



Pinout Designation

K1	1 ₀	8	K 1
G	2	7	А
NC	3	6	Α
K2	4	5	K2

Pin #	Pin Name	Description
1, 4,5, 8	K1, K2	Connect to subscriber lines (Tip/Ring)
2	G	Connect to battery (Reference Voltage)
6, 7	А	Connect to ground (earth)

Schematic Symbol



Description

The B61089BDR is a single channel SLIC (Subscriber Line Interface circuit) battery tracking protector. It consists of a pair of identical protection thyristors integrated with two anti-series diodes to protect the SLIC against lightning induced surges and power fault events.

The gated thyristor protectors which have crowbarring function, provide tracking battery protection down to -170V. The anti-series diode provides protection of positive surge events by diverting the surge energy to the ground.

The B61089BDR has a robust surge current capability which help the telecom and datacom products to comply with different surge standards such as Telcordia GR-1089, ITU-T K.20, K.21 and YD/ T950. For compliance with Enhanced Levels test conditions of ITU-T, TIA968-B, or GR-1089, additional series resistance in the Tip / Ring pairs may be required.

The SLIC chipset voltage reference may change as the on-hook/ off-hook line condition changes. Therefore, this component is referenced to the - V_{BAT} so that its negative protection threshold follows this changing reference voltage level. This B61089BDR utilizes a transistor gain network so that a low 5 mA current level will activate the thyristor based portion of this protector component during negative events. This also allows an easier turn on during slow rising power fault events. For all positive disturbances, the fast switching diode connected to earth reference will provide the needed protection.

Features

- Single port negative voltage tracking programmable component
- Supports battery voltages down to -170V
- Low gate triggering current 5 mA max
- Fails in a short circuit condition when it is surged in excess of its ratings to protect all downstream equipment

Applicable Global Standards

- Wireless In the Local Loop (WLL)
- Voice applications which require regenerated POTS
- VoIP applications
- PBX
- FXS applications

surge events within its ratings High holding current -150mA min

Surge capability does not

degrade after multiple

- Specified 2/10 limiting voltage
- Integrated diodes for positive surge protection
- MSL: Level 1 unlimited
- RoHS compliant and lead-free
- Digital Pair Gain systems (DPG) and Digital Loop Carrier systems (DLC)
- Small Office Home Office (SOHO)

Absolute Maximum Ratings (T_A =25°C)

Symbol	Parameter	Test Conditions	Value	Unit	
		10/1000µs	35		
	Non repetitive peak on state pulse surrent	5/310µs	65		
PPSM	Non-repetitive peak on-state pulse current	2/10µs	180	A	
		8/20µs	170		
		0.5s	12		
		1s	9		
I _{TSM} /I _{FSM} *	Non repetitive peak on-state current, 50Hz/60Hz	5s	7	A	
		30s	4		
		900s	3		
I _{GSM} *	Non repetitive peak gate current, 2/10µs pulse, cathodes commoned		40	А	
V	Repetitive peak off-state voltage, $V_{\rm GK}$ =0		-170	V	
V _{gkrm}	Repetitive peak gate-cathode voltage, $V_{\rm KA}{=}0$		-167	V	
T _A	Operating free-air temperature range		-40 - 85	°C	
T _{stg}	Storage temperature range		-40 - 150	°C	
Tj	Junction temperature		-40 - 150	°C	
TL	Maximum lead temperature for soldering during 10s		260	°C	
R _{eja}	Junction to ambient thermal resistance	$P_{tot} = 0.8 \text{ W}, T_A = 25 \text{ °C}, 5 \text{ cm}^2, \text{ FR4 PCB}$	160	°C /W	

* Notes :

- Initially the protector must be in thermal equilibrium with TJ=25°C. The surge may be repeated after the component returns to its initial conditions.

- These non-repetitive rated currents are peak values for either polarity. The rated current values may be applied to any cathode-anode terminal pair. Additionally, all cathode-anode terminal pairs may have their rated current values applied simultaneously (in this case the anode terminal current will be four times the rated current value of an individual terminal pair).

Electrical Characteristics

Symbol	Parameter	Test Conditions	Мах	Unit
V _F	Forward voltage	I _F =5Α, t _w =200μs	3	V
V _{FRM}	Impulse peak forward recovery voltage	2/10µs, I _{TM} =-27A,Rs=50 Ω , di/dt=-27A/µs	12	V
I _D	Off-state current	$V_{\rm D} = V_{\rm DRM}$, $V_{\rm GK} = 0$ T_J = 25°C	-5	μA
V _(BO)	Impulse breakover voltage	2/10µs, I _{TM} =-27A, Rs=50Ω, di/dt=-27A/µs, $V_{\rm GG}$ =-100V	-115	V
V _{GK(BO)}	Gate-cathode impulse breakover voltage	2/10µs, I _{TM} =-27A, Rs=50Ω, di/dt=-27A/µs, $V_{\rm GG}$ =-100V	20	V
I _H	Holding current	I_{T} =-1A, di/dt=1A/ms, V_{GG} =-100V	-150 (min)	mA
I _{GKS}	Gate reverse current	$V_{gg} = V_{gK} = V_{gKRM}, V_{KA} = 0, T_{J} = 25^{\circ}C$	-5	μA
I _{gt}	Gate trigger current	I_{T} =-3A, $t_{p(g)}^{*}$ ≥20µs, V_{GG} =-100V, T_{J} =25°C	5	mA
V _{gt}	Gate trigger voltage	I_{T} =-3A, $t_{p(g)}$ *>20µs, V_{GG} =-100V	2.5	V
C _{KA}	Cathodo apodo officiato capacitanco	$f=1MHz, V_d=1V, I_g=0V_D=-3V$	100	nE
	Carnoue-anoue on-state capacitance	$f=1MHz, V_d=1V, I_g=0V_D=-48V$	50	μr

 $T_{p(q)}$: gate pulse time

V-I Characteristics



Soldering Parameters

Reflow Condition		Pb-Free assembly	
	-Temperature Min (T _{s(min)})	+150°C	
Pre Heat	-Temperature Max (T _{s(max)})	+200°C	
	-Time (Min to Max) (t _s)	60-120 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.	
PeakTemp (T _P)		+260(+0/-5)°C	
Time within 5°C of actual PeakTemp $(t_{_{\rm p}})$		30 secs. Max.	
Ramp-down Rate		6°C/sec. Max.	
Time 25°C to PeakTemp (T _P)		8 min. Max.	
Do not exceed		+260°C	

Parameter	Symbol
Off-state current	I _D
Repetitive peak off-state voltage	V _{drm}
On-state Current(RMS)	I _T
Non-repetitive Peak On-state Current	I _{tsm}
Holding current	I _H
Breakover voltage	V _(BO)
Forward voltage	V _F
Gate-cathode impulse breakover voltage	V _{GK(BO)}
Gate trigger current	I _{GT}
SLIC supply voltage	V _{GG}



Environmental Specifications

High Temp Voltage Blocking	"Rated 75V (A=75V, K=0V, G=0V) +150°C, 1008hrs. MILSTD-750 (Method 1040) JEDEC, JESD22-A-101
Temp Cycling	-55°C to +150°C, 15 min. dwell, 1000cycles. MILSTD-750 (Method 1051) EIA/JEDEC, JESD22-A104
Biased Temp & Humidity	Rated 50V (A=50V, K=0V,G=0V) (+85°C) 85%RH,1008 hrs. EIA/JEDEC, JESD22-A-101
Resistance to Solder Heat	+260°C, 10 secs. JESD22-A111
Moisture Sensitivity Level	"85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1"

Physical Specifications

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

Dimensions - MS-012 (SOP-8)



Dimonsion	Inches		Millimeters		
Dimension	MIN	MAX	MIN	MAX	
А	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	
В	0.012	0.020	0.31	0.51	
С	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	
е	0.050 BSC*		1.27 BSC*		
L	0.016	0.050	0.40	1.27	

Part Number Code

Date Code

Y: Yearly code

XXX: Lot No

M: Monthly code

* BSC = Basic Spacing between Centers

Part Marking

IF

0

B61089B

YMXXX

Part Numbering



Packing Options

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

Tape and Reel Specifications – MS-012 (SOP-8)





Application Note

This B61089BDR MS-012 SMT (SOP-8) Single port Battrax ® is specifically designed to provide surge protection for SLIC (Subscriber Line Interface Circuit) cards implementing negative ringing only. This single 8-pin component provides protection for one SLIC port (T1/R1 or T2/R2) by shunting positive and negative surges to the ground reference.

The negative surges are diverted to ground through the SCR which are connected between the TIP/RING conductors and the ground reference. These SCR have a transistor buffered gate that provides a low current magnitude trigger level; typically 5 mA or less. The SCR will reset when the magnitude of the loop current drops below the component's holding current parameter IH. The fast switching diodes will turn on for any positive surge event > 3V between tip and ground or between ring and ground.

This SCR's turn-on threshold for negative polarity events tracks the negative reference voltage (-VBAT) of the SMART SLIC component. As the line conditions change from off-hook to on-hook, the SLIC reference voltage level will also change in an effort to conserve energy. The negative tracking protection component will typically operate at a voltage of -1.4 V below -VBAT during negative surge conditions or power fault events.

The single gate capacitor, which acts as charge reservoir, supplies the needed current to trigger the thyristor components to the on-state and should be physically located in close proximity to the B61089BDR gate (pin 2). During slow rising ac power fault events, the discharge current of the capacitor (IC = C dv/dt) easily achieves the 5 mA threshold to activate the SCR. This solution below will comply with the power fault and surge requirements of GR-1089 Intra-building Port Type and the Basic level of ITU K20/21. For GR-1089 Port Type 3 and Enhanced level of ITU K20/21, the series resistor value may need to be increased. The TeleLink fuse complies with both GR-1089 intra-building and inter-building requirements and both Basic and Enhanced levels of the ITU Recommendations.

The figure shows a typical B61089BDR SLIC card protection circuit. The incoming line conductors, Ring (R) and Tip (T), connect to the relay matrix via the series overcurrent protection. Positive temperature coefficient (PTC) resistors can be used for overcurrent protection. Resistors will reduce the prospective current from the surge generator for both the B61089BDR and the ring/test protector.



Product Disclaimer - Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, lifesaving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse. "Littelfuse" includes Littelfuse, Inc., and all of its affiliate entities. https://www.littelfuse.com/legal/disclaimers/product-disclaimer.aspx

