Device Modeling Report

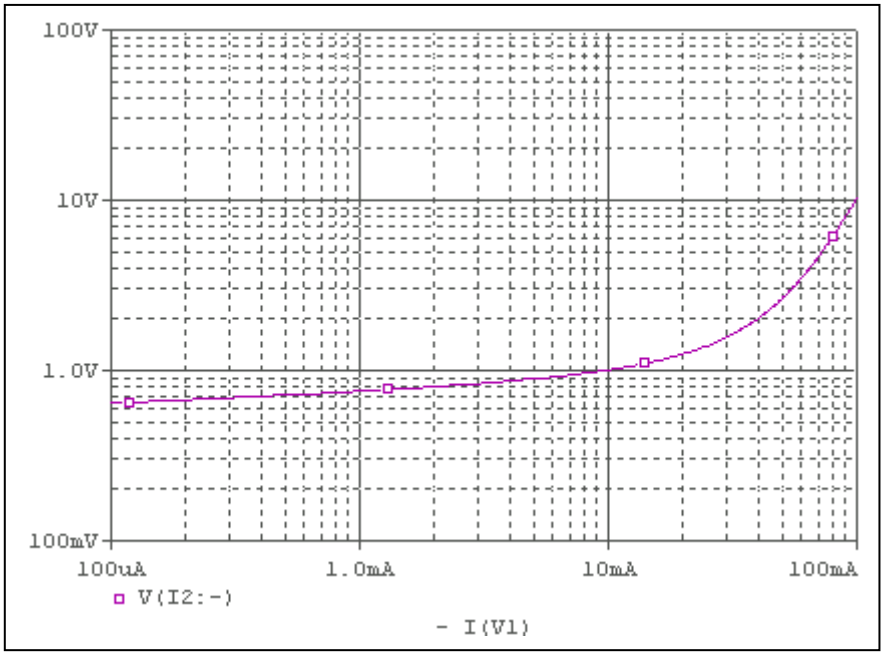
COMPONENTS: Digital transistors (built-in resistors)
PART NUMBER: DTC143ZUA
MANUFACTURER: ROHM

Bee Technologies Inc.

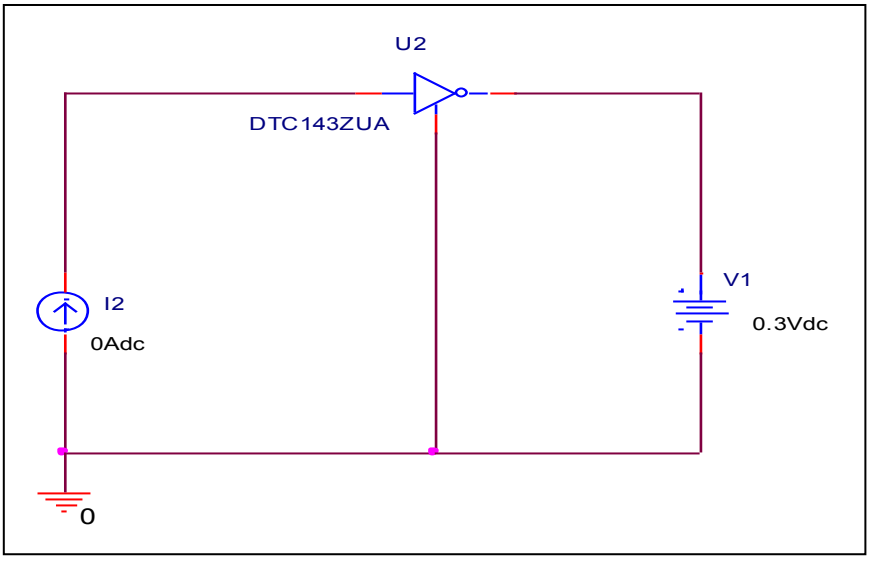
PSpice model parameter	Model description
IS	Saturation Current
BF	Ideal Maximum Forward Beta
NF	Forward Current Emission Coefficient
VAF	Forward Early Voltage
IKF	Forward Beta Roll-off Knee Current
ISE	Non-ideal Base-Emitter Diode Saturation Current
NE	Non-ideal Base-Emitter Diode Emission Coefficient
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

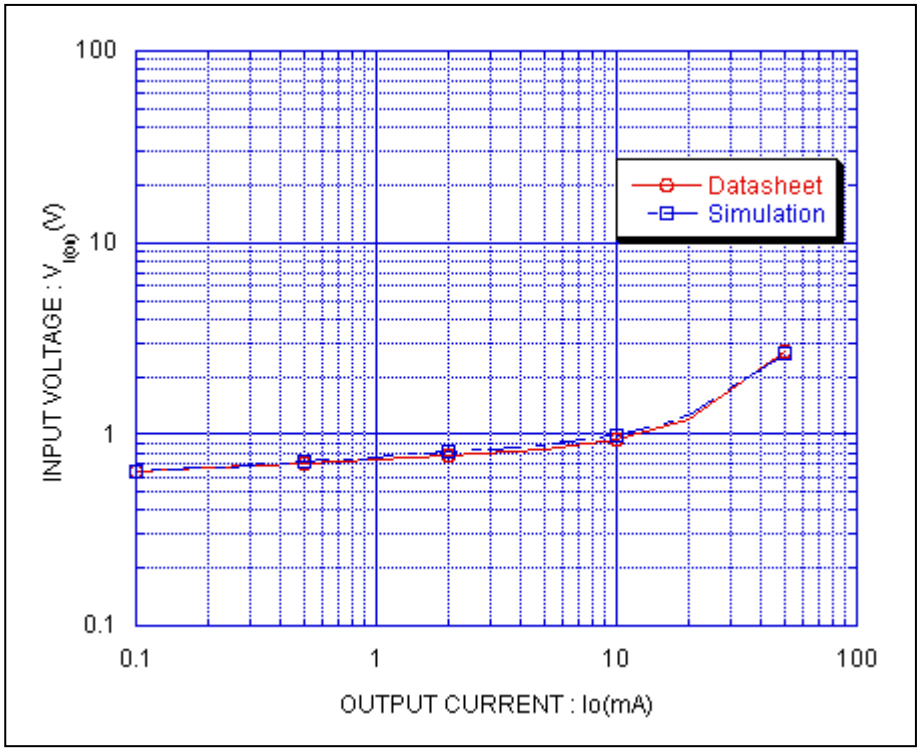


Evaluation circuit



Comparison Graph

Circuit Simulation Result



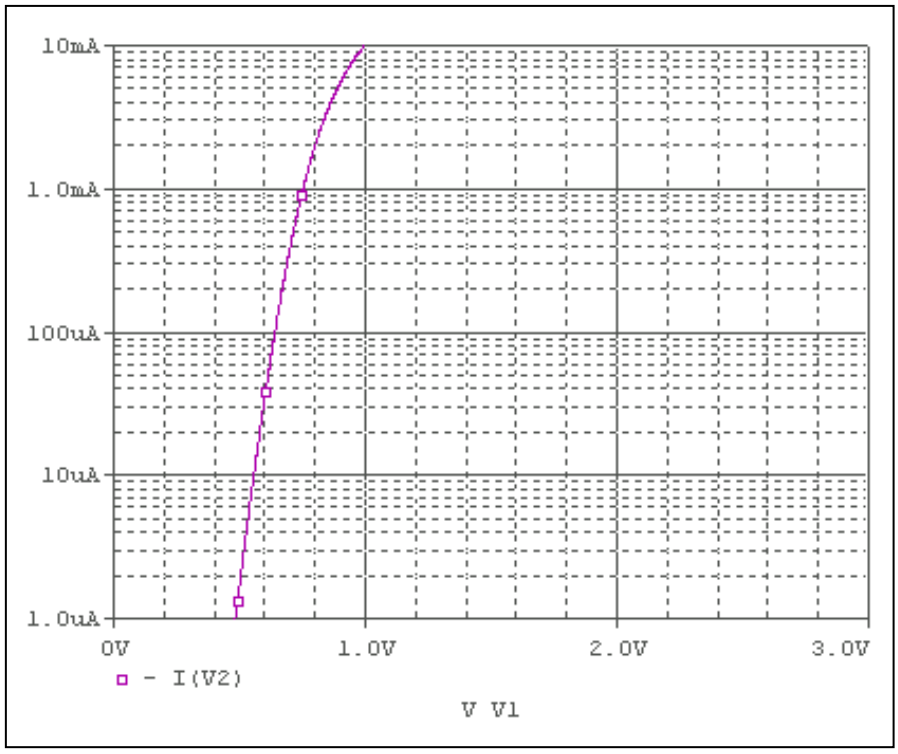
Simulation Result

Condition @ Vo = 0.3 V

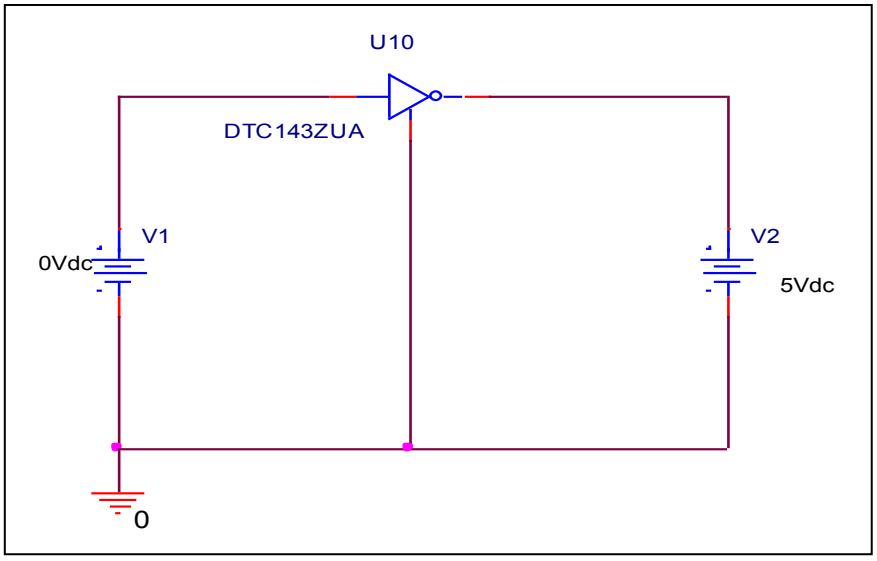
Io(A)	$V_{I(ON)}$ (V)		Error (%)
	Datasheet	Simulation	
100u	0.64	0.646	0.937
200u	0.67	0.672	0.298
500u	0.71	0.716	0.845
1m	0.74	0.755	2.027
2m	0.77	0.804	4.415
5m	0.83	0.87	4.819
10m	0.94	0.98	4.255
20m	1.2	1.25	4.166
50m	2.7	2.64	-2.222

Output current vs. input voltage (OFF characteristics)

Circuit simulation result

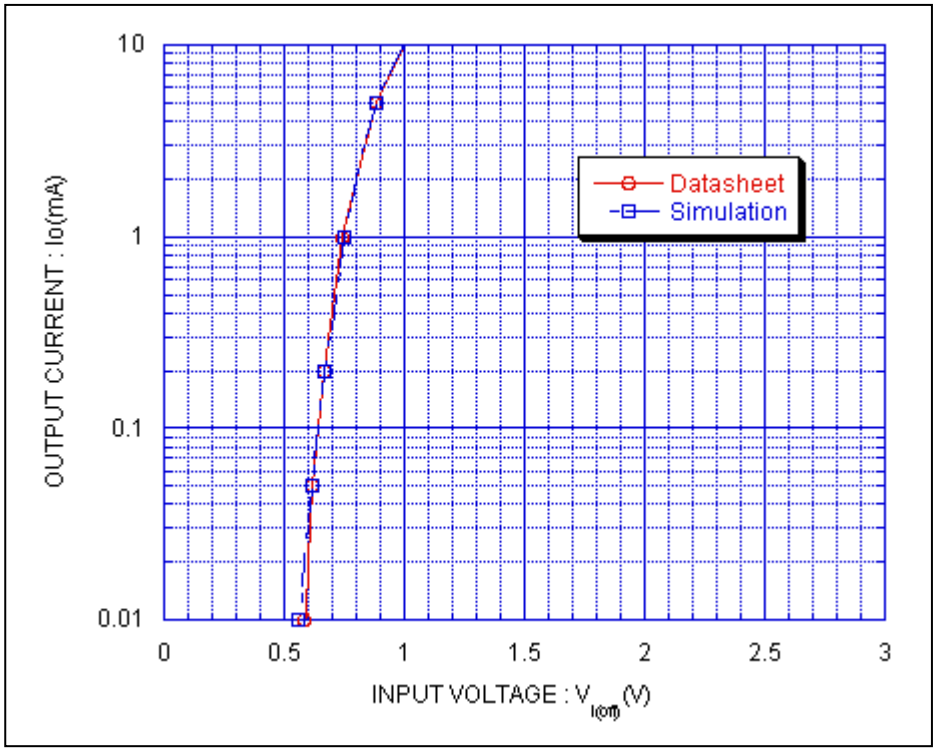


Evaluation circuit



Comparison Graph

Circuit Simulation Result



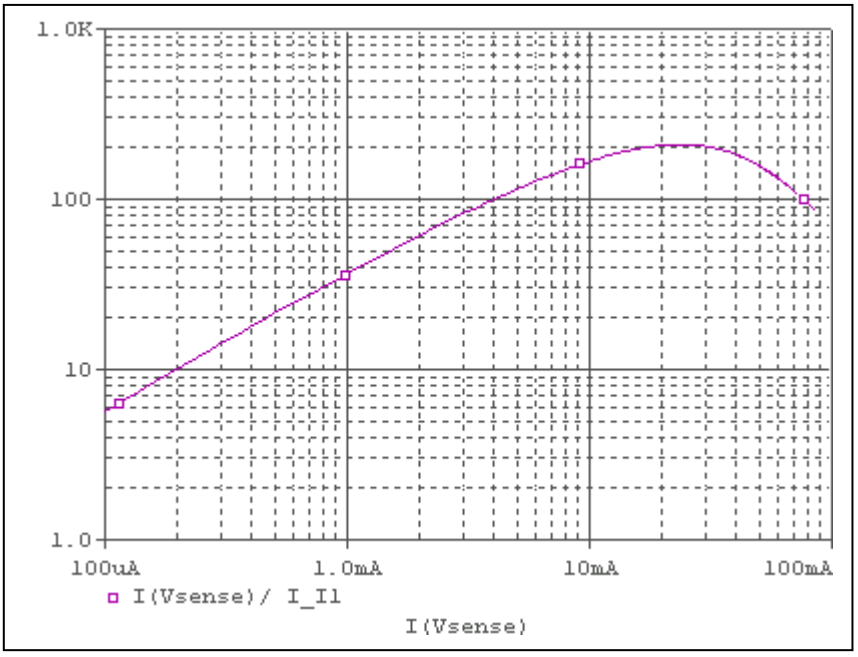
Simulation Result

Condition @ V_{CC} = 5 V

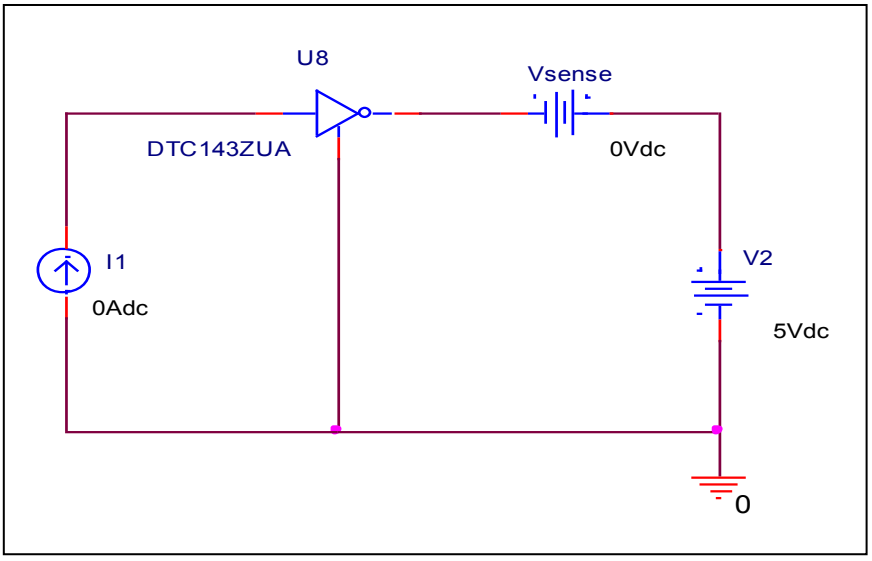
Io(A)	$V_{I(Off)}$ (V)		Error (%)
	Datasheet	Simulation	
10u	0.58	0.556	-4.137
20u	0.6	0.582	-3
50u	0.62	0.614	-0.967
100u	0.64	0.64	0
200u	0.67	0.67	0
500u	0.71	0.713	0.422
1m	0.74	0.752	1.621
2m	0.8	0.8	0
5m	0.88	0.886	0.681
10m	1	0.998	-0.2

DC current gain vs. output current

Circuit simulation result

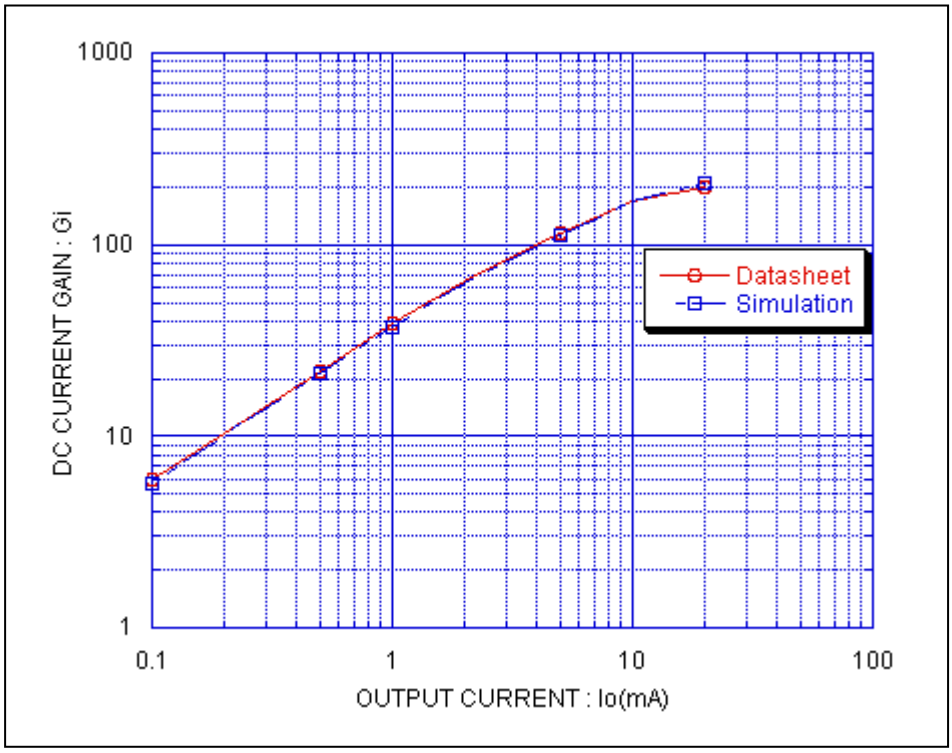


Evaluation circuit



Comparison Graph

Circuit Simulation Result



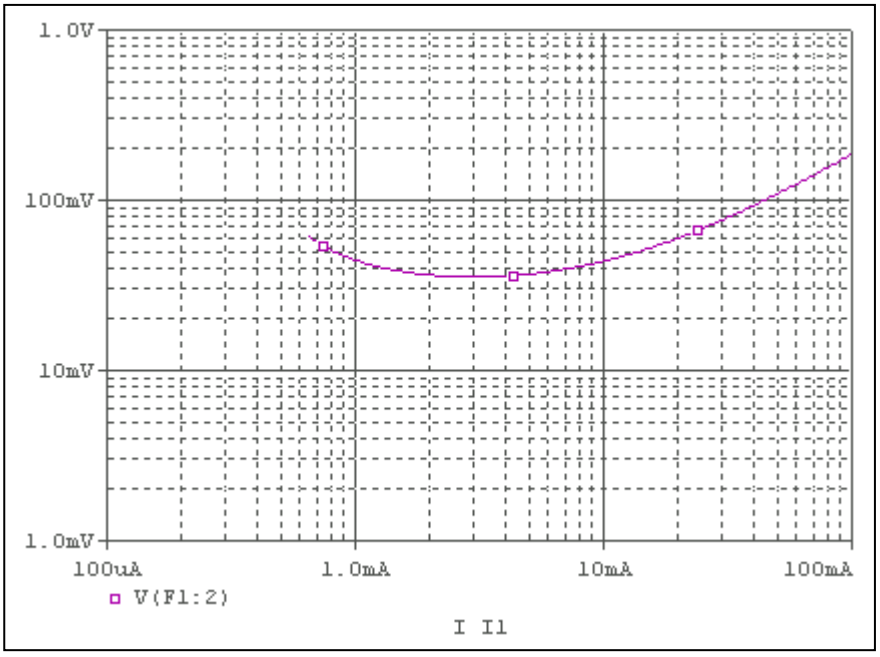
Simulation Result

Condition @ V_{CC} = 5V

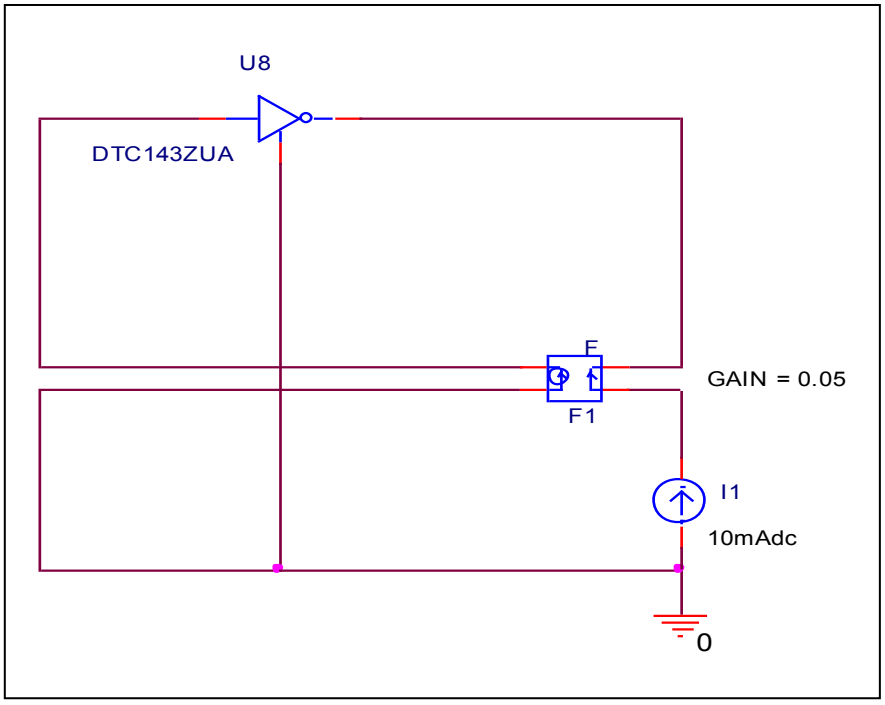
Io(A)	$V_{I(Off)}$ (V)		Error (%)
	Datasheet	Simulation	
100u	5.9	5.65	-4.237
200u	10.4	10.14	-2.5
500u	22	21.3	-3.181
1m	38.5	36.6	-4.935
2m	65	62.62	-3.661
5m	115	113	-1.739
10m	170	167	-1.764
20m	200	207	3.5

Output voltage VS. output current

Circuit simulation result

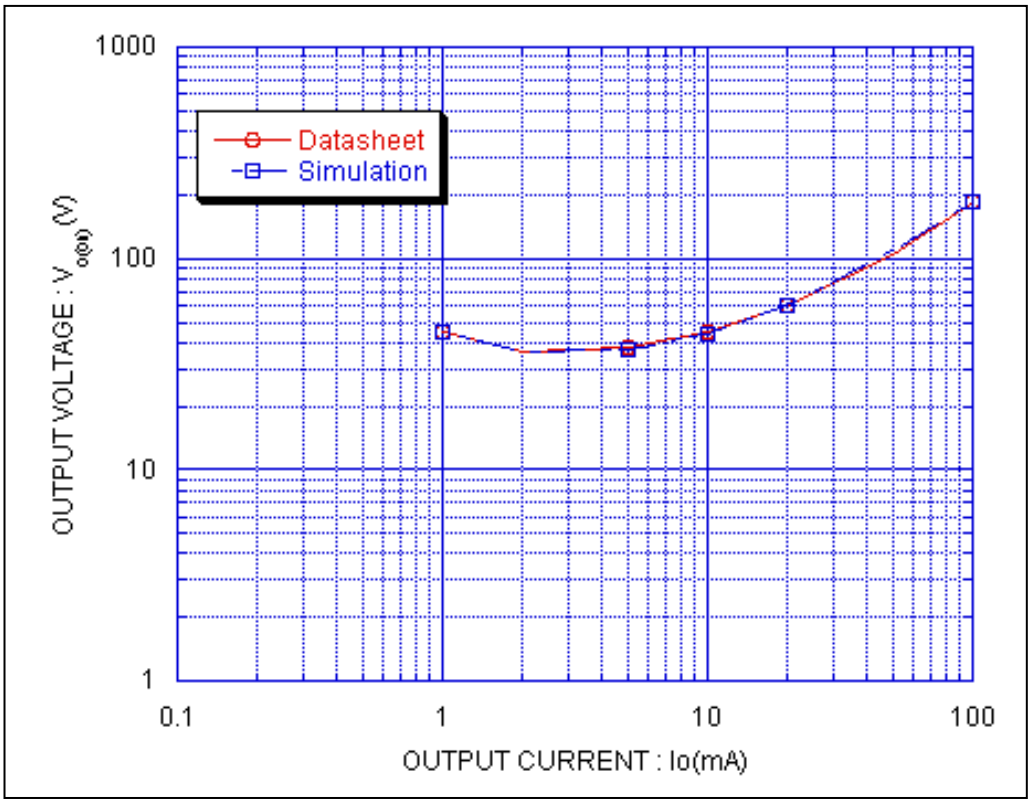


Evaluation circuit



Comparison Graph

Circuit Simulation Result



Simulation Result

Condition @ Io/Iı = 20

Io(A)	$V_{I(Off)}$ (mV)		Error (%)
	Datasheet	Simulation	
1m	45	44.42	-1.288
2m	36	36.37	1.027
5m	38	36.8	-3.157
10m	45	43.81	-2.644
20m	60	60	0
50m	105	109	3.809
100m	185	186	0.54