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# FM and TV Propagation Curves

This Javascript calculator uses the FM or TV television propagation curves to find the distance to a service or interfering contour, or the corresponding field strength at a given contour distance. [More after the form.](#)

Select Contour Type:	<div>F(50,50) Service Contour -- FM and NTSC (analog) TV F(50,10) Interfering Contour F(50,90) Digital TV Service Contour</div>
Select Channel Range: (not TV Virtual Channel)	<div>FM Radio or TV Transmit Channels 2-6 TV Transmit Channels 7-13 TV Transmit Channels 14-69</div>
Find This:	<div>Field Strength, given a Distance (in km) Distance, Given a Field Strength (in dBu) FM ERP, given Distance and Field Strength [F(50,50) Service Contour]</div>
<div><input type="text" value="0.090"/> ERP (kW)</div>	<div><input type="text"/> Distance (km)</div>
<div><input type="text" value="150"/> HAAT (meters)</div>	<div><input type="text" value="120"/> Field (dBu)</div>
<div>Find Result</div> <div>Clear Form</div>	
<div>Results:</div> <div><div>Calculated Distance = <b>0.067 km</b></div><div>Free Space equation used to compute distance.</div></div>	

This function uses the FCC's CURVES program to make calculations of the F(50,50) FM and NTSC (analog) TV service curves, the F(50,10) interfering signal curves, and the F(50,90) digital TV service curves. Printable copies of these propagation curves are available at [FM and TV Propagation Curves Graphs \(/media/radio/fm-and-tv-propagation-curves-graphs\)](https://www.fcc.gov/media/radio/fm-and-tv-propagation-curves-graphs).

Antenna Height Above Average Terrain (HAAT) values for a particular FM or TV station can be obtained from the [FM Query \(/media/radio/fm-query\)](/media/radio/fm-query) or the [TV Query \(/media/television/tv-query\)](/media/television/tv-query), or use the [HAAT Calculator \(/media/radio/haat-calculator\)](/media/radio/haat-calculator). The class of an FM station may be retrieved from the [FM Query \(/media/radio/fm-query\)](/media/radio/fm-query).

## FM Broadcast Radio

F(50,50) protected service contours for FM stations are defined as follows:

- 54 dBu contour for commercial Class B stations
- 57 dBu contour for commercial Class B1 stations
- 60 dBu (1 mV/m) contour for commercial Class A, C3, C2, C1, and C stations
- 60 dBu for all classes of noncommercial educational stations in the reserved band (88.1 to 91.9 MHz)

For LPFM (low power FM) stations, the 60 dBu service contour is not protected from interference caused by changes made to regular FM stations:

- 60 dBu service contour for LPFM stations

For radio stations, the service contour generally does not define the outer limit of listenable signal. In the absence of interference, FM stations can often be heard in locations well beyond the protected service contour. That extended service is not protected from interference caused by other stations.

City coverage for commercial FM stations is defined by the F(50,50) 70 dBu contour, per [Section 73.315 \(http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1315\)](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1315). For noncommercial educational stations (except LPFM), coverage over the community of license is defined by the 60 dBu contour (see [Section 73.515 \(http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1515\)](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1515)).

For the appropriate FM interfering contour, please consult [Section 73.509 \(http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1509\)](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1509) for noncommercial educational stations (88.1 MHz to 91.9 MHz) or [Section 73.215 \(http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1215\)](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1215) for commercial FM stations (92.1 MHz to 107.9 MHz).

If you already know the [FM station class \(/media/radio/fm-station-classes\)](/media/radio/fm-station-classes) and the HAAT, use [Fmpower \(/media/radio/fmpower\)](/media/radio/fmpower) to compute the effective radiated power (ERP) needed to achieve coverage equivalent to the reference (maximum) facilities for the station class.

## Digital Television (DTV)

For DTV TV stations, service is defined to exist where the received signal strength exceeds the limit shown in the following table, using the F(50,90) propagation curves. These field strength values are defined in [Section 73.622 \(http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1622\)](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1622) and [Section 73.625 \(http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1625\)](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1625)).

Channels	DTV Noise-Limited Service	Minimum Field Strength over Community of License
Channels 2 through 6	28 dBu	35 dBu
Channels 7 through 13	36 dBu	43 dBu
Channels 14 through 69	41 dBu	48 dBu

*Note: Using ERP and HAAT to define the F(50,90) contour may not give identical results to the more complex methods of noise-limited coverage prediction used for DTV allocations work.*

## NTSC (analog) Television

For NTSC (analog) TV stations, the service contours are as follows (from [Section 73.683](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1683) ([http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1683](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1683)) and [Section 73.685](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1685) ([http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1685](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1685))):

Channels	Grade B Service Contour	Grade A Service Contour	City Grade Service Contour
Channels 2 through 6	47 dBu	68 dBu	74 dBu
Channels 7 through 13	56 dBu	71 dBu	77 dBu
Channels 14 through 69	64 dBu	74 dBu	80 dBu

Frequencies corresponding to TV channels are available from [Section 73.603](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1603) ([http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73\\_1603](http://www.ecfr.gov/cgi-bin/text-idx?node=se47.4.73_1603)).

Information about AM and FM broadcast radio stations is available at the [Audio Division](/media/radio/audio-division) (</media/radio/audio-division>) on the FCC's website, and at [Broadcast Radio Links](/media/radio/broadcast-radio-links) (</media/radio/broadcast-radio-links>).

Information about TV stations is available at the [Video Division](/media/television/video-division) (</media/television/video-division>).

[FCC \(https://www.fcc.gov\)](https://www.fcc.gov) > [Media Bureau \(/media\)](/media) > [Audio Division \(/media/radio/audio-division\)](/media/radio/audio-division) and [Video Division \(/media/television/video-division\)](/media/television/video-division).

## Bureau/Office:

[Media \(https://www.fcc.gov/media\)](https://www.fcc.gov/media)

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