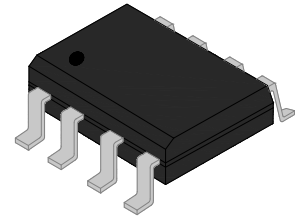




JIP61089Q Quad Programmable Thyristor Transient Voltage Suppressor Rev.3.1

DESCRIPTION:

JIP61089Q is a quad forward-conducting buffered p-gate overvoltage protector. This device is especially designed to protect monolithic subscriber line card interfaces (SLIC) against transient overvoltages on the telephone line caused by lightning. The JIP61089Q has an array of four buffered thyristors with commoned gates and a common anode connection. Each thyristor cathode has a separate terminal connection. An antiparallel anode-cathode diode is connected across each thyristor. The buffer transistors reduce the gate supply current. Positive overloads are clipped to common by forward of the antiparallel diodes. Negative surges are suppressed by the four thyristors, their breakdown voltage being referenced to $-V_{BAT}$ through the gate. This component presents a very low gate triggering current (I_{GT}) in order to reduce the current consumption on printed circuit board during the firing phase. If sufficient clipping current flows, the JIP61089Q thyristor will regenerate and switch into a low voltage on-state condition. As the overvoltage subsides, the high holding current of the device prevents d.c latch up.



Device package type SOP-8

FEATURES:

- ✧ Quad programmable transient suppressor.
- ✧ Wide negative firing voltage range: $V_{GKRM} = -167V$ max.
- ✧ Low dynamic switching voltage: V_{FRM} and $V_{GK(BD)}$.
- ✧ Low gate triggering current: $I_{GT} = 5mA$ max.
- ✧ Peak pulse current: $I_{PP} = 30A$ for 10/1000 μs surge.
- ✧ Holding current: $I_H = 150mA$ min.
- ✧ Moisture sensitivity level: Level 3.
- ✧ UL 497B item recognized. (File No.: E480698).
- ✧ IEC61000-4-2 (ESD) $\pm 30kV$ (air), $\pm 30kV$ (contact).

APPLICATION:

JIP61089Q is designed to protect communication equipment such as SPC exchanger from being damaged by transient overvoltages at the second level.

TESTING STANDARDS

Type	Wave Sharp		V_{PP}/I_{PP}
ITU-T K.20/21 and K.45	Voltage	10/700 μs	2000V
	Current	5/310 μs	40A

ABSOLUTE MAXIMUM RATINGS ($T_A=25^{\circ}\text{C}$, RH=45%-75%, unless otherwise noted)

Parameter		Symbol	Value	Unit
Storage temperature range		T_{STG}	-40 to +150	$^{\circ}\text{C}$
Operating junction temperature		T_J	-40 to +150	$^{\circ}\text{C}$
Operating free-air temperature range		T_A	-40 to +85	$^{\circ}\text{C}$
Non-repetitive peak on-state pulse current				
10/1000 μs	(Telcordia (Bellcore) GR-1089-CORE, Issue 2, February)	I_{TSP}	30	A
5/310 μs	(ITU-T K.20/21& K.45/44 open-circuit voltage 10/700 μs)		40	
1.2/50 μs	(Telcordia (Bellcore) GR-1089-CORE, Issue 2, February)		100	
Non-repetitive peak pulse voltage(10/700 μs)		V_{PP}	2000	V
Non repetitive surge peak on-state current (sinusoidal) 60Hz (Note 2)900s		I_{TSM}	0.5	A
Maximum voltage LINE/GROUND		V_{DRM}	-170	V
Maximum voltage GATE/LINE		V_{GKRM}	-167	V

Note1: 5/310 μs means current wave, and its rise time is 5 μs , fall time is 310 μs .

10/700 μs means voltage wave, and its rise time is 10 μs , fall time is 700 μs .

Note2: Initially the protector must be in thermal equilibrium with $T_J=25^{\circ}\text{C}$. EIA/JESD51-2 environment and EIA/JESD51-7 high effective thermal conductivity test board (multi-layer) connected with 0.6 mm printed wiring track widths

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$)

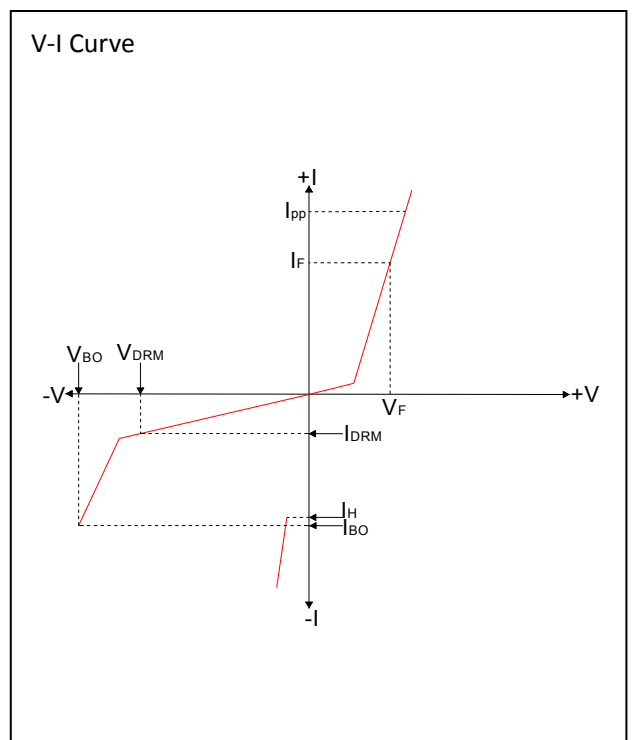
Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
Parameters related to the diode						
V_F	Forward voltage	$I_F=5\text{A}$, $t_w=200\mu\text{s}$	-	-	3	V
V_{FRM}	Peak forward recovery voltage	10/700 μs , $I_F=40\text{A}$, $R_S=55\Omega$ $V_{GG}=-48\text{V}$, $C_G=100\text{nF}$	-	12	-	V
Parameters related to the protection thyristor						
I_{DRM}	Off-state current	$V_{DRM}=-170\text{V}$, $V_{GK}=0\text{V}$	-	-	-5	μA
V_{BO}	Breakover voltage	10/700 μs , $I_F=-40\text{A}$, $R_S=55\Omega$, $V_{GG}=-48\text{V}$, $C_G=100\text{nF}$	-	-	-64	V
I_H	Holding current	$I_T=-1\text{A}$, $di/dt=1\text{A/ms}$, $V_{GG}=-100\text{V}$	-150	-	-	mA

ELECTRICAL CHARACTERISTICS ($T_A=25^{\circ}\text{C}$, continued)

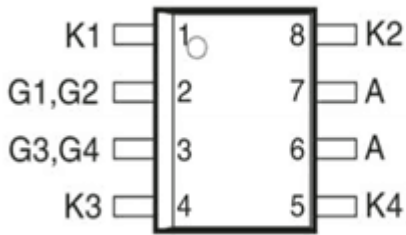
Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
I_{GKS}	Gate reverse current	$V_{GG}=V_{GK}=-167\text{V}$, $V_{KA}=0, T_J=25^{\circ}\text{C}$	-	-	-5	μA
I_{GT}	Gate trigger current	$I_T=3\text{A}$, $t_{P(g)}\geq 20\mu\text{s}$, $V_{GG}=-100\text{V}$	-	-	5	mA
V_{GT}	Gate trigger voltage	$I_T=3\text{A}$, $t_{P(g)}\geq 20\mu\text{s}$, $V_{GG}=-100\text{V}$	-	-	2.5	V
C_{AK}	Anode-cathode off-state capacitance	$f=1\text{MHz}$, $V_d=1\text{V}$, $I_G=0\text{A}$, $V_D=-3\text{V}$	-	-	70	pF

ELECTERICAL CAHRACTERISTIC

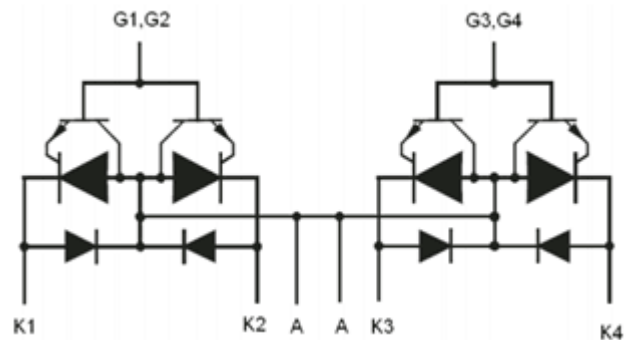
Symbol	Parameters
I_{DRM}	Off-state current
I_H	Holding current
V_{BO}	Break-over voltage
V_F	Forward voltage
V_{FRM}	Peak forward recovery voltage
$V_{GK(BD)}$	Gate-cathode impulse break-over voltage
I_{GKS}	Gate reverse current
I_{GT}	Gate trigger current
V_{GT}	Gate-cathode trigger voltage
C_{KA}	Cathode-anode off-state capacitance



SOP PACKAGE TOP VIEW AND DEVICE SYMBOL

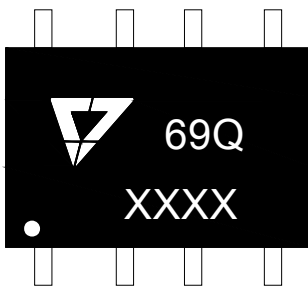


Package (Top view)



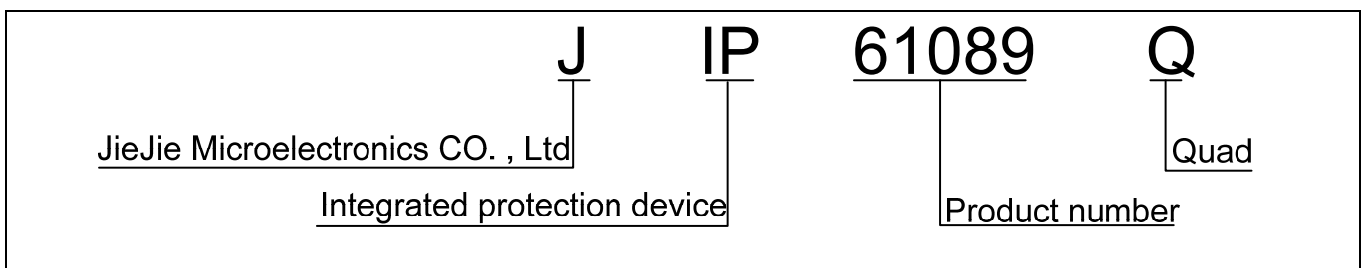
Device symbol

MARKING



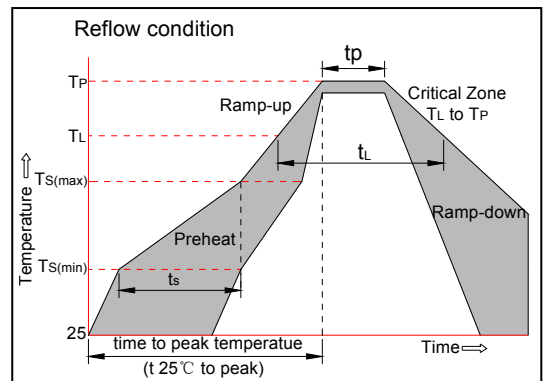
69Q: Device marking code
XXXX: Date of manufacture

ORDERING INFORMATION



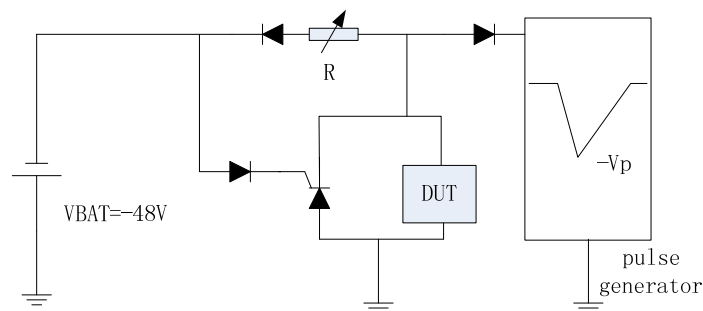
SOLDERING PARAMETERS

Reflow Condition		Pb-Free assembly (see figure at right)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time (Min to Max) (ts)	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 Peak Temp (t_p)		30secs.Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_p)		8 min. Max
Do not exceed		+260°C



TEST METHOD AND CIRCUIT

Holding current test circuit(test circuit 1)

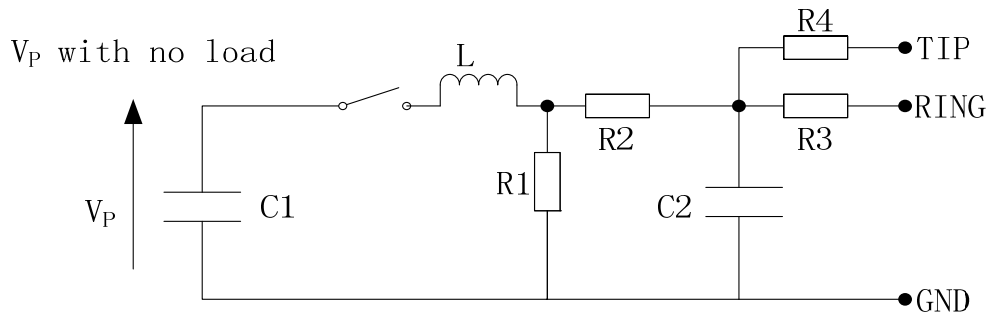


This is a conduction-cutoff test. The test circuit can ascertain the size of holding current.

Test method :

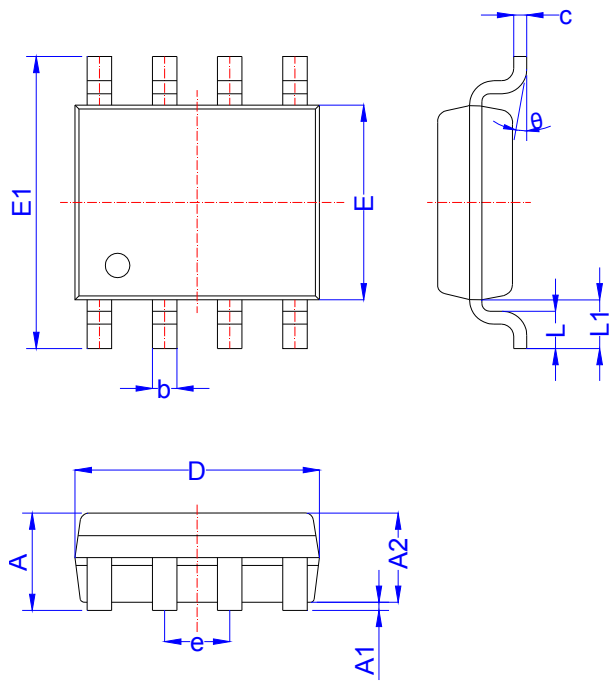
1. Short out DUT, regulating current in I_H range;
2. Triggering DUT with $I_{PP}=10A$, 10/1000 μs surge current;
3. DUT needs to return to the off-state in the maximum 50ms.

V_{FP} and V_{DGL} test circuit(test circuit 2)



Pulse(μs)		V _P (V)	C1 (μF)	C2 (nF)	L (μH)	R1 (Ω)	R2 (Ω)	R3 (Ω)	R4 (Ω)	I _{PP} (A)	R _P (Ω)
T _{rise}	T _{fall}										
10	700	1500	20	200	0	50	15	25	25	30	10
1.2	50	1500	1	33	0	76	13	25	25	30	10
2	10	2500	10	0	1.1	1.3	0	3	3	38	62

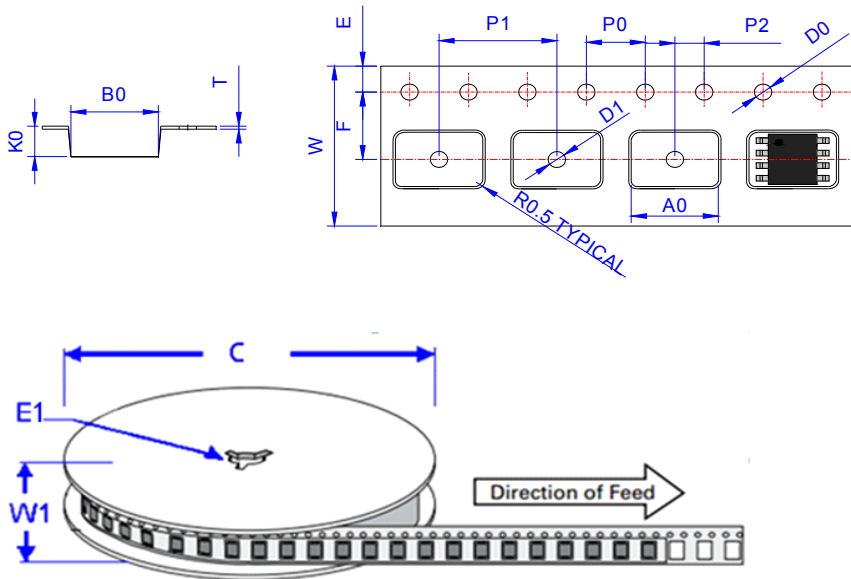
PACKAGE MECHANICAL DATA



SOP-8

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35		1.70	0.053		0.067
A1	0.04		0.18	0.002		0.007
A2	1.30		1.55	0.051		0.061
b	0.31		0.51	0.012		0.020
c	0.17		0.25	0.007		0.010
D	4.65		5.10	0.183		0.201
E	3.70		4.10	0.146		0.161
E1	5.80		6.20	0.228		0.244
e	1.14	1.27	1.40	0.045	0.050	0.055
L	0.40		0.77	0.016		0.030
L1	0.825		1.225	0.032		0.048
θ	0°		8°	0°		8°

TAPE AND REEL SPECIFICATION-SOP-8



Ref.	Dimensions	
	Millimeters	Inches
A0	6.6±0.10	0.260 ± 0.004
B0	5.3±0.10	0.209 ± 0.004
C	330	13.0
D0	1.50±0.10	0.059 + 0.004
D1	1.50±0.10	0.059 + 0.004
E1	13.3±0.3	0.524± 0.012
E	1.75±0.1	0.069± 0.004
F	5.5±0.05	0.217 ± 0.002
K0	2.1±0.1	0.083 ± 0.004
P0	4.0±0.1	0.157± 0.004
P1	8.0±0.1	0.315± 0.004
P2	2.0±0.05	0.079 ± 0.002
T	0.24±0.1	0.009 ± 0.002
W	12.0±0.3	0.472 ± 0.012
W1	15.7±2.0	0.618 ± 0.079

PART No.	UNIT WEIGHT (g/PCS) typ.	REEL (PCS)	PER CARTON (PCS)	DESCRIPTION
JIP61089Q	0.077	4,000	64,000	13 inch reel pack

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