

Wafer data
Star120
(900V/120A)
Nov 2025

Features

GaNPower innovative all-GaN-IC enables 3.8V turn-on voltage and +/-20 V regulated gate driving.

Enhanced system reliability and compatibility with conventional gate drivers (*).

Regulated gate driving enables anti-ringing protection / ESD protection

Lossless source side current sensing

(*) May require adjustment and increase of isolated auxiliary power supply of driver board if driving several parallelized Star120.

Content



Basic wafer info/DC data

Dynamic test data

Chip probe data

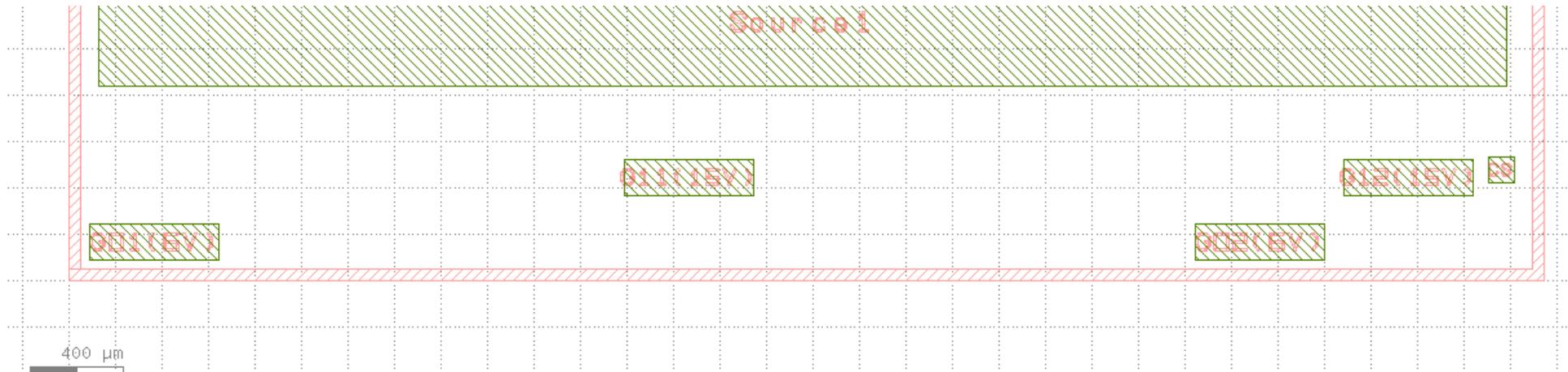
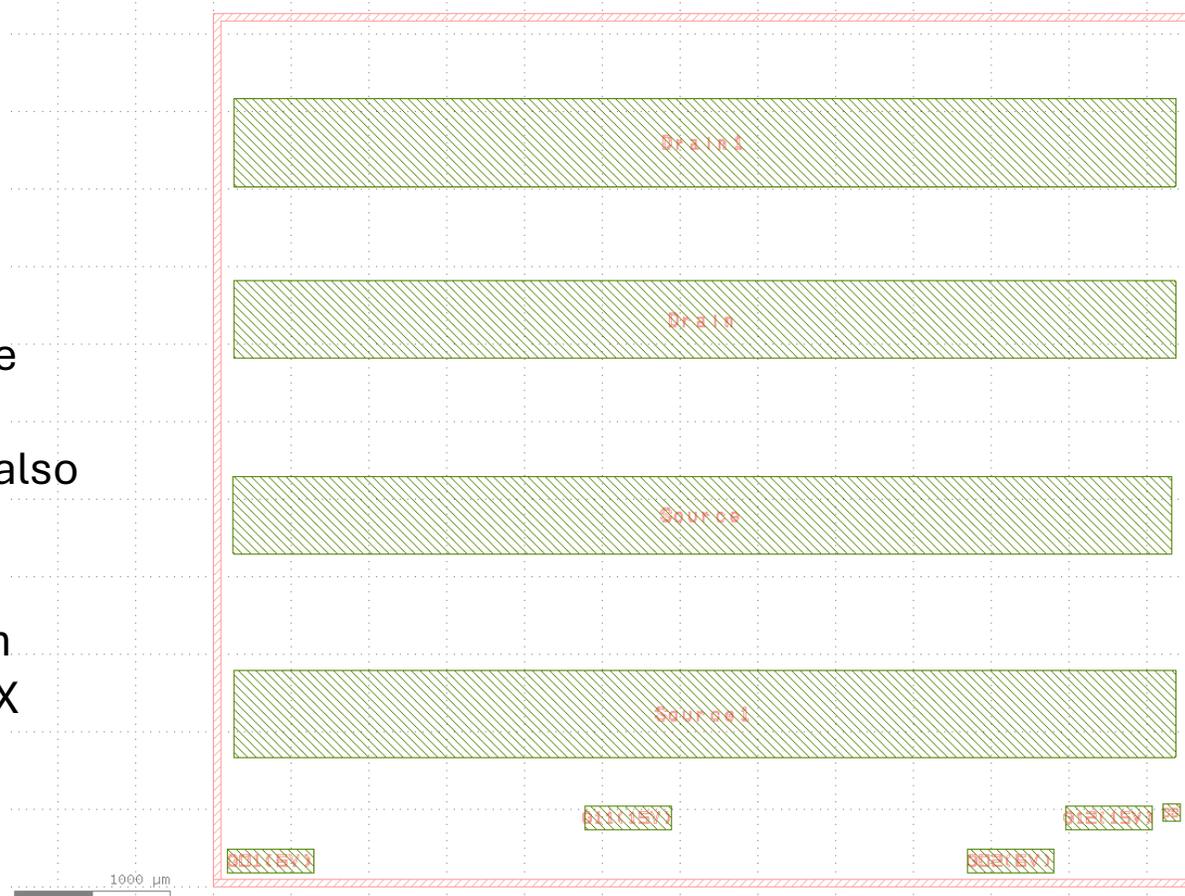
App notes

Device-name	x-size	y-size
Star120	6345.90	5634.28

Star120
Version 1

Note that G11(15V) and G12(15V) are internally connected.
Similarly, G01(6V) and G02(6V) are also internally connected.

For best gate control uniformity, both G1X (for 12/15V driving) or both G0X (for 6V driving) shall be used if wire bonding configuration allows.



Main switch FET channel width: 1,426,822 um

Star120
Version 1

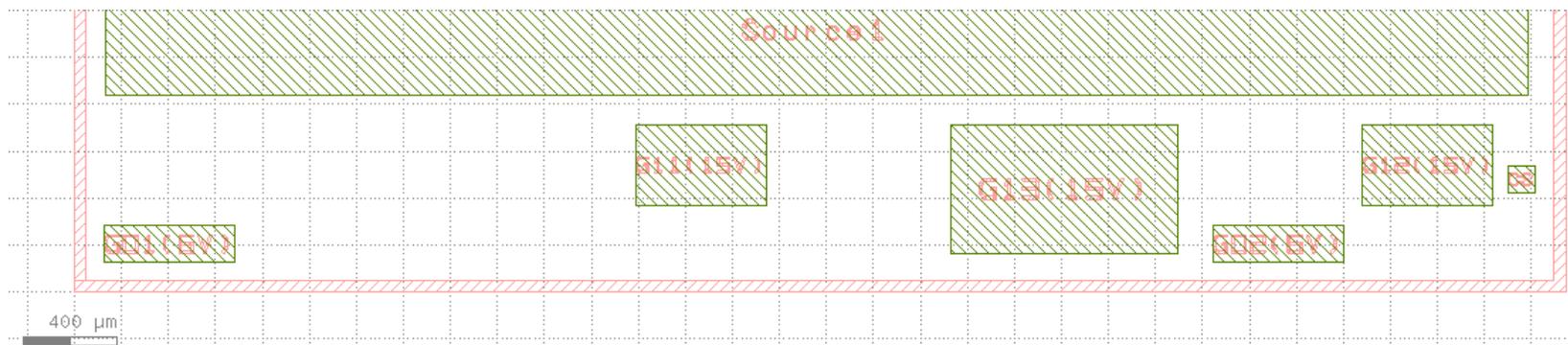
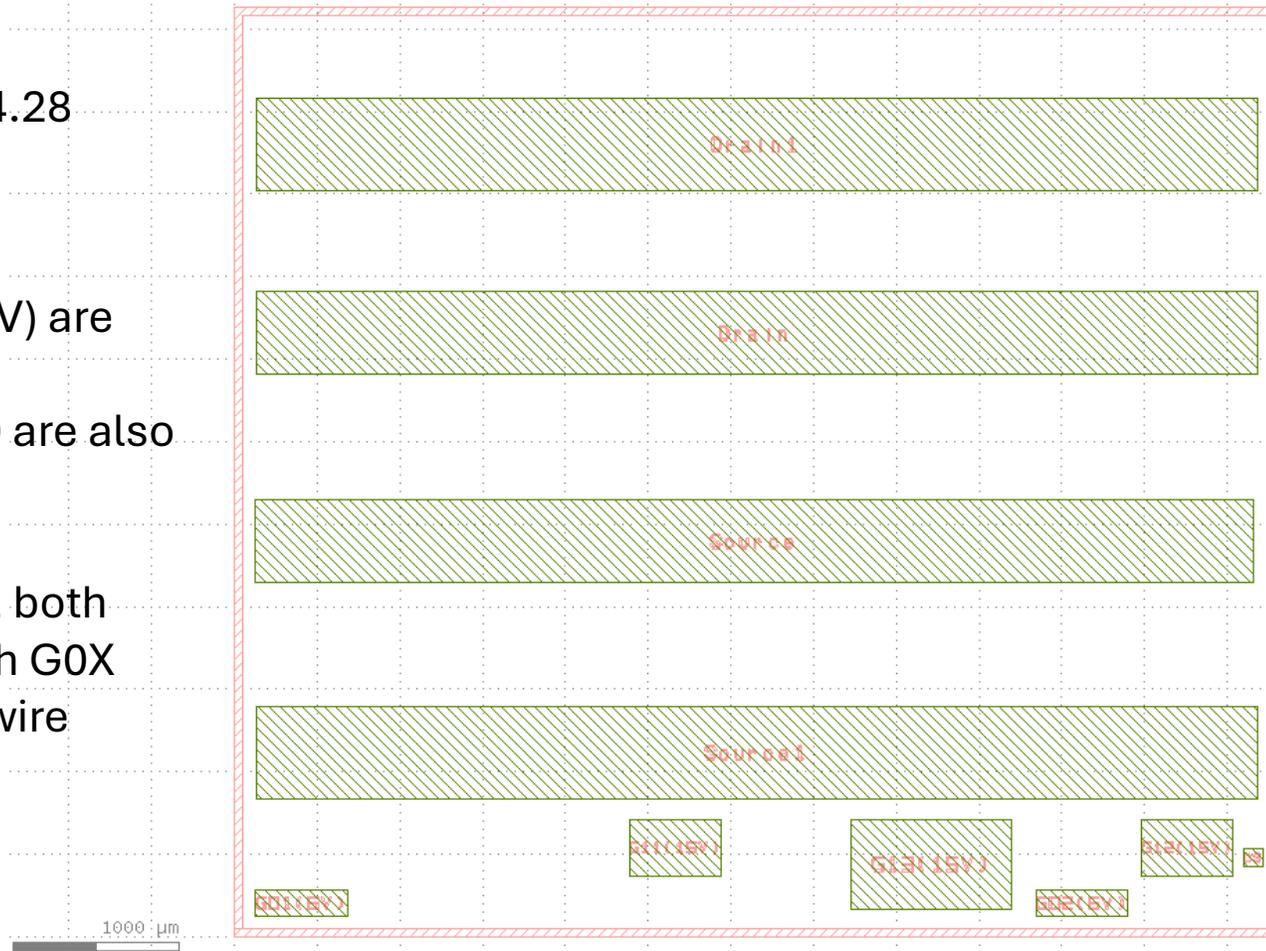
PAD	Dx	Dy	Center_x	Center_y
G01(6V)	555.00	155.00	368.30	168.30
G11(15V)	585.00	185.00	2664.55	446.30
Source	6032.72	500.00	3144.16	2397.14
Source1	6053.72	560.00	3156.66	1116.70
Drain	6053.72	500.00	3156.66	3657.14
Drain1	6053.72	567.00	3156.66	4799.98
CS	111.00	111.00	6158.02	479.30
G02(6V)	555.00	155.00	5121.95	168.30
G12(15V)	585.00	185.00	5759.20	446.30

Device-name	x-size	y-size
Star120	6345.90	5634.28

Note that G11(15V) and G12(15V) are internally connected.
 Similarly, G01(6V) and G02(6V) are also internally connected.

For best gate control uniformity, both G1X (for 12/15V driving) or both G0X (for 6V driving) shall be used if wire bonding configuration allows.

Star120
Version 2



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=====
PAD          Dx          Dy          Center_x    Center_y
-----
Drain        6053.29  500.00     3156.45     3657.14
Drain1       6053.29  567.00     3156.45     4799.98
Source       6032.14  500.00     3143.87     2397.14
Source1      6053.29  560.00     3156.45     1116.70
G11(15V)    555.00   345.00     2664.55     541.30
G12(15V)    555.00   345.00     5759.20     541.30
G13(15V)    970.00   548.00     4211.88     439.80
G01(6V)     555.00   155.00     404.30      204.30
G02(6V)     555.00   155.00     5121.95     204.30
CS          111.00   111.00     6157.44     479.30
=====

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Star120
Version 2

Basic specifications

Back metal	optional
Front metal	AlCu 4um
Wafer diameter	6 inch
Wafer thickness before dicing	1000 um
Recommended die thickness after dicing	150-250um
Street width	80 um
Recommended storage	N2 environment

Wire bonding suggestion

Larger pads use 10mil or 12mil Al .

Smaller pads use Cu, PdCu , or Au (1.5 mil – 2 mil)

Backside must be glued to backplate using conductive glue or be soldered after back metal

Backplate must be connected to the source of the GaNFET using wire bonding (low stress Al-wire recommended).

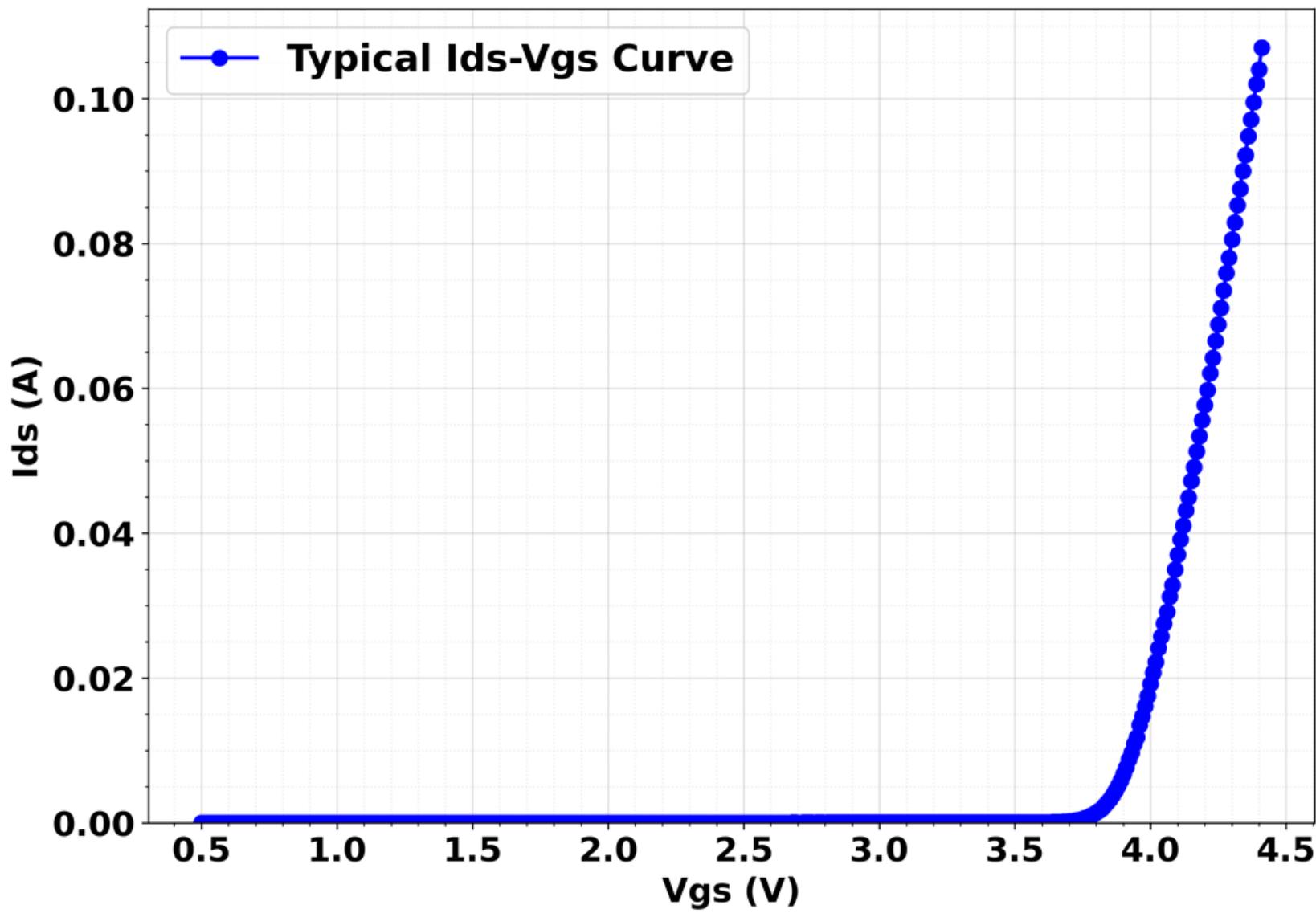
Pressurized Ag sintering should be avoided while pressureless Ag sintering is recommended for best thermal performance.

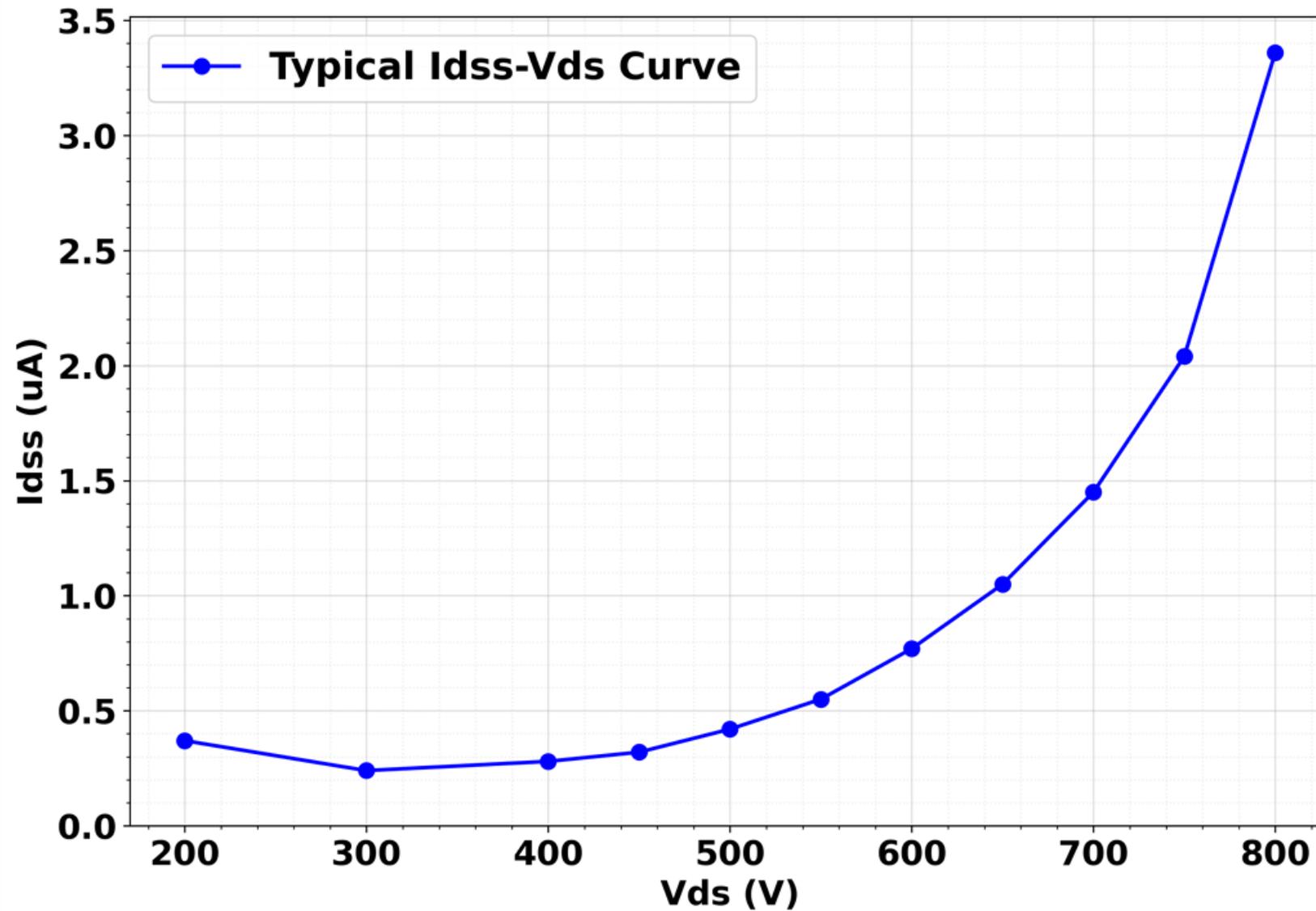
Characteristics

		Condition	min	typical	max	
I _{ds} -max	Max current at 125C	V _{gs} =6/15 125C		120		A
I _{ds} -max	Max current at 25C	V _{gs} =6/15 25C		240		A
V _{ds} -max	D-S breakdown voltage	V _{gs} =0 25C < 10uA		900		V
V _{g0s}	Original gate voltage		-3		7	V
V _{g1s}	Regulated		-20		20	
V _{gth} (G0)	Gate threshold voltage	V _{gs} =V _{ds} I _{ds} =35mA		1.3		V
V _{g1th_lin} (G1)	Regulated threshold	V _{ds} =0.01V, I _{ds} =100 mA	2.64	3.95	5.26	V
V _{g1th_sat} (G1)	Regulated threshold	V _{ds} =0.01V, I _{ds} =100 mA		2.09	3.75	V
R _{dson}	On resistance	V _{g0s} =6/V _{g1s} =15 I _{ds} =1A 25C	8.4	12	18	mOhm
R _{dson} (150C)	On resistance	V _{g0s} =6/V _{g1s} =15 I _{ds} =1A 150C	18	26	34	mOhm
V _{cs}	Current sensing	I _{ds} =+/-120A	-2.5		2.5	V
Q _g	Gate charge	V _{bus} =500V Turn-off from I _{ds} =60A V _{g0s} from 6 to 0 25C		29		nC

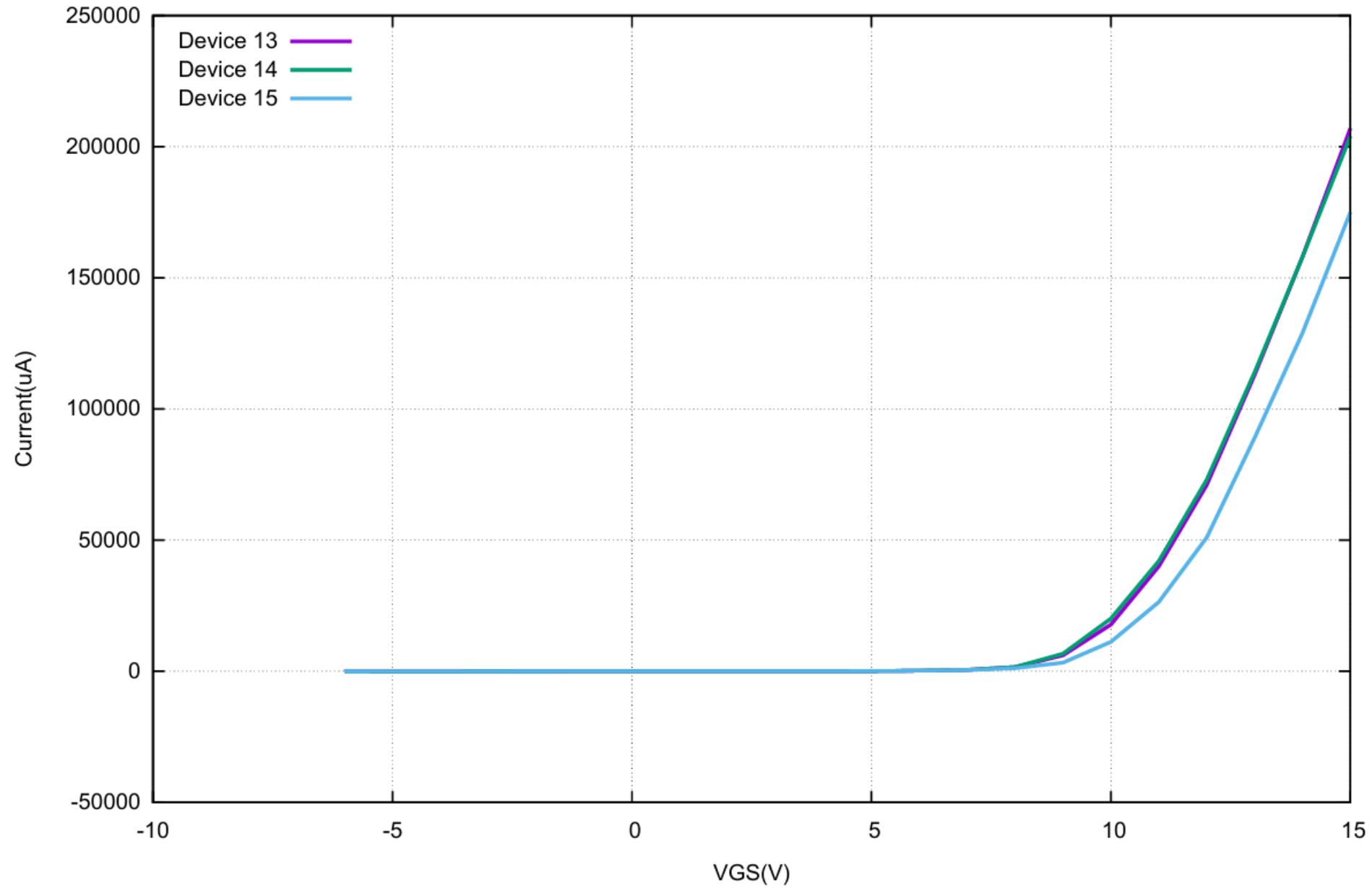
		Condition	min	typical	max	
Gm-Max	Max transconductance		360	650		mS
IDSS	Drain leakage	Vg1s=0 / Vg0s=0 Vds=800 25C		3.8	10	uA
IDSS(150C)	Drain leakage	Vg1s=0 / Vg0s=0 Vds=850 150C		19	75	μA
IDSS(150C)	Drain leakage	Vg1s=0 / Vg0s=0 Vds=900 150C		33	85	μA
IGSSF	Forward gate leakage	Vg1s=6 Vds=0 25C		670	5500	μA
-IGSSR	Reverse gate leakage	Vg1s=-6 Vds=0 25C		0.2	0.8	μA
-IGSSR(150C)	Reverse gate leakage	Vg1s=-6 Vds=0 150C		131	930	uA
Max_Isoff	Source leakage	Vg=Vs=Vb=GND, Vd=800V		0.6	7	μA
Isub	Bulk/substrate leakage	Vs=Vg=Vd=800V, B=GND		4.3		μA
Eoff	Turn-off energy	Vg=-2/12 Ids=60A		84.7		uJ
Tfall	Fall time	Vg=-2/12 Ids=60A		13.3		ns
Tdoff	Turn-off delay	Vg=-2/12 Ids=60A		35		ns
Eon	Turn-on energy	Vg=-2/12 Ids=60A		439		uJ
Trise	Rise time	Vg=-2/12 Ids=60A		39		ns
Tdon	Turn-on delay	Vg=-2/12 Ids=60A		12		ns

DUT	Transient	Tdon/Tdoff (ns)	Trise/Tfall (ns)	Ton/Toff (ns)	Eloss (uJ)	Load
Star120-V1 Vg=-1.3/12 V Rg = 2ohm	Turn-off	39	20	59	254	400 V 92 A
	Turn-on	9	60	69	1062	
Star120-V1 Vg=-3.3/12 V Rg = 2ohm	Turn-off	25	13	37	157	400 V 99 A
	Turn-on	11	98	109	1549	

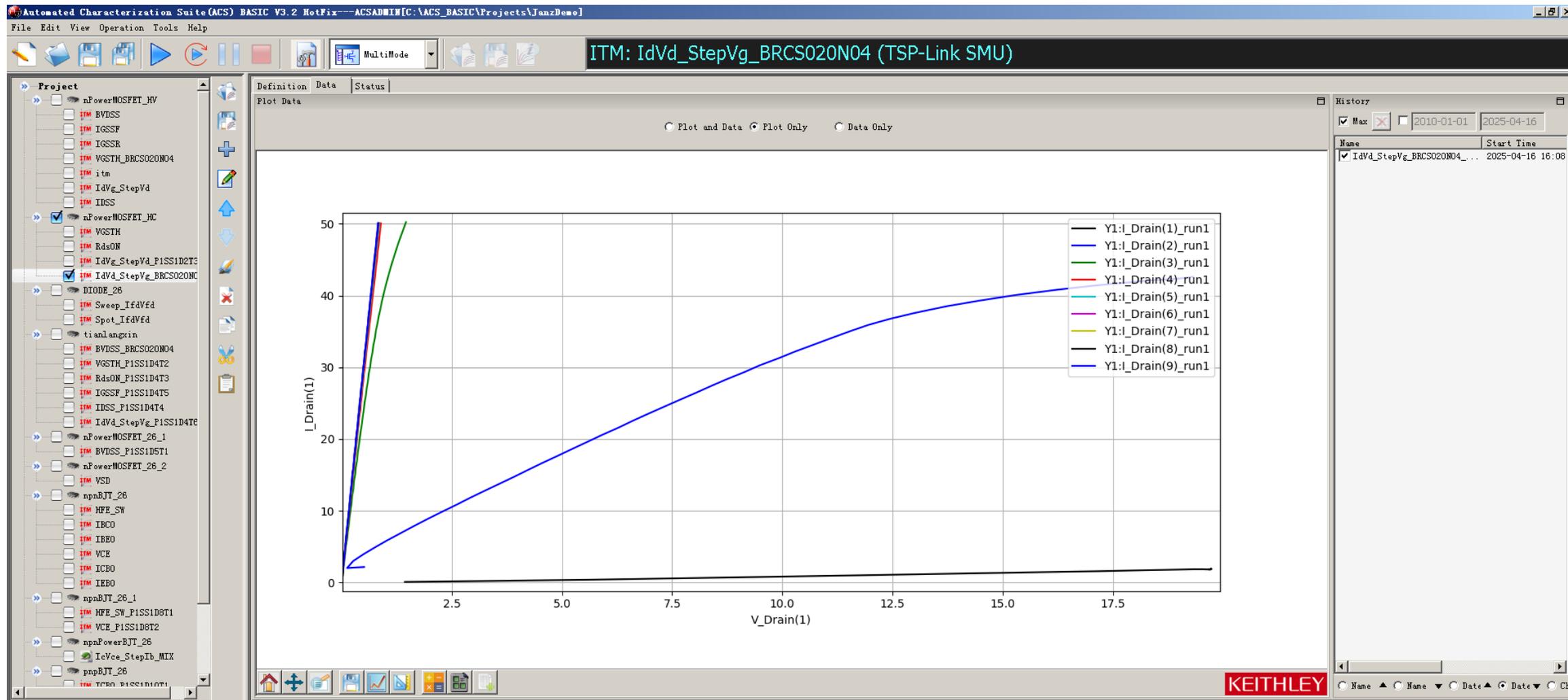




Star120 gate leakage (TO247)



开态IdVds-StepVg测试结果 (电流扫描1~50A, Vgs 4~12V, 温度25°C)



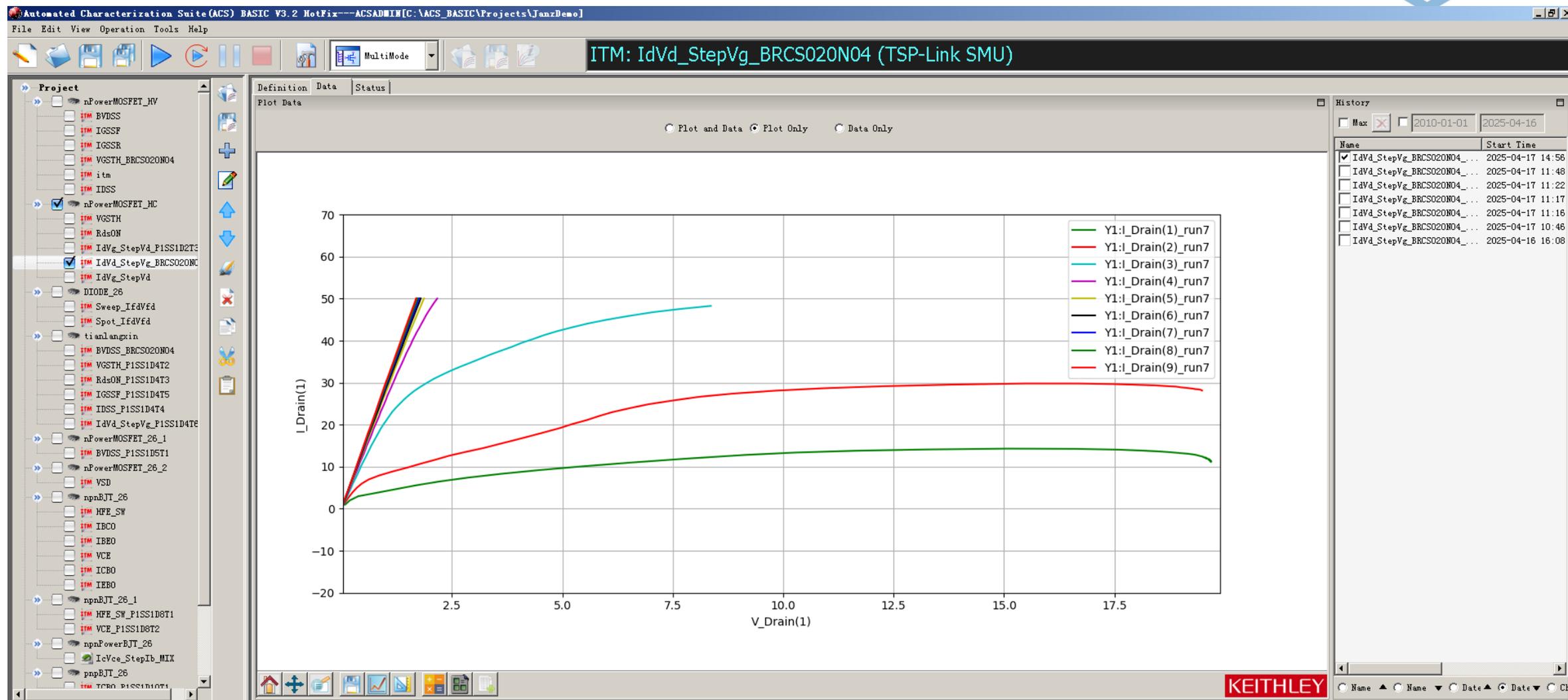
2025-04-16 16:06:02 CRITICAL SMU3 hit compliance. Test is aborted.

will expire in 28 days. Maintain service will expire in -434 day. Current version...

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开态IdVds-StepVg测试结果 (电流扫描1~50A, Vgs 4~12V, 温度150°C)



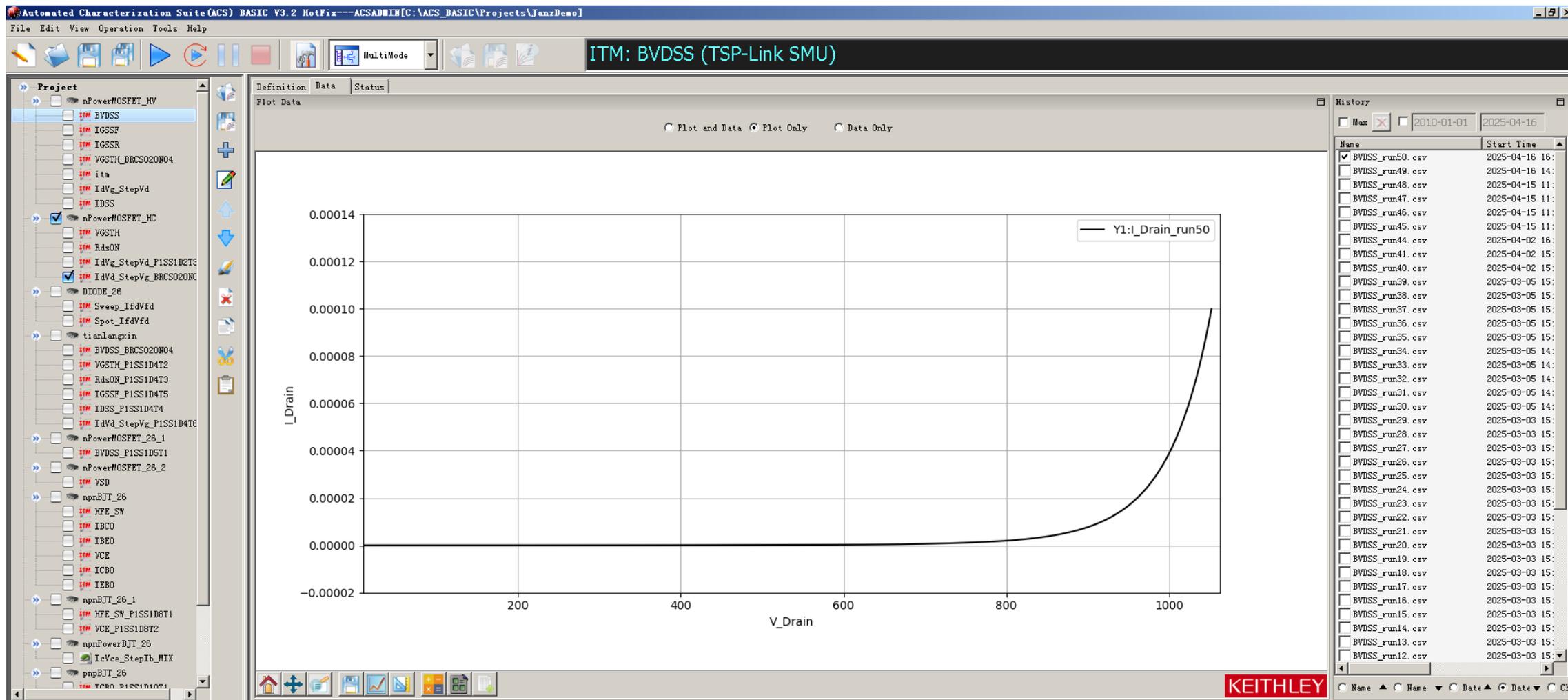
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2025-04-16 17:03:48 CRITICAL SMU4 hit compliance. Test is aborted.
2025-04-16 17:08:01 CRITICAL SMU4 hit compliance. Test is aborted.
2025-04-16 17:08:51 CRITICAL SMU4 hit compliance. Test is aborted.
2025-04-16 17:47:55 CRITICAL SMU4 hit compliance. Test is aborted.

all expire in -434 day. Current version license will expire in 28 days. Maintain s...

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关态的Idss-Vds (最高Vds可到900V) (扫描0~1200V, 100uA触发保护关断, 温度25°C)



2025-04-16 16:06:02 CRITICAL SMU3 hit compliance. Test is aborted.

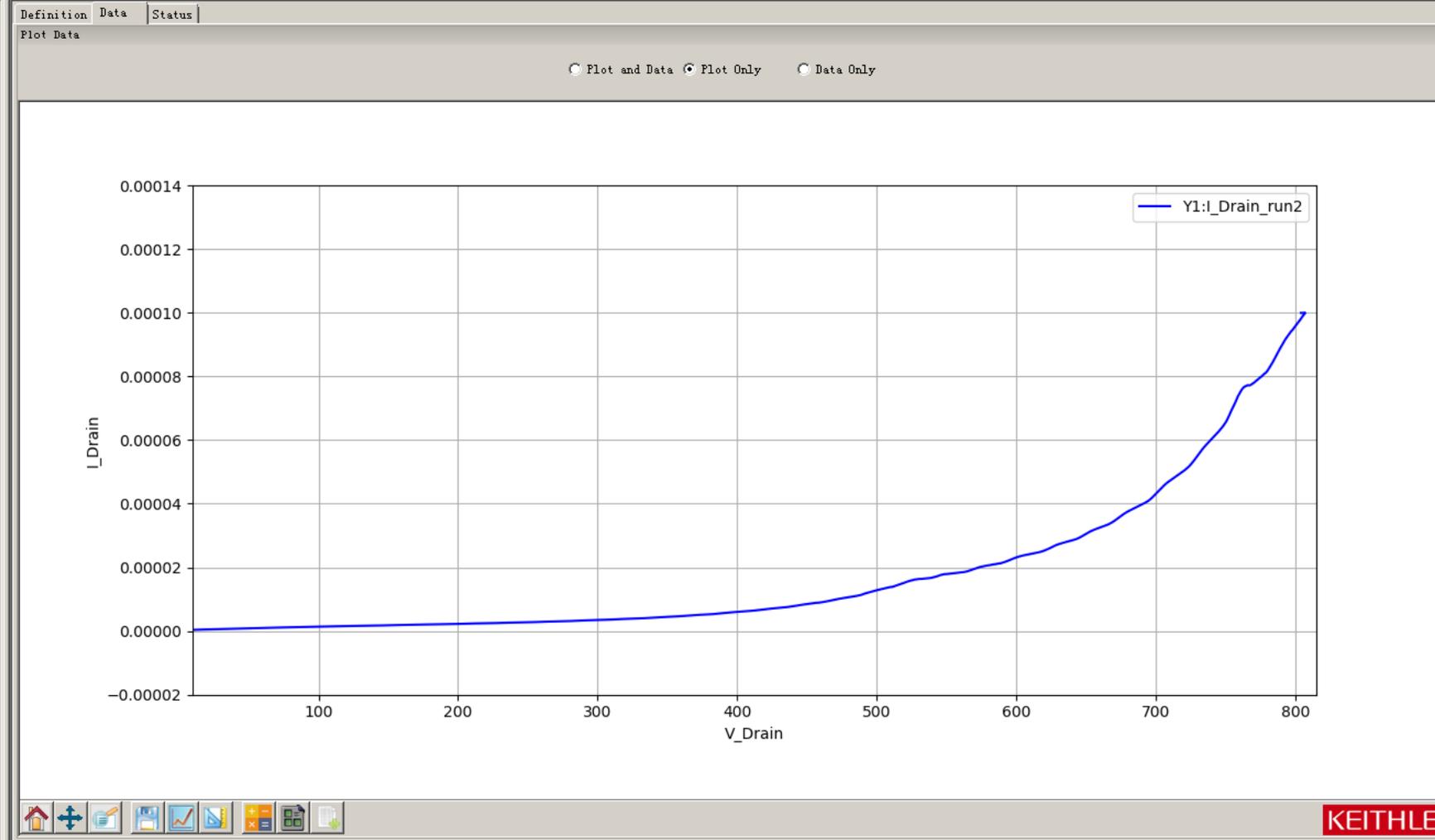
-434 day. Current version license will expire in 28 days. Maintain service will e...

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ITM: BVDSS (TSP-Link SMU)

- Project
 - nPowerMOSFET_HV
 - BVDSS
 - IGSSF
 - IGSSR
 - VGSTH_BRCS020ND4
 - itm
 - IDSS
 - nPowerMOSFET_HC
 - VGSTH
 - RdsON
 - IdVd_StepVd_P1SS1D2T3
 - IdVd_StepVg_BRCS020NC
 - IdVd_StepVd
 - DIODE_26
 - Sweep_IfdVfd
 - Spot_IfdVfd
 - tianlangxin
 - BVDSS_BRCS020ND4
 - VGSTH_P1SS1D4T2
 - RdsON_P1SS1D4T3
 - IGSSF_P1SS1D4T5
 - IDSS_P1SS1D4T4
 - IdVd_StepVg_P1SS1D4T6
 - nPowerMOSFET_26_1
 - BVDSS_P1SS1D5T1
 - nPowerMOSFET_26_2
 - VSD
 - npnBJT_26
 - HFE_SW
 - IBCO
 - IBEO
 - VCE
 - ICBO
 - IEBO
 - npnBJT_26_1
 - HFE_SW_P1SS1D8T1
 - VCE_P1SS1D8T2
 - npnPowerBJT_26
 - IcVce_StepIb_MIX
 - pnpBJT_26
 - ICR_P1SS1D10T1



History

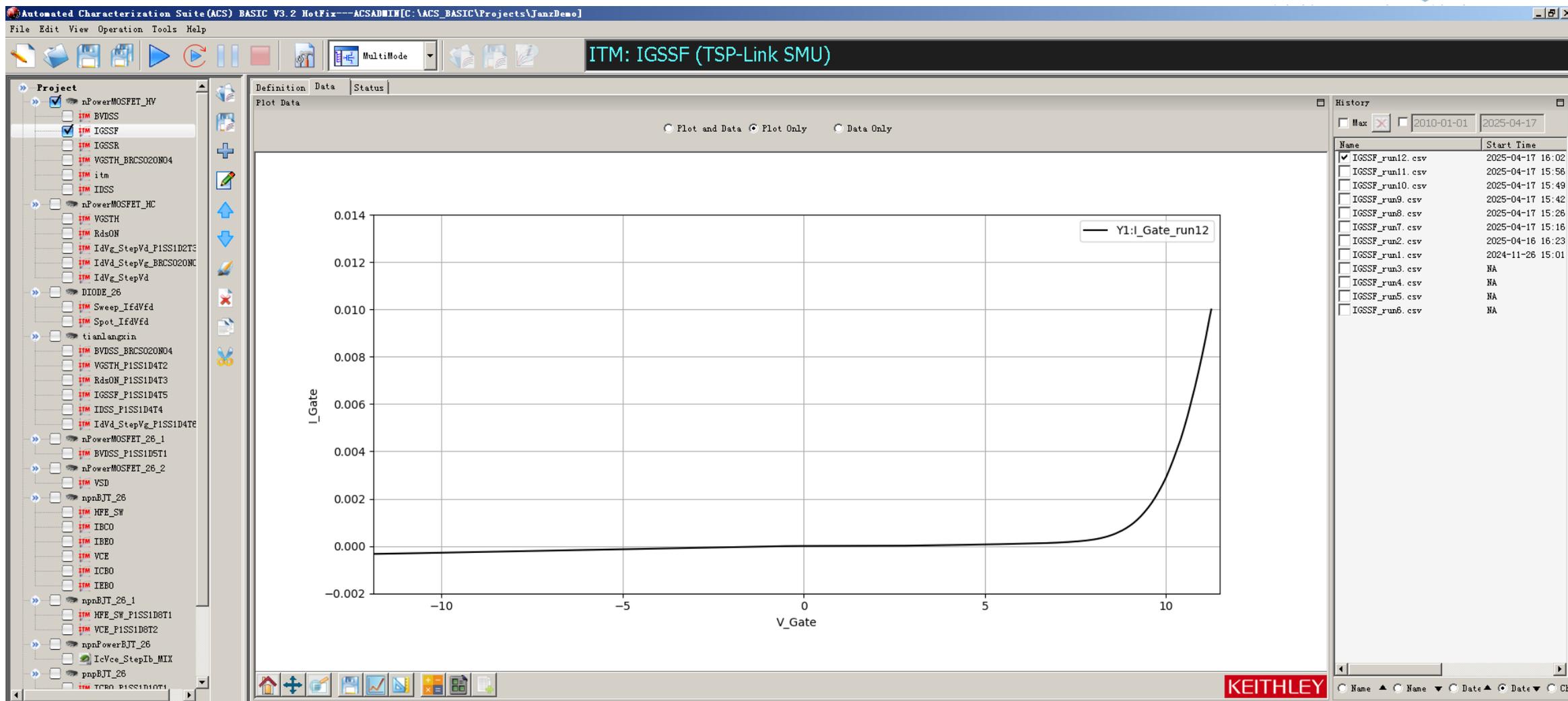
Max 2010-01-01 2025-04-17

Name	Start Time
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<input type="checkbox"/> BVDSS_run1.csv	2025-04-17 15:33

2025-04-17 15:24:42 CRITICAL SMU2 hit compliance. Test is aborted.
 2025-04-17 15:30:40 CRITICAL SMU2 hit compliance. Test is aborted.
 2025-04-17 15:33:23 CRITICAL BVDSS Hit max history, backup all history files.
 2025-04-17 15:34:49 CRITICAL SMU3 hit compliance. Test is aborted.
 2025-04-17 15:37:00 CRITICAL SMU3 hit compliance. Test is aborted.



Ig-Vg曲线 (Vgs=-12 to 12V, Igss限流10mA, Vds = 0V, 温度25°C)



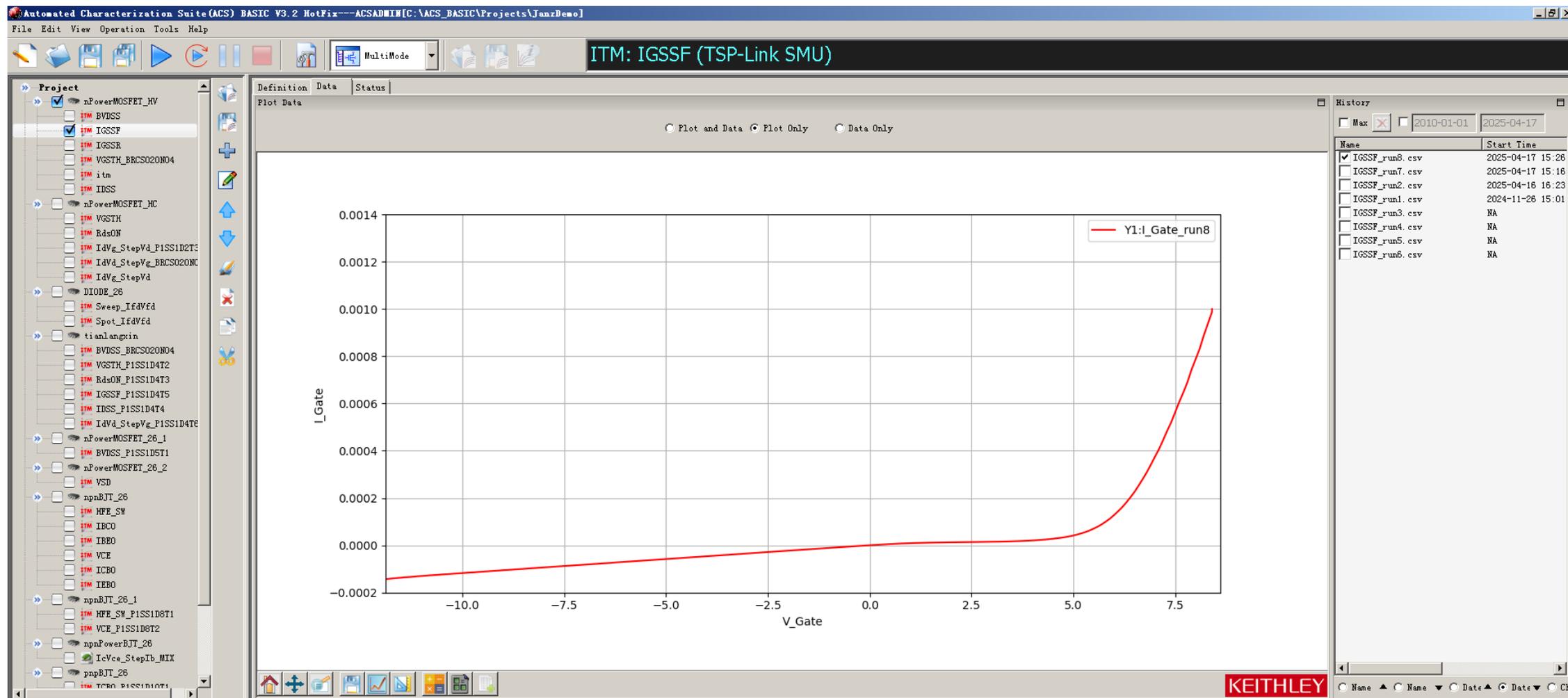
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2025-04-17 15:33:23 CRITICAL BVDSS Hit max history, backup all history files.
2025-04-17 15:34:49 CRITICAL SMU3 hit compliance. Test is aborted.
2025-04-17 15:37:00 CRITICAL SMU3 hit compliance. Test is aborted.
2025-04-17 15:46:19 CRITICAL SMU2 hit compliance. Test is aborted.
2025-04-17 15:52:55 CRITICAL SMU2 hit compliance. Test is aborted.
2025-04-17 16:00:41 CRITICAL SMU2 hit compliance. Test is aborted.
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ire in 27 days. Maintain service will expire in ~435 day. Current version license ...

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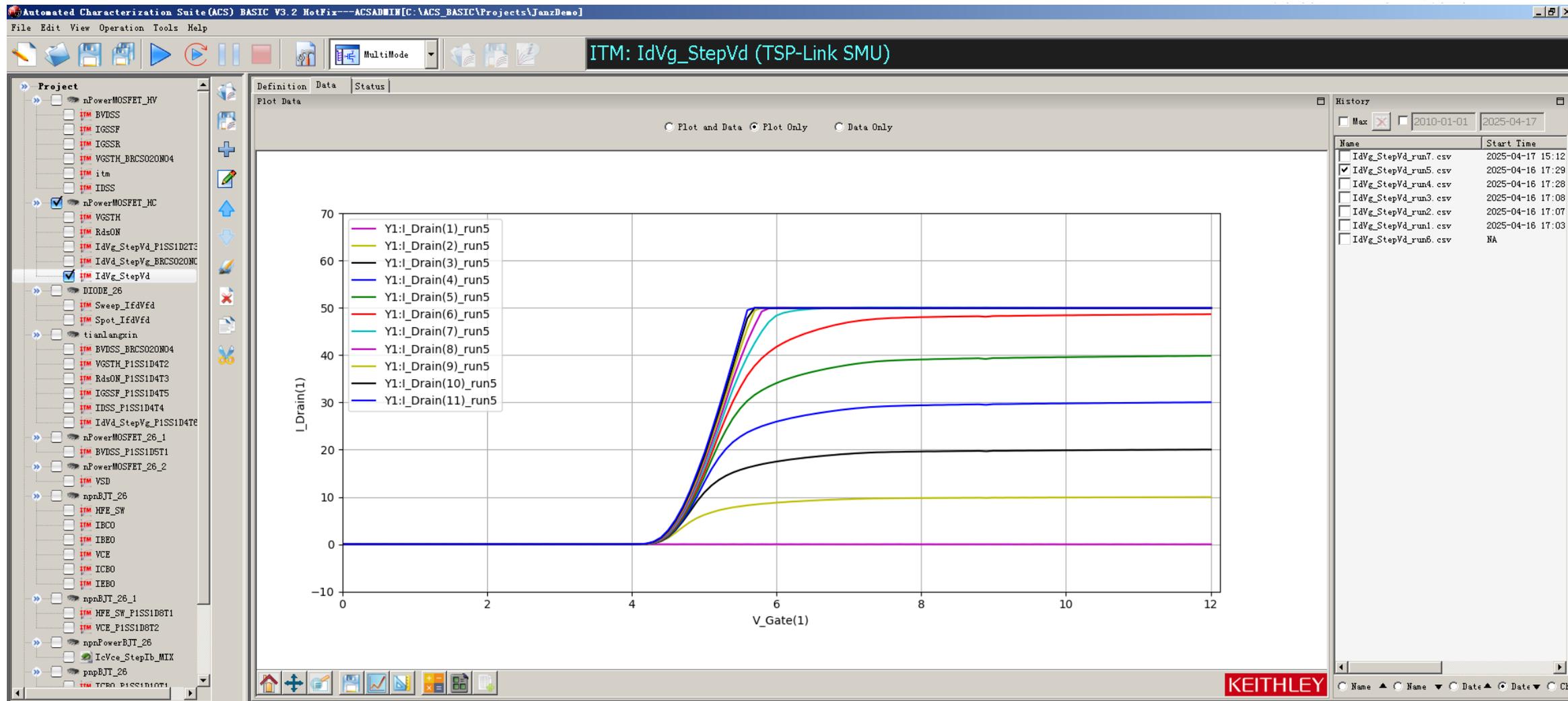


Ig-Vg曲线 (Vgs=-12 to 12V, Igss限流1mA, Vds = 0V, 温度150°C)

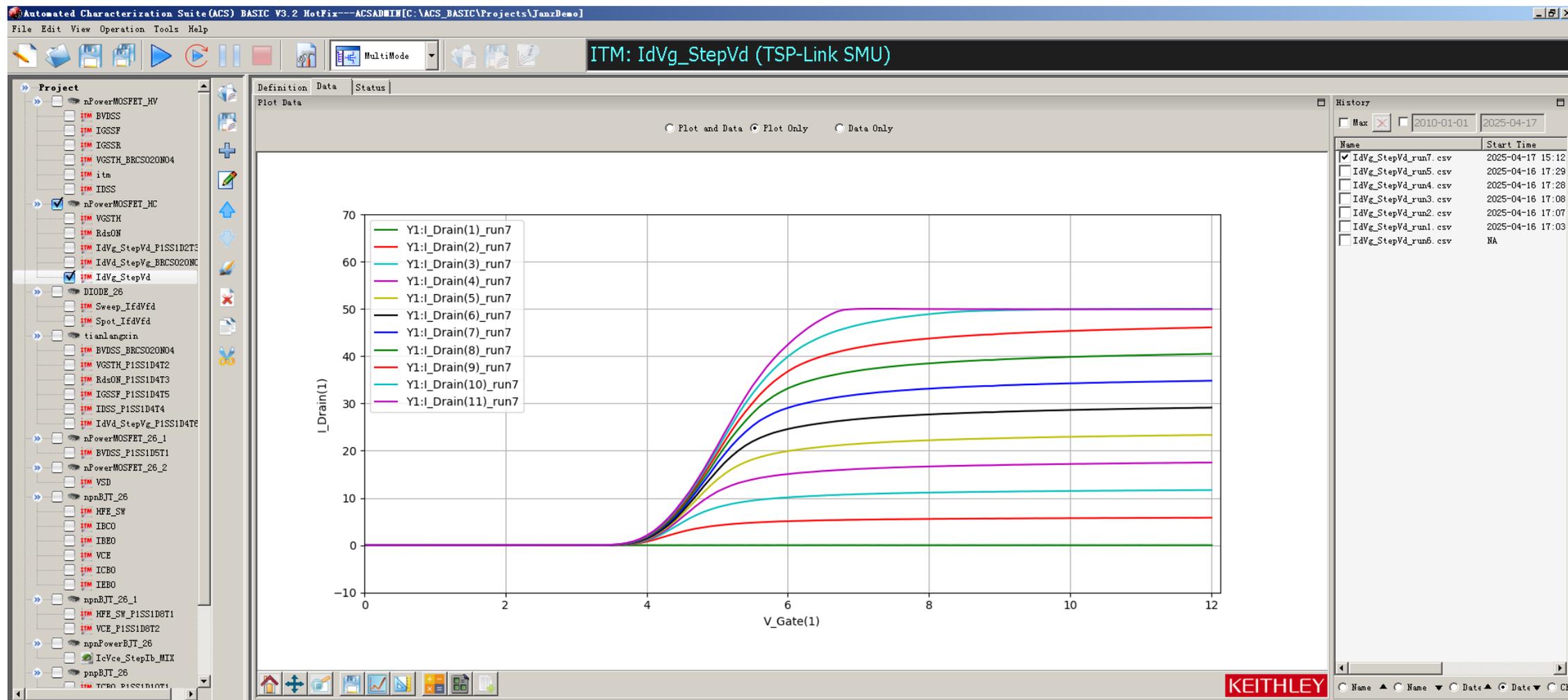


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 2025-04-17 15:30:40 CRITICAL SMU2 hit compliance. Test is aborted.

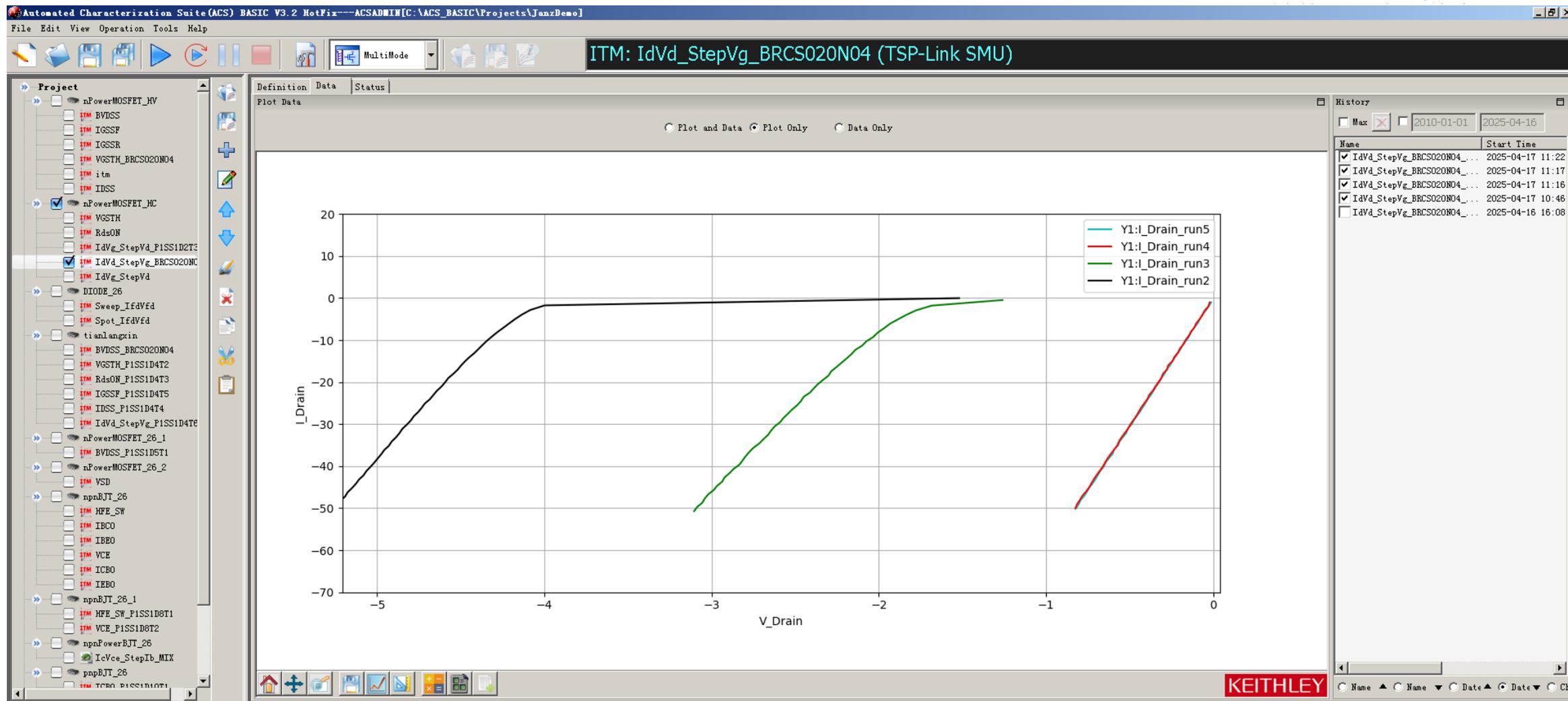
Id-Vg曲线 (Vgs=0-12V, Vds=0~2V, Id=0~50A, 温度25°C)



Id-Vg曲线 (Vgs=0-12V, Vds=0~2V, Id=0~50A, 温度150°C)



反向导通的Isd-Vsd (Vgs=-3V/0V/12V, 温度25°C)



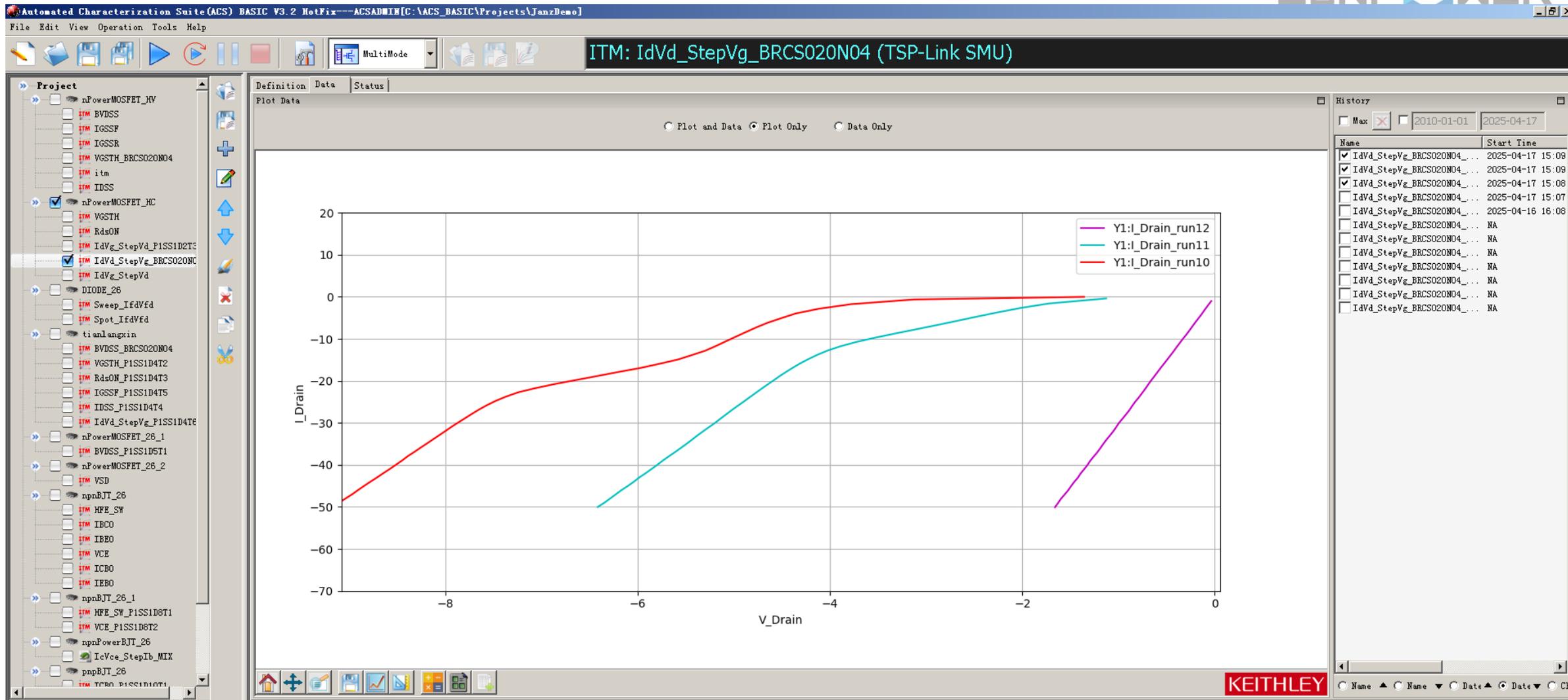
2025-04-16 16:06:02 CRITICAL SMU3 hit compliance. Test is aborted.
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2025-04-16 17:47:55 CRITICAL SMU4 hit compliance. Test is aborted.

License will expire in -434 day. Current version license will expire in 28 days. Main...

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反向导通的Isd-Vsd (Vgs=-3V/0V/12V, 温度150°C)



Content

Basic wafer info/DC data

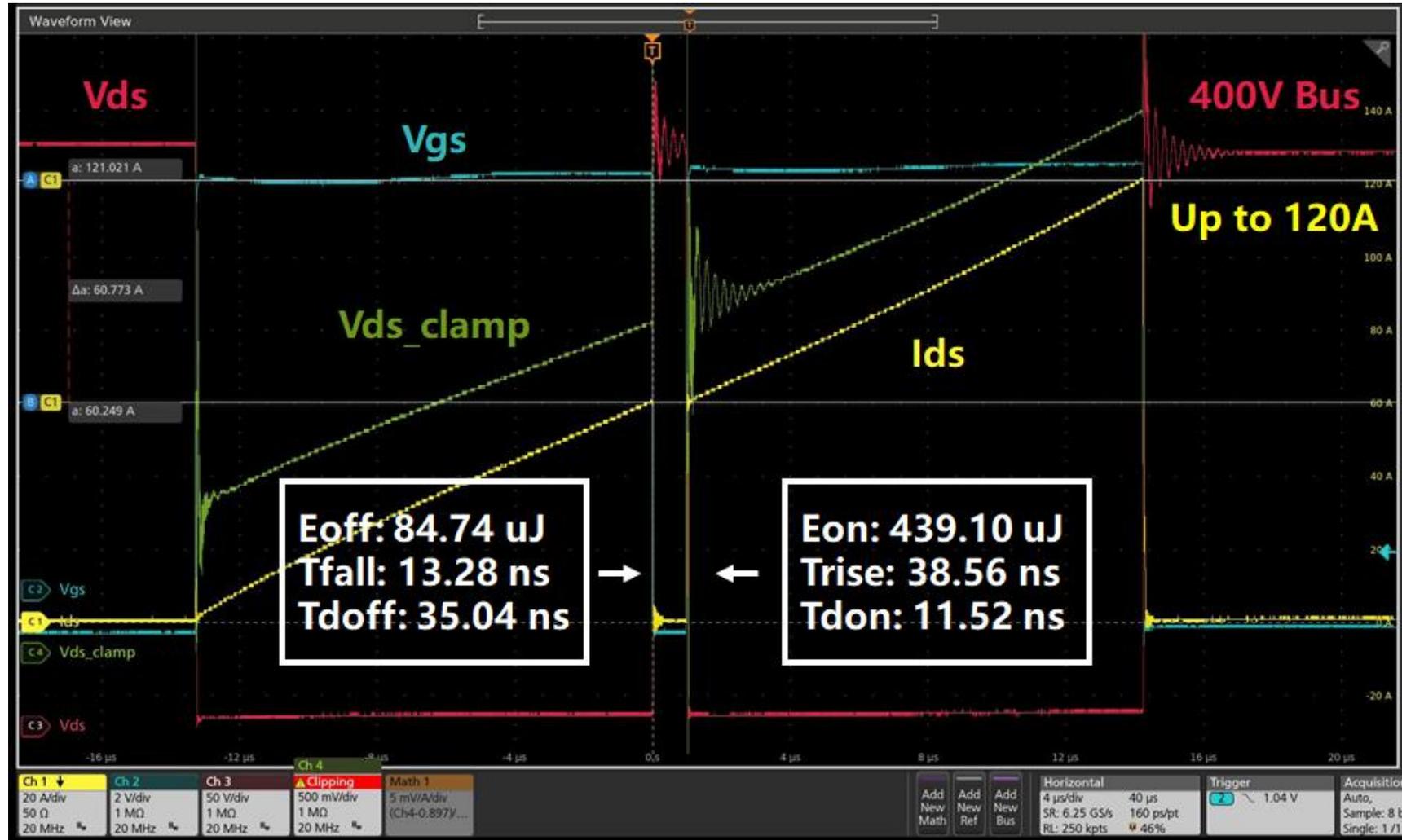


Dynamic test data

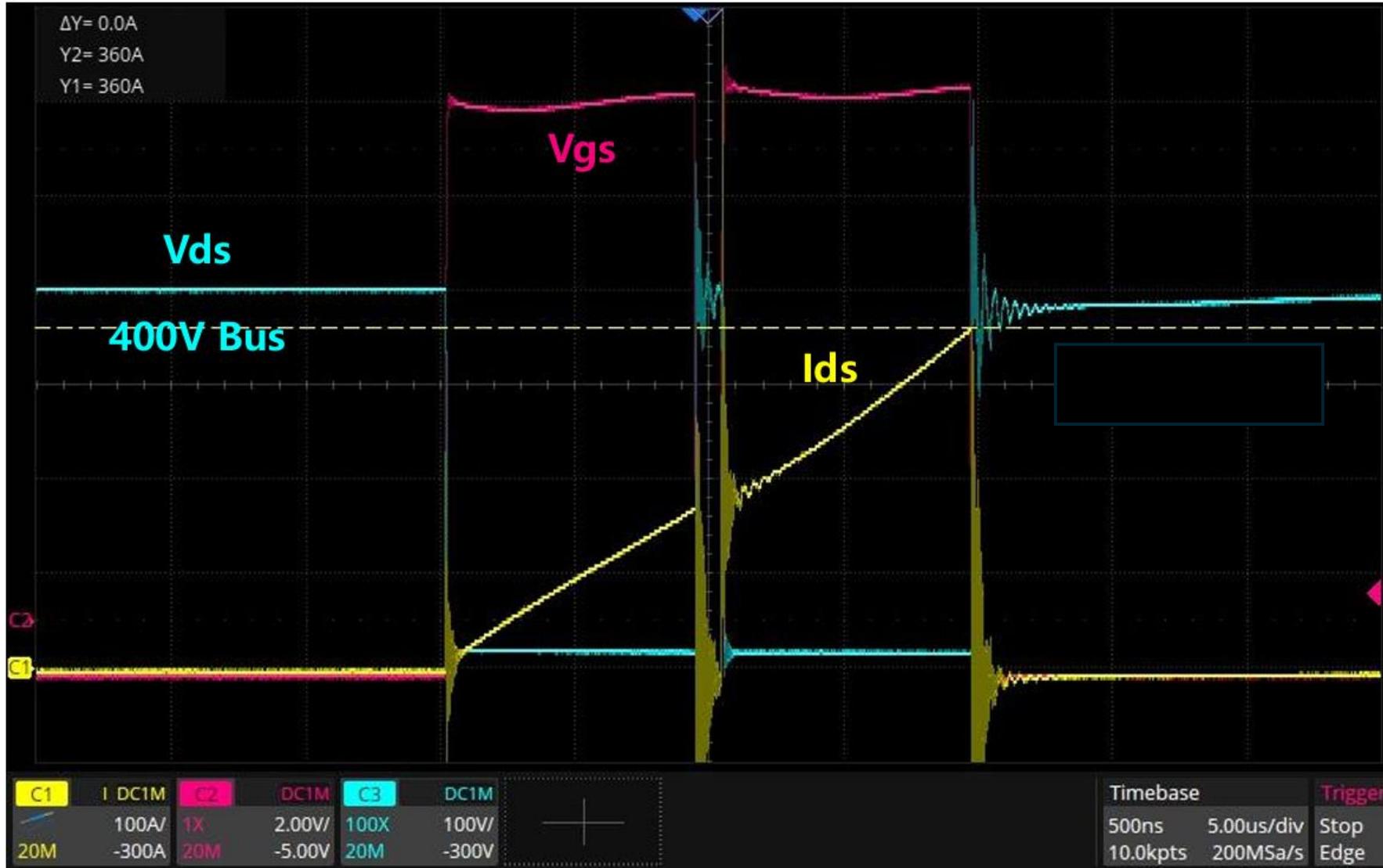
Chip probe data

App notes

TO247-4 DPT Waveform



3-parallel TO247-4 DPT Waveform (> 360A)



Gate pulsing test at 200KHz (4 uS on /1 uS off)

VG1(-)	VG1(+)	VG0(-)	VG0(+)	VBUS
-1.3	11.6	-0.7	7.4	0
-3.4	11.6	-3.1	7.4	0
-6.3	11.6	-6.3	7.4	0
-3.4	11.6	-3.0	7.4	100V (1.5A)
-3.4	11.6	-2.9	7.4	200V (2.1A)
-3.4	11.6	-2.8	7.4	400V (4.5A)

Content

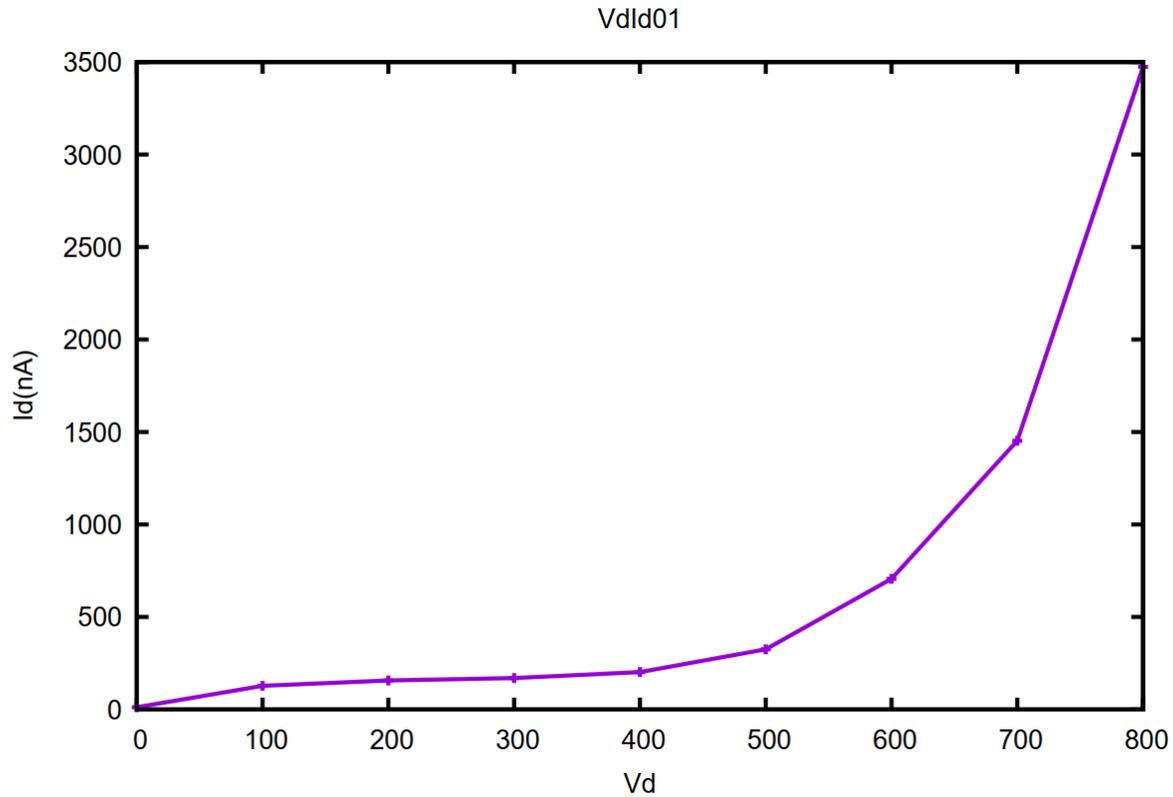
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Dynamic test data

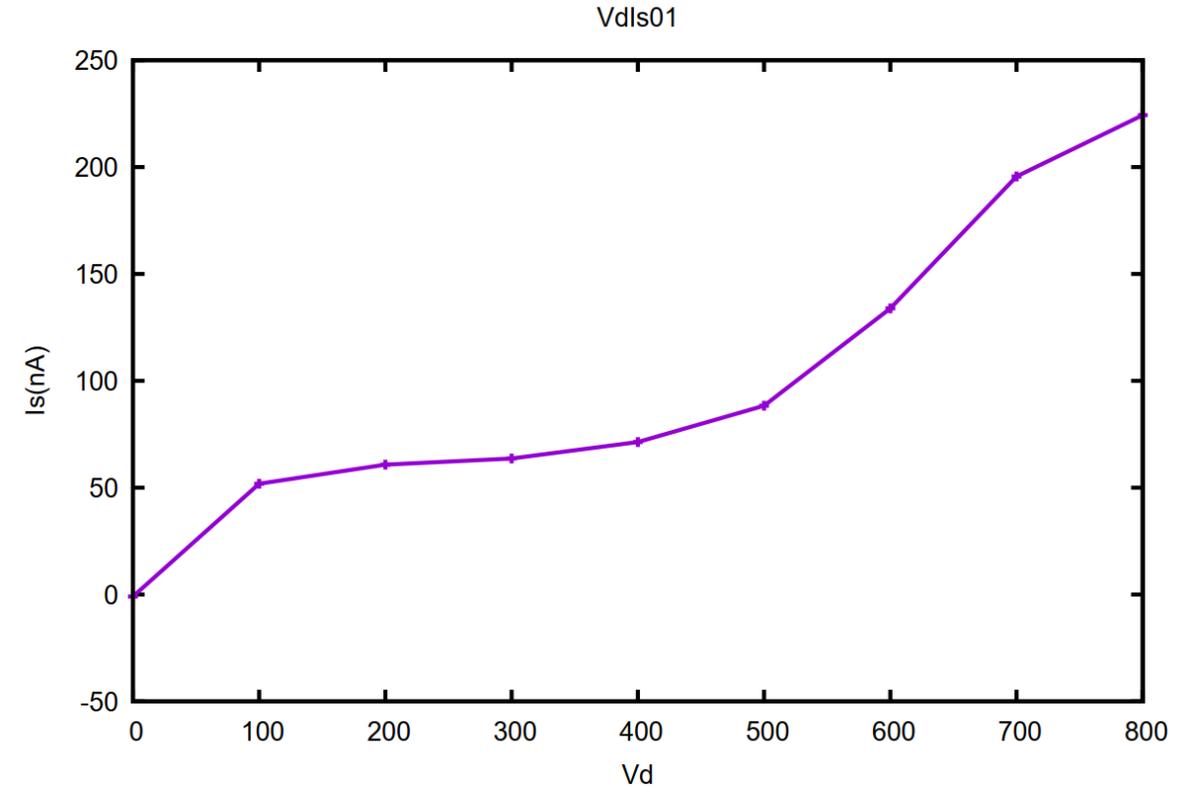
→ Chip probe data

App notes

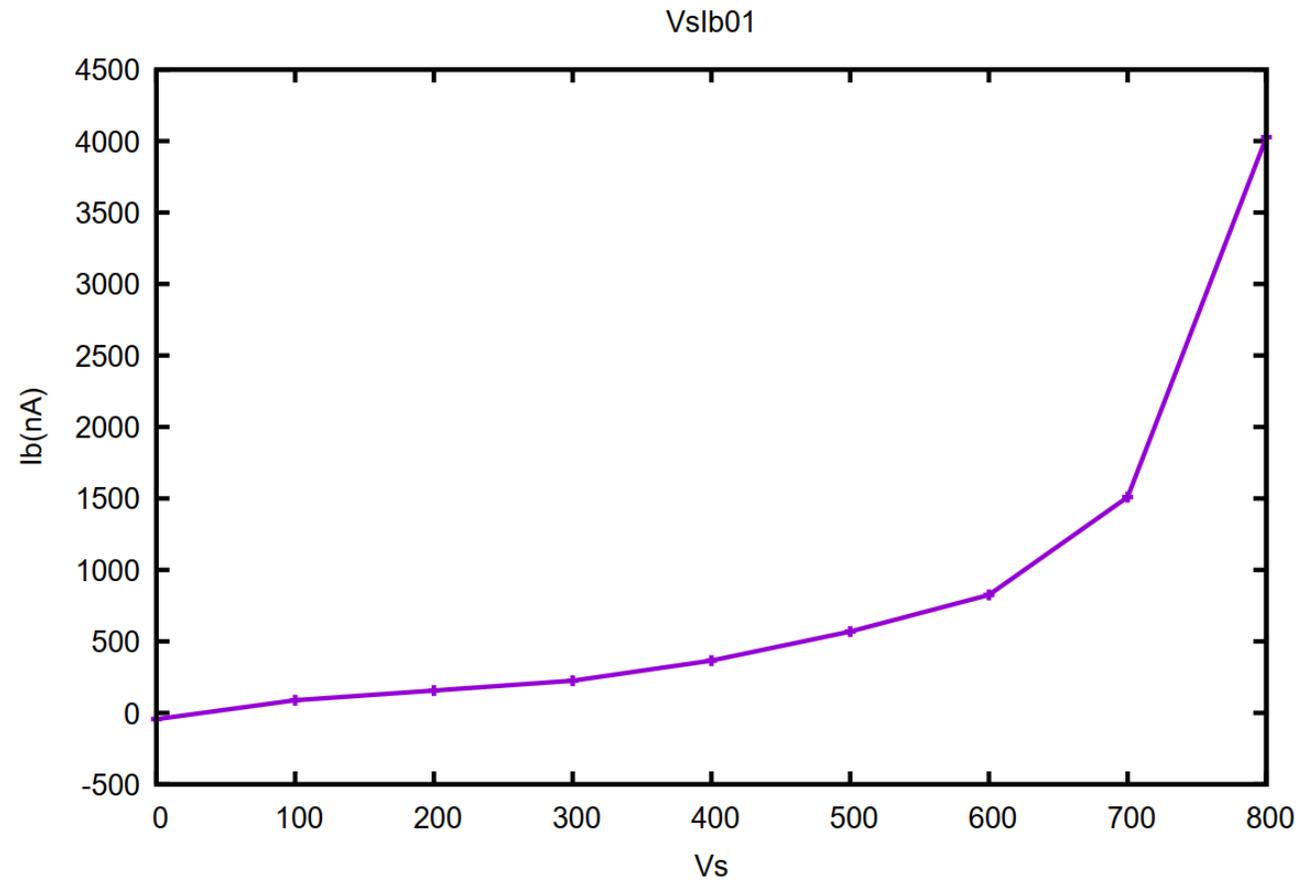
@RT



**Drain leakage I_{dss} versus V_{ds}
@ $V_g=V_s=V_b=GND$**

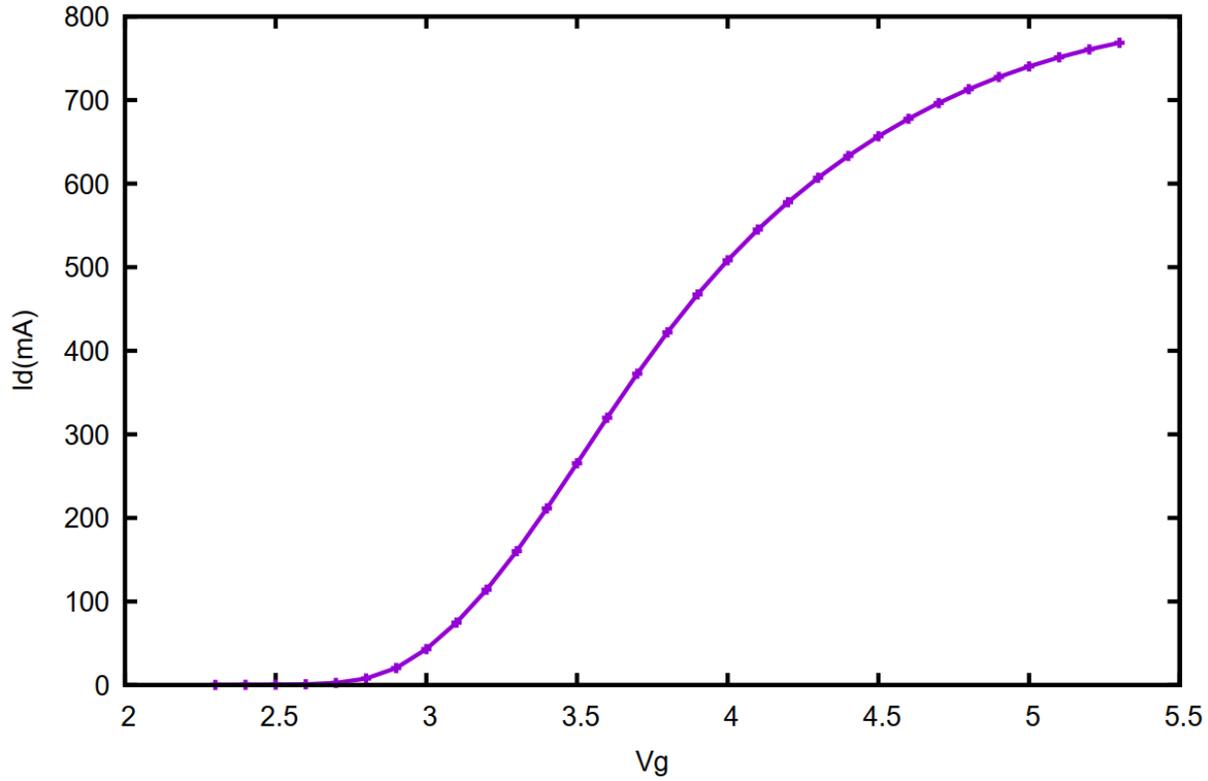


**Source leakage I_s versus V_{ds}
@ $V_g=V_s=V_b=GND$**



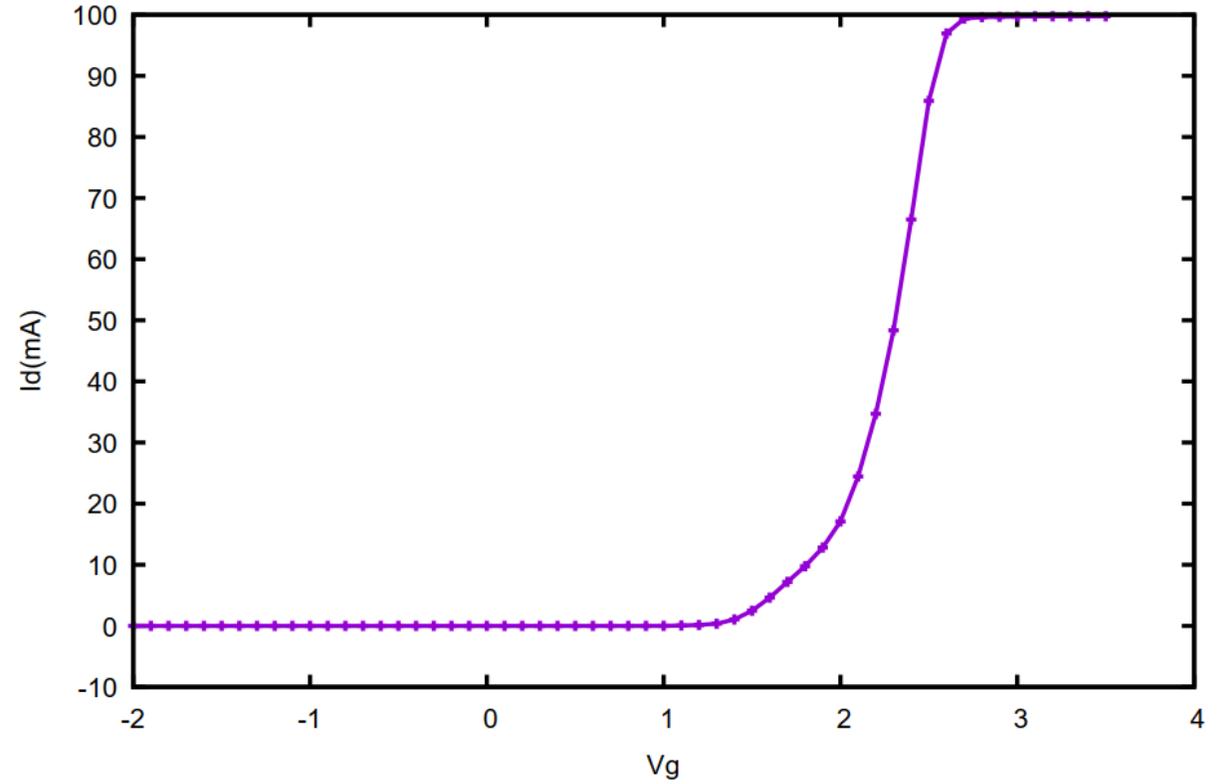
**Bulk (Substrate) leakage I_b versus V_s
@ $V_g=V_s=V_d$, B=GND**

VgId03

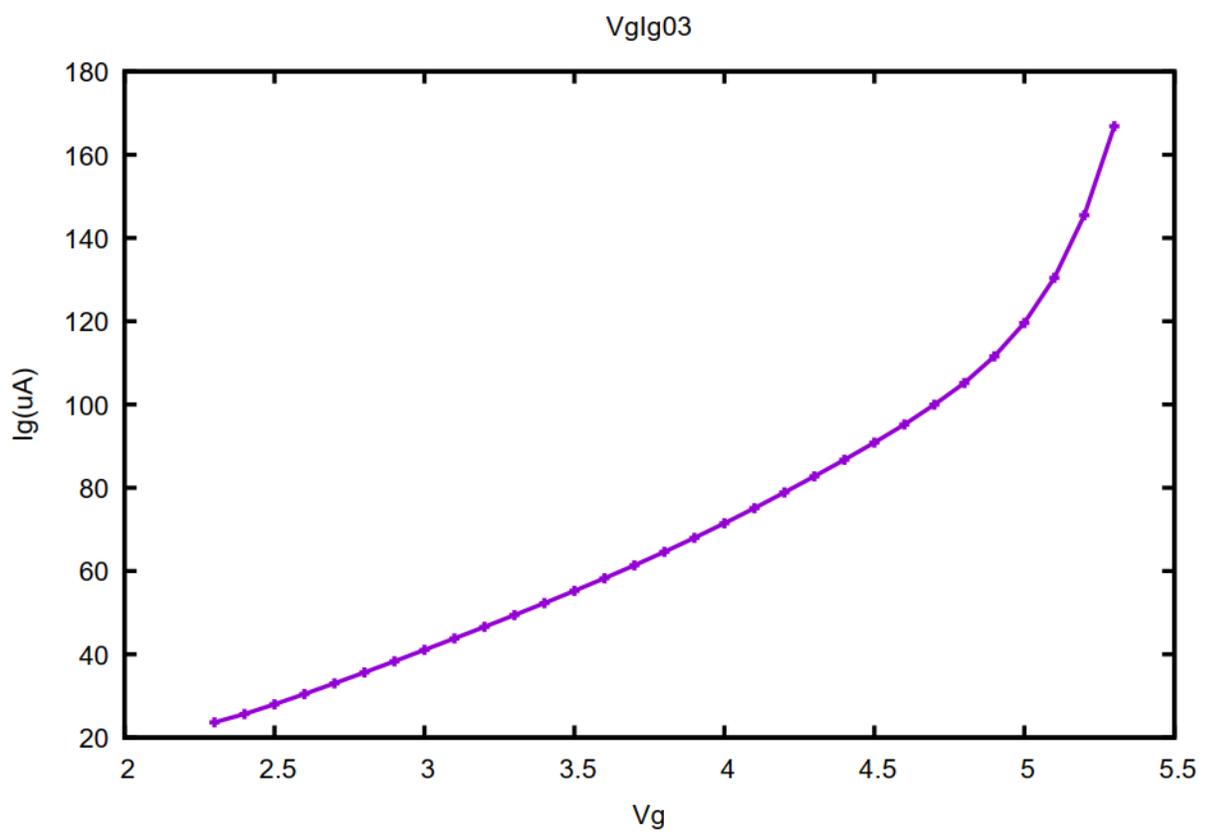
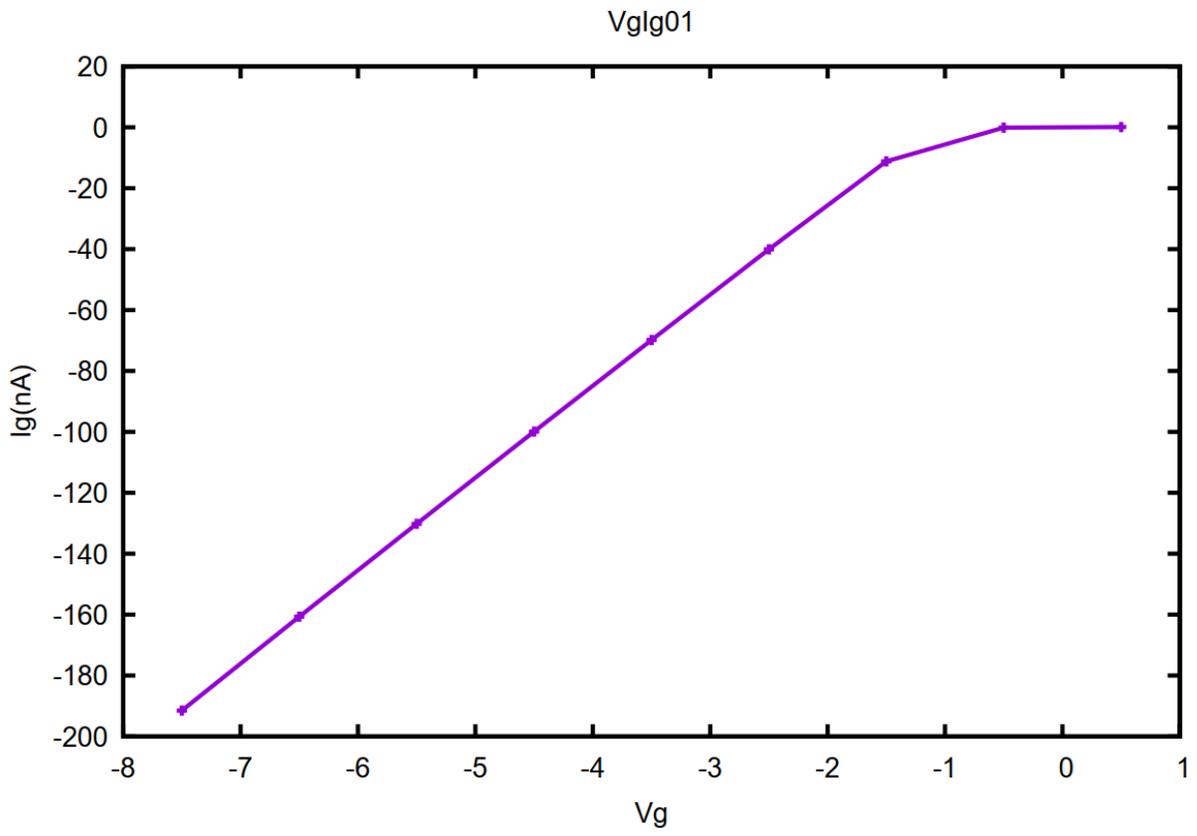


Id-Vg transfer curve
@Vds=0.01V, Vs=Vb=GND

VgId04

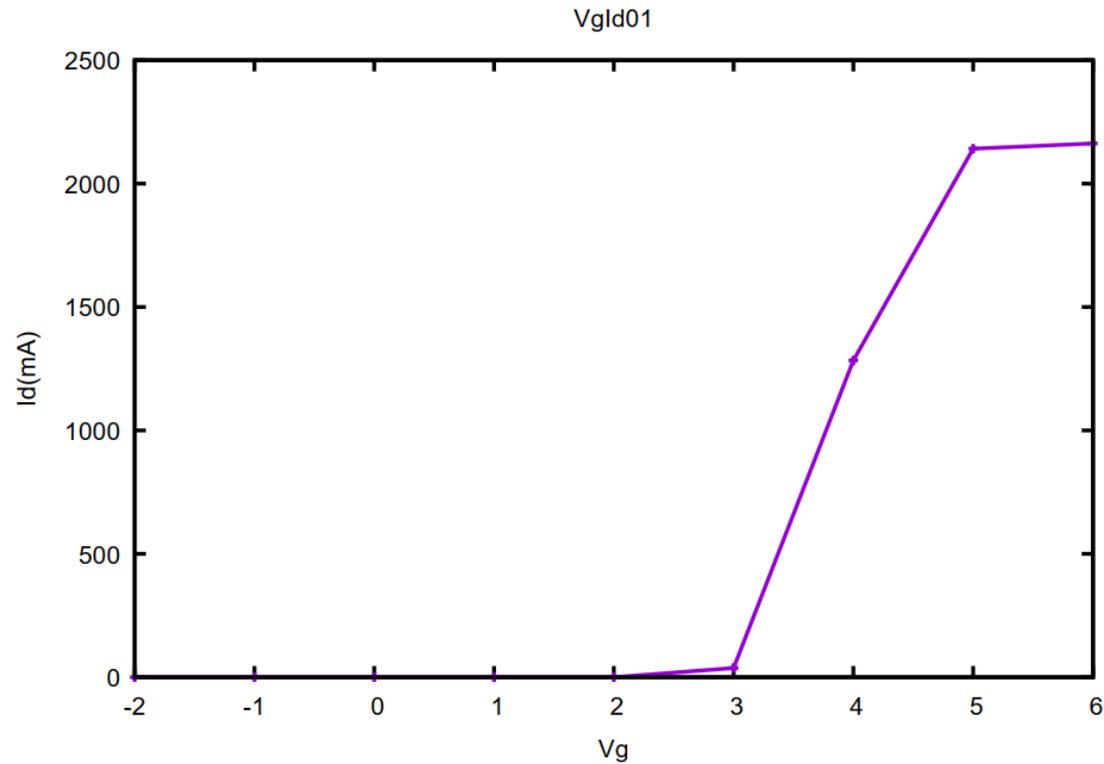


Id vs Vg transfer curve
@Vds=100V, Vs=Vb=GND

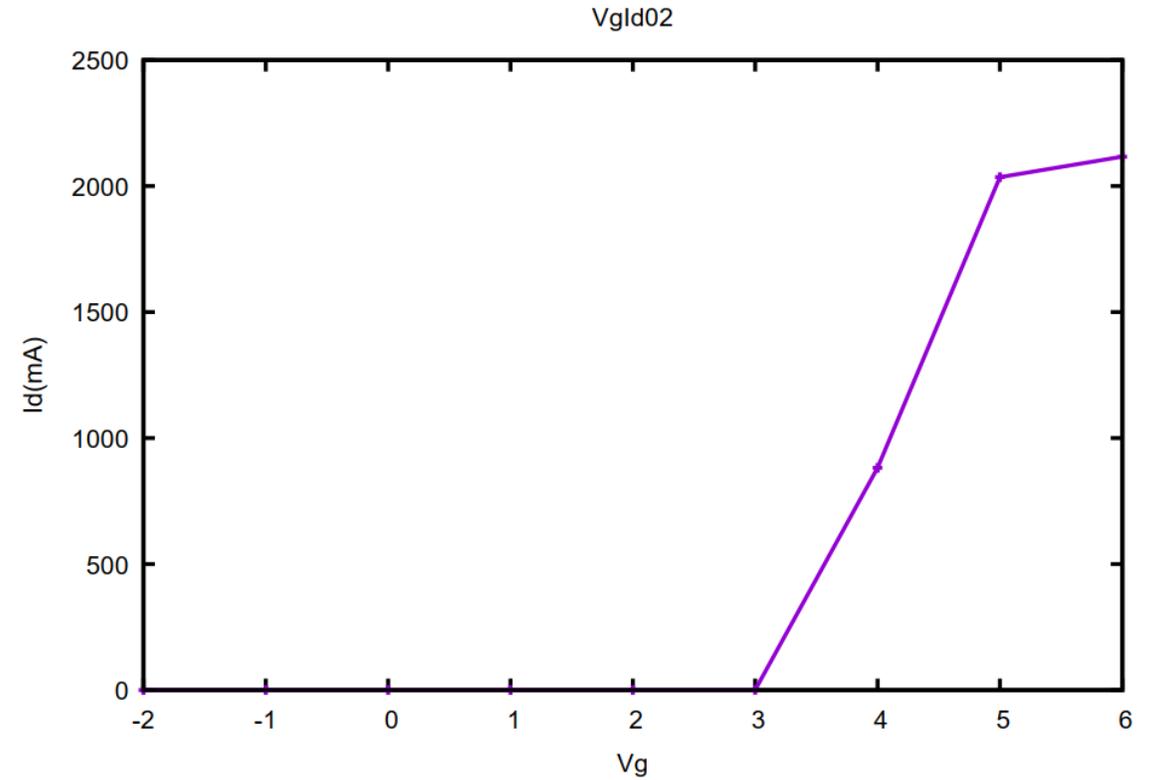


Gate leakage
@ $V_{ds}=0.1$ V, $V_s=V_b=GND$

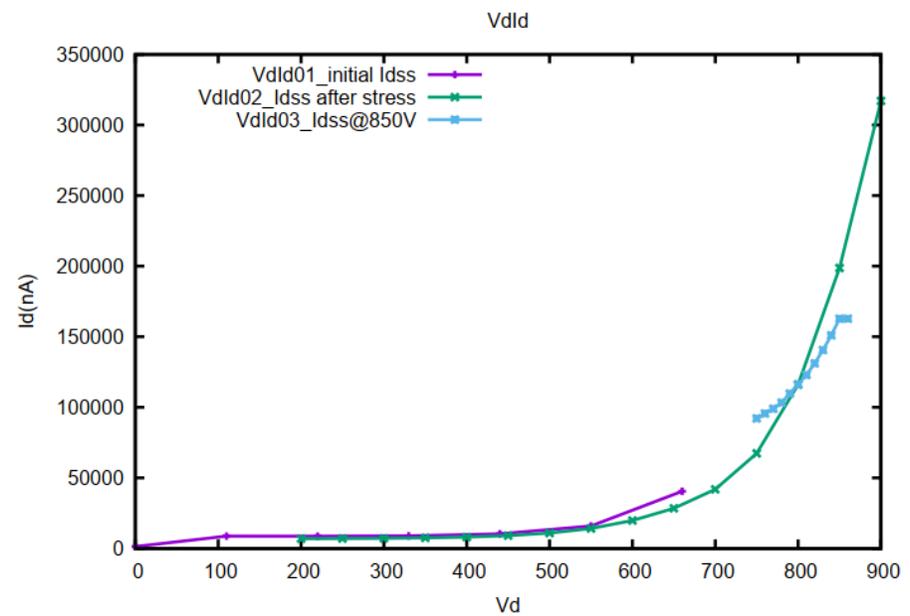
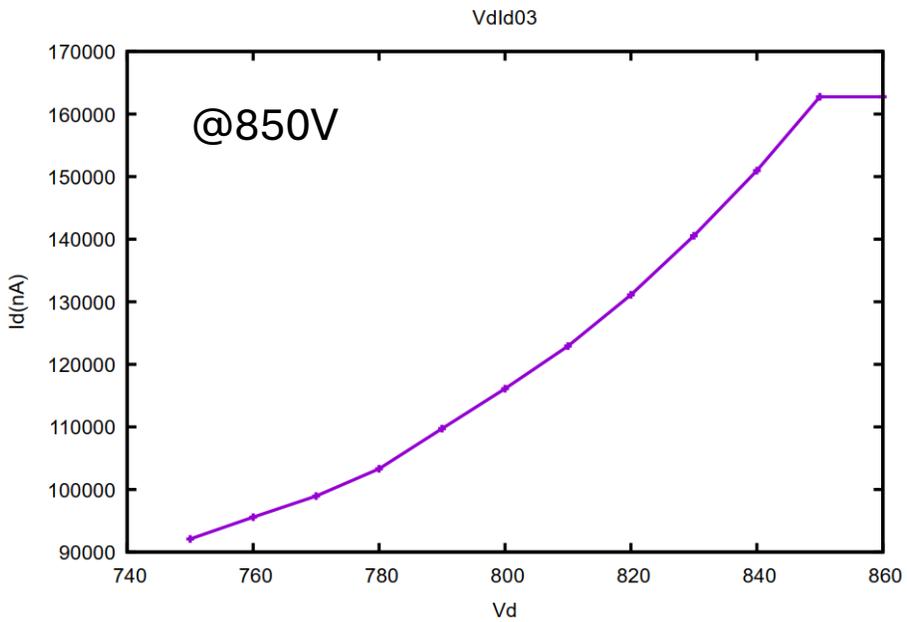
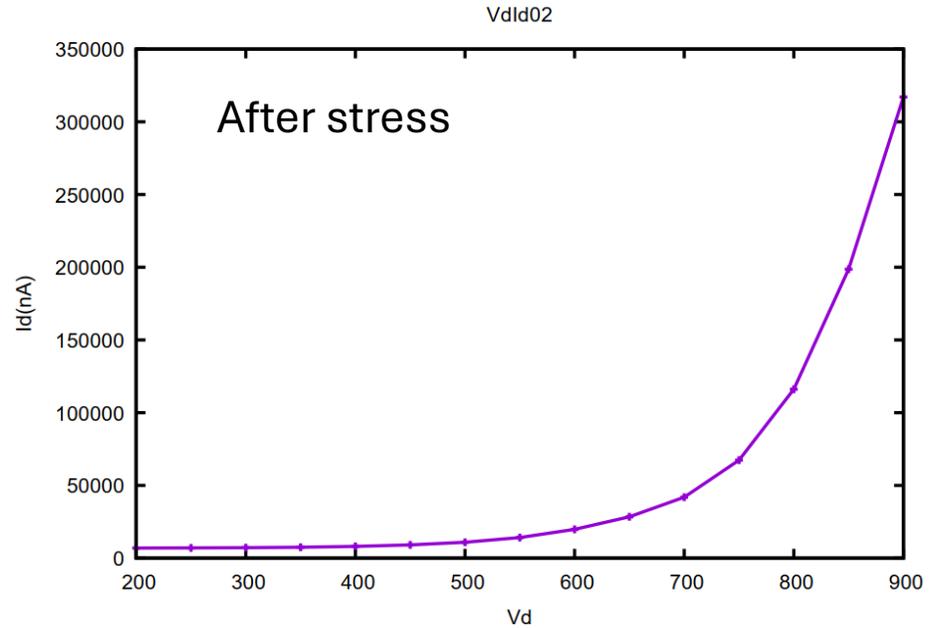
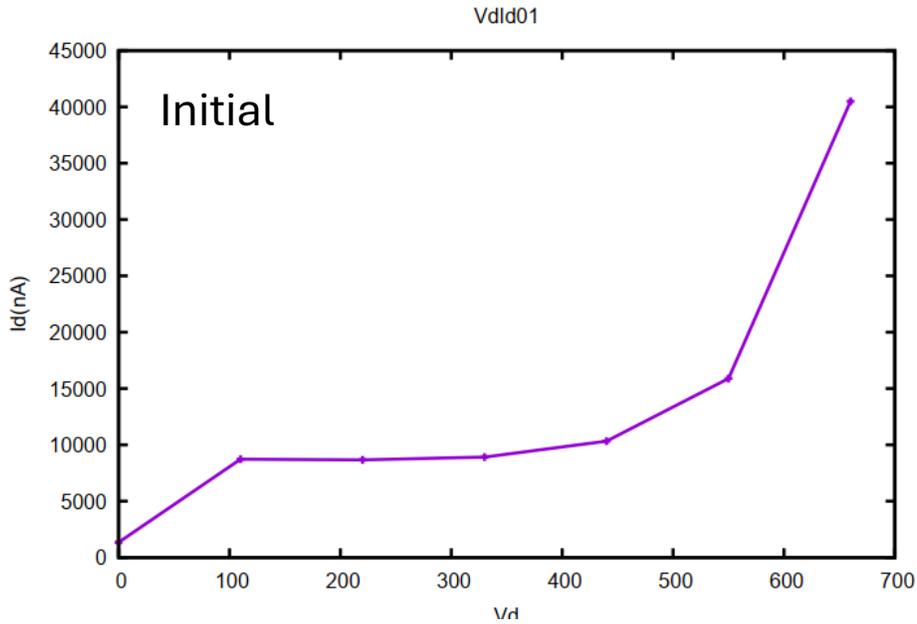
@HT 150 °C



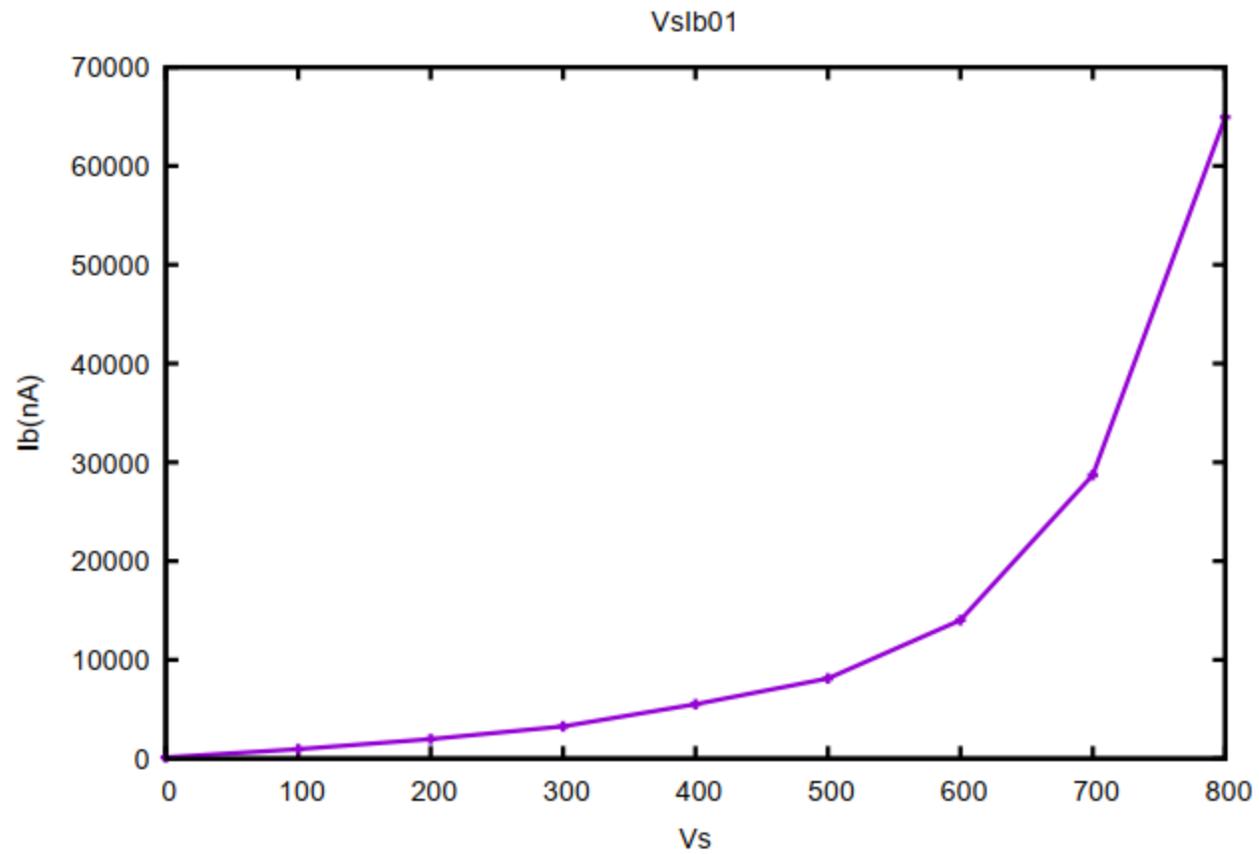
Id-Vg transfer curve, initial @Vds=0.1V



Id-Vg transfer curve, after stress @Vds=0.1V



Drain leakage Idss versus Vd @Vg=Vs=Vb=GND



**Bulk/substrate leakage I_b versus V_s
@ $V_g=V_s=V_d$, $B=GND$**

Content

Basic wafer info/DC data

Dynamic test data

Chip probe data

➔ App notes

Application note on G1 (15V) driving



Negative Gate Turn-off

As with most EMODE GaNFET, it is best to use negative turn off gate driving to achieve fast turn off. In such a case, G0 can be left not connected (NC). Negative gate voltage of -1 to -3 is recommended.

Zero Gate Turn-off

When using G1 for driving (either 0-12V or 0-15V), it is best to wire bond a bare die of low voltage diode (max rating 20V, max current 0.5A) between G0 and G1 such that the forward direction of the diode points from G0 to G1. Caution: at light loading (less than 0.5A), turn-off may be slow.

Recommended $R_{goff}=0$ $R_{gon}=0$ to 5 Ohm. Recommended driver: 1EDBX275F, or other driver with stronger current capability. When driving multiple Star120 dies (more than 3), it is recommended that isolated auxiliary power supply for driver should be upgraded to support $> 0.5A$ on-state (not only instantaneous peak) current. Reference driver board design is offered to selected customers.

Application note on G0 (6V) driving

G0 can be used as a standard EMODE p-GaN gate. Recommended $R_{goff}=0$ $R_{gon}=5-10$ Ohm

Choice of G1 or G0:

For better system reliability, G1 is recommended.