

## 低功耗三通道和四通道数字隔离器

 查询样品: [ISO7631FM](#), [ISO7631FC](#), [ISO7641FC](#)

### 特性

- 信号发送速率: **150Mbps (M 级)**, **25Mbps (C 级)**
- 具有集成噪声滤波器 (C 级) 的稳健设计
- 低功耗、每通道典型  $I_{CC}$  (3.3V 电源):
  - **ISO7631FM**: 在 10Mbps 时为 **2mA**
  - **ISO7631FC**: 10Mbps 时为 **1.5mA**
  - **ISO7641FC**: 在 10Mbps 时为 **1.3 mA**
- 极低的  $I_{CC\_disable}$  (C 级)
- 低传播延迟: 典型值为 **7ns (M 级)**
- 在故障安全模式下输出默认为低电平状态
- 宽温度范围: **-40°C 至 125°C**
- **50KV/μs** 典型瞬态抗扰度
- 使用 **SiO<sub>2</sub>** 绝缘隔栅实现长使用寿命
- 在 **2.7V (M 级)**, **3.3V** 和 **5V** 电源和逻辑电平下运行
- 宽体小外形尺寸集成电路 (**SOIC)-16** 封装

### 应用范围

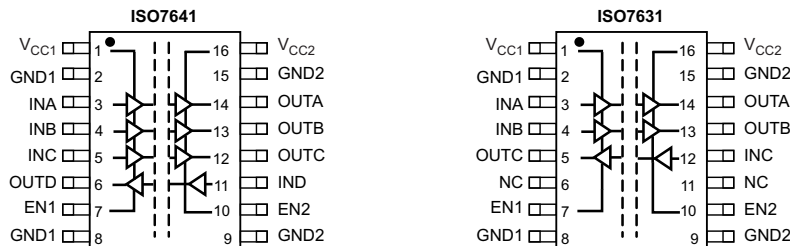
- 是下列应用中光耦合器的替代产品:
  - 工业现场总线 (**Fieldbus**)
  - **Profibus** 现场总线
  - **Modbus** 串行通信协议
  - **DeviceNet™** 数据总线
  - 伺服器控制接口
  - 电机控制
  - 电源
  - 电池组

### 安全及管理批准

- 符合 **UL1577** 的 1 分钟 **2500 V<sub>RMS</sub>** (已批准)
- 针对 **DIN EN 60747-5-2 (VDE 0884 修订版本 2)** 标准的 **4242 V<sub>PK</sub>VDE** 额定值, **1414 V<sub>PK</sub>** 工作电压 (已批准)
- **CSA** 组件接受通知 **5A** (已批准)
- 针对 **EN/UL/CSA 60950-1** 和 **EN/UL/CSA 61010-1** (已获批准) 符合 **TUV** 标准的 **3000 V<sub>RMS</sub>** 增强隔离

### 说明

ISO7631F 和 ISO7641F 提供符合 VDE 规范的高达 4242 V<sub>PK</sub> 的电流隔离。ISO7631F 具有 3 个通道, 其中 2 个正向和 1 个反向通道, 而 ISO7641F 具有 4 个通道, 其中 3 个正向通道和 1 个反向通道。后缀 F 说明在故障安全情况下输出默认为低电平状态 (参见 Table 1)。M 级器件是具有快速传播延迟且数据速率可达 150Mbps 的高速隔离器, 而 C 级器件在低功耗下的数据速率可高达 25Mbps 且具有针对易于产生噪音应用的集成滤波器。建议将 C 级器件用于低速应用, 在此类应用中需要抑制持续时间少于 6ns 的输入噪声脉冲或者应用中的低功耗十分重要。



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.



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.

说明（继续）

每个隔离通道都有一个由二氧化硅 (SiO<sub>2</sub>) 绝缘隔栅分开的逻辑输入和输出缓冲器。与隔离电源配合使用，这些器件可防止数据总线或者其它电路上的噪声电流进入本地接地或者干扰或损坏敏感电路。此器件具有 TTL 输入阈值并可在 2.7V (M 级)，3.3V 和 5V 电源供电的情况下运行。当由 3.3V 或者 2.7V 电源供电时，所有输入均可耐受 5V 电压。

PIN DESCRIPTIONS

PIN			I/O	DESCRIPTION
NAME	ISO7641	ISO7631		
INA	3	3	I	Input, channel A
INB	4	4	I	Input, channel B
INC	5	12	I	Input, channel C
IND	11	-	I	Input, channel D
OUTA	14	14	O	Output, channel A
OUTB	13	13	O	Output, channel B
OUTC	12	5	O	Output, channel C
OUTD	6	-	O	Output, channel D
EN1	7	7	I	Enables (when input is High or Open) or Disables (when input is Low) OUTD of ISO7641 and OUTC of ISO7631
EN2	10	10	I	Enables (when input is High or Open) or Disables (when input is Low) OUTA, OUTB, and OUTC of ISO7641 Enables (when input is High or Open) or Disables (when input is Low) OUTA and OUTB of ISO7631
V <sub>CC1</sub>	1	1	-	Power supply, V <sub>CC1</sub>
V <sub>CC2</sub>	16	16	-	Power supply, V <sub>CC2</sub>
GND1	2,8	2,8	-	Ground connection for V <sub>CC1</sub>
GND2	9,15	9,15	-	Ground connection for V <sub>CC2</sub>
NC	-	6,11	-	No Connect pins are floating with no internal connection

Table 1. FUNCTION TABLE<sup>(1)</sup>

INPUT V <sub>CC</sub>	OUTPUT V <sub>CC</sub>	INPUT (IN <sub>x</sub> )	OUTPUT ENABLE (EN <sub>x</sub> )	OUTPUT (OUT <sub>x</sub> )
PU	PU	H	H or Open	H
		L	H or Open	L
		X	L	Z
		Open	H or Open	L
PD	PU	X	H or Open	L
PD	PU	X	L	Z
PU	PD	X	X	Undetermined

(1) PU = Powered Up (V<sub>CC</sub> ≥ 2.7 V); PD = Powered Down (V<sub>CC</sub> ≤ 2.1 V); X = Irrelevant; H = High Level; L = Low Level; Z = High Impedance

**AVAILABLE OPTIONS**

PRODUCT	RATED ISOLATION	PACKAGE	INPUT THRESHOLD	DATA RATE and FILTER	CHANNEL DIRECTION	MARKED AS	ORDERING NUMBER
ISO7631FM	4242 V <sub>PK</sub> / 2500 V <sub>RMS</sub> <sup>(1)</sup>	DW-16	1.5 V TTL (CMOS Compatible)	150 Mbps, No Noise Filter	2 Forward, 1 Reverse	ISO7631FM	ISO7631FMDW (rail)
						ISO7631FMDWR (reel)	
ISO7631FC				25 Mbps, Integrated Noise Filter	2 Forward, 1 Reverse	ISO7631FC	ISO7631FCDW (rail)
							ISO7631FCDWR (reel)
ISO7641FC					3 Forward, 1 Reverse	ISO7641FC	ISO7641FCDW (rail)
							ISO7641FCDWR (reel)

(1) See the [Regulatory Information](#) table for detailed isolation ratings.

**ABSOLUTE MAXIMUM RATINGS<sup>(1)</sup>**

PARAMETER		VALUE		UNIT	
		MIN	MAX		
Supply voltage <sup>(2)</sup>	V <sub>CC1</sub> , V <sub>CC2</sub>	-0.5	6	V	
Voltage	INx, OUTx, ENx	-0.5	6	V	
Output Current, I <sub>O</sub>			±15	mA	
Electrostatic discharge	Human Body Model	ESDA, JEDEC JS-001-2012		±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 <sub>J</sub>			150	°C	
Storage temperature, T <sub>STG</sub>		-65	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
Supply voltage	V <sub>CC1</sub> , V <sub>CC2</sub>	M-Grade	2.7	5.5	V
		C-Grade	3	5.5	
High-level output current	I <sub>OH</sub>	-4			mA
Low-level output current	I <sub>OL</sub>			4	mA
High-level input voltage	V <sub>IH</sub>	2		V <sub>CC</sub>	V
Low-level input voltage	V <sub>IL</sub>	0		0.8	V
Input pulse duration	t <sub>ui</sub>	M-Grade: ≥3V-Operation	6.67		ns
		M-Grade: <3V-Operation	10		
		C-Grade: ≥3V-Operation	40		
Signaling rate	1 / t <sub>ui</sub>	M-Grade: ≥3V-Operation	0	150	Mbps
		M-Grade: <3V-Operation	0	100	
		C-Grade: ≥3V-Operation	0	25	
Junction temperature	T <sub>J</sub>	-40		136	°C
Ambient temperature	T <sub>A</sub>	-40	25	125	°C

**THERMAL INFORMATION**

THERMAL METRIC <sup>(1)</sup>		ISO76xx	UNITS	
		DW (16 Pins)		
θ <sub>JA</sub>	Junction-to-ambient thermal resistance	72	°C/W	
θ <sub>JC(top)</sub>	Junction-to-case(top) thermal resistance	38		
θ <sub>JB</sub>	Junction-to-board thermal resistance	39		
ψ <sub>JT</sub>	Junction-to-top characterization parameter	9.4		
ψ <sub>JB</sub>	Junction-to-board characterization parameter	n/a		
θ <sub>JC(bottom)</sub>	Junction-to-case(bottom) thermal resistance	n/a		
P <sub>D</sub>	Maximum Device Power Dissipation	V <sub>CC1</sub> = V <sub>CC2</sub> = 5.5V, T <sub>J</sub> = 150°C, C <sub>L</sub> = 15pF Input a 75 MHz 50% duty cycle square wave	399	mW

- (1) 有关传统和全新热度的更多信息，请参阅 IC 封装热量应用报告 (文献号: ZHCA543)。

## ELECTRICAL CHARACTERISTICS

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

ISO7631F, ISO7641F		TEST CONDITIONS	M-Grade			C-Grade			UNIT
PARAMETER			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{OH}$	High-level output voltage	$I_{OH} = -4\text{ mA}$ ; see <a href="#">Figure 1</a>	$V_{CCx}^{(1)} - 0.8$	4.8		$V_{CCx}^{(1)} - 0.8$	4.7		V
		$I_{OH} = -20\text{ }\mu\text{A}$ ; see <a href="#">Figure 1</a>	$V_{CCx}^{(1)} - 0.1$		5	$V_{CCx}^{(1)} - 0.1$		5	
$V_{OL}$	Low-level output voltage	$I_{OL} = 4\text{ mA}$ ; see <a href="#">Figure 1</a>		0.2	0.4		0.3	0.5	V
		$I_{OL} = 20\text{ }\mu\text{A}$ ; see <a href="#">Figure 1</a>		0	0.1		0	0.1	
$V_{I(HYS)}$	Input threshold voltage hysteresis			450			450		mV
$I_{IH}$	High-level input current	$V_{IH} = V_{CC}$ at INx or ENx			10			10	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_{IL} = 0\text{ V}$ at INx or ENx	-10			-10			
CMTI	Common-mode transient immunity	$V_I = V_{CC}$ or $0\text{ V}$ ; see <a href="#">Figure 4</a>	25	75		25	75		kV/ $\mu\text{s}$

(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  $5\text{ V} \pm 10\%$  (over recommended operating conditions unless otherwise noted)

ISO7631F, ISO7641F		TEST CONDITIONS	M-Grade			C-Grade			UNIT
PARAMETER			MIN	TYP	MAX	MIN	TYP	MAX	
$t_{PLH}$ , $t_{PHL}$	Propagation delay time	See <a href="#">Figure 1</a>	3.5	7	10.5	11	17	28	ns
PWD <sup>(1)</sup>	Pulse width distortion $ t_{PHL} - t_{PLH} $				2			3	
$t_{sk(o)}$ <sup>(2)</sup>	Channel-to-channel output skew time	Same-direction Channels			2			3	ns
		Opposite-direction Channels			3			4	
$t_{sk(pp)}$ <sup>(3)</sup>	Part-to-part skew time			4.5			13		
$t_r$	Output signal rise time	See <a href="#">Figure 1</a>		1.6			2.8		ns
$t_f$	Output signal fall time			1			2.9		
$t_{PHZ}$	Disable Propagation Delay, high-to-high impedance output	See <a href="#">Figure 2</a>		5	16		8	20	ns
$t_{PLZ}$	Disable Propagation Delay, low-to-high impedance output			5	16		7	20	
$t_{PZH}$	Enable Propagation Delay, high impedance-to-high output			4	16		11000	22000 <sup>(4)</sup>	
$t_{PZL}$	Enable Propagation Delay, high impedance-to-low output			4	16		8	20	
$t_{fs}$	Fail-safe output delay time from input data or power loss	See <a href="#">Figure 3</a>		9.5			9		$\mu\text{s}$

(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.

(4) The enable signal rate for C-grade devices should be  $\leq 45\text{ Kbps}$ .

**SUPPLY CURRENT**

V<sub>CC1</sub> and V<sub>CC2</sub> at 5 V ± 10% (over recommended operating conditions unless otherwise noted)

ISO7631F			M-Grade			C-Grade			UNIT	
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	MIN	TYP	MAX		
I <sub>CC1</sub>	Disable	EN1 = EN2 = 0 V	2.5		4	1.1		1.9	mA	
I <sub>CC2</sub>			3.7		5.4	1.5		2.6		
I <sub>CC1</sub>	DC to 1 Mbps	DC Signal: V <sub>i</sub> = V <sub>CC</sub> or 0 V AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF	2.6		4.1	1.8		2.7		
I <sub>CC2</sub>			3.8		5.5	2.6		3.9		
I <sub>CC1</sub>	10 Mbps		3.3		4.5	2.7		3.7		
I <sub>CC2</sub>			4.9		6.6	3.9		5.3		
I <sub>CC1</sub>	25 Mbps		4.5		6	4.1		5.4		
I <sub>CC2</sub>			6.8		9	5.9		7.8		
I <sub>CC1</sub>	150 Mbps		15		19.5	Not Applicable				
I <sub>CC2</sub>			22		30					
ISO7641F						C-Grade				
I <sub>CC1</sub>	Disable		EN1 = EN2 = 0 V				1.2		2.1	mA
I <sub>CC2</sub>					1.6		2.6			
I <sub>CC1</sub>	DC to 1 Mbps	DC Signal: V <sub>i</sub> = V <sub>CC</sub> or 0 V, AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF				1.8		2.8		
I <sub>CC2</sub>						3.1		4.2		
I <sub>CC1</sub>	10 Mbps					3		4		
I <sub>CC2</sub>						4.9		6.1		
I <sub>CC1</sub>	25 Mbps					4.8		6		
I <sub>CC2</sub>						7.7		9.5		

## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  at  $5\text{ V} \pm 10\%$  and  $V_{CC2}$  at  $3.3\text{ V} \pm 10\%$  (over recommended operating conditions unless otherwise noted)

ISO7631F, ISO7641F		TEST CONDITIONS		M-Grade			C-Grade			UNIT	
PARAMETER				MIN	TYP	MAX	MIN	TYP	MAX		
$V_{OH}$	High-level output voltage	$I_{OH} = -4\text{ mA}$ ; see Figure 1	OUTx on $V_{CC1}$ (5V) side	$V_{CC1} - 0.8$	4.8		$V_{CC1} - 0.8$	4.7		V	
			OUTx on $V_{CC2}$ (3.3V) side	$V_{CC2} - 0.4$	3		$V_{CC2} - 0.6$	2.9			
		$I_{OH} = -20\text{ }\mu\text{A}$ ; see Figure 1	OUTx on $V_{CC1}$ (5V) side	$V_{CC1} - 0.1$	5		$V_{CC1} - 0.1$	5			
			OUTx on $V_{CC2}$ (3.3V) side	$V_{CC2} - 0.1$	3.3		$V_{CC2} - 0.1$	3.3			
$V_{OL}$	Low-level output voltage	$I_{OL} = 4\text{ mA}$ ; see Figure 1			0.2	0.4		0.3	0.5	V	
		$I_{OL} = 20\text{ }\mu\text{A}$ ; see Figure 1			0	0.1		0	0.1		
$V_{I(HYS)}$	Input threshold voltage hysteresis				430			430		mV	
$I_{IH}$	High-level input current	$V_{IH} = V_{CC}$ at INx or ENx				10				$\mu\text{A}$	
$I_{IL}$	Low-level input current	$V_{IL} = 0\text{ V}$ at INx or ENx			-10			-10			
CMTI	Common-mode transient immunity	$V_I = V_{CC}$ or $0\text{ V}$ ; see Figure 4			25	50		25	50	kV/ $\mu\text{s}$	

## SWITCHING CHARACTERISTICS

 $V_{CC1}$  at  $5\text{ V} \pm 10\%$  and  $V_{CC2}$  at  $3.3\text{ V} \pm 10\%$  (over recommended operating conditions unless otherwise noted)

ISO7631F, ISO7641F		TEST CONDITIONS		M-Grade			C-Grade			UNIT
PARAMETER				MIN	TYP	MAX	MIN	TYP	MAX	
$t_{PLH}, t_{PHL}$	Propagation delay time	See Figure 1		4	8	13	11	18	32	ns
PWD <sup>(1)</sup>	Pulse width distortion $ t_{PHL} - t_{PLH} $					2			3.5	
$t_{sk(o)}$ <sup>(2)</sup>	Channel-to-channel output skew time	Same-direction Channels				2.5			4.5	
		Opposite-direction Channels				3.5			5.5	
$t_{sk(pp)}$ <sup>(3)</sup>	Part-to-part skew time					6			15	
$t_r$	Output signal rise time	See Figure 1				2		3.6		ns
$t_f$	Output signal fall time					1.2		3.3		
$t_{PHZ}$	Disable Propagation Delay, high-to-high impedance output	See Figure 2				6.5	17	9	20	ns
$t_{PLZ}$	Disable Propagation Delay, low-to-high impedance output					6.5	17	8	20	
$t_{PZH}$	Enable Propagation Delay, high impedance-to-high output					5.5	17	11000	22000 <sup>(4)</sup>	
$t_{PZL}$	Enable Propagation Delay, high impedance-to-low output					5.5	17	10	30	
$t_{fs}$	Fail-safe output delay time from input data or power loss	See Figure 3				9.5		8.5		$\mu\text{s}$

(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.

(4) The enable signal rate for C-grade devices should be  $\leq 45\text{ Kbps}$ .

**SUPPLY CURRENT**

V<sub>CC1</sub> at 5 V ± 10% and V<sub>CC2</sub> at 3.3V ± 10% (over recommended operating conditions unless otherwise noted)

ISO7631F			M-Grade			C-Grade			UNIT	
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	MIN	TYP	MAX		
I <sub>CC1</sub>	Disable	EN1 = EN2 = 0 V		2.5	4		1.1	1.9	mA	
I <sub>CC2</sub>				2.7	3.7		0.7	1.3		
I <sub>CC1</sub>	DC to 1 Mbps	DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF		2.6	4.1		1.8	2.7		
I <sub>CC2</sub>				2.8	3.8		1.8	2.6		
I <sub>CC1</sub>	10 Mbps			3.3	4.5		2.7	3.7		
I <sub>CC2</sub>				3.5	4.6		2.6	3.5		
I <sub>CC1</sub>	25 Mbps			4.5	6		4.1	5.4		
I <sub>CC2</sub>				4.7	5.9		3.8	5		
I <sub>CC1</sub>	150 Mbps			15	19.5		Not Applicable			
I <sub>CC2</sub>				14.6	19		Not Applicable			
ISO7641F						C-Grade				
I <sub>CC1</sub>	Disable		EN1 = EN2 = 0 V					1.2	2.1	mA
I <sub>CC2</sub>							0.8	1.3		
I <sub>CC1</sub>	DC to 1 Mbps	DC Signal: V <sub>I</sub> = V <sub>CC</sub> or 0 V, AC Signal: All channels switching with square wave clock input; C <sub>L</sub> = 15 pF					1.8	2.8		
I <sub>CC2</sub>							2	2.9		
I <sub>CC1</sub>	10 Mbps						3	4		
I <sub>CC2</sub>							3.2	4.1		
I <sub>CC1</sub>	25 Mbps						4.8	6		
I <sub>CC2</sub>							5.1	7		



## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  at  $3.3V \pm 10\%$  and  $V_{CC2}$  at  $5V \pm 10\%$  (over recommended operating conditions unless otherwise noted)

ISO7631F, ISO7641F		TEST CONDITIONS	M-Grade			C-Grade			UNIT
PARAMETER			MIN	TYP	MAX	MIN	TYP	MAX	
$V_{OH}$	High-level output voltage	$I_{OH} = -4 \text{ mA}$ ; see Figure 1	OUTx on $V_{CC1}$ (3.3 V) side	$V_{CC1}-0.4$	3		$V_{CC1}-0.6$	2.9	V
			OUTx on $V_{CC2}$ (5 V) side	$V_{CC2}-0.8$	4.8		$V_{CC2}-0.8$	4.7	
		$I_{OH} = -20 \mu\text{A}$ ; see Figure 1	OUTx on $V_{CC1}$ (3.3 V) side	$V_{CC1}-0.1$	3.3		$V_{CC1}-0.1$	3.3	
			OUTx on $V_{CC2}$ (5 V) side	$V_{CC2}-0.1$	5		$V_{CC2}-0.1$	5	
$V_{OL}$	Low-level output voltage	$I_{OL} = 4 \text{ mA}$ ; see Figure 1		0.2	0.4		0.3	0.5	V
		$I_{OL} = 20 \mu\text{A}$ ; see Figure 1		0	0.1		0	0.1	
$V_{I(HYS)}$	Input threshold voltage hysteresis			430			430	mV	
$I_{IH}$	High-level input current	$V_{IH} = V_{CC}$ at INx or ENx			10			10	$\mu\text{A}$
$I_{IL}$	Low-level input current	$V_{IL} = 0 \text{ V}$ at INx or ENx		-10			-10		
CMTI	Common-mode transient immunity	$V_I = V_{CC}$ or $0 \text{ V}$ ; see Figure 4		25	50		25	50	kV/ $\mu\text{s}$

## SWITCHING CHARACTERISTICS

 $V_{CC1}$  at  $3.3 \text{ V} \pm 10\%$  and  $V_{CC2}$  at  $5 \text{ V} \pm 10\%$  (over recommended operating conditions unless otherwise noted)

ISO7631F, ISO7641F		TEST CONDITIONS	M-Grade			C-Grade			UNIT
PARAMETER			MIN	TYP	MAX	MIN	TYP	MAX	
$t_{PLH}, t_{PHL}$	Propagation delay time	See Figure 1	4	7.5	12.5	11	18.5	32	ns
PWD <sup>(1)</sup>	Pulse width distortion $ t_{PHL} - t_{PLH} $				2			2.5	
$t_{sk(o)}$ <sup>(2)</sup>	Channel-to-channel output skew time	Same-direction Channels			2.5			4.5	
		Opposite-direction Channels			3.5			5.5	
$t_{sk(pp)}$ <sup>(3)</sup>	Part-to-part skew time			6			15		
$t_r$	Output signal rise time	See Figure 1		1.7			2.9	ns	
$t_f$	Output signal fall time			1.1			2.9		
$t_{PHZ}$	Disable Propagation Delay, high-to-high impedance output	See Figure 2		5.5	17		8	20	ns
$t_{PLZ}$	Disable Propagation Delay, low-to-high impedance output			5.5	17		7	20	
$t_{PZH}$	Enable Propagation Delay, high impedance-to-high output			4.5	17		11000	22000 <sup>(4)</sup>	
$t_{PZL}$	Enable Propagation Delay, high impedance-to-low output			4.5	17		8	30	
$t_{fs}$	Fail-safe output delay time from input data or power loss	See Figure 3		9.5			7.5	$\mu\text{s}$	

(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.

(4) The enable signal rate for C-grade devices should be  $\leq 45 \text{ Kbps}$ .

**SUPPLY CURRENT**

$V_{CC1}$  at  $3.3V \pm 10\%$  and  $V_{CC2}$  at  $5V \pm 10\%$  (over recommended operating conditions unless otherwise noted)

ISO7631F			M-Grade			C-Grade			UNIT
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	MIN	TYP	MAX	
$I_{CC1}$	Disable	EN1 = EN2 = 0 V			1.8	2.8	0.6	1.1	mA
$I_{CC2}$					3.7	5.4	1.5	2.6	
$I_{CC1}$	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	2.9	1.2	1.8	
$I_{CC2}$					3.8	5.5	2.6	3.9	
$I_{CC1}$	10 Mbps				2.4	3.4	1.8	2.6	
$I_{CC2}$					4.9	6.6	3.9	5.3	
$I_{CC1}$	25 Mbps				3.2	4.2	2.7	3.6	
$I_{CC2}$					6.8	9	5.9	7.8	
$I_{CC1}$	150 Mbps				9.3	12.5	Not Applicable		
$I_{CC2}$					22	30			
ISO7641F						C-Grade			
$I_{CC1}$	Disable		EN1 = EN2 = 0 V					0.7	1.1
$I_{CC2}$						1.6	2.6		
$I_{CC1}$	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	1.9	
$I_{CC2}$							3.1	4.2	
$I_{CC1}$	10 Mbps						2	2.8	
$I_{CC2}$							4.9	6.1	
$I_{CC1}$	25 Mbps						3.1	4	
$I_{CC2}$							7.7	9.5	

## ELECTRICAL CHARACTERISTICS

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

ISO7631F, ISO7641F		TEST CONDITIONS	M-Grade			C-Grade			UNIT
PARAMETER	MIN		TYP	MAX	MIN	TYP	MAX		
$V_{OH}$	High-level output voltage	$I_{OH} = -4$ mA; see <a href="#">Figure 1</a>	$V_{CCx}^{(1)} - 0.4$	3		$V_{CCx}^{(1)} - 0.6$	2.9	V	
		$I_{OH} = -20$ $\mu$ A; see <a href="#">Figure 1</a>	$V_{CCx}^{(1)} - 0.1$	3.3		$V_{CCx}^{(1)} - 0.1$	3.3		
$V_{OL}$	Low-level output voltage	$I_{OL} = 4$ mA; see <a href="#">Figure 1</a>		0.2	0.4		0.3	0.5	V
		$I_{OL} = 20$ $\mu$ A; see <a href="#">Figure 1</a>		0	0.1		0	0.1	
$V_{I(HYS)}$	Input threshold voltage hysteresis			425			425	mV	
$I_{IH}$	High-level input current	$V_{IH} = V_{CC}$ at INx or ENx			10			$\mu$ A	
$I_{IL}$	Low-level input current	$V_{IL} = 0$ V at INx or ENx	-10			-10			
CMTI	Common-mode transient immunity	$V_I = V_{CC}$ or 0 V; see <a href="#">Figure 4</a>	25	50		25	50	kV/ $\mu$ 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)

ISO7631F, ISO7641F		TEST CONDITIONS	M-Grade			C-Grade			UNIT
PARAMETER	MIN		TYP	MAX	MIN	TYP	MAX		
$t_{PLH}$ , $t_{PHL}$	Propagation delay time	See <a href="#">Figure 1</a>	4	8.5	14	12	23	35	ns
PWD <sup>(1)</sup>	Pulse width distortion $ t_{PHL} - t_{PLH} $		2					3	
$t_{sk(o)}$ <sup>(2)</sup>	Channel-to-channel output skew time	Same-direction Channels			3			5	
		Opposite-direction Channels			4			6	
$t_{sk(pp)}$ <sup>(3)</sup>	Part-to-part skew time			6.5			16		
$t_r$	Output signal rise time	See <a href="#">Figure 1</a>		2			3.7	ns	
$t_f$	Output signal fall time			1.3			3.4		
$t_{PHZ}$	Disable Propagation Delay, high-to-high impedance output	See <a href="#">Figure 2</a>		6.5	17		9	20	ns
$t_{PLZ}$	Disable Propagation Delay, low-to-high impedance output			6.5	17		8	20	
$t_{PZH}$	Enable Propagation Delay, high impedance-to-high output			5.5	17		11000	22000 <sup>(4)</sup>	
$t_{PZL}$	Enable Propagation Delay, high impedance-to-low output			5.5	17		10	30	
$t_{fs}$	Fail-safe output delay time from input data or power loss	See <a href="#">Figure 3</a>		9.2			7.5	$\mu$ s	

(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.

(4) The enable signal rate for C-grade devices should be  $\leq$  45 Kbps.

**SUPPLY CURRENT**

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

ISO7631F			M-Grade			C-Grade			UNIT	
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	MIN	TYP	MAX		
$I_{CC1}$	Disable	EN1 = EN2 = 0 V	1.8 2.8			0.6 1.1			mA	
$I_{CC2}$			2.7 3.7			0.7 1.3				
$I_{CC1}$	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	1.9 2.9			1.2 1.8				
$I_{CC2}$			2.8 3.8			1.8 2.6				
$I_{CC1}$	10 Mbps		2.4 3.4			1.8 2.6				
$I_{CC2}$			3.5 4.6			2.6 3.5				
$I_{CC1}$	25 Mbps		3.2 4.2			2.7 3.6				
$I_{CC2}$			4.7 5.9			3.8 5				
$I_{CC1}$	150 Mbps		9.3 12.5			Not Applicable				
$I_{CC2}$			14.6 19			Not Applicable				
ISO7641F						C-Grade			UNIT	
$I_{CC1}$	Disable		EN1 = EN2 = 0 V				0.7 1.1			
$I_{CC2}$					0.8 1.3					
$I_{CC1}$	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 1.9				
$I_{CC2}$						2 2.9				
$I_{CC1}$	10 Mbps					2 2.8				
$I_{CC2}$						3.2 4.1				
$I_{CC1}$	25 Mbps					3.1 4				
$I_{CC2}$						5.1 7				

## ELECTRICAL CHARACTERISTICS

 $V_{CC1}$  and  $V_{CC2}$  at 2.7 V<sup>(1)</sup> (over recommended operating conditions unless otherwise noted)

ISO7631F		TEST CONDITIONS	M-Grade			UNIT
PARAMETER			MIN	TYP	MAX	
$V_{OH}$	High-level output voltage	$I_{OH} = -4$ mA; see <a href="#">Figure 1</a>	$V_{CC}^{(2)} - 0.5$	2.4		V
		$I_{OH} = -20$ $\mu$ A; see <a href="#">Figure 1</a>	$V_{CC}^{(2)} - 0.1$	2.7		
$V_{OL}$	Low-level output voltage	$I_{OL} = 4$ mA; see <a href="#">Figure 1</a>		0.2	0.4	V
		$I_{OL} = 20$ $\mu$ A; see <a href="#">Figure 1</a>		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	$\mu$ 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 <a href="#">Figure 4</a>	25	50		kV/ $\mu$ s

(1) Only M-Grade devices are recommended for operation down to 2.7 V supplies. For 2.7 V-operation, max data rate is 100 Mbps.

(2)  $V_{CCx}$  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)

ISO7631F		TEST CONDITIONS	M-Grade			UNIT
PARAMETER			MIN	TYP	MAX	
$t_{PLH}, t_{PHL}$	Propagation delay time	See <a href="#">Figure 1</a>	5	8	16	ns
PWD <sup>(1)</sup>	Pulse width distortion $ t_{PHL} - t_{PLH} $				2.5	
$t_{sk(o)}$ <sup>(2)</sup>	Channel-to-channel output skew time	Same-direction Channels			4	ns
		Opposite-direction Channels			5	
$t_{sk(pp)}$ <sup>(3)</sup>	Part-to-part skew time			8		
$t_r$	Output signal rise time	See <a href="#">Figure 1</a>		2.3		ns
$t_f$	Output signal fall time			1.8		
$t_{PHZ}$	Disable Propagation Delay, high-to-high impedance output	See <a href="#">Figure 2</a>		8	18	ns
$t_{PLZ}$	Disable Propagation Delay, low-to-high impedance output			8	18	
$t_{PZH}$	Enable Propagation Delay, high impedance-to-high output			7	18	
$t_{PZL}$	Enable Propagation Delay, high impedance-to-low output			7	18	
$t_{fs}$	Fail-safe output delay time from input data or power loss	See <a href="#">Figure 3</a>		8.5		$\mu$ s

(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.

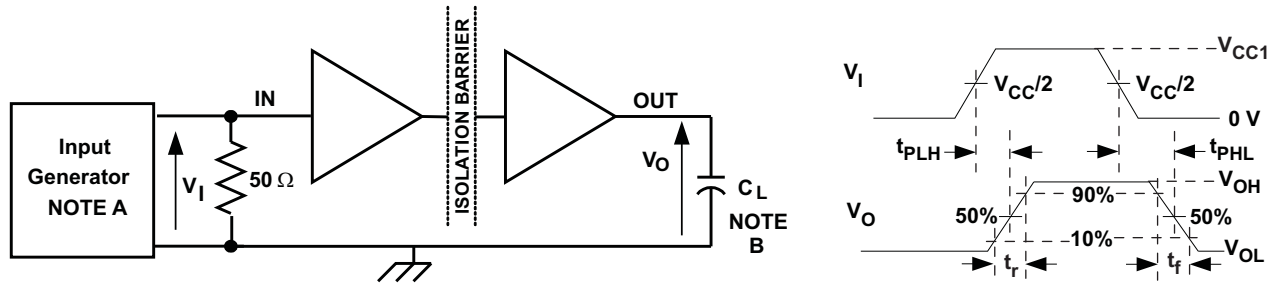
(3)  $t_{sk(pp)}$  is the magnitude of the difference in propagation delay times between any terminals of different devices switching in the same direction while operating at identical supply voltages, temperature, input signals and loads.

### SUPPLY CURRENT

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

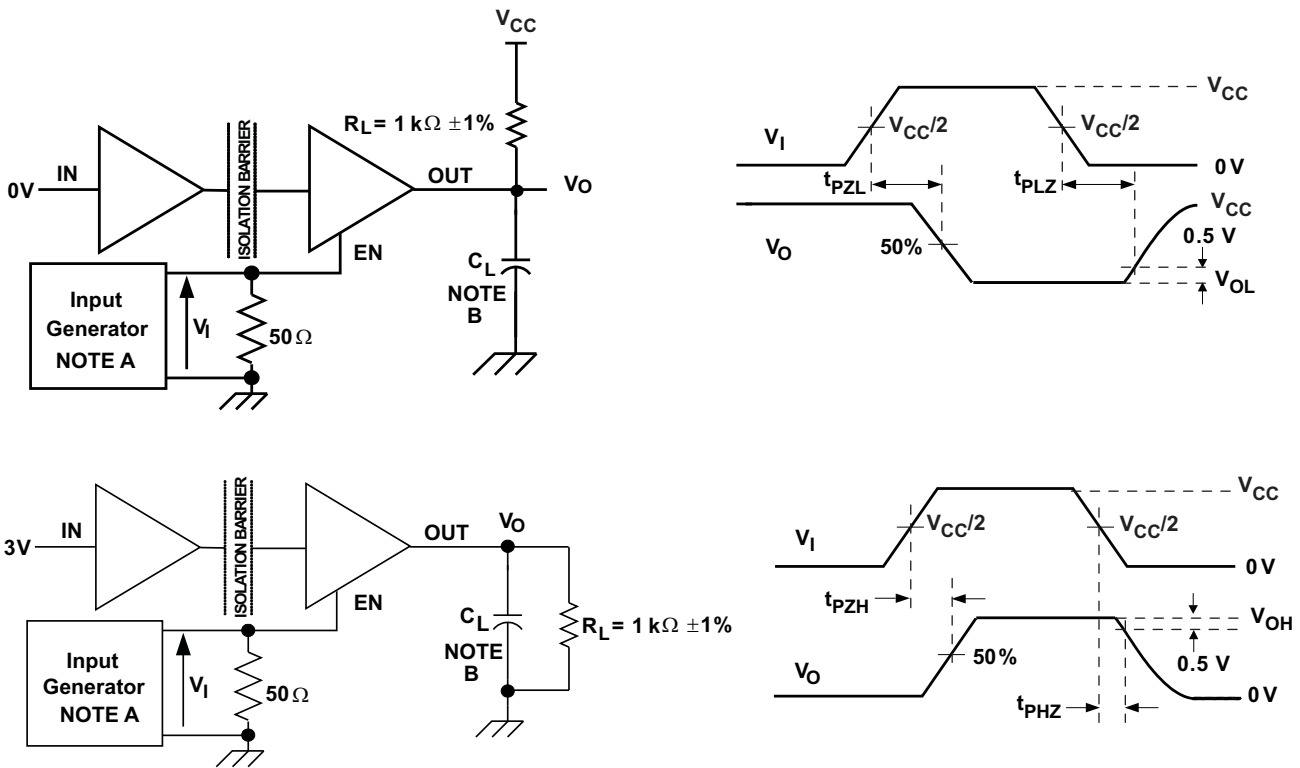
ISO7631F			M-Grade			UNIT
PARAMETER	TEST CONDITIONS		MIN	TYP	MAX	
$I_{CC1}$	Disable	EN1 = EN2 = 0 V	1.5		2.4	mA
$I_{CC2}$			2.2		3.2	
$I_{CC1}$	DC to 1 Mbps	DC Signal: $V_I = V_{CC}$ or 0 V AC Signal: All channels switching with square wave clock input; $C_L = 15$ pF	1.6		2.5	
$I_{CC2}$			2.3		3.2	
$I_{CC1}$	10 Mbps		2		2.9	
$I_{CC2}$			3		3.9	
$I_{CC1}$	25 Mbps		2.7		3.7	
$I_{CC2}$			3.9		4.9	
$I_{CC1}$	100 Mbps		5.7		6.8	
$I_{CC2}$			8.6		12	

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, 50  $\Omega$  resistor is required to terminate Input Generator signal. It is not needed in actual application.
- B.  $C_L = 15$  pF and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

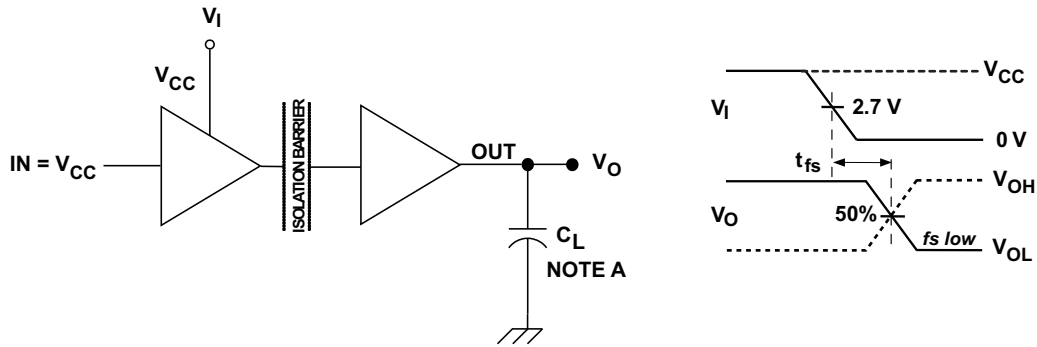
Figure 1. Switching Characteristics Test Circuit and Voltage Waveforms



- A. The input pulse is supplied by a generator having the following characteristics: PRR ≤ 10 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  $\pm 20\%$ .

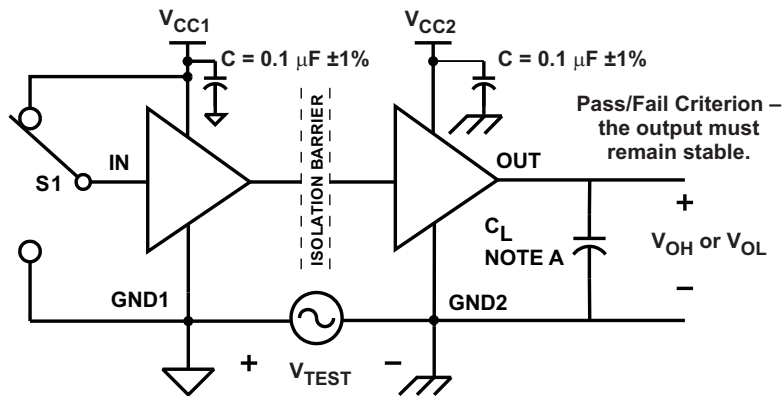
Figure 2. Enable/Disable Propagation Delay Time Test Circuit and Waveform

**PARAMETER MEASUREMENT INFORMATION (continued)**



A.  $C_L = 15 \text{ pF}$  and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

**Figure 3. Failsafe Delay Time Test Circuit and Voltage Waveforms**



A.  $C_L = 15 \text{ pF}$  and includes instrumentation and fixture capacitance within  $\pm 20\%$ .

**Figure 4. Common-Mode Transient Immunity Test Circuit**



**DEVICE INFORMATION**
**IEC INSULATION AND SAFETY-RELATED SPECIFICATIONS FOR DW-16 PACKAGE**

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
L(I01)	Minimum air gap (Clearance)	Shortest terminal to terminal distance through air	8.3			mm
L(I02) <sup>(1)</sup>	Minimum external tracking (Creepage)	Shortest terminal to terminal distance across the package surface	8.1			mm
CTI	Tracking resistance (Comparative Tracking Index)	DIN IEC 60112 / VDE 0303 Part 1	≥400			V
	Minimum Internal Gap (Internal Clearance)	Distance through the insulation	0.014			mm
R <sub>IO</sub> <sup>(2)</sup>	Isolation resistance, Input to Output	V <sub>IO</sub> = 500 V, T <sub>A</sub> < 100°C		>10 <sup>12</sup>		Ω
		V <sub>IO</sub> = 500 V, 100°C ≤ T <sub>A</sub> ≤ max		>10 <sup>11</sup>		
C <sub>IO</sub> <sup>(2)</sup>	Barrier capacitance, Input to Output	V <sub>I</sub> = 0.4 sin (2πft), f = 1MHz		2		pF
C <sub>I</sub> <sup>(3)</sup>	Input capacitance	V <sub>I</sub> = V <sub>CC</sub> /2 + 0.4 sin (2πft), f = 1MHz, V <sub>CC</sub> = 5 V		2		pF

- (1) Per JEDEC package dimensions.  
(2) All pins on each side of the barrier tied together creating a two-terminal device.  
(3) 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 according to the measurement techniques shown in the Isolation Glossary. Techniques such as inserting grooves and/or ribs on a printed circuit board are used to help increase these specifications.

**Table 2. DIN EN 60747-5-2 (VDE 0884 TEIL 2) INSULATION CHARACTERISTICS<sup>(1)</sup> over recommended operating conditions (unless otherwise noted)**

PARAMETER		TEST CONDITIONS	SPECIFICATION	UNIT
V <sub>IORM</sub>	Maximum working insulation voltage		1414	V <sub>PEAK</sub>
V <sub>PR</sub>	Input-to-output test voltage	After Input/Output safety test subgroup 2/3, V <sub>PR</sub> = V <sub>IORM</sub> × 1.2, t = 10 s, Partial discharge < 5 pC	1697	V <sub>PEAK</sub>
		Method a, After environmental tests subgroup 1, V <sub>PR</sub> = V <sub>IORM</sub> × 1.6, t = 10 s, Partial Discharge < 5 pC	2262	
		Method b1, 100% Production test V <sub>PR</sub> = V <sub>IORM</sub> × 1.875, t = 1 s Partial discharge < 5 pC	2652	
V <sub>IOTM</sub>	Maximum transient overvoltage	V <sub>TEST</sub> = V <sub>IOTM</sub> t = 60 sec (Qualification) t = 1 sec (100% Production)	4242	V <sub>PEAK</sub>
R <sub>S</sub>	Insulation resistance	V <sub>IO</sub> = 500 V at T <sub>S</sub>	>10 <sup>9</sup>	Ω
	Pollution degree		2	

- (1) Climatic Classification 40/125/21

**Table 3. IEC 60664-1 RATINGS TABLE**

PARAMETER	TEST CONDITIONS	SPECIFICATION
Basic Isolation Group	Material Group	II
Installation classification	Rated mains voltage $\leq 300 V_{RMS}$	I–IV
	Rated mains voltage $\leq 600 V_{RMS}$	I–III
	Rated mains voltage $\leq 1000 V_{RMS}$	I–II

**REGULATORY INFORMATION**

VDE	TUV	CSA	UL
Certified according to DIN EN 60747-5-2	Certified according to EN/UL/CSA 60950-1 and 61010-1	Approved under CSA Component Acceptance Notice #5A	Recognized under 1577 Component Recognition Program
Basic Insulation Maximum Transient Overvoltage, 4242 $V_{PK}$ Maximum Working Voltage, 1414 $V_{PK}$	3000 $V_{RMS}$ Reinforced Insulation, 400 $V_{RMS}$ maximum working voltage 3000 $V_{RMS}$ Basic Insulation, 600 $V_{RMS}$ maximum working voltage	4242 $V_{PK}$ Insulation	Single Protection, 2500 $V_{RMS}$ <sup>(1)</sup>
File Number: 40016131	Certificate Number: U8V 13 09 77311 010	File Number: 220991	File Number: E181974

(1) Production tested  $\geq 3000 V_{RMS}$  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			UNIT	
	MIN	TYP	MAX		
$I_S$ Safety input, output, or supply current	DW-16	$\theta_{JA} = 72 \text{ }^\circ\text{C/W}, V_I = 5.5\text{V}, T_J = 150^\circ\text{C}, T_A = 25^\circ\text{C}$		316	
		$\theta_{JA} = 72 \text{ }^\circ\text{C/W}, V_I = 3.6\text{V}, T_J = 150^\circ\text{C}, T_A = 25^\circ\text{C}$		482	
		$\theta_{JA} = 72 \text{ }^\circ\text{C/W}, V_I = 2.7\text{V}, T_J = 150^\circ\text{C}, T_A = 25^\circ\text{C}$		643	
$T_S$ Maximum case temperature				150	$^\circ\text{C}$

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.

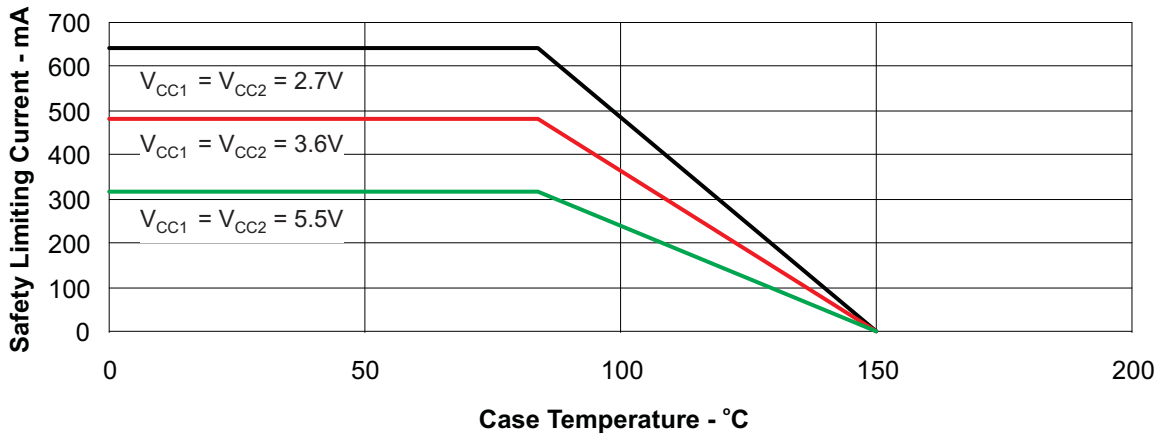


Figure 5. DW-16  $\theta_{JC}$  Thermal Derating Curve per IEC 60747-5-2

APPLICATION INFORMATION

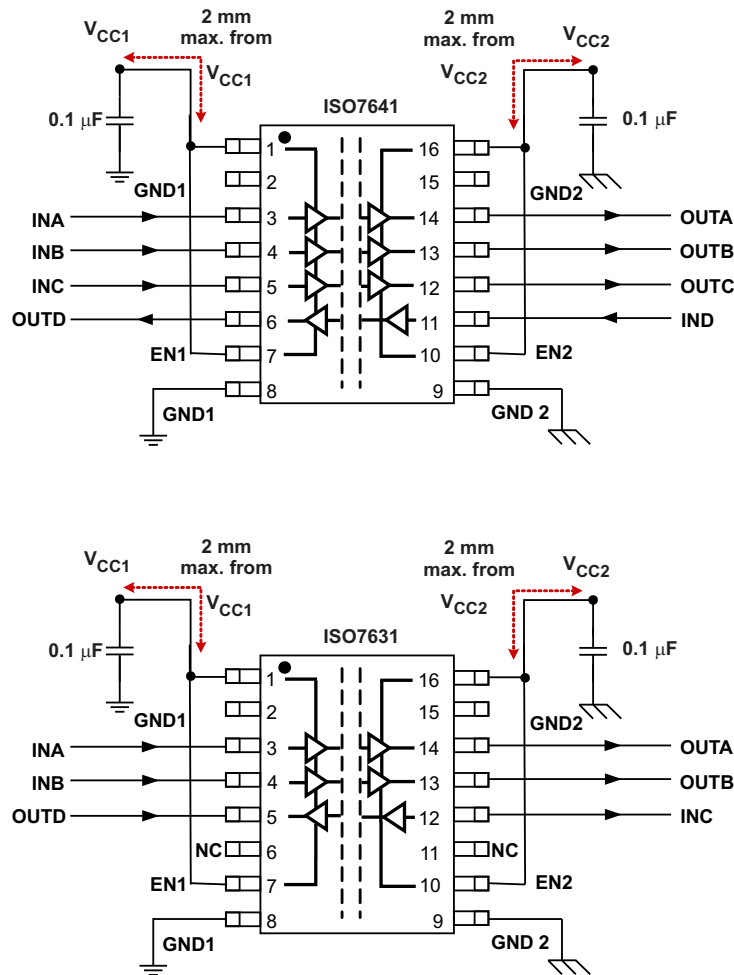


Figure 6. Typical ISO7641 and ISO7631 Application Circuit

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

**TYPICAL SUPPLY CURRENT EQUATIONS**

(Calculated based on room temperature and typical Silicon process)

**ISO7631FM:**

At  $V_{CC1} = V_{CC2} = 3.3V$   
 $I_{CC1} = 1.8072 + 0.0244 \times f + 0.0016 \times f \times C_L$   
 $I_{CC2} = 2.4625 + 0.0252 \times f + 0.0033 \times f \times C_L$   
 At  $V_{CC1} = V_{CC2} = 5V$   
 $I_{CC1} = 2.3183 + 0.04 \times f + 0.0025 \times f \times C_L$   
 $I_{CC2} = 3.2582 + 0.0403 \times f + 0.0049 \times f \times C_L$

**ISO7631FC:**

At  $V_{CC1} = V_{CC2} = 3.3V$   
 $I_{CC1} = 1.1762 + 0.0325 \times f + 0.0017 \times f \times C_L$   
 $I_{CC2} = 1.5285 + 0.0299 \times f + 0.0033 \times f \times C_L$   
 At  $V_{CC1} = V_{CC2} = 5V$   
 $I_{CC1} = 1.6001 + 0.0528 \times f + 0.0025 \times f \times C_L$   
 $I_{CC2} = 2.2032 + 0.0475 \times f + 0.005 \times f \times C_L$

**ISO7641FC:**

At  $V_{CC1} = V_{CC2} = 3.3V$   
 $I_{CC1} = 1.2162 + 0.0462 \times f + 0.0017 \times f \times C_L$   
 $I_{CC2} = 1.8054 + 0.0411 \times f + 0.005 \times f \times C_L$   
 At  $V_{CC1} = V_{CC2} = 5V$   
 $I_{CC1} = 1.6583 + 0.0757 \times f + 0.0025 \times f \times C_L$   
 $I_{CC2} = 2.5008 + 0.0655 \times f + 0.0076 \times f \times C_L$

$I_{CC1}$  and  $I_{CC2}$  are typical supply currents measured in mA;  $f$  is data rate measured in Mbps;  $C_L$  is the capacitive load on each channel measured in pF.

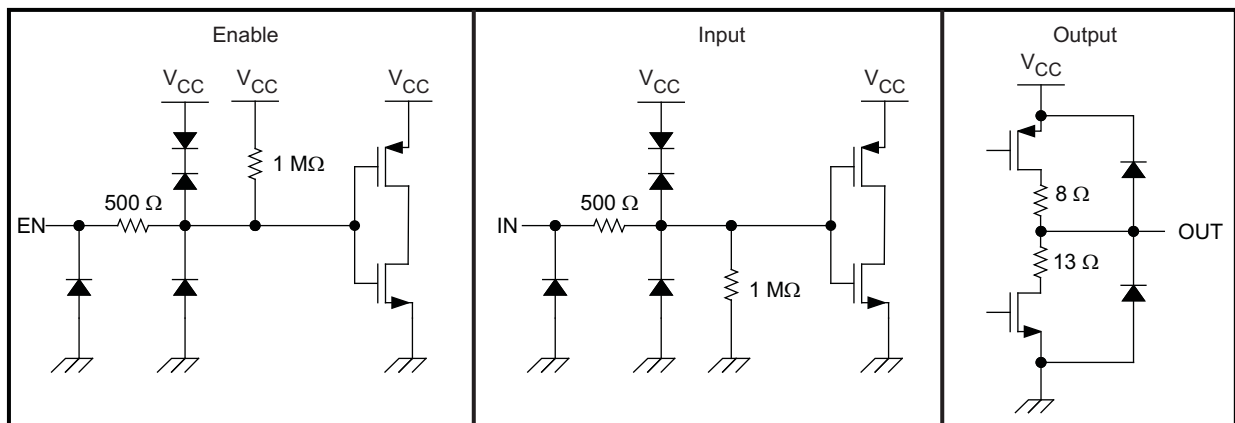


Figure 7. Device I/O Schematics

TYPICAL CHARACTERISTICS

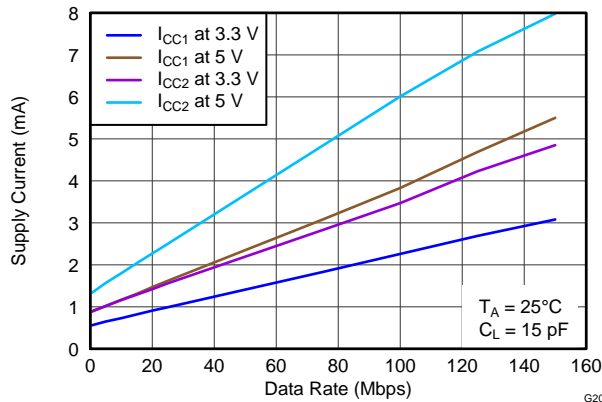


Figure 8. ISO7631FM Supply Current Per Channel vs Data Rate

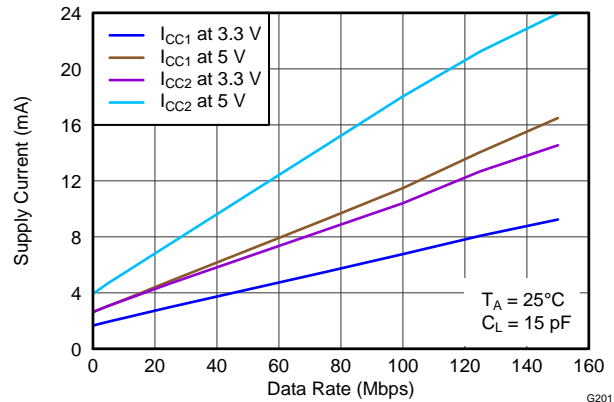


Figure 9. ISO7631FM Supply Current For All Channels vs Data Rate

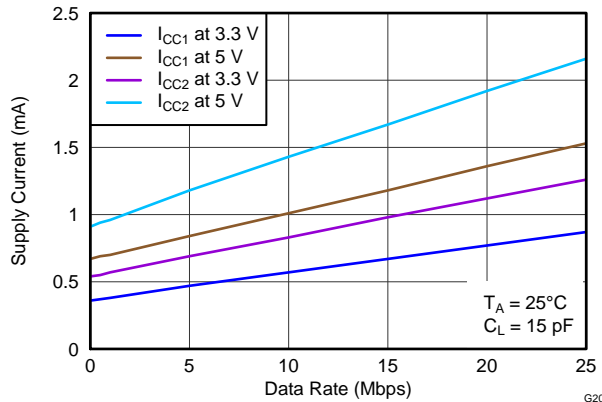


Figure 10. ISO7631FC Supply Current Per Channel vs Data Rate

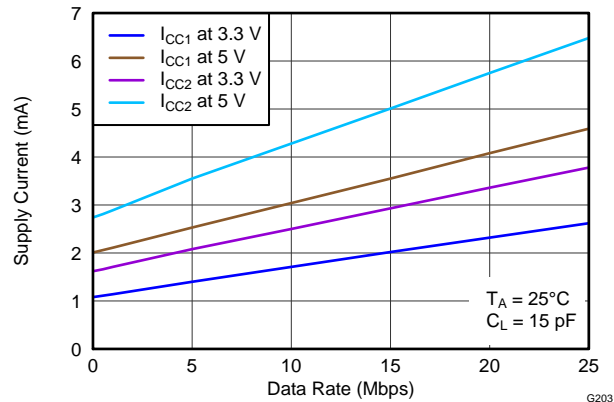


Figure 11. ISO7631FC Supply Current For All Channels vs Data Rate

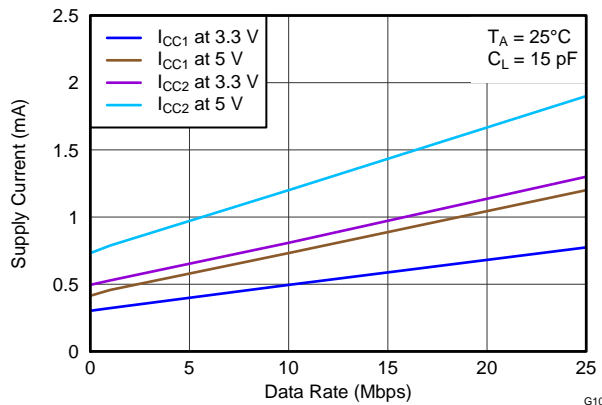


Figure 12. ISO7641FC Supply Current Per Channel vs Data Rate

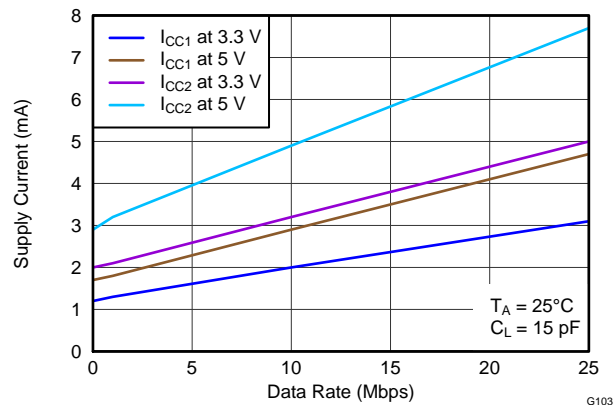


Figure 13. ISO7641FC Supply Current For All Channels vs Data Rate

TYPICAL CHARACTERISTICS (continued)

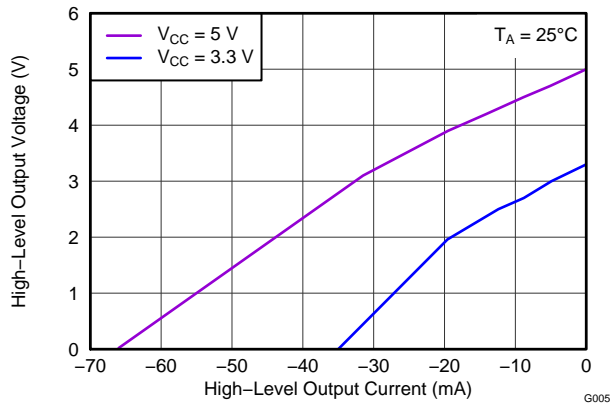


Figure 14. M-Grade High-Level Output Voltage vs High-Level Output Current

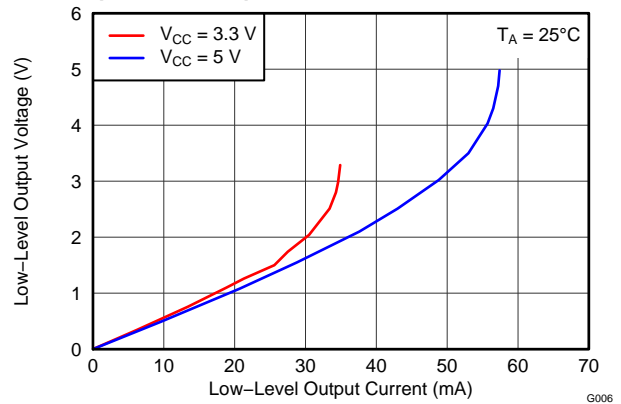


Figure 15. M-Grade Low-Level Output Voltage vs Low-Level Output Current

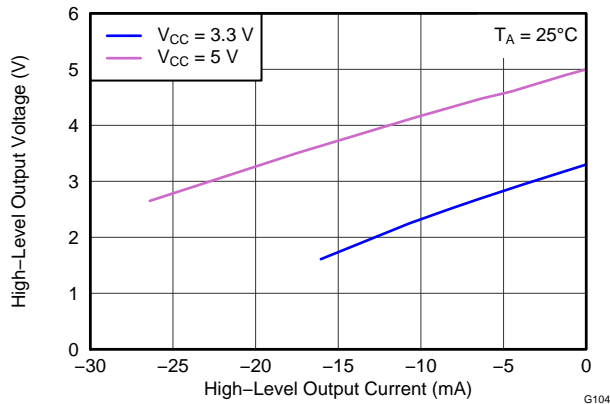


Figure 16. C-Grade High-Level Output Voltage vs High-Level Output Current

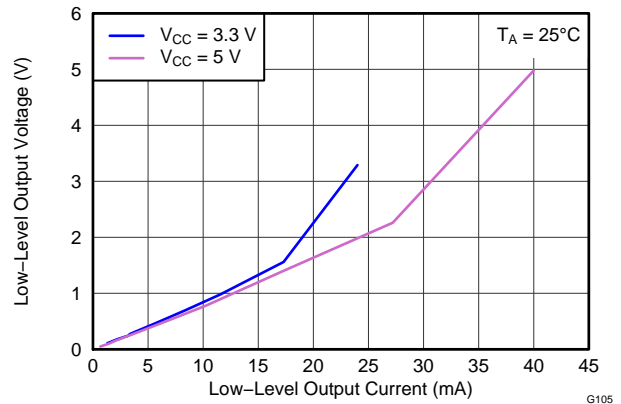


Figure 17. C-Grade Low-Level Output Voltage vs Low-Level Output Current

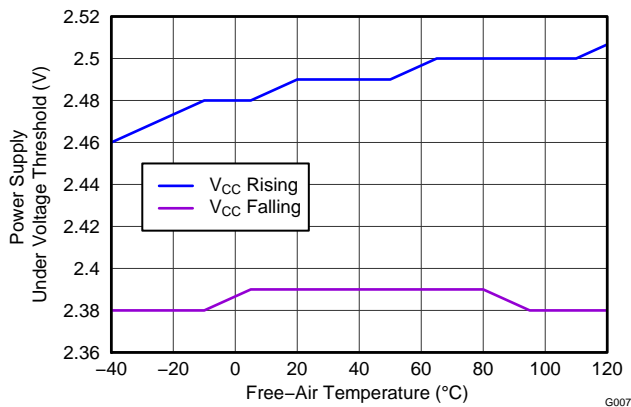


Figure 18. VCC Undervoltage Threshold vs Free Air Temperature

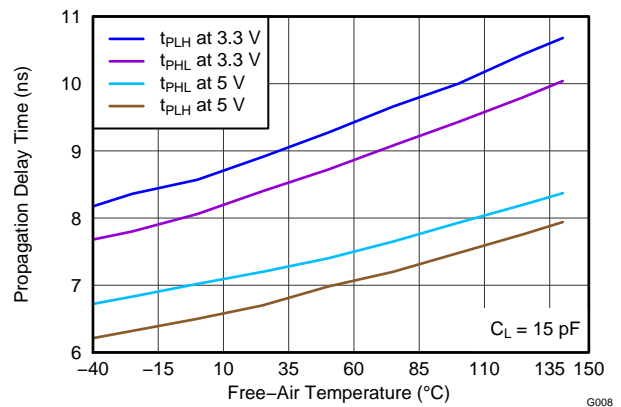


Figure 19. M-Grade Propagation Delay Time vs Free Air Temperature

TYPICAL CHARACTERISTICS (continued)

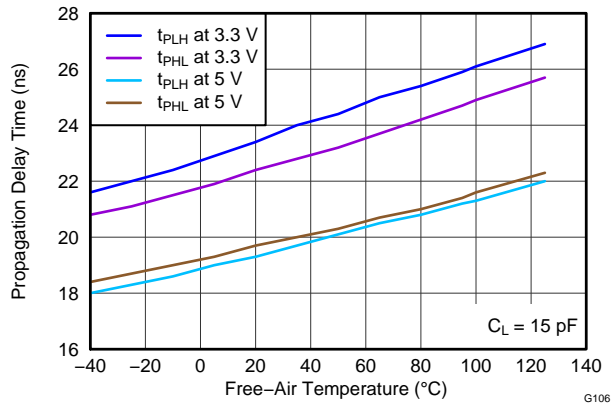


Figure 20. C-Grade Propagation Delay Time vs Free Air Temperature

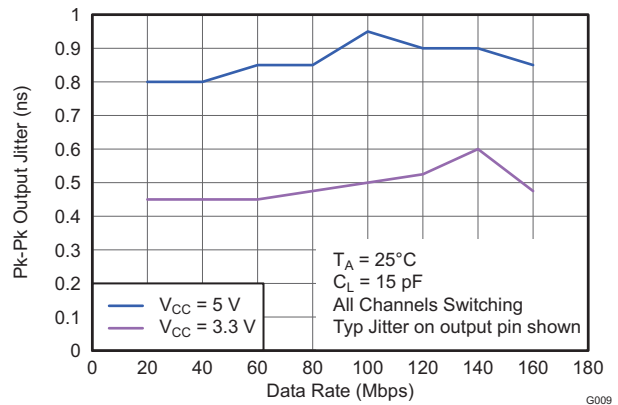


Figure 21. M-Grade Output Jitter vs Data Rate

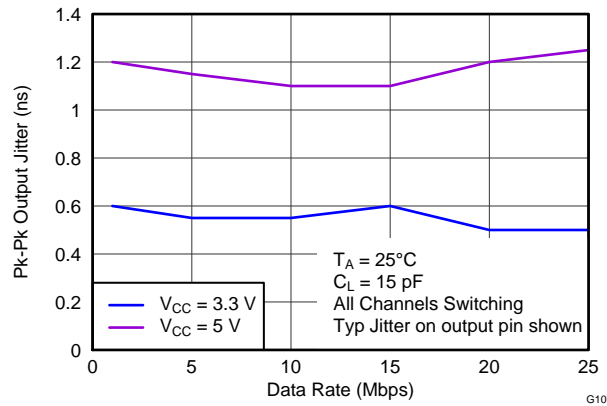


Figure 22. C-Grade Output Jitter vs Data Rate

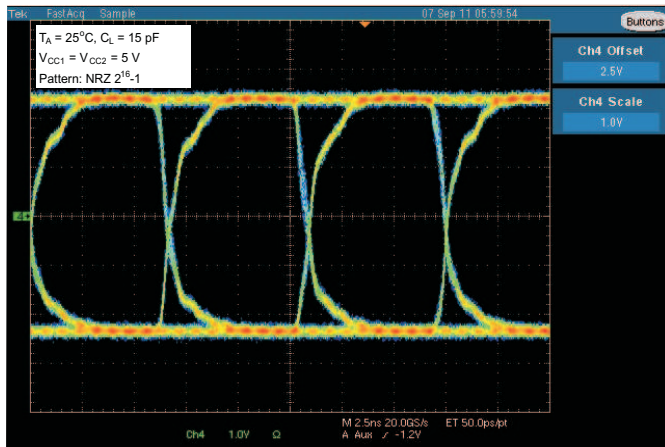


Figure 23. M-Grade Typical Eye Diagram at 150 Mbps, 5 V Operation

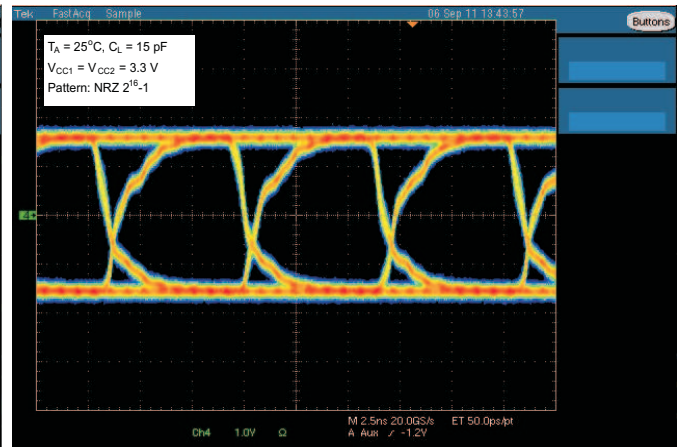


Figure 24. M-Grade Typical Eye Diagram at 150 Mbps, 3.3 V Operation

**TYPICAL CHARACTERISTICS (continued)**

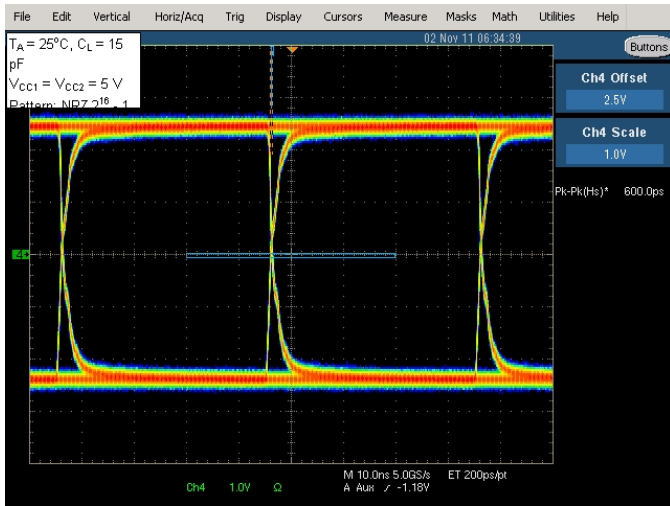


Figure 25. C-Grade Typical Eye Diagram at 25 Mbps, 5 V Operation

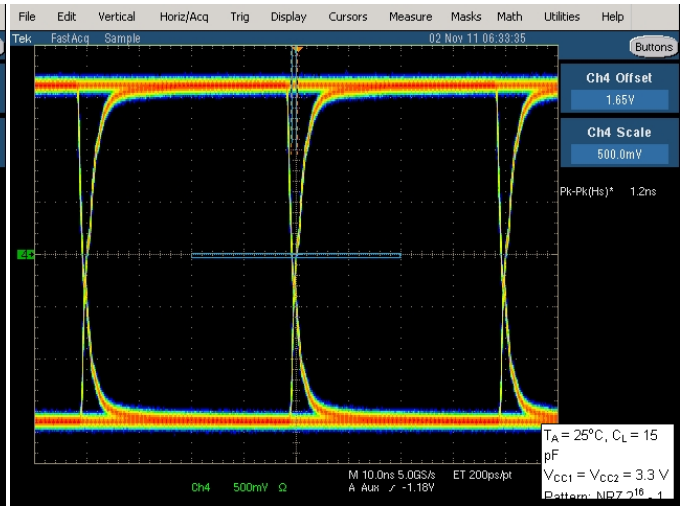


Figure 26. C-Grade Typical Eye Diagram at 25 Mbps, 3.3 V Operation



## REVISION HISTORY

<b>Changes from Original (September 2012) to Revision A</b>	<b>Page</b>
• 将说明文本从：“输入噪声脉冲持续时间少于 10ns 的应用。。。。。”改为：“输入噪声脉冲持续时间少于 6ns 的应用。。。。。” .....	1
• Changed Input PU in the Function table From: Z To: 'Undetermined' .....	2
• Added note "Product Preview" to ISO7640FC in the Available Options table .....	3

<b>Changes from Revision A (September 2012) to Revision B</b>	<b>Page</b>
• 将安全特性从：针对 DIN EN 60747-5-2 ( VDE 0884 修订版本 2 ) 标准的 4000 V <sub>PK</sub> VDE 额定值改为：针对 DIN EN 60747-5-2 ( VDE 0884 修订版本 2 ) 标准的 4242 V <sub>PK</sub> VDE 额定值 .....	1
• Changed the V <sub>IOTM</sub> SPECIFICATION From: 4000 V <sub>PEAK</sub> to 4242 V <sub>PEAK</sub> .....	17
• Changed the REGULATORY INFORMATION table: 4242 V <sub>PK</sub> To: 4000 V <sub>PK</sub> .....	18

<b>Changes from Revision B (April 2013) to Revision C</b>	<b>Page</b>
• 已从页面顶部删除器件图 .....	1
• 已删除器件编号 ISO7640FC .....	1
• 已删除特性 ISO7640FC : 10Mbps 时为 1.1mA .....	1
• 已添加安全特性：针对 EN/UL/CSA 60950-1 和 EN/UL/CSA 61010-1 ( 已获批准 ) 符合 TUV 标准的 3000 V <sub>RMS</sub> 增强隔离 .....	1
• 已更改说明 .....	1
• 已删除 ISO7640 引脚分配图 .....	1
• Deleted ISO7640FC from the Available Options table .....	3
• Changed The ISO7631FC Rated Isolation values in the Available Options table .....	3
• Added the TUV column to the REGULATORY INFORMATION table .....	18
• Deleted the ISO7640 circuit from the APPLICATION INFORMATION section .....	19
• Deleted ISO7640FC from the TYPICAL SUPPLY CURRENT EQUATIONS section .....	20
• Deleted Graph ISO7640FC Supply Current Per Channel vs Data Rate .....	21
• Deleted Graph ISO7640FC Supply Current For All Channels vs Data Rate .....	21

<b>Changes from Revision C (August 2013) to Revision D</b>	<b>Page</b>
• Changed the REGULATORY INFORMATION table, TUV column From: Certificate Number: U8V 13 07 77311 009 To: Certificate Number: U8V 13 09 77311 010 .....	18

**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)
<a href="#">ISO7631FCDW</a>	Active	Production	SOIC (DW)   16	40   TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FC
ISO7631FCDW.A	Active	Production	SOIC (DW)   16	40   TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FC
ISO7631FCDW.B	Active	Production	SOIC (DW)   16	40   TUBE	-	Call TI	Call TI	-40 to 125	
<a href="#">ISO7631FCDWR</a>	Active	Production	SOIC (DW)   16	2000   LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FC
ISO7631FCDWR.A	Active	Production	SOIC (DW)   16	2000   LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FC
ISO7631FCDWR.B	Active	Production	SOIC (DW)   16	2000   LARGE T&R	-	Call TI	Call TI	-40 to 125	
<a href="#">ISO7631FMDW</a>	Active	Production	SOIC (DW)   16	40   TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FM
ISO7631FMDW.A	Active	Production	SOIC (DW)   16	40   TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FM
ISO7631FMDW.B	Active	Production	SOIC (DW)   16	40   TUBE	-	Call TI	Call TI	-40 to 125	
<a href="#">ISO7631FMDWR</a>	Active	Production	SOIC (DW)   16	2000   LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FM
ISO7631FMDWR.A	Active	Production	SOIC (DW)   16	2000   LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7631FM
ISO7631FMDWR.B	Active	Production	SOIC (DW)   16	2000   LARGE T&R	-	Call TI	Call TI	-40 to 125	
<a href="#">ISO7641FCDW</a>	Active	Production	SOIC (DW)   16	40   TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7641FC
ISO7641FCDW.A	Active	Production	SOIC (DW)   16	40   TUBE	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7641FC
ISO7641FCDW.B	Active	Production	SOIC (DW)   16	40   TUBE	-	Call TI	Call TI	-40 to 125	
<a href="#">ISO7641FCDWR</a>	Active	Production	SOIC (DW)   16	2000   LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7641FC
ISO7641FCDWR.A	Active	Production	SOIC (DW)   16	2000   LARGE T&R	Yes	NIPDAU	Level-3-260C-168 HR	-40 to 125	ISO7641FC
ISO7641FCDWR.B	Active	Production	SOIC (DW)   16	2000   LARGE T&R	-	Call TI	Call TI	-40 to 125	

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

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

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

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

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

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

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

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**TAPE AND REEL INFORMATION**

**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
ISO7631FCDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7631FMDWR	SOIC	DW	16	2000	330.0	16.4	10.75	10.7	2.7	12.0	16.0	Q1
ISO7641FCDWR	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)
ISO7631FCDWR	SOIC	DW	16	2000	350.0	350.0	43.0
ISO7631FMDWR	SOIC	DW	16	2000	350.0	350.0	43.0
ISO7641FCDWR	SOIC	DW	16	2000	350.0	350.0	43.0

**TUBE**


\*All dimensions are nominal

Device	Package Name	Package Type	Pins	SPQ	L (mm)	W (mm)	T (μm)	B (mm)
ISO7631FCDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7631FCDW.A	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7631FMDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7631FMDW.A	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7641FCDW	DW	SOIC	16	40	506.98	12.7	4826	6.6
ISO7641FCDW.A	DW	SOIC	16	40	506.98	12.7	4826	6.6

## GENERIC PACKAGE VIEW

**DW 16**

**SOIC - 2.65 mm max height**

7.5 x 10.3, 1.27 mm pitch

SMALL OUTLINE INTEGRATED CIRCUIT

This image is a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.



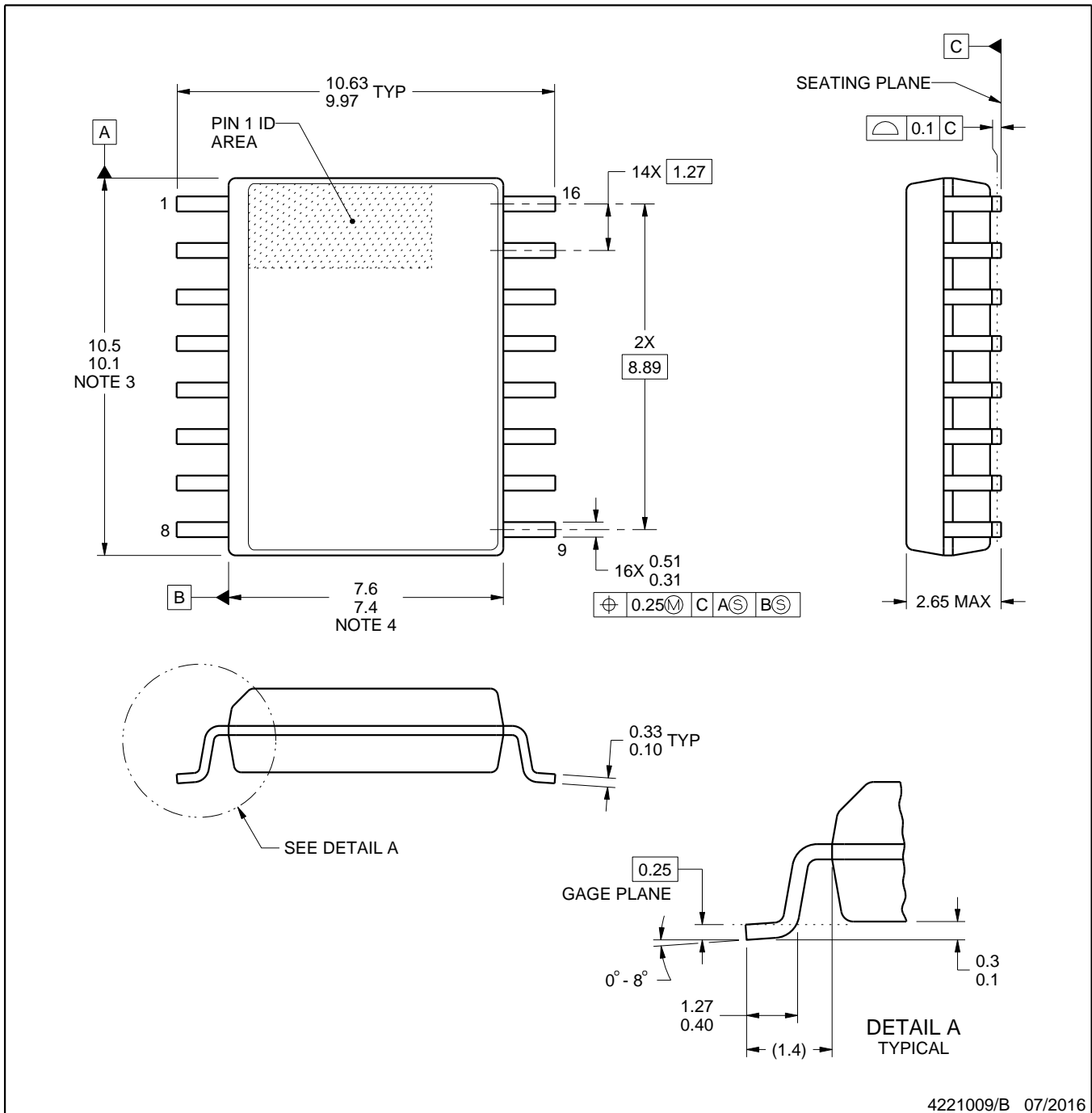
4224780/A



# DW0016B

# PACKAGE OUTLINE SOIC - 2.65 mm max height

SOIC



4221009/B 07/2016

### NOTES:

1. All linear dimensions are in millimeters. Dimensions in parenthesis are for reference only. 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 0.15 mm, per side.
4. This dimension does not include interlead flash. Interlead flash shall not exceed 0.25 mm, per side.
5. Reference JEDEC registration MS-013.

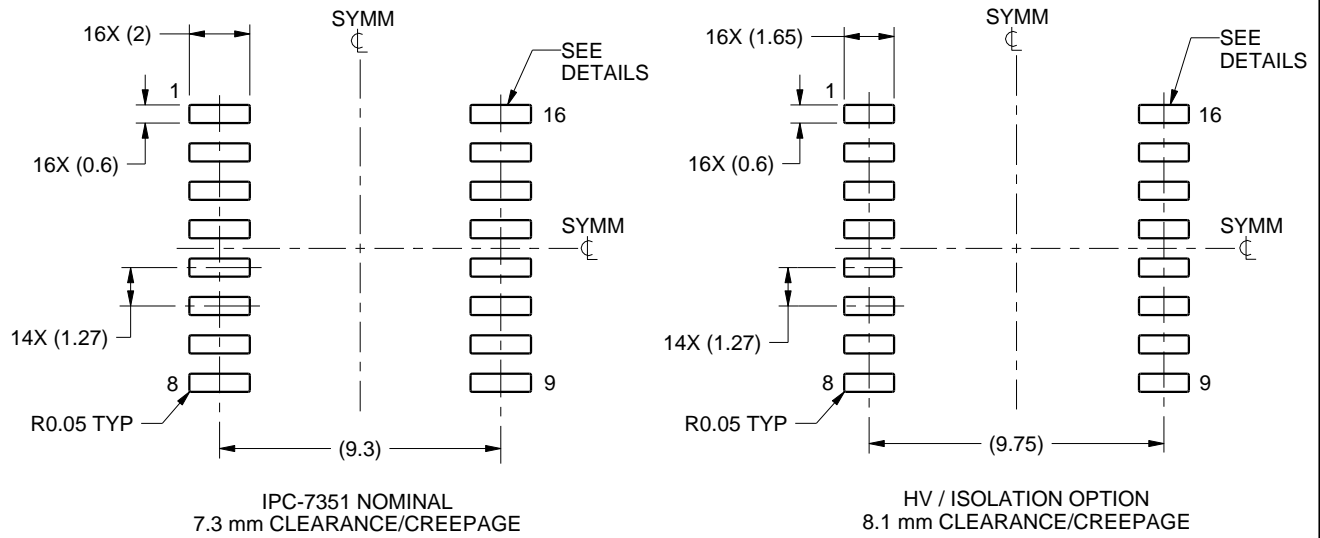


# EXAMPLE BOARD LAYOUT

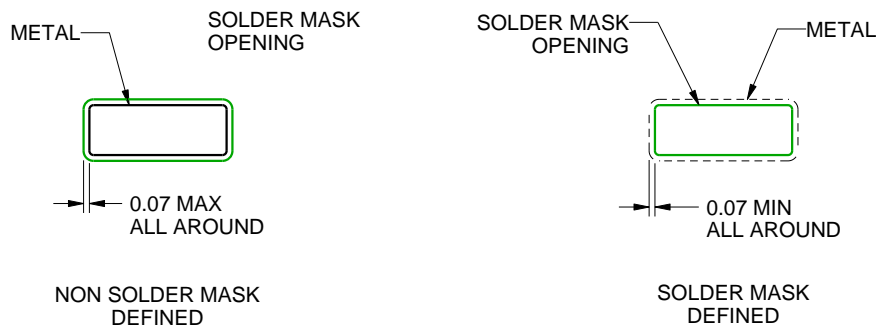
DW0016B

SOIC - 2.65 mm max height

SOIC



LAND PATTERN EXAMPLE  
SCALE:4X



SOLDER MASK DETAILS

4221009/B 07/2016

NOTES: (continued)

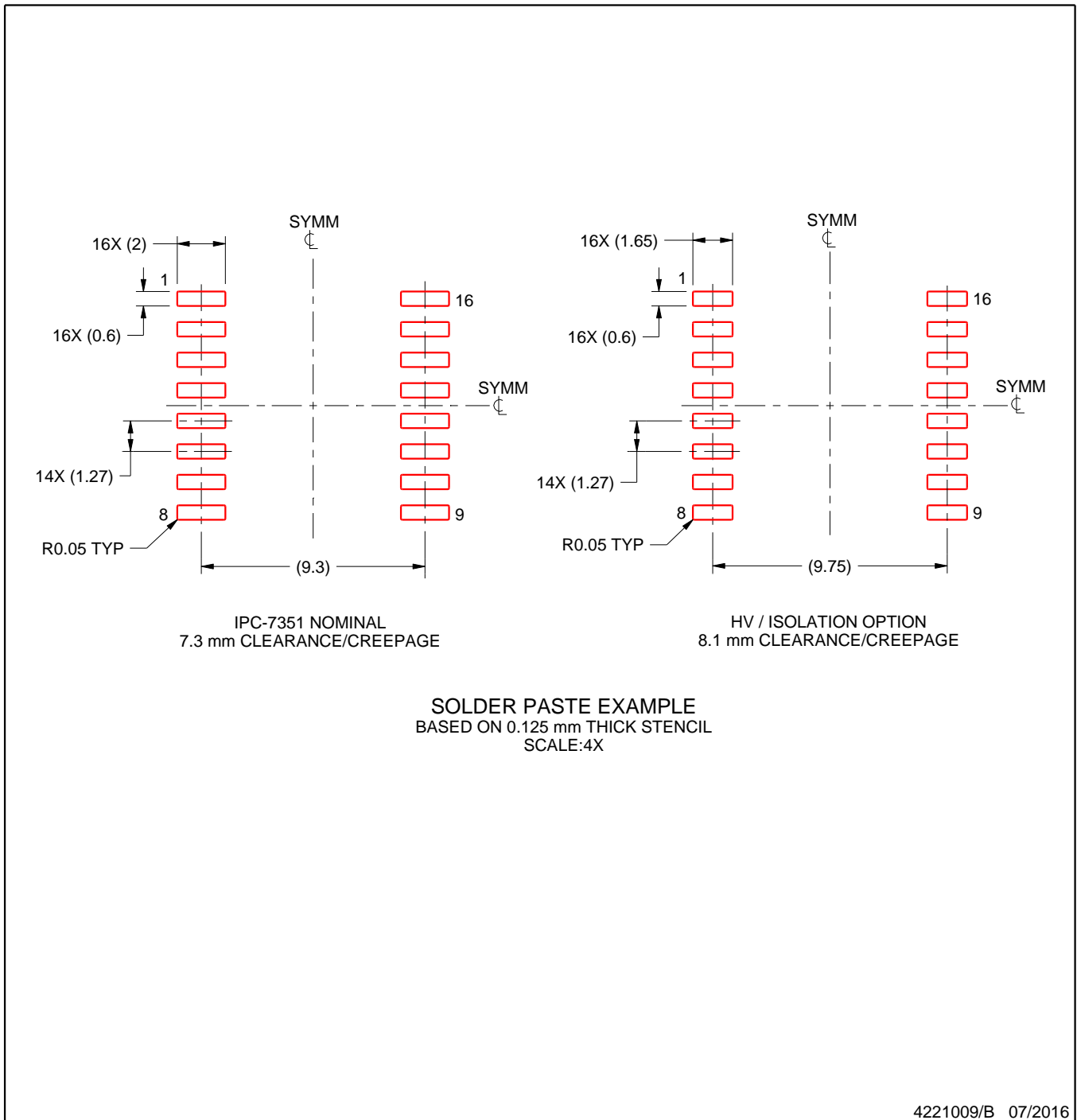
- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

# EXAMPLE STENCIL DESIGN

DW0016B

SOIC - 2.65 mm max height

SOIC



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.

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