High Efficiency Thyristor

advanced

V_{DRM}	=	**1200** V
I_{TAV}	=	**20** A
V_T	=	**1.4** V

Triode
Single Reverse Conducting Thyristor

Part number

CLA20EF1200PZ

Marking on Product: CLA20EF1200PZ

1
3
4 (TAB)

Backside: anode

4

3

1
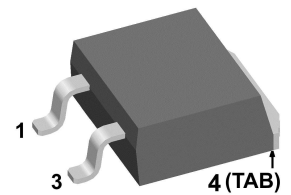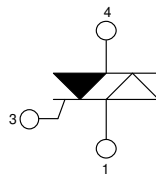
Features / Advantages:
- Thyristor for fast turn-on switching
- Integrated free wheeling diode
- Planar passivated chip
- Long-term stability

Applications:
- Ignition for HD lamps
- Capacity discharge

Package: TO-263 (D2Pak-HV)
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0

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advanced

Thyristor

Ratings

Symbol	Definition	Conditions		min.	typ.	max.	Unit
V_{DSM}	max. non-repetitive forward blocking voltage	T_{VJ} = 25°C				1300	V
V_{DRM}	max. repetitive forward blocking voltage	T_{VJ} = 25°C				1200	V
I_D	drain current	V_D = 1200 V	T_{VJ} = 25°C			10	µA
		V_D = 1200 V	T_{VJ} = 125°C			1	mA
V_T	forward voltage drop	I_T = 20 A	T_{VJ} = 25°C			1.40	V
	Note: reverse voltage drop ~1.2 x VT	I_T = 40 A				1.60	V
		I_T = 20 A	T_{VJ} = 125°C			1.40	V
		I_T = 40 A				1.60	V
I_{TAV}	average forward current	T_C = 115°C DC	T_{VJ} = 150°C			20	A
V_{T0}	threshold voltage $\Big\}$ for power loss calculation only		T_{VJ} = 150°C			0.90	V
r_T	slope resistance					25	mΩ
R_{thJC}	thermal resistance junction to case					0.65	K/W
R_{thCH}	thermal resistance case to heatsink				0.25		K/W
P_{tot}	total power dissipation	T_C = 25°C				190	W
I_{TSM}	max. forward surge current	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			120	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			130	A
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			100	A
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			110	A
I²t	value for fusing	t = 10 ms; (50 Hz), sine	T_{VJ} = 45°C			72	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			70	A²s
		t = 10 ms; (50 Hz), sine	T_{VJ} = 150°C			50	A²s
		t = 8,3 ms; (60 Hz), sine	V_R = 0 V			50	A²s
C_J	junction capacitance	V_R = 400 V f = 1 MHz	T_{VJ} = 25°C		6		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} = 150°C; f = 50 Hz repetitive, I_T = 60 A				500	A/µs
		t_P = 1 µs; di_G/dt = 0.5 A/µs; I_{TSA} = 600 A					
		I_G = 0.07 A; V = ⅔ V_{DRM} non-repet., I_T = 20 A				1500	A/µs
$(dv/dt)_{cr}$	critical rate of rise of voltage	V = ⅔ V_{DRM}	T_{VJ} = 150°C			500	V/µs
		R_{GK} = ∞; method 1 (linear voltage rise)					
V_{GT}	gate trigger voltage	V_D = 6 V	T_{VJ} = 25°C			1.3	V
			T_{VJ} = -40°C			1.6	V
I_{GT}	gate trigger current	V_D = 6 V	T_{VJ} = 25°C			20	mA
			T_{VJ} = -40°C			35	mA
V_{GD}	gate non-trigger voltage	V_D = ⅔ V_{DRM}	T_{VJ} = 150°C			0.2	V
I_{GD}	gate non-trigger current					1	mA
I_L	latching current	t_p = 10 µs	T_{VJ} = 25°C			30	mA
		I_G = 0.07 A; di_G/dt = 0.5 A/µs					
I_H	holding current	V_D = 6 V R_{GK} = ∞	T_{VJ} = 25°C			25	mA
t_{gd}	gate controlled delay time	V_D = ½ V_{DRM}	T_{VJ} = 25°C			2	µs
		I_G = 0.07 A; di_G/dt = 0.5 A/µs					
t_q	turn-off time	V_R = 0 V; I_T = 20 A; V = ⅔ V_{DRM} T_{VJ} =125 °C			150		µs
		di/dt = 10 A/µs dv/dt = 20 V/µs t_p = 200 µs					

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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
Weight				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 No. → XXXXXXXXX

Logo → IXYS Zyyww

Assembly Line
Date Code → 000000
Assembly Code
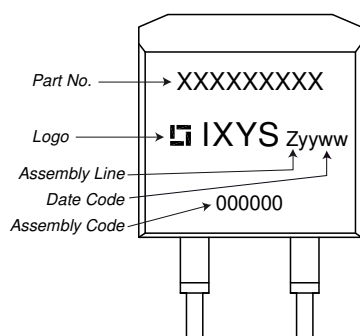
Part description

C = Thyristor (SCR)
L = High Efficiency Thyristor
A = (up to 1200V)
20 = Current Rating [A]
EF = Single Reverse Conducting Thyristor
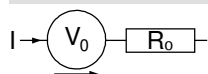1200 = Reverse Voltage [V]
PZ = TO-263AB (D2Pak) (2HV)

Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	CLA20EF1200PZ-TRL	CLA20EF1200PZ	Tape & Reel	800	522555
Alternative	CLA20EF1200PZ-TUB	CLA20EF1200PZ	Tube	50	523762

Similar Part	Package	Voltage class
CLA20EF1200PB	TO-220AB (3)	1200

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

Thyristor

$V_{0\,max}$	threshold voltage	0.9	V
$R_{0\,max}$	slope resistance *	22	mΩ

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Outlines   TO-263 (D2Pak-HV)
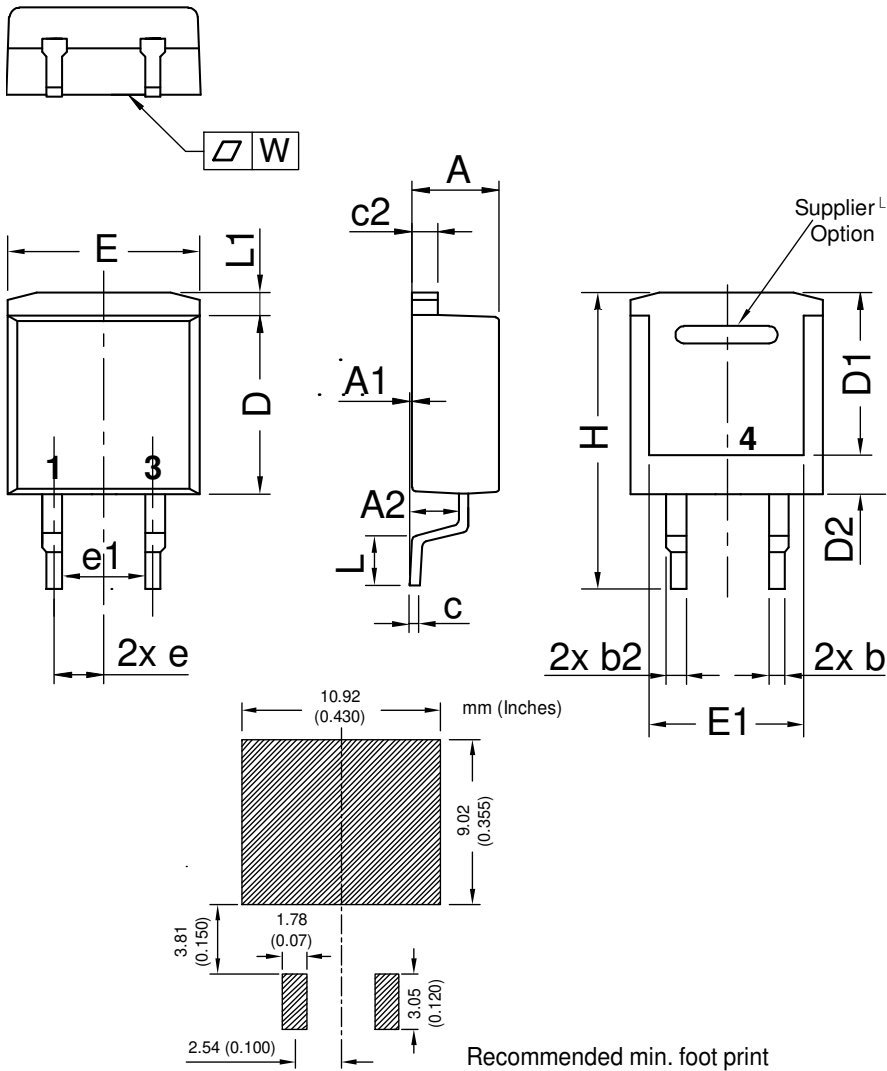
Dim.	Millimeter		Inches	
	min	max	min	max
A	4.06	4.83	0.160	0.190
A1	typ. 0.10		typ. 0.004	
A2	2.41		0.095	
b	0.51	0.99	0.020	0.039
b2	1.14	1.40	0.045	0.055
c	0.40	0.74	0.016	0.029
c2	1.14	1.40	0.045	0.055
D	8.38	9.40	0.330	0.370
D1	8.00	8.89	0.315	0.350
D2	2.3		0.091	
E	9.65	10.41	0.380	0.410
E1	6.22	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.

Supplier Option

mm (Inches)

10.92 (0.430)

9.02 (0.355)

3.81 (0.150)

1.78 (0.07)

3.05 (0.120)

2.54 (0.100)

Recommended min. foot print

Thyristor