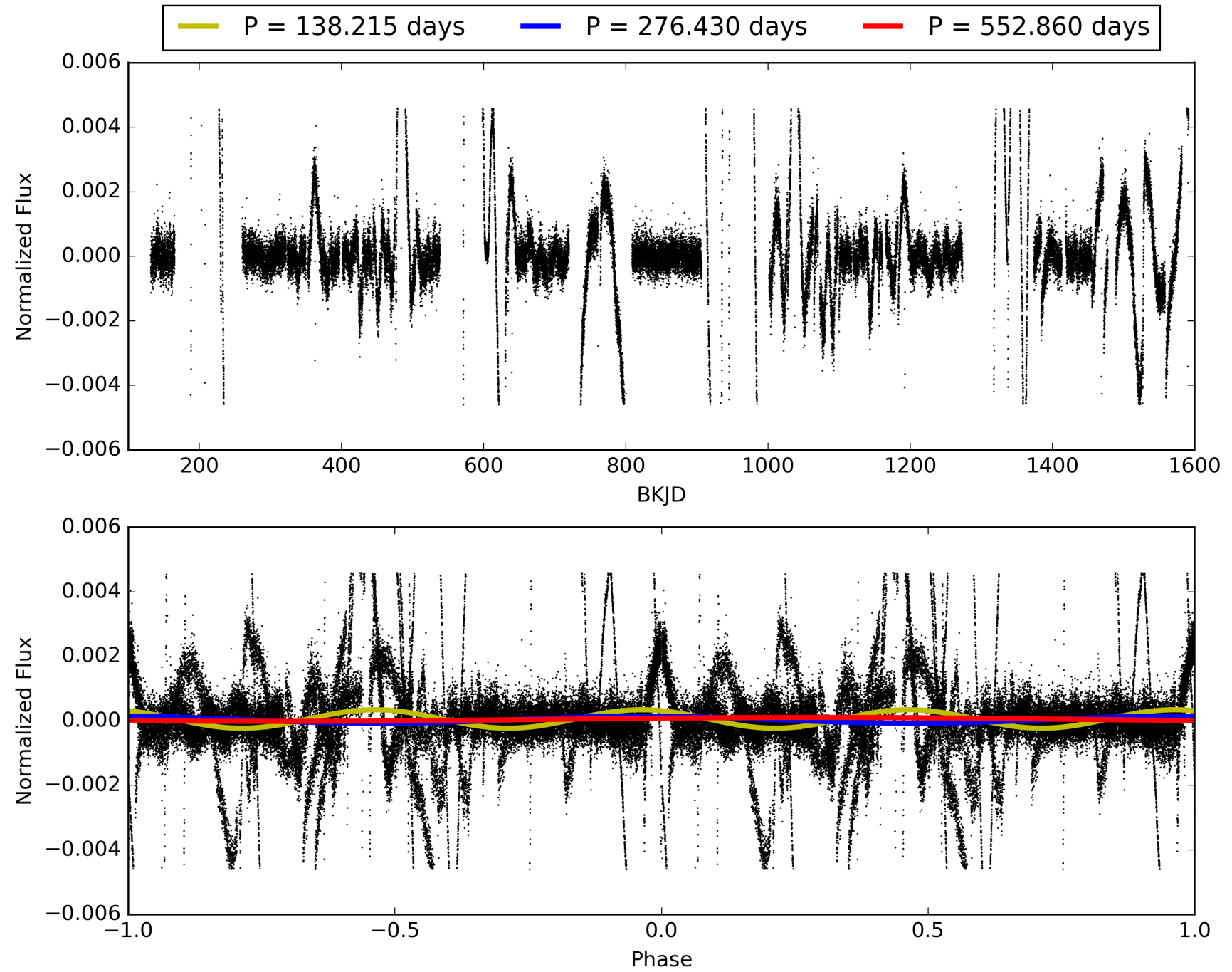
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:18:13 Z

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

# TCE 007456521-02, PDC Light Curves

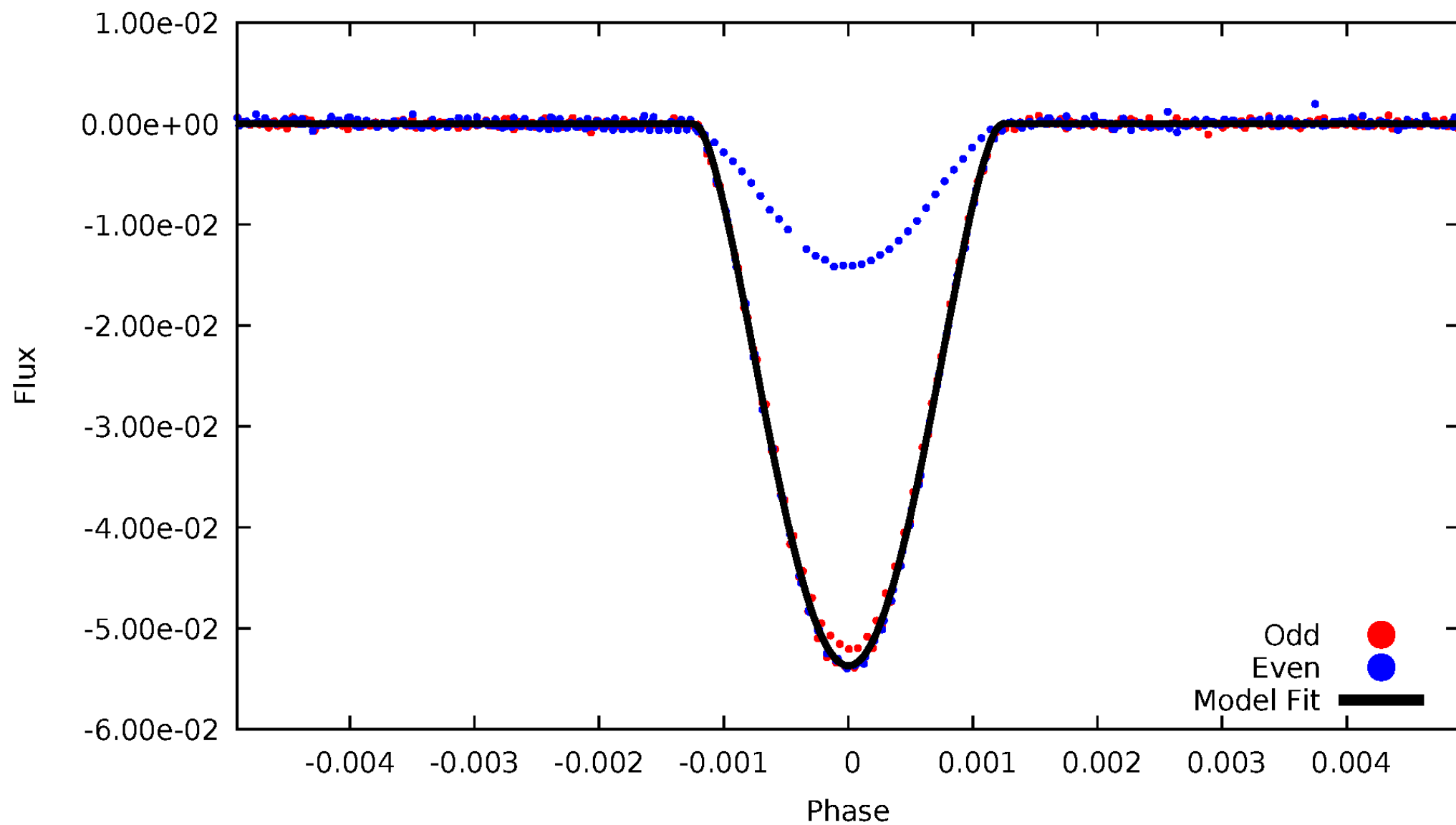


# TCE 007456521-02



# DV Odd/Even

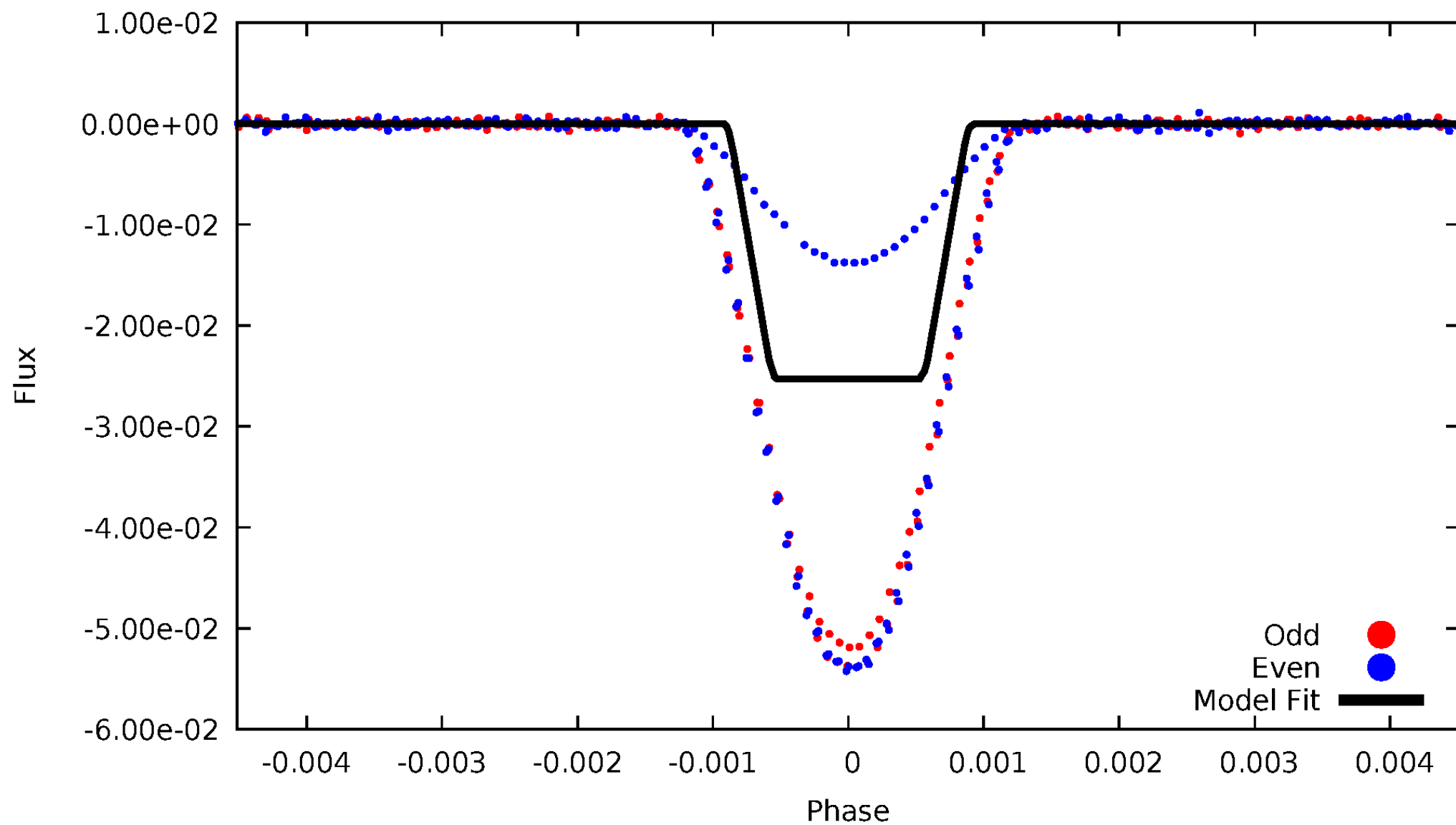
TCE 007456521-02





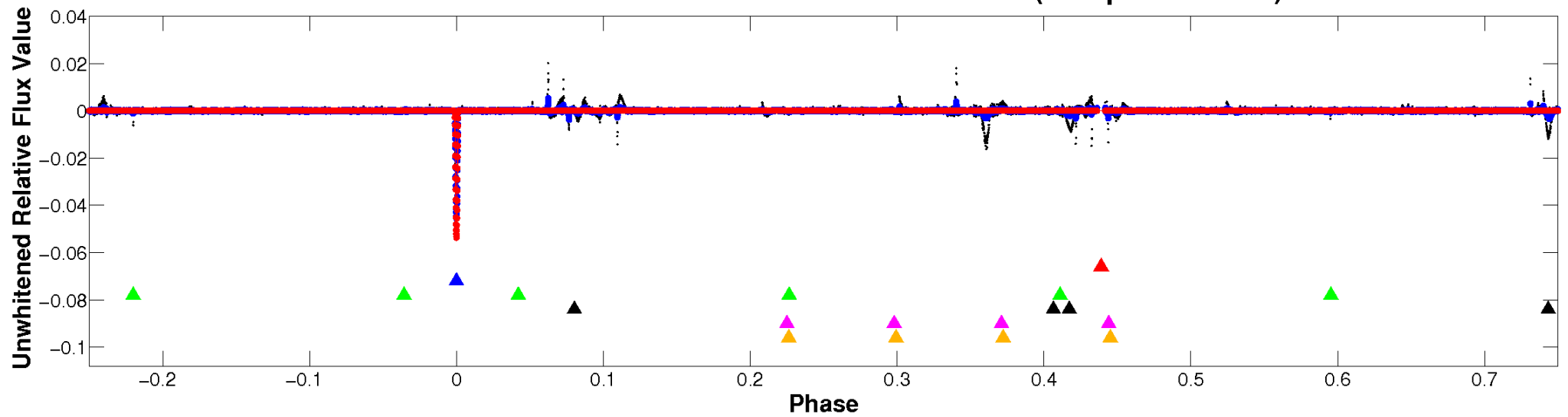
# ALT Odd/Even

TCE 007456521-02

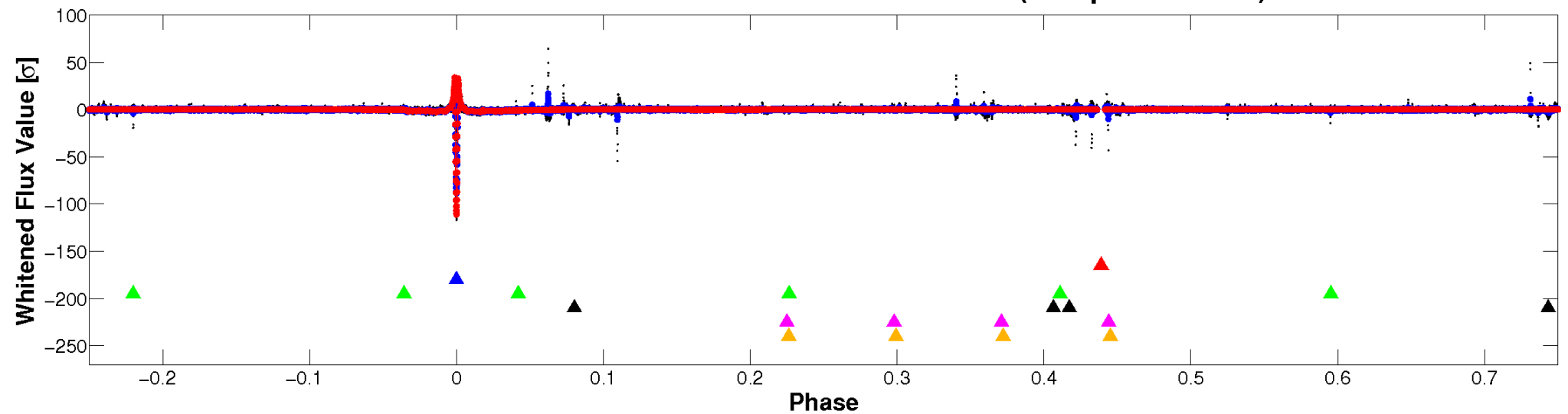


# Non-Whitened Vs. Whitened Light Curve

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

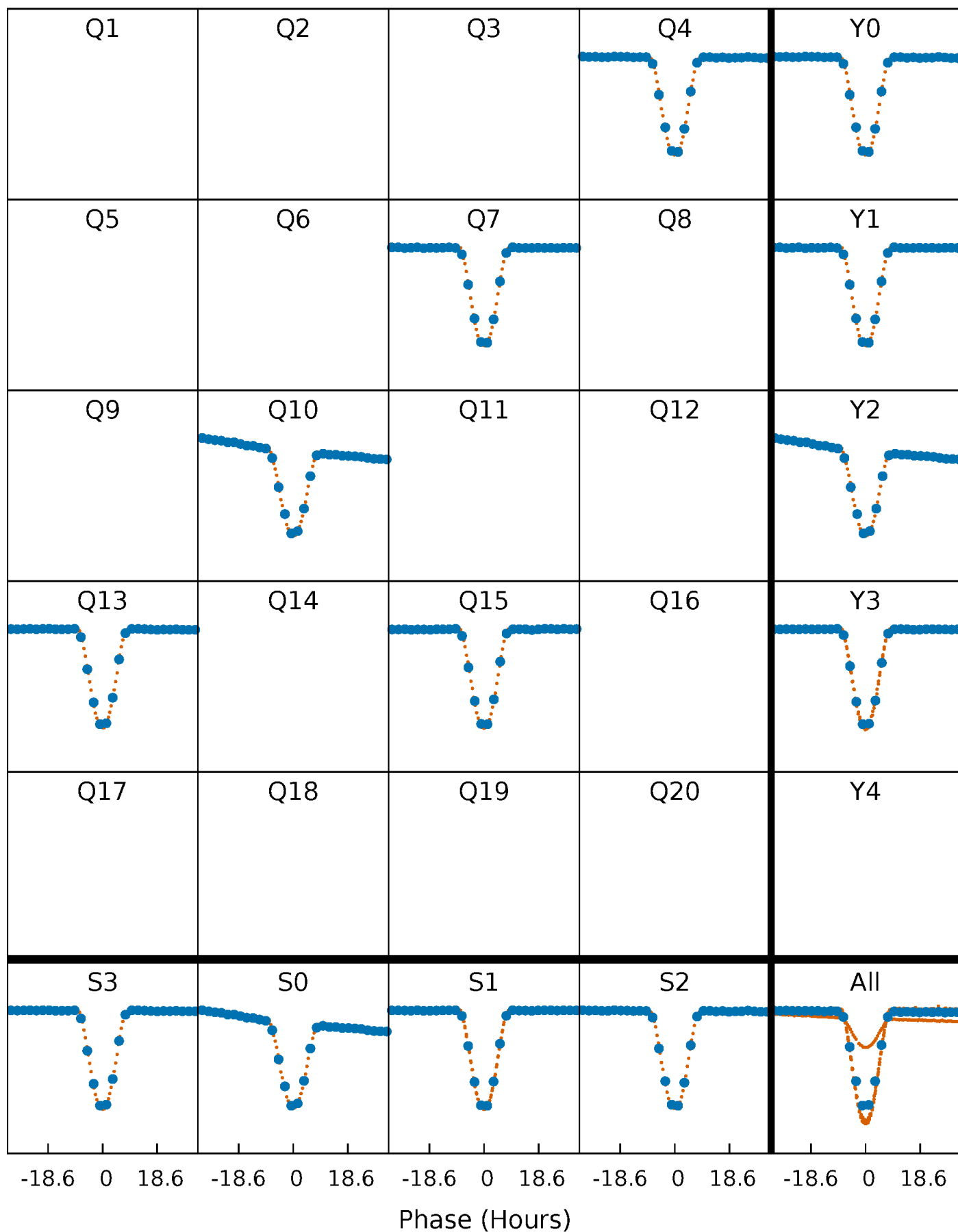


## Planet 2 : Phased Whitened Flux Time Series (Fit Epoch/Period)



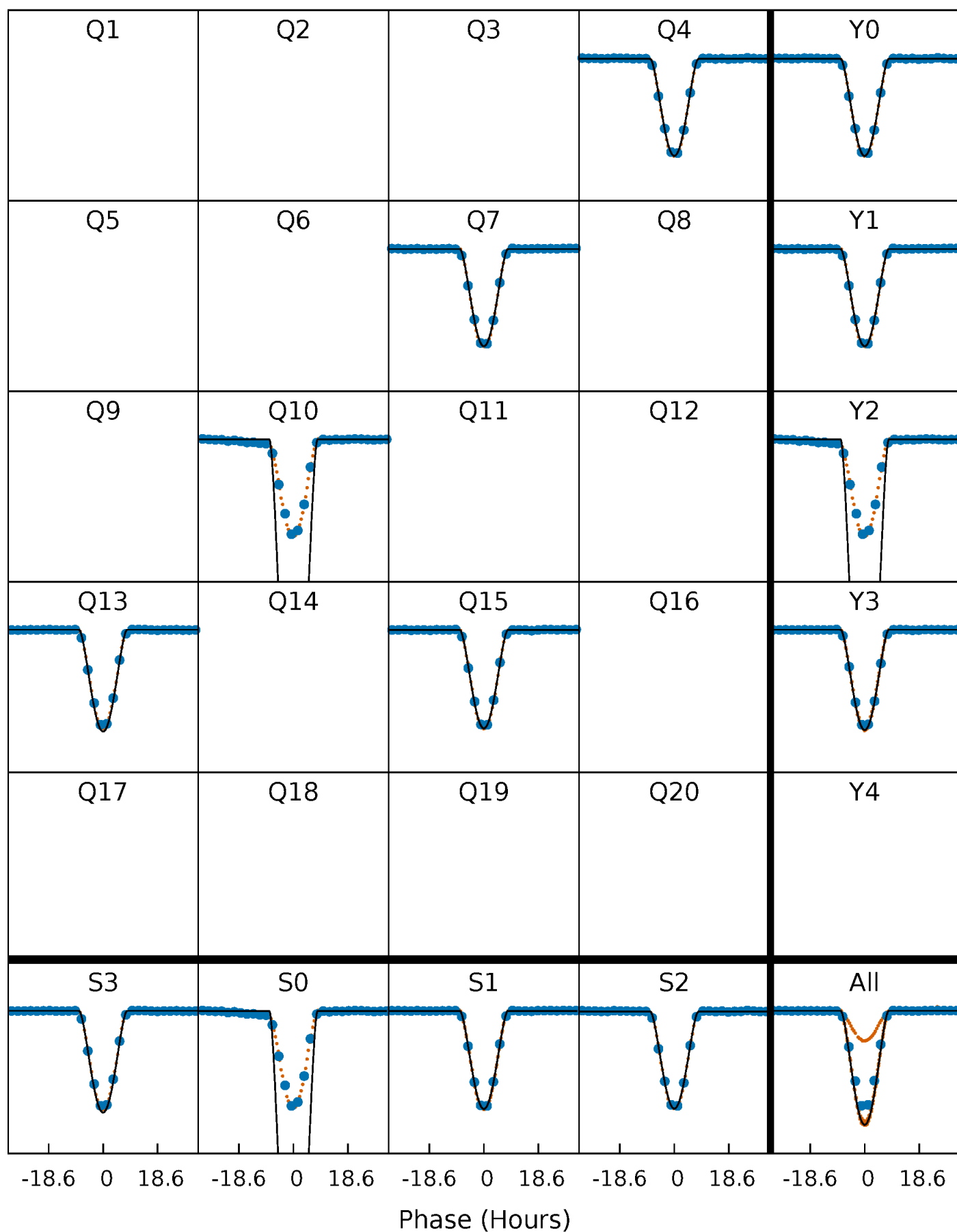
# PDC Quarter-Phased Transit Curves

TCE 007456521-02     $P=276.430042$  Days     $T_0=362.865365$  (BKJD)



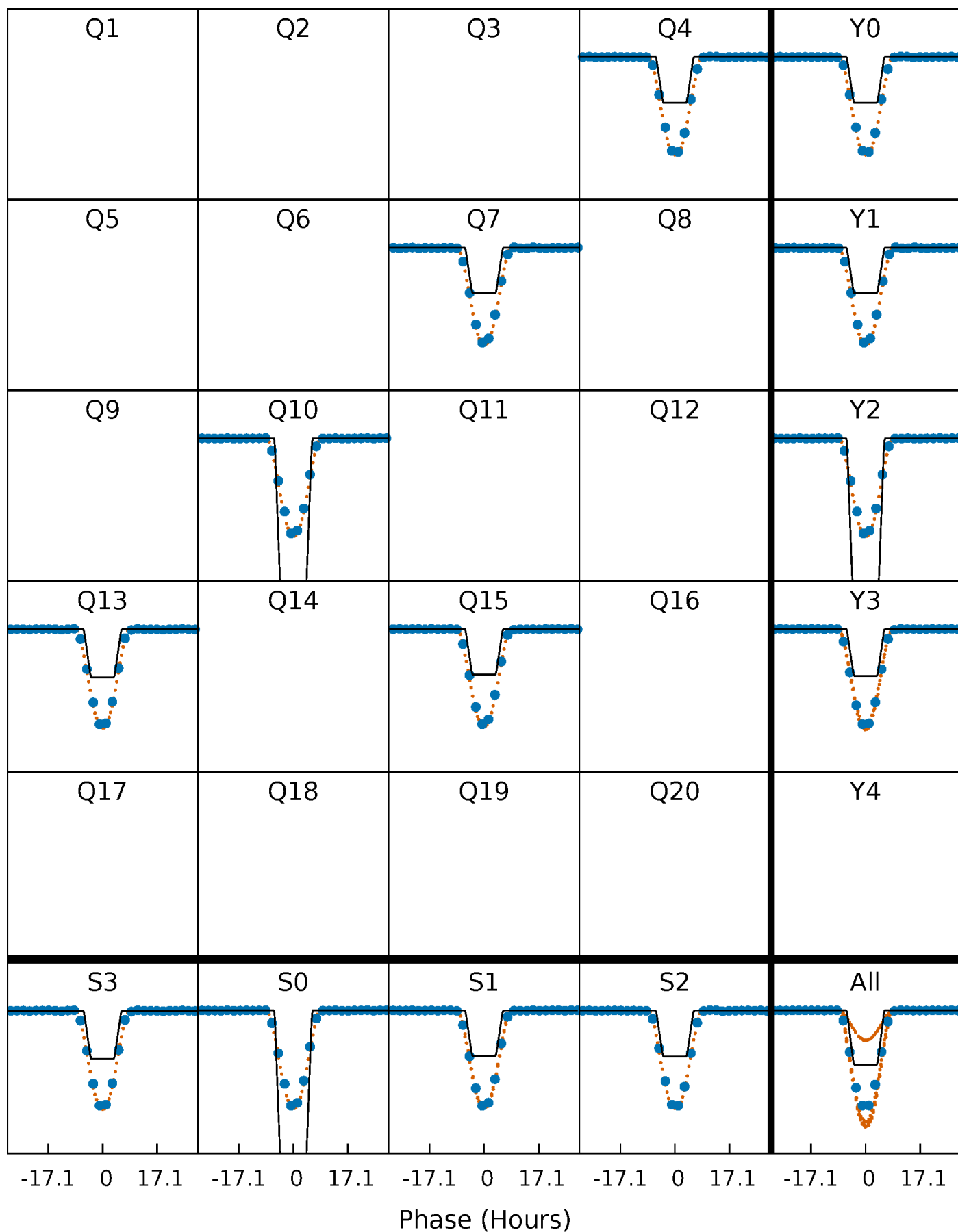
# DV Quarter-Phased Transit Curves

TCE 007456521-02   P=276.430042 Days    $T_0=362.865365$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

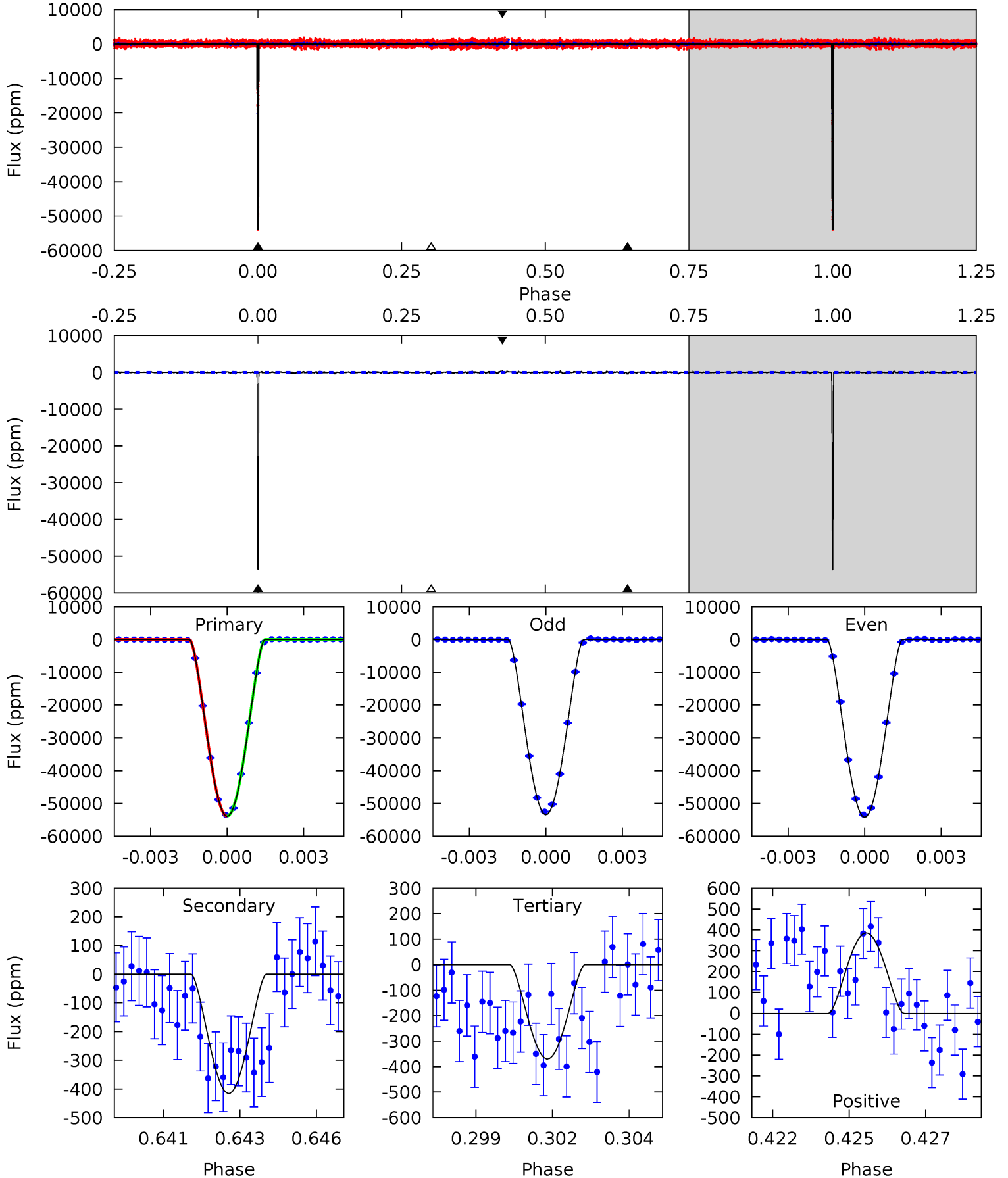
TCE 007456521-02 P=276.432011 Days  $T_0=362.858337$  (BKJD)



# DV Model-Shift Uniqueness Test

007456521-02, P = 276.430042 Days, E = 86.435323 Days

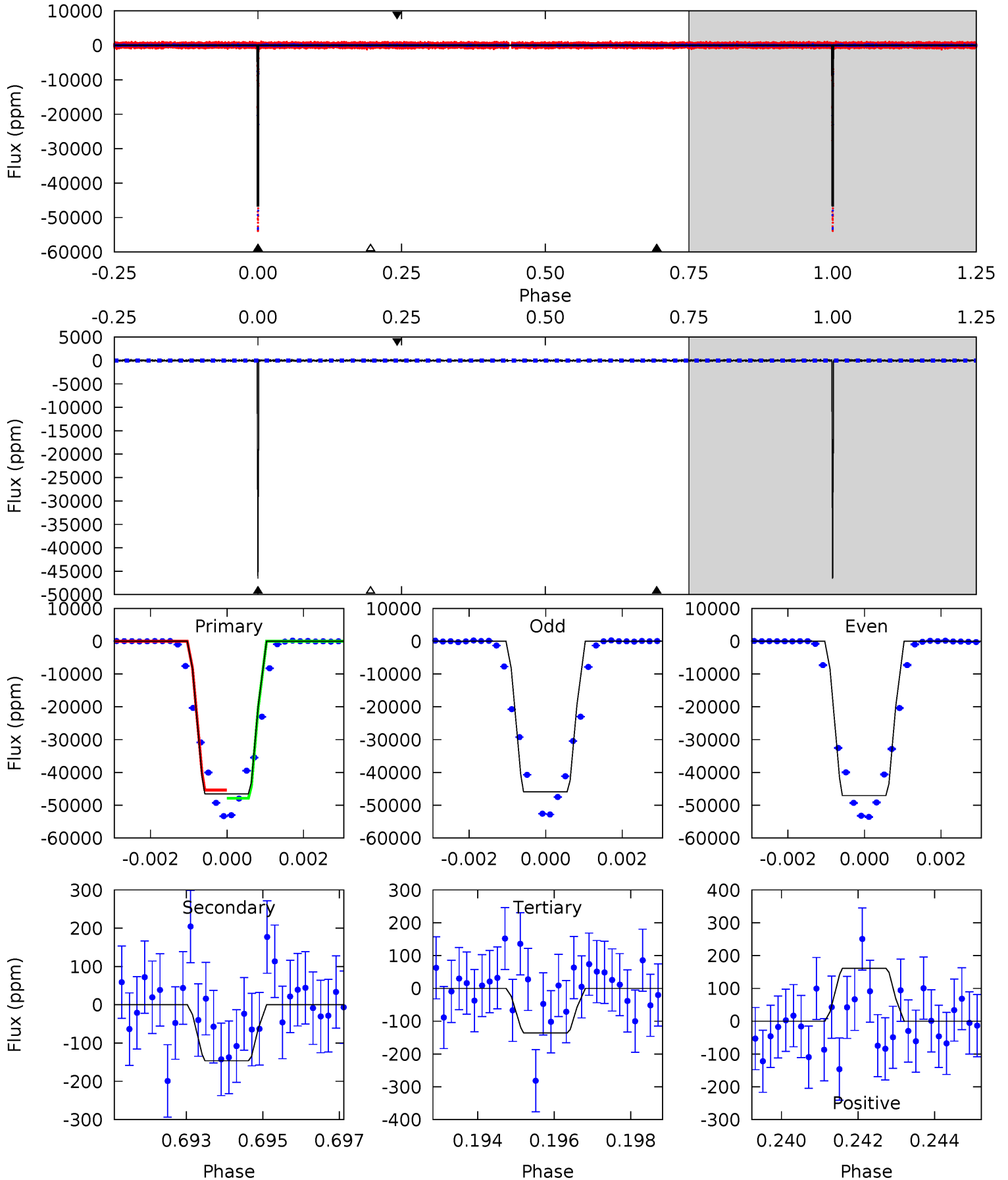
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1742	13.4	12.0	12.4	5.29	3.02	3.17	1730	1730	1.48	0.99	9.51	0.85	0.01	0.84



# Alt Model-Shift Uniqueness Test

007456521-02, P = 276.432011 Days, E = 86.426326 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
1117	3.51	3.26	3.87	5.34	3.12	0.87	1114	1114	0.25	-0.36	14.7	0.84	0.00	30.0





### Stellar Parameters For KIC 007456521

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R (R_{\odot})$	$M(M_{\odot})$	$\rho_{\star} (\text{g}\cdot\text{cm}^{-3})$
	$5956^{+179}_{-179}$	$4.403^{+0.149}_{-0.182}$	$-0.680^{+0.300}_{-0.300}$	$0.929^{+0.233}_{-0.155}$	$0.797^{+0.102}_{-0.055}$	$1.398^{+0.955}_{-0.653}$
	+3%/-3%	+3%/-4%	+44%/-44%	+25%/-17%	+13%/-7%	+68%/-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 007456521-02 / KOI

Detrend	Depth (ppm)	$R_p (R_{\oplus})$	$T_{\text{max}} (K)$	$T_{\text{obs}} (K)$	$A_{\text{obs}}$
DV	$-415 \pm 31$	$36.50^{+7.69}_{-5.96}$	$407^{+29}_{-26}$	$2336^{+86}_{-74}$	$101^{+46}_{-31}$
Alt.	$-146 \pm 42$	$16.43^{+5.27}_{-5.42}$	$404^{+27}_{-26}$	$2481^{+256}_{-181}$	$169^{+231}_{-79}$

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

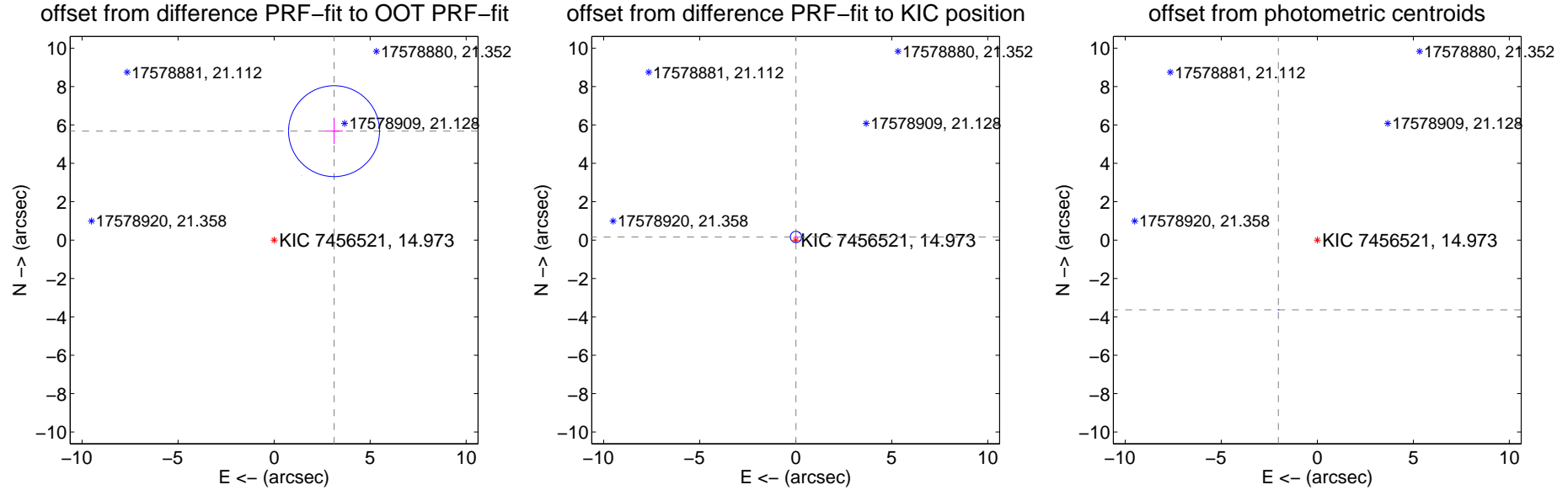
## DV Centroid Data

Supplemental centroid analysis for 007456521-02. Kepler magnitude: 14.97. Transit SNR 706.43

There are 3 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 3.42 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$6.478 \pm 0.789$	8.21	$-3.120 \pm 0.460$	$5.677 \pm 0.665$
PRF-fit source offset from KIC position	$0.165 \pm 0.098$	1.69	$-0.013 \pm 0.100$	$0.165 \pm 0.098$
photometric centroid source offset	$4.16 \pm 0.00$	3117.32	$2.03 \pm 0.00$	$-3.63 \pm 0.00$



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.

Q1 no difference image



Q1 no OOT image



Q2 no difference image



Q2 no OOT image



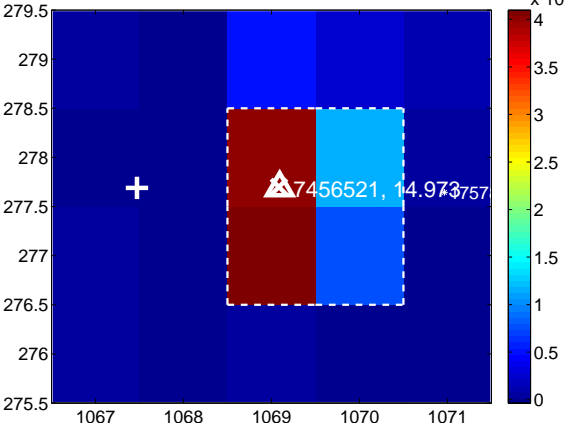
Q3 no difference image



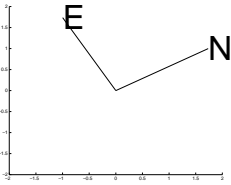
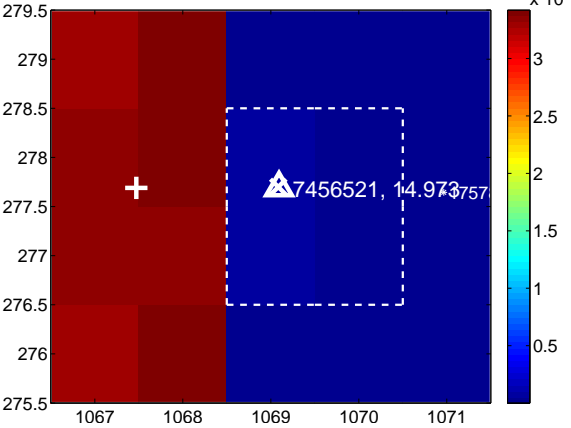
Q3 no OOT image



Q4 difference image



Q4 OOT image



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

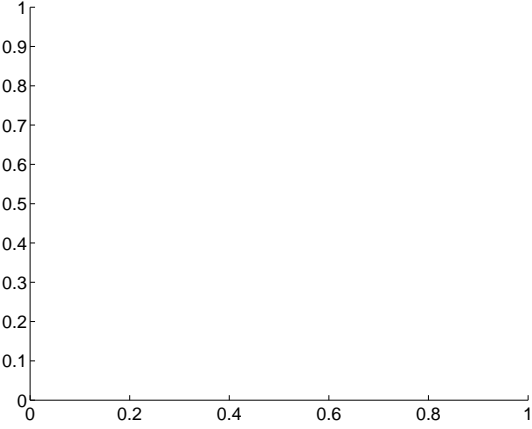
Q5 no difference image



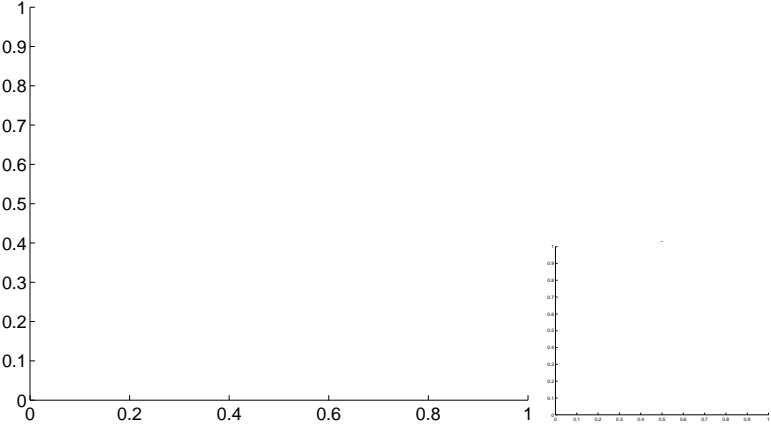
Q5 no OOT image



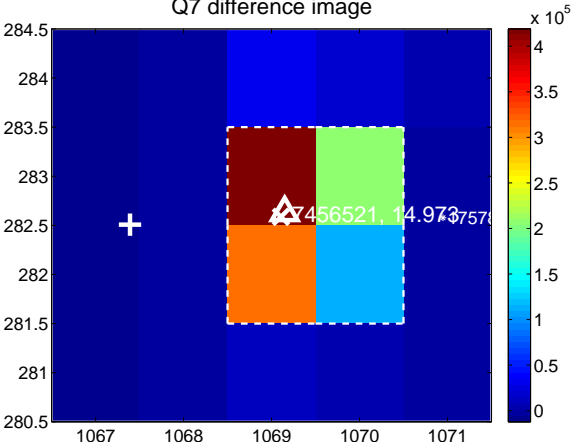
Q6 no difference image



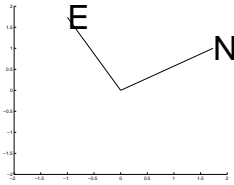
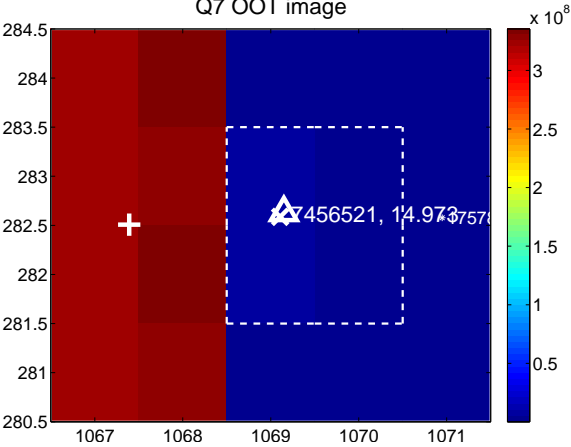
Q6 no OOT image



Q7 difference image



Q7 OOT image



Q8 no difference image



Q8 no OOT image

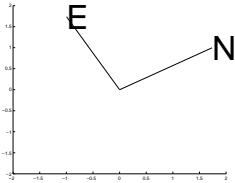
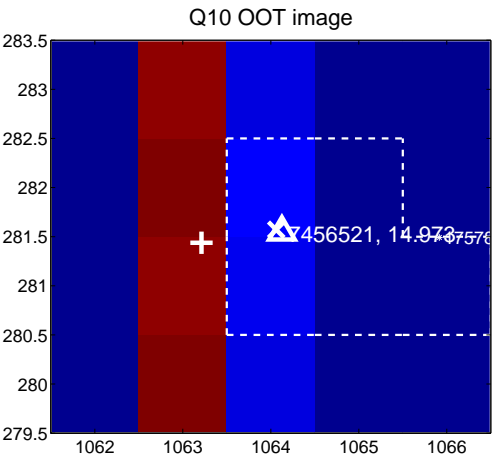
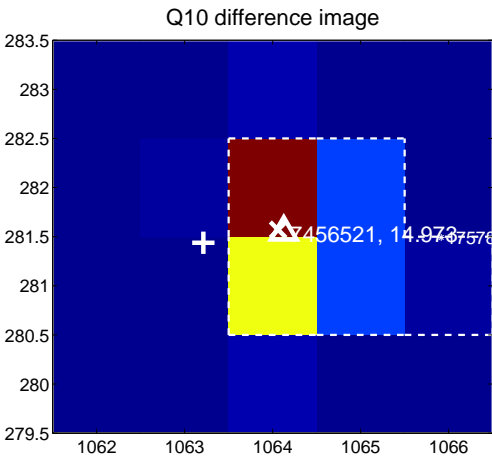
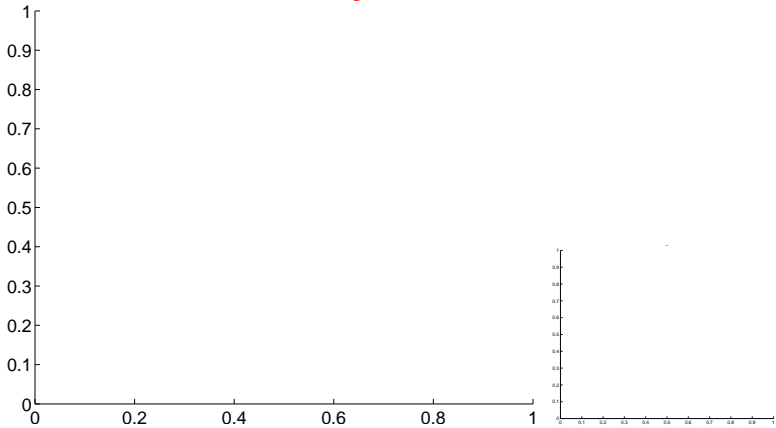


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

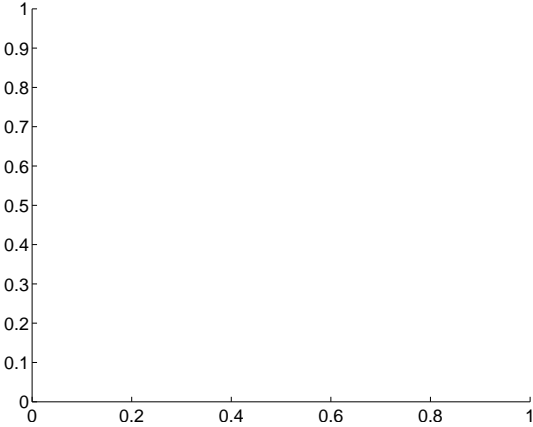
Q9 no difference image



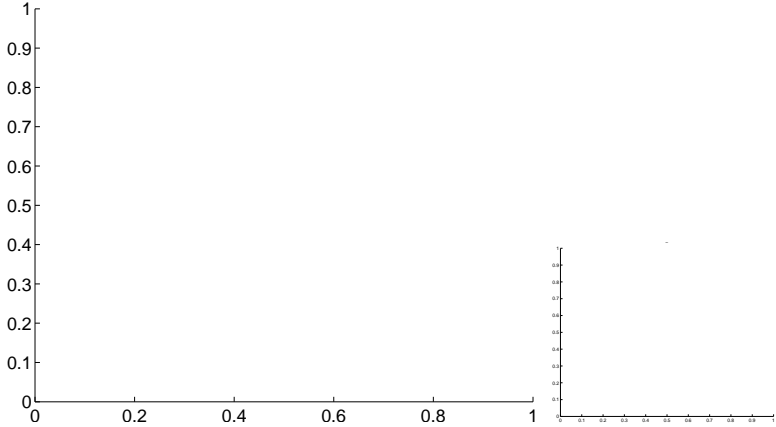
Q9 no OOT image



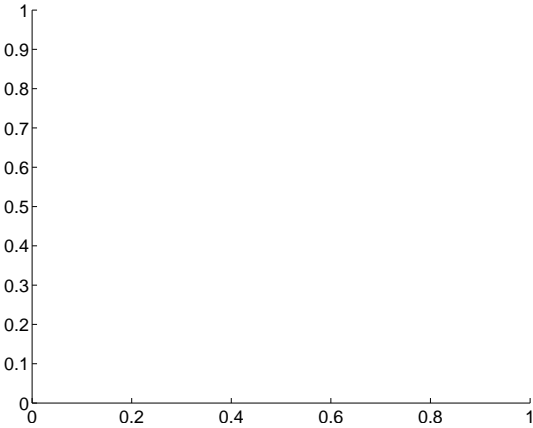
Q11 no difference image



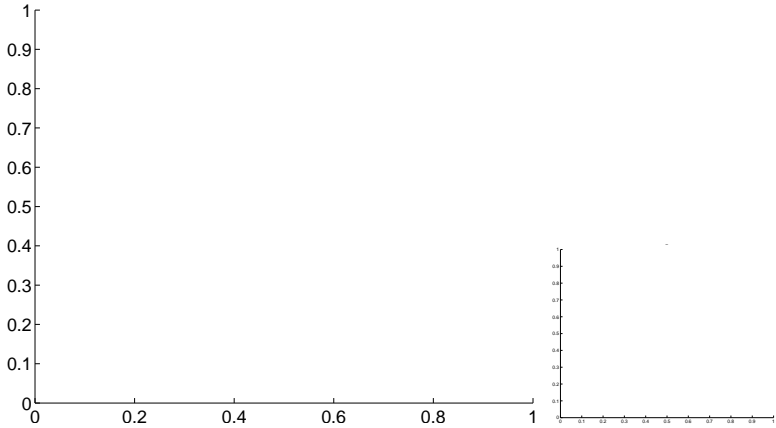
Q11 no OOT image



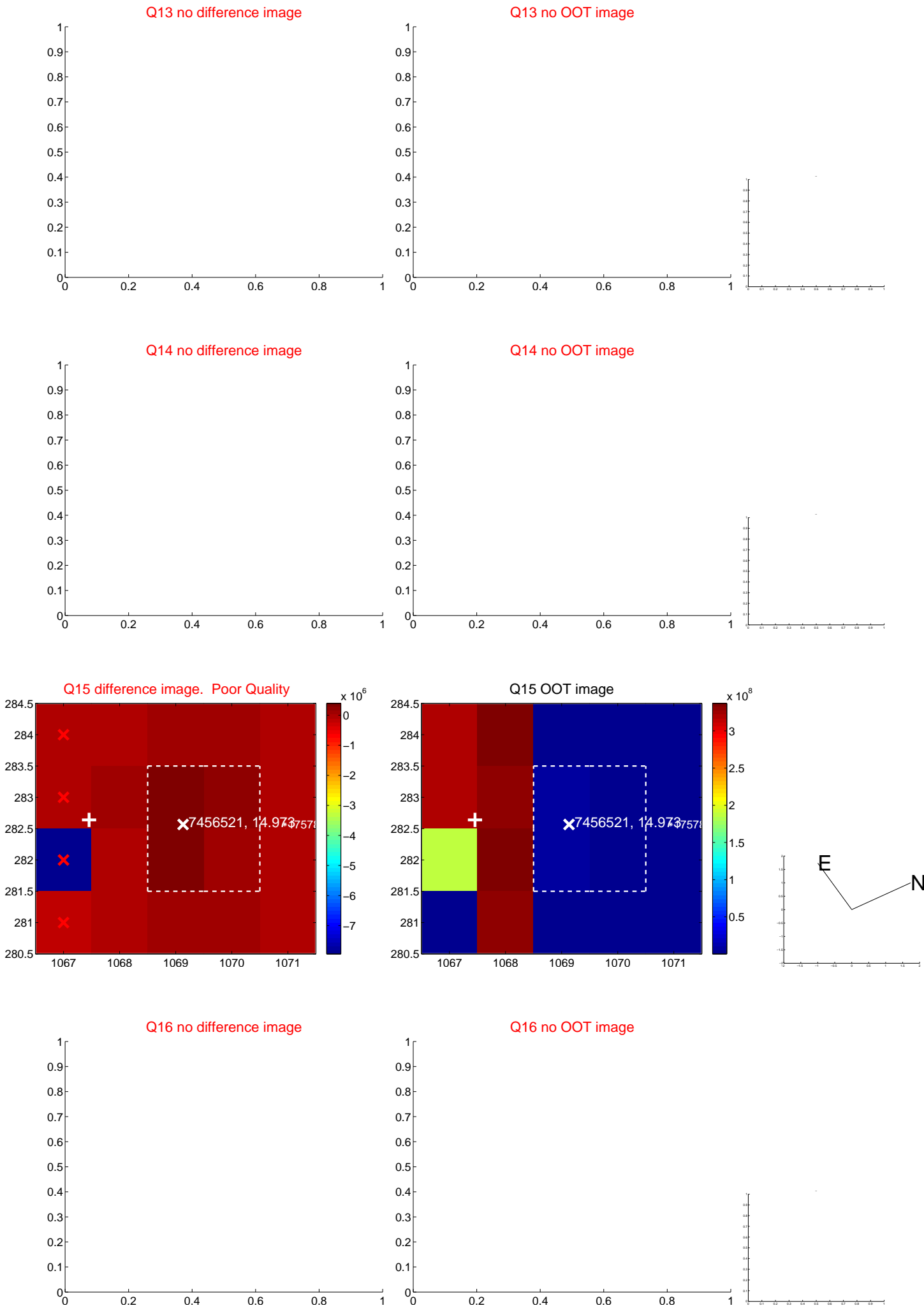
Q12 no difference image



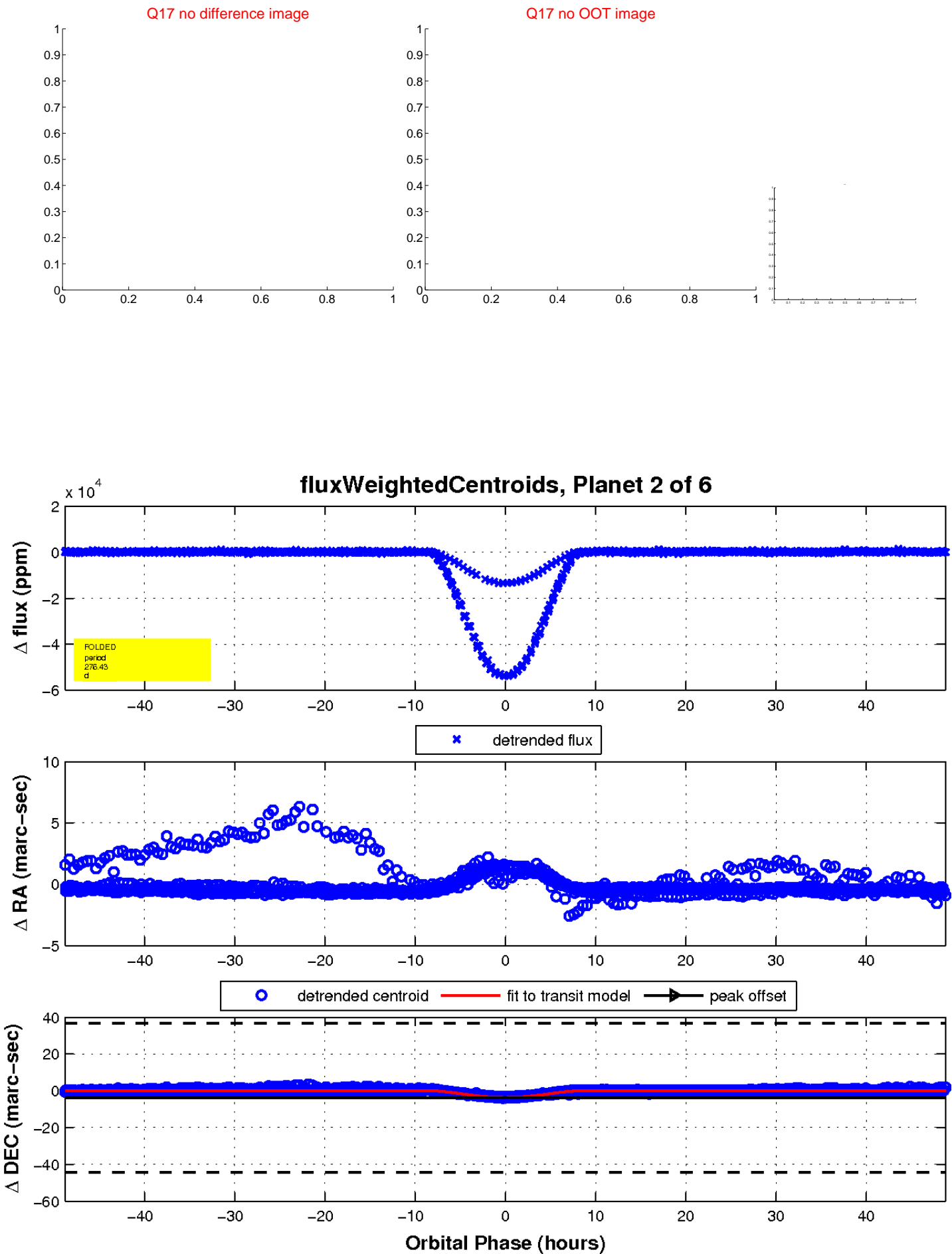
Q12 no OOT image



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

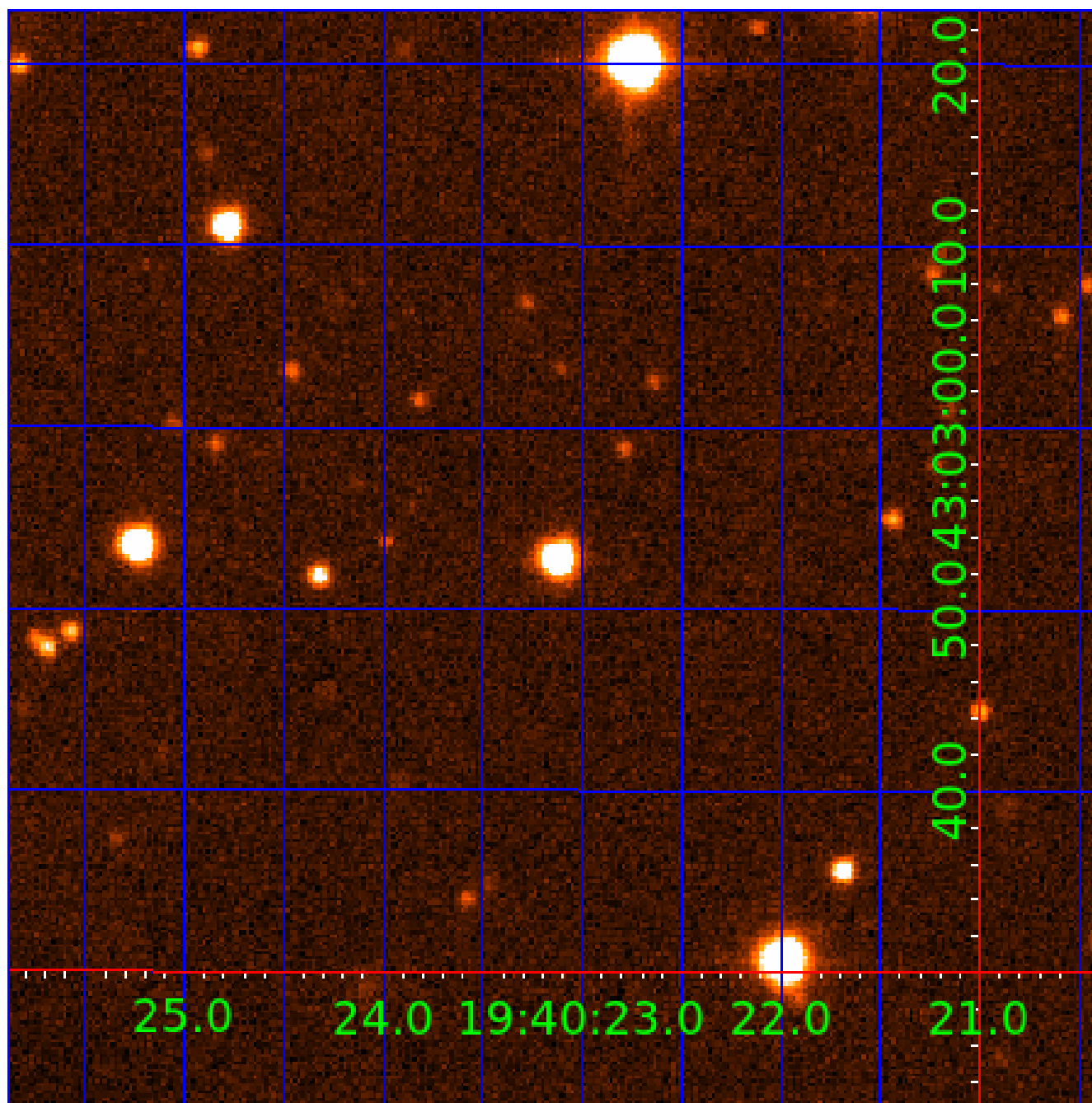


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007456521

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007456521-01	OBS	6880.01	276.418388	207.809907	201230.6	12.500	2534.0	-1.0	0.93	5956	34.12	1.64
007456521-02	OBS	No	276.430042	362.865365	53710.2	16.269	717.2	706.4	0.93	5956	35.89	1.64
007456521-03	OBS	No	225.444119	353.002631	6050.6	1.675	45.2	43.3	0.93	5956	13.34	2.15
007456521-04	OBS	No	369.571723	198.783464	13725.0	74.217	28.5	50.0	0.93	5956	19.14	1.11
007456521-05	OBS	No	296.620153	425.062593	422.4	0.565	13.3	1.7	0.93	5956	2.24	1.49
007456521-06	OBS	No	296.599935	425.427321	778.9	15.000	12.5	-1.0	0.93	5956	2.60	1.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007456521-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_NOFITS
007456521-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD—CENT_KIC_POS
007456521-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-04	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—SAME_NTL_PERIOD—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 007456521-03

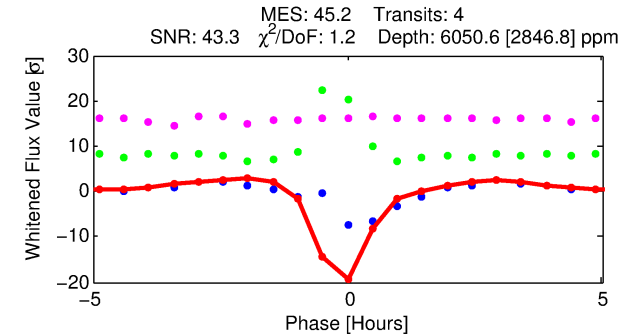
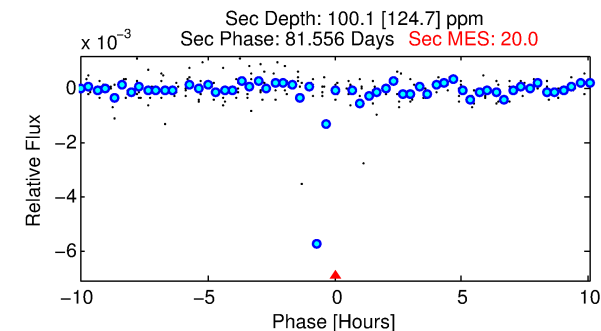
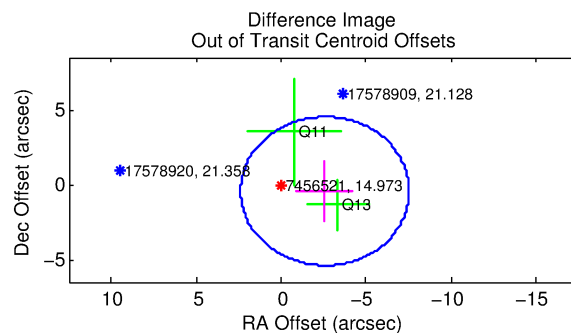
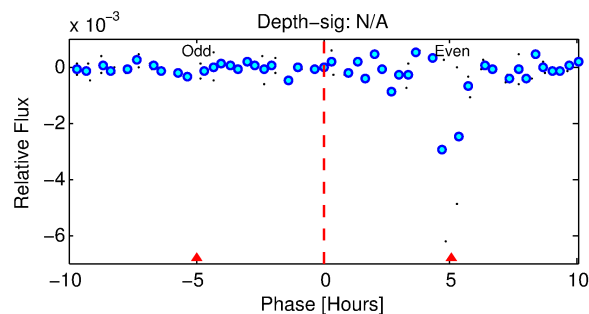
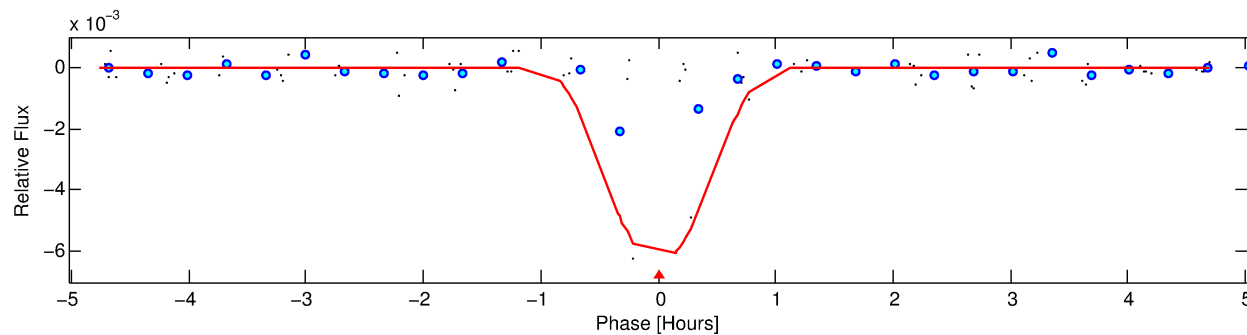
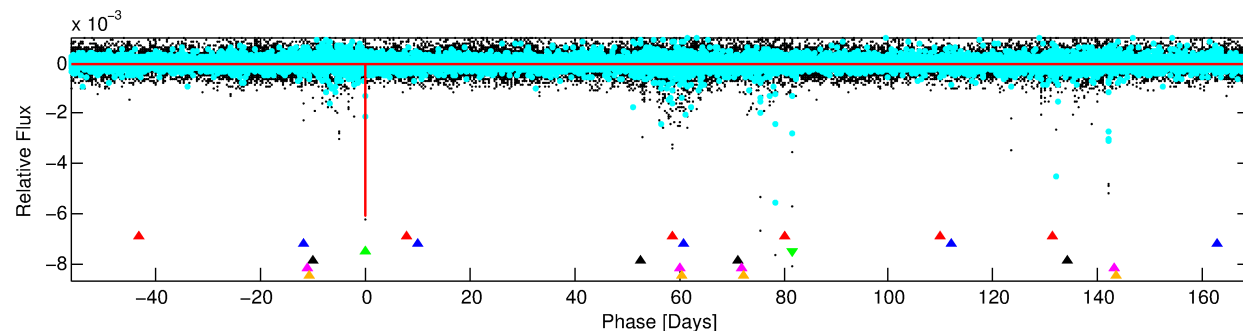
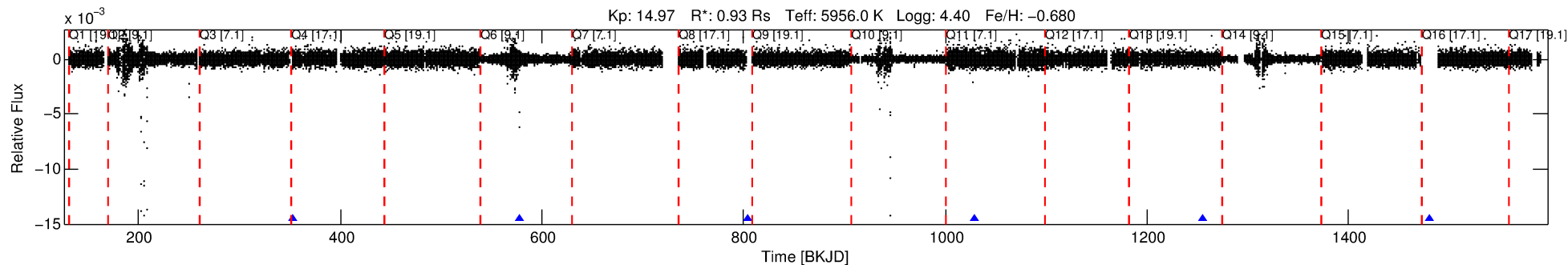
No Significant Match Found

# DV One-Page Summary

KIC: 7456521 Candidate: 3 of 6 Period: 225.444 d

KOI: K06880 Corr: No Ephemeris Match

Kp: 14.97 R\*: 0.93 Rs Teff: 5956.0 K Logg: 4.40 Fe/H: -0.680



## DV Fit Results:

Period = 225.44412 [0.00052] d  
Epoch = 353.0026 [0.0014] BKJD  
Rp/R\* = 0.1316 [1.2552]  
a/R\* = 551.67 [881.90]  
b = 1.00 [1.83]  
Seff = 2.15 [0.75]  
Teq = 309 [27] K  
Rp = 13.34 [127.29] Re  
a = 0.6720 [0.1464] AU  
Ag = 139.76 [2672.17] [0.05σ]  
Teffp = 1642 [7849] K [0.17σ]

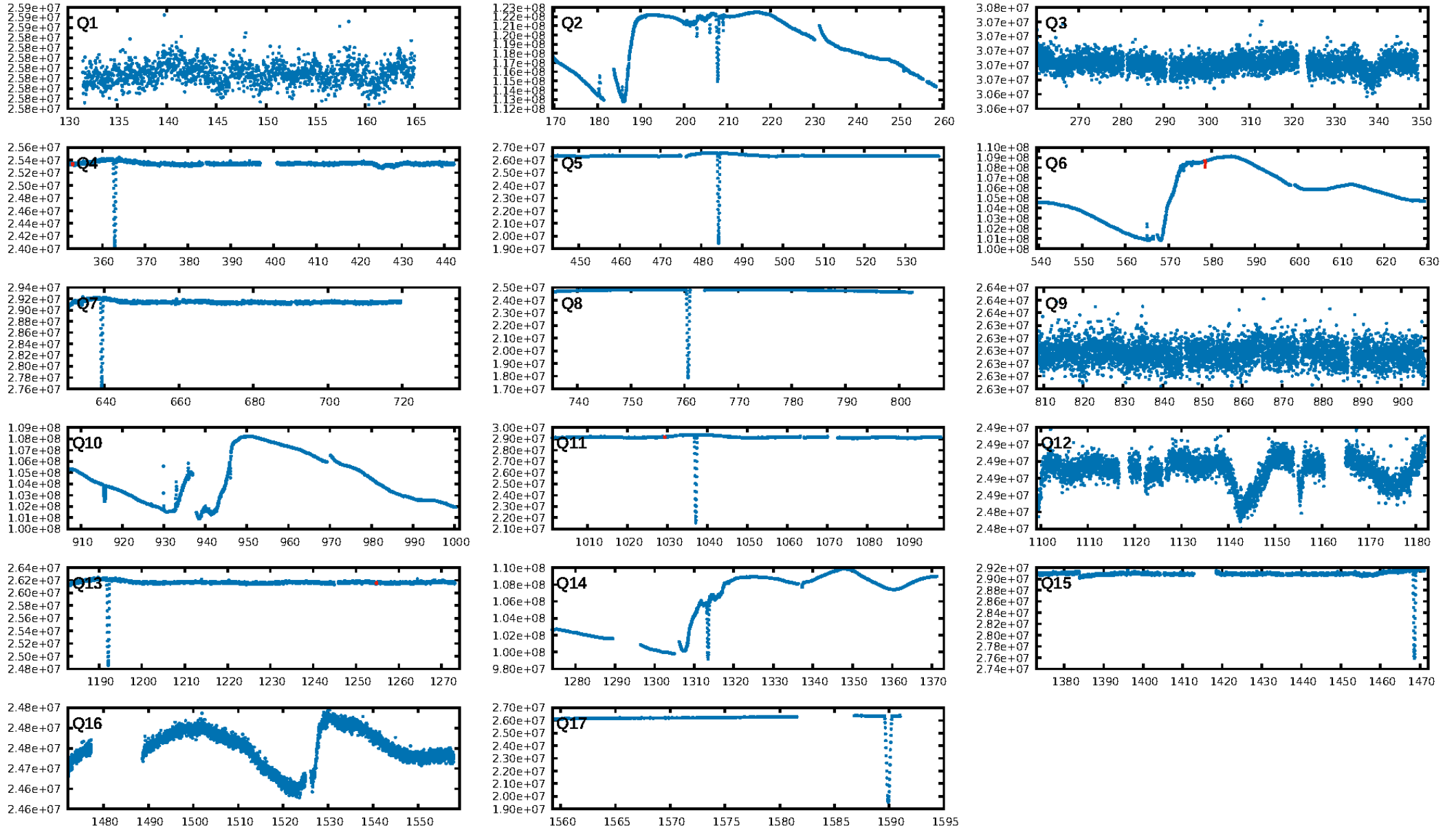
## DV Diagnostic Results:

ShortPeriod-sig: N/A  
LongPeriod-sig: 100.0% [97.00σ]  
ModelChiSquare2-sig: 50.4%  
ModelChiSquareGof-sig: 99.4%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: 0.6629  
Centroid-sig: N/A  
Centroid-so: 4.236 arcsec [244.73σ]  
OotOffset-rm: 2.625 arcsec [1.59σ]  
KicOffset-rm: 5.693 arcsec [2.92σ]  
OotOffset-st: 0/1/0/1 [2]  
KicOffset-st: 0/1/0/1 [2]  
DiffImageQuality-fgm: 0.50 [1/2]  
DiffImageOverlap-fno: 1.00 [3/3]

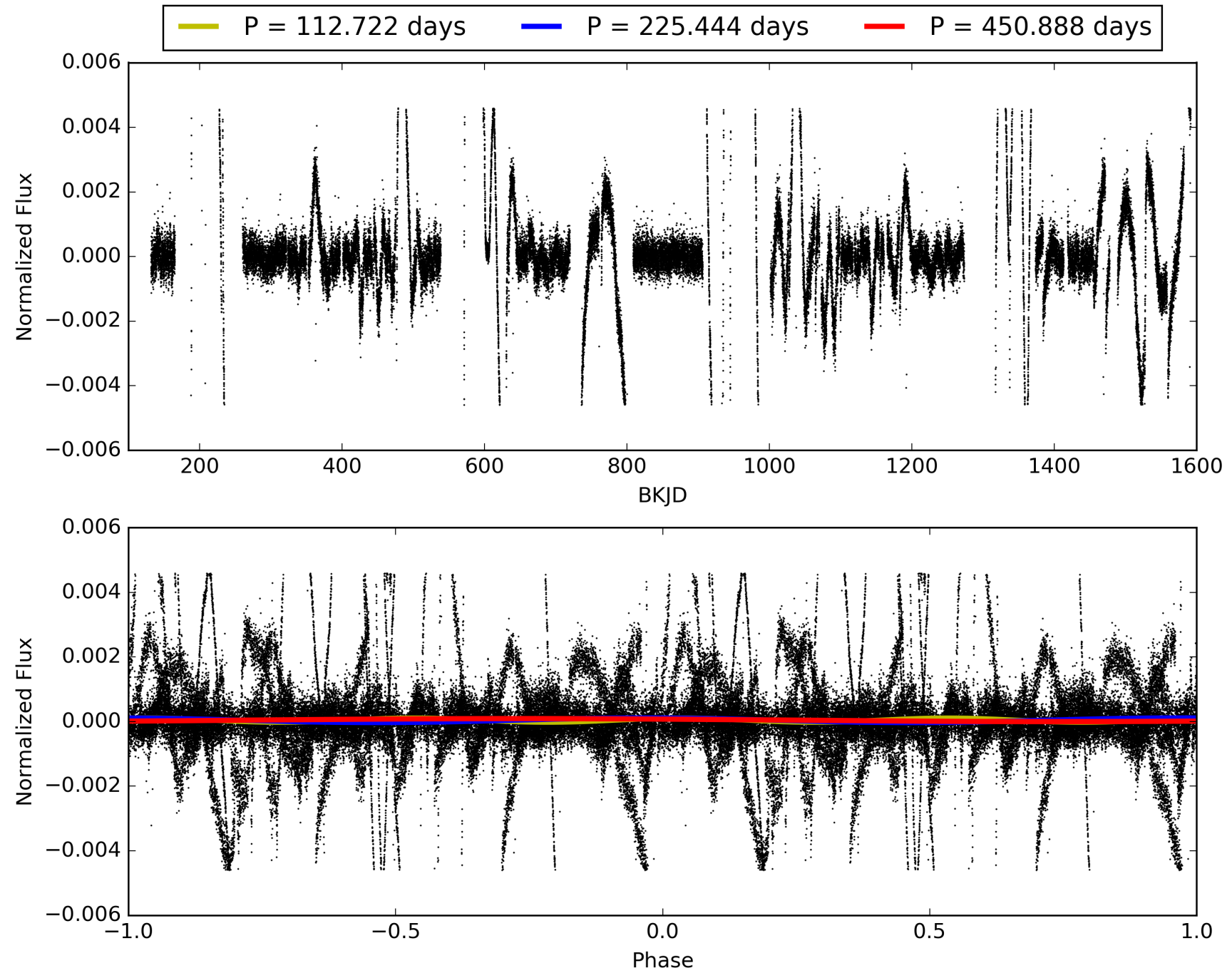
Software Revision: svn-ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:18:31 Z

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

# TCE 007456521-03, PDC Light Curves

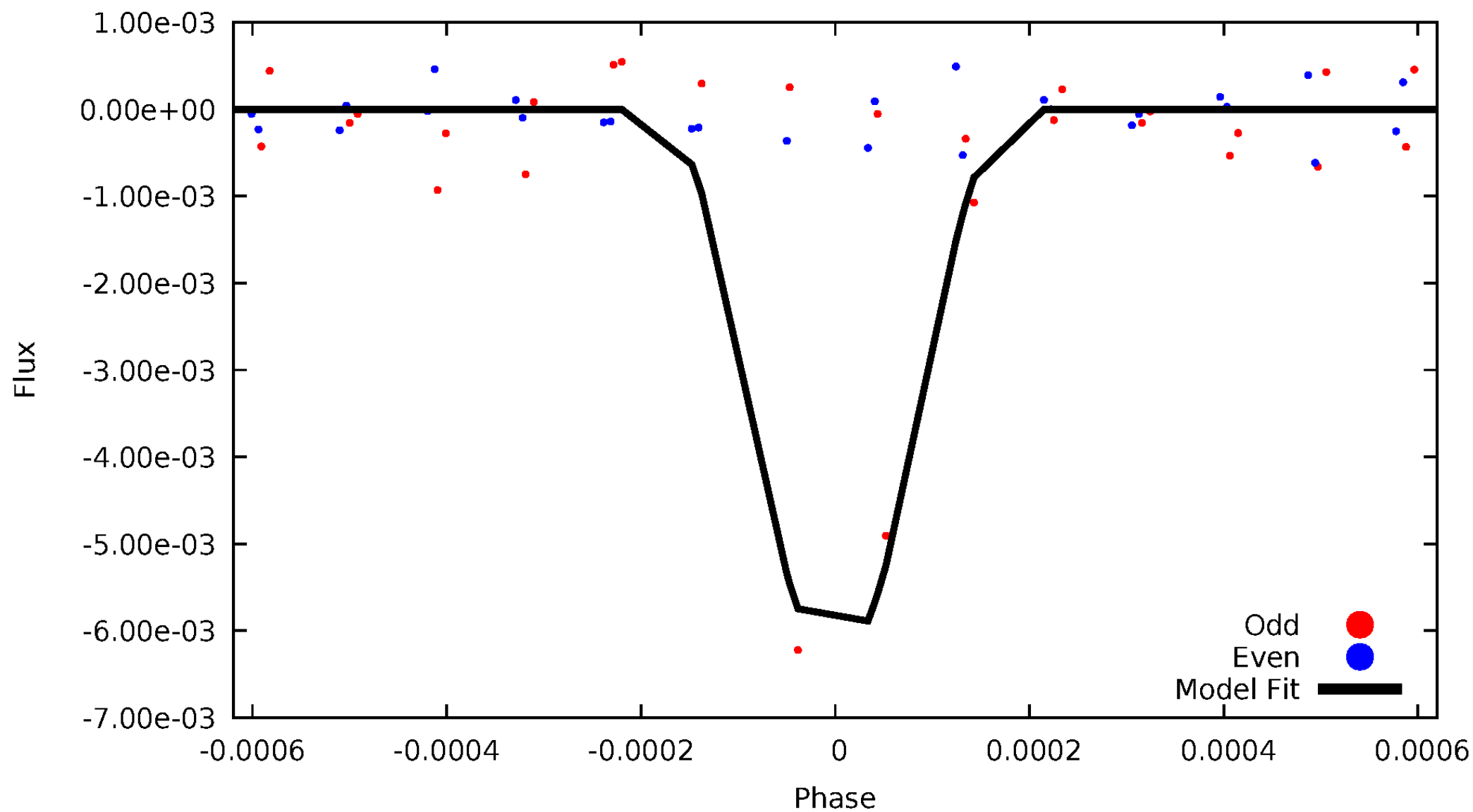


TCE 007456521-03



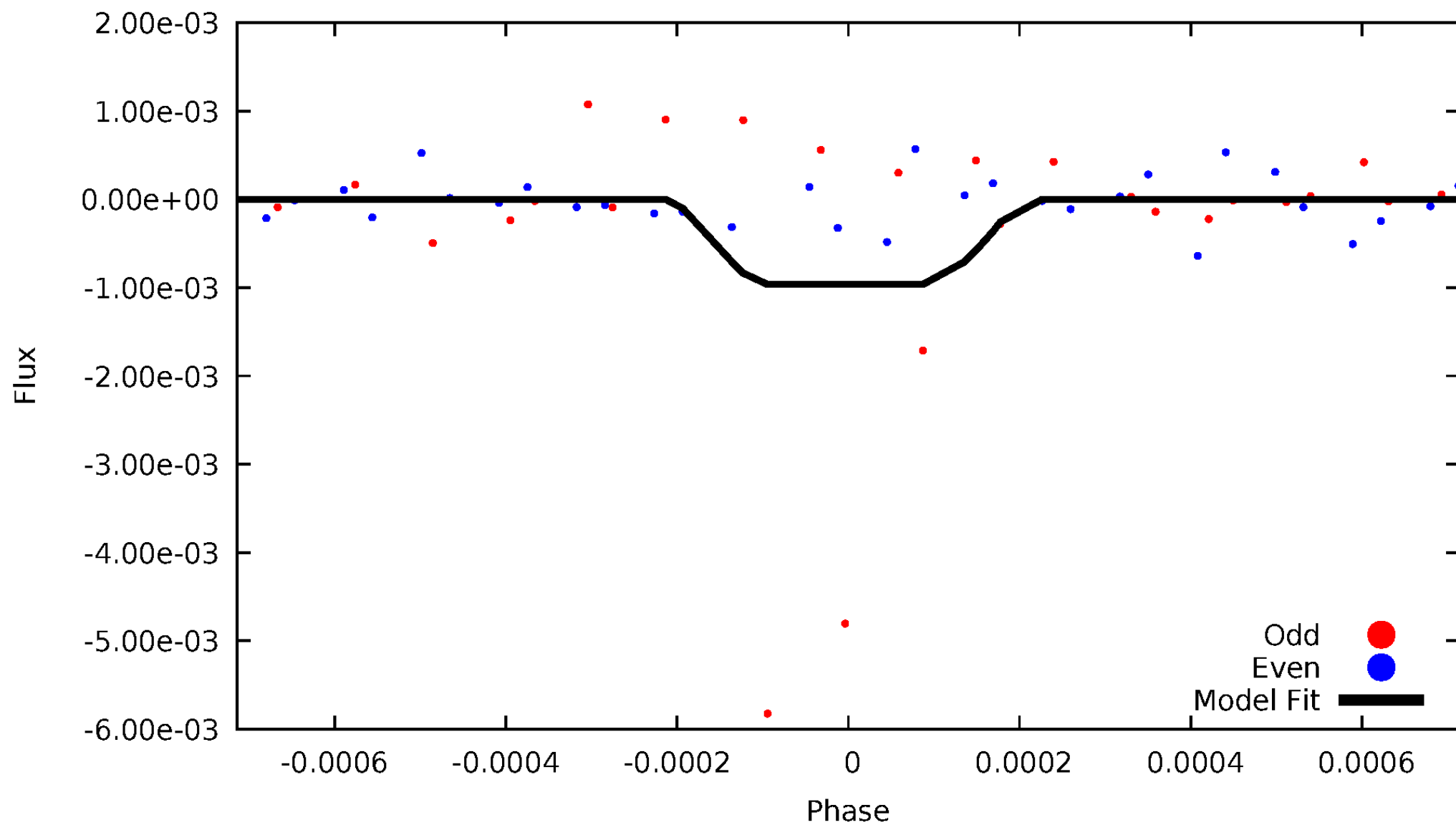
DV Odd/Even

TCE 007456521-03

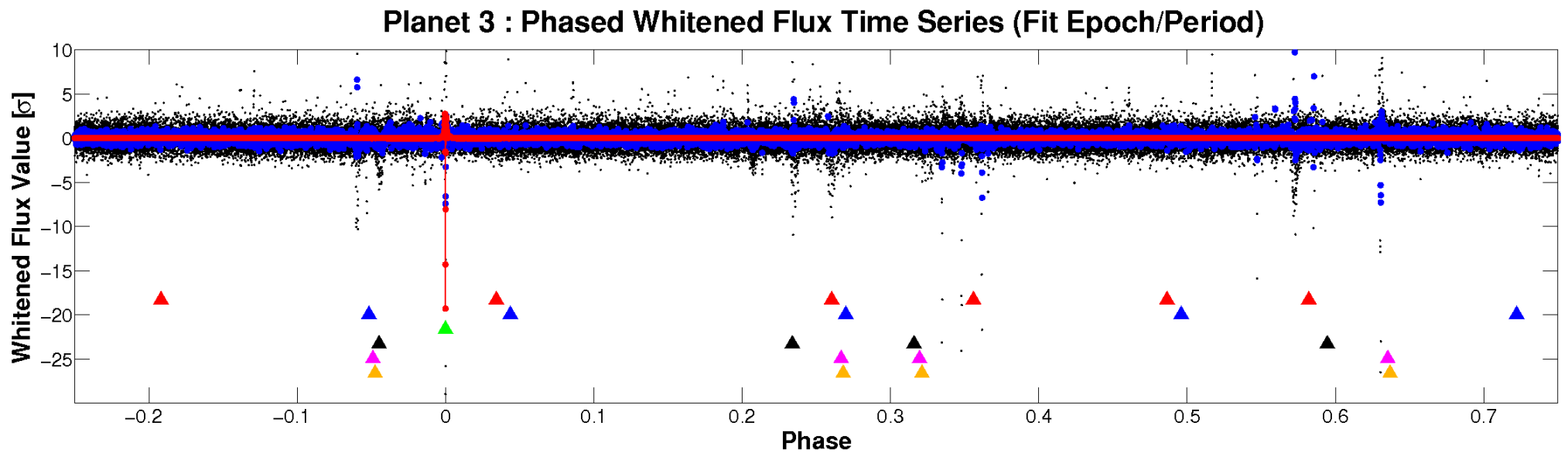
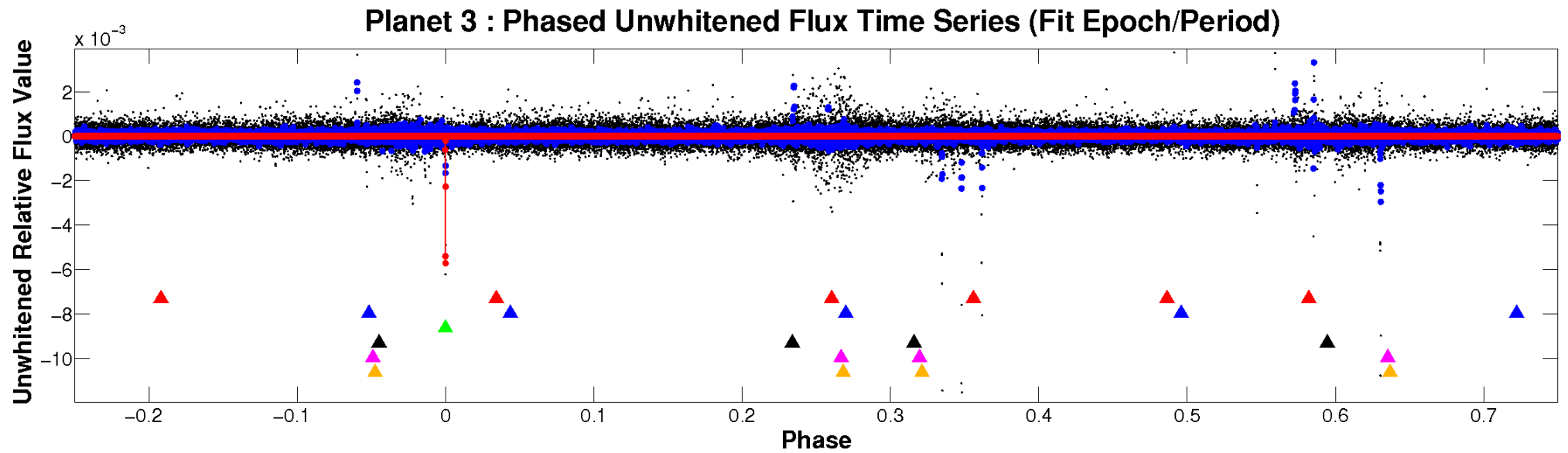


# ALT Odd/Even

TCE 007456521-03

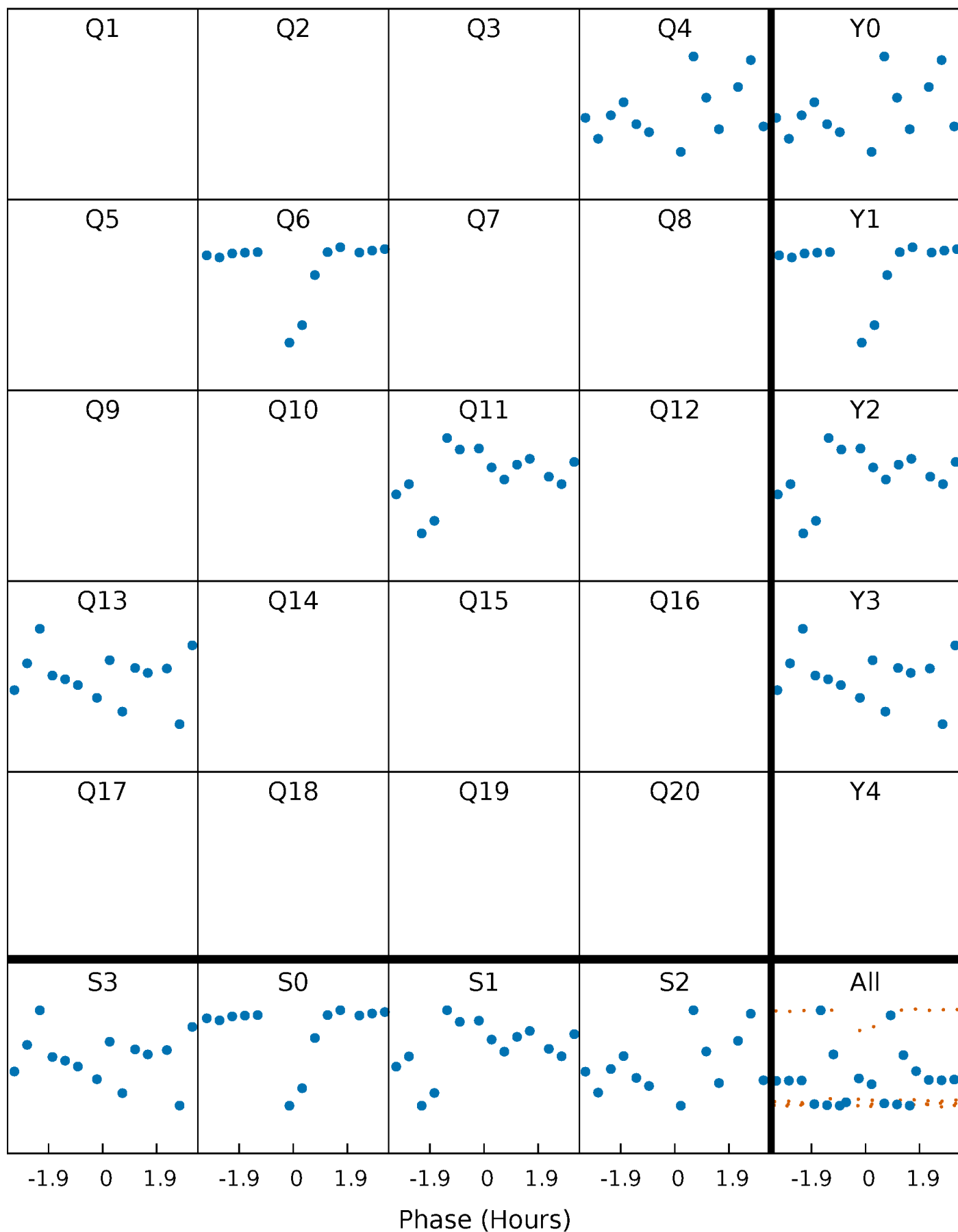


# Non-Whitened Vs. Whitened Light Curve



# PDC Quarter-Phased Transit Curves

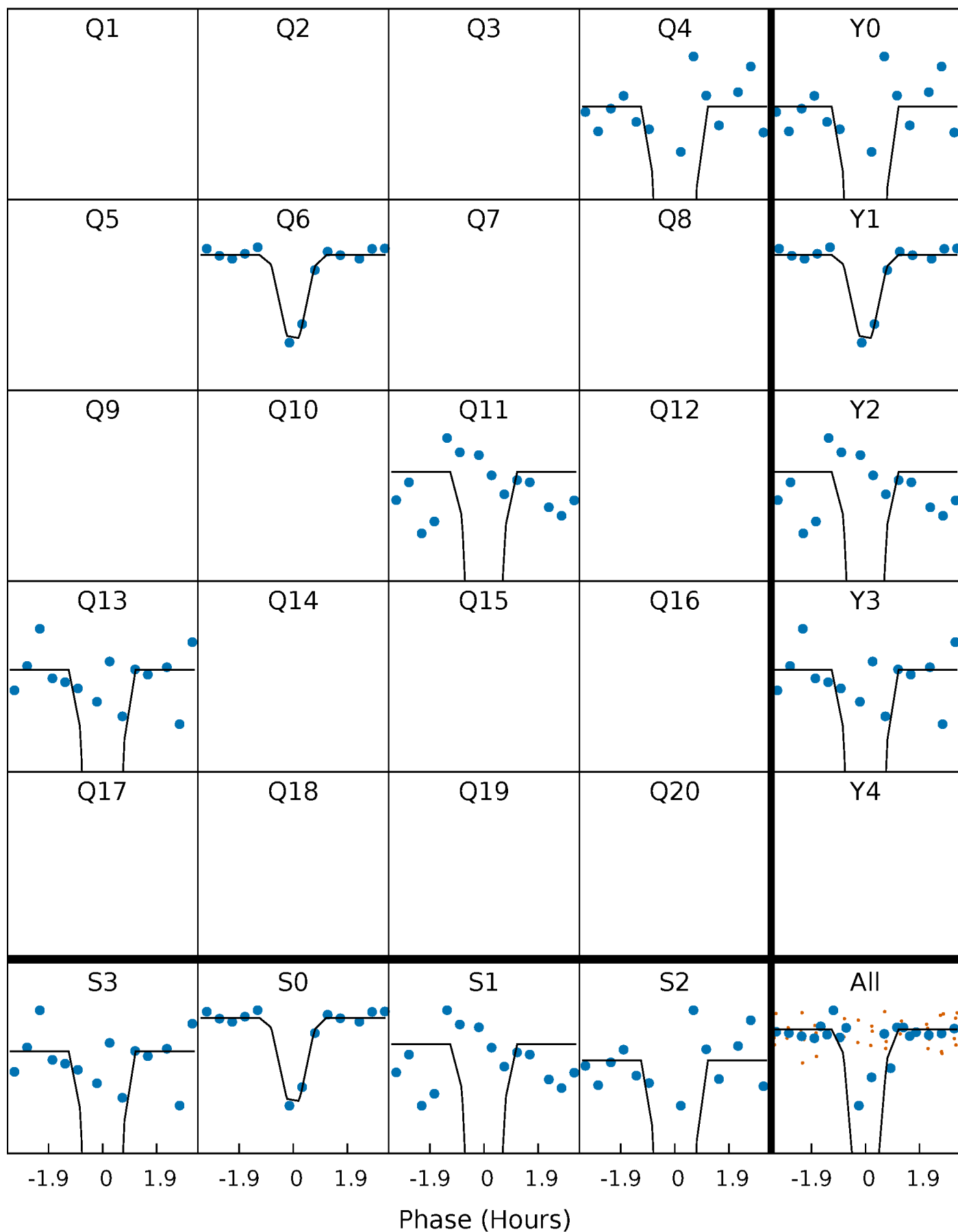
TCE 007456521-03 P=225.444119 Days  $T_0=353.002631$  (BKJD)





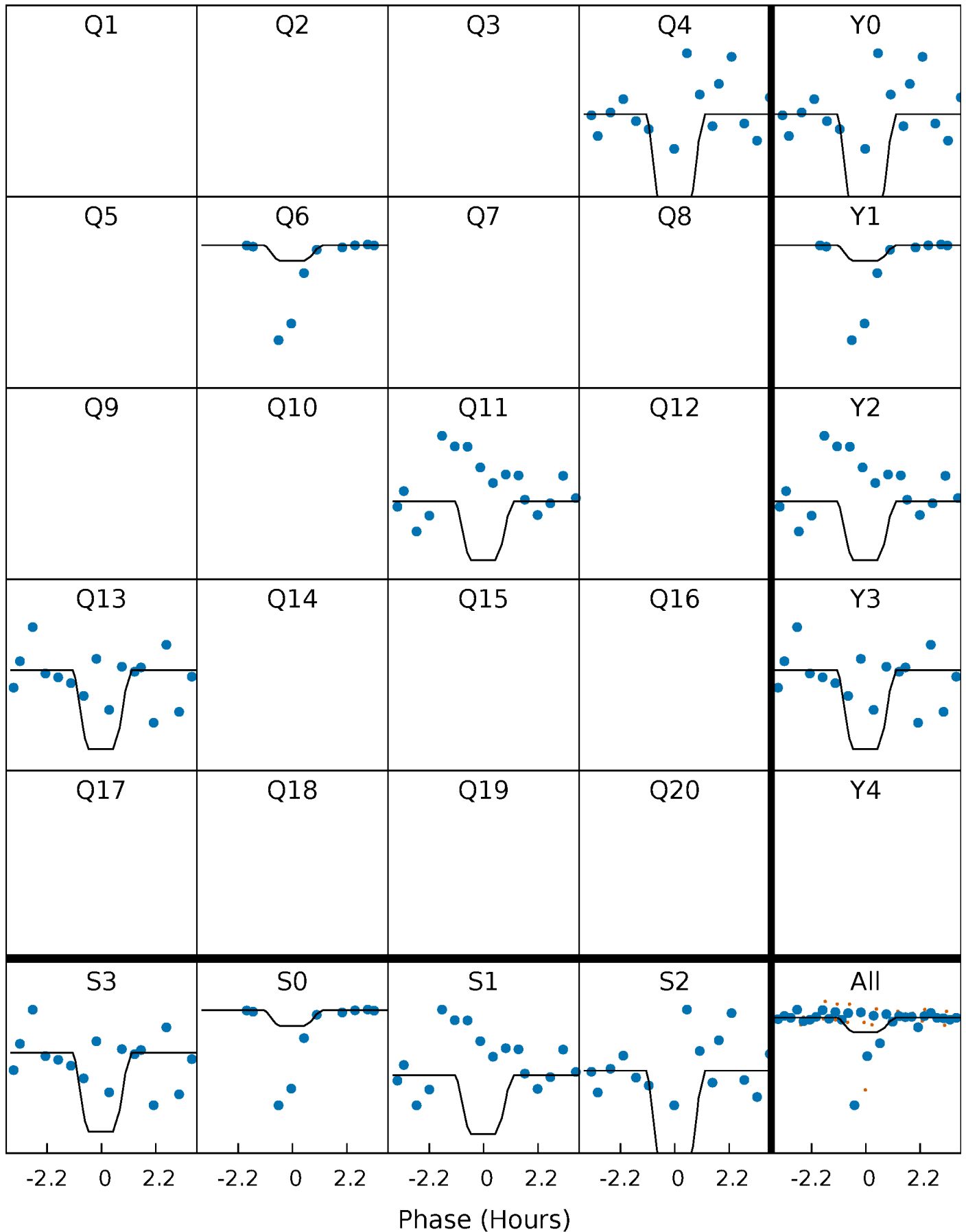
# DV Quarter-Phased Transit Curves

TCE 007456521-03 P=225.444119 Days  $T_0=353.002631$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

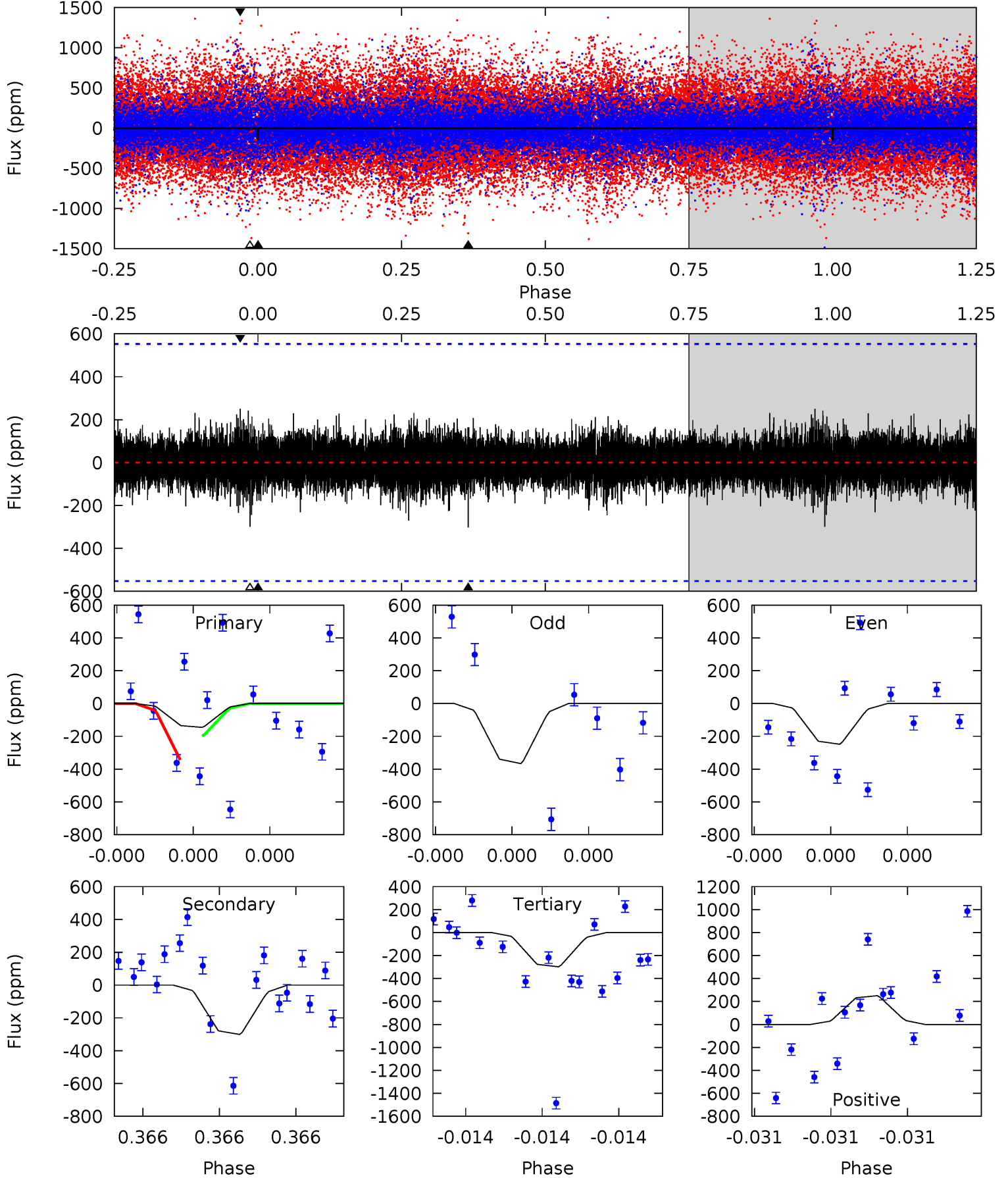
TCE 007456521-03 P=225.446387 Days  $T_0=353.012957$  (BKJD)



# DV Model-Shift Uniqueness Test

007456521-03, P = 225.444119 Days, E = 127.558512 Days

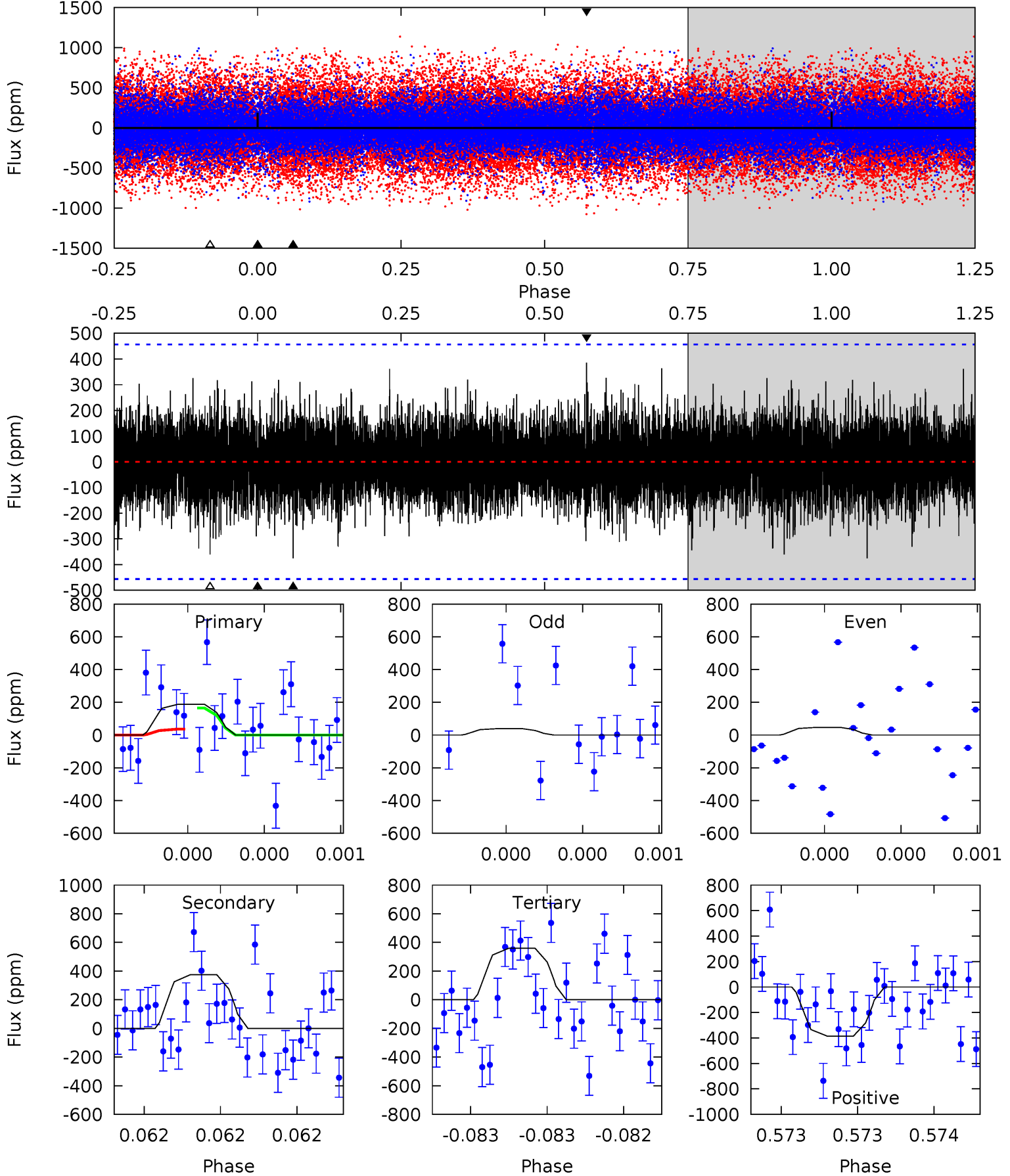
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
1.49	3.09	3.06	2.57	5.67	3.62	0.59	-1.57	-1.07	0.03	0.52	0.46	6.13	0.45	0



# Alt Model-Shift Uniqueness Test

007456521-03, P = 225.446387 Days, E = 127.566570 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
2.33	4.63	4.44	4.76	5.63	3.57	1.06	-2.11	-2.43	0.19	-0.12	0.05	46.8	0.51	0



### Stellar Parameters For KIC 007456521

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5956^{+179}_{-179}$	$4.403^{+0.149}_{-0.182}$	$-0.680^{+0.300}_{-0.300}$	$0.929^{+0.233}_{-0.155}$	$0.797^{+0.102}_{-0.055}$	$1.398^{+0.955}_{-0.653}$
	+3%/-3%	+3%/-4%	+44%/-44%	+25%/-17%	+13%/-7%	+68%/-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 007456521-03 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-301 \pm 97$	$89.49^{+103.75}_{-62.90}$	$433^{+32}_{-26}$	$1860^{+562}_{-289}$	$9.228^{+99.268}_{-7.516}$
Alt.	$-376 \pm 81$	$84.34^{+95.20}_{-59.18}$	$433^{+29}_{-27}$	$1928^{+596}_{-270}$	$13^{+135}_{-10}$

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

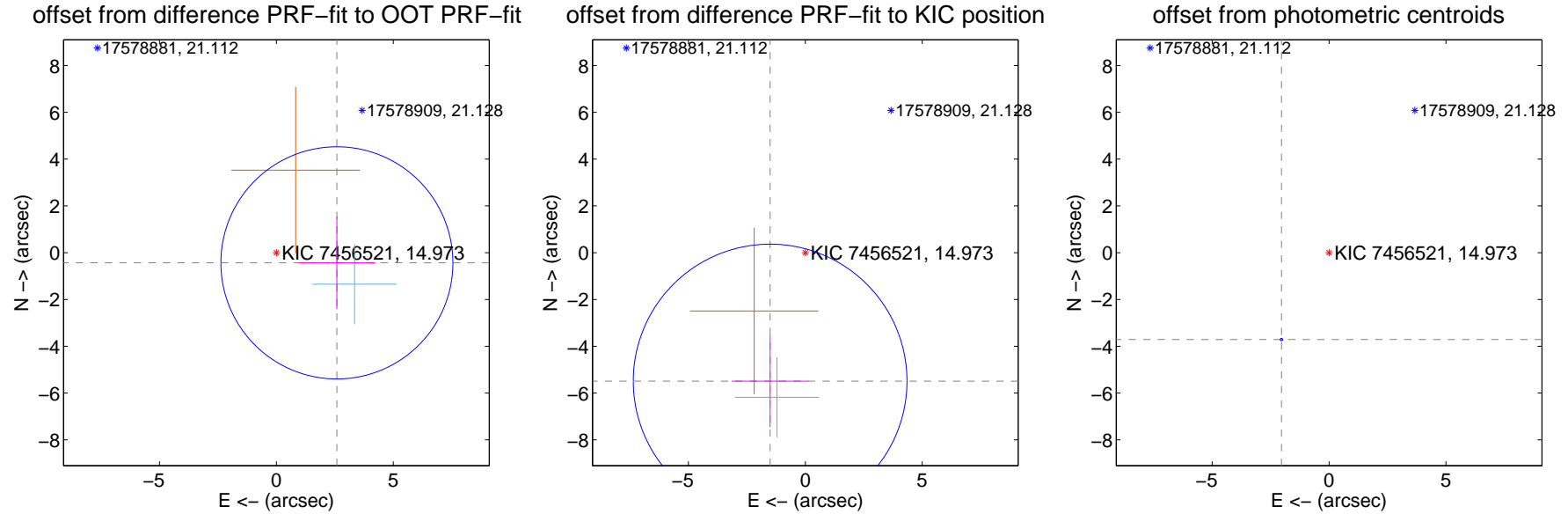
## DV Centroid Data

Supplemental centroid analysis for 007456521-03. Kepler magnitude: 14.97. Transit SNR 43.31

There are 1 quarters with good PRF difference image offsets

The OOT PRF centroid is offset from the target star catalog position by about 6.64 arcsec so the offset from difference PRF-fit to OOT-fit may be invalid.

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	$2.625 \pm 1.654$	1.59	$-2.588 \pm 1.644$	$-0.435 \pm 1.973$
PRF-fit source offset from KIC position	$5.693 \pm 1.951$	2.92	$1.505 \pm 1.644$	$-5.490 \pm 1.973$
photometric centroid source offset	$4.24 \pm 0.02$	<b>244.73</b>	$2.04 \pm 0.02$	$-3.71 \pm 0.02$



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

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



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

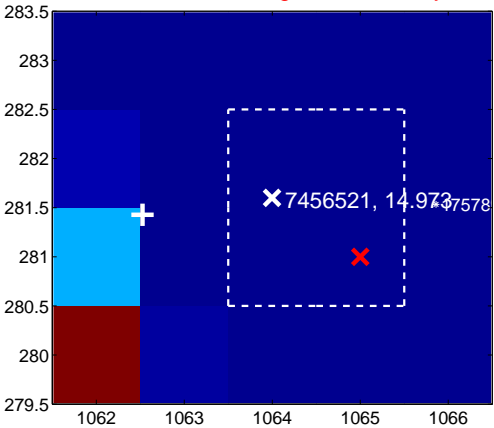
Q5 no difference image



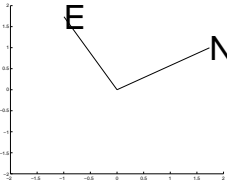
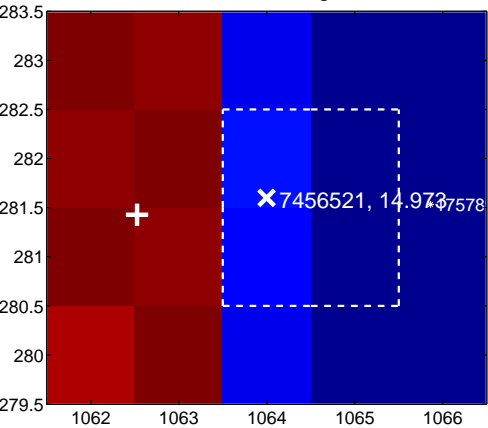
Q5 no OOT image



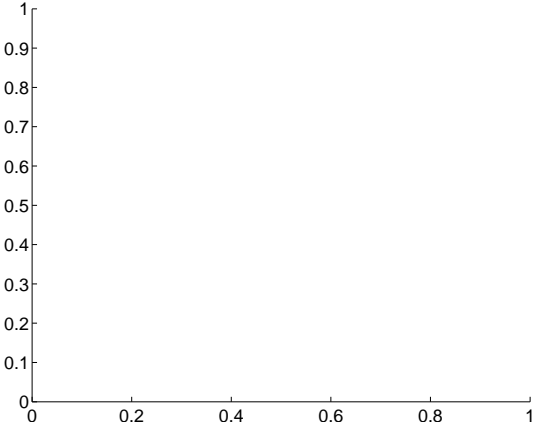
Q6 difference image. Poor Quality



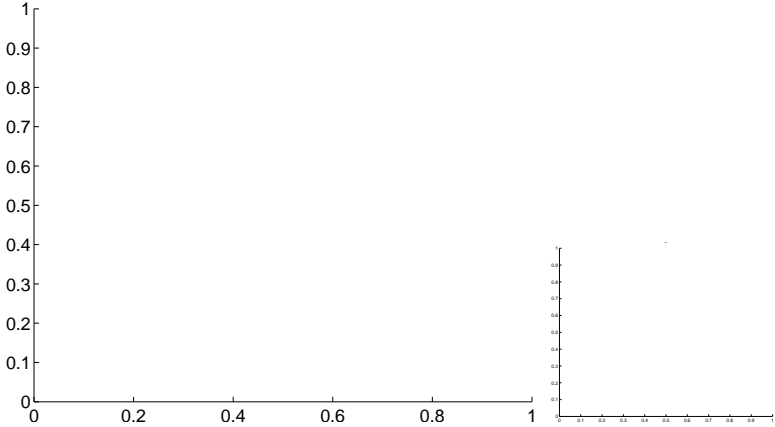
Q6 OOT image



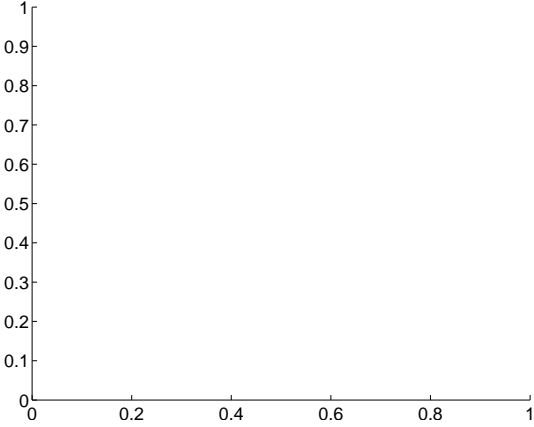
Q7 no difference image



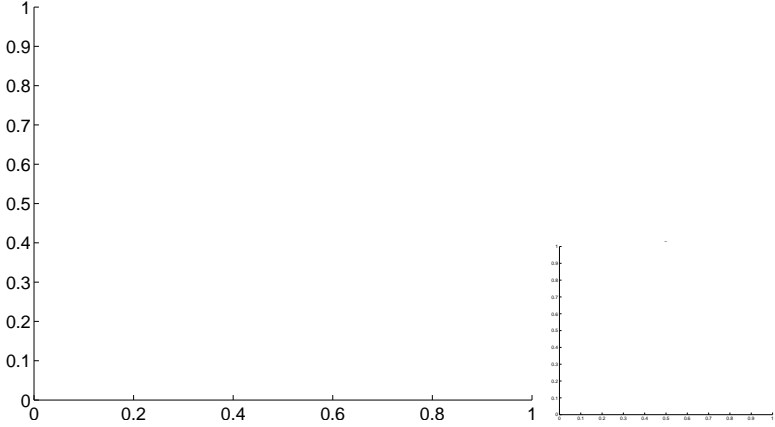
Q7 no OOT image



Q8 no difference image



Q8 no OOT image





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

Q9 no difference image



Q9 no OOT image



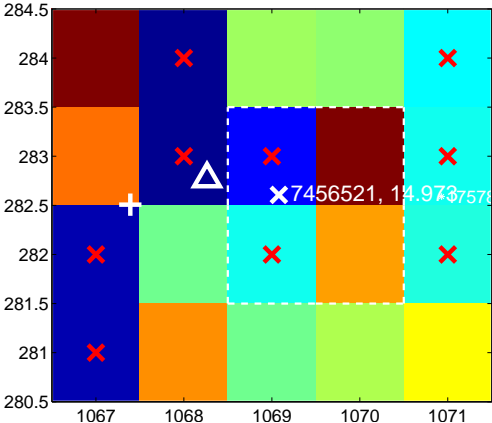
Q10 no difference image



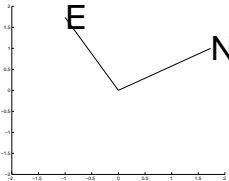
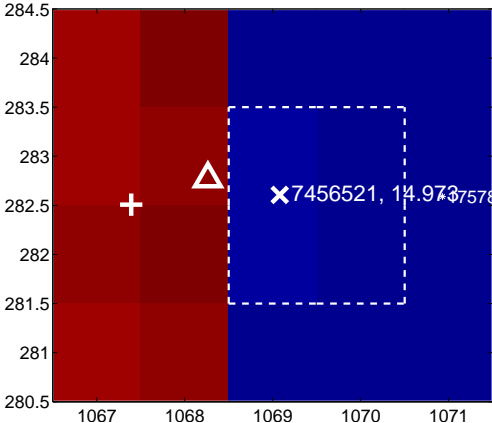
Q10 no OOT image



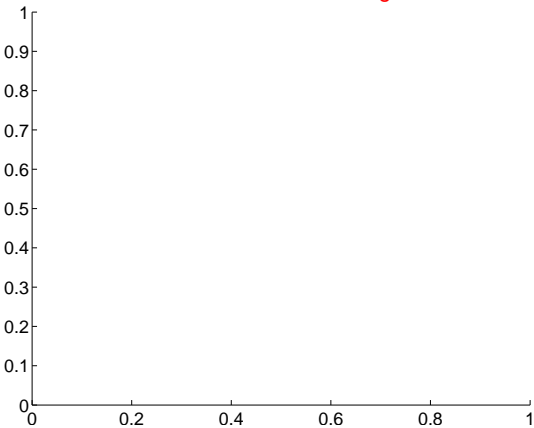
Q11 difference image. Poor Quality



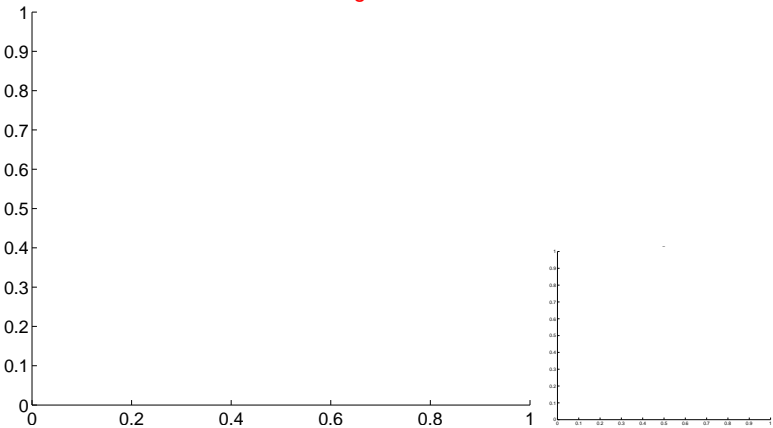
Q11 OOT image



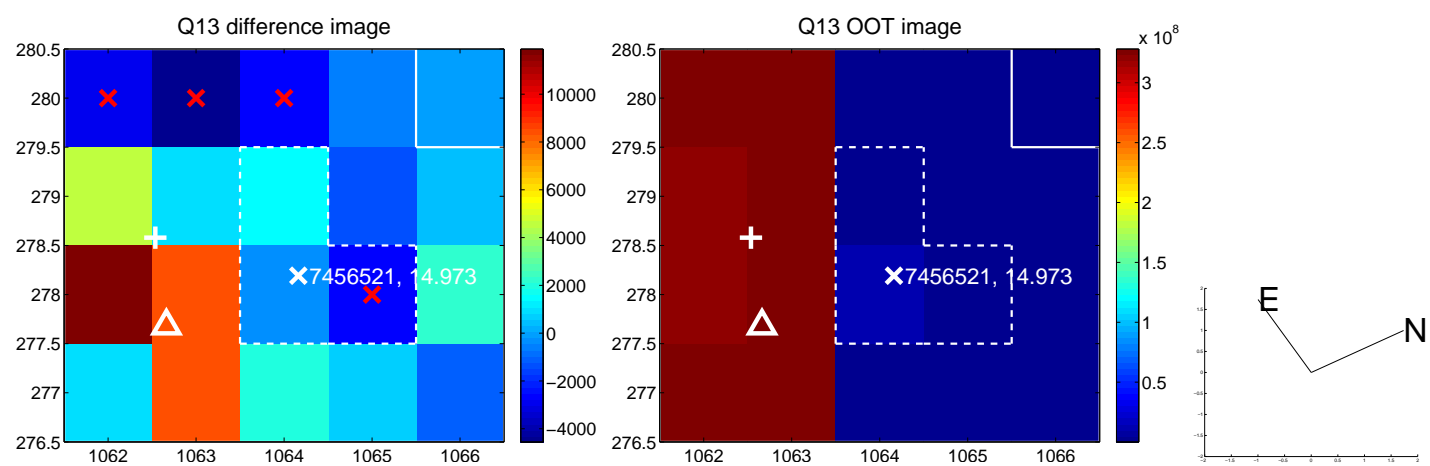
Q12 no difference image



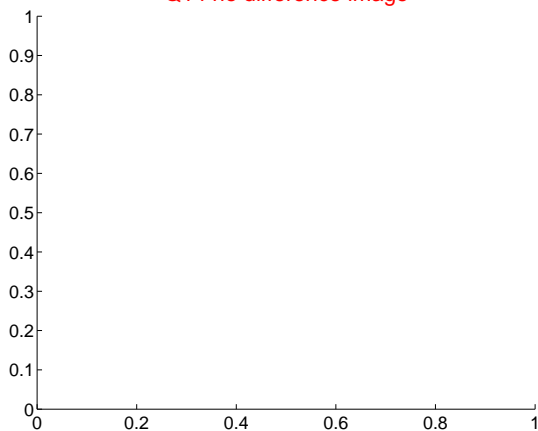
Q12 no OOT image



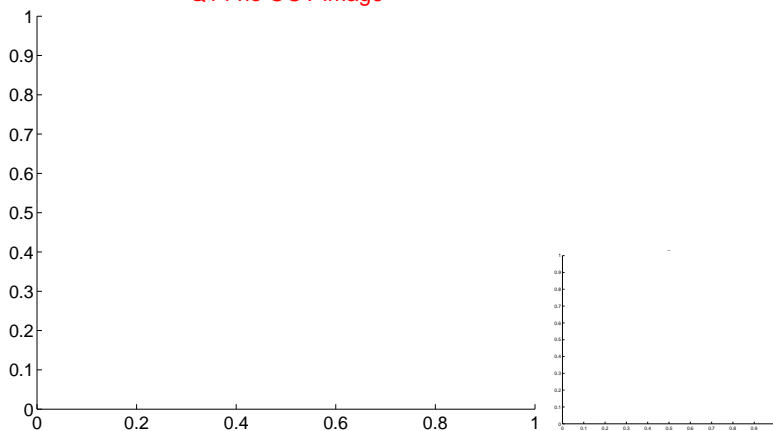
white  $\times$ : KIC target position; +: OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



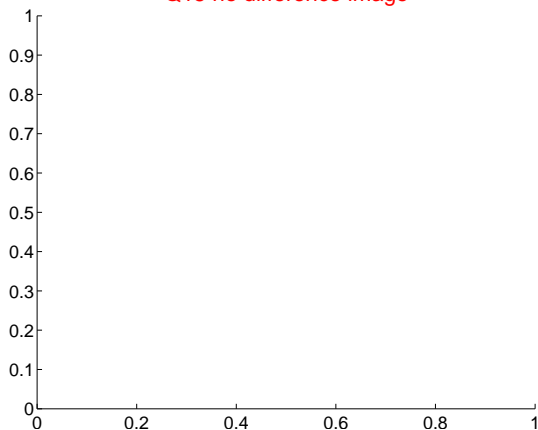
Q14 no difference image



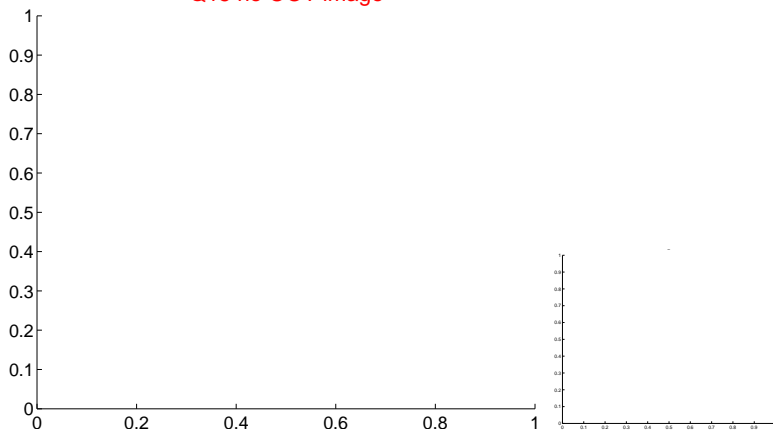
Q14 no OOT image



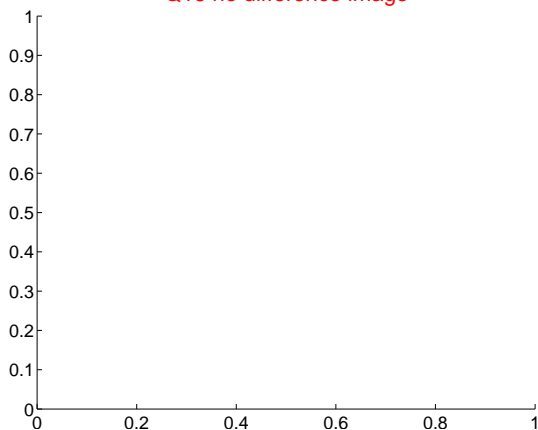
Q15 no difference image



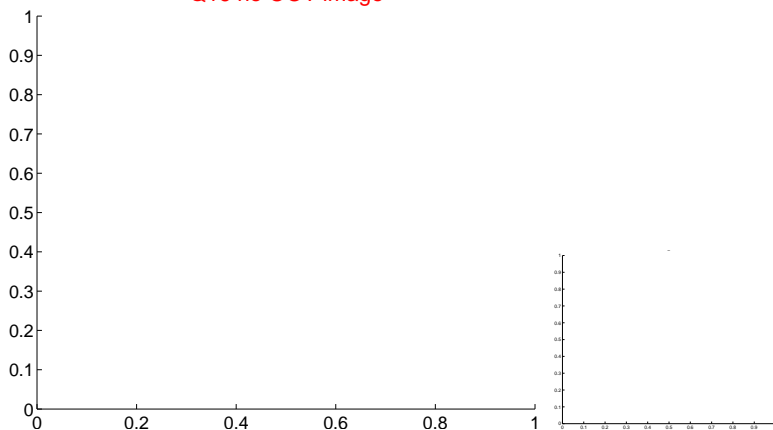
Q15 no OOT image



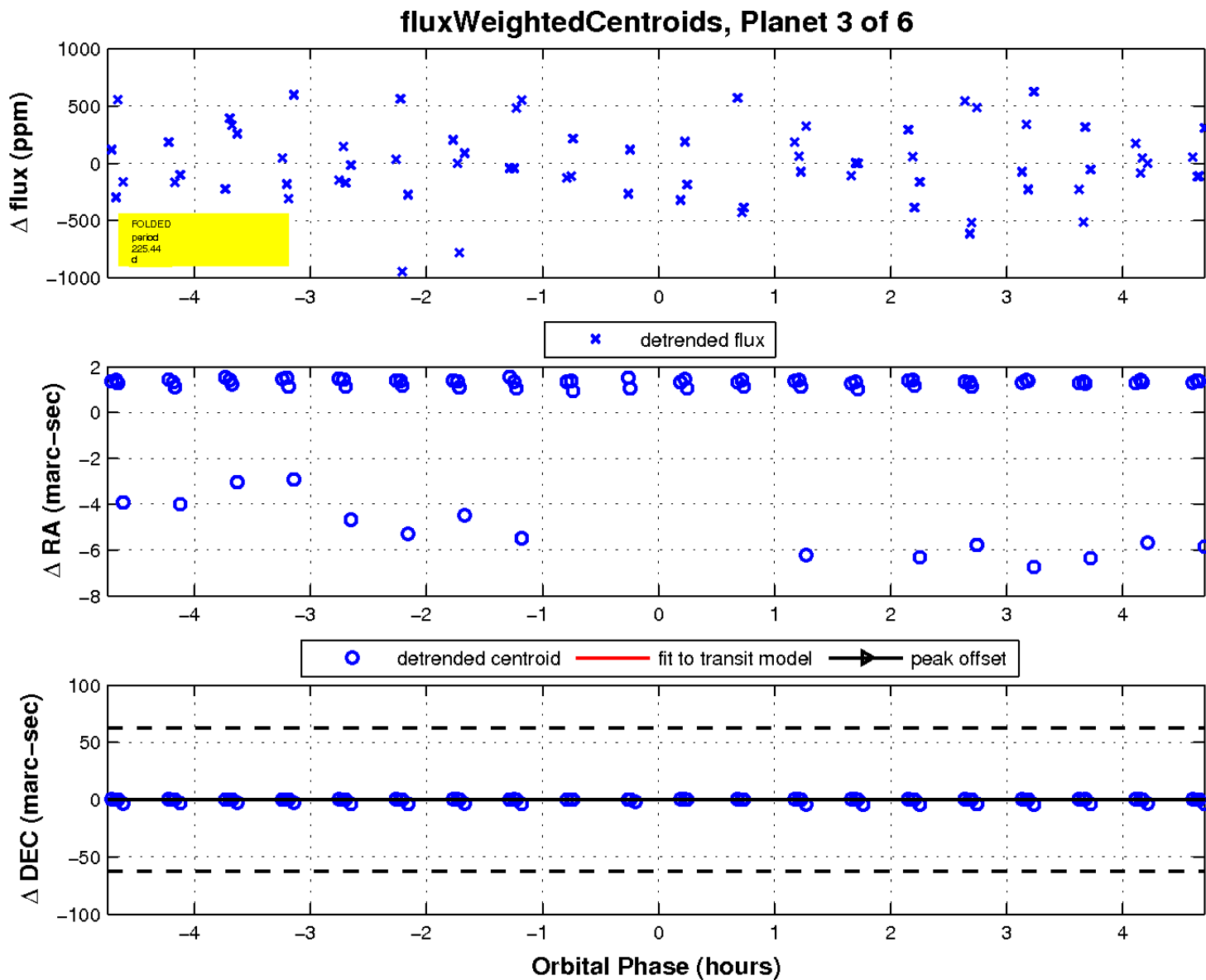
Q16 no difference image



Q16 no OOT image

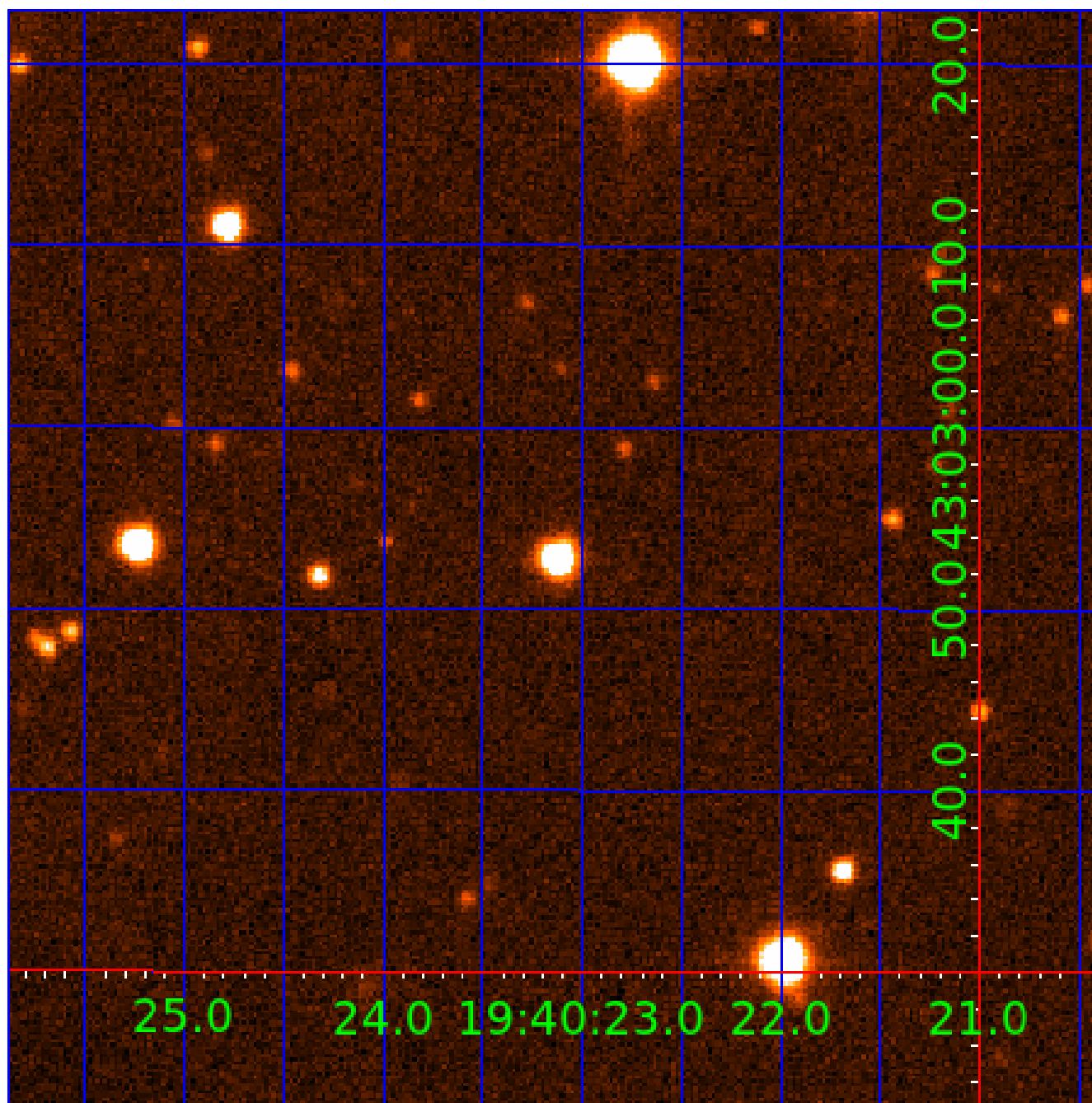


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007456521

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007456521-01	OBS	6880.01	276.418388	207.809907	201230.6	12.500	2534.0	-1.0	0.93	5956	34.12	1.64
007456521-02	OBS	No	276.430042	362.865365	53710.2	16.269	717.2	706.4	0.93	5956	35.89	1.64
007456521-03	OBS	No	225.444119	353.002631	6050.6	1.675	45.2	43.3	0.93	5956	13.34	2.15
007456521-04	OBS	No	369.571723	198.783464	13725.0	74.217	28.5	50.0	0.93	5956	19.14	1.11
007456521-05	OBS	No	296.620153	425.062593	422.4	0.565	13.3	1.7	0.93	5956	2.24	1.49
007456521-06	OBS	No	296.599935	425.427321	778.9	15.000	12.5	-1.0	0.93	5956	2.60	1.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007456521-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_NOFITS
007456521-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD—CENT_KIC_POS
007456521-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-04	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—SAME_NTL_PERIOD—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.

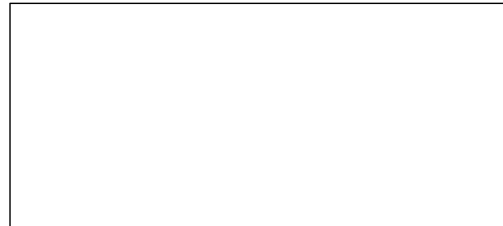
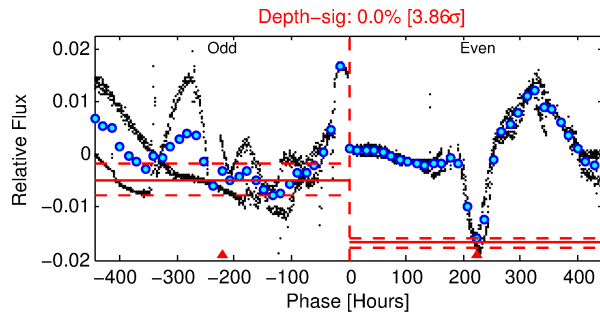
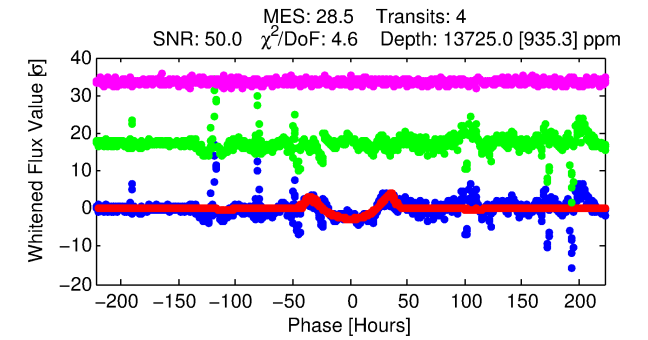
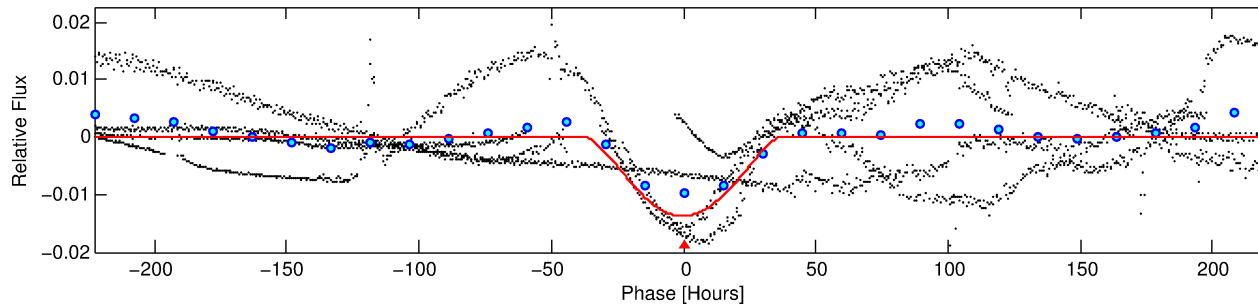
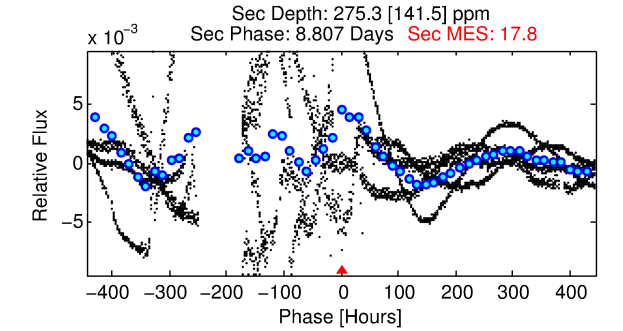
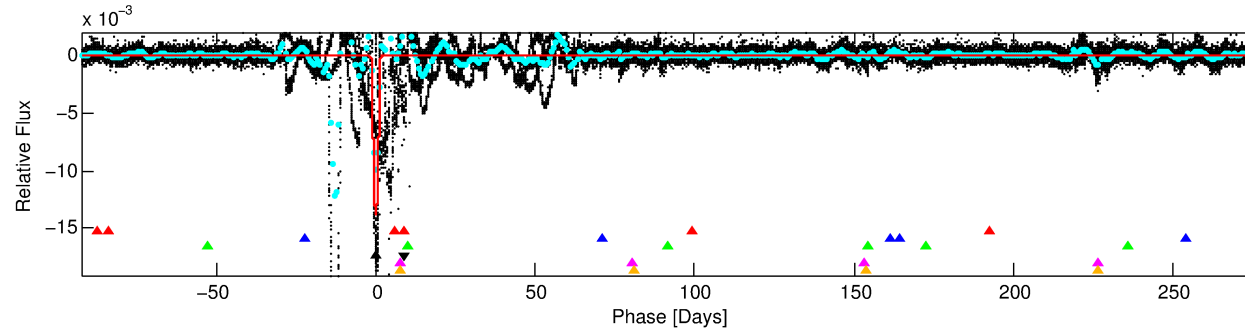
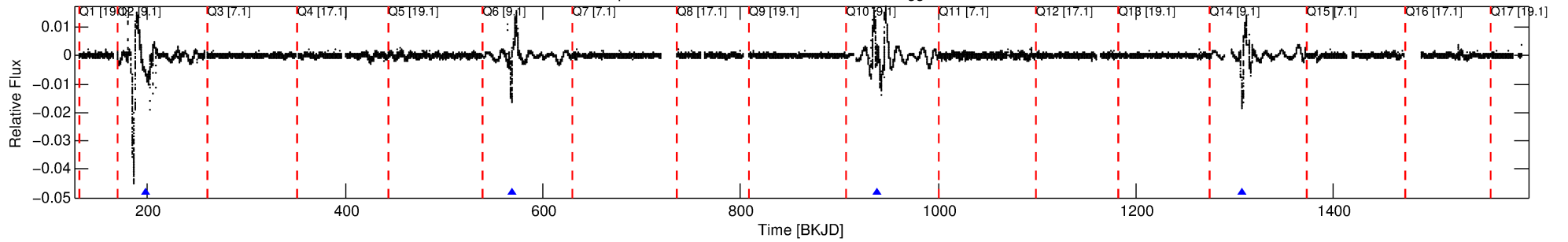
Ephemeris Match Information For 007456521-04

No Significant Match Found

# DV One-Page Summary

KIC: 7456521 Candidate: 4 of 6 Period: 369.572 d  
KOI: K06880 Corr: No Ephemeris Match

Kp: 14.97 R\*: 0.93 Rs Teff: 5956.0 K Logg: 4.40 Fe/H: -0.680



## DV Fit Results:

Period = 369.57172 [0.01665] d  
Epoch = 198.7835 [0.0340] BKJD  
Rp/R\* = 0.1888 [0.0659]  
a/R\* = 24.48 [1.02]  
b = 1.00 [0.09]  
Seff = 1.11 [0.39]  
Teq = 262 [23] K  
Rp = 19.14 [8.22] Re  
a = 0.9343 [0.2036] AU  
Ag = 360.75 [333.95] [1.08σ]  
Teffp = 1765 [386] K [3.89σ]

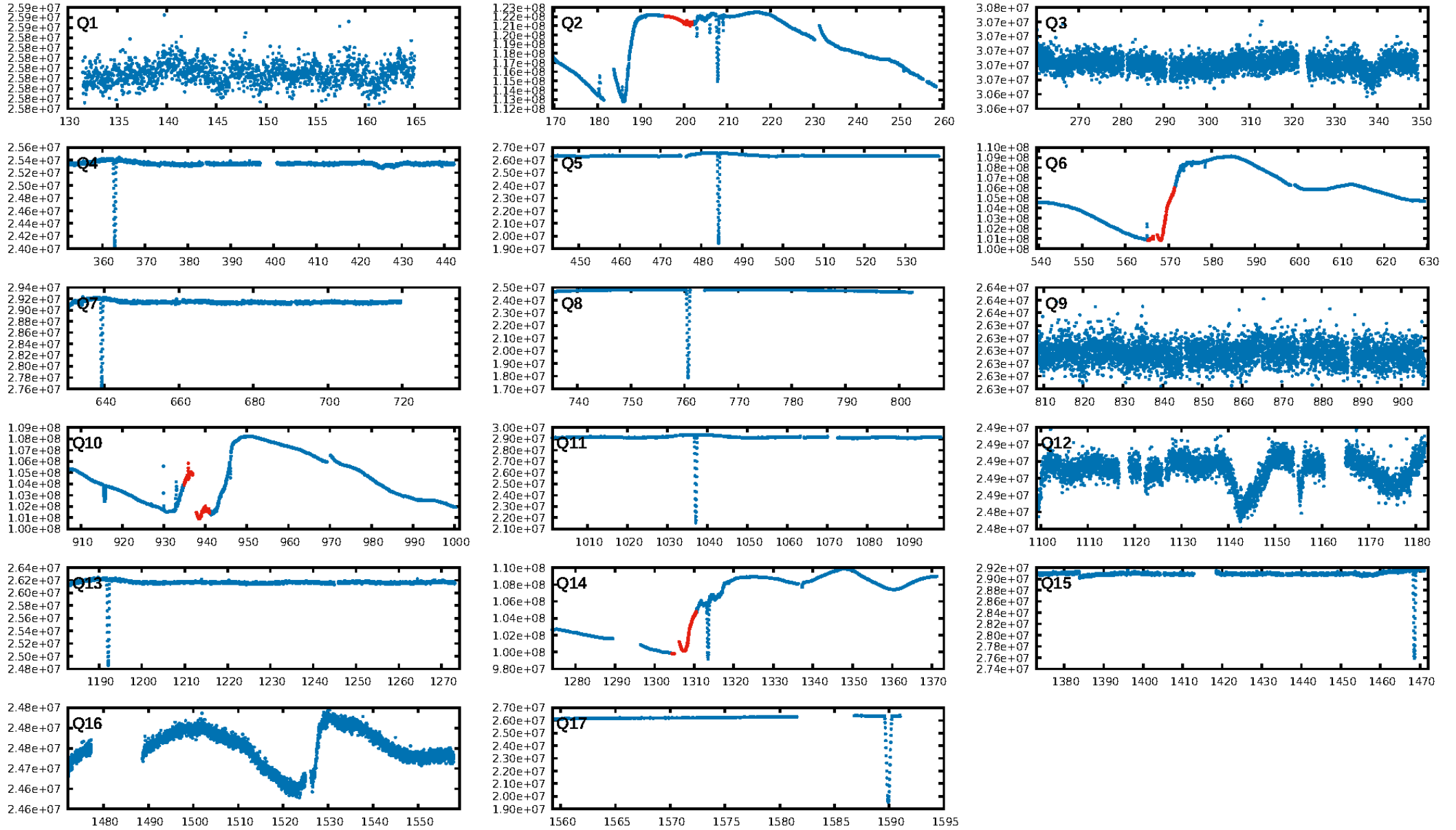
## DV Diagnostic Results:

ShortPeriod-sig: 100.0% [23.59σ]  
LongPeriod-sig: N/A  
ModelChiSquare2-sig: 0.0%  
ModelChiSquareGof-sig: 0.0%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [4/4]  
GhostDiagnostic-chr: -1.456  
Centroid-sig: N/A  
Centroid-so: 4.379 arcsec [47.60σ]  
OotOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-rm: N/A  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: N/A

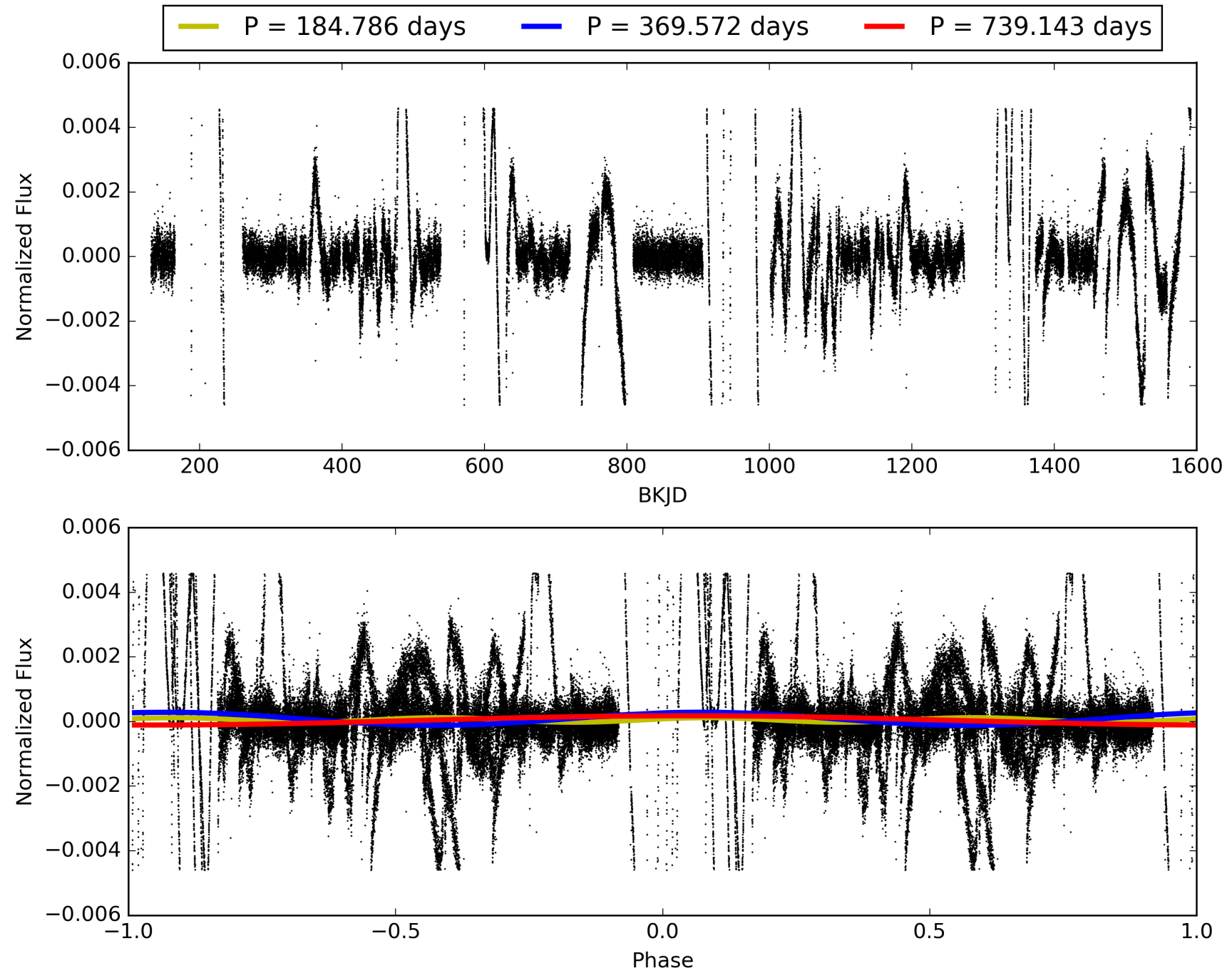
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:18:40 Z

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

# TCE 007456521-04, PDC Light Curves



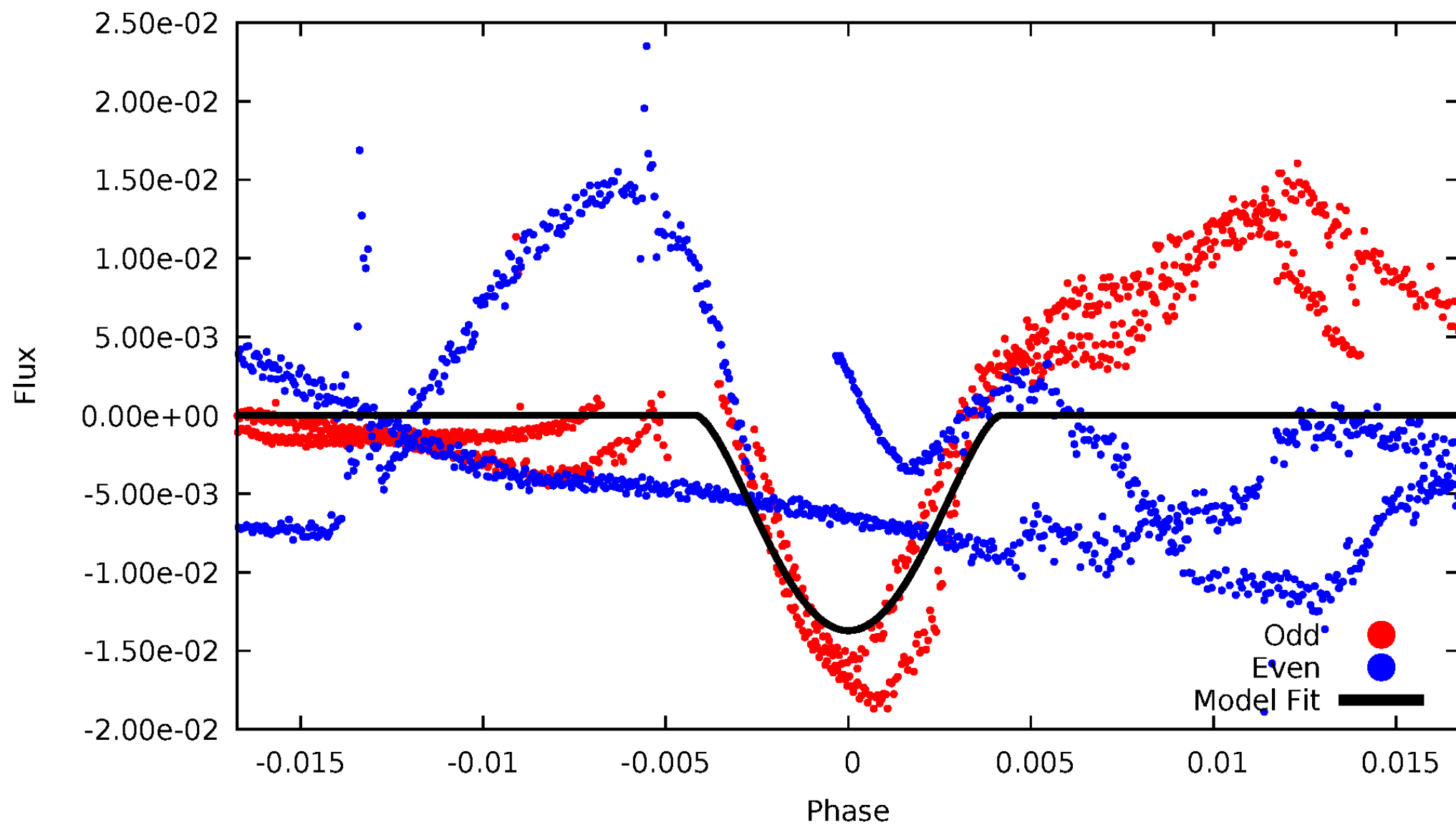
TCE 007456521-04





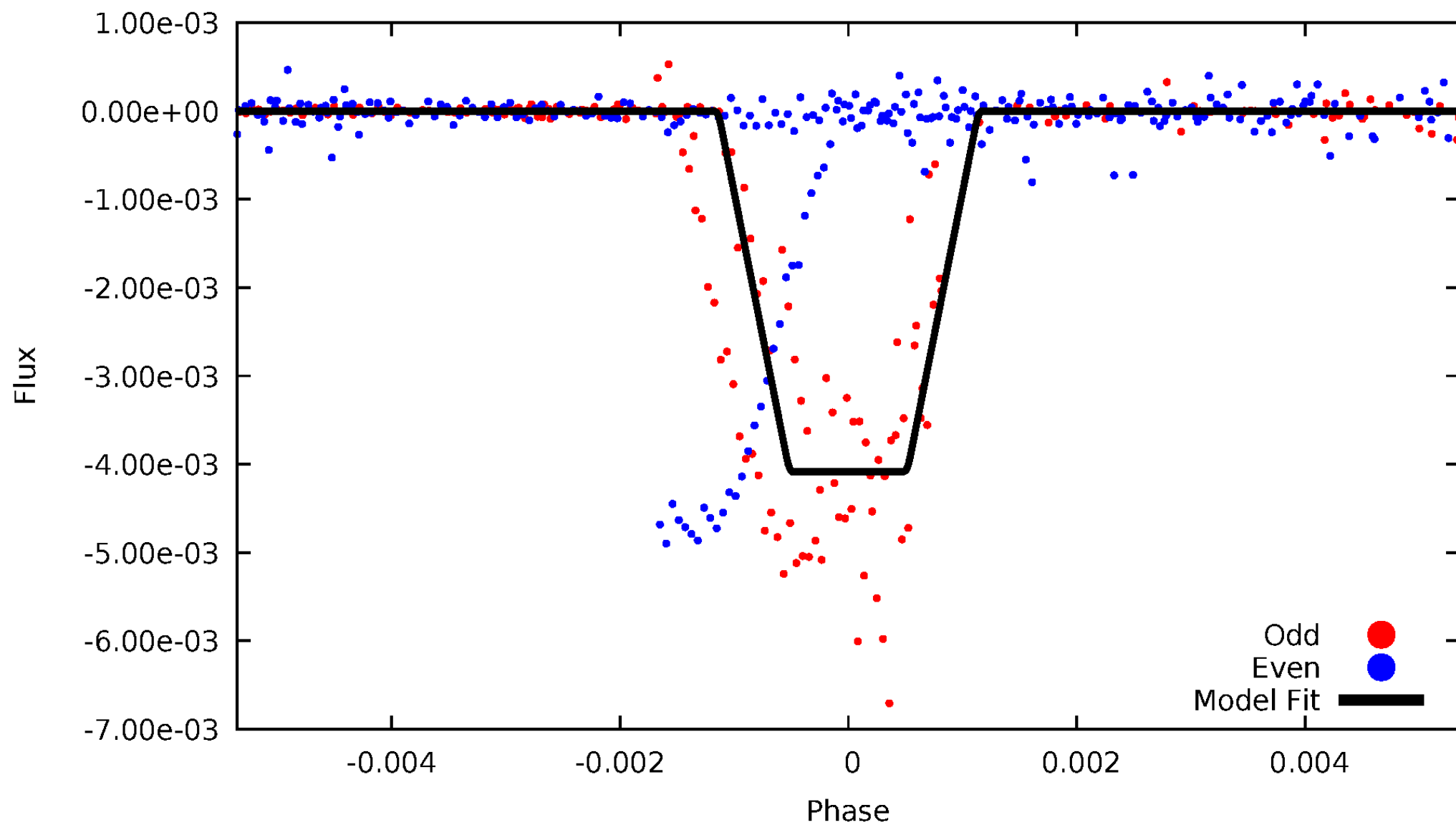
# DV Odd/Even

TCE 007456521-04



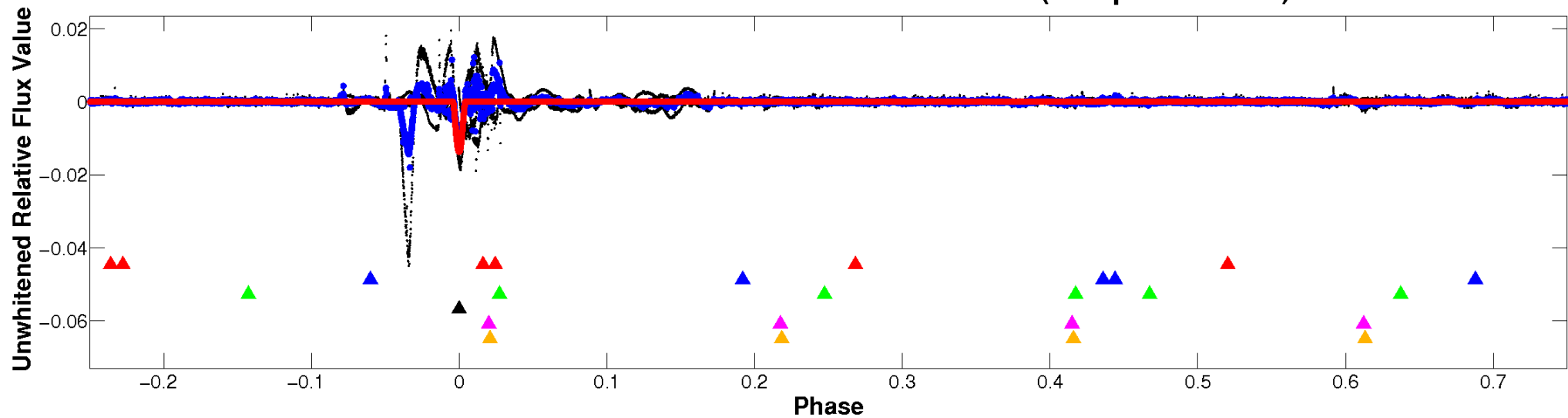
# ALT Odd/Even

TCE 007456521-04

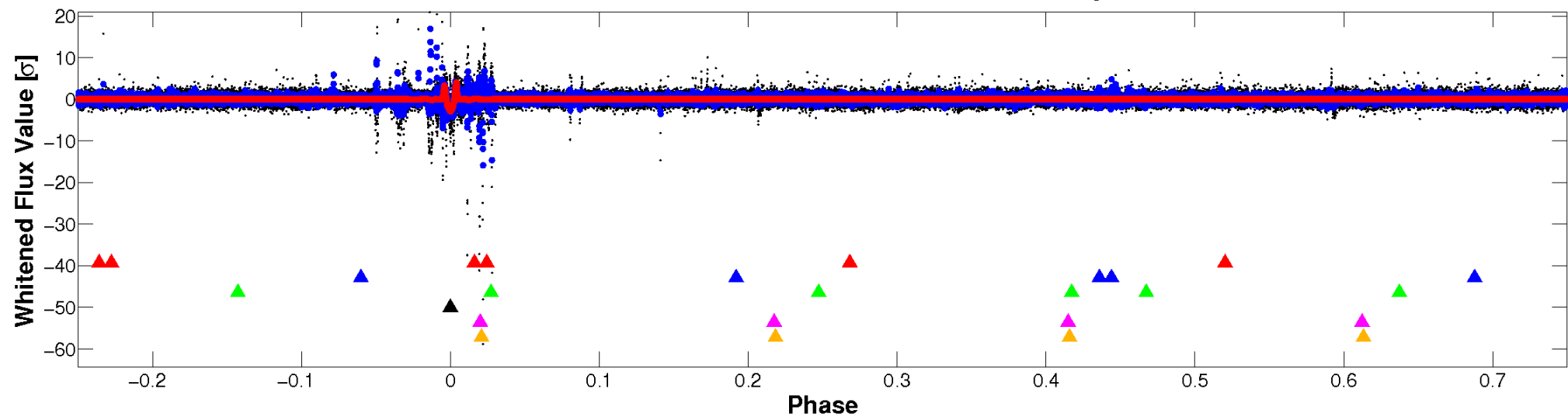


# Non-Whitened Vs. Whitened Light Curve

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

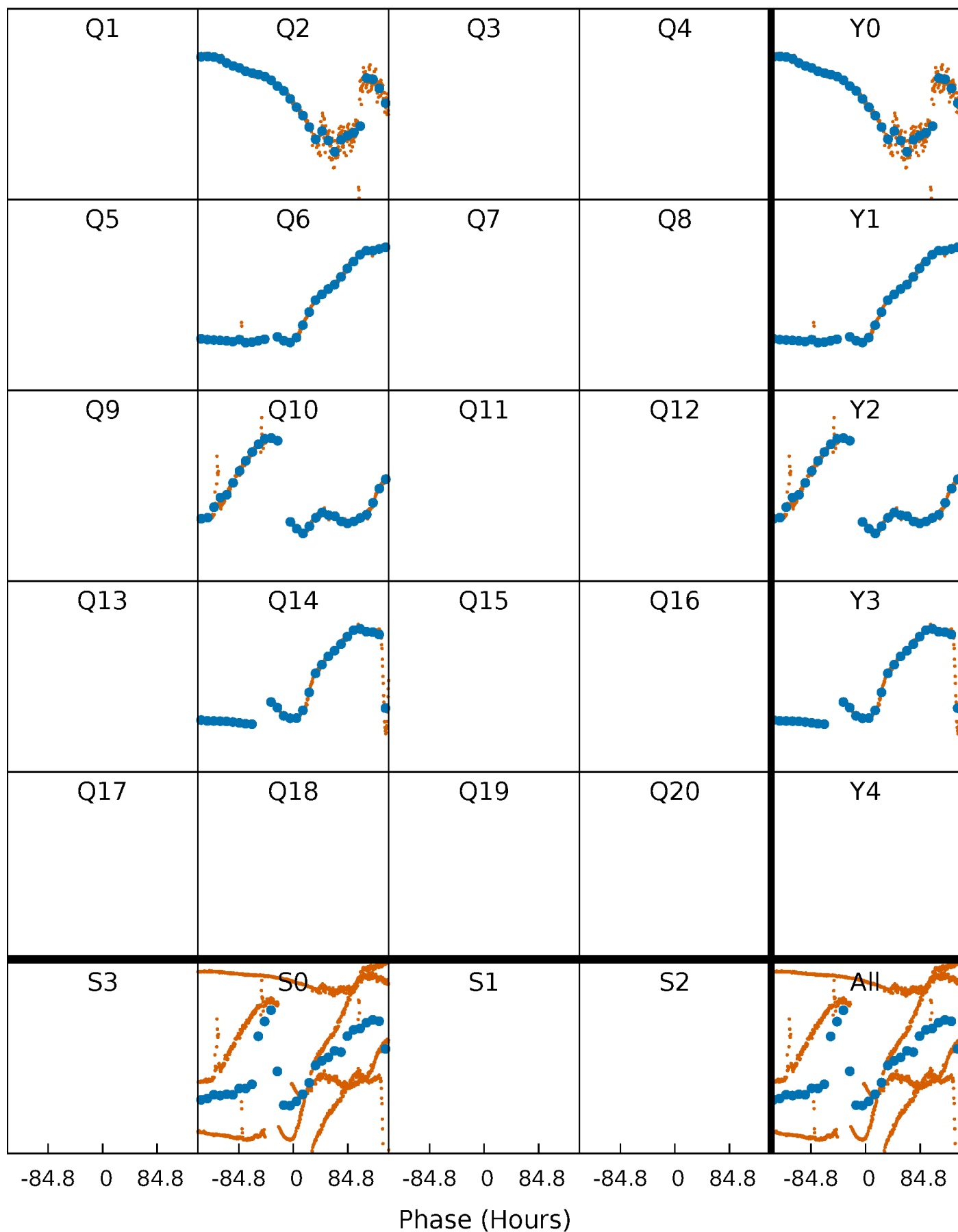


## Planet 4 : Phased Whitened Flux Time Series (Fit Epoch/Period)



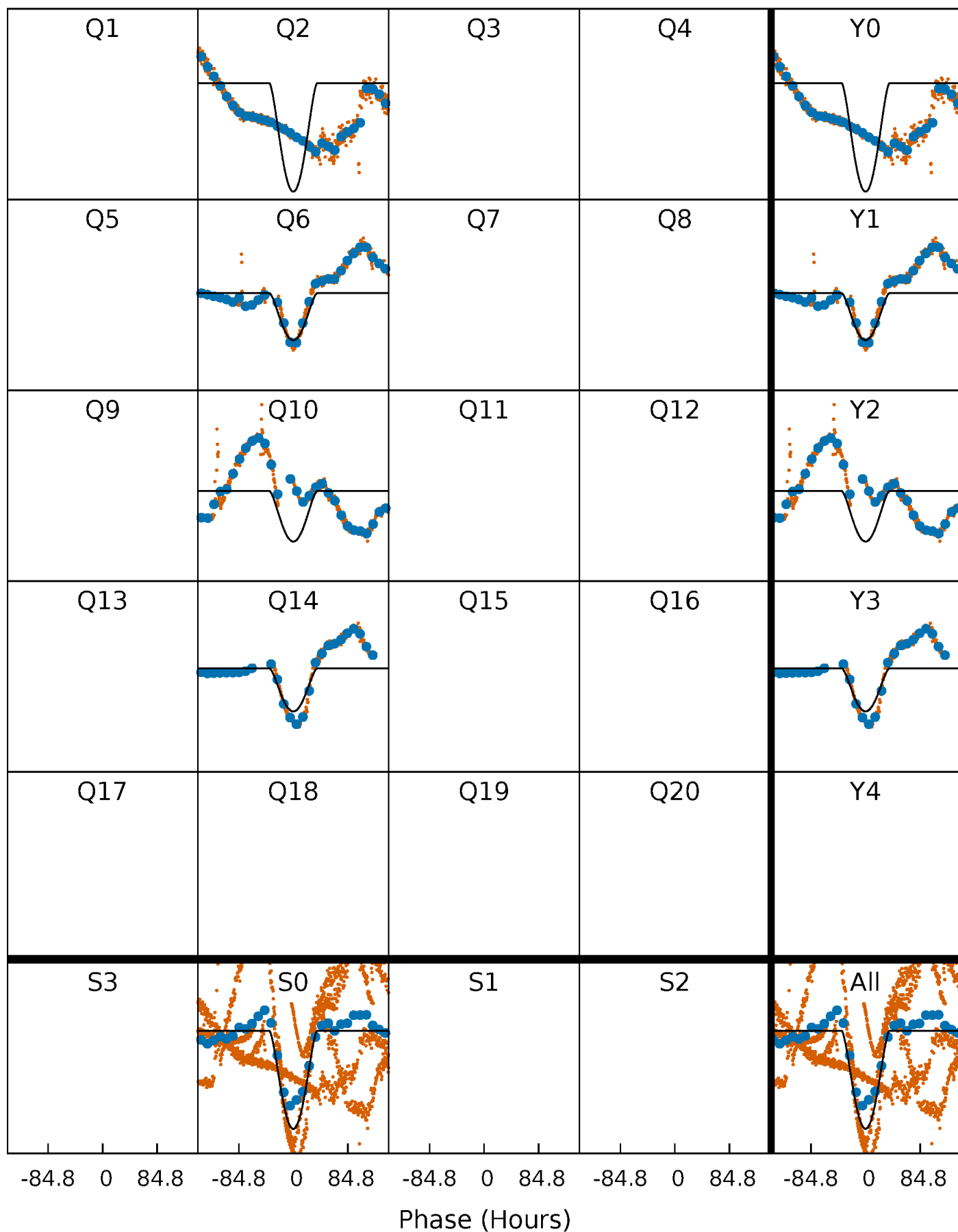
# PDC Quarter-Phased Transit Curves

TCE 007456521-04 P=369.571723 Days  $T_0=198.783464$  (BKJD)



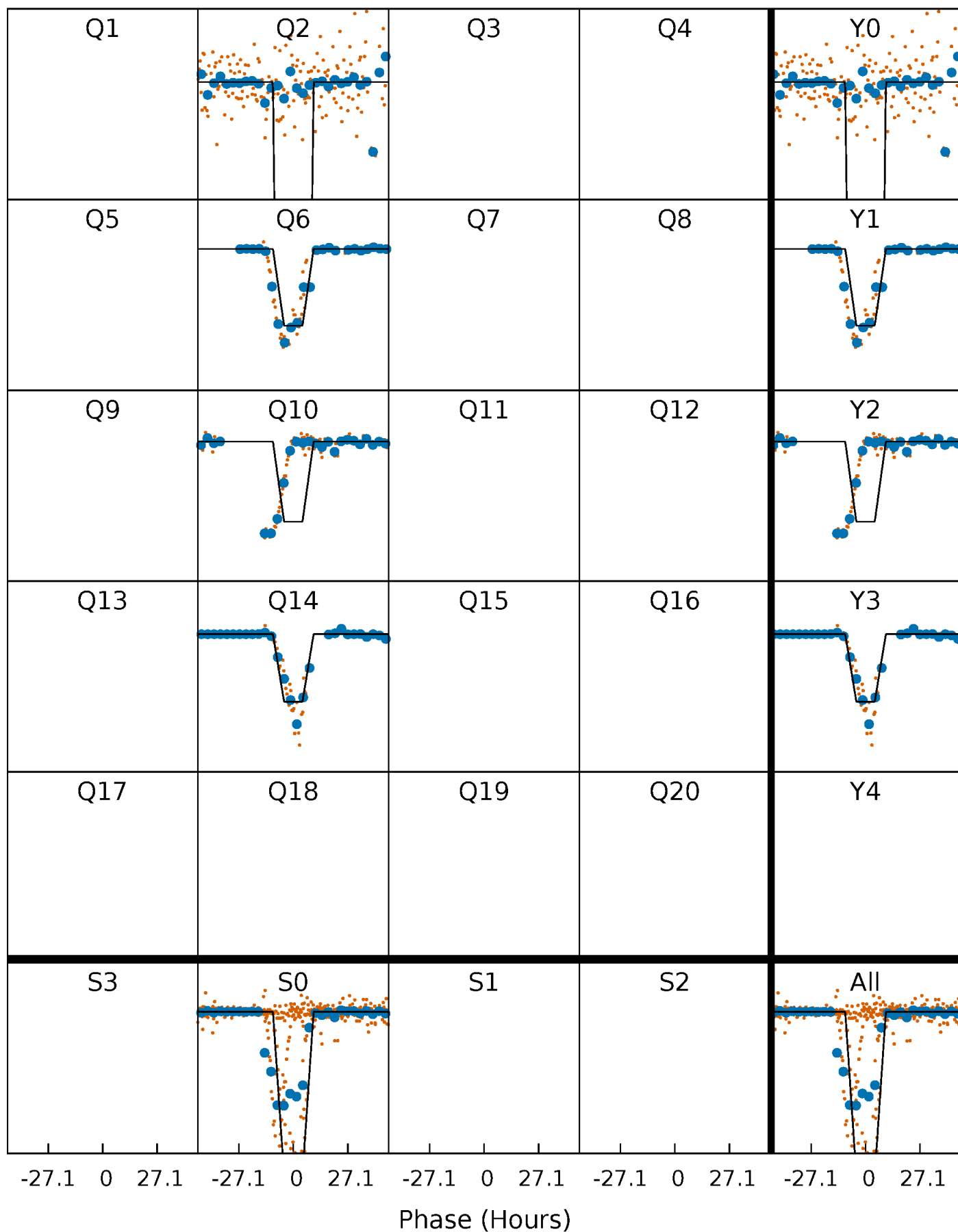
# DV Quarter-Phased Transit Curves

TCE 007456521-04     $P=369.571723$  Days     $T_0=198.783464$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

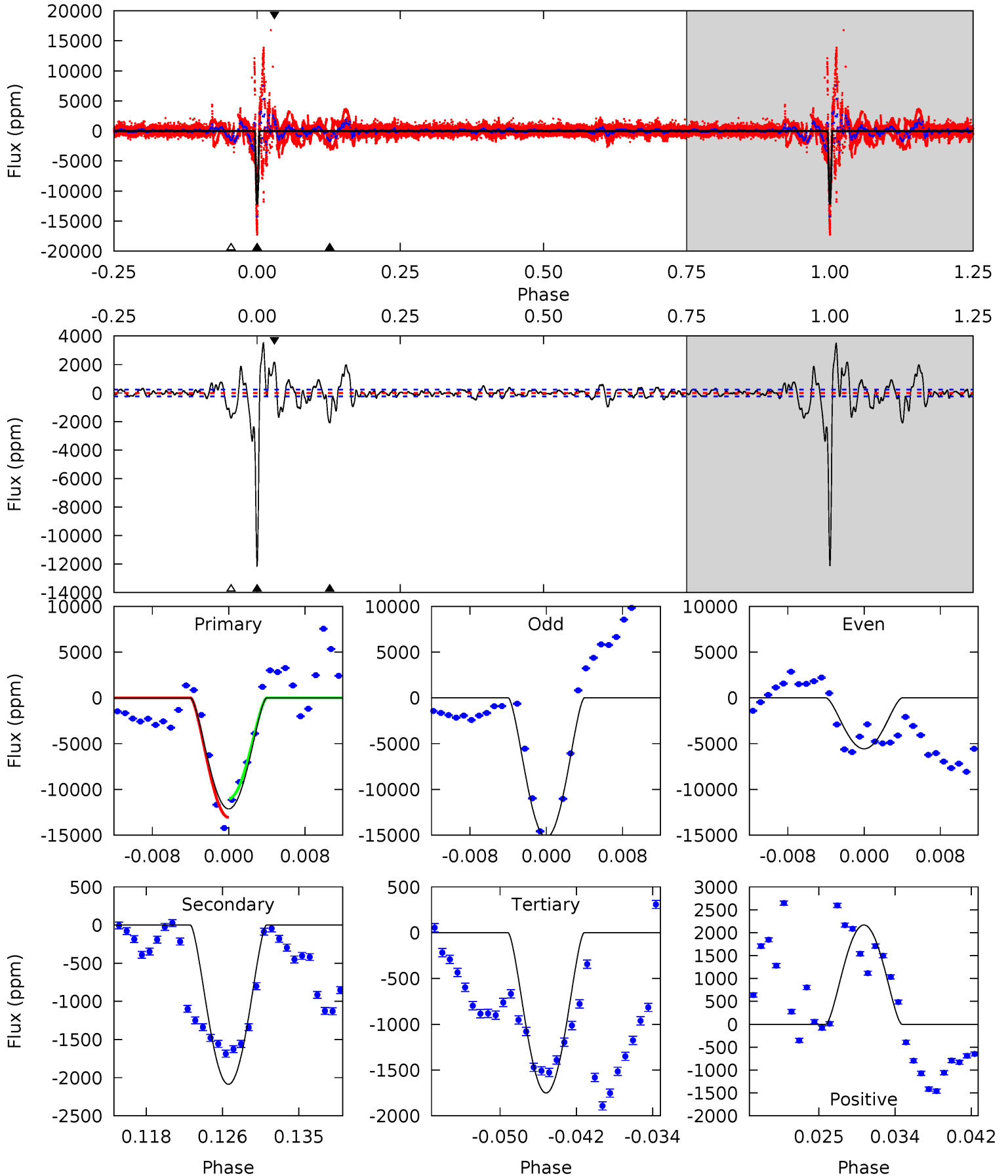
TCE 007456521-04 P=369.840625 Days  $T_0=198.732636$  (BKJD)



# DV Model-Shift Uniqueness Test

007456521-04, P = 369.571723 Days, E = 198.783464 Days

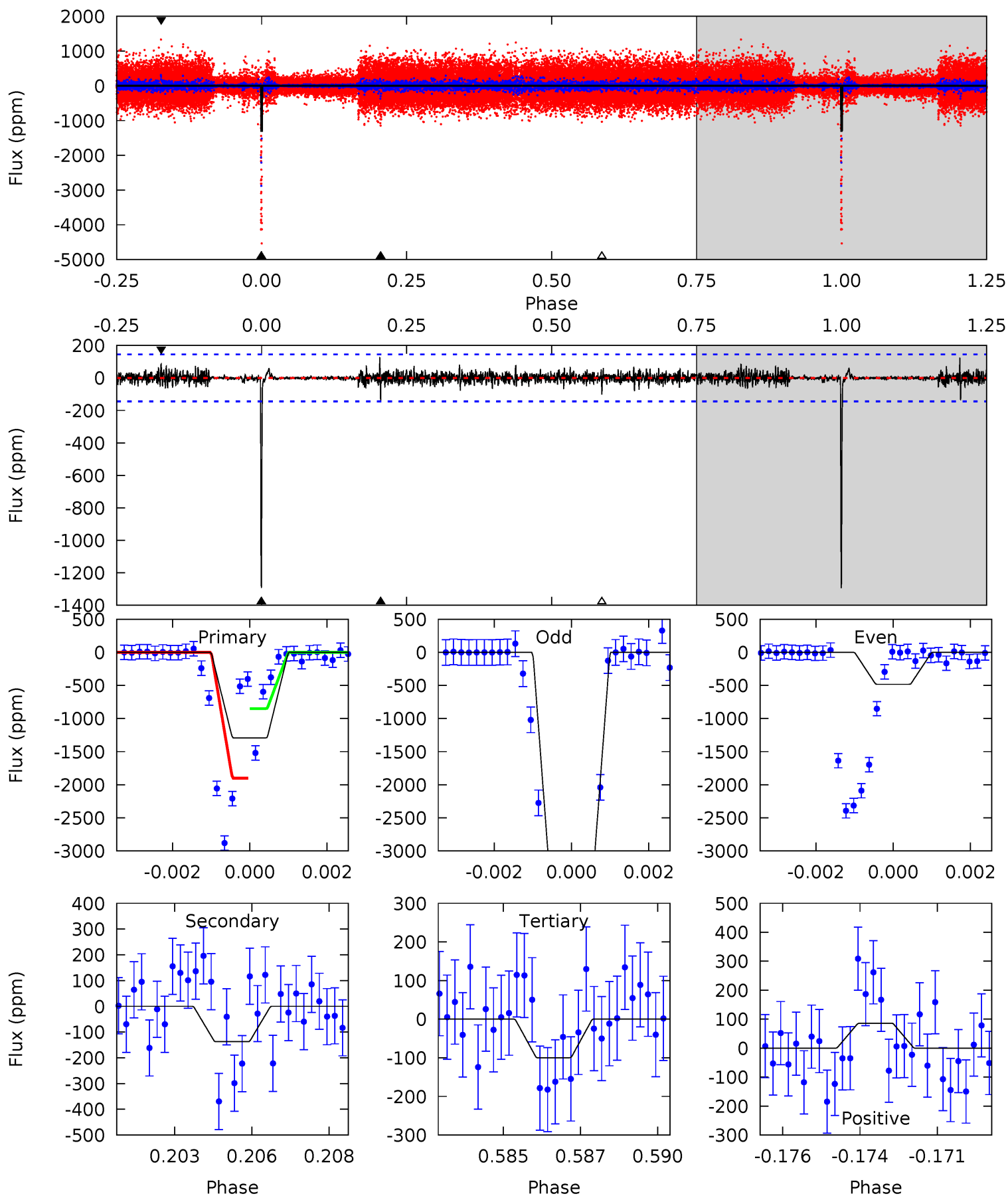
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
259.9	44.7	37.5	46.4	5.06	2.64	10.7	222.4	213.4	7.20	-1.75	74.0	0.92	0.22	0



# Alt Model-Shift Uniqueness Test

007456521-04, P = 369.840625 Days, E = 198.732636 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
47.3	5.03	3.65	3.14	5.30	3.05	0.71	43.7	44.2	1.38	1.89	80.1	0.92	0.09	0





### Stellar Parameters For KIC 007456521

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5956^{+179}_{-179}$	$4.403^{+0.149}_{-0.182}$	$-0.680^{+0.300}_{-0.300}$	$0.929^{+0.233}_{-0.155}$	$0.797^{+0.102}_{-0.055}$	$1.398^{+0.955}_{-0.653}$
	+3%/-3%	+3%/-4%	+44%/-44%	+25%/-17%	+13%/-7%	+68%/-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 007456521-04 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-2087 \pm 47$	$19.48^{+7.03}_{-6.42}$	$367^{+26}_{-22}$	$3426^{+487}_{-289}$	$2675^{+3237}_{-1246}$
Alt.	$-138 \pm 27$	$8.10^{+6.19}_{-5.08}$	$367^{+26}_{-22}$	$2958^{+1058}_{-398}$	$937^{+6238}_{-625}$

$T_{max}$  = 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

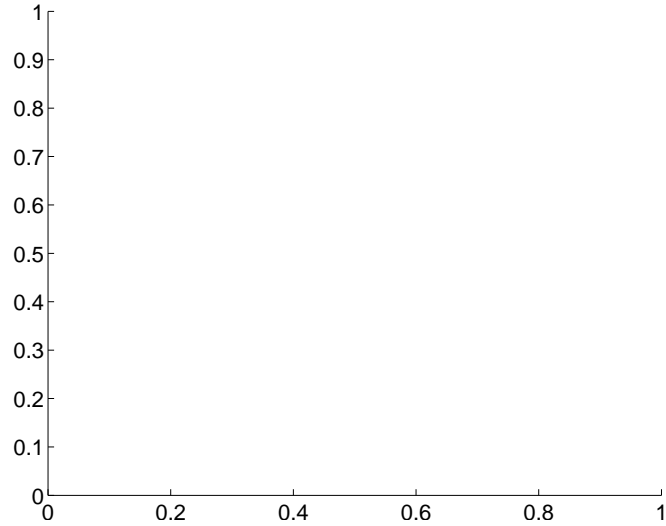
Supplemental centroid analysis for 007456521-04. Kepler magnitude: 14.97. Transit SNR 50.01

There are 0 quarters with good PRF difference image offsets

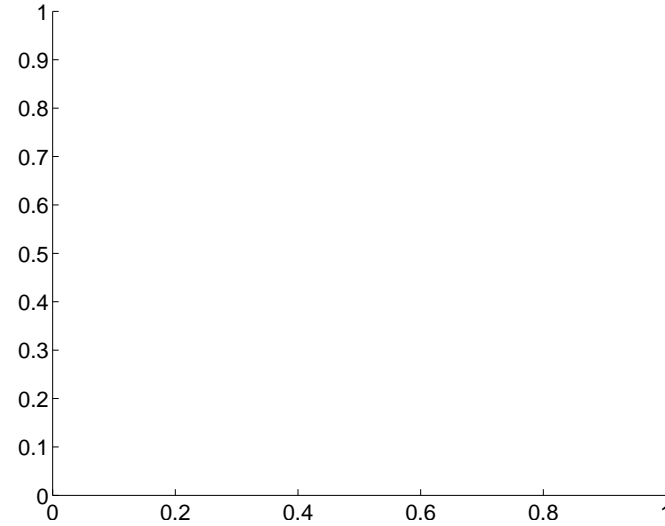
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$4.38 \pm 0.09$	47.60	$2.61 \pm 0.12$	$-3.52 \pm 0.08$

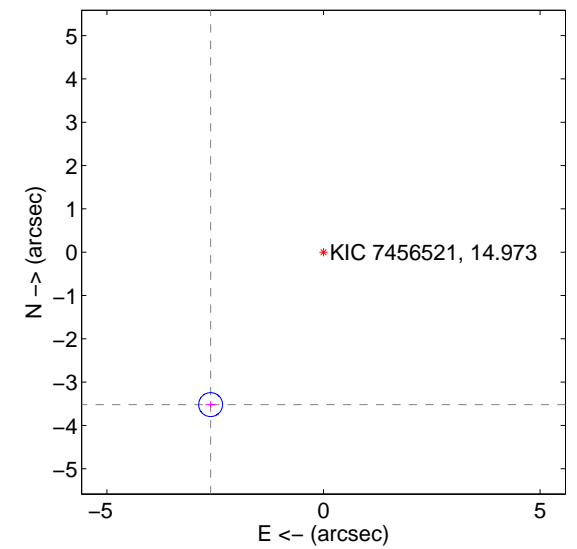
There is no PRF-fit offset from OOT-fit



There is no PRF-fit offset from KIC



offset from photometric centroids



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

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



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



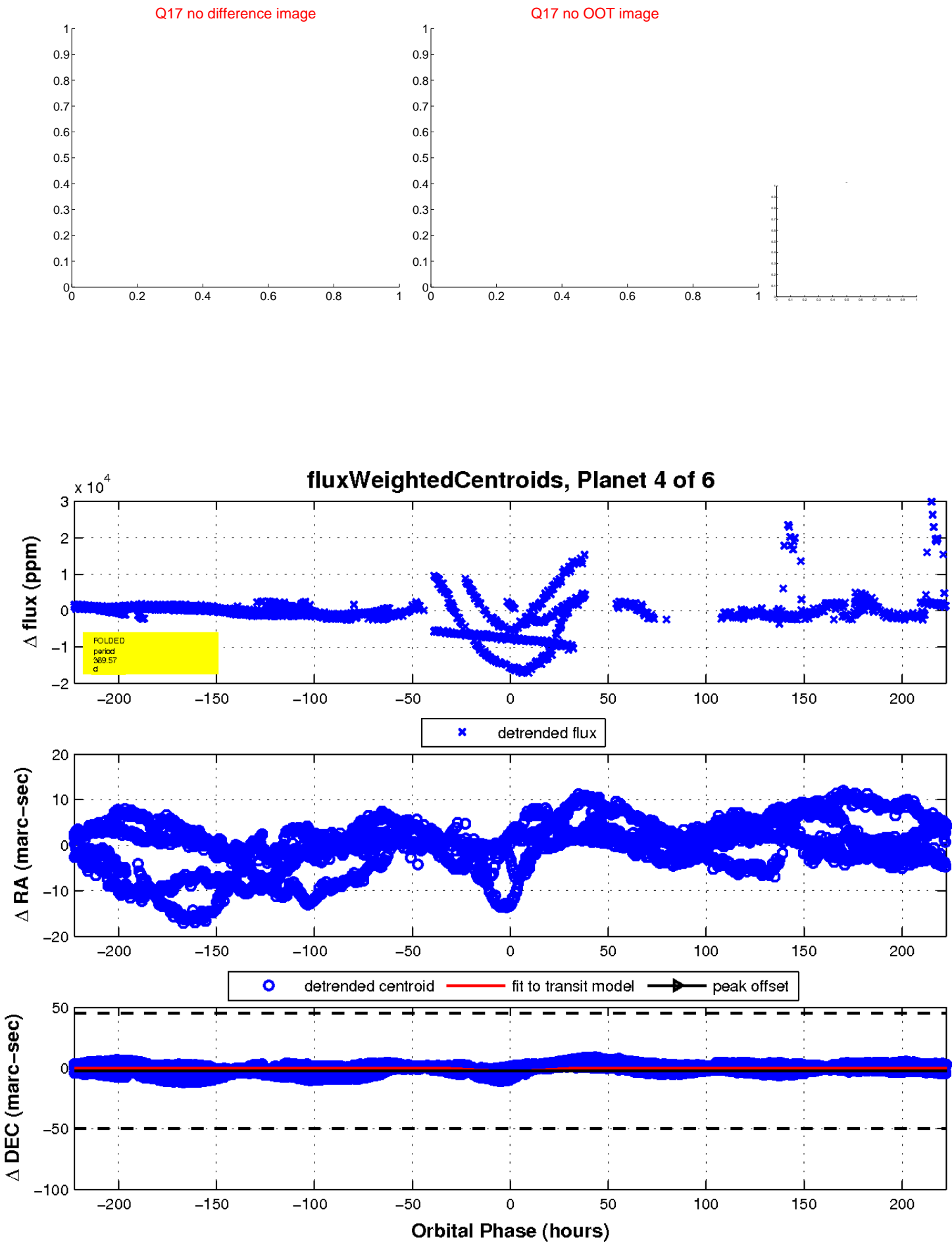
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

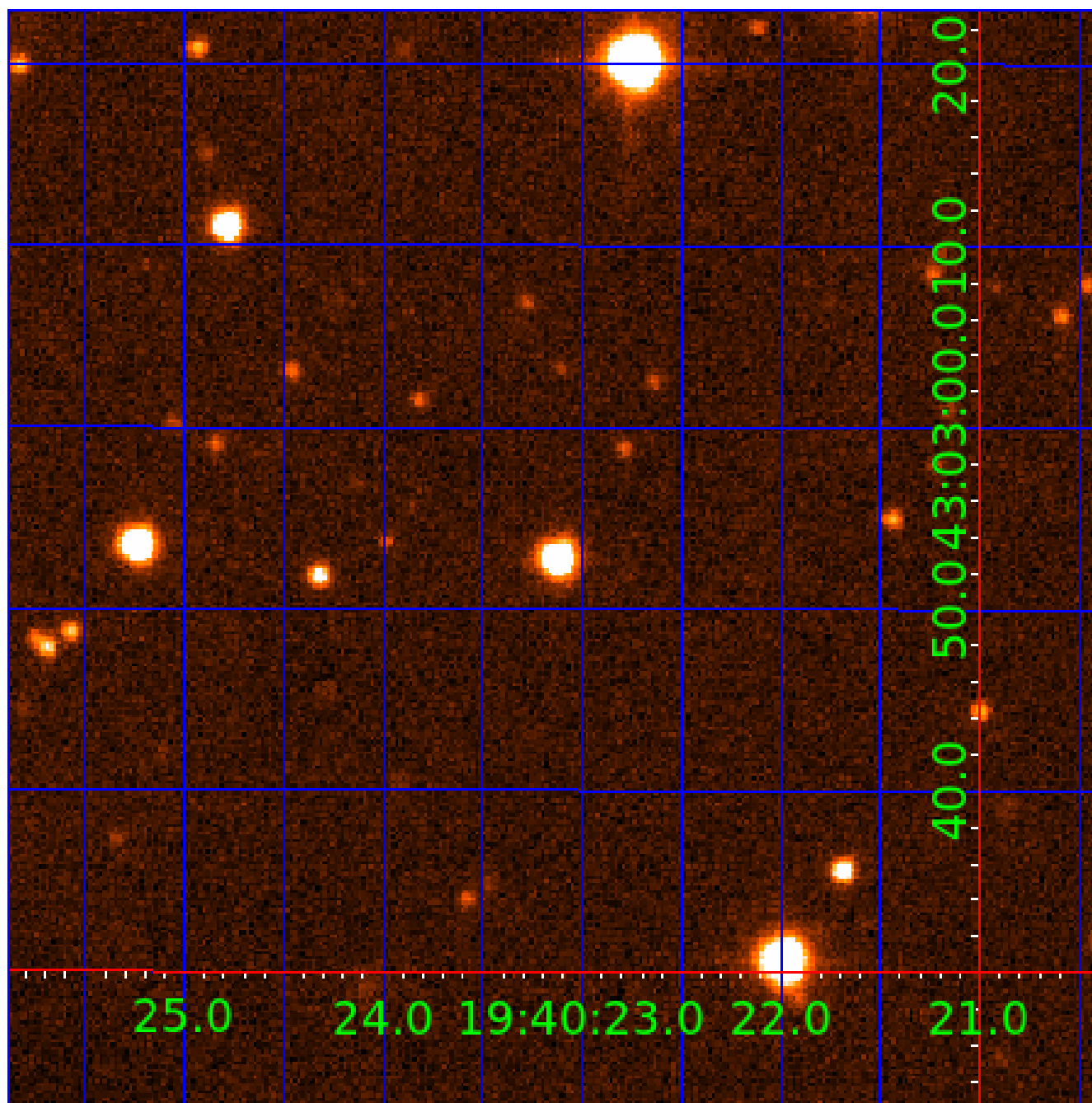


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination





# KIC 007456521

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007456521-01	OBS	6880.01	276.418388	207.809907	201230.6	12.500	2534.0	-1.0	0.93	5956	34.12	1.64
007456521-02	OBS	No	276.430042	362.865365	53710.2	16.269	717.2	706.4	0.93	5956	35.89	1.64
007456521-03	OBS	No	225.444119	353.002631	6050.6	1.675	45.2	43.3	0.93	5956	13.34	2.15
007456521-04	OBS	No	369.571723	198.783464	13725.0	74.217	28.5	50.0	0.93	5956	19.14	1.11
007456521-05	OBS	No	296.620153	425.062593	422.4	0.565	13.3	1.7	0.93	5956	2.24	1.49
007456521-06	OBS	No	296.599935	425.427321	778.9	15.000	12.5	-1.0	0.93	5956	2.60	1.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007456521-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_NOFITS
007456521-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD—CENT_KIC_POS
007456521-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-04	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—SAME_NTL_PERIOD—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 007456521-05

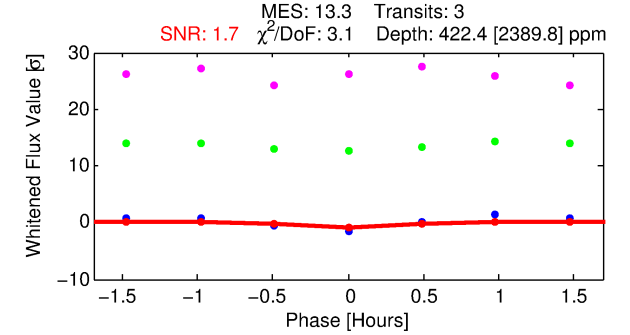
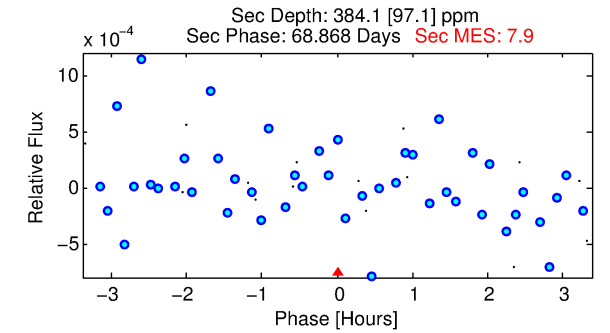
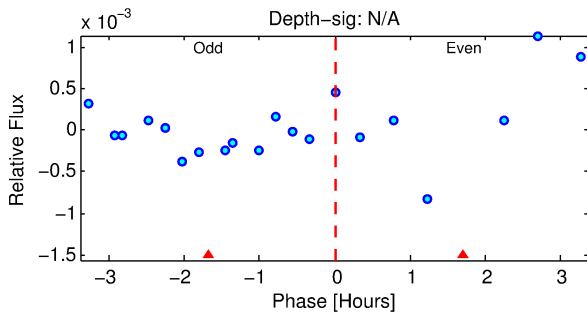
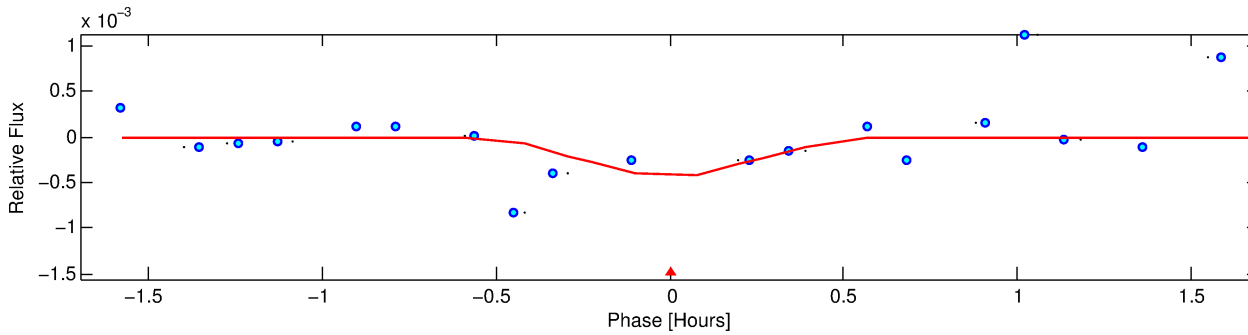
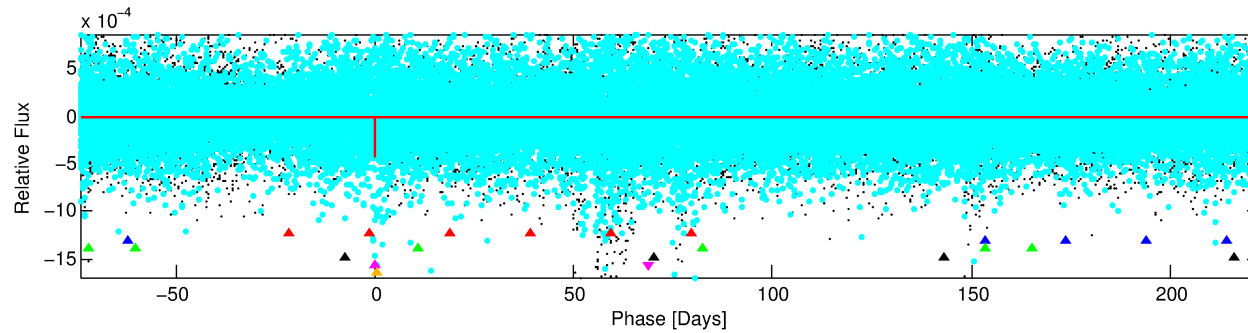
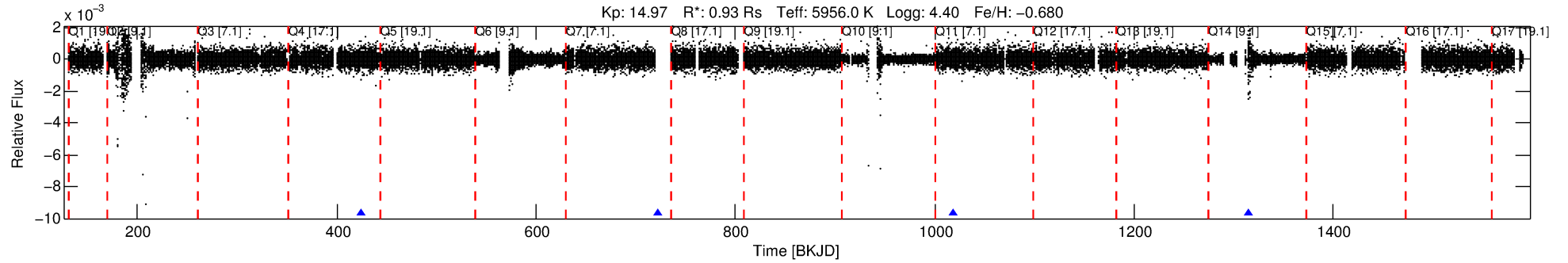
No Significant Match Found

# DV One-Page Summary

KIC: 7456521 Candidate: 5 of 6 Period: 296.620 d

KOI: K06880 Corr: No Ephemeris Match

Kp: 14.97 R\*: 0.93 Rs Teff: 5956.0 K Logg: 4.40 Fe/H: -0.680



## DV Fit Results:

Period = 296.62015 [0.04591] d  
Epoch = 425.0626 [0.0356] BKJD  
Rp/R\* = 0.0221 [0.4289]  
a/R\* = 2864.97 [241084.64]  
b = 0.73 [59.24]  
Seff = 1.49 [0.52]  
Teq = 282 [24] K  
Rp = 2.24 [43.48] Re  
a = 0.8069 [0.1758] AU  
Ag = 27317.84 [1058636.22] [0.03σ]  
Teffp = 5604 [54290] K [0.10σ]

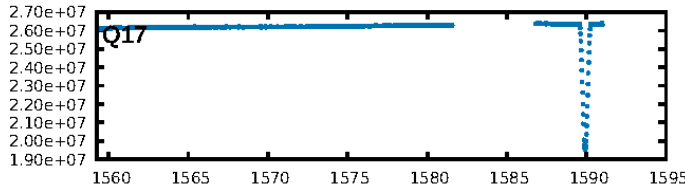
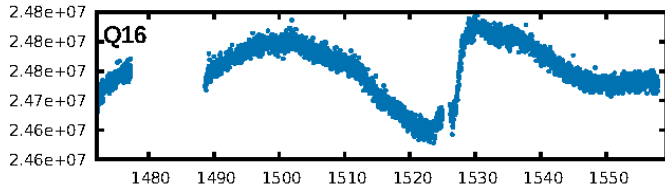
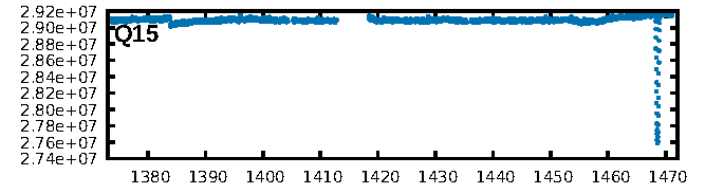
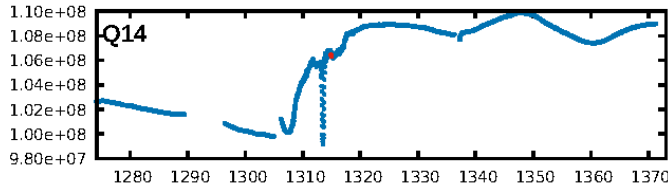
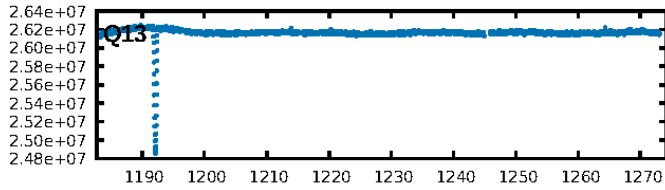
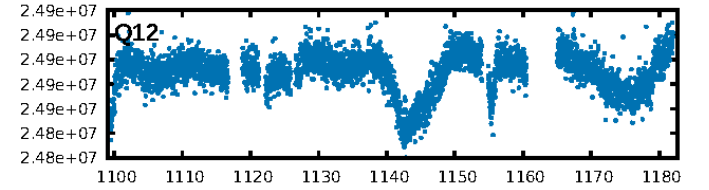
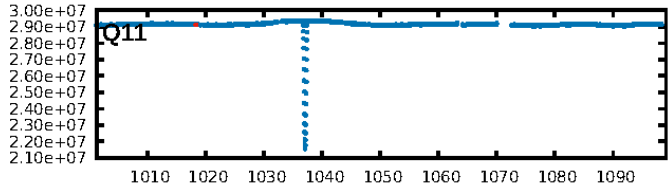
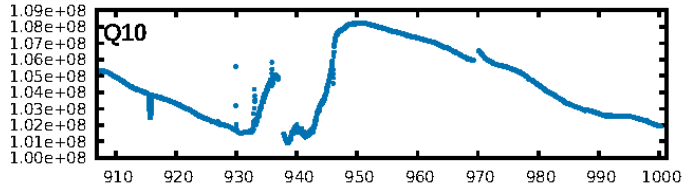
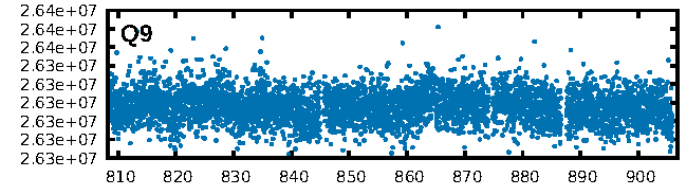
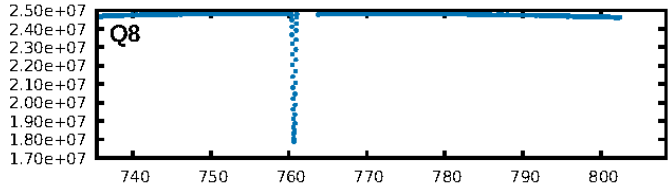
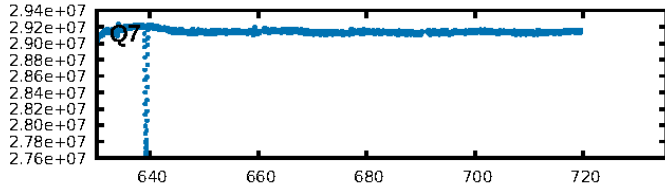
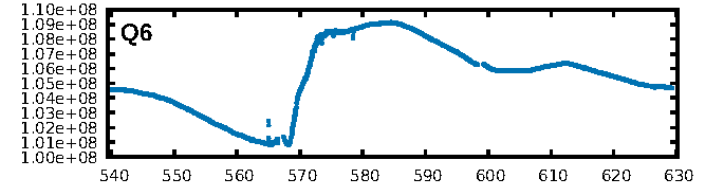
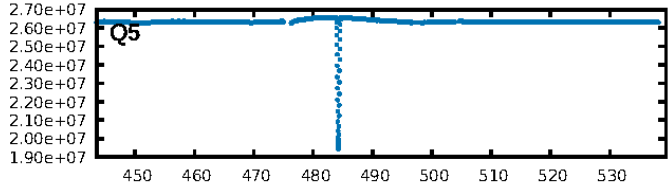
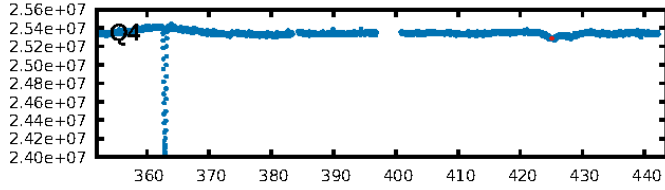
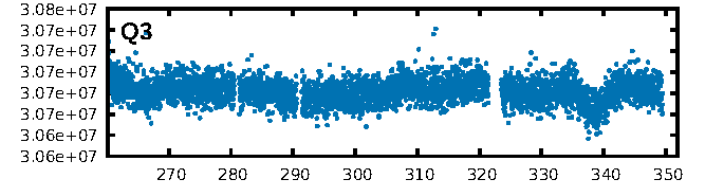
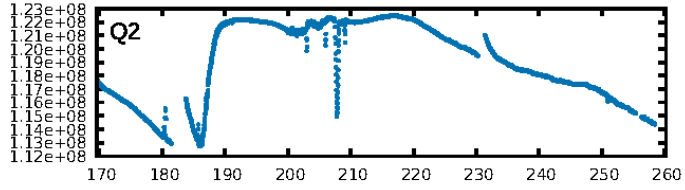
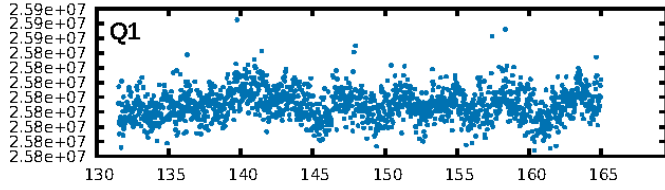
## DV Diagnostic Results:

ShortPeriod-sig: 2.6% [0.03σ]  
LongPeriod-sig: 100.0% [23.59σ]  
ModelChiSquare2-sig: 77.6%  
ModelChiSquareGof-sig: 91.7%  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: 1.743  
Centroid-sig: N/A  
Centroid-so: 4.337 arcsec [8.82σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0/0 [0]  
KicOffset-st: 0/0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 0.00 [0/2]

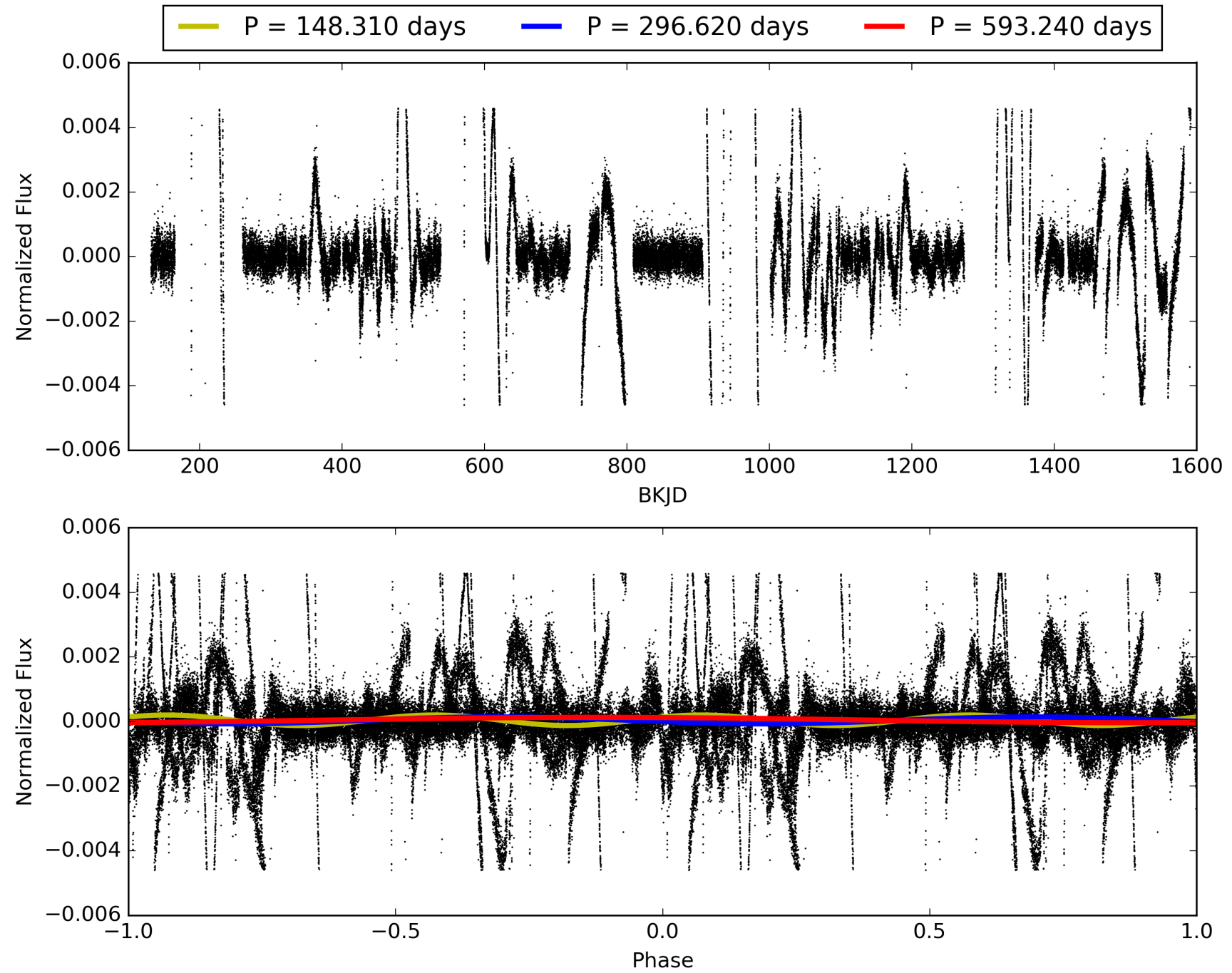
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:19:34 Z

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

## TCE 007456521-05, PDC Light Curves

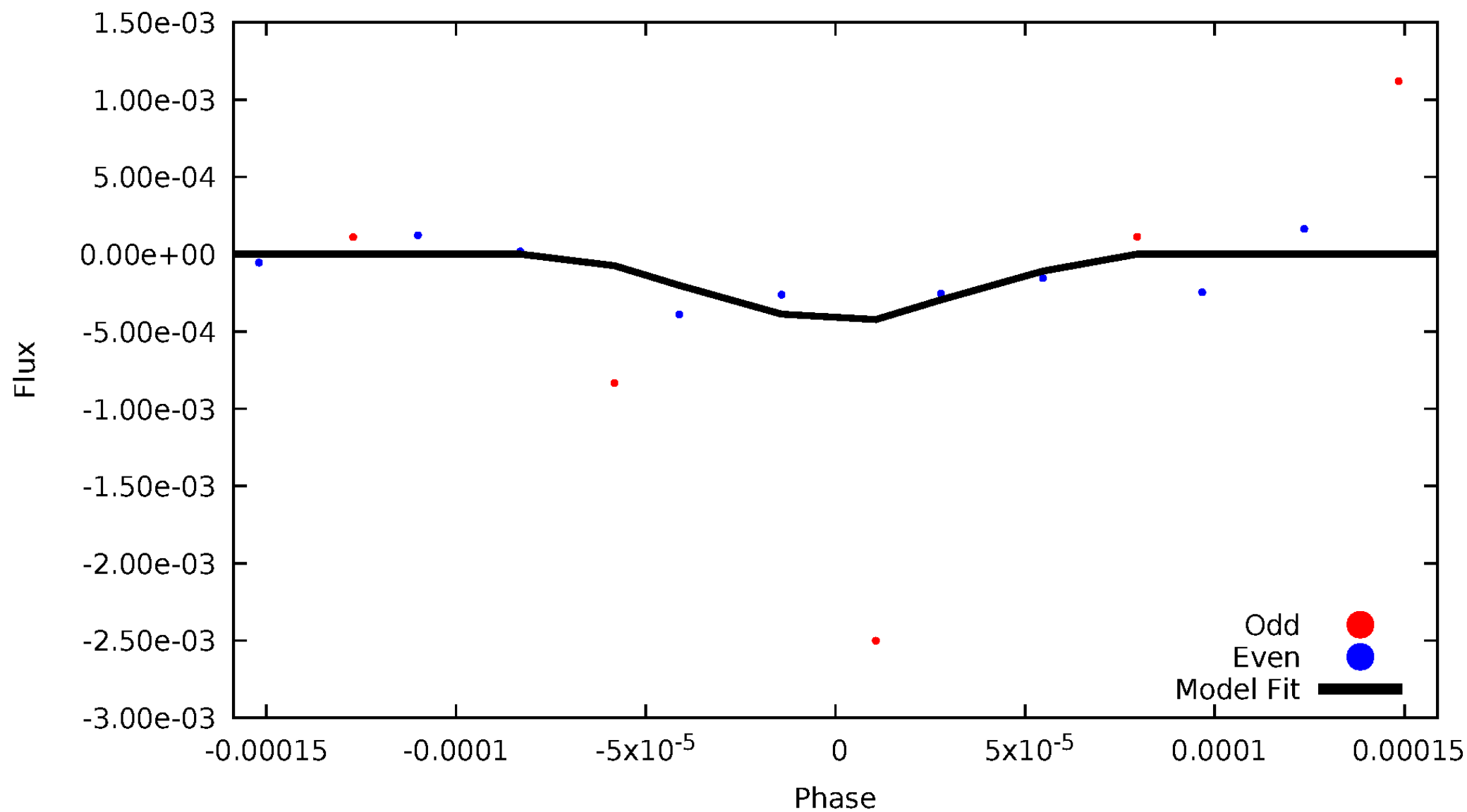


TCE 007456521-05



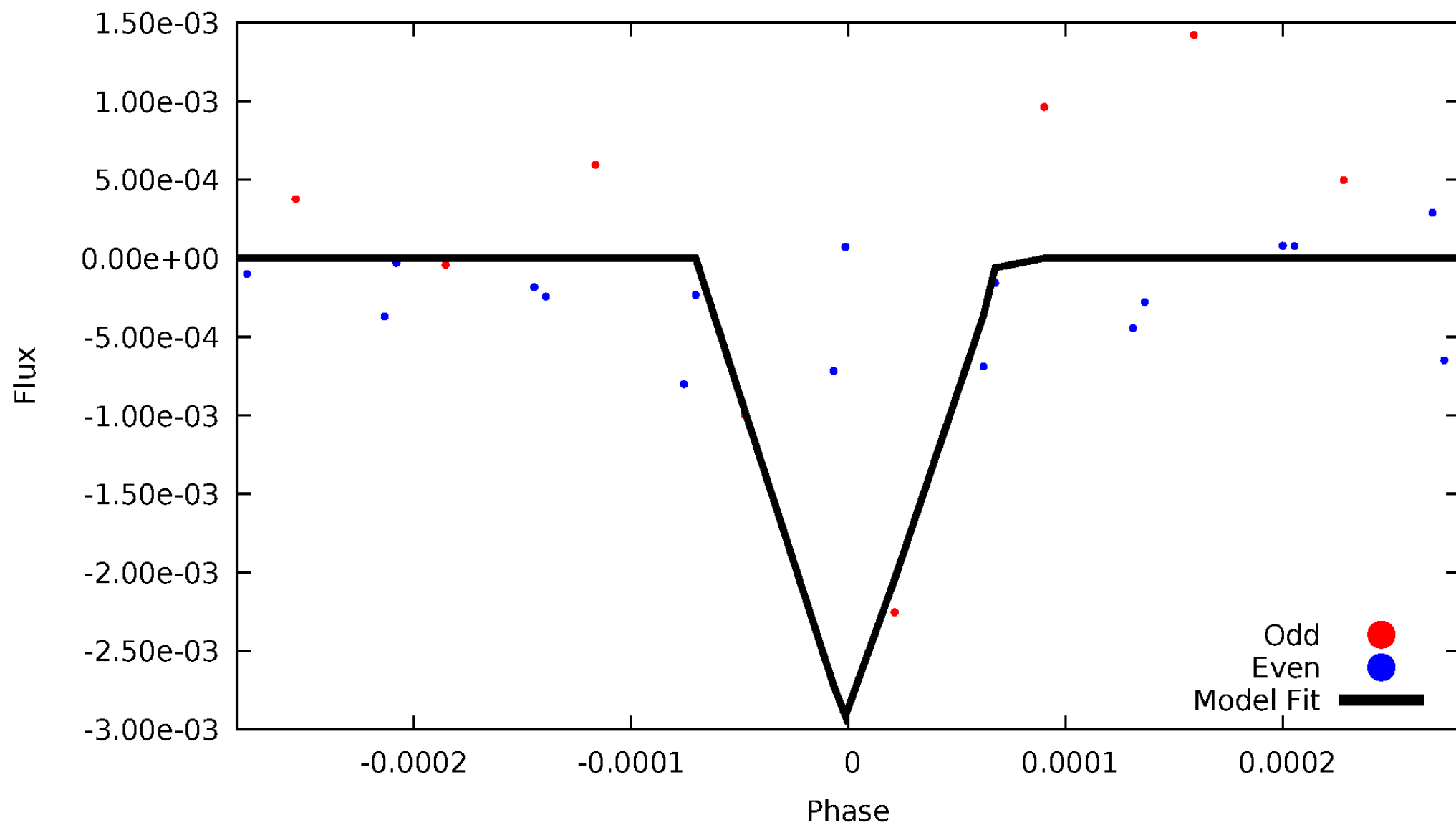
# DV Odd/Even

TCE 007456521-05



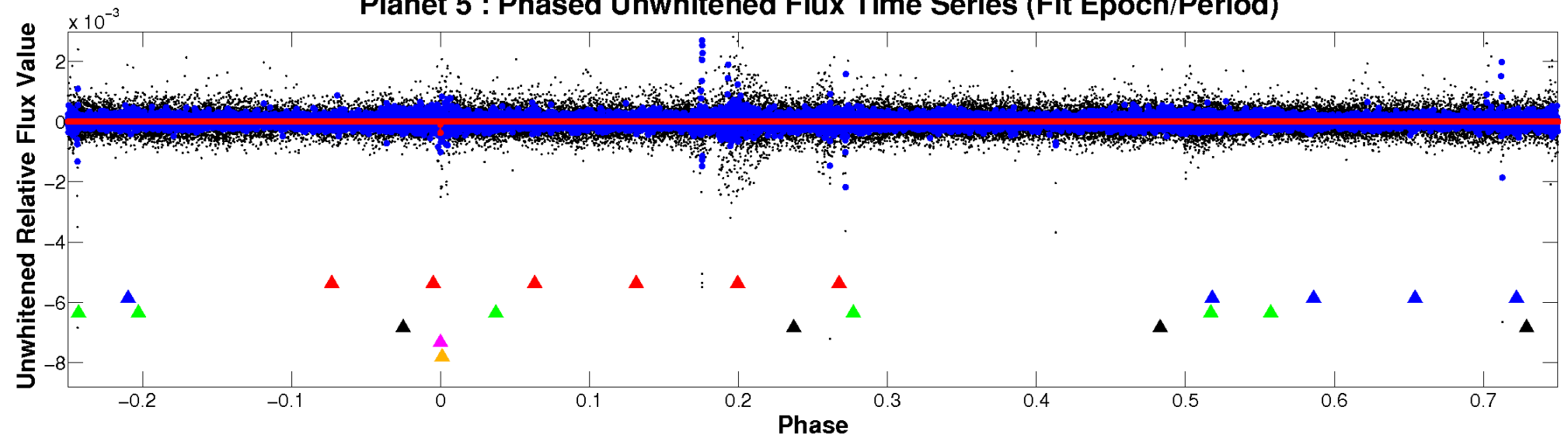
# ALT Odd/Even

TCE 007456521-05

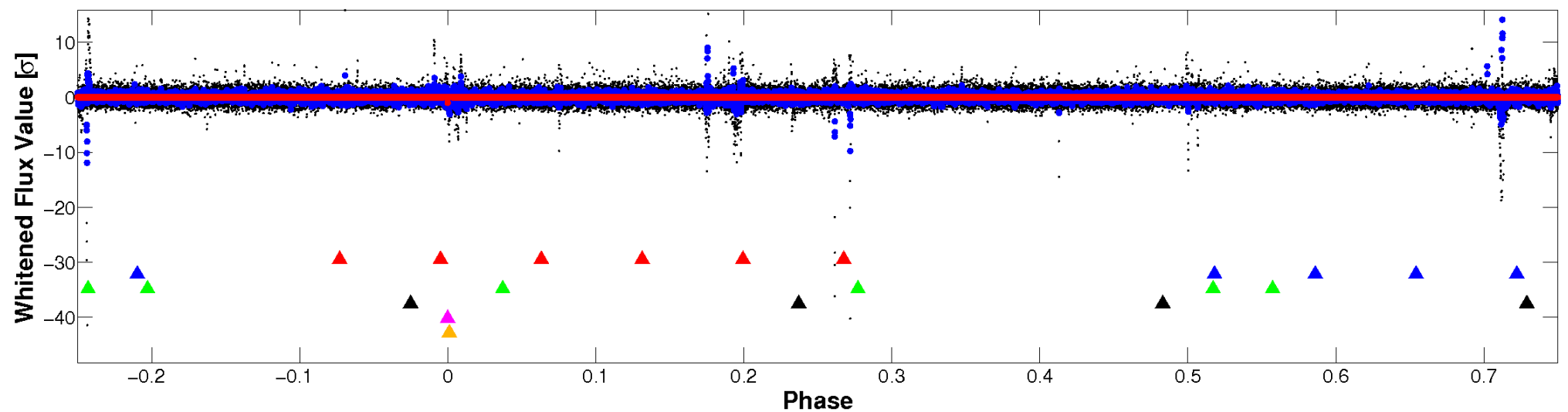


# Non-Whitened Vs. Whitened Light Curve

## Planet 5 : Phased Unwhitened Flux Time Series (Fit Epoch/Period)



## Planet 5 : Phased Whitened Flux Time Series (Fit Epoch/Period)



# PDC Quarter-Phased Transit Curves

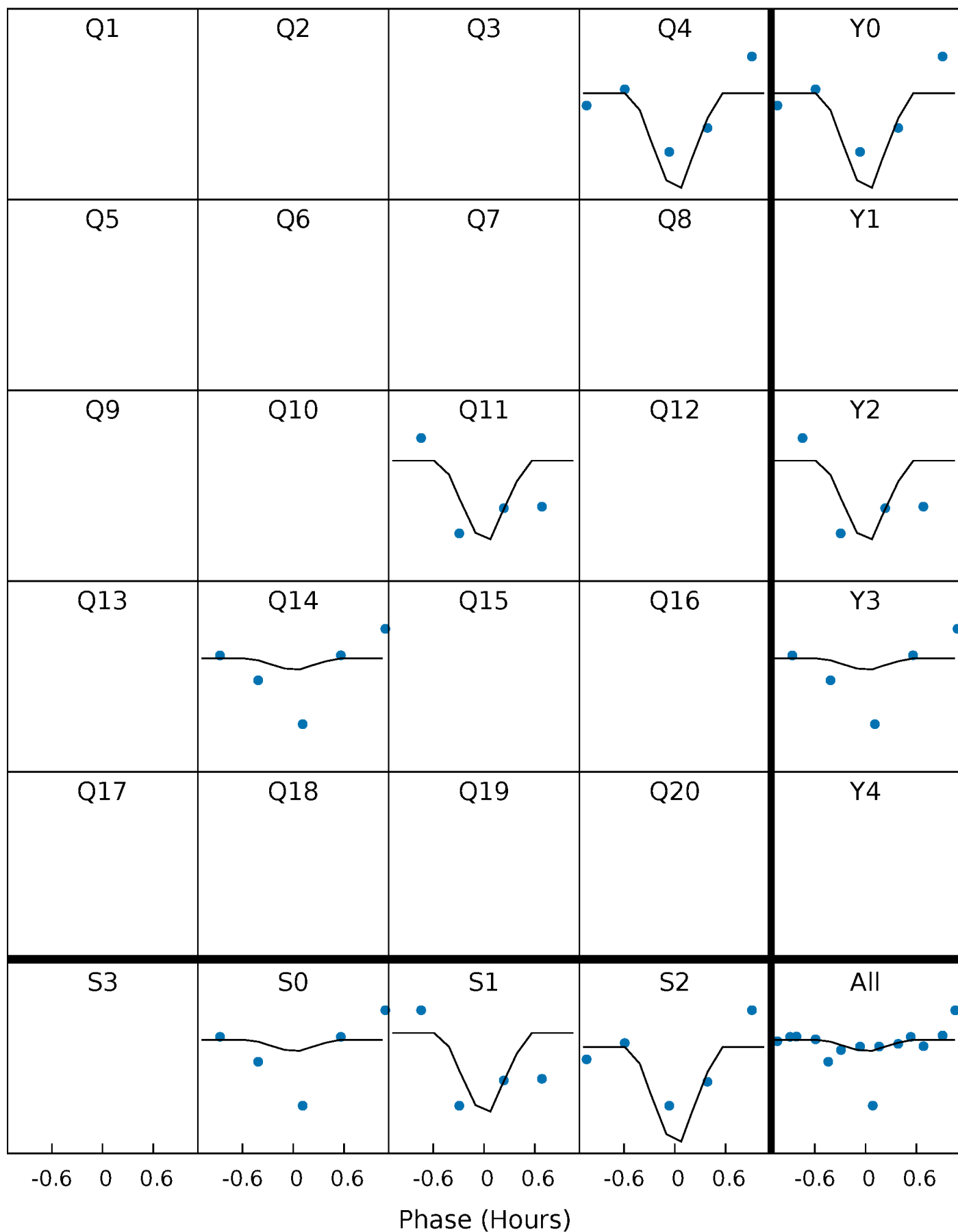
TCE 007456521-05     $P=296.620153$  Days     $T_0=425.062593$  (BKJD)





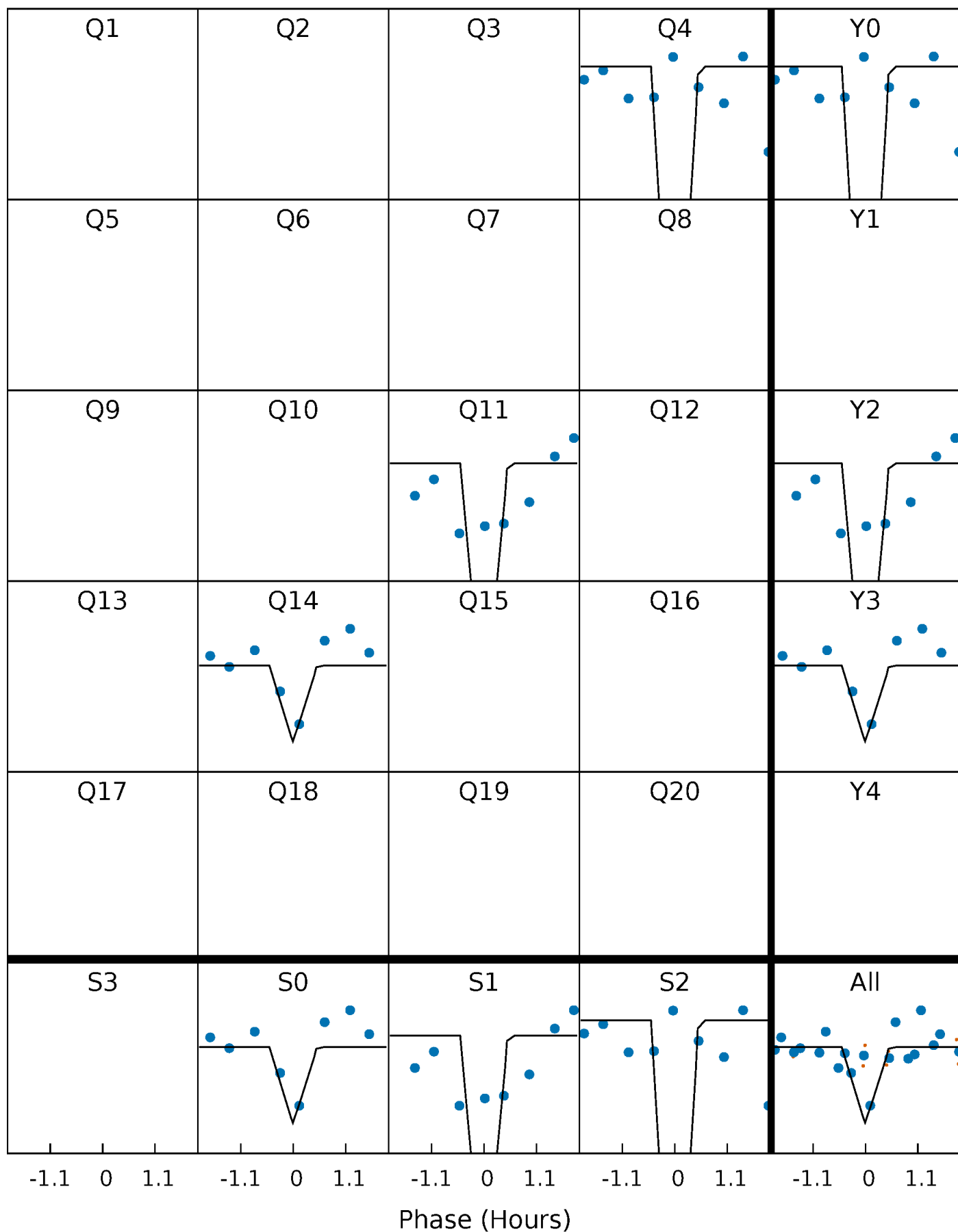
# DV Quarter-Phased Transit Curves

TCE 007456521-05     $P=296.620153$  Days     $T_0=425.062593$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

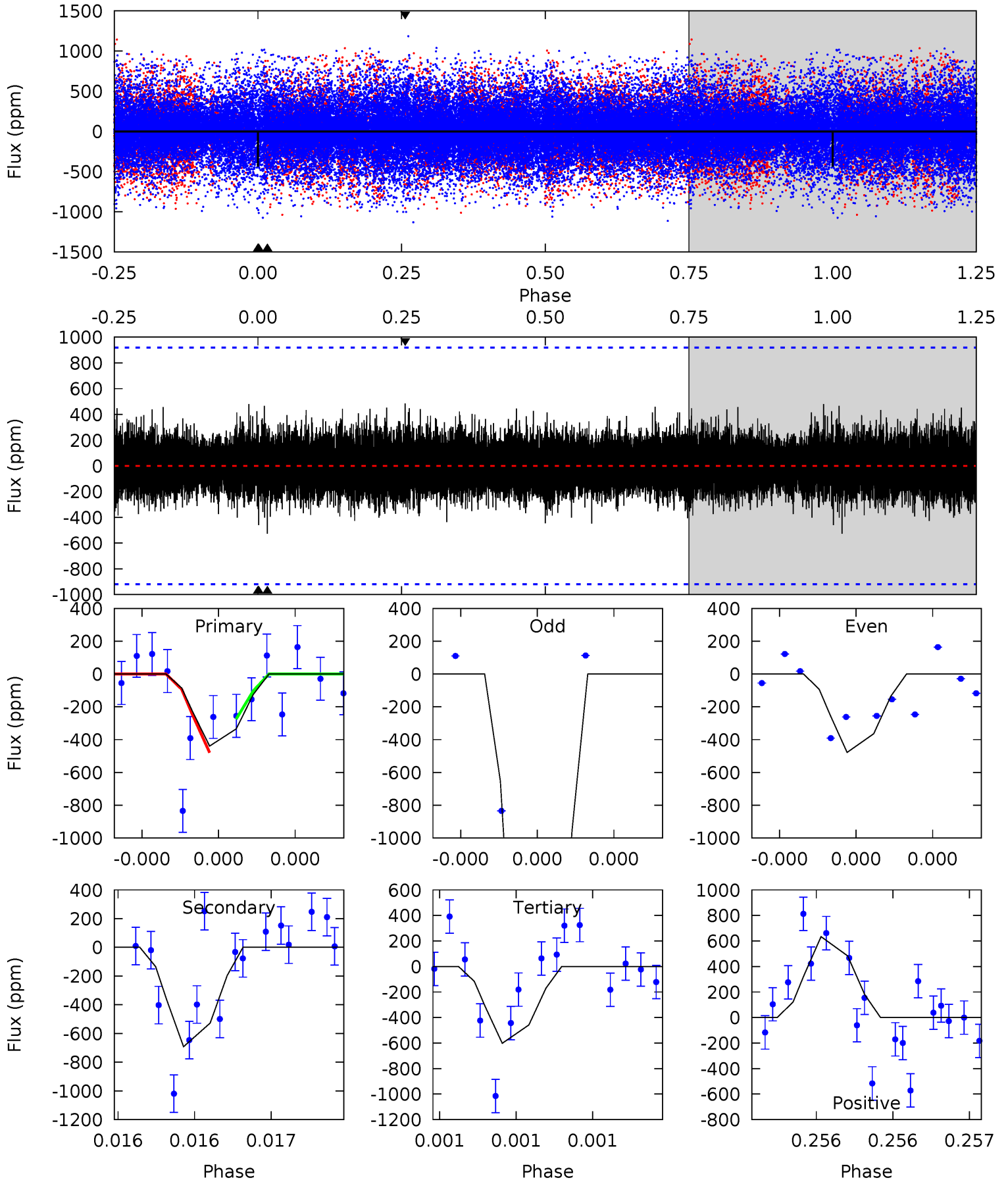
TCE 007456521-05 P=296.606746 Days  $T_0=425.099644$  (BKJD)



# DV Model-Shift Uniqueness Test

007456521-05, P = 296.620153 Days, E = 128.442440 Days

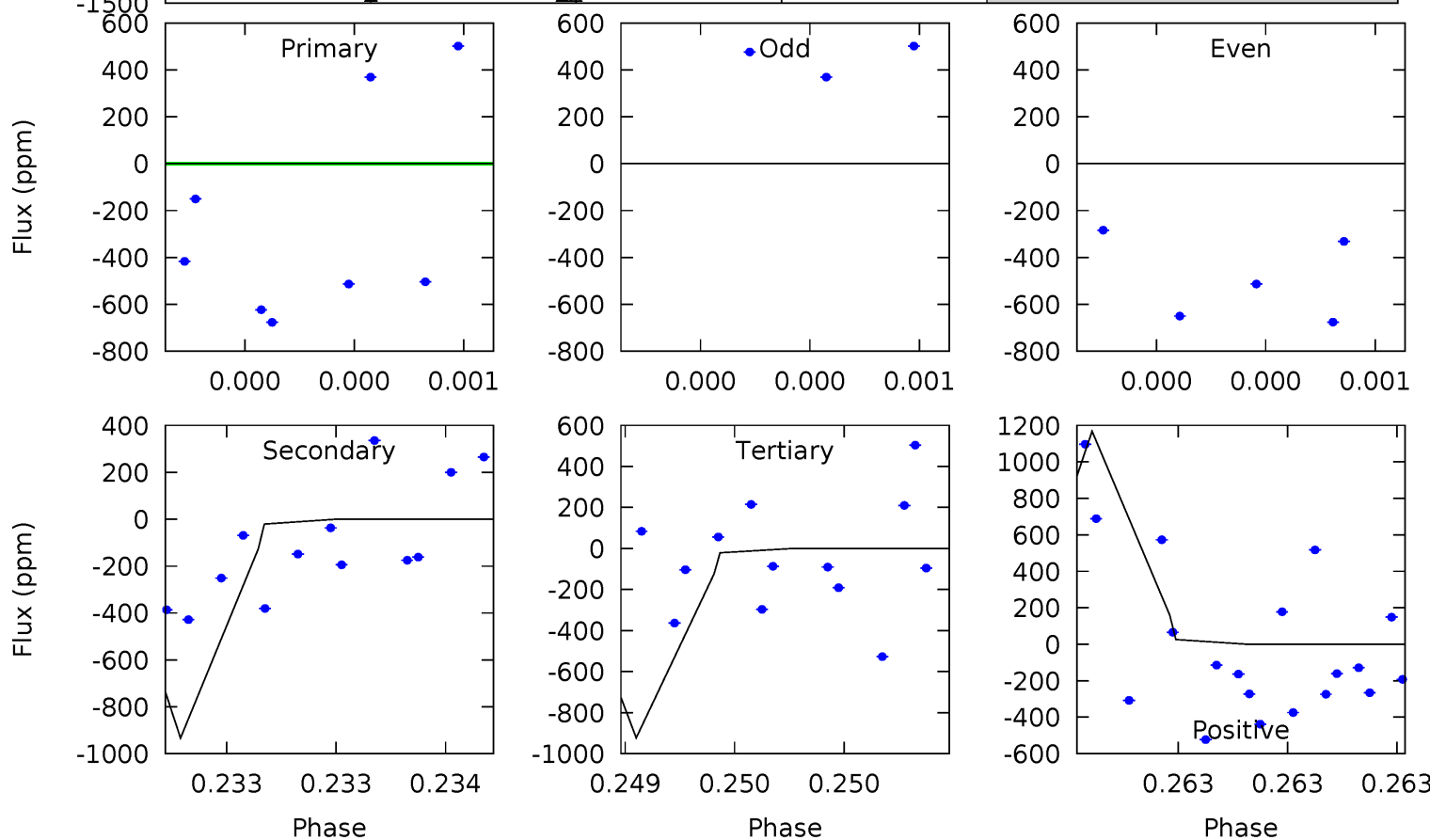
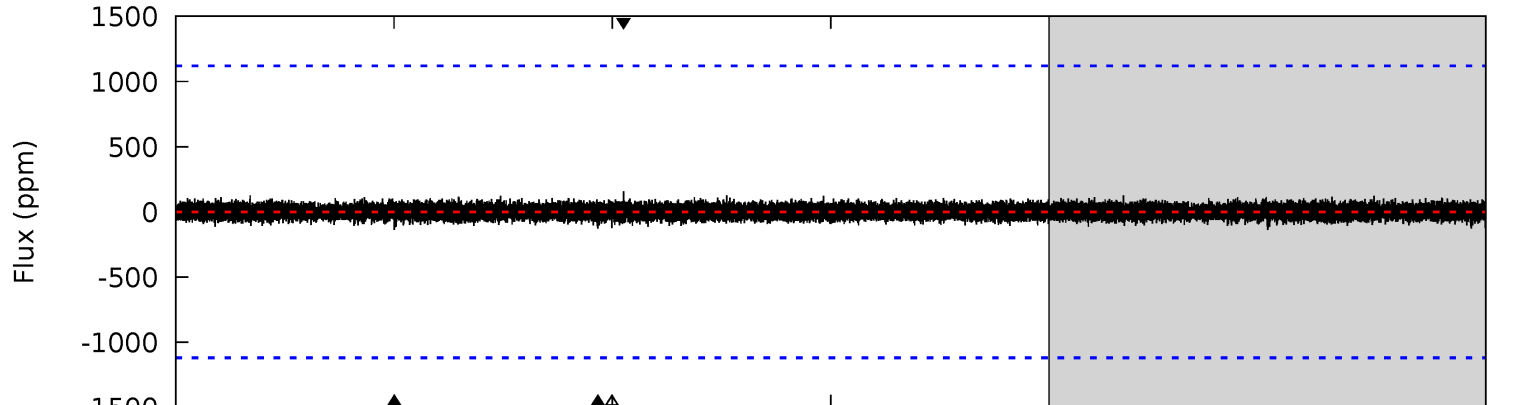
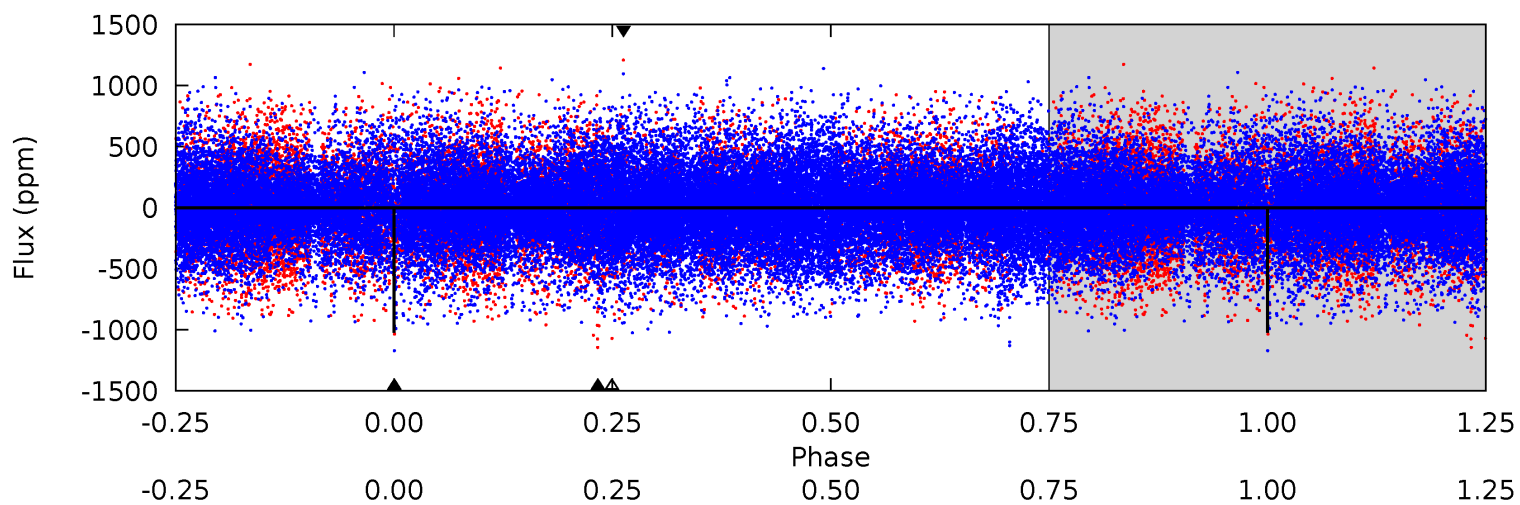
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
2.12	3.34	2.90	3.06	5.82	3.84	0.68	-0.78	-0.94	0.44	0.28	7.16	2.22	0.48	0.62



# Alt Model-Shift Uniqueness Test

007456521-05, P = 296.606746 Days, E = 128.492898 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
0.72	0.66	0.65	0.82	5.85	3.90	0.15	0.07	-0.10	0.01	-0.17	6.30	1.54	0.53	6.03



### Stellar Parameters For KIC 007456521

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5956^{+179}_{-179}$	$4.403^{+0.149}_{-0.182}$	$-0.680^{+0.300}_{-0.300}$	$0.929^{+0.233}_{-0.155}$	$0.797^{+0.102}_{-0.055}$	$1.398^{+0.955}_{-0.653}$
	+3%/-3%	+3%/-4%	+44%/-44%	+25%/-17%	+13%/-7%	+68%/-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 007456521-05 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$-527 \pm 158$	$30.27^{+31.98}_{-20.08}$	$396^{+26}_{-24}$	$2498^{+920}_{-370}$	$197^{+1543}_{-149}$
Alt.	$-126 \pm 191$	$30.36^{+36.46}_{-21.18}$	$395^{+28}_{-21}$	$1988^{+829}_{-3932}$	$26^{+460}_{-45}$

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

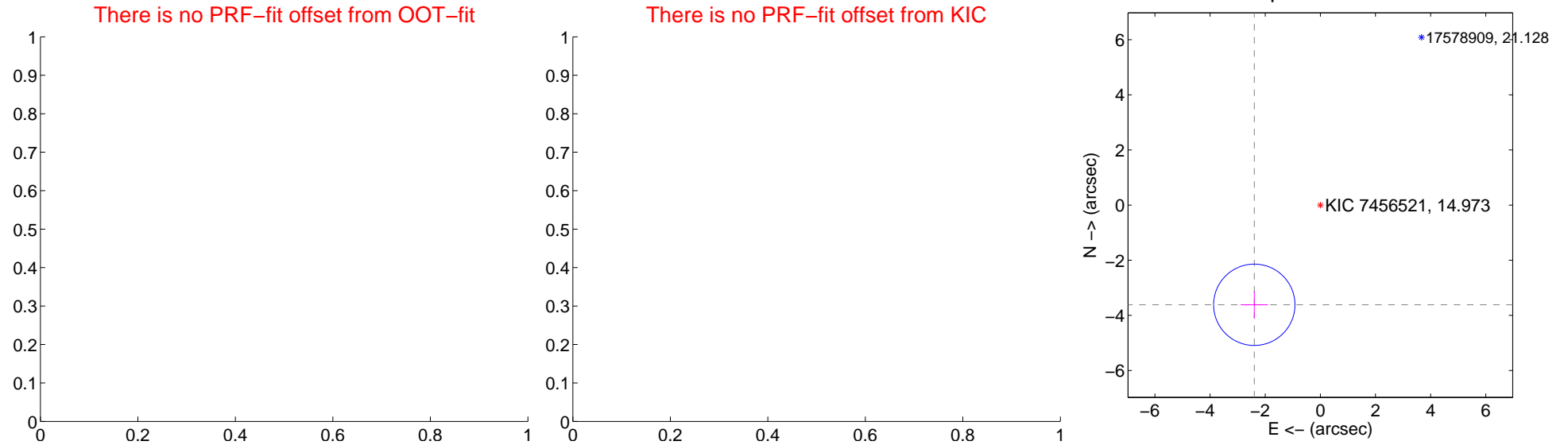
## DV Centroid Data

Supplemental centroid analysis for 007456521-05. Kepler magnitude: 14.97. Transit SNR 1.74

There are 0 quarters with good PRF difference image offsets

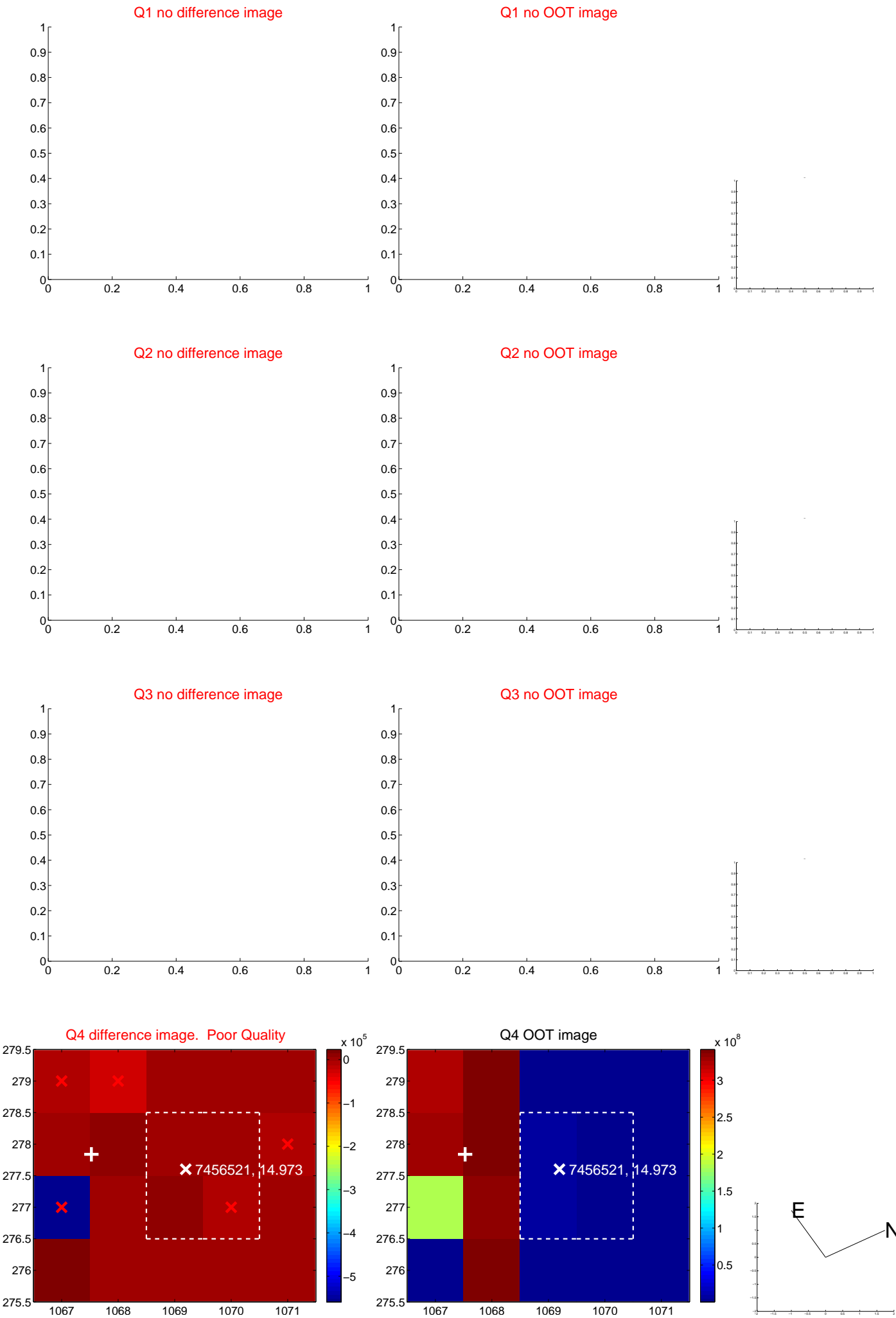
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$4.34 \pm 0.49$	8.82	$2.40 \pm 0.50$	$-3.61 \pm 0.49$



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.

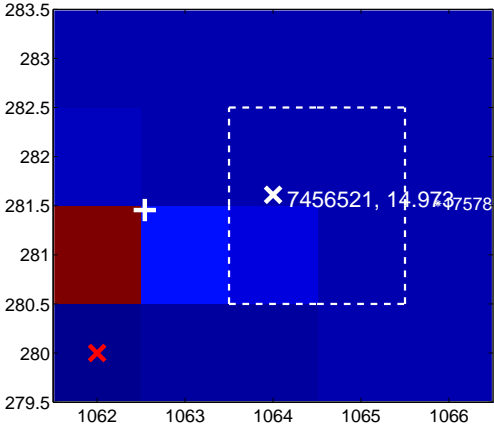
Q13 no difference image



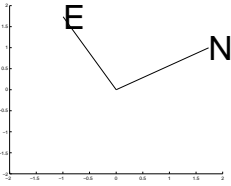
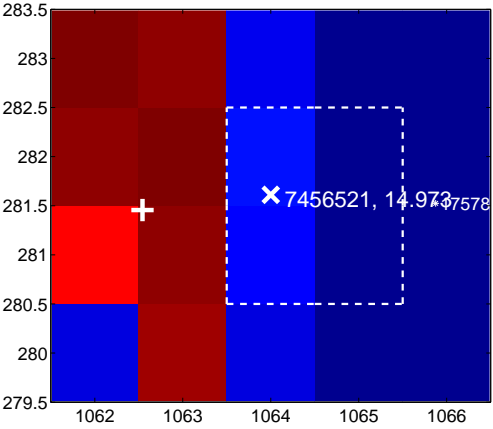
Q13 no OOT image



Q14 difference image. Poor Quality



Q14 OOT image



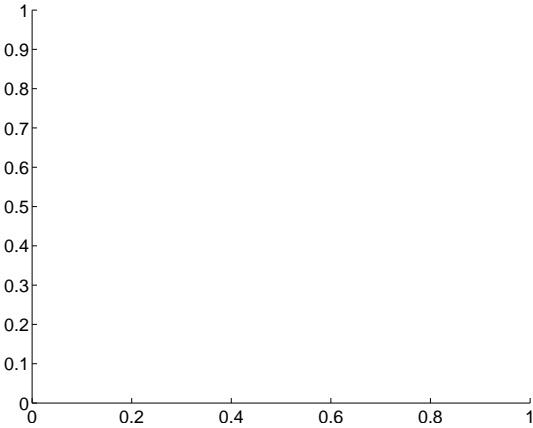
Q15 no difference image



Q15 no OOT image



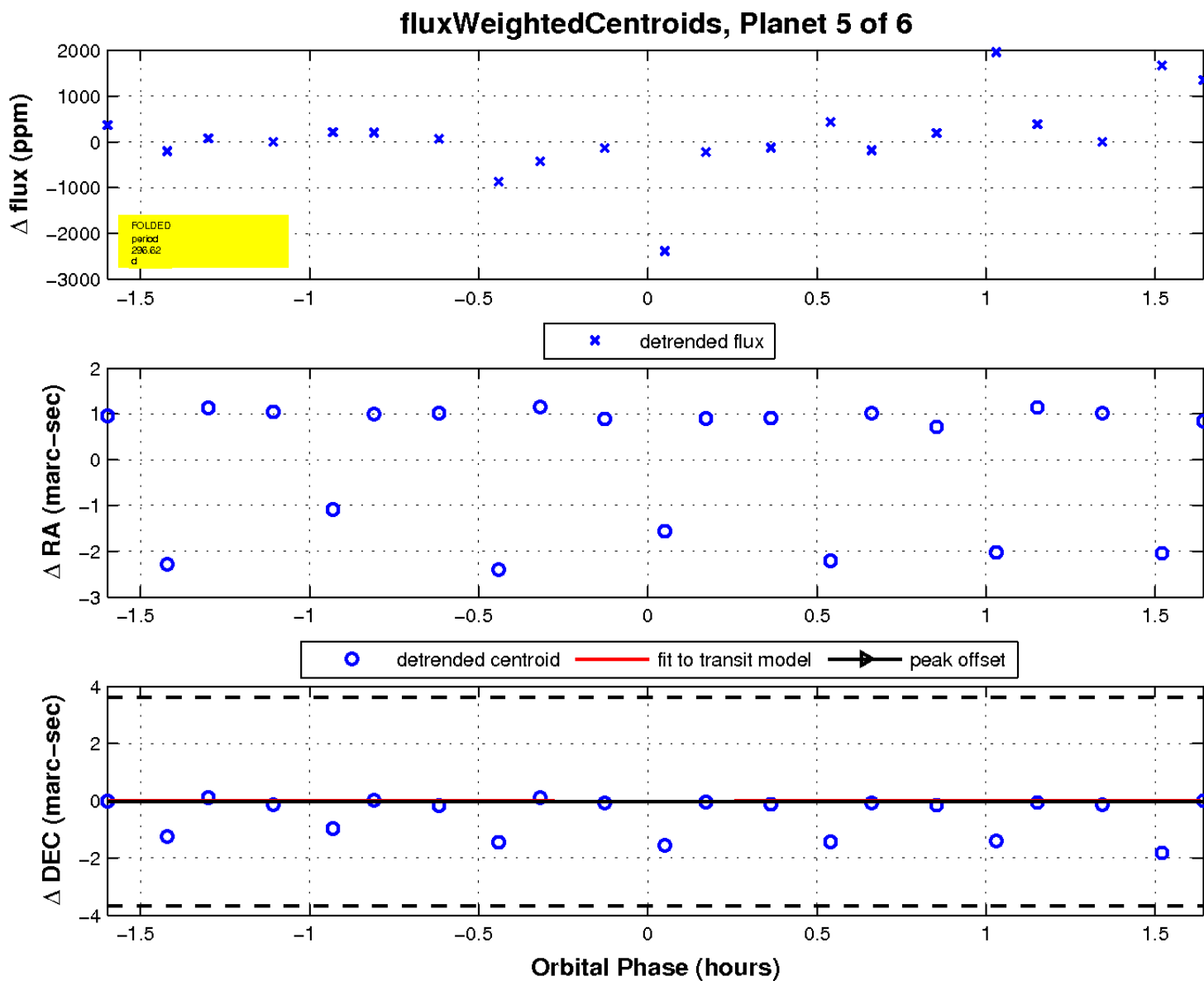
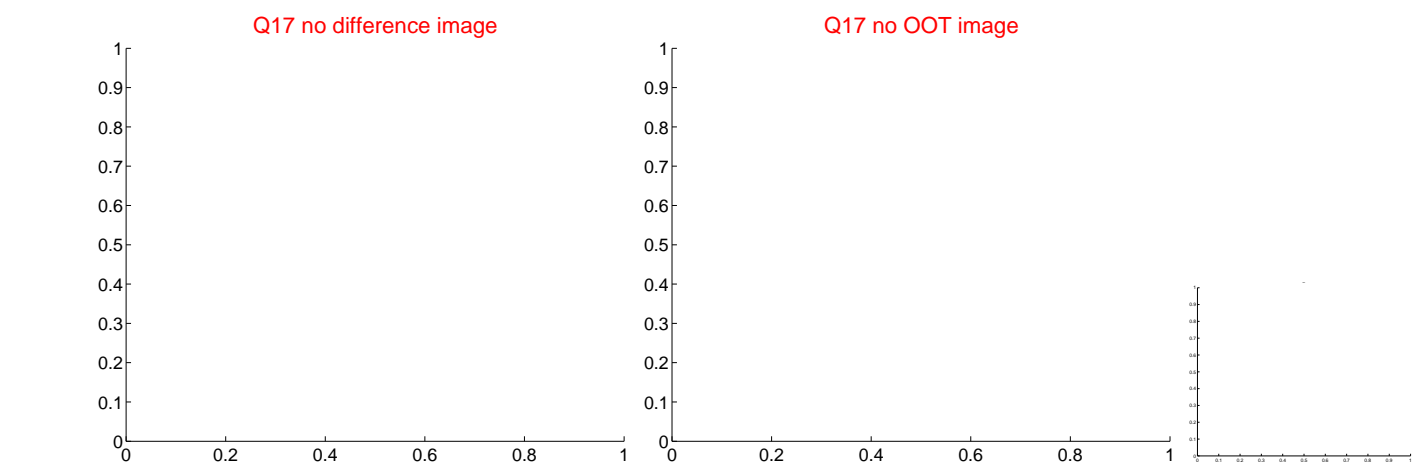
Q16 no difference image



Q16 no OOT image

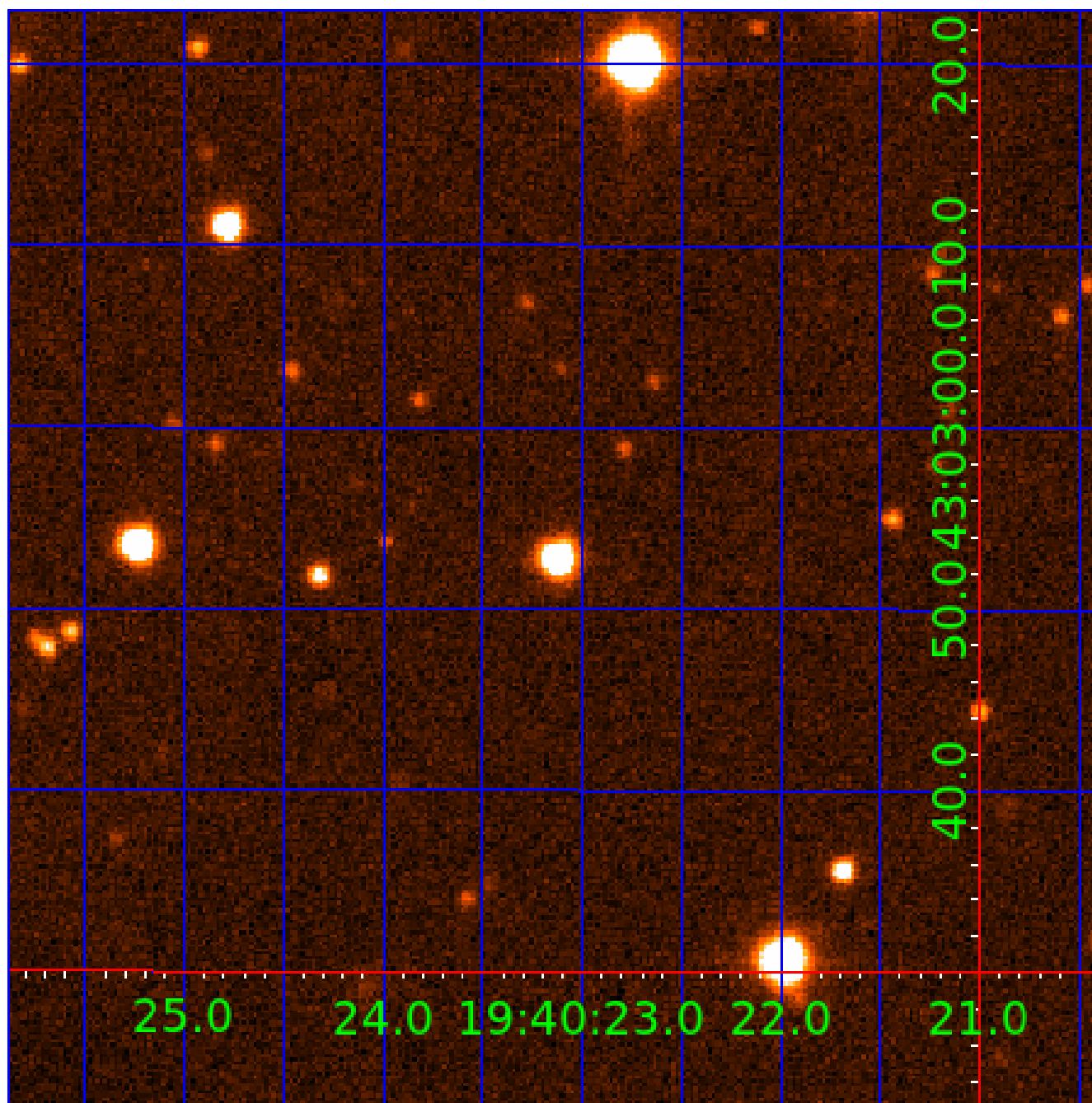


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



UKIRT Image

Declination



# KIC 007456521

## 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)	$R_p$ ( $R_{\oplus}$ )	$S_p$ ( $S_{\oplus}$ )
007456521-01	OBS	6880.01	276.418388	207.809907	201230.6	12.500	2534.0	-1.0	0.93	5956	34.12	1.64
007456521-02	OBS	No	276.430042	362.865365	53710.2	16.269	717.2	706.4	0.93	5956	35.89	1.64
007456521-03	OBS	No	225.444119	353.002631	6050.6	1.675	45.2	43.3	0.93	5956	13.34	2.15
007456521-04	OBS	No	369.571723	198.783464	13725.0	74.217	28.5	50.0	0.93	5956	19.14	1.11
007456521-05	OBS	No	296.620153	425.062593	422.4	0.565	13.3	1.7	0.93	5956	2.24	1.49
007456521-06	OBS	No	296.599935	425.427321	778.9	15.000	12.5	-1.0	0.93	5956	2.60	1.49

## Robovetter Results

TCE	Run Type	Disp	Score	N	S	C	E	Comments
007456521-01	OBS	FP	0.00	1	0	0	0	INCONSISTENT_TRANS—CENT_NOFITS
007456521-02	OBS	FP	0.00	1	0	0	0	SAME_NTL_PERIOD—CENT_KIC_POS
007456521-03	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_CHASES_MARSHALL—LPP_DV—LPP_ALT—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-04	OBS	FP	0.00	1	0	0	0	LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-05	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE_TRACKER—LPP_DV—LPP_ALT—ALL_TRANS_CHASES—MOD_NONUNIQ_DV—MOD_TER_DV—MOD_POS_DV—MOD_NONUNIQ_ALT—MOD_TER_ALT—MOD_POS_ALT—INCONSISTENT_TRANS—CENT_FEW_DIFFS
007456521-06	OBS	FP	0.00	1	0	0	0	INDIV_TRANS_MARSHALL_SKYE—LPP_DV—ALL_TRANS_CHASES—INCONSISTENT_TRANS—SAME_NTL_PERIOD—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 007456521-06

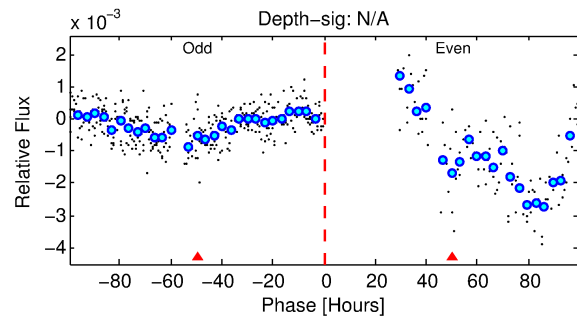
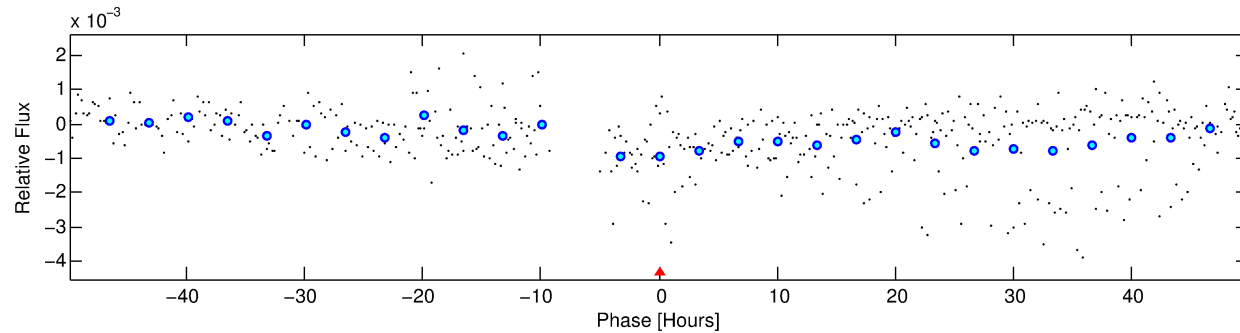
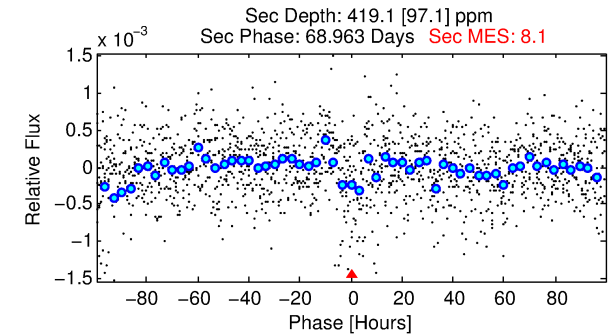
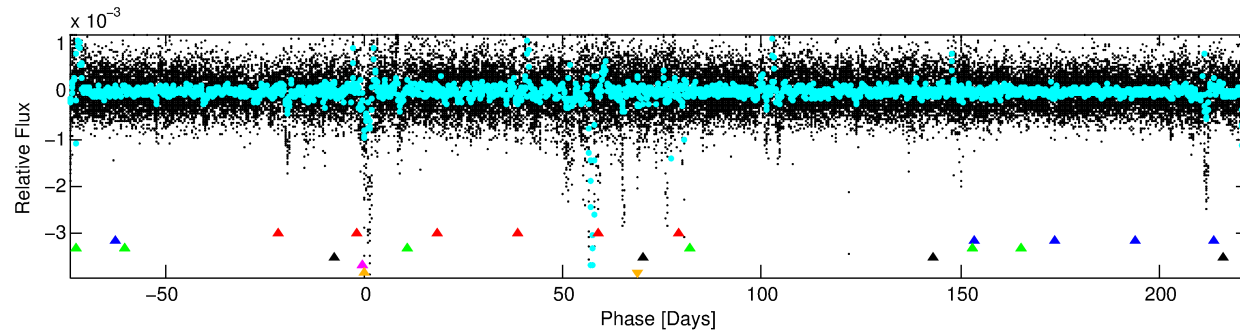
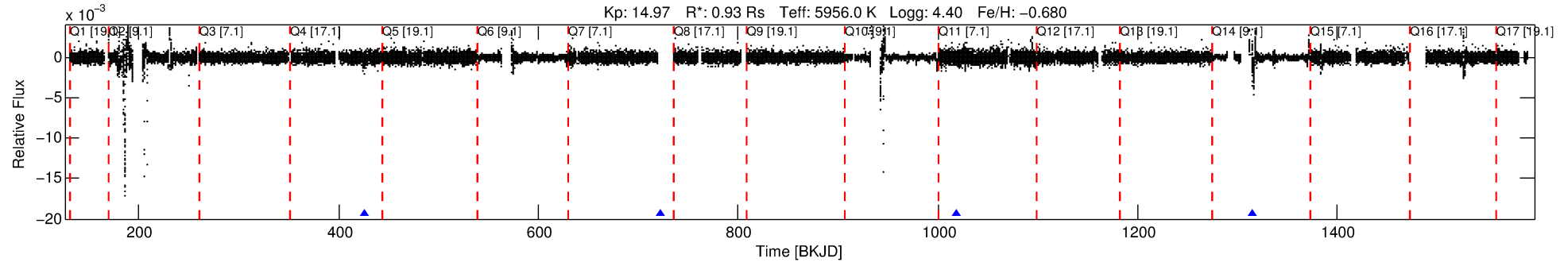
No Significant Match Found

# DV One-Page Summary

KIC: 7456521 Candidate: 6 of 6 Period: 296.600 d

KOI: K06880 Corr: No Ephemeris Match

Kp: 14.97 R\*: 0.93 Rs Teff: 5956.0 K Logg: 4.40 Fe/H: -0.680



## TPS TCE Results:

Period = 296.59993 d  
Epoch = 425.4273 BKJD

DV fit results are unavailable

## DV Diagnostic Results:

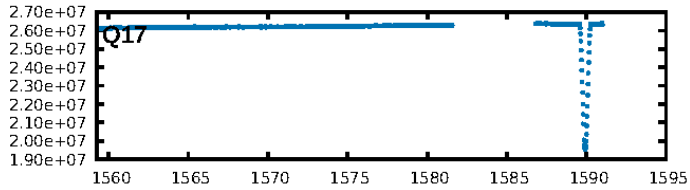
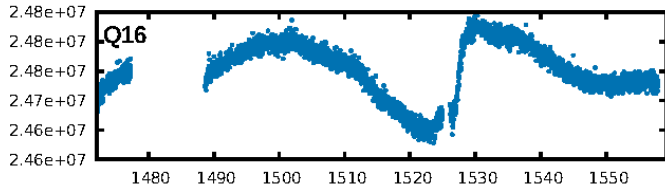
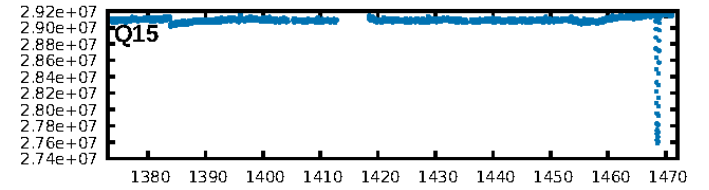
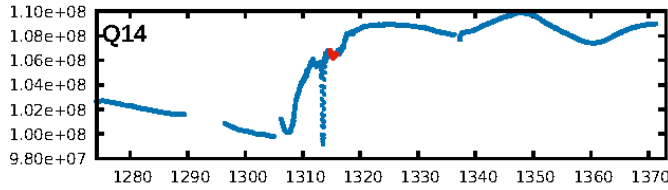
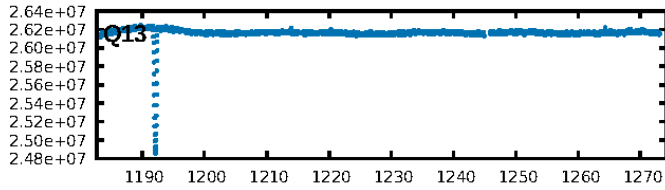
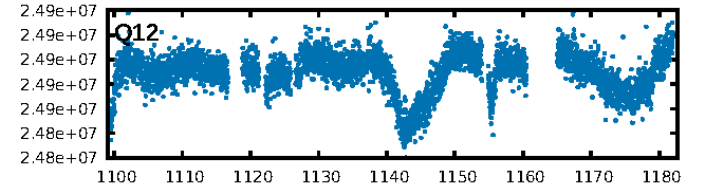
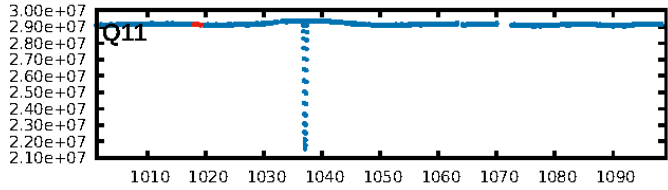
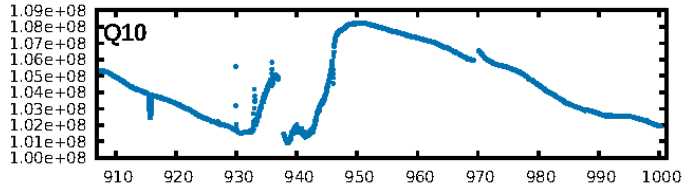
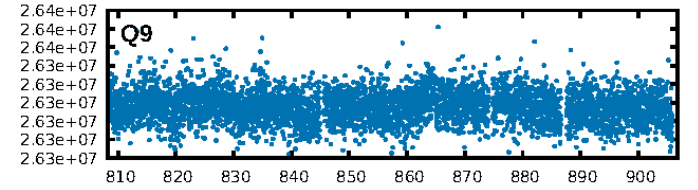
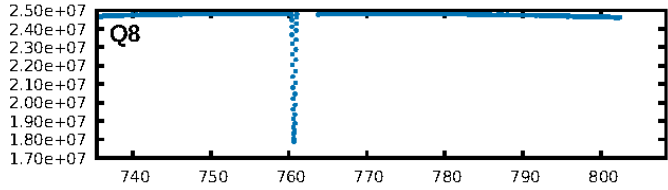
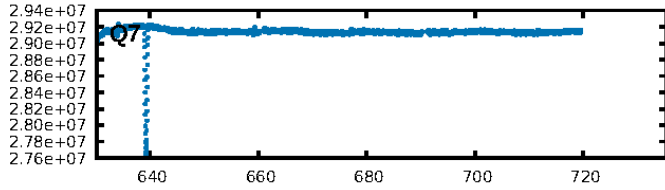
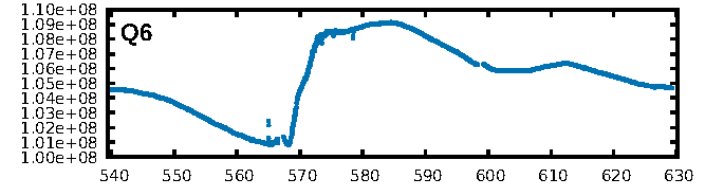
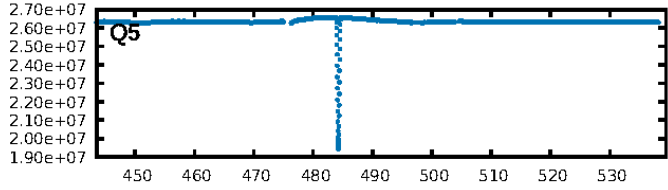
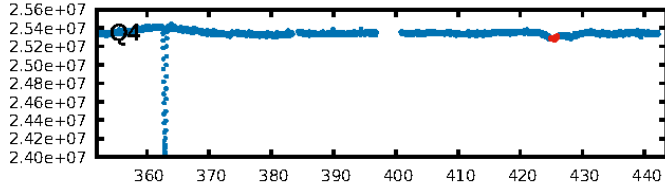
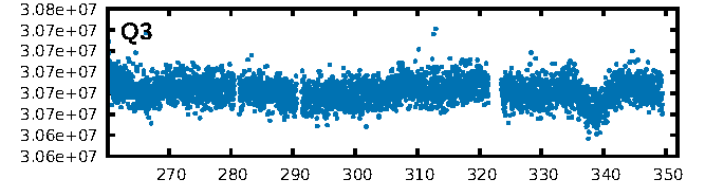
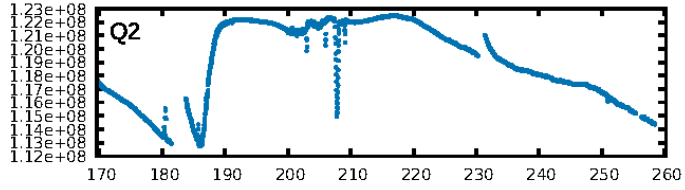
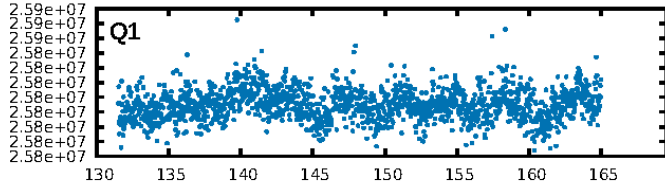
ShortPeriod-sig: 100.0% [21.88σ]  
LongPeriod-sig: 2.6% [0.03σ]  
ModelChiSquare2-sig: N/A  
ModelChiSquareGof-sig: N/A  
Bootstrap-pfa: N/A  
RollingBand-fgt: 1.00 [3/3]  
GhostDiagnostic-chr: -4.143

Centroid-sig: N/A  
Centroid-so: 4.251 arcsec [56.15σ]  
OotOffset-rm: N/A  
KicOffset-rm: N/A  
OotOffset-st: 0/0/0 [0]  
KicOffset-st: 0/0/0 [0]  
DiffImageQuality-fgm: N/A  
DiffImageOverlap-fno: 0.00 [0/3]

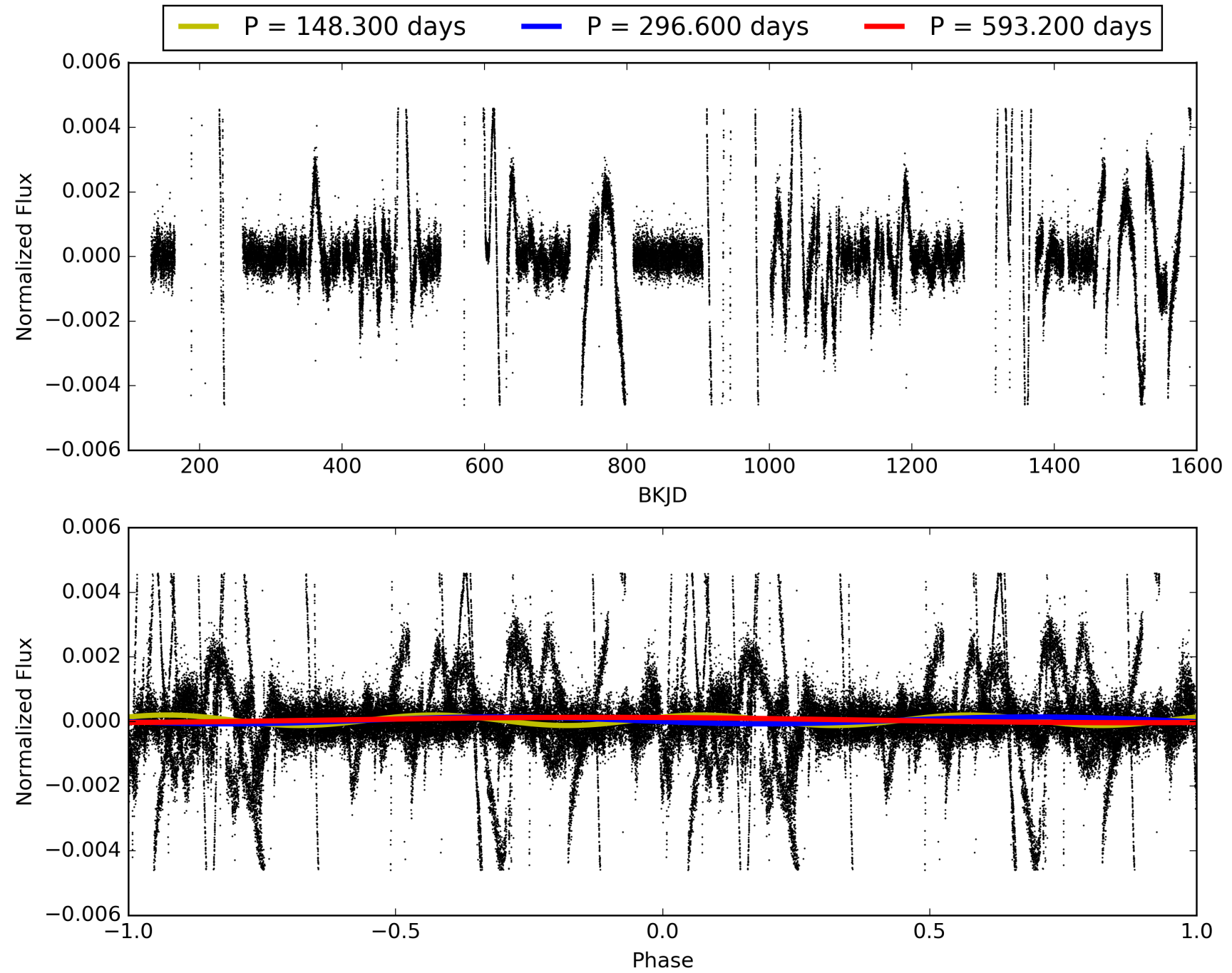
Software Revision: svn+ssh://murzim/repo/soc/tags/release/9.3.42@60958 -- Date Generated: 03-Feb-2016 09:19:44 Z

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

## TCE 007456521-06, PDC Light Curves



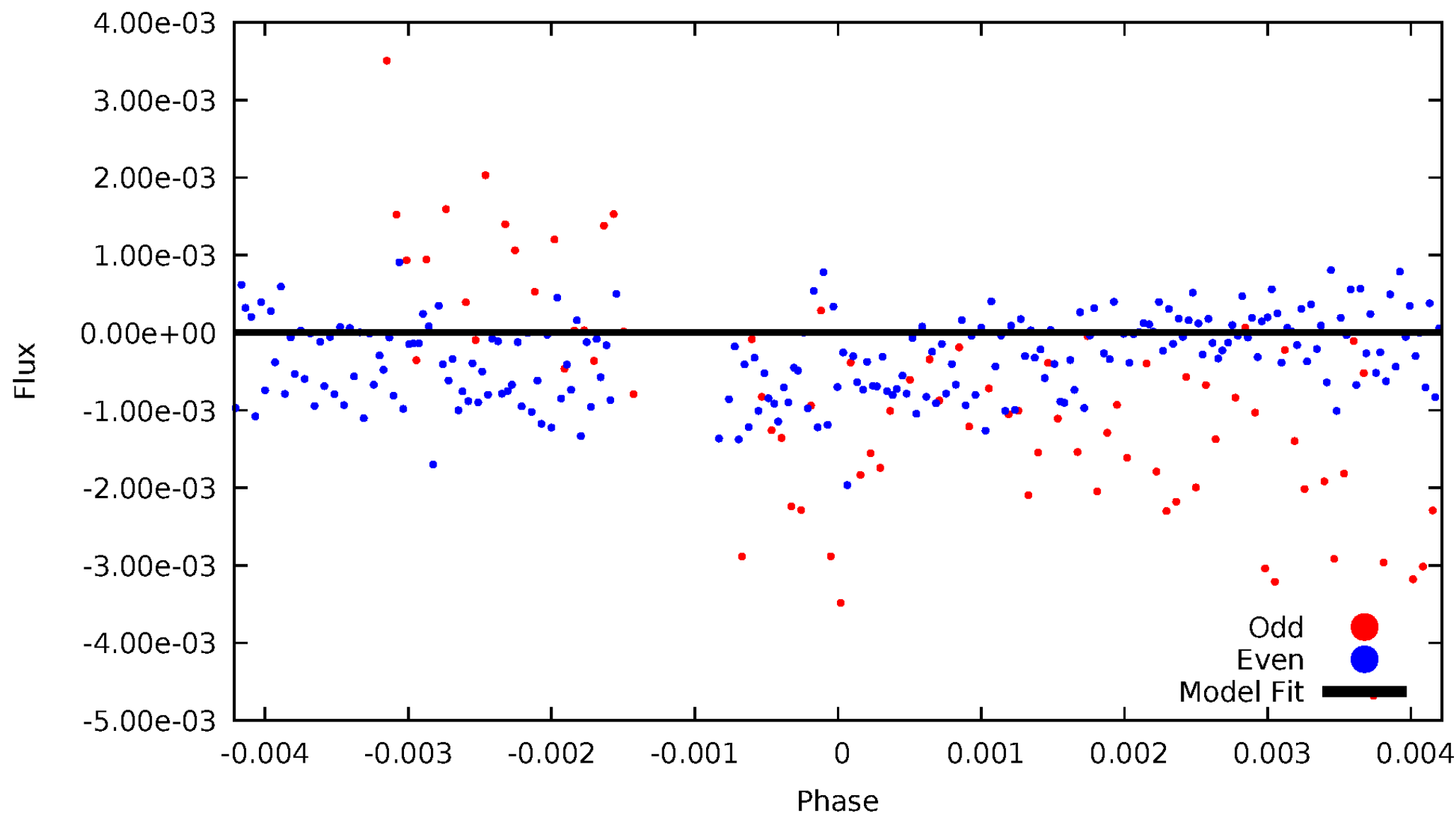
TCE 007456521-06





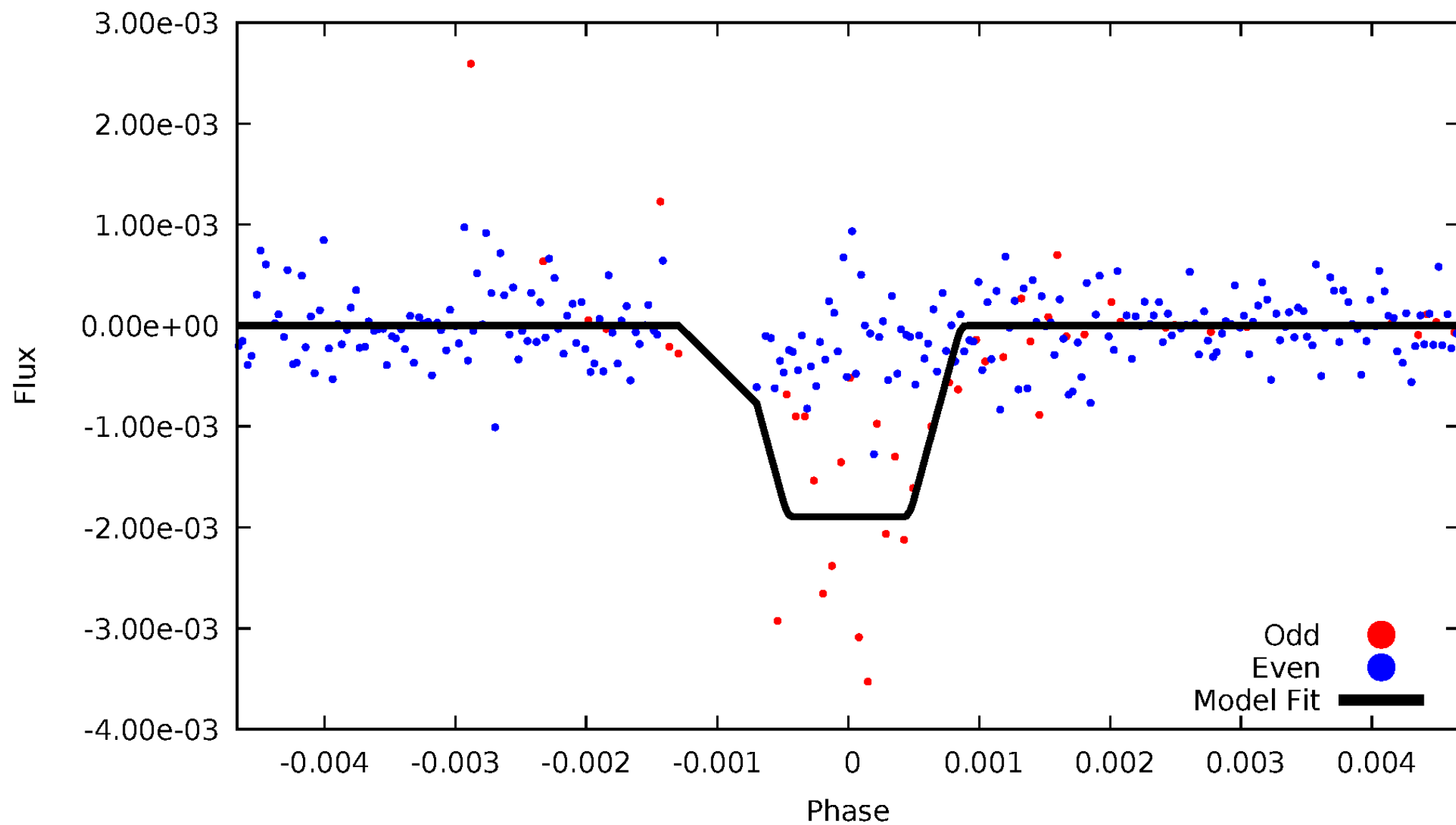
# DV Odd/Even

TCE 007456521-06



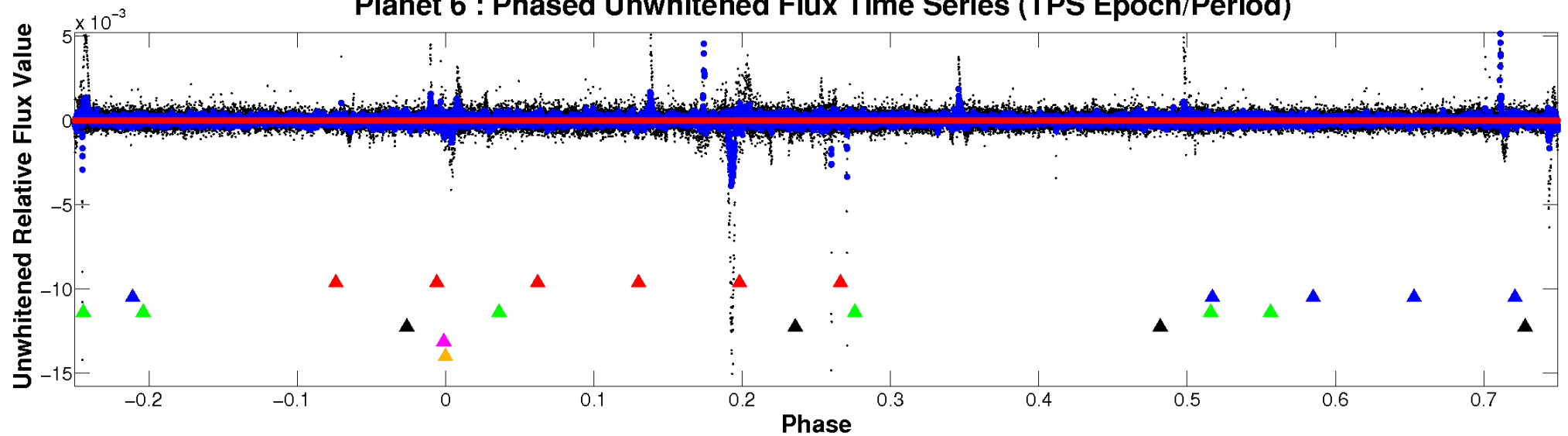
# ALT Odd/Even

TCE 007456521-06



# Non-Whitened Vs. Whitened Light Curve

**Planet 6 : Phased Unwhitened Flux Time Series (TPS Epoch/Period)**

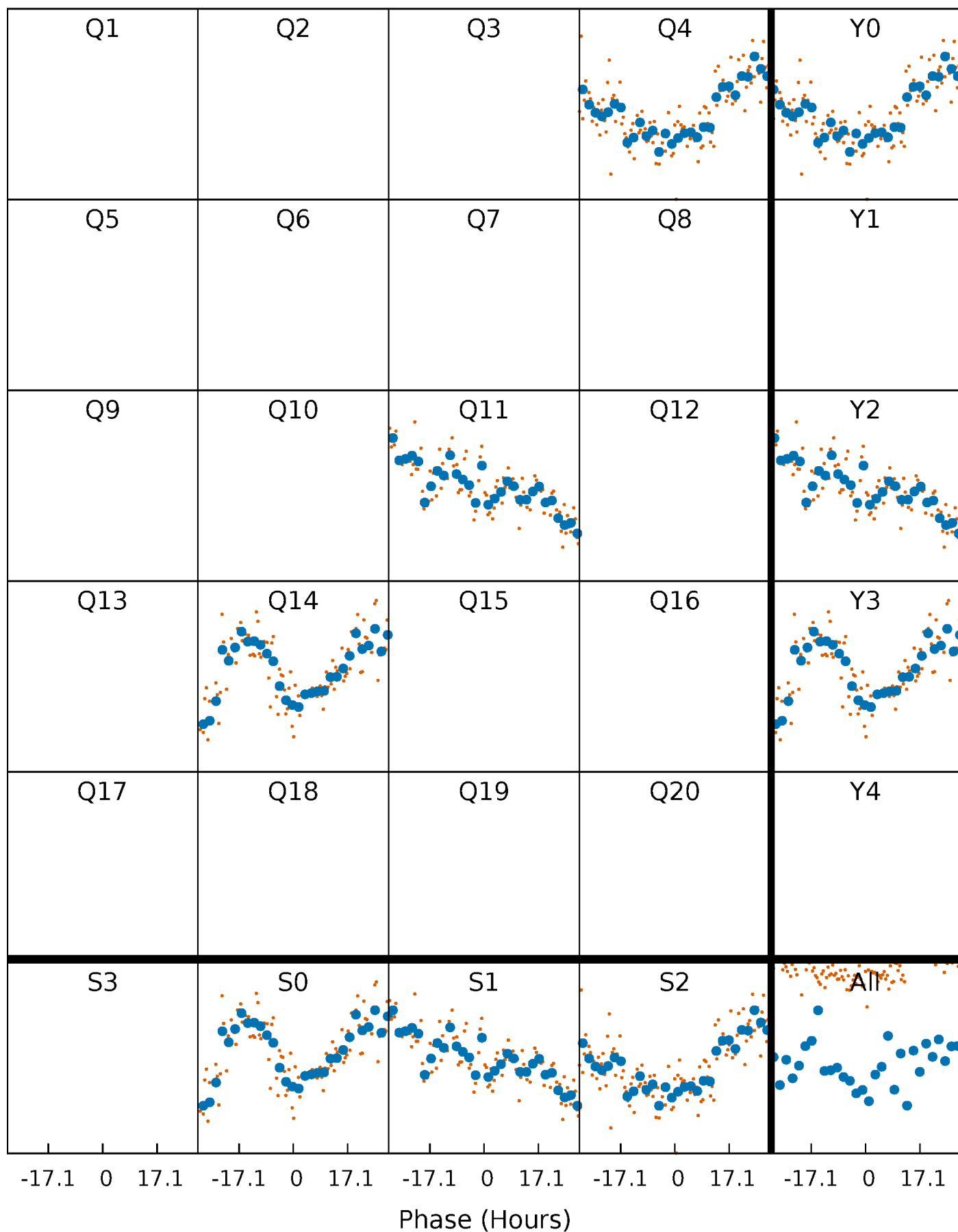


**Planet 6 : Phased Whitened Flux Time Series (TPS Epoch/Period)**



# PDC Quarter-Phased Transit Curves

TCE 007456521-06     $P=296.599935$  Days     $T_0=425.427321$  (BKJD)



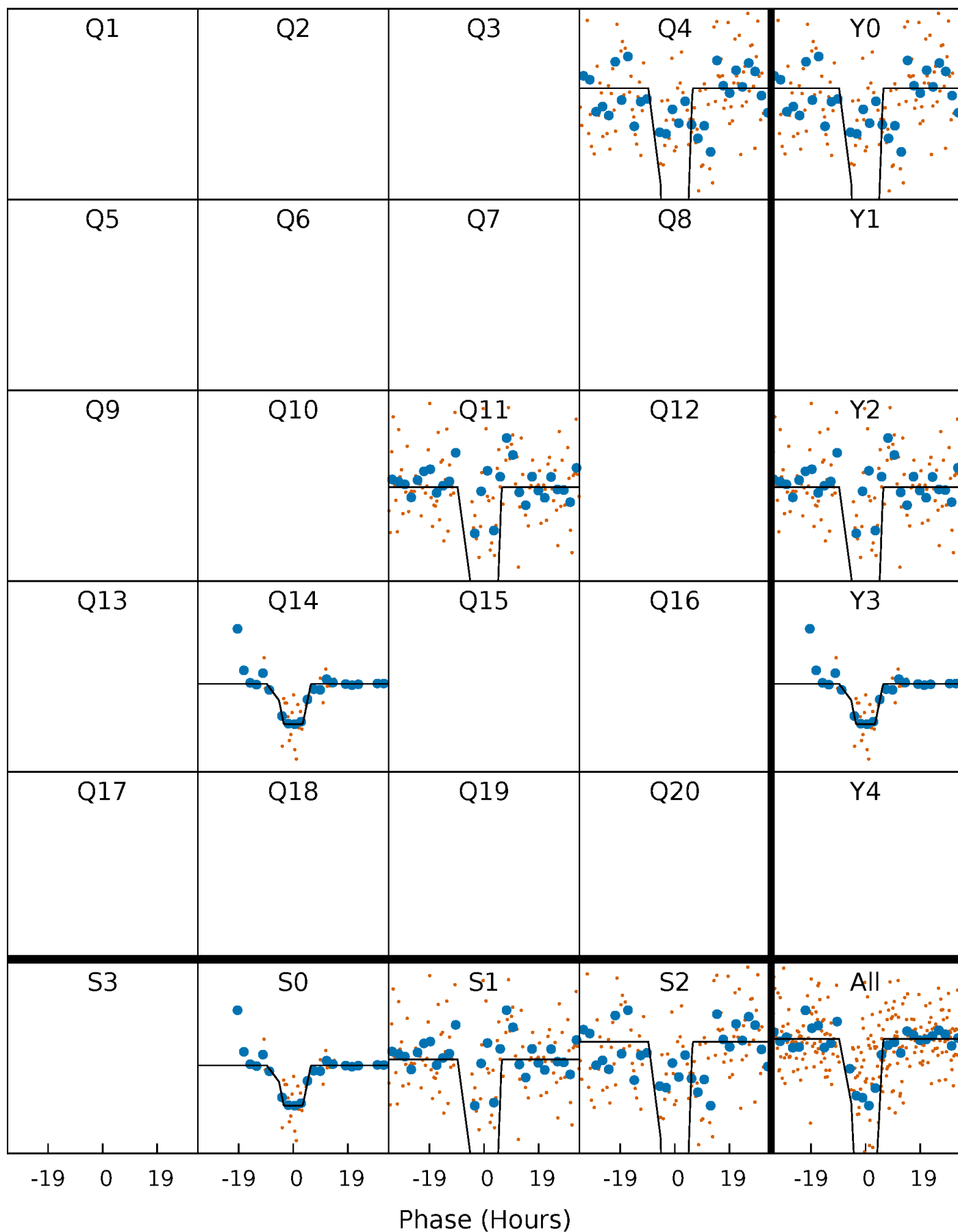
# DV Quarter-Phased Transit Curves

TCE 007456521-06 P=296.599935 Days  $T_0=425.427321$  (BKJD)



# Alt. Detrend Quarter-Phased Transit Curves

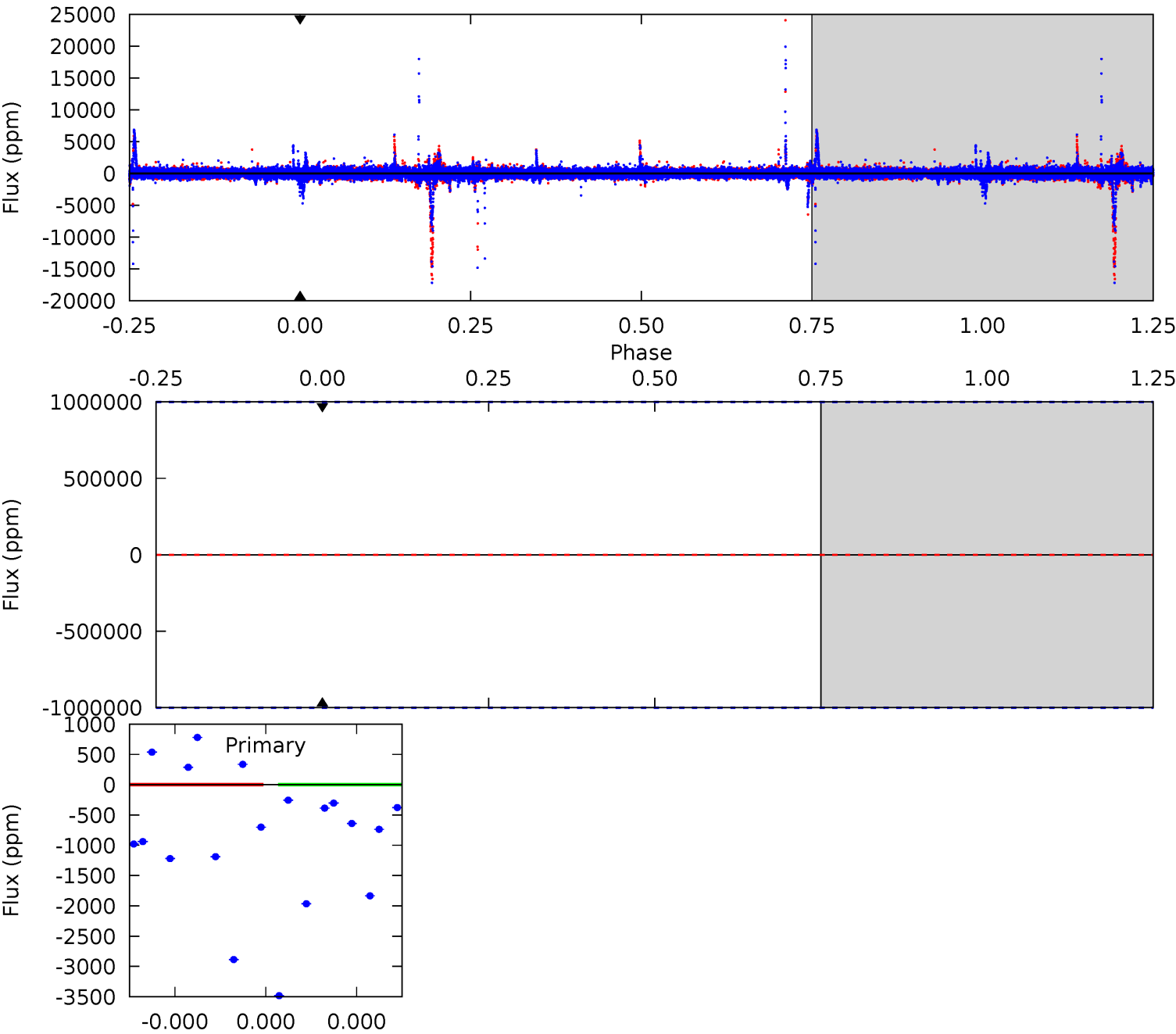
TCE 007456521-06 P=296.599935 Days  $T_0=425.388514$  (BKJD)



# DV Model-Shift Uniqueness Test

007456521-06, P = 296.599935 Days, E = 128.827386 Days

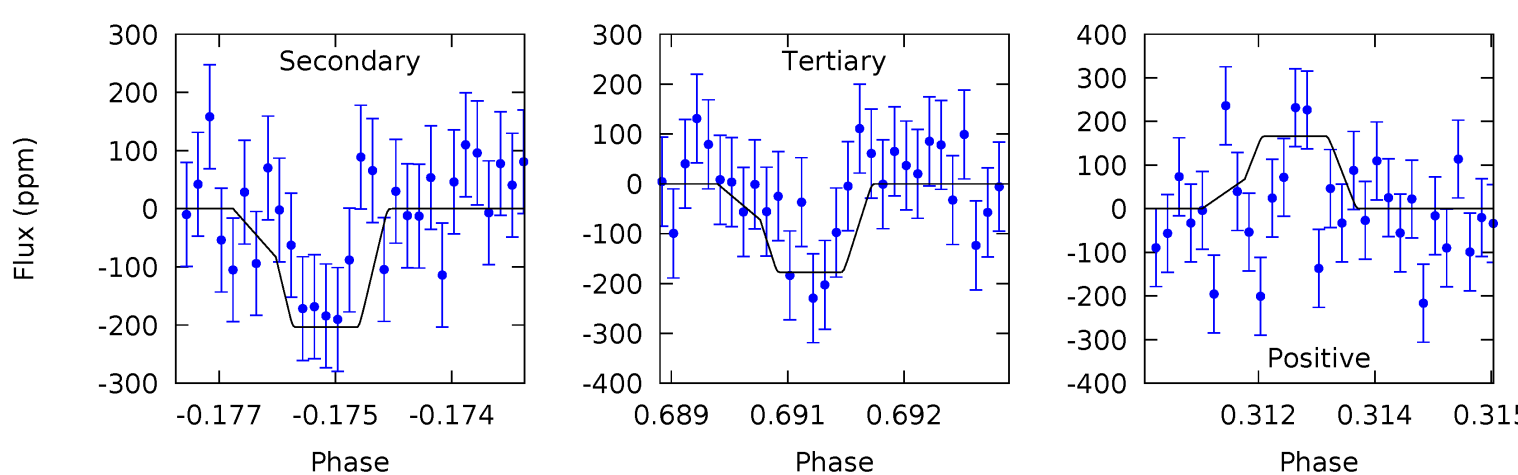
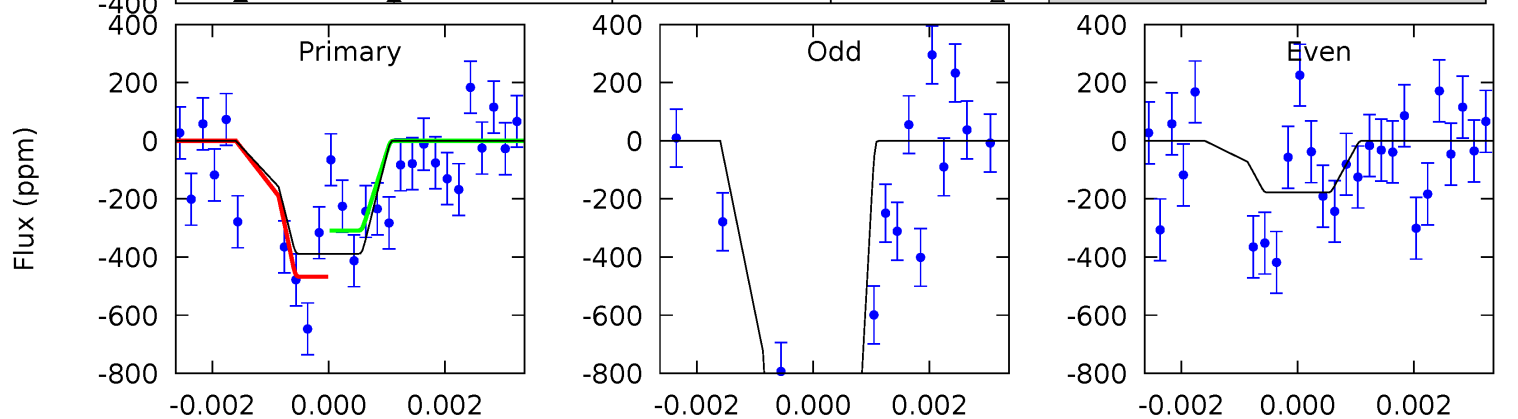
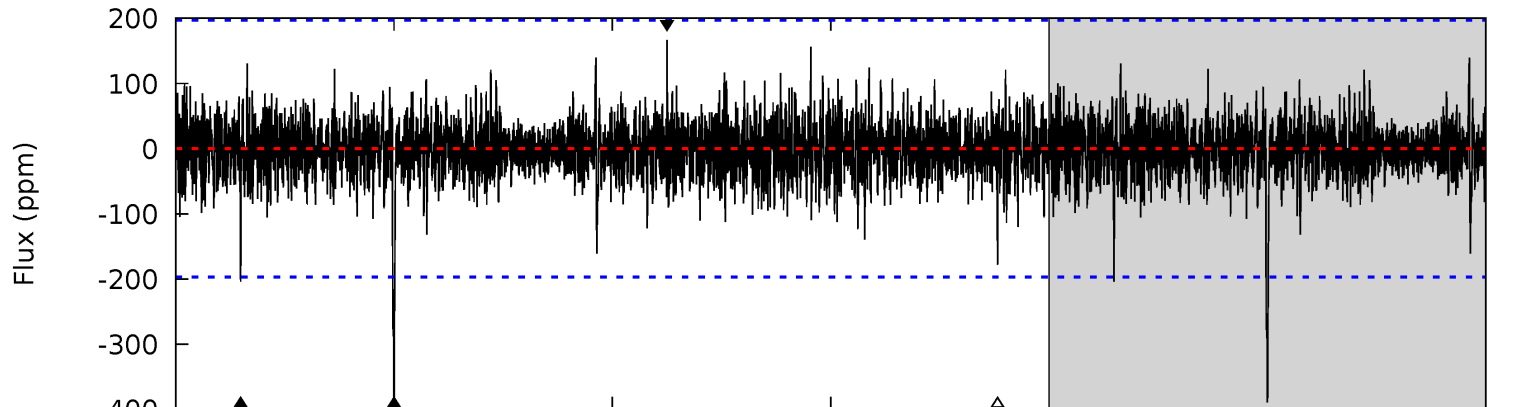
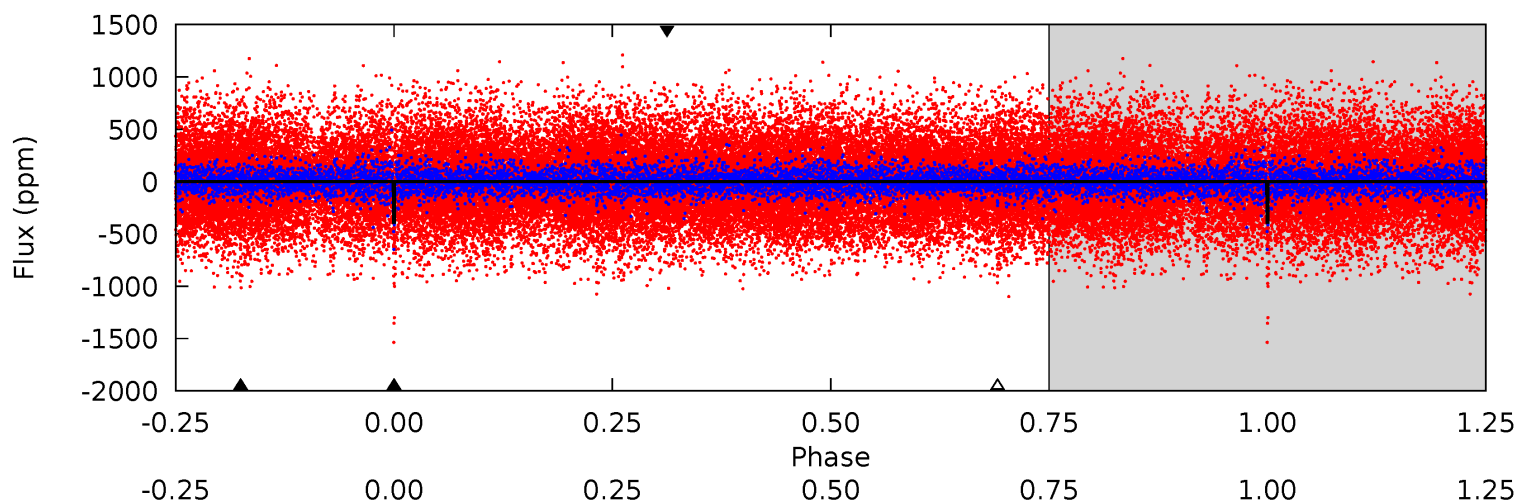
Pri	Sec	Ter	Pos	FA <sub>1</sub>	FA <sub>2</sub>	F <sub>Red</sub>	Pri-Ter	Pri-Pos	Sec-Ter	Sec-Pos	Odd-Evn	DMM	Shape	TAT
0	0	0	0	1.00	1.00	1.00	0	0	0	0	0	0	0	0



# Alt Model-Shift Uniqueness Test

007456521-06, P = 296.599935 Days, E = 128.788579 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
10.6	5.55	4.84	4.53	5.36	3.15	0.98	5.76	6.07	0.71	1.02	21.3	2.70	0.30	2.12





### Stellar Parameters For KIC 007456521

	$T_{\text{eff}}(K)$	$\log(g)$	[Fe/H]	$R$ ( $R_{\odot}$ )	$M(M_{\odot})$	$p_{\star}$ ( $\text{g}\cdot\text{cm}^{-3}$ )
	$5956^{+179}_{-179}$	$4.403^{+0.149}_{-0.182}$	$-0.680^{+0.300}_{-0.300}$	$0.929^{+0.233}_{-0.155}$	$0.797^{+0.102}_{-0.055}$	$1.398^{+0.955}_{-0.653}$
	+3%/-3%	+3%/-4%	+44%/-44%	+25%/-17%	+13%/-7%	+68%/-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 007456521-06 / KOI

Detrend	Depth (ppm)	$R_p$ ( $R_{\oplus}$ )	$T_{max}$ (K)	$T_{obs}$ (K)	$A_{obs}$
DV	$0 \pm 1000000$	$7.62^{+8.09}_{-5.54}$	$393^{+28}_{-22}$	$-5148^{+24676}_{-21007}$	$-15730.037^{+959729.723}_{-1384088.309}$
Alt.	$-204 \pm 37$	$9.26^{+9.32}_{-6.09}$	$396^{+28}_{-24}$	$3032^{+1263}_{-500}$	$850^{+6211}_{-635}$

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

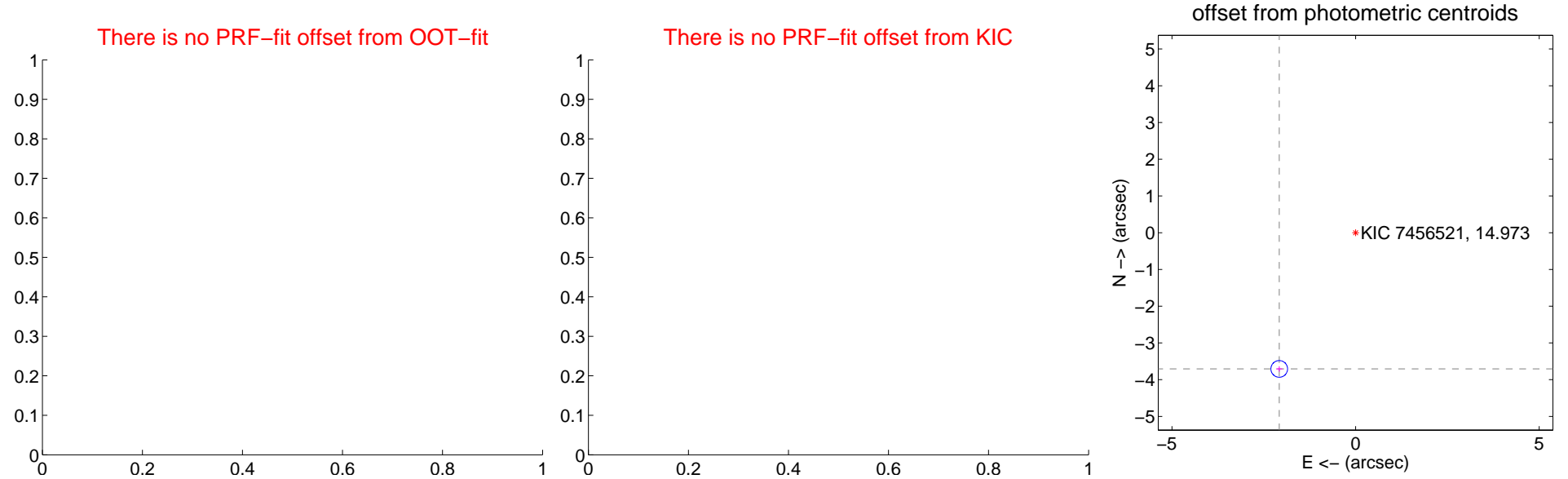
## DV Centroid Data

Supplemental centroid analysis for 007456521-06. Kepler magnitude: 14.97. Transit SNR -1.00

There are 0 quarters with good PRF difference image offsets

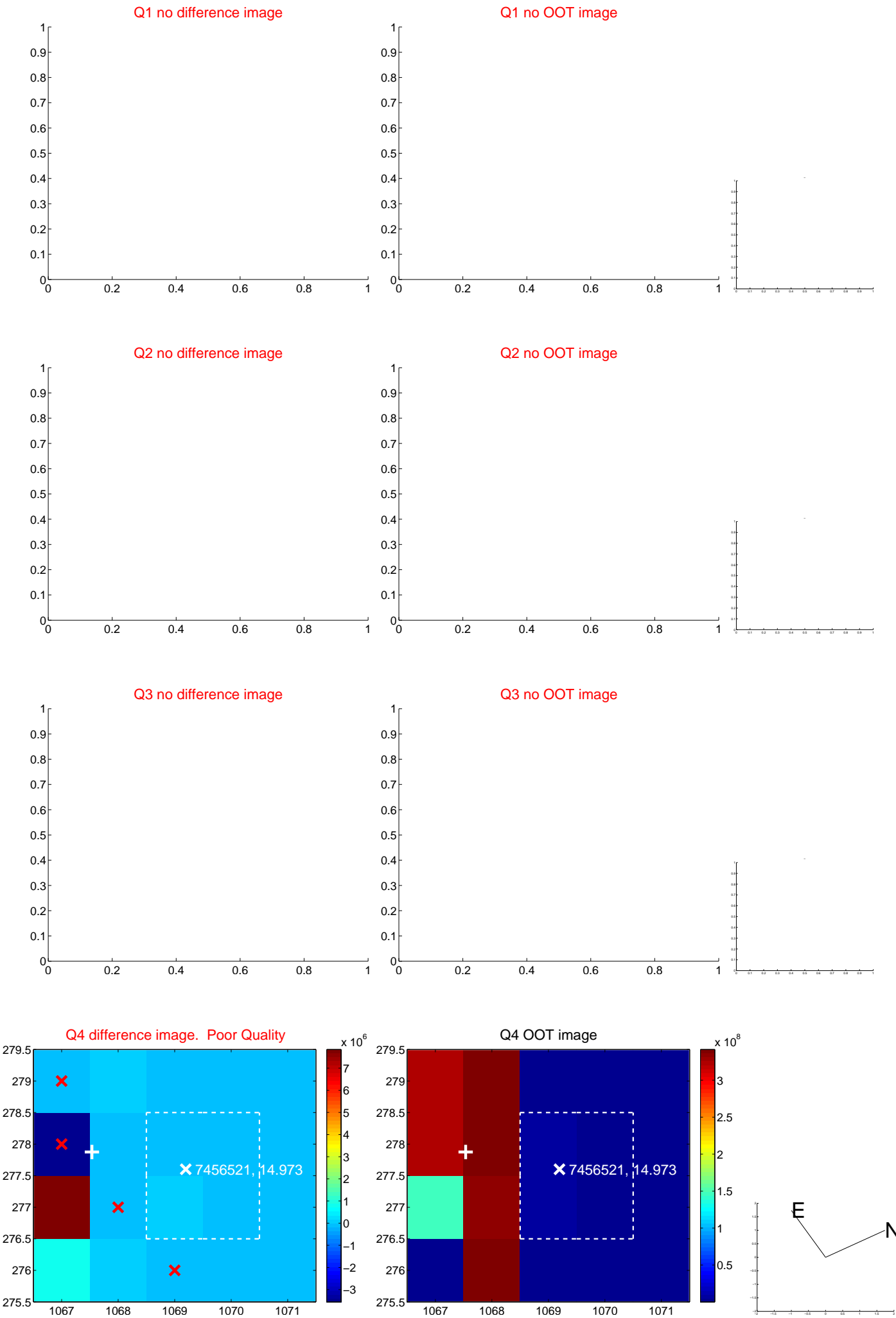
The direct PRF centroid is offset from the target star catalog position by about NaN arcsec

	Distance in arcsec	Distance / $\sigma$	$\Delta$ RA	$\Delta$ Dec
PRF-fit source offset from OOT	—	—	—	—
PRF-fit source offset from KIC position	—	—	—	—
photometric centroid source offset	$4.25 \pm 0.08$	$56.15$	$2.08 \pm 0.09$	$-3.71 \pm 0.07$



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.

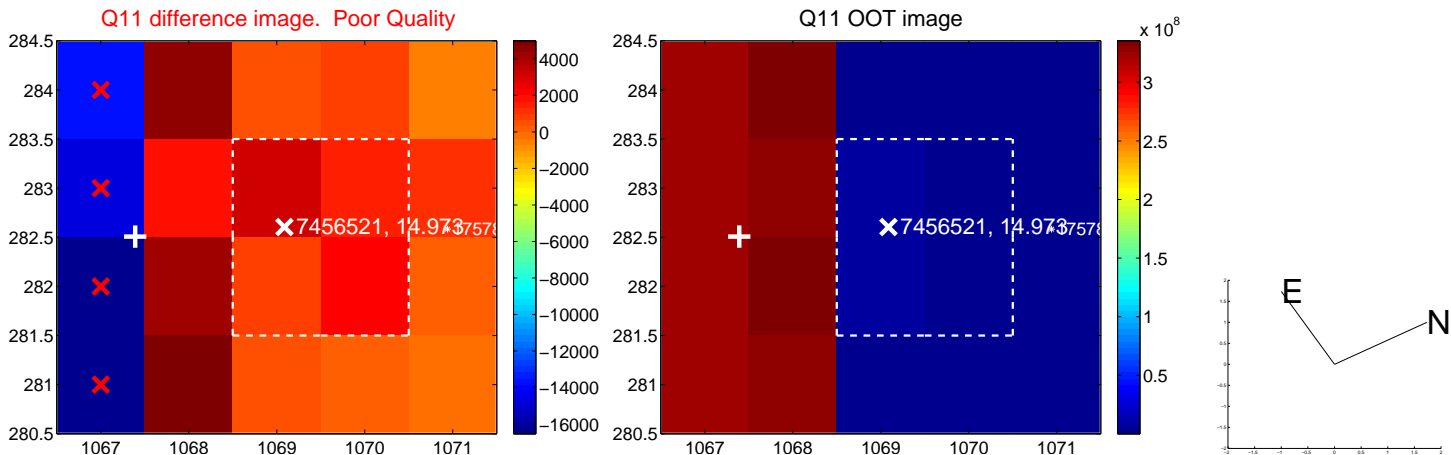
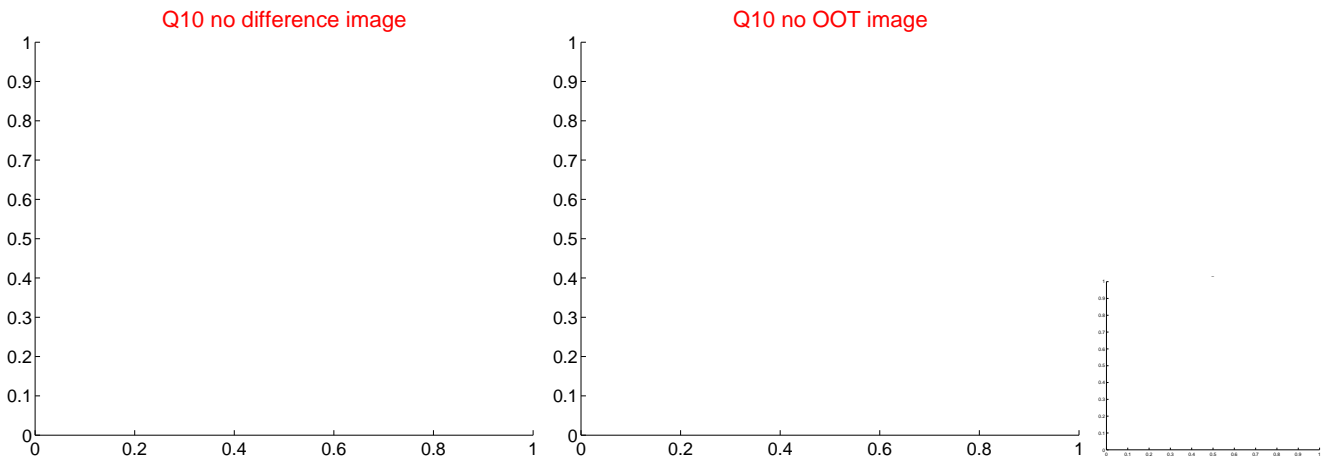
white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.



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

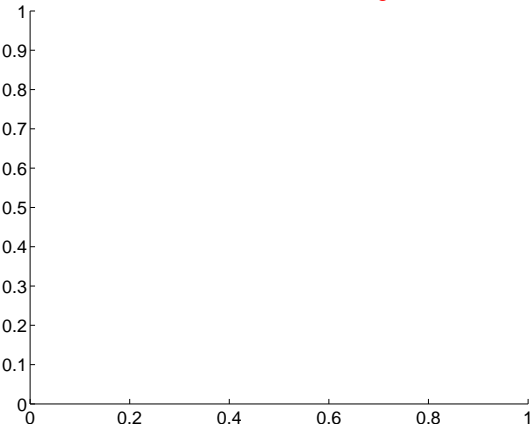


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value

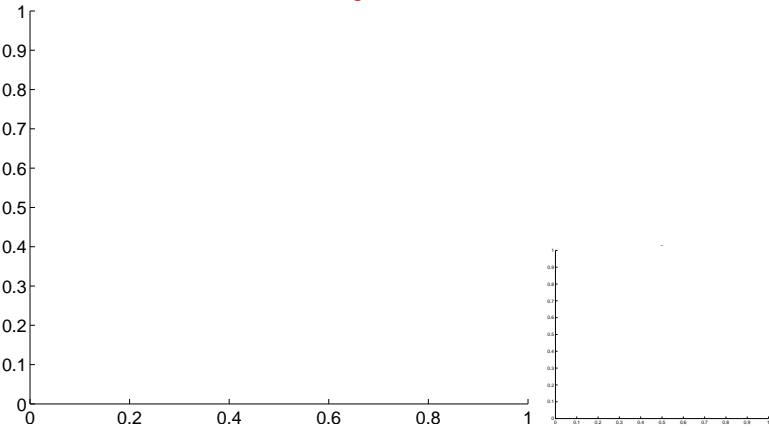


white  $\times$ : KIC target position;  $+$ : OOT centroid;  $\triangle$ : difference centroid. red  $\times$ : large negative pixel value.

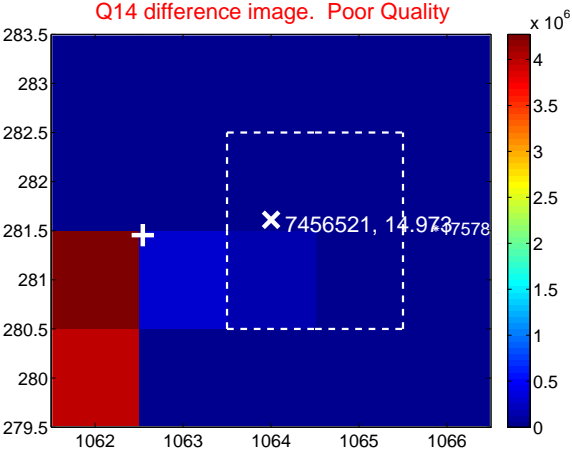
Q13 no difference image



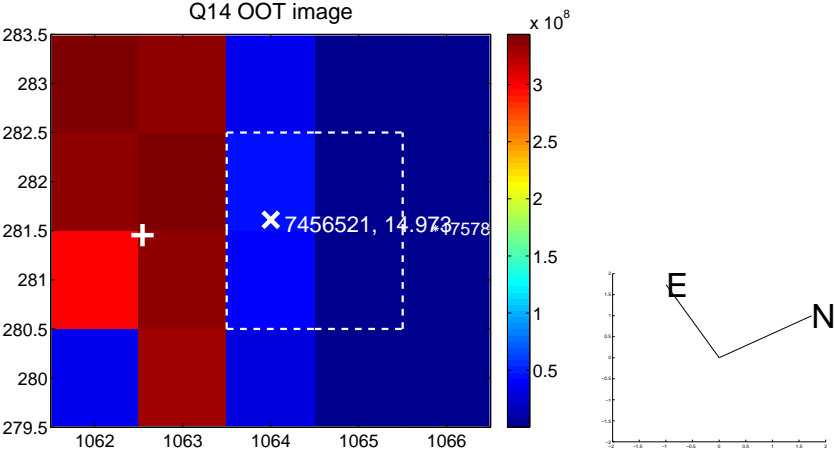
Q13 no OOT image



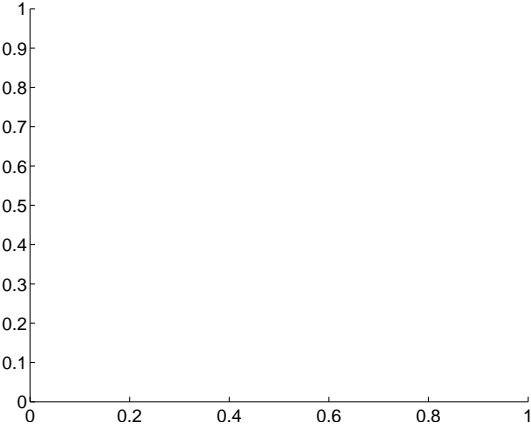
Q14 difference image. Poor Quality



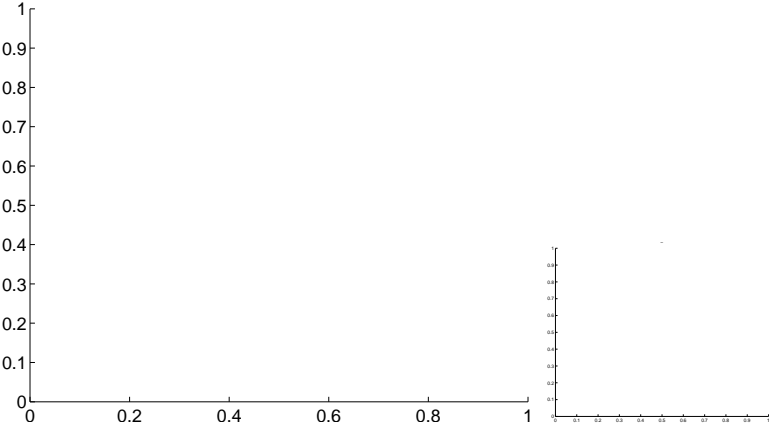
Q14 OOT image



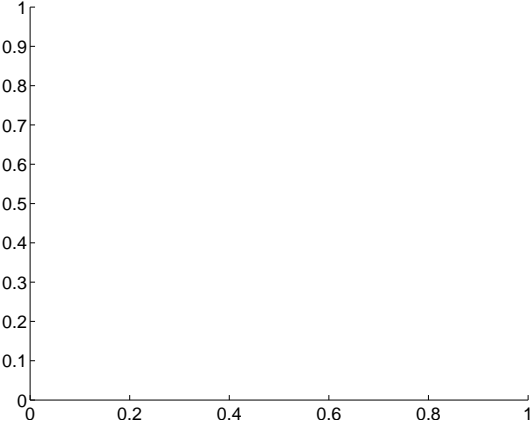
Q15 no difference image



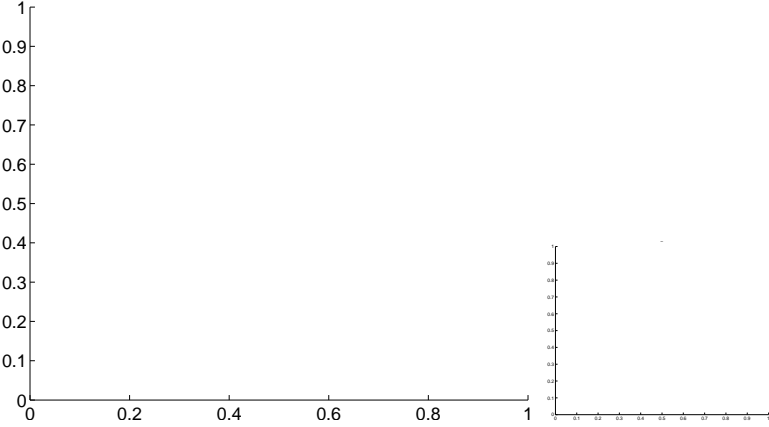
Q15 no OOT image



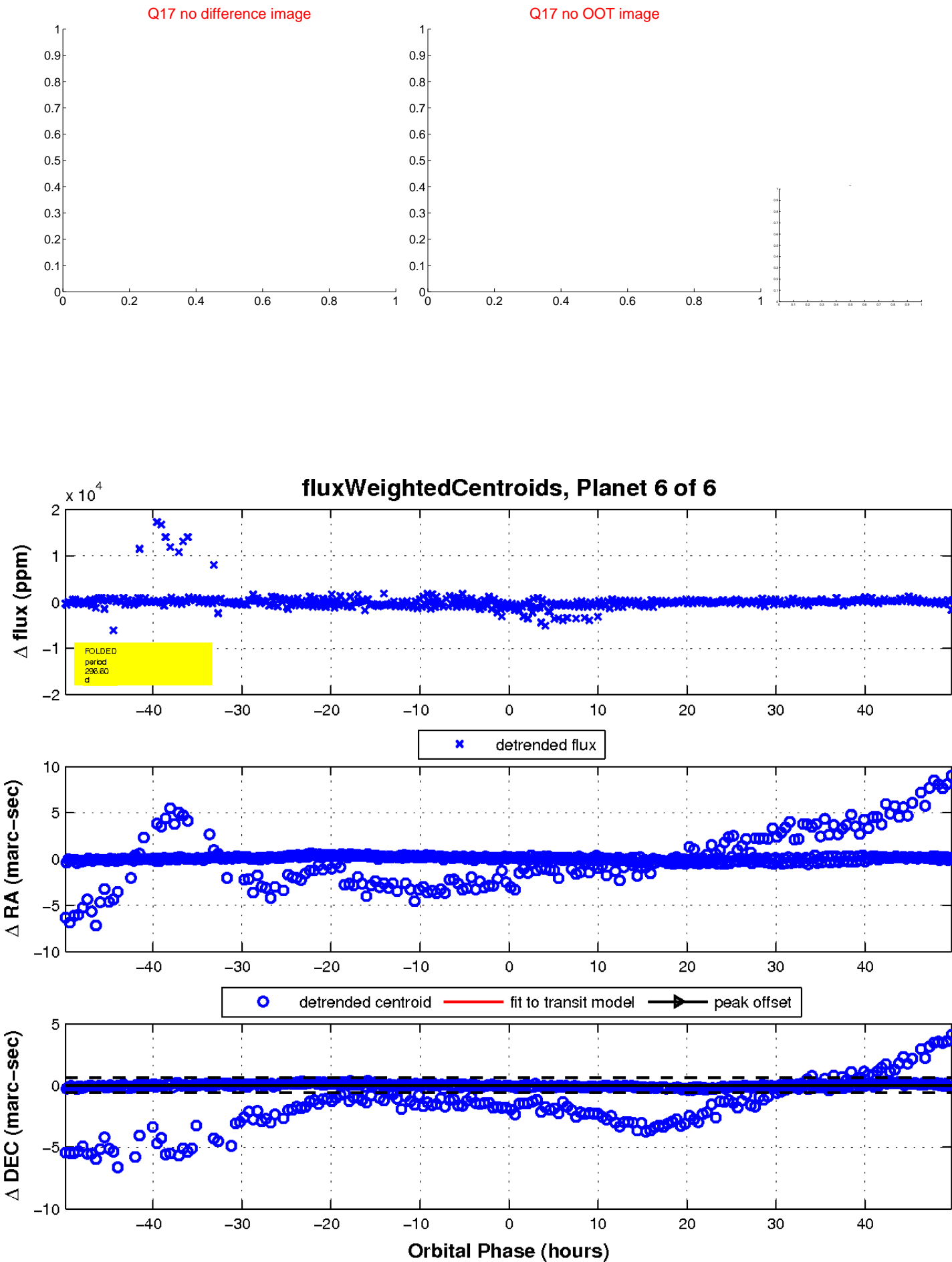
Q16 no difference image



Q16 no OOT image



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



UKIRT Image

Declination

