

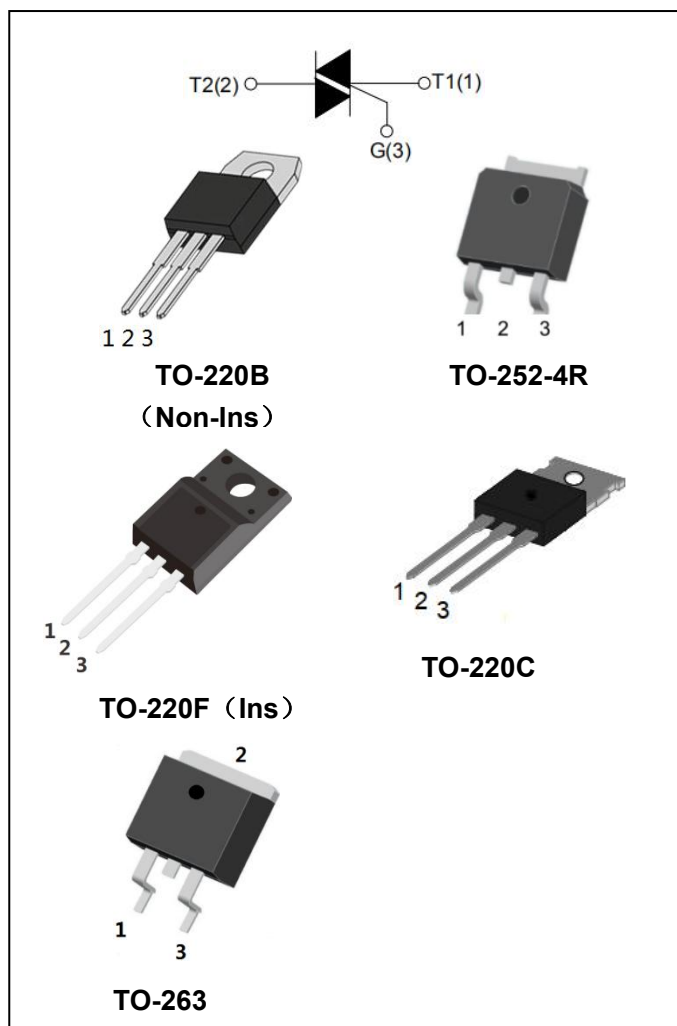


## Jiangsu Weida Semiconductor Co., Ltd.

### 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.



#### 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	$^{\circ}C$
Operating junction temperature range	$T_j$	-40~125	$^{\circ}C$
Repetitive peak off-state voltage ( $T_j=25^{\circ}C$ )	$V_{DRM}$	600/800	V
Repetitive peak reverse voltage ( $T_j=25^{\circ}C$ )	$V_{RRM}$	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 ( $t_p=10ms$ )	$I^2t$	45	$A^2s$



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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



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$I_L$	$I_G=1.2I_{GT}$	I-III-IV	MAX	10	30	50	70	mA
		II		20	40	70	100	
dV/dt	$V_D=0.66 \times V_{DRM}$ $T_j=125^\circ\text{C}$ Gate open		MIN	20	50	100	200	V/ $\mu\text{s}$

### STATIC CHARACTERISTICS

Symbol	Test Condition			Value	Unit
$V_{TM}$	$I_{TM}=15\text{A}$ $t_p=380\mu\text{s}$	$T_j=25^\circ\text{C}$	MAX	1.6	V
$I_{DRM}$ $I_{RRM}$	$V_{DRM}=V_{RRM}$	$T_j=25^\circ\text{C}$	MAX	5	$\mu\text{A}$
		$T_j=125^\circ\text{C}$		1	mA

### THERMAL RESISTANCES

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

### ORDERING INFORMATION

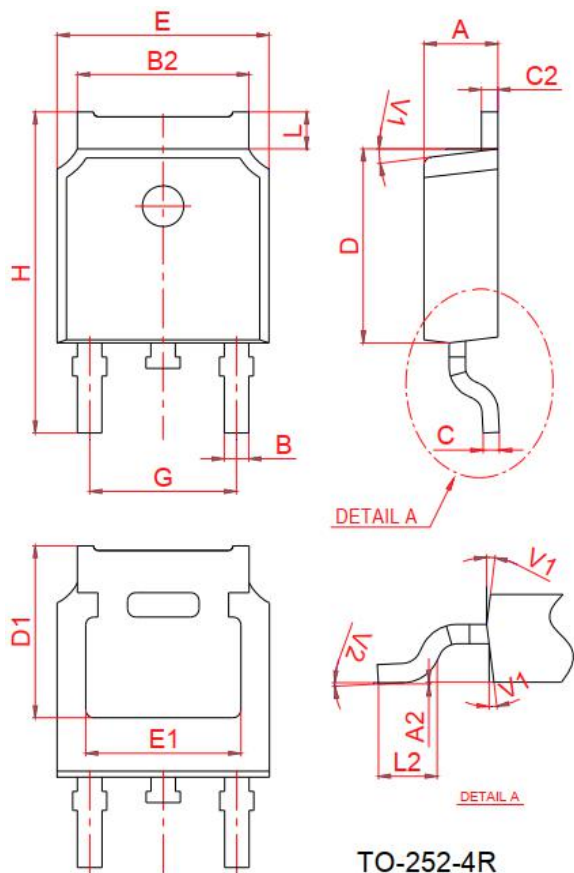
<p><b>BT</b>    <b>138-600</b>    <b>D</b></p> <p>Triacs</p> <p><math>I_{T(RMS)}:12\text{A}</math></p> <p><math>V_{DRM}, V_{RRM}</math>: 600: 600V 800: 800V</p>	<p>D: <math>I_{GT1-3} \leq 5\text{mA}</math>, <math>I_{GT4} \leq 10\text{mA}</math>  E: <math>I_{GT1-3} \leq 10\text{mA}</math>, <math>I_{GT4} \leq 25\text{mA}</math>  F: <math>I_{GT1-3} \leq 25\text{mA}</math>, <math>I_{GT4} \leq 70\text{mA}</math>  G: <math>I_{GT1-3} \leq 50\text{mA}</math>, <math>I_{GT4} \leq 100\text{mA}</math>  SW: <math>I_{GT1-3} \leq 10\text{mA}</math>  CW: <math>I_{GT1-3} \leq 35\text{mA}</math>  BW: <math>I_{GT1-3} \leq 50\text{mA}</math></p>
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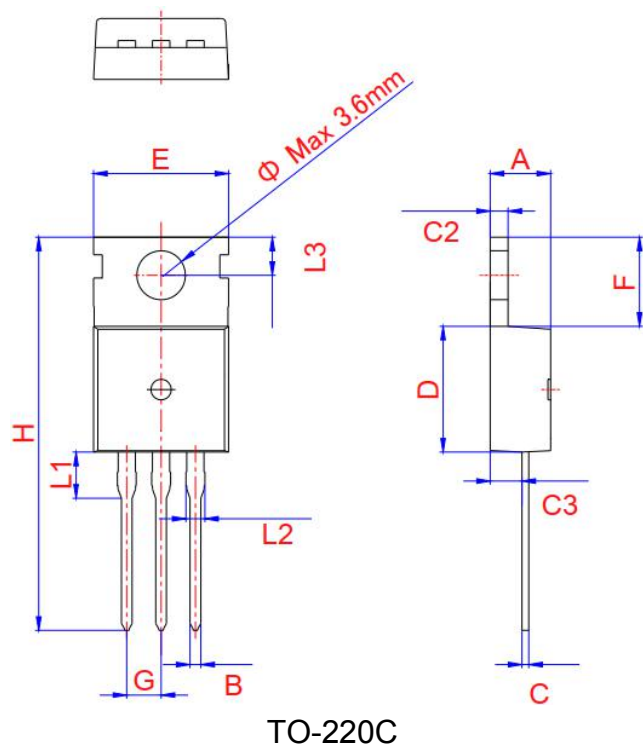
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## BT138 Series 12A Triacs

### 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°

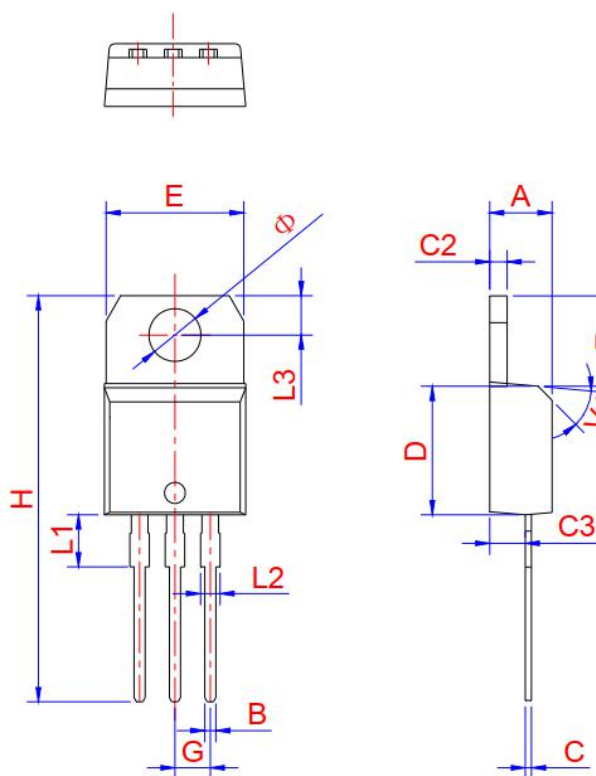


Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.3		4.5	0.169		0.177
B	0.7		0.9	0.028		0.035
C	0.45		0.6	0.018		0.024
C2	1.23	1.30	1.32	0.048	0.051	0.052
C3	2.2		2.6	0.087		0.102
D	8.9		9.9	0.35		0.39
E	9.9	10.1	10.3	0.39	0.398	0.406
F	6.3		6.9	0.248		0.272
G		2.54			0.1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



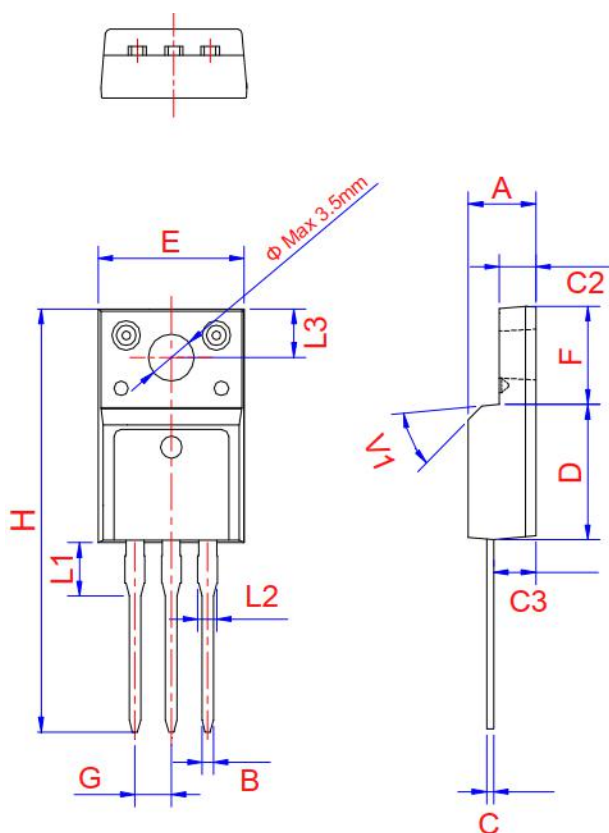
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## BT138 Series 12A Triacs



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°	
$\phi$	3.7	3.75	3.8	0.145	0.147	0.149



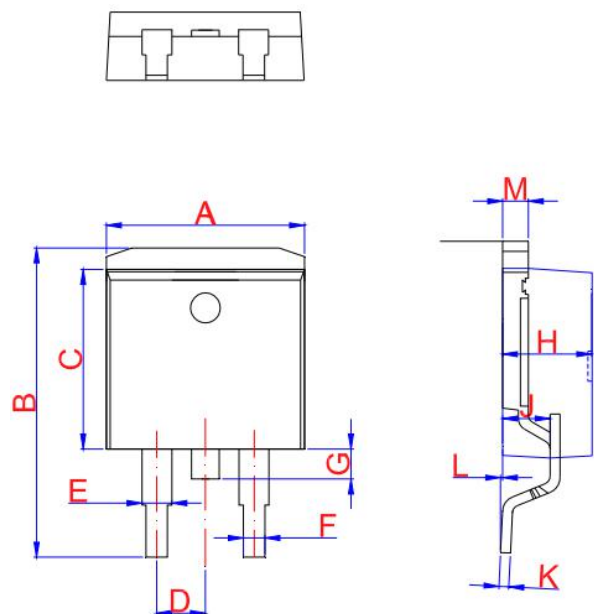
TO-220F Ins

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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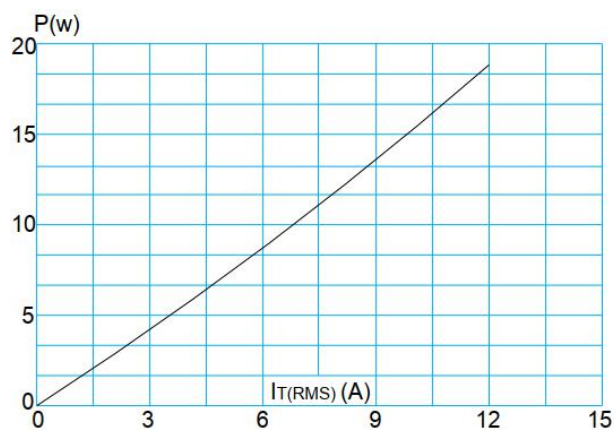
## BT138 Series 12A Triacs



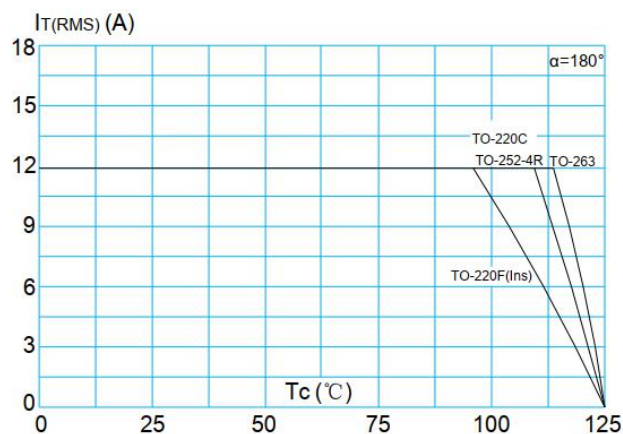
TO-263

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

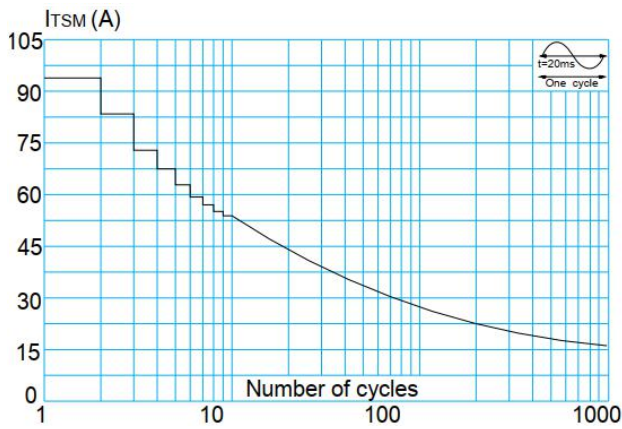




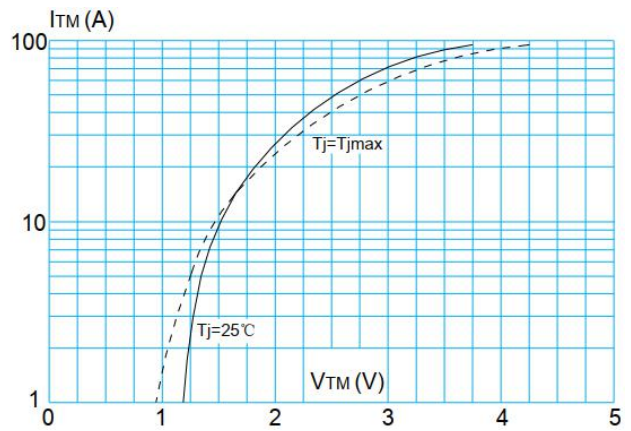
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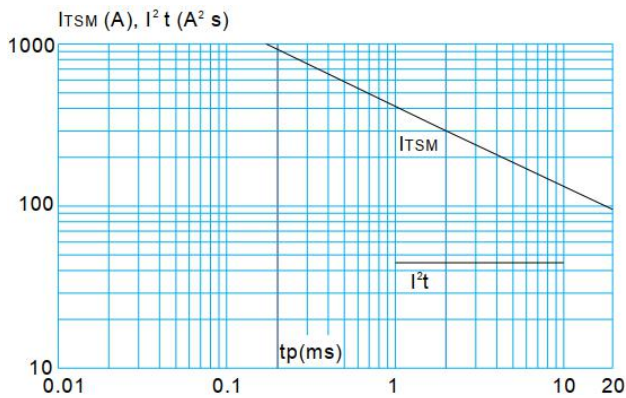
**FIG.3:** Surge peak on-state current versus number of cycles



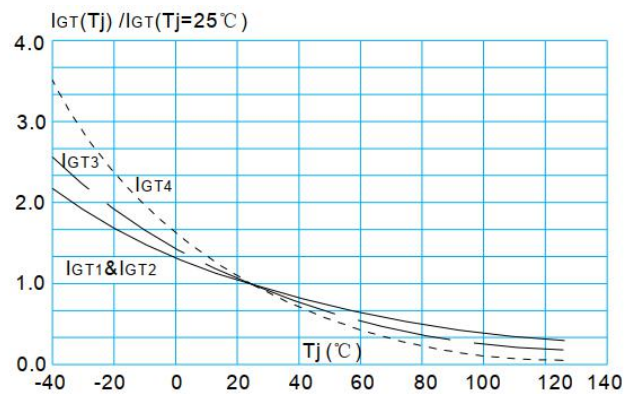
**FIG.4:** On-state characteristics (maximum values)



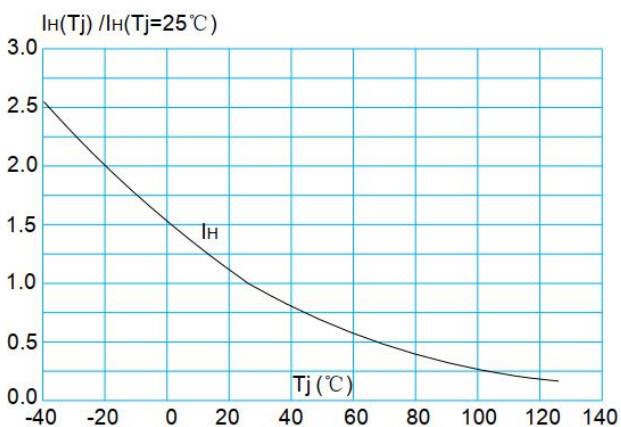
**FIG.5:** Non-repetitive surge peak on-state current for a sinusoidal pulse with width  $t_p < 20\text{ms}$ , and corresponding value of  $I^2t$  ( I - II -III:  $dI/dt < 50\text{A}/\mu\text{s}$ ; IV:  $dI/dt < 10\text{A}/\mu\text{s}$ )



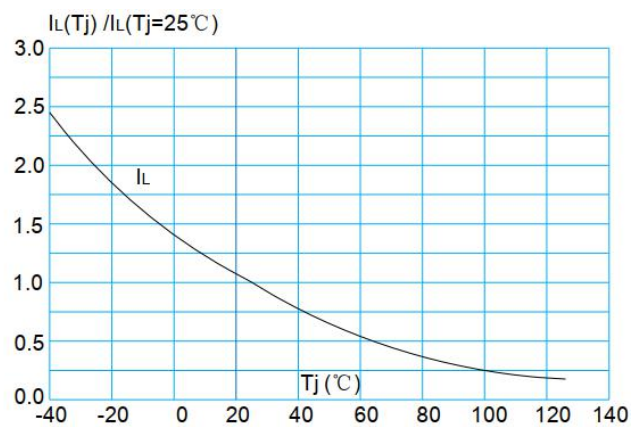
**FIG.6:** Relative variations of gate trigger current versus junction temperature



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



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





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