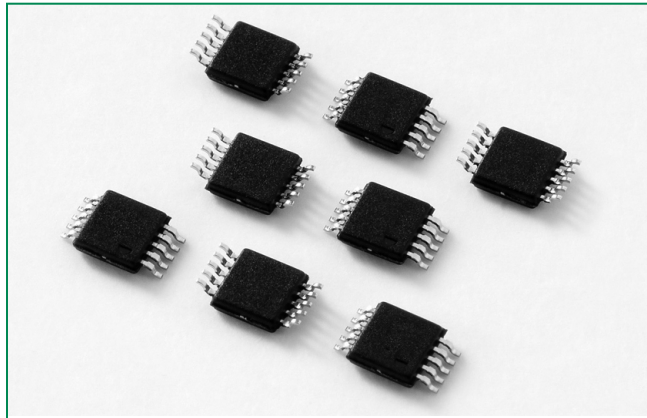
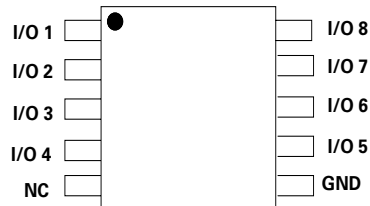


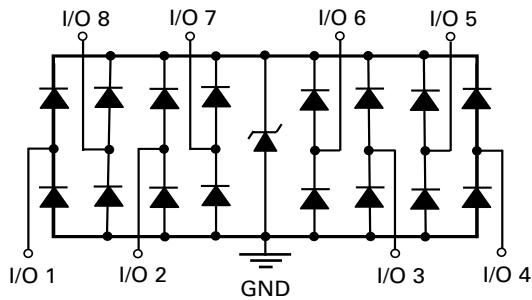
**SP4060 Series 2.5V 20A Diode Array**



**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 ( $t_p=8/20\mu s$ ) 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 high speed signal pins.

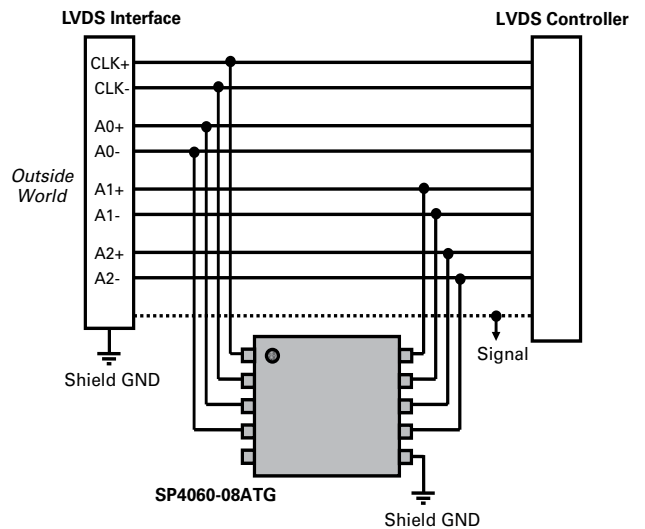
**Features**

- ESD, IEC 61000-4-2,  $\pm 30kV$  contact,  $\pm 30kV$  air
- EFT, IEC 61000-4-4, 40A (5/50ns)
- Lightning, IEC 61000-4-5, 20A (8/20 $\mu s$ )
- Low capacitance of 4.4pF (TYP) per I/O
- Low leakage current of 1 $\mu A$  (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.

### 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

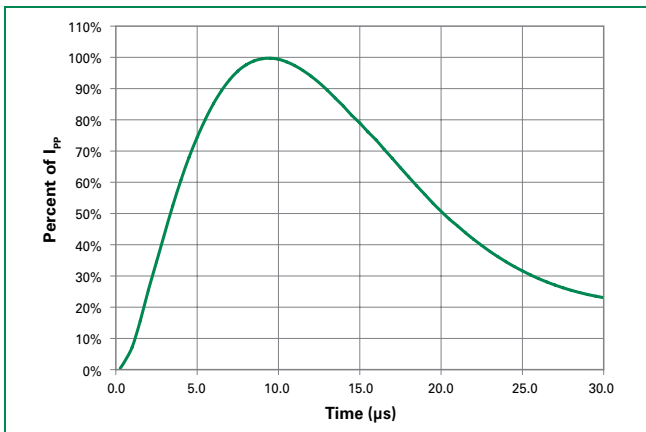
Parameter	Rating	Units
Storage Temperature Range	-55 to 150	°C
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (Soldering 20-40s)	260	°C

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

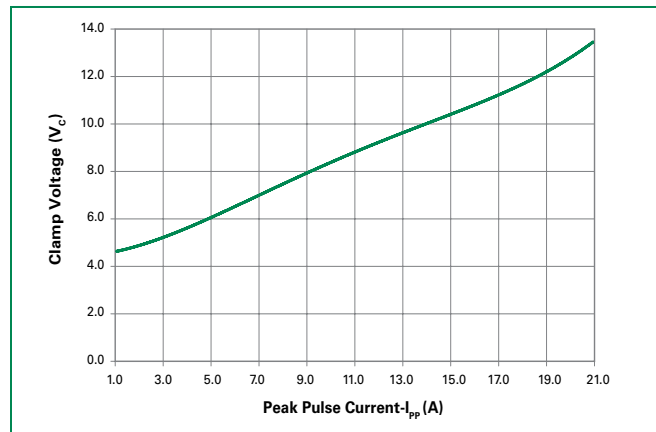
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Reverse Standoff Voltage	$V_{RWM}$				2.5	V
Snap Back Voltage	$V_{SB}$	$I_{SB}=50mA$	2.0			V
Reverse Leakage Current	$I_{LEAK}$	$V_R=2.5V$ , I/O to GND		0.5	1.0	$\mu A$
Clamp Voltage <sup>1</sup>	$V_C$	$I_{PP}=1A$ , $t_p=8/20\mu s$ , Fwd		4.5	5.5	V
		$I_{PP}=5A$ , $t_p=8/20\mu s$ , Fwd		6.0	7.2	V
		$I_{PP}=10A$ , $t_p=8/20\mu s$ , Fwd		8.0	9.6	V
		$I_{PP}=20A$ , $t_p=8/20\mu s$ , Fwd		12.5	15.0	V
ESD Withstand Voltage <sup>1</sup>	$V_{ESD}$	IEC61000-4-2 (Contact)	$\pm 30$			kV
		IEC61000-4-2 (Air)	$\pm 30$			kV
Diode Capacitance <sup>1</sup>	$C_{I/O-GND}$	Reverse Bias=0V		4.4	5.0	pF
Diode Capacitance <sup>1</sup>	$C_{I/O-I/O}$	Reverse Bias=0V		2.2		pF

Note: <sup>1</sup> Parameter is guaranteed by design and/or device characterization.

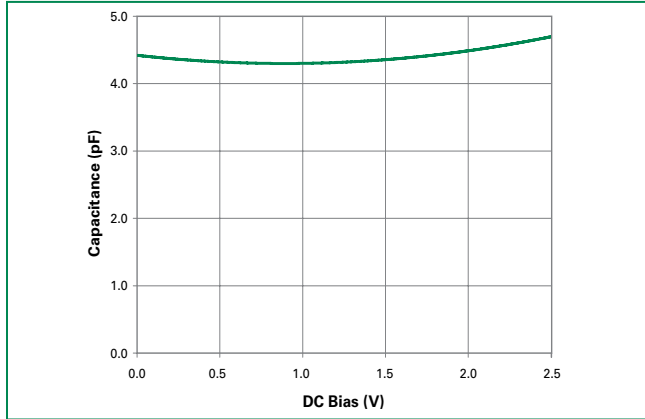
### 8/20 $\mu s$ Pulse Waveform



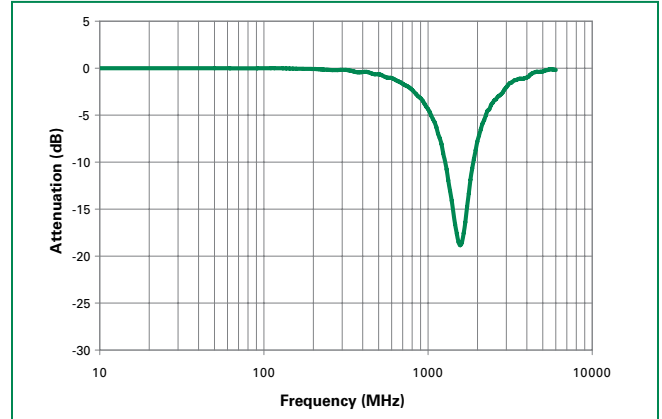
### Clamping Voltage vs. $I_{PP}$



**Capacitance vs. Bias**

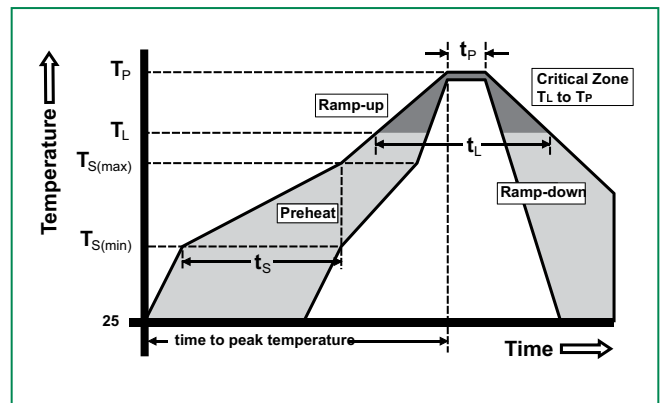


**Insertion Loss (S21) I/O to GND**

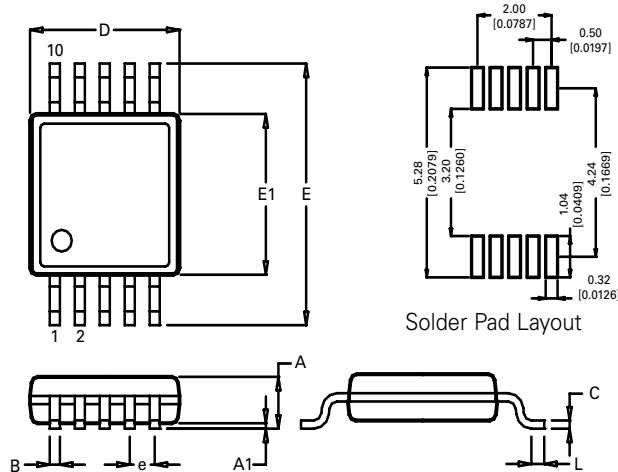


**Soldering Parameters**

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 <sup>+0/-5</sup> °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

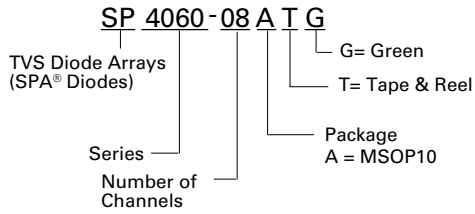


**Package Dimensions – MSOP10**

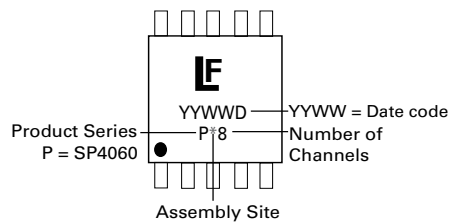


Package	MSOP			
Pins	10			
JEDEC	MO-187			
	Millimeters		Inches	
DIM	Min	Max	Min	Max
<b>A</b>	-	1.10	-	0.043
<b>A1</b>	0.00	0.15	0.000	0.006
<b>B</b>	0.17	0.27	0.007	0.011
<b>c</b>	0.08	0.23	0.003	0.009
<b>D</b>	2.90	3.10	0.114	0.122
<b>E</b>	4.67	5.10	0.184	0.200
<b>E1</b>	2.90	3.10	0.114	0.122
<b>e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

**Part Numbering System**



**Part Marking System**



**Product Characteristics**

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

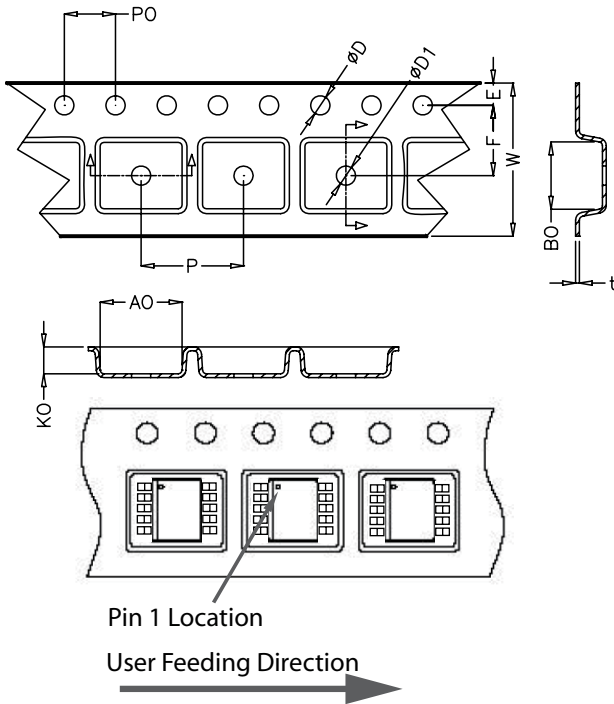
Notes :

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

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