

DATA SHEET

BTH151S-650R

Thyristor

High Repetitive Surge

Product specification

March 2001



WeEn

WeEn Semiconductors

Thyristor

High Repetitive Surge

BTH151S-650R**GENERAL DESCRIPTION**

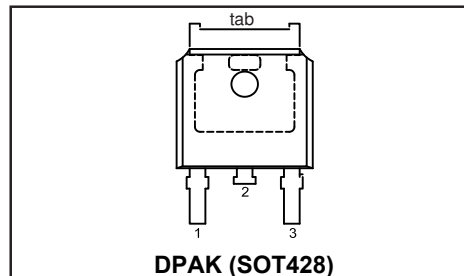
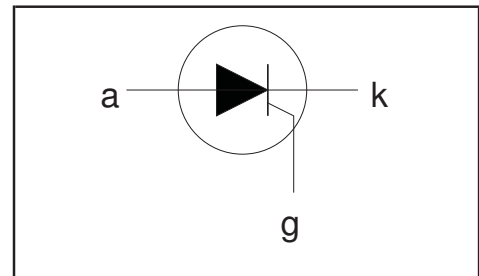
Passivated thyristor in a plastic envelope, suitable for surface mounting, intended for use in applications requiring high bidirectional blocking voltage capability and high thermal cycling performance. This thyristor has a high repetitive surge specification which makes it suitable for applications where high inrush currents or stall currents are likely to occur on a repetitive basis.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{DRM}, V_{RRM}	Repetitive peak off-state voltages	650	V
$I_{T(AV)}$	Average on-state current	7.5	A
$I_{T(RMS)}$	RMS on-state current	12	A
I_{TSM}	Non-repetitive peak on-state current	110	A
I_{TRM}	Repetitive peak on-state current	60	A

PINNING - SOT428

PIN	DESCRIPTION
1	cathode
2	anode
3	gate
tab	anode

PIN CONFIGURATION**SYMBOL****LIMITING VALUES**

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DRM}, V_{RRM}	Repetitive peak off-state voltages	half sine wave;	-	650	V
$I_{T(AV)}$	Average on-state current	$T_{mb} \leq 103\text{ }^{\circ}\text{C}$	-	7.5	A
$I_{T(RMS)}$	RMS on-state current	all conduction angles	-	12	A
I_{TSM}	Non-repetitive peak on-state current	half sine wave; $T_j = 25\text{ }^{\circ}\text{C}$ prior to surge	-	110	A
		$t = 10\text{ ms}$	-	121	A
I_{TRM}	Repetitive peak on-state current	$t = 8.3\text{ ms}$	-	60	A
		$t = 10\text{ ms}, \tau = 3\text{ s}, T_{mb} \leq 45\text{ }^{\circ}\text{C}$, no. of surges = 100k	-		
I^2t	I^2t for fusing	$t = 10\text{ ms}$	-	61	A ² s
dI_T/dt	Repetitive rate of rise of on-state current after triggering	$I_{TM} = 20\text{ A}; I_G = 50\text{ mA}; dI_G/dt = 50\text{ mA}/\mu\text{s}$	-	50	A/ μs
I_{GM}	Peak gate current		-	2	A
V_{GM}	Peak gate voltage		-	5	V
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	$^{\circ}\text{C}$
T_j	Operating junction temperature		-	125	$^{\circ}\text{C}$

1 Although not recommended, off-state voltages up to 800V may be applied without damage, but the thyristor may switch to the on-state. The rate of rise of current should not exceed 15 A/ μs .

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THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	-	1.8	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	pcb (FR4) mounted; footprint as in Fig.14	-	75	-	K/W

STATIC CHARACTERISTICS

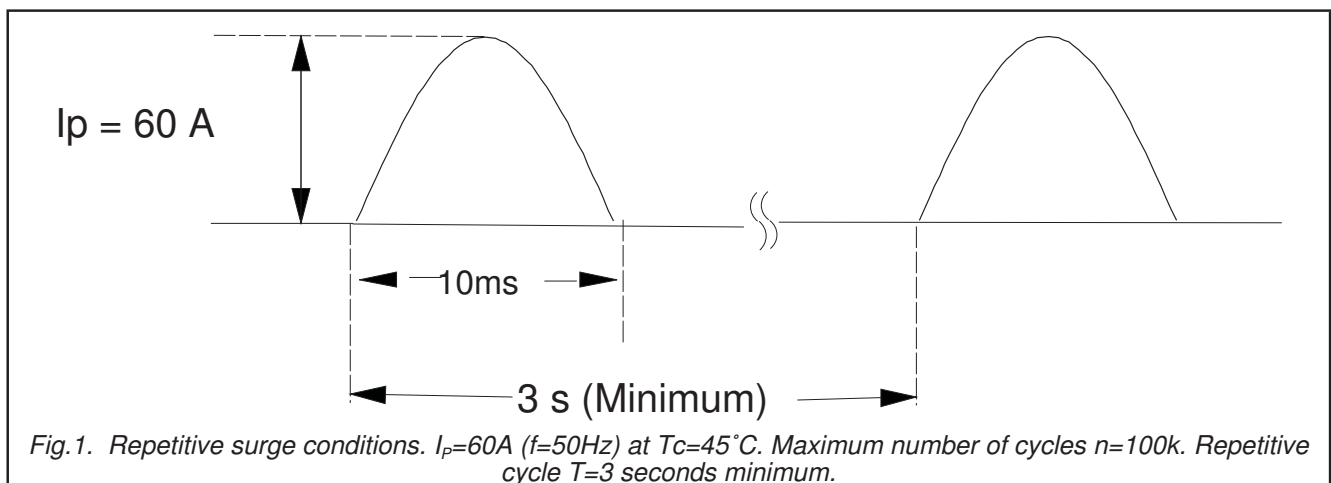
 $T_j = 25\ ^\circ\text{C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{GT}	Gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	2	15	mA
I_L	Latching current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	10	40	mA
I_H	Holding current	$V_D = 12\text{ V}; I_{GT} = 0.1\text{ A}$	-	7	20	mA
V_T	On-state voltage	$I_T = 23\text{ A}$	-	1.4	1.75	V
V_{GT}	Gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}$	-	0.6	1.5	V
I_D, I_R	Off-state leakage current	$V_D = V_{DRM(max)}; I_T = 0.1\text{ A}; T_j = 125\ ^\circ\text{C}$	0.25	0.4	-	V
		$V_D = V_{DRM(max)}; V_R = V_{RRM(max)}; T_j = 125\ ^\circ\text{C}$	-	0.1	0.5	mA

DYNAMIC CHARACTERISTICS

 $T_j = 25\ ^\circ\text{C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
dV_D/dt	Critical rate of rise of off-state voltage	$V_{DM} = 67\% V_{DRM(max)}; T_j = 125\ ^\circ\text{C};$ exponential waveform;				
		Gate open circuit $R_{GK} = 100\ \Omega$	50 200	130 1000	- -	V/ μs V/ μs
t_{gt}	Gate controlled turn-on time	$I_{TM} = 40\text{ A}; V_D = V_{DRM(max)}; I_G = 0.1\text{ A};$ $dI_G/dt = 5\text{ A}/\mu\text{s}$	-	2	-	μs
t_q	Circuit commutated turn-off time	$V_D = 67\% V_{DRM(max)}; T_j = 125\ ^\circ\text{C};$ $I_{TM} = 20\text{ A}; V_R = 25\text{ V}; dI_{TM}/dt = 30\text{ A}/\mu\text{s};$ $dV_D/dt = 50\text{ V}/\mu\text{s}; R_{GK} = 100\ \Omega$	-	70	-	μs



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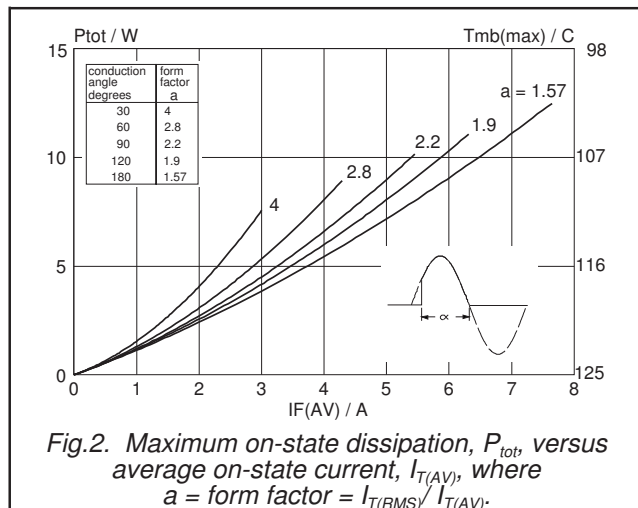


Fig.2. Maximum on-state dissipation, P_{tot} , versus average on-state current, $I_{T(AV)}$, where $a = \text{form factor} = I_{T(RMS)} / I_{T(AV)}$.

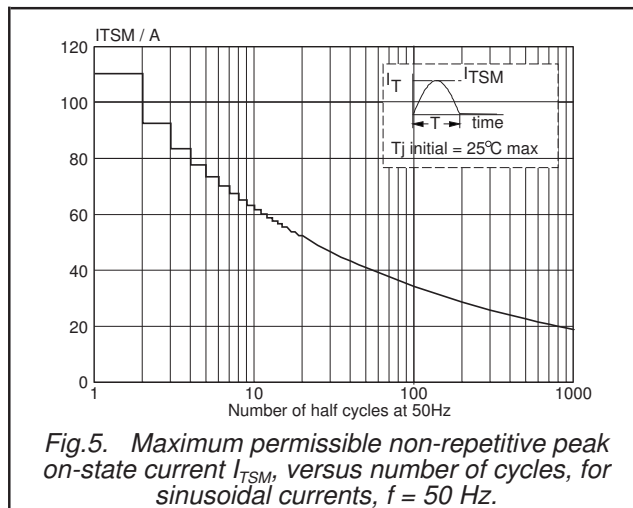


Fig.5. Maximum permissible non-repetitive peak on-state current I_{TSM} , versus number of cycles, for sinusoidal currents, $f = 50 \text{ Hz}$.

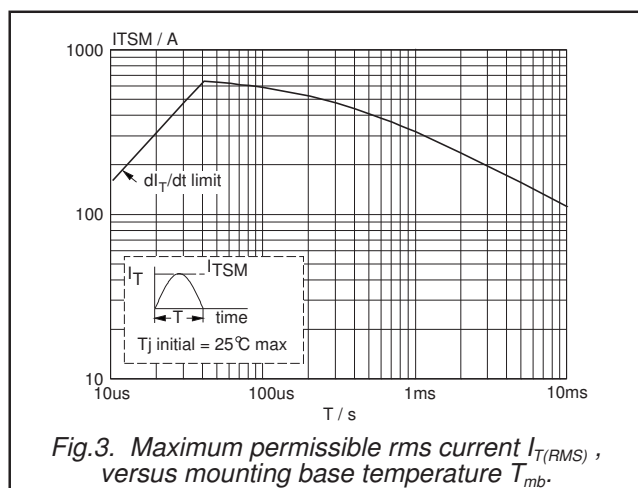


Fig.3. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

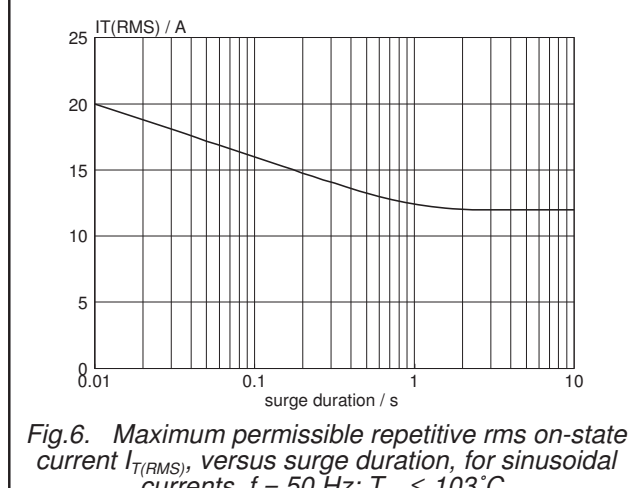


Fig.6. Maximum permissible repetitive rms on-state current $I_{T(RMS)}$, versus surge duration, for sinusoidal currents, $f = 50 \text{ Hz}$; $T_{mb} \leq 103^\circ\text{C}$.

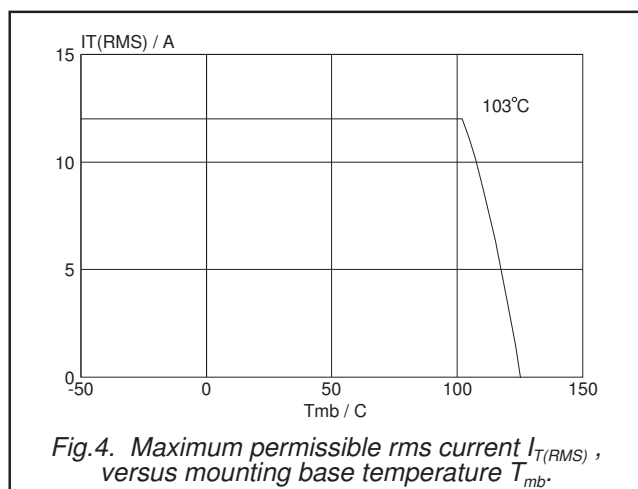


Fig.4. Maximum permissible rms current $I_{T(RMS)}$, versus mounting base temperature T_{mb} .

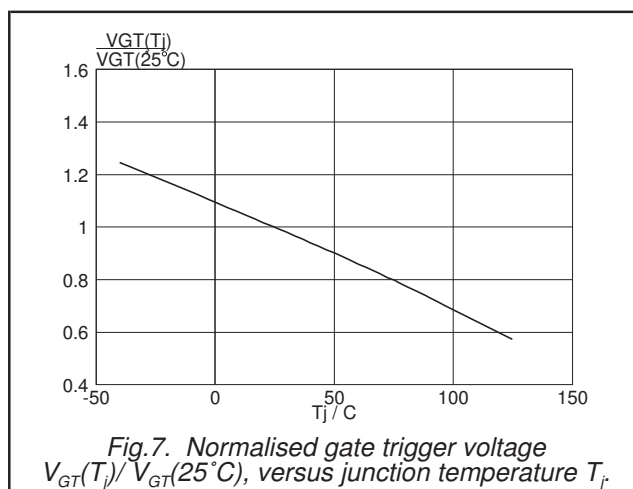
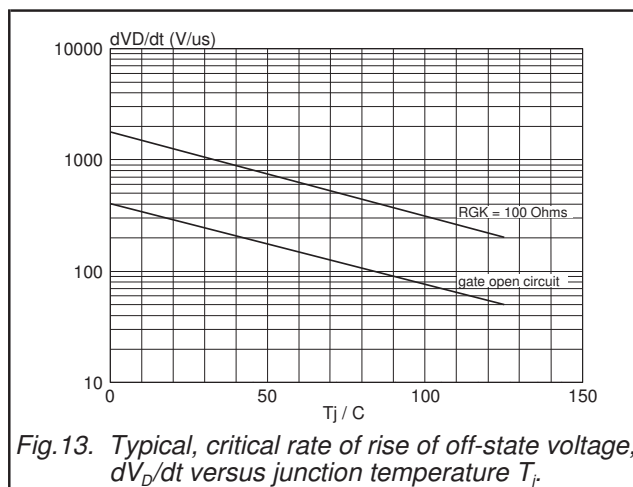
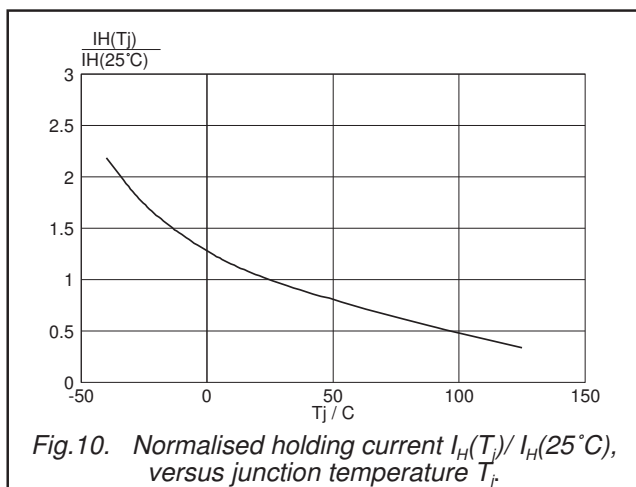
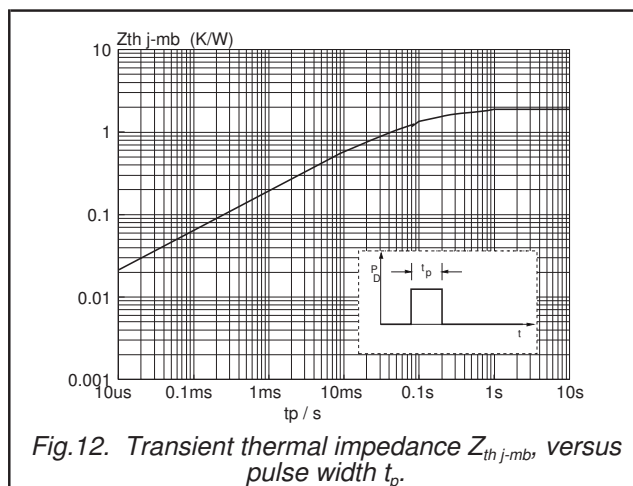
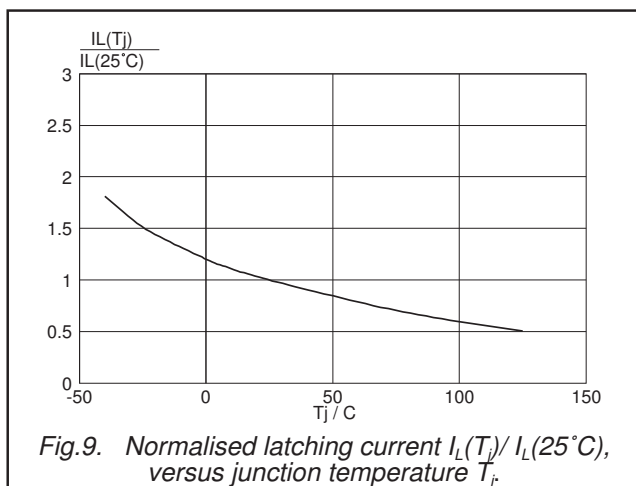
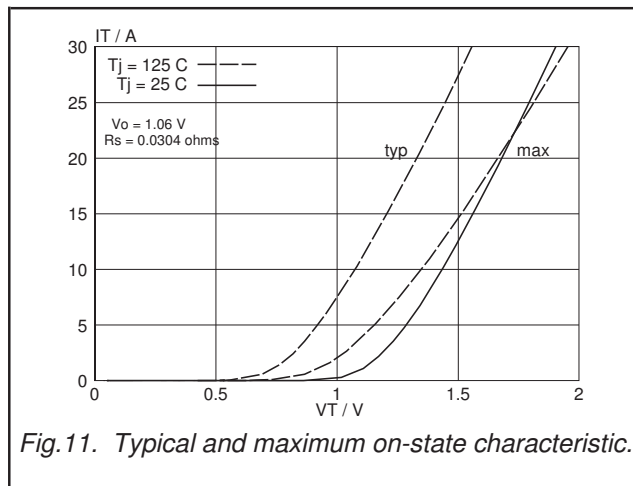
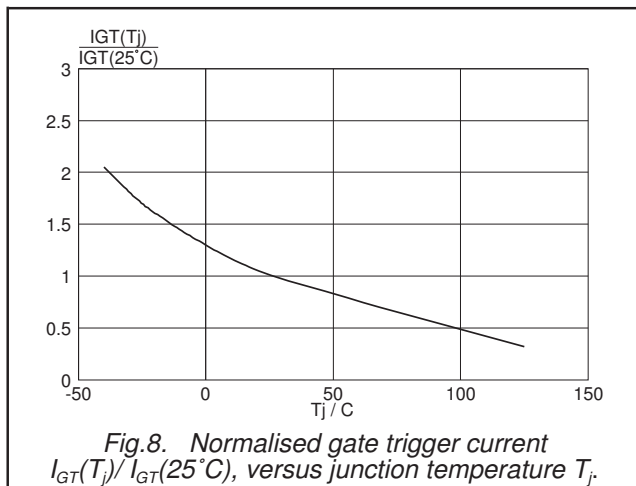


Fig.7. Normalised gate trigger voltage $V_{GT}(T_j) / V_{GT}(25^\circ\text{C})$, versus junction temperature T_j .

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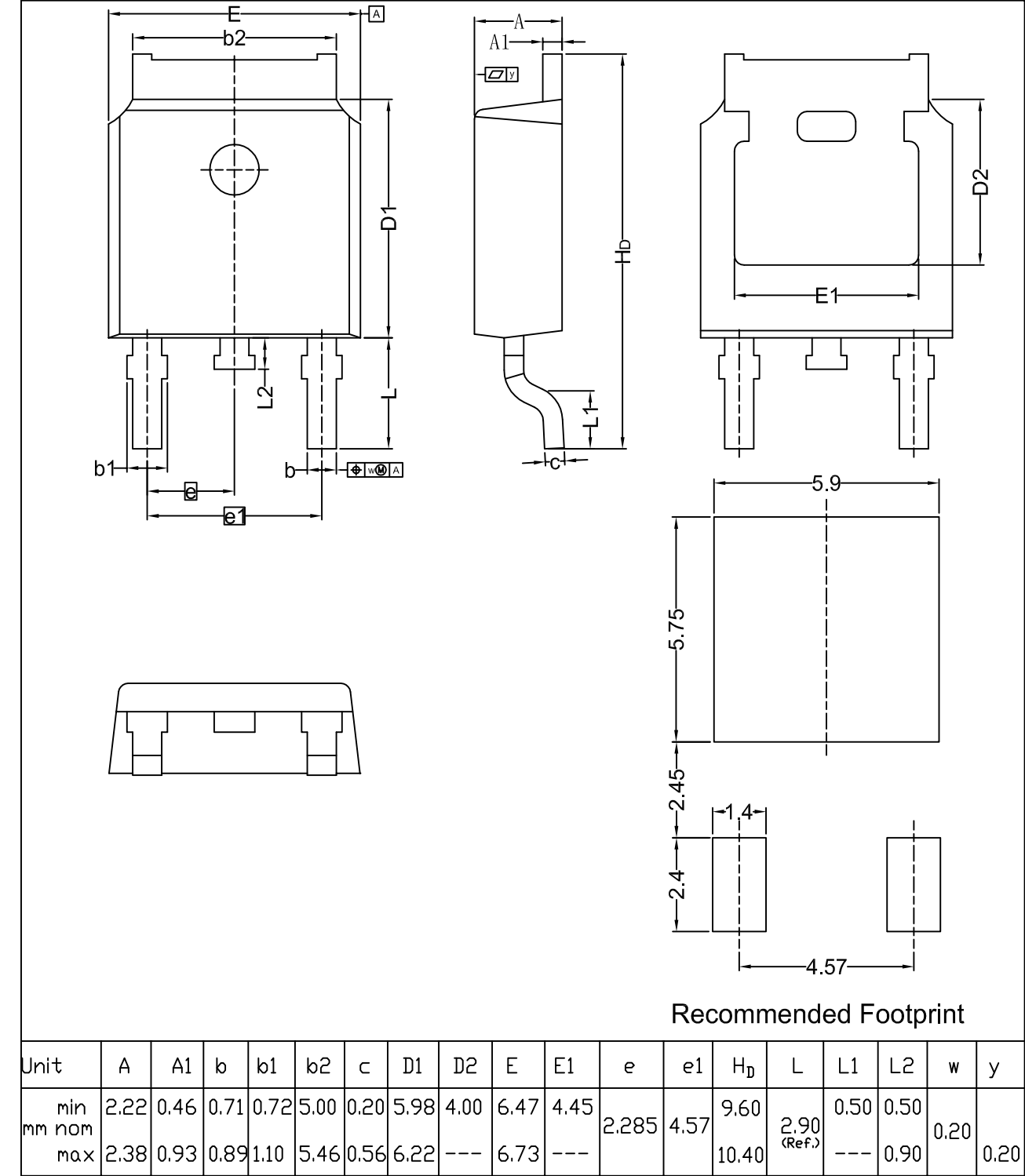


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MECHANICAL DATA

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



Legal information

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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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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