TS824-1.2

HIGH THERMAL STABILITY MICROPOWER SHUNT VOLTAGE REFERENCE

- LOW Tc: 50 ppm/°C MAXIMUM
- 1.225V OUTPUT VOLTAGE
- LOW OPERATING CURRENT: 45µA max @ 25°C
- HIGH PRECISION AT 25°C: ±1%
- STABLE WHEN USED WITH CAPACITIVE LOADS
- INDUSTRIAL TEMPERATURE RANGE: -40 to +85°C

L
SOT23-3L
(Plastic Micropackage)

DESCRIPTION

The TS824 is a low power shunt voltage reference featuring a very low temperature coefficient of 50ppm/°C as a maximum value. Providing 1.225V output voltage, the TS824 operates over the industrial temperature range (-40 to +85°C). Ideal for battery-powered equipments where power conservation is critical, the TS824 is housed in a tiny SOT23-3 package allowing space saving.

The TS824 is typically stable with any capacitive loads within the entire temperature range. The product is thus easy to use and the design simplified.

APPLICATION

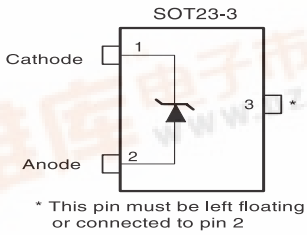
- Instrumentation,
- Data acquisition systems,
- Portable, Battery powered equipments
- Power management

ORDER CODE

Voltage	Precision	SOT23-3	SOT23 Marking
1.225V	1%	TS824ILT-1.2	L251
Single temperature range: -40 to +85°C			

LT = Tiny Package (SOT23-3) - only available in Tape & Reel (LT)

PIN CONNECTIONS (top view)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
I_K	Reverse Breakdown Current	20	mA
I_F	Forward Current	10	mA
P_D	Power Dissipation (note 1) SOT23-3	360	mW
T_{Std}	Storage Temperature	-65 to +150	°C
TJ	Junction Temperature	+150	°C
T_{Lead}	Lead Temperature (soldering, 10 seconds)	+260	°C
ESD	Human Body Model (HBM) (note 2)	2	kV
	Machine Model (MM) (note 2)	200	V

Note 1: The maximum power dissipation must be derated at high temperature. It can be calculated using T_{JMAX} (maximum junction temperature), R_{THJA} (Thermal resistance junction to ambient) and T_A (Ambient temperature). The maximum power dissipation formula at any temperature is $P_{DMAX} = (T_{JMAX} - T_A) / R_{THJA}$. R_{THJA} is 340°C/W for the SOT23-3 package.

Note 2: The Human Body Model (HBM) is defined as a 100pF capacitor discharge through a 1.5kΩ resistor into each pin. The Machine Mode (MM) is defined as a 200pF capacitor discharge directly into each pins.

OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
I_{min}	Minimum Operating Current	40	µA
I_{max}	Maximum Operating Current	12	mA
T_{oper}	Operating Free Air Temperature Range	-40 to +85	°C

ELECTRICAL CHARACTERISTICS (note 3)

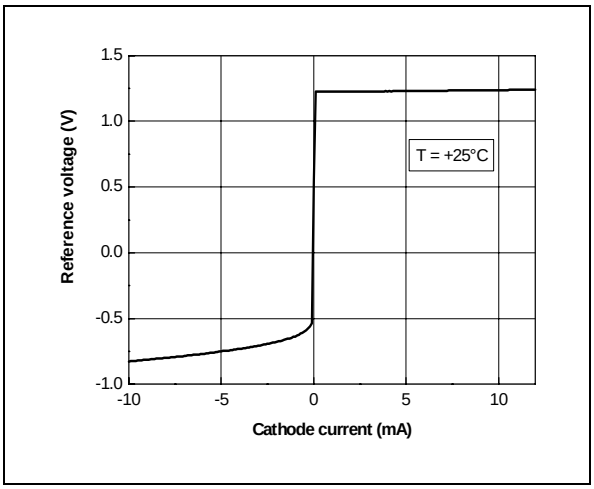
T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_K	Reverse Breakdown Voltage	I_K = 100µA	1.213	1.225	1.237	V
	Reverse Breakdown Voltage Tolerance	I_K = 100µA -40°C < T_{amb} < +85°C	-12 -16		+12 +16	mV
I_{KMIN}	Minimum Operating Current	T_{amb} = 25°C		40	45	µA
		-40°C < T_{amb} < +85°C			50	
$\Delta V_K / \Delta T$	Average Temperature Coefficient (note 4)	I_K = 100µA			50	ppm/°C
$\Delta V_K / \Delta I_K$	Reverse Breakdown Voltage Change with Operating Current Range	I_{KMIN} < I_K < 1mA -40°C < T_{amb} < +85°C		0.3	1 1.5	mV
		1mA < I_K < 12mA -40°C < T_{amb} < +85°C		2.5	8 10	
R_{KA}	Static Impedance	ΔI_K = I_{KMIN} to 1mA -40°C < T_{amb} < +85°C		0.3	1 1.5	Ω
		ΔI_K = 1mA to 12mA -40°C < T_{amb} < +85°C		0.25	0.7 0.9	
K_{VH}	Long Term Stability	I_K = 100µA, t = 1000hrs		120		ppm
E_N	Wide Band Noise	I_K = 100µA 100Hz < f < 10kHz		200		nV/√Hz

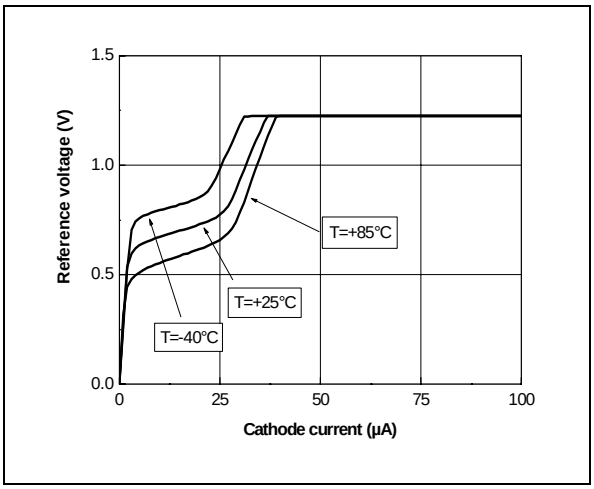
Note 3: Limits are 100% production tested at 25°C. Limits over temperature are guaranteed through correlation and by design.

Note 4: The total tolerance within the industrial range, where the maximum ΔT versus 25°C is 65°C, is explained hereafter:
± 1 % + (± 50 ppm/°C x 65°C) = ± 1.325 %

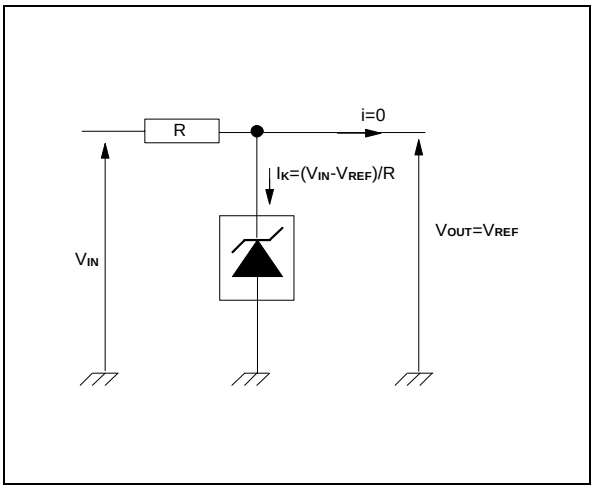
Reference voltage versus cathode current



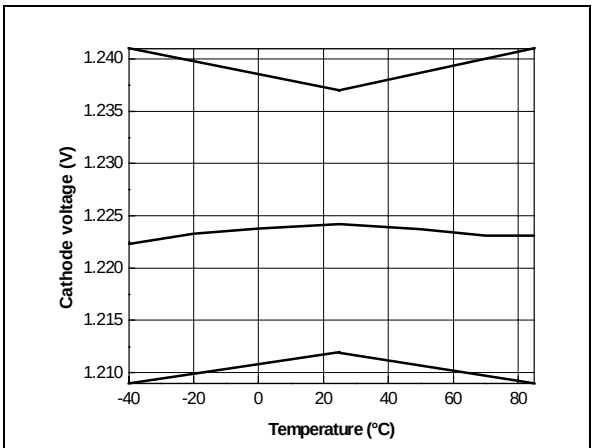
Reference voltage versus cathode current



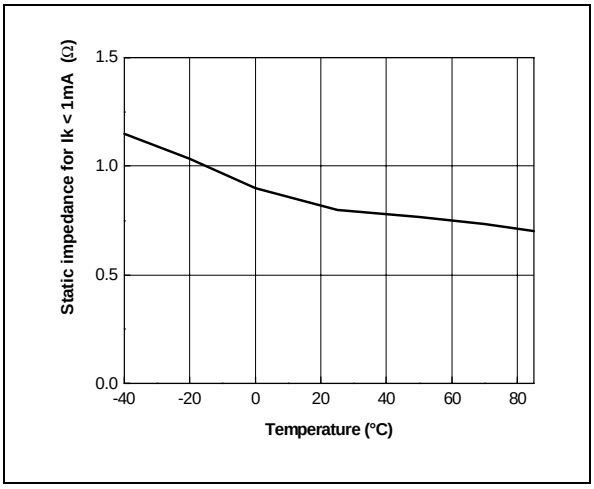
Test circuit



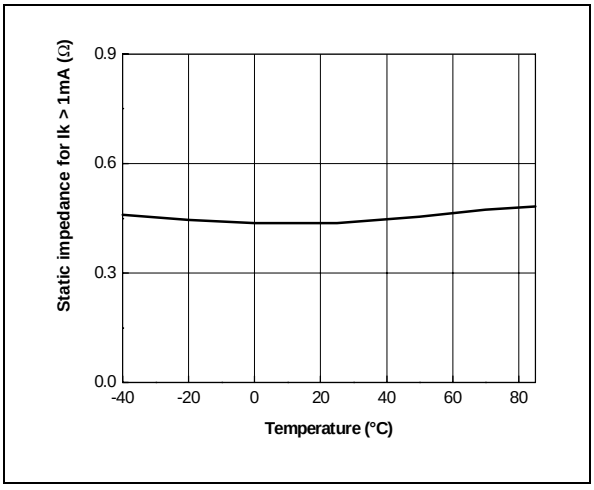
Reference voltage versus Temperature



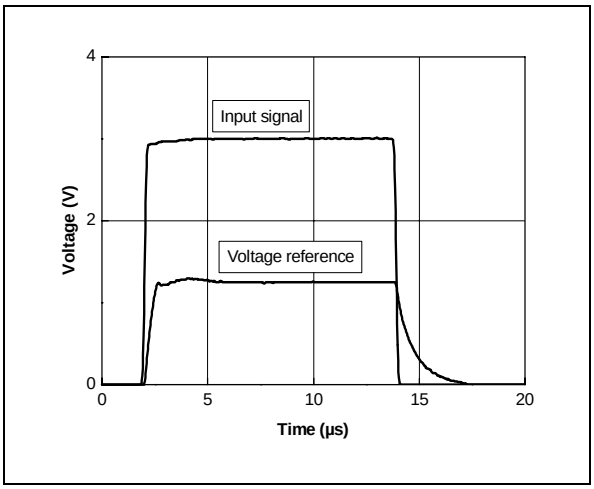
Static impedance for Ik < 1mA



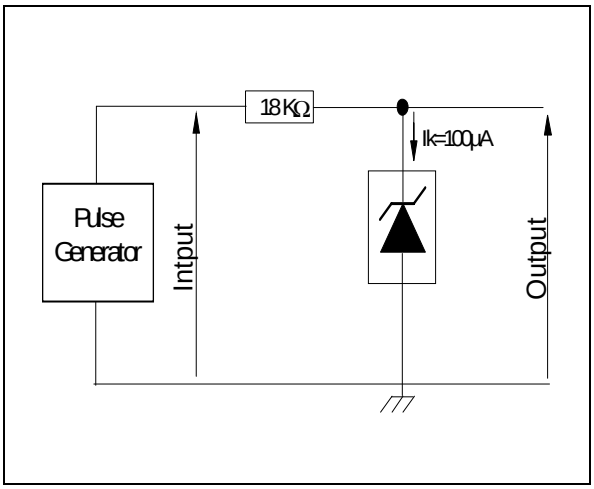
Static impedance for Ik > 1mA



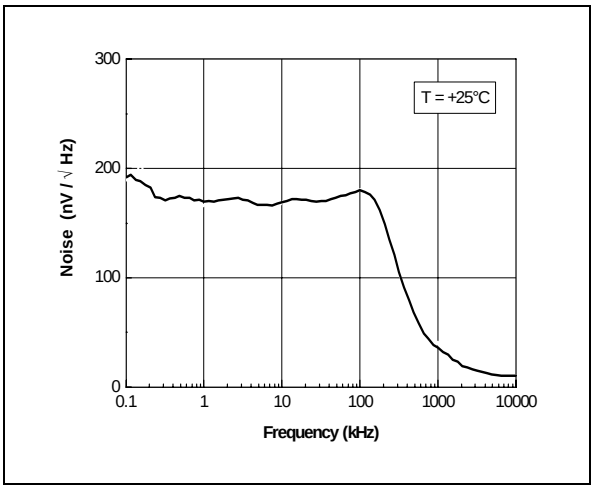
Start-Up characteristics with low Ik (100µA)



Start-Up schematic with low Ik (100µA)

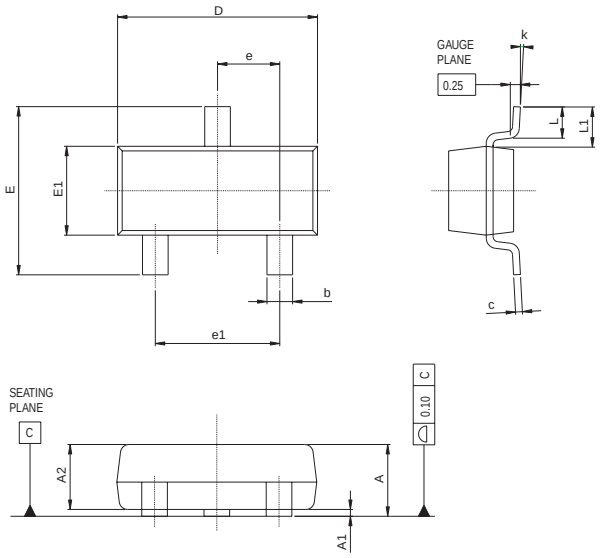


Noise versus frequency



PACKAGE MECHANICAL DATA

3 PINS - TINY PACKAGE (SOT23-3)



Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.890		1.120	0.035		0.044
A1	0.010		0.100	0.0004		0.004
A2	0.880	0.950	1.020		0.037	0.040
b	0.300		0.500	0.012		0.020
c	0.080		0.200	0.003		0.008
D	2.800	2.900	3.040	0.110	0.114	0.120
E	2.100		2.640	0.083		0.104
E1	1.200	1.300	1.400	0.047	0.051	0.055
e		0.950			0.037	
e1		1.900			0.075	
L	0.400	0.500	0.600	0.016	0.020	0.024
L1		0.540			0.021	
k	0°		8°			