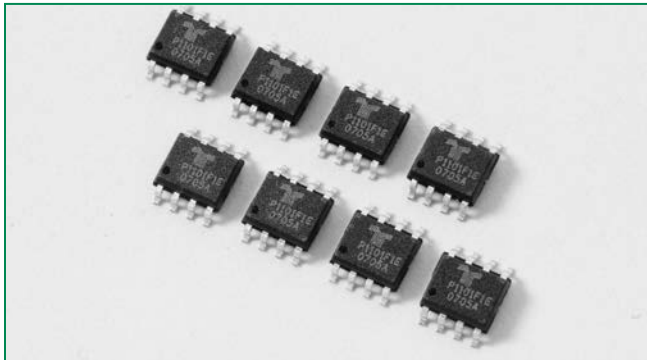


Fixed Voltage Enhanced Single Port Series - MS-012



**Description**

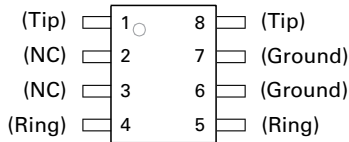
The MS-012 packaged Fixed Voltage Enhanced Single Port Series consists of SIDACtor® components designed to protect sensitive SLICs (Subscriber Line Interface Circuit) from damaging overvoltage transients.

The series provides single port protection using a fixed voltage switching device for negative surges. Positive surges are routed through enhanced switching diodes to a ground reference. The series is also pin-to-pin compatible to industry standard programmable SO-8 SLIC protectors.

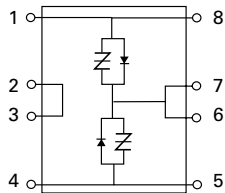
**Agency Approvals**

Agency	Agency File Number
	E133083

**Pinout**



**Schematic Symbol**



**Features & Benefits**

- Integrated fast switching diodes for positive voltage surges
- RoHS Compliant and Lead-Free
- Single port protection in one package
- Low voltage overshoot
- Low on-state voltage
- Pin-to-pin SO-8 compatible footprint
- Fails short circuit when surged in excess of ratings
- Does not degrade surge capability after multiple surge events within limit
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

**Applicable Global Standards**

- TIA-968-A
  - TIA-968-B
  - ITU K.20/21 Enhanced Level
  - ITU K.20/21 Basic Level
  - GR 1089 Inter-building\*
  - GR 1089 Intra-building\*
  - IEC 61000-4-5 2nd edition
  - YD/T 1082
  - YD/T 993
  - YD/T 950
- \* Series resistance required

**Electrical Characteristics**

Part Number	Marking	$V_{DRM}@I_{DRM}=5\mu A$	$V_S@100V/\mu s$	$I_H$	$I_S$	$I_T@V_T$	$V_T@I_T=1$ Amps	$V_F@25^\circ$	Capacitance
		V min	V max	mA min	mA max	A max	V max	V max	
P0641DF-1E	P0641F1E	58	77	150	800	1	5	5	See Capacitance Values Table
P0721DF-1E	P0721F1E	65	88	150	800	1	5	5	
P0901DF-1E	P0901F1E	75	98	150	800	1	5	5	
P0991DF-1E	P0991F1E	80	104	150	800	1	5	5	
P1001DF-1E	P1001F1E	85	110	150	800	1	5	5	
P1101DF-1E	P1101F1E	95	130	150	800	1	5	5	
P1301DF-1E	P1301F1E	120	165	150	800	1	5	5	
P1501DF-1E	P1501F1E	140	180	150	800	1	5	5	
P1701DF-1E	P1701F1E	160	200	150	800	1	5	5	

Notes:  
 - Absolute maximum ratings measured at  $T_A=25^\circ C$  (unless otherwise noted).  
 - Components are not appropriate for positive ringing systems  
 - All electrical characteristics shown are defined from Tip (pins 1 & 8) to Ground (pins 6 & 7), and Ring (pins 4 & 5) to ground (pins 6 & 7)  
 -  $V_f < 8.5$  volts @ 10 / 700 $\mu s$ , 375 Amps

### Capacitance Values

Part Number	pF Pin 1,8-6,7 / 4,5-6,7 Tip-Ground, Ring-Ground		pF Pin 1,8-4,5 Tip-Ring	
	MIN	MAX	MIN	MAX
P0641DF-1E	40	90	20	45
P0721DF-1E	35	85	20	45
P0901DF-1E	30	80	20	40
P0991DF-1E	25	75	15	35
P1001DF-1E	25	75	15	35
P1101DF-1E	25	70	15	30
P1301DF-1E	20	70	15	30
P1701DF-1E	20	70	15	30

Note: Off-state capacitance ( $C_o$ ) is measured at 1 MHz with a 2V bias

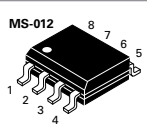
### Surge Ratings

Series	$I_{PP}$				$I_{TSM}$	di/dt
	2/10	1.2/50 - 8/20	10/700 - 5/310	10/1000	600V <sub>RMS</sub> 1s	
	A min	A min	A min	A min	A min	Amps/μs max
F	120	100	50	30	1	500

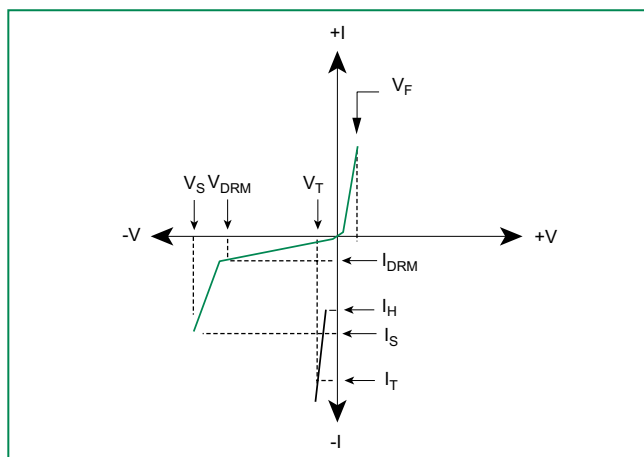
Notes:

- Peak pulse current rating ( $I_{pp}$ ) is repetitive and guaranteed for the life of the product that is in thermal equilibrium.
- $I_{pp}$  ratings applicable over temperature range of -40°C to +85°C
- The component must initially be in thermal equilibrium with -40°C ≤  $T_J$  ≤ +150°C

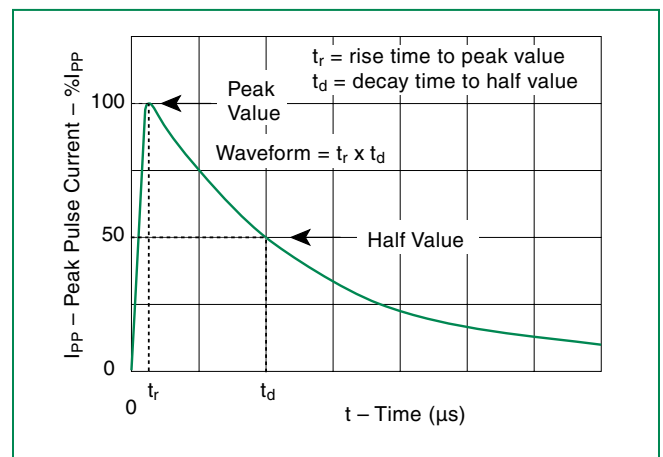
### Thermal Considerations

Package	Symbol	Parameter	Value	Unit
	$T_J$	Operating Junction Temperature Range	-40 to +150	°C
	$T_S$	Storage Temperature Range	-65 to +150	°C
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	120	°C/W

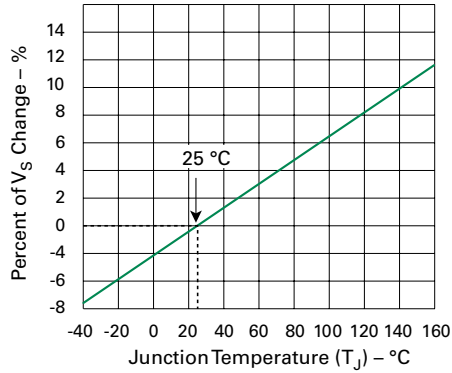
### V-I Characteristics



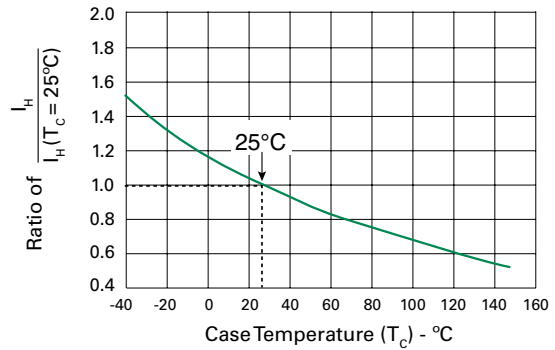
### $t_r \times t_d$ Pulse Waveform



**Normalized  $V_s$  Change vs. Junction Temperature**

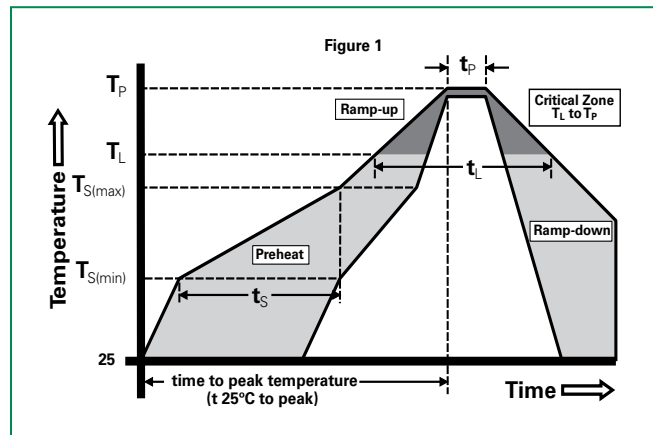


**Normalized DC Holding Current vs. Case Temperature**



**Soldering Parameters**

Reflow Condition	Pb-Free assembly (see Fig. 1)	
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/sec. Max.	
$T_{s(max)}$ to $T_L$ - Ramp-up Rate	3°C/sec. Max.	
Reflow	-Temperature ( $T_L$ ) (Liquidus)	+217°C
	-Temperature ( $t_L$ )	60-150 secs.
Peak Temp ( $T_p$ )	+260(+0/-5)°C	
Time within 5°C of actual PeakTemp ( $t_p$ )	30 secs. Max.	
Ramp-down Rate	6°C/sec. Max.	
Time 25°C to Peak Temp ( $T_p$ )	8 min. Max.	
Do not exceed	+260°C	



**Physical Specifications**

<b>Lead Material</b>	Copper Alloy
<b>Terminal Finish</b>	100% Matte-Tin Plated
<b>Body Material</b>	UL Recognized compound meeting flammability rating V-0

**Additional Information**



Datasheet



Resources

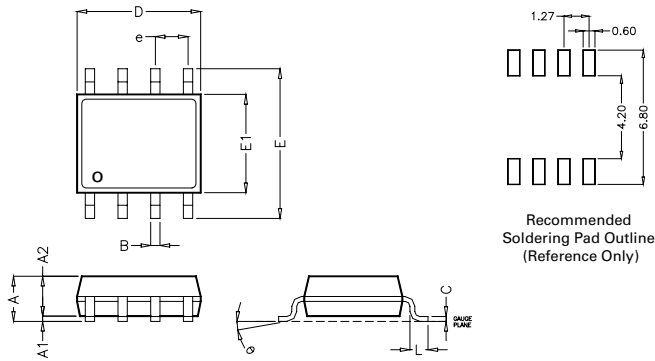


Samples

**Environmental Specifications**

<b>High Temp Voltage Blocking</b>	80% Rated $V_{DRM}$ ( $V_{DC}$ ) +125°C or +150°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101
<b>Temp Cycling</b>	-65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104
<b>Biased Temp &amp; Humidity</b>	52 $V_{DC}$ (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101
<b>High Temp Storage</b>	+150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101
<b>Low Temp Storage</b>	-65°C, 1008 hrs.
<b>Thermal Shock</b>	0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106
<b>Autoclave (Pressure Cooker Test)</b>	+121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102
<b>Resistance to Solder Heat</b>	+260°C, 30 secs. MIL-STD-750 (Method 2031)
<b>Moisture Sensitivity Level</b>	85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1

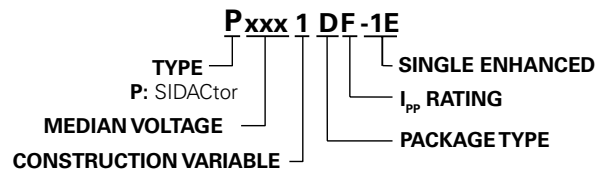
**Dimensions — MS-012**



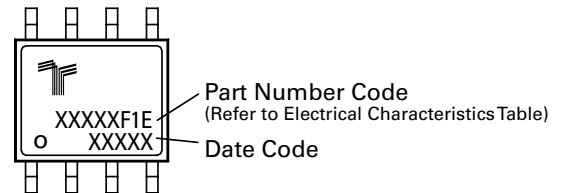
Dimension	Inches		Millimeters	
	MIN	MAX	MIN	MAX
A	0.053	0.069	1.35	1.75
A1	0.004	0.010	0.10	0.25
A2	0.043	0.065	1.25	1.65
B	0.012	0.020	0.31	0.51
C	0.007	0.010	0.17	0.25
D	0.189	0.197	4.80	5.00
E	0.228	0.244	5.80	6.20
E1	0.150	0.157	3.80	4.00
e	0.050 BSC*		1.27 BSC*	
L	0.016	0.050	0.40	1.27

\* BSC = Basic Spacing between Centers

**Part Numbering**



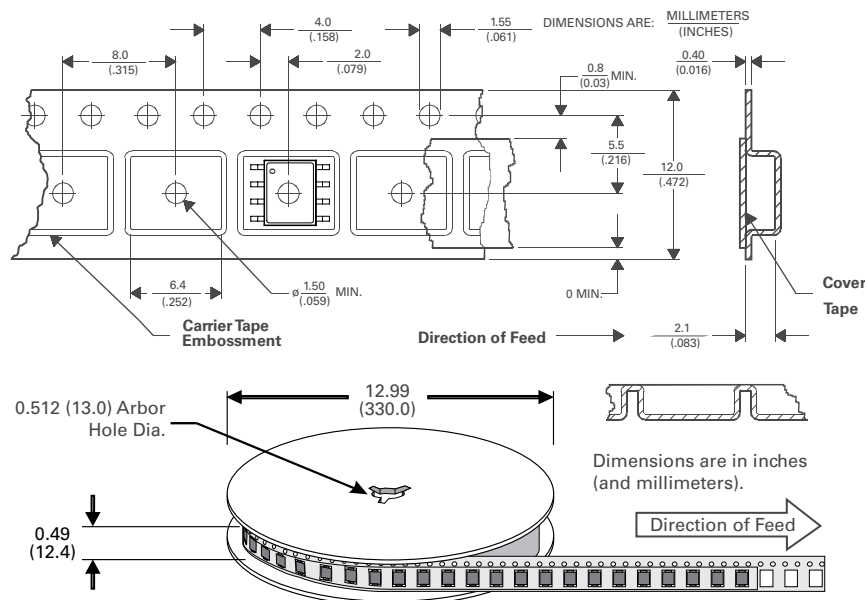
**Part Marking**



**Packing Options**

Package Type	Description	Quantity	Added Suffix	Industry Standard
D	MS-012 SMT 8-pin SOIC Tape and Reel Pack	2500	N/A	EIA-481-D

**Tape and Reel Specifications — MS-012**



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