

# Temp Profile to Maintain Optimum FIT Performance

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## 2 Introduction

Temperatures within the product cases of modern telecommunication equipment are increasing due to higher IC integration, and denser channel configurations. Even with moderately elevated environmental temperatures, IC junction temperatures are rising to near-maximum limits. Naturally, operation at elevated junction temperatures must be controlled to maintain device reliability in the field.

## 3 Data Sheet Junction Temperature Limits

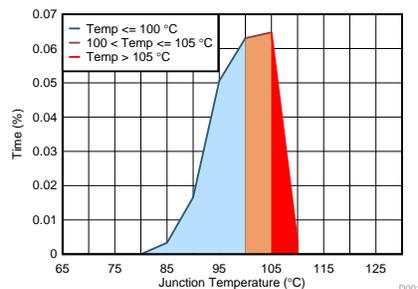
The data sheet provides a maximum operating junction temperature of 110°C. To prevent any undesired degradation in reliability, avoid continuously operating at this temperature over extended durations.

As denoted in [Equation 1](#), cumulative operating time between 105°C and 110°C must be less than one-third of the total operating time below 100°C.

$$\int_{T_j=105^{\circ}\text{C}}^{110^{\circ}\text{C}} t \, dT_j \leq \frac{1}{3} \times \int_{T_{j,\text{min}}}^{100^{\circ}\text{C}} t \, dT_j \quad (1)$$

With standard model assumptions, the operation temperature of the device may extend beyond 105°C if the duration is offset by operating below 100°C for at least three times that amount of time. In a discrete example, say the device operates at 110 degC for 20% of time. That time must be compensated for by operating at (or below) 100°C for at least 60% of the time. For the remaining time, the device operates between 100°C and 105°C.

[Figure 1](#) illustrates an example temp profile that satisfies the previously discussed restriction. The area under the temp profile curve from 105°C to 110°C (red) is equal to one-third of the area under the curve up to 100°C (blue).



**Figure 1. Example Temperature Profile**

## 4 Conclusion

The temp profile provided in this report is strictly for illustrative purposes. It is not intended to be a recommended profile. It is simply an example of an arbitrary temp profile that satisfies the criteria in [Equation 1](#). The model supports operating up to 110°C as long as sufficient time is spent operating at cooler temperatures (< 100°C). However, it is recommended to keep junction temperatures as low as possible to maintain the best reliability.

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