

5. RADIATED EMISSION TEST

5.1 TEST EQUIPMENT

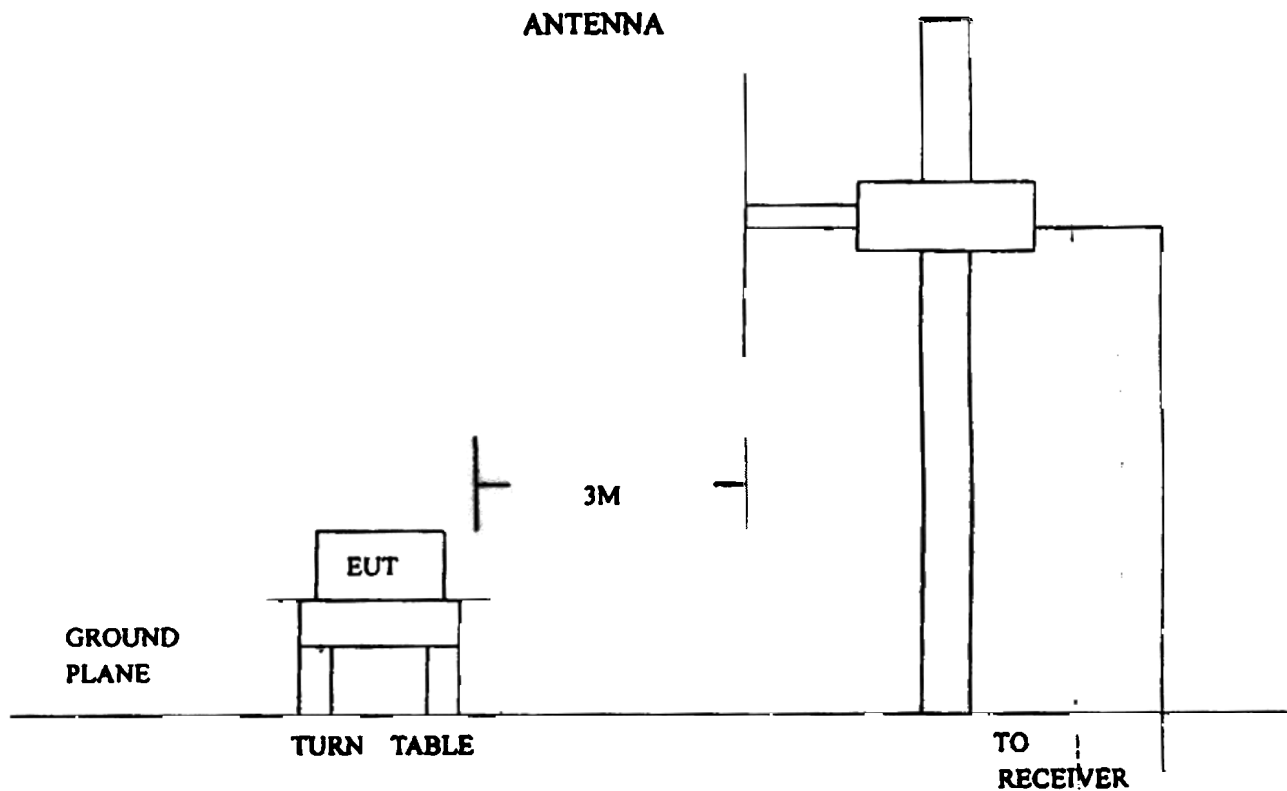
The following test equipment were used during the radiated emission test :

EQUIPMENT / FACILITIES	SPECIFICATIONS	MANUFACTURER	MODEL # / SERIAL #	DATE OF CAL. & CAL. CENTER	DUE DATE	FIN. TES
TEST RECEIVER	9 KHz TO 2.75 MHz	R & S	ESVS30/ 830245/012	JULY 2000 , ETC	1Y	
TEST RECEIVER	20 MHz TO 1000 MHz	R & S	ESVS30/ 841977/003	MARCH 2000 ETC	1Y	√
SPECTRUM ANALYZER	100 Hz TO 1500 MHz	HP	8568B/ 3019A05294	OCT. 2000 ETC	1Y	
SPECTRUM ANALYZER	9 KHz TO 22 GHz	HP	8593E/ 3322A00670	MARCH 2000 ETC	1Y	
SIGNAL GENERATOR	9 KHz TO 1080 MHz	ROHDE & SCHWARZ	SMY01/ 841104/019	MARCH 2000 ETC	1Y	√
DIPOLE ANTENNA	28 MHz TO 1000 MHz	EMCO	3121C/ 9003-534	MARCH 2000 SRT	1Y	
DIPOLE ANTENNA	28 MHz TO 1000 MHz	EMCO	3142/ 9701-1124	NOV. 2000 SRT	1Y	
BI-LOG ANTENNA	26 MHz TO 2000 MHz	EMCO	3142/ 9608-1073	SET. 2000 SRT	1Y	√
BI-LOG ANTENNA	26 MHz TO 2000 MHz	EMCO	3142/ 9608-1073	AUG. 2000 SRT	1Y	
BI-LOG ANTENNA	26 MHz TO 1100 MHz	EMCO	3143/ 9509-1152	AUG. 2000 SRT	1Y	
PRE-AMPLIFIER	0.1 MHz TO 1300 MHz	HP	8447D/ 2944A08402	MARCH 2000 ETC	1Y	
PRE-AMPLIFIER	0.1 MHz TO 1300 MHz	HP	8447D/ 2944A06412	JULY 2000 ETC	1Y	
HORN ANTENNA	1 GHz TO 18 GHz	EMCO	3115/ 9012-3619	JAN. 2001 ETC	1Y	

5.2 TEST PROCEDURE

- (1).The EUT was tested according to ANSI C63.4-1992. The radiated test was performed at SRT lab's open site. This site is on file with the FCC laboratory division, reference 31040/SIT.
- (2).The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.4-1992.
- (3).The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.
- (4).The antenna high were varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5).The antenna polarization : Vertical polarization and horizontal polarization.

5.3 RADIATED TEST SET-UP



5.4 CONFIGURATION OF THE THE EUT

Same as section 4.4 of this report

5.5 EUT OPERATING CONDITION

Same as section 4.5 of this report.

5.6 RADIATED EMISSION LIMITS

All emission from a digital device, including any network of conductor and apparatus connected thereto, shall not exceed the level of field strength specified below :

CLASS B

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (dBuV/m)
30 - 88	3	40.0
88 - 216	3	43.5
216 - 960	3	46.0
ABOVE 960	3	54.0

CLASS B (OPEN CASE)

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (dBuV/m)
30 - 88	3	46.0
88 - 216	3	49.5
216 - 960	3	52.0
ABOVE 960	3	60.0

CLASS A

FREQUENCY (MHz)	DISTANCE (m)	FIELD STRENGTH (dBuV/m)
30 - 88	3	50.0
88 - 216	3	53.5
216 - 960	3	56.0
ABOVE 960	3	64.0

- NOTE**
1. In the emission tables above, the tighten limit applies at the band edges.
 2. Distance refers to the distance between measuring instrument, antenna, and the closest point of any part of the device or system.

5.7 RADIATED EMISSION TEST RESULTS

The frequency spectrum from 30 MHz to 1 GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 KHz. All readings are above 1 GHz, peak values with a resolution bandwidth of 1 MHz. Measurements were made at 3 meters.

Temperature 22 °CHumidity : 67 %RH

FREQ. (MHz)	FACTOR (dB)	ANT. FACTOR (dB/m)	READING (dBuV)		EMISSION (dBuV/m)		LIMITS (dBuV/m)
			HORIZ	VERT	HORIZ	VERT	
27.0455	0.2	20.0	45.1	49.8	65.3	70.0	80.0
54.2500	0.8	10.3	18.2	18.0	29.3	29.1	40.0
81.4100	1.1	8.2	19.3	18.8	28.6	28.1	40.0
108.5700	1.2	9.6	20.3	20.0	31.1	30.8	43.5
135.7300	1.4	8.4	22.3	21.8	32.2	31.7	43.5
162.8900	1.5	9.9	23.0	22.6	34.4	34.0	43.5
189.0800	1.8	10.5	23.2	21.5	35.5	33.8	43.5
216.2400	1.9	11.4	24.2	23.6	37.5	36.9	46.0
243.4000	2.0	12.5	24.5	24.0	39.0	38.5	46.0
270.5600	2.1	13.6	25.1	24.8	40.8	40.5	46.0

- REMARKS** :
- (1). *= Measurement does not apply for this frequency.
 - (2). Uncertainty in radiated emission measured is ± 4 dB
 - (3). Any departure from specification : N/A
 - (4). Factor will include cable loss and correction factor.
 - (5). Sample calculation
 $20 \log (\text{emission}) \text{ uV/m} = \text{Factor (dB)} + \text{Ant. Factor (dB/m)} + \text{reading (dBuV)}$
 - (6). Operation frequency : 27MHz

SIGNED BY TESTING ENGINEER

Nissan

6. BANDWIDTH

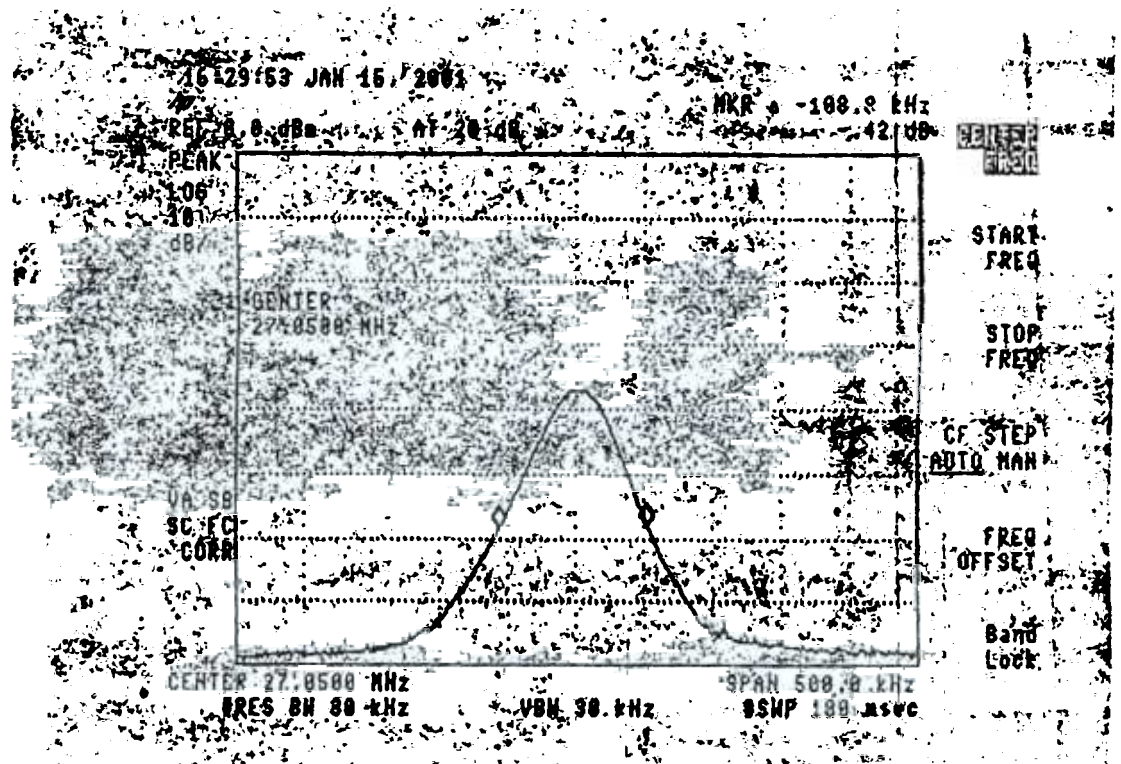
6.1 LIMIT

20dB bandwidth

6.2 TEST RESULTS

Operation frequency	20dB bandwidth
27MHz	-108.8KHz

Please see attached plotter.



7. FUNDAMENTAL FREQUENCY TEST**TEST EQUIPMENT**

EQUIPMENT / FACILITIES	MANUFACTURER	MODEL # / SERIAL #
EMI TEST RECEIVER	R&S	ESCS30/ 830245/012
DIPOLE ANTENNA	EMCO	3121C/ 9003-534

TEST PROCEDURE

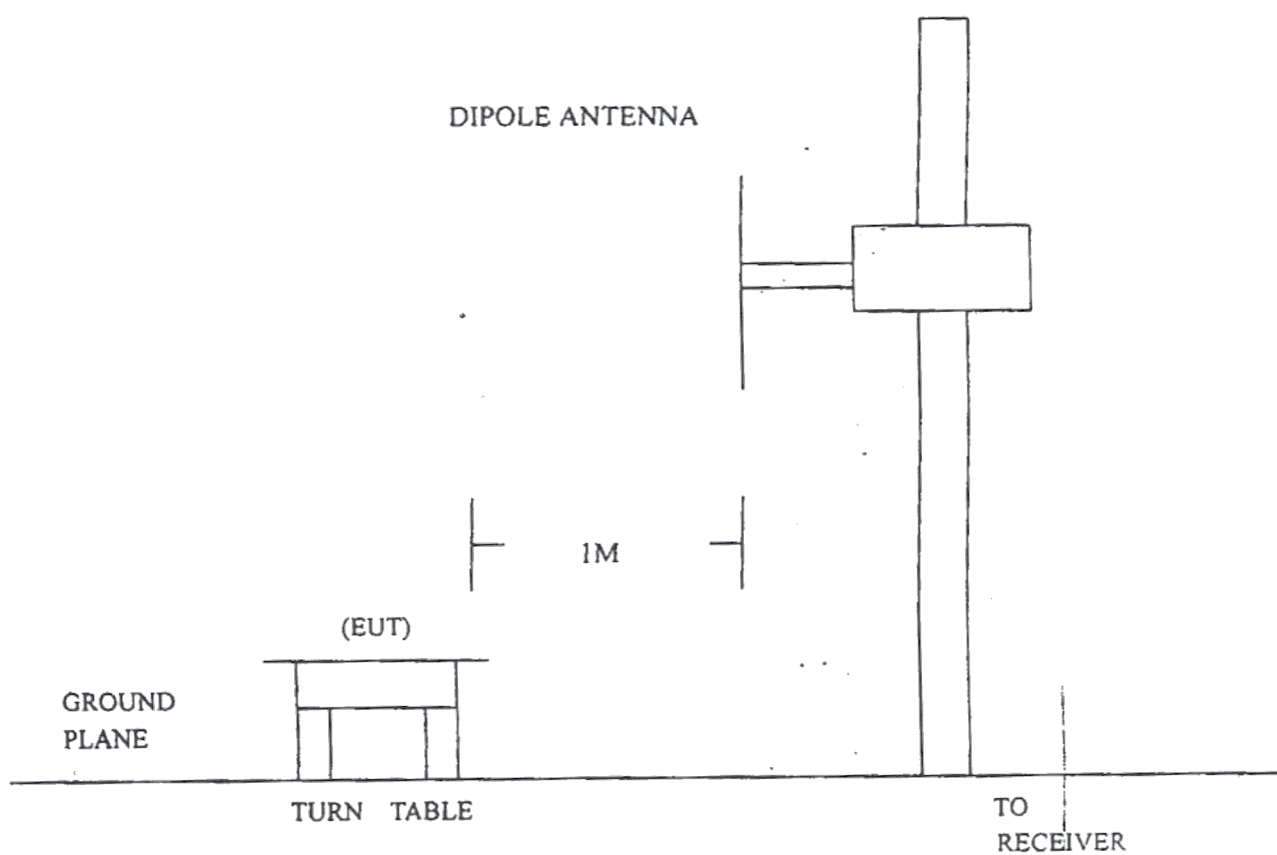
According to EN55022

- Set-up DIPOLE antenna at 3m distance.
2. The signal is too small to detect.
3. Move DIPOLE antenna at 1m distance.
4. Turn the turn-table.
5. After find the max. Data then changed the height of antenna from 1m to 2m to find the max of emission.
6. Turn the turn-table again.
7. Changed the DIPOLE antenna to the other polarization.

NOTE :

- 1). Both polarizations (vertical and horizontal) were tested.
- 2). The testing distance is under 15cm between TX and RX. We can not pick up any emission if the distance is over 15cm. We found the max. Signal is on the vertical and pen touch to the TX (board).

7.3 TEST SETUP



7.4 CONFIGURATION OF THE EUT

Same as section 4.5 of this report

7.5 EUT OPERATING CONDITION

Same as section 4.6 of this report

7.6 LIMIT

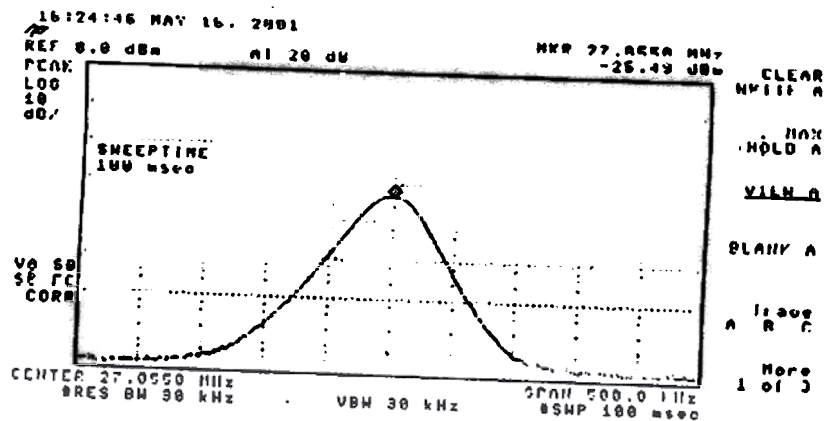
47MHz to 74MHz 87.5MHz to 118MHz 174MHz to 230MHz 470MHz to 862MHz	Other frequencies $\leq$ 1000MHz	Frequencies > 1000MHz
4.0nW	250nW	1 μ W

7.7 TEST RESULTS

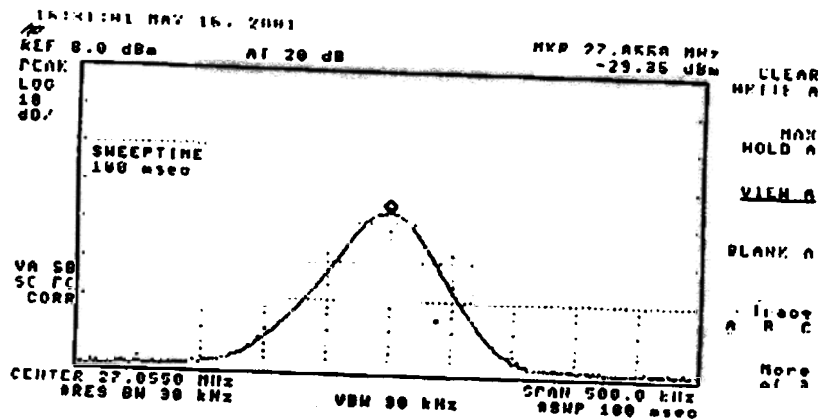
Operation frequency	Operating (nW)
27MHz	85.1nW

8. CHANGE THE VOLTAGE FROM -15% TO +15% TO CHECK THE FREQUENCY VARIATION

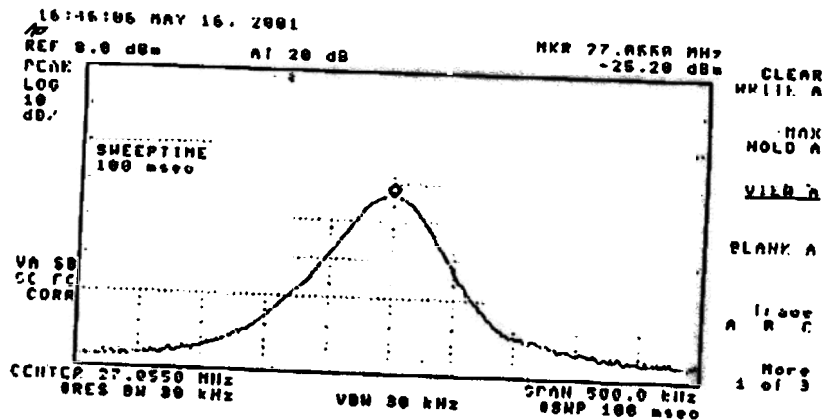
- A. When voltage is 3.45V (change +15%)
- B. When voltage is 2.55V (change -15%)
- C. When voltage is 3V



+15%

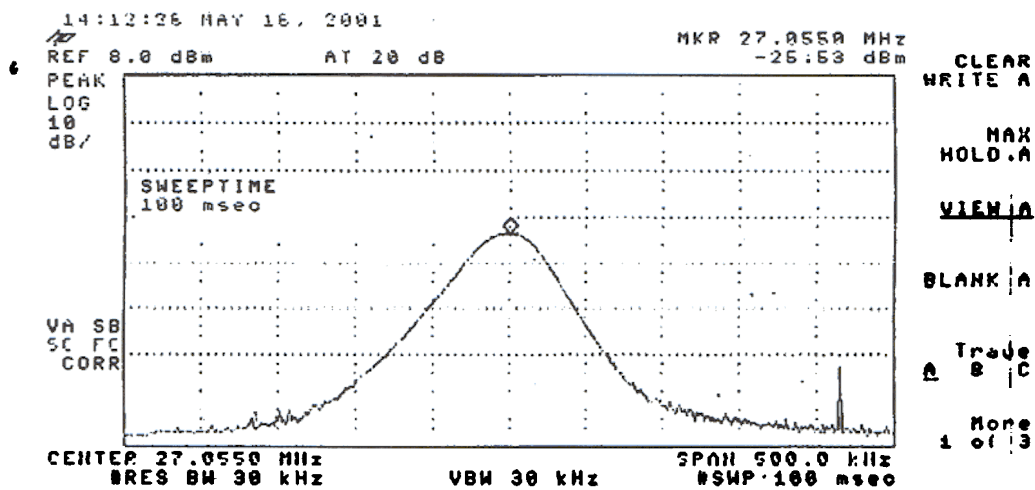
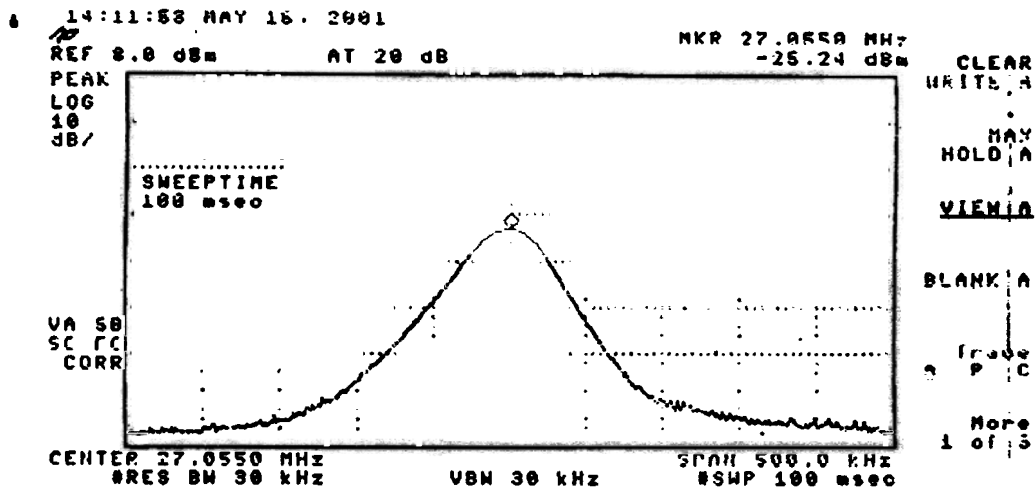


→V

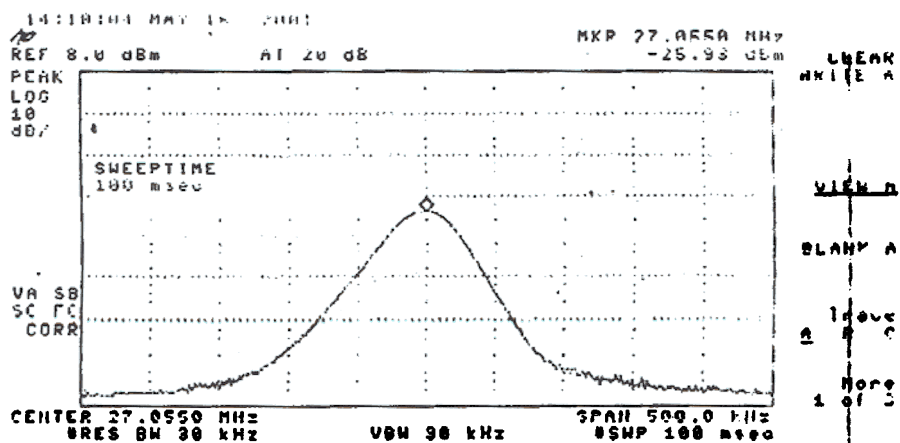
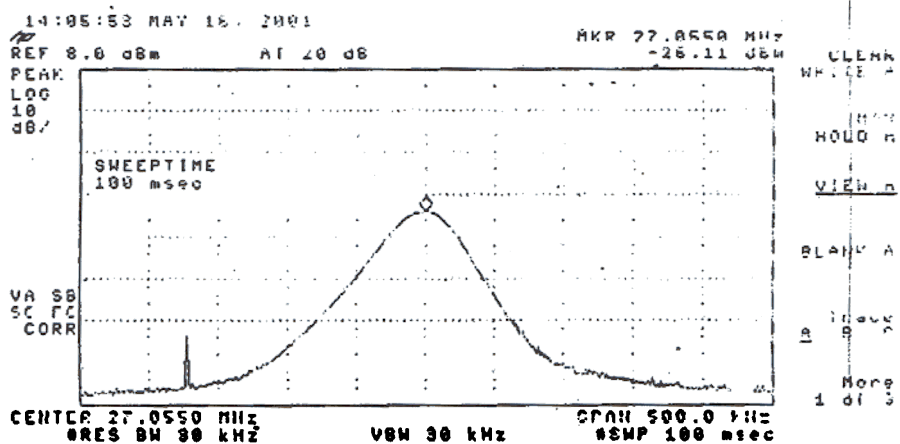
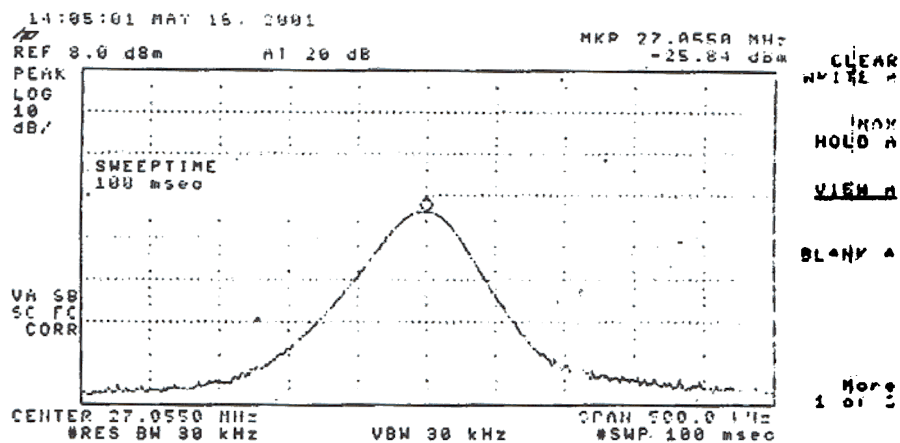


9. THE TEMPERATURE CHANGE TEST

A. Temperature is -10°C and -20°C



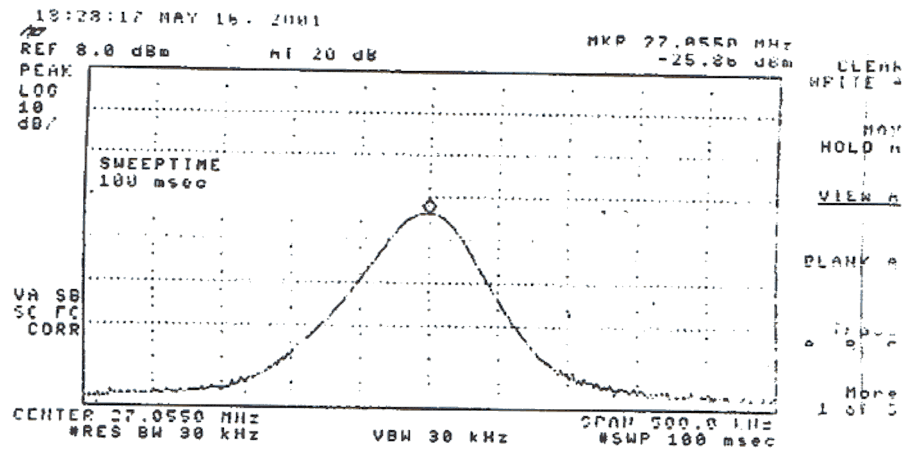
B. Temperature is 20°C, 10°C and 0°C



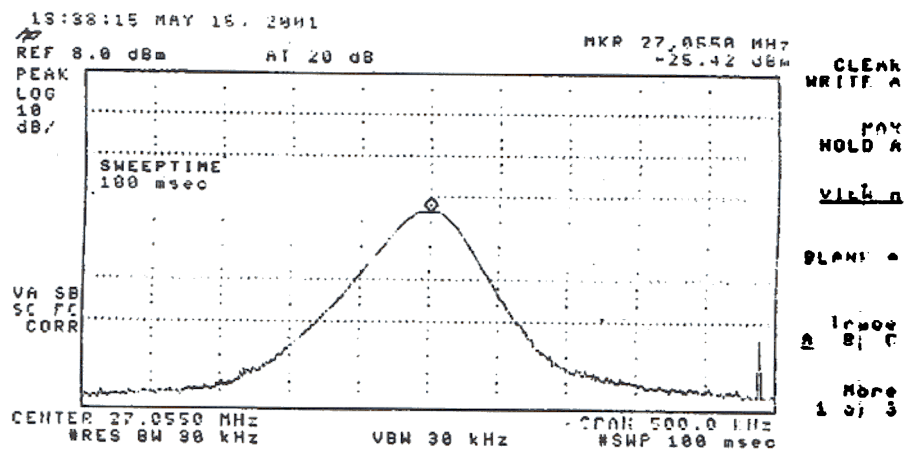
C. Temperature is 50°C, 40°C and 30°C

6

50°C



40°C



30°C

