

FAR 43 Appendix F Transponder Output Power Testing

Accommodating for transponder antenna gain, using the 43 MOD Setting on the IFR6000 and IFR6015, and the RF Port on the AVX-10K.

The PWR LIM FAR 43 and 43 MOD 4 setting in the IFR6000 and IFR6015 is accessed in the setup menu for the transponder instrument.

SETUP-XPDR		BAT 2.5 Hr	
ANTENNA: BOTTOM		RF PORT: ANTENNA	
	ANT RANGE	ANT HEIGHT	
TOP:	50.0 m	10.0 m	
BOTTOM:	50.0 m	0.0 m	
ANT CABLE LEN: 1 FT		ANT GAIN (dBi)	
ANT CABLE LOSS: 1.1 dB		1.03 GHz: 7.1	
COUPLER LOSS: 0.8 dB		1.09 GHz: 6.1	
UUT ADDRESS: AUTO			
MANUAL AA: 123456		PWR LIM: FAR 43	
DIV TEST: ON		RAD47: OFF	
		CHECK CAP: YES	
ADSB SETUP	PREV PARAM	NEXT PARAM	TEST DATA

IFR6000 set up screen showing the test set Power Limit setting as Far 43.

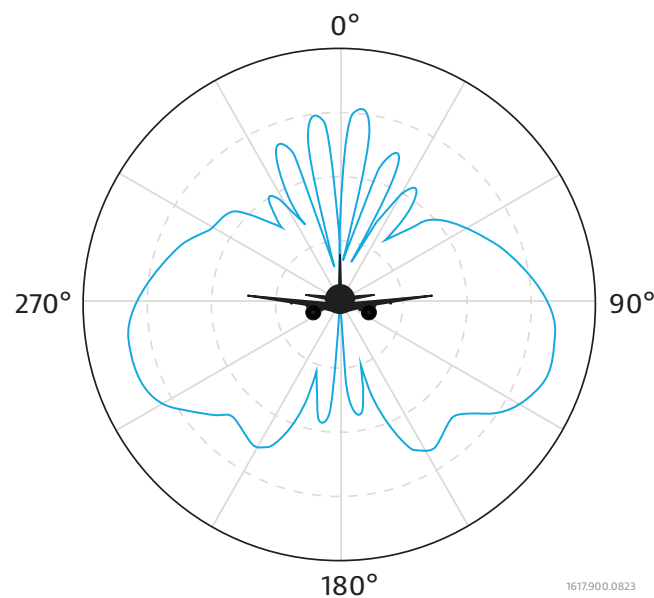
FAR 43 Setting

The power limit settings of the IFR6000 and IFR6015, when set for FAR 43, are set per the FAR 43 appendix F. These power output minimum and maximum limits are defined in the RTCA specification as being measured at the end of the feedline connected to the transponder. The specifications for the performance of the transponder output power for class A transponders is +51.0 dBm minimum (125 watts) and for class B transponders the minimum power output should be at least +48.5 dBm (70 watts).

The FAR also states that the operator must verify that the measured maximum power output does not exceed +57 dBm (500 watts). However, measuring at the end of the feedline is not always practical, as testing the transponder at this connection involves removing components to access the connector at the antenna. Most operators throughout the industry choose to test the transponder without disconnecting the antenna by testing over-the-air to the aircraft antenna or using a coupler to cover the transponder antenna. This ensures that all the transponder components are completely tested. The aircraft antenna normally exhibits no appreciable gain or loss to the system, and testing over the air or using an antenna coupler yields results that are similar when tested at the end of the feedline.

Transponder Antennas with Gain

On rare occasions we have experienced aircraft with antennas installed on aircraft that do have a significant amount of gain and do influence the power readings when over-the-air testing or coupler testing is performed.



This is a projection of the gain characteristics of an antenna looking towards the nose of the aircraft.

The 3 dB point is in the shape of a toroid around the aircraft.

Depending on the angle and height of the test equipment's antenna, the operator observed power level could exceed the +57dBm limit. Through extensive testing we have found that the power measured at the feed lines were well within the FAR 43 specification. However, the output power of the transponder, with the gain of the antenna added, showed the ERP to exceed the +57 dBm limit.

43 MOD Setting

To address these antennas that have gain, VIAVI has equipped the IFR-6000 and IFR-6015 with the 43 MOD setting.

SETUP-XPDR		BAT 2.5 Hr	
ANTENNA: BOTTOM RF PORT: ANTENNA			
	ANT RANGE	ANT HEIGHT	
TOP:	50.0 m	10.0 m	
BOTTOM:	50.0 m	0.0 m	
ANT CABLE LEN: 1 FT		ANT GAIN (dBi)	
ANT CABLE LOSS: 1.1 dB		1.03 GHz: 7.1	
COUPLER LOSS: 0.8 dB		1.09 GHz: 6.1	
UUT ADDRESS: AUTO			
MANUAL AA: 123456		PWR LIM: 43 MOD	
DIV TEST: ON		RAD47: OFF	
		CHECK CAP: YES	
ADSB SETUP	PREV PARAM	NEXT PARAM	TEST DATA

IFR6000 set up screen showing the test set Power Limit setting as 43 MOD.

The purpose of the 43 MOD setting is to remove the upper limit of +57 dBm (500 watts) accommodating aircraft with antennas that have gain, yet still maintaining the minimum output power settings. When using the 43 MOD setting the operator should observe the displayed output power. If the output power exceeds the upper limit, the operator should verify all setup parameters are correct. If all setup parameters are correct and the output power does not exceed the limit by more than 3dB, then this is likely attributed to the antenna gain, and is acceptable.

Direct with Coupler Testing

Testing over the air presents challenges from surrounding metallic objects and can add or subtract from the ERP power measurements. To avoid this, a coupler shielding the aircraft antenna will make the measurements more stable and will not be affected by the position of the operator.



Use the UC-584 Antenna Coupler for precision measurement.

AVX-10K Operation

The AVX-10K performs a similar limit change when set for RF Port, ANTENNA (ANT). The upper limit of the power measurement is removed in this setting and operates the same as the IFR-6000/6015 set to 43 MOD. The limits are set to the FAR 43 appendix F when set for direct RF connection and Direct with Coupler.



The AVX-10K operates the same as the IFR6000/6015 when performing the Far 43 and 43 MOD test.

If you have any questions about this document, please send them to:

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