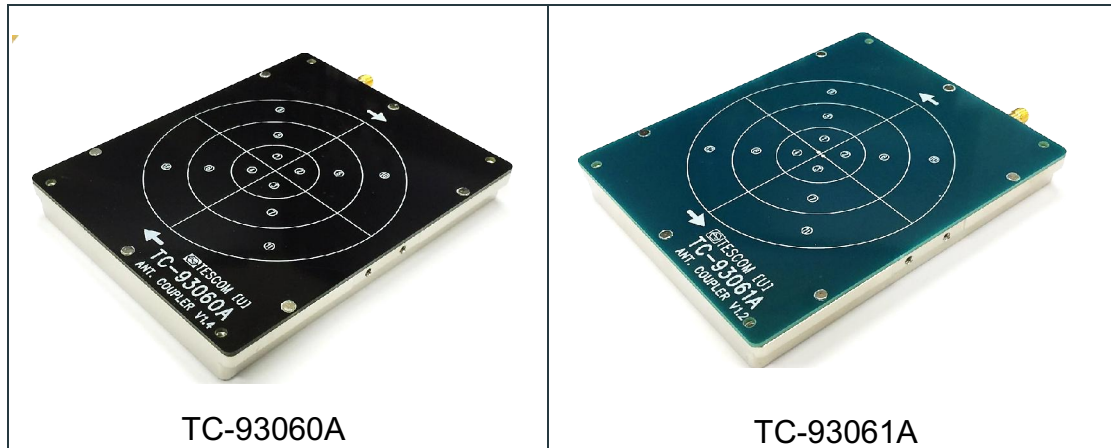


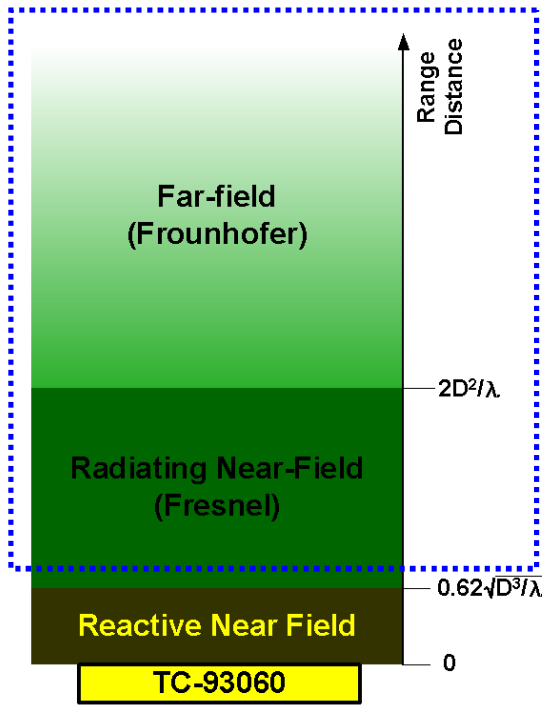
TC-93060A & TC-93061A Test Guideline (Proper Test Range)



Frequency Range	800 ~ 6000 MHz
RF Connector	SMA(f)
Dimension	106(W) x 130(D) x 15.6(H) mm
Weight	300 g
Terminal	50 ohm
VSWR	better than 1 : 2.2 (Typ 1.8)
Polarization	TC-93060A(LHCP), TC-93061A(RHCP)

1. Antenna Range

TC-93060A / TC-93061A Recommend test area



< Figure1. TC-93060A/93061A Proper Test Range >

1.1 Far-Field ($> 2D^2 / \lambda$), (D: Max antenna size, λ : wave length)

In this region, the beam pattern from the antenna is not related to the distance from the antenna. The beam pattern is observed same pattern in any point inside the area. The sinusoidal wave from antenna will be seen plane wave by DUT in this region.

1.2 Radiating Near-Field ($< 2D^2 / \lambda$)

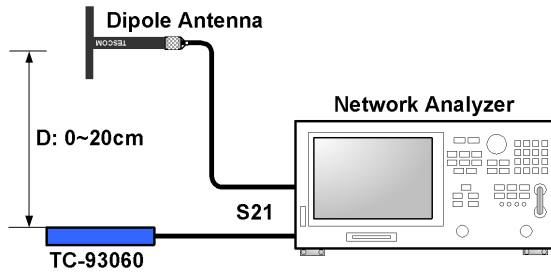
In this region, the average energy density remains fairly constant. Most mobile device is tested in this region because of size of shielding cell. The E-field distribution is a little more sensitive than Far-Field but the radiation test can be performed without many difficulties.

1.3 Reactive Near-Field ($< 0.62\sqrt{D^3 / \lambda}$)

The reactive near field region is the region very close to the antenna. In the reactive region, the energy decays very rapidly with distance. This region is also called as Ground Reflection Range. It is not recommended that TC-93060 is used in this region for radiation test inside shielding cell.

2. Path loss changes according to the Antenna Range

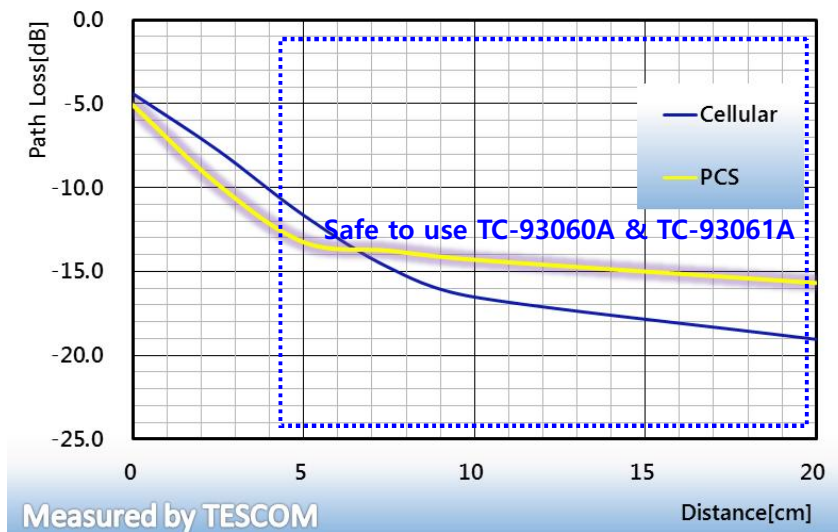
2.1 Test Setup



<Figure 2. Test Setup>

- Measure the path loss (S21) by changing the location of Dipole Antenna from 0~20 cm.
- Dipole Antenna: Cellular Band (900 MHz), PCS Band (1900 MHz)

2.2 Measured Result



<Figure 3. Path Loss – Distance >

- The continuity of path loss strays when the distance between dipole Antenna and TC-93060A is smaller than 5 cm.

3. Expected problems when DUT antenna places just on the TC-93060A or TC-93061A

- Characteristics change of the DUT Antenna
- The path loss will have much deviation depending on DUT location.
- Unwanted DUT faulty rate will be arisen because metal material is placed near the DUT.

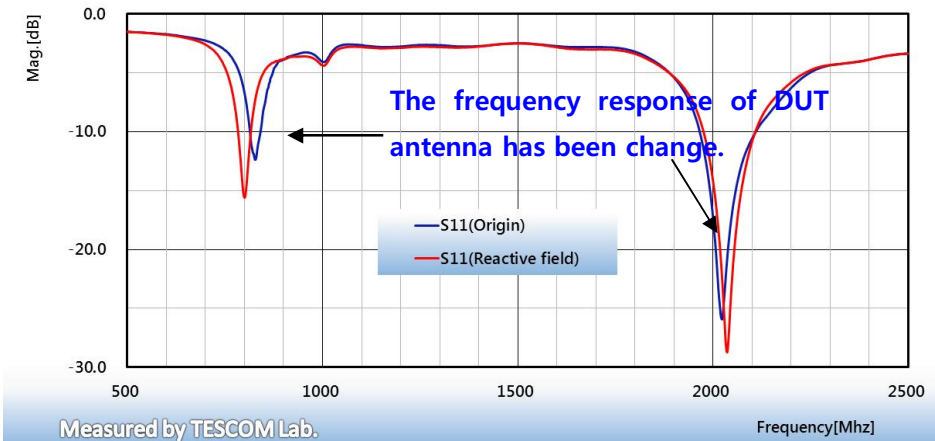
4. Simple example of problem

4.1 Test Setup

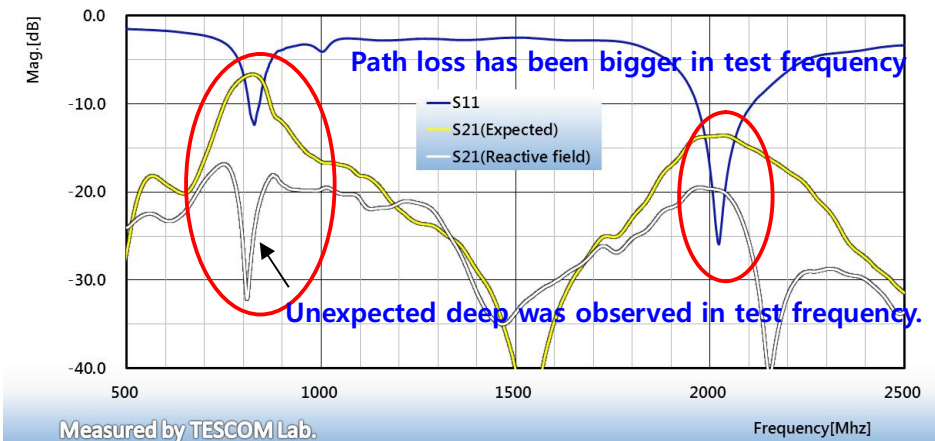


<Figure 4. Place a DUT on the Antenna Coupler- Reactive Field >

4.2 Test Result



<Figure 5. S11 change of DUT antenna in Reactive Field Test >



< Figure 6. S21 change in Reactive Field Test >