

$$N = 259 = 7 \cdot 37$$

By the Ibukiyama-Kitayama dimension formula,
 $\dim(S_4(K(259))) = 150$

By the Skoruppa-Zagier dimension formula and Jacobi restriction,
the lift dimension of $S_4(K(259))^+$ is 49
the nonlift dimension of $S_4(K(259))^+$ is heuristically 88
 $\dim(S_4(K(259))^+)$ thus is heuristically 137
 $\dim(S_4(K(259))^-)$ is heuristically 13

$\dim(J_{\{2,259\}}^{\{\text{cusp}\}}) = 7$ (Skoruppa-Zagier), so need to span to within 6 dimensions

$q = 5$ for TraceDown

After TD($\text{Grit}(J_{\{4,1295\}}^{\{\text{cusp}\}})$) and $(\text{Grit}(J_{\{2,259\}}^{\{\text{cusp}\}}))^2$,
spanned rank in $S_4(K(259))^+$ is 137
spanned rank in $S_4(K(259))^-$ is 0

After Borcherds products,
spanned rank in $S_4(K(259))^-$ is 9

Final spanned rank in $S_4(K(259))^+$ is 137

Final spanned rank in $S_4(K(259))^-$ is 9

 $S_2(K(259))^+$ is determined by Jacobi restriction and the $H4Ndl(3,+)$ test
($\dim(H_4(259,3,1))^+ \leq 4$ and this is less than $\dim(J_{\{2,259\}}^{\{\text{cusp}\}})+1 = 8$)
 $S_2(K(259))^- = 0$ by Jacobi restriction and the $H4Ndl(1,-)$ test
($\dim(H_4(259,1,1))^- \leq 4$ and this is less than $\dim(J_{\{2,259\}}^{\{\text{cusp}\}}) = 7$)

So $S_2(K(259)) = \text{Grit}(J_{\{2,259\}}^{\{\text{cusp}\}})$ (dimension 7)