

BT12F-1600xW



THREE-QUADRANTS TRIAC

VOLTAGE: 1600 Volts

CURRENT: 12 Ampers

Package: TO-220FP

FEATURES

- Highly di/dt For High Reliability
- Low Thermal Resistance Increases Carrying Capacity
- Very High Commutation Capability
- Packages Are RoHS (2011/65/EU) Compliant

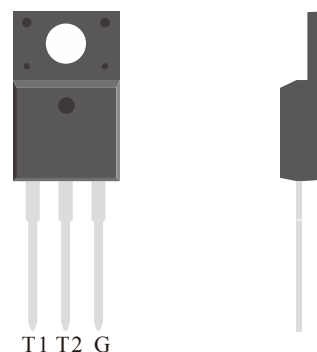
TYPICAL APPLICATIONS

- Phase Control Operation Of Light Dimmers And Motor Speed Controllers
- ON/OFF Control Operation Of Heating Regulation And Induction Motor

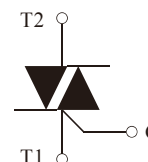
PRODUCT SUMMARY

Gear	TW	SW	CW	BW	Unit
$I_{GT(I-II-III)} \text{ Max.}$	5	10	35	50	mA
$V_{DRM}/V_{RRM} \text{ Min.}$	1600				V
$I_{T(RMS)}$	12				A

Diagram:



Polarity:



Absolute Maximum Ratings (Ta=25°C Unless otherwise specified)

Parameter	Test Conditions	Symbol	Ratings	Unit
Repetitive Peak Off-State Voltage		V_{DRM}	1600	V
Repetitive Peak Reverse Voltage		V_{RRM}	1600	V
RMS On-State Current	$T_c \leq 85^\circ\text{C}$	$I_{T(RMS)}$	12	A
Non Repetitive Surge Peak On-State Current	F= 50 Hz, $T_p= 20 \text{ ms}$	I_{TSM}	120	A
	F= 50 Hz, $T_p= 16.6 \text{ ms}$		132	
I^2T Value For Fusing	$T_p= 10 \text{ ms}$	I^2t	72	A
Critical Rate Of Rise Of On-State Current	$I_G=2 \cdot I_{GT}$, $t_r \leq 100\text{ns}$ F=100Hz, $T_j=125^\circ\text{C}$	di/dt	100	A/ μs
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 Dissipation		P_{GM}	5	W
Maximum Mounting Torque	M3 srew	T_{MM}	1.1	N.m

Thermal Characteristics (Ta=25°C Unless otherwise specified)

Parameter	Test Conditions	Symbol	Typ.	Unit
Operating Junction Temperature Range		T_J	-40 to 125	°C
Storage Temperature Range		T_{STD}	-40 to 150	
Thermal Resistance Junction To Ambient With Steady-State	Still Air Environment With $T_a=25^\circ\text{C}$	$R_{\theta JA}$	60	°C/W
Thermal Resistance Junction-Case With Steady-State	Device Mounted On 75mm x 45mm x 2.5mm Alu. Heat.	$R_{\theta JC}$	2.5	

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Electrical Characteristics (Ta=25°C Unless otherwise specified)

Parameter	Test Conditions	Symbol	Quadrant	Value					Unit
					TW	SW	CW	BW	
Gate Trigger Current	$V_D=12V, R_L=33\Omega$	I_{GT}	I - II - III	Max.	5	10	35	50	mA
Max. Gate Trigger Voltage	$V_D=12V, R_L=33\Omega$	V_{GT}	I - II - III	Max.	1.5				V
Min. Gate Trigger Voltage	$V_D=V_{DRM}, T_j=125^\circ C, R_L=3.3K\Omega$	V_{GD}	I - II - III	Min.	0.2				V
Holding Current	$I_T=100\text{ mA}$	I_H		Max.	5	10	40	60	mA
Latching Current	$I_G=1.2 \cdot I_{GT}$	I_L	I - III	Max.	20	30	50	70	mA
			II	Max.	25	40	60	80	
Rise Of Off- State Voltage	$V_D=2/3 V_{DRM}, T_j=125^\circ C, \text{Gate Open}$	dv/dt		Min.	40	100	200	300	V/us

Static Characteristics (Ta=25°C Unless otherwise specified)

Parameter	Test Conditions	Symbol	T_j	Value		Unit
Peak On-State Voltage	$I_T=17\text{ A}, T_p=380\mu s$	V_{TM}	25°C	Max.	1.5	V
Threshold Voltage		V_{TO}	125°C	Max.	0.78	V
Dynamic Resistance		R_D	125°C	Max.	42	mΩ
Peak Repetitive Forward Blocking Current	$V_D=V_{DRM}$	I_{DRM}	25°C	Max.	20	uA
	$V_D=V_{DRM}$		125°C		10	mA
Peak Repetitive Reverse Blocking Current	$V_R=V_{RRM}$	I_{RRM}	25°C	Max.	20	uA
	$V_R=V_{RRM}$		125°C		10	mA

Model and identification instructions

Product Type	BT	12	F	-	1600	xW
BT=TRIAC						
Insulation Spec.:						
A=Ins.=Insulation						
Empty=No Ins.=No Insulation						
$I_{T(RMS)}$ Spec.:						
12=12A						
Package Spec.:						
F=TO-220FP						
"- "=Connection Symbol						
Constant And Unchanging						
V_{DRM}/V_{RRM} Spec.						
1600 $\geq$ 1600V						
I_{GT} Spec.						
TW:IGT I - II - III $\leq$ 5mA	SW:IGT I - II - III $\leq$ 10mA	CW:IGT I - II - III $\leq$ 35mA	BW:IGT I - II - III $\leq$ 50mA			
Temperature Spec.:						
Empty=Standard Temperature						
H=high temperature						

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Typical Characteristics Curves

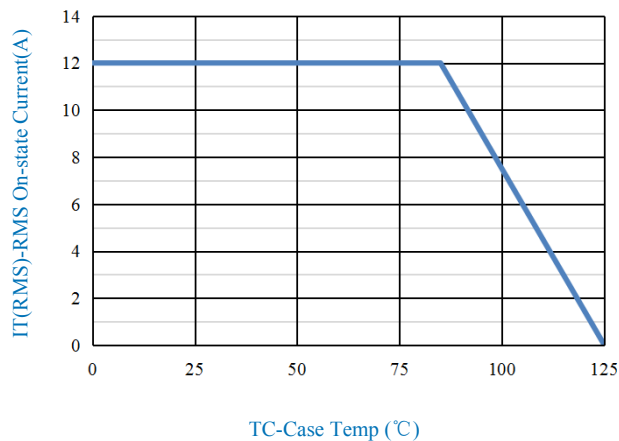


Fig.1-RMS on-state current vs. case temperature

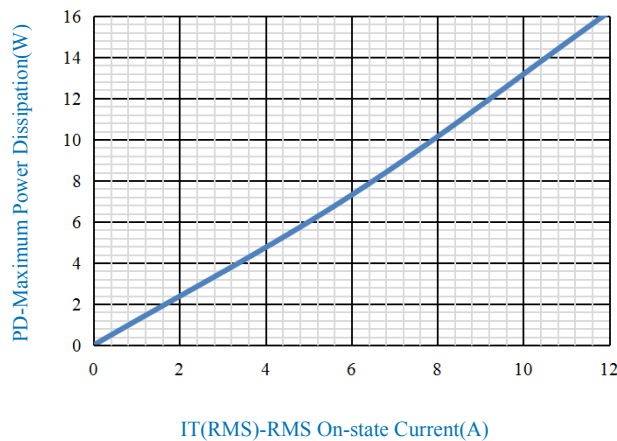


Fig.2- Maximum Power Dissipation Vs. on-state current

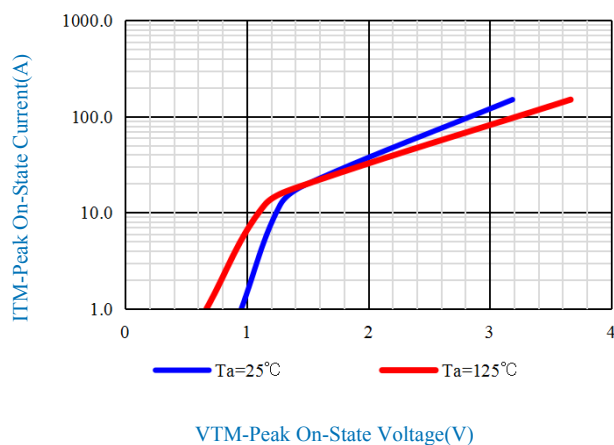


Fig.3-On-State Characteristics

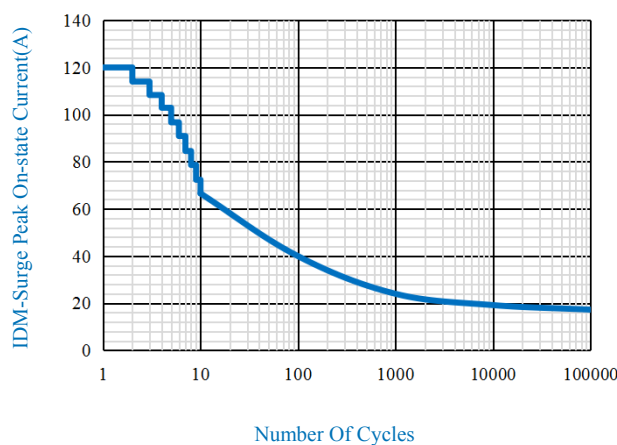


Fig.4- Surge Peak On-state Current Vs. Number Cycles

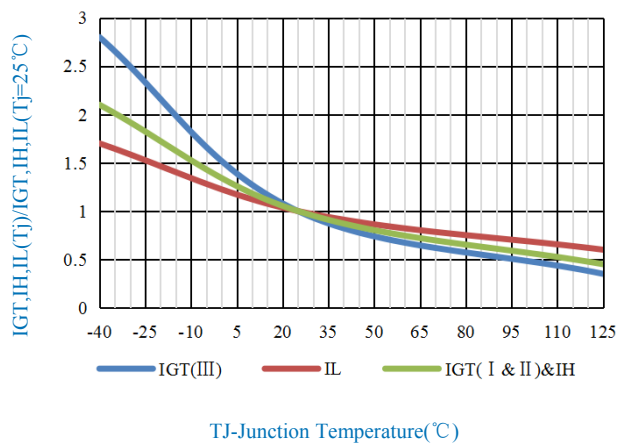


Fig.5- Relative Variation Of Gate Trigger Current , Holding Current And Latching Current Versus Junction Temperature (Typical Value)

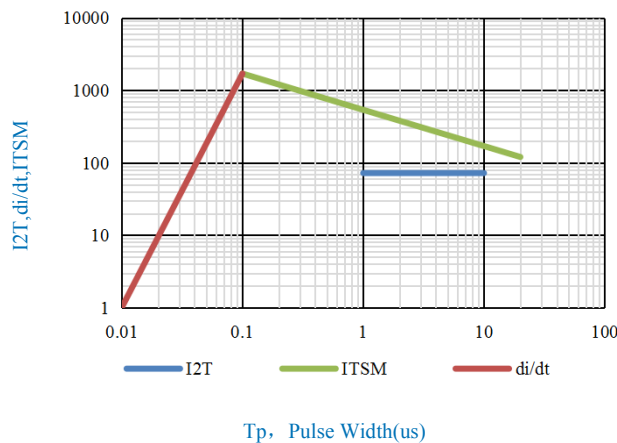


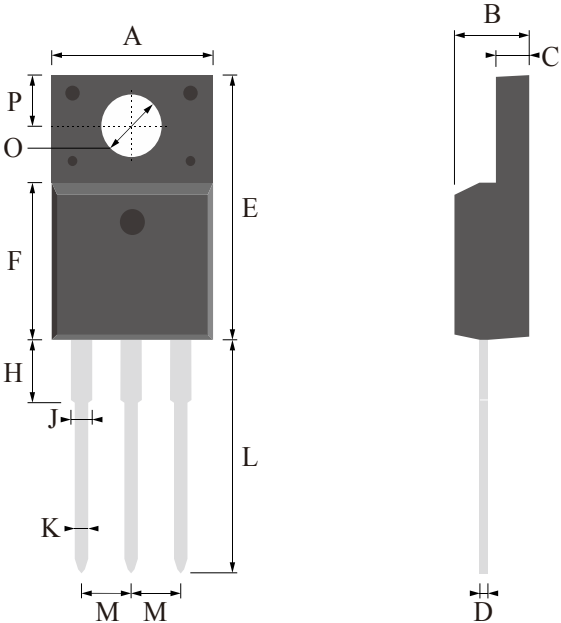
Fig.6- Non-repetitive surge peak on-state current for a sinusoidal pulse with width $t_p < 20\text{ms}$, and corresponding value of I_2t ($di/dt < 50\text{A}/\mu\text{s}$)

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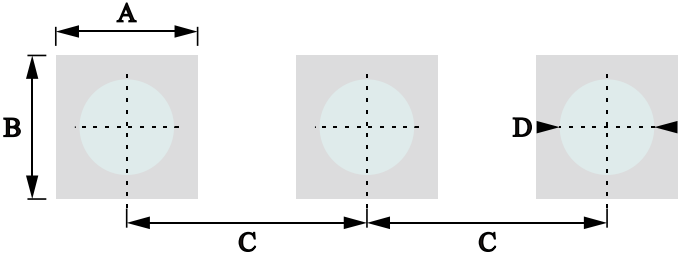
OUTLINE DRAWINGS



TO-220FP

OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.25	-	10.75	0.3642	-	0.4232
B	4.20	-	5.20	0.1654	-	0.2047
C	2.30	-	2.90	0.0906	-	0.1142
D	0.35	-	0.75	0.0138	-	0.0295
E	14.80	-	16.80	0.5827	-	0.6614
F	8.25	-	9.75	0.3248	-	0.3839
L	12.15	-	14.15	0.4783	-	0.5571
H	2.60	-	3.80	0.1024	-	0.1496
J	1.10	-	1.60	0.0433	-	0.0630
K	0.60	-	1.00	0.0236	-	0.0394
M	2.20	-	3.00	0.0866	-	0.1181
O	2.70	-	3.50	0.1063	-	0.1378
P	3.10	-	3.80	0.1220	-	0.1496

RECOMMEDND LAYOUT DRAWINGS



TO-220FP

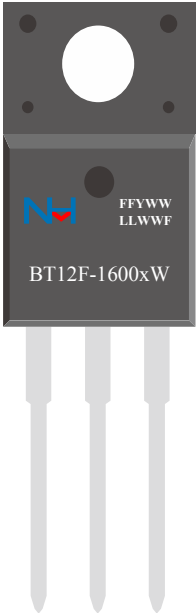
OUTLINE DIMENSIONS						
Dim.	Milimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	-	1.60	-	-	0.0630	-
B	-	1.60	-	-	0.0630	-
C	-	2.54	-	-	0.1000	-
D	-	1.00	-	-	0.0394	-

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MARKING INFORMATION



MARKING INSTRUCTIONS

NH=Niuhang Trademark
FF=Product Line Code,According To Actual Changes
YWW=Date Code,According To Actual Changes
LLWWF=Inernal Code,According To Actual Changes
BT12F-1600xW=mark,x=T,S,C,B

PACKING INFORMATION

Package Type	Package Code	Product Weight Approx(g/Pcs)	Package Method	Quantity (Pcs/Min. Pack.)	Quantity (Pcs/Inner Box)	Quantity (Pcs/Carton)
TO-220FP	P1	2.048	Tube	50	1000	5000

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Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow

	Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
	Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
	Preheat-Temperature Min (T _S min) -Temperature Max (T _S max) -Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
	Time maintained above: -Temperature (T _L) - Time (t _L)	183°C 60-150 seconds	217°C 60-150 seconds
	Peak Temperature(T _P)	240 +0/-5 °C	260 +0/-5 °C
	Time within 5°C of actual peak temperature (tp)	10-30 seconds	20-40 seconds
	Ramp down rate	6°C/second max.	6°C/second max.
	Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

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Specification Revision History

Rev.	Date	Changed Items	Pre-Changed Content	Changed Content
A/1	2014-10-20	First Issue		
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