

SP0506CA, SP0518CAA

NEW

This family of rail clamp or “diode steering” arrays are designed for very low capacitance ESD protection and is offered in small surface mount packages. An Avalanche diode has been added between VP and VN to suppress transients on the supply rails. The multi-channel devices are used to help protect high speed sensitive digital or analog input circuits on data, signal, or control lines with unipolar voltage levels up to 5VDC. The state-of-the-art structure is designed to suppress ESD and other transient over-voltage events to meet the International Electrotechnical Compatibility (IEC) transient immunity standards IEC 61000-4-2 for Electrostatic Discharge Requirements.

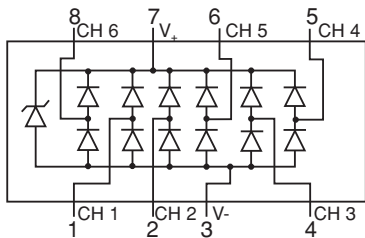
The monolithic silicon devices are comprised of specially designed low capacitance structures for transient voltage suppression (TVS). The size and shape of these structures have been tailored for transient protection. The very low capacitance and clamp voltage are ideal for ultra high speed signal line protection.

Ordering Information

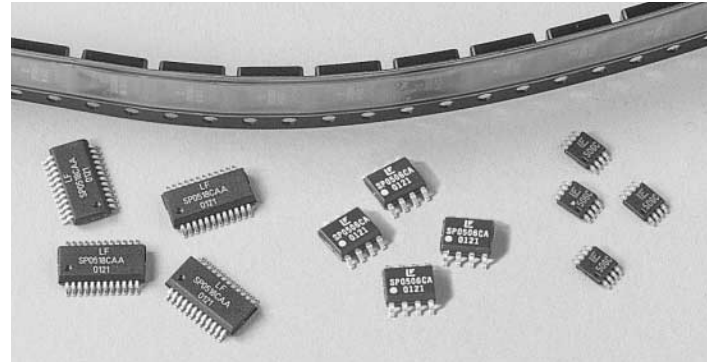
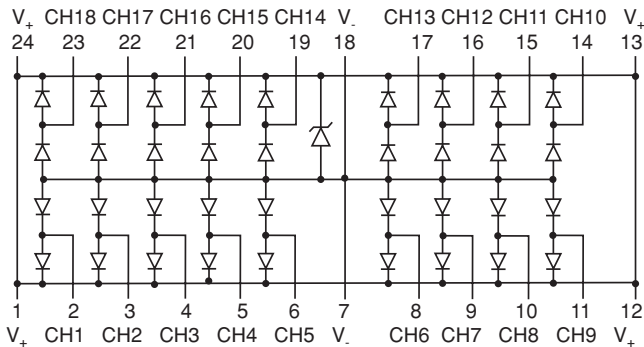
| Part Number | CH | Package Type | Quantity Per Reel |
|-------------|----|--------------|-------------------|
| SP0506CAAT | 6 | MSOP8 | 4000 |
| SP0506CABT | 6 | SOIC8 | 2500 |
| SP0518CAAT | 18 | QSOP24 | 2500 |

Schematic

SP0506CAAT
and
SP0506CABT



SP0518CAAT



Features

- A low capacitance 2, 6 and 18 channel array of rail clamp current steering diodes in small surface mount packages
- ESD Protection Capability (SP0506CA)
 - IEC 61000-4-2, Direct Discharge 8kV (Level 4)
 - MIL STD 3015.7 15kV
- ESD Protection Capability (SP0518CA)
 - IEC 61000-4-2, Direct Discharge 15kV (Level 4)
 - MIL STD 3015.7 15kV
- Input Protection for Applications Up to 5VDC
- Low Input Capacitance 3 - 7pF Typical
- Low Clamp Voltage Vrail + 13V Max
- Low Input Leakage 100nA Typ
- Operating Temperature Range 20°C to 85°C

Applications

- Computer ports
- Personal Digital Assistants (PDA)
- Portable handheld equipment (Laptop, Palmtop computers)
- Computer port, keyboard (USB1.1)

SILICON PROTECTION CIRCUITS 5

Silicon Protection Circuits

TVS Rail Clamp Diode Array with an Avalanche Diode

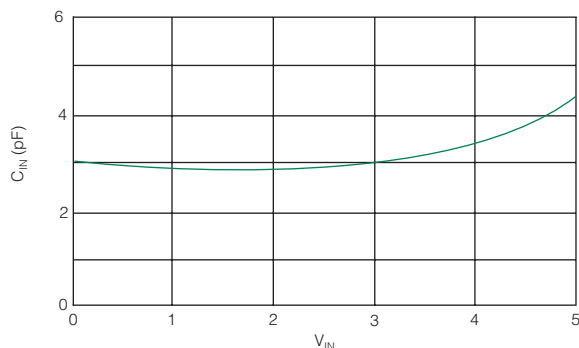
SP0506CA, SP0518CAA

Electrical Specifications $T_A = 25^\circ\text{C}$ Unless Otherwise Specified

| PARAMETER | TEST CONDITIONS | MIN | TYPICAL | MAX | UNITS |
|----------------------------------|---------------------------|-------------|---------|-------------|------------------|
| Operating Supply Voltage | $V_p - V_n$ | - | - | 5.5 | V |
| Supply Current | $V_p - V_n = 5.5\text{V}$ | | | 10 | μA |
| Channel Leakage Current | | | 0.1 | 0.1 | μA |
| Signal Clamp Voltage | 15kV ESD HBM | | | | |
| Positive | | | | $V_p + 13$ | V |
| Negative | | | | $V_N - 13$ | V |
| Diode Forward Voltage | | 0.65 | | 0.95 | V |
| Maximum Forward current | | | | | |
| SP0506x | | | | 20 | mA |
| SP0518 | | | | 40 | mA |
| Maximum DC Input voltage | | $V_N - 0.5$ | | $V_p + 0.5$ | V |
| ESD Test Level (SP0506x) | | | | | |
| IEC-61000-4-2, Contact discharge | | 8 | | | kV |
| MIL-STD-883 Method 3015 (HBM) | | 15 | | | kV |
| ESD Test Level (SP0518) | | | | | |
| IEC-61000-4-2, Contact discharge | | 15 | | | kV |
| MIL-STD-883 Method 3015 (HBM) | | 15 | | | kV |
| Capacitance | | | | | |
| SP0506x | 2.5VDC @ 1Mhz | | 3 | 6 | pF |
| SP0518 | 2.5VDC @ 1Mhz | | 7 | 12 | pF |
| Turn on/off Time | | | <1 | | ns |
| Temperature Range | | | | | |
| Operating | | - 20 | | +85 | $^\circ\text{C}$ |
| Storage | | - 65 | | +150 | $^\circ\text{C}$ |

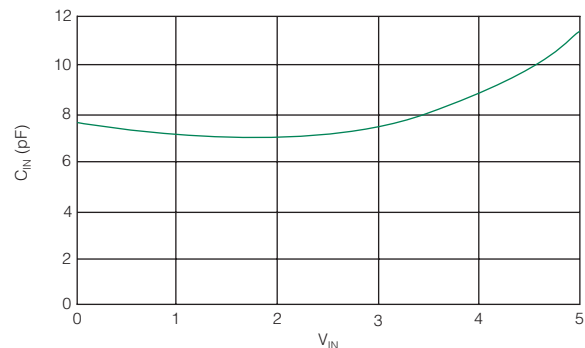
Typical Capacitance

SP0506x



Typical Variation of C_{IN} with V_{IN}
 $(V_p=5\text{V}, V_N=0\text{V}, 0.1\mu\text{F}$ chip capacitor between V_p & $V_N)$

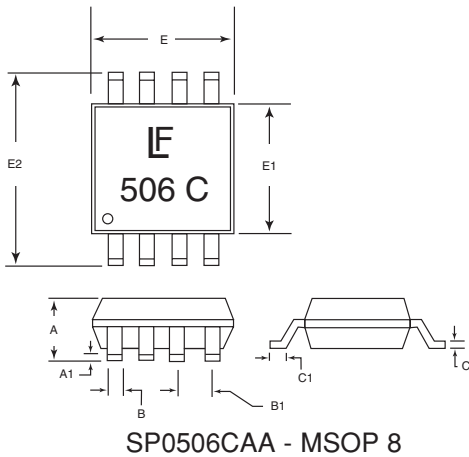
SP0518



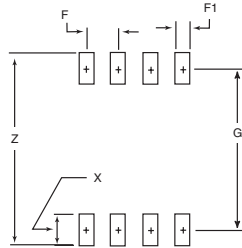
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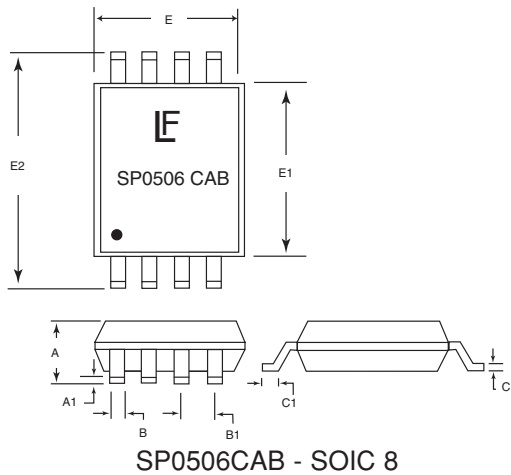
Outline Drawings



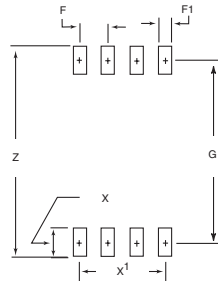
Recommended Pad Layout



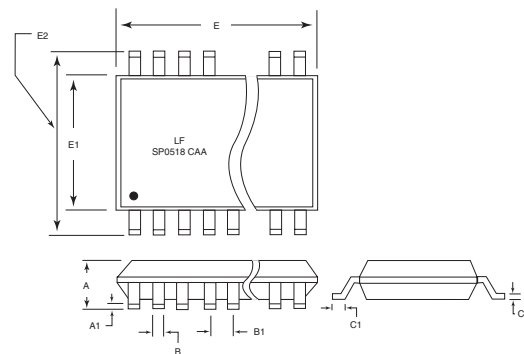
| Package | MSOP 8 | | | |
|---------|--------|---------|--------|---------|
| | mm | | inches | |
| | min | max | min | max |
| E | 2.90 | 3.10 | .114 | .122 |
| E1 | 2.90 | 3.10 | .114 | .122 |
| E2 | 4.78 | 4.98 | .188 | .196 |
| A | 0.87 | 1.17 | .034 | .046 |
| A1 | 0.05 | 0.25 | .002 | .010 |
| B | - | 0.30TYP | - | .012TYP |
| B1 | - | 0.65TYP | - | .25TYP |
| C | - | 0.18TYP | - | .007TYP |
| C1 | 0.52 | 0.54 | .017 | .025 |
| F | - | 0.65 | - | .0256 |
| F1 | - | 0.38 | - | .015 |
| Z | - | 5.28 | - | .208 |
| X | - | 1.04 | - | .041 |
| G | - | 4.24 | - | .167 |



Recommended Pad Layout



| Package | SOIC 8 | | | |
|---------|--------|---------|--------|----------|
| | mm | | inches | |
| | min | max | min | max |
| E | 4.80 | 5.00 | .189 | .197 |
| E1 | 3.80 | 4.19 | .150 | .165 |
| E2 | 5.80 | 6.20 | .228 | .244 |
| A | 1.35 | 1.75 | .053 | .069 |
| A1 | 0.10 | 0.25 | .004 | .010 |
| B | 0.33 | 0.51TYP | .013 | .020TYP |
| B1 | - | 1.27TYP | - | 0.050TYP |
| C | 0.19 | 0.25 | .007 | .010 |
| C1 | 0.40 | 1.27 | .016 | .050 |
| F | - | 1.27 | - | .05 |
| F1 | 0.60 | 0.80 | .02 | .03 |
| Z | 7.20 | 7.40 | - | .29 |
| X | - | 2.40 | - | .09 |
| X' | - | 3.81REF | - | .15REF |
| G | - | 5.00REF | - | .19REF |



| Package | QSOP 24 | | | |
|---------|---------|---------|---------|---------|
| | mm | | inches | |
| | min | max | min | max |
| E | 8.56 | 8.73 | .337 | .344 |
| E1 | 3.81 | 3.98 | .150 | .157 |
| E2 | 5.79 | 6.19 | .228 | .244 |
| A | 1.35 | 1.75 | .053 | .069 |
| A1 | 0.10 | 0.25 | .004 | .010 |
| B | 0.20TYP | 0.30TYP | .008TYP | .012TYP |
| B1 | - | 0.64TYP | - | .025TYP |
| C | 0.18 | 0.25 | .007 | .010 |
| C1 | 0.40 | 1.27 | .016 | .050 |