

Description of Modification for Class II Permissive Change

We, Kyocera Corporation have been granted the Type Acceptance of our Single Mode IRIDIUM Handset (model: SS-66K) from Federal Communications Commission on December 15, 1998.

As Kyocera intends to modify its antenna, we would like to describe details of the modification.

As the shape of the antenna is modified, then the dimensions of the handset are also modified a little bit due to the influence of the modified antenna.

However, we do not modify other items as follows.

1. We do not modify all printed circuit boards including the radio frequency circuit block.
2. We do not modify all electronic circuits except the antenna section.
3. We do not modify the location, structure and layout of all printed circuit boards.
4. We do not modify internal mechanical structure including the shielding mechanism except the antenna section.
5. We do not modify the front case dimensions and also all man-machine interface components such as keys, indicators and a display on the front case.
6. We do not modify the battery case.
7. We do not modify the model number.

1. Reasons of the modification

We found the current model SS-66K had the following problem.

Even if the antenna is extended for use, its top can not stick out of user's head because of its short length. Therefore, if user's head obstructs the passage of the radio frequency wave from a satellite, the current model has sometimes a difficulty to receive the radio frequency wave.

We intend to make the antenna length longer in order to avoid the obstruction.

Since the radio frequency wave is circularly polarized wave, we also intend to change the antenna from Patch Type to Helical Type in order to receive the radio frequency wave more reliably.

2. Modification of the antenna

Please refer the following drawings concerning the modification of the antenna shape.

- Single Mode IRIDIUM Handset SS-66K External View (Current Model)
- Single Mode IRIDIUM Handset SS-66K External View (Modified Model)

We lengthen the extended antenna length from 126.5 mm to 263.3 mm.

The modified antenna is possible to turn to left or right up to 45 degrees at the middle of the antenna so that the antenna is held toward vertical position.

Table 1. Summary of the antenna characteristics

Items	Modified model	Current model
Antenna type	Helix	Patch
Antenna polarization	RHCP	RHCP
Antenna gain (max.)	0 dBi	0 dBi
Extended antenna length	263.3 mm	126.5 mm
Retracted antenna length	73 mm	45.5 mm
Antenna diameter (min.)	18 mm	10.8 mm

2.1. Antenna measurement data in an anechoic chamber

We have measured the maximum antenna gain at lower, middle and higher frequency regarding both current and modified model.

Then, we have confirmed both maximum antenna gain are less than 3 dBic, i.e., 0 dBi.

Table 2. Current Antenna for Single Mode IRIDIUM Handset (Model: SS-66K) July 28,1998

Frequency (GHz)	Retracted Antenna Max. Gain (dBic)			Extended Antenna Max. Gain (dBic)		
	X-Y axis	Y-Z axis	Z-X axis	X-Y axis	Y-Z axis	Z-X axis
1.618	-3.9	1.6	2.0	-4.4	1.9	1.8
1.623	-1.9	2.3	2.6	-3.1	2.5	2.4
1.627	-0.9	1.7	2.0	-2.3	2.4	2.1

Table 3. Modified Antenna for Single Mode IRIDIUM Handset (Model: SS-66K) March 10,1999

Frequency (GHz)	Retracted Antenna Max. Gain (dBic)			Extended Antenna Max. Gain (dBic)		
	X-Y axis	Y-Z axis	Z-X axis	X-Y axis	Y-Z axis	Z-X axis
1.618	-1.3	0.1	-2.1	-1.7	0.3	0.9
1.623	-0.3	1.1	-1.0	-0.4	1.4	1.5
1.627	1.2	2.3	0.6	1.1	2.8	1.6

3. Modification of the case dimensions

Please refer the following drawings concerning the modification of the case dimensions.

- Single Mode IRIDIUM Handset SS-66K External View (Current Model)
- Single Mode IRIDIUM Handset SS-66K External View (Modified Model)

Table 4. Difference of the case dimensions

	Modified model	Current model
The width of the rear part	59.7 mm	56.5 mm
The max. thickness of the handset	51.8 mm	49.9 mm

Because the antenna diameter is bigger, the antenna case that stores the antenna is also bigger. The width of the rear part and the maximum thickness of the handset is extended in order to adjust the surface to the antenna case because the antenna case touches the rear case. However, the size of the battery case is not changed.

The position of the coaxial antenna connector is the same as the current model.

Please compare the following drawings.

- Internal View of the current model
- Internal View of the modified model

4. Addition of an external antenna jack

When we modify the antenna section, we also add a jack with a mechanical RF switch for an external antenna between the internal antenna and the antenna connector. The internal antenna is directly connected with the antenna connector on the RF block in the current model. Please refer the Item 30 "External Ant. Jack and Cover" on the drawing of Single Mode Iridium Handset SS-66K External View (Modified Model).

The external antenna jack is located on the left side of the handset. When the external antenna is not used, a rubber cover protects the external antenna jack.

When a plug on the cable from the external antenna is inserted into the jack, RF signal line is mechanically switched from the internal antenna to the external antenna.

When the plug is pulled out from the jack, RF signal line is mechanically switched from the external antenna to the internal antenna.

