

FTTH Compliant Truly Fused 1x4 Couplers for Passive Optical Network (PON) Applications

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Introduction:

Fiber to the Home segment has widely accepted Passive Optical Networks as the main branching network due to its advantages like protocol and data rate independency, economic benefit and convenience of deploying in fields without any electrical power requirements, etc. The fused bi-conical couplers are known to have limited bandwidth performance and there has been a sidelining of fused couplers for FTTH applications. NeST's improved design and refined fabrication technologies have now brought the bandwidth performance of these couplers compatible with Planar Lightwave Circuits in terms of its usage in FTTH applications with considerable cost benefits.

FTTH PON:

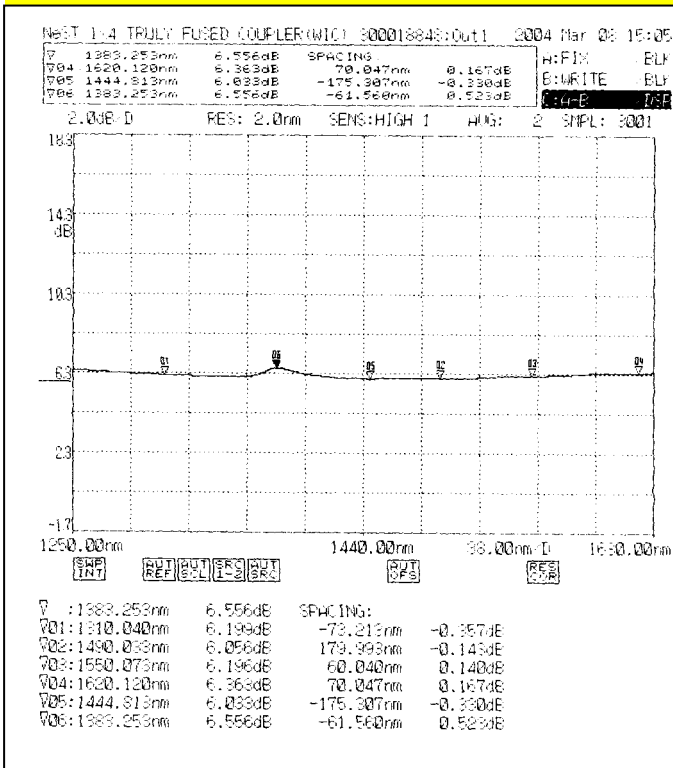
The Fiber to the Home network shall combinably support Data, Voice and Video services which are individually reaching from various origins like Ethernet/IP or ATM interfaces, Public Switched Network and Cable TV Head end or satellite feed, respectively. The wavelength of operation of voice and data are 1310nm upstream and 1490nm downstream. The wavelength of operation of video is 1550 nm. Since the fiber optic physical layer network has become so branched and complex, monitoring of these fibers as well as the healthy operation of associated systems have become a necessity. A separate wavelength which is out of the normally used band is being identified for this, namely 1625 nm. It has become a practice to use OTDRs at 1625 nm, to monitor the existing optical networks.

In order to fully comply with the FTTH optical bandwidth requirements, it is a must that each and every branching component used as either PON or otherwise should be able to operate over this wide band starting from 1300 nm to 1635 nm. Through improved designs and finer fabrication technologies, NeST has come up with a truly fused 1x4 Wavelength Independent Coupler, which performs over the above said band.

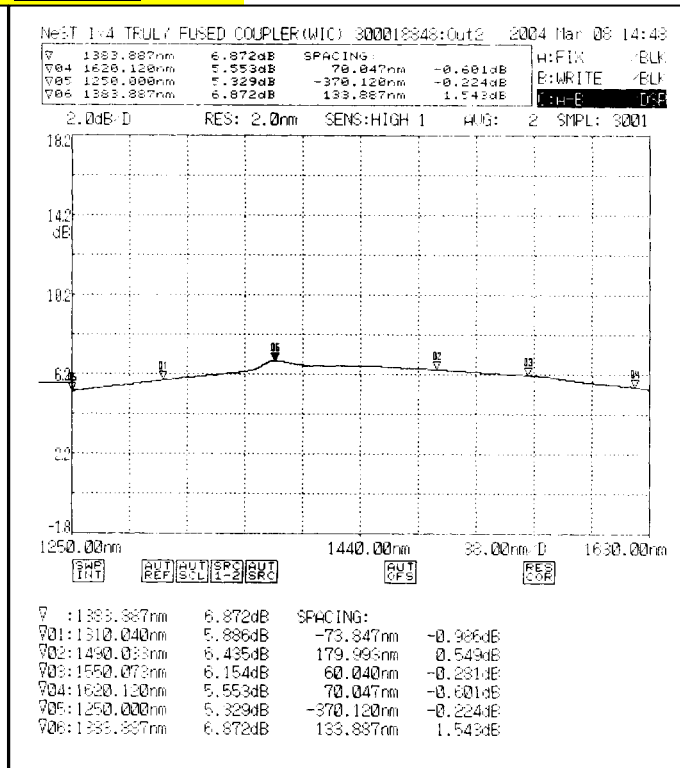
FTTH Compliant 1x4 Truly Fused Couplers

The commonly used splitting device in FTTH are 1x4, 1x8 and 1x16. Using 1x4 truly fused coupler as the basic component, 1x8 and 1x16 can be built which are comparable in performance with that of PLCs. It is also made sure that there is not much degradation in uniformity when such cascades are made. NeST manufactures various types of couplers and their performances are stored in data base during testing itself. An automatic mix and match algorithm then identifies specific couplers for use to achieve the best uniformity while cascaded.

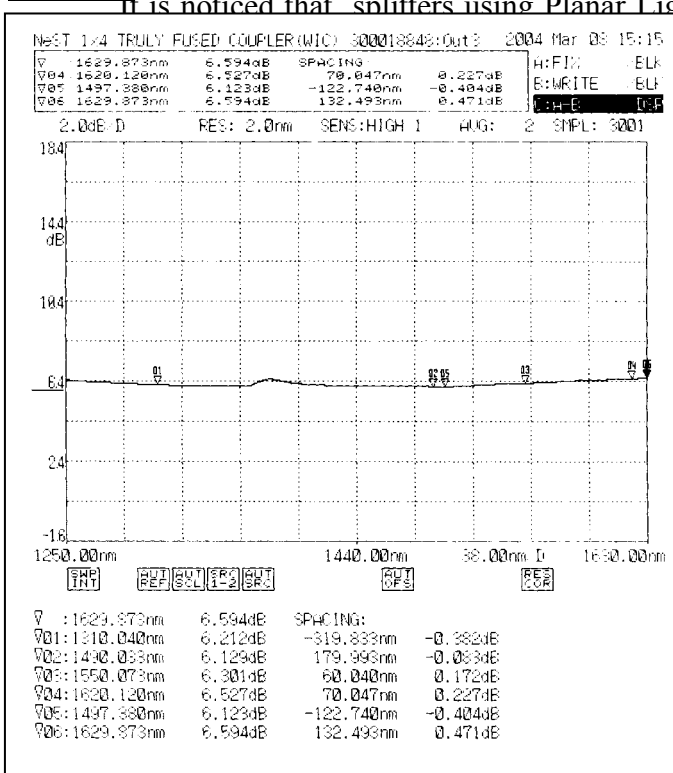
Output-1



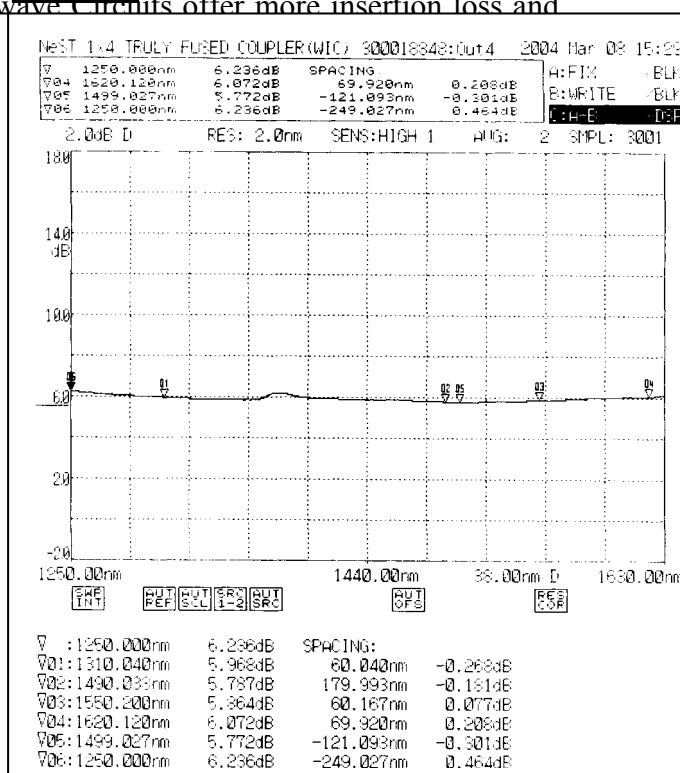
Output-2



Output-3



Output-4



It is noticed that splitters using Planar Lightwave Circuits offer more insertion loss and

Loss is one of the main concern and any extra loss in power directly brings in reduction of number of subscribers to the service provider. This becomes a permanent loss to the service provider. But if we consider the uniformity of these splitters, the case is not so. There can be little less power in one branch whereas that extra power is going to another branch. There is a possibility that the total number of subscribers can be still maintained and the service provider is at no loss.

Another advantage of using fused type branching modules is the optical path is epoxy free. Therefore, there is no performance degradation due to change in epoxy characteristics over time.

Cost Advantage

There is sure to be a cost advantage when a fused splitter is considered compared to that of PLC counterpart.

Size

When one compares 1x4 truly fused and the PLC splitter, the size of the truly fused is less. But when one compares 1x8 and 1x16 splitters, the cascaded fused couplers require more space for proper routing and normally these are managed within a splitter unit. But in FTTH applications, normally these splitters are not kept open as such and are managed within a metallic box to make it a splitter unit. This facilitates the service provider to mount in network racks. The improved stacking mechanism of the individual fused couplers within the box makes it possible to use the same splitter unit box of PLC.

Reliability

The truly fused couplers are manufactured under strict quality control in ISO 9000:2000 certified facility, which has got the credit of manufacturing around 1 million couplers per year. Each coupler manufactured undergoes rigorous temperature cycling and drop tests before they are tested and packed. The truly fused 1x4 couplers passed Telcordia 1209 tests and are undergoing 1221 tests.

Conclusion

NeST's 1x4 Truly Fused Couplers perform throughout the band from 1260 to 1630 nm and are FTTH Compliant. This forms the basic element in 1x8 and 1x16 splitters and are cost effective compared to their PLC counterparts without any compromise on reliability.