



4242-V_{PK} Small-Footprint and Low-Power Triple and Quad Channels Digital Isolators

Check for Samples: [ISO7131CC](#), [ISO7140CC](#), [ISO7140FCC](#), [ISO7141CC](#), [ISO7141FCC](#)

FEATURES

- **Maximum Signaling Rate: 50 Mbps (with 5V Supplies)**
- **Robust Design With Integrated Noise Filter**
- **Default Output Low Option (Suffix F)**
- **Low Power Consumption, Typical I_{CC} per Channel (with 3.3 V Supplies):**
 - ISO7131: 1.5 mA at 1 Mbps, 2.6 mA at 25 Mbps
 - ISO7140: TBD at 1 Mbps, TBD at 25 Mbps
 - ISO7141: TBD at 1 Mbps, TBD at 25 Mbps
- **Low Propagation Delay: 23 ns Typical (3.3 V Supplies)**
- **Wide Temperature Range: –40°C to 125°C**
- **50 kV/μs Transient Immunity, Typical**
- **Long Life with SiO₂ Isolation Barrier**
- **Operates From 2.7 V, 3.3 V and 5 V Supply and Logic Levels**
- **Small QSOP-16 Package**

APPLICATIONS

- **General-Purpose Isolation**
 - Industrial Fieldbus
 - Profibus
 - Modbus™
 - DeviceNet Data Buses
 - RS-232, RS-485
 - Serial Peripheral Interface

SAFETY AND REGULATORY APPROVALS

- **2500 V_{RMS} Isolation for 1 minute per UL 1577**
- **4242 V_{PK} Isolation per DIN EN 60747-5-2 (VDE 0884 Teil 2), 566 V_{PK} Working Voltage**
- **CSA Component Acceptance Notice 5A**
- **IEC 60950-1 and IEC 61010-1 End Equipment Standard Approvals**
- **All Approvals Pending**

DESCRIPTION

ISO7131, ISO7140, and ISO7141 provide galvanic isolation up to 2500 V_{RMS} for 1 minute per UL and 4242 V_{PK} per VDE. ISO7131 has three channels with two forward and one reverse-direction channels. ISO7140 and ISO7141 are quad-channel isolators; ISO7140 has four forward, ISO7141 has three forward and one reverse-direction channel. These devices are capable of 50 Mbps maximum data rate with 5V supplies and 40Mbps maximum data rate with 3.3V or 2.7V supplies, with integrated filters on the inputs for noise-prone applications. The suffix F indicates that default output state is low; otherwise, the default output state is high (see [Table 1](#)).

Each isolation channel has a logic input and output buffer separated by a silicon dioxide (SiO₂) insulation barrier. Used in conjunction with isolated power supplies, these devices prevent noise currents on a data bus or other circuits from entering the local ground and interfering with or damaging sensitive circuitry. The devices have TTL input thresholds and can operate from 2.7 V, 3.3 V, and 5 V supplies.

PRODUCT	STATUS
ISO7131CC	Released
ISO7140CC	Product Preview
ISO7140FCC	Product Preview
ISO7141CC	Product Preview
ISO7141FCC	Product Preview



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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.

DEVICE INFORMATION

PIN CONFIGURATIONS (TOP VIEW)

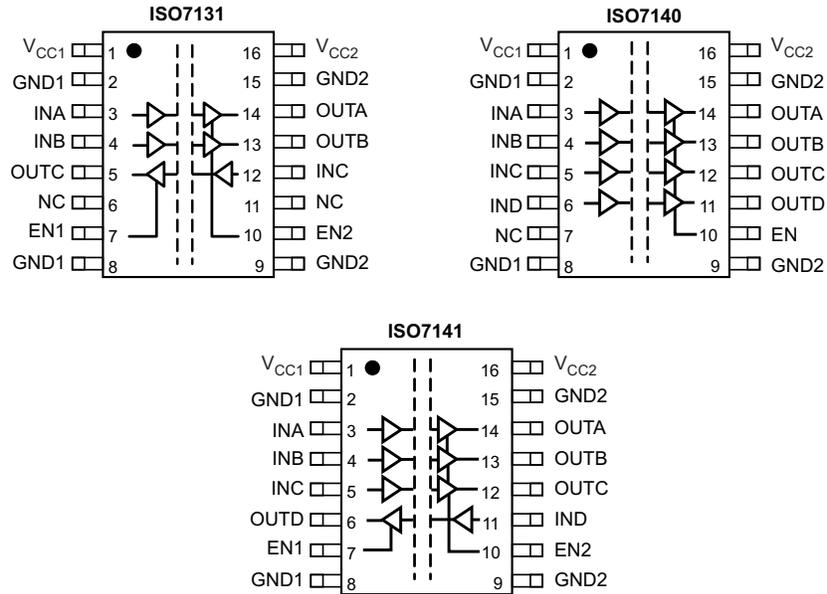


Table 1. FUNCTION TABLE⁽¹⁾

INPUT V _{CC}	OUTPUT V _{CC}	INPUT (IN _x)	OUTPUT ENABLE (EN _x)	OUTPUT (OUT _x)	
				ISO71xxCC	ISO71xxFCC
PU	PU	H	H or open	H	H
		L	H or open	L	L
		X	L	Z	Z
		Open	H or open	H	L
PD	PU	X	H or open	H	L
PD	PU	X	L	Z	Z
PU	PD	X	X	Undetermined	Undetermined

(1) PU = Powered Up (V_{CC} ≥ 2.7 V); PD = Powered Down (V_{CC} ≤ 2.1 V); X = Irrelevant; H = High Level; L = Low Level; Z = High Impedance

AVAILABLE OPTIONS

PRODUCT	RATED ISOLATION	INPUT THRESHOLD	DEFAULT OUTPUT	MAX DATA RATE and INPUT FILTER	CHANNEL DIRECTION	MARKED AS	ORDERING NUMBER
ISO7131CC	4242 V _{PK}	1.5-V TTL (CMOS compatible)	High	50 Mbps, with noise filter integrated	2 forward, 1 reverse	7131CC	ISO7131CCDBQ (tube)
							ISO7131CCDBQR (reel)
ISO7140CC ⁽¹⁾			Low		4 forward, 0 reverse	7140CC	ISO7140CCDBQ (tube)
							ISO7140CCDBQR (reel)
ISO7140FCC ⁽¹⁾			High		7140FC	ISO7140FCCDBQ (tube)	
						ISO7140FCCDBQR (reel)	
ISO7141CC ⁽¹⁾	Low	3 forward, 1 reverse	7141CC	ISO7141CCDBQ (tube)			
				ISO7141CCDBQR (reel)			
ISO7141FCC ⁽¹⁾			7141FC	ISO7141FCCDBQ (tube)			
				ISO7141FCCDBQR (reel)			

(1) Product Preview

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

PARAMETER		VALUE		
Supply voltage ⁽²⁾	V_{CC1}, V_{CC2}	-0.5 V to 6 V		
Voltage	INx, OUTx, ENx	-0.5 V to $V_{CC} + 0.5$ V		
Output current	I_O	±15 mA		
Electrostatic discharge	Human-body model	ESDA / JEDEC JS-001-2012	All pins	±4 kV
	Field-induced charged device model	JEDEC JESD22-C101E		±1.5 kV
	Machine model	JEDEC JESD22-A115-A		±200 V
Maximum junction temperature	T_J	150°C		
Storage temperature	T_{STG}	-65°C to 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 except differential I/O bus voltages are with respect to the local ground terminal (GND1 or GND2) and are peak voltage values.

RECOMMENDED OPERATING CONDITIONS

PARAMETER		MIN	TYP	MAX	UNIT
V_{CC1}, V_{CC2}	Supply voltage	2.7		5.5	V
I_{OH}	High-level output current ($V_{CC} \geq 3.0$ V)	-4			mA
	High-level output current ($V_{CC} < 3.0$ V)	-2			mA
I_{OL}	Low-level output current			4	mA
V_{IH}	High-level input voltage	2		V_{CC}	V
V_{IL}	Low-level input voltage	0		0.8	V
t_{ui}	Input pulse duration ($V_{CC} \geq 4.5$ V)	20			ns
t_{ui}	Input pulse duration ($V_{CC} < 4.5$ V)	25			ns
$1 / t_{ui}$	Signaling rate ($V_{CC} \geq 4.5$ V)	0		50	Mbps
$1 / t_{ui}$	Signaling rate ($V_{CC} < 4.5$ V)	0		40	Mbps
T_J	Junction temperature	-40		136	°C
T_A	Ambient temperature	-40	25	125	°C

THERMAL INFORMATION

THERMAL METRIC ⁽¹⁾		ISO7131, ISO714x	UNIT	
		DBQ (16 Pins)		
θ_{JA}	Junction-to-ambient thermal resistance	104.5	°C/W	
$\theta_{JC(top)}$	Junction-to-case(top) thermal resistance	57.8	°C/W	
θ_{JB}	Junction-to-board thermal resistance	46.8	°C/W	
ψ_{JT}	Junction-to-top characterization parameter	18.3	°C/W	
ψ_{JB}	Junction-to-board characterization parameter	46.4	°C/W	
$\theta_{JC(bottom)}$	Junction-to-case(bottom) thermal resistance	n/a	°C/W	
P_D	Device power dissipation	$V_{CC1} = V_{CC2} = 5.5$ V, $T_J = 150$ °C, $C_L = 15$ pF Input a 25-MHz, 50% duty cycle square wave	150	mW

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

ELECTRICAL CHARACTERISTICS

V_{CC1} and V_{CC2} at 5 V \pm 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 1	$V_{CCx}^{(1)} - 0.5$	4.8		V
		$I_{OH} = -20$ μ A; see Figure 1	$V_{CCx}^{(1)} - 0.1$	5		
V_{OL}	Low-level output voltage	$I_{OL} = 4$ mA; see Figure 1		0.2	0.4	V
		$I_{OL} = 20$ μ A; see Figure 1		0	0.1	
$V_{I(HYS)}$	Input threshold voltage hysteresis			450		mV
I_{IH}	High-level input current	$V_{IH} = V_{CC}$ at INx or ENx			10	μ A
I_{IL}	Low-level input current	$V_{IL} = 0$ V at INx or ENx	-10			
CMTI	Common-mode transient immunity	$V_I = V_{CC}$ or 0 V; see Figure 4	25	75		kV/ μ s

(1) V_{CCx} is the supply voltage, V_{CC1} or V_{CC2} , for the output channel that is being measured.

SWITCHING CHARACTERISTICS

V_{CC1} and V_{CC2} at 5 V \pm 10% (over recommended operating conditions unless otherwise noted.)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH} , t_{PHL}	Propagation delay time	See Figure 1	12	19	35	ns
PWD ⁽¹⁾	Pulse width distortion $ t_{PHL} - t_{PLH} $				3	
$t_{sk(o)}$ ⁽²⁾	Channel-to-channel output skew time	Same-direction channels			2	
		Opposite-direction channels			4	
$t_{sk(pp)}$ ⁽³⁾	Part-to-part skew time			12		
t_r	Output signal rise time	See Figure 1		2		ns
t_f	Output signal fall time			2		
t_{PHZ} , t_{PLZ}	Disable propagation delay, high/low-to-high impedance output	See Figure 2		6	10	ns
t_{PZH} , t_{PZL}	Enable propagation delay, high impedance-to-high/low output			5	10	
t_{fs}	Fail-safe output delay time from input data or power loss	See Figure 3		9.5		μ s
t_{GR}	Input glitch rejection time		8	11	18	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.

SUPPLY CURRENT

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

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT	
ISO7131							
I _{CC1}	Disable	EN1 = EN2 = 0V		2.2	3.7	mA	
I _{CC2}				3.7	5		
I _{CC1}	DC to 1 Mbps	DC signal: V _I = V _{CC} or 0 V AC signal: All channels switching with square-wave clock input; C _L = 15 pF		2.2	3.7		
I _{CC2}				3.7	5		
I _{CC1}	10 Mbps			3.4	4.8		
I _{CC2}				4.9	6.6		
I _{CC1}	25 Mbps			4.9	6.6		
I _{CC2}				6.8	9		
I _{CC1}	50 Mbps			7.1	10		
I _{CC2}				10.5	13		
ISO7140							
I _{CC1}	Disable		EN = 0 V		TBD	TBD	mA
I _{CC2}				TBD	TBD		
I _{CC1}	DC to 1 Mbps	DC Signal: V _I = V _{CC} or 0 V, AC Signal: All channels switching with square wave clock input; C _L = 15 pF		TBD	TBD		
I _{CC2}				TBD	TBD		
I _{CC1}	10 Mbps			TBD	TBD		
I _{CC2}				TBD	TBD		
I _{CC1}	25 Mbps			TBD	TBD		
I _{CC2}				TBD	TBD		
I _{CC1}	50 Mbps			TBD	TBD		
I _{CC2}				TBD	TBD		
ISO7141							
I _{CC1}	Disable		EN1 = EN2 = 0V		TBD	TBD	mA
I _{CC2}				TBD	TBD		
I _{CC1}	DC to 1 Mbps	DC signal: V _I = V _{CC} or 0 V, AC signal: All channels switching with square wave clock input; C _L = 15 pF		TBD	TBD		
I _{CC2}				TBD	TBD		
I _{CC1}	10 Mbps			TBD	TBD		
I _{CC2}				TBD	TBD		
I _{CC1}	25 Mbps			TBD	TBD		
I _{CC2}				TBD	TBD		
I _{CC1}	50 Mbps			TBD	TBD		
I _{CC2}				TBD	TBD		

ELECTRICAL CHARACTERISTICS

V_{CC1} and V_{CC2} at 3.3 V \pm 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 1	$V_{CCx}^{(1)} - 0.5$	3		V
		$I_{OH} = -20$ μ A; see Figure 1	$V_{CCx}^{(1)} - 0.1$	3.3		
V_{OL}	Low-level output voltage	$I_{OL} = 4$ mA; see Figure 1		0.2	0.4	V
		$I_{OL} = 20$ μ A; see Figure 1		0	0.1	
$V_{I(HYS)}$	Input threshold voltage hysteresis			425		mV
I_{IH}	High-level input current	$V_{IH} = V_{CC}$ at INx or ENx			10	μ A
I_{IL}	Low-level input current	$V_{IL} = 0$ V at INx or ENx	-10			
CMTI	Common-mode transient immunity	$V_I = V_{CC}$ or 0 V; see Figure 4	25	50		kV/ μ s

(1) V_{CCx} is the supply voltage, V_{CC1} or V_{CC2} , for the output channel that is being measured.

SWITCHING CHARACTERISTICS

V_{CC1} and V_{CC2} at 3.3 V \pm 10% (over recommended operating conditions unless otherwise noted.)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH} , t_{PHL}	Propagation delay time	See Figure 1	15	23	45	
PWD ⁽¹⁾	Pulse width distortion $ t_{PHL} - t_{PLH} $				3	
$t_{sk(o)}$ ⁽²⁾	Channel-to-channel output skew time	Same-direction Channels			2	ns
		Opposite-direction Channels			4	
$t_{sk(pp)}$ ⁽³⁾	Part-to-part skew time				19	
t_r	Output signal rise time	See Figure 1		2.5		ns
t_f	Output signal fall time			2.5		
t_{PHZ} , t_{PLZ}	Disable propagation delay, from high/low to high-impedance output	See Figure 2		6.5	15	ns
t_{PZH} , t_{PZL}	Enable propagation delay, from high-impedance to high/low output			6.5	15	
t_{fs}	Fail-safe output delay time from input data or power loss	See Figure 3		8		μ s
t_{GR}	Input glitch rejection time		9	12.5	22	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.

SUPPLY CURRENT

V_{CC1} and V_{CC2} at 3.3 V \pm 10% (over recommended operating conditions unless otherwise noted.)

PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT	
ISO7131							
I_{CC1}	Disable	EN1 = EN2 = 0 V		1.9	2.7	mA	
I_{CC2}				2.6	3.8		
I_{CC1}	DC to 1 Mbps	DC signal: $V_I = V_{CC}$ or 0 V AC signal: All channels switching with square-wave clock input; $C_L = 15$ pF		1.9	2.7		
I_{CC2}				2.6	3.8		
I_{CC1}	10 Mbps			2.4	3.5		
I_{CC2}				3.5	4.7		
I_{CC1}	25 Mbps			3.2	4.6		
I_{CC2}				4.7	6.2		
I_{CC1}	40 Mbps			5	7		
I_{CC2}				7	9		
ISO7140							
I_{CC1}	Disable		EN = 0 V		TBD	TBD	mA
I_{CC2}				TBD	TBD		
I_{CC1}	DC to 1 Mbps	DC signal: $V_I = V_{CC}$ or 0 V, AC signal: All channels switching with square-wave clock input; $C_L = 15$ pF		TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	10 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	25 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	40 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
ISO7141							
I_{CC1}	Disable		EN1 = EN2 = 0 V		TBD	TBD	mA
I_{CC2}				TBD	TBD		
I_{CC1}	DC to 1 Mbps	DC signal: $V_I = V_{CC}$ or 0 V, AC signal: All channels switching with square-wave clock input; $C_L = 15$ pF		TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	10 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	25 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	40 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		

ELECTRICAL CHARACTERISTICS

V_{CC1} and V_{CC2} at 2.7 V (over recommended operating conditions unless otherwise noted.)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OH}	High-level output voltage	$I_{OH} = -2$ mA; see Figure 1	$V_{CC}^{(1)} - 0.3$	2.5		V
		$I_{OH} = -20$ μ A; see Figure 1	$V_{CC}^{(1)} - 0.1$	2.7		
V_{OL}	Low-level output voltage	$I_{OL} = 4$ mA; see Figure 1		0.2	0.4	V
		$I_{OL} = 20$ μ A; see Figure 1		0	0.1	
$V_{I(HYS)}$	Input threshold voltage hysteresis			350		mV
I_{IH}	High-level input current	$V_{IH} = V_{CC}$ at INx or ENx			10	μ A
I_{IL}	Low-level input current	$V_{IL} = 0$ V at INx or ENx	-10			
CMTI	Common-mode transient immunity	$V_I = V_{CC}$ or 0 V; see Figure 4	25	50		kV/ μ s

(1) V_{CCx} is the supply voltage, V_{CC1} or V_{CC2} , for the output channel that is being measured.

SWITCHING CHARACTERISTICS

V_{CC1} and V_{CC2} at 2.7 V (over recommended operating conditions unless otherwise noted.)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{PLH} , t_{PHL}	Propagation delay time	See Figure 1	15	27	50	ns
PWD ⁽¹⁾	Pulse width distortion $ t_{PHL} - t_{PLH} $		3			
$t_{sk(o)}$ ⁽²⁾	Channel-to-channel output skew time	Same-direction Channels			2	
		Opposite-direction Channels			4	
$t_{sk(pp)}$ ⁽³⁾	Part-to-part skew time				22	
t_r	Output signal rise time	See Figure 1		3		ns
t_f	Output signal fall time			3		
t_{PHZ} , t_{PLZ}	Disable propagation delay, from high/low to high-impedance output	See Figure 2		9	15	ns
t_{PZH} , t_{PZL}	Enable propagation delay, from high-impedance to high/low output			9	15	
t_{fs}	Fail-safe output delay time from input data or power loss	See Figure 3		8.5		μ s
t_{GR}	Input glitch rejection time		10	14	22.5	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.

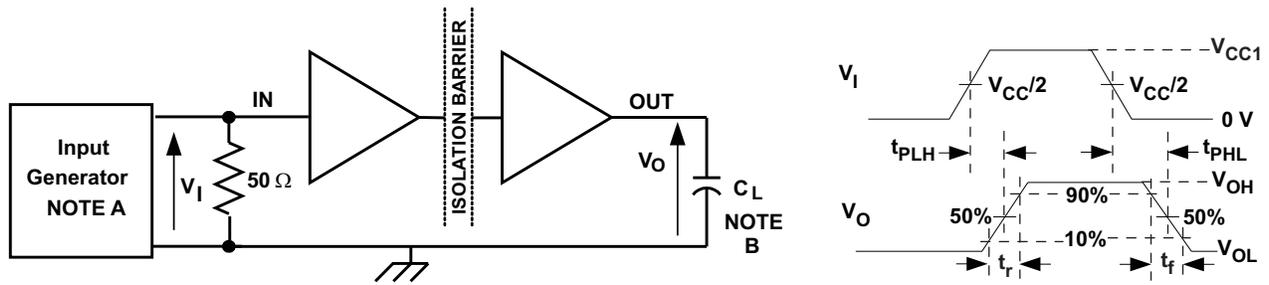
(3) $t_{sk(pp)}$ is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals, and loads.

SUPPLY CURRENT

V_{CC1} and V_{CC2} at 2.7 V (over recommended operating conditions unless otherwise noted.)

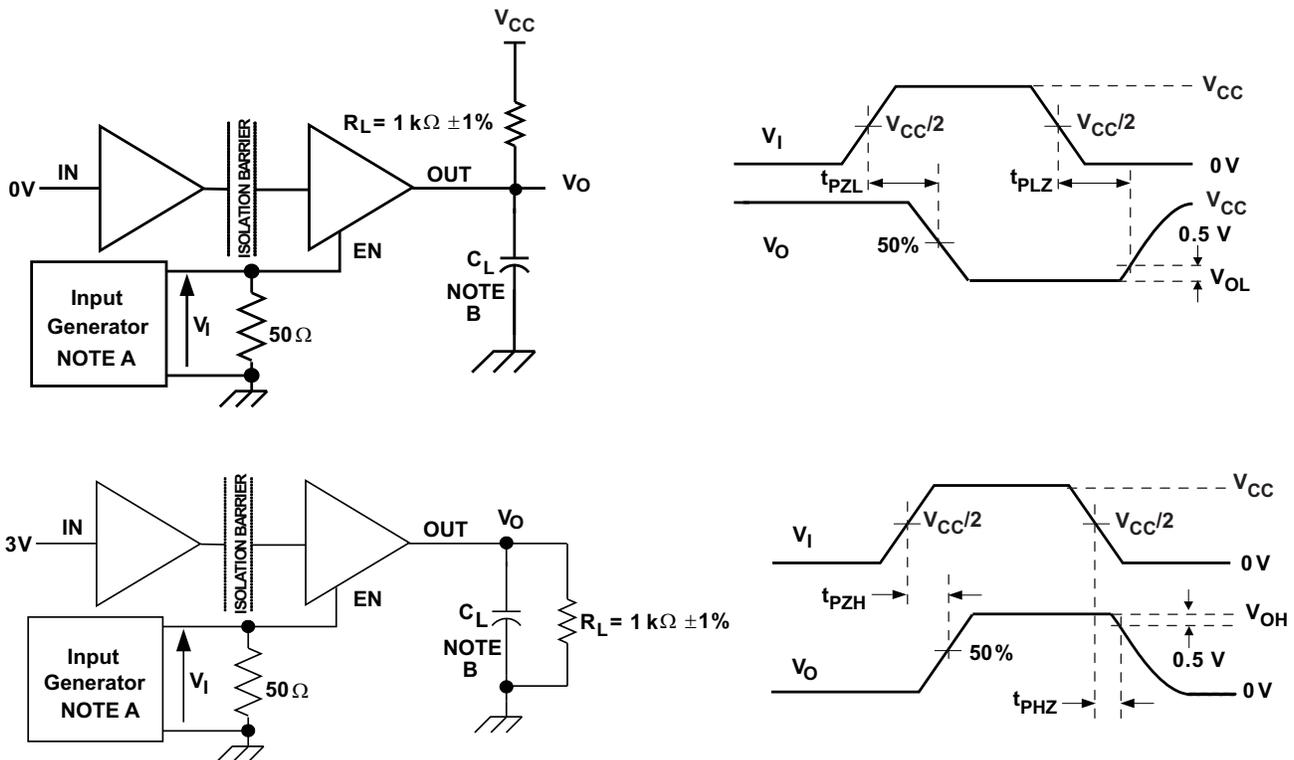
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	UNIT	
ISO7131							
I_{CC1}	Disable	EN1 = EN2 = 0 V		1.2	2.4	mA	
I_{CC2}				2.3	3.3		
I_{CC1}	DC to 1 Mbps	DC signal: $V_I = V_{CC}$ or 0 V AC signal: All channels switching with square-wave clock input; $C_L = 15$ pF		1.2	2.4		
I_{CC2}				2.3	3.3		
I_{CC1}	10 Mbps			2.1	3		
I_{CC2}				2.9	4		
I_{CC1}	25 Mbps			3	3.8		
I_{CC2}				4	5.2		
I_{CC1}	40 Mbps			4.2	5.3		
I_{CC2}				5.8	7		
ISO7140							
I_{CC1}	Disable		EN = 0 V		TBD	TBD	mA
I_{CC2}				TBD	TBD		
I_{CC1}	DC to 1 Mbps	DC signal: $V_I = V_{CC}$ or 0 V, AC signal: All channels switching with square-wave clock input; $C_L = 15$ pF		TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	10 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	25 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	40 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
ISO7141							
I_{CC1}	Disable		EN1 = EN2 = 0 V		TBD	TBD	mA
I_{CC2}				TBD	TBD		
I_{CC1}	DC to 1 Mbps	DC signal: $V_I = V_{CC}$ or 0 V, AC signal: All channels switching with square-wave clock input; $C_L = 15$ pF		TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	10 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	25 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		
I_{CC1}	40 Mbps			TBD	TBD		
I_{CC2}				TBD	TBD		

PARAMETER MEASUREMENT INFORMATION



- A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 50 kHz, 50% duty cycle, $t_r \leq 3$ ns, $t_f \leq 3$ ns, $Z_O = 50 \Omega$. At the input, a 50- Ω resistor is required to terminate the input-generator signal. It is not needed in an actual application.
- B. $C_L = 15$ pF and includes instrumentation and fixture capacitance within $\pm 20\%$.

Figure 1. Switching-Characteristics Test Circuit and Voltage Waveforms



- A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 50 kHz, 50% duty cycle, $t_r \leq 3$ ns, $t_f \leq 3$ ns, $Z_O = 50 \Omega$.
- B. $C_L = 15$ pF and includes instrumentation and fixture capacitance within $\pm 20\%$.

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

DEVICE INFORMATION
INSULATION AND SAFETY-RELATED SPECIFICATIONS

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{IOTM}	Maximum transient overvoltage per DIN EN 60747-5-2 (VDE 0884 Teil 2)				4242	V_{PK}
V_{IORM}	Maximum working voltage per DIN EN 60747-5-2 (VDE 0884 Teil 2)				566	V_{PK}
V_{ISO}	Isolation Voltage per UL 1577	$V_{TEST} = V_{ISO}$, $t = 60$ sec (qualification)			2500	V_{RMS}
		$V_{TEST} = 1.2 * V_{ISO}$, $t = 1$ sec (100% production)			3000	V_{RMS}
V_{PR}	Input-to-output test voltage	After Input/Output safety test subgroup 2/3, $V_{PR} = V_{IORM} * 1.2$, $t = 10$ s, Partial discharge < 5 pC			679	V_{PK}
		Method a, After environmental tests subgroup 1, $V_{PR} = V_{IORM} * 1.6$, $t = 10$ s, Partial discharge < 5 pC			906	
		Method b1, 100% production test, $V_{PR} = V_{IORM} * 1.875$, $t = 1$ s, Partial discharge < 5 pC			1061	
L(I01)	Minimum air gap (clearance)	Shortest terminal to terminal distance through air	3.7			mm
L(I02)	Minimum external tracking (creepage)	Shortest terminal to terminal distance across the package surface	3.7			mm
	Minimum internal gap (internal clearance)	Distance through the insulation	0.014			mm
	Pollution degree			2		
CTI	Tracking resistance (comparative tracking index)	DIN IEC 60112 / VDE 0303 Part 1	≥400			V
$R_{IO}^{(1)}$	Isolation Resistance, Input to Output	$V_{IO} = 500$ V, $T_A < 100^\circ\text{C}$			>10 ¹²	Ω
		$V_{IO} = 500$ V, $100^\circ\text{C} \leq T_A \leq \text{max}$			>10 ¹¹	
$C_{IO}^{(1)}$	Barrier capacitance, input to output	$V_I = 0.4 \sin(2\pi ft)$, $f = 1$ MHz			2.3	pF
$C_I^{(2)}$	Input capacitance	$V_I = V_{CC}/2 + 0.4 \sin(2\pi ft)$, $f = 1$ MHz, $V_{CC} = 5$ V			2.8	pF

(1) All pins on each side of the barrier tied together creating a two-terminal device.

(2) Measured from input pin to ground.

NOTE

Creepage and clearance requirements should be applied according to the specific equipment isolation standards of an application. Care should be taken to maintain the creepage and clearance distance of a board design to ensure 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 and/or ribs on a printed circuit board are used to help increase these specifications.

Table 2. IEC 60664-1 RATINGS TABLE

PARAMETER	TEST CONDITIONS	SPECIFICATION
Basic Isolation Group	Material Group	II
Installation classification	Rated mains voltage $\leq 150 V_{RMS}$	I–IV
	Rated mains voltage $\leq 300 V_{RMS}$	I–III
	Rated mains voltage $\leq 400 V_{RMS}$	I–II

REGULATORY INFORMATION

VDE	UL	CSA
Certified according to DIN EN 60747-5-2	Recognized under 1577 Component Recognition Program	Approved under CSA Component Acceptance Notice
Basic Insulation Maximum Transient Overvoltage, 4242 V _{PK} Maximum Working Voltage, 566 V _{PK}	Single protection, 2500 V _{RMS} ⁽¹⁾	Reinforced Insulation per CSA 60950-1-03 and IEC 60950-1 (2nd Ed.), 150 V _{RMS} maximum working voltage Basic Insulation per CSA 60950-1-03 and IEC 60950-1 (2nd Ed.), 380 V _{RMS} maximum working voltage Reinforced Insulation per CSA 61010-1-04 and IEC 61010-1 (2nd Edition), 150 V _{RMS} maximum working voltage
File number: 40016131 (approval pending)	File number: E181974 (approval pending)	File number: 220991 (approval pending)

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

IEC SAFETY LIMITING VALUES

Safety limiting intends to prevent potential damage to the isolation barrier upon failure of input or output circuitry. A failure of the IO can allow low resistance to ground or the supply and, without current limiting, dissipate sufficient power to overheat the die and damage the isolation barrier, potentially leading to secondary system failures.

PARAMETER		TEST CONDITIONS			MIN	TYP	MAX	UNIT	
I _S	Safety input, output, or supply current	DBQ-16	θ _{JA} = 104.5°C/W, V _I = 5.5V, T _J = 150°C, T _A = 25°C					217	mA
			θ _{JA} = 104.5°C/W, V _I = 3.6V, T _J = 150°C, T _A = 25°C					332	
			θ _{JA} = 104.5°C/W, V _I = 2.7V, T _J = 150°C, T _A = 25°C					443	
T _S	Maximum case temperature						150	°C	

The safety-limiting constraint is the absolute-maximum junction temperature specified in the *Absolute Maximum Ratings* table. The power dissipation and junction-to-air thermal impedance of the device installed in the application hardware determines the junction temperature. The assumed junction-to-air thermal resistance in the *Thermal Information* table is that of a device installed on a high-K test board for leaded surface-mount packages. The power is the recommended maximum input voltage times the current. The junction temperature is then the ambient temperature plus the power times the junction-to-air thermal resistance.

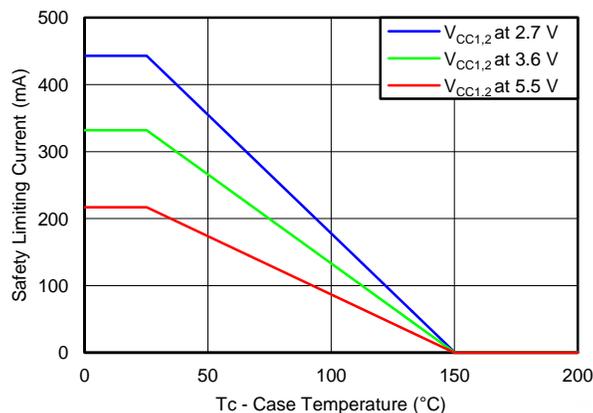


Figure 5. DBQ-16 θ_{JC} Thermal Derating Curve

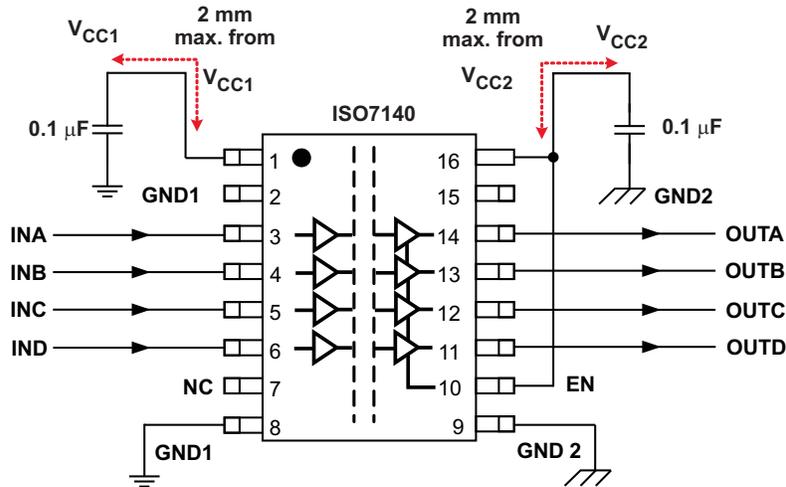
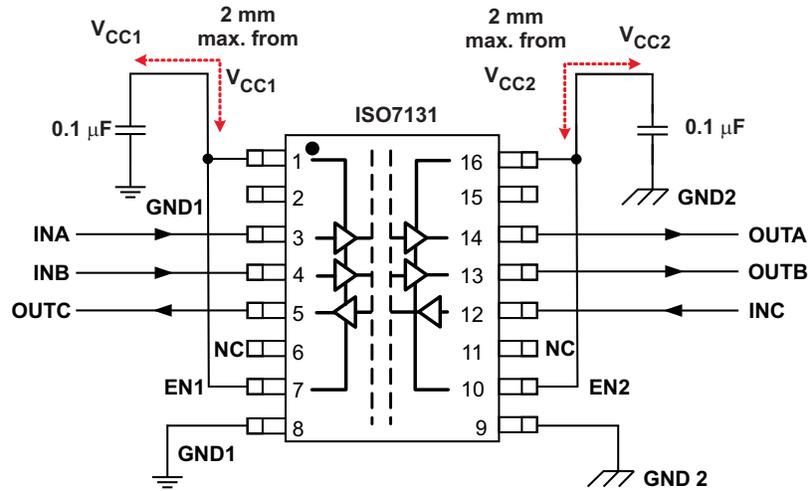


Figure 6. Typical Application Circuits for ISO7131 and ISO7140

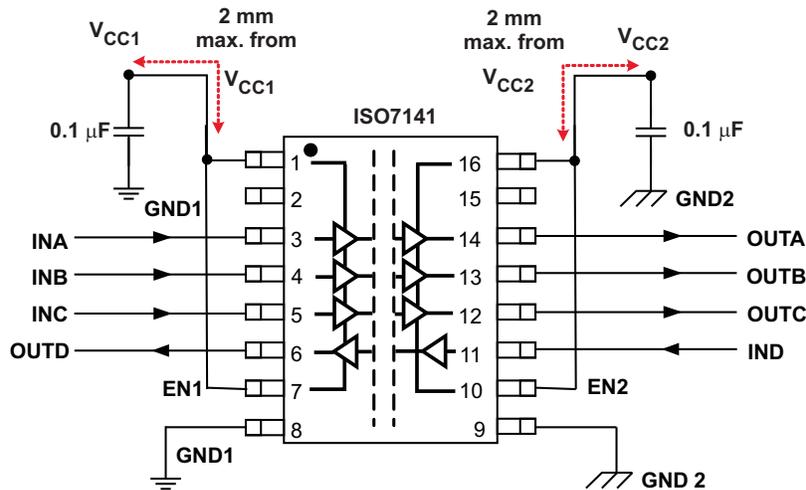


Figure 7. Typical Application Circuit for ISO7141

Note: For detailed layout recommendations, see Application Note [SLLA284](#), *Digital Isolator Design Guide*.

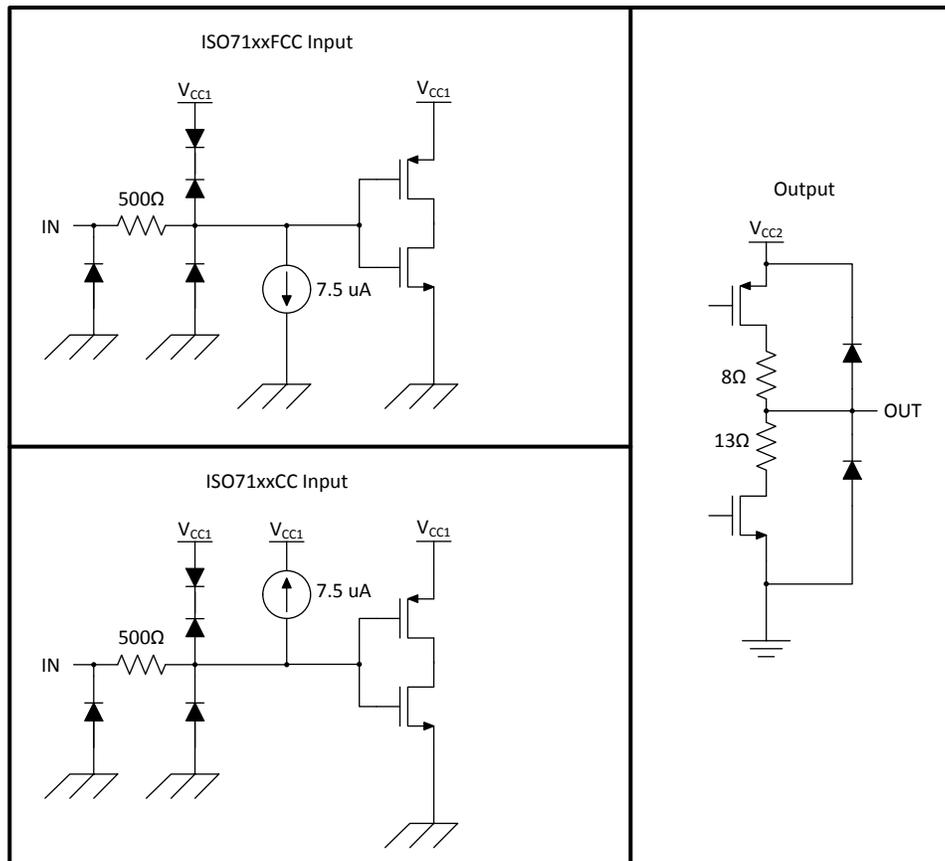


Figure 8. Device I/O Schematics

TYPICAL CHARACTERISTICS

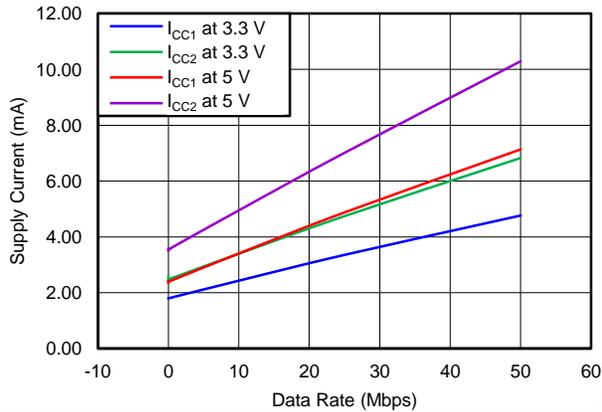


Figure 9. ISO7131 SUPPLY CURRENT FOR ALL CHANNELS vs DATA RATE

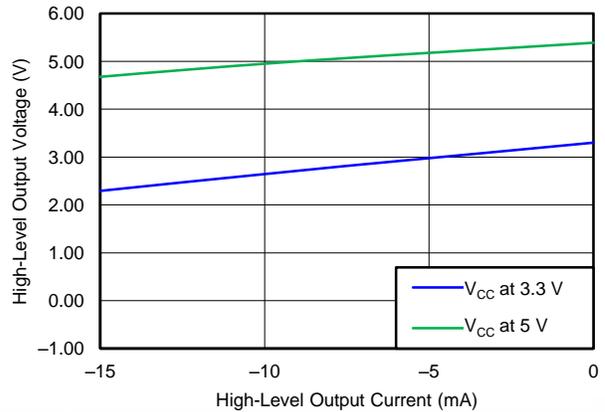


Figure 10. HIGH-LEVEL OUTPUT VOLTAGE vs HIGH-LEVEL OUTPUT CURRENT

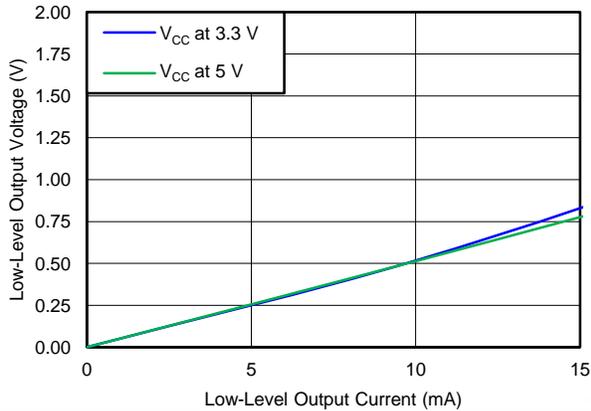


Figure 11. LOW-LEVEL OUTPUT VOLTAGE vs LOW-LEVEL OUTPUT CURRENT

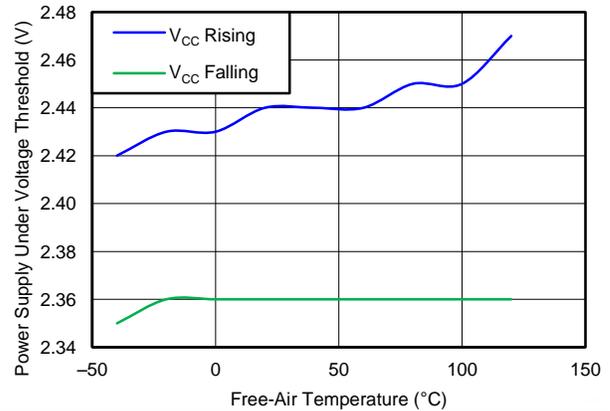


Figure 12. V_{CC} UNDERVOLTAGE THRESHOLD vs FREE-AIR TEMPERATURE

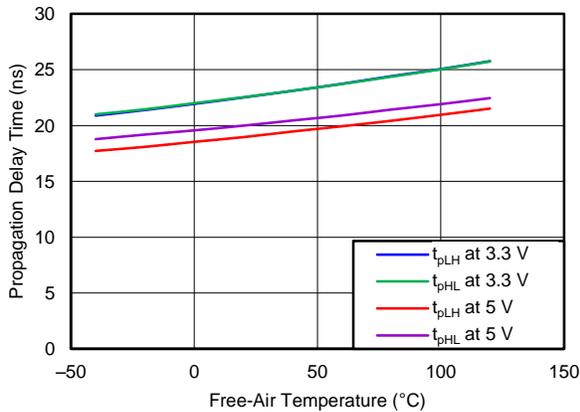


Figure 13. PROPAGATION DELAY TIME vs FREE-AIR TEMPERATURE

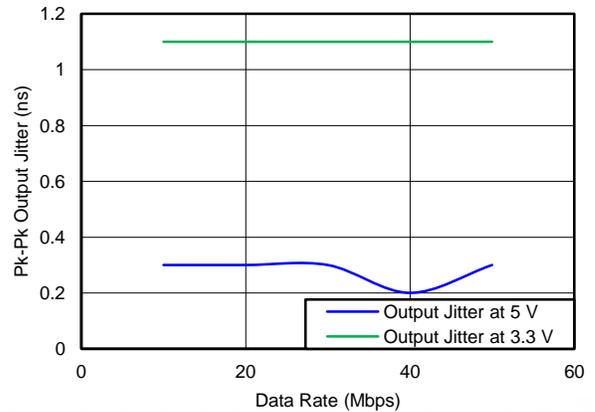


Figure 14. OUTPUT JITTER vs DATA RATE

TYPICAL CHARACTERISTICS (continued)

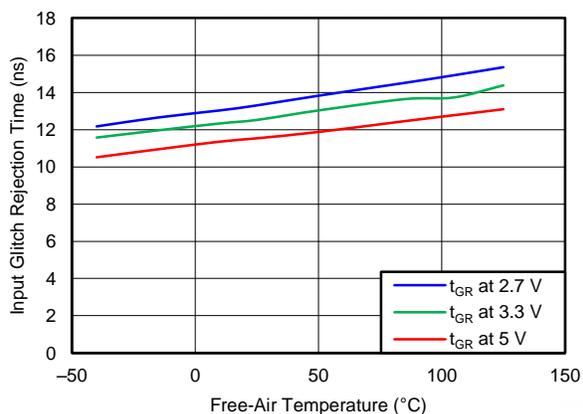


Figure 15. INPUT GLITCH REJECTION vs FREE-AIR TEMPERATURE

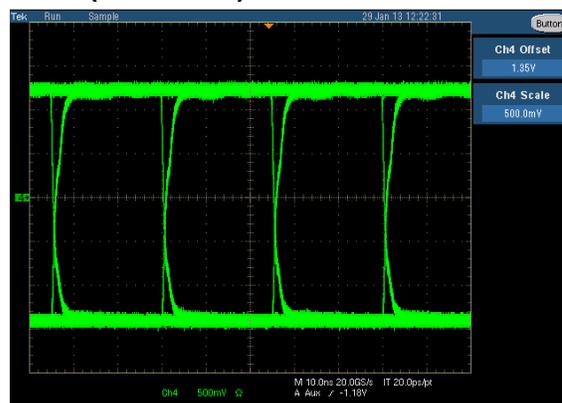


Figure 16. TYPICAL EYE DIAGRAM AT 40 MBPS, 2.7-V OPERATION

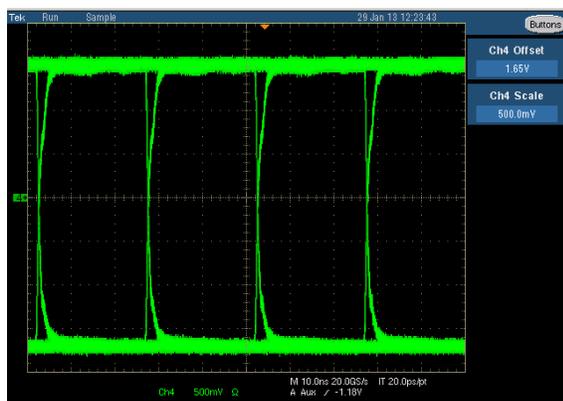


Figure 17. TYPICAL EYE DIAGRAM AT 40 MBPS, 3.3-V OPERATION

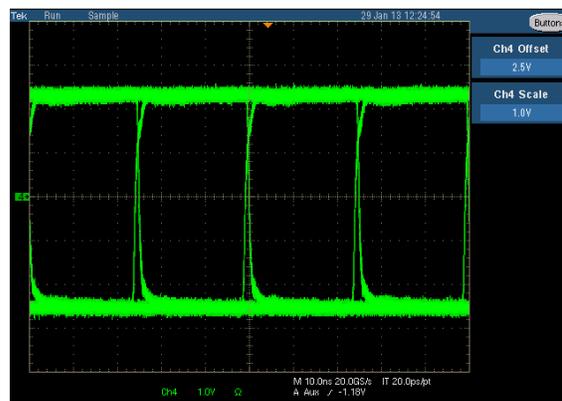


Figure 18. TYPICAL EYE DIAGRAM AT 50 MBPS, 5-V OPERATION

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
ISO7131CCDBQ	PREVIEW	SSOP	DBQ	16	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7131CC	
ISO7131CCDBQR	PREVIEW	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7131CC	
ISO7140CCDBQ	PREVIEW	SSOP	DBQ	16	75	Green (RoHS & no Sb/Br)	Call TI	Level-2-260C-1 YEAR	-40 to 125	7140CC	
ISO7140CCDBQR	PREVIEW	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	Call TI	Level-2-260C-1 YEAR	-40 to 125	7140CC	
ISO7141CCDBQ	PREVIEW	SSOP	DBQ	16	75	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7141CC	
ISO7141CCDBQR	PREVIEW	SSOP	DBQ	16	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-2-260C-1 YEAR	-40 to 125	7141CC	

(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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