

Engineering Development Model

Power Splitter/Combiner

LRPS-ED8835A/2

4 Way-0°

Important Note

This model has been designed, built and tested in our engineering department. Performance data represents model capability. At present it is a non-catalog model. On request, we can supply a final specification sheet, part number and price/delivery information.



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CASE STYLE : QQQ130

| ELECTRICAL SPECIFICATIONS 50Ω @ +25°C | | | | | |
|---------------------------------------|--------------|------|-------|------|-------|
| Parameter | | Min. | Typ. | Max. | Units |
| Frequency | | 0.3 | | 180 | MHz |
| Isolation | 0.3 - 3 MHz | | 50 | | dB |
| | 3 - 90 MHz | | 40 | | dB |
| | 90 - 180 MHz | | 26 | | dB |
| Insertion Loss Above 6.0 dB | 0.3 - 3 MHz | | 0.60 | | dB |
| | 3 - 90 MHz | | 0.50 | | dB |
| | 90 - 180 MHz | | 0.80 | | dB |
| Phase Unbalance | 0.3 - 3 MHz | | 1.745 | | deg. |
| | 3 - 90 MHz | | 0.486 | | deg. |
| | 90 - 180 MHz | | 1.462 | | deg. |
| Amplitude Unbalance | 0.3 - 3 MHz | | 0.230 | | dB |
| | 3 - 90 MHz | | 0.130 | | dB |
| | 90 - 180 MHz | | 0.173 | | dB |
| VSWR | SUM Port | | 1.18 | | (:1) |
| | OUT Ports | | 1.15 | | (:1) |

| MAXIMUM RATINGS | |
|-----------------------|----------------|
| Operating Temperature | -40°C to 85°C |
| Storage Temperature | -55°C to 100°C |

| PIN CONNECTIONS | |
|-----------------|---|
| SUM PORT | 5 |
| PORT 1 | 1 |
| PORT 2 | 3 |
| PORT 3 | 4 |
| PORT 4 | 6 |
| GND EXT | 2 |

Functional Diagram



4 Way-0° Power Splitter/Combiner

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Typical Performance Data

| FREQ. (MHz) | TOTAL LOSS ¹ (dB) | | | | AMP. UNBAL. (dB) | ISOLATION (dB) | | | PHASE UNBAL. (deg.) | FREQ. (MHz) | VSWR (:1) | | | | |
|----------------|---------------------------------|------|------|------|------------------------|-------------------|-------|-------|---------------------------|----------------|--------------|------|------|------|------|
| | S-1 | S-2 | S-3 | S-4 | | 1-2 | 1-3 | 3-4 | | | S | 1 | 2 | 3 | 4 |
| 0.3 | 6.97 | 6.61 | 6.92 | 6.66 | 0.36 | 55.28 | 52.76 | 63.73 | 3.63 | 0.3 | 1.40 | 1.61 | 1.43 | 1.61 | 1.44 |
| 0.4 | 6.83 | 6.54 | 6.85 | 6.57 | 0.31 | 56.84 | 52.86 | 65.23 | 2.93 | 0.4 | 1.32 | 1.49 | 1.35 | 1.49 | 1.35 |
| 0.5 | 6.78 | 6.51 | 6.75 | 6.51 | 0.27 | 57.26 | 54.68 | 66.12 | 2.15 | 0.5 | 1.27 | 1.42 | 1.31 | 1.42 | 1.31 |
| 0.6 | 6.70 | 6.46 | 6.73 | 6.52 | 0.27 | 58.22 | 54.32 | 67.00 | 1.79 | 0.6 | 1.24 | 1.37 | 1.28 | 1.37 | 1.28 |
| 0.7 | 6.69 | 6.45 | 6.66 | 6.46 | 0.24 | 57.63 | 55.23 | 66.10 | 1.78 | 0.7 | 1.22 | 1.34 | 1.25 | 1.34 | 1.25 |
| 0.8 | 6.64 | 6.44 | 6.65 | 6.42 | 0.22 | 57.31 | 54.17 | 66.22 | 1.91 | 0.8 | 1.20 | 1.31 | 1.24 | 1.31 | 1.24 |
| 1.0 | 6.60 | 6.39 | 6.59 | 6.43 | 0.21 | 59.38 | 54.26 | 66.10 | 1.60 | 1.0 | 1.17 | 1.27 | 1.21 | 1.27 | 1.21 |
| 1.5 | 6.51 | 6.33 | 6.52 | 6.35 | 0.19 | 57.02 | 52.81 | 65.77 | 1.15 | 1.5 | 1.14 | 1.22 | 1.17 | 1.21 | 1.17 |
| 2.0 | 6.46 | 6.30 | 6.44 | 6.31 | 0.16 | 55.51 | 52.64 | 64.20 | 0.73 | 2.0 | 1.12 | 1.18 | 1.14 | 1.18 | 1.14 |
| 2.5 | 6.45 | 6.29 | 6.42 | 6.30 | 0.15 | 54.61 | 51.08 | 63.63 | 0.69 | 2.5 | 1.10 | 1.16 | 1.13 | 1.16 | 1.12 |
| 3.0 | 6.39 | 6.25 | 6.40 | 6.27 | 0.15 | 53.98 | 50.40 | 62.14 | 0.83 | 3.0 | 1.10 | 1.15 | 1.11 | 1.15 | 1.11 |
| 3.5 | 6.40 | 6.29 | 6.40 | 6.24 | 0.16 | 52.88 | 49.06 | 60.81 | 0.66 | 3.5 | 1.09 | 1.13 | 1.11 | 1.13 | 1.11 |
| 4.0 | 6.40 | 6.27 | 6.39 | 6.27 | 0.13 | 52.06 | 48.75 | 60.60 | 0.54 | 4.0 | 1.09 | 1.13 | 1.10 | 1.12 | 1.10 |
| 4.5 | 6.39 | 6.25 | 6.38 | 6.26 | 0.14 | 51.32 | 47.45 | 59.62 | 0.39 | 4.5 | 1.08 | 1.12 | 1.09 | 1.12 | 1.09 |
| 5.0 | 6.37 | 6.27 | 6.39 | 6.23 | 0.15 | 50.72 | 46.74 | 59.25 | 0.56 | 5.0 | 1.08 | 1.11 | 1.09 | 1.11 | 1.09 |
| 6.0 | 6.35 | 6.26 | 6.39 | 6.26 | 0.13 | 49.41 | 45.98 | 58.41 | 0.28 | 6.0 | 1.08 | 1.11 | 1.09 | 1.11 | 1.08 |
| 7.0 | 6.35 | 6.25 | 6.38 | 6.27 | 0.13 | 48.36 | 44.72 | 57.05 | 0.36 | 7.0 | 1.07 | 1.10 | 1.08 | 1.10 | 1.08 |
| 8.0 | 6.36 | 6.26 | 6.36 | 6.28 | 0.11 | 47.61 | 44.25 | 56.13 | 0.15 | 8.0 | 1.07 | 1.10 | 1.08 | 1.10 | 1.08 |
| 10.0 | 6.37 | 6.25 | 6.34 | 6.24 | 0.13 | 46.13 | 42.49 | 54.64 | 0.23 | 10.0 | 1.07 | 1.09 | 1.08 | 1.09 | 1.07 |
| 15.0 | 6.36 | 6.25 | 6.35 | 6.27 | 0.11 | 43.24 | 39.68 | 51.67 | 0.30 | 15.0 | 1.08 | 1.09 | 1.07 | 1.09 | 1.07 |
| 20.0 | 6.40 | 6.29 | 6.37 | 6.27 | 0.13 | 40.62 | 37.60 | 50.13 | 0.18 | 20.0 | 1.09 | 1.08 | 1.07 | 1.08 | 1.07 |
| 25.0 | 6.40 | 6.26 | 6.37 | 6.24 | 0.16 | 39.03 | 35.75 | 48.00 | 0.18 | 25.0 | 1.10 | 1.08 | 1.07 | 1.08 | 1.07 |
| 30.0 | 6.41 | 6.30 | 6.38 | 6.31 | 0.12 | 37.78 | 34.52 | 46.71 | 0.33 | 30.0 | 1.12 | 1.08 | 1.07 | 1.09 | 1.07 |
| 35.0 | 6.41 | 6.31 | 6.42 | 6.33 | 0.11 | 36.45 | 33.14 | 45.64 | 0.63 | 35.0 | 1.13 | 1.08 | 1.07 | 1.09 | 1.07 |
| 40.0 | 6.42 | 6.31 | 6.44 | 6.36 | 0.13 | 35.60 | 32.05 | 44.72 | 0.53 | 40.0 | 1.15 | 1.09 | 1.07 | 1.09 | 1.07 |
| 50.0 | 6.45 | 6.34 | 6.44 | 6.33 | 0.12 | 33.93 | 30.41 | 43.10 | 0.44 | 50.0 | 1.19 | 1.09 | 1.08 | 1.09 | 1.08 |
| 60.0 | 6.50 | 6.39 | 6.46 | 6.40 | 0.11 | 32.49 | 29.11 | 41.75 | 0.66 | 60.0 | 1.22 | 1.09 | 1.08 | 1.10 | 1.08 |
| 70.0 | 6.50 | 6.42 | 6.51 | 6.39 | 0.11 | 31.39 | 28.09 | 40.71 | 0.87 | 70.0 | 1.26 | 1.10 | 1.09 | 1.10 | 1.09 |
| 80.0 | 6.56 | 6.44 | 6.56 | 6.43 | 0.13 | 30.41 | 27.10 | 39.75 | 0.60 | 80.0 | 1.30 | 1.10 | 1.09 | 1.11 | 1.09 |
| 90.0 | 6.59 | 6.47 | 6.60 | 6.50 | 0.13 | 29.50 | 26.09 | 38.97 | 0.99 | 90.0 | 1.34 | 1.11 | 1.10 | 1.11 | 1.10 |
| 100.0 | 6.64 | 6.53 | 6.63 | 6.53 | 0.11 | 28.69 | 25.40 | 38.13 | 1.23 | 100.0 | 1.39 | 1.12 | 1.10 | 1.12 | 1.11 |
| 120.0 | 6.80 | 6.62 | 6.77 | 6.62 | 0.18 | 27.24 | 23.80 | 36.85 | 1.52 | 120.0 | 1.47 | 1.14 | 1.12 | 1.14 | 1.13 |
| 140.0 | 6.89 | 6.72 | 6.84 | 6.69 | 0.20 | 26.06 | 22.67 | 35.70 | 1.53 | 140.0 | 1.57 | 1.16 | 1.14 | 1.15 | 1.15 |
| 160.0 | 6.98 | 6.80 | 6.97 | 6.79 | 0.20 | 25.08 | 21.60 | 34.72 | 1.84 | 160.0 | 1.66 | 1.18 | 1.16 | 1.17 | 1.16 |
| 180.0 | 7.12 | 6.90 | 7.12 | 6.92 | 0.22 | 24.16 | 20.69 | 33.94 | 1.66 | 180.0 | 1.75 | 1.21 | 1.17 | 1.18 | 1.18 |
| 200.0 | 7.20 | 7.07 | 7.15 | 6.94 | 0.26 | 23.35 | 19.91 | 33.26 | 2.43 | 200.0 | 1.84 | 1.22 | 1.19 | 1.20 | 1.21 |
| 220.0 | 7.47 | 7.18 | 7.40 | 7.23 | 0.28 | 22.73 | 19.26 | 32.71 | 2.52 | 220.0 | 1.95 | 1.25 | 1.21 | 1.21 | 1.22 |
| 240.0 | 7.56 | 7.32 | 7.51 | 7.25 | 0.32 | 22.11 | 18.66 | 32.16 | 2.49 | 240.0 | 2.08 | 1.26 | 1.22 | 1.23 | 1.24 |
| 260.0 | 7.75 | 7.49 | 7.66 | 7.45 | 0.31 | 21.56 | 18.06 | 31.73 | 2.95 | 260.0 | 2.17 | 1.28 | 1.24 | 1.25 | 1.27 |
| 280.0 | 7.98 | 7.61 | 7.89 | 7.61 | 0.38 | 21.06 | 17.55 | 31.21 | 2.96 | 280.0 | 2.31 | 1.30 | 1.25 | 1.27 | 1.28 |
| 300.0 | 8.03 | 7.80 | 7.94 | 7.66 | 0.36 | 20.57 | 17.12 | 30.87 | 2.86 | 300.0 | 2.42 | 1.32 | 1.27 | 1.29 | 1.31 |

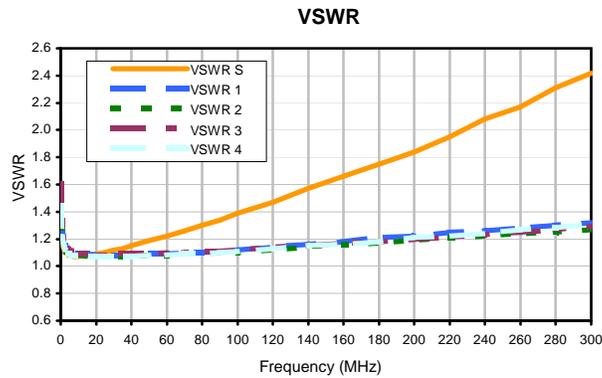
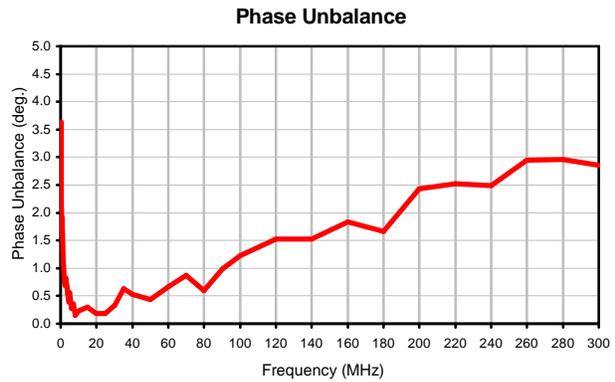
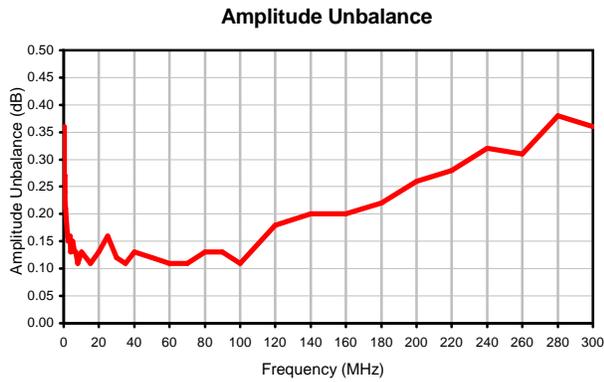
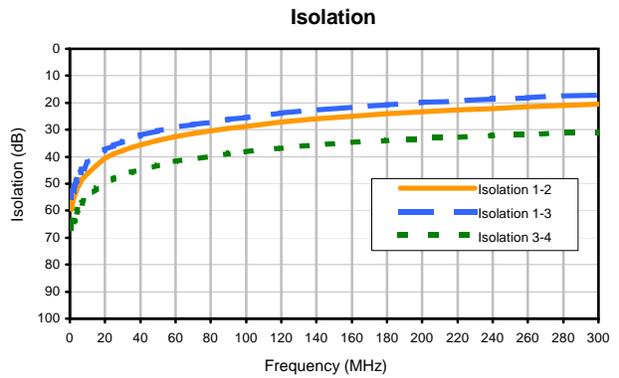
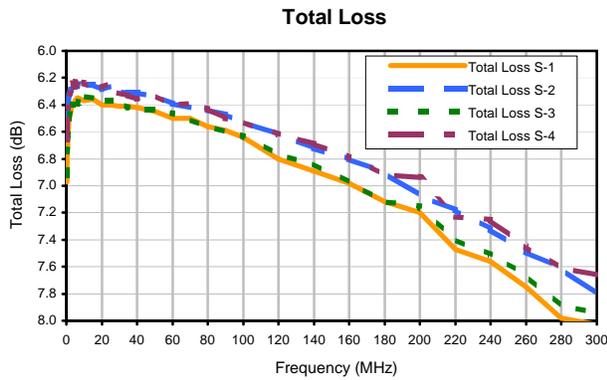
¹ Total Loss = Insertion Loss + 6dB Splitter Loss



4 Way-0° Power Splitter/Combiner

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Typical Performance Curves

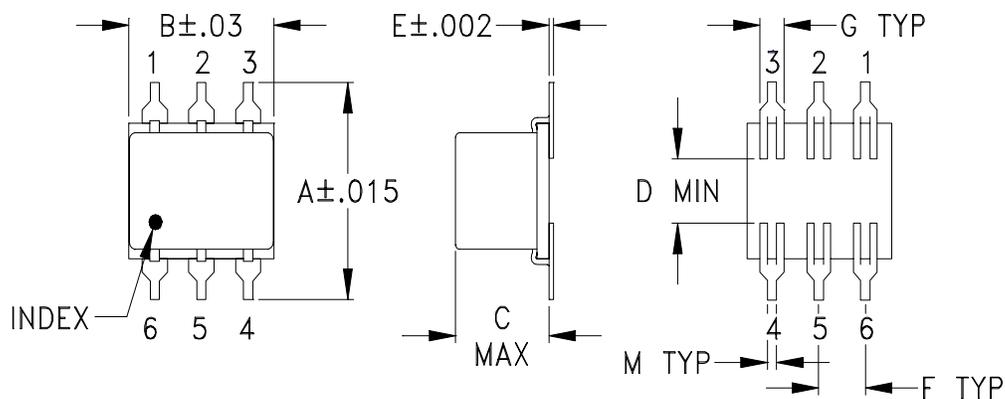


Case Style

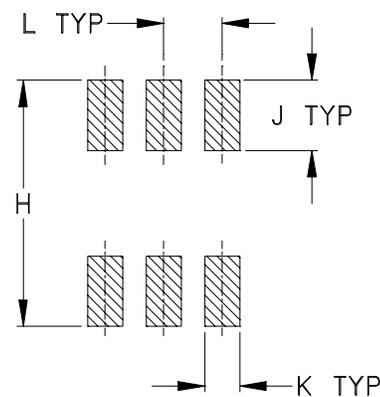
QQQ

QQQ130 (non-waterproof)
QQQ828 (washable)

Outline Dimensions



PCB Land Pattern



Suggested Layout,
Tolerance to be within $\pm .002$

| CASE# | A | B | C | D | E | F | G | H | J | K | L | M | WT, GRAM |
|--------|-----------------|---------------|----------------|---------------|---------------|----------------|----------------|-----------------|----------------|----------------|----------------|---------------|----------|
| QQQ130 | .400 (10.16) | .31 (7.87) | .200 (5.08) | .10 (2.54) | .010 (.25) | .100 (2.54) | .050 (1.27) | .420 (10.67) | .120 (3.05) | .060 (1.52) | .100 (2.54) | .020 (.51) | .55 |
| QQQ828 | | | .050 (1.27) | | | | | | | | | | .20 |

Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .01$; 3 Pl. $\pm .005$

Notes:

- Case material: Ceramic.
- Termination finish:
 - For RoHS Case Styles: Tin plate over Nickel plate.
 - For RoHS-5 Case Styles: Tin-Lead plate.



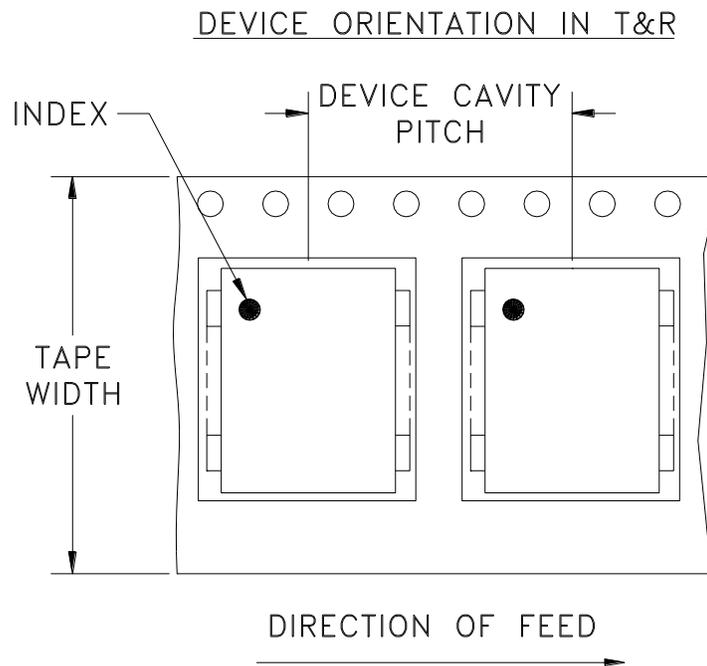
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Tape & Reel Packaging TR-F10



| Tape Width, mm | Device Cavity Pitch, mm | Reel Size, inches | Devices per Reel |
|----------------|-------------------------|-------------------|------------------|
| 24 | 16 | 7 | 10,20,50,100 |
| | | 13 | 200,500 |

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| Specification | Test/Inspection Condition | Reference/Spec |
|--------------------------------|---|--|
| Operating Temperature | -40° to 85°C Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 100° C Ambient Environment | Individual Model Data Sheet |
| Humidity | 90 to 95% RH, 240 hours, 50°C | MIL-STD-202, Method 103, Condition A, Except 50°C and end-point electrical test done within 12 hours |
| Thermal Shock | -55° to 100°C, 100 cycles | MIL-STD-202, Method 107, Condition A-3, except +100°C |
| Solder Reflow Heat | Sn-Pb Eutetic Process: 225°C peak Pb-Free Process 245° - 250°C peak | J-STD-020, Table 4-1, 4-2 and 5-2, Figure 5-1 |
| Solderability | 10X Magnification | J-STD-002, 95% Coverage |
| Vibration (High Frequency) | 20g peak, 10-2000 Hz, 12 times in each of three perpendicular directions (total 36) | MIL-STD-202, Method 204, Condition D |
| Mechanical Shock | 50g, 11 ms, 1/2-sine, 18 shocks: 3 each direction, each of 3 axes | MIL-STD-202, Method 213, Condition A |
| Marking Resistance to Solvents | Isopropyl alcohol + mineral spirits at 25°C; terpene defluxer at 25°C; distilled water + proylene glycol monomethyl ether + monoethanolamine at 63°C to 70°C | MIL-STD-202, Method 215 |