

Description

The API772X family consists of high-performance dual-channel digital isolators with 5000V_{RMS} (SO-8W (Type CJ) package) and 3000V_{RMS} (SO-8 (Type CJ2) package) isolation ratings per UL 1577. This family insulation level can fulfill reinforced and basic isolation requirements, according to VDE, UL, and CQC. The data rate of the API772X is up to 100Mbps. They provide digital channel direction configuration and a default output level. The family can also operate under a wide supply voltage of 2.5V to 5.5V.

The API772X family provides strong electromagnetic immunity and low emissions at low-power consumption. These devices have a minimum of 150kV/ μ s common-mode transient immunity (CMTI). The API7720 device has both channels in the same direction while the API7721/22 devices have both channels in the opposite direction. The default output is high for devices without suffix F and low for devices with suffix F. See *Device Functional Modes* section for further details.

Features

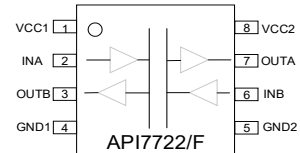
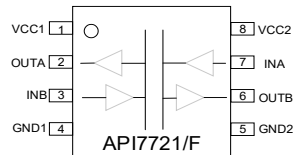
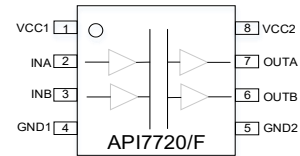
- 100Mbps Data Rate
- Supply Voltage: 2.5V to 5.5V
- $\pm 150\text{kV}/\mu\text{s}$ Minimum CMTI
- CMOS Threshold Inputs
- Default Output High (API772X) and Low (API772XF) Options
- Low Power Consumption, Typical 2.1mA per Channel at 1Mbps
- Low Propagation Delay: 11ns Typical
- Safety-Related Certifications:
 - 8000V_{PK} (SO-8W (Type CJ)) Isolation per DIN EN IEC 60747-17 (VDE 0884-17)
 - 5000V_{RMS} (SO-8W (Type CJ)) Isolation for 1 Minute per UL 1577
 - CQC Certification per GB 4943.1
- Device HBM ESD 8kV
- Device CDM ESD 1.6kV
- Packaged in SO-8 (Type CJ2) and SO-8W (Type CJ)
- Operational Temperature Range: -40 to +125°C
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An automotive-compliant part is available under a separate datasheet ([API772XQ](#))**

Notes:

1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Pin Assignments

SO-8 (Type CJ2) / SO-8W (Type CJ)



Top View

Applications

- Solar inverters
- Motor control
- Industrial automation
- Power in DATA center/telecom equipment
- Grid, electricity meters

Typical Applications Circuit

The API772X devices can be used with MCUs, CAN transceivers, bias power supplies, and voltage regulators to create an isolated CAN interface. The following is an example circuit of the API7721.

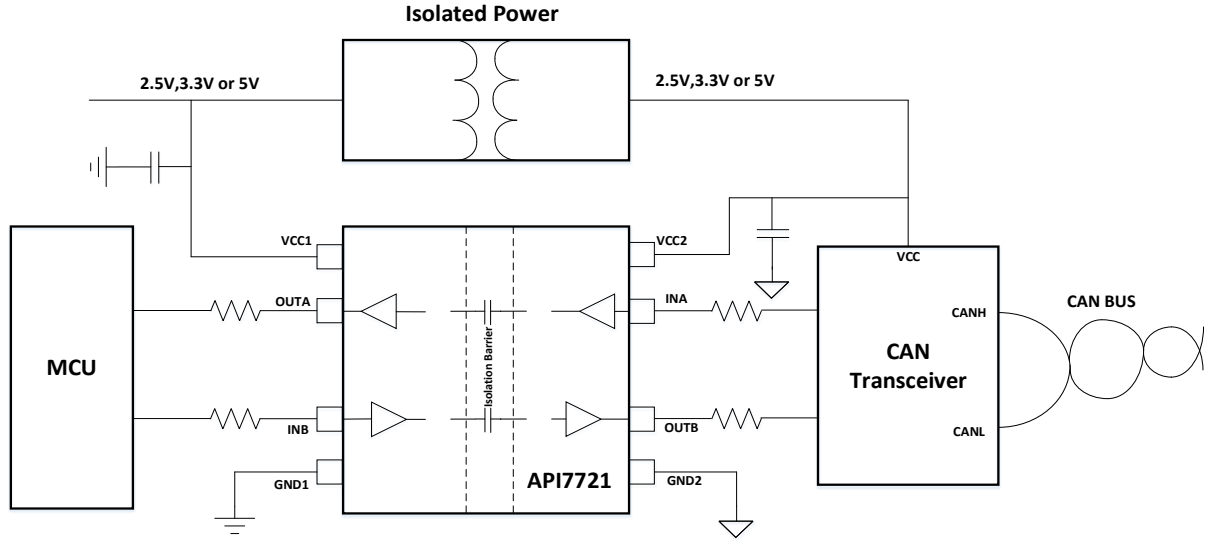


Figure 1. Typical Application Circuit of API772X

Pin Configuration and Descriptions

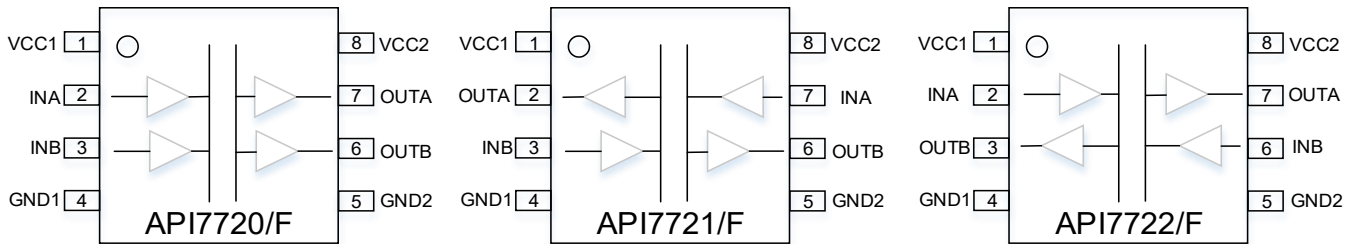


Figure 2. API772X Pin Configuration

Pin Name	Pin Number SO-8 (Type CJ2)/SO-8W (Type CJ)			Function
	API7720/F	API7721/F	API7722/F	
VCC1	1	1	1	Power Supply, VCC1
INA	2	7	2	Input of Channel A
INB	3	3	6	Input of Channel B
GND1	4	4	4	Ground Reference for VCC1 Side
GND2	5	5	5	Ground Reference for VCC2 Side
OUTB	6	6	3	Output of Channel B
OUTA	7	2	7	Output of Channel A
VCC2	8	8	8	Power Supply, VCC2

Table 1. Pin Description

Absolute Maximum Ratings (Note 4)

Symbol	Parameter	Rating	Unit
V _{CC1} , V _{CC2}	Supply Voltage	-0.5 to 6	V
V _{INA} , V _{INB}	Input Signal Voltage	-0.5 to V _{CC} +0.5 (Note 5)	V
V _{OUTA} , V _{OUTB}	Output Signal Voltage	-0.5 to V _{CC} +0.5 (Note 5)	V
I _O	Output Current	-15 to 15	mA
T _J	Operating Junction Temperature Range	-40 to +150	°C
T _{STG}	Storage Temperature Range	-65 to +150	°C
ESD	Human Body Model	8000	V
	Charged Device Model	1600	V
	Contact Discharge per IEC 61000-4-2; Isolation Barrier Withstand Test (Note 6)	8000	V

- Notes:
- Stresses greater than those listed under *Absolute Maximum Ratings* can 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 Ratings* for extended periods can affect device reliability.
 - Maximum voltage must not exceed 6V.
 - IEC ESD strike is applied across the barrier with all pins on each side tied together creating a two-terminal device.

Recommended Operating Conditions

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC1} , V _{CC2}	Power Supply Voltage	2.5	—	5.5	V
V _{IH}	High-Level Input Voltage	0.7 × V _{CC1}	—	V _{CC1}	V
V _{IL}	Low-Level Input Voltage	0	—	0.3 × V _{CC1}	V
DR	Data Rate	—	—	100	Mbps
T _A	Ambient Temperature	-40	—	+125	°C

Package Thermal Information

Symbol	Parameter	SO-8 (Type CJ2)	SO-8W (Type CJ)	Unit
$R_{\theta JA}$	Junction to Ambient Thermal Resistance	100.6	92.3	°C/W
$R_{\theta JC(top)}$	Junction to Case Thermal Resistance	36.7	34.0	°C/W
$R_{\theta JB}$	Junction-to-Board Thermal Resistance	32.7	39.5	°C/W
ψ_{JT}	Junction-to-Top Characterization Parameter	4.5	7.7	°C/W
ψ_{JB}	Junction-to-Board Characterization Parameter	31.7	37.7	°C/W
$R_{\theta JC(bot)}$	Junction-to-Case (Bottom) Thermal Resistance	41.0	48.2	°C/W

Power Ratings

Parameter		Test Conditions	Min	Typ	Max	Unit
API7720						
P _D	Maximum Power Dissipation (Both Sides)	V _{CC1} = V _{CC2} = 5.5V, T _J = +150°C, CL = 15pF, Input 50MHz 50% duty cycle square wave	—	—	154	mW
P _{D1}	Maximum Power Dissipation (Side-1)		—	—	27.5	mW
P _{D2}	Maximum Power Dissipation (Side-2)		—	—	126.5	mW
API7721/API7722						
P _D	Maximum Power Dissipation (Both Sides)	V _{CC1} = V _{CC2} = 5.5V, T _J = +150°C, CL = 15pF, Input 50MHz 50% duty cycle square wave	—	—	165	mW
P _{D1}	Maximum Power Dissipation (Side-1)		—	—	82.5	mW
P _{D2}	Maximum Power Dissipation (Side-2)		—	—	82.5	mW

Insulation Specifications

Symbol	Parameter	Condition	Value		Unit
			SO-8 (Type CJ2)	SO-8W (Type CJ)	
CLR	External Clearance	Shortest terminal-to-terminal distance through air	> 4	> 8	mm
CPG	External Creepage	Shortest terminal-to-terminal distance across the package surface	> 4	> 8	mm
DTI	Distance Through the Insulation	Minimum internal gap (internal clearance)	26		μm
CTI	Comparative Tracking Index	DIN EN 60112 (VDE 0303-11); IEC 60112	> 600	> 600	V
—	Material Group	According to IEC 60664-1	I	I	—
Overvoltage Category per IEC60664-1					
—	For Rated Mains Voltage ≤ 150V _{RMS}	—	I to IV	I to IV	—
—	For Rated Mains Voltage ≤ 300V _{RMS}	—	I to III	I to IV	—
—	For Rated Mains Voltage ≤ 600V _{RMS}	—	—	I to IV	—
—	For Rated Mains Voltage ≤ 1000V _{RMS}	—	—	I to III	—
DIN EN IEC 60747-17 (VDE 0884-17)					
V _{IORM}	Maximum Repetitive Peak Isolation Voltage	AC voltage	637	2121	V _{PK}
V _{IOWM}	Maximum Working Isolation Voltage	AC voltage	450	1500	V _{RMS}
		DC voltage	637	2121	V _{DC}
V _{IOTM}	Maximum Transient Isolation Voltage	V _{TEST} = V _{IOTM} , t = 60s (qualification) V _{TEST} = 1.2 × V _{IOTM} , t = 1s (100% production)	4242	8000	V _{PK}
V _{IMP}	Maximum Impulse Voltage	Tested in air, 1.2/50μs waveform per IEC 62368-1	5000	8000	V _{PK}
V _{IOSM}	Maximum Surge Isolation Voltage	V _{IOSM} ≥ 1.3 × V _{IMP} ; Tested in oil (qualification test), 1.2/50μs waveform, per IEC 62368-1	6500	12800	V _{PK}
Q _{pd}	Apparent Charge	Method a, After I/O safety test subgroup 2/3. V _{ini} = V _{IOTM} , t _{ini} = 60s; V _{pd} (m) = 1.2 × V _{IORM} , t _m = 10s	< 5	< 5	pC
		Method a, After environmental tests subgroup 1. V _{ini} = V _{IOTM} , t _{ini} = 60s; V _{pd} (m) = 1.6 × V _{IORM} , t _m = 10s	< 5	< 5	pC
		Method b1; At routine test (100% production) and preconditioning (type test) V _{ini} = 1.2 × V _{IOTM} ; t _{ini} = 1s; V _{pd} (m) = 1.875 × V _{IORM} , t _m = 1s	< 5	< 5	pC
C _{io}	Barrier Capacitance, Input to Output	V _{io} = 0.4 sin (2πft), f = 1MHz	~0.5	~0.5	pF
R _{io}	Isolation Resistance, Input to Output	V _{io} = 500V at T _A = +25°C	> 10 ¹²	> 10 ¹²	Ω
R _{io}	Isolation Resistance, Input to Output	V _{io} = 500V at +100°C ≤ T _A ≤ +125°C	> 10 ¹¹	> 10 ¹¹	Ω
R _{io}	Isolation Resistance, Input to Output	V _{io} = 500V at T _S = +150°C	> 10 ⁹	> 10 ⁹	Ω
Pollution Degree	—	—	2	2	—
Climatic Category	—	—	55/125/21	55/125/21	—
UL 1577					
V _{iso}	Withstand Isolation Voltage	V _{TEST} = V _{iso} , t = 60s (qualification), V _{TEST} = 1.2 × V _{iso} , t = 1s (100% production)	3750	5000	V _{RMS}

Safety-Related Certifications

VDE	UL	CQC
DIN EN IEC 60747-17 (VDE 0884-17)	UL 1577	GB 4943.1
Maximum transient isolation voltage, 8000V_{PK} (SO-8W (Type CJ)) and 4242V_{PK} (SO-8 (Type CJ2)); Maximum repetitive peak isolation voltage, 2121V_{PK} (SO-8W (Type CJ)) and 637V_{PK} (SO-8 (Type CJ2)); Maximum surge isolation voltage, 12800V_{PK} (SO-8W (Type CJ)) and 6500V_{PK} (SO-8 (Type CJ2))	SO-8W (Type CJ): Single protection, 5000V_{RMS}; SO-8 (Type CJ2): Single protection, 3750V_{RMS}	SO-8W (Type CJ): Reinforced Insulation, Altitude ≤ 5000m, Tropical Climate, 700V_{RMS} maximum working voltage; SO-8 (Type CJ2): Basic Insulation, Altitude ≤ 5000m, Tropical Climate, 400V_{RMS} maximum working voltage
Certificate planned	E550819	Certificate planned

Safety-Limiting Values

Symbol	Parameter	Condition	Value		Unit
			SO-8 (Type CJ2)	SO-8W (Type CJ)	
I _S	Safety Supply Current	V _{CC} = 5.5V, T _J = +150°C, T _A = +25°C	225	246	mA
P _S	Safety Supply Power	V _{CC} = 5.5V, T _J = +150°C, T _A = +25°C	1242	1353	mW
T _S	Safety Temperature	—	+150		°C

Electrical Characteristics (V_{CC1} = V_{CC2}, T_A = -40°C to +125°C. Unless otherwise noted, typical values are at T_A = +25°C)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V _{CC} (UVLOP)	UVLO Threshold When Supply Voltage is Rising	—	—	2.2	—	V
V _{CC} (UVLON)	UVLO Threshold When Supply Voltage is Falling	—	—	2.1	—	V
V _{HYS} (UVLO)	Supply Voltage UVLO Hysteresis	—	—	100	—	mV
V _{OH}	High-Level Output Voltage	I _O ≤ 4mA	V _{CCO} - 0.4	—	—	V
V _{OL}	Low-Level Output Voltage	I _O ≤ 4mA	—	—	0.4	V
V _{IT+(IN)}	Rising Input Threshold Voltage	—	—	0.6 x V _{CCI}	0.7 x V _{CCI}	V
V _{IT-(IN)}	Falling Input Threshold Voltage	—	0.3 x V _{CCI}	0.4 x V _{CCI}	—	V
V _{I(HYS)}	Input Threshold Voltage Hysteresis	—	0.1 x V _{CCI}	0.2 x V _{CCI}	—	V
I _{IH}	High-Level Input Current	V _{IH} = V _{CCI} at IN _x	—	—	15	μA
I _{IL}	Low-Level Input Current	V _{IL} = 0 at IN _x	-15	—	—	μA
CMTI	Common-Mode Transient Immunity (Note 7)	V _I = V _{CCI} or 0, V _{CM} = 1200V	150	—	—	kV/μs

Note: 7. Parameter is not subject to production test - verified by design/characterization.

Supply Current Characteristics – 5V Supply

($V_{CC1} = V_{CC2} = 5V \pm 10\%$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Unless otherwise noted, typical values are at $T_A = +25^\circ\text{C}$.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
API7720, API7720F						
I _{CC1} (DC)	Supply Current - DC Signal	V _I = V _{CCI} (API7720), V _I = 0 (API7720F)	—	0.80	1.19	mA
I _{CC2} (DC)			—	1.80	2.88	
I _{CC1} (DC)		V _I = 0 (API7720), V _I = V _{CCI} (API7720F)	—	3.15	4.55	
I _{CC2} (DC)			—	1.84	2.85	
I _{CC1} (1M)	Supply Current - AC Signal	All channels switching with 1Mbps square wave clock input; CL = 15pF	—	1.96	2.76	
I _{CC2} (1M)			—	2.00	3.04	
I _{CC1} (10M)		All channels switching with 10Mbps square wave clock input; CL = 15pF	—	1.97	2.86	
I _{CC2} (10M)			—	3.49	4.50	
I _{CC1} (100M)		All channels switching with 100Mbps square wave clock input; CL = 15pF	—	2.26	4.00	
I _{CC2} (100M)			—	16.88	24.08	
API7721, API7721F, API7722, API7722F						
I _{CC1} (DC), I _{CC2} (DC)	Supply Current - DC Signal	V _I = V _{CCI} (API7721, API7722), V _I = 0 (API7721F, API7722F)	—	1.48	1.91	mA
I _{CC1} (DC), I _{CC2} (DC)			V _I = 0 (API7721, API7722), V _I = V _{CCI} (API7721F, API7722F)	—	2.74	
I _{CC1} (1M), I _{CC2} (1M)	Supply Current - AC Signal	All channels switching with 1Mbps square wave clock input; CL = 15pF	—	2.10	2.87	
I _{CC1} (10M), I _{CC2} (10M)		All channels switching with 10Mbps square wave clock input; CL = 15pF	—	2.89	3.83	
I _{CC1} (100M), I _{CC2} (100M)		All channels switching with 100Mbps square wave clock input; CL = 15pF	—	10.16	12.25	

Supply Current Characteristics – 3.3V Supply

($V_{CC1} = V_{CC2} = 3.3V \pm 10\%$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Unless otherwise noted, typical values are at $T_A = +25^\circ\text{C}$.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
API7720, API7720F						
Icc1(DC)	Supply Current - DC Signal	V _I = V _{CCI} (API7720), V _I = 0 (API7720F)	—	0.64	0.91	mA
Icc2(DC)			—	1.62	2.81	
Icc1(DC)		V _I = 0 (API7720), V _I = V _{CCI} (API7720F)	—	2.98	4.25	
Icc2(DC)			—	1.67	2.77	
Icc1(1M)	Supply Current - AC Signal	All channels switching with 1Mbps square wave clock input; CL = 15pF	—	1.79	2.62	
Icc2(1M)			—	1.75	2.92	
Icc1(10M)		All channels switching with 10Mbps square wave clock input; CL = 15pF	—	1.80	2.66	
Icc2(10M)			—	2.75	4.26	
Icc1(100M)		All channels switching with 100Mbps square wave clock input; CL = 15pF	—	2.17	3.63	
Icc2(100M)			—	12.88	16.53	
API7721, API7721F, API7722, API7722F						
Icc1(DC), Icc2(DC)	Supply Current - DC Signal	V _I = V _{CCI} (API7721, API7722), V _I = 0 (API7721F, API7722F)	—	1.32	1.77	mA
Icc1(DC), Icc2(DC)		V _I = 0 (API7721, API7722), V _I = V _{CCI} (API7721F, API7722F)	—	2.56	3.57	
Icc1(1M), Icc2(1M)	Supply Current - AC Signal	All channels switching with 1Mbps square wave clock input; CL = 15pF	—	1.95	2.68	
Icc1(10M), Icc2(10M)		All channels switching with 10Mbps square wave clock input; CL = 15pF	—	2.47	3.33	
Icc1(100M), Icc2(100M)		All channels switching with 100Mbps square wave clock input; CL = 15pF	—	6.77	9.67	

Supply Current Characteristics – 2.5V Supply ($V_{CC1} = V_{CC2} = 2.5V \pm 10\%$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Unless otherwise noted, typical values are at $T_A = +25^\circ\text{C}$.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
API7720, API7720F						
I _{CC1(DC)}	Supply Current - DC Signal	V _I = V _{CCI} (API7720), V _I = 0 (API7720F)	—	0.62	0.89	mA
I _{CC2(DC)}			—	1.60	2.78	
I _{CC1(DC)}		V _I = 0 (API7720), V _I = V _{CCI} (API7720F)	—	2.95	4.32	
I _{CC2(DC)}			—	1.64	2.76	
I _{CC1(1M)}	Supply Current - AC Signal	All channels switching with 1Mbps square wave clock input; CL = 15pF	—	1.76	2.58	
I _{CC2(1M)}			—	1.70	2.87	
I _{CC1(10M)}		All channels switching with 10Mbps square wave clock input; CL = 15pF	—	1.78	2.62	
I _{CC2(10M)}			—	2.46	3.96	
I _{CC1(100M)}		All channels switching with 100Mbps square wave clock input; CL = 15pF	—	2.15	3.40	
I _{CC2(100M)}			—	10.42	13.53	
API7721, API7721F, API7722, API7722F						
I _{CC1(DC), I_{CC2(DC)}}	Supply Current - DC Signal	V _I = V _{CCI} (API7721, API7722), V _I = 0 (API7721F, API7722F)	—	1.30	1.72	mA
I _{CC1(DC), I_{CC2(DC)}}			V _I = 0 (API7721, API7722), V _I = V _{CCI} (API7721F, API7722F)	—	2.54	
I _{CC1(1M), I_{CC2(1M)}}	Supply Current - AC Signal	All channels switching with 1Mbps square wave clock input; CL = 15pF	—	1.97	2.68	
I _{CC1(10M), I_{CC2(10M)}}		All channels switching with 10Mbps square wave clock input; CL = 15pF	—	2.36	3.79	
I _{CC1(100M), I_{CC2(100M)}}		All channels switching with 100Mbps square wave clock input; CL = 15pF	—	5.73	8.03	

Switching Characteristics – 5V Supply

($V_{CC1} = V_{CC2} = 5V \pm 10\%$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Unless otherwise noted, typical values are at $T_A = +25^\circ\text{C}$.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
t_{PLH} , t_{PHL}	Propagation Delay Time	—	—	10	17	ns
PWD	Pulse-Width Distortion $ t_{PHL} - t_{PLH} $	—	—	0.5	5	ns
$t_{sk(o)}$	Channel-to-Channel Output Skew Time (Note 8)	Same direction channels	—	—	4	ns
$t_{sk(pp)}$	Part-to-Part Skew Time (Note 9)	—	—	—	5	ns
t_r	Output Signal Rise Time	—	—	—	5	ns
t_f	Output Signal Fall Time	—	—	—	5	ns
MPW	Minimum Pulse Width	—	—	—	10	ns
$t_{JIT(PK)}$	Peak Eye Diagram Jitter (Note 10)	—	—	350	—	ps

Switching Characteristics – 3.3V Supply

($V_{CC1} = V_{CC2} = 3.3V \pm 10\%$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Unless otherwise noted, typical values are at $T_A = +25^\circ\text{C}$.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
t_{PLH} , t_{PHL}	Propagation Delay Time	—	—	10.5	18.5	ns
PWD	Pulse Width Distortion $ t_{PHL} - t_{PLH} $	—	—	0.5	5	ns
$t_{sk(o)}$	Channel-to-Channel Output Skew Time (Note 8)	Same direction channels	—	—	4	ns
$t_{sk(pp)}$	Part-to-Part Skew Time (Note 9)	—	—	—	5	ns
t_r	Output Signal Rise Time	—	—	—	5	ns
t_f	Output Signal Fall Time	—	—	—	5	ns
MPW	Minimum Pulse Width	—	—	—	10	ns
$t_{JIT(PK)}$	Peak Eye Diagram Jitter (Note 10)	—	—	350	—	ps

Switching Characteristics – 2.5V Supply

($V_{CC1} = V_{CC2} = 2.5V \pm 10\%$, $T_A = -40^\circ\text{C}$ to $+125^\circ\text{C}$. Unless otherwise noted, typical values are at $T_A = +25^\circ\text{C}$.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
t_{PLH} , t_{PHL}	Propagation Delay Time	—	—	11	21	ns
PWD	Pulse Width Distortion $ t_{PHL} - t_{PLH} $	—	—	0.5	5	ns
$t_{sk(o)}$	Channel-to-Channel Output Skew Time (Note 8)	Same direction channels	—	—	4	ns
$t_{sk(pp)}$	Part-to-Part Skew Time (Note 9)	—	—	—	5	ns
t_r	Output Signal Rise Time	—	—	—	5	ns
t_f	Output Signal Fall Time	—	—	—	5	ns
MPW	Minimum Pulse Width	—	—	—	10	ns
$t_{JIT(PK)}$	Peak Eye Diagram Jitter (Note 10)	—	—	350	—	ps

- Notes:
- $t_{sk(o)}$ is the skew between outputs of a single device with all inputs connected and outputs switching in the same direction with same loads.
 - $t_{sk(pp)}$ 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.
 - Parameter is not subject to production test - verified by design/characterization.

Insulation Characteristics Curves

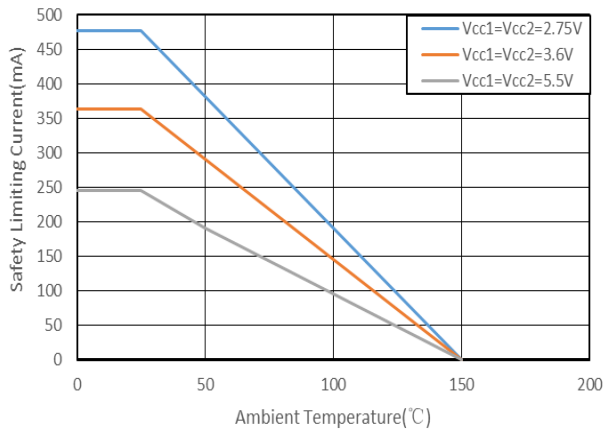


Figure 3. Thermal Derating Curve for Limiting Current per VDE for SO-8W (Type CJ) Package

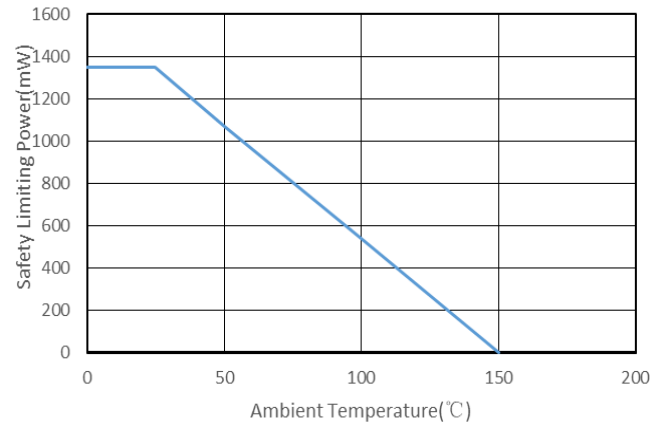


Figure 4. Thermal Derating Curve for Limiting Power per VDE for SO-8W (Type CJ) Package

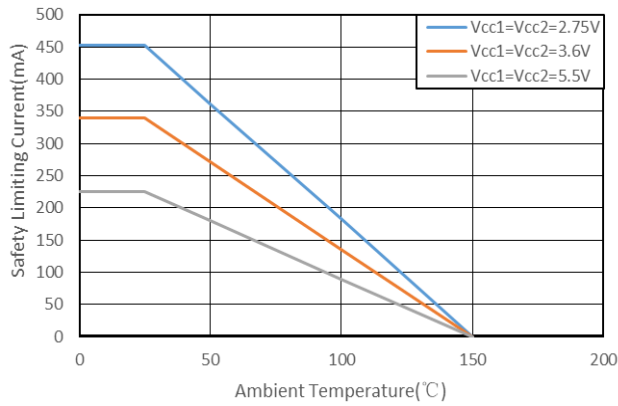


Figure 5. Thermal Derating Curve for Limiting Current per VDE for SO-8 (Type CJ2) Package

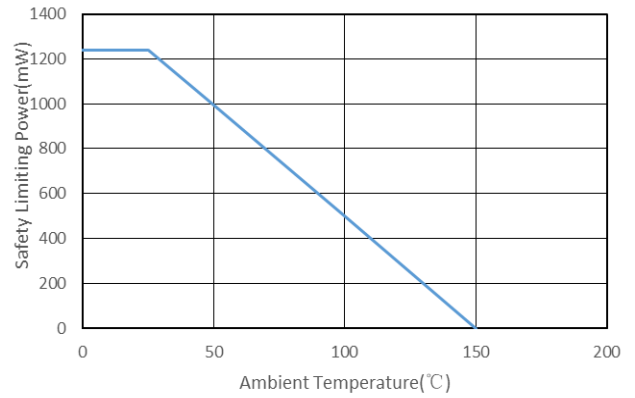
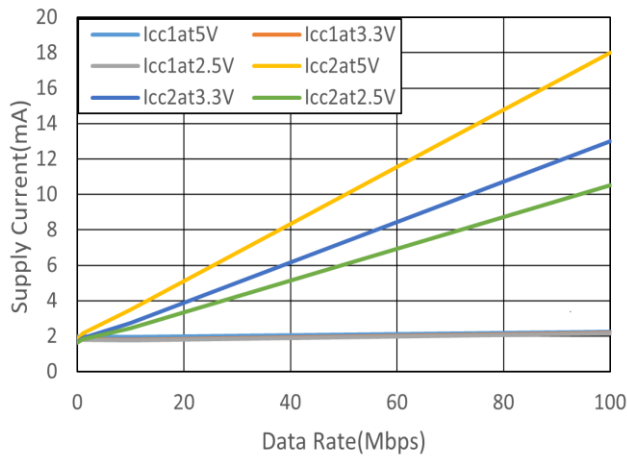
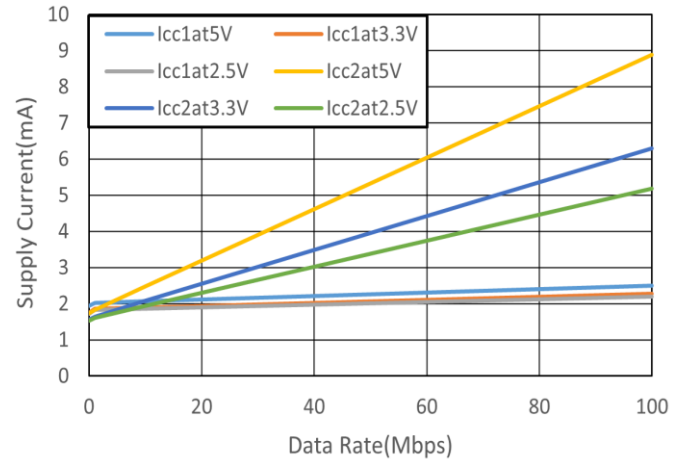


Figure 6. Thermal Derating Curve for Limiting Power per VDE for SO-8 (Type CJ2) Package

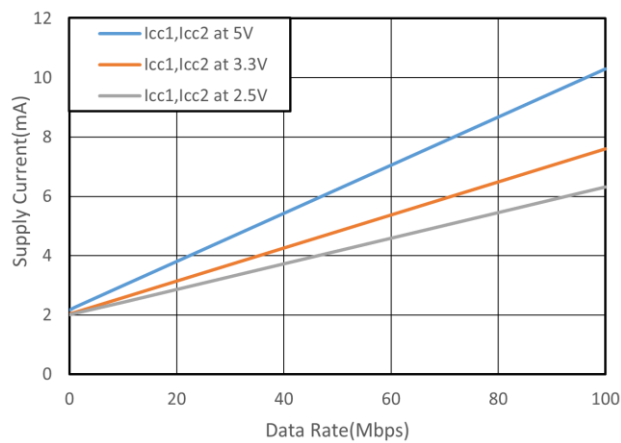
Typical Characteristics



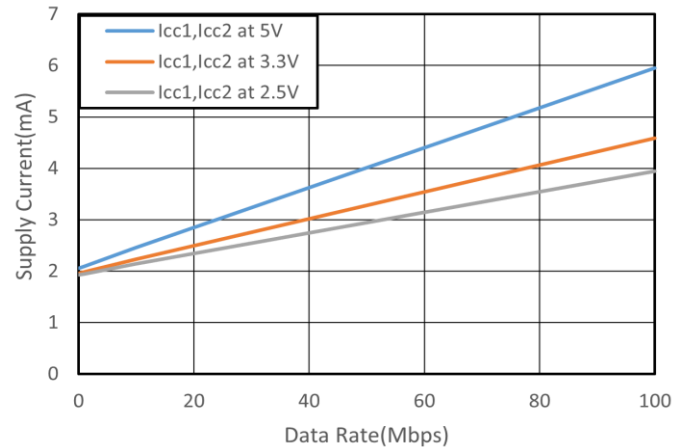
$T_A = +25^\circ\text{C}$ $CL = 15\text{pF}$
Figure 7. API7720 Supply Current vs. Data Rate
(With 15pF Load)



$T_A = +25^\circ\text{C}$ $CL = \text{No Load}$
Figure 8. API7720 Supply Current vs. Data Rate
(With No Load)



$T_A = +25^\circ\text{C}$ $CL = 15\text{pF}$
Figure 9. API7721/API7722 Supply Current vs. Data Rate
(With 15pF Load)



$T_A = +25^\circ\text{C}$ $CL = \text{No Load}$
Figure 10. API7721/API7722 Supply Current vs. Data Rate
(With No Load)

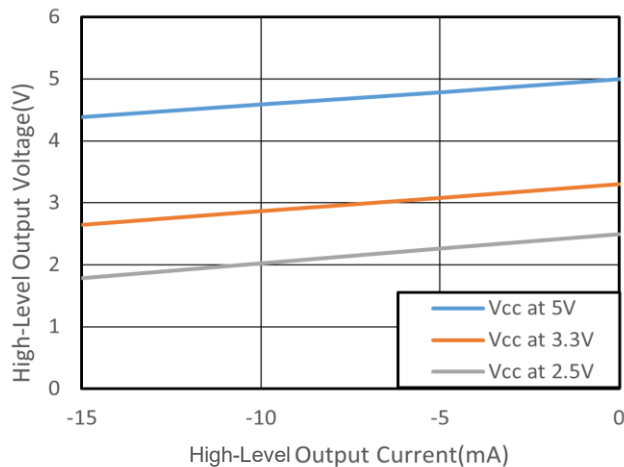


Figure 11. High-Level Output Voltage vs. High-Level
Output Current

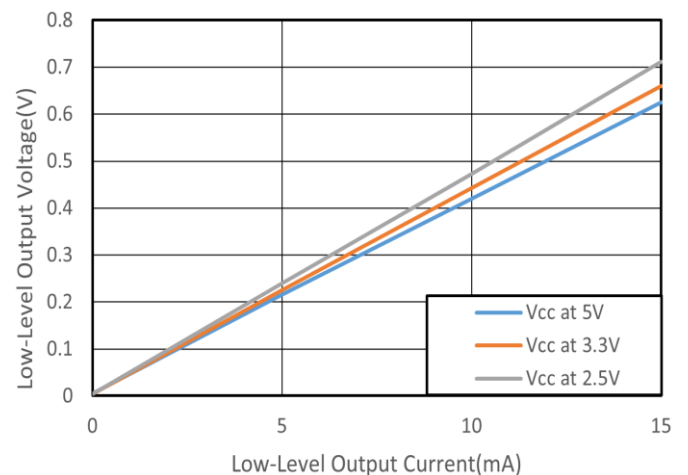


Figure 12. Low-Level Output Voltage vs. Low-Level
Output Current

Typical Characteristics (continued)

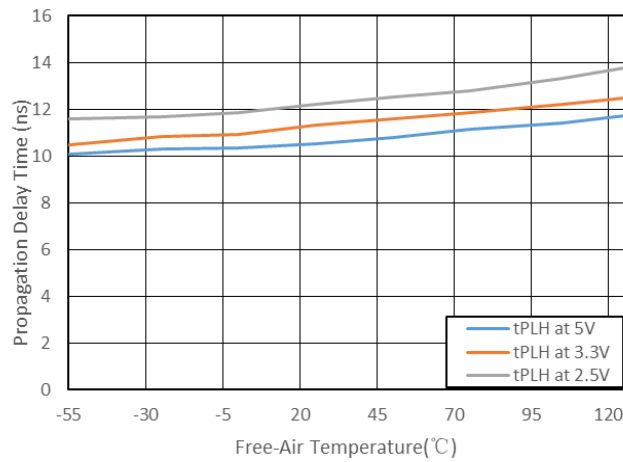


Figure 13. Propagation Delay Time vs. Free-Air Temperature

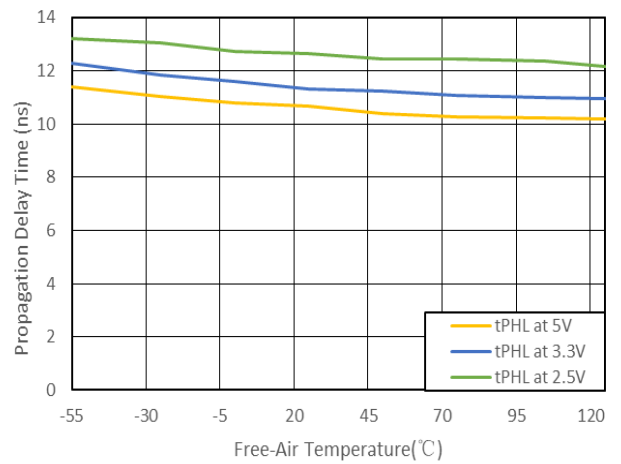


Figure 14. Propagation Delay Time vs. Free-Air Temperature

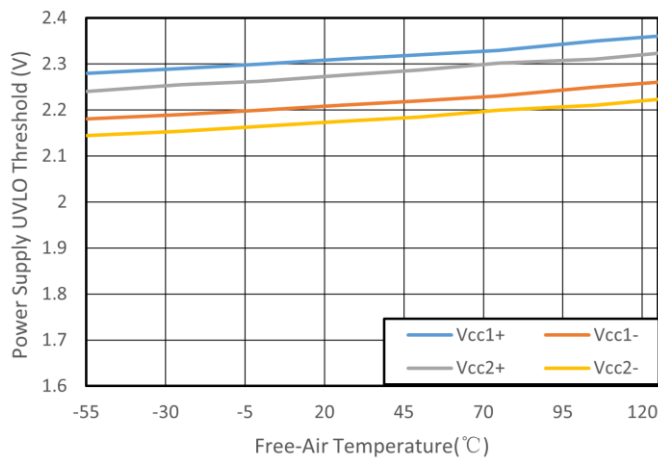
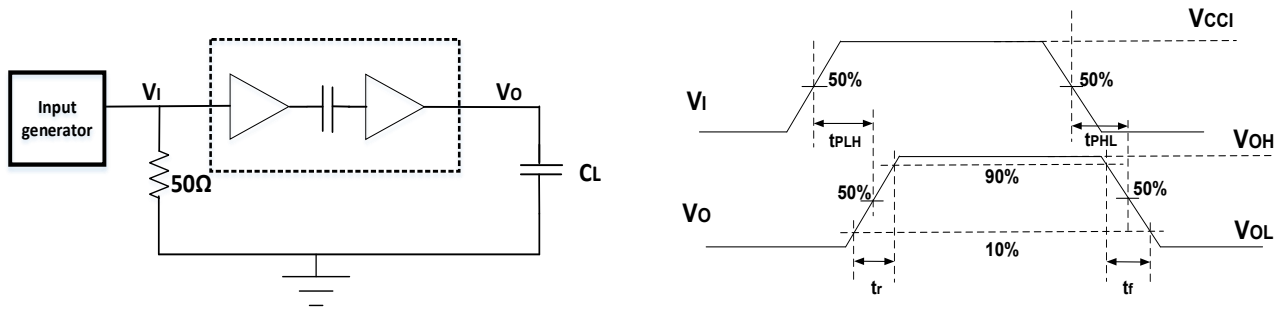


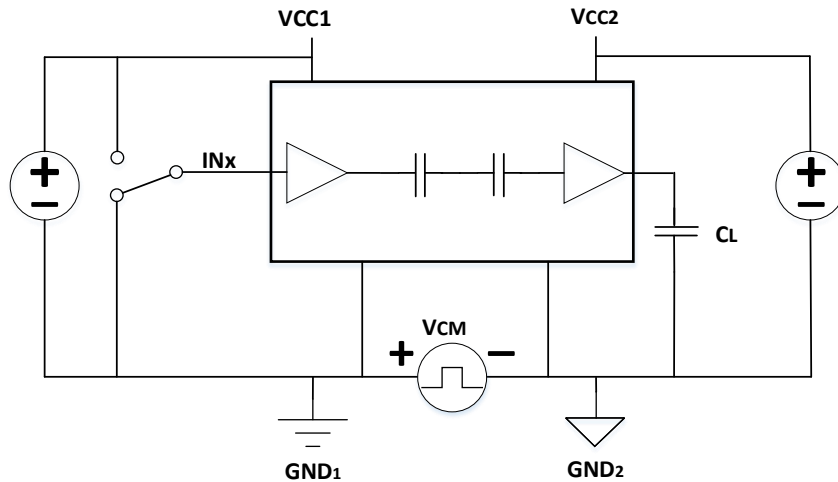
Figure 15. Power-Supply Undervoltage Threshold vs. Free-Air Temperature

Parameter Measurement



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

Figure 16. Switching Characteristics Test Circuit and Voltage Waveforms



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

Figure 17. Common-Mode Transient Immunity Test Circuit

Operation Description

Overview

The API772X/API772XF family of devices are dual-channel isolators based on an ON-OFF keying (OOK) modulation scheme to transfer digital data through a capacitive isolation barrier. The different states of digital data were modulated with a high-frequency carrier at the transmitter-side and demodulated at the receiver-side by an advanced signal process technique. The accomplished circuit technique was incorporated to enhance CMTI performance and minimize the influence of radiated emissions.

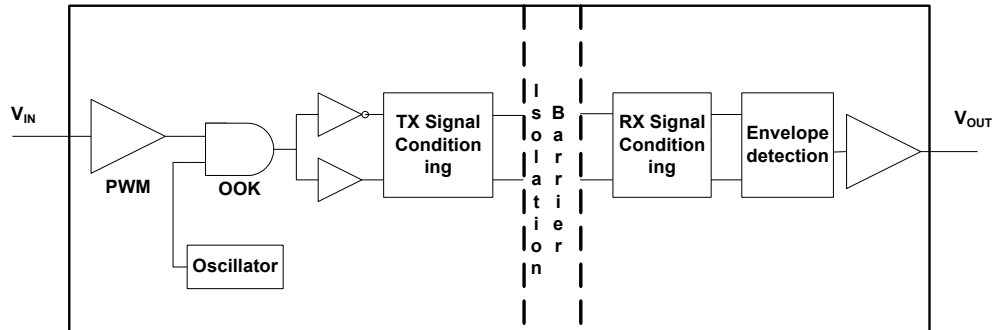


Figure 18. API772X Internal Block Diagram

A concept of the OOK modulation scheme:

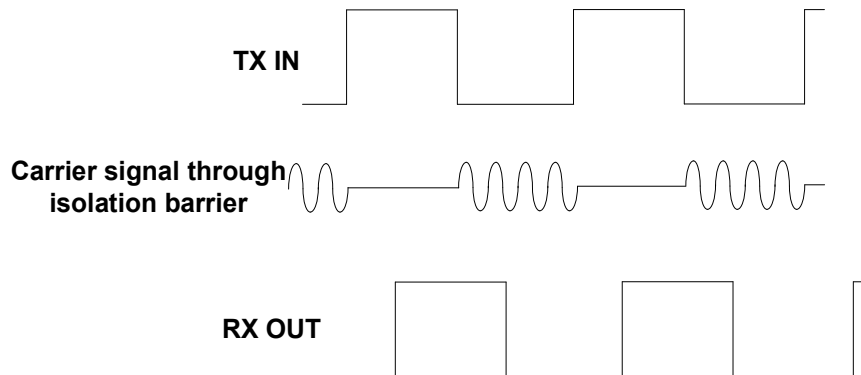


Figure 19. ON-OFF Keying (OOK) Modulation Scheme

Device Functional Modes:

The table below lists the functional modes for the API772X devices.

Input	V _{CCI} Status	V _{CCO} Status	Output	Comment
H	Ready	Ready	H	Normal operation.
L	Ready	Ready	L	
O	Ready	Ready	Default	Default mode: When INx is open, the corresponding channel output goes to the default logic state. The default is High for API7720/21/22 and Low for API7720F/21F/22F.
X	Unready	Ready	Default	Default mode: When V _{CCI} is unpowered, a channel output assumes the logic state based on the selected default option. The default is High for API7720/21/22 and Low for API7720F/21F/22F. When V _{CCI} transitions from unpowered to powered-up, a channel output assumes the logic state of the input. When V _{CCI} transitions from powered-up to unpowered, a channel output assumes the selected default state.
X	X	Unready	Undetermined	When V _{CCO} is unpowered, a channel output is undetermined. When V _{CCO} transitions from unpowered to powered-up, a channel output assumes the logic state of the input.

Note: H = Logic High; L = Logic Low; O = Left Open; X = Irrelevant.

Table 2. API772X Function Table

Application and Implementation

Application Curve

The following typical eye diagrams of the API772X family of devices indicate low jitter and wide open-eye at the maximum data rate of 100Mbps.

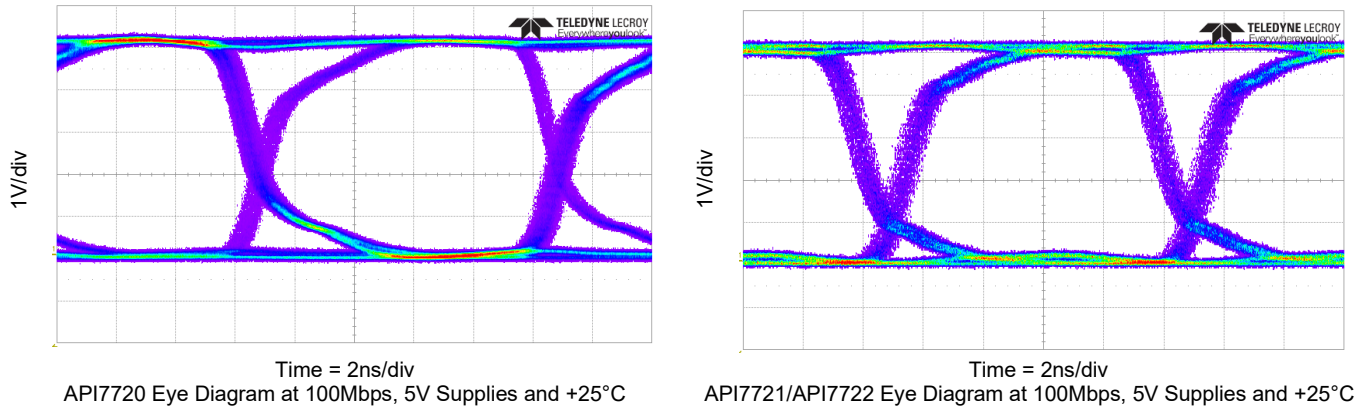
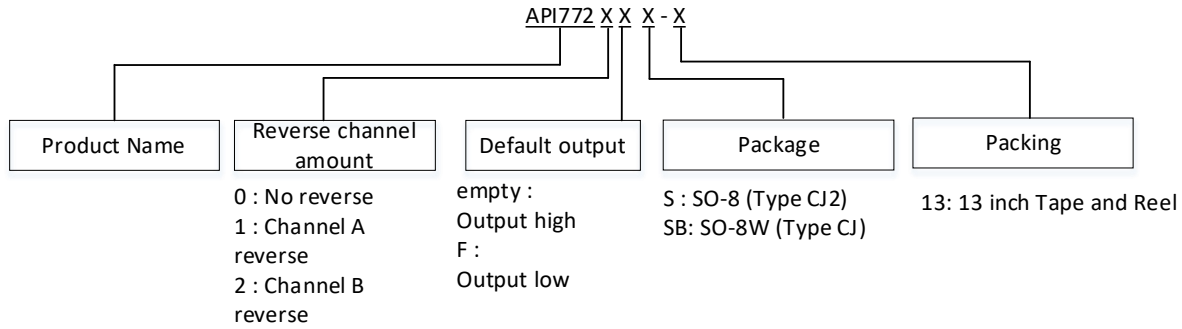


Figure 20. API7720/21/22 Eye Diagram

Ordering Information (Note 11)



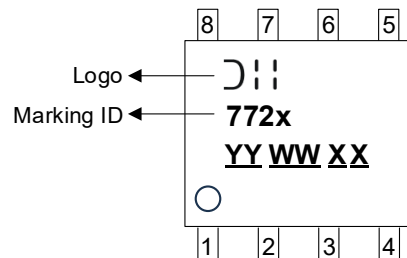
Orderable Part Number	Marking ID	Package	Packing	
			Qty.	Carrier
API7720S-13	7720	SO-8 (Type CJ2)	4000	Tape and Reel
API7721S-13	7721	SO-8 (Type CJ2)	4000	Tape and Reel
API7722S-13	7722	SO-8 (Type CJ2)	4000	Tape and Reel
API7720FS-13	7720F	SO-8 (Type CJ2)	4000	Tape and Reel
API7721FS-13	7721F	SO-8 (Type CJ2)	4000	Tape and Reel
API7722FS-13	7722F	SO-8 (Type CJ2)	4000	Tape and Reel
API7720SB-13	7720	SO-8W (Type CJ)	1000	Tape and Reel
API7721SB-13	7721	SO-8W (Type CJ)	1000	Tape and Reel
API7722SB-13	7722	SO-8W (Type CJ)	1000	Tape and Reel
API7720FSB-13	7720F	SO-8W (Type CJ)	1000	Tape and Reel
API7721FSB-13	7721F	SO-8W (Type CJ)	1000	Tape and Reel
API7722FSB-13	7722F	SO-8W (Type CJ)	1000	Tape and Reel

Note: 11. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information

SO-8 (Type CJ2) / SO-8W (Type CJ)

(Top View)

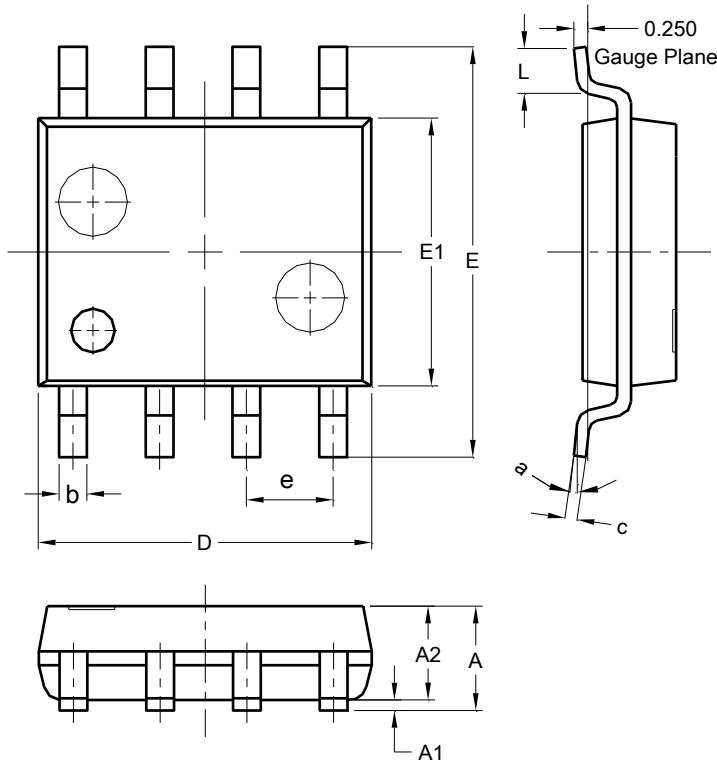


YY : Year (ex: 26 = 2026)
 WW : Week : 01 to 52; 52
 Represents Week 52 and 53
 XX : Internal Code

Package Outline Dimensions

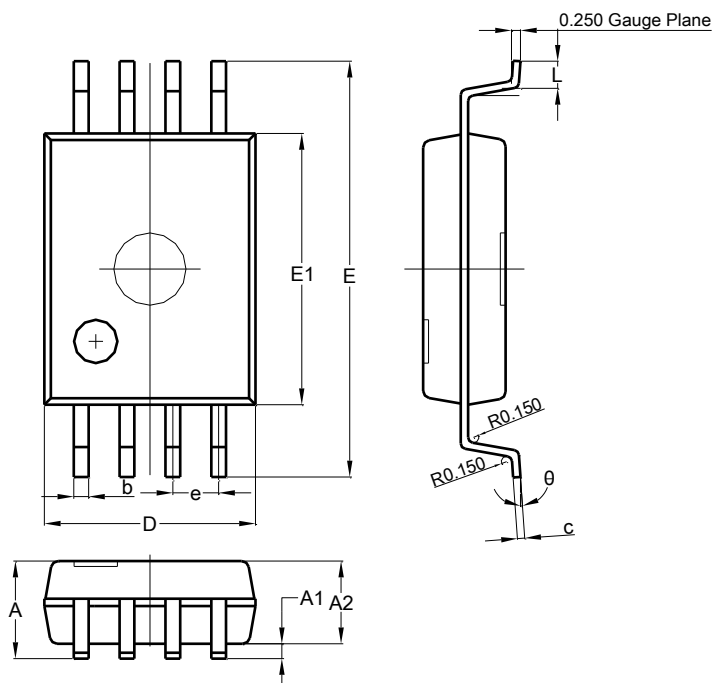
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SO-8 (Type CJ2)



SO-8 (Type CJ2)			
Dim	Min	Max	Typ
A	1.450	1.750	--
A1	0.100	0.250	--
A2	1.350	1.550	--
b	0.330	0.510	--
c	0.170	0.250	--
D	4.700	5.100	--
E	5.800	6.200	--
E1	3.800	4.000	--
e	1.27 BSC		
L	0.400	1.270	--
A	0°	8°	--
All Dimensions in mm			

SO-8W (Type CJ)

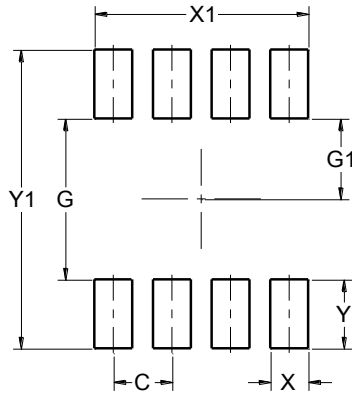


SO-8W (Type CJ)		
Dim	Min	Max
A	--	2.800
A1	0.360	0.460
A2	2.186	2.386
b	0.310	0.510
c	0.153	0.303
D	5.750	5.950
E	11.250	11.750
E1	7.400	7.600
e	1.140	1.400
L	0.500	1.000
A	0°	8°
All dimensions in mm		

Suggested Pad Layout

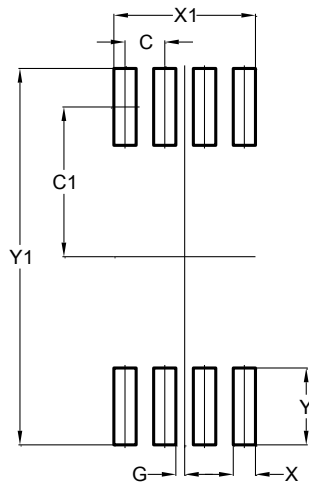
Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SO-8 (Type CJ2)



Dimensions	Value (in mm)
C	1.270
G	3.500
G1	1.750
X	0.820
X1	4.630
Y	1.500
Y1	6.500

SO-8W (Type CJ)



Dimensions	Value (in mm)
C	1.270
C1	4.775
G	0.280
X	0.710
X1	4.520
Y	2.450
Y1	12.000

Mechanical Data

SO-8 (Type CJ2)

- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per JESD22-B102 **(e3)**
- Weight: 0.079 grams (Approximate)

SO-8W (Type CJ)

- Moisture Sensitivity: Level 3 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per JESD22-B102 **(e3)**
- Weight: 0.143 grams (Approximate)

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