The Hat Creek Radio Observatory

VNA test results of the IF Splitter

Alexander Pollak & Marc Jacquart

SETI Institute
339 Bernardo Ave, Suite 200
Mountain View, CA 94043
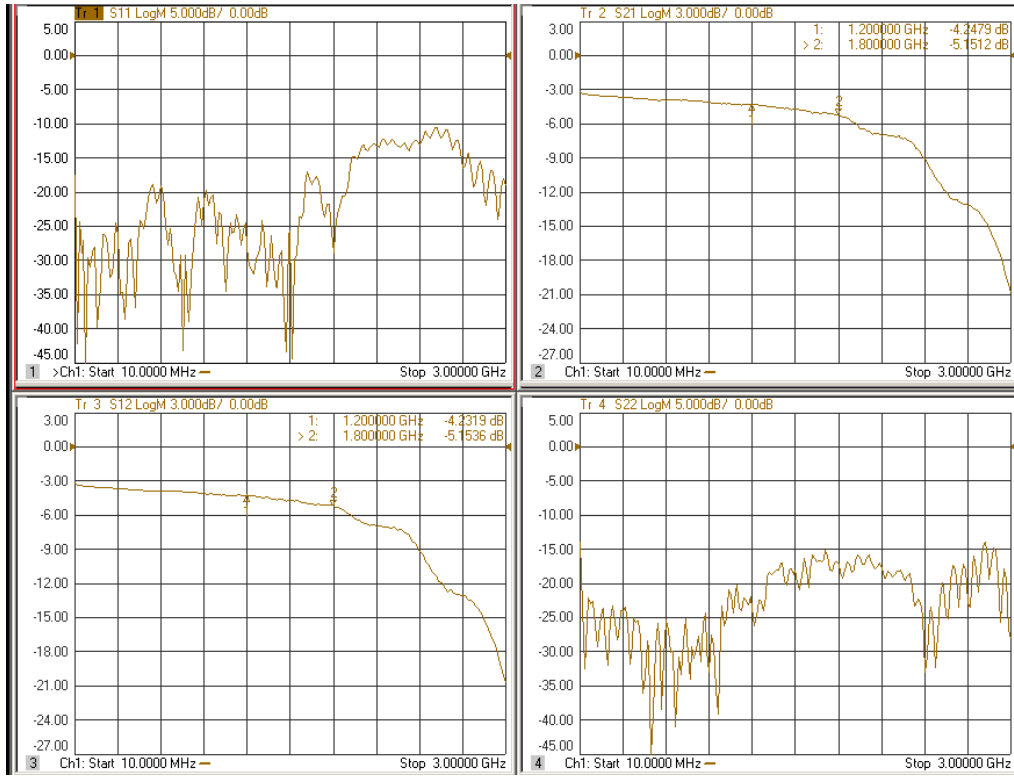Alexander.Pollak.87@gmail.com

April 10, 2024

Figure 1: Scattering matrix for channel 1A, polarization x and output 3dB1.
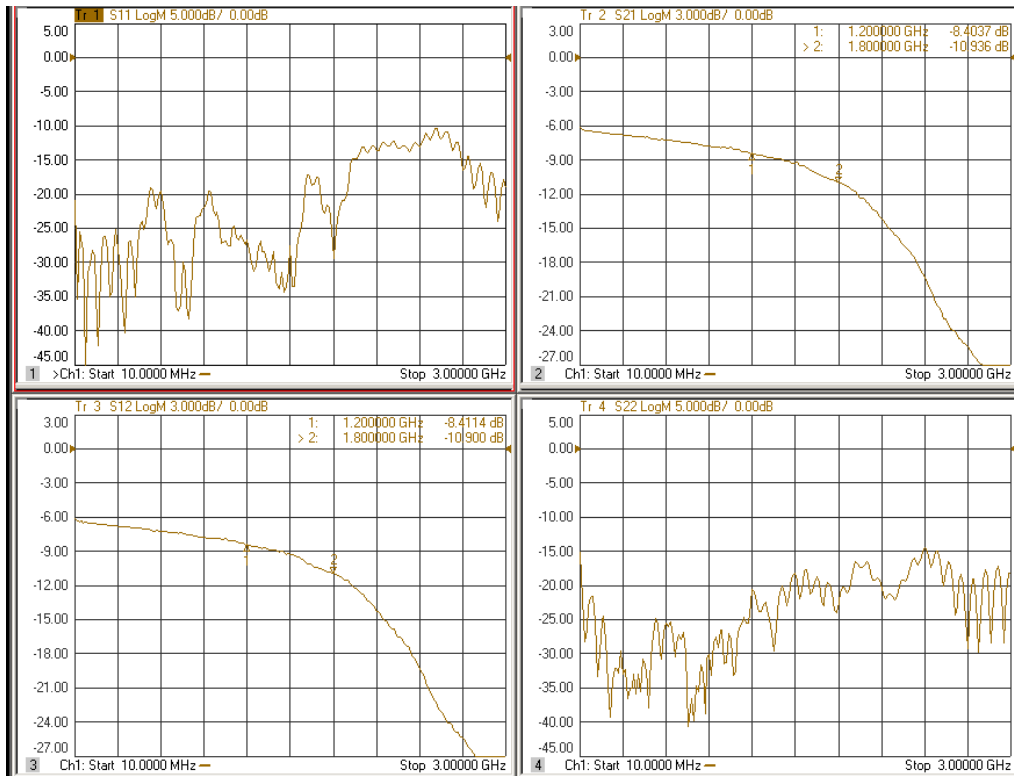

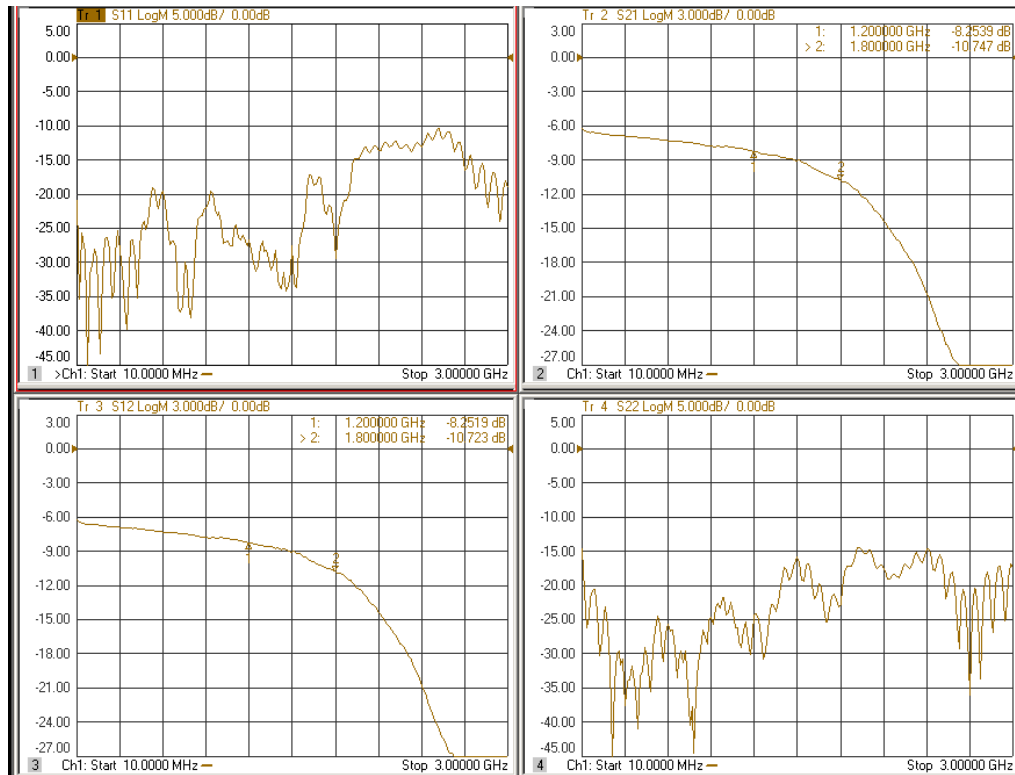Figure 2: Scattering matrix for channel 1A, polarization x and output 6dB2.

Figure 3: Scattering matrix for channel 1A, polarization x and output 6dB3.
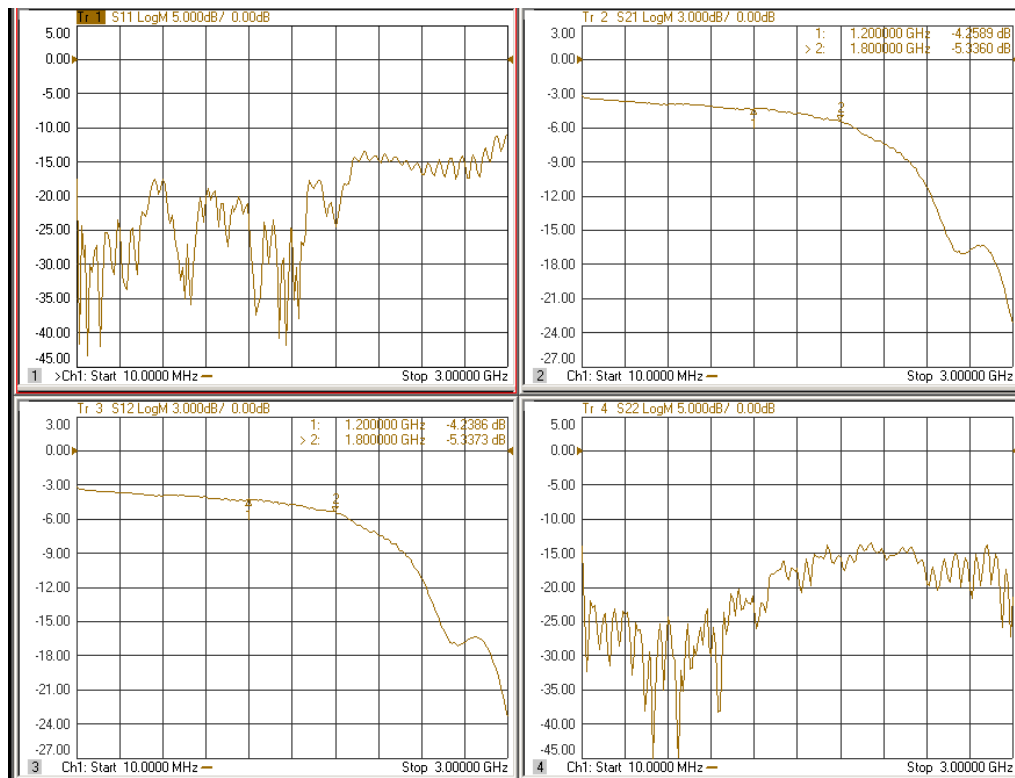

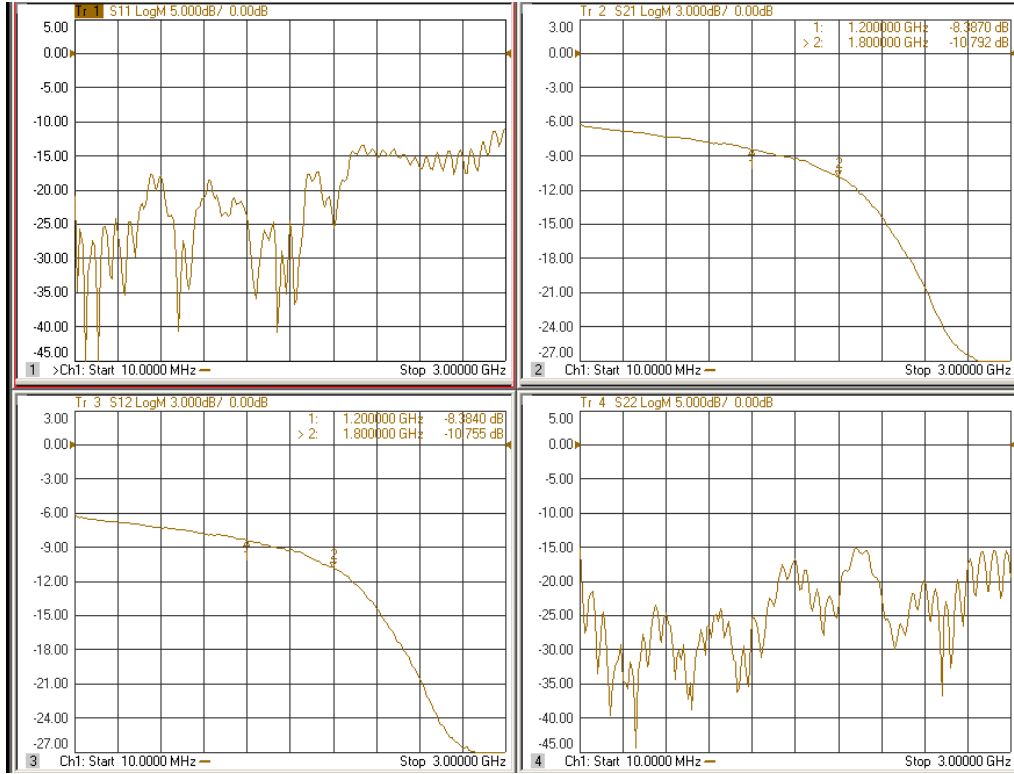Figure 4: Scattering matrix for channel 1A, polarization y and output 3dB1.

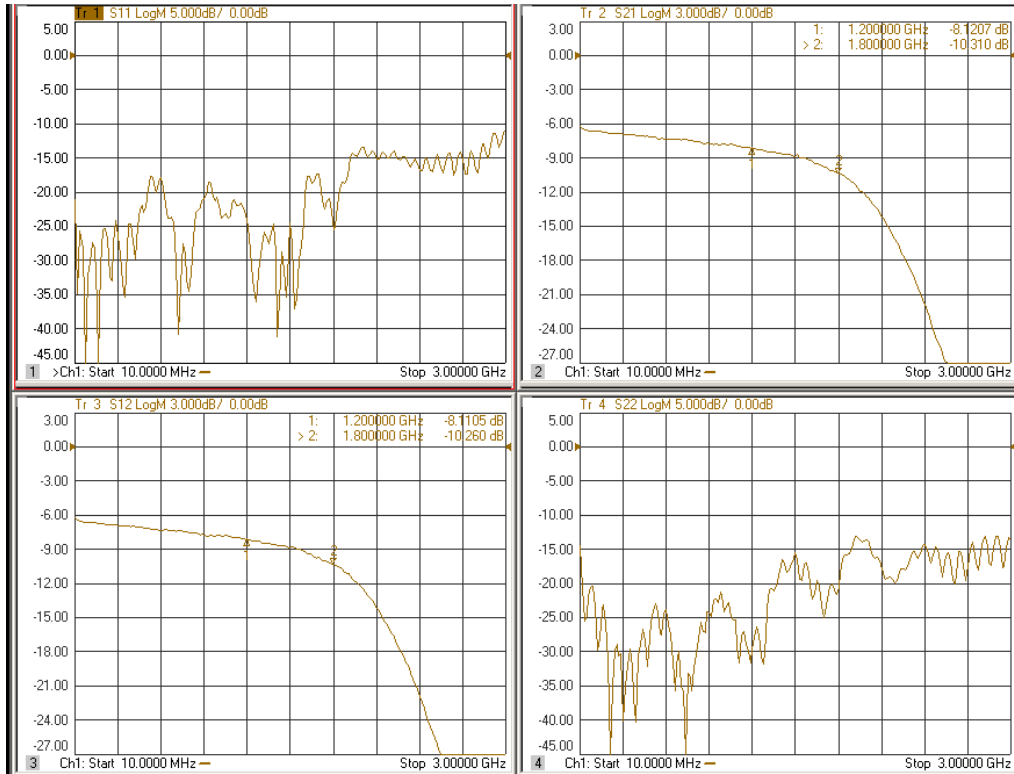Figure 5: Scattering matrix for channel 1A, polarization y and output 6dB2.

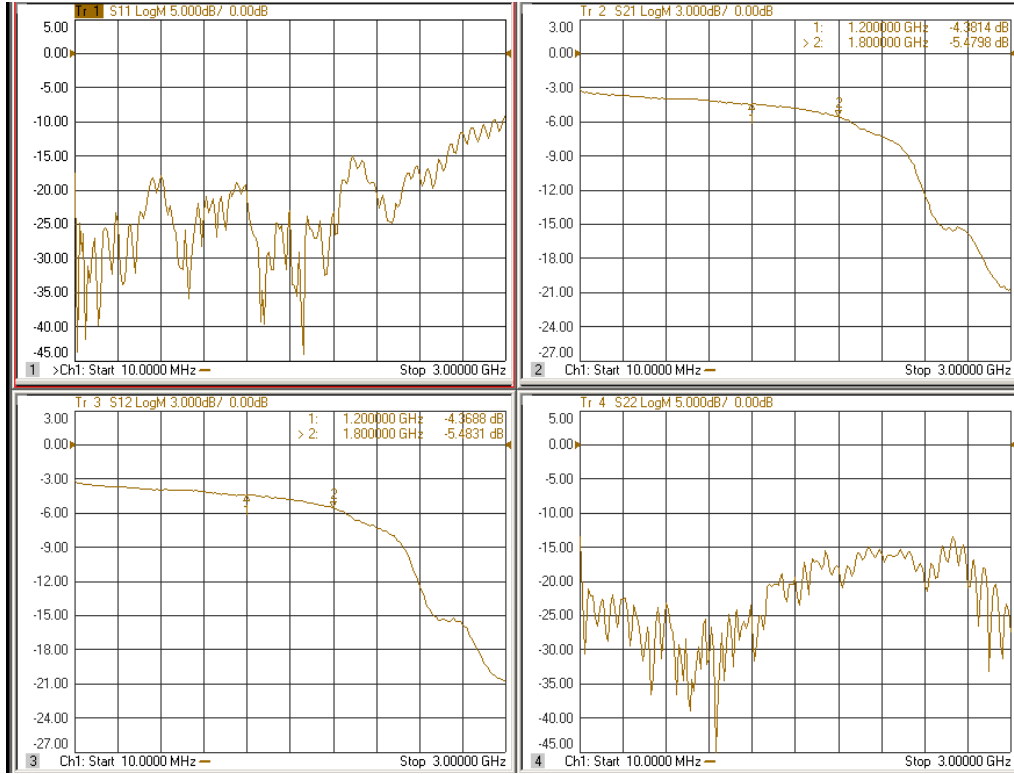Figure 6: Scattering matrix for channel 1A, polarization y and output 6dB3.

Figure 7: Scattering matrix for channel 1B, polarization x and output 3dB1.
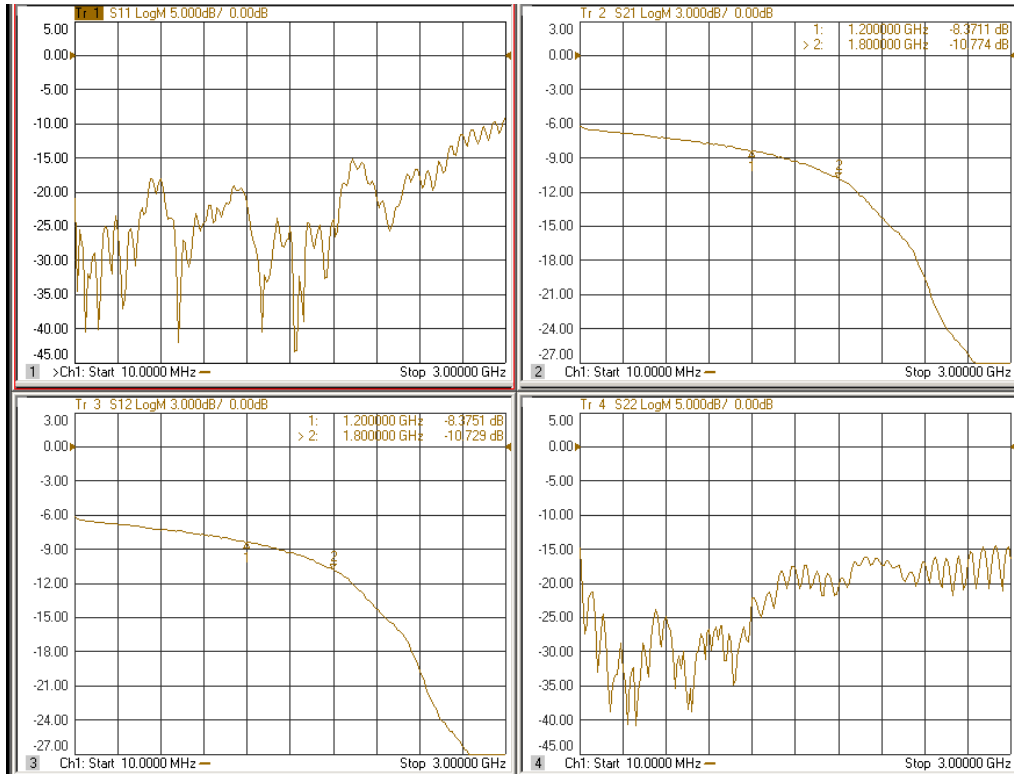

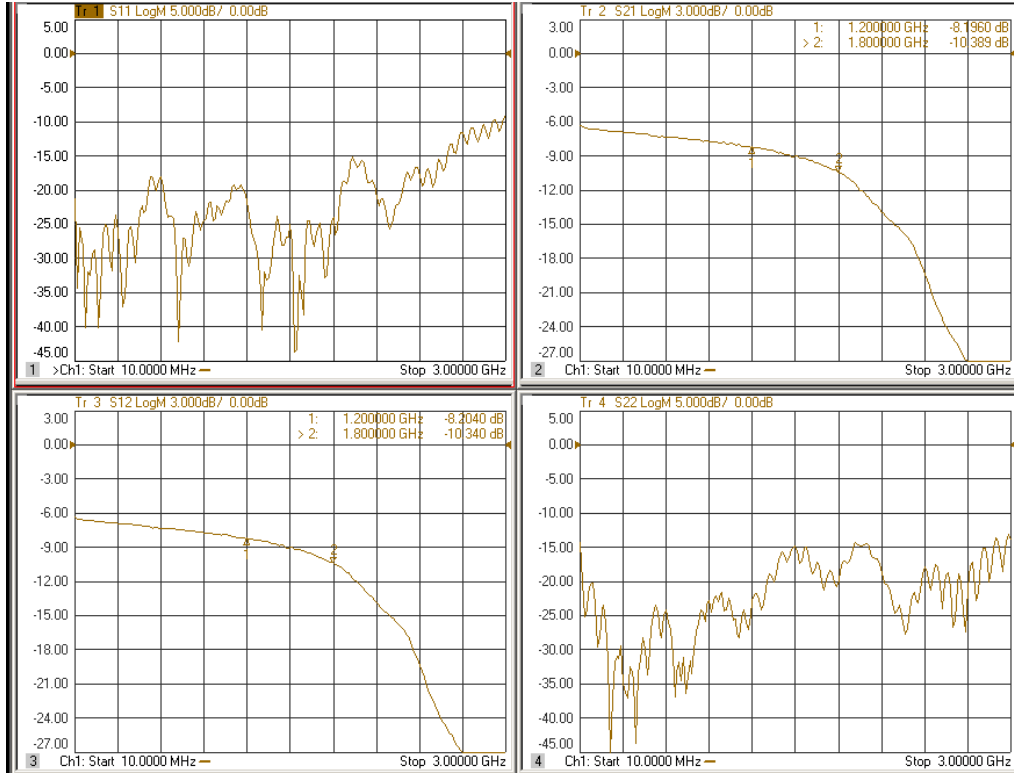Figure 8: Scattering matrix for channel 1B, polarization x and output 6dB2.

Figure 9: Scattering matrix for channel 1B, polarization x and output 6dB3.
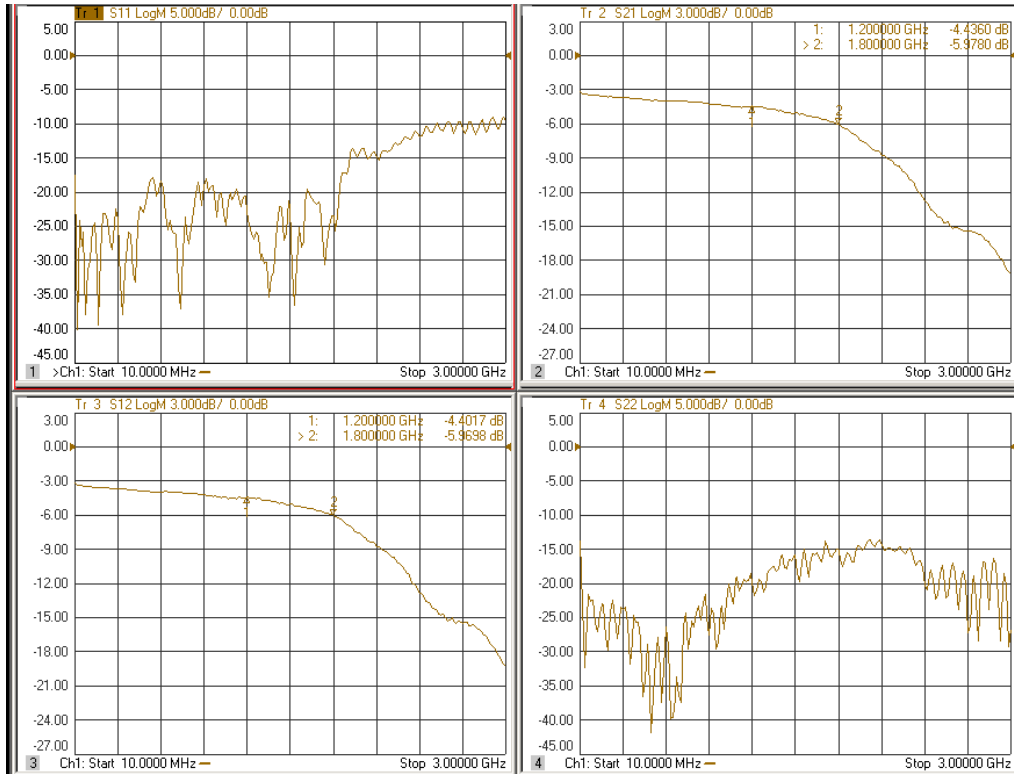

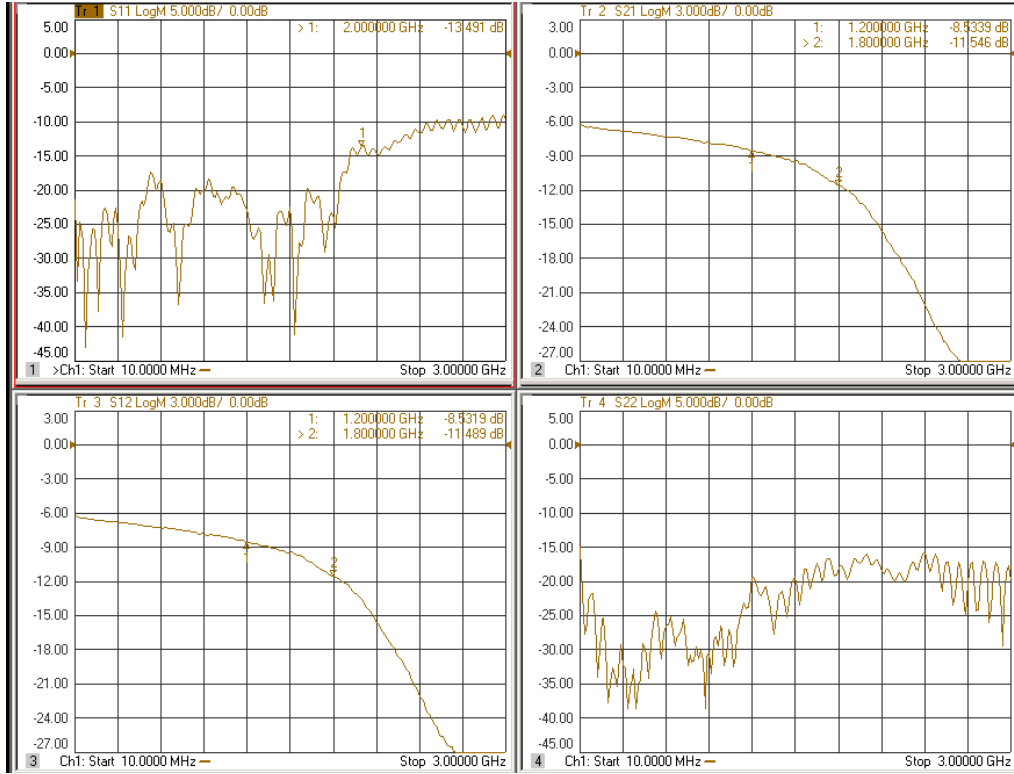Figure 10: Scattering matrix for channel 1B, polarization y and output 3dB1.

Figure 11: Scattering matrix for channel 1B, polarization y and output 6dB2.
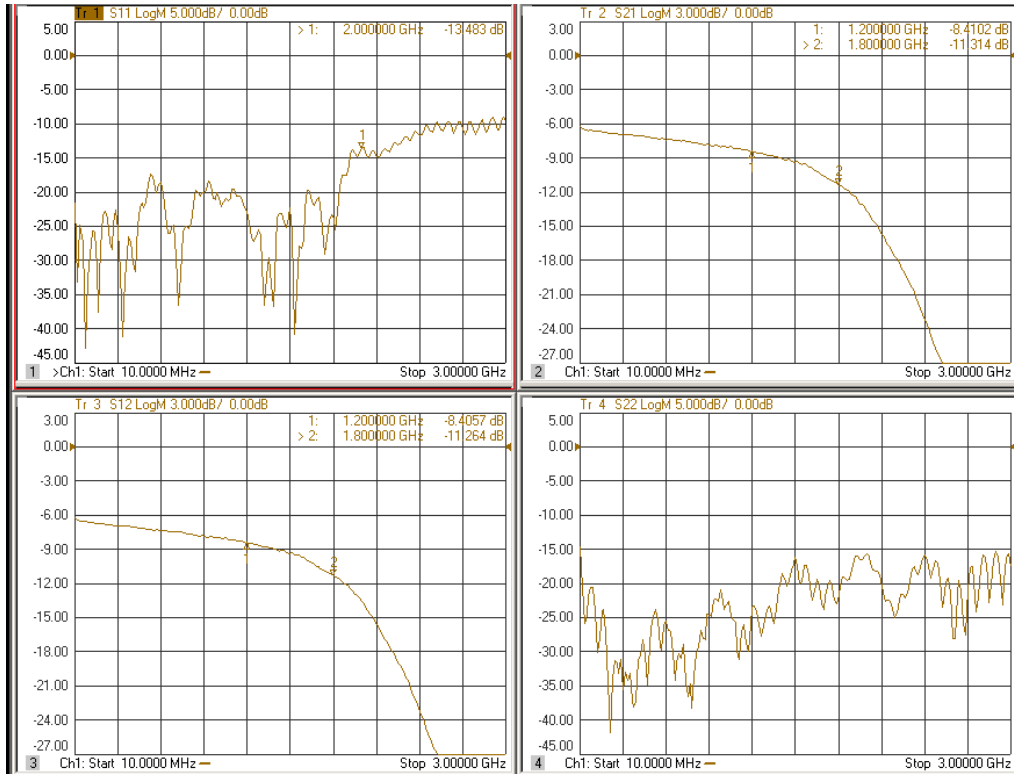

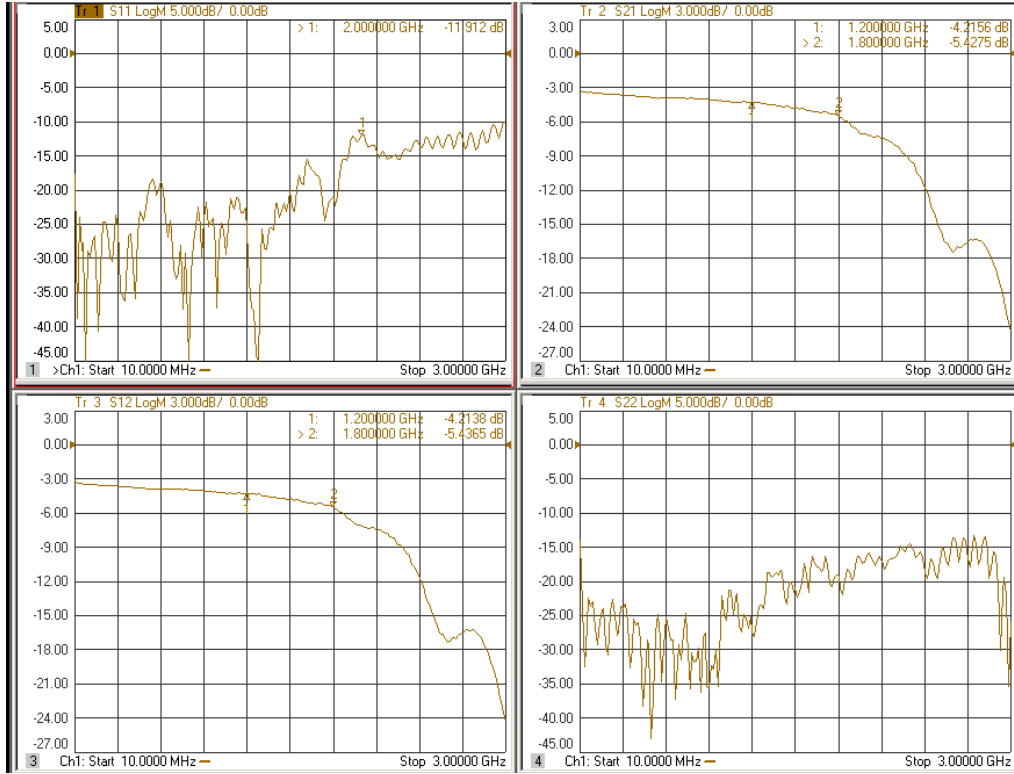Figure 12: Scattering matrix for channel 1B, polarization y and output 6dB3.

Figure 13: Scattering matrix for channel 1C, polarization x and output 3dB1.
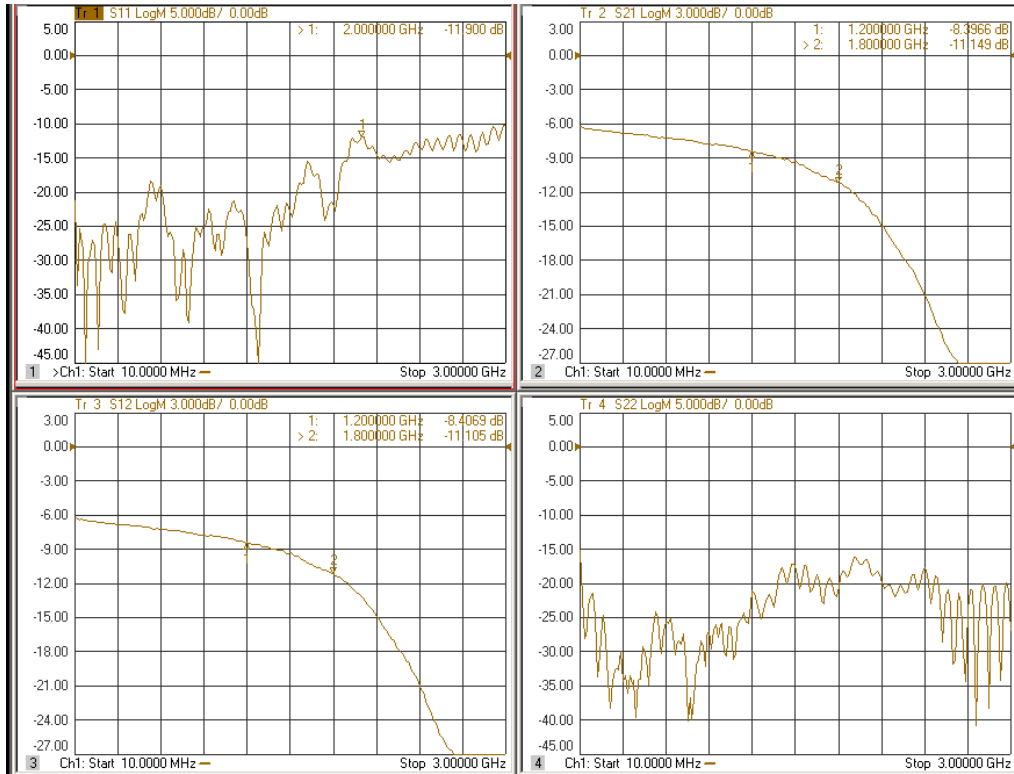

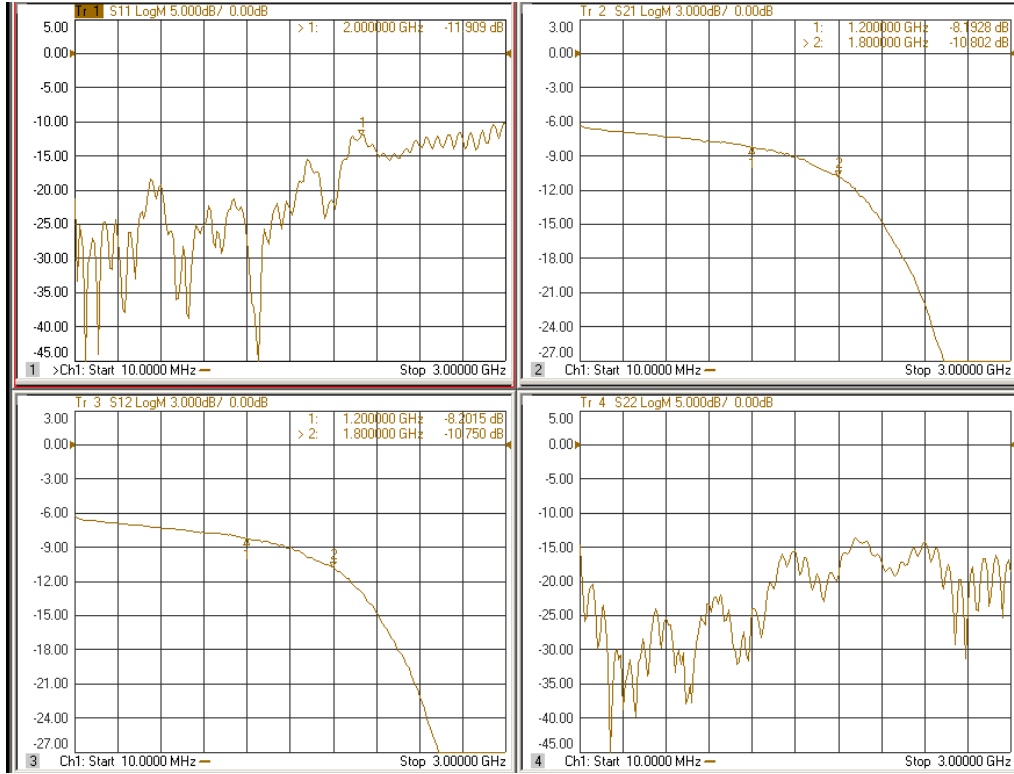Figure 14: Scattering matrix for channel 1C, polarization x and output 6dB2.

Figure 15: Scattering matrix for channel 1C, polarization x and output 6dB3.
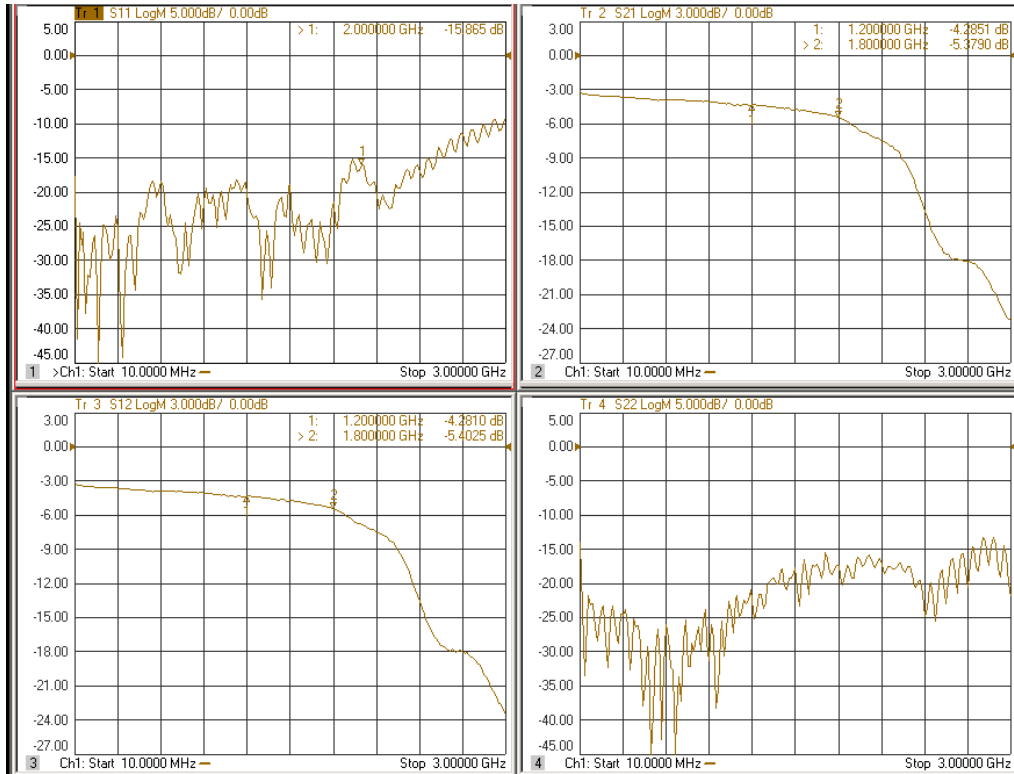

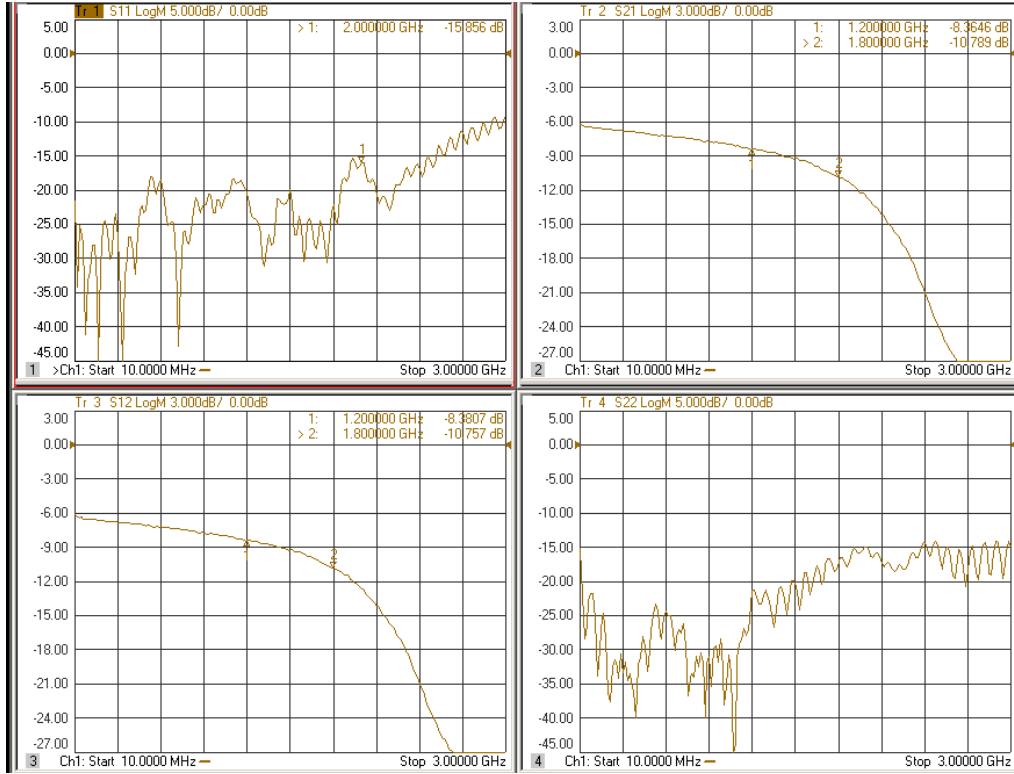Figure 16: Scattering matrix for channel 1C, polarization y and output 3dB1.

Figure 17: Scattering matrix for channel 1C, polarization y and output 6dB2.
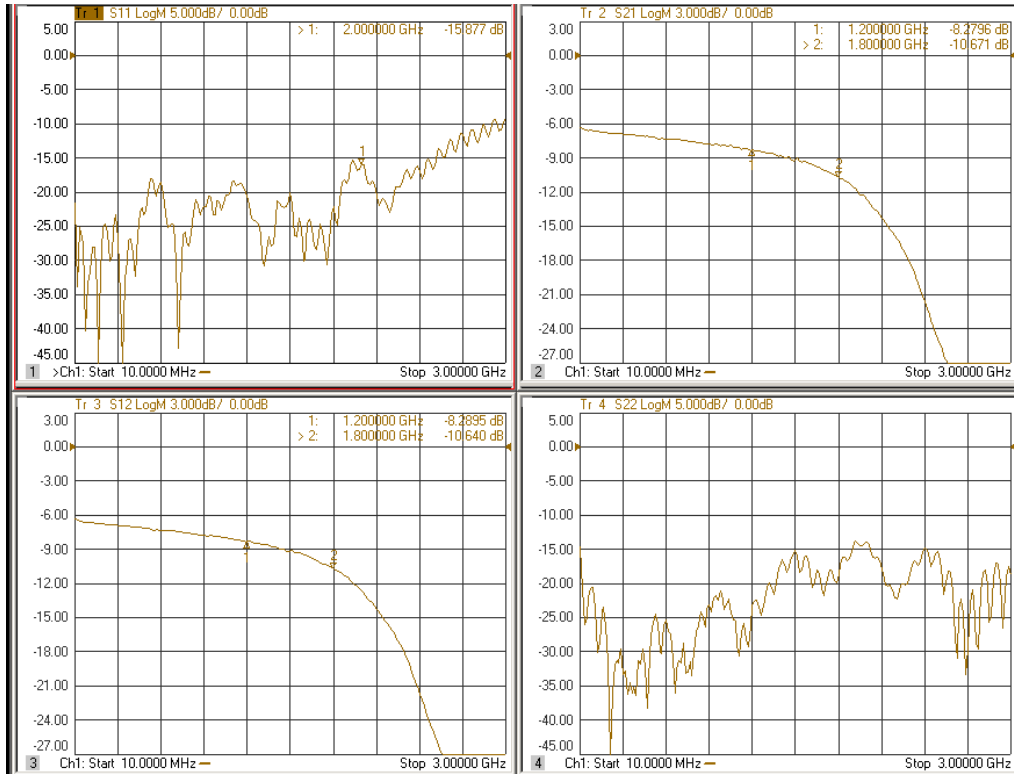

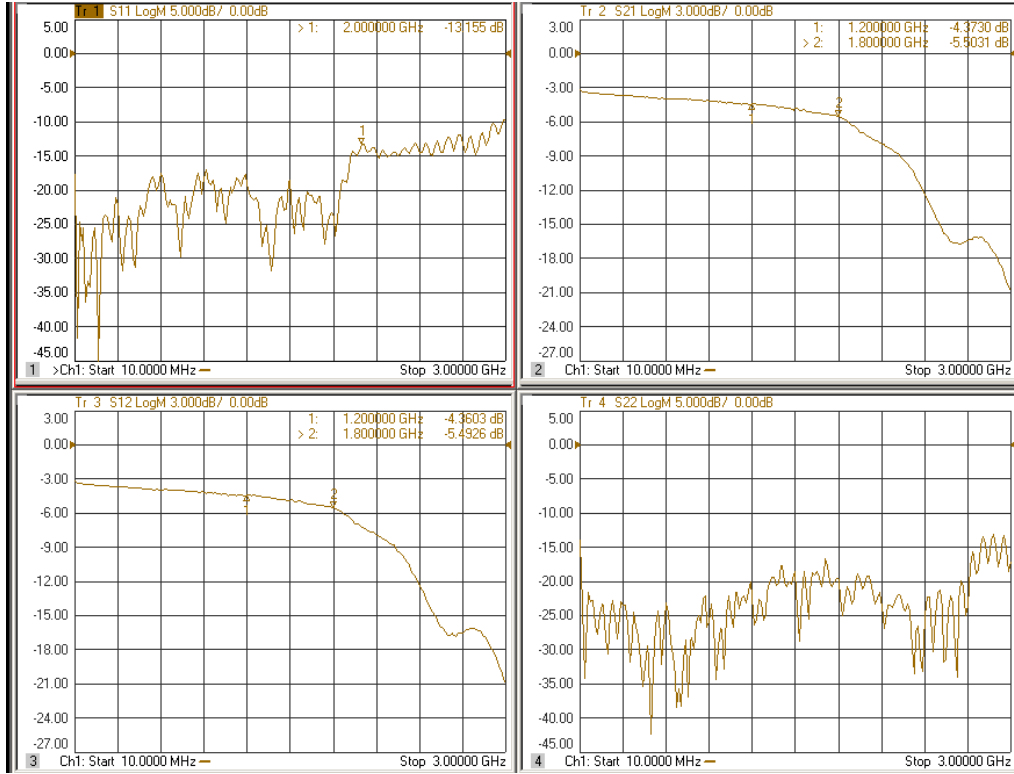Figure 18: Scattering matrix for channel 1C, polarization y and output 6dB3.

Figure 19: Scattering matrix for channel 1D, polarization x and output 3dB1.
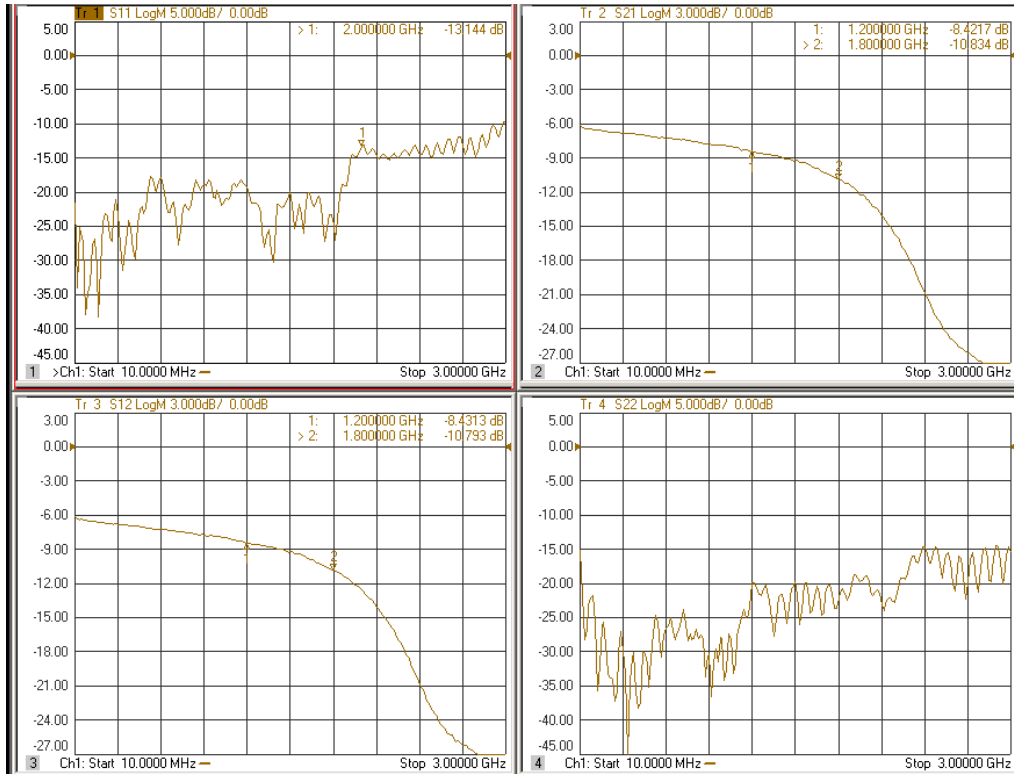

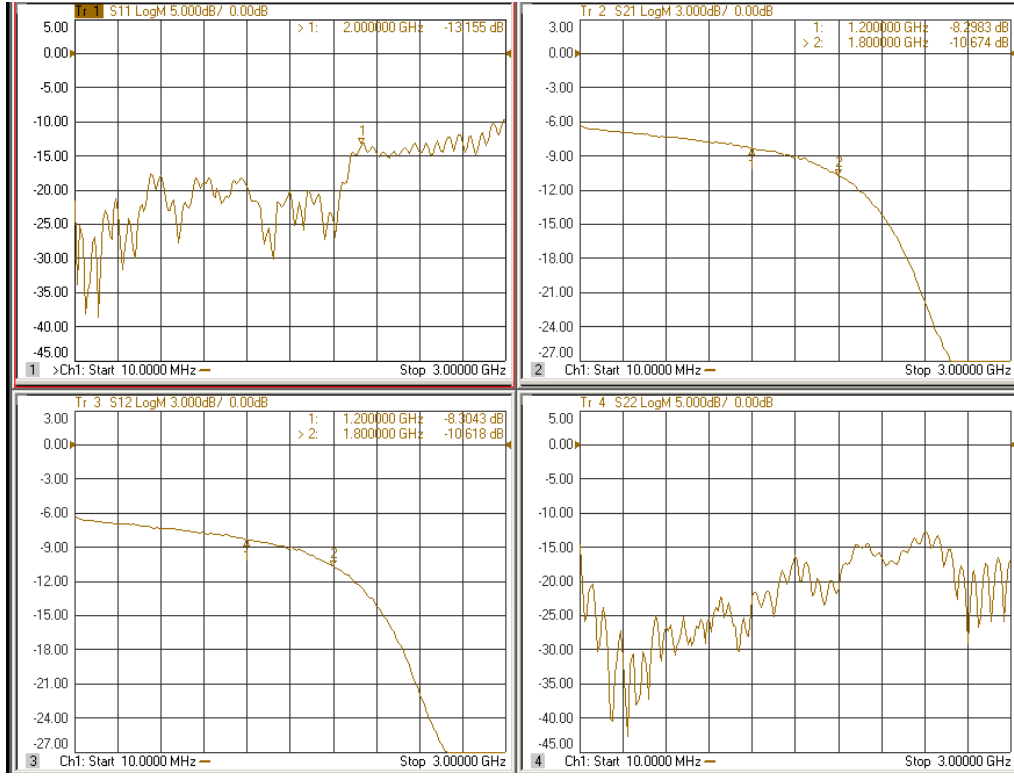Figure 20: Scattering matrix for channel 1D, polarization x and output 6dB2.

Figure 21: Scattering matrix for channel 1D, polarization x and output 6dB3.
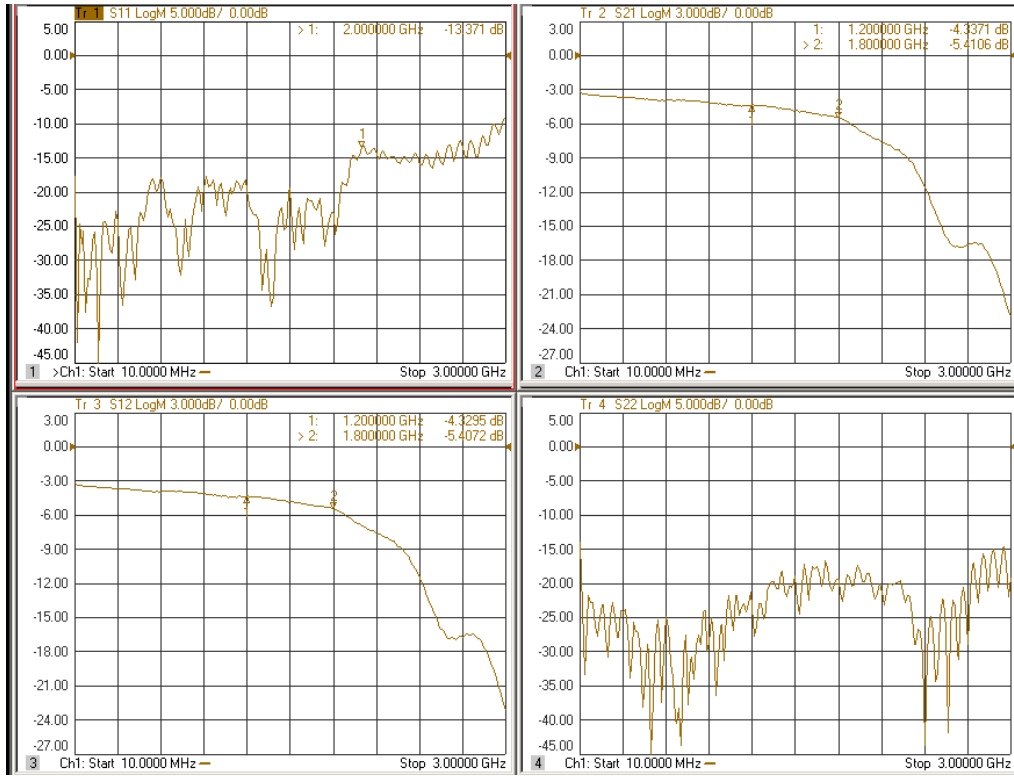

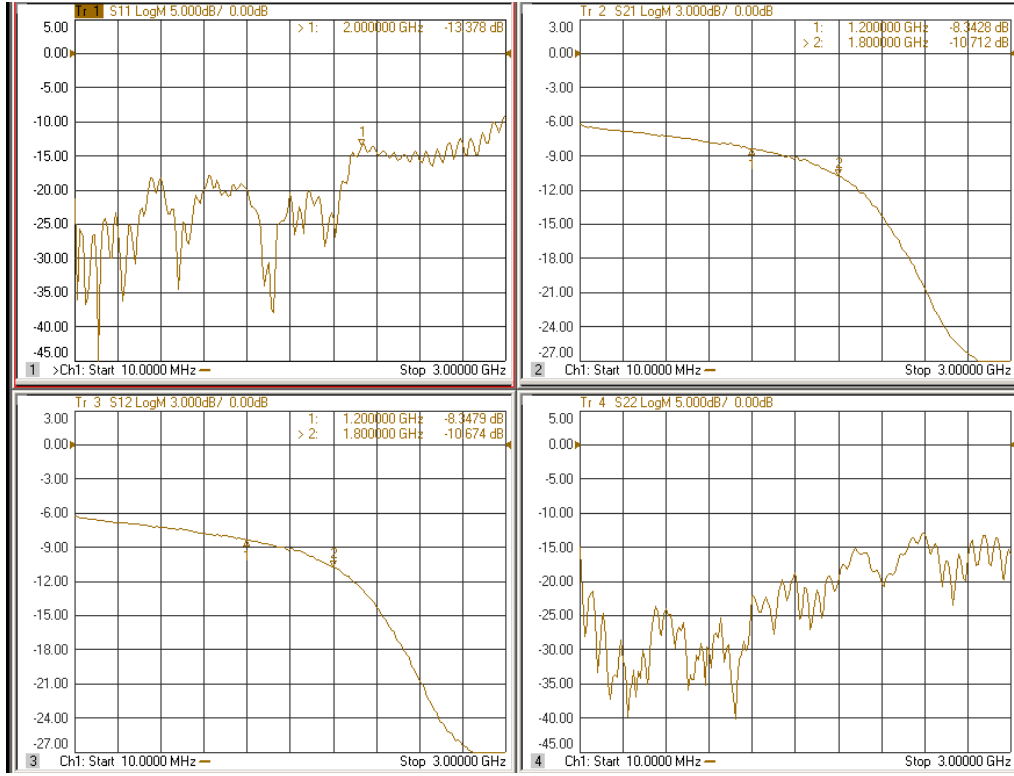Figure 22: Scattering matrix for channel 1D, polarization y and output 3dB1.

Figure 23: Scattering matrix for channel 1D, polarization y and output 6dB2.
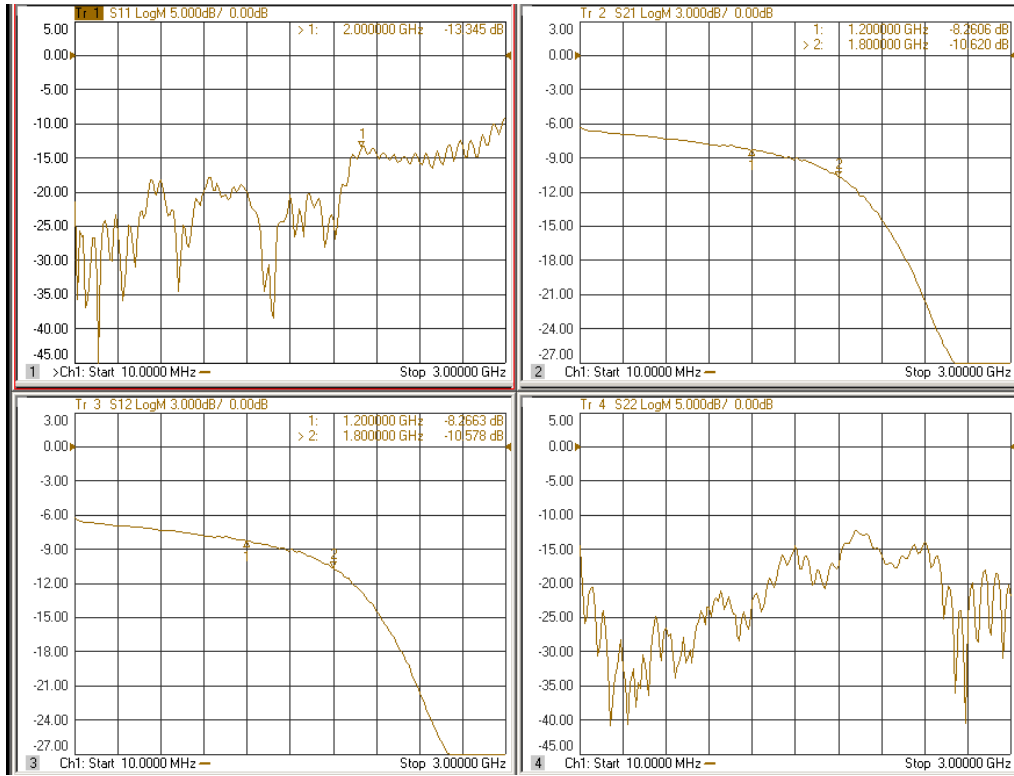
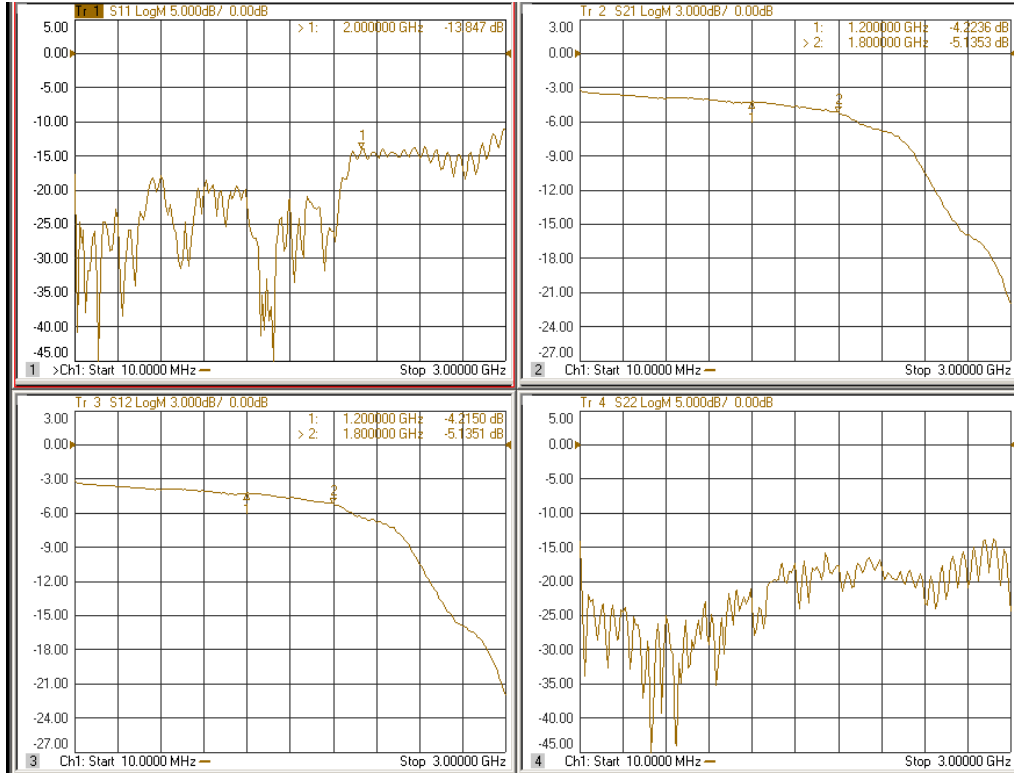Figure 24: Scattering matrix for channel 1D, polarization y and output 6dB3.

Figure 25: Scattering matrix for channel 1E, polarization x and output 3dB1.
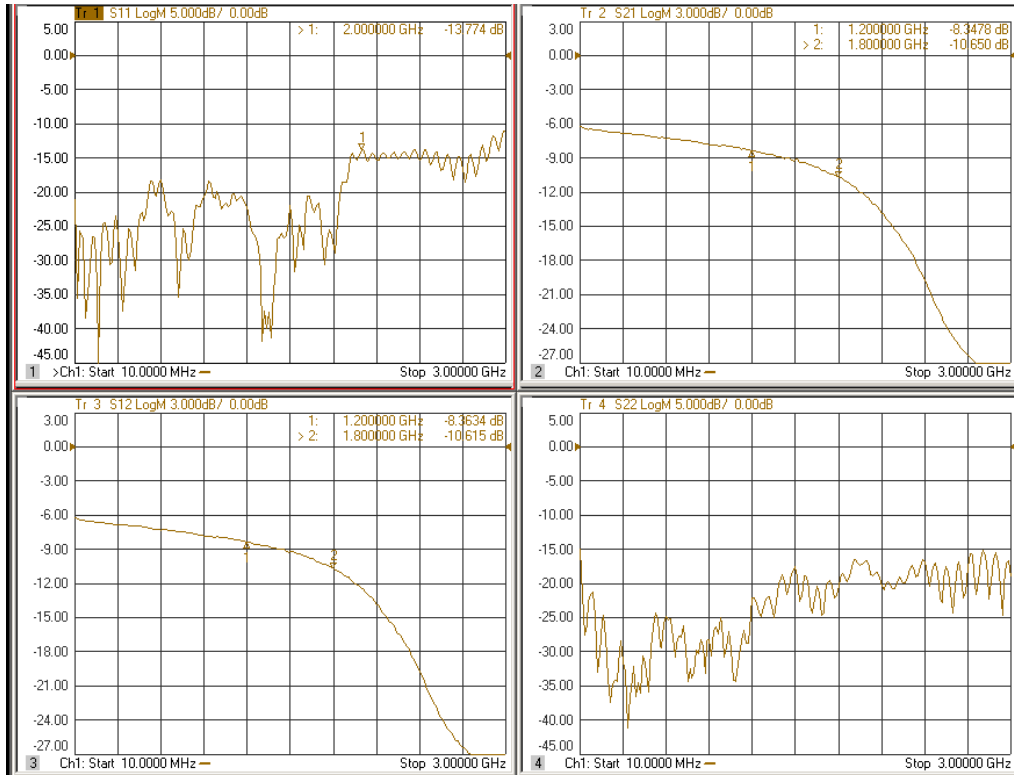

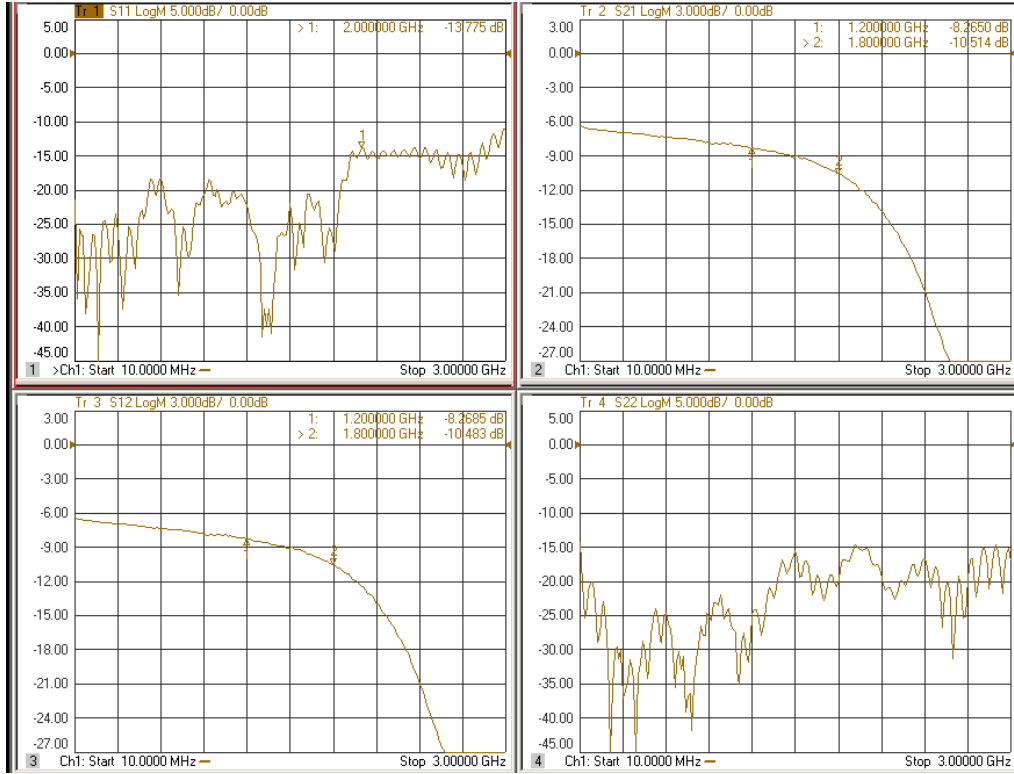Figure 26: Scattering matrix for channel 1E, polarization x and output 6dB2.

Figure 27: Scattering matrix for channel 1E, polarization x and output 6dB3.
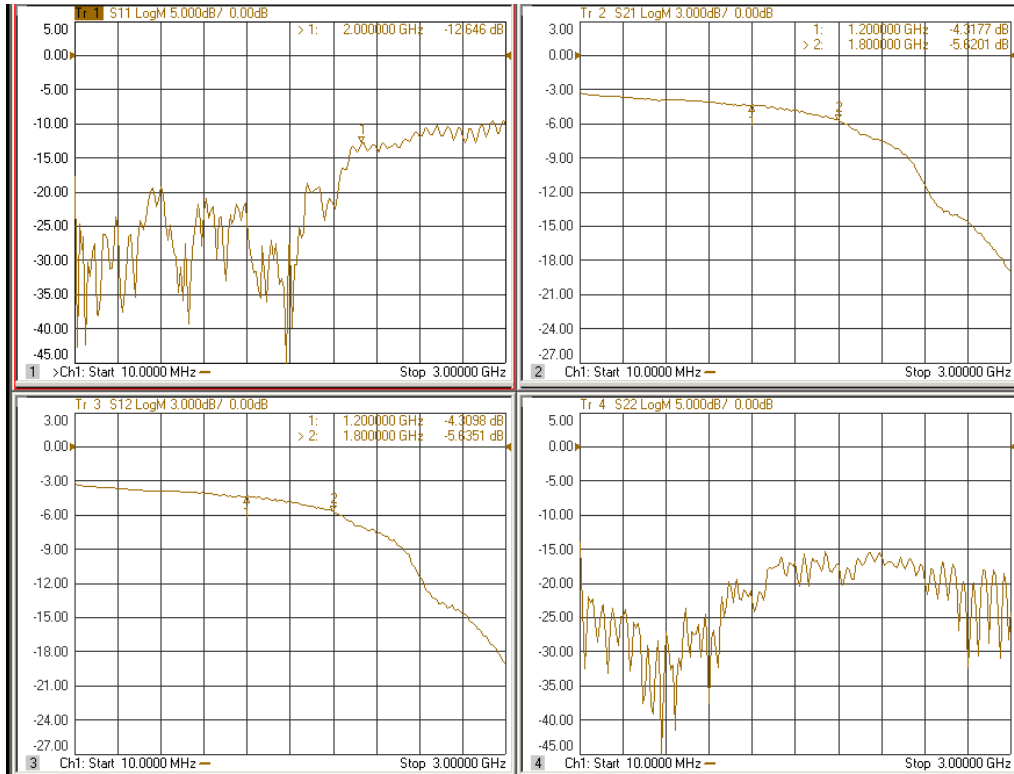

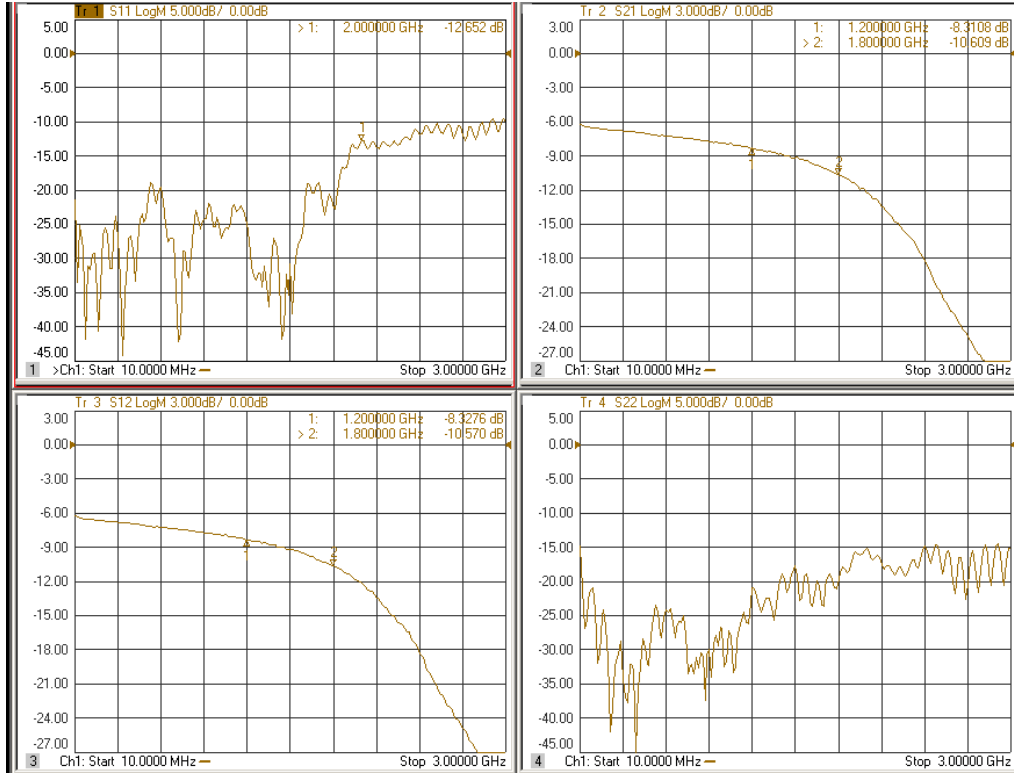Figure 28: Scattering matrix for channel 1E, polarization y and output 3dB1.

Figure 29: Scattering matrix for channel 1E, polarization y and output 6dB2.
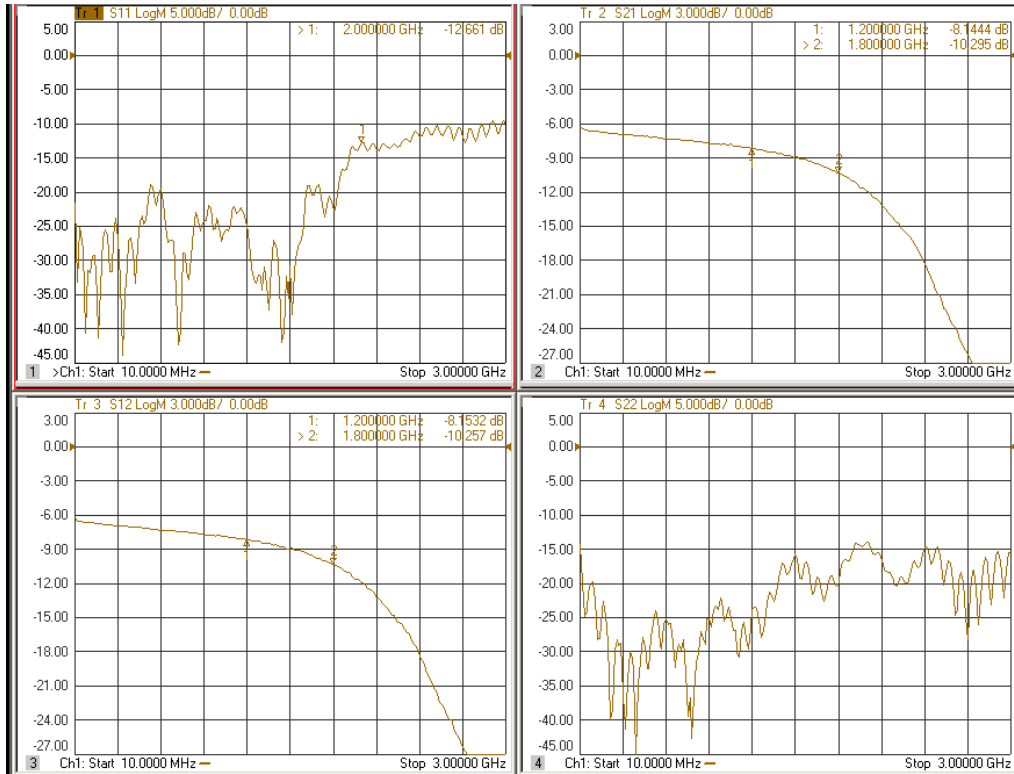

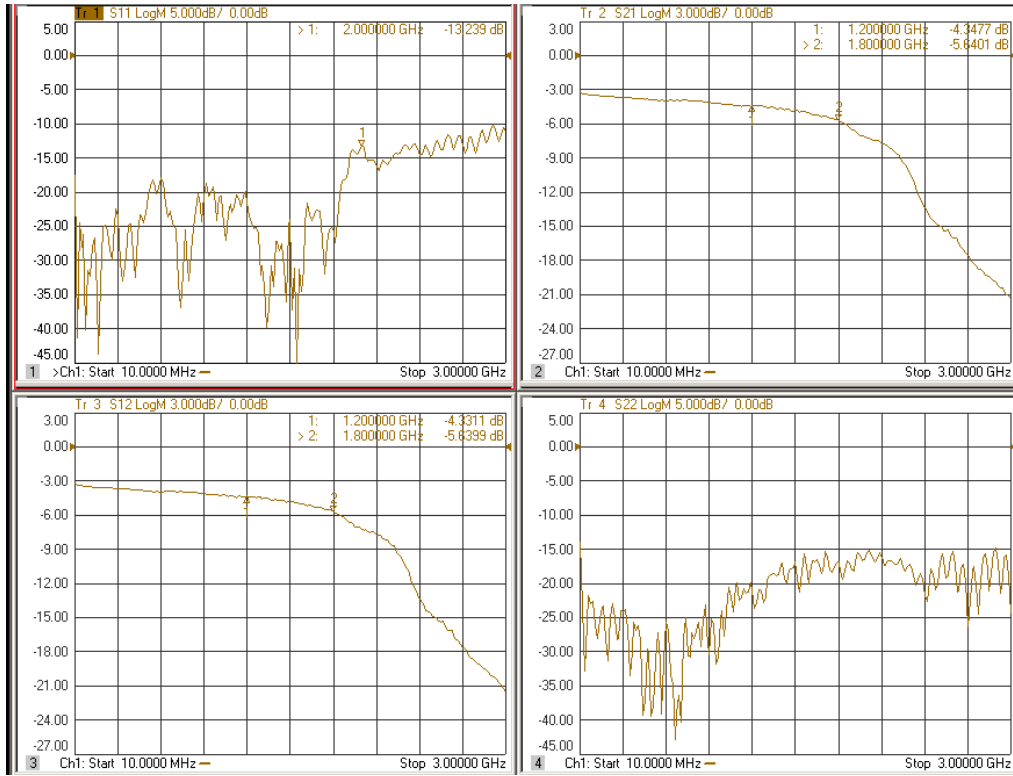Figure 30: Scattering matrix for channel 1E, polarization y and output 6dB3.

Figure 31: Scattering matrix for channel 1F, polarization x and output 3dB1.
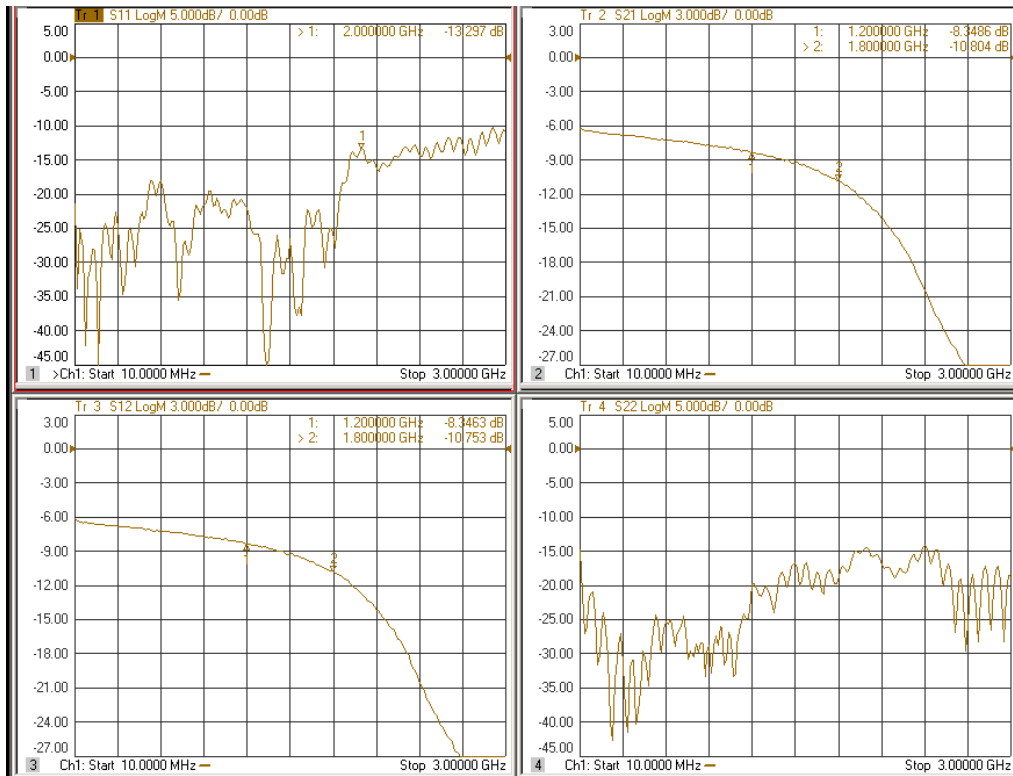

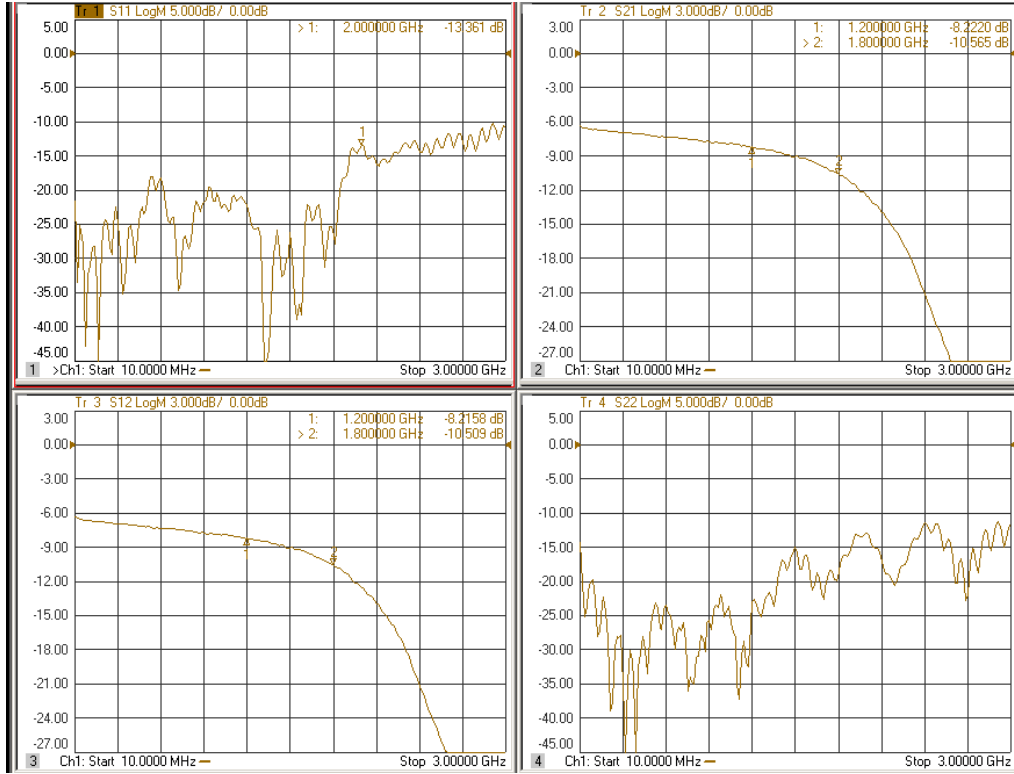Figure 32: Scattering matrix for channel 1F, polarization x and output 6dB2.

17

Figure 33: Scattering matrix for channel 1F, polarization x and output 6dB3.
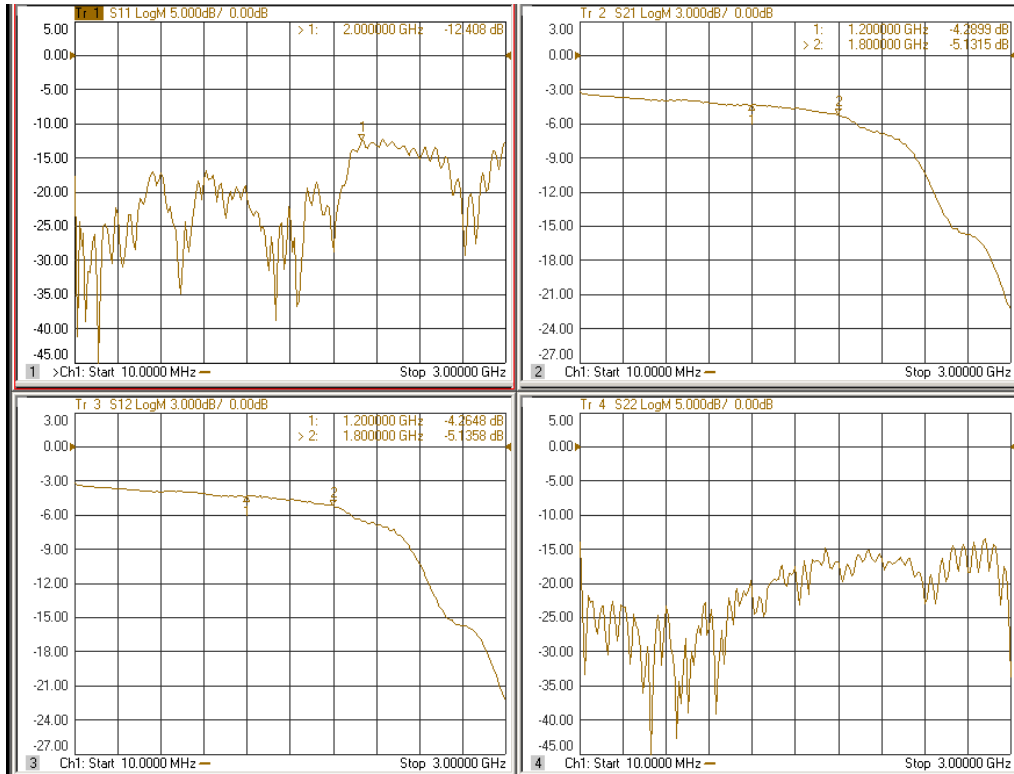

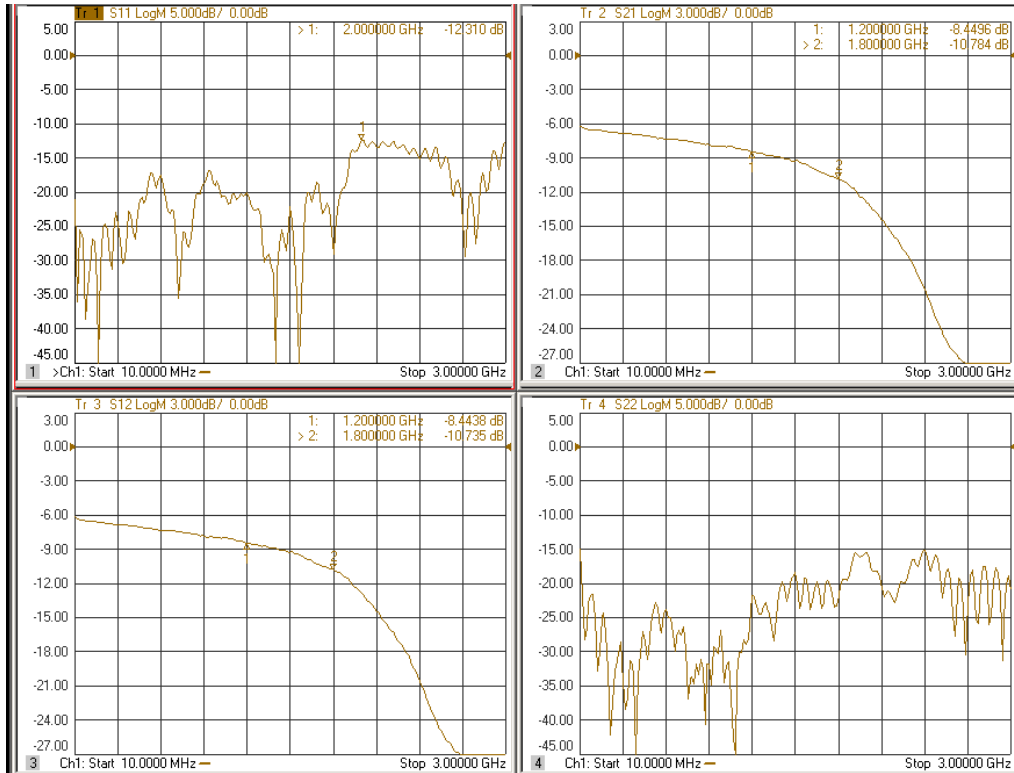Figure 34: Scattering matrix for channel 1F, polarization y and output 3dB1.

Figure 35: Scattering matrix for channel 1F, polarization y and output 6dB2.
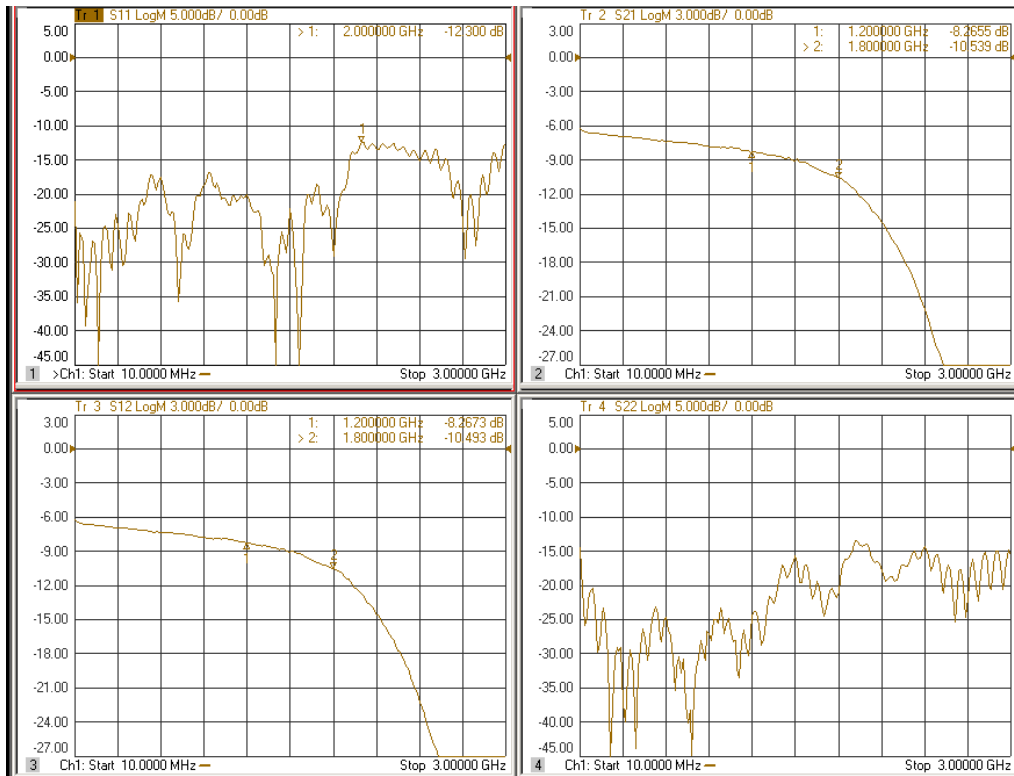

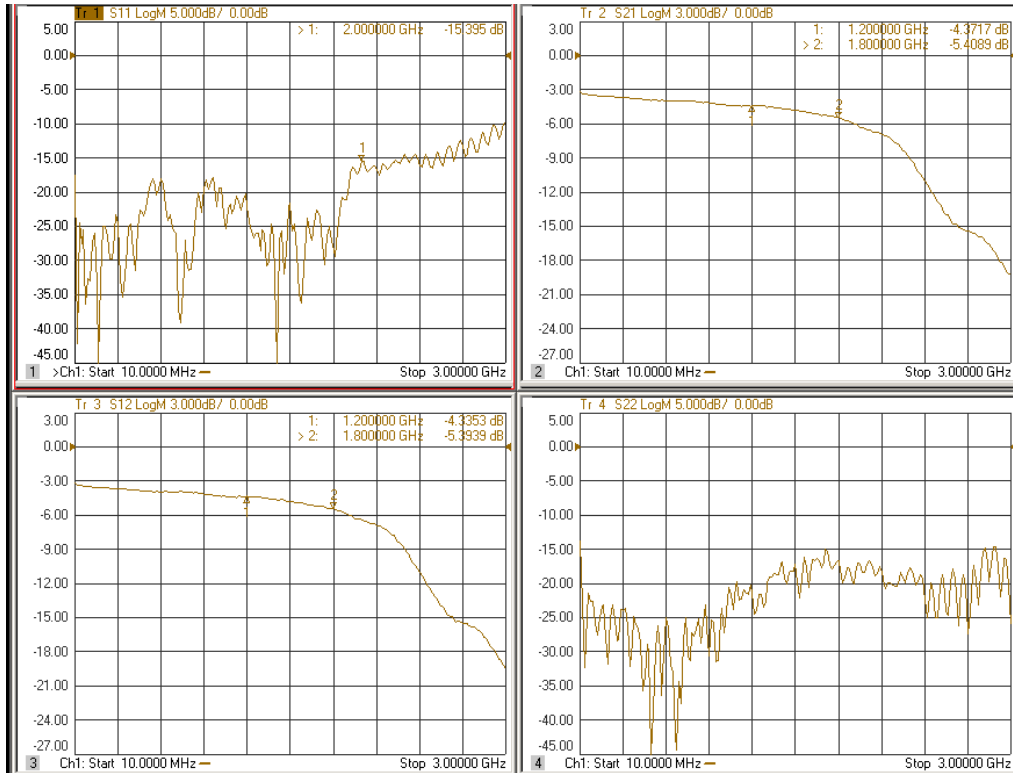Figure 36: Scattering matrix for channel 1F, polarization y and output 6dB3.

Figure 37: Scattering matrix for channel 1G, polarization x and output 3dB1.
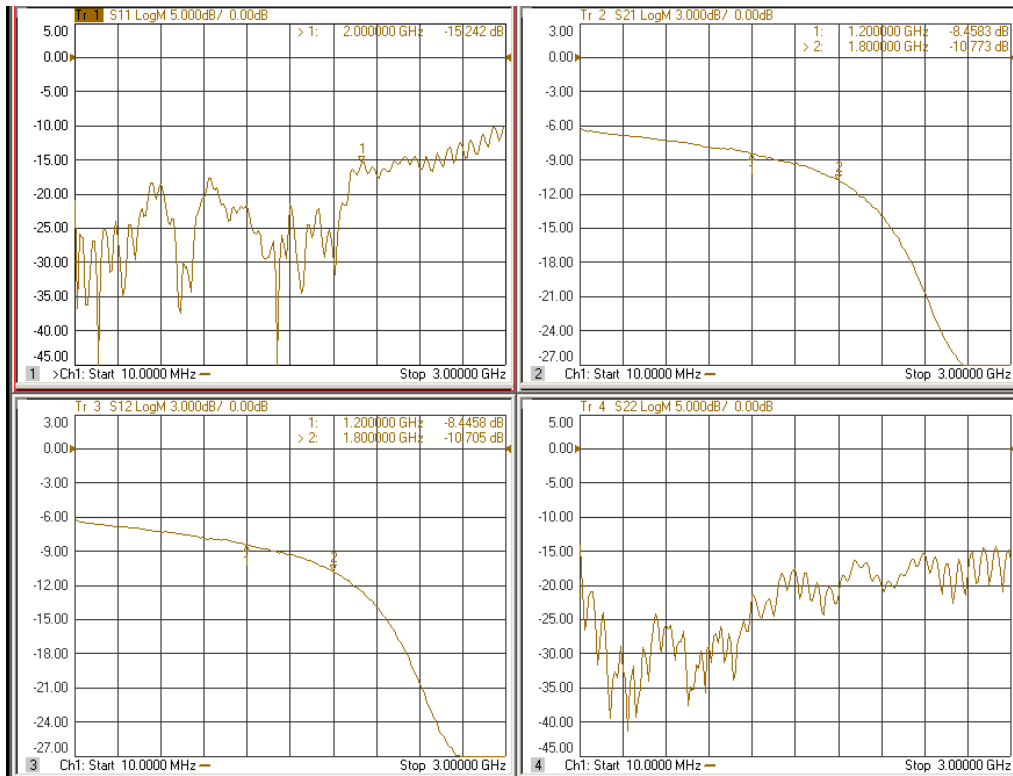

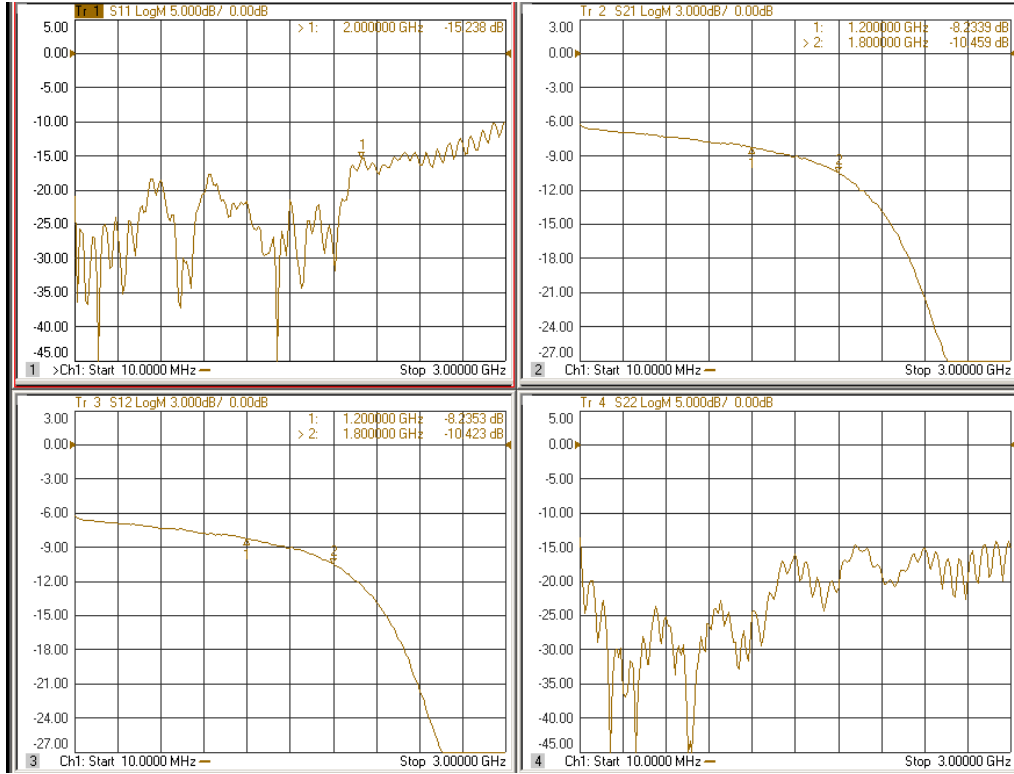Figure 38: Scattering matrix for channel 1G, polarization x and output 6dB2.

Figure 39: Scattering matrix for channel 1G, polarization x and output 6dB3.
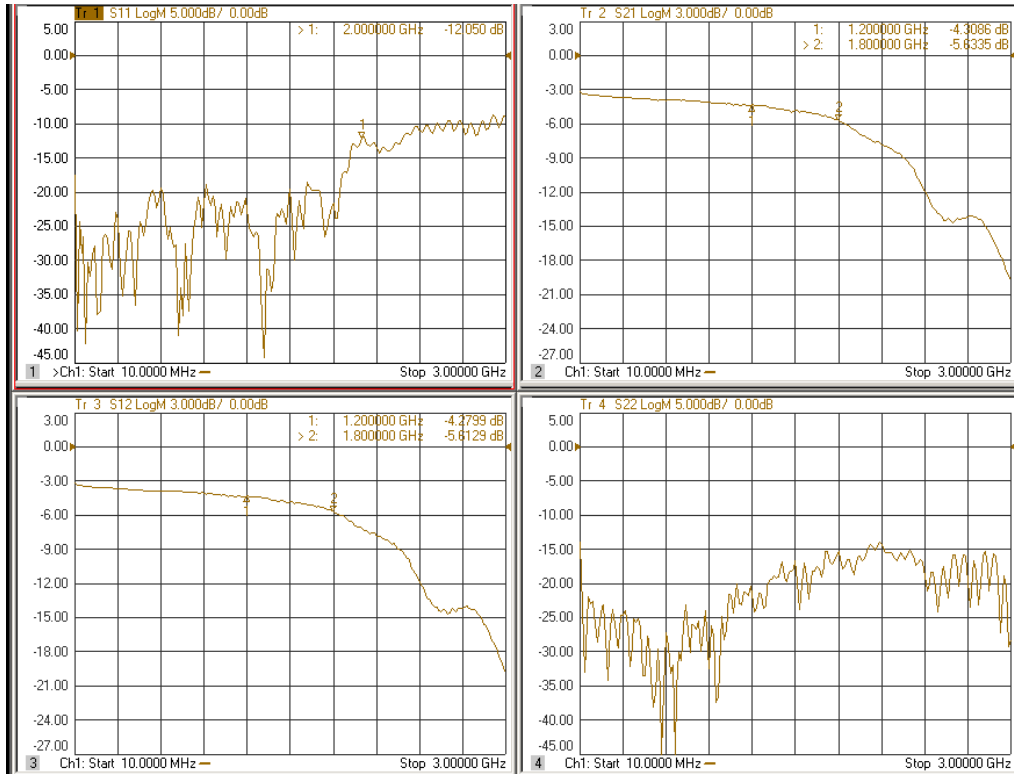

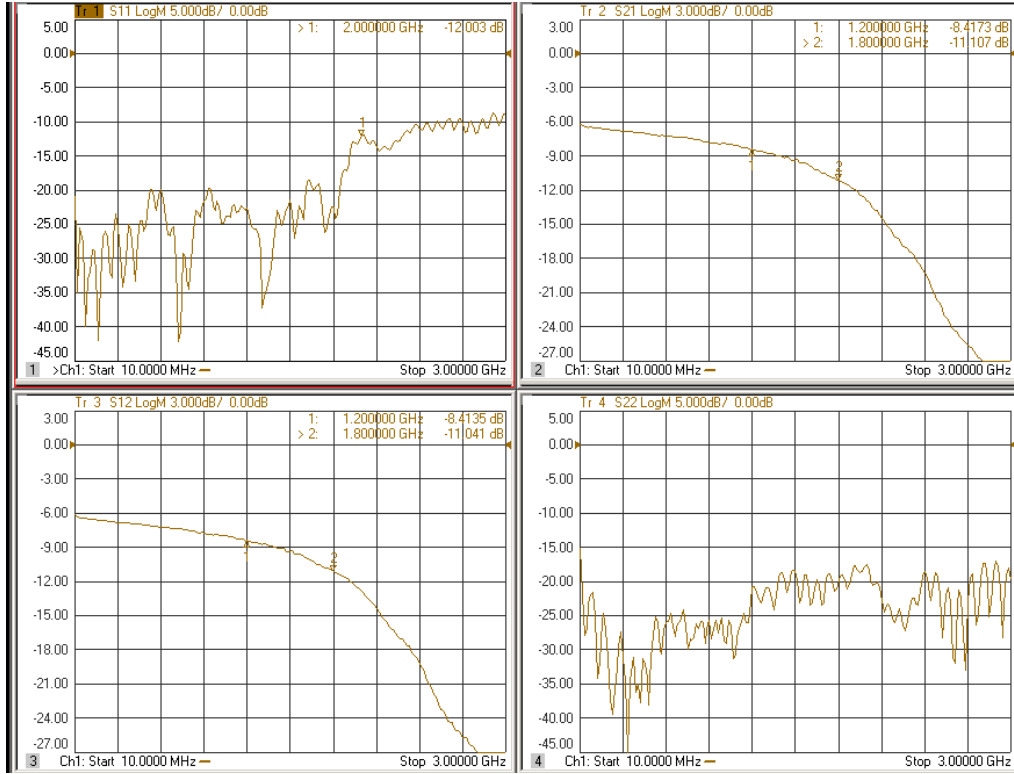Figure 40: Scattering matrix for channel 1G, polarization y and output 3dB1.

Figure 41: Scattering matrix for channel 1G, polarization y and output 6dB2.
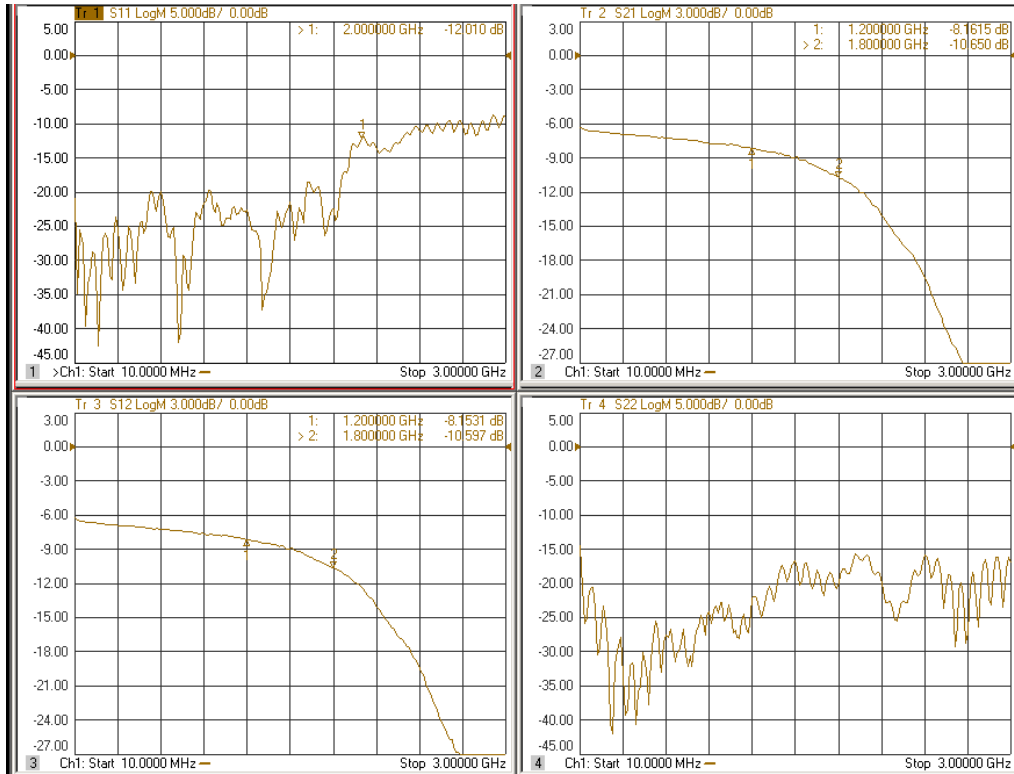

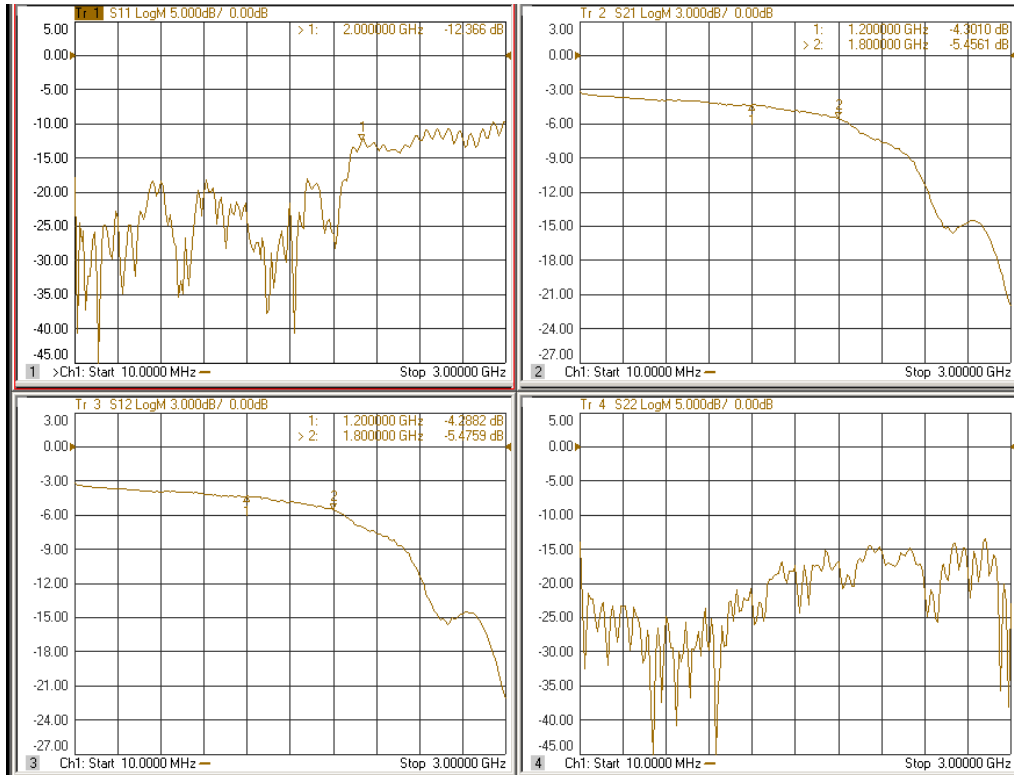Figure 42: Scattering matrix for channel 1G, polarization y and output 6dB3.

Figure 43: Scattering matrix for channel 1H, polarization x and output 3dB1.
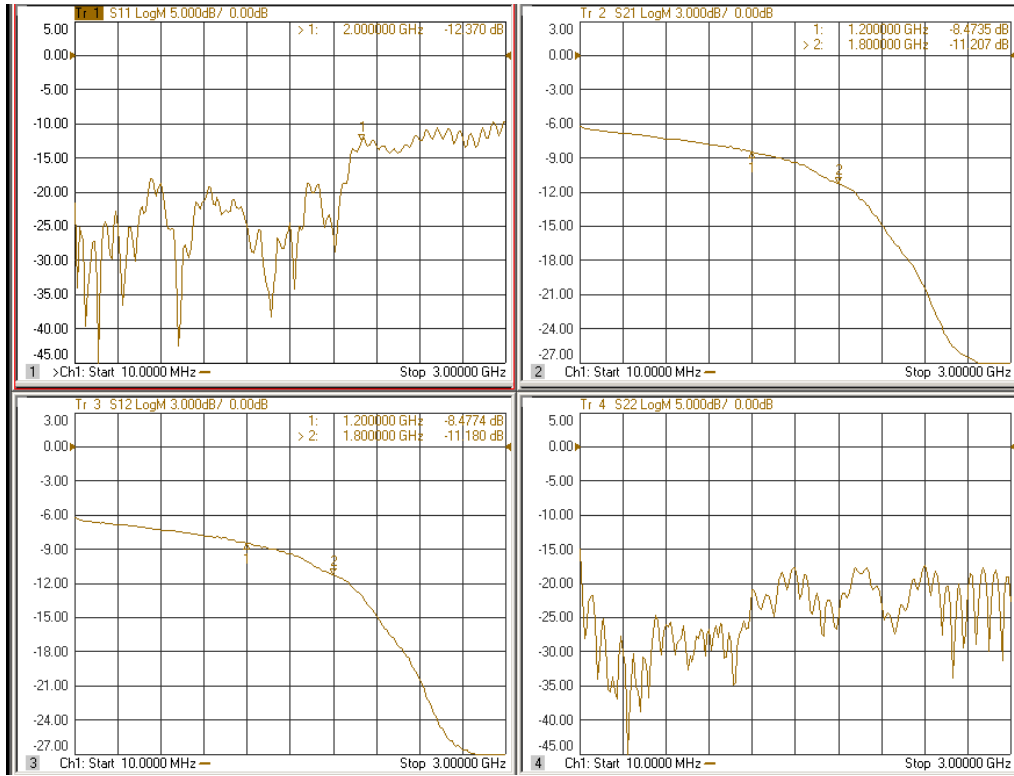

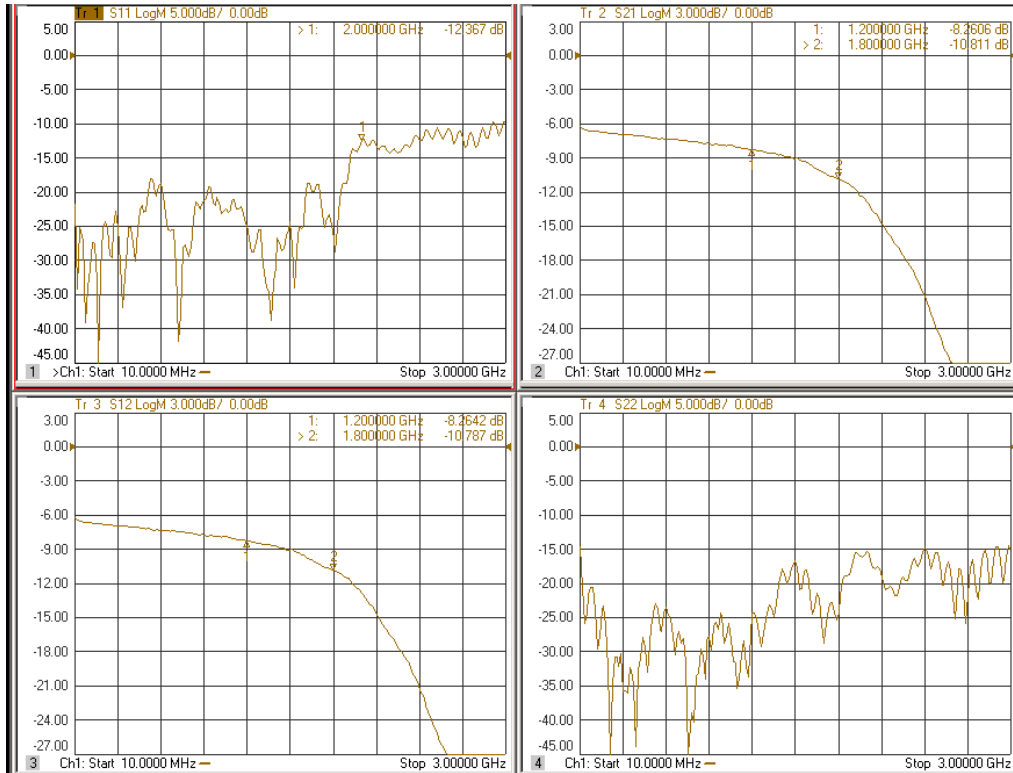Figure 44: Scattering matrix for channel 1H, polarization x and output 6dB2.

Figure 45: Scattering matrix for channel 1H, polarization x and output 6dB3.
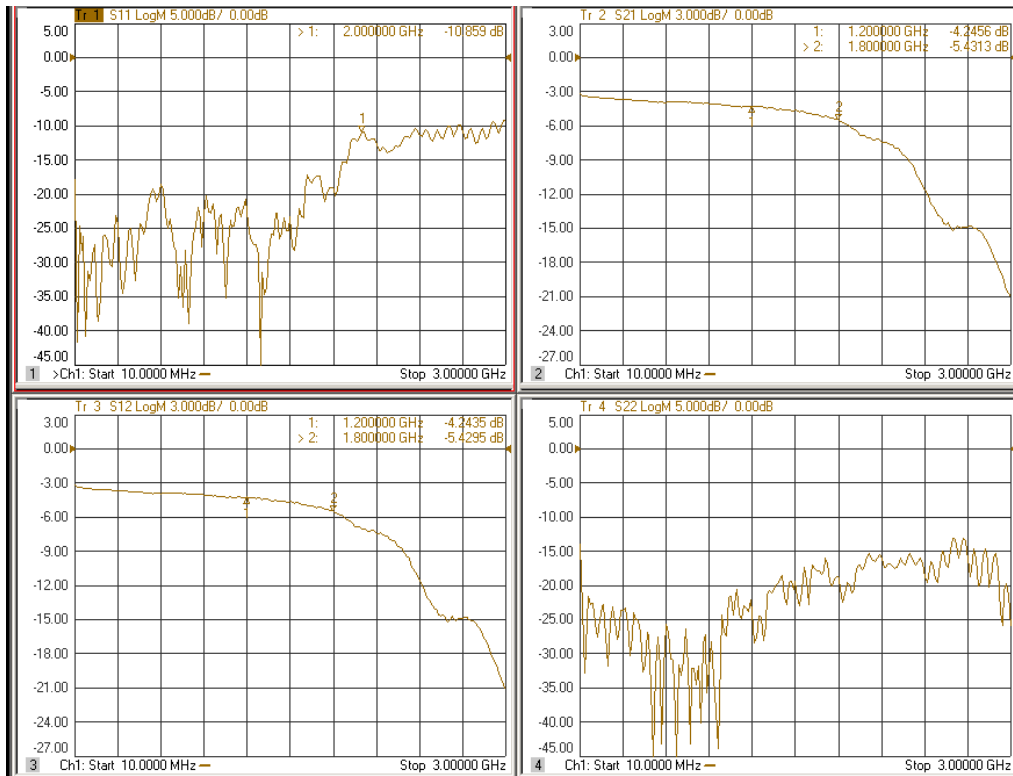

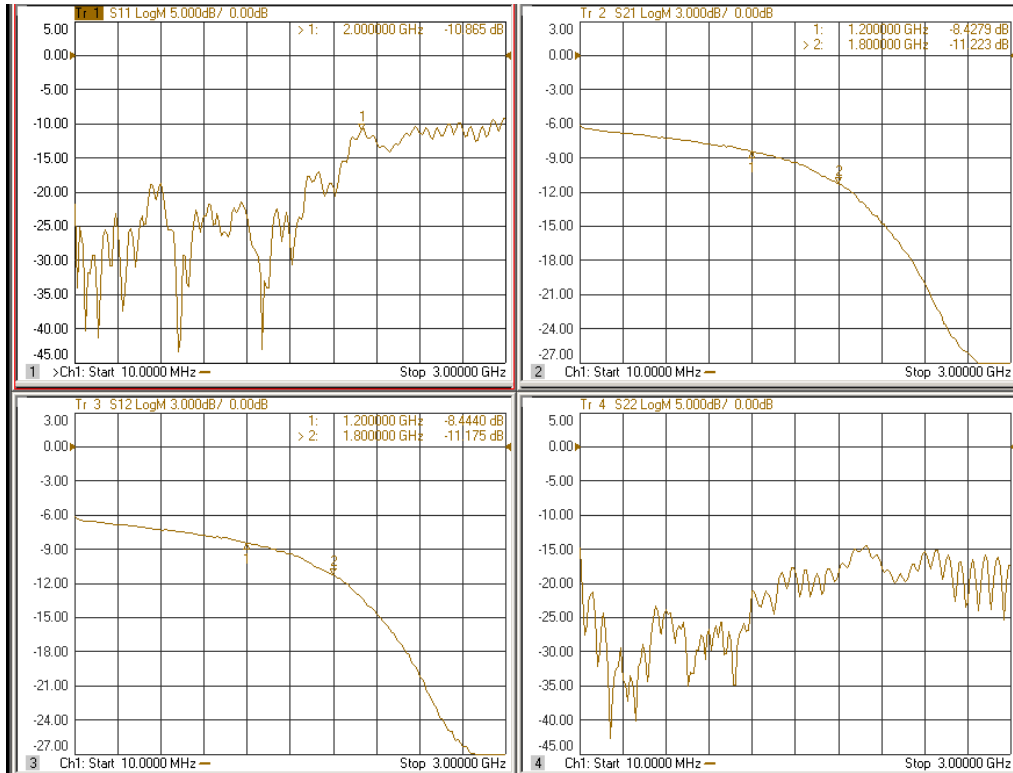Figure 46: Scattering matrix for channel 1H, polarization y and output 3dB1.

Figure 47: Scattering matrix for channel 1H, polarization y and output 6dB2.
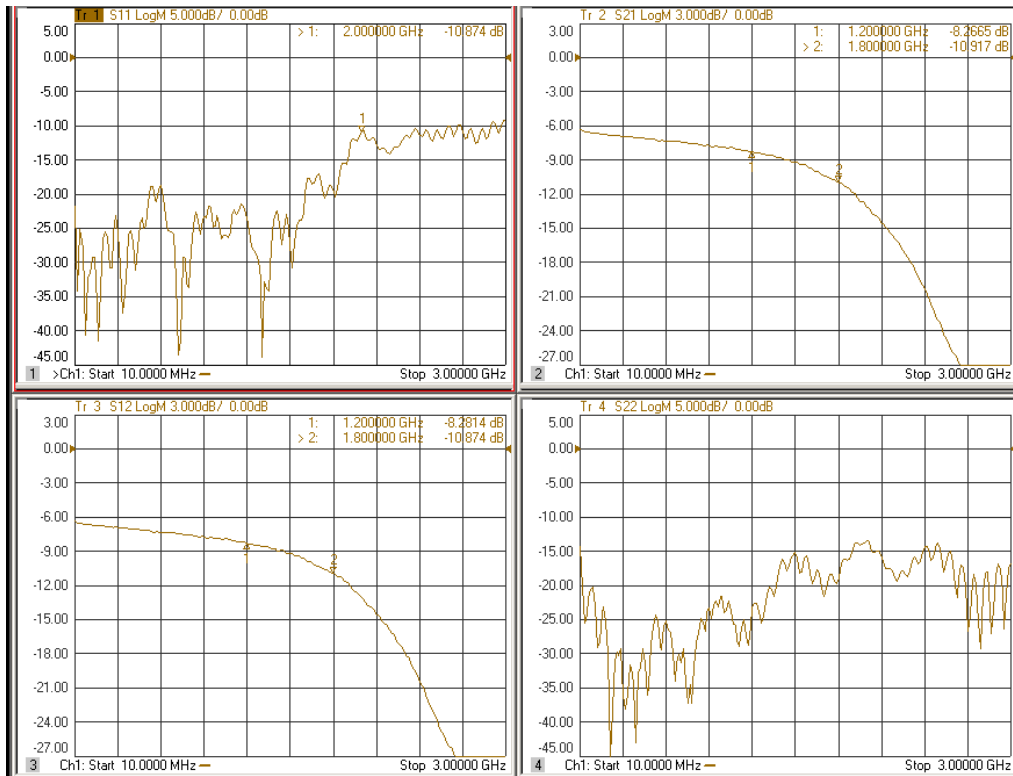

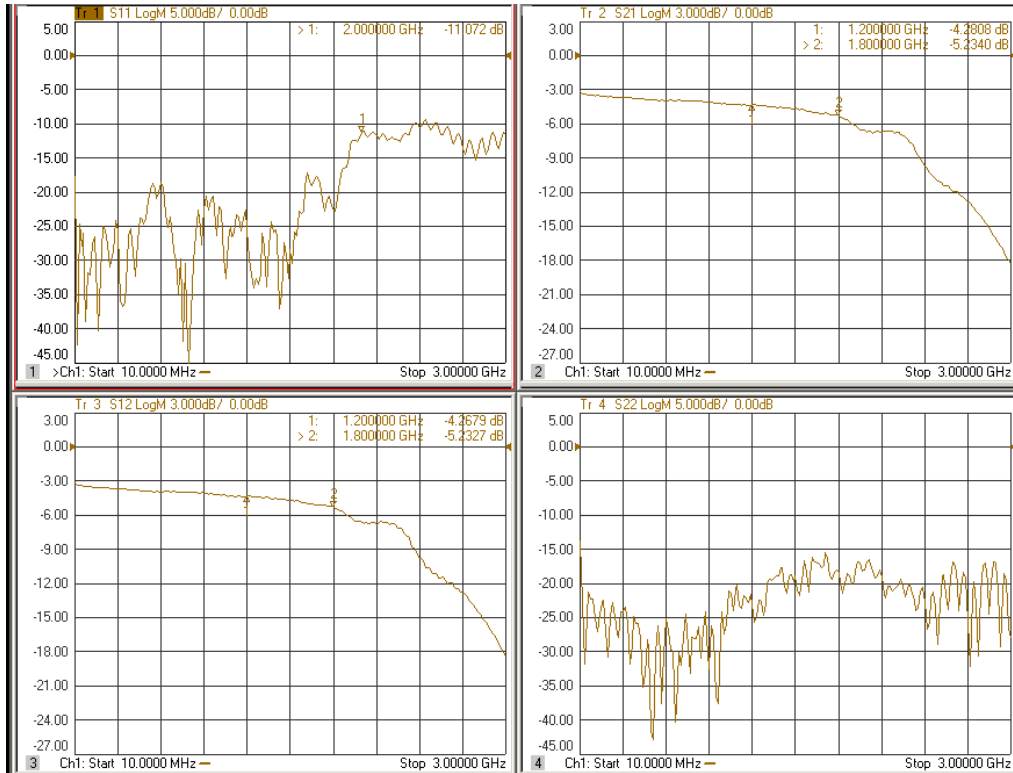Figure 48: Scattering matrix for channel 1H, polarization y and output 6dB3.

Figure 49: Scattering matrix for channel 1J, polarization x and output 3dB1.
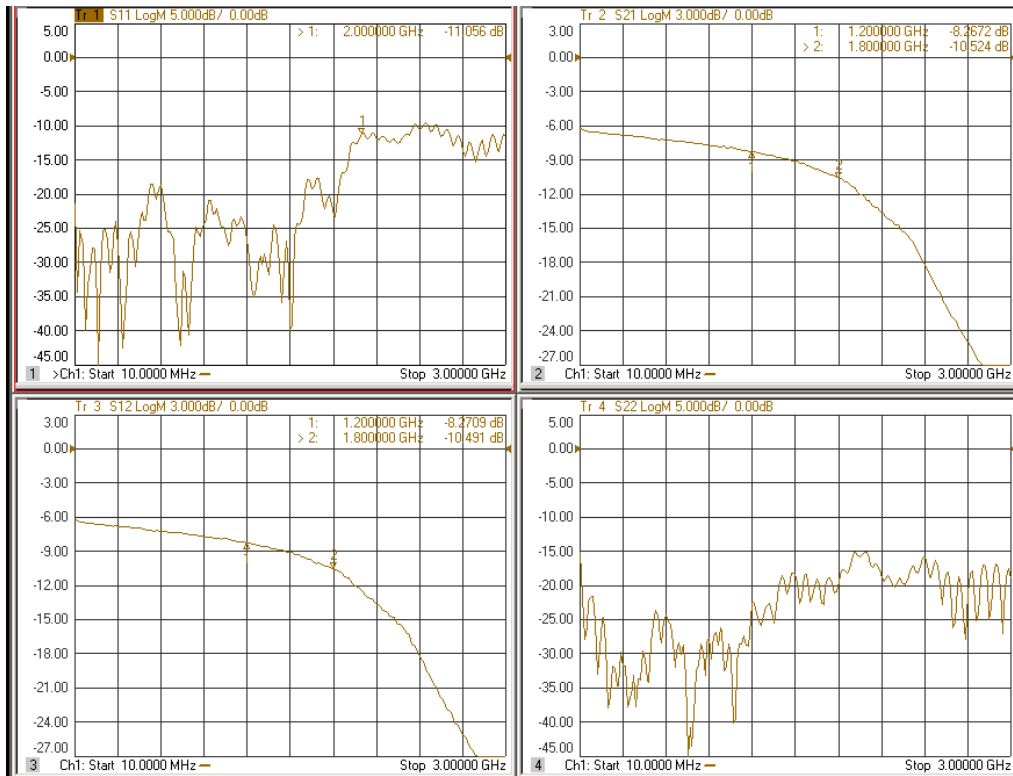

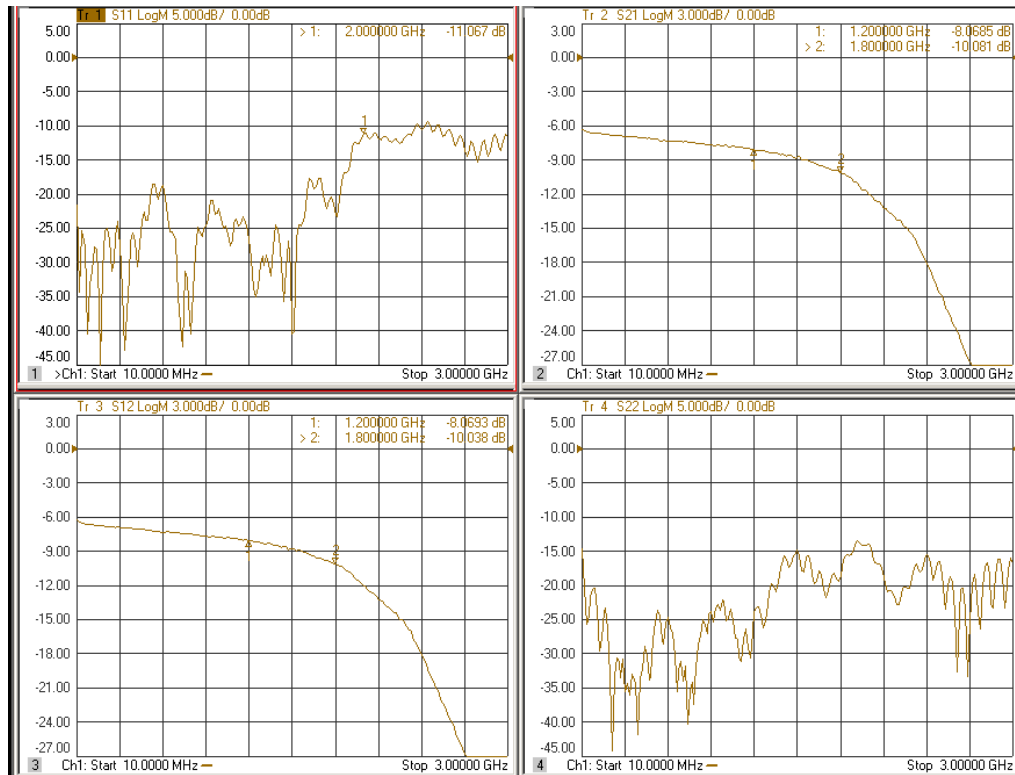Figure 50: Scattering matrix for channel 1J, polarization x and output 6dB2.

Figure 51: Scattering matrix for channel 1J, polarization x and output 6dB3.
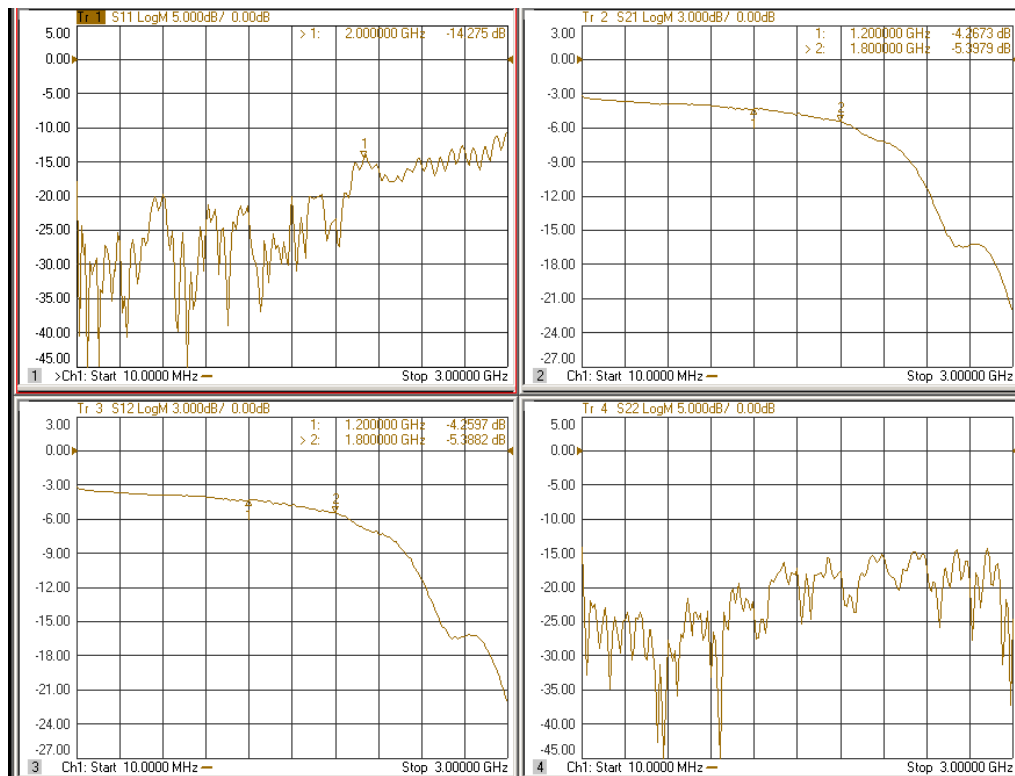

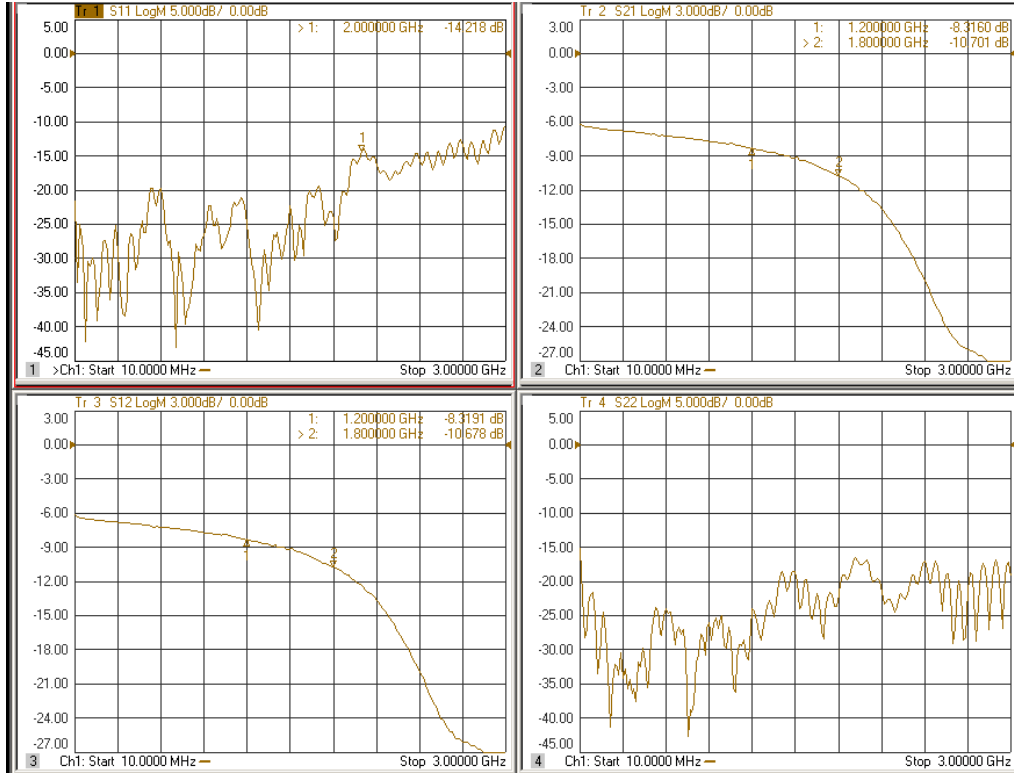Figure 52: Scattering matrix for channel 1J, polarization y and output 3dB1.

Figure 53: Scattering matrix for channel 1J, polarization y and output 6dB2.
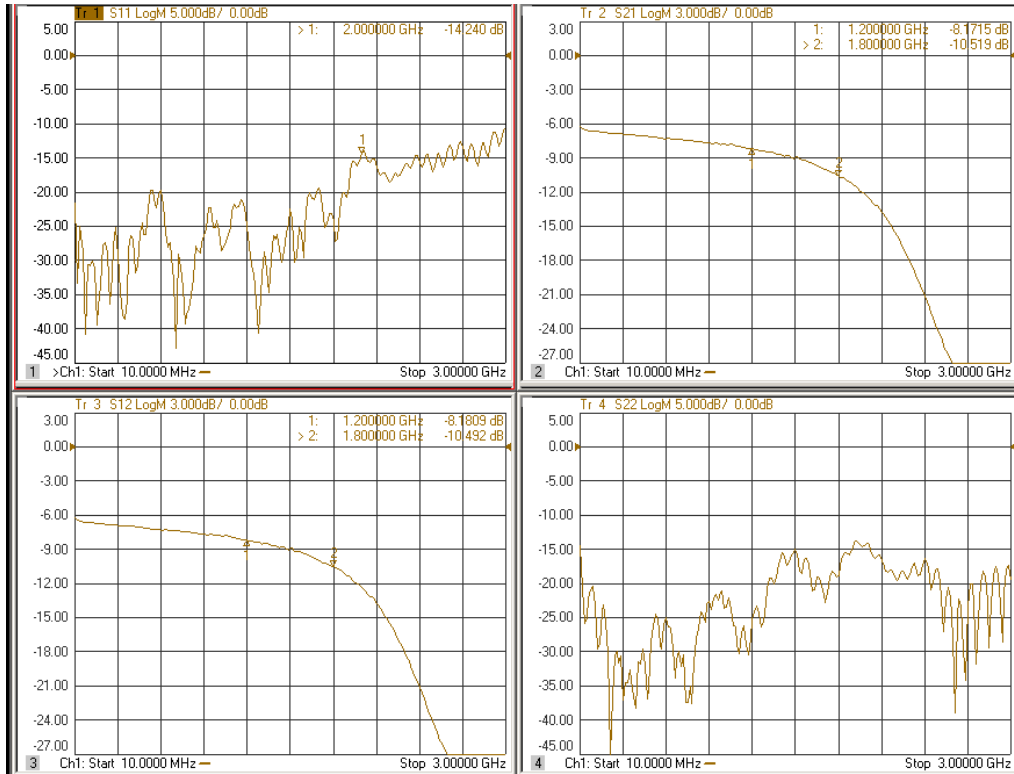

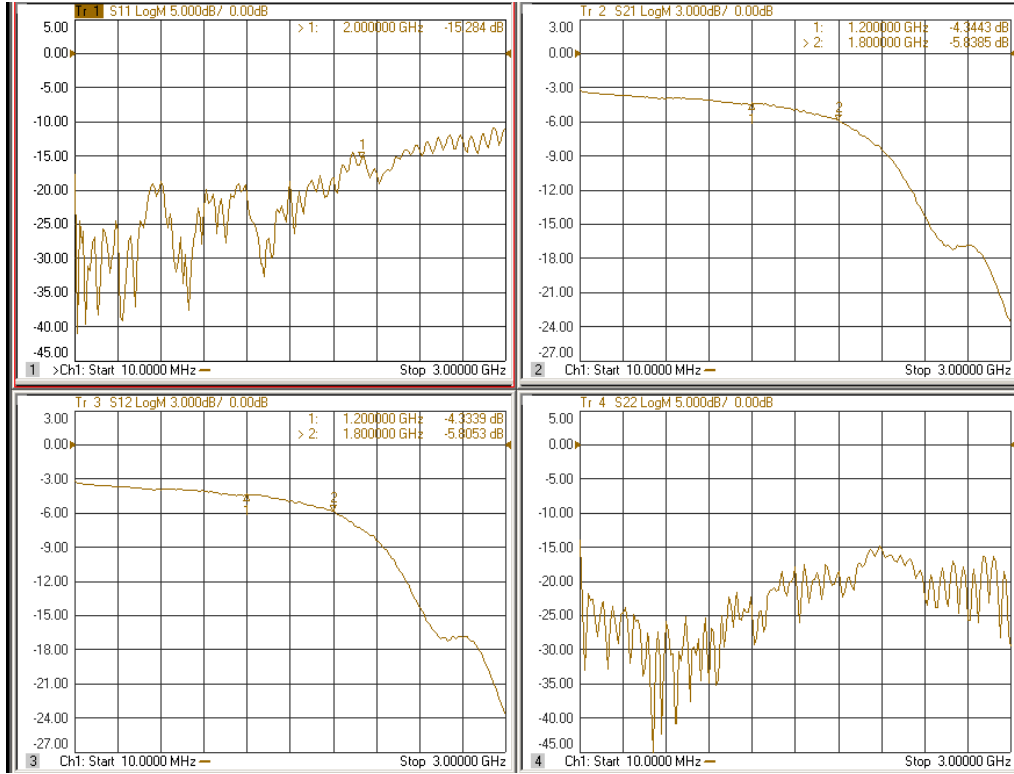Figure 54: Scattering matrix for channel 1J, polarization y and output 6dB3.

Figure 55: Scattering matrix for channel 1K, polarization x and output 3dB1.
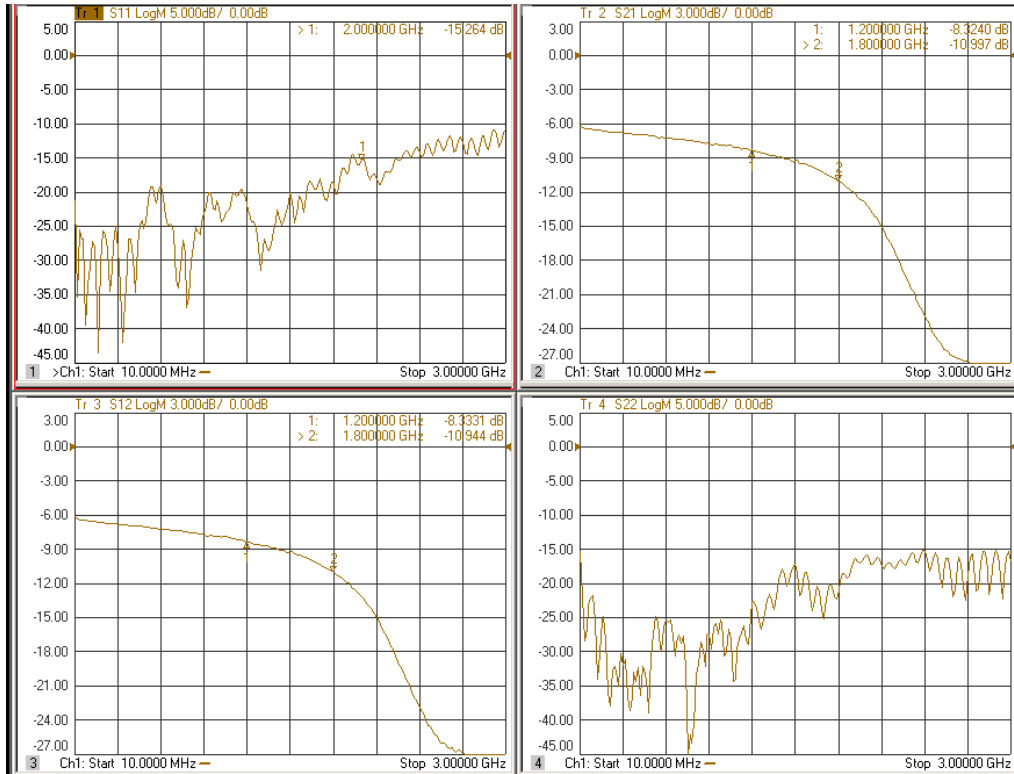

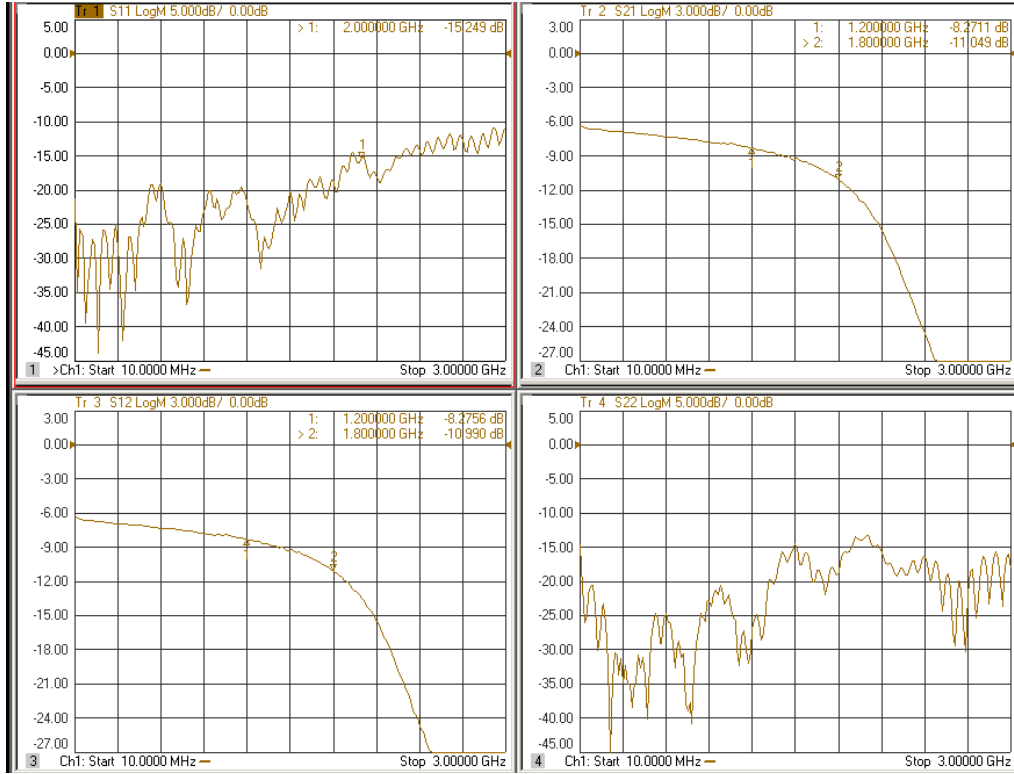Figure 56: Scattering matrix for channel 1K, polarization x and output 6dB2.

Figure 57: Scattering matrix for channel 1K, polarization x and output 6dB3.
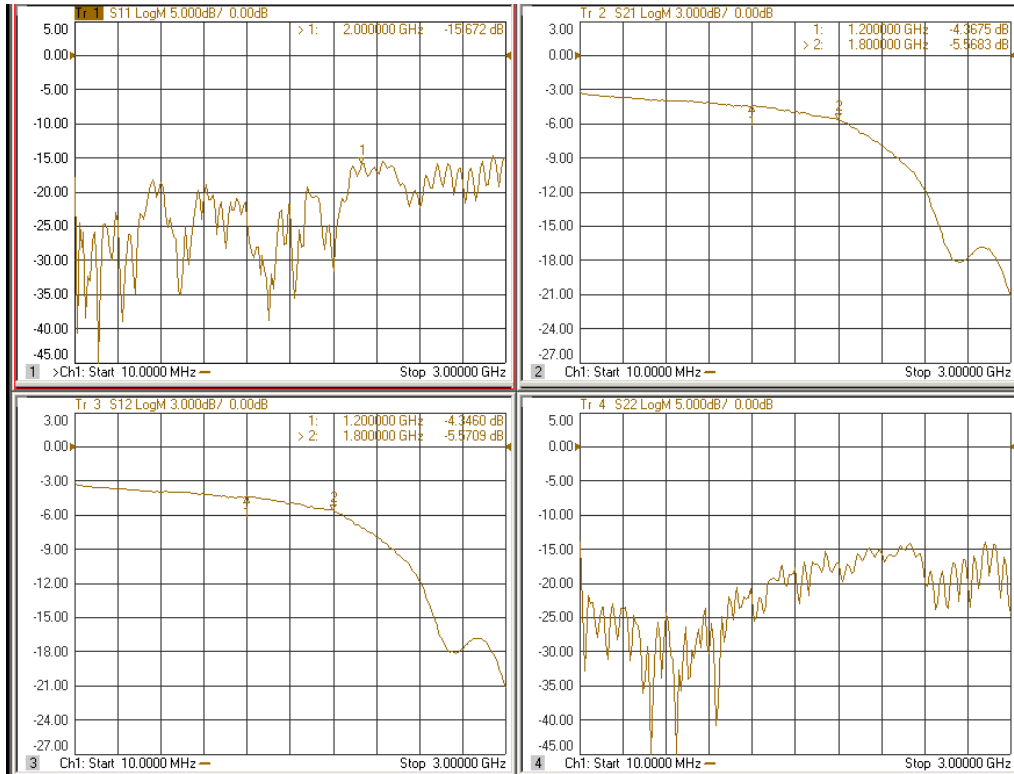

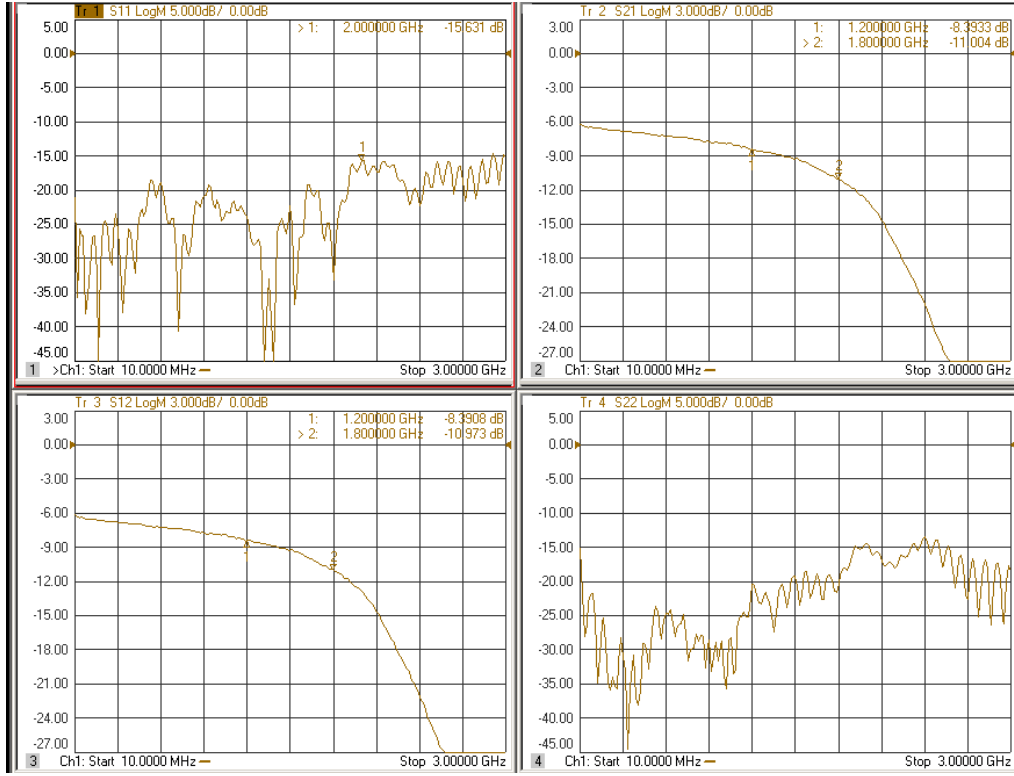Figure 58: Scattering matrix for channel 1K, polarization y and output 3dB1.

Figure 59: Scattering matrix for channel 1K, polarization y and output 6dB2.
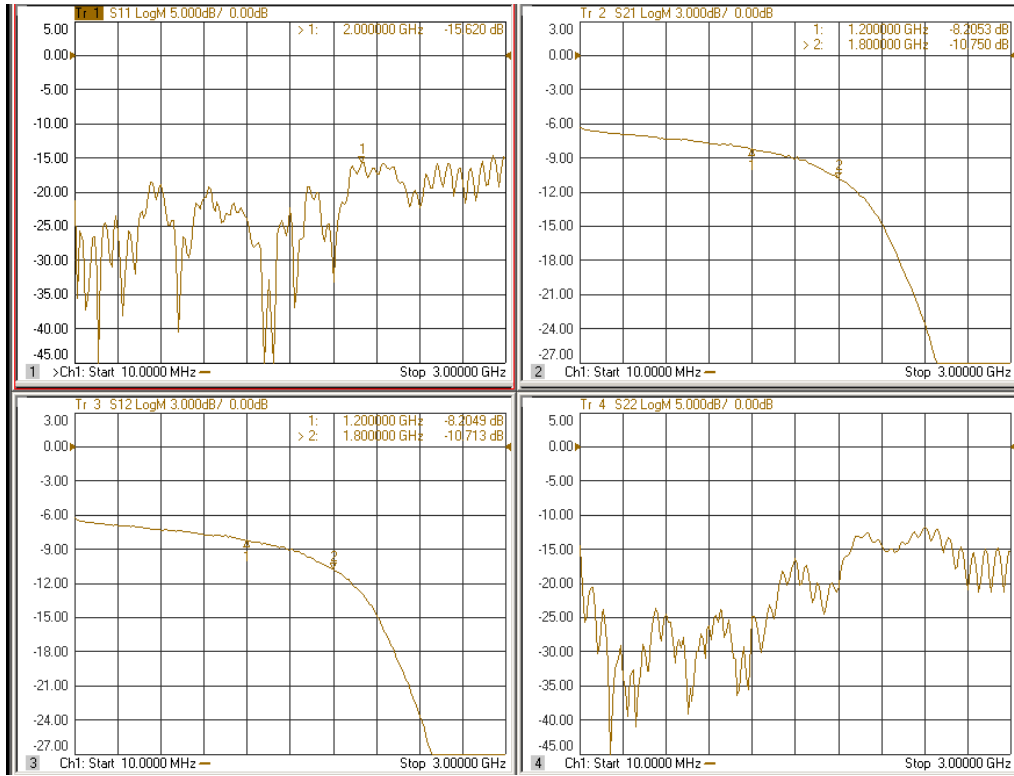

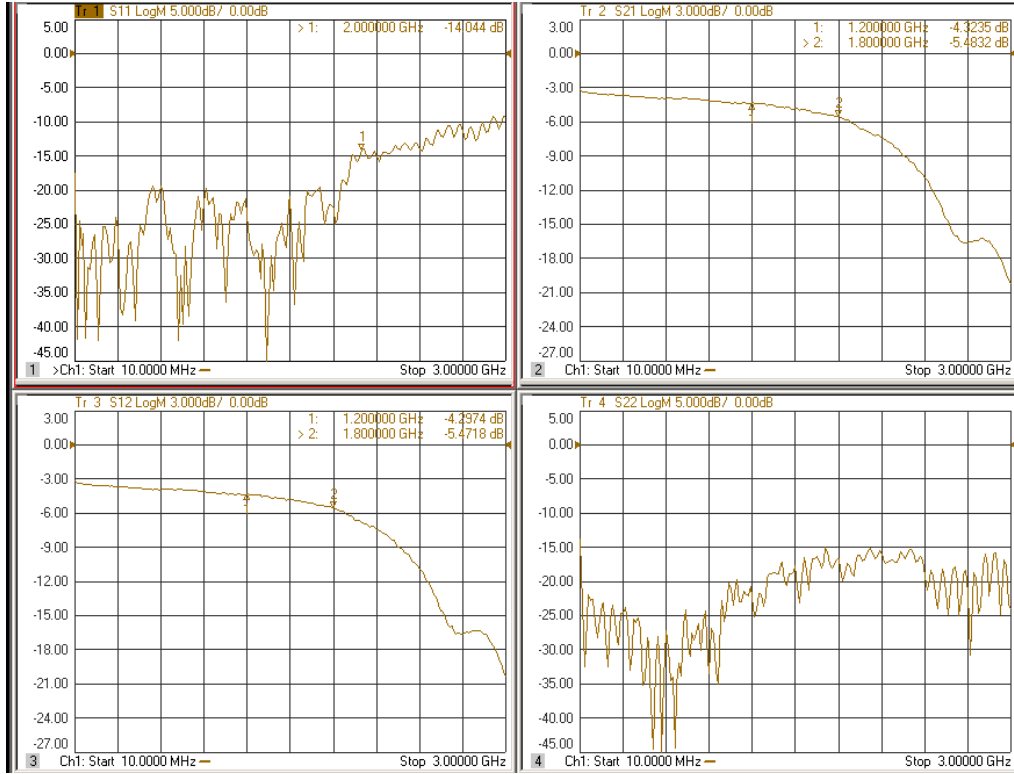Figure 60: Scattering matrix for channel 1K, polarization y and output 6dB3.

Figure 61: Scattering matrix for channel 2A, polarization x and output 3dB1.
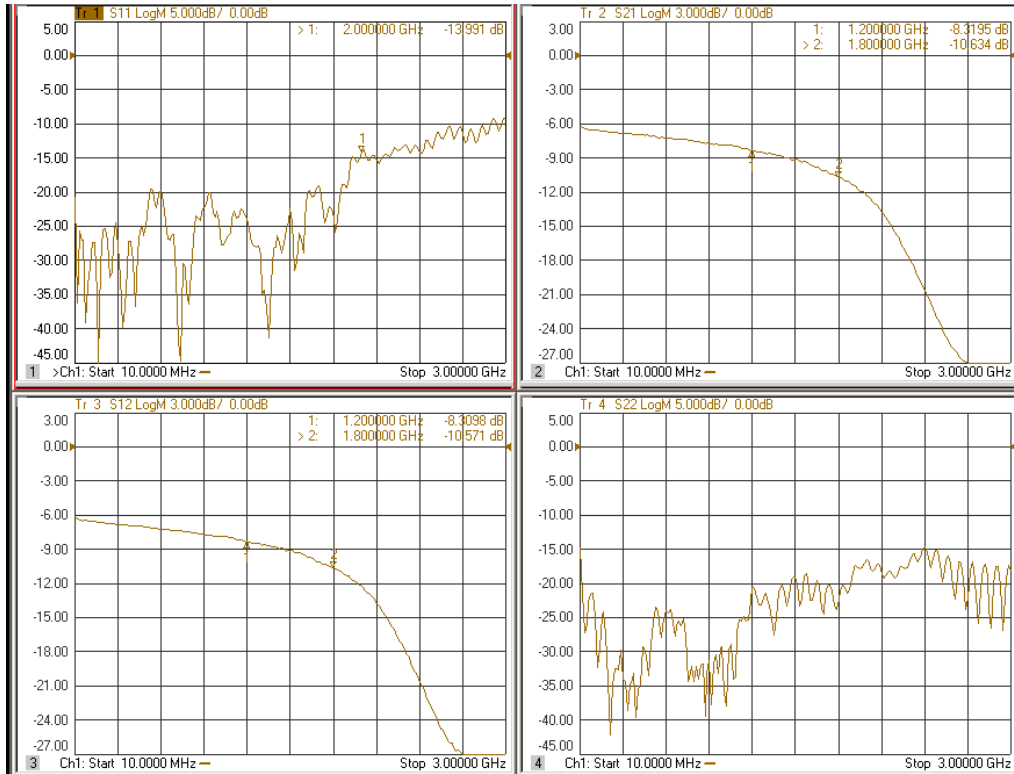

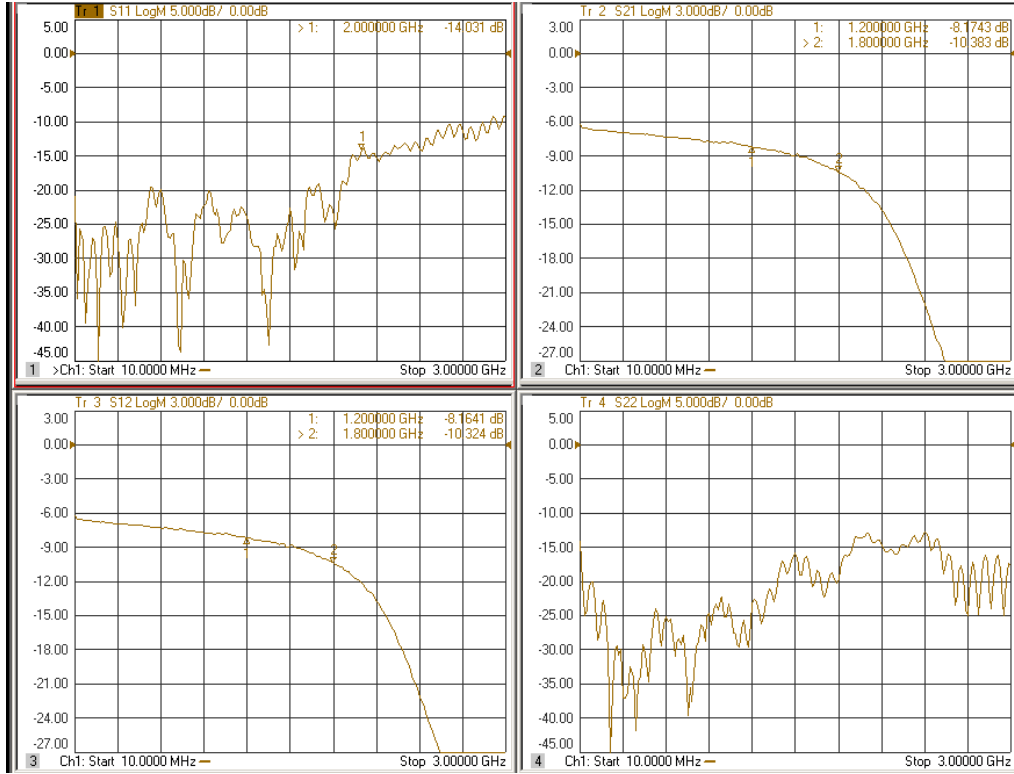Figure 62: Scattering matrix for channel 2A, polarization x and output 6dB2.

Figure 63: Scattering matrix for channel 2A, polarization x and output 6dB3.
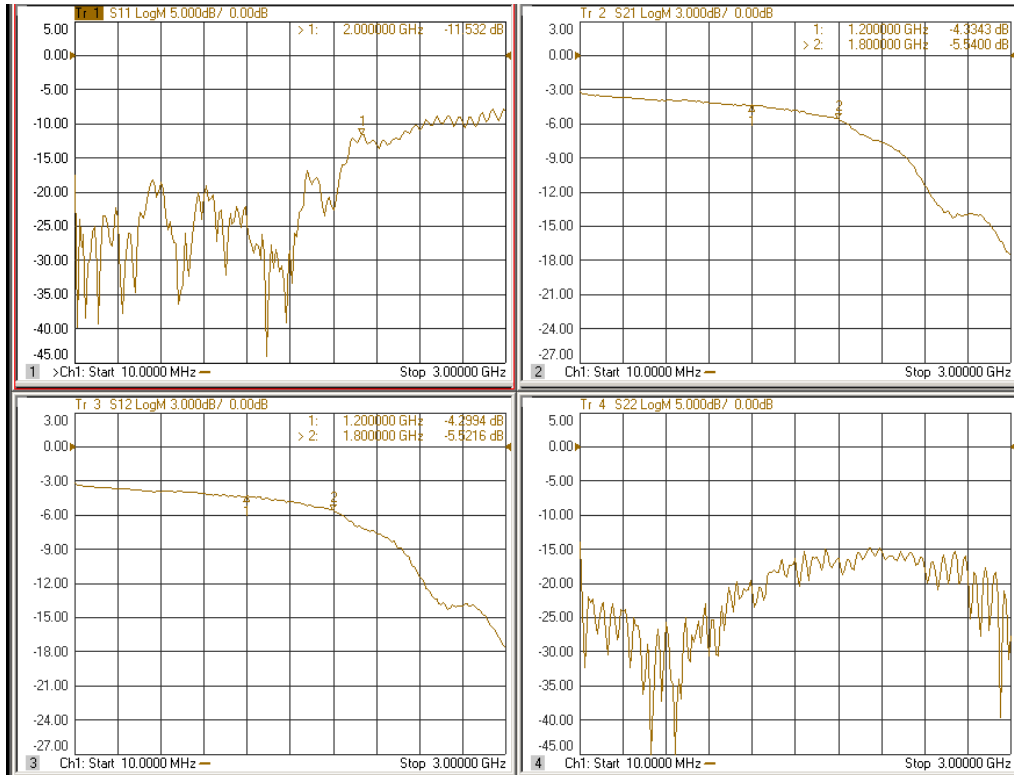

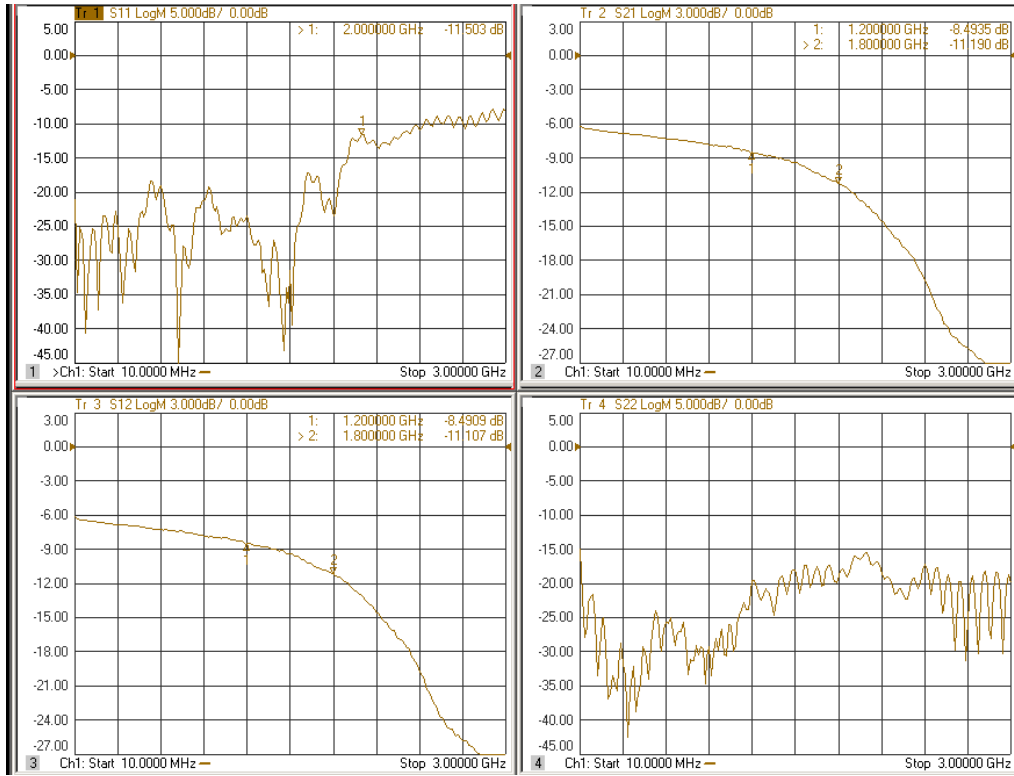Figure 64: Scattering matrix for channel 2A, polarization y and output 3dB1.

Figure 65: Scattering matrix for channel 2A, polarization y and output 6dB2.
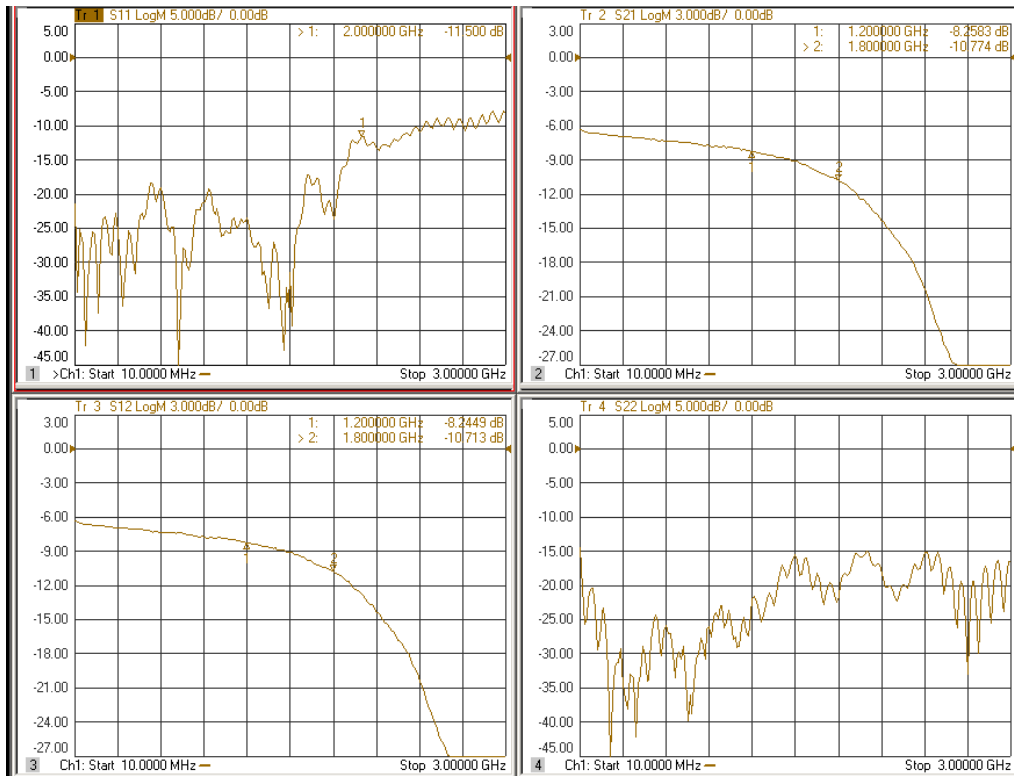

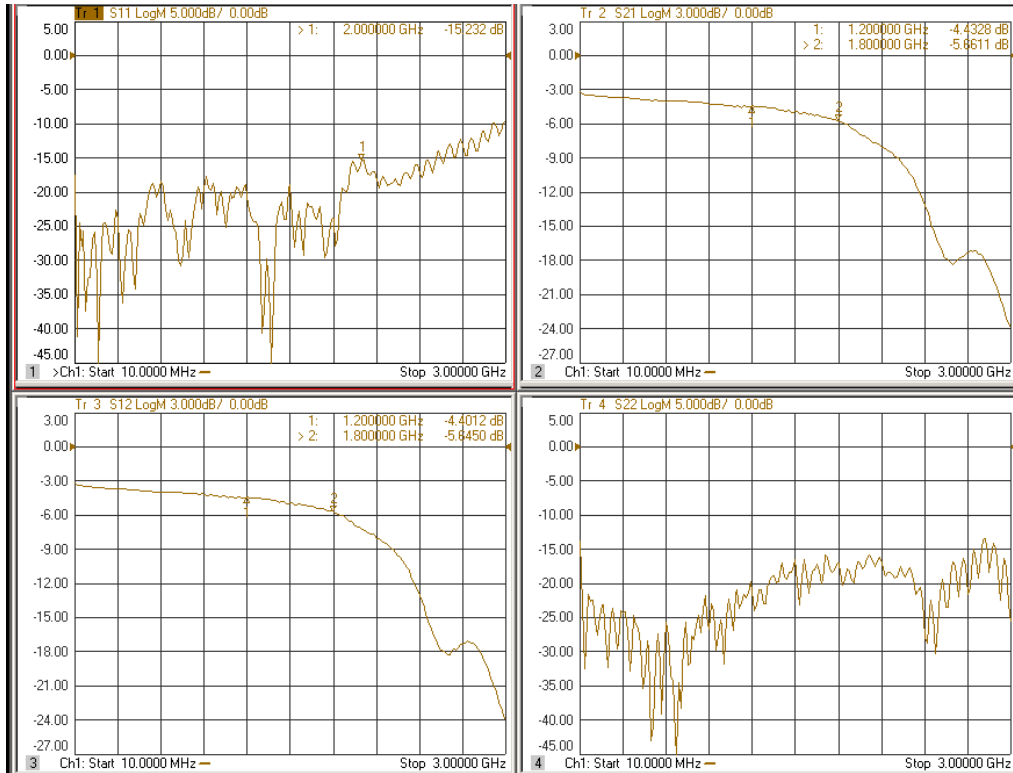Figure 66: Scattering matrix for channel 2A, polarization y and output 6dB3.

Figure 67: Scattering matrix for channel 2B, polarization x and output 3dB1.
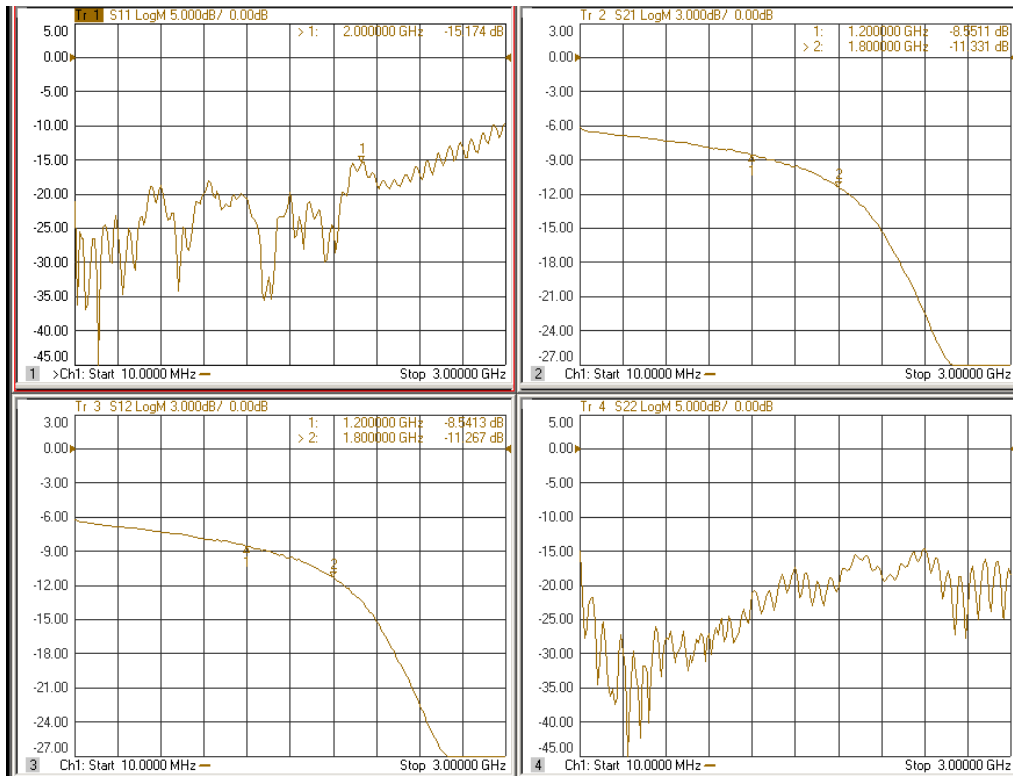

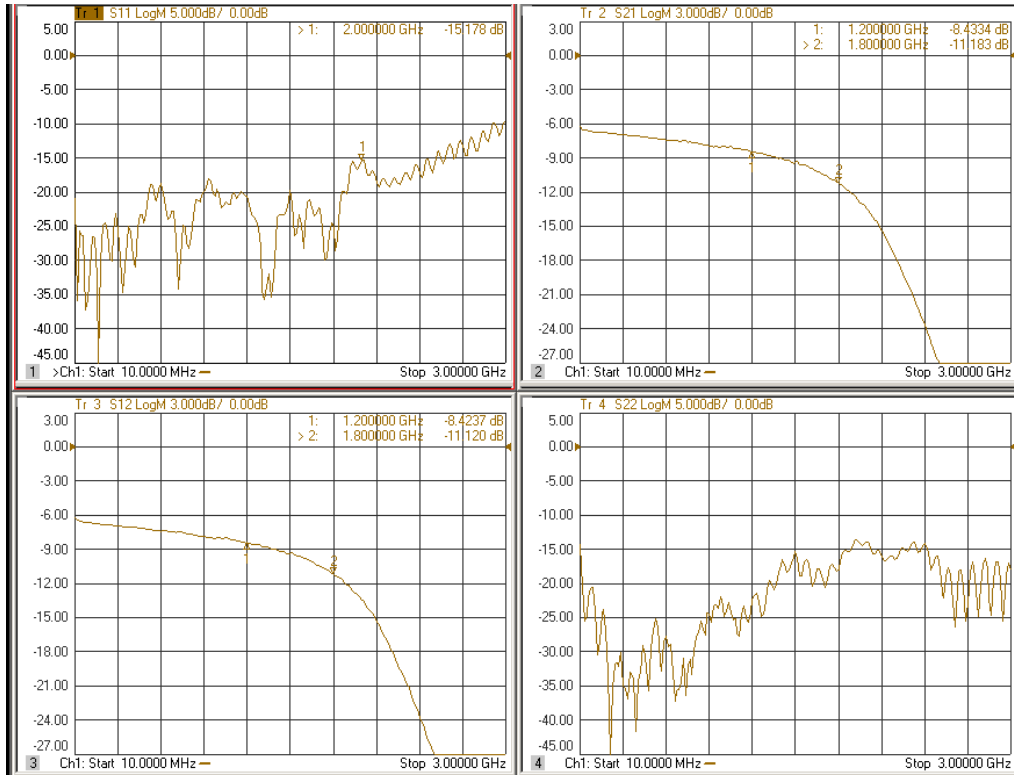Figure 68: Scattering matrix for channel 2B, polarization x and output 6dB2.

Figure 69: Scattering matrix for channel 2B, polarization x and output 6dB3.
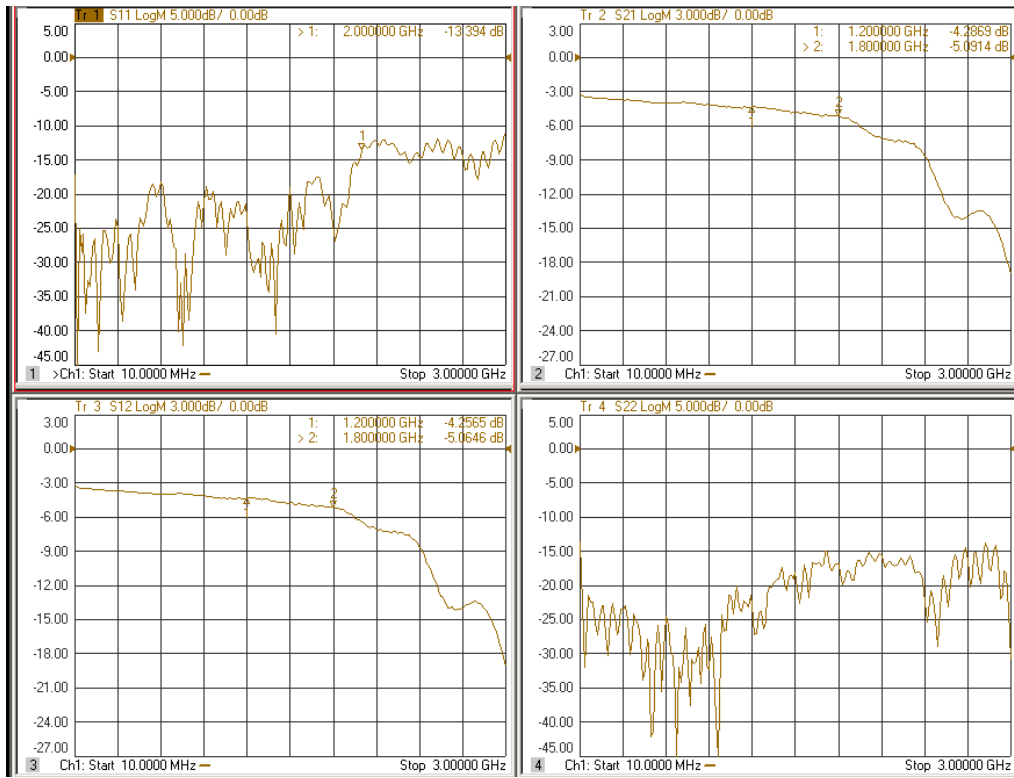

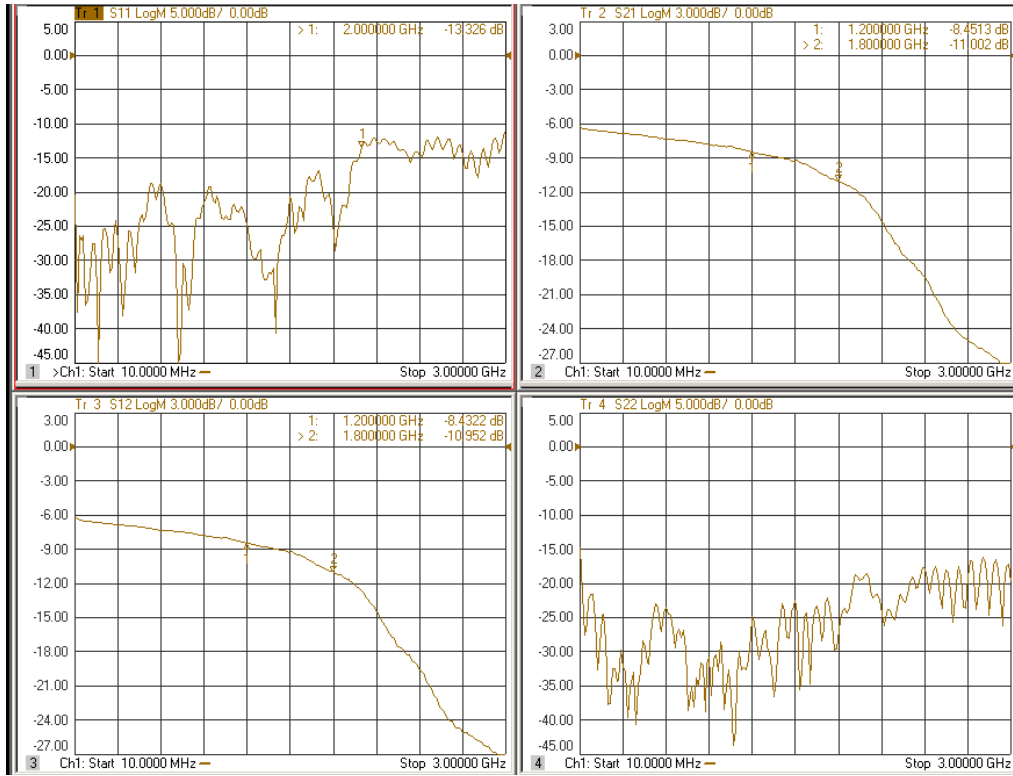Figure 70: Scattering matrix for channel 2B, polarization y and output 3dB1.

Figure 71: Scattering matrix for channel 2B, polarization y and output 6dB2.
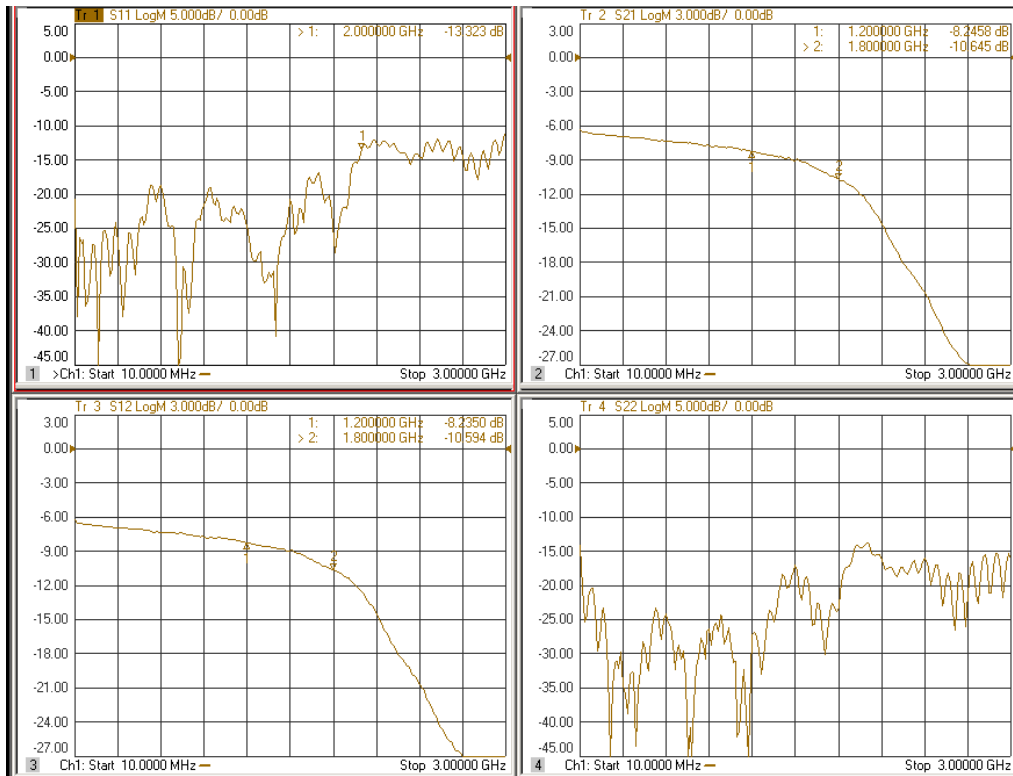

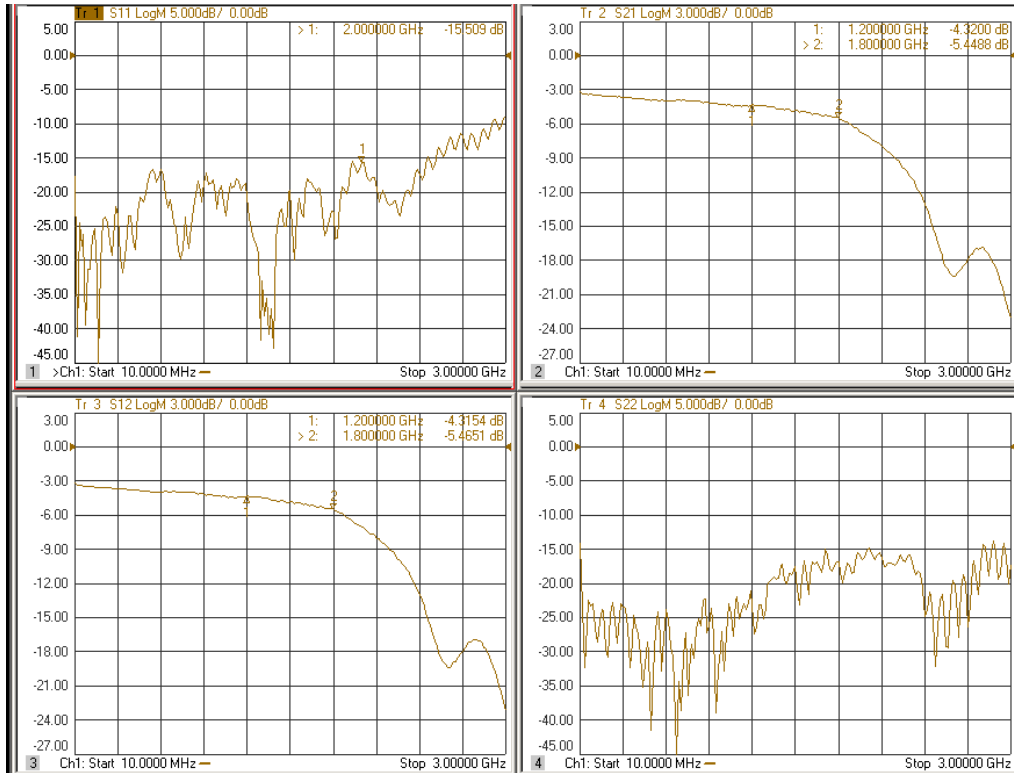Figure 72: Scattering matrix for channel 2B, polarization y and output 6dB3.

Figure 73: Scattering matrix for channel 2C, polarization x and output 3dB1.
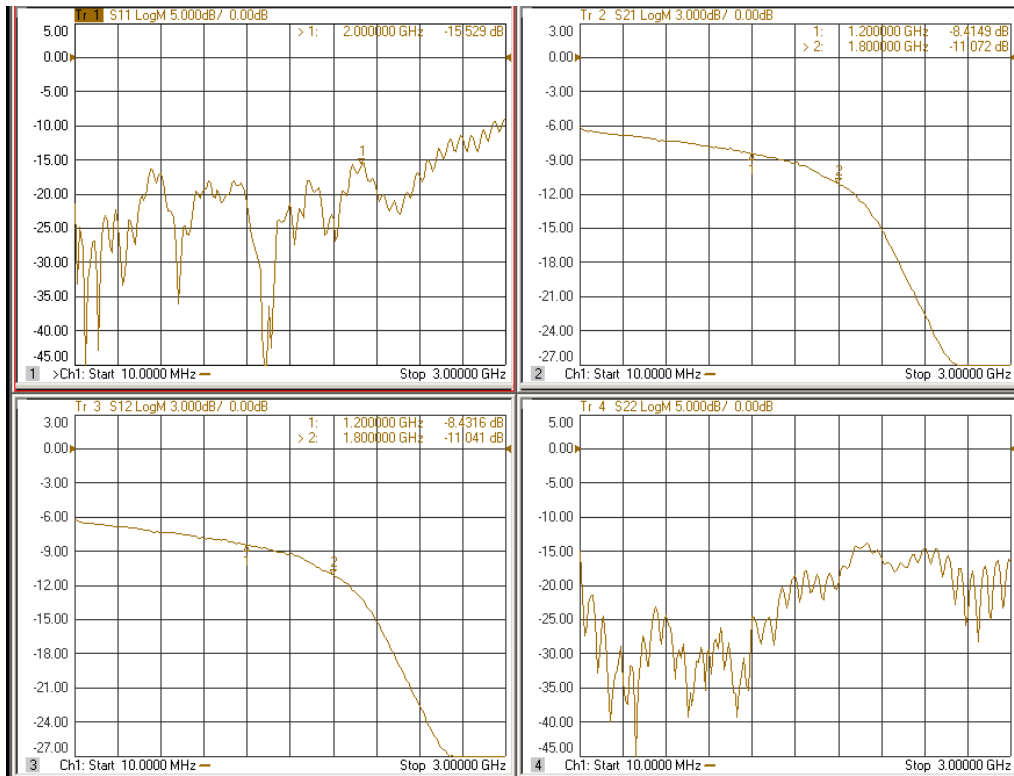

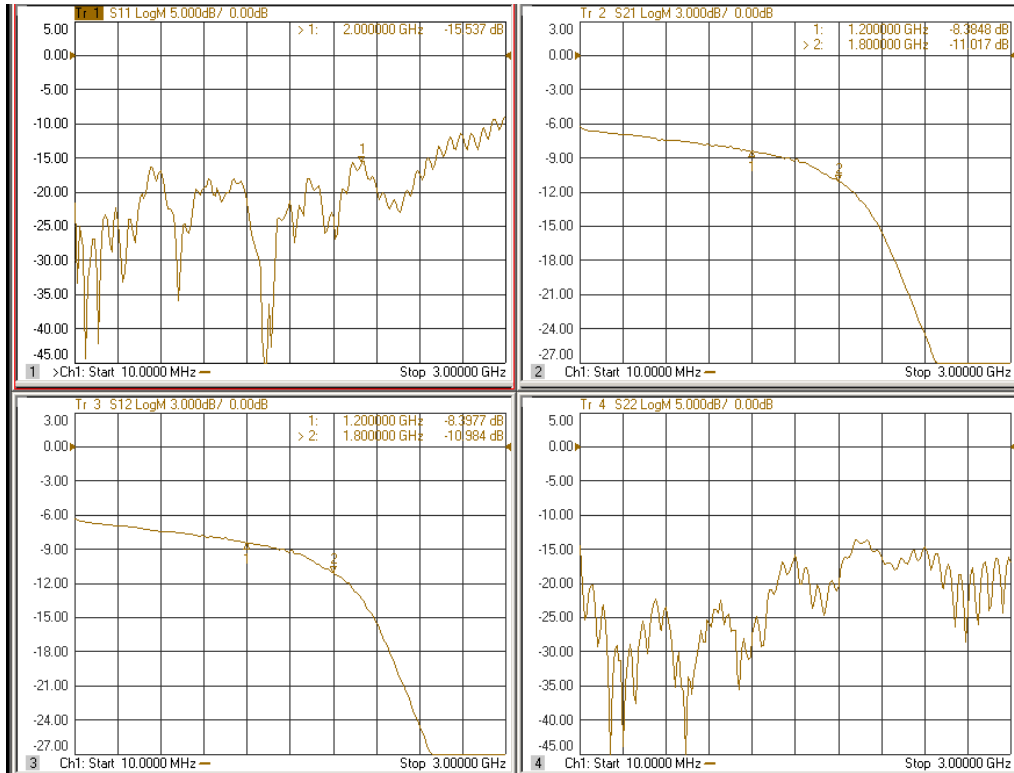Figure 74: Scattering matrix for channel 2C, polarization x and output 6dB2.

Figure 75: Scattering matrix for channel 2C, polarization x and output 6dB3.
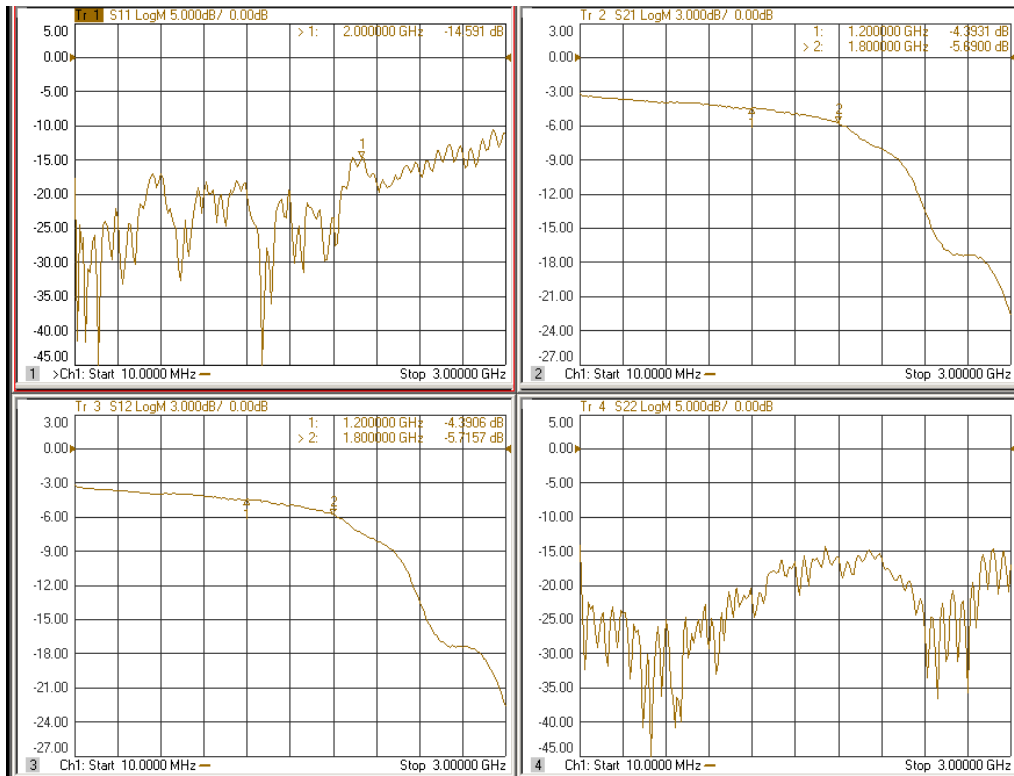

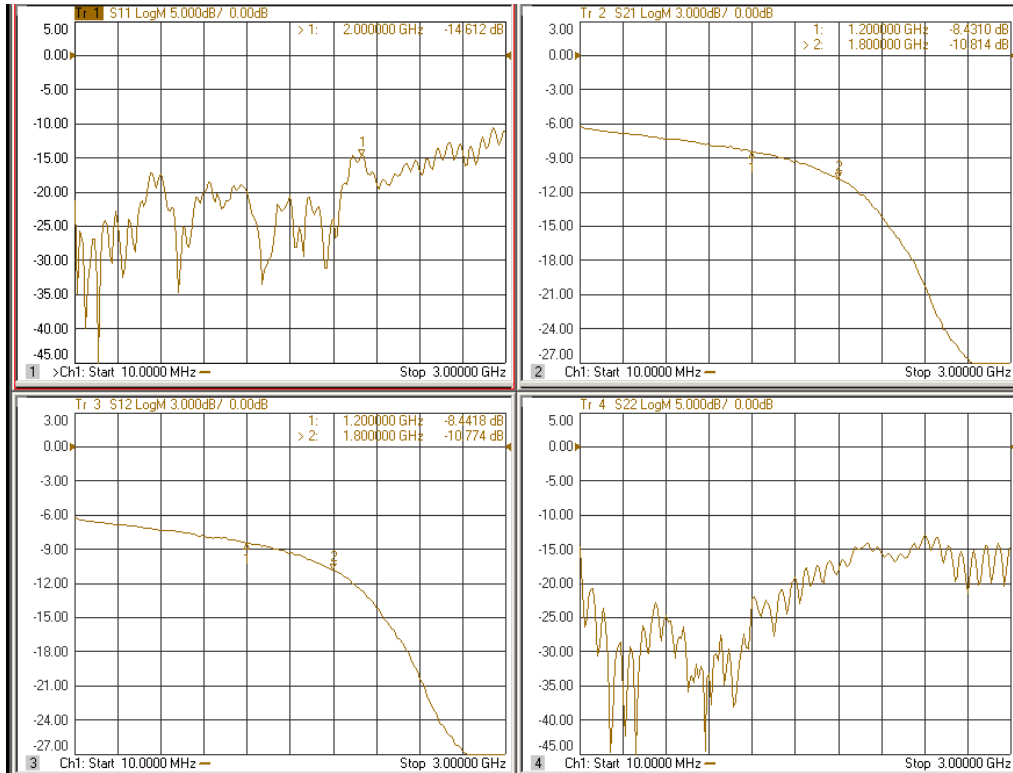Figure 76: Scattering matrix for channel 2C, polarization y and output 3dB1.

Figure 77: Scattering matrix for channel 2C, polarization y and output 6dB2.
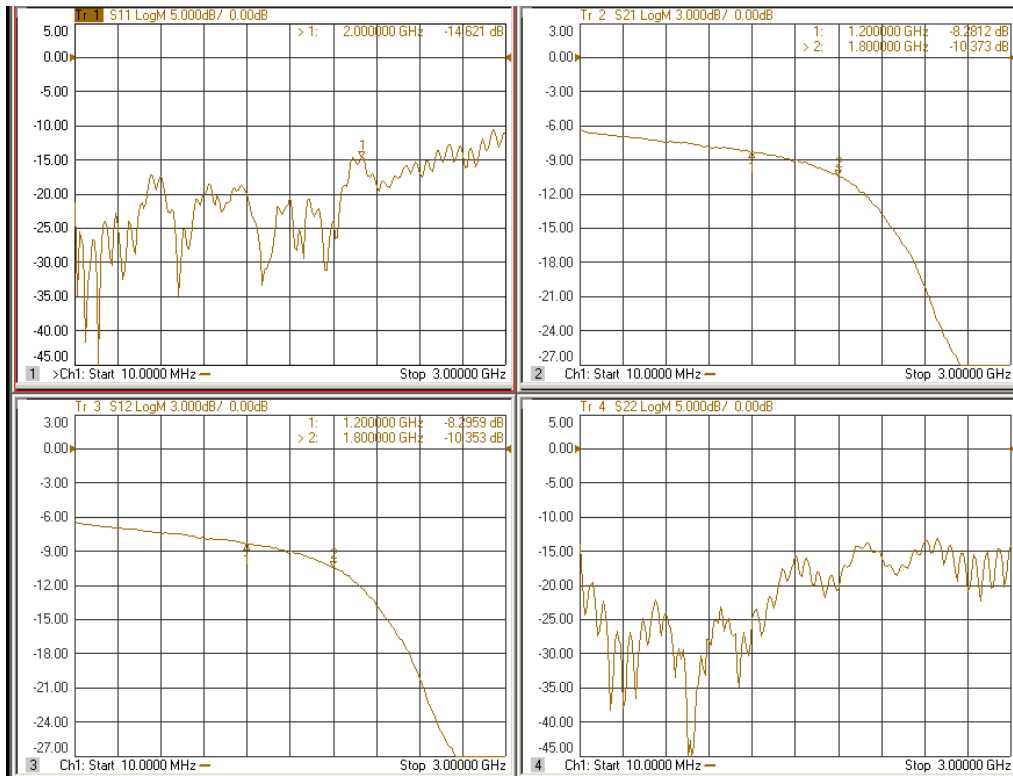

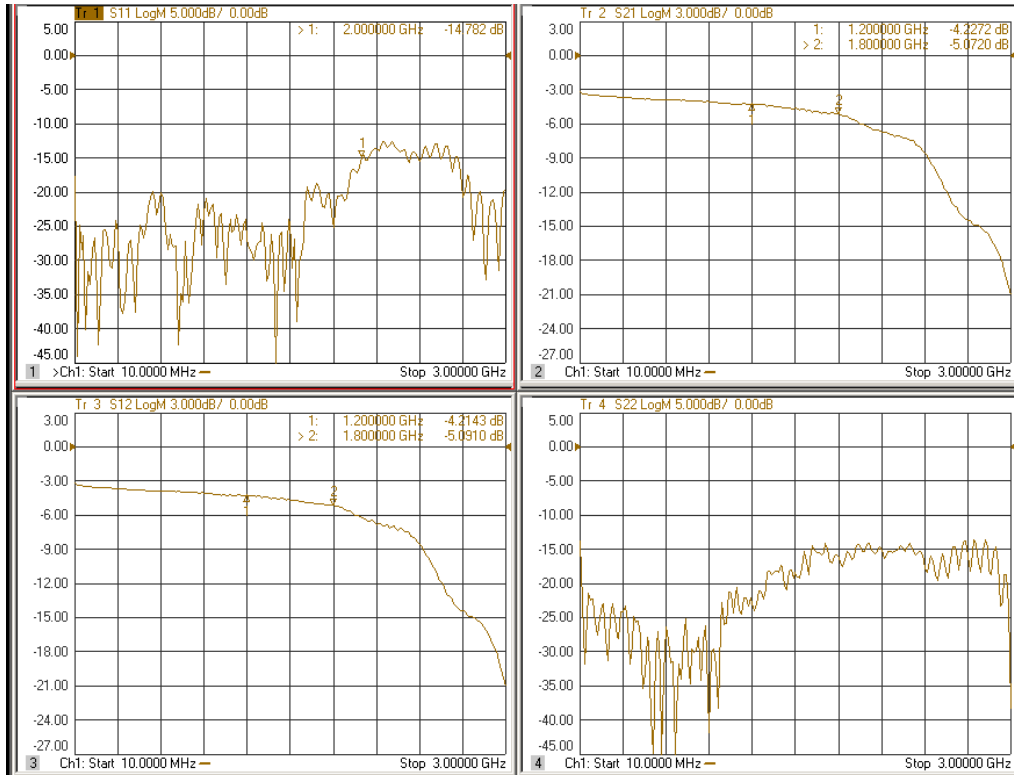Figure 78: Scattering matrix for channel 2C, polarization y and output 6dB3.

Figure 79: Scattering matrix for channel 2D, polarization x and output 3dB1.
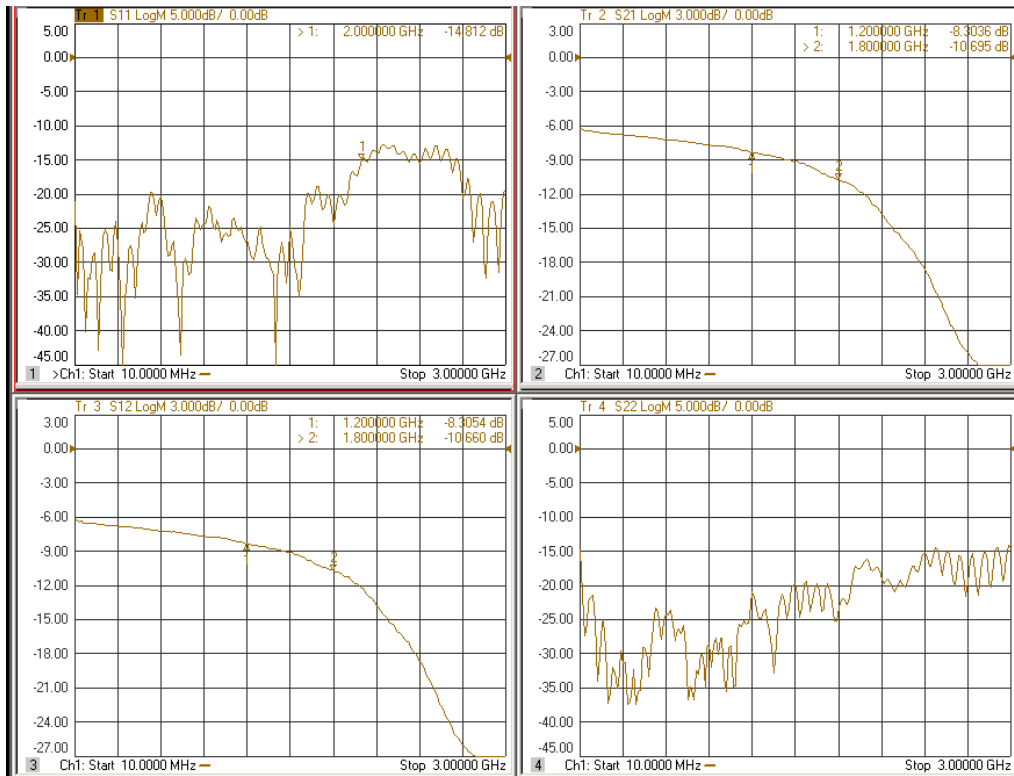

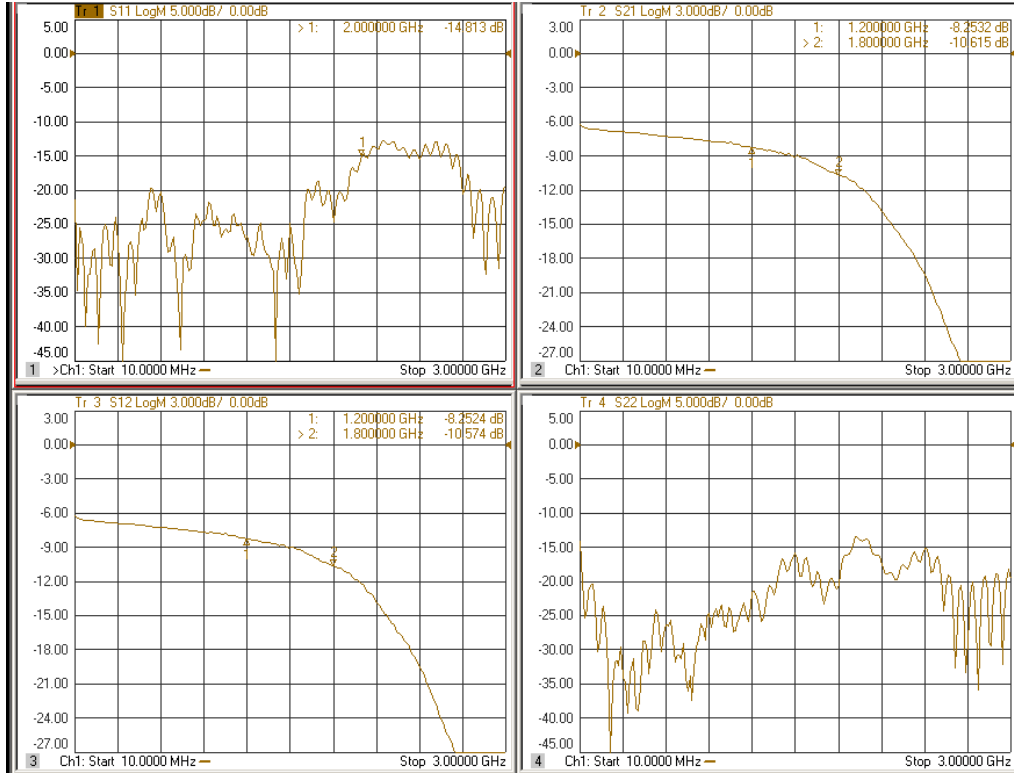Figure 80: Scattering matrix for channel 2D, polarization x and output 6dB2.

Figure 81: Scattering matrix for channel 2D, polarization x and output 6dB3.
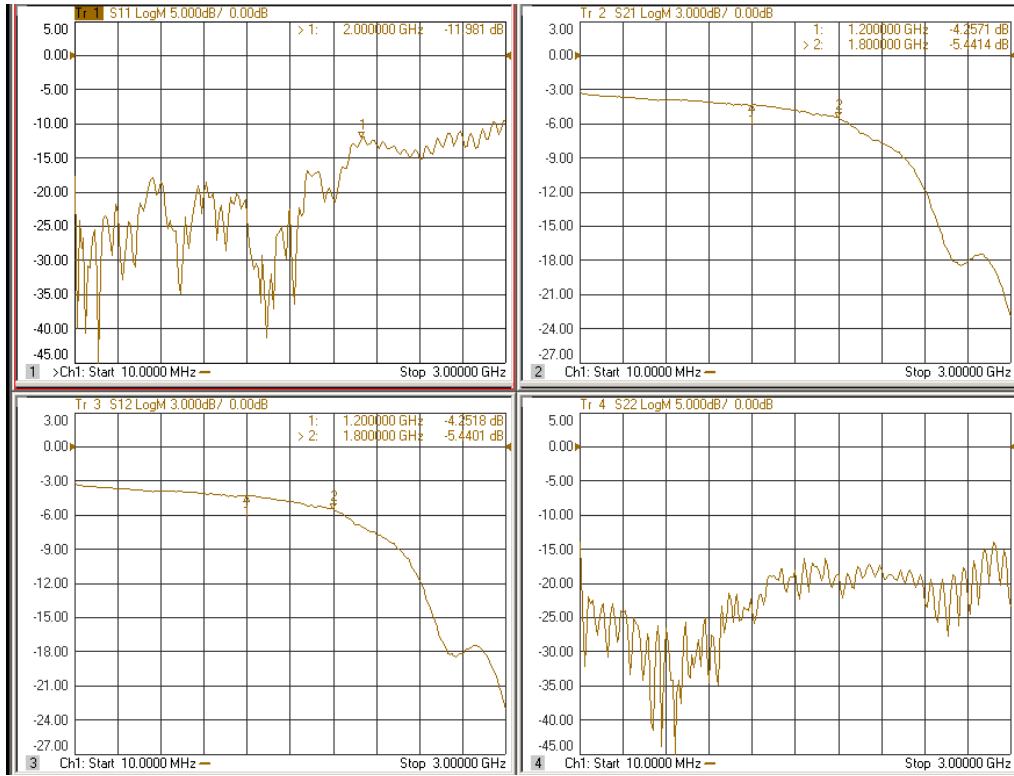

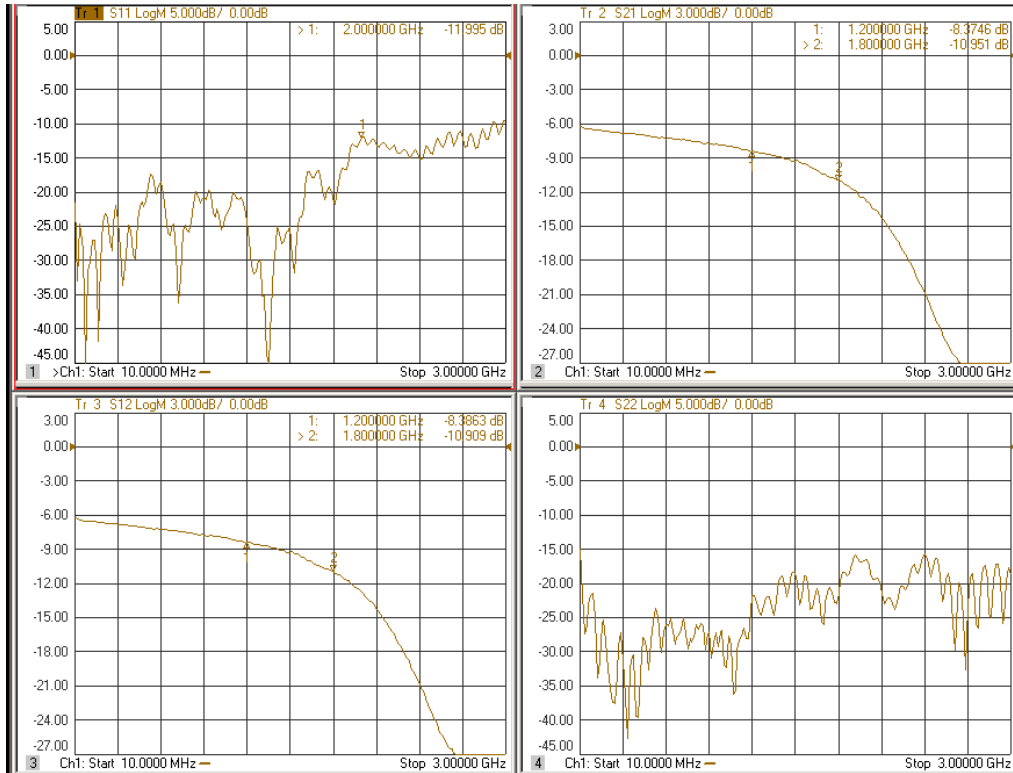Figure 82: Scattering matrix for channel 2D, polarization y and output 3dB1.

Figure 83: Scattering matrix for channel 2D, polarization y and output 6dB2.
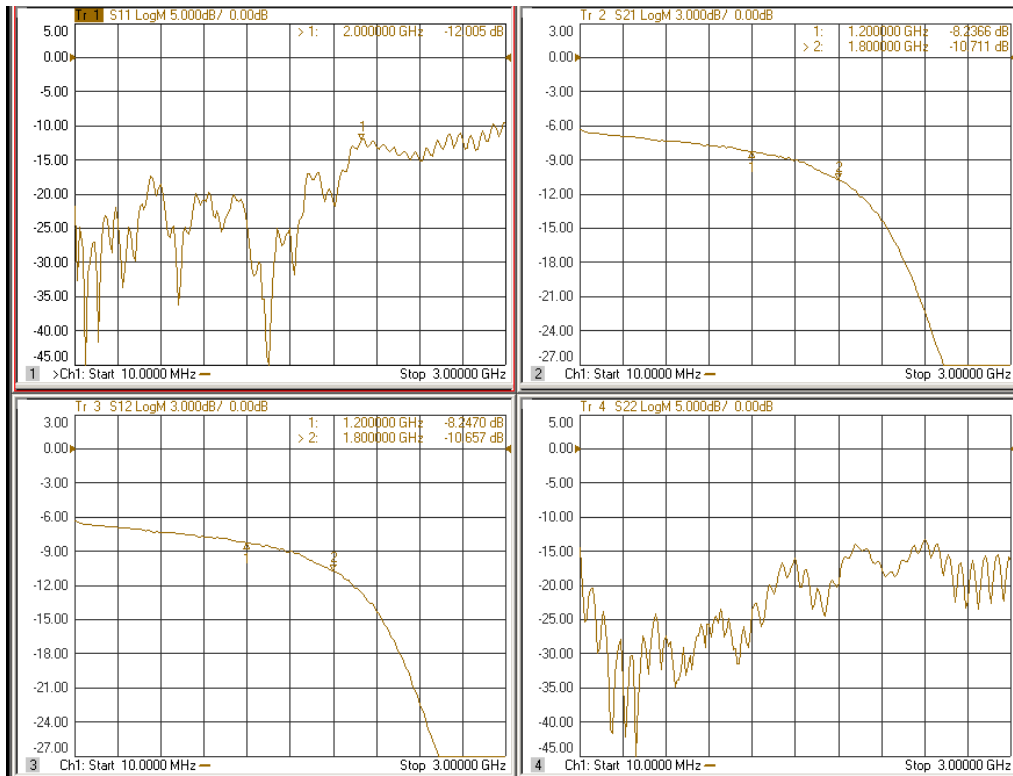

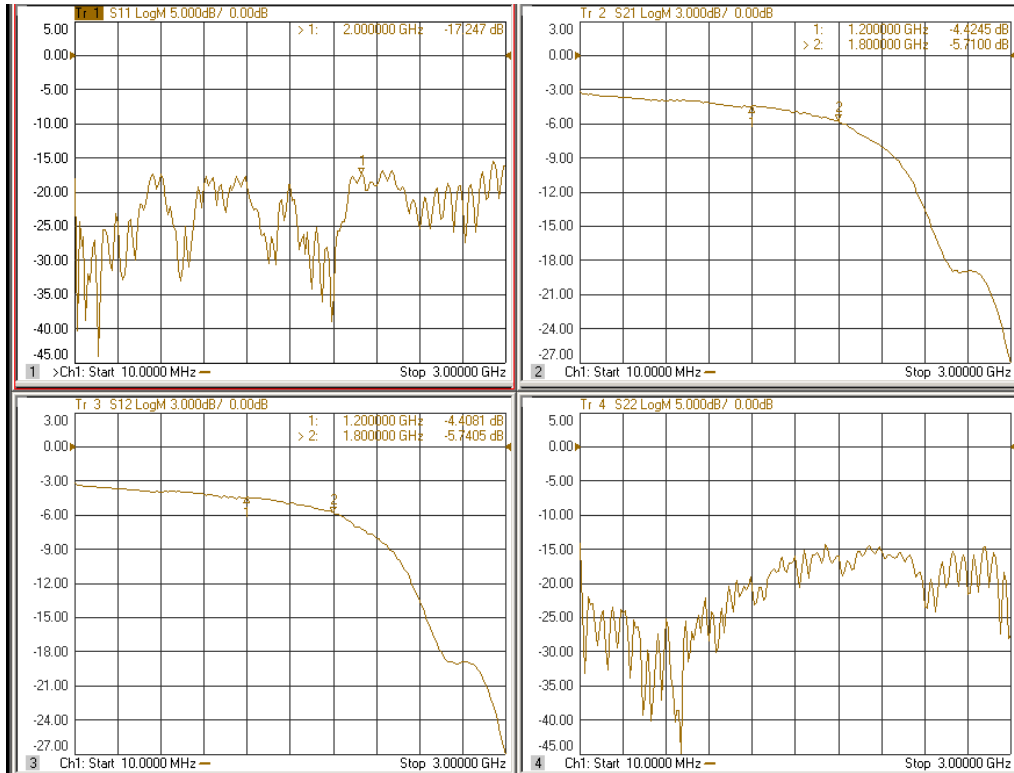Figure 84: Scattering matrix for channel 2D, polarization y and output 6dB3.

Figure 85: Scattering matrix for channel 2E, polarization x and output 3dB1.
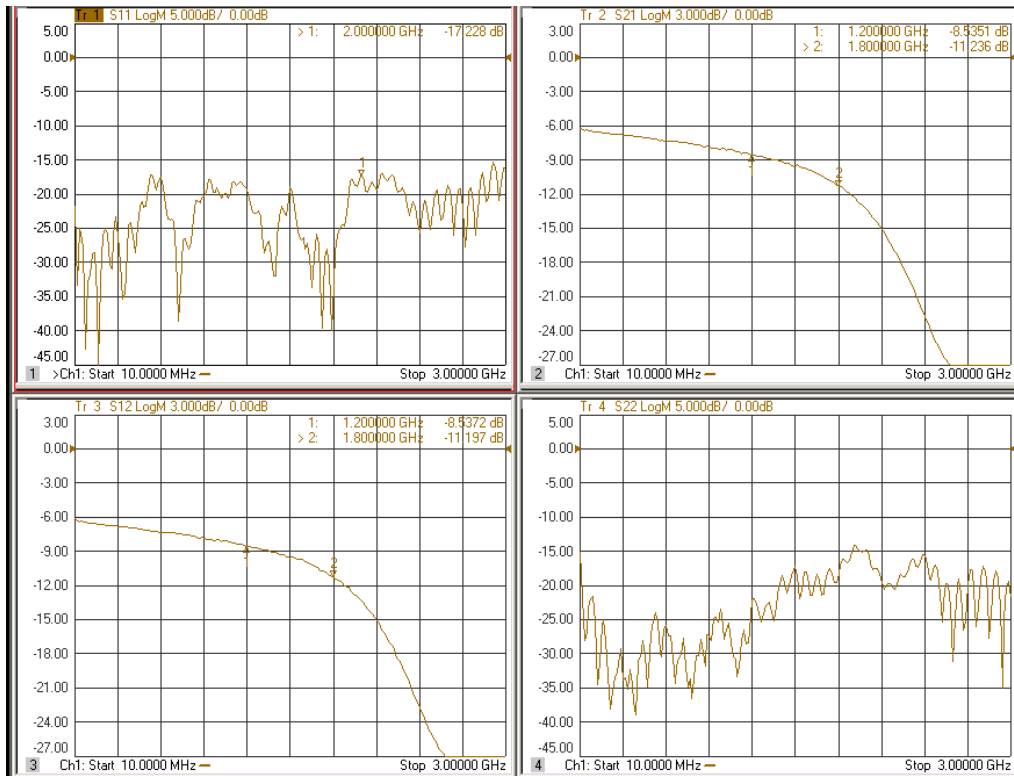

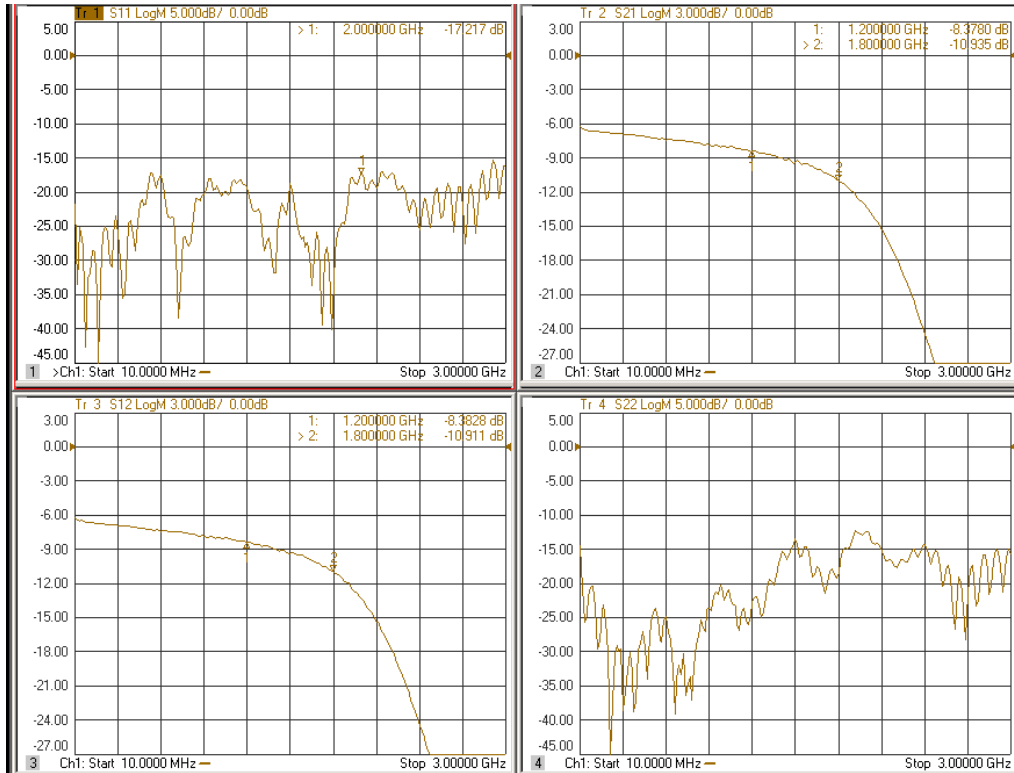Figure 86: Scattering matrix for channel 2E, polarization x and output 6dB2.

Figure 87: Scattering matrix for channel 2E, polarization x and output 6dB3.
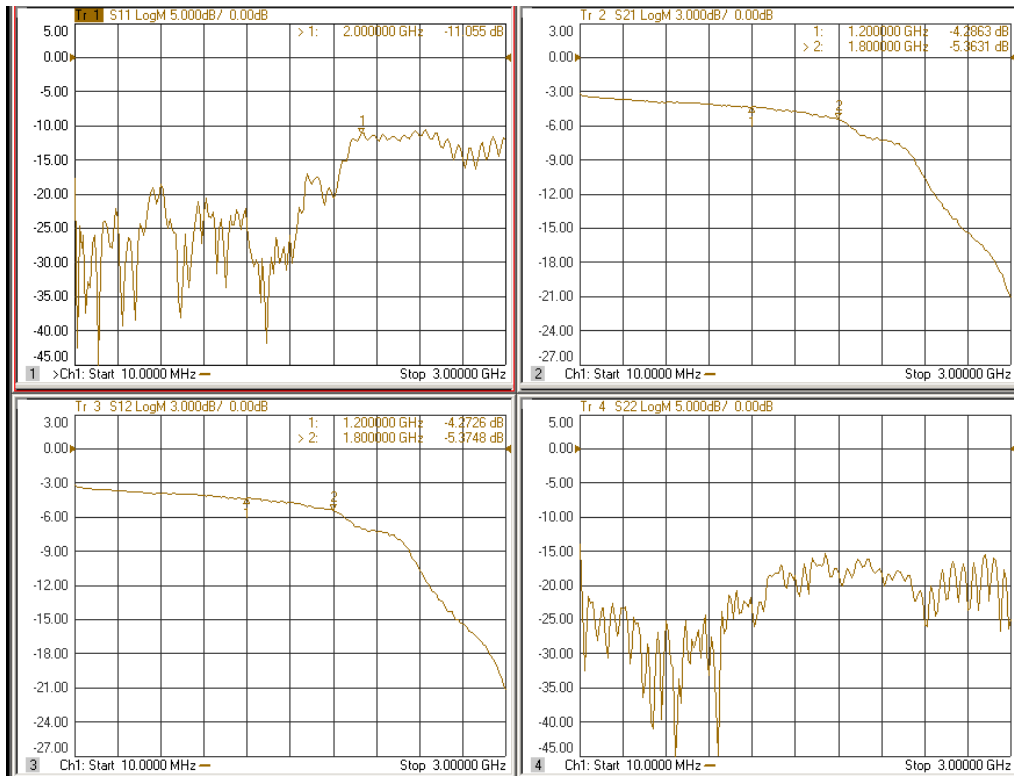

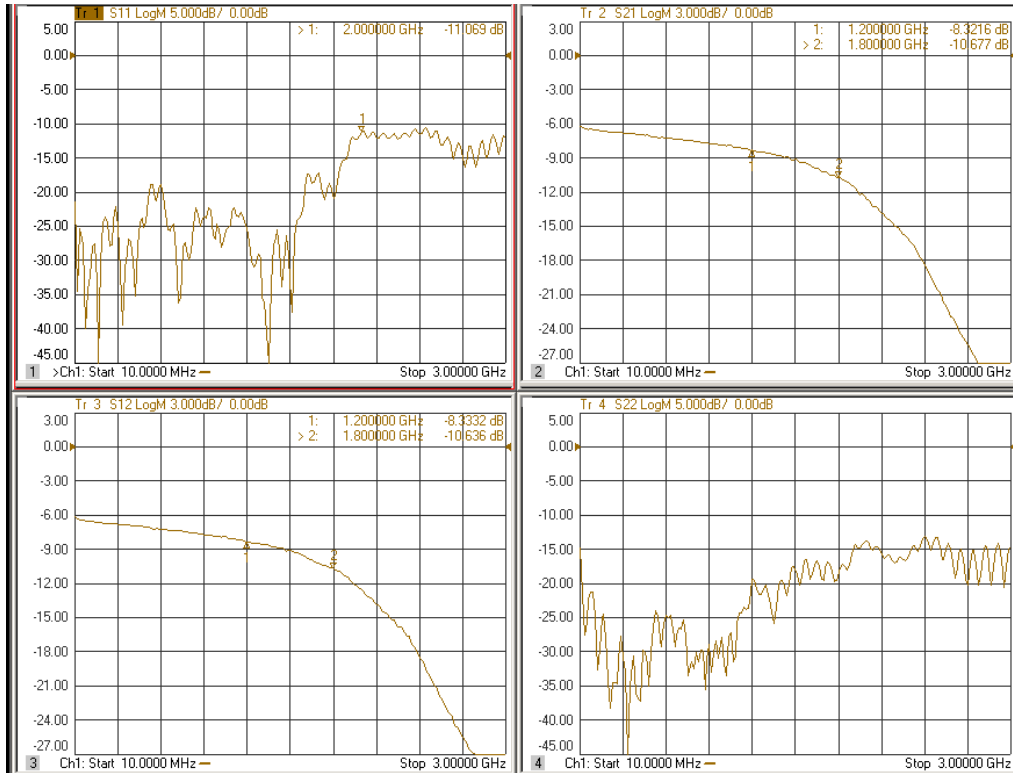Figure 88: Scattering matrix for channel 2E, polarization y and output 3dB1.

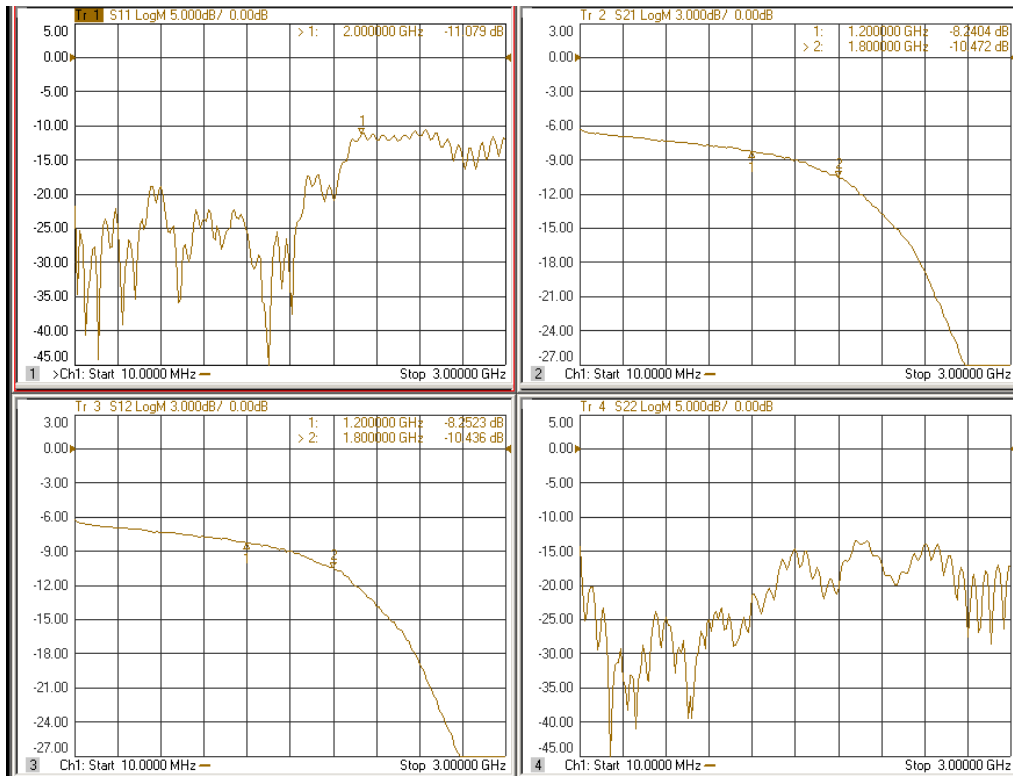Figure 89: Scattering matrix for channel 2E, polarization y and output 6dB2.

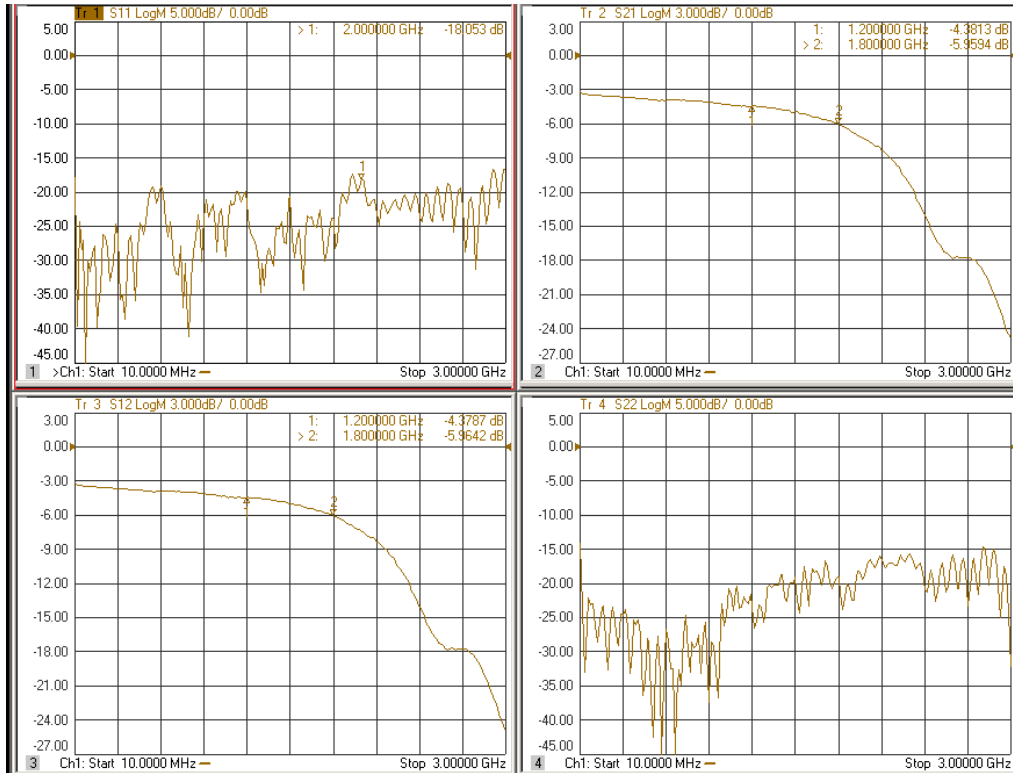Figure 90: Scattering matrix for channel 2E, polarization y and output 6dB3.

46

Figure 91: Scattering matrix for channel 2F, polarization x and output 3dB1.
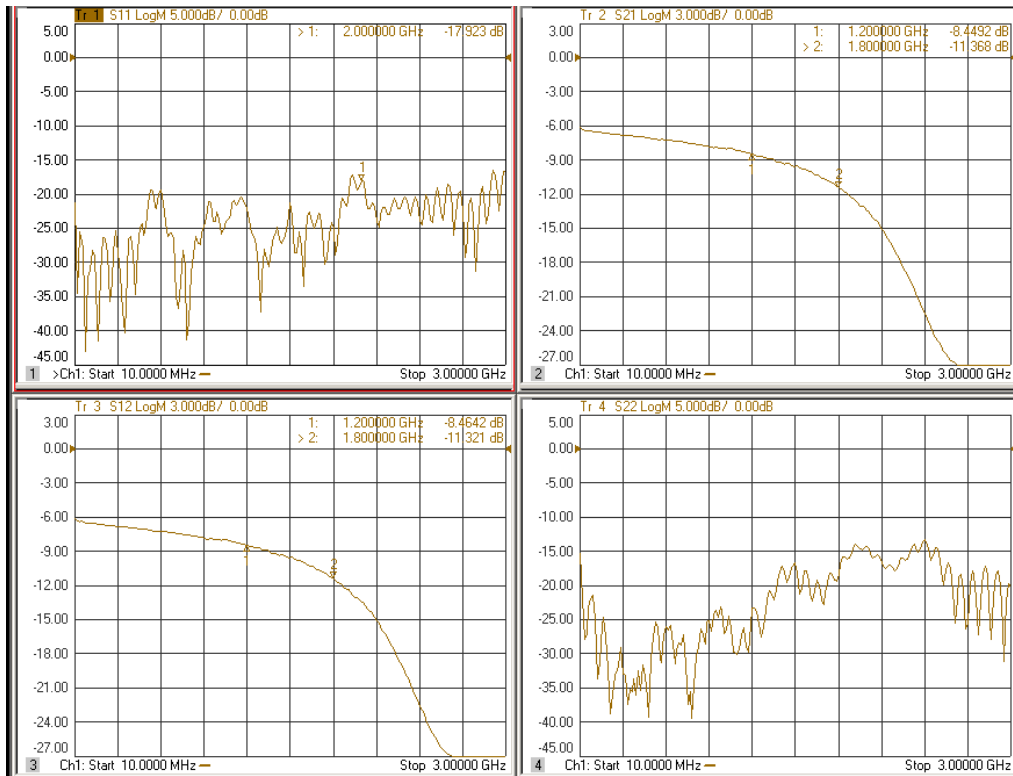

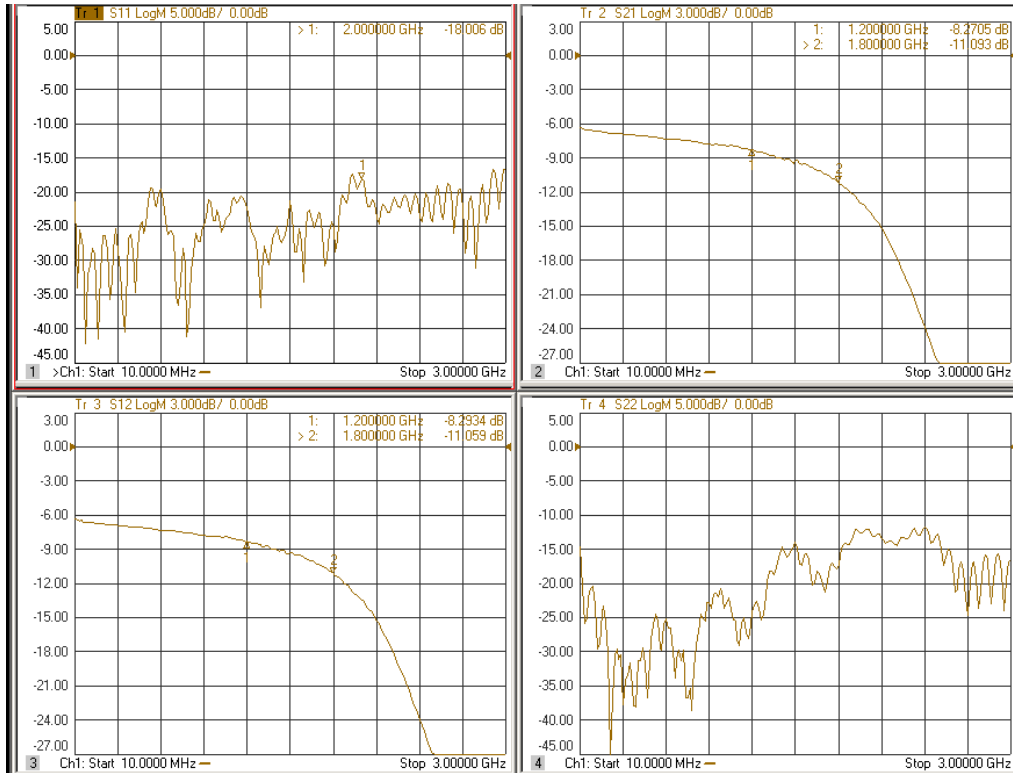Figure 92: Scattering matrix for channel 2F, polarization x and output 6dB2.

Figure 93: Scattering matrix for channel 2F, polarization x and output 6dB3.
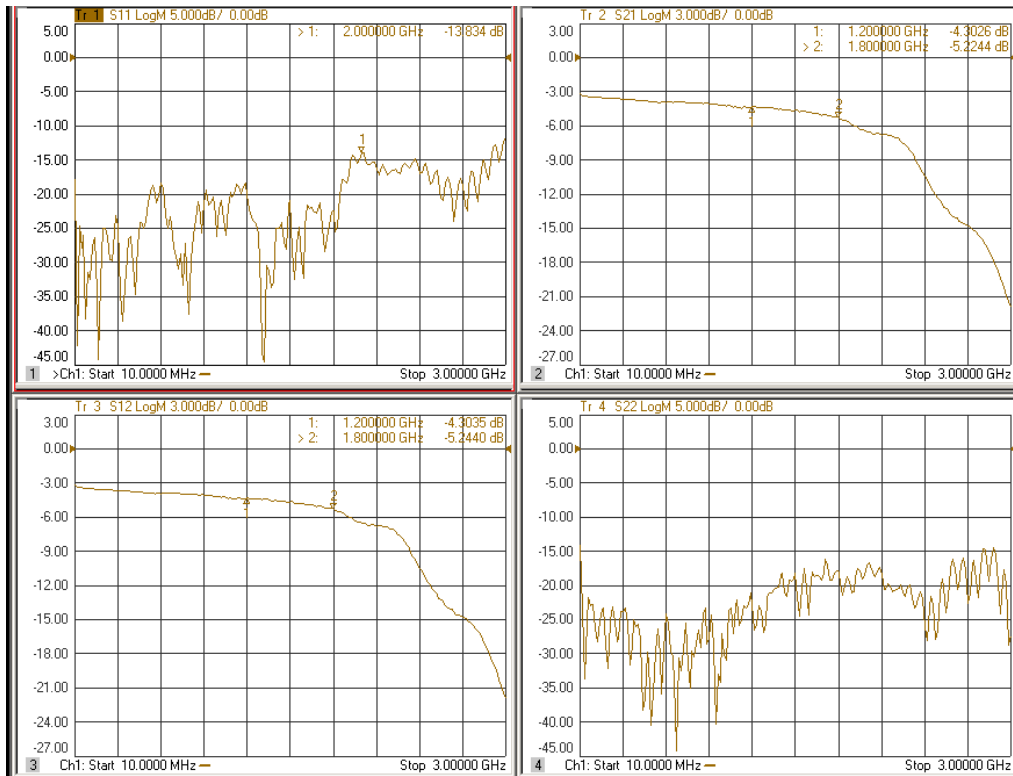

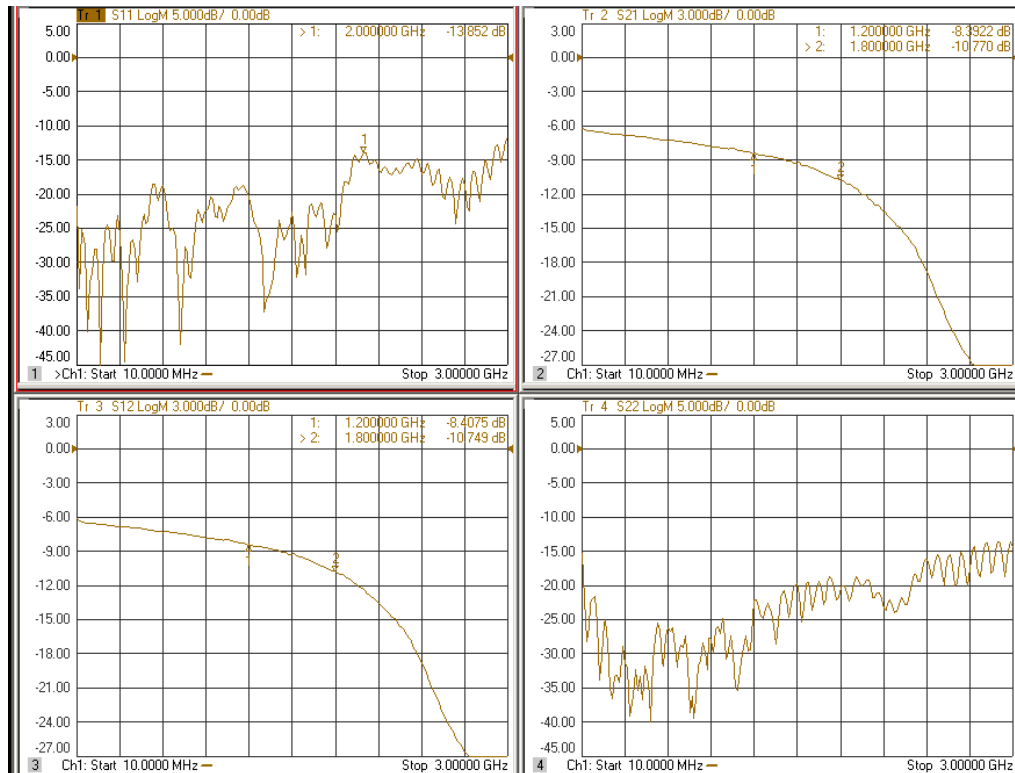Figure 94: Scattering matrix for channel 2F, polarization y and output 3dB1.

Figure 95: Scattering matrix for channel 2F, polarization y and output 6dB2.
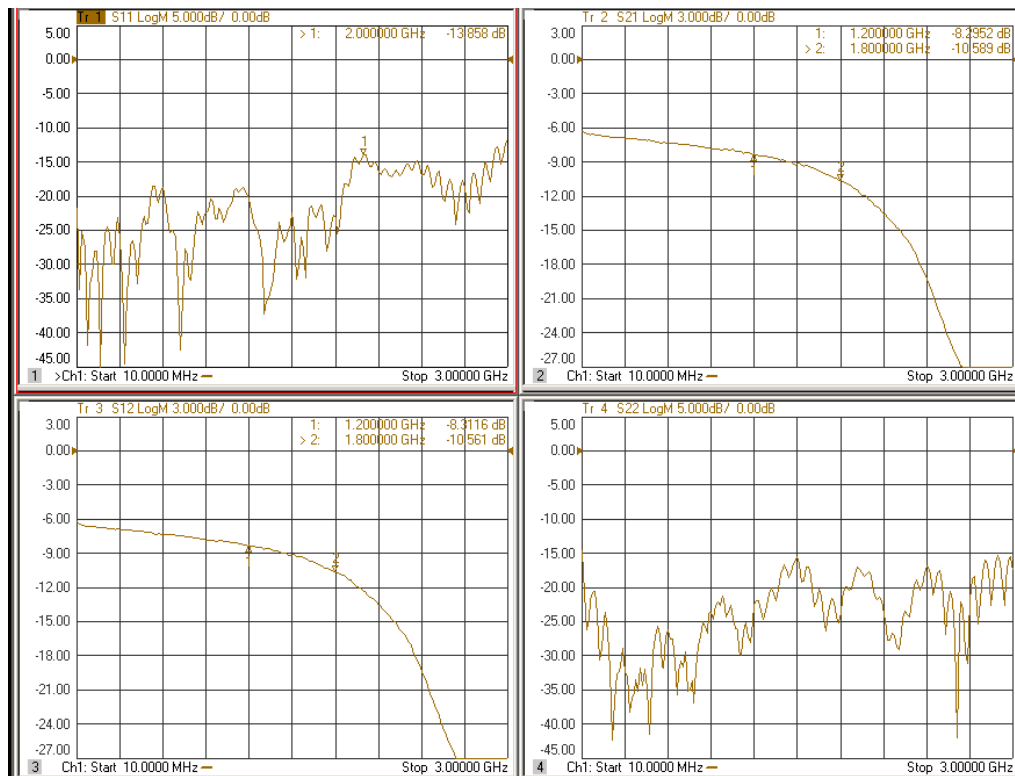

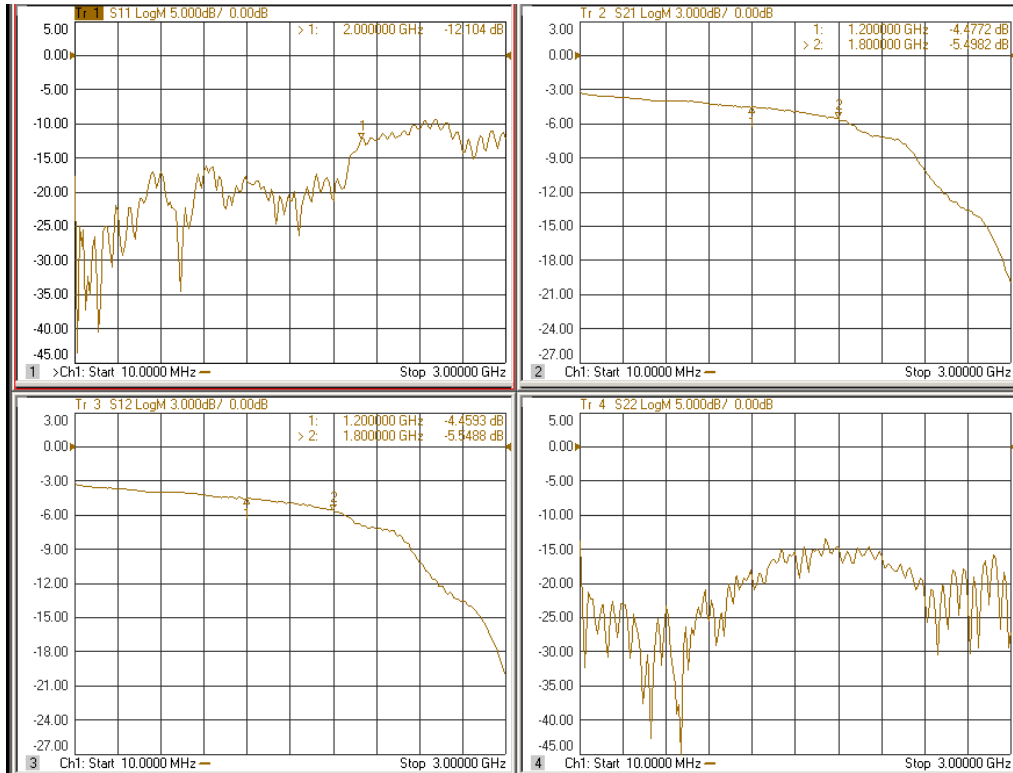Figure 96: Scattering matrix for channel 2F, polarization y and output 6dB3.

Figure 97: Scattering matrix for channel 2G, polarization x and output 3dB1.
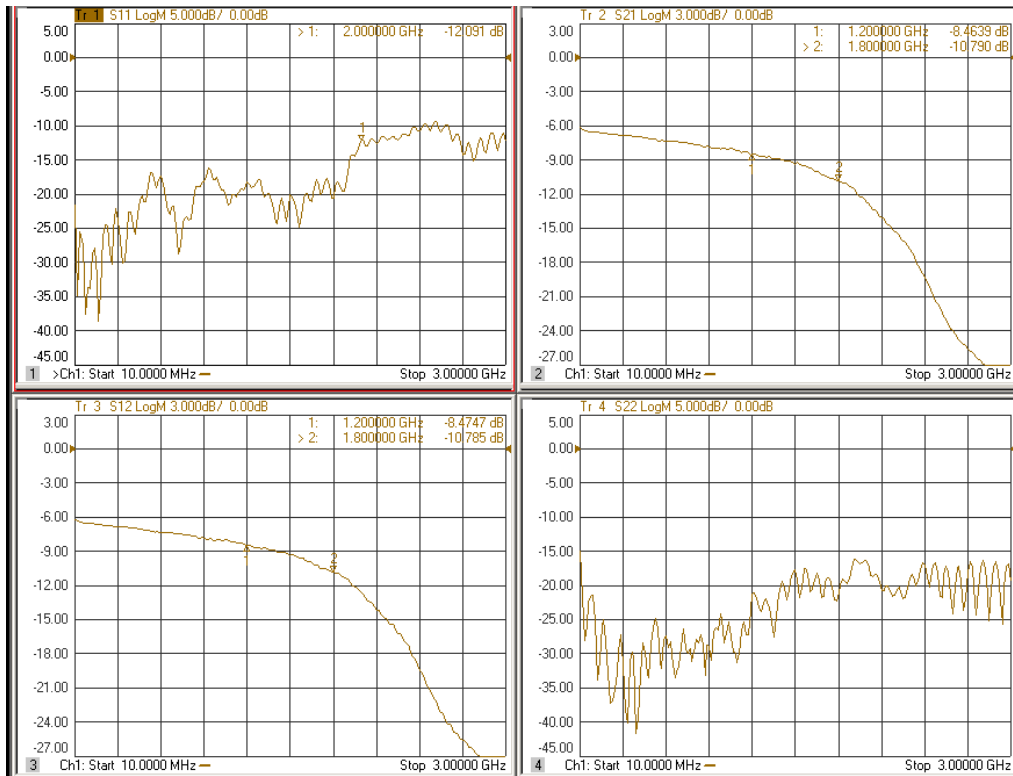

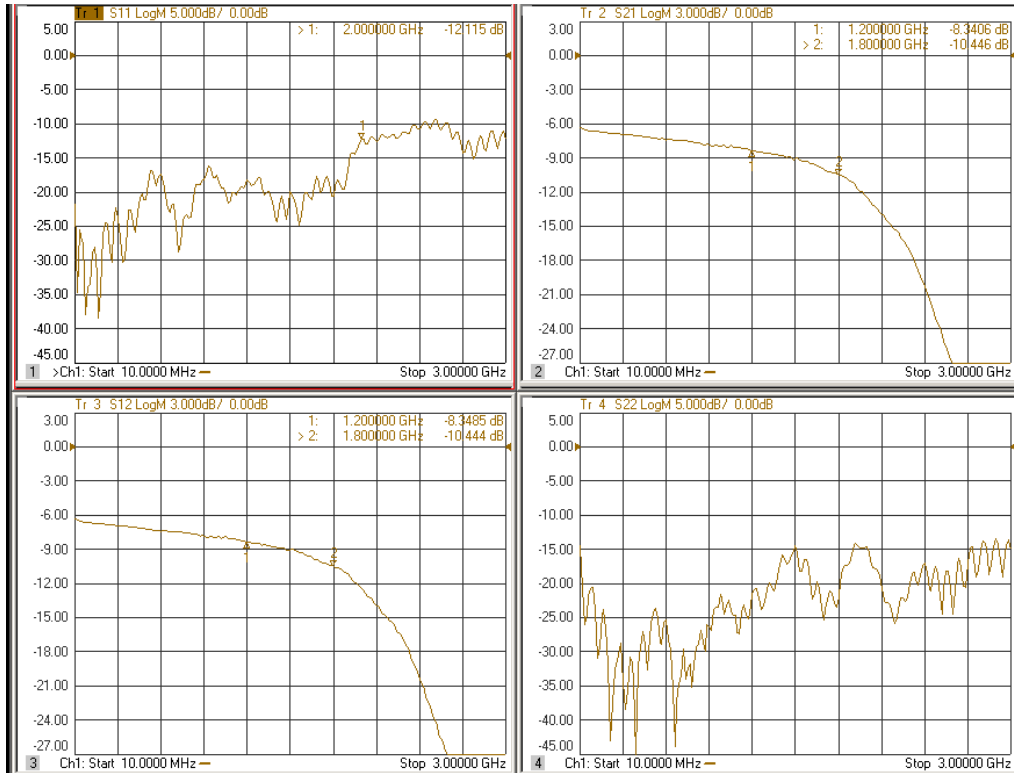Figure 98: Scattering matrix for channel 2G, polarization x and output 6dB2.

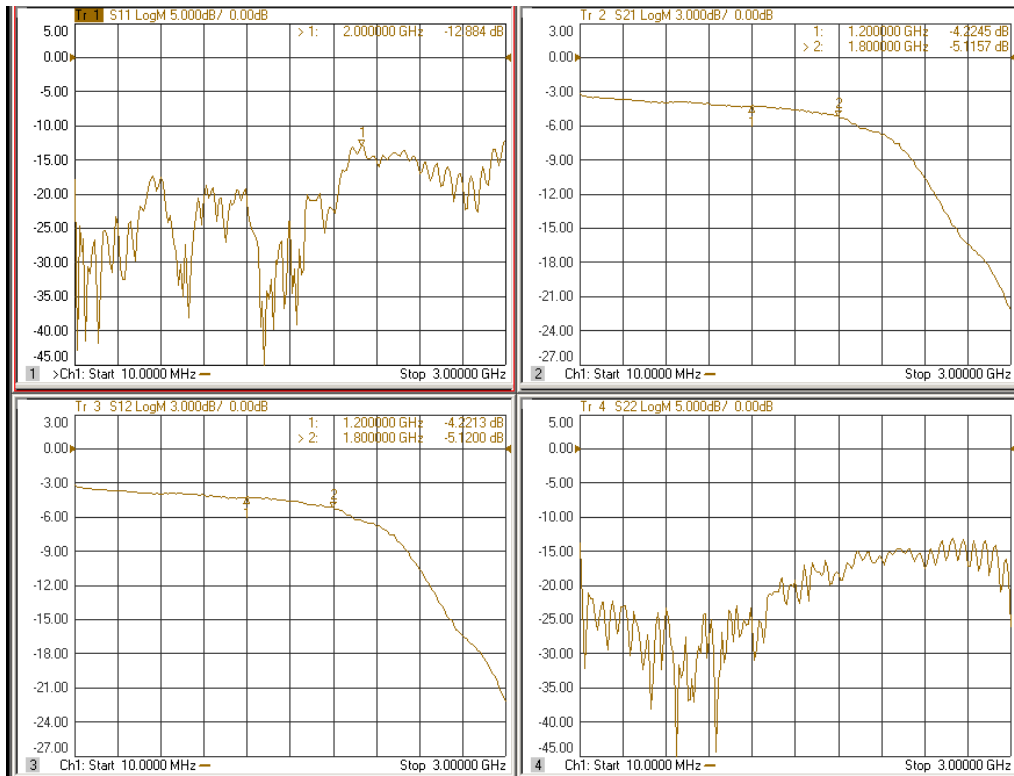Figure 99: Scattering matrix for channel 2G, polarization x and output 6dB3.

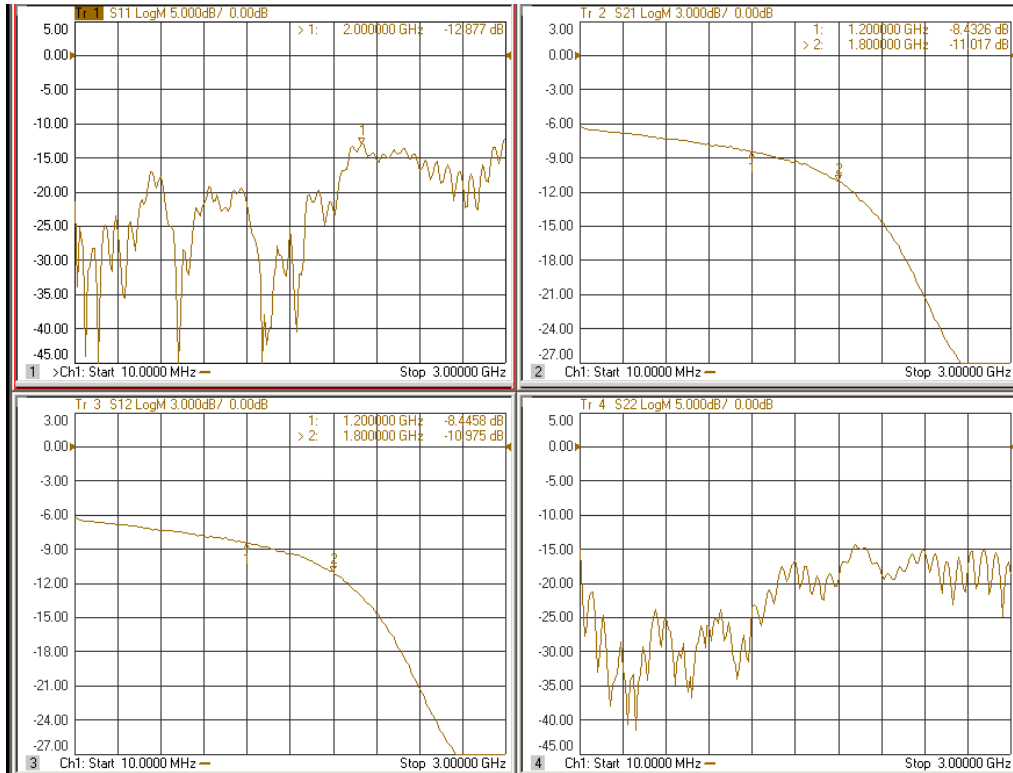Figure 100: Scattering matrix for channel 2G, polarization y and output 3dB1.

Figure 101: Scattering matrix for channel 2G, polarization y and output 6dB2.
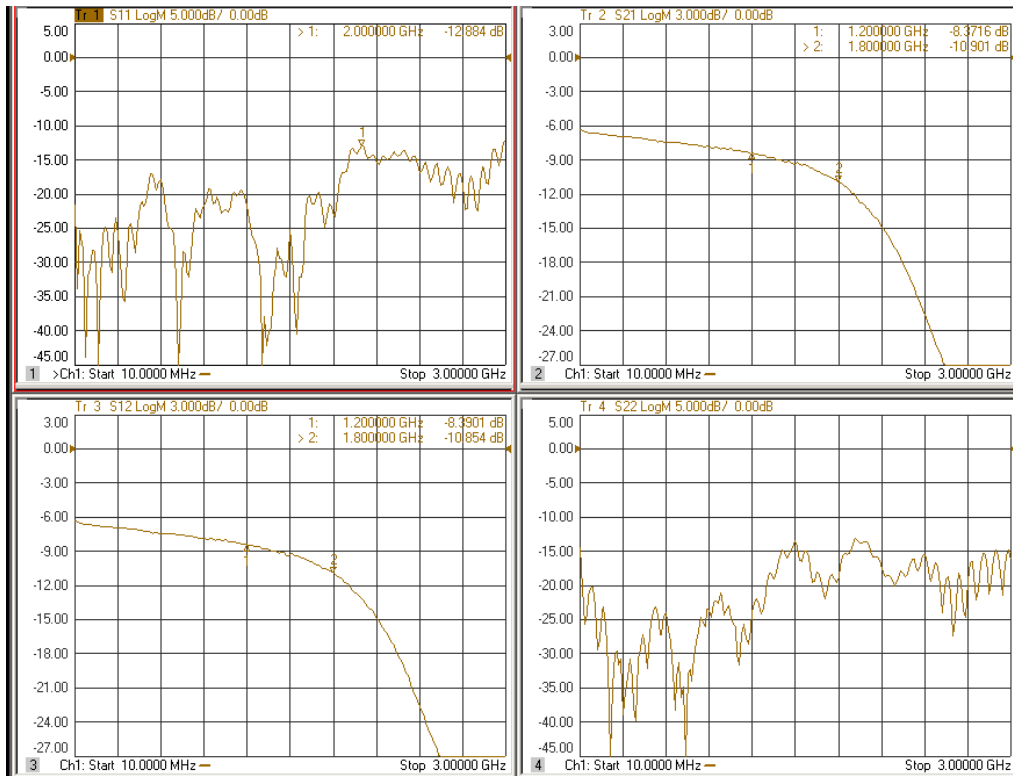

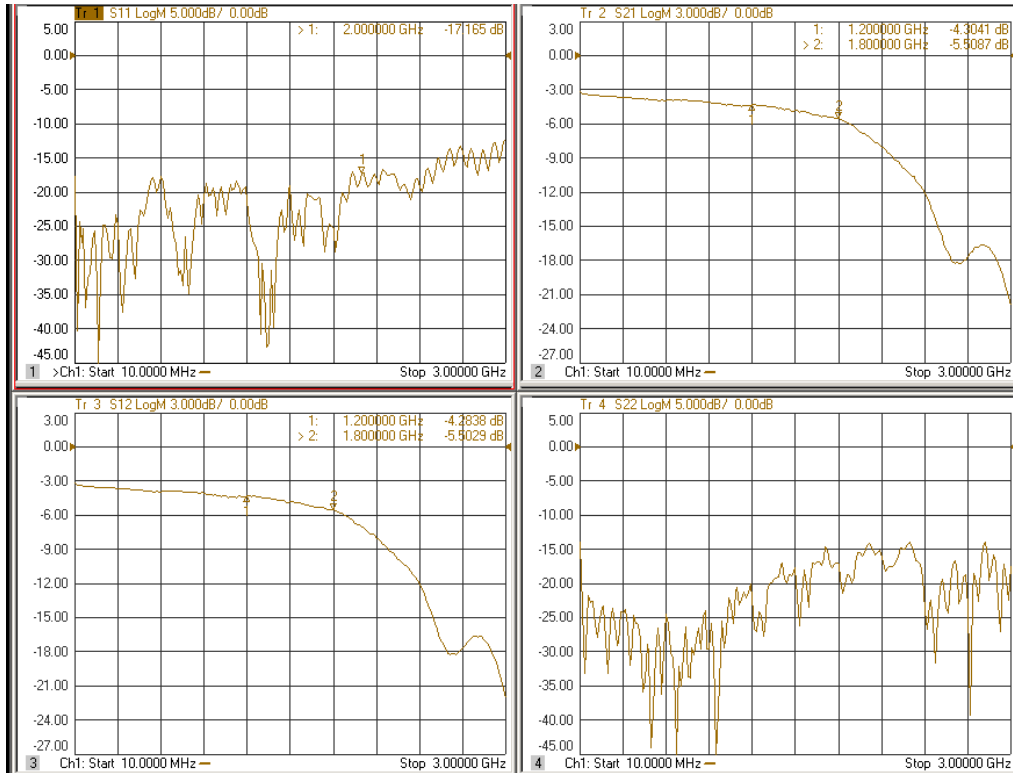Figure 102: Scattering matrix for channel 2G, polarization y and output 6dB3.

Figure 103: Scattering matrix for channel 2H, polarization x and output 3dB1.
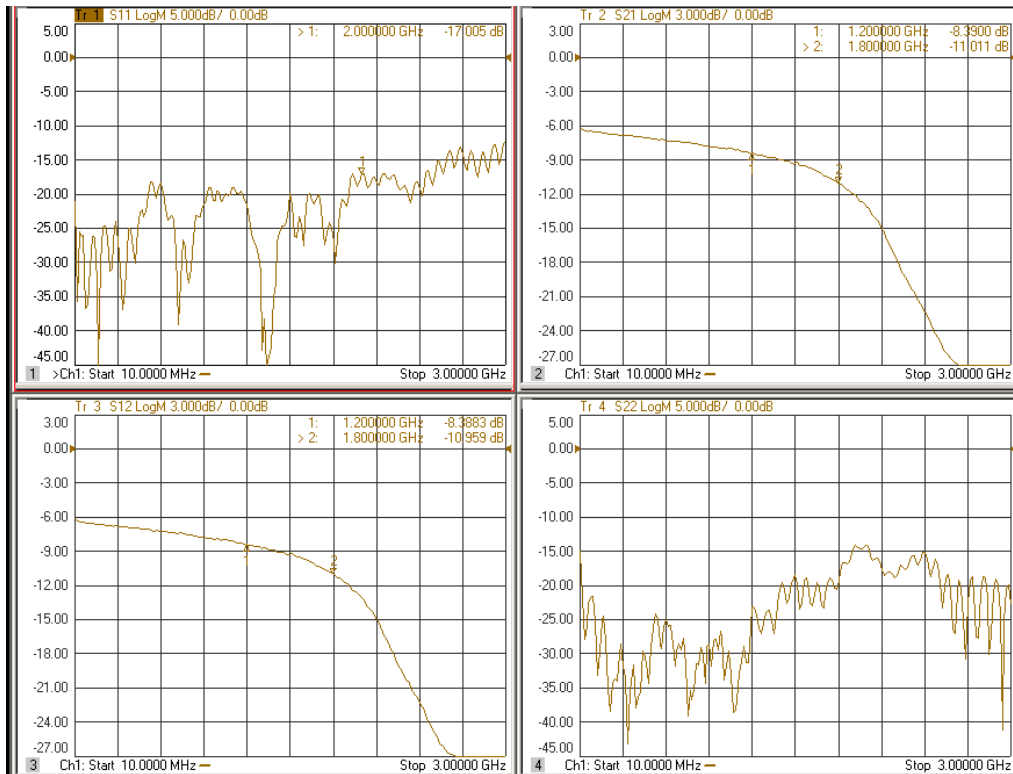

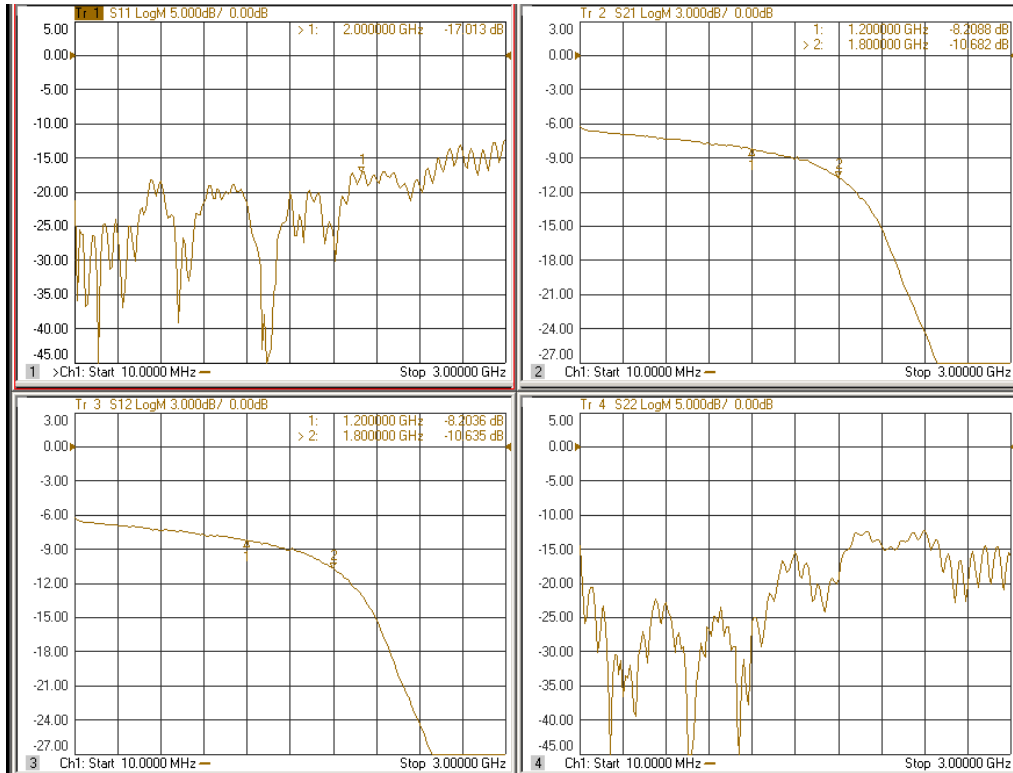Figure 104: Scattering matrix for channel 2H, polarization x and output 6dB2.

Figure 105: Scattering matrix for channel 2H, polarization x and output 6dB3.
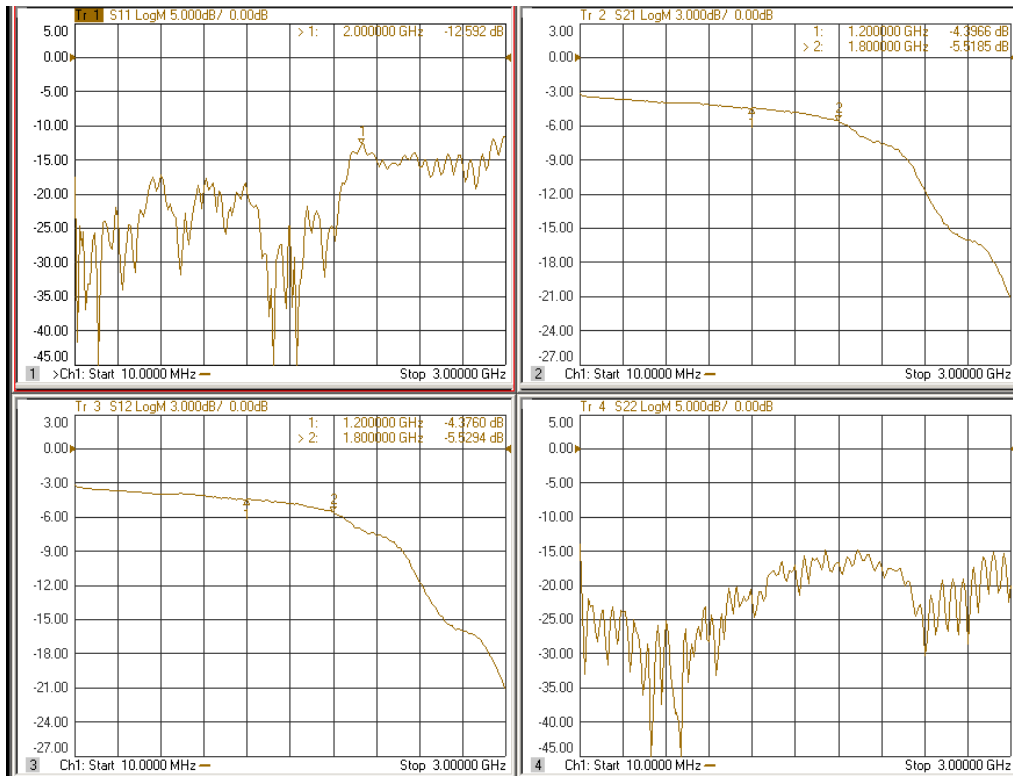

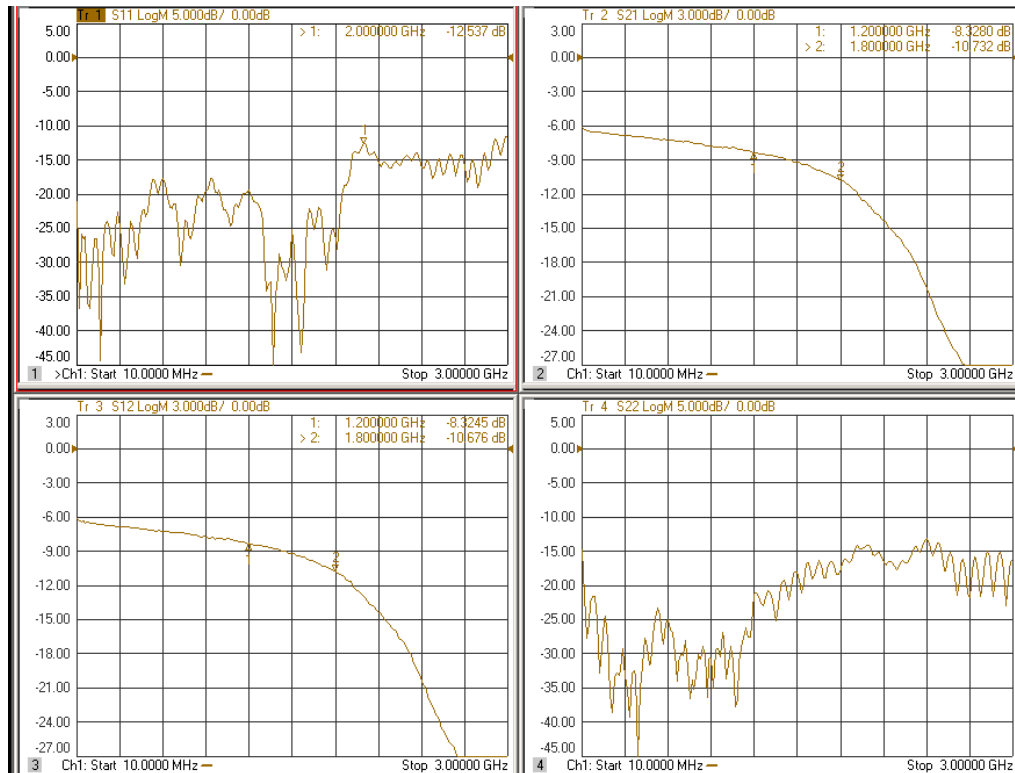Figure 106: Scattering matrix for channel 2H, polarization y and output 3dB1.

Figure 107: Scattering matrix for channel 2H, polarization y and output 6dB2.
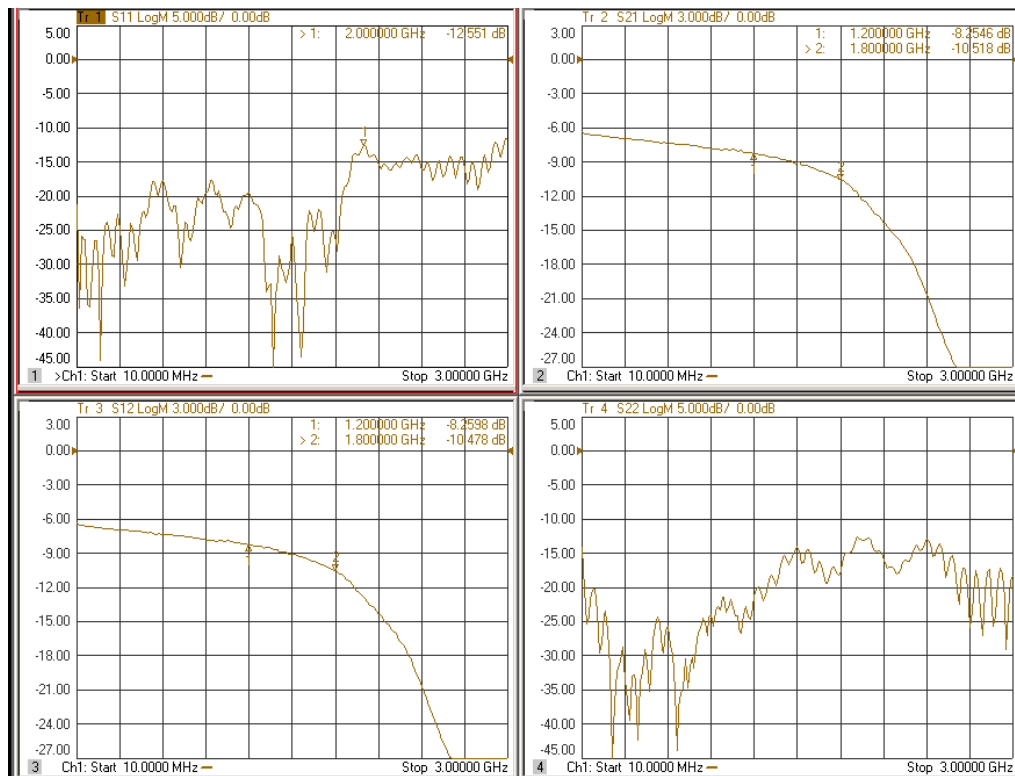

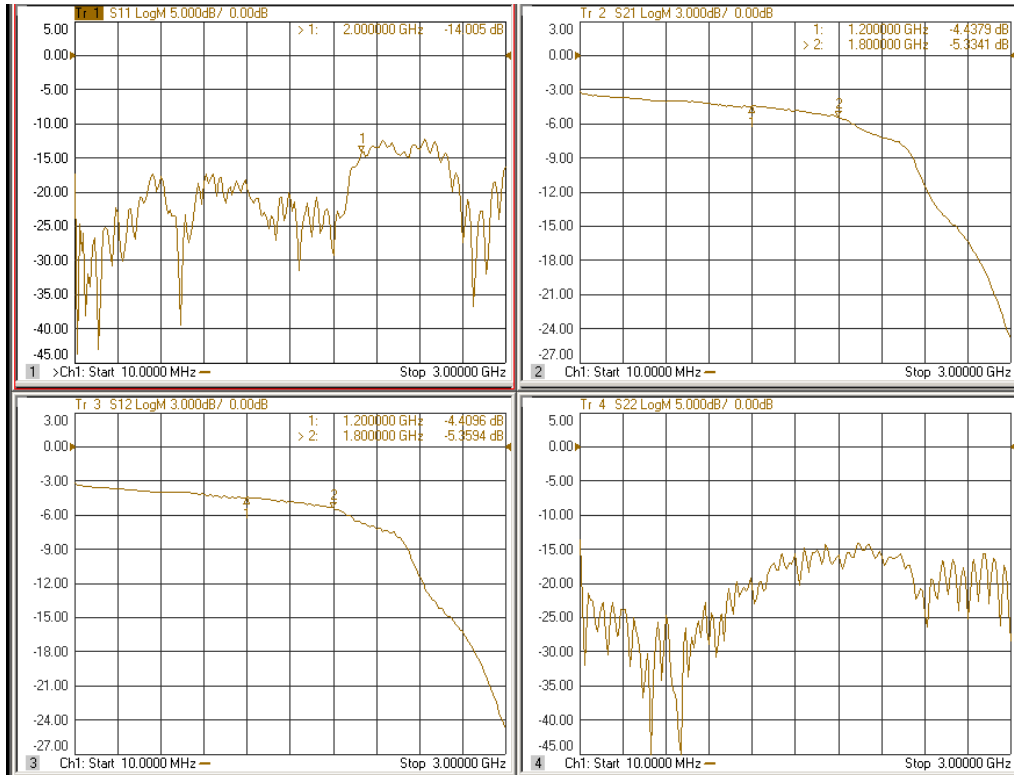Figure 108: Scattering matrix for channel 2H, polarization y and output 6dB3.

Figure 109: Scattering matrix for channel 2J, polarization x and output 3dB1.
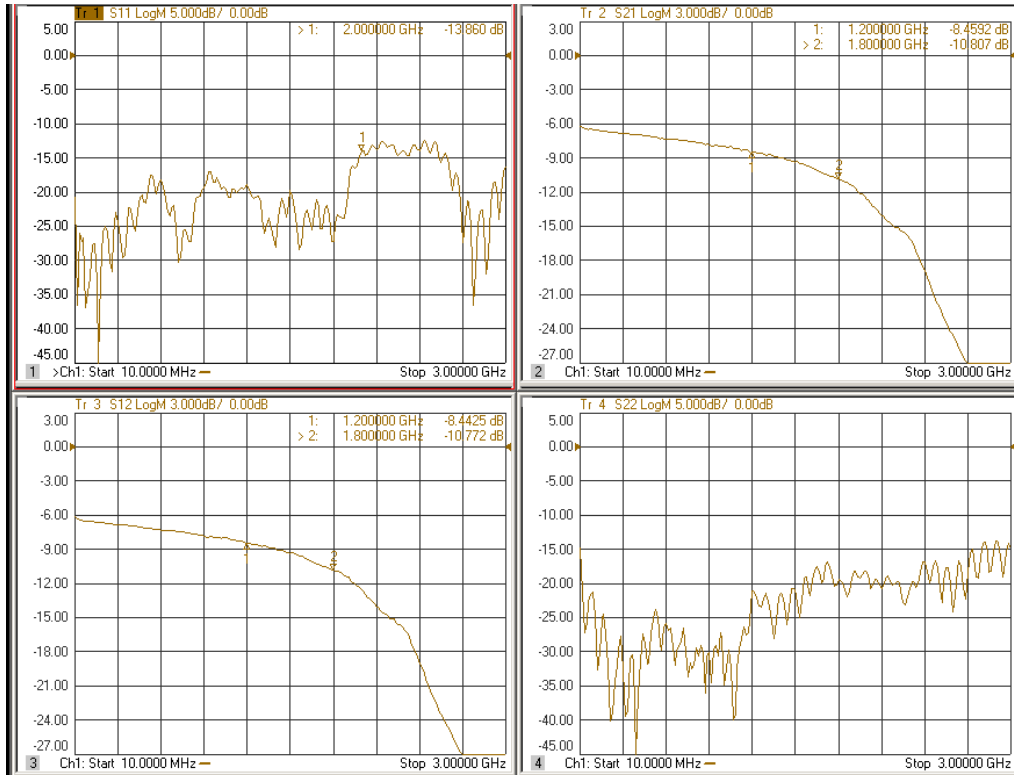

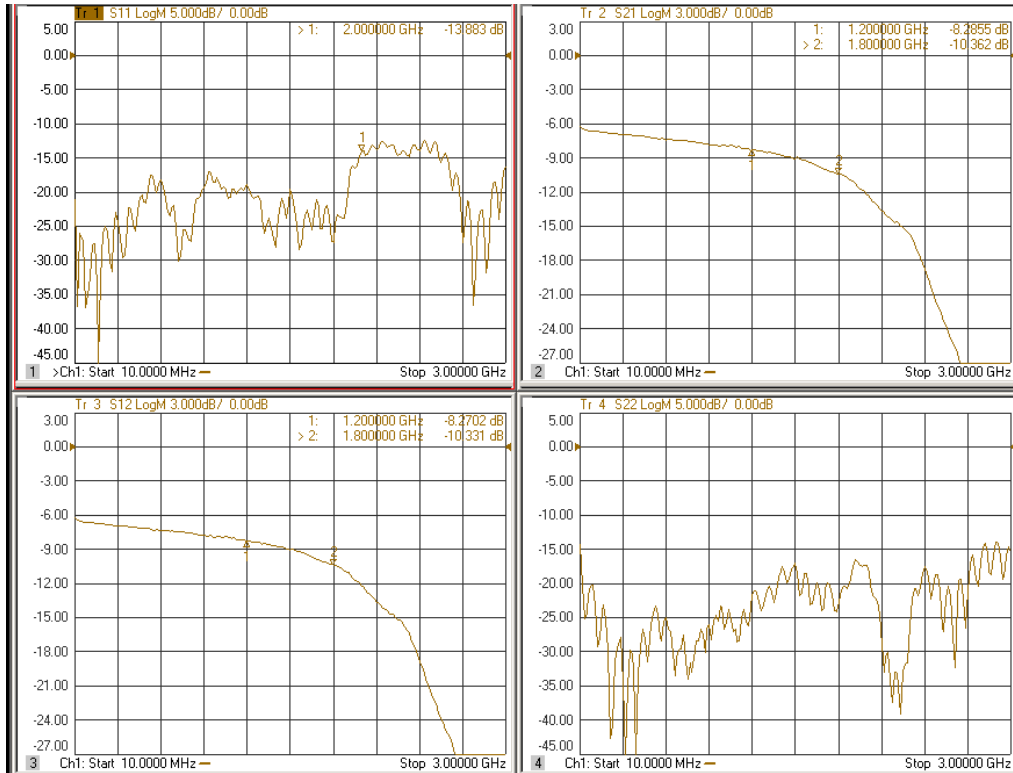Figure 110: Scattering matrix for channel 2J, polarization x and output 6dB2.

Figure 111: Scattering matrix for channel 2J, polarization x and output 6dB3.
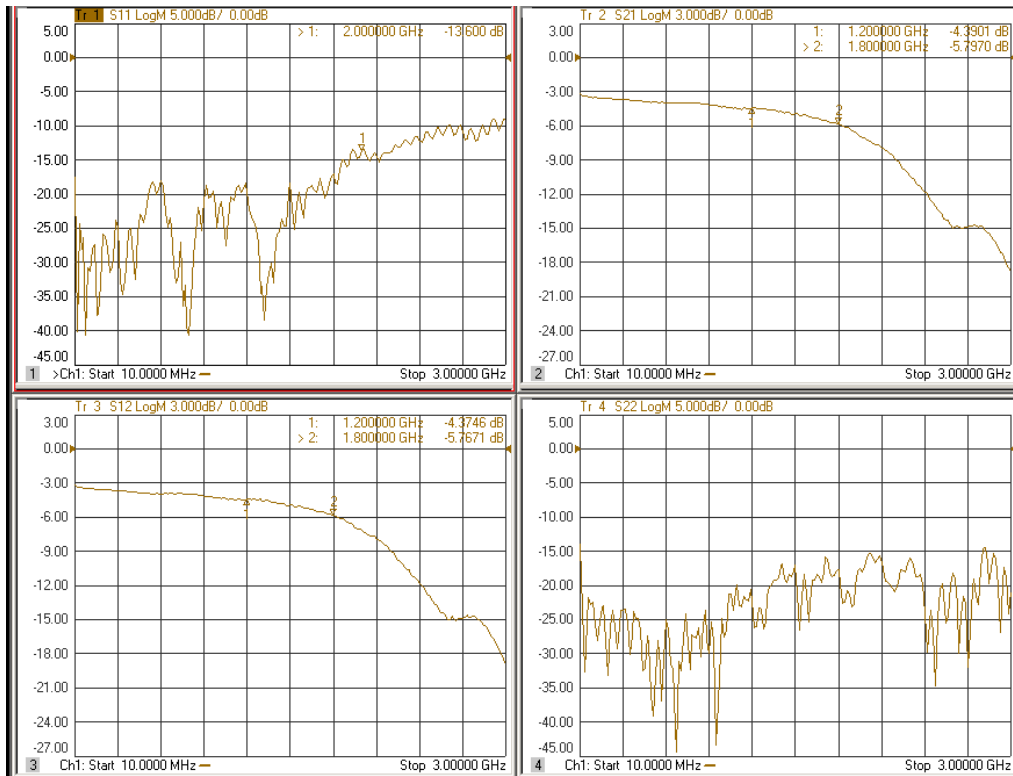

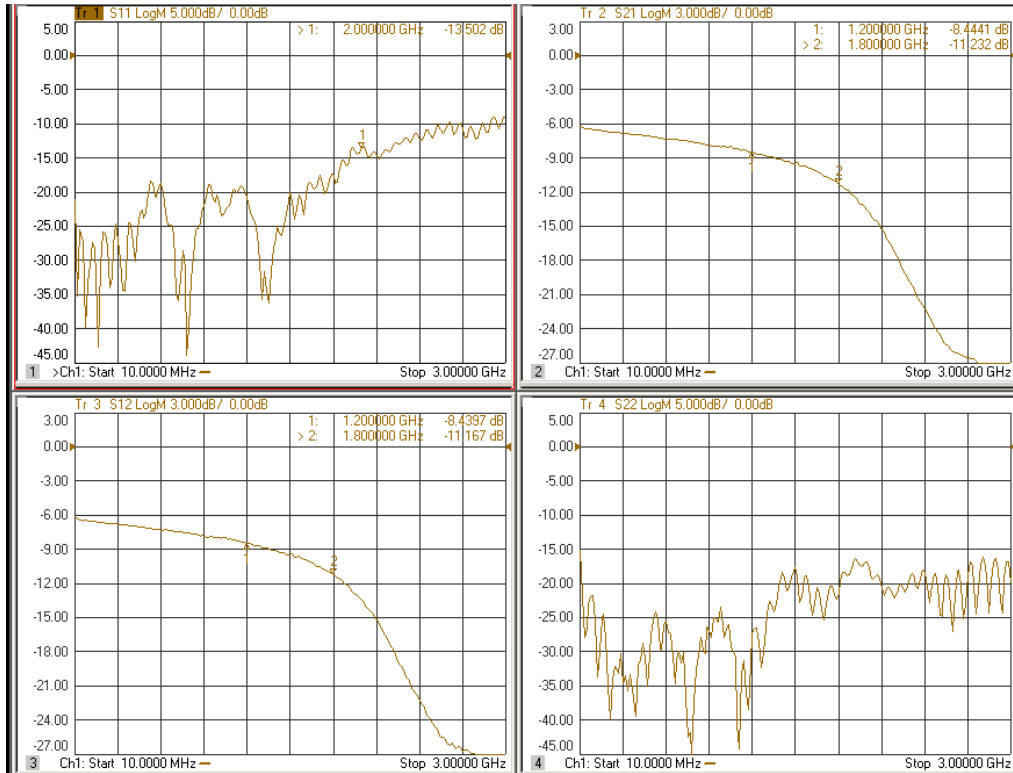Figure 112: Scattering matrix for channel 2J, polarization y and output 3dB1.

Figure 113: Scattering matrix for channel 2J, polarization y and output 6dB2.
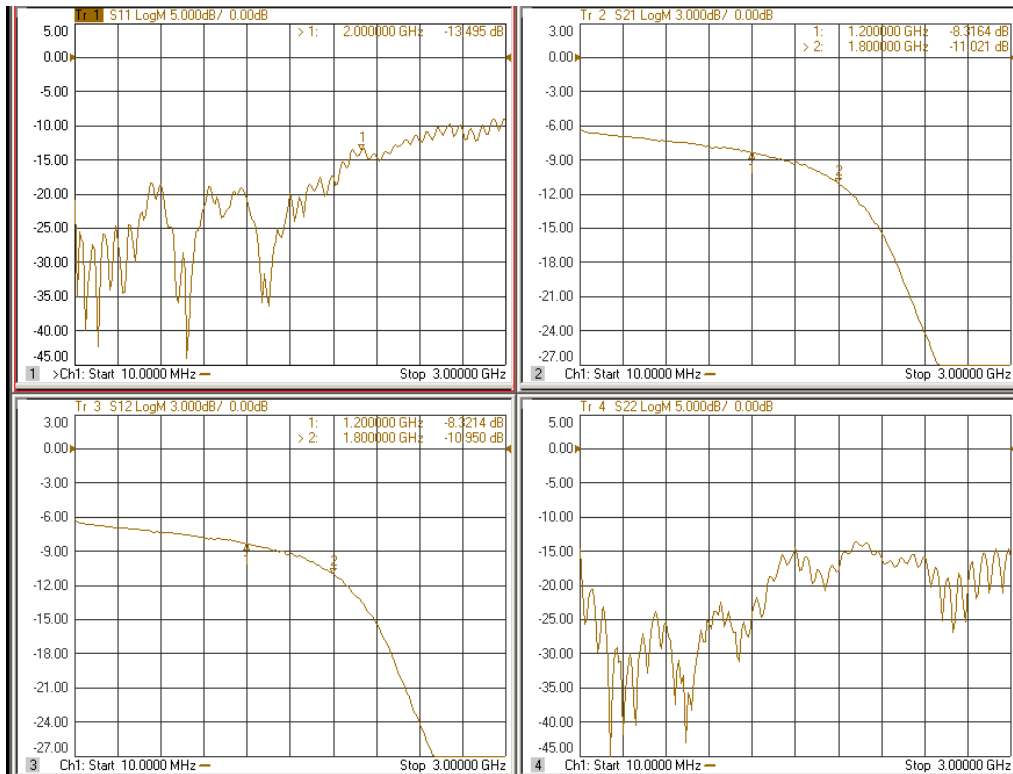

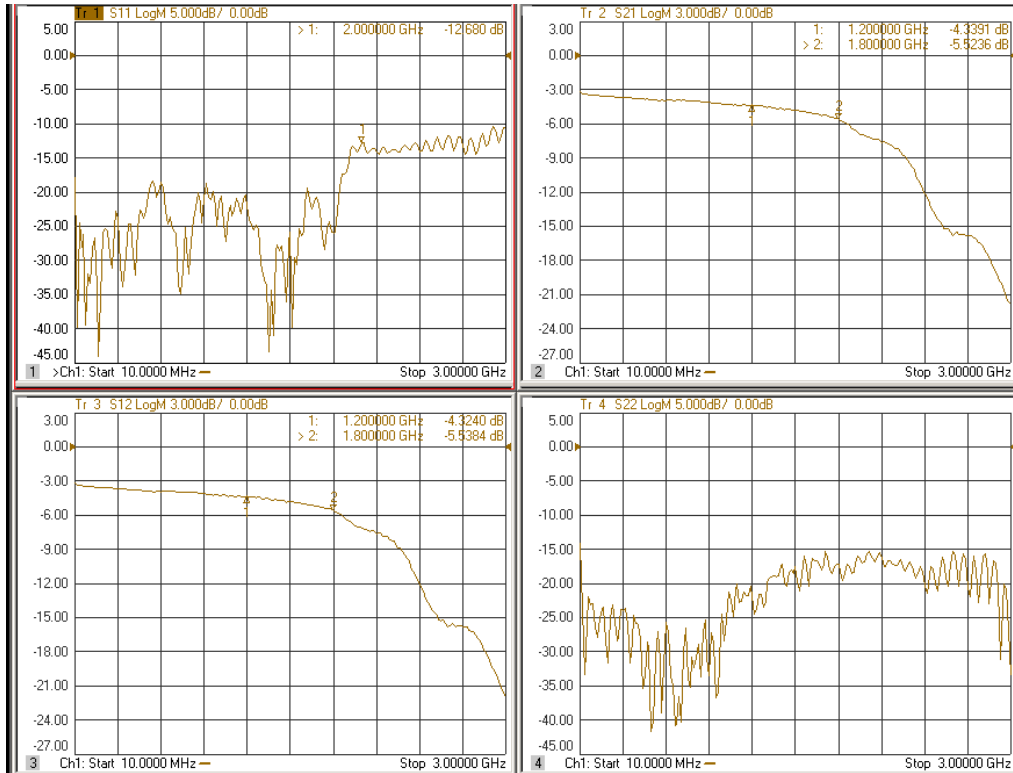Figure 114: Scattering matrix for channel 2J, polarization y and output 6dB3.

Figure 115: Scattering matrix for channel 2K, polarization x and output 3dB1.
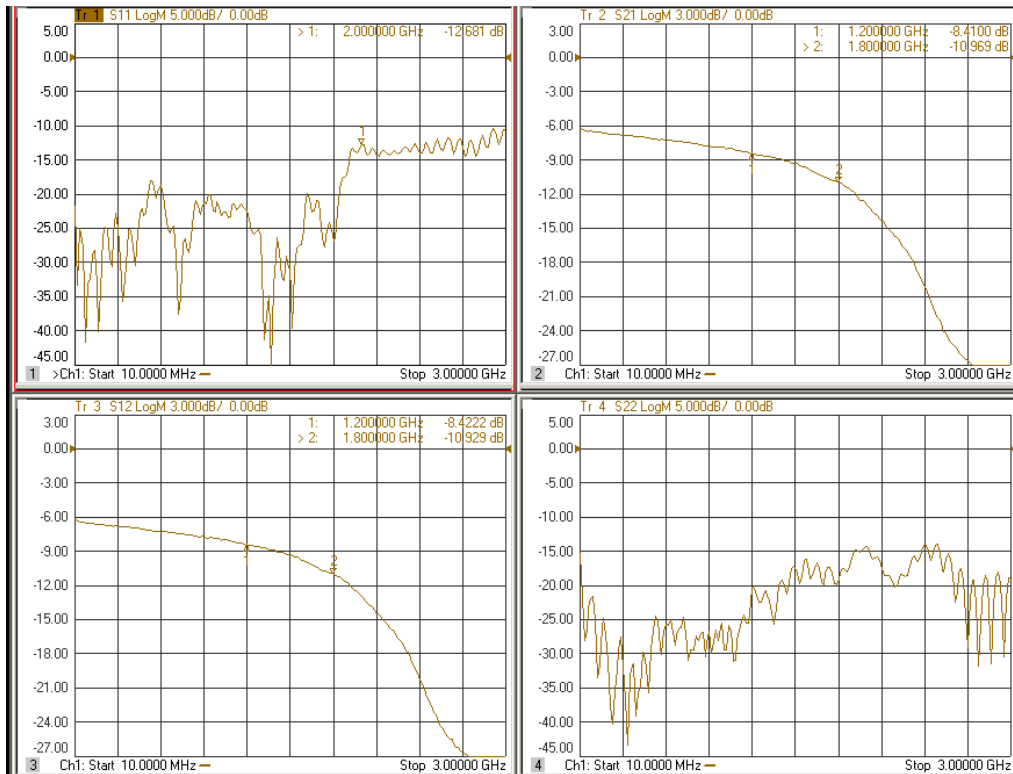

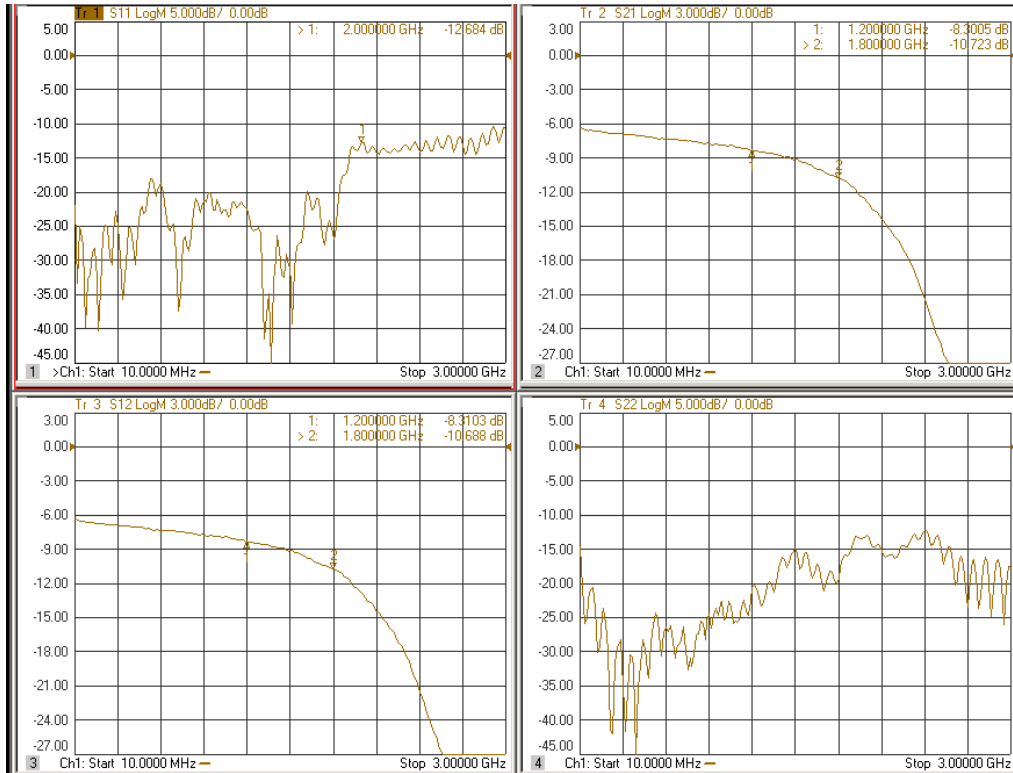Figure 116: Scattering matrix for channel 2K, polarization x and output 6dB2.

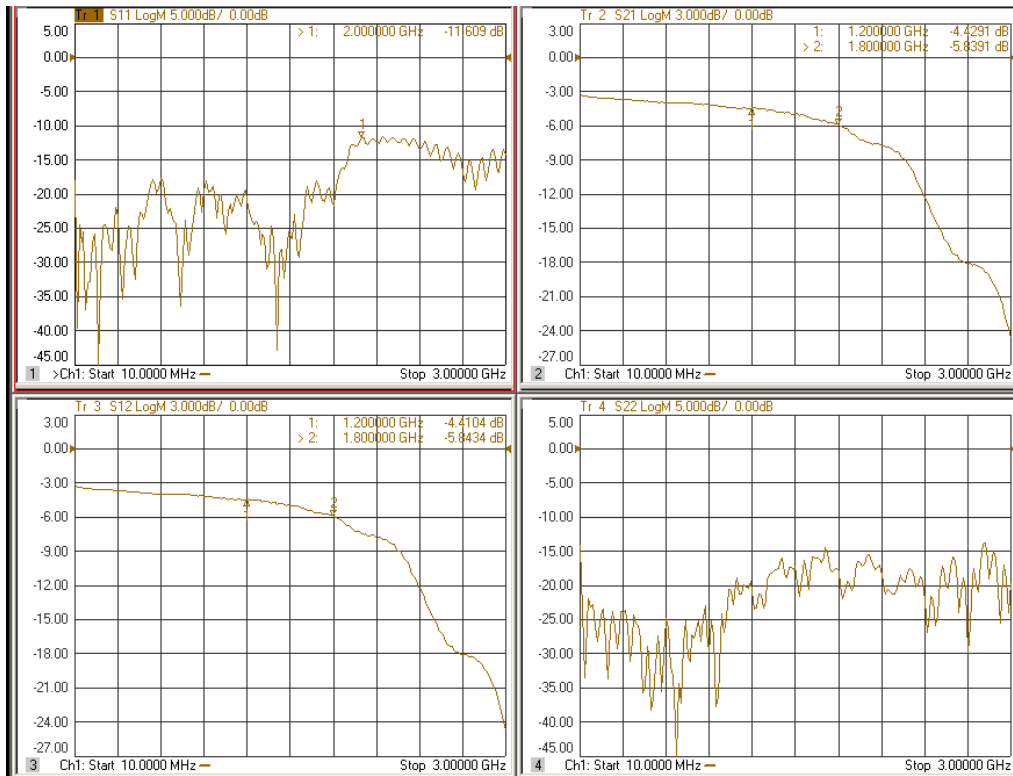Figure 117: Scattering matrix for channel 2K, polarization x and output 6dB3.

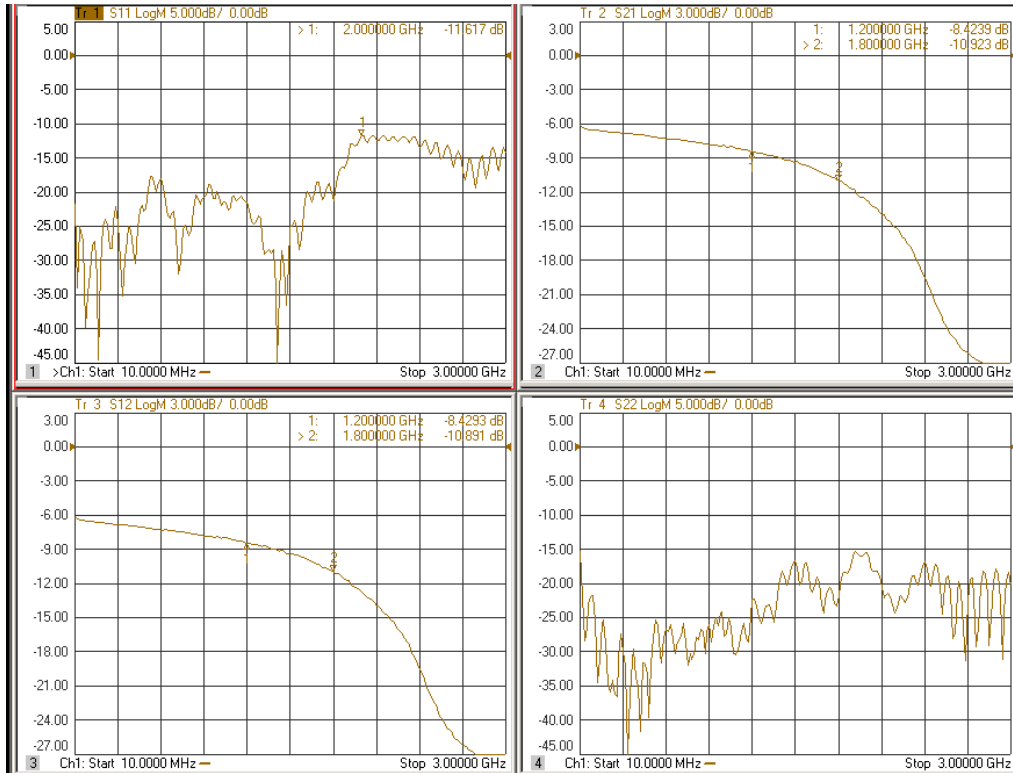Figure 118: Scattering matrix for channel 2K, polarization y and output 3dB1.

Figure 119: Scattering matrix for channel 2K, polarization y and output 6dB2.
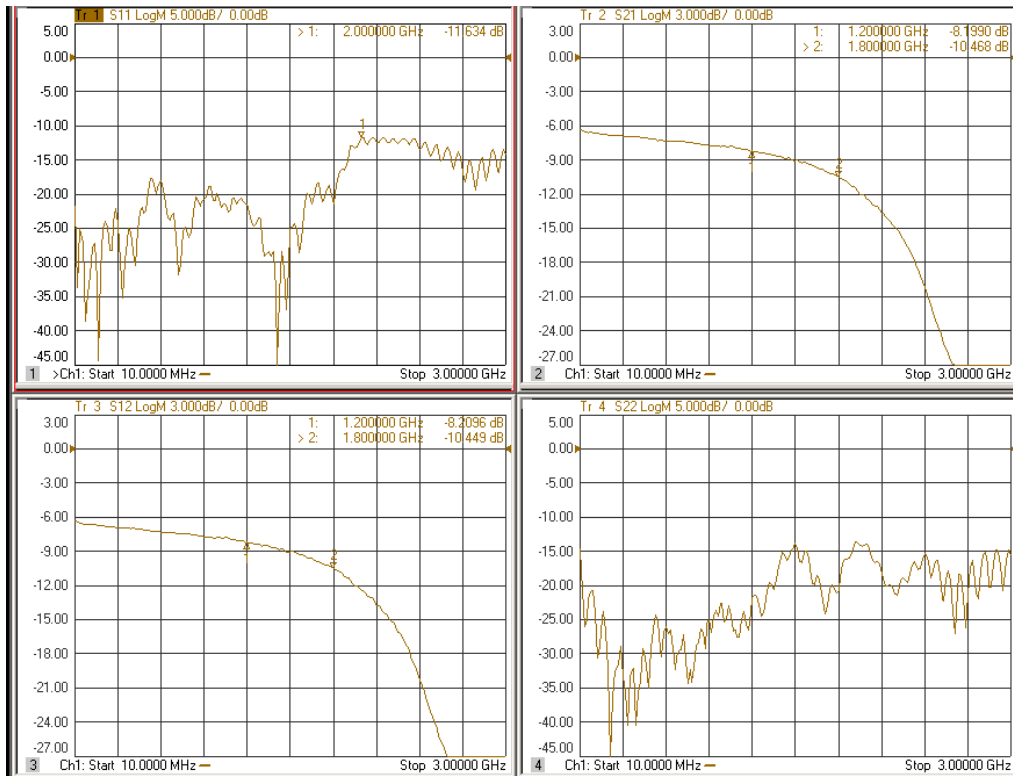

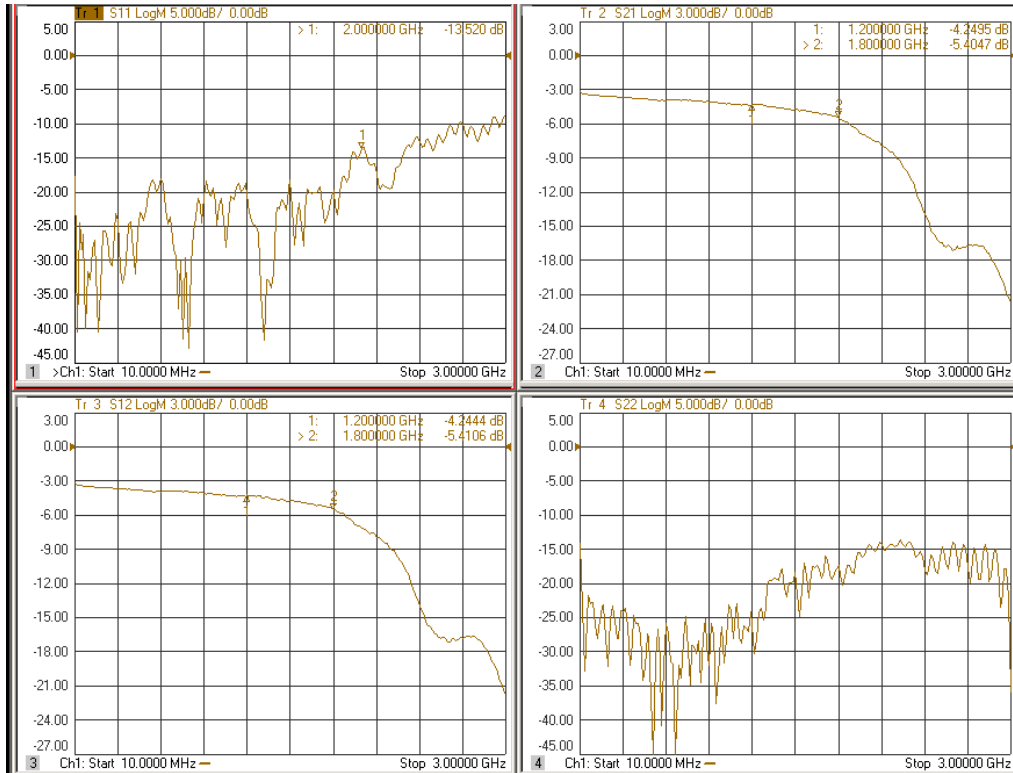Figure 120: Scattering matrix for channel 2K, polarization y and output 6dB3.

Figure 121: Scattering matrix for channel 2L, polarization x and output 3dB1.
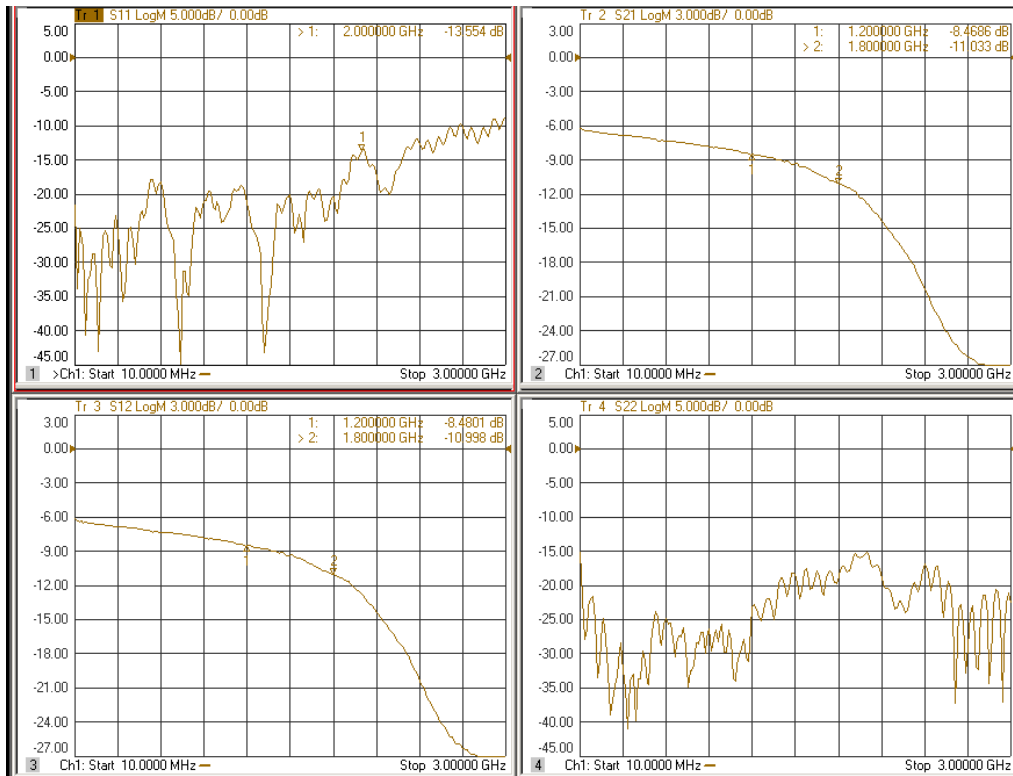

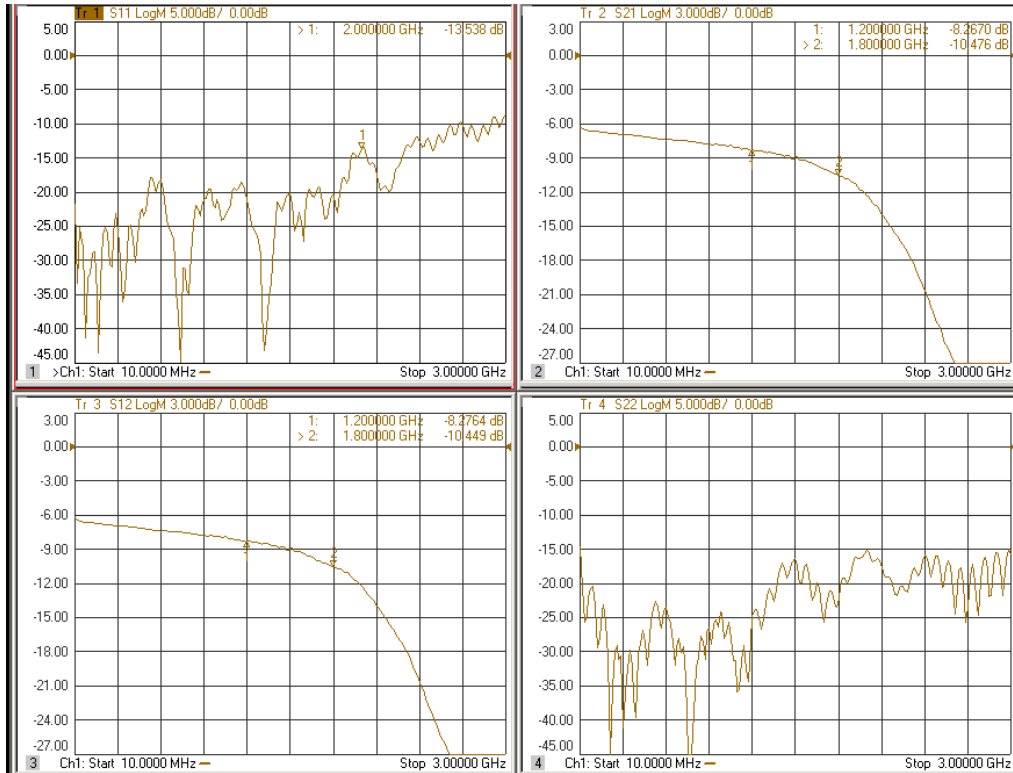Figure 122: Scattering matrix for channel 2L, polarization x and output 6dB2.

Figure 123: Scattering matrix for channel 2L, polarization x and output 6dB3.
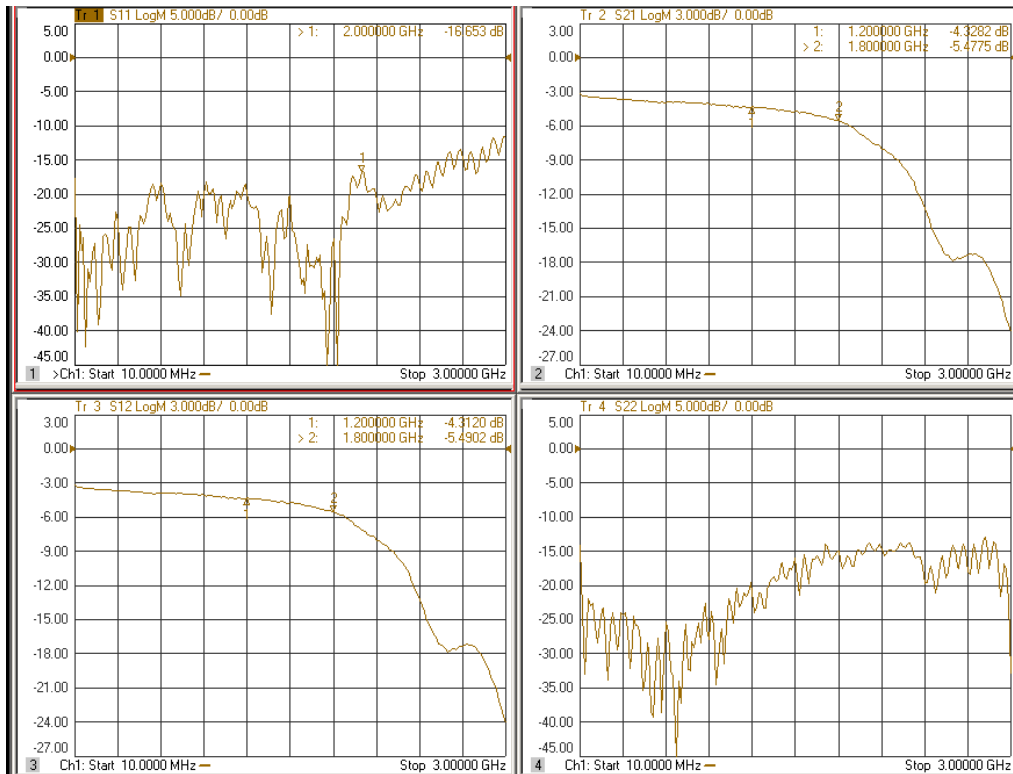

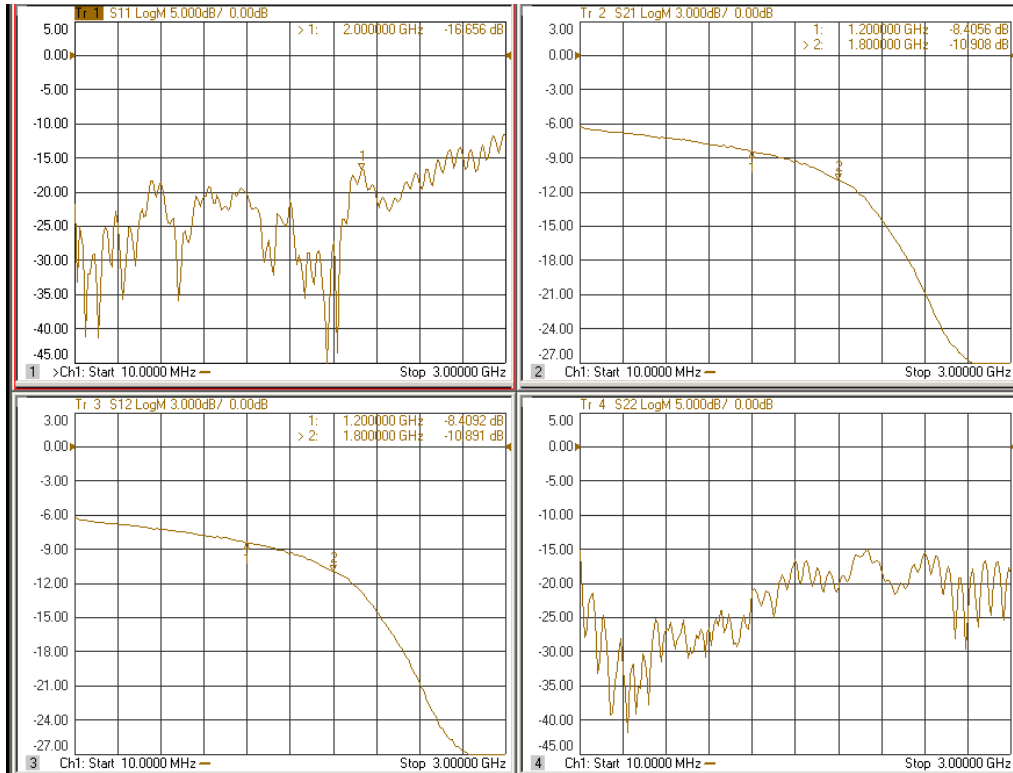Figure 124: Scattering matrix for channel 2L, polarization y and output 3dB1.

Figure 125: Scattering matrix for channel 2L, polarization y and output 6dB2.
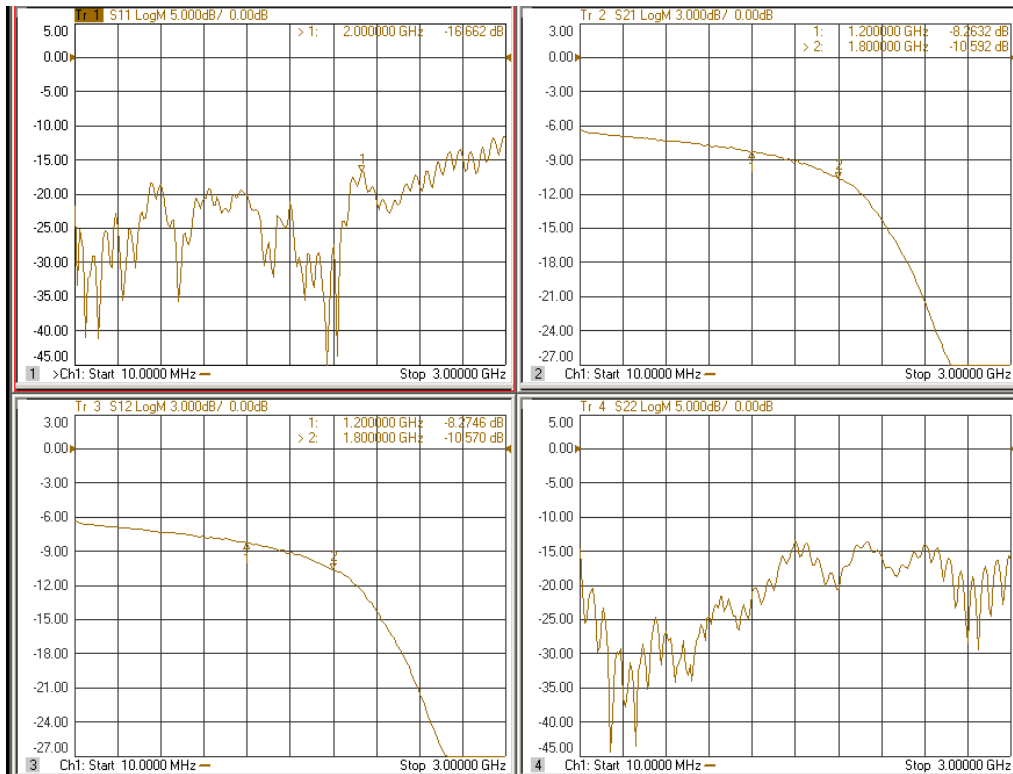

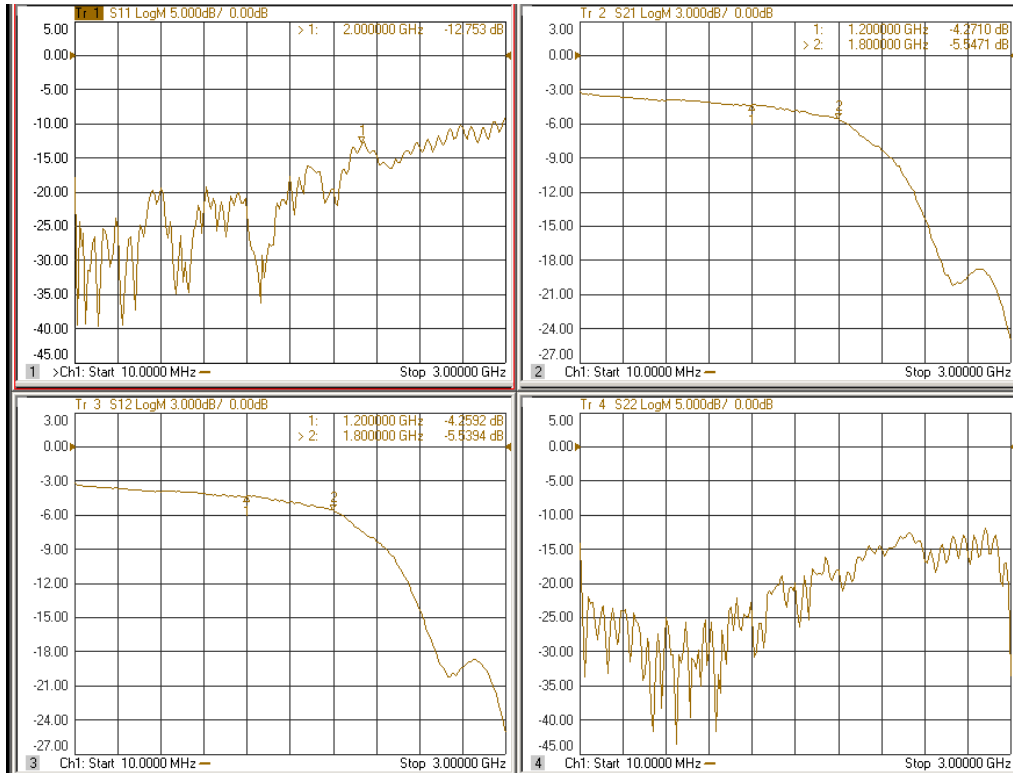Figure 126: Scattering matrix for channel 2L, polarization y and output 6dB3.

Figure 127: Scattering matrix for channel 2M, polarization x and output 3dB1.
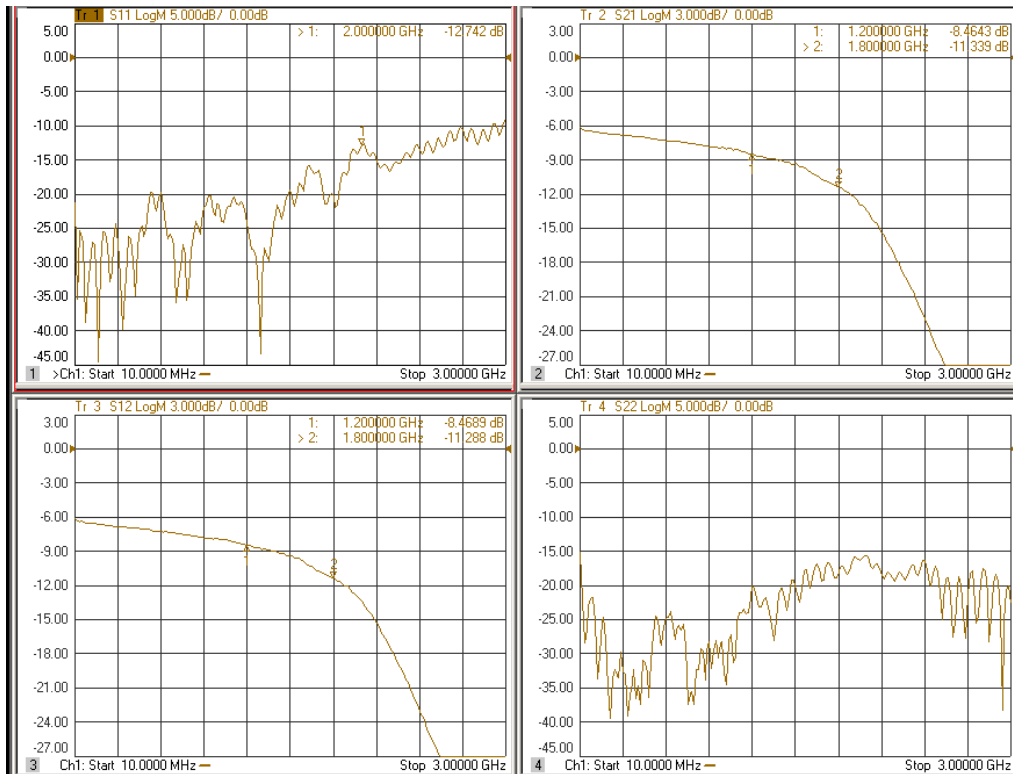

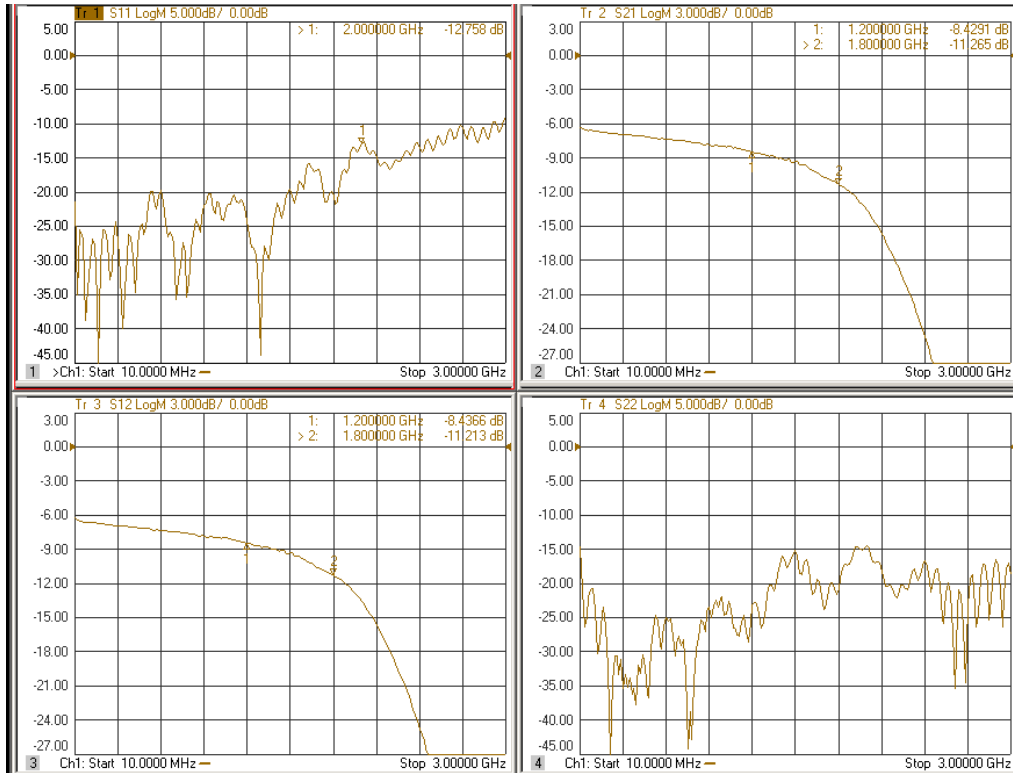Figure 128: Scattering matrix for channel 2M, polarization x and output 6dB2.

Figure 129: Scattering matrix for channel 2M, polarization x and output 6dB3.
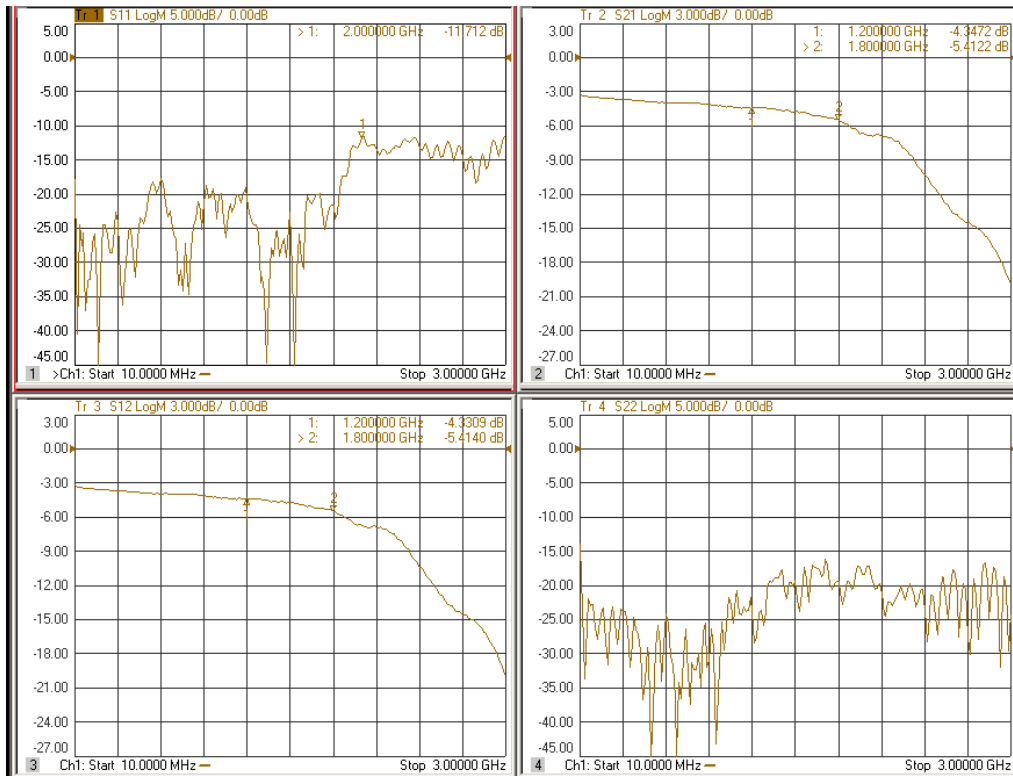

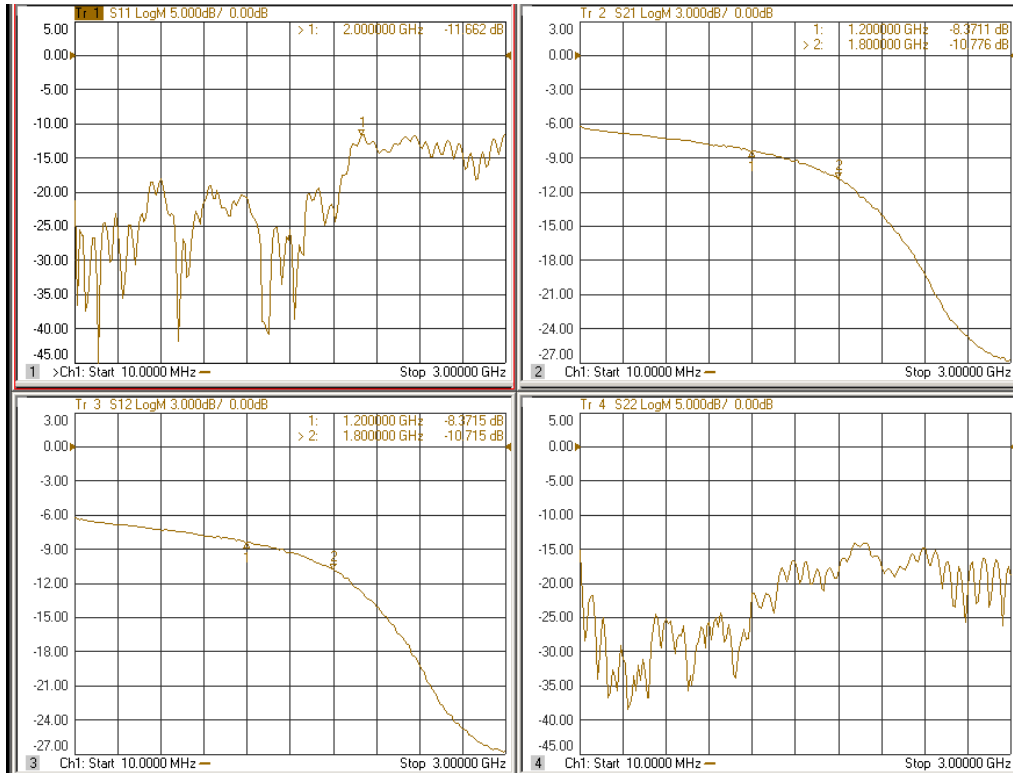Figure 130: Scattering matrix for channel 2M, polarization y and output 3dB1.

Figure 131: Scattering matrix for channel 2M, polarization y and output 6dB2.
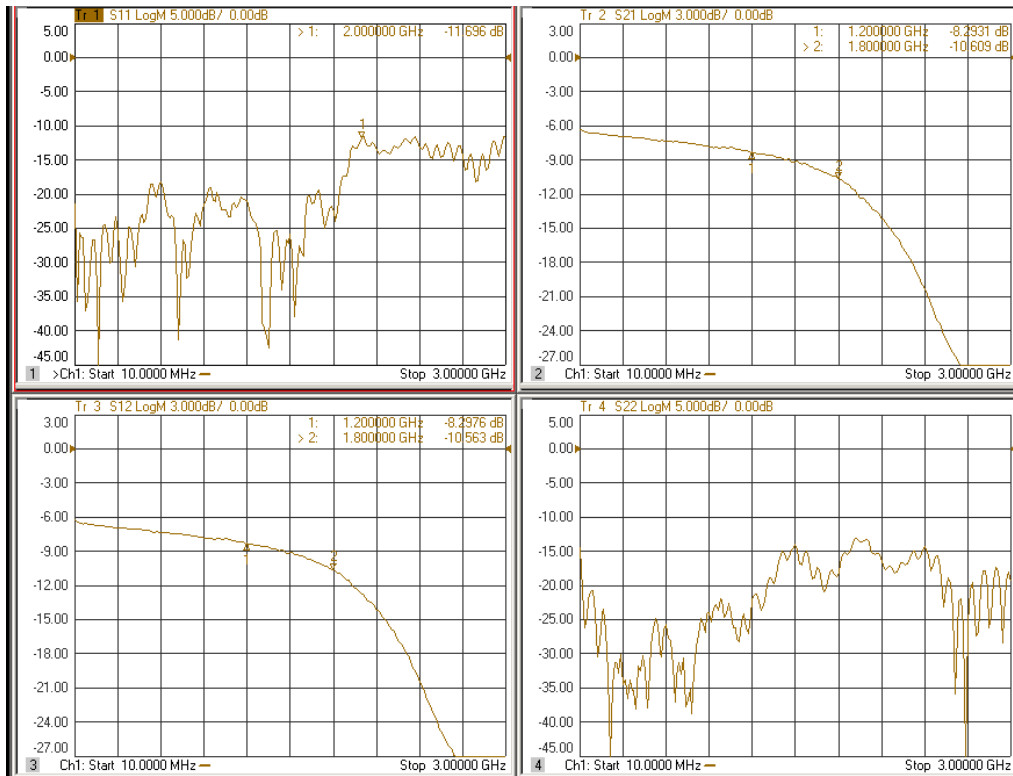

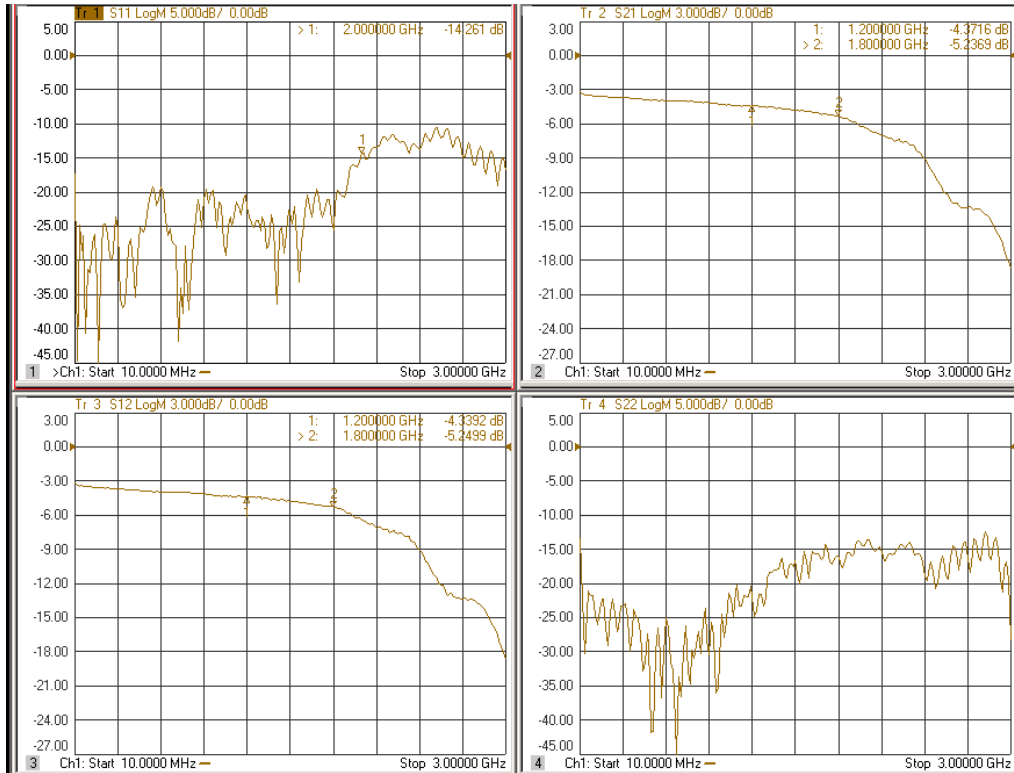Figure 132: Scattering matrix for channel 2M, polarization y and output 6dB3.

Figure 133: Scattering matrix for channel Ia, polarization x and output 3dB1.
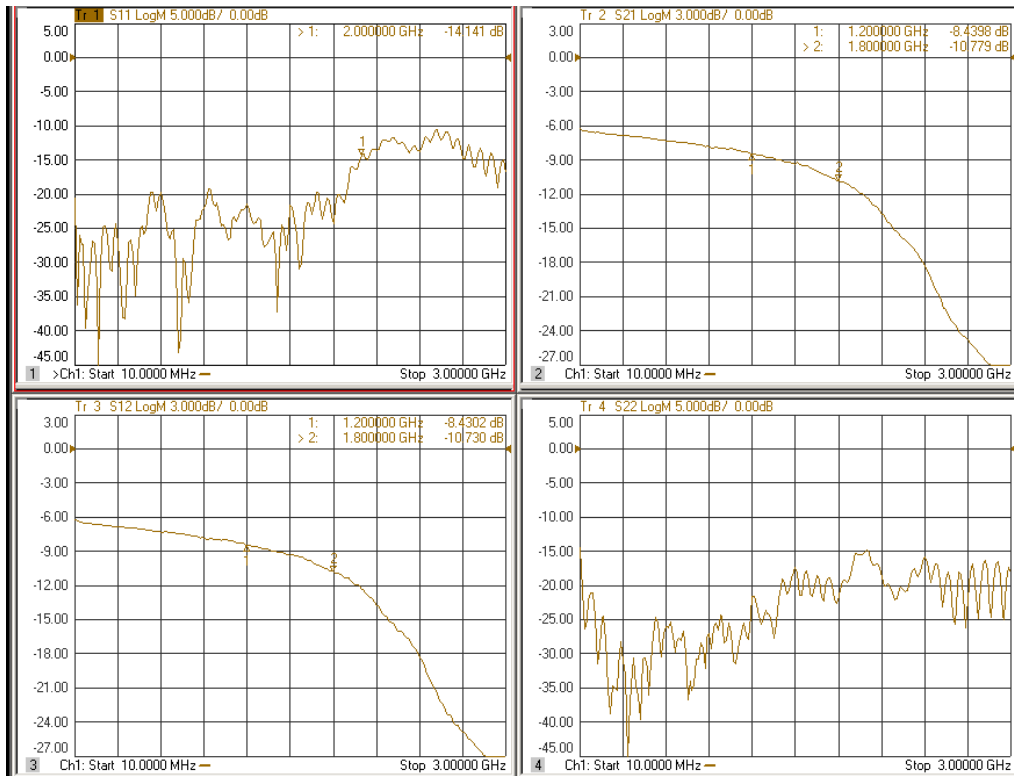

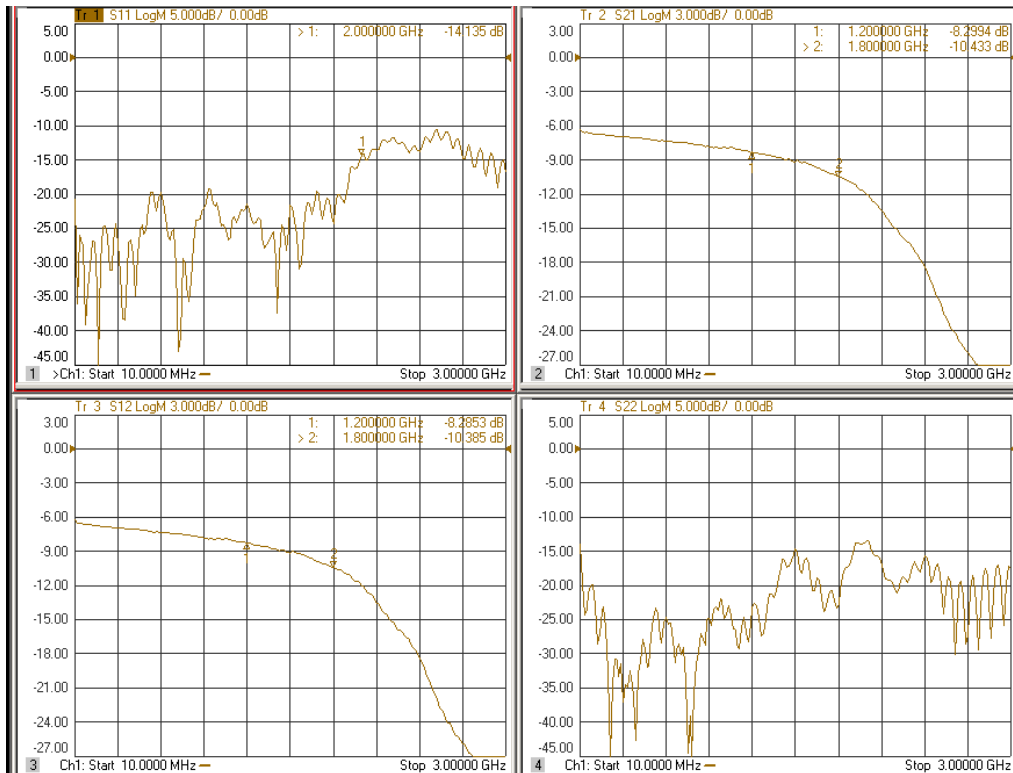Figure 134: Scattering matrix for channel Ia, polarization x and output 6dB2.

Figure 135: Scattering matrix for channel Ia, polarization x and output 6dB3.
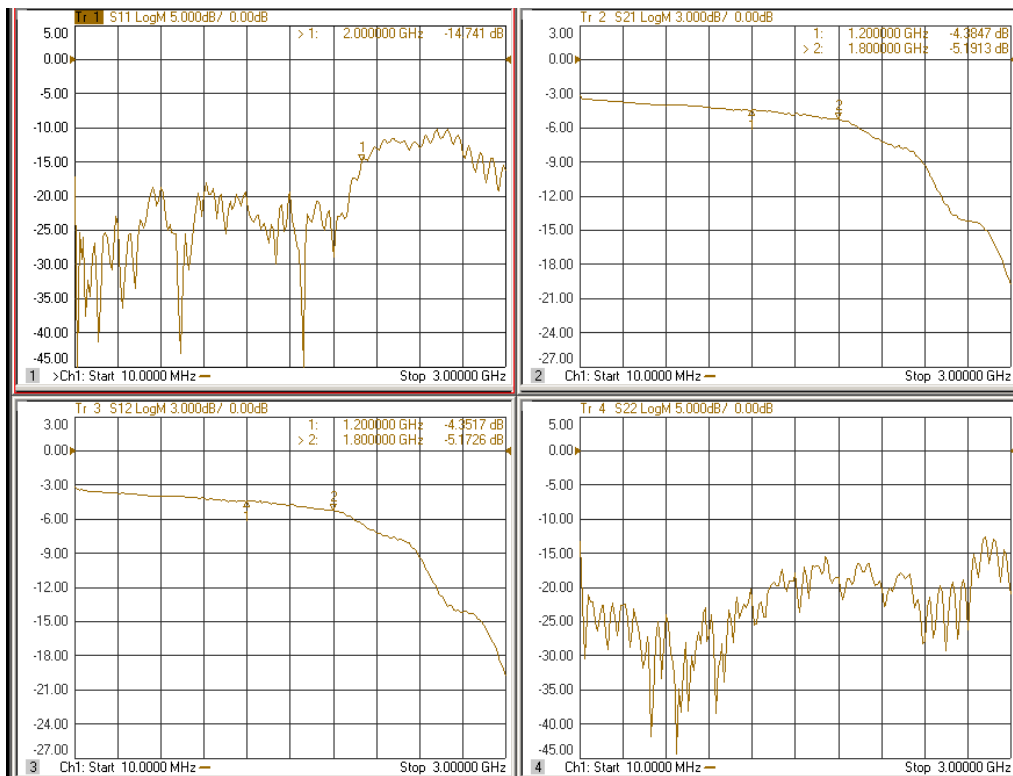

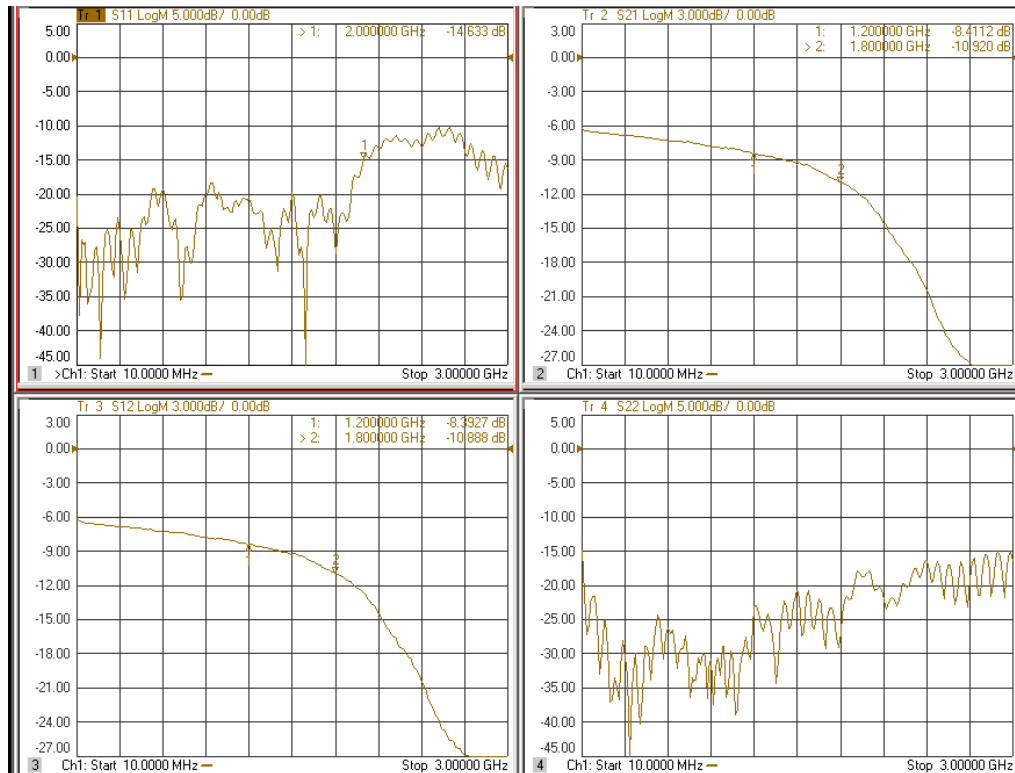Figure 136: Scattering matrix for channel Ia, polarization y and output 3dB1.

69

Figure 137: Scattering matrix for channel Ia, polarization y and output 6dB2.
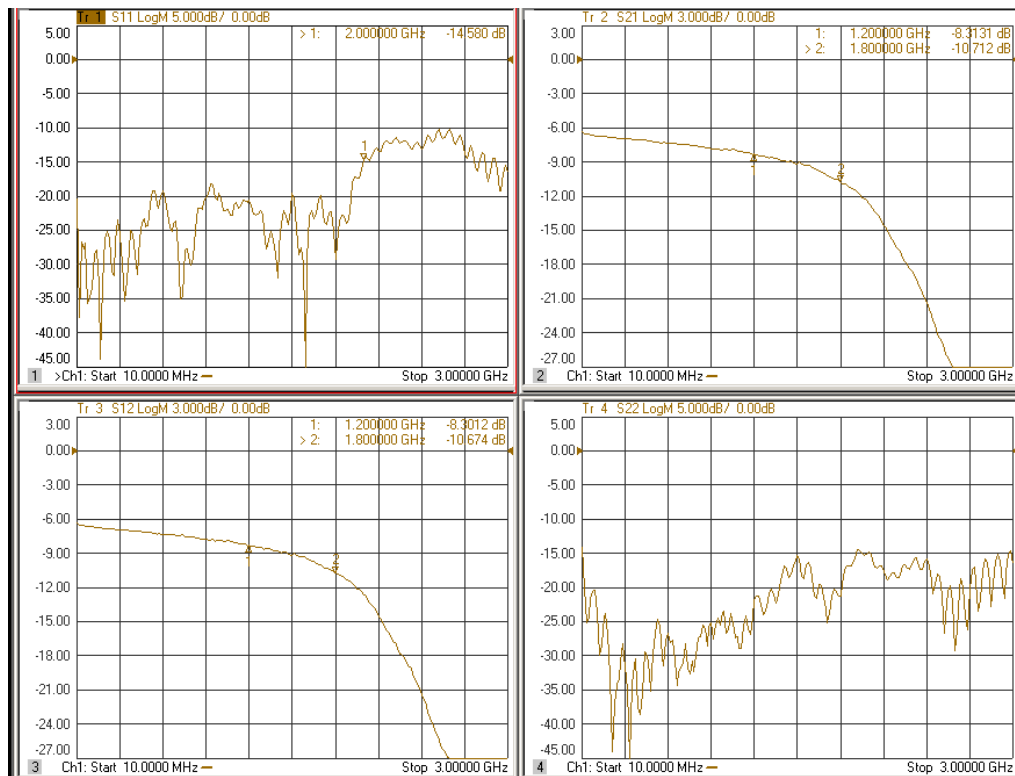

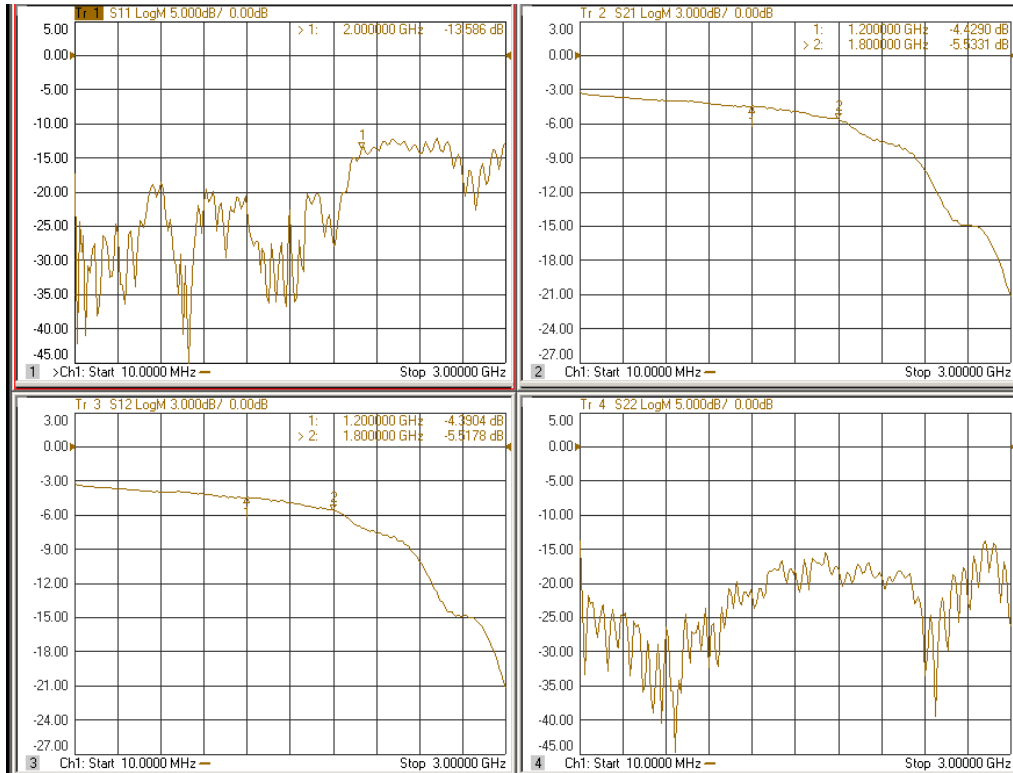Figure 138: Scattering matrix for channel Ia, polarization y and output 6dB3.

Figure 139: Scattering matrix for channel IIa, polarization x and output 3dB1.
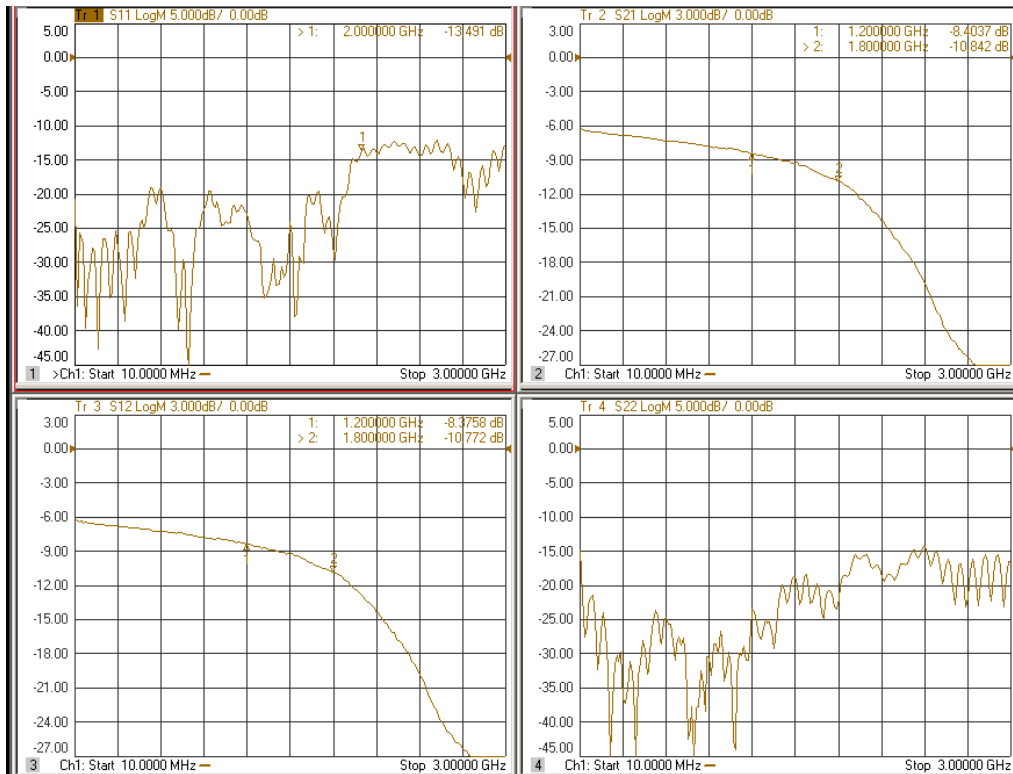

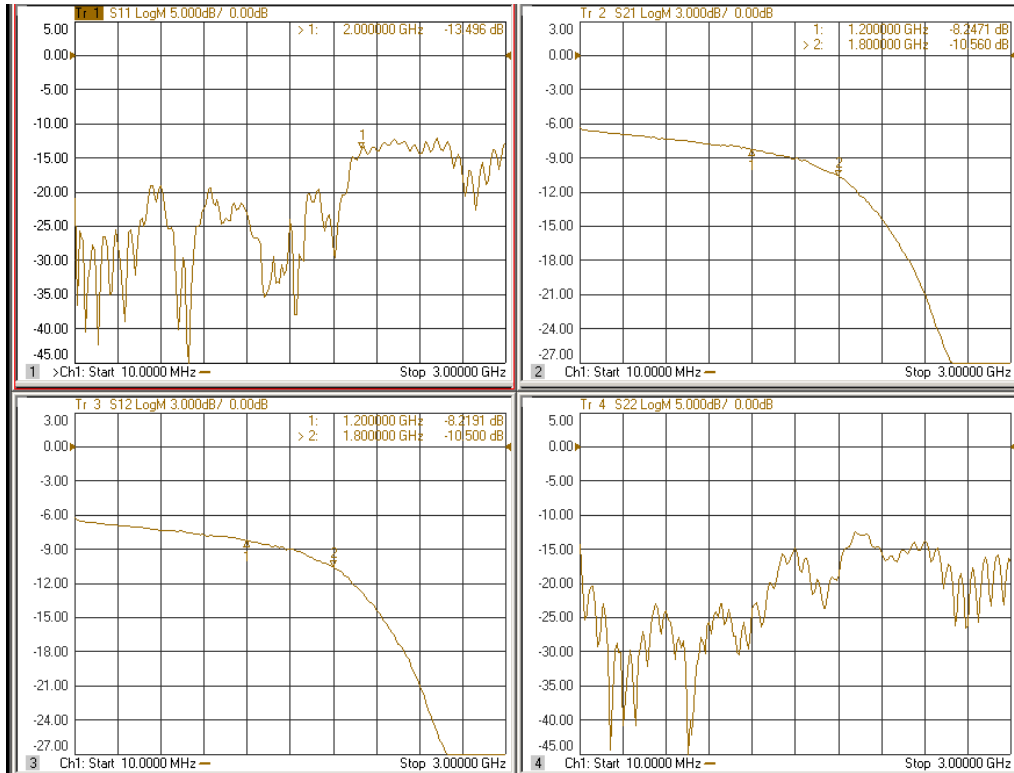Figure 140: Scattering matrix for channel IIa, polarization x and output 6dB2.

Figure 141: Scattering matrix for channel IIa, polarization x and output 6dB3.
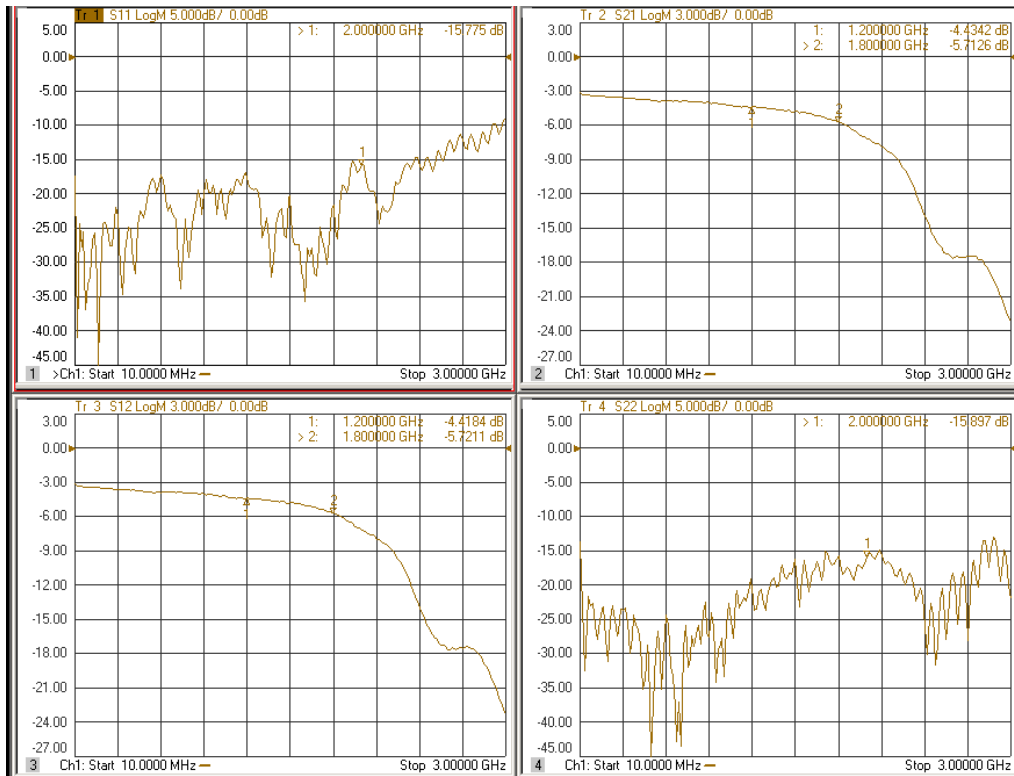

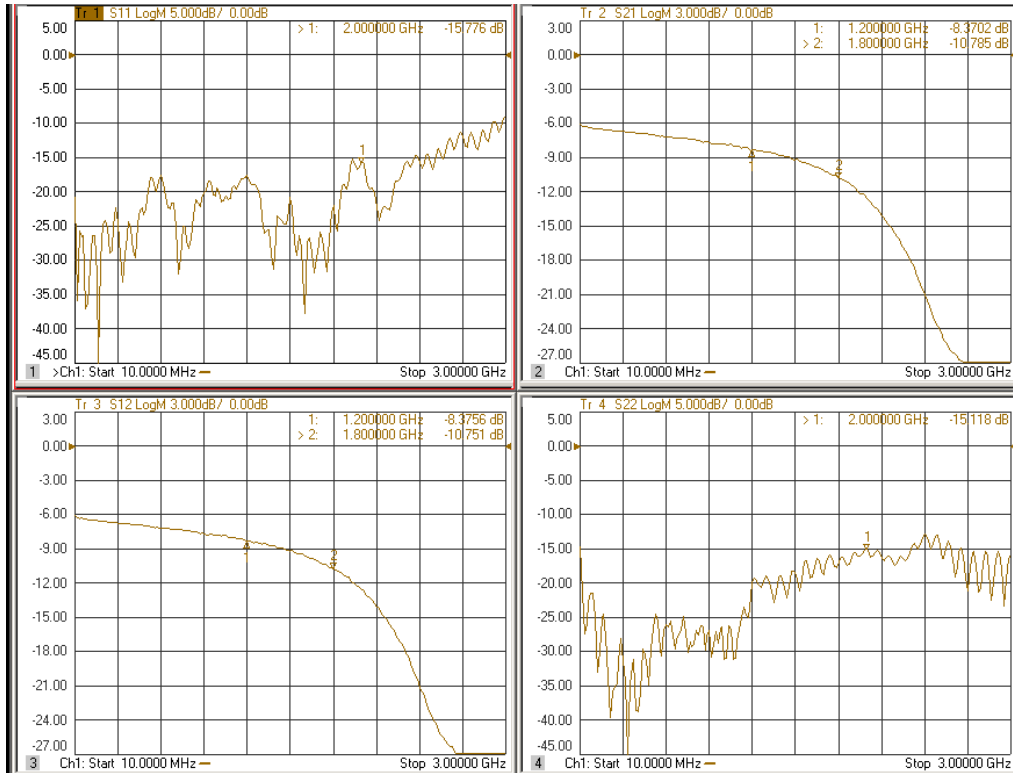Figure 142: Scattering matrix for channel IIa, polarization y and output 3dB1.

Figure 143: Scattering matrix for channel IIa, polarization y and output 6dB2.
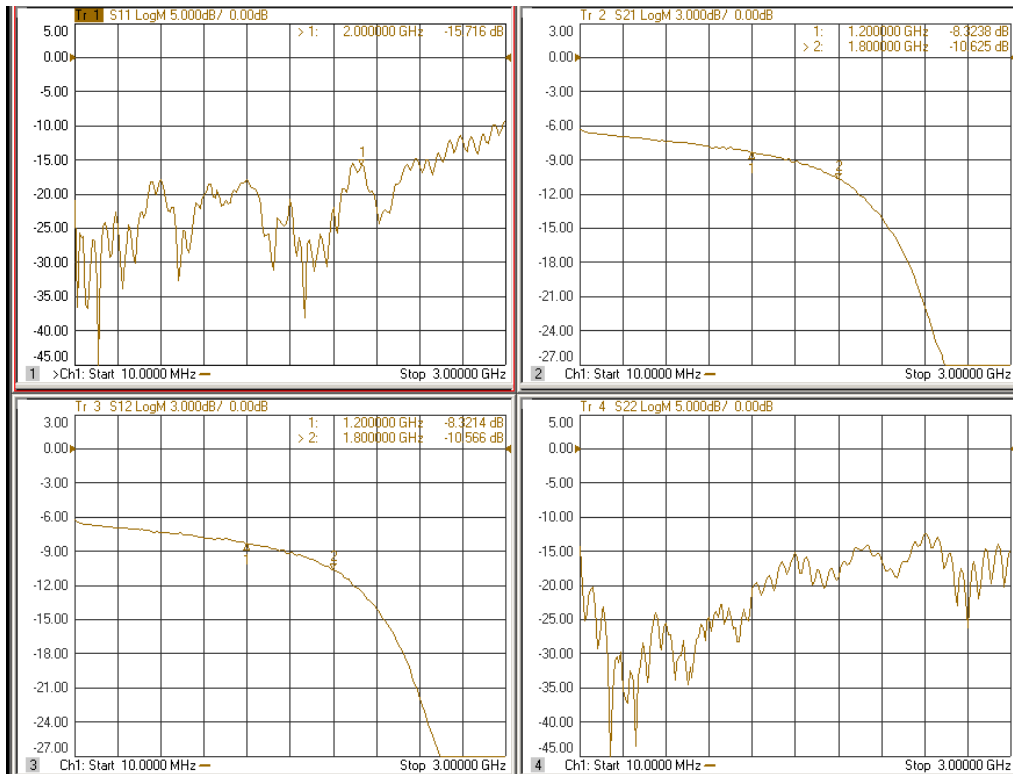

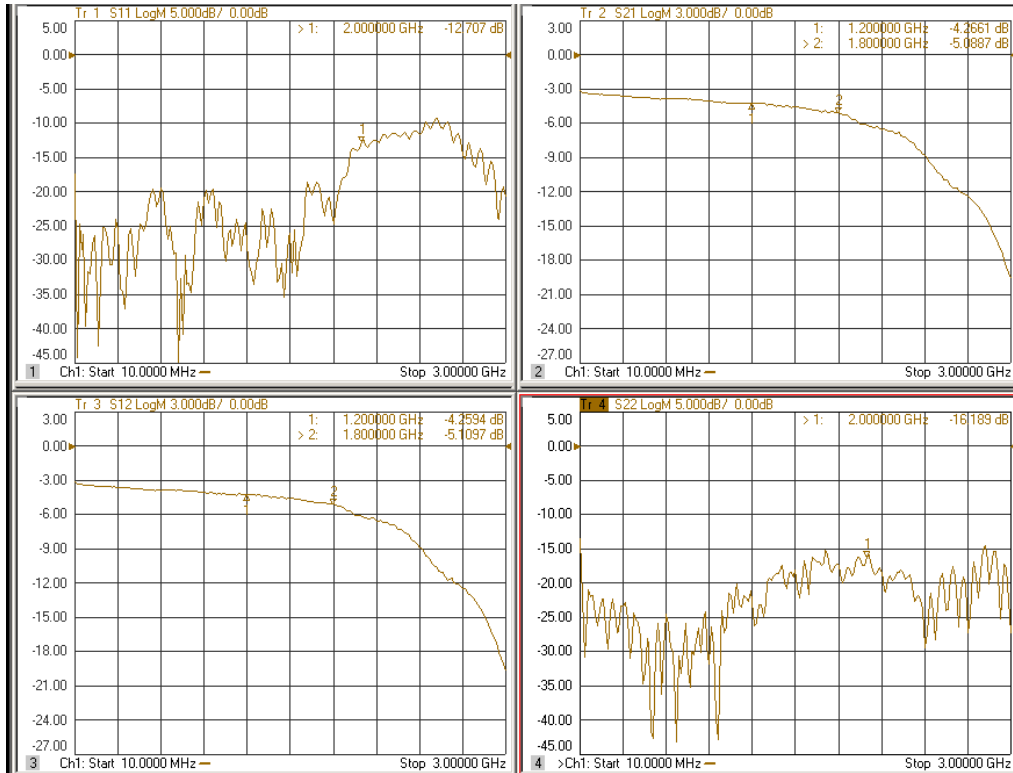Figure 144: Scattering matrix for channel IIa, polarization y and output 6dB3.

Figure 145: Scattering matrix for channel 3C, polarization x and output 3dB1.
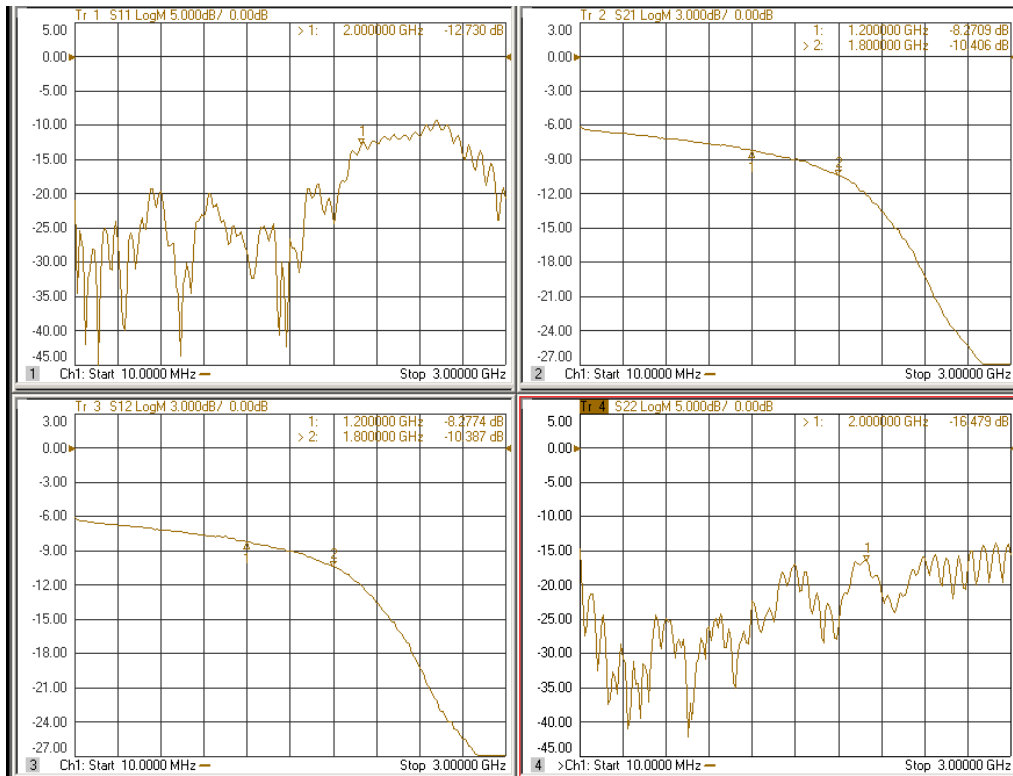

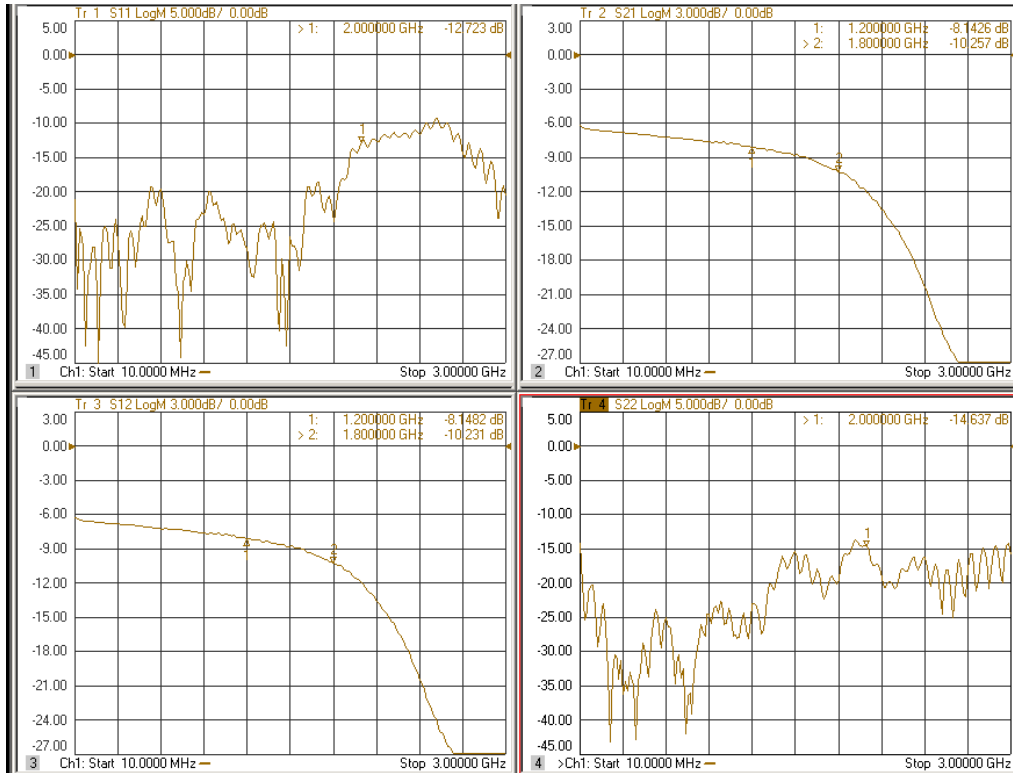Figure 146: Scattering matrix for channel 3C, polarization x and output 6dB2.

Figure 147: Scattering matrix for channel 3C, polarization x and output 6dB3.
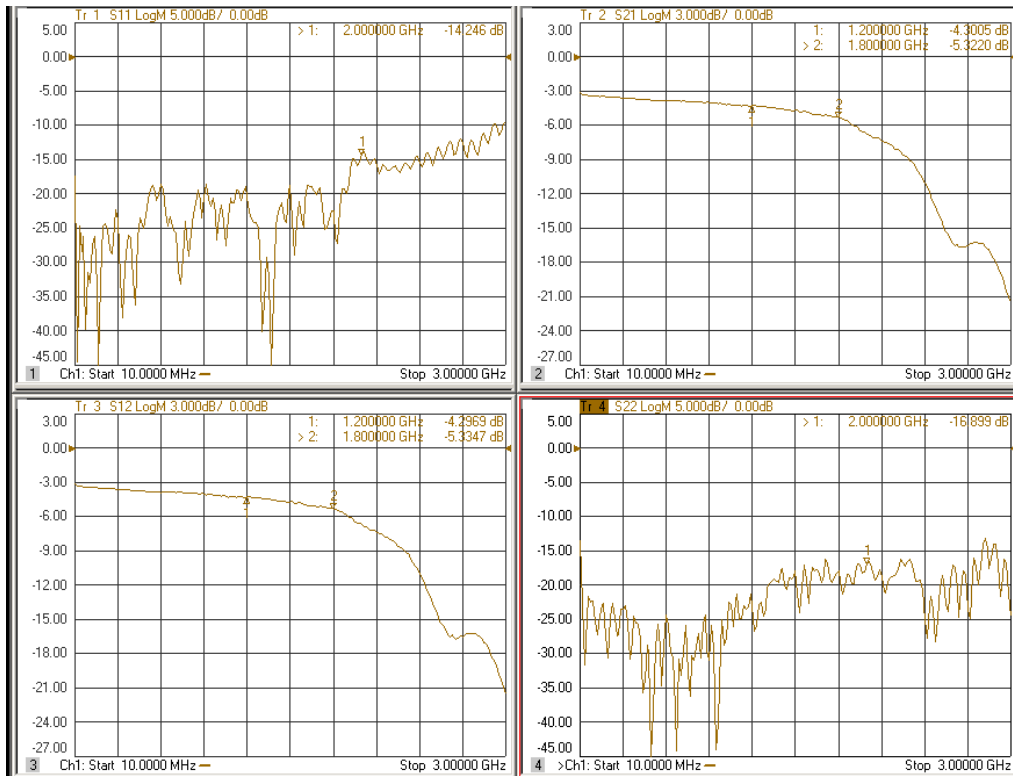

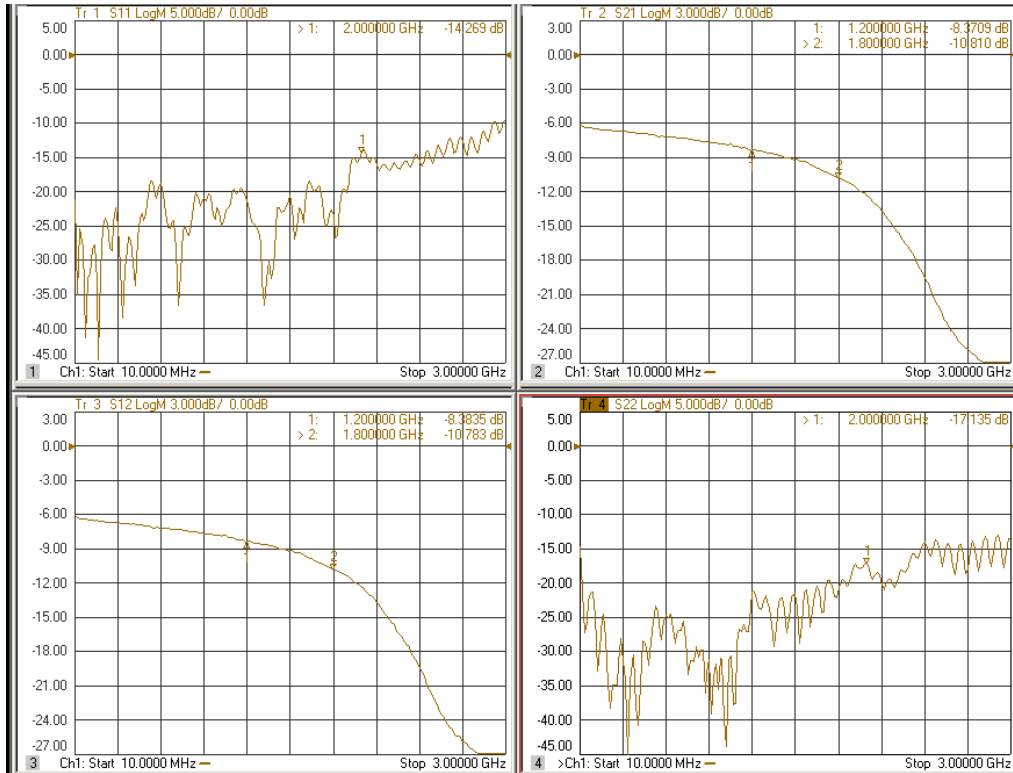Figure 148: Scattering matrix for channel 3C, polarization y and output 3dB1.

Figure 149: Scattering matrix for channel 3C, polarization y and output 6dB2.
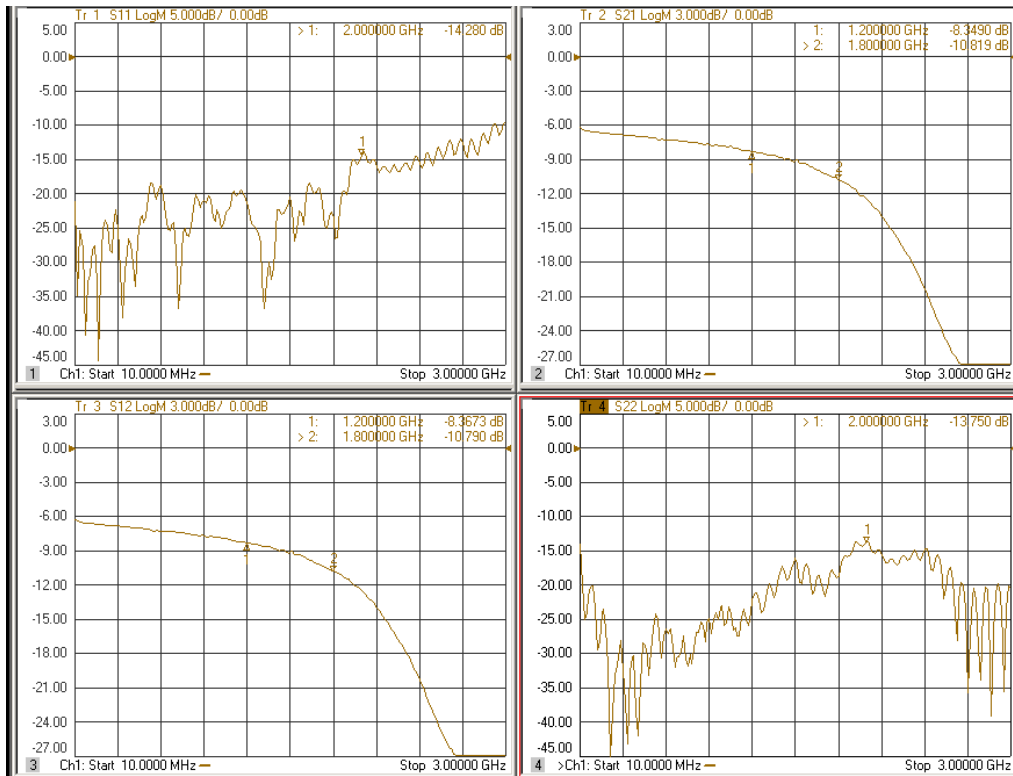

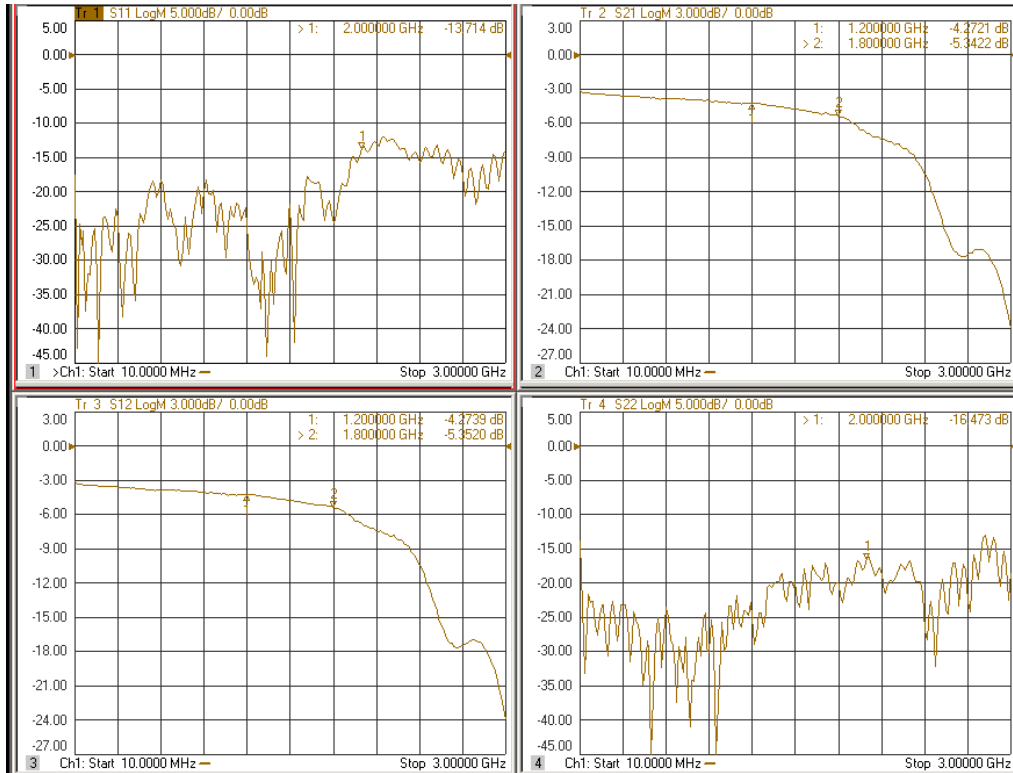Figure 150: Scattering matrix for channel 3C, polarization y and output 6dB3.

Figure 151: Scattering matrix for channel 3D, polarization x and output 3dB1.
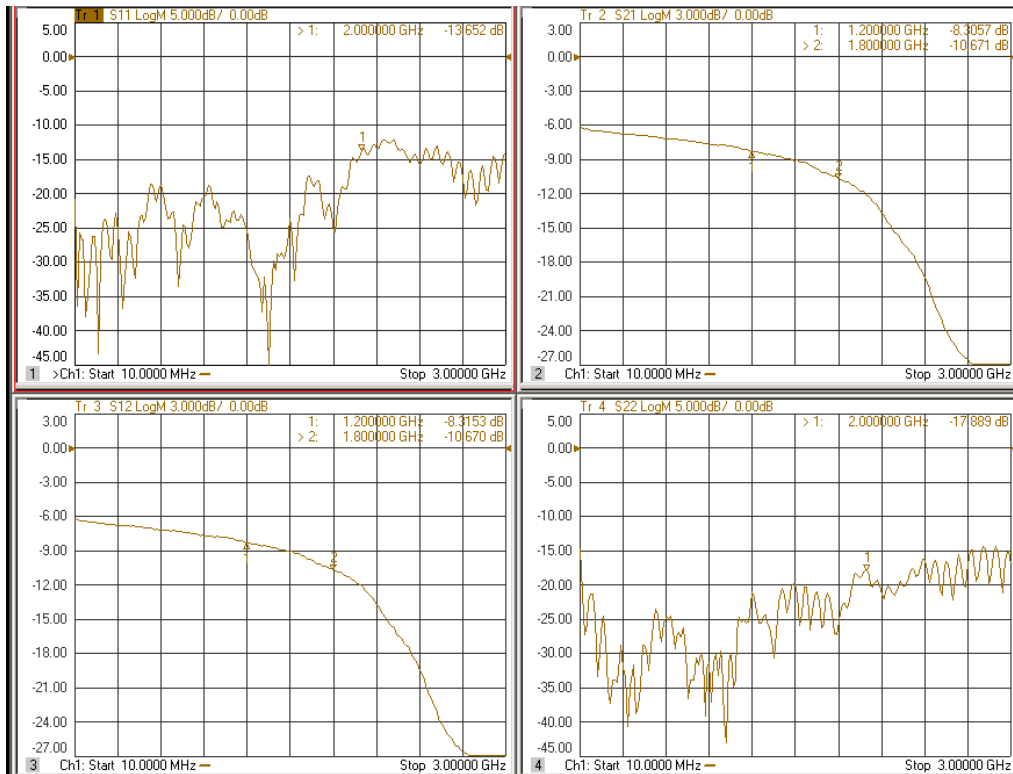

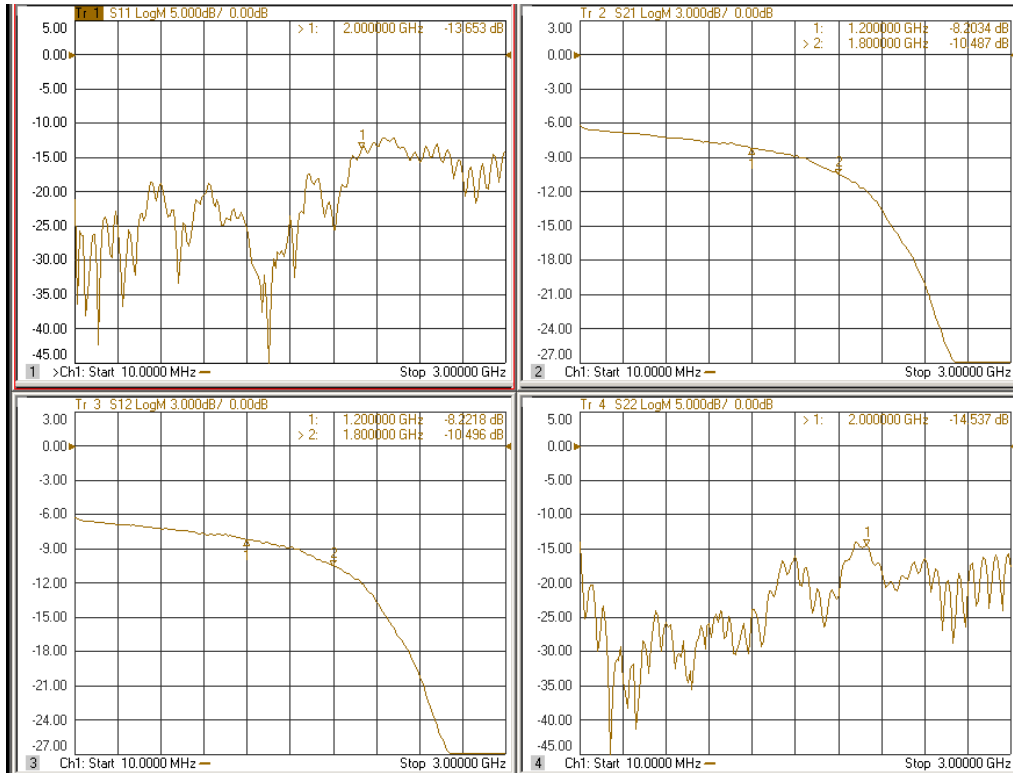Figure 152: Scattering matrix for channel 3D, polarization x and output 6dB2.

Figure 153: Scattering matrix for channel 3D, polarization x and output 6dB3.
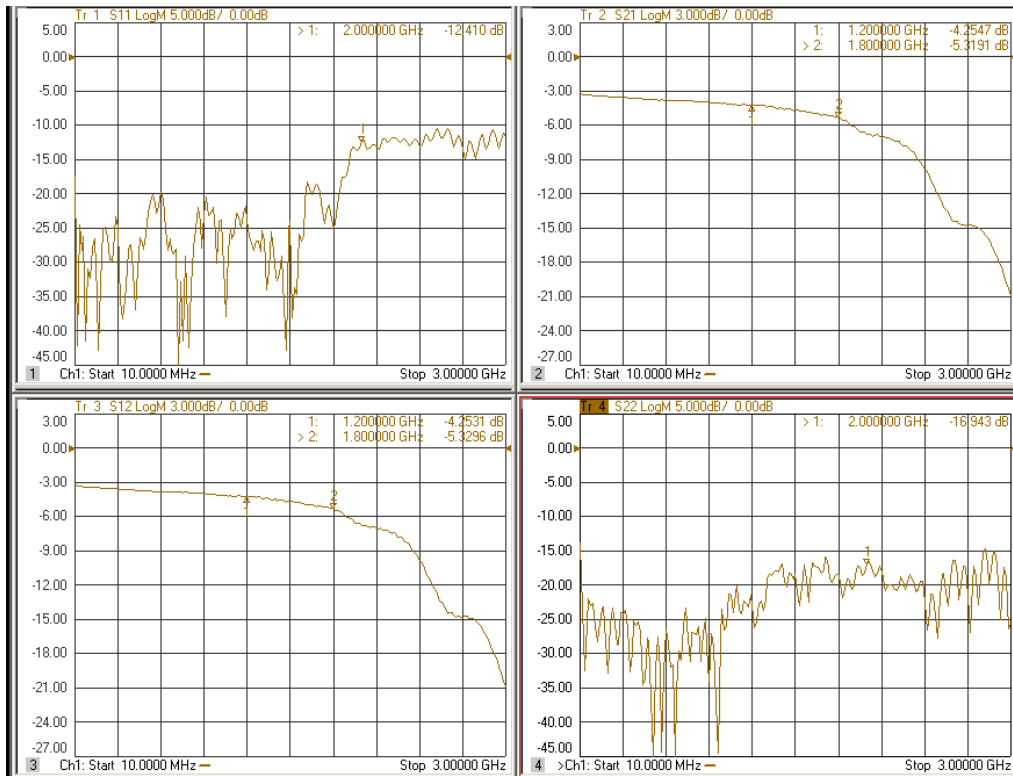

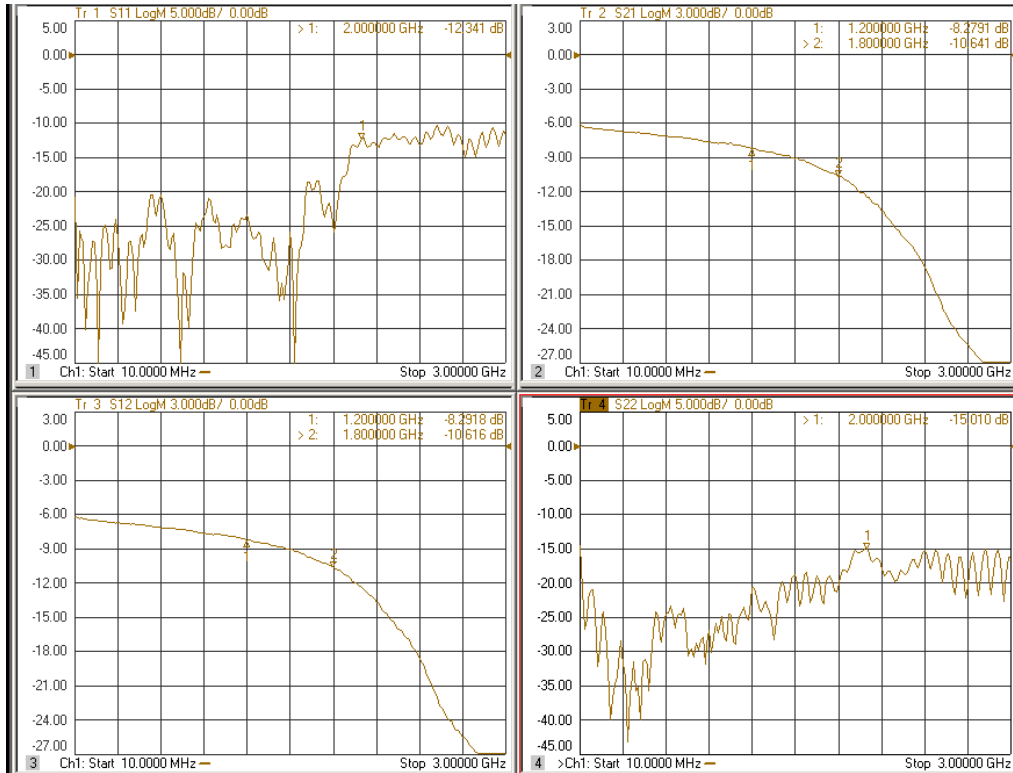Figure 154: Scattering matrix for channel 3D, polarization y and output 3dB1.

Figure 155: Scattering matrix for channel 3D, polarization y and output 6dB2.
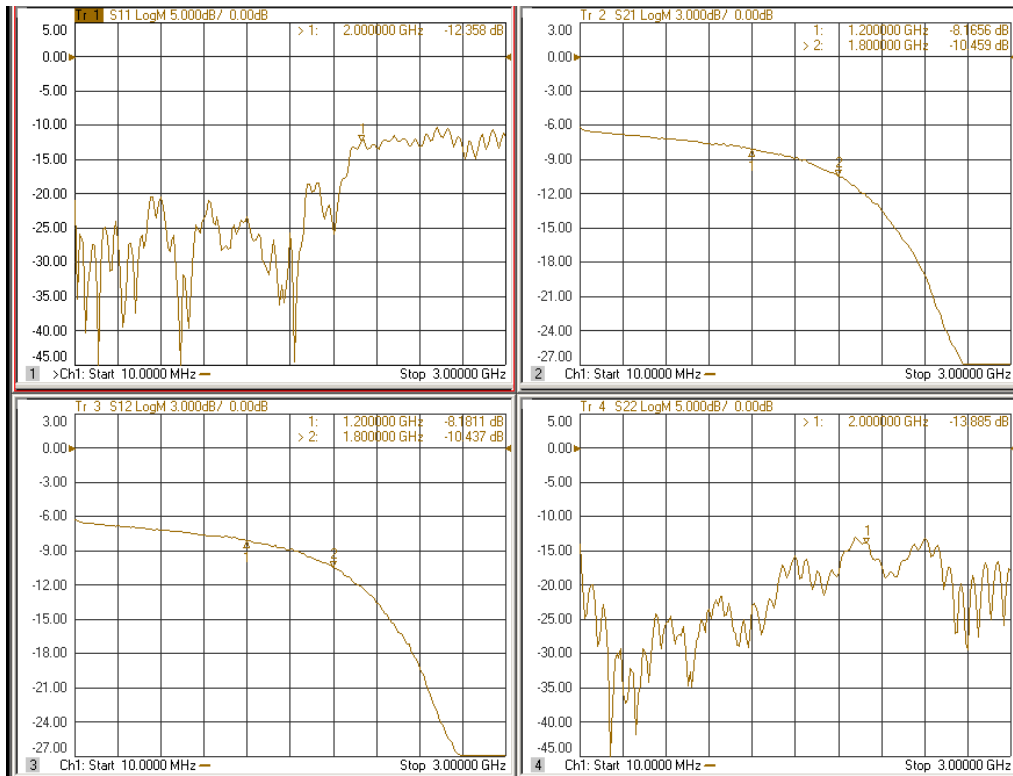

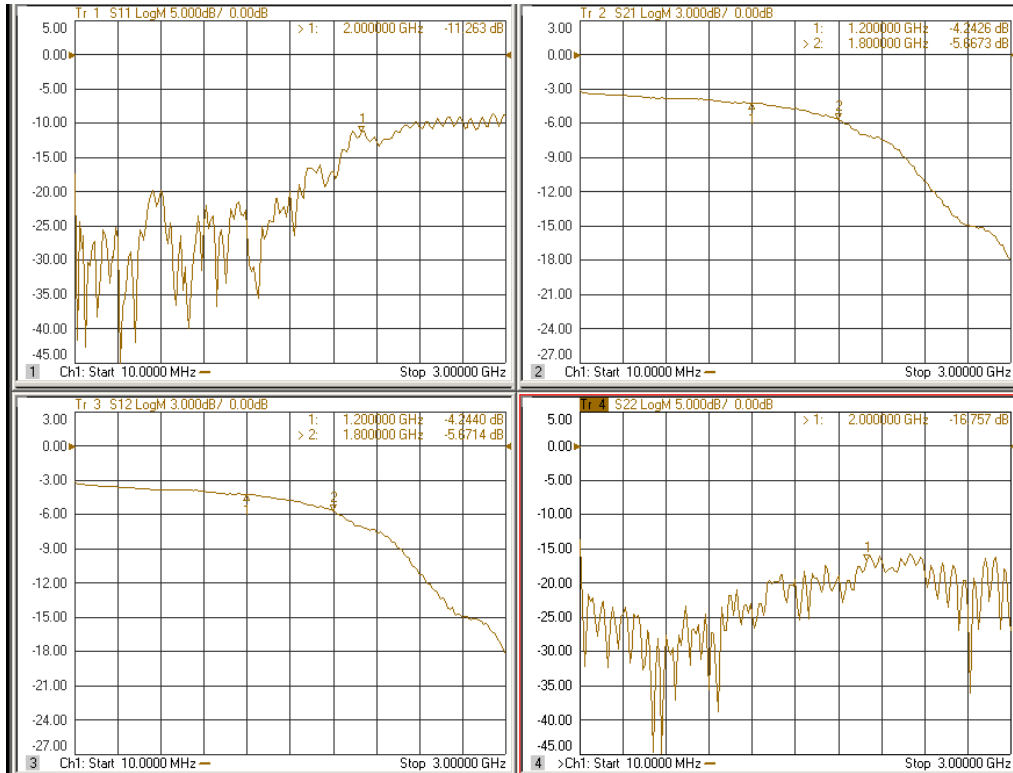Figure 156: Scattering matrix for channel 3D, polarization y and output 6dB3.

Figure 157: Scattering matrix for channel 3E, polarization x and output 3dB1.
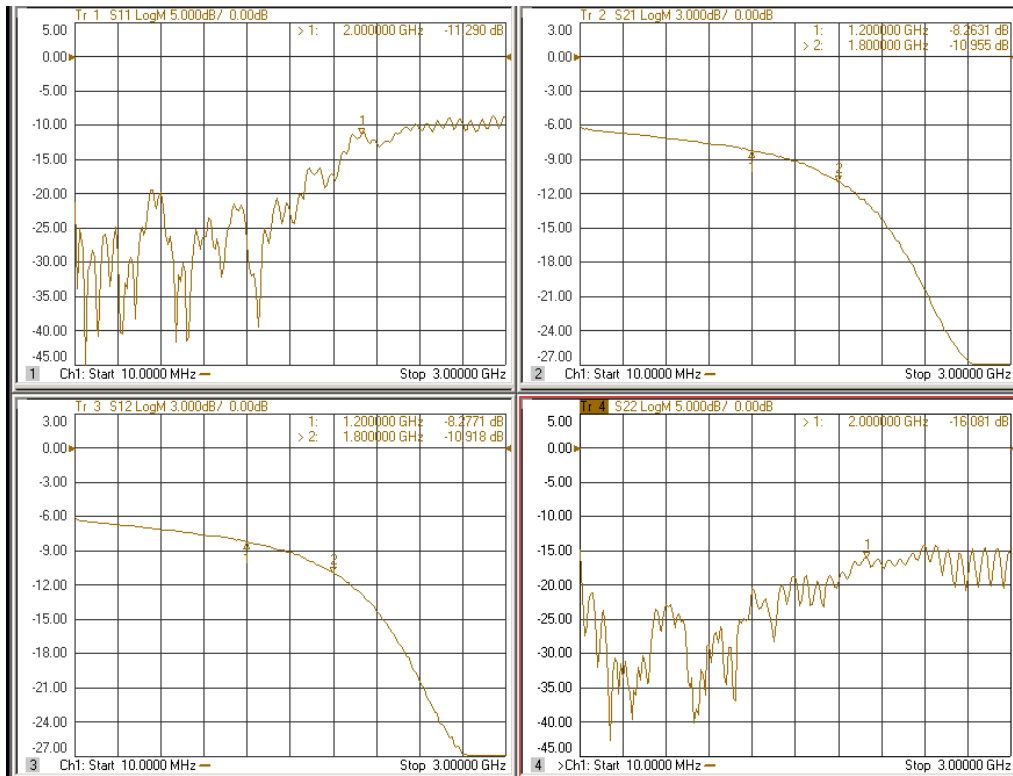

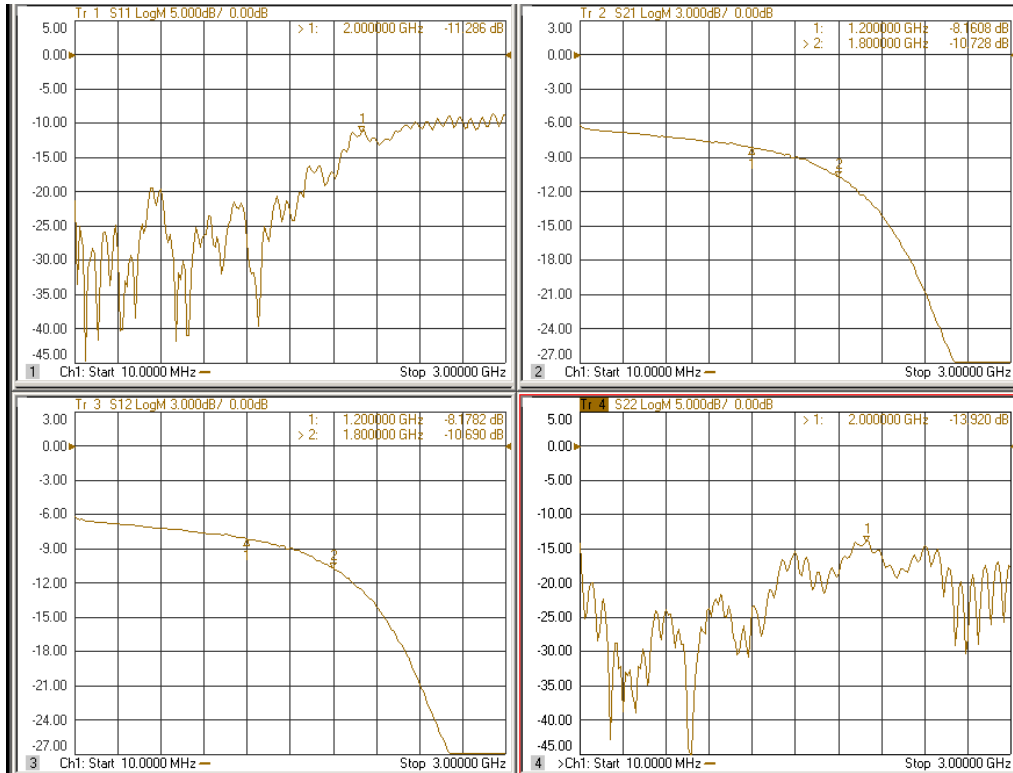Figure 158: Scattering matrix for channel 3E, polarization x and output 6dB2.

Figure 159: Scattering matrix for channel 3E, polarization x and output 6dB3.
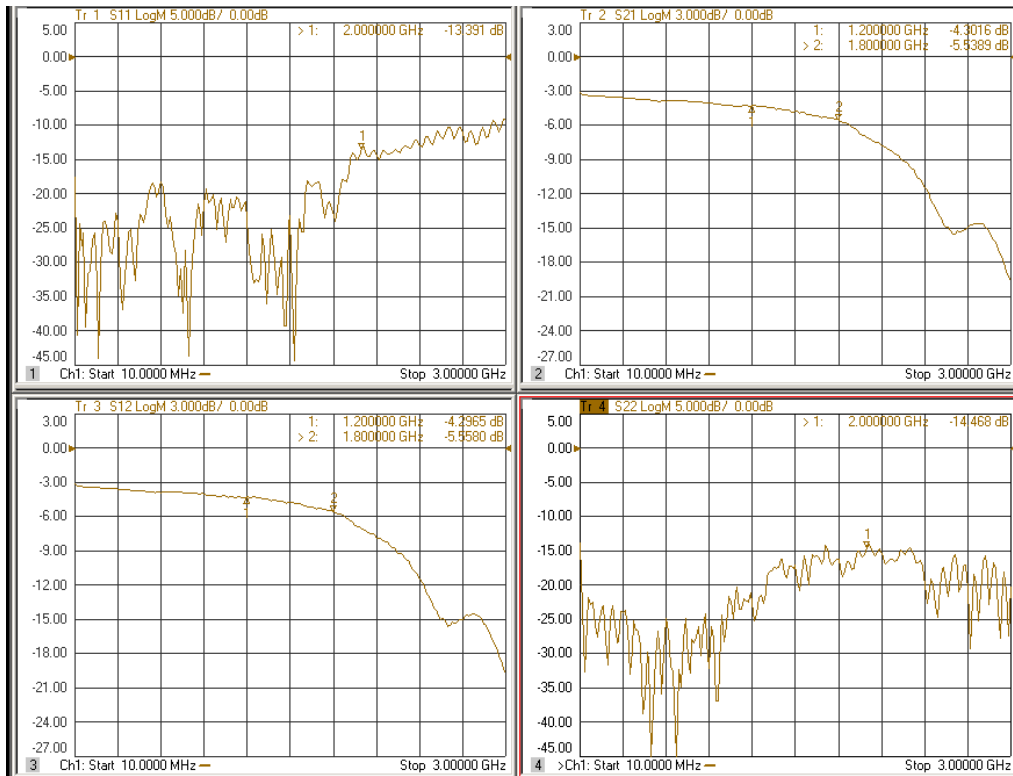

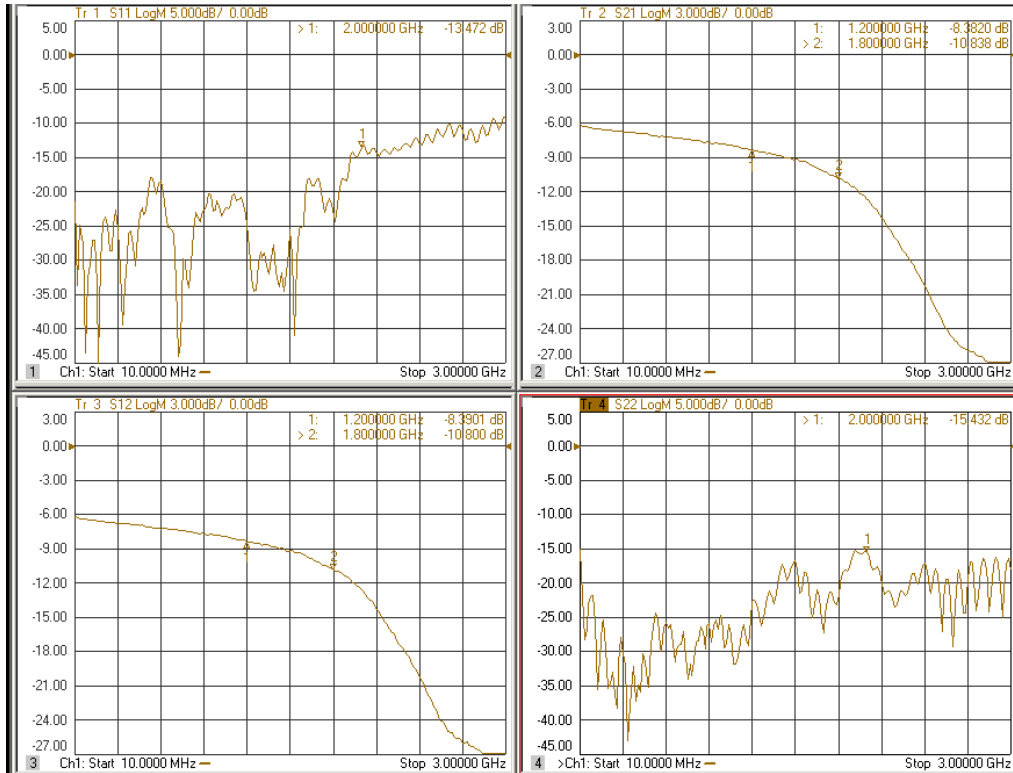Figure 160: Scattering matrix for channel 3E, polarization y and output 3dB1.

Figure 161: Scattering matrix for channel 3E, polarization y and output 6dB2.
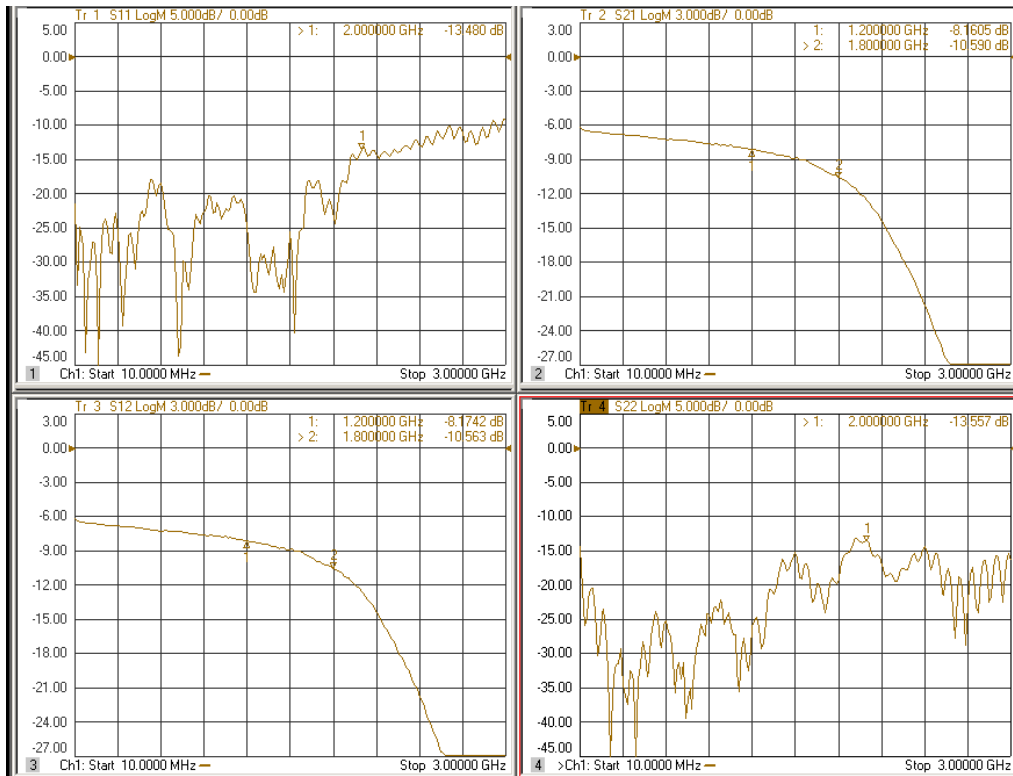

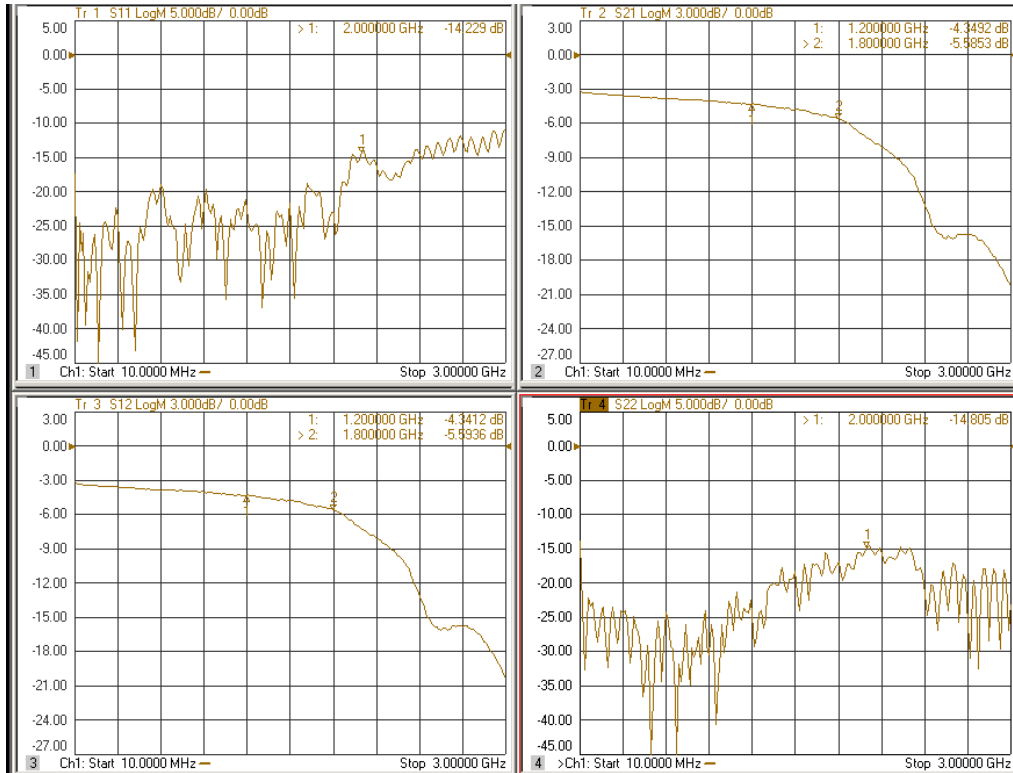Figure 162: Scattering matrix for channel 3E, polarization y and output 6dB3.

Figure 163: Scattering matrix for channel 3F, polarization x and output 3dB1.
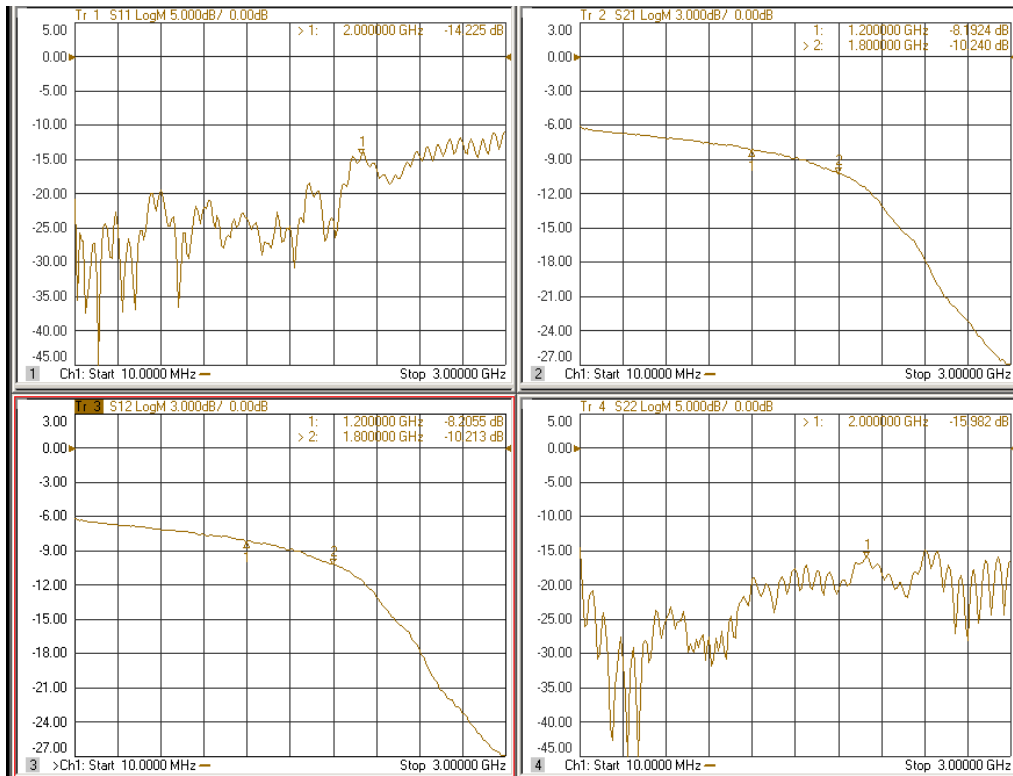

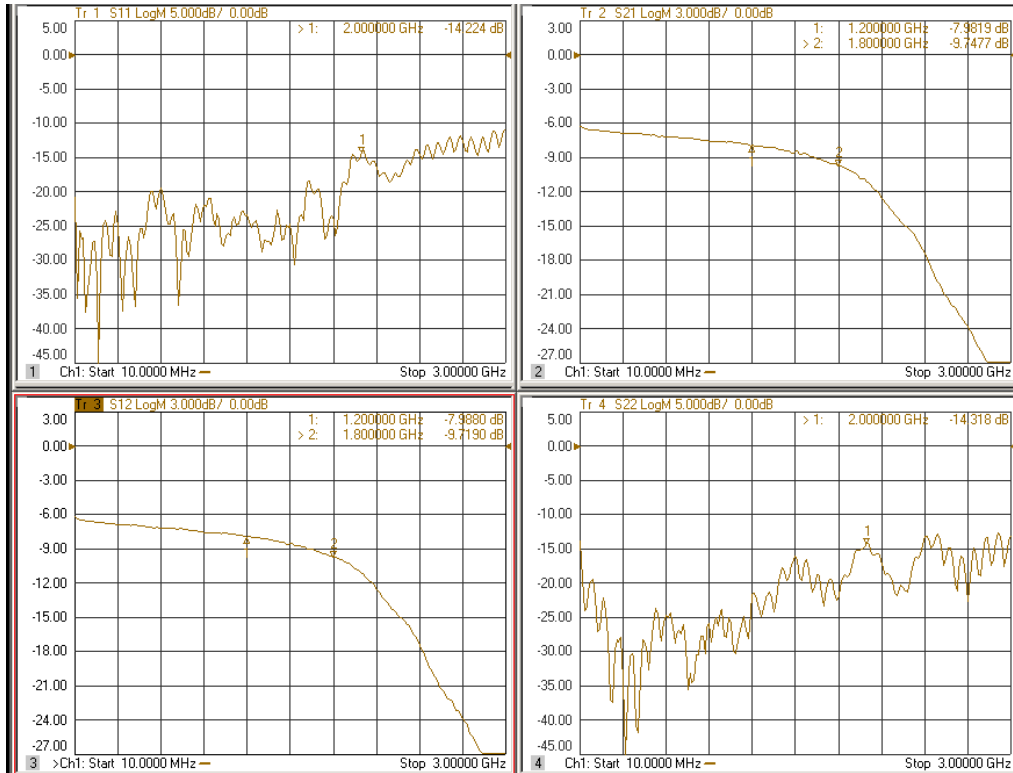Figure 164: Scattering matrix for channel 3F, polarization x and output 6dB2.

Figure 165: Scattering matrix for channel 3F, polarization x and output 6dB3.
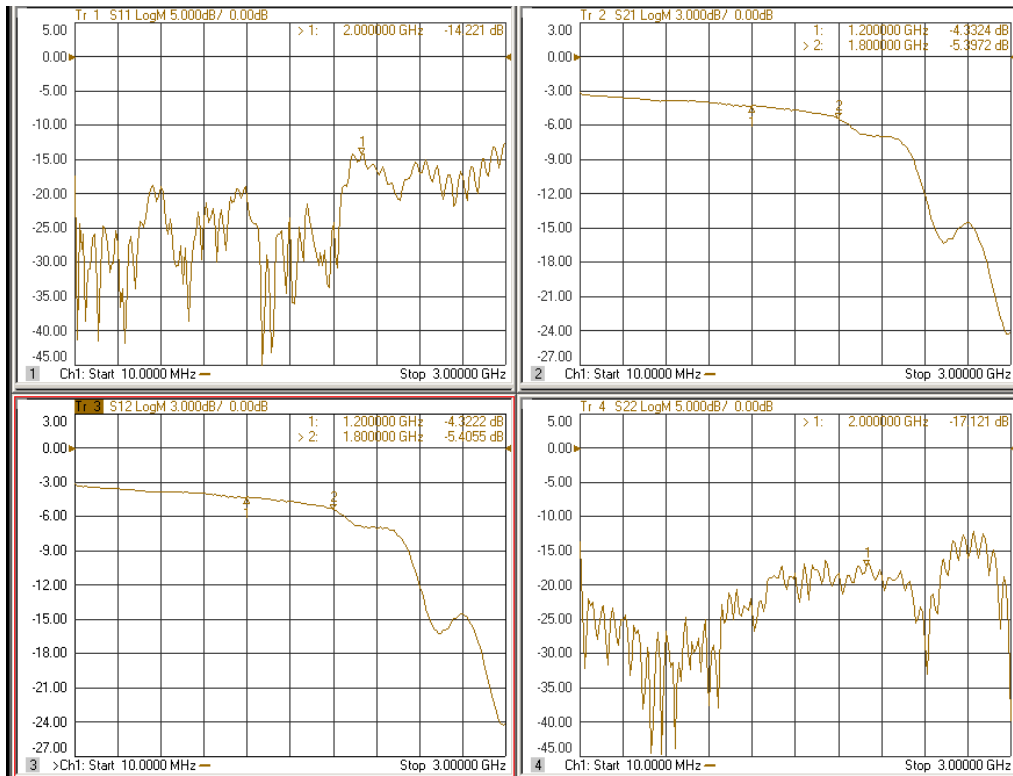

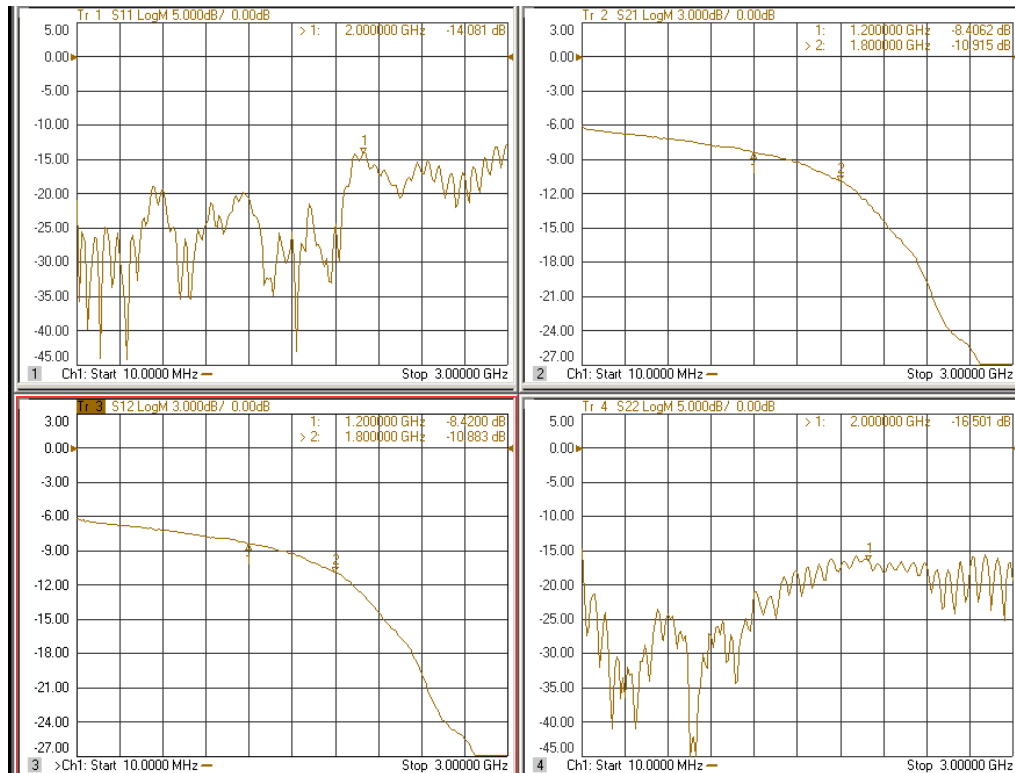Figure 166: Scattering matrix for channel 3F, polarization y and output 3dB1.

Figure 167: Scattering matrix for channel 3F, polarization y and output 6dB2.
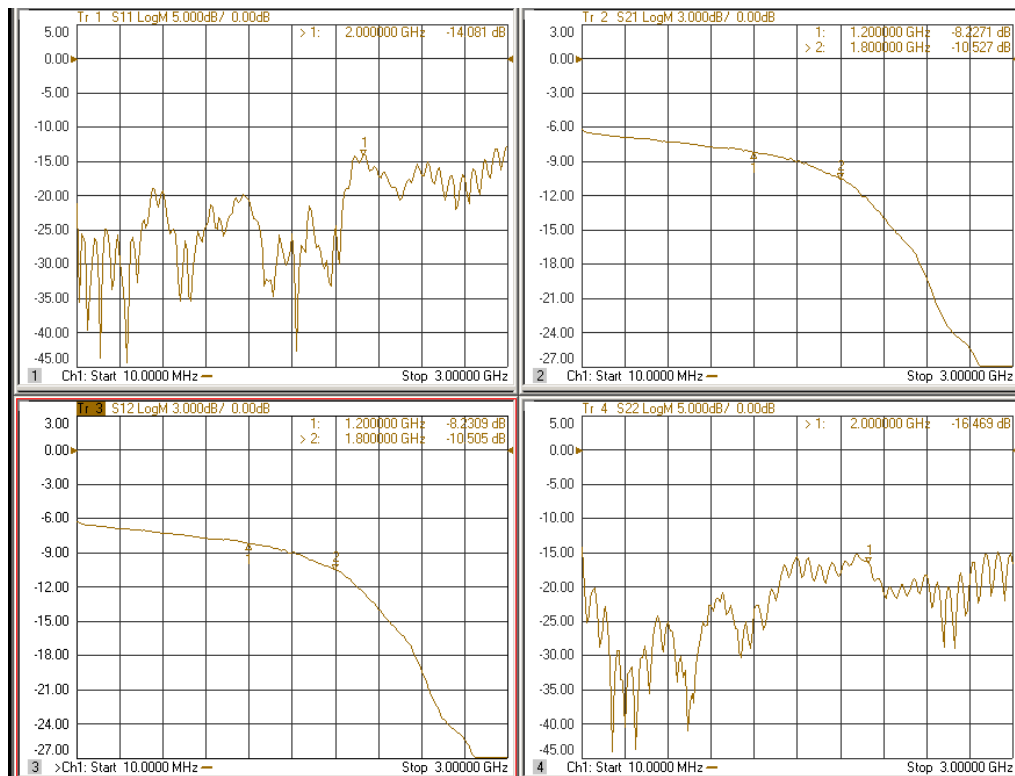

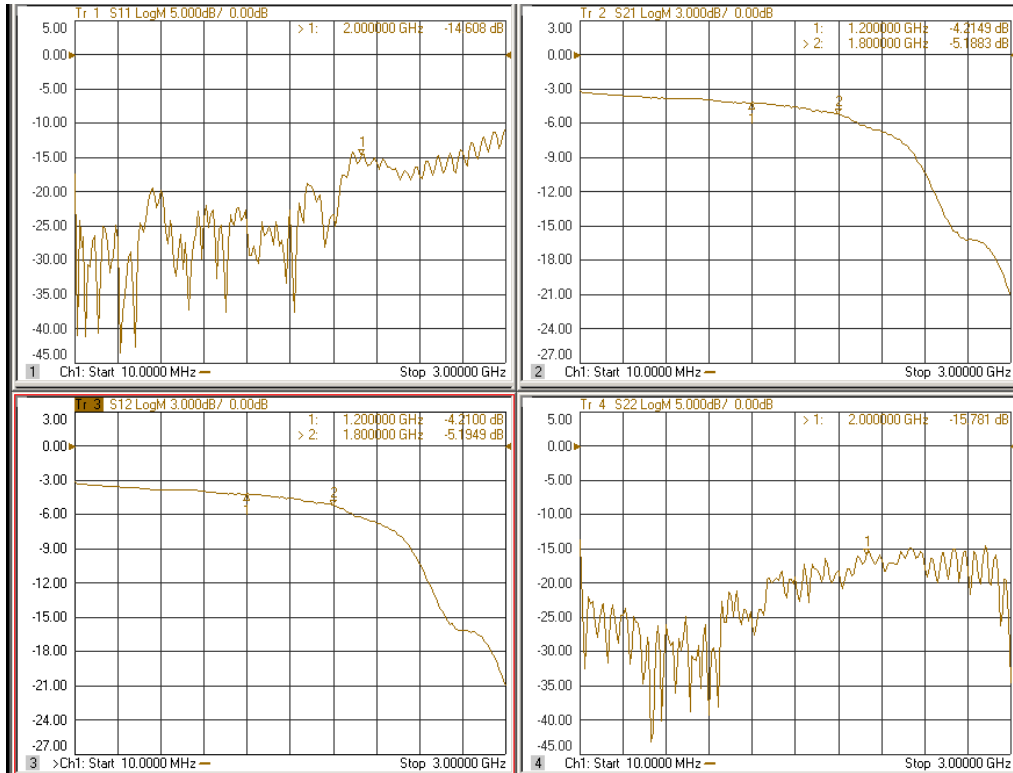Figure 168: Scattering matrix for channel 3F, polarization y and output 6dB3.

Figure 169: Scattering matrix for channel 3G, polarization x and output 3dB1.
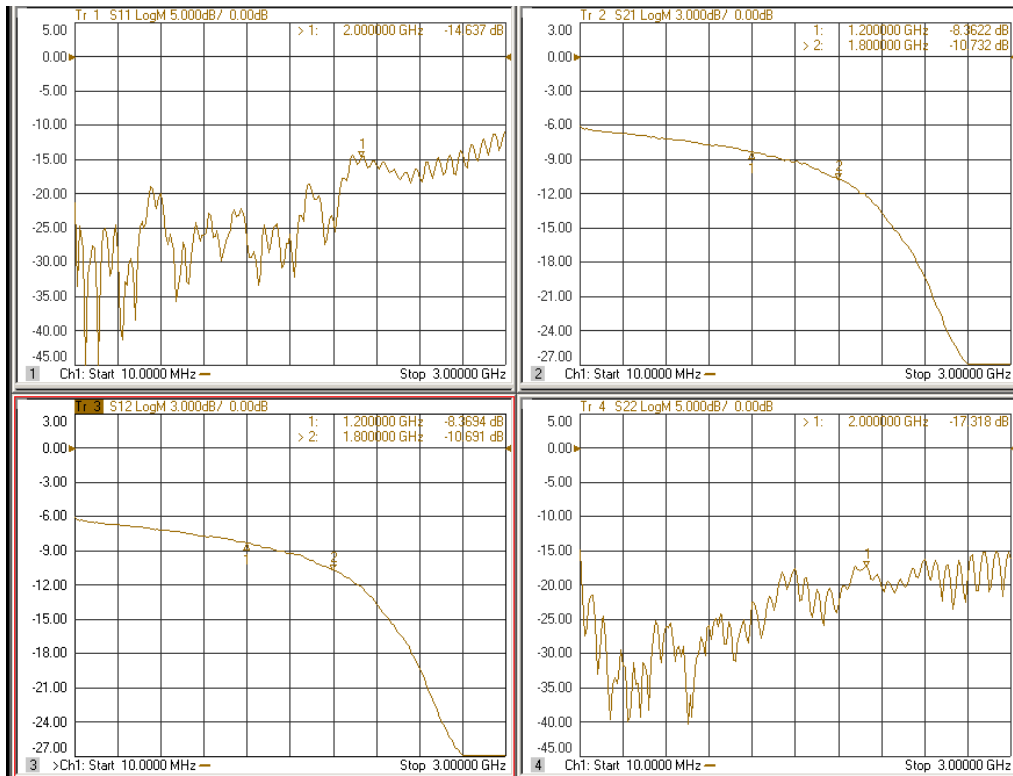

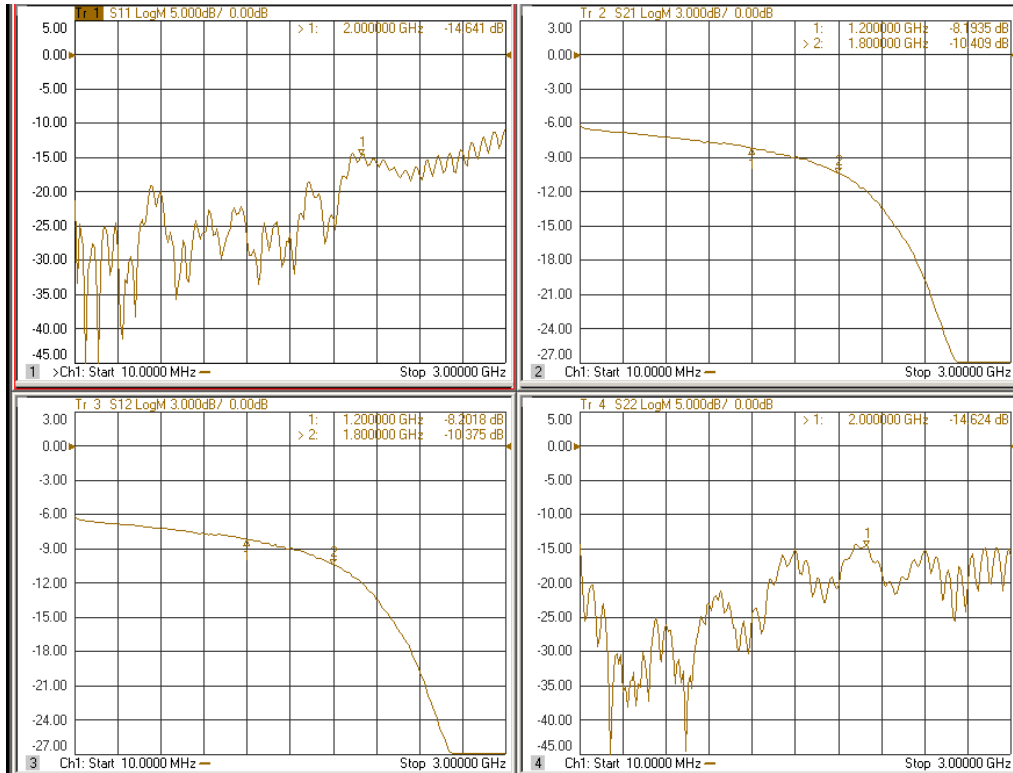Figure 170: Scattering matrix for channel 3G, polarization x and output 6dB2.

Figure 171: Scattering matrix for channel 3G, polarization x and output 6dB3.
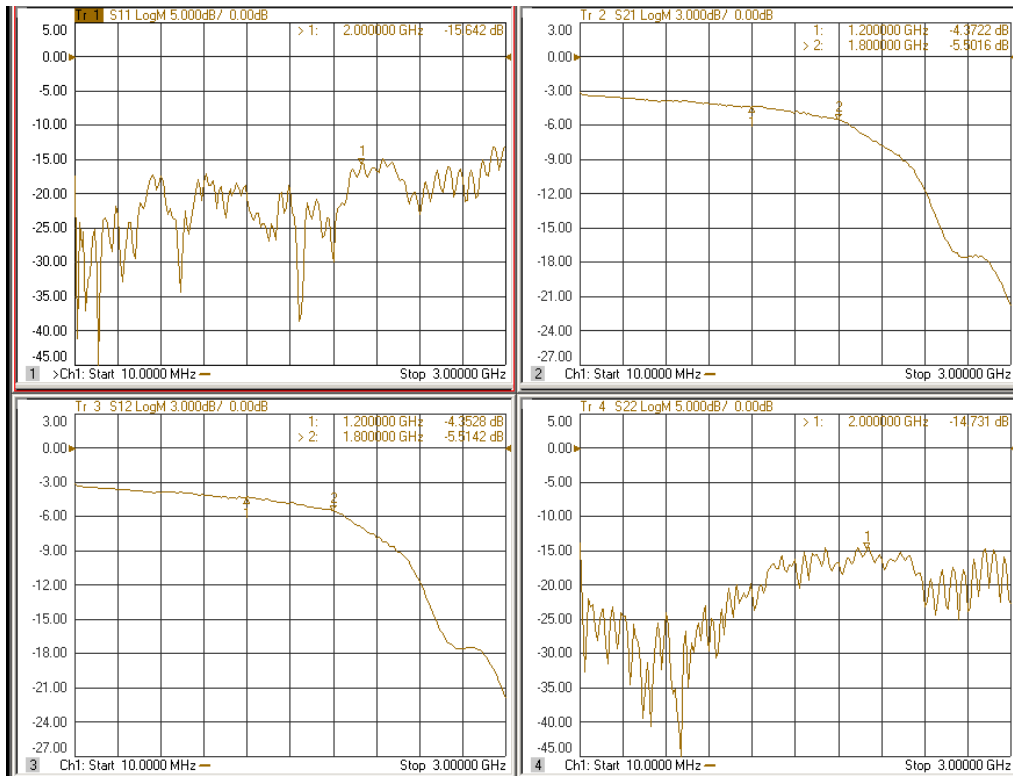

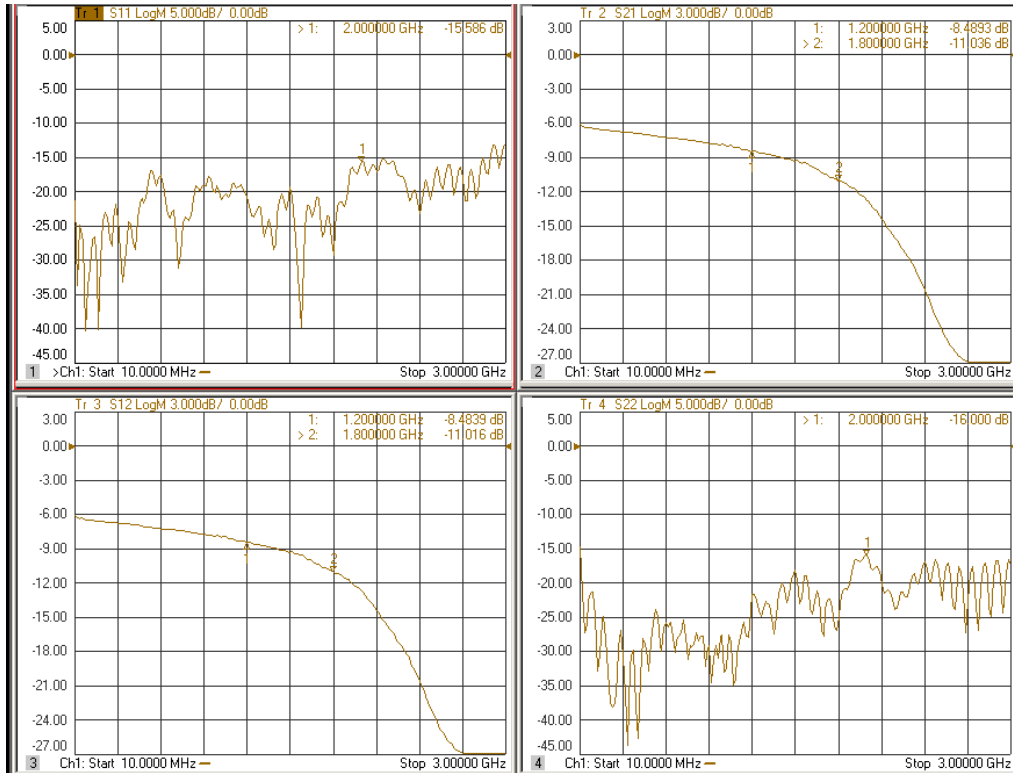Figure 172: Scattering matrix for channel 3G, polarization y and output 3dB1.

Figure 173: Scattering matrix for channel 3G, polarization y and output 6dB2.
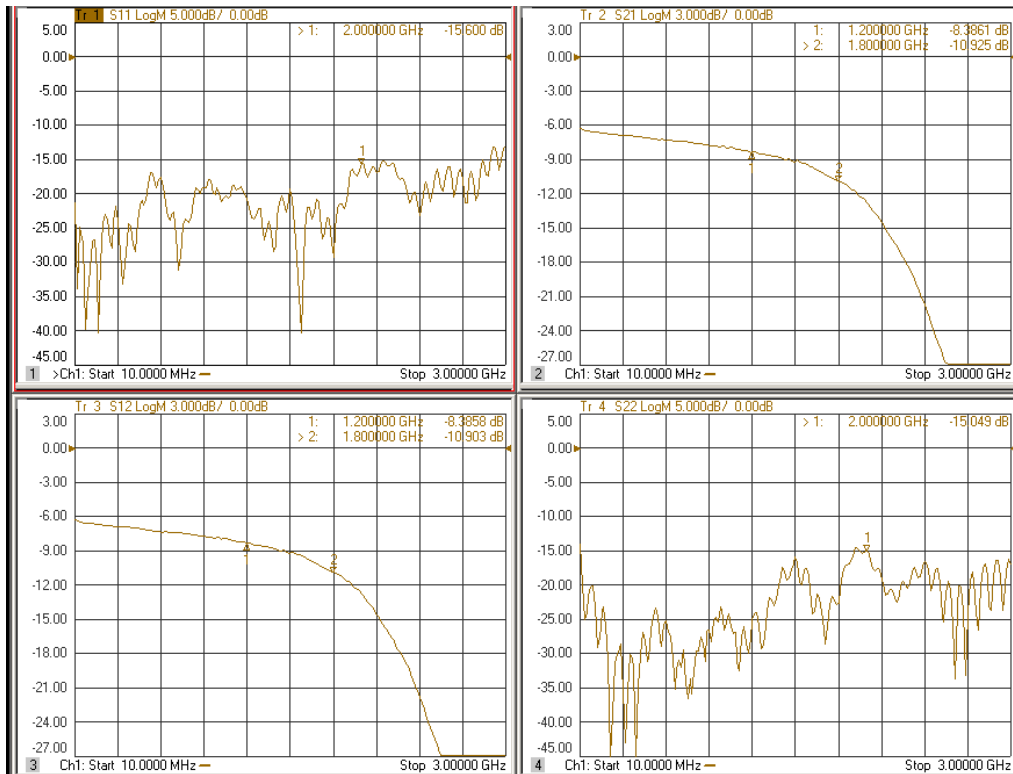

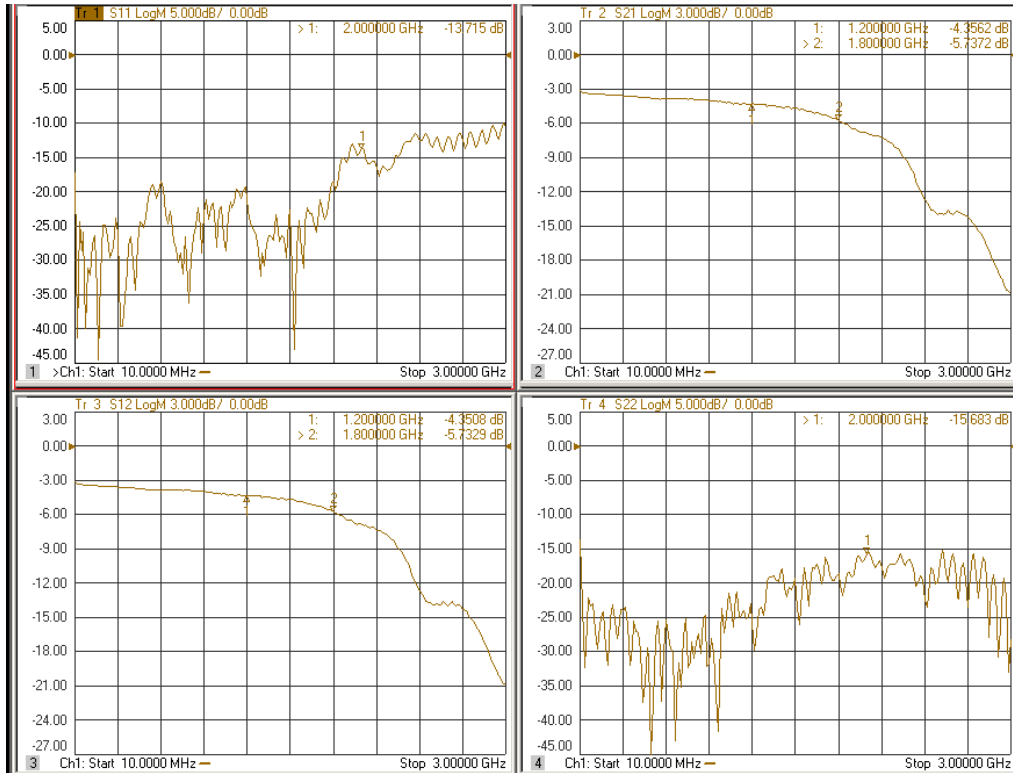Figure 174: Scattering matrix for channel 3G, polarization y and output 6dB3.

Figure 175: Scattering matrix for channel 3H, polarization x and output 3dB1.
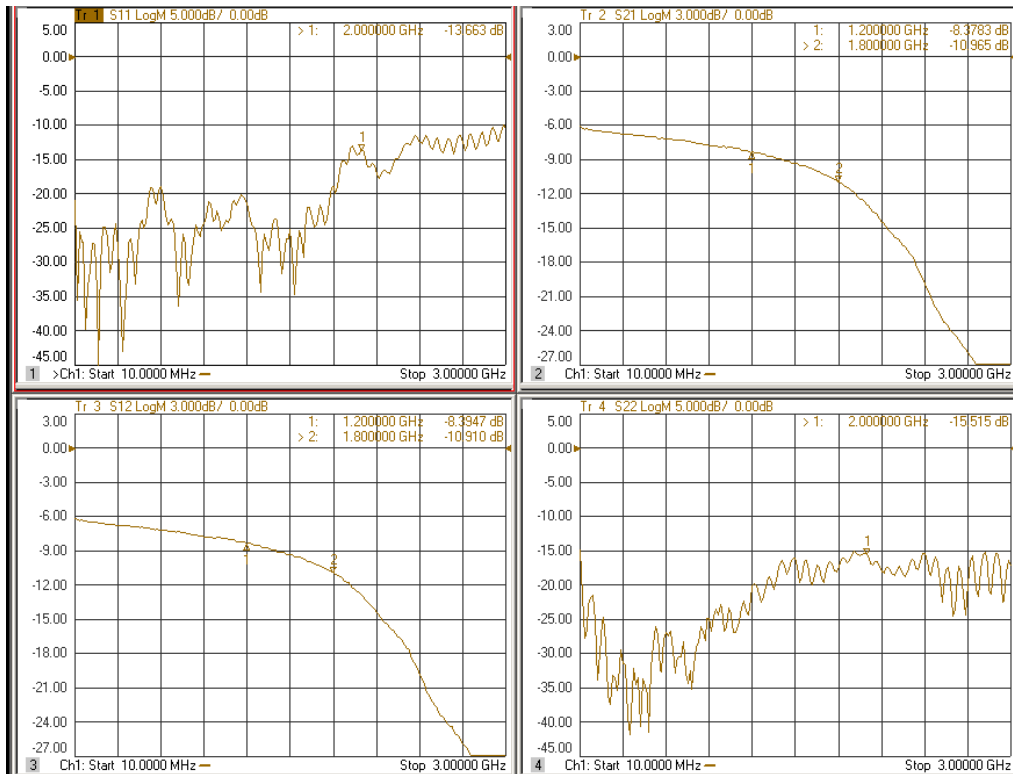

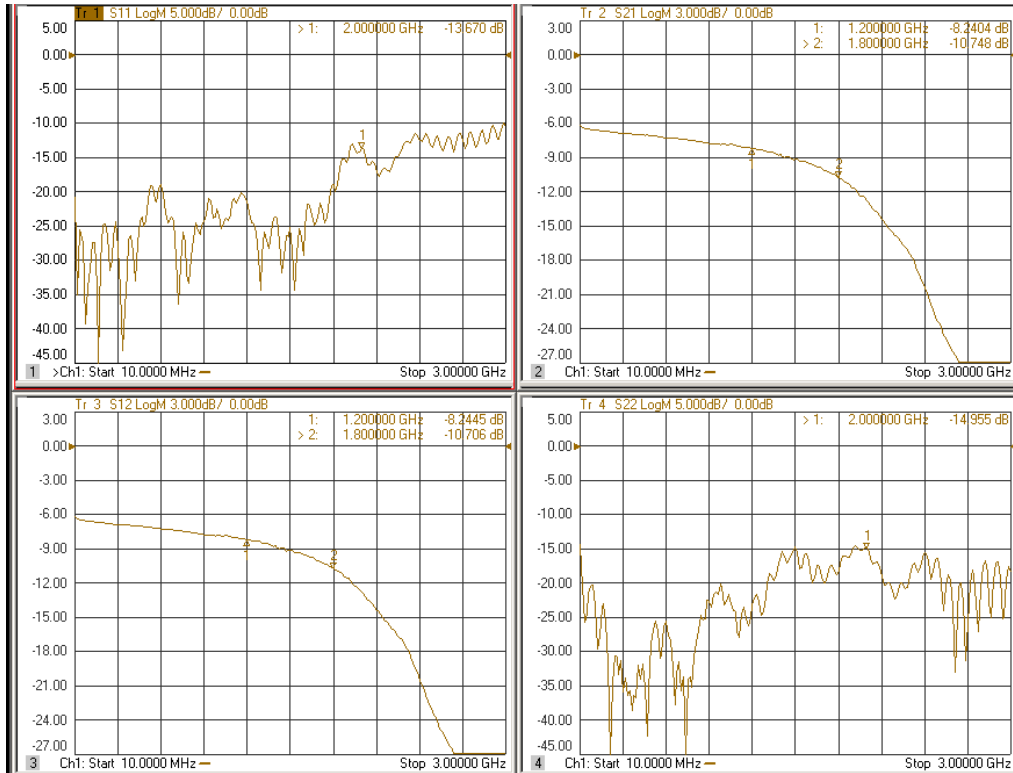Figure 176: Scattering matrix for channel 3H, polarization x and output 6dB2.

Figure 177: Scattering matrix for channel 3H, polarization x and output 6dB3.
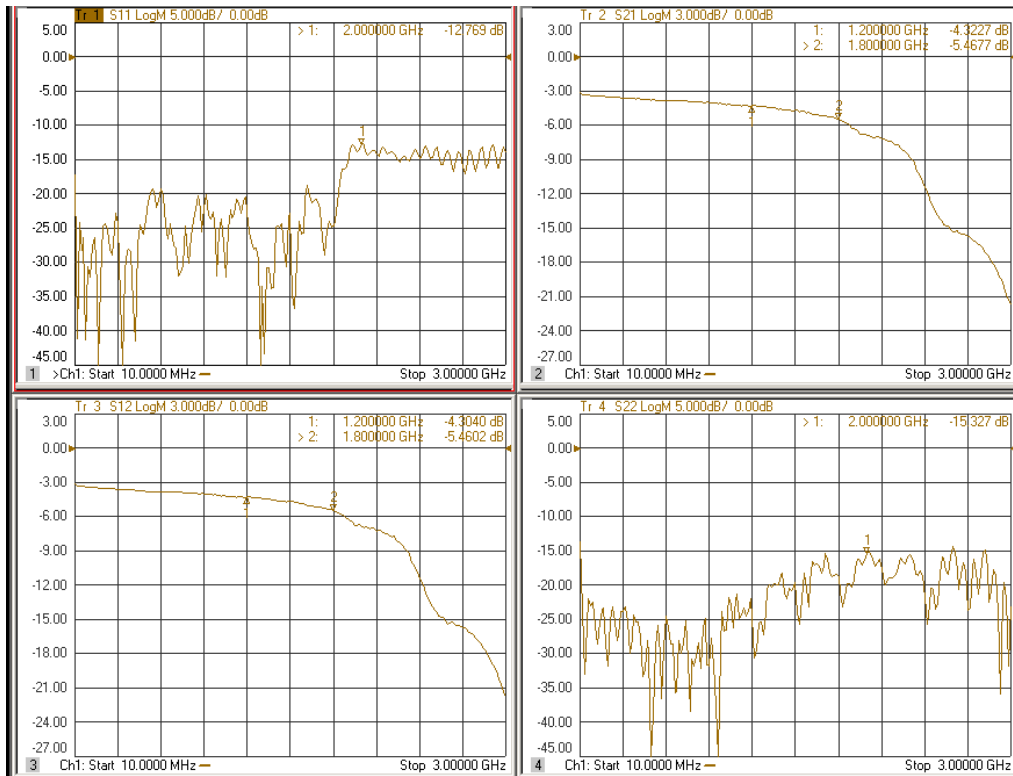

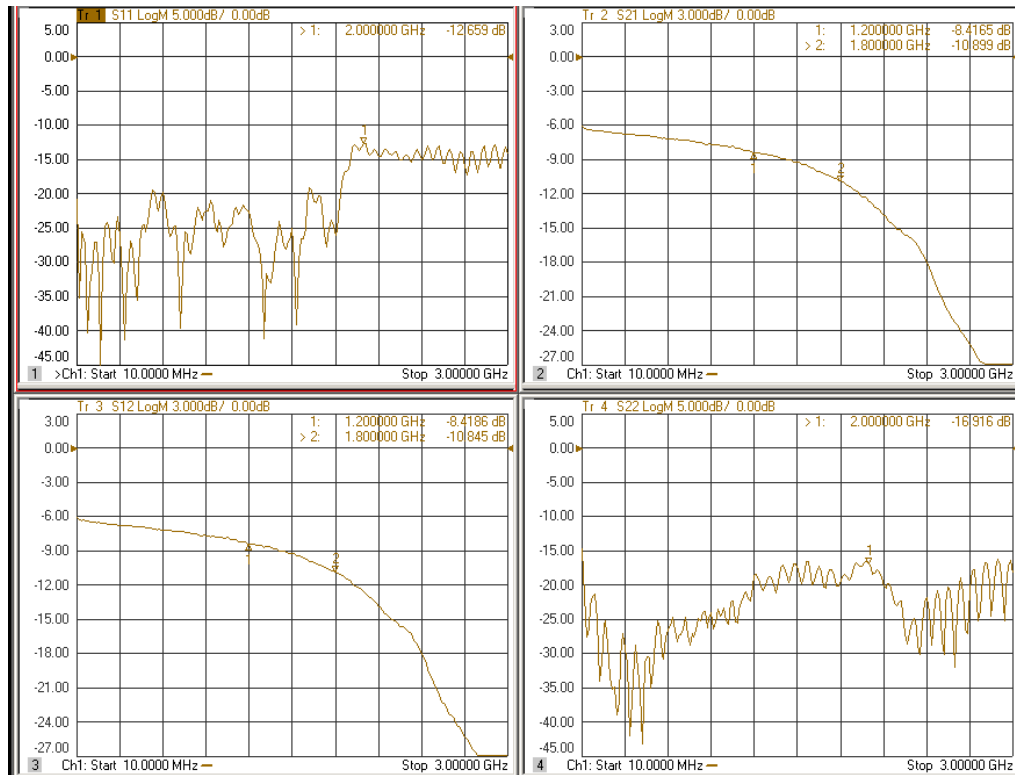Figure 178: Scattering matrix for channel 3H, polarization y and output 3dB1.

Figure 179: Scattering matrix for channel 3H, polarization y and output 6dB2.
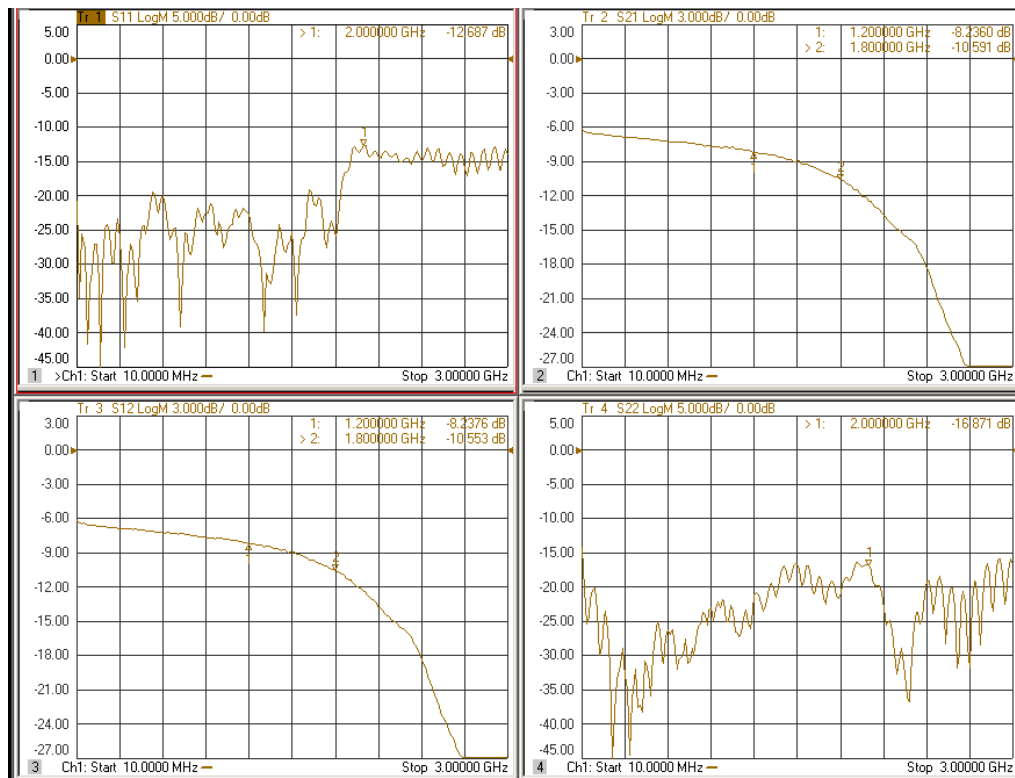

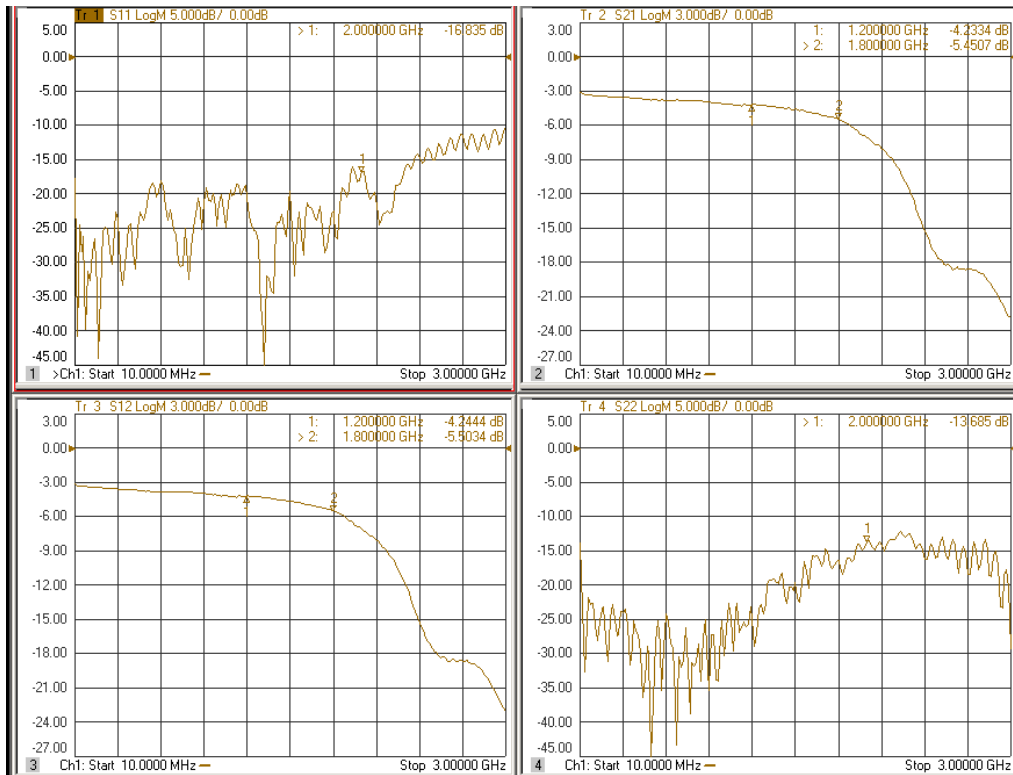Figure 180: Scattering matrix for channel 3H, polarization y and output 6dB3.

Figure 181: Scattering matrix for channel 3J, polarization x and output 3dB1.
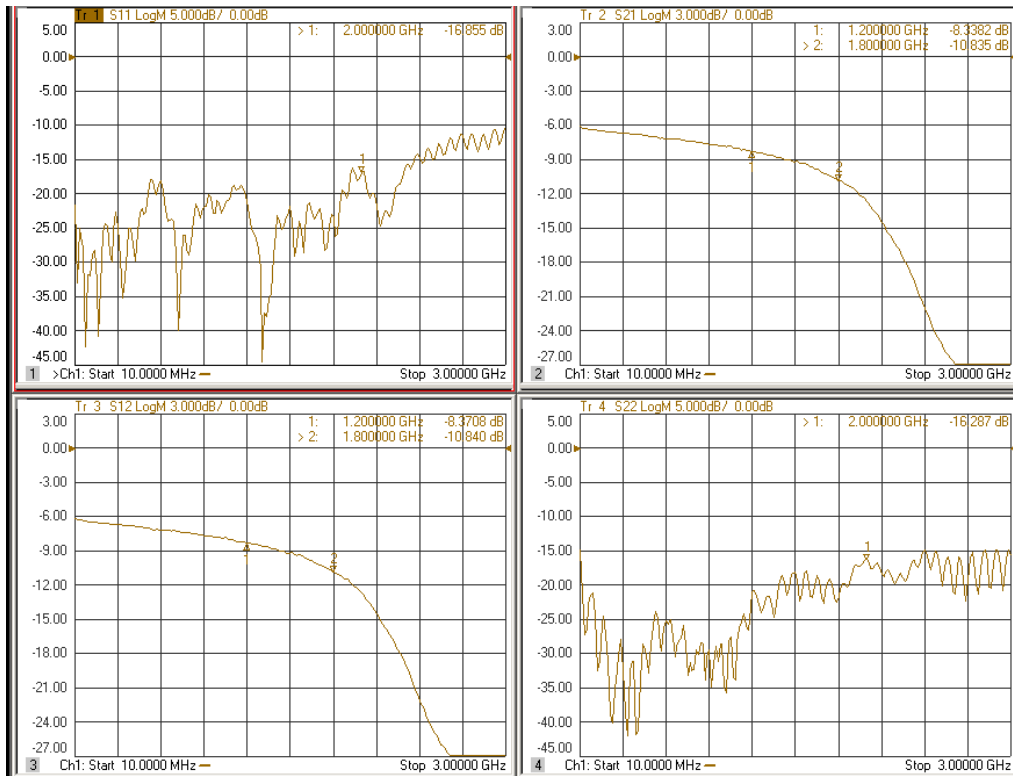

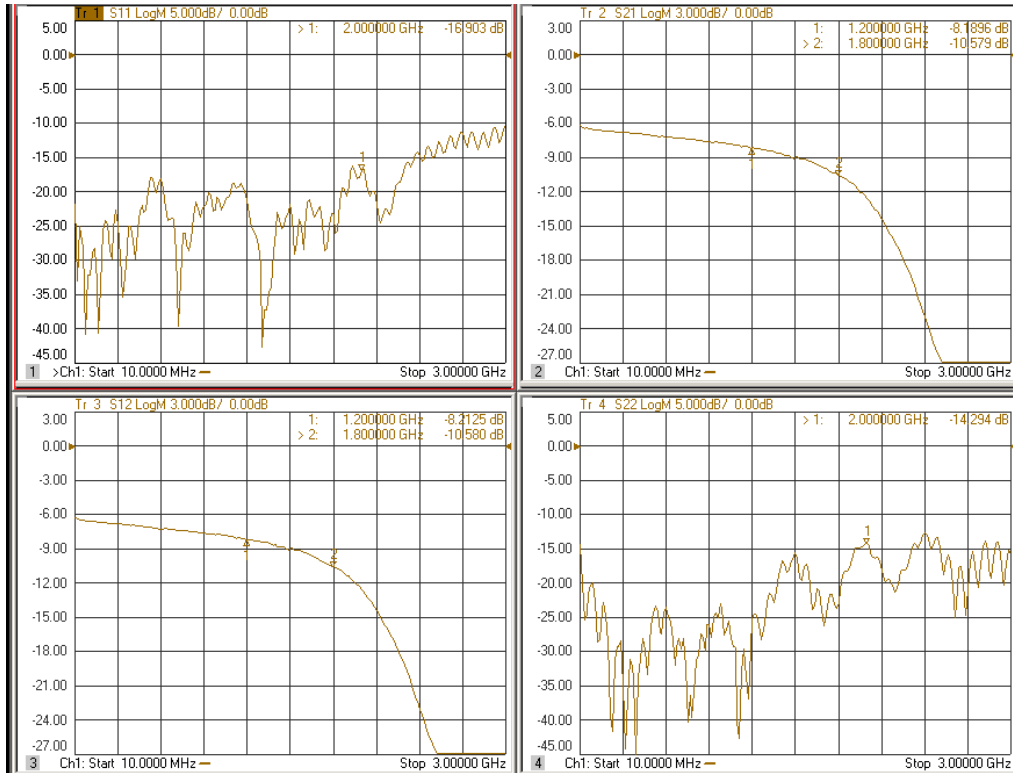Figure 182: Scattering matrix for channel 3J, polarization x and output 6dB2.

Figure 183: Scattering matrix for channel 3J, polarization x and output 6dB3.
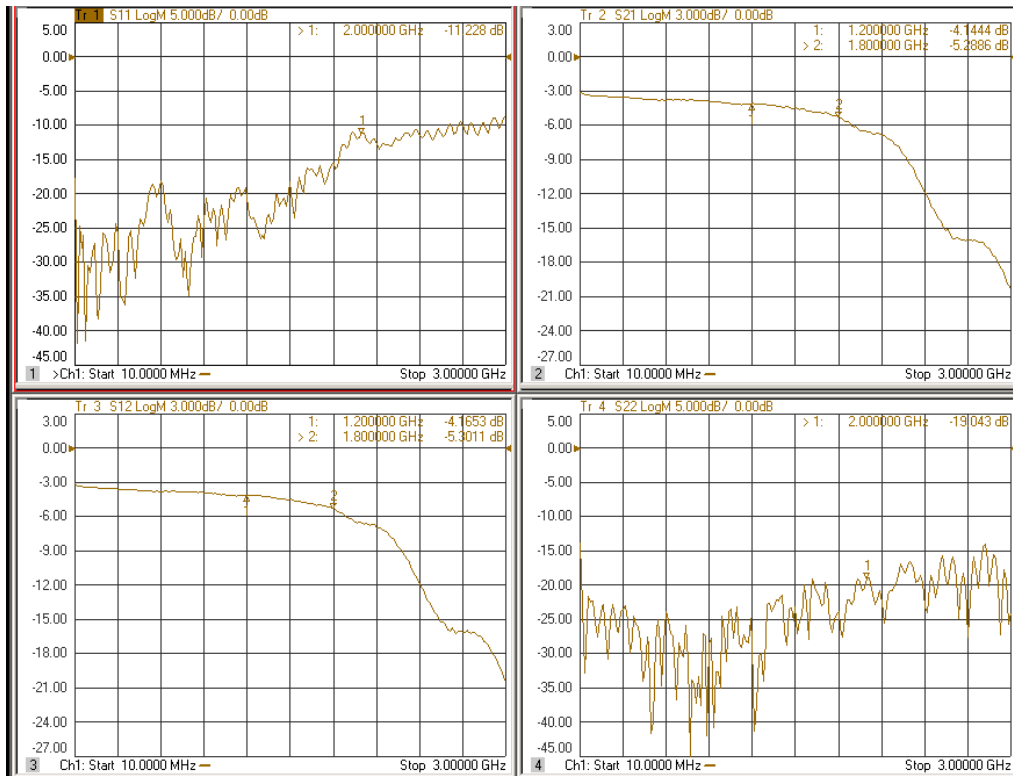

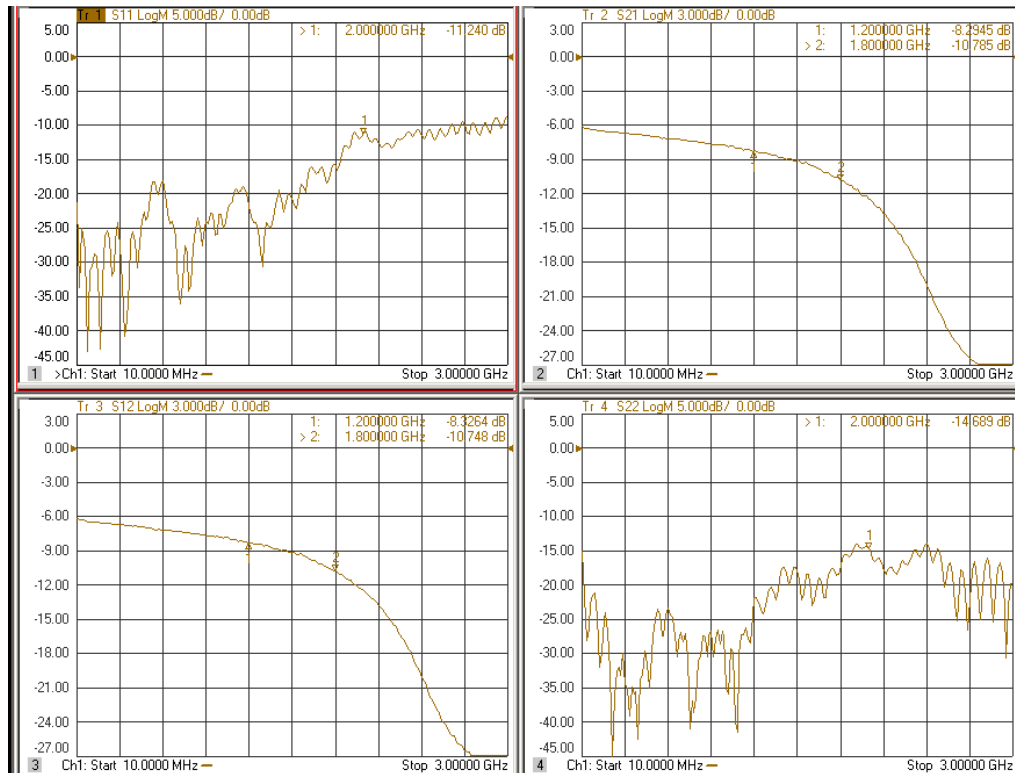Figure 184: Scattering matrix for channel 3J, polarization y and output 3dB1.

Figure 185: Scattering matrix for channel 3J, polarization y and output 6dB2.
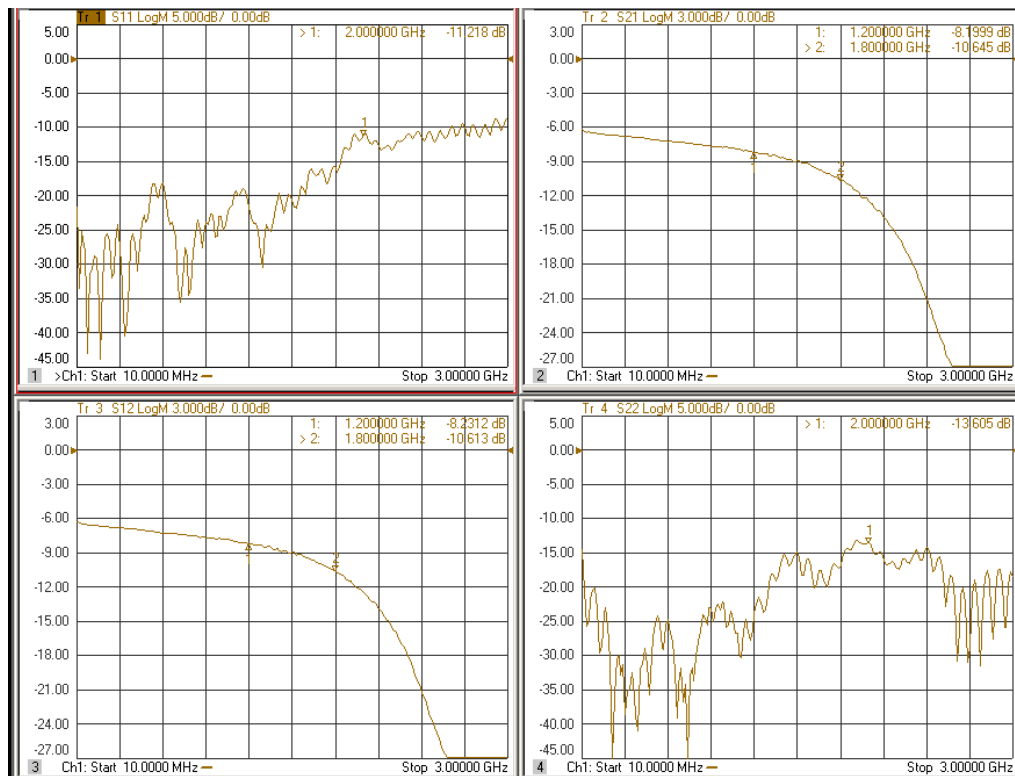

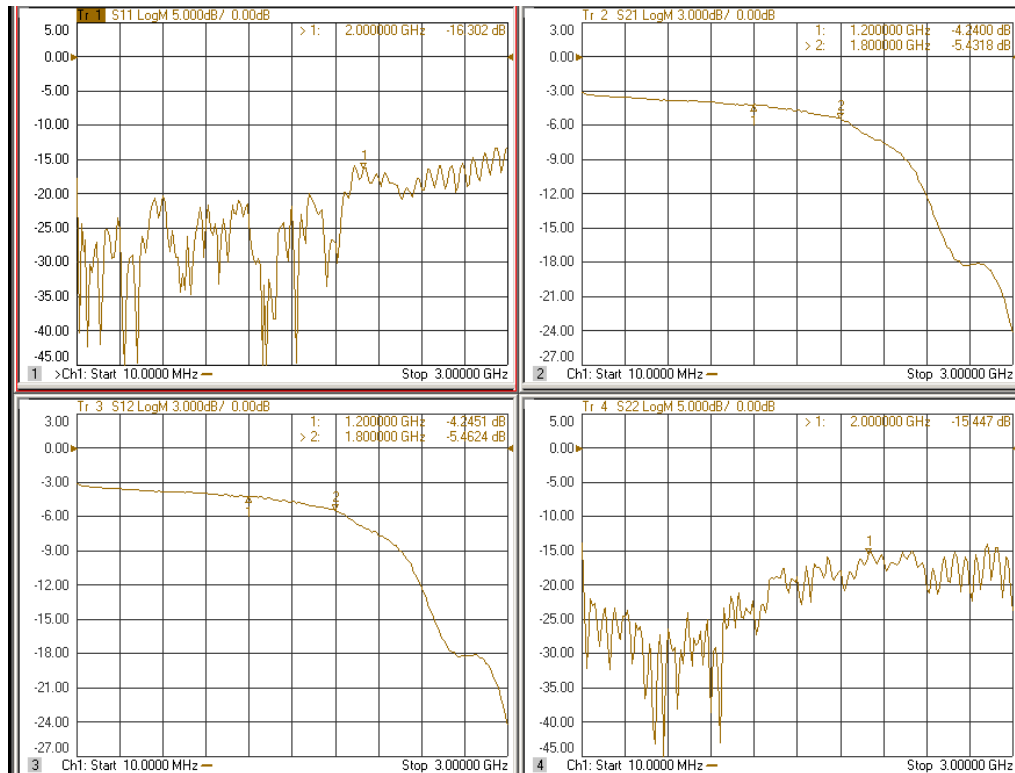Figure 186: Scattering matrix for channel 3J, polarization y and output 6dB3.

Figure 187: Scattering matrix for channel 3L, polarization x and output 3dB1.
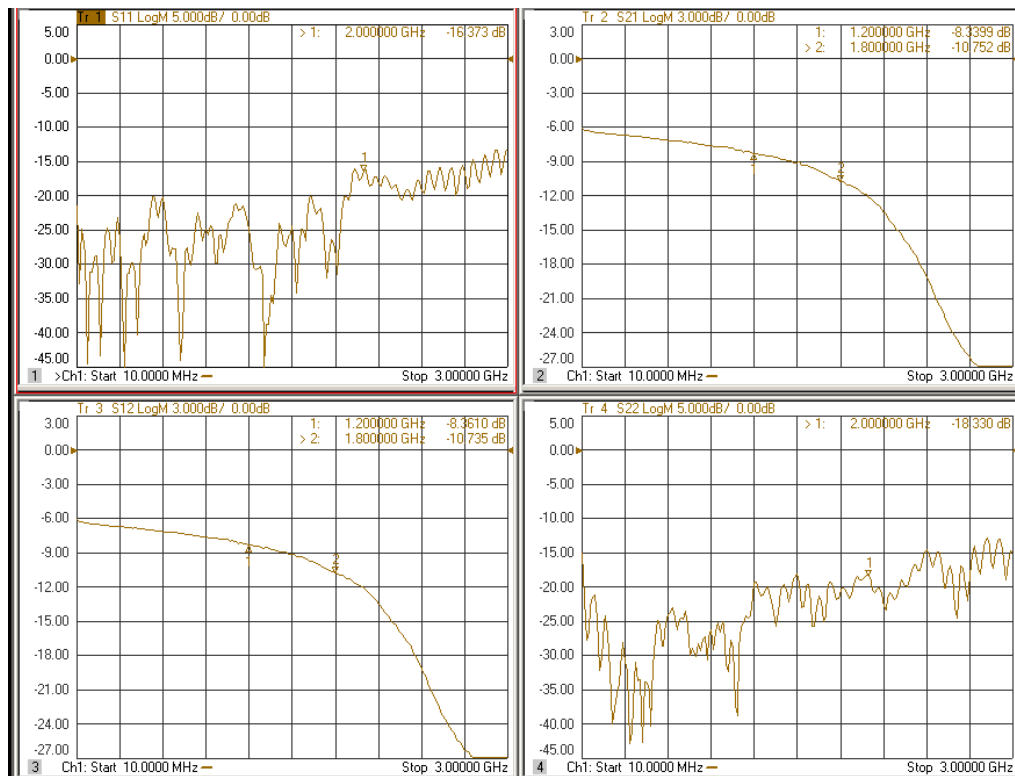

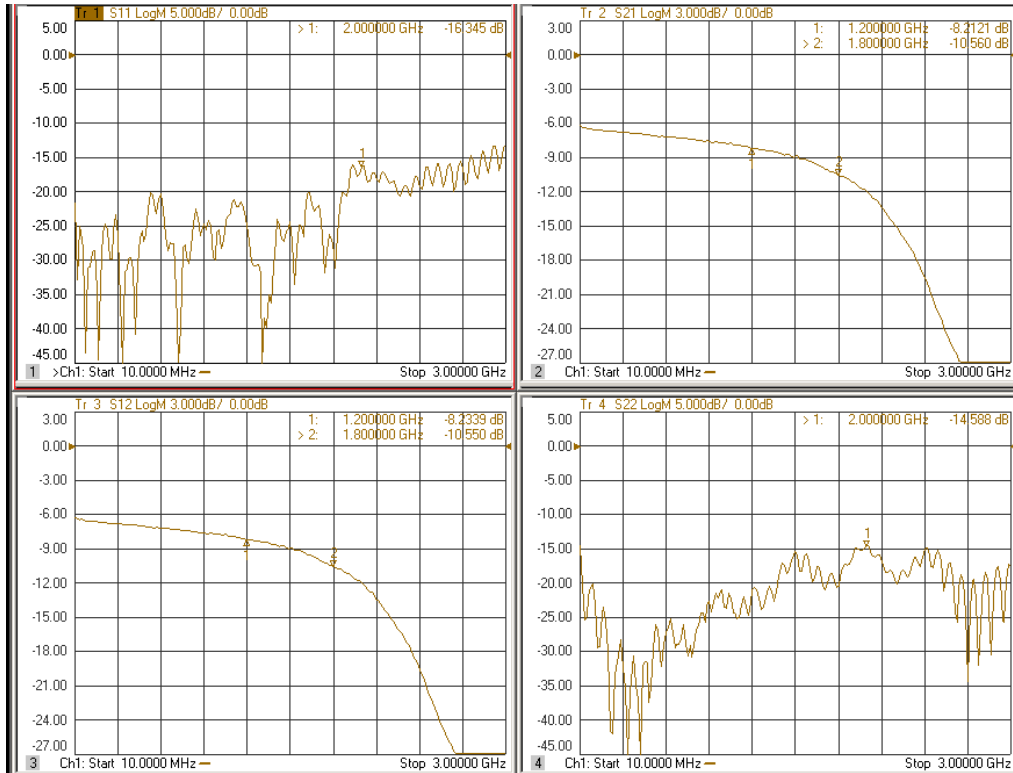Figure 188: Scattering matrix for channel 3L, polarization x and output 6dB2.

Figure 189: Scattering matrix for channel 3L, polarization x and output 6dB3.
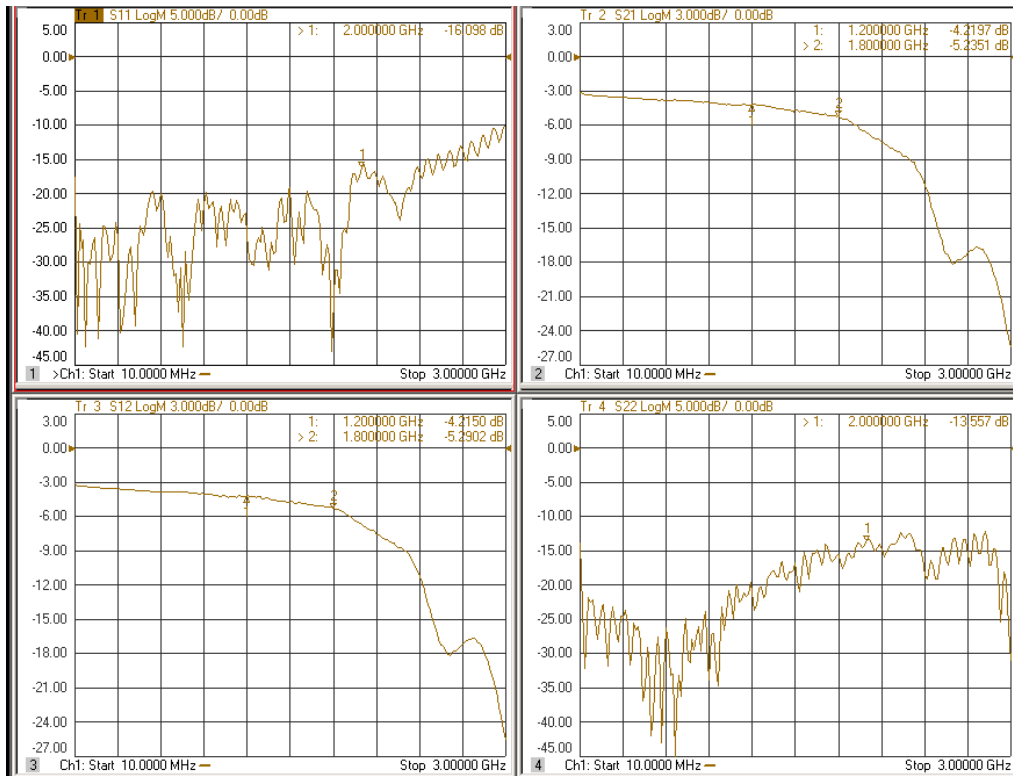

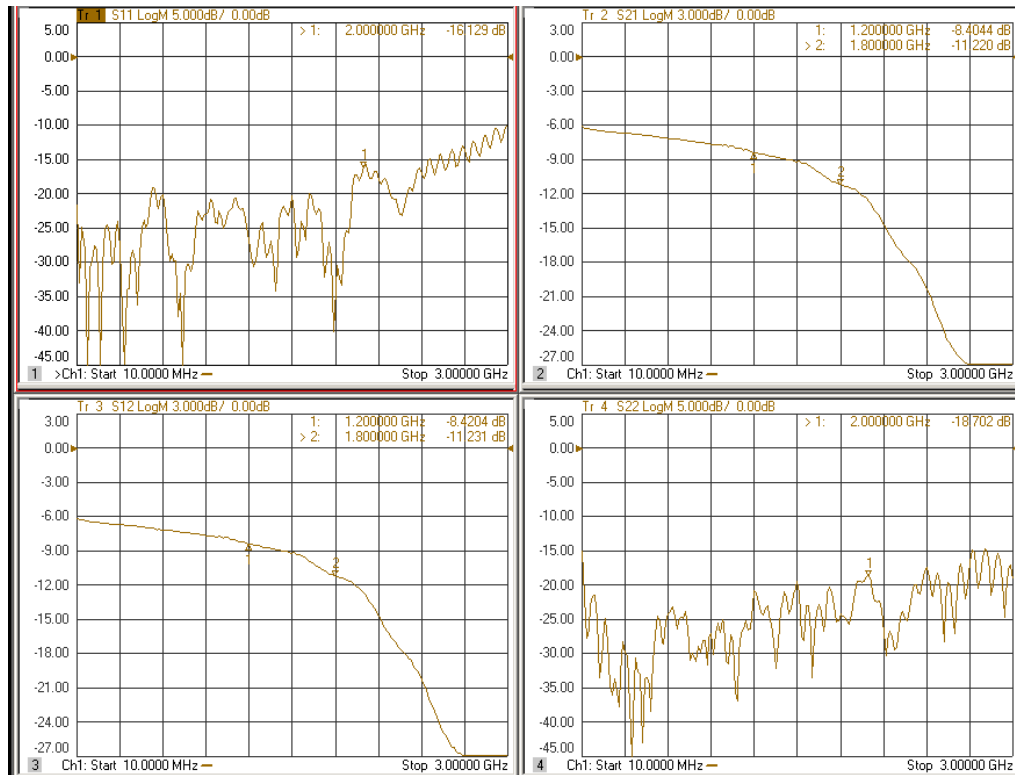Figure 190: Scattering matrix for channel 3L, polarization y and output 3dB1.

Figure 191: Scattering matrix for channel 3L, polarization y and output 6dB2.
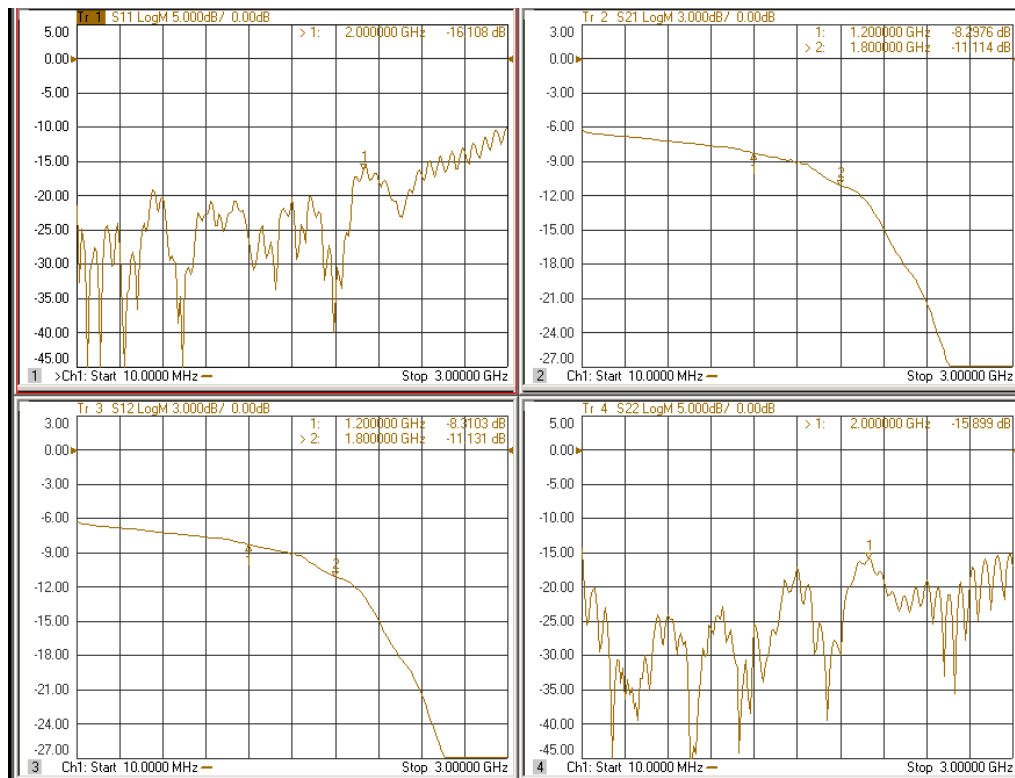

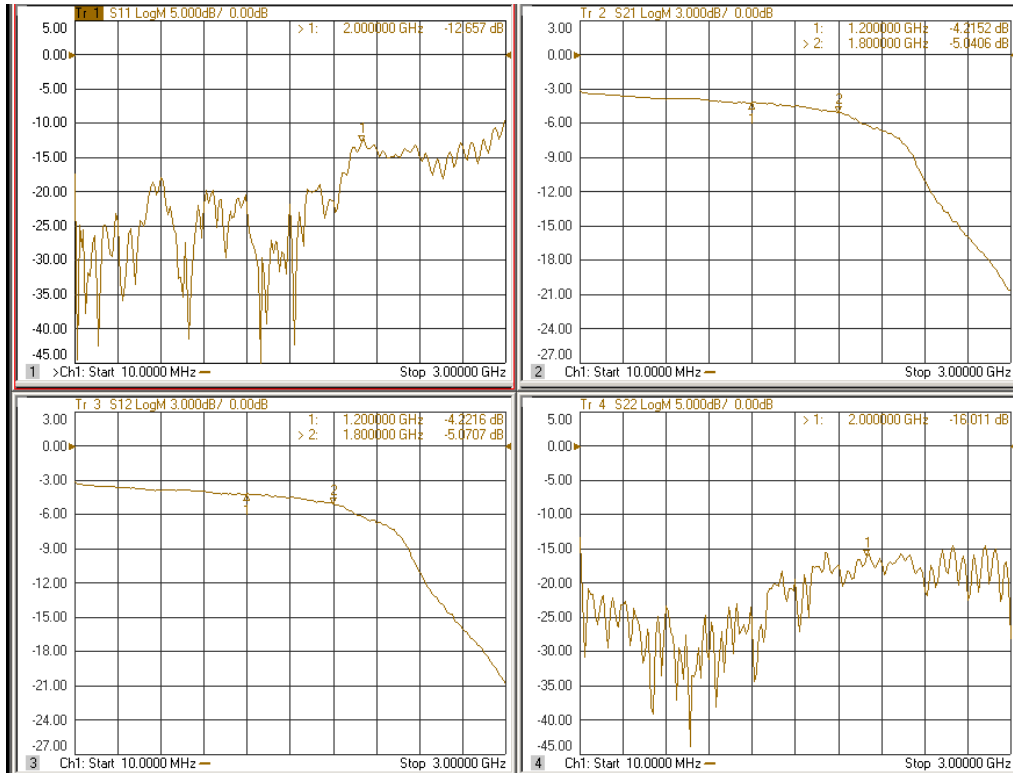Figure 192: Scattering matrix for channel 3L, polarization y and output 6dB3.

Figure 193: Scattering matrix for channel 4E, polarization x and output 3dB1.
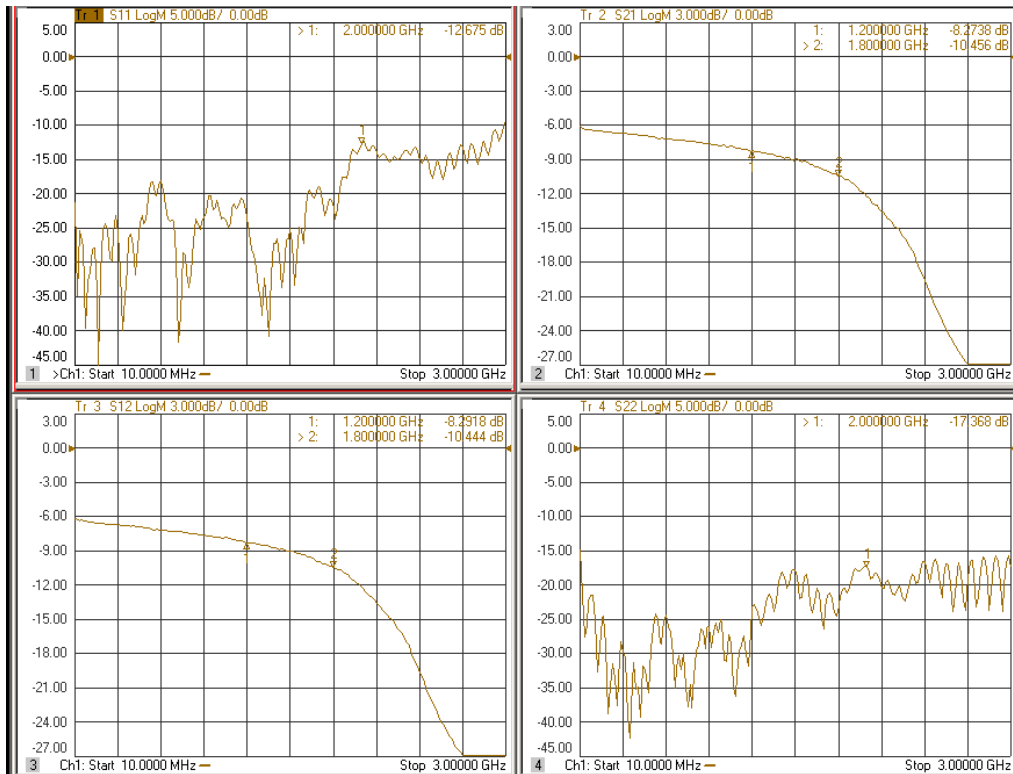

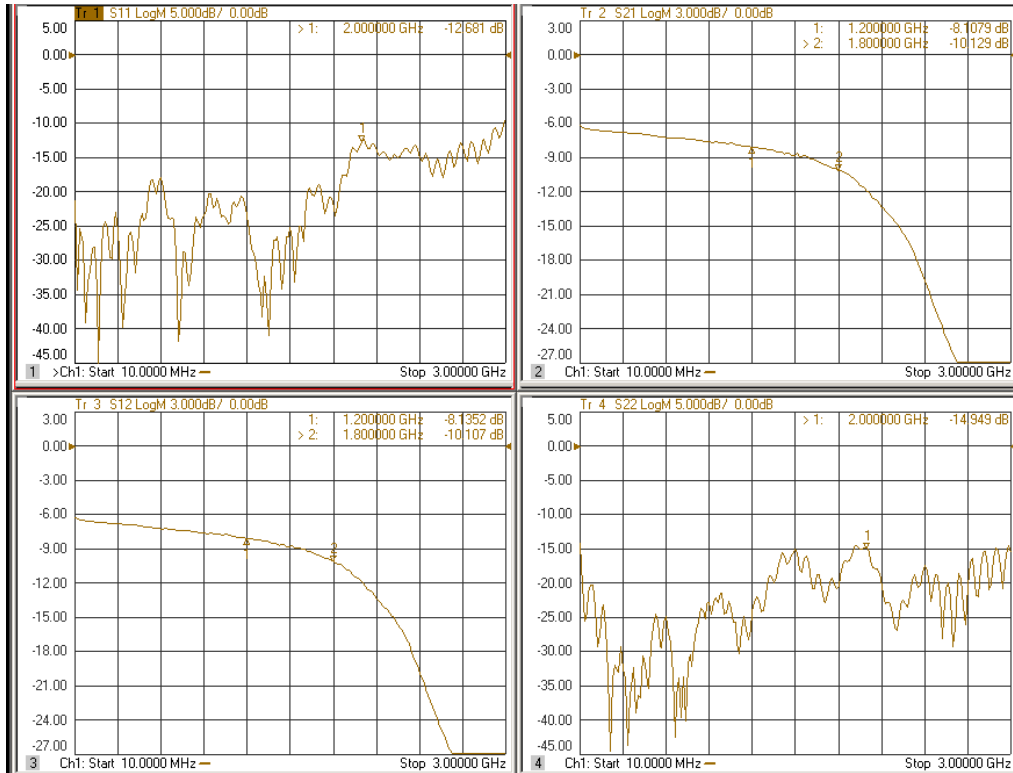Figure 194: Scattering matrix for channel 4E, polarization x and output 6dB2.

Figure 195: Scattering matrix for channel 4E, polarization x and output 6dB3.
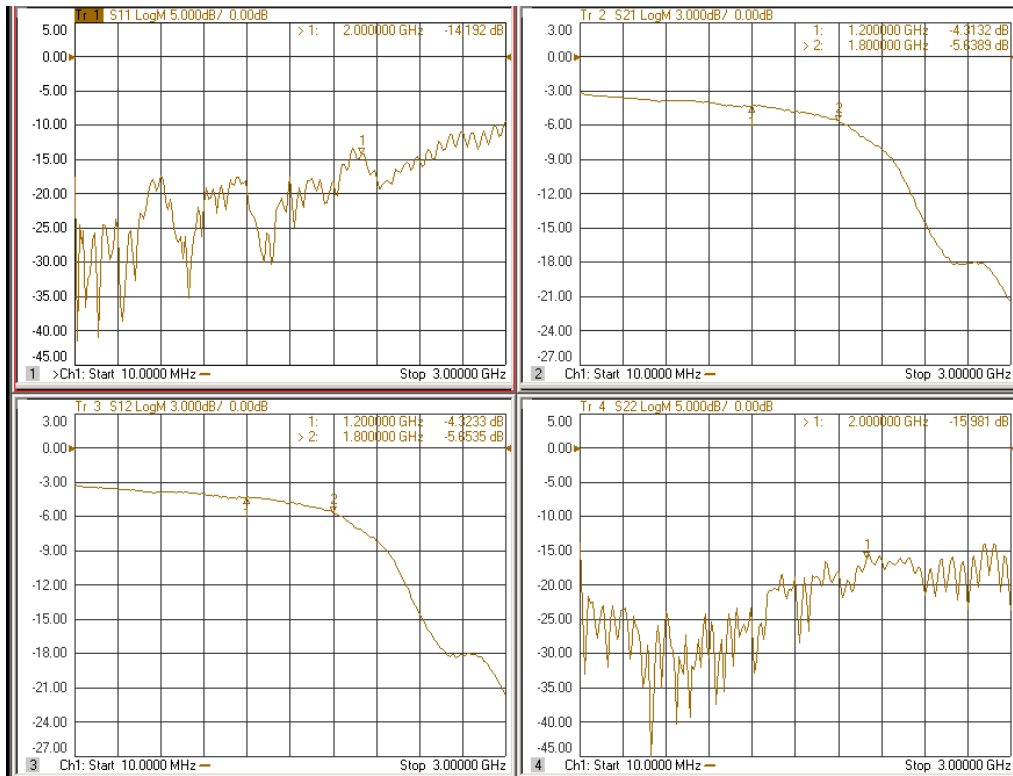

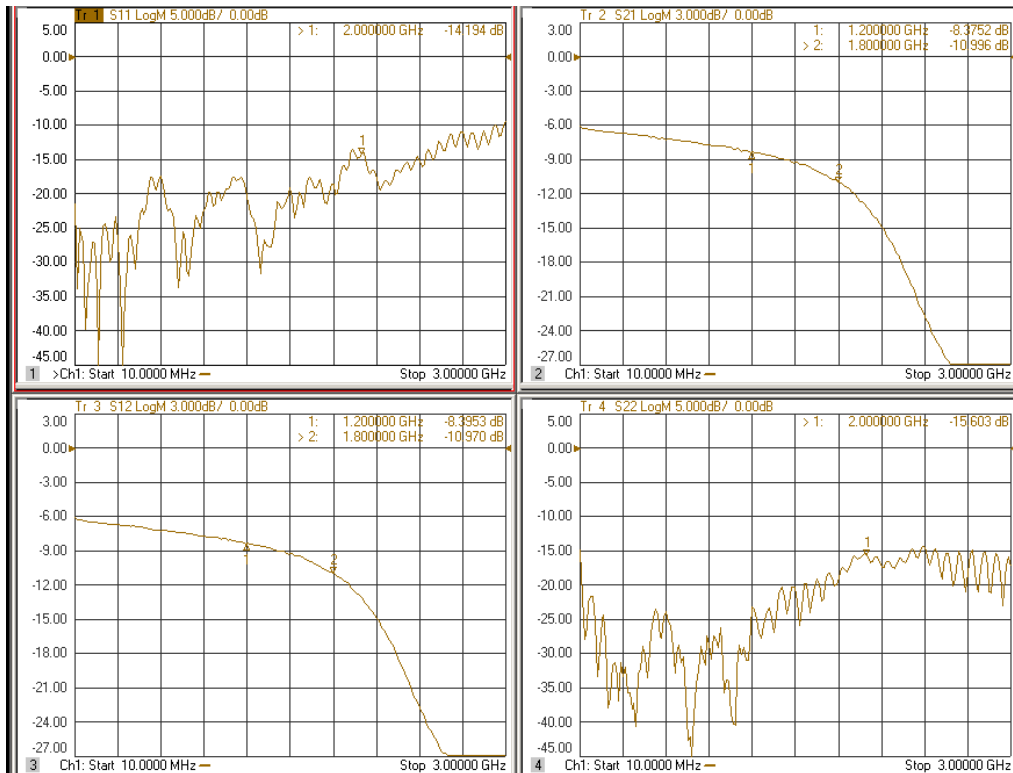Figure 196: Scattering matrix for channel 4E, polarization y and output 3dB1.

Figure 197: Scattering matrix for channel 4E, polarization y and output 6dB2.
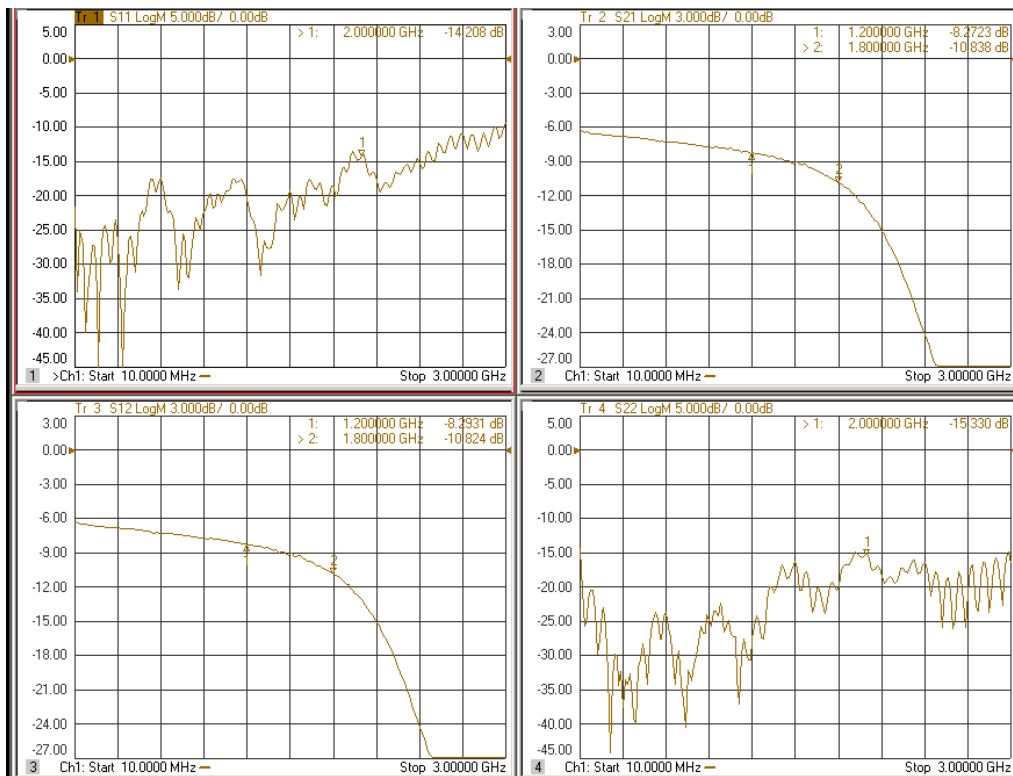

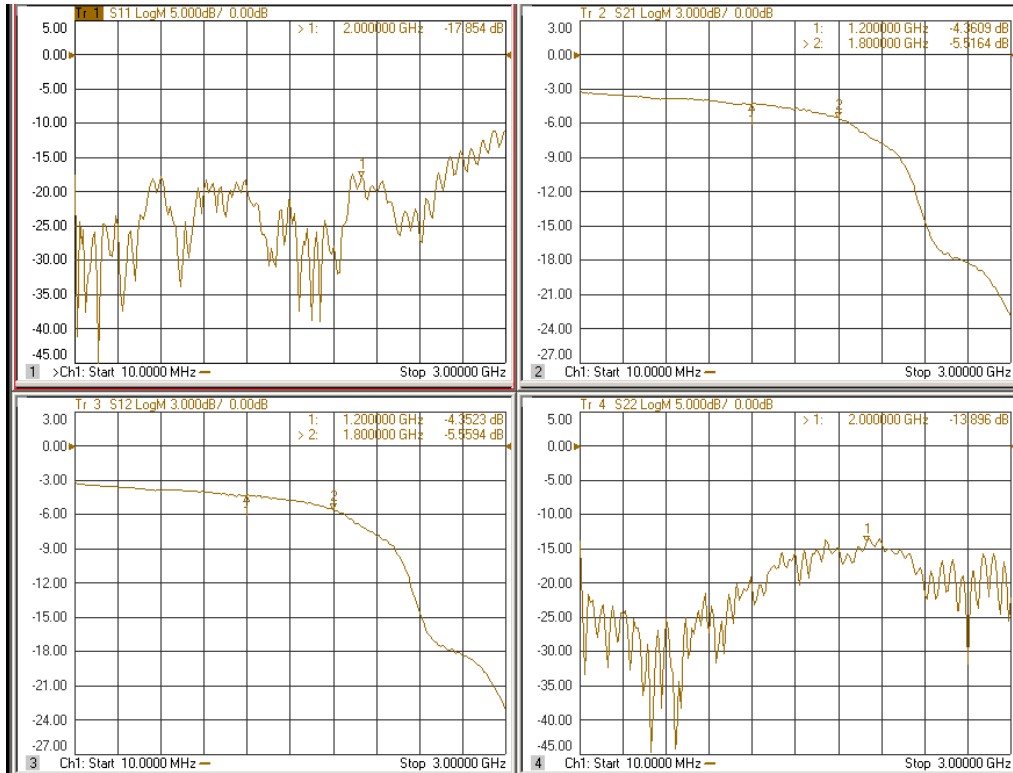Figure 198: Scattering matrix for channel 4E, polarization y and output 6dB3.

Figure 199: Scattering matrix for channel 4F, polarization x and output 3dB1.
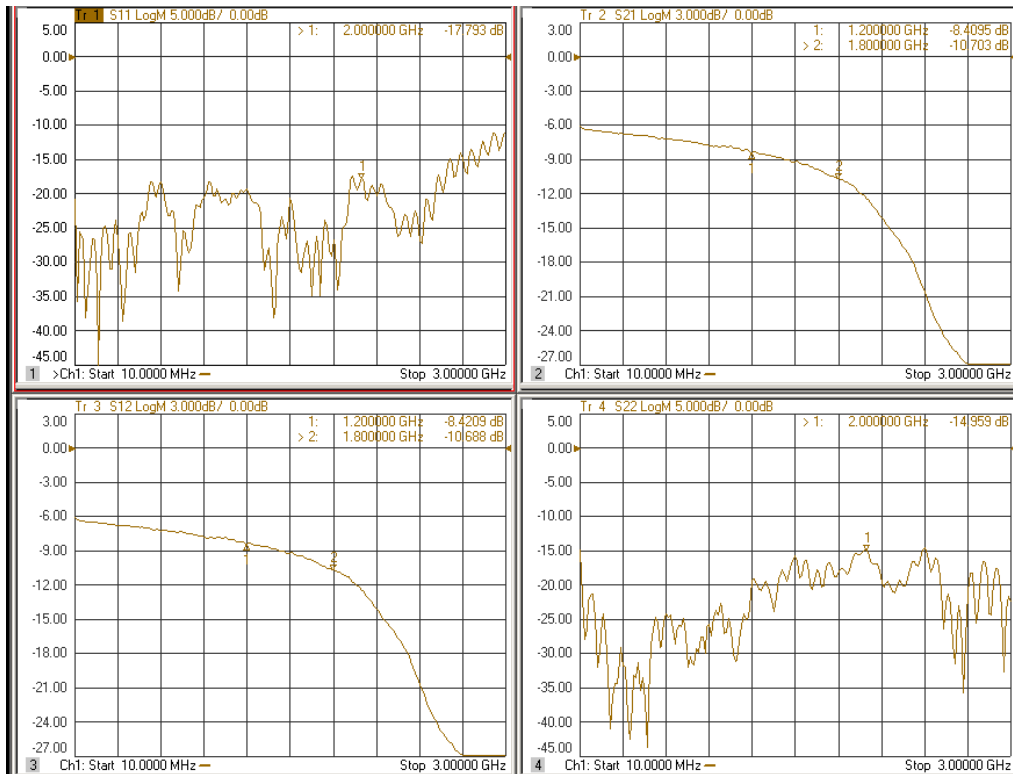

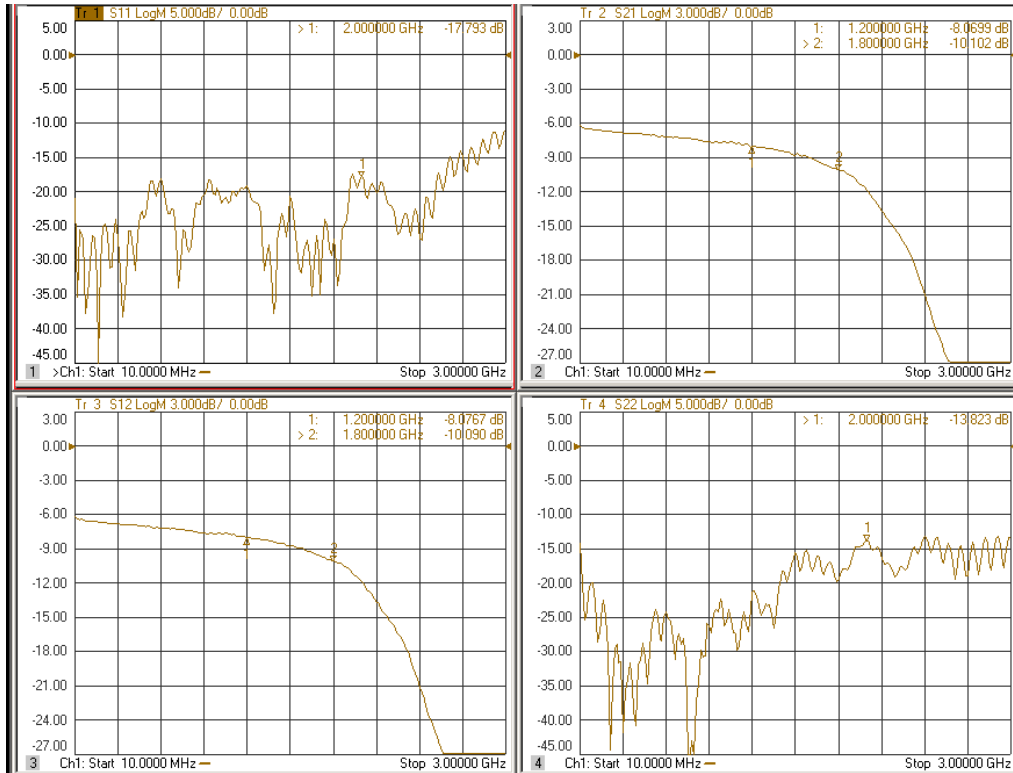Figure 200: Scattering matrix for channel 4F, polarization x and output 6dB2.

Figure 201: Scattering matrix for channel 4F, polarization x and output 6dB3.
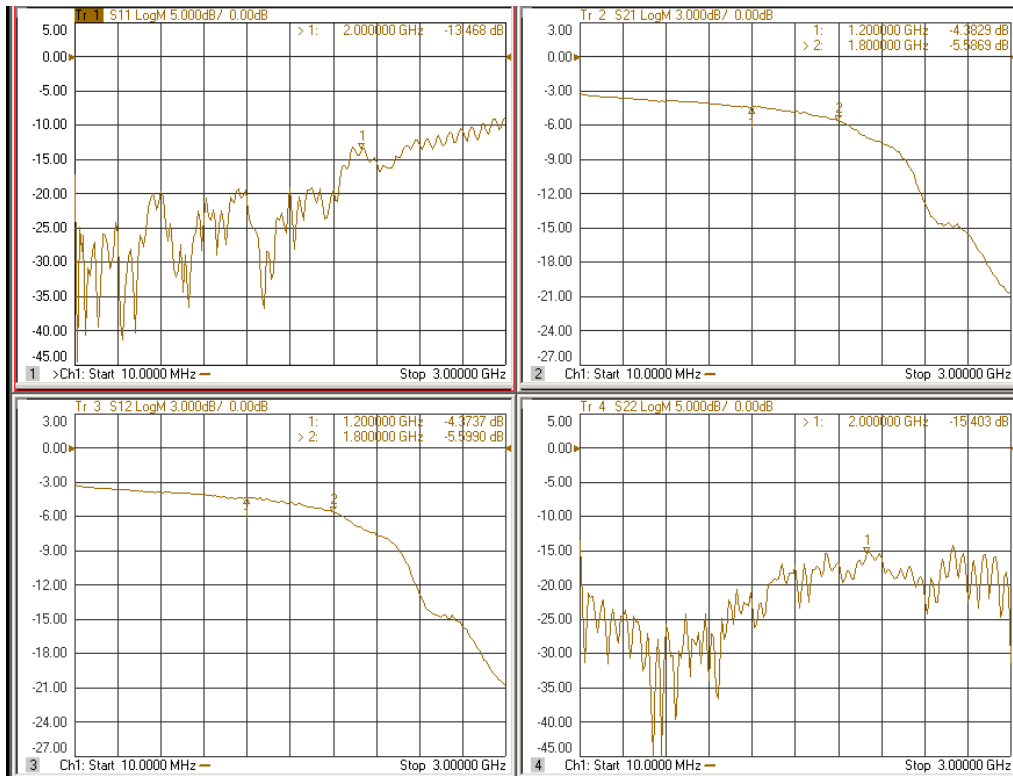

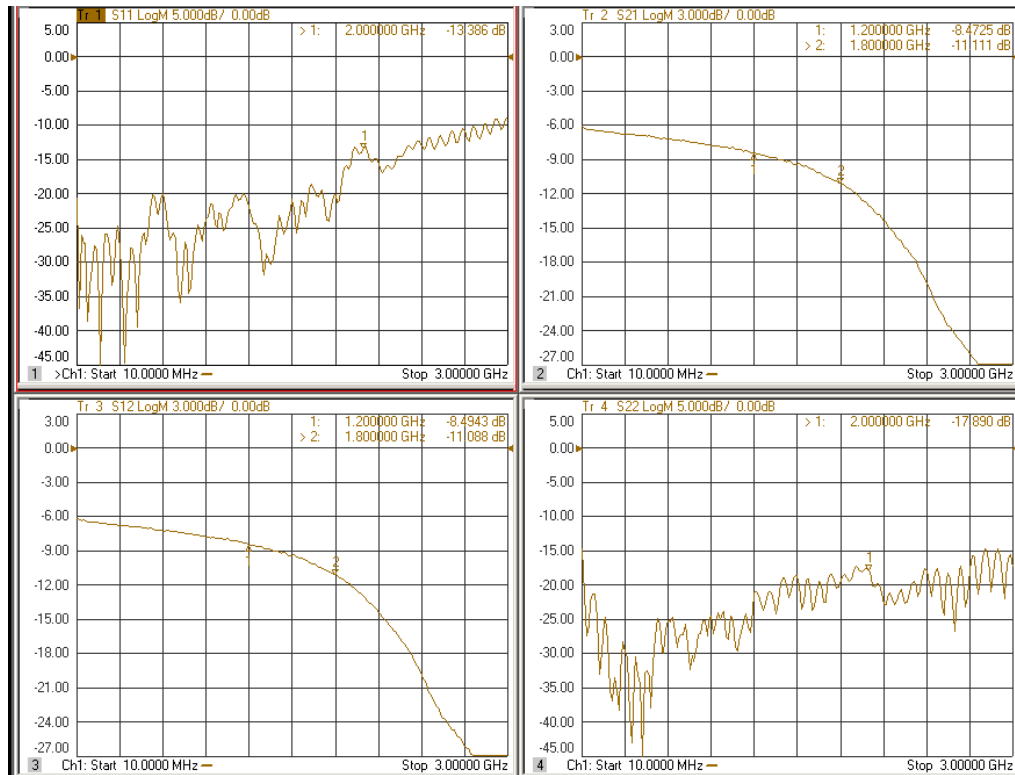Figure 202: Scattering matrix for channel 4F, polarization y and output 3dB1.

Figure 203: Scattering matrix for channel 4F, polarization y and output 6dB2.
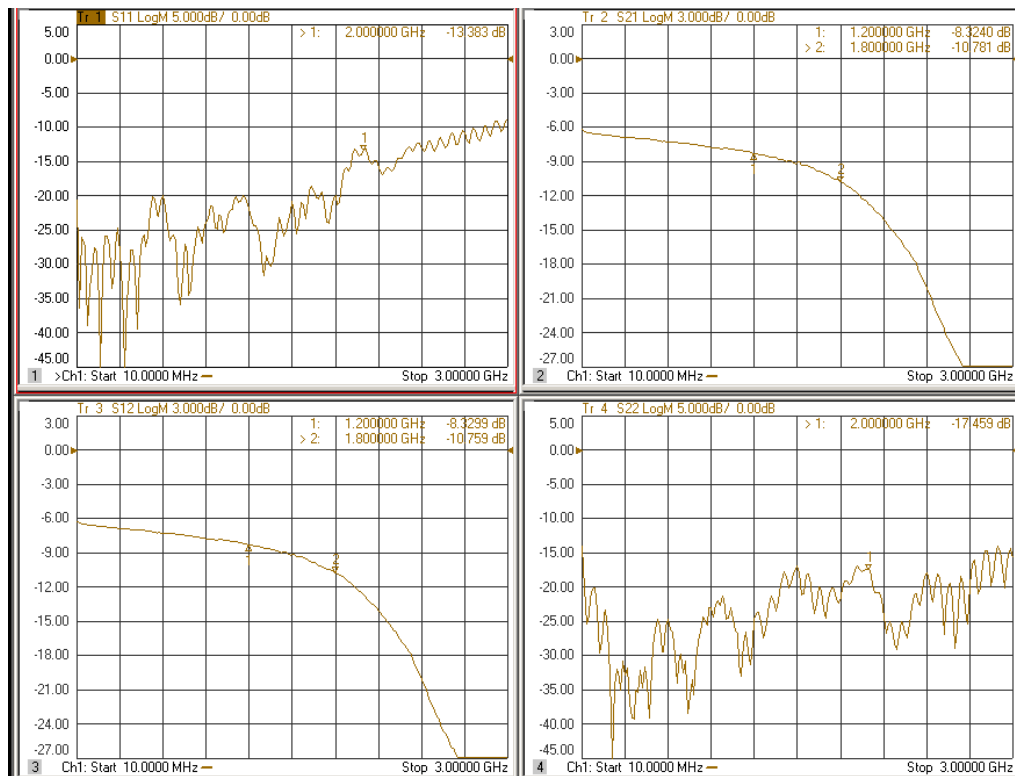

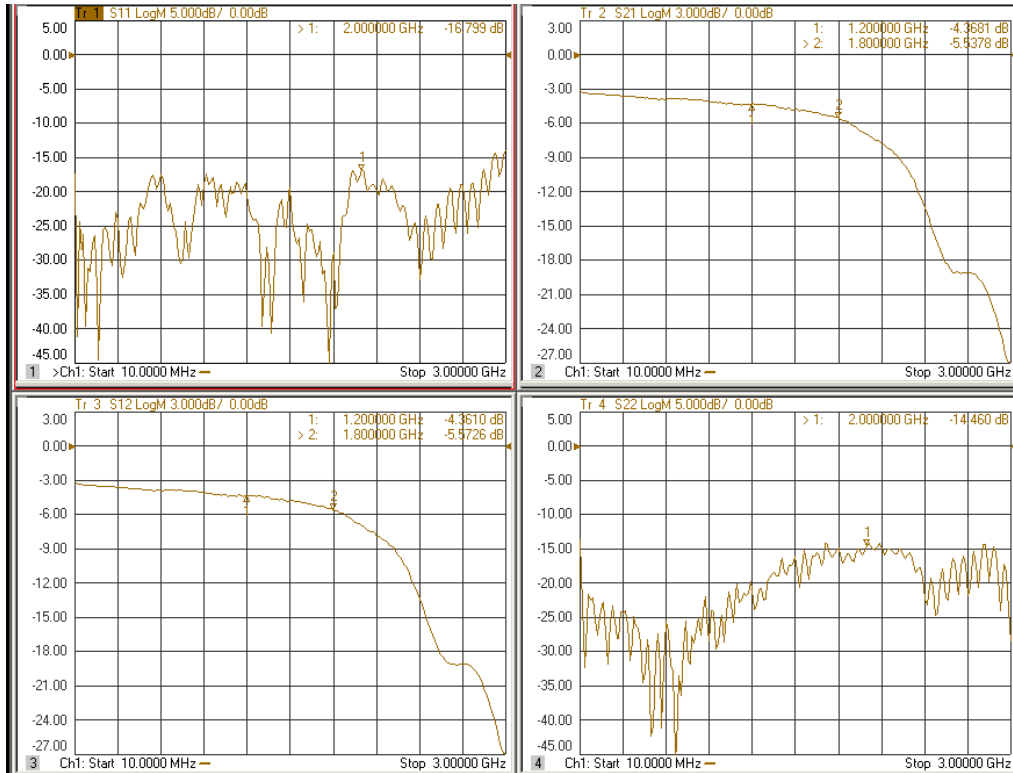Figure 204: Scattering matrix for channel 4F, polarization y and output 6dB3.

Figure 205: Scattering matrix for channel 4G, polarization x and output 3dB1.
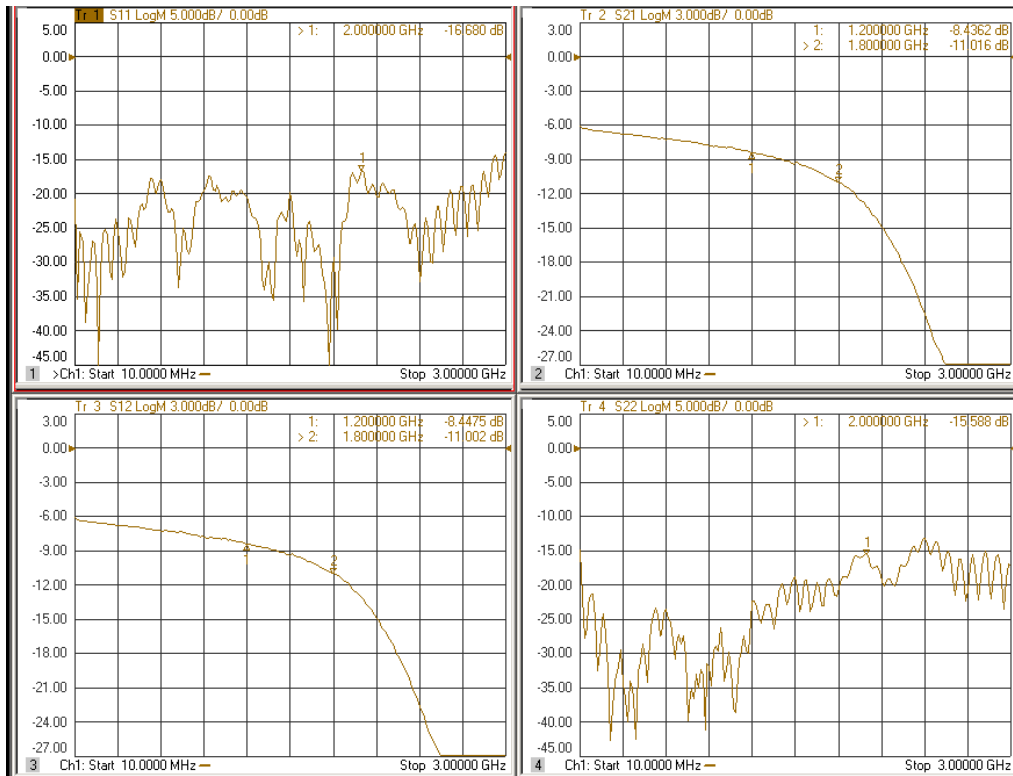

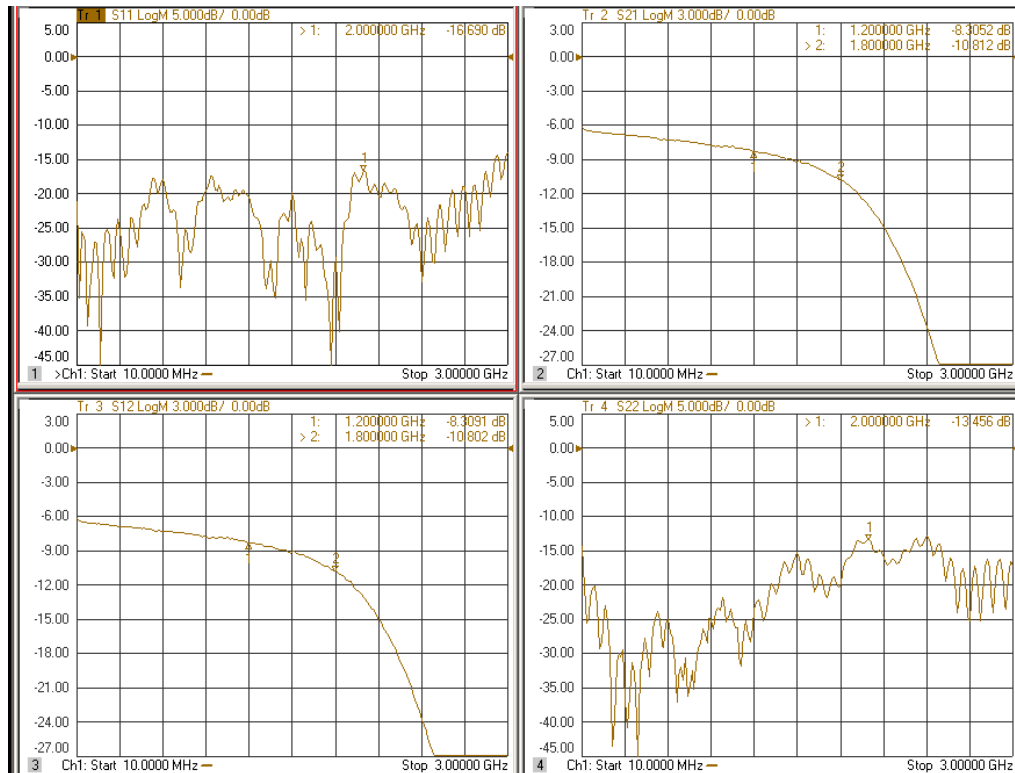Figure 206: Scattering matrix for channel 4G, polarization x and output 6dB2.

Figure 207: Scattering matrix for channel 4G, polarization x and output 6dB3.
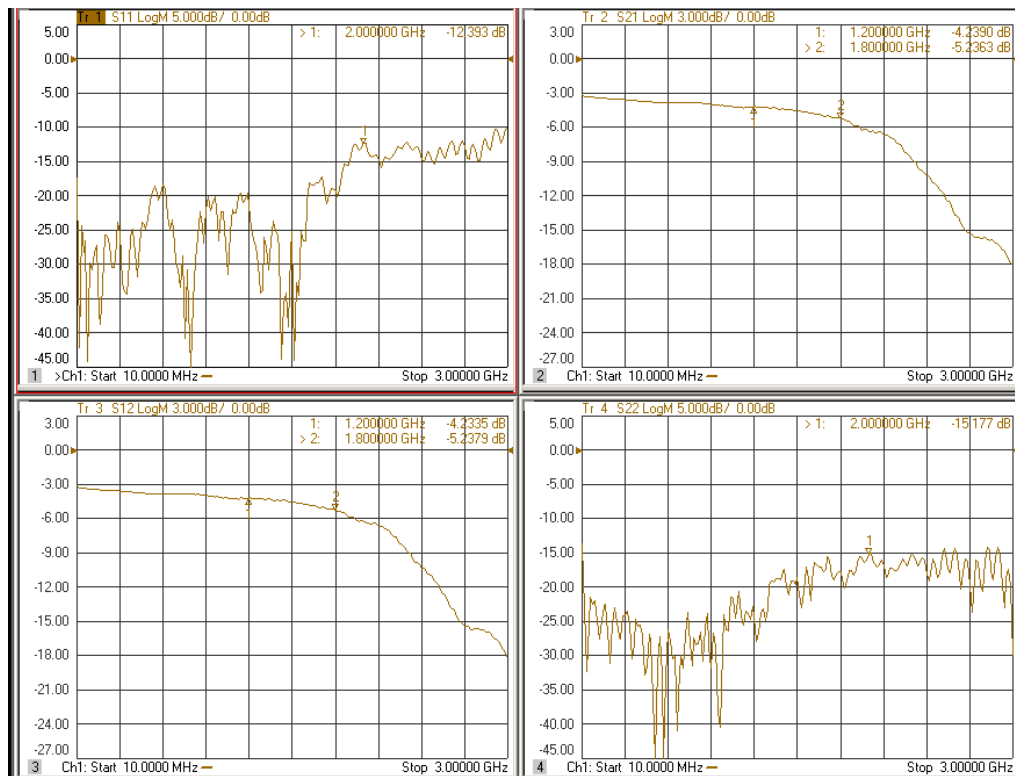

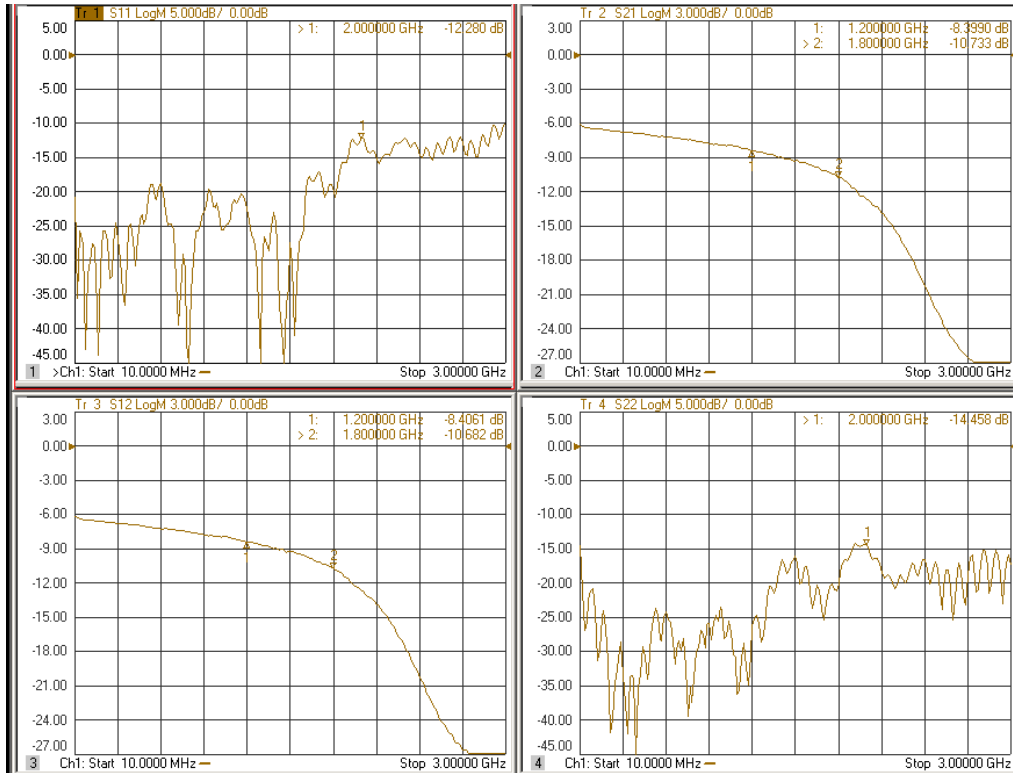Figure 208: Scattering matrix for channel 4G, polarization y and output 3dB1.

Figure 209: Scattering matrix for channel 4G, polarization y and output 6dB2.
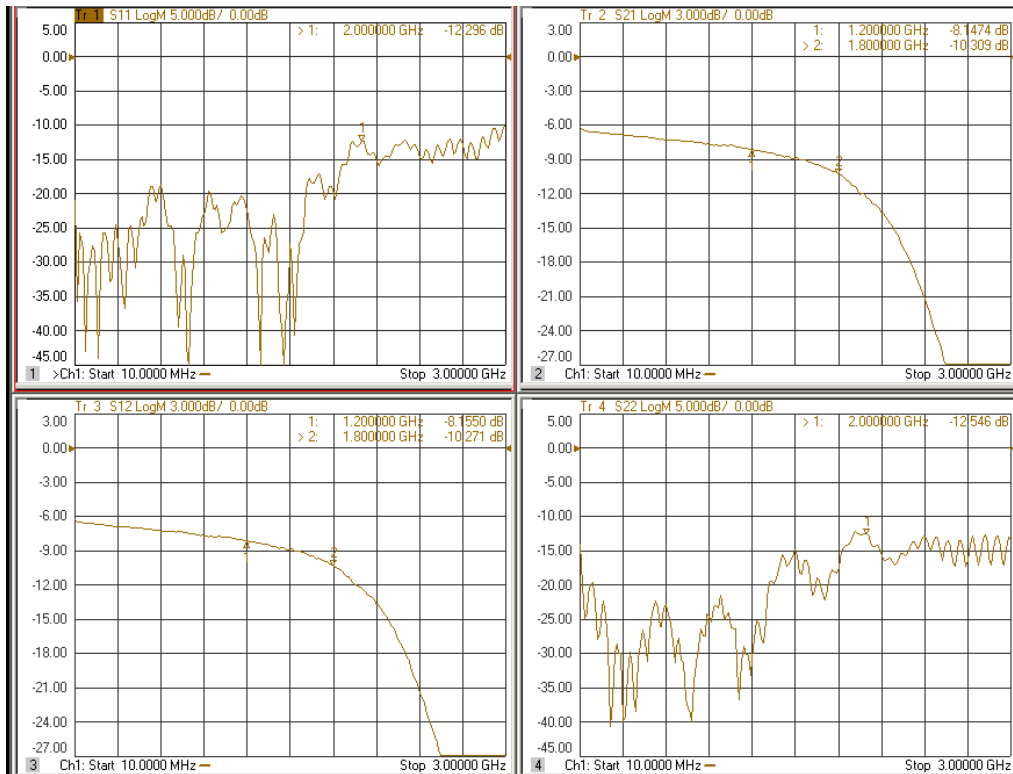

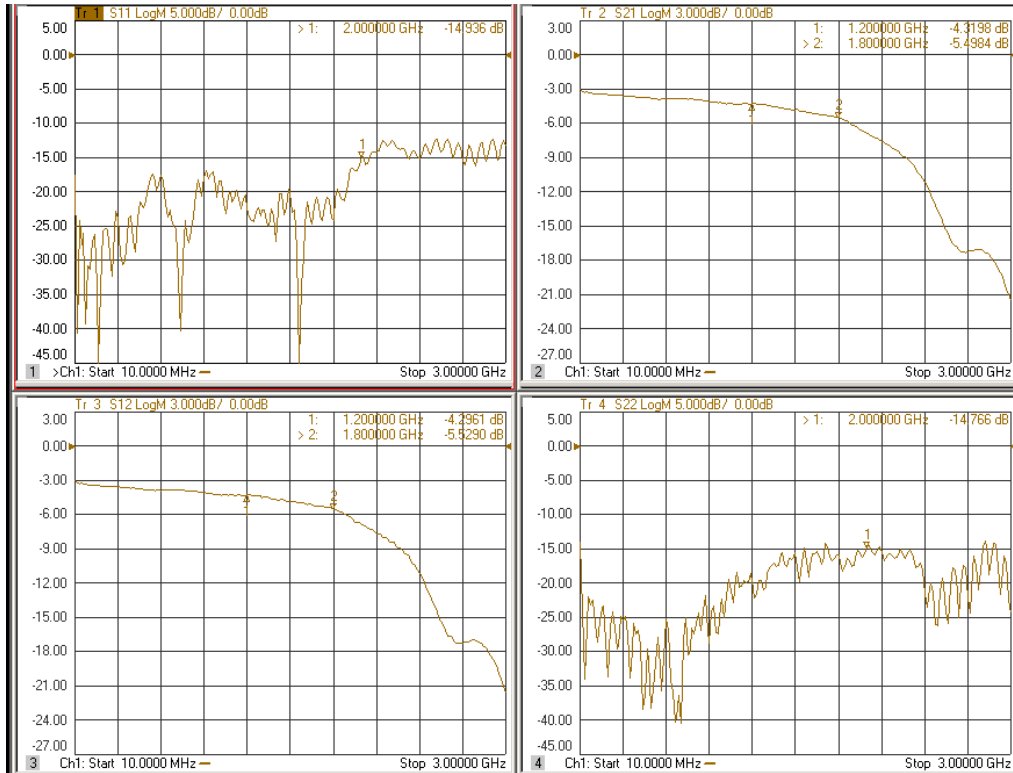Figure 210: Scattering matrix for channel 4G, polarization y and output 6dB3.

Figure 211: Scattering matrix for channel 4H, polarization x and output 3dB1.
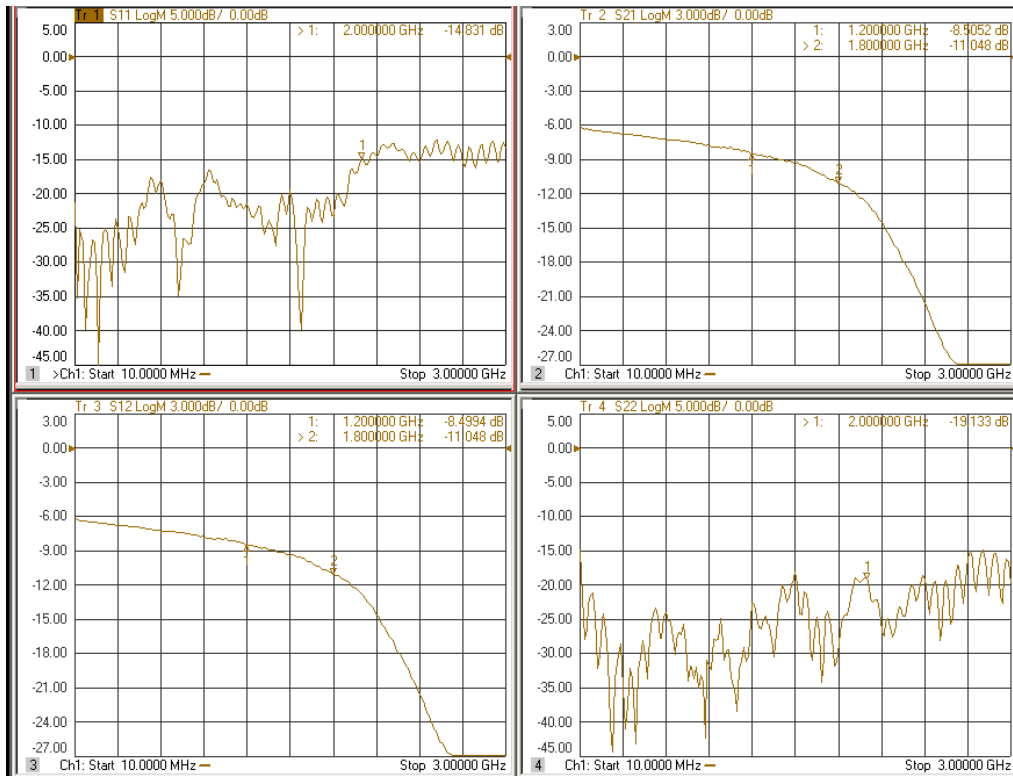

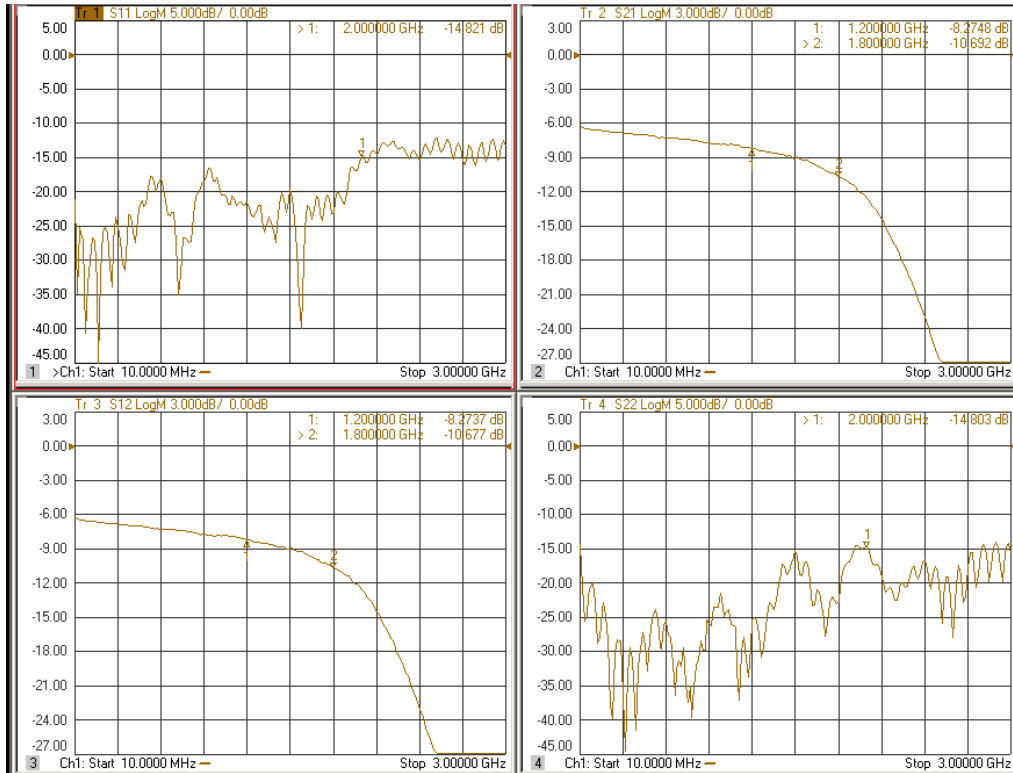Figure 212: Scattering matrix for channel 4H, polarization x and output 6dB2.

Figure 213: Scattering matrix for channel 4H, polarization x and output 6dB3.
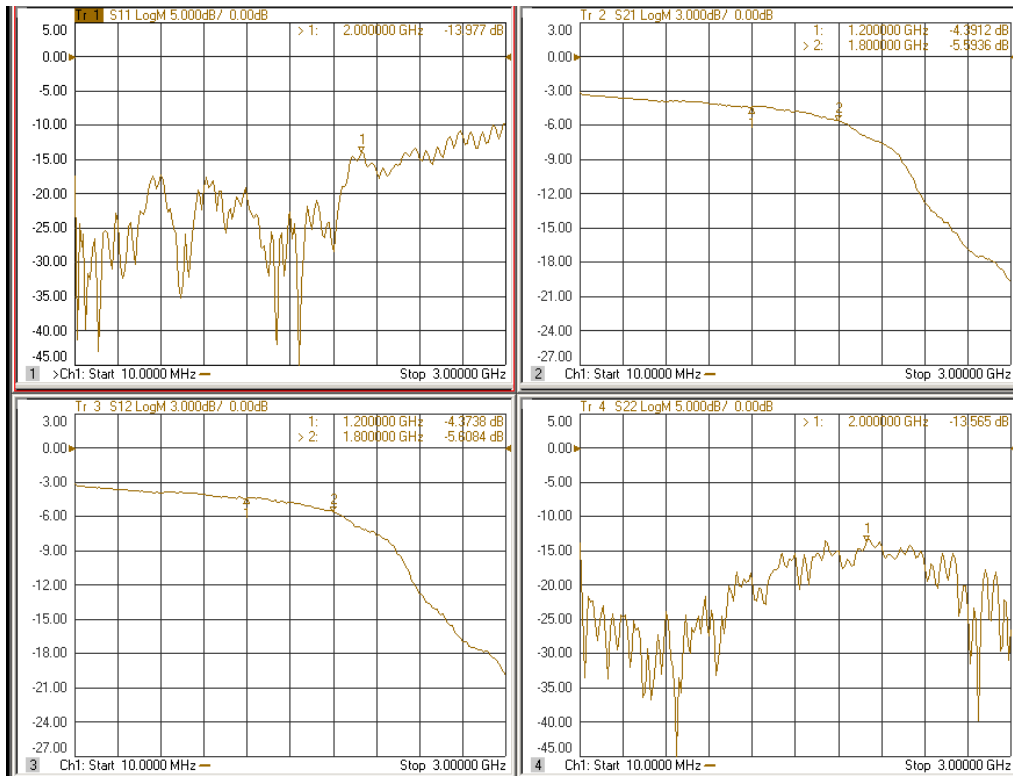

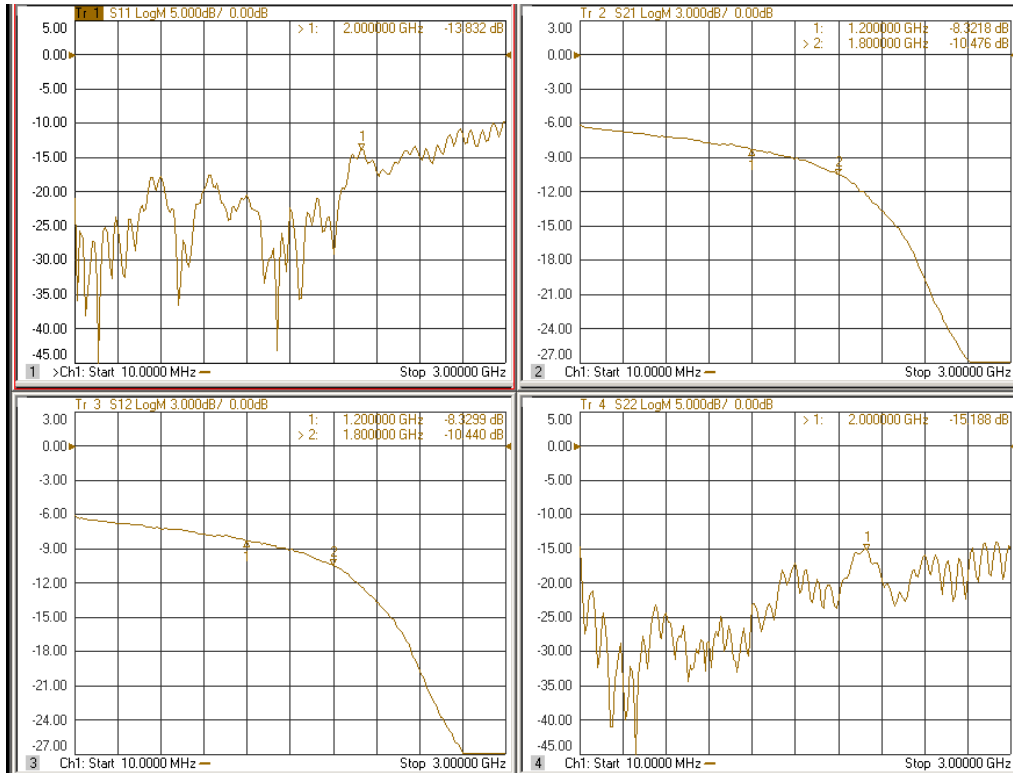Figure 214: Scattering matrix for channel 4H, polarization y and output 3dB1.

Figure 215: Scattering matrix for channel 4H, polarization y and output 6dB2.
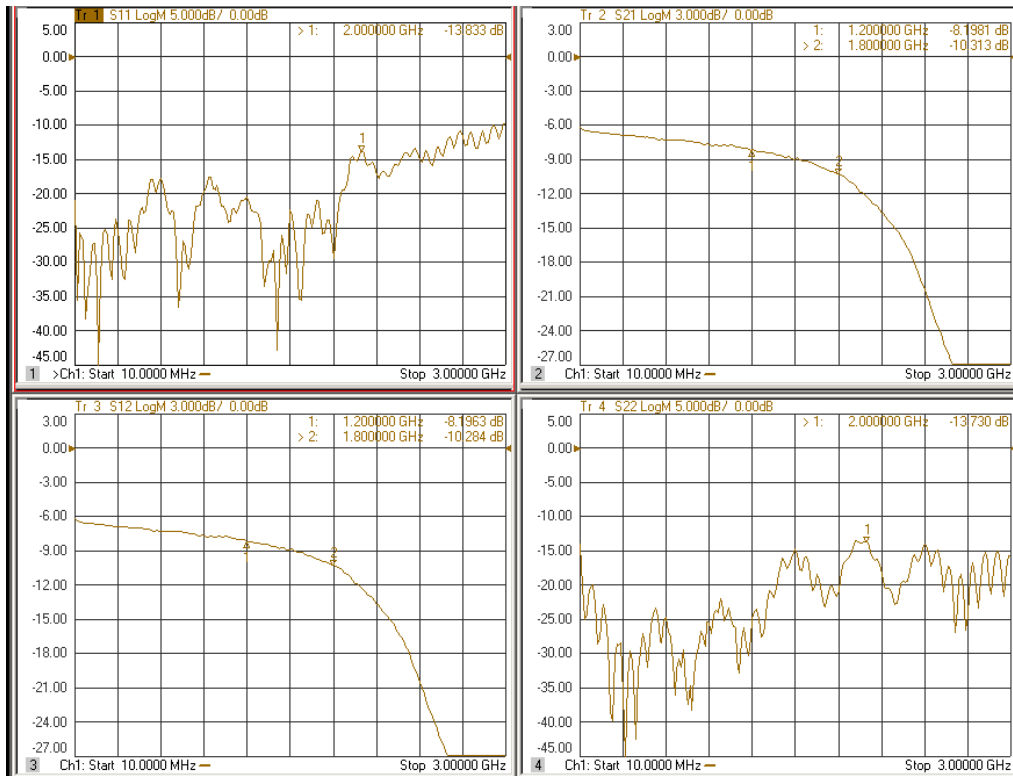

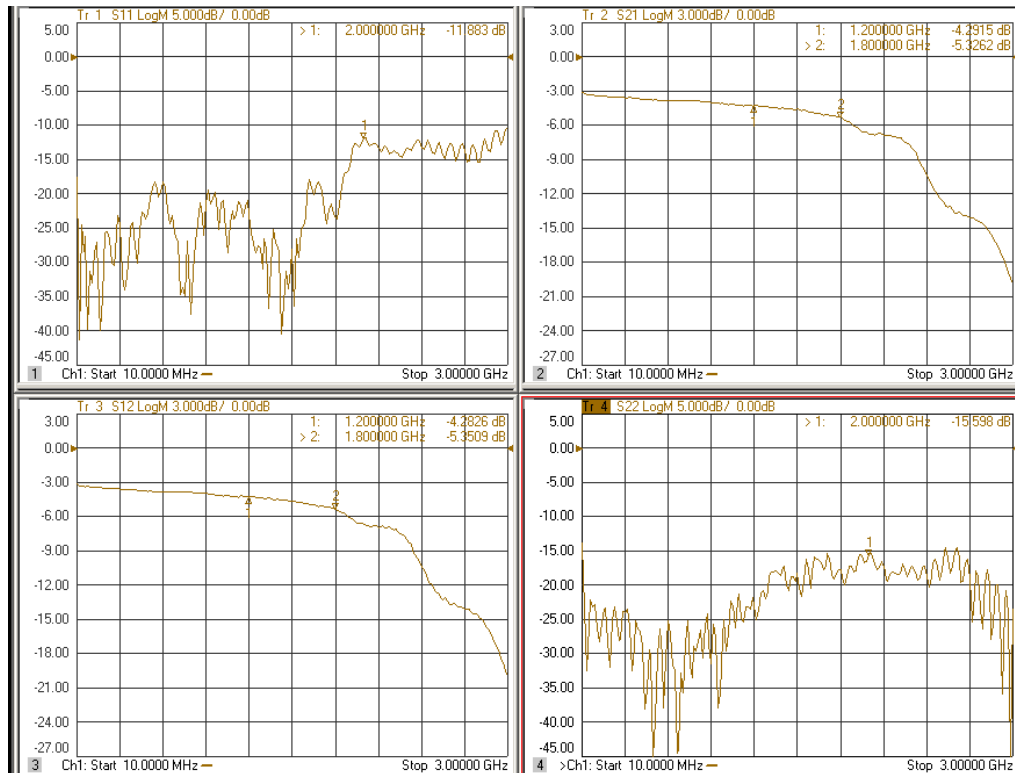Figure 216: Scattering matrix for channel 4H, polarization y and output 6dB3.

Figure 217: Scattering matrix for channel 4J, polarization x and output 3dB1.
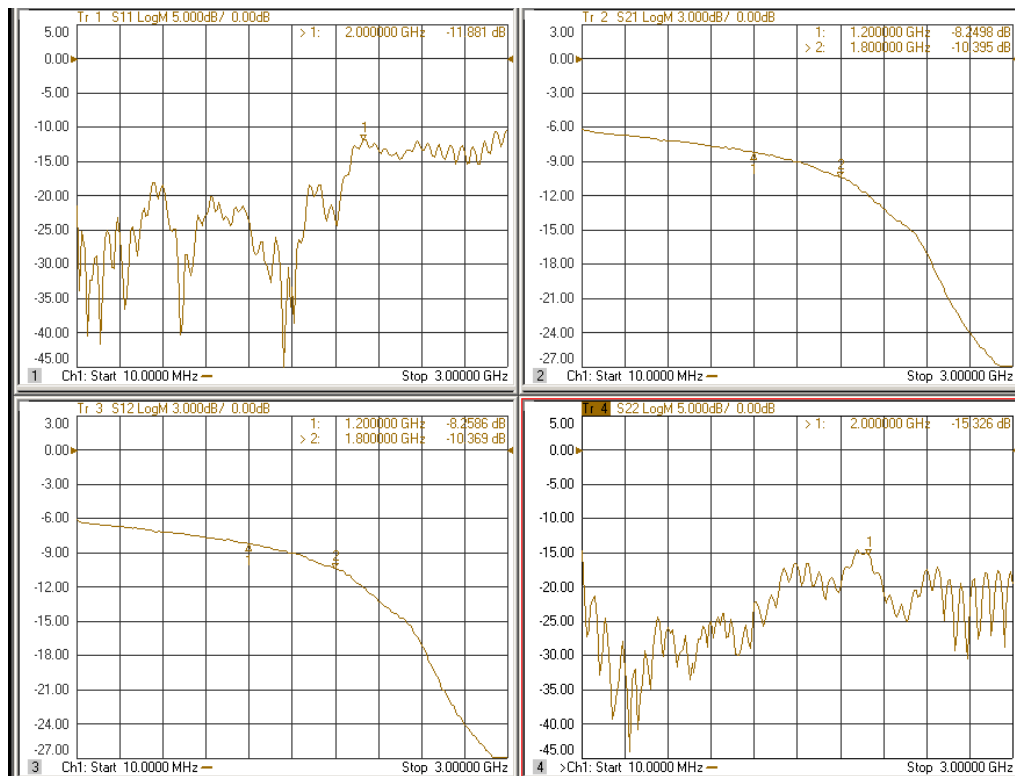

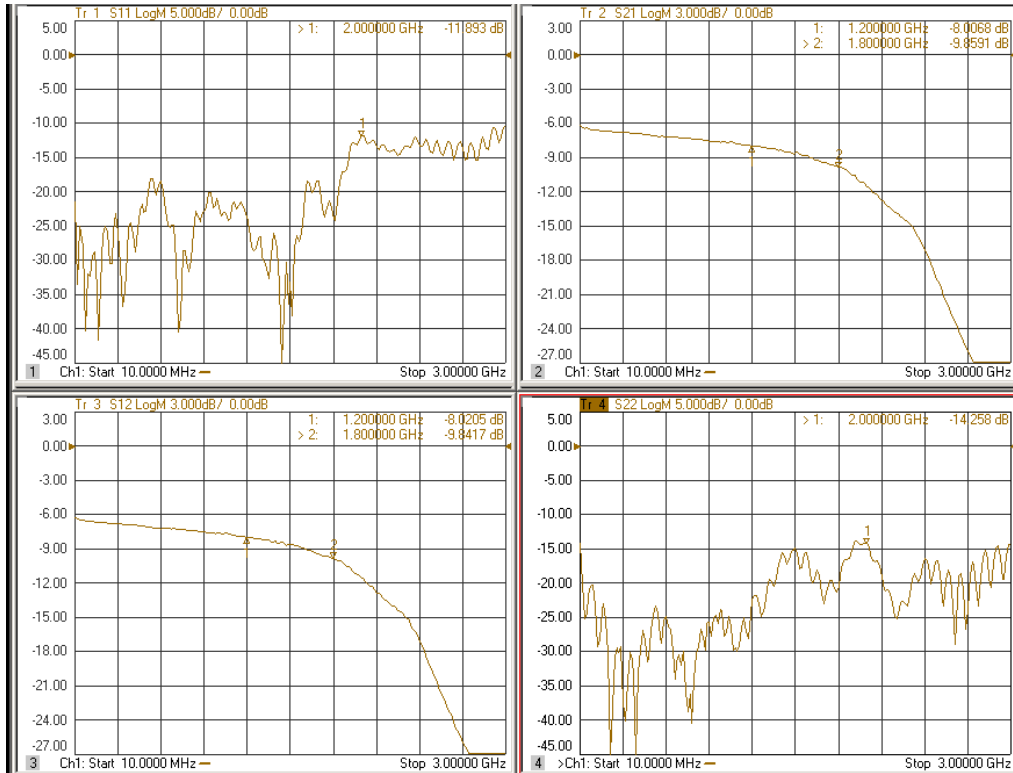Figure 218: Scattering matrix for channel 4J, polarization x and output 6dB2.

Figure 219: Scattering matrix for channel 4J, polarization x and output 6dB3.
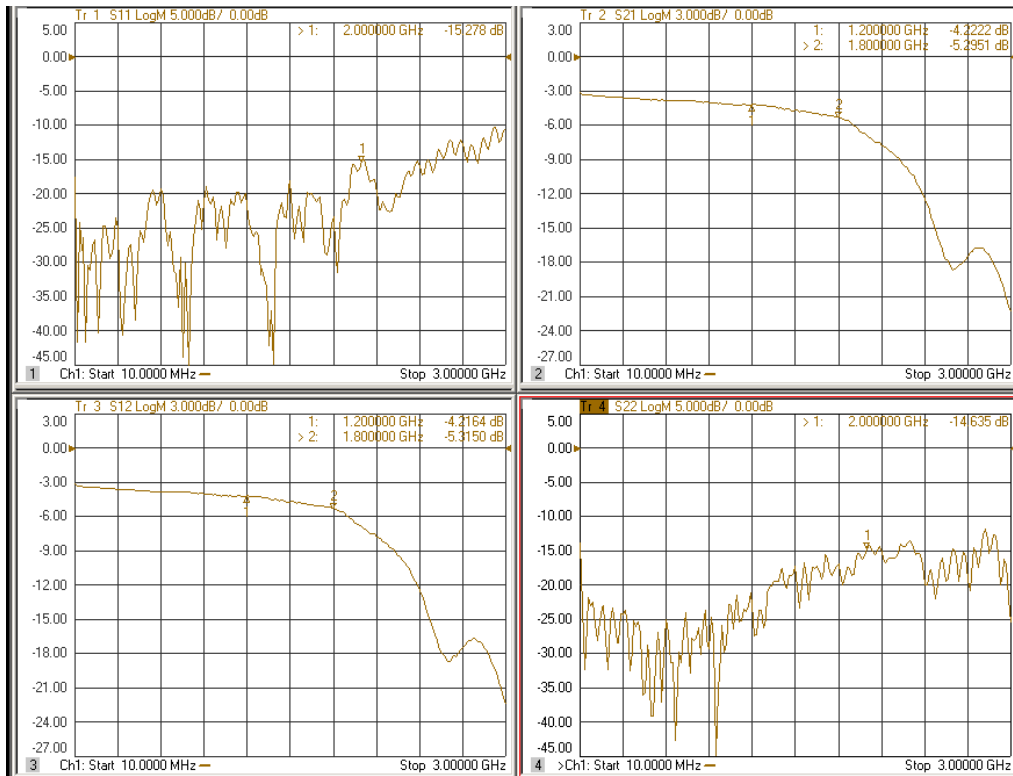

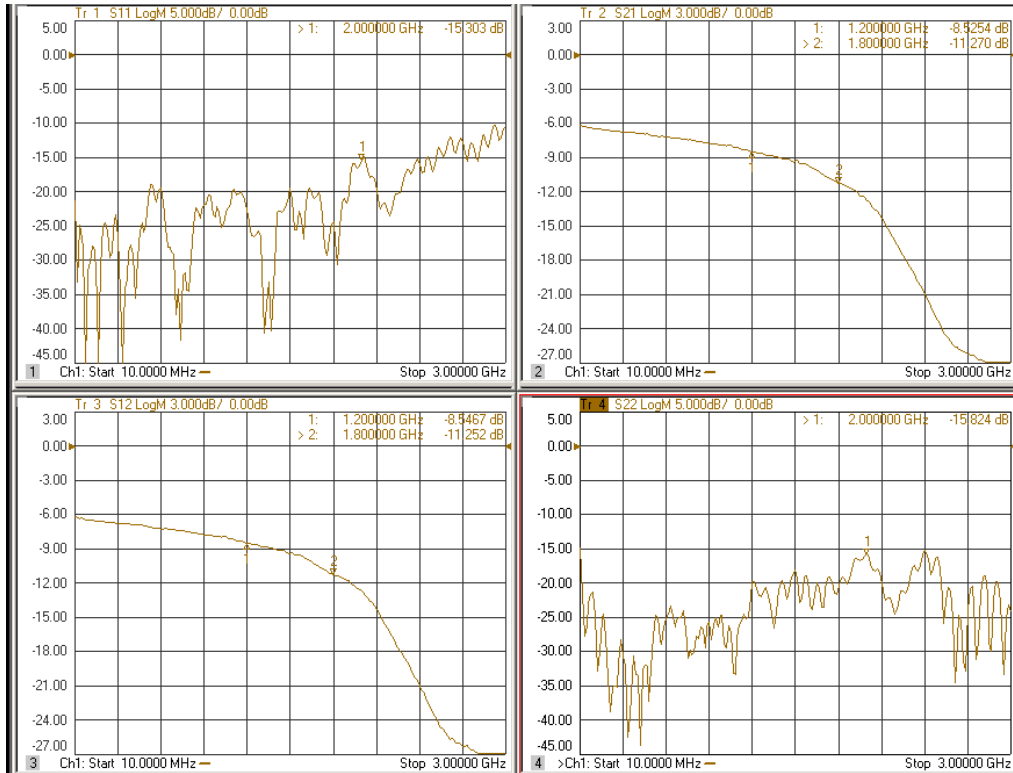Figure 220: Scattering matrix for channel 4J, polarization y and output 3dB1.

Figure 221: Scattering matrix for channel 4J, polarization y and output 6dB2.
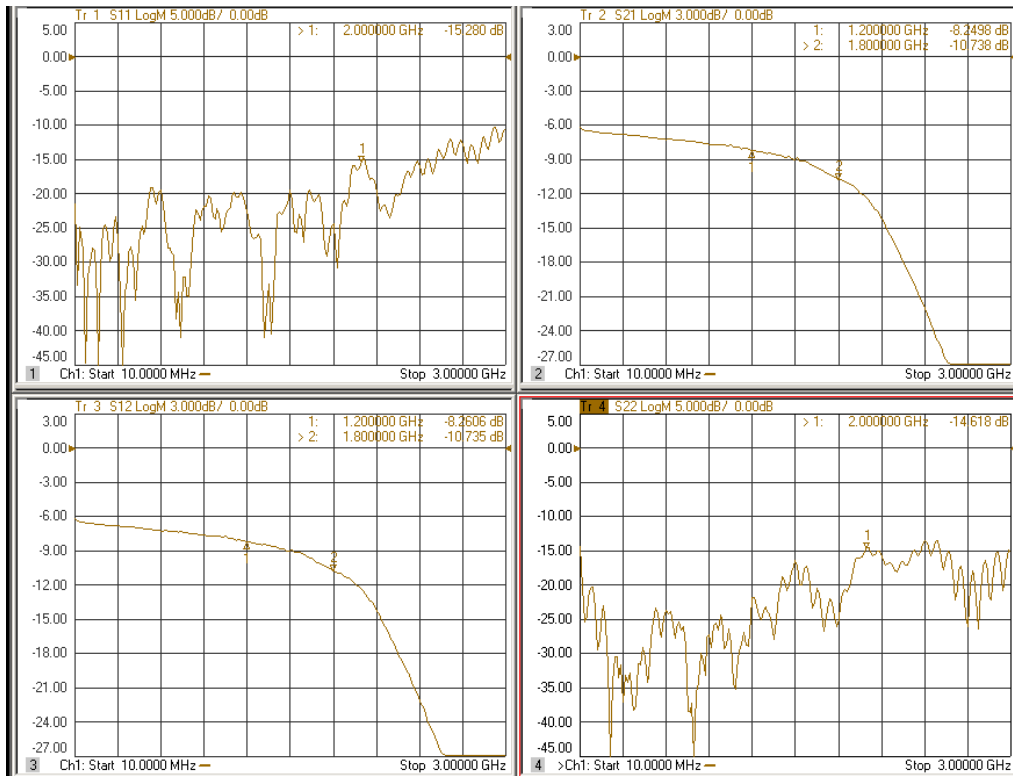

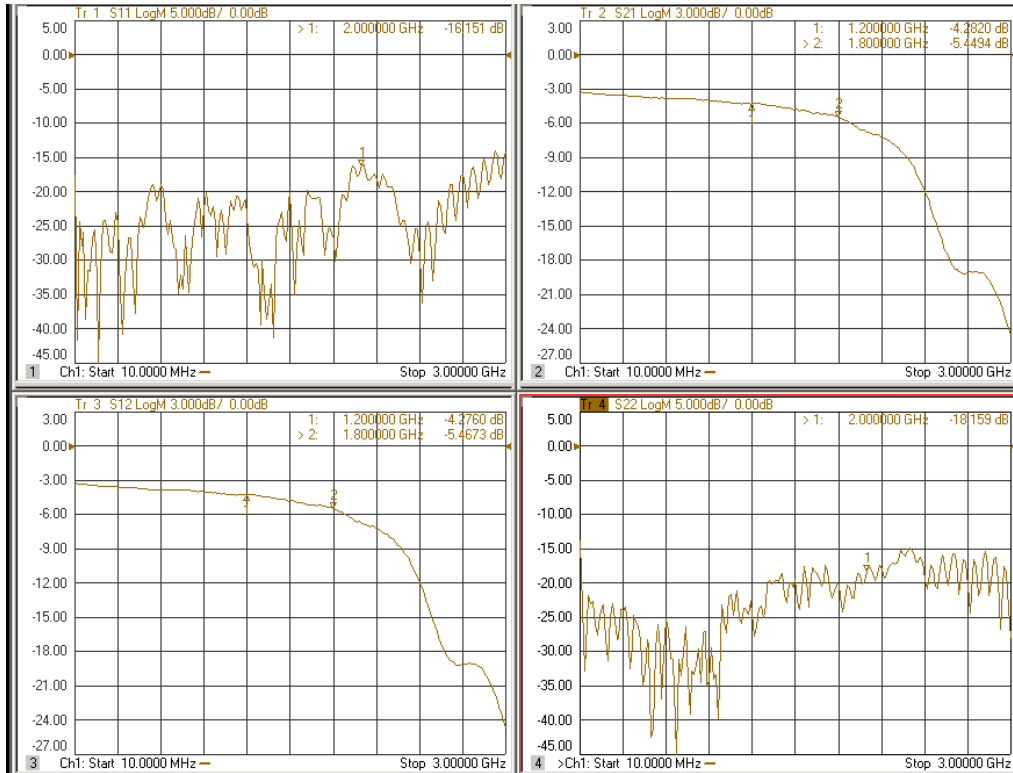Figure 222: Scattering matrix for channel 4J, polarization y and output 6dB3.

Figure 223: Scattering matrix for channel 4K, polarization x and output 3dB1.
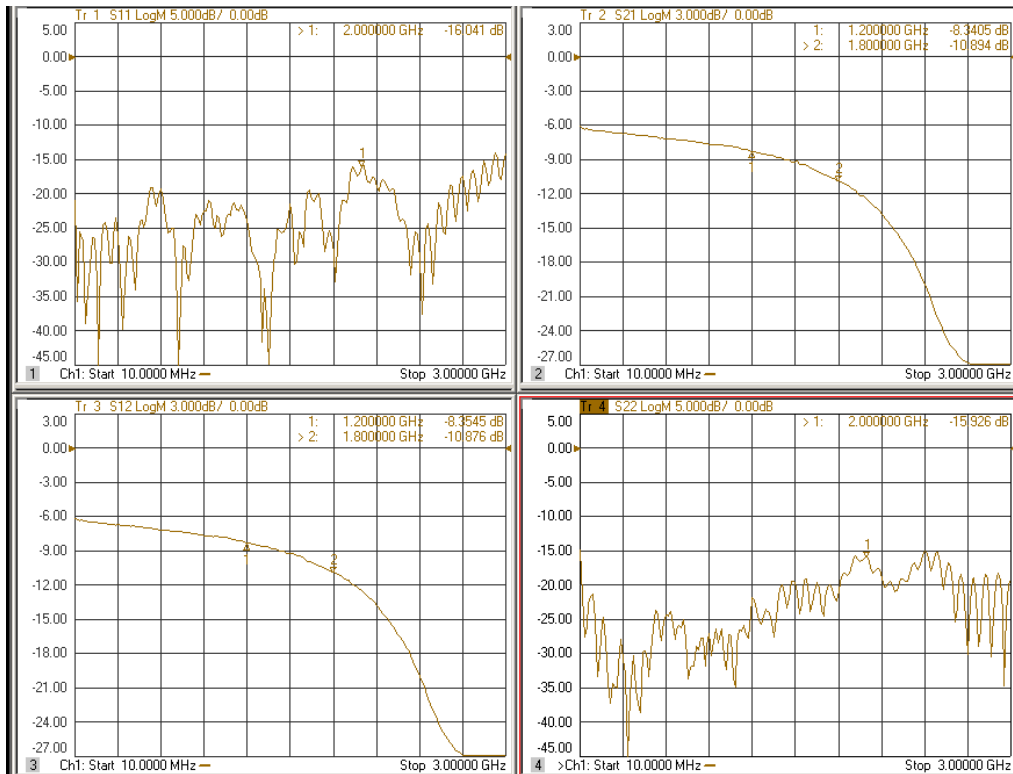

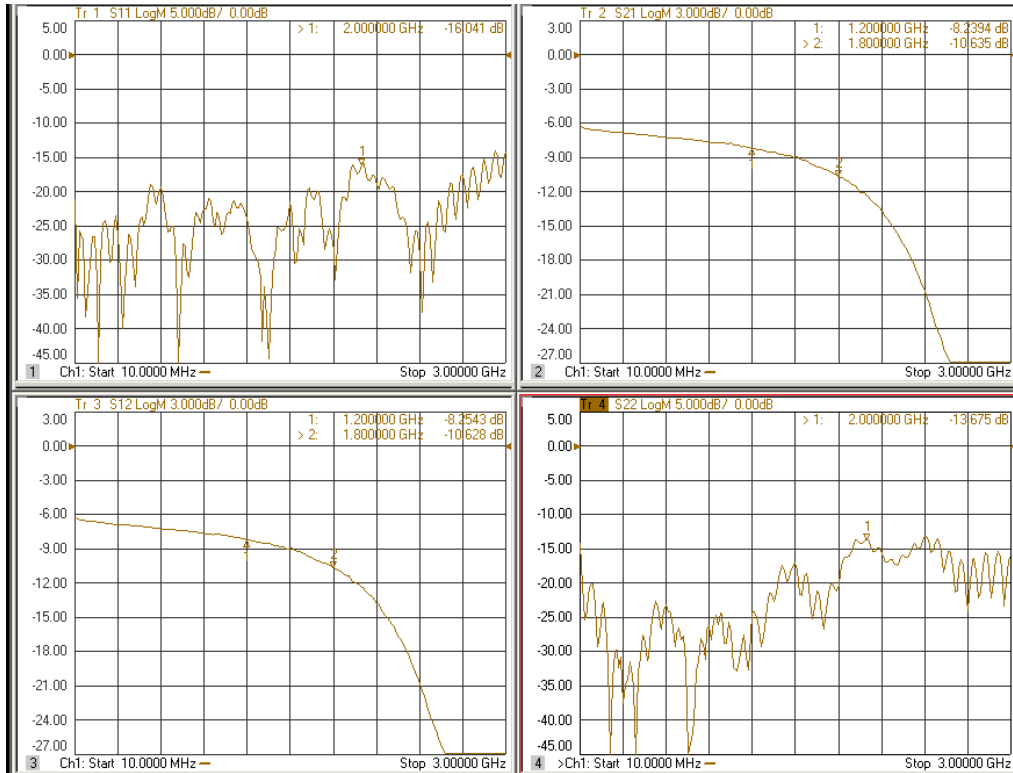Figure 224: Scattering matrix for channel 4K, polarization x and output 6dB2.

Figure 225: Scattering matrix for channel 4K, polarization x and output 6dB3.
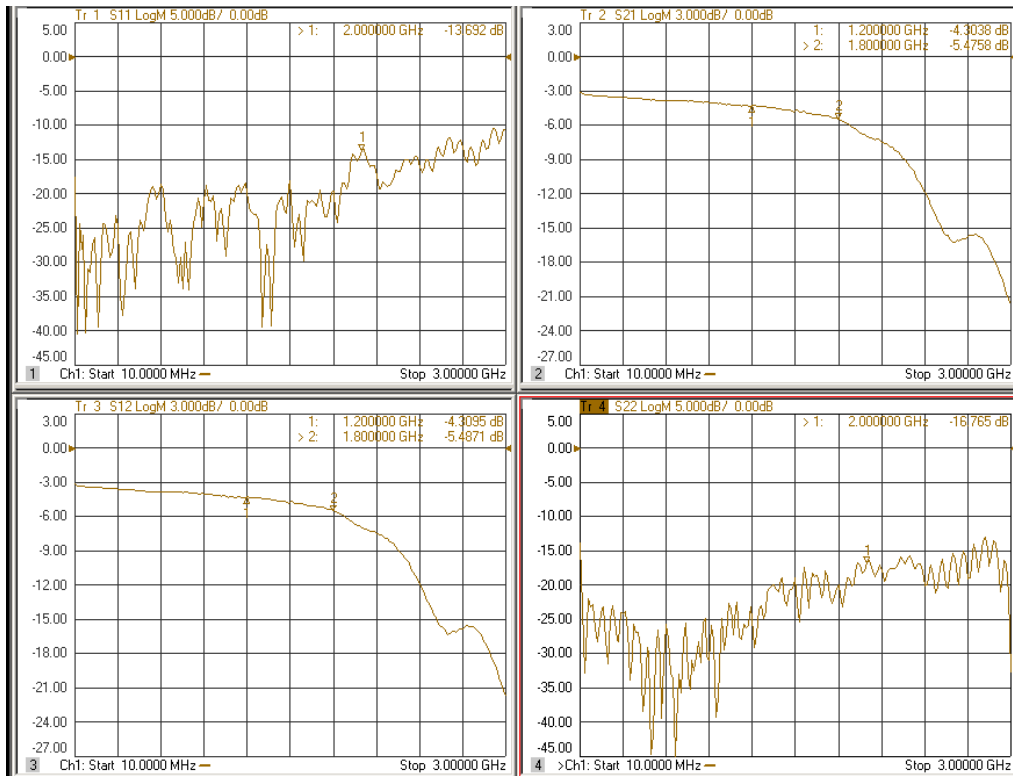

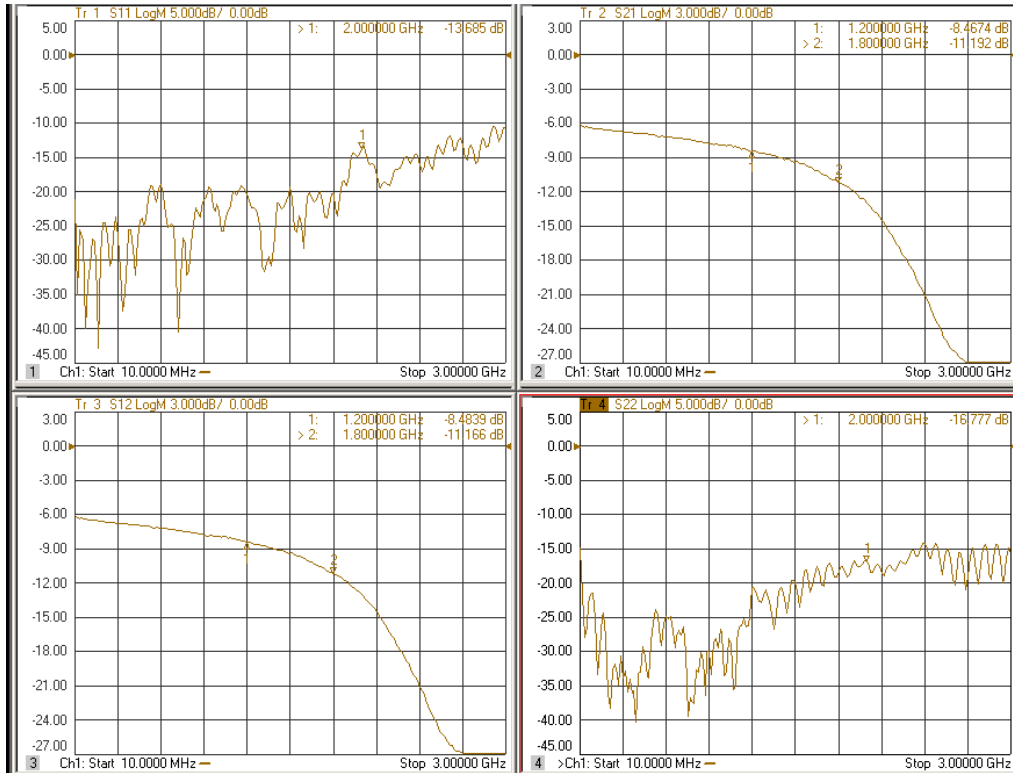Figure 226: Scattering matrix for channel 4K, polarization y and output 3dB1.

Figure 227: Scattering matrix for channel 4K, polarization y and output 6dB2.
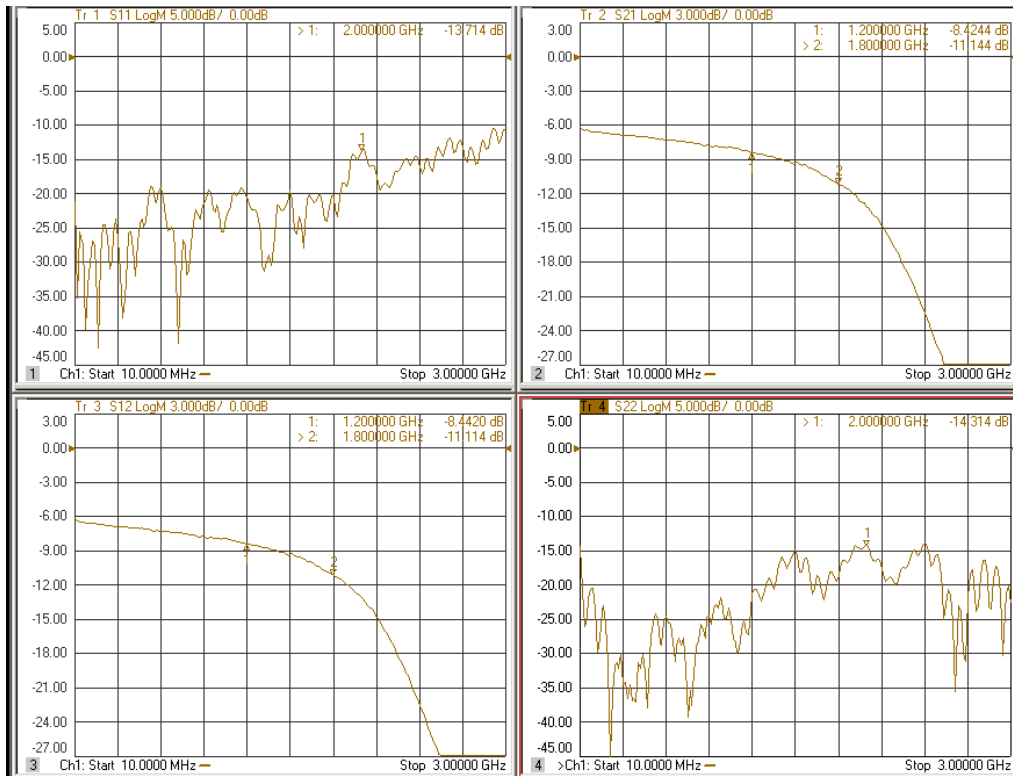

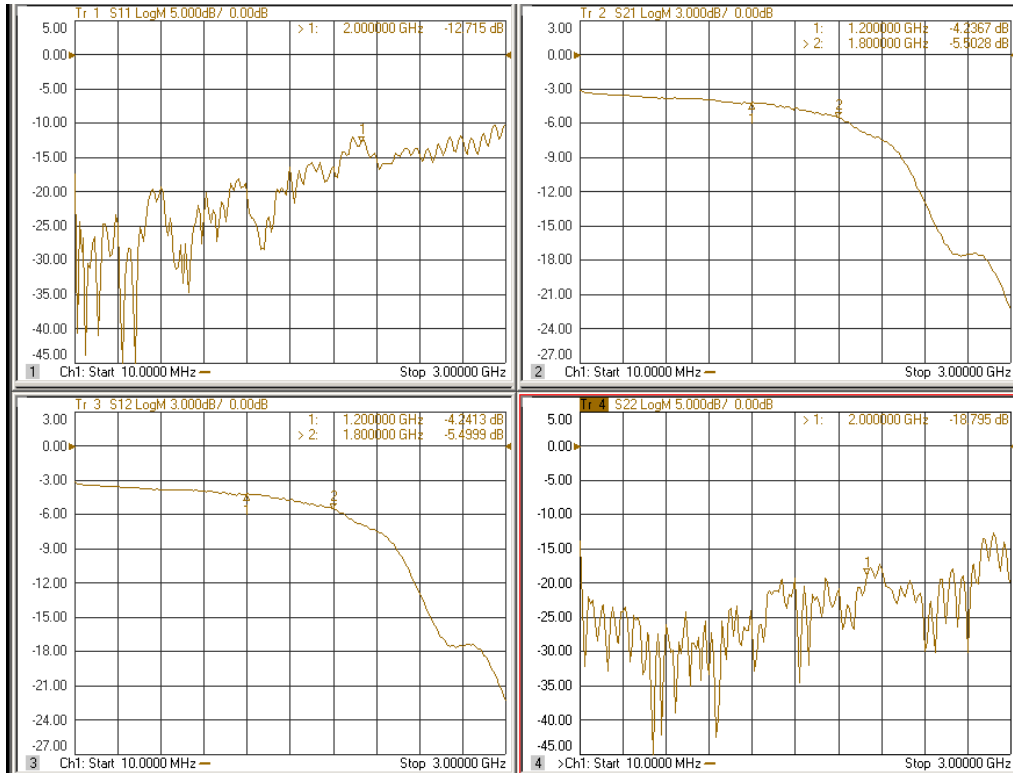Figure 228: Scattering matrix for channel 4K, polarization y and output 6dB3.

Figure 229: Scattering matrix for channel 4L, polarization x and output 3dB1.
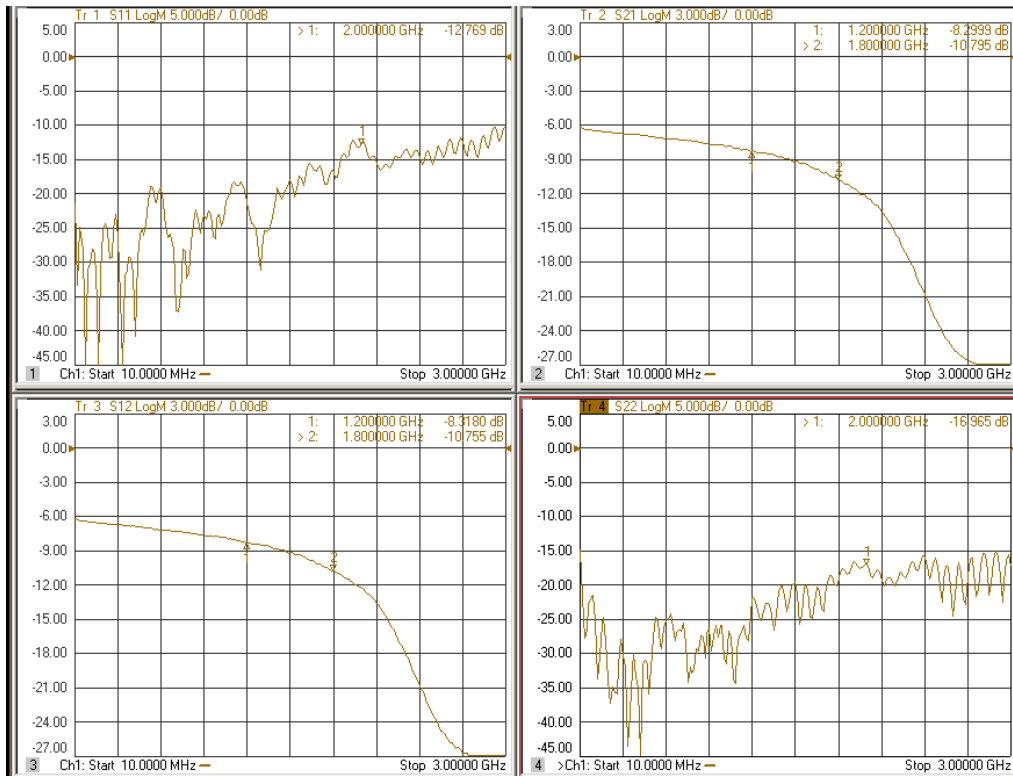

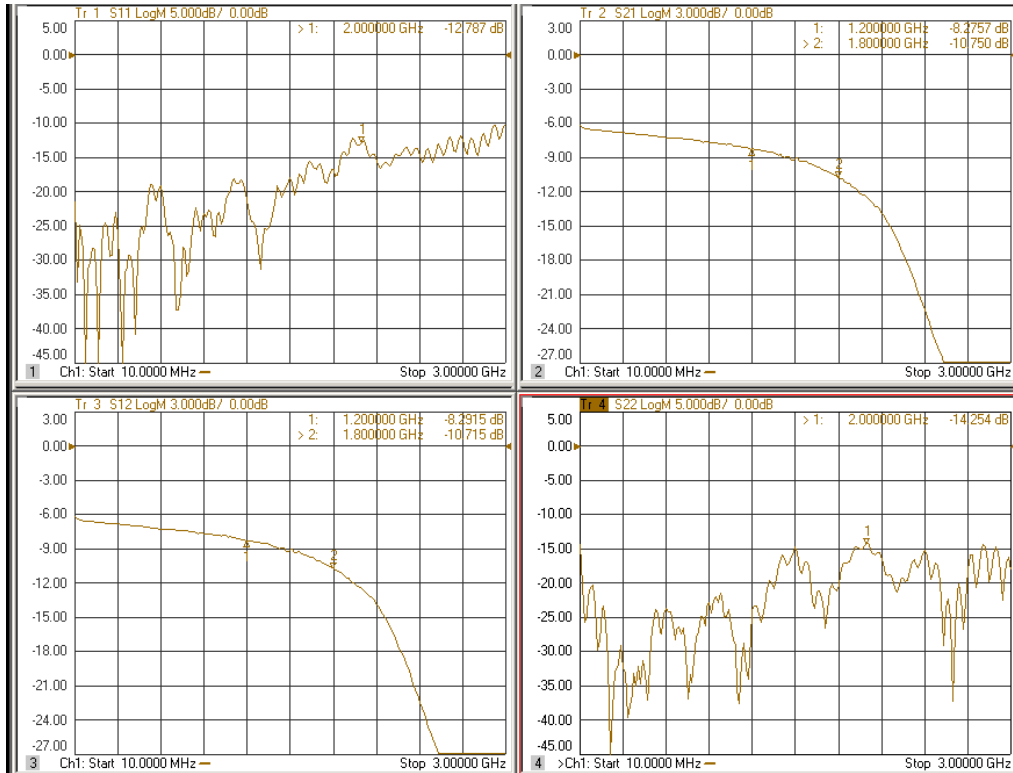Figure 230: Scattering matrix for channel 4L, polarization x and output 6dB2.

Figure 231: Scattering matrix for channel 4L, polarization x and output 6dB3.
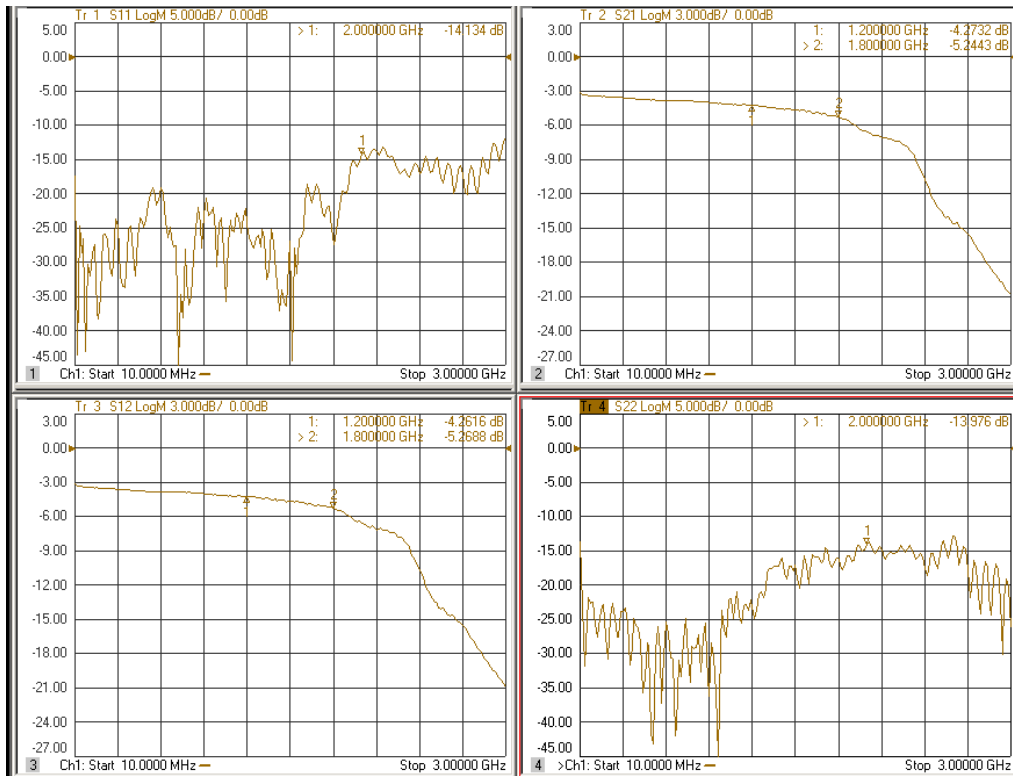

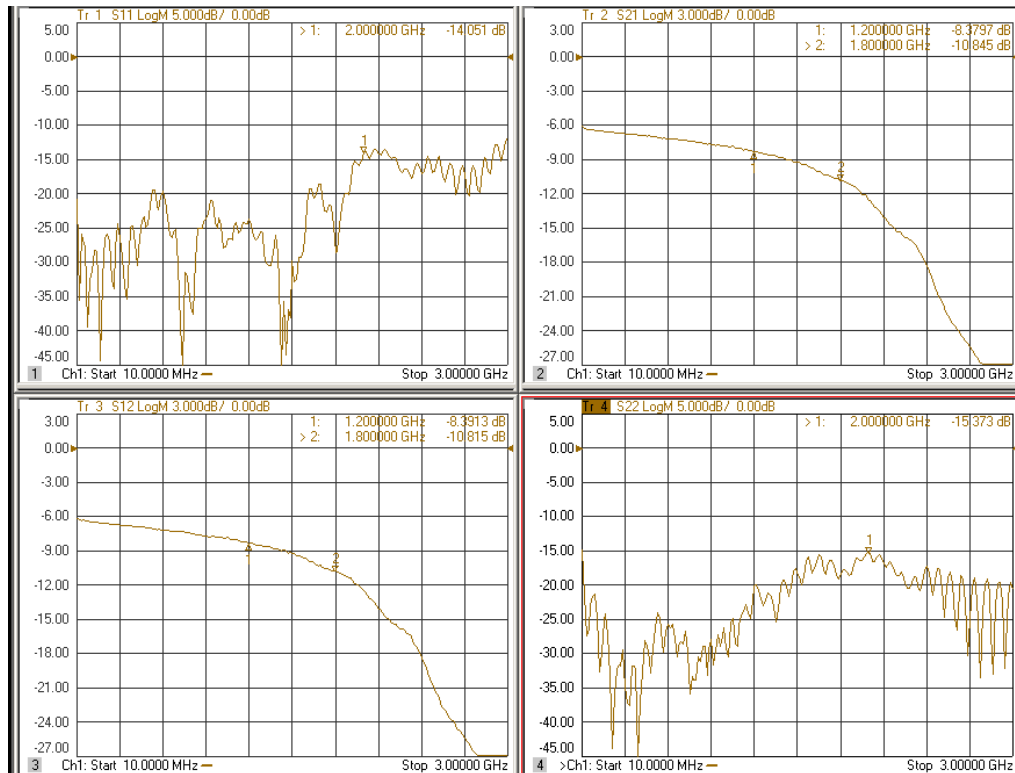Figure 232: Scattering matrix for channel 4L, polarization y and output 3dB1.

Figure 233: Scattering matrix for channel 4L, polarization y and output 6dB2.
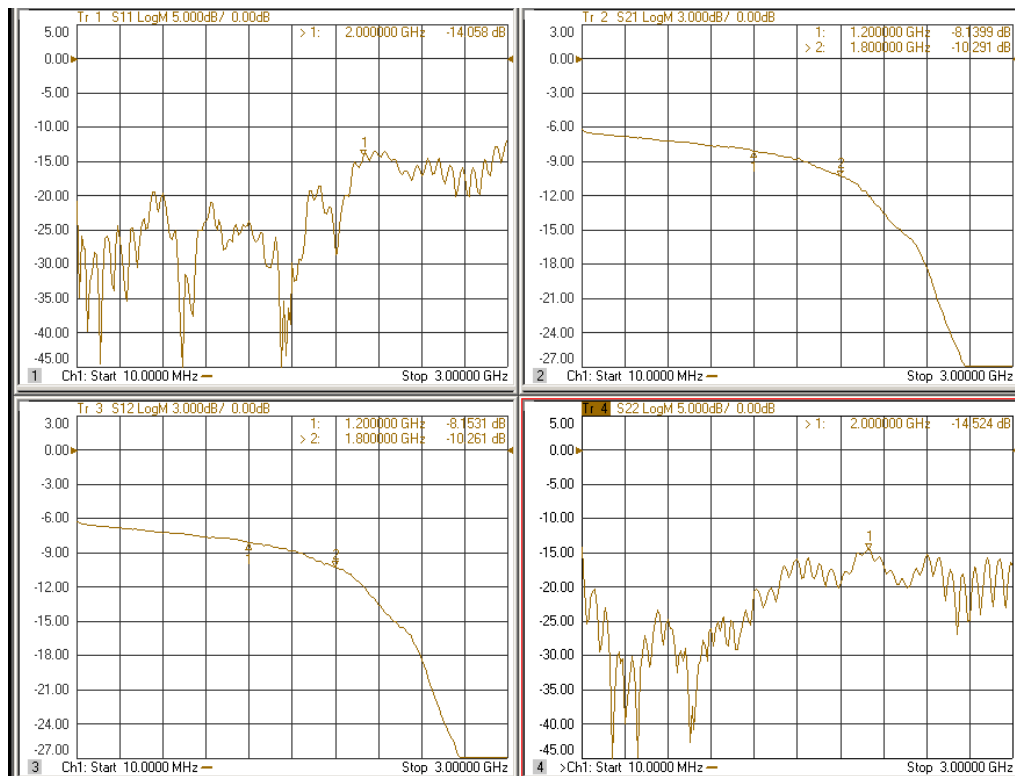

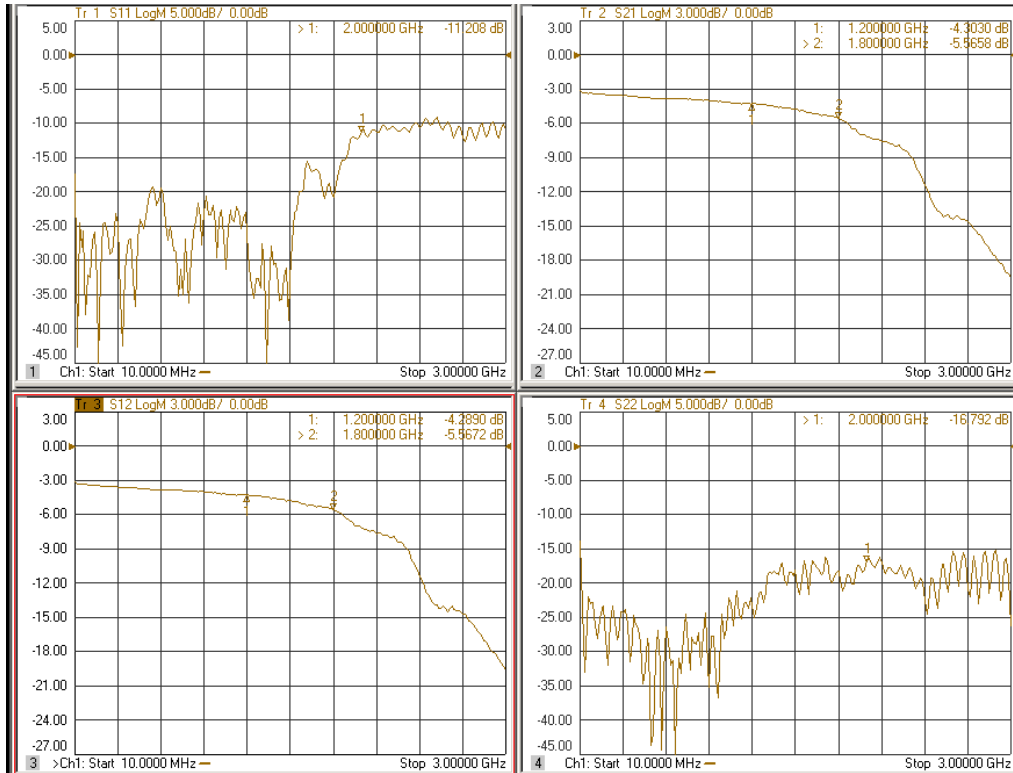Figure 234: Scattering matrix for channel 4L, polarization y and output 6dB3.

Figure 235: Scattering matrix for channel 5B, polarization x and output 3dB1.
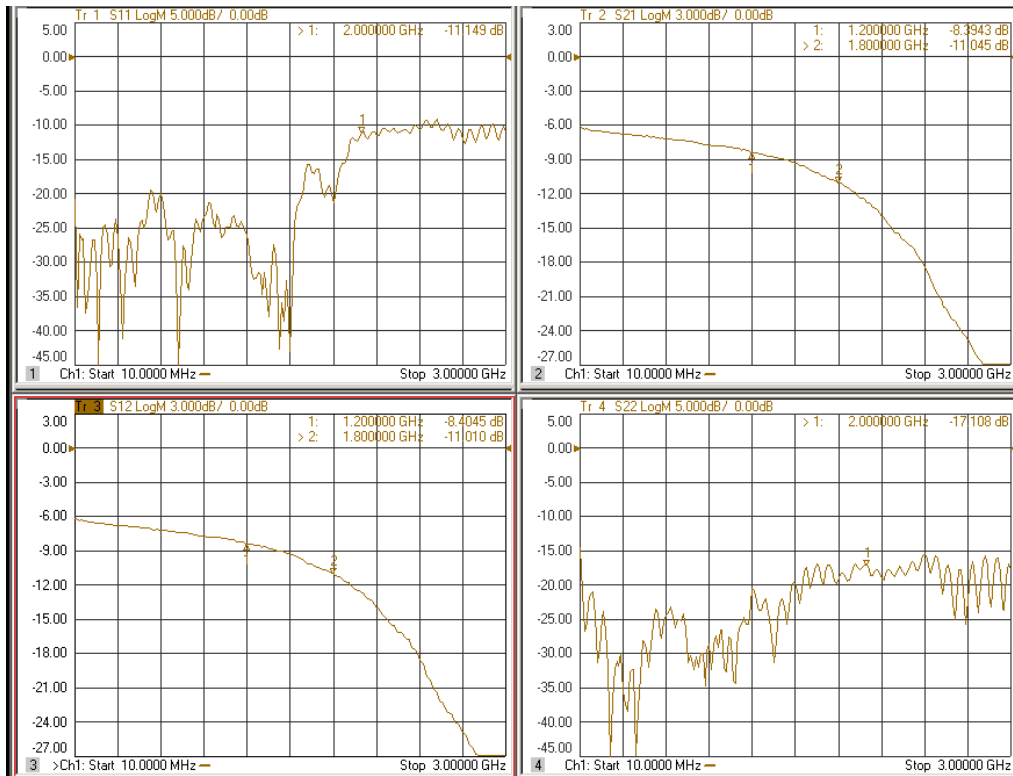

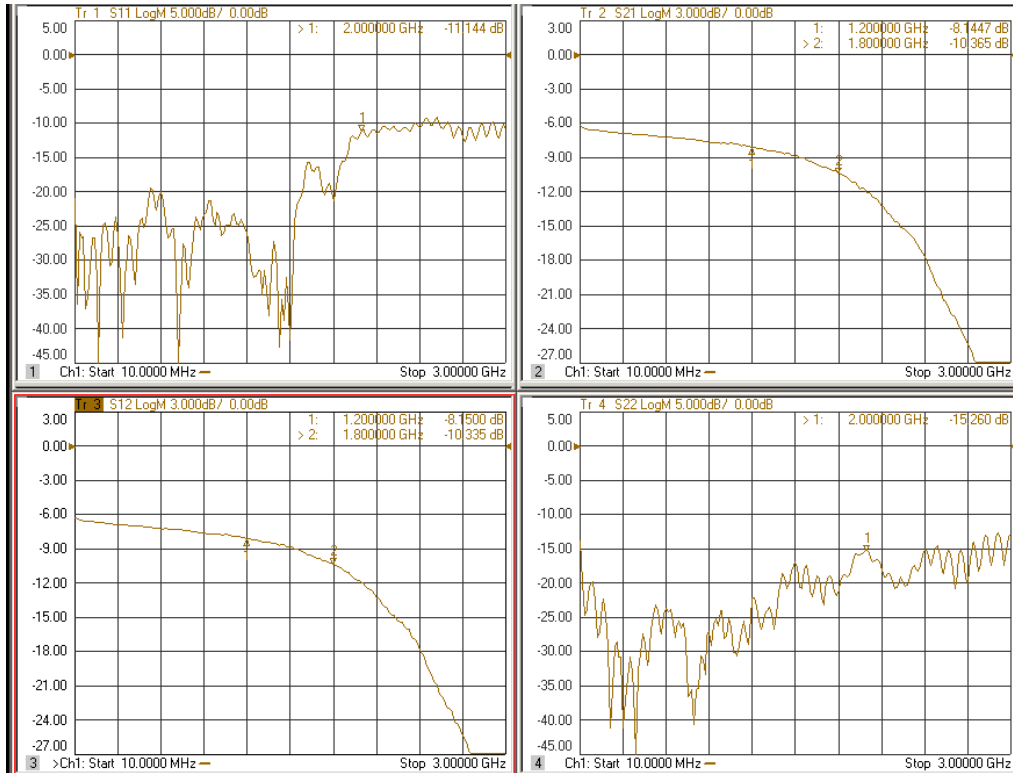Figure 236: Scattering matrix for channel 5B, polarization x and output 6dB2.

Figure 237: Scattering matrix for channel 5B, polarization x and output 6dB3.
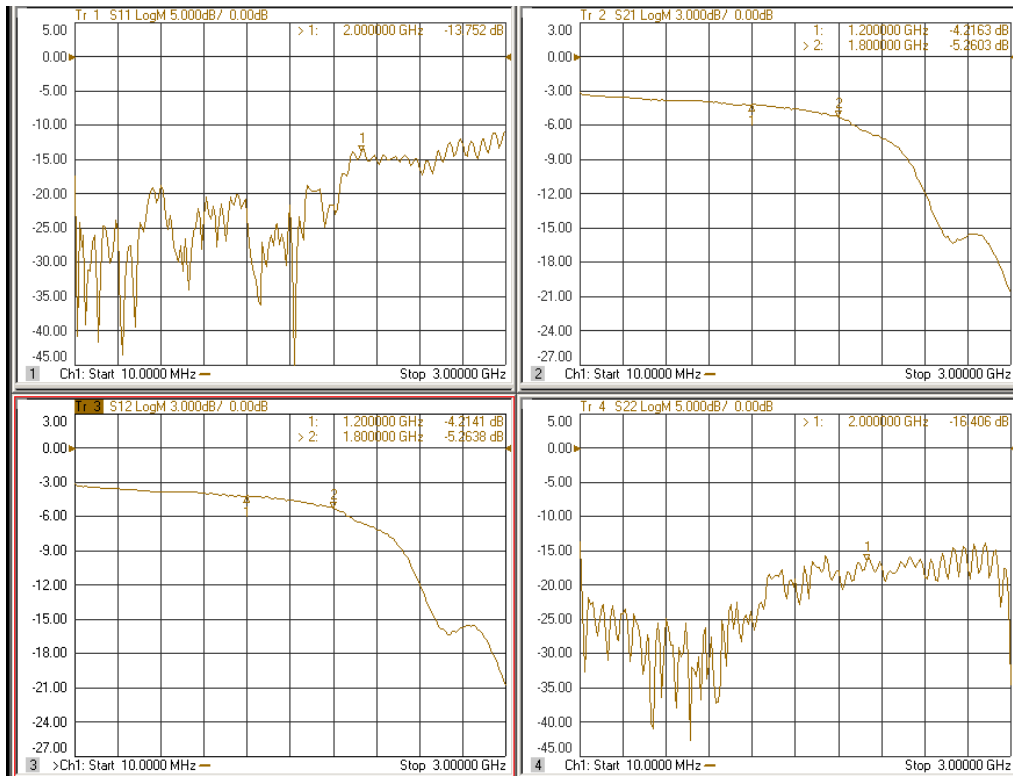

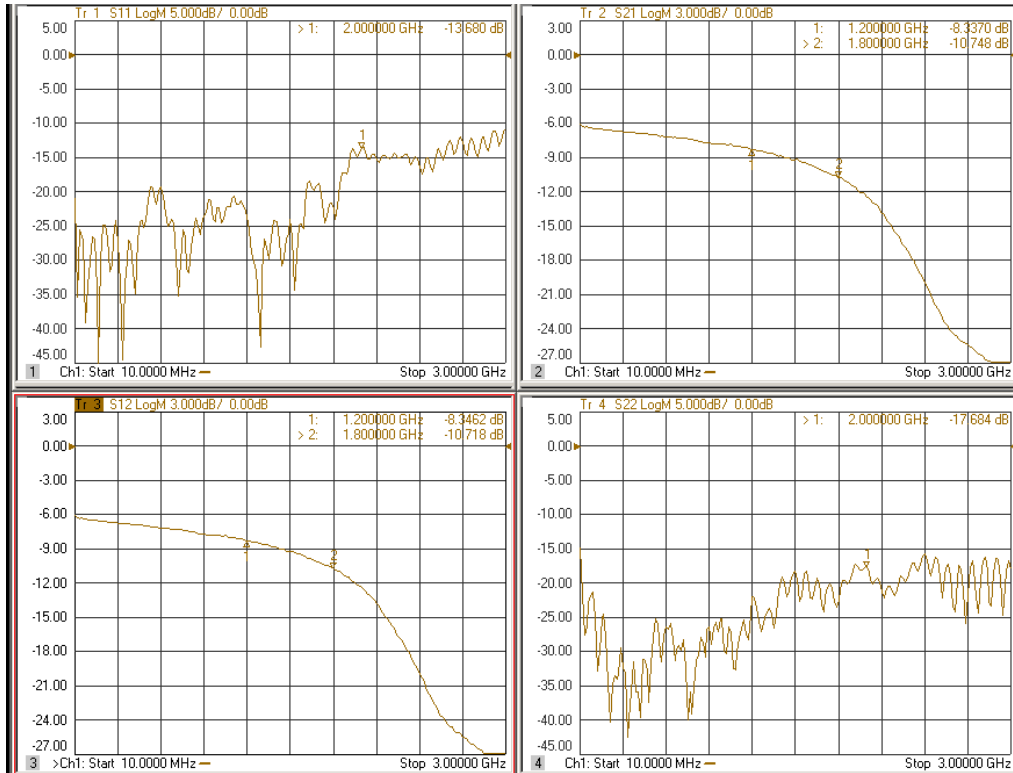Figure 238: Scattering matrix for channel 5B, polarization y and output 3dB1.

Figure 239: Scattering matrix for channel 5B, polarization y and output 6dB2.
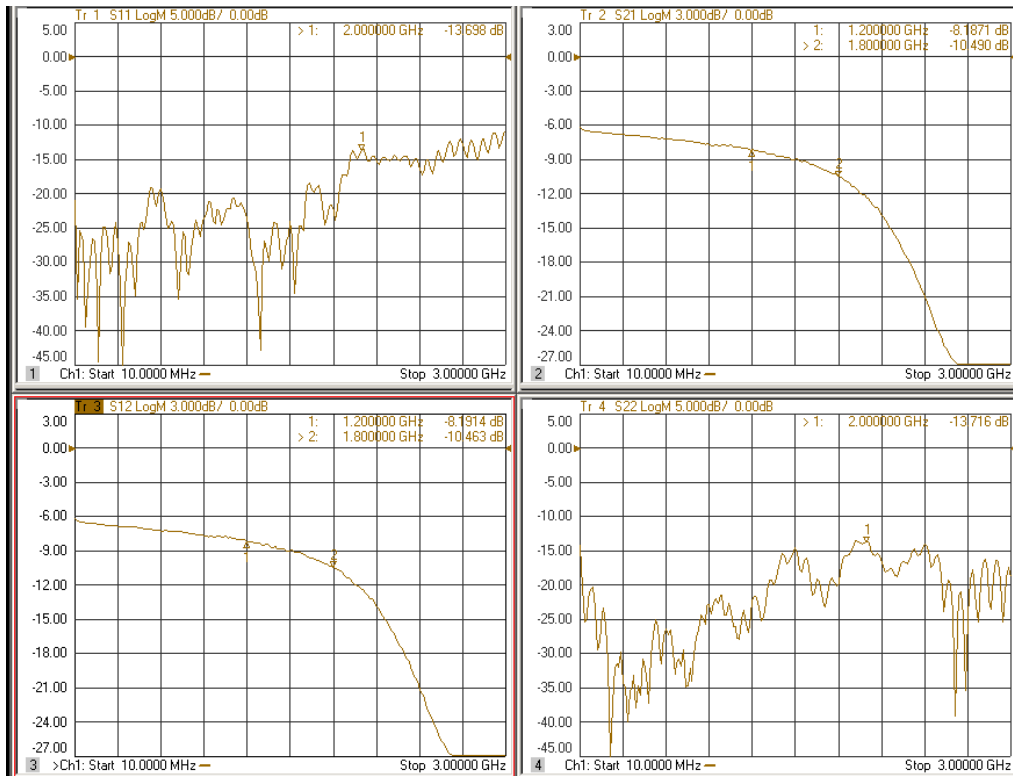

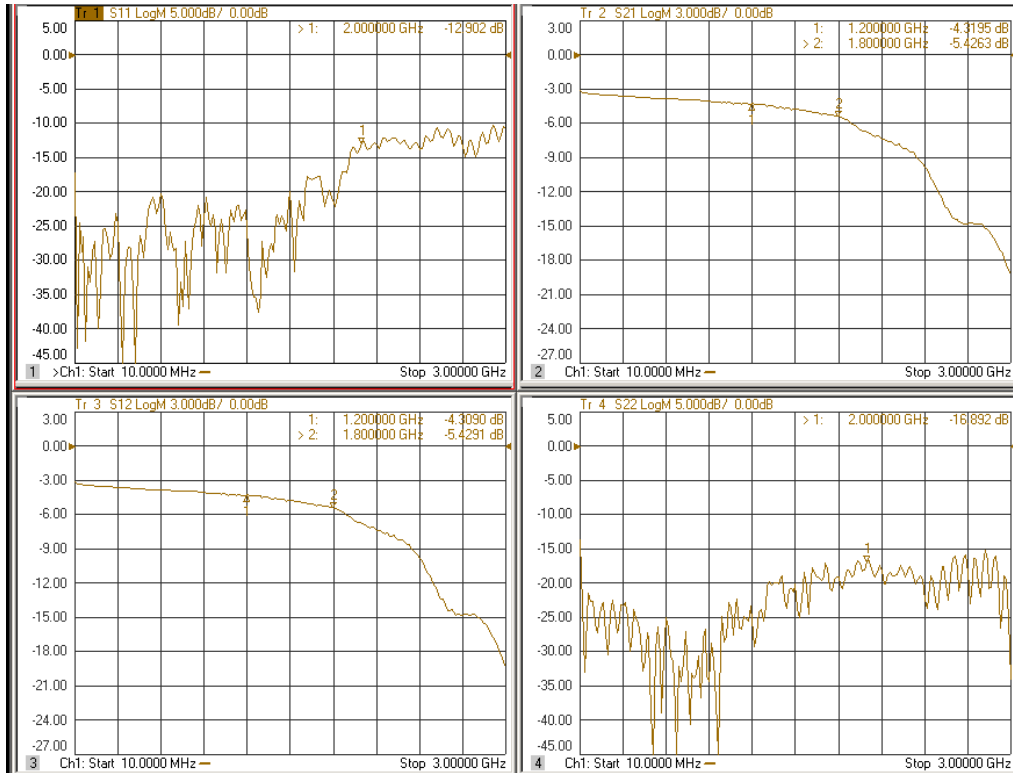Figure 240: Scattering matrix for channel 5B, polarization y and output 6dB3.

Figure 241: Scattering matrix for channel 5C, polarization x and output 3dB1.
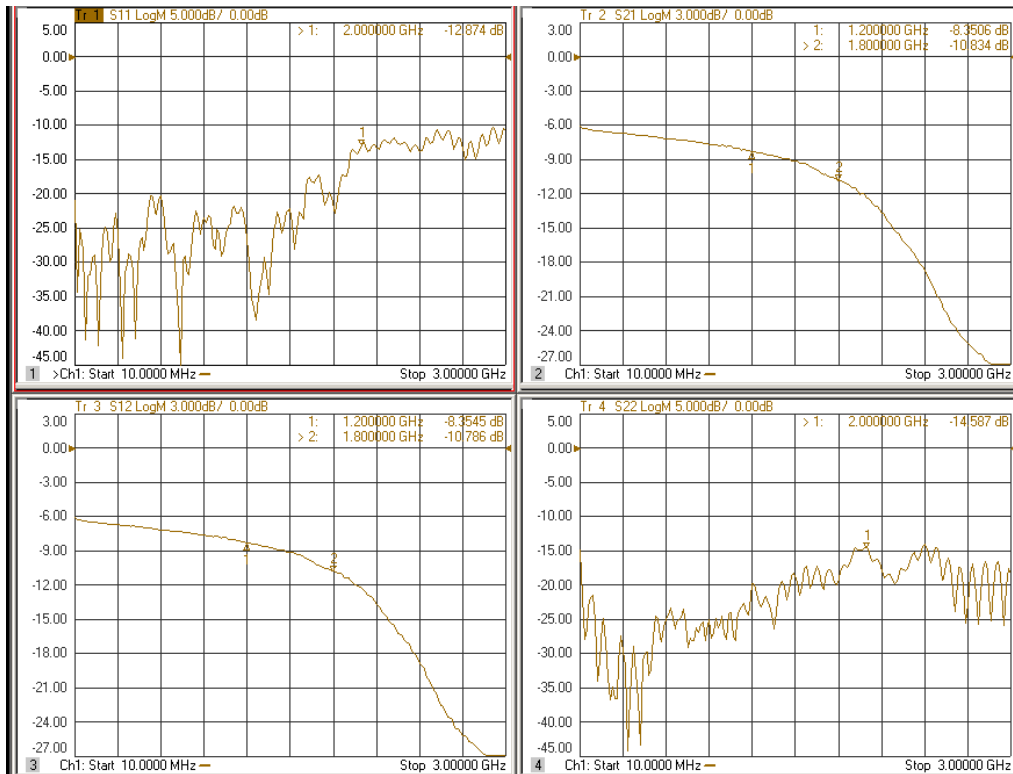

Figure 242: Scattering matrix for channel 5C, polarization x and output 6dB2.
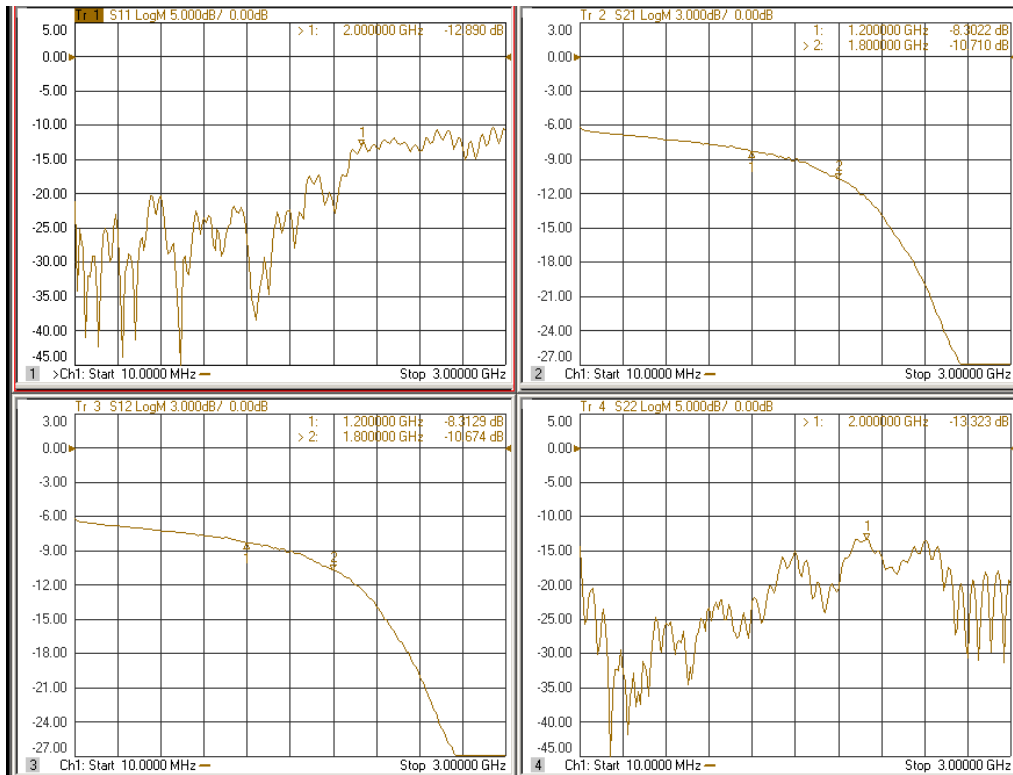
Figure 243: Scattering matrix for channel 5C, polarization x and output 6dB3.
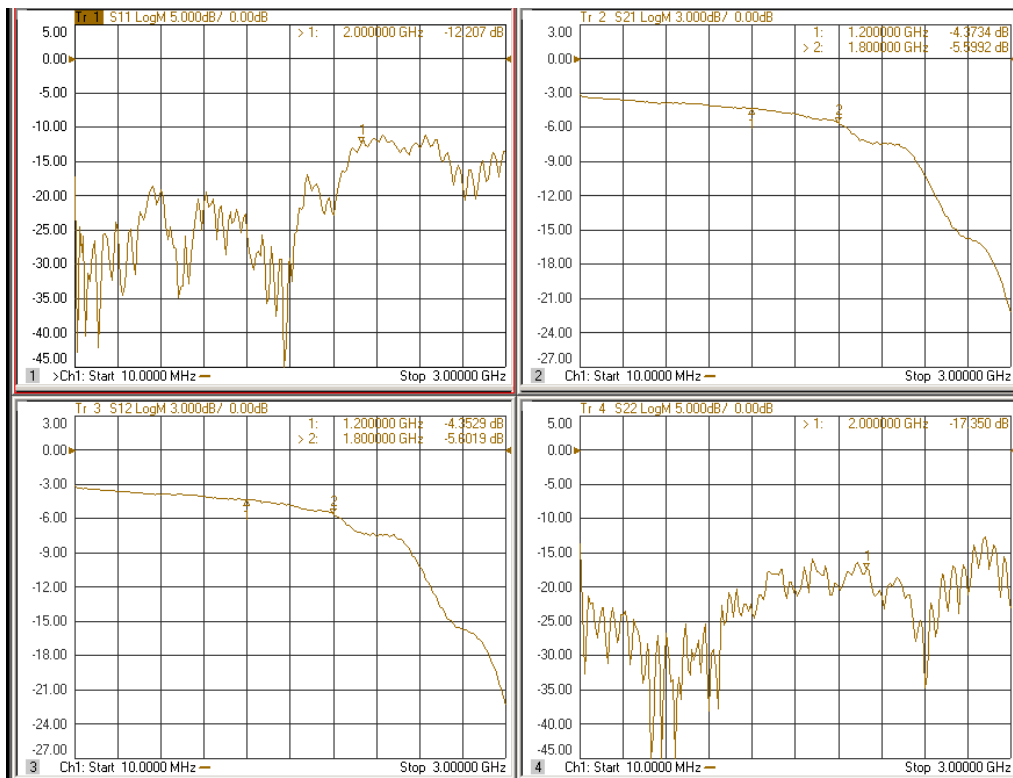

Figure 244: Scattering matrix for channel 5C, polarization y and output 3dB1.
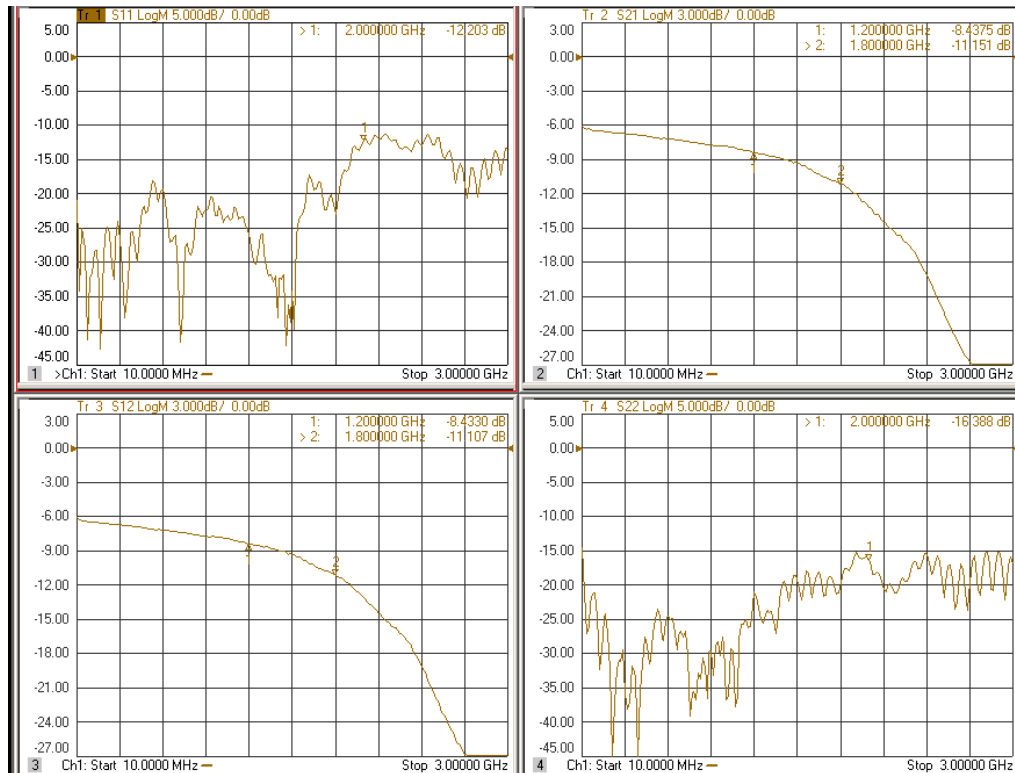
Figure 245: Scattering matrix for channel 5C, polarization y and output 6dB2.
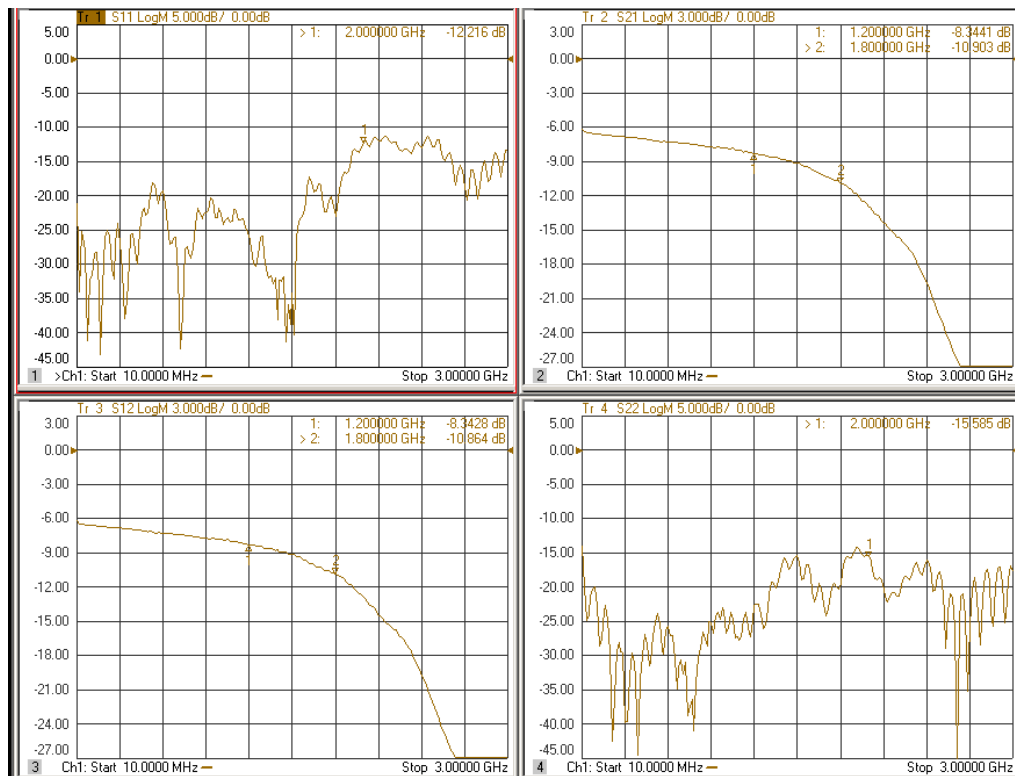

Figure 246: Scattering matrix for channel 5C, polarization y and output 6dB3.
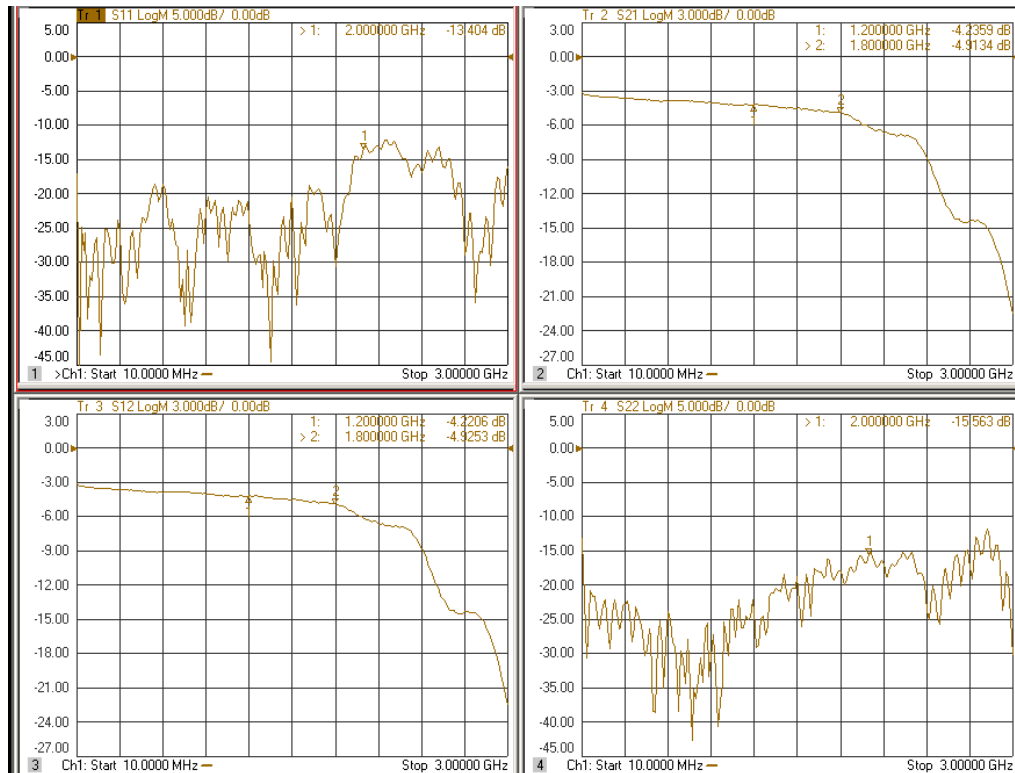
Figure 247: Scattering matrix for channel 5E, polarization x and output 3dB1.
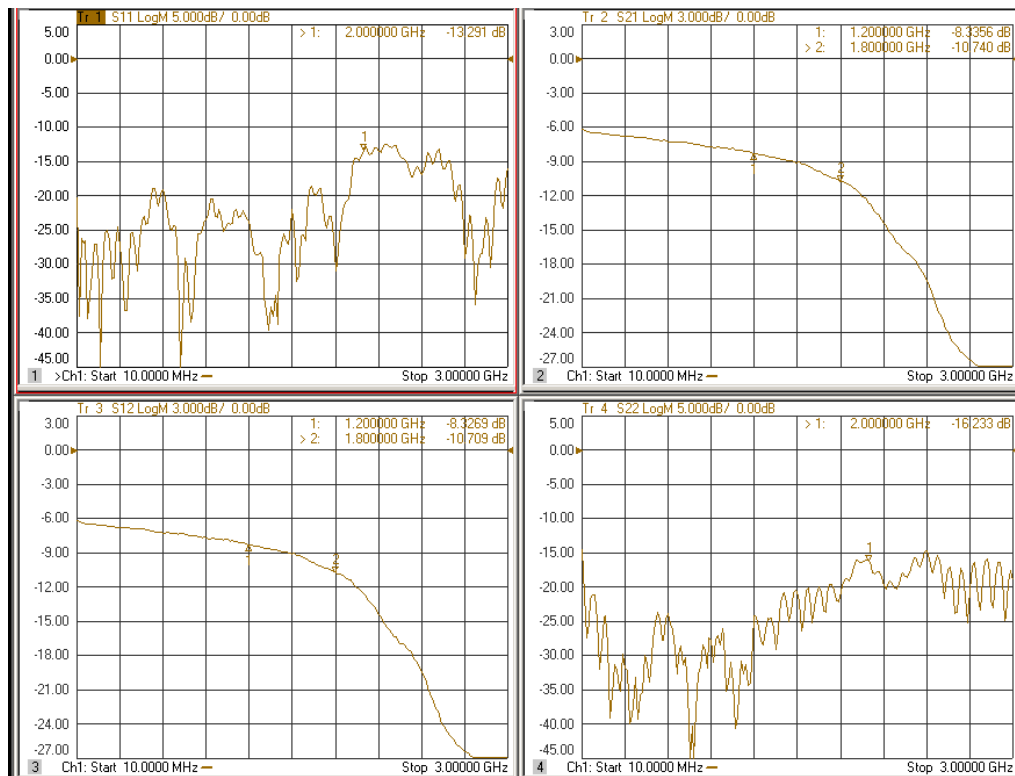

Figure 248: Scattering matrix for channel 5E, polarization x and output 6dB2.
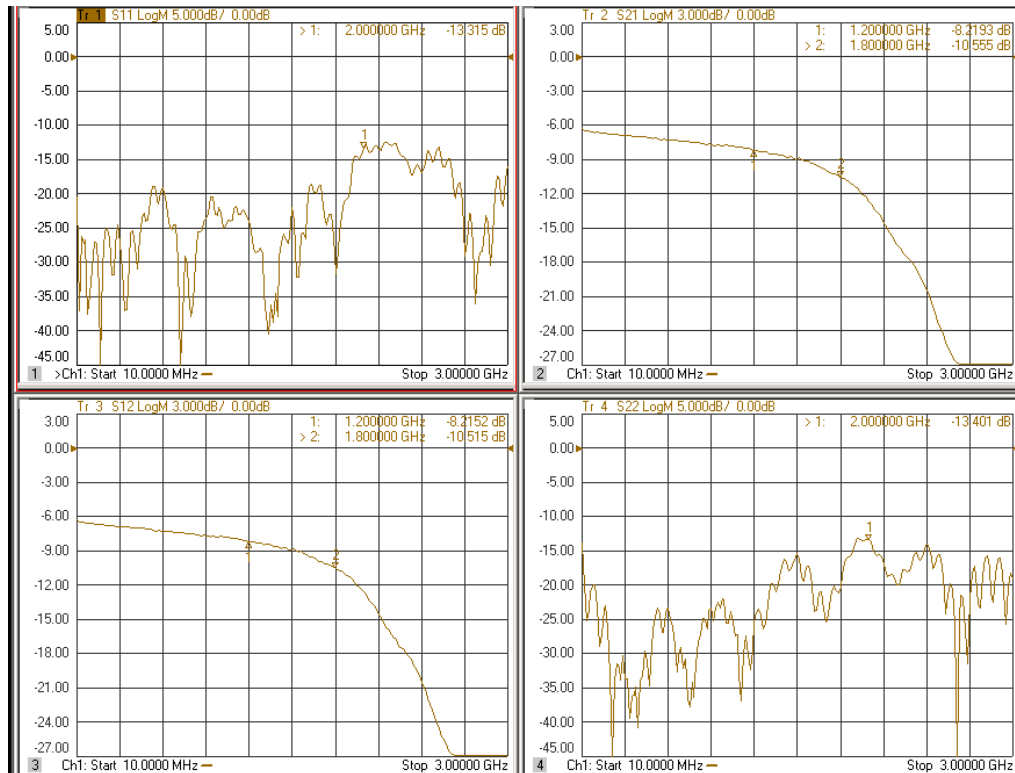
Figure 249: Scattering matrix for channel 5E, polarization x and output 6dB3.
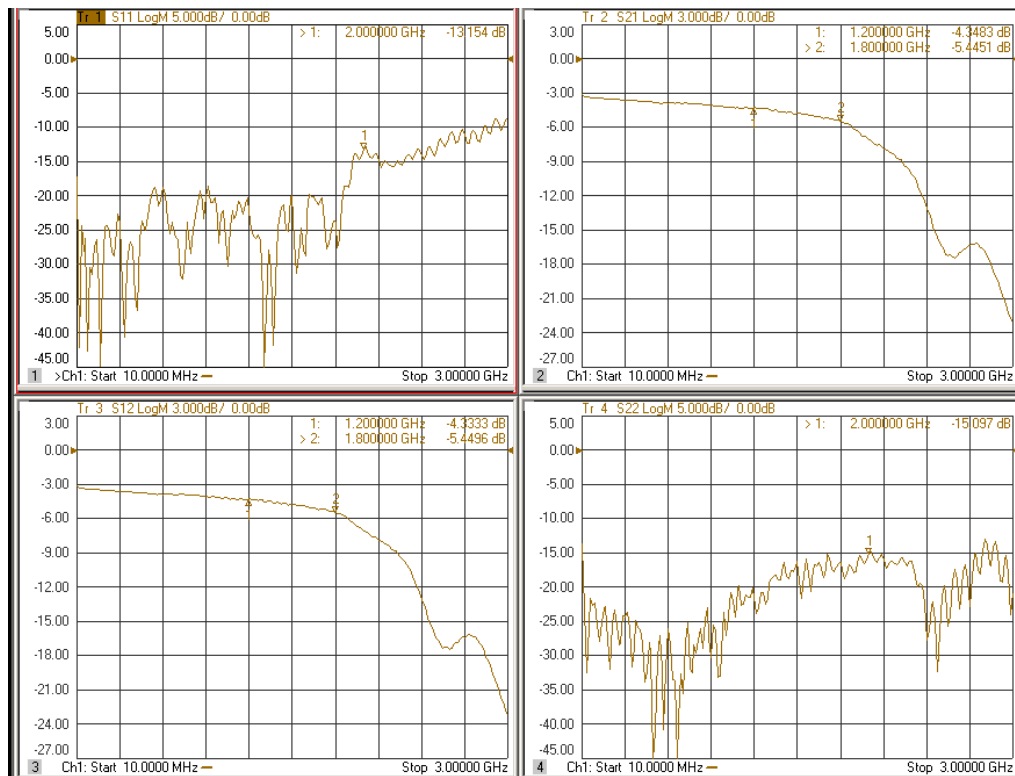

Figure 250: Scattering matrix for channel 5E, polarization y and output 3dB1.
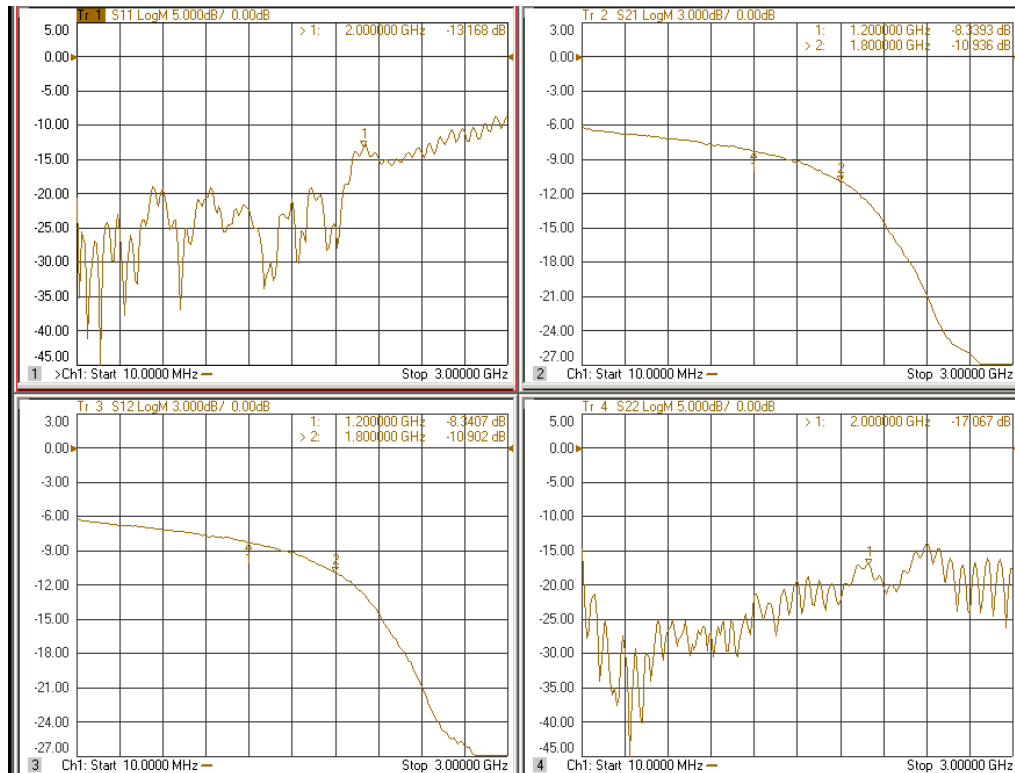
Figure 251: Scattering matrix for channel 5E, polarization y and output 6dB2.
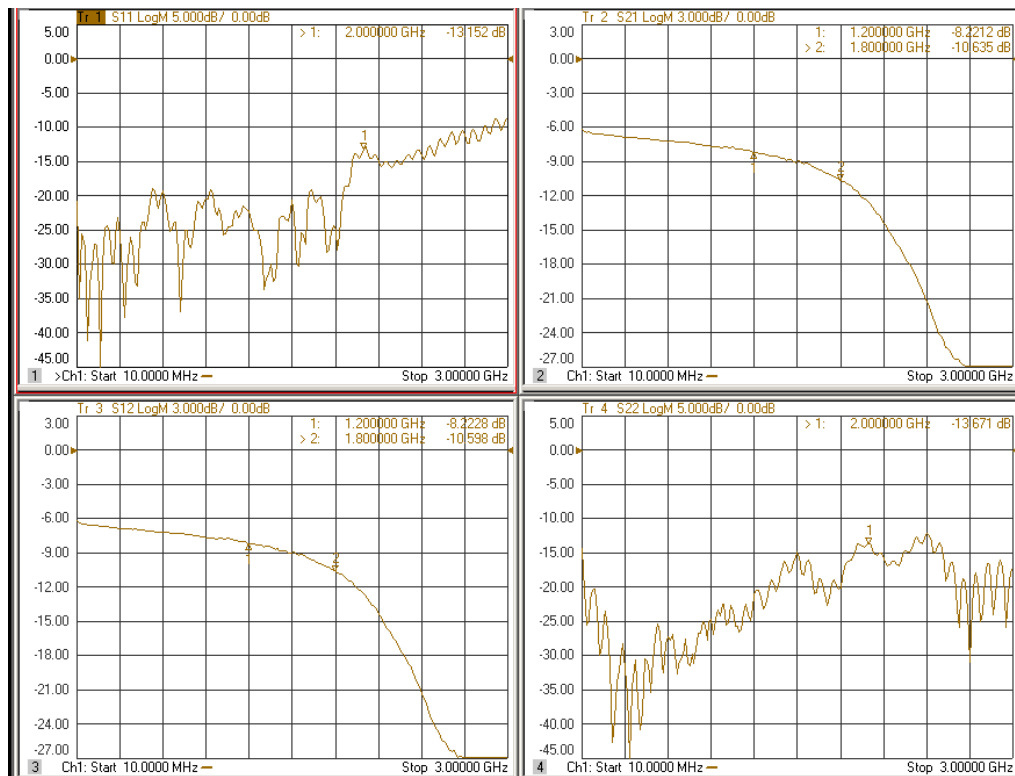

Figure 252: Scattering matrix for channel 5E, polarization y and output 6dB3.
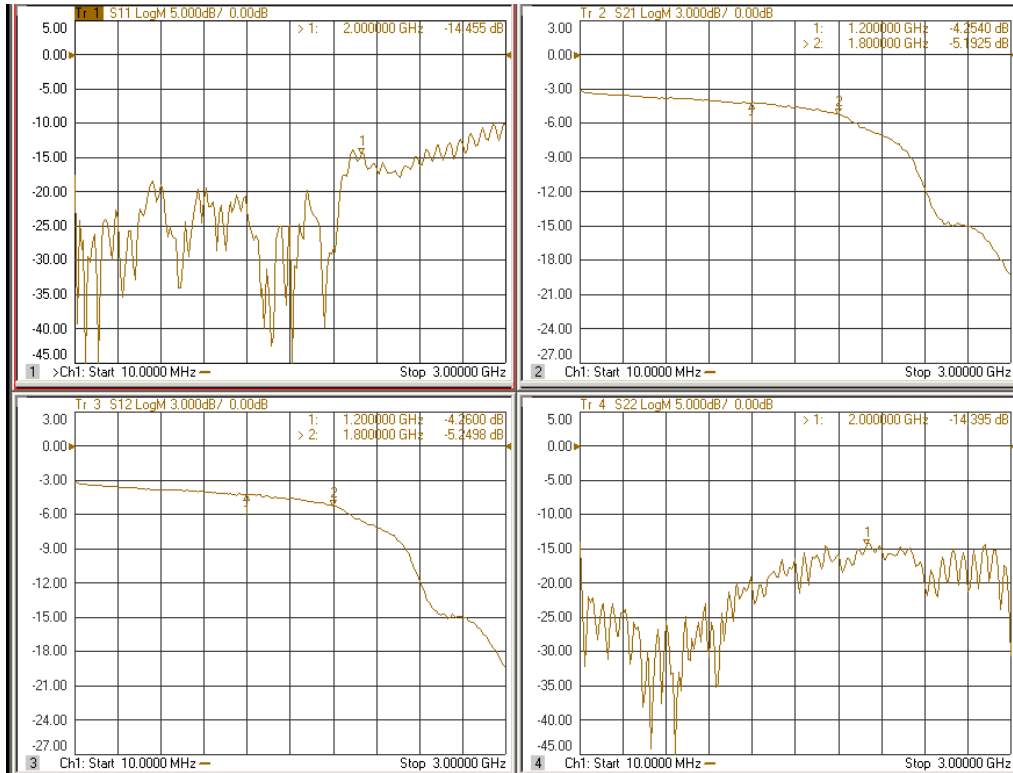
Figure 253: Scattering matrix for channel 5G, polarization x and output 3dB1.
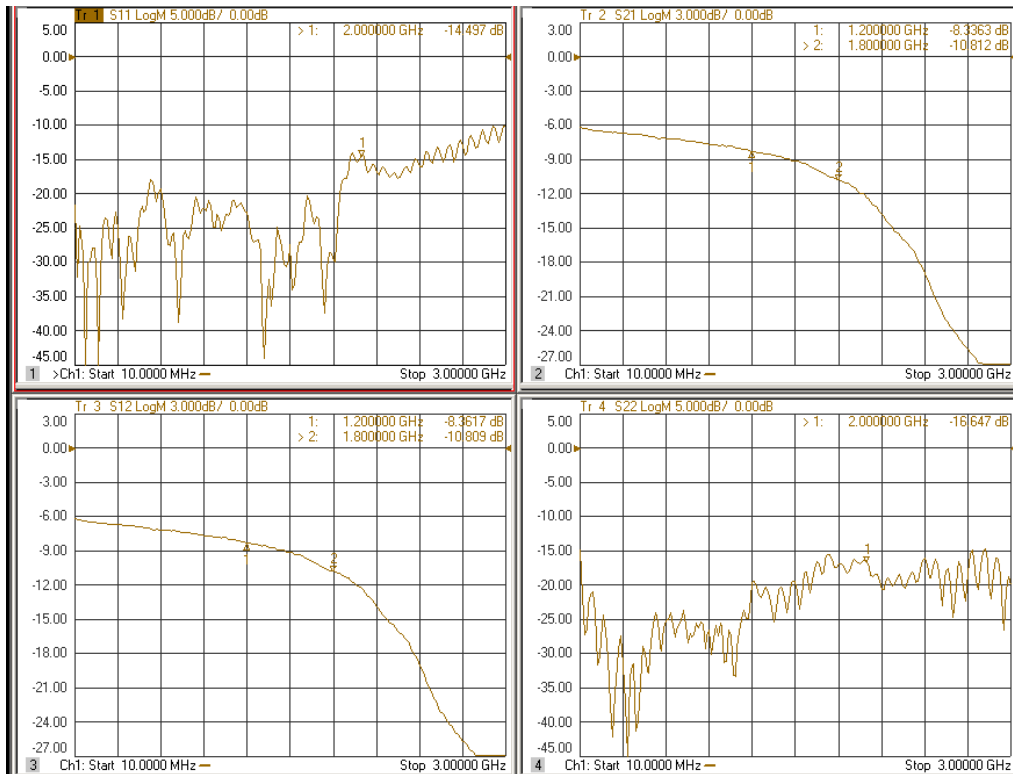

Figure 254: Scattering matrix for channel 5G, polarization x and output 6dB2.
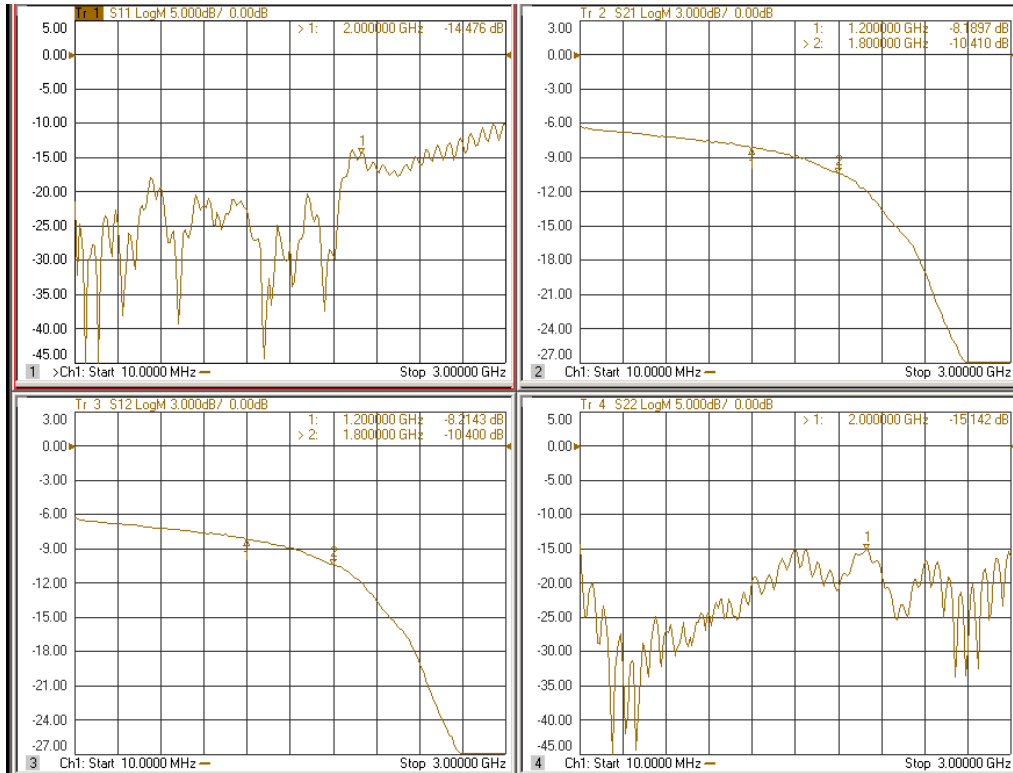
Figure 255: Scattering matrix for channel 5G, polarization x and output 6dB3.
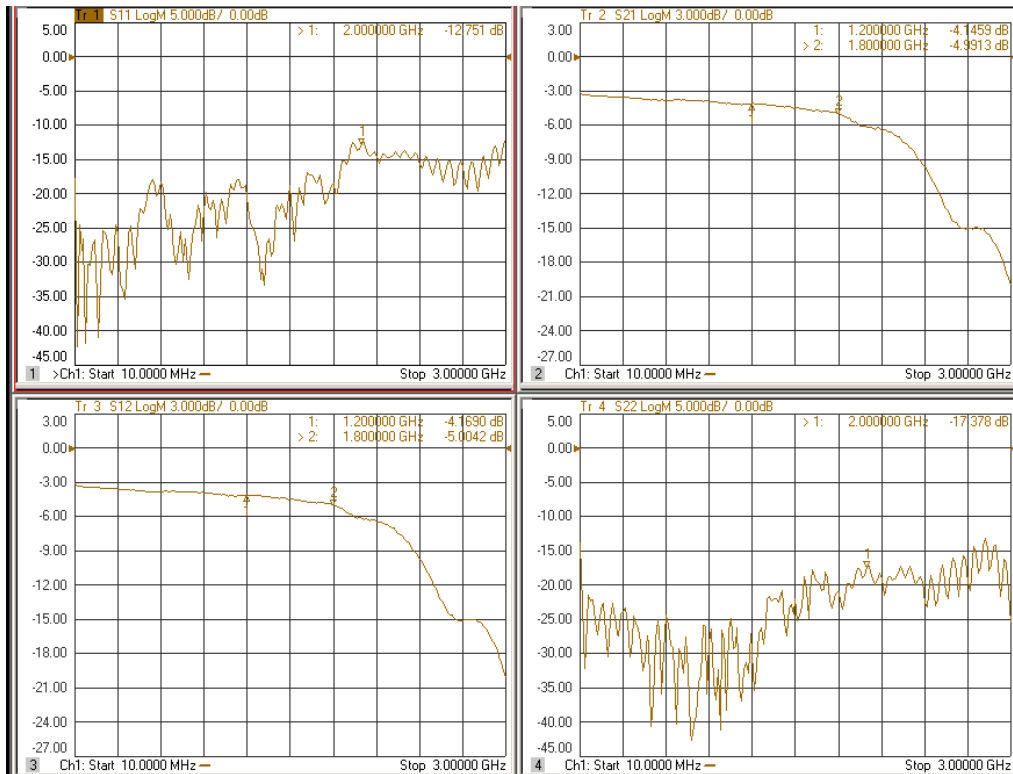

Figure 256: Scattering matrix for channel 5G, polarization y and output 3dB1.
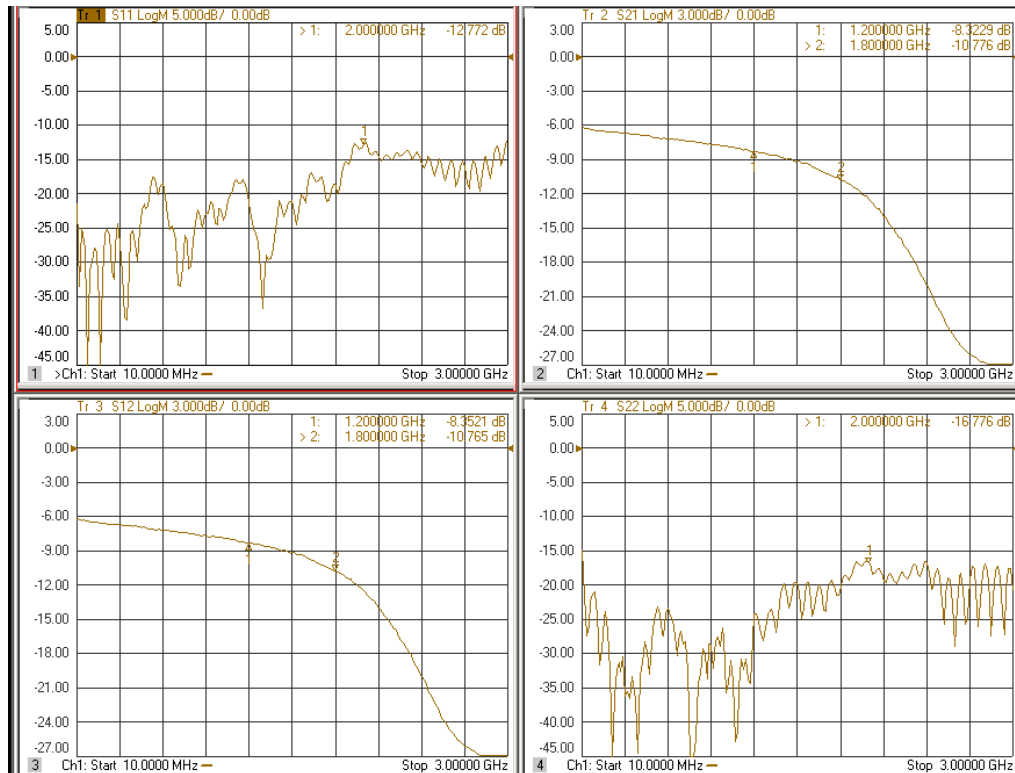
Figure 257: Scattering matrix for channel 5G, polarization y and output 6dB2.
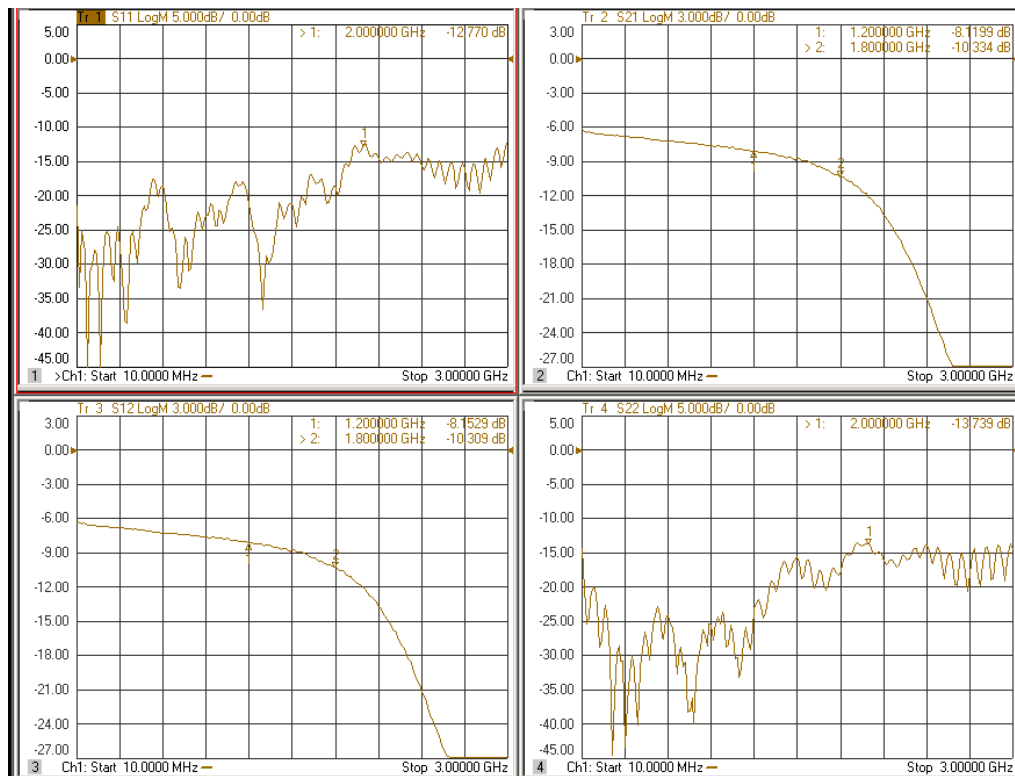

Figure 258: Scattering matrix for channel 5G, polarization y and output 6dB3.
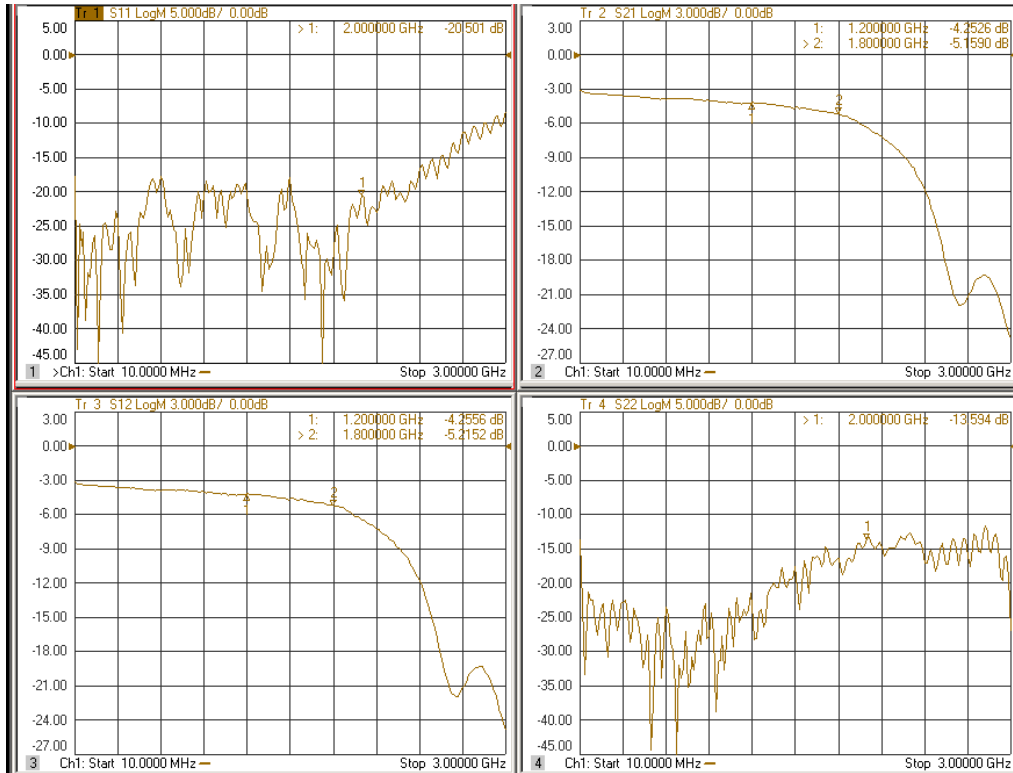
Figure 259: Scattering matrix for channel 5H, polarization x and output 3dB1.
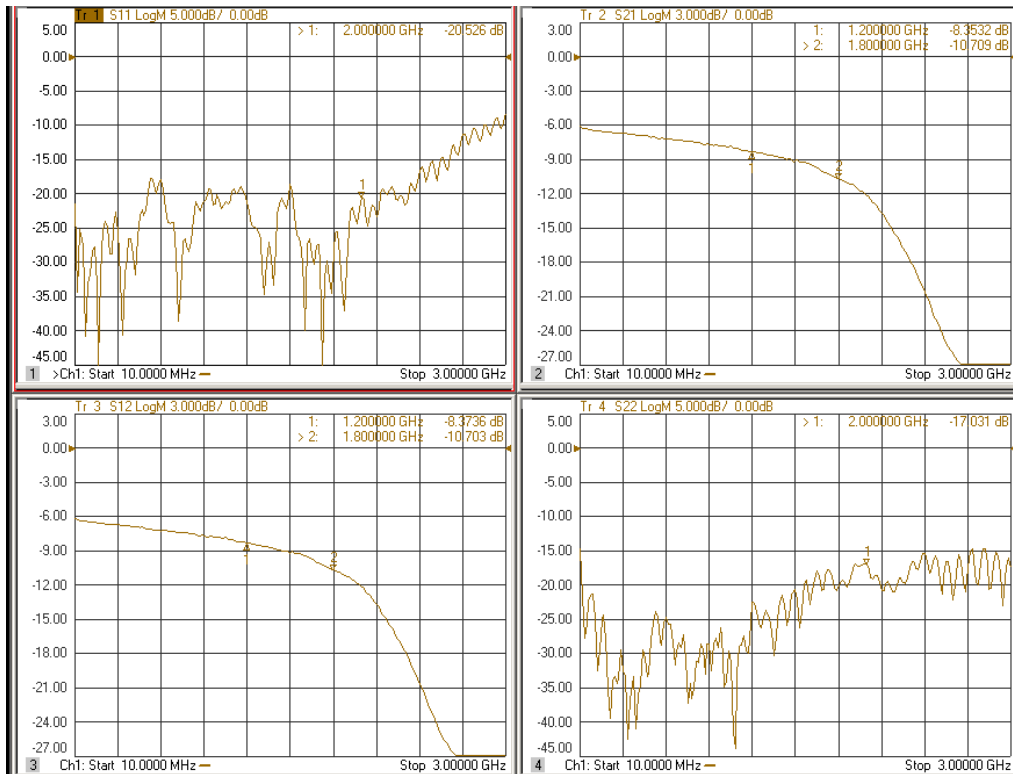

Figure 260: Scattering matrix for channel 5H, polarization x and output 6dB2.
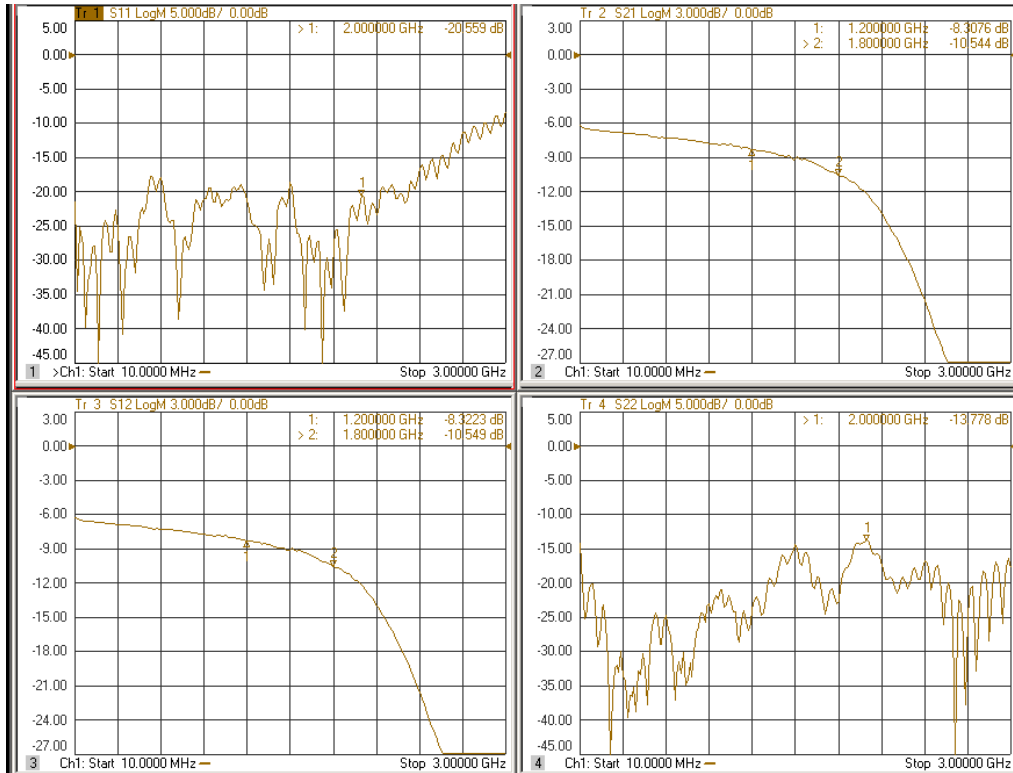
Figure 261: Scattering matrix for channel 5H, polarization x and output 6dB3.
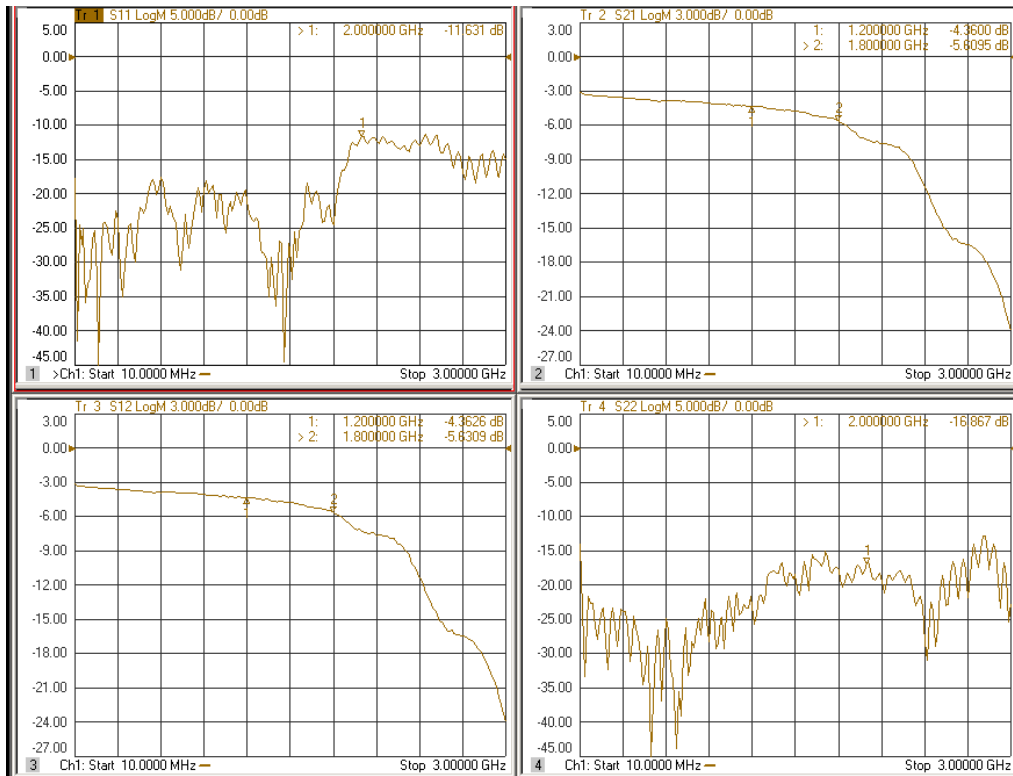

Figure 262: Scattering matrix for channel 5H, polarization y and output 3dB1.
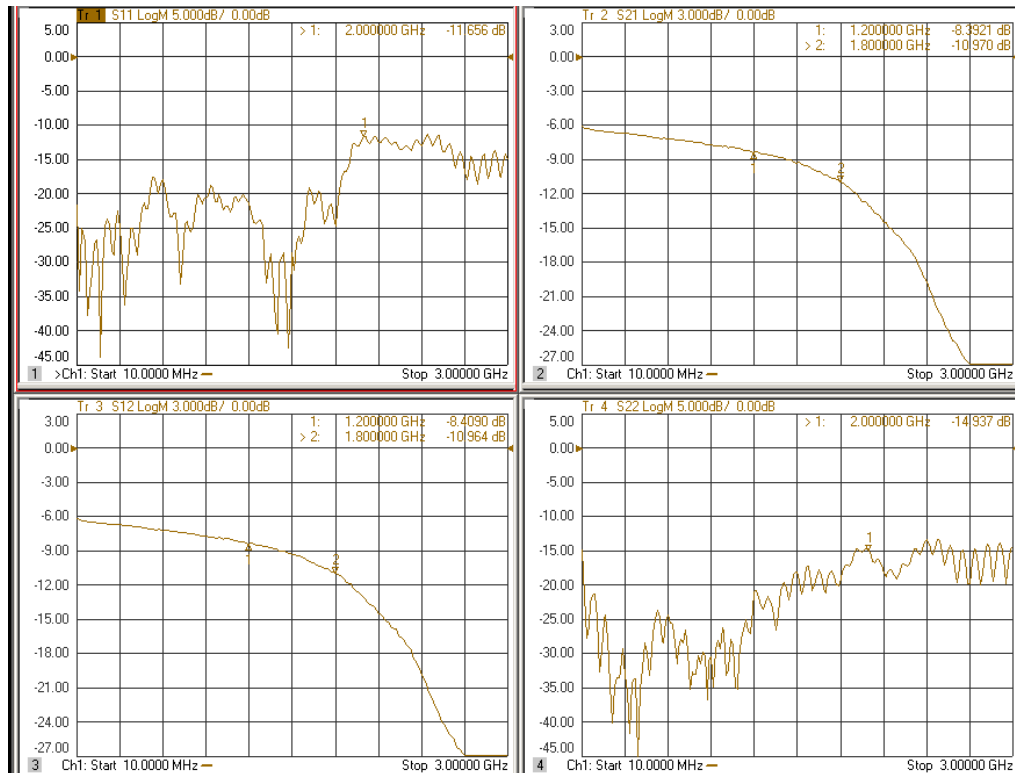
Figure 263: Scattering matrix for channel 5H, polarization y and output 6dB2.
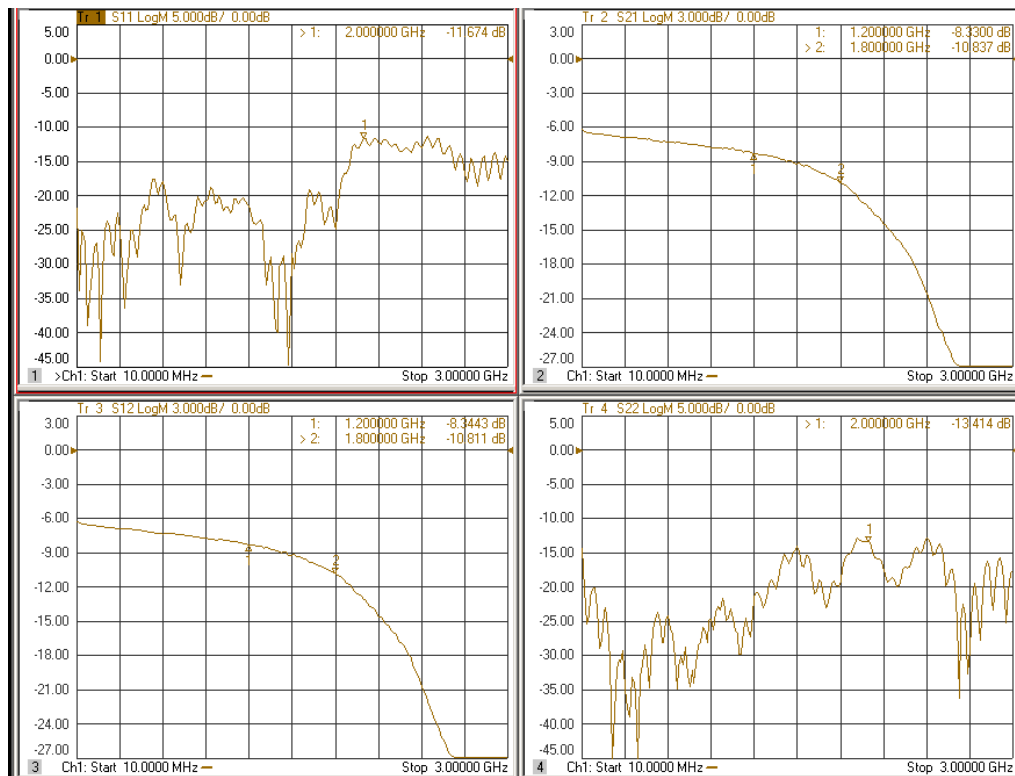

Figure 264: Scattering matrix for channel 5H, polarization y and output 6dB3.
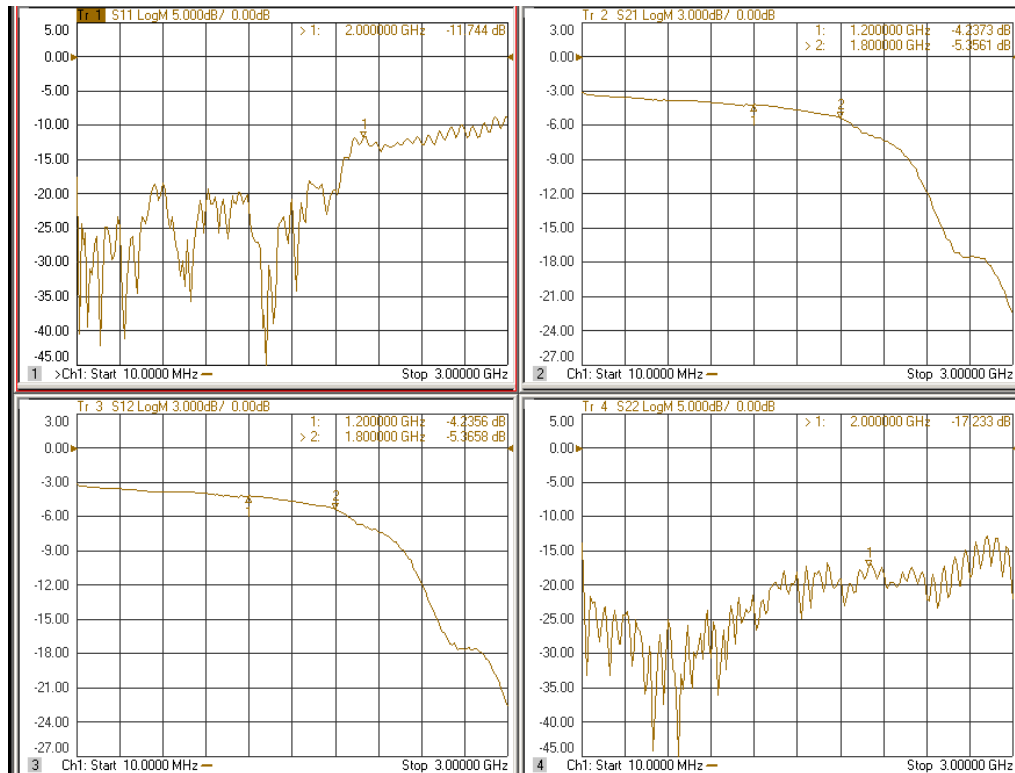
Figure 265: Scattering matrix for channel Ib, polarization x and output 3dB1.
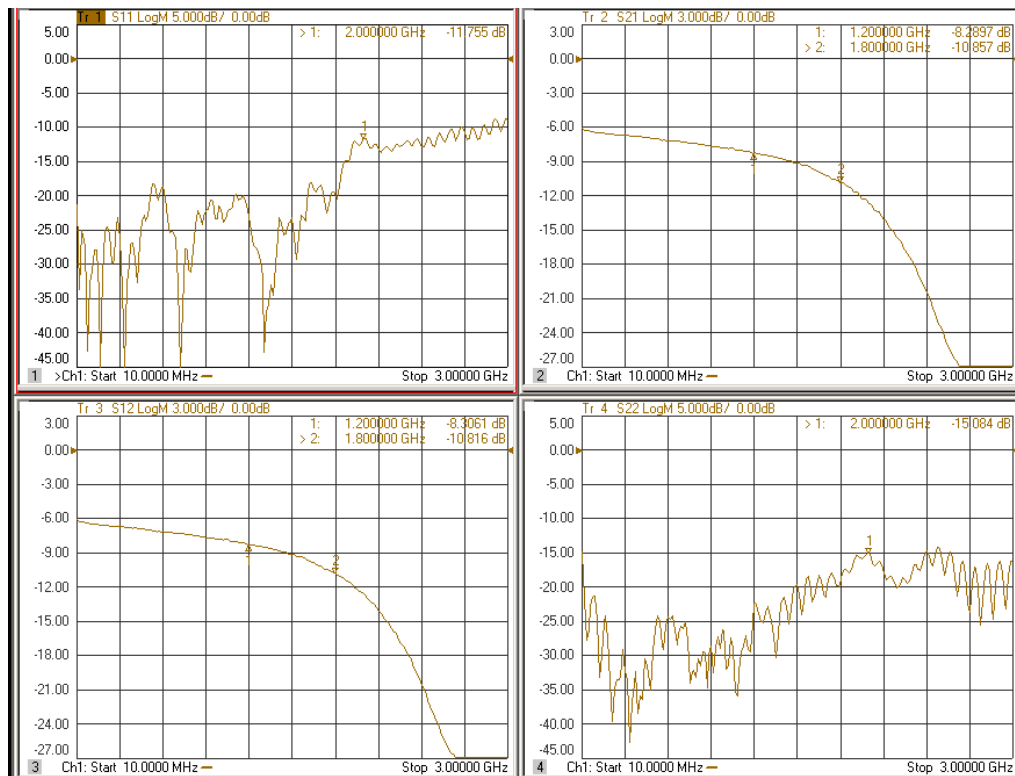

Figure 266: Scattering matrix for channel Ib, polarization x and output 6dB2.
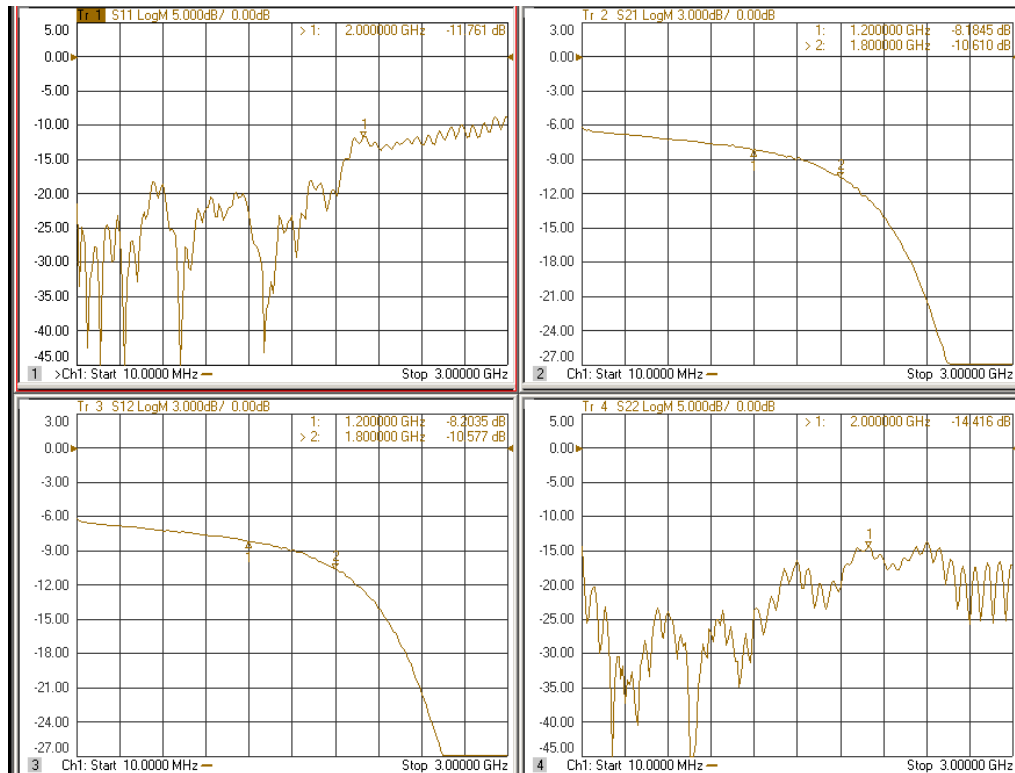
Figure 267: Scattering matrix for channel Ib, polarization x and output 6dB3.

Figure 268: Scattering matrix for channel Ib, polarization y and output 3dB1.

135

Figure 269: Scattering matrix for channel Ib, polarization y and output 6dB2.

Figure 270: Scattering matrix for channel Ib, polarization y and output 6dB3.
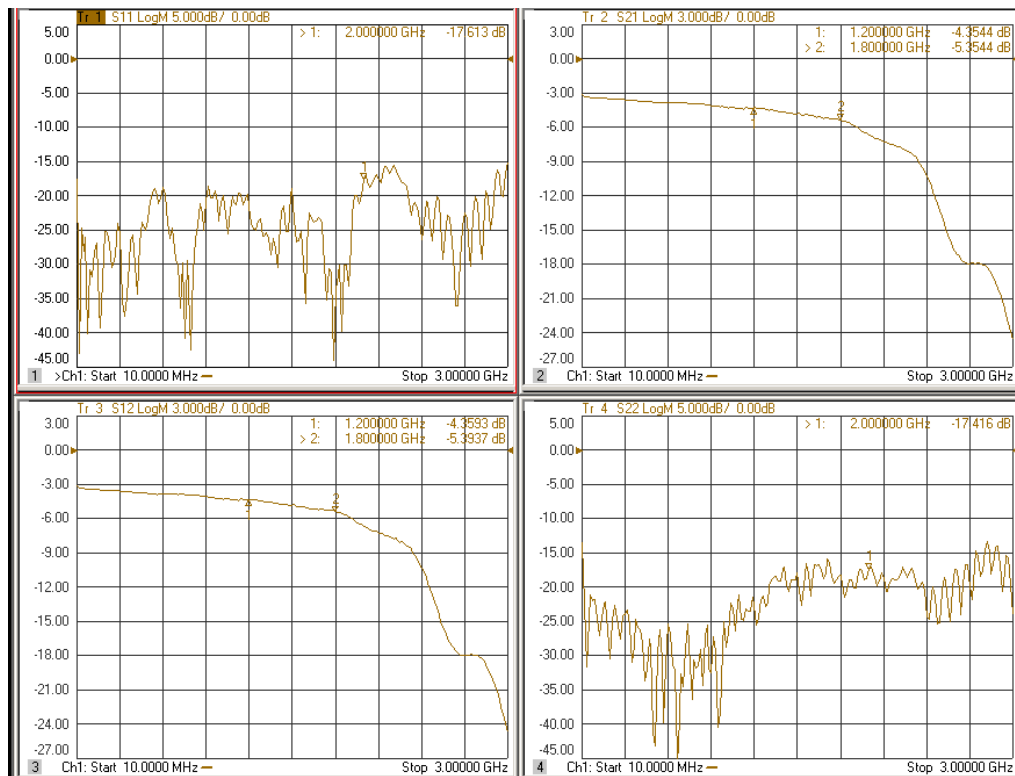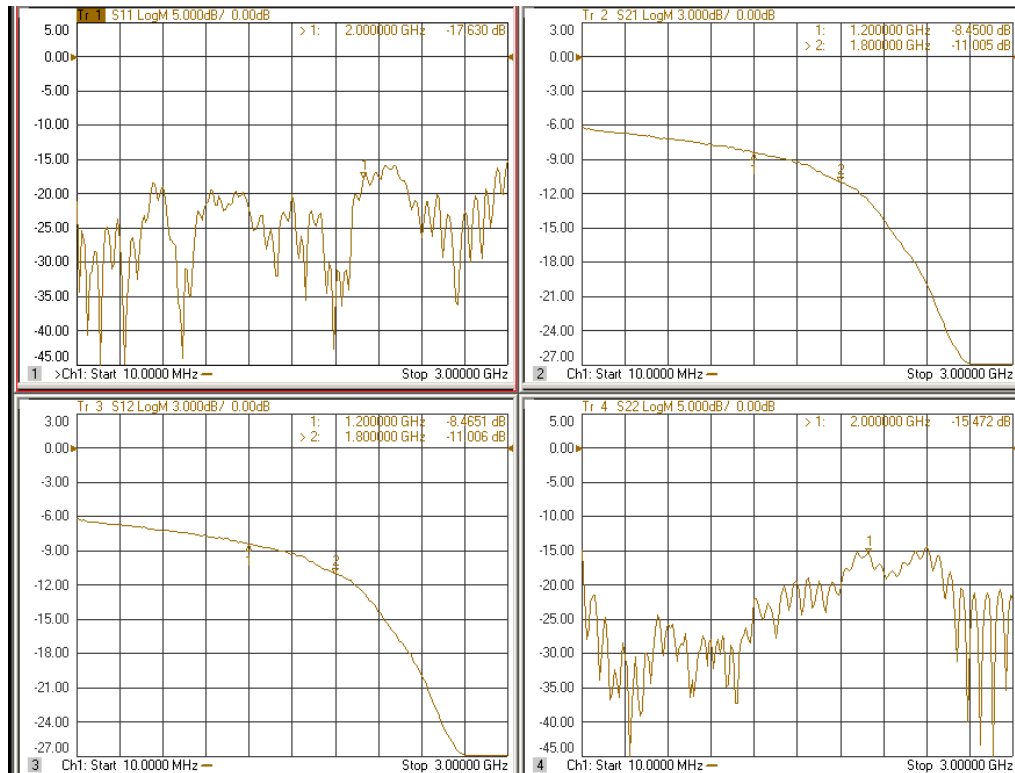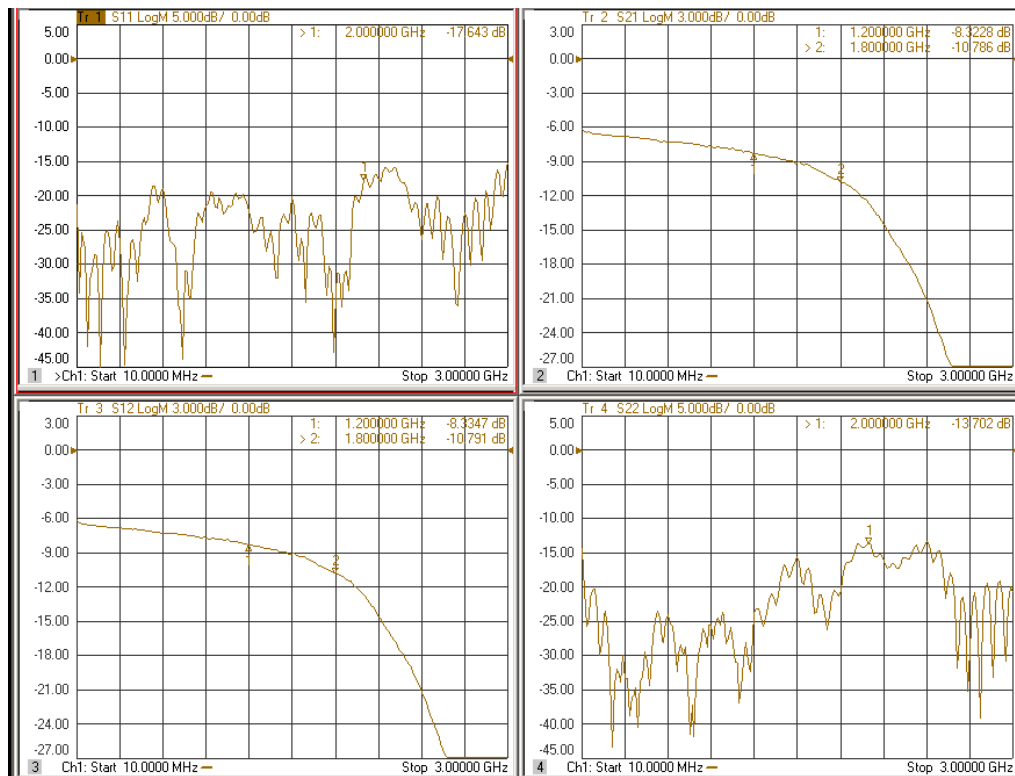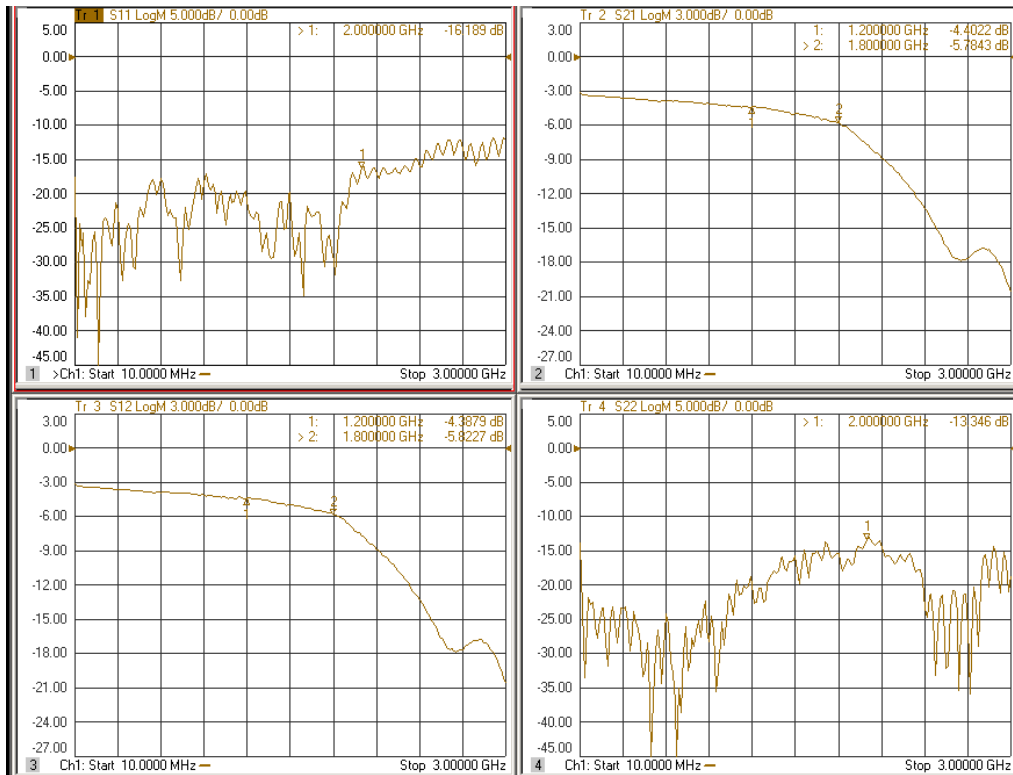
Figure 271: Scattering matrix for channel IIb, polarization x and output 3dB1.

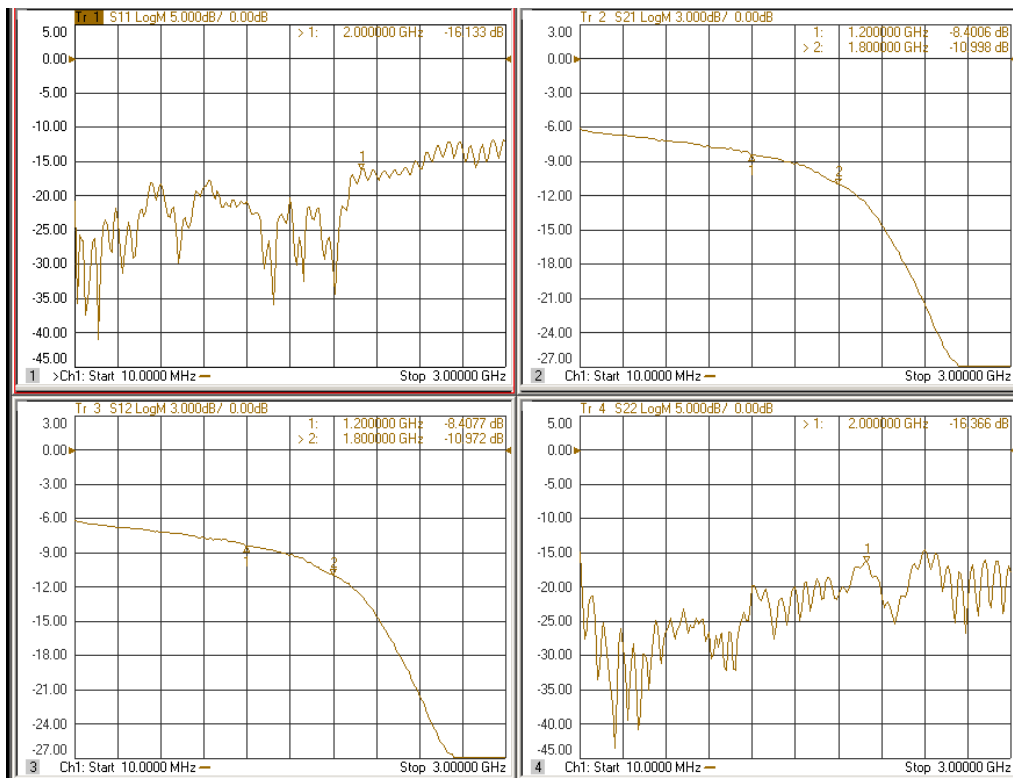
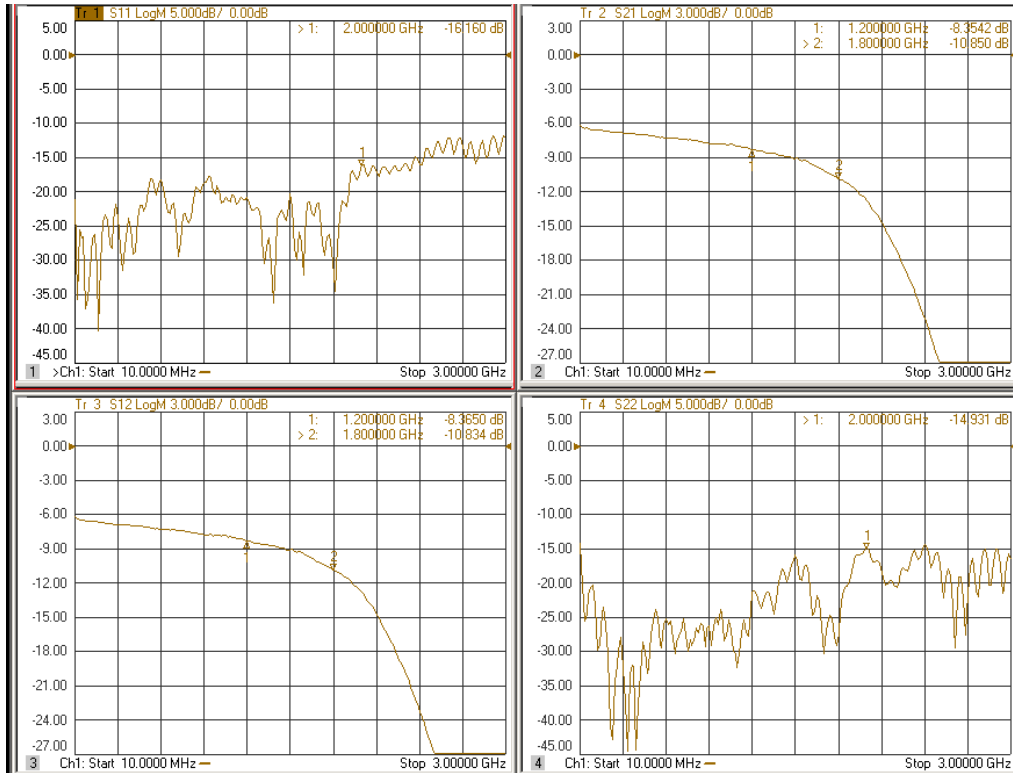Figure 272: Scattering matrix for channel IIb, polarization x and output 6dB2.

Figure 273: Scattering matrix for channel IIb, polarization x and output 6dB3.

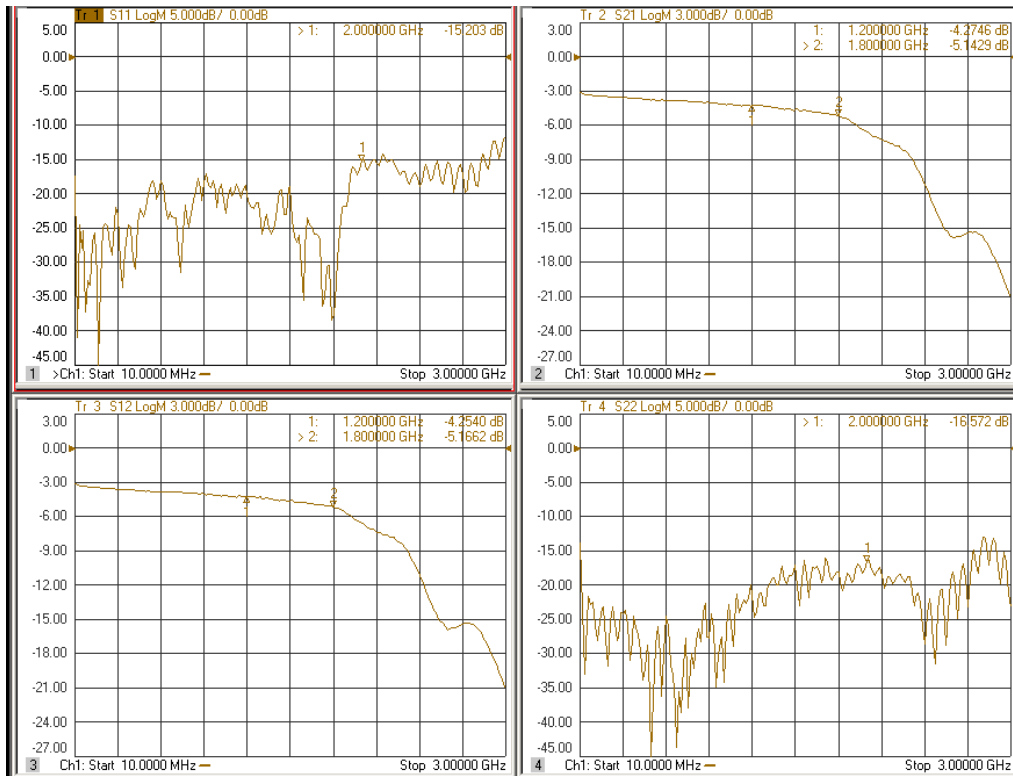
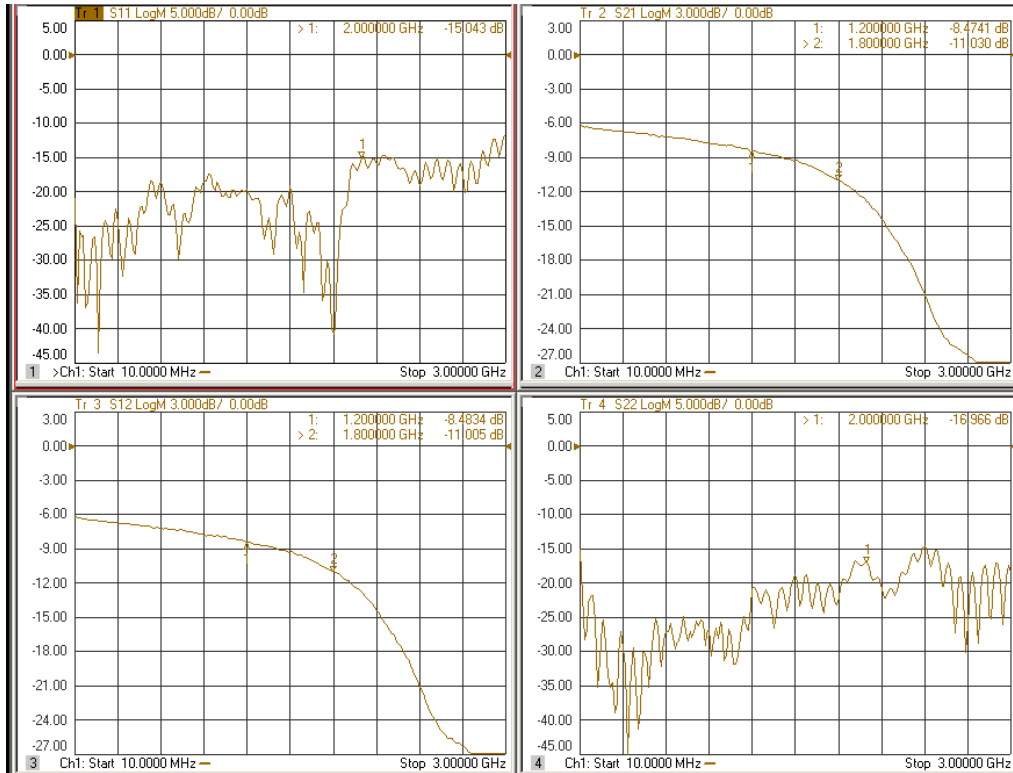Figure 274: Scattering matrix for channel IIb, polarization y and output 3dB1.

Figure 275: Scattering matrix for channel IIb, polarization y and output 6dB2.

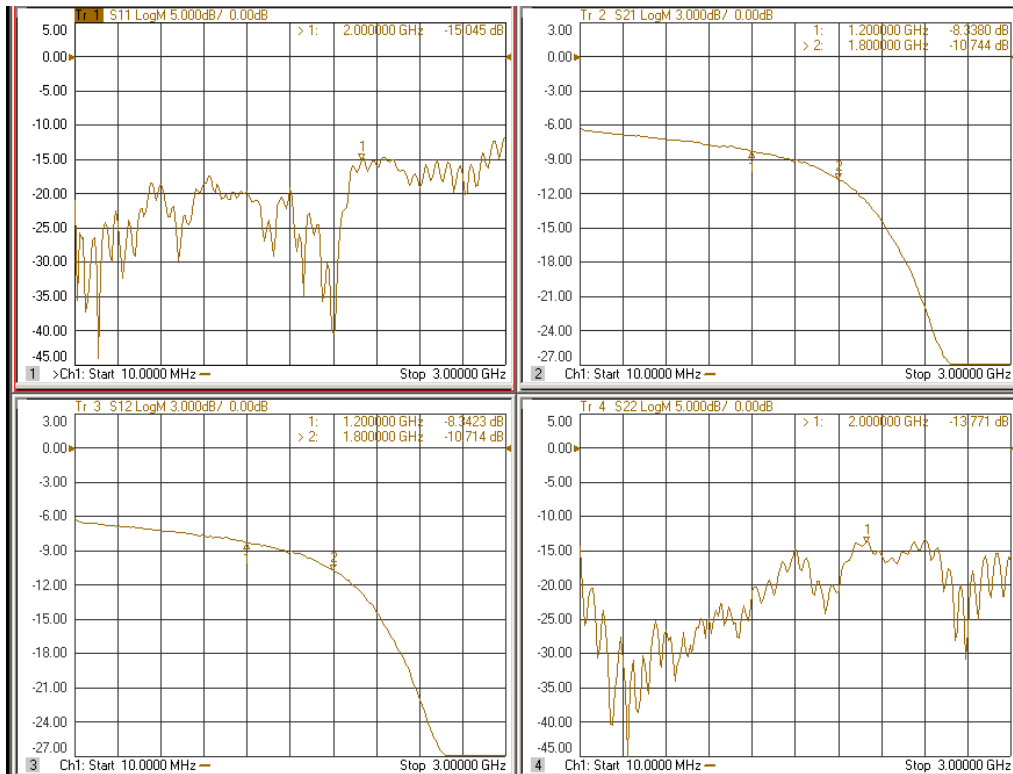
Figure 276: Scattering matrix for channel IIb, polarization y and output 6dB3.
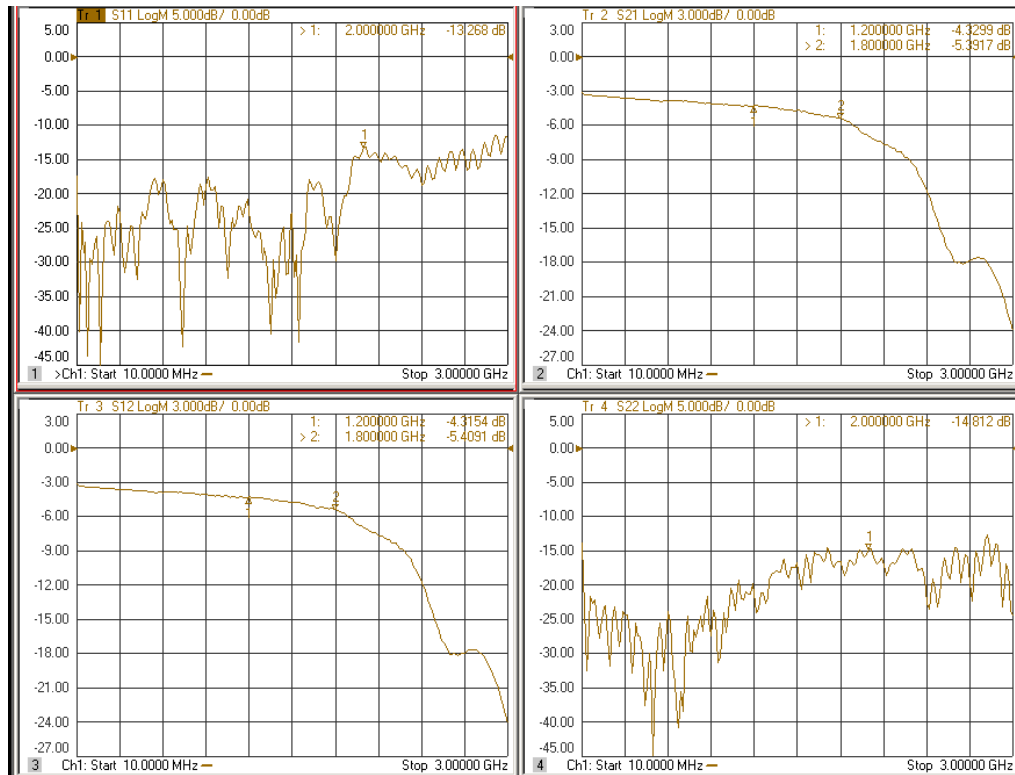
Figure 277: Scattering matrix for channel IIIb, polarization x and output 3dB1.
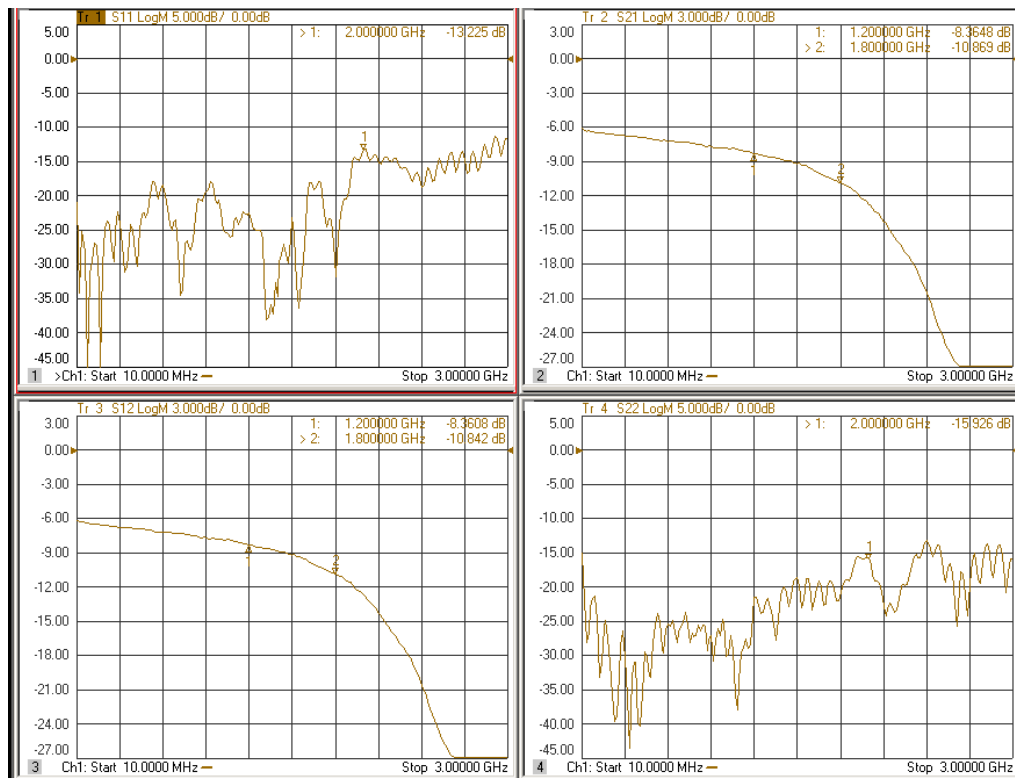

Figure 278: Scattering matrix for channel IIIb, polarization x and output 6dB2.
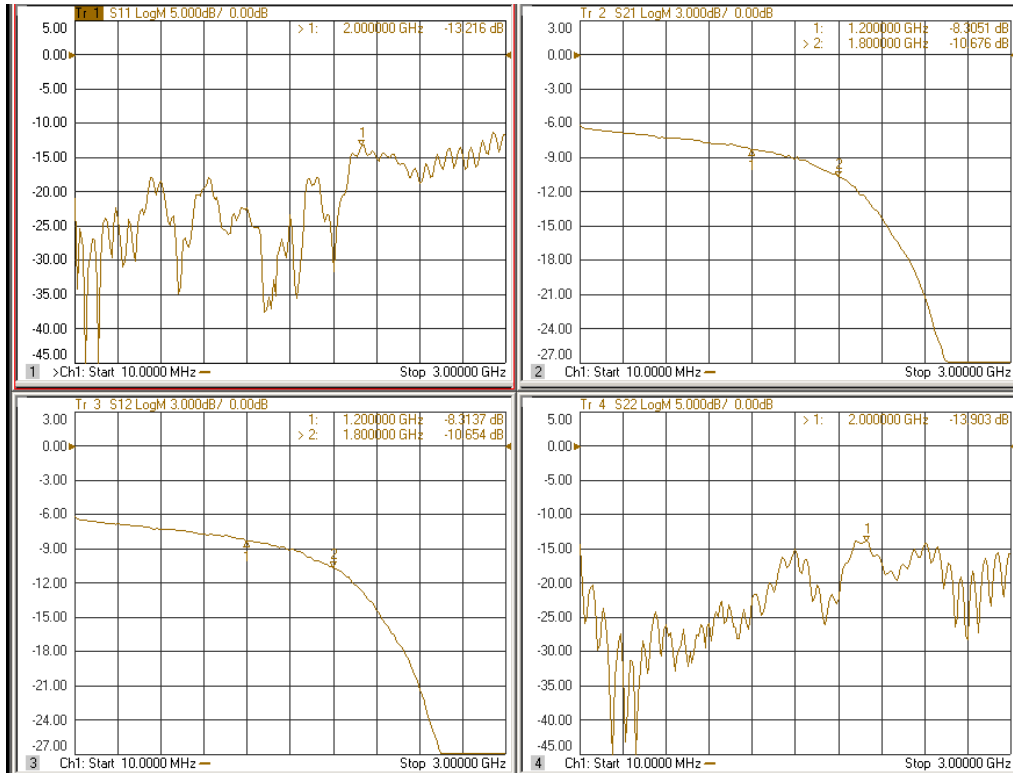
Figure 279: Scattering matrix for channel IIIb, polarization x and output 6dB3.
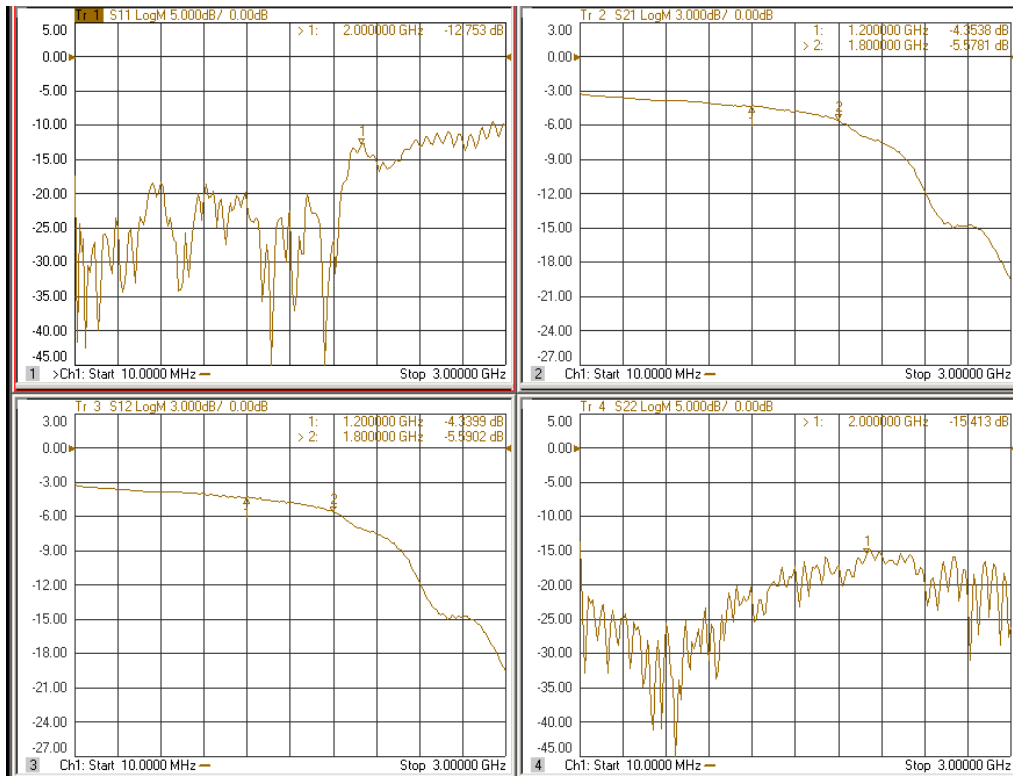

Figure 280: Scattering matrix for channel IIIb, polarization y and output 3dB1.
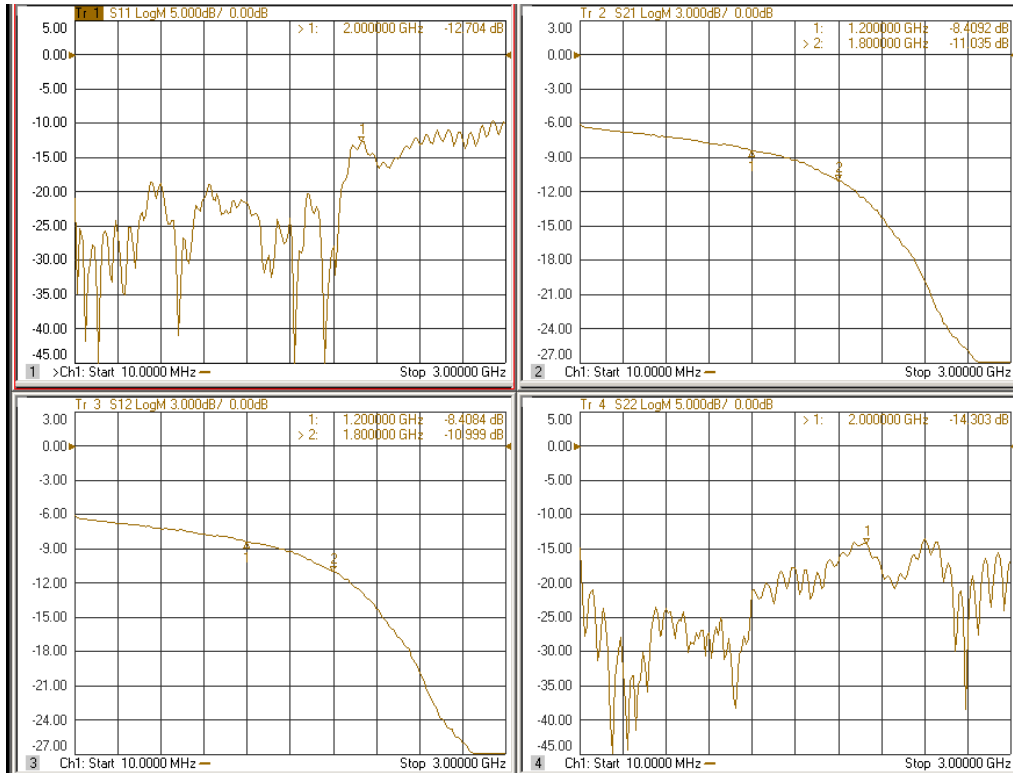
Figure 281: Scattering matrix for channel IIIb, polarization y and output 6dB2.
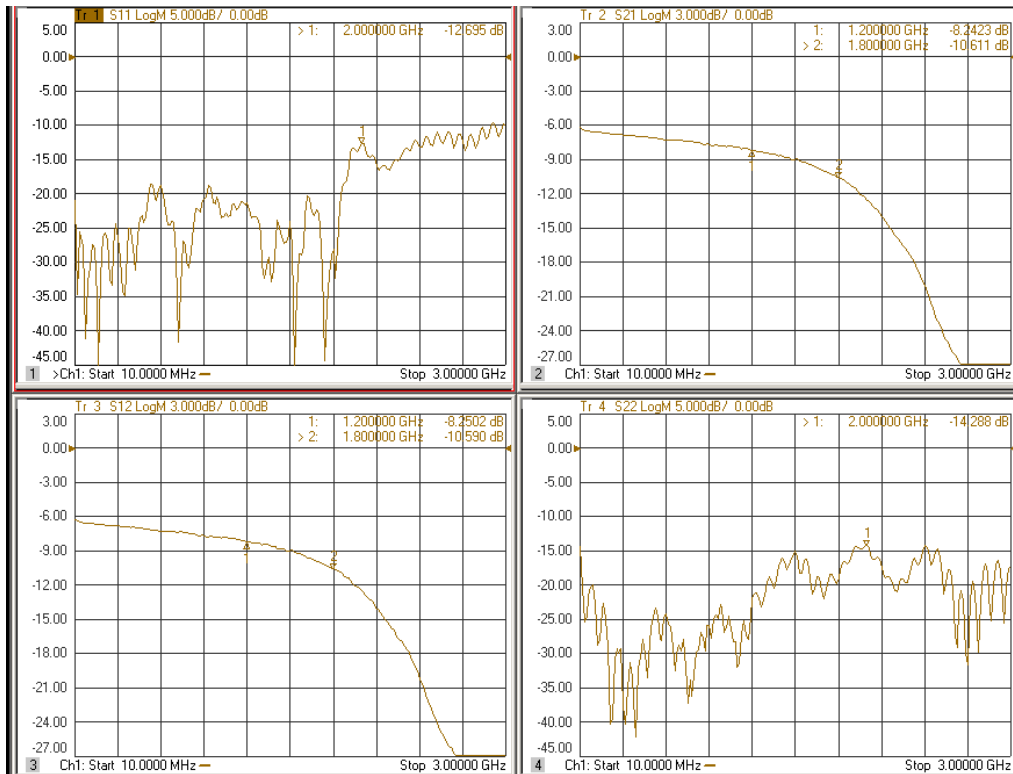

Figure 282: Scattering matrix for channel IIIb, polarization y and output 6dB3.
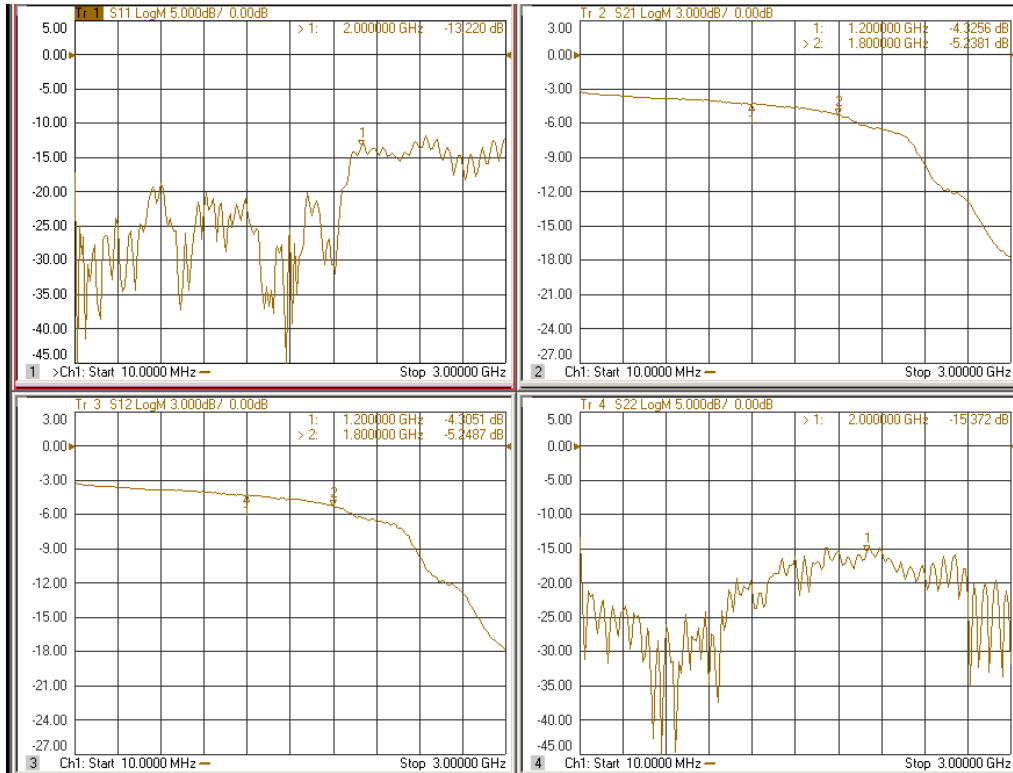
Figure 283: Scattering matrix for channel IVb, polarization x and output 3dB1.
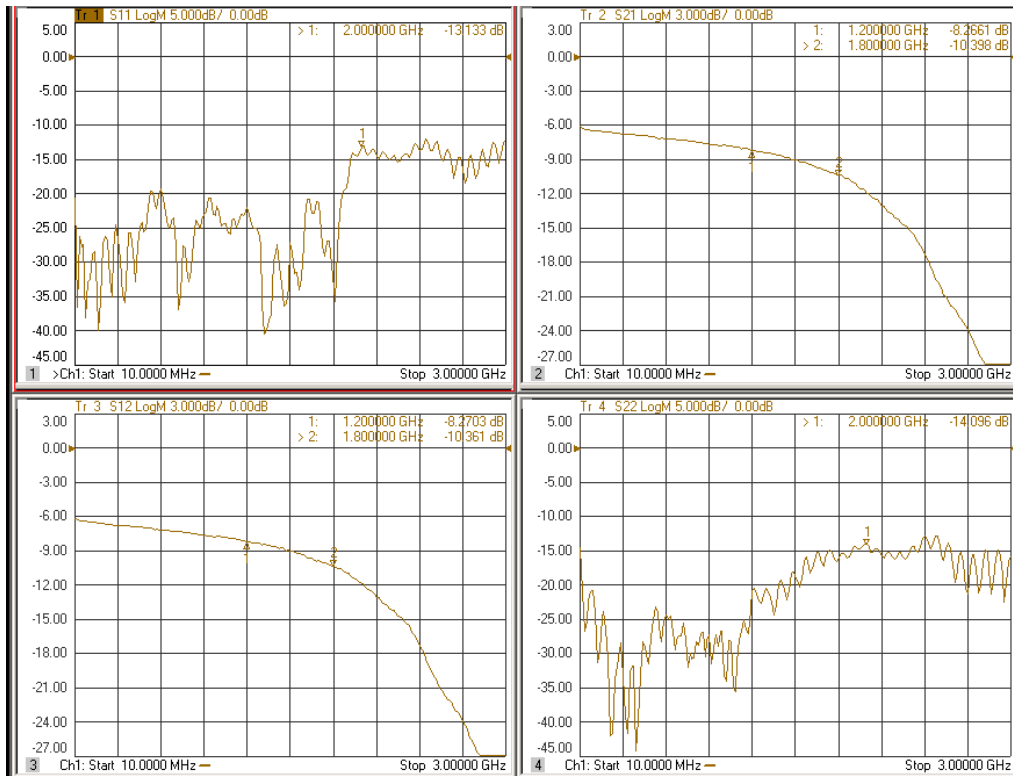

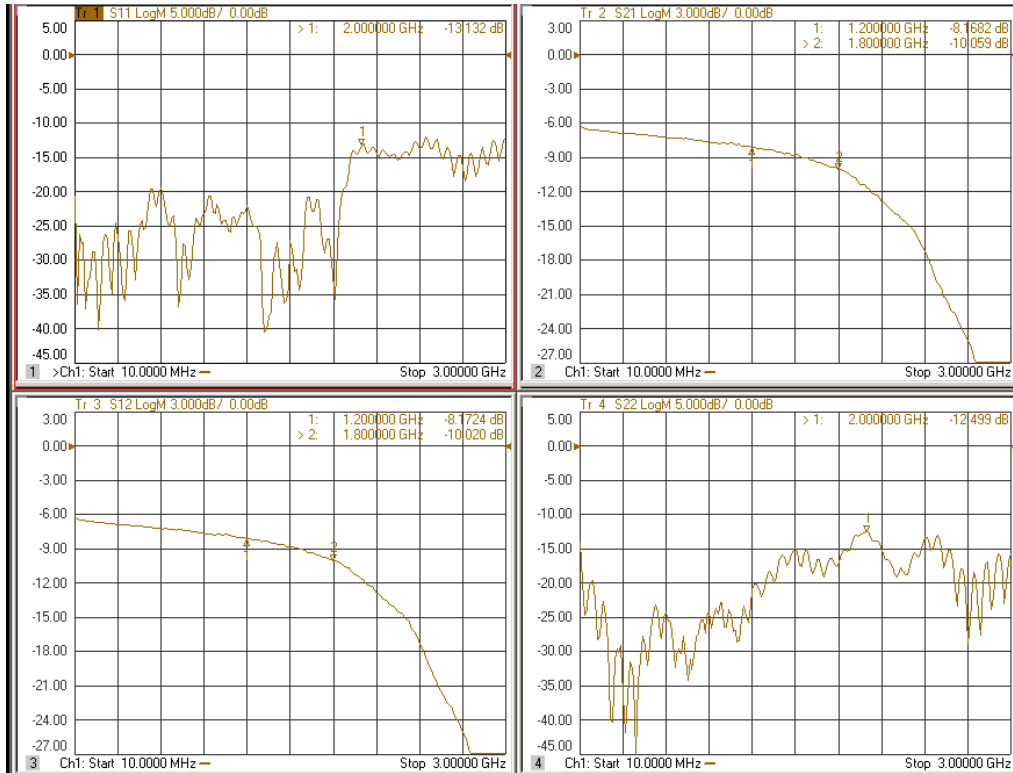Figure 284: Scattering matrix for channel IVb, polarization x and output 6dB2.

Figure 285: Scattering matrix for channel IVb, polarization x and output 6dB3.
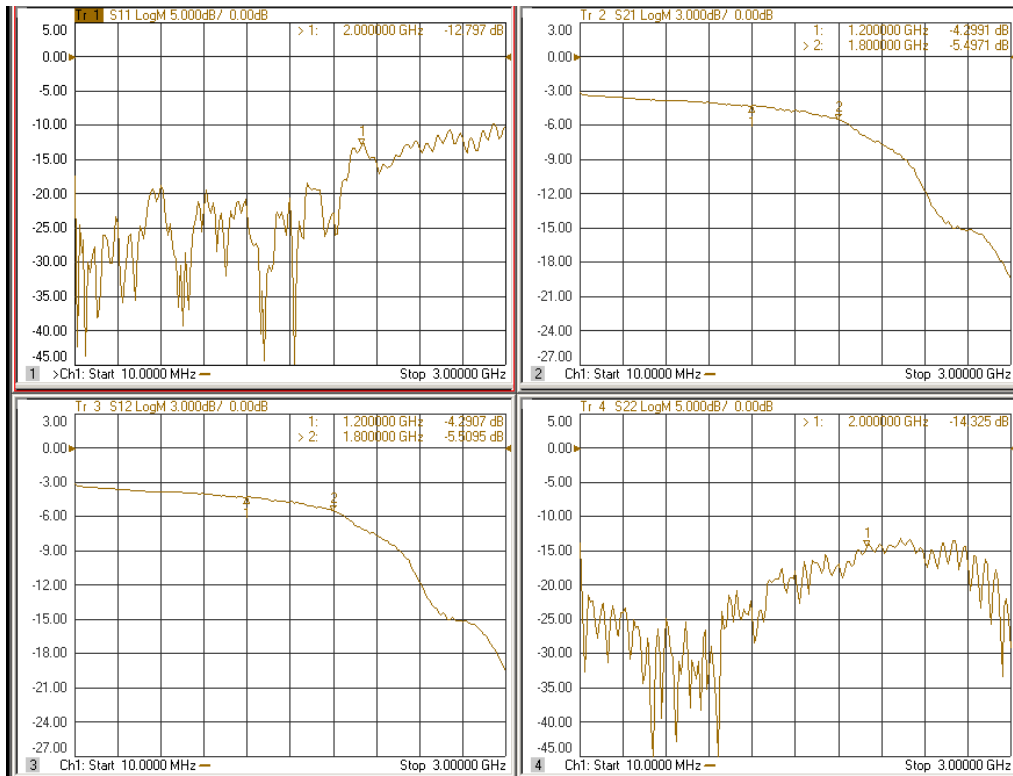

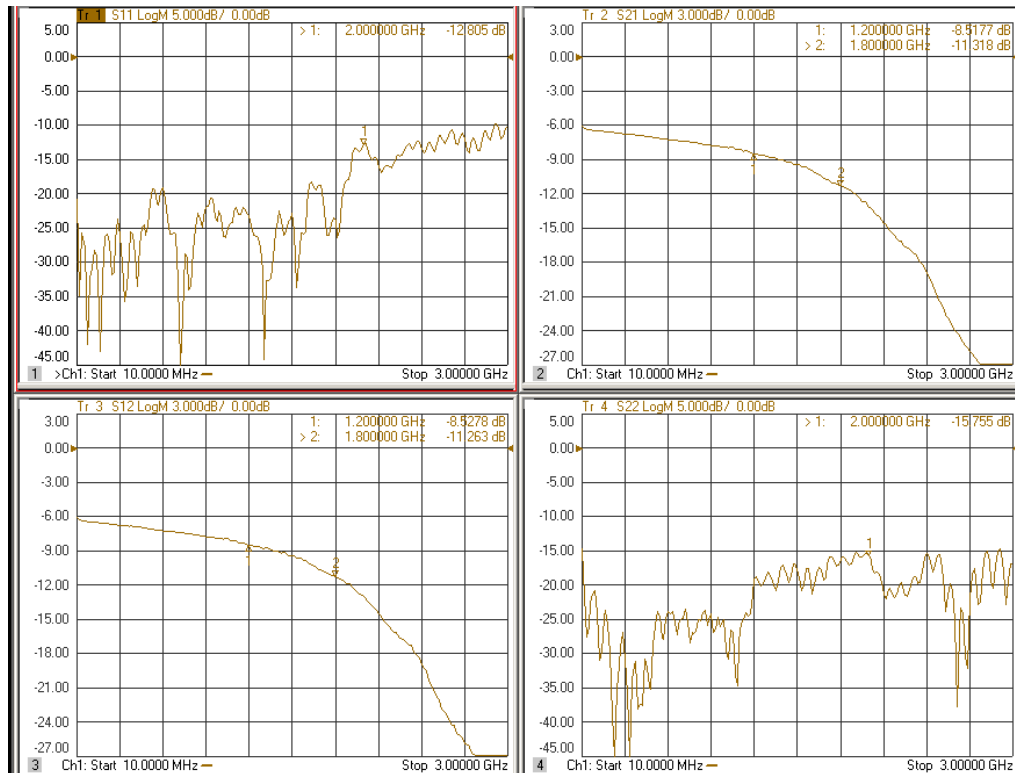Figure 286: Scattering matrix for channel IVb, polarization y and output 3dB1.

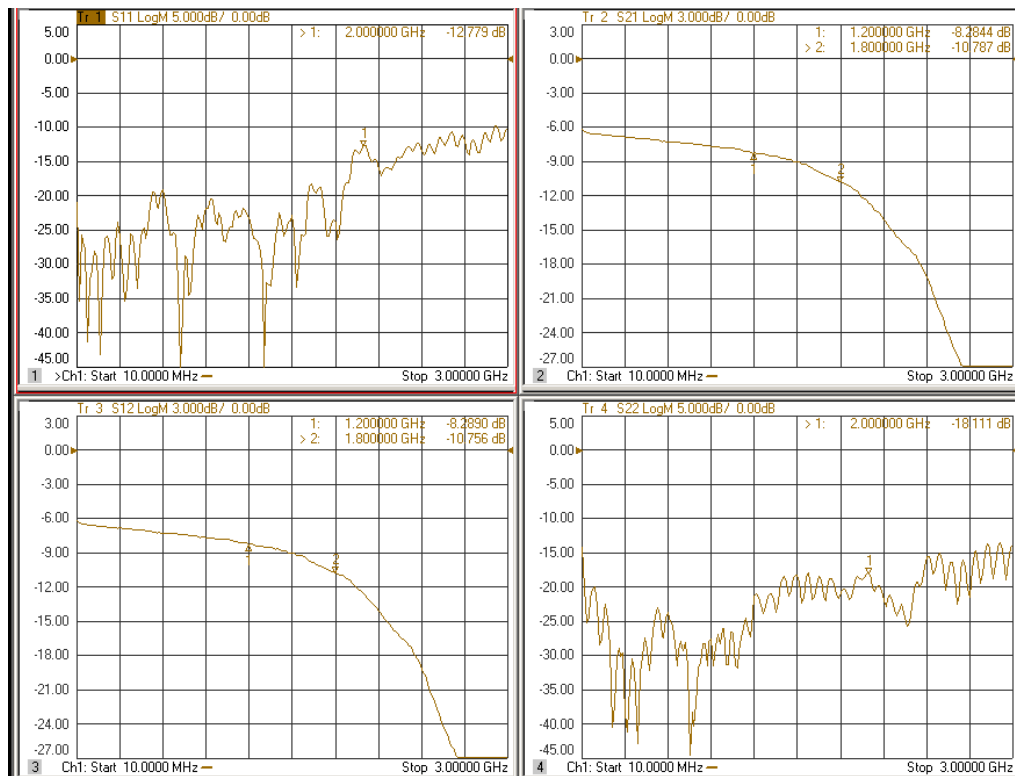Figure 287: Scattering matrix for channel IVb, polarization y and output 6dB2.

Figure 288: Scattering matrix for channel IVb, polarization y and output 6dB3.