

# Small Quantity Tape and Reel Splicing

(AN-40-017)

## I. MINI-CIRCUITS' INNOVATIVE TAPE AND REEL PROCESS

Several years ago, Mini-Circuits CEO, Harvey Kaylie identified a void in the market: customers who were unable to justify purchasing a full-reel quantity of surface-mount components, but wanted smaller quantities packed for automated pick-and-place process. At that time, choices were limited to paying an extra 'up charge' for custom reel quantities, or ordering parts in loose condition, without the leader or trailer needed for automatic placement.

## II. THE SOLUTION WAS SIMPLE!

Mini-Circuits began offering our customers surface-mount parts in '*standard small quantity reels*' of 20, 50, 100, 200 and 500 parts per reel, complete with EIA 481 approved leader and trailer. In addition, we were able to make the pricing attractive enough for customers to justify ordering in standard quantities rather than odd amounts.

As simple as this concept may sound, achieving it was no easy matter. A major project was initiated to identify the ideal reel quantities based on historical customer demand. Re-taping each reel for the smaller quantity was very time consuming and involved touching every part. We needed to devise a practical way to count out the required quantity and add the leader and trailer.

## III. MINI-CIRCUITS SPLICING

Splicing of carrier tape is a process that has been around for decades. In fact, it is based on splicing of photographic film and uses similar controls based on sprocket spacing. Splicing kits including clamps and tapes are widely available, but most of these are intended for manual, low volume processing.

New, high-speed equipment was needed and was designed and built in-house in Mini-Circuits' machine shops. The equipment included precise counting, trimming and clamping mechanisms that allowed us to keep up with ever increasing demand for small quantity tape and reel packaging. Consistency of application and clamping is the highest priority to prevent jams in customer feeders.

## IV. INNOVATIVE FLAT LEADER AND TRAILER TAPE

One concern with splicing is the requirement to have leaders and trailers of the same carrier tape as the rest of the reel. This became a bottleneck of trying to match leaders and trailers with the wide variety of pocket shapes and sizes used for Mini-Circuits surface mount components.

Someone raised the question, '*Why do we need pockets at all for leaders and trailers?*' In truth, all carrier tape manufacturers start with flat ribbons of film and form the pockets as a secondary operation. We contacted the suppliers and ordered the basic tape widths needed without pockets. This saved a lot of time and money and increased our efficiencies and consistency.



Figure 1: flat leader/trailer tape spliced onto carrier tape with pockets.

## V. COMPLIANCE WITH EIA-481

After several years of successfully providing customers with small quantity reels, we received a complaint from a major customer advising us that our flat tape was not compliant to the EIA-481 standard because the standard (originated several decades ago) specifically defines the length of leader and trailer using 'empty pockets' in the description. According to the complaint, flat tape does not have pockets, empty or otherwise, and is therefore, non-compliant.

As this was the first and only complaint of this kind we'd received, we could have let it slide and used pocketed tape for the leader and trailer. Instead, however, we went a step further and looked at this as an opportunity to improve, not only for ourselves, but for the industry at large as well.

## VI. COMMON SENSE PREVAILS

We were able to identify one of the directors of the ECIA, the parent body of the EIA standards, and as luck would have it, the group had a meeting scheduled that very week to review upgrades. Samples of Mini-Circuits' flat trailer and leader splicing were provided and reviewed by the working group. As a result of their review, the next release of the EIA-481 standard will remove the unnecessary words about 'empty pockets' from the standard. *Flat leader and trailer tape is compliant.*

## VII. CUSTOMER CHOICES

This article illustrates one of many ways Mini-Circuits anticipates customer needs, takes steps to address those needs, and uses innovative methods to continuously improve our products and services.

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