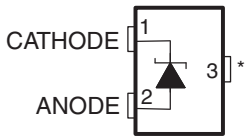
FEATURES

- **1.225-V Fixed and Adjustable (1.225-V to 10-V) Outputs**
- **Tight Output Tolerances and Low Temperature Coefficient**
  - **Max 0.1%, 50 ppm/°C – A Grade**
  - **Max 0.2%, 50 ppm/°C – B Grade**
  - **Max 0.5%, 50 ppm/°C – C Grade**
- **Low Output Noise…20 μV_{RMS} (Typ)**
- **Wide Operating Current Range… 60 μA (Typ) to 12 mA**
- **Stable With All Capacitive Loads; No Output Capacitor Required**
- **Available in**
  - **Industrial Temperature: –40°C to 85°C**
  - **Extended Temperature: –40°C to 125°C**

APPLICATIONS

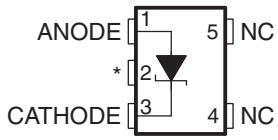
- **Data-Acquisition Systems**
- **Power Supplies and Power-Supply Monitors**
- **Instrumentation and Test Equipment**
- **Process Control**
- **Precision Audio**
- **Automotive Electronics**
- **Energy Management/Metering**
- **Battery-Powered Equipment**

1.2 V...DBZ (SOT-23-3) PACKAGE
(TOP VIEW)



* Pin 3 is attached to Substrate and must be connected to ANODE or left open.

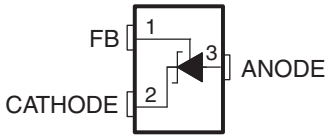
1.2 V...DCK (SC-70) PACKAGE
(TOP VIEW)



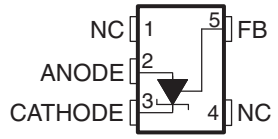
NC – No internal connection

* Pin 2 is attached to Substrate and must be connected to ANODE or left open.

Adjustable...DBZ (SOT-23-3) PACKAGE
(TOP VIEW)



Adjustable...DCK (SC-70) PACKAGE
(TOP VIEW)



NC – No internal connection

DESCRIPTION/ORDERING INFORMATION

The TL4051 series of shunt voltage references are versatile easy-to-use references suitable for a wide array of applications. The device is available in a fixed 1.225-V output or an adjustable output whose voltage is determined by an external resistor divider. The device requires no external capacitors for operation and is stable with all capacitive loads. Additionally, the reference offers low dynamic impedance, low noise, and low temperature coefficient to ensure a stable output voltage over a wide range of operating currents and temperatures.

The TL4051 is offered in three initial tolerances, ranging from 0.1% (max) for the A grade to 0.5% (max) for the C grade. Thus, a great deal of flexibility is offered to designers in choosing the best cost-to-performance ratio for their applications. Packaged in the space-saving SOT-23-3 and SC-70 packages and requiring a minimum current of 45 μA (typ), the TL4051 also is ideal for portable applications.

The TL4051xI is characterized for operation over an ambient temperature range of –40°C to 85°C. The TL4051xQ is characterized for operation over an ambient temperature range of –40°C to 125°C.

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.

PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of the Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

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ORDERING INFORMATION(1)

T_A	DEVICE GRADE	V_Z	PACKAGE(2)		ORDERABLE PART NUMBER	TOP-SIDE MARKING(3)
–40°C to 85°C	A grade: 0.1% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 3000	TL4051AIDBZR	TN2_
				Reel of 250	TL4051AIDBZT	
			SC-70 – DCK	Reel of 3000	TL4051AIDCKR	97_
				Reel of 250	TL4051AIDCKT	
		1.2 V	SOT-23-3 – DBZ	Reel of 3000	TL4051A12IDBZR	TN8_
				Reel of 250	TL4051A12IDBZT	
			SC-70 – DCK	Reel of 3000	TL4051A12IDCKR	9D_
				Reel of 250	TL4051A12IDCKT	
	B grade: 0.2% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 3000	TL4051BIDBZR	TN3_
				Reel of 250	TL4051BIDBZT	
			SC-70 – DCK	Reel of 3000	TL4051BIDCKR	98_
				Reel of 250	TL4051BIDCKT	
		1.2 V	SOT-23-3 – DBZ	Reel of 3000	TL4051B12IDBZR	TN9_
				Reel of 250	TL4051B12IDBZT	
			SC-70 – DCK	Reel of 3000	TL4051B12IDCKR	9E_
				Reel of 250	TL4051B12IDCKT	
	C grade: 0.5% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 3000	TL4051CIDBZR	TN4_
				Reel of 250	TL4051CIDBZT	
			SC-70 – DCK	Reel of 3000	TL4051CIDCKR	99_
				Reel of 250	TL4051CIDCKT	
		1.2 V	SOT-23-3 – DBZ	Reel of 3000	TL4051C12IDBZR	TNU_
				Reel of 250	TL4051C12IDBZT	
			SC-70 – DCK	Reel of 3000	TL4051C12IDCKR	9F_
				Reel of 250	TL4051C12IDCKT	

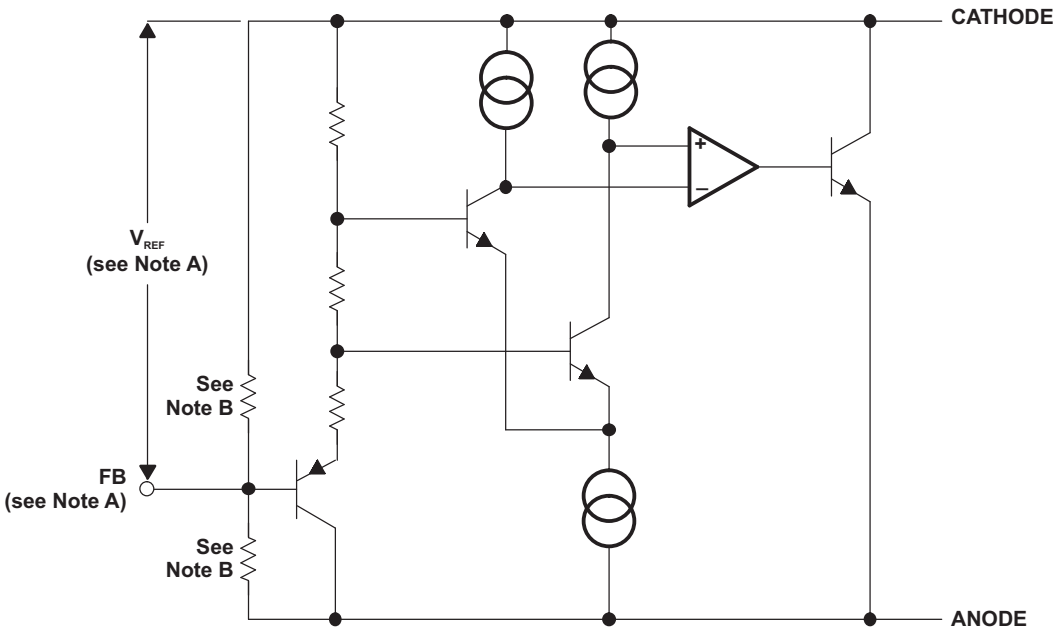
(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI web site at www.ti.com.
(2) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.
(3) The actual top-side marking has one additional character that designates the assembly/test site.

ORDERING INFORMATION(1)

T_A	DEVICE GRADE	V_Z	PACKAGE(2)		ORDERABLE PART NUMBER	TOP-SIDE MARKING(3)
–40°C to 125°C	A grade: 0.1% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 3000	TL4051AQDBZR	TN5_
				Reel of 250	TL4051AQDBZT	
			SC-70 – DCK	Reel of 3000	TL4051AQDCKR	9A_
				Reel of 250	TL4051AQDCKT	
		1.2 V	SOT-23-3 – DBZ	Reel of 3000	TL4051A12QDBZR	TNV_
				Reel of 250	TL4051A12QDBZT	
			SC-70 – DCK	Reel of 3000	TL4051A12QDCKR	9G_
				Reel of 250	TL4051A12QDCKT	
	B grade: 0.2% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 3000	TL4051BQDBZR	TN6_
				Reel of 250	TL4051BQDBZT	
			SC-70 – DCK	Reel of 3000	TL4051BQDCKR	9B_
				Reel of 250	TL4051BQDCKT	
		1.2 V	SOT-23-3 – DBZ	Reel of 3000	TL4051B12QDBZR	TNW_
				Reel of 250	TL4051B12QDBZT	
			SC-70 – DCK	Reel of 3000	TL4051B12QDCKR	9H_
				Reel of 250	TL4051B12QDCKT	
	C grade: 0.5% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 3000	TL4051CQDBZR	TN7_
				Reel of 250	TL4051CQDBZT	
			SC-70 – DCK	Reel of 3000	TL4051CQDCKR	9C_
				Reel of 250	TL4051CQDCKT	
		1.2 V	SOT-23-3 – DBZ	Reel of 3000	TL4051C12QDBZR	TNY_
				Reel of 250	TL4051C12QDBZT	
			SC-70 – DCK	Reel of 3000	TL4051C12QDCKR	9J_
				Reel of 250	TL4051C12QDCKT	

(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.
(2) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.
(3) The actual top-side marking has one additional character that designates the assembly/test site.

FUNCTIONAL BLOCK DIAGRAM



A. TL4051x (Adjustable) only

B. TL4051x12 only

Absolute Maximum Ratings(1)

over free-air temperature range (unless otherwise noted)

			MIN	MAX	UNIT
V_Z	Continuous cathode voltage			15	V
I_Z	Continuous cathode current		–10	20	mA
θ_{JA}	Package thermal impedance(2)(3)	DBZ package		206	°C/W
		DCK package		252	
T_J	Operating virtual junction temperature			150	°C
T_{stg}	Storage temperature range		–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) Maximum power dissipation is a function of $T_J(max)$, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can affect reliability.

(3) The package thermal impedance is calculated in accordance with JESD 51-7.

Recommended Operating Conditions

			MIN	MAX	UNIT
I_Z	Cathode current		(1)	12	mA
V_Z	Reverse breakdown voltage (adjustable version)			10	V
T_A	Free-air temperature	I temperature	–40	85	°C
		Q temperature	–40	125	

(1) See parametric tables

TL4051x12I Electrical Characteristics

full range T_A = –40°C to 85°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	TL4051A12I			TL4051B12I			TL4051C12I			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_Z	Reverse breakdown voltage	I_Z = 100 µA	25°C		1.225			1.225			1.225		V
	Reverse breakdown voltage tolerance	I_Z = 100 µA	25°C	–1.2		1.2	–2.4		2.4	–6		6	mV
			Full range	–5.2		5.2	–6.4		6.4	–10.1		10.1	
$I_{Z,min}$	Minimum cathode current		25°C		39	60		39	60		39	60	µA
			Full range			65			65			65	
α_{VZ}	Average temperature coefficient of reverse breakdown voltage	I_Z = 10 mA	25°C		±20			±20			±20		ppm/°C
		I_Z = 1 mA	25°C		±15			±15			±15		
		I_Z = 100 µA	25°C		±15			±15			±15		
			Full range			±50			±50			±50	
$\frac{\Delta V_Z}{\Delta I_Z}$	Reverse breakdown voltage change with cathode current change	$I_{Z,min} < I_Z < 1$ mA	25°C		0.3	1.1		0.3	1.1		0.3	1.1	mV
			Full range			1.5			1.5			1.5	
		1 mA < I_Z < 12 mA	25°C		1.8	6		1.8	6		1.8	6	
			Full range			8			8			8	
Z_Z	Reverse dynamic impedance	I_Z = 1 mA, f = 120 Hz, I_{AC} = 0.1 I_Z	25°C		0.5			0.5			0.5		Ω
e_N	Wideband noise	I_Z = 100 µA, 10 Hz ≤ f ≤ 10 kHz	25°C		20			20			20		μV_{RMS}
	Long-term stability of reverse breakdown voltage	t = 1000 h, T_A = 25°C ± 0.1°C, I_Z = 100 µA	25°C		120			120			120		ppm
V_{HYST}	Thermal hysteresis(1)	ΔT_A = –40°C to 125°C			0.36			0.36			0.36		mV/V

(1) Thermal hysteresis is defined as $V_{Z,25°C}$ (after cycling to –40°C) – $V_{Z,25°C}$ (after cycling to 125°C).

TL4051x12Q Electrical Characteristics

full range T_A = –40°C to 125°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	TL4051A12Q			TL4051B12Q			TL4051C12Q			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_Z	Reverse breakdown voltage	I_Z = 100 µA	25°C		1.225			1.225			1.225		V
	Reverse breakdown voltage tolerance	I_Z = 100 µA	25°C	–1.2		1.2	–2.4		2.4	–6		6	mV
			Full range	–7.4		7.4	–8.6		8.6	–12.2		12.2	
$I_{Z,min}$	Minimum cathode current		25°C		39	60		39	60		39	60	µA
			Full range			65			65			65	
α_{VZ}	Average temperature coefficient of reverse breakdown voltage	I_Z = 10 mA	25°C		±20			±20			±20		ppm/°C
		I_Z = 1 mA	25°C		±15			±15			±15		
		I_Z = 100 µA	25°C		±15			±15			±15		
			Full range			±50			±50			±50	
$\frac{\Delta V_Z}{\Delta I_Z}$	Reverse breakdown voltage change with cathode current change	$I_{Z,min} < I_Z < 1$ mA	25°C		0.3	1.1		0.3	1.1		0.3	1.1	mV
			Full range			1.5			1.5			1.5	
		1 mA < I_Z < 12 mA	25°C		1.8	6		1.8	6		1.8	6	
			Full range			8			8			8	
Z_Z	Reverse dynamic impedance	I_Z = 1 mA, f = 120 Hz, I_{AC} = 0.1 I_Z	25°C		0.5			0.5			0.5		Ω
e_N	Wideband noise	I_Z = 100 µA, 10 Hz ≤ f ≤ 10 kHz	25°C		20			20			20		μV_{RMS}
	Long-term stability of reverse breakdown voltage	t = 1000 h, T_A = 25°C ± 0.1°C, I_Z = 100 µA	25°C		120			120			120		ppm
V_{HYST}	Thermal hysteresis(1)	ΔT_A = –40°C to 125°C			0.36			0.36			0.36		mV/V

(1) Thermal hysteresis is defined as $V_{Z,25°C}$ (after cycling to –40°C) – $V_{Z,25°C}$ (after cycling to 125°C).

TL4051xI (Adjustable Version) Electrical Characteristics

full range T_A = –40°C to 85°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	TL4051AI			TL4051BI			TL4051CI			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_{REF}	Reference voltage	I_Z = 100 µA, V_Z = 5 V	25°C		1.212			1.212			1.212		V
	Reference voltage tolerance(1)	I_Z = 100 µA, V_Z = 5 V	25°C	–1.2		1.2	–2.4		2.4	–6		6	mV
			Full range	–5.2		5.2	–6.4		6.4	–10.1		10.1	
$I_{Z,min}$	Minimum cathode current		25°C		36	60		36	60		36	65	µA
			Full range			65			65			70	
$\frac{\Delta V_{REF}}{\Delta I_Z}$	Reference voltage change with cathode current change	$I_{Z,min} < I_Z < 1$ mA	25°C		0.3	1.1		0.3	1.1		0.3	1.1	mV
			Full range			1.5			1.5			1.5	
		1 mA < I_Z < 12 mA	25°C		0.6	6		0.6	6		0.6	6	
			Full range			8			8			8	
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Reference voltage change with output voltage change	I_Z = 1 mA	25°C		–1.69	–2.8		–1.69	–2.8		–1.69	–2.8	mV/V
			Full range			–3.5			–3.5			–3.5	
I_{FB}	Feedback current		25°C		70	130		70	130		70	130	nA
			Full range			150			150			150	
αV_{REF}	Average temperature coefficient of reference voltage(1)	I_Z = 10 mA, V_Z = 2.5 V	25°C		±20			±20			±20		ppm/°C
		I_Z = 1 mA, V_Z = 2.5 V	25°C		±15			±15			±15		
		I_Z = 100 µA, V_Z = 2.5 V	25°C		±15			±15			±15		
			Full range			±50			±50			±50	
Z_Z	Reverse dynamic impedance	I_Z = 1 mA, f = 120 Hz, I_{AC} = 0.1 I_Z, V_Z = V_{REF}	25°C		0.3			0.3			0.3		Ω
		I_Z = 1 mA, f = 120 Hz, I_{AC} = 0.1 I_Z, V_Z = 10 V	25°C		2			2			2		
e_N	Wideband noise	I_Z = 100 µA, V_Z = V_{REF}, 10 Hz ≤ f ≤ 10 kHz	25°C		20			20			20		μV_{RMS}
	Long-term stability of reverse breakdown voltage	t = 1000 h, T_A = 25°C ± 0.1°C, I_Z = 100 µA	25°C		120			120			120		ppm
V_{HYST}	Thermal hysteresis(2)	ΔT_A = –40°C to 125°C			0.3			0.3			0.3		mV/V

(1) Reference voltage tolerance and average temperature coefficient change with output voltage (V_Z). See *Typical Characteristics*.
(2) Thermal hysteresis is defined as $V_{Z,25°C}$ (after cycling to –40°C) – $V_{Z,25°C}$ (after cycling to 125°C).

TL4051xQ (Adjustable Version) Electrical Characteristics

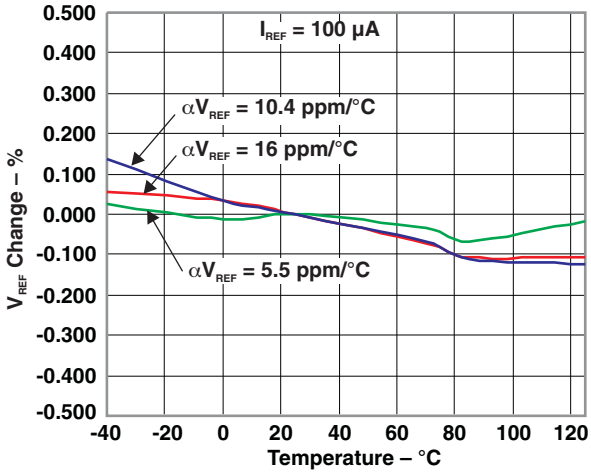
full range T_A = –40°C to 125°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	T_A	TL4051AQ			TL4051BQ			TL4051CQ			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_{REF}	Reference voltage	I_Z = 100 µA, V_Z = 5 V	25°C		1.212			1.212			1.212		V
	Reference voltage tolerance(1)	I_Z = 100 µA, V_Z = 5 V	25°C	–1.2		1.2	–2.4		2.4	–6		6	mV
			Full range	–7.4		7.4	–8.6		8.6	–12.2		12.2	
$I_{Z,min}$	Minimum cathode current		25°C		36	60		36	60		36	65	µA
			Full range			70			70			75	
$\frac{\Delta V_{REF}}{\Delta I_Z}$	Reference voltage change with cathode current change	$I_{Z,min} < I_Z < 1$ mA	25°C		0.3	1.1		0.3	1.1		0.3	1.1	mV
			Full range			1.5			1.5			1.5	
		1 mA < I_Z < 12 mA	25°C		0.6	6		0.6	6		0.6	6	
			Full range			8			8			8	
$\frac{\Delta V_{REF}}{\Delta V_{KA}}$	Reference voltage change with output voltage change	I_Z = 1 mA	25°C		–1.69	–2.8		–1.69	–2.8		–1.69	–2.8	mV/V
			Full range			–3.5			–3.5			–3.5	
I_{FB}	Feedback current		25°C		70	130		70	130		70	130	nA
			Full range			150			150			150	
αV_{REF}	Average temperature coefficient of reference voltage(1)	I_Z = 10 mA, V_Z = 2.5 V	25°C		±20			±20			±20		ppm/°C
		I_Z = 1 mA, V_Z = 2.5 V	25°C		±15			±15			±15		
		I_Z = 100 µA, V_Z = 2.5 V	25°C		±15			±15			±15		
			Full range			±50			±50			±50	
Z_Z	Reverse dynamic impedance	I_Z = 1 mA, f = 120 Hz, I_{AC} = 0.1 I_Z, V_Z = V_{REF}	25°C		0.3			0.3			0.3		Ω
		I_Z = 1 mA, f = 120 Hz, I_{AC} = 0.1 I_Z, V_Z = 10 V	25°C		2			2			2		
e_N	Wideband noise	I_Z = 100 µA, V_Z = V_{REF}, 10 Hz ≤ f ≤ 10 kHz	25°C		20			20			20		μV_{RMS}
	Long-term stability of reverse breakdown voltage	t = 1000 h, T_A = 25°C ± 0.1°C, I_Z = 100 µA	25°C		120			120			120		ppm
V_{HYST}	Thermal hysteresis(2)	ΔT_A = –40°C to 125°C			0.3			0.3			0.3		mV/V

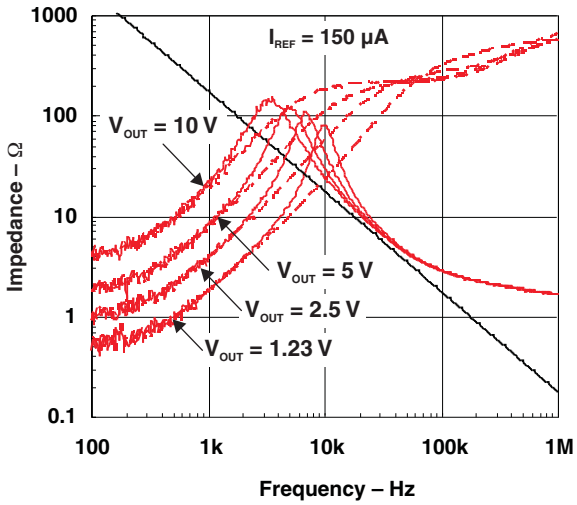
(1) Reference voltage tolerance and average temperature coefficient change with output voltage (V_Z). See *Typical Characteristics*.
(2) Thermal hysteresis is defined as $V_{Z,25°C}$ (after cycling to –40°C) – $V_{Z,25°C}$ (after cycling to 125°C).

TYPICAL CHARACTERISTICS

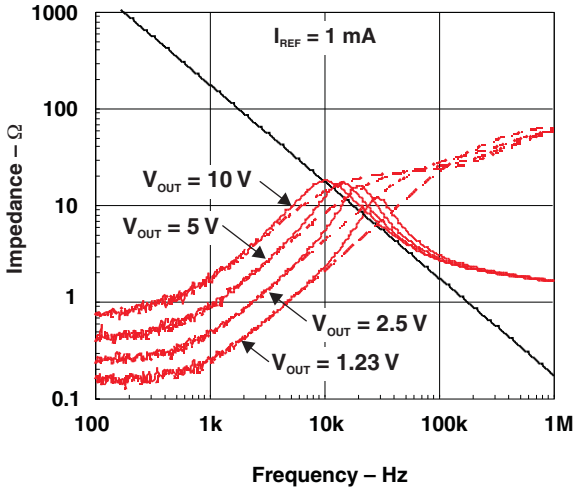
TEMPERATURE DRIFT FOR DIFFERENT AVERAGE TEMPERATURE COEFFICIENTS



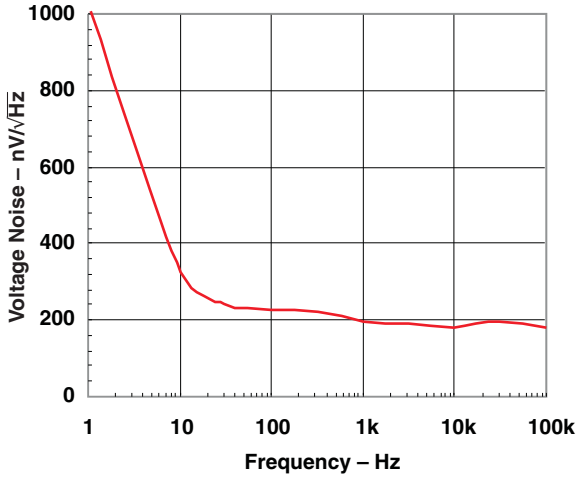
OUTPUT IMPEDANCE vs FREQUENCY



OUTPUT IMPEDANCE vs FREQUENCY

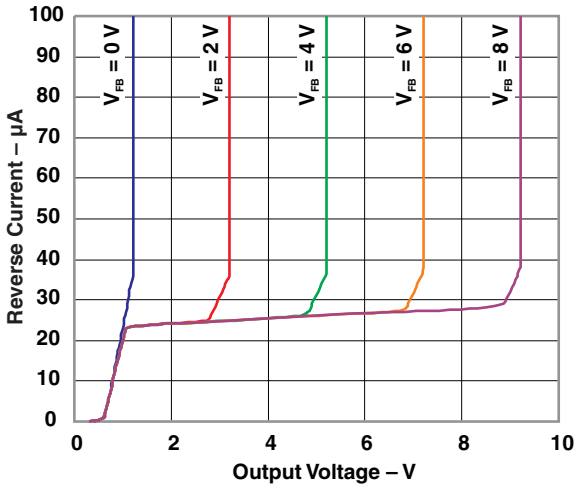


NOISE VOLTAGE vs FREQUENCY

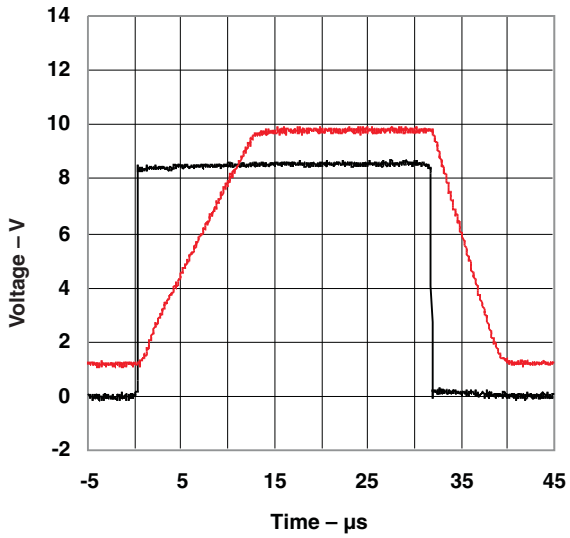


TYPICAL CHARACTERISTICS (continued)

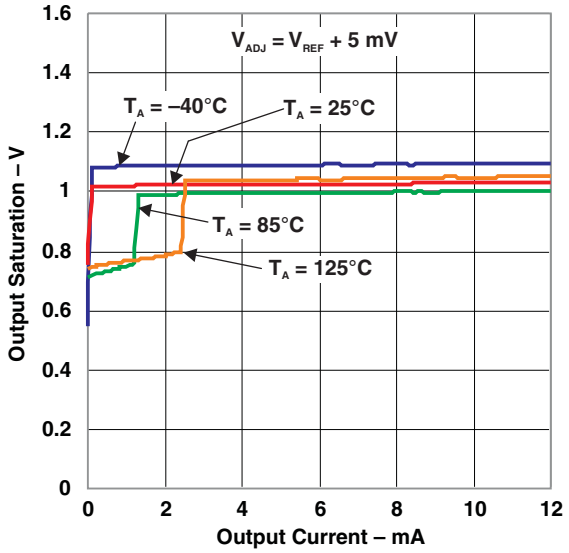
REVERSE CHARACTERISTICS



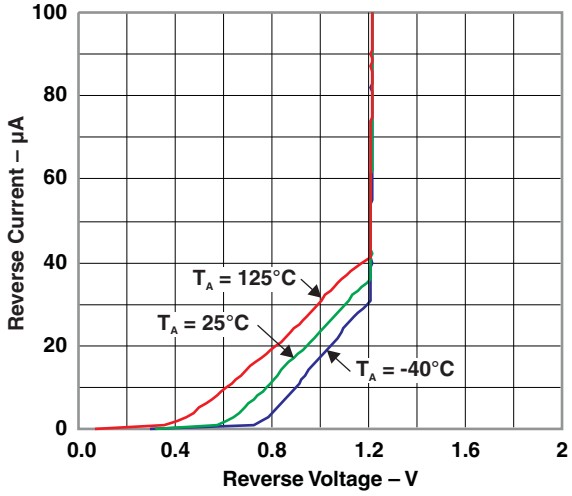
LARGE SIGNAL PULSE RESPONSE



OUTPUT SATURATION vs OUTPUT CURRENT

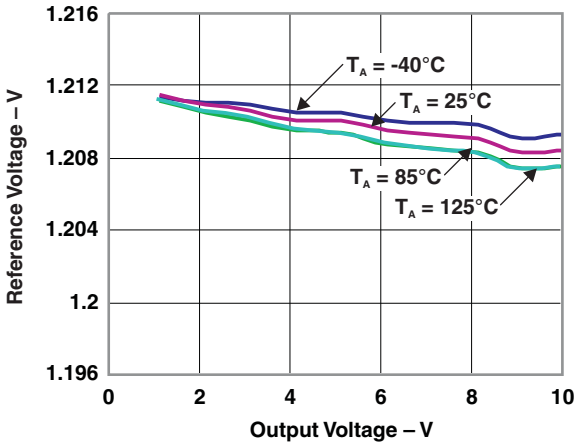


REVERSE CURRENT vs REVERSE VOLTAGE

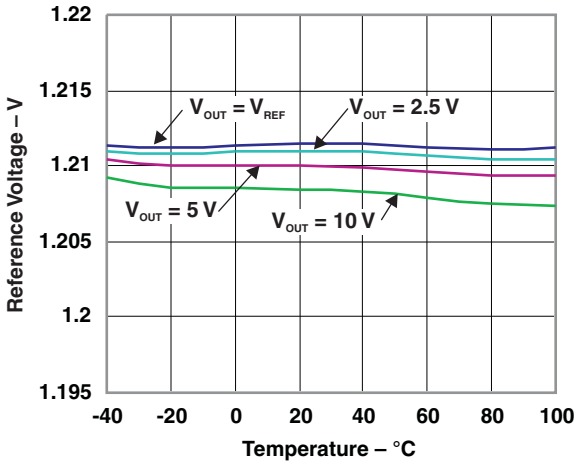


TYPICAL CHARACTERISTICS (continued)

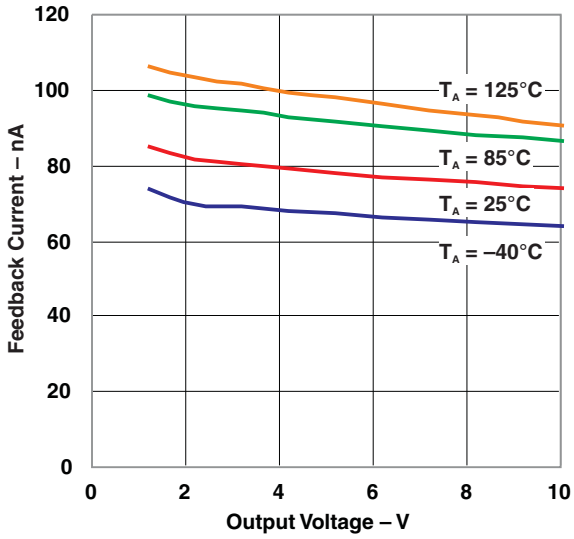
REFERENCE VOLTAGE
vs
OUTPUT VOLTAGE



REFERENCE VOLTAGE
vs
TEMPERATURE



FEEDBACK CURRENT
vs
OUTPUT VOLTAGE



APPLICATION INFORMATION

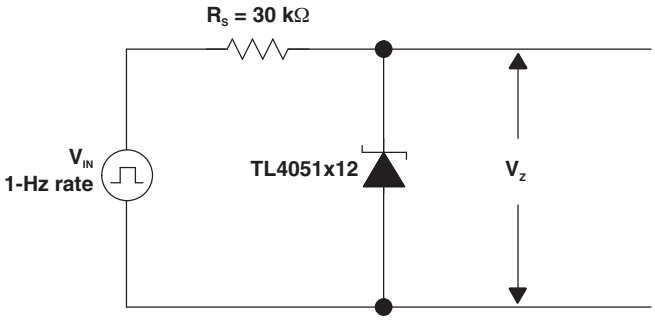


Figure 1. Start-Up Characteristics Test Circuit

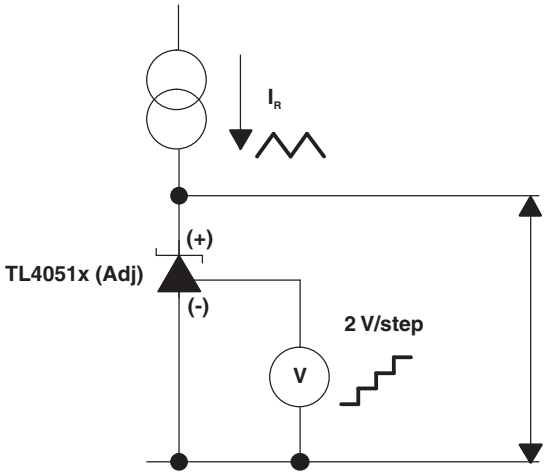


Figure 2. Reverse Characteristics Test Circuit

Output Capacitor

The TL4051 does not require an output capacitor across CATHODE and ANODE for stability. However, if an output bypass capacitor is desired, the TL4051 is designed to be stable with all capacitive loads.

SOT-23 Pin Connections

There is a parasitic Schottky diode connected between pins 2 and 3 of the SOT-23 packaged device. Thus, pin 3 of the SOT-23 package must be left floating or connected to pin 2.

APPLICATION INFORMATION (continued)

Adjustable Version

The adjustable version allows V_Z to be set by a user-defined resistor divider. The output voltage, V_Z, is set according to the equation shown in Figure 3.

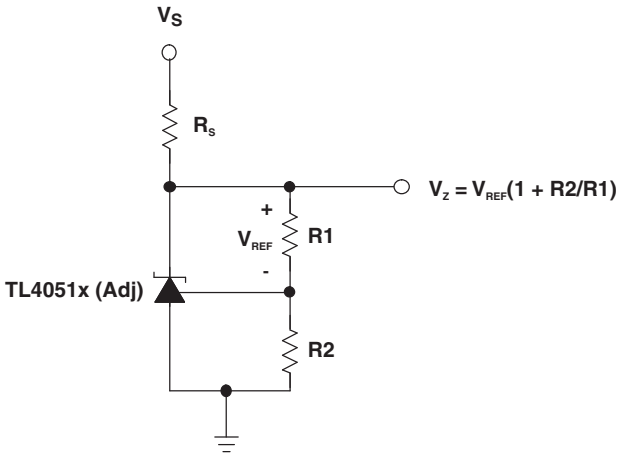


Figure 3. Adjustable Shunt Regulator

Cathode and Load Currents

In a typical shunt regulator configuration (see Figure 4), an external resistor, R_S, is connected between the supply and the cathode of the TL4051. R_S must be set properly, as it sets the total current available to supply the load (I_L) and bias the TL4051 (I_Z). In all cases, I_Z must stay within a specified range for proper operation of the reference. Taking into consideration one extreme in the variation of the load and supply voltage (maximum I_L and minimum V_S), R_S must be small enough to supply the minimum I_Z required for operation of the regulator, as given by data sheet parameters. At the other extreme, maximum V_S and minimum I_L, R_S must be large enough to limit I_Z to less than its maximum recommended rating of 12 mA.

R_S is calculated as shown in Equation 1.

$$R_S = \frac{(V_S - V_Z)}{(I_L + I_Z)} \quad (1)$$

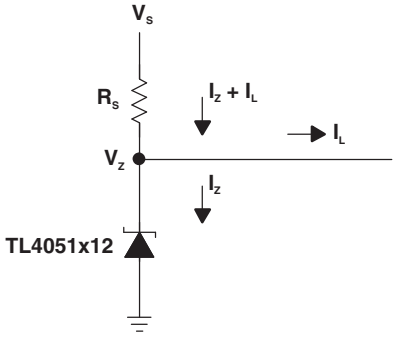


Figure 4. Shunt Regulator

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
TL4051A12IDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN8U	Samples
TL4051A12IDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN8U	Samples
TL4051A12IDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN8U	Samples
TL4051A12IDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN8U	Samples
TL4051A12IDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9DU	Samples
TL4051A12IDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9DU	Samples
TL4051A12IDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9DU	Samples
TL4051A12IDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9DU	Samples
TL4051A12QDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNVU	Samples
TL4051A12QDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNVU	Samples
TL4051A12QDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNVU	Samples
TL4051A12QDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNVU	Samples
TL4051A12QDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9GU	Samples
TL4051A12QDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9GU	Samples
TL4051A12QDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9GU	Samples
TL4051A12QDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9GU	Samples
TL4051AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN2U	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
TL4051AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN2U	Samples
TL4051AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN2U	Samples
TL4051AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN2U	Samples
TL4051AIDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	97U	Samples
TL4051AIDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	97U	Samples
TL4051AIDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	97U	Samples
TL4051AIDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	97U	Samples
TL4051AQDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN5U	Samples
TL4051AQDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN5U	Samples
TL4051AQDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN5U	Samples
TL4051AQDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN5U	Samples
TL4051AQDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9AU	Samples
TL4051AQDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9AU	Samples
TL4051AQDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9AU	Samples
TL4051AQDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9AU	Samples
TL4051B12IDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN9U	Samples
TL4051B12IDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN9U	Samples
TL4051B12IDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN9U	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
TL4051B12IDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN9U	Samples
TL4051B12IDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9EU	Samples
TL4051B12IDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9EU	Samples
TL4051B12IDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9EU	Samples
TL4051B12IDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9EU	Samples
TL4051B12QDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNWU	Samples
TL4051B12QDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNWU	Samples
TL4051B12QDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNWU	Samples
TL4051B12QDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNWU	Samples
TL4051B12QDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9HU	Samples
TL4051B12QDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9HU	Samples
TL4051B12QDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9HU	Samples
TL4051B12QDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9HU	Samples
TL4051BIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN3U	Samples
TL4051BIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN3U	Samples
TL4051BIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN3U	Samples
TL4051BIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN3U	Samples
TL4051BIDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	98U	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
TL4051BIDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	98U	Samples
TL4051BIDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	98U	Samples
TL4051BIDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	98U	Samples
TL4051BQDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN6U	Samples
TL4051BQDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN6U	Samples
TL4051BQDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN6U	Samples
TL4051BQDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN6U	Samples
TL4051BQDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9BU	Samples
TL4051BQDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9BU	Samples
TL4051BQDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9BU	Samples
TL4051BQDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9BU	Samples
TL4051C12IDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TNUU	Samples
TL4051C12IDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TNUU	Samples
TL4051C12IDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TNUU	Samples
TL4051C12IDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TNUU	Samples
TL4051C12IDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9FU	Samples
TL4051C12IDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9FU	Samples
TL4051C12IDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9FU	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
TL4051C12IDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	9FU	Samples
TL4051C12QDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNYU	Samples
TL4051C12QDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNYU	Samples
TL4051C12QDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNYU	Samples
TL4051C12QDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TNYU	Samples
TL4051C12QDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9JU	Samples
TL4051C12QDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9JU	Samples
TL4051C12QDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9JU	Samples
TL4051C12QDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9JU	Samples
TL4051CIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN4U	Samples
TL4051CIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN4U	Samples
TL4051CIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN4U	Samples
TL4051CIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	TN4U	Samples
TL4051CIDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	99U	Samples
TL4051CIDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	99U	Samples
TL4051CIDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	99U	Samples
TL4051CIDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 85	99U	Samples
TL4051CQDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN7U	Samples

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
TL4051CQDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN7U	Samples
TL4051CQDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN7U	Samples
TL4051CQDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	TN7U	Samples
TL4051CQDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9CU	Samples
TL4051CQDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9CU	Samples
TL4051CQDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9CU	Samples
TL4051CQDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM	-40 to 125	9CU	Samples

(1) 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.

(2) 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)

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

(4) Only one of markings shown within the brackets will appear on the physical device.

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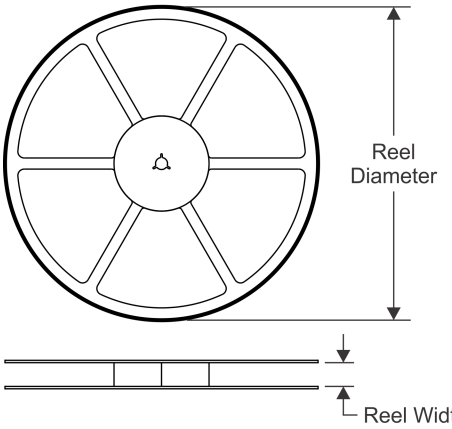
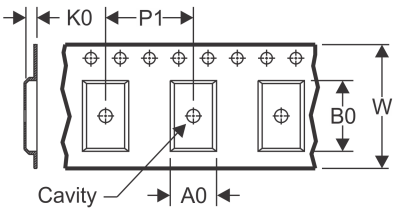
TAPE AND REEL INFORMATION

REEL DIMENSIONS

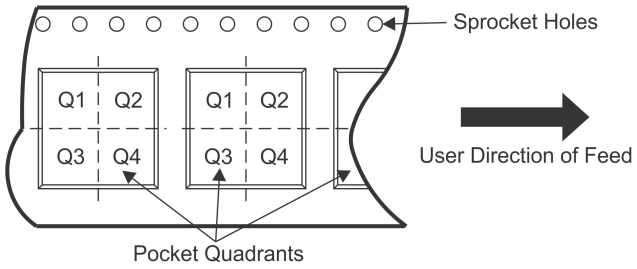


TAPE DIMENSIONS



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

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

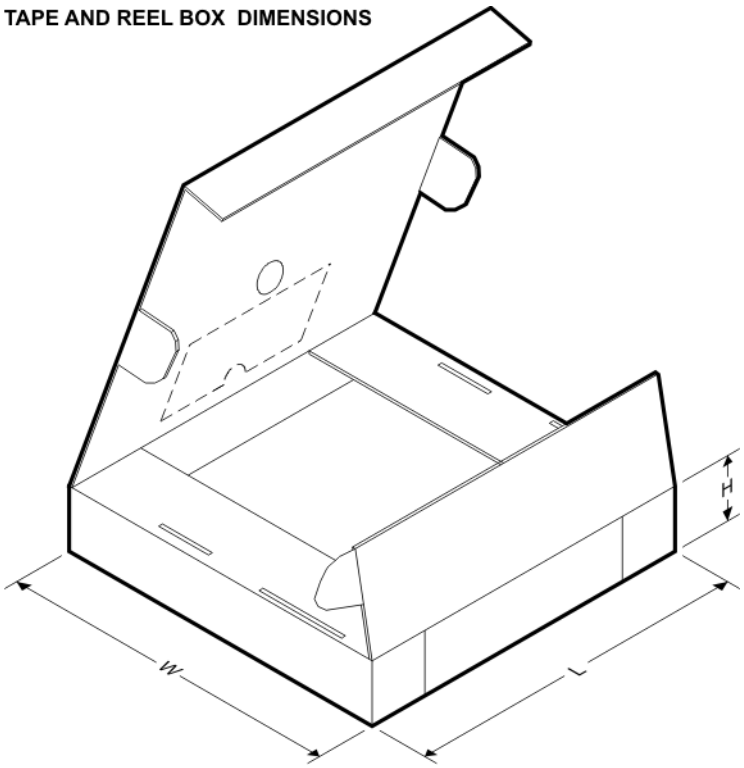


*All dimensions are nominal

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
TL4051A12IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051A12IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051A12IDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051A12IDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051A12QDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051A12QDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051A12QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051A12QDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051AIDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051AIDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051AIDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051AIDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051AQDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051AQDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051AQDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051AQDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051B12IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051B12IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3

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
TL4051B12IDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051B12IDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051B12QDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051B12QDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051B12QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051B12QDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051BIDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051BIDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051BIDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051BIDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051BQDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051BQDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051BQDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051BQDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051C12IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051C12IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051C12IDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051C12IDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051C12QDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051C12QDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051C12QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051C12QDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051CIDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051CIDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051CIDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051CIDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051CQDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051CQDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051CQDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051CQDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS

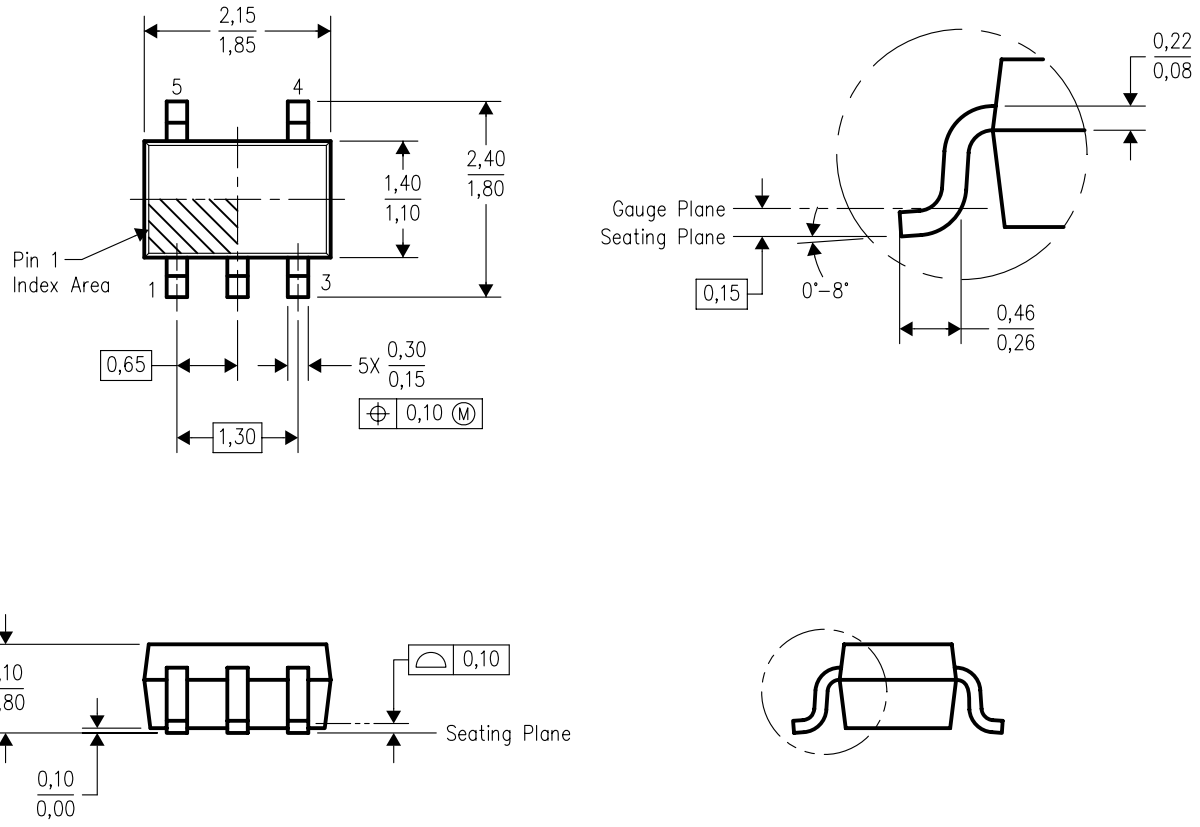


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TL4051A12IDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051A12IDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051A12IDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051A12IDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051A12QDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051A12QDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051A12QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051A12QDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051AIDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051AIDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051AIDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051AIDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051AQDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051AQDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051AQDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051AQDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051B12IDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051B12IDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051B12IDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051B12IDCKT	SC70	DCK	5	250	203.0	203.0	35.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TL4051B12QDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051B12QDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051B12QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051B12QDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051BIDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051BIDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051BIDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051BIDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051BQDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051BQDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051BQDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051BQDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051C12IDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051C12IDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051C12IDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051C12IDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051C12QDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051C12QDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051C12QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051C12QDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051CIDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051CIDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051CIDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051CIDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4051CQDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4051CQDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4051CQDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4051CQDCKT	SC70	DCK	5	250	203.0	203.0	35.0

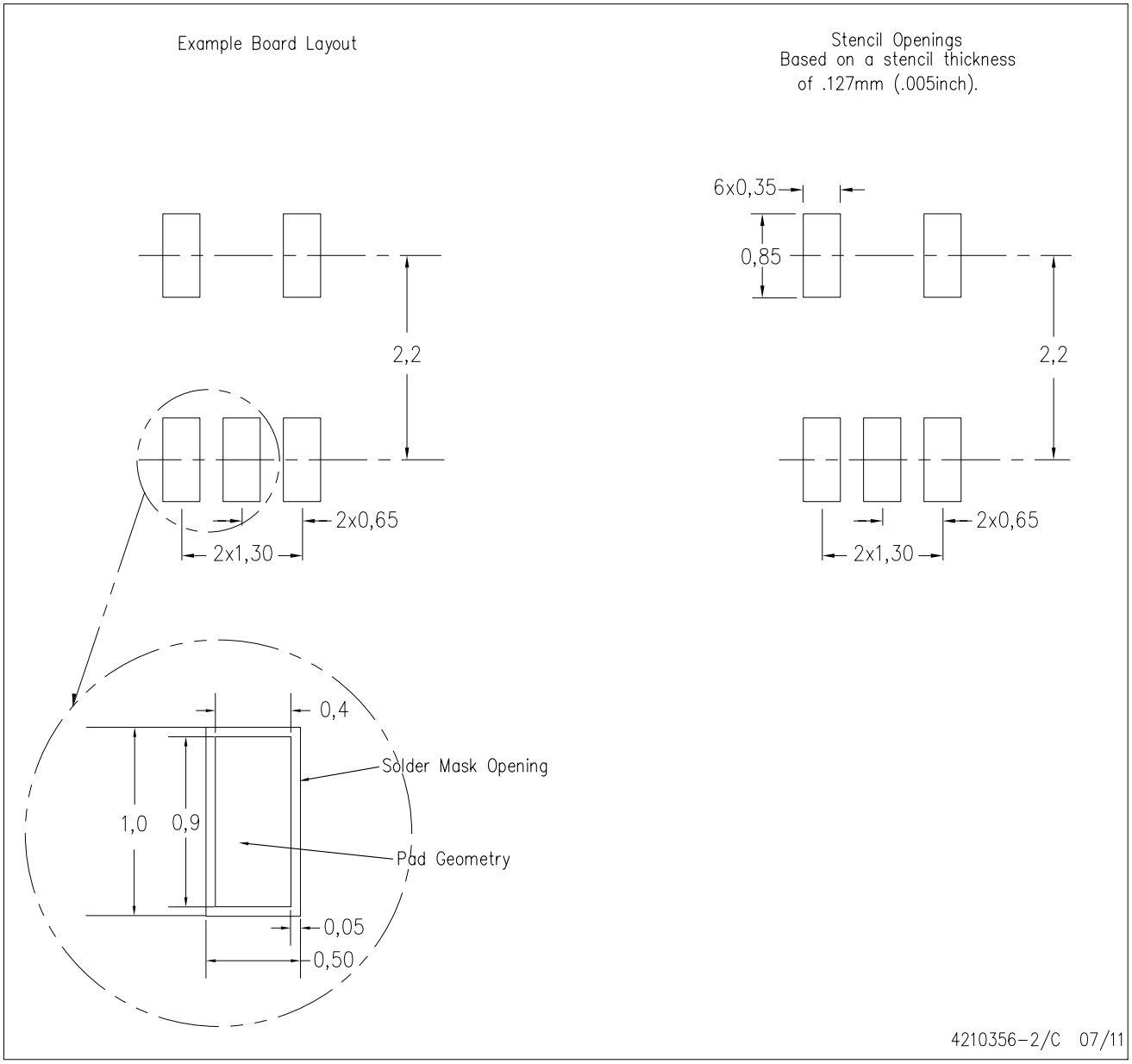
DCK (R–PDSO–G5) PLASTIC SMALL–OUTLINE PACKAGE



4093553–3/G 01/2007

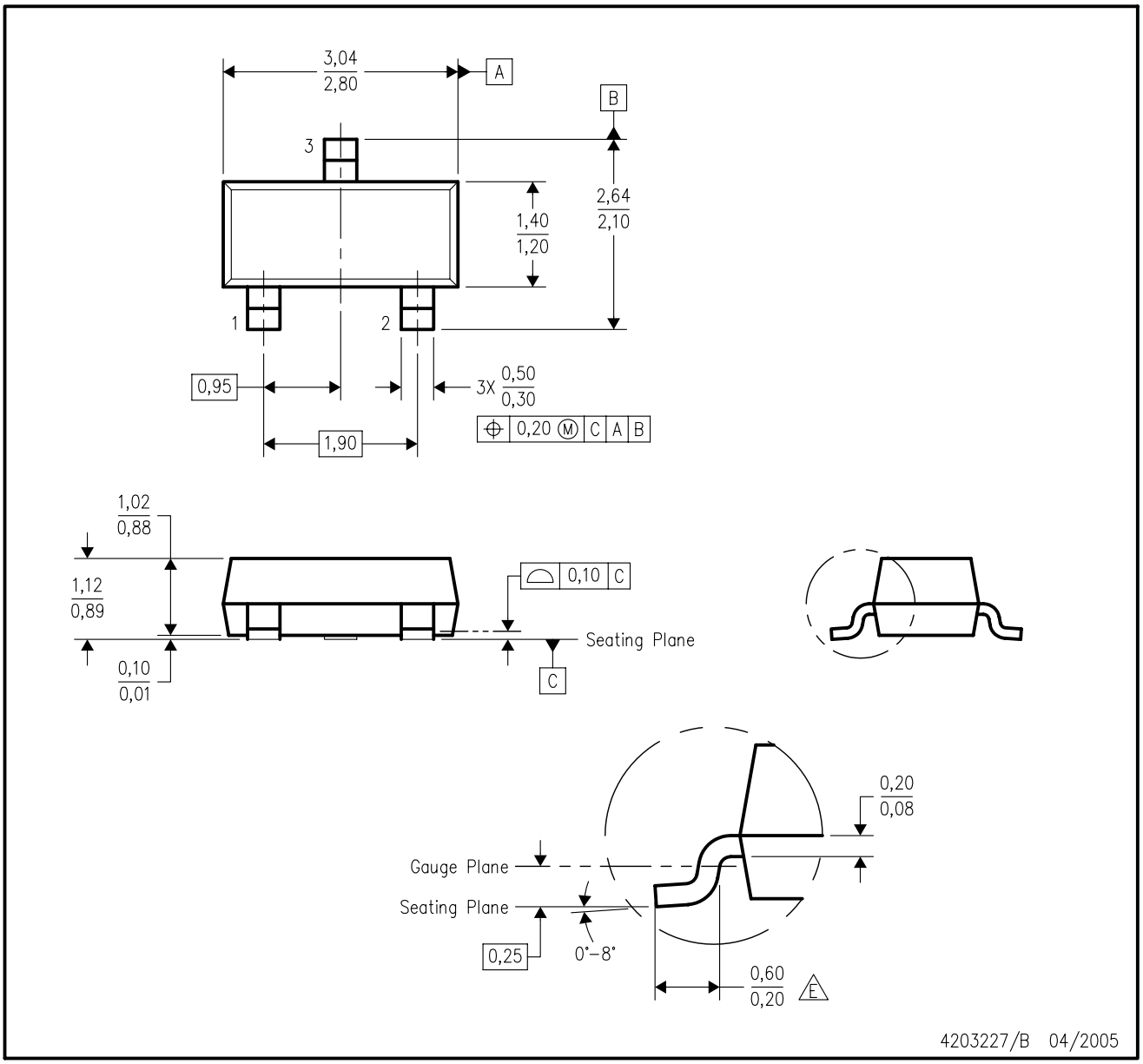
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion. Mold flash and protrusion shall not exceed 0.15 per side.
D. Falls within JEDEC MO–203 variation AA.

DCK (R–PDSO–G5) PLASTIC SMALL OUTLINE



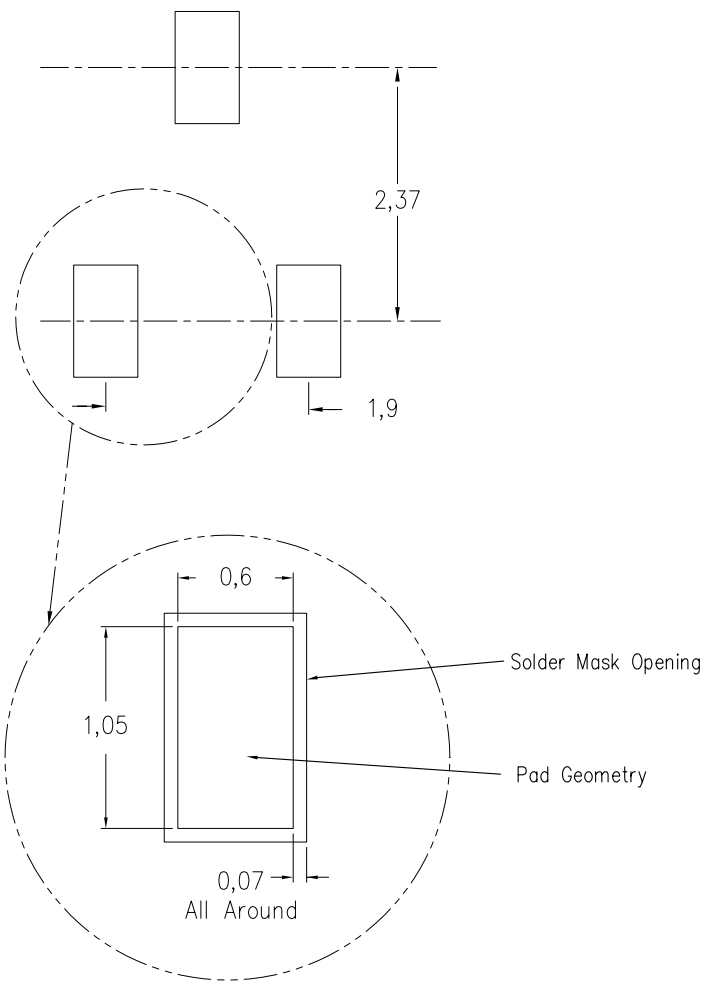
NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
D. Publication IPC–7351 is recommended for alternate designs.
E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC–7525 for other stencil recommendations.

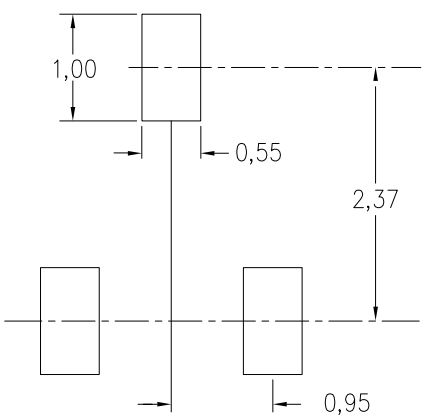
DBZ (R–PDSO–G3) PLASTIC SMALL–OUTLINE



NOTES:
A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M–1994.
B. This drawing is subject to change without notice.
C. Lead dimensions are inclusive of plating.
D. Body dimensions are exclusive of mold flash and protrusion. Mold flash and protrusion not to exceed 0.25 per side.
E. Falls within JEDEC TO–236 variation AB, except minimum foot length.

DBZ (R–PDSO–G3) PLASTIC SMALL OUTLINE





4212057/A 08/11

NOTES:
A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Customers should place a note on the circuit board fabrication drawing not to alter the center solder mask defined pad.
D. Publication IPC–7351 is recommended for alternate designs.
E. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Example stencil design based on a 50% volumetric metal load solder paste. Refer to IPC–7525 for other stencil recommendations.

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TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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