

Device Modeling Report

COMPONENTS: Power MOSFET (Model Parameters)
PART NUMBER: 2SJ527
MANUFACTURER: HITACHI
Body Diode (Model Parameters) / ESD Protection Diode

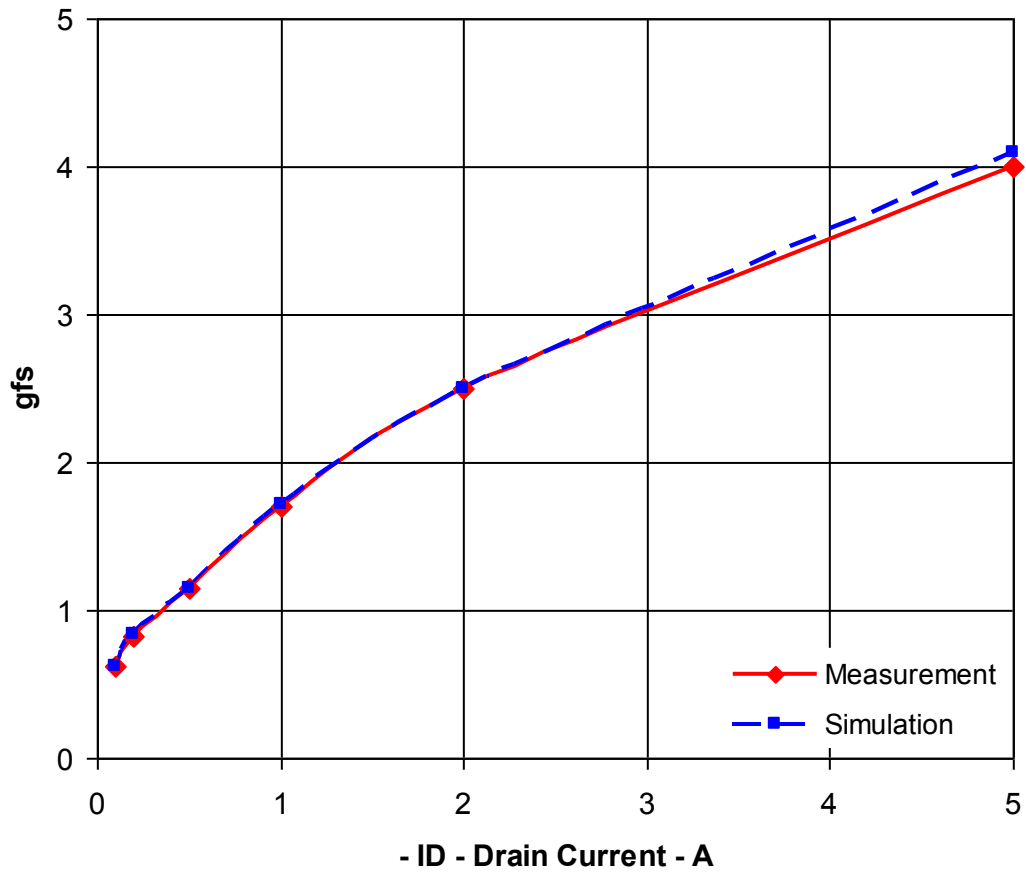


MOSFET MODEL

PSpice model parameter	Model description
LEVEL	
L	Channel Length
W	Channel Width
KP	Transconductance
RS	Source Ohmic Resistance
RD	Ohmic Drain Resistance
VTO	Zero-bias Threshold Voltage
RDS	Drain-Source Shunt Resistance
TOX	Gate Oxide Thickness
CGSO	Zero-bias Gate-Source Capacitance
CGDO	Zero-bias Gate-Drain Capacitance
CBD	Zero-bias Bulk-Drain Junction Capacitance
MJ	Bulk Junction Grading Coefficient
PB	Bulk Junction Potential
FC	Bulk Junction Forward-bias Capacitance Coefficient
RG	Gate Ohmic Resistance
IS	Bulk Junction Saturation Current
N	Bulk Junction Emission Coefficient
RB	Bulk Series Resistance
PHI	Surface Inversion Potential
GAMMA	Body-effect Parameter
DELTA	Width effect on Threshold Voltage
ETA	Static Feedback on Threshold Voltage
THETA	Mobility Modulation
KAPPA	Saturation Field Factor
VMAX	Maximum Drift Velocity of Carriers
XJ	Metallurgical Junction Depth
UO	Surface Mobility

Transconductance Characteristic

Circuit Simulation Result

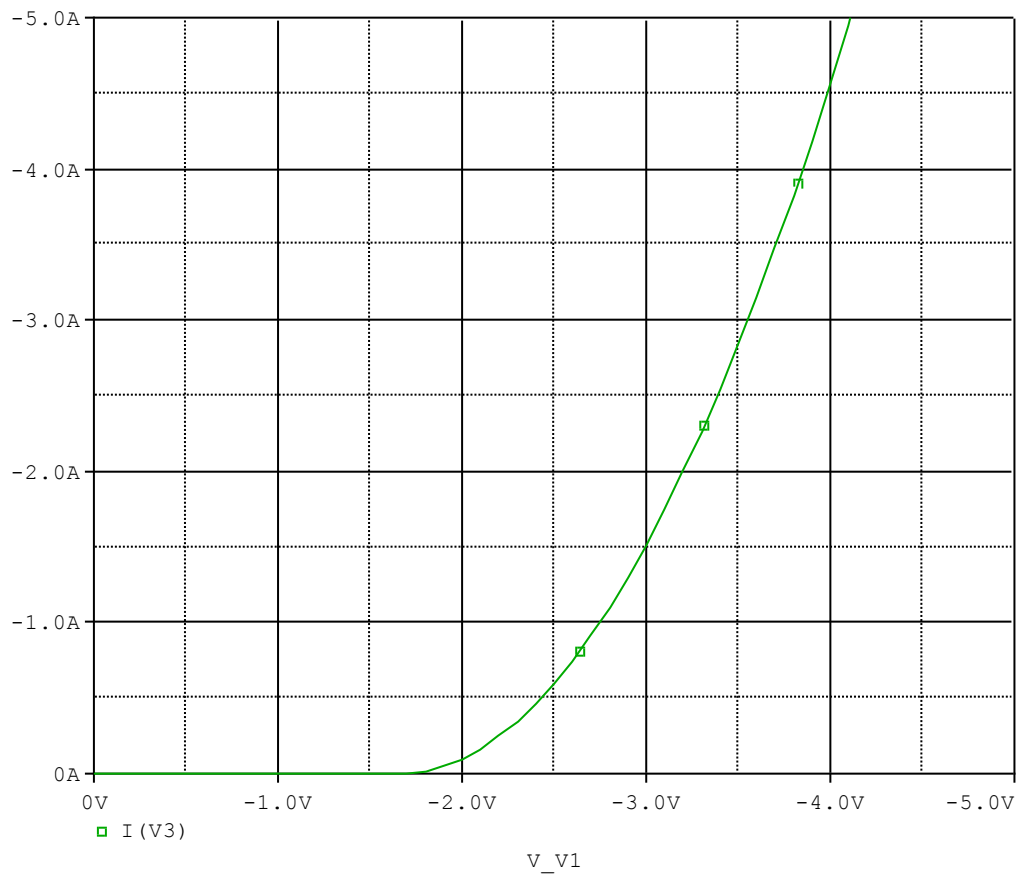


Comparison table

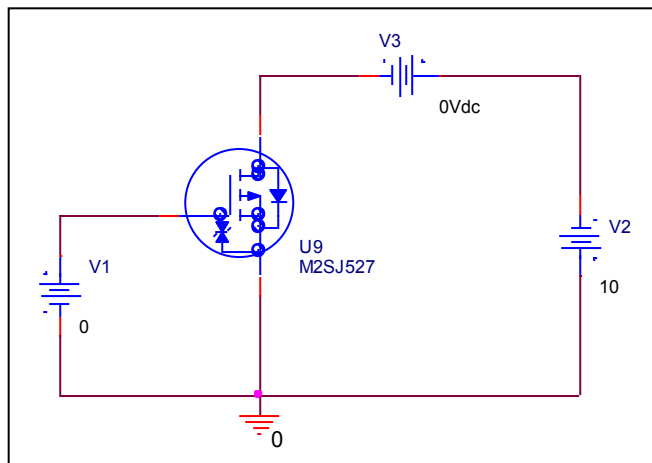
-Id(A)	gfs		Error(%)
	Measurement	Simulation	
0.1	0.620	0.625	0.806
0.2	0.820	0.833	1.585
0.5	1.150	1.151	0.087
1	1.700	1.715	0.882
2	2.500	2.500	0.000
5	4.000	4.098	2.450

V_{gs}-I_d Characteristic

Circuit Simulation result

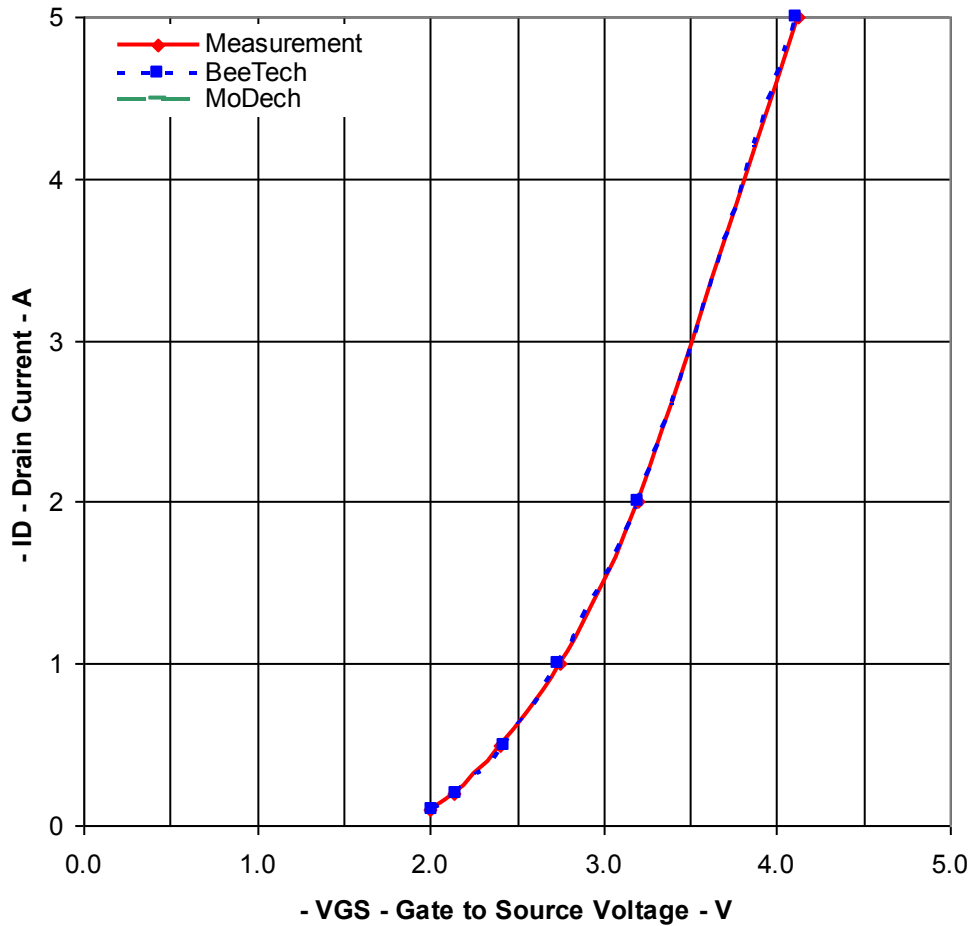


Evaluation circuit



Comparison Graph

Circuit Simulation Result

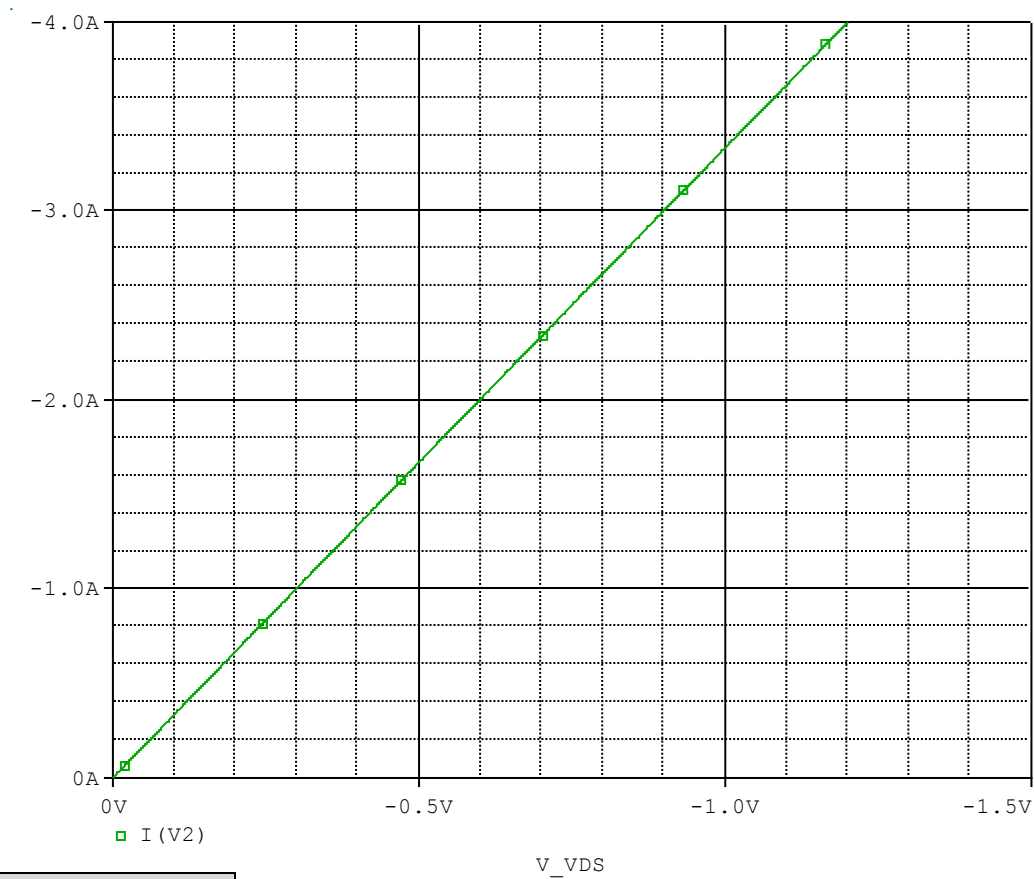


Simulation Result

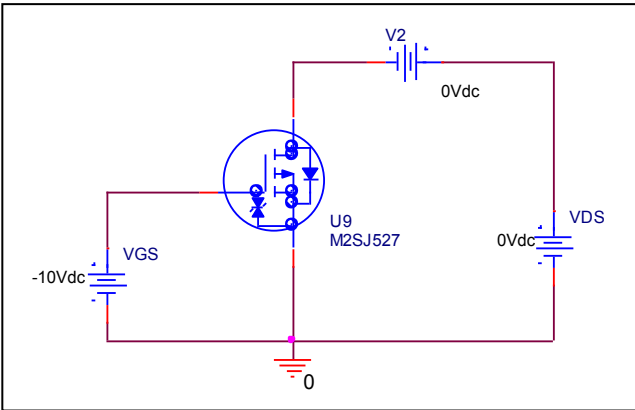
-I_D(A)	-V_{GS}(V)		Error (%)
	Measurement	Simulation	
0.1	2.000	2.006	0.300
0.2	2.140	2.145	0.234
0.5	2.400	2.428	1.167
1	2.750	2.740	-0.364
2	3.200	3.200	0.000
5	4.120	4.112	-0.194

Rds(on) Characteristic

Circuit Simulation result



Evaluation circuit

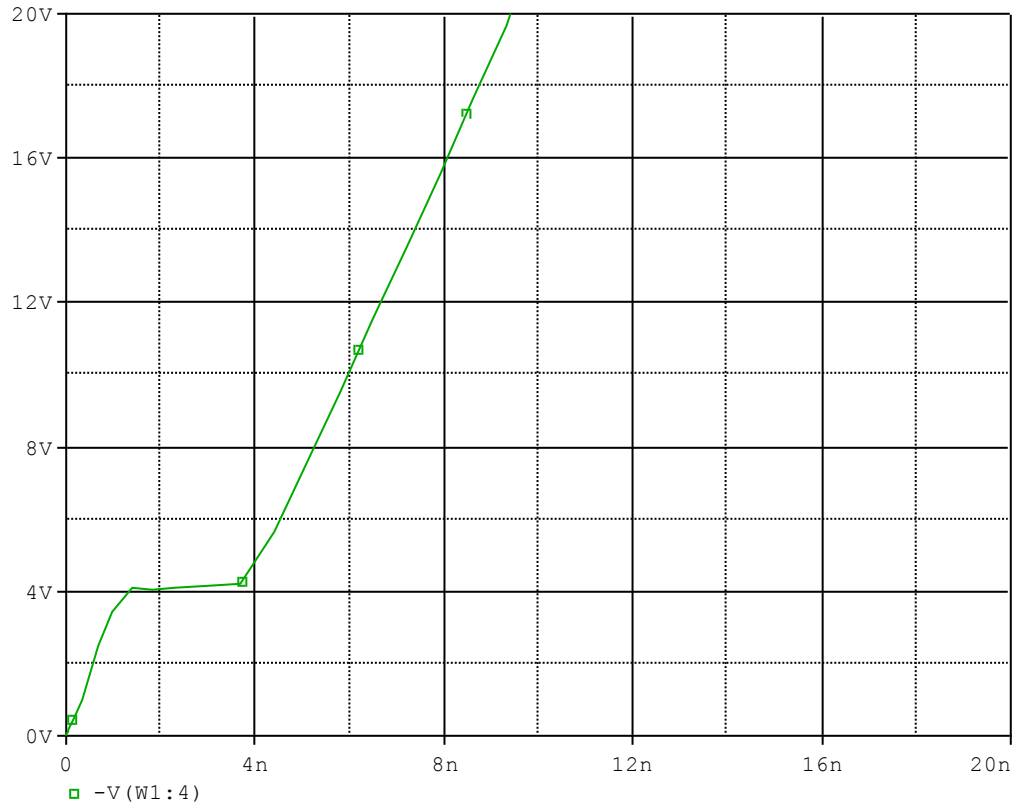


Simulation Result

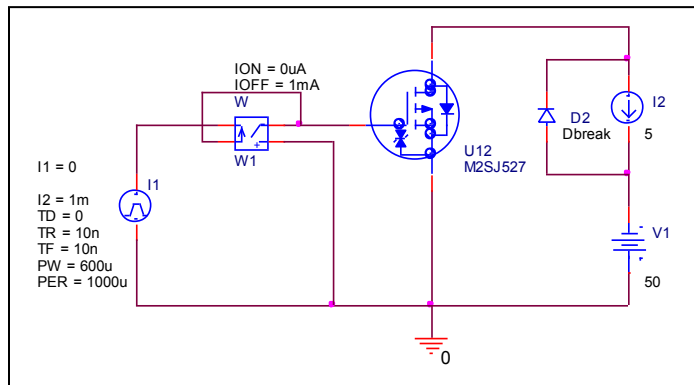
$I_D = -3A, V_{GS} = -10V$	Measurement		Simulation		Error (%)
$R_{DS(on)}$	0.300	Ω	0.300	Ω	0

Gate Charge Characteristic

Circuit Simulation result



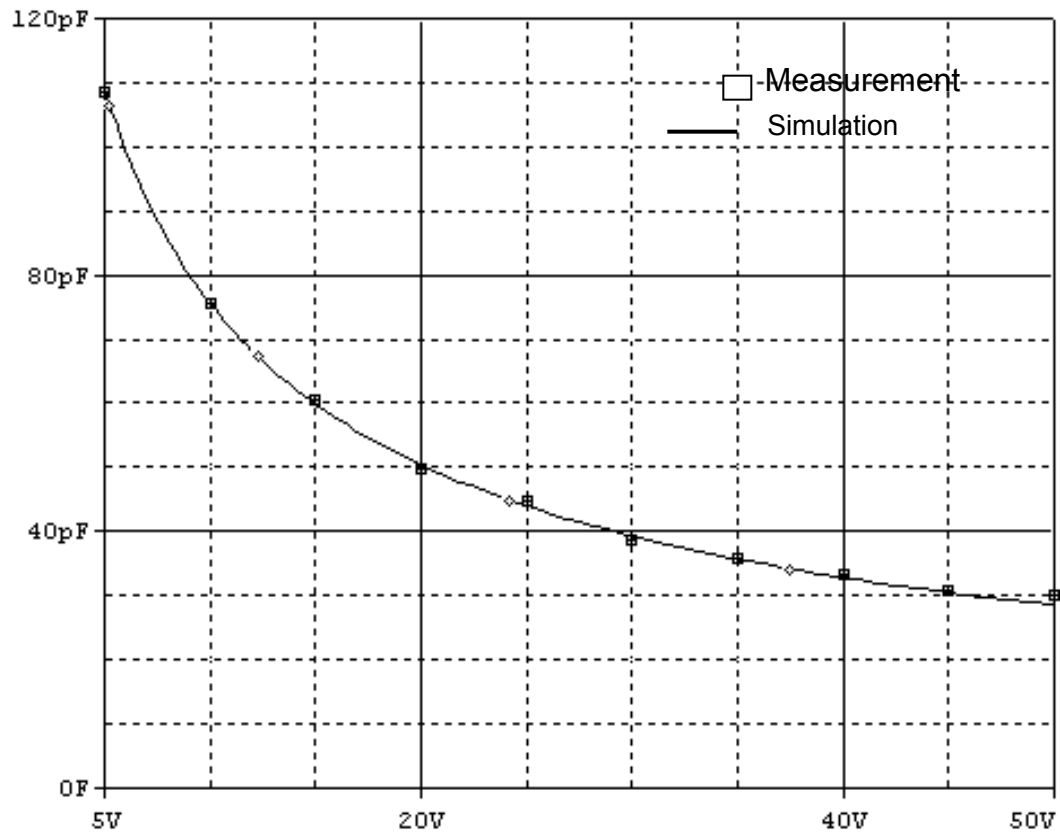
Evaluation circuit



Simulation Result

$V_{DD} = -50V, I_D = -5A$ $V_{GS} = -10V$	Measurement	Simulation	Error (%)
$Q_{gs}(nC)$	1.000	1.017	1.700
$Q_{gd}(nC)$	2.700	2.665	-1.296
Q_g	7.200	5.974	-17.028

Capacitance Characteristic

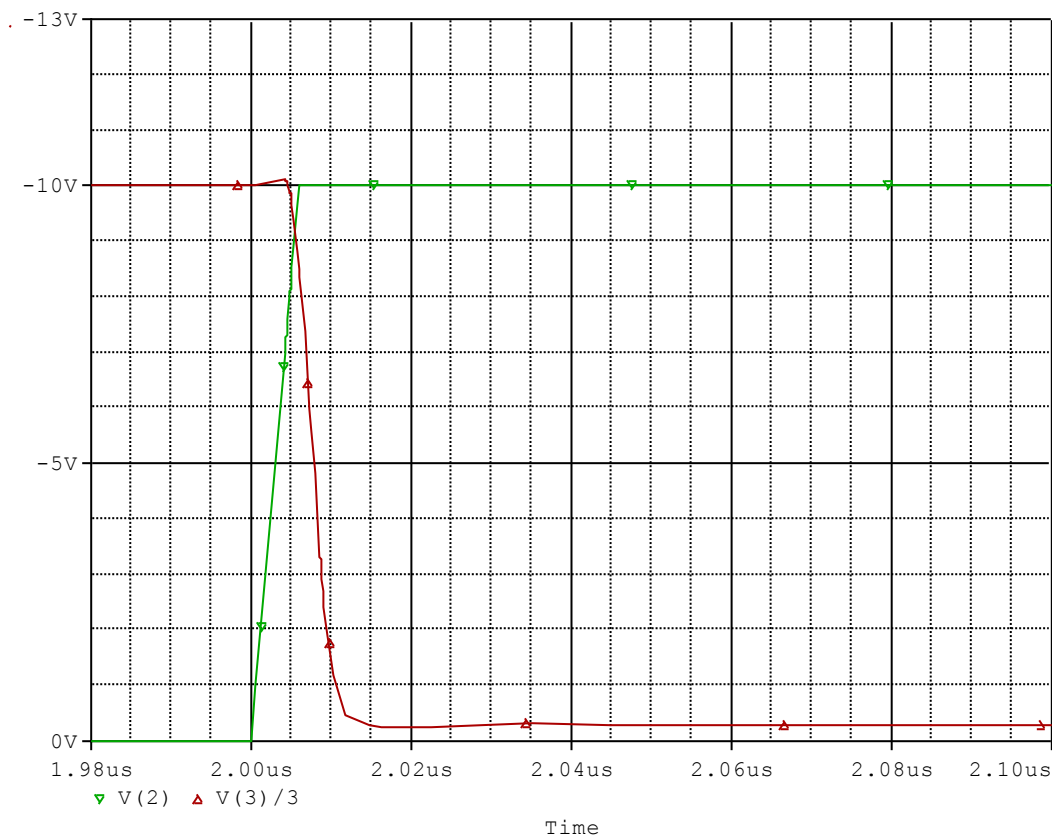


Simulation Result

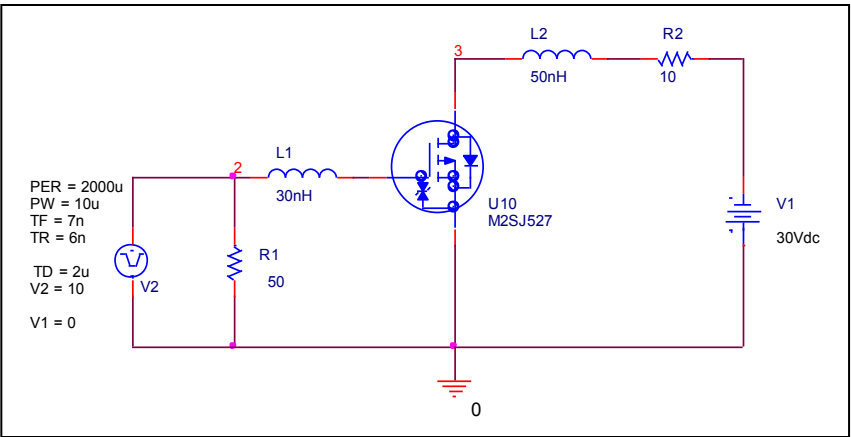
V_{DS} (V)	Cbd(pF)		Error(%)
	Measurement	Simulation	
5	109.000	110.000	0.917
10	76.000	75.500	-0.658
15	61.000	61.400	0.656
20	50.000	50.600	1.200
25	45.000	44.230	-1.711
30	39.000	39.131	0.336
35	36.000	35.914	-0.239
40	33.500	33.274	-0.675
45	31.100	31.000	-0.322
50	30.500	30.000	-1.639

Switching Time Characteristic

Circuit Simulation result



Evaluation circuit

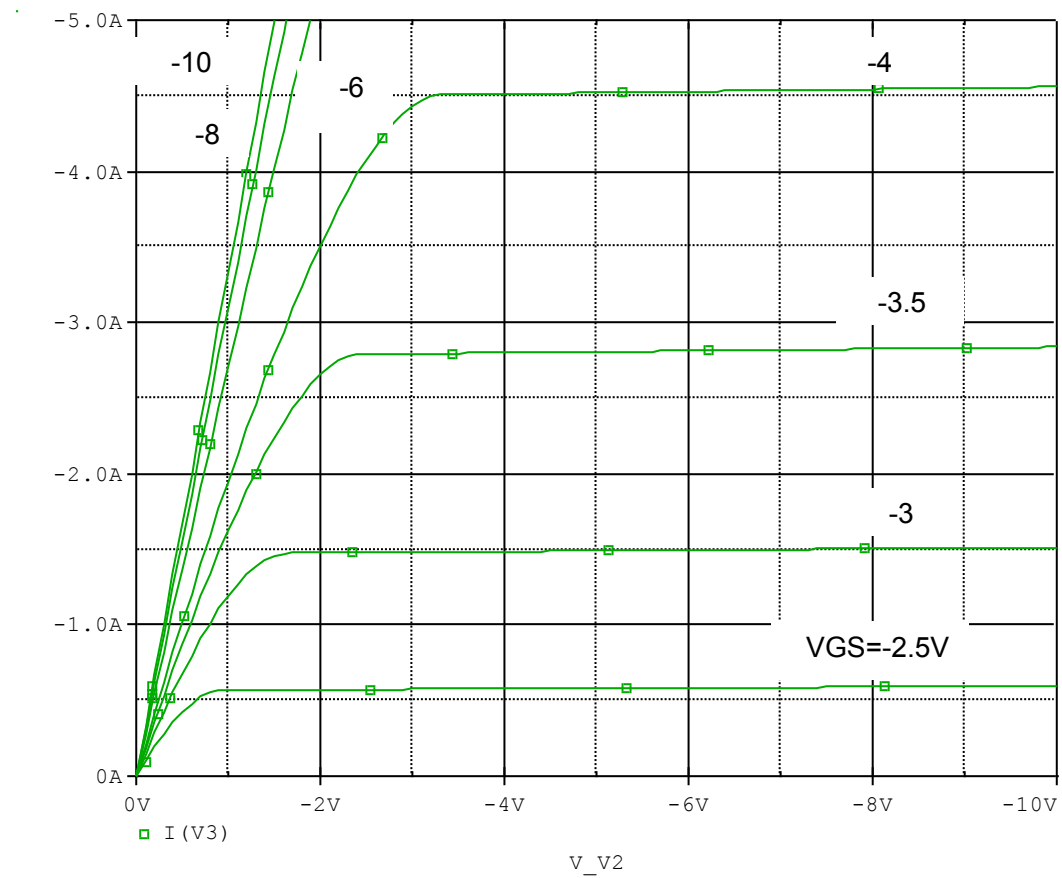


Simulation Result

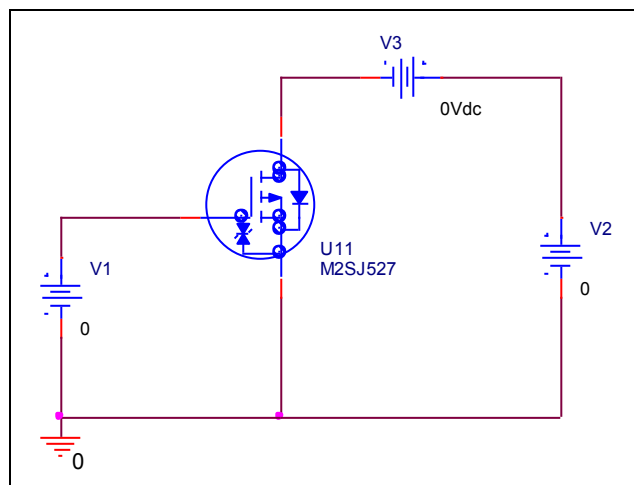
$I_D = -3A, V_{DD} = -30V$ $V_{GS} = 0/-10V$	Measurement	Simulation	Error(%)
Ton(ns)	10.000	10.020	0.200

Output Characteristic

Circuit Simulation result

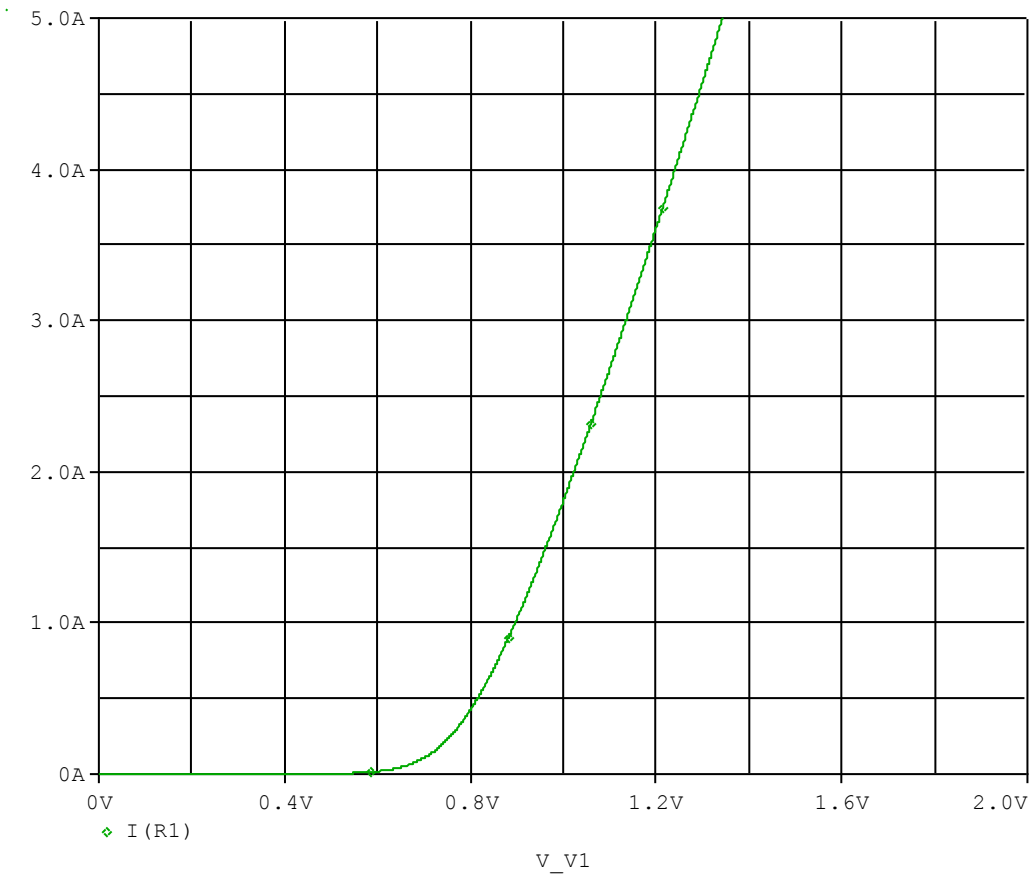


Evaluation circuit

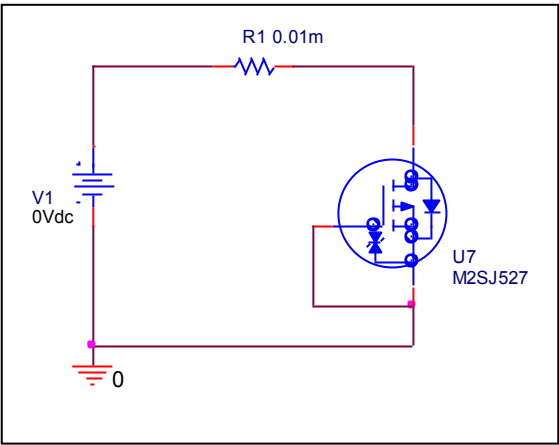


Forward Current Characteristic

Circuit Simulation Result

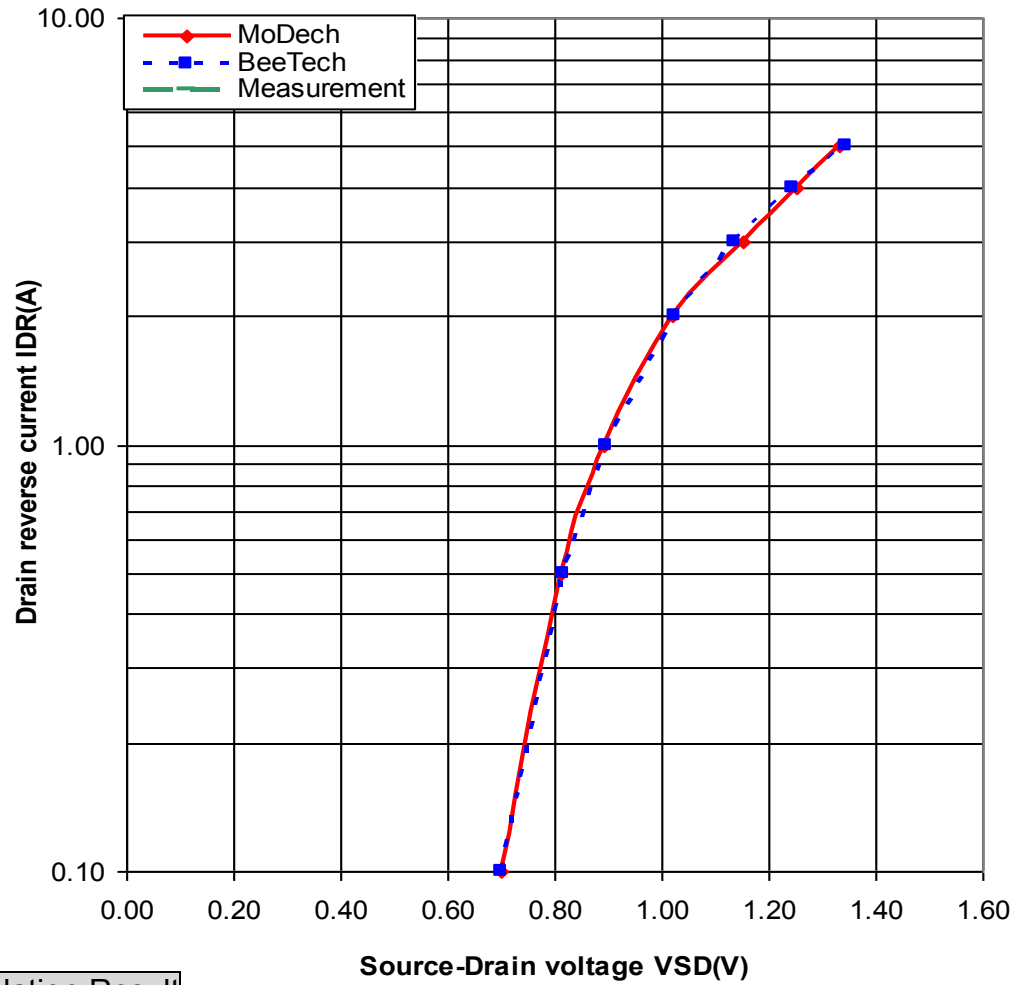


Evaluation Circuit



Comparison Graph

Circuit Simulation Result

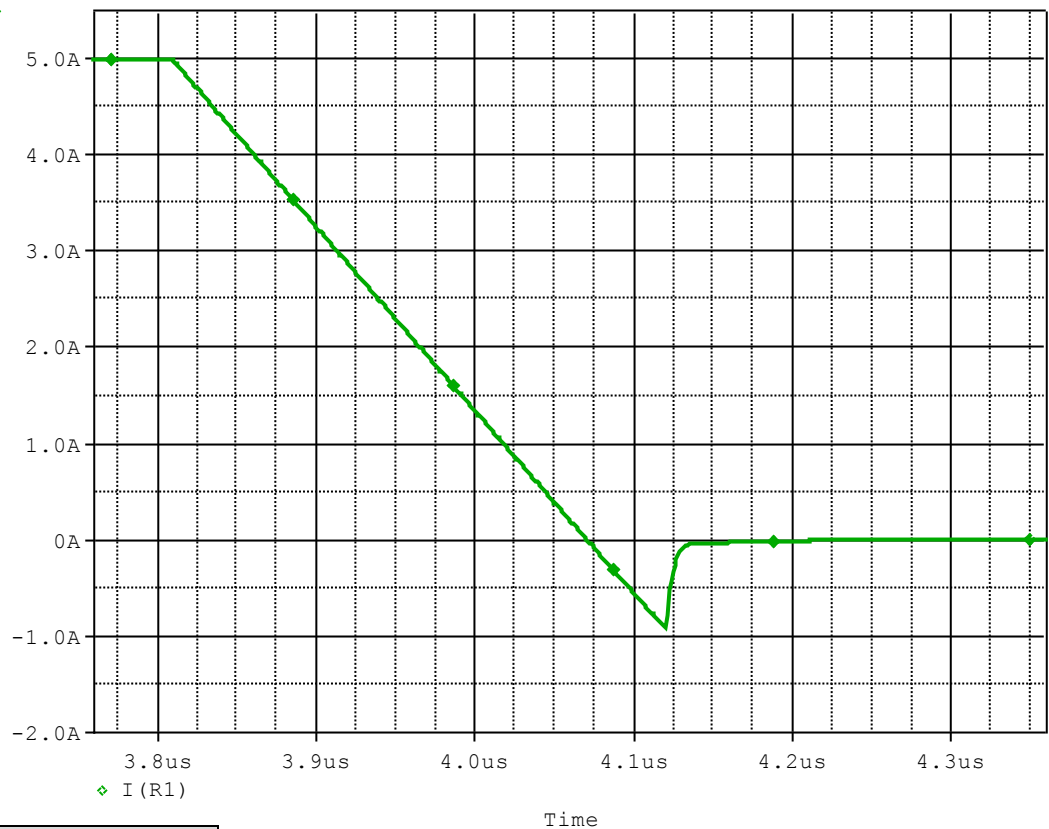


Simulation Result

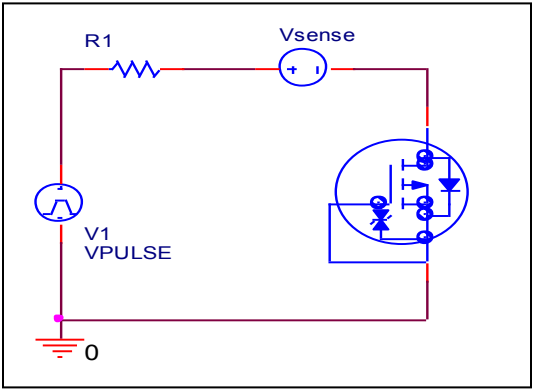
IDR(A)	VSD(V)		%Error
	Measurement	Simulation	
0.1	0.700	0.698	-0.286
0.5	0.810	0.814	0.494
1	0.890	0.896	0.674
2	1.020	1.023	0.294
3	1.150	1.135	-1.304
4	1.250	1.244	-0.480
5	1.330	1.343	0.977

Reverse Recovery Characteristics (Body Diode)

Circuit Simulation Result



Evaluation Circuit



Compare Measurement vs. Simulation

	Measurement	Simulation	Error (%)
Trr(ns)	55.000	54.737	-0.478