Supplementary tables:

Table S1. Algorithms or rules for the rational design of miRNA and siRNA molecules.

<table>
<tr><td colspan="3">E-value
$E = Kmn\, e^{-\lambda S}$

K, λ = high-scoring segment pairs parameters
m, n = limit of sufficiently large sequence lengths</td></tr>
<tr><th>Ui-Tei rules</th><th>Amarzguioui rules</th><th>Reynolds rules</th></tr>
<tr><td>- A/U at the 5′ terminus of the sense strand
- G/C at the 5′ terminus of the antisense strand
- At least 4 A/U residues in the 5′ terminal 7 bp of sense strand
- No GC stretch longer than 9 nucleotides</td><td>- Duplex End A/U differential >0
- Strong binding of 5′ sense strand
- No U at position 1
- Presence of A at position 6
- Weak binding of 3′ sense strand</td><td>- GC content 30–52% (one point)
- Occurrence of three or more A/U base pair at position 15–19 of the sense strand (Each A/U base pair in this region earns one point)
- Low internal stability at the target site (Tm>−20◦C) (one point)
- Presence of A at position 19 of the sense strand (one point)
- Presence of A at position three of the sense strand (one point)
- Presence of U at position ten of the sense strand (one point)
- Absence of G at position 13 of the sense strand (one point)
- Threshold for efficient siRNAs score >= 6</td></tr>
<tr><td colspan="3">T_m calculation formula
$T_m = \{(1000\times \Delta H)/ (A+\Delta S+R \ln (CT/4)) - 273.15 + 16.6 \log [Na+]$
Here,
ΔH = the sum of the nearest neighbor enthalpy change (kcal/ mol).
A = the helix initiation constant (-10.8).
ΔS = the sum of the nearest neighbor entropy change.
R = the gas constant (1.987 cal/deg/mol).
CT = the total molecular concentration of the strand (100 μM).
[Na+] was fixed at 100 mM.</td></tr>
<tr><td colspan="3">Free energy of the heterodimer of sequence A and sequence B
$\Delta Gbinding = \Delta GAB - \Delta GA - \Delta GB$</td></tr>
</table>

Table S2. Predicted siRNA molecules with target, GC%, T_mC_p, T_m (concentration) (point at which concentration increases), and validity (binary).

Location of target within mRNA	siRNA target within mRNA	Predicted siRNA duplex siRNA candidate at 37° C	GC %	T_mC_p	T_m(conc)	Validity (binary)
175-197	GGCGTTTTGCCTCAACTTGAACA	UUCAAGUUGAGGCAAAACGCC CGUUUUGCCUCAACUUGAACA	47.62	85.2	84.7	1.004
365-387	TTCTTCGTAAGAACGGTAATAAA	UAUUACCGUUCUUACGAAGAA CUUCGUAAGAACGGUAAUAAA	33.33	81.9	81.3	0.978
645-667	GTCCGAACAACTGGACTTTATTG	AUAAAGUCCAGUUGUUCGGAC CCGAACAACUGGACUUUAUUG	42.86	84.8	83.7	0.916
958-980	CTCATGAAGTGTGATCATTGTGG	ACAAUGAUCACACUUCAUGAG CAUGAAGUGUGAUCAUUGUGG	38.1	79.6	78.8	0.937
1060-1082	GCCACTACTTGTGGTTACTTACC	UAAGUAACCACAAGUAGUGGC CACUACUUGUGGUUACUUACC	42.86	84.9	84	0.927
1080-1102	ACCCCAAAATGCTGTTGTTAAAA	UUAACAACAGCAUUUUGGGGU CCCAAAAUGCUGUUGUUAAAA	38.1	84	82.7	1.044
1409-1431	ATGAAGAGATCGCCATTATTTTG	AAAUAAUGGCGAUCUCUUCAU GAAGAGAUCGCCAUUAUUUUG	33.33	82.8	81.5	0.913

1467-1489	AACTGTGAAAGGTTTGGATTATA	UAAUCCAAACCUUUCACAGUU CUGUGAAAGGUUUGGAUUAUA	33.33	82.2	80.9	0.989
1505-1527	TTGTTGAATCCTGTGGTAATTTT	AAUUACCACAGGAUUCAACAA GUUGAAUCCUGUGGUAAUUUU	33.33	82.1	80.8	0.955
1761-1783	ATCTGATTTGGCTACTAACAATC	UUGUUAGUAGCCAAAUCAGAU CUGAUUUGGCUACUAACAAUC	33.33	82.2	80.9	0.977
1784-1806	TAGTTGTAATGGCCTACATTACA	UAAUGUAGGCCAUUACAACUA GUUGUAAUGGCCUACAUUACA	33.33	83.8	82.8	0.918
1843-1865	AACATCTTTGGCACTGTTTATGA	AUAAACAGUGCCAAAGAUGUU CAUCUUUGGCACUGUUUAUGA	33.33	82.8	81.4	0.960
2349-2371	TTGTATTAACGGGCTTATGTTGC	AACAUAAGCCCGUUAAUACAA GUAUUAACGGGCUUAUGUUGC	33.33	82.5	81.6	0.982
2358-2380	CGGGCTTATGTTGCTCGAAATCA	AUUUCGAGCAACAUAAGCCCG GGCUUAUGUUGCUCGAAAUCA	47.62	87.3	85.9	0.991
2697-2719	GTGGAGTATGGCTACATACTACT	UAGUAUGUAGCCAUACUCCAC GGAGUAUGGCUACAUACUACU	42.86	85.7	84.7	1.064
2805-2827	TTGTGAAGAAGAAGAGTTTGAGC	UCAAACUCUUCUUCUUCACAA GUGAAGAAGAAGAGUUUGAGC	33.33	79.7	78.6	0.913
2920-2942	GAGCAAGAAGAAGATTGGTTAGA	UAACCAAUCUUCUUCUUGCUC	38.1	82.5	81.2	0.968

		GCAAGAAGAAGAUUGGUUAGA				
2984-3006	AGGACAATCAGACAACTACTATT	UAGUAGUUGUCUGAUUGUCCU GACAAUCAGACAACUACUAUU	38.1	82.8	81.6	0.900
3051-3073	ACCAGTTGTTCAGACTATTGAAG	UCAAUAGUCUGAACAACUGGU CAGUUGUUCAGACUAUUGAAG	38.1	81.4	80.7	1.008
3136-3158	GTGGAAGAAGCTAAAAAGGTAAA	UACCUUUUUAGCUUCUUCCAC GGAAGAAGCUAAAAAGGUAAA	38.1	83	81.6	1.062
3318-3340	CGGACACAATCTTGCTAAACACT	UGUUUAGCAAGAUUGUGUCCG GACACAAUCUUGCUAAACACU	42.86	83.1	81.9	1.072
3425-3447	AAGTTCTACTTGCACCATTATTA	AUAAUGGUGCAAGUAGAACUU GUUCUACUUGCACCAUUAUUA	33.33	83.5	82.1	0.951
3580-3602	AAGAGTGAAAAGCAAGTTGAACA	UUCAACUUGCUUUUCACUCUU GAGUGAAAAGCAAGUUGAACA	33.33	81.3	80	1.030
3735-3757	AACTAAGTTCCTCACAGAAAACT	UUUUCUGUGAGGAACUUAGUU CUAAGUUCCUCACAGAAAACU	33.33	81.9	81.5	0.968
3804-3826	CACTCTTGTTAGTGACATTGACA	UCAAUGUCACUAACAAGAGUG CUCUUGUUAGUGACAUUGACA	38.1	80.2	79.7	0.892
3869-3891	TTGTTCAAGAGGGTGTTTTAACT	UUAAAACACCCUCUUGAACAA GUUCAAGAGGGUGUUUUAACU	33.33	82.5	81.3	1.031
4022-4044	AGGCAAAGACAGTGCTTAAAAAG	UUUUAAGCACUGUCUUUGCCU	38.1	84.8	83.5	0.977

		GCAAAGACAGUGCUUAAAAAG				
4284-4306	AACAACTGTAGCGTCACTTATCA	AUAAGUGACGCUACAGUUGUU CAACUGUAGCGUCACUUAUCA	38.1	85.5	84.2	0.947
4479-4501	TTCTAAAACACCTGAAGAACATT	UGUUCUUCAGGUGUUUUAGAA CUAAAACACCUGAAGAACAUU	33.33	80.7	79.4	1.017
4932-4954	TAGGTACATGTCAGCATTAAATC	UUUAAUGCUGACAUGUACCUA GGUACAUGUCAGCAUUAAAUC	33.33	83.2	81.8	1.079
4965-4987	GTGGAAATACCCACAAGTTAATG	UUAACUUGUGGGUAUUUCCAC GGAAAUACCCACAAGUUAAUG	38.1	82.6	81.9	1.029
5229-5251	TTGCAAAAGAGTCTTGAACGTGG	ACGUUCAAGACUCUUUUGCAA GCAAAAGAGUCUUGAACGUGG	38.1	82.1	81	0.978
5289-5311	GGGTGTAGAAGCTGTTATGTACA	UACAUAACAGCUUCUACACCC GUGUAGAAGCUGUUAUGUACA	42.86	84.3	83.1	0.990
5538-5560	TTGCATAGACGGTGCTTTACTTA	AGUAAAGCACCGUCUAUGCAA GCAUAGACGGUGCUUUACUUA	42.86	86.6	85.5	0.930
5539-5561	TGCATAGACGGTGCTTTACTTAC	AAGUAAAGCACCGUCUAUGCA CAUAGACGGUGCUUUACUUAC	42.86	86.5	85.4	0.995
5745-5767	ACCAAACCAACCATATCCAAACG	UUUGGAUAUGGUUGGUUUGGU CAAACCAACCAUAUCCAAACG	38.1	83	81.7	0.945
6043-6065	AGCACAAAACCAGTTGAAACATC	UGUUUCAACUGGUUUUGUGCU	38.1	81.9	80.6	0.957

		CACAAAACCAGUUGAAACAUC				
6146-6168	AAGAAGTAGTGGAAAATCCTACC	UAGGAUUUUCCACUACUUCUU GAAGUAGUGGAAAAUCCUACC	33.33	82.1	81	0.941
6206-6228	CCGAAGTTGTAGGAGACATTATA	UAAUGUCUCCUACAACUUCGG GAAGUUGUAGGAGACAUUAUA	42.86	84.5	83.3	0.925
6374-6396	ATGGTTTAGCTGCTGTTAATAGT	UAUUAACAGCAGCUAAACCAU GGUUUAGCUGCUGUUAAUAGU	33.33	84.4	83	0.997
6838-6860	ACCTACTGTACTGGTTCTATACC	UAUAGAACCAGUACAGUAGGU CUACUGUACUGGUUCUAUACC	38.1	85	83.7	0.906
6857-6879	TACCTTGTAGTGTTTGTCTTAGT	UAAGACAAACACUACAAGGUA CCUUGUAGUGUUUGUCUUAGU	33.33	82.5	81.1	0.951
7196-7218	ATGTTGTAGACGGTTGTAATTCA	AAUUACAACCGUCUACAACAU GUUGUAGACGGUUGUAAUUCA	33.33	82.5	81.2	0.968
7250-7272	GAGCAACAAGAGTCGAATGTACA	UACAUUCGACUCUUGUUGCUC GCAACAAGAGUCGAAUGUACA	42.86	84	82.7	0.934
7284-7306	TGGTGTTAGAAGGTCCTTTTATG	UAAAAGGACCUUCUAACACCA GUGUUAGAAGGUCCUUUUAUG	38.1	84.7	83.4	0.949
7332-7354	TTGCAAACTACACAATTGGAATT	UUCCAAUUGUGUAGUUUGCAA GCAAACUACACAAUUGGAAUU	33.33	80.9	79.7	0.941
7514-7536	TTGATAAAGCTGGTCAAAAGACT	UCUUUUGACCAGCUUUAUCAA	33.33	81.2	80	1.064

		GAUAAAGCUGGUCAAAAGACU				
7542-7564	AAGACATTCTCTCTCTCATTTTG	AAAUGAGAGAGAGAAUGUCUU GACAUUCUCUCUCUCAUUUUG	33.33	81.7	80.5	0.926
7659-7681	TGCAAAATCAGCGTCTGTTTACT	UAAACAGACGCUGAUUUUGCA CAAAAUCAGCGUCUGUUUACU	38.1	83.7	82.5	0.966
7687-7709	CAGCTTATGTGTCAACCTATACT	UAUAGGUUGACACAUAAGCUG GCUUAUGUGUCAACCUAUACU	38.1	83.5	82.2	1.020
7808-7830	ACGTACCAATGGAAAAACTCAAA	UGAGUUUUUCCAUUGGUACGU GUACCAAUGGAAAAACUCAAA	38.1	81.6	80.4	0.944
7864-7886	AAGAATGTGTCCTTAGACAATGT	AUUGUCUAAGGACACAUUCUU GAAUGUGUCCUUAGACAAUGU	33.33	81.7	80.7	0.933
7971-7993	GTCACATCAATCTGACATAGAAG	UCUAUGUCAGAUUGAUGUGAC CACAUCAAUCUGACAUAGAAG	38.1	79.3	78.9	0.975
8155-8177	ATGTCATTGTCTGAACAACTACG	UAGUUGUUCAGACAAUGACAU GUCAUUGUCUGAACAACUACG	33.33	80.6	79.7	0.985
8163-8185	GTCTGAACAACTACGAAAACAAA	UGUUUUCGUAGUUGUUCAGAC CUGAACAACUACGAAAACAAA	38.1	80.3	79.1	0.982
8273-8295	TAGCACTTAAGGGTGGTAAAATT	UUUUACCACCCUUAAGUGCUA GCACUUAAGGGUGGUAAAAUU	38.1	86.9	85.5	0.960
8373-8395	ACCTGTTCATGTCATGTCTAAAC	UUAGACAUGACAUGAACAGGU	38.1	82.3	81	0.855

		CUGUUCAUGUCAUGUCUAAAC				
8459-8481	TAGCATCTACAGATACTTGTTTT	AACAAGUAUCUGUAGAUGCUA GCAUCUACAGAUACUUGUUUU	33.33	82.2	81.2	0.923
8542-8564	GACAAAGCTTGCCCATTGATTGC	AAUCAAUGGGCAAGCUUUGUC CAAAGCUUGCCCAUUGAUUGC	42.86	85.6	84.3	0.846
8613-8635	CACGATATTACGCACAACTAATG	UUAGUUGUGCGUAAUAUCGUG CGAUAUUACGCACAACUAAUG	38.1	82.2	81	1.065
8683-8705	ATCTGTTACACACCATCAAAACT	UUUUGAUGGUGUGUAACAGAU CUGUUACACACCAUCAAAACU	33.33	81.4	80.3	0.935
8723-8745	TTGCAACATCAGCTTGTGTTTTG	AAACACAAGCUGAUGUUGCAA GCAACAUCAGCUUGUGUUUUG	38.1	84.2	83	0.908
8902-8924	TACCTTGAAGGTTCTGTTAGAGT	UCUAACAGAACCUUCAAGGUA CCUUGAAGGUUCUGUUAGAGU	38.1	83.3	83.1	0.917
8981-9003	CTGGTGTTTGTGTATCTACTAGT	UAGUAGAUACACAAACACCAG GGUGUUUGUGUAUCUACUAGU	38.1	82.6	81.2	1.001
9002-9024	GTGGTAGATGGGTACTTAACAAT	UGUUAAGUACCCAUCUACCAC GGUAGAUGGGUACUUAACAAU	42.86	84.7	83.4	1.024
9121-9143	TTGGACATATCAGCATCTATAGT	UAUAGAUGCUGAUAUGUCCAA GGACAUAUCAGCAUCUAUAGU	33.33	82.3	81	0.998
9708-9730	GGCTCTCAATGACTTCAGTAACT	UUACUGAAGUCAUUGAGAGCC	42.86	83.5	82.3	0.939

		CUCUCAAUGACUUCAGUAACU				
9712-9734	CTCAATGACTTCAGTAACTCAGG	UGAGUUACUGAAGUCAUUGAG CAAUGACUUCAGUAACUCAGG	38.1	80.8	79.6	0.940
9779-9801	CTGTTTTGCAGAGTGGTTTTAGA	UAAAACCACUCUGCAAAACAG GUUUUGCAGAGUGGUUUUAGA	38.1	83.5	82.2	0.990
9830-9852	AGGGTTGTATGGTACAAGTAACT	UUACUUGUACCAUACAACCCU GGUUGUAUGGUACAAGUAACU	38.1	84	82.8	0.997
10073-10095	ATCCTAAGACACCTAAGTATAAG	UAUACUUAGGUGUCUUAGGAU CCUAAGACACCUAAGUAUAAG	33.33	83.7	82.4	0.983
10172-10194	GTGCTATGAGGCCCAATTTCACT	UGAAAUUGGGCCUCAUAGCAC GCUAUGAGGCCCAAUUUCACU	47.62	87.4	86.1	0.877
10408-10430	TGGTTGTACGCTGCTGTTATAAA	UAUAACAGCAGCGUACAACCA GUUGUACGCUGCUGUUAUAAA	42.86	87.6	86.3	0.912
10451-10473	ATCGATTTACCACAACTCTTAAT	UAAGAGUUGUGGUAAAUCGAU CGAUUUACCACAACUCUUAAU	33.33	81.6	80.3	1.004
10557-10579	AACTGGAATTGCCGTTTTAGATA	UCUAAAACGGCAAUUCCAGUU CUGGAAUUGCCGUUUUAGAUA	38.1	83.1	83.1	0.949
10702-10724	TTCCAAAGTGCAGTGAAAAGAAC	UCUUUUCACUGCACUUUGGAA CCAAAGUGCAGUGAAAAGAAC	38.1	82.8	81.5	0.998
10999-11021	TTGGATATGGTTGATACTAGTTT	ACUAGUAUCAACCAUAUCCAA	33.33	80.9	79.7	0.970

		GGAUAUGGUUGAUACUAGUUU				
11088-11110	AGCAAGAACTGTGTATGATGATG	UCAUCAUACACAGUUCUUGCU CAAGAACUGUGUAUGAUGAUG	38.1	81.5	80.4	0.979
11499-11521	TAGCATAGATGCCTTCAAACTCA	AGUUUGAAGGCAUCUAUGCUA GCAUAGAUGCCUUCAAACUCA	38.1	84.2	83	0.919
11664-11686	GGCTCAATGTGTCCAGTTACACA	UGUAACUGGACACAUUGAGCC CUCAAUGUGUCCAGUUACACA	47.62	84.9	83.8	1.003
11674-11696	GTCCAGTTACACAATGACATTCT	AAUGUCAUUGUGUAACUGGAC CCAGUUACACAAUGACAUUCU	38.1	81.4	80.2	0.922
11709-11731	TACTACTGAAGCCTTTGAAAAAA	UUUUCAAAGGCUUCAGUAGUA CUACUGAAGCCUUUGAAAAAA	33.33	83.1	82	0.950
11825-11847	AAGCTATAGCCTCAGAGTTTAGT	UAAACUCUGAGGCUAUAGCUU GCUAUAGCCUCAGAGUUUAGU	38.1	87.2	85.8	0.974
12020-12042	AAGCTATGACCCAAATGTATAAA	UAUACAUUUGGGUCAUAGCUU GCUAUGACCCAAAUGUAUAAA	33.33	83.3	81.9	0.961
12298-12320	CAGGTTGTAGATGCAGATAGTAA	ACUAUCUGCAUCUACAACCUG GGUUGUAGAUGCAGAUAGUAA	42.86	84.3	83	0.889
12396-12418	GGCCAATTCTGCTGTCAAATTAC	AAUUUGACAGCAGAAUUGGCC CCAAUUCUGCUGUCAAAUUAC	42.86	84.3	83	1.047
12546-12568	TGCACTGTTATCCGATTTACAGG	UGUAAAUCGGAUAACAGUGCA	38.1	82.3	81.1	0.941

		CACUGUUAUCCGAUUUACAGG				
12555-12577	ATCCGATTTACAGGATTTGAAAT	UUCAAAUCCUGUAAAUCGGAU CCGAUUUACAGGAUUUGAAAU	33.33	80.4	79.6	1.048
12825-12847	TGCTGCTAAAGCTTACAAAGATT	UCUUUGUAAGCUUUAGCAGCA CUGCUAAAGCUUACAAAGAUU	38.1	83.8	83.3	0.999
12994-13016	TGCCACATAGATCATCCAAATCC	AUUUGGAUGAUCUAUGUGGCA CCACAUAGAUCAUCCAAAUCC	38.1	83.1	81.9	0.985
13056-13078	ACCTACAACTTGTGCTAATGACC	UCAUUAGCACAAGUUGUAGGU CUACAACUUGUGCUAAUGACC	38.1	82.6	81.7	0.996
13404-13426	TTCTCTAACTACCAACATGAAGA	UUCAUGUUGGUAGUUAGAGAA CUCUAACUACCAACAUGAAGA	33.33	81.2	79.9	1.018
14443-14465	CTGTGTCTAAGGGTTTCTTTAAG	UAAAGAAACCCUUAGACACAG GUGUCUAAGGGUUUCUUUAAG	38.1	83.8	82.4	0.959
14554-14576	TACCAACAATGTGTGATATCAGA	UGAUAUCACACAUUGUUGGUA CCAACAAUGUGUGAUAUCAGA	33.33	79.9	79	0.963
14749-14771	ATGCACTTTTCGCATATACAAAA	UUGUAUAUGCGAAAAGUGCAU GCACUUUUCGCAUAUACAAAA	33.33	80.5	81.5	1.003
14812-14834	ATGCCATTAGTGCAAAGAATAGA	UAUUCUUUGCACUAAUGGCAU GCCAUUAGUGCAAAGAAUAGA	33.33	83.1	81.8	0.970
14851-14873	GTGTCTCTATCTGTAGTACTATG	UAGUACUACAGAUAGAGACAC	38.1	82.8	81.5	1.007

		GUCUCUAUCUGUAGUACUAUG				
14864-14886	TAGTACTATGACCAATAGACAGT	UGUCUAUUGGUCAUAGUACUA GUACUAUGACCAAUAGACAGU	33.33	81.3	80.3	0.969
14873-14895	GACCAATAGACAGTTTCATCAAA	UGAUGAAACUGUCUAUUGGUC CCAAUAGACAGUUUCAUCAAA	38.1	80.6	79.4	0.960
15590-15612	TACTAAAGGACCTCATGAATTTT	AAUUCAUGAGGUCCUUUAGUA CUAAAGGACCUCAUGAAUUUU	33.33	82.8	81.5	0.985
15798-15820	CAGGAGTATGCTGATGTCTTTCA	AAAGACAUCAGCAUACUCCUG GGAGUAUGCUGAUGUCUUUCA	42.86	85.1	83.7	0.976
15843-15865	AAGCTACATGATGAGTTAACAGG	UGUUAACUCAUCAUGUAGCUU GCUACAUGAUGAGUUAACAGG	33.33	81.1	79.9	1.015
15855-15877	GAGTTAACAGGACACATGTTAGA	UAACAUGUGUCCUGUUAACUC GUUAACAGGACACAUGUUAGA	38.1	82.2	81.1	0.951
15992-16014	TTGCAATTCACAGACTTCATTAA	AAUGAAGUCUGUGAAUUGCAA GCAAUUCACAGACUUCAUUAA	33.33	81.1	79.9	0.949
16026-16048	TGCATACGTAGACCATTCTTATG	UAAGAAUGGUCUACGUAUGCA CAUACGUAGACCAUUCUUAUG	38.1	83.3	82.7	0.930
16056-16078	TGCTGTTACGACCATGTCATATC	UAUGACAUGGUCGUAACAGCA CUGUUACGACCAUGUCAUAUC	42.86	85.2	84.6	1.018
16336-16358	TAGCTAACACCTGTACTGAAAGA	UUUCAGUACAGGUGUUAGCUA	38.1	85.5	84.1	0.923

		GCUAACACCUGUACUGAAAGA				
16349-16371	TACTGAAAGACTCAAGCTTTTTG	AAAAGCUUGAGUCUUUCAGUA CUGAAAGACUCAAGCUUUUUG	33.33	82.8	81.7	0.918
16517-16539	TACTGGTTATCGTGTAACTAAAA	UUAGUUACACGAUAACCAGUA CUGGUUAUCGUGUAACUAAAA	33.33	82.4	81.4	0.987
16777-16799	ATCAAAAGGTTGGTATGCAAAAG	UUUGCAUACCAACCUUUUGAU CAAAAGGUUGGUAUGCAAAAG	33.33	82.2	80.9	0.923
17367-17389	GACAAATCAGCTCAATGCTTTAA	AAAGCAUUGAGCUGAUUUGUC CAAAUCAGCUCAAUGCUUUAA	38.1	82.4	81.3	0.942
17486-17508	TTGGAGAAAAGCTGTCTTTATTT	AUAAAGACAGCUUUUCUCCAA GGAGAAAAGCUGUCUUUAUUU	33.33	82.7	81.7	0.955
17607-17629	TTCACTCAAACCACTGAAACAGC	UGUUUCAGUGGUUUGAGUGAA CACUCAAACCACUGAAACAGC	38.1	82.2	81	0.948
17660-17682	TGCTATTACCAGAGCAAAAGTAG	ACUUUUGCUCUGGUAAUAGCA CUAUUACCAGAGCAAAAGUAG	38.1	83.5	82.7	0.985
17671-17693	GAGCAAAAGTAGGCATACTTTGC	AAAGUAUGCCUACUUUUGCUC GCAAAAGUAGGCAUACUUUGC	38.1	83.9	82.8	0.934
17690-17712	TTGCATAATGTCTGATAGAGACC	UCUCUAUCAGACAUUAUGCAA GCAUAAUGUCUGAUAGAGACC	33.33	80.2	79.3	1.049
17697-17719	ATGTCTGATAGAGACCTTTATGA	AUAAAGGUCUCUAUCAGACAU	33.33	82.6	81.6	0.930

		GUCUGAUAGAGACCUUUAUGA				
17699-17721	GTCTGATAGAGACCTTTATGACA	UCAUAAAGGUCUCUAUCAGAC CUGAUAGAGACCUUUAUGACA	38.1	81	80.1	0.953
17753-17775	TAGGAATGTGGCAACTTTACAAG	UGUAAAGUUGCCACAUUCCUA GGAAUGUGGCAACUUUACAAG	38.1	84.1	82.9	0.954
18000-18022	CGCGAAGAAGCTATAAGACATGT	AUGUCUUAUAGCUUCUUCGCG CGAAGAAGCUAUAAGACAUGU	42.86	84.5	83.2	0.979
18248-18270	TTGGAATGTAGTGCGTATAAAGA	UUUAUACGCACUACAUUCCAA GGAAUGUAGUGCGUAUAAAGA	33.33	82.7	81.5	0.986
18338-18360	TGGCTTTGAGTTGACATCTATGA	AUAGAUGUCAACUCAAAGCCA GCUUUGAGUUGACAUCUAUGA	38.1	83.3	82.1	1.037
19234-19256	ATGCTAATGAGTACAGATTGTAT	ACAAUCUGUACUCAUUAGCAU GCUAAUGAGUACAGAUUGUAU	33.33	80.9	80	0.940
19584-19606	GTGGACATTGCTGCTAATACTGT	AGUAUUAGCAGCAAUGUCCAC GGACAUUGCUGCUAAUACUGU	42.86	84.3	83.4	0.949
19680-19702	AAGAAACCAACTGAAACGATTTG	AAUCGUUUCAGUUGGUUUCUU GAAACCAACUGAAACGAUUUG	33.33	81.2	80	1.011
19764-19786	GCCCGTAATGGTGTTCTTATTAC	AAUAAGAACACCAUUACGGGC CCGUAAUGGUGUUCUUAUUAC	42.86	84.8	83.7	0.963
19823-19845	TCCCAAACAAGCTAGTCTTAATG	UUAAGACUAGCUUGUUUGGGA	38.1	84.4	83.2	0.965

		CCAAACAAGCUAGUCUUAAUG				
19911-19933	GTCCAACAATTACCTGAAACTTA	AGUUUCAGGUAAUUGUUGGAC CCAACAAUUACCUGAAACUUA	38.1	80.5	79.4	0.953
20045-20067	TGCCTTCGAACATATCGTTTATG	UAAACGAUAUGUUCGAAGGCA CCUUCGAACAUAUCGUUUAUG	38.1	83.2	82.2	0.968
20049-20071	TTCGAACATATCGTTTATGGAGA	UCCAUAAACGAUAUGUUCGAA CGAACAUAUCGUUUAUGGAGA	33.33	78.3	78.2	1.016
20915-20937	TTCTTGGAATGCTGATCTTTATA	UAAAGAUCAGCAUUCCAAGAA CUUGGAAUGCUGAUCUUUAUA	33.33	82	80.8	0.920

Table S3. T_m values of siRNA (guide strand and passenger strand).

RNA oligo sequences 21nt guide (5′→3′) 21nt passenger (5′→3′)	Seed-duplex stability (T_m)°C	
	Guide	Passenger
UUCAAGUUGAGGCAAAACGCC CGUUUUGCCUCAACUUGAACA	19.2 °C	21.1 °C
UAUUACCGUUCUUACGAAGAA CUUCGUAAGAACGGUAAUAAA	20.6 °C	16.5 °C
AUAAAGUCCAGUUGUUCGGAC CCGAACAACUGGACUUUAUUG	14.6 °C	21.1 °C
ACAAUGAUCACACUUCAUGAG CAUGAAGUGUGAUCAUUGUGG	13.6 °C	19.2 °C
UAAGUAACCACAAGUAGUGGC CACUACUUGUGGUUACUUACC	12.9 °C	17.6 °C
UUAACAACAGCAUUUUGGGGU CCCAAAAUGCUGUUGUUAAAA	14.7 °C	11.3 °C
AAAUAAUGGCGAUCUCUUCAU GAAGAGAUCGCCAUUAUUUUG	-1.8 °C	19.1 °C
UAAUCCAAACCUUUCACAGUU CUGUGAAAGGUUUGGAUUAUA	20.1 °C	20.5 °C
AAUUACCACAGGAUUCAACAA GUUGAAUCCUGUGGUAAUUUU	20.0 °C	16.3 °C
UUGUUAGUAGCCAAAUCAGAU CUGAUUUGGCUACUAACAAUC	19.0 °C	13.8 °C
UAAUGUAGGCCAUUACAACUA GUUGUAAUGGCCUACAUUACA	11.6 °C	6.9 °C
AUAAACAGUGCCAAAGAUGUU CAUCUUUGGCACUGUUUAUGA	11.8 °C	12.0 °C
AACAUAAGCCCGUUAAUACAA GUAUUAACGGGCUUAUGUUGC	11.6 °C	1.4 °C
AUUUCGAGCAACAUAAGCCCG GGCUUAUGUUGCUCGAAAUCA	21.0 °C	19.7 °C
UAGUAUGUAGCCAUACUCCAC GGAGUAUGGCUACAUACUACU	19.0 °C	20.3 °C
UCAAACUCUUCUUCUUCACAA GUGAAGAAGAAGAGUUUGAGC	19.2 °C	20.4 °C
UAACCAAUCUUCUUCUUGCUC GCAAGAAGAAGAUUGGUUAGA	18.8 °C	16.6 °C
UAGUAGUUGUCUGAUUGUCCU GACAAUCAGACAACUACUAUU	17.6 °C	20.5 °C
UCAAUAGUCUGAACAACUGGU CAGUUGUUCAGACUAUUGAAG	11.6 °C	17.8 °C

UACCUUUUUAGCUUCUUCCAC GGAAGAAGCUAAAAAGGUAAA	17.3 °C	19.1 °C
UGUUUAGCAAGAUUGUGUCCG GACACAAUCUUGCUAAACACU	20.9 °C	19.3 °C
AUAAUGGUGCAAGUAGAACUU GUUCUACUUGCACCAUUAUUA	20.0 °C	18.9 °C
UUCAACUUGCUUUUCACUCUU GAGUGAAAAGCAAGUUGAACA	19.2 °C	19.2 °C
UUUUCUGUGAGGAACUUAGUU CUAAGUUCCUCACAGAAAACU	19.2 °C	14.6 °C
UCAAUGUCACUAACAAGAGUG CUCUUGUUAGUGACAUUGACA	20.5 °C	19.2 °C
UUAAAACACCCUCUUGAACAA GUUCAAGAGGGUGUUUUAACU	7.2 °C	20.4 °C
UUUUAAGCACUGUCUUUGCCU GCAAAGACAGUGCUUAAAAAG	13.7 °C	19.2 °C
AUAAGUGACGCUACAGUUGUU CAACUGUAGCGUCACUUAUCA	20.3 °C	19.0 °C
UGUUCUUCAGGUGUUUUAGAA CUAAAACACCUGAAGAACAUU	21.5 °C	7.2 °C
UUUAAUGCUGACAUGUACCUA GGUACAUGUCAGCAUUAAAUC	15.3 °C	20.4 °C
UUAACUUGUGGGUAUUUCCAC GGAAAUACCCACAAGUUAAUG	11.8 °C	10.0 °C
ACGUUCAAGACUCUUUUGCAA GCAAAAGAGUCUUGAACGUGG	21.1 °C	12.2 °C
UACAUAACAGCUUCUACACCC GUGUAGAAGCUGUUAUGUACA	14.6 °C	20.3 °C
AGUAAAGCACCGUCUAUGCAA GCAUAGACGGUGCUUUACUUA	20.9 °C	20.3 °C
AAGUAAAGCACCGUCUAUGCA CAUAGACGGUGCUUUACUUAC	9.8 °C	20.9 °C
UUUGGAUAUGGUUGGUUUGGU CAAACCAACCAUAUCCAAACG	21.2 °C	18.8 °C
UGUUUCAACUGGUUUUGUGCU CACAAAACCAGUUGAAACAUC	14.9 °C	13.3 °C
UAGGAUUUUCCACUACUUCUU GAAGUAGUGGAAAAUCCUACC	18.7 °C	17.6 °C
UAAUGUCUCCUACAACUUCGG GAAGUUGUAGGAGACAUUAUA	19.2 °C	17.8 °C
UAUUAACAGCAGCUAAACCAU GGUUUAGCUGCUGUUAAUAGU	6.9 °C	20.9 °C
UAUAGAACCAGUACAGUAGGU CUACUGUACUGGUUCUAUACC	14.5 °C	20.2 °C

UAAGACAAACACUACAAGGUA CCUUGUAGUGUUUGUCUUAGU	19.2 °C	16.4 °C
AAUUACAACCGUCUACAACAU GUUGUAGACGGUUGUAAUUCA	6.9 °C	20.3 °C
UACAUUCGACUCUUGUUGCUC GCAACAAGAGUCGAAUGUACA	21.1 °C	16.7 °C
UAAAAGGACCUUCUAACACCA GUGUUAGAAGGUCCUUUUAUG	18.7 °C	20.3 °C
UUCCAAUUGUGUAGUUUGCAA GCAAACUACACAAUUGGAAUU	20.1 °C	11.8 °C
UCUUUUGACCAGCUUUAUCAA GAUAAAGCUGGUCAAAAGACU	12.2 °C	13.6 °C
AAAUGAGAGAGAGAAUGUCUU GACAUUCUCUCUCUCAUUUUG	20.4 °C	19.2 °C
UAAACAGACGCUGAUUUUGCA CAAAAUCAGCGUCUGUUUACU	19.2 °C	7.4 °C
UAUAGGUUGACACAUAAGCUG GCUUAUGUGUCAACCUAUACU	18.5 °C	11.6 °C
UGAGUUUUUCCAUUGGUACGU GUACCAAUGGAAAAACUCAAA	13.3 °C	20.0 °C
AUUGUCUAAGGACACAUUCUU GAAUGUGUCCUUAGACAAUGU	20.3 °C	19.3 °C
UCUAUGUCAGAUUGAUGUGAC CACAUCAAUCUGACAUAGAAG	20.3 °C	20.5 °C
UAGUUGUUCAGACAAUGACAU GUCAUUGUCUGAACAACUACG	17.8 °C	20.5 °C
UGUUUUCGUAGUUGUUCAGAC CUGAACAACUACGAAAACAAA	15.3 °C	20.5 °C
UUUUACCACCCUUAAGUGCUA GCACUUAAGGGUGGUAAAAUU	20.0 °C	11.8 °C
UUAGACAUGACAUGAACAGGU CUGUUCAUGUCAUGUCUAAAC	20.3 °C	20.5 °C
AACAAGUAUCUGUAGAUGCUA GCAUCUACAGAUACUUGUUUU	19.0 °C	20.3 °C
AAUCAAUGGGCAAGCUUUGUC CAAAGCUUGCCCAUUGAUUGC	13.6 °C	17.0 °C
UUAGUUGUGCGUAAUAUCGUG CGAUAUUACGCACAACUAAUG	19.0 °C	3.5 °C
UUUUGAUGGUGUGUAACAGAU CUGUUACACACCAUCAAAACU	13.8 °C	20.4 °C
AAACACAAGCUGAUGUUGCAA GCAACAUCAGCUUGUGUUUUG	19.3 °C	20.5 °C
UCUAACAGAACCUUCAAGGUA CCUUGAAGGUUCUGUUAGAGU	16.4 °C	16.6 °C

UAGUAGAUACACAAACACCAG GGUGUUUGUGUAUCUACUAGU	18.9 °C	19.3 °C
UGUUAAGUACCCAUCUACCAC GGUAGAUGGGUACUUAACAAU	12.9 °C	20.3 °C
UAUAGAUGCUGAUAUGUCCAA GGACAUAUCAGCAUCUAUAGU	13.3 °C	16.0 °C
UUACUGAAGUCAUUGAGAGCC CUCUCAAUGACUUCAGUAACU	20.3 °C	20.4 °C
UGAGUUACUGAAGUCAUUGAG CAAUGACUUCAGUAACUCAGG	21.4 °C	19.2 °C
UAAAACCACUCUGCAAAACAG GUUUUGCAGAGUGGUUUUAGA	18.8 °C	20.0 °C
UUACUUGUACCAUACAACCCU GGUUGUAUGGUACAAGUAACU	19.0 °C	14.6 °C
UAUACUUAGGUGUCUUAGGAU CCUAAGACACCUAAGUAUAAG	6.3 °C	18.9 °C
UGAAAUUGGGCCUCAUAGCAC GCUAUGAGGCCCAAUUUCACU	7.4 °C	17.8 °C
UAUAACAGCAGCGUACAACCA GUUGUACGCUGCUGUUAUAAA	11.6 °C	21.0 °C
UAAGAGUUGUGGUAAAUCGAU CGAUUUACCACAACUCUUAAU	17.7 °C	10.0 °C
UCUAAAACGGCAAUUCCAGUU CUGGAAUUGCCGUUUUAGAUA	4.9 °C	20.1 °C
UCUUUUCACUGCACUUUGGAA CCAAAGUGCAGUGAAAAGAAC	12.2 °C	16.7 °C
ACUAGUAUCAACCAUAUCCAA GGAUAUGGUUGAUACUAGUUU	11.2 °C	21.2 °C
UCAUCAUACACAGUUCUUGCU CAAGAACUGUGUAUGAUGAUG	14.9 °C	17.7 °C
AGUUUGAAGGCAUCUAUGCUA GCAUAGAUGCCUUCAAACUCA	14.9 °C	13.3 °C
UGUAACUGGACACAUUGAGCC CUCAAUGUGUCCAGUUACACA	19.0 °C	20.5 °C
AAUGUCAUUGUGUAACUGGAC CCAGUUACACAAUGACAUUCU	20.5 °C	19.0 °C
UUUUCAAAGGCUUCAGUAGUA CUACUGAAGCCUUUGAAAAAA	7.7 °C	20.3 °C
UAAACUCUGAGGCUAUAGCUU GCUAUAGCCUCAGAGUUUAGU	17.7 °C	19.5 °C
UAUACAUUUGGGUCAUAGCUU GCUAUGACCCAAAUGUAUAAA	6.7 °C	20.3 °C
ACUAUCUGCAUCUACAACCUG GGUUGUAGAUGCAGAUAGUAA	17.8 °C	19.0 °C

AAUUUGACAGCAGAAUUGGCC CCAAUUCUGCUGUCAAAUUAC	14.8 °C	12.0 °C
UGUAAAUCGGAUAACAGUGCA CACUGUUAUCCGAUUUACAGG	10.0 °C	19.0 °C
UUCAAAUCCUGUAAAUCGGAU CCGAUUUACAGGAUUUGAAAU	16.3 °C	9.0 °C
UCUUUGUAAGCUUUAGCAGCA CUGCUAAAGCUUACAAAGAUU	11.8 °C	19.7 °C
AUUUGGAUGAUCUAUGUGGCA CCACAUAGAUCAUCCAAAUCC	20.1 °C	17.9 °C
UCAUUAGCACAAGUUGUAGGU CUACAACUUGUGCUAAUGACC	19.7 °C	19.0 °C
UUCAUGUUGGUAGUUAGAGAA CUCUAACUACCAACAUGAAGA	20.5 °C	18.9 °C
UAAAGAAACCCUUAGACACAG GUGUCUAAGGGUUUCUUUAAG	5.5 °C	20.3 °C
UGAUAUCACACAUUGUUGGUA CCAACAAUGUGUGAUAUCAGA	17.4 °C	12.1 °C
UUGUAUAUGCGAAAAGUGCAU GCACUUUUCGCAUAUACAAAA	8.2 °C	10.3 °C
UAUUCUUUGCACUAAUGGCAU GCCAUUAGUGCAAAGAAUAGA	5.3 °C	17.4 °C
UAGUACUACAGAUAGAGACAC GUCUCUAUCUGUAGUACUAUG	18.8 °C	20.2 °C
UGUCUAUUGGUCAUAGUACUA GUACUAUGACCAAUAGACAGU	14.5 °C	13.1 °C
UGAUGAAACUGUCUAUUGGUC CCAAUAGACAGUUUCAUCAAA	16.3 °C	13.4 °C
AAUUCAUGAGGUCCUUUAGUA CUAAAGGACCUCAUGAAUUUU	13.6 °C	19.9 °C
AAAGACAUCAGCAUACUCCUG GGAGUAUGCUGAUGUCUUUCA	19.2 °C	20.3 °C
UGUUAACUCAUCAUGUAGCUU GCUACAUGAUGAGUUAACAGG	12.9 °C	17.9 °C
UAACAUGUGUCCUGUUAACUC GUUAACAGGACACAUGUUAGA	19.3 °C	11.8 °C
AAUGAAGUCUGUGAAUUGCAA GCAAUUCACAGACUUCAUUAA	19.2 °C	13.8 °C
UAAGAAUGGUCUACGUAUGCA CAUACGUAGACCAUUCUUAUG	12.0 °C	16.2 °C
UAUGACAUGGUCGUAACAGCA CUGUUACGACCAUGUCAUAUC	20.5 °C	21.0 °C
UUUCAGUACAGGUGUUAGCUA GCUAACACCUGUACUGAAAGA	20.3 °C	19.0 °C

AAAAGCUUGAGUCUUUCAGUA CUGAAAGACUCAAGCUUUUUG	17.0 °C	20.4 °C
UUAGUUACACGAUAACCAGUA CUGGUUAUCGUGUAACUAAAA	14.3 °C	20.0 °C
UUUGCAUACCAACCUUUUGAU CAAAAGGUUGGUAUGCAAAAG	21.1 °C	17.3 °C
AAAGCAUUGAGCUGAUUUGUC CAAAUCAGCUCAAUGCUUUAA	18.5 °C	12.0 °C
AUAAAGACAGCUUUUCUCCAA GGAGAAAAGCUGUCUUUAUUU	14.6 °C	14.8 °C
UGUUUCAGUGGUUUGAGUGAA CACUCAAACCACUGAAACAGC	19.2 °C	19.2 °C
ACUUUUGCUCUGGUAAUAGCA CUAUUACCAGAGCAAAAGUAG	18.6 °C	15.3 °C
AAAGUAUGCCUACUUUUGCUC GCAAAAGUAGGCAUACUUUGC	11.6 °C	10.3 °C
UCUCUAUCAGACAUUAUGCAA GCAUAAUGUCUGAUAGAGACC	20.2 °C	5.6 °C
AUAAAGGUCUCUAUCAGACAU GUCUGAUAGAGACCUUUAUGA	18.6 °C	21.4 °C
UCAUAAAGGUCUCUAUCAGAC CUGAUAGAGACCUUUAUGACA	3.5 °C	21.4 °C
UGUAAAGUUGCCACAUUCCUA GGAAUGUGGCAACUUUACAAG	12.9 °C	20.5 °C
AUGUCUUAUAGCUUCUUCGCG CGAAGAAGCUAUAAGACAUGU	20.3 °C	19.1 °C
UUUAUACGCACUACAUUCCAA GGAAUGUAGUGCGUAUAAAGA	8.5 °C	16.1 °C
AUAGAUGUCAACUCAAAGCCA GCUUUGAGUUGACAUCUAUGA	20.3 °C	16.6 °C
ACAAUCUGUACUCAUUAGCAU GCUAAUGAGUACAGAUUGUAU	18.1 °C	13.4 °C
AGUAUUAGCAGCAAUGUCCAC GGACAUUGCUGCUAAUACUGU	6.3 °C	20.5 °C
AAUCGUUUCAGUUGGUUUCUU GAAACCAACUGAAACGAUUUG	15.2 °C	18.8 °C
AAUAAGAACACCAUUACGGGC CCGUAAUGGUGUUCUUAUUAC	6.9 °C	13.7 °C
UUAAGACUAGCUUGUUUGGGA CCAAACAAGCUAGUCUUAAUG	18.9 °C	12.2 °C
AGUUUCAGGUAAUUGUUGGAC CCAACAAUUACCUGAAACUUA	19.2 °C	12.1 °C
UAAACGAUAUGUUCGAAGGCA CCUUCGAACAUAUCGUUUAUG	15.2 °C	21.0 °C

UCCAUAAACGAUAUGUUCGAA CGAACAUAUCGUUUAUGGAGA	12.8 °C	16.1 °C
UAAAGAUCAGCAUUCCAAGAA CUUGGAAUGCUGAUCUUUAUA	14.8 °C	20.1 °C