Multi Output Function Repeater MOFR 01

MOFR are compact signal repeater units that convert
time sync signals from copper or fibre input to copper
and fibre output, providing electrical isolation
between equipment being synchronized.

The MOFR receives a source time sync signal on the
input side (either TTL, RS2332, RS422 or ST Fibre) and
reproduces the signal on the output side:
- TTL/232/422 simultaneously
- HV switching
- ST Fibre Tx
- Amplitude Modulated (AM) IRIG-B (from DC IRIG-B
input or AM IRIG-B input).

Fibre-based Time Sync Architecture

MOFR are available with fibre receiver and
transmitter (repeater) function, facilitating “daisy-
chaining” for implementation of fully fibre-based sync
distribution architecture. This enables a wide variety
of IED’s to receive sync signals at the voltage levels
they require - at a system cost not much greater than
copper-based distribution.

DC IRIG-B to AM IRIG-B Conversion

MOFR can be ordered with an option which converts
Digital (DC) IRIG-B to Amplitude Modulated (AM)
IRIG-B inside the MOFR. This allows digital (DC level-
shift) IRIG-B to be reticulated via a single low-cost
multimode fibre or CU cable and converted to AM
IRIG-B at the location it is required.
**FUNCTIONAL DIAGRAM**

**INPUT SPECIFICATIONS**

*Input (uses 'INPUT' terminals)*

- **Input Burden**: TTL, CMOS, 7mA; RS422, 5V
- **Input voltage (max)**: 12V (RS232 compatible)
- **Copper MOFR (ordering option 'i' = 2)**
  - **Termination**: 150Ω by wire link on 'TERM'
  - **Tab layout**:

```
  +-----------------+       +-----------------+
  | AM IRIG         |       | TERM LOOP INPUT |
  +-----------------+       +-----------------+
```

- **Fibre MOFR (ordering option 'i' = 5)**
  - **Tab layout**:

```
  +-----------------+       +-----------------+
  | AM IRIG TX RX   |       | AM IRIG TX RX   |
  +-----------------+       +-----------------+
```

- **Fibre Spec**: ST Fibre connector, $\lambda$ = 820nm
- **Compatibility**: 62.5/125um multi-mode fibre

**OUTPUT SPECIFICATIONS**

- **Isolation**: Input to outputs: 3.5kV
- **Power Supply to outputs**:
  - **Low voltage signals (ordering option 'o' = L)**
    - **Output Rating**: TTL = 0—5V 75mA; RS422 = ±5V 50 RS422 loads; RS232 = ±10V 15mA
  - **Tab layout**:

```
  +-----------------+       +-----------------+
  | AM IRIG GND TTL 232 422 PWR |
  +-----------------+       +-----------------+
```

- **High voltage output (ordering option 'o' = H)**
  - **Switching capability**: 300V, 1A
  - **Technology**: High speed MOSFET
  - **Tab layout**:

```
  +-----------------+       +-----------------+
  | AM IRIG GND TTL 232 422 PWR |
  +-----------------+       +-----------------+
```

- **Equivalent circuit**:

```
  +-----------------+       +-----------------+
  | IRIG S P S P P P P P |
  +-----------------+       +-----------------+
```

**AM-IRIG-B SUPPORT**

- **AM-IRIG-B transformer (ordering option 'i' = A)**
  - **Input Connection**: Via AM-IRIG terminals on input side of MOFR
  - **Isolation**: 4kV

- **DC IRIG-B to AM IRIG-B (ordering option 'i' = D)**
  - **Input Connection**: Via Copper or Fibre input
  - **Isolation**: 7kV

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All specifications subject to change without notice
**MOFR 01 DATA SHEET**

### INDICATORS

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Green LED On when power supply is good</td>
</tr>
<tr>
<td>Signal</td>
<td>Red LED On when logic high at input</td>
</tr>
</tbody>
</table>

### ELECTRICAL PROPERTIES

**Power Supply:**
- Orderable Ranges: 12–36 Vdc, 20–72 Vdc, 90–350 Vdc
- Power consumption: 3W (max)

**Signal delay through MOFR:**
- Input to all Outputs: 85 ± 10ns

### PHYSICAL PROPERTIES

**Case:**
- DIN-rail mount 3 module case
- UL94-V0 flame retardant lexan

**Dimensions:**
- 53mm wide x 90mm high x 63mm deep
- DIN rail size = 35mm

**I/O terminals:**
- 5mm centres
- Max wire size 1.5mm diameter

### ENVIRONMENTAL

**Operating temperature:**
- -10°C to +65°C

**Humidity:**
- To 95% non condensing

### ORDERING INFORMATION

Order code: MOFR 01-toip where
- \( t \) = MOFR type (2 or 5)
- \( o \) = Output option (L or H)
- \( i \) = IRIG-B option (A or D)
- \( p \) = Power supply option (L, M, or H)

**MOFR TYPE \( t \):**
- 2 = Copper only
- 5 = Fibre TX and RX + Copper

**OUTPUT OPTION \( o \):**
- L = Low voltage signals
- H = High voltage switching

**IRIG-B OPTION \( i \):**
- D = DC IRIG-B input to AM IRIG-B output
- A = AM IRIG-B input to AM IRIG-B output

**POWER SUPPLY OPTION \( p \):**
- L = Low voltage (12-36Vdc)
- M = Medium voltage (20-72Vdc)
- H = High voltage (90-300Vdc)

**EXAMPLE**

MOFR01-5LAL

- Fibre and Copper input + Fibre Output
- MOFR type \( t \) = 5
- Input for AM-IRIG-B
- AM IRIG option \( i \) = A
- Power indicator (green)
- Input signal indicator (red)
- DIN rail mountable case
- AM IRIG-B output
- Low voltage signals
- Output option \( o \) = L

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www.tekroninternational.com

409 Cuba Street, Alicetown
PO Box 31 285, Lower Hutt 6009, New Zealand
Phone: +64 4 566 7722, Fax +64 4 569 9272
MOFR 01 DATA SHEET

CONNECTION EXAMPLE

Terminate line using link at ‘TERM’ (for few MOFR in chain) or an external resistor at ‘LOOP’ terminal

Fibre IRIG-B out
Fibre IRIG-B in

Daisy-chain, up to 10 MOFR from a single MOFR TTL output

APPLICATION ADVICE

The following information is advice only. It is NOT guaranteed to be correct for all situations.

MAXIMUM RECOMMENDED CABLE RUNS

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Maximum Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibre</td>
<td>up to 750m</td>
</tr>
<tr>
<td>TTL</td>
<td>up to 100m</td>
</tr>
<tr>
<td>AM-IRIG-B</td>
<td>up to 200m</td>
</tr>
</tbody>
</table>

COPPER CABLING

Shielded twisted pair is the preferred cable type for copper signals, although coaxial can be used.

Do NOT earth the outer shield when using coaxial cable because electrical isolation will be lost.

TERMINATING TTL LINES

To prevent reflections at MOFR and IED inputs, terminate TTL outputs, at the end of the line.

<table>
<thead>
<tr>
<th>TTL Load</th>
<th>Termination Resistor</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;21mA</td>
<td>220 ohm or wire link</td>
</tr>
<tr>
<td>&lt;42mA</td>
<td>330 ohm</td>
</tr>
<tr>
<td>&gt;42mA</td>
<td>no termination resistor required</td>
</tr>
</tbody>
</table>

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