

# Device Modeling Report

COMPONENTS:  
SERIES REGULATOR WITH RESET FUNCTION  
PART NUMBER: NJM78LR05  
MANUFACTURER: NEW JAPAN RADIO



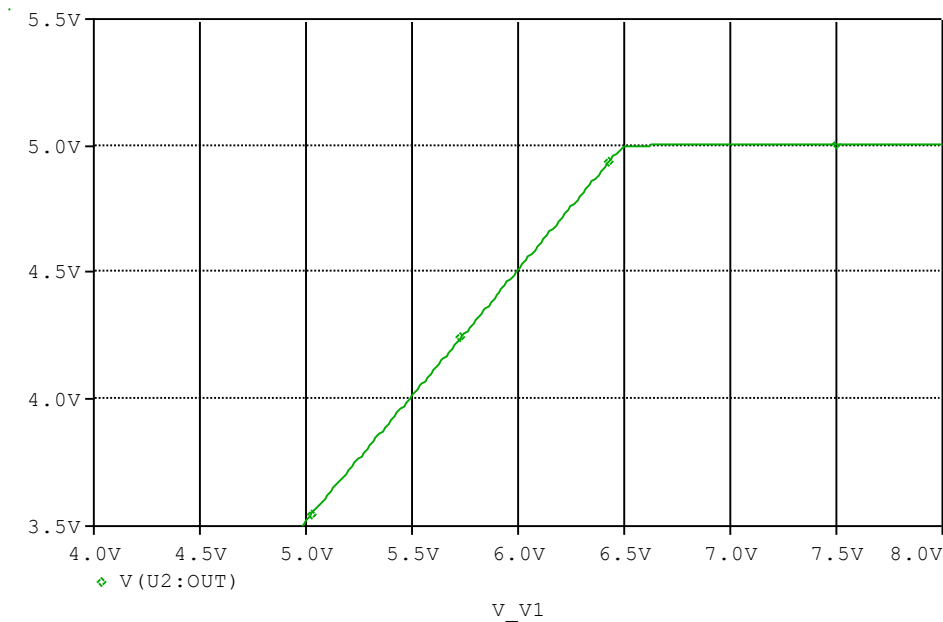
**Bee Technologies Inc.**

## MODEL PARAMETER

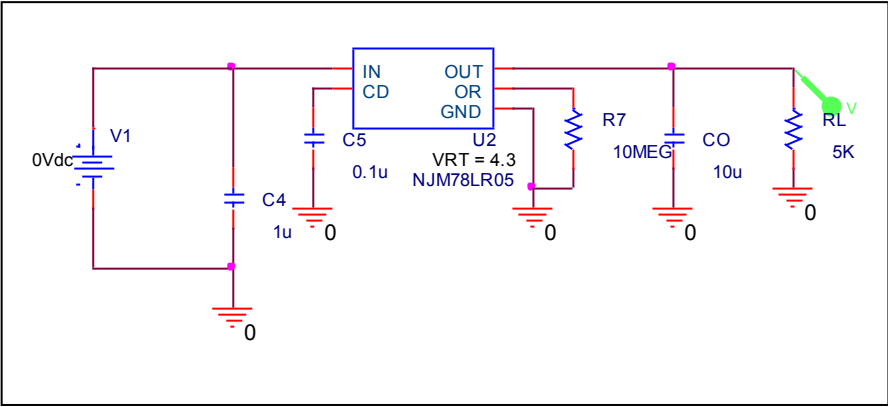
| PSpice model parameter | Model description                                 |
|------------------------|---------------------------------------------------|
| VREF                   | Reference Voltage                                 |
| N                      | Emission Coefficient                              |
| BETA                   | Transconductance of JFET Transistor               |
| VAF                    | Early Voltage of Output Pass Transistor           |
| CPZ                    | Output Impedance Zero Capacitor                   |
| RB2                    | Base Resistance of Output Limit Voltage Source    |
| ESC1                   | Coefficient of Current Limit Voltage Source       |
| ESC2                   | Coefficient of Current Limit Voltage Source       |
| EFB1                   | Coefficient of Foldback Current Voltage Source    |
| EFB2                   | Coefficient of Foldback Current Voltage Source    |
| EFB3                   | Coefficient of Foldback Current Voltage Source    |
| EB                     | Non-ideal Base-Collector Diode Saturation Current |

# Dropout Voltage Characteristics

Circuit Simulation result



Evaluation circuit

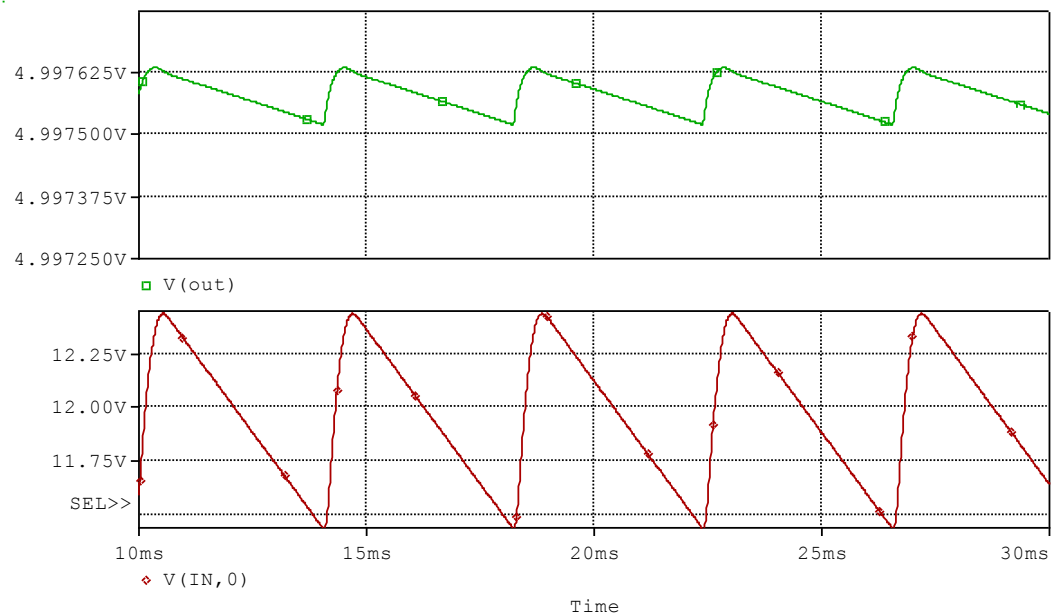


Simulation Result

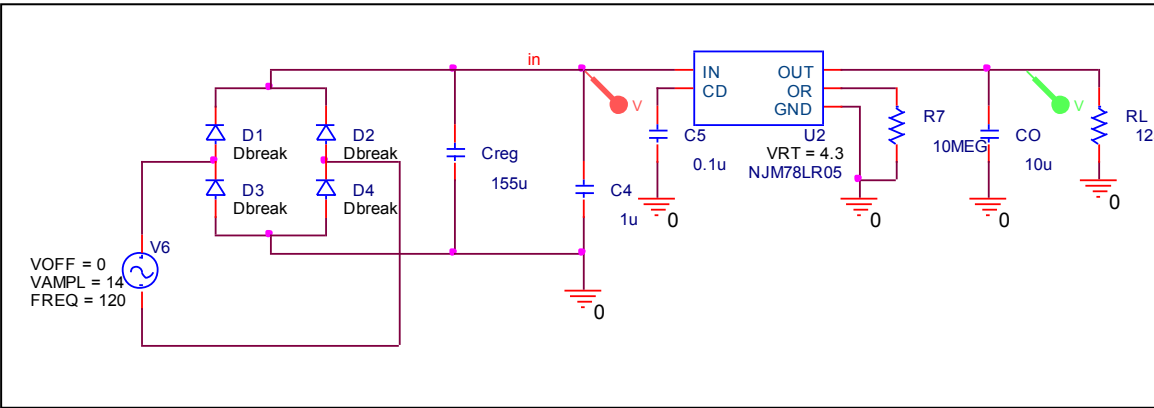
| Condition: I <sub>O</sub> =1mA | Measurement |   | Simulation |   | Error (%) |
|--------------------------------|-------------|---|------------|---|-----------|
| $\Delta V_{I-O}$               | 1.500       | V | 1.509      | V | 0.600     |

# Ripple Rejection (R•R) Characteristic

## Circuit Simulation result



## Evaluation circuit



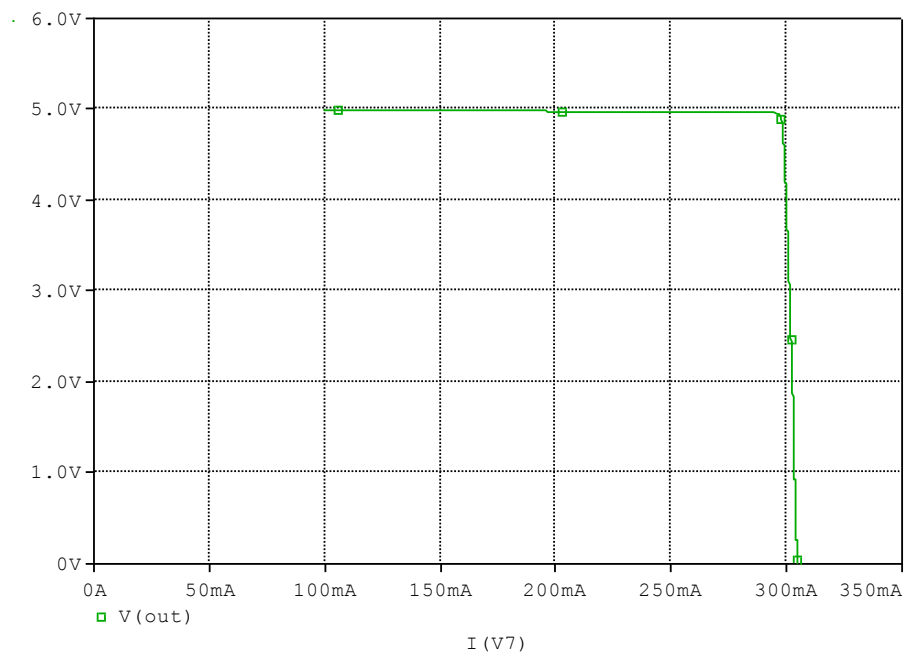
## Simulation Result

Condition:  $f=120\text{Hz}$ ,  $e_{in}=1\text{V}$ ,  $V_{in}=8$  to  $18\text{V}$

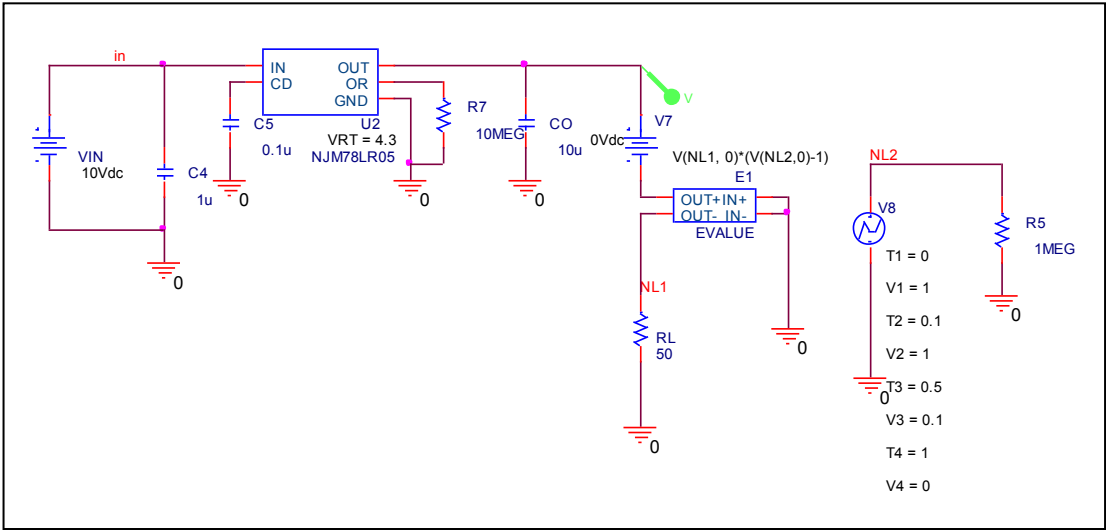
|            | Measurement  |           | Simulation   |           | Error (%)    |
|------------|--------------|-----------|--------------|-----------|--------------|
| <b>R•R</b> | <b>79.00</b> | <b>dB</b> | <b>78.86</b> | <b>dB</b> | <b>-0.18</b> |

# Output Voltage vs. Output Current Characteristics

Circuit Simulation result



Evaluation circuit

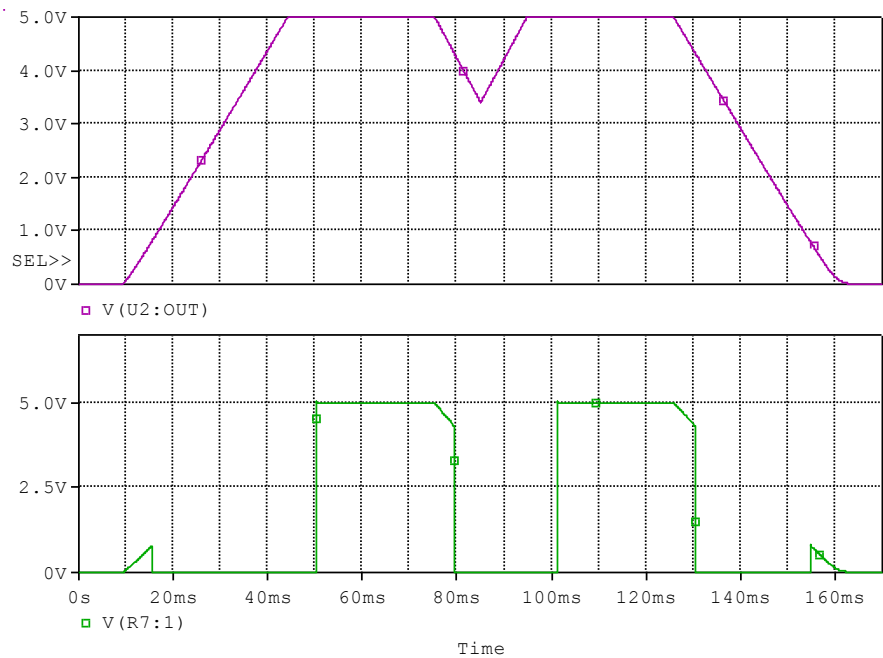


Simulation Result

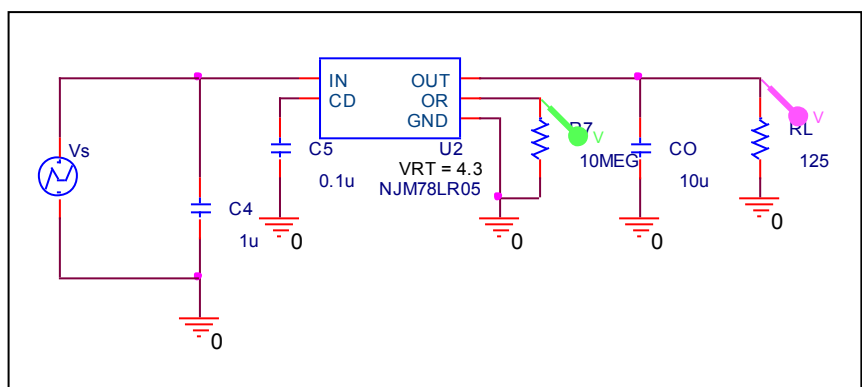
| Condition: $I_{IN}=10V$ | Measurement |    | Simulation |    | Error (%) |
|-------------------------|-------------|----|------------|----|-----------|
| $I_{osc}$               | 300.000     | mA | 304.514    | mA | 1.505     |

# Reset Output Voltage (Timing Chart Simulation)

## Circuit Simulation result



## Evaluation circuit



## Simulation Result

| Condition:<br>Cd=0.1uF | Measurement |           | Simulation |    | Error (%) |
|------------------------|-------------|-----------|------------|----|-----------|
|                        | td          | 10.000 ms | 10.019 ms  | ms |           |
|                        |             |           |            |    | 0.190     |