

The following code is the test bench for the design

```
1- int main() {
2-     int status = 0;
3-     unsigned short int a, b;
4-
5-     for (unsigned int i = 0; i < 65536/2; i++) {
6-         a = (unsigned short int)i;
7-         design_file(a, &b);
8-
9-         if (b != 2*a) {
10-             status = -1;
11-             std::cout << " Error at" << " i = " << i
12-                 << " a = " << a
13-                 << " b = " << b
14-                 << " 2*a = " << 2*a
15-                 << std::endl;
16-             break;
17-         }
18-     }
19- }
20- if (status == 0) {
21-     std::cout << "Test Passed" << std::endl;
22- } else {
23-     std::cout << "Test Failed" << std::endl;
24- }
25-
26- return status;
27- }
```

The for-loop at Line 5 generates all the possible design input.

Line 4 prepares the design top-function input argument.

The generated test vector is applied to the design at Line 7.

The if statement at Line 9 check any possible error in the design output and report the possible discrepancy.