

TL4050 精密微功耗并联电压基准

1 特性

- 2.5V、4.096V、5V 和 10V 的固定输出电压
- 严格输出容差和低温度系数
 - 0.1% (最大值), 50ppm/°C-A 级
 - 0.2% (最大值), 50ppm/°C-B 级
 - 0.5% (最大值), 50ppm/°C-C 级
- 低输出噪声: 41 μV_{RMS} 典型值
- 宽工作电流范围:
60 μA (典型值) 至 15mA
- 与所有容性负载一起工作时保持稳定; 无需输出电容器
- 工作温度范围: -40°C 至 125°C

2 应用

- 数据采集系统
- 电源和电源监控器
- 仪表和测试设备
- 过程控制
- 精密音频
- 汽车电子产品
- 能源管理
- 电池供电设备

3 说明

TL4050 系列并联电压基准功能多样、易于使用, 适合各种应用。该二端子固定输出器件无需外部电容器即可运行, 与所有容性负载一起工作时也可保持稳定。此外, 该基准具备低动态阻抗、低噪声和低温度系数, 可确保在宽工作电流和温度范围内实现稳定的输出电压。

TL4050 具有三个初始容差, 范围从 A 级的 0.1% (最大值) 到 C 级的 0.5% (最大值)。这样设计人员可以非常灵活地为任何应用选择具有高性价比的产品。TL4050 采用节省空间的 SOT-23-3 和 SC-70 封装, 最低电流为 45 μA (典型值), 是便携式应用的上佳选择。

TL4050xI 的额定工作环境温度范围是 -40°C 至 85°C。TL4050xQ 的额定工作环境温度范围是 -40°C 至 125°C。

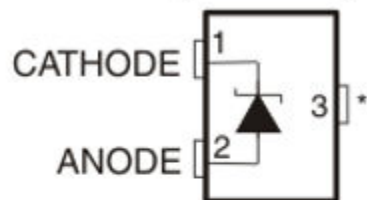


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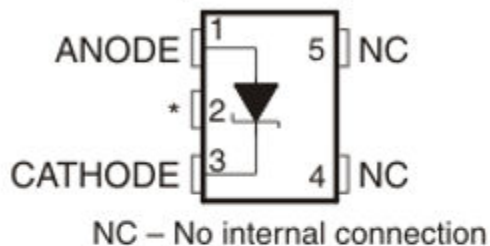
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4 引脚配置和功能

**DBZ (SOT-23-3) PACKAGE
(TOP VIEW)**



**DCK (SC-70) PACKAGE
(TOP VIEW)**



在高电磁干扰（例如放置在变压器或其他电磁源附近时）或显著高频开关噪声的应用中，TI 建议将该引脚连接到阳极。

5 规格

5.1 绝对最大额定值 ⁽¹⁾

在自然通风条件下的温度范围内测得 (除非另有说明)

		最小值	最大值	单位
I_Z	连续阴极电流	-10	20	mA
θ_{JA}	封装热阻抗 ^{(2) (3)}	DBV 封装	206	°C/W
		DCK 封装	252	
T_J	工作虚拟结温		150	°C
T_{stg}	贮存温度范围	-65	150	°C

- (1) 应力超出绝对最大额定值下列出的值可能会对器件造成永久损坏。这些列出的值仅仅是应力额定值，并不表示器件在这些条件下以及在建议运行条件以外的任何其他条件下能够正常运行。长时间处于绝对最大额定条件下可能会影响器件的可靠性。
- (2) 最大功耗是与 $T_J(\max)$ 、 θ_{JA} 和 T_A 相关的函数。在任何允许的环境温度下，允许的最大功耗为 $P_D = (T_J(\max) - T_A) / \theta_{JA}$ 。在 150°C 的绝对最大 T_J 下运行可能会影响可靠性。
- (3) 封装热阻抗根据 JESD 51-7 计算。

5.2 ESD 等级

		值	单位
$V_{(ESD)}$	静电放电		
	人体放电模型 (HBM), 符合 ANSI/ESDA/JEDEC JS-001 标准 ^{(1) (2)}	±2000	V
	充电器件模型 (CDM), 符合 JEDEC 规范 JESD22-C101 ⁽³⁾	±500	

- (1) JEDEC 文档 JEP155 指出：500V HBM 时能够在标准 ESD 控制流程下安全生产。
- (2) 人体放电模型是一个通过 1.5k Ω 电阻器对每个引脚放电的 100pF 电容器。对于人体放电模型，所有引脚的额定值均为 2kV，而反馈引脚的额定值为 1kV。
- (3) JEDEC 文档 JEP157 指出：250V CDM 时能够在标准 ESD 控制流程下安全生产。若部署必要的预防措施，不足 250V CDM 时也能进行生产。

5.3 建议运行条件

		最小值	最大值	单位
I_Z	阴极电流	⁽¹⁾	15	mA
T_A	自然通风温度	I 温度	-40	°C
		Q 温度	-40	

- (1) 查看参数表

5.4 TL4050x25I 电气特性

在工业温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 85°C (除非另有说明)

参数		测试条件	T _A	TL4050A25I			TL4050B25I			TL4050C25I			单位	
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值		
V _Z	反向击穿电压	I _Z = 100 μ A	25°C	2.5			2.5			2.5			V	
Δ V _Z	反向击穿电压容差	I _Z = 100 μ A	25°C	-2.5		2.5	-5		5		-13		13	mV
			完整范围	-11		11		-14		14		-21		
I _{Z,min}	最小阴极电流		25°C	41		60	41		60		41		60	μ A
			完整范围			65			65				65	
α V _Z	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±20			±20			±20			ppm/°C	
		I _Z = 1mA	25°C	±15			±15			±15				
		I _Z = 100 μ A	25°C	±15			±15			±15				
			完整范围	±50			±50			±50				
$\frac{\Delta V_Z}{\Delta I_Z}$	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.3		0.8	0.3		0.8		0.3		0.8	mV
			完整范围			1.2			1.2				1.2	
		1mA < I _Z < 15mA	25°C	2.3		6	2.3		6		2.3		6	
			完整范围			8			8				8	
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.3			0.3			0.3			Ω	
e _N	宽带噪声	I _Z = 100 μ A , 10Hz ≤ f ≤ 10kHz	25°C	41			41			41			μ V _{RMS}	
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μ A		120			120			120			ppm	
V _{HYST}	热滞后 ⁽¹⁾	Δ T _A = - 40°C 至 125°C		0.7			0.7			0.7			mV	

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

5.5 TL4050x25Q 电气特性

在工作温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 125°C (除非另有说明)

参数		测试条件	T _A	TL4050A25Q			TL4050B25Q			TL4050C25Q			单位
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值	
V _Z	反向击穿电压	I _Z = 100 μA	25°C	2.5			2.5			2.5			V
ΔV _Z	反向击穿电压容差	I _Z = 100 μA	25°C	-2.5		2.5	-5		5	-13		13	mV
			完整范围	-15		15	-18		18	-25		25	
I _{Z,min}	最小阴极电流		25°C	41	60	41		60	41		60	μA	
			完整范围			65			65				65
α _{VZ}	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±20		±20		±20					ppm/°C
		I _Z = 1mA	25°C	±15		±15		±15					
		I _Z = 100 μA	25°C	±15		±15		±15					
			完整范围			±50	±50		±50				
$\frac{\Delta V_Z}{\Delta I_Z}$	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.3	0.8	0.3		0.8	0.3		0.8	mV	
			完整范围			1.2			1.2				
		1mA < I _Z < 15mA	25°C	2.3	6	2.3		6	2.3		6		
			完整范围			8			8				8
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.3		0.3		0.3					Ω
e _N	宽带噪声	I _Z = 100 μA , 10Hz ≤ f ≤ 10kHz	25°C	41		41		41					μV _{RMS}
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μA		120		120		120					ppm
V _{HYST}	热滞后 ⁽¹⁾	ΔT _A = -40°C 至 125°C		0.7		0.7		0.7					mV

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

5.6 TL4050x41I 电气特性

在工业温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 85°C (除非另有说明)

参数		测试条件	T _A	TL4050A41I			TL4050B41I			TL4050C41I			单位
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值	
V _Z	反向击穿电压	I _Z = 100 μ A	25°C	4.096			4.096			4.096			V
Δ V _Z	反向击穿电压容差	I _Z = 100 μ A	25°C	-4.1		4.1	-8.2		8.2	-21		21	mV
			完整范围	-18		18	-22		22	-34		34	
I _{Z,min}	最小阴极电流		25°C	52		68	52		68	52		68	μ A
			完整范围			73			73			73	
α V _Z	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±30			±30			±30			ppm/°C
		I _Z = 1mA	25°C	±20			±20			±20			
		I _Z = 100 μ A	25°C	±20			±20			±20			
			完整范围	±50			±50			±50			
$\frac{\Delta V_Z}{\Delta I_Z}$	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.2		0.9	0.2		0.9	0.2		0.9	mV
			完整范围			1.2			1.2			1.2	
		1mA < I _Z < 15mA	25°C	2		7	2		7	2		7	
			完整范围			10			10			10	
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.5			0.5			0.5			Ω
e _N	宽带噪声	I _Z = 100 μ A , 10Hz ≤ f ≤10 kHz	25°C	93			93			93			μ V _{RMS}
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μ A		120			120			120			ppm
V _{HYST}	热滞后 ⁽¹⁾	Δ T _A = - 40°C 至 125°C		1.148			1.148			1.148			mV

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

5.7 TL4050x41Q 电气特性

在工作温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 125°C (除非另有说明)

参数		测试条件	T _A	TL4050A41Q			TL4050B41Q			TL4050C41Q			单位
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值	
V _Z	反向击穿电压	I _Z = 100 μ A	25°C	4.096			4.096			4.096			V
Δ V _Z	反向击穿电压容差	I _Z = 100 μ A	25°C	-4.1		4.1	-8.2		8.2	-21		21	mV
			完整范围	-25		25	-29		29	-41		41	
I _{Z,min}	最小阴极电流		25°C	52		68	52		68	52		68	μ A
			完整范围			78			78			78	
α V _Z	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±30			±30			±30			ppm/°C
		I _Z = 1mA	25°C	±20			±20			±20			
		I _Z = 100 μ A	25°C	±20			±20			±20			
			完整范围	±50			±50			±50			
$\frac{\Delta V_Z}{\Delta I_Z}$	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.2		0.9	0.2		0.9	0.2		0.9	mV
			完整范围			1.2			1.2			1.2	
		1mA < I _Z < 15mA	25°C	2		7	2		7	2		7	
			完整范围			10			10			10	
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.5			0.5			0.5			Ω
e _N	宽带噪声	I _Z = 100 μ A , 10Hz ≤ f ≤10 kHz	25°C	93			93			93			μ V _{RMS}
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μ A		120			120			120			ppm
V _{HYST}	热滞后 ⁽¹⁾	Δ T _A = - 40°C 至 125°C		1.148			1.148			1.148			mV

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

5.8 TL4050x50I 电气特性

在工业温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 85°C (除非另有说明)

参数		测试条件	T _A	TL4050A50I			TL4050B50I			TL4050C50I			单位
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值	
V _Z	反向击穿电压	I _Z = 100 μ A	25°C	5			5			5			V
Δ V _Z	反向击穿电压容差	I _Z = 100 μ A	25°C	-5			-10			-25			25
			完整范围	-22			-27			-42			42
I _{Z,min}	最小阴极电流		25°C	56			56			56			74
			完整范围	80			80			80			80
α V _Z	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±30			±30			±30			ppm/°C
		I _Z = 1mA	25°C	±20			±20			±20			
		I _Z = 100 μ A	25°C	±20			±20			±20			
			完整范围	±50			±50			±50			
$\frac{\Delta V_Z}{\Delta I_Z}$	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.2			0.2			0.2			1
			完整范围	1.4			1.4			1.4			1.4
		1mA < I _Z < 15mA	25°C	2			2			2			8
			完整范围	12			12			12			12
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.5			0.5			0.5			Ω
e _N	宽带噪声	I _Z = 100 μ A , 10Hz ≤ f ≤10 kHz	25°C	93			93			93			μ V _{RMS}
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μ A		120			120			120			ppm
V _{HYST}	热滞后 ⁽¹⁾	Δ T _A = - 40°C 至 125°C		1.4			1.4			1.4			mV

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

5.9 TL4050x50Q 电气特性

在工作温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 125°C (除非另有说明)

参数		测试条件	T _A	TL4050A50Q			TL4050B50Q			TL4050C50Q			单位	
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值		
V _Z	反向击穿电压	I _Z = 100 μ A	25°C	5			5			5			V	
Δ V _Z	反向击穿电压容差	I _Z = 100 μ A	25°C	-5			-10			-25			25	mV
			完整范围	-30			-35			-50			50	
I _{Z,min}	最小阴极电流		25°C	56			56			56			74	μ A
			完整范围	90			90			90			90	
α v _Z	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±30			±30			±30			ppm/°C	
		I _Z = 1mA	25°C	±20			±20			±20				
		I _Z = 100 μ A	25°C	±20			±20			±20				
			完整范围	±50			±50			±50				
ΔV _Z ΔI _Z	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.2			0.2			0.2			1	mV
			完整范围	1.4			1.4			1.4				
		1mA < I _Z < 15mA	25°C	2			2			2			8	
			完整范围	12			12			12			12	
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.5			0.5			0.5			Ω	
e _N	宽带噪声	I _Z = 100 μ A , 10Hz ≤ f ≤ 10kHz	25°C	93			93			93			μ V _{RMS}	
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μ A		120			120			120			ppm	
V _{HYST}	热滞后 ⁽¹⁾	Δ T _A = - 40°C 至 125°C		1.4			1.4			1.4			mV	

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

5.10 TL4050x10I 电气特性

在工业温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 85°C (除非另有说明)

参数		测试条件	T _A	TL4050A10I			TL4050B10I			TL4050C10I			单位
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值	
V _Z	反向击穿电压	I _Z = 100 μ A	25°C	10			10			10			V
Δ V _Z	反向击穿电压容差	I _Z = 100 μ A	25°C	-10 10			-20 20			-50 50			mV
			完整范围	-43 43			-53 53			-83 83			
I _{Z,min}	最小阴极电流		25°C	80 100			80 100			80 100			μ A
			完整范围	103			103			103			
α V _Z	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±40			±40			±40			ppm/°C
		I _Z = 1mA	25°C	±20			±20			±20			
		I _Z = 100 μ A	25°C	±20			±20			±20			
			完整范围	±50			±50			±50			
$\frac{\Delta V_Z}{\Delta I_Z}$	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.8 1.5			0.8 1.5			0.8 1.5			mV
			完整范围	3.8			3.8			3.8			
		1mA < I _Z < 15mA	25°C	8 12			8 12			8 12			
			完整范围	23			23			23			
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.7			0.7			0.7			Ω
e _N	宽带噪声	I _Z = 100 μ A , 10Hz ≤ f ≤ 10kHz	25°C	150			150			150			μ V _{RMS}
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μ A		120			120			120			ppm
V _{HYST}	热滞后 ⁽¹⁾	Δ T _A = - 40°C 至 125°C		2.8			2.8			2.8			mV

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

5.11 TL4050x10Q 电气特性

在工作温度范围内，全范围 $T_A = -40^{\circ}\text{C}$ 至 125°C (除非另有说明)

参数		测试条件	T _A	TL4050A10Q			TL4050B10Q			TL4050C10Q			单位
				最小值	典型值	最大值	最小值	典型值	最大值	最小值	典型值	最大值	
V _Z	反向击穿电压	I _Z = 100 μ A	25°C	10			10			10			V
Δ V _Z	反向击穿电压容差	I _Z = 100 μ A	25°C	-10			-20			-50			mV
			完整范围	-60			-70			-100			
I _{Z,min}	最小阴极电流		25°C	80			80			80			μ A
			完整范围	110			110			110			
α V _Z	反向击穿电压的平均温度系数	I _Z = 10mA	25°C	±40			±40			±40			ppm/°C
		I _Z = 1mA	25°C	±20			±20			±20			
		I _Z = 100 μ A	25°C	±20			±20			±20			
			完整范围	±50			±50			±50			
ΔV _Z ΔI _Z	随着阴极电流的变化，反向击穿电压会发生变化	I _{Z,min} < I _Z < 1mA	25°C	0.8			0.8			0.8			mV
			完整范围	3.8			3.8			3.8			
		1mA < I _Z < 15mA	25°C	8			8			8			
			完整范围	23			23			23			
Z _Z	反向动态阻抗	I _Z = 1mA , f = 120Hz , I _{AC} = 0.1 I _Z	25°C	0.7			0.7			0.7			Ω
e _N	宽带噪声	I _Z = 100 μ A , 10Hz ≤ f ≤10 kHz	25°C	150			150			150			μ V _{RMS}
	反向击穿电压的长期稳定性	t = 1000 h , T _A = 25°C ± 0.1°C , I _Z = 100 μ A		120			120			120			ppm
V _{HYST}	热滞后 ⁽¹⁾	Δ T _A = - 40°C 至 125°C		2.8			2.8			2.8			mV

(1) 热迟滞定义为 $V_{Z,25^{\circ}\text{C}}$ (在循环至 -40°C 之后) - $V_{Z,25^{\circ}\text{C}}$ (在循环至 125°C 之后) 。

6 典型特性

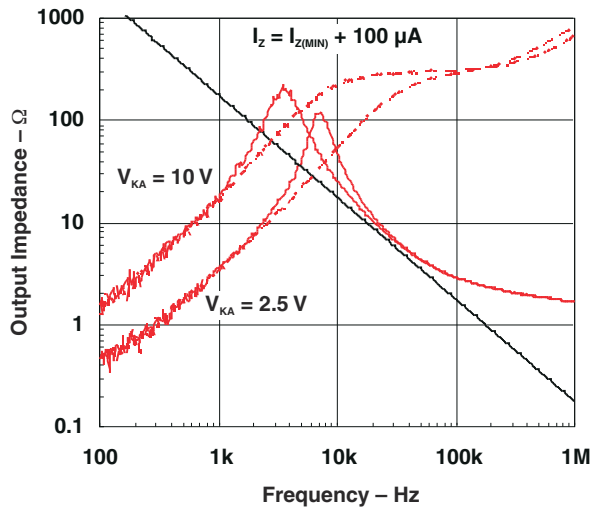


图 6-1. 输出阻抗与频率间的关系

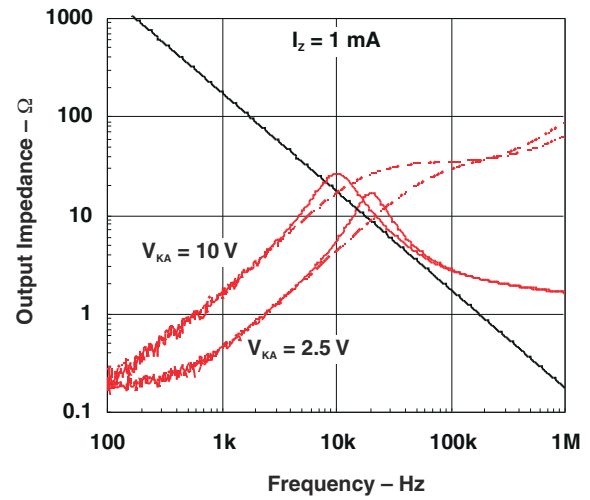


图 6-2. 输出阻抗与频率间的关系

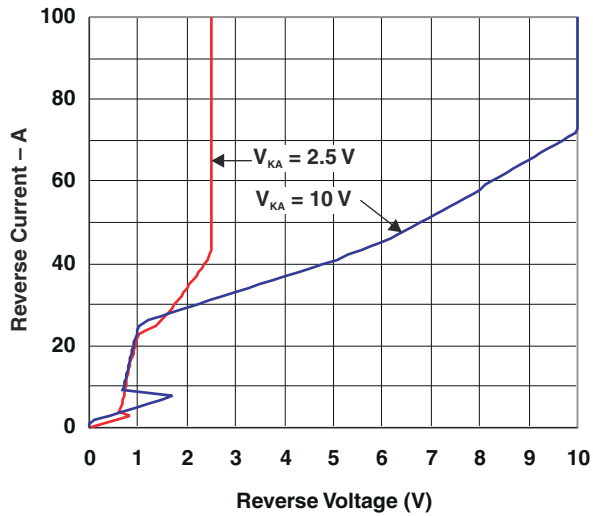


图 6-3. 反向特性和最小工作电流

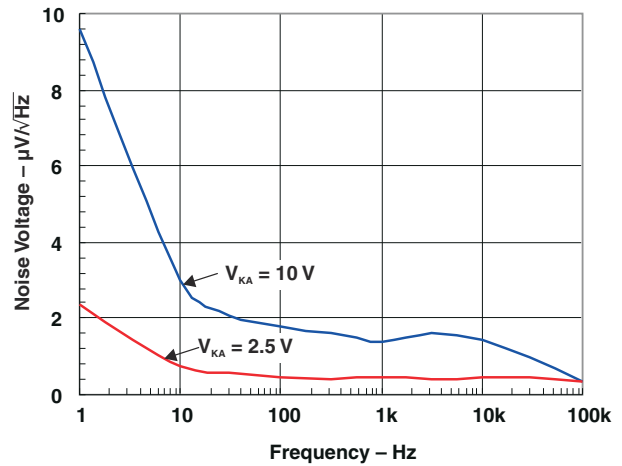


图 6-4. 噪声电压与频率间的关系

6 典型特性 (续)

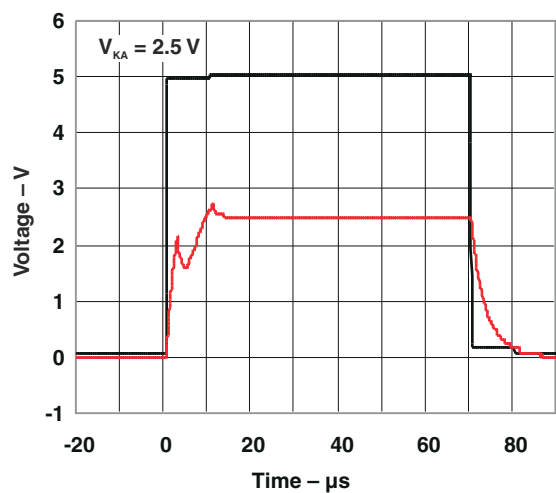


图 6-5. 大信号脉冲响应

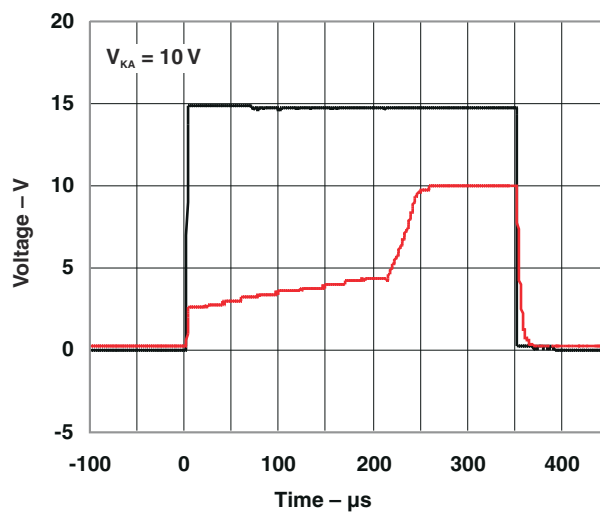


图 6-6. 大信号脉冲响应

7 详细说明

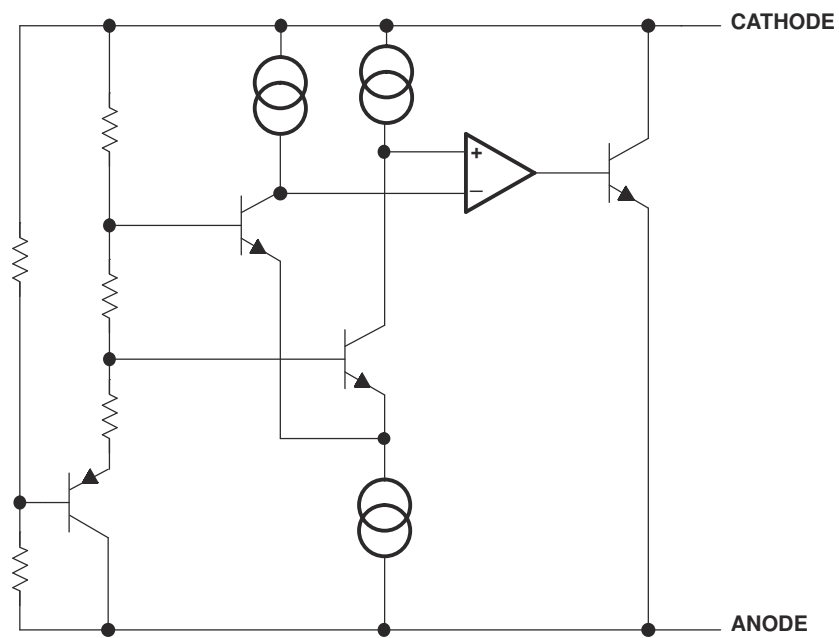


图 7-1. 功能方框图

8 应用信息

备注

以下应用部分中的信息不属于 TI 器件规格的范围，TI 不担保其准确性和完整性。TI 的客户应负责确定器件是否适用于其应用。客户应验证并测试其设计，以确保系统功能。

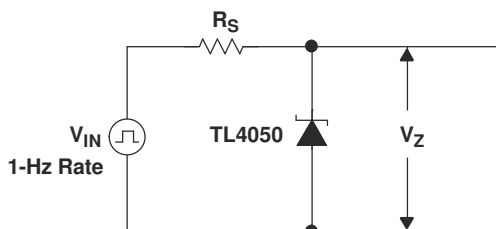


图 8-1. 启动测试电路

8.1 输出电容器

TL4050 无需在阴极和阳极之间使用输出电容器即可实现稳定性。不过，如果需要输出旁路电容器，TL4050 也可在所有容性负载下保持稳定。

8.2 SOT-23 引脚连接

在 SOT-23 封装器件的引脚 2 和 3 之间连接了一个寄生肖特基二极管。因此，SOT-23 封装的引脚 3 必须悬空或连接到引脚 2。

8.3 可与 ADC 或 DAC 搭配使用

TL4050x-41 旨在成为 12 位数据采集系统中所要求的具有成本效益的电压基准。对于由 5V 电源供电的 12 位系统（如 ADS7842（请参阅图 8-2）、TL4050x-41（4.096V）），允许使用 1mV 的 LSB 进行工作。

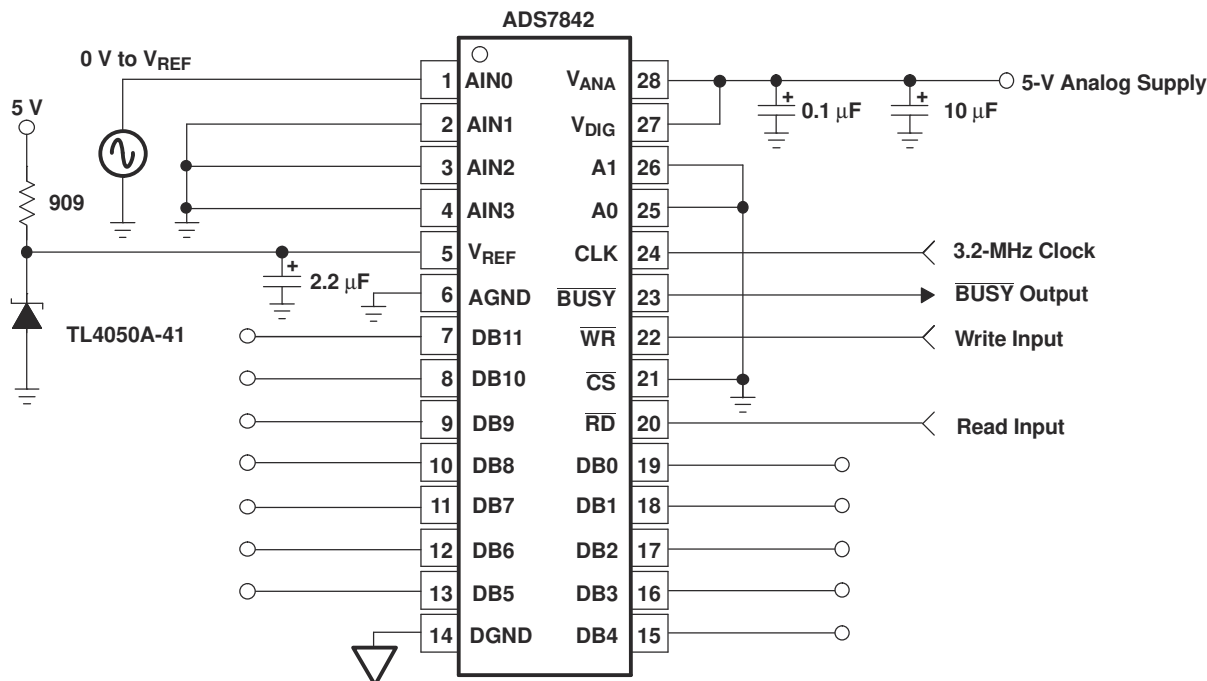


图 8-2. 使用 TL4050x-41 的数据采集电路

8.4 阴极和负载电流

在典型的分流稳压器配置 (请参阅图 8-3) 中, 在电源和 TL4050 的阴极之间连接了一个外部电阻器 R_S 。必须正确设置 R_S , 因为 R_S 设置可用于为负载供电 (I_L) 和偏置 TL4050 (I_Z) 的总电流。在所有情况下, I_Z 都必须保持在指定范围内, 才能使基准正常运行。考虑到负载和电源电压变化的一个极端情况 (最大 I_L 和最小 V_S), R_S 必须足够小, 以提供稳压器运行所需的最小 I_Z , 如数据表参数所示。在另一个极端情况下, 即使用最大 V_S 和最小 I_L , 则 R_S 必须足够大, 才能将 I_Z 限制为小于最大额定值 15mA 的电流。

R_S 根据方程式 1 计算得出:

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

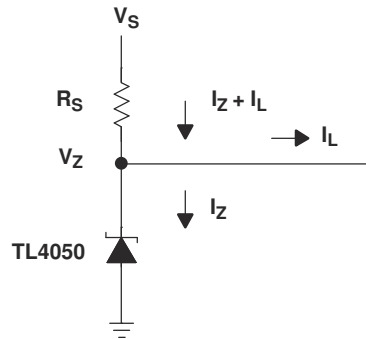


图 8-3. 并联稳压器

9 器件和文档支持

9.1 订购信息

表 9-1. 订购信息 ⁽¹⁾

T _A	器件等级	V _{KA}	封装 ⁽²⁾		可订购器件型号	正面标识 ⁽³⁾
-40°C 至 85°C	A 级： 0.1% 初始精度 和 50ppm/°C 温度系数	2.5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A25IDBZR	TKE_
				卷带 (250 个)	TL4050A25IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A25IDCKR	82_
				卷带 (250 个)	TL4050A25IDCKT	
		4.096V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A41IDBZR	TKL_
				卷带 (250 个)	TL4050A41IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A41IDCKR	8E_
				卷带 (250 个)	TL4050A41IDCKT	
		5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A50IDBZR	TKS_
				卷带 (250 个)	TL4050A50IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A50IDCKR	8L_
				卷带 (250 个)	TL4050A50IDCKT	
		10V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A10IDBZR	TK2_
				卷带 (250 个)	TL4050A10IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A10IDCKR	8Z_
				卷带 (250 个)	TL4050A10IDCKT	
	B 级： 0.2% 初始精度 和 50ppm/°C 温度系数	2.5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B25IDBZR	TKF_
				卷带 (250 个)	TL4050B25IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B25IDCKR	83_
				卷带 (250 个)	TL4050B25IDCKT	
		4.096V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B41IDBZR	TKM_
				卷带 (250 个)	TL4050B41IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B41IDCKR	8F_
				卷带 (250 个)	TL4050B41IDCKT	
		5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B50IDBZR	TKT_
				卷带 (250 个)	TL4050B50IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B50IDCKR	8M_
				卷带 (250 个)	TL4050B50IDCKT	
		10V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B10IDBZR	TK3_
				卷带 (250 个)	TL4050B10IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B10IDCKR	92_
				卷带 (250 个)	TL4050B10IDCKT	

表 9-1. 订购信息 ⁽¹⁾ (续)

T _A	器件等级	V _{KA}	封装 ⁽²⁾		可订购器件型号	正面标识 ⁽³⁾
-40°C 至 85°C	C 级： 0.5% 初始精度 和 50ppm/°C 温度系数	2.5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C25IDBZR	TKG_
				卷带 (250 个)	TL4050C25IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C25IDCKR	84_
				卷带 (250 个)	TL4050C25IDCKT	
		4.096V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C41IDBZR	TKN_
				卷带 (250 个)	TL4050C41IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C41IDCKR	8G_
				卷带 (250 个)	TL4050C41IDCKT	
		5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C50IDBZR	TKU_
				卷带 (250 个)	TL4050C50IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C50IDCKR	8N_
				卷带 (250 个)	TL4050C50IDCKT	
		10V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C10IDBZR	TK4_
				卷带 (250 个)	TL4050C10IDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C10IDCKR	93_
				卷带 (250 个)	TL4050C10IDCKT	
-40°C 至 125°C	A 级： 0.1% 初始精度 和 50ppm/°C 温度系数	2.5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A25QDBZR	TKH_
				卷带 (250 个)	TL4050A25QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A25QDCKR	85_
				卷带 (250 个)	TL4050A25QDCKT	
		4.096V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A41QDBZR	TKP_
				卷带 (250 个)	TL4050A41QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A41QDCKR	8H_
				卷带 (250 个)	TL4050A41QDCKT	
		5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A50QDBZR	TKV_
				卷带 (250 个)	TL4050A50QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A50QDCKR	8P_
				卷带 (250 个)	TL4050A50QDCKT	
		10V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050A10QDBZR	TK5_
				卷带 (250 个)	TL4050A10QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050A10QDCKR	94_
				卷带 (250 个)	TL4050A10QDCKT	

表 9-1. 订购信息⁽¹⁾ (续)

T _A	器件等级	V _{KA}	封装 ⁽²⁾		可订购器件型号	正面标识 ⁽³⁾
-40°C 至 125°C	B 级： 0.2% 初始精度 和 50ppm/°C 温度系数	2.5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B25QDBZR	TKJ_
				卷带 (250 个)	TL4050B25QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B25QDCKR	86_
				卷带 (250 个)	TL4050B25QDCKT	
		4.096V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B41QDBZR	TKQ_
				卷带 (250 个)	TL4050B41QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B41QDCKR	8J_
				卷带 (250 个)	TL4050B41QDCKT	
		5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B50QDBZR	TKW_
				卷带 (250 个)	TL4050B50QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B50QDCKR	8R_
				卷带 (250 个)	TL4050B50QDCKT	
		10V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050B10QDBZR	TK6_
				卷带 (250 个)	TL4050B10QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050B10QDCKR	95_
				卷带 (250 个)	TL4050B10QDCKT	
	C 级： 0.5% 初始精度 和 50ppm/°C 温度系数	2.5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C25QDBZR	TKK_
				卷带 (250 个)	TL4050C25QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C25QDCKR	87_
				卷带 (250 个)	TL4050C25QDCKT	
		4.096V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C41QDBZR	TKR_
				卷带 (250 个)	TL4050C41QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C41QDCKR	8K_
				卷带 (250 个)	TL4050C41QDCKT	
		5V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C50QDBZR	TKY_
				卷带 (250 个)	TL4050C50QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C50QDCKR	8S_
				卷带 (250 个)	TL4050C50QDCKT	
		10V	SOT-23-3 - DBZ	卷带 (3000 个)	TL4050C10QDBZR	TK7_
				卷带 (250 个)	TL4050C10QDBZT	
			SC-70 - DCK	卷带 (3000 个)	TL4050C10QDCKR	96_
				卷带 (250 个)	TL4050C10QDCKT	

(1) 有关最新的封装和订购信息，请参阅本文档结尾的“封装选项附录”，或访问 TI 网站：www.ti.com。

(2) 封装图、热数据和符号可登录 www.ti.com/packaging 获取。

(3) 实际的顶端标记有一个用于标明晶圆制造/组装场所的附加字符。

9.2 接收文档更新通知

要接收文档更新通知，请导航至 ti.com 上的器件产品文件夹。点击 [通知](#) 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

9.3 支持资源

TI E2E™ 中文支持论坛是工程师的重要参考资料，可直接从专家处获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题，获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的[使用条款](#)。

9.4 商标

TI E2E™ is a trademark of Texas Instruments.

所有商标均为其各自所有者的财产。

9.5 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

9.6 术语表

[TI 术语表](#) 本术语表列出并解释了术语、首字母缩略词和定义。

10 修订历史记录

注：以前版本的页码可能与当前版本的页码不同

Changes from Revision A (June 2007) to Revision B (March 2025)	Page
• 更新了整个文档中的表格、图和交叉参考的编号格式.....	1
• 更新了高 EMI 应用的引脚排列信息。.....	1
• 添加了 ESD 等级.....	4
• 更新了反向击穿电压与阴极电流之间的变化关系。.....	11
• 更新了反向击穿电压与工作电流之间的变化关系。.....	12

11 机械、封装和可订购信息

以下页面包含机械、封装和可订购信息。这些信息是指定器件可用的最新数据。数据如有变更，恕不另行通知，且不会对此文档进行修订。有关此数据表的浏览器版本，请查阅左侧的导航栏。

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TL4050A10IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK2U
TL4050A10IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK2U
TL4050A10IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK2U
TL4050A10IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK2U
TL4050A10IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8ZU
TL4050A10IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8ZU
TL4050A10IDCKT	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8ZU
TL4050A10IDCKT.A	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8ZU
TL4050A10QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	TK5U
TL4050A10QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	TK5U
TL4050A10QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	94U
TL4050A10QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	94U
TL4050A25IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKEU
TL4050A25IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKEU
TL4050A25IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKEU
TL4050A25IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKEU
TL4050A25IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	82U
TL4050A25IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	82U
TL4050A25IDCKT	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	82U
TL4050A25IDCKT.A	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	82U
TL4050A25QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	TKHU
TL4050A25QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	TKHU
TL4050A25QDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	TKHU
TL4050A25QDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	TKHU
TL4050A25QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	85U

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TL4050A25QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	85U
TL4050A41IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKL3, TKLU)
TL4050A41IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKL3, TKLU)
TL4050A41IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKL3, TKLU)
TL4050A41IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKL3, TKLU)
TL4050A41QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKP3, TKPU)
TL4050A41QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKP3, TKPU)
TL4050A41QDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKP3, TKPU)
TL4050A41QDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKP3, TKPU)
TL4050A41QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8HU
TL4050A41QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8HU
TL4050A50IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKS3, TKSU)
TL4050A50IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKS3, TKSU)
TL4050A50IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKS3, TKSU)
TL4050A50IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKS3, TKSU)
TL4050A50IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8LU
TL4050A50IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8LU
TL4050A50IDCKT	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8LU
TL4050A50IDCKT.A	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8LU
TL4050A50QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKV3, TKVU)
TL4050A50QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKV3, TKVU)
TL4050A50QDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKV3, TKVU)
TL4050A50QDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKV3, TKVU)
TL4050A50QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8PU
TL4050A50QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8PU
TL4050B10IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK3U
TL4050B10IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK3U
TL4050B10IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK3U

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TL4050B10IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	TK3U
TL4050B10QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	TK6U
TL4050B10QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	TK6U
TL4050B10QDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	TK6U
TL4050B10QDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	TK6U
TL4050B10QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	95U
TL4050B10QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	95U
TL4050B10QDCKRG4	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	95U
TL4050B10QDCKRG4.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	95U
TL4050B25IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKFU
TL4050B25IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKFU
TL4050B25IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKFU
TL4050B25IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKFU
TL4050B25IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	83U
TL4050B25IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	83U
TL4050B25QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	TKJU
TL4050B25QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	TKJU
TL4050B25QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	86U
TL4050B25QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	86U
TL4050B41IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKMU
TL4050B41IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKMU
TL4050B41IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKMU
TL4050B41IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKMU
TL4050B41IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8FU
TL4050B41IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8FU
TL4050B41IDCKT	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8FU
TL4050B41IDCKT.A	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8FU

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TL4050B41QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKQ3, TKQU)
TL4050B41QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKQ3, TKQU)
TL4050B41QDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKQ3, TKQU)
TL4050B41QDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKQ3, TKQU)
TL4050B50IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKT3, TKTU)
TL4050B50IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKT3, TKTU)
TL4050B50IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKT3, TKTU)
TL4050B50IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKT3, TKTU)
TL4050B50IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8MU
TL4050B50IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8MU
TL4050B50QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKW3, TKWU)
TL4050B50QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKW3, TKWU)
TL4050B50QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8RU
TL4050B50QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8RU
TL4050C10IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(TK43, TK4U)
TL4050C10IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(TK43, TK4U)
TL4050C10IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(TK43, TK4U)
TL4050C10IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 85	(TK43, TK4U)
TL4050C10QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(TK73, TK7U)
TL4050C10QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-40 to 125	(TK73, TK7U)
TL4050C25IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKGU
TL4050C25IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKGU
TL4050C25IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKGU
TL4050C25IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKGU
TL4050C25IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	84U
TL4050C25IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	84U
TL4050C25IDCKT	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	84U
TL4050C25IDCKT.A	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	84U

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TL4050C25QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	TKKU
TL4050C25QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	TKKU
TL4050C25QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	87U
TL4050C25QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	87U
TL4050C41IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKNU
TL4050C41IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKNU
TL4050C41IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	TKNU
TL4050C41IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	TKNU
TL4050C41IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8GU
TL4050C41IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8GU
TL4050C41QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	TKRU
TL4050C41QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	TKRU
TL4050C41QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8KU
TL4050C41QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8KU
TL4050C41QDCKT	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8KU
TL4050C41QDCKT.A	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8KU
TL4050C50IDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKU3, TKUU)
TL4050C50IDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKU3, TKUU)
TL4050C50IDBZT	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 85	(TKU3, TKUU)
TL4050C50IDBZT.A	Active	Production	SOT-23 (DBZ) 3	250 SMALL T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 85	(TKU3, TKUU)
TL4050C50IDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8NU
TL4050C50IDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8NU
TL4050C50IDCKT	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8NU
TL4050C50IDCKT.A	Active	Production	SC70 (DCK) 5	250 SMALL T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 85	8NU
TL4050C50QDBZR	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	NIPDAU SN	Level-1-260C-UNLIM	-40 to 125	(TKY3, TKYU)
TL4050C50QDBZR.A	Active	Production	SOT-23 (DBZ) 3	3000 LARGE T&R	Yes	SN	Level-1-260C-UNLIM	-40 to 125	(TKY3, TKYU)

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
TL4050C50QDCKR	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	NIPDAU SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8SU
TL4050C50QDCKR.A	Active	Production	SC70 (DCK) 5	3000 LARGE T&R	Yes	SPOT AG (TOP SIDE)	Level-1-260C-UNLIM	-40 to 125	8SU

⁽¹⁾ **Status:** For more details on status, see our [product life cycle](#).

⁽²⁾ **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

⁽³⁾ **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

⁽⁴⁾ **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

⁽⁵⁾ **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

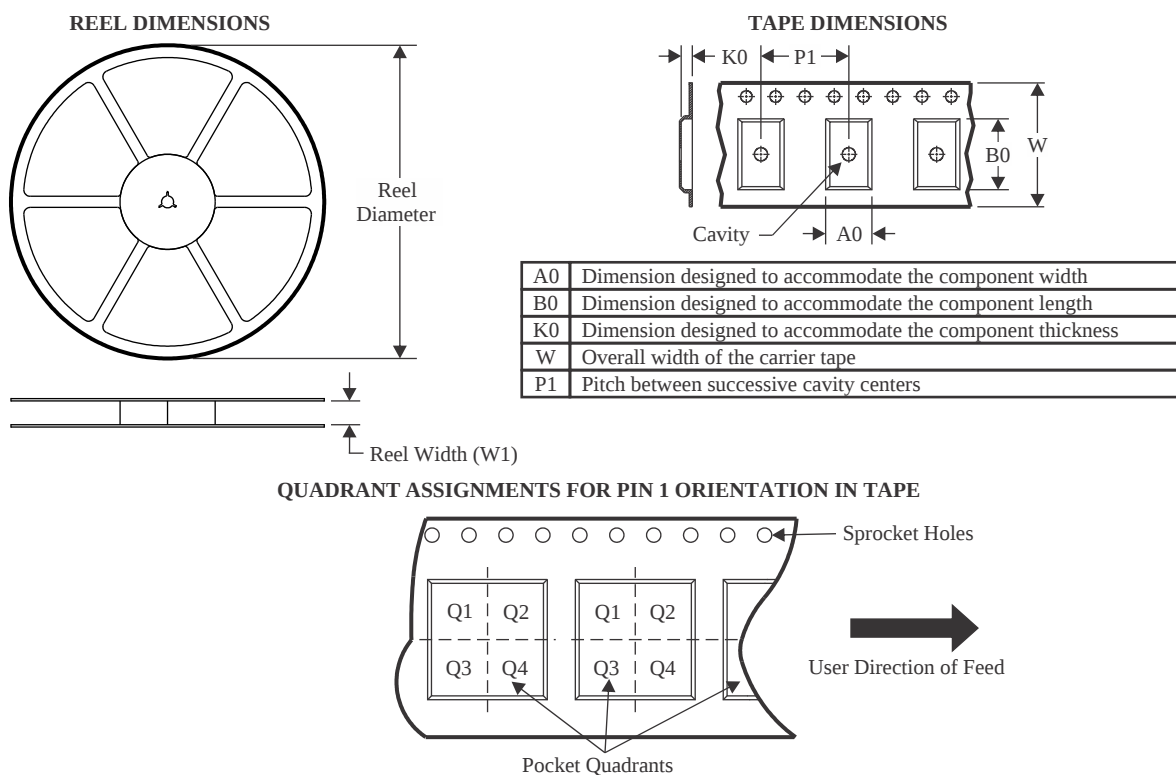
⁽⁶⁾ **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "-" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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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
TL4050A10IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050A10IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050A10IDCKR	SC70	DCR	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050A10IDCKT	SC70	DCR	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050A10QDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050A10QDCKR	SC70	DCR	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050A25IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A25IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A25IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050A25IDCKR	SC70	DCR	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050A25IDCKR	SC70	DCR	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050A25IDCKT	SC70	DCR	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050A25IDCKT	SC70	DCR	5	250	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050A25QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A25QDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050A25QDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	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
TL4050A25QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050A25QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050A41IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A41IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A41QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A41QDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A41QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050A41QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050A50IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A50IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A50IDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050A50IDCKT	SC70	DCK	5	250	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050A50QDBZR	SOT-23	DBZ	3	3000	178.0	9.2	3.15	2.77	1.22	4.0	8.0	Q3
TL4050A50QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A50QDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050A50QDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050A50QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050B10IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050B10IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050B10QDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050B10QDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050B10QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050B10QDCKRG4	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050B25IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B25IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B25IDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050B25IDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050B25QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B25QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050B25QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050B41IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050B41IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B41IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B41IDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050B41IDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050B41IDCKT	SC70	DCK	5	250	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050B41IDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050B41QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B41QDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B50IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050B50IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	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
TL4050B50IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B50IDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050B50QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050B50QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C10IDBZR	SOT-23	DBZ	3	3000	178.0	9.2	3.15	2.77	1.22	4.0	8.0	Q3
TL4050C10IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050C10IDBZT	SOT-23	DBZ	3	250	178.0	9.2	3.15	2.77	1.22	4.0	8.0	Q3
TL4050C10IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050C10QDBZR	SOT-23	DBZ	3	3000	178.0	9.2	3.15	2.77	1.22	4.0	8.0	Q3
TL4050C10QDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050C25IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C25IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C25IDBZT	SOT-23	DBZ	3	250	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050C25IDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050C25IDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C25IDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050C25IDCKT	SC70	DCK	5	250	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C25QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C25QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050C25QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C41IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C41IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C41IDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050C41IDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C41QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C41QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C41QDCKR	SC70	DCK	5	3000	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050C41QDCKT	SC70	DCK	5	250	179.0	8.4	2.2	2.5	1.2	4.0	8.0	Q3
TL4050C41QDCKT	SC70	DCK	5	250	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C50IDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C50IDBZR	SOT-23	DBZ	3	3000	179.0	8.4	3.15	2.95	1.22	4.0	8.0	Q3
TL4050C50IDBZR	SOT-23	DBZ	3	3000	178.0	9.2	3.15	2.77	1.22	4.0	8.0	Q3
TL4050C50IDBZT	SOT-23	DBZ	3	250	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C50IDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C50IDCKT	SC70	DCK	5	250	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3
TL4050C50QDBZR	SOT-23	DBZ	3	3000	180.0	8.4	3.2	2.85	1.3	4.0	8.0	Q3
TL4050C50QDCKR	SC70	DCK	5	3000	180.0	8.4	2.3	2.55	1.2	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

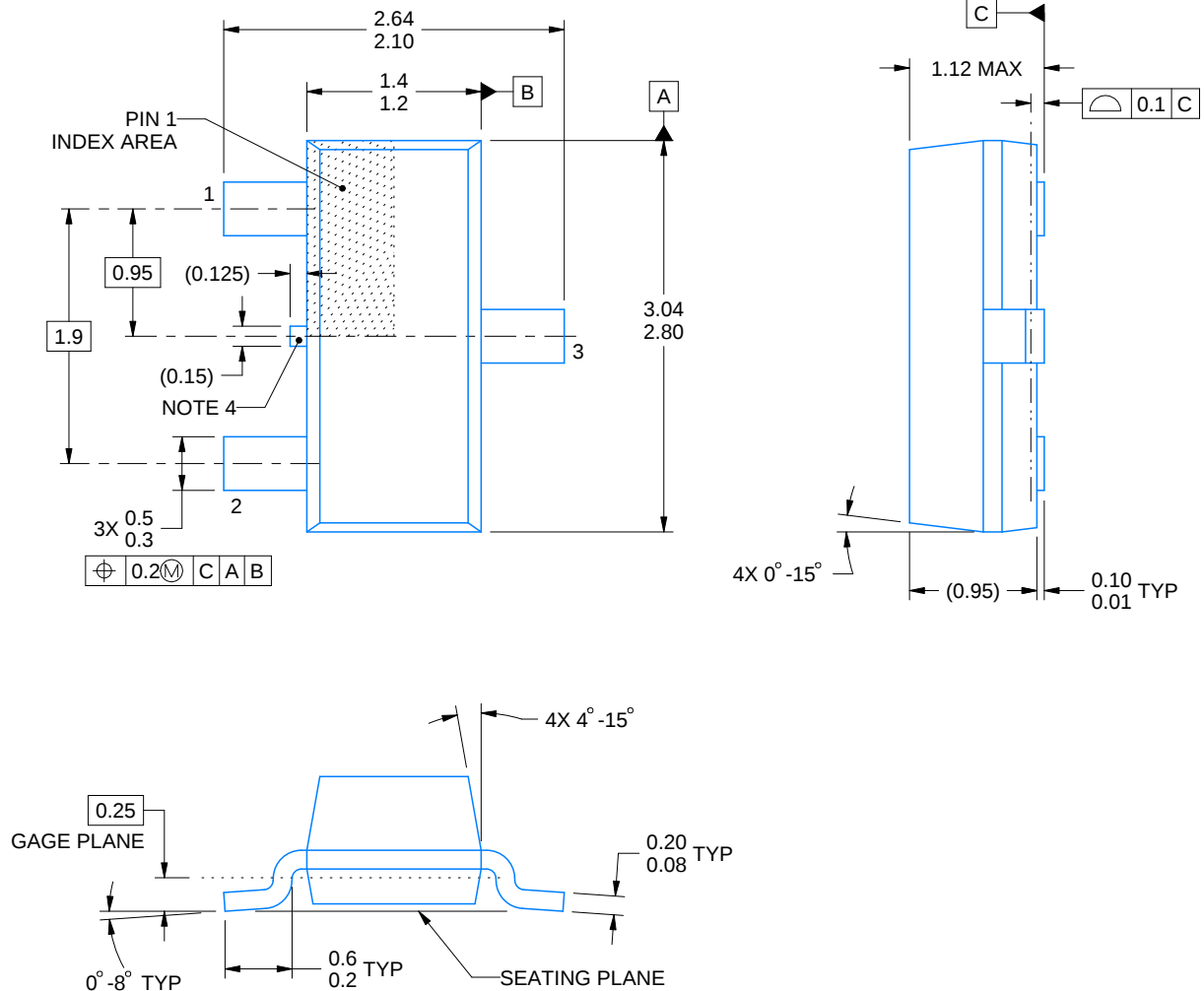
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TL4050A10IDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050A10IDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4050A10IDCKR	SC70	DCK	5	3000	200.0	183.0	25.0
TL4050A10IDCKT	SC70	DCK	5	250	200.0	183.0	25.0
TL4050A10QDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050A10QDCKR	SC70	DCK	5	3000	200.0	183.0	25.0
TL4050A25IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050A25IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050A25IDBZT	SOT-23	DBZ	3	250	200.0	183.0	25.0
TL4050A25IDCKR	SC70	DCK	5	3000	200.0	183.0	25.0
TL4050A25IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050A25IDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4050A25IDCKT	SC70	DCK	5	250	210.0	185.0	35.0
TL4050A25QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050A25QDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4050A25QDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050A25QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050A25QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TL4050A41IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050A41IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050A41QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050A41QDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050A41QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050A41QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050A50IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050A50IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050A50IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050A50IDCKT	SC70	DCK	5	250	210.0	185.0	35.0
TL4050A50QDBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0
TL4050A50QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050A50QDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050A50QDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050A50QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050B10IDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050B10IDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4050B10QDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4050B10QDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4050B10QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050B10QDCKRG4	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050B25IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050B25IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050B25IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050B25IDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050B25QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050B25QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050B25QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050B41IDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050B41IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050B41IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050B41IDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050B41IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050B41IDCKT	SC70	DCK	5	250	210.0	185.0	35.0
TL4050B41IDCKT	SC70	DCK	5	250	200.0	183.0	25.0
TL4050B41QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050B41QDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050B50IDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050B50IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050B50IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050B50IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050B50QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050B50QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
TL4050C10IDBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0
TL4050C10IDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050C10IDBZT	SOT-23	DBZ	3	250	180.0	180.0	18.0
TL4050C10IDBZT	SOT-23	DBZ	3	250	203.0	203.0	35.0
TL4050C10QDBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0
TL4050C10QDBZR	SOT-23	DBZ	3	3000	203.0	203.0	35.0
TL4050C25IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050C25IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050C25IDBZT	SOT-23	DBZ	3	250	200.0	183.0	25.0
TL4050C25IDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050C25IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050C25IDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4050C25IDCKT	SC70	DCK	5	250	210.0	185.0	35.0
TL4050C25QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050C25QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050C25QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050C41IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050C41IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050C41IDCKR	SC70	DCK	5	3000	200.0	183.0	25.0
TL4050C41IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050C41QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050C41QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050C41QDCKR	SC70	DCK	5	3000	203.0	203.0	35.0
TL4050C41QDCKT	SC70	DCK	5	250	203.0	203.0	35.0
TL4050C41QDCKT	SC70	DCK	5	250	210.0	185.0	35.0
TL4050C50IDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050C50IDBZR	SOT-23	DBZ	3	3000	200.0	183.0	25.0
TL4050C50IDBZR	SOT-23	DBZ	3	3000	180.0	180.0	18.0
TL4050C50IDBZT	SOT-23	DBZ	3	250	210.0	185.0	35.0
TL4050C50IDCKR	SC70	DCK	5	3000	210.0	185.0	35.0
TL4050C50IDCKT	SC70	DCK	5	250	210.0	185.0	35.0
TL4050C50QDBZR	SOT-23	DBZ	3	3000	210.0	185.0	35.0
TL4050C50QDCKR	SC70	DCK	5	3000	210.0	185.0	35.0

DBZ0003A**PACKAGE OUTLINE****SOT-23 - 1.12 mm max height**

SMALL OUTLINE TRANSISTOR



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NOTES:

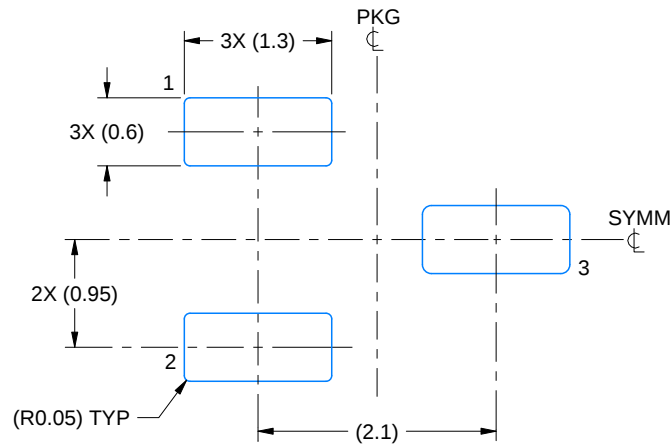
1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC registration TO-236, except minimum foot length.
4. Support pin may differ or may not be present.
5. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side

EXAMPLE BOARD LAYOUT

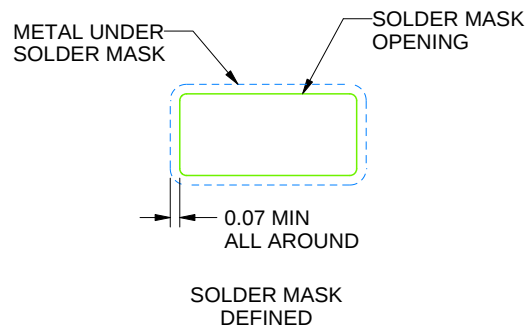
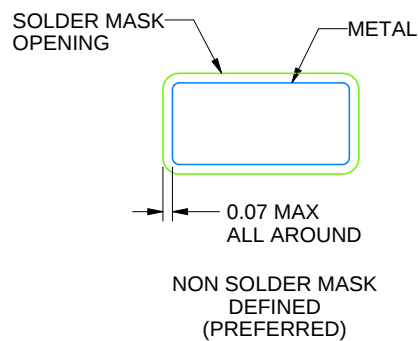
DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



LAND PATTERN EXAMPLE
SCALE:15X



SOLDER MASK DETAILS

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NOTES: (continued)

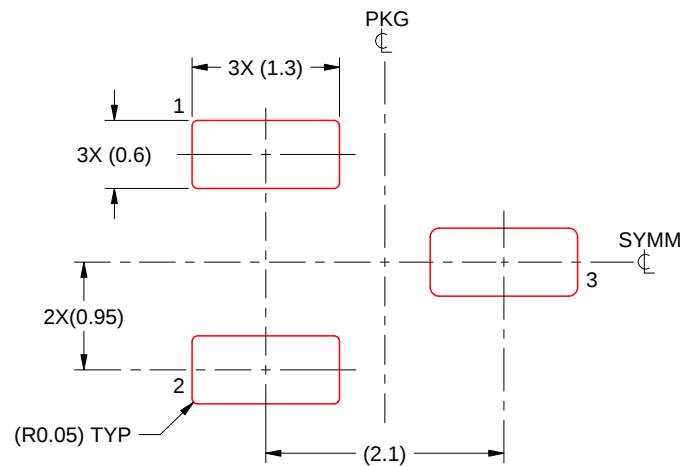
5. Publication IPC-7351 may have alternate designs.
6. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

DBZ0003A

SOT-23 - 1.12 mm max height

SMALL OUTLINE TRANSISTOR



SOLDER PASTE EXAMPLE
BASED ON 0.125 THICK STENCIL
SCALE:15X

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NOTES: (continued)

7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.



SOT - 1.1 max height

Technical drawing of a mechanical part showing three views: front, side, and top.

Front View:

- Overall dimensions: 2.4 (width) x 2.15 (height).
- Feature locations: 1.4 (width), 1.1 (width), 1.3 (height), 1.3 (height).
- Hole diameters: 0.15, 0.1.
- Feature labels: PIN 1 INDEX AREA, NOTE 4.
- Feature control frames: ϕ 0.1 M, C A B, 0.1 C.

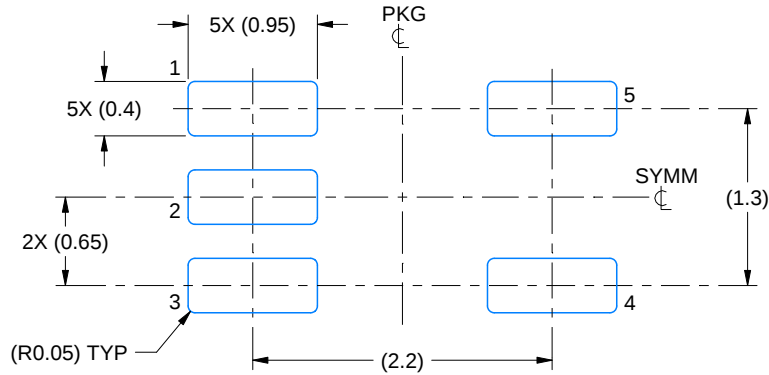
Side View:

- Width: 1.1 MAX.
- Thickness: 0.1.
- Feature label: 4X 0° -12°.

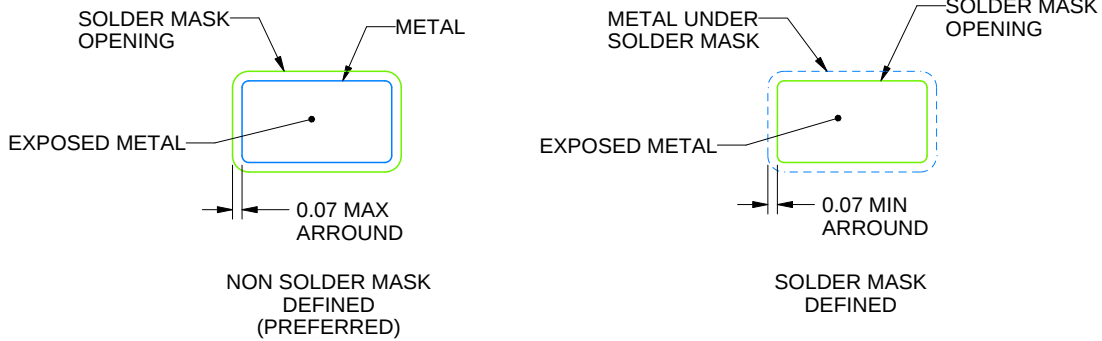
Top View:

- Width: 0.46 TYP.
- Height: 0.22 TYP.
- Feature label: 4X 4° -15°.
- Feature control frame: 0.15.
- Feature label: SEATING PLANE.
- Feature label: GAGE PLANE.
- Feature label: 8° 0° TYP.

1. All linear dimensions are in millimeters. Any dimensions in parenthesis are for reference only. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-203.
4. Support pin may differ or may not be present.
5. Lead width does not comply with JEDEC.
6. Body dimensions do not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.25mm per side



LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:18X

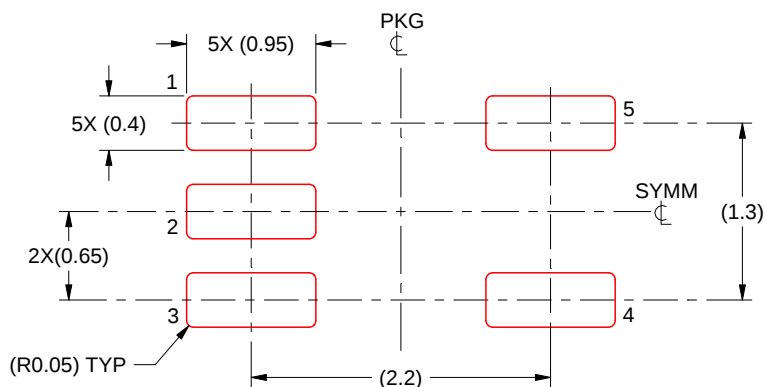


SOLDER MASK DETAILS

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NOTES: (continued)

7. Publication IPC-7351 may have alternate designs.
8. Solder mask tolerances between and around signal pads can vary based on board fabrication site.



SOLDER PASTE EXAMPLE
BASED ON 0.125 THICK STENCIL
SCALE:18X

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NOTES: (continued)

9. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
10. Board assembly site may have different recommendations for stencil design.

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最后更新日期：2025 年 10 月