BT151S-500L

SCR

Rev.02 - 19 March 2025 Product data sheet

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) in a SOT428 (DPAK) surface mountable plastic package intended for use in applications requiring high bidirectional blocking voltage capability, high surge current capability and high thermal cycling performance.

2. Features and benefits

- Good bidirectional blocking voltage capability
- High surge current capability
- High thermal cycling performance
- Sensitive gate
- Surface mountable package

3. Applications

- Ignition circuits
- Motor control
- Protection circuits
- Voltage regulation

4. Quick reference data

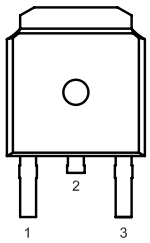
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	-	500	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq$ 103 °C; Fig. 1		-	-	7.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq$ 103 °C; Fig. 2; Fig. 3		-	-	12	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		-	-	120	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms		-	-	132	A
T_j	junction temperature			-	-	125	°C
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 8		-	2	5	mA
Dynamic characteristics							

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 335 V; T_j = 125 °C; R_{GK} = 100 Ω; (V_{DM} = 67% of V_{DRM}); exponential waveform; Fig. 13		200	1000	-	V/µs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
3	G	gate		
mb	A	mounting base; connected to 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
BT151S-500L	TO252	BT151S-500L,118	Reel	2500	TO252N	07-Mar-2025
					TO252Q	05-Mar-2025

Type number	Marking codes	
	Assembly factory: N	Assembly factory: Q
BT151S-500L	151S5L PJNxxxx xx	151S5L PJQxxxx xx

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7. Limiting values

Table 4. Limiting values

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

Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage			-	500	V
V_{RRM}	repetitive peak reverse voltage			-	500	V
$I_{T(AV)}$	average on-state current	half sine wave; $T_{mb} \leq 103$ °C; Fig. 1		-	7.5	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{mb} \leq 103$ °C; Fig. 2; Fig. 3		-	12	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		-	120	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms		-	132	A
I^2t	I^2t for fusing	$t_p = 10$ ms; SIN		-	72	A^2s
dI_T/dt	rate of rise of on-state current	$I_G = 10$ mA		-	50	A/µs
I_{GM}	peak gate current			-	2	A
V_{RGM}	peak reverse gate voltage			-	5	V
P_{GM}	peak gate power			-	5	W
$P_{G(AV)}$	average gate power	over any 20 ms period		-	0.5	W
T_{stg}	storage temperature			-40	150	°C
T_j	junction temperature			-	125	°C

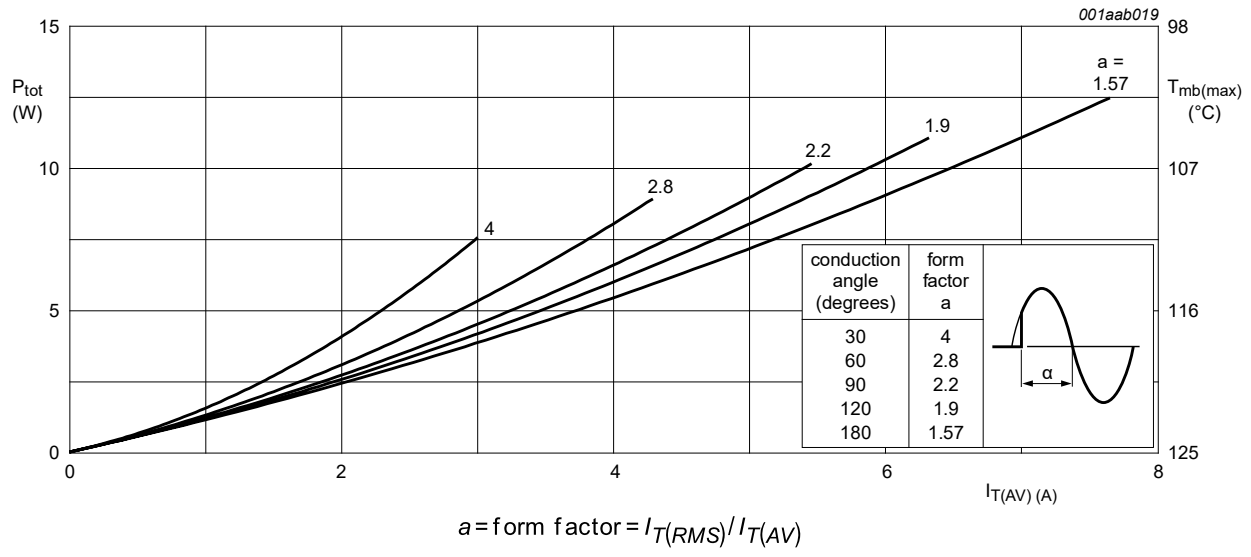

Fig. 1. Total power dissipation as a function of average on-state current; maximum values

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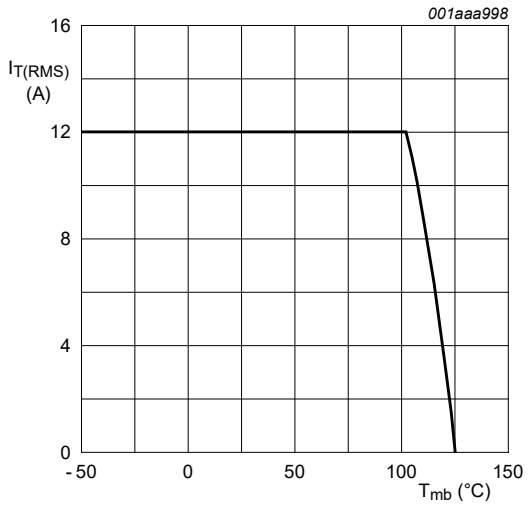
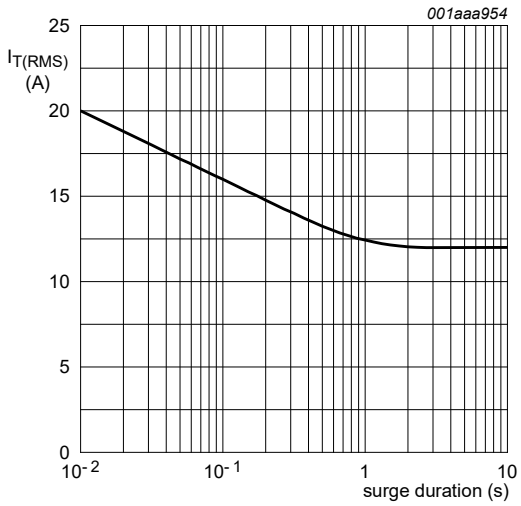
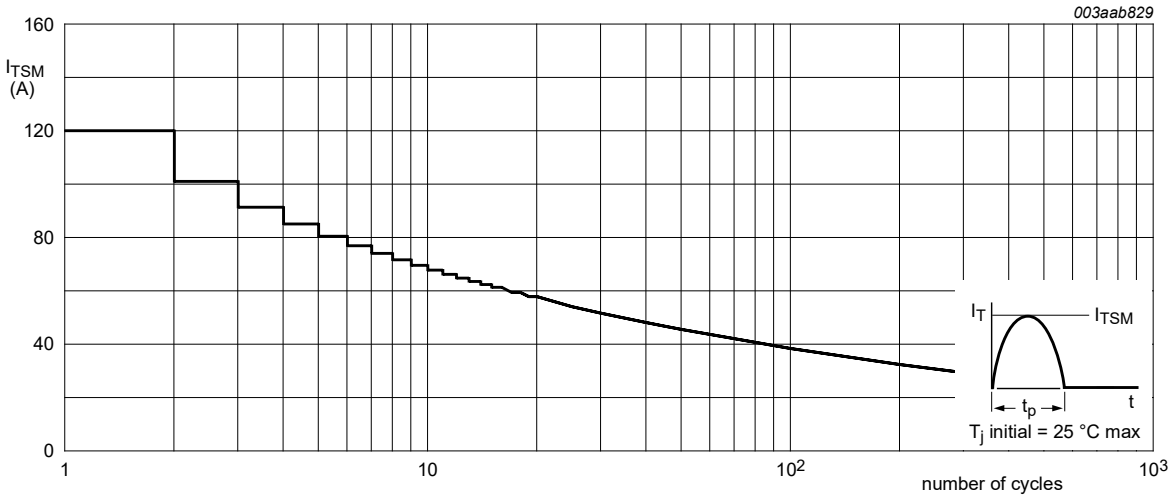


Fig. 2. RMS on-state current as a function of mounting base temperature; maximum values



f = 50 Hz; T_{mb} = 103 °C

Fig. 3. RMS on-state current as a function of surge duration; 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

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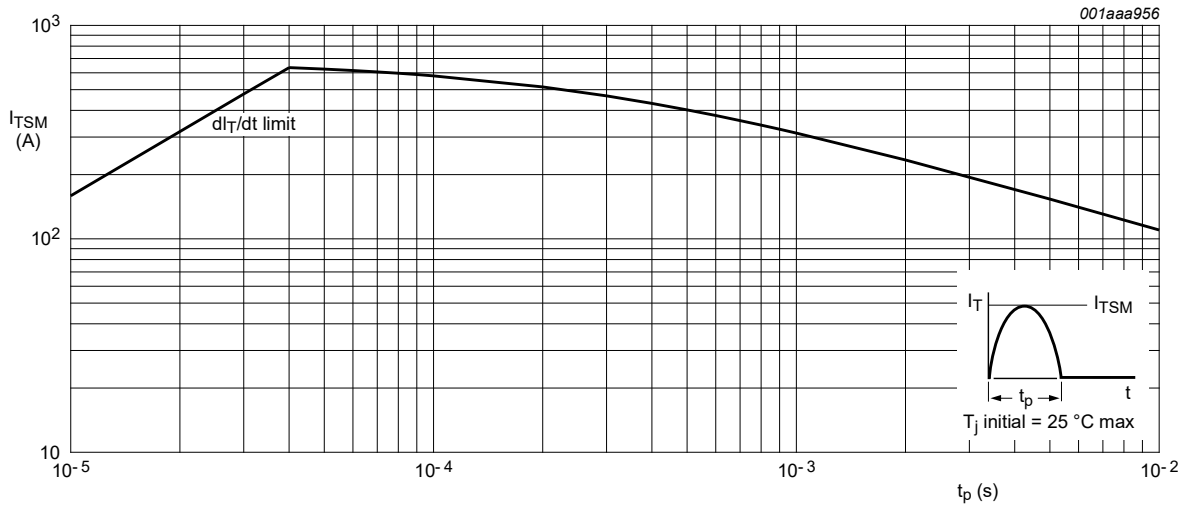

$t_p = 10\,ms$

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

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8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 6		-	-	1.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	mounted on an FR4 printed-circuit board;; Fig. 7		-	75	-	K/W

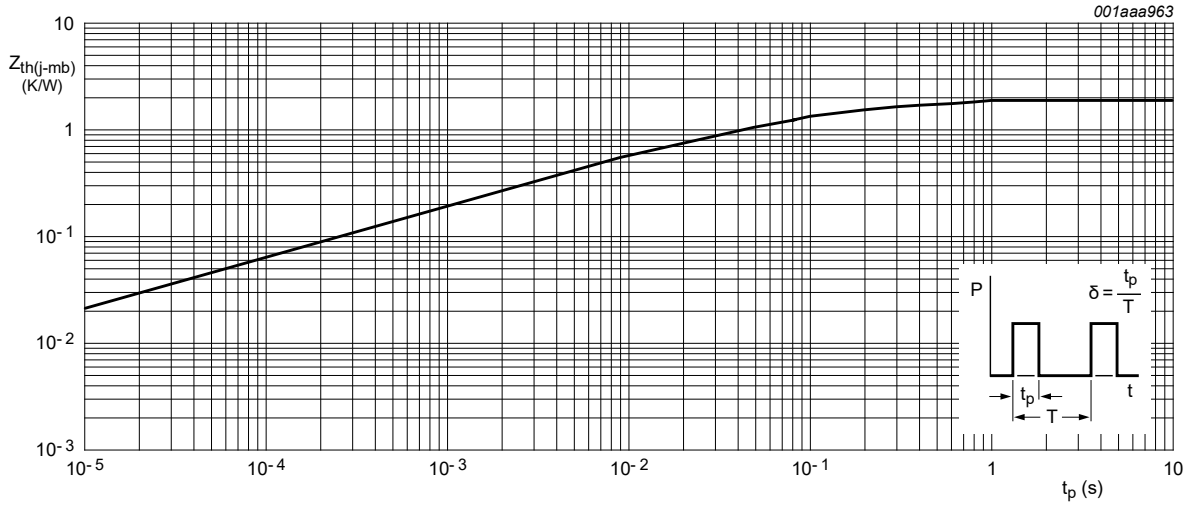
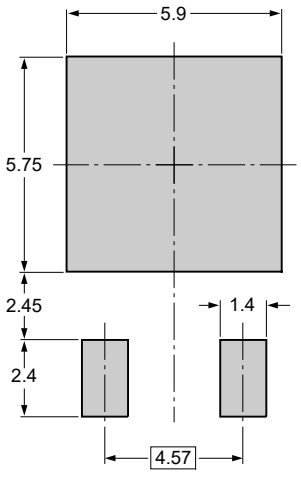


Fig. 6. Transient thermal impedance from junction to mounting base as as function of pulse width



001aab021 all dimensions are in mm

Fig. 7. Minimum footprint SOT428

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9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 8		-	2	5	mA
I_L	latching current	V_D = 12 V; I_G = 0.1 A; T_j = 25 °C; Fig. 9		-	10	40	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; Fig. 10		-	7	20	mA
V_T	on-state voltage	I_T = 23 A; T_j = 25 °C; Fig. 11		-	1.4	1.75	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 12		-	0.6	1.5	V
		V_D = 500 V; I_T = 0.1 A; T_j = 125 °C; Fig. 12		0.25	0.4	-	V
I_D	off-state current	V_D = 500 V; T_j = 125 °C		-	0.1	0.5	mA
I_R	reverse current	V_R = 500 V; T_j = 125 °C		-	0.1	0.5	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 335 V; T_j = 125 °C; R_{GK} = 100 Ω; (V_{DM} = 67% of V_{DRM}); exponential waveform; Fig. 13		200	1000	-	V/µs
		V_{DM} = 335 V; T_j = 125 °C; (V_{DM} = 67% of V_{DRM}); exponential waveform; gate open circuit; Fig. 13		50	130	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 40 A; V_D = 500 V; I_G = 0.1 A; dI_G/dt = 5 A/µs; T_j = 25 °C		-	2	-	µs
t_q	commutated turn-off time	V_{DM} = 335 V; T_j = 125 °C; I_{TM} = 20 A; V_R = 25 V; $(dI_T/dt)_M$ = 30 A/µs; dV_D/dt = 50 V/µs; $R_{GK(ext)}$ = 100 Ω; (V_{DM} = 67% of V_{DRM})		-	70	-	µs

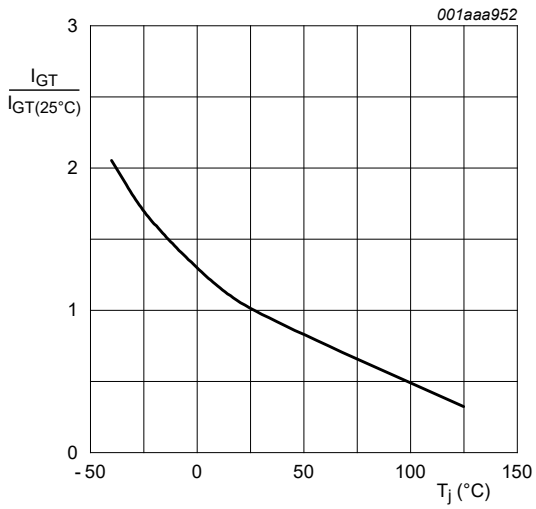

Fig. 8. Normalized gate trigger current as a function of junction temperature

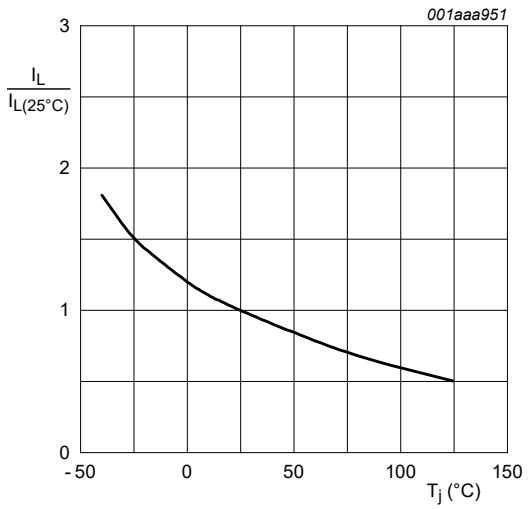

Fig. 9. Normalized latching current as a function of junction temperature

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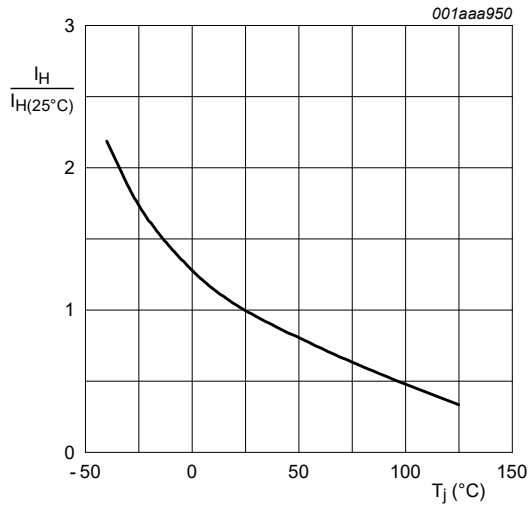
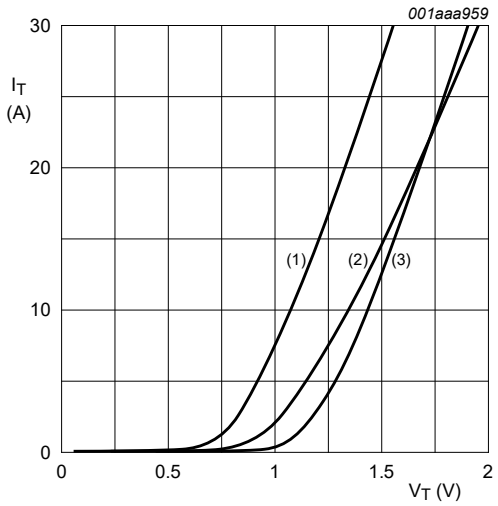


Fig. 10. Normalized holding current as a function of junction temperature



V_o = 1.06 V; R_s = 0.0304 Ω
(1) T_j = 125 °C; typical values
(2) T_j = 125 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 11. On-state current as a function of on-state voltage

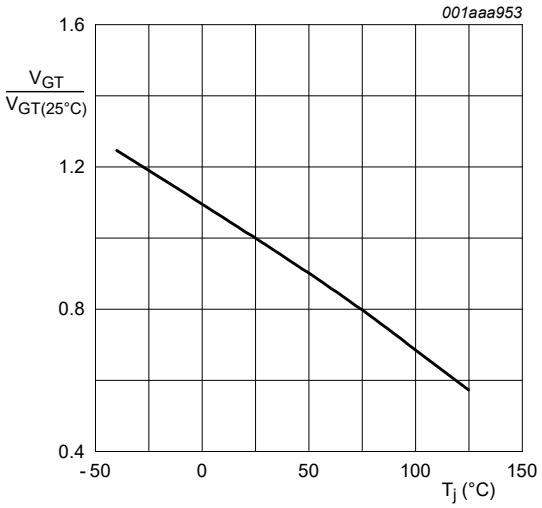
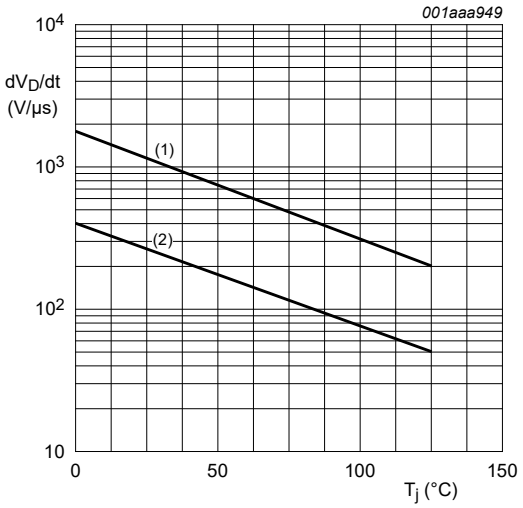


Fig. 12. Normalized gate trigger voltage as a function of junction temperature



(1) R_{GK} = 100 Ω;
(2) gate open circuit

Fig. 13. Critical rate of rise of off-state voltage as a function of junction temperature; minimum values

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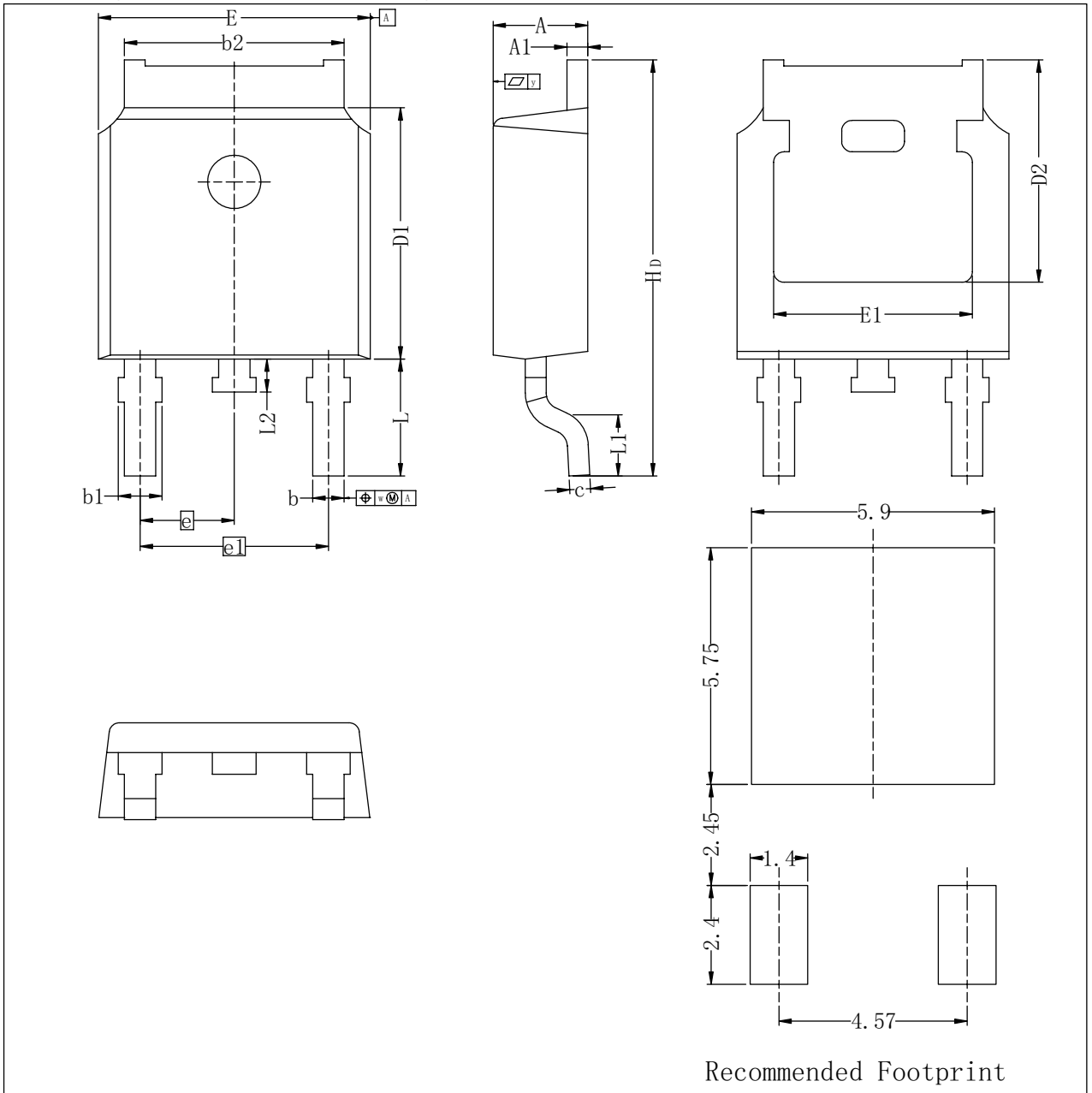
10. Package outline

Assembly factory: N

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)



Recommended Footprint

Unit	A	A1	b	b1	b2	c	D1	D2	E	E1	e	e1	H_D	L	L1	L2	w	y
min	2.22	0.46	0.71	0.72	5.00	0.20	5.98	4.00	6.47	4.45	2.285	4.57	9.60	2.90 (Ref.)	0.50	0.50	0.20	
mm nom																		
max	2.38	0.93	0.89	1.10	5.46	0.56	6.22	---	6.73	---			10.40		---	0.90		0.20

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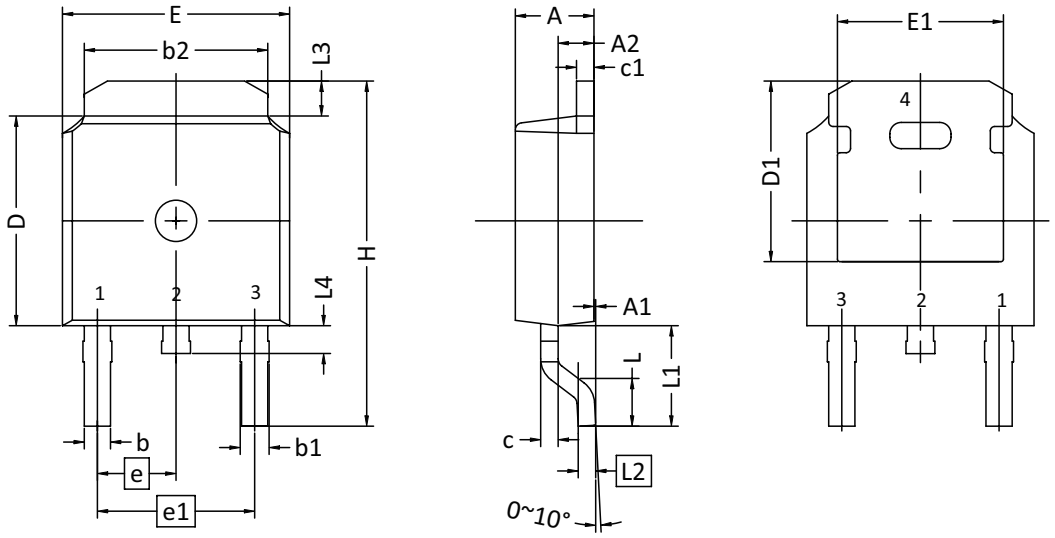
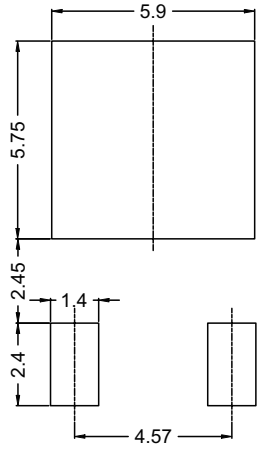
Assembly factory: Q

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) TO252





Recommended Footprint

SYMBOLS	DIMENSION IN MM		
	MIN	NOM	MAX
A	2.184	2.286	2.400
A1	0.000	---	0.200
A2	0.889	1.041	1.170
b	0.635	0.762	0.889
b1	0.680	0.840	1.143
b2	4.953	5.340	5.500
c	0.450	0.508	0.610
c1	0.450	0.508	0.630
D	5.969	6.096	6.223
D1	5.210	5.249	5.380
E	6.350	6.604	6.800
E1	4.318	4.826	4.920
e	2.286BSC		
e1	4.572BSC		
H	9.398	10.033	10.500
L	1.270	1.520	2.032
L1	2.921REF		
L2	0.408	0.508	0.608
L3	0.889	1.016	1.270
L4	0.600	---	1.016

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[2] The term 'short data sheet' is explained in section "Definitions".
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