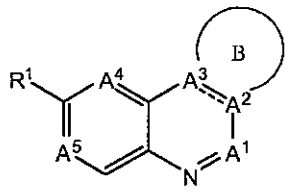
CLAIMS

What is claimed is:

1. A compound of formula 1:



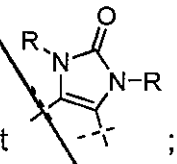
(1)

and/or at least one pharmaceutically acceptable salt thereof wherein

A^1 is N or CH;

A^4 and A^5 are independently N or CR^2;

A^2 and A^3, together with B ring, are a 5-membered heteroaryl or heterocycle containing 1 to 4 heteroatoms selected from N, O and S, and said 5-membered heteroaryl or heterocycle is optionally substituted by one or more groups independently chosen from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, $-OR^b$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, haloalkyl, heteroaryl, and heterocycle;

provided that A^2 and A^3, together with the B ring, are not  ;

 is a single bond or a double bond;

R^1 is heteroaryl, optionally substituted by one or more groups independently chosen from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, $-OR^b$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, haloalkyl, heteroaryl, and heterocycle;

R and R^2 are independently chosen from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, $-OR^b$, $-OC(O)R^a$, $-OC(O)NR^cR^d$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, haloalkyl, heteroaryl, and heterocycle;

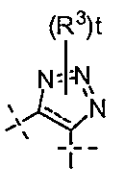
and each of said above alkyl, alkenyl, alkynyl, aryl, cycloalkyl, haloalkyl, heteroaryl and heterocycle can be optionally substituted by one or more groups independently chosen from optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, -OH, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, OR^b, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, optionally substituted haloalkyl, optionally substituted heteroaryl, and optionally substituted heterocycle;

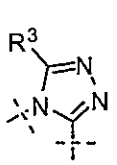
R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl optionally substituted aryl, optionally substituted cycloalkyl, optionally substituted haloalkyl, optionally substituted heteroaryl, and optionally substituted heterocycle,

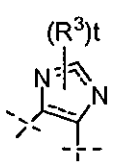
or R^a and R^c, and/or R^c and R^d, and/or R^c and R^e, and/or R^c and R^f, and/or R^d and R^e, and /or R^g and R^f together with the atom(s) to which they are attached, form a 3-10 membered optionally substituted heterocycle ring; and

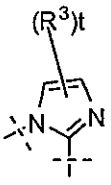
for each occurrence, n is independently 0, 1, or 2.

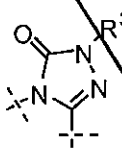
2. The compound according to Claim 1, wherein A^2 and A^3, together with B ring, are selected from structures (2)-(6)


(2)


(3)


(4)


(5)


(6)

;

wherein,

t is 1, 2 or 3; and

R^3 is independently chosen from H, C_1-C_6 alkyl,C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14}aryl, C_3-C_9 membered cycloalkyl, -$C(O)OR^b$, -CN, -$C(O)NR^cR^d$, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, -OR^b, -$OC(O)R^a$, -$OC(O)NR^cR^d$, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$, halo, haloalkyl, heteroaryl, and heterocycle;

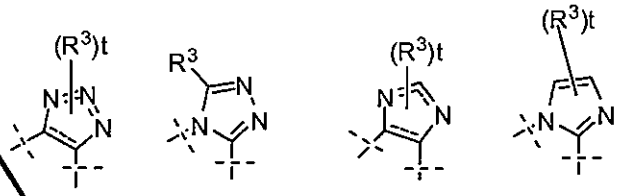
and each of said above alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl and heterocycle can be optionally substituted by one or more groups independently chosen from optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, -OH, oxo, -$C(O)R^a$, -$C(O)OR^b$, -CN, -$C(O)NR^cR^d$, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, OR^b, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$, halo, optionally substituted haloalkyl, optionally substituted heteroaryl, and optionally substituted heterocycle;

provided that, when A^2 and A^3, together with B ring, are structure (4), A^4 is not CR^2.

3. The compound according to Claim 2, wherein said R^3 is chosen from H, OH, CN, NO_2, halo, C_1-C_6 alkyl,C_2-C_8 alkenyl, C_2-C_8 alkynyl, aryl, C_3-C_9 cycloalkyl, heteroaryl, and heterocycle, wherein each of the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycle is optionally substituted by one or more groups independently chosen from optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, -OH, oxo, -$C(O)R^a$, -$C(O)OR^b$, -CN, -$C(O)NR^cR^d$, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, OR^b, -$S(O)_nR^e$, -

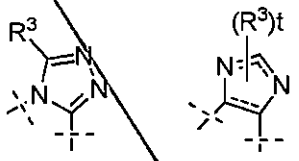
$S(O)_nNR^cR^d$, halo, optionally substituted haloalkyl, optionally substituted heteroaryl, and optionally substituted heterocycle.

4. The compound according to any one of Claims 2 and 3, wherein A^2 and A^3, together with B ring, are chosen from the following structures (2)-(5)



(2) (3) (4) (5)

5. The compound according to any one of Claims 2-4, wherein A^2 and A^3, together with the B ring, are chosen from structures (3)-(4)



(3) (4)

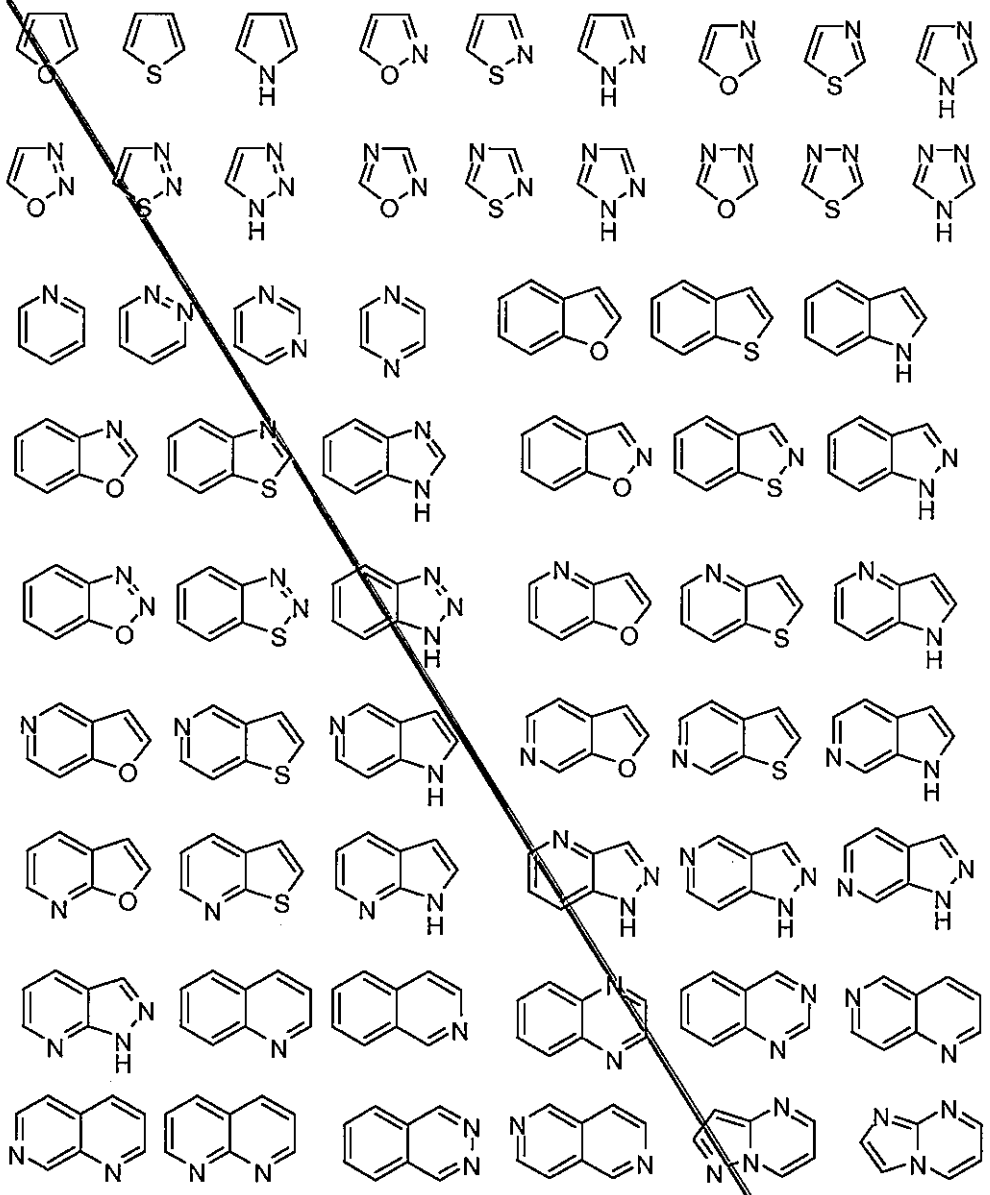
6. The compound according to any one of Claims 1-5, wherein A^4 is N or CH.

7. The compound according to any one of Claims 1-6, wherein A^5 is N or CH.

8. The compound according to any one of Claims 1-7, wherein A^1, A^4, and A^5 are CH.

9. The compound according to any one of Claims 1-7, wherein A^1 and A^5 are CH, and A^4 is N.

10. The compound according to any one of Claims 1-9, wherein R^1 is a heteroaryl chosen from the following structures

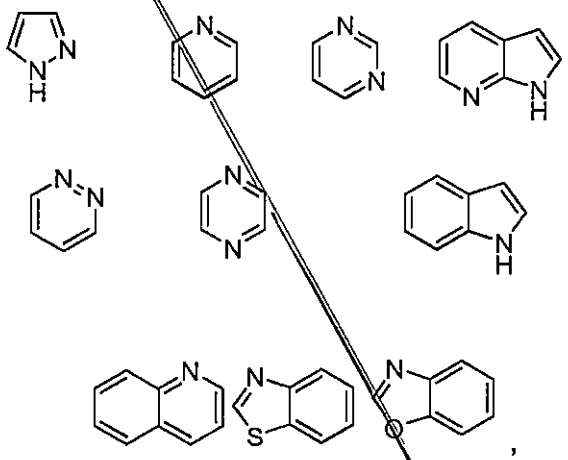


wherein each of which is optionally substituted by one or more groups independently chosen from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, haloalkyl, heteroaryl, heterocycle, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, $-OR^b$, $-OC(O)R^a$, $-OC(O)NR^cR^d$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$ and halo, and wherein each of the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, haloalkyl, heteroaryl and heterocycle is optionally substituted by one or more groups independently chosen from optionally

substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, -OH, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, OR^b, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, optionally substituted haloalkyl, optionally substituted heteroaryl, and optionally substituted heterocycle;

wherein R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, alkyl, aryl, cycloalkyl, haloalkyl, heteroaryl, and heterocycle, further wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle in R^a, R^b, R^c, R^d, R^e, R^f and R^g is optionally substituted by one or more substitutents independently selected from halo and alkyl.

11. The compound according to Claim 10, wherein R^1 is a heteroaryl chosen from



,

wherein each of which is optionally substituted by one or more groups independently chosen from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, haloalkyl, heteroaryl, heterocycle, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, $-OR^b$, $-OC(O)R^a$, $-OC(O)NR^cR^d$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$ and halo, and wherein each of the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, haloalkyl, heteroaryl and heterocycle is optionally substituted by one or more groups independently chosen from optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl,

optionally substituted aryl, optionally substituted cycloalkyl, -OH, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, OR^b, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, optionally substituted haloalkyl, optionally substituted heteroaryl, and optionally substituted heterocycle;

wherein R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, alkyl, aryl, cycloalkyl, haloalkyl, heteroaryl, and heterocycle, further wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle in R^a, R^b, R^c, R^d, R^e, R^f and R^g is optionally substituted by one or more substitutents independently selected from halo and alkyl.

12. Thecompound according to any one of Claims 1-11, wherein R^1 is , which is optionally substituted with one or more groups independently chosen from:

- alkyl, alkenyl, alkynyl, wherein each of which is optionally substituted by one or more groups independently chosen from optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted aryl, optionally substituted cycloalkyl, -OH, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, OR^b, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, optionally substituted haloalkyl, optionally substituted heteroaryl, and optionally substituted heterocycle;

$-C(O)NR^cR^d$;

$-NR^cR^d$;

$-OR^b$;

-halo;

-cyano;

$-NR^cS(O)_nR^e$,

wherein R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, alkyl, aryl, cycloalkyl, haloalkyl, heteroaryl, and heterocycle, wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle in R^a, R^b, R^c, R^d, R^e, R^f and R^g is optionally substituted by one or more substitutents independently selected from halo and alkyl.

13. A compound selected from compounds 1 to 184 and/or at least one pharmaceutically acceptable salt.

14. A pharmaceutical composition comprising at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1-13 and at least one pharmaceutically acceptable carrier.

15. A method of inhibiting the activity of PI3K and/or mTOR comprising contacting the enzyme with an effective amount of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1-13.

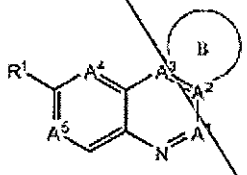
16. A method of treating cancer responsive to inhibition of PI3K and/or mTOR comprising administering to a subject in need thereof an effective amount of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1-13.

17. A use of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1-13 in the manufacture of a medicament for inhibiting the activity of PI3K and/or mTOR.

18. A use of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1-13 in the manufacture of a medicament for treating cancer.

What is claimed is:

1 . A compound of formula 1 :



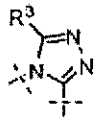
(1)

and/or at least one pharmaceutically acceptable salt thereof wherein

A^1 is CH;

A^4 and A^5 are independently CH;

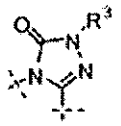
A^2 and A^3, together with B ring, is



(3)Wherein,

R^3 is independently chosen from H, C_1-C_6 alkyl,C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 membered cycloalkyl, -C(O)OR^b, -CN, -C(O)NR^cR^d, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, -OR^b, -$OC(O)R^a$, -$OC(O)NR^cR^d$, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$, halo, halo C_1-C_6 alkyl, heteroaryl, and heterocycle; and each of said above alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl and heterocycle can be optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_9 cycloalkyl, -OH, oxo, -C(O)R^a, -C(O)OR^b, -CN, -C(O)NR^cR^d, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, OR^b, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$,

halo halo C_1-C_6 alkyl, heteroaryl, and heterocycle, optionally substituted with –C(O) C_1-C_4 alkyl, further wherein each of alkyl is optionally substituted with -CN or -OH;



or A^2 and A^3, together with B ring, is (6) ,

wherein,

R^3 is independently chosen from H, C_1-C_6 alkyl,C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 membered cydoalkyl;

R^1 is heteroaryl, optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, oxo, -C(O)R^a, -C(O)OR^b, -CN, -C(O)NR^cR^d, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, -OR^b, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$, halo, halo C_1-C_6 alkyl, heteroaryl, and heterocycle;

R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl C_6-C_{14} aryl, optionally substituted with C_1-C_6 alkyl or halo, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, and heterocycle,

or R^a and R^c, and/or R^c and R^d, and/or R^c and R^e, and/or R^c and R^f, and/or R^d and R^e, and /or R^g and R^f together with the atom(s) to which they are attached, form a 3-10 membered heterocycle ring; and

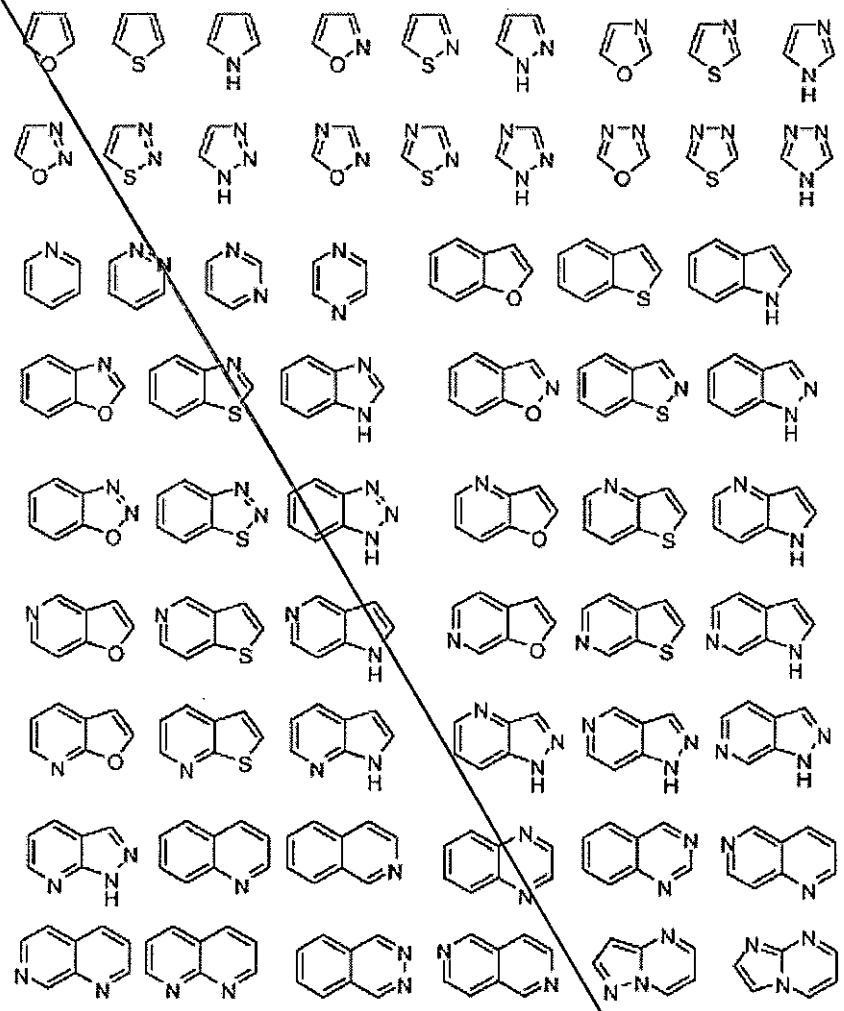
for each occurrence, n is independently 0, 1 , or 2.

2. The compound according to Claim 1, wherein said R^3 is chosen from H, OH, CN, NO_2, halo, C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, heteroaryl, and heterocycle, wherein each of the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycle is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14}aryl, C_3-C_9 cycloalkyl, -OH, oxo,

$-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, OR^b, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, halo C_1-C_6 alkyl, heteroaryl, and heterocycle optionally substituted with –C(O) C_1-C_4 alkyl, further wherein each of alkyl is optionally substituted with –CN or -OH.

3. The compound according to Claim2, wherein said R^3 is chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, heteroaryl, and heterocycle, wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl -OH, $-C(O)R^a$, -CN, $-NR^cR^d$, $-OR^b$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, and heterocycle optionally substituted with –C(O) C_1-C_4 alkyl, further wherein each of alkyl is optionally substituted with –CN or -OH.

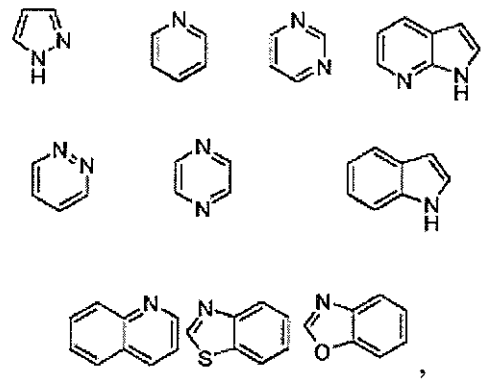
4. The compound according to Claim 1, wherein R^1 is a heteroaryl chosen from the following structures



wherein each of which is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, heterocycle, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, $-OR^b$, $-OC(O)R^a$, $-OC(O)NR^cR^d$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$ and halo;

wherein R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, and heterocycle, further wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle in R^a, R^b, R^c, R^d, R^e, R^f and R^g is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

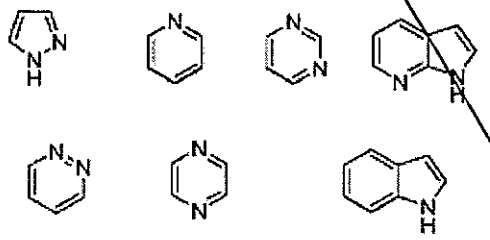
5 . The compound according to Claim 4, wherein R^1 is a heteroaryl chosen from



wherein each of which is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, heterocycle, oxo, -C(O)R^a, -C(O)OR^b, -CN, -C(O)N$R^c$$R^d$, -N$R^c$$R^d$, - N$R^c$C(O)$R^a$, -N$R^c$S(O)$_n$$R^e$, -N$R^c$S(O)$_nNR^f$$R^g$, -N$R^c$C(O)O$R^b$, -N$R^c$C(O)N$R^d$$R^e$, -$NO_2$, - O$R^b$, -OC(O)$R^a$, -OC(O)N$R^c$$R^d$, -S(O)$_n$$R^e$, -S(O)$_nNR^c$$R^d$ and halo;

wherein R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, and heterocycle, further wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle in R^a, R^b, R^c, R^d, R^e, R^f and R^g is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

6. The compound according to Claim 4, wherein R^1 is a heteroaryl chosen from



wherein each of which is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, haloalkyl, -N$R^c$$R^d$, -N$R^c$S(O)$_n$$R^e$, and halo;

wherein, R^b, R^c, R^d, and R^e are each independently chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, further wherein aryl, in R^b, R^c, R^d, and R^e is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

7. The compound according to Claim 6 , wherein R^1 is ,
which is optionally substituted with one or more groups independently chosen from:

- halo C_1-C_6 alkyi,;

-NR^cR^d;

-OR^b;

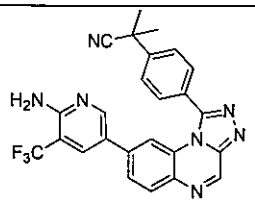
-halo;

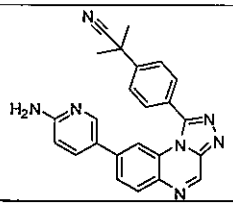
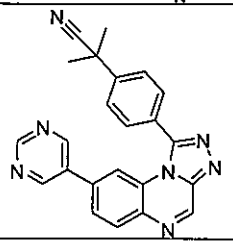
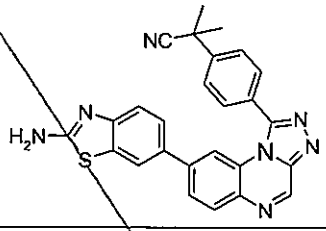
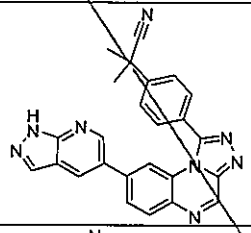
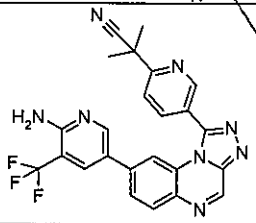
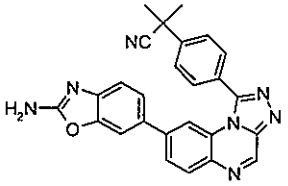
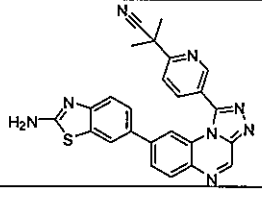
-$NR^cS(O)_nR^e$,

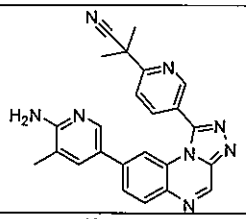
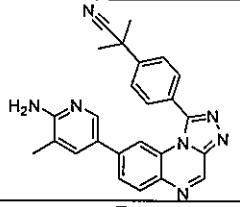
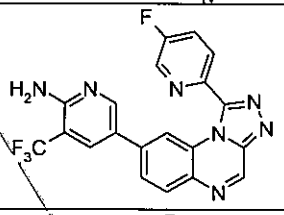
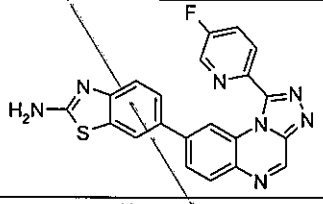
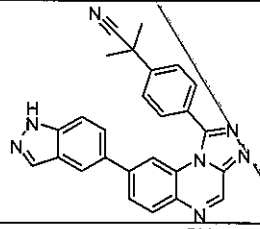
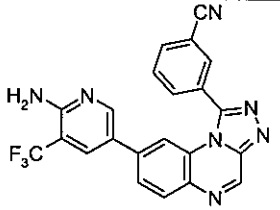
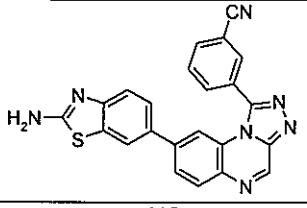
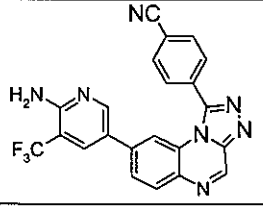
wherein R^b, R^c, R^d, and R^e are each independently chosen from H, C_1-C_6 alkyl, aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, , wherein aryl in R^b, R^c, R^d and R^e is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

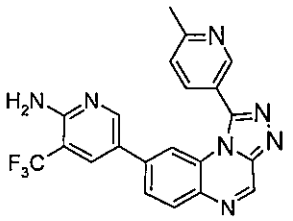
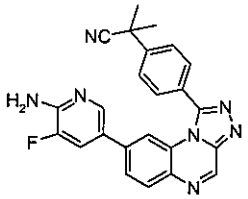
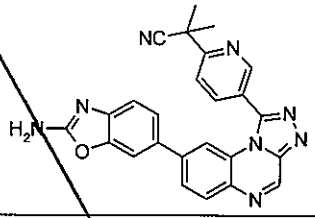
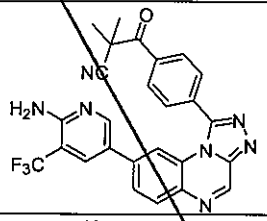
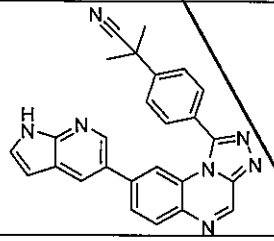
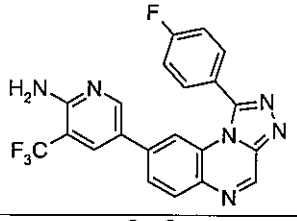
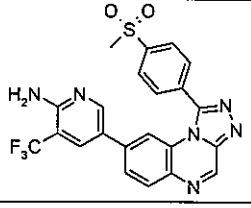
8. A compound selected from following compounds and/or at least one

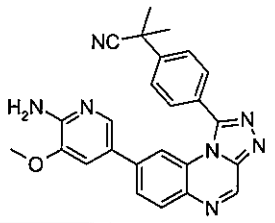
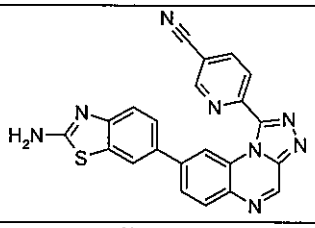
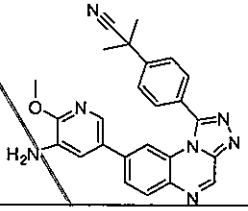
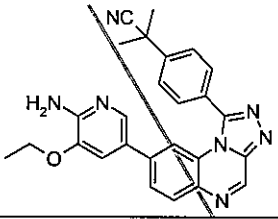
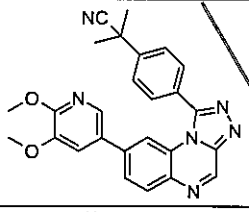
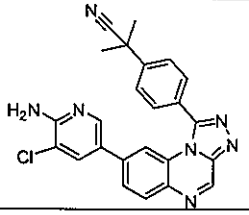
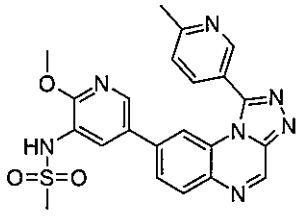
pharmaceutically acceptable salt:

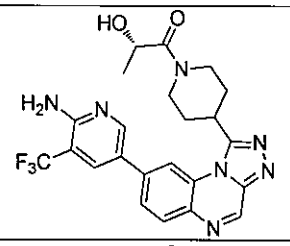
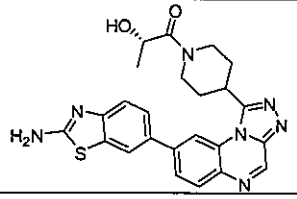
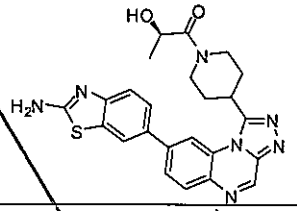
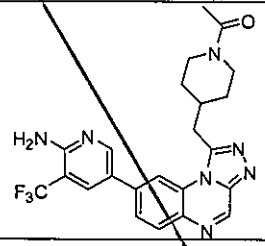
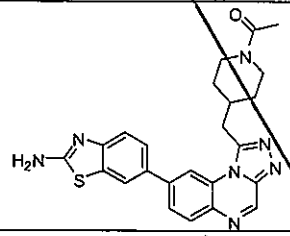
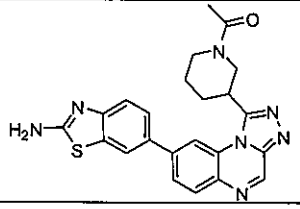
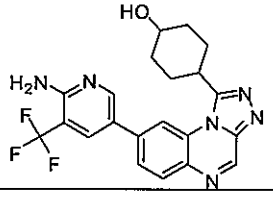
Compound	Structure
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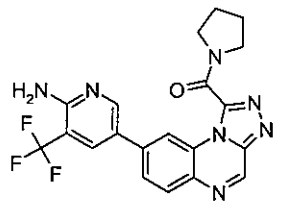
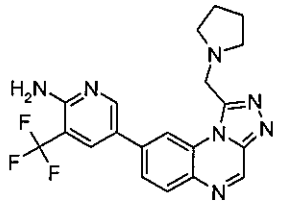
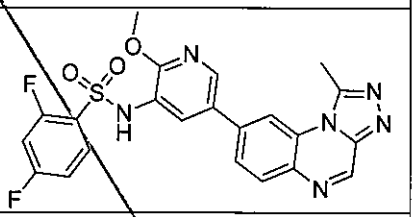
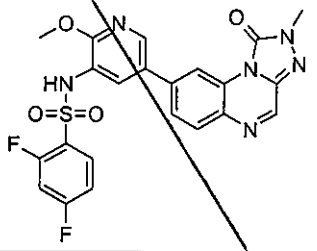
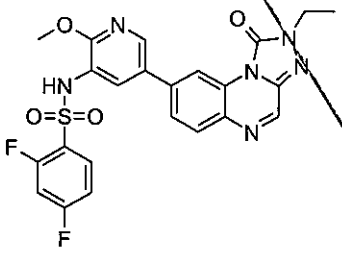
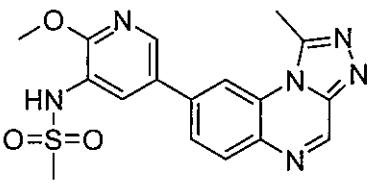
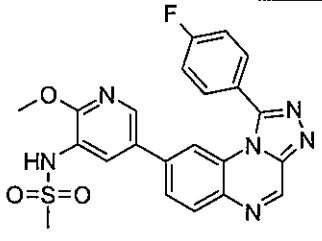
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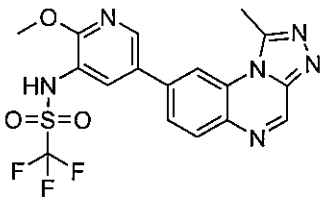
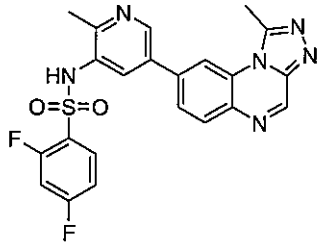
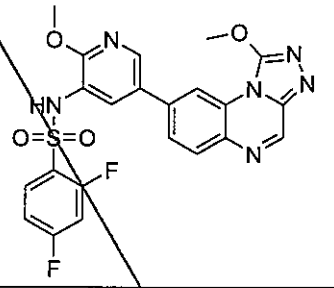
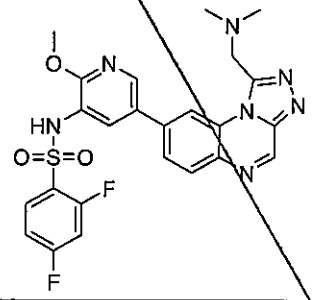
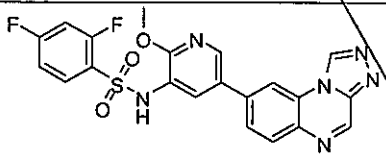
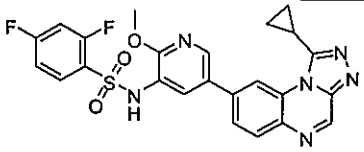
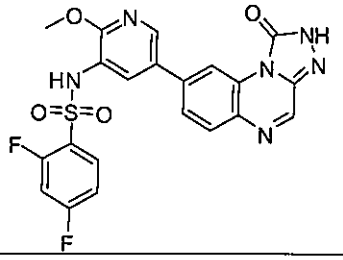
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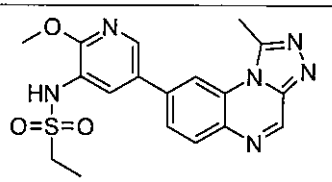
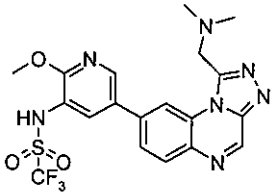
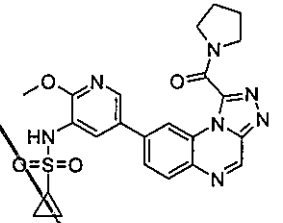
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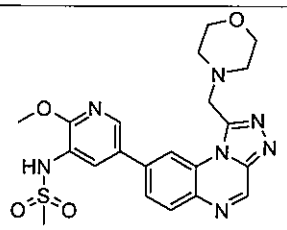
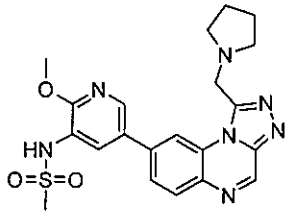
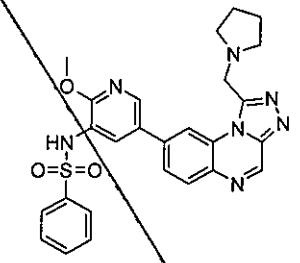
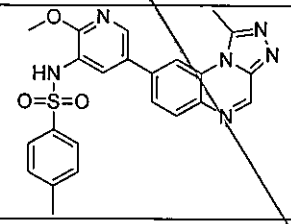
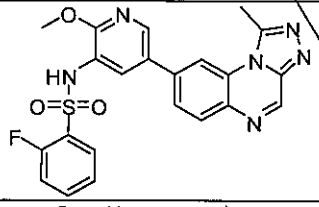
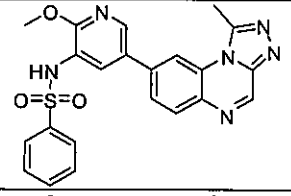
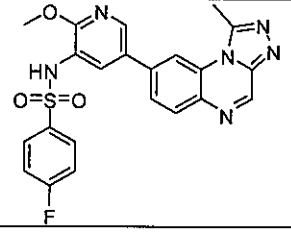
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9. A pharmaceutical composition comprising at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8 and at least one pharmaceutically acceptable carrier.

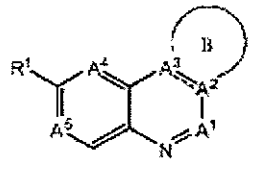
10. A method of inhibiting the activity of PI3K and/or mTOR comprising contacting the enzyme with an effective amount of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8.

11. A use of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8 in the manufacture of a medicament for inhibiting the activity of PI3K and/or mTOR.

12. A use of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8 in the manufacture of a medicament for treating cancer.

What is claimed is:

1 . A compound of formula 1 :



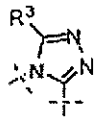
(1)

and/or at least one pharmaceutically acceptable salt thereof wherein

A^1 is CH;

A^4 and A^5 are independently CH;

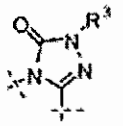
A^2 and A^3, together with B ring, is



(3)Wherein,

R^3 is independently chosen from H, C_1-C_6 alkyl,C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 membered cycloalkyl, -C(O)OR^b, -CN, -C(O)NR^cR^d, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, -OR^b, -$OC(O)R^a$, -$OC(O)NR^cR^d$, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$, halo, halo C_1-C_6 alkyl, heteroaryl, and heterocycle; and each of said above alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl and heterocycle can be optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_9 cycloalkyl, -OH, oxo, -C(O)R^a, -C(O)OR^b, -CN, -C(O)NR^cR^d, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, OR^b, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$,

halo halo C_1-C_6 alkyl, heteroaryl, and heterocycle, optionally substituted with –C(O) C_1-C_4 alkyl, further wherein each of alkyl is optionally substituted with -CN or -OH;



or A^2 and A^3, together with B ring, is (6) ,

wherein,

R^3 is independently chosen from H, C_1-C_6 alkyl,C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 membered cydoalkyl;

R^1 is heteroaryl, optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, oxo, -C(O)R^a, -C(O)OR^b, -CN, -C(O)NR^cR^d, -NR^cR^d, -$NR^cC(O)R^a$, -$NR^cS(O)_nR^e$, -$NR^cS(O)_nNR^fR^g$, -$NR^cC(O)OR^b$, -$NR^cC(O)NR^dR^e$, -NO_2, -OR^b, -$S(O)_nR^e$, -$S(O)_nNR^cR^d$, halo, halo C_1-C_6 alkyl, heteroaryl, and heterocycle;

R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl C_6-C_{14} aryl, optionally substituted with C_1-C_6 alkyl or halo, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, and heterocycle,

or R^a and R^c, and/or R^c and R^d, and/or R^c and R^e, and/or R^c and R^f, and/or R^d and R^e, and /or R^g and R^f together with the atom(s) to which they are attached, form a 3-10 membered heterocycle ring; and

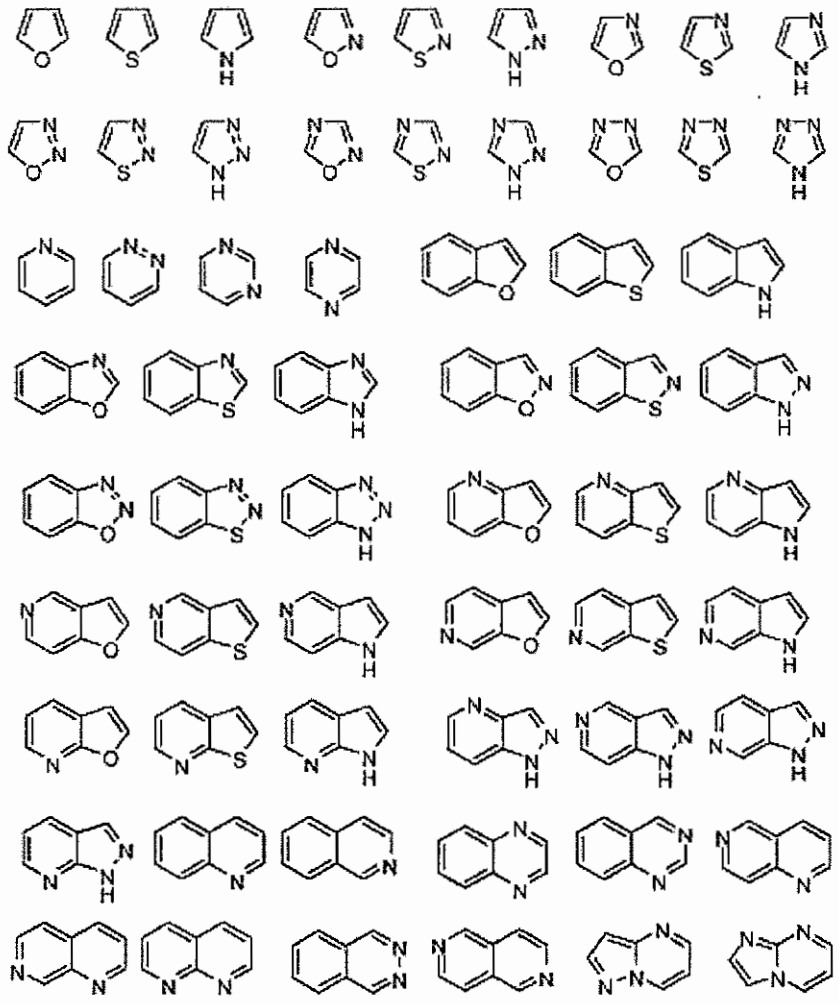
for each occurrence, n is independently 0, 1 , or 2.

2. The compound according to Claim 1, wherein said R^3 is chosen from H, OH, CN, NO_2, halo, C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, heteroaryl, and heterocycle, wherein each of the alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heteroaryl, and heterocycle is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14}aryl, C_3-C_9 cycloalkyl, -OH, oxo,

$-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, OR^b, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, halo C_1-C_6 alkyl, heteroaryl, and heterocycle optionally substituted with –C(O) C_1-C_4 alkyl, further wherein each of alkyl is optionally substituted with –CN or -OH.

3. The compound according to Claim2, wherein said R^3 is chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, heteroaryl, and heterocycle, wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl -OH, $-C(O)R^a$, -CN, $-NR^cR^d$, $-OR^b$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$, halo, and heterocycle optionally substituted with –C(O) C_1-C_4 alkyl, further wherein each of alkyl is optionally substituted with –CN or -OH.

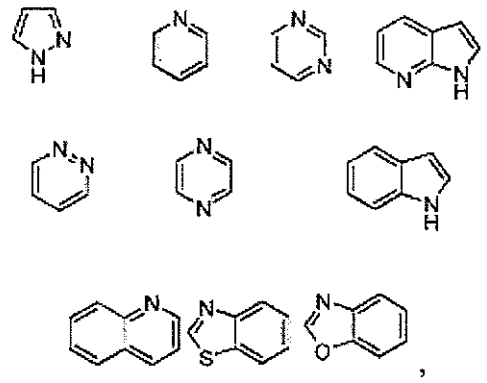
4. The compound according to Claim 1, wherein R^1 is a heteroaryl chosen from the following structures



wherein each of which is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, heterocycle, oxo, $-C(O)R^a$, $-C(O)OR^b$, -CN, $-C(O)NR^cR^d$, $-NR^cR^d$, $-NR^cC(O)R^a$, $-NR^cS(O)_nR^e$, $-NR^cS(O)_nNR^fR^g$, $-NR^cC(O)OR^b$, $-NR^cC(O)NR^dR^e$, $-NO_2$, $-OR^b$, $-OC(O)R^a$, $-OC(O)NR^cR^d$, $-S(O)_nR^e$, $-S(O)_nNR^cR^d$ and halo;

wherein R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, and heterocycle, further wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle in R^a, R^b, R^c, R^d, R^e, R^f and R^g is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

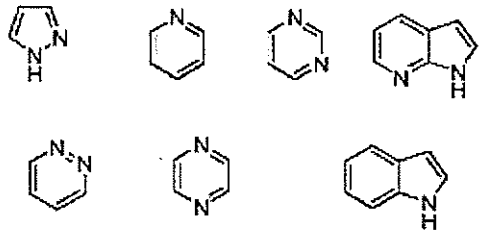
5 . The compound according to Claim 4, wherein R^1 is a heteroaryl chosen from



wherein each of which is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, heterocycle, oxo, -C(O)R^a, -C(O)OR^b, -CN, -C(O)N$R^c$$R^d$, - N$R^c$$R^d$, - N$R^c$C(O)$R^a$, -N$R^c$S(O)$_n$$R^e$, -N$R^c$S(O)$_nNR^f$$R^g$, -N$R^c$C(O)O$R^b$, -N$R^c$C(O)N$R^d$$R^e$, -$NO_2$, - O$R^b$, -OC(O)$R^a$, -OC(O)N$R^c$$R^d$, -S(O)$_n$$R^e$, -S(O)$_nNR^c$$R^d$ and halo;

wherein R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, heteroaryl, and heterocycle, further wherein each of the alkyl, aryl, cycloalkyl, heteroaryl, and heterocycle in R^a, R^b, R^c, R^d, R^e, R^f and R^g is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

6. The compound according to Claim 4, wherein R^1 is a heteroaryl chosen from



wherein each of which is optionally substituted by one or more groups independently chosen from C_1-C_6 alkyl, haloalkyl, -N$R^c$$R^d$, -N$R^c$S(O)$_n$$R^e$, and halo;

wherein, R^b, R^c, R^d, and R^e are each independently chosen from H, C_1-C_6 alkyl, C_6-C_{14} aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, further wherein aryl, in R^b, R^c, R^d, and R^e is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

7. The compound according to Claim 6 , wherein R^1 is ,
which is optionally substituted with one or more groups independently chosen from:

- halo C_1-C_6 alkyi,;

-NR^cR^d;

-OR^b;

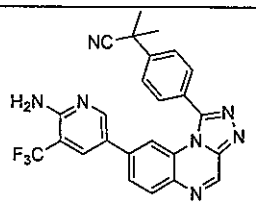
-halo;

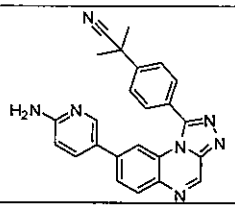
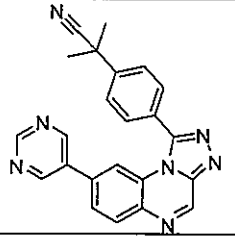
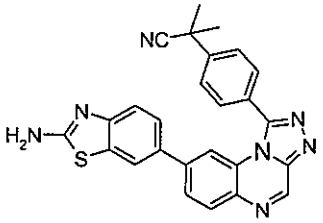
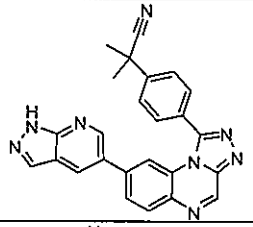
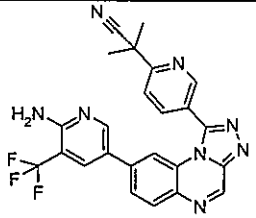
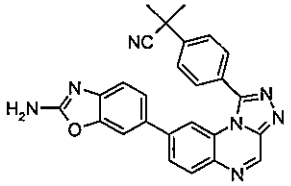
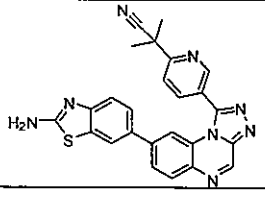
-$NR^cS(O)_nR^e$,

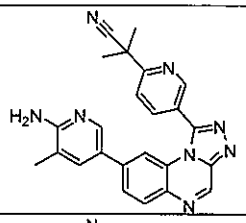
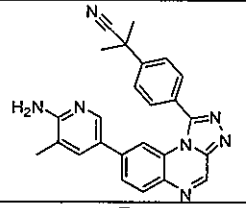
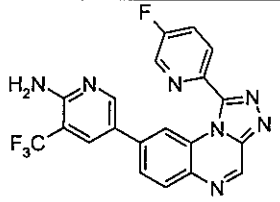
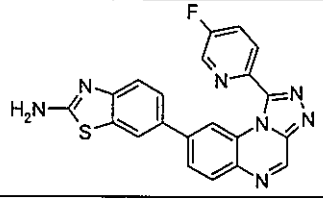
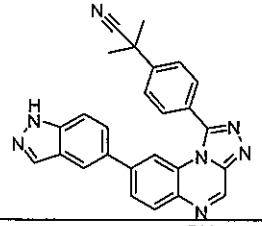
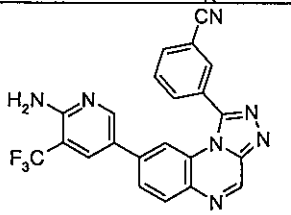
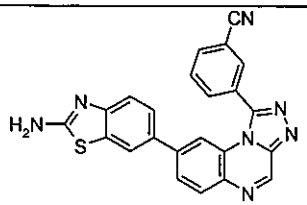
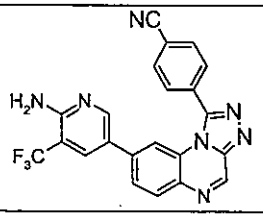
wherein R^b, R^c, R^d, and R^e are each independently chosen from H, C_1-C_6 alkyl, aryl, C_3-C_9 cycloalkyl, halo C_1-C_6 alkyl, , wherein aryl in R^b, R^c, R^d and R^e is optionally substituted by one or more substitutents independently selected from halo and C_1-C_6 alkyl.

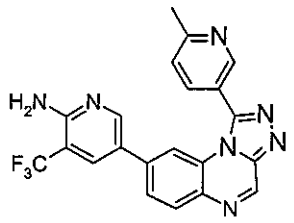
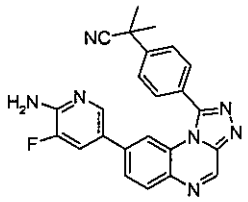
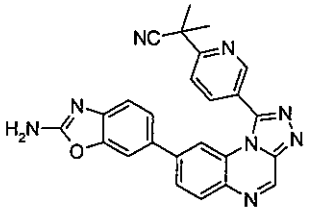
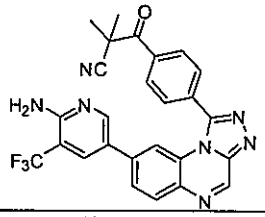
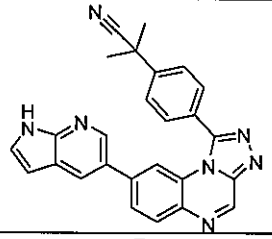
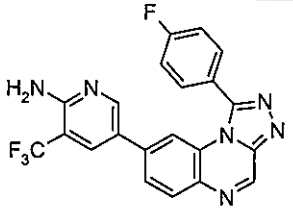
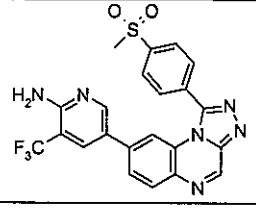
8. A compound selected from following compounds and/or at least one

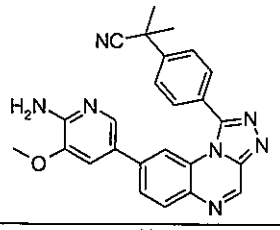
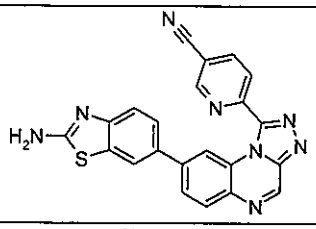
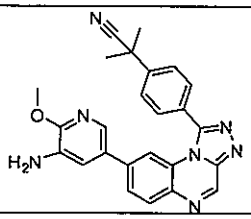
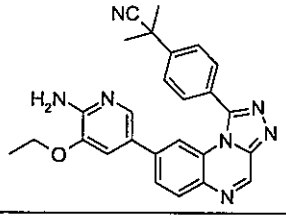
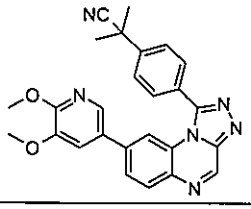
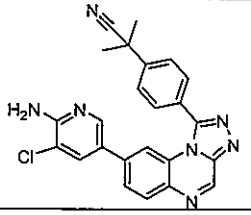
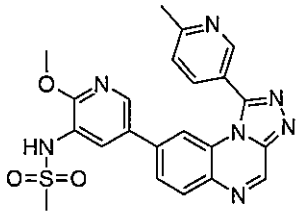
pharmaceutically acceptable salt:

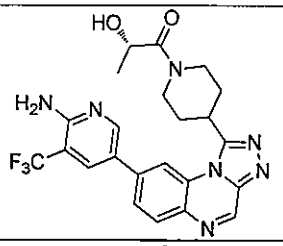
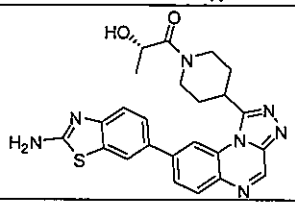
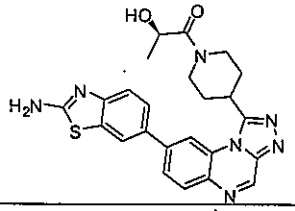
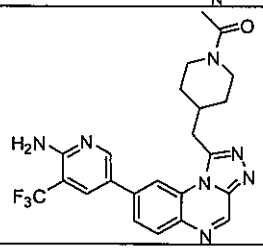
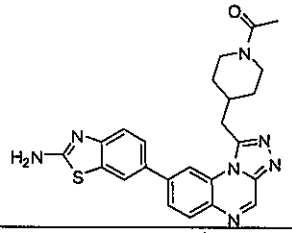
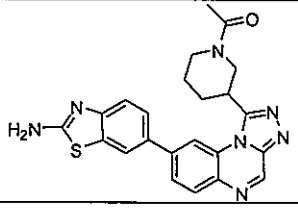
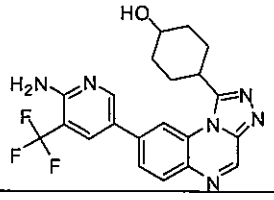
Compound	Structure
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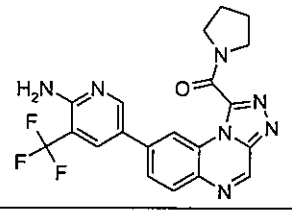
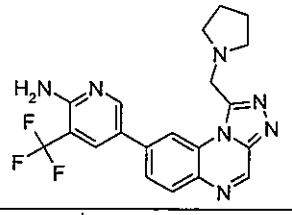
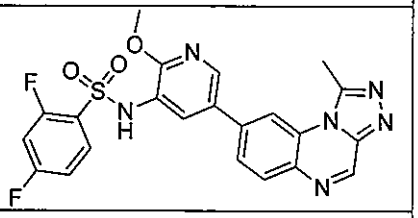
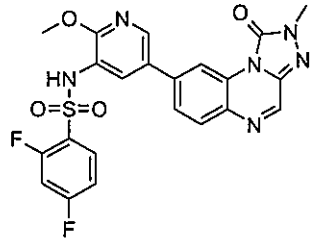
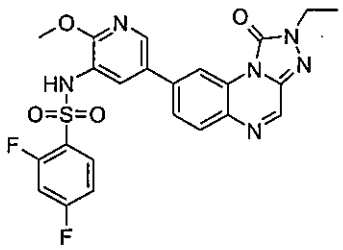
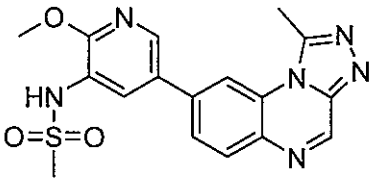
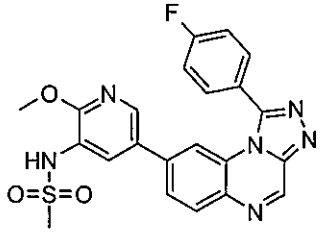
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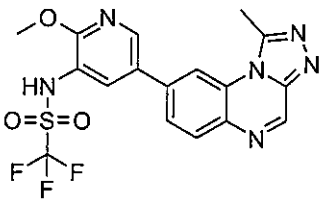
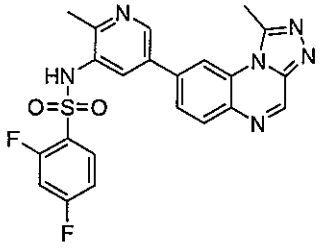
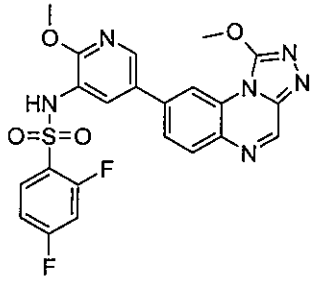
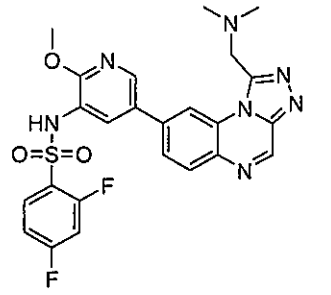
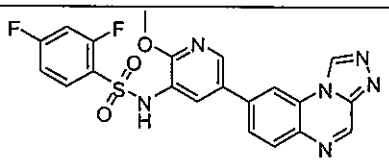
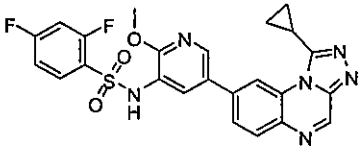
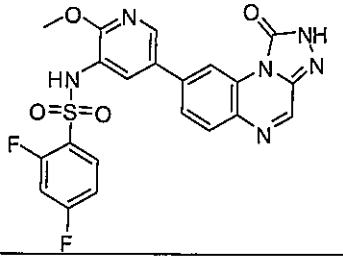
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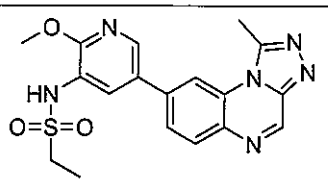
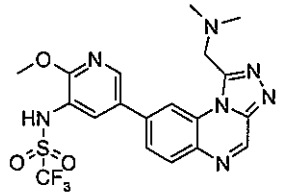
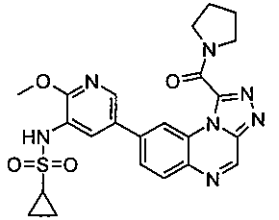
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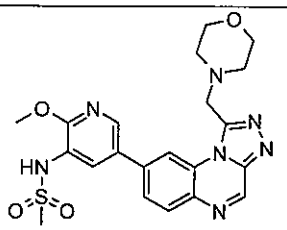
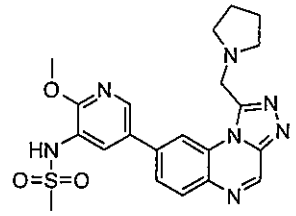
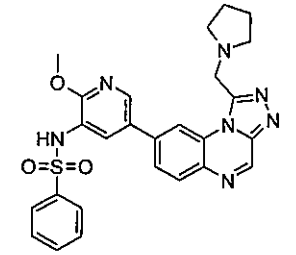
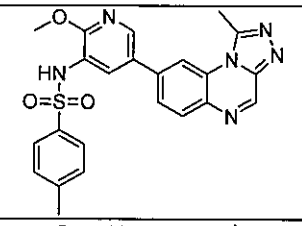
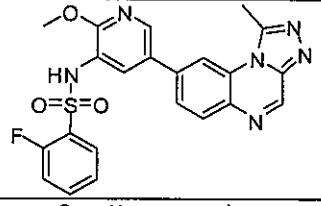
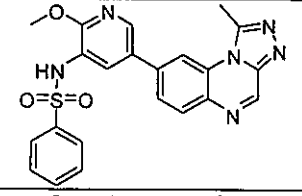
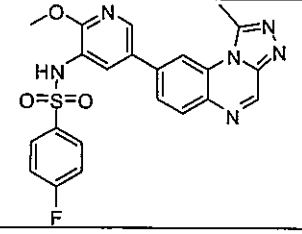
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9. A pharmaceutical composition comprising at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8 and at least one pharmaceutically acceptable carrier.

10. A method of inhibiting the activity of PI3K and/or mTOR comprising contacting the enzyme with an effective amount of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8.

11. A use of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8 in the manufacture of a medicament for inhibiting the activity of PI3K and/or mTOR.

12. A use of at least one compound and/or at least one pharmaceutically acceptable salt thereof according to any one of Claims 1 -8 in the manufacture of a medicament for treating cancer.