

FCC RF Exposure description

FCC ID : A3LSSG5900

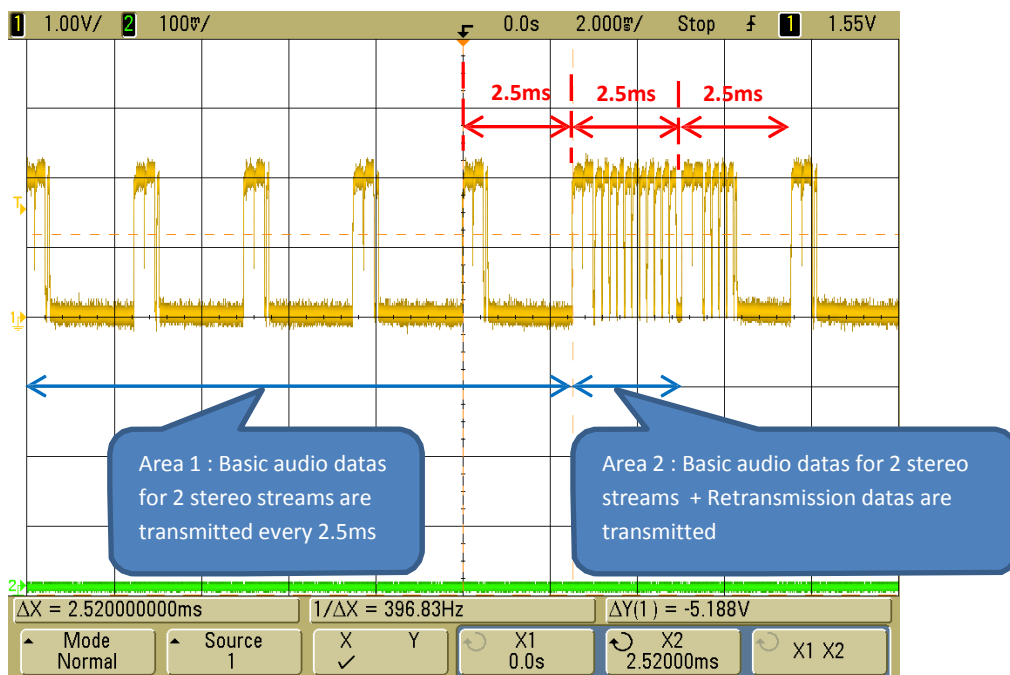
1. Applicable Standard

According to §1.1307(b)(5), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline. This Smart Touch Control can be used in a Portable device.

2. Audio Part

2.1. Description of Duty Cycle

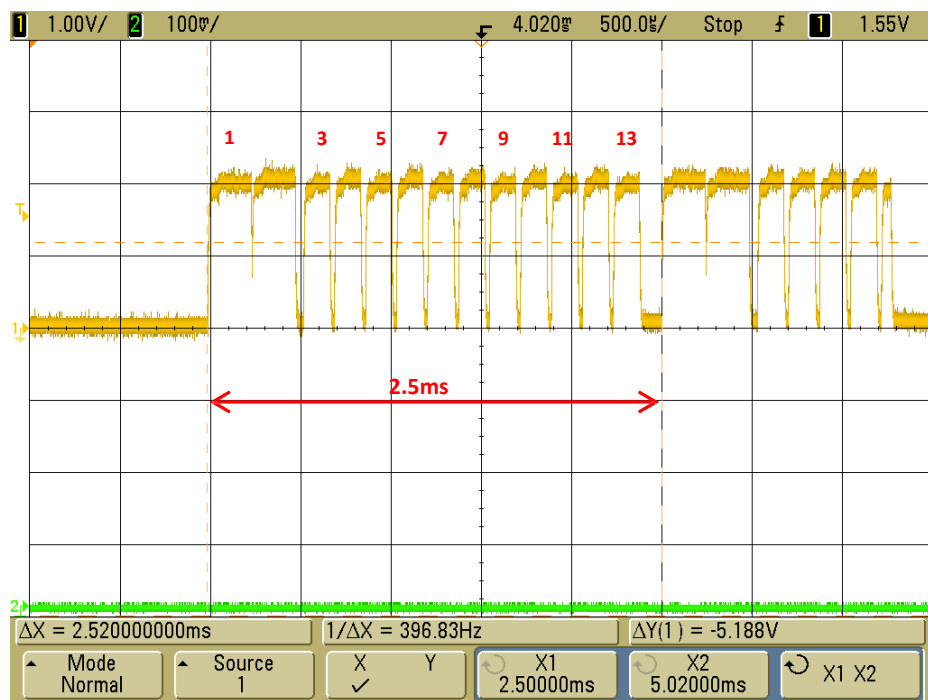
2.1.1. Companion device (DARR Transmission as a transmitter at TV side.)



When DARR works as a transmitter, DARR transmits every 2.5ms as shown above.

A application Samsung uses has 13 slots and dummy Tx for LTPC(Local Transmit Power Control)

The snap-shots of Area 2 is magnified as follows.



DARR transmitter is able to send more datas which will be loaded into 11 slots from index 3 to 13.

2.1.2. SSG-5900CR (MU) (DARR Transmission as a receiver (Samsung 3D glasses))

The DARR MU operates in three modes

- No_Sync
- In_Sync at Pairing mode
- In_Sync at Not Pairing mode.

In No-Sync mode,

MU is in listening state only.

In In_Sync at Pairing mode,

MU shall transmit a pairing data as well (every 500ms).

This is the mode in which MU performs **the most transmission** within a frame, as follows: (NACK means here Retransmission Request)

1	2	3	4	5	6	7	8	9	10	11	12	13	
NACK	NACK	NACK	NACK	NACK	NACK	NACK	NACK	NACK	NACK			Data	Dummy

(NACK means here a Retransmission request to a transmitter.)

The worst may fall in to this case “10 Retransmissions + 1 Data message + 1 Dummy Tx”. Time that will be taken for the transmission is

$$(10 * 21.45\mu s) + (112\mu s) + (24.9\mu s) = 351.4\mu s$$

(Please note that DARR needs 2 successful Rx in order to allow data message transmission)

So the theoretical maximum duty cycle per frame is $(351.4/2515) * 100\%$, which gives $< 14\%$.

In In Sync at Not Pairing mode.

MU shall not transmit any data whether paired or not.

This is the normal connection or not paired state. The worst transmission in this mode is as follows :

1	2	3	4	5	6	7	8	9	10	11	12	13	
NAck	NAck	NAck	NAck	NAck	NAck	NAck	NAck	NAck	NAck	Nack	NAck	NAck	Dummy

Time that will be taken for the transmission is $(13 * 21.45\mu s) + (0 \mu s) + (24.9\mu s) = 303.75\mu s$

MU(Samsung 3D glasses) goes to No_Sync mode once MU is NOT linked with any other transmitter.

So cases that get MU to run No-Sync mode and listen only are when

- MU fails to be paired and the Pairing window is closed.
- Connections is lost due to heavy interferences of the surrounding or No Transmitter.

No additional transmission is required to end the connection.

2.2. Maximum output power that is adjusted by duty factor

Frequency band (GHz)	¹⁾ Target power (dBm)	¹⁾ Tolerance (dB)	Target + Tolerance (dBm)	Target + Tolerance (mW)	Maximum duty factor (%)	²⁾ Max.power, including tune-up tolerance (mW)
2.4	11.3	2.0	13.3	21.4	14.0	3.0
5.2	9.2	2.0	11.2	13.2	14.0	1.8
5.8	9.1	2.0	11.1	12.9	14.0	1.8

Notes:

1) Target power and tolerance was declared by manufacturer.

2) Max.Power, Including tune-up tolerance (mW) = (Target +Tolerance)(mW) x Maximum duty factor(%)

2.3. SAR test exclusion thresholds

Frequency band (GHz)	¹⁾ Max.power, including tune-up tolerance (mW)	²⁾ Min. test separation distance (mm)	$\sqrt{f_{\text{(GHz)}}}$	³⁾ SAR test exclusion calculation result	⁴⁾ 1-g SAR test exclusion threshold	Result
2.4	3.0	5.0	1.5	0.9	3.0	Pass
5.2	1.8	5.0	2.3	0.8	3.0	Pass
5.8	1.8	5.0	2.4	0.9	3.0	Pass

Notes:

- 1) Max.Power, Including tune-up tolerance (mW) = (Target +Tolerance)(mW) x Maximum duty factor(%)
- 2) When the antenna in the device is at close proximity to user, the test separation distance is determined by the smallest distance between the outer surface of the device and the user.
- 3) SAR test exclusion calculation result =[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [$\sqrt{f_{\text{(GHz)}}$ }]
- 4) SAR Test Exclusion Thresholds at 5 mm Separation Distance were referred to Appendix A in 447498 D01 General RF Exposure Guidance v05r01. See a table for SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm in Appendix A on page 15

3. Bluetooth Part

3.1. Maximum output power and SAR test exclusion thresholds

Frequency band (GHz)	¹⁾ Target power (dBm)	¹⁾ Tolerance (dB)	²⁾ Max.power, including tune-up tolerance (mW)	³⁾ Min. test separation distance (mm)	$\sqrt{f_{\text{(GHz)}}}$	⁴⁾ SAR test exclusion calculation result	⁵⁾ 1-g SAR test exclusion threshold	Result
2.4	0.0	2.0	1.6	5.0	1.5	0.5	3.0	Pass

Notes:

- 1) Target power and tolerance was declared by manufacturer.
- 2) Max.Power, Including tune-up tolerance (mW) = $10^{[(\text{Target power (dBm)} + \text{Tolerance (dB)})/10]}$
- 3) When the antenna in the device is at close proximity to user, the test separation distance is determined by the smallest distance between the outer surface of the device and the user.

4) SAR test exclusion calculation result = $\frac{[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$

5) SAR Test Exclusion Thresholds at 5 mm Separation Distance were referred to Appendix A in 447498 D01 General RF Exposure Guidance v05r01. See a table for SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm in Appendix A on page 15

4. Consideration for the simultaneous SAR of Audio part and Bluetooth part

As the antennas are on different sides of the head, the antennas are spaced > 5 cm apart. Therefore, it is considered that there are no SAR influence concerns.

5. Conclusion

As the output power of SSG-5900CR is below SAR test exclusion thresholds, the SAR evaluation is not required.