

BT151S-650R 12A SCR

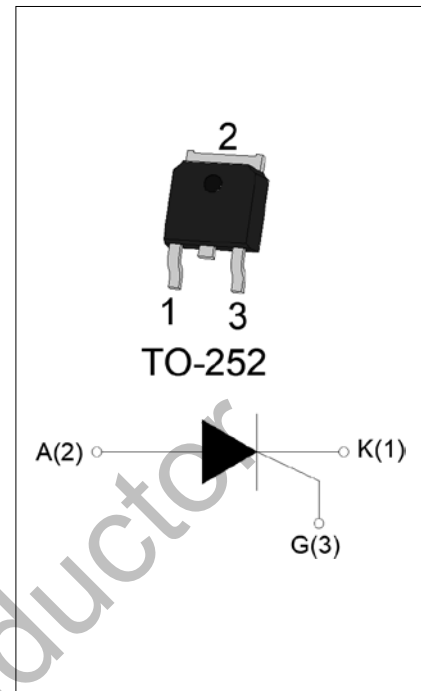
DESCRIPTION:

With high ability to withstand the shock loading of large current, BT151S-650R of silicon controlled rectifiers provides high dV/dt rate with strong resistance to electromagnetic interference.

It is especially recommended for use on solid state relay, motorcycle, power charger, T-tools etc. Package TO-252 is RoHS compliant.

MAIN FEATURES

Symbol	Value	Unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	650	V
I_{GT}	≤ 15	mA



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Storage junction temperature range	T_{stg}	-40-150	$^{\circ}\text{C}$
Operating junction temperature range	T_j	-40-125	$^{\circ}\text{C}$
Repetitive peak off-state voltage ($T_j=25^{\circ}\text{C}$)	V_{DRM}	650	V
Repetitive peak reverse voltage ($T_j=25^{\circ}\text{C}$)	V_{RRM}	650	V
Average on-state current ($T_c \leq 49^{\circ}\text{C}$)	$I_{T(AV)}$	7.5	A
RMS on-state current ($T_c \leq 49^{\circ}\text{C}$)	$I_{T(RMS)}$	12	A
Non repetitive surge peak on-state current ($t_p=10\text{ms}$, $T_j=25^{\circ}\text{C}$)	I_{TSM}	120	A
Non repetitive surge peak on-state current ($t_p=8.3\text{ms}$, $T_j=25^{\circ}\text{C}$)		132	
I^2t value for fusing ($t_p=10\text{ms}$, $T_j=25^{\circ}\text{C}$)	I^2t	72	A^2s
Critical rate of rise of on-state current ($I_G=2 \times I_{GT}$, $f=100\text{Hz}$, $T_j=125^{\circ}\text{C}$)	di/dt	100	$\text{A}/\mu\text{s}$
Peak gate current ($t_p=20\mu\text{s}$, $T_j=125^{\circ}\text{C}$)	I_{GM}	4	A

Average gate power dissipation ($T_j=125^{\circ}\text{C}$)	$P_{G(AV)}$	1	W
Peak gate power	P_{GM}	10	W
Peak pulse voltage ($T_j=25^{\circ}\text{C}$; non-repetitive, off-state; FIG.8)	V_{pp}	0.7	kV

ELECTRICAL CHARACTERISTICS ($T_j=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Test Condition	Value			Unit
		MIN.	TYP.	MAX.	
I_{GT}	$V_D=12\text{V } R_L=33\Omega$	-	-	15	mA
V_{GT}		-	-	1	V
V_{GD}	$V_D=V_{DRM} T_j=125^{\circ}\text{C } R_L=3.3\text{k}\Omega$	0.2	-	-	V
I_L	$I_G=1.2I_{GT}$	-	-	40	mA
I_H	$I_T=100\text{mA}$	-	-	30	mA
dV/dt	$V_D=436\text{V}$ Gate Open $T_j=125^{\circ}\text{C}$	800	-	-	V/ μs
t_{on}	$I_G=20\text{mA } I_A=200\text{mA } I_R=20\text{mA}$ $T_j=25^{\circ}\text{C}$	-	3	-	μs
t_{off}		-	50	-	

STATIC CHARACTERISTICS

Symbol	Parameter		Value(MAX.)	Unit
V_{TM}	$I_{TM}=23\text{A } t_p=380\mu\text{s}$	$T_j=25^{\circ}\text{C}$	1.6	V
V_{TO}	Threshold voltage	$T_j=125^{\circ}\text{C}$	0.77	V
R_D	Dynamic resistance	$T_j=125^{\circ}\text{C}$	27	m Ω
I_{DRM}	$V_D=V_{DRM} V_R=V_{RRM}$	$T_j=25^{\circ}\text{C}$	5	μA
I_{RRM}		$T_j=125^{\circ}\text{C}$	0.2	mA

THERMAL RESISTANCES

Symbol	Parameter	Value	Unit
$R_{th(j-c)}$	junction to case (DC)	4.5	$^{\circ}\text{C/W}$
$R_{th(j-a)}$	junction to ambient (DC)	120	$^{\circ}\text{C/W}$

FIG.1: Maximum power dissipation versus RMS on-state current

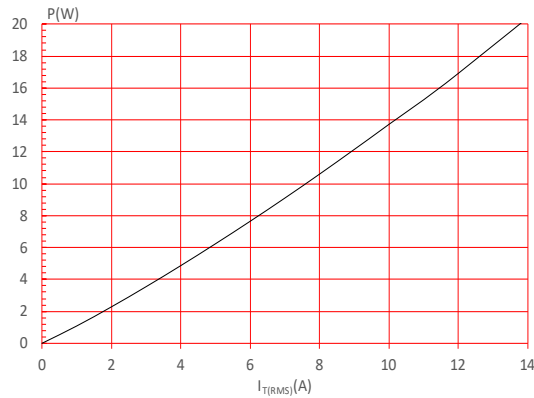


FIG.2: RMS on-state current versus case temperature

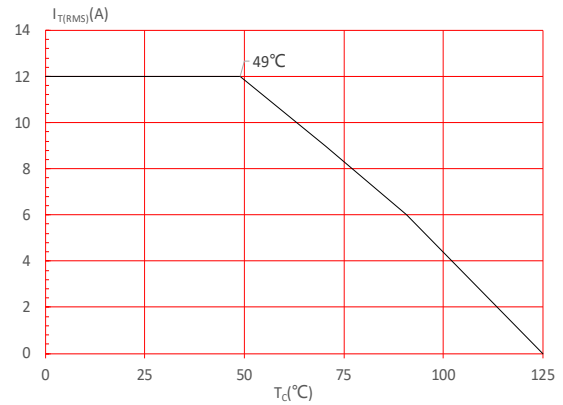


FIG.3: RMS on-state current versus ambient temperature (printed circuit board FR4,copper thickness:35μm)(full cycle)

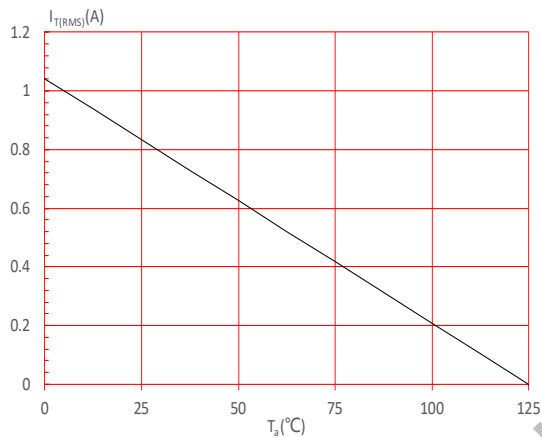


FIG.4: Surge peak on-state current versus number of cycles

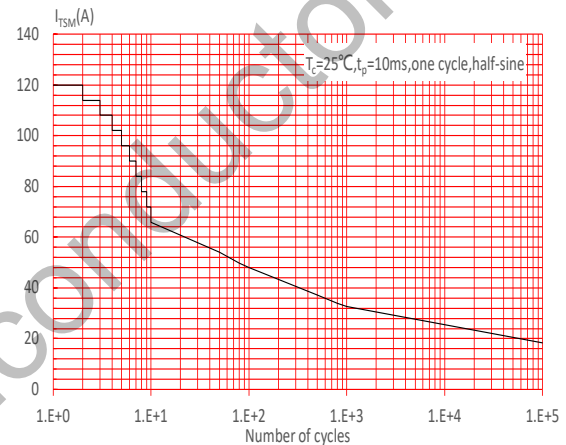


FIG.5: On-state characteristics

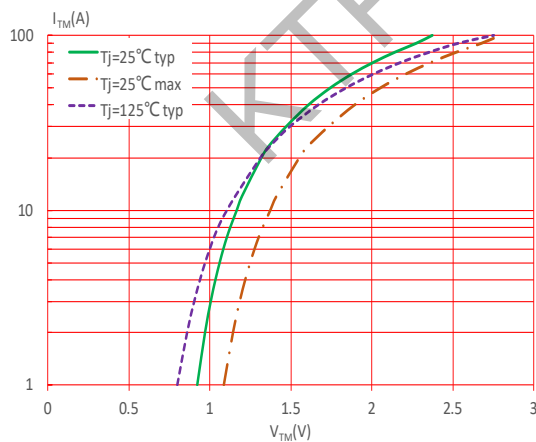


FIG.6: Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 10ms$, and corresponding value of I^2t ($dI/dt < 100A/\mu s$)

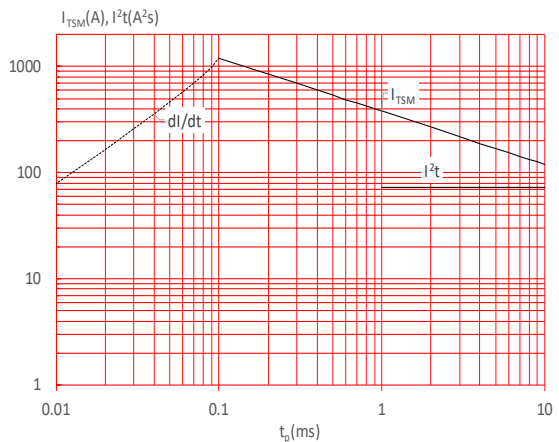


FIG.7: Relative variations of gate trigger current, holding current and latching current versus junction temperature

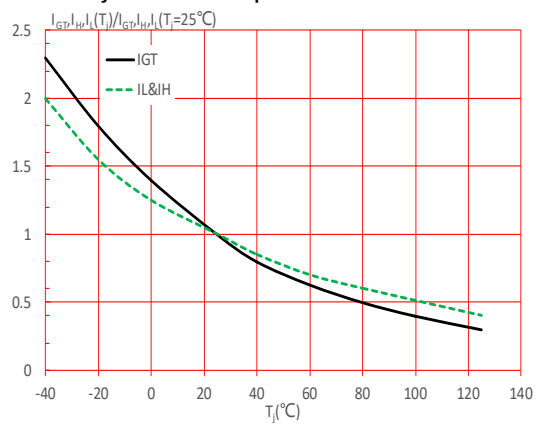
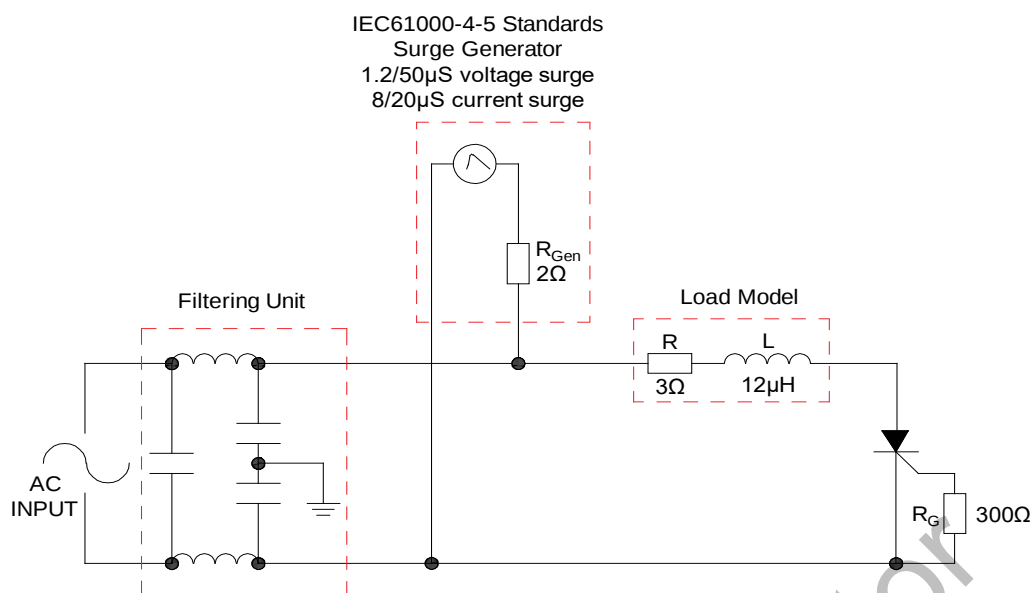
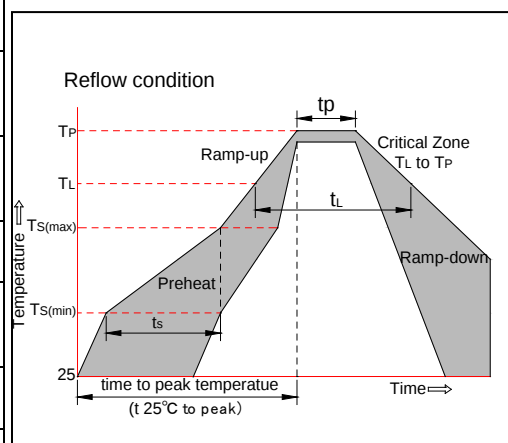


FIG.8: Test circuit for inductive and resistive loads to IEC-61000-4-5 standards.



SOLDERING PARAMETERS

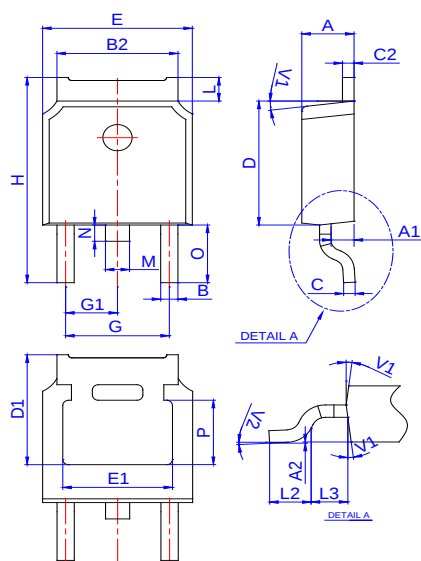
Reflow Condition		Pb-Free assembly (see figure at right)
Pre Heat	-Temperature Min ($T_{S(min)}$)	+150°C
	-Temperature Max($T_{S(max)}$)	+200°C
	-Time (Min to Max) (t_s)	60-180 secs.
Average ramp up rate (Liquidus Temp (T_L) to peak)		3°C/sec. Max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L) (Liquidus)	+217°C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_p)		20-40secs.
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_p)		8 min. Max
Do not exceed		+260°C



ORDERING INFORMATION

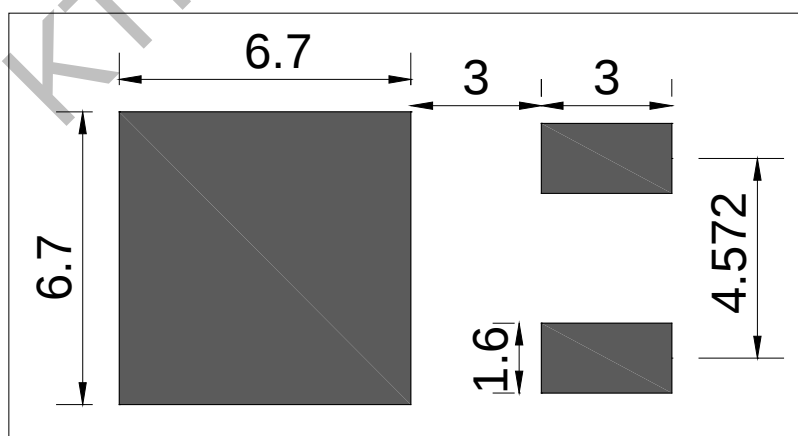
Order code	Voltage V_{DRM}/V_{RRM} (V)	IGT(mA)	Package	Base qty. (pcs)	Delivery mode
BT151S-650R	650	15	TO-252	80	Tube
BT151S-650R-TR				2,500	Tape & Reel

PACKAGE MECHANICAL DATA



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A1	0.80		1.20	0.031		0.047
A2	0		0.15	0		0.006
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
G1	2.18		2.38	0.086		0.094
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
L3	1.10		1.50	0.043		0.059
M	0.65		0.95	0.026		0.037
N	0.65		0.95	0.026		0.037
O	2.80		3.20	0.110		0.126
P	3.10		3.30	0.122		0.130
V1		7°			7°	
V2	0°		6°	0°		6°

FOOTPRINT-TO-252 (dimensions in mm)



Technical drawing of a mechanical part, showing front and side views with dimensions.

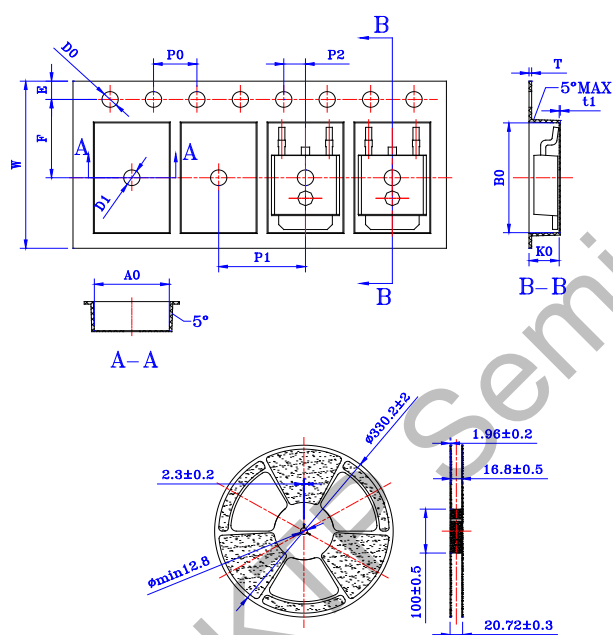
Front View (Left):

- Overall length: 548 ± 1
- Top flange width: 4
- Top flange thickness: 6
- Top flange hole diameter: $\phi 3 \pm 0.03$
- Central feature: A rectangular block with a circular hole, mounted on two vertical supports.

Side View (Right):

- Overall height: 19.75
- Top flange thickness: 1.50 ± 0.10
- Top flange width: 1.90 ± 0.10
- Top flange hole diameter: 1.40 ± 0.10
- Top flange hole position from top edge: 7.25 ± 0.10
- Top flange hole position from side edge: 2.40
- Top flange hole position from bottom edge: ± 0.10
- Top flange hole position from center: 1.85 ± 0.10
- Top flange hole position from side edge: 2.2 ± 0.10
- Top flange hole position from bottom edge: 5.25 ± 0.10
- Top flange hole position from center: 1.20
- Top flange hole position from side edge: 0.50

PACKAGE	OUTLINE	TUBE (PCS)	INNER BOX (PCS)	PER CARTON
TO-252	TUBE	80	4,000	20,000



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.50	1.55	1.60	0.059	0.060	0.063
D1	1.50	—	—	0.059	—	—
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
10P0	39.80	40.00	40.20	1.567	1.575	1.583
A0	6.80	6.90	7.00	0.267	0.272	0.276
B0	10.40	10.50	10.60	0.408	0.413	0.417
K0	2.60	2.70	2.80	0.102	0.106	0.110
T	0.25	0.30	0.35	0.010	0.012	0.014
t1	0.10	—	—	0.004	—	—

PACKAGE	OUTLINE	REEL (PCS)	PER CARTON (PCS)	TAPE & REEL
TO-252	TAPING	2,500	25,000	13 inch