HIGH SPEED, TRIPLE DIGITAL ISOLATORS

Check for Samples: ISO7230C-Q1, ISO7231C-Q1

FEATURES

- **Qualified for Automotive Applications**
- **25 and 150-Mbps Signaling Rate Options**
  - **Low Channel-to-Channel Output Skew**
  - **Low Pulse-Width Distortion (PWD)**
  - **Low Jitter Content; 1 ns Typ at 150 Mbps**
- **Typical 25-Year Life at Rated Working Voltage (See Application Note SLLA197 and Figure 14)**
- **4000-V_{peak} Isolation, 560-V_{peak} V_{IORM}**
  - **UL 1577, IEC 60747-5-2 (VDE 0884, Rev 2), IE 61010-1, IEC 60950-1 and CSA Approved**
- **4 kV ESD Protection**
- **Operate With 3.3-V or 5-V Supplies**
- **High Electromagnetic Immunity (See Application Note SLLA181)**
- **–40°C to 125°C Operating Range**

DESCRIPTION

The ISO7230C-Q1 and ISO7231C-Q1 are triple-channel digital isolators each with multiple channel configurations and output enable functions. These devices have logic input and output buffers separated by TI's silicon dioxide (SiO_2) isolation barrier. Used in conjunction with isolated power supplies, these devices block high voltage, isolate grounds, and prevent noise currents on a data bus or other circuits from entering the local ground and interfering with or damaging sensitive circuitry.

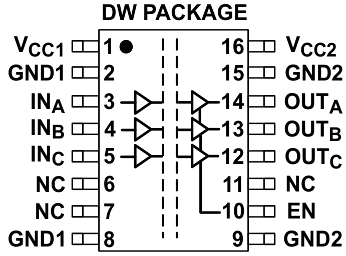
The ISO7230C-Q1 triple-channel device has all three channels in the same direction while the ISO7231C-Q1 has two channels in one direction and one channel in opposition. These devices have an active-high output enable that when driven to a low level, places the output in a high-impedance state.

The ISO7230C-Q1 and ISO7231C-Q1 have TTL input thresholds and a noise-filter at the input that prevents transient pulses of up to 2 ns in duration from being passed to the output of the device.

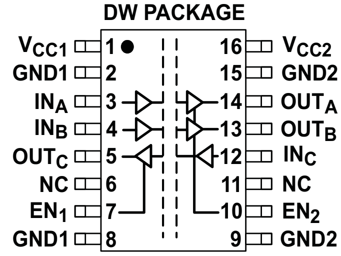
In each device, a periodic update pulse is sent across the isolation barrier to ensure the proper dc level of the output. If this dc-refresh pulse is not received, the input is assumed to be unpowered or not being actively driven, and the failsafe circuit drives the output to a logic high state. (Contact TI for a logic low failsafe option).

These devices require two supply voltages of 3.3-V, 5-V, or any combination. All inputs are 5-V tolerant when supplied from a 3.3-V supply and all outputs are 4-mA CMOS. These devices are characterized for operation over the ambient temperature range of –40°C to 125°C.

ISO7230
DW PACKAGE



ISO7231
DW PACKAGE



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

FUNCTION DIAGRAM

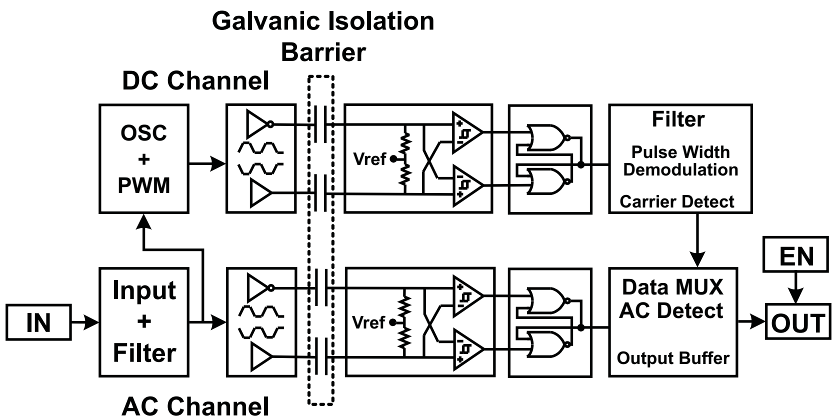


Table 1. Device Function Table ISO723xC-Q1 (1)

INPUT V_{CC}	OUTPUT V_{CC}	INPUT (IN)	OUTPUT ENABLE (EN)	OUTPUT (OUT)
PU	PU	H	H or Open	H
		L	H or Open	L
		X	L	Z
		Open	H or Open	H
PD	PU	X	H or Open	H
PD	PU	X	L	Z

(1) PU = Powered Up; PD = Powered Down ; X = Irrelevant; H = High Level; L = Low Level

ORDERING INFORMATION(1)

T_A	PACKAGE		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–40°C to 125°C	SOIC - DW	Reel of 2000	ISO7230CQDWRQ1	PREVIEW
			ISO7231CQDWRQ1	ISO7231CQ

(1) For the most current package and ordering information, see the Package Option Addendum at the end of this document, or see the TI website at www.ti.com.

ABSOLUTE MAXIMUM RATINGS(1)

				VALUE	UNIT
V_{CC}	Supply voltage(2), V_{CC1}, V_{CC2}			–0.5 to 6	V
V_I	Voltage at IN, OUT, EN			–0.5 to 6	V
I_O	Output current			±15	mA
ESD	Electrostatic discharge	Human Body Model	All pins	±4	kV
		Field-Induced-Charged Device Model		±1	
		Machine Model		±200	V
T_J	Maximum junction temperature			150	°C

(1) Stresses beyond those listed under *absolute maximum ratings* may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under *recommended operating conditions* is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
(2) All voltage values are with respect to network ground terminal and are peak voltage values.

RECOMMENDED OPERATING CONDITIONS

		MIN	TYP	MAX	UNIT
V_{CC}	Supply voltage(1), V_{CC1}, V_{CC2}	3.15		5.5	V
I_{OH}	High-level output current	–4			mA
I_{OL}	Low-level output current			4	mA
t_{ui}	Input pulse width	40			ns
$1/t_{ui}$	Signaling rate	0	30(2)	25	Mbps
V_{IH}	High-level input voltage (IN) (EN on all devices)	2		V_{CC}	V
V_{IL}	Low-level input voltage (IN) (EN on all devices)	0		0.8	
T_A	Operating free-air temperature	-40		125	°C
H	External magnetic field-strength immunity per IEC 61000-4-8 and IEC 61000-4-9 certification			1000	A/m

(1) For the 5-V operation, V_{CC1} or V_{CC2} is specified from 4.5 V to 5.5 V.
For the 3-V operation, V_{CC1} or V_{CC2} is specified from 3.15 V to 3.6 V.
(2) Typical sigalling rate under ideal conditions at 25°C.

ELECTRICAL CHARACTERISTICS: V_{CC1} and V_{CC2} at 5-V(1) OPERATION

over recommended operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY CURRENT							
I_{CC1}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_2 at 3 V		1	3	mA
		25 Mbps			7	9.5	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_1 at 3 V, EN_2 at 3 V		6.5	11	mA
		25 Mbps			11	17	
I_{CC2}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_2 at 3 V		15	22	mA
		25 Mbps			17	24	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_1 at 3 V, EN_2 at 3 V		13	20	mA
		25 Mbps			17.5	27	
ELECTRICAL CHARACTERISTICS							
I_{OFF}	Sleep mode output current		EN at 0 V, Single channel		0		μA
V_{OH}	High-level output voltage		I_{OH} = –4 mA, See Figure 1	V_{CC} – 0.8			V
			I_{OH} = –20 μA, See Figure 1	V_{CC} – 0.1			
V_{OL}	Low-level output voltage		I_{OL} = 4 mA, See Figure 1			0.4	V
			I_{OL} = 20 μA, See Figure 1			0.1	
$V_{I(HYS)}$	Input voltage hysteresis				150		mV
I_{IH}	High-level input current		IN from 0 V to V_{CC}			10	μA
I_{IL}	Low-level input current			–10			
C_I	Input capacitance to ground		IN at V_{CC}, V_I = 0.4 sin (4E6πt)		2		pF
CMTI	Common-mode transient immunity		$V_I = V_{CC}$ or 0 V, See Figure 4	25	50		kV/μs

(1) For the 5-V operation, V_{CC1} or V_{CC2} is specified from 4.5 V to 5.5 V.
For the 3-V operation, V_{CC1} or V_{CC2} is specified from 3.15 V to 3.6 V.

SWITCHING CHARACTERISTICS: V_{CC1} and V_{CC2} at 5-V OPERATION

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay	See Figure 1	18		45	ns
PWD	Pulse-width distortion(1) $\|t_{PHL} – t_{PLH}\|$				5	
$t_{sk(pp)}$	Part-to-part skew (2)				8	ns
$t_{sk(o)}$	Channel-to-channel output skew (3)			0	4	ns
t_r	Output signal rise time	See Figure 1		2		ns
t_f	Output signal fall time			2		
t_{PHZ}	Propagation delay, high-level-to-high-impedance output	See Figure 2		15	25	ns
t_{PZH}	Propagation delay, high-impedance-to-high-level output			15	25	
t_{PLZ}	Propagation delay, low-level-to-high-impedance output			15	25	
t_{PZL}	Propagation delay, high-impedance-to-low-level output			15	25	
t_{fs}	Failsafe output delay time from input power loss	See Figure 3		12		μs

(1) Also referred to as pulse skew.
(2) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any specified terminals of two devices when both devices operate with the same supply voltages, at the same temperature, and have identical packages and test circuits.
(3) $t_{sk(o)}$ is the skew between specified outputs of a single device with all driving inputs connected together and the outputs switching in the same direction while driving identical specified loads.

ELECTRICAL CHARACTERISTICS: V_{CC1} at 5-V, V_{CC2} at 3.3-V(1) OPERATION

over recommended operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
SUPPLY CURRENT								
I_{CC1}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_2 at 3 V			1	3	mA
		25 Mbps				7	9.5	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_1 at 3 V, EN_2 at 3 V			6.5	11	mA
		25 Mbps				11	17	
I_{CC2}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_2 at 3 V			9	15	mA
		25 Mbps				10	17	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_1 at 3 V, EN_2 at 3 V			8	12	mA
		25 Mbps				10.5	16	
ELECTRICAL CHARACTERISTICS								
I_{OFF}	Sleep mode output current		EN at 0 V, Single channel			0		μA
V_{OH}	High-level output voltage		I_{OH} = –4 mA, See Figure 1	ISO7230C-Q1	V_{CC} – 0.4			V
				ISO7231C-Q1 (5-V side)	V_{CC} – 0.8			
			I_{OH} = –20 μA, See Figure 1		V_{CC} – 0.1			
V_{OL}	Low-level output voltage		I_{OL} = 4 mA, See Figure 1				0.4	V
			I_{OL} = 20 μA, See Figure 1				0.1	
$V_{I(HYS)}$	Input voltage hysteresis					150		mV
I_{IH}	High-level input current		IN from 0 V to V_{CC}				10	μA
I_{IL}	Low-level input current				–10			
C_I	Input capacitance to ground		IN at V_{CC}, V_I = 0.4 sin (4E6πt)			2		pF
CMTI	Common-mode transient immunity		$V_I = V_{CC}$ or 0 V, See Figure 4		25	50		kV/μs

(1) For the 5-V operation, V_{CC1} or V_{CC2} is specified from 4.5 V to 5.5 V.
For the 3-V operation, V_{CC1} or V_{CC2} is specified from 3.15 V to 3.6 V.

SWITCHING CHARACTERISTICS: V_{CC1} at 5-V, V_{CC2} at 3.3-V OPERATION

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay, low-to-high-level output	See Figure 1	20		50	ns
PWD	Pulse-width distortion[(1)] $\|t_{PHL} – t_{PLH}\|$	See Figure 1			4	ns
$t_{sk(pp)}$	Part-to-part skew [(2)]				10	ns
$t_{sk(o)}$	Channel-to-channel output skew [(3)]			0	4	ns
t_r	Output signal rise time	See Figure 1		2		ns
t_f	Output signal fall time	See Figure 1		2		ns
t_{PHZ}	Propagation delay, high-level-to-high-impedance output	See Figure 2		15	25	ns
t_{PZH}	Propagation delay, high-impedance-to-high-level output	See Figure 2		15	25	ns
t_{PLZ}	Propagation delay, low-level-to-high-impedance output	See Figure 2		15	25	ns
t_{PZL}	Propagation delay, high-impedance-to-low-level output	See Figure 2		15	25	ns
t_{fs}	Failsafe output delay time from input power loss	See Figure 3		18		μs

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

ELECTRICAL CHARACTERISTICS: V_{CC1} at 3.3-V, V_{CC2} at 5-V(1) OPERATION

over recommended operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS		MIN	TYP	MAX	UNIT
SUPPLY CURRENT								
I_{CC1}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_2 at 3 V			0.5	1	mA
		25 Mbps				3	5	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_1 at 3 V, EN_2 at 3 V			4.5	7	mA
		25 Mbps				6.5	11	
I_{CC2}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_2 at 3 V			15	22	mA
		25 Mbps				17	24	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, All channels, no load, EN_1 at 3 V, EN_2 at 3 V			13	20	mA
		25 Mbps				17.5	27	
ELECTRICAL CHARACTERISTICS								
I_{OFF}	Sleep mode output current		EN at 0 V, Single channel			0		μA
V_{OH}	High-level output voltage		I_{OH} = –4 mA, See Figure 1	ISO7230C-Q1	V_{CC} – 0.4			V
				ISO7231C-Q1 (5-V side)	V_{CC} – 0.8			
			I_{OH} = –20 μA, See Figure 1		V_{CC} – 0.1			
V_{OL}	Low-level output voltage		I_{OL} = 4 mA, See Figure 1				0.4	V
			I_{OL} = 20 μA, See Figure 1				0.1	
$V_{I(HYS)}$	Input voltage hysteresis					150		mV
I_{IH}	High-level input current		IN from 0 V to V_{CC}				10	μA
I_{IL}	Low-level input current				–10			
C_I	Input capacitance to ground		IN at V_{CC}, V_I = 0.4 sin (4E6πt)			2		pF
CMTI	Common-mode transient immunity		$V_I = V_{CC}$ or 0 V, See Figure 4		25	50		kV/μs

(1) For the 5-V operation, V_{CC1} or V_{CC2} is specified from 4.5 V to 5.5 V.
For the 3-V operation, V_{CC1} or V_{CC2} is specified from 3.15 V to 3.6 V.

SWITCHING CHARACTERISTICS: V_{CC1} at 3.3-V and V_{CC2} at 5-V OPERATION

, over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay	See Figure 1	20		51	ns
PWD	Pulse-width distortion (1) $\|t_{PHL} – t_{PLH}\|$				4	
$t_{sk(pp)}$	Part-to-part skew (2)				10	ns
$t_{sk(o)}$	Channel-to-channel output skew (3)			0	4	ns
t_r	Output signal rise time	See Figure 1		2		ns
t_f	Output signal fall time			2		
t_{PHZ}	Propagation delay, high-level-to-high-impedance output	See Figure 2		15	25	ns
t_{PZH}	Propagation delay, high-impedance-to-high-level output			15	25	
t_{PLZ}	Propagation delay, low-level-to-high-impedance output			15	25	
t_{PZL}	Propagation delay, high-impedance-to-low-level output			15	25	
t_{fs}	Failsafe output delay time from input power loss	See Figure 3		12		μs

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

ELECTRICAL CHARACTERISTICS: V_{CC1} and V_{CC2} at 3.3 V(1) OPERATION

, over recommended operating conditions (unless otherwise noted)

PARAMETER			TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY CURRENT							
I_{CC1}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, all channels, no load, EN_2 at 3 V		0.5	1	mA
		25 Mbps			3	5	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, all channels, no load, EN_1 at 3 V, EN_2 at 3 V		4.5	7	mA
		25 Mbps			6.5	11	
I_{CC2}	ISO7230C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, all channels, no load, EN_2 at 3 V		9	15	mA
		25 Mbps			10	17	
	ISO7231C-Q1	Quiescent	$V_I = V_{CC}$ or 0 V, all channels, no load, EN_1 at 3 V, EN_2 at 3 V		8	12	mA
		25 Mbps			10.5	16	
ELECTRICAL CHARACTERISTICS							
I_{OFF}	Sleep mode output current		EN at 0 V, single channel		0		μA
V_{OH}	High-level output voltage		I_{OH} = –4 mA, See Figure 1	V_{CC} – 0.4			V
			I_{OH} = –20 μA, See Figure 1	V_{CC} – 0.1			
V_{OL}	Low-level output voltage		I_{OL} = 4 mA, See Figure 1			0.4	V
			I_{OL} = 20 μA, See Figure 1			0.1	
$V_{I(HYS)}$	Input voltage hysteresis				150		mV
I_{IH}	High-level input current		IN from 0 V or V_{CC}			10	μA
I_{IL}	Low-level input current			–10			
C_I	Input capacitance to ground		IN at V_{CC}, V_I = 0.4 sin (4E6πt)		2		pF
CMTI	Common-mode transient immunity		$V_I = V_{CC}$ or 0 V, See Figure 4	25	50		kV/μs

(1) For the 5-V operation, V_{CC1} or V_{CC2} is specified from 4.5 V to 5.5 V.
For the 3-V operation, V_{CC1} or V_{CC2} is specified from 3.15 V to 3.6 V.

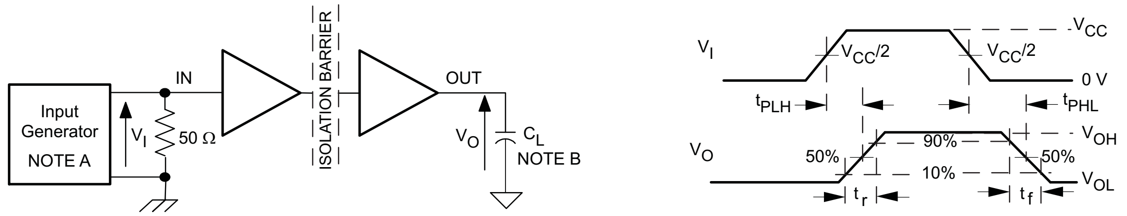
SWITCHING CHARACTERISTICS: V_{CC1} and V_{CC2} at 3.3-V OPERATION

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH}, t_{PHL}	Propagation delay	See Figure 1	25		56	ns
PWD	Pulse-width distortion(1) $\|t_{PHL} – t_{PLH}\|$				4	
$t_{sk(pp)}$	Part-to-part skew (2)				10	ns
$t_{sk(o)}$	Channel-to-channel output skew			0	4	ns
t_r	Output signal rise time	See Figure 1		2		ns
t_f	Output signal fall time			2		
t_{PHZ}	Propagation delay, high-level-to-high-impedance output	See Figure 2		15	25	ns
t_{PZH}	Propagation delay, high-impedance-to-high-level output			15	25	
t_{PLZ}	Propagation delay, low-level-to-high-impedance output			15	25	
t_{PZL}	Propagation delay, high-impedance-to-low-level output			15	25	
t_{fs}	Failsafe output delay time from input power loss	See Figure 3		18		μs

(1) Also referred to as pulse skew.
(2) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any specified terminals of two devices when both devices operate with the same supply voltages, at the same temperature, and have identical packages and test circuits.

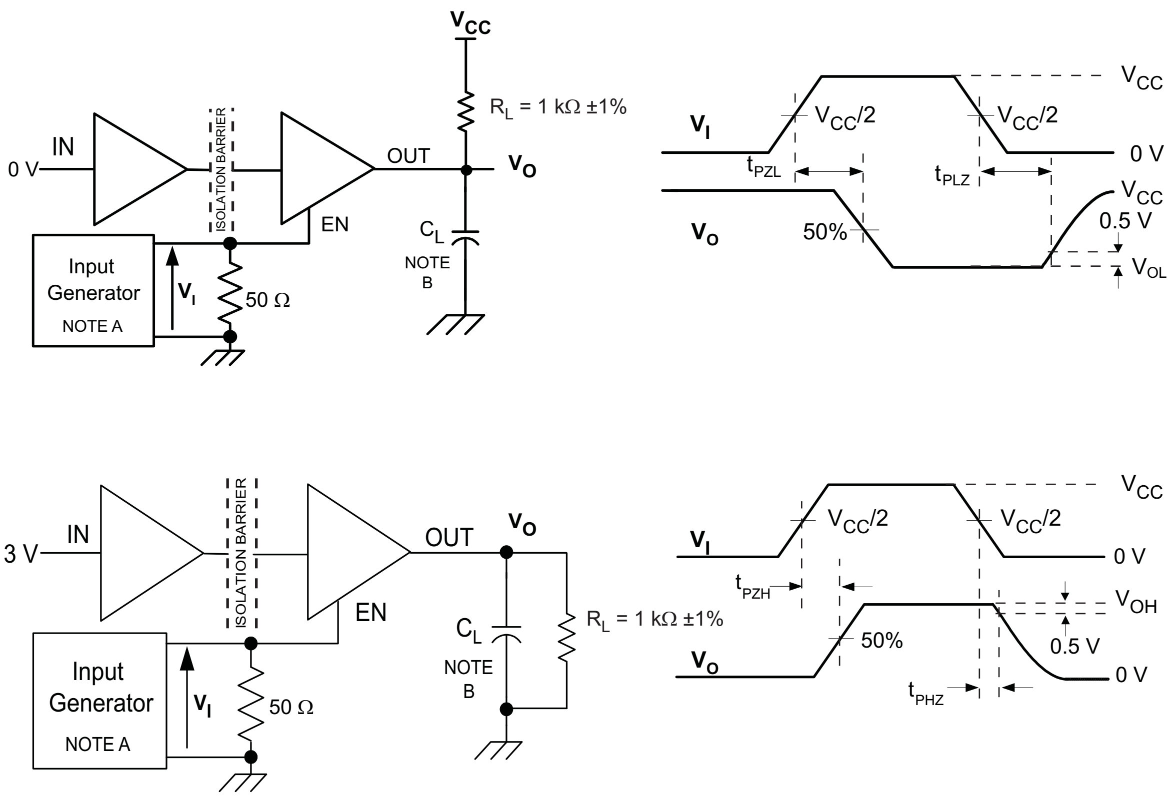
PARAMETER MEASUREMENT INFORMATION



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 = 50Ω.

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

Figure 1. Switching Characteristic Test Circuit and Voltage Waveforms

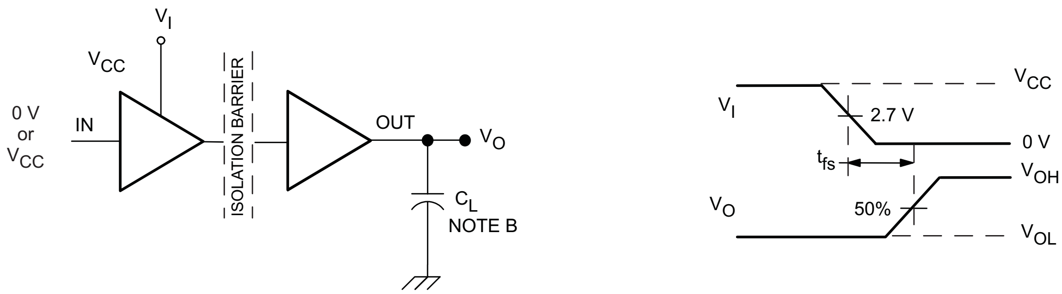


A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 50 kHz, 50% duty cycle, t_r ≤ 3 ns, t_f ≤ 3 ns, Z_O = 50Ω.

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

Figure 2. Enable/Disable Propagation Delay Time Test Circuit and Waveform

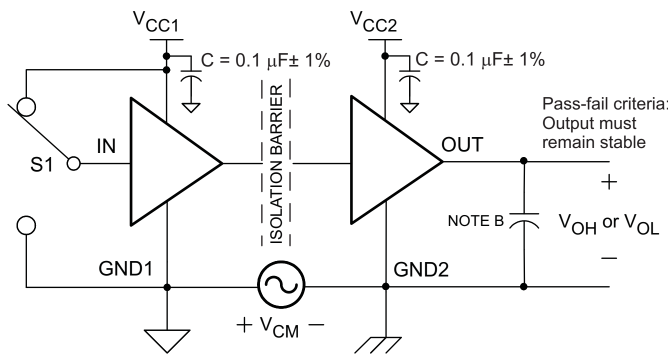
PARAMETER MEASUREMENT INFORMATION (continued)



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 = 50Ω.

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

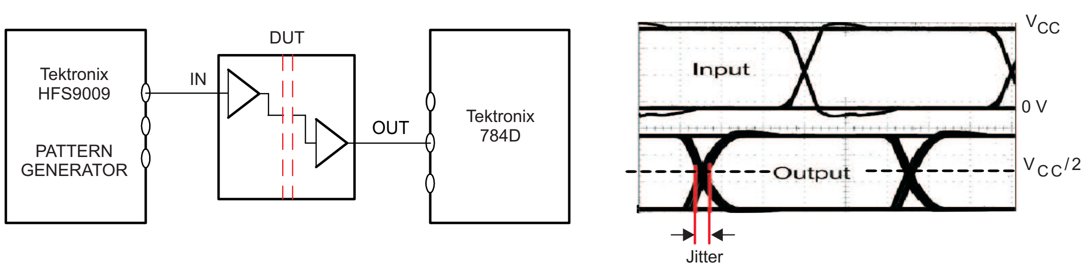
Figure 3. Failsafe Delay Time Test Circuit and Voltage Waveforms



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 = 50Ω.

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

Figure 4. Common-Mode Transient Immunity Test Circuit and Voltage Waveform



NOTE: PRBS bit pattern run length is 2^{16} – 1. Transition time is 800 ps. NRZ data input has no more than five consecutive 1s or 0s.

Figure 5. Peak-to-Peak Eye-Pattern Jitter Test Circuit and Voltage Waveform

DEVICE INFORMATION

PACKAGE CHARACTERISTICS

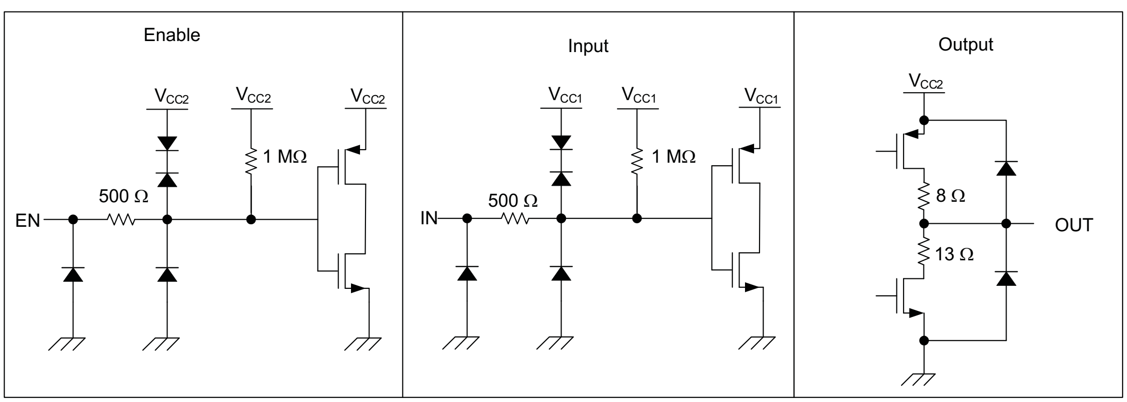
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
L(I01)	Minimum air gap (Clearance)	Shortest terminal-to-terminal distance through air	8.34			mm
L(I02)	Minimum external tracking (Creepage)	Shortest terminal-to-terminal distance across the package surface	8.1			mm
	Minimum Internal Gap (Internal Clearance)	Distance through the insulation	0.008			mm
R_{IO}	Isolation resistance	Input to output, V_{IO} = 500 V, all pins on each side of the barrier tied together creating a two-terminal device, T_A < 100°C		$>10^{12}$		Ω
		Input to output, V_{IO} = 500 V, 100°C ≤ T_A ≤ T_A max		$>10^{11}$		Ω
C_{IO}	Barrier capacitance Input to output	V_I = 0.4 sin (4E6πt)		2		pF
C_I	Input capacitance to ground	V_I = 0.4 sin (4E6πt)		2		pF

REGULATORY INFORMATION

VDE	CSA	UL
Certified according to IEC 60747-5-2	Approved under CSA Component Acceptance Notice	Recognized under 1577 Component Recognition Program (1)
File Number: 40016131	File Number: 220991	File Number: E181974

(1) Production tested ≥ 3000 VRMS for 1 second in accordance with UL 1577.

DEVICE I/O SCHEMATICS



NOTE: Input is assumed to be on V_{CC1} side and Output on V_{CC2} side.

THERMAL CHARACTERISTICS

over recommended operating conditions (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$θ_{JA}$	Junction-to-air	Low-K Thermal Resistance (1)		168		°C/W
		High-K Thermal Resistance		96.1		
$θ_{JB}$	Junction-to-Board Thermal Resistance			61		°C/W
$θ_{JC}$	Junction-to-Case Thermal Resistance			48		°C/W
P_D	Device Power Dissipation	V_{CC1} = V_{CC2} = 5.5 V, T_J = 150°C, C_L = 15 pF, Input a 50% duty cycle square wave			220	mW

(1) Tested in accordance with the Low-K or High-K thermal metric definitions of EIA/JESD51-3 for leaded surface mount packages.

TYPICAL CHARACTERISTIC CURVES

ISO7230 C/M RMS SUPPLY CURRENT vs SIGNALING RATE

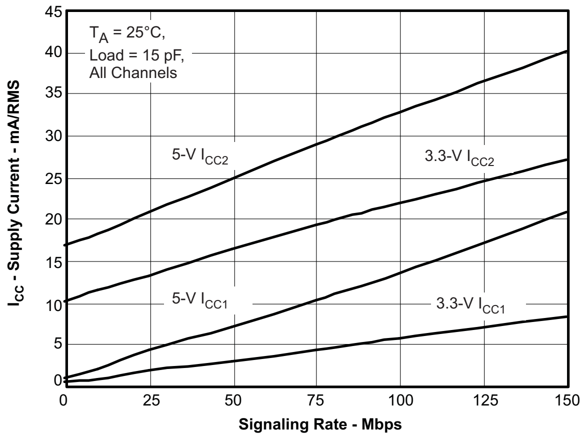


Figure 6.

ISO7231 C/M RMS SUPPLY CURRENT vs SIGNALING RATE

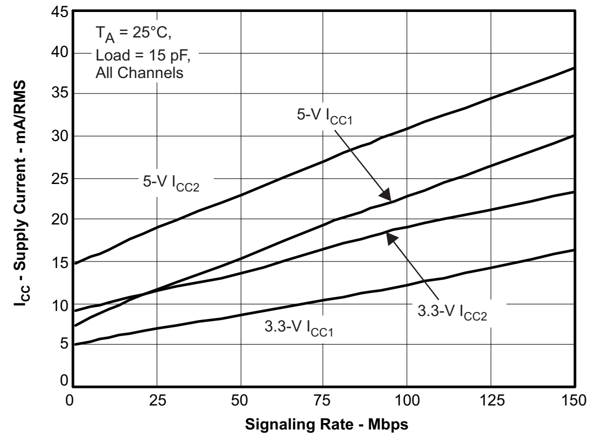


Figure 7.

PROPAGATION DELAY vs FREE-AIR TEMPERATURE

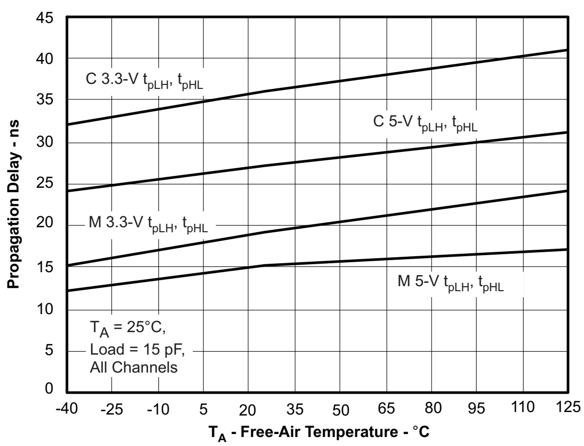


Figure 8.

INPUT THRESHOLD VOLTAGE vs FREE-AIR TEMPERATURE

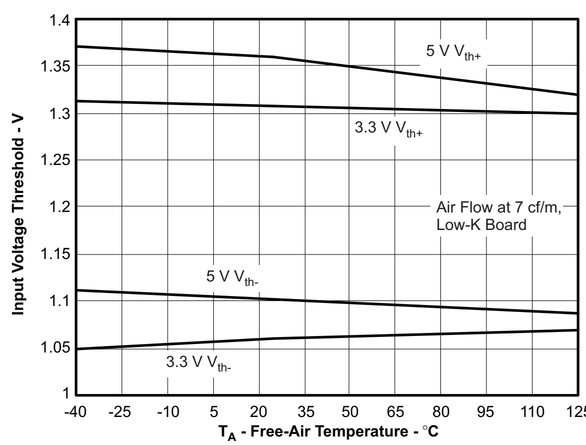


Figure 9.

TYPICAL CHARACTERISTIC CURVES (continued)

V_{CC1} FAILSAFE THRESHOLD vs FREE-AIR TEMPERATURE

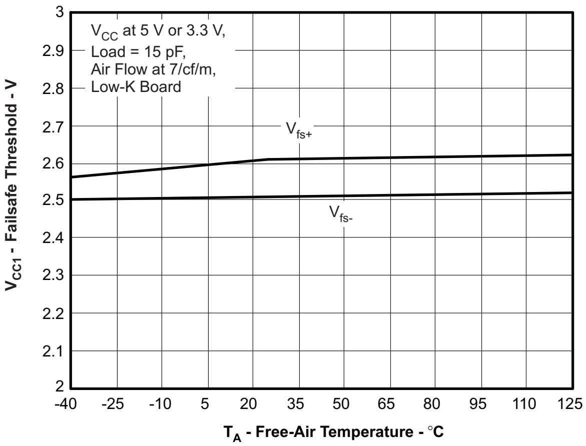


Figure 10.

HIGH-LEVEL OUTPUT CURRENT vs HIGH-LEVEL OUTPUT VOLTAGE

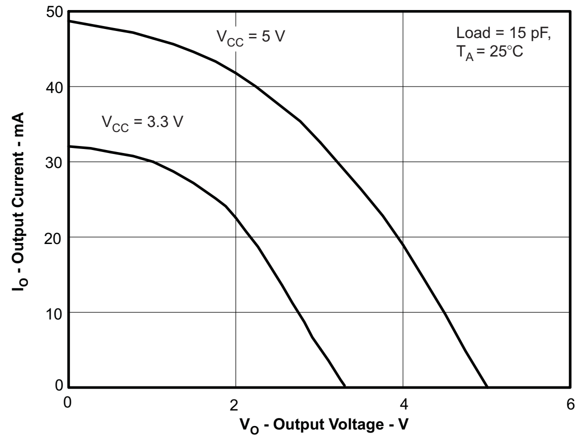


Figure 11.

LOW-LEVEL OUTPUT CURRENT vs LOW-LEVEL OUTPUT VOLTAGE

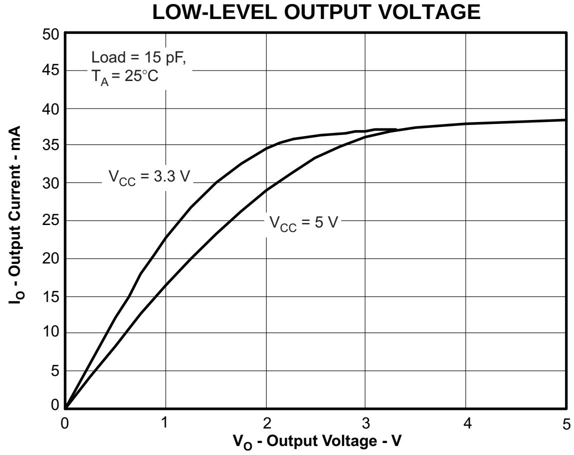


Figure 12.

APPLICATION INFORMATION

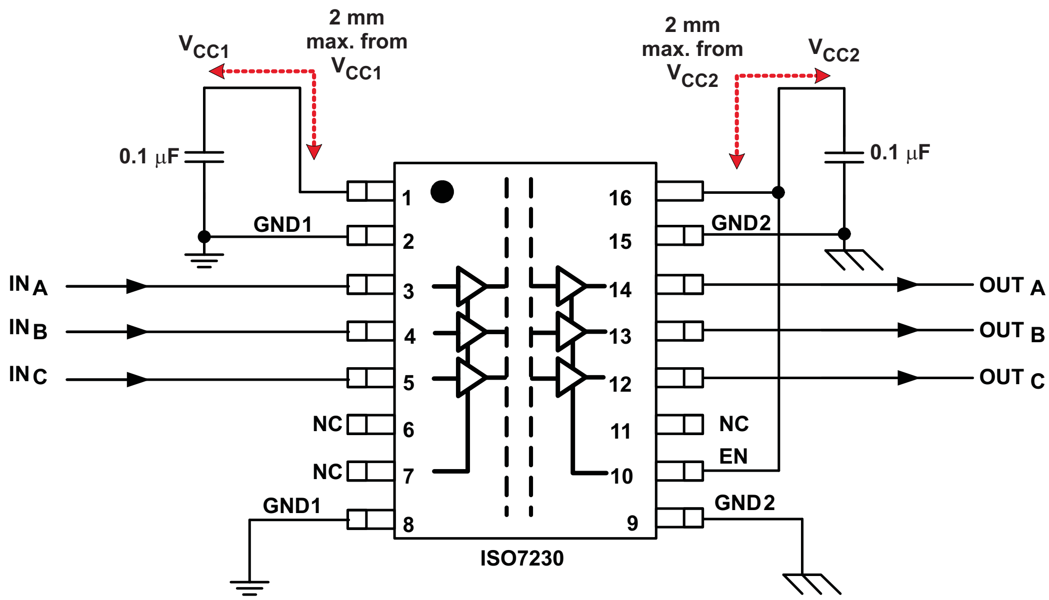


Figure 13. Typical ISO7230 Application Circuit

LIFE EXPECTANCY vs WORKING VOLTAGE

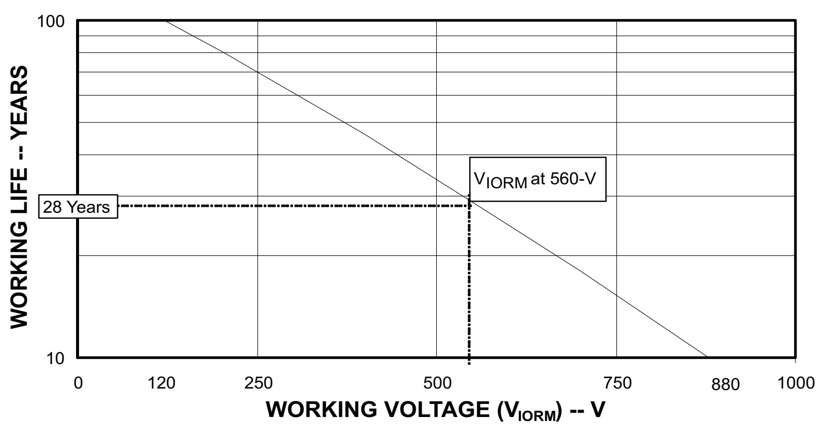


Figure 14. Time Dependant Dielectric Breakdown Testing Results

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
ISO7231CQDWRQ1	ACTIVE	SOIC	DW	16	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7231CQ	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

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

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

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OTHER QUALIFIED VERSIONS OF ISO7231C-Q1 :

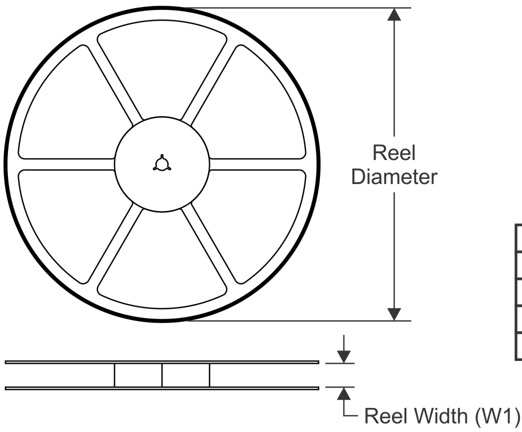
- Catalog: ISO7231C

NOTE: Qualified Version Definitions:

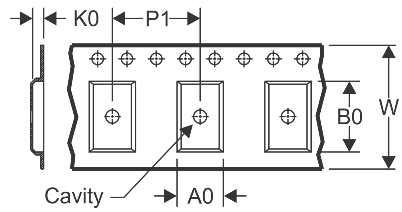
- Catalog - TI's standard catalog product

TAPE AND REEL INFORMATION

REEL DIMENSIONS

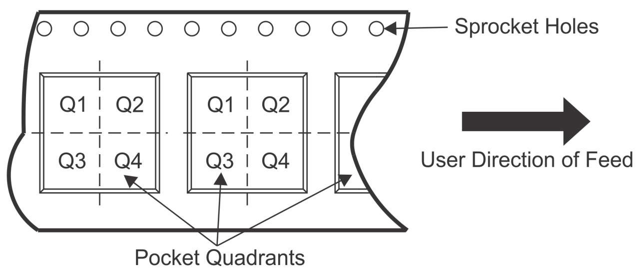


TAPE DIMENSIONS



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

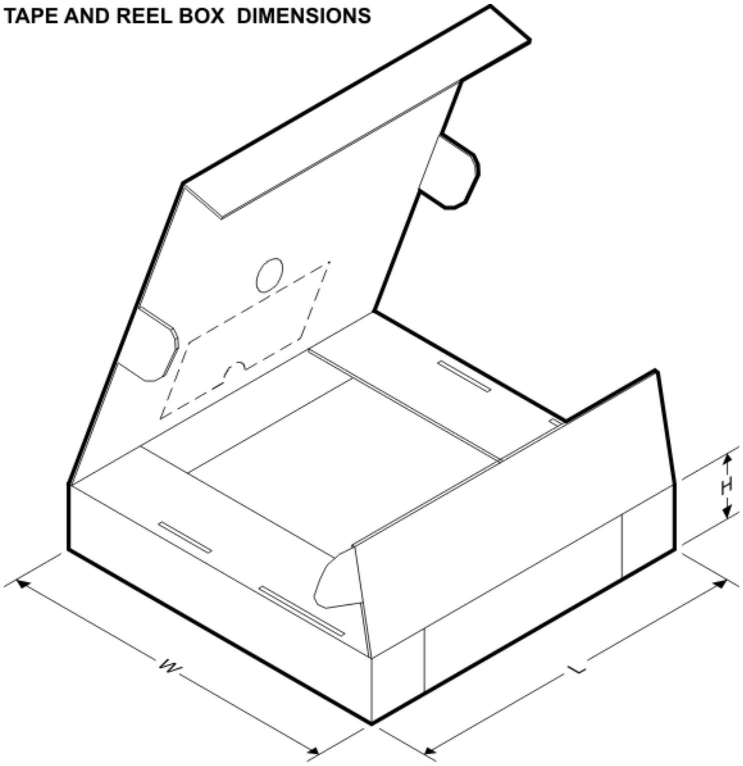
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*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
ISO7231CQDWRQ1	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1

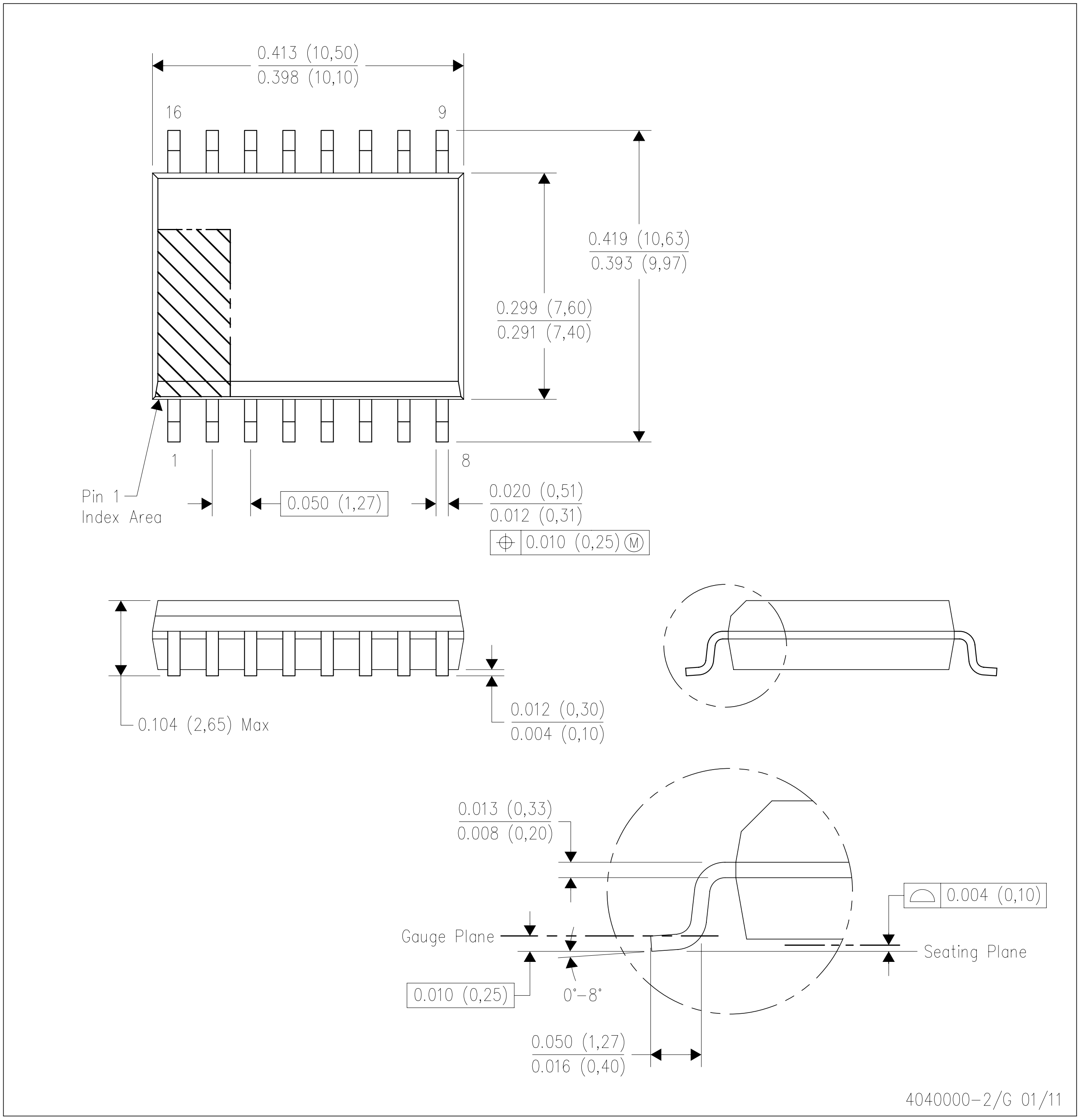
TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

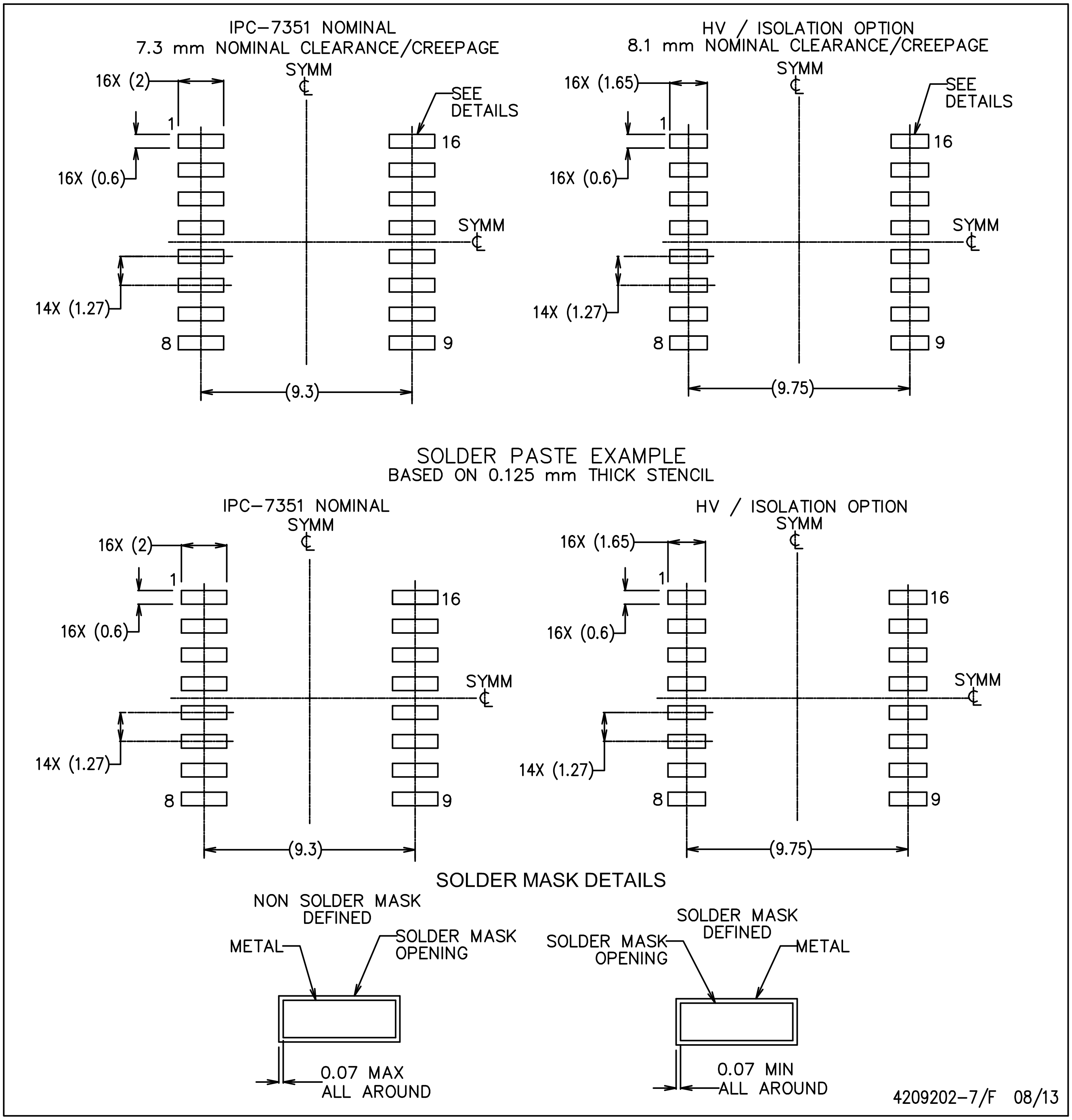
Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
ISO7231CQDWRQ1	SOIC	DW	16	2000	367.0	367.0	38.0

DW (R-PDSO-G16) PLASTIC SMALL OUTLINE



NOTES:
A. All linear dimensions are in inches (millimeters). Dimensioning and tolerancing per ASME Y14.5M-1994.
B. This drawing is subject to change without notice.
C. Body dimensions do not include mold flash or protrusion not to exceed 0.006 (0,15).
D. Falls within JEDEC MS-013 variation AA.

DW (R–PDSO–G16) PLASTIC SMALL OUTLINE



NOTES:
- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Refer to IPC7351 for alternate board design.
- D. Solder mask tolerances between and around signal pads can vary based on board fabrication site.
- E. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC–7525 may have alternate design recommendations.
- F. Board assembly site may have different recommendations for stencil design.

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