



Antenna Technology Bad Blankenburg

## Joint WorldDAB and ASBU DAB+ technical webinar

Presented by Honey Habibollahzadeh  
Account Manager MENA  
hhabibollahzadeh@atbb.eu

Weimar, den 17.09.2020

A **DESAY SV AUTOMOTIVE** Company



- **Company Profile**
- **Product Portfolio**
  - **OEM**
  - **After Sales Market**
    - **DAB Antennas**
      - **Fix**
      - **Splitters**
      - **Mobile**
- **Project References**
- **Q&A**

# COMPANY PROFILE– WHO ARE WE?



ATBB is internationally recognized as a specialist for high-quality and reliable antenna and mobile router solutions and can implement any customer solution quickly and reliably

## Mobile applications

- Automotive
- Commercial
- Agricultural
- Public Transport
- Emergency / Blue light

## Fixed applications

- Smart Metering
- Smart Industry
- Smart City
- Smart Building

ATBB has supplied the automotive industry and Commercial vehicle manufacturers since more than 20 years

ATBB is strategic partner of leading and well-known industries, companies and distributors

ATBB researches, develops and manufactures in Weimar / Germany

Over 100  
top motivated  
employees

Over  
12 M €  
turnover

15%  
Employees in  
R&D

Over  
1.500  
antennas  
produced and  
delivered daily

More than  
1.000  
realized  
development  
projects

More than  
200  
Business-  
partners

Employees  
from more  
than 10  
nationalities

We deliver our  
systems to  
26 countries



## Scania Truck & Bus – Tier 1

Multifunctional Antennas for 2G/3G/4G(LTE), CB, AM/FM, DAB+, DVB-T, GNSS and active GNSS antenna splitter





## MAN Truck & Bus – Tier 1

Multifunction antennas for 2G/3G/4G(LTE), CB, AM/FM, DAB+, GNSS and customized cables



# DAIMLER

## Daimler Truck & Bus – Tier 1

Multifunctional Antennas for 2G/3G/4G(LTE), CB, AM/FM, DAB+, GNSS



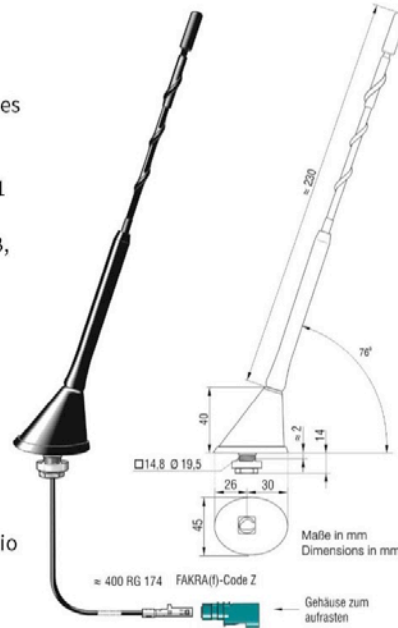
## 2116.01 AM/ FM/ DAB, DAB+ passiv

### Flex-Dachantenne

- Dachantenne mit folgenden Eigenschaften:
- geringe Aufbauhöhe durch Einsatz eines Kurzstabes
  - geringe Einbautiefe (~15 mm)
  - geringer Montageaufwand
  - Verwendbar mit 4723.01 (Verstärker) und 4724.01 (Rundfunkverteiler für die Aufteilung FM/ DAB+ Frequenzen) oder 4721.01 (Verstärker AM/ FM/ DAB, DAB+)

### Flex-Roof Mount Antenna

- A roof mount antenna with the following specifications:
- Low height by using of a short rod
  - Only ~15 mm installation depth
  - Easy to install
  - Usable with 4723.01 (amplifier) and 4724.01 (Radio splitter for the division FM/ DAB+ frequencies or 4721.01 (amplifier AM/ FM /DAB, DAB+)



## 2118.01 AM/FM, DAB/DAB+

### Kombiflex-Dachantenne

- Dachantenne mit folgenden Funktionen und Eigenschaften:
- **DAB\***-Empfang, aktiv und rauscharm im Bereich Band III, L-Band passiv
  - Rundfunkempfang, aktiv und rauscharm für **LMK/UKW**
  - 12 V-Stromversorgung der Verstärker wahlweise über Innenleiter der Kabelanschlüsse oder DIN-Steckhülse
  - geräuscharmer Antennenstab
  - geringe Einbautiefe (15 mm)
  - geringer Montageaufwand – nur eine Montagebohrung für 2 Funktionen

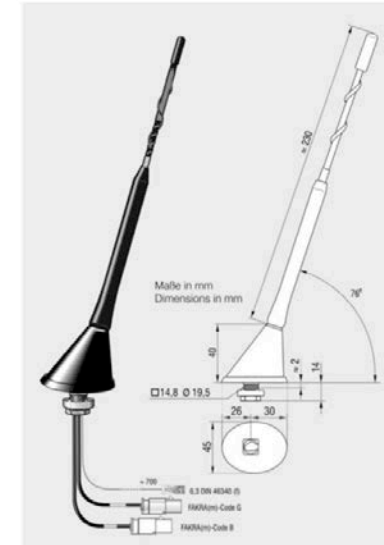
Ersatzstrahler: 4626.11

### Combi Flex Roof Mount Antenna

- A roof mount antenna with the following functions and features:
- Active and low noise **DAB\*** receiving (band III), L-band passive
  - Active and low noise **AM/FM** receiving
  - 12 V power supply of the amplifiers optionally via inner conductor of the cable connections or DIN receptacle
  - Low wind noise antenna rod
  - Small installation depth (15 mm)
  - Easy fit – only one hole for 2 functions

Spare rod: 4626.11

\*) Digital Audio Broadcast



| Frequenzbereich | Frequency Range | AM          | FM/ UKW      | B III       | L-Band        |
|-----------------|-----------------|-------------|--------------|-------------|---------------|
| Frequenz        | Frequency       | 0,15-16 MHz | 87,5-108 MHz | 174-240 MHz | 1452-1492 MHz |
| Gewinn          | Gain            |             | -2 dBi *     | 0 dBi *     | 2 dBi         |
| Verstärkung     | Amplification   | 0 dB        |              |             |               |
| Impedanz        | Impedance       | ≤ 10 pF     | 50 Ω         |             |               |
| Anpassung       | VSWR            | ≤ 2,0 : 1 * |              |             |               |
| Kabel RG 174    | Cable RG 174    | 400 mm      |              |             |               |
| Steckverbinder  | Connector       | FAKRA (f)-Z |              |             |               |

\* Bandmitte

| Frequenzbereich        | Frequency Range       | LMK / AM      | UKW / FM     | B III        | L-Band        |
|------------------------|-----------------------|---------------|--------------|--------------|---------------|
| Frequenz               | Frequency             | 0,15-16 MHz   | 87,5-108 MHz | 174-240 MHz  | 1452-1492 MHz |
| Impedanz               | Impedance             | 50 Ω          |              |              |               |
| Anpassung              | VSWR                  | ≤ 3,0 : 1     | ≤ 2,0 : 1    | ≤ 2,0 : 1    | ≤ 1,8 : 1     |
| Verstärkung            | Amplification         | 6 dB          | 14 dB        | 10 dB        | 0 dB          |
| Rauschmaß              | Noise Figure          |               | 3,5 dB typ.  | 2,0 dB typ.  |               |
| Stromversorgung extern | Power Supply external | + 12 V, 25 mA |              |              |               |
| Stromversorgung        | Power Supply          | +12 V, 25 mA  |              | +12 V, 25 mA |               |
| Kabel RG 174           | Cable RG 174          | 145 mm        |              | 180 mm       |               |
| Steckverbinder         | Connector             | FAKRA (m)-B   |              | FAKRA(m)-G   |               |

## 3775.01 AM/FM, DAB+ (Band III)

Dachantenne, aktiv

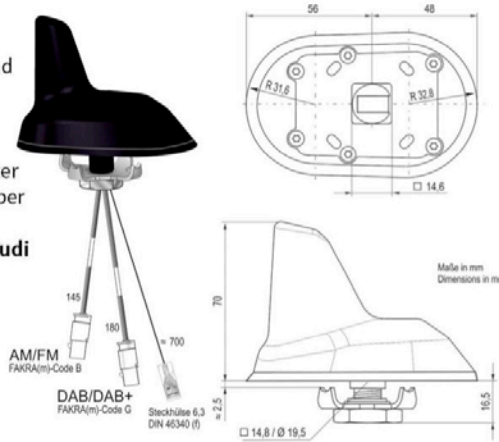
Dachantenne mit folgenden Funktionen und Eigenschaften:

- DAB-Empfang, aktiv und rauscharm in dem Band III
- Rundfunkempfang, aktiv und rauscharm für AM/FM
- 12V-Stromversorgung wahlweise über Innenleiter der Kabelanschlüsse (Phantomspeisung) oder über DIN-Steckhülse
- Montage bei neuen Lochbildern von MB+VW/Audi möglich (Dichtungsadapter lieferbar)
- geringe Einbautiefe (16,5 mm)

Roof Mount Antenna, active

A roof mount antenna with following functions and specifications:

- Active and low noise DAB receiving Band III
- Active and low noise AM/FM receiving
- 12 V power supply optionally via inner conductor of the cable connections (phantom power supply) or DIN receptacle
- Can be mounted on new MB+VW/ Audi (Seal adapter available)
- Small installation depth (16,5 mm)



| Frequenzbereich         | Frequency Range       | AM                            | FM           | DAB+                         |
|-------------------------|-----------------------|-------------------------------|--------------|------------------------------|
| Frequenz                | Frequency             | 0,15-1,71 MHz                 | 87,5-108 MHz | 174-240 MHz                  |
| Impedanz                | Impedance             | 50 Ω                          |              |                              |
| Verstärkung             | Amplification         | 6 dB                          | 20 dB        | 20 dB                        |
| Rauschzahl              | Noise Factor          | k.a. n/a                      | 3,5 dB typ.  | 2,0 dB typ.                  |
| Anpassung               | VSWR                  | ≤ 2,5 : 1                     |              | ≤ 2,0 : 1                    |
| Stromversorgung extern  | Power Supply external | +9...16 V, 25 mA bei/ at 12 V |              |                              |
| Stromversorgung Phantom | Power Supply Phantom  | +9...16 V, 20 mA bei/ at 12 V |              | +9...16 V, 5 mA bei/ at 12 V |
| Kabel RG 174            | Cable RG 174          | 145 mm                        |              | 180 mm                       |
| Steckverbinder          | Connector             | FAKRA (m) - B                 |              | FAKRA (m) - G                |

## 3785.01 AM/FM, DAB+ (Band III), GPS

Dachantenne, aktiv

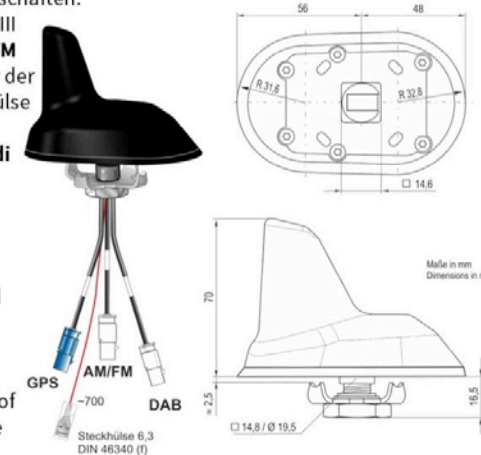
Dachantenne mit folgenden Funktionen und Eigenschaften:

- DAB-Empfang, aktiv und rauscharm in dem Band III
- Rundfunkempfang, aktiv und rauscharm für AM/FM
- 12V-Stromversorgung wahlweise über Innenleiter der Kabelanschlüsse (Phantom) oder über DIN-Steckhülse
- aktive GPS Antenne (Phantomspeisung)
- Montage bei neuen Lochbildern von MB+VW/Audi möglich (Dichtungsadapter lieferbar)
- geringe Einbautiefe (16,5 mm)

Roof Mount Antenna, active

A roof mount antenna with following functions and specifications:

- Active and low noise DAB receiving Band III
- Active and low noise AM/FM receiving
- 12 V power supply optionally via inner conductor of the cable connections (phantom) or DIN receptacle
- Active GPS antenna (Phantom power supply)
- Can be mounted on new MB+VW/ Audi (Seal adapter available)
- Small installation depth (16,5 mm)



| Frequenzbereich         | Frequency Range       | AM                            | FM           | DAB+                         | GPS                     |
|-------------------------|-----------------------|-------------------------------|--------------|------------------------------|-------------------------|
| Frequenz                | Frequency             | 0,15-16 MHz                   | 87,5-108 MHz | 174-240 MHz                  | 1575,42 MHz             |
| Impedanz                | Impedance             | 50 Ω                          |              |                              |                         |
| Verstärkung             | Amplification         | 6 dB                          | 20 dB        | 20 dB                        | 28 ± 3 dB               |
| Rauschzahl              | Noise Factor          | 3,5 dB typ.                   |              | 2,0 dB typ.                  | 1,7 dB typ.             |
| Anpassung               | VSWR                  | ≤ 2,5 : 1                     |              | ≤ 2,0 : 1                    | ≤ 1,5 : 1               |
| Gewinn                  | Gain                  | 32 dBic typ.                  |              |                              |                         |
| Stromversorgung extern  | Power Supply external | +9...16 V, 25 mA bei/ at 12 V |              |                              |                         |
| Stromversorgung Phantom | Power Supply Phantom  | +9...16 V, 20 mA bei/ at 12 V |              | +9...16 V, 5 mA bei/ at 12 V | +3,3...5,0 V 15...40 mA |
| Kabel RG 174            | Cable RG 174          | 145 mm                        |              | 200 mm                       | 150 mm                  |
| Steckverbinder          | Connector             | FAKRA (m) - B                 |              | FAKRA (m) - G                | FAKRA (m) - C           |





# DAB Antennas for Vehicles

## 4570.01 FM, DAB, DAB+ (B III/L-Band)

### Glasklebe-Innenantenne

Aktive Glasklebe-Innenantenne zur Klebefestigung an der rechten oder linken Seite der Frontscheibe oder an Seitenscheiben mit folgenden Eigenschaften:

- günstige Empfangseigenschaften
- diebstahlsicher und sicher vor mutwilliger Zerstörung
- keine Windgeräusche
- lange Lebensdauer
- bestens geeignet zum Anschluss an nachgerüstete digitale Autoempfänger

#### Hinweise:

- 0...5 mm Mindestabstand zwischen Antenne und Karosserie
- beschichtungs-, partikel- und heizdrahtfreie Scheibe im Montagebereich

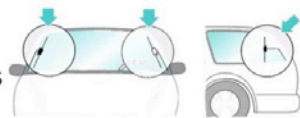
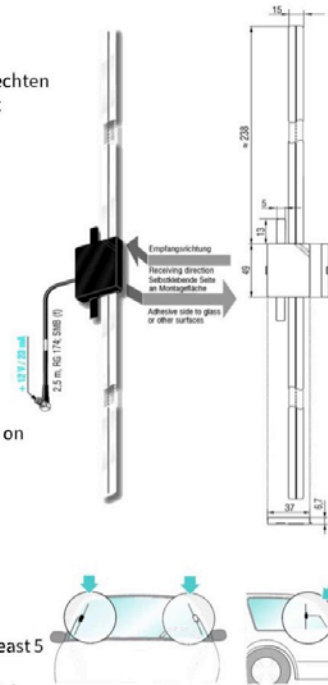
### Glass Mount Indoor Antenna

An active glass mount internal antenna for adhesive mounting on the right or left side of windscreen or on side panes with the following features:

- Favourable reception properties
- Theft proof and secure from destruction
- No wind noise
- Long product life
- Suitable to use with retrofitted digital receivers

#### Advices:

- The antenna should be mounted in a location that allows at least 5 mm between antenna and vehicle body
- For best performance avoid locating the antenna in areas which have heating wires or tinted areas of glass



| Frequenzbereich       | Frequency Range      | FM                             | B III       | L-Band        |
|-----------------------|----------------------|--------------------------------|-------------|---------------|
| Frequenz              | Frequency            | 87,5-108 MHz                   | 174-230 MHz | 1452-1492 MHz |
| Impedanz              | Impedance            | 50 Ω                           |             |               |
| Gewinn                | Gain                 | 0 dBi                          | 2 dBi       | 2 dBi         |
| Anpassung             | VSWR                 | ≤ 2,0 : 1                      |             |               |
| Verstärkung LNA       | Amplification LNA    | 14 dB                          | 10 dB       | 0 dB, passiv  |
| Rauschmaß             | Noise Figure         | 3,5 dB typ.                    | 2,0 dB typ. | k.A. n/a      |
| Phantom Stromspeisung | Phantom Power Supply | + 9...16 V, 23 mA bei/ at 12 V |             | k.A. n/a      |
| Kabel RG 174          | Cable RG 174         | ≈ 2,5 m                        |             |               |
| Steckverbinder        | Connector            | SMB (f), Winkel/ Angle         |             |               |

## 4573.01 DAB, DAB+ (B III/L-Band)

### Glasklebe-Innenantenne

Glasklebeantenne für alle feststehenden Fahrzeugscheiben mit folgenden Eigenschaften:

- schnelle Montage
- günstige Übertragungseigenschaften durch Außenstrahler
- einfache, verdeckte Kabelverlegung
- Strahler-Schwenkbereich > 180°
- Einstellung der Gelenkhemmung mit Sechskantschraube

Hinweis: beschichtungs-, partikel- und heizdrahtfreie Scheibe im Montagebereich

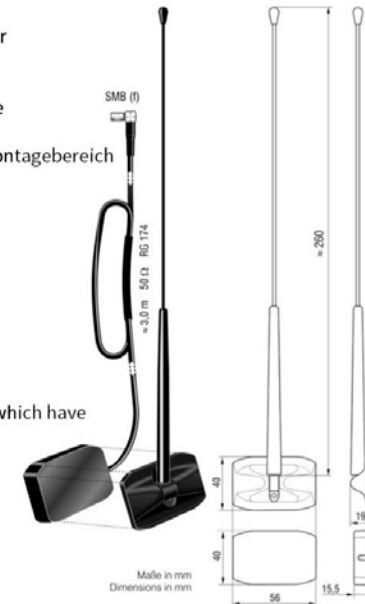
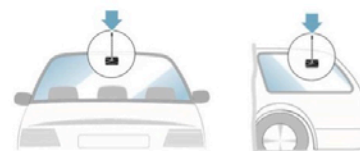
### Glass Mount Indoor Antenna

A glass mount antenna for all fixed car windows with following functions:

- Fast and easy mounting
- Favourable transmission properties from outer rod
- Easy, covered cable installation
- Angle adjustment of rod > 180°
- Hinge locked by hexagonal screw

#### Advise:

For best performance avoid locating the antenna in areas which have heating wires or tinted areas.



| Frequenzbereich       | Frequency Range      | B III                         | L-Band        |
|-----------------------|----------------------|-------------------------------|---------------|
| Frequenz              | Frequency            | 174-230 MHz                   | 1452-1492 MHz |
| Gewinn                | Gain                 | 2 dBi                         | 2 dBi         |
| Polarisation          | Polarisation         | Vertikal / vertical           |               |
| Impedanz              | Impedance            | 50Ω                           |               |
| Anpassung             | VSWR                 | ≤ 2,0 : 1                     | ≤ 1,5 : 1     |
| Verstärkung LNA       | Amplification LNA    | 15 dB typ.                    | Passiv, 0 dB  |
| Rauschzahl            | Noise Figure         | 1,5 dB typ.                   | k.A. n/a      |
| Phantom Stromspeisung | Phantom Power Supply | 9...16 V / 20 mA bei/ at 12 V |               |
| Kabel RG 174          | Cable RG 174         | 3,0 m                         |               |
| Steckverbinder        | Connector            | SMB (f)                       |               |

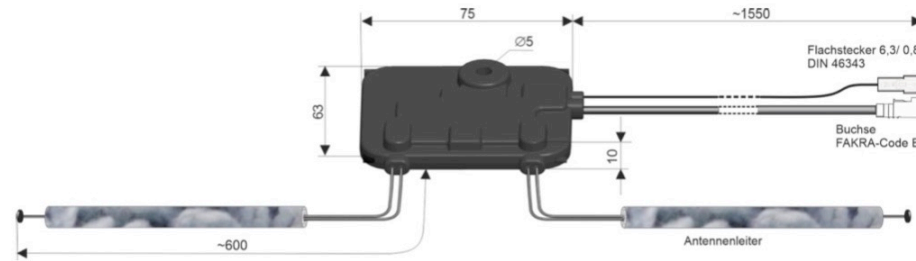
## 5010.07

### 🇩🇪 Rundfunkantenne

- Die Antenne ist für die Montage in eigenstabilen Kunststoffbaugruppen vorgesehen
- Verwendbar mit **4724.01** /Rundfunkverteiler für die Aufteilung AM/FM und DAB+ Frequenzen)
- Die Betriebsspannung wird über eine separate Versorgungsleitung der Antenne zugeführt.
- **Die Spannungszuführung muss an einen abgesicherten Stromkreis angeschlossen werden.**

### 🇬🇧 Broadcast antenna

- The antenna is designed for installation in inherently stable plastic assemblies
- Usable with **4724.01** (Radio splitter for the division AM/FM band and DAB+ frequencies)
- The operating voltage is fed to the antenna via a separate supply line.
- **The voltage supply must be connected to a fused circuit.**



| Frequenzbereich         | Frequency Range       | AM / LMK     | FM / UKW     | DAB+        | WX                  |
|-------------------------|-----------------------|--------------|--------------|-------------|---------------------|
| Frequenz                | Frequency             | 0,15-30 MHz  | 87,5-108 MHz | 174-240 MHz | 162,525-162,550 MHz |
| Verstärkung             | Amplification         | 10 dB        | 13 dB        |             |                     |
| Impedanz                | Impedance             | 50...75 Ω    |              |             |                     |
| Anpassung               | VSWR                  | ≤ 1,5 : 1    |              |             |                     |
| Rauschzahl              | Noise Figure          | ≤ 3,5 dB     |              |             |                     |
| Externe Stromversorgung | External power supply | +12 V, 70 mA |              |             |                     |
| Kabel RG 58             | Cable RG 58           | ~1,5 m       |              |             |                     |
| Steckverbinder          | Connector             | FAKRA(f)-B   |              |             |                     |

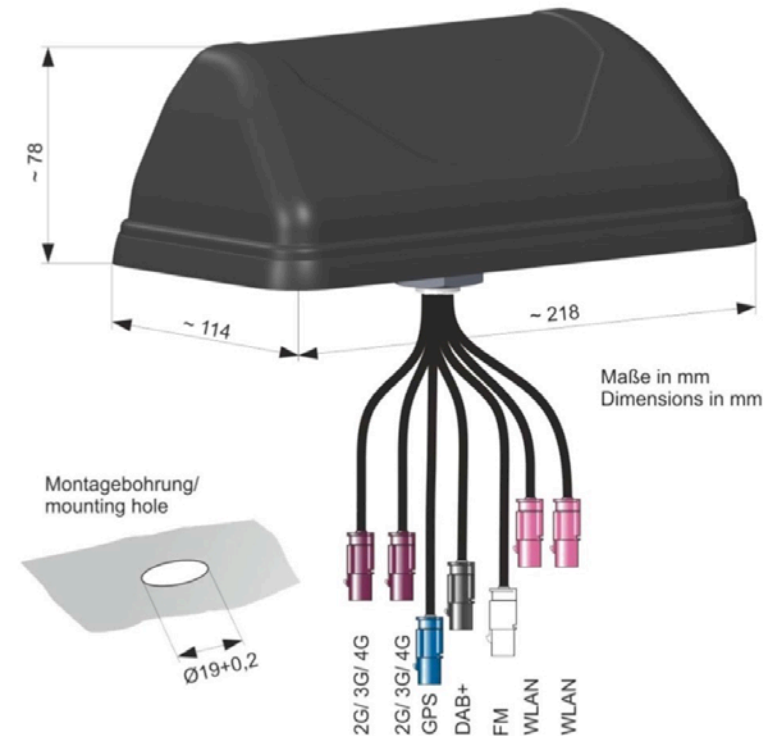
## 4736.01

### 🇩🇪 Kombi-Antenne

- DAB+ Empfang(rauscharmer Verstärker Band III)
- Rundfunkempfang, aktiv und rauscharm für UKW
- 2-Anschlüsse für Mobilfunk GSM/ UMTS/ LTE (MIMO)
- 2-Anschlüsse für WLAN/Wi-Fi (MIMO)
- aktive GPS/GLONASS-Antenne (Phantomspesung)

### 🇬🇧 Combi-Antenna

- DAB+ radio (low noise amplifier Band III)
- Active and low noise FM radio
- 2 connectors for mobile GSM / UMTS / LTE (MIMO)
- 2 connectors for WLAN/Wi-Fi (MIMO)
- Active GPS/GLONASS Antenna (Phantom Power Supply)



# DAB Splitters for Vehicles

## 4721.01 AM/FM, DAB/DAB+

Rundfunk-Verstärker

Besonderheiten

Rundfunkverstärker für den Fahrzeug- bzw. Hausinnenbereich mit folgenden Funktionen und Eigenschaften:

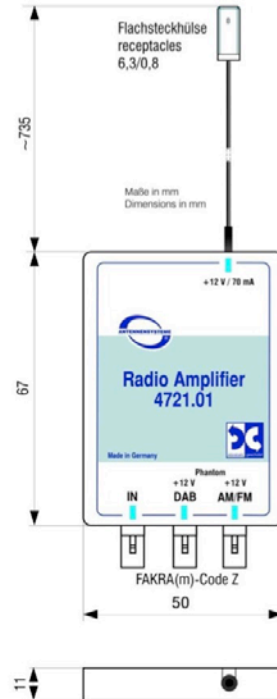
- Verbesserung der Empfangsqualität passiver Rundfunkantennen
- DRM- tauglich durch erweiterte Bandbreite im KW-Frequenzbereich
- Aufteilung AM/FM und DAB Signale
- Einfache und schnelle Befestigung

Radio-Amplifier

Specifications

FM-amplifier is designed for use inside the car or house and has the following features:

- Improves reception with passive antenna
- Qualified for DRM because of extended bandwidth
- Splitter for AM/FM band and DAB-band
- Quick and easy mounting



| Frequenzbereich         | Frequency Range       | AM               | FM             | DAB, DAB+        |
|-------------------------|-----------------------|------------------|----------------|------------------|
| Frequenz                | Frequency             | 0,15 – 1,71 MHz  | 87,5 - 108 MHz | 174 - 230 MHz    |
| Gewinn                  | Gain                  | 10 dB            | 13 dB          | 15 dB            |
| Impedanz                | Impedance             | 50Ω              |                |                  |
| Anpassung               | VSWR                  | ≤ 1,5:1          |                |                  |
| Rauschzahl              | Noise figure          | k.A. n/a         | ≤ 3,5 dB       | ≤ 2,0 dB         |
| Externe Stromversorgung | External power supply | +9...16 V, 70 mA |                |                  |
| Phantom Stromspeisung   | Phantom power supply  | +9...16 V, 50 mA |                | +9...16 V, 20 mA |
| Steckverbinder          | Connector             | FAKRA(m)-Z       |                | FAKRA(m)-Z       |

## 4726.01 Radio, DAB/DAB+

Rundfunkverteiler aktiv

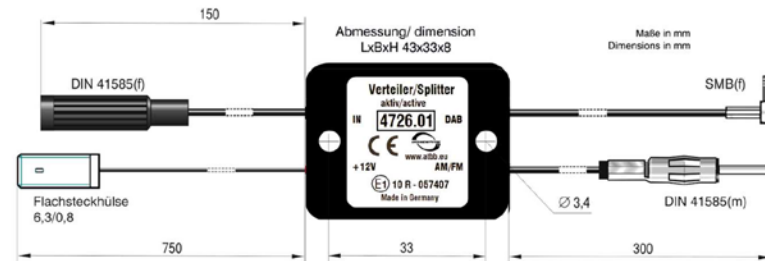
Aktiver Rundfunkverteiler für den Fahrzeug- bzw. Hausinnenbereich mit folgenden Funktionen und Eigenschaften:

- Aufteilung analoges Radio und DAB, DAB+ Frequenzbereiche
- Verbesserung der Empfangsqualität passiver Rundfunkantennen
- Einfache und schnelle Befestigung
- DAS PRODUKT IST FÜR TYPISCHE DACH-/ KOTFLÜGELANTENNEN VORGESEHEN.
- NICHT VERWENDEN BEI INTEGRIERTEN GLASS- ODER AKTIVEN DACHANTENNEN

Radio Splitter active

Active Radio Splitter is designed for use inside the car or home application and has the following features:

- Splitter for the radio and DAB, DAB+ Band
- Improving reception quality of the passive antenna
- Quick and easy installation
- THE PRODUCT IS DESIGNED FOR VEHICLES WITH ROD TYPE ROOF/WING AERIALS
- NOT TO BE USED WITH INTEGRATED GLASS OR AMPLIFIED ROOF AERIALS



| Frequenzbereich                 | Frequency Range               | Radio                          | DAB, DAB+            | L-Band        |
|---------------------------------|-------------------------------|--------------------------------|----------------------|---------------|
| Frequenz                        | Frequency                     | 87,5-108 MHz                   | 174-230 MHz          | 1452-1492 MHz |
| Impedanz                        | Impedance                     | 50 Ω                           |                      |               |
| Verstärkung                     | Amplification                 | 20 dB                          | 20 dB                | 10 dB         |
| Rauschzahl                      | Noisefigure                   | ≤ 3,0 dB                       | ≤ 2,0 dB             |               |
| Entkopplung (AM/FM – DAB, DAB+) | Isolation (AM/FM – DAB, DAB+) | ≥ 20 dB                        |                      |               |
| Anpassung                       | VSWR                          | ≤ 2,0                          |                      |               |
| Stromversorgung                 | Power supply                  | +8...+16 V, 20 mA bei/ at 12 V |                      |               |
| Kabel RG 174                    | Cable RG 174                  | 0,3 m                          | 0,3 m                |               |
| Steckverbinder                  | Connector                     | DIN 41585 (m)                  | SMB(f)-Winkel/ angle |               |

# DAB antennas for Fix

## 4929.01 DAB+ (BIII/L-Band)

### Stationäre Antenne

Stationäre Antenne zur Montage an vertikalen Flächen mit folgenden Eigenschaften:

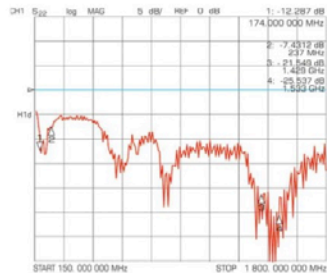
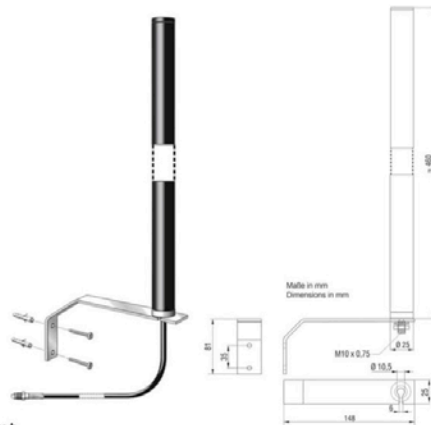
Eigenschaften:

- geeignet für den Innen-/Außenbereich
- Vermeidung metallischer Flächen in Strahlernähe
- Strahler in einem Kunststoffrohr geschützt untergebracht
- HF-Kabel fest mit der Antenne verbunden

### Fixed Station Antenna

A fixed antenna for mounting to vertical surfaces with the following features:

- Suitable for external and internal use
- Avoid metallic surfaces close to the antenna
- Radiator protected with plastic tube
- RF cable is connected directly to antenna element



einschließlich Adapterkabel Adapter cable including  
F (m) ≈ 150, RG 174 FME (m)

| Frequenzbereich    | Frequency Range | B III                               | L-Band                               |
|--------------------|-----------------|-------------------------------------|--------------------------------------|
| Frequenz           | Frequency       | 174-240 MHz                         | 1452-1492 MHz                        |
| Polarisation       | Polarization    | vertikal                            | vertical                             |
| Gewinn             | Gain            | 1 dBi                               | 2 dBi                                |
| Impedanz           | Impedance       | 50 Ω                                |                                      |
| Rückfluss-dämpfung | Return loss     | ≈ 14 dB                             |                                      |
| Anpassung          | VSWR            | ≤ 1,5 : 1 (Bandmitte Midband)       |                                      |
| UV-Beständigkeit   | UV Resistance   | gegeben (Gehäuseaufhellung möglich) | Exists (Housing flares are possible) |
| HF-Kabel RG 58     | RF Cable RG 58  | ≈ 5,0 m                             |                                      |
| Steckverbinder     | Connector       | FME (f)                             |                                      |

## 4403.80 DAB+ (B III/L-Band)

### Magnethaftantenne

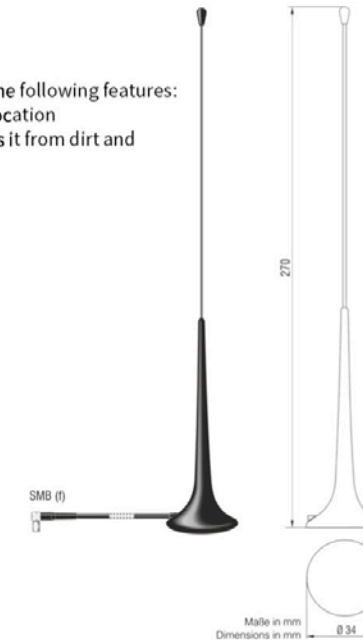
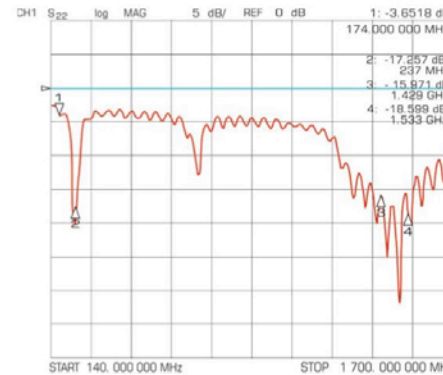
Magnethaftantenne für Stahlblechkarosserien mit folgenden Eigenschaften:

- Strahlersystem schmutz- und korrosionsgeschützt in einem Kunststoffgehäuse platziert
- optimale Sende- und Empfangseigenschaften auf dem Fahrzeugdach

### Magnetic Mount Antenna

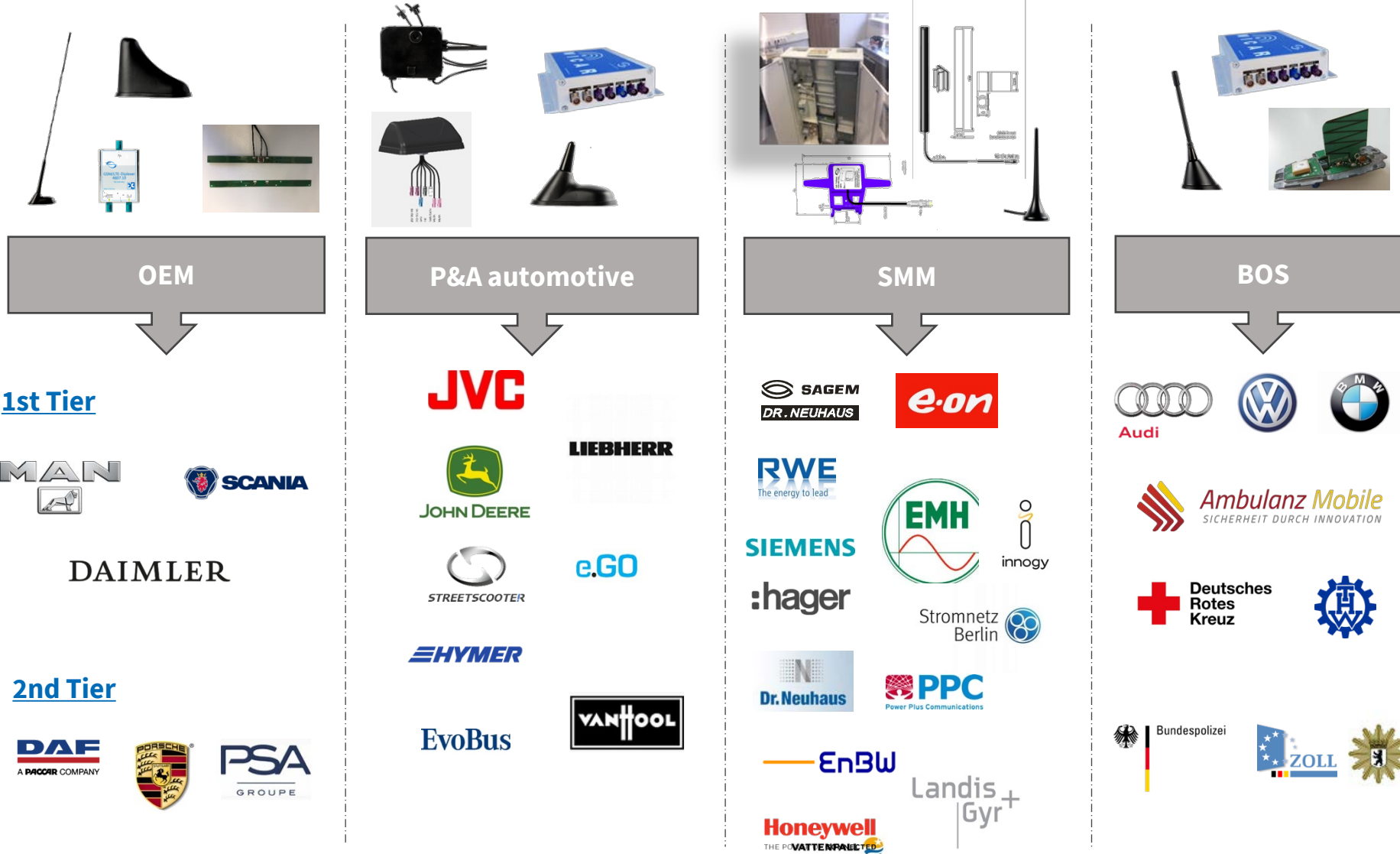
A magnetic mount antenna for steel car bodies with the following features:

- Optimal transmitting and receiving from a car roof location
- Placing of radiator system in plastic housing protects it from dirt and corrosion



| Frequenzbereich    | Frequency Range | B III                         | L-Band        |
|--------------------|-----------------|-------------------------------|---------------|
| Frequenz           | Frequency       | 174-240 MHz                   | 1452-1492 MHz |
| Impedanz           | Impedance       | 50 Ω                          |               |
| Gewinn             | Gain            | 2 dBi                         |               |
| Rückfluss-dämpfung | Return Loss     | 14 dB                         |               |
| Anpassung          | VSWR            | ≤ 1,5 : 1 (Bandmitte Midband) |               |
| Kabel RG 174       | Cable RG 174    | ≈ 3,0 m                       |               |
| Steckverbinder     | Connector       | SMB (f), Winkel/ Angle        |               |

# References





# Thank you

# Q&A ?