Device Modeling Report

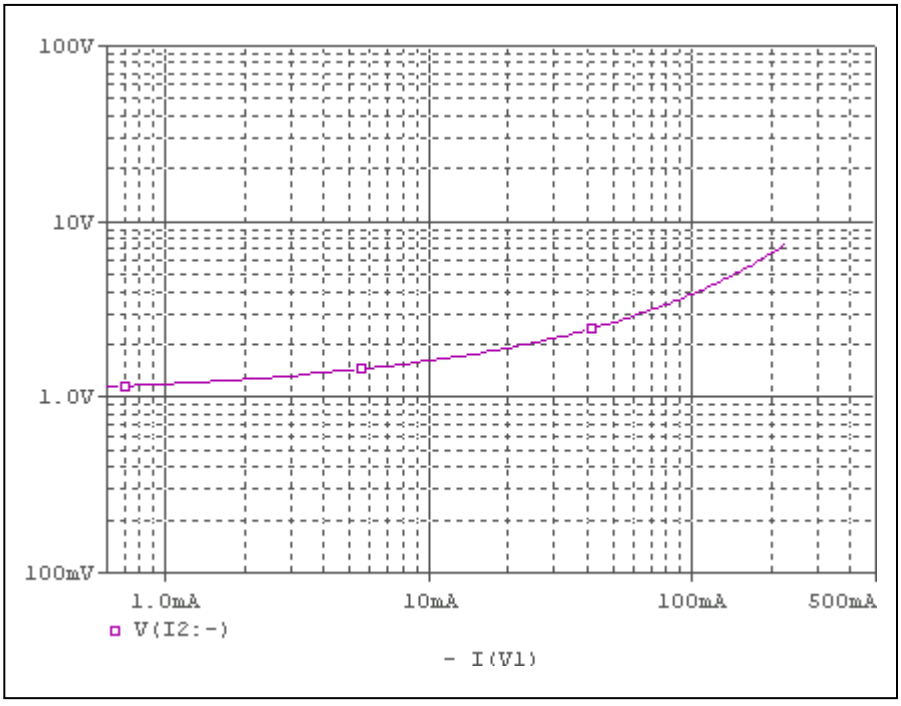
COMPONENTS: Digital transistors (built-in resistors)
PART NUMBER: DTC363ES
MANUFACTURER: ROHM

Bee Technologies Inc.

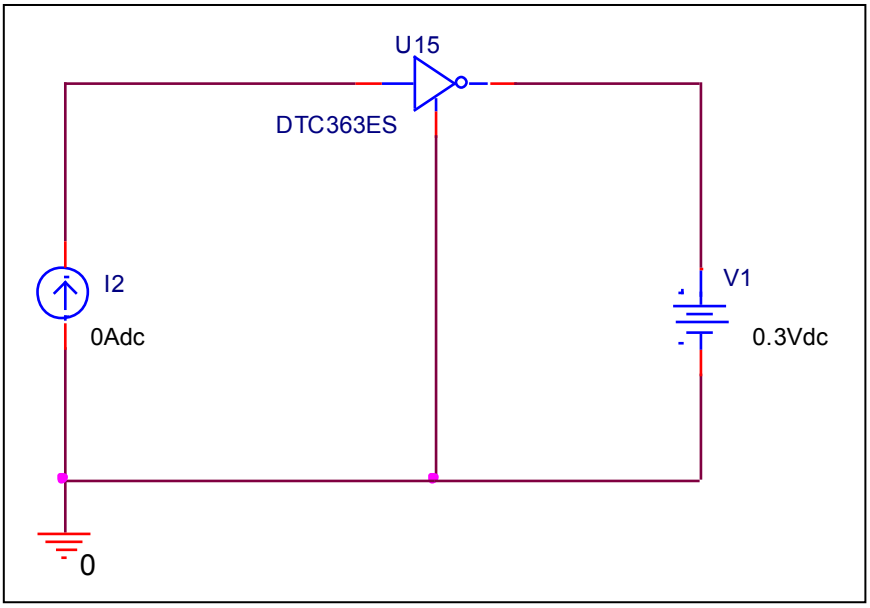
PSpice model parameter	Model description
IS	Saturation Current
BF	Ideal Maximum Forward Beta
NF	Forward Current Emission Coefficient
VAF	Forward Early Voltage
IKF	Forward Beta Roll-off Knee Current
ISE	Non-ideal Base-Emitter Diode Saturation Current
NE	Non-ideal Base-Emitter Diode Emission Coefficient
BR	Ideal Maximum Reverse Beta
NR	Reverse Emission Coefficient
VAR	Reverse Early Voltage
IKR	Reverse Beta Roll-off Knee Current
ISC	Non-ideal Base-Collector Diode Saturation Current
NC	Non-ideal Base-Collector Diode Emission Coefficient
NK	Forward Beta Roll-off Slope Exponent
RE	Emitter Resistance
RB	Base Resistance
RC	Series Collector Resistance
CJE	Zero-bias Emitter-Base Junction Capacitance
VJE	Emitter-Base Junction Potential
MJE	Emitter-Base Junction Grading Coefficient
CJC	Zero-bias Collector-Base Junction Capacitance
VJC	Collector-base Junction Potential
MJC	Collector-base Junction Grading Coefficient
FC	Coefficient for Onset of Forward-bias Depletion Capacitance
TF	Forward Transit Time
XTF	Coefficient for TF Dependency on Vce
VTF	Voltage for TF Dependency on Vce
ITF	Current for TF Dependency on Ic
PTF	Excess Phase at f=1/2pi*TF
TR	Reverse Transit Time
EG	Activation Energy
XTB	Forward Beta Temperature Coefficient
XTI	Temperature Coefficient for IS

Input voltage vs. output current (ON characteristics)

Circuit simulation result

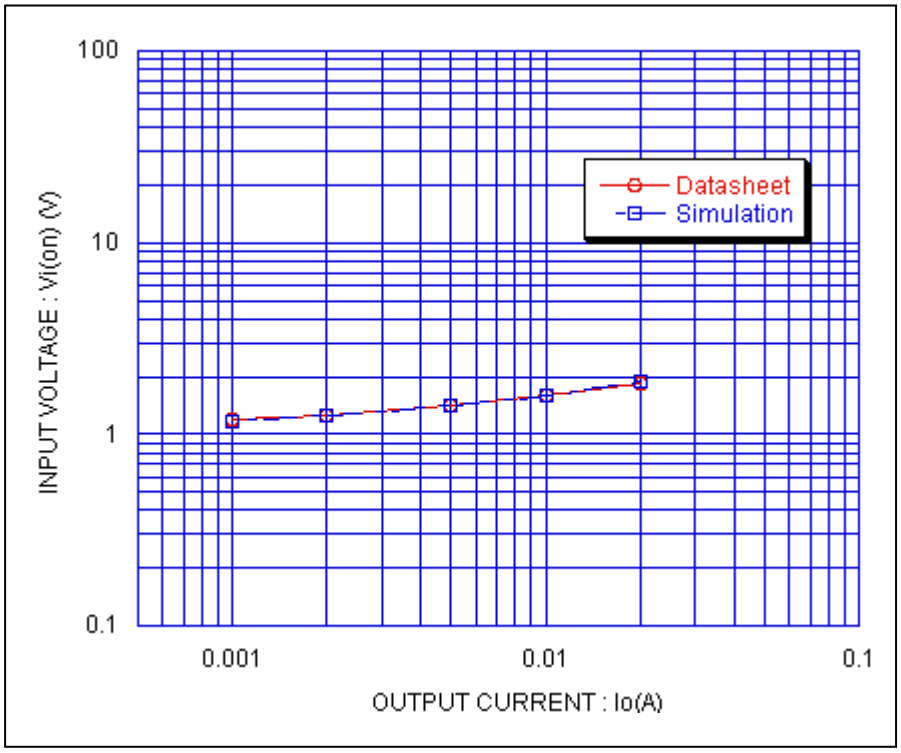


Evaluation circuit



Comparison Graph

Circuit Simulation Result



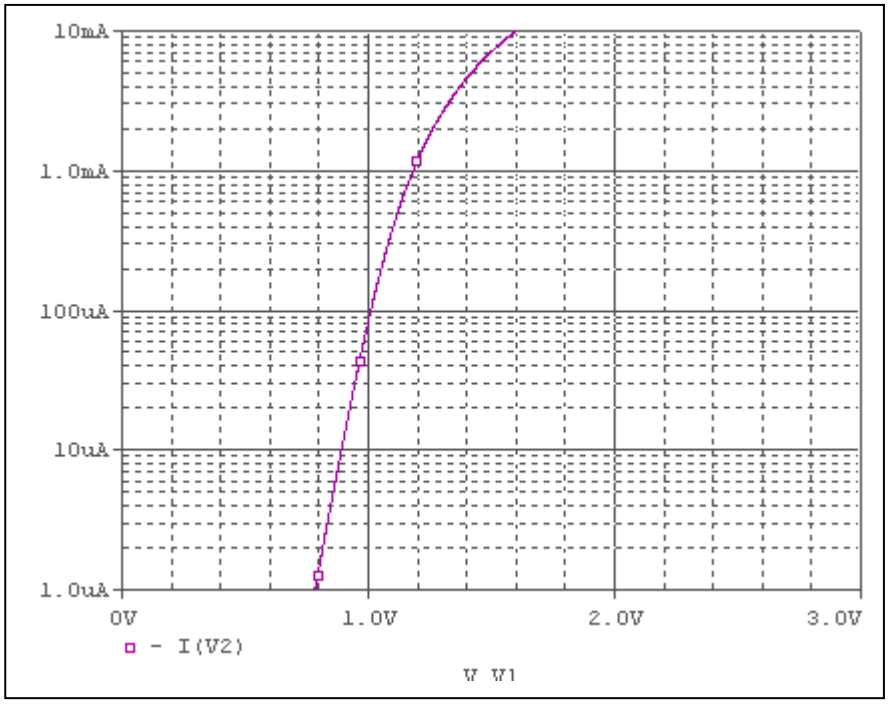
Simulation Result

Condition @ Vo = 0.3 V

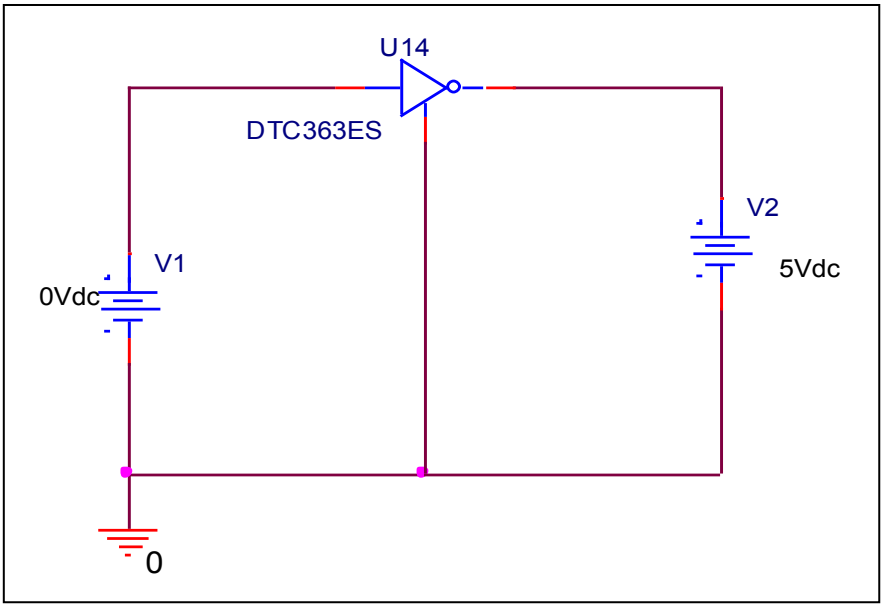
Io(A)	$V_{I(ON)}$ (V)		Error (%)
	Datasheet	Simulation	
1m	1.2	1.18	-1.666
2m	1.25	1.26	0.8
5m	1.4	1.42	1.428
10m	1.6	1.61	0.625
20m	1.85	1.9	2.702

Output current vs. input voltage (OFF characteristics)

Circuit simulation result

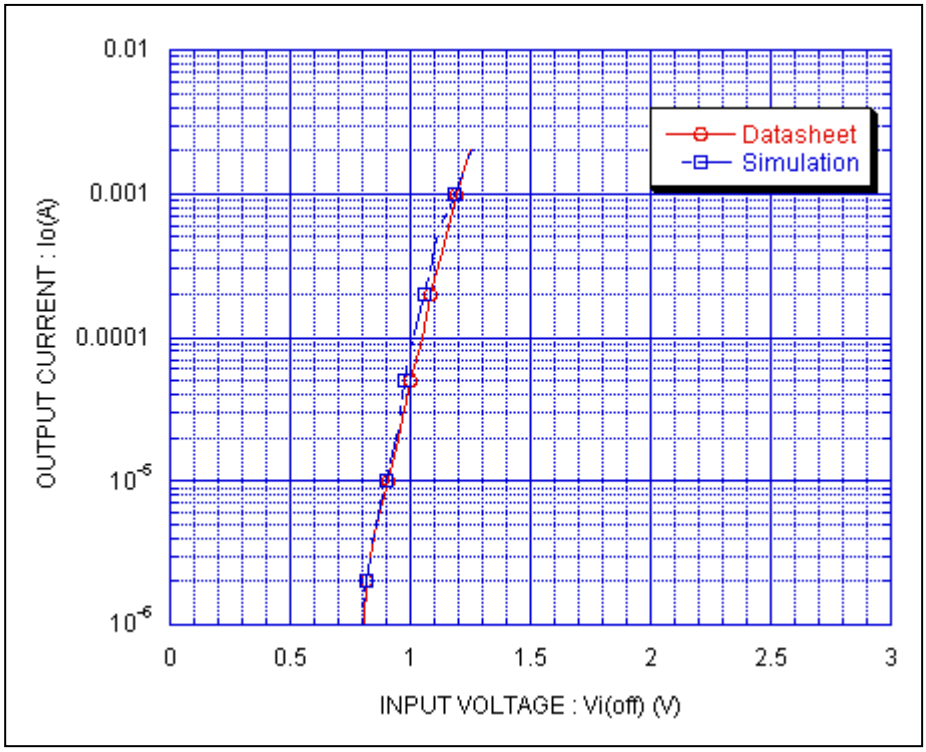


Evaluation circuit



Comparison Graph

Circuit Simulation Result



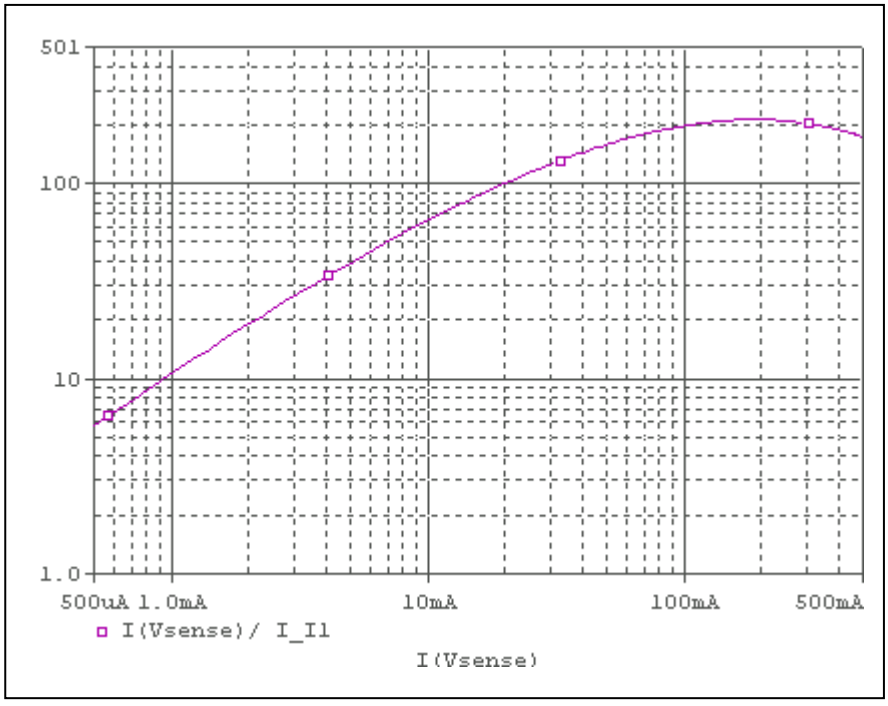
Simulation Result

Condition @ Vcc = 5 V

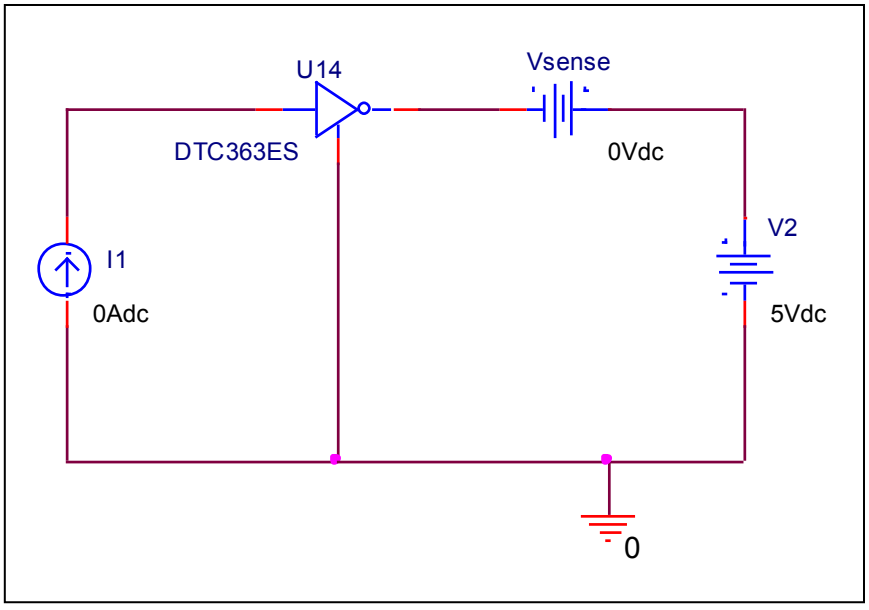
Io(A)	$V_{I(OFF)}$ (V)		Error (%)
	Datasheet	Simulation	
1u	0.8	0.78	-2.5
2u	0.82	0.814	-0.731
5u	0.86	0.857	-0.348
10u	0.91	0.9	-1.098
20u	0.95	0.94	-1.052
50u	1	0.972	-2.8
100u	1.05	1.01	-3.809
200u	1.08	1.06	-1.851
500u	1.15	1.11	-3.478
1m	1.19	1.18	-0.84
2m	1.25	1.26	0.8

DC current gain vs. output current

Circuit simulation result

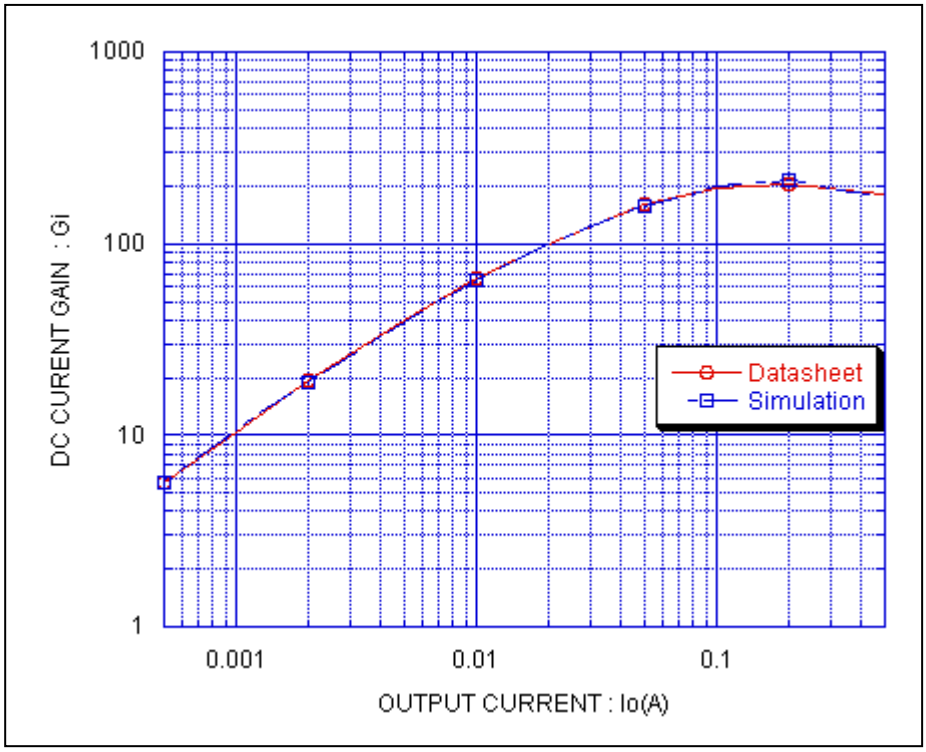


Evaluation circuit



Comparison Graph

Circuit Simulation Result



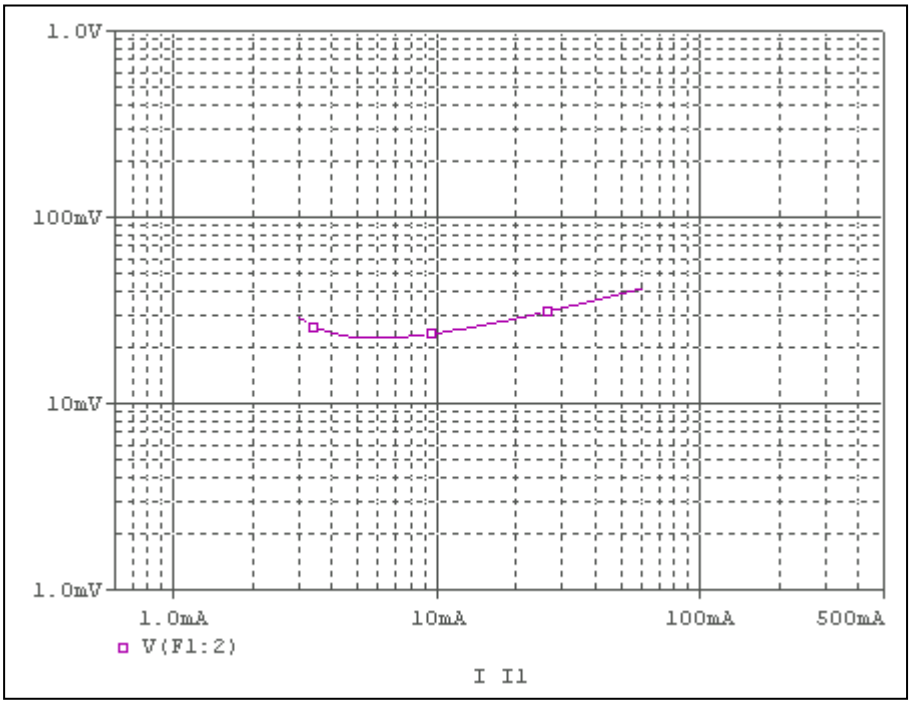
Simulation Result

Condition @ Vo = 5 V

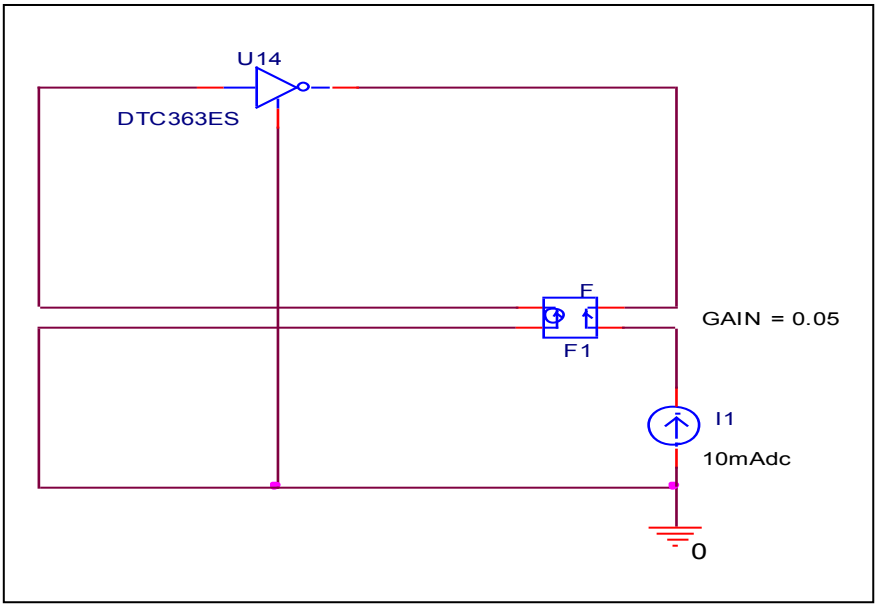
Ic(A)	hFE		Error (%)
	Datasheet	Simulation	
500u	5.7	5.7	0
1m	10.4	10.5	0.961
2m	19.5	19	-2.564
5m	40	39.17	-2.075
10m	66	64.4	-2.424
20m	100	99.74	-0.26
50m	160	157.81	-1.368
100m	195	197.25	1.153
200m	205	212	3.414
500m	175	174.5	-0.285

Output voltage VS. output current

Circuit simulation result

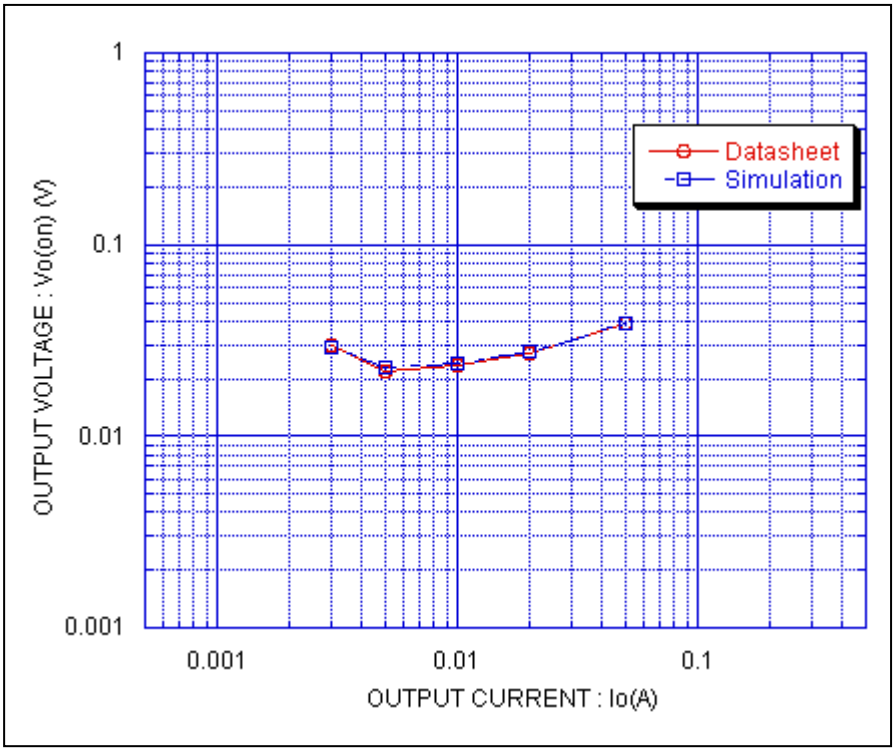


Evaluation circuit



Comparison Graph

Circuit Simulation Result



Simulation Result

Condition @ I_o/I_I = 20

Ic(A)	V_{CE} (sat)(mV)		Error (%)
	Datasheet	Simulation	
3m	0.03	0.0294	-2
5m	0.022	0.02263	2.863
10m	0.0235	0.02388	1.617
20m	0.027	0.028	3.703
50m	0.039	0.0387	-0.769