



QUALITY & RELIABILITY ENGINEERING

FIT and MTTF Calculation Report

November 6, 2023

PN Family Series	TQM300NB06DCR
Part Description	60V, 25A, Dual N-Channel Power MOSFET
Package Type	PDFN56U Dual

Test Variables:

Stress Test	=	HAST	
No. of failures	=	0	units
No. of devices	=	77	units
No. of hours	=	96	hours
Accelerated Temp (Ta)	=	130	° C
Operating Temp (Tu)	=	100	° C
Accelerated RH (Ha)	=	85	%
Operating RH (Hu)	=	20	%
Activation Energy (Ea)	=	0.9	eV
Confidence Level	=	90	%
Boltzman's Constant (k)	=	8.617E-05	eV / ° K
Model Constant (n)	=	3	

Calculations:

$$\begin{aligned}
 \text{Chi squared value} &= 4.605170186 \text{ @ 90\% Confidence Level} \\
 \text{Failure Rate (@Ta)} &= \frac{(\text{Chi squared value})}{2(\text{No of devices})(\text{No of hours})} \\
 &= 311.50 \text{ PPM-Hrs}
 \end{aligned}$$

$$\begin{aligned}
 \text{Acceleration Factor}^{[1]} &= [\text{Ha}/\text{Hu}]^n \cdot \exp^{[(\text{Ea}/k) ((1/\text{Tu}) - (1/\text{Ta}))]} \\
 \text{(Temperature \& Humidity)} &= 616.154
 \end{aligned}$$

Results:

$$\begin{aligned}
 \text{Failure Rate (@ Use conditions)} &= (\text{Failure Rate (@ Accelerated conditions)} / (\text{AF})) \\
 &= 506 \text{ FIT}
 \end{aligned}$$

$$\begin{aligned}
 \text{Mean-Time-to-Failure (MTT)} &= 1978043 \text{ hours} \\
 &= 226 \text{ years}
 \end{aligned}$$

^[1]Based on Hallberg-Peck Acceleration Model