

Lab 2 - Results: Circuit Theorems

ECE209: *Fundamentals of Electrical Engineering*

Name	Student ID	CCID	Lab Section

Pre-lab Sign-off: _____ Results Sign-off: _____

Superposition

Superposition: Prelab Calculations ($R_{LOAD} = 1000 \Omega$)								
Circuit	V_B	V_A	V_{R1}	V_{R2}	V_{LOAD}	I_{R1}	I_{R2}	I_{LOAD}
-	(V)	(V)	(V)	(V)	(V)	(mA)	(mA)	(mA)
V_B only	20	0						
V_A only	0	10						
$V_B + V_A$								

Superposition Test Circuit: ($V_B = 20V$ and $V_A = 10V$)								
R_{LOAD}	V_B	V_A	V_{R1}	V_{R2}	V_{LOAD}	I_{R1}	I_{R2}	I_{LOAD}
(Ω)	(V)	(V)	(V)	(V)	(V)	(mA)	(mA)	(mA)
Open								
4000								
2000								
1000								
Short								

Superposition Test Circuit: (V_B acting alone: $V_B = 20V$ and $V_A = 0V$)								
R_{LOAD}	V_B	V_A	V_{R1}	V_{R2}	V_{LOAD}	I_{R1}	I_{R2}	I_{LOAD}
(Ω)	(V)	(V)	(V)	(V)	(V)	(mA)	(mA)	(mA)
Open								
4000								
2000								
1000								
Short								

Superposition Test Circuit: (V_A acting alone, $V_B = 0V$ and $V_A = 10V$)								
R_{LOAD}	V_B	V_A	V_{R1}	V_{R2}	V_{LOAD}	I_{R1}	I_{R2}	I_{LOAD}
(Ω)	(V)	(V)	(V)	(V)	(V)	(mA)	(mA)	(mA)
Open								
4000								
2000								
1000								
Short								

Superposition Test Circuit: (V_B acting alone + V_A acting alone)								
R_{LOAD}	V_B	V_A	V_{R1}	V_{R2}	V_{LOAD}	I_{R1}	I_{R2}	I_{LOAD}
(Ω)	(V)	(V)	(V)	(V)	(V)	(mA)	(mA)	(mA)
Open								
4000								
2000								
1000								
Short								

Superposition Test Circuit: (% Difference)								
R_{LOAD}	V_B	V_A	V_{R1}	V_{R2}	V_{LOAD}	I_{R1}	I_{R2}	I_{LOAD}
(Ω)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Open								
4000								
2000								
1000								
Short								

Thevenin and Norton Theorems

Finding Thevenin/Norton Equivalent Parameters: Prelab Calculations					
$V_{TH} =$		$I_{NORTON} =$		$R_{TH} =$	

Finding Thevenin/Norton Equivalent Parameters					
$V_{TH} =$			$R_{TH_1} = V_{TH}/I_{NORTON}$		
$I_{NORTON} =$			$R_{TH_2} = V_{LOAD} = 1/2 V_{TH}$		
			$R_{TH_3} = \text{Ohmmeter}$		

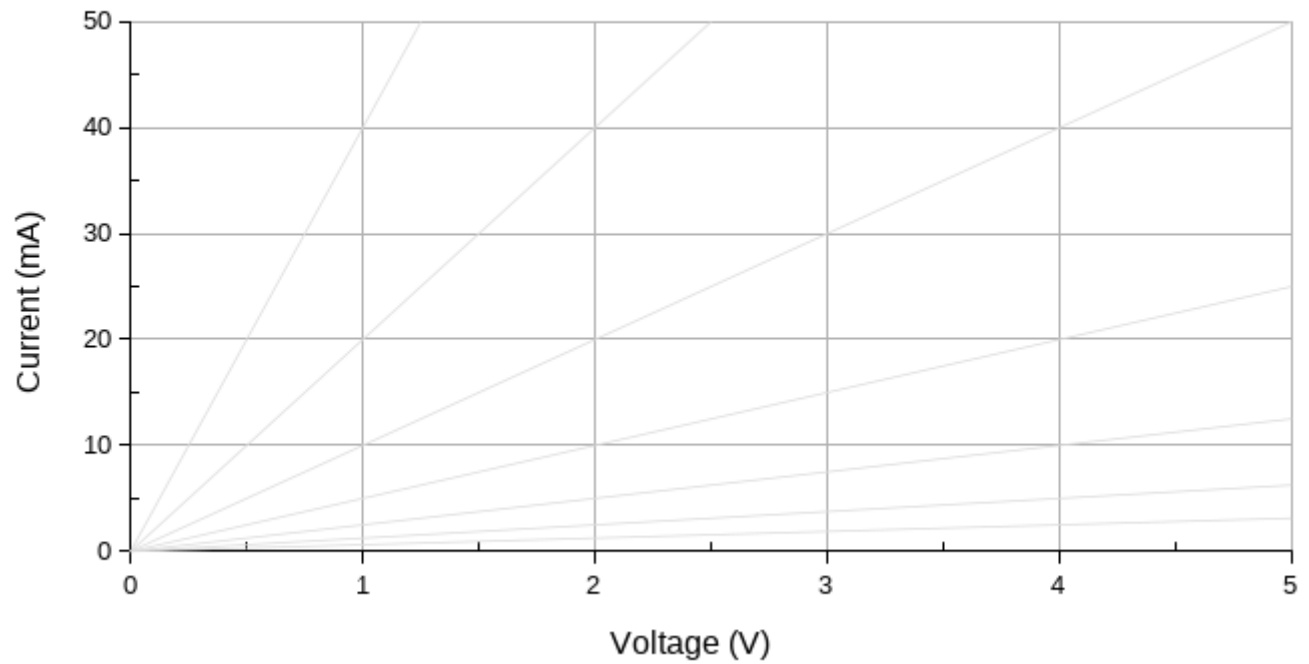
Testing Thevenin's Theorem							
R_{LOAD}	V_{LOAD}	I_{LOAD}	V_{LOAD}	I_{LOAD}	P_S	P_{LOAD}	Efficiency
(Ω)	(V)	(mA)	(% Difference)	(%Difference)	(mW)	(mW)	(%)
Open							
4000							
2000							
1000							
Short							

Thevenin-Norton Equivalency and Max Power Transfer

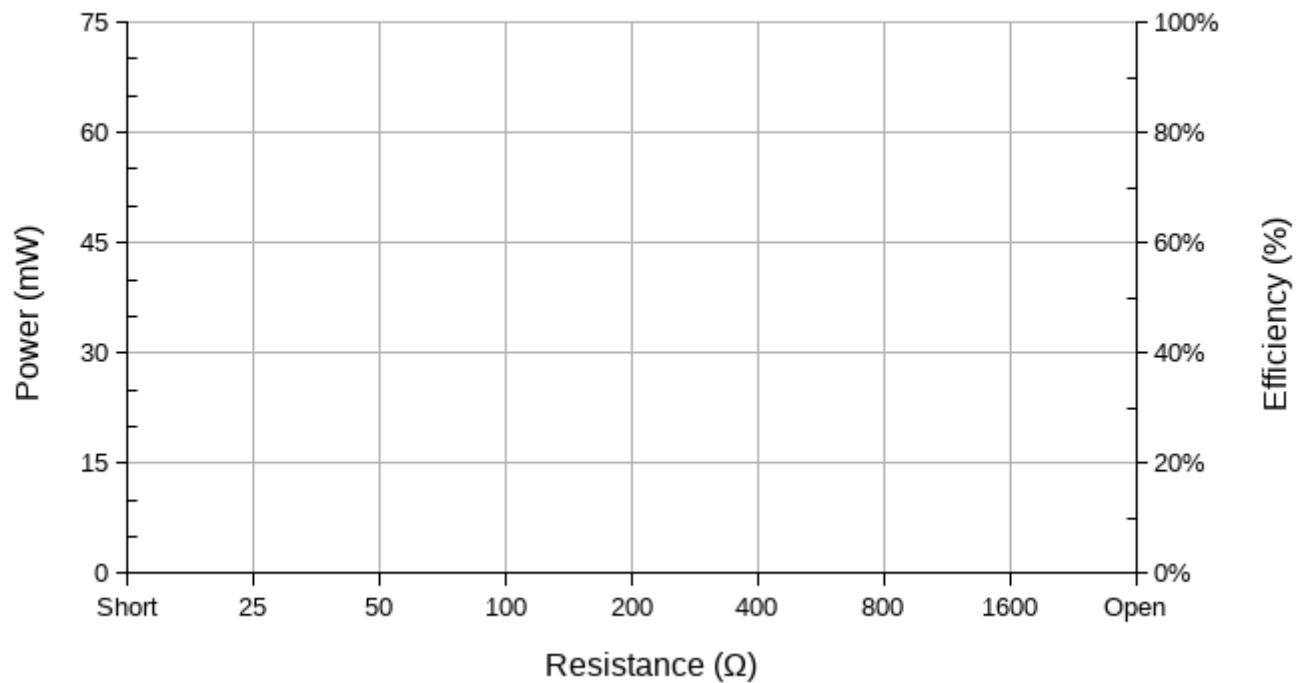
Thevenin's Test Circuit ($V_{TH} = 5V$, $R_{TH} = 100\Omega$)				$V_{TH} =$	
R_{LOAD}	V_{LOAD}	$I_{LOAD} = I_S$	P_S	P_{LOAD}	Efficiency
(Ω)	(V)	(mA)	(mW)	(mW)	(%)
Open					
1600					
800					
400					
200					
100					
50					
25					
Short					

Norton's Test Circuit ($I_{NORTON} = 50mA$, $R_{NORTON} = 100\Omega$)				$I_{NORTON} =$	
R_{LOAD}	$V_{LOAD} = V_S$	I_{LOAD}	P_S	P_{LOAD}	Efficiency
(Ω)	(V)	(mA)	(mW)	(mW)	(%)
Open					
1600					
800					
400					
200					
100					
50					
25					
Short					

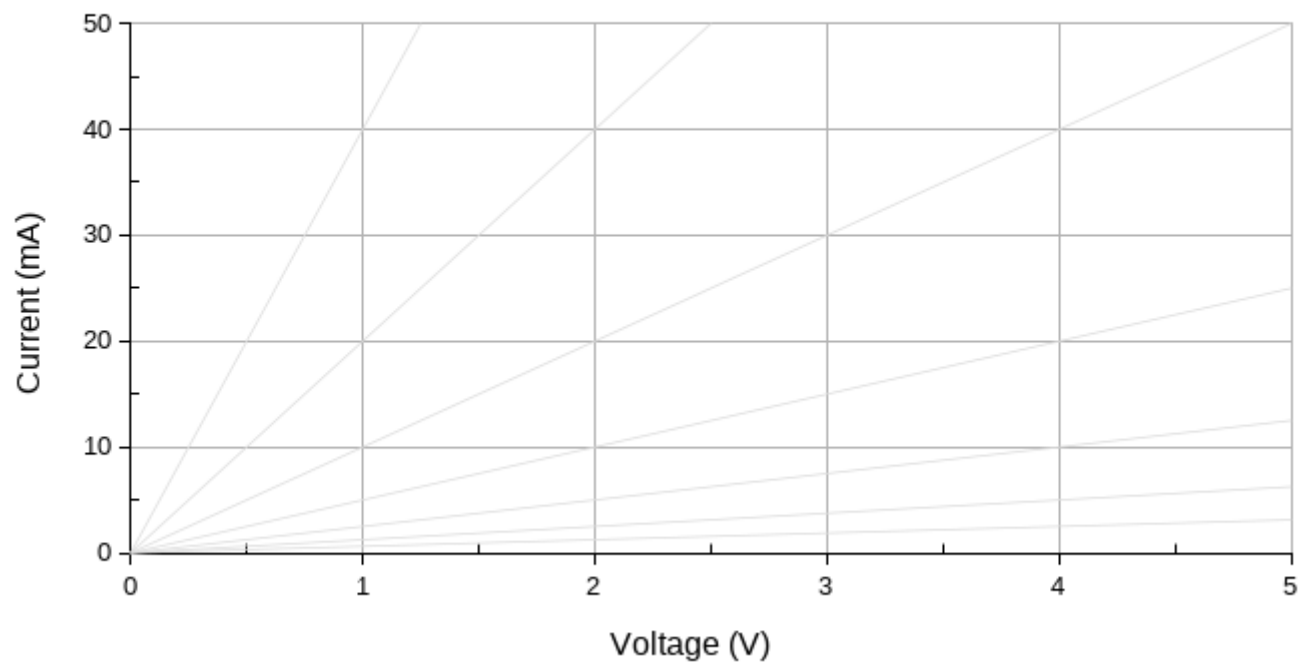
Thevenin I-V Characteristic Curve



Thevenin Load Curve and Efficiency



Norton I-V Characteristic Curve



Norton Load Curve and Efficiency

