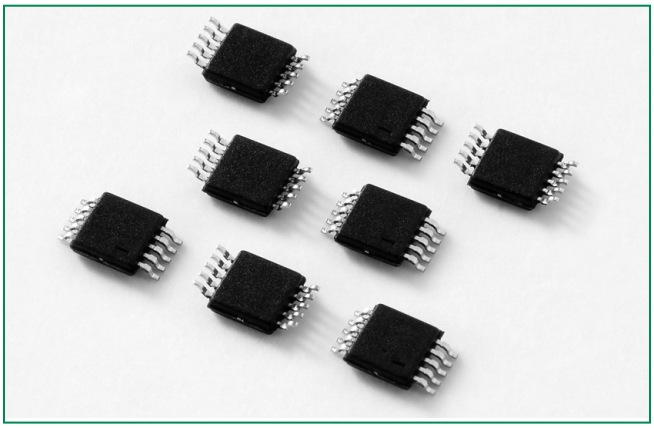
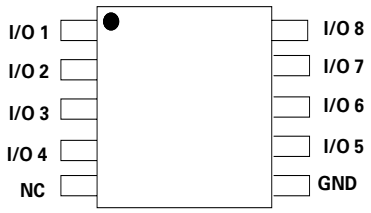
SP4060 Series 2.5V 20A Diode Array

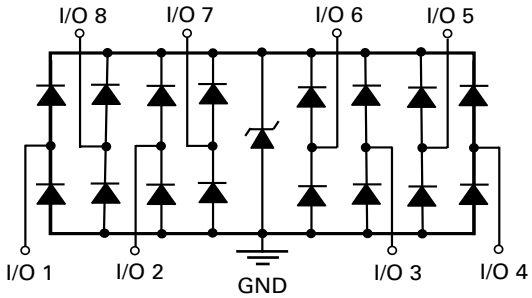
HF RoHS Pb GREEN



Pinout



Functional Block Diagram



Additional Information

Datasheet | Resources | Samples

Description

The SP4060 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 (t_p=8/20µs) without performance degradation and a minimum ±30kV ESD per IEC 61000-4-2 International Standard. Their low loading capacitance also makes them ideal for protecting high speed signal pins.

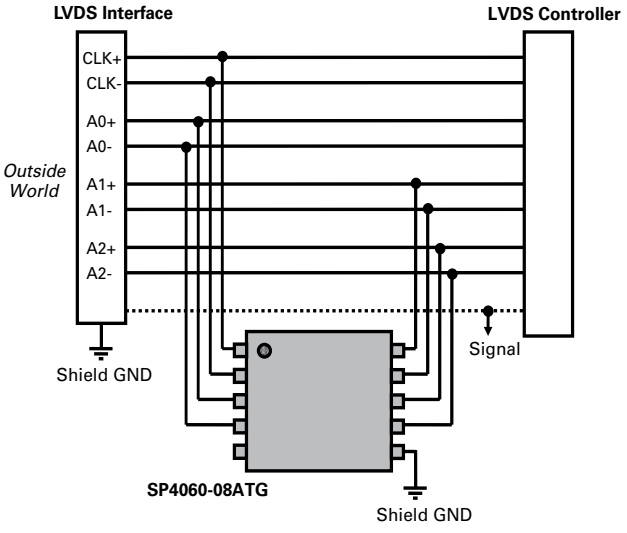
Features

- ESD, IEC 61000-4-2, ±30kV contact, ±30kV air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5, 20A (8/20µs)
- Low capacitance of 4.4pF (TYP) per I/O
- Low leakage current of 1µA (MAX) at 2.5V
- Moisture Sensitivity Level (MSL-1)

Applications

- LCD/PD TVs
- Desktops
- Game Consoles
- Set Top Boxes
- Notebooks

Application Example



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.

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Absolute Maximum Ratings

Symbol	Parameter	Value	Units
I_{PP}	Peak Current (t_p=8/20µs)	20.0	A
P_{PK}	Peak Pulse Power (t_p=8/20µs)	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

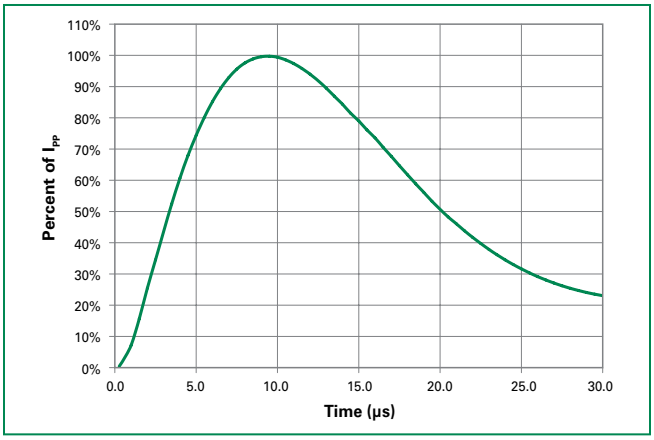
Parameter	Rating	Units
Storage Temperature Range	–55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

Electrical Characteristics (T_{OP}=25°C)

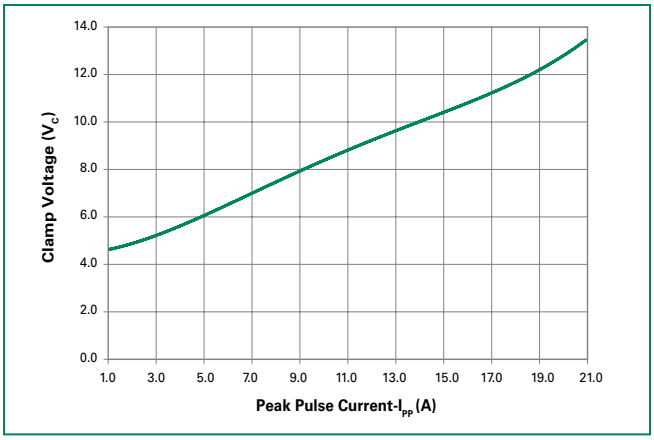
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	V_{RWM}				2.5	V
Snap Back Voltage	V_{SB}	I_{SB}=50mA	2.0			V
Reverse Leakage Current	I_{LEAK}	V_R=2.5V, I/O to GND		0.5	1.0	µA
Clamp Voltage[1]	V_C	I_{PP}=1A, t_p=8/20µs, Fwd		4.5	5.5	V
		I_{PP}=5A, t_p=8/20µs, Fwd		6.0	7.2	V
		I_{PP}=10A, t_p=8/20µs, Fwd		8.0	9.6	V
		I_{PP}=20A, t_p=8/20µs, Fwd		12.5	15.0	V
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.

8/20µs Pulse Waveform



Clamping Voltage vs. I_{PP}



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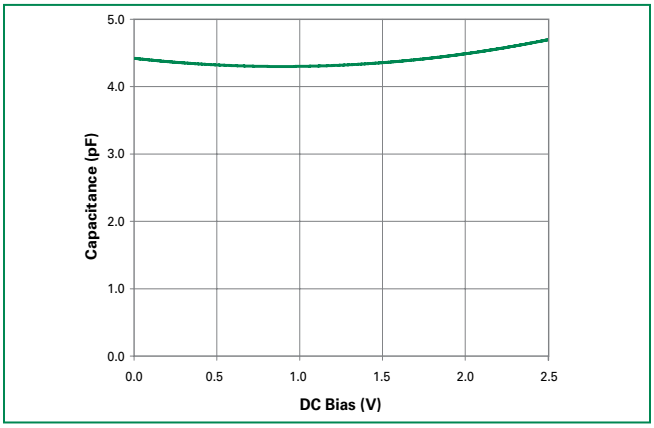
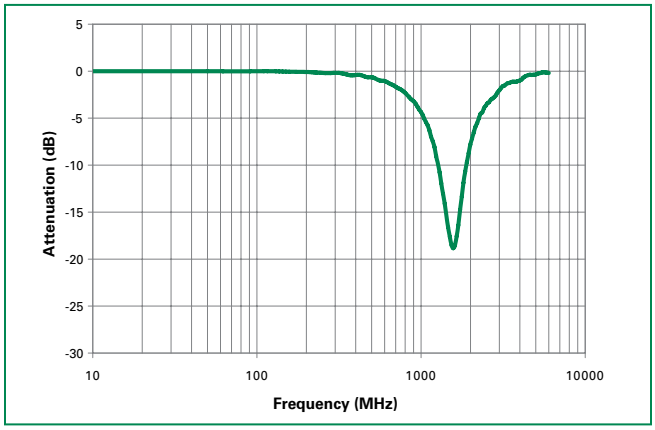
TVS Diode Arrays (SPA® Diodes)

Lightning Surge Protection - SP4060 Series

Capacitance vs. Bias

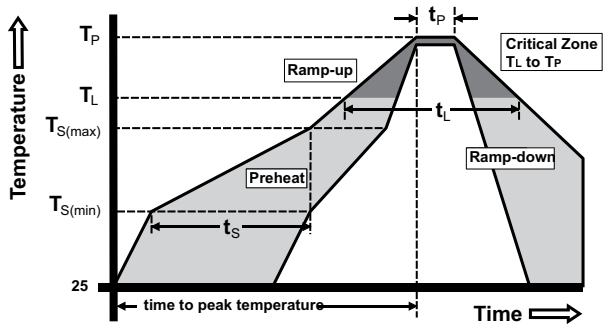


Insertion Loss (S21) I/O to GND

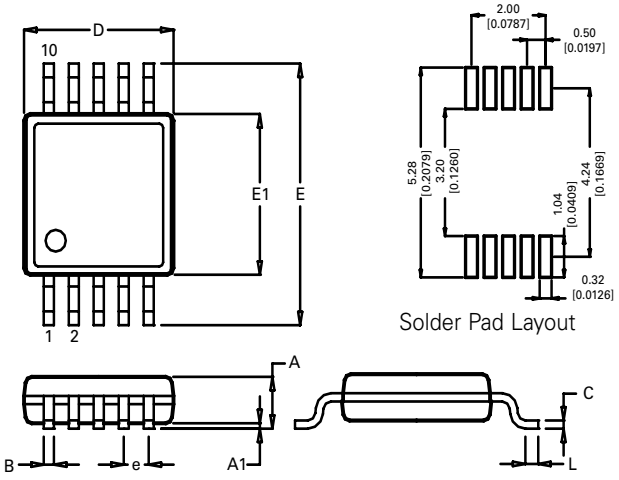


Soldering Parameters

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_L)	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



Package Dimensions — MSOP10



Package	MSOP			
Pins	10			
JEDEC	MO-187			
	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

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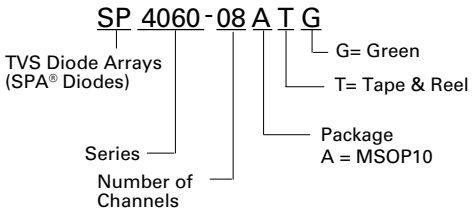
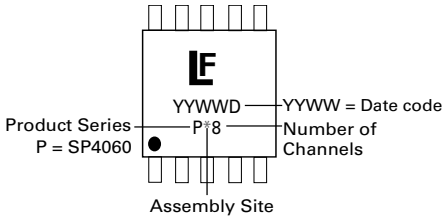
Part Numbering System



Part Marking System



Product Characteristics

Lead Plating	Pre-Plated Frame
Lead Material	Copper Alloy
Lead Coplanarity	0.0004 inches (0.102mm)
Substitute Material	Silicon
Body Material	Molded Epoxy
Flammability	UL 94 V-0

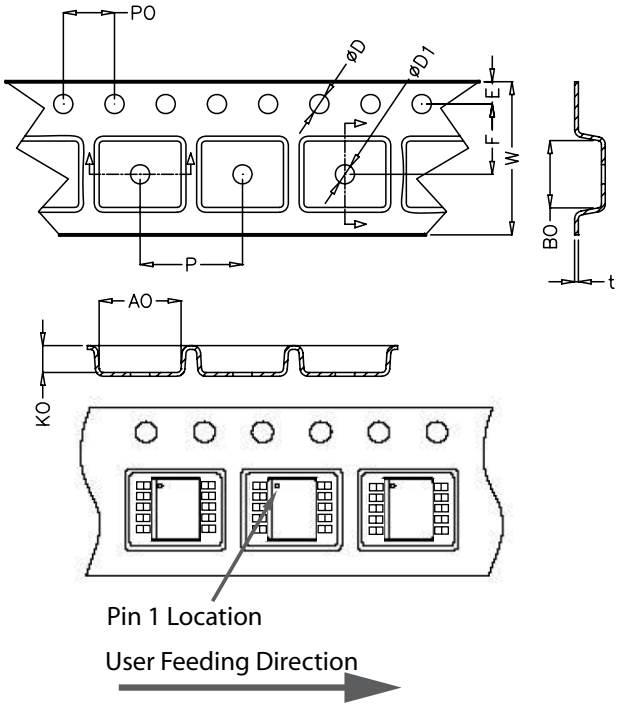
Notes :

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.

Ordering Information

Part Number	Package	Marking	Min. Order Qty.
SP4060-08ATG	MSOP10	P*8	4000

Embossed Carrier Tape & Reel Specification — MSOP-10



	Millimetres		Inches	
	Min	Max	Min	Max
E	1.65	1.85	0.065	0.073
F	5.40	5.60	0.213	0.220
D	1.50	1.60	0.059	0.063
D1	1.50 Min		0.059 Min	
P0	3.90	4.10	0.154	0.161
10P0	40.0± 0.20		1.574±0.008	
W	11.90	12.10	0.469	0.476
P	7.90	8.10	0.311	0.319
A0	5.20	5.40	0.205	0.213
B0	3.20	3.40	0.126	0.134
K0	1.20	1.40	0.047	0.055
t	0.30 ± 0.05		0.012± 0.002	

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