Standex Electronics

PHOTO-MOSFET SOLID STATE RELAYS OVERVIEW

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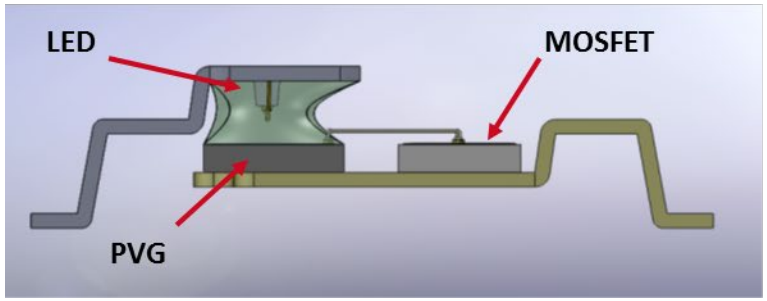
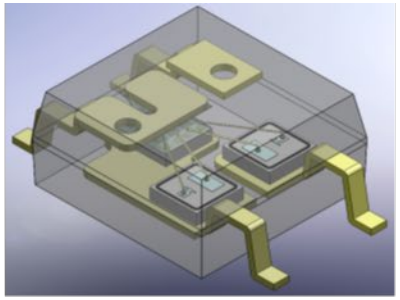
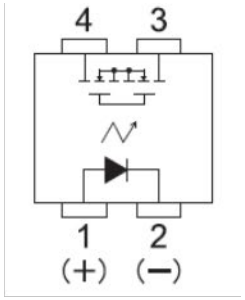
Introduction to Photo-MOSFET Solid State Relays

❖ What is a Photo-MOSFET Solid State Relay?

- ➢ Control Side: IR LED
- ➢ Output Side: PVG & MOSFET output

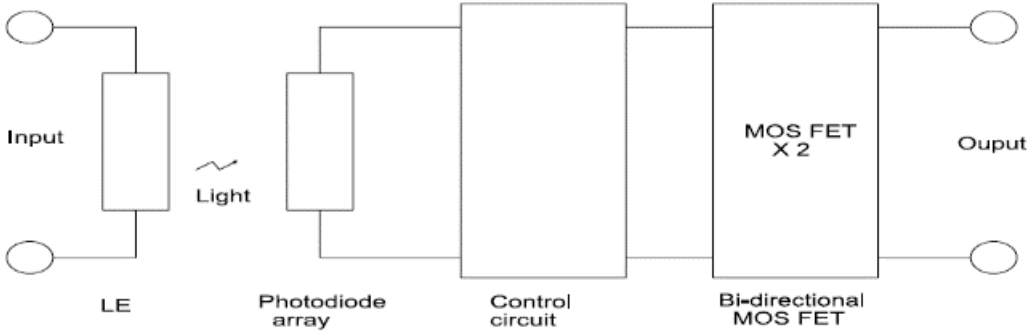






❖ Functionality

- ➢ Current flow through IR LED generates IR frequency light
- ➢ IR incident on PVG, (photovoltaic generator), photo diode array creates photo current & generates voltage
- ➢ MOSFET Gate turns on when voltage exceeds threshold level



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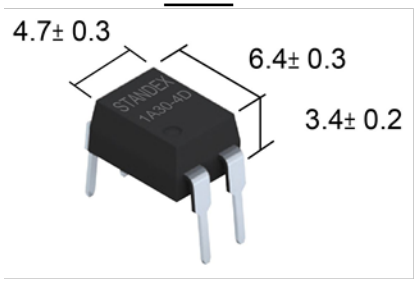
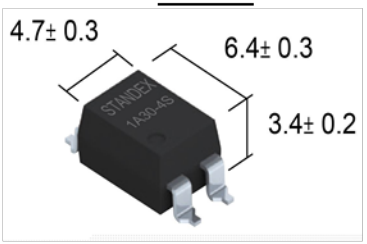
Features & General Specifications

- **AC or DC Switching in a very small package**
  - Output Voltage, V_L : 40 ~ 1500 V (DC or Peak AC)
  - Output Current, I_L : 30mA ~ 4.5A
  - Output Capacitance, C_{OUT}: 13 pF ~ 470 pF
- **Low operation current**
  - Input Current, I_F : 3 ~ 50 mA, 10 mA or higher recommended
- **Fast switching speed**
  - Turn-On Time, T_{ON}: 0.05 mS ~ 3.0 mS
- **Stable On-resistance**
  - On Resistance R_{ON}: 0.07 ohm ~ 200 ohm
- **Extremely high Input-Output isolation**
  - I/O Breakdown Voltage, $V_{I/O}$: SOP --1500 VAC ; DIP & SMD -- 3750 / 5000 VAC
- **Low Off-state leakage current**
  - Off State Leakage, I_{LEAK}: 1uA ~ 10uA
- **High Reliability and long operating life**
- **Vibration proof and shock proof**
- **No Contact Bounce**
- **Package : DIP / SMD / SOP**
- **Number of Pins : 4 / 6 / 8 pin**

DIP



SMD



SOP

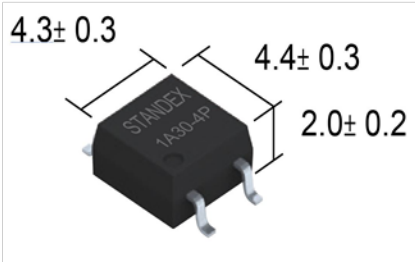


Photo-MOSFET Solid State Relay P/N System

Product Marking

S M P - 1 A 3 0 - 4 S T - Q

1 2 3 4 5 6 7 8 9 10 11

Standex Meder Photo-MOSFET

Number of poles – 1 or 2

Contact form – A, B or C (1A + 1B)

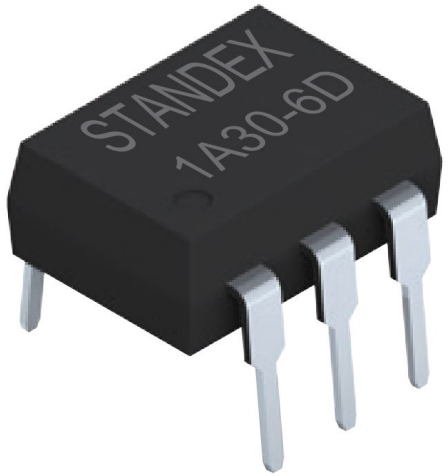
Series number

Number of pins – 4, 6 or 8

Package type – DIP, SMD or SOP

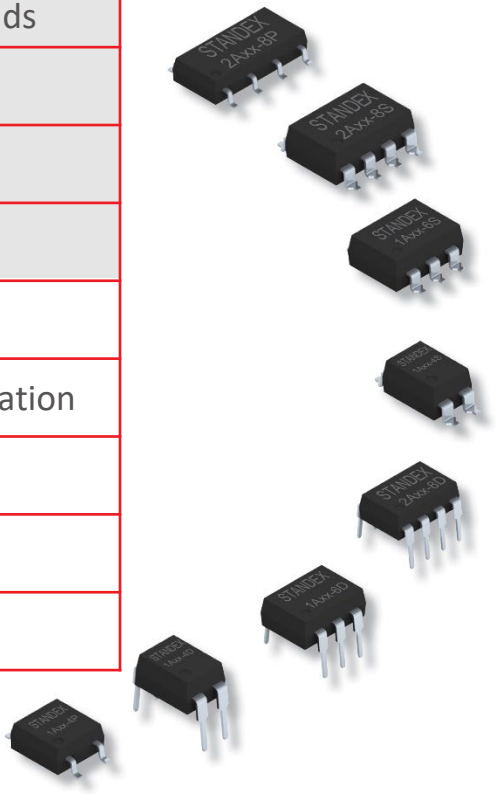
Packaging – Tube or Reel

Special features – Nil = Standard, R = Reinforced Isolation or Q = AEC-Q101/Hi-Temp



Advantages of Photo-MOSFET Solid State Relays vs. Reed Relays

Specification	Reed	Photo-MOSFET
		Advantage
Longer life expectancy	1 billion cycles at low level load	Nearly unlimited across rated loads
Fast switching speed		√
Smaller package		√
No bounce of contacts		√
Higher switching voltage	0 -10 kVDC	1 – 1.5 kVDC
Isolation voltage (across open output)	up to 15kVDC	No galvanic isolation
Isolation voltage (input to output)	up to 15kVDC	up to 5kVDC
Higher contact resistance	<150 mΩ	0.07 Ω ~ 200 Ω
Leakage current	~10^{-13}	~10^{-6}



Advantage

Applications / Markets








- **Measurement Equipment**
  (ex. Memory Testers, Logic Testers, Board Testers, Data Loggers, Multi-point Recorders, Flow meters, Timers)
- **BMS**
  (ex. Battery monitoring, Battery Balancing, Isolation testing)
- **Telecommunication Equipment**
  (ex. Modems, Electronic switching systems, PBX, multi-function telephones, Fax)
- **Industrial Equipment**
  (ex. Robotics, Process Controllers, PLC, Compressors, Numerical Controllers, Thermostats, Relay output I/O boards, actuator drivers)
- **Medical Equipment**
  (ex. Electrocardiograph, Electroencephalograph, X-ray CT scanners)
- **Security Equipment**
  (ex. Home, Office & Building security systems)
- **Home Electronic Equipment**
  (ex. Air conditioners, Refrigerators, Microwave ovens, Washing machines, Internet TV, Home Network Box)
- **Telemetry Equipment**
  (ex. Automatic meter reading systems, Home medical equipment, Plant monitoring systems, Security systems)

Applications / Markets Cont'd

❖ Important Parameters When Considering an Application

- V_L : Max. output load voltage
- I_L : Max. output load current
- R_{on} : On State Output Resistance
- C_{out} : On State Output Capacitance
- $V_{I/O}$: Isolation input to output (I/O Breakdown Voltage)
- T_{on} : for testing speed & efficiency
- I_{Leak} : Off State Leakage Current

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