

PHOTOCOUPPLERS

Catalog



BIG IDEAS
FOR EVERY SPACE

RENESAS PHOTOCOUPPLERS CONTRIBUTE TO THE REALIZATION OF INDUSTRIAL SYSTEMS THAT ARE SAFE, EFFICIENT, AND ENVIRONMENTALLY FRIENDLY.



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In manufacturing and industrial settings, photocouplers convey control signals while shielding persons and control systems from high voltages. Renesas photocouplers enable isolation of high voltages in solar and wind power generation systems, and in inverters that convert DC power to AC they enable accurate signal transfer and help improve power efficiency. The lineup includes products with integrated functionality for protecting the IGBTs used in inverter circuits. Also available are high-precision isolation amplifiers, for accurate voltage monitoring and motor control, and IC- or transistor-output products, which isolate microcontrollers and control devices while allowing high-speed signal transfer. Renesas photocoupler products deliver improved efficiency in manufacturing and industrial applications while contributing to safe and stable operation.

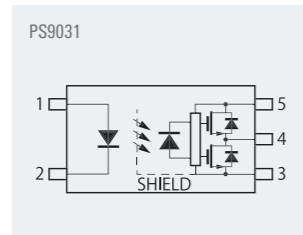
IGBT Drive, IPM Drive

IGBT Drive, IPM Drive

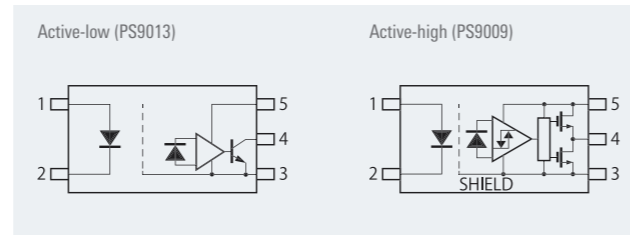
Reduced IGBT switching loss contributes to improved inverter efficiency, better real-time performance, and greater compactness.

- Advantages
IGBT on-off operation at high dv/dt
- Features
High CMR: $\pm 50\text{kV}/\mu\text{s}$, min.
High-temperature operation: $T_a = 125^\circ\text{C}$ max.

■ IGBT drive



■ IPM drive



IGBT Drive with Protection Functions

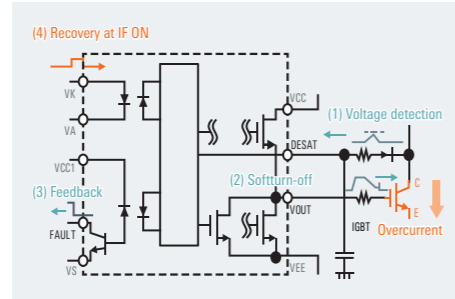
PS9402 IGBT drive coupler with protection functions
Integrated peripheral functions for reduced board area
(IGBT gate driver with protection functions)

- Advantages
Lower design and board costs due to reduced need for external protection circuits and elimination of negative power supply
 - Features
Two on-chip protection functions
- Desat (desaturation detection)
- Active Miller clamp
- | | | | |
|---|---------|--------|----|
| 1 | Vs | VE | 16 |
| 2 | Vcc1 | VLED | 15 |
| 3 | Fault | Desat | 14 |
| 4 | Vs | Vcc2 | 13 |
| 5 | Cathode | VEE | 12 |
| 6 | Anode | Vo | 11 |
| 7 | Anode | Vclamp | 10 |
| 8 | Cathode | VEE | 9 |

Desat

Protects the IGBT from damage from overcurrent.

- (1) Detects rise in the collector voltage due to overcurrent.
- (2) Softturn-off of Vout (IGBT gate).
- (3) Fault feedback to the MCU.
- (4) Operation recovery when IF input turns on again.

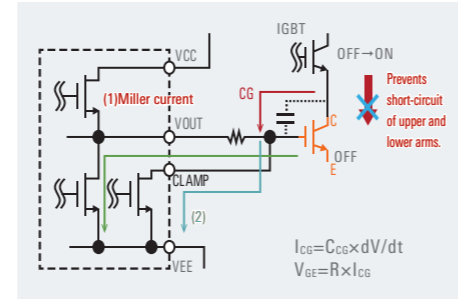


Active Miller clamp

Prevents short-circuit of upper and lower arms if IGBT turns on erroneously.

The displacement current (Miller current(1) *) when the upper arm turns on is drawn off by the clamp circuit(2), preventing erroneous on-switching.

* Current (ICG) that flows to the Miller capacitance between the collector and gate of the IGBT



Isolation Amplifiers, Communication Applications

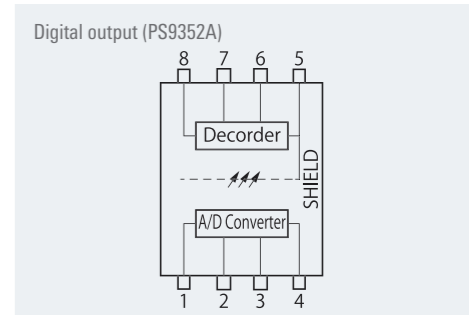
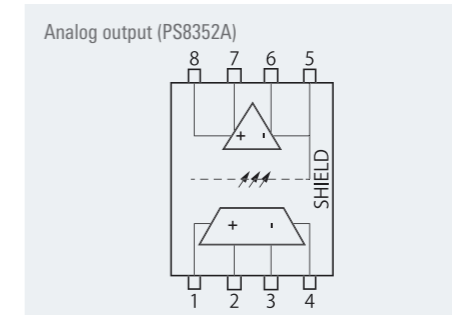
Isolation Amplifiers, Δ - Σ Modulators

PS8352A Isolation Amplifier/PS9352A Δ - Σ Modulator

Contributes to highly precise motor control with high precision and high input resistance.

(Very-high-precision isolation amplifier and Δ - Σ modulator)

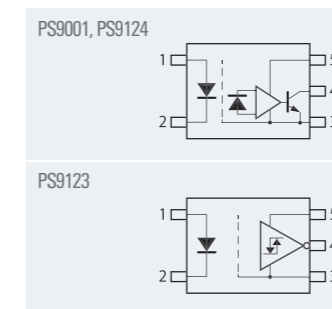
- Advantages
High-precision feedback
Small mounting area
- Features
High precision: Gain $\pm 1\%$
Compact: 44% smaller than DIP package
High input resistance: 450k Ω



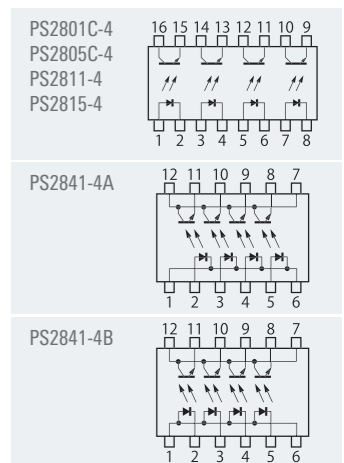
Communication

High noise tolerance simplifies isolation design between control devices.

- Advantages
Low power consumption
10/15Mbps transfer rate
High ringing resistance
- Features
PS9124
Low input IFHL: 3mA
PS9001
Low current consumption: 2mA max.
High CMR: $\pm 50\text{kV}/\mu\text{s}$, min.
High-temperature operation: $T_a = 125^\circ\text{C}$ max.



- Advantages
Compact I/O
- Features
Low input
4-channel package (SSOP, common leads)



New Package

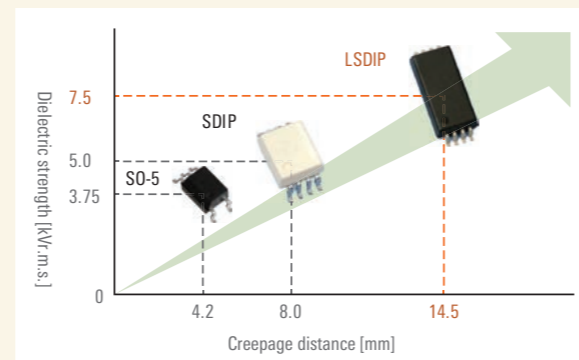
LSDIP

Advanced package for high-voltage systems
(Package with very long creepage of 14.5mm)

- Features
First in industry with long creepage of 14.5mm
High dielectric strength: 7.5kV r.m.s.
High surge resistance: 12kV allowable transient voltage
- Advantages
Less board space is needed to ensure isolation.
Enables smaller boards for large-capacity battery control.
Simplifies high-voltage feedback.

• Lineup

- PS9905 for IGBT drive
- PS9924 for 10Mbps high-speed communication
- PS8902 for 1Mbps analog



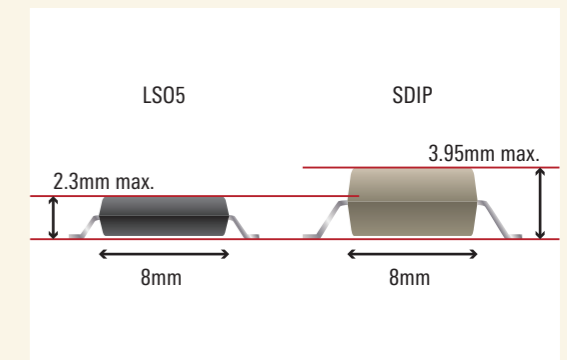
LSO5

Next-generation standard package that contributes to smaller board mounting area
(Thin and narrow package with 8mm creepage and support for high ambient temperatures)

- Features
Compact: 25% smaller mounting area than SDIP
Low profile: 2.3 mm height max.
Operation guaranteed at $T_a = 125^\circ\text{C}$
Material group II CTI = 400 support
- Advantages
Small mounting area
Shorter isolation distance for high-voltage systems

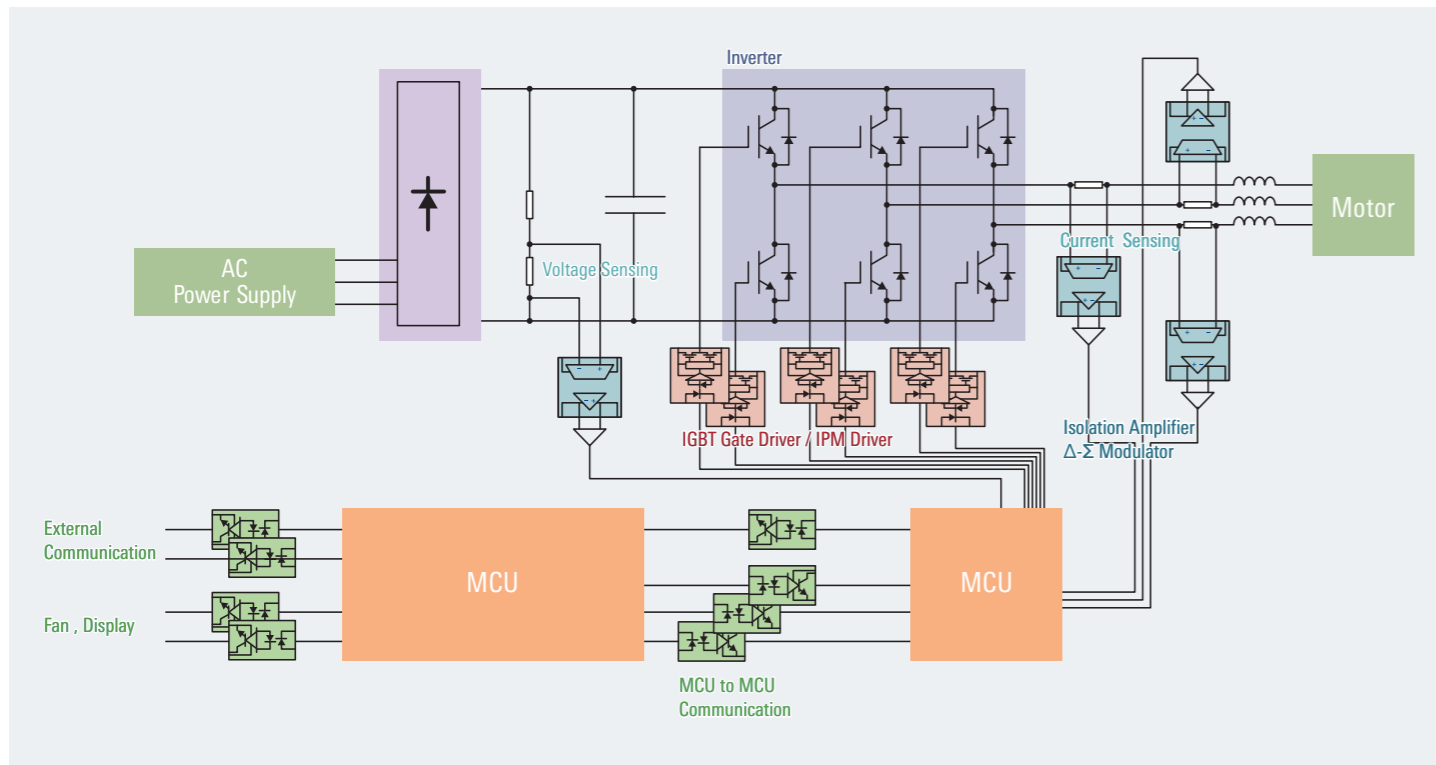
• Lineup

- PS9031 for IGBT drive
- IPM drive
- Active-high: PS9009
- Active-low: PS9013
- PS9001 for 10Mbps high-speed communication

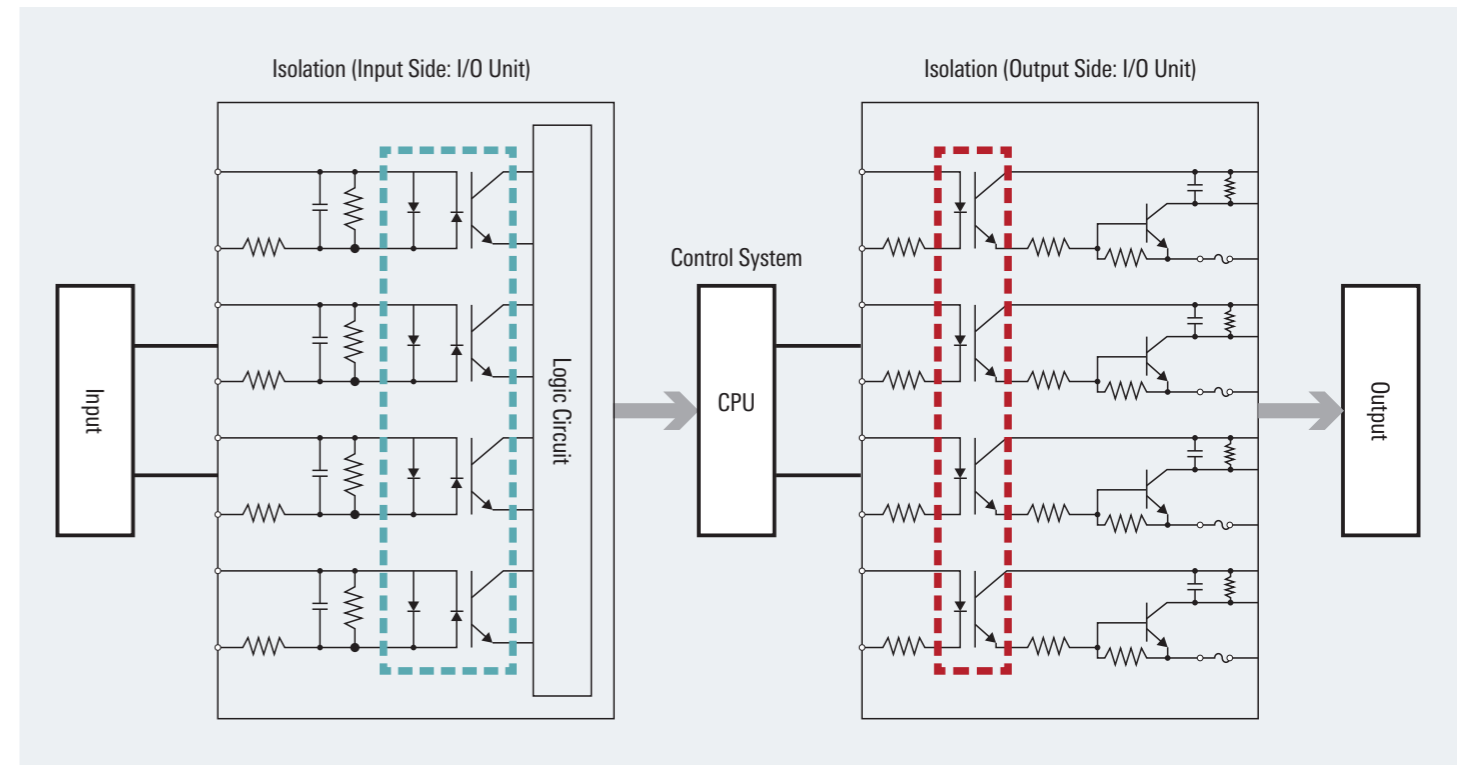


Application Examples

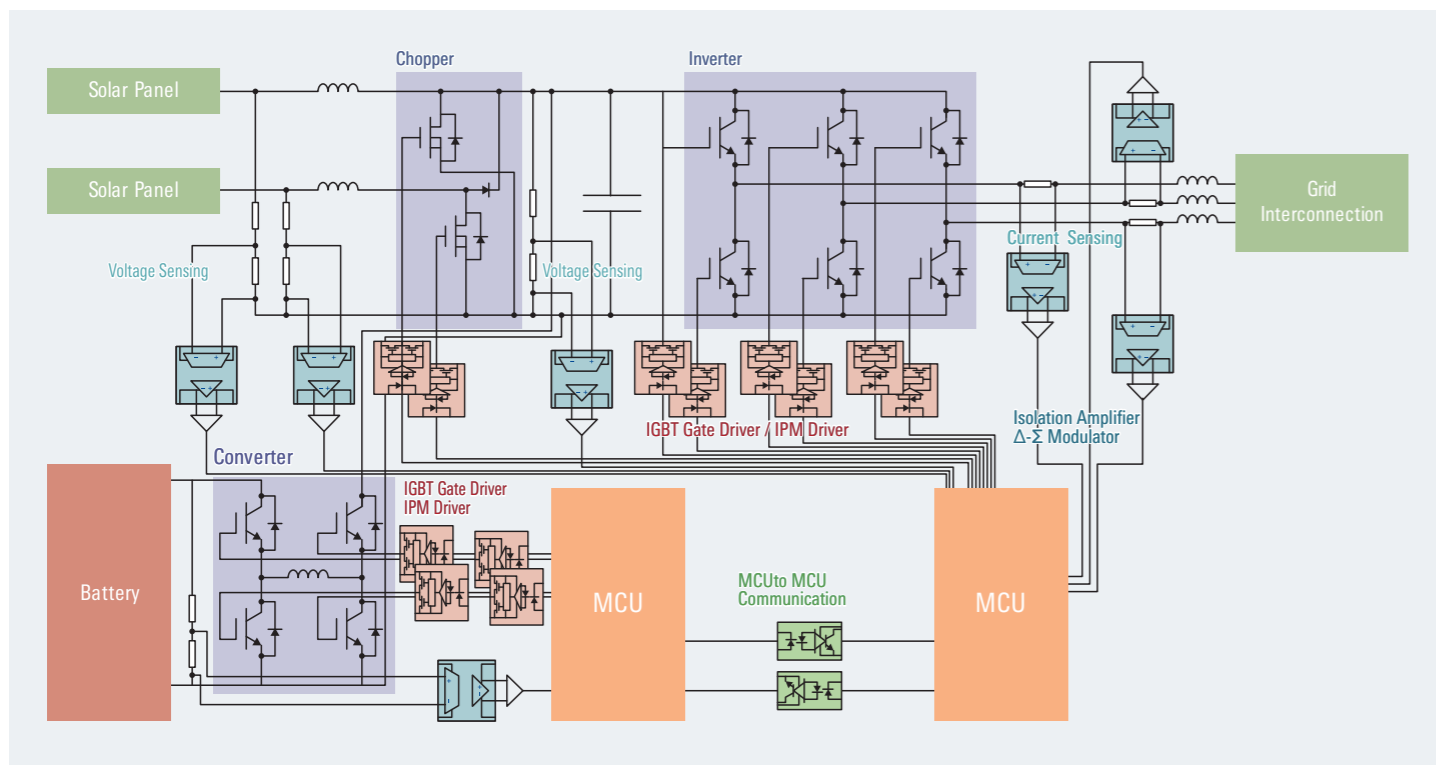
Motor Solution



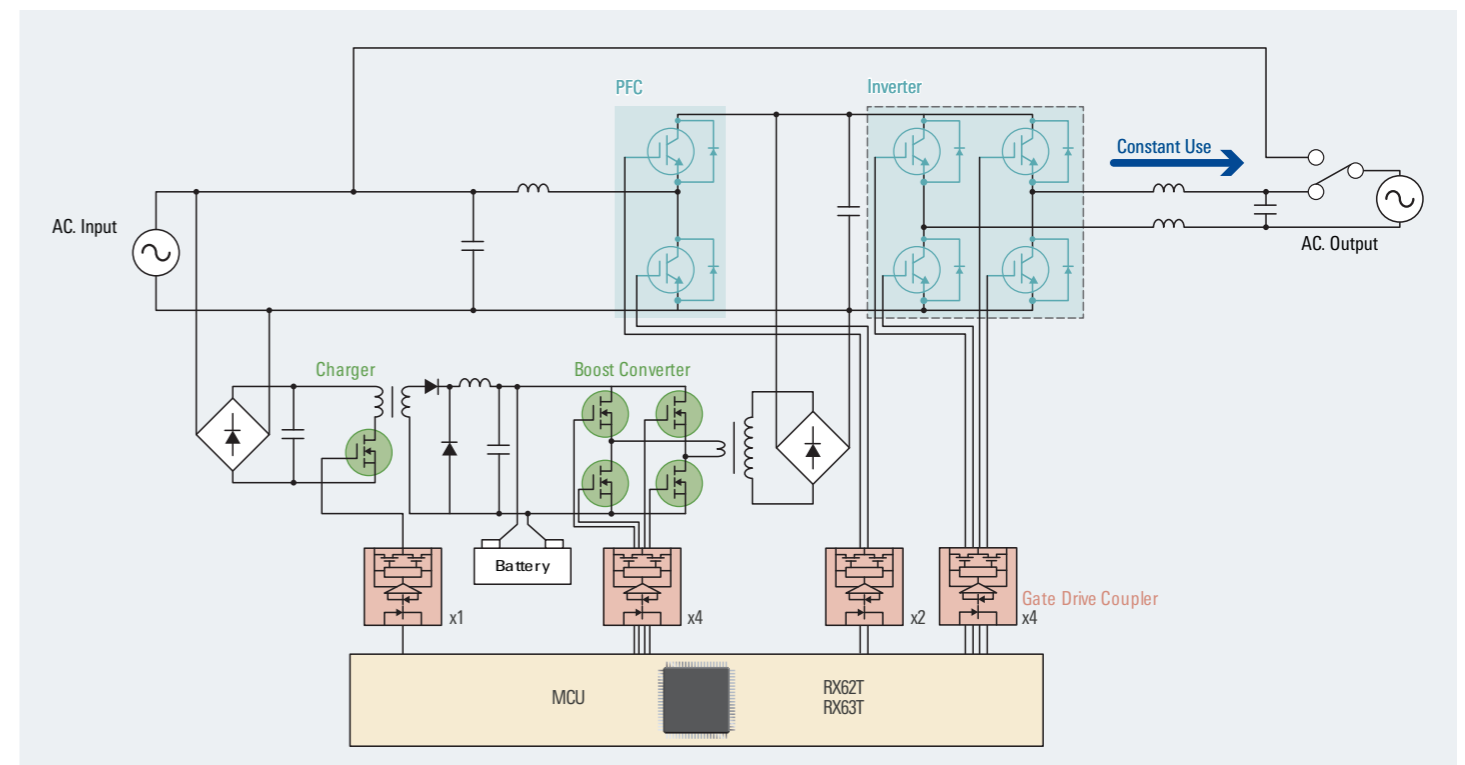
PLC



Power Control + Storage Battery



UPS



Isolation Amplifiers

Function	Part No.	Output	Package		Absolute Maximum Ratings		Electrical Characteristics							
			Configuration	Creepage [mm]	Dielectric Strength [Vr.m.s]	Ta max. [°C]	Input Voltage Linearity Range [mV]	Gain typ. [-]	Gain Error Max. [%]	NL typ. [%]	VDD2 [V]	CMR min. [kV/μs]	fc typ. [kHz]	Output Type
Isolation amplifier	PS8551A	Analog	DIP8	8	5000	105	-200 to 200	8	1	0.014	5	10	100	Differential
	PS8352A		SDIP8	8	5000	110	-200 to 200	8	1	0.014	5	10	100	Differential

Δ-Σ Modulators

Function	Part No.	Output	Package		Absolute Maximum Ratings		Electrical Characteristics						
			Configuration	Creepage [mm]	Dielectric Strength [Vr.m.s]	Ta max. [°C]	Input Voltage Linearity Range [mV]	Gain Error Max. [%]	INL max. [LSB]	VDD2 [V]	ENOB typ. [bits]	CMR min. [kV/μs]	fCLK typ. [MHz]
Δ-Σ Modulators	PS9551A	Digital	DIP8	8	5000	105	-200 to 200	1	3	5	12	15	10
	PS9352A		SDIP8	8	5000	110	-200 to 200	1	3	5	12	15	10

High-Speed Communication (Analog)

Function	Part No.	Speed	Output Type	Absolute Maximum Rated Power Supply Voltage [V]	Package		Dielectric Strength [Vr.m.s]	Ta max.	Electrical Characteristics						
					Configuration	Creepage [mm]			Detector				Coupled		
									IOH @Vcc30V max. [μA]	VOL max. [V]	ICCL typ. [μA]	ICCH max. [μA]	CTR IF 16mA Vcc 4.5V Vo 0.4V [%]	tpHL/LH max. [ns]	CMR min. [kV/μs]
High-Speed Communication (Analog)	PS8101	1M	Open Collector	35	S05	4.2	3750	100	100	0.4	50	2	15 to 35	800/1200	15
	PS8302				SDIP6	L:7 L2:8	5000	110	100	0.4	150	1	15 and Over	800/800	15
	PS8501				DIP8	-L:3.7 L1/L2:8	5000	100	100	0.4	150	1	15 and Over	800/800	-
	PS8502														
	PS8902				LSDIP4	14.5	7500	110	100	0.4	50	2	15 to 35	800/1200	15

High-Speed Communication (Digital)

Function	Part No.	Speed	Output Type	Power Supply Voltage [V]	Package		Dielectric Strength [Vr.m.s]	Ta max.	DC				AC			
					Configuration	Creepage Distance [mm]			VOL max. [V]	VOH min. [V]	ICCL/H max. [mA]	IFHL max. [mA]	tpHL/LH max. [ns]	PWD max. [ns]	tpsk max. [ns]	CMR min. [kV/μs]
High-Speed Communication (Digital)	PS9122	1M	Open Collector	N 2.7~3.6, L 4.5~5.5	S05	4.2	3750	100	0.6	-	3.5/2.5	5.0	500/700	200	-	15
	PS9822-1/2				S08	4.0	2500	100	0.6	-	3.5/2.5	5.0	500/700	200	-	-
	PS9124	10M	Open Collector	2.7~3.6 & 4.5~5.5	S05	4.2	3750	110	0.6	-	10/7	3.0	100/100	35	40	10
	PS9324				SDIP6	L:7 L2:8	5000	110	0.6	-	10/7	3.0	100/100	35	40	15
	PS9924				LSDIP8	14.5	7500	110	0.6	-	10/7	5.0	100/100	35	40	15
	PS9821-1/2				S08	4.0	2500	85	0.6	-	10/7	5.0	100/100	35	40	15
	PS9587				DIP8	-L:3.7 L1/L2:8	5000	85	0.6	-	11/8	5.0	100/100	50	60	15
	PS9317															
	PS9001				LSO5	8.0	5000	125	0.6	-	2/2	4.0	100/100	50	60	20
	PS9117A				S05	4.2	3750	85	0.6	-	10/7	5.0	100/100	35	40	15
	PS9817A-1/2				S08	4.0	2500	85	0.6	-	10/7	5.0	100/100	35	40	15
	PS9123				15M	Totem Pole	4.5~5.5	S05	4.2	3750	100	0.6	2.4	10/7	5.0	60/60
	PS9151	S05	4.2	3750				100	0.1	4.0	5/5	5.0	60/60	30	40	15
	PS9851															
	PS9851	S08	4.0	2500				100	0.1	4.0	5/5	6.0	60/60	30	40	10
PS9351	SDIP6	L:7 L2:8	5000	100				0.1	4.0	5/5	5.0	60/60	30	40	15	

Transistor-Output (DC Input) Single

Function	Part No.	Output Type	Package		Absolute Maximum Ratings				Electrical Characteristics				
			Configuration	Creepage [mm]	VCEO max. [V]	IC max. [mA]	Dielectric Strength [Vr.m.s]	Ta max.	DC	SW			
									CTR %	tr typ. [μs]	tf typ. [μs]	ton typ. [μs]	toff typ. [μs]
Transistor-Output (DC Input)	PS2561D-1	Single	DIP4	-L:7 L1/L2:8	80	50	5000	110	50 to 400	3	5	-	-
	PS2561F-1		DIP4	7	80	50	5000	110	300 to 600	5	7	-	-
	PS2514-1		DIP4	7	40	20	5000	100	50 to 200	-	-	15	15
	PS2381-1		LSOP4	8	80	50	5000	115	50 to 400	4	5	-	-
	PS2701A-1		SOP4	5	70	30	3750	100	50 to 300	5	7	8	10
	PS2761B-1		SOP4	5	70	50	3750	110	50 to 400	4	5	8	5
	PS2703-1		SOP4	5	120	30	3750	100	50 to 400	10	10	13	11
	PS2711-1		SOP4	5	40	40	3750	100	100 to 400	4	5	-	-
	PS2801C-1		SSOP4	4.5	80	30	2500	100	50 to 400	5	7	10	7
	PS2801C-4		SSOP16	4.5	80	30	2500	100	50 to 400	5	7	10	7
	PS2861B-1		SSOP4	5	70	50	3750	110	50 to 300	4	5	5	5
	PS2811-1		SSOP4	4.5	40	40	2500	100	100 to 400	4	5	7	5
	PS2811-4		SSOP16	4.5	40	40	2500	100	100 to 400	4	5	7	5
	PS2841-4A		SSOP Common Leads	4	70	20	1500	100	100 to 400	-	-	20	110
	PS2841-4B		SSOP Common Leads	4	70	20	1500	100	100 to 400	-	-	20	110
	PS2911-1		Flat Leads	4	40	40	2500	100	100 to 400	5	10	40	120
	PS2913-1		Flat Leads	4	120	30	2500	100	50 to 200	10	10	80	50

Transistor-Output (DC Input) Darlington

Function	Part No.	Output Type	Absolute Maximum Ratings		Package		Dielectric Strength [Vr.m.s]	Ta max. [°C]	Electrical Characteristics																		
			VCEO [V]	IC [mA/ch]	Configuration	Creepage [mm]			DC			SW															
									CTR min. [%]	CTR max. [%]	VCE SAT [V]	tr typ. [μs]	tf typ. [μs]	ton typ. [μs]	toff typ. [μs]												
Transistor-Output (DC Input)	PS2802-1	Darlington	40	90	SSOP4	4.5	2500	100	200	-	1.0	200	200	-	-												
	PS2802-4															100	SSOP16	4.5	2500	100	200	-	1.0	200	200	-	-
	PS2562-1															200	DIP4	7	5000	100	200	-	1.0	100	100	-	-
	PS2702-1															200	SOP4	5	3750	100	200	-	1.0	70	60	90	60
	PS2833-1															60	SSOP4	4.5	2500	100	400	4500	1.0	20	5	-	-
	PS2833-4															60	SSOP16	4.5	2500	100	400	4500	1.0	20	5	-	-
	PS2535-1															120	DIP4	7	5000	100	400	5500	1.0	18	5	-	-
	PS2533-1															150	DIP4	7	5000	100	1500	6500	1.0	100	100	-	-
	PS2733-1															150	SOP4	5	2500	100	1500	-	1.0	100	100	-	-

Transistor-Output (AC Input)

Function	Part No.	Output Type	Package		Absolute Maximum Ratings				Electrical Characteristics					
			Configuration	Creepage [mm]	VCEO max. [V]	IC max. [mA]	Dielectric Strength [Vr.m.s]	Ta max.	DC	SW				
									CTR %	tr typ. [μs]	tf typ. [μs]	ton typ. [μs]	toff typ. [μs]	
Transistor-Output (AC Input)	PS2565-1	Single	DIP4	7	80	50	5000	100	80 to 400	3	5	-	-	
	PS2705A-1		SOP4	5	70	30	3750	100	50 to 300	5	7	8	10	
	PS2715-1		SOP4	5	40	40	3750	100	100 to 400	4	5	-	-	
	PS2805C-1		SSOP4	4.5	80	30	2500	100	50 to 400	5	7	10	7	
	PS2805C-4		SSOP16	4.5	80	30	2500	100	50 to 400	5	7	10	7	
	PS2815-1		SSOP4	4.5	40	40	2500	100	100 to 400	4	5	7	5	
	PS2815-4		SSOP16	4.5	40	40	2500	100	100 to 400	4	5	7	5	
	PS2845-4A		SSOP Common Leads	4	70	20	1500	100	100 to 400	-	-	20	110	
	PS2915-1		Flat Leads	4	40	40	2500	100	100 to 400	5	10	40	120	
	PS2506-1		Darlington	DIP4	7	40	200	5000	100	200 min.	100	100	-	-
	PS2706-1			SOP4	5	40	200	3750	100	200 min.	200	200	-	-

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