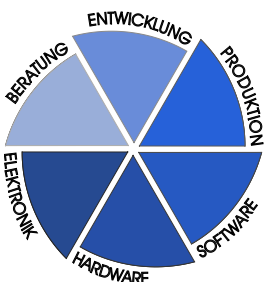


Line Interface

FT 634

FT 634 C

FT 634 CL



FunkTronic
Kompetent für Elektroniksysteme

English Version 1.0

Line Interface FT634 / FT634C / FT634CL

There are two housing versions of the Line Interface FT634. One in a black box and one in a 19 inch box. The FT634 is used for higher distances between control head and radio over an own or rented 2- or 4 wire.

The FT634 is approved by TBR 15 and TBR 17. All audio signals are coupled via transformers.

Standard version FT634

To connect a control head or a radio there is PTT in/output, the audio in/output and supply contact. On the other side you connect the two- or four wire.

Micro controller version FT634C

Additionally there are four digital outputs. For example it can be used for channel switching.

The 19 inch version has 6 digital outputs and 6 digital inputs.

Micro controller version FT634CL

Additionally the line is watched of disconnect failure.

Squelch/PTT input (FT 634 C/CL)

The logic input of squelch/PTT is set in register 01 on 3rd digit.

Registers 01

- 3. digit SQL/PTT input active, if
 - 0 = LOW (<0,6 V) (factory default)
 - 1 = HIGH (> 3V)

Furthermore, one can configure Jumper JP10, whether the output of the radio/controlhead connected at the SQL/PTT input

- also the logical HIGH actively switches or
 - only the logical LOW level actively to GND can switch
- (for example with an Open-Collector to GND)

In the more final case an internal Pull-Up-Resistor is connected. See also section configuration of the Jumper.

Jumper JP10

HIGH of the SQL/PTT input switched through

- 1 = active voltage (> 3 V)
- 2 = keep open (Open-Collector)

Transmitter control/carrier display (FT634)

The Transmitter control/carrier display (PTT/SQL-output) switches on, as soon as from the AC-Line the pilot-tone (3300 Hz) is received.

That FT 634 switches the TX/SQL-output through a potential-free relay as a result.

Transmitter control/carrier display (FT634 C/CL)

The Transmitter control/carrier display (PTT/SQL-output) switches on, as soon as either from the AC-Line the pilot-tone (3300 Hz) or an audio signal (Audio-Squelch) is received.

In 2 wire mode/simplex the Squelch/PTT input must not be activated, since his function priority has sets the Audio-Squelch out of order and puts down the pilot-tone.

Register 01

- 1. digit PTT/SQL-output switches through:
 - 0 = pilot tone decoding (2 wire/simplex)
{not with active Squelch-/PTT input!}
 - 1 = pilot tone decoding (4 wire/duplex)
{always!}
 - 2 = audio squelch (2 wire/simplex)
{not with active Squelch-/PTT input!}
 - 3 = audio-squelch (4 wire/duplex)
{always!}

The FT634C/CL switches the PTT/SQL output through a potential-free relay as a result.

The audio squelch mode is only for the application as controlhead interface, to recommend, since a TX switching on is normally too uncertain over audio squelch.

Samples how to connect and to program

The programming of the FT634 has to be according to the application.

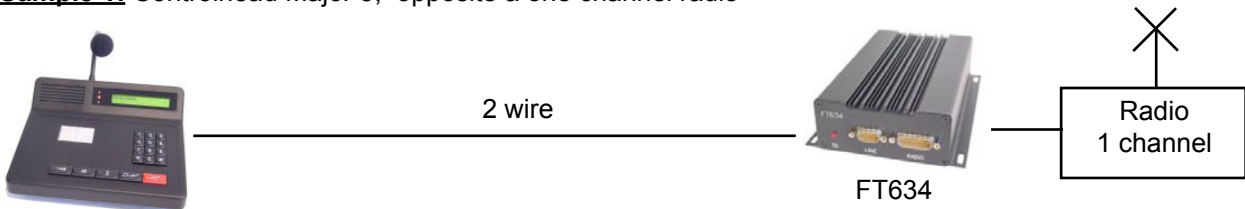
The following considerations should be done:

- FT634 connected to the control head or to the radio
- Channel remote control necessary?
- Line watching necessary?
- AC Line two or four wire, simplex or duplex?
- Opposite a FT634 or a controlhead (for example major 3,4,5)?

In the following examples the most important EEPROM registers 01, 05, 08 and 12 are listed.

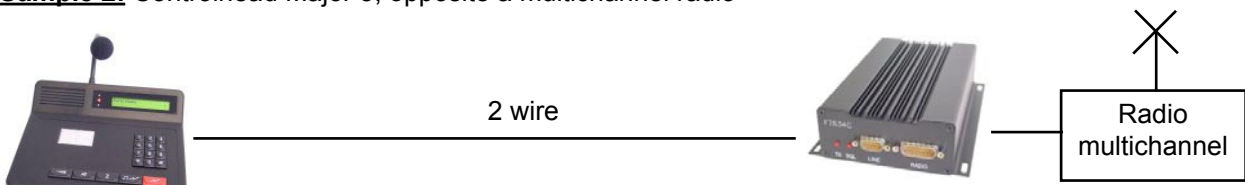
Hint: x marked digits are without importance or depends on customer application.

Sample 1: Controlhead Major 5, opposite a one channel radio



Major 5
EE-Reg 33 = 00046

Sample 2: Controlhead Major 5, opposite a multichannel radio

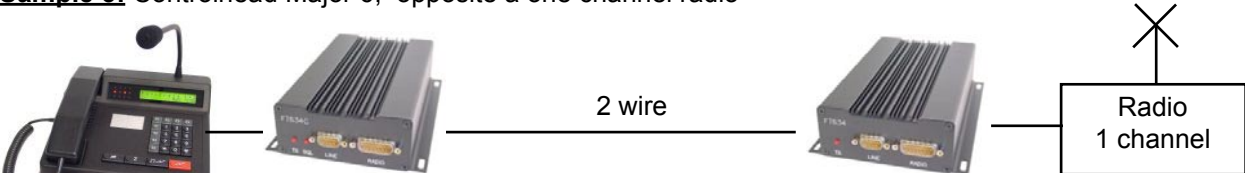


Major 5
EE-Reg 33 = 00046
EE-Reg 28 = x6x0x

FT634 C
EE-Reg 01 = 0100
EE-Reg 05 = BCDx
EE-Reg 08 = 020x
EE-Reg 12 = 0xxx

SQL:
LOW active (GND)
Channelbits:
HIGH active,
binary - 1

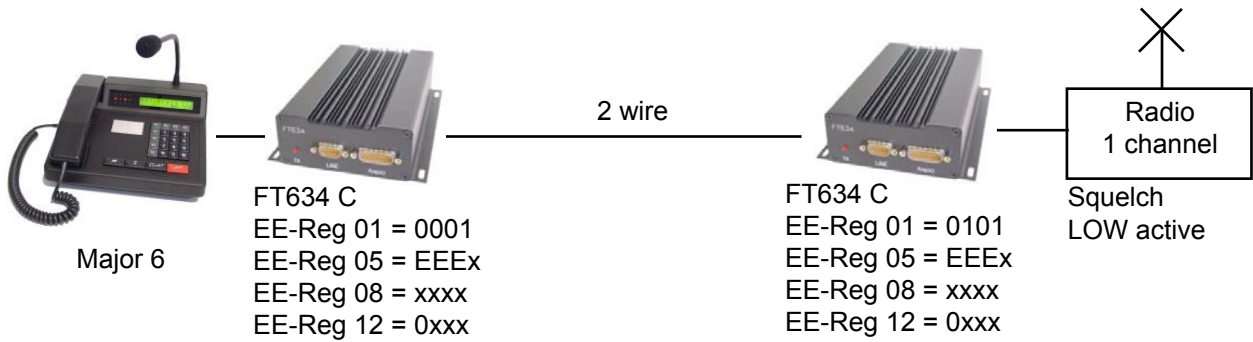
Sample 3: Controlhead Major 6, opposite a one channel radio



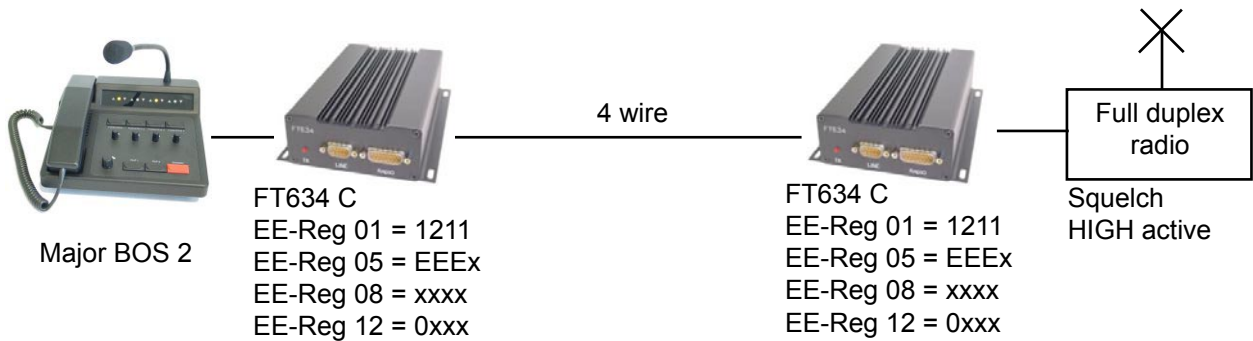
Major 6
FT634 C
EE-Reg 01 = 2101
EE-Reg 05 = EEEEx
EE-Reg 08 = xxxx
EE-Reg 12 = 0xxx

Attention: No transmission of true carrier status possible, only audio squelch on FT634C left side!

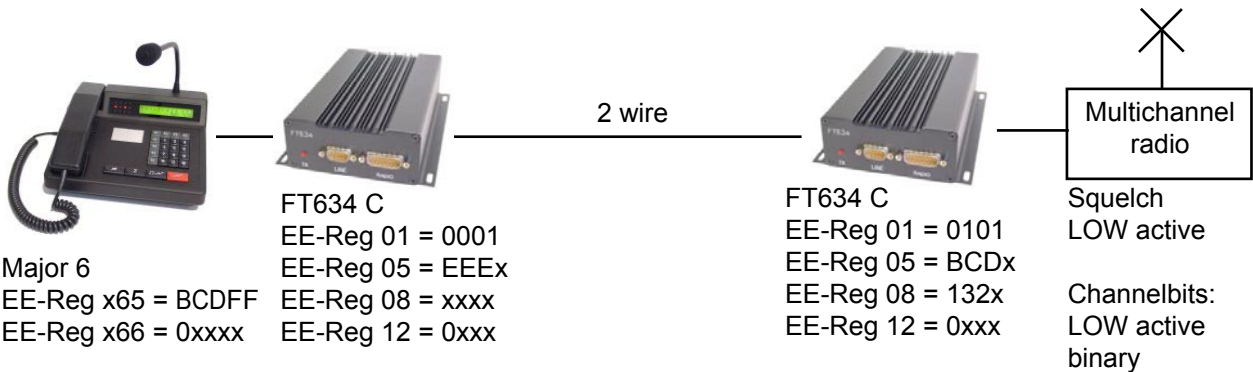
Sample 4: Controlhead Major 6, opposite a 1 channel radio, true transmission of carrier status



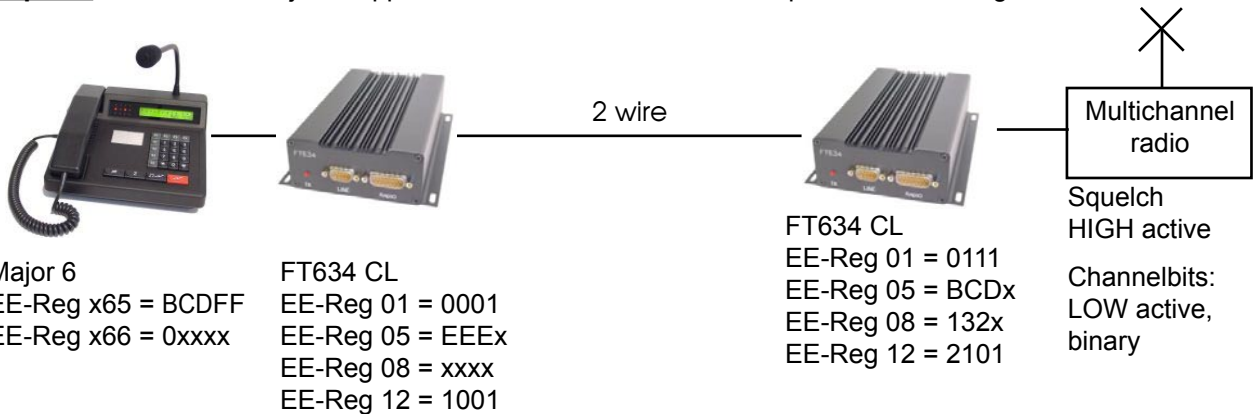
Sample 5: Controlhead Major BOS 2, opposite a full duplex radio



Sample 6: Controlhead Major 6 on multichannel radio



Sample 7: Controlhead Major 6, opposite a multichannel radio, with option line watching



Service Program, only with FT634C and FT634CL

The FT634C/CL have one RS232 interface (TTL, dont connect direct to PC) with following specification:

4800 bauds, 1 start bit, 8 data bits, no parity, 1 stop bit

The connections for the RS232 interface is either inside of the case on the 3-pin male connector ST4 or on the 64-pin DIN41612 connector ST1.

For programming you must use the interface RS232Ad1.

If the terminal is connected, you have access on the service program and some commands, like for example:

- programming the EEPROM
- transmitting of tone sequence
- service mode analog switch
- level tone transmitting

To start the service program, you simply enter at the terminal <Return> or <X>,<Return> .

Programming mode EEPROM

To program a address <xx> with the content <yyyy>, do the following:

- 1) **Start** service program with <Return> or <X>,<Return>
- 2) **Read** register --> put in <Rxx>,<Return>
=> At the screen appears: <>Register xx: wwwww
- 3) **Write** register --> put in <Pxxyyyy>,<Return>

xx = number of register
yyyy = value of register

You find a list of all registers in the following section.

Register encoding for

- 00 Impedance of the AC line
1. digit 0 = high input impedance
1 = input impedance 600 ohms
 2. digit 0 = high output impedance
1 = output impedance 600 ohms

Register encoding for

- 01
1. digit, PTT/SQL switching
 - 0 = pilot tone evaluation (2 wire/simplex)
{not with active SQL/PTT input!}
 - 1 = pilot tone evaluation (4 wire/duplex)
{always!}
 - 2 = audio squelch (2 wire/simplex)
{not with active SQL/PTT input!}
 - 3 = audio squelch (4 wire/duplex)
{always!}
 2. digit, in silence switched through audio path
 - 0 = multi wire → AC line,
switched by pilot tone evaluation
 - 1 = AC line → multi wire,
switch by active squelch/PTT input
 - 2 = AC line → multi wire, without toggle
 3. digit, squelch/PTT input active if
 - 0 = LOW (<0,6V)
 - 1 = HIGH (> 3V)
 4. digit, if squelch/PTT input active then
 - 0 = pilot tone not transmitted to the AC line
 - 1 = pilot tone transmitted to the AC line
- 05 5 tone to switch the output, EEEE = disable
- 06 last set digital outputs
- 07 5 tone for digital inputs
- 08 configurations for channel interface
1. digit, output logic
 - 0 = normally (1 = HIGH)
 - 1 = inverts (1 = LOW)
 2. digit, bit-interpretation
 - 2 = binary-1
 - 3 = binary
 3. digit, acknowledge mode (1. and 2. digit of telegram)
 - 0 = normally, without pilot tone
 - 1 = swapped, without pilot tone
 - 2 = swapped, with pilot tone
- 10 Tone sequence for line watching
- 11
1. digit, master cycle time, $n * 10$ sec
 2. digit, master cycle time, $n * 1$ sec
 3. digit, slave cycle time, $n * 10$ sec
 4. digit, slave cycle time, $n * 1$ sec
- 12
1. digit, line watching
 - 0 = off
 - 1 = device is master
 - 2 = device is slave
 2. digit, line watching with pilot tone 1=on, 0=off
 3. digit, line failure indicated by
 - Bit 3 = ---
 - Bit 2 =---
 - Bit 1 = digital output 5
 - Bit 0 = digital output 4
 4. digit, line failure indicated by
 - Bit 3 = digital output 3
 - Bit 2 = digital output 2
 - Bit 1 = digital output 1
 - Bit 0 = digital output 0

Adjustment

All FT634 delivered are on default levels. Please adjust the levels to your radio or controlhead. Also adjust the incoming level of the AC line. Follow the steps below.

1) Adjustment of AC line input:

- a) put in 1000 Hz at the pre-determined level into the ac line
- b) measuring on the testpoints MP1 and MP0 (GND) is normally -12 dBm
- c) turn R35 anticlockwise to the end
- d) adjust the level on R30
- e) put in 3400 Hz at the pre-determined level into the ac line
- f) adjust the frequency response on R35 to - 12 dBm, the max. gain for higher frequencies is 12 dB

2) Adjustment of the audio output to the radio or controlhead:

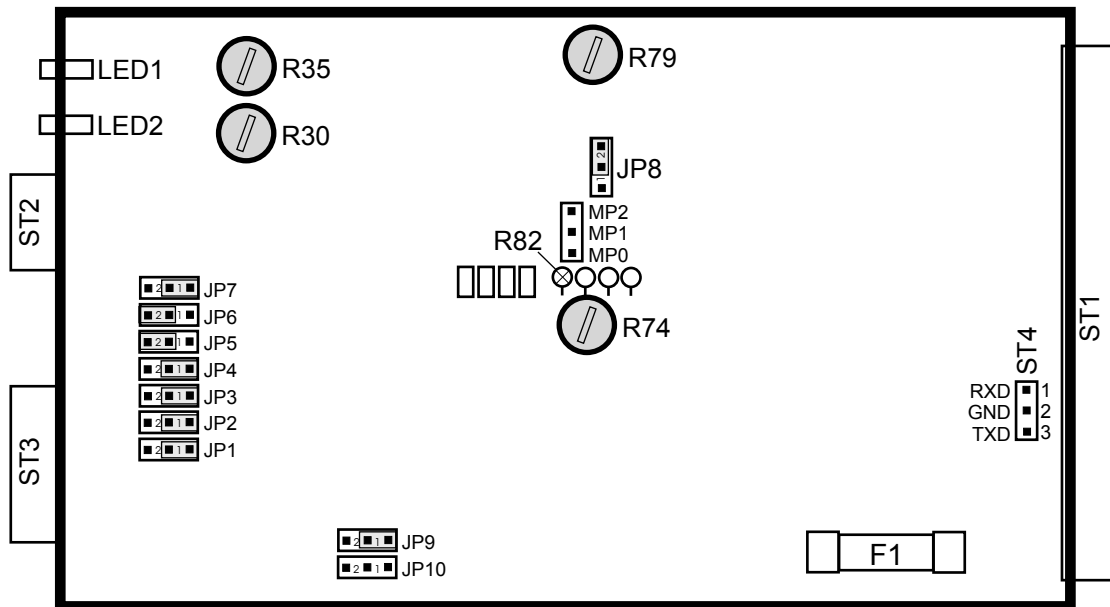
- a) put in 1000 Hz at the pre-determined level into the ac line
- b) put in jumper JP9 to position 2
- c) connect the radio or controlhead according to your application
- d) adjust R74 to get nomonally deviation
- e) put jumper JP9 back to position 1

3) Adjustment of the audio input coming from the radio or controlhead

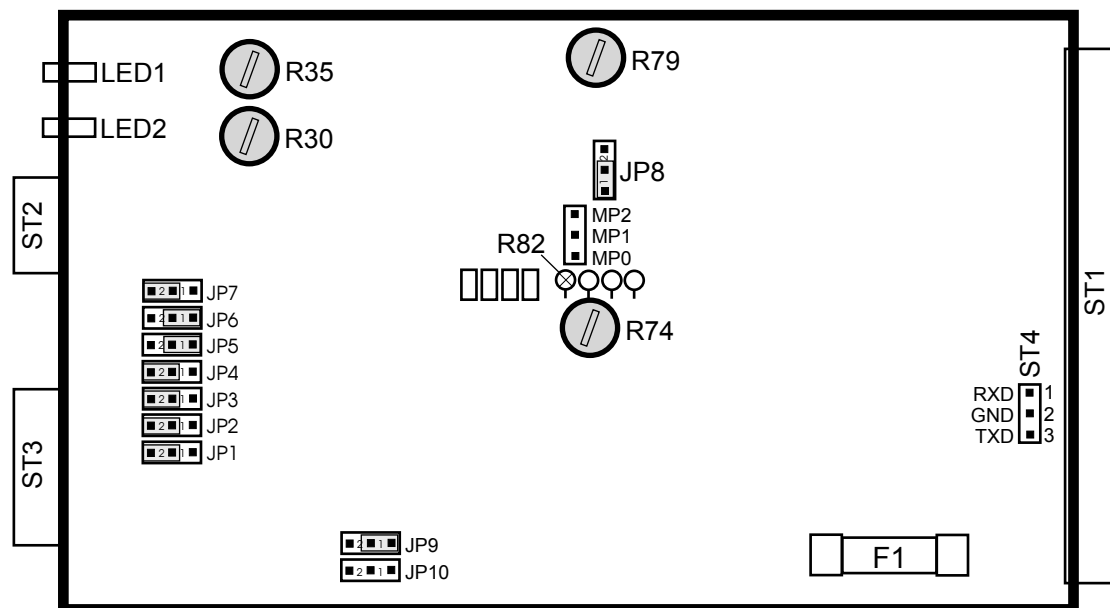
- a) put in 1000 Hz at the pre-determined level to get maximum deviation
- b) measuring on the testpoints MP2 and MP0 (GND) is normally -12 dBm
- c) adjust the level on R79

Configuration of the jumpers

1a) Configuration 4 wire mode: Set the jumpers JP1-JP8 accordingly



1b) Configuration 2 wire mode: Set the jumpers JP1-JP8 accordingly (**default on delivery**)



2) Configuration of squelch/ptt input (jumper **JP10**):



a) Set the jumper JP10 to position 2 for squelch/PTT active low.



b) Set the jumper JP10 to position 1 for squelch/PTT active high.

Connectors FT 634, FT634C, FT634CL

AC line

Standard Box: Connector **ST2** (9-pin D-Sub)
19" Box: Connector **ST1** (64-pin DIN41612)

Standard pin/No.	19" pin/No.		
1	6c	Audio In/Out a	2 wire AC line
5	7c	Audio In/Out b	
1	6c	Audio Out a	4 wire AC line
6	5c	Audio Out b	
5	7c	Audio In a	
9	4c	Audio In b	

Connector for radio

Standard Box: Connector **ST3** (15-pin D-Sub)
19" Box: Connector **ST1** (64-pin DIN41612)

Standard pin/No.	19" pin/No.	
1+9	1a+c	+12 V supply
8+15	32a+c	GND
4	16c	Audio Out a (TX)
5	15c	Audio Out b (TX)
11	10c	Audio In a (RX)
12	11c	Audio In b (RX)
2	24c	PTT relais contact a
3	24a	PTT relais contact b

Additional ports, only with version FT634C and FT634CL

10	26a	sqelch input
6	9a	digital out 0
7	10a	digital out 1
13	11a	digital out 2
14	12a	digital out 3
--	13a	digital out 4
--	14a	digital out 5
--	3a	digital in 0
--	4a	digital in 1
--	5a	digital in 2
--	6a	digital in 3
--	7a	digital in 4
--	8a	digital in 5

Connector RS232

Standard Box: Connector **ST4** (3-pin)
19" Box: Connector **ST1** (64-pin DIN41612)

Standard pin/No.	19" pin/No.		
1	20a	RXD	Attention: only TTL level, do not connect direct to PC, use interface RS232AD1, Order No. 901900
2	21a	GND	
3	22a	TXD	

Technical Data

Supply

Voltage	+ 12 V/DC - 8% + 40%
Supply current (FT 634)	60 mA
Supply current (FT 634 C/CL)	110 mA
Fuse	500 mA

Input level AC line

Factory adjusted to	- 10 dBm (245 mV)
Adjusting range (R30)	- 30 dBm to - 6 dBm (25 to 390 mV)
Input impedance (normaly)	600 Ohm
Input impedance (high)	20/40 kOhm (2 wire/4 wire)

Output level AC line

Output impedance	- 10 dBm (245 mV) 600 Ohm
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Input level radio/controlhead

Factory adjusted to	+ 3 dBm (1094 mV)
Adjusting range (R79)	- 24 dBm to + 6 dBm (49 to 1546 mV)
Input impedance	600 Ohm

Output level radio/controlhead

Factory adjusted to	- 17 dBm (109 mV)
Adjusting range (R74)	- 30 dBm to + 5 dBm (25 to 1377 mV)
Output impedance	600 Ohm

Pilot tone frequency

$$f_c = 3300 \text{ Hz}$$

Pilot tone notch filter

Absorption	> 50 dB
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Weight

Standard version	550 g
19 Inch Box	530 g

Dimensions

Standard version	130 x 46 x 180 mm
19 Inch Box	35 x 186 x 128 mm