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Application Based Optocoupler Design Guide



Solutions as Easy as 1-2-3

Quickly select the right optocoupler for your application. We made it as simple as **1-2-3** regardless if you are a seasoned engineer or novice.

Simply follow the steps below to find your optocoupler solution:

- 1.** Select your application.
- 2.** Look at the block diagram. Follow the corresponding color coded tables. (See Reference Tables on back page for series specs.)
- 3.** Answer the Questions in the block diagram to determine an orderable part. Visit www.cel.com/Optocouplers for a detailed datasheet.

What is your Application?

- ▶ **Switch Mode Power Supply**
- ▶ **Factory Automation Network**
- ▶ **Motor Drive and Control**
- ▶ **Power Over Ethernet (PoE)**
- ▶ **Power Line Communication (PLC)**
- ▶ **Smart Meters**
- ▶ **Solar Power**

Choose your Application:

Switch Mode Power Supply

AC to DC Converter

Isolation Voltage	Package	Family	Table
5Kv.r.m.s.	DIP 4	PS25xx	1
5Kv.r.m.s.	LSOP 4	PS2381	2
3.75Kv.r.m.s.	SOP 4	PS27xx	3
2.5Kv.r.m.s. isolation, 3.75Kv.r.m.s. for PS2861B	SSOP 4	PS28xx	4
2.5Kv.r.m.s.	Mini Flat 4	PS2911	6

Data Communication

DC to DC Converter

Power Supplies

Speed	Package	Family	Table
1 Mb/s Analog	DIP 8	PS8501	5

Questions ?

- What Isolation Voltage do you require?
- SMT or Through Hole Package?
- What Operating Temperature do you require?
- What Current Transfer Ratio (CTR) do you require?
- What are your creepage distance requirements?
- What Safety Standards do you require? (UL, VDE, etc.)

Factory Automation

Isolation Voltage	Package	Family	Table
5Kv.r.m.s.	DIP 4	PS25xx	1
5Kv.r.m.s.	LSOP 4	PS2381	2
3.75Kv.r.m.s.	SOP 4	PS27xx	3
2.5Kv.r.m.s. isolation, 3.75Kv.r.m.s. for PS2861B	SSOP 4	PS28xx	4

Isolation Voltage	Package	Family	Table
2.5Kv.r.m.s.	SSOP 4	PS2801C	4
2.5Kv.r.m.s.	SSOP 4	PS2805C	4
1.5Kv.r.m.s.	SSOP 12	PS2841-4x	4
3.75Kv.r.m.s.	SOP 4	PS2701A	3
5Kv.r.m.s.	SOP 4	PS2501A	1

Speed	Package	Family	Table
1 Mb/s Analog	SOP 5	PS8101	5
1 Mb/s Digital	SOP 5 SOP 8	PS9122 PS9822	5
10 Mb/s Digital	SOP 5	PS9117A	5
10 Mb/s Digital	SOP 8	PS9817A	5
15 Mb/s Digital	SOP 5 SOP 5 SOP 8	PS9121 PS9123 PS9821	5
10 Mb/s Digital	DIP 8	PS9587	5

Questions ?

- What Isolation Voltage do you require?
- What Transfer Speed do you require?
- SMT or Through Hole Package?
- How many channels do you need to isolate? (1, 2 or 4 per package)
- What Operating Temperature do you require?
- What are your creepage distance requirements?
- What Safety Standards do you require? (UL, VDE, etc.)

AC Servo
See motor drive and control application on the following page.

Motor Drive and Control

Inverter Control Isolated Gate Driving of MOSFETs and IGBTs

I _o peak (A)	Package	Family	Table
2.5	DIP 8	PS9905	7
0.6	SDIP 6	PS9307	7
2.5	SDIP 8	PS9305	7
2.5	DIP 8	PS9505	7
0.6	DIP 8	PS9506	7
2.5	SO16	PS9402	7

Power Supply Isolation

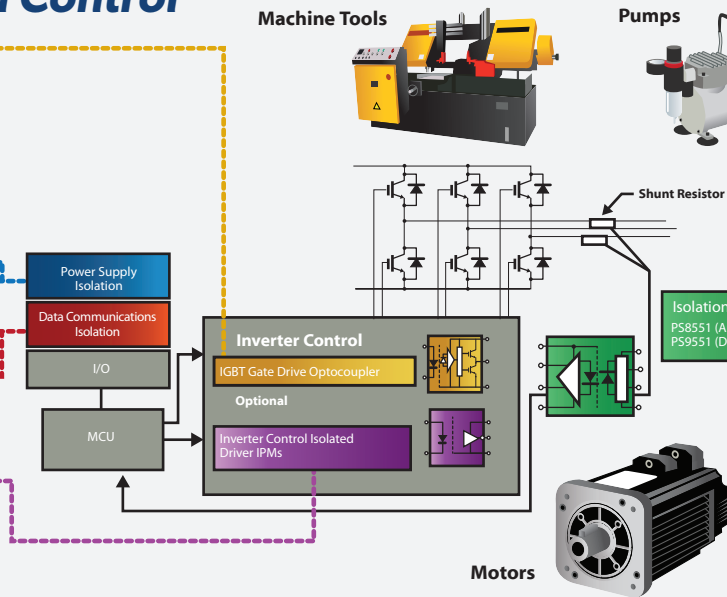
Isolation Voltage	Package	Family	Table
3.75KVr.m.s.	SOP 4	PS27xx	3
2.5KVr.m.s. isolation, 3.75KVr.m.s. for PS2861B	SSOP 4	PS28xx	4

Data Communication Isolation

Speed	Package	Family	Table
10 Mb/s Digital	SOP 5	PS9117A	5
10 Mb/s Digital	SOP 8	PS9817A	5

Inverter Control Isolated Driving of IPMs

Speed	Package	Family	Table
5 Mb/s Digital	SDIP 6	PS9309	8
1 Mb/s Digital	SDIP 6	PS9303	8
1 Mb/s Digital	SOP 5	PS9113	8
1 Mb/s Digital	SDIP 6	PS9313	8
1 Mb/s Digital	DIP 8	PS9513	8



Isolation Amplifier for feedback control

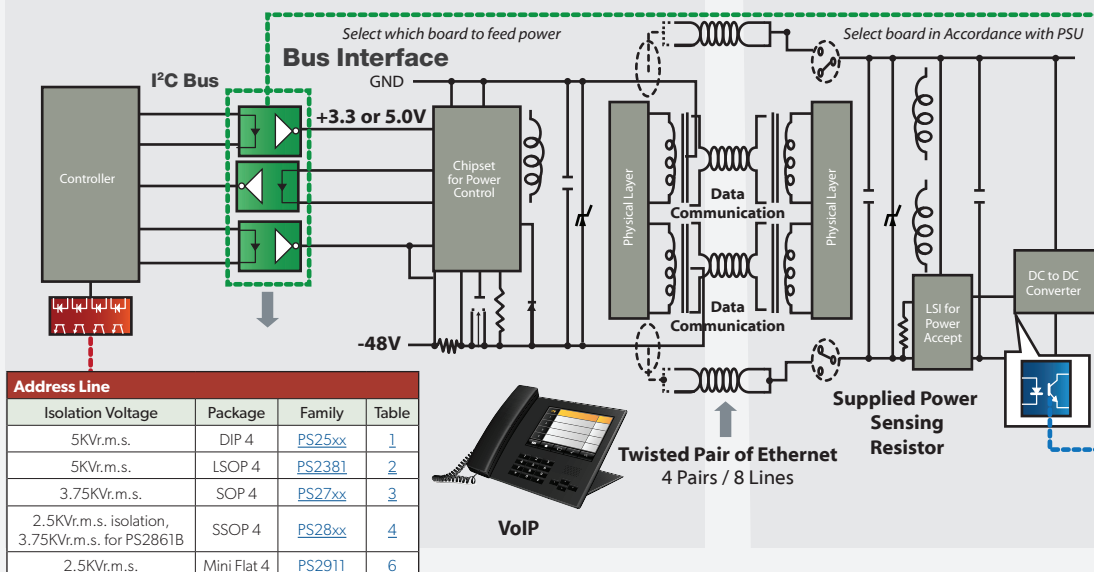
Isolation Voltage	Package	Family	Table
5KVr.m.s.	SDIP 8	PS8551	9
5KVr.m.s.	SDIP 8	PS9551	10

Isolation Amplifier
PS8551 (Analog Type)
PS9551 (Digital Type)

Questions ?

- What Isolation Voltage do you require?
- What Transfer Speed do you require?
- SMT or Through Hole Package?
- How many channels do you need to isolate? (1, 2 or 4 per package)
- What Operating Temperature do you require?
- What are your creepage distance requirements?
- What Safety Standards do you require? (UL, VDE, etc.)

POE (Power Over Ethernet)



Questions ?

- What Isolation Voltage do you require?
- What Transfer Speed do you require?
- SMT or Through Hole Package?
- How many channels do you need to isolate? (1, 2 or 4 per package)
- What Operating Temperature do you require?
- What are your creepage distance requirements?
- What Safety Standards do you require? (UL, VDE, etc.)

I2C Bus

Speed	Package	Family	Table
1 Mb/s Analog	SOP 8	PS8821	5
1 Mb/s Digital	SOP 5 SOP 8	PS9122 PS9822	5
15 Mb/s Digital	SOP 5 SOP 5 SOP 8	PS9121 PS9123 PS9821	5

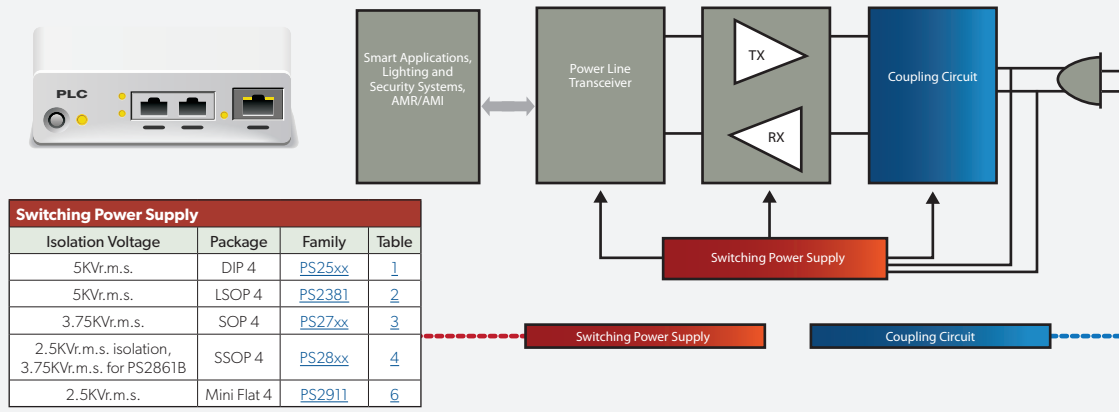
Address Line

Isolation Voltage	Package	Family	Table
5KVr.m.s.	DIP 4	PS25xx	1
5KVr.m.s.	LSOP 4	PS2381	2
3.75KVr.m.s.	SOP 4	PS27xx	3
2.5KVr.m.s. isolation, 3.75KVr.m.s. for PS2861B	SSOP 4	PS28xx	4
2.5KVr.m.s.	Mini Flat 4	PS2911	6

Feedback for DC to DC Converter

Isolation Voltage	Package	Family	Table
5KVr.m.s.	DIP 4	PS25xx	1
5KVr.m.s.	LSOP 4	PS2381	2
3.75KVr.m.s.	SOP 4	PS27xx	3
2.5KVr.m.s. isolation, 3.75KVr.m.s. for PS2861B	SSOP 4	PS28xx	4
2.5KVr.m.s.	Mini Flat 4	PS2911	6

PLC (Power Line Communication)



Questions ?

- What Isolation Voltage do you require?
- What Transfer Speed do you require?
- SMT or Through Hole Package?
- What is your Operating Voltage?
- What Operating Temperature do you require?
- What are your creepage distance requirements?
- What Safety Standards do you require? (UL, VDE, etc.)

Switching Power Supply

Isolation Voltage	Package	Family	Table
5KVr.m.s.	DIP 4	PS25xx	1
5KVr.m.s.	LSOP 4	PS2381	2
3.75KVr.m.s.	SOP 4	PS27xx	3
2.5KVr.m.s. isolation, 3.75KVr.m.s. for PS2861B	SSOP 4	PS28xx	4
2.5KVr.m.s.	Mini Flat 4	PS2911	6

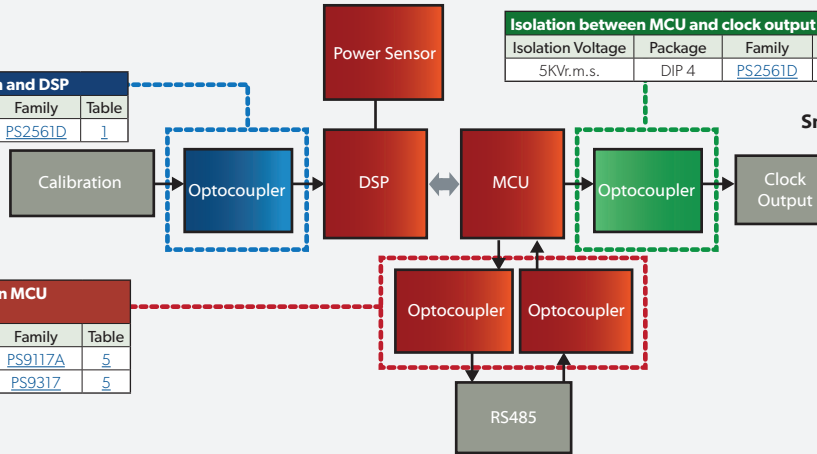
Coupling Circuit

Vcc	Package	Family	Table
5V	SOP 5	PS9117A	5
5V	SOP 5	PS9123	5
5V	SOP 8	PS9851	5
3.3V	SOP 8	PS9821	5

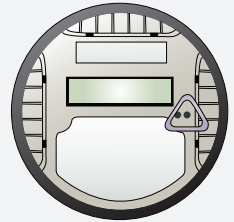
Smart Meters

Isolation between Calibration and DSP			
Isolation Voltage	Package	Family	Table
5Kv.r.m.s.	DIP 4	PS2561D	1

Isolation between MCU and clock output			
Isolation Voltage	Package	Family	Table
5Kv.r.m.s.	DIP 4	PS2561D	1



Smart Meters



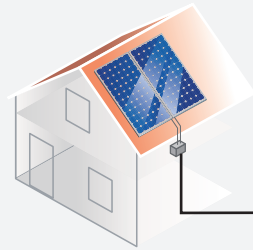
Questions ?

- What Isolation Voltage do you require?
- What Transfer Speed do you require?
- SMT or Through Hole Package?
- How many channels do you need to isolate? (1, 2 or 4 per package)
- What Operating Temperature do you require?
- What are your creepage distance requirements?
- What Safety Standards do you require? (UL, VDE, etc.)

High Speed Isolation between MCU and RS485			
Speed	Package	Family	Table
10 Mb/s Digital	SOP 5	PS9117A	5
10 Mb/s Digital	SDIP 6	PS9317	5

Solar Power

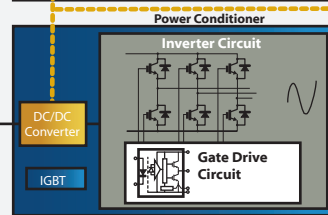
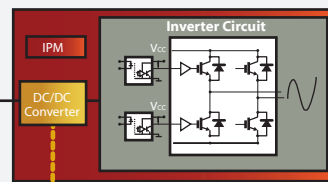
Home System Solar Cell



Plant / Building System



IPM Driver			
Isolation Voltage	Package	Family	Table
3.75Kv.r.m.s.	SOP 5	PS9113	8
5Kv.r.m.s.	DIP 8	PS9513	8



Feedback Control Circuit in DC/DC Converter			
Isolation Voltage	Package	Family	Table
5Kv.r.m.s.	DIP 4	PS2561D	1

IGBT Gate Driver			
I _o peak (A)	Package	Family	Table
2.5	DIP 8	PS9905	Z
0.6	SDIP 6	PS9307	Z
2.5	SDIP 8	PS9305	Z
2.5	DIP 8	PS9505	Z
0.6	DIP 8	PS9506	Z

Questions ?

- What Isolation Voltage do you require?
- What Transfer Speed do you require?
- SMT or Through Hole Package?
- How many channels do you need to isolate? (1, 2 or 4 per package)
- What Operating Temperature do you require?
- What are your creepage distance requirements?
- What Safety Standards do you require? (UL, VDE, etc.)

Part Numbering System

Note: This diagram is intended to explain existing part numbers and is not to be used to create part numbers since NOT all combinations are available.



Package Style	
No.	Description
23	4 Pin LSOP (Pin pitch 2.54 mm)
25	4 Pin to16 DIP Multi Type
27	4 Pin to16 SOP (Pin pitch 2.54 mm)
28	4 Pin or 16 SSOP (Pin pitch 1.27 mm)
29	4 Pin Mini Flat (Pin pitch 1.27 mm)
81	SOP5 (Analog Output)
83	6 Pin SDIP (Analog Output)
85	8 Pin DIP (Hi-Speed Analog Output)
88	SO8 (Analog Output)
91	SOP5 (Digital Output)
92	SOP5 (Digital Output / 5.5 mm long creepage)
93	6 Pin SDIP (Digital Output)
94	SO16 (Hi-Speed / Hi-Function)
95	8 Pin DIP (Hi-Speed / Hi-Function)
98	SO8 (Digital Output)
99	8 Pin DIP (Long Creepage Distance 14 mm)

Package Terminology	
Style	Description
DIP	Dual In Line Package with through hole and/or surface mount leads
Mini Flat	Small package with flat surface mount leads
LSOP	Long Small Outline Package with surface mount leads
SDIP	Small Dual In Line Package with surface mount leads
SOP	Small Outline Package with surface mount leads
SSOP	Shrink Small Outline Package with surface mount leads

- Options
- 23
25
27
28
29
81
83
85
88
91
92
93
94
95
98
99

ID Number

- Options
- A
B
C
D
F

Options

Lead Bend

- Options
- 1
2
4

Options

V = VDE

Options

Tape/Reel

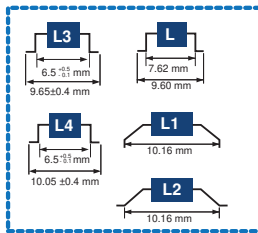
Options

CTR Rank (See Datasheet)

Options

Lead Finish

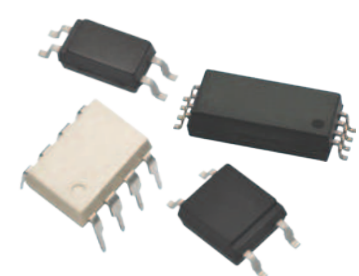
Variations	
Letter	Description
A	Die shrunk
B	High Temperature
C	Die Shrunken High V _{CEO}
D	New Process
F	New Process



Tape and Reel	
Options	Description
E3	Reel
F3	Larger Reel

Lead Finish	
Options	Description
None	Standard Finish
A	Pb-Free Finish
AX	NiPdAu Finish

Channel Type	
No.	Description
1	1-Channel Type
2	2-Channel Type
4	4-Channel Type



Reference Tables

Bold* = Focus Products

Table 1	Root Part	Input	Output	Operating Temperature Range (°C)	V _{CEO} Max (V)	I _F Max (mA)	CTR (%)	CTR Rank Available	Comments
	PS2561D*	DC	Standard	-55 to +110	80	40	50-400	Yes	Low cost version of PS2561B, PS2501 and PS2501A, High temp
	PS2501	DC	Standard	-55 to +100	80	80	80-600	Yes	Standard
	PS2501A	DC	Standard	-55 to +100	70	30	50-400	Yes	Low cost version of PS2501
	PS2561B	DC	Standard	-55 to +110	80	40	50-400	Yes	High temp, 0.4mm Internal isolation distance
PS2561E	DC	Standard	-55 to +110	80	30	300-600	No	Low cost version of PS2501-1-K, High temp	

Table 2	Root Part	Input	Output	Operating Temperature Range (°C)	V _{CEO} Max (V)	I _F Max (mA)	CTR (%)	CTR Rank Available	Comments
	PS2381*	DC	Standard	-40 to +115	80	60	50-450	Yes	Stretched package, high temp operation

Table 3	Root Part	Input	Output	Operating Temperature Range (°C)	V _{CEO} Max (V)	I _F Max (mA)	CTR (%)	CTR Rank Available	Comments
	PS2761B*	DC	Standard	-55 to +110	70	25	50-400	Yes	High temp, low cost version of PS2701 and PS2701A
	PS2701	DC	Standard	-55 to +100	40	50	50-300	Yes	Standard
PS2701A	DC	Standard	-55 to +100	70	30	50-300	Yes	Low cost version of PS2701	

Table 4	Root Part	Input	Output	Operating Temperature Range (°C)	V _{CEO} Max (V)	I _F Max (mA)	CTR (%)	CTR Rank Available	Comments
	PS2861B*	DC	Standard	-55 to +110	70	50	50-400	No	High temp version of PS2801 and PS2801C
	PS2801C	DC	Standard	-55 to +100	80	30	50-400	Yes	Low cost version of PS2801
	PS2801	DC	Standard	-55 to +100	80	50	80-600	Yes	Standard
	PS2805C	AC	Standard	-55 to +100	80	±30	50-400	Yes	AC input
PS2841-4x	x=A common cathode x=B common anode	Common Collector	-40 to +100	70	20	100-400	No	Ultra SSOP, quad channel with 12 leads	

Table 5	Root Part	Type	Speed	Operating Temperature Range (°C)	Package	Isolation Voltage (Vr.m.s.)	CMR (KV/μS)	V _{CC} Max (V)	V _{CC} TYP (V)	Comments
	PS9122*	High Speed / High Function	1 Mbps	-40 to +100	5 pin SOP	3.75K	±15	7	3.3 or 5	3.3V & 5V versions, Open Collector
	PS9117A*	High Speed / High Function	10 Mbps	-40 to +85	5 pin SOP	3.75K	±15	7	5	5V, Low Distortion
	PS9821*	High Speed / High Function	15 Mbps	-40 to +85	SO8	2.5K	±15	7	3.3	3.3V, Low Distortion
	PS9324L/L2*	High Speed / High Function	15 Mbps	-40 to +100	6 pin SDIP	5k	±15	7	3.3 or 5	3.3V & 5V versions, Open Collector, Low Distortion
	PS9123*	High Speed / High Function	15 Mbps	-40 to +100	5 pin SOP	3.75K	±15	7	5	Totem Pole Output, Low Distortion
	PS8101	High Speed / High Function	1 Mbps	-55 to +100	5 pin SOP	3.75K	±15	35	-	High CMR analog output
	PS8821	High Speed / High Function	1 Mbps	-55 to +100	SO8	2.5K	±1	7	3.3 typ.	3.3V, Power Over Ethernet
	PS9822	High Speed / High Function	1 Mbps	-40 to +100	SO8	2.5K	±20	7	3.3 or 5	3.3V & 5V versions, Open Collector
	PS9121	High Speed / High Function	15 Mbps	-40 to +85	5 pin SOP	3.75K	±15	7	3.3	3.3V, Low Distortion
	PS9817A	High Speed / High Function	10 Mbps	-40 to +85	SO8	2.5K	±15	7	5	5V, Low Distortion
	PS9317	High Speed / High Function	10 Mbps	-40 to +85	6 pin SDIP	5K	±15	7	5	8mm creepage, 6 pin SDIP
	PS9587	High Speed / High Function	10 Mbps	-40 to +85	8 pin DIP	5K	±15	7	5	8mm creepage, 8 pin DIP
	PS8501	High Speed / High Function	1 Mbps	-55 to +100	8 pin DIP	5K	-	35	-	8mm creepage, 8 pin DIP
PS9851	High Speed / High Function	15 Mbps	-40 to +100	SO8	2.5K	±10	5.5	5	5V, 100°C max operating temp	

Table 6	Root Part	Input	Output	Operating Temperature Range (°C)	V _{CEO} Max (V)	I _F Max (mA)	CTR (%)	CTR Rank Available	Comments
	PS2911*	DC	Standard	-55 to +100	40	50	100-400	Yes	Ultra small flat-lead package
	PS2705A	AC	Standard	-55 to +100	80	±30	50-300	Yes	AC input

Table 7	Root Part	Input	t _{PLH} / t _{PHL} (μS)	Operating Temperature Range (°C)	Isolation Voltage (Vr.m.s.)	I _F Max (mA)	CMR (KV/μS)	V _{CC} Max (V)	Comments
	PS9905*	DC	0.25	-40 to +110	7.5K	25	±25	30	14mm Long creepage, 8 pin DIP
	PS9307*	DC	0.175	-40 to +125	5K	25	±50	35	6 pin SDIP
	PS9505*	DC	0.25	-40 to +110	5K	25	±25	30	UVLO (Under Voltage Lock Out) protection with hysteresis
	PS9402*	DC	0.2	-40 to +110	5K	25	±25	33	Fault detection (desaturation detection, UVLO protection and active Miller clamping)
	PS9305	DC	0.25	-40 to +110	5K	25	±25	30	UVLO (Under Voltage Lock Out) protection with hysteresis
PS9506	DC	0.4	-40 to +110	5K	25	±25	30	8mm creepage option available	

Table 8	Root Part	Input	t _{PLH} / t _{PHL} (nS)	Operating Temperature Range (°C)	Isolation Voltage (Vr.m.s.)	I _F Max (mA)	CMR (KV/μS)	V _{CC} Max (V)	Comments
	PS9309*	DC	250/250	-40 to +110	5K	20	±15	20	5 Mbps Totem Pole output type, 6 pin SDIP, IPM driver
	PS9303	DC	500/550	-40 to +110	5K	20	±15	25	1 Mbps Totem Pole output type, 6 pin SDIP, IPM driver
	PS9113	DC	750/500	-40 to +110	3.75K	25	±15	35	1 Mbps, open collector output, 5 pin SOP (SO5) IPM driver
	PS9313	DC	750/500	-40 to +110	5K	25	±15	30	1 Mbps, open collector output, 8mm creepage 6 pin SDIP IPM driver
PS9513	DC	750/500	-40 to +100	5K	30	±15	35	1 Mbps, open collector output, 8mm creepage 8 pin DIP IPM driver	

Table 9	Root Part	Operating Temperature Range (°C)	Bandwidth TYP (kHz)	Input Supply Max (mA)	Output Supply Max (mA)	Gain v/v TYP	Gain Error (%)	CMR (KV/μS)	Comments
	PS8551*	-55 to +100	100	18	16	8	±3	±10	1 Mbps high CMR analog output isolation amplifier

Table 10	Root Part	Operating Temperature Range (°C)	V _{CC} Max (V)	V _{CC} Range Recommended (V)	Input Supply Max (mA)	Output Supply Max (mA)	ENOB (Bits Min)	Output Clock Frequency (MHz Typ)	Comments
	PS9551	-40 to +85	5.5	4.5 to 5.5	18	15	10	10	High CMR digital output isolation amplifier, sigma-delta modulator

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Tel: (561) 613-8342

Florida - Orlando
Rep One
Tel: (407) 952-9013

Florida - Tampa
Rep One
Tel: (813) 957-5293

Northern NJ / NYC / LI
Strategic Sales Inc.
Tel: (973) 808-5060

Southern NJ / East PA / DE
Strategic Sales Inc.
Tel: (856) 489-3883

MD / VA / WV
Strategic Sales Inc.
Tel: (410) 964-0097

New York - Syracuse
L.D. Allen
Tel: (315) 431-1001

New York - Rochester
L.D. Allen
Tel: (585) 218-5250

Eastern Canada

Ontario, Quebec, Maritime
Provinces
Astec Components Ltd.
Tel: (905) 607-1444

Western Canada

BC, Alberta, Saskatchewan,
Manitoba
Disman Bakner
Tel: (800) 347-3010

Mexico

Zapopan, Jalisco
Everest Sales & Solutions
Tel: +(52) 33-3123-0848

Ecatepec, EDO de
Mexico, DF
Everest Sales & Solutions
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South America

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VLA Solutions
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Africa/Middle East

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RF Design
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