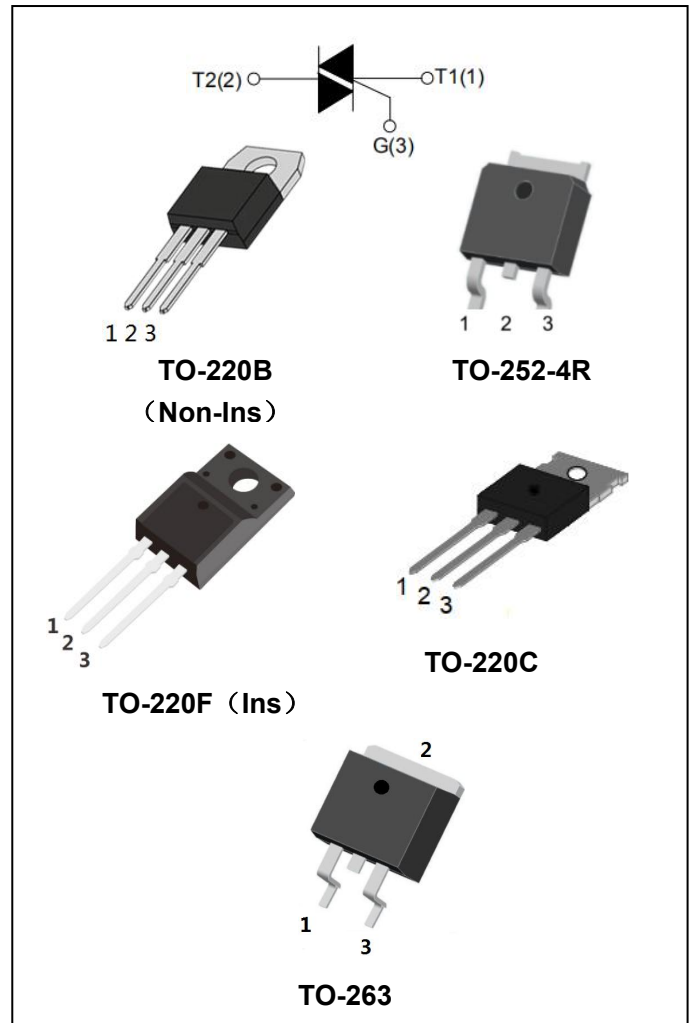


**BT138 Series 12A Triacs**

**DESCRIPTION:**

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



**MAIN FEATURES:**

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

**ABSOLUTE MAXIMUM RATINGS:**

Parameter	Symbol	Value	Unit
Storage junction temperature range	$T_{stg}$	-40~150	°C
Operating junction temperature range	$T_j$	-40~125	°C
Repetitive peak off-state voltage ( $T_j=25^\circ\text{C}$ )	$V_{DRM}$	600/800	V
Repetitive peak reverse voltage ( $T_j=25^\circ\text{C}$ )	$V_{RRM}$	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 ( $t_p=10\text{ms}$ )	$I^2t$	45	$\text{A}^2\text{s}$

**BT138 Series 12A Triacs**

Critical rate of rise of on-state current ( $I_G=2 \times I_{GT}$ )	di/dt	I - II - III	50	A/ $\mu$ s
		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** ( $T_j=25^\circ\text{C}$  unless otherwise specified)

**3 Quadrants:**

Parameter	Test Condition	Quadrant		Value			Unit
				SW	CW	BW	
$I_{GT}$	$V_D=12\text{V}, R_L=33\Omega$	I - II - III	MAX	10	35	50	mA
$V_{GT}$				1.3			V
$V_{GD}$	$V_D=V_{DRM}, T_j=125^\circ\text{C}$	I - II - III	MIN	0.2			V
$I_H$	$I_T=100\text{mA}$		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	$V_D=2/3V_{DRM}, T_j=125^\circ\text{C}$ Gate open		MIN	200	500	1000	V/ $\mu$ s

**4 Quadrants:**

Parameter	Test Condition	Quadrant		Value				Unit
				D	E	F	G	
$I_{GT}$	$V_D=12\text{V}, R_L=33\Omega$	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
$I_H$	$I_T=100\text{mA}$		MAX	10	20	40	60	mA

**BT138 Series 12A Triacs**

I <sub>L</sub>	I <sub>G</sub> =1.2I <sub>GT</sub>	I -III-IV	MAX	10	30	50	70	mA
		II		20	40	70	100	
dV/dt	V <sub>D</sub> =0.66×V <sub>DRM</sub> T <sub>j</sub> =125°C Gate open		MIN	20	50	100	200	V/μs

**STATIC CHARACTERISTICS**

Symbol	Test Condition			Value	Unit	
V <sub>TM</sub>	I <sub>TM</sub> =15A	t <sub>p</sub> =380μs	T <sub>j</sub> =25°C	MAX	1.6	V
I <sub>DRM</sub> I <sub>RRM</sub>	V <sub>DRM</sub> = V <sub>RRM</sub>		T <sub>j</sub> =25°C	MAX	5	μA
			T <sub>j</sub> =125°C		1	mA

**THERMAL RESISTANCES**

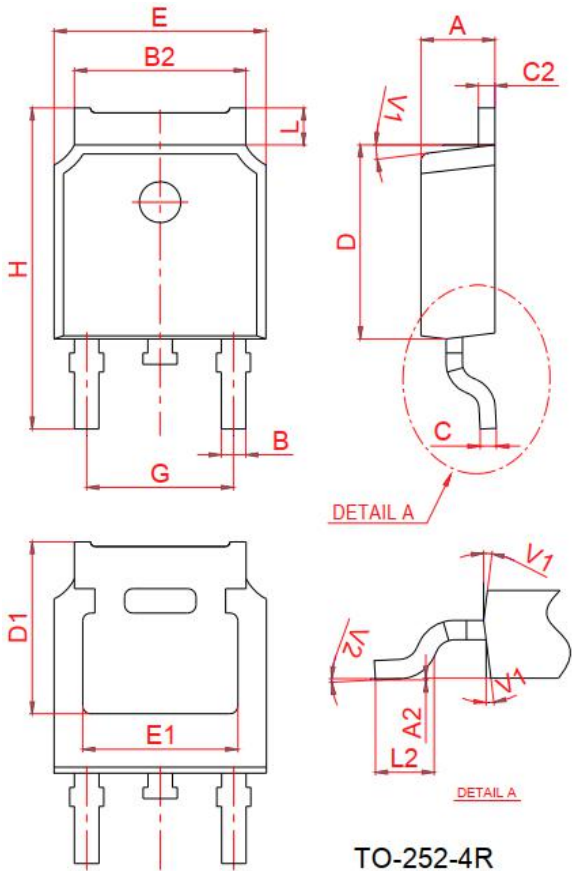
Symbol	Test Condition		Value	Unit
R <sub>th(j-c)</sub>	junction to case(AC)	TO-252-4R	1.8	°C/W
		TO-220B(Non-Ins)/ TO-220C	1.5	
		TO-220F	2.5	
		TO-263	1.5	

**ORDERING INFORMATION**

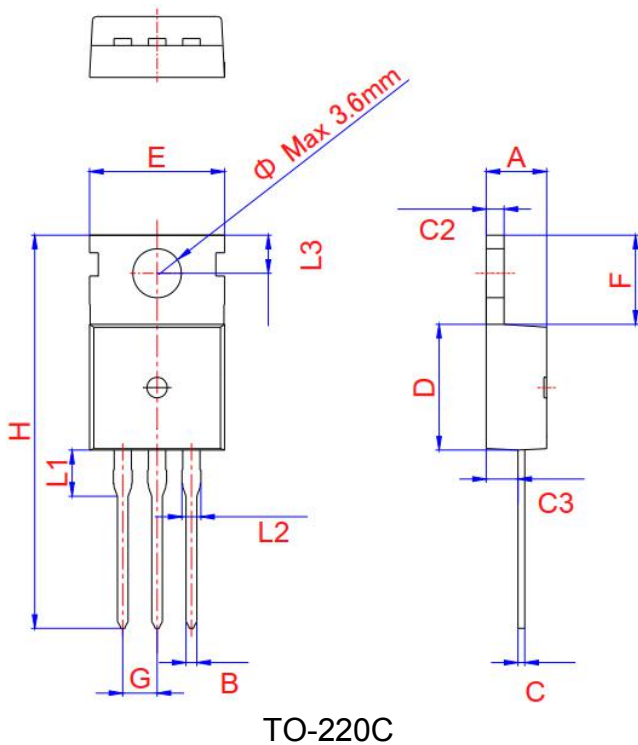
<p><b>BT 138-600</b></p> <p>Triacs</p> <p>I<sub>T(RMS)</sub>:12A</p>	<p><b>D</b></p> <p>V<sub>DRM</sub>, V<sub>RRM</sub>: 600: 600V 800: 800V</p>	<p>D: I<sub>GT1-3</sub>≤5mA、I<sub>GT4</sub>≤10mA  E: I<sub>GT1-3</sub>≤10mA、I<sub>GT4</sub>≤25mA  F: I<sub>GT1-3</sub>≤25mA、I<sub>GT4</sub>≤70mA  G: I<sub>GT1-3</sub>≤50mA、I<sub>GT4</sub>≤100mA  SW: I<sub>GT1-3</sub>≤10mA  CW: I<sub>GT1-3</sub>≤35mA  BW: I<sub>GT1-3</sub>≤50mA</p>
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**BT138 Series 12A Triacs**

**PACKAGE MECHANICAL DATA**

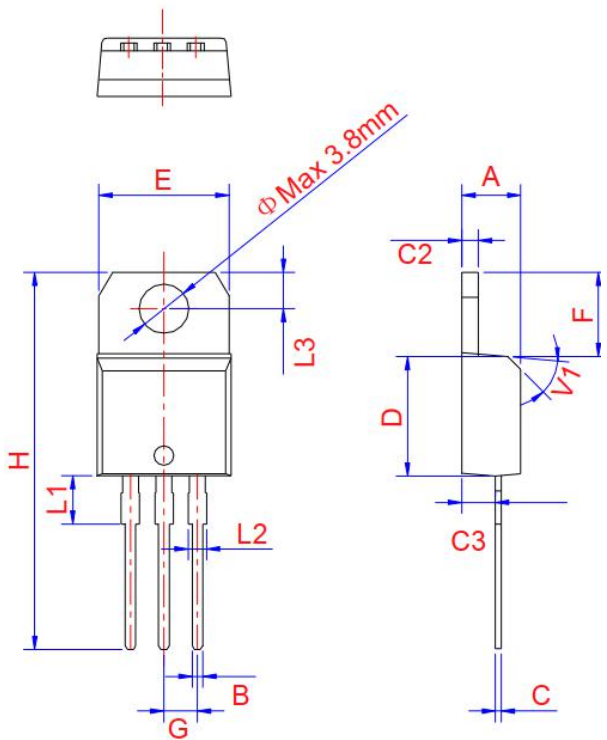


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.2		2.4	0.087		0.094
A2	0		0.1	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.1		5.46	0.201		0.215
C	0.46		0.58	0.018		0.023
C2	0.44		0.58	0.017		0.023
D	5.9		6.3	0.232		0.248
D1	5.30REF			0.211REF		
E	6.4		6.8	0.252		0.268
E1	4.63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



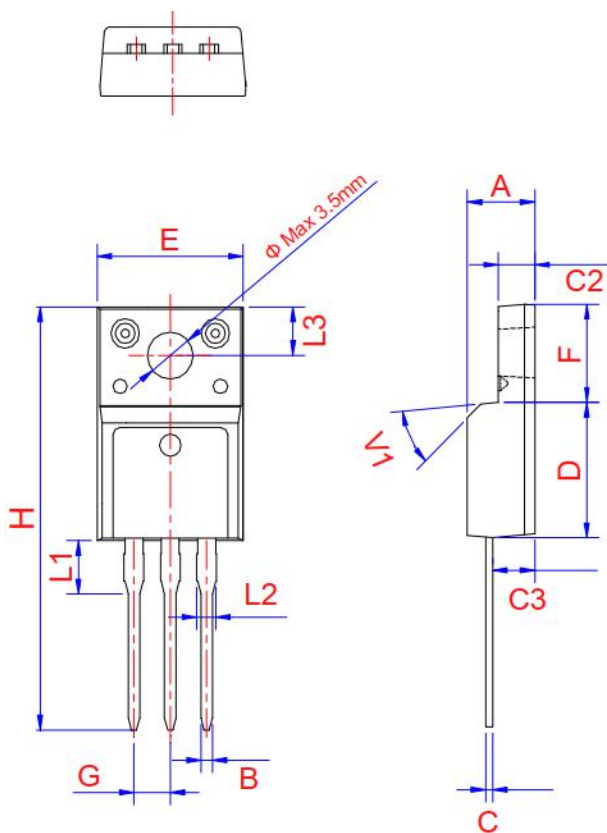
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.3		4.5	0.169		0.177
B	0.7		0.9	0.028		0.035
C	0.45		0.6	0.018		0.024
C2	1.23	1.30	1.32	0.048	0.051	0.052
C3	2.2		2.6	0.087		0.102
D	8.9		9.9	0.35		0.39
E	9.9	10.1	10.3	0.39	0.398	0.406
F	6.3		6.9	0.248		0.272
G		2.54			0.1	
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	

**BT138 Series 12A Triacs**



TO-220B Non-Ins

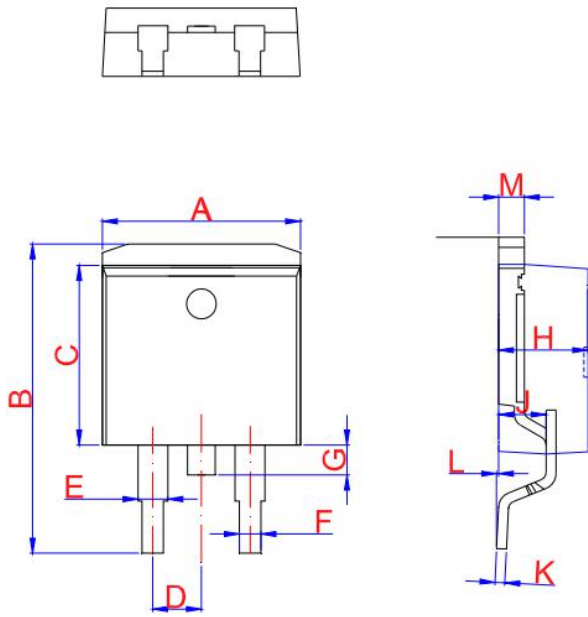
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.4	4.47	4.6	0.173	0.176	0.181
B	0.61		0.88	0.024		0.035
C	0.46	0.50	0.7	0.018	0.02	0.028
C2	1.21	1.27	1.32	0.048	0.050	0.052
C3	2.4		2.72	0.094		0.107
D	8.6		9.7	0.339		0.382
E	9.8		10.4	0.386		0.409
F	6.55		6.95	0.258		0.274
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°	

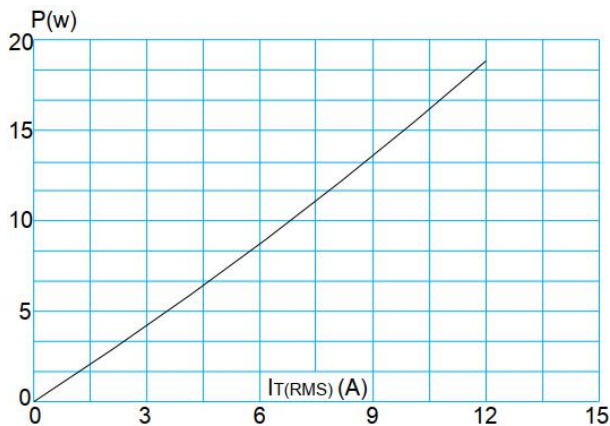
**BT138 Series 12A Triacs**



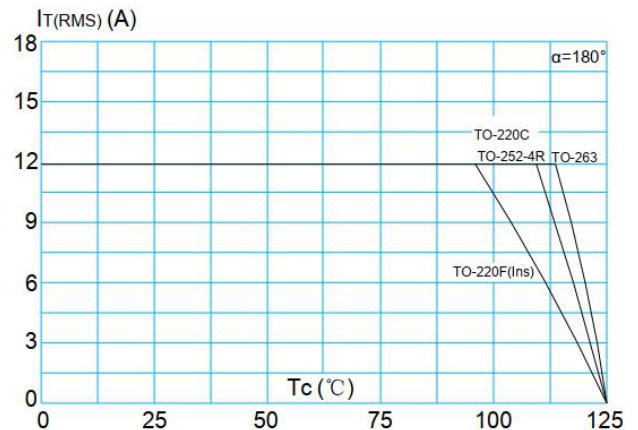
TO-263

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

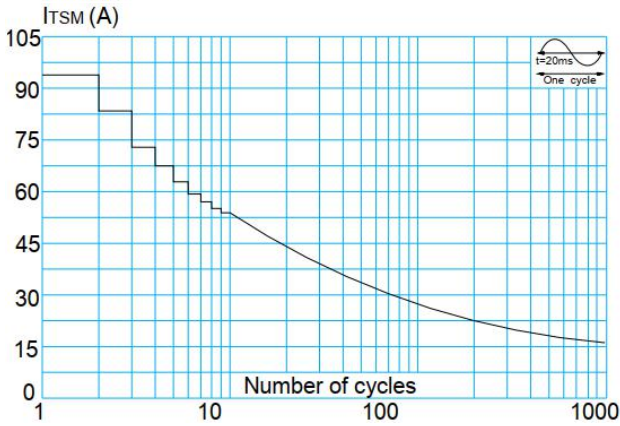


**FIG.2:** RMS on-state current versus case temperature

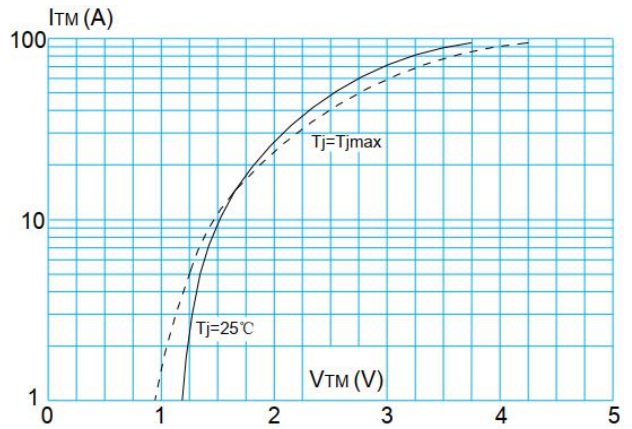


**BT138 Series 12A Triacs**

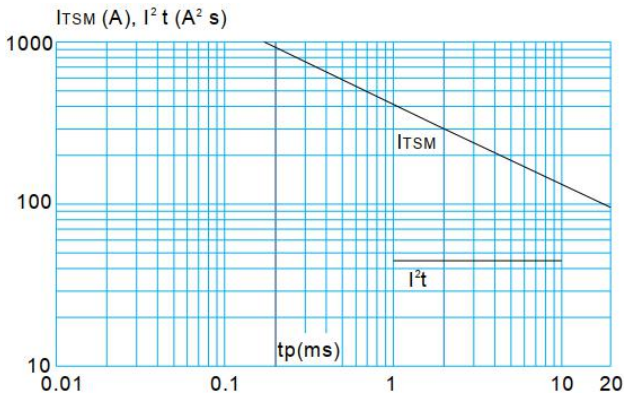
**FIG.3:** Surge peak on-state current versus number of cycles



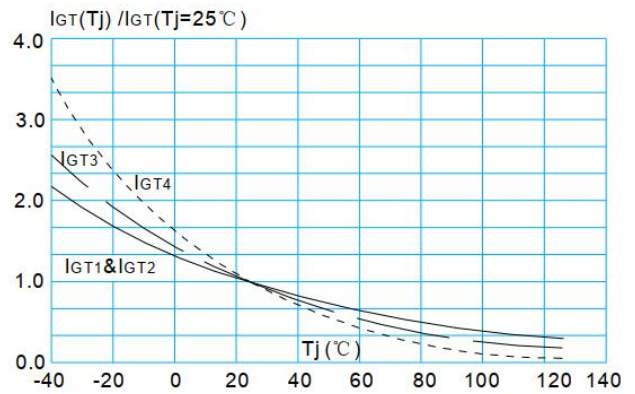
**FIG.4:** On-state characteristics (maximum values)



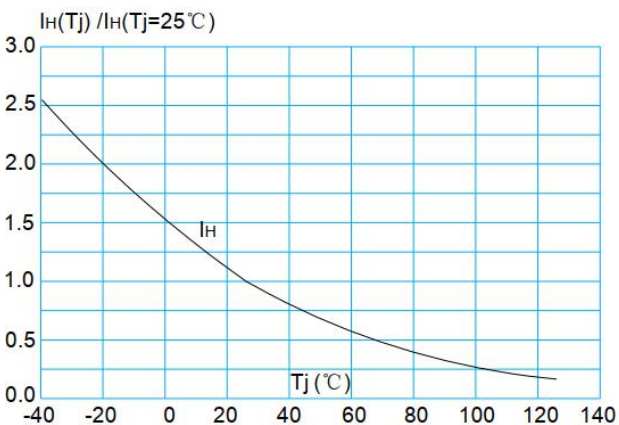
**FIG.5:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I^2t$  ( I - II -III:  $dI/dt < 50\text{A}/\mu\text{s}$ ; IV:  $dI/dt < 10\text{A}/\mu\text{s}$ )



**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

