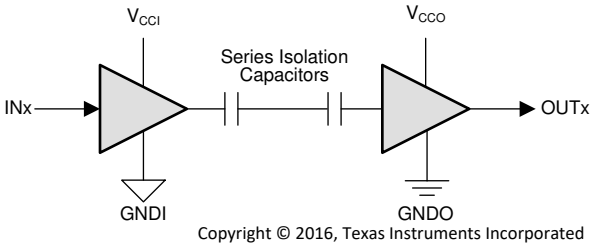
ISO652x-Q1 General Purpose Dual-Channel Automotive Functional Isolators

1 Features

- Dual channel, CMOS output functional isolators
- 50Mbps data rate
- AEC-Q100 qualified with the following results:
  - Device temperature Grade 1: –40°C to +125°C ambient operating temperature range
- Robust SiO_2 isolation barrier with ±150kV/µs typical CMTI
- Functional Isolation (8-D):
  - $450V_{RMS}$, $637V_{DC}$ working voltage
  - $707V_{RMS}$, $1000V_{DC}$ transient voltage (60s)
- Wide supply range: 1.71V to 1.89V and 2.25V to 5.5V
- 1.71V to 5.5V level translation
- Default output *High* (ISO652x-Q1) and *Low* (ISO652xF-Q1) Options
- 1.8mA per channel typical at 1Mbps at 3.3V
- Low propagation delay: 11ns typical at 3.3V
- Robust electromagnetic compatibility (EMC)
  - System-Level ESD, EFT, and surge immunity
  - Ultra-low emissions
- Narrow-SOIC (8-D) package options

2 Applications

- Body electronics and Lighting
- Premium Audio
- Starter Generator
- Battery management system (BMS)
- Active Suspension



V_{CCI}=Input supply, V_{CCO}=Output supply
GNDI=Input ground, GNDO=Output ground

Simplified Schematic

3 Description

The ISO652x-Q1 devices are high-performance, dual-channel functional isolators designed for cost sensitive, space constrained applications that require isolation for non-safety applications. The isolation barrier supports a working voltage of $450V_{RMS}$ and transient over voltages of $1000V_{DC}$.

The ISO652x-Q1 devices provide high electromagnetic immunity and low emissions at low power consumption, while isolating CMOS or LVCMOS digital I/Os. Each isolation channel has a logic input and output buffer separated by TI's double capacitive silicon dioxide (SiO_2) insulation barrier. ISO6520-Q1 has two isolation channels with both channels in the same direction. ISO6521-Q1 has two isolation channels with one channel in each direction. In the event of input power or signal loss, the default output is *high* for devices without suffix F and *low* for devices with suffix F. See Device Functional Modes section for further details.

These devices help prevent ground loops and noise currents between mixed voltage domain systems on data buses, such as CAN and LIN, from causing data corruption. Through chip design and layout techniques, the electromagnetic compatibility of the ISO652x-Q1 devices have been significantly enhanced to ease system-level ESD and emissions compliance.

Package Information

PART NUMBER	PACKAGE (1)	PACKAGE SIZE(2)
ISO6520-Q1, ISO6520F-Q1	D (SOIC, 8)	4.9mm × 6.0mm
ISO6521-Q1, ISO6521F-Q1		

(1) For all available packages, see the orderable addendum at the end of the data sheet.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.

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4 Pin Configuration and Functions

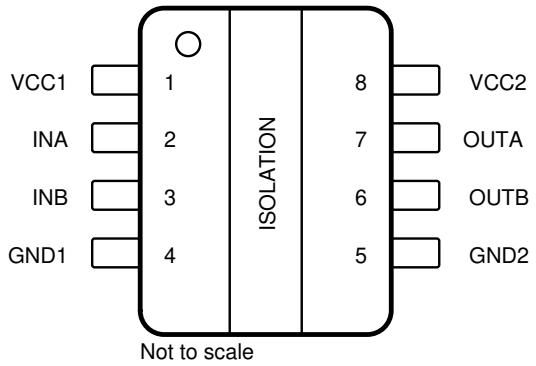


Figure 4-1. ISO6520 D Package 8-Pin SOIC Top View

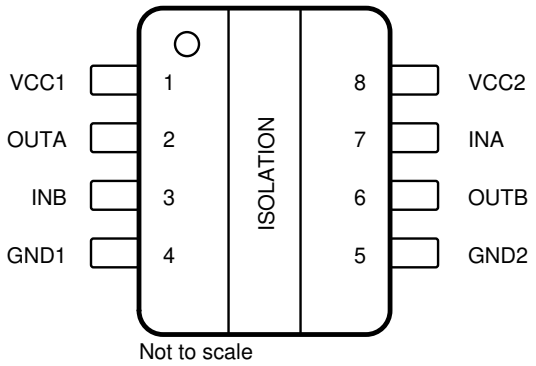


Figure 4-2. ISO6521 D Package 8-Pin SOIC Top View

Table 4-1. Pin Functions

NAME	PIN		TYPE [1]	Description
	ISO6520	ISO6521		
GND1	4	4	-	Ground connection for V_{CC1}
GND2	5	5	-	Ground connection for V_{CC2}
INA	2	7	I	Input, channel A
INB	3	3	I	Input, channel B
OUTA	7	2	O	Output, channel A
OUTB	6	6	O	Output, channel B
V_{CC1}	1	1	P	Power supply, V_{CC1}
V_{CC2}	8	8	P	Power supply, V_{CC2}

(1) I = Input, O = Output, P = Power

5 Specifications

5.1 Absolute Maximum Ratings

See(1)

		MIN	MAX	UNIT
Supply Voltage (2)	V_{CC1} to GND1	-0.5	6	V
	V_{CC2} to GND2	-0.5	6	
Input/Output Voltage	INx to GNDx	-0.5	V_{CCX} + 0.5 (3)	V
	OUTx to GNDx	-0.5	V_{CCX} + 0.5 (3)	
Output Current	Io	-15	15	mA
Temperature	Operating junction temperature, T_J		150	°C
	Storage temperature, T_{stg}	-65	150	°C
Transient Isolation Voltage (SOIC-8)	AC Voltage, t=60s		707	V_{RMS}
	DC Voltage, t=60s		1000	V_{DC}

(1) Operation outside the Absolute Maximum Ratings may cause permanent device damage. Absolute Maximum Ratings do not imply functional operation of the device at these or any other conditions beyond those listed under Recommended Operating Conditions. If used outside the Recommended Operating Conditions but within the Absolute Maximum Ratings, the device may not be fully functional, and this may affect device reliability, functionality, performance, and shorten the device lifetime.
(2) All voltage values except differential I/O bus voltages are with respect to the local ground terminal (GND1 or GND2) and are peak voltage values
(3) Maximum voltage must not exceed 6 V.

5.2 ESD Ratings

			VALUE	UNIT
$V_{(ESD)}$	Electrostatic discharge	Human body model (HBM), per ANSI/ESDA/JEDEC JS-001, all pins(1)	±6000	V
		Charged device model (CDM), per JEDEC specification JESD22-C101, all pins(2)	±1500	

(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.

5.3 Recommended Operating Conditions

		TEST CONDITIONS	MIN	NOM	MAX	UNIT
V_{CC1} (1)	Supply Voltage Side 1	V_{CC} = 1.8 V (3)	1.71		1.89	V
V_{CC1} (1)	Supply Voltage Side 1	V_{CC} = 2.5 V to 5 V (3)	2.25		5.5	V
V_{CC2} (1)	Supply Voltage Side 2	V_{CC} = 1.8 V (3)	1.71		1.89	V
V_{CC2} (1)	Supply Voltage Side 2	V_{CC} = 2.5 V to 5 V (3)	2.25		5.5	V
V_{CC} (UVLO+)	UVLO threshold when supply voltage is rising			1.53	1.71	V
V_{CC} (UVLO-)	UVLO threshold when supply voltage is falling		1.1	1.41		V
Vhys (UVLO)	Supply voltage UVLO hysteresis		0.08	0.13		V
V_{IH}	High level Input voltage		0.7 x V_{CCI} (2)		V_{CCI}	V
V_{IL}	Low level Input voltage		0		0.3 x V_{CCI}	V

		TEST CONDITIONS	MIN	NOM	MAX	UNIT
I_{OH}	High level output current	V_{CCO} (2) = 5 V	-4			mA
		V_{CCO} = 3.3 V	-2			mA
		V_{CCO} = 2.5 V	-1			mA
		V_{CCO} = 1.8 V	-1			mA
I_{OL}	Low level output current	V_{CCO} = 5 V			4	mA
		V_{CCO} = 3.3 V			2	mA
		V_{CCO} = 2.5 V			1	mA
		V_{CCO} = 1.8 V			1	mA
DR	Data Rate		0		50	Mbps
T_A	Ambient temperature		-40	25	125	°C
V_{IOWM}	Functional Isolation Working Voltage (SOIC-8)	AC Voltage (sine wave)			450	V_{RMS}
		DC Voltage			637	V_{DC}

(1) V_{CC1} and V_{CC2} can be set independent of one another
(2) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}
(3) The channel outputs are in undetermined state when 1.89 V < V_{CC1}, V_{CC2} < 2.25 V and 1.05 V < V_{CC1}, V_{CC2} < 1.71 V

5.4 Thermal Information

THERMAL METRIC (1)		ISO652x-Q1	UNIT
		D (SOIC-8)	
		8 PINS	
$R_{\theta JA}$	Junction-to-ambient thermal resistance	104.6	°C/W
$R_{\theta JC(top)}$	Junction-to-case (top) thermal resistance	48.9	°C/W
$R_{\theta JB}$	Junction-to-board thermal resistance	52.9	°C/W
ψ_{JT}	Junction-to-top characterization parameter	7.9	°C/W
ψ_{JB}	Junction-to-board characterization parameter	52.1	°C/W

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

5.5 Package Characteristics

PARAMETER		TEST CONDITIONS	VALUE	UNIT
			8-D	
CLR	External clearance(1)	Shortest pin to pin distance through air	>4	mm
CPG	External creepage(1)	Shortest pin to pin distance across the package surface	>4	mm
CTI	Comparative tracking index	IEC 60112; UL 746A	>400	V
	Material Group	According to IEC 60664-1	II	
C_{IO}	Capacitance, input to output(2)	V_{IO} = 0.4 × sin (2 πft), f = 1 MHz	≅0.5	pF
R_{IO}	Resistance, input to output(2)	T_A = 25°C	$>10^{12}$	Ω

(1) Creepage and clearance requirements must be applied according to the specific equipment isolation standards of an application. Care must be taken to maintain the creepage and clearance distance of a board design to verify that the mounting pads of the isolator on the printed-circuit board do not reduce this distance. Creepage and clearance on a printed-circuit board become equal in certain cases. Techniques such as inserting grooves, ribs, or both on a printed circuit board are used to help increase these specifications.
(2) All pins on each side of the barrier tied together creating a two-pin device.

5.6 Electrical Characteristics—5-V Supply

V_{CC1} = V_{CC2} = 5 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage	I_{OH} = -4 mA; See Figure 6-1	V_{CCO} - 0.4			V
V_{OL}	Low-level output voltage	I_{OL} = 4 mA; See Figure 6-1			0.4	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 700V ; See Figure 6-3	100	150		kV/µs
C_i	Input Capacitance (2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 5 V		2.8		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}.
(2) Measured from input pin to same side ground.

5.7 Supply Current Characteristics—5-V Supply

V_{CC1} = V_{CC2} = 5 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6520							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6520), V_I = 0 V (ISO6520 with F suffix)		I_{CC1}		1.1	1.7	mA
			I_{CC2}		1.3	2.2	
	V_I = 0V (ISO6520), V_I = V_{CC1} (ISO6520 with F suffix)		I_{CC1}		3.2	4.6	
			I_{CC2}		1.4	2.3	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}		2.1	3.1	
			I_{CC2}		1.5	2.4	
		10 Mbps	I_{CC1}		2.2	3.2	
			I_{CC2}		2.7	3.6	
		50 Mbps	I_{CC1}		2.5	3.6	
			I_{CC2}		7.9	9.5	
ISO6521							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6521); V_I = 0 V (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		1.2	2.2	mA
	V_I = 0 V (ISO6521); V_I = V_{CCI} (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		2.3	3.5	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.9	2.9	
		10 Mbps	I_{CC1}, I_{CC2}		2.5	3.6	
		50 Mbps	I_{CC1}, I_{CC2}		5.2	6.7	

(1) V_{CCI} = Input-side V_{CC}
(2) Supply current valid for ENx = V_{CCx} and ENx = 0V
(3) Supply current valid for ENx = V_{CCx}

5.8 Electrical Characteristics—3.3-V Supply

V_{CC1} = V_{CC2} = 3.3 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage	I_{OH} = -2mA; See Figure 6-1	V_{CCO} - 0.2			V
V_{OL}	Low-level output voltage	I_{OL} = 2mA; See Figure 6-1			0.2	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 700V ; See Figure 6-3	100	150		kV/µs
C_i	Input Capacitance(2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 3.3 V		2.8		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}.
(2) Measured from input pin to same side ground.

5.9 Supply Current Characteristics—3.3-V Supply

V_{CC1} = V_{CC2} = 3.3 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6520							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6520), V_I = 0 V (ISO6520 with F suffix)		I_{CC1}		1.1	1.6	mA
			I_{CC2}		1.3	2.2	
	V_I = 0V (ISO6520), V_I = V_{CC1} (ISO6520 with F suffix)		I_{CC1}		3.2	4.5	
			I_{CC2}		1.4	2.3	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}		2.1	3.1	
			I_{CC2}		1.4	2.3	
		10 Mbps	I_{CC1}		2.2	3.1	
			I_{CC2}		2.3	3.2	
		50 Mbps	I_{CC1}		2.4	3.4	
			I_{CC2}		6	7.3	
ISO6521							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6521); V_I = 0 V (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		1.2	2.2	mA
	V_I = 0 V (ISO6521); V_I = V_{CCI} (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		2.3	3.5	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.8	2.9	
		10 Mbps	I_{CC1}, I_{CC2}		2.3	3.4	
		50 Mbps	I_{CC1}, I_{CC2}		4.2	5.5	

(1) V_{CCI} = Input-side V_{CC}
(2) Supply current valid for ENx = V_{CCx} and ENx = 0V
(3) Supply current valid for ENx = V_{CCx}

5.10 Electrical Characteristics—2.5-V Supply

V_{CC1} = V_{CC2} = 2.5 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage	I_{OH} = -1mA ; See Figure 6-1	V_{CCO} - 0.1			V
V_{OL}	Low-level output voltage	I_{OL} = 1mA ; See Figure 6-1			0.1	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 700V ; See Figure 6-3	100	150		kV/µs
C_i	Input Capacitance(2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 2.5 V		2.8		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}.
(2) Measured from input pin to same side ground.

5.11 Supply Current Characteristics—2.5-V Supply

V_{CC1} = V_{CC2} = 2.5 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6520							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6520), V_I = 0 V (ISO6520 with F suffix)		I_{CC1}		1.1	1.6	mA
			I_{CC2}		1.3	2.1	
	V_I = 0V (ISO6520), V_I = V_{CC1} (ISO6520 with F suffix)		I_{CC1}		3.1	4.5	
			I_{CC2}		1.4	2.3	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}		2.1	3.1	
			I_{CC2}		1.4	2.3	
		10 Mbps	I_{CC1}		2.1	3.1	
			I_{CC2}		2	2.9	
		50 Mbps	I_{CC1}		2.3	3.3	
			I_{CC2}		4.8	6	
ISO6521							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6521); V_I = 0 V (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		1.2	2.2	mA
	V_I = 0 V (ISO6521); V_I = V_{CCI} (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		2.3	3.5	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.8	2.9	
		10 Mbps	I_{CC1}, I_{CC2}		2.1	3.2	
		50 Mbps	I_{CC1}, I_{CC2}		3.6	4.9	

(1) V_{CCI} = Input-side V_{CC}
(2) Supply current valid for ENx = V_{CCx} and ENx = 0V
(3) Supply current valid for ENx = V_{CCx}

5.12 Electrical Characteristics—1.8-V Supply

V_{CC1} = V_{CC2} = 1.8 V ± 5% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage	I_{OH} = -1mA; See Figure 6-1	V_{CCO} - 0.1			V
V_{OL}	Low-level output voltage	I_{OL} = 1mA; See Figure 6-1			0.1	V
$V_{IT+(IN)}$	Rising input switching threshold				0.7 x V_{CCI} (1)	V
$V_{IT-(IN)}$	Falling input switching threshold		0.3 x V_{CCI}			V
$V_{I(HYS)}$	Input threshold voltage hysteresis		0.1 x V_{CCI}			V
I_{IH}	High-level input current	V_{IH} = V_{CCI} (1) at INx			10	µA
I_{IL}	Low-level input current	V_{IL} = 0 V at INx	-10			µA
CMTI	Common mode transient immunity	V_I = V_{CC} or 0 V, V_{CM} = 700V ; See Figure 6-3	100	150		kV/µs
C_i	Input Capacitance(2)	V_I = V_{CC}/ 2 + 0.4×sin(2πft), f = 2 MHz, V_{CC} = 1.8 V		2.8		pF

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}.
(2) Measured from input pin to same side ground.

5.13 Supply Current Characteristics—1.8-V Supply

V_{CC1} = V_{CC2} = 1.8 V ± 5% (over recommended operating conditions unless otherwise noted)

PARAMETER	TEST CONDITIONS		SUPPLY CURRENT	MIN	TYP	MAX	UNIT
ISO6520							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6520), V_I = 0 V (ISO6520 with F suffix)		I_{CC1}		0.8	1.5	mA
			I_{CC2}		1.2	2.1	
	V_I = 0V (ISO6520), V_I = V_{CC1} (ISO6520 with F suffix)		I_{CC1}		2.8	4.3	
			I_{CC2}		1.3	2.3	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}		1.8	2.9	
			I_{CC2}		1.3	2.3	
		10 Mbps	I_{CC1}		1.8	2.9	
			I_{CC2}		1.8	2.7	
		50 Mbps	I_{CC1}		2	3.1	
			I_{CC2}		3.8	4.9	
ISO6521							
Supply current - DC signal (2)	V_I = V_{CCI} (1) (ISO6521); V_I = 0 V (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		1.1	2.1	mA
	V_I = 0 V (ISO6521); V_I = V_{CCI} (ISO6521 with F suffix)		I_{CC1}, I_{CC2}		2.1	3.4	
Supply current - AC signal (3)	All channels switching with square wave clock input; C_L = 15 pF	1 Mbps	I_{CC1}, I_{CC2}		1.6	2.7	
		10 Mbps	I_{CC1}, I_{CC2}		1.9	3	
		50 Mbps	I_{CC1}, I_{CC2}		3	4.2	

(1) V_{CCI} = Input-side V_{CC}
(2) Supply current valid for ENx = V_{CCx} and ENx = 0V
(3) Supply current valid for ENx = V_{CCx}

5.14 Switching Characteristics—5-V Supply

V_{CC1} = V_{CC2} = 5 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 6-1		11	18	ns
$t_{P(dft)}$	Propagation delay drift			8		ps/°C
t_{UI}	Minimum pulse width	See Figure 6-1	20			ns
PWD	Pulse width distortion(1) $\lvert t_{PHL} - t_{PLH} \rvert$	See Figure 6-1		0.2	7	ns
$t_{sk(o)}$	Channel-to-channel output skew time (2)	Same direction channels			6	ns
$t_{sk(p-p)}$	Part-to-part skew time (3)				6	ns
t_r	Output signal rise time	See Figure 6-1		2.6	4.5	ns
t_f	Output signal fall time			2.6	4.5	ns
t_{PU}	Time from UVLO to valid output data				300	µs
t_{DO}	Default output delay time from input power loss	Measured from the time V_{CC} goes below 1.2V. See Figure 6-2		0.1	0.3	µs
t_{ie}	Time interval error	2^{16} – 1 PRBS data at 50 Mbps		1		ns

(1) Also known as pulse skew.
(2) $t_{sk(o)}$ is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
(3) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

5.15 Switching Characteristics—3.3-V Supply

V_{CC1} = V_{CC2} = 3.3 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 6-1		11	18	ns
$t_{P(dft)}$	Propagation delay drift			9.2		ps/°C
t_{UI}	Minimum pulse width	See Figure 6-1	20			ns
PWD	Pulse width distortion(1) $\lvert t_{PHL} - t_{PLH} \rvert$	See Figure 6-1		0.5	7	ns
$t_{sk(o)}$	Channel-to-channel output skew time (2)	Same direction channels			6	ns
$t_{sk(p-p)}$	Part-to-part skew time (3)				6	ns
t_r	Output signal rise time	See Figure 6-1		1.6	3.2	ns
t_f	Output signal fall time			1.6	3.2	ns
t_{PU}	Time from UVLO to valid output data				300	µs
t_{DO}	Default output delay time from input power loss	Measured from the time V_{CC} goes below 1.2V. See Figure 6-2		0.1	0.3	µs
t_{ie}	Time interval error	2^{16} – 1 PRBS data at 50 Mbps		1		ns

(1) Also known as pulse skew.
(2) $t_{sk(o)}$ is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
(3) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

5.16 Switching Characteristics—2.5-V Supply

V_{CC1} = V_{CC2} = 2.5 V ± 10% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 6-1		12	20.5	ns
$t_{P(dft)}$	Propagation delay drift			14.3		ps/°C
t_{UI}	Minimum pulse width	See Figure 6-1	20			ns
PWD	Pulse width distortion(1) $\lvert t_{PHL} - t_{PLH} \rvert$	See Figure 6-1		0.6	7.1	ns
$t_{sk(o)}$	Channel-to-channel output skew time(2)	Same direction channels			6	ns
$t_{sk(p-p)}$	Part-to-part skew time(3)				6.1	ns
t_r	Output signal rise time	See Figure 6-1		2	4	ns
t_f	Output signal fall time			2	4	ns
t_{PU}	Time from UVLO to valid output data				300	µs
t_{DO}	Default output delay time from input power loss	Measured from the time V_{CC} goes below 1.2V. See Figure 6-2		0.1	0.3	µs
t_{ie}	Time interval error	2^{16} – 1 PRBS data at 50 Mbps		1		ns

(1) Also known as pulse skew.
(2) $t_{sk(o)}$ is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
(3) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

5.17 Switching Characteristics—1.8-V Supply

V_{CC1} = V_{CC2} = 1.8 V ± 5% (over recommended operating conditions unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay time	See Figure 7-1		15	25.1	ns
$t_{P(dft)}$	Propagation delay drift			15.2		ps/°C
t_{UI}	Minimum pulse width	See Figure 7-1	20			ns
PWD	Pulse width distortion(1) $\lvert t_{PHL} - t_{PLH} \rvert$	See Figure 7-1		0.7	8.2	ns
$t_{sk(o)}$	Channel-to-channel output skew time(2)	Same direction channels			6	ns
$t_{sk(p-p)}$	Part-to-part skew time(3)				8.8	ns
t_r	Output signal rise time	See Figure 7-1		2.7	5.3	ns
t_f	Output signal fall time			2.7	5.3	ns
t_{PU}	Time from UVLO to valid output data				300	µs
t_{DO}	Default output delay time from input power loss	Measured from the time V_{CC} goes below 1.2V. See Figure 6-2		0.1	0.3	µs
t_{ie}	Time interval error	2^{16} – 1 PRBS data at 50 Mbps		1		ns

(1) Also known as pulse skew.
(2) $t_{sk(o)}$ is the skew between outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical loads.
(3) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

5.18 Typical Characteristics

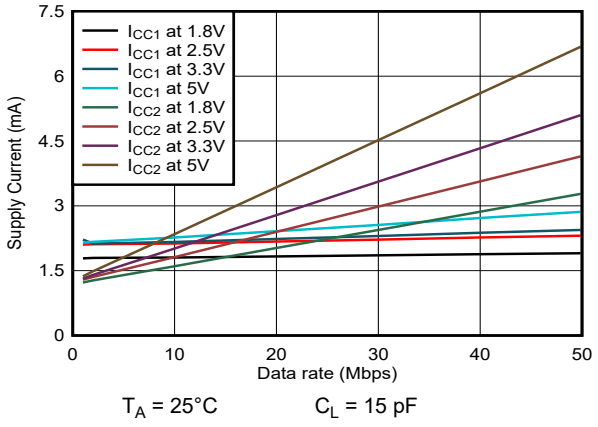


Figure 5-1. ISO6520 Supply Current vs Data Rate (With 15-pF Load)

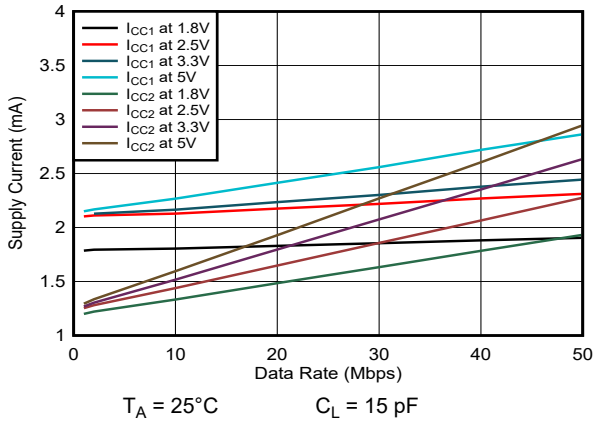


Figure 5-2. ISO6520 Supply Current vs Data Rate (With No Load)

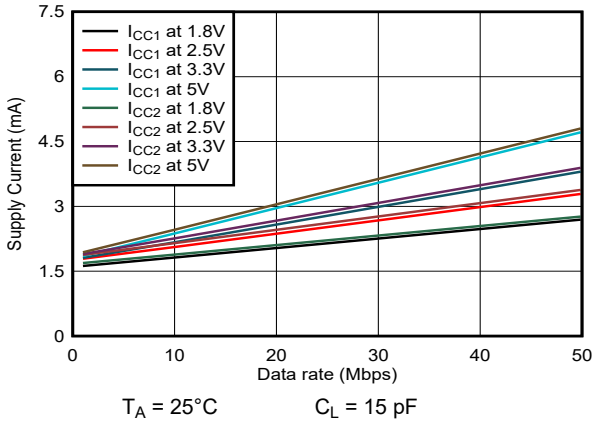


Figure 5-3. ISO6521 Supply Current vs Data Rate (With 15-pF Load)

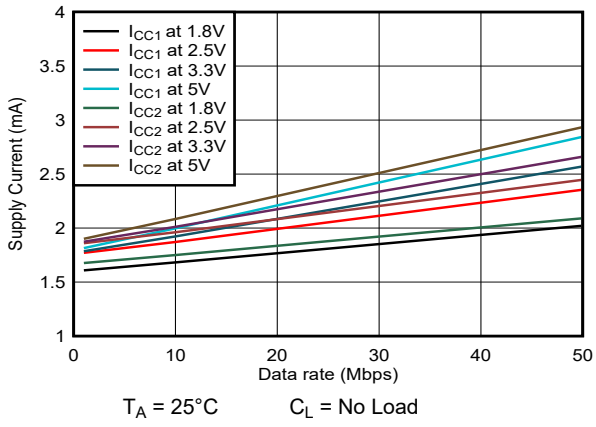


Figure 5-4. ISO6521 Supply Current vs Data Rate (With No Load)

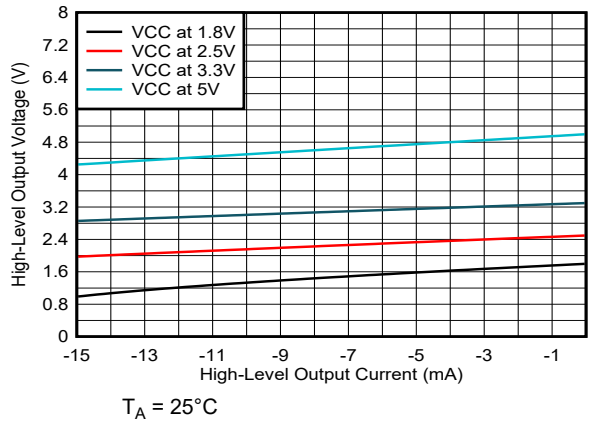


Figure 5-5. High-Level Output Voltage vs High-level Output Current

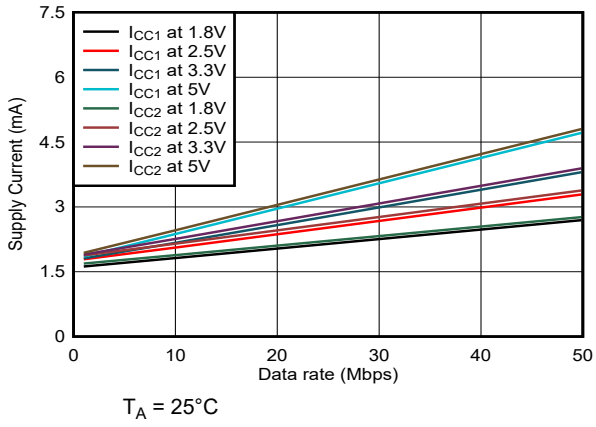


Figure 5-6. Low-Level Output Voltage vs Low-Level Output Current

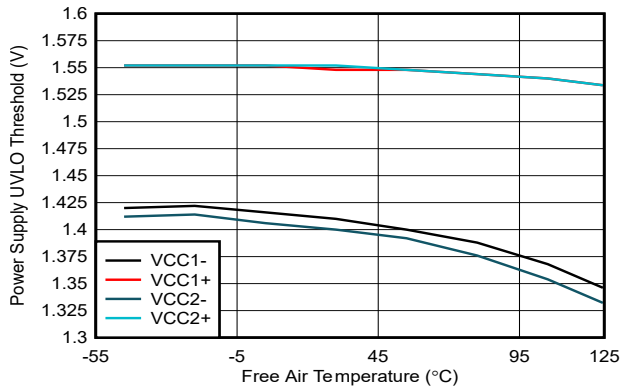


Figure 5-7. Power Supply Undervoltage Threshold vs Free-Air Temperature

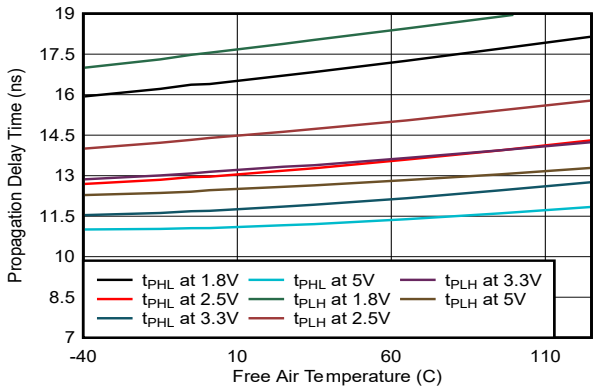
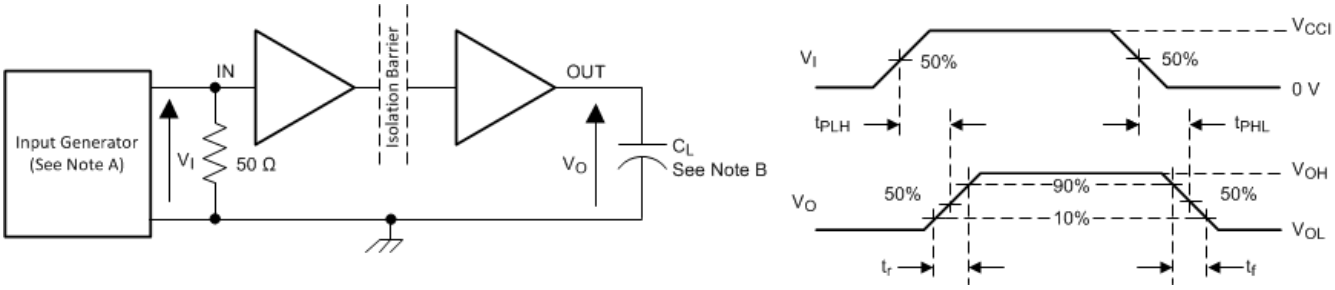


Figure 5-8. Propagation Delay Time vs Free-Air Temperature

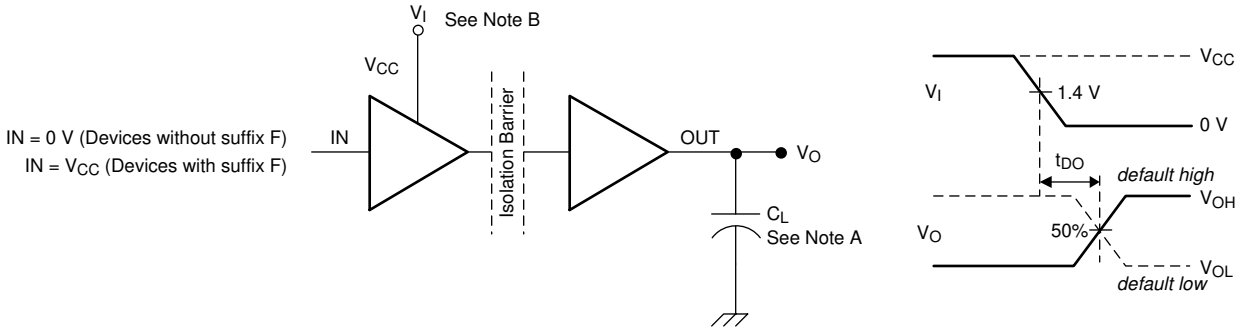
6 Parameter Measurement Information



A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 50 kHz, 50% duty cycle, t_r ≤ 3 ns, t_f ≤ 3 ns, Z_O = 50 Ω. At the input, 50 Ω resistor is required to terminate Input Generator signal. The 50 Ω resistor is not needed in the actual application.

B. C_L = 15 pF and includes instrumentation and fixture capacitance within ±20%.

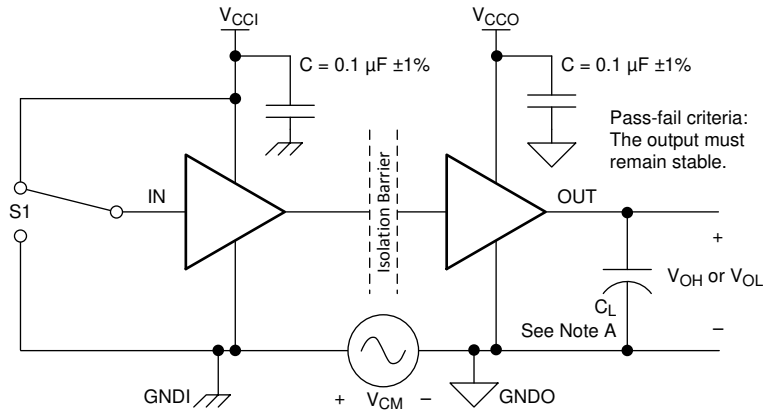
Figure 6-1. Switching Characteristics Test Circuit and Voltage Waveforms



A. C_L = 15 pF and includes instrumentation and fixture capacitance within ±20%.

B. Power Supply Ramp Rate = 10 mV/ns

Figure 6-2. Default Output Delay Time Test Circuit and Voltage Waveforms



A. C_L = 15 pF and includes instrumentation and fixture capacitance within ±20%.

Figure 6-3. Common-Mode Transient Immunity Test Circuit

7 Detailed Description

7.1 Overview

The ISO652x-Q1 family of devices has an ON-OFF keying (OOK) modulation scheme to transmit the digital data across a silicon dioxide based isolation barrier. The transmitter sends a high frequency carrier across the barrier to represent one digital state and sends no signal to represent the other digital state. The receiver demodulates the signal after advanced signal conditioning and produces the output through a buffer stage. These devices also incorporate advanced circuit techniques to maximize the CMTI performance and minimize the radiated emissions due the high frequency carrier and IO buffer switching. The conceptual block diagram of a digital capacitive isolator, Figure 7-1, shows a functional block diagram of a typical channel.

7.2 Functional Block Diagram

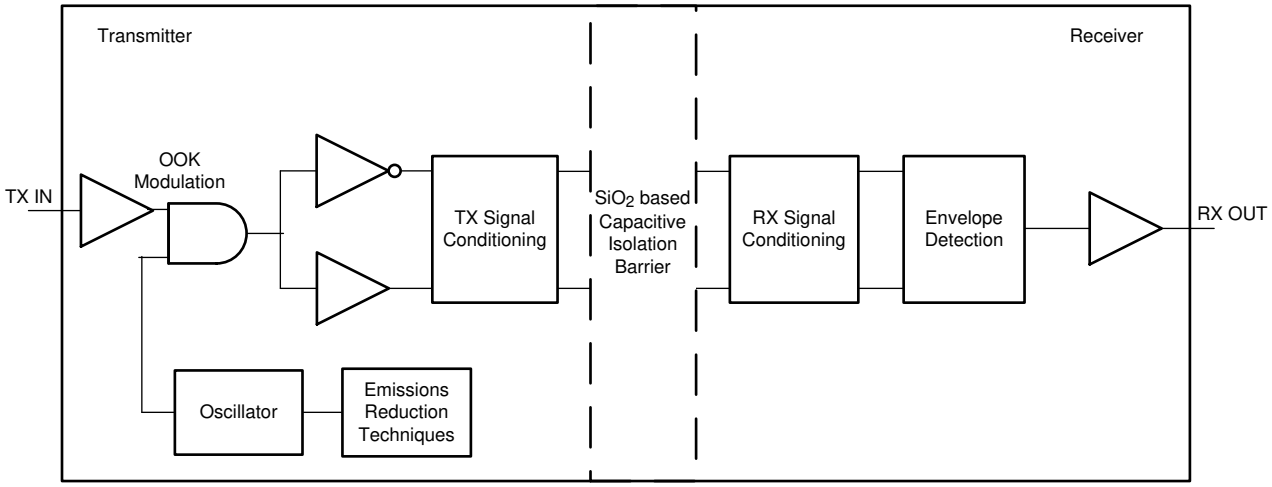


Figure 7-1. Conceptual Block Diagram of a Digital Capacitive Isolator

Figure 7-2 shows a conceptual detail of how the OOK scheme works.

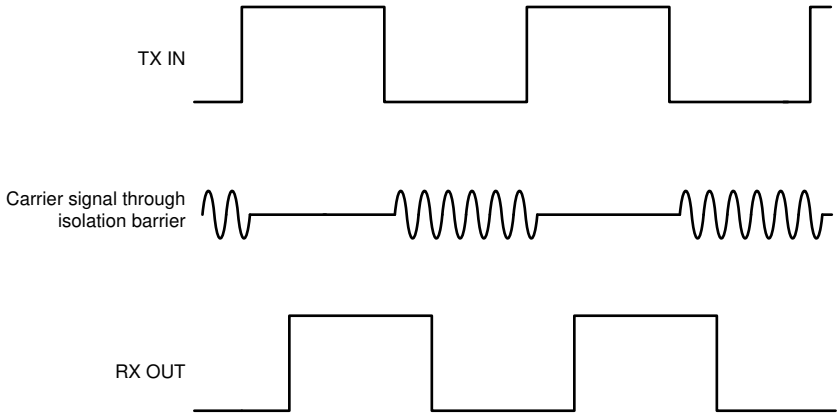


Figure 7-2. On-Off Keying (OOK) Based Modulation Scheme

7.3 Feature Description

The ISO652x-Q1 family of devices is available in two channel configurations and default output state options to enable a variety of application uses. The Table 7-1 lists features of ISO652x-Q1 devices.

Table 7-1. Device Features

PART NUMBER	MAXIMUM DATA RATE	CHANNEL DIRECTION	DEFAULT OUTPUT STATE	PACKAGE
ISO6520-Q1	50 Mbps	2 Forward, 0 Reverse	High	SOIC-8
ISO6520F-Q1	50 Mbps	2 Forward, 0 Reverse	Low	SOIC-8
ISO6521-Q1	50 Mbps	1 Forward, 1 Reverse	High	SOIC-8
ISO6521F-Q1	50 Mbps	1 Forward, 1 Reverse	Low	SOIC-8

7.4 Device Functional Modes

Table 7-2 lists the functional modes for the ISO652x-Q1 devices.

Table 7-2. Function Table

V_{CCI} (1)	V_{CCO}	INPUT (INx)(2)	OUTPUT (OUTx)	COMMENTS
PU	PU	H	H	Normal Operation: A channel output assumes the logic state of the input.
		L	L	
		Open	Default	Default mode: When INx is open, the corresponding channel output goes to the default logic state. The default is *High* for ISO652x-Q1 and *Low* for ISO652x-Q1 with F suffix.
PD	PU	X	Default	Default mode: When V_{CCI} is unpowered, a channel output assumes the logic state based on the selected default option. The default is *High* for ISO652x-Q1 and *Low* for ISO652x-Q1 with F suffix. When V_{CCI} transitions from unpowered to powered-up, a channel output assumes the logic state of the input. When V_{CCI} transitions from powered-up to unpowered, channel output assumes the selected default state.
X	PD	X	Undetermined	When V_{CCO} is unpowered, a channel output is undetermined(3). When V_{CCO} transitions from unpowered to powered-up, a channel output assumes the logic state of the input

(1) V_{CCI} = Input-side V_{CC}; V_{CCO} = Output-side V_{CC}; PU = Powered up (V_{CC} ≥ 1.71V); PD = Powered down (V_{CC} ≤ 1.05 V); X = Irrelevant; H = High level; L = Low level
(2) A strongly driven input signal can weakly power the floating V_{CC} via an internal protection diode and cause undetermined output.
(3) The outputs are in undetermined state when 1.89 V < V_{CCI}, V_{CCO} < 2.25 V and 1.05 V < V_{CCI}, V_{CCO} < 1.71 V

7.4.1 Device I/O Schematics

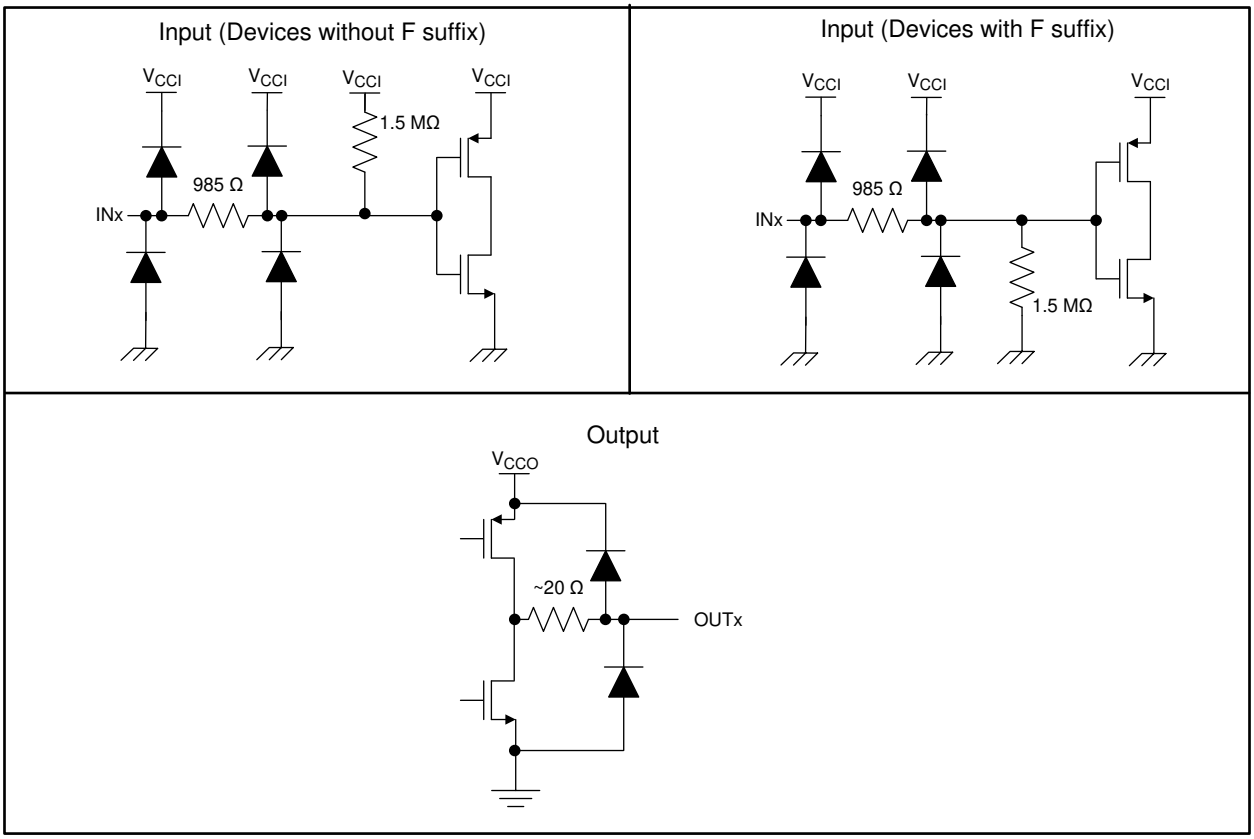


Figure 7-3. Device I/O Schematics

8 Application and Implementation

Note

Information in the following applications sections is not part of the TI component specification, and TI does not warrant the 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 ISO652x-Q1 devices are high-performance, dual-channel digital isolators. The devices use single-ended CMOS-logic switching technology. The supply voltage range is from 1.71 V to 5.5 V for both supplies, V_{CC1} and V_{CC2}. Since an isolation barrier separates the two sides, each side can be sourced independently with any voltage within the recommended operating conditions. As an example, supplying ISO652x-Q1 V_{CC1} with 3.3 V (which is within 1.71 V to 1.89 V and 2.25 V to 5 V) and V_{CC2} with 5 V (which is also within 1.71 V to 1.89 V and 2.25 V to 5 V) is possible. The digital isolator can be used as a logic-level translator in addition to providing isolation. When designing with digital isolators, keep in mind that because of the single-ended design structure, digital isolators do not conform to any specific interface standard and are only intended for isolating single-ended CMOS or TTL digital signal lines. The isolator is typically placed between the data controller (that is, MCU or FPGA), and a data converter or a line transceiver, regardless of the interface type or standard.

Note

ISO652x-Q1 is a functional isolator, and is not certified for isolation by standard bodies. For applications that require certified isolation by standard bodies, customers must choose ISO672x, ISO772x or ISO782x families of digital isolators.

8.2 Typical Application

For automotive applications, the ISO652x-Q1 device can also be used with Texas Instruments' Piccolo™ microcontroller, CAN transceiver, transformer driver, and voltage regulator to create an isolated CAN interface. As ISO652x-Q1 is a functional isolation device, the device is designed for applications that require galvanic isolation for correct system operation and warrant smaller solution sizes for higher board density. As shown in Figure 8-1, ISO652x-Q1 can be used in automotive applications like 12V-48V ground isolation commonly seen in various body electronics circuits.

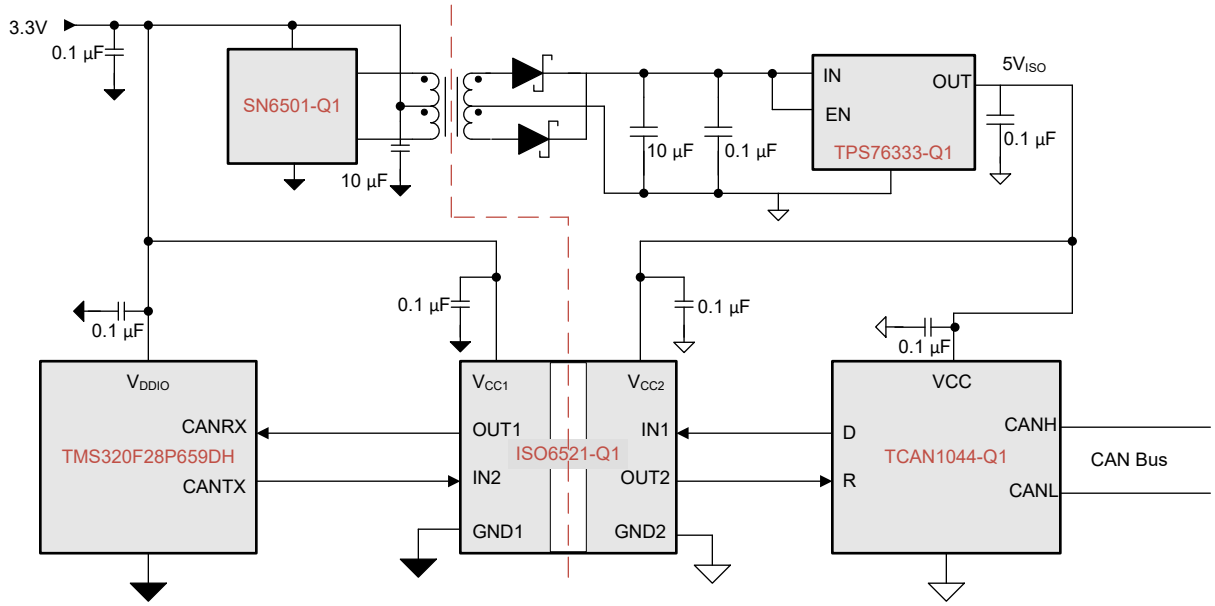


Figure 8-1. Typical Isolated CAN Application Circuit

8.2.1 Design Requirements

To design with these devices, use the parameters listed in Table 8-1.

Table 8-1. Design Parameters

PARAMETER	VALUE
Supply voltage, V_{CC1} and V_{CC2}	1.71 V to 1.89 V and 2.25 V to 5.5 V
Decoupling capacitor between V_{CC1} and GND1	0.1 µF
Decoupling capacitor from V_{CC2} and GND2	0.1 µF

8.3 Power Supply Recommendations

To provide reliable operation at data rates and supply voltages, a 0.1-µF bypass capacitor is recommended at the input and output supply pins (V_{CC1} and V_{CC2}). The capacitors must be placed as close to the supply pins as possible. If only a single primary-side power supply is available in an application, isolated power can be generated for the secondary-side with the help of a transformer driver. For automotive applications, please use SN6501-Q1 or SN6505B-Q1. For such applications, detailed power supply design and transformer selection recommendations are available in *SN6501-Q1 Transformer Driver for Isolated Power Supplies* or *SN6505B-Q1 Automotive, low-noise, 1-A, 420-kHz transformer driver with soft start for isolated power supplies*

8.4 Layout

8.4.1 Layout Guidelines

A minimum of two layers is required to accomplish a cost optimized and low EMI PCB design. To further improve EMI, a four layer board can be used. Layer stacking for a four layer board must be in the following order (top-to-bottom): high-speed signal layer, ground plane, power plane and low-frequency signal layer.

- Routing the high-speed traces on the top layer avoids the use of vias (and the introduction of the inductances) and allows for clean interconnects between the isolator and the transmitter and receiver circuits of the data link.
- Placing a solid ground plane next to the high-speed signal layer establishes controlled impedance for transmission line interconnects and provides an excellent low-inductance path for the return current flow.
- Placing the power plane next to the ground plane creates additional high-frequency bypass capacitance of approximately 100pF/in^2.
- Routing the slower speed control signals on the bottom layer allows for greater flexibility as these signal links typically have margin to tolerate discontinuities such as vias.
- Bypass the VCC pin to ground with a low-ESR ceramic bypass capacitor. The typical recommended bypass capacitance is 0.1µF when using a ceramic capacitor with an X5R- or X7R-rated dielectric. The capacitor must be placed as close to the VCC pin as possible in the PCB layout and on the same layer. The capacitor must have a voltage rating greater than the VCC voltage level.

If an additional supply voltage plane or signal layer is needed, add a second power or ground plane system to the stack to keep the planes symmetrical. This design makes the stack mechanically stable and prevents warping. Also the power and ground plane of each power system can be placed closer together, thus increasing the high-frequency bypass capacitance significantly.

For detailed layout recommendations, refer to the *Digital Isolator Design Guide*.

8.4.1.1 PCB Material

For digital circuit boards operating at less than 150 Mbps, (or rise and fall times greater than 1 ns), and trace lengths of up to 10 inches, use standard FR-4 UL94V-0 printed circuit board. This PCB is preferred over cheaper alternatives because of lower dielectric losses at high frequencies, less moisture absorption, greater strength and stiffness, and the self-extinguishing flammability-characteristics.

8.4.2 Layout Example

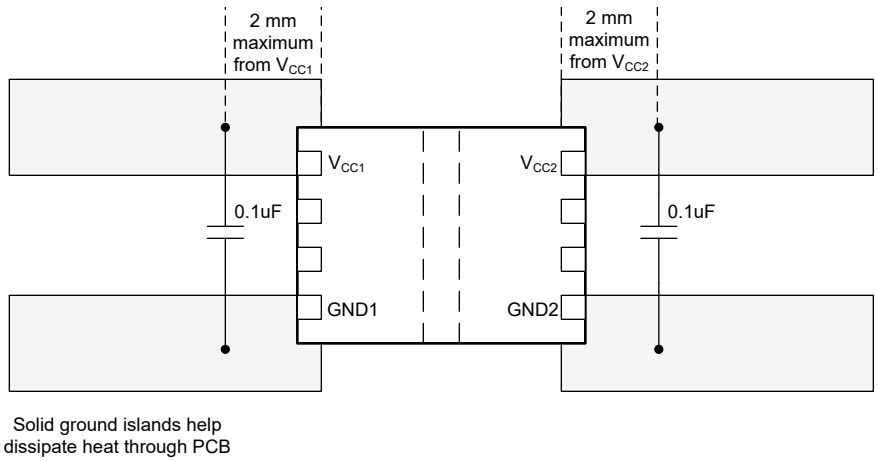


Figure 8-2. Layout Example

9 Device and Documentation Support

9.1 Documentation Support

9.1.1 Related Documentation

For related documentation, see the following:

- Texas Instruments, *Isolation Glossary*, application note
- Texas Instruments, *SN6501 Transformer Driver for Isolated Power Supplies*, data sheet
- Texas Instruments, *SN6505x Low-Noise 1-A Transformer Drivers for Isolated Power Supplies*, data sheet
- Texas Instruments, *SN6507 Low-Emissions, 36-V Push-Pull Transformer Driver with Duty Cyle Control for Isolated Power Supplies*, data sheet

9.2 Receiving Notification of Documentation Updates

To receive notification of documentation updates, navigate to the device product folder on ti.com. Click on *Notifications* to register and receive a weekly digest of any product information that has changed. For change details, review the revision history included in any revised document.

9.3 Support Resources

TI E2E™ support forums are an engineer's go-to source for fast, verified answers and design help — straight from the experts. Search existing answers or ask your own question to get the quick design help you need.

Linked content is 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.

9.4 Trademarks

Piccolo™ is a trademark of Texas Instruments.
TI E2E™ is a trademark of Texas Instruments.
All trademarks are the property of their respective owners.

9.5 Electrostatic Discharge Caution

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

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

9.6 Glossary

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

10 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (December 2024) to Revision A (February 2025)	Page
• Updated the numbering format for tables, figures, and cross-references throughout the document	1
• Deleted the preview package from the document	1

11 Mechanical, Packaging, and Orderable Information

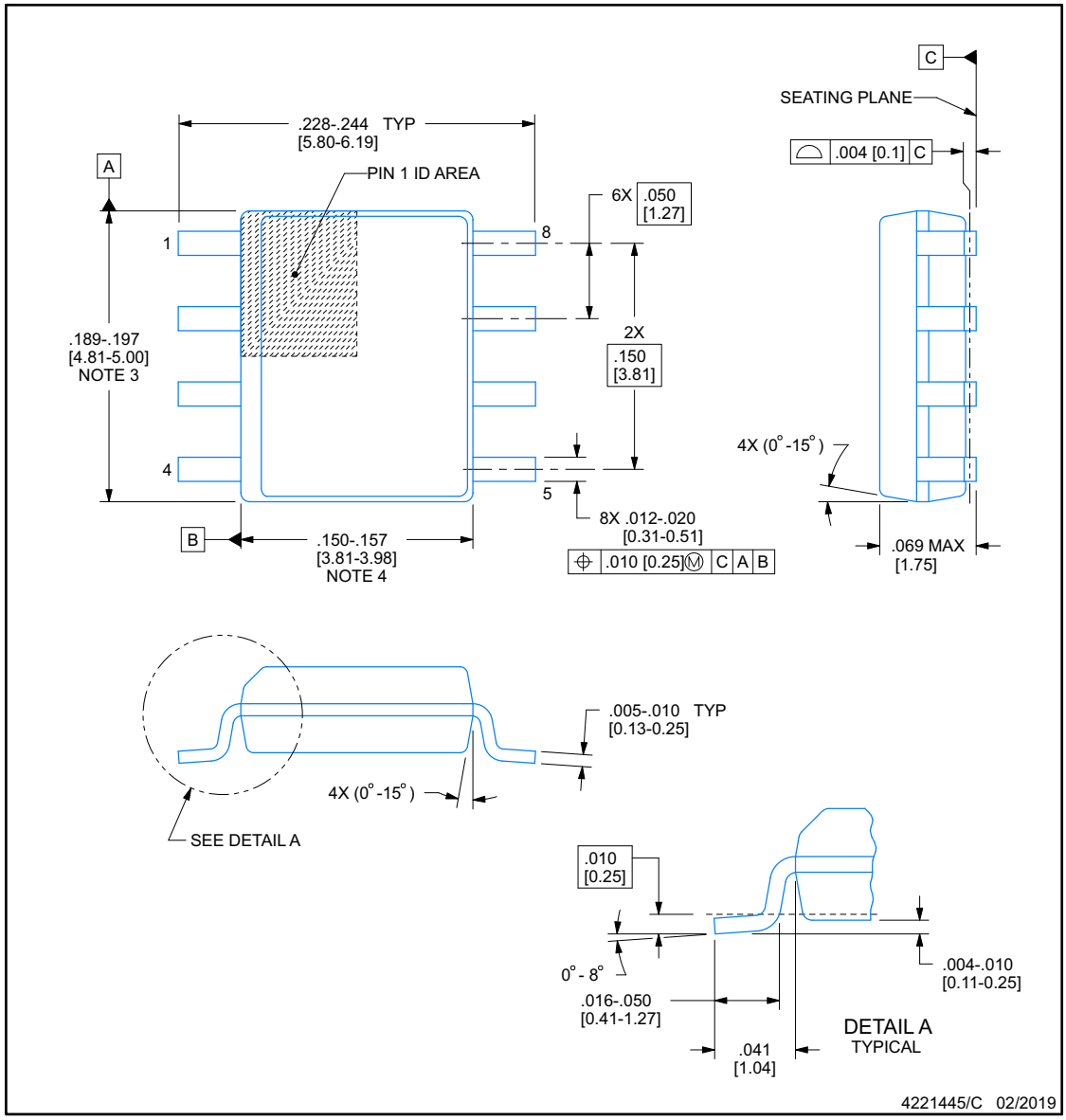
The following pages include mechanical packaging and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

PACKAGE OUTLINE

D0008B

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



NOTES:

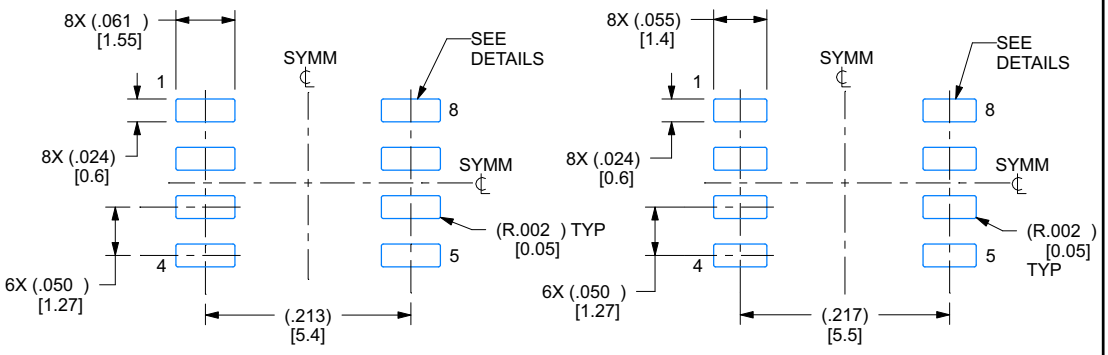
1. Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
2. This drawing is subject to change without notice.
3. This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15], per side.
4. This dimension does not include interlead flash.
5. Reference JEDEC registration MS-012, variation AA.

EXAMPLE BOARD LAYOUT

D0008B

SOIC - 1.75 mm max height

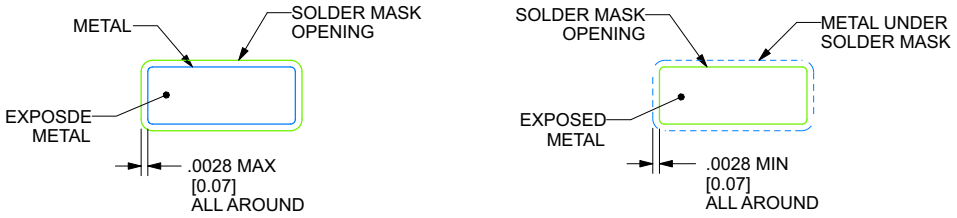
SMALL OUTLINE INTEGRATED CIRCUIT



IPC-7351 NOMINAL
.150 [3.85] CLEARANCE / CREEPAGE

HV / ISOLATION OPTION
.162 [4.1] CLEARANCE / CREEPAGE

LAND PATTERN EXAMPLE
EXPOSED METAL SHOWN
SCALE:6X



NON SOLDER MASK
DEFINED

SOLDER MASK
DEFINED

SOLDER MASK DETAILS

4221445/C 02/2019

NOTES: (continued)

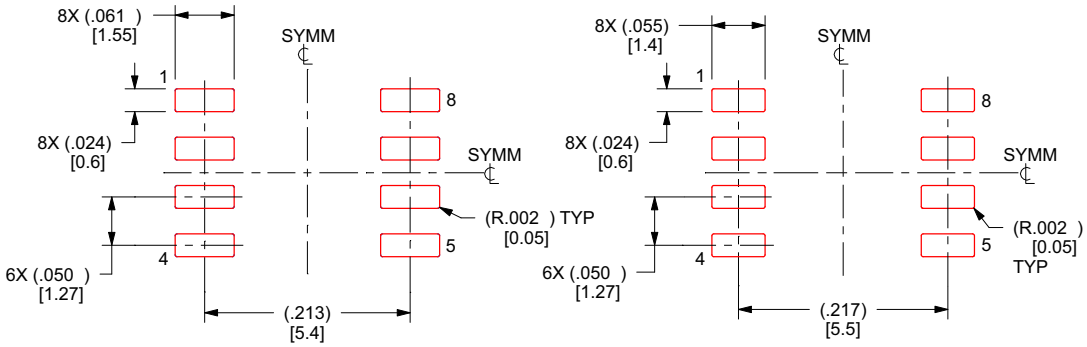
6. Publication IPC-7351 may have alternate designs.
7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008B

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



IPC-7351 NOMINAL
.150 [3.85] CLEARANCE / CREEPAGE

HV / ISOLATION OPTION
.162 [4.1] CLEARANCE / CREEPAGE

SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.127 MM] THICK STENCIL
SCALE:6X

4221445/C 02/2019

NOTES: (continued)

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

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)
ISO6520FQDRQ1	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	6520F
ISO6520FQDRQ1.A	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	See ISO6520FQDRQ1	6520F
ISO6520FQDRQ1.B	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	-	Call TI	Call TI	See ISO6520FQDRQ1	
ISO6520QDRQ1	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	6520
ISO6520QDRQ1.A	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	See ISO6520QDRQ1	6520
ISO6520QDRQ1.B	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	-	Call TI	Call TI	See ISO6520QDRQ1	
ISO6521FQDRQ1	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	6521F
ISO6521FQDRQ1.A	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	See ISO6521FQDRQ1	6521F
ISO6521FQDRQ1.B	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	-	Call TI	Call TI	See ISO6521FQDRQ1	
ISO6521QDRQ1	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	-40 to 125	6521
ISO6521QDRQ1.A	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	Yes	NIPDAU	Level-2-260C-1 YEAR	See ISO6521QDRQ1	6521
ISO6521QDRQ1.B	Active	Production	SOIC (D) | 8	3000 | LARGE T&R	-	Call TI	Call TI	See ISO6521QDRQ1	

(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.

OTHER QUALIFIED VERSIONS OF ISO6520-Q1, ISO6521-Q1 :

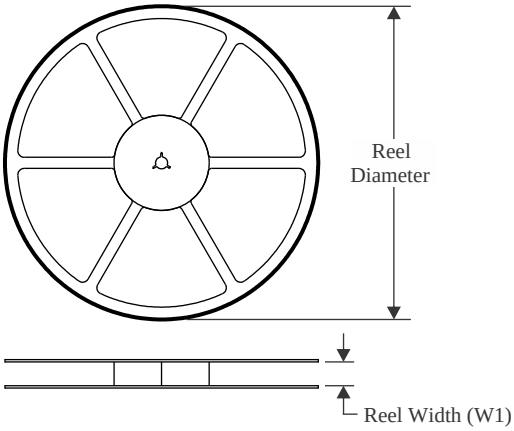
- Catalog : ISO6520, ISO6521

NOTE: Qualified Version Definitions:

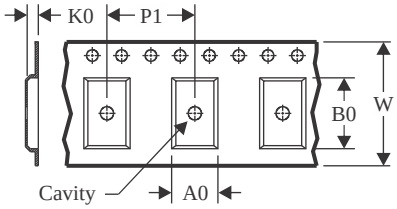
- Catalog - TI's standard catalog product

TAPE AND REEL INFORMATION

REEL DIMENSIONS

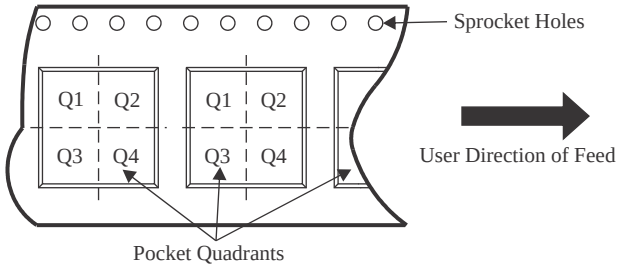


TAPE DIMENSIONS



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

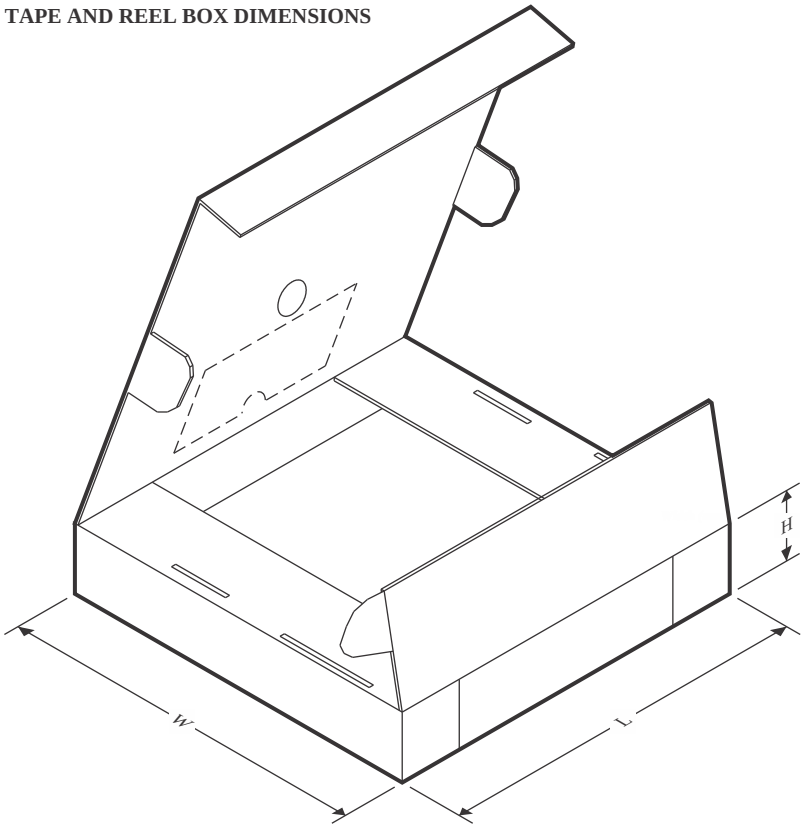
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
ISO6520FQDRQ1	SOIC	D	8	3000	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO6520QDRQ1	SOIC	D	8	3000	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO6521FQDRQ1	SOIC	D	8	3000	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1
ISO6521QDRQ1	SOIC	D	8	3000	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
ISO6520FQDRQ1	SOIC	D	8	3000	353.0	353.0	32.0
ISO6520QDRQ1	SOIC	D	8	3000	353.0	353.0	32.0
ISO6521FQDRQ1	SOIC	D	8	3000	353.0	353.0	32.0
ISO6521QDRQ1	SOIC	D	8	3000	353.0	353.0	32.0

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