SP1PN06CXXP01 Series

Electrostatic Discharged Protection Devices

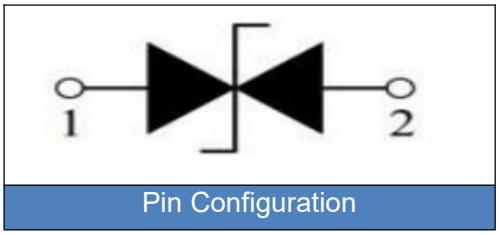
Datasheet-production date

Descriptions

The SP1PN06 series includes back-to-back TVS diodes fabricated is an ultra low capacitance Transient Voltage Suppressor (TVS) designed to protect low speed data interfaces. This device has been specifically designed to protect sensitive components which are connected to low-speed data and transmission lines from over-voltage caused by ESD (electrostatic discharge), CDE (Cable Discharge Events), and EFT (electrical fast transients). They may be used to meet the ESD immunity requirements of IEC 61000-4-2. It gives the designer the flexibility to protect single lines in applications where arrays are not practical.

Features

- IEC61000-4-2 ESD 15KV Air, 8KV contact compliance
- DFN0603-2L surface mount package
- Working voltage: 05 12 15 24 36
- Low leakage current
- Low operating and clamping voltages
- Lead Free/RoHS compliant
- Flammability rating UL 94V-0
- Meets MSL level 1, per J-STD-020



Pin Configuration

Applications

- LED Lighting Modules
- Mobile&handhelds
- RS232&RS485
- Can Bus
- General Purpose I/O
- Portable Instrumentation

Maximum Ratings

Rating	Symbol	Value	Unit
Peak Pulse Power (8/20us)	P_{PP}	100	W
Operating temperature range	T_J	-55~+125	℃
Storage temperature range	T_{STG}	-55~+150	℃

Electrical Characteristics (T_A=25℃ unless otherwise noted)

SP1PN06C05P01

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Reverse stand-off voltage	V_{RWM}				5	V
Reverse breakdown voltage	V_{BR}	I_{BR}=1mA	6.0			V
Reverse leakage current	I_R	V_R=5V			5	μA
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=1A	8.0			V
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=15A	24			V
Peak pulse current (tp=8/20μs)	IPP				15	A
ESD voltage (Contact discharge)	V_{ESD}	±30				KV
ESD voltage (Air discharge)		±30				KV
Off state junction capacitance	C_J	0Vdc,f=1MHz		30	40	pF

SP1PN06C12P01

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Reverse stand-off voltage	V_{RWM}				12	V
Reverse breakdown voltage	V_{BR}	I_{BR}=1mA	13.3			V
Reverse leakage current	I_R	V_R=12V			0.1	μA
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=1A		16		V
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=8A		19		V
Peak pulse current (tp=8/20μs)	IPP				8	A
ESD voltage (Contact discharge)	V_{ESD}	±30				KV
ESD voltage (Air discharge)		±30				KV
Off state junction capacitance	C_J	0Vdc,f=1MHz		26	30	pF

Electrical Characteristics (T_A=25℃ unless otherwise noted)

SP1PN06C15P01

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Reverse stand-off voltage	V_{RWM}				15	V
Reverse breakdown voltage	V_{BR}	I_{BR}=1mA	16.7			V
Reverse leakage current	I_R	V_R=15V			0.1	μA
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=1A		21		V
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=5A		27		V
Peak pulse current (tp=8/20μs)	IPP				5	A
ESD voltage (Contact discharge)	V_{ESD}	±30				KV
ESD voltage (Air discharge)		±30				KV
Off state junction capacitance	C_J	0Vdc,f=1MHz		21	24	pF

SP1PN06C24P01

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Reverse stand-off voltage	V_{RWM}				24	V
Reverse breakdown voltage	V_{BR}	I_{BR}=1mA	26.7			V
Reverse leakage current	I_R	V_R=24V			0.1	μA
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=1A		32		V
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=3A		40		V
Peak pulse current (tp=8/20μs)	IPP				3	A
ESD voltage (Contact discharge)	V_{ESD}	±18				KV
ESD voltage (Air discharge)		±24				KV
Off state junction capacitance	C_J	0Vdc,f=1MHz		13	17	pF

Electrical Characteristics (T_A=25℃ unless otherwise noted)

SP1PN06C36P01

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Reverse stand-off voltage	V_{RWM}				36	V
Reverse breakdown voltage	V_{BR}	I_{BR}=1mA	40.0			V
Reverse leakage current	I_R	V_R=24V			0.1	μA
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=1A		48		V
Clamping voltage (tp=8/20μs)	V_C	I_{PP}=1.5A		56		V
Peak pulse current (tp=8/20μs)	IPP				1.5	A
ESD voltage (Contact discharge)	V_{ESD}	±10				KV
ESD voltage (Air discharge)		±15				KV
Off state junction capacitance	C_J	0Vdc,f=1MHz		10	13	pF

Typical Characteristics Curves (T_A=25℃ unless otherwise noted)

Figure 1. Pulse Wave

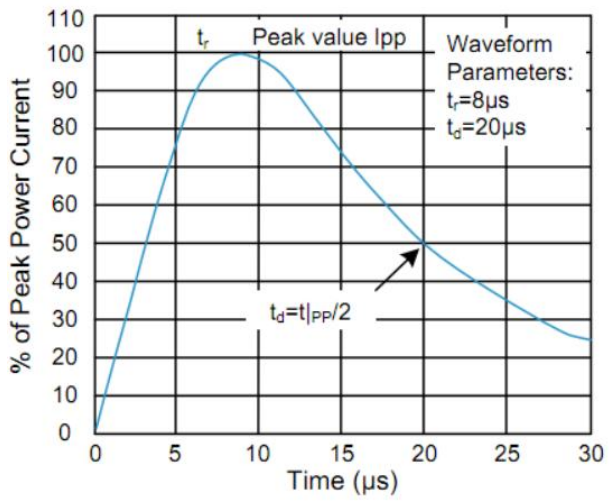
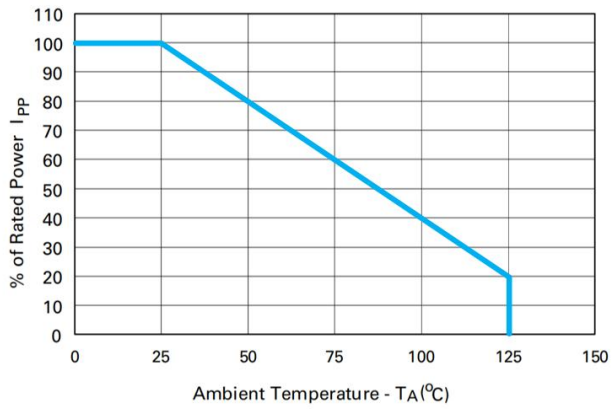
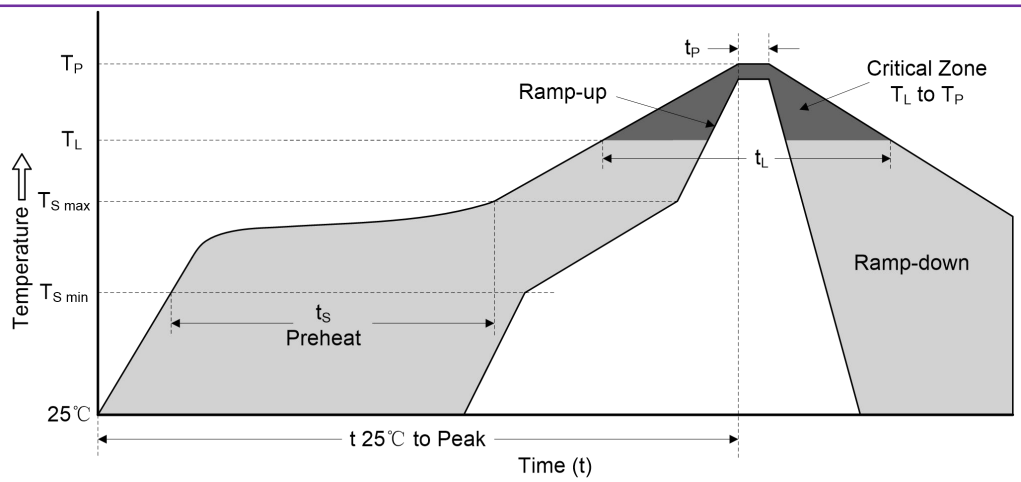


Figure 2. Power Derating Curve

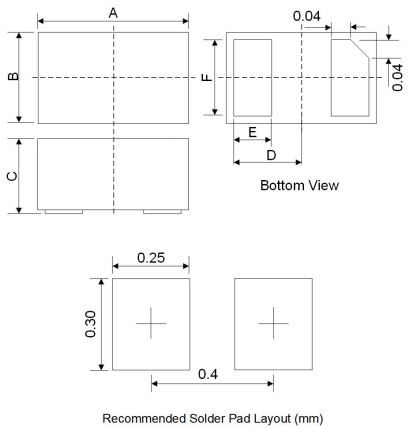


Reflow Soldering Parameters



Reflow Condition		Lead-free Assembly
Pre heat	-Temperature Min ($T_{S\ min}$)	150℃
	-Temperature Max ($T_{S\ max}$)	200℃
	-Time (min to max) (t_S)	60-180 seconds
Average ramp-up rate (T_L to T_P)		3℃/second max.
$T_{S\ max}$ to T_L -Ramp-up Rate		3℃/second max.
Reflow	-Temperature (T_L) (Liquidus)	217℃
	-Time (min to max) (t_S)	60-150 seconds
Peak Temperature (T_P)		260(+0/-5)℃
Time within 5℃ of actual Peak Temperature (t_P)		20-40 seconds
Ramp-down Rate		6℃/second max.
Time 25℃ to Peak Temperature(T_P)		8 minutes max.
Do not exceed		260℃

Dimensions (DFN0603-2L unit:mm)



Symbol	Dimension			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.55	0.67	0.021	0.026
B	0.25	0.37	0.010	0.014
C	0.25	0.35	0.010	0.014
D	0.34		0.013	
E	0.125	0.195	0.005	0.008
F	0.20	0.26	0.007	0.010