

Thyristor

$$V_{RRM} = 1600 \text{ V}$$

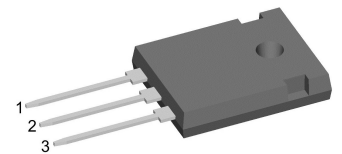
$$I_{TAV} = 30 \text{ A}$$

$$V_T = 1.35 \text{ V}$$


Three Quadrants operation: QI - QIII
 1~ Triac

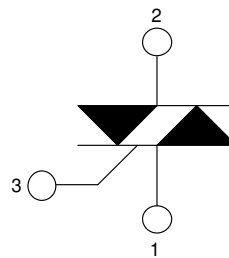
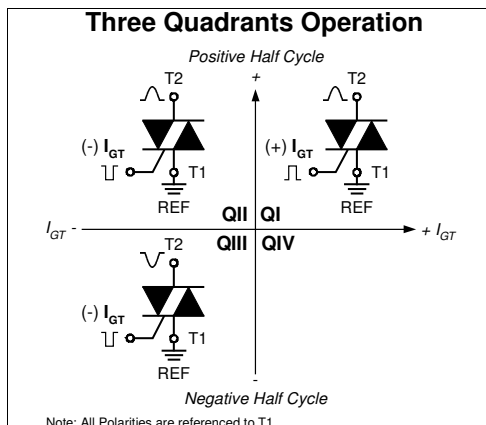
Part number

CMA60MT1600NHR



Backside: isolated

 E72873



Features / Advantages:

- Triac for line frequency
- Three Quadrants Operation - QI - QIII
- Planar passivated chip
- Long-term stability of blocking currents and voltages

Applications:

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

Package: ISO247

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

Disclaimer Notice

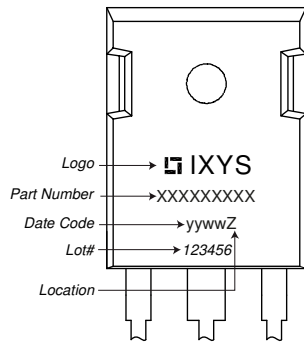
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Rectifier			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1600	V
I_{RD}	reverse current, drain current	$V_{R/D} = 1600 V$	$T_{VJ} = 25^{\circ}C$		10	μA
		$V_{R/D} = 1600 V$	$T_{VJ} = 125^{\circ}C$		2	mA
V_T	forward voltage drop	$I_T = 30 A$	$T_{VJ} = 25^{\circ}C$		1.36	V
		$I_T = 60 A$			1.70	V
		$I_T = 30 A$	$T_{VJ} = 125^{\circ}C$		1.35	V
		$I_T = 60 A$			1.79	V
I_{TAV}	average forward current	$T_C = 90^{\circ}C$	$T_{VJ} = 150^{\circ}C$		30	A
I_{RMS}	RMS forward current per phase	180° sine			66	A
V_{T0}	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		0.89	V
r_T	slope resistance				15.1	m Ω
R_{thJC}	thermal resistance junction to case				0.9	K/W
R_{thCH}	thermal resistance case to heatsink			0.3		K/W
P_{tot}	total power dissipation		$T_C = 25^{\circ}C$		140	W
I_{TSM}	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		260	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		280	A
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		220	A
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		240	A
I^2t	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 45^{\circ}C$		340	A ² s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		325	A ² s
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{ sine}$	$T_{VJ} = 150^{\circ}C$		240	A ² s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{ sine}$	$V_R = 0 V$		240	A ² s
C_J	junction capacitance	$V_R = 400 V \quad f = 1 \text{ MHz}$	$T_{VJ} = 25^{\circ}C$		9	pF
P_{GM}	max. gate power dissipation	$t_p = 30 \mu s$	$T_C = 150^{\circ}C$		10	W
		$t_p = 300 \mu s$			5	W
P_{GAV}	average gate power dissipation				0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^{\circ}C; f = 50 \text{ Hz}$	repetitive, $I_T = 90 A$		150	A/ μs
		$t_p = 200 \mu s; di_G/dt = 0.2 A/\mu s;$ $I_G = 0.2 A; V = \frac{2}{3} V_{DRM}$	non-repet., $I_T = 30 A$		500	A/ μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$		500	V/ μs
		$R_{GK} = \infty; \text{method 1 (linear voltage rise)}$				
V_{GT}	gate trigger voltage	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		1.3	V
			$T_{VJ} = -40^{\circ}C$		1.6	V
I_{GT}	gate trigger current	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		± 60	mA
			$T_{VJ} = -40^{\circ}C$		± 80	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^{\circ}C$		0.2	V
I_{GD}	gate non-trigger current				± 1	mA
I_L	latching current	$t_p = 10 \mu s$	$T_{VJ} = 25^{\circ}C$		90	mA
		$I_G = 0.2 A; di_G/dt = 0.2 A/\mu s$				
I_H	holding current	$V_D = 6 V \quad R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		60	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	μs
		$I_G = 0.5 A; di_G/dt = 0.5 A/\mu s$				
t_q	turn-off time	$V_R = 100 V; I_T = 30 A; V = \frac{2}{3} V_{DRM}$ $di/dt = 10 A/\mu s \quad dv/dt = 20 V/\mu s \quad t_p = 200 \mu s$	$T_{VJ} = 125^{\circ}C$		150	μs



Package ISO247		Ratings				
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			70	A
T_{VJ}	virtual junction temperature		-55		150	°C
T_{op}	operation temperature		-55		125	°C
T_{stg}	storage temperature		-55		150	°C
Weight				6		g
M_D	mounting torque		0.8		1.2	Nm
F_C	mounting force with clip		20		120	N
$d_{Spp/APP}$	creepage distance on surface striking distance through air	terminal to terminal	2.7			mm
$d_{Spb/APb}$		terminal to backside	4.1			mm
V_{ISOL}	isolation voltage	t = 1 second	3600			V
		t = 1 minute	3000			V

Product Marking



Part description

- C = Thyristor (SCR)
- M = Thyristor
- A = (up to 1800V)
- 60 = Current Rating [A]
- MT = 1~ Triac
- 1600 = Reverse Voltage [V]
- N = Three Quadrants operation: QI - QIII
- HR = ISO247 (3)

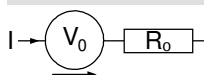
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CMA60MT1600NHR	CMA60MT1600NHR	Tube	30	517853

Similar Part	Package	Voltage class
CMA60MT1600NHB	TO-247AD (3)	1600

Equivalent Circuits for Simulation

* on die level

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

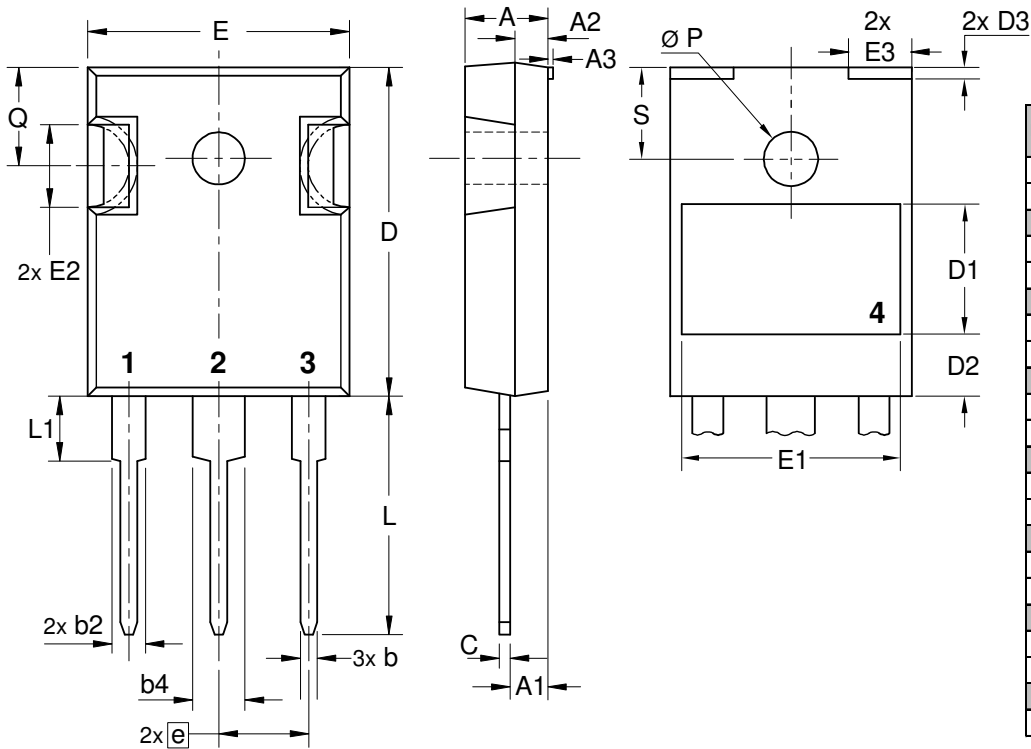


Thyristor

$V_{0\ max}$	threshold voltage	0.89	V
$R_{0\ max}$	slope resistance *	12.6	mΩ



Outlines ISO247



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.70	5.30	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
A3	typ. 0.05		typ. 0.002	
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.79	21.45	0.819	0.844
D1	typ. 8.90		typ. 0.350	
D2	typ. 2.90		typ. 0.114	
D3	typ. 1.00		typ. 0.039	
E	15.49	16.24	0.610	0.639
E1	typ. 13.45		typ. 0.530	
E2	4.31	5.48	0.170	0.216
E3	typ. 4.00		typ. 0.157	
e	5.46 BSC		0.215 BSC	
L	19.80	20.30	0.780	0.799
L1	-	4.49	-	0.177
Ø P	3.55	3.65	0.140	0.144
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	

