

Descriptions

The SP5PT23C712P02 replaces four discrete components by integrating two 12V and two 7V TVS diodes in a single package. SP5PT23C712P02 is designed to protect RS-485 applications with asymmetrical working voltages (12V to -7V) from damage due to electrostatic discharge (ESD), electrical fast transients (EFT), and lightning induced surges.



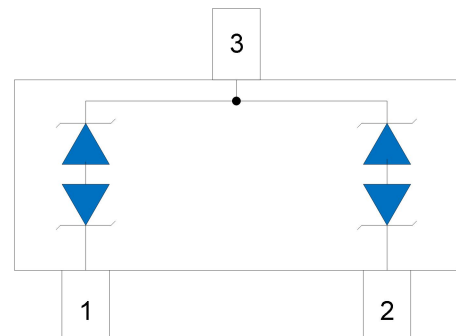
Features

- ◆ Transient Protect to
IEC 61000-4-2 (ESD): $\pm 30\text{kV}$ (Air), $\pm 30\text{kV}$ (Contact)
IEC 61000-4-4 (EFT): 40A (5/50ns)
IEC 61000-4-5 (Lightning): 21A for 12V TVS & 38A for 7V TVS ($t_p = 8/20\mu\text{s}$)
- ◆ Peak pulse power($t_p=8/20\mu\text{s}$):500W-700W
- ◆ Protects two Protects two +12V to -7V lines
- ◆ Working voltage is -7V to 12V
- ◆ Lower leakage current
- ◆ Excellent clamping voltages
- ◆ Solid-state silicon avalanche technology
- ◆ Solder reflow temperature Tin-Sn, 260-270°C
- ◆ Plastic package has underwriters laboratory flammability 94V-0
- ◆ Meet Lead Free/RoHS compliant

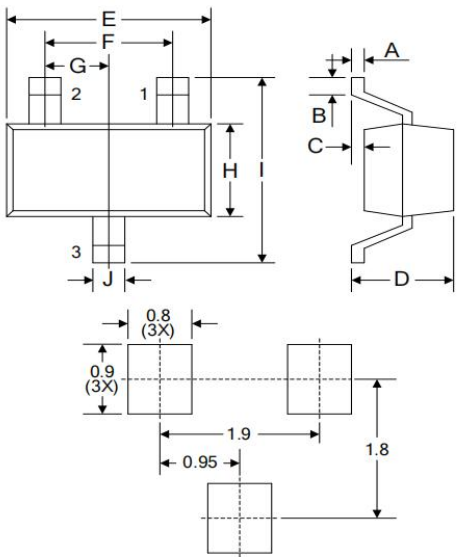
Applications

- ◆ RS-485 transceivers with extended common mode range
- ◆ Security systems
- ◆ Automatic Teller Machines
- ◆ HFC systems
- ◆ Networks

Schematic



Dimensions (SOT-23)

 Recommended Soldering Pad Layout	Symbol	Dimension			
		Millimeters		Inches	
		Min.	Max.	Min.	Max.
	A	0.08	0.18	0.003	0.007
	B	0.15	-	0.006	-
	C	-	0.13	-	0.005
	D	0.89	1.09	0.035	0.043
	E	2.80	3.05	0.110	0.120
	F	1.90		0.075	
	G	0.95		0.037	
	H	1.19	1.40	0.047	0.055
	I	2.10	2.49	0.083	0.098
	J	0.35	0.50	0.014	0.020

Maximum Ratings and Electrical Characteristics($T_A=25^{\circ}\text{C}$ Unless Otherwise Noted)

Rating	Symbol	Value	Unit
Peak Pulse Power ($t_p = 8/20\mu\text{s}$)	P_{PPM}	500-700	W
Peak Pulse Current ($t_p = 8/20\mu\text{s}$), Pin 1 or 2 to Pin 3	I_{PP}	21	A
Peak Pulse Current ($t_p = 8/20\mu\text{s}$), Pin 3 to Pin 1 or 2		38	
ESD per IEC 61000-4-2 (Contact)	V_{ESD}	30	KV
ESD per IEC 61000-4-2 (Air)		30	
Operating Temperature	T_J	-55 to +125	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55 to +150	$^{\circ}\text{C}$

Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Reverse Stand-Off Voltage	V_{RWM}	Pin 1 or Pin 2 to 3			12	V
		Pin 3 to Pin 1 or 2			7	
Breakdown Voltage	V_{BR}	$I_t=1\text{mA}$ Pin 1 or 2 to Pin 3	13.3			V
		$I_t=1\text{mA}$ Pin 3 and Pin 1 or 2	7.5			V
Reverse Leakage Current	I_R	$V_R=12\text{V}$ Pin 1 or Pin 2 to 3			1	μA
		$V_R=7\text{V}$ Pin 3 to Pin 1 or 2			20	
Clamping Voltage	V_C	$I_{PP} = 5\text{A}$, Pin 1 or 2 to Pin 3 $t_p = 8/20\mu\text{s}$			20	V
Clamping Voltage	V_C	$I_{PP} = 5\text{A}$, Pin 3 to Pin 1 or 2 $t_p = 8/20\mu\text{s}$			10	
Clamping Voltage	V_C	$I_{PP} = 21\text{A}$, Pin 1 or 2 to Pin 3 $t_p = 8/20\mu\text{s}$			26	V
Clamping Voltage	V_C	$I_{PP} = 38\text{A}$, Pin 3 to Pin 1 or 2 $t_p = 8/20\mu\text{s}$			19	
Junction Capacitance	C_J	$V_R=0\text{V}$	Pin 1 or 2 to Pin 3		75	pF
			Pin 3 to Pin 1 or 2		75	
		$V_R=12\text{V}$	Pin 1 or 2 to Pin 3	57		
		$V_R=7\text{V}$	Pin 3 to Pin 1 or 2	35		

Ratings and Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted)

Figure 1. Non-Repetitive Peak Pulse Power vs. Pulse Time

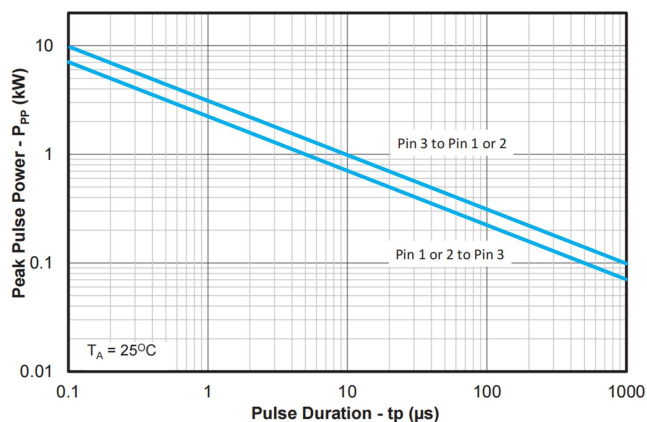


Figure 2. Pulse Derating Curve

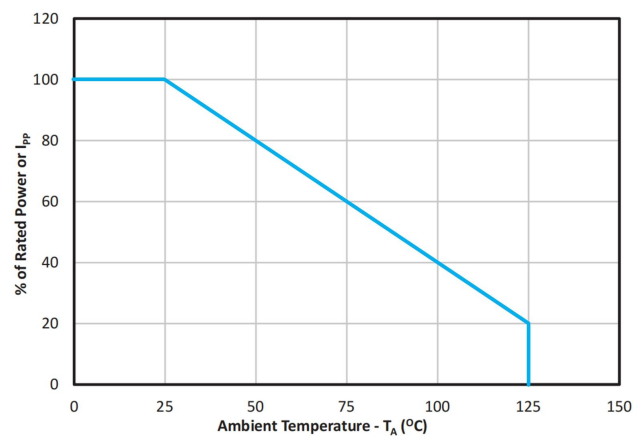


Figure 3. Clamping Voltage vs. Peak Pulse Current ($t_p = 8/20\mu\text{s}$)

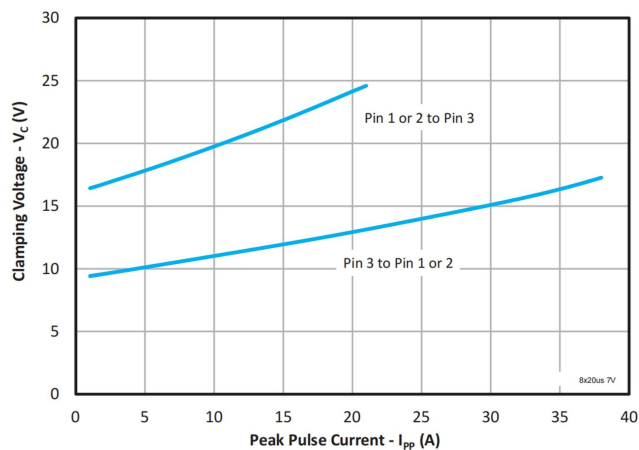
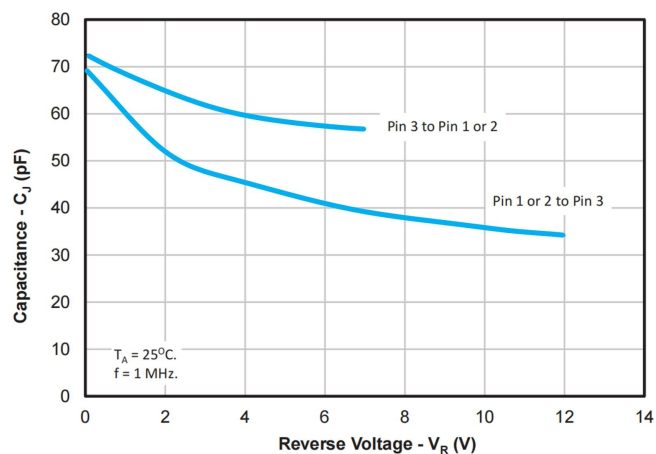
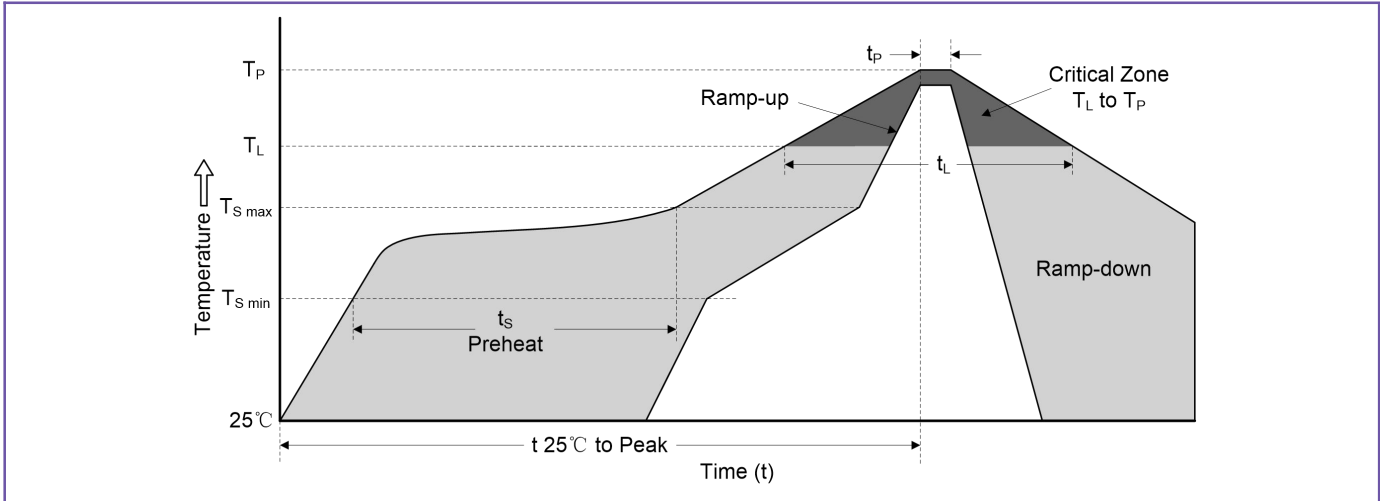


Figure 4. Capacitance vs. Reverse Voltage



Reflow Soldering Parameters



Reflow Condition		Lead-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 seconds
Average ramp-up rate (T_L to T_P)		3°C/second max.
$T_{S\ max}$ to T_L -Ramp-up Rate		3°C/second max.
Reflow	-Temperature (T_L) (Liquidus)	217°C
	-Time (min to max) (t_s)	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

Part number	QTY/Reel	Reel Size
SP5PT23C712P02	3000PCS	7Inch