

IPOSIM Lifetime Calculation Report

Report No: 51d2d008-b820-4628-b72d-79753e9fd13a

2021-11-19

User	Customer
	Infineon Technologies AG

Summary

Lifetime calculation for:	FF1200R17IP5
Topology:	DC/AC Three Phase - 2 Level
Load cycle duration:	1:47:28 [h:min:s]
Analysis mode:	Single cycle simulation
Cooling:	User defined heatsink
Max. junction temperature:	168.7°C (Diode)
Estimated lifetime:	3265 possible cycles
Lifetime limitation :	Diode - Power cycling

User comments

test_6k5Points

Calculation status message

Calculation finished normally

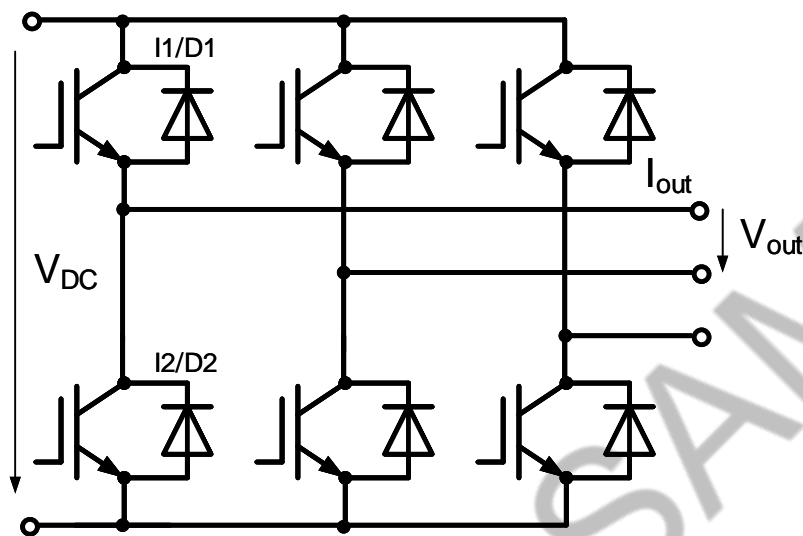
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1 Simulation Conditions

1.1 Simulation Parameters

Selected topology: DC/AC Three Phase - 2 Level



Control algorithm: Sine-Triangle PWM
Load type: Lagging (inductive)

1.2 Application Parameters

$R_{g,on}$: 0.6 ■
 $R_{g,off}$: 1.0 ■

1.3 Cooling Conditions

Ambient temperature: 40°C
Heatsink thermal model:

i	1	2	3	4	5
$R_{th,hs,i}$ [K/W]	0.0824	0	0	0	0
$\tau_{th,hs,i}$ [s]	70	1	1	1	1

1.4 Selected Device

FF1200R17IP5

Voltage class: 1 700 V
Current rating: 1 200 A
Package: PrimePACK2

IGBT Parameters

$V_{ce,sat}$: 2.14 V (at 1 200 A, 125 °C)
 E_{on} : 0.3995 J (at 1 200 A, 125 °C)
 E_{off} : 0.3984 J (at 1 200 A, 125 °C)
 $R_{th,JH}$: 0.024 K/W
 $T_{vj,max}$: 175 °C

Diode Parameters

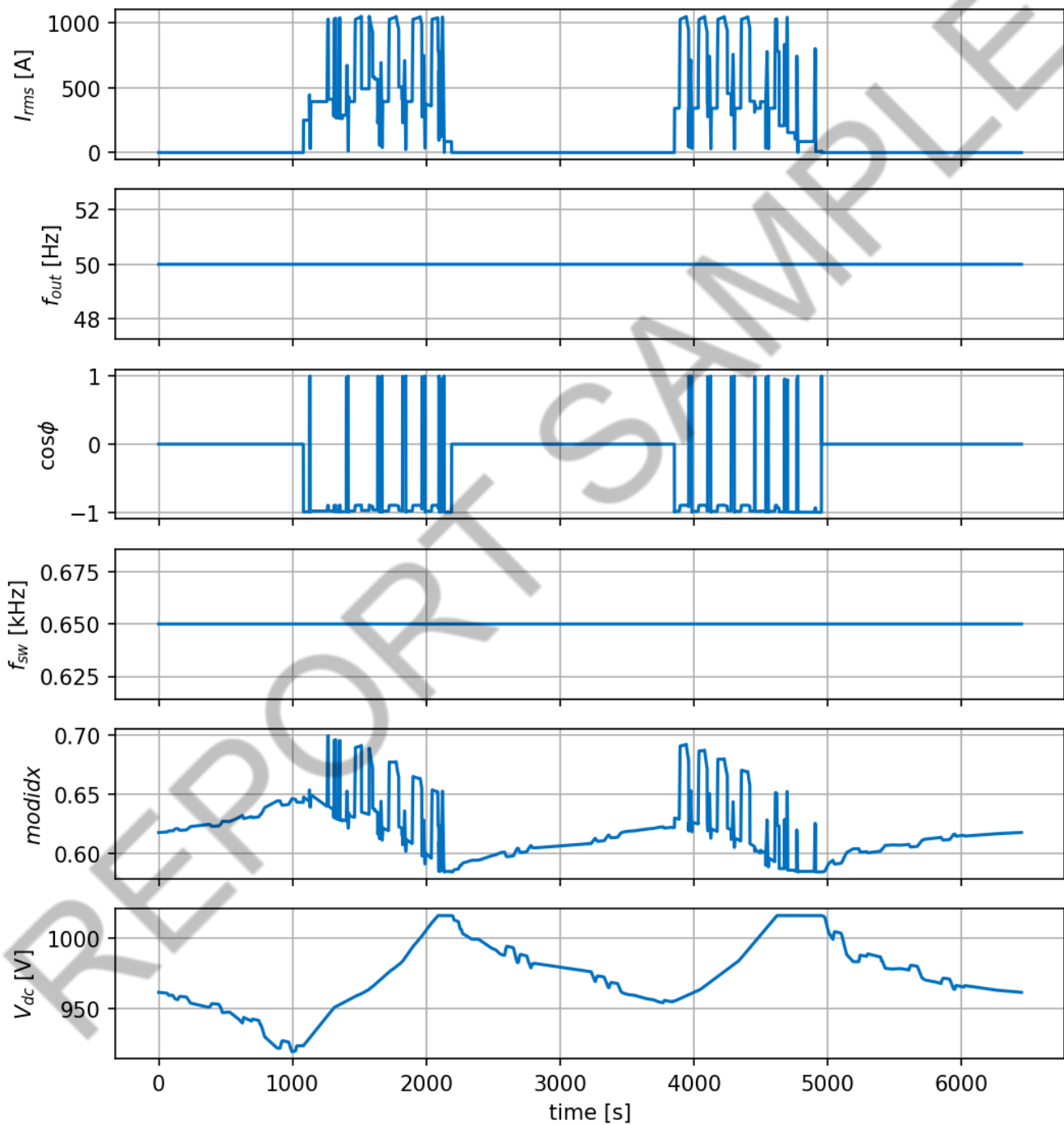
V_f : 1.74 V (at 1 200 A, 125 °C)
 E_{rec} : 0.244 J (at 1 200 A, 125 °C)
 $R_{th,JH}$: 0.044 K/W
 $T_{vj,max}$: 175 °C

Product website: <https://www.infineon.com/>

1.5 Load Cycle Profile

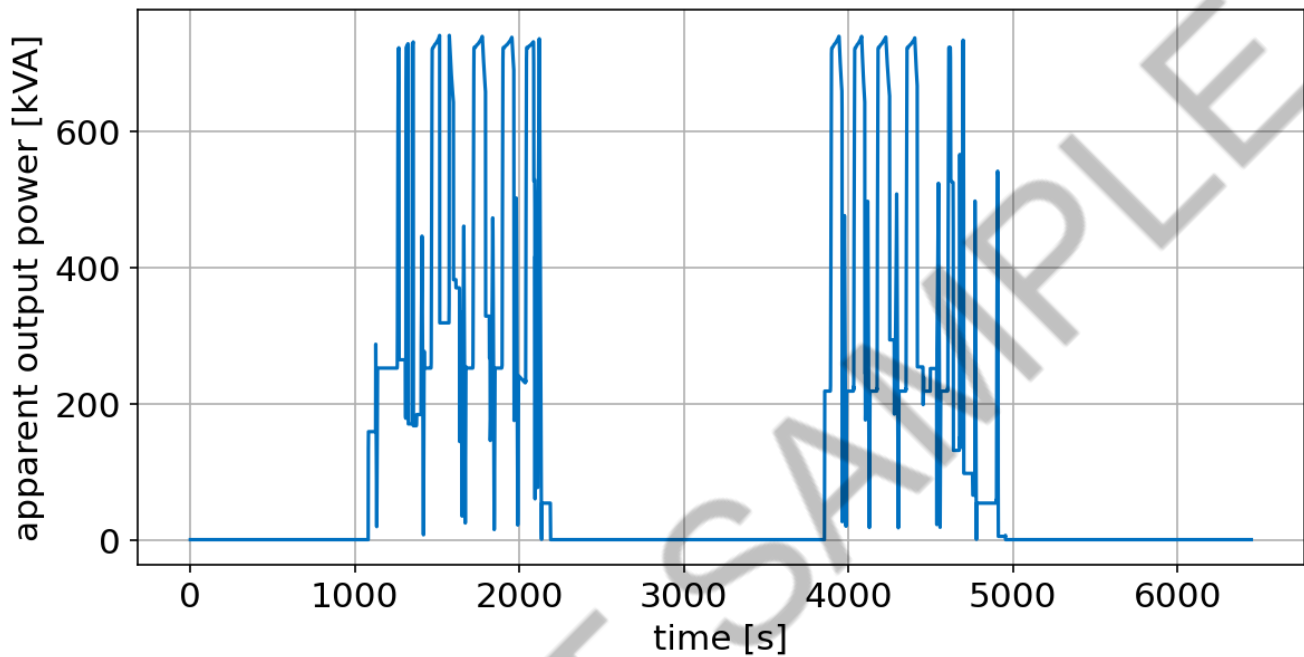
Load cycle duration: 1:47:28 [h:min:s]

Interpolation: Yes

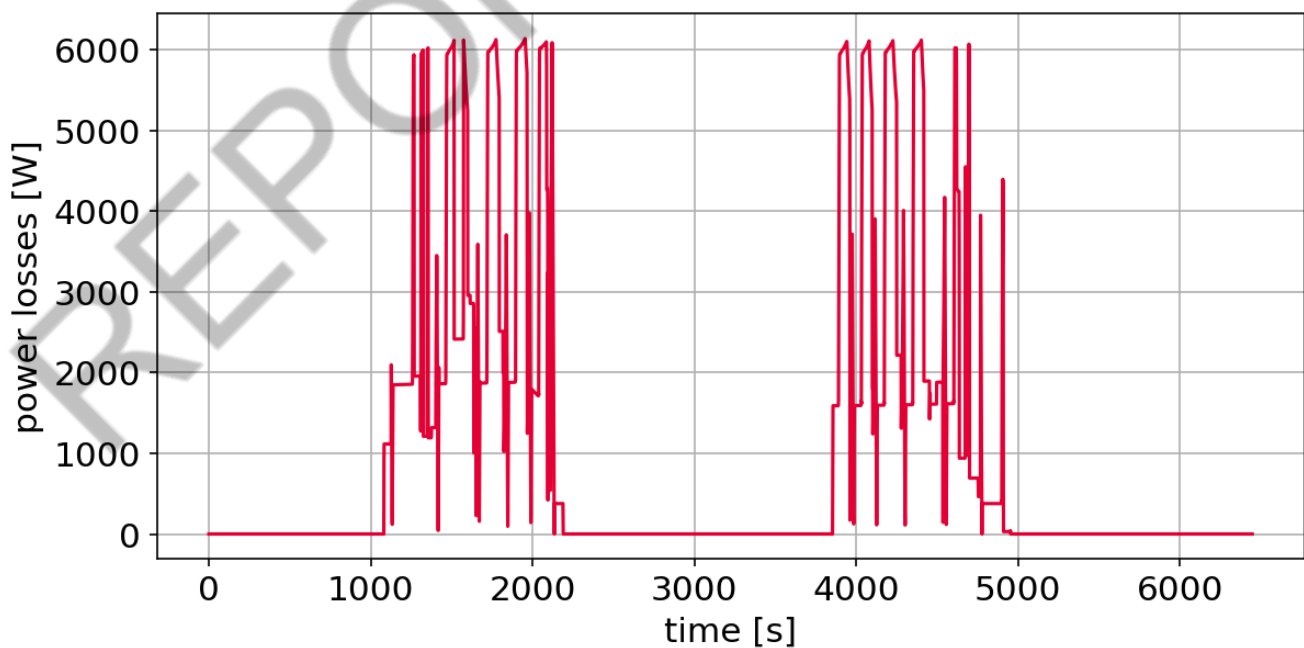


2 Simulation Results

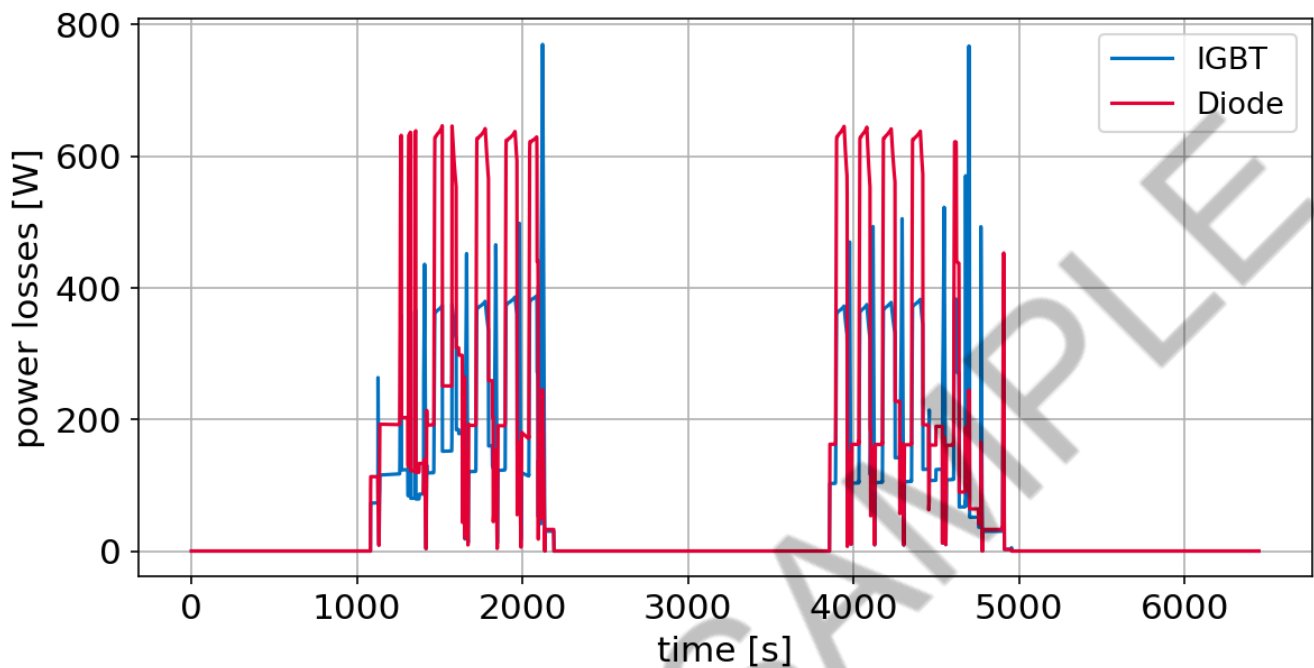
Converter Output Power



Converter Power Losses

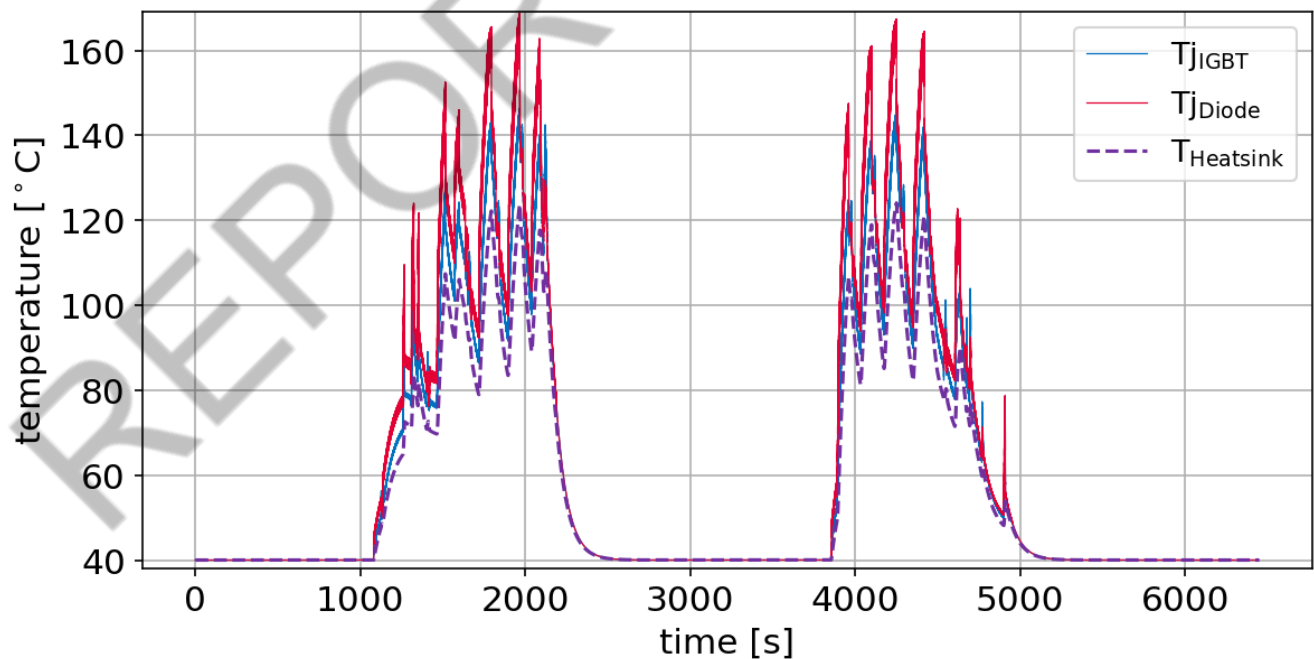


Device Power Losses



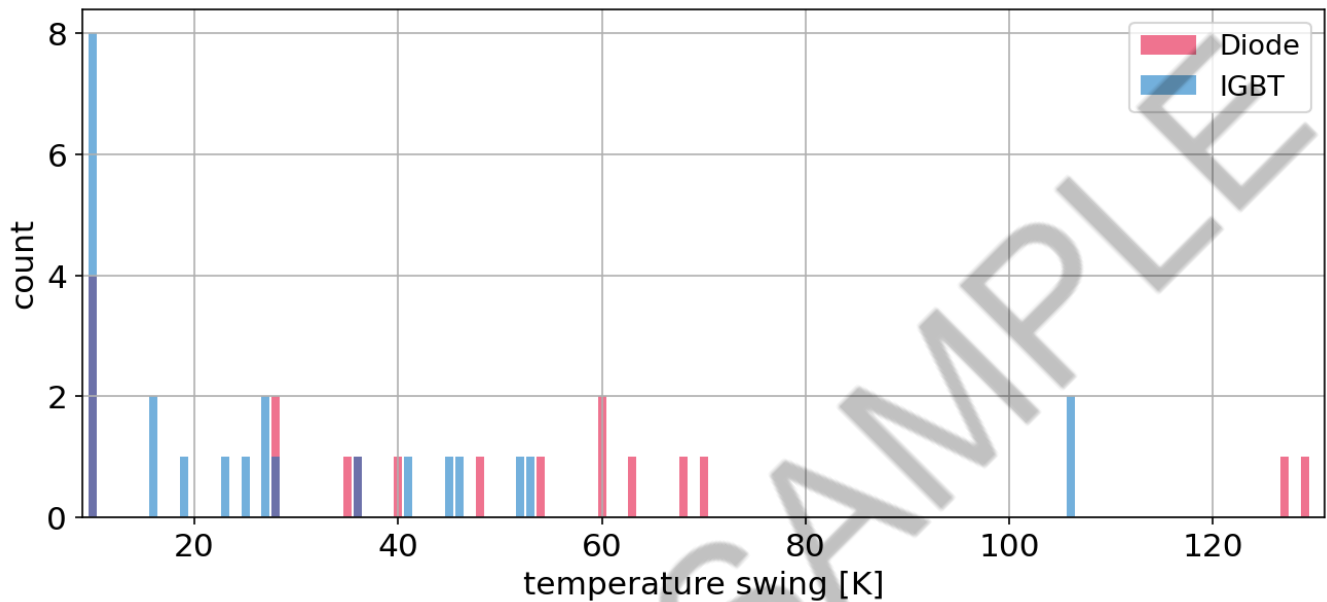
Temperature Results

Ambient temperature: 40 °C

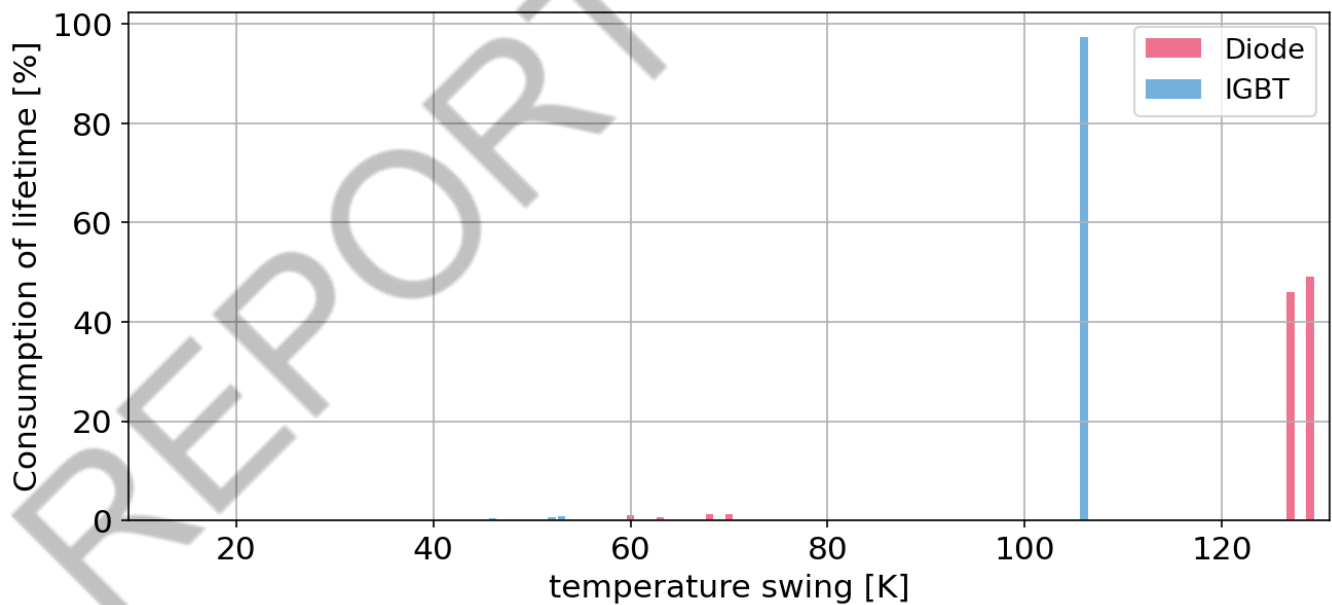


3 Lifetime Calculation

3.1 Power Cycling of IGBT and Diode



Lifetime Consumption



Estimated power cycling lifetime for IGBT: **10858** cycles

Estimated power cycling lifetime for Diode: **3265** cycles

3.2 Summary of Lifetime Calculation

	Power cycling IGBT	Power cycling Diode	Thermal cycling
Possible number of cycles	10858	3265	n/a

Total lifetime: **3265 cycles**
Lifetime limitation: **Diode - Power cycling**

Notes:

- Thermal cycling is not calculated for certain types of modules, e.g. baseplate-less modules, or if a fixed heatsink temperature is selected as cooling condition.

References

- [1] AN2019-05 PC and TC Diagrams
- [2] Product Parameters: Datasheet FF1200R17IP5
- [3] Product Website: <https://www.infineon.com/>
- [4] Power Cycling Reference: (PC-15) Power Cycling IGBT5 rev.2
- [5] Thermal Cycling Reference: n/a

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