DESCRIPTION

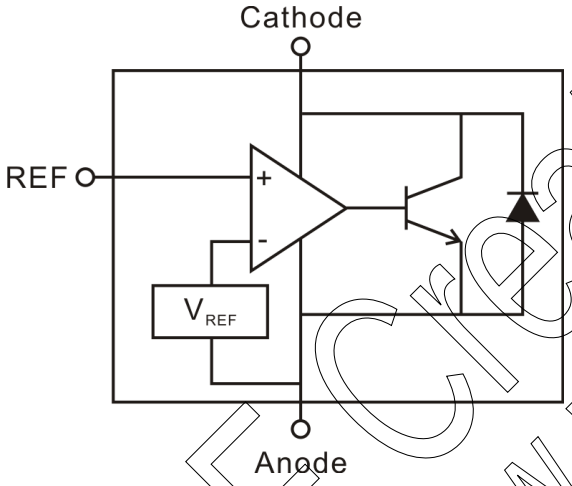
The RS431 series are three-terminal adjustable regulators with guaranteed thermal stability over applicable temperature ranges. The output voltage may be set to any value between V_{REF} (approximately 2.5V) and 36V with two external resistors. These devices have a typical dynamic output impedance of 0.2Ω. Active output circuitry provides a very sharp turn-on characteristic, making these devices excellent replacement for zener diodes in many applications.

FEATURES

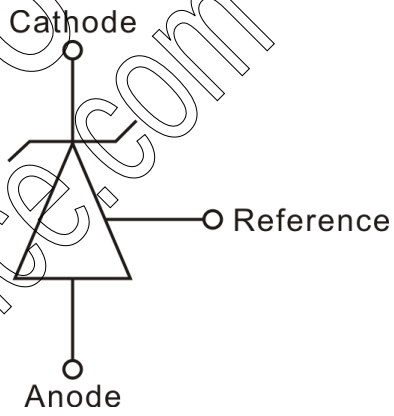
- Programmable Precise Output Voltage from 2.5V to 36V
- High Stability under Capacitive Load
- Low Temperature Deviation: 4.5mV Typical
- Low Dynamic Output Resistance: 0.2Ω Typical
- Sink Current Capacity from 1mA to 100mA
- Low Output Noise
- Wide Operating Range of -40 to 125℃
- Low Equivalent Full-range Temperature Coefficient with 20PPM/℃ Typical

BLOCK DIAGRAM

Functional Block Diagram



Symbol



APPLICATION CIRCUIT

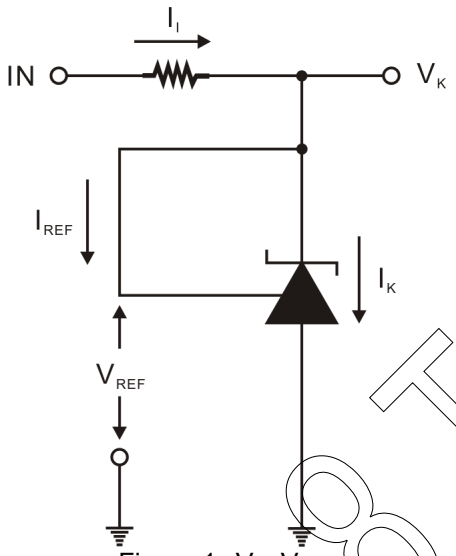


Figure 1. $V_K=V_{REF}$

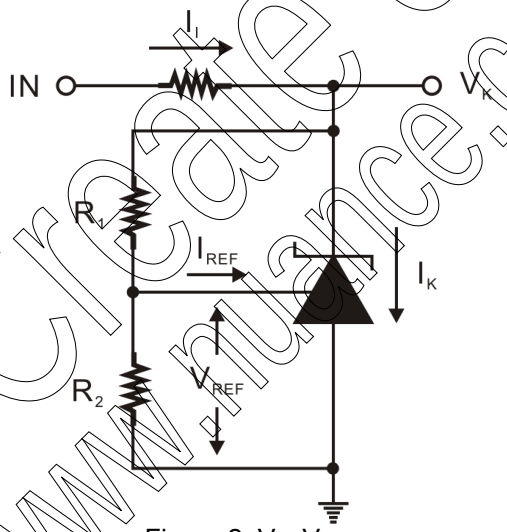


Figure 2. $V_K>V_{REF}$

Note: $V_K=V_{REF}(1+R_1/R_2)+I_{REF}\times R_1$

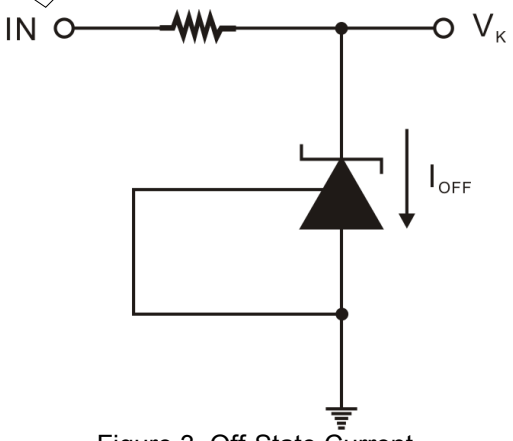


Figure 3. Off-State Current

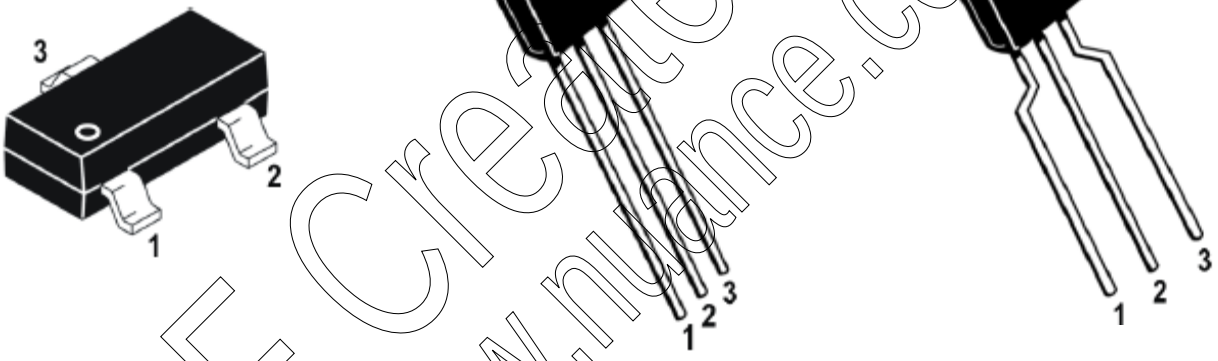
ORDER INFORMATION

Device	Device Code
RS431 X YY Z	**X is Reference voltage precision designator:** A: 2.5V±0.4% B: 2.5V±0.8% **YY is package designator:** A: TO-92 (Straight lead option) AT: TO-92 (Formed lead option) N: SOT-23 **Z is Lead Free designator:** P: Commercial Standard, Lead (Pb) Free and Phosphorous (P) Free Package G: Green (Halogen Free with Commercial Standard)

PIN ASSIGNMENTS

SOT-23 T ***O-92*** ***TO-92***

(STRAIGHT LEAD OPTION) (FORMED LEAD OPTION)



PIN DESCRIPTION

Package	Pin No.	Description
SOT-23	1	Reference
	2	Cathode
	3	Anode
TO-92	1	Reference
	2	Anode
	3	Cathode

ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

Parameter	Symbol	Ratings		Unit
Cathode voltage	V_{KA}	40		V
Cathode current range (Continuous)	I_K	-100 ~ +150		mA
Reference input current range	I_{REF}	0.05 ~ +10		mA
Power dissipation	P_D	SOT-23 370		mW
		TO-92	770	
Operating temperature range (Max.)	T_{OPR}	-40 ~ +125		℃
Storage temperature range	T_{STG}	-40 ~ +150		℃

OPERATING CONDITIONS

Parameter	Symbol	Min.	Max.	Unit
Cathode voltage	V_{KA}	V_{REF} 36		V
Cathode current range (Continuous)	I_K 1		100	mA
Operating ambient temperature range	T_{OPR} -40		125	℃

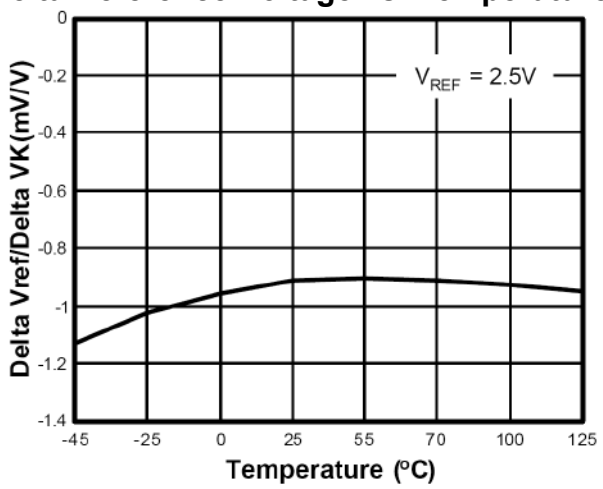
ELECTRICAL CHARACTERISTICS

(T_A=25℃, unless otherwise specified)

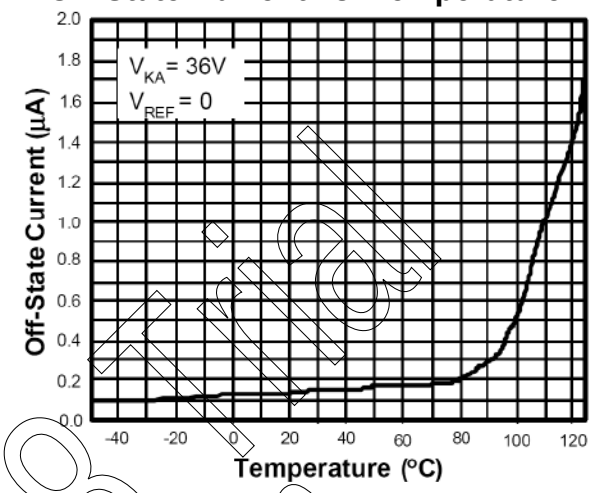
Characteristics		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Reference input voltage (Figure 1)	2.5V±0.4%	V_{REF}	V_K=V_{REF}, I_K=10mA	2.49	2.50	2.51	V
	2.5V±0.8%	2.48			2.50	2.52	
Deviation of reference input voltage over-temperature (Figure 1)		$V_{REF(dev)}$	V_K=V_{REF}, I_K=10mA T_{MIN}≤T_A≤T_{MAX} (-40~+125℃)	-	4.5	16	mV
Ratio of change in reference input voltage to the change in cathode voltage (Figure 2)		$\Delta V_{REF}/\Delta V_K$	I_K=10mA, ΔV_K=10V~V_{REF}	-	1.0	2.7	mV/V
			I_K=10mA, ΔV_K=36V~10V	-	0.5	2.0	
Reference input current (Figure 2)		I_{REF}	I_K=10mA, R1=10KΩ, R2=∞	-	0.7	4	
Deviation of reference input current over full temperature range (Figure 2)		$I_{REF(dev)}$	I_K=10mA, R1=10KΩ R2=∞, T_A=-40~+125℃	-	0.4	1.2	μA
Minimum cathode current for regulation (Figure 1)		$I_{K(min)}$	V_K=V_{REF}	-	0.4	1.0	mA
Off-state cathode current (Figure 3)		$I_{K(off)}$	V_K=36V, V_{REF}=0	-	0.05	1.0	μA
Dynamic output impedance (Figure 1)		Z_K	V_K=V_{REF}, f≤1KHz, I_K=1~100mA	-	0.15	0.5	Ω

TYPICAL PERFORMANCE CHARACTERISTICS

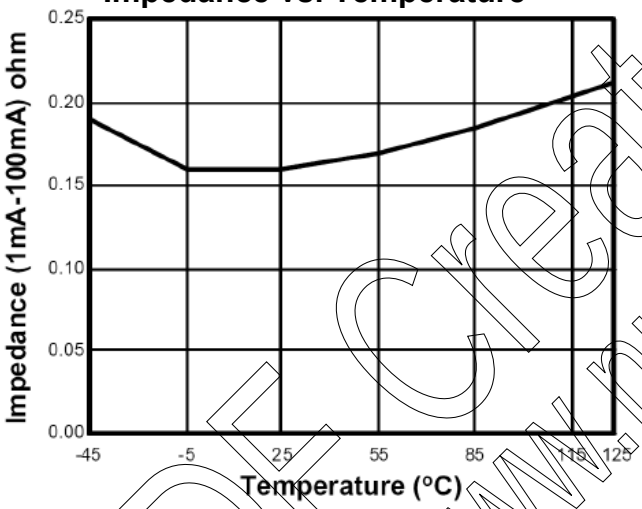
Delta Reference Voltage vs. Temperature



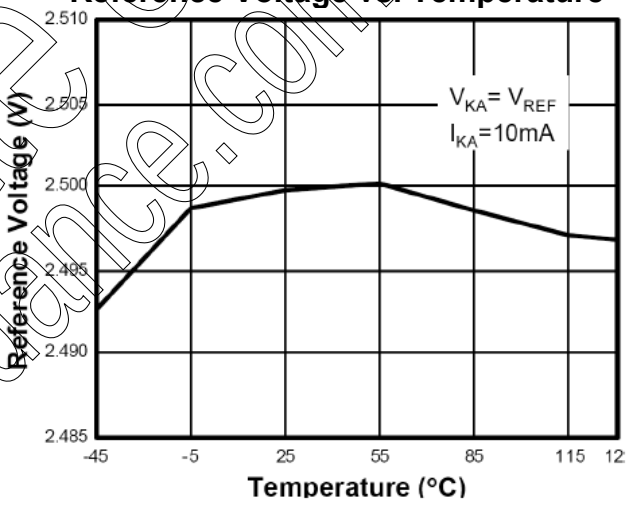
Off-State Current vs. Temperature



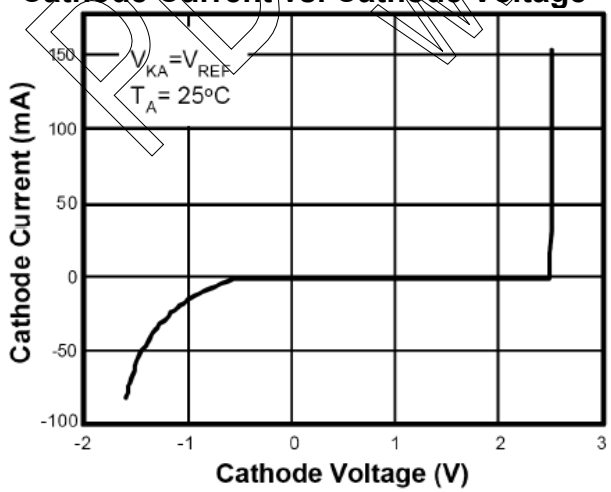
Impedance vs. Temperature



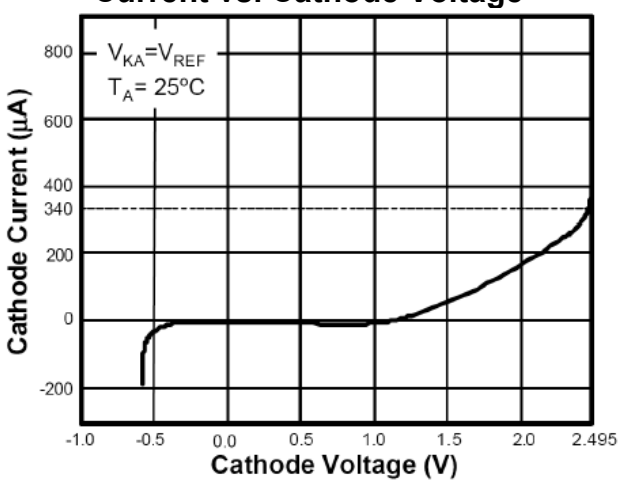
Reference Voltage vs. Temperature



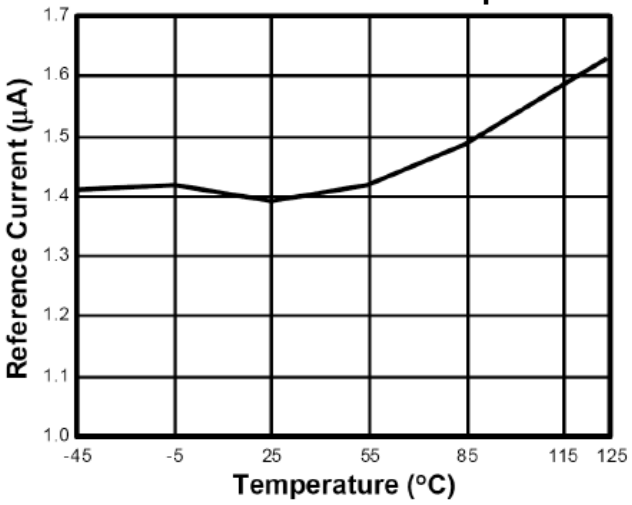
Cathode Current vs. Cathode Voltage



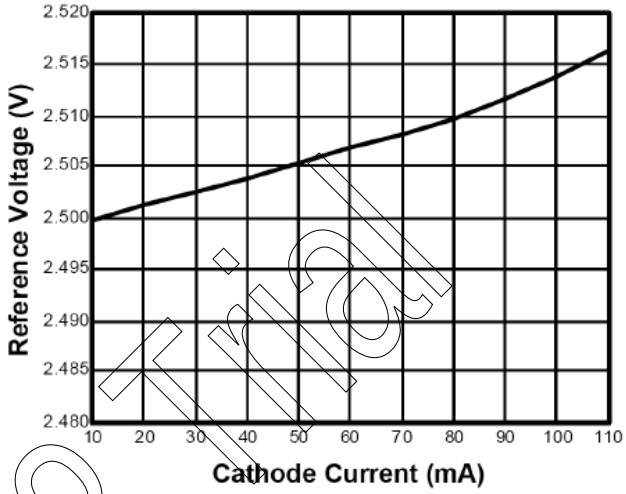
Current vs. Cathode Voltage



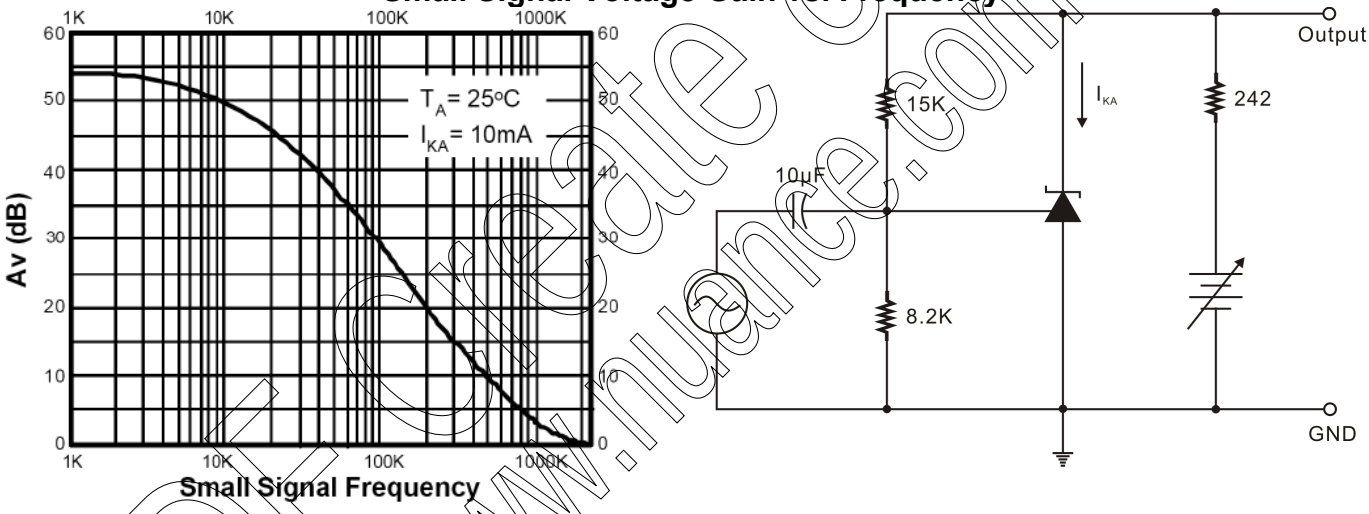
Reference Current vs. Temperature



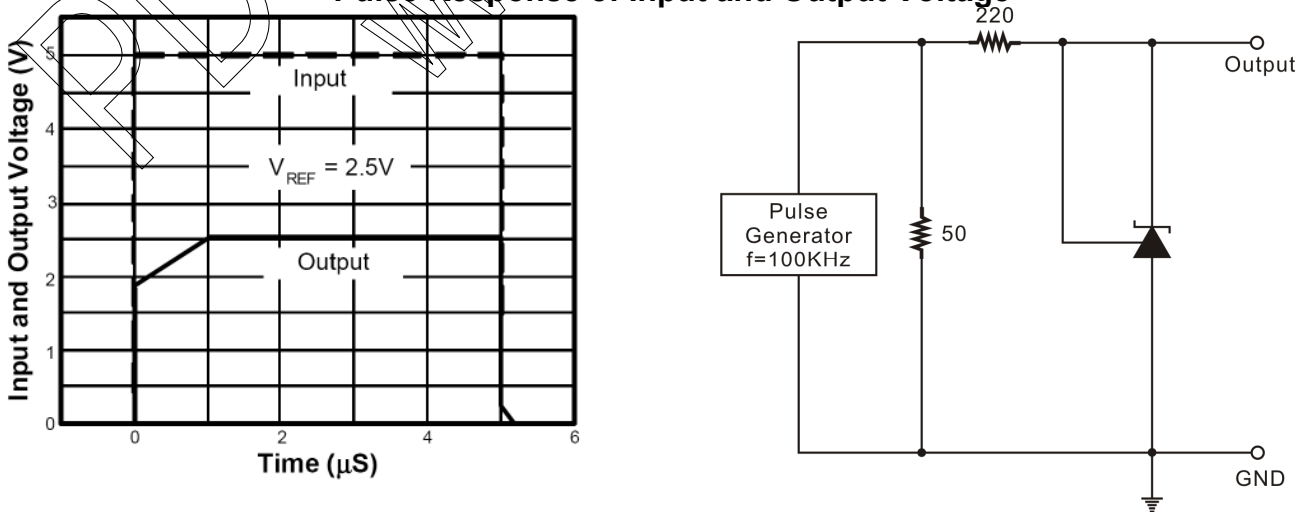
Reference Voltage vs. Cathode Current



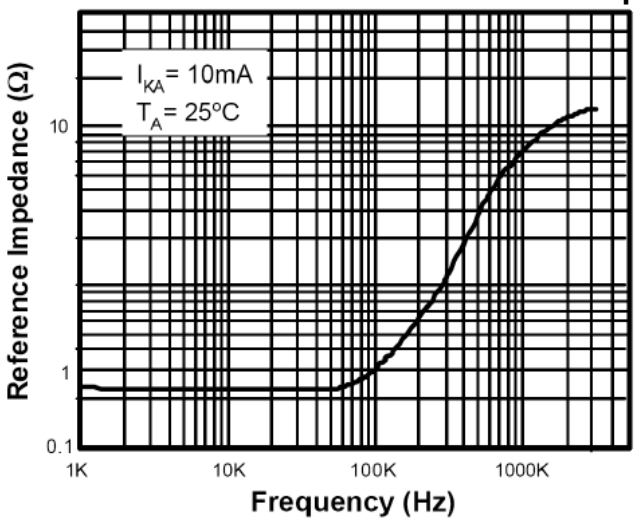
Small Signal Voltage Gain vs. Frequency

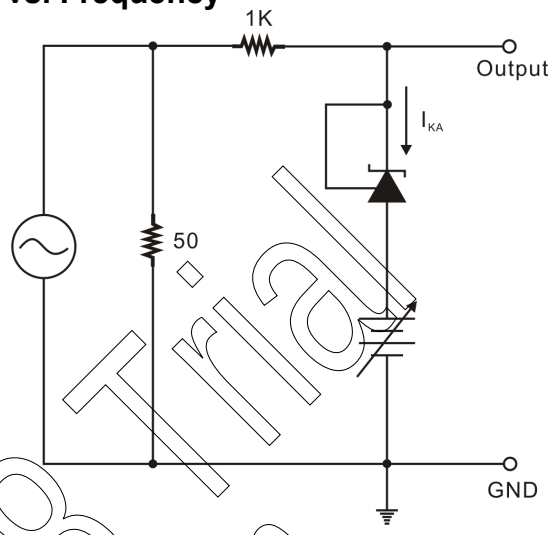


Pulse Response of Input and Output Voltage

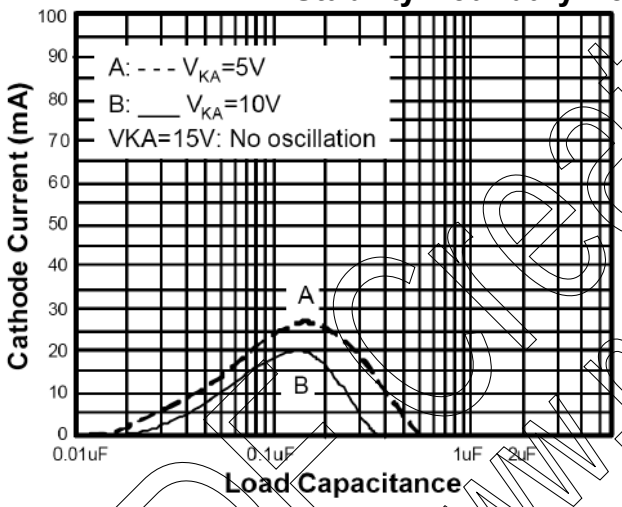


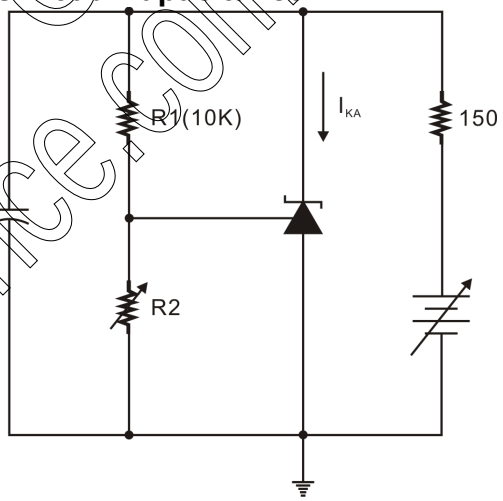
Reference Impedance vs. Frequency





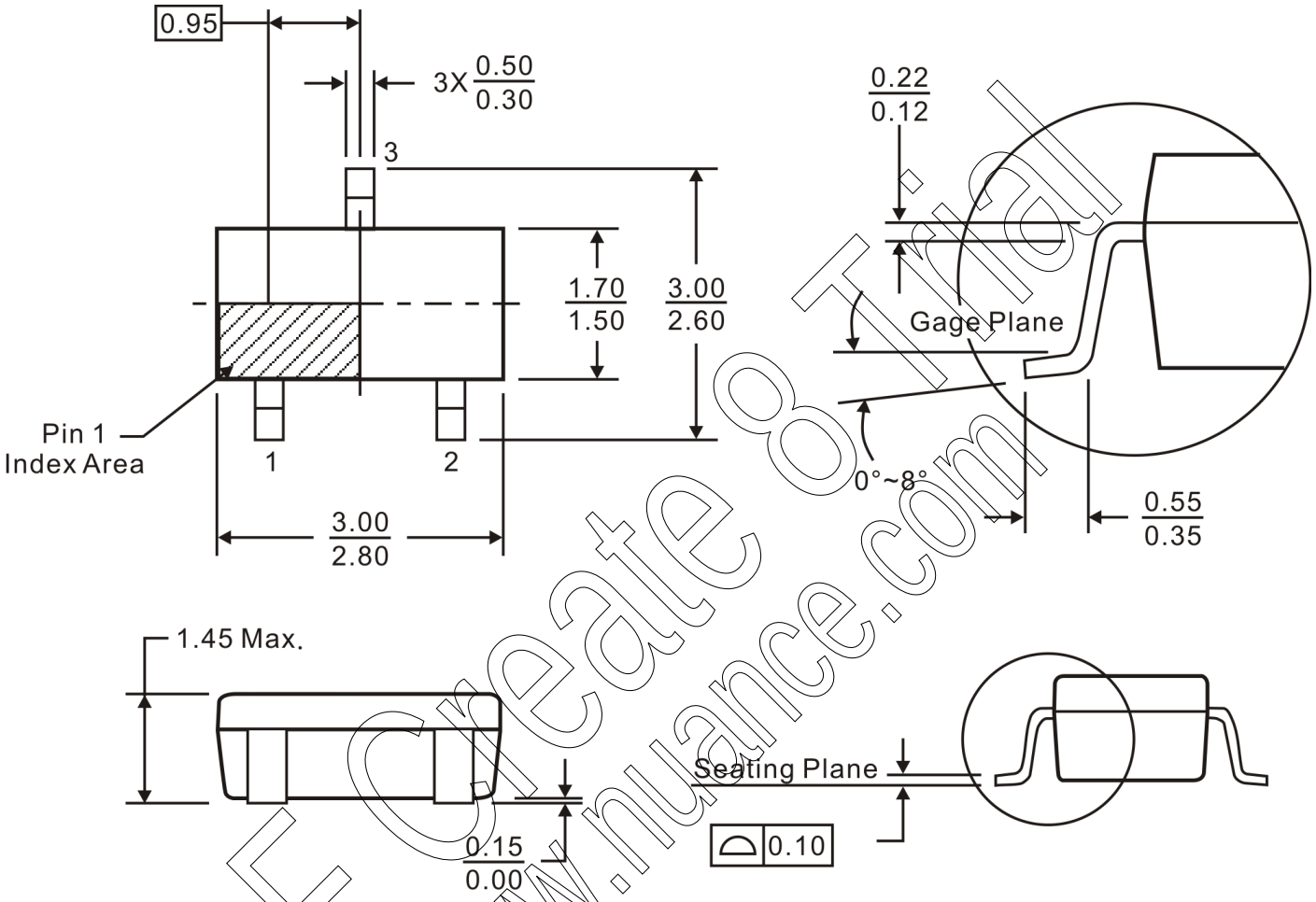
Stability Boundary Conditions vs. Load Capacitance





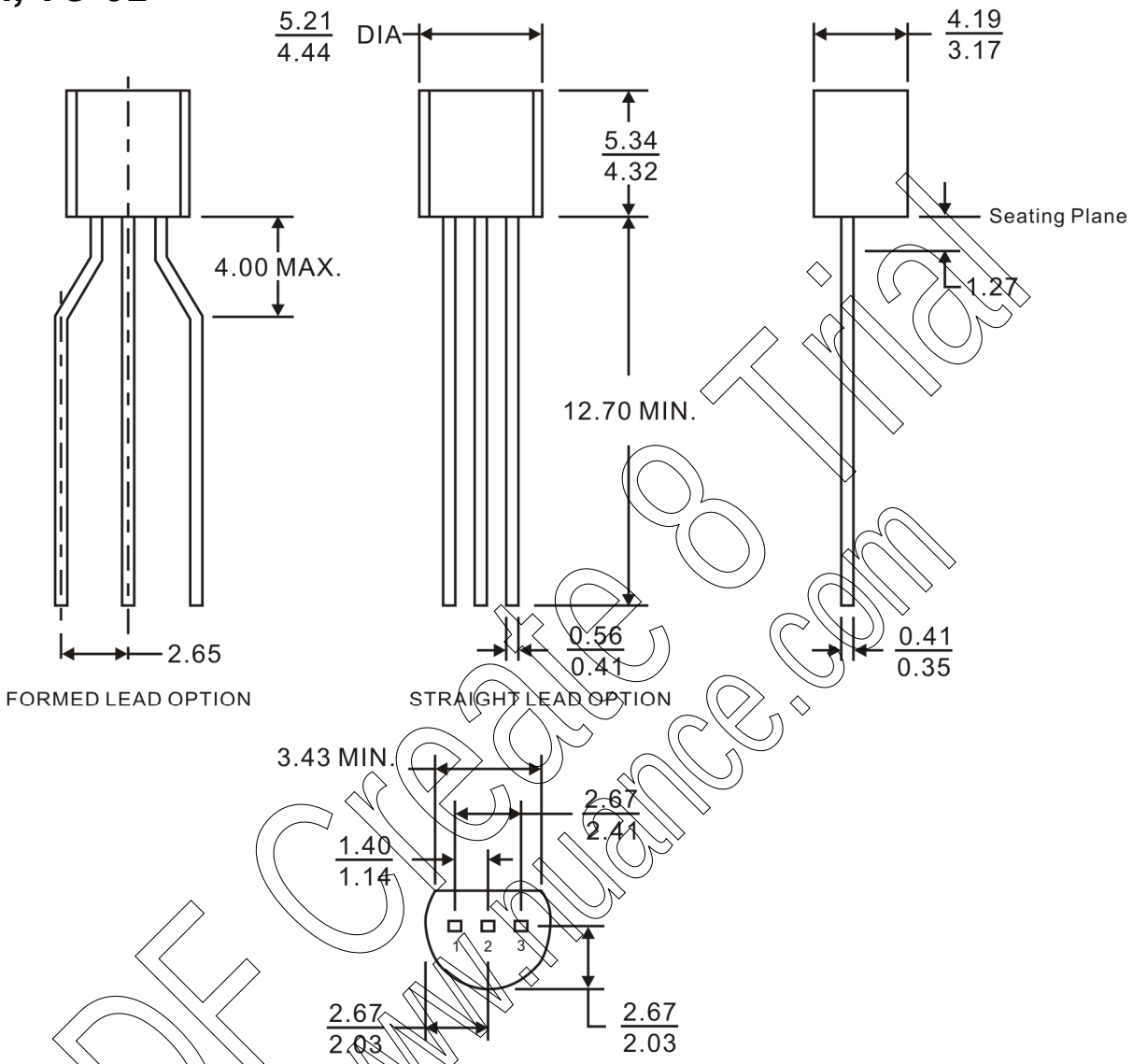
PACKAGE INFORMATION

3-PIN, SOT-23



Note: All dimensions are in millimeter.

3-PIN, TO-92



Notes:
1. Refer to JEDEC TO-226 AA.
2. All dimensions are in millimeter.

IMPORTANT NOTICE

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