BT169HKL

SCR

Rev.01 - 20 June 2025 Product data sheet

1. General description

Planar passivated very sensitive gate Silicon Controlled Rectifier in a SSOT23 plastic package.

2. Features and benefits

- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Very sensitive gate

3. Applications

- Earth leakage circuit breakers or Ground Fault Circuit Interrupters (GFCI)
- Ignition circuits
- Low power latching circuits
- Protection circuits / shut-down circuits: lighting ballasts
- Protection circuits / shut-down circuits: Switched Mode Power Supplies

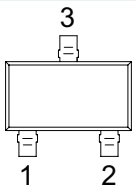
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{DRM}	repetitive peak off-state voltage			800			V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 87$ °C;		0.5			A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 87$ °C; Fig. 1; Fig. 2; Fig. 3		0.8			A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; Fig. 4; Fig. 5		9			A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		10			A
T_j	operating junction temperature			-40 to 125			°C
Symbol	**Parameter**	**Conditions**	**Notes**	**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12$ V; $I_T = 10$ mA; $T_j = 25$ °C; Fig. 7		1	-	100	µA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 536$ V; $T_j = 125$ °C; $R_{GK} = 1$ kΩ; (V_{DM} = 67% of V_{DRM}); exponential waveform		150	-	-	V/µs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	G	gate		
3	A	anode		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BT169HKL	SSOT23	BT169HKLX	Reel	3000	SSOT23L	10-Apr-2025

7. Marking

Table 4. Marking codes

Type number	Marking codes
BT169HKL	TCHML

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DRM}	repetitive peak off-state voltage			800	V
V_{RRM}	repetitive peak reverse voltage			800	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{sp} \leq 87$ °C;		0.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 87$ °C; Fig. 1; Fig. 2; Fig. 3		0.8	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; Fig. 4; Fig. 5		9	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		10	A
I^2t	I^2t for fusing	$t_p = 10$ ms; SIN		0.41	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 10$ mA		50	A/µs
I_{GM}	peak gate current			1	A
V_{RGM}	peak reverse gate voltage			5	V
P_{GM}	peak gate power			2	W
$P_{G(AV)}$	average gate power	over any 20 ms period		0.1	W
T_{stg}	storage temperature			-40 to 150	°C
T_j	operating junction temperature		[1]	-40 to 125	°C

[1] Operation above 110˚C may require the use of a gate to cathode resistor of 1kΩ or less.

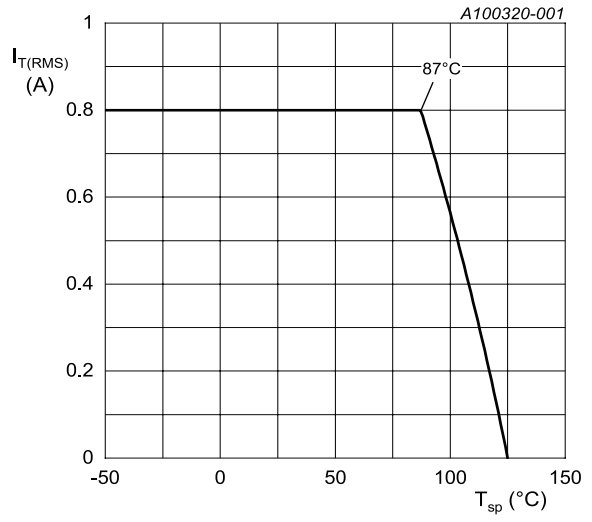
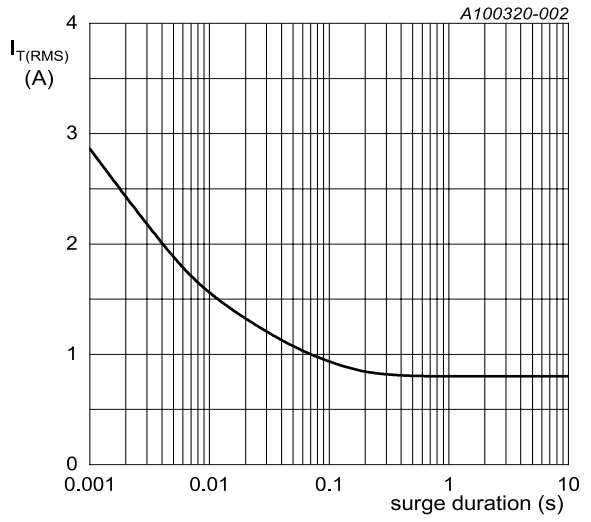
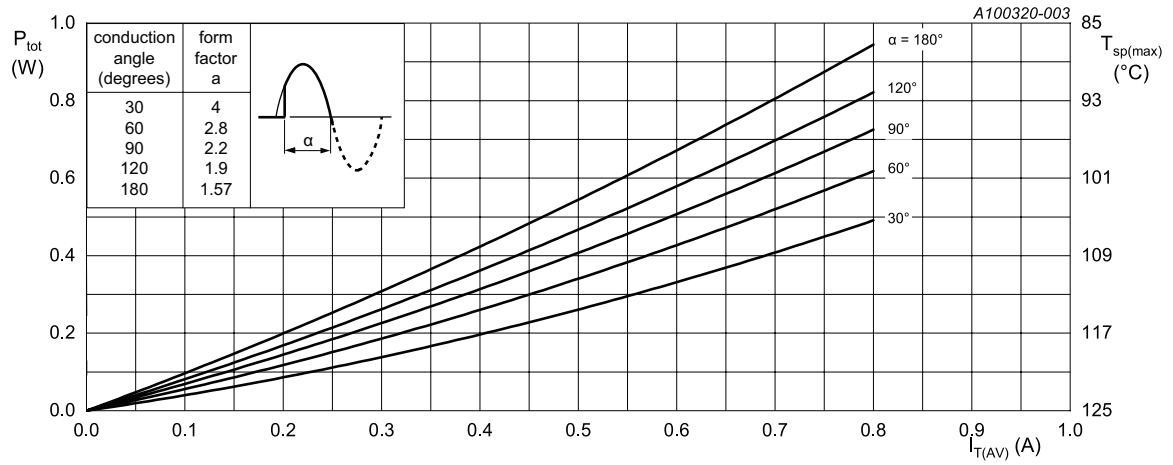


Fig. 1. RMS on-state current as a function of solder point temperature; maximum values



f = 50 Hz; T_{sp} = 87 °C

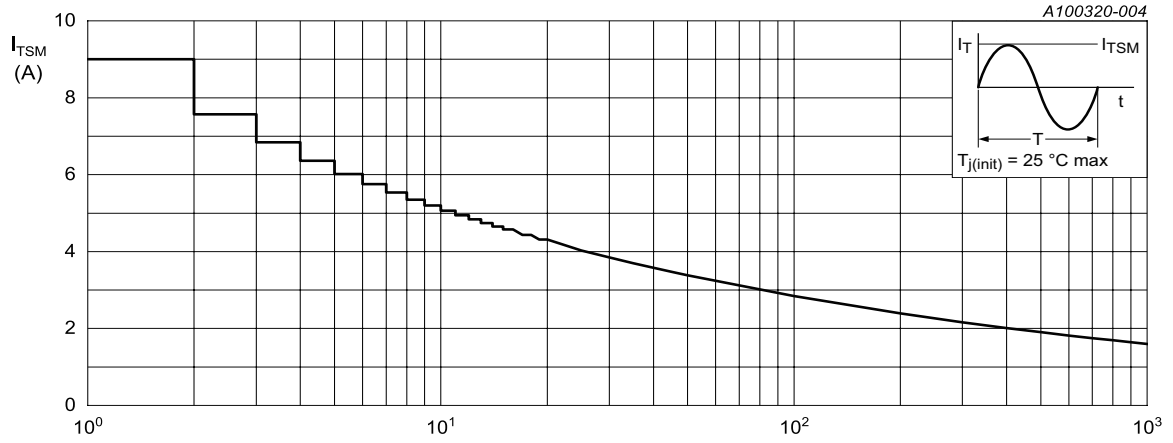
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

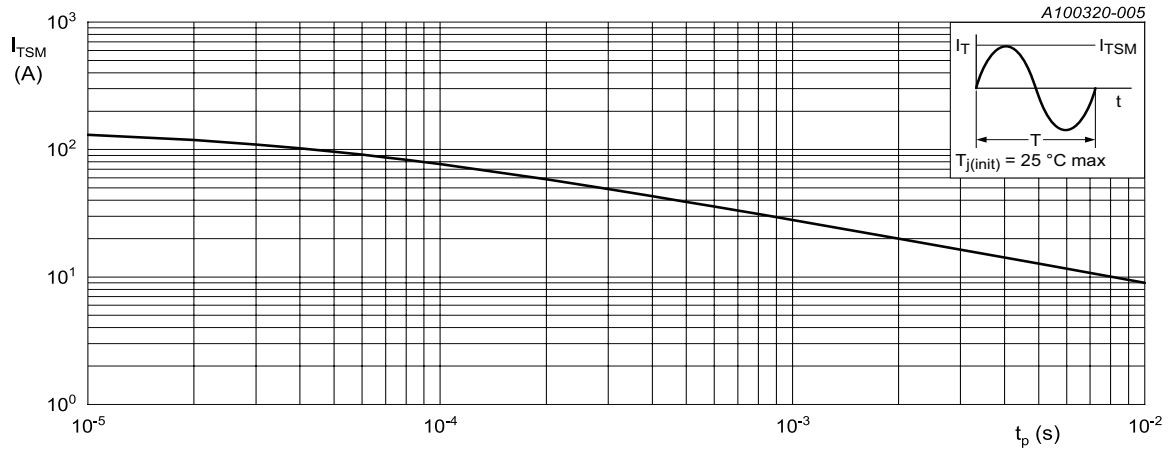
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values



f = 50 Hz

Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



t_p ≤ 10 ms

Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	full cycle; Fig 6		-	-	40	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air		-	105	-	K/W

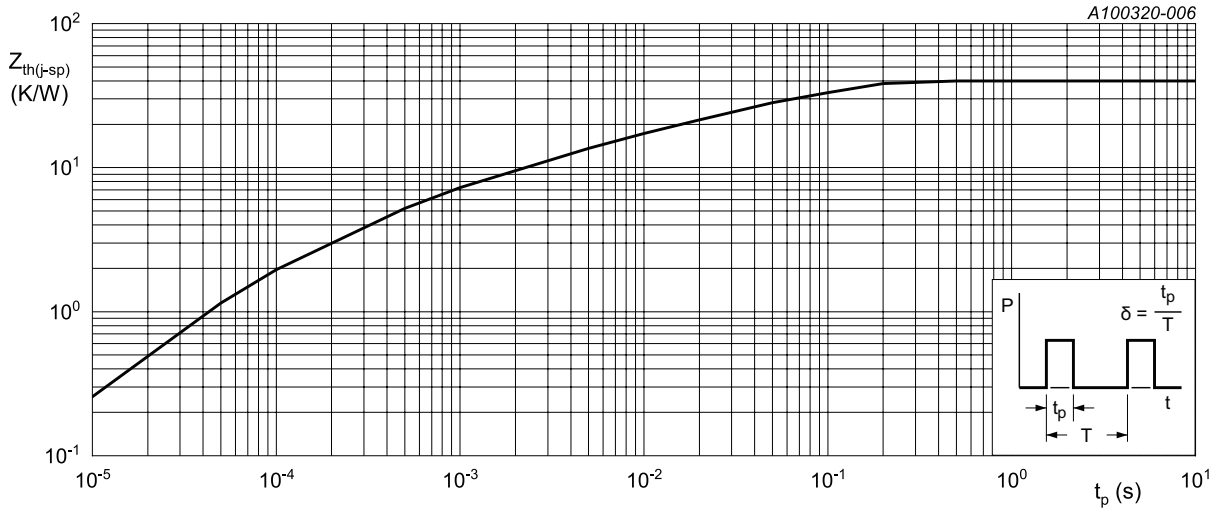


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse width

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 10 mA; T_j = 25 °C; Fig. 7		1	-	100	µA
I_L	latching current	V_D = 12 V; I_G = 0.5 mA; T_j = 25 °C; $R_{GK(ext)}$ = 1 kΩ; Fig. 8		-	-	6	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; $R_{GK(ext)}$ = 1 kΩ; Fig. 9		-	-	3	mA
V_T	on-state voltage	I_T = 1.2 A; T_j = 25 °C; Fig. 10		-	1.25	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 10 mA; T_j = 25 °C; Fig. 11		-	0.5	0.8	V
		V_D = 800 V; I_T = 10 mA; T_j = 125 °C		0.3	0.5	-	V
I_D	off-state current	V_D = 800 V; $R_{GK(ext)}$ = 1 kΩ; T_j = 125 °C		-	-	0.1	mA
I_R	reverse current	V_R = 800 V; T_j = 125 °C; $R_{GK(ext)}$ = 1 kΩ		-	-	0.1	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 536 V; T_j = 125 °C; R_{GK} = 1 kΩ; (V_{DM} = 67% of V_{DRM}); exponential waveform; Fig. 12		150	-	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 2 A; V_D = 800 V; I_G = 10 mA; dI_G/dt = 0.1 A/µs; T_j = 25 °C		-	2	-	µs
t_q	commutated turn-off time	V_{DM} = 536 V; T_j = 125 °C; I_{TM} = 1.6 A; V_R = 35 V; $(dI_T/dt)_M$ = 30 A/µs; dV_D/dt = 2 V/µs; $R_{GK(ext)}$ = 1 kΩ; (V_{DM} = 67% of V_{DRM})		-	100	-	µs

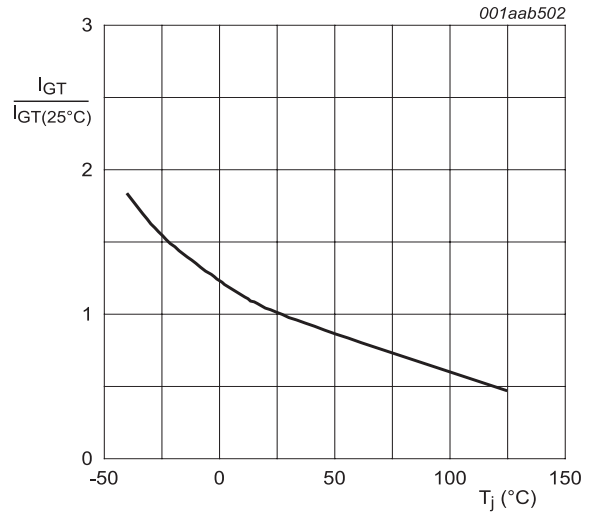
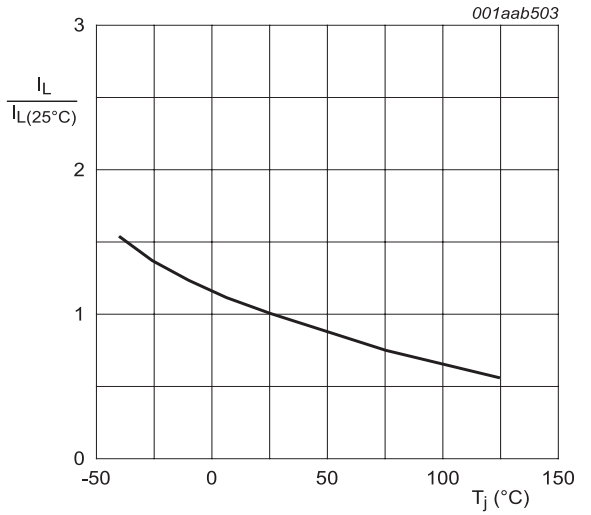
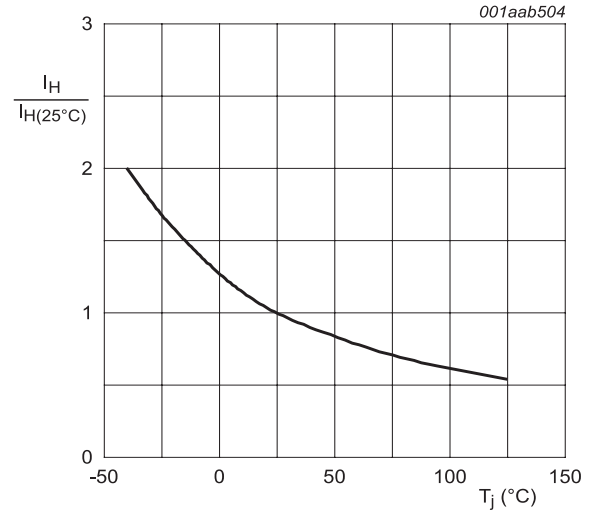


Fig. 7. Normalized gate trigger current as a function of junction temperature



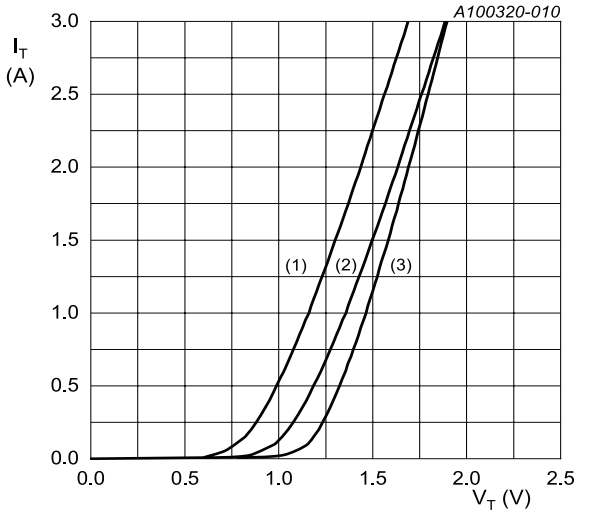
R_{GK} = 1 kΩ

Fig. 8. Normalized latching current as a function of junction temperature



R_{GK} = 1 kΩ

Fig. 9. Normalized holding current as a function of junction temperature



V_o = 1.039 V; R_s = 0.3062 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 10. On-state current as a function of on-state voltage

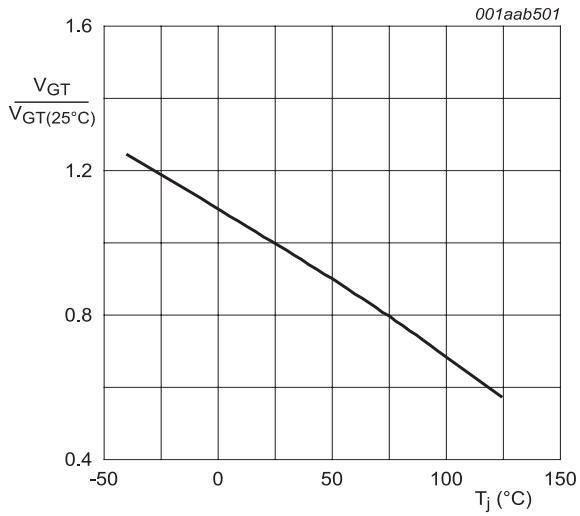
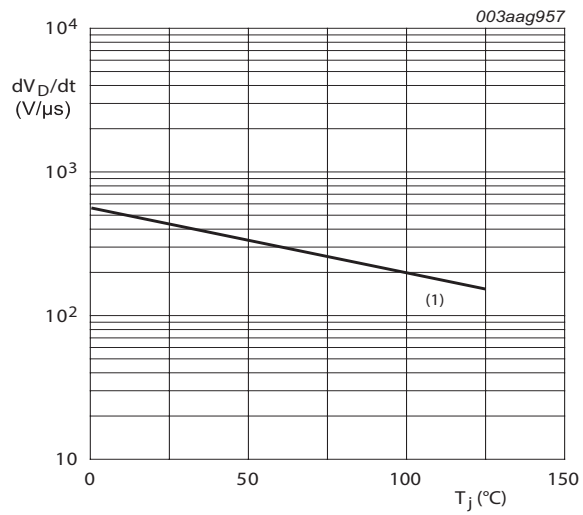


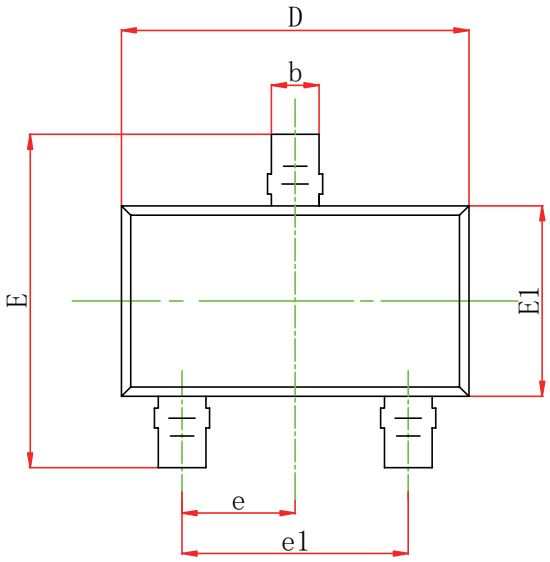
Fig. 11. Normalized gate trigger voltage as a function of junction temperature



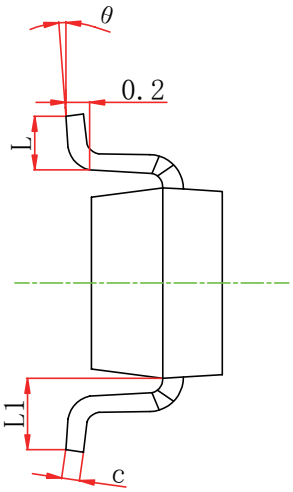
(1) R_{GK} = 1 kΩ

Fig. 12. Critical rate of rise of off-state voltage as a function of junction temperature; typical values

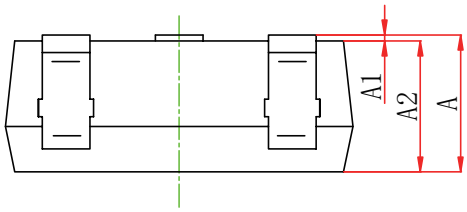
11. Package outline



TOP VIEW



SIDE VIEW



BOTTOM VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC.)		0.037(BSC.)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
L1	0.600REF.		0.024REF.	
θ	0°	8°	0°	8°

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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Product [short] data sheet	Production	This document contains the product specification.

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13. Contents

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