

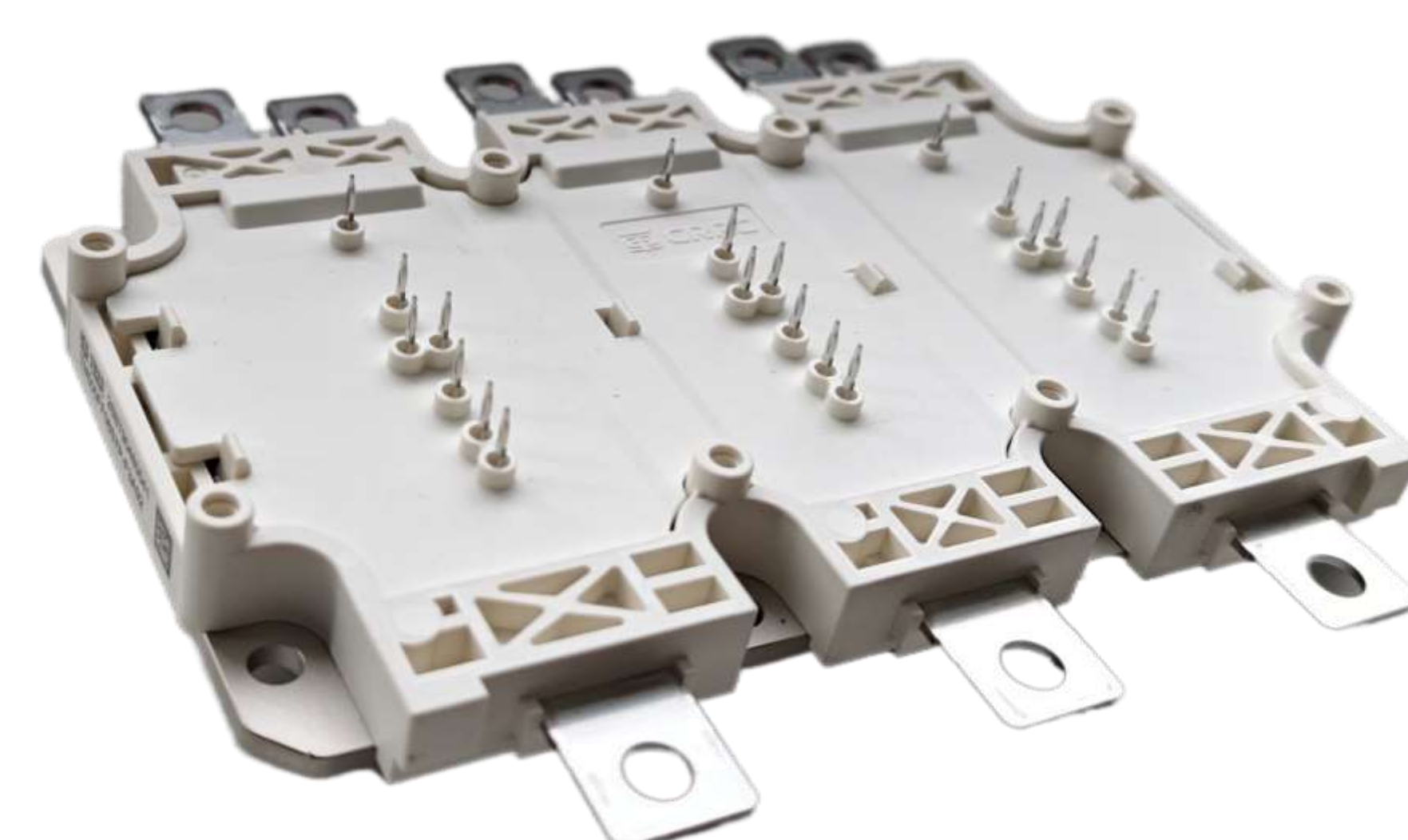
900V High Junction Temperature and High Reliability SiC MOSFET for Automotive Drive Applications

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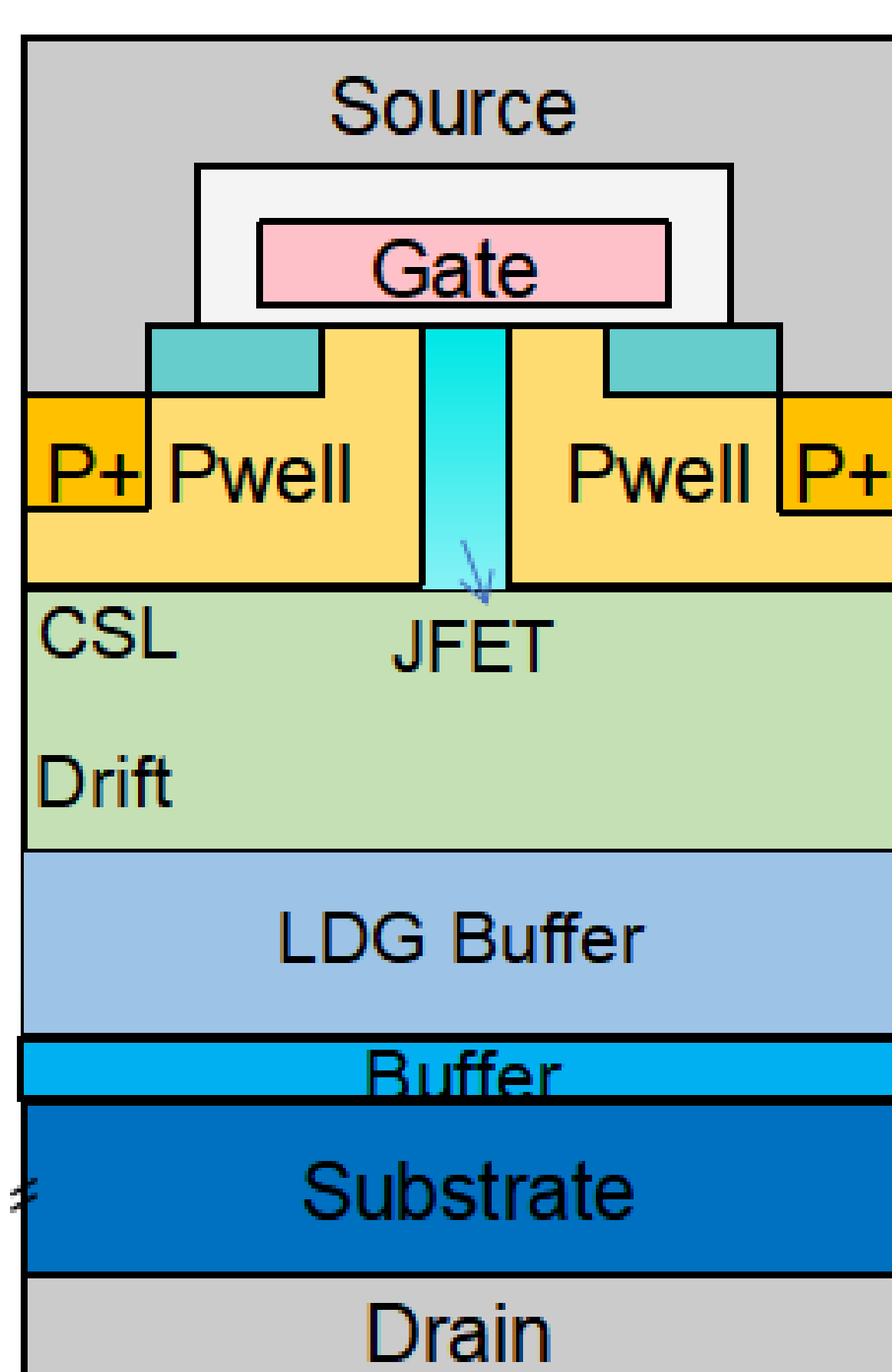
Introduction

- Declining SiC Raw Material Costs Enhance Low-Voltage SiC MOSFET Market Prospects
- 900V Rated Voltage, 185 °C Long-Term Junction Temperature, 200 °C Reliability
- Validation Based on CRRC S3 4-chip Configuration in HPDmini Module

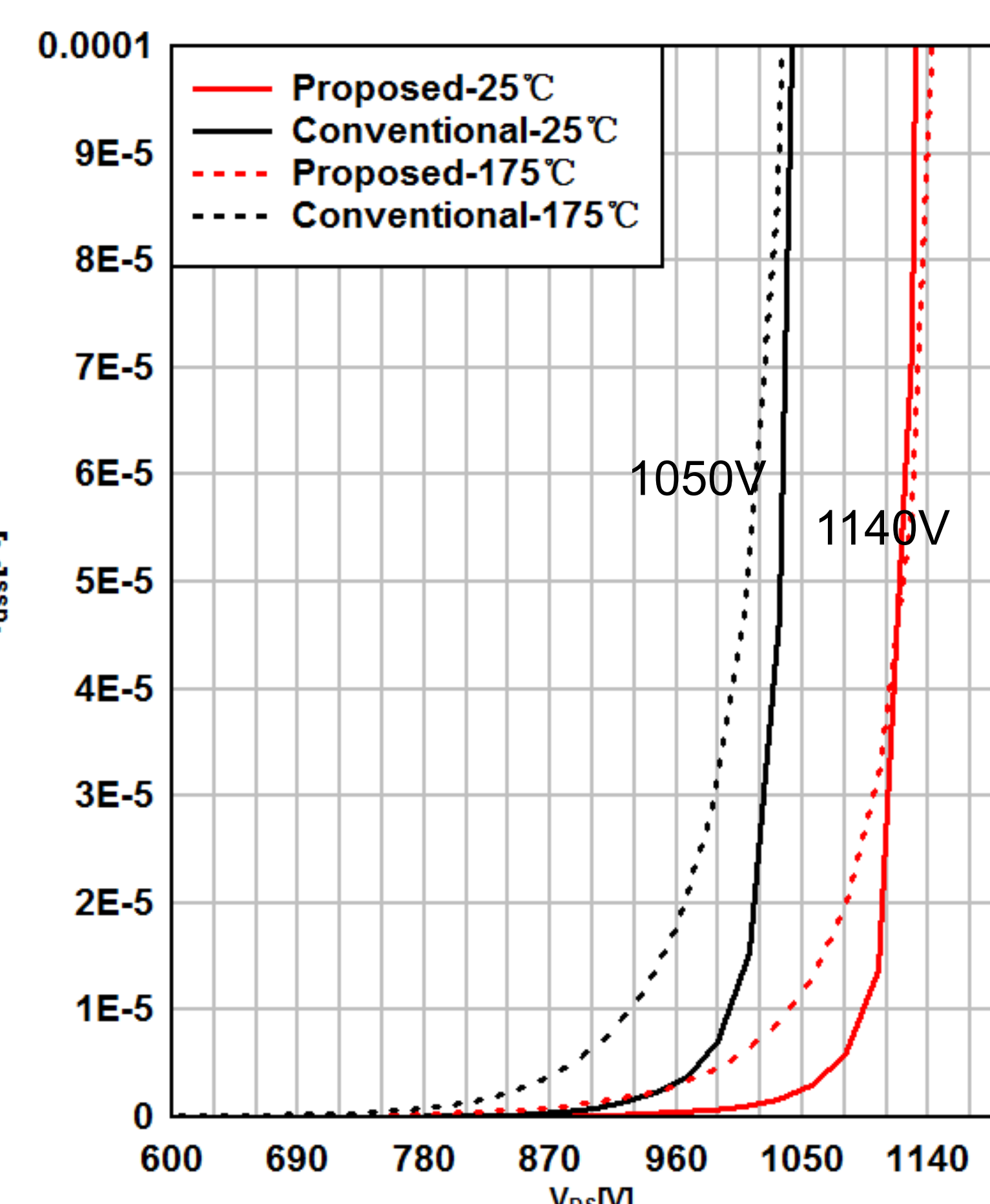
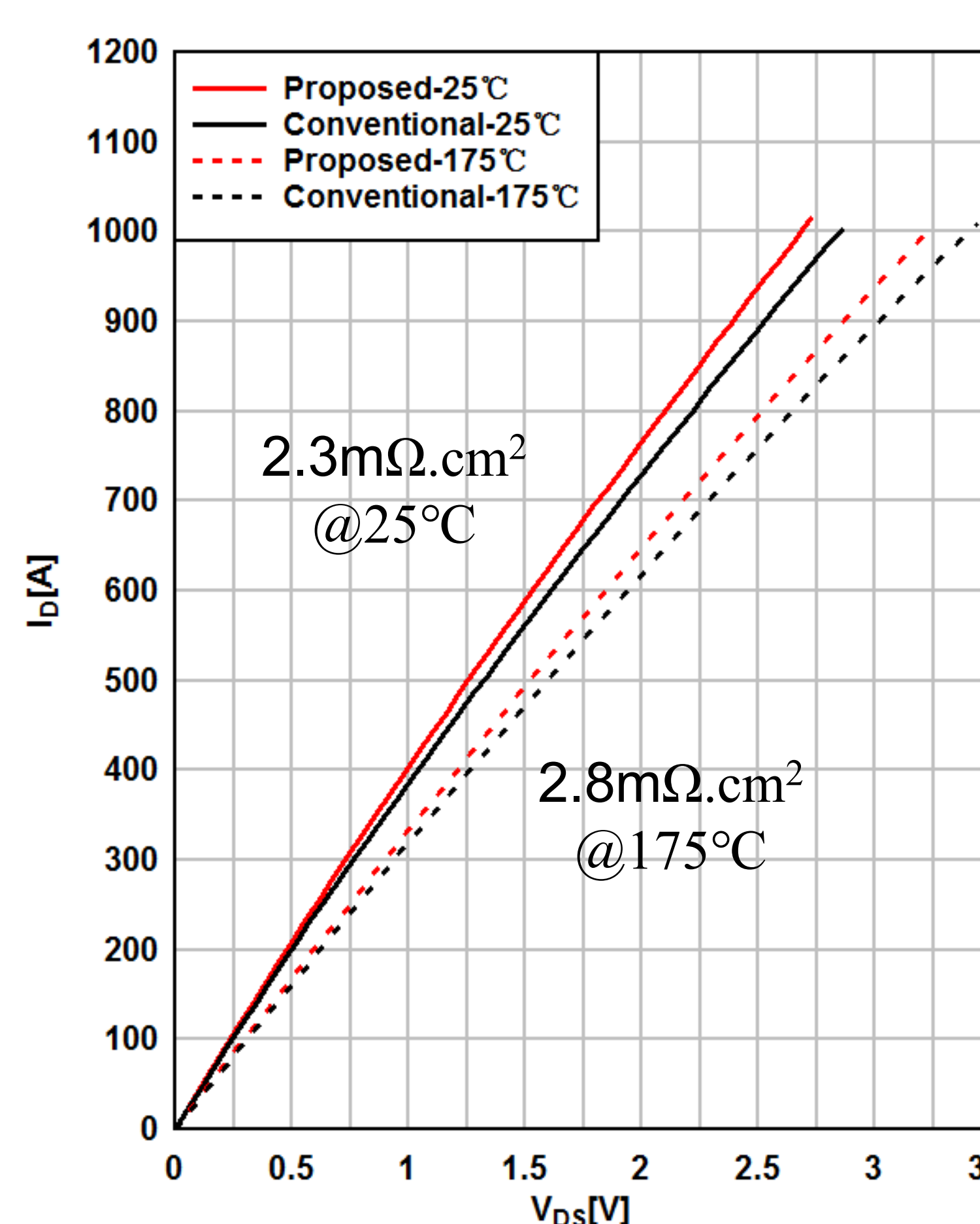


Device Structure & Static Performance

- Narrow JFET Shields Electric Field
- High Doping Concentration CSL Reduce R_{dson}
- LDG Buffer Suppresses V_{rrm}

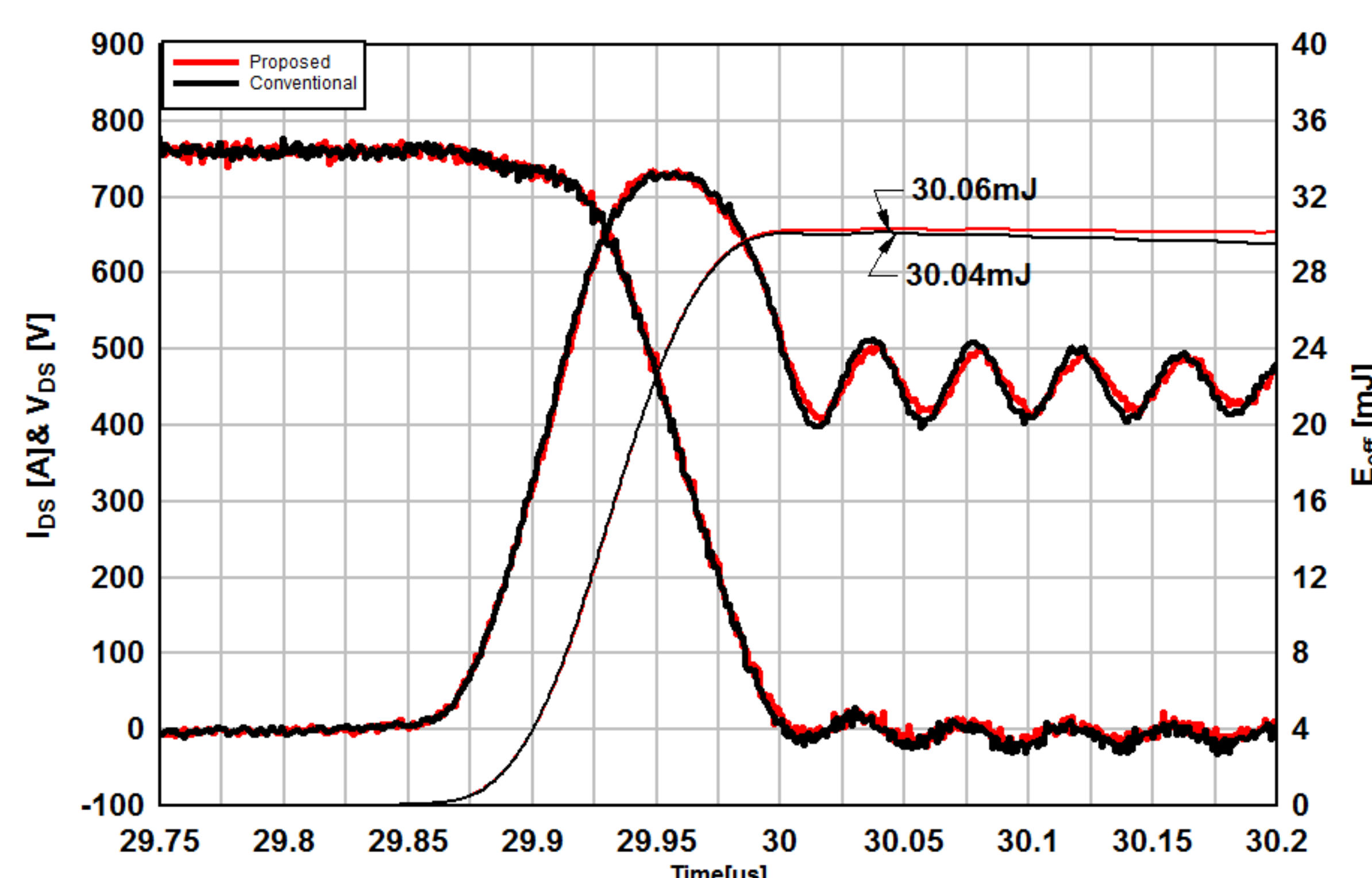
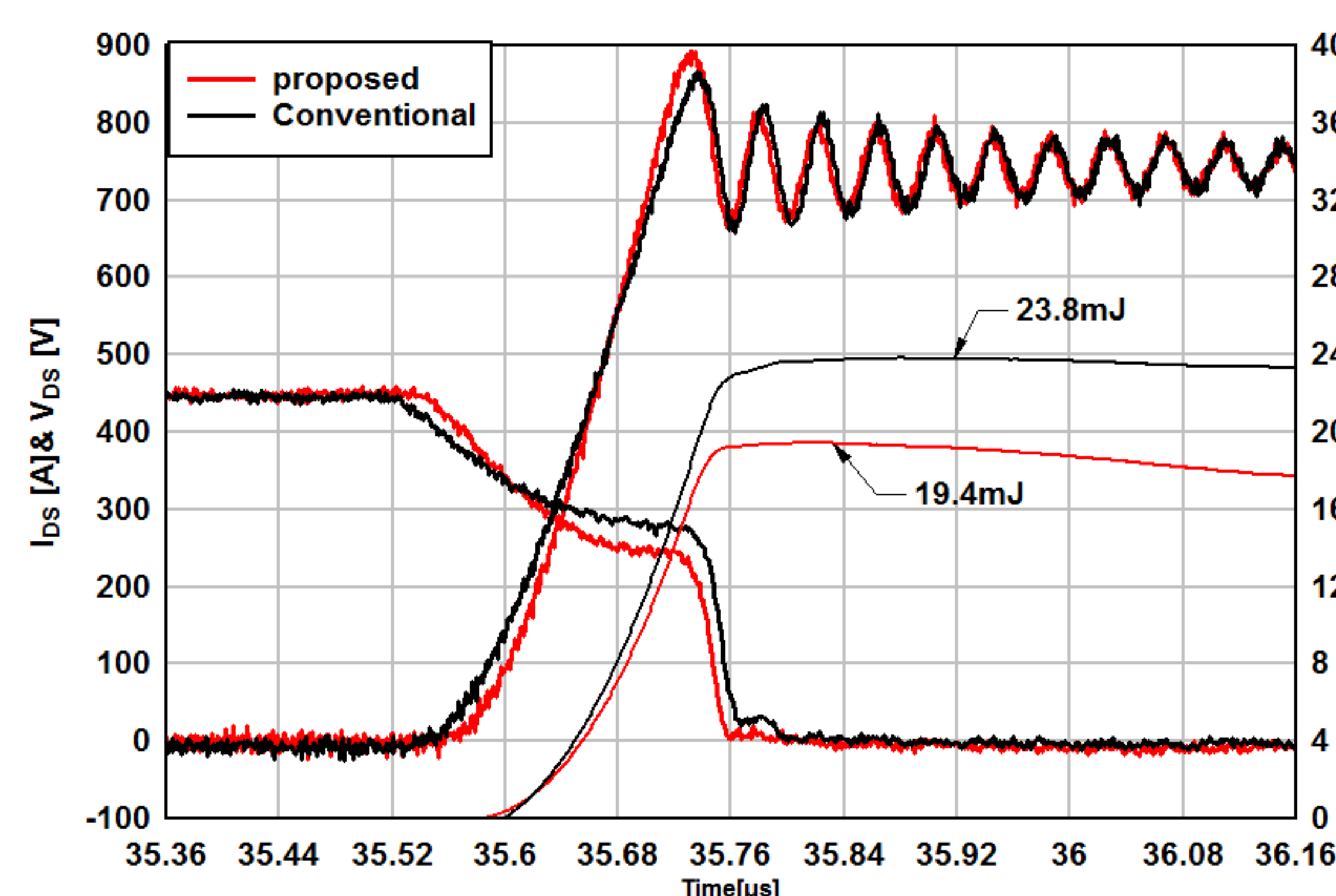


- Faster di/dt at the same $V_{rrm,max}$
- Sufficiently Long Channel and Lower I_{dss}



- $R_{on,sp}$ of 2.3 $m\Omega \cdot cm^2$, No Compromise Loss R_{dson}
- The Average BV Has Increased by 80V

Dynamics Performance

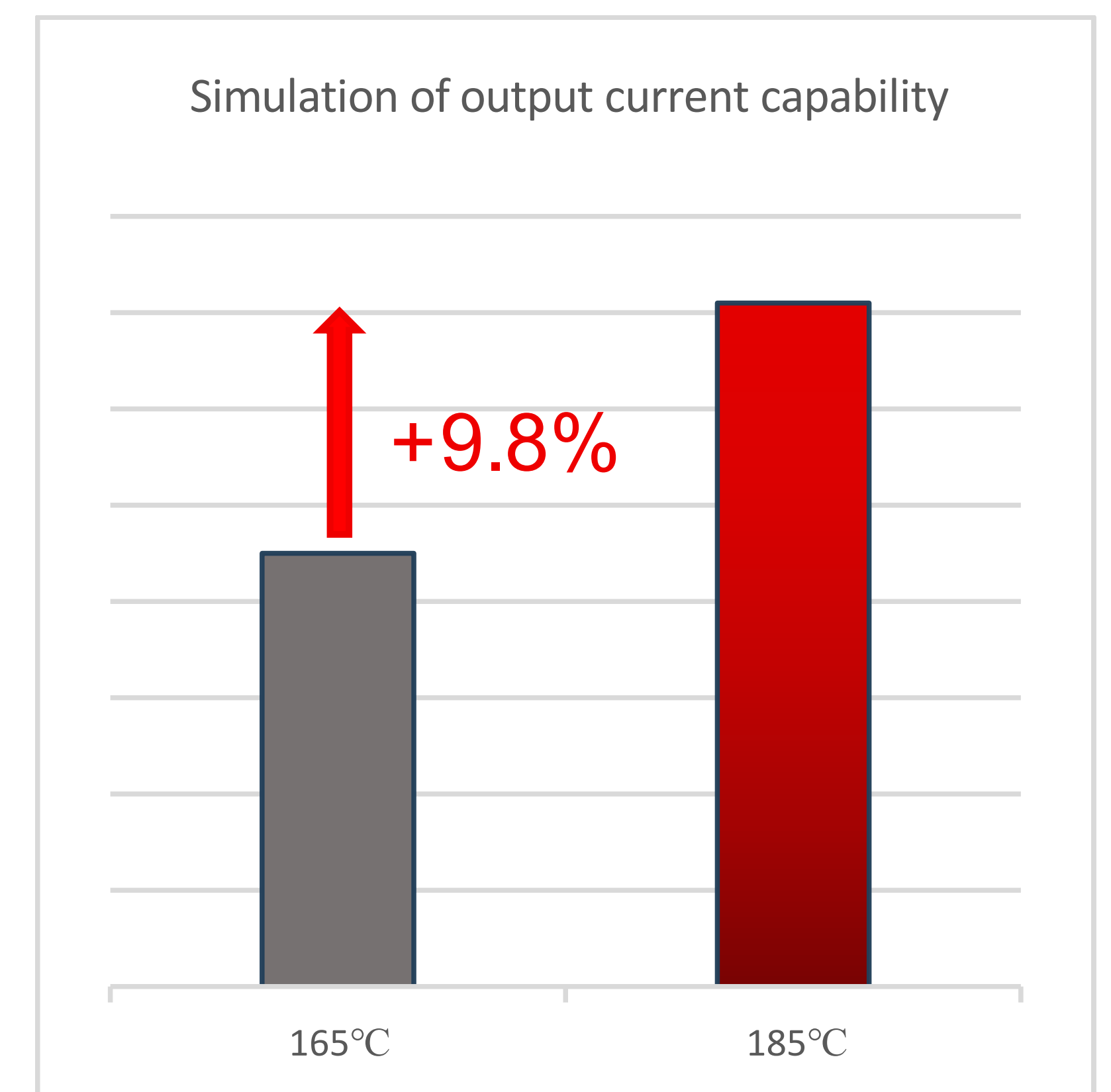


- E_{on} Reduced by 23% at 470V/780A, 175°C
- E_{off} Exhibits No Significant Variation

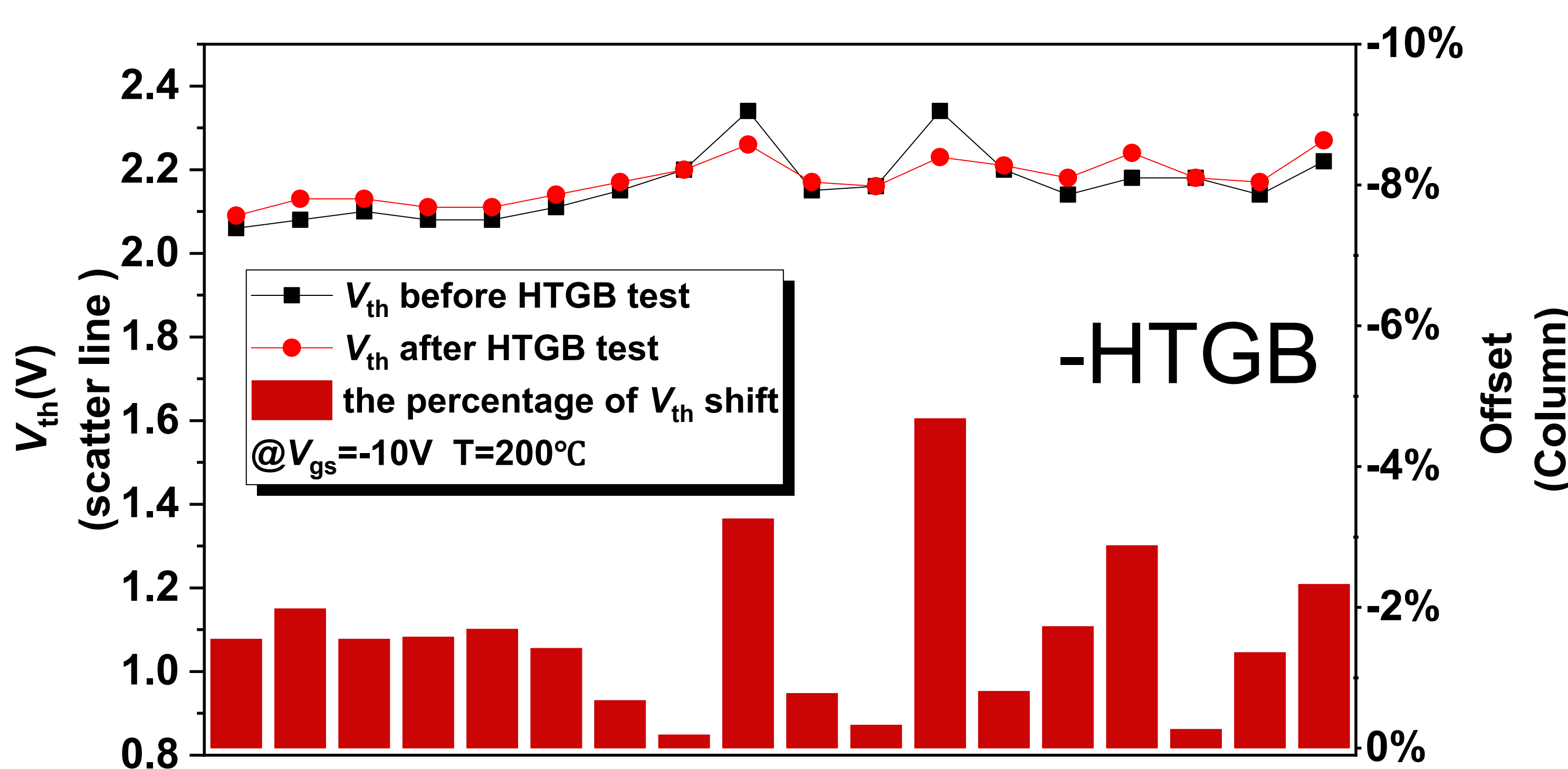
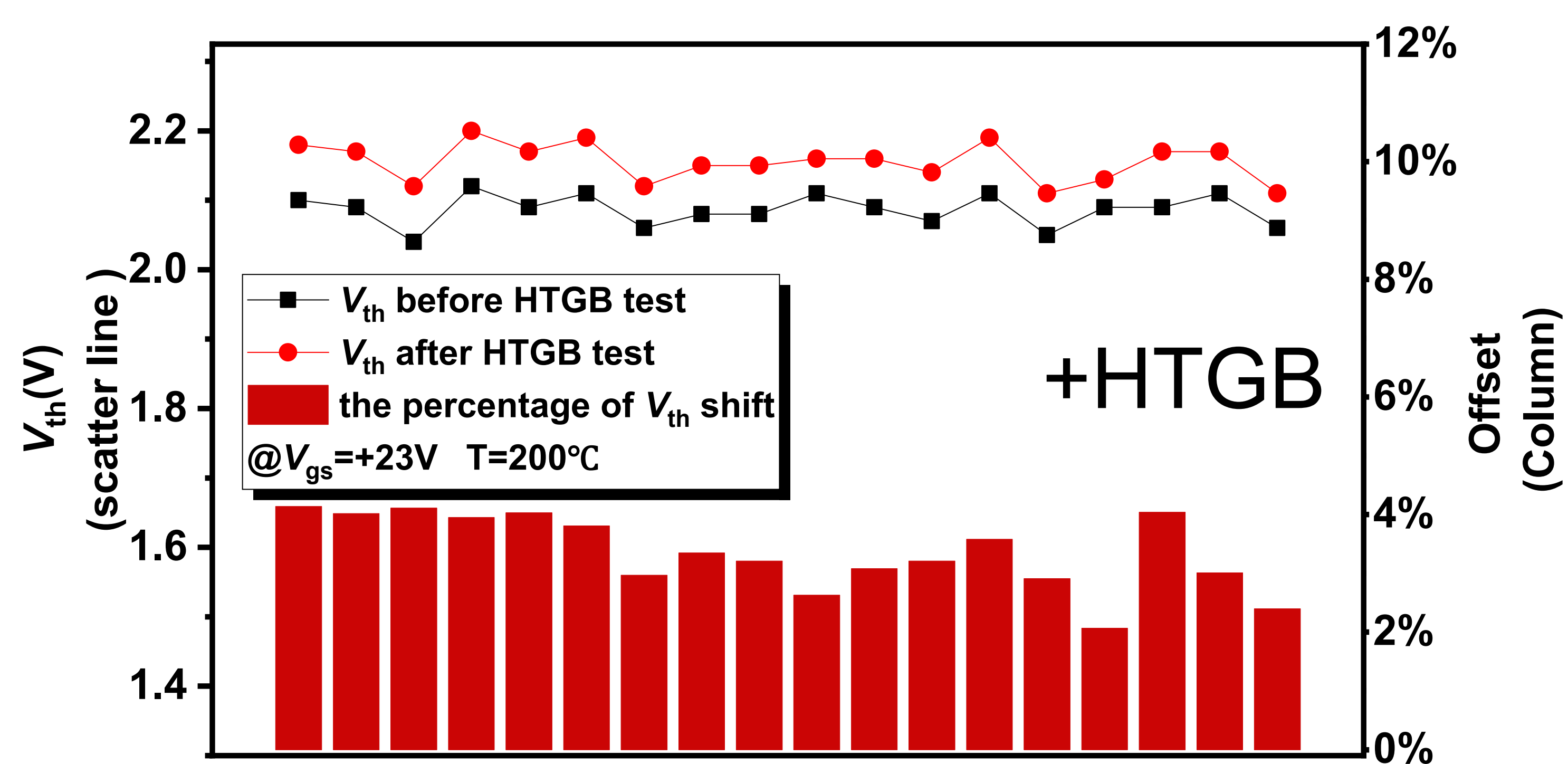
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Output Current Capability

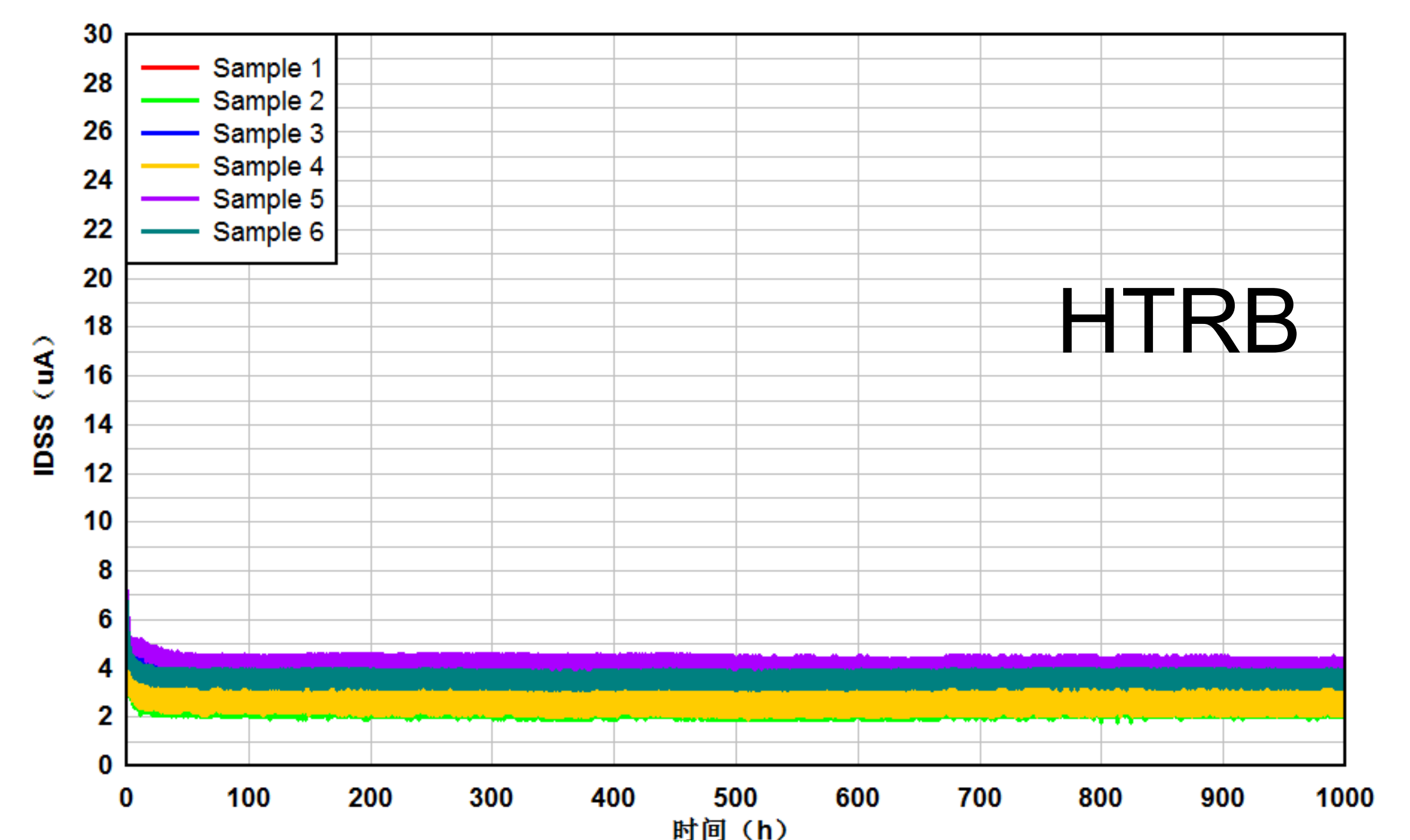
- Sufficiently Long Channel ,And Higher BV Margin, Support Higher Junction Temperature Operation
- Combined with Reduced Turn-on Loss, The Output Current Capability Increased by 9.8%,(From 550 Arms to 604 Arms at 470 V), When the Maximum Junction Temperature is Raised From 165 °C to 185 °C



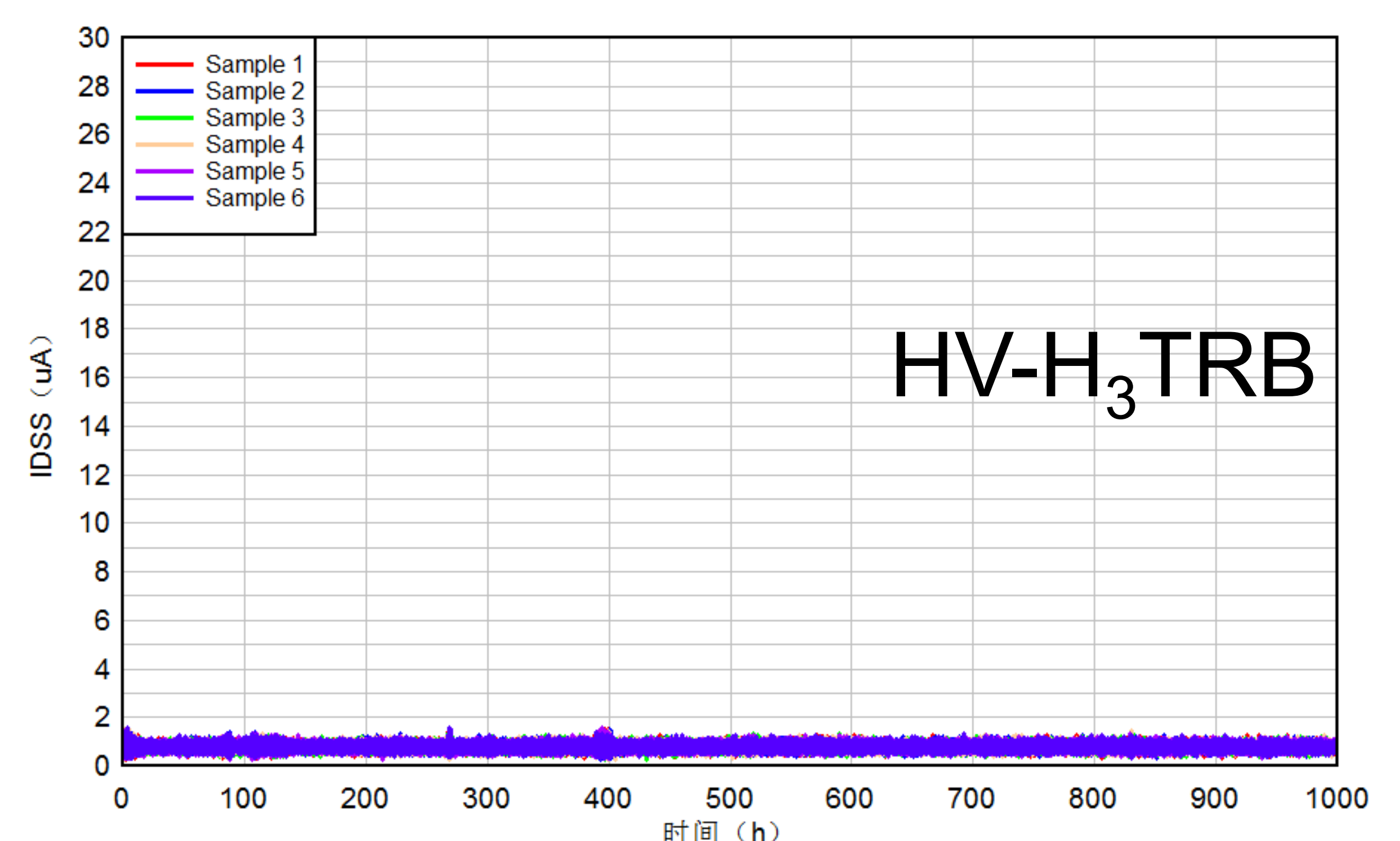
Extended Reliability Tests (Exceeding AQC-324)



- $T_{jmax}=200^{\circ}C$; $V_{GS}=+23/-10V$; $t=1000h$
- Test Passed, $\Delta V_{(gs)th} \leq 5\%$



- $T_{jmax}=200^{\circ}C$; $V_{DS}=900V$; $V_{GS}=-4V$; $t=1000h$
- Test Passed, Stable $I_{dss} \leq 6\mu A$



- $V_{DS}=900V$; $T=85^{\circ}C$; $RH=85\%$; $t=1000h$
- Test Passed, Stable $I_{dss} \leq 2\mu A$