



वर्गीय आवश्यकताओं के लिए मानक

टीईसी 57030:2022

STANDARD FOR GENERIC REQUIREMENTS

TEC 57030:2022

**बैंड पास फिल्टर फॉर सी-बैंड सॅटलाइट अर्थ रिसीवर्स इन
3700-4200 MHz विद 30 MHz गार्ड बैंड**

**BANDPASS FILTER FOR C-BAND SATELLITE
EARTH RECEIVERS IN 3700-4200 MHz WITH 30 MHz
GUARD BAND**



ISO 9001:2015

दूरसंचार अभियांत्रिकी केंद्र

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FOREWORD

Telecommunication Engineering Centre (TEC) is the technical arm of the Department of Telecommunications (DOT), Government of India. Its activities include:

- Framing of TEC Standards for Generic Requirements for a Product/ -Equipment, Standards for Interface Requirements for a Product/ Equipment, Standards for Service Requirements & Standard document of TEC for Telecom Products and Services
- Formulation of Essential Requirements (ERs) under Mandatory Testing and Certification of Telecom Equipment (MTCTE)
- Field evaluation of Telecom Products and Systems
- Designation of Conformity Assessment Bodies (CABs)/ Testing facilities
- Testing & Certification of Telecom products
- Adoption of Standards
- Support to DoT on technical/ technology issues

For the purpose of testing, four Regional Telecom Engineering Centers (RTECs) have been established which are located at New Delhi, Bangalore, Mumbai, and Kolkata.

ABSTRACT

Band pass filters are used with receiving systems to cut off the frequencies which can cause interferences in the receiving system by limiting the output frequencies This Standard is for Generic Requirements for a Bandpass Filter to reduce or eliminate the interference caused by the 5G cellular system in the C-band Satellite Earth Receivers.

1. Introduction

One simple and effective solution to enable the co-existence of 5G services and Fixed Satellite Service (FSS) receiving earth stations (ES) within the same geographical area is to retrofit the FSS earth station with a microwave bandpass filter (BPF) at the receiving antenna. Choosing the right BPF can help mitigate the 5G interfering signals with the least impact on in-band FSS traffic. This will help 5G network deployments. As the IMT emissions are going to be in the 3300-3670 MHz band and may saturate the Low Noise Block (LNB) of the FSS earth station which traditionally operates in the 3400-4200 MHz, there is a need to make use of high-quality bandpass filters operating in 3700-4200 MHz range.

2. Description

Satellite communication terminals operate in different frequency bands, one of which is called the C-band. Terminals operating in the C-band normally receive signals in the range of 3.4 to 4.2 GHz and transmit signals in the range of 5.925 GHz to 6.425 GHz. Until recently, there was no other well-established terrestrial technology operating in this band. However, 5G cellular technology is expected to be ubiquitous and will share the same spectrum. The 5G interference signals could be powerful enough to saturate the sensitive C-band satellite receiving systems, causing a potential for the total loss of service.

Since the above-mentioned 5G frequency band falls in the C-band range of 3.4 GHz to 4.2 GHz of the receiver of a C-band terminal, the latter may face interference. Even if the satellite signals received by the C-band terminal are limited to 3.7-4.2 GHz, there is still a risk of 5G signal interference. The satellite signal received at the ground terminal is usually several orders of magnitude weaker than the cellular signal. The receiver equipment of a satellite terminal is usually chosen or designed to detect these extremely low power levels in the 3.4 to 4.2 GHz range and the presence of any strong carrier may affect the performance of its receiving system including the LNB and the modem.

To solve the problem of co-channel interference and adjacent-channel interference in the 5G spectrum, a specific type of microwave bandpass filter (BPF) is required. This bandpass filter is mounted on the C-band antenna to filter out unwanted frequency interference signals from surrounding 5G base stations. The Generic Requirements of these bandpass filters have been described in this document.

3. Functional/ Operational Requirements

S.No.	Specification	Range	Parameter
3.1	Frequency Range (Passband)		3.70 to 4.20 GHz
3.2	Central Frequency		3.95 GHz
3.3	Lower Guard Band	30MHz	3.67 to 3.70 GHz
3.4	Upper Guard Band	30MHz	4.20 to 4.23 GHz
3.5	Rejections	3.30 to 3.67 GHz	More than 60 dB
3.6		At 3.70 GHz	Less than 1.5 dB
3.7		At 3.95 GHz	Less than 0.5 dB
3.8		At 4.20 GHz	Less than 1.5 dB
3.9		More than 4.23 GHz	More than 30 dB
3.10	Minimum Return Loss in the passband		17 dB
3.11	Maximum VSWR in the passband		1.33
3.12	Group Delay within +/- 0.5 MHz		3 nSec

4. Interface Requirements

S.No.	Specification	Parameter
4.1	Flanges (Input)	CPR-229G
4.2	Flanges (Output)	CPR-229F

5. Environmental/ Physical Requirements

S.No.	Specification	Parameter
5.1	Protection	IP 67
5.2	Temperature Operational	-30 to +60°C
5.3	Environment	Weatherized for outdoor use
5.4	Construction	Machined solid body
5.5	Finish	UV resistant Epoxy

6. Quality Requirements

The equipment shall conform to the requirements for Environment specified in TEC QA standards QM-333 {Issue- March, 2010} "Standard for Environmental testing of Telecommunication Equipments" or any other equivalent international standard, for operation, transportation and storage. The applicable tests shall be for environmental category "D" including vibration and corrosion (salt mist).

7. Information for the procurer of product

This standard has been framed keeping in view the frequency spectrum allocated for IMT-2020 (5G) in India in the 3300-3670 MHz band with a narrow guard band of 30 MHz from 3670-3700 MHz as recommended by TRAI. The frequency allocation and width of guard band might be different in various other countries. Also the operating temperature and other factors are as per the climatic conditions in India. This Standard is therefore framed for the India specific requirements for the bandpass filter for C-band fixed satellite service earth station receivers to avoid interference from 5G signals.

8. Abbreviations

Abbreviation	Expanded Form
FSS	Fixed Satellite Service
ES	Earth Station
BPF	Band Pass Filter
IMT	International Mobile Telecommunications
LNB	Low Noise Block