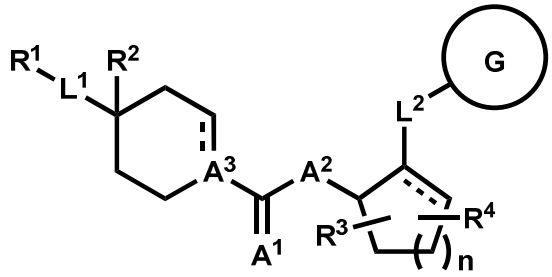
CLAIMS

1. A compound of formula (1):



(1)

or a pharmaceutically acceptable salt thereof

wherein

R^1 is optionally-substituted C_{6-10} aromatic carbocyclyl group, optionally-substituted 5- to 10-membered aromatic heterocyclyl group, optionally-substituted C_{3-6} saturated carbocyclyl group, optionally-substituted 4- to 10-membered saturated heterocyclyl group, or cyano;

L^1 and L^2 are each independently single bond, methylene wherein said methylene may be optionally substituted with the same or different one or more C_{1-4} alky, $-NR^8-$, $-C(=O)-$, $-OC(=O)-$, $-SO-$, $-SO_2-$, $-S-$, or oxygen atom;

R^2 is hydrogen atom, hydroxy group, halogen atom, cyano, or optionally-substituted C_{1-4} alkyl; or

when L^1 is single bond, R^1 and R^2 may be combined together as a spiro ring to form optionally-substituted C_{3-6} saturated carbon ring or optionally-substituted 4- to 10-membered saturated heteroring;

R^3 and R^4 are each independently hydrogen atom, halogen atom, cyano, $-(C=O)NR^5R^6$, carboxy group, $-(C=O)O-R^7$, optionally-substituted C_{1-4} alkyl, or optionally-substituted C_{1-4} alkoxy, wherein R^3 and R^4 may bind to the same carbon atom if chemically possible; or

when R^3 and R^4 bind to different ring carbon atoms, R^3 and R^4 may be taken together via C_{1-6} alkylene to form a fused ring or a bridged ring;

R^5 to R^7 are each independently hydrogen atom, halogen atom, or optionally-substituted C_{1-4} alkyl;

R^8 is each independently hydrogen atom or optionally-substituted C_{1-4} alkyl;

n is an integer of 1, 2, 3, or 4;

Ring G is optionally-substituted C_{6-10} aromatic carbocyclyl group, optionally-substituted 5- to 10-membered aromatic heterocyclyl group, optionally-substituted C_{3-6} saturated carbocyclyl group, or optionally-substituted 4- to 10-membered saturated heterocyclyl group;

A^1 is oxygen atom or sulfur atom;

A^2 is oxygen atom or $-NR^8-$;

A^3 is -CH-, nitrogen atom, or carbon atom; and

the bond accompanied with broken line is each independently single bond or double bond.

2. The compound of claim 1 or a pharmaceutically acceptable salt thereof, wherein

in R^2 – R^8, the optional substituent of "optionally-substituted C_{1-4} alkyl" is the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkoxy, C_{6-10} aromatic carbocyclyl group, and C_{3-7} cycloalkyl; and the optional substituent of "optionally-substituted C_{1-4} alkoxy" is the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{3-7} cycloalkyl;

in R^1, the optional substituent of "optionally-substituted C_{6-10} aromatic carbocyclyl group", "optionally-substituted 5- to 10-membered aromatic heterocyclyl group",

"optionally-substituted C_{3-6} saturated carbocyclyl group", and "optionally-substituted 4- to 10-membered saturated heterocyclyl group" is each independently at least one substituent selected from the group consisting of hydrogen atom, halogen atom, hydroxy group, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, C_{1-6} alkylamino wherein the alkyl group of said C_{1-6} alkylamino may be optionally substituted with halogen atom, hydroxy group, or C_{3-7} cycloalkyl, C_{3-7} cycloalkoxy wherein said C_{3-7} cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, cyano, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl optionally-substituted with the same or different one or more halogen atoms, and C_{3-7} cycloalkyl, and 5- to 10-membered aromatic heterocyclyl group wherein said 5- to 10-membered aromatic heterocyclyl group may be optionally substituted with the same or different one or more substituents selected from

the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl; and

in Ring G, the optional substituent of "optionally-substituted C_{6-10} aromatic carbocyclyl group", "optionally-substituted 5- to 10-membered aromatic heterocyclyl group", "optionally-substituted C_{3-6} saturated carbocyclyl group", and "optionally-substituted 4- to 10-membered saturated heterocyclyl group" is each independently at least one substituent selected from the group consisting of halogen atom, C_{1-6} alkyl wherein said C_{1-6} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{3-7} cycloalkyl, C_{1-6} alkylamino wherein the alkyl group of said C_{1-6} alkylamino may be optionally substituted with halogen atom, hydroxy group, or C_{3-7} cycloalkyl), C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, and C_{3-7} cycloalkoxy wherein said C_{3-7} cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl; or when there are plural

optional substituents, two of them may be taken together via C_{1-6} alkylene to form a chemically-possible bicyclic structure selected from a fused ring, a spiro ring, and bridged ring.

3. The compound of claim 1 or 2 or a pharmaceutically acceptable salt thereof, wherein

in R^2 – R^7, the optional substituent of "optionally-substituted C_{1-4} alkyl" is the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy; and the optional substituent of "optionally-substituted C_{1-4} alkoxy" is the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl;

in R^1, the optional substituent of "optionally-substituted C_{6-10} aromatic carbocyclyl group", "optionally-substituted 5- to 10-membered aromatic heterocyclyl group", "optionally-substituted C_{3-6} saturated carbocyclyl group", and "optionally-substituted 4- to 10-membered saturated heterocyclyl group" is each independently at least one substituent selected from the group consisting of hydrogen atom, halogen atom, hydroxy group, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting

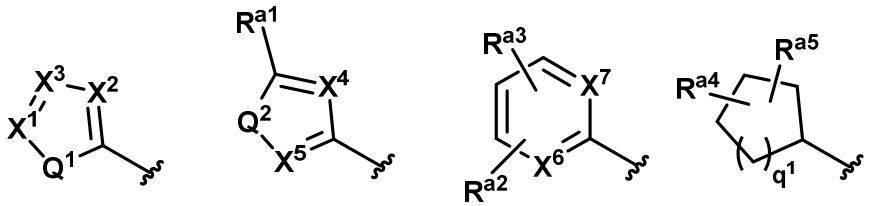
of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, cyano, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl optionally-substituted with the same or different one or more halogen atoms, and C_{3-7} cycloalkyl, and 5- to 10-membered aromatic heterocyclyl group wherein said 5- to 10-membered aromatic heterocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, C_{1-4} alkoxy, and C_{3-7} cycloalkyl; and

in Ring G, the optional substituent of "optionally-substituted C_{6-10} aromatic carbocyclyl group", "optionally-substituted 5- to 10-membered aromatic heterocyclyl group", "optionally-substituted C_{3-6} saturated carbocyclyl group", and "optionally-substituted 4- to 10-membered saturated heterocyclyl group" is each independently at least one substituent selected from the group consisting of halogen atom, C_{1-6} alkyl wherein said C_{1-6} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen

atom, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-6} alkylamino wherein the alkyl group of said C_{1-6} alkylamino may be optionally substituted with halogen atom, hydroxy group, or C_{3-7} cycloalkyl, and C_{3-7} cycloalkoxy (wherein said C_{3-7} cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy; or when there are plural optional substituents, two of them may be taken together via C_{1-6} alkylene to form a chemically-possible bicyclic structure selected from a fused ring, a spiro ring, and bridged ring.

4. The compound of any one of claims 1 to 3 or a pharmaceutically acceptable salt thereof, wherein

R^1 is selected from the following formulae (1a-1) to (1a-4):



(1a-1) (1a-2) (1a-3) (1a-4)

wherein

X^1 – X^7 are each independently nitrogen atom or CR^{a6};

Q^1 and Q^2 are oxygen atom, $-NR^{a7}-$, or sulfur atom;

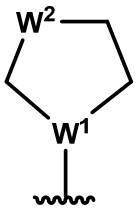
R^{a1} – R^{a7} are each independently, if there are plural CR^{a6}, each R^{a6} is also independently, hydrogen atom, halogen atom, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group

consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, cyano, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{3-7} cycloalkoxy wherein said C_{3-7} cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, or 5- to 10-membered aromatic heterocyclyl group; wherein R^{a4} and R^{a5} may bind to the same carbon atom if chemically possible; and when X^1 and X^3 are both CR^{a6}, the two R^{a6} may be taken together with the carbon atoms to which they are each attached to form 6-membered carbon ring that is fused with the 5-membered ring comprising X^1, X^2, and X^3; and

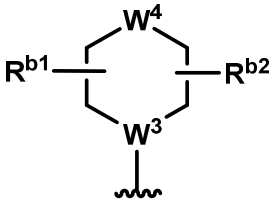
q^1 is an integer of 1 or 2.

5. The compound of any one of claims 1 to 4 or a pharmaceutically acceptable salt thereof, wherein

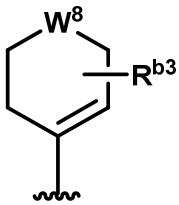
Ring G is selected from the following (1b-1) to (1b-14):



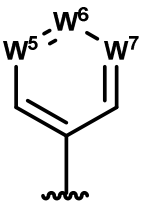
(1b-1)



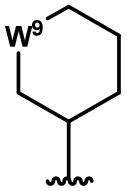
(1b-2)



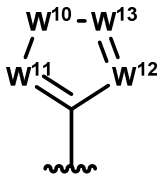
(1b-3)



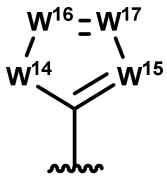
(1b-4)



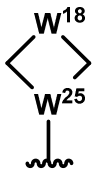
(1b-5)



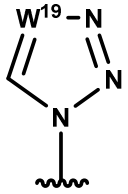
(1b-6)



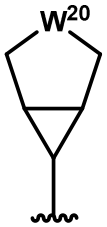
(1b-7)



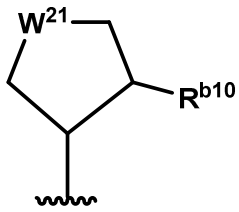
(1b-8)



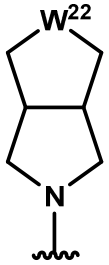
(1b-9)



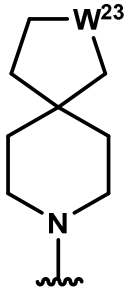
(1b-10)



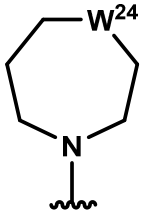
(1b-11)



(1b-12)



(1b-13)



(1b-14)

wherein

W^1, W^3, W^5, W^6, W^7, W^{11}, W^{12}, W^{13}, W^{15}, W^{16}, W^{17}, W^{19}, and W^{25} are each independently nitrogen atom or CR^{b4};

W^2, W^4, W^8, W^9, W^{10}, W^{14}, W^{18}, W^{20}, W^{21}, W^{22}, W^{23}, and W^{24} are NR^{b5}, oxygen atom, or $CR^{b6}R^{b7}$;

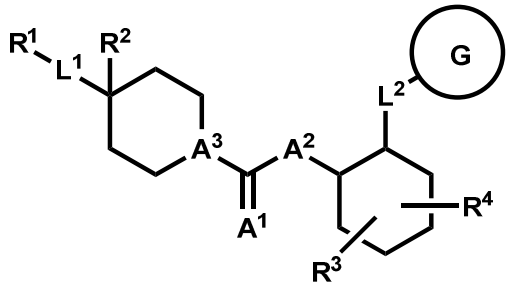
R^{b1} – R^{b7} are each independently, if there are plural CR^{b4}, each R^{b4} is also independently, hydrogen atom, $-N(R^{b8})R^{b9}$, C_{1-6} alkyl wherein said C_{1-6} alkyl may be

optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{3-7} cycloalkyl which may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl wherein said C_{1-4} alkyl may be substituted with halogen atom, and C_{1-4} alkoxy, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, 5- to 10-membered aromatic heterocyclyl group wherein said 5- to 10-membered aromatic heterocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, or C_{3-7} cycloalkoxy wherein said cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy; wherein R^{b1} and R^{b2} may bind to the same carbon atom if chemically possible; or R^{b1} and R^{b2} may be taken together via C_{1-6} alkylene to form a chemically-possible bicyclic structure selected from a fused ring, a spiro ring, and bridged ring; and

R^{b8} and R^{b9} are each independently hydrogen atom, C_{1-6} alkyl wherein said C_{1-6} alkyl may be optionally substituted

with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkoxy, C_{3-7} cycloalkyl which may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl wherein said C_{1-4} alkyl may be substituted with halogen atom, and 5- to 10-membered aromatic heterocyclyl group, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl, 5- to 10-membered aromatic heterocyclyl group wherein said 5- to 10-membered aromatic heterocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, or C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy; or R^{b8} and R^{b9} may be taken together with the nitrogen atom to which they are attached to form 3- to 7-membered nitrogen-containing saturated heterocycle.

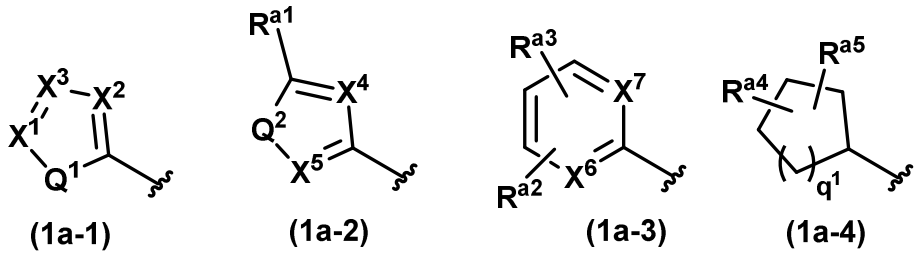
6. The compound of any one of claims 1 to 5 of formula (2):



(2)

or a pharmaceutically acceptable salt thereof, wherein

R^1 is selected from the following formulae (1a-1) to (1a-4):



(1a-1) (1a-2) (1a-3) (1a-4)

wherein

X^1 – X^7 are each independently nitrogen atom or CR^{a6};

Q^1 and Q^2 are oxygen atom, $-NR^{a7}-$, or sulfur atom;

R^{a1} – R^{a7} are each independently, if there are plural CR^{a6}, each R^{a6} is also independently, hydrogen atom, halogen atom, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{3-6} cycloalkyl wherein said C_{3-6} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, cyano, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{3-7} cycloalkoxy wherein said C_{3-7} cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, or 5- to 10-membered aromatic heterocyclyl group; wherein R^{a4} and R^{a5}

may bind to the same carbon atom if chemically possible; and when X^1 and X^3 are both CR^{a6}, the two R^{a6} may be taken together with the carbon atoms to which they are each attached to form 6-membered carbon ring that is fused with the 5-membered ring comprising X^1, X^2, and X^3; and

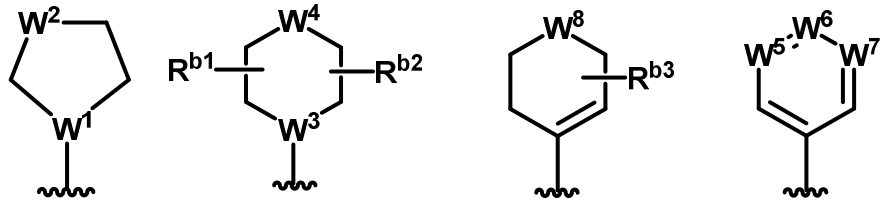
q^1 is an integer of 1 or 2;

L^1 and L^2 are each independently single bond, $-CH_2-$, or oxygen atom;

R^2 is hydrogen atom, hydroxy group, halogen atom, cyano, or optionally-substituted C_{1-4} alkyl;

R^3 and R^4 are each independently hydrogen atom, halogen atom, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkoxy, and C_{3-7} cycloalkyl, or C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{3-7} cycloalkyl; wherein R^3 and R^4 may bind to the same carbon atom if chemically possible; and when R^3 and R^4 bind to different carbon atoms on the ring, R^3 and R^4 may be taken together via C_{1-6} alkylene to form a fused ring or bridged ring;

Ring G is selected from the following (1b-1) to (1b-4):



(1b-1) (1b-2) (1b-3) (1b-4)

wherein

W^1, W^3, W^5, W^6, and W^7 are each independently nitrogen atom or CR^{b4};

W^2, W^4, and W^8 are NR^{b5}, oxygen atom or $CR^{b6}R^{b7}$;

R^{b1} – R^{b7} are each independently, if there are plural CR^{b4}, each R^{b4} is also independently, hydrogen atom, C_{1-6} alkyl wherein said C_{1-6} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, or C_{3-7} cycloalkoxy wherein said C_{3-7} cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy; wherein R^{b1} and R^{b2} may bind to the same carbon atom if chemically possible; or R^{b1} and R^{b2} may be taken together via C_{1-6} alkylene to form a chemically-possible bicyclic structure selected from a fused ring, a spiro ring, and bridged ring;

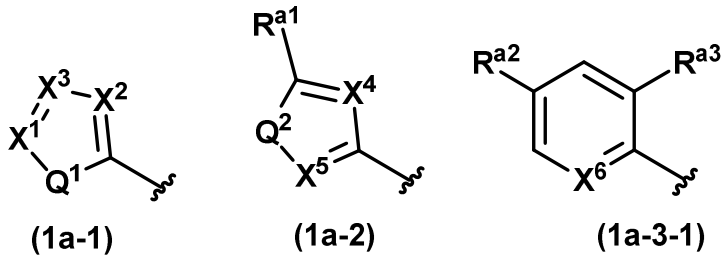
A^1 is oxygen atom or sulfur atom;

A^2 is oxygen atom or –NH–; and

A^3 is –CH–, nitrogen atom, or carbon atom.

7. The compound of claim 6 or a pharmaceutically acceptable salt thereof, wherein

R^1 is selected from the following formulae (1a-1), (1a-2), and (1a-3-1):



(1a-1) (1a-2) (1a-3-1)

wherein

X^1 – X^6 are each independently nitrogen atom or CR^{a6};

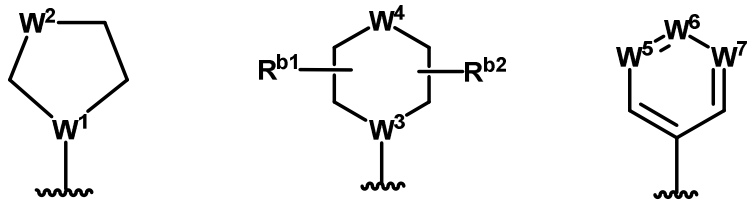
Q^1 and Q^2 are oxygen atom, $-NR^{a7}-$, or sulfur atom; and

R^{a1} – R^{a3}, R^{a6}, and R^{a7} are each independently, if there are plural CR^{a6}, each R^{a6} is also independently, hydrogen atom, halogen atom, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, cyano, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{3-7} cycloalkoxy wherein C_{3-7} cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, or 5– to 10–membered aromatic heterocyclyl group; wherein when X^1 and X^3 are both CR^{a6}, the two R^{a6} may be taken together with the carbon atoms to which they are each attached to form 6–

membered carbon ring that is fused with the 5-membered ring comprising X^1, X^2, and X^3.

8. The compound of claims 6 or 7 or a pharmaceutically acceptable salt thereof, wherein

Ring G is selected from the following (1b-1), (1b-2), and (1b-4):



(1b-1) (1b-2) (1b-4)

wherein

W^1, W^3, W^5, W^6, and W^7 are each independently nitrogen atom or CR^{b4};

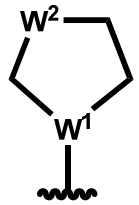
W^2 and W^4 are NR^{b5} or $CR^{b6}R^{b7}$; and

R^{b1}, R^{b2}, and R^{b4} – R^{b7} are each independently, if there are plural CR^{b4}, each R^{b4} is also independently, hydrogen atom, C_{1-6} alkyl wherein said C_{1-6} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, or C_{3-7} cycloalkoxy wherein said C_{3-7}

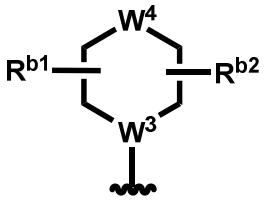
cycloalkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy; or R^{b1} and R^{b2} may bind to the same carbon atom if chemically possible; or R^{b1} and R^{b2} may be taken together via C_{1-6} alkylene to form a bridged bicyclic structure.

9. The compound of any one of claims 6 to 8 or a pharmaceutically acceptable salt thereof, wherein

Ring G is selected from the following (1b-1) and (1b-2):



(1b-1)



(1b-2)

wherein

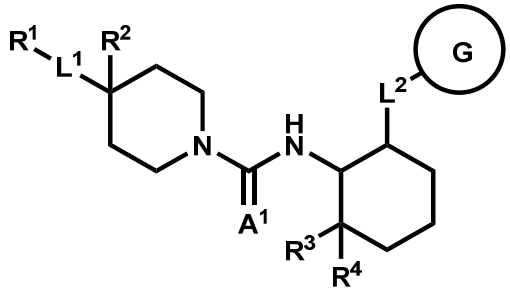
W^1 and W^3 are nitrogen atom or CR^{b4};

W^2 and W^4 are NR^{b5} or $CR^{b6}R^{b7}$; and

R^{b1}, R^{b2}, and R^{b4} – R^{b7} are each independently hydrogen atom, C_{1-6} alkyl wherein said C_{1-6} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy, C_{6-10} aromatic carbocyclyl group wherein said C_{6-10} aromatic carbocyclyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy, C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl, C_{3-7} cycloalkyl (wherein said C_{3-7} cycloalkyl may be optionally

substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy), or C_{3-7} cycloalkoxy wherein said C_{3-7} cycloalkoxmay be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy; wherein R^{b1} and R^{b2} may bind to the same carbon atom if chemically possible; or R^{b1} and R^{b2} may be taken together via C_{1-6} alkylene to form a bridged bicyclic structure.

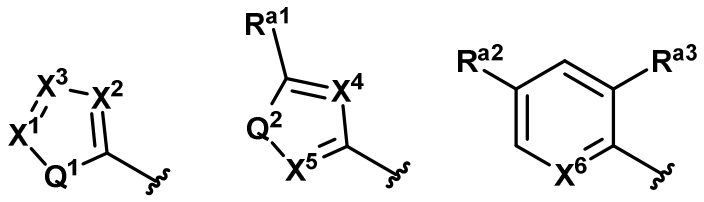
10. The compound of any one of claims 1 to 9 of formula (3):



(3)

or a pharmaceutically acceptable salt thereof, wherein

R^1 is the following formula (1a-1), (1a-2), or (1a-3-1):



(1a-1) (1a-2) (1a-3-1)

wherein

X^1 – X^6 are each independently nitrogen atom or CR^{a6};

Q^1 and Q^2 are oxygen atom or sulfur atom;

R^{a1} – R^{a3} and R^{a6} are each independently, if there are plural CR^{a6}, each R^{a6} is also independently, hydrogen atom,

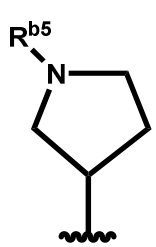
halogen atom, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, and C_{1-4} alkoxy, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, cyano, or C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy; wherein when X^1 and X^3 are both CR^{a6}, the two R^{a6} may be taken together with the carbon atoms to which they are each attached to form 6-membered carbon ring that is fused with the 5-membered ring comprising X^1, X^2, and X^3;

L^1 and L^2 are each independently single bond or oxygen atom;

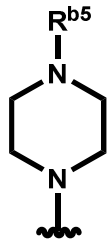
R^2 is hydrogen atom, halogen atom, or C_{1-4} alkyl which may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and hydroxy group;

R^3 and R^4 are each independently halogen atom;

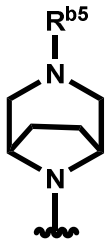
Ring G is the following (1b-1), (1b-2-1), (1b-2-2), or (1b-2-3):



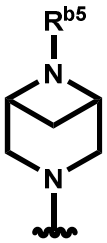
(1b-1-1)



(1b-2-1)



(1b-2-2)



(1b-2-3)

wherein

R^{b5} is hydrogen atom, or C_{1-6} alkyl which may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy; and

A^1 is oxygen atom or sulfur atom.

11. The compound of any one of claims 4 to 10 or a pharmaceutically acceptable salt thereof, wherein

R^1 is formula (1a-2), and

R^{a1} is hydrogen atom, halogen atom, C_{1-4} alkyl wherein said C_{1-4} alkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy, C_{3-7} cycloalkyl wherein said C_{3-7} cycloalkyl may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, hydroxy group, C_{1-4} alkyl, and C_{1-4} alkoxy, or C_{1-4} alkoxy wherein said C_{1-4} alkoxy may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkyl.

12. The compound of claim 10 to 11 or a pharmaceutically acceptable salt thereof, wherein

R^1 is formula (1a-2), and

X^4 and X^5 are both nitrogen atom.

13. The compound of any one of claims 10 to 12 or a pharmaceutically acceptable salt thereof, wherein

Ring G is formula (1b-1-1), and

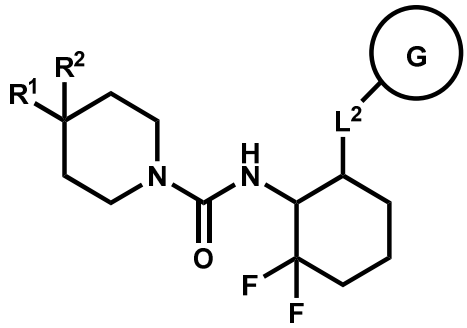
R^{b5} is C_{1-4} alkyl which may be optionally substituted with the same or different one or more halogen atoms.

14. The compound of any one of claims 10 to 12 or a pharmaceutically acceptable salt thereof, wherein

Ring G is formula (1b-2-1), and

R^{b5} is hydrogen atom, or C_{1-4} alkyl which may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy.

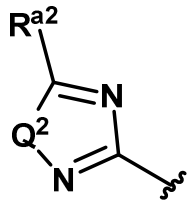
15. The compound of any one of claims 1 to 12 of formula (4):



(4)

or a pharmaceutically acceptable salt thereof, wherein

R^1 is the following (1a-2-1):



(1a-2-1)

wherein

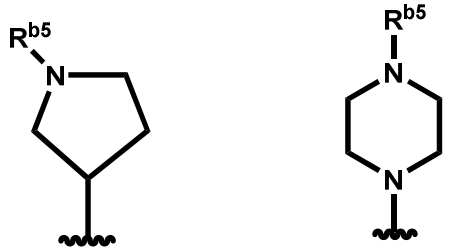
Q^2 is oxygen atom or sulfur atom;

R^{a2} is C_{3-7} cycloalkyl group wherein said C_{3-7} cycloalkyl group may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy or cycloalkoxy group wherein said cycloalkoxy group may be optionally substituted with the same or different

one or more substituents selected from the group consisting of halogen atom, C_{1-4} alkyl, and C_{1-4} alkoxy;

R^2 is C_{1-4} alkyl;

Ring G is the following (1b-1-1) or (1b-2-1):



wherein

R^{b5} is C_{1-4} alkyl which may be optionally substituted with the same or different one or more substituents selected from the group consisting of halogen atom and C_{1-4} alkoxy; and

L^2 is single bond or oxygen atom.

16. The compound of claim 15 or a pharmaceutically acceptable salt thereof, wherein

R^{a2} is C_{3-7} cycloalkyl group which may be optionally substituted with the same or different one or more substituents selected from halogen atoms, and

R^2 is methyl group.

17. The compound of claim 15 or 16 or a pharmaceutically acceptable salt thereof, wherein

R^{a2} is cyclopropyl group which may be optionally substituted with the same or different one or more substituents selected from halogen atoms, and

R^2 is methyl group.

18. The compound of any one of claims 15 to 17 or a pharmaceutically acceptable salt thereof, wherein

Ring G is formula (1b-2-1), and

R^{b5} is isopropyl group.

19. The compound of any one of claims 15 to 17 or a pharmaceutically acceptable salt thereof, wherein

Ring G is formula (1b-1-1), and

R^{b5} is isobutyl group.

20. The compound of any one of claims 15 to 17 or a pharmaceutically acceptable salt thereof, wherein

Ring G is formula (1b-1-1),

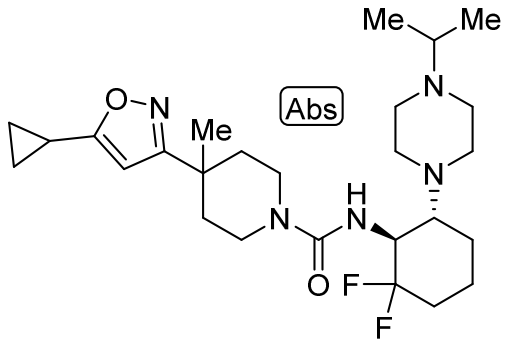
R^{b5} is isopropyl group, and

L^2 is oxygen atom.

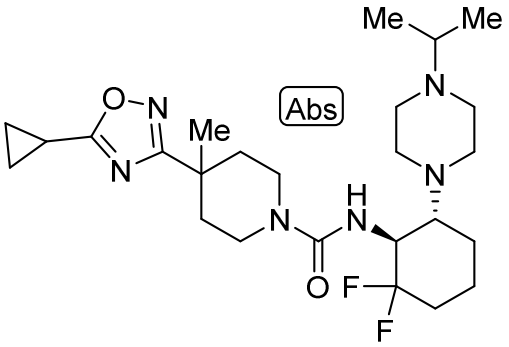
21. The compound of any one of claims 15 to 20 or a pharmaceutically acceptable salt thereof, wherein Q^2 is oxygen atom.

22. The compound of claim 1 or a pharmaceutically acceptable salt thereof, which is selected from the following compound names or structures:

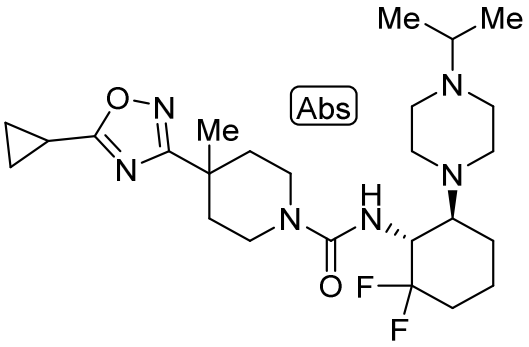
4-(5-cyclopropyl-1,2-oxazol-3-yl)-N-{(1S,6R)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



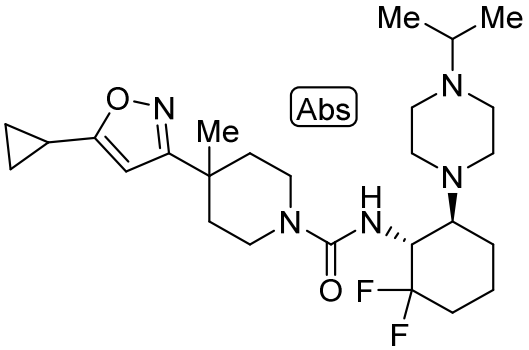
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-{(1S,6R)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



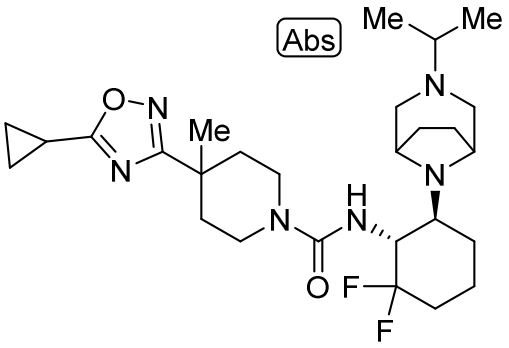
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



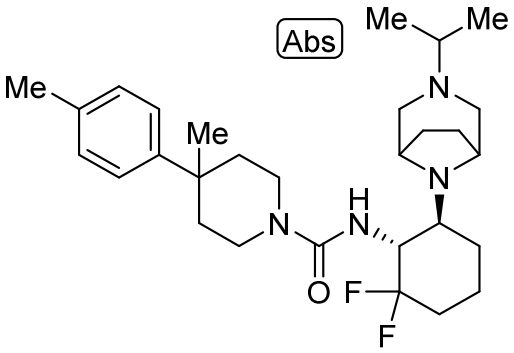
4-(5-cyclopropyl-1,2-oxazol-3-yl)-N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



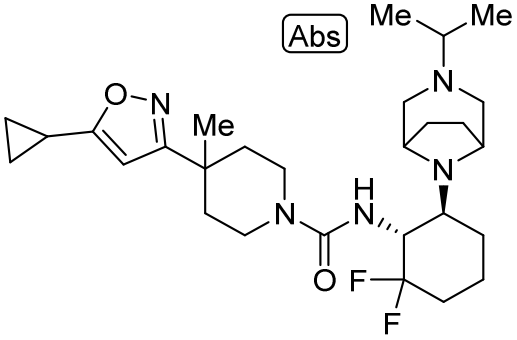
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-{(1R,6S)-2,2-difluoro-6-[3-(propan-2-yl)-3,8-diazabicyclo[3.2.1]octan-8-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



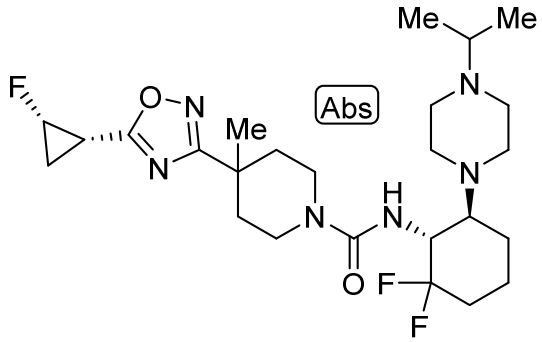
N-{(1R,6S)-2,2-difluoro-6-[3-(propan-2-yl)-3,8-diazabicyclo[3.2.1]octan-8-yl]cyclohexyl}-4-methyl-4-(4-methylphenyl)piperidine-1-carboxamide



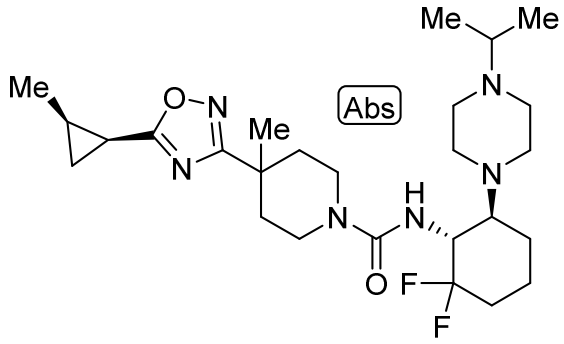
4-(5-cyclopropyl-1,2-oxazol-3-yl)-N-{(1R,6S)-2,2-difluoro-6-[3-(propan-2-yl)-3,8-diazabicyclo[3.2.1]octan-8-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



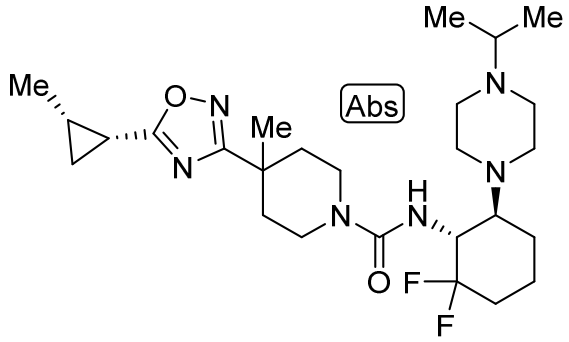
N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



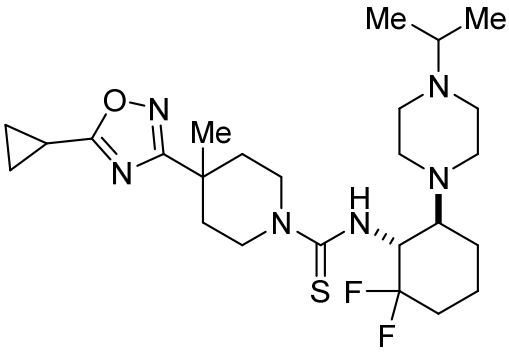
N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methyl-4-{5-[(1S,2R)-2-methylcyclopropyl]-1,2,4-oxadiazol-3-yl}piperidine-1-carboxamide



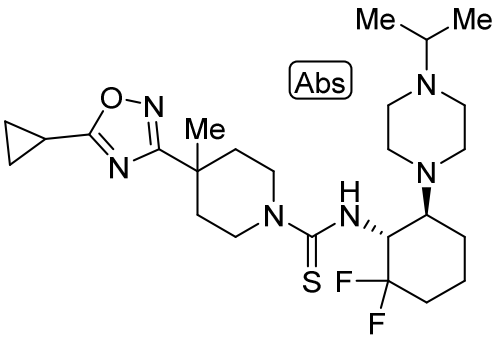
N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methyl-4-{5-[(1R,2S)-2-methylcyclopropyl]-1,2,4-oxadiazol-3-yl}piperidine-1-carboxamide



rac-4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carbothioamide

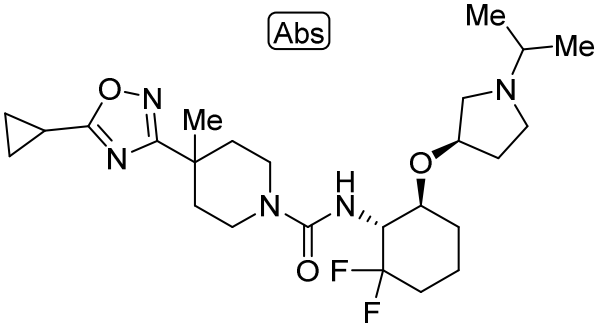


4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carbothioamide.

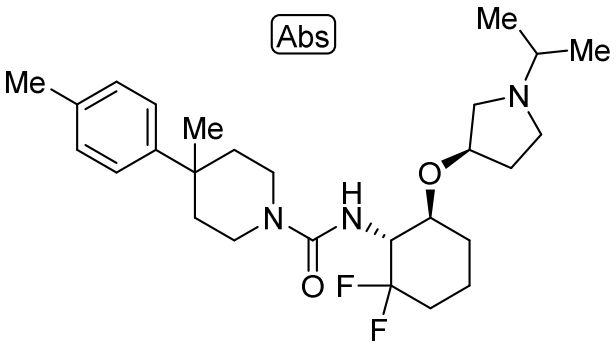


23. The compound of claim 1 or a pharmaceutically acceptable salt thereof, which is selected from the following compound names or structures:

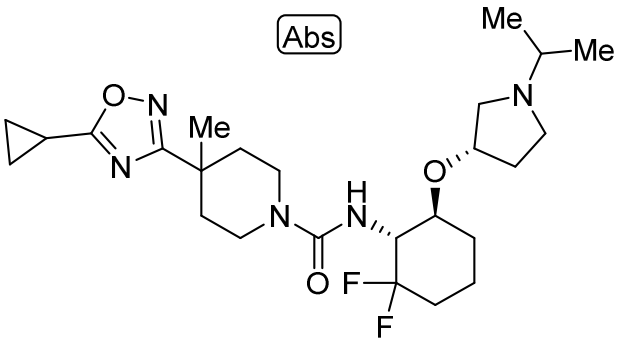
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-{[(3R)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-methylpiperidine-1-carboxamide



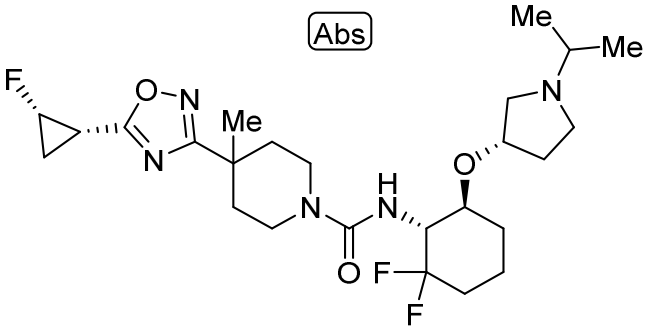
N-[(1R,6S)-2,2-difluoro-6-{[(3R)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-methyl-4-(4-methylphenyl)piperidine-1-carboxamide



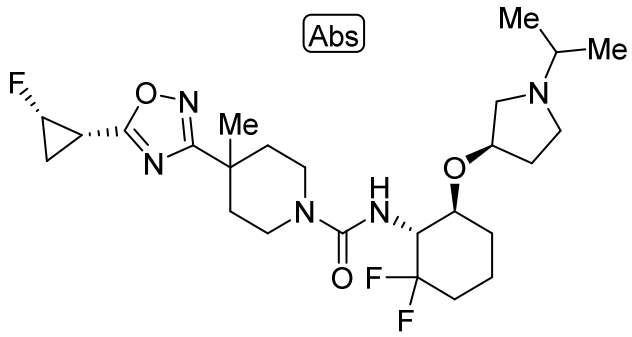
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-methylpiperidine-1-carboxamide



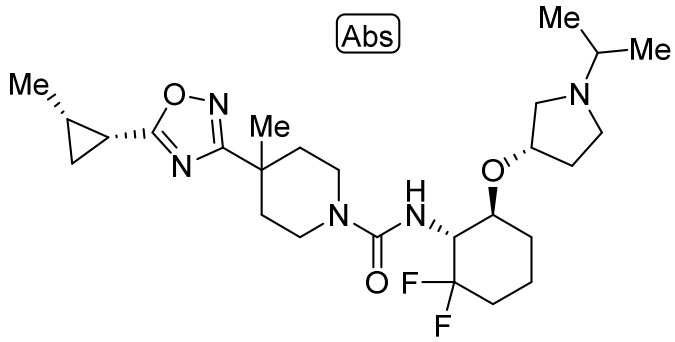
N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



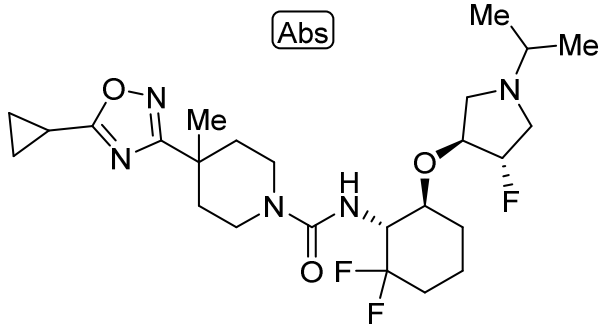
N-[(1R,6S)-2,2-difluoro-6-{[(3R)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



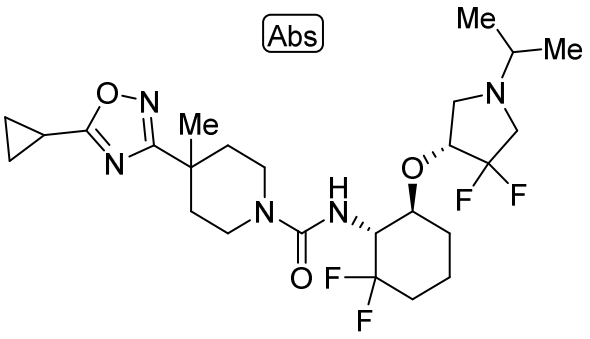
N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-methyl-4-{5-[(1R,2S)-2-methylcyclopropyl]-1,2,4-oxadiazol-3-yl}piperidine-1-carboxamide



4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-{[(3S,4S)-4-fluoro-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-methylpiperidine-1-carboxamide

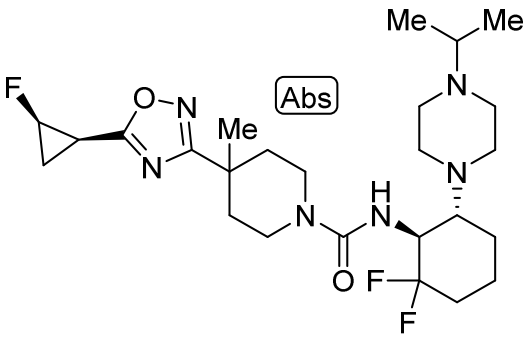


4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-6-{[(3R)-4,4-difluoro-1-(propan-2-yl)pyrrolidin-3-yl]oxy}-2,2-difluorocyclohexyl]-4-methylpiperidine-1-carboxamide.

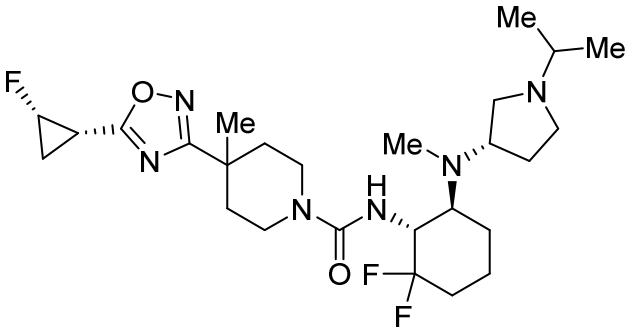


24. The compound of claim 1 or a pharmaceutically acceptable salt thereof, which is selected from the following compound names or structures:

N-{(1S,6R)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-{5-[(1R,2R)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide

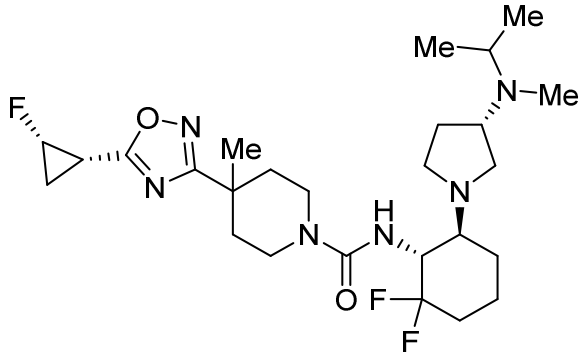


N-[(1R,6S)-2,2-difluoro-6-{methyl[(3S)-1-(propan-2-yl)pyrrolidin-3-yl]amino}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide

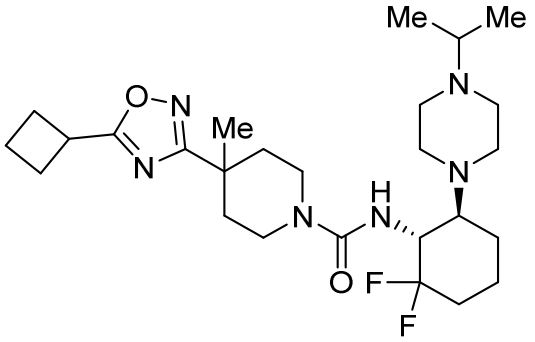


N-[(1R,6S)-2,2-difluoro-6-{(3S)-3-[methyl(propan-2-yl)amino]pyrrolidin-1-yl}cyclohexyl]-4-{5-[(1S,2S)-2-

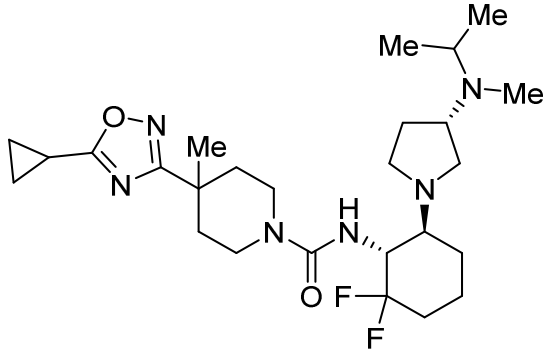
fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



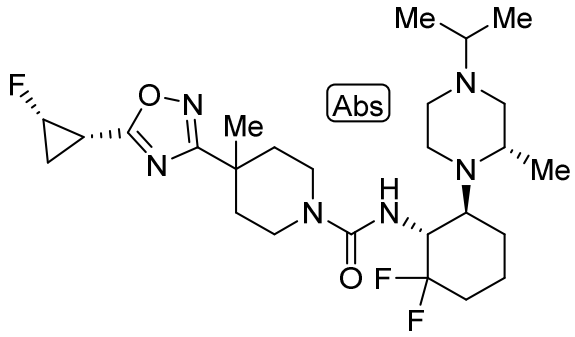
4-(5-cyclobutyl-1,2,4-oxadiazol-3-yl)-N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



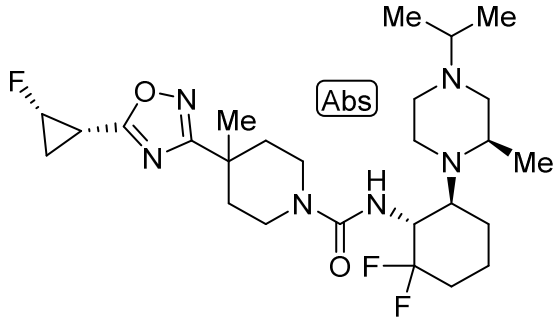
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-{(3S)-3-[methyl(propan-2-yl)amino]pyrrolidin-1-yl}cyclohexyl]-4-methylpiperidine-1-carboxamide



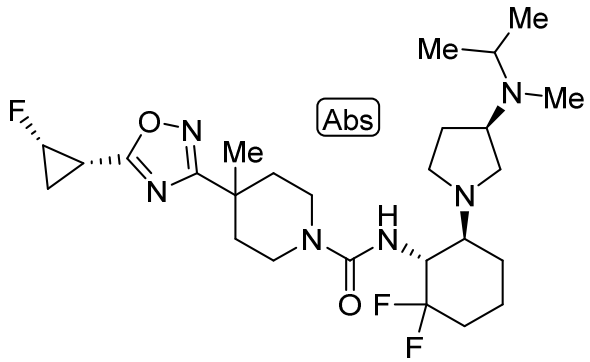
N-{(1R,6S)-2,2-difluoro-6-[(2S)-2-methyl-4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



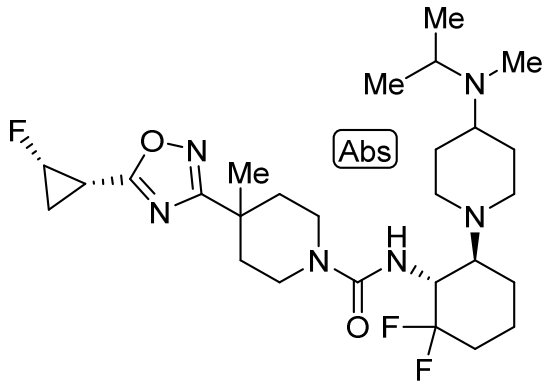
N-{(1R,6S)-2,2-difluoro-6-[(2R)-2-methyl-4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



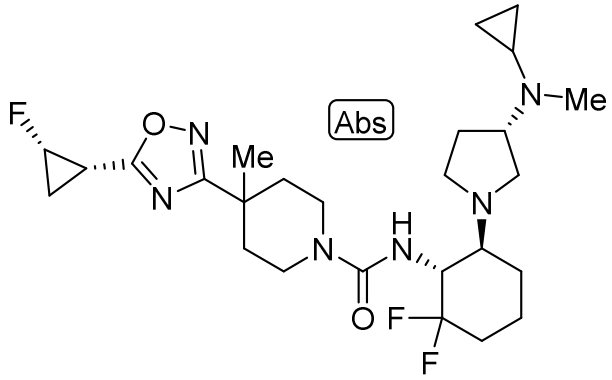
N-[(1R,6S)-2,2-difluoro-6-{(3R)-3-[methyl(propan-2-yl)amino]pyrrolidin-1-yl}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



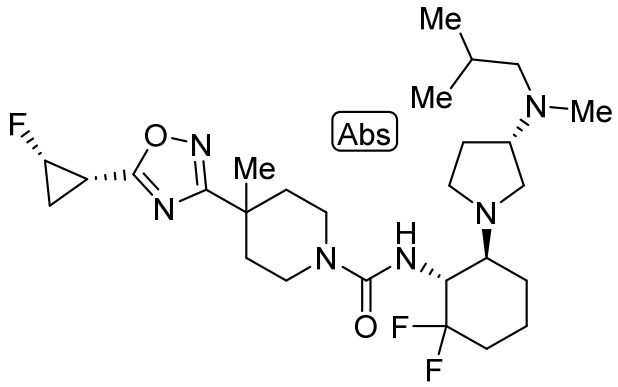
N-[(1R,6S)-2,2-difluoro-6-{4-[methyl(propan-2-yl)amino]piperidin-1-yl}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



N-[(1R,6S)-6-{(3S)-3-[cyclopropyl(methyl)amino]pyrrolidin-1-yl}-2,2-difluorocyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide

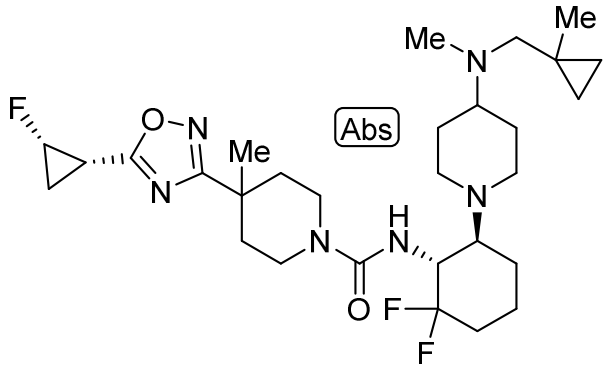


N-[(1R,6S)-2,2-difluoro-6-{(3S)-3-[methyl(2-methylpropyl)amino]pyrrolidin-1-yl}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide

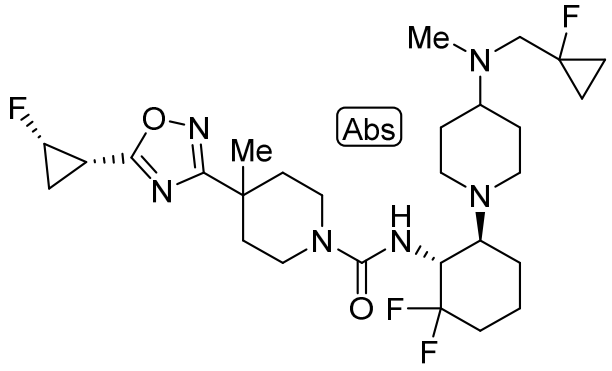


N-[(1R,6S)-2,2-difluoro-6-(4-{methyl[(1-methylcyclopropyl)methyl]amino}piperidin-1-yl)cyclohexyl]-

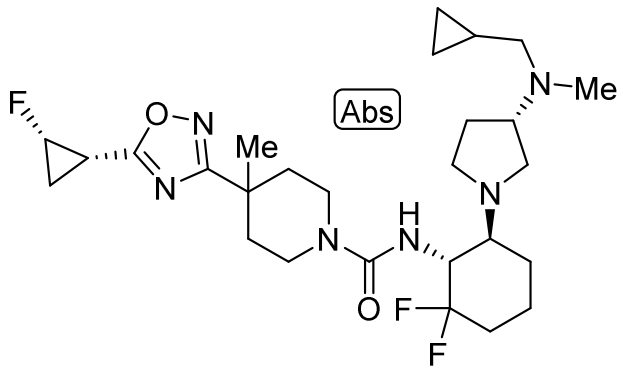
4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



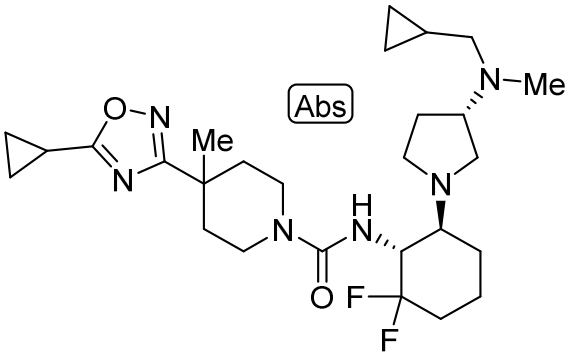
N-[(1R,6S)-2,2-difluoro-6-(4-{[(1-fluorocyclopropyl)methyl](methyl)amino}piperidin-1-yl)cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



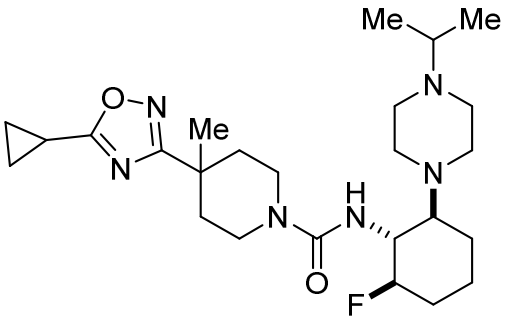
N-[(1R,6S)-6-{(3S)-3-[(cyclopropylmethyl)(methyl)amino]pyrrolidin-1-yl}-2,2-difluorocyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



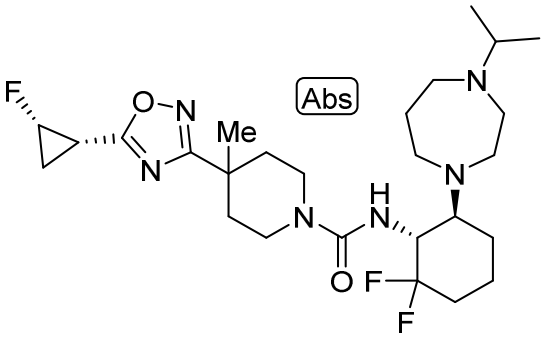
N-[(1R,6S)-6-{(3S)-3-[(cyclopropylmethyl)(methyl)amino]pyrrolidin-1-yl}-2,2-difluorocyclohexyl]-4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-4-methylpiperidine-1-carboxamide



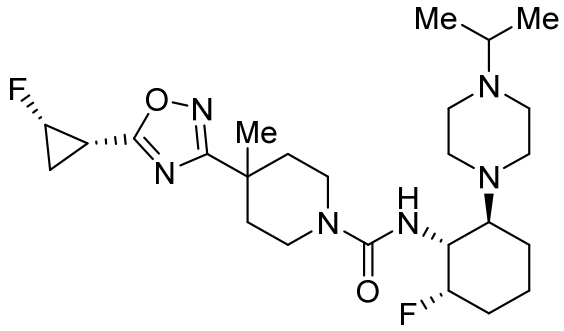
rac-4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-{(1R,2R,6S)-2-fluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



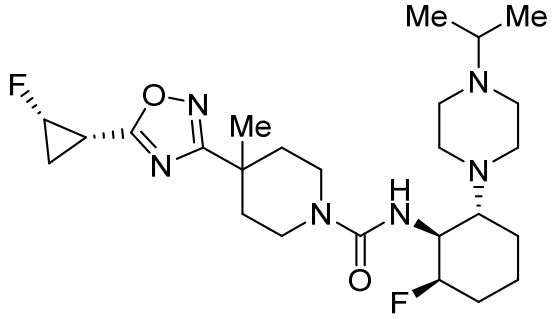
N-{(1R,6S)-2,2-difluoro-6-[4-(propan-2-yl)-1,4-diazepan-1-yl]cyclohexyl}-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



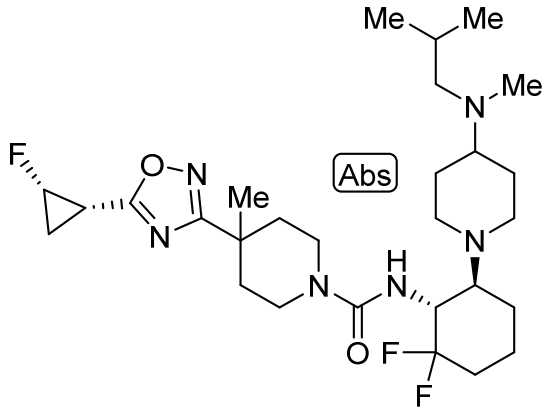
4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-N-{(1R,2S,6S)-2-fluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide



4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-N-{(1S,2R,6R)-2-fluoro-6-[4-(propan-2-yl)piperazin-1-yl]cyclohexyl}-4-methylpiperidine-1-carboxamide

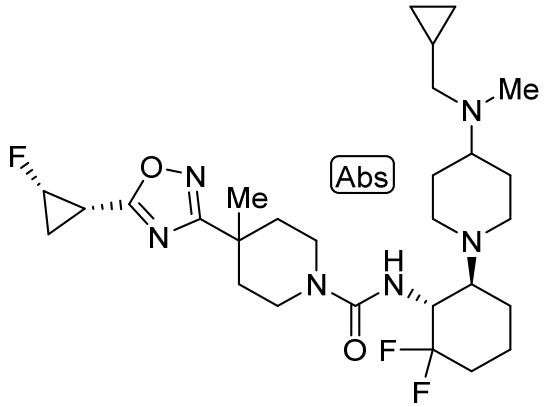


N-[(1R,6S)-2,2-difluoro-6-{4-[methyl(2-methylpropyl)amino]piperidin-1-yl}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide

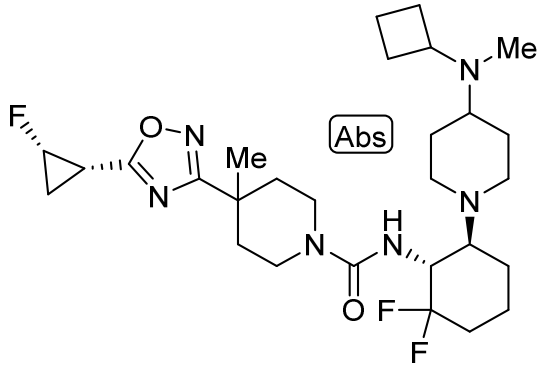


N-[(1R,6S)-6-{4-[(cyclopropylmethyl)(methyl)amino]piperidin-1-yl}-2,2-

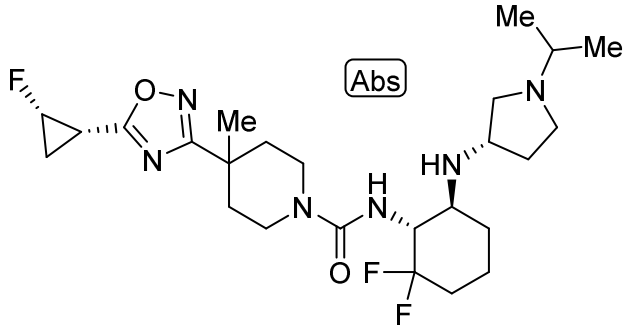
difluorocyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



N-[(1R,6S)-6-{4-[cyclobutyl(methyl)amino]piperidin-1-yl}-2,2-difluorocyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide

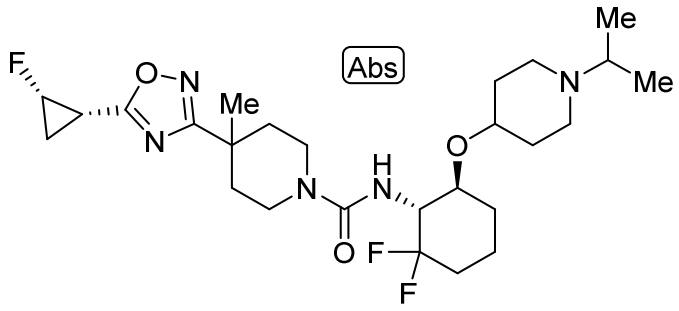


N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(propan-2-yl)pyrrolidin-3-yl]amino}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide

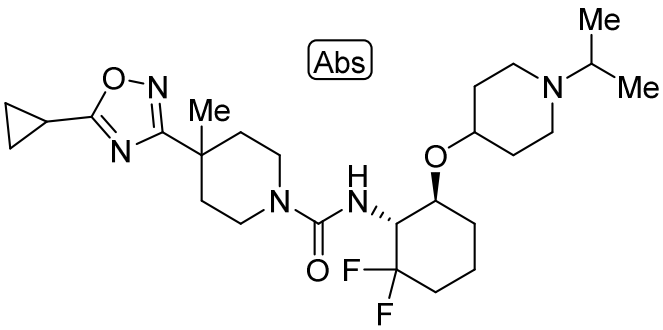


25. The compound of claim 1 or a pharmaceutically acceptable salt thereof, which is selected from the following compound names or structures:

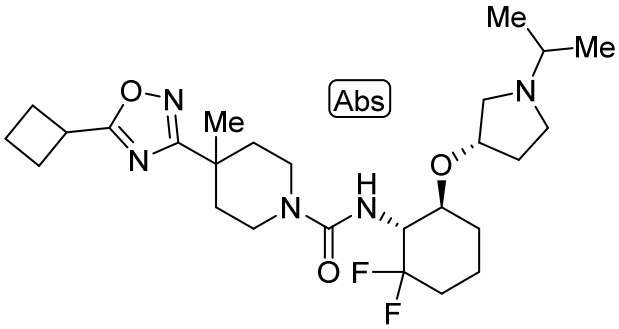
N-[(1R,6S)-2,2-difluoro-6-{[1-(propan-2-yl)piperidin-4-yl]oxy}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-{[1-(propan-2-yl)piperidin-4-yl]oxy}cyclohexyl]-4-methylpiperidine-1-carboxamide

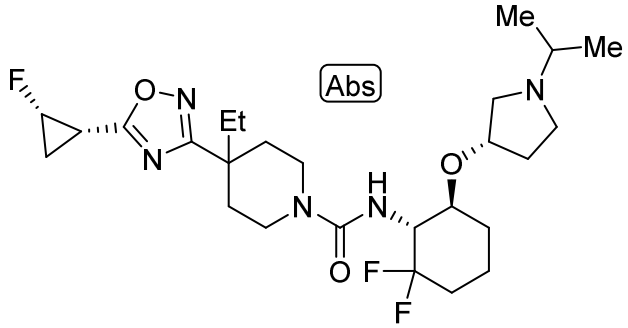


4-(5-cyclobutyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-methylpiperidine-1-carboxamide

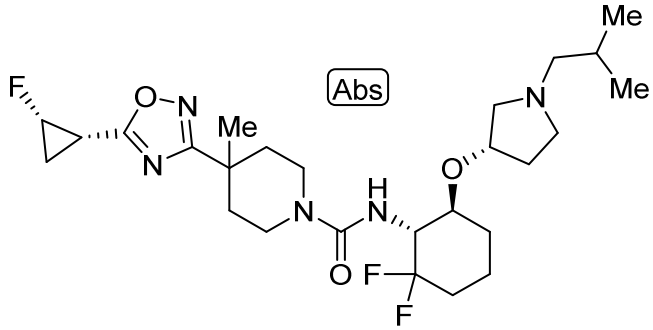


N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(propan-2-yl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-ethyl-4-{5-[(1S,2S)-2-

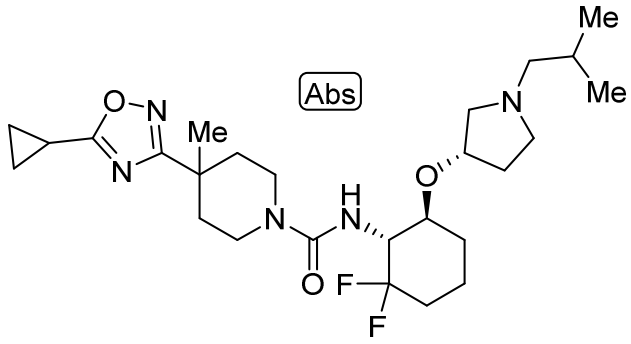
fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}piperidine-1-carboxamide



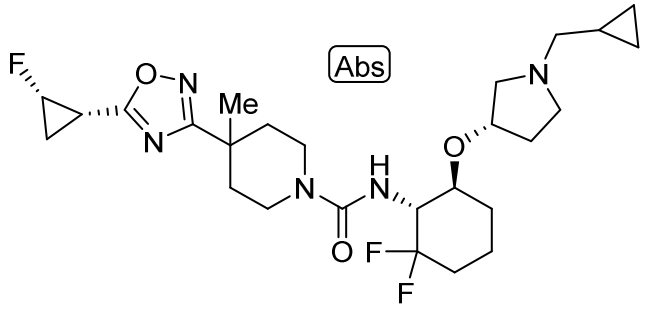
N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(2-methylpropyl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



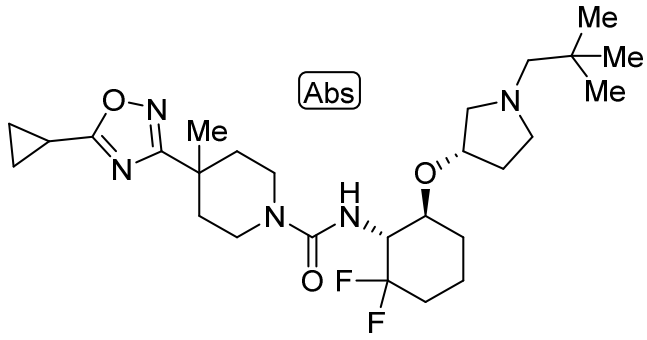
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(2-methylpropyl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-methylpiperidine-1-carboxamide



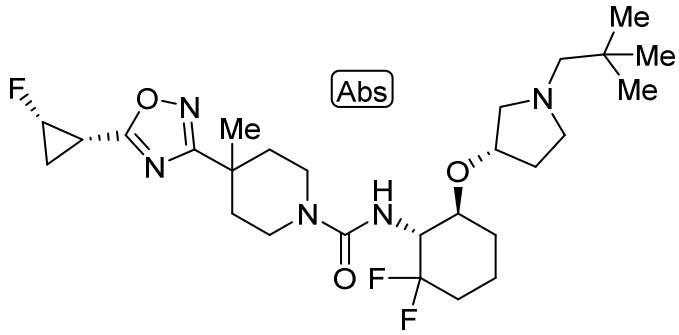
N-[(1R,6S)-6-{[(3S)-1-(cyclopropylmethyl)pyrrolidin-3-yl]oxy}-2,2-difluorocyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



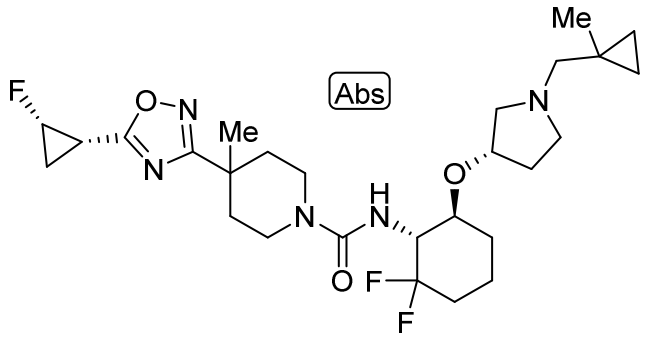
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-6-{[(3S)-1-(2,2-dimethylpropyl)pyrrolidin-3-yl]oxy}-2,2-difluorocyclohexyl]-4-methylpiperidine-1-carboxamide



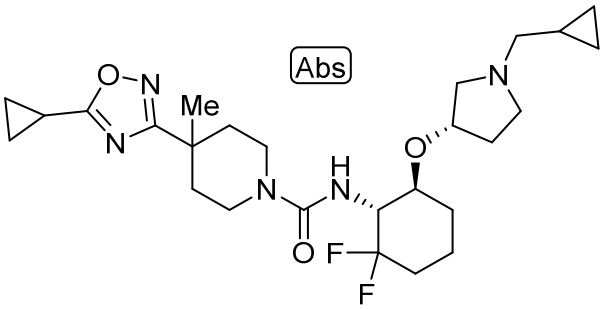
N-[(1R,6S)-6-{[(3S)-1-(2,2-dimethylpropyl)pyrrolidin-3-yl]oxy}-2,2-difluorocyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



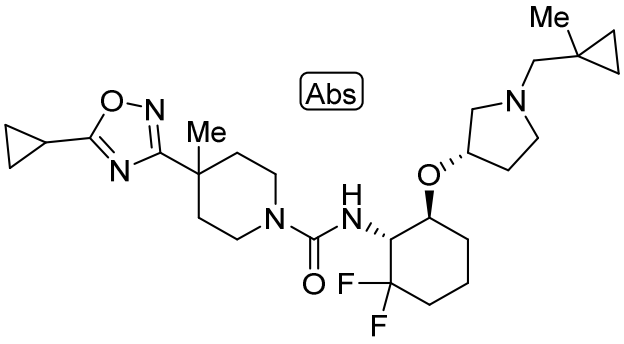
N-[(1R,6S)-2,2-difluoro-6-({(3S)-1-[(1-methylcyclopropyl)methyl]pyrrolidin-3-yl}oxy)cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



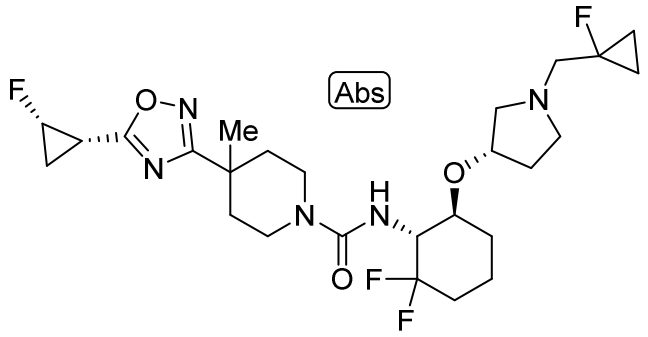
N-[(1R,6S)-6-{[(3S)-1-(cyclopropylmethyl)pyrrolidin-3-yl]oxy}-2,2-difluorocyclohexyl]-4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-4-methylpiperidine-1-carboxamide



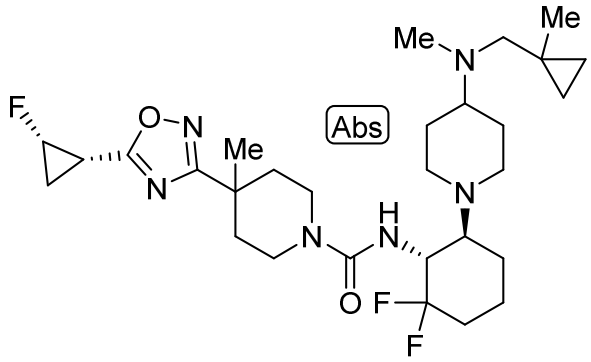
4-(5-cyclopropyl-1,2,4-oxadiazol-3-yl)-N-[(1R,6S)-2,2-difluoro-6-({(3S)-1-[(1-methylcyclopropyl)methyl]pyrrolidin-3-yl}oxy)cyclohexyl]-4-methylpiperidine-1-carboxamide



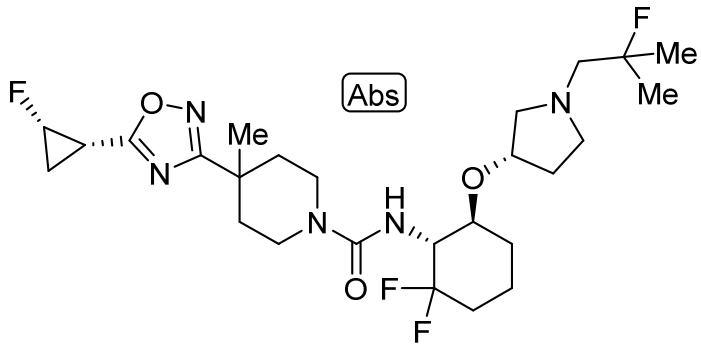
N-[(1R,6S)-2,2-difluoro-6-({(3S)-1-[(1-fluorocyclopropyl)methyl]pyrrolidin-3-yl}oxy)cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



N-[(1R,6S)-2,2-difluoro-6-(4-{methyl[(1-methylcyclopropyl)methyl]amino}piperidin-1-yl)cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide



N-[(1R,6S)-2,2-difluoro-6-{[(3S)-1-(2-fluoro-2-methylpropyl)pyrrolidin-3-yl]oxy}cyclohexyl]-4-{5-[(1S,2S)-2-fluorocyclopropyl]-1,2,4-oxadiazol-3-yl}-4-methylpiperidine-1-carboxamide.



26. A medicament for treating a disease related to orexin receptor, comprising the compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof.

27. The compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof for use in treating a disease related to orexin receptor.

28. Use of the compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof in the manufacture of a medicament for treating a disease related to orexin receptor.

29. A medicament for treating narcolepsy, idiopathic hypersomnia, hypersomnia, sleep apnea syndrome, narcolepsy syndrome involving narcolepsy-like symptom, hypersomnia associated with Parkinson's disease, hypersomnia associated with dementia with Lewy body, hypersomnia syndrome involving daytime hypersomnia (e.g. Kleine-Levin syndrome, major depression accompanied by hypersomnia, dementia with Lewy body, Parkinson's disease, progressive supranuclear palsy, Prader-Willi syndrome, Moebius syndrome, hypoventilation syndrome, Niemann-Pick disease type C, brain contusion, cerebral infarction, brain tumor, muscular dystrophy, multiple sclerosis, acute disseminated encephalomyelitis, Guillain-Barre syndrome, Rasmussen's encephalitis, Wernicke's encephalopathy, limbic encephalitis, Hashimoto encephalopathy), coma, loss of consciousness, obesity (e.g. malignant mast cell, extrinsic obesity, hyperinsulinar obesity, hyperplasmic obesity, hypophysial obesity, hypoplasmic obesity, hypothyroid obesity, hypothalamic obesity, symptomatic obesity, childhood obesity, upper body obesity, alimentary obesity, gonadal obesity, systemic mastocytosis, primary obesity, central obesity), insulin resistance syndrome, Alzheimer, impaired consciousness such as coma, side effect or complication caused by anesthesia, sleep disturbance, sleep problem, insomnia, intermittent sleep, night myoclonus, REM

sleep interruption, jet lag, jet lag syndrome, sleep disorder of shift workers, dyssomnia, sleep terror, depression, major depression, sleepwalking, enuresis, sleep disorder, Alzheimer's sundown syndrome, disease associated with circadian rhythm, fibromyalgia, condition resulting from decrease in sleeping quality, bulimia, obsessive eating disorder, obesity-related diseases, hypertension, diabetes, elevated plasma insulin level/insulin resistance, hyperlipemia, hyperlipidaemia, endometrial cancer, breast cancer, prostate cancer, colon cancer, cancer, osteoarthritis, obstructive sleep apnea, cholelithiasis, gallstone, heart disease, abnormal heartbeat, arrhythmia, myocardial infarction, congestive heart failure, heart failure, coronary heart disease, cardiovascular disease, sudden death, polycystic ovary, craniopharyngioma, Prader-Willi syndrome, Froehlich syndrome, growth hormone deficiency, normal variant short stature, Turner syndrome, children suffering from acute lymphoblastic leukemia, syndrome X, reproductive hormone abnormality, decrease of fecundability, infertility, hypogonadism in men, sexual/reproductive-function dysfunction such as hirsutism in women, fetal defect associated with maternity obesity, gastrointestinal motility disorder such as obesity-related gastroesophageal reflux, obesity hypoventilation syndrome (Pickwickian syndrome), respiratory disease such as respiratory distress, inflammation such as vascular systemic inflammation, arteriosclerosis, hypercholesterolemia, hyperuricemia, low back pain, gallbladder disease, gout, renal cancer, secondary risk of obesity such as risk of left ventricle hypertrophy, migraine, headache, neuropathic pain, Parkinson's disease, psychosis, schizophrenia, facial flushing, night sweat, disease in genitalium/urinary system, disease associated

with sexual function or fecundability, dysthymic disorder, bipolar disorder, bipolar I disorder, bipolar II disorder, cyclothymic disorder, acute stress disorder, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, panic attack, panic disorder, posttraumatic stress disorder, separation anxiety disorder, social phobia, anxiety disorder, acute neurological and psychiatric disorder such as cerebral deficiency developed after heart bypass surgery or heart transplant, stroke, ischemic stroke, cerebral ischemia, spinal cord trauma, head injury, periparturient hypoxia, cardiac arrest, hypoglycemic nerve injury, Huntington's disease, amyotrophic lateral sclerosis, multiple sclerosis, eye damage, retinopathy, cognitive impairment, muscle spasm, tremor, epilepsy, disorder associated with muscle spasm, delirium, amnestic disorder, age-associated cognitive decline, schizoaffective disorder, paranoia, drug addiction, movement disorder, chronic fatigue syndrome, fatigue, medication-induced parkinsonian syndrome, Gilles de la Tourette syndrome, chorea, myoclonus, tic, restless legs syndrome, dystonia, dyskinesia, attention deficit hyperactivity disorder (ADHD), conduct disorder, urinary incontinence, withdrawal symptom, trigeminal neuralgia, hearing loss, tinnitus, nerve injury, retinopathy, macular degeneration, vomiting, cerebral edema, pain, bone pain, arthralgia, toothache, cataplexy, or traumatic brain injury, comprising the compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof.

30. The compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof for use in treating narcolepsy, idiopathic hypersomnia, hypersomnia, sleep apnea syndrome, narcolepsy syndrome involving

narcolepsy-like symptom, hypersomnia associated with Parkinson's disease, hypersomnia associated with dementia with Lewy body, hypersomnia syndrome involving daytime hypersomnia (e.g. Kleine-Levin syndrome, major depression accompanied by hypersomnia, dementia with Lewy body, Parkinson's disease, progressive supranuclear palsy, Prader-Willi syndrome, Moebius syndrome, hypoventilation syndrome, Niemann-Pick disease type C, brain contusion, cerebral infarction, brain tumor, muscular dystrophy, multiple sclerosis, acute disseminated encephalomyelitis, Guillain-Barre syndrome, Rasmussen's encephalitis, Wernicke's encephalopathy, limbic encephalitis, Hashimoto encephalopathy), coma, loss of consciousness, obesity (e.g. malignant mast cell, extrinsic obesity, hyperinsulinar obesity, hyperplasmic obesity, hypophysial obesity, hypoplasmic obesity, hypothyroid obesity, hypothalamic obesity, symptomatic obesity, childhood obesity, upper body obesity, alimentary obesity, gonadal obesity, systemic mastocytosis, primary obesity, central obesity), insulin resistance syndrome, Alzheimer, impaired consciousness such as coma, side effect or complication caused by anesthesia, sleep disturbance, sleep problem, insomnia, intermittent sleep, night myoclonus, REM sleep interruption, jet lag, jet lag syndrome, sleep disorder of shift workers, dyssomnia, sleep terror, depression, major depression, sleepwalking, enuresis, sleep disorder, Alzheimer's sundown syndrome, disease associated with circadian rhythm, fibromyalgia, condition resulting from decrease in sleeping quality, bulimia, obsessive eating disorder, obesity-related diseases, hypertension, diabetes, elevated plasma insulin level/insulin resistance, hyperlipemia, hyperlipidaemia, endometrial cancer, breast cancer, prostate cancer, colon cancer, cancer, osteoarthritis,

obstructive sleep apnea, cholelithiasis, gallstone, heart disease, abnormal heartbeat, arrhythmia, myocardial infarction, congestive heart failure, heart failure, coronary heart disease, cardiovascular disease, sudden death, polycystic ovary, craniopharyngioma, Prader-Willi syndrome, Froehlich syndrome, growth hormone deficiency, normal variant short stature, Turner syndrome, children suffering from acute lymphoblastic leukemia, syndrome X, reproductive hormone abnormality, decrease of fecundability, infertility, hypogonadism in men, sexual/reproductive-function dysfunction such as hirsutism in women, fetal defect associated with maternity obesity, gastrointestinal motility disorder such as obesity-related gastroesophageal reflux, obesity hypoventilation syndrome (Pickwickian syndrome), respiratory disease such as respiratory distress, inflammation such as vascular systemic inflammation, arteriosclerosis, hypercholesterolemia, hyperuricemia, low back pain, gallbladder disease, gout, renal cancer, secondary risk of obesity such as risk of left ventricle hypertrophy, migraine, headache, neuropathic pain, Parkinson's disease, psychosis, schizophrenia, facial flushing, night sweat, disease in genitalium/urinary system, disease associated with sexual function or fecundability, dysthymic disorder, bipolar disorder, bipolar I disorder, bipolar II disorder, cyclothymic disorder, acute stress disorder, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, panic attack, panic disorder, posttraumatic stress disorder, separation anxiety disorder, social phobia, anxiety disorder, acute neurological and psychiatric disorder such as cerebral deficiency developed after heart bypass surgery or heart transplant, stroke, ischemic stroke, cerebral ischemia, spinal cord trauma, head injury, periparturient hypoxia, cardiac arrest,

hypoglycemic nerve injury, Huntington's disease, amyotrophic lateral sclerosis, multiple sclerosis, eye damage, retinopathy, cognitive impairment, muscle spasm, tremor, epilepsy, disorder associated with muscle spasm, delirium, amnestic disorder, age-associated cognitive decline, schizoaffective disorder, paranoia, drug addiction, movement disorder, chronic fatigue syndrome, fatigue, medication-induced parkinsonian syndrome, Gilles de la Tourette syndrome, chorea, myoclonus, tic, restless legs syndrome, dystonia, dyskinesia, attention deficit hyperactivity disorder (ADHD), conduct disorder, urinary incontinence, withdrawal symptom, trigeminal neuralgia, hearing loss, tinnitus, nerve injury, retinopathy, macular degeneration, vomiting, cerebral edema, pain, bone pain, arthralgia, toothache, cataplexy, or traumatic brain injury.

31. Use of the compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof in the manufacture of a medicament for treating narcolepsy, idiopathic hypersomnia, hypersomnia, sleep apnea syndrome, narcolepsy syndrome involving narcolepsy-like symptom, hypersomnia associated with Parkinson's disease, hypersomnia associated with dementia with Lewy body, hypersomnia syndrome involving daytime hypersomnia (e.g. Kleine-Levin syndrome, major depression accompanied by hypersomnia, dementia with Lewy body, Parkinson's disease, progressive supranuclear palsy, Prader-Willi syndrome, Moebius syndrome, hypoventilation syndrome, Niemann-Pick disease type C, brain contusion, cerebral infarction, brain tumor, muscular dystrophy, multiple sclerosis, acute disseminated encephalomyelitis, Guillain-Barre syndrome, Rasmussen's encephalitis, Wernicke's encephalopathy, limbic encephalitis, Hashimoto encephalopathy), coma, loss of

consciousness, obesity (e.g. malignant mast cell, extrinsic obesity, hyperinsulinar obesity, hyperplasmic obesity, hypophysial obesity, hypoplasmic obesity, hypothyroid obesity, hypothalamic obesity, symptomatic obesity, childhood obesity, upper body obesity, alimentary obesity, gonadal obesity, systemic mastocytosis, primary obesity, central obesity), insulin resistance syndrome, Alzheimer, impaired consciousness such as coma, side effect or complication caused by anesthesia, sleep disturbance, sleep problem, insomnia, intermittent sleep, night myoclonus, REM sleep interruption, jet lag, jet lag syndrome, sleep disorder of shift workers, dyssomnia, sleep terror, depression, major depression, sleepwalking, enuresis, sleep disorder, Alzheimer's sundown syndrome, disease associated with circadian rhythm, fibromyalgia, condition resulting from decrease in sleeping quality, bulimia, obsessive eating disorder, obesity-related diseases, hypertension, diabetes, elevated plasma insulin level/insulin resistance, hyperlipemia, hyperlipidaemia, endometrial cancer, breast cancer, prostate cancer, colon cancer, cancer, osteoarthritis, obstructive sleep apnea, cholelithiasis, gallstone, heart disease, abnormal heartbeat, arrhythmia, myocardial infarction, congestive heart failure, heart failure, coronary heart disease, cardiovascular disease, sudden death, polycystic ovary, craniopharyngioma, Prader-Willi syndrome, Froehlich syndrome, growth hormone deficiency, normal variant short stature, Turner syndrome, children suffering from acute lymphoblastic leukemia, syndrome X, reproductive hormone abnormality, decrease of fecundability, infertility, hypogonadism in men, sexual/reproductive-function dysfunction such as hirsutism in women, fetal defect associated with maternity obesity, gastrointestinal motility disorder such as obesity-related

gastroesophageal reflux, obesity hypoventilation syndrome (Pickwickian syndrome), respiratory disease such as respiratory distress, inflammation such as vascular systemic inflammation, arteriosclerosis, hypercholesterolemia, hyperuricemia, low back pain, gallbladder disease, gout, renal cancer, secondary risk of obesity such as risk of left ventricle hypertrophy, migraine, headache, neuropathic pain, Parkinson's disease, psychosis, schizophrenia, facial flushing, night sweat, disease in genitalium/urinary system, disease associated with sexual function or fecundability, dysthymic disorder, bipolar disorder, bipolar I disorder, bipolar II disorder, cyclothymic disorder, acute stress disorder, agoraphobia, generalized anxiety disorder, obsessive-compulsive disorder, panic attack, panic disorder, posttraumatic stress disorder, separation anxiety disorder, social phobia, anxiety disorder, acute neurological and psychiatric disorder such as cerebral deficiency developed after heart bypass surgery or heart transplant, stroke, ischemic stroke, cerebral ischemia, spinal cord trauma, head injury, periparturient hypoxia, cardiac arrest, hypoglycemic nerve injury, Huntington's disease, amyotrophic lateral sclerosis, multiple sclerosis, eye damage, retinopathy, cognitive impairment, muscle spasm, tremor, epilepsy, disorder associated with muscle spasm, delirium, amnestic disorder, age-associated cognitive decline, schizoaffective disorder, paranoia, drug addiction, movement disorder, chronic fatigue syndrome, fatigue, medication-induced parkinsonian syndrome, Gilles de la Tourette syndrome, chorea, myoclonus, tic, restless legs syndrome, dystonia, dyskinesia, attention deficit hyperactivity disorder (ADHD), conduct disorder, urinary incontinence, withdrawal symptom, trigeminal neuralgia, hearing loss, tinnitus, nerve injury,

retinopathy, macular degeneration, vomiting, cerebral edema, pain, bone pain, arthralgia, toothache, cataplexy, or traumatic brain injury.

32. A medicament for treating narcolepsy, idiopathic hypersomnia, hypersomnia, sleep apnea syndrome, narcolepsy syndrome involving narcolepsy-like symptom, hypersomnia associated with Parkinson's disease, or hypersomnia associated with dementia with Lewy body, comprising the compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof.

33. The compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof for use in treating narcolepsy, idiopathic hypersomnia, hypersomnia, sleep apnea syndrome, narcolepsy syndrome involving narcolepsy-like symptom, hypersomnia associated with Parkinson's disease, or hypersomnia associated with dementia with Lewy body.

34. Use of the compound of any one of claims 1 to 25 or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for treating narcolepsy, idiopathic hypersomnia, hypersomnia, sleep apnea syndrome, narcolepsy syndrome involving narcolepsy-like symptom, hypersomnia associated with Parkinson's disease, or hypersomnia associated with dementia with Lewy body.