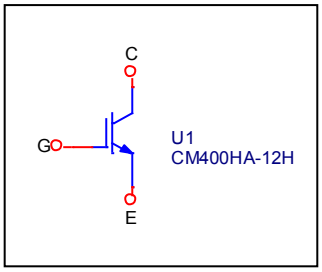
Device Modeling Report

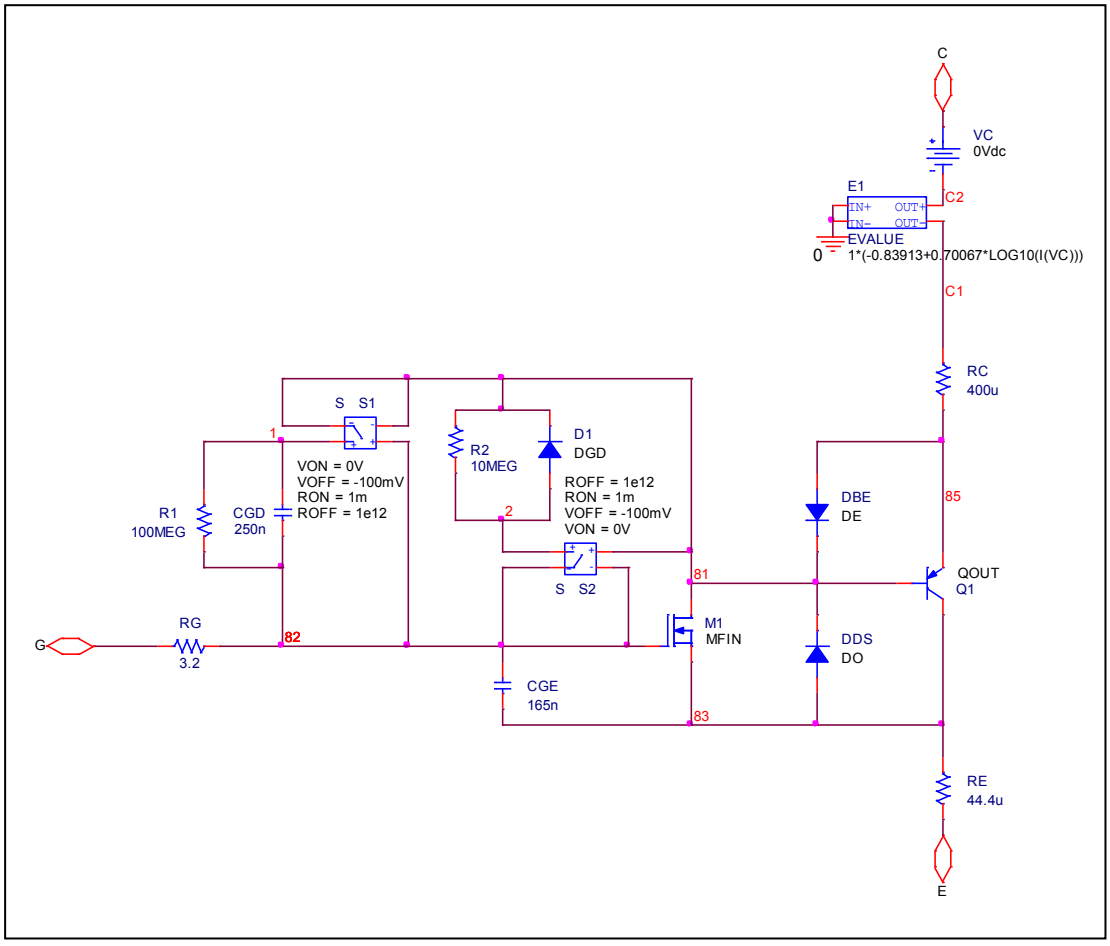
COMPONENTS: Insulated Gate Bipolar Transistor (IGBT)
PART NUMBER: CM400HA-12H
MANUFACTURER: MITSUBISHI
*REMARK: Free-Wheeling Diode Professional Model

Bee Technologies Inc.

Circuit Configuration

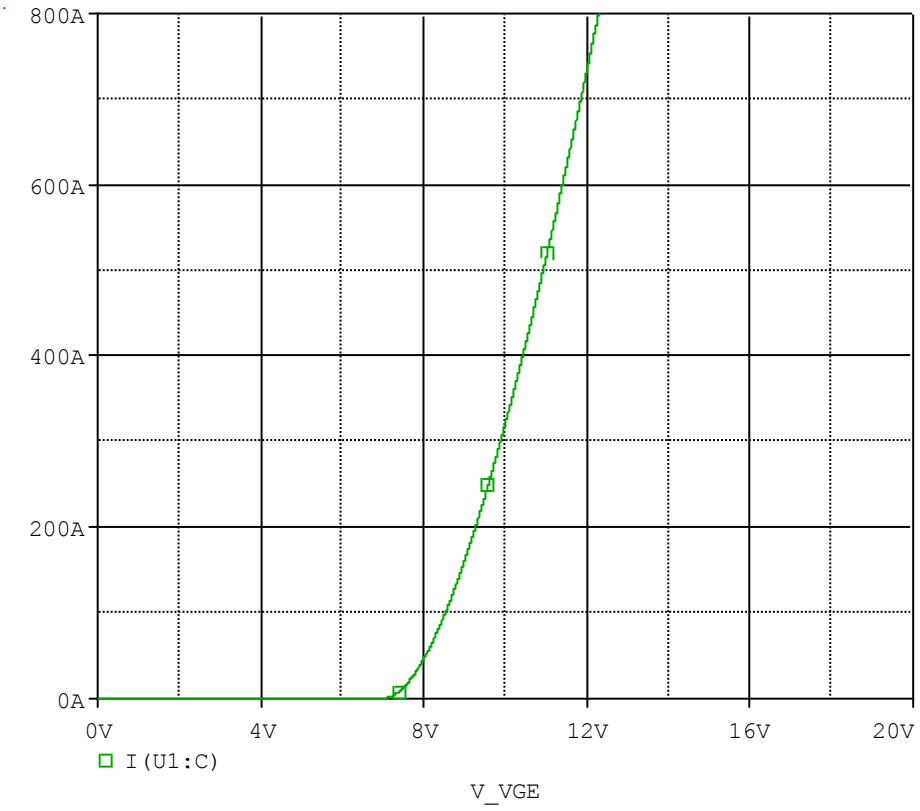


IGBT Subcircuit

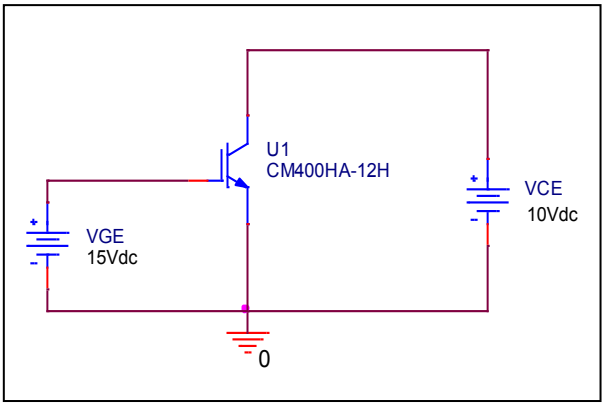


Transfer Characteristics

Circuit Simulation result

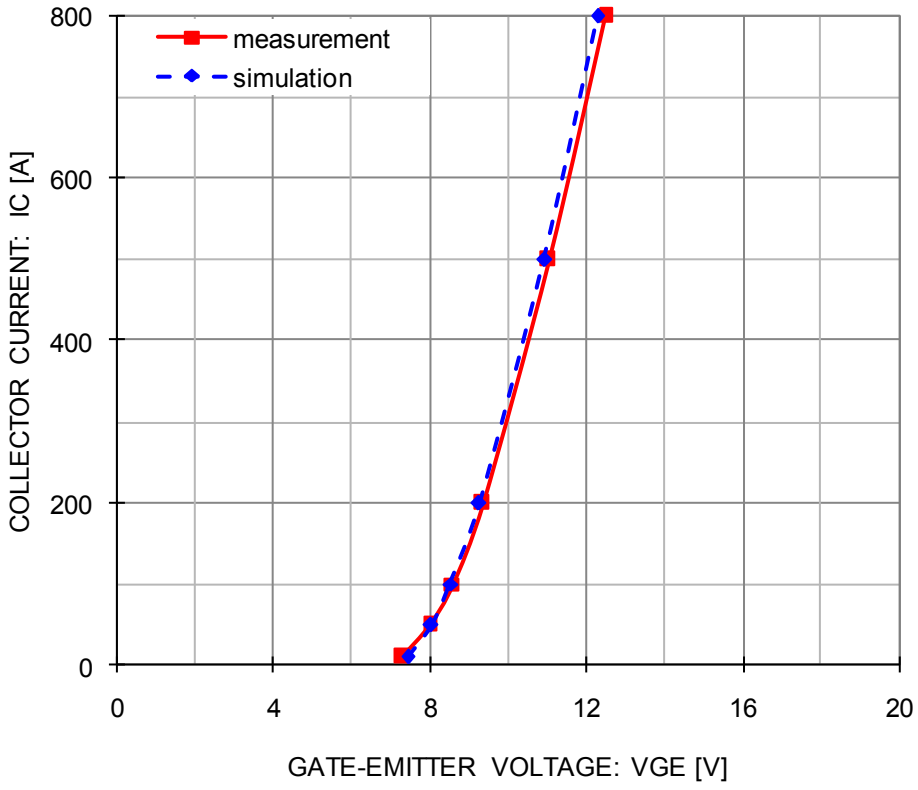


Evaluation circuit



Comparison Graph

Circuit Simulation Result



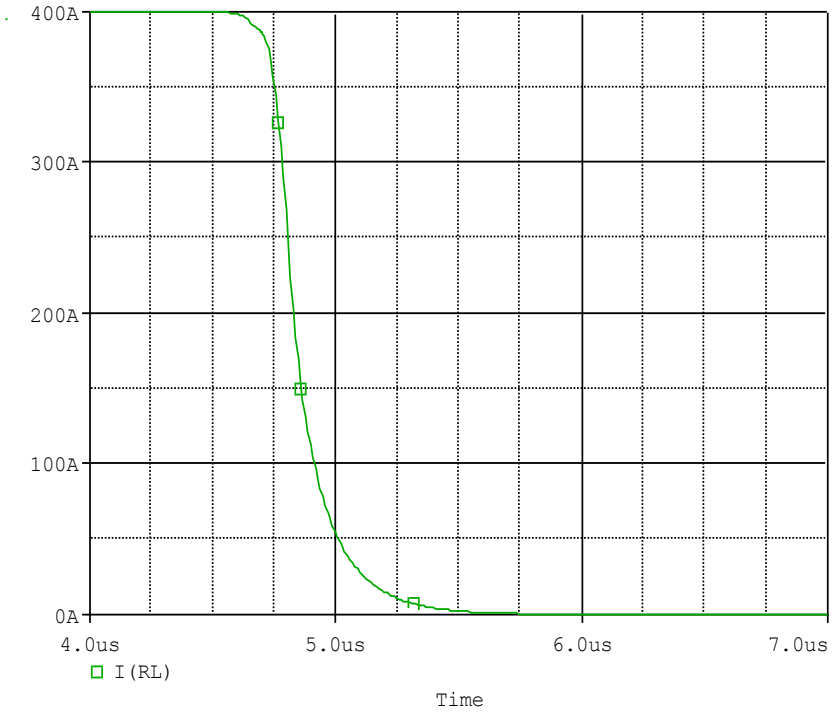
Simulation Result

Test condition: V_{CE} = 10 V

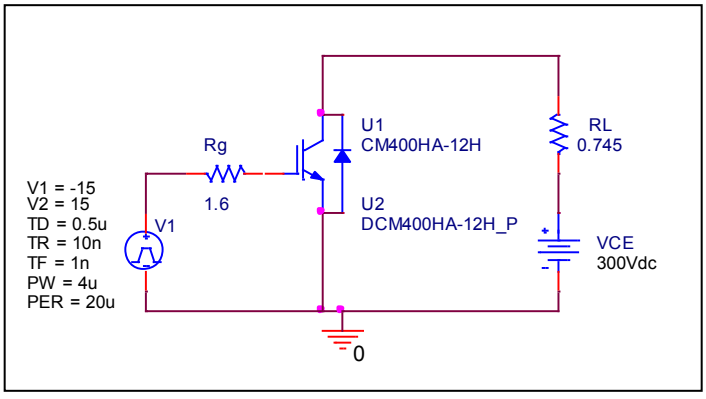
IC (A)	VGE (V)		Error (%)
	Measurement	Simulation	
10	7.300	7.432	1.81
50	8.000	8.036	0.45
100	8.600	8.524	-0.88
200	9.350	9.266	-0.90
500	11.050	10.926	-1.12
800	12.500	12.287	-1.70

Fall Time Characteristics

Circuit Simulation result



Evaluation circuit

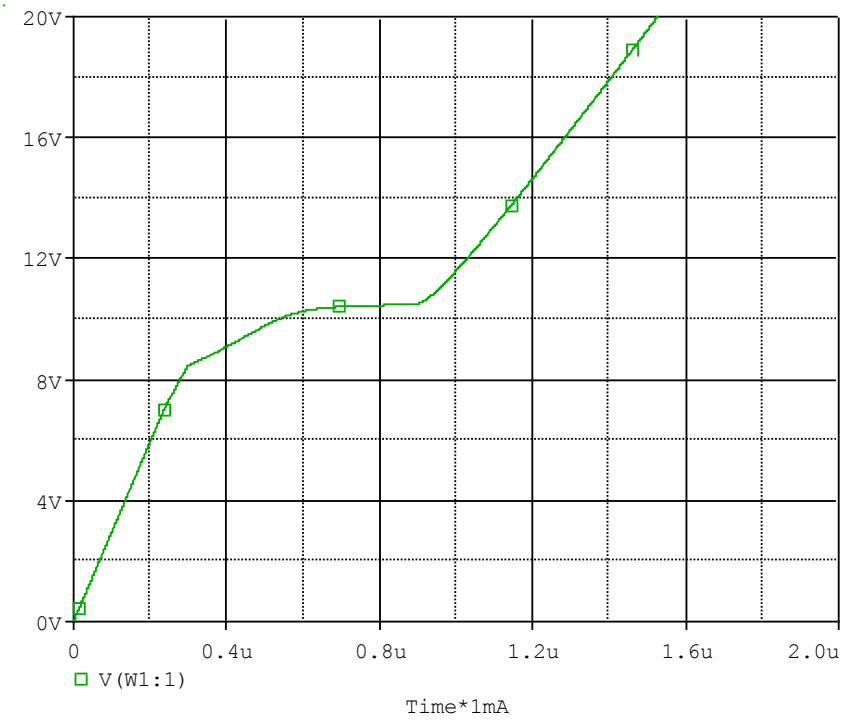


Test condition Vcc=300(V), Ic=400 (A)

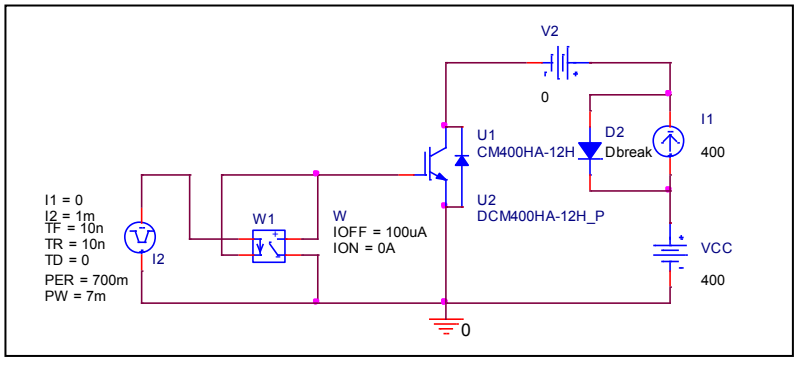
Parameter	Unit	Measurement	Simulation	Error
tf	ns	300.000	300.748	0.249

Gate Charge Characteristics

Circuit Simulation result



Evaluation circuit

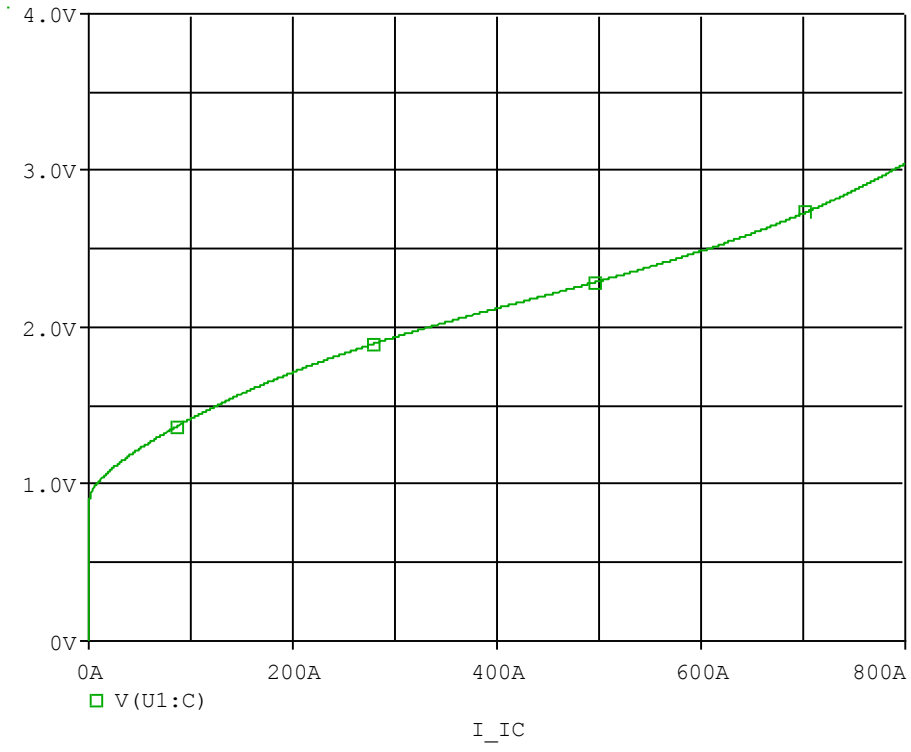


Test condition: V_{CC}=400 (V), I_C=400(A) ,V_{GE}=15(V)

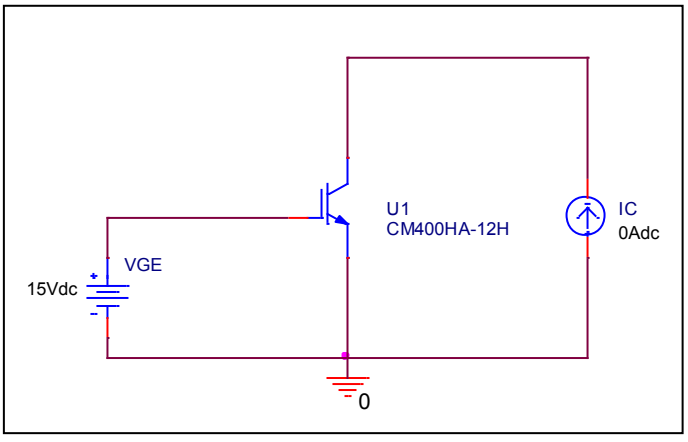
Parameter	Unit	Measurement	Simulation	Error(%)
Qge	nc	300.000	301.674	0.558
Qgc	nc	610.000	594.818	-2.489
Qg	nc	1200.000	1223.300	1.942

Saturation Characteristics

Circuit Simulation result

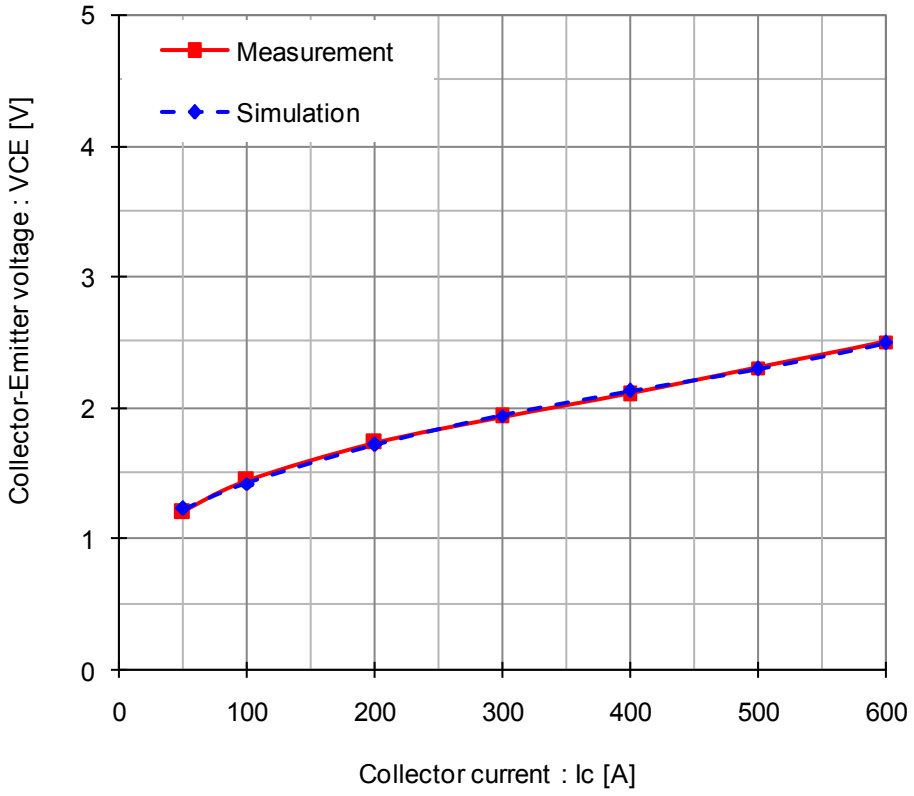


Evaluation circuit



Comparison Graph

Circuit Simulation Result



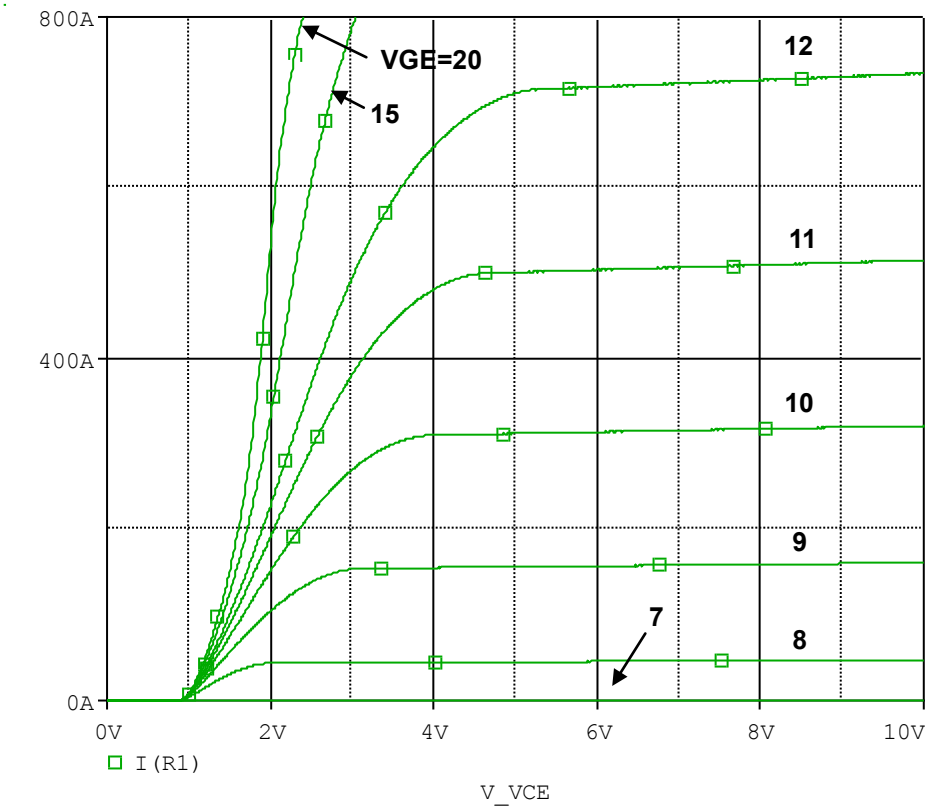
Simulation Result

Test condition: V_{GE} = 15 V

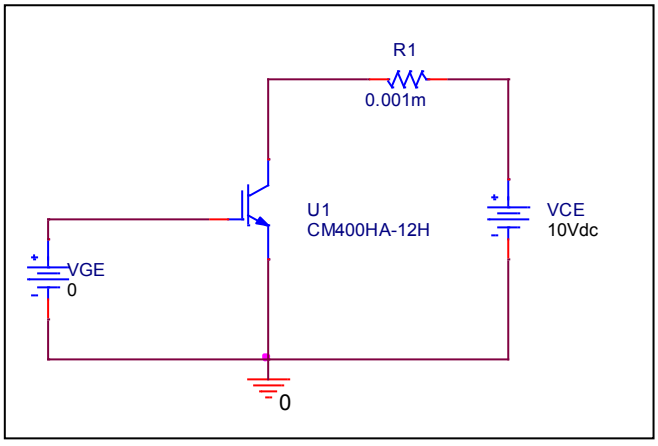
Ic(A)	VCE (V)		Error (%)
	Measurement	Simulation	
50	1.200	1.226	2.16
100	1.440	1.417	-1.58
200	1.725	1.714	-0.66
300	1.925	1.938	0.65
400	2.100	2.121	1.01
500	2.300	2.295	-0.23
600	2.500	2.487	-0.52
700	2.730	2.727	-0.11
800	2.975	3.045	2.37

Output Characteristics

Circuit Simulation result

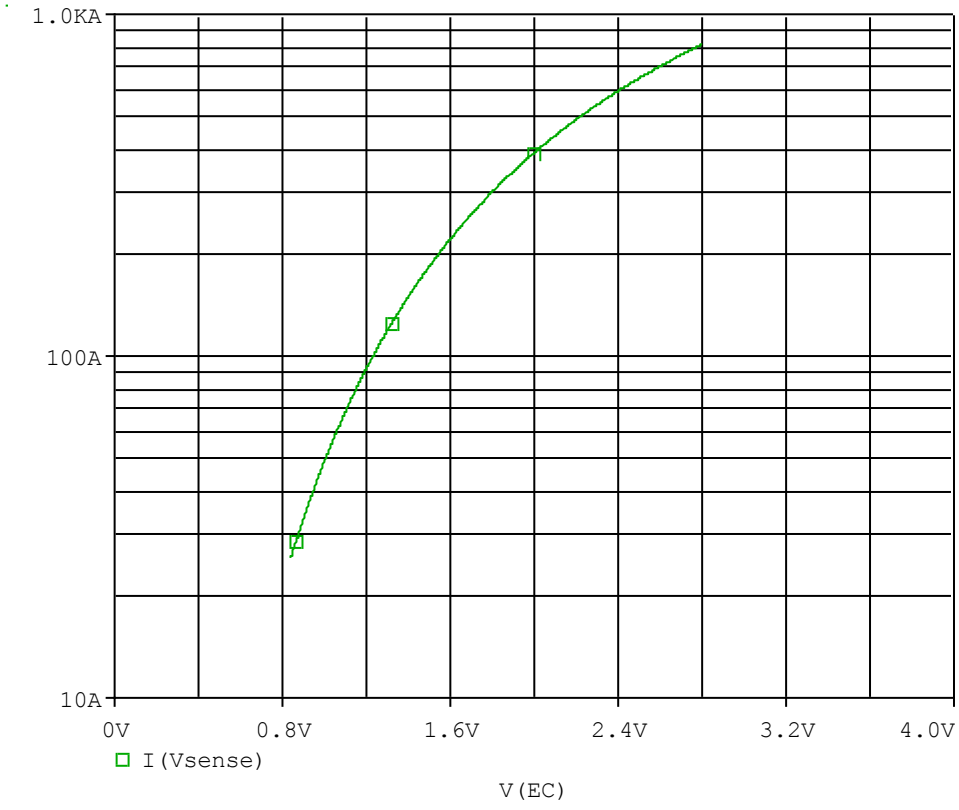


Evaluation circuit

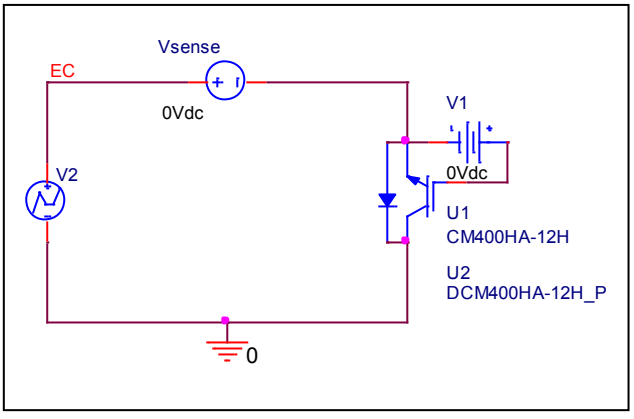


Forward Current Characteristic

Circuit Simulation Result

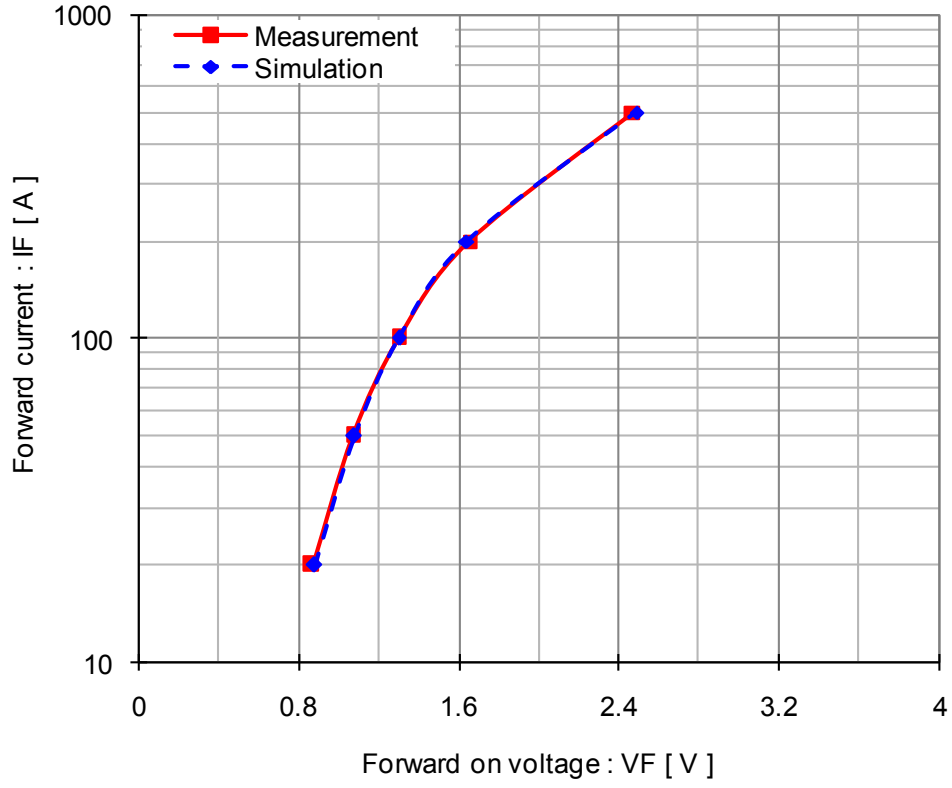


Evaluation Circuit



Comparison Graph

Circuit Simulation Result

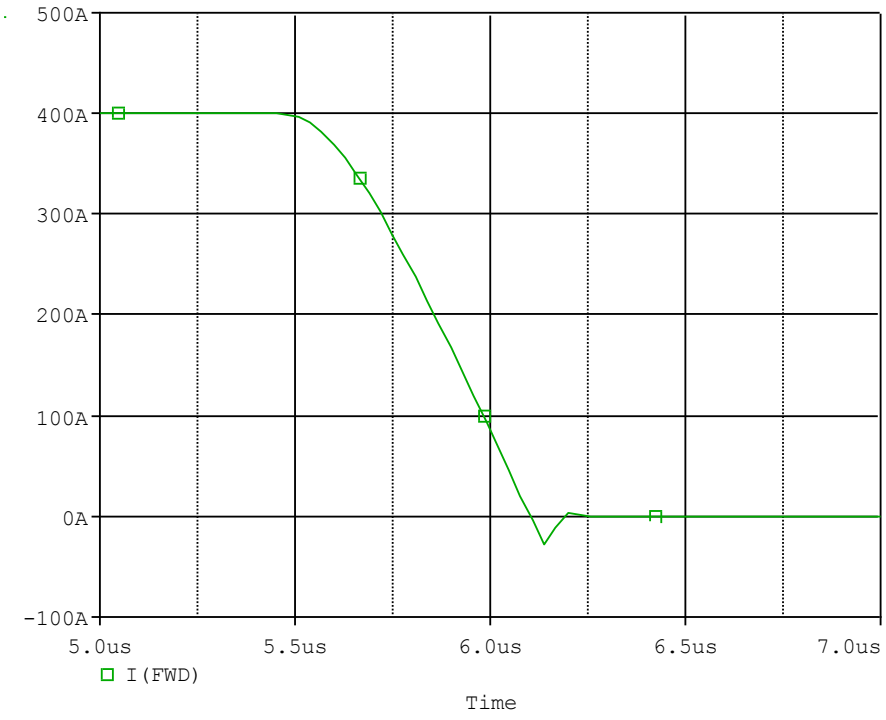


Simulation Result

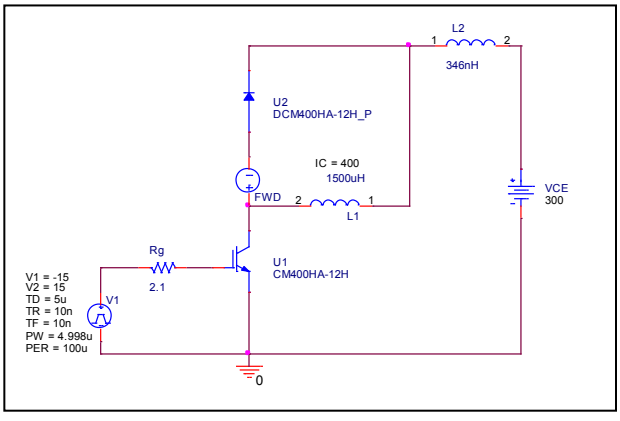
IE(A)	VEC(V)		%Error
	Measurement	Simulation	
30	0.880	0.875	-0.59
50	1.000	1.004	0.37
100	1.220	1.231	0.90
200	1.550	1.546	-0.26
500	2.230	2.215	-0.67
800	2.760	2.214	-19.78

Reverse Recovery Characteristics

Circuit Simulation result



Evaluation circuit



Test condition: V_{CC}=300 (V), I_C=400(A) ,V_{GE}=±15(V)

Parameter	Unit	Measurement	Simulation	Error(%)
trr	nsec	82	81.676	-0.40
Irr	A	28	28.911	3.25