वर्गीय आवश्यकताओं के लिए मानक

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STANDARD FOR GENERIC REQUIREMENTS

TEC 57030:2022

बैंड पास फिल्टर फॉर सी-बैंड सॅटॅलाइट अर्थ रिसीवर्स

BANDPASS FILTER FOR C-BAND SATELLITE EARTH RECEIVERS

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.

❖ 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 suppress 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.

❖ 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 5.85 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 will 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 bands fall in the C-band receive a spectrum of 3.4 GHz to 4.2 GHz, the receiver of a C-band terminal operating at the same frequency as the 5G signal will face interference. Even if the satellite signals received by the C-band terminal are limited to 3.8 – 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.

❖ Functional/Operational Requirements

Specification	**Range**	**Parameter**
Frequency Range		3.70 to 4.20 GHz
VSWR		1.37:1 Max.
Rejections	At 3.5 GHz	More than -60 dB
	At 3.6 GHz	More than -60 dB
	At 3.67 GHz	More than -60 dB
	At 3.70 GHz	Less than -1.5 dB
	At 4.20 GHz	Less than -1.5 dB
	At 4.23 GHz	More than -30 dB
	At 4.25 GHz	More than -40 dB
Group Delay		3 nSec. (Within +/- 5 MHz)

Insertion Loss in the passband		0.5 dB Max. at center band
Return Loss		17 dB Typical
Construction		Machined solid Body
Finish		UV resistant Epoxy

❖ Standard for Interface Requirements for a Product/Equipment

Flanges	Input	CPR-229G
	Output	CPR-229F

❖ RF Requirements

❖ Environmental Requirement

Protection	IP 67
Temperature Operational	-40 to +60°C
Temperature Storage	-50 to +70°C
Environment	Weatherized for outdoor use

- **Quality Requirements**
- **EMI/EMC Requirements**
- **Safety Requirements**
- **Security Requirements**
- **Various requirements of the category/configuration of the product for testing**
- **Information for the procurer of product**
- **Specific remarks/information to be mentioned in the Certificate**
- **ABBREVIATIONS**