

FEC Symbol Capture Function for Evaluating 400 GbE FEC Symbol Errors

PAM4 ED MU196040B

Signal Quality Analyzer-R MP1900A Series



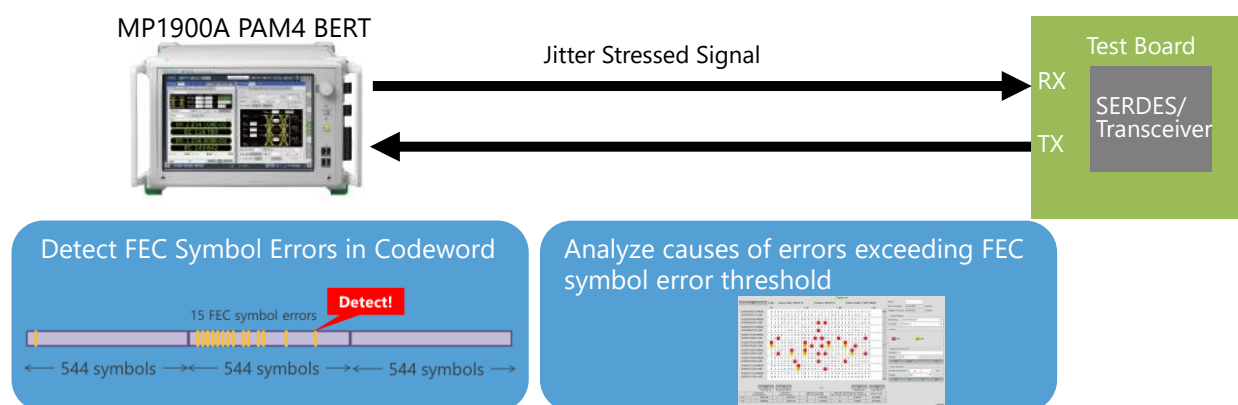
Outline

To assure transmission quality, IEEE standards specify FEC for fast and large-capacity communications using PAM4 signaling, such as 400 GbE. As a result, jitter tolerance test measurements of SERDES transceivers as well as DSP receivers require evaluation of FEC-uncorrectable symbol errors.

The Signal Quality Analyzer-R MP1900A series is a high-performance BERT for evaluating the PHY layer of current 400-GbE and future 800-GbE PAM4 transmissions. With a high input sensitivity of 36 mV EH at 53 Gbaud, the MP1900A PAM4 Error Detector (ED) achieves more accurate Pre-FEC jitter tolerance performance evaluation, while the FEC Symbol Capture function helps analyze which data stream caused the uncorrectable errors.

Consequently, in addition to evaluating DUT performance capacity, the MP1900A can also be used to evaluate whether IEEE transmission standards are met when using FEC.

[Target Applications] 50, 100, 200, 400, and 800 GbE



Features

- High input sensitivity performance of 36 mV EH at 53 Gbaud plus FEC Symbol Capture function for Pre-FEC jitter tolerance evaluation and analysis of FEC uncorrectable errors
- FEC Symbol Error detection for IEEE802.3-defined RS-FEC Codeword length and FEC Symbol length standards
- Input signal capture at timing exceeding settable FEC Symbol error threshold (1 to 32 per step), and Input Pattern Analysis function for causes of errors exceeding the threshold

Typical Specifications

Item	Specification
Baud Rate	2.4 Gbaud to 32.1 Gbaud (Opt-001) 2.4 Gbaud to 58.2 Gbaud (PAM4)/64.2 Gbaud (NRZ) (Opt-002)
Input Sensitivity (Eye Height)	NRZ: 19 mV @ 26.5625 Gbaud, 21 mV @ 53.125 Gbaud PAM4: 23 mV @ 26.5625 Gbaud, 36 mV @ 53.125 Gbaud
Clock Recovery	2.4 to 29 Gbaud (Opt-021) or 32.1 Gbaud (Opt-022) 51 to 58.2 Gbaud extension (Opt-023)
Capture	(PAM4 requires MU196040B-041 option)
Capture Mode	FEC Symbol Capture , Sync Mode Capture, Raw Data Capture
Block Count	1, 2, 4, 8, 16, 32, 64, 128
Block Length	NRZ: 8 Mbits/n; PAM4: 4 Msymbols/n (n = Block Count)
Trigger	Consecutive Error Detect , Intermittent Error Detect , Error Detect, Match Pattern, Manual
FEC Symbol Capture Settings	
FEC Symbol Length	10 or 20 bits
Presets	NRZ: Variable; 25G NRZ 1 Lane, 100G NRZ 4 Lane PAM4: Variable; 50G PAM4 1 Lane, 100G PAM4 1 Lane, 100G PAM4 2 Lane, 200G PAM4 4 Lane, 400G PAM4 4 Lane, 400G PAM4 8 Lane
Number of FEC Symbols	68, 132, 136, 272, 528, 544 FEC Symbols, 1 FEC Symbol step (Sets FEC Symbol count per Lane in 1 Codeword)
FEC Symbol Error Threshold	1 to 32 FEC Symbols, step 1: at Consecutive Error Detect 1 to n, 1 FEC Symbol, step 1: at Intermittent Error Detect (n = FEC Symbol count in 1 codeword)

Ordering Information

Model	Name
MU196040B	PAM4 ED
MU196040B-001	32G baud (2.4 to 32.1 Gbaud)
MU196040B-002	58G baud (2.4 to 64.2 Gbaud NRZ/2.4 to 58.2 Gbaud PAM4)
MU196040B-011	Equalizer
MU196040B-021	29G baud Clock Recovery (2.4 to 29 Gbaud)
MU196040B-022	32G baud Clock Recovery (2.4 to 32.1 Gbaud)
MU196040B-023	58G baud Clock Recovery Extension (51 to 58.2 Gbaud)
MU196040B-041	SER Measurement (Requires FEC Symbol Capture option)