

## Bi-Directional Triode Thyristor

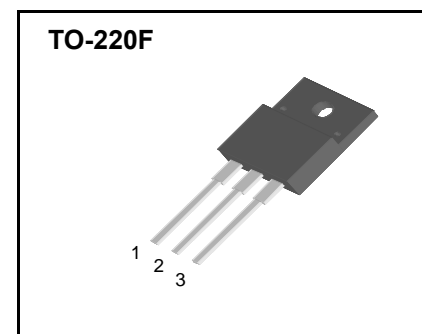
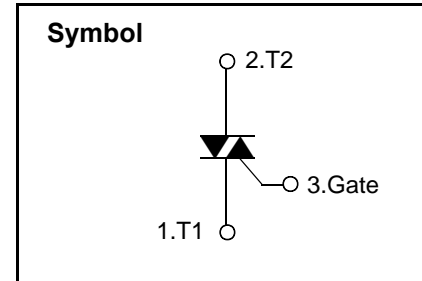
### Features

- ◆ Repetitive Peak Off-State Voltage : 600V
- ◆ R.M.S On-State Current (  $I_{T(RMS)} = 12\text{ A}$  )
- ◆ High Commutation  $dv/dt$
- ◆ Isolation Voltage (  $V_{ISO} = 1500\text{V AC}$  )

### General Description

This device is fully isolated package suitable for AC switching application, phase control application such as fan speed and temperature modulation control, lighting control and static switching relay.

This device is approved to comply with applicable requirements by Underwriters Laboratories Inc.



### Absolute Maximum Ratings ( $T_J = 25^\circ\text{C}$ unless otherwise specified )

Symbol	Parameter	Condition	Ratings	Units
$V_{DRM}$	Repetitive Peak Off-State Voltage		600	V
$I_{T(RMS)}$	R.M.S On-State Current	$T_C = 58^\circ\text{C}$	12	A
$I_{TSM}$	Surge On-State Current	One Cycle, 50Hz/60Hz, Peak, Non-Repetitive	100/110	A
$I^2t$	$I^2t$ for fusing	$t = 10\text{ms}$	50	$\text{A}^2\text{s}$
$P_{GM}$	Peak Gate Power Dissipation		5.0	W
$P_{G(AV)}$	Average Gate Power Dissipation	Over any 20ms period	0.5	W
$I_{GM}$	Peak Gate Current		2.0	A
$V_{GM}$	Peak Gate Voltage		10	V
$V_{ISO}$	Isolation Breakdown Voltage(R.M.S.)	A.C. 1 minute	1500	V
$T_J$	Operating Junction Temperature		- 40 ~ 125	$^\circ\text{C}$
$T_{STG}$	Storage Temperature		- 40 ~ 150	$^\circ\text{C}$
	Mass		2.0	g

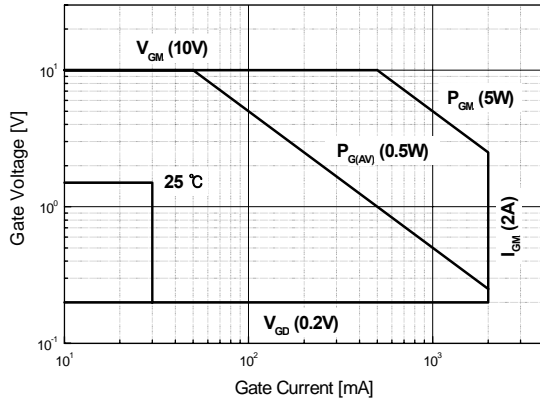
# BT138F-600

## Electrical Characteristics

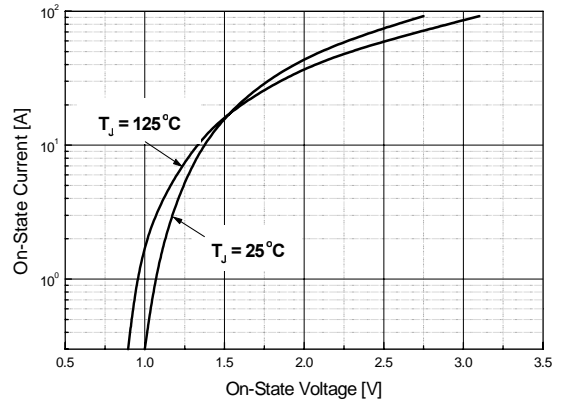
Symbol	Items		Conditions	Ratings			Unit
				Min.	Typ.	Max.	
$I_{DRM}$	Repetitive Peak Off-State Current		$V_D = V_{DRM}$ , Single Phase, Half Wave $T_J = 125\text{ }^\circ\text{C}$	—	—	2.0	mA
$V_{TM}$	Peak On-State Voltage		$I_T = 15\text{ A}$ , Inst. Measurement	—	—	1.65	V
$I_{GT1}^+$	I	Gate Trigger Current	$V_D = 6\text{ V}$ , $R_L = 10\text{ }\Omega$	—	—	25	mA
$I_{GT1}^-$	II			—	—	25	
$I_{GT3}^-$	III			—	—	25	
$V_{GT1}^+$	I	Gate Trigger Voltage	$V_D = 6\text{ V}$ , $R_L = 10\text{ }\Omega$	—	—	1.5	V
$V_{GT1}^-$	II			—	—	1.5	
$V_{GT3}$	III			—	—	1.5	
$V_{GD}$	Non-Trigger Gate Voltage		$T_J = 125\text{ }^\circ\text{C}$ , $V_D = 1/2 V_{DRM}$	0.2	—	—	V
$(dv/dt)_c$	Critical Rate of Rise Off-State Voltage at Commutation		$T_J = 125\text{ }^\circ\text{C}$ , $[di/dt]_c = -4.0\text{ A/ms}$ , $V_D = 2/3 V_{DRM}$	10	—	—	$V/\mu\text{s}$
$I_H$	Holding Current			—	15	—	mA
$R_{th(j-c)}$	Thermal Impedance		Junction to case	—	—	3.7	$^\circ\text{C/W}$



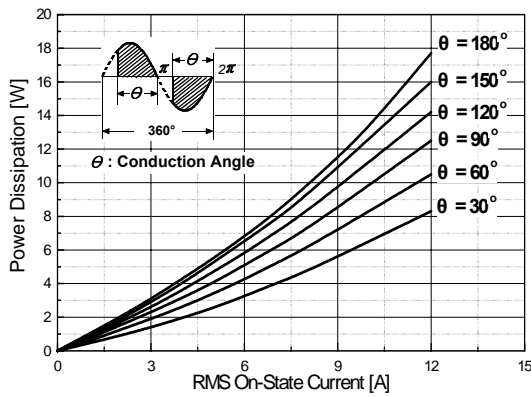
**Fig 1. Gate Characteristics**



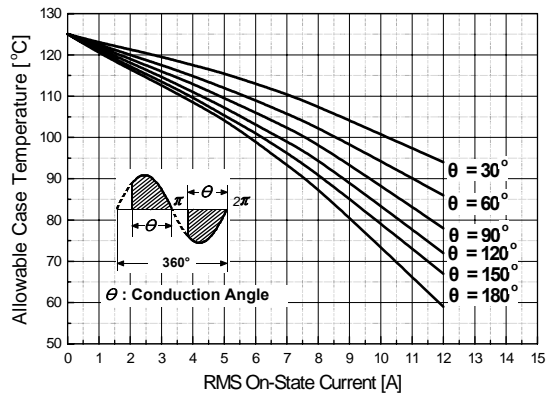
**Fig 2. On-State Voltage**



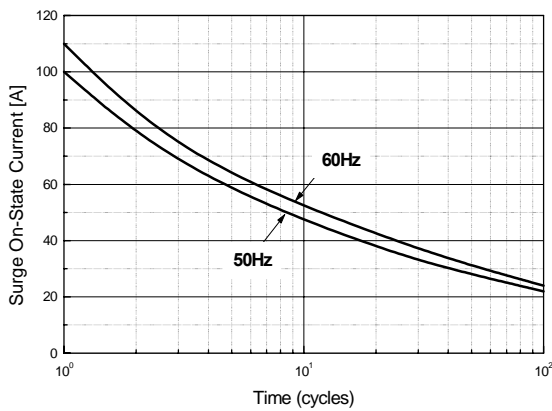
**Fig 3. On State Current vs. Maximum Power Dissipation**



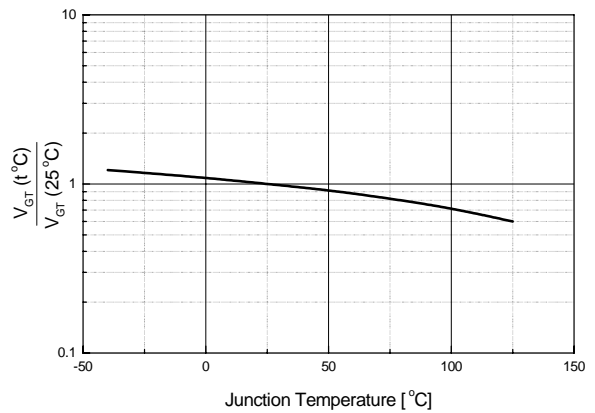
**Fig 4. On State Current vs. Allowable Case Temperature**



**Fig 5. Surge On-State Current Rating ( Non-Repetitive )**

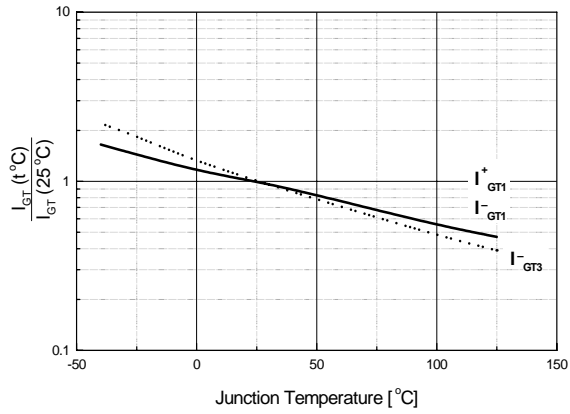


**Fig 6. Gate Trigger Voltage vs. Junction Temperature**

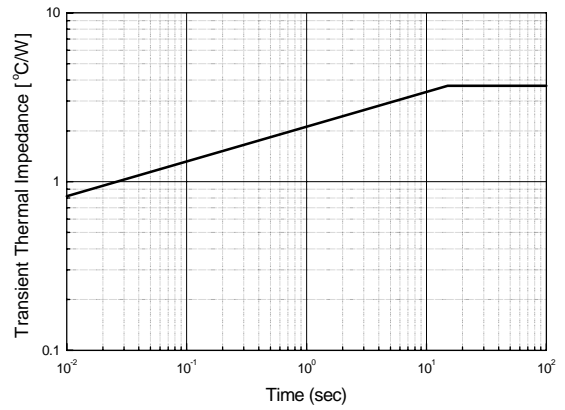


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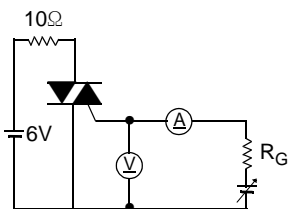
**Fig 7. Gate Trigger Current vs. Junction Temperature**



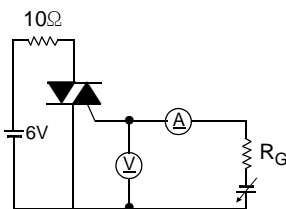
**Fig 8. Transient Thermal Impedance**



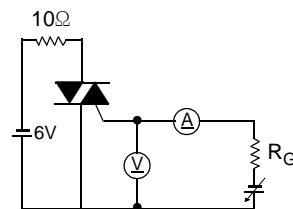
**Fig 9. Gate Trigger Characteristics Test Circuit**



Test Procedure I



Test Procedure II



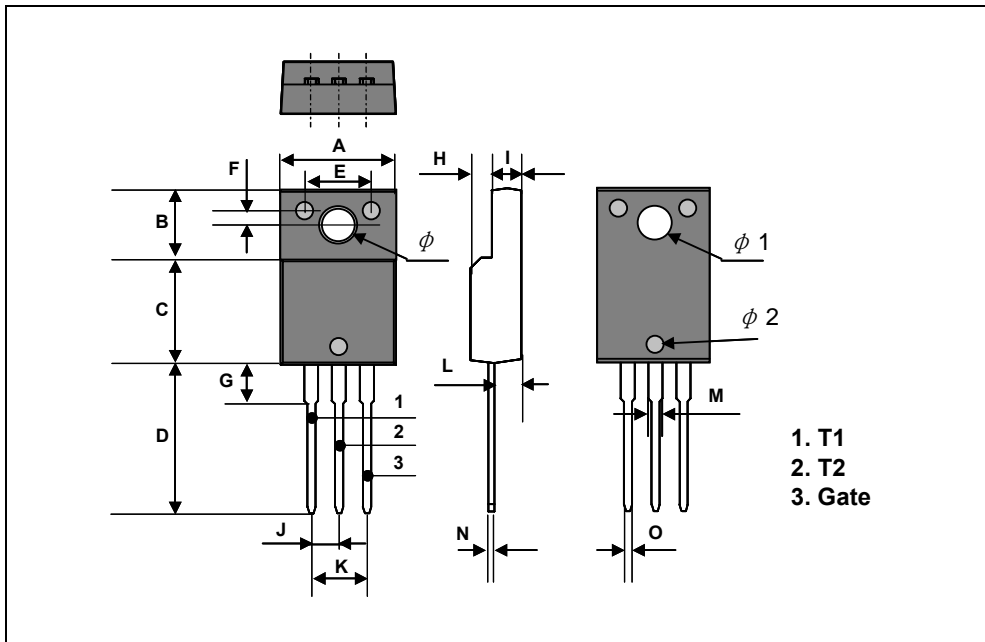
Test Procedure III



# BT138F-600

## TO-220F Package Dimension

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	10.4		10.6	0.409		0.417
B	6.18		6.44	0.243		0.254
C	9.55		9.81	0.376		0.386
D	13.47		13.73	0.530		0.540
E	6.05		6.15	0.238		0.242
F	1.26		1.36	0.050		0.054
G	3.17		3.43	0.125		0.135
H	1.87		2.13	0.074		0.084
I	2.57		2.83	0.101		0.111
J		2.54			0.100	
K		5.08			0.200	
L	2.51		2.62	0.099		0.103
M	1.25		1.55	0.049		0.061
N	0.45		0.63	0.018		0.025
O	0.6		1.0	0.024		0.039
$\phi$		3.7			0.146	
$\phi 1$		3.2			0.126	
$\phi 2$		1.5			0.059	



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## TO-220F Package Dimension, Forming

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	10.4		10.6	0.409		0.417
B	6.18		6.44	0.243		0.254
C	9.55		9.81	0.376		0.386
D	8.4		8.66	0.331		0.341
E	6.05		6.15	0.238		0.242
F	1.26		1.36	0.050		0.054
G	3.17		3.43	0.125		0.135
H	1.87		2.13	0.074		0.084
I	2.57		2.83	0.101		0.111
J		2.54			0.100	
K		5.08			0.200	
L	2.51		2.62	0.099		0.103
M	1.25		1.55	0.049		0.061
N	0.45		0.63	0.018		0.025
O	0.6		1.0	0.024		0.039
P		5.0			0.197	
$\phi$		3.7			0.146	
$\phi 1$		3.2			0.126	
$\phi 2$		1.5			0.059	

