

## RF EXPOSURE EVALUATION

### EUT Specification

<b>EUT</b>	PORTABLE COLOR-CHANGING WIRELESS SPEAKER
<b>Frequency band (Operating)</b>	<input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz <input checked="" type="checkbox"/> Others(Bluetooth: 2.402GHz ~ 2.480GHz)
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others ____
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	-3.08dBm(0.49mW)
<b>Antenna gain</b>	0dBi
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation

Limits for Maximum Permissible Exposure (MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm <sup>2</sup> )	Average Time
<b>(A) Limits for Occupational/Control Exposures</b>				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
<b>(B) Limits for General Population/Uncontrol Exposures</b>				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

## Friis transmission formula: $P_d = \frac{P_{out} * G}{4 * \pi * R^2}$

Where

$P_d$  = Power density in  $mW/cm^2$

$P_{out}$  = output power to antenna in Mw

$G$  = gain of antenna in linear scale

$\pi = 3.1416$

$R$  = distance between observation point and center of the radiator in cm

$P_d$  the limit of MPE,  $1mW/cm^2$ . If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

## Measurement Result

Channel	Channel Frequency (MHz)	Max Output power (dBm)	Tolerance	Max Output power (mW)	Power density at 20cm ( $mW/cm^2$ )	Power density Limits ( $mW/cm^2$ )
GFSK						
Low	2402.00	-4.95	$\pm 0.2$	0.33	$6.57e-5$	1
Middle	2441.00	-6.30	$\pm 0.2$	0.25	$4.97e-5$	1
High	2480.00	-7.96	$\pm 0.2$	0.17	$3.38e-5$	1
$\pi/4$ -DQPSK						
Low	2402.00	-3.31	$\pm 0.2$	0.49	$9.75e-5$	1
Middle	2441.00	-4.41	$\pm 0.2$	0.38	$7.56e-5$	1
High	2480.00	-6.30	$\pm 0.2$	0.25	$4.97e-5$	1
8DPSK						
Low	2402.00	-3.08	$\pm 0.2$	0.52	$1.03e-4$	1
Middle	2441.00	-4.38	$\pm 0.2$	0.38	$7.56e-5$	1
High	2480.00	-5.87	$\pm 0.2$	0.27	$5.37e-5$	1