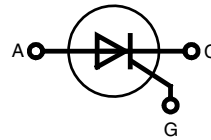


# Phase Control Thyristor

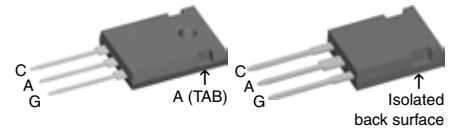
$V_{RRM} = 800-1600\text{ V}$   
 $I_{T(RMS)} = 75\text{ A}$   
 $I_{T(AV)M} = 48\text{ A}$

$V_{RSM}$ $V_{DSM}$ V	$V_{RRM}$ $V_{DRM}$ V	Type
900	800	CS 45-08 io1
1300	1200	CS 45-12 io1
1700	1600	CS 45-16 io1 CS 45-16 io1R



**TO-247 AD**  
Version io1

**ISOPLUS247™**  
Version io1R



A = Anode, C = Cathode, G = Gate

Symbol	Conditions	Maximum Ratings	
$I_{TRMS}$	$T_{VJ} = T_{VJM}$	75	A
$I_{T(AV)M}$	$T_C = 75^\circ\text{C}$ , 180° sine	48	A
$I_{TSM}$	$T_{VJ} = 45^\circ\text{C}$ $V_R = 0\text{ V}$	t = 10 ms (50 Hz), sine	520 A
		t = 8.3 ms (60 Hz), sine	560 A
	$T_{VJ} = T_{VJM}$ $V_R = 0$	t = 10 ms (50 Hz), sine	460 A
		t = 8.3 ms (60 Hz), sine	500 A
$I^2t$	$T_{VJ} = 45^\circ\text{C}$ $V_R = 0\text{ V}$	t = 10 ms (50 Hz), sine	1350 A <sup>2</sup> s
		t = 8.3 ms (60 Hz), sine	1300 A <sup>2</sup> s
$(di/dt)_{cr}$	$T_{VJ} = T_{VJM}$ f = 50 Hz; $t_p = 200\ \mu\text{s}$ $V_D = \frac{2}{3} V_{DRM}$ $I_G = 0.3\text{ A}$ $di_G/dt = 0.3\text{ A}/\mu\text{s}$	repetitive, $I_T = 40\text{ A}$	150 A/ $\mu\text{s}$
		non repetitive, $I_T = I_{T(AV)M}$	500 A/ $\mu\text{s}$
$(dv/dt)_{cr}$	$T_{VJ} = T_{VJM}$ ; $V_D = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$ ; method 1 (linear voltage rise)	1000	V/ $\mu\text{s}$
$P_{GM}$	$T_{VJ} = T_{VJM}$ ; $t_p = 30\ \mu\text{s}$ $I_T = I_{T(AV)M}$ ; $t_p = 300\ \mu\text{s}$	10	W
		5	W
$P_{GAV}$		0.5	W
$V_{RGM}$		10	V
$T_{VJ}$		-40 ... +140	°C
$T_{VJM}$		140	°C
$T_{stg}$		-40 ... 125	°C
$M_d$	Version io1: mounting torque M3	0.8...1.2	Nm
$F_C$	Version io1R: mounting force with clip	20...120	N
$V_{ISOL}^*$	50/60 Hz, RMS, t = 1 minute, leads-to-tab	2500	V~
<b>Weight</b>	typ.	6	g

\* Version io1R only

Data according to IEC 60747

## Features

- Thyristor for line frequency
- International standard package JEDEC TO-247
- Planar passivated chip
- Long-term stability of blocking currents and voltages
- Version AR isolated and UL registered E153432
- Epoxy meets UL 94V-0

## Applications

- Motor control
- Power converter
- AC power controller
- Switch-mode and resonant mode power supplies
- Light and temperature control

## Advantages

- Easy to mount with 1 screw (isolated mounting screw hole)
- Space and weight savings
- Simple mounting
- Improved temperature and power cycling

Symbol	Conditions	Characteristic Values	
		min.	max.
$I_R, I_D$	$V_R = V_{RRM}; V_D = V_{DRM}; T_{VJ} = T_{VJM}$		5 mA
$V_T$	$I_T = 80 \text{ A}; T_{VJ} = 25^\circ\text{C}$		1.64 V
$V_{TO}$	For power-loss calculations only		0.85 V
$r_T$	$T_{VJ} = 125^\circ\text{C}$		11 mΩ
$V_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$		1.5 V
	$T_{VJ} = -40^\circ\text{C}$		1.6 V
$I_{GT}$	$V_D = 6 \text{ V}; T_{VJ} = 25^\circ\text{C}$		100 mA
	$T_{VJ} = -40^\circ\text{C}$		200 mA
$V_{GD}$	$V_D = \frac{2}{3} V_{DRM}; T_{VJ} = T_{VJM}$		0.2 V
$I_{GD}$			10 mA
$I_L$	$t_p = 10 \mu\text{s}; T_{VJ} = 25^\circ\text{C}$ $I_G = 0.3 \text{ A}; di_G/dt = 0.3 \text{ A}/\mu\text{s}$		150 mA
$I_H$	$V_D = 6 \text{ V}; R_{GK} = \infty; T_{VJ} = 25^\circ\text{C}$		100 mA
$t_{gd}$	$V_D = \frac{1}{2} V_{DRM}; T_{VJ} = 25^\circ\text{C}$ $I_G = 0.3 \text{ A}; di_G/dt = 0.3 \text{ A}/\mu\text{s}$		2 μs
$R_{thJC}$	DC current		0.62 K/W
$R_{thJH}$	DC current		0.82 K/W
<b>a</b>	Max. acceleration; 50 Hz		50 m/s <sup>2</sup>

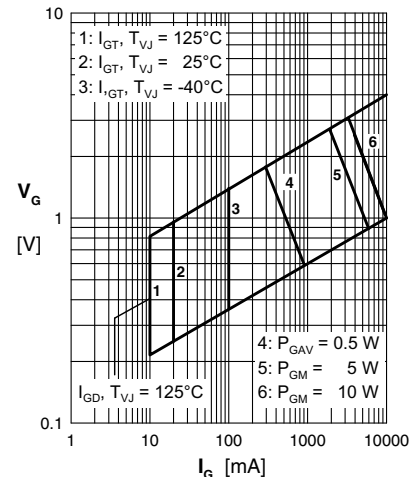


Fig. 1 Gate trigger range

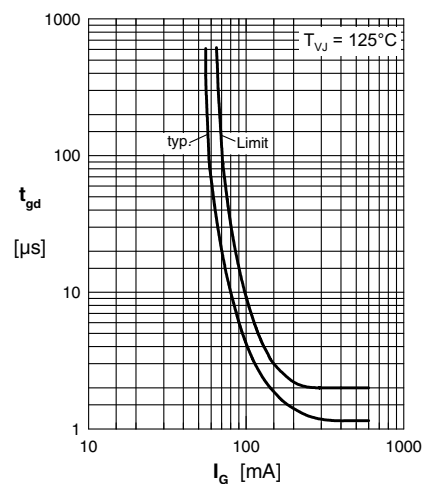
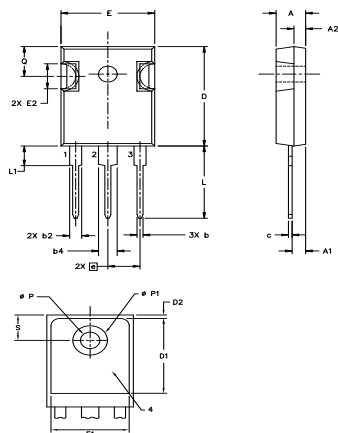


Fig. 2 Gate controlled delay time  $t_{gd}$

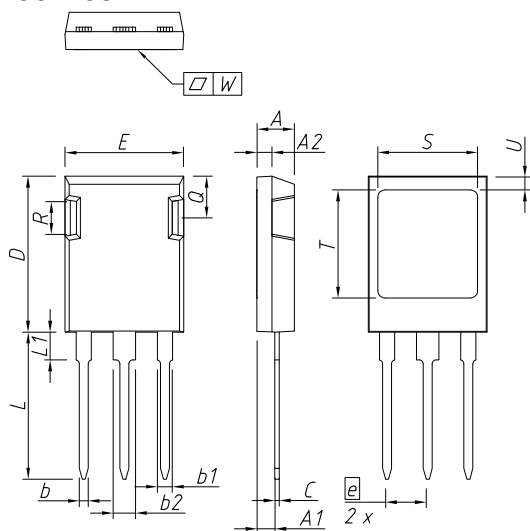
### TO-247 AD



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.40	6.20	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.50	-	0.177
J	1.00	1.40	0.040	0.055
K	10.80	11.00	0.426	0.433
L	4.70	5.30	0.185	0.209
M	0.40	0.80	0.016	0.031
N	1.50	2.49	0.087	0.102

### Dimensions (1 mm = 0.0394")

### ISOPLUS 247™



DIM.	MILLIMETER		INCHES	
	MIN	MAX	MIN	MAX
A	4,83	5,21	0,190	0,205
A1	2,29	2,54	0,090	0,100
A2	1,91	2,16	0,075	0,085
b	1,14	1,40	0,045	0,055
b1	1,91	2,15	0,075	0,085
b2	2,92	3,20	0,115	0,126
C	0,61	0,83	0,024	0,033
D	20,80	21,34	0,819	0,840
E	15,75	16,13	0,620	0,635
e	5,45 BSC		0,215 BSC	
L	19,81	20,60	0,780	0,811
L1	3,81	4,38	0,150	0,172
Q	5,59	6,20	0,220	0,244
R	4,32	4,85	0,170	0,191
S	13,21	13,72	0,520	0,540
T	15,75	16,26	0,620	0,640
U	1,65	2,03	0,065	0,080
W	-	0,10	-	0,004

Die konvexe Form des Substrates ist typ. < 0.04 mm über der Kunststoffoberfläche der Bauteilunterseite  
The convex bow of substrate is typ. < 0.04 mm over plastic surface level of device bottom side  
Die Gehäuseabmessungen entsprechen dem Typ TO-247 AD gemäß JEDEC außer Schraubloch und  $L_{max}$   
This drawing will meet all dimensions requirement of JEDEC outline TO-247 AD except screw hole and except  $L_{max}$

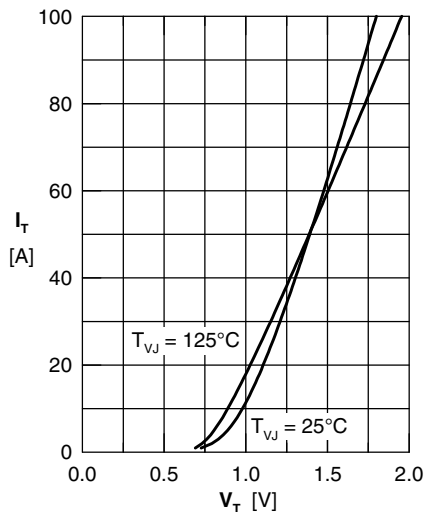


Fig. 3 Forward characteristics

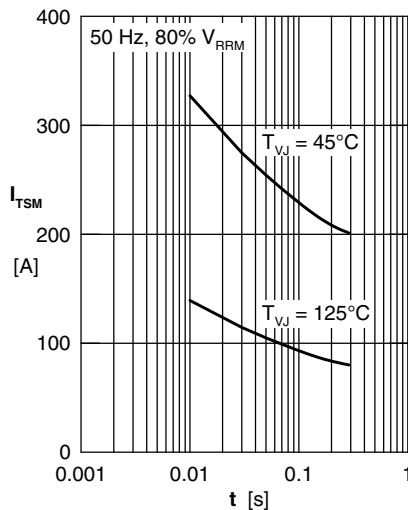


Fig. 4 Surge overload current  
 $I_{TSM}$ : crest value, t: duration

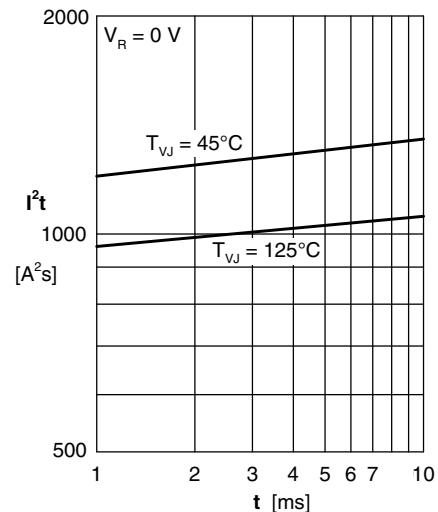


Fig. 5  $I^2t$  versus time (1-10 s)

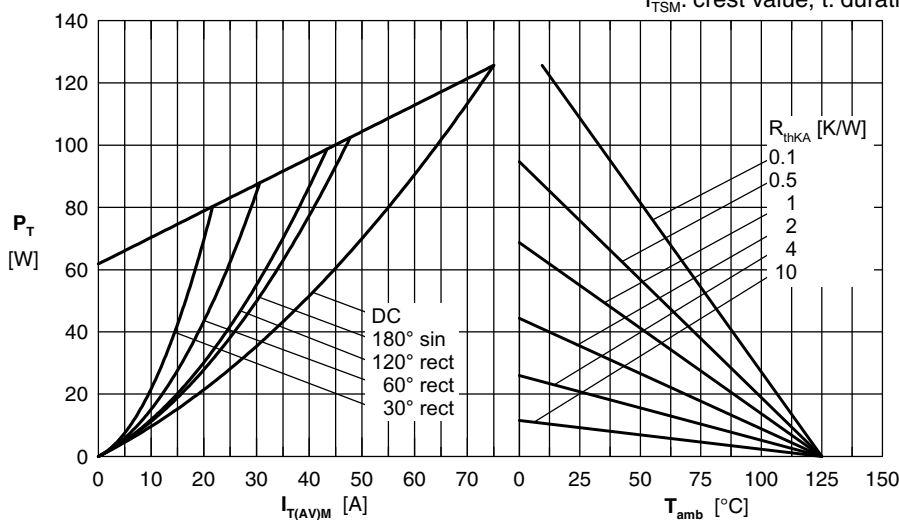


Fig. 6 Power dissipation versus forward current and ambient temperature

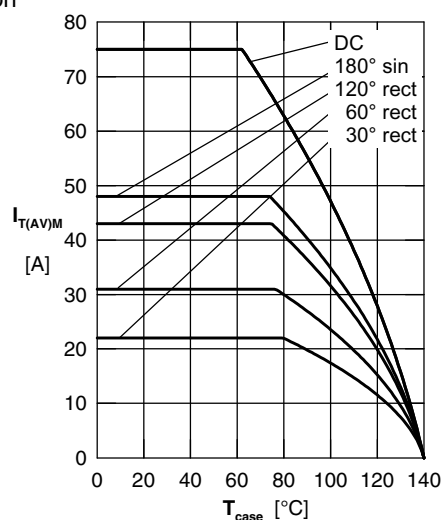


Fig. 7 Max. forward current at case temperature

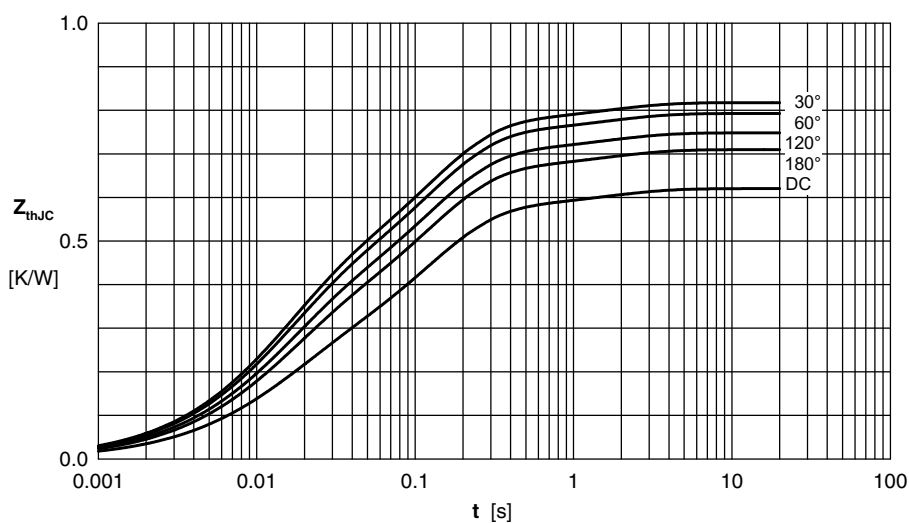


Fig. 8 Transient thermal impedance junction to case

$R_{thJC}$  for various conduction angles  $d$ :

$d$	$R_{thJC}$ (K/W)
DC	0.62
180°	0.71
120°	0.748
60°	0.793
30°	0.817

Constants for  $Z_{thJC}$  calculation:

$i$	$R_{thi}$ (K/W)	$t_i$ (s)
1	0.206	0.013
2	0.362	0.118
3	0.052	1.488