Candidate: a 2.829-day dip on TIC 328548852

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Tustin, California. 28 October 2026. Not submitted to VSX. The host is not settled, so this star is labeled a candidate.

Abstract

TESS QLP photometry of TIC 328548852 (V = 11.75) shows a shallow dip every 2.829 days, and a second dip of about 1 percent at phase 0.502. The star is not a VSX entry. The TIC contamination ratio is 0.244, so a neighbor in the aperture is still possible and the dip is not filed. 45 minima give

$$\mathrm{BJD_{TDB}} = 2459868.63275 + 2.829242\ E$$

with an rms O−C of 14 minutes. The ring search quoted BTJD 2868.632 + 2.829246 E, a depth of 0.05 mag, a width of about 1.1 hours, and a possible 1 percent secondary at phase 0.502. The epoch and the period agree. The local depth is 0.050 mag. The time below 98 percent of normal light is 1.8 hours, and the time below half depth is 1.6 hours. Both are longer than 1.1 hours. The dip finder had marked these events "short" with widths of 0.021 to 0.025 days, about 0.5 to 0.6 hours, which is the time below its own threshold and not the width used here. The phase-0.502 dip is real in the fold, at 0.95 percent.

1. How the star was found

Same screen as TIC 422108500: 357 stars, V < 12.5, ring 1.50 to 1.60 degrees, QLP sectors 16, 17, 56, 57, 83 and 84. TIC 328548852 lies 1.579 degrees, 95 arcmin, west of V345 Lac. The dip finder returned 68 events and called them short. Sectors 16 and 17 are 30-minute cadence (KSPSAP_FLUX). A 1.8-hour dip is only a few of those cadences, and one sector-16 detection was rejected as a false time. The later sectors are 200-second cadence (DET_FLUX).

2. The star

TIC 328548852 is TYC 3973-02754-1, Gaia DR3 2005681871064654208, 2MASS J22075199+5453030, UCAC4 725-084355. TIC v8.2 J2000, MAST, 28 October 2026: 22h 07m 52.00s, +54° 53′ 03.0″ (RA 331.966668°, Dec 54.884167°). V = 11.748 ± 0.020, B = 11.864, T = 11.332, contamination ratio 0.244, l = 100.81°, b = −0.80°. TIC quotes the Gaia DR2 parallax, 1.502 ± 0.030 mas, and proper motion −11.25, −7.86 mas $\mathrm{yr^{-1}}$. Gaia DR3, ESA TAP, 28 October 2026: parallax 1.386 ± 0.021 mas, proper motion −10.65, −8.02 mas $\mathrm{yr^{-1}}$, G = 11.684, BP = 11.944, RP = 11.261, RUWE 1.42. The DR3 parallax is the one used here. It differs from the DR2 value in the TIC. The TIC position and the DR3 source agree to 0.22 arcsec.

3. The ephemeris

A dip is a run below 0.975 of the sector median. One sector-16 time, more than two days off any cycle, was rejected. 45 minima give

$$\mathrm{T_0} = 2868.63275\ \mathrm{BTJD},\ \mathrm{P} = 2.829242 \pm 0.000006\ \mathrm{d}.$$

The formal error on $\mathrm{T_0}$ is 2.3 minutes. The rms residual is 13.9 minutes and the largest is 45 minutes. The ring-search elements, 2868.632 + 2.829246 E, leave 14.0 minutes rms on the same times. The two clocks are the same at the level of the scatter.

The local depth on 200-second sectors is 0.050 mag, 4.6 percent of the light. The time below 98 percent of normal light is 1.8 hours. The time below half depth is 1.6 hours. Sector-median bottoms sit near flux 0.961.

A box of 0.008 in phase, outside the primary, is deepest at phase 0.502 and 0.95 percent down. The box noise is 0.06 percent. That is the "possible 1 percent" secondary. On the fold the width of that dip, below a 0.5 percent deficit, is 1.6 hours on the fold below a 0.5 percent deficit. It is shallow enough that a ground light curve can miss it, and it is coherent enough that it is not dismissed as bin

noise.

Sector	Cycle	Mid-eclipse (BTJD)	UTC	Min. flux	O−C (min)
16	-398	1742.5970	2019-09-16 02:14	0.961	+4.0
16	-397	1745.4304	2019-09-18 22:14	0.957	+9.9
16	-394	1753.9096	2019-09-27 09:44	0.963	-2.3
16	-393	1756.7430	2019-09-30 05:44	0.959	+3.5
16	-392	1759.5763	2019-10-03 01:44	0.962	+9.4
17	-389	1768.0554	2019-10-11 13:14	0.957	-3.0
17	-388	1770.8679	2019-10-14 08:44	0.963	-27.1
17	-387	1773.7220	2019-10-17 05:14	0.961	+8.7
17	-385	1779.3886	2019-10-22 21:14	0.961	+20.4
17	-384	1782.2010	2019-10-25 16:44	0.963	-3.8
17	-383	1785.0343	2019-10-28 12:44	0.961	+2.0
17	-382	1787.8884	2019-10-31 09:14	0.961	+37.8
56	-15	2826.2037	2022-09-03 16:48	0.961	+13.8
56	-14	2829.0150	2022-09-06 12:16	0.959	-12.0
56	-12	2834.6598	2022-09-12 03:44	0.962	-31.8
56	-11	2837.5105	2022-09-15 00:09	0.963	-0.8
56	-10	2840.3091	2022-09-17 19:19	0.964	-45.0
56	-9	2843.1663	2022-09-20 15:54	0.957	-4.6
56	-7	2848.8219	2022-09-26 07:38	0.960	-8.9
56	-6	2851.6466	2022-09-29 03:25	0.961	-15.4
57	-5	2854.4762	2022-10-01 23:20	0.964	-14.9
57	-4	2857.3160	2022-10-04 19:29	0.962	+0.3
57	-3	2860.1447	2022-10-07 15:22	0.962	-0.5
57	-2	2862.9788	2022-10-10 11:24	0.962	+6.6
57	0	2868.6278	2022-10-16 02:58	0.962	-7.1
57	1	2871.4535	2022-10-18 22:47	0.958	-12.2
57	2	2874.2909	2022-10-21 18:53	0.962	-0.5
57	3	2877.1126	2022-10-24 14:37	0.962	-11.4
57	4	2879.9487	2022-10-27 10:41	0.961	-1.5
83	245	3561.8050	2024-09-08 07:14	0.958	+11.3
83	246	3564.6296	2024-09-11 03:01	0.959	+4.6
83	247	3567.4545	2024-09-13 22:49	0.959	-1.6
83	248	3570.2885	2024-09-16 18:50	0.957	+5.2
83	249	3573.1254	2024-09-19 14:55	0.957	+16.3
83	250	3575.9448	2024-09-22 10:35	0.959	+2.2
83	251	3578.7801	2024-09-25 06:37	0.960	+10.9
83	252	3581.5981	2024-09-28 02:15	0.961	-5.3
84	254	3587.2526	2024-10-03 17:58	0.964	-11.1
84	255	3590.1015	2024-10-06 14:20	0.959	+17.2
84	256	3592.9187	2024-10-09 09:57	0.966	-0.2
84	258	3598.5833	2024-10-15 01:54	0.961	+8.6
84	259	3601.4102	2024-10-17 21:45	0.962	+5.4
84	260	3604.2336	2024-10-20 17:31	0.961	-3.1
84	261	3607.0753	2024-10-23 13:43	0.960	+14.8
84	262	3609.9021	2024-10-26 09:34	0.963	+11.3

Table 1. Primary minima of TIC 328548852. UTC = BJD_TDB - light time - 69.184 s. Cycle 0 is the minimum nearest the quoted epoch, in sector 57.

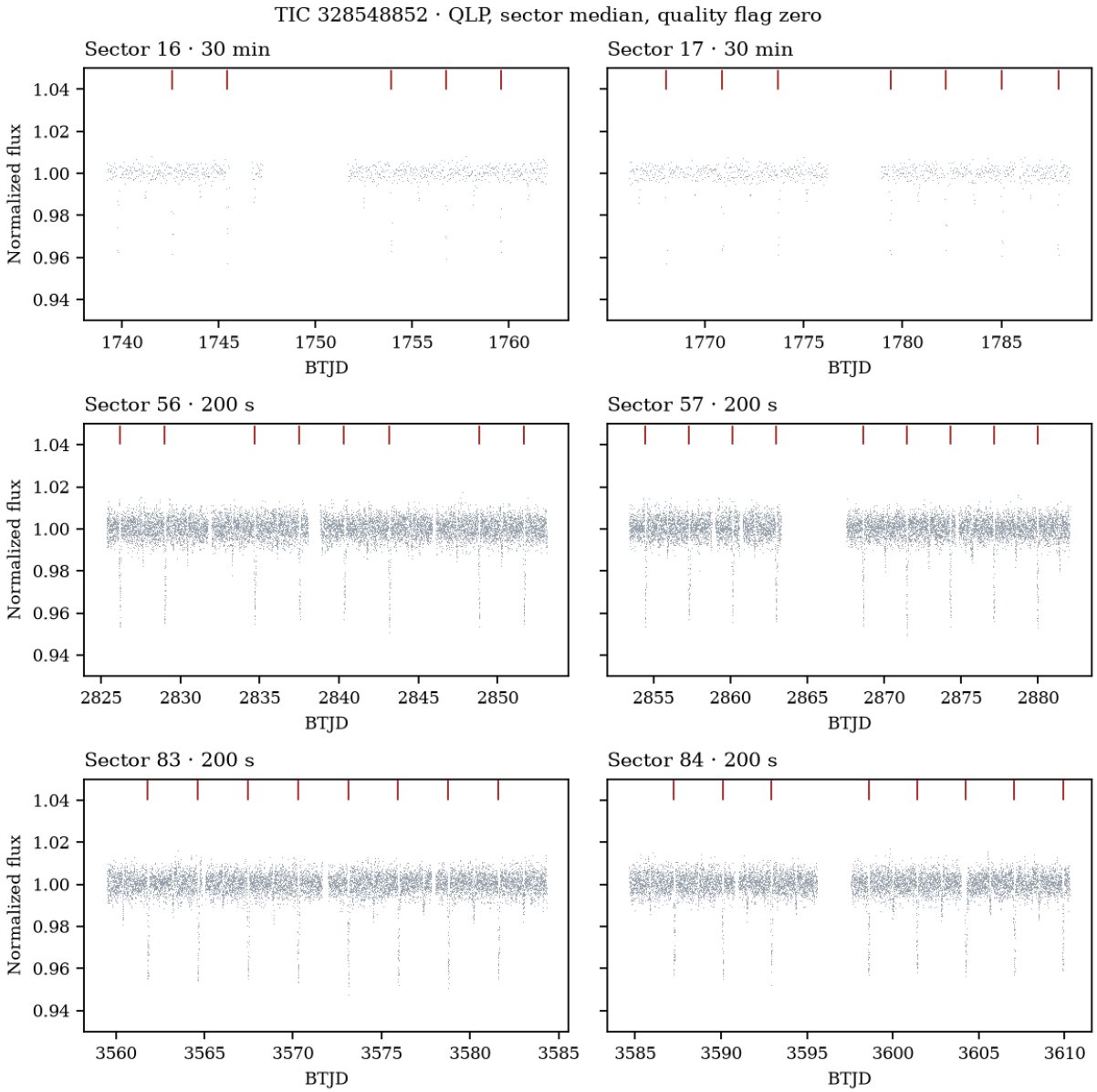

Figure 1. QLP light curves. Red ticks are the minima in Table 1. The dip is shallow, and the 30-minute sectors barely sample it.

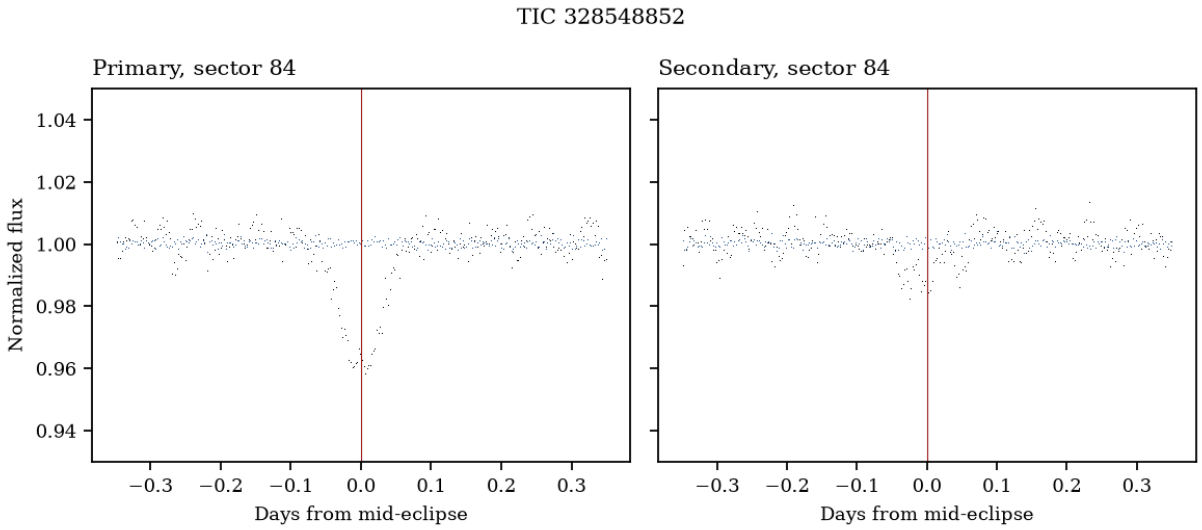

Figure 2. One primary and the phase-0.502 minimum in sector 84. Black is TIC 328548852. Blue is TIC 328548850, V = 10.1, 101 arcsec away, at full light.

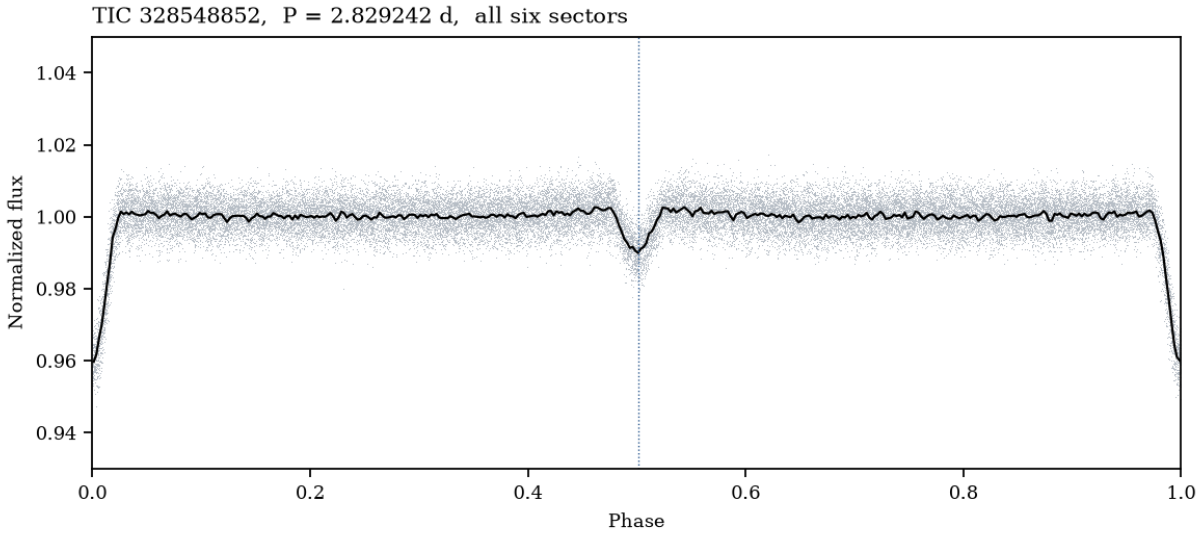

Figure 3. All six sectors folded on the period above. The dotted line marks phase 0.502.

4. Why it stays a candidate

The contamination ratio, 0.244, means other stars contribute about a fifth of the light in the catalog aperture. A 4.6 percent dip can be a shallow eclipse of this star, diluted by that light, or a deeper eclipse of something else in the aperture. The centroid shift during the dip is 0.04 to 0.29 arcsec, inside a scatter of 0.35 to 0.95 arcsec, so the centroid does not point at a neighbor.

What the neighbor test does rule out is limited. TIC 328548850, V = 10.10, 101 arcsec away, stays at 0.9999 of its light at these times. TIC 328548883, V = 11.45, 176 arcsec away, stays at full light. Inside 20 arcsec the brightest Gaia star is 5.0 arcsec away, G = 16.22 (Gaia DR3 2005681871064653952), 4.5 mag fainter than the target. That star is about 1.6 percent of the target's light. It cannot, by itself, put a 4.6 percent dip into this aperture even if it disappears. The contamination has to be a sum of stars, or the halo of the brighter star 101 arcsec away. Because that sum is not identified star by star, the host is not taken as settled.

The VSX cone of 5 arcmin on 28 October 2026 does not contain this star. The nearest entry is Gaia DR3 2005681080790676864, type S, 45 arcsec away. An eclipsing star 109 arcsec away has a 0.329-day period, which is not this clock.

5. Status

Candidate. Not submitted to VSX. A resolved light curve, with the 5-arcsec neighbor and the bright star 101 arcsec away kept out of the aperture, is the check. TIC 330739083 remains the one star in review.

6. The other new stars in this ring

TIC 422108500 and TIC 328546841 are cleaner eclipsing-binary candidates. TIC 415460747 and TIC 2015971564 are an unresolved pair. This star is the shallow one.

7. The next minima

The secondary is predicted at phase 0.502 and is only about 1 percent. Counted from 2026-10-29 04:25 UTC.

• secondary: BTJD 4344.0883, 2026-10-30 14:02 UTC, 2026-10-30 07:02 PT

• primary: BTJD 4345.4973, 2026-10-31 23:51 UTC, 2026-10-31 16:51 PT

• secondary: BTJD 4346.9175, 2026-11-02 09:56 UTC, 2026-11-02 01:56 PT

• primary: BTJD 4348.3265, 2026-11-03 19:45 UTC, 2026-11-03 11:45 PT

• secondary: BTJD 4349.7468, 2026-11-05 05:50 UTC, 2026-11-04 21:50 PT

• primary: BTJD 4351.1557, 2026-11-06 15:39 UTC, 2026-11-06 07:39 PT

• secondary: BTJD 4352.5760, 2026-11-08 01:44 UTC, 2026-11-07 17:44 PT

The largest residual is 45 minutes. The dip lasts under two hours, so the series has to be dense. A visual glance will not show 0.05 mag.

References

• Gaia Collaboration, 2023, A&A;, 674, A1 (DR3). ESA TAP cone, 28 October 2026.

• Huang C. X. et al., 2020, RNAAS, 4, 204 (QLP)

• Stassun K. G. et al., 2019, AJ, 158, 138 (TIC). MAST, 28 October 2026.

• Watson C., Henden A., Price A., 2006–, AAVSO VSX. Cone of 5 arcmin, 28 October 2026.