Thyristor Module

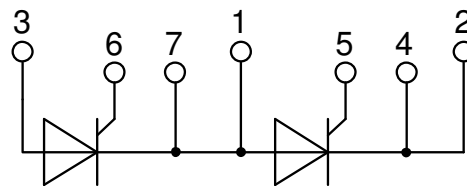|		
V_{RRM}	=	2 x 1600 V
I_{TAV}	=	700 A
V_T	=	1.11 V

Phase leg

Part number

MCMA700P1600CA

Backside: isolated

E72873

Features / Advantages:
- Thyristor for line frequency
- Planar passivated chip
- Long-term stability
- Direct Copper Bonded Al2O3-ceramic

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

Package: ComPack
- Isolation Voltage: 4800 V~
- Industry standard outline
- RoHS compliant
- Base plate: Copper internally DCB isolated
- Advanced power cycling
- Phase Change Material available

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	$T_{VJ} = 25°C$			2	mA
		$V_{R/D} = 1600$ V	$T_{VJ} = 125°C$			40	mA
V_T	forward voltage drop	$I_T = 700$ A	$T_{VJ} = 25°C$			1.16	V
		$I_T = 1400$ A				1.41	V
		$I_T = 700$ A	$T_{VJ} = 125°C$			1.11	V
		$I_T = 1400$ A				1.41	V
I_{TAV}	average forward current	$T_C = 85°C$	$T_{VJ} = 140°C$			700	A
$I_{T(RMS)}$	RMS forward current	180° sine				1100	A
V_{T0}	threshold voltage ⎫ for power loss calculation only	$T_{VJ} = 140°C$				0.82	V
r_T	slope resistance ⎭					0.4	mΩ
R_{thJC}	thermal resistance junction to case					0.05	K/W
R_{thCH}	thermal resistance case to heatsink				0.020		K/W
P_{tot}	total power dissipation	$T_C = 25°C$				2300	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			19.0	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			20.5	kA
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140°C$			16.2	kA
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			17.4	kA
I^2t	value for fusing	t = 10 ms; (50 Hz), sine	$T_{VJ} = 45°C$			1.81	MA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			1.75	MA²s
		t = 10 ms; (50 Hz), sine	$T_{VJ} = 140°C$			1.30	MA²s
		t = 8,3 ms; (60 Hz), sine	$V_R = 0$ V			1.27	MA²s
C_J	junction capacitance	$V_R = 400$ V f = 1 MHz	$T_{VJ} = 25°C$		876		pF
P_{GM}	max. gate power dissipation	$t_P = 30$ μs	$T_C = 140°C$			240	W
		$t_P = 300$ μs				120	W
P_{GAV}	average gate power dissipation					40	W
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 140°C$; f = 50 Hz repetitive, $I_T = 2100$ A				100	A/μs
		$t_P = 200$ μs; $di_G/dt = 1$ A/μs;					
		$I_G = 1$ A; V = ⅔ V_{DRM} non-repet., $I_T = 700$ A				500	A/μs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM}	$T_{VJ} = 140°C$			1000	V/μs
		$R_{GK} = ∞$; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	$V_D = 6$ V	$T_{VJ} = 25°C$			2	V
			$T_{VJ} = -40°C$			3	V
I_{GT}	gate trigger current	$V_D = 6$ V	$T_{VJ} = 25°C$			300	mA
			$T_{VJ} = -40°C$			400	mA
V_{GD}	gate non-trigger voltage	$V_D = ⅔ V_{DRM}$	$T_{VJ} = 140°C$			0.25	V
I_{GD}	gate non-trigger current					10	mA
I_L	latching current	$t_p = 30$ μs	$T_{VJ} = 25°C$			400	mA
		$I_G = 1$ A; $di_G/dt = 1$ A/μs					
I_H	holding current	$V_D = 6$ V $R_{GK} = ∞$	$T_{VJ} = 25°C$			300	mA
t_{gd}	gate controlled delay time	$V_D = ½ V_{DRM}$	$T_{VJ} = 25°C$			2	μs
		$I_G = 1$ A; $di_G/dt = 1$ A/μs					
t_q	turn-off time	$V_R = 100$ V; $I_T = 700$ A; V = ⅔ V_{DRM} $T_{VJ} = 125$ °C			350		μs
		di/dt = 10 A/μs dv/dt = 50 V/μs $t_p = 200$ μs					

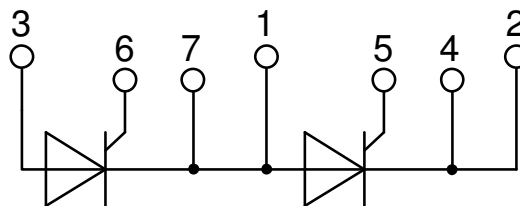| Package	ComPack		Ratings			
Symbol	**Definition**	**Conditions**	**min.**	**typ.**	**max.**	**Unit**
I_{RMS}	RMS current	per terminal			1200	A
T_{VJ}	virtual junction temperature		-40		140	°C
T_{op}	operation temperature		-40		125	°C
T_{stg}	storage temperature		-40		125	°C
Weight				500		g
M_D	mounting torque		3		5	Nm
M_T	terminal torque		12		14	Nm
$d_{Spp/App}$	creepage distance on surface | striking distance through air	terminal to terminal	21.0			mm
$d_{Spb/Apb}$		terminal to backside	18.0			mm
V_{ISOL}	isolation voltage	t = 1 second	4800			V
		t = 1 minute 50/60 Hz, RMS; $I_{ISOL} \le 1$ mA	4000			V
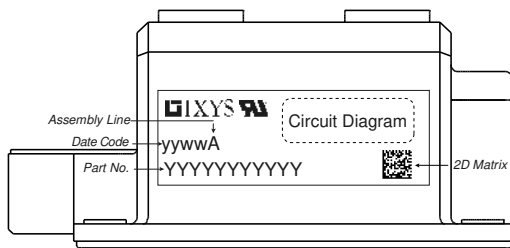
Part description
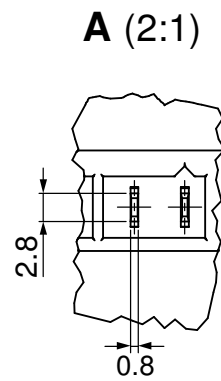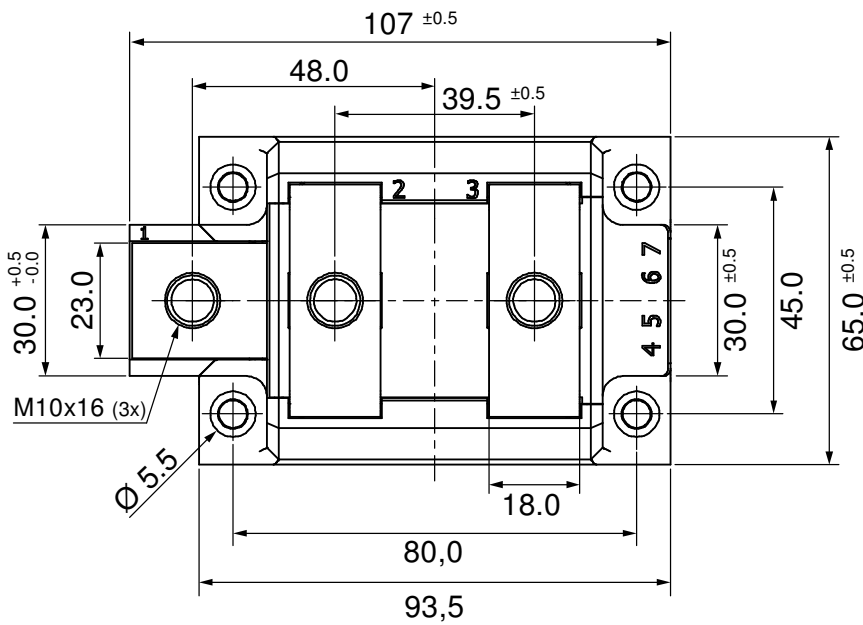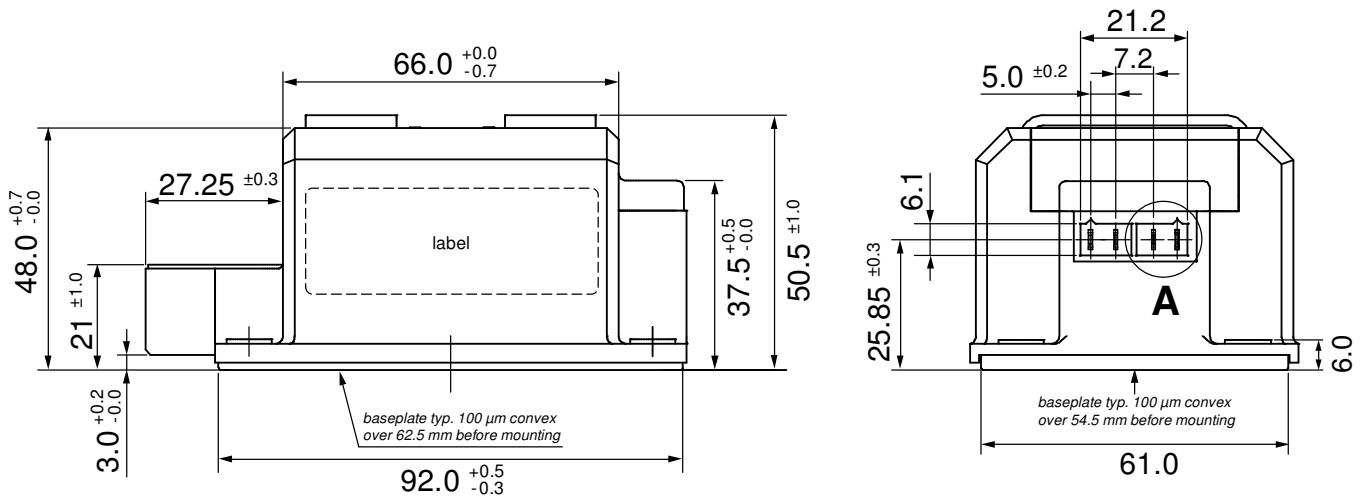
M = Module
C = Thyristor (SCR)
M = Thyristor
A = (up to 1800V)
700 = Current Rating [A]
P = Phase leg
1600 = Reverse Voltage [V]
CA = ComPack

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCMA700P1600CA	MCMA700P1600CA	Box	3	513835

Equivalent Circuits for Simulation   *on die level $T_{VJ} = 140\,°C$
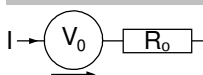
Thyristor

$V_{0\,max}$	threshold voltage	0.82	V
$R_{0\,max}$	slope resistance *	0.21	mΩ

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20171113c

Outlines   ComPack

66.0 $^{+0.0}_{-0.7}$

27.25 ±0.3

48.0 $^{+0.7}_{-0.0}$

21 ±1.0

3.0 $^{+0.2}_{-0.0}$

37.5 $^{+0.5}_{-0.0}$

50.5 ±1.0

label

baseplate typ. 100 µm convex
over 62.5 mm before mounting

92.0 $^{+0.5}_{-0.3}$

21.2

5.0 ±0.2

7.2

6.1

25.85 ±0.3

6.0

A

baseplate typ. 100 µm convex
over 54.5 mm before mounting

61.0

107 ±0.5

48.0

39.5 ±0.5

30.0 $^{+0.5}_{-0.0}$

23.0

1

2   3

4 5   6 7

30.0 ±0.5

45.0

65.0 ±0.5

M10x16 (3x)

Ø 5.5

18.0

80,0

93,5

A (2:1)

2.8

0.8

3   6   7   1   5   4   2
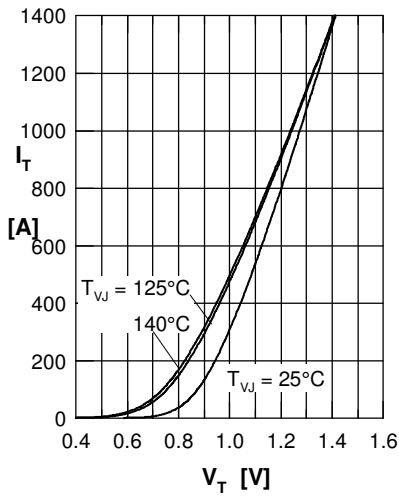
Thyristor

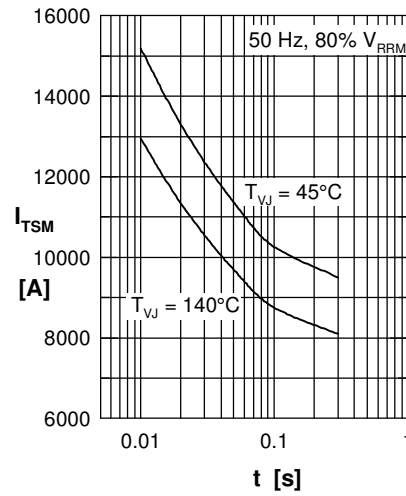Fig. 1 Forward characteristics

Fig. 2 Surge overload current
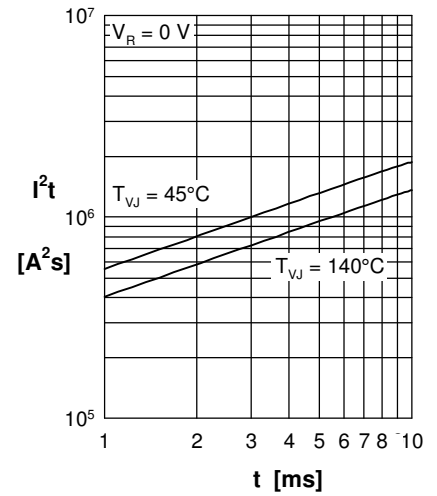I_{TSM}: crest value, t: duration
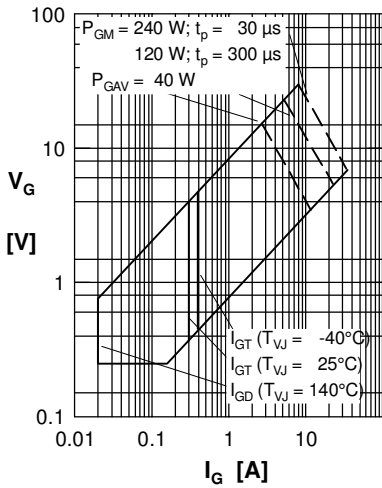

Fig. 3 I^2t versus time (1-10 s)

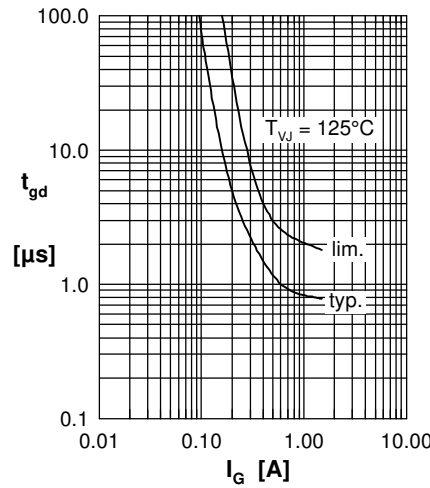Fig. 4 Gate voltage & gate current
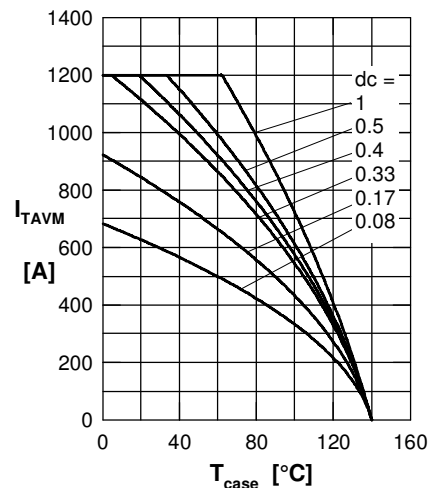

Fig. 5 Gate controlled delay time t_{gd}
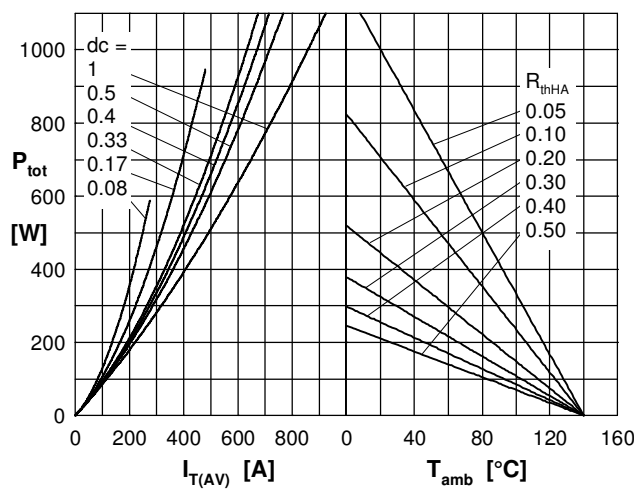

Fig. 6 Max. forward current at case temperature

Fig. 7a Power dissipation versus direct output current
Fig. 7b and ambient temperature

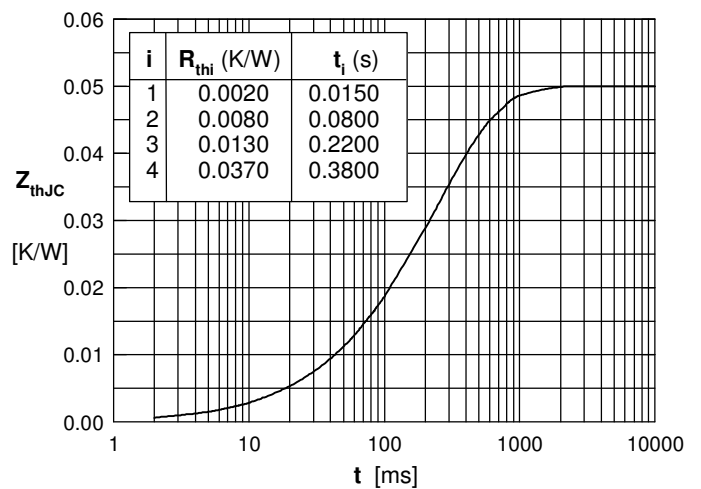| i	R_{thi} (K/W)	t_i (s)
1	0.0020	0.0150
2	0.0080	0.0800
3	0.0130	0.2200
4	0.0370	0.3800

Fig. 8 Transient thermal impedance junction to case

IXYS reserves the right to change limits, conditions and dimensions.   Data according to IEC 60747and per semiconductor unless otherwise specified   20171113c