RADIO FREQUENCY EXPOSURE

LIMIT

According to FCC, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

EUT Specification

EUT	Computer
Model	TREK-570;TREK-570XXXXXXXXXXXXXX (where "X" may be any alphanumeric character , "-" or blank)
Frequency band (Operating)	☒ GSM 850MHz: 824.2MHz ~ 848.8MHz ☒ GSM 1900MHz: 1850.2MHz ~ 1909.8MHz ☒ WCDMA Band II: 1852.4MHz ~ 1907.6MHz ☒ WCDMA Band V: 826.4MHz ~ 846.6MHz ☒ LTE Band 2: 1852.5MHz ~ 1907.5MHz ☒ LTE Band 5: 826.5MHz ~ 846.5MHz ☒ LTE Band 25: 1852.5MHz ~ 1912.5MHz ☒ LTE Band 4: 1710.0MHz ~ 1755.0MHz ☒ LTE Band 13: 779.5MHz ~ 784.5MHz ☒ LTE Band 17: 706.5MHz ~ 713.5MHz ☒ Bluetooth 2.1 + EDR / 4.0: 2402 ~ 2480 MHz 802.11b/g/n HT20: 2412MHz ~ 2462MHz 802.11n HT40: 2422MHz ~ 2452MHz UNII Band 1: 802.11a, 802.11an HT20 : 5180MHz ~ 5240MHz 802.11an HT40 : 5190MHz ~ 5230MHz UNII Band 2A: 802.11a, 802.11an HT20 : 5260MHz ~ 5320MHz 802.11an HT40 : 5270MHz ~ 5310MHz UNII Band 2C: 802.11a, 802.11an HT20 : 5500MHz ~ 5700MHz 802.11an HT40 : 5510MHz ~ 5670MHz UNII Band 3: 802.11a, 802.11an HT20 : 5745MHz ~ 5825MHz 802.11an HT40 : 5755MHz ~ 5795MHz ☐ Others
Device category	☐ Portable (<20cm separation) ☒ Mobile (>20cm separation) ☐ Others
Exposure classification	☐ Occupational/Controlled exposure (S = 5mW/cm^2) ☒ General Population/Uncontrolled exposure (S=1mW/cm^2)

Antenna Specification	GSM 850:	Antenna Gain :	2.88 dBi	(Numeric gain 1.94)
	GSM 1900:	Antenna Gain :	5.26 dBi	(Numeric gain 3.36)
	WCDMA Band II	Antenna Gain :	5.26 dBi	(Numeric gain 3.36)
	WCDMA Band V	Antenna Gain :	2.88 dBi	(Numeric gain 1.94)
	LTE Band 2:	Antenna Gain :	5.26 dBi	(Numeric gain 3.36)
	LTE Band 5:	Antenna Gain :	2.88 dBi	(Numeric gain 1.94)
	LTE Band 25:	Antenna Gain :	5.26 dBi	(Numeric gain 3.36)
	LTE Band 4:	Antenna Gain :	5.26 dBi	(Numeric gain 3.36)
	LTE Band 13:	Antenna Gain :	2.88 dBi	(Numeric gain 1.94)
	LTE Band 17:	Antenna Gain :	2.88 dBi	(Numeric gain 1.94)
	2.4GHz:			
	PIFA Antenna:	Antenna 1 Gain :	3.97 dBi	(Numeric gain 2.49)
	Dipole Antenna:	Antenna 1 Gain :	2.62 dBi	(Numeric gain 1.83)
	Dipole Antenna:	Antenna 1 Gain :	5.00 dBi	(Numeric gain 3.16)
	5GHz:			
	PIFA Antenna:	Antenna 1 Gain :	2.75 dBi	(Numeric gain 1.88)
	Dipole Antenna:	Antenna 1 Gain :	2.62 dBi	(Numeric gain 1.83)
	Dipole Antenna:	Antenna 2 Gain :	5.00 dBi	(Numeric gain 3.16)

Measurement Average output power

System	Power	
GSM850	29.53 dBm	(897.43 mW)
GSM1900	29.15 dBm	(822.24 mW)
WCDMA Band II	23.07 dBm	(202.77 mW)
WCDMA Band V	23.37 dBm	(217.27 mW)
LTE Band 2	29.07 dBm	(807.24 mW)
LTE Band 5	28.55 dBm	(716.14 mW)
LTE Band 25	28.99 dBm	(792.50 mW)
LTE Band 4	28.87 dBm	(770.90 mW)
LTE Band 13	28.62 dBm	(727.78 mW)
LTE Band 17	28.76 dBm	(751.62 mW)
1TX :		
2.4G		
IEEE 802.11b Mode	23.64 dBm	(231.21 mW)
IEEE 802.11g Mode	26.19 dBm	(415.91 mW)
IEEE 802.11gn HT 20 Mode	25.68 dBm	(369.83 mW)
IEEE 802.11gn HT 40 Mode	23.87 dBm	(243.78 mW)
Bluetooth 4.0	2.90 dBm	(1.95 mW)
Bluetooth 2.1 + EDR	5.91 dBm	(3.90 mW)
5G UNII Band 1		
IEEE 802.11a Mode	20.77 dBm	(119.40 mW)
IEEE 802.11an HT 20 Mode	20.66 dBm	(116.41 mW)
IEEE 802.11an HT 40 Mode	20.24 dBm	(105.68 mW)
5G UNII Band 2A		
IEEE 802.11a Mode	20.57 dBm	(114.02 mW)
IEEE 802.11an HT 20 Mode	20.26 dBm	(106.17 mW)
IEEE 802.11an HT 40 Mode	19.23 dBm	(83.75 mW)
5G UNII Band 2C		
IEEE 802.11a Mode	19.36 dBm	(86.30 mW)
IEEE 802.11an HT 20 Mode	19.30 dBm	(85.11 mW)
IEEE 802.11an HT 40 Mode	18.32 dBm	(67.92 mW)
5G UNII Band 3		
IEEE 802.11a Mode	18.32 dBm	(67.92 mW)
IEEE 802.11an HT 20 Mode	18.36 dBm	(68.55 mW)
IEEE 802.11an HT 40 Mode	18.35 dBm	(68.39 mW)

Measurement Average output power	

System	Power	
2TX :		
2.4G		
IEEE 802.11b Mode	18.72 dBm	(74.47 mW)
IEEE 802.11g Mode	25.98 dBm	(396.28 mW)
IEEE 802.11gn HT 20 Mode	26.60 dBm	(457.09 mW)
IEEE 802.11gn HT 40 Mode	21.22 dBm	(132.43 mW)
Bluetooth 4.0	2.90 dBm	(1.95 mW)
Bluetooth 2.1 + EDR	5.91 dBm	(3.90 mW)
5G UNII Band 1		
IEEE 802.11a Mode	19.95 dBm	(98.86 mW)
IEEE 802.11an HT 20 Mode	20.59 dBm	(114.55 mW)
IEEE 802.11an HT 40 Mode	21.67 dBm	(146.89 mW)
5G UNII Band 2A		
IEEE 802.11a Mode	20.09 dBm	(102.09 mW)
IEEE 802.11an HT 20 Mode	20.15 dBm	(103.51 mW)
IEEE 802.11an HT 40 Mode	21.77 dBm	(150.31 mW)
5G UNII Band 2C		
IEEE 802.11a Mode	19.89 dBm	(97.50 mW)
IEEE 802.11an HT 20 Mode	19.71 dBm	(93.54 mW)
IEEE 802.11an HT 40 Mode	20.81 dBm	(120.50 mW)
5G UNII Band 3		
IEEE 802.11a Mode	19.28 dBm	(84.72 mW)
IEEE 802.11an HT 20 Mode	17.91 dBm	(61.80 mW)
IEEE 802.11an HT 40 Mode	20.47 dBm	(111.43 mW)

Evaluation applied	☒ MPE Evaluation* ☐ SAR Evaluation ☐ N/A

Remark :*1. For more details, please refer to the User's manual of the EUT.*
2. The model TREK-570 was considered the main model for testing.

Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	2015/06/04	Initial Issue	ALL	Gloria Chang

TEST RESULTS

No non-compliance noted.

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

Maximum Permissible Exposure

Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

Where P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

GSM850 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
848.8	897.43	1.94	20	0.3465	0.566

GSM1900 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
1900	822.24	3.36	20	0.5498	1.000

WCDMA Band II mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
1900	202.27	3.36	20	0.1352	1.000

WCDMA Band V mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
850	217.27	1.94	20	0.0839	0.567

LTE Band 2 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
1850.76	807.24	3.36	20	0.5398	1.000

LTE Band 5 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
836.82	716.14	1.94	20	0.2765	0.558

LTE Band 25 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
1882.5	792.50	3.36	20	0.5299	1.000

LTE Band 4 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
1900	770.90	3.36	20	0.5155	1.000

LTE Band 13 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
1732.5	727.78	1.94	20	0.2810	1.000

LTE Band 17 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
712.1	751.62	1.94	20	0.2902	1.000

1TX :

IEEE 802.11b mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	23.21	3.16	20	0.0146	1.000

IEEE 802.11g mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	415.91	3.16	20	0.2615	1.000

IEEE 802.11gn HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	369.83	3.16	20	0.2326	1.000

IEEE 802.11gn HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	243.78	3.16	20	0.1533	1.000

Bluetooth 4.0 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2402	1.95	2.49	20	0.0010	1.000

Bluetooth 2.1 + EDR mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2402	3.90	2.49	20	0.0019	1.000

UNII Band 1:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5240	119.40	3.16	20	0.0751	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5220	116.41	3.16	20	0.0732	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5230	105.68	3.16	20	0.0665	1.000

UNII Band 2A:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5260	114.02	3.16	20	0.0717	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5260	106.17	3.16	20	0.0668	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5270	83.75	3.16	20	0.0527	1.000

UNII Band 2C:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5700	86.30	3.16	20	0.0543	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5700	85.11	3.16	20	0.0535	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5550	67.92	3.16	20	0.0427	1.000

UNII Band 3:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5745	67.92	3.16	20	0.0427	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5745	68.55	3.16	20	0.0431	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5755	68.39	3.16	20	0.0430	1.000

2TX :

IEEE 802.11b mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	74.47	3.16	20	0.0468	1.000

IEEE 802.11g mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	396.28	3.16	20	0.2492	1.000

IEEE 802.11gn HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	457.09	3.16	20	0.2874	1.000

IEEE 802.11gn HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2437	132.43	3.16	20	0.0833	1.000

Bluetooth 4.0 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2402	1.95	2.49	20	0.0010	1.000

Bluetooth 2.1 + EDR mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
2402	3.90	2.49	20	0.0019	1.000

UNII Band 1:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5240	98.86	3.16	20	0.0622	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5220	114.55	3.16	20	0.0720	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5230	146.89	3.16	20	0.0924	1.000

UNII Band 2A:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5260	102.09	3.16	20	0.0642	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5260	103.51	3.16	20	0.0651	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5270	150.31	3.16	20	0.0945	1.000

UNII Band 2C:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5700	97.50	3.16	20	0.0613	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5700	93.54	3.16	20	0.0588	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5550	150.31	3.16	20	0.0945	1.000

UNII Band 3:

IEEE 802.11a mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5745	84.72	3.16	20	0.0533	1.000

IEEE 802.11an HT20 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5745	61.80	3.16	20	0.0389	1.000

IEEE 802.11an HT40 mode:

Frq.(MHz)	P (mW)	Gain (num.)	D (cm)	Power density in mW / cm^2	Limit (mW/cm^2)
5755	111.43	3.16	20	0.0701	1.000

Simultaneously MPE

Simultaneously MPE = MPE1/Limit1 + MPE2/Limit2 + MPE3/Limit3

2.4G + 5G + WWAN

Simultaneously MPE = 0.2874 + 0.0945 + 0.2947= 0.6766 mW/cm^2