

## Triacs

BT137S series  
BT137M series

## GENERAL DESCRIPTION

Passivated triacs in a plastic envelope, suitable for surface mounting, intended for use in applications requiring high bidirectional transient and blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

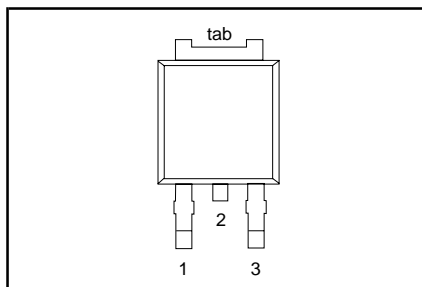
## QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	MAX.	MAX.	UNIT
$V_{\text{DRM}}$	<b>BT137S</b> (or BT137M)- <b>BT137S</b> (or BT137M)- <b>BT137S</b> (or BT137M)- Repetitive peak off-state voltages	<b>500</b> <b>500F</b> <b>500G</b> 500	<b>600</b> <b>600F</b> <b>600G</b> 600	<b>800</b> <b>800F</b> <b>800G</b> 800	V
$I_{\text{T(RMS)}}$	RMS on-state current	8	8	8	A
$I_{\text{TSM}}$	Non-repetitive peak on-state current	65	65	65	A

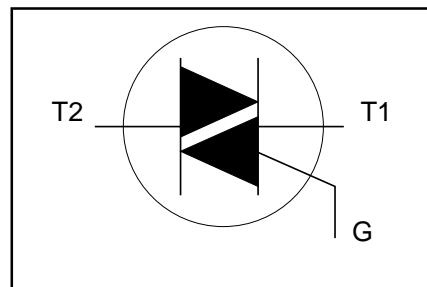
## PINNING - SOT428

PIN NUMBER	Standard S	Alternative M
1	MT1	gate
2	MT2	MT2
3	gate	MT1
tab	MT2	MT2

## PIN CONFIGURATION



## SYMBOL



## LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.			UNIT
$V_{\text{DRM}}$	Repetitive peak off-state voltages		-	<b>-500</b> 500 <sup>1</sup>	<b>-600</b> 600 <sup>1</sup>	<b>-800</b> 800	V
$I_{\text{T(RMS)}}$	RMS on-state current	full sine wave; $T_{\text{mb}} \leq 102^\circ\text{C}$	-	8			A
$I_{\text{TSM}}$	Non-repetitive peak on-state current	full sine wave; $T_j = 25^\circ\text{C}$ prior to surge $t = 20\text{ ms}$ $t = 16.7\text{ ms}$ $t = 10\text{ ms}$	-	65			A
$I^2t$	$I^2t$ for fusing		-	71			A
$di_{\text{T}}/dt$	Repetitive rate of rise of on-state current after triggering	$I_{\text{TM}} = 12\text{ A}$ ; $I_{\text{G}} = 0.2\text{ A}$ ; $di_{\text{G}}/dt = 0.2\text{ A}/\mu\text{s}$	-	21			A <sup>2</sup> s
$I_{\text{GM}}$	Peak gate current	T2+ G+ T2+ G- T2- G- T2- G+	-	50			A/ $\mu\text{s}$
$V_{\text{GM}}$	Peak gate voltage		-	50			A/ $\mu\text{s}$
$P_{\text{GM}}$	Peak gate power		-	50			A/ $\mu\text{s}$
$P_{\text{G(AV)}}$	Average gate power		-	10			A/ $\mu\text{s}$
$T_{\text{stg}}$	Storage temperature		-	2			A
$T_j$	Operating junction temperature	over any 20 ms period	-	5			V
			-	5			W
			-	0.5			W
			-40	150			°C
			-	125			°C

<sup>1</sup> Although not recommended, off-state voltages up to 800V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 6 A/ $\mu\text{s}$ .

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## THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base	full cycle	-	-	2.0	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	half cycle	-	-	2.4	K/W
		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	<b>BT137S</b> -(or BT137M) $V_D = 12\ \text{V}$ ; $I_T = 0.1\ \text{A}$	-	-	...	...F	...G	
		T2+ G+	-	5	35	25	50	mA
		T2+ G-	-	8	35	25	50	mA
		T2- G-	-	11	35	25	50	mA
		T2- G+	-	30	70	70	100	mA
$I_L$	Latching current	$V_D = 12\ \text{V}$ ; $I_{GT} = 0.1\ \text{A}$	-	-	-	-	-	
		T2+ G+	-	7	30	30	45	mA
		T2+ G-	-	16	45	45	60	mA
		T2- G-	-	5	30	30	45	mA
		T2- G+	-	7	45	45	60	mA
$I_H$	Holding current	$V_D = 12\ \text{V}$ ; $I_{GT} = 0.1\ \text{A}$	-	5	20	20	40	mA
$V_T$	On-state voltage	$I_T = 10\ \text{A}$	-	1.3	1.65			V
$V_{GT}$	Gate trigger voltage	$V_D = 12\ \text{V}$ ; $I_T = 0.1\ \text{A}$	-	0.7	1.5			V
		$V_D = 400\ \text{V}$ ; $I_T = 0.1\ \text{A}$ ; $T_j = 125\ ^\circ\text{C}$	0.25	0.4	-			V
$I_D$	Off-state leakage current	$V_D = V_{DRM(max)}$ ; $T_j = 125\ ^\circ\text{C}$	-	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	<b>BT137S</b> -(or BT137M) $V_{DM} = 67\% V_{DRM(max)}$ ; $T_j = 125\ ^\circ\text{C}$ ; exponential waveform; gate open circuit	100	...	...	250	-	V/ $\mu\text{s}$
$dV_{com}/dt$	Critical rate of change of commutating voltage	$V_{DM} = 400\ \text{V}$ ; $T_j = 95\ ^\circ\text{C}$ ; $I_{T(RMS)} = 8\ \text{A}$ ; $dI_{com}/dt = 3.6\ \text{A/ms}$ ; gate open circuit	-	-	10	20	-	V/ $\mu\text{s}$
$t_{gt}$	Gate controlled turn-on time	$I_{TM} = 12\ \text{A}$ ; $V_D = V_{DRM(max)}$ ; $I_G = 0.1\ \text{A}$ ; $dI_G/dt = 5\ \text{A}/\mu\text{s}$	-	-	-	2	-	$\mu\text{s}$

## Triacs

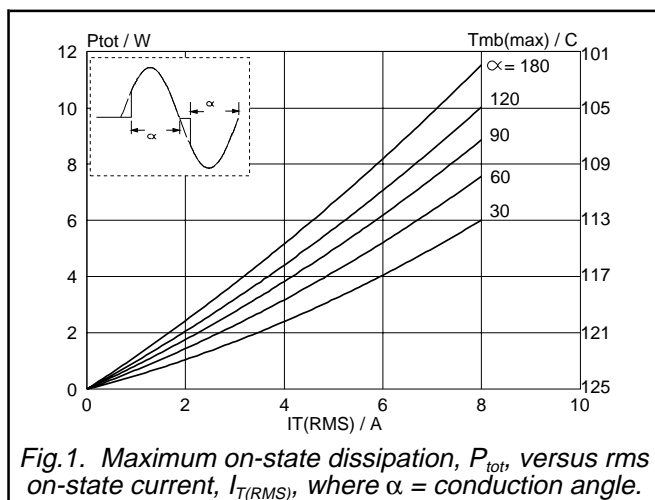
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Fig.1. Maximum on-state dissipation,  $P_{tot}$ , versus rms on-state current,  $I_{T(RMS)}$ , where  $\alpha$  = conduction angle.

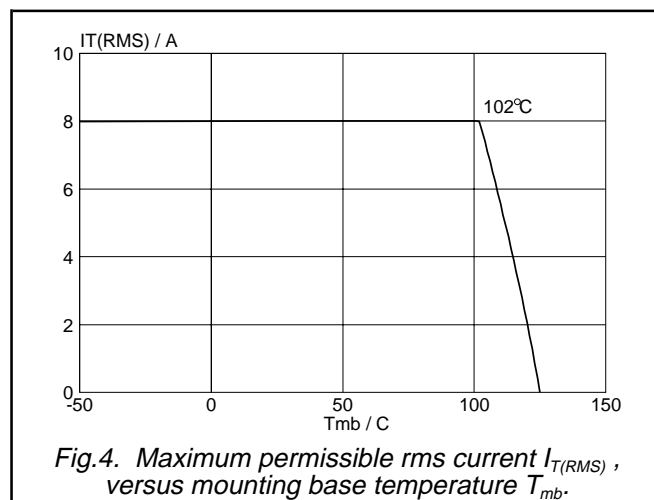


Fig.4. Maximum permissible rms current  $I_{T(RMS)}$ , versus mounting base temperature  $T_{mb}$ .

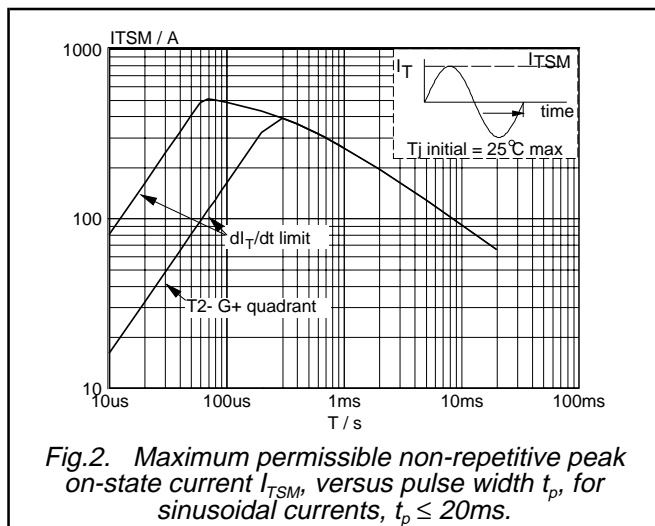


Fig.2. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus pulse width  $t_p$ , for sinusoidal currents,  $t_p \leq 20$  ms.

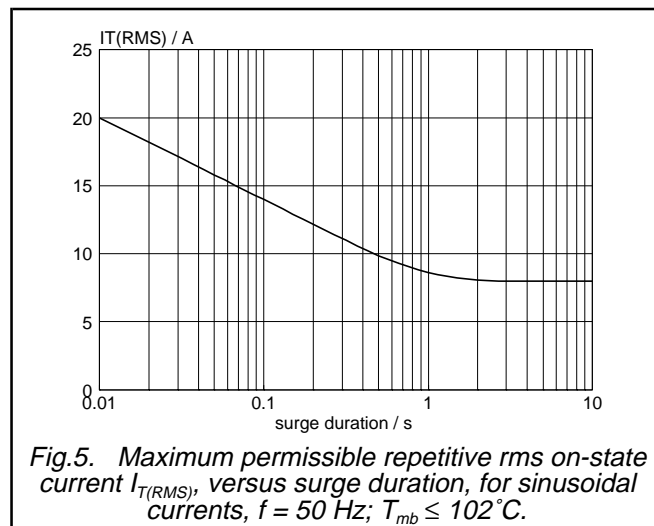


Fig.5. Maximum permissible repetitive rms on-state current  $I_{T(RMS)}$ , versus surge duration, for sinusoidal currents,  $f = 50$  Hz;  $T_{mb} \leq 102$  °C.

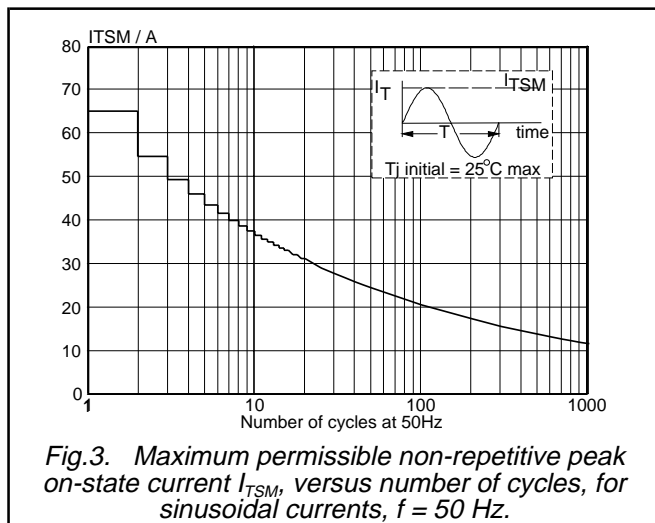


Fig.3. Maximum permissible non-repetitive peak on-state current  $I_{TSM}$ , versus number of cycles, for sinusoidal currents,  $f = 50$  Hz.

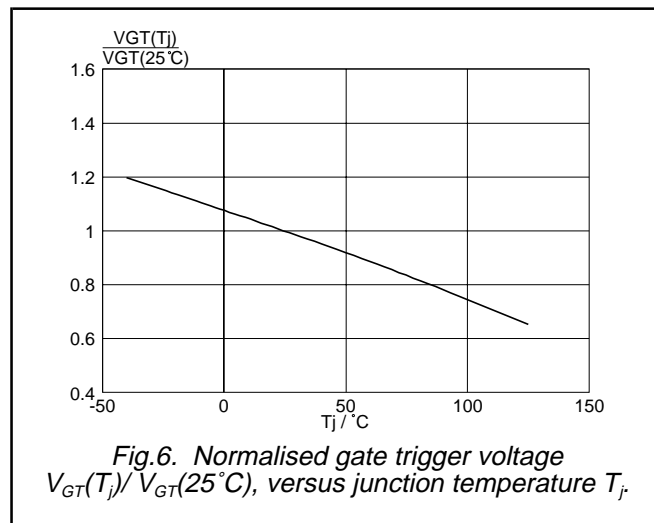


Fig.6. Normalised gate trigger voltage  $V_{GT}(T_j) / V_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

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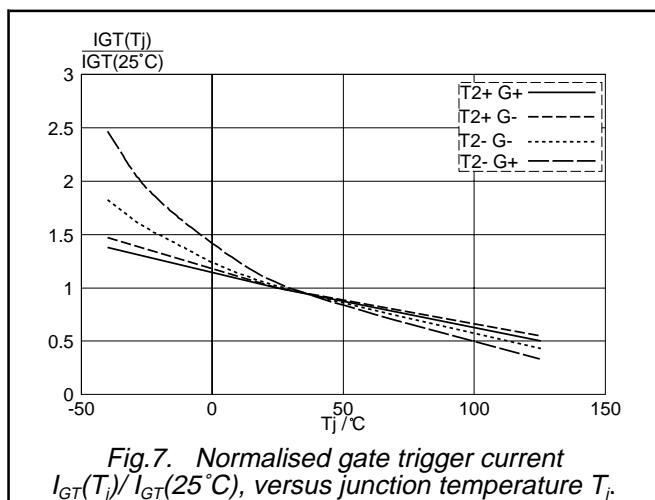
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Fig. 7. Normalised gate trigger current  $I_{GT}(T_j)/I_{GT}(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

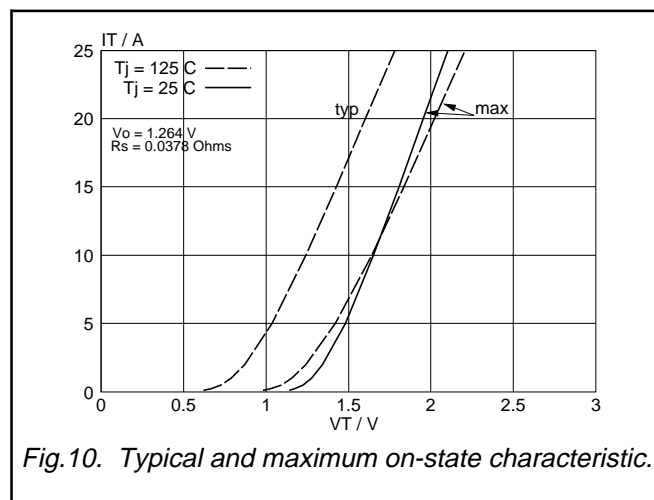


Fig. 10. Typical and maximum on-state characteristic.

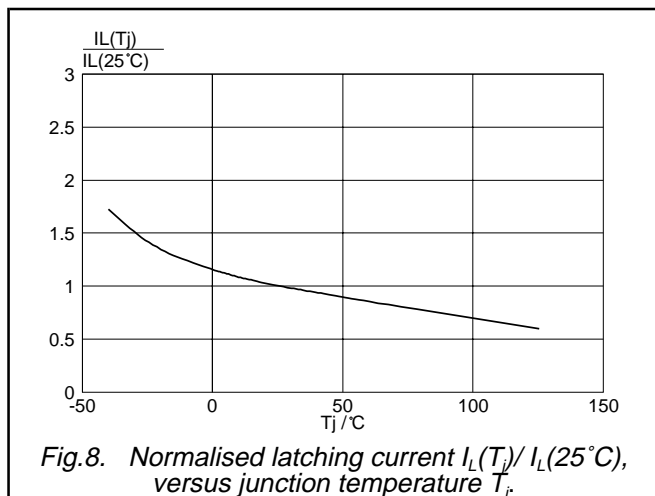


Fig. 8. Normalised latching current  $I_L(T_j)/I_L(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

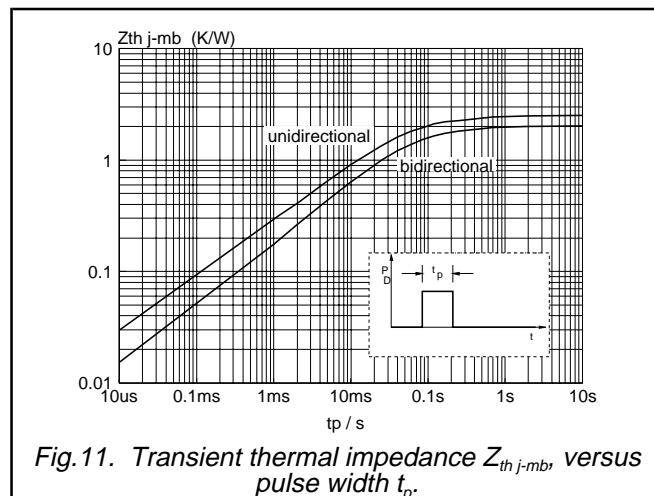


Fig. 11. Transient thermal impedance  $Z_{th j-mb}$ , versus pulse width  $t_p$ .

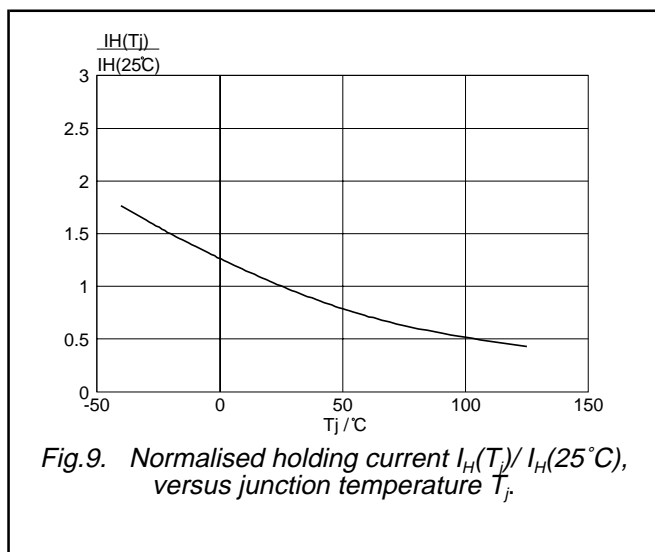


Fig. 9. Normalised holding current  $I_H(T_j)/I_H(25^\circ\text{C})$ , versus junction temperature  $T_j$ .

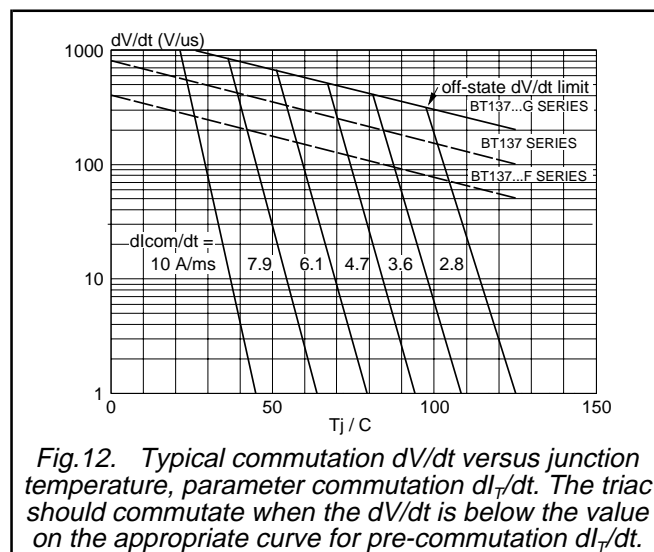


Fig. 12. Typical commutation  $dV/dt$  versus junction temperature, parameter commutation  $dI_T/dt$ . The triac should commute when the  $dV/dt$  is below the value on the appropriate curve for pre-commutation  $dI_T/dt$ .

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## MECHANICAL DATA

Dimensions in mm

Net Mass: 1.1 g

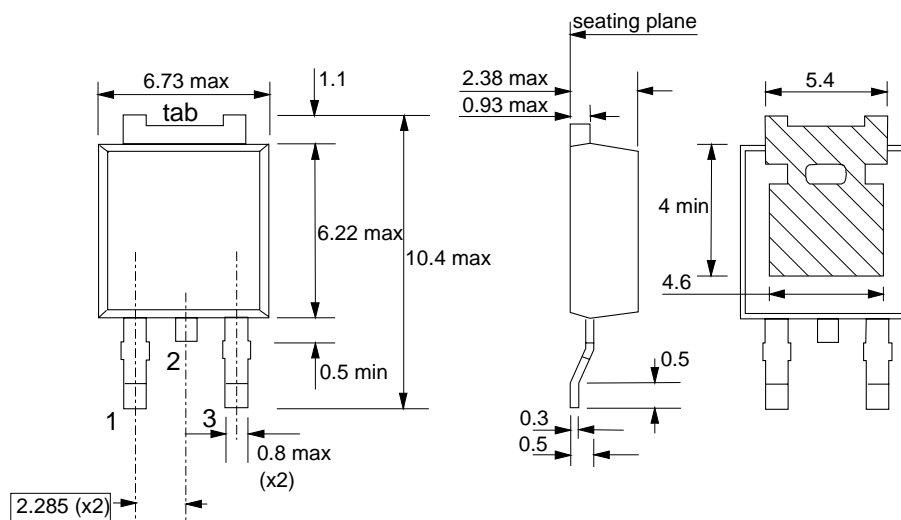


Fig.13. SOT428 : centre pin connected to tab.

## MOUNTING INSTRUCTIONS

Dimensions in mm

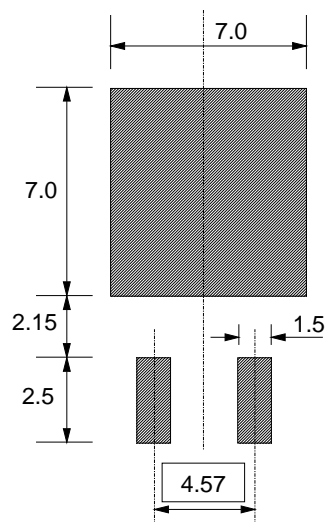


Fig.14. SOT428 : minimum pad sizes for surface mounting.

## Notes

1. Plastic meets UL94 V0 at 1/8".

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<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	
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