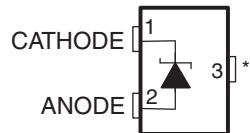


FEATURES

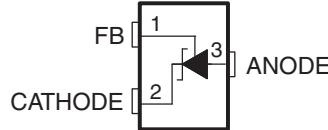
- 1.225-V Fixed and Adjustable (1.225-V to 10-V) Outputs
- Tight Output Tolerances and Low Temperature Coefficient
 - Max 0.1%, 50 ppm/ $^{\circ}\text{C}$ – A Grade
 - Max 0.2%, 50 ppm/ $^{\circ}\text{C}$ – B Grade
 - Max 0.5%, 50 ppm/ $^{\circ}\text{C}$ – C Grade
- Low Output Noise...20 μV_{RMS} (Typ)
- 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

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.

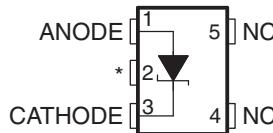
Adjustable...DBZ (SOT-23-3) PACKAGE
(TOP VIEW)



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

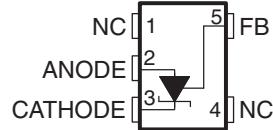
1.2 V...DCK (SC-70) PACKAGE
(TOP VIEW)



NC – No internal connection

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

Adjustable...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 TL4051xl 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.

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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_
		1.2 V	SOT-23-3 – DBZ	Reel of 250	TL4051AIDCKT	
				Reel of 3000	TL4051A12IDBZR	TN8_
			SC-70 – DCK	Reel of 250	TL4051A12IDBZT	
				Reel of 3000	TL4051A12IDCKR	9D_
	B grade: 0.2% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 250	TL4051BIDBZR	TN3_
				Reel of 3000	TL4051BIDBZT	
			SC-70 – DCK	Reel of 250	TL4051BIDCKT	98_
		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_
		1.2 V	SOT-23-3 – DBZ	Reel of 250	TL4051CIDCKT	
				Reel of 3000	TL4051C12IDBZR	TNU_
			SC-70 – DCK	Reel of 250	TL4051C12IDBZT	
				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⁾

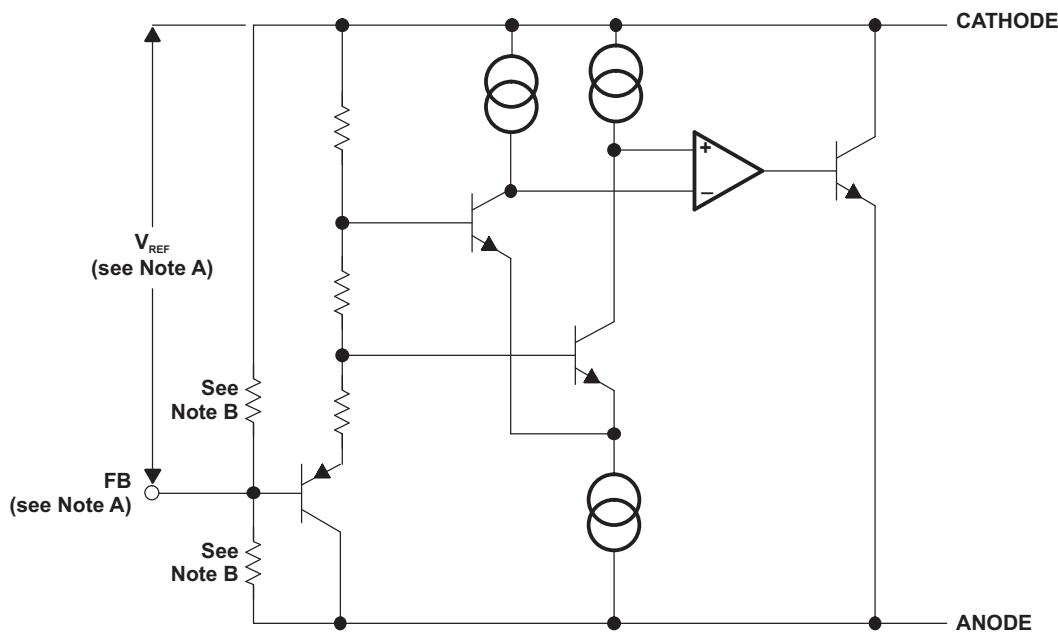
T _A	DEVICE GRADE	V _Z	PACKAGE ⁽²⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING ⁽³⁾
–40°C to 125°C	A grade: 0.1% initial accuracy and 50 ppm/°C temperature coefficient	ADJ	SOT-23-3 – DBZ	Reel of 3000	TL4051AQDBZR	TN5_
				Reel of 250	TL4051AQDBZT	
			SC-70 – DCK	Reel of 3000	TL4051AQDCKR	9A_
		1.2 V	SOT-23-3 – DBZ	Reel of 250	TL4051AQDCKT	
				Reel of 3000	TL4051A12QDBZR	TNV_
			SC-70 – DCK	Reel of 250	TL4051A12QDBZT	
	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_
		1.2 V	SOT-23-3 – DBZ	Reel of 250	TL4051BQDCKT	
				Reel of 3000	TL4051B12QDBZR	TNW_
			SC-70 – DCK	Reel of 250	TL4051B12QDBZT	
	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_
		1.2 V	SOT-23-3 – DBZ	Reel of 250	TL4051CQDCKT	
				Reel of 3000	TL4051C12QDBZR	TNY_
			SC-70 – DCK	Reel of 250	TL4051C12QDBZT	
			SOT-23-3 – DBZ	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)/θ_{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
		Q temperature	-40	125

(1) See parametric tables

TL4051x12I Electrical Characteristics

 full range $T_A = -40^\circ\text{C}$ 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	$I_Z = 100 \mu\text{A}$	25°C	1.225		1.225			1.225			V
V_Z	Reverse breakdown voltage tolerance	$I_Z = 100 \mu\text{A}$	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	$I_Z = 100 \mu\text{A}$	25°C	±20		±20		±20				ppm/ $^\circ\text{C}$
			25°C	±15		±15		±15				
			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	$I_{Z,min} < I_Z < 1 \text{ mA}$	25°C	0.3	1.1	0.3	1.1	0.3	1.1			mV
			Full range		1.5		1.5		1.5			
		$1 \text{ mA} < I_Z < 12 \text{ mA}$	25°C	1.8	6	1.8	6	1.8	6			
			Full range		8		8		8			
Z_Z	Reverse dynamic impedance	$I_Z = 1 \text{ mA}$, $f = 120 \text{ Hz}$, $I_{AC} = 0.1 I_Z$	25°C	0.5		0.5		0.5				Ω
e_N	Wideband noise	$I_Z = 100 \mu\text{A}$, $10 \text{ Hz} \leq f \leq 10 \text{ kHz}$	25°C	20		20		20				μVRMS
	Long-term stability of reverse breakdown voltage	$t = 1000 \text{ h}$, $T_A = 25^\circ\text{C} \pm 0.1^\circ\text{C}$, $I_Z = 100 \mu\text{A}$	25°C	120		120		120				ppm
V_{HYST}	Thermal hysteresis ⁽¹⁾	$\Delta T_A = -40^\circ\text{C}$ to 125°C		0.36		0.36		0.36				mV/V

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

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 **TEXAS
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TL4051x12Q Electrical Characteristics

full range $T_A = -40^\circ\text{C}$ 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	$I_Z = 100 \mu\text{A}$	25°C	1.225		1.225			1.225			V
V_Z	Reverse breakdown voltage tolerance	$I_Z = 100 \mu\text{A}$	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	$I_Z = 100 \mu\text{A}$	25°C	±20		±20		±20				ppm/ $^\circ\text{C}$
			$I_Z = 1 \text{ mA}$	±15		±15		±15				
			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	$I_{Z,min} < I_Z < 1 \text{ mA}$	25°C	0.3	1.1	0.3	1.1	0.3	1.1			mV
			Full range		1.5			1.5		1.5		
		$1 \text{ mA} < I_Z < 12 \text{ mA}$	25°C	1.8	6	1.8	6	1.8	6			
			Full range		8			8		8		
Z_Z	Reverse dynamic impedance	$I_Z = 1 \text{ mA}$, $f = 120 \text{ Hz}$, $I_{AC} = 0.1 I_Z$	25°C	0.5		0.5		0.5				Ω
e_N	Wideband noise	$I_Z = 100 \mu\text{A}$, $10 \text{ Hz} \leq f \leq 10 \text{ kHz}$	25°C	20		20		20				μV_{RMS}
	Long-term stability of reverse breakdown voltage	$t = 1000 \text{ h}$, $T_A = 25^\circ\text{C} \pm 0.1^\circ\text{C}$, $I_Z = 100 \mu\text{A}$	25°C	120		120		120				ppm
V_{HYST}	Thermal hysteresis ⁽¹⁾	$\Delta T_A = -40^\circ\text{C}$ to 125°C		0.36		0.36		0.36				mV/V

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

TL4051xl (Adjustable Version) Electrical Characteristics

full range $T_A = -40^\circ\text{C}$ 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	$I_Z = 100 \mu\text{A}$, $V_Z = 5 \text{ V}$	25°C	1.212			1.212			1.212			V
ΔV_{REF} ΔI_z	Reference voltage tolerance ⁽¹⁾	$I_Z = 100 \mu\text{A}$, $V_Z = 5 \text{ V}$	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				
$I_{Z,\text{min}}$	Minimum cathode current		25°C	36	60	36	60	36	65	μA			
			Full range		65		65		70				
$\frac{\Delta V_{\text{REF}}}{\Delta I_z}$	Reference voltage change with cathode current change	$I_{Z,\text{min}} < I_Z < 1 \text{ mA}$	25°C	0.3	1.1	0.3	1.1	0.3	1.1	mV			
			Full range		1.5		1.5		1.5				
		$1 \text{ mA} < I_Z < 12 \text{ mA}$	25°C	0.6	6	0.6	6	0.6	6				
			Full range		8		8		8				
$\frac{\Delta V_{\text{REF}}}{\Delta V_{\text{KA}}}$	Reference voltage change with output voltage change	$I_Z = 1 \text{ mA}$	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⁾	$I_Z = 10 \text{ mA}$, $V_Z = 2.5 \text{ V}$	25°C	±20			±20			ppm/°C			
		$I_Z = 1 \text{ mA}$, $V_Z = 2.5 \text{ V}$	25°C	±15			±15						
		$I_Z = 100 \mu\text{A}$, $V_Z = 2.5 \text{ V}$	25°C	±15			±15						
			Full range	±50			±50						
Z_Z	Reverse dynamic impedance	$I_Z = 1 \text{ mA}$, $f = 120 \text{ Hz}$, $I_{AC} = 0.1 I_Z$, $V_Z = V_{\text{REF}}$	25°C	0.3			0.3			Ω			
		$I_Z = 1 \text{ mA}$, $f = 120 \text{ Hz}$, $I_{AC} = 0.1 I_Z$, $V_Z = 10 \text{ V}$	25°C	2			2						
e_N	Wideband noise	$I_Z = 100 \mu\text{A}$, $V_Z = V_{\text{REF}}$, $10 \text{ Hz} \leq f \leq 10 \text{ kHz}$	25°C	20			20			20	μV _{RMS}		
	Long-term stability of reverse breakdown voltage	$t = 1000 \text{ h}$, $T_A = 25^\circ\text{C} \pm 0.1^\circ\text{C}$, $I_Z = 100 \mu\text{A}$	25°C	120			120			120	ppm		
V_{HYST}	Thermal hysteresis ⁽²⁾	$\Delta T_A = -40^\circ\text{C}$ 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 $V_{Z,25^\circ\text{C}}$ (after cycling to -40°C) – $V_{Z,25^\circ\text{C}}$ (after cycling to 125°C).

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TL4051xQ (Adjustable Version) Electrical Characteristics

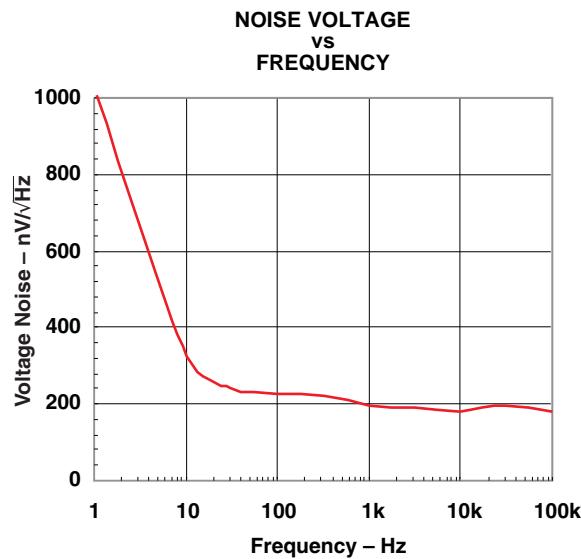
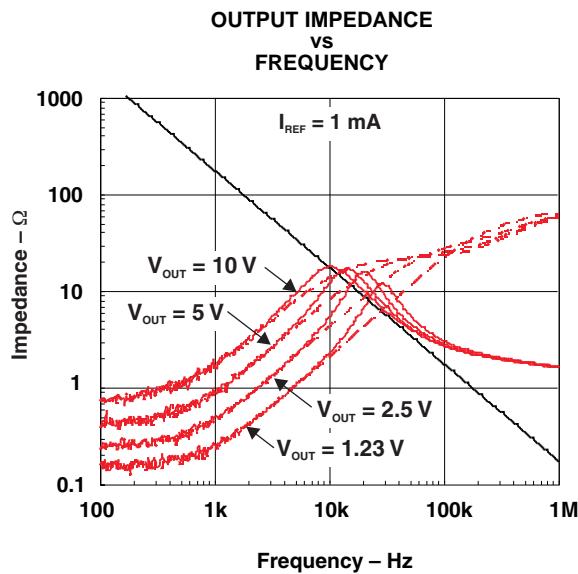
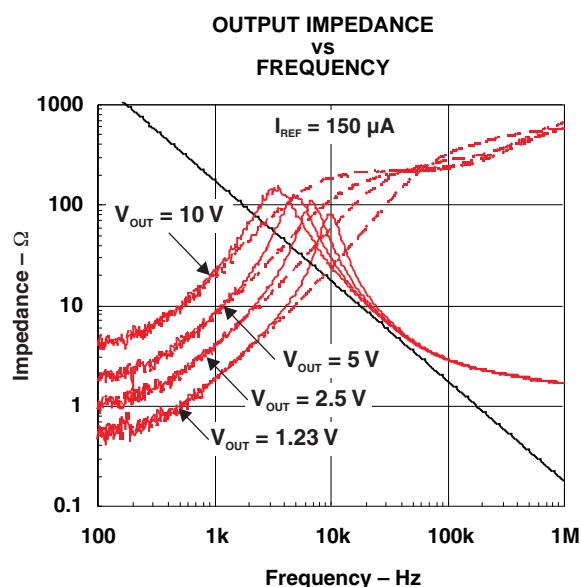
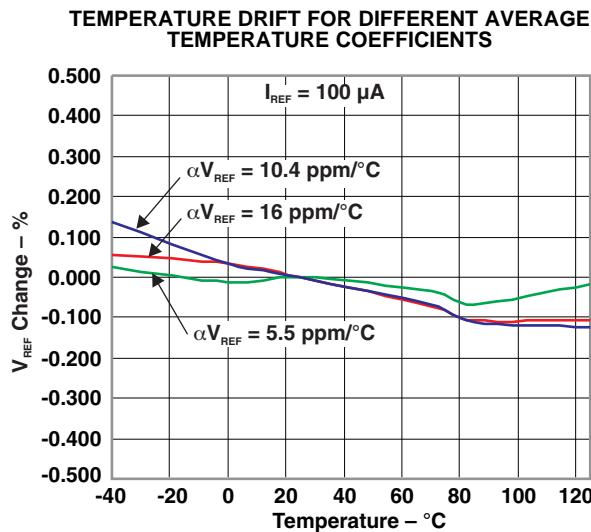
full range $T_A = -40^\circ\text{C}$ to 125°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS	T_A	TL4051AQ			TL4051BQ			TL4051CQ			UNIT	
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
V_{REF}	Reference voltage	$I_Z = 100 \mu\text{A}, V_Z = 5 \text{ V}$	25°C	1.212			1.212			1.212			V
$\frac{\Delta V_{\text{REF}}}{\Delta I_Z}$	Reference voltage tolerance ⁽¹⁾	$I_Z = 100 \mu\text{A}, V_Z = 5 \text{ V}$	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				
$I_{Z,\text{min}}$	Minimum cathode current		25°C	36	60	36	60	36	65	μA			
			Full range		70		70		75				
$\frac{\Delta V_{\text{REF}}}{\Delta I_Z}$	Reference voltage change with cathode current change	$I_{Z,\text{min}} < I_Z < 1 \text{ mA}$	25°C	0.3	1.1	0.3	1.1	0.3	1.1	mV			
			Full range		1.5		1.5		1.5				
		$1 \text{ mA} < I_Z < 12 \text{ mA}$	25°C	0.6	6	0.6	6	0.6	6				
			Full range		8		8		8				
$\frac{\Delta V_{\text{REF}}}{\Delta V_{\text{KA}}}$	Reference voltage change with output voltage change	$I_Z = 1 \text{ mA}$	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⁾	$I_Z = 10 \text{ mA}, V_Z = 2.5 \text{ V}$	25°C	± 20		± 20		± 20		ppm/°C			
		$I_Z = 1 \text{ mA}, V_Z = 2.5 \text{ V}$	25°C	± 15		± 15		± 15					
		$I_Z = 100 \mu\text{A}, V_Z = 2.5 \text{ V}$	25°C	± 15		± 15		± 15					
			Full range	± 50		± 50		± 50					
Z_Z	Reverse dynamic impedance	$I_Z = 1 \text{ mA}, f = 120 \text{ Hz}, I_{\text{AC}} = 0.1 I_Z, V_Z = V_{\text{REF}}$	25°C	0.3		0.3		0.3		Ω			
		$I_Z = 1 \text{ mA}, f = 120 \text{ Hz}, I_{\text{AC}} = 0.1 I_Z, V_Z = 10 \text{ V}$	25°C	2		2		2					
e_N	Wideband noise	$I_Z = 100 \mu\text{A}, V_Z = V_{\text{REF}}, 10 \text{ Hz} \leq f \leq 10 \text{ kHz}$	25°C	20		20		20		μV_{RMS}			
	Long-term stability of reverse breakdown voltage	$t = 1000 \text{ h}, T_A = 25^\circ\text{C} \pm 0.1^\circ\text{C}, I_Z = 100 \mu\text{A}$	25°C	120		120		120		ppm			
V_{HYST}	Thermal hysteresis ⁽²⁾	$\Delta T_A = -40^\circ\text{C}$ 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*.

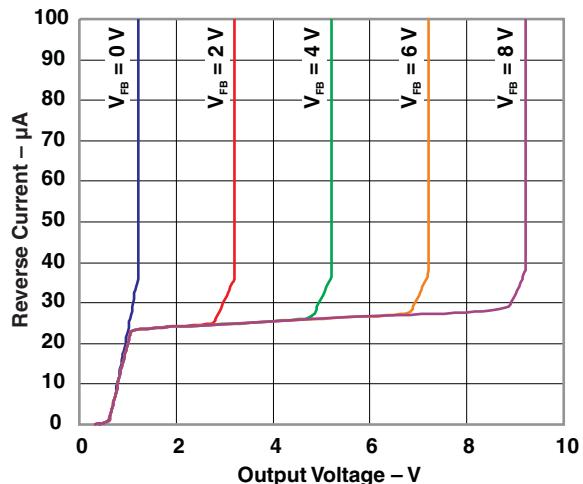
(2) Thermal hysteresis is defined as $V_{Z,25^\circ\text{C}}$ (after cycling to -40°C) – $V_{Z,25^\circ\text{C}}$ (after cycling to 125°C).

TYPICAL CHARACTERISTICS

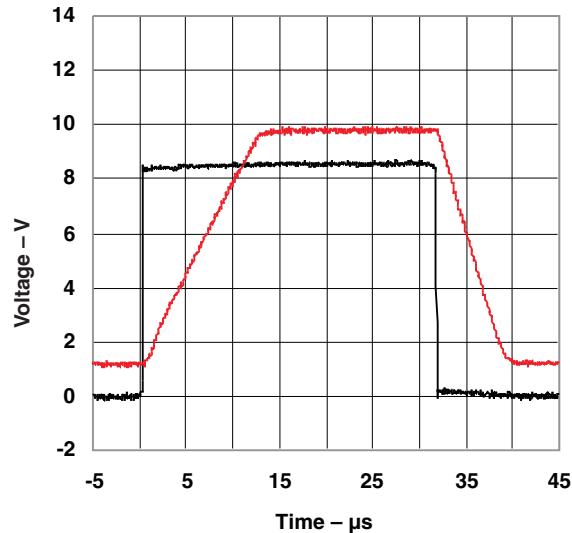


TYPICAL CHARACTERISTICS (continued)

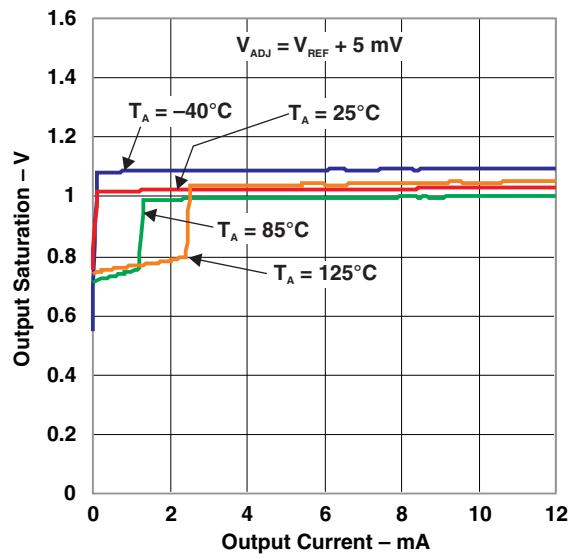
REVERSE CHARACTERISTICS



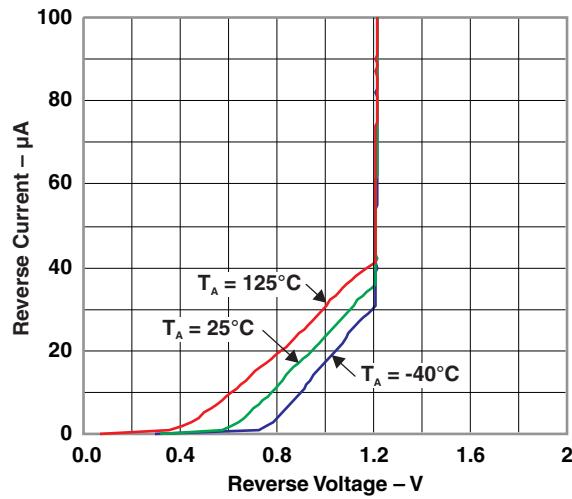
LARGE SIGNAL PULSE RESPONSE



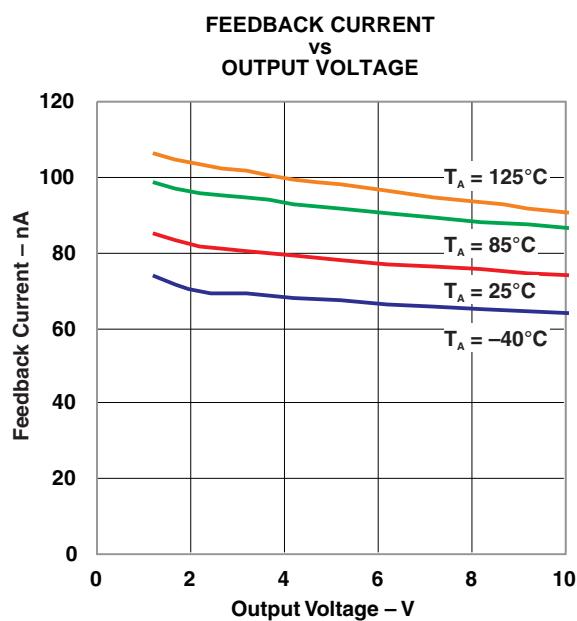
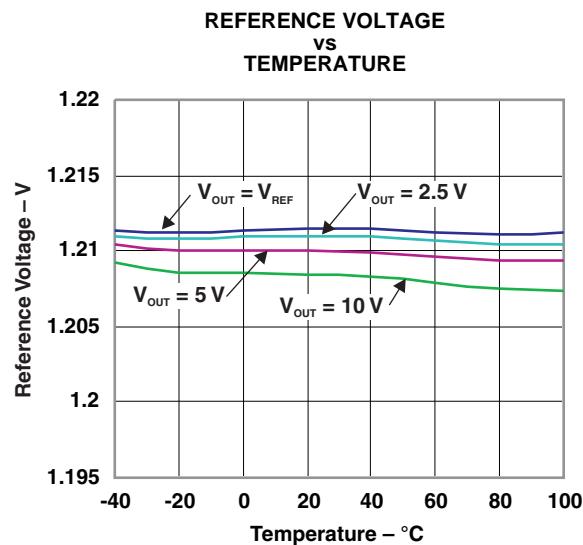
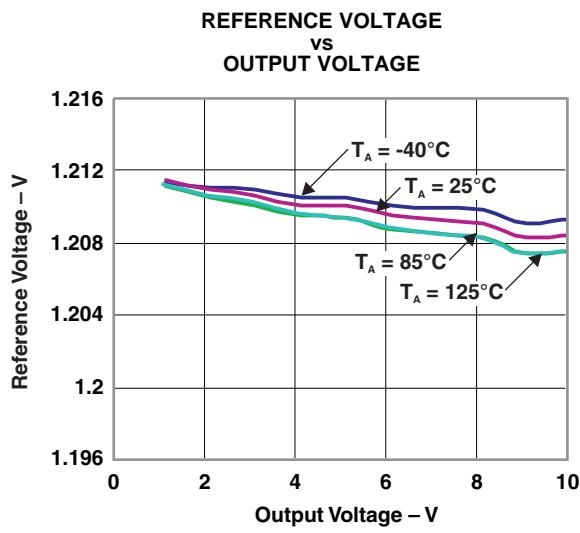
**OUTPUT SATURATION
VS
OUTPUT CURRENT**



**REVERSE CURRENT
VS
REVERSE VOLTAGE**



TYPICAL CHARACTERISTICS (continued)



APPLICATION INFORMATION

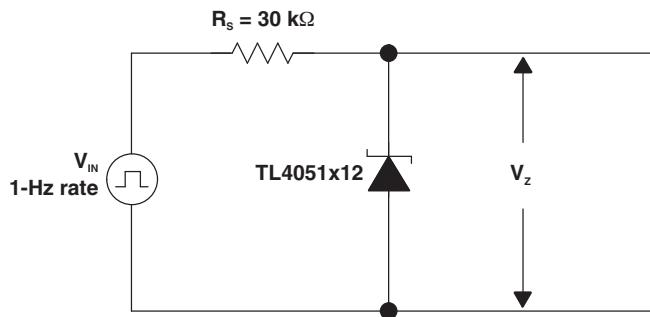


Figure 1. Start-Up Characteristics Test Circuit

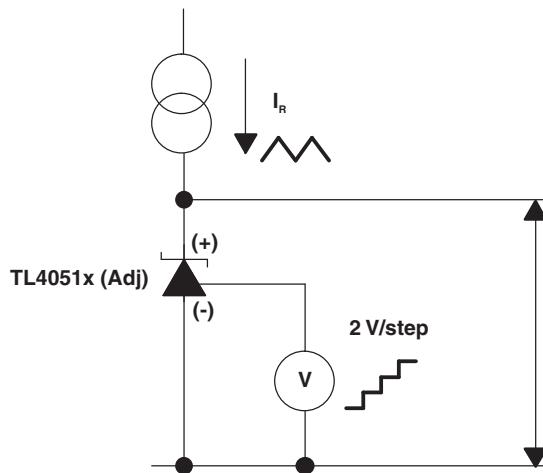


Figure 2. Reverse Characteristics Test Circuit

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](#).

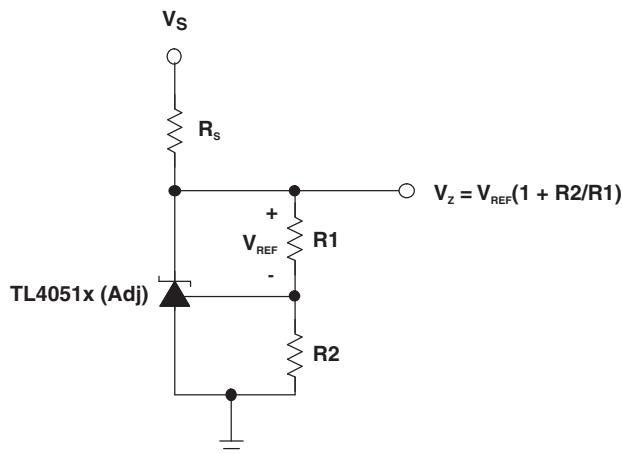


Figure 3. Adjustable Shunt Regulator

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](#).

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

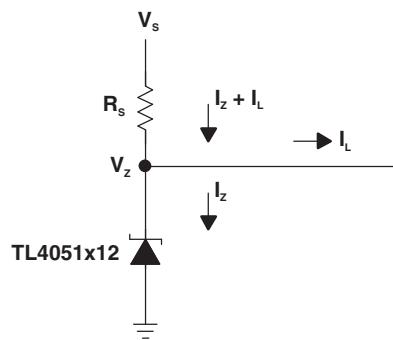


Figure 4. Shunt Regulator

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
TL4051A12IDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12IDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12IDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12IDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12IDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12IDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12IDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12IDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051A12QDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AIDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AQDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Package Qty	Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
TL4051AQDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AQDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AQDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AQDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AQDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AQDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051AQDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12IDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051B12QDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051BIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051BIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051BIDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

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TL4051BIDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
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TL4051BQDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
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TL4051BQDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051C12IDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051C12IDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
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TL4051C12QDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051C12QDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051CIDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051CIDBZRG4	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
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TL4051CQDBZR	ACTIVE	SOT-23	DBZ	3	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
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TL4051CQDBZT	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051CQDBZTG4	ACTIVE	SOT-23	DBZ	3	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051CQDCKR	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051CQDCKRG4	ACTIVE	SC70	DCK	5	3000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051CQDCKT	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
TL4051CQDCKTG4	ACTIVE	SC70	DCK	5	250	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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)

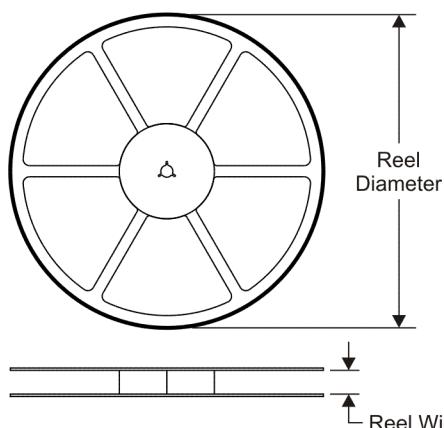
(³) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

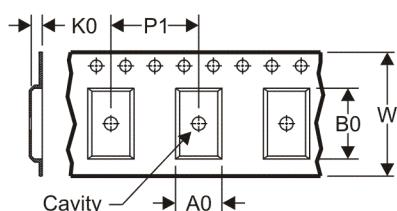
In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

TAPE AND REEL INFORMATION

REEL DIMENSIONS

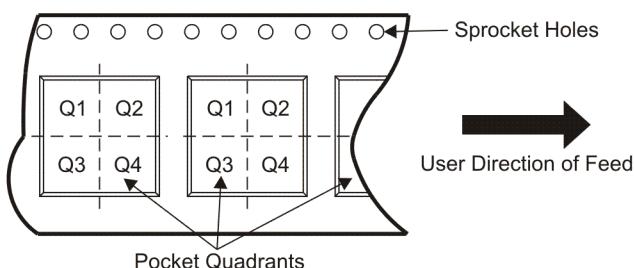


TAPE DIMENSIONS



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

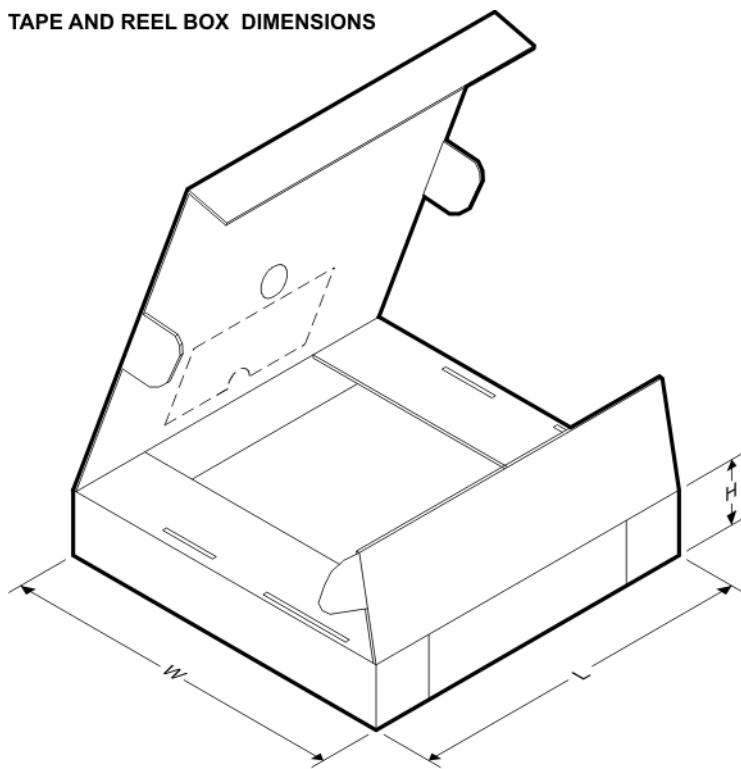
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
TL4051B1DBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051B1DBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4051B1DCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4051B1DCKT	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


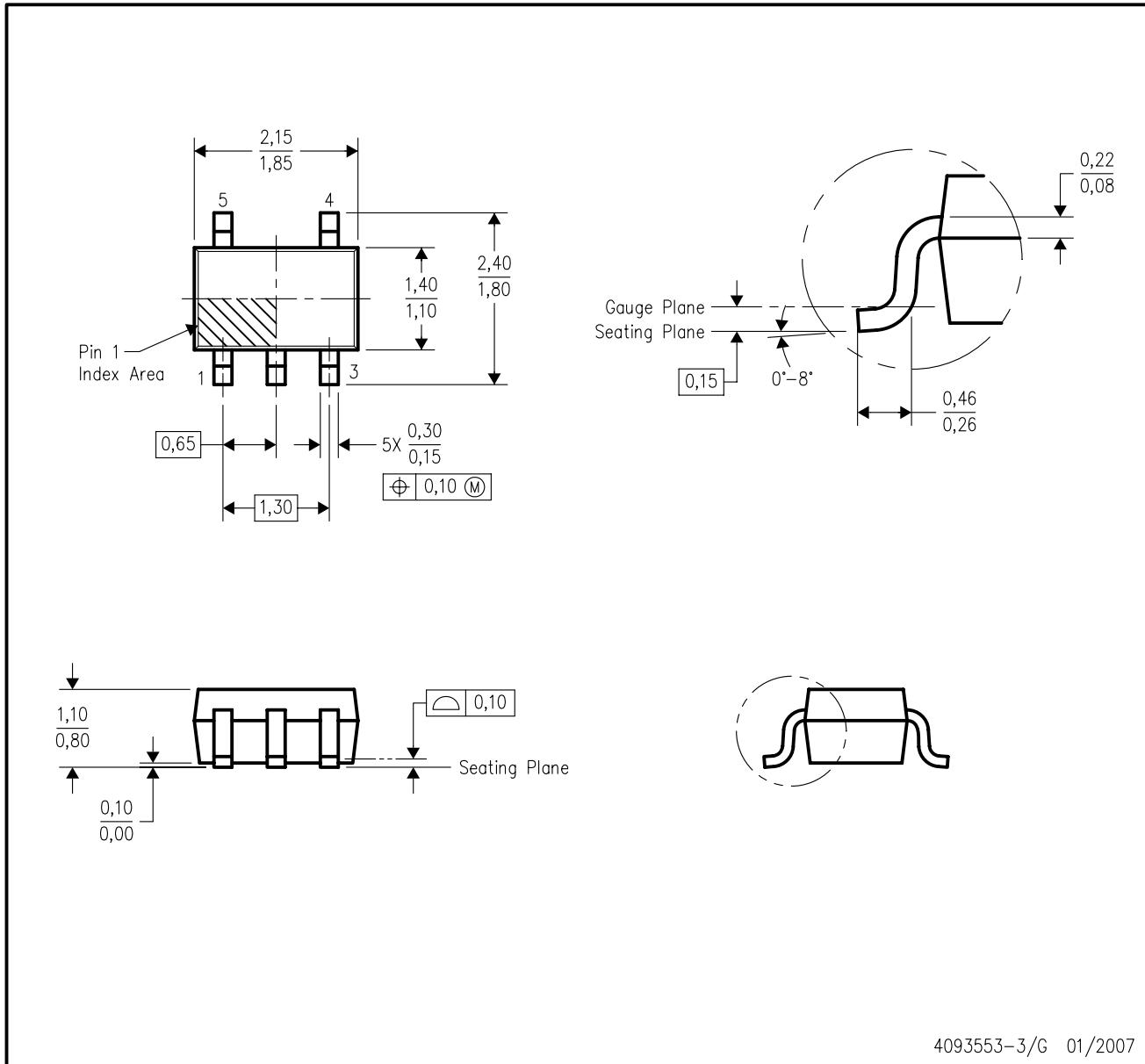
*All dimensions are nominal

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

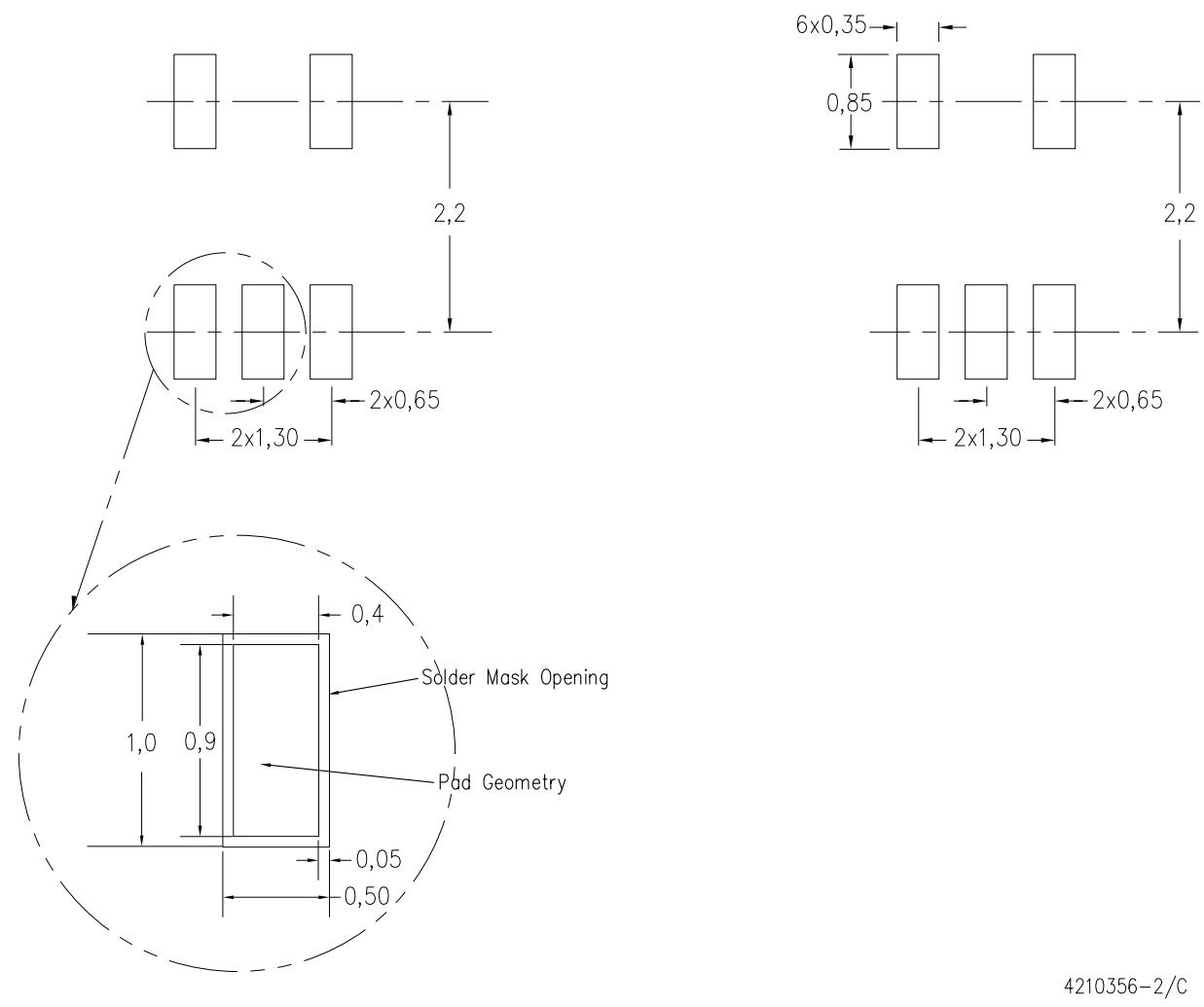
LAND PATTERN DATA

DCK (R-PDSO-G5)

PLASTIC SMALL OUTLINE

Example Board Layout

Stencil Openings
Based on a stencil thickness
of .127mm (.005inch).

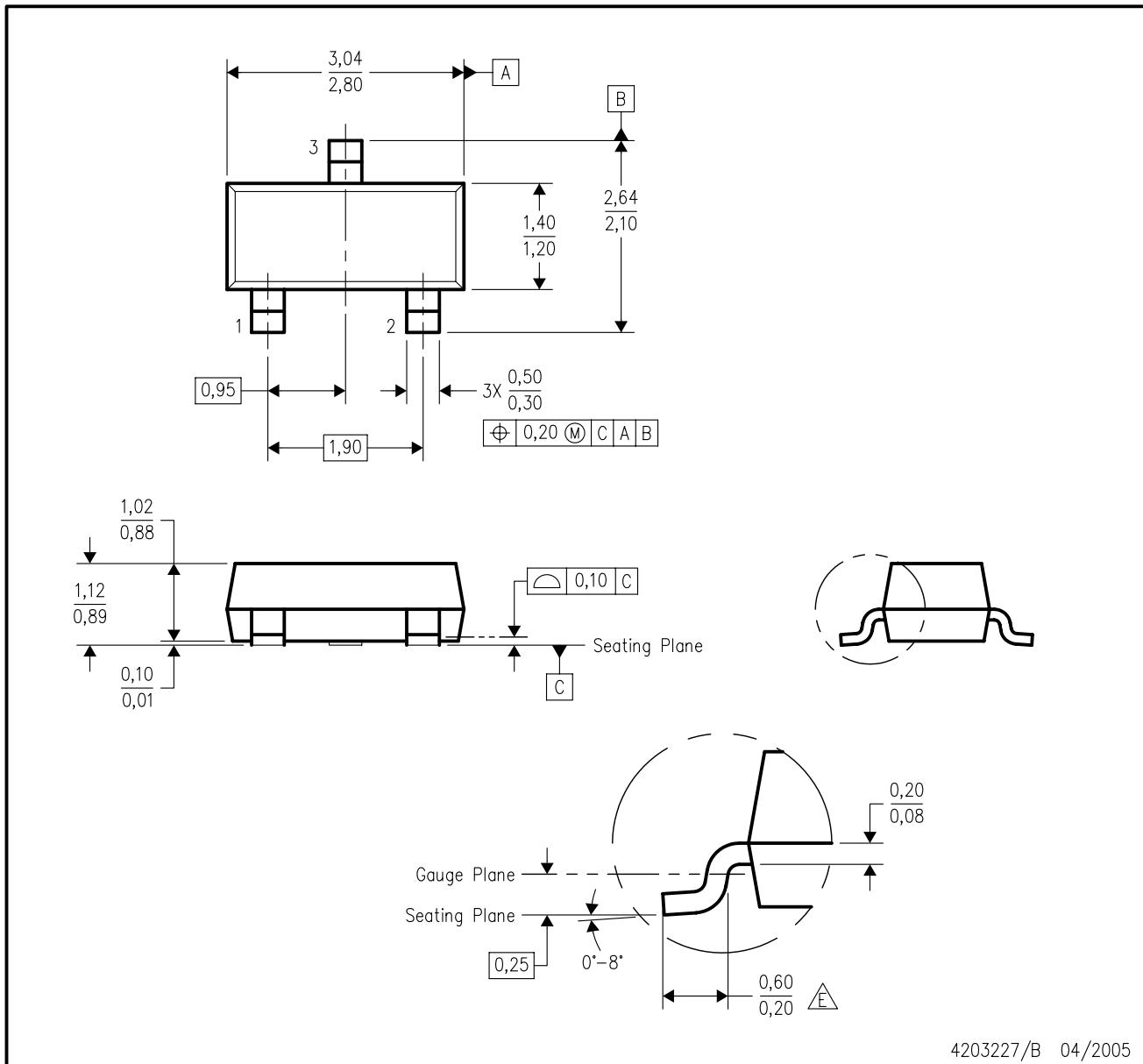


4210356-2/C 07/11

- 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.

DBZ (R-PDSO-G3)

PLASTIC SMALL-OUTLINE



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

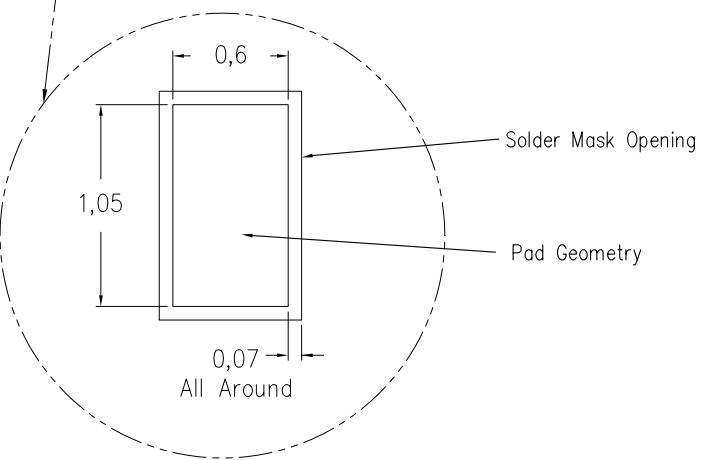
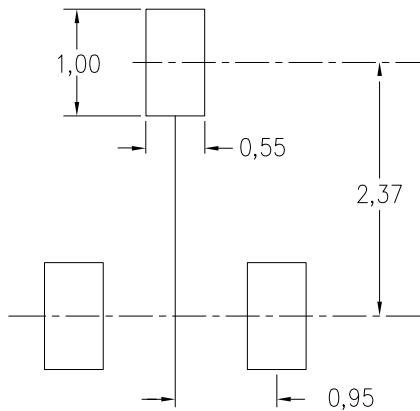
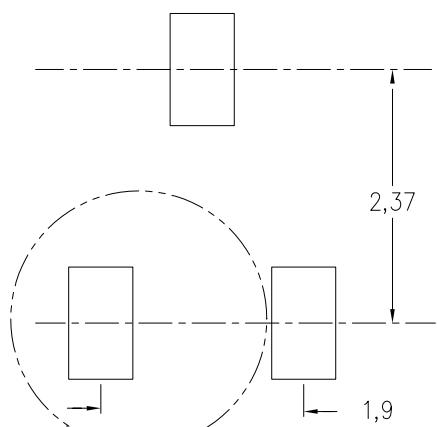
LAND PATTERN DATA

DBZ (R-PDSO-G3)

PLASTIC SMALL OUTLINE

Example Board Layout

Stencil Openings
Based on a stencil thickness
of .127mm (.005inch).



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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