

## 200-mA LOW- $I_Q$ LOW-DROPOUT REGULATOR FOR PORTABLE DEVICES

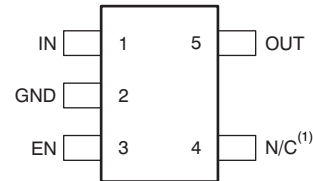
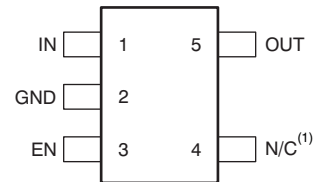
 Check for Samples: [TLV70033-Q1](#), [TLV70025-Q1](#), [TLV70012-Q1](#), [TLV70030-Q1](#)

### FEATURES

- Qualified for Automotive Applications
- AEC-Q100 Qualified With the Following Results:
  - Device Temperature Grade 1:  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  Ambient Operating Temperature Range
  - Device HBM ESD Classification Level H2
  - Device CDM ESD Classification Level C3B
- 2% Accuracy
- Low  $I_Q$ : 31  $\mu\text{A}$
- Fixed-Output Voltage of 3.3 V
- High PSRR: 68 dB at 1 kHz
- Stable with Effective Capacitance of 0.1  $\mu\text{F}$
- Thermal Shutdown and Overcurrent Protection
- Latch-Up Performance Meets 100 mA Per AEC-Q100, Level I
- Available in the SOT23-5 (DDC) and SC70-5 (DCK) Packages

### APPLICATIONS

- Automotive

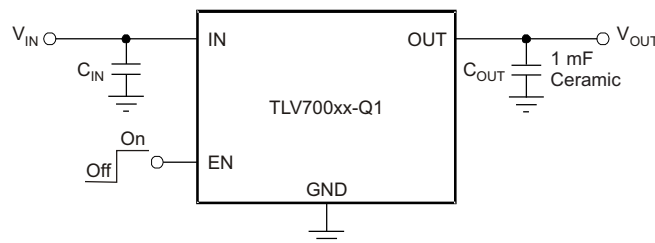
**TLV700xx-Q1 DDC  
SOT23-5 PACKAGE  
(TOP VIEW)**

**TLV700xx-Q1 DCK  
SC70-5 PACKAGE  
(TOP VIEW)**


### DESCRIPTION

The TLV700xx-Q1 series of low-dropout (LDO) linear regulators are low quiescent current devices with excellent line and load transient performance. These LDOs are designed for power-sensitive applications. A precision bandgap and error amplifier provides overall 2% accuracy. Low output noise, very high power-supply rejection ratio (PSRR), and low dropout voltage make this series of devices ideal for most battery-operated handheld equipment. All device versions have thermal shutdown and current limit for safety.

Furthermore, these devices are stable with an effective output capacitance of only 0.1  $\mu\text{F}$ . This feature enables the use of cost-effective capacitors that have higher bias voltages and temperature derating. The devices regulate to specified accuracy with no output load.

The TLV700xx-Q1 LDOs are available in the SOT23-5 (DDC) and the SC70-5 (DCK) packages.


**Typical Application Circuit (Fixed-Voltage Versions)**


Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

**ORDERING INFORMATION<sup>(1)</sup>**

T <sub>A</sub>	PACKAGE <sup>(2)</sup>		ORDERABLE PART NUMBER	TOP-SIDE MARKING
-40°C to 125°C	SOT23 – DDC	Reel of 3000	TLV70033QDDCRQ1	OFL
			TLV70025QDDCRQ1	QVC
-40°C to 125°C	SC70-5 – DCK	Reel of 3000	TLV70012QDCKRQ1	SDX
			TLV70030QDCKRQ1	SDW

- (1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at [www.ti.com](http://www.ti.com).
- (2) Package drawings, thermal data, and symbolization are available at [www.ti.com/packaging](http://www.ti.com/packaging).

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

At T<sub>A</sub> = -40°C to 125°C (unless otherwise noted). All voltages are with respect to GND.

V <sub>IN</sub>	Input voltage range	-0.3 V to 6 V
V <sub>EN</sub>	Enable voltage range	-0.3 V to 6 V
V <sub>OUT</sub>	Output voltage range	-0.3 V to 6 V
I <sub>OUT</sub>	Maximum output current	Internally limited
	Output short-circuit duration	Indefinite
T <sub>A</sub>	Operating ambient temperature range	-55°C to 150°C
T <sub>STG</sub>	Storage temperature range	-55°C to 150°C

- (1) Stresses above these ratings may cause permanent damage. Exposure to absolute maximum conditions for extended periods may degrade device reliability. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those specified is not implied.

**THERMAL INFORMATION**

THERMAL METRIC <sup>(1)</sup>		TLV700xx-Q1	TLV700xx-Q1	UNIT
		DCK (5 PINS)	DDC (5 PINS)	
θ <sub>JA</sub>	Junction-to-ambient thermal resistance	307.6	262.8	°C/W
θ <sub>JCtop</sub>	Junction-to-case (top) thermal resistance	79.1	68.2	
θ <sub>JB</sub>	Junction-to-board thermal resistance	93.7	81.6	
ψ <sub>JT</sub>	Junction-to-top characterization parameter	1.3	101	
ψ <sub>JB</sub>	Junction-to-board characterization parameter	92.8	80.9	
θ <sub>JCbot</sub>	Junction-to-case (bottom) thermal resistance	n/a	n/a	

- (1) For more information about traditional and new thermal metrics, see the *IC Package Thermal Metrics* application report, [SPRA953](http://SPRA953).

PRODUCT PREVIEW

**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/ Ball Finish	MSL Peak Temp <sup>(3)</sup>	Samples (Requires Login)
TLV70012QDDCRQ1	ACTIVE	SOT	DDC	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
TLV70025QDDCRQ1	ACTIVE	SOT	DDC	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	
TLV70033QDDCRQ1	ACTIVE	SOT	DDC	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	

<sup>(1)</sup> The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBsolete:** TI has discontinued the production of the device.

<sup>(2)</sup> Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

<sup>(3)</sup> MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

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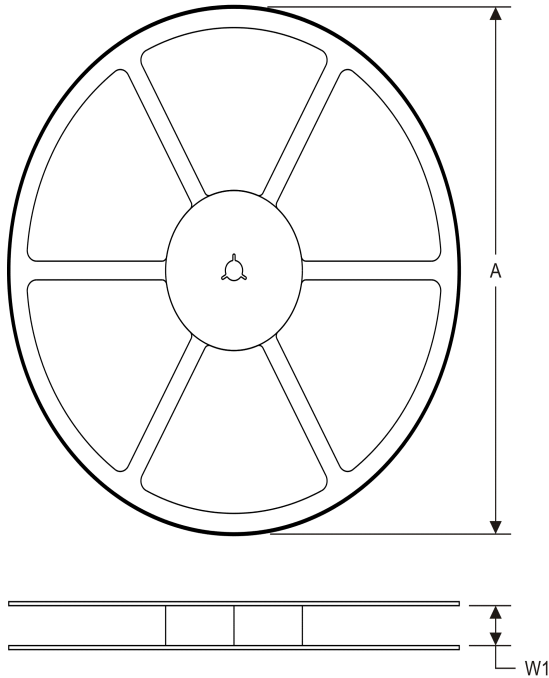
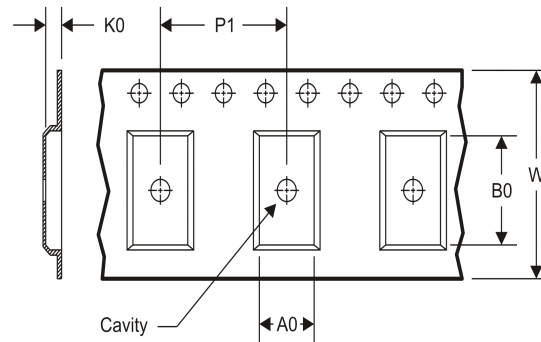
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**OTHER QUALIFIED VERSIONS OF TLV70012-Q1, TLV70025-Q1, TLV70033-Q1 :**

- Catalog: [TLV70012](#), [TLV70025](#), [TLV70033](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

**TAPE AND REEL INFORMATION**
**REEL DIMENSIONS**

**TAPE DIMENSIONS**


A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

**TAPE AND REEL INFORMATION**

\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
TLV70012QDDCRQ1	SOT	DDC	5	3000	179.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
TLV70025QDDCRQ1	SOT	DDC	5	3000	179.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3
TLV70033QDDCRQ1	SOT	DDC	5	3000	179.0	8.4	3.2	3.2	1.4	4.0	8.0	Q3

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TLV70012QDDCRQ1	SOT	DDC	5	3000	195.0	200.0	45.0
TLV70025QDDCRQ1	SOT	DDC	5	3000	195.0	200.0	45.0
TLV70033QDDCRQ1	SOT	DDC	5	3000	195.0	200.0	45.0



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### Applications

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