TS824-2.5

HIGH THERMAL STABILITY MICROPOWER SHUNT VOLTAGE REFERENCE

- LOW Tc: 50 ppm/°C MAXIMUM
- 2.5V OUTPUT VOLTAGE
- LOW OPERATING CURRENT: 60µA max @ 25°C
- HIGH PRECISION AT 25°C: ±0.5% AND ±1%
- STABLE WHEN USED WITH CAPACITIVE LOADS
- INDUSTRIAL TEMPERATURE RANGE: -40 to +85°C

DESCRIPTION

The TS824-2.5 is a low power shunt voltage reference featuring a very low temperature coefficient of 50ppm/°C as a maximum value. Providing a 2.5V output voltage, the TS824-2.5 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.

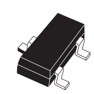
APPLICATION

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

ORDER CODE

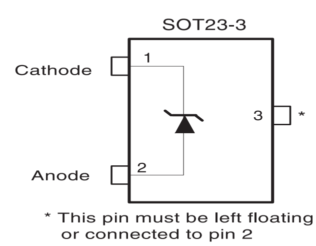
Voltage	Precision	SOT23-3	SOT23 Marking
2.5V	±1%	TS824ILT-2.5	L252
	±0.5%	TS824AILT-2.5	L253
Single temperature range: -40 to +85°C			

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



L
SOT23-3L
(Plastic Micropackage)

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 (note1) SOT23-3	360	mW
T_{Std}	Storage Temperature	-65 to +150	°C
ESD	Human Body Model (HBM) (note2)	2	kV
	Machine Model (MM) (note 2)	200	V
T_{Lead}	Lead Temperature (soldering, 10 seconds)	260	°C

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	60	µA
I_{max}	Maximum Operating Current	15	mA
T_{oper}	Operating Free Air Temperature Range	-40 to +85	°C

ELECTRICAL CHARACTERISTICS (note 3)

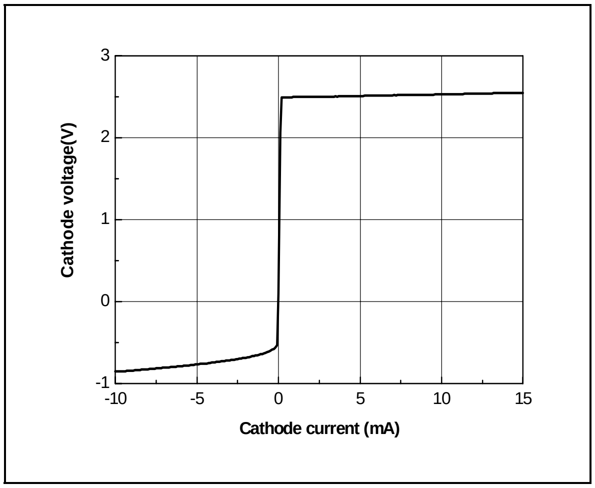
T_{amb} = 25°C (unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_K	Reverse Breakdown Voltage	I_K = 100µA, ±0.5%	2.4875	2.500	2.5125	V
		I_K = 100µA, ±1%	2.475	2.500	2.525	
	Reverse Breakdown Voltage Tolerance	I_K = 100µA, ±0.5% -40°C < T_{amb} < +85°C	-12.5 -20		+12.5 +20	mV
		I_K = 100µA, ±1% -40°C < T_{amb} < +85°C	-25 -33		+25 +33	
I_{KMIN}	Minimum Operating Current	T_{amb} = 25°C		50	60	µA
		-40°C < T_{amb} < +85°C			65	
$\Delta V_K / \Delta T$	Average Temperature Coefficient (note 5)	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		0.4	1 1.2	mV
		1mA < I_K < 15mA -40°C < T_{amb} < +85°C		4.5	8 10	
R_{KA}	Static Impedance	$\Delta I_K = I_{KMIN}$ to 1mA -40°C < T_{amb} < +85°C		0.4	1 1.2	Ω
		ΔI_K = 1mA to 15mA -40°C < T_{amb} < +85°C		0.3	0.6 0.7	
K_{VH}	Long Term Stability	I_K = 100µA, t = 1000hrs		120		ppm
E_N	Wide Band Noise	I_K = 100µA 100Hz < f < 10kHz		350		nV/√Hz

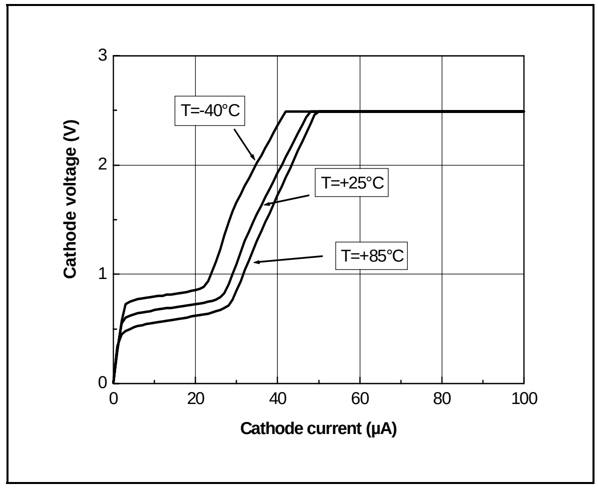
Note 3: Limits are 100% production tested at 25°C. Limits over temperature are guaranteed through correlation and by design.

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 %

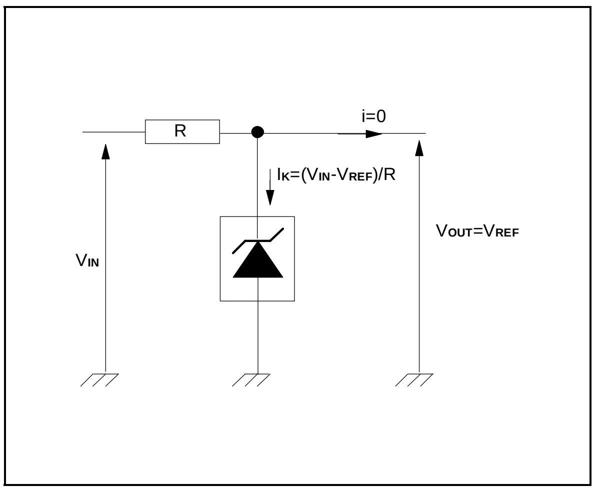
Reference voltage versus cathode current



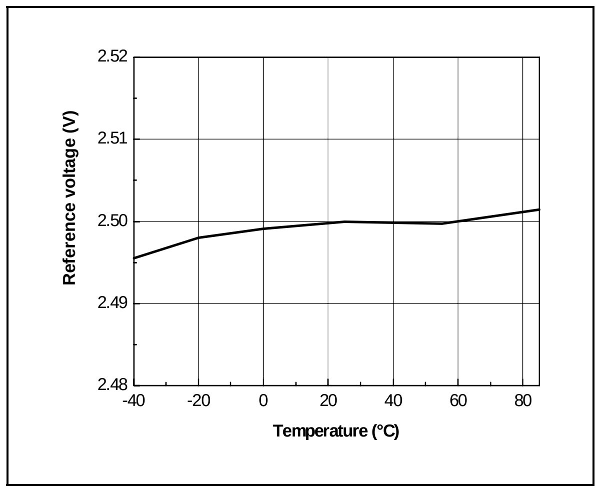
Reference voltage versus cathode current



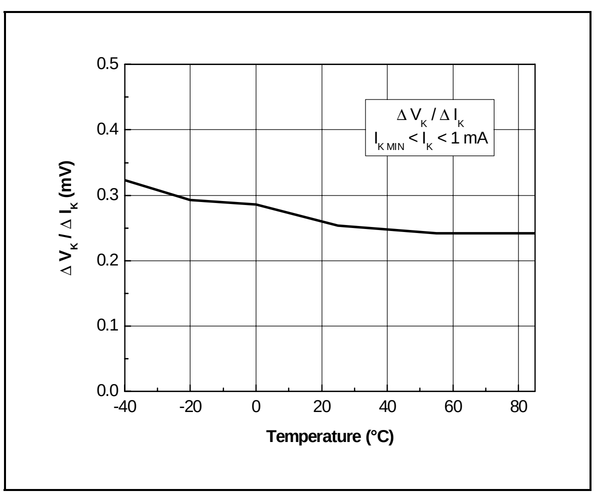
Test circuit



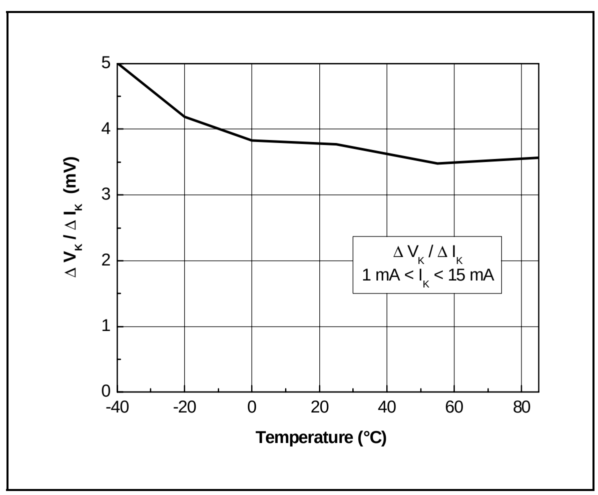
Reference voltage versus Temperature



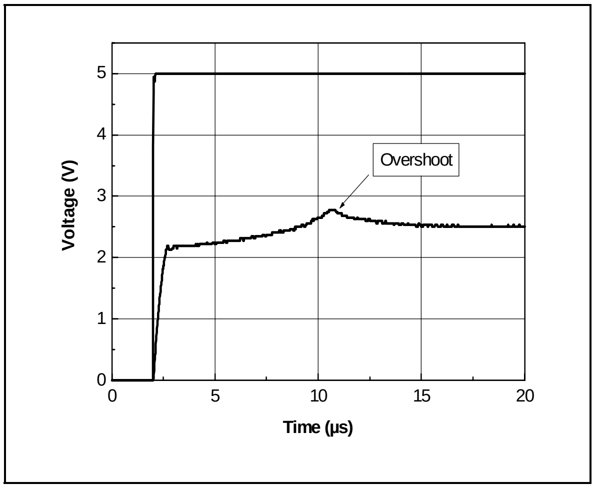
$\Delta V_K/\Delta I_K$ for I_K < 1mA versus temperature



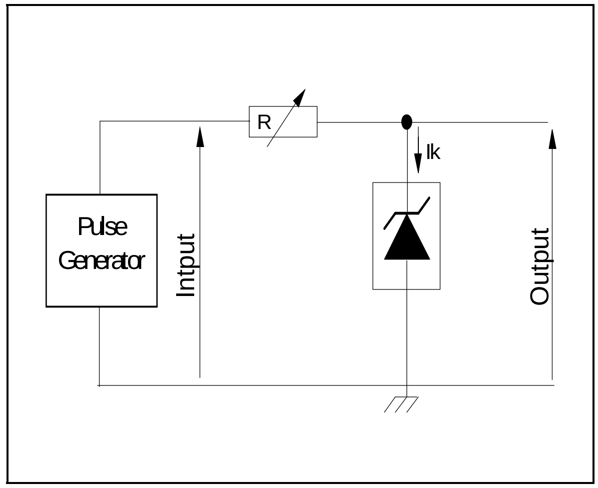
$\Delta V_K/\Delta I_K$ for I_K > 1mA versus temperature



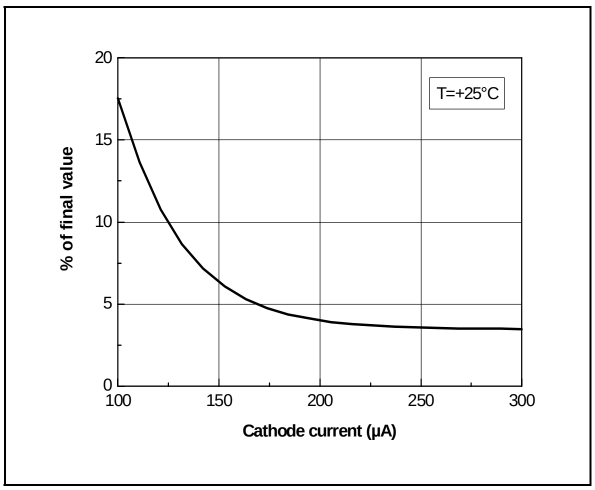
Start-up response with low cathode current



Start-up schematic with low cathode current



Overshoot versus cathode current



Noise versus frequency