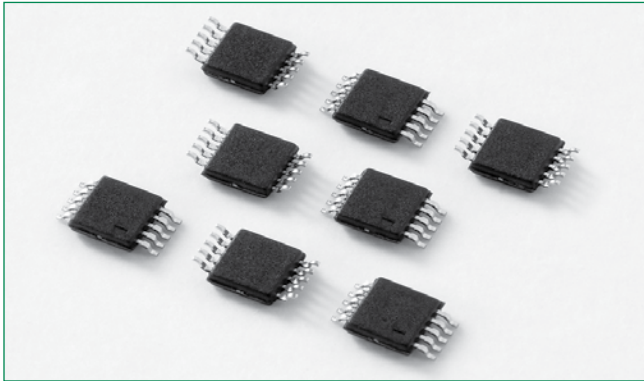
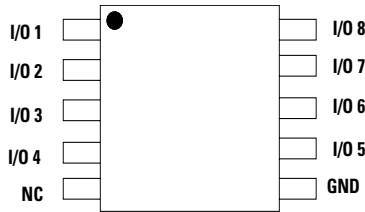


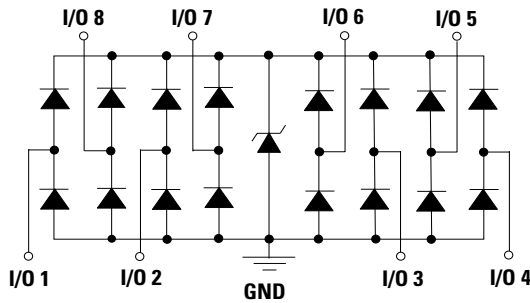
SP4065 Series 3.3V 20A Diode Array



Pinout



Functional Block Diagram



Additional Information



Datasheet



Resources



Samples

Life Support Note:

Not Intended for Use in Life Support or Life Saving Applications

The products shown herein are not designed for use in life sustaining or life saving applications unless otherwise expressly indicated.

Description

The SP4065 integrates low capacitance diodes with an additional zener diode to protect each I/O pin against ESD and high surge events. This robust device can safely absorb up to 20A per IEC 61000-4-5, 2nd Edition ($t_p=8/20\mu s$) without performance degradation and a minimum $\pm 30kV$ ESD per IEC 61000-4-2 International Standard. Their low loading capacitance also makes them ideal for protecting highspeed signal pins.

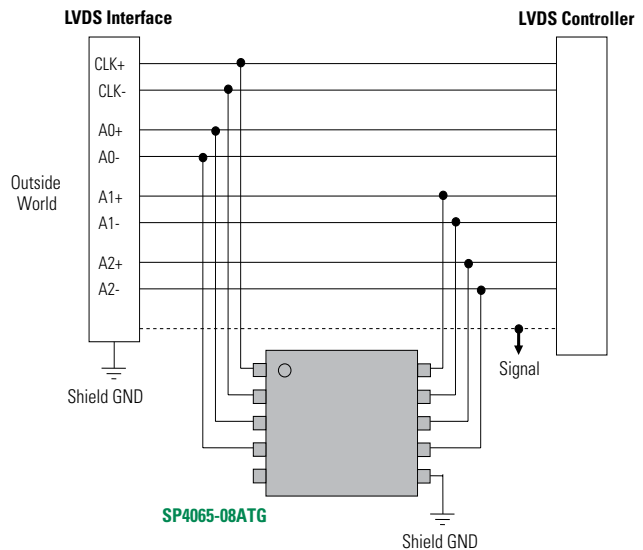
Features

- ESD, IEC 61000-4-2, $\pm 30kV$ contact, $\pm 30kV$ air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5, 2nd Edition 20A (8/20 μs)
- Low capacitance of 4.4pF (TYP) per I/O
- Low leakage current of $1\mu A$ (MAX) at 3.3V
- Halogen free, Lead-free and RoHS compliant
- Moisture Sensitivity Level (MSL - Level 1)

Applications

- LCD/LED TVs
- Desktops
- Game Consoles
- Set Top Boxes
- Notebooks
- 1Gb Ethernet
- Network Hardware
- Small Cells

Application Example



Absolute Maximum Ratings

| Symbol | Parameter | Value | Units |
|------------|--------------------------------------|------------|-------|
| I_{PP} | Peak Current ($t_p=8/20\mu s$) | 20.0 | A |
| P_{PK} | Peak Pulse Power ($t_p=8/20\mu s$) | 300 | W |
| T_{OP} | Operating Temperature | -40 to 125 | °C |
| T_{STOR} | Storage Temperature | -55 to 150 | °C |

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Thermal Information

| Parameter | Rating | Units |
|---|------------|-------|
| Storage Temperature Range | -55 to 150 | °C |
| Maximum Junction Temperature | 150 | °C |
| Maximum Lead Temperature (Soldering 20-40s) | 260 | °C |

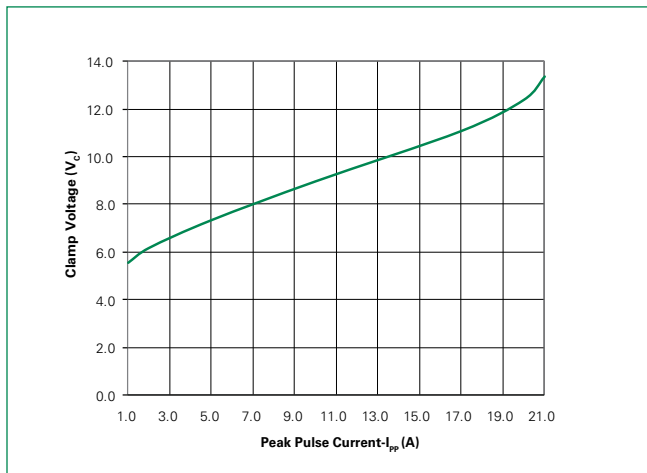
Electrical Characteristics ($T_{OP}=25^\circ C$)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Units |
|------------------------------------|---------------|---|----------|------|-----|----------|
| Reverse Standoff Voltage | V_{RWM} | | | | 3.3 | V |
| Snap Back Voltage | V_{SB} | $I_{SB}=50mA$ | 2.8 | | | V |
| Reverse Leakage Current | I_{LEAK} | $V_R=3.3V$, I/O to GND | | 0.5 | 1.0 | μA |
| Clamp Voltage ¹ | V_C | $I_{PP}=1A$, $t_p=8/20\mu s$, Fwd | | 5.5 | | V |
| | | $I_{PP}=5A$, $t_p=8/20\mu s$, Fwd | | 7.0 | | V |
| | | $I_{PP}=10A$, $t_p=8/20\mu s$, Fwd | | 9.0 | | V |
| | | $I_{PP}=20A$, $t_p=8/20\mu s$, Fwd | | 13.5 | | V |
| Dynamic Resistance | R_{DYN} | $(V_{C2} - V_{C1}) / (I_{PP2} - I_{PP1})$ | | 0.4 | | Ω |
| ESD Withstand Voltage ¹ | V_{ESD} | IEC61000-4-2 (Contact) | ± 30 | | | kV |
| | | IEC61000-4-2 (Air) | ± 30 | | | kV |
| Diode Capacitance ¹ | $C_{I/O-GND}$ | Reverse Bias=0V | | 4.4 | 5.0 | pF |
| Diode Capacitance ¹ | $C_{I/O-I/O}$ | Reverse Bias=0V | | 2.2 | | pF |

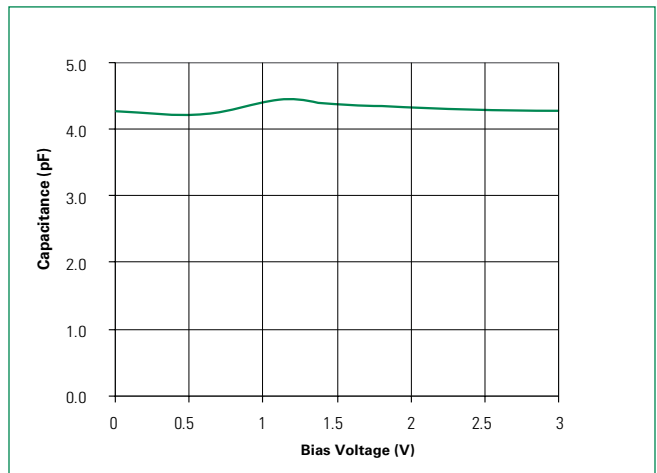
Note:

1. Parameter is guaranteed by design and/or device characterization.

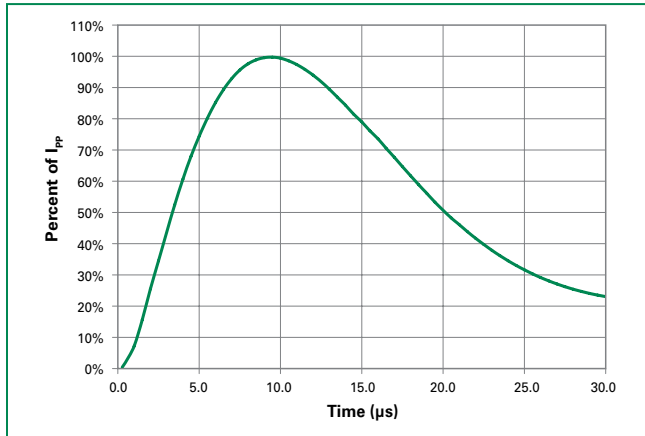
Clamping Voltage vs. I_{PP}



Capacitance vs. Bias



8/20µs Pulse Waveform



Product Characteristics

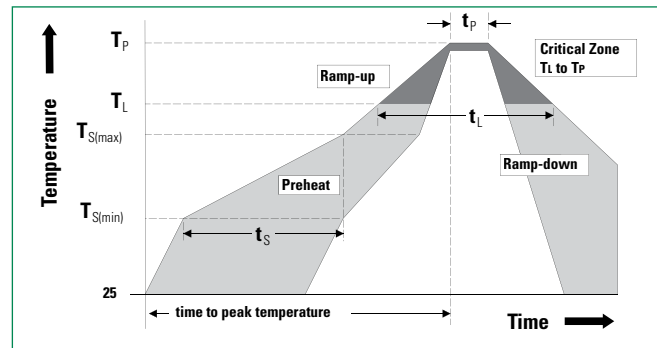
| | |
|---------------------------|-------------------------------|
| Lead Plating | Pre-Plated Frame |
| Lead Material | Copper Alloy |
| Lead Coplanarity | 0.0004 inches (0.102mm) |
| Substrate material | Silicon |
| Body Material | Molded Epoxy, rated UL 94 V-0 |

Notes :

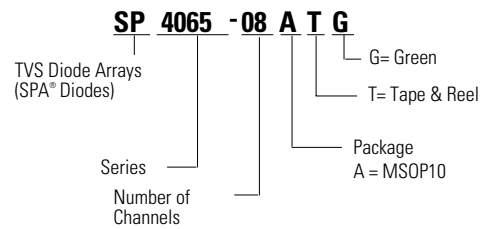
1. All dimensions are in millimeters
2. Dimensions include solder plating.
3. Dimensions are exclusive of mold flash & metal burr.
4. Blo is facing up for mold and facing down for trim/form, i.e. reverse trim/form.
5. Package surface matte finish VDI 11-13.

Soldering Parameters

| | | |
|--|------------------------------------|------------------|
| Reflow Condition | Pb – Free assembly | |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus) Temp (T_L) to peak | 3°C/second max | |
| $T_{s(max)}$ to T_L - Ramp-up Rate | 3°C/second max | |
| Reflow | - Temperature (T_L) (Liquidus) | 217°C |
| | - Temperature (t_i) | 60 – 150 seconds |
| Peak Temperature (T_p) | 260 ^{+0/-5} °C | |
| Time within 5°C of actual peak Temperature (t_p) | 20 – 40 seconds | |
| Ramp-down Rate | 6°C/second max | |
| Time 25°C to peak Temperature (T_p) | 8 minutes Max. | |
| Do not exceed | 260°C | |



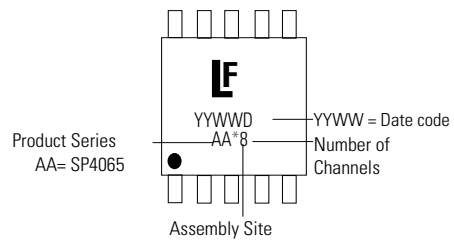
Part Numbering System



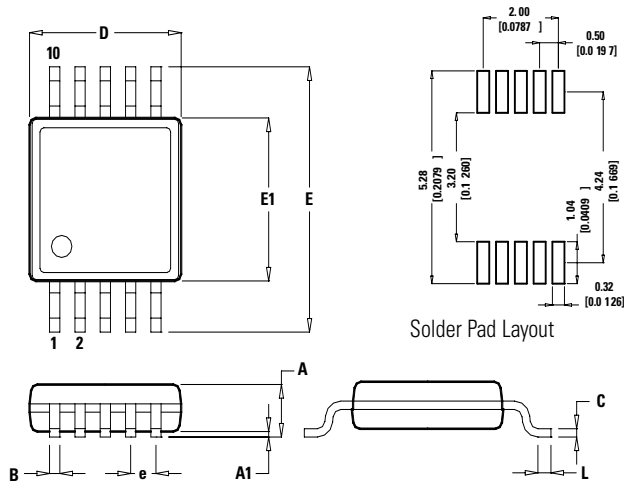
Ordering Information

| Part Number | Package | Min. Order Qty. |
|--------------|---------|-----------------|
| SP4065-08ATG | MSOP-10 | 4000 |

Part Marking System

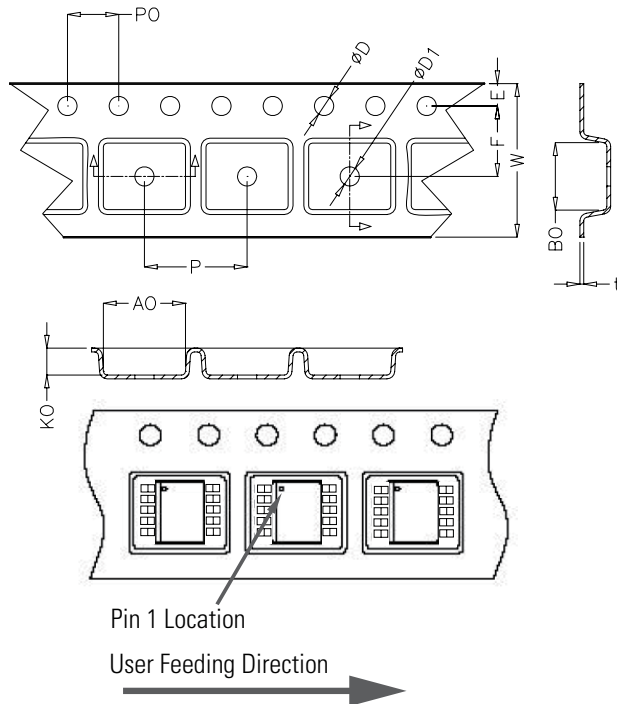


Package Dimensions – MSOP-10



| Package | MSOP | | | |
|---------|-------------|------|-----------|-------|
| Pins | 10 | | | |
| JEDEC | MO-187 | | | |
| Symbol | Millimeters | | Inches | |
| DIM | Min | Max | Min | Max |
| A | - | 1.10 | - | 0.043 |
| A1 | 0.00 | 0.15 | 0.000 | 0.006 |
| B | 0.17 | 0.27 | 0.007 | 0.011 |
| c | 0.08 | 0.23 | 0.003 | 0.009 |
| D | 2.90 | 3.10 | 0.114 | 0.122 |
| E | 4.67 | 5.10 | 0.184 | 0.200 |
| E1 | 2.90 | 3.10 | 0.114 | 0.122 |
| e | 0.50 BSC | | 0.020 BSC | |
| L | 0.40 | 0.80 | 0.016 | 0.032 |

Embossed Carrier Tape & Reel Specification – MSOP-10



| Symbol | Millimetres | | Inches | |
|--------|---------------|-------|-----------------|-------|
| | Min | Max | Min | Max |
| E | 1.65 | 1.85 | 0.065 | 0.073 |
| e | 0.5 | | 0.02 | |
| F | 5.40 | 5.60 | 0.213 | 0.220 |
| D | 1.50 | 1.60 | 0.059 | |
| D1 | 1.50 Min | | 0.059 Min | |
| P0 | 3.90 | 4.10 | 0.154 | 0.161 |
| W | 11.70 | 12.30 | 0.460 | 0.484 |
| P | 7.90 | 8.10 | 0.311 | 0.319 |
| A0 | 5.20 | 5.40 | 0.205 | 0.213 |
| B0 | 3.20 | 3.50 | 0.126 | 0.138 |
| K0 | 1.20 | 1.50 | 0.047 | 0.059 |
| t | 0.30 +/- 0.05 | | 0.012 +/- 0.002 | |

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