TEXAS INSTRUMENTS
DRV5053-Q1
JAJSCY7A – DECEMBER 2014 – REVISED DECEMBER 2015

DRV5053-Q1 車載用アナログ・バイポーラ、ホール効果センサ

1 特長

- 線形出力ホール・センサ
- 車載アプリケーション用にAEC-Q100認定済み
  - グレード1: T_A = -40℃～125℃ (Q、図17を参照)
  - グレード0: T_A = -40℃～150℃ (E、図17を参照)
- 優れた温度安定性
  - 温度範囲の全体で感度±10%
- 高感度オプション
  - -11mV/mT (OA、図17を参照)
  - -23mV/mT (PA)
  - -45mV/mT (RA)
  - -90mV/mT (VA)
  - +23mV/mT (CA)
  - +45mV/mT (EA)
- 広い範囲の電圧をサポート
  - 2.7～38V
  - 外部レギュレータ不要
- 出力段の増幅
  - 2.3mAシンク、300µAソース
- 出力電圧: 0.2～1.8V
  - B = 0mT、OUT = 1V
- 高速パワーオン: 35µs
- 小さなパッケージと占有面積
  - 表面実装の3ピンSOT-23 (DBZ)
    - 2.92mm×2.37mm
  - スルーホールの3ピンTO-92 (LPG)
    - 4.00mm×3.15mm
- 保護機能
  - 逆電圧保護(最大-22V)
  - 40Vまでの負荷ダンプをサポート
  - 出力短絡保護
  - 出力電流制限
  - OUTからバッテリへの短絡保護

2 アプリケーション

- 流量計
- ドッキング調整
- 振動補正
- ダンパー制御

3 概要

DRV5053-Q1デバイスはチョッパ安定化されたホールICで、全温度範囲で優れた感度安定性を持ち、保護機能が内蔵された磁気センシング・ソリューションです。

0～2Vのアナログ出力は、印加された磁束密度に対して線形的に応答し、磁界方向の極性を区別します。このデバイスは2.7～38Vの広い動作電圧範囲と、-22Vまでの逆極性保護を持つため、広範な車載用および民生用アプリケーションに適しています。

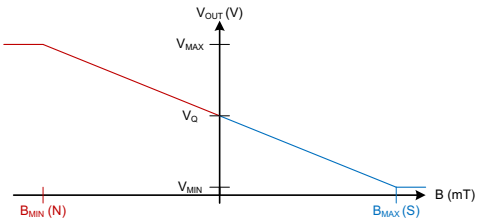
逆電圧の状態、負荷ダンプ、および出力短絡や過電流に対して、内部的な保護機能が搭載されています。

製品情報(1)

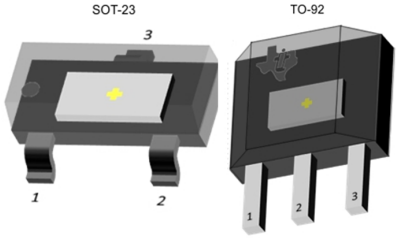
型番	パッケージ	本体サイズ(公称)
DRV5053-Q1	SOT-23 (3)	2.92mm×1.30mm
	TO-92 (3)	4.00mm×3.15mm

(1) 提供されているすべてのパッケージについては、巻末の注文情報を参照してください。

出力状態



デバイスのパッケージ



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4 改訂履歴

2014年12月発行のものから更新 **Page**

- SOT-23パッケージの本体サイズを訂正し、SIPパッケージ名をTO-92に訂正 ... 1
- Added B_{MAX} to *Absolute Maximum Ratings* ... 4
- Removed table notes regarding testing for the operating junction temperature in *Absolute Maximum Ratings* ... 4
- Updated the typical value for B_N and V_N for each version ... 5
- Updated Figure 6 ... 7
- Updated the *Functional Block Diagram* ... 8
- Updated *Output Stage* ... 11
- パッケージのテープ&リールに関するMとブランクのオプションを更新 ... 15
- コミュニティ・リソースを追加 ... 16

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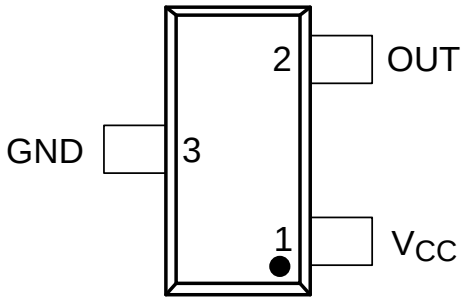
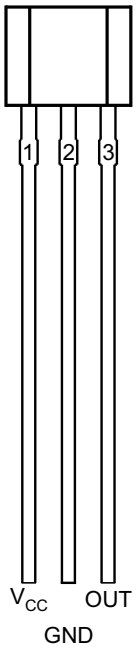
5 Pin Configuration and Functions

For additional configuration information, see デバイスのマーキング and メカニカル、パッケージ、および注文情報.

DBZ Package
3-Pin SOT-23
Top View



LPG Package
3-Pin TO-92
Top View



Pin Functions

PIN			TYPE	DESCRIPTION
NAME	DBZ	LPG		
GND	3	2	GND	Ground pin
V_{CC}	1	1	Power	2.7 to 38 V power supply. Bypass this pin to the GND pin with a 0.01-μF (minimum) ceramic capacitor rated for V_{CC}.
OUT	2	3	Output	Hall sensor analog output. 1 V output corresponds to B = 0 mT

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6 Specifications

6.1 Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)(1)

		MIN	MAX	UNIT
Power supply voltage	V_{CC}	–22(2)	40	V
	Voltage ramp rate (V_{CC}), V_{CC} < 5 V	Unlimited		V/µs
	Voltage ramp rate (V_{CC}), V_{CC} > 5 V	0	2	
Output pin voltage		–0.5	2.5	V
Output pin reverse current during reverse supply condition		0	–20	mA
Magnetic flux density, B_{MAX}		Unlimited		
Operating junction temperature, T_J	Q, see 図 17	–40	150	°C
	E, see 図 17	–40	175	
Storage temperature, T_{stg}		–65	150	°C

(1) Stresses beyond those listed under *Absolute Maximum Ratings* may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under *Recommended Operating Conditions*. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) Ensured by design. Only tested to –20 V.

6.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1)	±2500	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins(2)	±500	

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.
(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6.3 Recommended Operating Conditions

over operating free-air temperature range (unless otherwise noted)

			MIN	MAX	UNIT
V_{CC}	Power supply voltage		2.7	38	V
V_{OUT}	Output pin voltage (OUT)		0	2	V
I_{SOURCE}	Output pin current source (OUT)		0	300	µA
I_{SINK}	Output pin current sink (OUT)		0	2.3	mA
T_A	Operating ambient temperature	Q, see 図 17	–40	125	°C
		E, see 図 17	–40	150	

6.4 Thermal Information

THERMAL METRIC(1)		DRV5053-Q1		UNIT
		DBZ (SOT-23)	LPG (TO-92)	
		3 PINS	3 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	333.2	180	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	99.9	98.6	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	66.9	154.9	°C/W
ψ_{JT}	Junction-to-top characterization parameter	4.9	40	°C/W
ψ_{JB}	Junction-to-board characterization parameter	65.2	154.9	°C/W

(1) For more information about traditional and new thermal metrics, see the *Semiconductor and IC Package Thermal Metrics* application report, SPRA953.

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6.5 Electrical Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
POWER SUPPLIES (V_{CC})						
V_{CC}	V_{CC} operating voltage		2.7		38	V
I_{CC}	Operating supply current	V_{CC} = 2.7 to 38 V, T_A = 25°C		2.7		mA
		V_{CC} = 2.7 to 38 V, T_A = $T_{A, MAX}$ (1)		3	3.6	
t_{on}	Power-on time			35	50	µs
PROTECTION CIRCUITS						
V_{CCR}	Reverse supply voltage		–22			V
$I_{OCP,SOURCE}$	Overcurrent protection level	Sourcing current		300		µA
$I_{OCP,SINK}$	Overcurrent protection level	Sinking current		2.3		mA

(1) $T_{A, MAX}$ is 125°C for Q Grade 1 devices and 150°C for E Grade 0 devices (see 図 17)

6.6 Switching Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
ANALOG OUTPUT (OUT)						
t_d	Output delay time	T_A = 25°C		13	25	µs

6.7 Magnetic Characteristics

over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT (1)
V_Q	Quiescent output	B = 0 mT	0.9	1.02	1.15	V
f_{BW}	Bandwidth (2)		20			kHz
B_N	Input-referred noise (3)	C_{OUT} = 50 pF	0.40	0.49	0.79	mT_{pp}
Le	Linearity (4)	$–B_{SAT}$ < B < B_{SAT}		1%		
$V_{OUT\ MIN}$	Output saturation voltage (min)	B < $–B_{SAT}$			0.2	V
$V_{OUT\ MAX}$	Output saturation voltage (max)	B > B_{SAT}	1.8			V
DRV5053OA: –11 mV/mT						
S	Sensitivity	V_{CC} = 3.3 V	–17.5	–11	–5	mV/mT
V_N	Output-referred noise	V_{CC} = 3.3 V; R_{OUT} = 10 kΩ; C_{OUT} = 50 pF		5		mV_{pp}
B_{SAT}	Input saturation field	V_{CC} = 3.3 V		73		mT
DRV5053PA: –23 mV/mT						
S	Sensitivity	V_{CC} = 3.3 V	–35	–23	–10	mV/mT
V_N	Output-referred noise	V_{CC} = 3.3 V; R_{OUT} = 10 kΩ; C_{OUT} = 50 pF		11		mV_{pp}
B_{SAT}	Input saturation field	V_{CC} = 3.3 V		35		mT

(1) 1 mT = 10 Gauss
(2) Bandwidth describes the fastest changing magnetic field that can be detected and translated to the output.
(3) Not tested in production; limits are based on characterization data.
(4) Linearity describes the change in sensitivity across the B-range. The sensitivity near B_{SAT} is typically within 1% of the sensitivity near B = 0.

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Magnetic Characteristics (continued)

over operating free-air temperature range (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT(1)
DRV5053RA: –45 mV/mT						
S	Sensitivity	V_{CC} = 3.3 V	–70	–45	–20	mV/mT
V_N	Output-referred noise	V_{CC} = 3.3 V; R_{OUT} = 10 kΩ; C_{OUT} = 50 pF		22		mV_{pp}
B_{SAT}	Input saturation field	V_{CC} = 3.3 V		18		mT
DRV5053VA: –90 mV/mT						
S	Sensitivity	V_{CC} = 3.3 V	–140	–90	–45	mV/mT
V_N	Output-referred noise	V_{CC} = 3.3 V; R_{OUT} = 10 kΩ; C_{OUT} = 50 pF		44		mV_{pp}
B_{SAT}	Input saturation field	V_{CC} = 3.3 V		9		mT
DRV5053CA: 23 mV/mT						
S	Sensitivity	V_{CC} = 3.3 V	10	23	35	mV/mT
V_N	Output-referred noise	V_{CC} = 3.3 V; R_{OUT} = 10 kΩ; C_{OUT} = 50 pF		11		mV_{pp}
B_{SAT}	Input saturation field	V_{CC} = 3.3 V		35		mT
DRV5053EA: 45 mV/mT						
S	Sensitivity	V_{CC} = 3.3 V	20	45	70	mV/mT
V_N	Output-referred noise	V_{CC} = 3.3 V; R_{OUT} = 10 kΩ; C_{OUT} = 50 pF		22		mV_{pp}
B_{SAT}	Input saturation field	V_{CC} = 3.3 V		18		mT

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6.8 Typical Characteristics

T_A > 125°C data is valid for Grade 0 devices only (E, see 図 17)

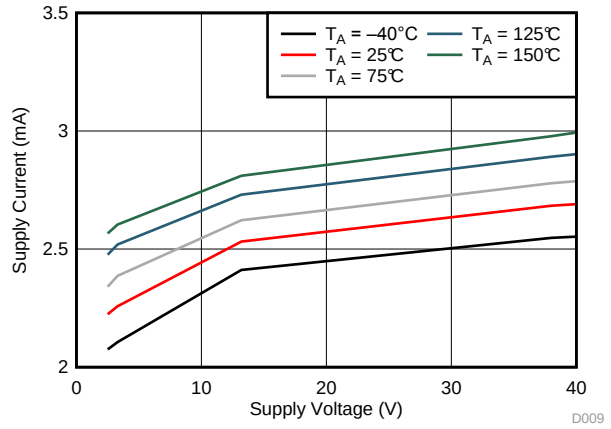


Figure 1. I_{CC} vs V_{CC}

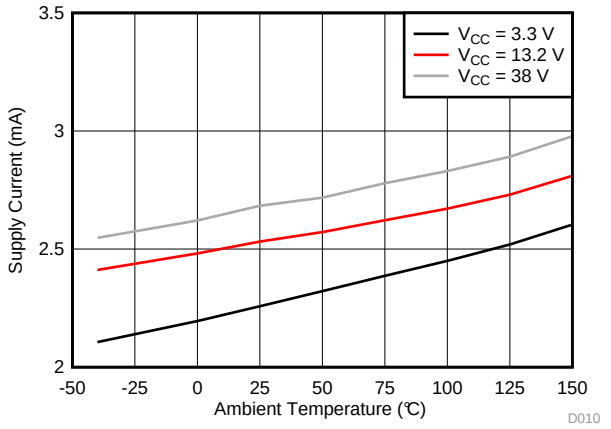
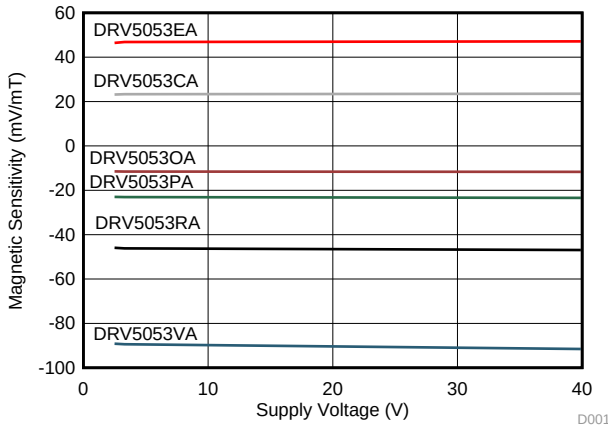
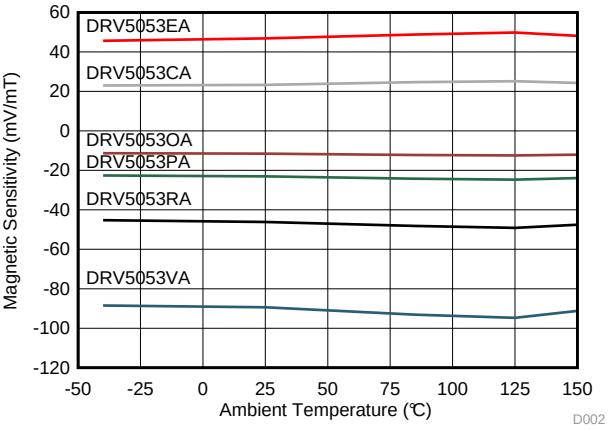


Figure 2. I_{CC} vs Temperature



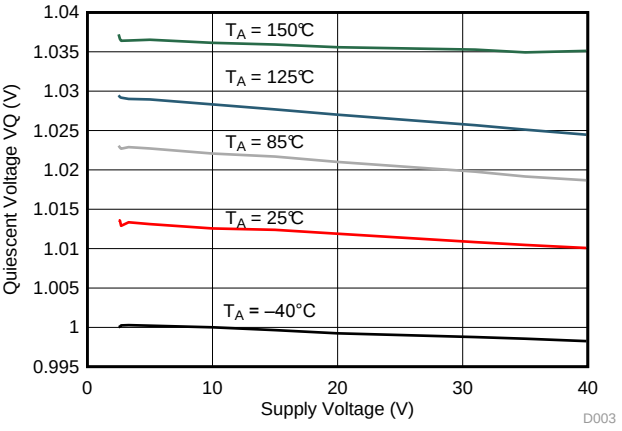
T_A = 25°C

Figure 3. Sensitivity vs V_{CC}



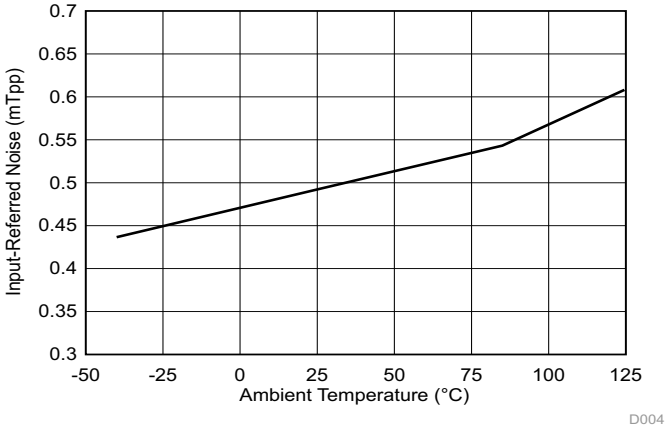
V_{CC} = 3.3 V

Figure 4. Sensitivity vs Temperature



T_A = 25°C

Figure 5. V_Q vs V_{CC}



V_{CC} = 3.3 V

Figure 6. B_N vs Temperature

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7 Detailed Description

7.1 Overview

The DRV5053-Q1 device is a chopper-stabilized Hall sensor with an analog output for magnetic sensing applications. The DRV5053-Q1 device can be powered with a supply voltage between 2.7 and 38 V, and will survive –22 V reverse battery conditions continuously. Note that the DRV5053-Q1 device will not be operating when approximately –22 to 2.4 V is applied to V_{CC} (with respect to GND). In addition, the device can withstand supply voltages up to 40 V for transient durations.

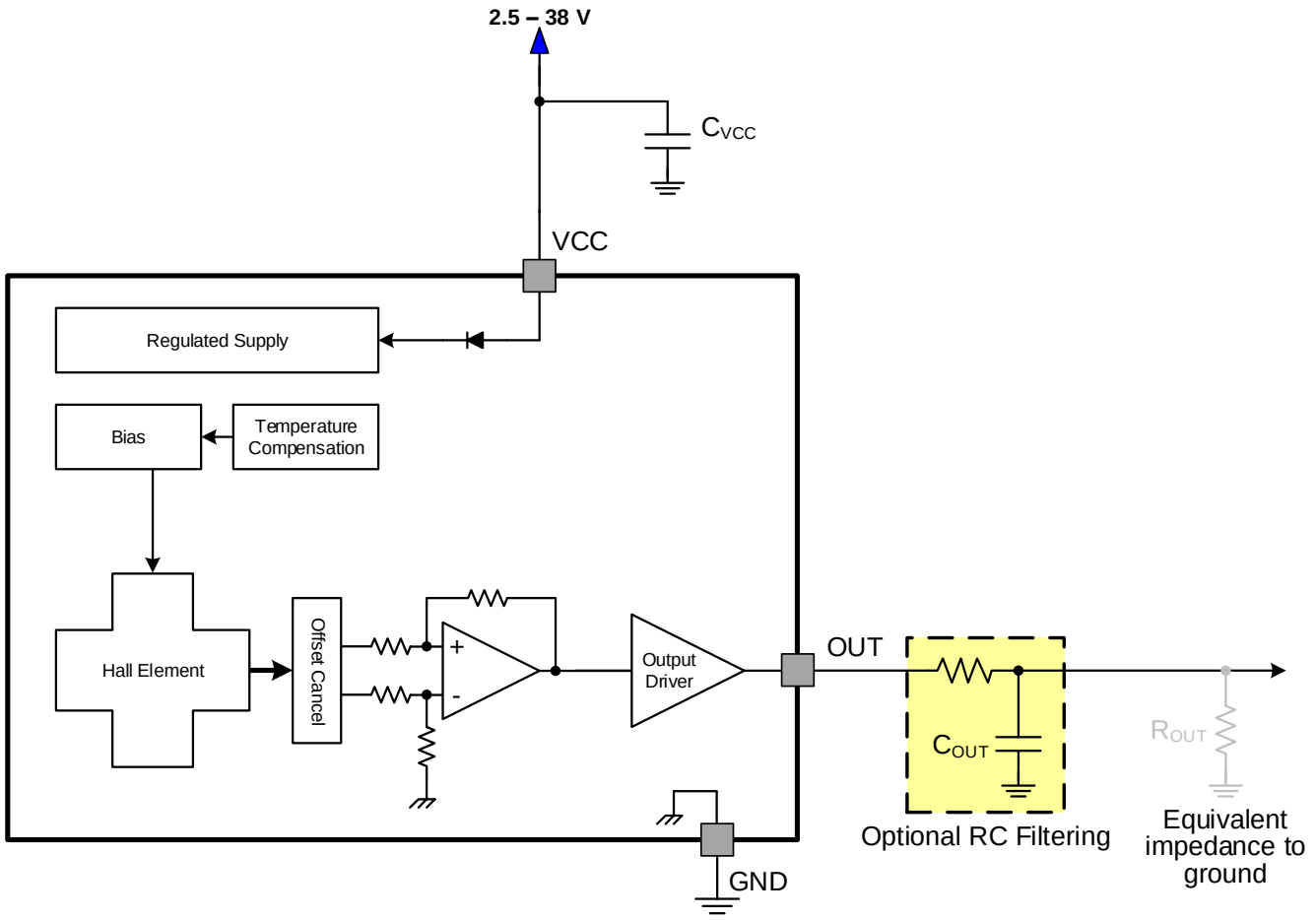
The output voltage is dependent on the magnetic field perpendicular to the package. The absence of a magnetic field will result in OUT = 1 V. A magnetic field will cause the output voltage to change linearly with the magnetic field.

The field polarity is defined as follows: a south pole near the marked side of the package is a positive magnetic field. A north pole near the marked side of the package is a negative magnetic field.

For devices with a negative sensitivity (that is, DRV5053RA: –40 mV/mT), a south pole will cause the output voltage to drop below 1 V, and a north pole will cause the output to rise above 1 V.

For devices with a positive sensitivity (that is, DRV5053EA: +40 mV/mT), a south pole will cause the output voltage to rise above 1 V, and a north pole will cause the output to drop below 1 V.

7.2 Functional Block Diagram



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7.3 Feature Description

7.3.1 Field Direction Definition

A positive magnetic field is defined as a south pole near the marked side of the package as shown in Figure 7.

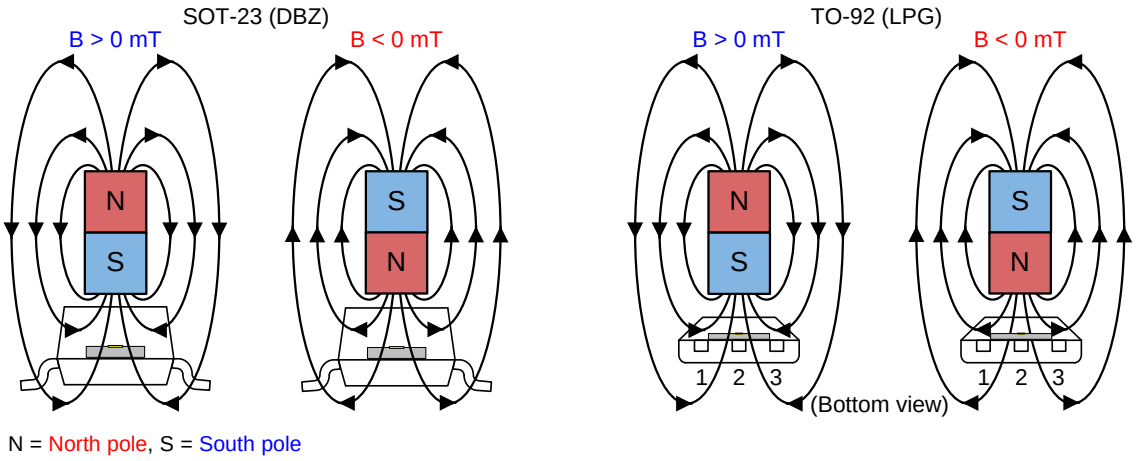

Figure 7. Field Direction Definition

7.3.2 Device Output

The DRV5053-Q1 device output is defined below for negative sensitivity (that is, –45 mV/mT, RA) and positive sensitivity (that is, +45 mV/mT, EA):

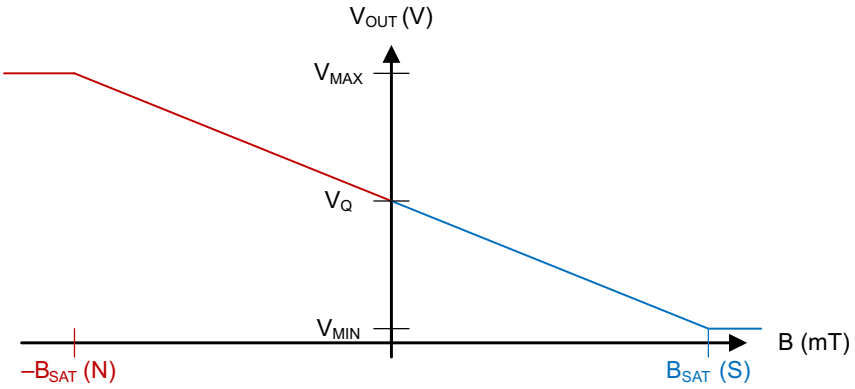

Figure 8. DRV5053-Q1 – Negative Sensitivity

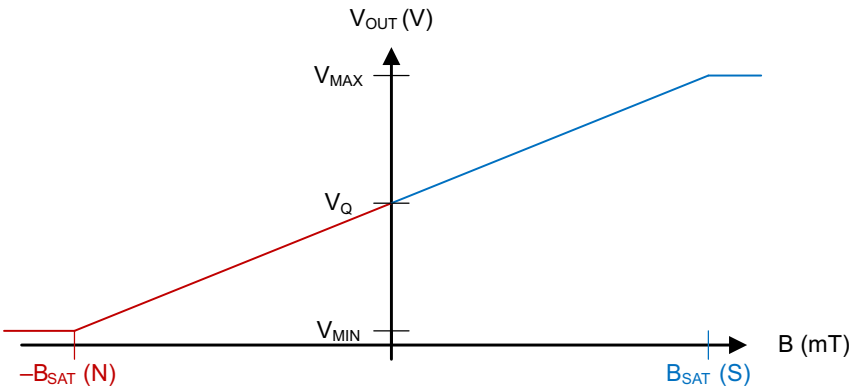

Figure 9. DRV5053-Q1 – Positive Sensitivity

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Feature Description (continued)

7.3.3 Power-On Time

After applying V_{CC} to the DRV5053-Q1 device, t_{on} must elapse before OUT is valid. Figure 10 shows Case 1 and Figure 11 shows case 2; the output is defined assuming a negative sensitivity device and a constant magnetic field $-B_{SAT} < B < B_{SAT}$.

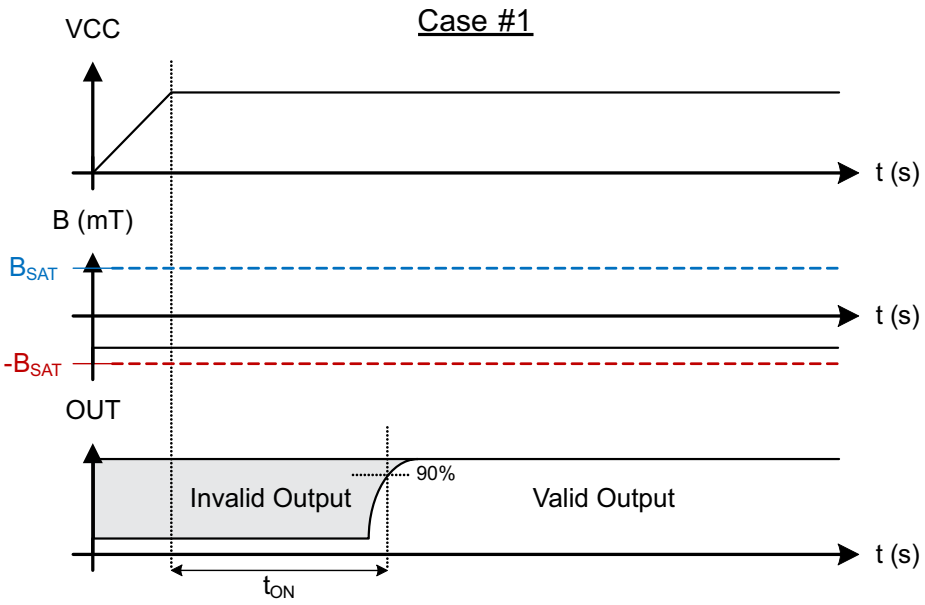

Figure 10. Case 1: Power On When B < 0, North

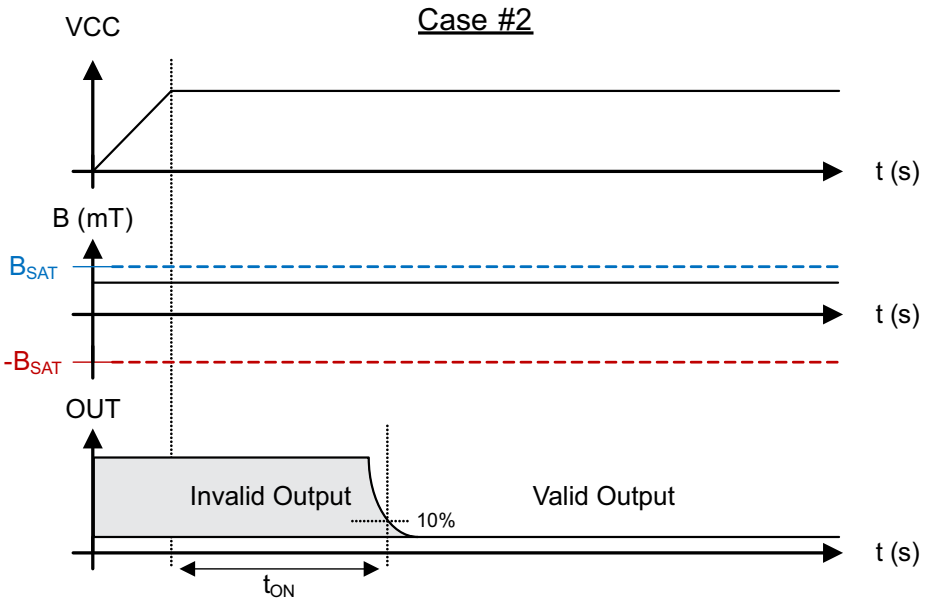

Figure 11. Case 2: Power On When B > 0, South

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Feature Description (continued)

7.3.4 Output Stage

The DRV5053-Q1 output stage is capable of up to 300-µA of current source or 2.3-mA sink. For proper operation, ensure that equivalent output load R_{OUT} > 10 kΩ.

The capacitive load directly present on the OUT pin should be less than 10 nF to ensure the internal operational amplifier is stable. If an external RC filter is added to reduce noise, it is acceptable to use a resistor ≥ 200 Ω with a capacitor ≤0.1 µF. For an application example, see *Filtered Typical Application*.

7.3.5 Protection Circuits

An analog current limit circuit limits the current through the output driver. The driver current will be clamped to I_{OCP}

7.3.5.1 Overcurrent Protection (OCP)

An analog current-limit circuit limits the current through the FET. The driver current is clamped to I_{OCP}. During this clamping, the $r_{DS(on)}$ of the output FET is increased from the nominal value.

7.3.5.2 Load Dump Protection

The DRV5053-Q1 device operates at DC V_{CC} conditions up to 38 V nominally, and can additionally withstand V_{CC} = 40 V. No current-limiting series resistor is required for this protection.

7.3.5.3 Reverse Supply Protection

The DRV5053-Q1 device is protected in the event that the V_{CC} pin and the GND pin are reversed (up to –22 V).

NOTE

In a reverse supply condition, the OUT pin reverse-current must not exceed the ratings specified in the *Absolute Maximum Ratings*.

Table 1.

FAULT	CONDITION	DEVICE	DESCRIPTION	RECOVERY
FET overload (OCP)	$I_{SINK} \geq I_{OCP}$	Operating	Output current is clamped to I_{OCP}	$I_O < I_{OCP}$
Load Dump	38 V < V_{CC} < 40 V	Operating	Device will operate for a transient duration	$V_{CC} \leq$ 38 V
Reverse Supply	–22 V < V_{CC} < 0 V	Disabled	Device will survive this condition	$V_{CC} \geq$ 2.7 V

7.4 Device Functional Modes

The DRV5053-Q1 device is active only when V_{CC} is between 2.7 and 38 V.

When a reverse supply condition exists, the device is inactive.

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8 Application and Implementation

NOTE

Information in the following applications sections is not part of the TI component specification, and TI does not warrant its accuracy or completeness. TI's customers are responsible for determining suitability of components for their purposes. Customers should validate and test their design implementation to confirm system functionality.

8.1 Application Information

The DRV5053-Q1 device is used in magnetic-field sensing applications.

8.2 Typical Applications

8.2.1 Typical Application With No Filter

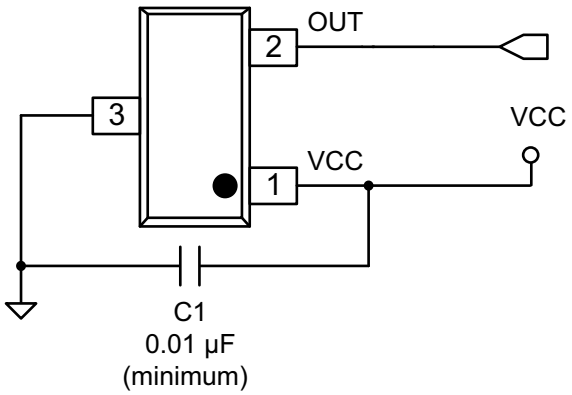

Figure 12. Typical Application Schematic – No Filter

8.2.1.1 Design Requirements

For this design example, use the parameters listed in Table 2 as the input parameters.

Table 2. Design Parameters

DESIGN PARAMETER	REFERENCE	EXAMPLE VALUE
System bandwidth	f_{BW}	15 kHz

8.2.1.2 Detailed Design Procedure

The DRV5053-Q1 has internal filtering that limits the bandwidth to at least 20 kHz. For this application no external components are required other than the C1 bypass capacitor, which is 0.01 µF minimum. If the analog output OUT is tied to a microcontroller ADC input, the equivalent load must be R > 10 kΩ and C < 10 nF.

Table 3. External Components

COMPONENT	PIN 1	PIN 2	RECOMMENDED
C1	V_{CC}	GND	A 0.01-µF (minimum) ceramic capacitor rated for V_{CC}

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8.2.1.3 Application Curve

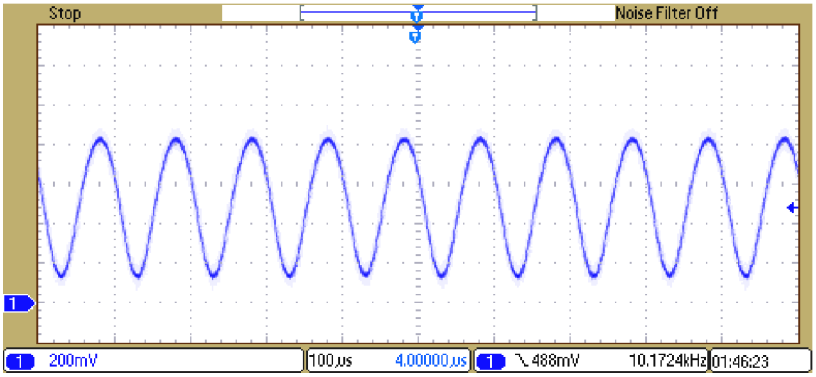

Figure 13. 10-kHz Switching Magnetic Field

8.2.2 Filtered Typical Application

For lower noise on the analog output OUT, additional RC filtering can be added to further reduce the bandwidth.

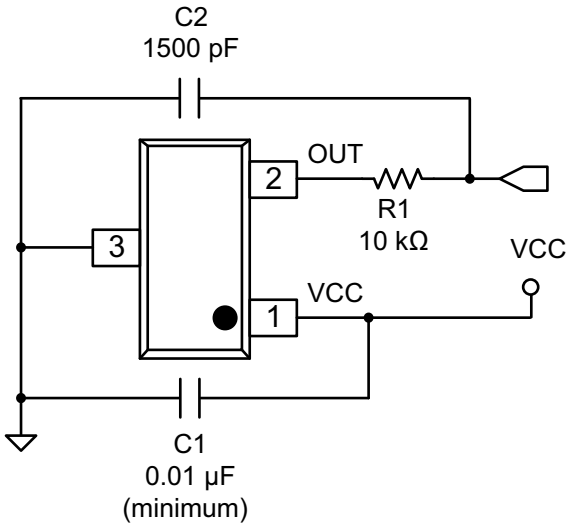

Figure 14. Filtered Typical Application Schematic

8.2.2.1 Design Requirements

For this design example, use the parameters listed in Table 4 as the input parameters.

Table 4. Design Parameters

DESIGN PARAMETER	REFERENCE	EXAMPLE VALUE
System bandwidth	f_{BW}	5 kHz

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8.2.2.2 Detailed Design Procedure

In this example we will add an external RC filter in order to reduce the output bandwidth.

In order to preserve the signal at the frequencies of interest, we will conservatively select a low-pass filter bandwidth (–3-dB point) at twice the system bandwidth (10 kHz).

$$10\ \text{kHz} < \frac{1}{2\pi \times R_1 \times C_2} \tag{1}$$

If we guess R1 = 10 kΩ, then C2 < 1590 pF. So we select C2 = 1500 pF.

8.2.2.2.1 Typical Noise Versus Cutoff Frequency

RC filters are an effective way to reduce the noise present on OUT. The following shows typical noise measurements for different cutoff frequencies using the DRV5053VA.

Table 5. DRV5053VA Typical Noise Data

R (Ω)	C (µF)	f_{CUTOFF} (kHz)	NOISE (mVpp)
163	0.1	9.8	30.4
349	0.1	4.6	22.8
750	0.1	2.1	15.2
1505	0.1	1.1	9.7
3322	0.1	0.5	5.3
7510	0.1	0.2	2.5

8.2.2.3 Application Curves

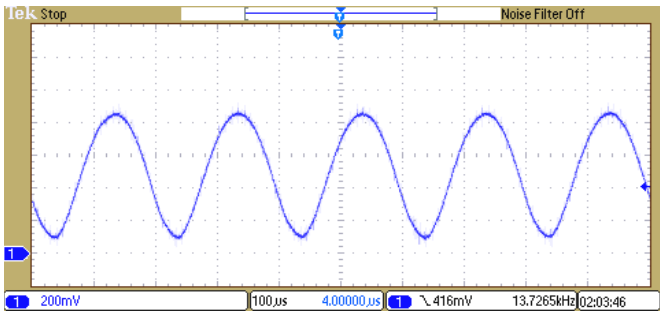

Figure 15. 5-kHz Switching Magnetic Field

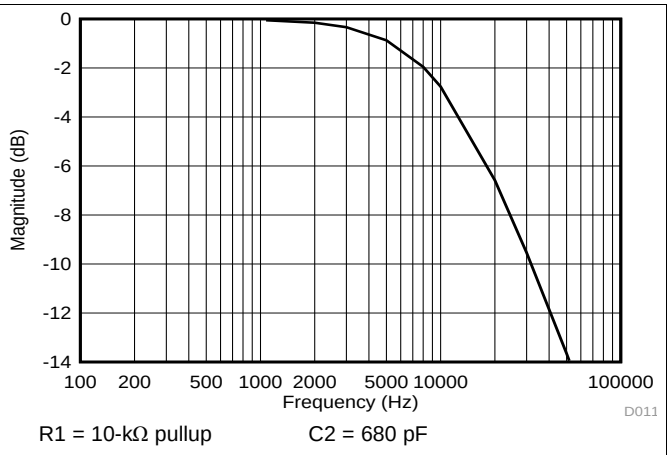

Figure 16. Low-Pass Filtering

9 Power Supply Recommendations

The DRV5053-Q1 device is designed to operate from an input voltage supply (VM) range between 2.7 and 38 V. A 0.01-µF (minimum) ceramic capacitor rated for V_{CC} must be placed as close to the DRV5053-Q1 device as possible.

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10 デバイスおよびドキュメントのサポート

10.1 デバイス・サポート

10.1.1 デバイスの項目表記

DRV5053-Q1デバイスの完全なデバイス名を読むための凡例を、図 17に示します。

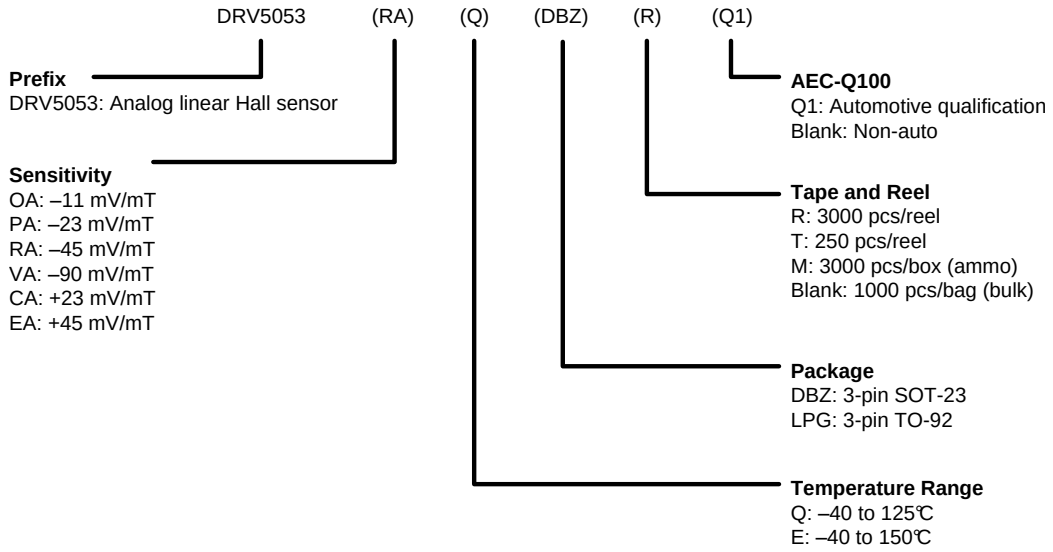

図 17. デバイス名の見方

10.1.2 デバイスのマーキング

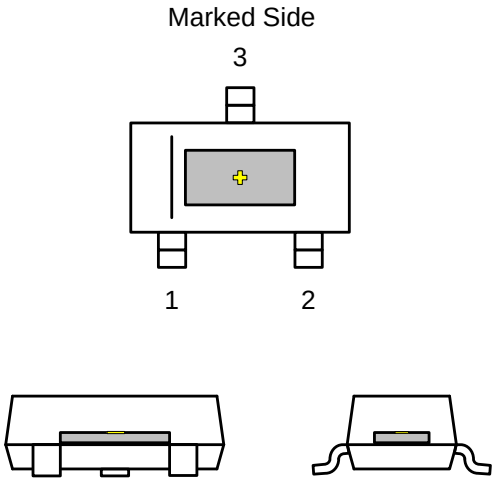

図 18. SOT-23 (DBZ)パッケージ

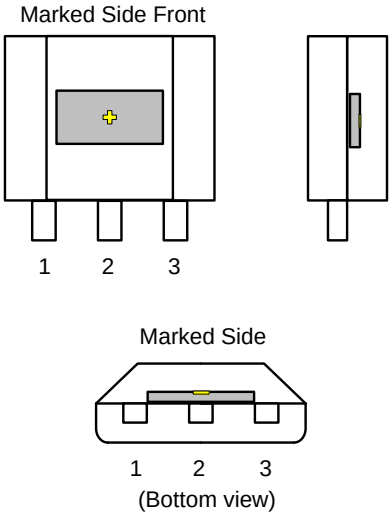

図 19. TO-92 (LPG)パッケージ

✚はホール効果センサを示します(実際の大きさに比例してはいません)。ホール素子はパッケージの中心に、許容誤差±100µmで配置されています。ホール素子の高さは、パッケージの底面から計測して、DBZパッケージでは0.7mm±50µm、LPGパッケージでは0.987mm±50µmです。

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10.2 コミュニティ・リソース

The following links connect to TI community resources. Linked contents are provided "AS IS" by the respective contributors. They do not constitute TI specifications and do not necessarily reflect TI's views; see TI's Terms of Use.

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設計サポート ***TIの設計サポート*** 役に立つE2Eフォーラムや、設計サポート・ ツールをすばやく見つけることができます。技術サポート用の連絡先情報も参照できます。

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10.5 Glossary

SLYZ022 — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

11 メカニカル、パッケージ、および注文情報

以降のページには、メカニカル、パッケージ、および注文に関する情報が記載されています。この情報は、そのデバイスについて利用可能な最新のデータです。このデータは予告なく変更されることがあり、ドキュメントが改訂される場合もあります。本データシートのブラウザ版を使用されている場合は、画面左側の説明をご覧ください。

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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)
DRV5053CAEDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJCA
DRV5053CAEDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJCA
DRV5053CAEDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 150	+AJCA
DRV5053CAELPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJCA
DRV5053CAELPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJCA
DRV5053CAELPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJCA
DRV5053CAELPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJCA
DRV5053CAQDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKCA
DRV5053CAQDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKCA
DRV5053CAQDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 125	+AKCA
DRV5053CAQLPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKCA
DRV5053CAQLPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKCA
DRV5053CAQLPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKCA
DRV5053CAQLPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKCA
DRV5053EAEDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJEA
DRV5053EAEDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJEA
DRV5053EAEDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 150	+AJEA
DRV5053EAELPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJEA
DRV5053EAELPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJEA
DRV5053EAELPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJEA
DRV5053EAELPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJEA
DRV5053EAQDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AKEA
DRV5053EAQDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AKEA
DRV5053EAQDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 150	+AKEA
DRV5053EAQLPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AKEA
DRV5053EAQLPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AKEA
DRV5053EAQLPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKEA
DRV5053EAQLPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKEA
DRV5053OAEDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJOA

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)
DRV5053OAEDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJOA
DRV5053OAEDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 150	+AJOA
DRV5053OAELPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJOA
DRV5053OAELPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJOA
DRV5053OAELPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJOA
DRV5053OAELPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJOA
DRV5053OAQDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKOA
DRV5053OAQDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKOA
DRV5053OAQDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 125	+AKOA
DRV5053OAQLPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKOA
DRV5053OAQLPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKOA
DRV5053OAQLPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKOA
DRV5053OAQLPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKOA
DRV5053PAEDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJPA
DRV5053PAEDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJPA
DRV5053PAEDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 150	+AJPA
DRV5053PAELPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJPA
DRV5053PAELPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJPA
DRV5053PAELPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJPA
DRV5053PAELPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJPA
DRV5053PAQDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKPA
DRV5053PAQDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKPA
DRV5053PAQDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 125	+AKPA
DRV5053PAQLPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKPA
DRV5053PAQLPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKPA
DRV5053PAQLPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKPA
DRV5053PAQLPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKPA
DRV5053RAEDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJRA
DRV5053RAEDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJRA
DRV5053RAEDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 150	+AJRA
DRV5053RAELPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJRA

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)
DRV5053RAELPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJRA
DRV5053RAELPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJRA
DRV5053RAELPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJRA
DRV5053RAQDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKRA
DRV5053RAQDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKRA
DRV5053RAQLPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKRA
DRV5053RAQLPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKRA
DRV5053RAQLPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-	+AKRA
DRV5053RAQLPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AKRA
DRV5053VAEDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJVA
DRV5053VAEDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 150	+AJVA
DRV5053VAEDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 150	+AJVA
DRV5053VAELPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJVA
DRV5053VAELPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 150	+AJVA
DRV5053VAELPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJVA
DRV5053VAELPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 150	+AJVA
DRV5053VAQDBZRQ1	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKVA
DRV5053VAQDBZRQ1.A	Active	Production	SOT-23 (DBZ) | 3	3000 | LARGE T&R	Yes	NIPDAUAG	Level-1-260C-UNLIM	-40 to 125	+AKVA
DRV5053VAQDBZTQ1	Obsolete	Production	SOT-23 (DBZ) | 3	-	-	Call TI	Call TI	-40 to 125	+AKVA
DRV5053VAQLPGMQ1	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKVA
DRV5053VAQLPGMQ1.A	Active	Production	TO-92 (LPG) | 3	3000 | AMMO	Yes	SN	N/A for Pkg Type	-40 to 125	+AKVA
DRV5053VAQLPGQ1	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKVA
DRV5053VAQLPGQ1.A	Active	Production	TO-92 (LPG) | 3	1000 | BULK	Yes	SN	N/A for Pkg Type	-40 to 125	+AKVA

(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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OTHER QUALIFIED VERSIONS OF DRV5053-Q1 :

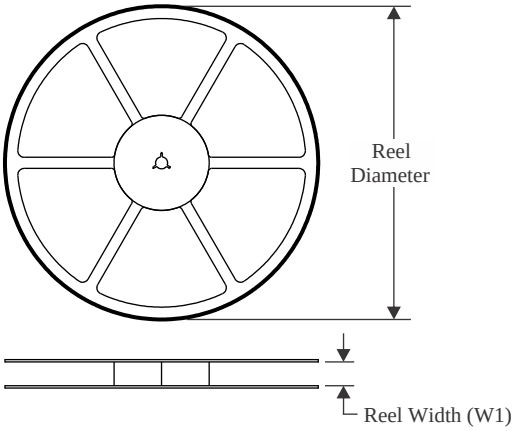
- Catalog : DRV5053

NOTE: Qualified Version Definitions:

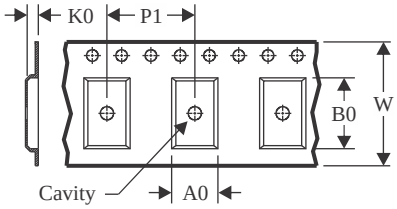
- Catalog - TI's standard catalog product

TAPE AND REEL INFORMATION

REEL DIMENSIONS

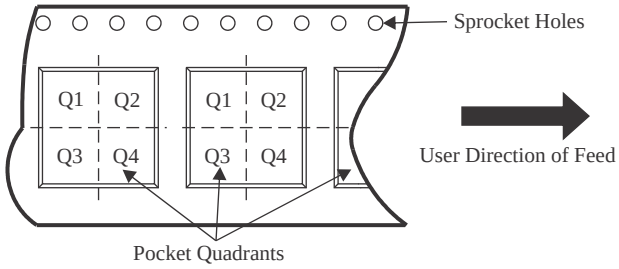


TAPE DIMENSIONS



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

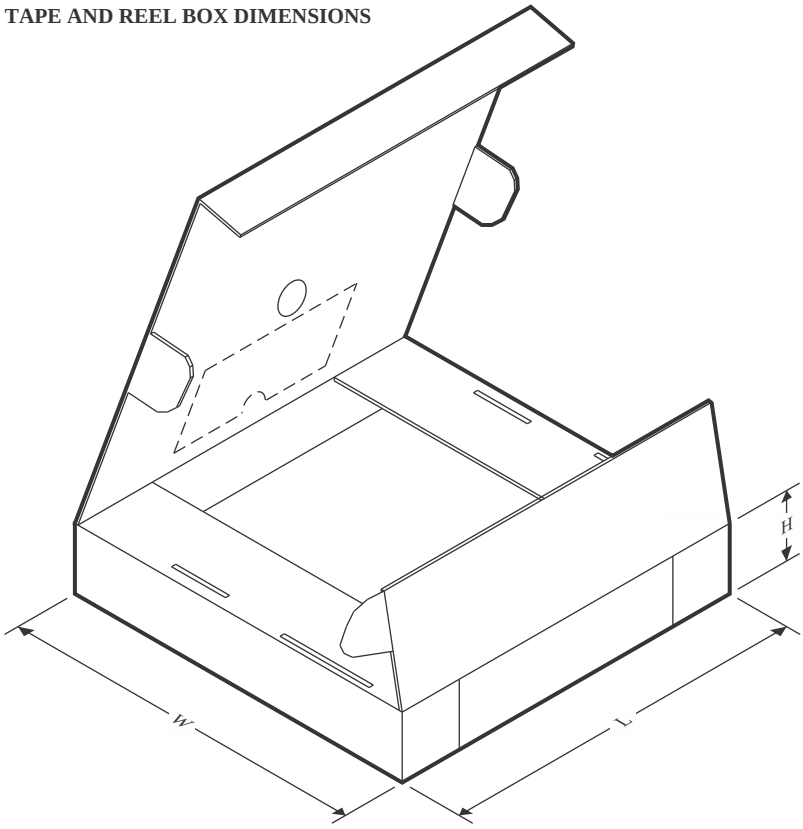
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
DRV5053CAEDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053CAQDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053EAEDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053EAQDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053OAEDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053OAQDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053PAEDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053PAQDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053RAEDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053RAQDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053VAEDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3
DRV5053VAQDBZRQ1	SOT-23	DBZ	3	3000	180.0	8.4	3.15	2.77	1.22	4.0	8.0	Q3

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

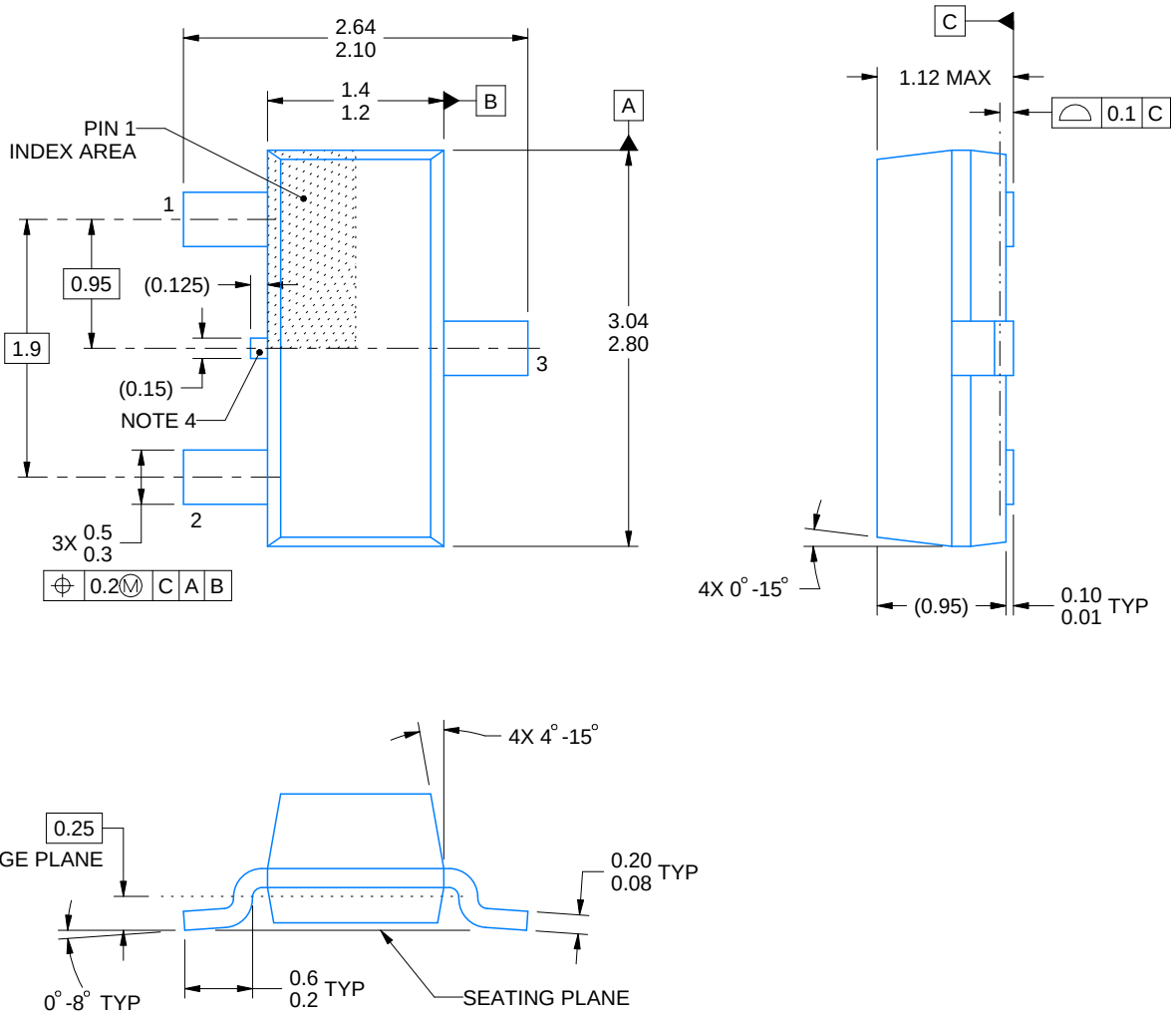
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DRV5053CAEDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053CAQDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053EAEDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053EAQDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053OAEDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053OAQDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053PAEDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053PAQDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053RAEDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053RAQDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053VAEDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0
DRV5053VAQDBZRQ1	SOT-23	DBZ	3	3000	202.0	201.0	28.0

PACKAGE OUTLINE

DBZ0003A

SOT-23 - 1.12 mm max height

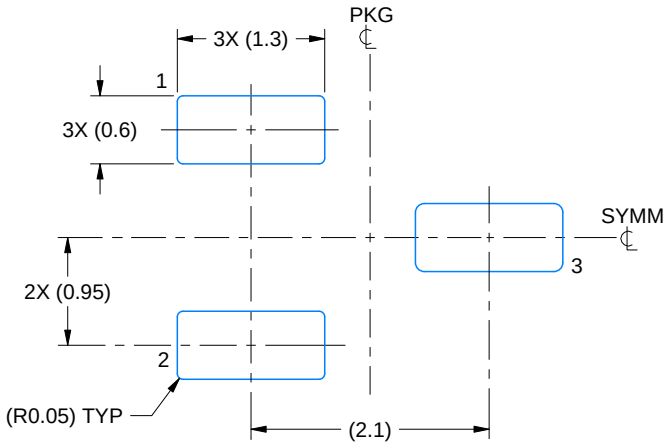
SMALL OUTLINE TRANSISTOR



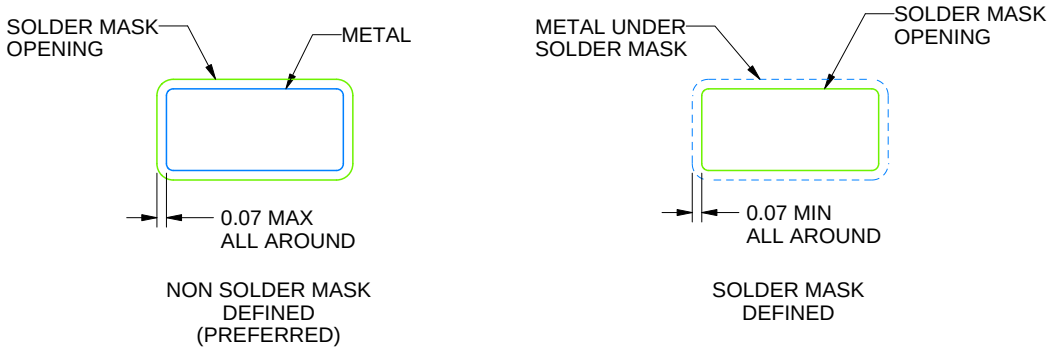
4214838/F 08/2024

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



LAND PATTERN EXAMPLE
SCALE:15X



SOLDER MASK DETAILS

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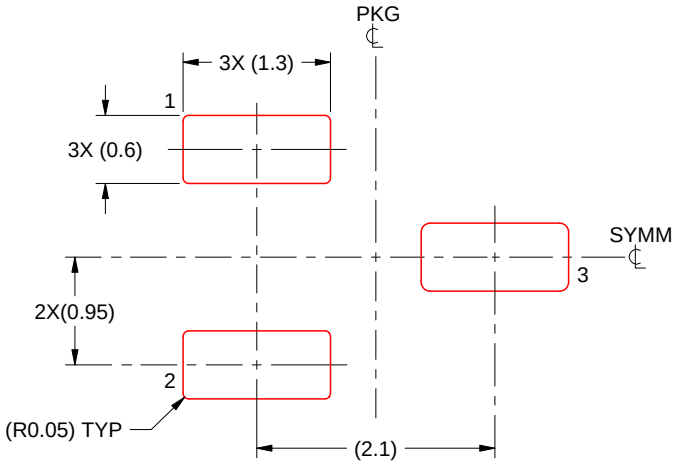
NOTES: (continued)

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



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

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NOTES: (continued)

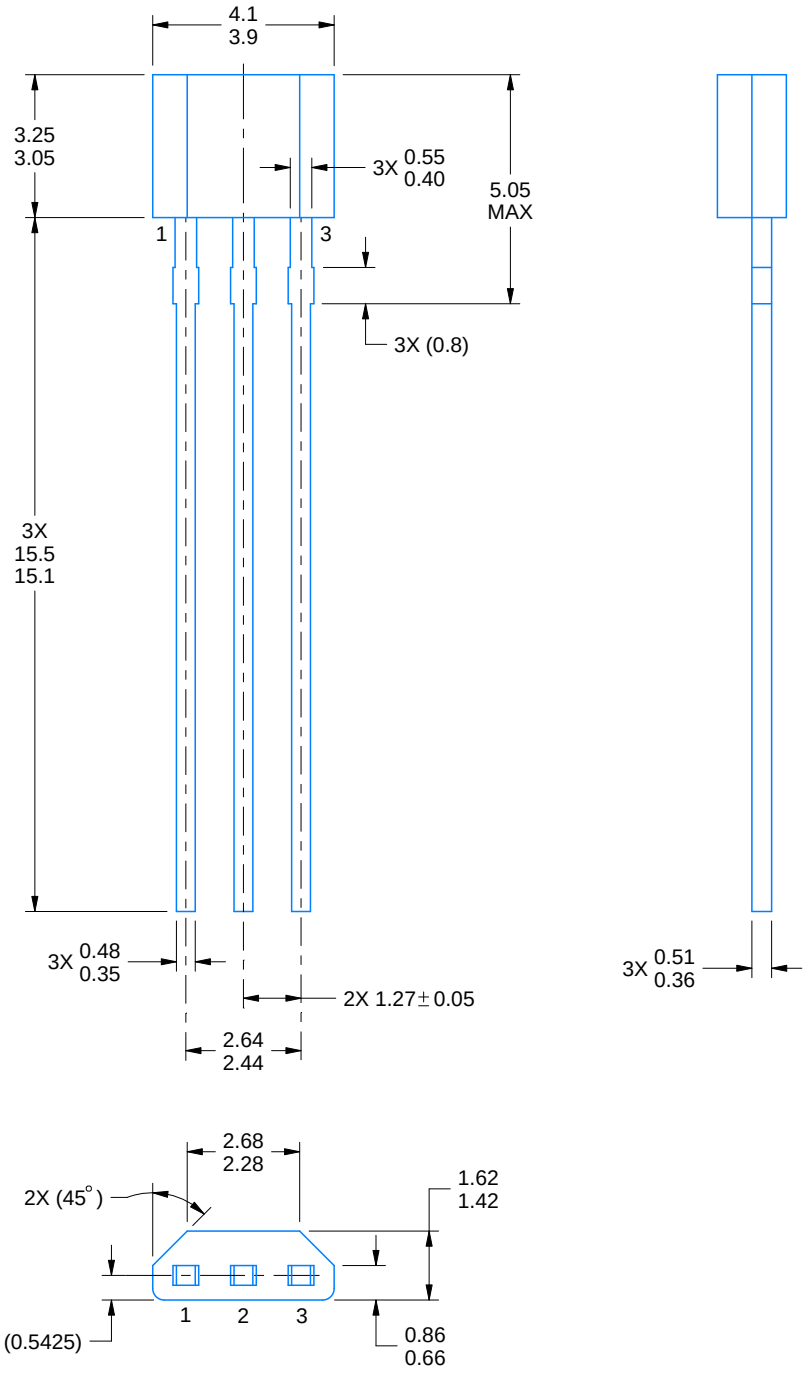
7. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
8. Board assembly site may have different recommendations for stencil design.

PACKAGE OUTLINE

LPG0003A

TO-92 - 5.05 mm max height

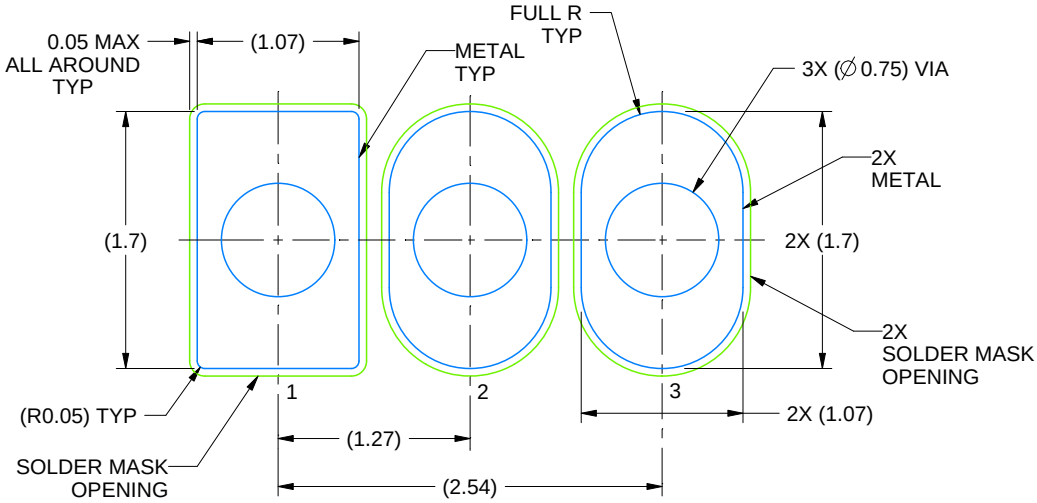
TRANSISTOR OUTLINE



4221343/C 01/2018

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.



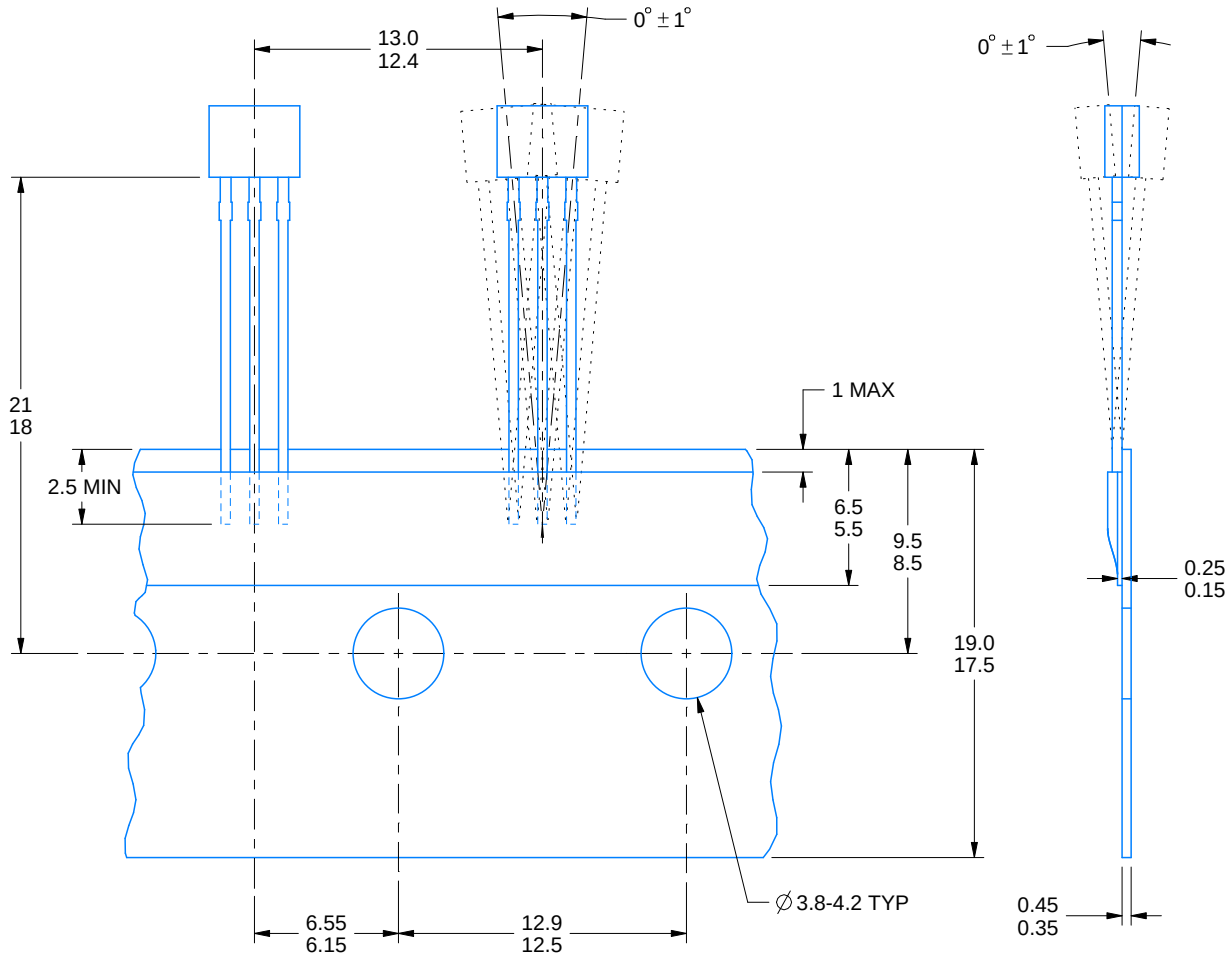
LAND PATTERN EXAMPLE
NON-SOLDER MASK DEFINED
SCALE:20X

4221343/C 01/2018

LPG0003A

TO-92 - 5.05 mm max height

TRANSISTOR OUTLINE



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