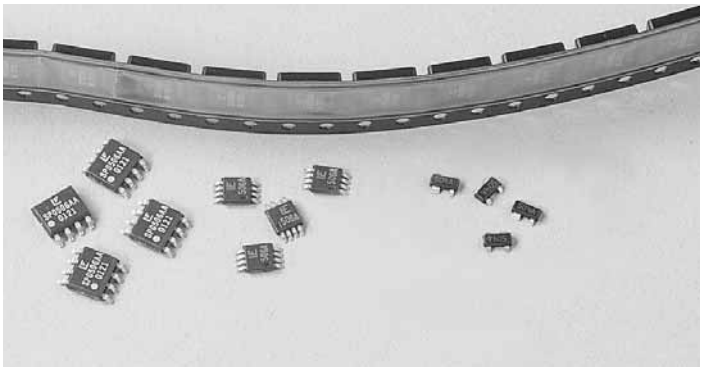
SP0502AAH, SP0506AAA, SP0506AAB

This family of rail clamp or “diode steering” arrays is designed for very low capacitance ESD protection and is offered in small surface mount packages. 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 5 VDC. 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 be tailored for transient protection. The low capacitance and clamp voltage are ideal for high speed signal line protection.

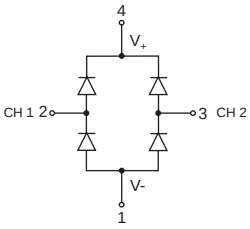


Ordering Information

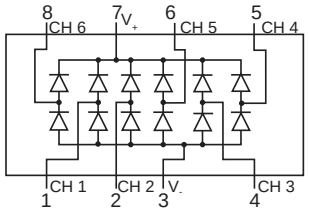
Part Number	CH	Package Type	Quantity Per Reel
SP0502AAHT	2	SOT143	3000
SP0506AAAT	6	MSOP8	4000
SP0506AABT	6	SOIC8	2500

Schematic

SP0502AAHT



SP0506AAHT and SP0506AABT



Features

- A low capacitance 2, 6 and 18 channel array of rail clamp current steering diodes in small surface mount packages
- ESD Protection Capability (SP0502 and SP0506)
  - IEC 61000-4-2, Direct Discharge . . . . . 8kV (Level 4)
  - MIL STD 3015.7 . . . . . 15kV
- ESD Protection Capability (SP0518)
  - IEC 61000-4-2, Direct Discharge . . . . . 15kV (Level 4)
  - MIL STD 3015.7 . . . . . 15kV
- Input Protection for Applications Up to 5VDC
- Fast Response Time . . . . . .< 1ns
- Low Input Capacitance. . . . . .3-7pF Typical
- Low Clamp Voltage . . . . . Vrail + 13V Max
- Operating Temperature Range. . . . . - 40°C to +85°C

Applications

- Cell phone hand sets
- Personal Digital Assistants (PDA)
- Portable handheld equipment (Laptop, Palmtop computers)
- Computer port, keyboard (USB1.1)
- Digital cameras
- V6A port protection
- Digital still camera
- Digital video camera

SP0502AAH, SP0506AAA, SP0506AAB

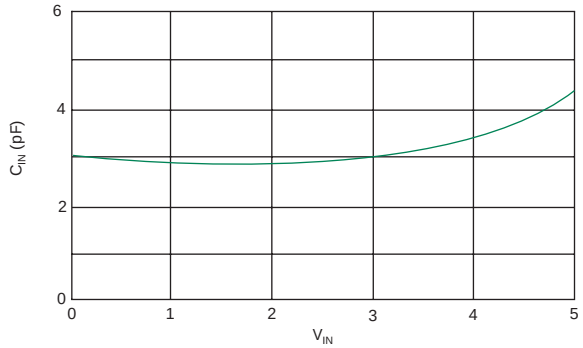
Electrical Specifications T_A = 25°C Unless Otherwise Specified

PARAMETER	TEST CONDITIONS	MIN	TYPICAL	MAX	UNITS
Operating Supply Voltage	Vp - Vn	-	-	6.0	V
Supply Current	Vp - Vn = 5.5V			10	µA
Channel Leakage Current			0.1	1.0	µA
Signal Clamp Voltage(2)	15kV ESD HBM				
Positive				V_P + 13	V
Negative				V_N - 13	V
Diode Forward Voltage I_f = 20mA		0.65		0.95	V
Maximum Forward current (1)					
SP0502 and SP0506x				20	mA
Power Rating (SOT143)				275	µW
SOIC8				350	µW
MSOP8				200	µW
Maximum DC Input voltage		V_N - 0.5		V_P + 0.5	V
ESD Test Level (SP0502 and SP0506x)(3)					
IEC-61000-4-2, Contact discharge		8			kV
MIL-STD-883 Method 3015 (HBM)		15			kV
Capacitance					
SP0502 and SP0506x	2.5VDC @ 1Mhz		3	5	pF
Turn on/off Time			<1		ns
Temperature Range					
Operating		- 40		+85	°C
Storage		- 65		+150	°C

1) One diode conducting at a time.
2) These parameters guarenteed by design and characterization.
3) From I/O pins to V_P or V_N only. V_P bypassed to V_N passed to V_N with a 0.22 µF cermic capacitor.

Typical Capacitance

SP0502 and SP0506x

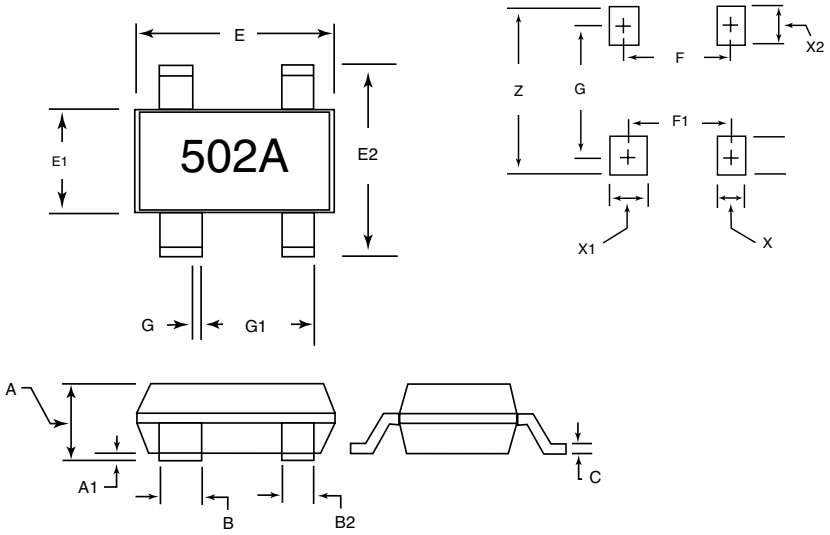


Typical Variation of C_{IN} with V_{IN}
(V_P=5V, V_N=0$_V$, 0.1µF chip capacitor between V_P & V_N)

SP0502AAH, SP0506AAA, SP0506AAB

Outline Drawings

Recommended Pad Layout

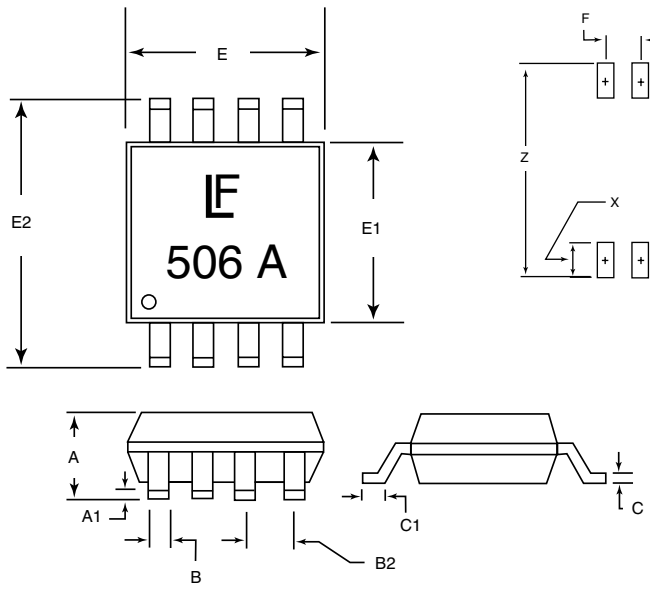


SP0502AAH - SOT143

Package	SOT143			
	mm		inches	
	min	max	min	max
E	2.80	3.04	.110	.120
E1	1.20	1.40	.047	.055
E2	2.10	2.64	.083	.104
G	-	.020REF	-	1.920REF
G1	-	1.920REF	-	.076
A	0.890	1.120	.035	.044
A1	0.013	0.100	.0005	.0040
B	0.760	0.940	.030	.037
B2	0.370	0.510	.015	.020
C	0.0850	0.180	.0033	.0071
Z	3.40	3.60	.134	.140
G	-	2.2REF	-	.087REF
F	-	1.90	-	.075
F1	-	1.70	-	.067
X	0.80	1.00	.032	.040
X1	1.00	1.20	.040	.048
X2	-	1.40	-	.055

Outline Drawings

Recommended Pad Layout



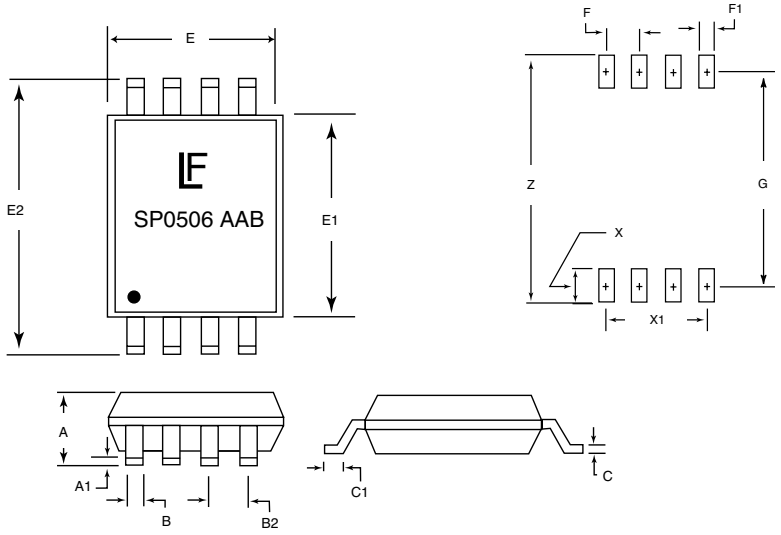
SP0506AAA - MSOP 8

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	-	0.30	-	.012TYP
B2	-	0.65	-	.25TYP
C	-	0.18	-	.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

SP0502AAH, SP0506AAA, SP0506AAB

Outline Drawings

Recommended Pad Layout



SP0506AAB - SOIC 8

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	0.51	.013	.020
B2	-	1.27	-	.050
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
X1	-	3.81REF	-	.15REF
G	-	5.00REF	-	.19REF