Device Modeling Report

COMPONENTS: Digital transistors (built-in resistors)
PART NUMBER: DTC144WKA
MANUFACTURER: ROHM

Bee Technologies Inc.

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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

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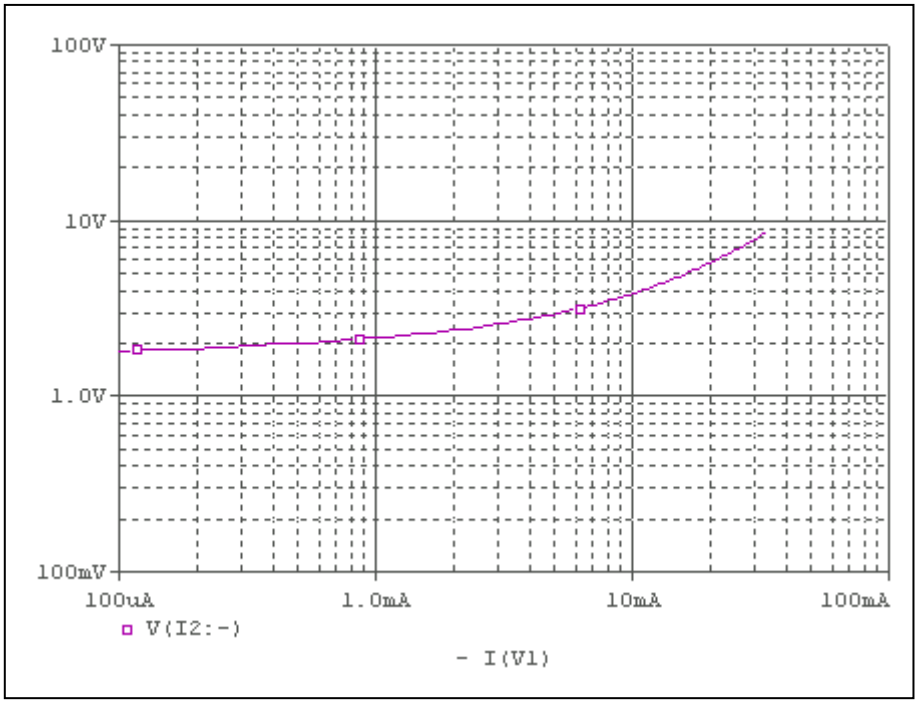
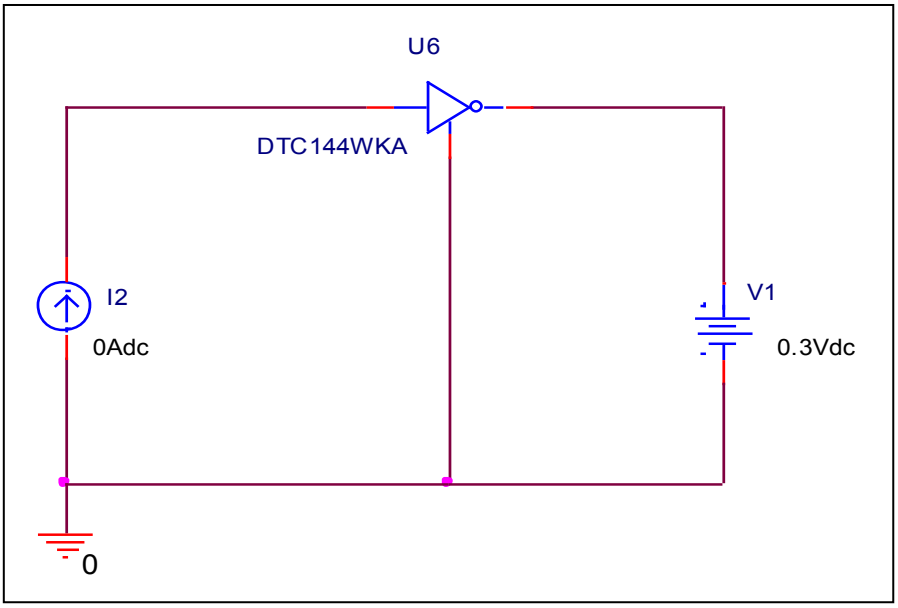
Input voltage vs. output current (ON characteristics)

Circuit simulation result



Evaluation circuit



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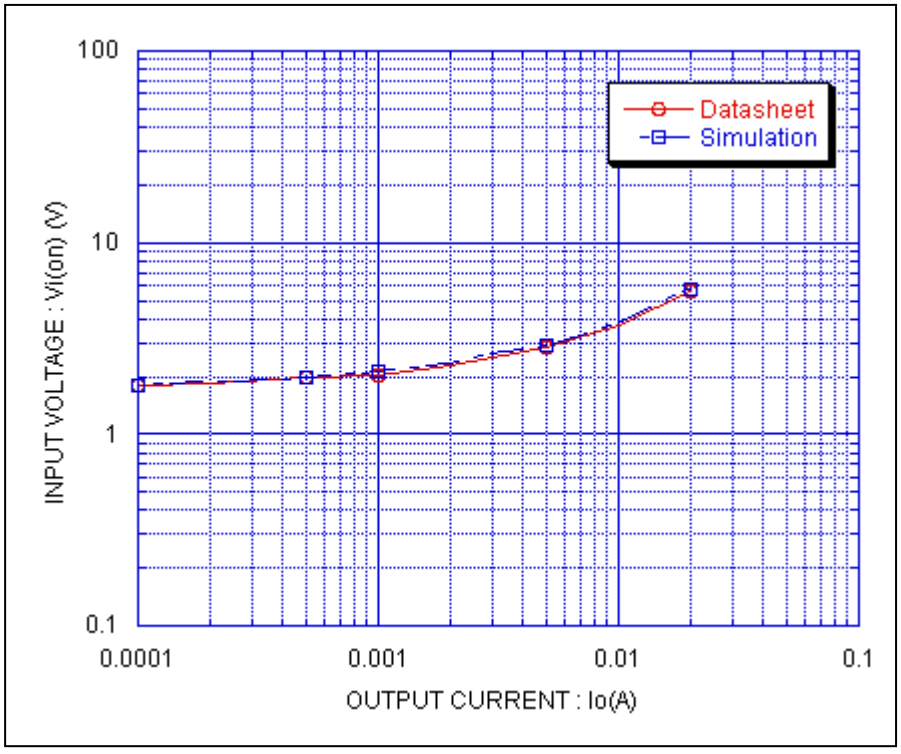
Comparison Graph

Circuit Simulation Result



Simulation Result

Condition @ Vo = 0.3 V

Io(A)	$V_{I(ON)}$ (V)		Error (%)
	Datasheet	Simulation	
100u	1.8	1.79	-0.555
200u	1.85	1.87	1.081
500u	1.97	2	1.522
1m	2.05	2.14	4.390
2m	2.3	2.37	3.043
5m	2.85	2.94	3.157
10m	3.7	3.83	3.513
20m	5.55	5.7	2.702

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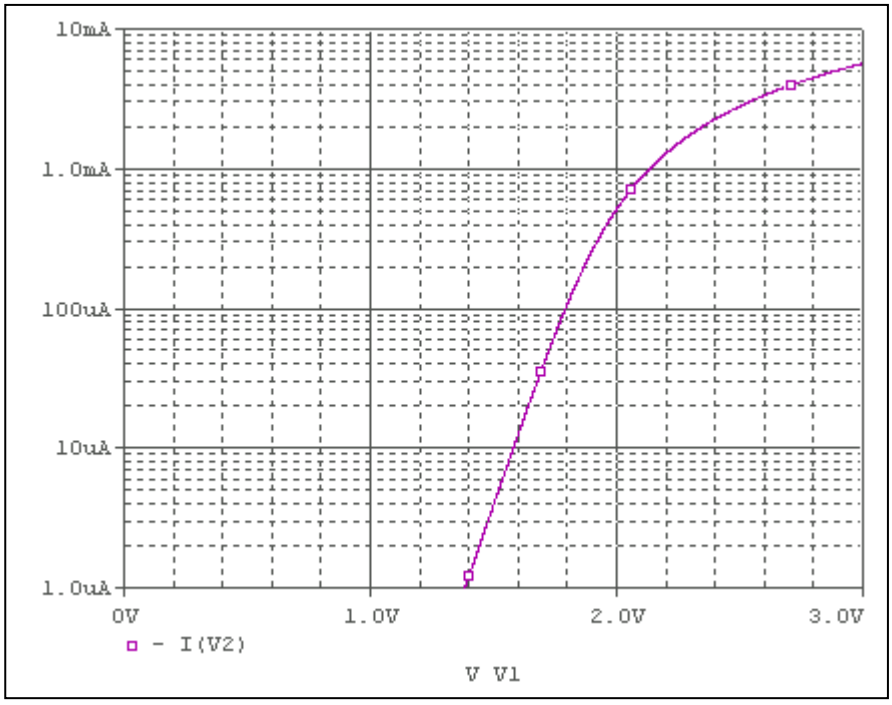
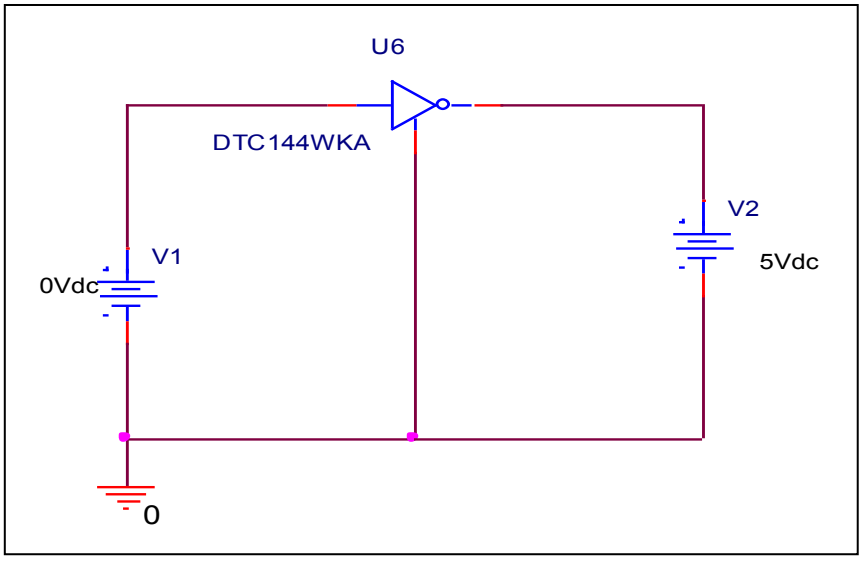
Output current vs. input voltage (OFF characteristics)

Circuit simulation result



Evaluation circuit



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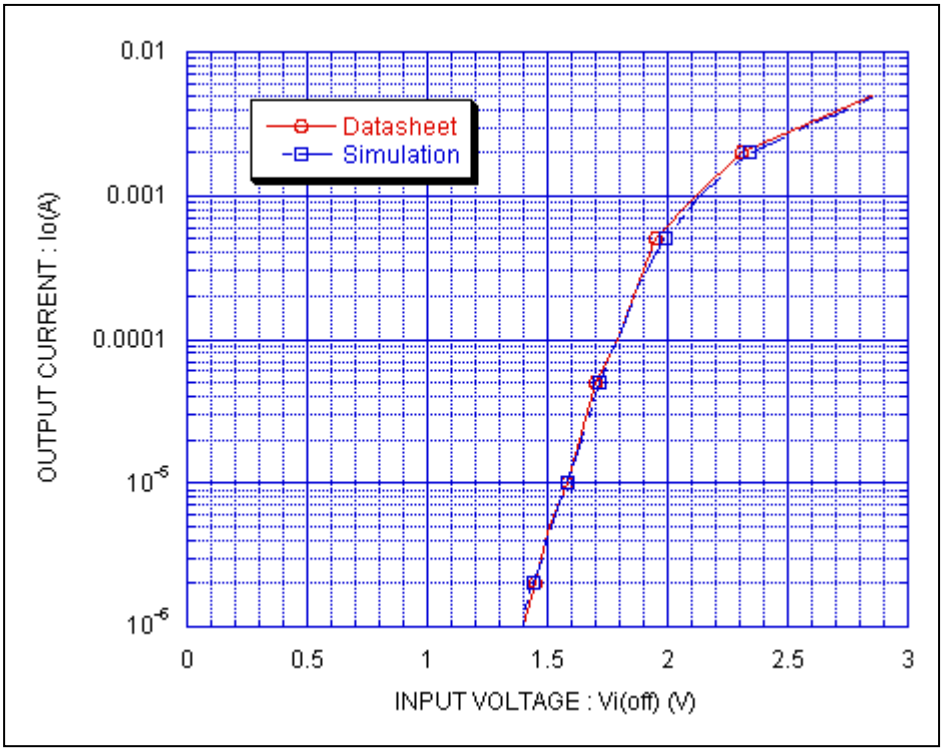
Comparison Graph

Circuit Simulation Result



Simulation Result

Condition @ V_{CC} = 5 V

Io(A)	$V_{I(Off)}$ (V)		Error (%)
	Datasheet	Simulation	
1u	1.39	1.38	-0.719
2u	1.45	1.44	-0.689
5u	1.51	1.52	0.662
10u	1.58	1.58	0
20u	1.63	1.64	0.613
50u	1.7	1.72	1.176
100u	1.79	1.79	0
200u	1.86	1.86	0
500u	1.95	1.99	2.051
1m	2.12	2.13	0.471
2m	2.31	2.34	1.298
5m	2.85	2.88	1.052

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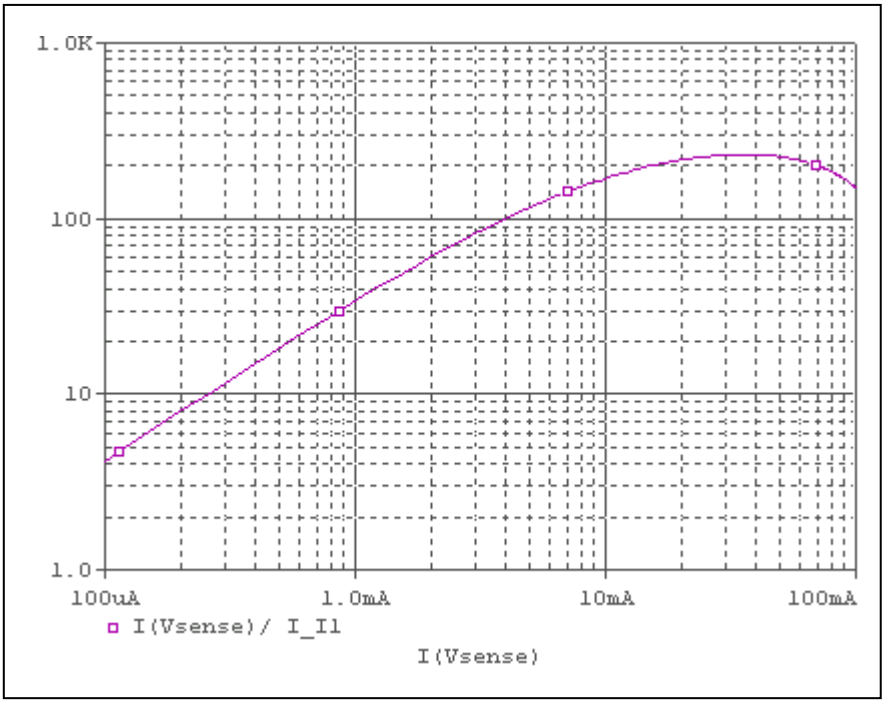
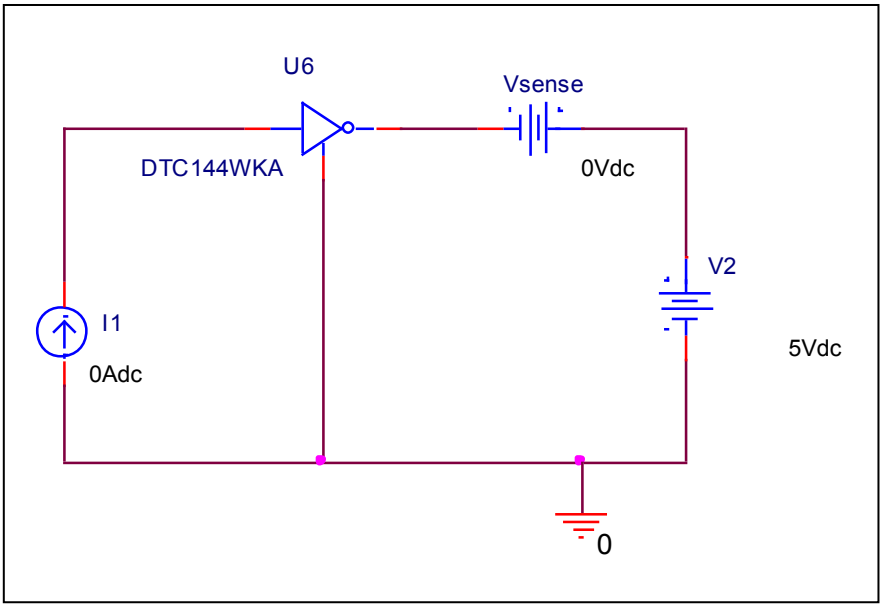
DC current gain vs. output current

Circuit simulation result



Evaluation circuit



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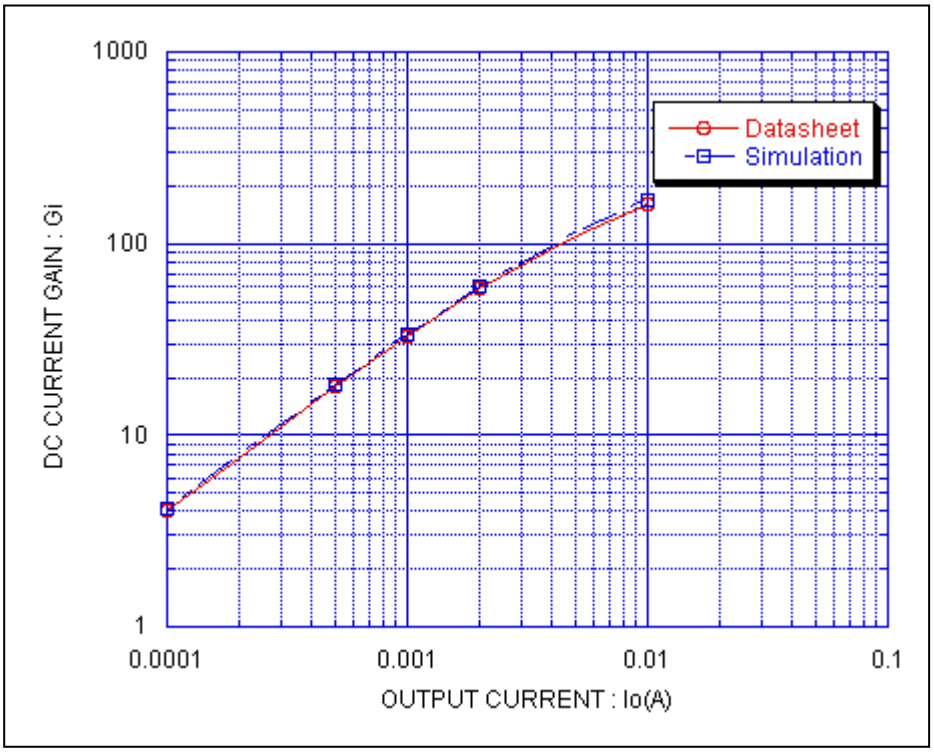
Comparison Graph

Circuit Simulation Result



Simulation Result

Condition @ V_{CC} = 5V

Io(A)	GAIN		Error (%)
	Datasheet	Simulation	
100u	4	4.16	4
200u	7.6	7.98	5
500u	18	18.36	2
1m	33	33.95	2.878
2m	58	60	3.448
5m	110	115	4.545
10m	162	169	4.320

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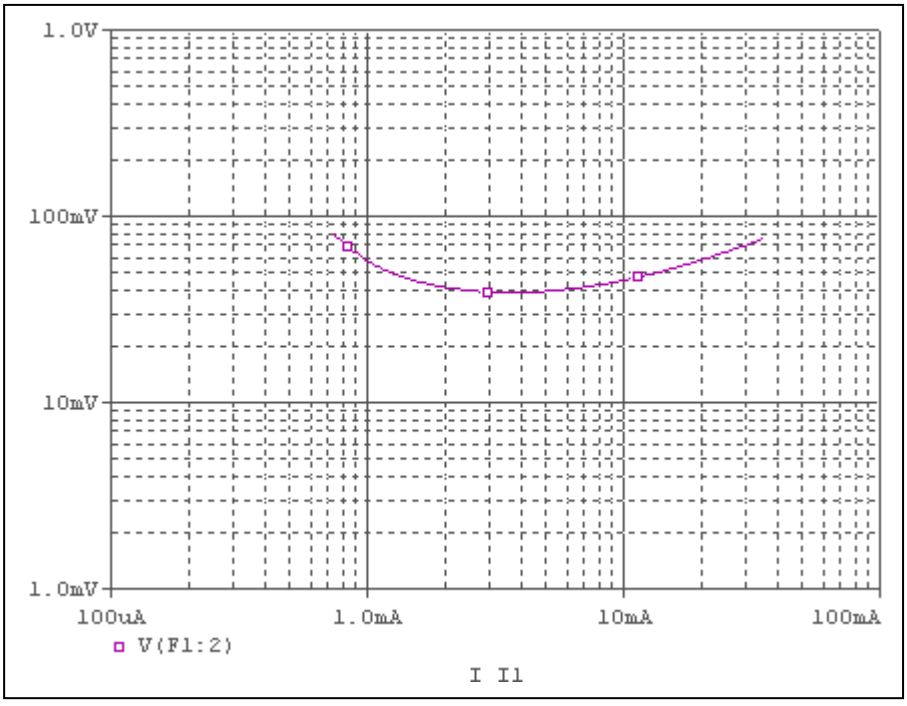
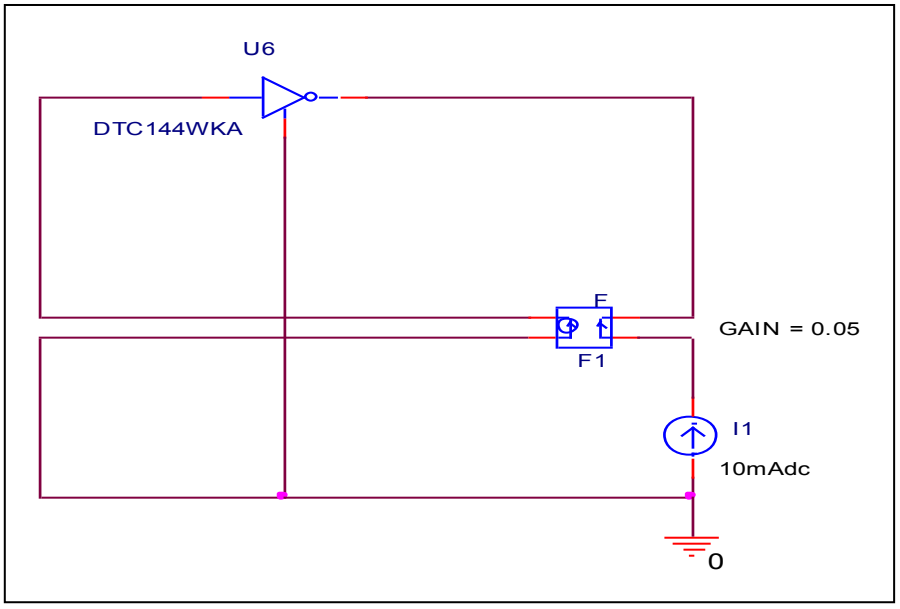
Output voltage VS. output current

Circuit simulation result



Evaluation circuit



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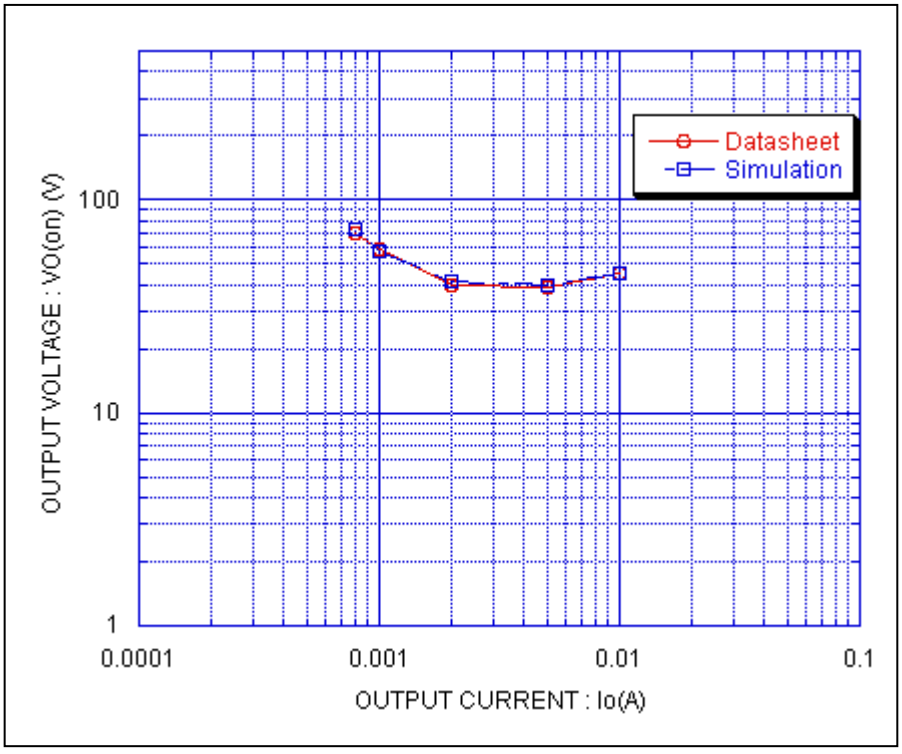
Comparison Graph

Circuit Simulation Result



Simulation Result

Condition @ Io/Iı = 20

Io(A)	$V_{0(on)}$ (mV)		Error (%)
	Datasheet	Simulation	
800u	70	72.7	3.857
1m	59	57.59	-2.389
2m	40	41.54	3.85
5m	39	39.62	1.589
10m	45	45.38	0.844

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