

Device Modeling Report

COMPONENTS: ZENER DIODE /PROFESSIONAL
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MANUFACTURER: PANASONIC

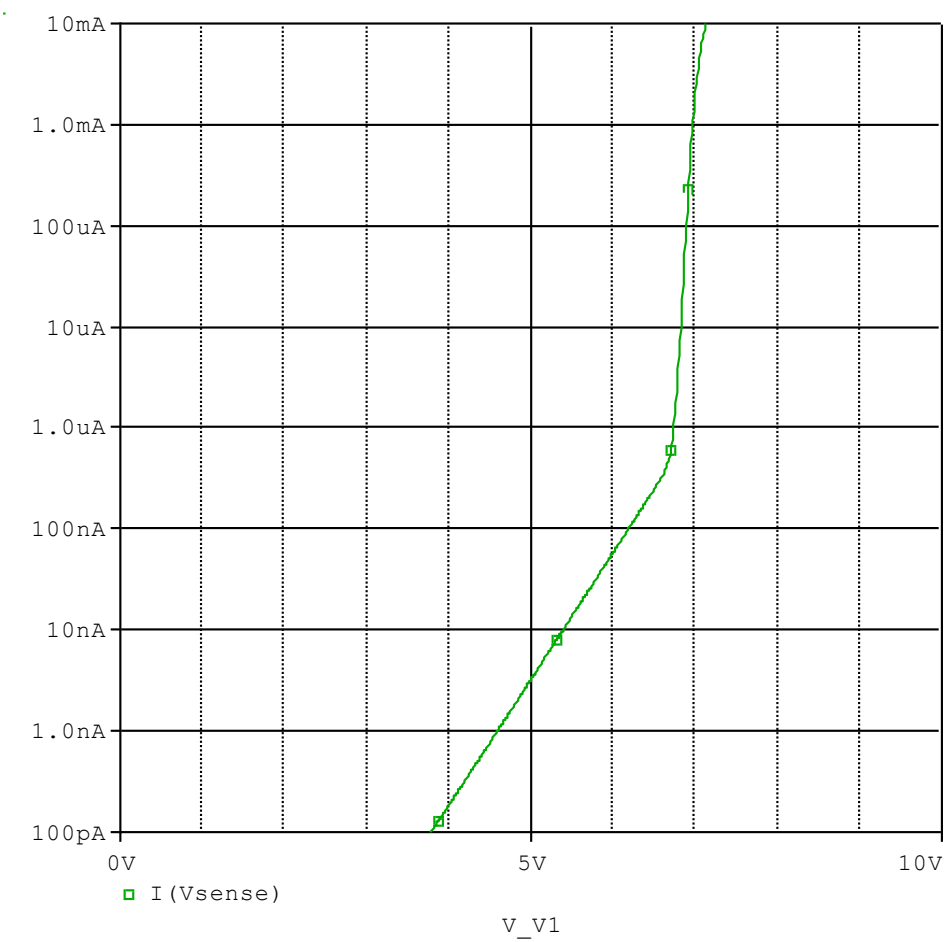


Bee Technologies Inc.

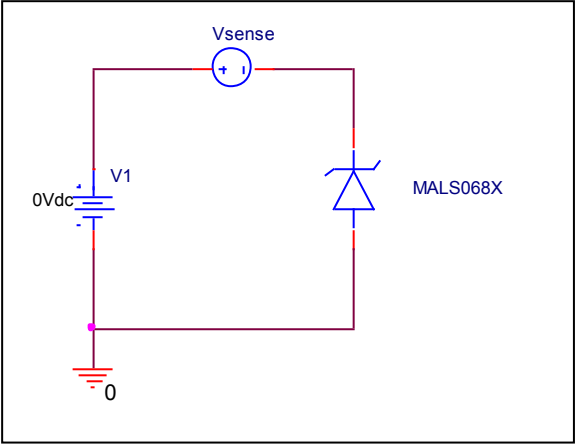
PSpice model parameter	Model description
IS	Saturation Current
N	Emission Coefficient
RS	Series Resistance
IKF	High-injection Knee Current
CJO	Zero-bias Junction Capacitance
M	Junction Grading Coefficient
VJ	Junction Potential
ISR	Recombination Current Saturation Value
BV	Reverse Breakdown Voltage(a positive value)
IBV	Reverse Breakdown Current(a positive value)
TT	Transit Time
EG	Energy-band Gap

Reverse Characteristic

Circuit Simulation Result

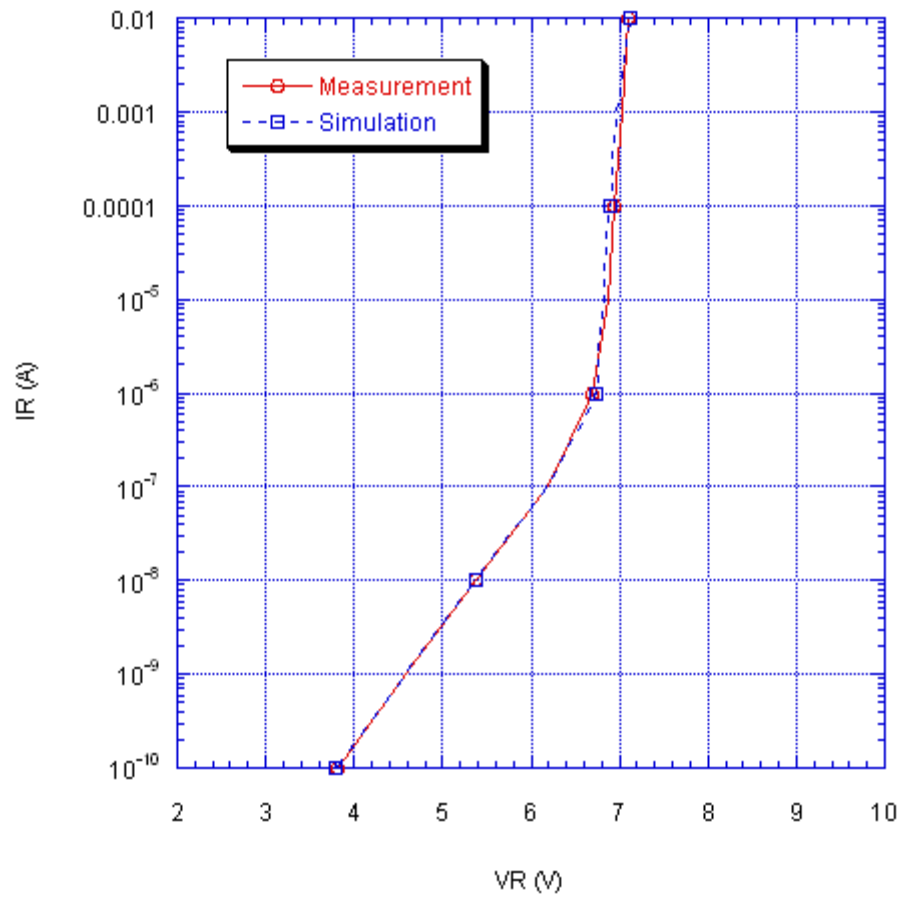


Evaluation circuit



Comparison Graph

Circuit Simulation Result

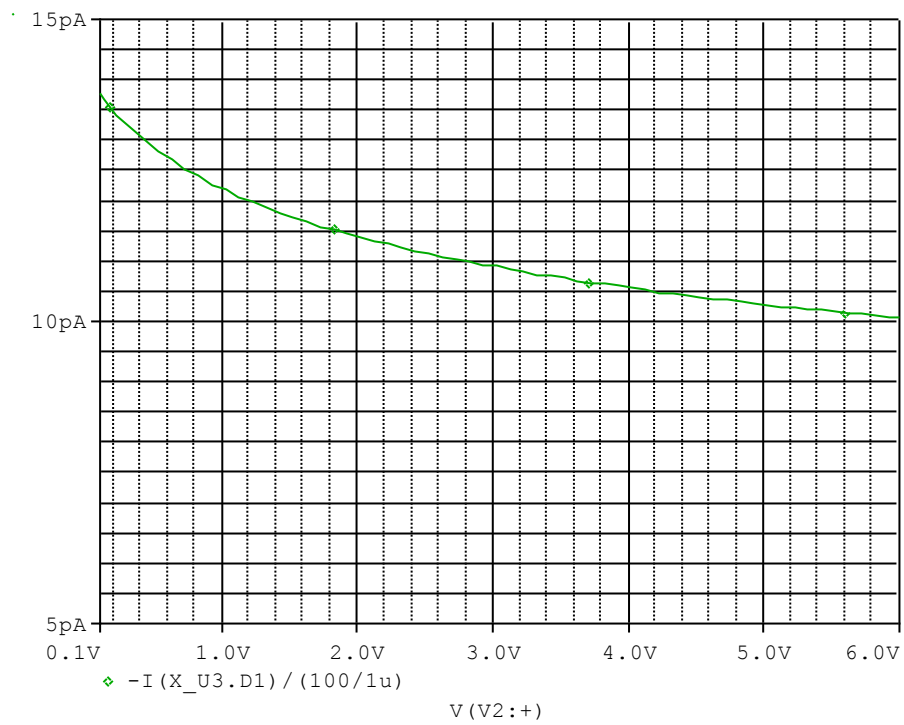


Simulation Result

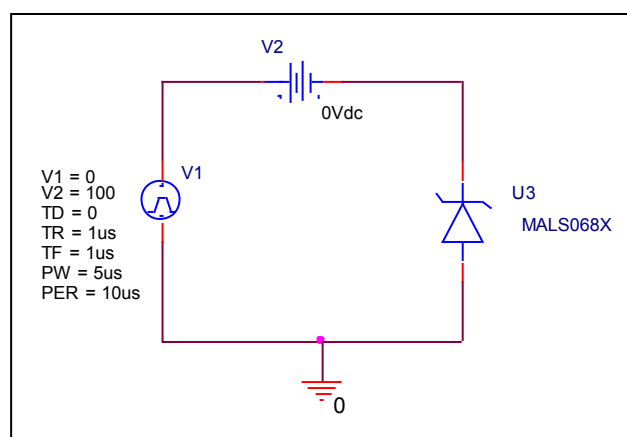
IR(mA)	VR(V)		Error (%)
	Measurement	Simulation	
100p	3.810	3.781	-0.761
1n	4.580	4.590	0.218
10n	5.370	5.388	0.335
100n	6.200	6.184	-0.258
1u	6.685	6.735	0.748
10u	6.870	6.820	-0.728
100u	6.950	6.890	-0.863
1m	7.020	6.967	-0.755
10m	7.100	7.128	0.394

Junction Capacitance Characteristic

Circuit Simulation Result

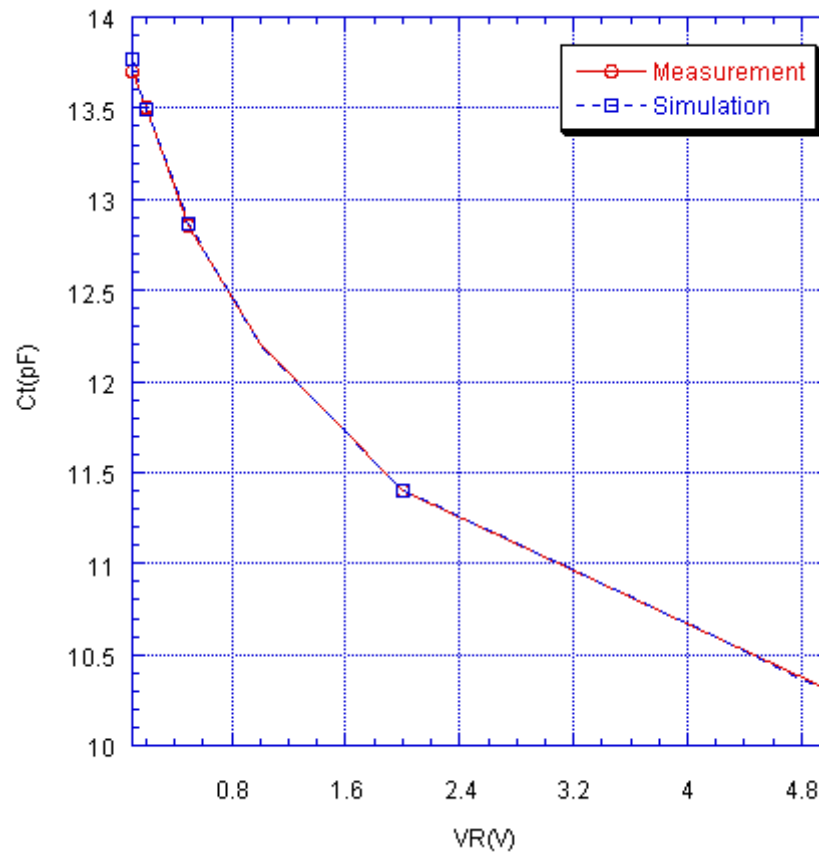


Evaluation circuit



Comparison Graph

Circuit Simulation Result

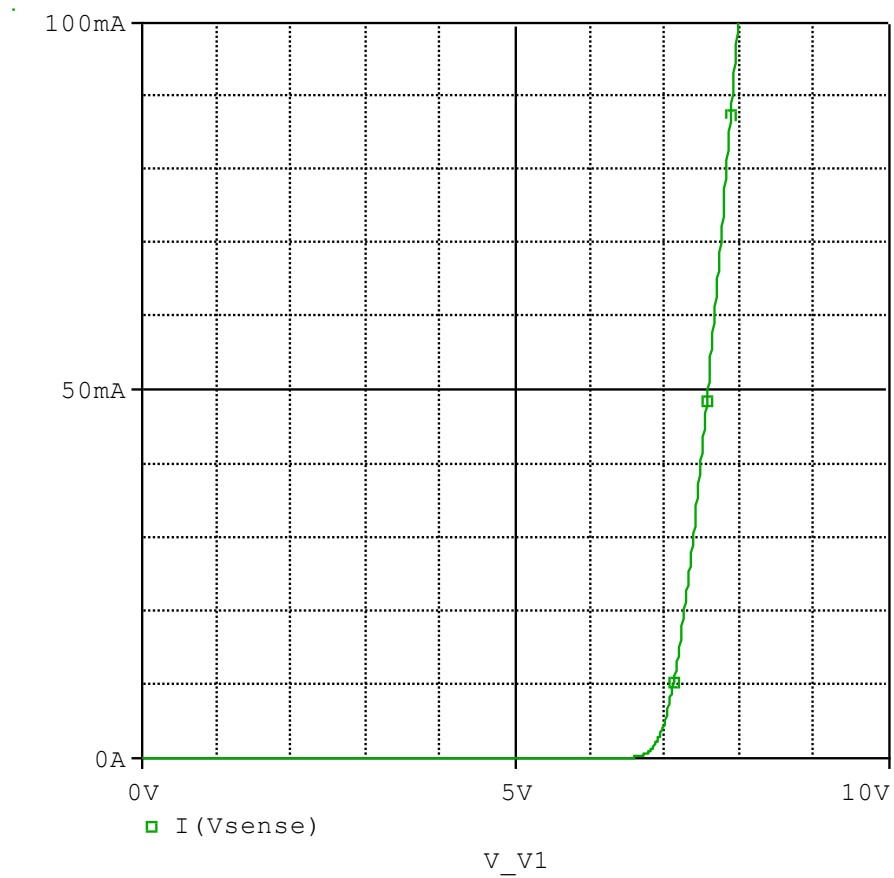


Simulation Result

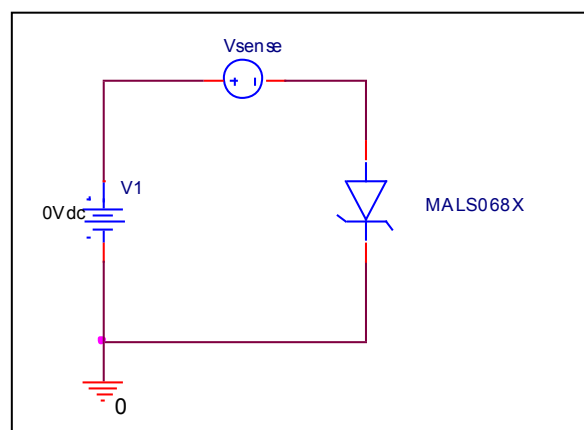
VR(V)	Ct(pF)		Error (%)
	Measurement	Simulation	
0.100	13.700	13.770	0.511
0.200	13.500	13.491	-0.067
0.500	12.850	12.870	0.156
1.000	12.200	12.197	-0.025
2.000	11.400	11.402	0.018
5.000	10.300	10.284	-0.155

Forward Characteristic

Circuit Simulation Result

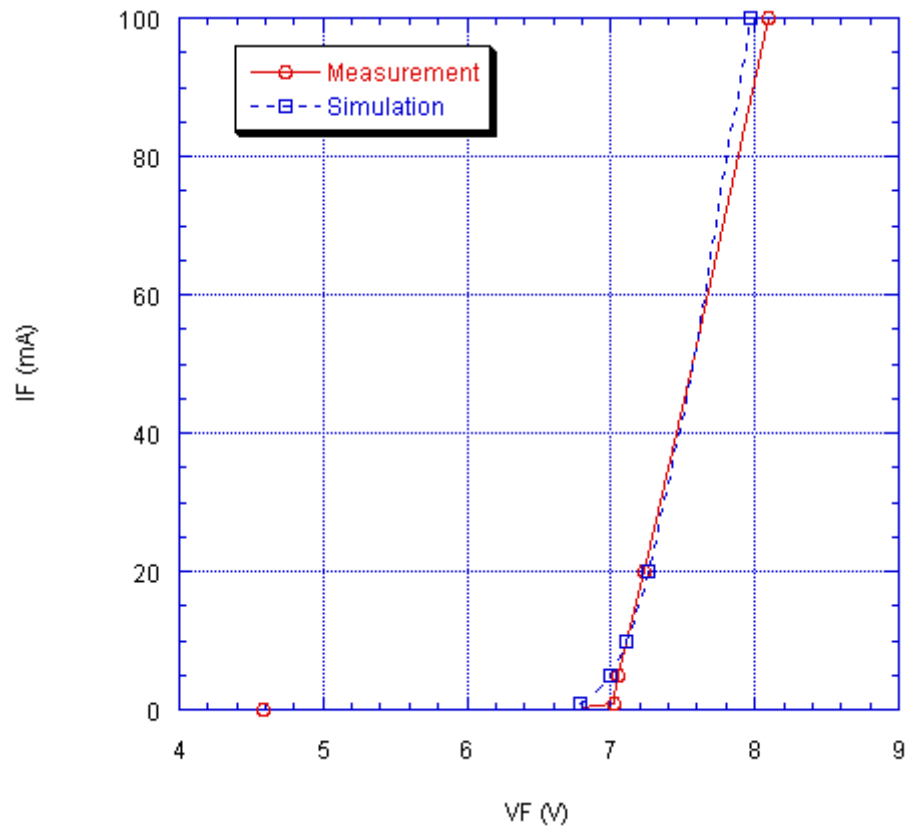


Evaluation circuit



Comparison Graph

Circuit Simulation Result

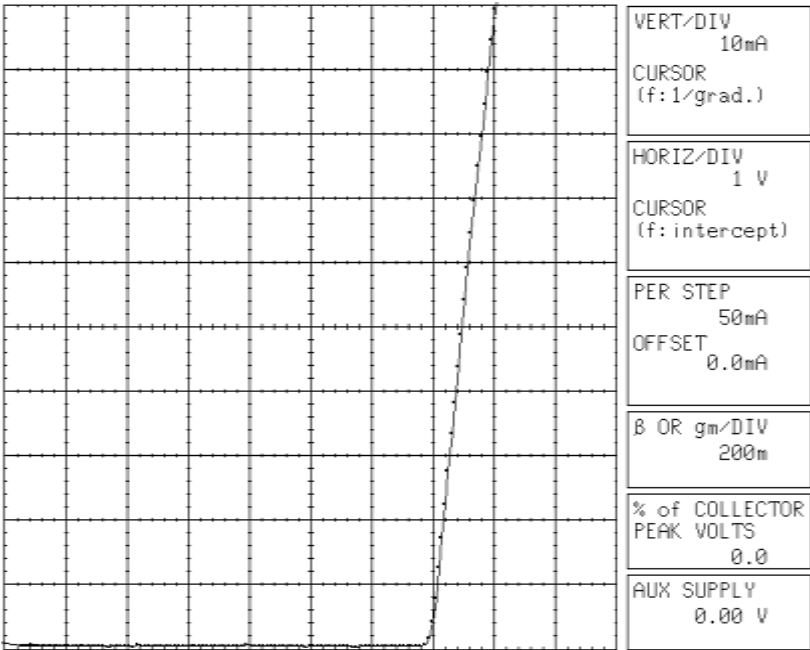


Simulation Result

IF(mA)	VF(V)		Error (%)
	Measurement	Simulation	
1.000	7.020	6.788	-3.305
2.000	7.028	6.870	-2.248
5.000	7.050	6.992	-0.823
10.000	7.100	7.105	0.070
20.000	7.230	7.255	0.346
50.000	7.560	7.569	0.119
100.000	8.090	7.970	-1.483

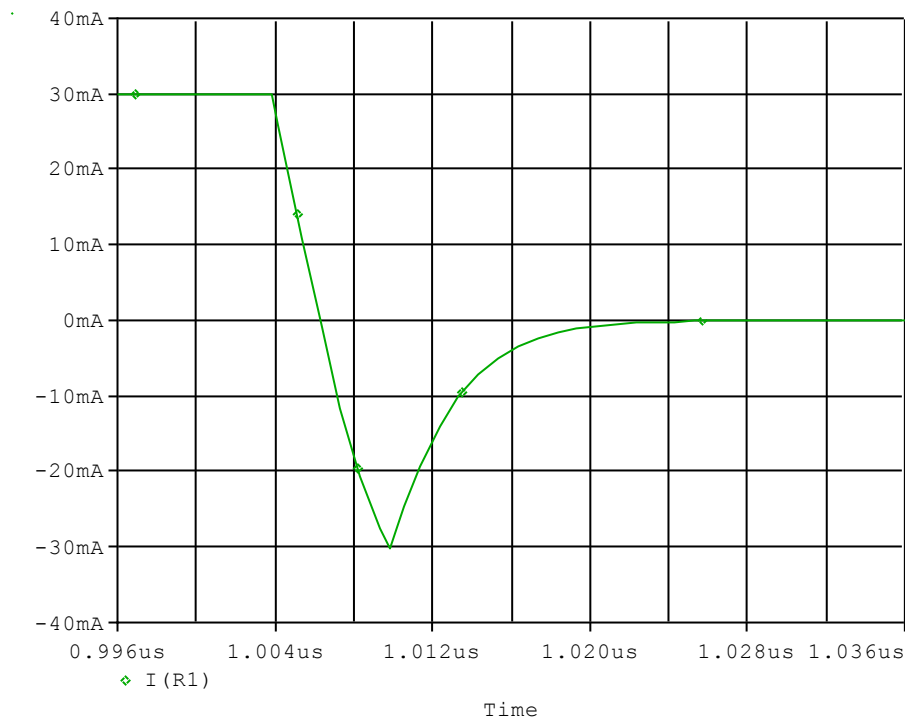
Forward Characteristic

Reference

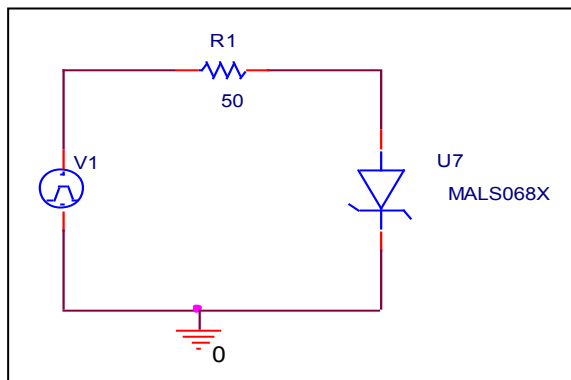


Reverse Recovery Characteristic

Circuit Simulation Result



valuation circuit

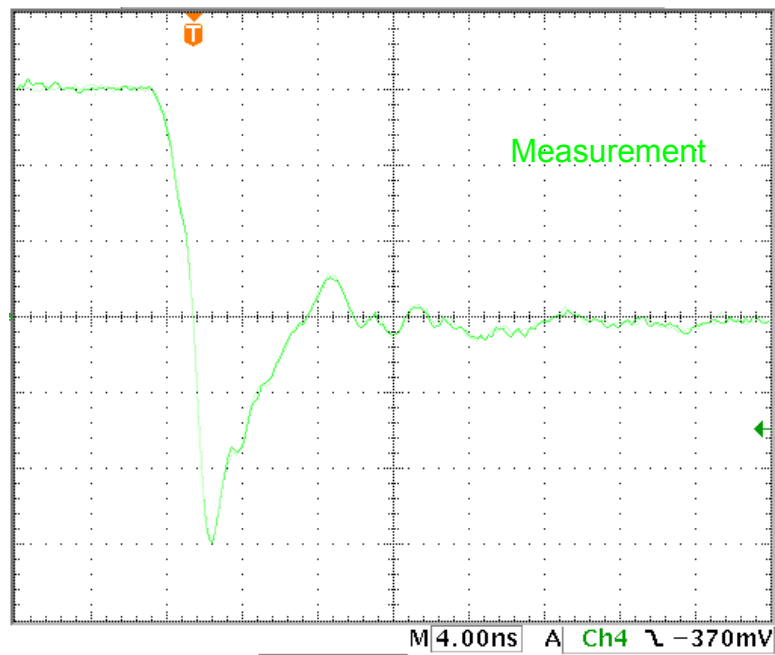


Compare
Measurement vs. Simulation

Trr	Measurement		Simulation		Error(%)
Trj+Trb	10.200	ns	10.193	ns	-0.069

Reverse Recovery Characteristic

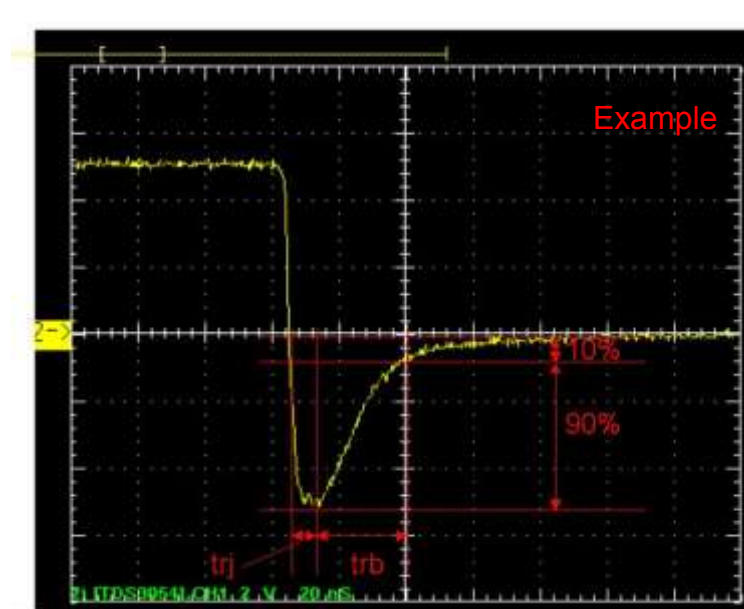
Reference



$t_{rj}=1.2(\text{ns})$

$t_{rb}=9.0(\text{ns})$

Conditions: $I_{fwd}=I_{rev}=0.03(\text{A})$, $R_I=50$



Relation between t_{rj} and t_{rb}