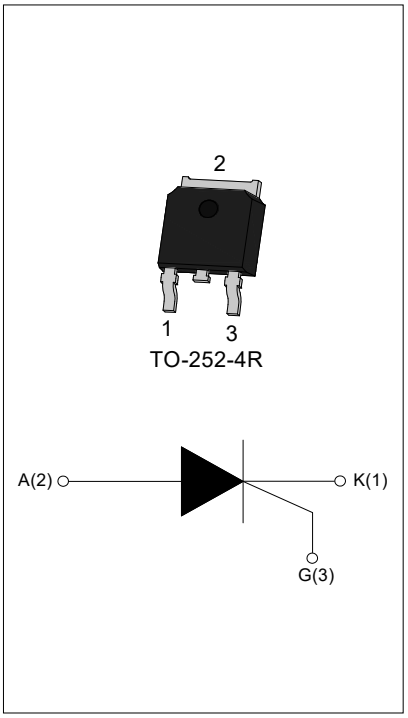
BT151S-500R 12A SCRs

Rev.1

DESCRIPTION:

With high ability to withstand the shock loading of large current, BT151S-500R of silicon controlled rectifiers provide high dv/dt rate with strong resistance to electromagnetic interference. They are especially recommended for use on solid state relay, motorcycle, power charger, T-tools etc. Package TO-252-4R is RoHS compliant. (2011/65/EU)



MAIN FEATURES

Symbol	Value	Symbol
V_{DRM}/ V_{RRM}	500	V
$I_{T(RMS)}$	12	A
I_{GT}	≤5	mA

ABSOLUTE MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Storage junction temperature range		T_{stg}	-40 - 150	℃
Operating junction temperature range		T_j	-40 - 125	℃
Repetitive peak off-state voltage (T_j=25℃)		V_{DRM}	500	V
Repetitive peak reverse voltage (T_j=25℃)		V_{RRM}	500	V
RMS on-state current	TO-252-4R (T_C=115℃)	$I_{T(RMS)}$	12	A
Non repetitive surge peak on-state current (F=50Hz tp=10ms)		I_{TSM}	120	A
Non repetitive surge peak on-state current (F=60Hz tp=8.3ms)		I_{TSM}	132	A
I^2t value for fusing (tp=10ms)		I^2t	72	A^2s
Repetitive rate of rise of on-state current (I_G=2×I_{GT})		dI/dt	50	A/μs
Peak gate current		I_{GM}	2	A
Peak gate power		P_{GM}	5	W
Average gate power dissipation		$P_{G(AV)}$	0.5	W

ELECTRICAL CHARACTERISTICS (T_j=25℃ unless otherwise specified)

Symbol	Test Condition	Value			Unit
		MIN.	TYP.	MAX.	
I_{GT}	V_D=12V R_L=33Ω	-		5	mA
V_{GT}		-	0.75	1.5	V
V_{GD}	V_D=V_{DRM} T_j=125℃ R_L=3.3KΩ	0.2	-	-	V
I_L	I_G=1.2I_{GT}	-	12	40	mA
I_H	I_T=500mA	-	12	30	mA
dv/dt	V_D=540V Gate Open T_j=125℃	50	-	-	V/μs
dv/dt	V_D=436V Gate Open T_j=125℃	80	-	-	V/μs

STATIC CHARACTERISTICS

Symbol	Parameter		Value(MAX)	Unit
V_{TM}	I_{TM}=23A tp=380μs	T_j=25℃	1.6	V
I_{DRM}	V_D=V_{DRM} V_R=V_{RRM}	T_j=25℃	10	μA
I_{RRM}		T_j=125℃	1	mA

THERMAL RESISTANCES

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case	TO-252-4R	1.3	℃/W
$R_{th(j-a)}$	Junction to ambient		70	

MARKING

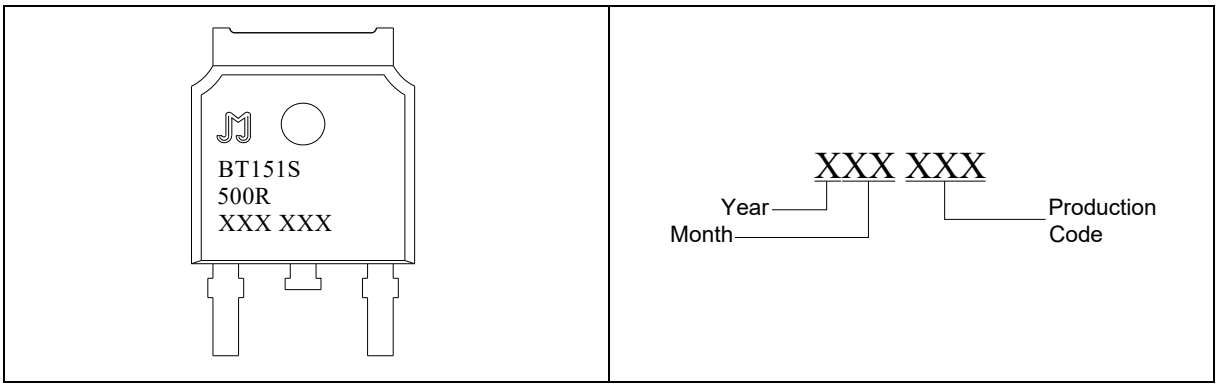


FIG.1: Maximum power dissipation versus RMS on-state current

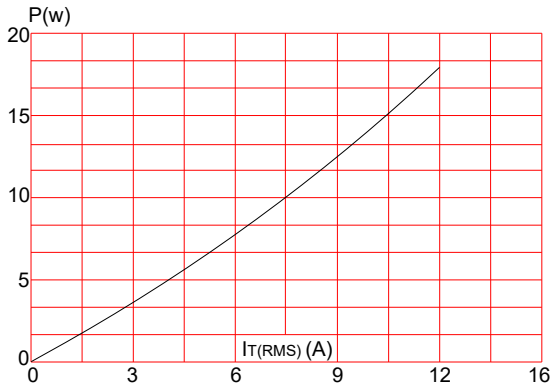


FIG.2: RMS on-state current versus ambient temperature (printed circuit board FR4, copper thickness: 35μm) (full cycle)

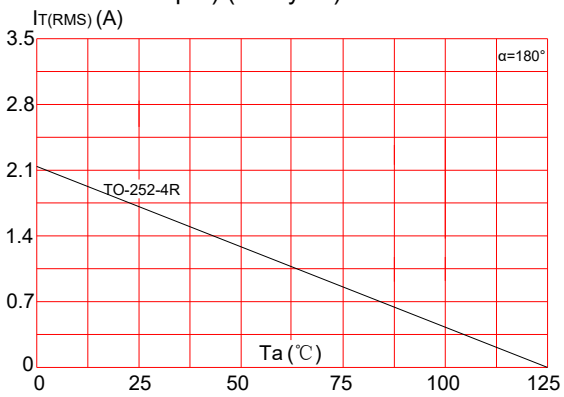


FIG.3: Surge peak on-state current versus number of cycles

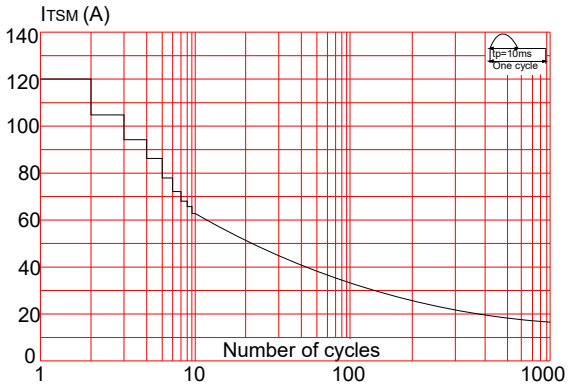


FIG.4: On-state characteristics (maximum values)

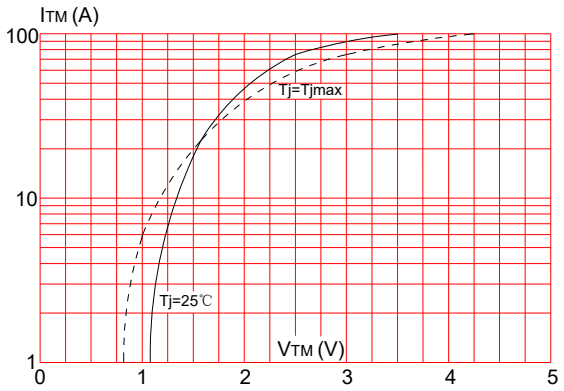


FIG.5: Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp<10ms, and corresponging value of I²t (dI/dt < 50A/μs)

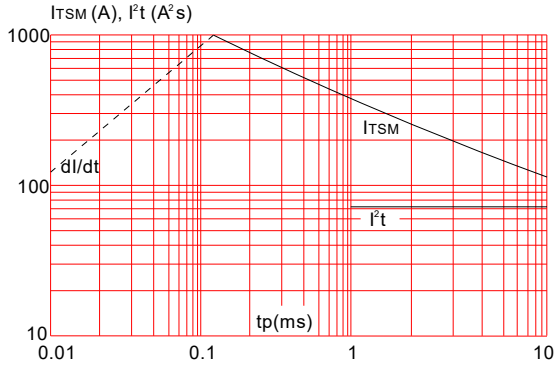
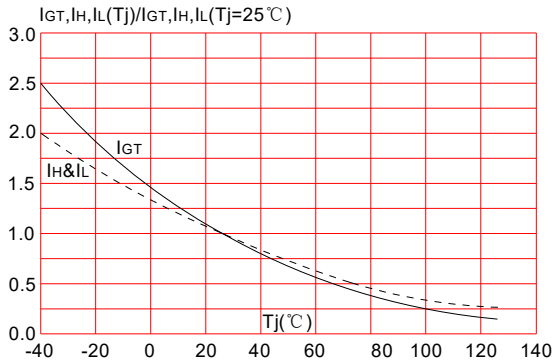
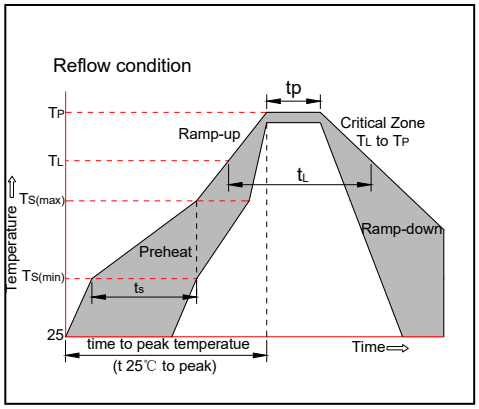


FIG.6: Relative variations of gate trigger current, holding current and latching current versus junction temperature



SOLDERING PARAMETERS

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



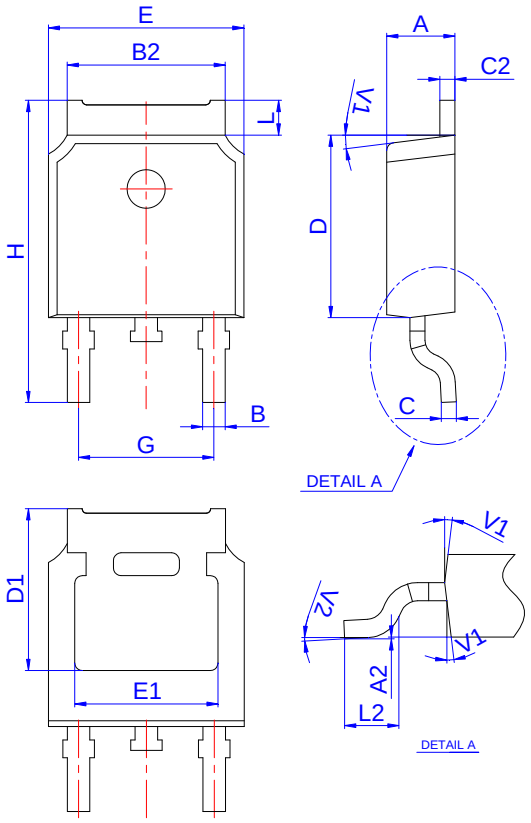
ORDERING INFORMATION

Order code	Voltage V_{DRM}/V_{RRM} (V)	IGT(mA)	Package	Base qty. (pcs)	Delivery mode
BT151S-500R	500	5	TO-252-4R	80	Tube
				2,500	Tape & Reel

Document Revision History

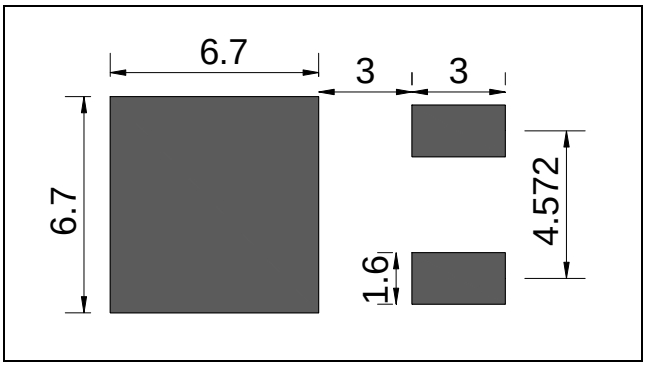
Date	Revision	Changes
Mar 15, 2022	1	Last update

PACKAGE MECHANICAL DATA

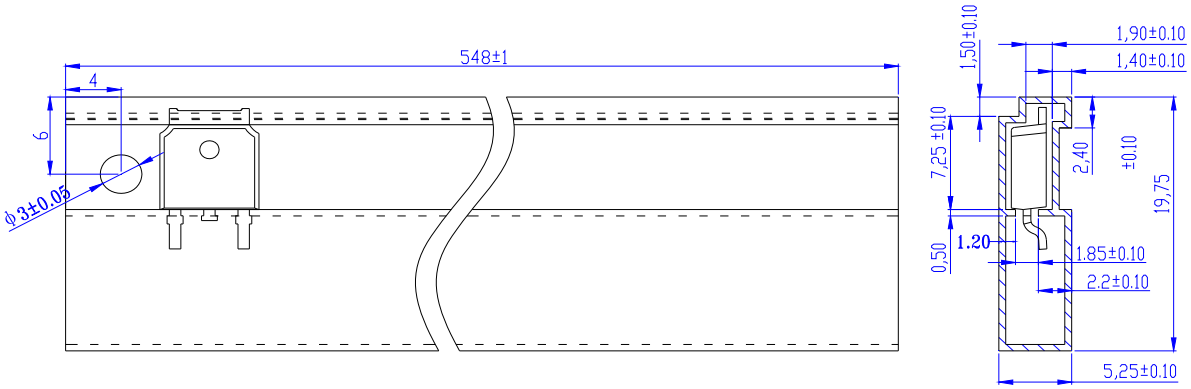


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
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
V1		7°			7°	
V2	0°		6°	0°		6°

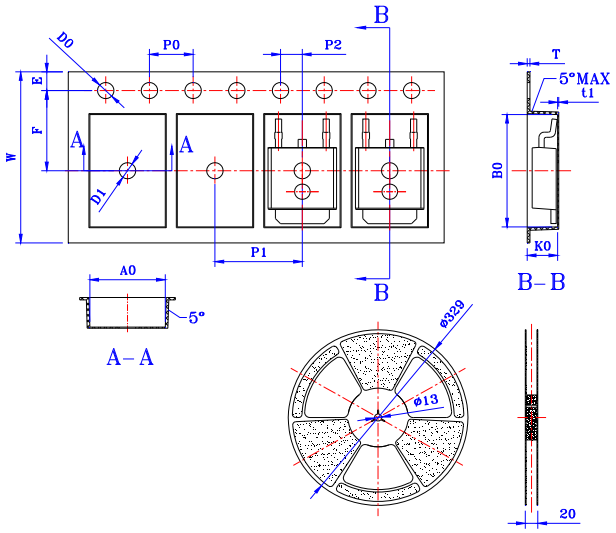
FOOTPRINT-TO-252-4R (dimensions in mm)



DELIVERY MODE



PACKAGE	OUTLINE	TUBE (PCS)	INNER BOX (PCS)	PER CARTON
TO-252-4R	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	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
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	6.85	6.90	7.00	0.270	0.272	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.106	0.109	0.113
T	0.24	–	0.27	0.009	–	0.011
t1	0.10	–	–	0.004	–	–

PACKAGE	OUTLINE	REEL (PCS)	PER CARTON (PCS)	TAPE & REEL
TO-252-4R	TAPING	2,500	25,000	13 inch