

# Thyristor

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

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

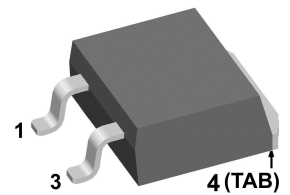
$$V_T = 1.96 \text{ V}$$

## SemiFast Single Thyristor

### Part number

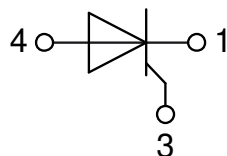
**CME30E1600PZ**

Marking on Product: CME30E1600PZ



Backside: anode

ESD Level: H3B



### Features / Advantages:

- Thyristor for line and moderate frequencies
- Short turn-off time
- 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-263 (D2Pak-HV)

- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- High creepage distance between terminals

### Disclaimer Notice

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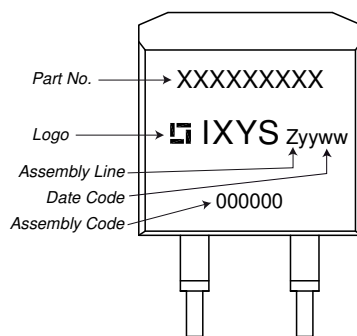


Thyristor			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^{\circ}C$			1600	V
$I_{RD}$	reverse current, drain current	$V_{R/D} = 1600 V$	$T_{VJ} = 25^{\circ}C$		50	$\mu A$
		$V_{R/D} = 1600 V$	$T_{VJ} = 125^{\circ}C$		2	mA
$V_T$	forward voltage drop	$I_T = 30 A$	$T_{VJ} = 25^{\circ}C$		1.92	V
		$I_T = 60 A$			2.47	V
		$I_T = 30 A$	$T_{VJ} = 125^{\circ}C$		1.96	V
		$I_T = 60 A$			2.68	V
$I_{TAV}$	average forward current	$T_C = 80^{\circ}C$ 180° sine	$T_{VJ} = 150^{\circ}C$		30	A
$V_{T0}$	threshold voltage	} for power loss calculation only	$T_{VJ} = 150^{\circ}C$		1.23	V
$r_T$	slope resistance				25	m $\Omega$
$R_{thJC}$	thermal resistance junction to case				0.75	K/W
$R_{thCH}$	thermal resistance case to heatsink			0.25		K/W
$P_{tot}$	total power dissipation		$T_C = 25^{\circ}C$		165	W
$I_{TSM}$	max. forward surge current	$t = 10 ms$ ; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$		260	A
		$t = 8,3 ms$ ; (60 Hz), sine	$V_R = 0 V$		280	A
		$t = 10 ms$ ; (50 Hz), sine	$T_{VJ} = 150^{\circ}C$		220	A
		$t = 8,3 ms$ ; (60 Hz), sine	$V_R = 0 V$		240	A
$I^2t$	value for fusing	$t = 10 ms$ ; (50 Hz), sine	$T_{VJ} = 45^{\circ}C$		340	A <sup>2</sup> s
		$t = 8,3 ms$ ; (60 Hz), sine	$V_R = 0 V$		325	A <sup>2</sup> s
		$t = 10 ms$ ; (50 Hz), sine	$T_{VJ} = 150^{\circ}C$		240	A <sup>2</sup> s
		$t = 8,3 ms$ ; (60 Hz), sine	$V_R = 0 V$		240	A <sup>2</sup> s
$C_J$	junction capacitance	$V_R = 400 V$ $f = 1 MHz$	$T_{VJ} = 25^{\circ}C$		13	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	$T_{VJ} = 125^{\circ}C$ ; $f = 50 Hz$ repetitive, $I_T = 90 A$			150	A/ $\mu s$
		$t_p = 200 \mu s$ ; $di_G/dt = 0.2 A/\mu s$ ; $I_G = 0.2 A$ ; $V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 30 A$			500	A/ $\mu s$
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$ $R_{GK} = \infty$ ; method 1 (linear voltage rise)	$T_{VJ} = 125^{\circ}C$		500	V/ $\mu s$
$V_{GT}$	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	$V_D = 6 V$	$T_{VJ} = 25^{\circ}C$		50	mA
			$T_{VJ} = -40^{\circ}C$		80	mA
$V_{GD}$	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 150^{\circ}C$		0.2	V
$I_{GD}$	gate non-trigger current				1	mA
$I_L$	latching current	$t_p = 10 \mu s$	$T_{VJ} = 25^{\circ}C$		120	mA
		$I_G = 0.2 A$ ; $di_G/dt = 0.2 A/\mu s$				
$I_H$	holding current	$V_D = 6 V$ $R_{GK} = \infty$	$T_{VJ} = 25^{\circ}C$		90	mA
$t_{gd}$	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^{\circ}C$		2	$\mu s$
		$I_G = 0.5 A$ ; $di_G/dt = 0.5 A/\mu s$				
$t_q$	turn-off time	$V_R = 20 V$ ; $I_T = 30 A$ ; $V = \frac{2}{3} V_{DRM}$ $di/dt = 10 A/\mu s$ $dv/dt = 1000 V/\mu s$ $t_p = 200 \mu s$	$T_{VJ} = 125^{\circ}C$		120	$\mu s$



Package TO-263 (D2Pak-HV)			Ratings			
Symbol	Definition	Conditions	min.	typ.	max.	Unit
$I_{RMS}$	RMS current	per terminal			35	A
$T_{VJ}$	virtual junction temperature		-40		150	°C
$T_{op}$	operation temperature		-40		125	°C
$T_{stg}$	storage temperature		-40		150	°C
<b>Weight</b>				1.5		g
$F_C$	mounting force with clip		20		60	N
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	4.2			mm
$d_{Spb/Apb}$		terminal to backside	4.7			mm

**Product Marking**



**Part description**

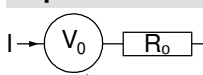
- C = Thyristor (SCR)
- M = Thyristor
- E = Semifast (up to 1800V)
- 30 = Current Rating [A]
- E = Single Thyristor
- 1600 = Reverse Voltage [V]
- PZ = TO-263AB (D2Pak) (2HV)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CME30E1600PZ-TRL	CME30E1600PZ	Tape & Reel	800	512781
Alternative	CME30E1600PZ-TUB	CME30E1600PZ	Tube	50	523828

**Equivalent Circuits for Simulation**

\* on die level

$T_{VJ} = 150\text{ °C}$

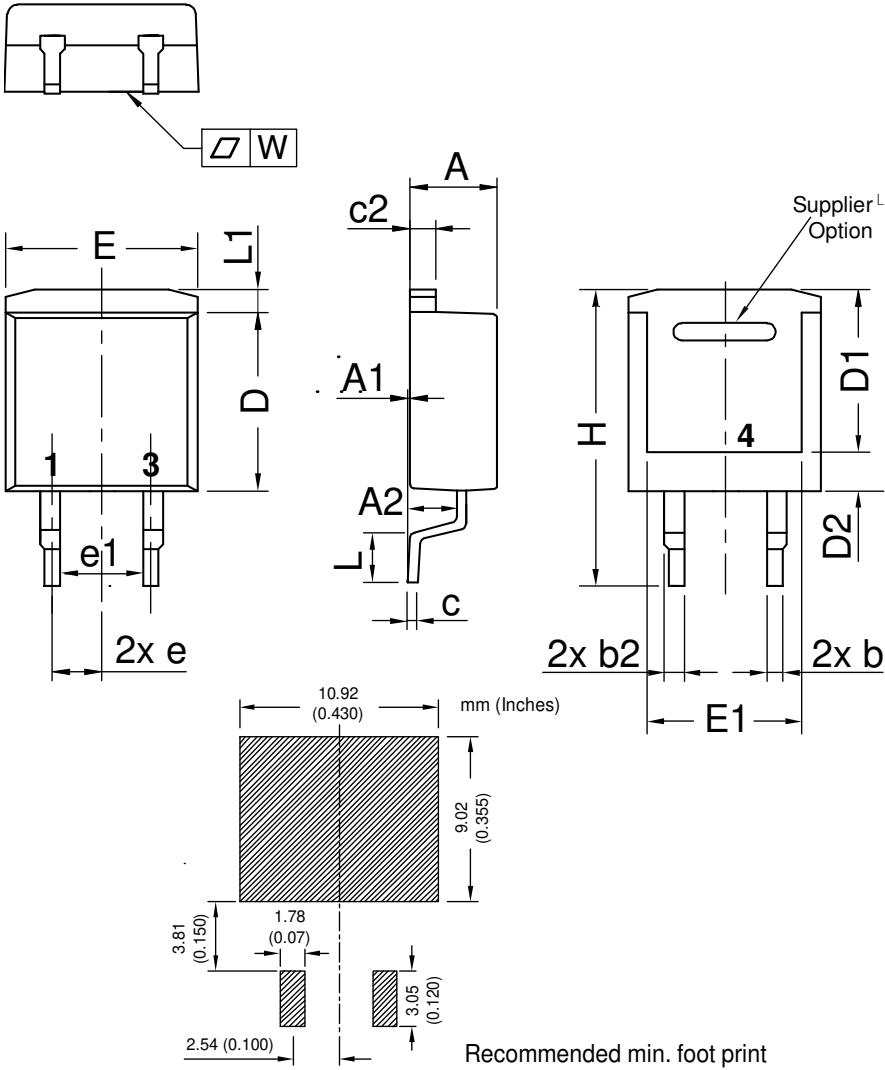


**Thyristor**

$V_{0\ max}$	threshold voltage	1.23	V
$R_{0\ max}$	slope resistance *	22	mΩ

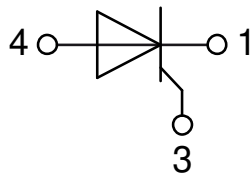


**Outlines TO-263 (D2Pak-HV)**



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.06	4.83	0.160	0.190
A1	typ. 0.10		typ. 0.004	
A2	2.41		0.095	
b	0.51	0.99	0.020	0.039
b2	1.14	1.40	0.045	0.055
c	0.40	0.74	0.016	0.029
c2	1.14	1.40	0.045	0.055
D	8.38	9.40	0.330	0.370
D1	8.00	8.89	0.315	0.350
D2	2.3		0.091	
E	9.65	10.41	0.380	0.410
E1	6.22	8.50	0.245	0.335
e	2,54 BSC		0,100 BSC	
e1	4.28		0.169	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	1.02	1.68	0.040	0.066
W	typ. 0.02	0.040	typ. 0.0008	0.002

*All dimensions conform with and/or within JEDEC standard.*



**Thyristor**

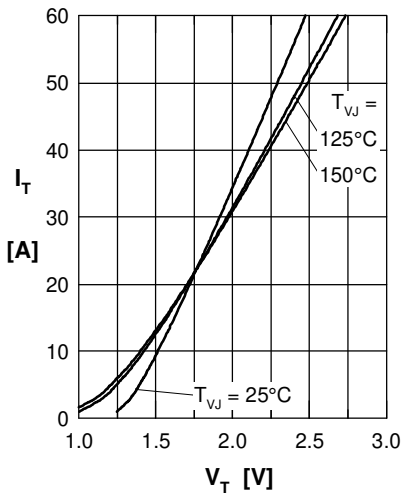


Fig. 1 Forward characteristics

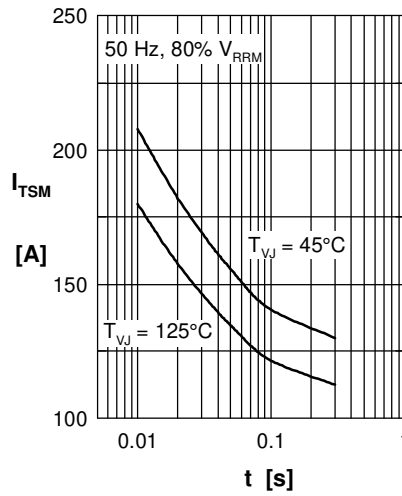


Fig. 2 Surge overload current  
 $I_{TSM}$ : crest value, t: duration

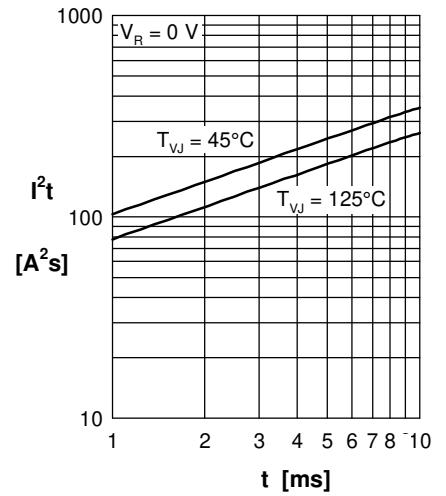


Fig. 3  $I^2t$  versus time (1-10 s)

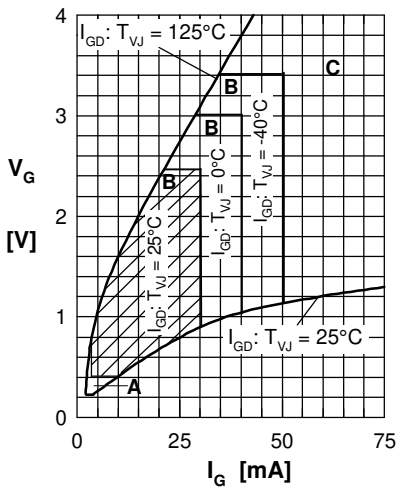


Fig. 4 Gate voltage & gate current  
Triggering: A = no; B = possible; C = safe

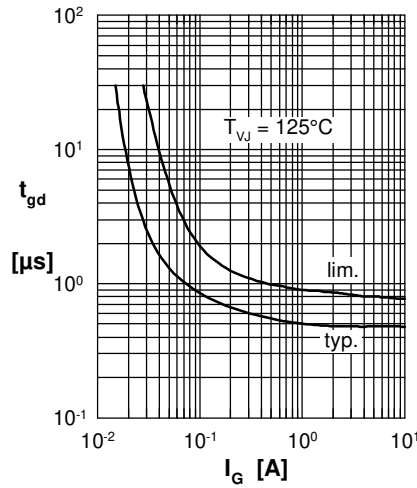


Fig. 5 Gate controlled delay time  $t_{gd}$

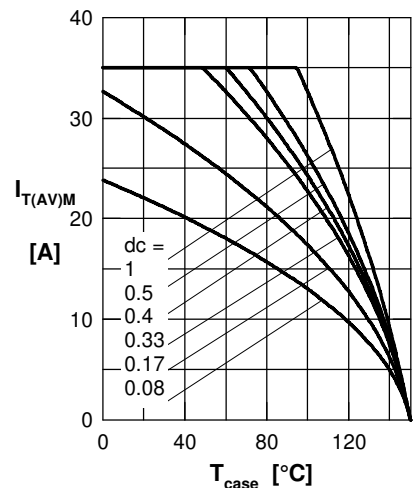


Fig. 6 Max. forward current at case temperature

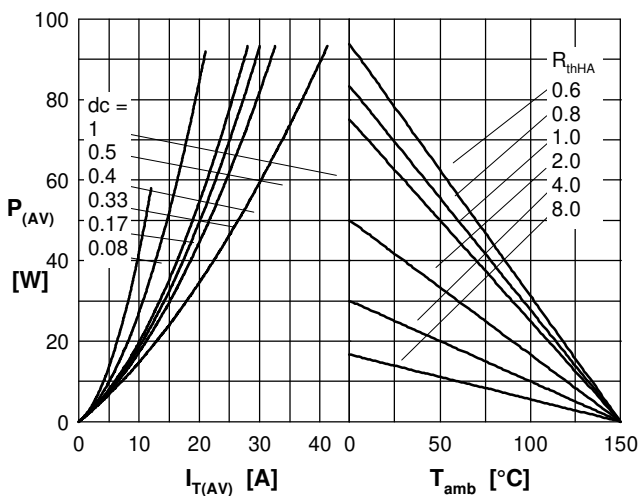


Fig. 7a Power dissipation versus direct output current  
Fig. 7b and ambient temperature

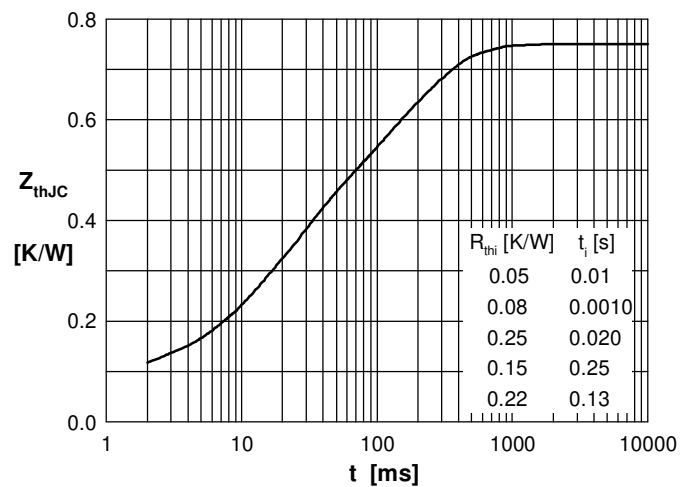


Fig. 7 Transient thermal impedance junction to case