

16 Port RF Multicoupler



User's Guide

Product Selection

DLI receiver multicouplers include a rack mount chassis containing a high performance, low noise amplifier, a flat-response 16-port RF power splitter, a surge protector, and power supply. Two versions of the multicoupler are available:

Wideband 1-U

1U multicouplers are typically employed with an external preselector. These multicouplers are standard part number RFM, in stock at DLI and available for daily shipment.

Filtered 2-U

2U multicouplers use a larger power supply and chassis to accommodate an attenuator or internal preselector when requested. DLI has a variety of preselectors and filters in stock. Check with an engineer via engineering@digital-loggers.com prior to ordering filtered multicouplers. High IM2 and High IP3 versions are available on special order.

Applications

Typical applications for DLI multicouplers include:

- Land Mobile FM Radio (30-960MHZ)
- Airband AM Radio (generally with external cavity and bandpass filters)
- FM Broadcast Radio
- Radio Test & Evaluation

The base design of this multicoupler is generally suitable for connecting an array of radio receivers to a single receiving

antenna located more than 40' away from transmitting antennae.

AC Power Input

Standard power input to the multicoupler is 90-130VAC, 50/60Hz. The internal power supply employs a linear regulator draws 11 watts maximum at 140VAC and creates no measurable RF emissions. 220V transformers and DC input boards are available on special order.

RF Surge Protection

The amplifier input surge protector uses a plasma GDT and an RF MOV to guard against surges caused by lightning and ESD.

Operating Theory

The main design goal of the multicoupler is to provide a strong signal to all attached receivers while eliminating port-to-port coupling which allows intermodulation interference between radios. This goal should be achieved while inducing a minimum amount of noise and at reasonable cost.

The transmission line from the system receiving antenna connects to the input of the multicoupler. To prevent overload from out-of-band signals, an external preselector may be added.

Terminating Unused Ports

Unused RF output ports should always be terminated with 1/2 watt 50 Ohm loads to maintain balance between power divider sections and flat frequency response.

RF Power Divider Isolation

The power dividers provide 36 dB of isolation between adjacent receiver feed ports for protection against receiver injection frequency leakage or possible intermodulation products generated in receiver input stages under high signal level conditions. The 36dB+ isolation is normally more than enough to eliminate intermodulation from local oscillator emissions in inexpensive radios.

The 16 port power divider is comprised of five 4-port inductive dividers, so the 36dB figure is the minimum isolation between adjacent ports. Isolation between ports on different dividers is significantly higher.

Adjustment

Generally, no adjustment to any component is required. Amplifier gain is fixed at 23dBm, producing typical overall gain of approximately +2.4dBm at the output port. The gain curve is relatively flat over the 10-900MHz range, decreasing by approximately 1dBm to 1.5dB gain at 1GHz.

Amplifier Overload and Compression

The 1dB compression point for the amplifier is -5dBm at 1GHz without input filtering. It is possible to damage the amplifier input with a continuous RF input of +20dBm. The input protection system guards against ESD only. If you suspect RF overload is driving the amplifier into compression, check by inserting an attenuator of 20dB or more in series with the antenna input.

Amplifier Noise Figure

At room temperature, the amplifier noise figure is typically 1.8dBm. Amplifiers are selected for a maximum specification of 2.5dBm.

Antenna System Design

The antenna feeding the multicoupler must provide adequate bandwidth for the range of frequencies involved. The receive antenna should have physical displacement from transmitting antennas to prevent overload. 50dB or more of antenna isolation is typically adequate. When using a duplexer or in a multiplex system, 65dB+ may be required.

Cabling Near Transmitters

Route receiver feedlines as far away from transmit feedlines as possible. Standing waves may be generated from the

shields on transmission feedlines. No coax shielding is perfect.

Interference Analysis

If interference is suspected, connect a spectrum analyzer to a single receiver port to identify the source. Note that localized high power transmitters may push the multicoupler into overload only when two or more transmitters are keyed at the same time. If interference goes away with a 20dBm series attenuator at the input, the nature of the problem is more related to overload than interference.

Limited One Year Warranty

The terms of this warranty may be legally binding. If you do not agree to the terms listed below, return the product immediately in original unopened condition for a full refund. The purchaser assumes the entire risk as to the results and performance of the unit. DLI warrants this multicoupler to be free from major defects. No agency, country, or local certifications are included with this unit. It is the responsibility of the user to obtain such certifications if they are necessary. DLI's entire liability and exclusive remedy as to defective hardware shall be, at DLI's option, either (a) return of the purchase price or (b) replacement or repair of the hardware that does not meet DLI's quality control standards and has been returned through proper RMA procedures. DLI's liability for repair or replacement is to DLI's customer ONLY. **WARRANTY SERVICE DOES NOT INCLUDE SOFTWARE OR HARDWARE UPGRADES.** No warranty service will be provided without an original invoice from DLI and an RMA number provided by technical support. RMA material must be shipped prepaid to DLI. RMA numbers are valid for 15 days from date of issue. This warranty does not cover products modified, subjected to rough handling, or used in applications for which they were not originally intended. No oral advice or verbal warranties made by DLI's employees, dealers, or distributors shall in any way increase the scope of this warranty. DLI makes no warranty as to merchantability or fitness for any particular purpose. DLI assumes no liability for incidental or consequential damages arising from the use or inability to use this product. This warranty gives you specific legal rights. You may also have other rights that vary from state to state. Since some states do not allow the exclusion of liability for consequential damages, some of the above limitations may not apply to you.

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