

Device Dynamics Analyzer : DDA8010

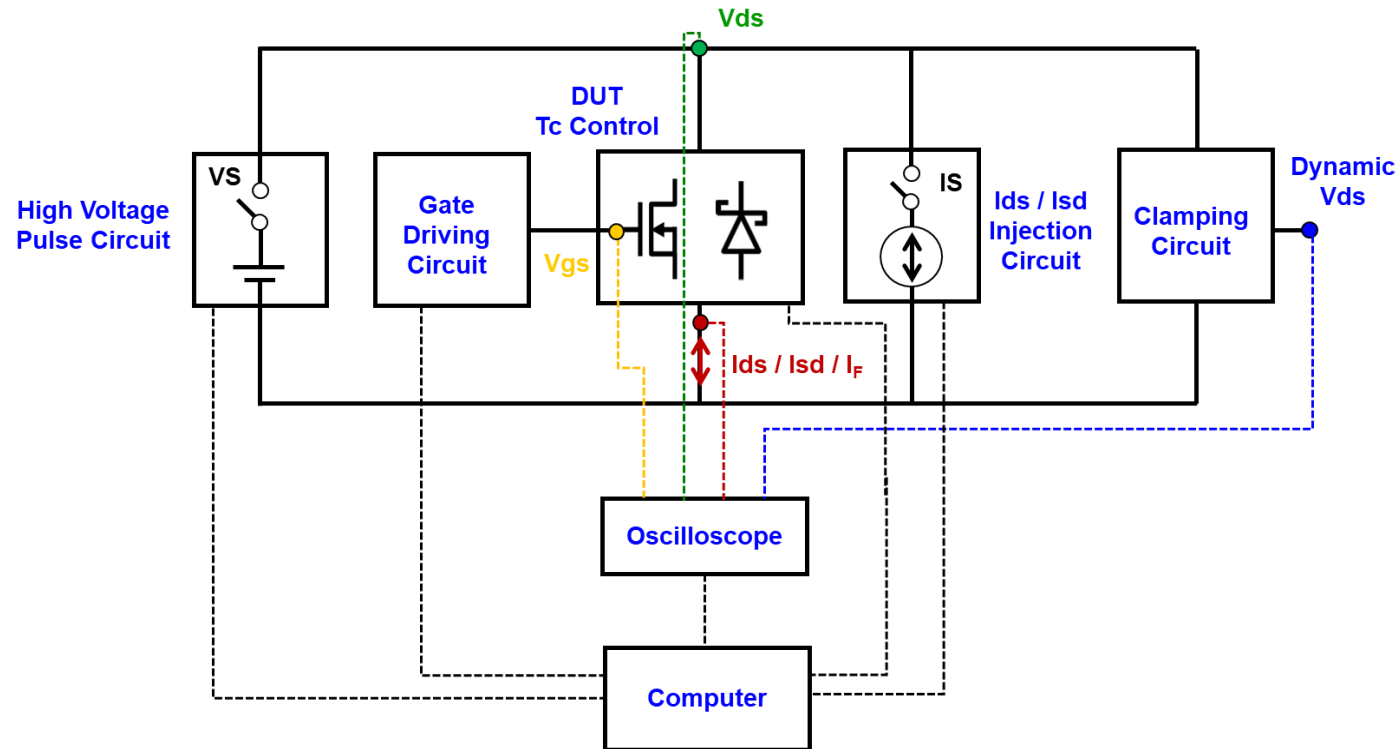


Features :

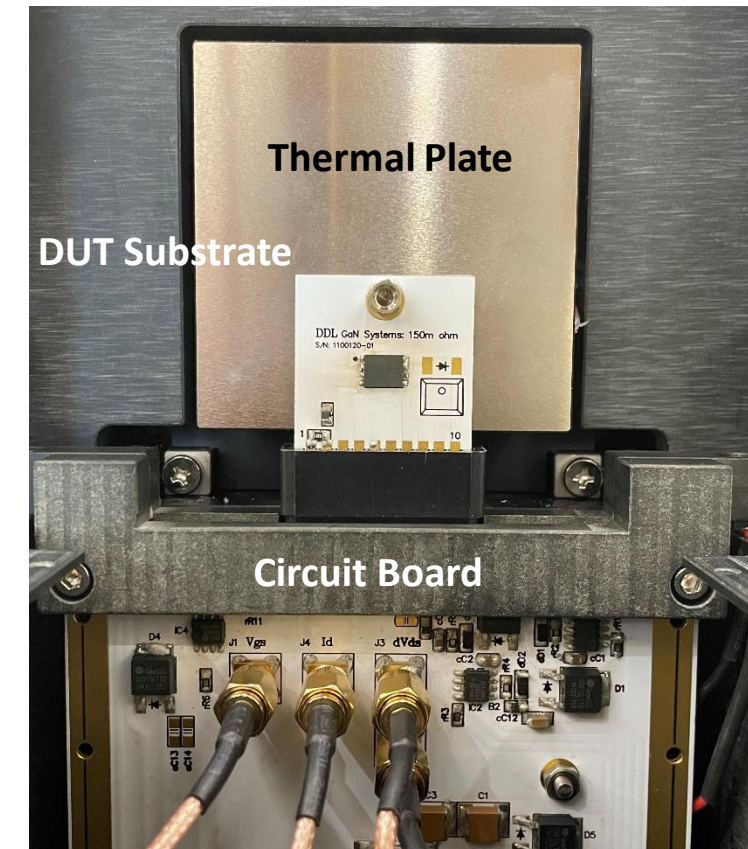
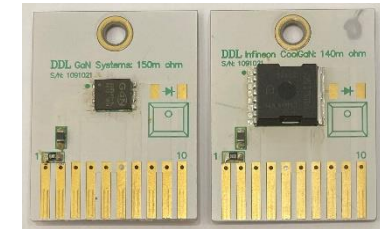
- Switching V_g : -12V~12V for device benchmark
- Switching Voltage : <800V
- Switching Current : <10A
- Switching Frequency : <500kHz
- Switching Duty : 10%~90%
- Temperature : 25°C~175°C
- Characterization Items :
 - Dynamic $R_{ds(on)}$ (HSW, ZVS)
 - Dynamic $R_{sd(on)}$ (ZVS)
 - Dynamic V_{th} (HSW, ZVS)
 - Dynamic V_{sd}
 - Dynamic HTOL (SALT)
 - Pulse I-V...



Configuration



Different Packages on DUT Substrates



User Interface : Pulse IV



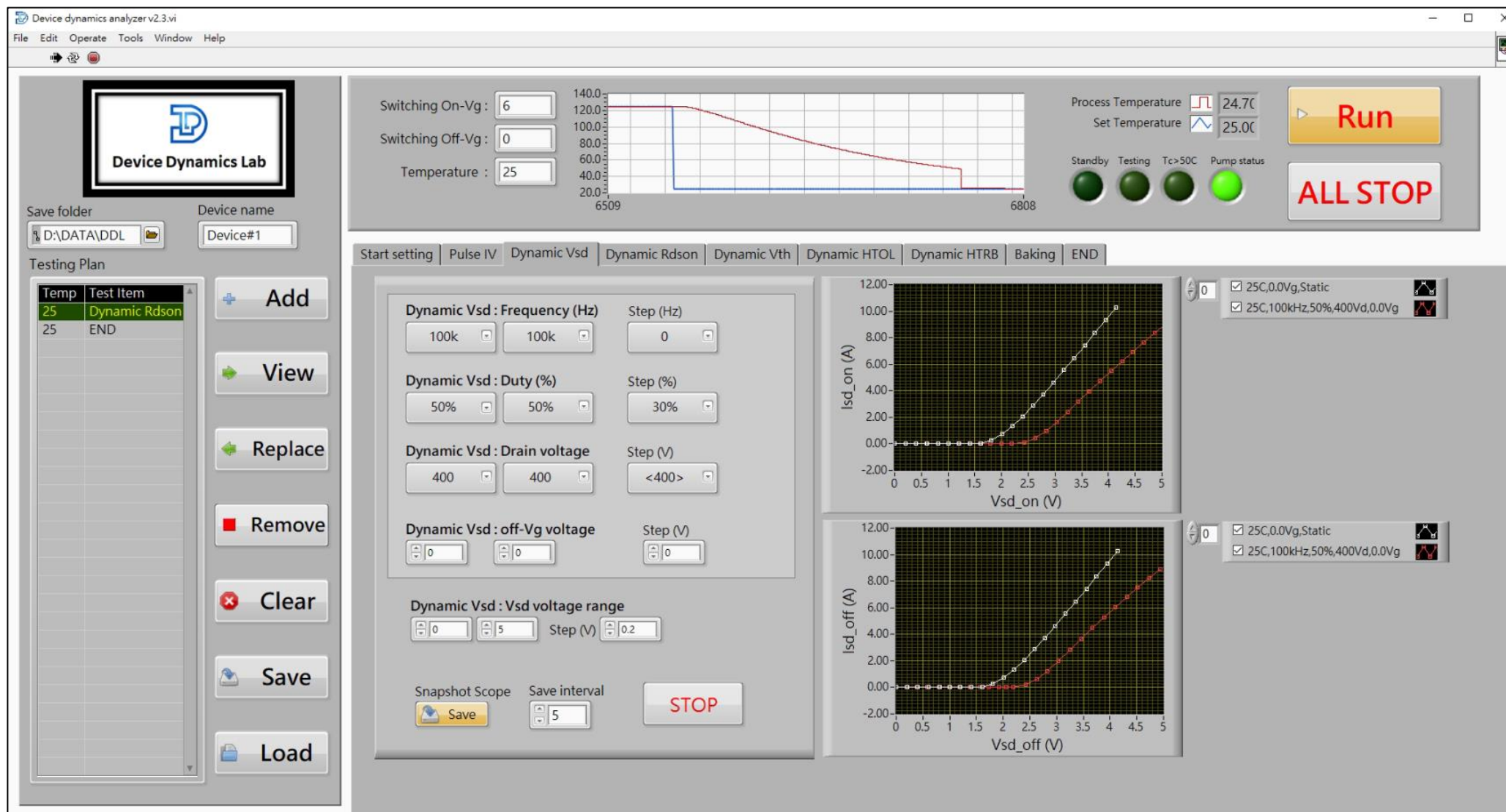
User Interface : Dynamic Rdson



User Interface : Dynamic Vth



User Interface : Dynamic Vsd



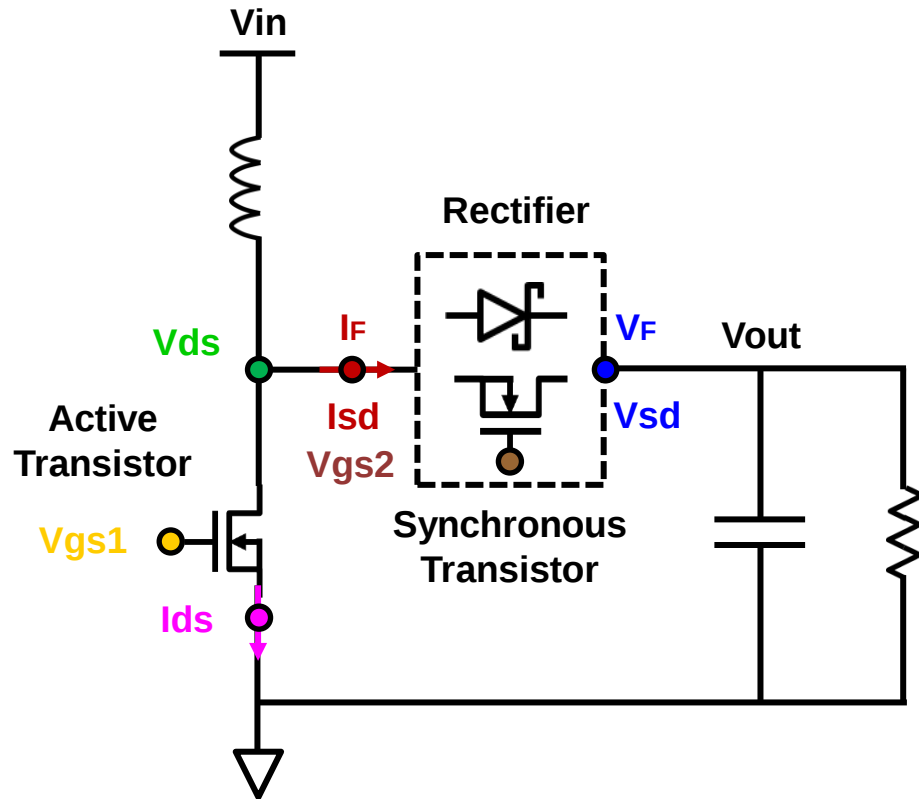
Specification of DDA8010

Specification of Device Dynamics Analyzer (DDA8010)						
Parameter	Operation Condition					Unit
Vgs	-12 ~ +12					V
Temperature	25 ~ 175					°C
Voltage	< 800			< 650		V
Frequency	100	200	300	400	500	kHz
Duty	10, 20, 30, 40, 50, 60, 70, 80, 90			20, 30, 40, 50, 60, 70, 80, 90		%
Current	10, 8, 8, 6, 6, 4, 4, 3, 3			8, 8, 6, 6, 4, 4, 3, 3		A
Pulse I-V	20V / 30A (>1us pulse width)					V / A

Power Device Operation : Boost Application



Conventional Boost Convertor :



Waveform : Continuous Current Mode (CCM)

Active Transistor

V_{gs1}

V_{ds}

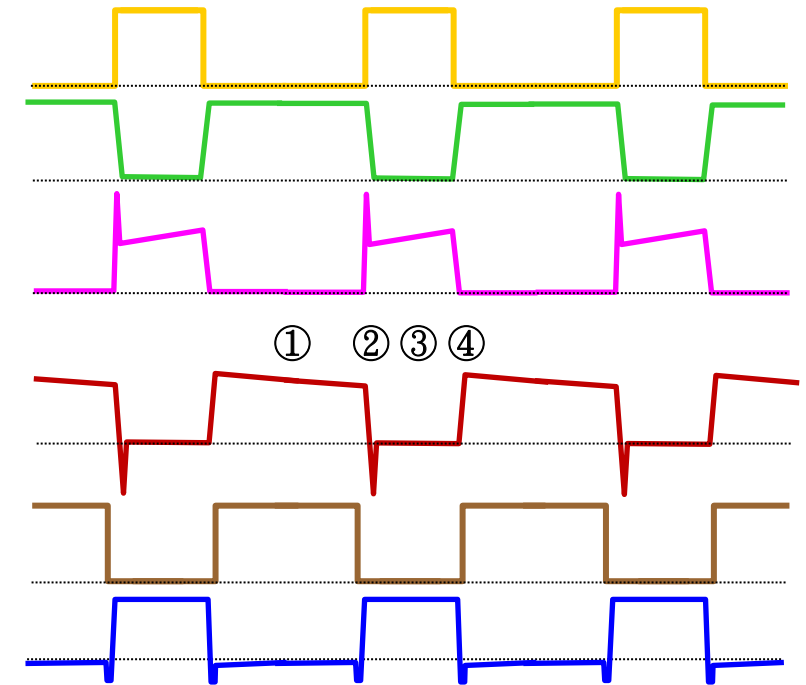
I_{ds}

Rectifier
Sync. Transistor

I_F / I_{sd}

V_{gs2}

V_F / V_{sd}



Period	①	②	③	④
Active Transistor	Off-state	HSW turn-on	Dyn. Rdson Dyn. Vth	Turn-off transient
Rectifier	Dyn. VF	Dyn. Trr/Qrr	Reverse	Forward transient
Sync. Transistor	Dyn. Rsdon Dyn. Vth	Dyn. Vsd	Off-state	ZVS turn-on

Dynamic Rdson Characterization



DUT : GaN Systems

(650V, 150mOhm; GS-065-011-1-L)

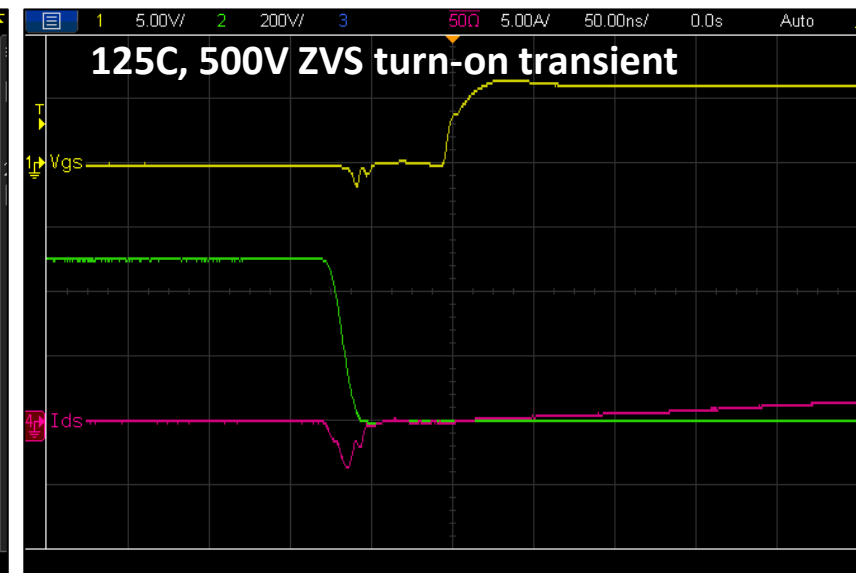
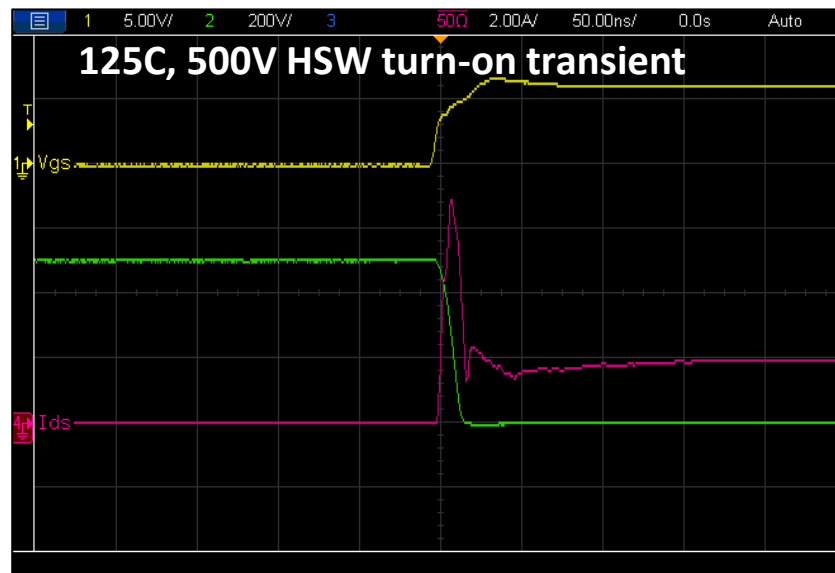
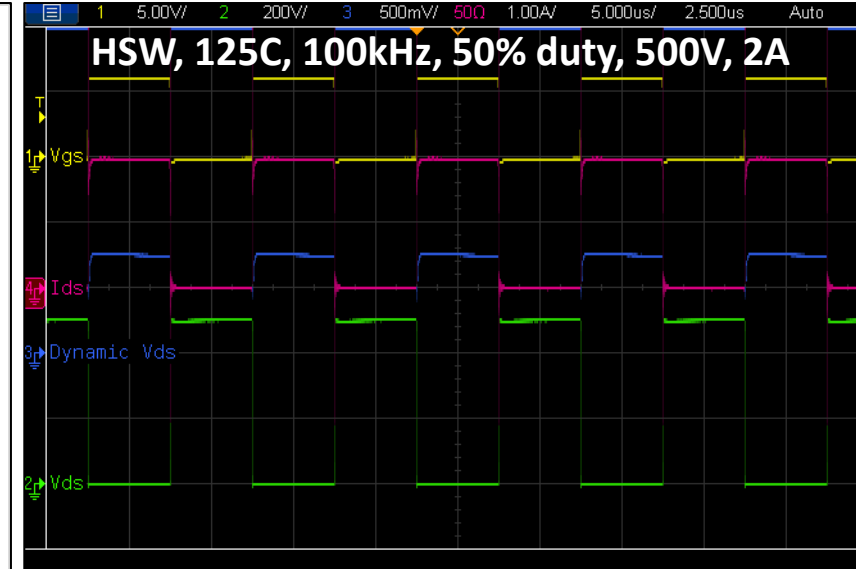
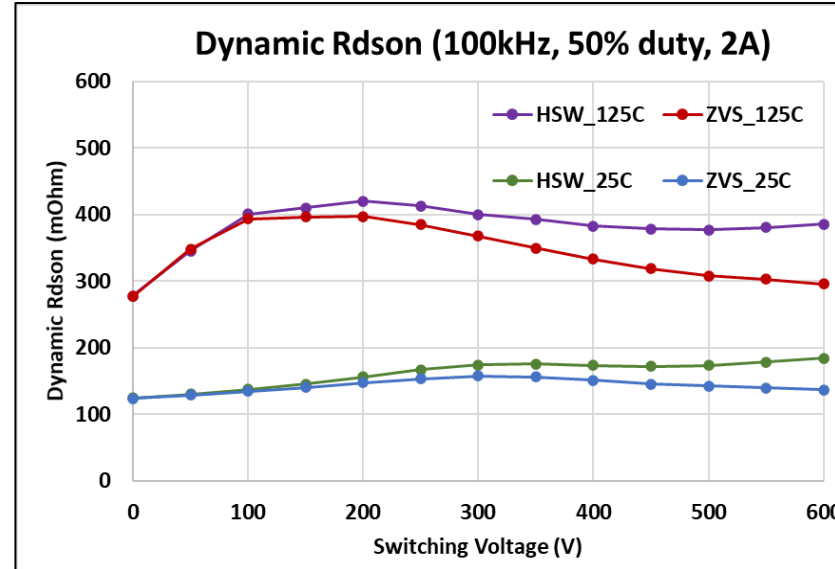


Methodology :

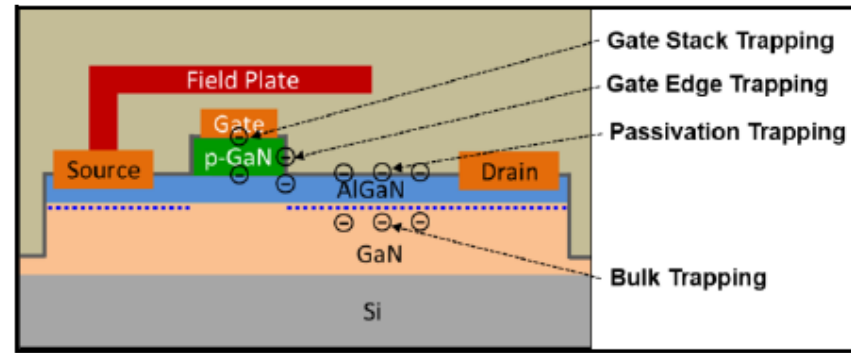
- Dynamic Rdson extraction under system-like operation

Switching Condition :

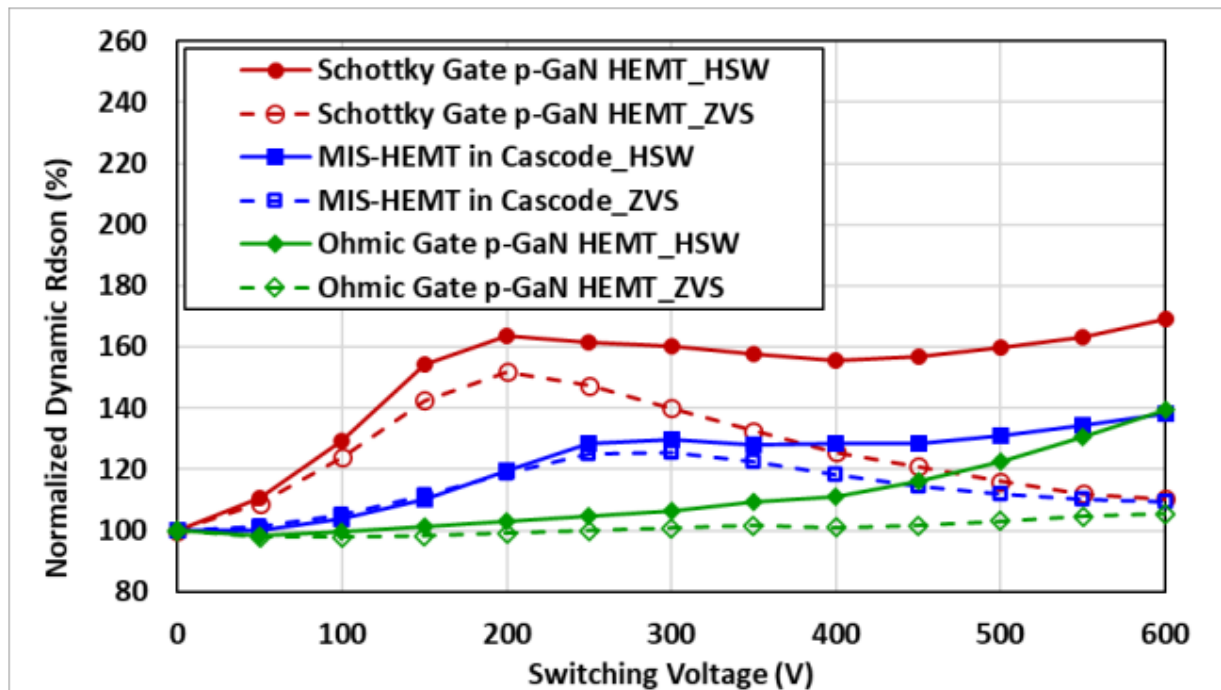
- HSW vs. ZVS
- 25C vs. 125C
- F=100kHz, Duty=50%
- Id=2A



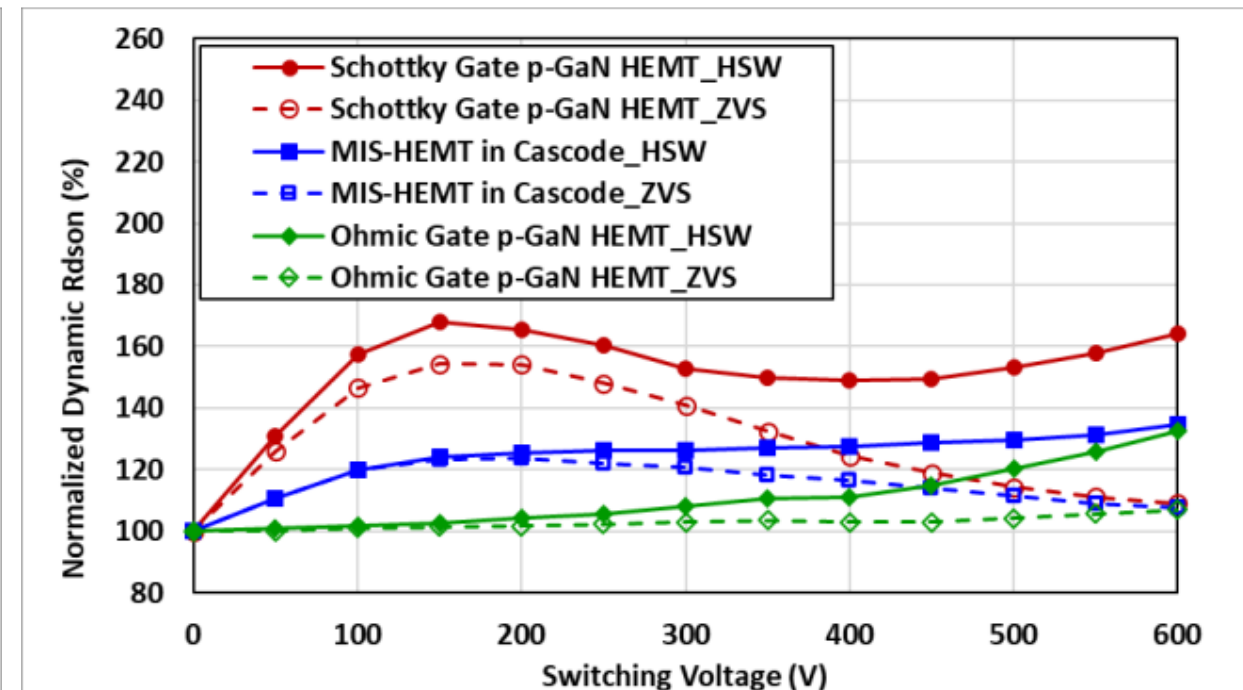
Dynamic Rdson



Dynamic Rdson : 25C, 200kHz, 50% duty, 2A



Dynamic Rdson : 125C, 200kHz, 50% duty, 2A



Dynamic V_{th} : I_d - V_g

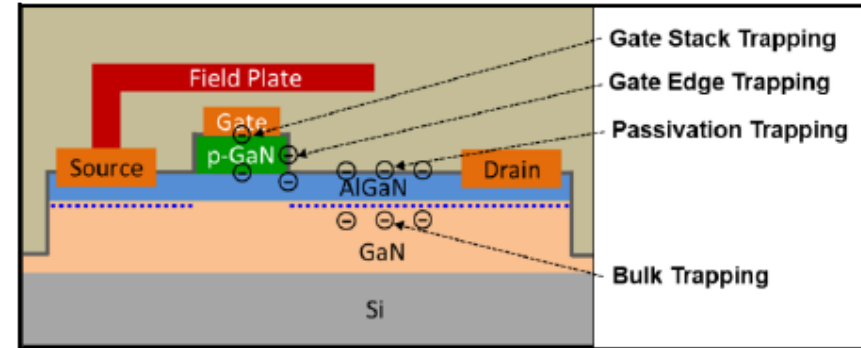
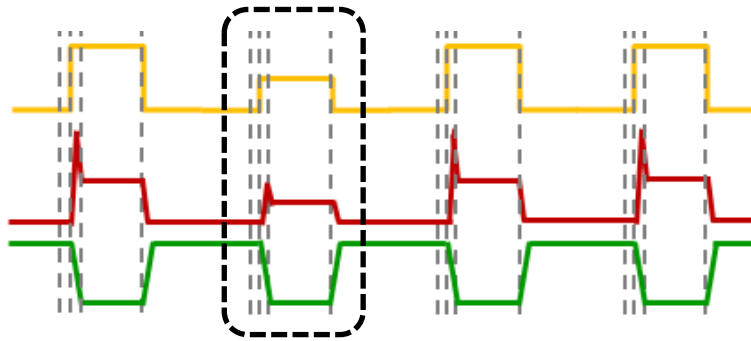


1/100 pulse Gate level sweep

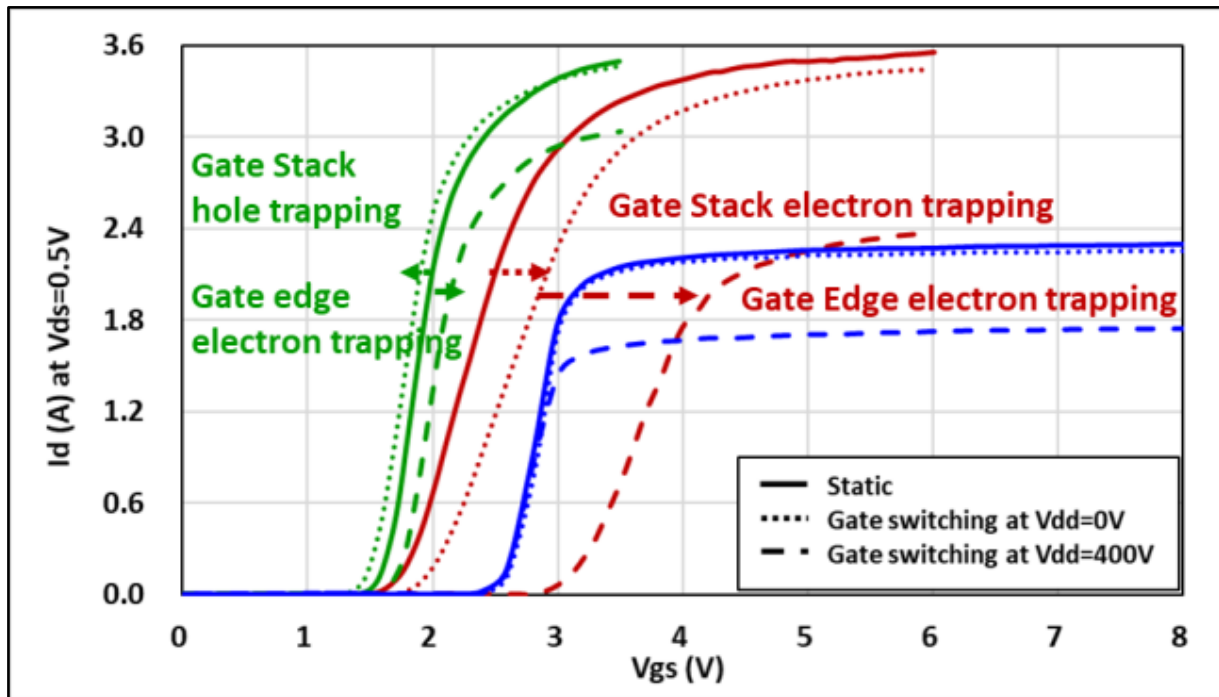
DUT V_{gs} :

DUT I_{ds} :

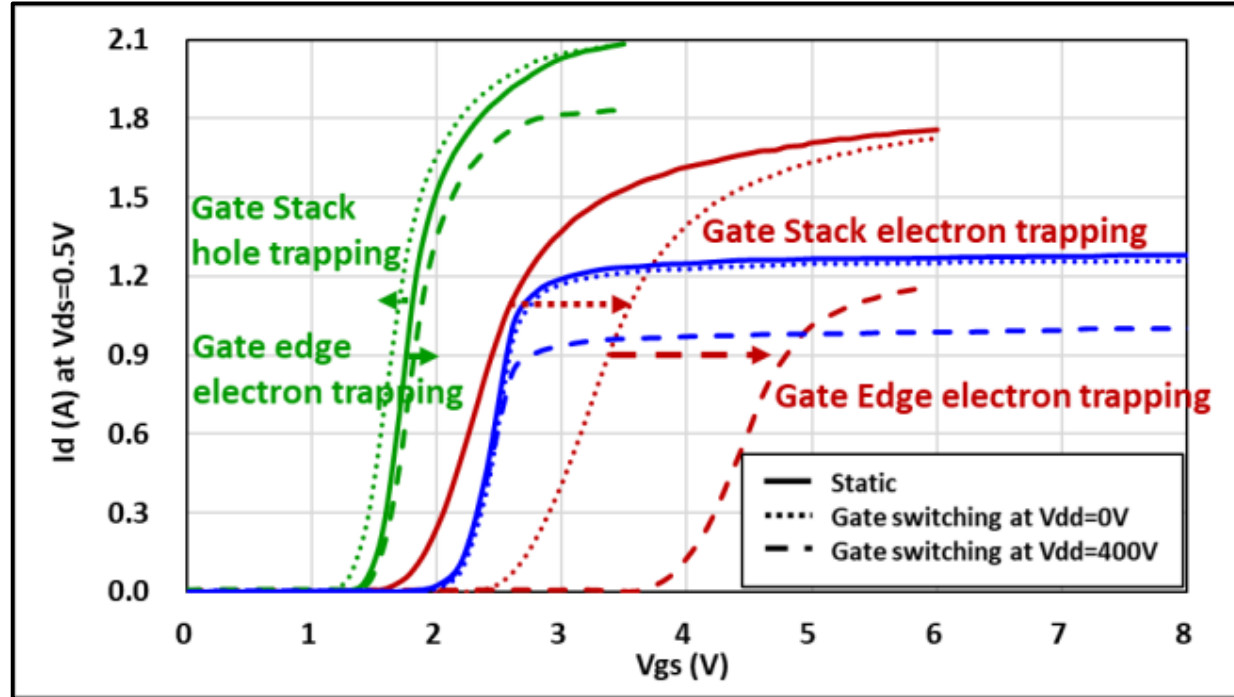
DUT V_{ds} :



Dynamic V_{th} : HSW, 25C, 200kHz, 50% duty



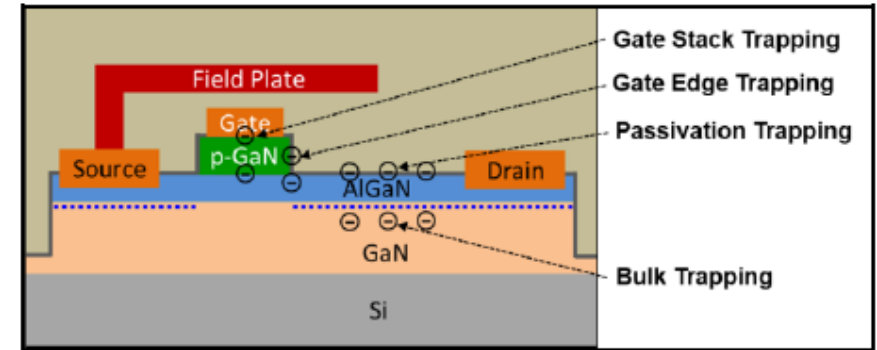
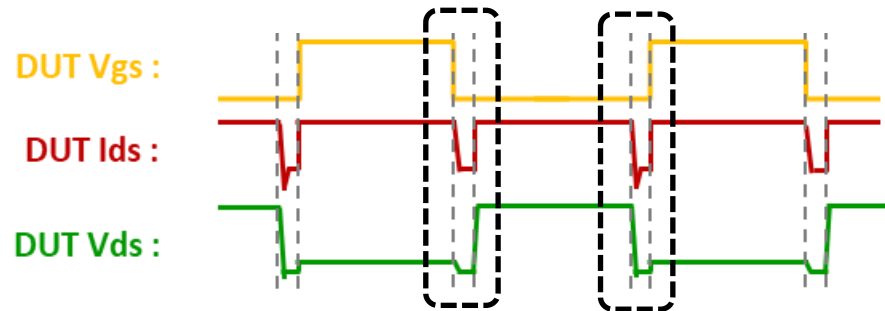
Dynamic V_{th} : HSW, 125C, 200kHz, 50% duty



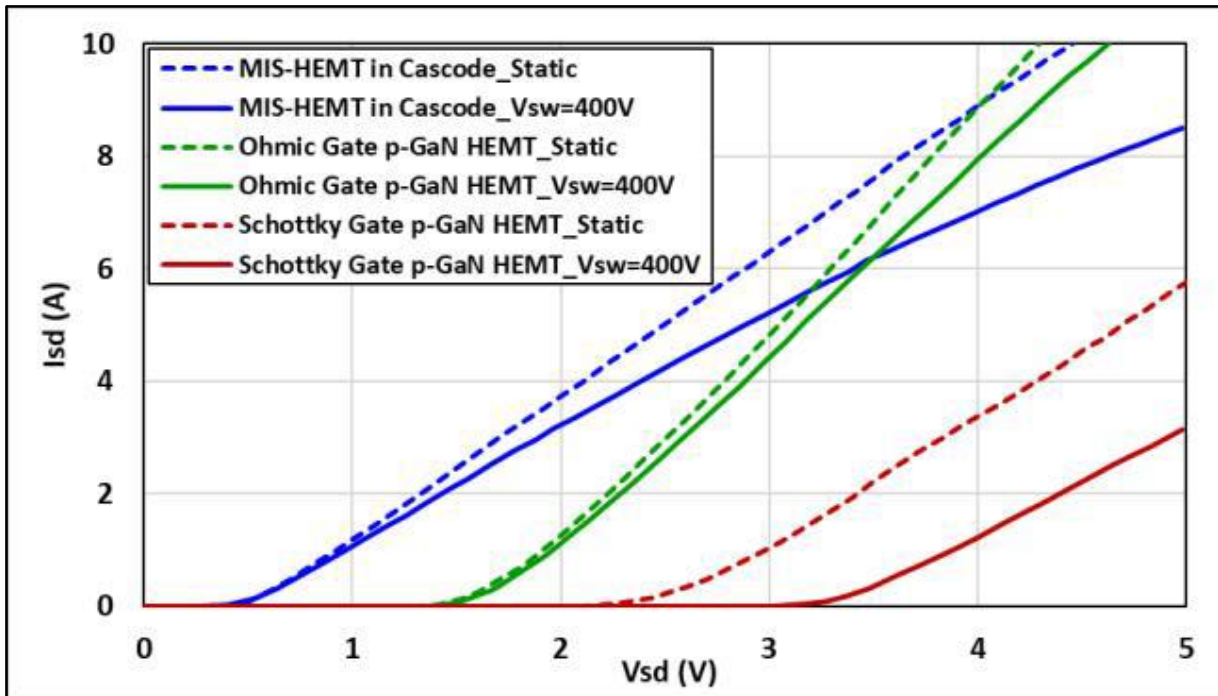
Dynamic Vsd



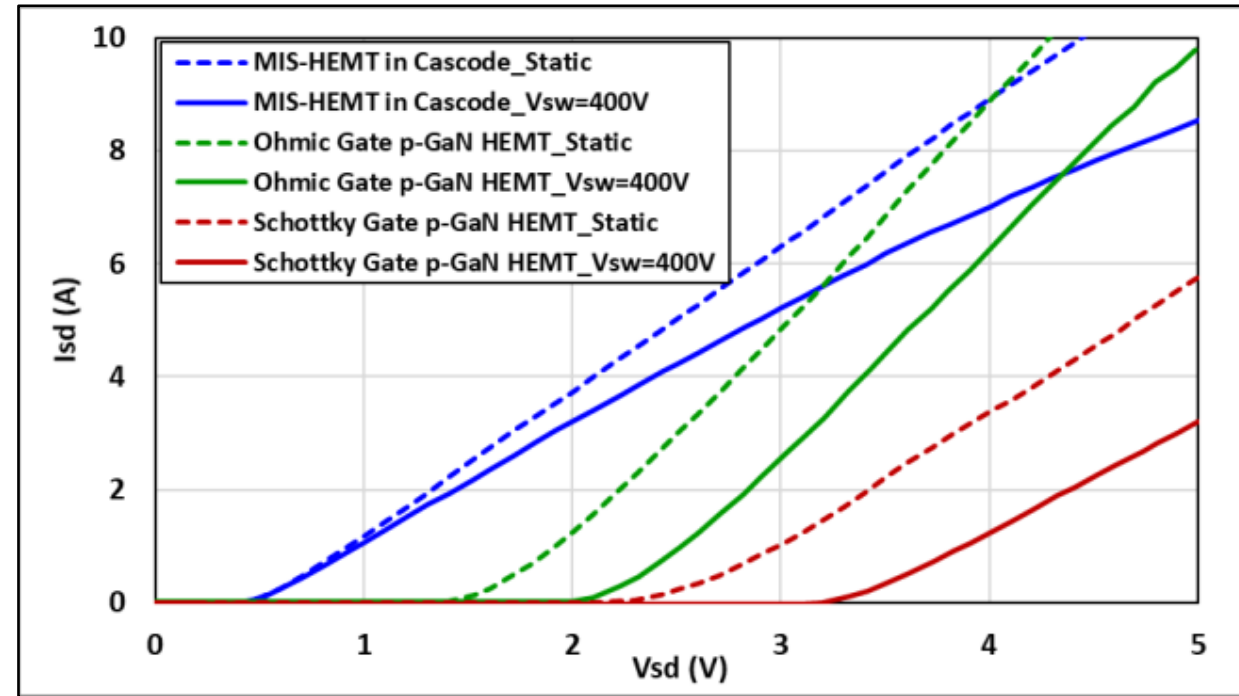
Vsd at Gate turn-off edge Vsd at Gate turn-on edge



Dynamic Vsd : 125C, 200kHz, 50% duty at turn-off edge



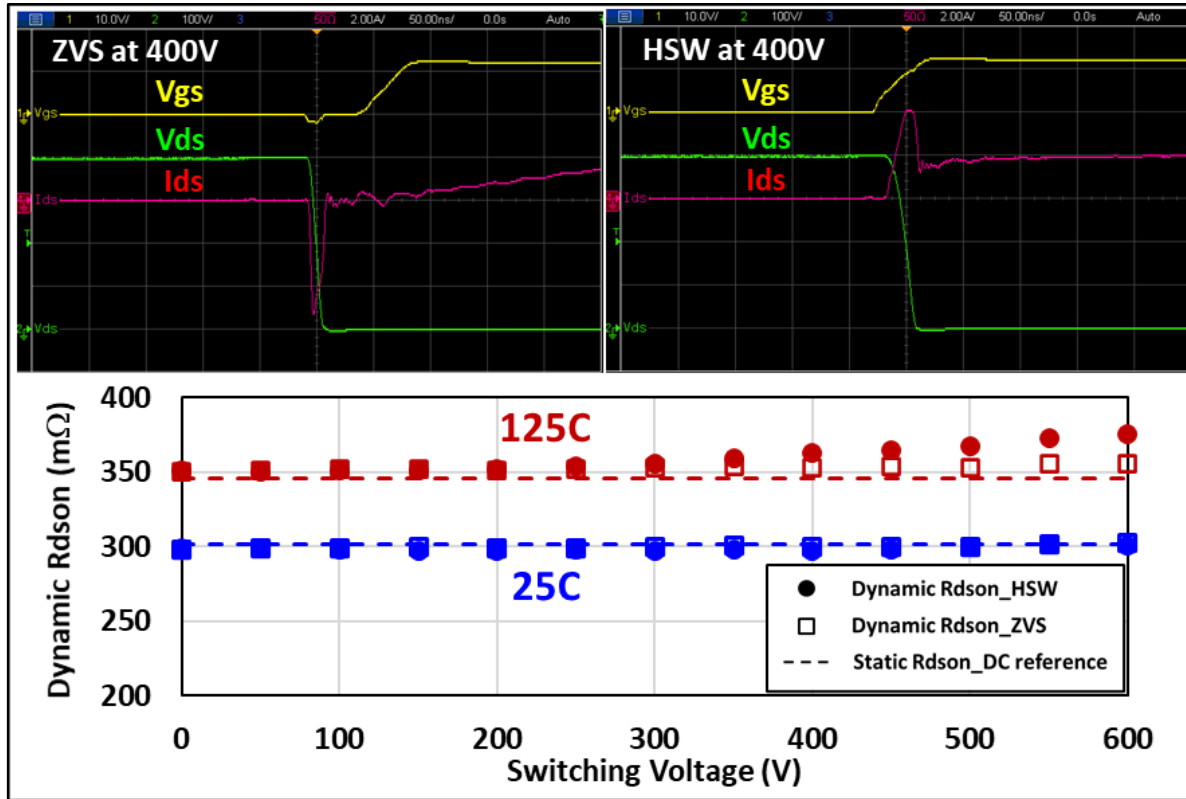
Dynamic Vsd : 125C, 200kHz, 50% duty at turn-on edge



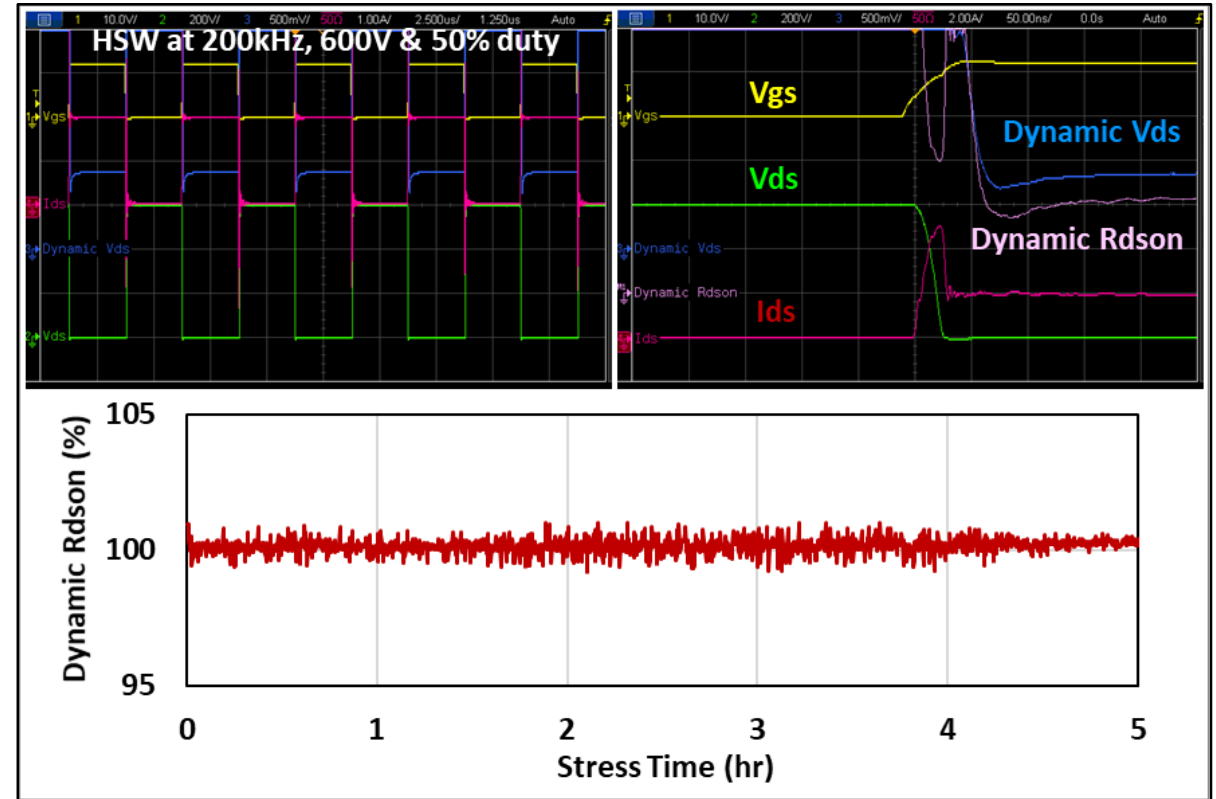
Accuracy & Resolution of Dynamic Rdson



Dynamic Rdson verification on SiC MOSFET



Accuracy : Ron offset < 1%



Resolution : $\Delta R_{on} < \pm 1\%$; 100ns response time

Dynamic HTOL

DUT : GaN Systems

(650V, 150mOhm; GS-065-011-1-L)

Methodology :

- Real-time Dynamic Rdson monitoring under system-like operation

