TAIWAN SEMICONDUCTOR

Report Date: December 7, 2022

QUALITY & RELIABILITY ENGINEERING
FIT and MTTF Calculation Report

PN Family Series	TQM150NB04DCR
Part Description	40V, 39A, Dual N-Channel Power MOS
Package Type	PDFN56U Dual

Test Variables:

Stress Test	=	**HTRB**	
No. of failures	=	0	**units**
Sample Size	=	77	**units**
Test Duration	=	1000	**hours**
Total device hours	=	77000	**hours**
Accelerated Temp (Ta)	=	175	**° C**
Operating Temp (Tu)	=	55	**° C**
Activation Energy (Ea)	=	0.7	**eV**
Confidence Level	=	90	**%**
Boltzmann's Constant (k)	=	8.617E-05	**eV / °K**

Calculations:

Chi squared value = **4.6051702** @ 90% Confidence Level

Failure Rate *(@accelerated condition)* = $\frac{\text{(Chi squared value)}}{\text{2*(Sample Size)*(Test Duration)}}$

= **29903.70 FIT**

Acceleration Factor, AF = $e^{(Ea/k)(1/Tu - 1/Ta)}$

= **760.4701686**

Results:

Failure Rate *(@operating condition)* = (Failure Rate *@accelerated condition*) / (AF)

= **39 FIT**

Mean Time to Failure (MTTF) = **25430636 hours**

= **2903 years**