

# DOE Design Summary

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## Design Overview

Design Type	Full Factorial Design
Number of Runs	840 (10 × 42 × 2)
Response Variable	Interface Temperature (°C)
Experiment Type	Three-Factor Factorial with Main Effects, 2-way, and 3-way Interactions

## Factor Levels and Definitions

Factor	Type	Levels	Description
Transceiver Manufacturer	Categorical	10	Accelight, CENTERA, Eoptolink, Finisar, Hisense, Intel Corp, Ligent Photonics, NON-JNPR, O
Rack Unit	Categorical Discrete	42	Integer values: 1, 2, 3, ..., 42 (representing physical rack positions)
Fan Speed Range	Categorical Binary	2	L = Low (< 9,999 rpm) H = High (≥ 10,000 rpm)

## Model Structure

**Main Effects:** 3 factors  
**Two-Factor Interactions:** 3 interactions (Mfr×Rack, Mfr×Speed, Rack×Speed)  
**Three-Factor Interaction:** 1 interaction (Mfr×Rack×Speed)  
**Total Model Terms:** 820 parameters (full factorial expansion)  
**Significant Terms (Reduced Model):** 25 parameters (after filtering  $p \leq 0.05$ )

## Data Summary

**Total Observations:** 7,600  
**Unique Factor Combinations:** 840 (representing all possible combinations of factors)  
**Replications:** Approximately 9 replications per combination ( $7,600 \div 840 \approx 9$ )