

Supporting Information for

Thermoring-driven cold activation of TRPM8

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This supplementary material includes:

Tables S1, S2, S3, S4, S5, S6, S7 and S8.

Table S1. Tertiary noncovalent interactions along the PIP₂-dependent gating pathway from F44 to I1067 in each subunit of ligand-free, fully-swapped, closed hTRPM8 in GDN at pH 7.4 and 4 °C (PDB ID, 9P8Y).

Noncovalent interaction	Cut-off distance	Linked residues
S-S		C54-C68
Salt bridge	3.2-4 Å	E53-R119, E131-R288, K175-E435, K310-E373, K321-E383, K574-E575, K599-E622, E620-R624, D802-R842, K1060-E1061
H-bond	<3.9 Å donor-H-acceptor <60°	Q46-T100, F57-N84, N66-Q74-H77, C68-G71, C70-H268, N90-H94, D101-R228, K113-N256, R119-D264, S147/V148-R278, Q173-N199, Y186-I252, Y191-R162, G218-R223, D254-N256, T258-H259, D264-G266, T318-N322, G331-D337, T392-K414, N425-Q429, E435-K468, W436-Q438, W453-N480-L476, R475-E582, N483-K486, L496-W567, F497-R532, H500-Q571, D518-K596, W567-Q571, N572-E613, K574/K578-E620, S577-Y621, W581-C587, E582-K1060, T584-C587, C587/T588-E1056, S595-D665, K596-E662, K599-D665, E622-F668, Y633-E641/N676, E637/E641-K680, N655-E658, I669-Q675, S679-R998, E684-R713, Y745-F839, H761/E768-R816, Q785-R1008, W786-T803, T848-N852, Q861-Q997, R862-D866, I969-N973, Q1003-S1007, C1006-N1010
π - π interaction	2.65–6.5 Å	F44-F49/H136, F57-H77, Y72-H268, F108-Y240, Y130-Y284, W137-H259, F155-F165/Y191, F165-Y191/F304, Y130-W178, H185-Y186, Y186-Y251, Y295-F416, W377-W380, W426-F447-W453, F447/F473-F477, F463-H500, H490-F531, F497-F501/W567, F501-W567, Y506-W525, F565/W581-Y621, F565-W581, F629-Y633/F668, W682/Y683-F735, W682-Y683, W682-F738/Y1005, W693-F709, F712-W725/Y726, W725-Y726, F730-F731-W740, F738-Y1005, F744-F1013, F748-F752, F748/F752-F839, F752-Y836, F752/F760/F809-F832, F752/Y772-F809-F839, H761-H765, F779-W786-F807, W786-Y793/F794, Y793-F794, W798-H845, F869-F872, F874-Y908
cation- π interaction	<6.0 Å	F103-R228, R167-Y170, R119-W217-R223, K175-W436, R228-F236, Y506-R532, Y621-R624
CH ₃ /CH- π interaction	2.65-3.01 Å	F49-I118/I128, C70-W89, Y91-N265, F108-N255, K116-W137-L132, F165-L188, Y191-V195, Y295-P300, F304-L168, D337-F361 -R360, L369-W377-L313, Y410-K414, Y413-L433, E435-W436, F447-N480, I467-H500, K513-W525, Y516-K603, H559-A650 , F565-I569, L592-F668, A594-Y621, L628-Y1063, Y633-E637/G673,

		L639-W1055-M1059, H667-Q992, F677-Q681, K694-F709, V705-F730, W725-A729, W740-P1012, F744-P1014, V775-F809, F776-C780, Y793-N799, Y808-I831, F815-S827, P855-W994, F869-L873, F870-L974, W877-F881, F874-M878-Y908, R895-W898, Y981-M859, W994-K995, Y999-I669, I1016-Y1020, Y1021-V1025
Lone pair- π interaction	3-3.7 Å	Y130-T134, Y413-S417, H490-T494, F668-Q671

Table S2. Tertiary noncovalent interactions along the PIP₂-dependent gating pathway from F44 to I1067 in each subunit of ligand-free, semi-swapped, open hTRPM8 in cell vesicles at pH 8 and 4 °C (PDB ID, 9ZF0).

Noncovalent interaction	Cut-off distance	Linked residues
S-S		C54-C68
Salt bridge	3.2-4 Å	E194-R197, D518-K596, K574-E620-K578, K599-D665, E631-K1066, R862-E988, D991-K995, K1060-E1061
H-bond	<3.9 Å donor-H-acceptor <60°	R52-H77/N265, E53-F98, Y72-R223, T100-L226, D105-K116, R119-D264, S121-D123, D125-E127, K140-G176, S147-E282, R162-Y191, Q173-N199, I209-T258, N222-Y240-Q107, N265-C267, R278-V148/T181, Y284-R288, I290-G297, G308-T312, N317-E383, N279-N322, C326-L390, K382-L349, K423-Q429, N425-G428, N427-K431, E435-R470, Q459-E460, R475-E582-K1060, R485-Q583, L496-W467, H500-Q571, K513-N517, N572-S614, W581-C587, D636-L639, E641-K680, V645-N655, Q666-Q992, F668-Q671, Q675-K995, S679-R998, S687-T690, S762-R816, V763-H765, E782/Q785-N799, S850-N852, M964-N968, C1006/R1008-N1010, V1058-N1062
π - π interaction	2.65–6.5 Å	F44-H136, Y72-H77, Y130-W178/Y284, W137-H259, F155-Y191, F165-F304, Y186-Y251, Y295-F416 , W377-W380, W426-F447-W453, F463-F487, F473-F477, H490-F531, F497-F531/W567, Y506-W525, F565-W651, W581-Y621, F629-Y633, W682-Y683/F735/F738/Y1005, Y683-F735, F709-W693, F712-Y726, F730-F731, F744-F1013, F745-F748-F752-F809/F832/Y836/F839, F760-F832, H761-H765, Y772-F809, F779-W786-F807, W798-H845, F809-F832, F868-F869, F870-Y981, F874-W877-F881-Y963, F996-F1000-Y999
cation- π interaction	<6.0 Å	W217-R223, Y506-R532, F760-R816, W994-R998, R1008-F1013,
CH ₃ /CH- π interaction	2.65-3.01 Å	F49-L120, P142-W178, F165-L168/L188, L188-Y191, Y191-V195, Y295-P300, R360-F361, L369-W377, Y410-K414, Y413-L433, F416-Q429, W426-I446, L434-F473, M462-F487, F463-V492, L496-W567, W581-R624, L592-F668, Y621-R624, Y633-E637, L639-W1055, F760-R829, E768-Y772-L813, F794-L797, L804-Y808, F870-M978, F874-M878, F881-T967, W954-I955, Y1063-I1067
Lone pair- π interaction	3-3.7 Å	Y170-S174, Q562-W651, F735-S739

Table S3. Tertiary noncovalent interactions along the PIP₂-dependent gating pathway from F44 to I1067 in each subunit of menthol-activated, fully-swapped, open hTRPM8 in cell vesicles at pH 7.4 and 4 °C (PDB ID, 9PB5).

Noncovalent interaction	Cut-off distance	Linked residues
Salt bridge	3.2-4 Å	E194-R197, K321-E383, K578-E620, E620-R624, E641-K680, E768-R816, D802-R842, E1004-R1008, K1060-E1061
H-bond	<3.9 Å donor-H-acceptor <60°	Q46-T100, R52-D264, C54-K96, Q74-H77, N90-H94, D101-R119, F103-R228, S121-T124, E127-R288, S147/V148-R278, A156-K158, L157-R162, R160-I394/K395, R162-Y191, R167-D401, I209-T258, V220-R223, N222-D244, D254-N256, N317-E383, T350-K382 , N425-N427, N437-R470, W453-N480, E454-D457, N483-K486, H500-Q571, S502-V505, K513-N517, D518-K596, N572-S614, S577-Y621, W581-C587, E582-K1060, K599-D665, D607-N609, C632-E1056, Q675-R998, S679-R998, G684-R713, E685-K714, H761-R816, R784-E1004, Q785-N799, V849-W994, Q886-R890, Y1005-N1010, R1008-Y1020
π - π interaction	2.65–6.5 Å	F44-H136, Y72-H77/H268, W89-Y91, Y130-W178/Y284, W137-H259, F155-Y191, F165-F304, Y186-Y251, Y295-F416, W377-W380, F447-W453, F463-F487-H500, F473-F477, H490-F531, F497-F501-F531, F501-Y506/W567, Y506-W525, F523-W651, F565-Y621-W581, F565-W581/W651, F629-F668, W682-F738-Y1005, W682/Y683-F735, W682-Y6983/Y1005, W693-F709, F700-W740, F712-Y726, F730-F731-W740-F744, Y745/F748/F752-F839, F748-F752, F752-Y836, F752/F760/Y772/F809-F832, F752/Y772-F809, F776-F1021, H761-H765, F779-F807, Y793-F1000, W798-H845, F868-F869/F872, F870-Y981, F874-W877-F881, F996-F1000-Y999, F1018-F1021
cation- π interaction	<6.0 Å	W217-R223, K314-W380, Y506-R532, F760-R829
CH ₃ /CH- π interaction	2.65-3.01 Å	F49-L120, F108-N255, K116-W137, P142-W178, F155-L188, K175-W436, Y191-V195, C267-H270, Y295-P300, L313-W377-L369, R360-F361, Y410-K414, Y413-L433, L434-F473, K513-W525, S515-Y516, F565-I569, Y621-R624-W581, F629-Y633-G673, L628-Y1063, I1016-Y1020, L639-W1055, W693-K694-F709, V705-Y727, P716-W725, F730-V736, F744-P1014, Y787-K1027, F794-V800, L804-Y808, Y826-V830, F872-V876, F870-M978, F874-M878, P952-W954

Lone pair- π interaction	3-3.7 Å	Y91-N265, M219-Y251, Q562-W651, W567-Q571, F668-Q671, F760-E768, F815-S827, F847-T848
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Table S4. Tertiary noncovalent interactions along the PIP₂-dependent gating pathway from F44 to I1067 in each subunit of ligand-free, fully-swapped, desensitized hTRPM8 in cell vesicles at pH 8 and 4 °C (PDB ID, 9ZCV).

Noncovalent interaction	Cut-off distance	Linked residues
S-S bond		C54-C68, C929-C940
Salt bridge	3.2-4 Å	D105-K116, E194-R197, R475-E582, K596-E662, K599-E622, E620-R624, D802-R842, R890-D918, E935-K937, E942-R950
H-bond	<3.9 Å donor-H-acceptor <60°	R52-D264, Y72-R223, D101-R228, R119-D264, D125-I128, S147-E282, V148-R278, G151-Q306, R160-E330/I394, R162-Y191, R197-N256, I209-T258, N222-Y240, R228-N229, N265-C267, E330-M396, D337-R360, L391-K414, N406-Q438, N425-Q429/G428, N427-K431, L434-R470, N483-K486, H490-T494. S502-Q571, D518-L520, W581/T584-C587, E582/T584-K1060, T588-E1056, D607-N609, E641-K680, Q675-K995, S679-R998, S687-D689, Y745-F839, D759-H765, S762-R816, N789-G790, P855-N990, Q886-R890/S902, R890-L939, E893-R895-K937, T930-P938/C940, D944-H946, Q1003-S1007
π - π interaction	2.65–6.5 Å	F44-H136, Y72-H77/W217/H268, W89-Y91/H270, F108-Y240, Y130-W178/Y284, W137-H259, F155-F165/Y191, F165-Y191/F304, Y186-Y251, Y295-F416, W377-W380, W426-F447-W453, F447-F477, F463-H500, H490/F497-F531, F497-F501/W567, F501-F506/W567, Y506-W525, F565-W581/W651, W581-Y621, F629-Y633/F668, W682-Y683/F735/F738/Y1005, Y683-F735, F738-Y1005, F712-Y726, Y727-F731-W740, F744-F1013, F745-F748-F752-F809/F832/Y836/F839, F748-F839, F760-F832, H761-H765, Y772-F809/F832, F779-W786-F807, W798-H845, F809-F832, F874-W877-F881, F874-Y908 -F912, F996-F1000-Y999
cation- π interaction	<6.0 Å	R119-W217-R223, Y410-K414, Y506-R532, F760-R816, W898-R901
CH ₃ /CH- π interaction	2.65-3.01 Å	I45-F103, R52-Y91, F108-N255, K116-W137, Y130-R288, P142-W178-I212, F155-L188, F165-L188, Y170-S174, K175-W436, Y191-V195, Y295-P300, L313/L369-W377, K314-W380, Y413-L433, L434-F473, I467-H500, W525-A529, H559-A650, W581-R624, L592-F668, L628-Y1063, Y633-E637/G673, L639-W1055, K694-F709, V705-F730-V736, L724-W725, Y772-L813, V775-F809, L804-Y808, P855-W994, F874-M878, W877-S966, F881-Y963, W954-I955, L975-F979

Lone pair- π interaction	3-3.7 Å	W567-Q571, F776-C780, E782-W786, D918-Y924, D925-H928
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Table S5. Tertiary noncovalent interactions along the PIP₂-dependent gating pathway from K116 to K1066 in each subunit of ligand-free, fully-swapped, closed mTRPM8 in MSP2N2 at pH 8 and 4 °C (PDB ID, 9VJN).

Noncovalent interaction	Cut-off distance	Linked residues
Salt bridge	3.2-4 Å	K175-E435, E194-R197, E127-R288, E287-K298, E356-R360, K431-E460, R452-E454, K599-D665, D781-R1008, D802-R842, R862-D866,
H-bond	<3.9 Å donor-H-acceptor <60°	D125-T128, E127-Y284, K140-T141, T149-E311, A156-K158, R160-E330, R162-Y191, Q173-E207, H185-K190, R203-E206, W217-R223, D254-H257, N279-T318, K283-T318, Y284-R288, L313-N317-W380, H389-K414, L390-T392, N406-Q438, T418-N419, Q421-N425, E435-R470, S443-D444, T448-D450, E454-D457, R475-E582, T489-E491, N490-R558, N517-T522, D518-K596-T600, N572-A610/S614, S577-Y621, K578-E582, W581-C587, E582-K1060, C587-E1056, S595-D665, K599-E622, E620-R624, E631-K1066, Y633-E641, E641-K680, L644-N655, S647-C648, V626-Q671, I669-Q675, N676-R688, K680-R713, Q681-Q1003/C1006, S687-R688, N741-F1013, Y745-F839, V763-H765, E782-Y793/T803, Y793-N799/T803, V814-H818, S820-N821, H818-S824, Q886-R890, V986-N990, D991-K995, Y999-Q1003-N1007, D1049-E1051
π - π interaction	2.65–6.5 Å	Y130-W178/Y284, W137-H259, H138-W178, F155-Y191, F165-Y191, Y295-F416, W377-W380, W426/F447-W453, F463-H500, F473-F477, F497-F501/W567, F501-Y506/W567, Y506-W525, F523-W651, F565-Y621-W581, F565-W581/W651, W581-Y1063, F629-Y633/F668, W682-F738, W682-Y683/Y1005, W682/Y683-F735, F712-W725/Y726, W725-Y726, F730-F731-W740, F738-Y1005, F744-F1013, F752-F839, F748-F752/F839, F752-Y836, F752/Y772-F809, F752/Y772-F832, H761-H765, F779-W786/F807, W786-Y793/F794/F807, Y793-F794, W798-H845, F809-F832/F839, F869-F872, F870-F874-W877-F881, F881-Y963, F996-F1000-Y999-F996
cation- π interaction	<6.0 Å	K116-W137, K140-W178, R451-W453, Y506-R532, Y621-R624, R895-W898
CH ₃ /CH- π interaction	2.65-3.01 Å	T141-W178, K153-Y186, F155-L188, L157-Y191, L168-F304-V328, T181-H257, T184-Y186, Y295-P300, V338-F361 , S376-W380, H389-L390, Y410-L441, Y413-L433, L434/L439-F473, M462-F487, I467-H500, Y516-K603, F523-G652, F565-I569, L592-F668, A594-Y621/W581, R624-W581, L628-Y1063, Y633-E637/G673, L639-

		W1055, W693-K694, L699-F700, W725-A729, F730-V736, F738-V742, F744-P1014, T803-F807, P855-W994-K995, M878-Y908, Y981-T982, W896-R897, F900-I904
Lone pair- π interaction	3-3.7 Å	D254-H257, W217-D264, T258-H259, H667-Q992

Table S6. Tertiary noncovalent interactions along the PIP₂-dependent gating pathway from K116 to K1066 in each subunit of icilin-activated, fully-swapped, open mTRPM8 in MSP2N2 at pH 8 and 4 °C (PDB ID, 9VJR).

Noncovalent interaction	Cut-off distance	Linked residues
Disulfide bond		C929-C940
Metal bridge		E782-Ca-Q785-Ca-N799-Ca-D802-Ca-E782
Icilin bridge		F738-Ic-Y745-Ic-L778-Ic-D802-Ic-F838-Ic-R842-Ic-H845-Ic-I846-Ic-F1013-Ic-F738
Salt bridge	3.2-4 Å	R197-D198, E356-R360, D518-K596, E768-R816, R851-D991-K995, R890-D918, R897-E935, D944-R950, E631-K1066
H-bond	<3.9 Å donor-H-acceptor <60°	R162-Y191, T184-Y186, S290-D292/G297, Y295-L412, I301-C326-A411, N317-K321-K323, L391-K414 , N406-Q438, Y413-Q429, K414-K423-Q429-S443-D444, N425-Q429, T448-D450, E460-T464, R475-E582, N483-K486, E491-T494, E495-T499-S498, F497-R532, H500-Q571-W567, R507-Q510, N508-N606, N517-T522, H559-C648, N572-A610/S614, S577-Y621, K578-E620, W581-C587, E582-K1060-E1061, T584-C587, C587/C632-E1056, K599-E622, E620-R624, Y621-E627-Y1063, N635-W1055, Y633-E641, Y633/E637/E641-K680, S647-G653, N655-E658, I669-Q675, A670-K995, Q675-K995, Q675/S679-R998, Y683-N692, S687-D689, Y745-F839, E768-Y772, D802-R842, H818-S820, H818/N821-S824, T848-W994, S850-N852-K856, R885-E906, Q886-R890/S902, E893-R895, P907-Y963, D920-T923, Y924-V941, S927-H928, C929-K937, T930-N934/P938/C940, E1004-R1008
π - π interaction	2.65–6.5 Å	Y130-W178/Y284, W137-H259-H138-W178, F165-F304, Y295-F416, W426/F447-W453, W426-F447, F463-F487/H500, F473-F477, F497-F501/W567, F501-Y506/W567, Y506-W525, F565-Y621-W581, F565-W581/W651, F629-Y633/F668, W682-F738, W682-Y683/Y1005, F738-Y1005, W682/Y683-F735, F712-W725/Y726, W725-Y726, F730-F731-W740, F744-F839/F1013, F752-F839, F748-F752/F839, F752-Y836, F752/Y772-F809, F752/F760/Y772-F832, H761-H765, F776-F779, W786-Y793/F794, Y793-F794, W798-H845, F807-Y808, F809-F832, F868-F872, F870-F874-Y908-F912, F881-Y963, Y924-F926, F996-F1000-Y999
cation- π interaction	<6.0 Å	K116-W137, K175-W436, W217-R223, Y410-K414, Y506-R532, R895-W898-R901, Y1005-R1008

CH ₃ /CH- π interaction	2.65-3.01 Å	L132-W137, F165-L188, T141-W178, Y284-R288, Y295-P300, W377-L369, Y413-L433, W426-R451, L434-F473, F447-N480, L493-F531, A512-W525, S515- Y516, Y516-K603, F523-G652, A594-Y621, R624- W581, Y633-E637/G673, W651-G593, L639-W1055, W693-K694, F730-V736, F744-F748/P1014, Y745-L749, F760-R829, L778-F1013, R851-W994, F870-L975, W877-L971, Y981-I985
Lone pair- π interaction	3-3.7 Å	Y130-T134, E435-W436, N530-F531, N741-F1013, M911-F912, F931-C940, Y963-T967

Table S7. Tertiary noncovalent interactions along the PIP₂-dependent gating pathway from D31 to Q1074 in each subunit of ligand-free, fully-swapped, closed pmTRPM8 in cell vesicles at pH 7.4 and 4 °C (PDB ID, 9P7S).

Noncovalent interaction	Cut-off distance	Linked residues
Salt bridge	3.2-4 Å	K154-D392, R158-E393, E273-K274, K314-E278, R359-E364, D413-R414, D509-K587, K569-E611, E773/D793-R832, K1050-E1051
H-bond	<3.9 Å donor-H-acceptor <60°	K144-L241, R151-K386, R153-Y184, K154-G391, Q164-N199, R188-D189, K274-V309, N285-E426, L304-N308, K312-E374, G324-D328, T356-R359, K370-E374, N397-Q429, Y404-E436, S408-R414, E426-K459, R466-E573, L467-N471, R485-F522, Y488-A554, N491-Q562, N499-N597, Q553-W642, K565-E607, S568-Y612, E573-K1050, C578-E1046, S586-D656, K587-S591, K590-E613/A654, D598-A601, E613-Q658, E622-K1056, Y624-N667, E632-K671, N646-E649, Q666-K985, N667-K671, S670-R988, T723-T1000, L740-Y826, D750-T756, K753-S810, C771-R775-V1006, D811-S814, T838-N842, Q851-Q987, K881-H884, D981-W984, K1056-K1060, S1065-R1071-Q1074, V1069-R1073
π - π interaction	2.65–6.5 Å	Y121-W169/Y275, W128-H129-W169/H250, W169-F171, F146-F156-Y182, F156-F295, Y177-Y242, Y286-F407, W368-W371, F401-Y404, W417-F438/W444, F438-W444/F468, F454-F478, Y488-F492/W558, F492-F497/W558, F497-W516, F556/W572-Y612, F556-W572-Y1053, F620-Y624/F659, W673/Y674-F726, W673-Y674, W673-F729/Y995, F729-Y995, F693-F722/W731, F703-Y717/F721, F721-F722-W731, F735-F1003, Y736-F829, F739-F743/F820, F743-F800/F822/Y826, F751-W815/F822, Y763-F800/F822, W777-F785/F798, W789-H835/F858, F800-F822, F859-F862, F864-W867-F871/Y953, F871-Y953, H884-W886-W888, F986-F990
cation- π interaction	<6.0 Å	Y121-R279, Y612-R615, F751-R807/R819
CH ₃ /CH- π interaction	2.65-3.01 Å	K107-W128, H129-V201, T132-W169, K144-Y177, F156-L179, K166-W427, H176-K181, Y182-V186, D328 /R351- F352 , H380-T409, F401-K405, Y404-L424, L425-F464, M453-F478, Y507-K594, K504-W516-E520, W572-R615, Y624-G664, L630-W1045, Y637-I1042, F668-Q672, F692-P694, K685/L695-F700, I696-Y718, Y736-L740, Y745-M749, R775-Y778, L788-F858, Y799-I821, F806-S817, P845-W984, M849-Y971, F860-L964, F862-V866, F890-I894, W984-K985, F989-I660/L669

Lone pair- π interaction	3-3.7 Å	Y121-T125, Y161-S165, F659-Q662, F767-C771, Q776-Y784
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Table S8. Tertiary noncovalent interactions along the PIP2-dependent gating pathway from D31 to Q1074 in each subunit of menthol-activated, semi-swapped, open pmTRPM8 in cell vesicles at pH 7.4 and 4 °C (PDB ID, 9ZEZ).

Noncovalent interaction	Cut-off distance	Linked residues
Salt bridge	3.2-4 Å	R43-E88, K83-D114, R110-D255, K181-E185, D235-K237, K312-E374, E335-K386 , E366-K370, K565-E607, K569-E611, K587-E653, E759-R807, D793-R832, R875-E896, R880-E883, E622-K1056
H-bond	<3.9 Å donor-H-acceptor <60°	D31-A33, R43-D114, D116-E118, S138-R269, V139-R269, T140-F295, K144-P240, R151-I385/K386, R153-Y182, K166-E426, R188-D189, V186-N190, I211-R214-L217, Y231-L244, D245-N247, N256-T264, K267-Q271, S284-K289, Q297-V320, L382-K405, N397-Q429, N410-E411, D413/R414-Q420, N474-K477, N563-S605, D598-N600/A601, E613-Q662, V617-Q662, E632-K671, N646-E649, Q666-K985, N646-L648, F693-Y718, E773-N790/T794, R775-Y1010, Q776/D787-N790-D793, E754-R807, H809-S814, Q752-W815, K846-Y971, L850-N963, E883-R885, T838-W984
π - π interaction	2.65–6.5 Å	F35-F40, F99-Y231, W128-H250, F156-F295, Y177-Y242, W208-H259, Y286-F407, W368-W371, W417-W444, F438-W417/F444/F468, F454-F478, F464-F468, Y488-F492-F497-W516, Y488-W558-F492, F556-Y612, W572-Y612/Y1053, F620-F659, W673-F726/F729/Y995, W673-Y674-F726, F691-F692, F726-F729-Y995, F721-F722-F693/Y718/W731, F735-F1005, Y736-F739/F829/F1003, F739-F743/F829/F1003, F743-F800/F822/Y826/F829, F751-W815-Y816, Y763-F800/F822, F800-F822/F829, W777-Y778/Y784/F785, W789-H835, F858-F859, F864-W867-F871, F864-Y898, F986-F990-F989, F1005-F1008
cation- π interaction	<6.0 Å	R110-W208, F401-K405
CH ₃ /CH- π interaction	2.65-3.01 Å	K166-W427, Y182-V186, D245-H248, T249-H250, R351-F352, L360-W368, K305-W371, H380-L381, F401-L432, F438-N471, L484-F522, L487-W558, Y624-G664, Y624-E628, L583-F659-V665, G584-W642, W684-K685, T794-F798, P845-W984, W944-I945, Y953-M954
Lone pair- π interaction	3-3.7 Å	W558-Q562, D627-W1045