Extended Data Table 4|Parameters in Step2

i	σ_{y_i}	$\overline{y}_i$
1	**0.890**	**0.26**
2	**1.042**	**-0.61**
3	**1.000**	**0.66**

In the process of ECP Transformation, the PDF of x_3 is mapped to the standard normal distribution function $\phi\left(y_3,0,1\right)$, which means that the mean value is 0, and the standard deviation is 1. Then, the PDF of x_1 and x_2 are mapped to a normal distribution function $\phi\left(y_1,0,\sigma_{y\_1}\right)$ and $\phi\left(y_2,0,\sigma_{y\_2}\right)$, which means the mean value is 0, and the standard deviation is σ_{y_1} and σ_{y_2}, respectively. σ_{y_i} can reflect the differences in standard deviations of probability density functions corresponding to different design variables. Here we define $\sigma_{y\_3}=1$, and σ_{y_1}, σ_{y_2} can be obtained by Methods, Eq. (7). $\overline{y}_i$ represents the nominal values of $\overline{x}_i$ after ECP Transformation. The parameters corresponding from $\overline{x}_i$ to $\overline{y}_i$, $i=1,2,3$ are obtained from Methods, Eq. (8). Since the parameters mapping from $\hat{f}\left(\overline{x}_i\right)$ to $\phi\left(y_i,0,\sigma_{y\_i}\right)$ is a nonlinear transformation process, the analytical solution expression cannot be constructed directly. Here we use Polynomial Fitting Method to construct the numerical expression, shown in Extended Data Fig.2.