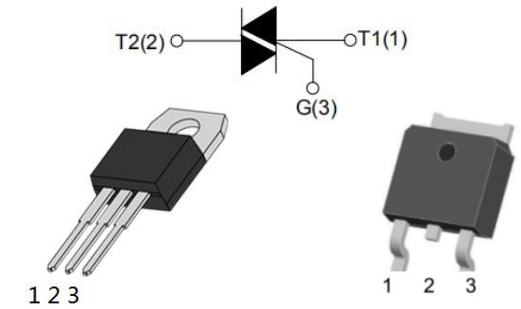
Jiangsu Weida Semiconductor Co., Ltd.

BT138 Series 12A Triacs

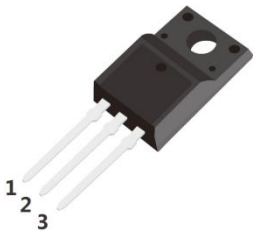
DESCRIPTION:

With low holding and latching current, BT138 Series triacs are especially recommended for use on middle and small resistance type power load.

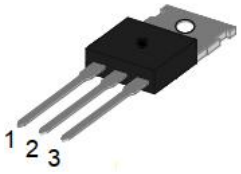


TO-220B
（Non-Ins）

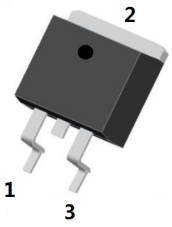
TO-252-4R



TO-220F（Ins）



TO-220C



TO-263

MAIN FEATURES:

symbol	value	unit
$I_{T(RMS)}$	12	A
V_{DRM}/V_{RRM}	600/800	V
V_{TM}	≤1.6	V

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}	600/800	V
Repetitive peak reverse voltage (T_j=25℃)	V_{RRM}	600/800	V
RMS on-state current	$I_{T(RMS)}$	12	A
Non repetitive surge peak on-state current (full cycle, F=50Hz)	I_{TSM}	120	A
I^2t value for fusing (t_p=10ms)	I^2t	45	A^2s

Critical rate of rise of on-state current (I_G=2×I_{GT})	dI/dt	Ⅰ-Ⅱ-Ⅲ	50	A/μs
		Ⅳ	10	
Peak gate current		I_{GM}	2	A
Average gate power dissipation		$P_{G(AV)}$	0.5	W
Peak gate power		P_{GM}	5	W

ELECTRICAL CHARACTERISTICS (T_j=25℃ unless otherwise specified)

3 Quadrants：

Parameter	Test Condition	Quadrant		Value			Unit
				SW	CW	BW	
I_{GT}	V_D=12V, R_L=33Ω	Ⅰ-Ⅱ-Ⅲ	MAX	10	35	50	mA
V_{GT}				1.3			V
V_{GD}	V_D=V_{DRM} T_j=125℃	Ⅰ-Ⅱ-Ⅲ	MIN	0.2			V
I_H	I_T=100mA		MAX	10	40	60	mA
I_L	I_G=1.2I_{GT}	Ⅰ-Ⅲ	MAX	30	50	70	mA
		Ⅱ		40	60	80	
dV/dt	V_D=2/3V_{DRM} T_j=125℃ Gate open		MIN	200	500	1000	V/μs

4 Quadrants：

Parameter	Test Condition	Quadrant		Value				Unit
				D	E	F	G	
I_{GT}	V_D=12V, R_L=33Ω	Ⅰ－Ⅱ－Ⅲ	MAX	5	10	25	50	mA
		Ⅳ		10	25	70	100	
V_{GT}		Ⅰ－Ⅱ－Ⅲ－Ⅳ		1.3				V
V_{GD}	V_D=V_{DRM}	Ⅰ－Ⅱ－Ⅲ－Ⅳ	MIN	0.2				V
I_H	I_T=100mA		MAX	10	20	40	60	mA

I_L	I_G=1.2I_{GT}	Ⅰ-Ⅲ-Ⅳ	MAX	10	30	50	70	mA
		Ⅱ		20	40	70	100	
dV/dt	V_D=0.66×V_{DRM} T_j=125℃ Gate open		MIN	20	50	100	200	V/μs

STATIC CHARACTERISTICS

Symbol	Test Condition			Value	Unit
V_{TM}	I_{TM}=15A t_p=380μs	T_j=25℃	MAX	1.6	V
I_{DRM} I_{RRM}	V_{DRM}= V_{RRM}	T_j=25℃	MAX	5	μA
		T_j=125℃		1	mA

THERMAL RESISTANCES

Symbol	Test Condition		Value	Unit
$R_{th(j-c)}$	junction to case(AC)	TO-252-4R	1.8	℃/W
		TO-220B(Non-Ins)/ TO-220C	1.5	
		TO-220F	2.5	
		TO-263	1.5	

ORDERING INFORMATION

BT 138 – 600 D

- BT: Triacs
- 138: $I_{T(RMS)}$:12A
- 600: V_{DRM}、V_{RRM}: 600：600V; 800：800V
- D: D：I_{GT1-3}≤5mA、I_{GT4}≤10mA; E：I_{GT1-3}≤10mA、I_{GT4}≤25mA; F：I_{GT1-3}≤25mA、I_{GT4}≤70mA; G：I_{GT1-3}≤50mA、I_{GT4}≤100mA; SW：I_{GT1-3}≤10mA; CW：I_{GT1-3}≤35mA; BW：I_{GT1-3}≤50mA

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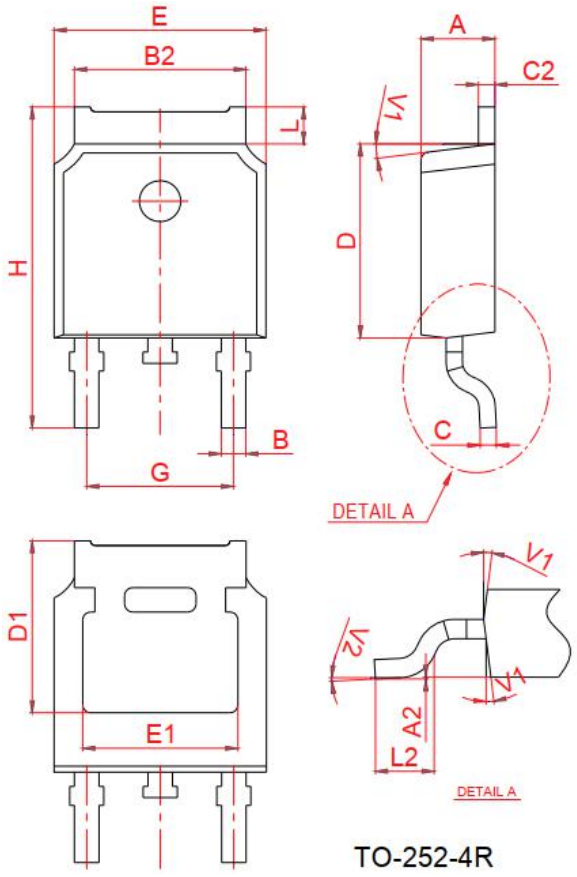
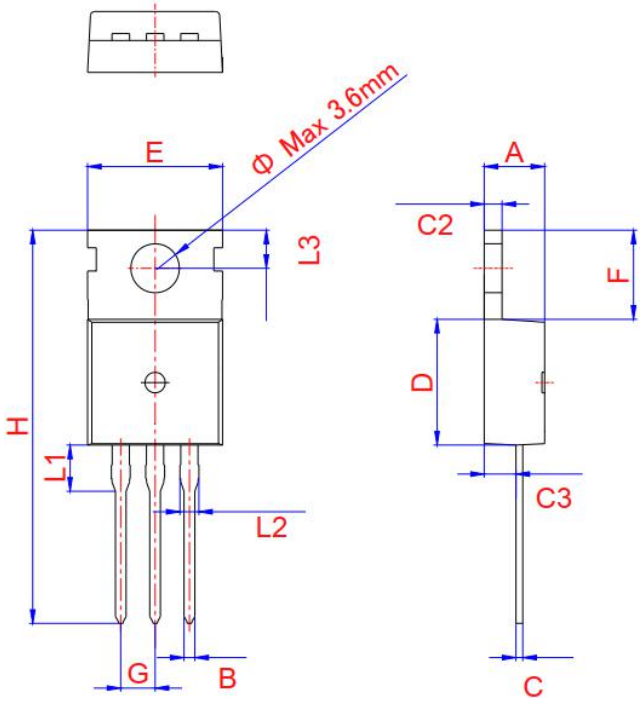
BT138 Series 12A Triacs

PACKAGE MECHANICAL DATA



TO-252-4R

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.087		0.094
A2	0		0.1	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.1		5.46	0.201		0.215
C	0.46		0.58	0.018		0.023
C2	0.44		0.58	0.017		0.023
D	5.9		6.3	0.232		0.248
D1	5.30REF			0.211REF		
E	6.4		6.8	0.252		0.268
E1	4.63			0.182		
G	4.372		4.772	0.172		0.188
H	9.8		10.4	0.386		0.409
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°



TO-220C

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.3		4.5	0.169		0.177
B	0.7		0.9	0.028		0.035
C	0.45		0.6	0.018		0.024
C2	1.23	1.30	1.32	0.048	0.051	0.052
C3	2.2		2.6	0.087		0.102
D	8.9		9.9	0.35		0.39
E	9.9	10.1	10.3	0.39	0.398	0.406
F	6.3		6.9	0.248		0.272
G		2.54			0.1	
H	28		29.8	1.102		1.173
L1		3.39			0.133	
L2	1.14		1.7	0.045		0.067
L3	2.65		2.95	0.104		0.116
Φ		3.6			0.142	

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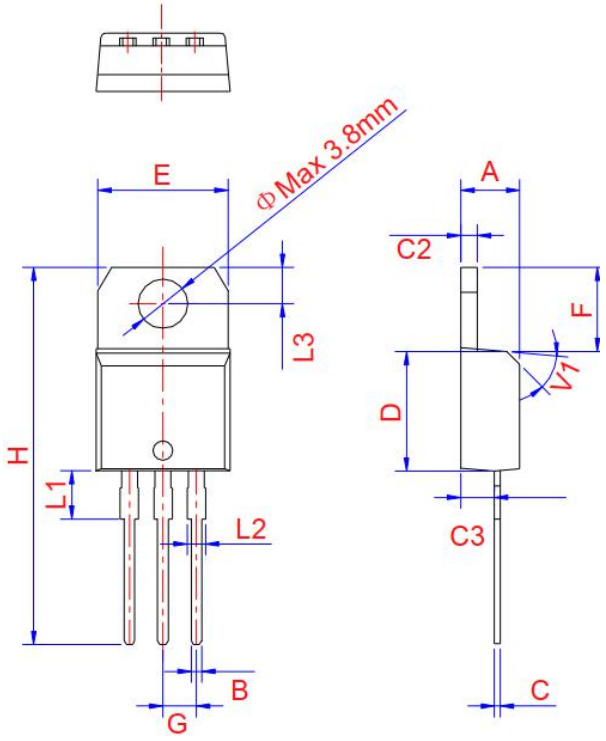
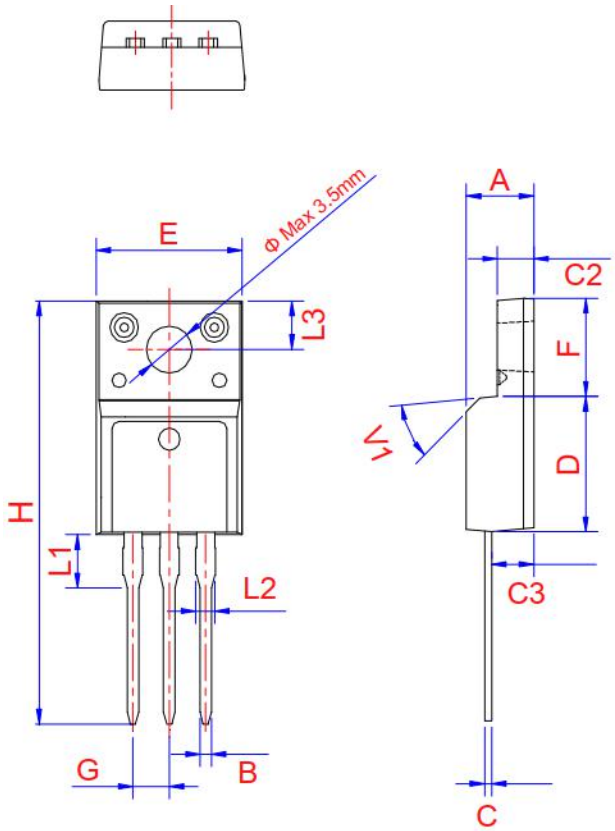


TO-220B Non-Ins

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4	4.47	4.6	0.173	0.176	0.181
B	0.61		0.88	0.024		0.035
C	0.46	0.50	0.7	0.018	0.02	0.028
C2	1.21	1.27	1.32	0.048	0.050	0.052
C3	2.4		2.72	0.094		0.107
D	8.6		9.7	0.339		0.382
E	9.8		10.4	0.386		0.409
F	6.55		6.95	0.258		0.274
G		2.54			0.1	
H	28		29.8	1.102		1.173
L1		3.75			0.148	
L2	1.14		1.7	0.045		0.067
L3	2.65		2.95	0.104		0.116
V1		45°			45°	



TO-220F Ins

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.5		4.9	0.177		0.193
B	0.74	0.8	0.83	0.029	0.031	0.033
C	0.47		0.65	0.019		0.026
C2	2.45		2.75	0.096		0.108
C3	2.6		3	0.102		0.118
D	8.8		9.3	0.346		0.366
E	9.8		10.4	0.386		0.41
F	6.4		6.8	0.252		0.268
G		2.54			0.1	
H	28		29.8	1.102		1.173
L1		3.63			0.148	
L2	1.14		1.7	0.045		0.067
L3	2.65	3.3	0		0.13	0.116
V1		45°			45°	

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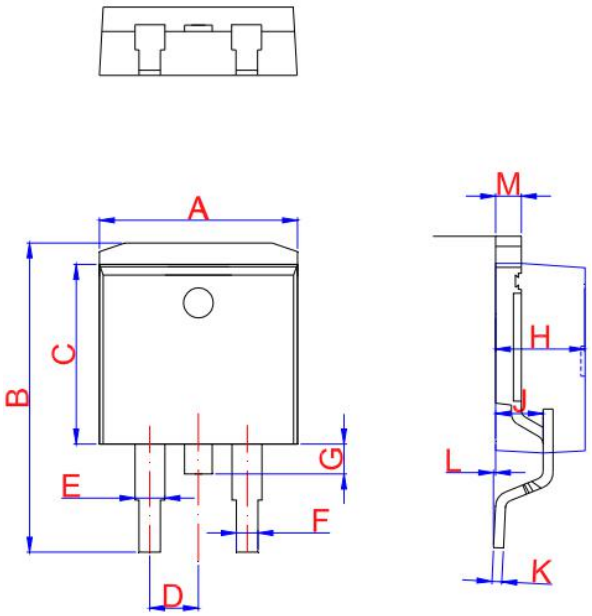


TO-263

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.9		10.3	0.390		0.406
B	14.7		15.8	0.579		0.622
C	8.5		8.9	0.370		0.378
D		2.54			0.100	
E	1.20		1.40	0.047		0.055
F	0.75		0.85	0.029		0.033
G			1.75			0.069
H	4.40	4.60	4.80	0.173	0.181	0.189
J	2.40	2.60	2.80	0.094	0.102	0.110
K	0.28	0.38	0.48	0.011	0.015	0.019
L	0	0.1	0.25	0	0.004	0.010
M	1.17	1.27	1.37	0.046	0.05	0.054

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

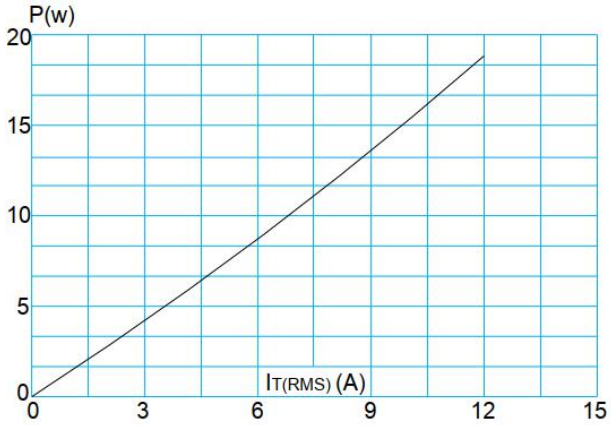


FIG.2: RMS on-state current versus case temperature

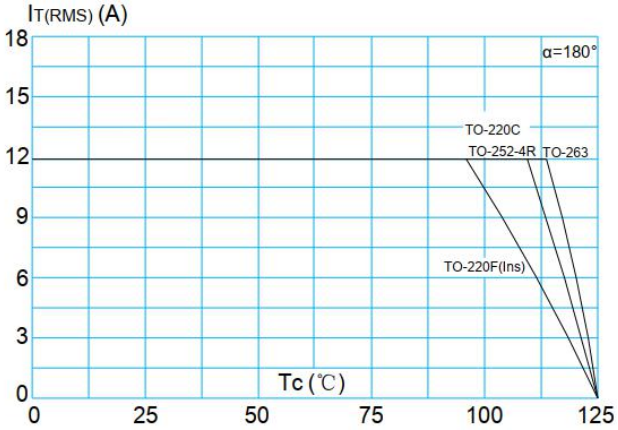


FIG.3: Surge peak on-state current versus number of cycles

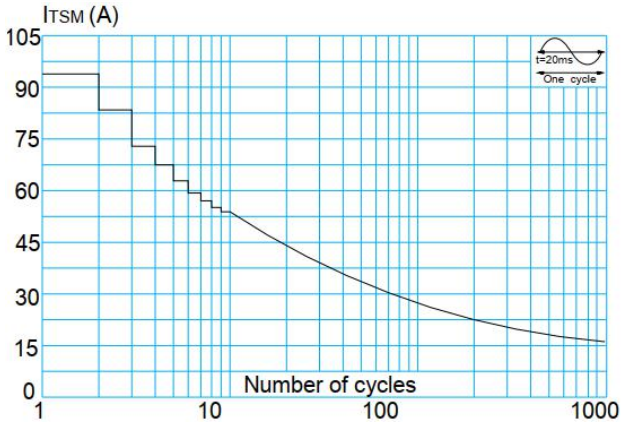


FIG.4: On-state characteristics (maximum values)

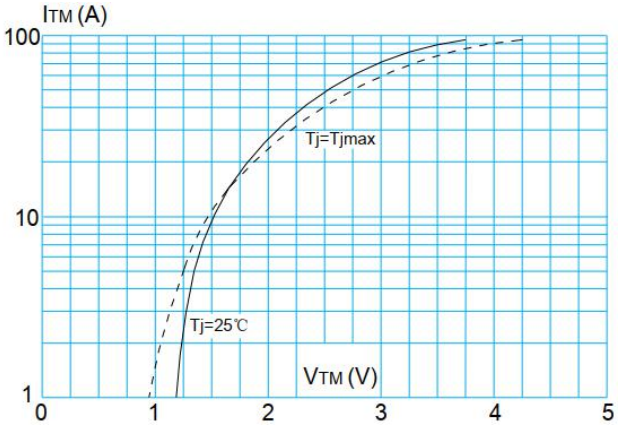


FIG.5: Non-repetitive surge peak on-state current for a sinusoidal pulse with width tp<20ms, and corresponging value of I^2t (Ⅰ-Ⅱ-Ⅲ:dI/dt < 50A/μs;Ⅳ:dI/dt < 10A/μs)

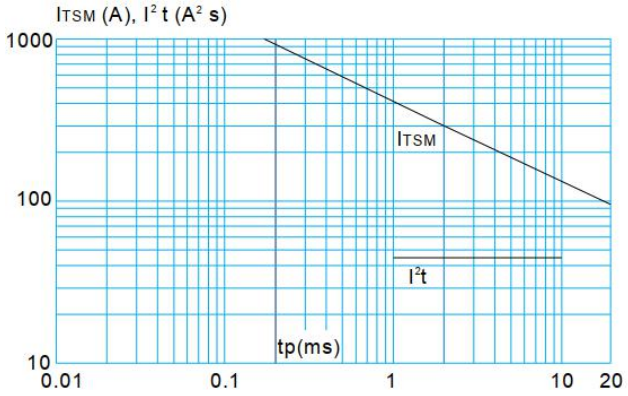


FIG.6: Relative variations of gate trigger current versus junction temperature

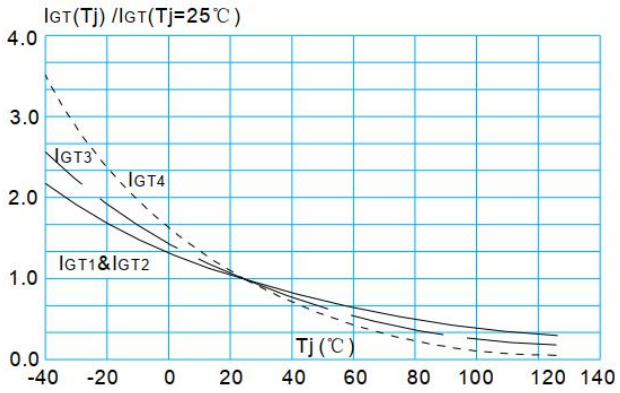


FIG.7: Relative variations of holding current versus junction temperature

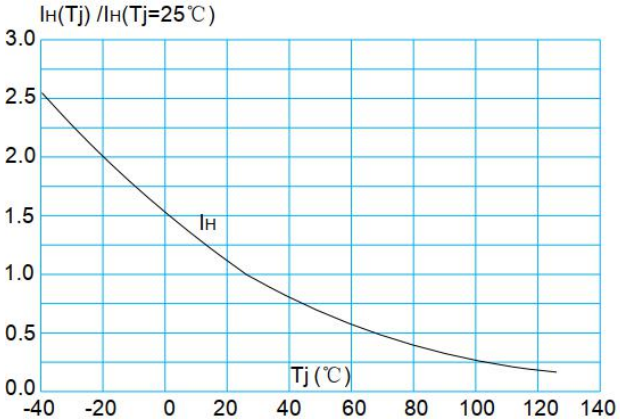
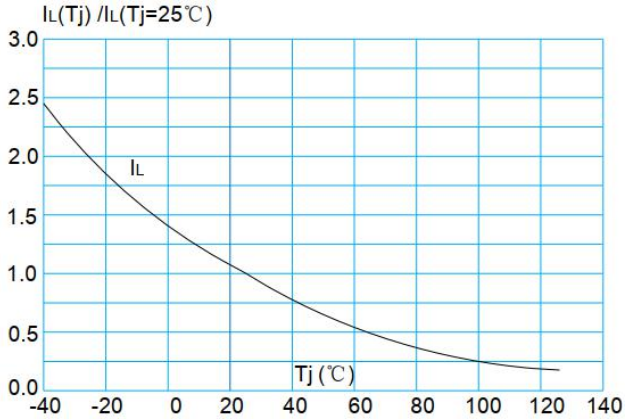


FIG.8: Relative variations of latching current versus junction temperature



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