

## TRANSMITTER RADIATED EMISSIONS IN THE GNSS BAND

SPECIFICATION: FCC 47 CFR 90.543

GUIDE: TIA/EIA-603E 2.2.12

### MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. Spurious emissions were measured in the GNSS band. (1559 – 1610 MHz)
3. The EUT was placed on a wooden turntable at a distance of three metres from the test antenna.
4. The test antenna was raised from 1m to 4m to obtain a maximum reading; the turntable was then rotated through 360° to obtain the maximum response of each spurious emission.
5. Valid emissions were determined by switching the EUT on and off.
6. The EUT was replaced by a signal generator and substitution antenna to make measurements by the substitution method.
7. The test was performed with a representative antenna connected to the EUT, at low and high output power settings.

MEASUREMENT UNCERTAINTY:  $\leq 12.75$  GHz  $\pm 4.6$  dB

### 758.4 MHz

Frequency		Antenna fitted	Antenna Polarity	Level dBW / MHz EIRP
1559-1610MHz	30 W	Multiband antenna	Vertical	< -98.0 noise floor
			Horizontal	< 103.0 noise floor

### 804.9 MHz

Frequency		Antenna fitted	Antenna Polarity	Level dBW / MHz EIRP
1609.8 MHz	30 W	Multiband antenna	Vertical	-94.45
			Horizontal	-92.35

## Transmitter Radiated Emissions in the GNSS Band - Continued

LIMIT CLAUSE FCC 47 CFR 90.543 (f)	-70 dBW / MHz EIRP
---------------------------------------	--------------------

(f) For operations in the 763-775 MHz and 793-805 MHz bands, all emissions including harmonics in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

This test only required for 768-776 MHz & 798-806 MHz frequency products.



## TRANSMITTER CONDUCTED EMISSIONS IN THE GNSS BAND

SPECIFICATION: RSS-119 5.8

GUIDE: ANSI C63.26 6.5.2.7.4

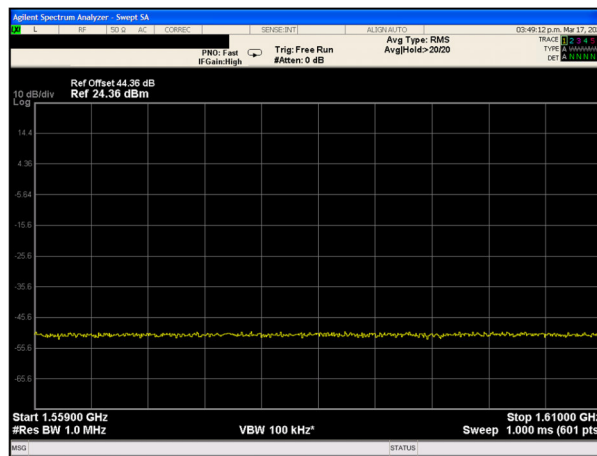
### MEASUREMENT PROCEDURE:

1. Refer Annex A for equipment set up.
2. Spurious emissions were measured in the GNSS band. (1559 – 1610 MHz)
3. The EUT was connected via an attenuator to a spectrum analyser.
4. Allowance was made for a theoretical dipole with a gain of 2.15dBm isotropic.
5. The emission at the frequency of the second harmonic was measured.

MEASUREMENT UNCERTAINTY:  $\leq 12.75$  GHz  $\pm 3.0$  dB

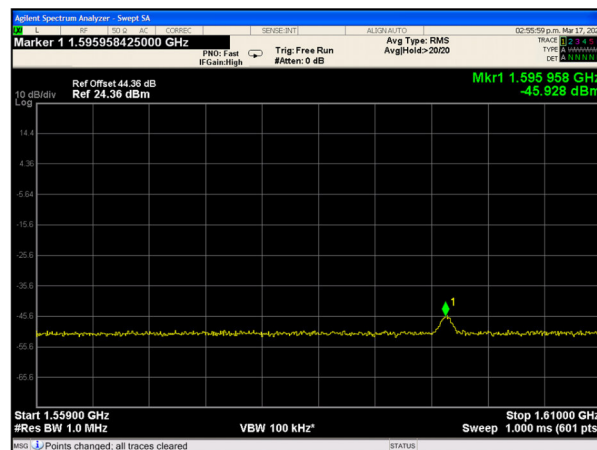
758.4 MHz 30 W

Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1559-1610 MHz	< -50 noise floor	< -80 noise floor



798.025 MHz 30 W

Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1595.958 MHz	-45.928	-75.928

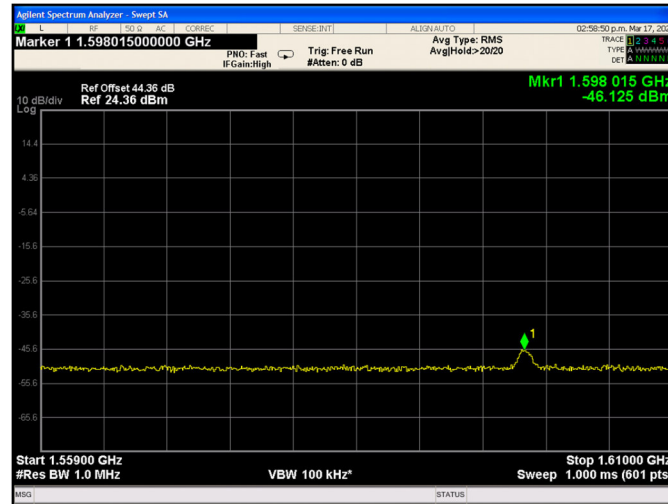


# TRANSMITTER CONDUCTED EMISSIONS IN THE GNSS BAND - continued

799.075 MHz

30 W

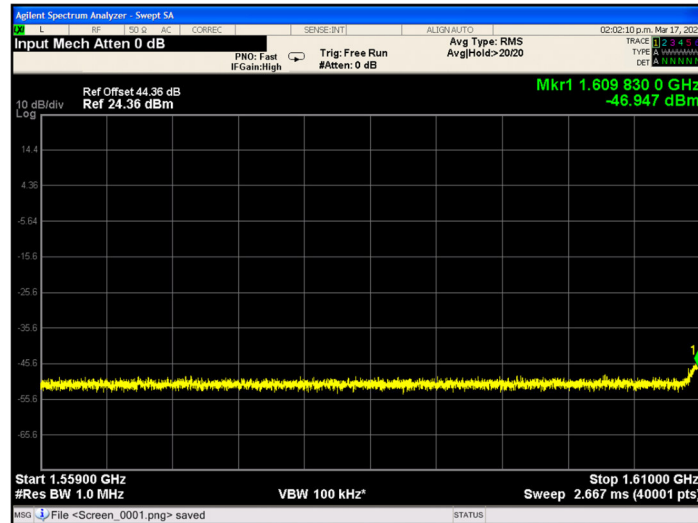
Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1598.015 MHz	-46.125	-76.125



804.9 MHz

30 W

Frequency	Level dBm / MHz EIRP	Level dBW / MHz EIRP
1609.830 MHz	-46.947	-76.947



LIMIT CLAUSE RSS-119 5.8.9.2	-70 dBW / MHz EIRP
---------------------------------	--------------------

# TRANSMITTER TRANSIENT FREQUENCY BEHAVIOUR

Transmitter Power: 50 W

12.5 kHz Channel Spacing

TRANSIENT PERIODS ms	FREQUENCY DIFFERENCE (kHz)				
	138.025MHz	143.975MHz	148.025MHz	150.025MHz	150.05MHz
t <sub>1</sub>	0.6	-0.7	-0.7	-0.6	-1.0
t <sub>2</sub>	-0.5	-0.6	-0.3	-0.7	-0.4
t <sub>3</sub>	0.2	1.1	-0.5	-2.9	1.5
	156.025MHz	161.975MHz	162.025MHz	173.975MHz	
t <sub>1</sub>	-0.7	-0.7	-0.9	-1.3	
t <sub>2</sub>	0.2	-0.3	-0.3	-0.3	
t <sub>3</sub>	0.9	-0.6	1.1	0.8	
Confirm that during periods t <sub>1</sub> and t <sub>3</sub> the frequency difference does not exceed the value of one channel separation				YES	NO
				✓	
Confirm that during period t <sub>2</sub> the frequency difference does not exceed the value of half a channel separation				YES	NO
				✓	
Measurement Uncertainty	Frequency ± 130 Hz; Time ± 0.2%				

Transmitter Power: 40 W

12.5 kHz Channel Spacing

TRANSIENT PERIODS ms	FREQUENCY DIFFERENCE (kHz)				
	378.125MHz	406.125MHz	418.025MHz	429.975MHz	438.025MHz
t <sub>1</sub>	-0.6	-0.4	-0.8	0.4	-0.9
t <sub>2</sub>	-0.4	-0.4	-0.4	-0.4	-0.3
t <sub>3</sub>	-0.3	-0.8	-0.3	0.4	-1.3
	450.025MHz	460.025MHz	469.975MHz	491.025MHz	511.975MHz
t <sub>1</sub>	-0.4	0.6	0.3	-0.4	-0.3
t <sub>2</sub>	-0.4	0.4	0.3	0.3	0.4
t <sub>3</sub>	-1.2	-3.5	-1.3	1.4	3.2
Confirm that during periods t <sub>1</sub> and t <sub>3</sub> the frequency difference does not exceed the value of one channel separation				YES	NO
				✓	
Confirm that during period t <sub>2</sub> the frequency difference does not exceed the value of half a channel separation				YES	NO
				✓	
Measurement Uncertainty	Frequency ± 130 Hz; Time ± 0.2%				

## 8.9 Transmitter Transient Frequency Behaviour

### LIMIT (5.1.9 Table-4)

Transient Periods	30 → 300MHz	> 300 → 500 MHz	> 500 → 1000 MHz
t <sub>1</sub> ms	5.0	10.0	20.0
t <sub>2</sub> ms	20.0	25.0	50.0
t <sub>3</sub> ms	5.0	10.0	10.0

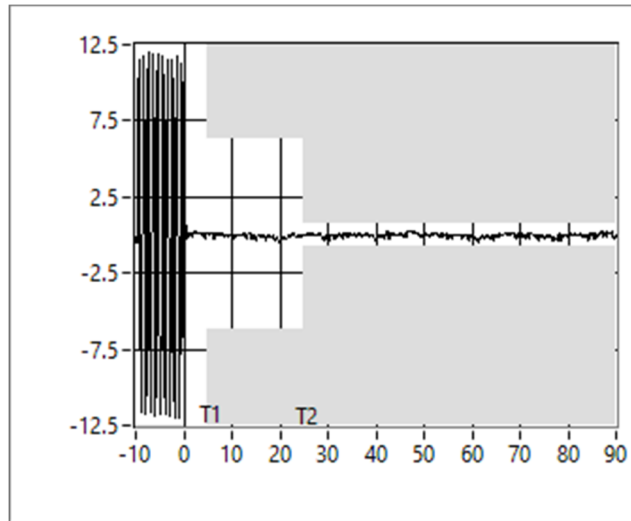
During the periods t<sub>1</sub> and t<sub>3</sub> the frequency difference shall not exceed the value of 1 channel separation.

During the period t<sub>2</sub> the frequency difference shall not exceed the value of half a channel separation.

In the case of equipment where an unmodulated carrier cannot be obtained, an additional ½ channel separation will be accepted for the limit of the peak frequency difference, during t<sub>1</sub>, t<sub>2</sub> and t<sub>3</sub>.

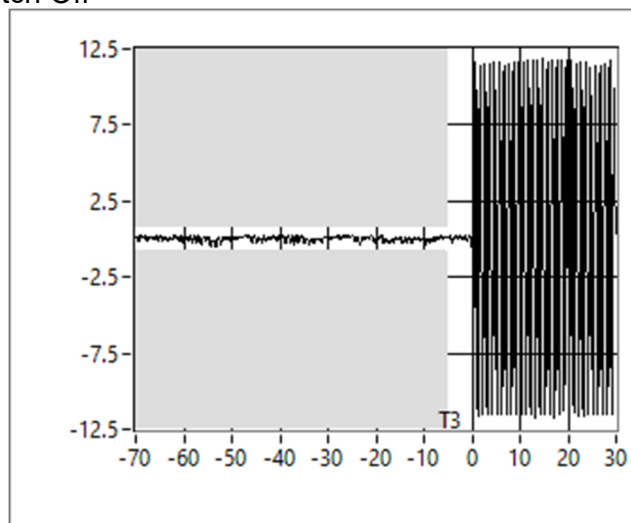
### Transient Frequency Behaviour

138.025 MHz Switch On



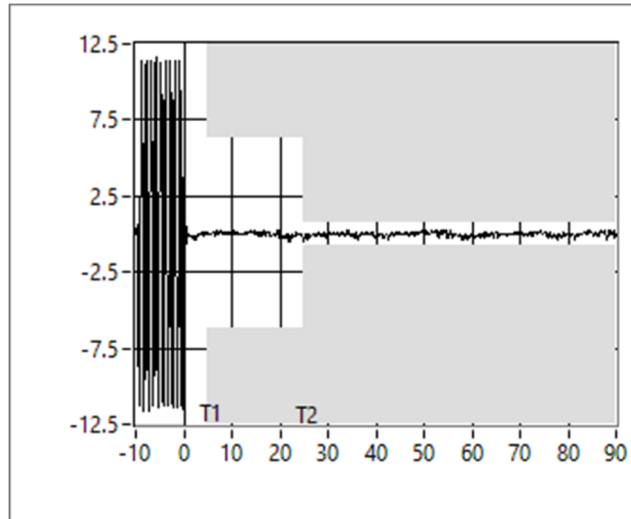
TARF 4402  
138.025000MHz 50Watts 12.50kHz Channel spacing

138.025 MHz Switch Off



TARF 4402  
138.025000MHz 50Watts 12.50kHz Channel spacing

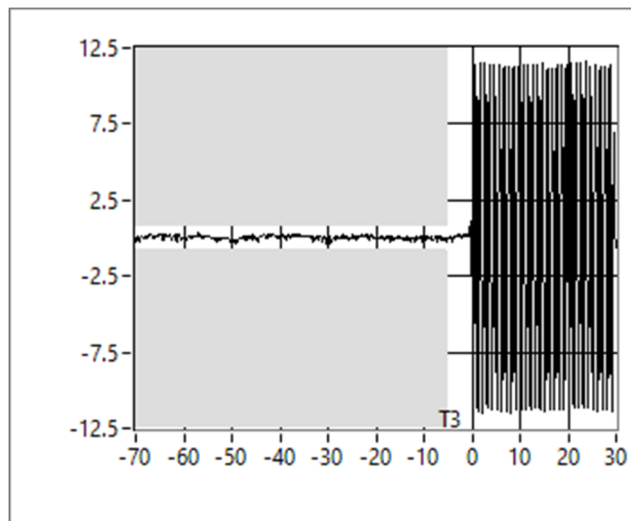
143.975 MHz Switch On



TARF 4402

143.975000MHz 50Watts 12.50kHz Channel spacing

143.975 MHz Switch Off

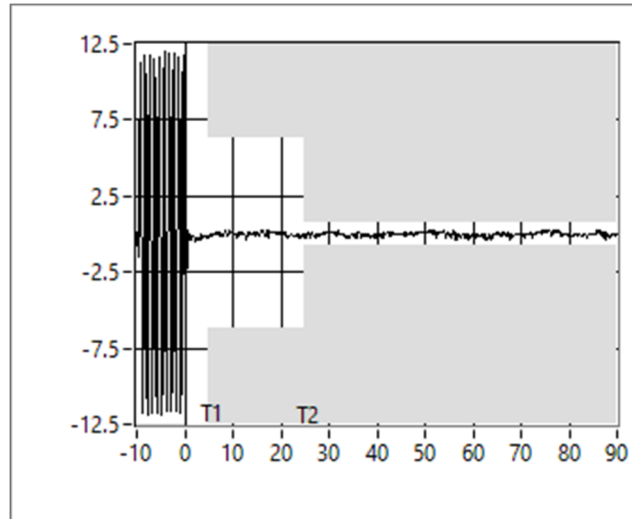


TARF 4402

143.975000MHz 50Watts 12.50kHz Channel spacing



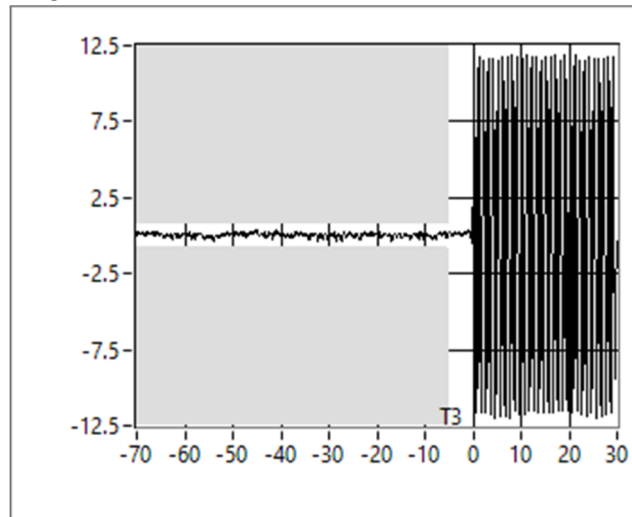
148.025 MHz Switch On



TARF 4402

148.025000MHz 50Watts 12.50kHz Channel spacing

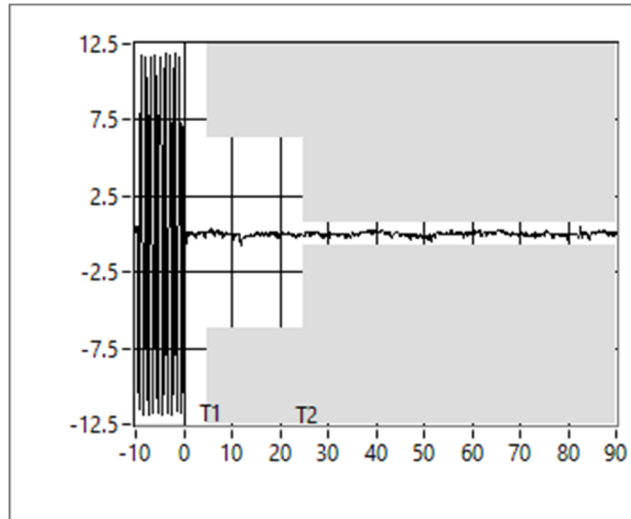
148.025 MHz Switch Off



TARF 4402

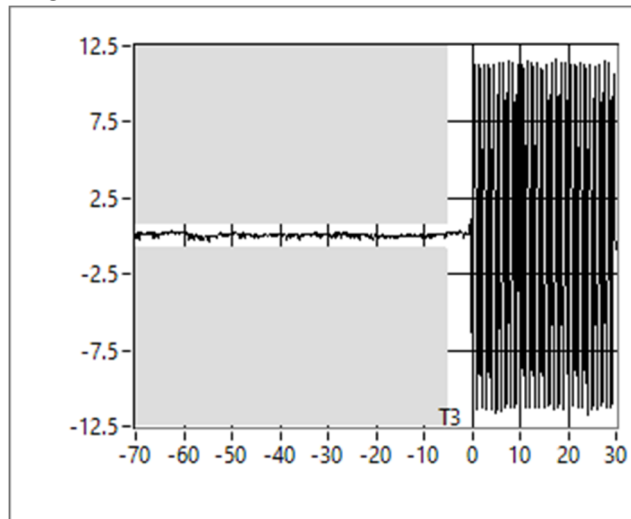
148.025000MHz 50Watts 12.50kHz Channel spacing

150.025 MHz Switch On



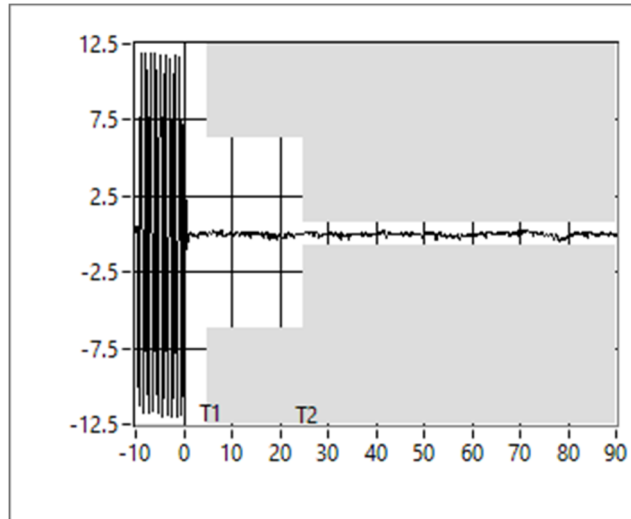
TARF 4402  
150.025000MHz 50Watts 12.5kHz Channel spacing

150.025 MHz Switch Off



TARF 4402  
150.025000MHz 50Watts 12.5kHz Channel spacing

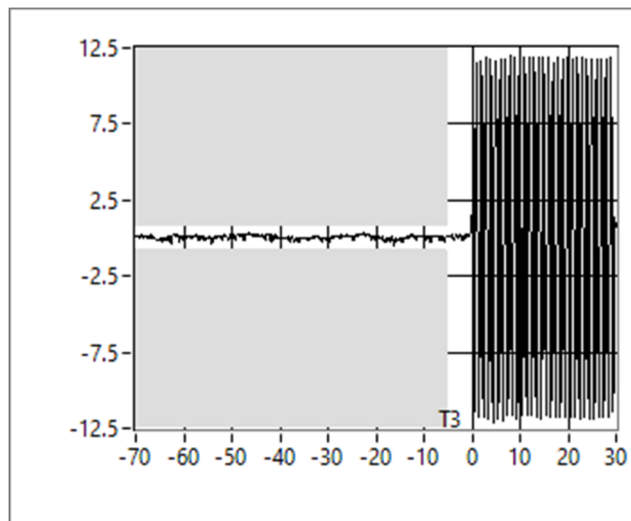
150.05 MHz Switch On



TARF 4402

150.050000MHz 50Watts 12.50kHz Channel spacing

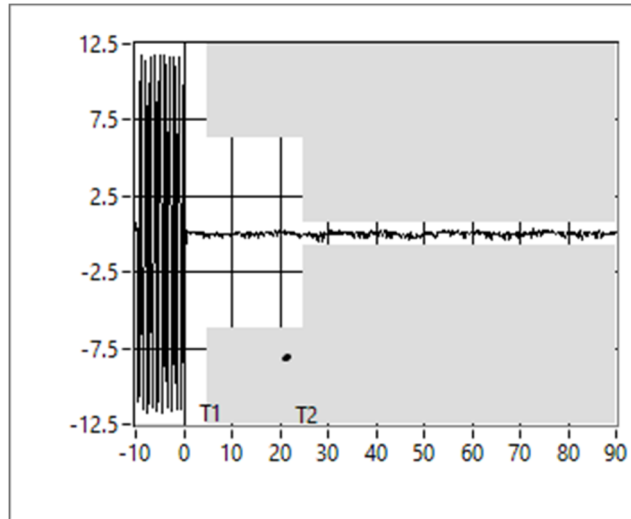
150.05 MHz Switch Off



TARF 4402

150.050000MHz 50Watts 12.50kHz Channel spacing

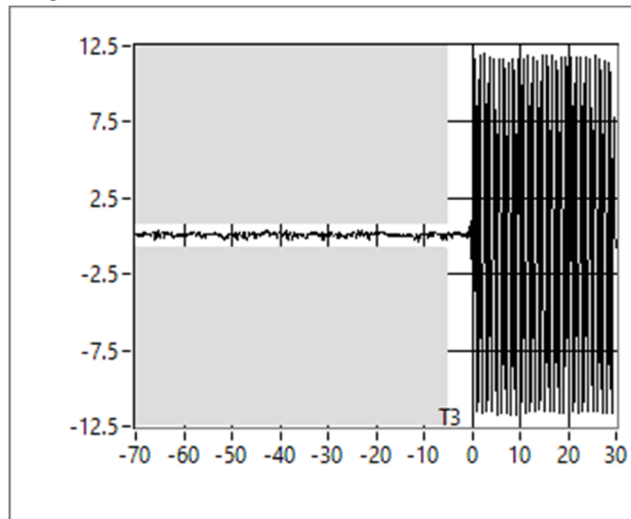
156.025 MHz Switch On



TARF 4402

156.025000MHz 50Watts 12.50kHz Channel spacing

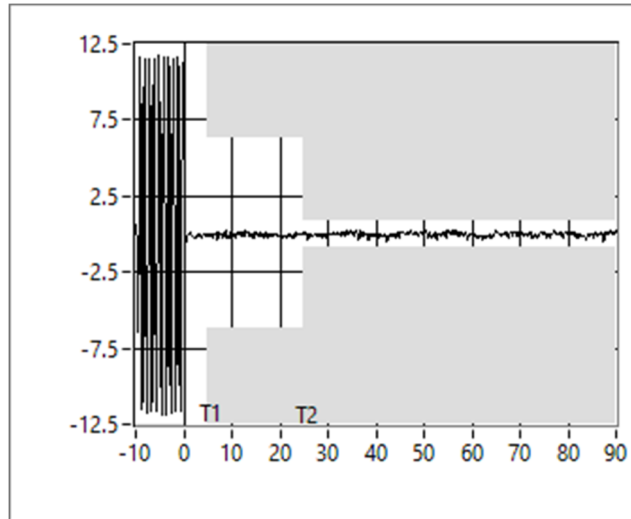
156.025 MHz Switch Off



TARF 4402

156.025000MHz 50Watts 12.50kHz Channel spacing

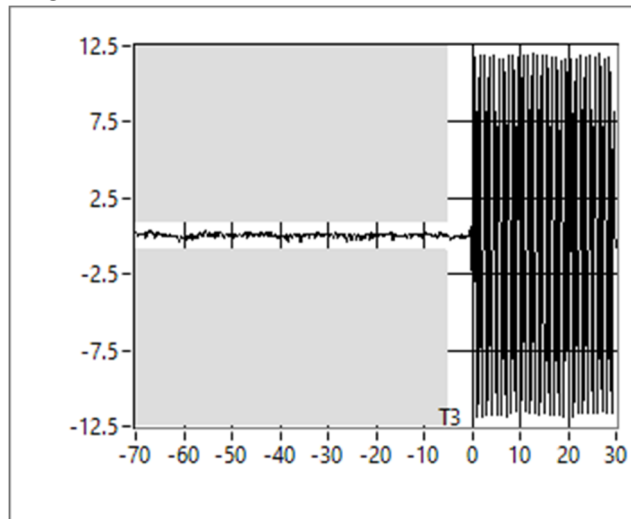
161.975 MHz Switch On



TARF 4402

161.975000MHz 50Watts 12.50kHz Channel spacing

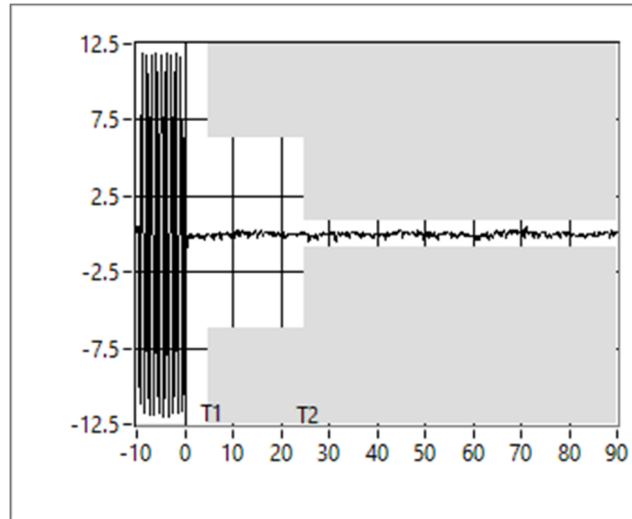
161.975 MHz Switch Off



TARF 4402

161.975000MHz 50Watts 12.50kHz Channel spacing

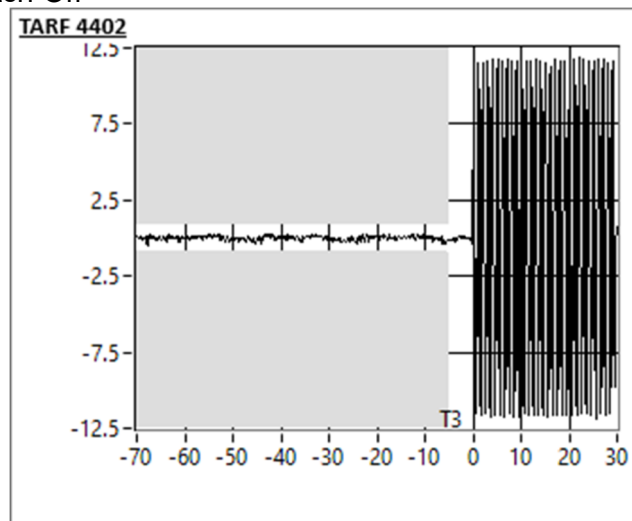
162.025 MHz Switch On



TARF 4402

162.025000MHz 50Watts 12.5kHz Channel spacing

162.025 MHz Switch Off



TARF 4402

162.025000MHz 50Watts 12.5kHz Channel spacing