Tracking Downconverter Product Range for S-, C-, X-, Ku-, Ka- and Q-band

MAIN FEATURES

- Indoor or outdoor construction
- Available for S-, C-, X-, Ku-, Ka- and Q-band
- Three independent channels with good phase and amplitude tracking
- Tuneable in 1kHz steps
- Excellent phase noise parameters
- Low unwanted spurious level

DESCRIPTION

This document describes the tracking downconverter family developed and manufactured by BHE. These downconverters have 3-channel amplitude and phase matched channels ideal for tracking system in satellite ground stations. They are available for S-, C-, X-, Ku-, Ka- and Q-band and they are manufactured indoor and outdoor construction as well. The downconverter channels are operated from internal common local sources which have very good spectral purity. The converter channels are equipped with phase and amplitude control elements in order to achieve very good phase and amplitude balance between the channels. The downconverter can be controlled and monitored via front panel keyboard and display (only the indoor versions) or remotely via Ethernet, RS232 or RS422.

SPECIFICATIONS

GENERAL									
RF input frequency [MHz]	S-band	C_1-band	C_2-band	X_1-band	X_2-band	K_u-band	K_{a1}-band	K_{a2}-band	Q-band
	2200-2300	3400-4200	4500-4800	7250-7750	7900-8500	10700-12750	17700-21200	25500-27000	37500-42500
IF output frequency	70MHz								
Type	Double conversion without inversion								
No. of Channels	3								
Local source	Common internal LO sources								
RF INPUT CHARACTERISTICS									
RF input frequency	S-band	C_1-band	C_2-band	X_1-band	X_2-band	K_u-band	K_{a1}-band	K_{a2}-band	Q-band
	2200-2300	3400-4200	4500-4800	7250-7750	7900-8500	10700-12750	17700-21200	25500-27000	37500-42500
Input operational signal level	-100dBm to -20dBm								
Max. input power level (nondestructive)	>+10dBm								
Input VSWR	≤1.5								
Nominal input impedance	50Ω								
Noise figure	≤10dB @ maximum gain in S-, C_1-, C_2-, X_1-, X_2-, K_u- and K_{a1}- band ≤12dB @ maximum gain in K_{a2}-band ≤15dB @ maximum gain in Q-band								
LO leakage	≤-80dBm								

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IF OUTPUT CHARACTERISTICS		
IF output frequency		70MHz
IF bandwidth (-1dB points)		>30MHz
Output P1dB		≥+10dBm @ maximum gain
Output VSWR		≤1.5
Nominal input impedance		50Ω
Signal independent spurious	outside F_0±4MHz	≤-70dBm
	inside F_0±4MHz	≤-100dBm
Signal related spurious		≤-60dBc
TRANSFER CHARACTERISTICS		
Nominal conversion gain		30dB±1dB
Attenuation range		0dB to 20dB attenuation
Attenuation step		0.5dB
Attenuation accuracy		≤0.5dB
Gain ripple within RF band		≤±1dB
Gain ripple within IF band		≤±0.5dB
Gain drift versus temperature		≤±1dB within the temperature range
Gain stability		<0.25dB/day @ constant temperature
Differential gain between channels		<1dB at 20°C, center frequency and nominal gain
Variation of differential gain		<2dB within RF bandwidth + full temperature range + full attenuation range
Differential Time Delay between channels		<0.5ns
Variation of Differential Phase between channels		<±5° within RF bandwidth + full temperature range + full attenuation range
Image rejection		>60dB
Isolation between channels		>60dB
Total group delay variation in ±15MHz		≤4ns
Group delay slope within IF band		≤0.3ns/MHz
INPUT FREQUENCY REFERENCE		
Frequency		The equipment shall lock on 5MHz, 10MHz and 100MHz
Connector		BNC female for indoor version, SMA female for outdoor version
Level		0dBm±3dB
VSWR		≤1.5/50Ω
LOCAL OSCILLATOR CHARACTERISTICS		
Step size		1kHz
Frequency accuracy		±10Hz considering a perfect external frequency reference
Frequency stability		±0.005ppm within temperature range on internal reference
Frequency drift per day		±0.001ppm per day on internal reference
Frequency aging		±0.1ppm/year
Local oscillator monitor level		>-10dBm
Local oscillator monitor port VSWR		≤1.5/50Ω

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Phase noise on internal reference [dBc/Hz]		S-band	C_1-band	C_2-band	X_1-band	X_2-band	K_u-band	K_{a1}-band	K_{a2}-band	Q-band
	@10Hz	≤-56	≤-54	≤-54	≤-48	≤-48	≤-45	≤-40	≤-38	≤-36
	@100Hz	≤-83	≤-80	≤-80	≤-75	≤-75	≤-72	≤-68	≤-66	≤-64
	@1kHz	≤-98	≤-90	≤-90	≤-85	≤-85	≤-82	≤-80	≤-78	≤-76
	@10kHz	≤-100	≤-100	≤-100	≤-95	≤-95	≤-92	≤-88	≤-86	≤-84
	@100kHz	≤-100	≤-105	≤-105	≤-95	≤-95	≤-92	≤-90	≤-88	≤-86
	@1MHz	≤-120	≤-120	≤-120	≤-105	≤-105	≤-105	≤-105	≤-103	≤-100

NON-LINEAR BEHAVIOUR		
3rd order intermodulation	≤-50dBc with two carriers (Δf =2MHz) at -10dBm at IF output	
AM/PM conversion	≤0.1°/dB at 0dBm IF output power	
CONTROL & MONITORING		
Control and monitoring interface	Keypad and LCD display for local M&C (only the indoor versions), Ethernet, RS232 and RS422 for remote M&C	
Controls	ON/OFF switch, input frequency, attenuation	
Monitoring	input frequency, attenuation, reference source	
Warnings	local oscillator fault, reference frequency fault, digital fault, general alarm	
MECHANICAL CHARACTERISTICS		
	Indoor version	Outdoor version
Dimensions	2U 19" rack (364mm depth)	312x312x142mm
Weight	12kg	12kg
RF input connectors	SMA female for S, C_1, C_2, X_1, X_2, K_u, 2.92mm for K_{a1}, K_{a2}, 2.4mm for Q	
IF output connectors	SMA female	
Reference input connector	BNC female	SMA female
LO monitor connectors	SMA female for S, C_1, C_2, X_1, X_2, K_u, 2.92mm for K_{a1}, K_{a2}, 2.4mm for Q	
AC mains input connector	IEC C14 inlet	Hirose H-MS3102A18-10P-D-T1(73)
Control connector	RJ45 for Ethernet, DSUB-9 for RS232 and RS422	Hirose H-MS3102A20-29P(73) for RS232 and RS422, Amphenol RJFTV21G for Ethernet
POWER SUPPLY		
Voltage	90-264VAC	
Frequency	47-63 Hz	
Power consumption	≤100VA	
Fuse value	T4A (4A, Slow blow)	
ENVIRONMENT		
	Indoor version	Outdoor version
Operating temperature range	0°C … +50°C	-20°C … +60°C
Storage temperature range	-30°C … +70°C	-40°C … +85°C
Humidity	95% (not condensing)	100% (condensing)
Ingress protection level	IP50	IP67
Vibration	according to MIL-STD-810G Method 514.6-Cat 4	
Shock	½ sinus 30g, 11msec on 3 axis	
QUALITY CONTROL AND PRODUCT ASSURANCE		
MTBF	50000 hours	
CE certification	provided	
ROHS certification	provided	
Warranty	1 year	

Specifications are subject to change without notice.

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OUTLINE DRAWING (mm)

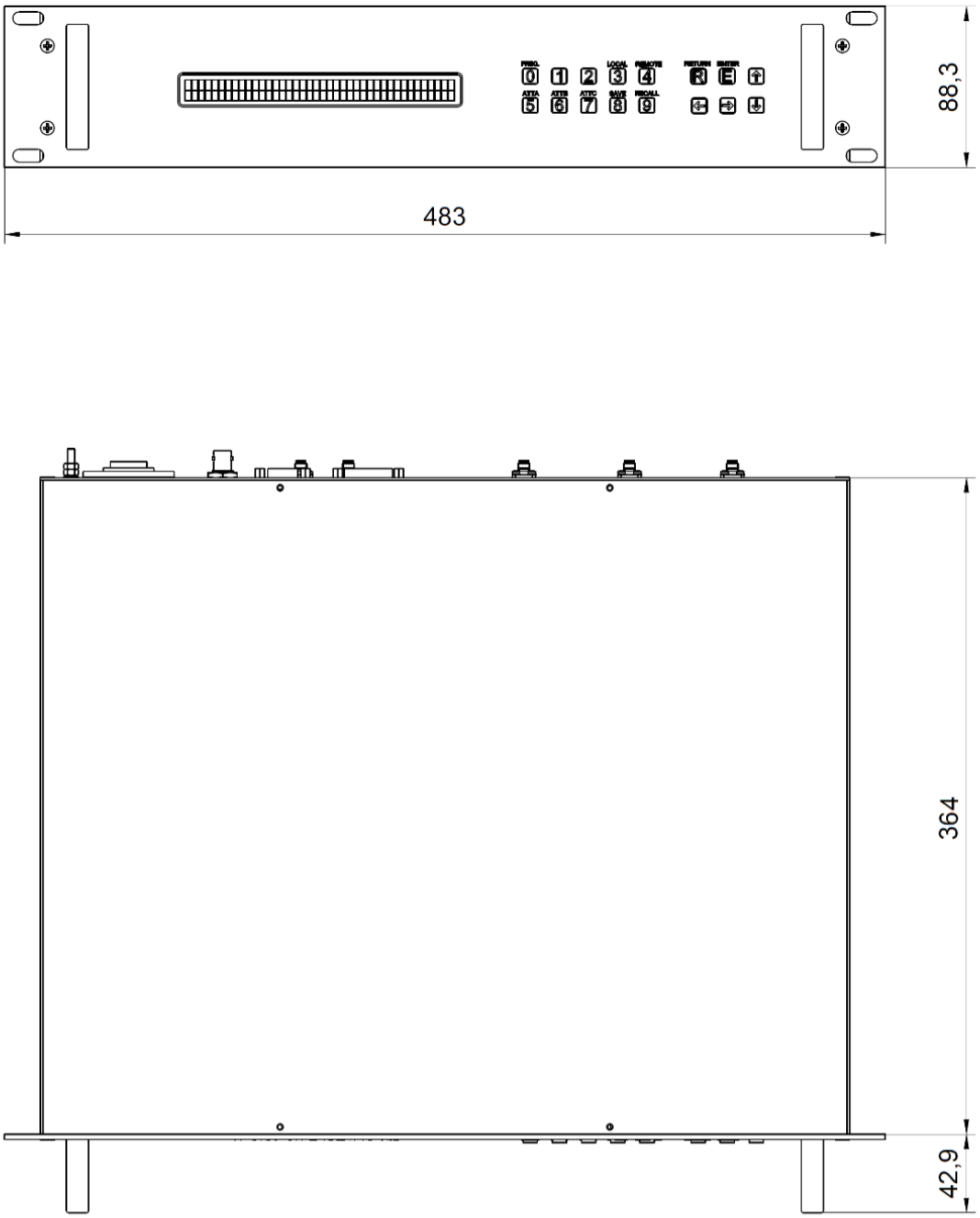

Figure 1. Outline drawing for indoor version

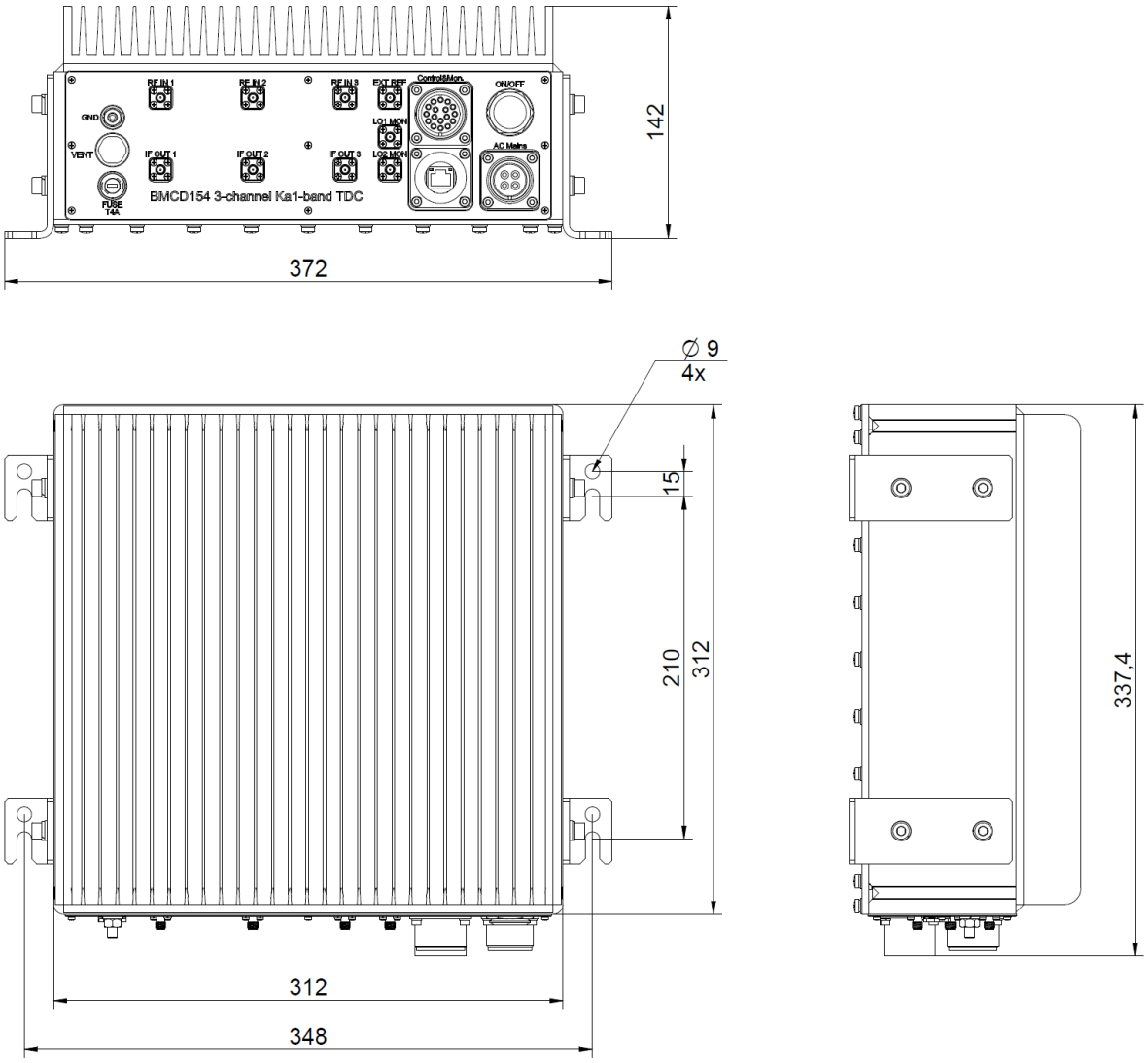

Figure 2. Outline drawing for outdoor version

ORDERING INFORMATION

MODEL NUMBER	DESCRIPTION
BMCD35	BMCD35 3-channel S-band indoor tracking downconverter
BMCD142	BMCD142 3-channel S-band outdoor tracking downconverter
BMCD143	BMCD143 3-channel C_1-band indoor tracking downconverter
BMCD144	BMCD144 3-channel C_1-band outdoor tracking downconverter
BMCD145	BMCD145 3-channel C_2-band indoor tracking downconverter
BMCD146	BMCD146 3-channel C_2-band outdoor tracking downconverter
BMCD147	BMCD147 3-channel X_1-band indoor tracking downconverter
BMCD148	BMCD148 3-channel X_1-band outdoor tracking downconverter
BMCD149	BMCD149 3-channel X_2-band indoor tracking downconverter
BMCD150	BMCD150 3-channel X_2-band outdoor tracking downconverter
BMCD151	BMCD151 3-channel K_u-band indoor tracking downconverter
BMCD152	BMCD152 3-channel K_u-band outdoor tracking downconverter
BMCD153	BMCD153 3-channel K_{a1}-band indoor tracking downconverter
BMCD154	BMCD154 3-channel K_{a1}-band outdoor tracking downconverter
BMCD155	BMCD155 3-channel K_{a2}-band indoor tracking downconverter
BMCD156	BMCD156 3-channel K_{a2}-band outdoor tracking downconverter
BMCD157	BMCD157 3-channel Q-band indoor tracking downconverter
BMCD158	BMCD158 3-channel Q-band outdoor tracking downconverter

DOCUMENT REVISION

DOCUMENT NAME	REVISION	DATE
TDC_Product Range	V21A	08/11/2021

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