

Description

The LM4040Q is a family of bandgap circuits designed to achieve precision micropower voltage references of 2.5V, 3.0V, 3.3V, 4.096V, and 5.0V. The devices are available in 0.2% B-grade, 0.5% C-grade, and 1% D-grade initial tolerances.

The devices are available in small outline, SOT23 surface mount package, which is ideal for applications where space is at a premium. Excellent performance is maintained over the 60µA to 15mA operating current range with a typical temperature coefficient of only 20ppm/°C. The device is designed to be highly tolerant of capacitive loads that maintain excellent stability.

This device offers a pin-for-pin compatible alternative to the industry standard LM4040 voltage reference for automotive applications.

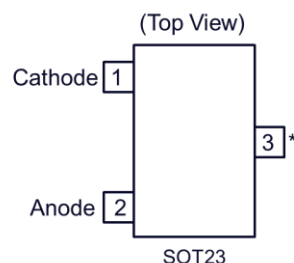
Features

- Small Package: SOT23
- No Output Capacitor Required
- Output Voltage Tolerance
 - LM4040BQ: ±0.2% at +25°C
 - LM4040CQ: ±0.5% at +25°C
 - LM4040DQ: ±1% at +25°C
- Low Output Noise
- 10Hz to 10kHz; 45µVRMS
- Wide Operating Current Range of 60µA to 15mA
- Extended Temperature Range of -40°C to +125°C
- Low Temperature Coefficient of 100 ppm/°C (max)
- Green Moulding in SOT23
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **The LM4040Q is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF 16949 certified facilities.**
<https://www.diodes.com/quality/product-definitions/>

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Assignments



SOT23

* Pin 3 must be left floating or connected to pin 2

Applications

- Automotive reference voltages
- Automotive data acquisition systems

Absolute Maximum Ratings (Voltages to GND Unless Otherwise Stated)

Parameter		Rating	Unit
Continuous Reverse Current		20	mA
Continuous Forward Current		10	mA
Operating Junction Temperature		-40 to +150	°C
Storage Temperature		-55 to +150	°C
ESD Susceptibility			
HBM	Human Body Model	4	kV
CDM	Charged Device Model	1	kV

Caution: Stresses greater than the *Absolute Maximum Ratings* specified above, can cause permanent damage to the device. These are stress ratings only; functional operation of the device at conditions between maximum recommended operating conditions and absolute maximum ratings is not implied. Device reliability can be affected by exposure to absolute maximum rating conditions for extended periods of time.

Semiconductor devices are ESD sensitive and can be damaged by exposure to ESD events. Suitable ESD precautions should be taken when handling and transporting these devices.

Package Thermal Data

Package	θ_{JA}	P_{DIS} $T_A = +25^\circ\text{C}, T_J = +150^\circ\text{C}$
SOT23	380°C/W	330mW

Recommended Operating Conditions

Characteristic	Min	Max	Unit
Reverse Current	0.06	15	mA
Operating Ambient Temperature Range	-40	+125	°C

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

LM4040-25Q

Symbol	Parameter	Conditions		Typ	B Limits	C Limits	D Limits	Unit
		(Note 4)	T_A					
V_{REF}	Reverse Breakdown Voltage	$I_R = 100\mu\text{A}$	+25°C	2.5	—	—	—	V
	Reverse Breakdown Voltage Tolerance	$I_R = 100\mu\text{A}$	+25°C	—	±5	±12	±25	mV
			-40°C to +85°C		±21	±29	±49	
			-40°C to +125°C		±30	±38	±63	
I_{RMIN}	Minimum Operating Current	—	+25°C	45	60	60	65	μA
			-40°C to +85°C	—	65	65	70	
			-40°C to +125°C		68	68	73	
$\Delta V_R/\Delta T$	Average Reverse Breakdown Voltage Temperature Coefficient	$I_R = 10\text{mA}$	-40°C to +125°C	±20	—	—	—	ppm/°C
		$I_R = 1\text{mA}$		±15	±100	±100	±150	
		$I_R = 100\mu\text{A}$		±15	—	—	—	
$\Delta V_R/\Delta I_R$	Reverse Breakdown Voltage Change with Current	$I_{RMIN} \leq I_R \leq 1\text{mA}$	+25°C	0.3	0.8	0.8	1.0	mV
			-40°C to +85°C	—	1.0	1.0	1.2	
			-40°C to +125°C		1.0	1.0	1.2	
		$1\text{mA} \leq I_R \leq 15\text{mA}$	+25°C	2.5	6.0	6.0	8.0	
			-40°C to +85°C	—	8.0	8.0	10.0	
			-40°C to +125°C		8.0	8.0	10.0	
Z_R	Dynamic Output Impedance	$I_R = 1\text{mA}, f = 120\text{Hz}, I_{AC} = 0.1I_R$		0.3	0.8	0.9	1.1	Ω
e_n	Noise Voltage	$I_R = 100\mu\text{A}, 10\text{Hz} < f < 10\text{kHz}$		35	—	—	—	μVRMS
V_R	Long Term Stability (Non-cumulative)	$t = 1000\text{Hrs}, I_R = 100\mu\text{A}$		120	—	—	—	ppm
V_{HYST}	Thermal Hysteresis	$\Delta T = -40^\circ\text{C}$ to $+125^\circ\text{C}$		0.08	—	—	—	%

Note: 4. Unless otherwise stated, voltages specified are relative to the Anode pin.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.) (continued)

LM4040-30Q

Symbol	Parameter	Conditions		Typ	B Limits	C Limits	D Limits	Unit
		(Note 4)	T _A					
V _{REF}	Reverse Breakdown Voltage	I _R = 100μA	+25°C	3.0	—	—	—	V
	Reverse Breakdown Voltage Tolerance	I _R = 100μA	+25°C	—	±6	±15	±30	mV
			-40°C to +85°C		±26	±34	±59	
			-40°C to +125°C		±36	±45	±75	
I _{RMIN}	Minimum Operating Current	—	+25°C	47	62	62	67	μA
			-40°C to +85°C	—	67	67	72	
			-40°C to +125°C		70	70	75	
ΔV _R /ΔT	Average Reverse Breakdown Voltage Temperature Coefficient	I _R = 10mA	-40°C to +125°C	±20	—	—	—	ppm/°C
		I _R = 1mA		±15	±100	±100	±150	
		I _R = 100μA		±15	—	—	—	
ΔV _R /ΔI _R	Reverse Breakdown Voltage Change with Current	I _{RMIN} ≤ I _R ≤ 1mA	+25°C	0.4	0.8	0.8	1.0	mV
			-40°C to +85°C	—	1.1	1.1	1.3	
			-40°C to +125°C		1.1	1.1	1.3	
		1mA ≤ I _R ≤ 15mA	+25°C	2.7	6.0	6.0	8.0	
			-40°C to +85°C	—	9.0	9.0	11.0	
			-40°C to +125°C		9.0	9.0	11.0	
Z _R	Dynamic Output Impedance	I _R = 1mA, f = 120Hz, I _{AC} = 0.1I _R		0.4	0.9	0.9	1.2	Ω
e _n	Noise Voltage	I _R = 100μA, 10Hz < f < 10kHz		35	—	—	—	μV _{RMS}
V _R	Long Term Stability (Non-cumulative)	t = 1000Hrs, I _R = 100μA		120	—	—	—	ppm
V _{HYST}	Thermal Hysteresis	ΔT = -40°C to = +125°C		0.08	—	—	—	%

LM4040-33Q

Symbol	Parameter	Conditions		Typ	B Limits	C Limits	D Limits	Unit
		(Note 4)	T _A					
V _{REF}	Reverse Breakdown Voltage	I _R = 100μA	+25°C	3.3	—	—	—	V
	Reverse Breakdown Voltage Tolerance	I _R = 100μA	+25°C	—	±6.6	±16.5	±33	mV
			-40°C to +85°C		±28	±38	±65	
			-40°C to +125°C		±40	±50	±83	
I _{RMIN}	Minimum Operating Current	—	+25°C	47	62	62	67	μA
			-40°C to +85°C	—	67	67	72	
			-40°C to +125°C		70	70	75	
ΔV _R /ΔT	Average Reverse Breakdown Voltage Temperature Coefficient	I _R = 10mA	-40°C to +125°C	±20	—	—	—	ppm/°C
		I _R = 1mA		±15	±100	±100	±150	
		I _R = 100μA		±15	—	—	—	
ΔV _R /ΔI _R	Reverse Breakdown Voltage Change with Current	I _{RMIN} ≤ I _R ≤ 1mA	+25°C	0.4	0.8	0.8	1	mV
			-40°C to +85°C	—	1.1	1.1	1.3	
			-40°C to +125°C		1.1	1.1	1.3	
		1mA ≤ I _R ≤ 15mA	+25°C	2.7	6	6	8	
			-40°C to +85°C	—	9.0	9	11	
			-40°C to +125°C		9.0	9	11	
Z _R	Dynamic Output Impedance	I _R = 1mA, f = 120Hz, I _{AC} = 0.1I _R		0.4	0.9	0.9	1.2	Ω
e _n	Noise Voltage	I _R = 100μA, 10Hz < f < 10kHz		35	—	—	—	μV _{RMS}
V _R	Long Term Stability (Non-cumulative)	t = 1000Hrs, I _R = 100μA		120	—	—	—	ppm
V _{HYST}	Thermal Hysteresis	ΔT = -40°C to = +125°C		0.08	—	—	—	%

Note: 4. Unless otherwise stated, voltages specified are relative to the Anode pin.

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.) (continued)

LM4040-41Q

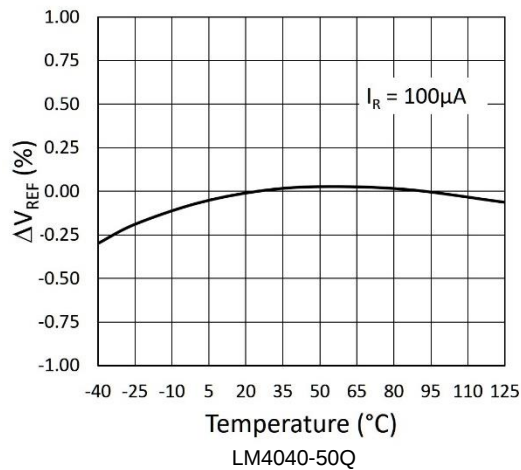
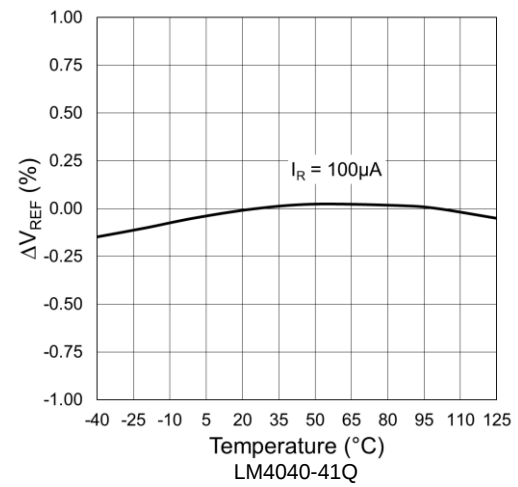
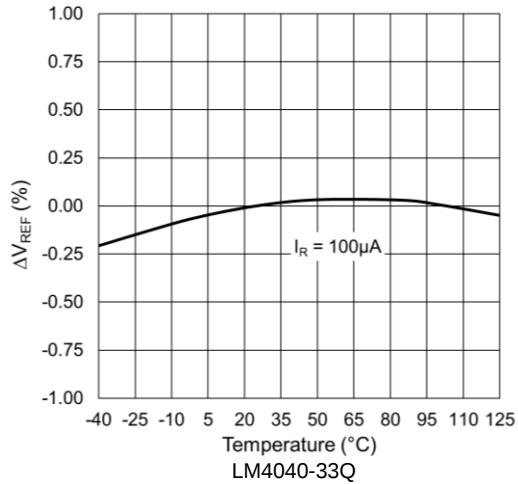
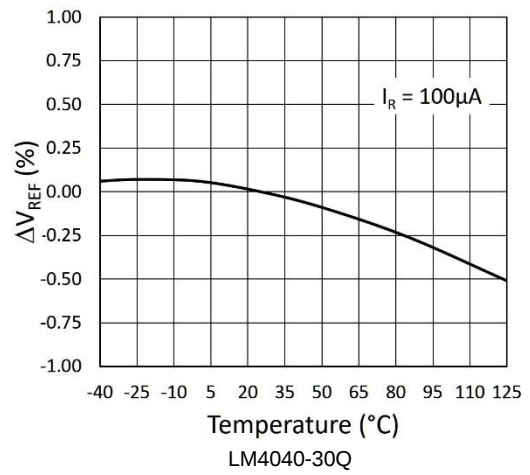
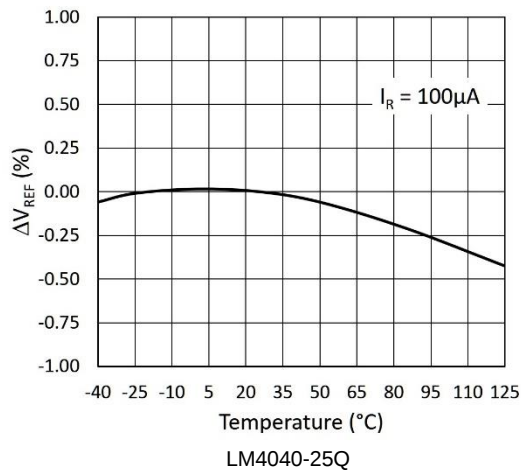
Symbol	Parameter	Conditions		Typ	B Limits	C Limits	D Limits	Unit
		(Note 4)	T _A					
V _{REF}	Reverse Breakdown Voltage	I _R = 100μA	+25°C	4.096	—	—	—	V
	Reverse Breakdown Voltage Tolerance	I _R = 100μA	+25°C	—	±8.2	±20	±41	mV
			-40°C to +85°C		±35	±47	±81	
			-40°C to +125°C		±49	±60	±102	
I _{RMIN}	Minimum Operating Current	—	+25°C	50	83	83	83	μA
			-40°C to +85°C	—	88	88	88	
			-40°C to +125°C		88	88	88	
	Average Reverse Breakdown Voltage Temperature Coefficient	—	—	—	—	—	—	—
ΔV _R /ΔT	Average Reverse Breakdown Voltage Temperature Coefficient	I _R = 10mA	-40°C to +125°C	±30	—	—	—	ppm/°C
		I _R = 1mA		±20	±100	±100	±150	
		I _R = 100μA		±20	—	—	—	
ΔV _R /ΔI _R	Reverse Breakdown Voltage Change With Current	I _{RMIN} ≤ I _R ≤ 1mA	+25°C	0.5	0.9	0.9	1.2	mV
			-40°C to +85°C	—	1.2	1.2	1.5	
			-40°C to +125°C		1.2	1.2	1.5	
		1mA ≤ I _R ≤ 15mA	+25°C	3	7	7	9	
			-40°C to +85°C	—	10	10	13	
			-40°C to +125°C		10	10	13	
Z _R	Dynamic Output Impedance	I _R = 1mA, f = 120Hz, I _{AC} = 0.1I _R		0.5	1	1	1.3	Ω
e _n	Noise Voltage	I _R = 100μA, 10Hz < f < 10kHz		64	—	—	—	μV _{RMS}
V _R	Long Term Stability (Non-cumulative)	t = 1000Hrs, I _R = 100μA		120	—	—	—	ppm
V _{HYST}	Thermal Hysteresis	ΔT = -40°C to +125°C		0.08	80	—	—	%

LM4040-50Q

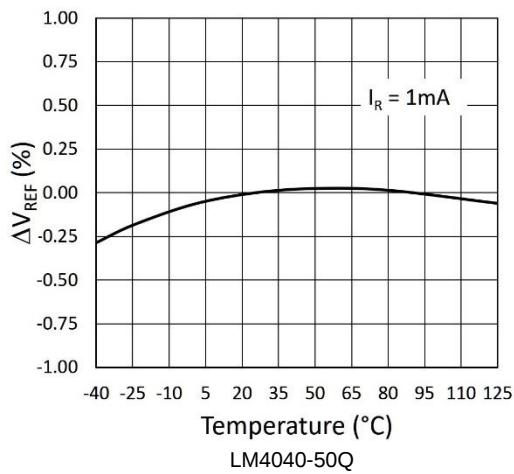
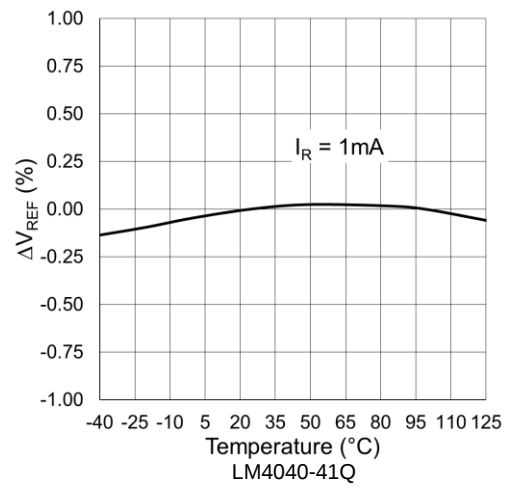
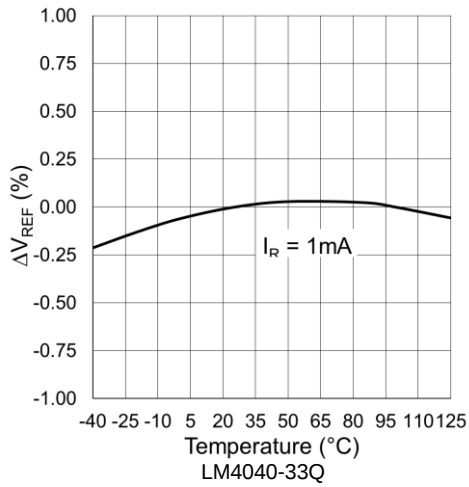
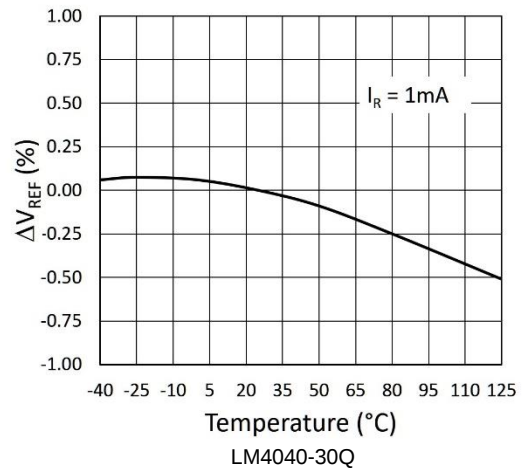
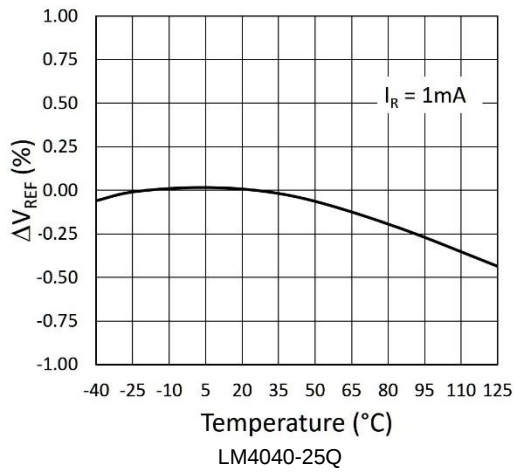
Symbol	Parameter	Conditions		Typ	B Limits	C Limits	D Limits	Unit
		(Note 4)	T _A					
V _{REF}	Reverse Breakdown Voltage	I _R = 100μA	+25°C	5.0	—	—	—	V
	Reverse Breakdown Voltage Tolerance	I _R = 100μA	+25°C	—	±10	±25	±50	mV
			-40°C to +85°C		±43	±58	±99	
			-40°C to +125°C		±60	±75	±125	
I _{RMIN}	Minimum Operating Current	—	+25°C	54	74	74	79	μA
			-40°C to +85°C	—	80	80	85	
			-40°C to +125°C		83	83	88	
	Average Reverse Breakdown Voltage Temperature Coefficient	—	—	—	—	—	—	—
ΔV _R /ΔT	Average Reverse Breakdown Voltage Temperature Coefficient	I _R = 10mA	-40°C to +125°C	±30	—	—	—	ppm/°C
		I _R = 1mA		±20	±100	±100	±150	
		I _R = 100μA		±20	—	—	—	
ΔV _R /ΔI _R	Reverse Breakdown Voltage Change With Current	I _{RMIN} ≤ I _R ≤ 1mA	+25°C	0.5	1.0	1.0	1.3	mV
			-40°C to +85°C	—	1.4	1.4	1.8	
			-40°C to +125°C		1.4	1.4	1.8	
		1mA ≤ I _R ≤ 15mA	+25°C	3.5	8.0	8.0	10.0	
			-40°C to +85°C	—	12.0	12.0	15.0	
			-40°C to +125°C		12.0	12.0	15.0	
Z _R	Dynamic Output Impedance	I _R = 1mA, f = 120Hz, I _{AC} = 0.1I _R		0.5	1.1	1.1	1.5	Ω
e _n	Noise Voltage	I _R = 100μA, 10Hz < f < 10kHz		80	—	—	—	μV _{RMS}
V _R	Long Term Stability (Non-cumulative)	t = 1000Hrs, I _R = 100μA		120	—	—	—	ppm
V _{HYST}	Thermal Hysteresis	ΔT = -40°C to +125°C		0.08	—	—	—	%

Note: 4. Unless otherwise stated, voltages specified are relative to the Anode pin.

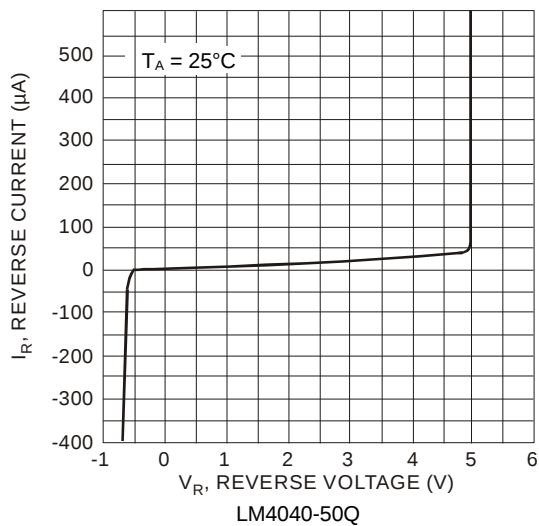
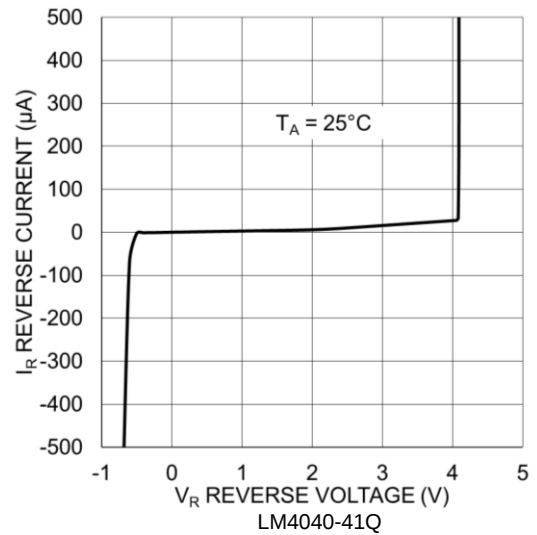
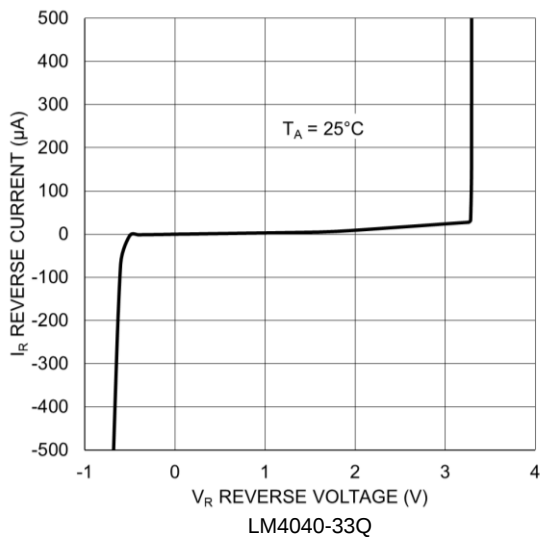
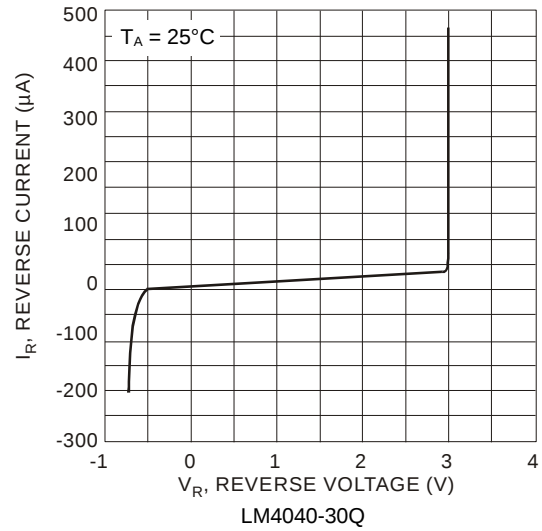
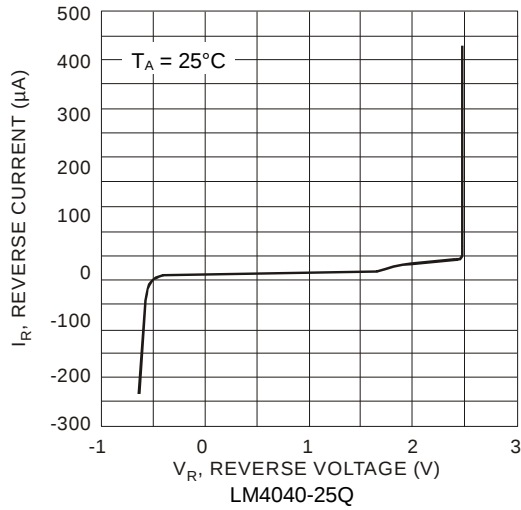
Typical Characteristics – Reference Voltage Temperature Coefficient at 100 μ A



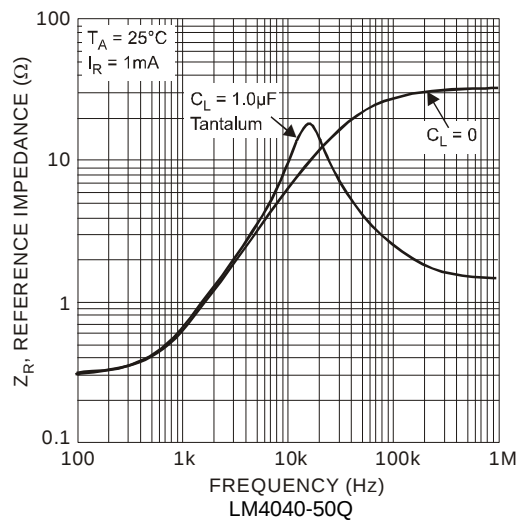
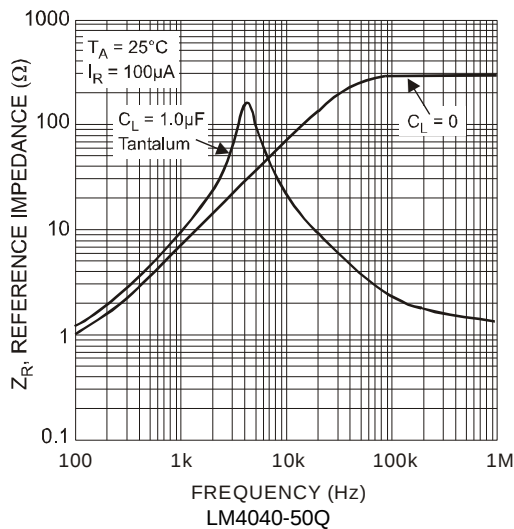
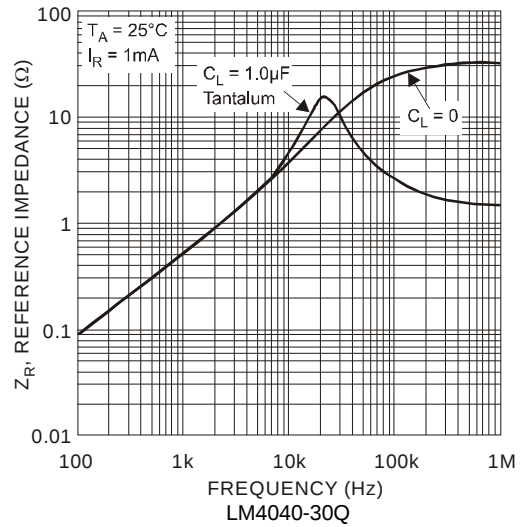
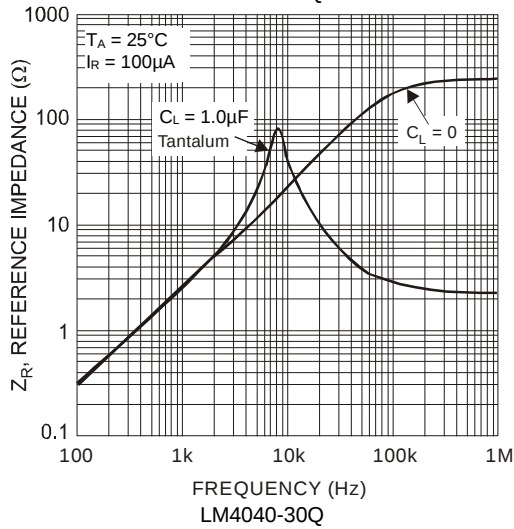
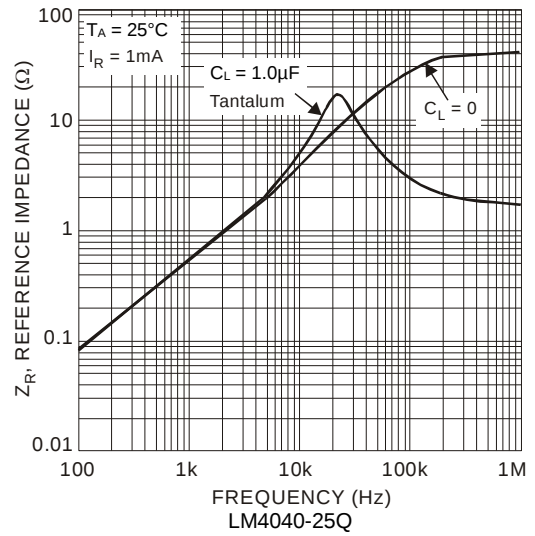
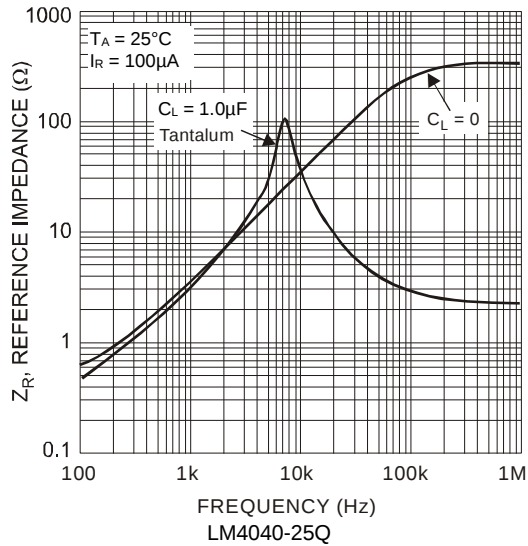
Typical Characteristics – Reference Voltage Temperature Coefficient at 1mA



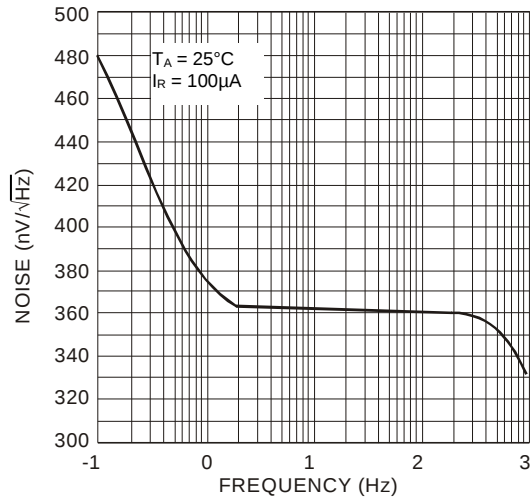
Typical Characteristics – Reverse Characteristics



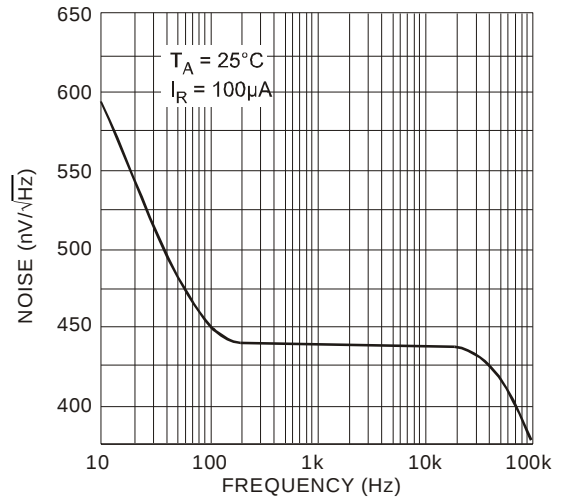
Typical Characteristics – LM4040Q Reference Impedance



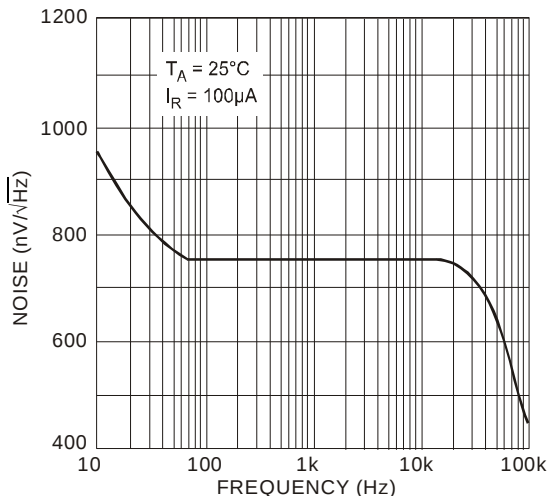
Typical Characteristics – LM4040Q Noise Characteristics



Noise Voltage vs. Frequency
LM4040-25Q

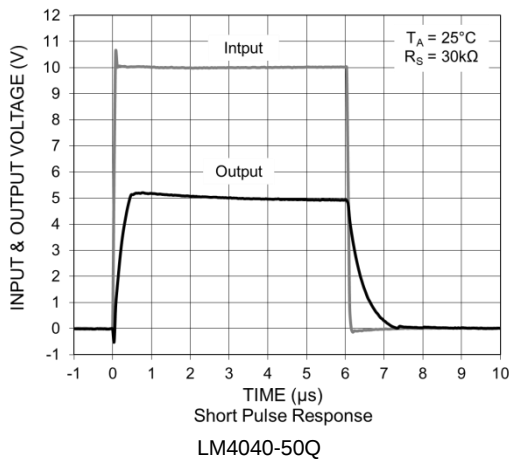
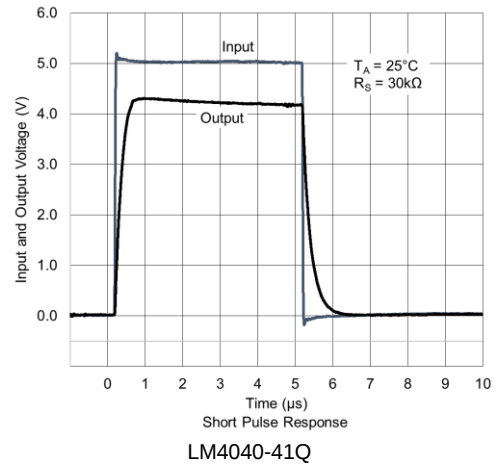
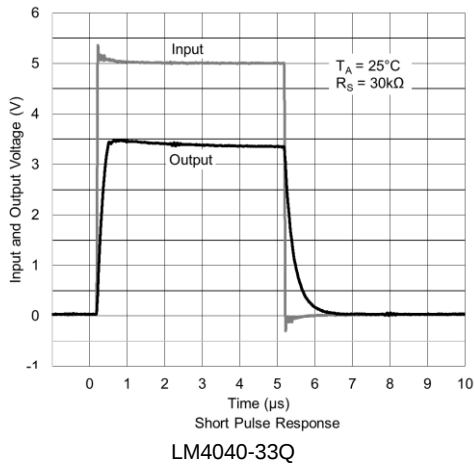
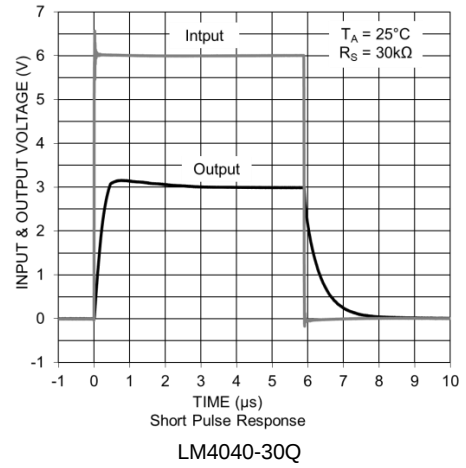
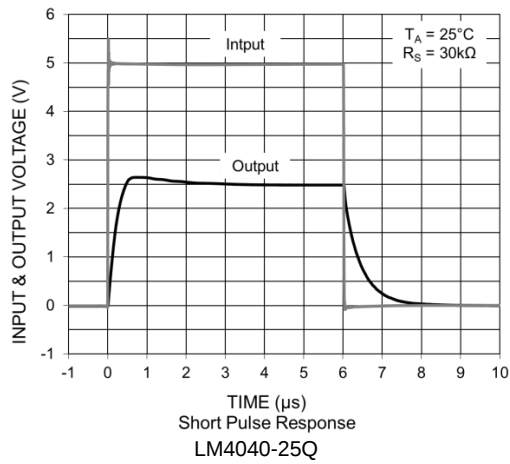


Noise Voltage vs. Frequency
LM4040-30Q

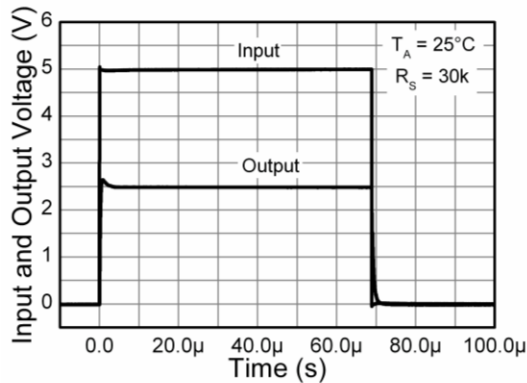


Noise Voltage vs. Frequency
LM4040-50Q

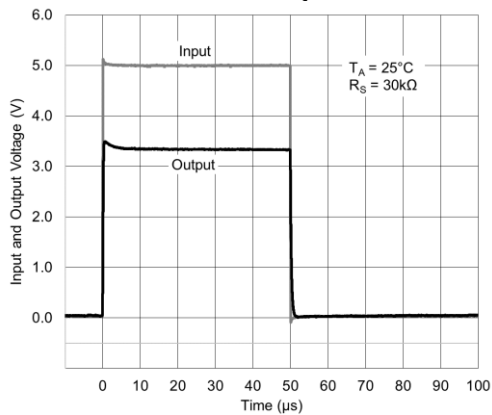
Start Up Characteristics – LM4040Q Short Pulse



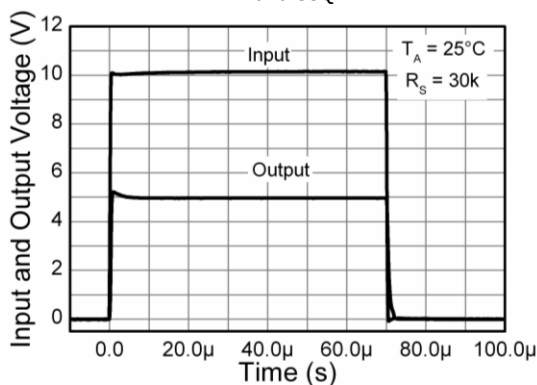
Start Up Characteristics – LM4040Q Long Pulse



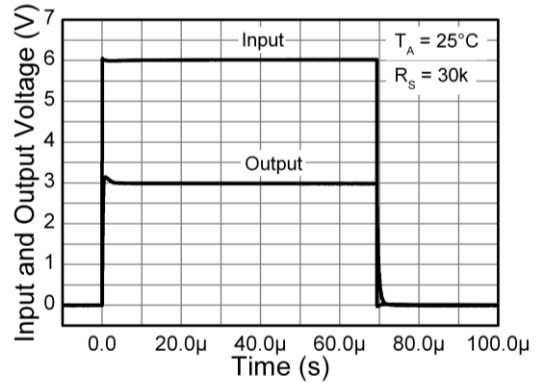
Long Pulse Response
LM4040-25Q



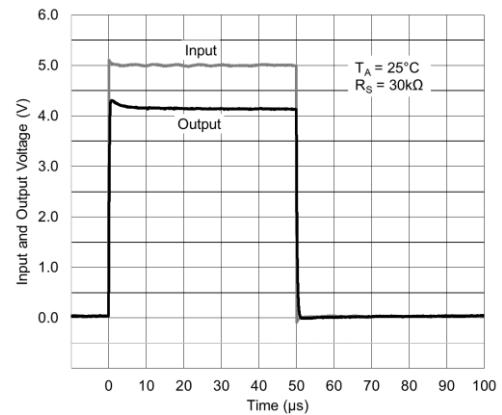
Long Pulse Response
LM4040-33Q



Long Pulse Response
LM4040-50Q



Long Pulse Response
LM4040-30Q



Long Pulse Response
LM4040-41Q

Application Information

In a conventional shunt regulator application (Figure 1), an external series resistor (R_S) is connected between the supply voltage, V_S , and the LM4040Q.

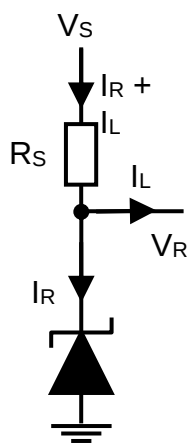


Figure 1

R_S determines the current that flows through the load (I_L) and the LM4040Q (I_R). Because load current and supply voltage can vary, R_S should be small enough to supply at least the minimum acceptable I_R to the LM4040Q even when the supply voltage is at its minimum and the load current is at its maximum value. When the supply voltage is at its maximum and I_L is at its minimum, R_S should be large enough so the current flowing through the LM4040Q is less than 15mA.

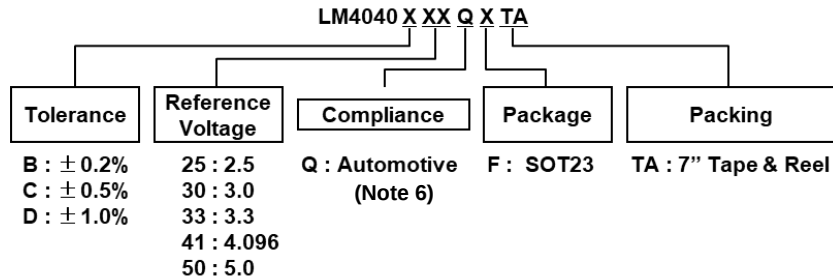
R_S is determined by the supply voltage, (V_S), the load and operating current, (I_L and I_R), and the LM4040Q's reverse breakdown voltage, V_R .

$$R_S = \frac{V_S - V_R}{I_L + I_R}$$

Printed Circuit Board Layout Considerations

The LM4040Q devices in the SOT23 package have the die attached to pin 3, which results in an electrical contact between pin 2 and pin 3. Therefore, pin 3 of the SOT23 package must be left floating or connected to pin 2.

Ordering Information

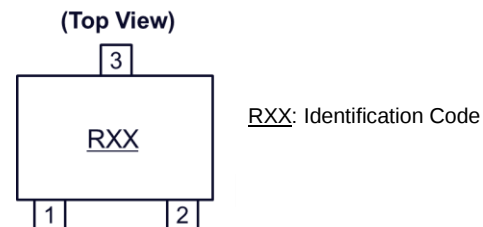


Part Number	25°C Tol	Voltage (V)	Package (Note 5)	Package Code	Identification Code	Packing (Note 7)			
						Quantity	Carrier	Tape Width	Part Number Suffix
LM4040B25QFTA	0.2%	2.5	SOT23	F	R2B	3000	7" Tape & Reel	8mm	TA
LM4040B30QFTA		3.0	SOT23	F	R3B	3000	7" Tape & Reel	8mm	TA
LM4040B33QFTA		3.3	SOT23	F	3B3Q	3000	7" Tape & Reel	8mm	TA
LM4040B41QFTA		4.096	SOT23	F	4B1Q	3000	7" Tape & Reel	8mm	TA
LM4040B50QFTA		5.0	SOT23	F	R5B	3000	7" Tape & Reel	8mm	TA
LM4040C25QFTA	0.5%	2.5	SOT23	F	R2C	3000	7" Tape & Reel	8mm	TA
LM4040C30QFTA		3.0	SOT23	F	R3C	3000	7" Tape & Reel	8mm	TA
LM4040C33QFTA		3.3	SOT23	F	3C3Q	3000	7" Tape & Reel	8mm	TA
LM4040C41QFTA		4.096	SOT23	F	4C1Q	3000	7" Tape & Reel	8mm	TA
LM4040C50QFTA		5.0	SOT23	F	R5C	3000	7" Tape & Reel	8mm	TA
LM4040D25QFTA	1%	2.5	SOT23	F	R2D	3000	7" Tape & Reel	8mm	TA
LM4040D30QFTA		3.0	SOT23	F	R3D	3000	7" Tape & Reel	8mm	TA
LM4040D33QFTA		3.3	SOT23	F	3D3Q	3000	7" Tape & Reel	8mm	TA
LM4040D41QFTA		4.096	SOT23	F	4D1Q	3000	7" Tape & Reel	8mm	TA
LM4040D50QFTA		5.0	SOT23	F	R5D	3000	7" Tape & Reel	8mm	TA

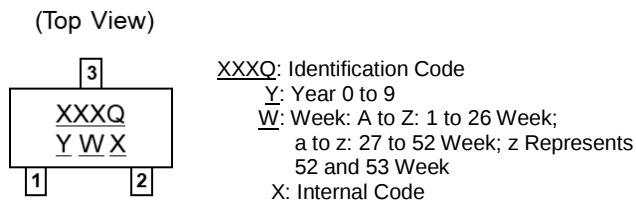
Notes: 5. Pad layout as shown in Diodes Incorporated's package outline PDFs, which can be found on our website at <http://www.diodes.com/package-outlines.html>.
6. LM4040Q is classified as "Automotive Compliant" and supports PPAP documentation. See LM4040 datasheet for commercial qualified versions.
7. See <https://www.diodes.com/assets/Packaging-Support-Docs/ap02007.pdf> for tape and reel information.

Marking Information

LM4040-25Q, LM4040-30Q, LM4040-50Q



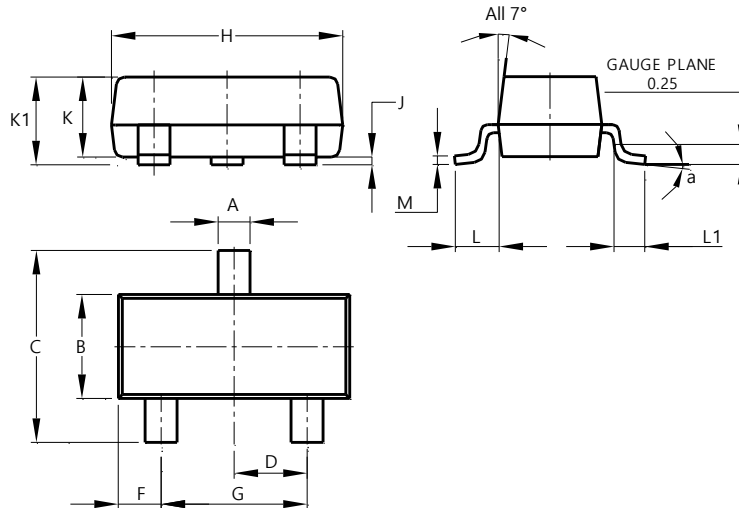
LM4040-33Q, LM4040-41Q



Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23

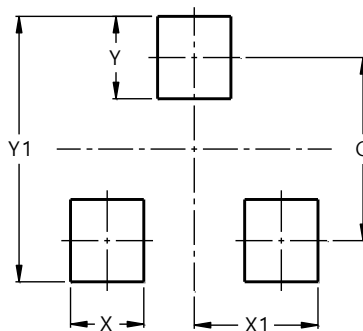


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

Note: The suggested land pattern dimensions have been provided for reference only, as actual pad layouts may vary depending on application. These dimensions may be modified based on user equipment capability or fabrication criteria. A more robust pattern may be desired for wave soldering and is calculated by adding 0.2 mm to the 'Z' dimension. For further information, please reference document IPC-7351A, Naming Convention for Standard SMT Land Patterns, and for International grid details, please see document IEC, Publication 97.

Mechanical Data

- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208③
- Weight: 0.009 grams (Approximate)

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).
2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.
3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.
4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.
5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (<https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/>) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.
7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes.
8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.
9. This Notice may be periodically updated with the most recent version available at <https://www.diodes.com/about/company/terms-and-conditions/important-notice>

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.
All other trademarks are the property of their respective owners.
© 2023 Diodes Incorporated. All Rights Reserved.

www.diodes.com