EXOPLANET ANALYSIS MODEL

A. French Jan 2021

Star	**Kepler 452**
Planet	**Kepler 452b**

"Earth 2.0"

Planet mass /earth masses	5
Planet radius /earth radii	1.5
Orbital period /days	384.84
Orbital radius /AU	1.046

Star mass /solar masses	1.037
Star radius /solar radii	1.11
Luminosity /solar luminosity	1.2
Star surface temperature /K	5757
Distance from Earth /ly	1402
Parallax /milli arc seconds	1.7838

1AU /m	1.50E+11
Solar mass /kg	1.99E+30
Earth mass /kg	5.97E+24
Solar radius /km	696340
Earth radius /km	6371
Solar luminosity /Wm^-2	3.85E+26
Speed of light /ms^-1	3.00E+08
1 year /s	31536000
1 light year (ly) /m	9.45E+15
Gravitational constant G / Nm^2kg^-2	6.67E-11
Stefan-Boltzmann constant /Wm^-2K^-4	5.67E-08
Sun surface temperature /K	5780
Sun peak spectral intensity wavelength /nm	502

Peak star spectral intensity wavelength /nm	504

Star calculation based upon main sequence correlations, and quoted star surface temperature

		Published value
Calculated star mass / solar masses	0.992	1.037
Calculated star radius /solar radii	0.994	1.11
Calculated star luminosity /solar luminosity	0.973	1.2

Star calculation based upon main sequence correlations, and quoted star mass

Calculated star surface temperature / Sun surface temperature	1.019	0.996
Calculated star surface temperature /K	5889	5757
Calculated star radius /solar radii	1.027	1.11
Calculated star luminosity /solar luminosity	1.135	1.2

Calculated orbital radius /AU from star mass and period	1.049	1.046
Orbital speed of star /ms^-1 about barycentre	0.430	
Calculated planet mass /earth mass	5.02	5.00
Maximum Doppler wavelength shift of star due to orbit about barycentre /nm	7.23E-07	
Orbital speed of planet /kms^-1 about barycentre (effectively the star centre of mass)	29.64	29.57

Time for centre of mass of planet to transit star /hours	14.49
Luminosity dip (%) during transit of planet in front of star	0.0153

https://en.wikipedia.org/wiki/Exoplanet

https://en.wikipedia.org/wiki/Doppler_spectroscopy

Kepler 452-b exoplanet

Kepler-452 star