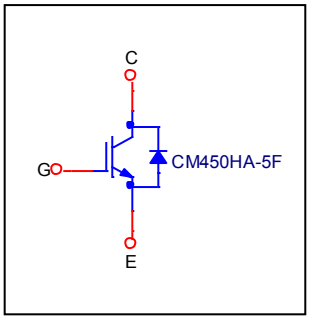
Device Modeling Report

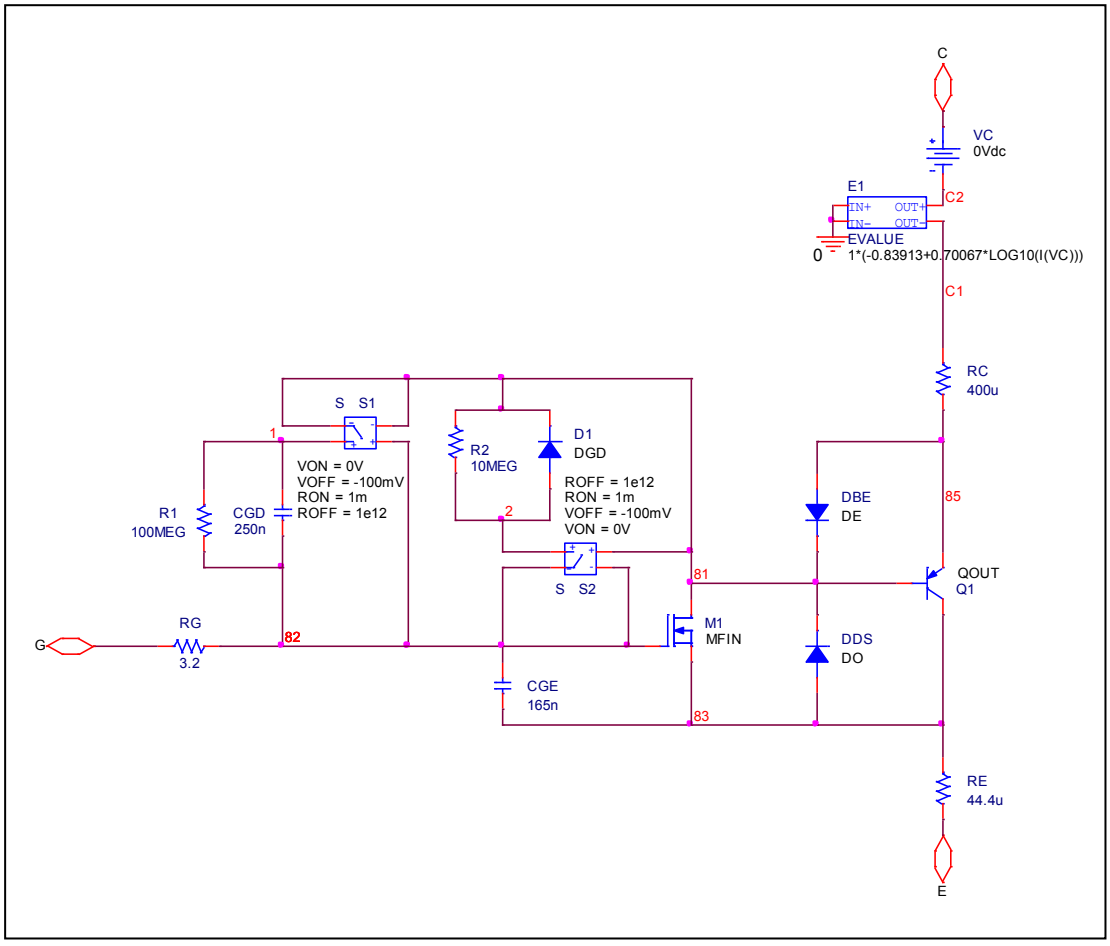
COMPONENTS: Insulated Gate Bipolar Transistor (IGBT)
PART NUMBER: CM450HA-5F
MANUFACTURER: MITSUBISHI
*REMARK: Free-Wheeling Diode Standard Model

Bee Technologies Inc.

Circuit Configuration

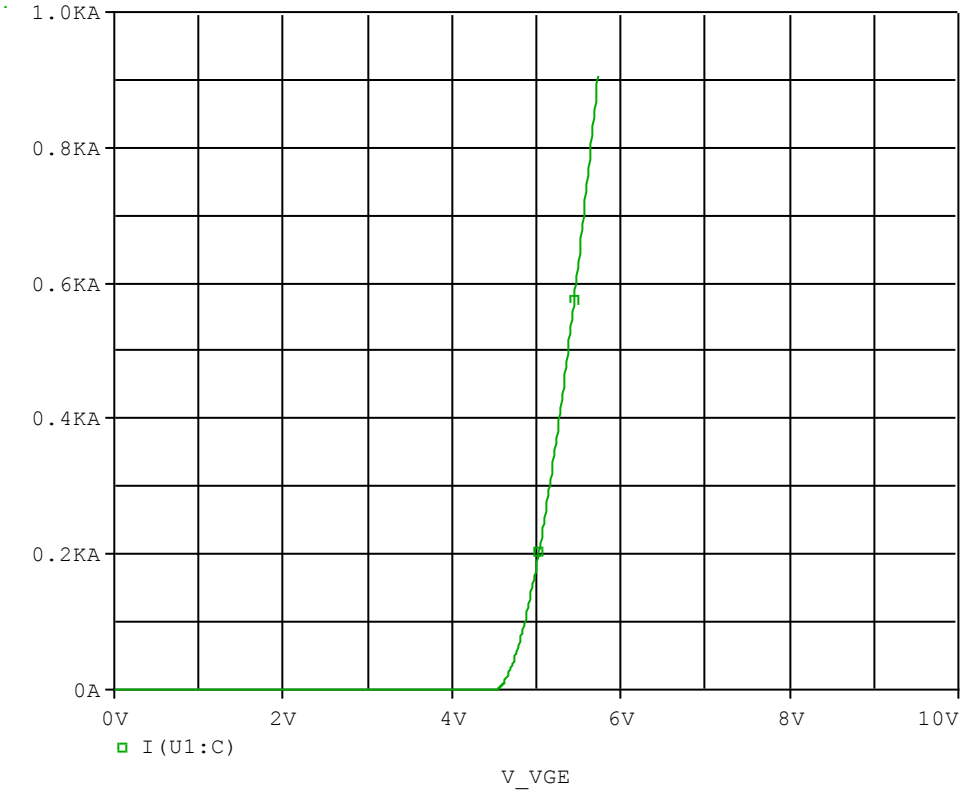


IGBT Subcircuit

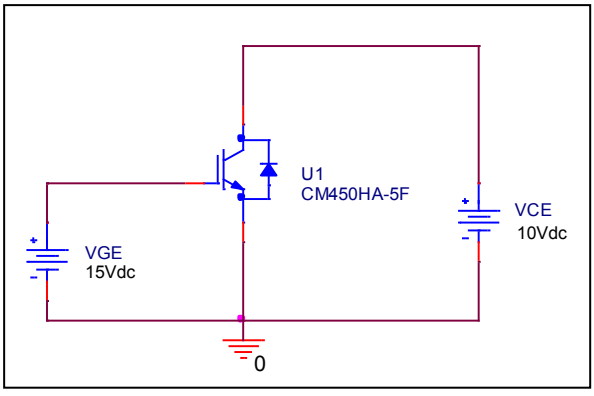


Transfer Characteristics

Circuit Simulation result

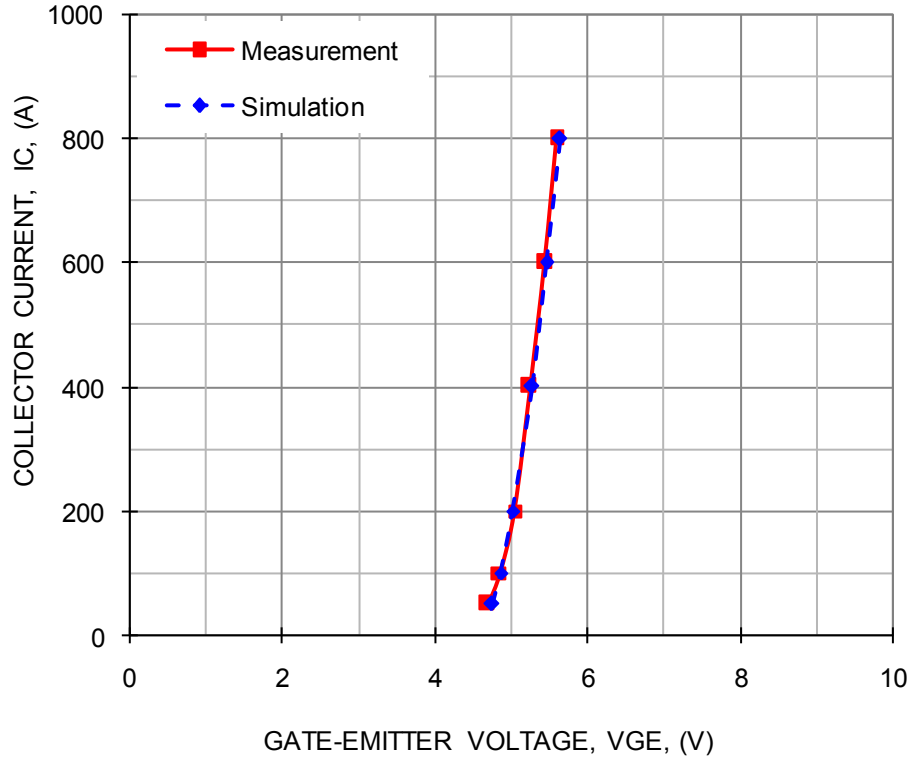


Evaluation circuit



Comparison Graph

Circuit Simulation Result



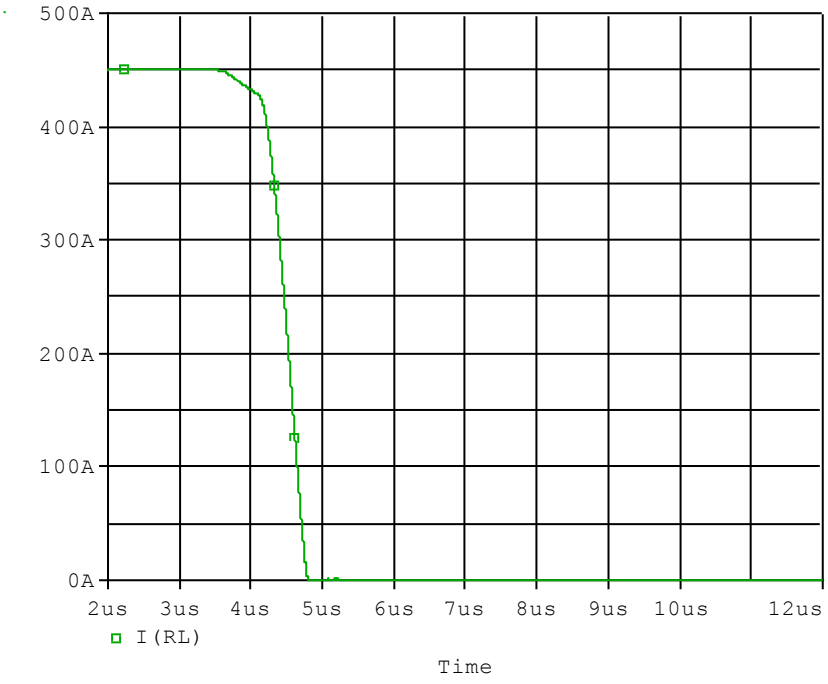
Simulation Result

Test condition: V_{CE} = 10 V

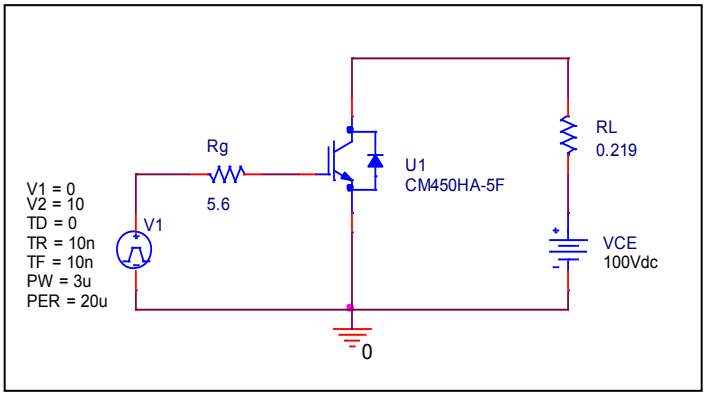
IC (A)	VGE (V)		Error (%)
	Measurement	Simulation	
50	4.700	4.751	1.09
100	4.850	4.863	0.26
200	5.050	5.027	-0.46
400	5.250	5.272	0.41
600	5.450	5.470	0.37
800	5.600	5.645	0.80

Fall Time Characteristics

Circuit Simulation result



Evaluation circuit

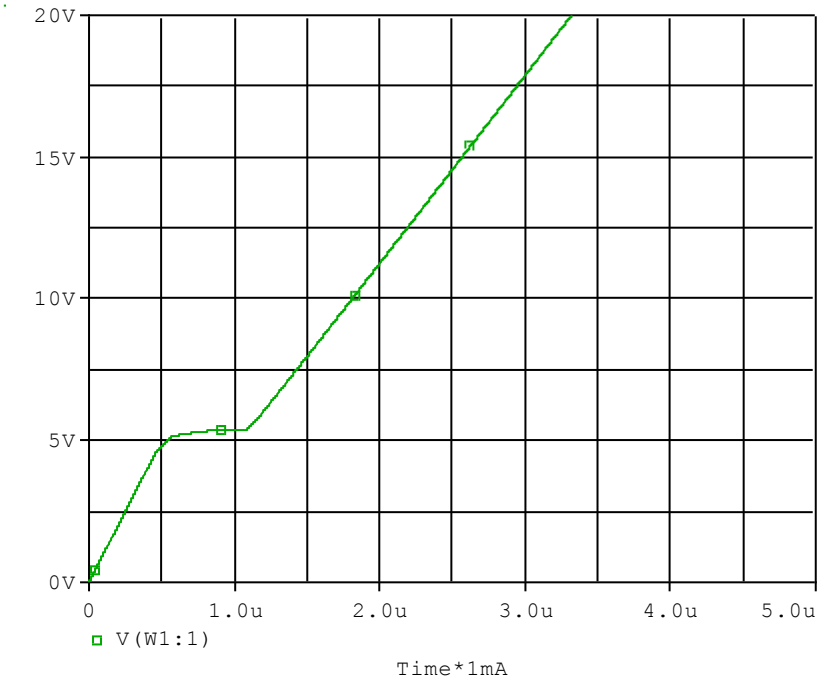


Test condition IC=450 (A), VCC=100(V)

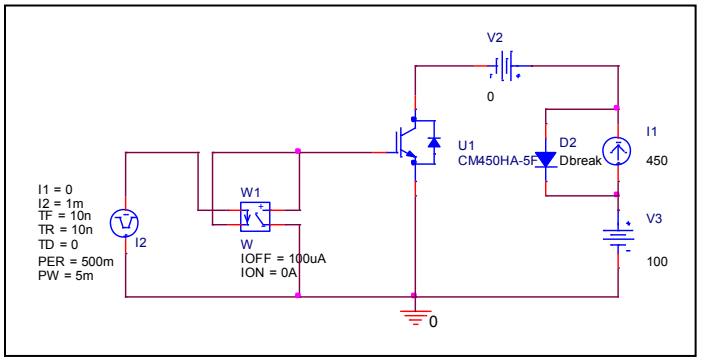
Parameter	Unit	Measurement	Simulation	Error
tf	ns	500.000	500.257	0.051

Gate Charge Characteristics

Circuit Simulation result



Evaluation circuit

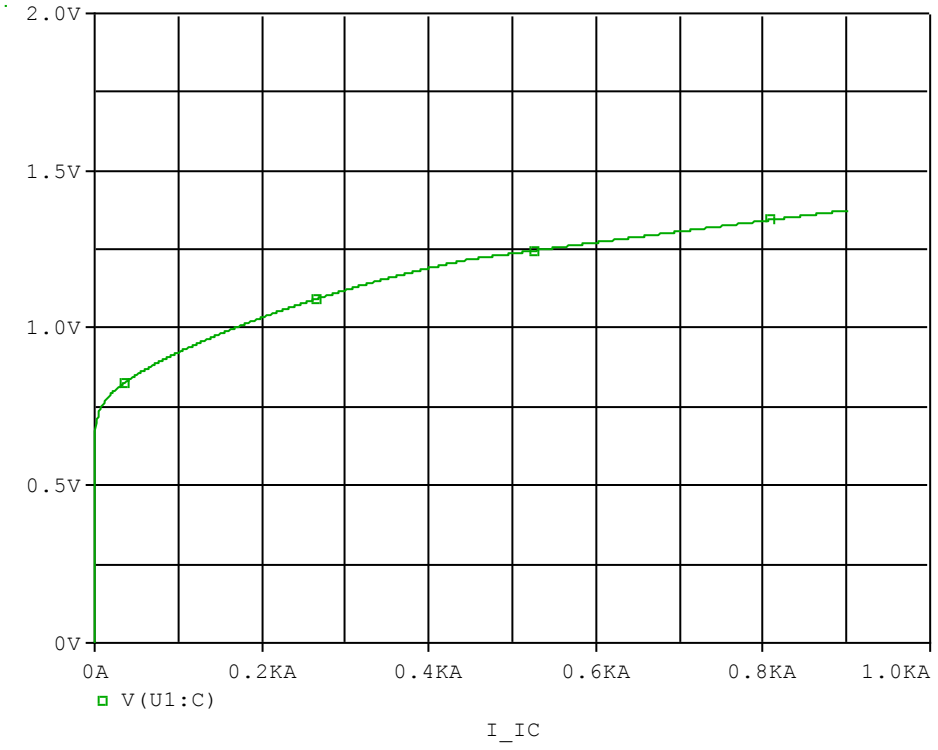


Test condition: V_{CC}=450 (V), I_C=100(A) ,V_{GE}=10(V)

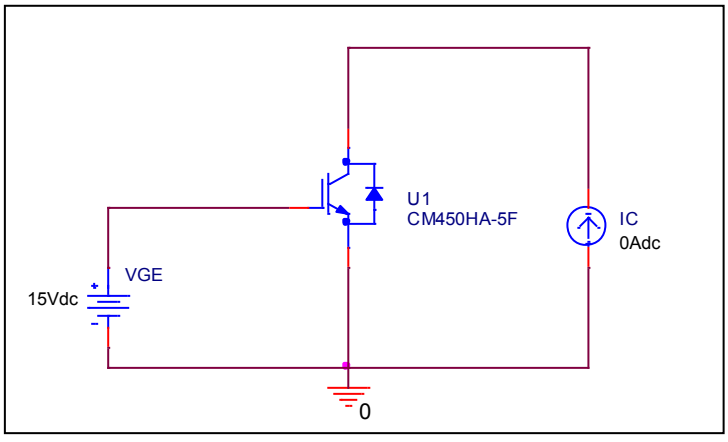
Parameter	Unit	Measurement	Simulation	Error(%)
Qge	nc	500.000	501.613	0.323
Qgc	nc	750.000	714.888	-4.682
Qg	nc	1760.000	1810.800	2.886

Saturation Characteristics

Circuit Simulation result

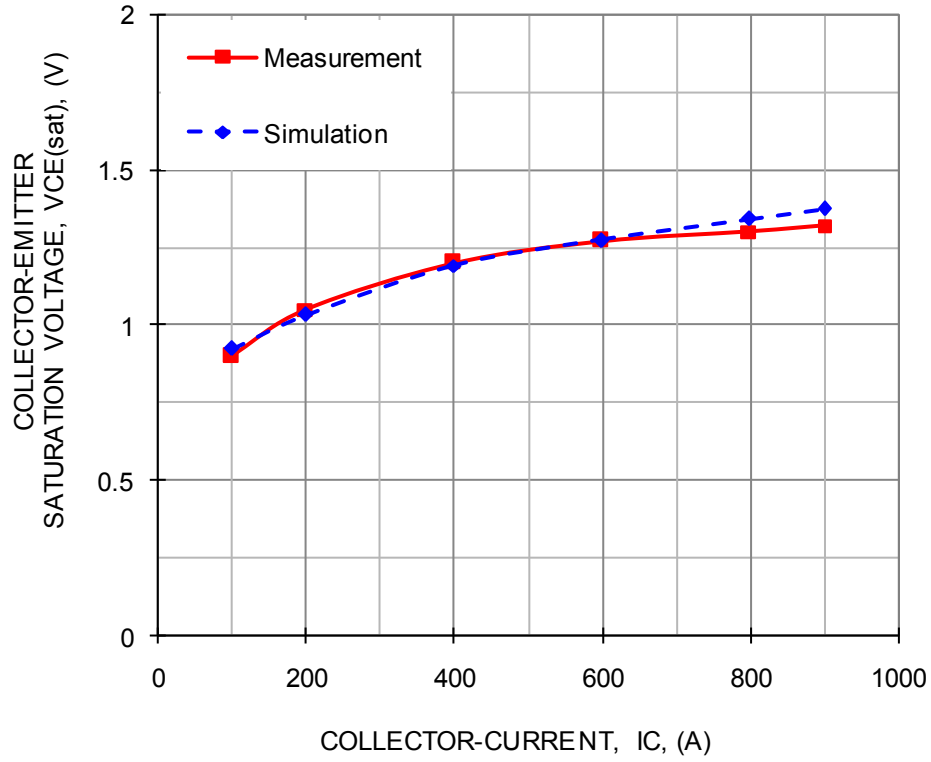


Evaluation circuit



Comparison Graph

Circuit Simulation Result



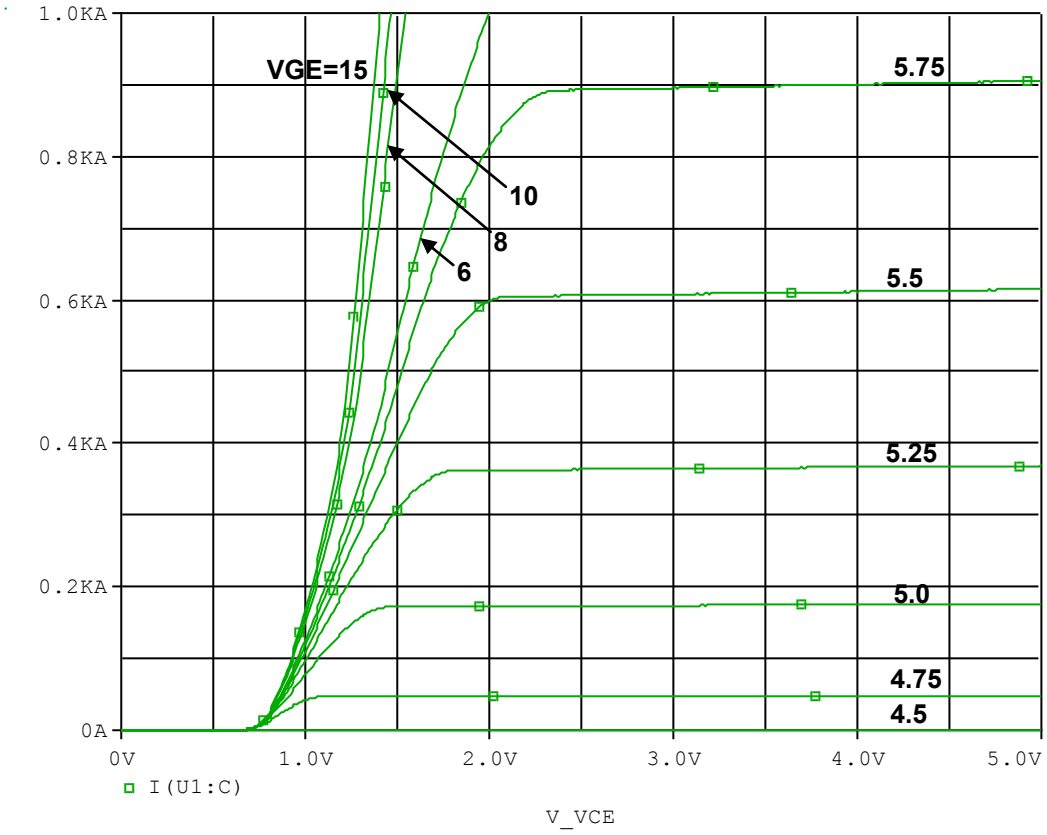
Simulation Result

Test condition: V_{GE} = 15 V

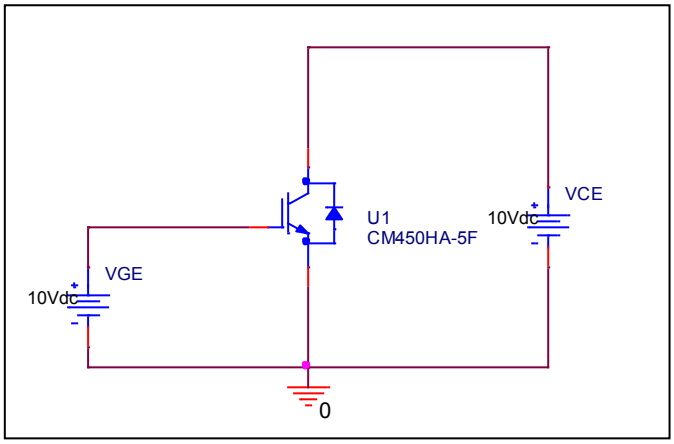
Ic(A)	VCE (V)		Error (%)
	Measurement	Simulation	
100	0.900	0.923	2.50
200	1.050	1.033	-1.61
400	1.200	1.190	-0.82
600	1.270	1.272	0.18
800	1.300	1.341	3.12
900	1.320	1.374	4.08

Output Characteristics

Circuit Simulation result

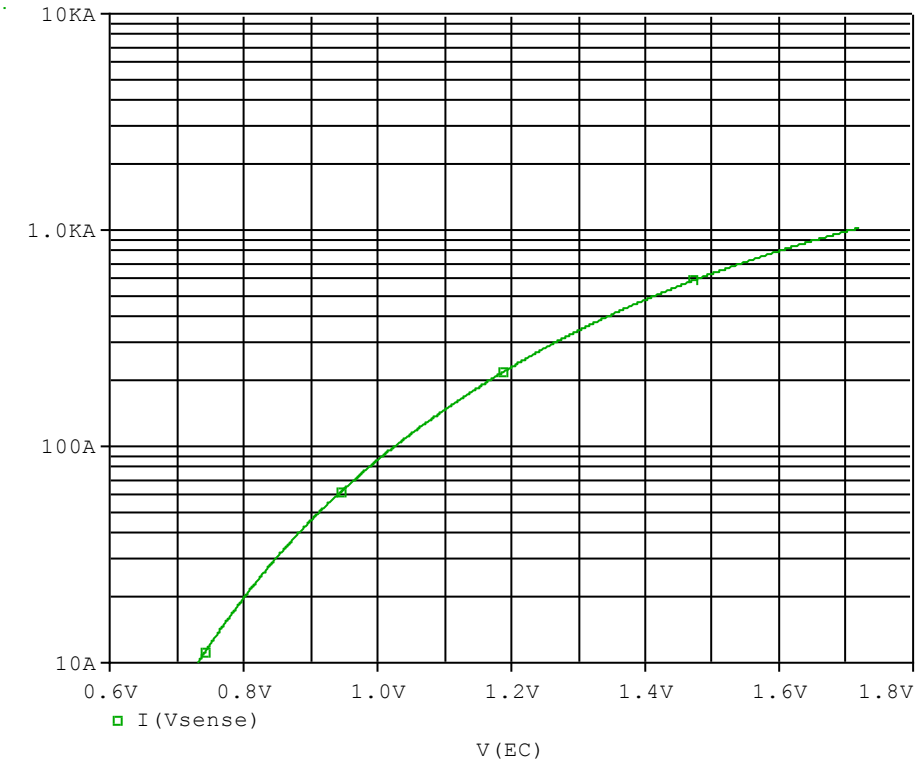


Evaluation circuit

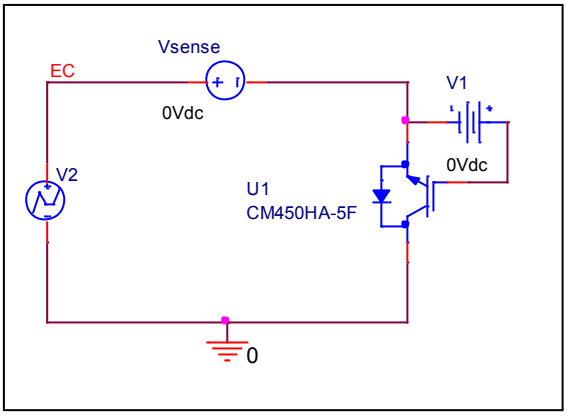


Forward Current Characteristic

Circuit Simulation Result

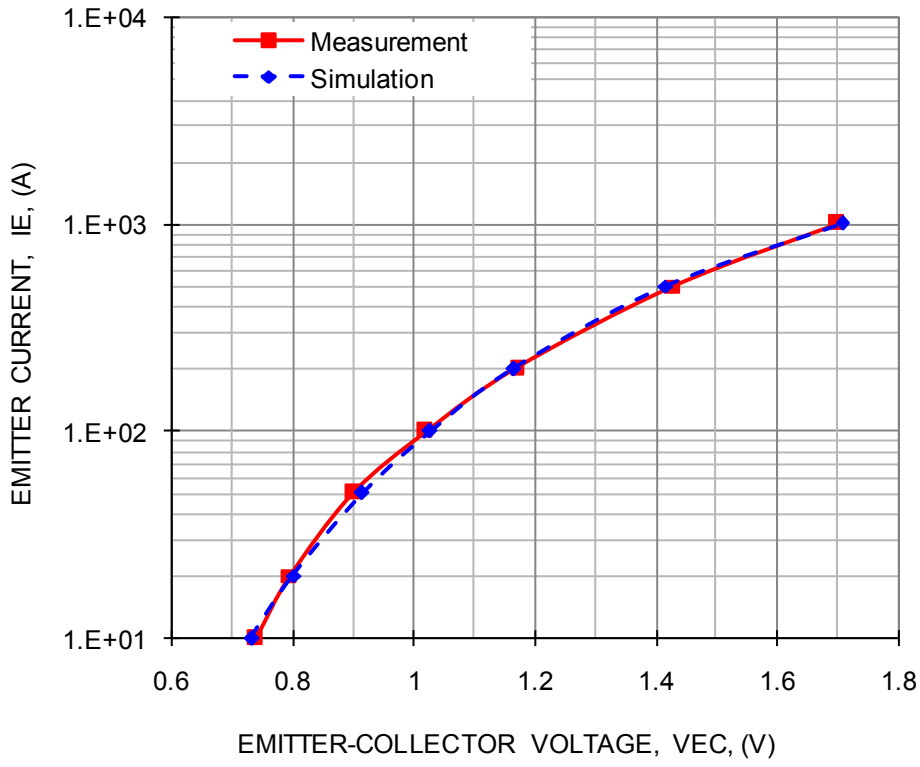


Evaluation Circuit



Comparison Graph

Circuit Simulation Result

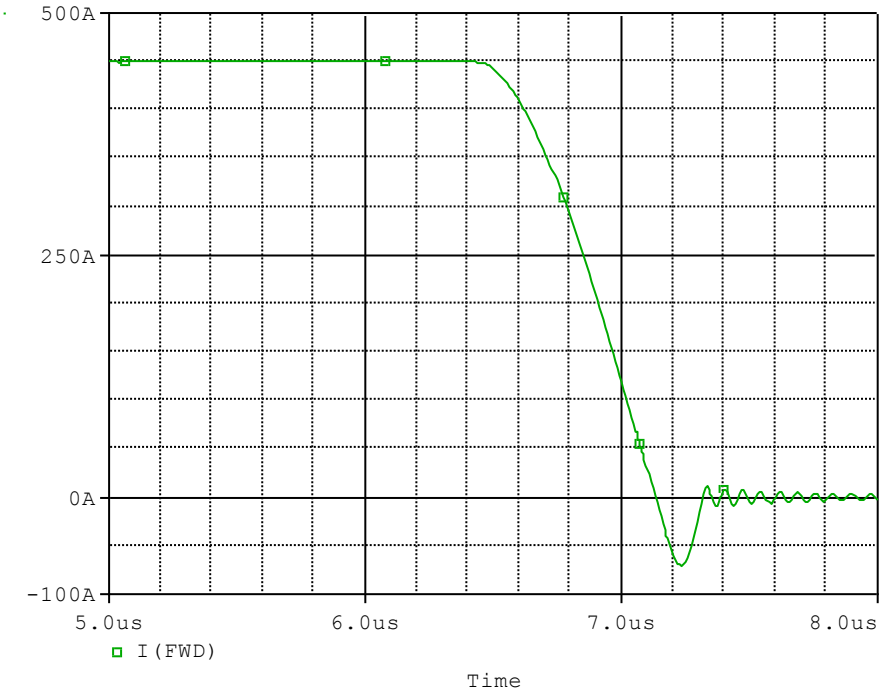


Simulation Result

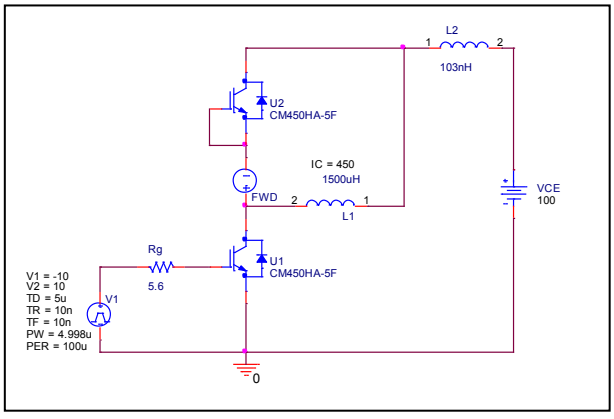
IE(A)	VEC(V)		%Error
	Measurement	Simulation	
10	0.740	0.732	-1.14
20	0.795	0.801	0.72
50	0.900	0.914	1.59
100	1.020	1.026	0.58
200	1.170	1.165	-0.41
500	1.430	1.416	-0.96
1000	1.700	1.708	0.46

Reverse Recovery Characteristics

Circuit Simulation result



Evaluation circuit



Test condition: V_{CC}=100 (V), I_C=450(A) ,V_{GE}=±10(V)

Parameter	Unit	Measurement	Simulation	Error(%)
trr	nsec	200.000	179.646	-10.18
Irr	A	70.000	70.073	0.10