Thyristor

V_{RRM}	=	1600 V
I_{TAV}	=	40 A
V_T	=	1.34 V

Three Quadrants operation: QI - QIII
1~ Triac

Part number

CMA80MT1600NHB

1
2
3

Backside: Terminal 2

Three Quadrants Operation

Positive Half Cycle

T2
(-) I_{GT}
T1
REF

T2
(+) I_{GT}
T1
REF

I_{GT} -   QII | QI
          QIII | QIV   + I_{GT}

T2
(-) I_{GT}
T1
REF

Negative Half Cycle

Note: All Polarities are referenced to T1
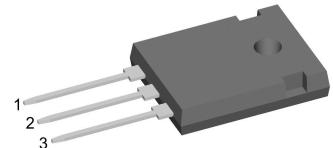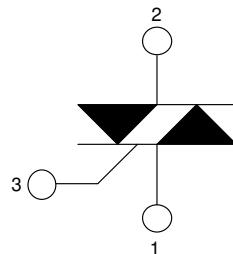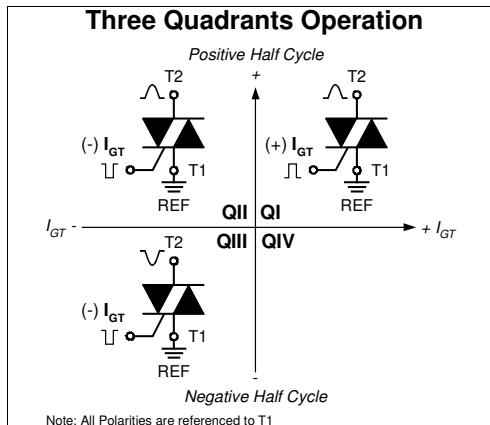
Features / Advantages:
- Triac for line frequency
- Three Quadrants Operation
  - QI - QIII
- Planar passivated chip
- Long-term stability
  of blocking currents and voltages

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

Package: TO-247
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

Disclaimer Notice

Rectifier

Symbol	Definition	Conditions		min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25°C$				1600	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1600$ V	$T_{VJ} = 25°C$			10	μA
		$V_{R/D} = 1600$ V	$T_{VJ} = 125°C$			2	mA
V_T	forward voltage drop	$I_T = 40$ A	$T_{VJ} = 25°C$			1.36	V
		$I_T = 80$ A				1.70	V
		$I_T = 40$ A	$T_{VJ} = 125°C$			1.34	V
		$I_T = 80$ A				1.78	V
I_{TAV}	average forward current	$T_C = 115°C$	$T_{VJ} = 150°C$			40	A
I_{RMS}	RMS forward current per phase	180° sine				88	A
V_{T0}	threshold voltage	$T_{VJ} = 150°C$				0.89	V
r_T	slope resistance	} for power loss calculation only				11.3	mΩ
R_{thJC}	thermal resistance junction to case					0.4	K/W
R_{thCH}	thermal resistance case to heatsink				0.3		K/W
P_{tot}	total power dissipation	$T_C = 25°C$				310	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			380	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			410	A
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			325	A
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			350	A
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			720	A²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			700	A²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 150°C$			530	A²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			510	A²s
C_J	junction capacitance	$V_R = 400$ V f = 1 MHz	$T_{VJ} = 25°C$		14		pF
P_{GM}	max. gate power dissipation	$t_P = 30$ μs	$T_C = 150°C$			10	W
		$t_P = 300$ μs				5	W
P_{GAV}	average gate power dissipation					0.5	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125°C$; f = 50 Hz repetitive, $I_T = 90$ A				150	A/μs
		$t_P = 200$ μs; $di_G/dt = 0.2$ A/μs;					
		$I_G = 0.2$ A; V = ⅔ V_{DRM} non-repet., $I_T = 40$ A				500	A/μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM}	$T_{VJ} = 125°C$			500	V/μs
		$R_{GK} = ∞$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6$ V	$T_{VJ} = 25°C$			1.7	V
			$T_{VJ} = -40°C$			1.9	V
I_{GT}	gate trigger current	$V_D = 6$ V	$T_{VJ} = 25°C$			± 70	mA
			$T_{VJ} = -40°C$			± 90	mA
V_{GD}	gate non-trigger voltage	$V_D = ⅔ V_{DRM}$	$T_{VJ} = 125°C$			0.2	V
I_{GD}	gate non-trigger current					± 1	mA
I_L	latching current	$t_p = 10$ μs	$T_{VJ} = 25°C$			100	mA
		$I_G = 0.2$ A; $di_G/dt = 0.2$ A/μs					
I_H	holding current	$V_D = 6$ V $R_{GK} = ∞$	$T_{VJ} = 25°C$			70	mA
t_{gd}	gate controlled delay time	$V_D = ½ V_{DRM}$	$T_{VJ} = 25°C$			2	μs
		$I_G = 0.5$ A; $di_G/dt = 0.5$ A/μs					
t_q	turn-off time	$V_R = 100$ V; $I_T = 40A$; V = ⅔ V_{DRM} $T_{VJ} = 125$ °C			150		μs
		di/dt = 10 A/μs dv/dt = 20 V/μs $t_p = 200$ μs					

Ratings

Package   TO-247

				Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
I_{RMS}	RMS current	per terminal			70	A
T_{VJ}	virtual junction temperature		-40		150	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage 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

Logo → ⊓ IXYS
Part Number → XXXXXXXXX
Date Code → yywwZ
Lot# → 1234
Location
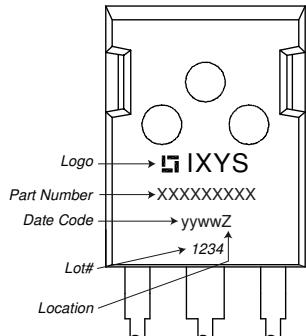
Part description

C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
80 = Current Rating [A]
MT = 1~ Triac
1600 = Reverse Voltage [V]
N = Three Quadrants operation: QI - QIII
HB = TO-247AD (3)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CMA80MT1600NHB	CMA80MT1600NHB	Tube	30	522868

Similar Part	Package	Voltage class
CMA80MT1600NHR	ISO247 (3)	1600

Equivalent Circuits for Simulation   *on die level* $T_{VJ} = 150°C$
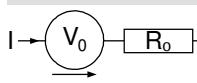
Thyristor

$V_{0\ max}$	threshold voltage	0.89	V
$R_{0\ max}$	slope resistance *	8.8	mΩ

Outlines   TO-247
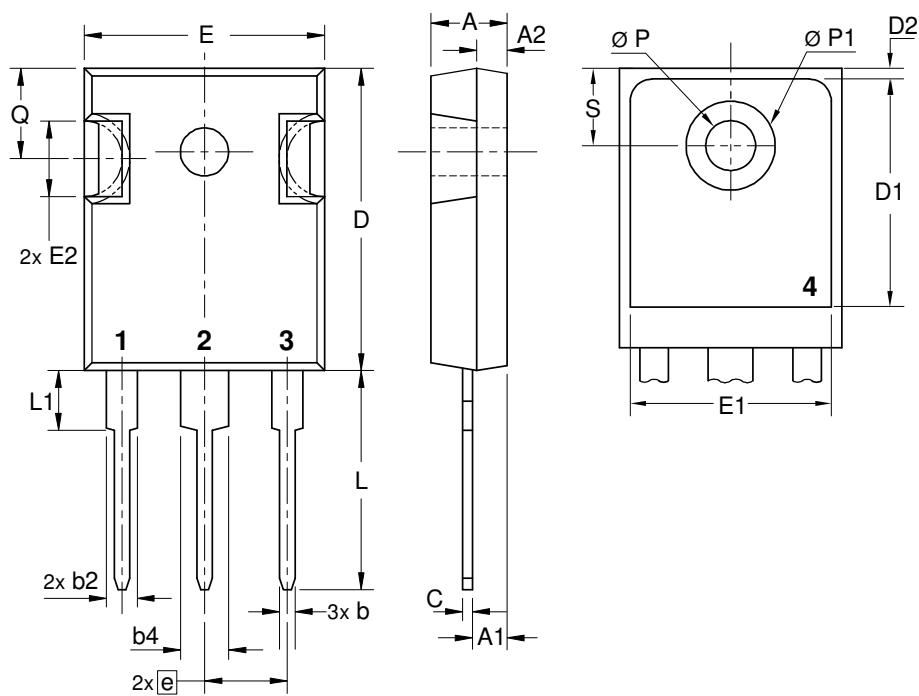
Sym.	Inches		Millimeter	
	min.	max.	min.	max.
A	0.185	0.209	4.70	5.30
A1	0.087	0.102	2.21	2.59
A2	0.059	0.098	1.50	2.49
D	0.819	0.845	20.79	21.45
E	0.610	0.640	15.48	16.24
E2	0.170	0.216	4.31	5.48
e	0.215 BSC		5.46 BSC	
L	0.780	0.800	19.80	20.30
L1	-	0.177	-	4.49
Ø P	0.140	0.144	3.55	3.65
Q	0.212	0.244	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