

Thyristor

advanced

$$V_{RRM} = 1600V$$

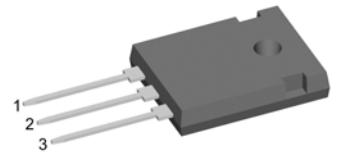
$$I_{TAV} = 80A$$

$$V_T = 1.43V$$

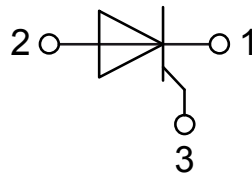
Single Thyristor

Part number

CMA80E1600HB



Backside: anode



Features / Advantages:

- Thyristor for line frequency
- Planar passivated chip
- Long-term stability

Applications:

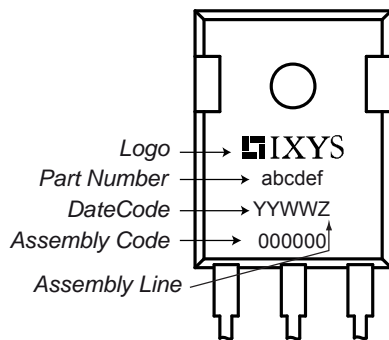
- Line rectifying 50/60 Hz
- Softstart AC motor control
- DC Motor control
- Power converter
- AC power control
- Lighting and temperature control

Package: TO-247

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

Thyristor			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$			1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}\text{C}$			1600	V
I_{RD}	reverse current, drain current	$V_{R/D} = 1600\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		50	μA
		$V_{R/D} = 1600\text{ V}$	$T_{VJ} = 125^{\circ}\text{C}$		3	mA
V_T	forward voltage drop	$I_T = 80\text{ A}$	$T_{VJ} = 25^{\circ}\text{C}$		1.47	V
					1.90	V
		$I_T = 160\text{ A}$	$T_{VJ} = 125^{\circ}\text{C}$		1.43	V
					1.93	V
I_{TAV}	average forward current	$T_C = 115^{\circ}\text{C}$	$T_{VJ} = 150^{\circ}\text{C}$		80	A
$I_{T(RMS)}$	RMS forward current	180° sine			79	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}\text{C}$		0.93	V
r_T	slope resistance				6.2	m Ω
R_{thJC}	thermal resistance junction to case				0.2	K/W
R_{thCH}	thermal resistance case to heatsink			0.25		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}\text{C}$		620	W
I_{TSM}	max. forward surge current	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$		720	A
				$V_R = 0\text{ V}$	780	A
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$		610	A
				$V_R = 0\text{ V}$	660	A
I^2t	value for fusing	$t = 10\text{ ms}; (50\text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}\text{C}$		2.59	kA ² s
				$V_R = 0\text{ V}$	2.53	kA ² s
		$t = 8,3\text{ ms}; (60\text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}\text{C}$		1.86	kA ² s
				$V_R = 0\text{ V}$	1.81	kA ² s
C_J	junction capacitance	$V_R = 400\text{ V}$ $f = 1\text{ MHz}$	$T_{VJ} = 25^{\circ}\text{C}$		32	pF
P_{GM}	max. gate power dissipation	$t_p = 30\text{ }\mu\text{s}$	$T_C = 150^{\circ}\text{C}$		10	W
		$t_p = 300\text{ }\mu\text{s}$			5	W
P_{GAV}	average gate power dissipation				0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^{\circ}\text{C}; f = 50\text{ Hz}$	repetitive, $I_T = 240\text{ A}$		150	A/ μs
				$t_p = 200\text{ }\mu\text{s}; di_G/dt = 0.3\text{ A}/\mu\text{s}$		
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}\text{C}$		1000	V/ μs
				$R_{GK} = \infty$; method 1 (linear voltage rise)		
V_{GT}	gate trigger voltage	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		1.4	V
			$T_{VJ} = -40^{\circ}\text{C}$		1.6	V
I_{GT}	gate trigger current	$V_D = 6\text{ V}$	$T_{VJ} = 25^{\circ}\text{C}$		80	mA
			$T_{VJ} = -40^{\circ}\text{C}$		200	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}\text{C}$		0.2	V
I_{GD}	gate non-trigger current				5	mA
I_L	latching current	$t_p = 10\text{ }\mu\text{s}$	$T_{VJ} = 25^{\circ}\text{C}$		450	mA
				$I_G = 0.3\text{ A}; di_G/dt = 0.3\text{ A}/\mu\text{s}$		
I_H	holding current	$V_D = 6\text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}\text{C}$		100	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}\text{C}$		2	μs
				$I_G = 0.5\text{ A}; di_G/dt = 0.5\text{ A}/\mu\text{s}$		
t_q	turn-off time	$V_R = 100\text{ V}; I_T = 80\text{ A}; V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}\text{C}$		150	μs
		$di/dt = 15\text{ A}/\mu\text{s}; dv/dt = 20\text{ V}/\mu\text{s}; t_p = 200\text{ }\mu\text{s}$				

Package TO-247			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			70	A
T_{stg}	storage temperature		-55		150	°C
T_{VJ}	virtual junction temperature		-40		150	°C
Weight				6		g
M_D	mounting torque		0.8		1.2	Nm
F_C	mounting force with clip		20		120	N

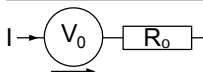
Product Marking

Part number

C = Thyristor (SCR)
 M = Thyristor
 A = (up to 1800V)
 80 = Current Rating [A]
 E = Single Thyristor
 1600 = Reverse Voltage [V]
 HB = TO-247AD (3)

Ordering	Part Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CMA80E1600HB	CMA80E1600HB	Tube	30	513206

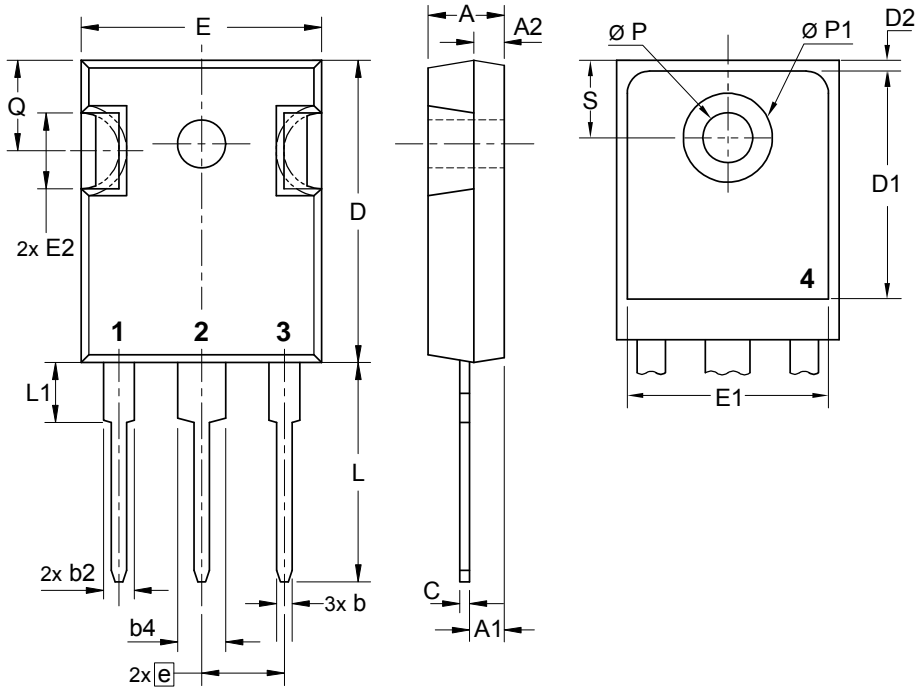
Equivalent Circuits for Simulation

* on die level

 $T_{VJ} = 150^{\circ}\text{C}$

Thyristor

$V_{0\max}$	threshold voltage	0.93	V
$R_{0\max}$	slope resistance *	3.7	mΩ

Outlines TO-247



Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.215 BSC		5.46 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	5.38	6.19
S	0.242 BSC		6.14 BSC	
b	0.039	0.055	0.99	1.40
b2	0.065	0.094	1.65	2.39
b4	0.102	0.135	2.59	3.43
c	0.015	0.035	0.38	0.89
D1	0.515	-	13.07	-
D2	0.020	0.053	0.51	1.35
E1	0.530	-	13.45	-
Ø P1	-	0.29	-	7.39

