

Thyristor Module

$V_{RRM} = 2 \times 1600 \text{ V}$

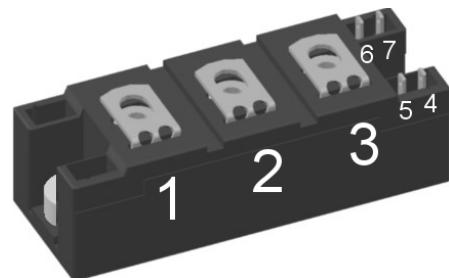
$I_{TAV} = 130 \text{ A}$

$V_T = 1.08 \text{ V}$

Phase leg

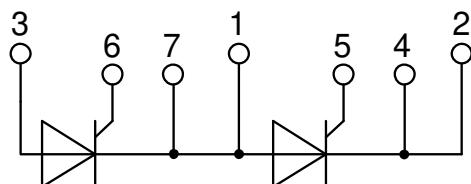
Part number

MCC132-16io1B



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: Y4

- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Soldering pins for PCB mounting
- Base plate: DCB ceramic
- Reduced weight
- Advanced power cycling

Disclaimer Notice

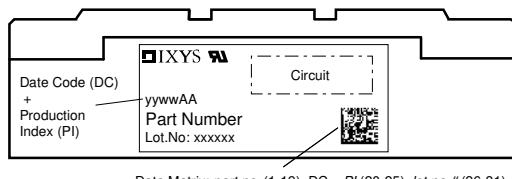
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Thyristor

Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	
$V_{RSM/DSM}$	max. non-repetitive reverse/forward blocking voltage	$T_{VJ} = 25^\circ\text{C}$			1700	V
$V_{RRM/DRM}$	max. repetitive reverse/forward blocking voltage	$T_{VJ} = 25^\circ\text{C}$			1600	V
$I_{R/D}$	reverse current, drain current	$V_{R/D} = 1600 \text{ V}$ $V_{R/D} = 1600 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$ $T_{VJ} = 125^\circ\text{C}$		200 10	μA mA
V_T	forward voltage drop	$I_T = 150 \text{ A}$	$T_{VJ} = 25^\circ\text{C}$		1.14	V
		$I_T = 300 \text{ A}$			1.36	V
		$I_T = 150 \text{ A}$ $I_T = 300 \text{ A}$	$T_{VJ} = 125^\circ\text{C}$		1.08 1.36	V
I_{TAV}	average forward current	$T_C = 85^\circ\text{C}$	$T_{VJ} = 125^\circ\text{C}$		130	A
$I_{T(RMS)}$	RMS forward current	180° sine			300	A
V_{T0}	threshold voltage	$\left. \begin{array}{l} \text{slope resistance} \\ \end{array} \right\} \text{for power loss calculation only}$	$T_{VJ} = 125^\circ\text{C}$		0.80	V
r_T	slope resistance				1.5	$\text{m}\Omega$
R_{thJC}	thermal resistance junction to case				0.23	K/W
R_{thCH}	thermal resistance case to heatsink			0.1		K/W
P_{tot}	total power dissipation		$T_C = 25^\circ\text{C}$		435	W
I_{TSM}	max. forward surge current	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 45^\circ\text{C}$		4.75	kA
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		5.13	kA
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 125^\circ\text{C}$		4.04	kA
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		4.36	kA
I^2t	value for fusing	$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 45^\circ\text{C}$		112.8	kA^2s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		109.5	kA^2s
		$t = 10 \text{ ms}; (50 \text{ Hz}), \text{sine}$	$T_{VJ} = 125^\circ\text{C}$		81.6	kA^2s
		$t = 8,3 \text{ ms}; (60 \text{ Hz}), \text{sine}$	$V_R = 0 \text{ V}$		79.1	kA^2s
C_J	junction capacitance	$V_R = 400 \text{ V}$ $f = 1 \text{ MHz}$	$T_{VJ} = 25^\circ\text{C}$	211		pF
P_{GM}	max. gate power dissipation	$t_p = 30 \mu\text{s}$	$T_C = 125^\circ\text{C}$		120	W
		$t_p = 500 \mu\text{s}$			60 8	W
P_{GAV}	average gate power dissipation					
$(di/dt)_{cr}$	critical rate of rise of current	$T_{VJ} = 125^\circ\text{C}; f = 50 \text{ Hz}$ repetitive, $I_T = 500 \text{ A}$			150	$\text{A}/\mu\text{s}$
		$t_p = 200 \mu\text{s}; di_G/dt = 0.5 \text{ A}/\mu\text{s};$ $I_G = 0.5 \text{ A}; V = \frac{2}{3} V_{DRM}$ non-repet., $I_T = 160 \text{ A}$			500	$\text{A}/\mu\text{s}$
$(dv/dt)_{cr}$	critical rate of rise of voltage	$V = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^\circ\text{C}$		1000	$\text{V}/\mu\text{s}$
		$R_{GK} = \infty$; method 1 (linear voltage rise)				
V_{GT}	gate trigger voltage	$V_D = 6 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$		2.5	V
			$T_{VJ} = -40^\circ\text{C}$		2.6	V
I_{GT}	gate trigger current	$V_D = 6 \text{ V}$	$T_{VJ} = 25^\circ\text{C}$		150	mA
			$T_{VJ} = -40^\circ\text{C}$		200	mA
V_{GD}	gate non-trigger voltage	$V_D = \frac{2}{3} V_{DRM}$	$T_{VJ} = 125^\circ\text{C}$		0.2	V
I_{GD}	gate non-trigger current				10	mA
I_L	latching current	$t_p = 30 \mu\text{s}$	$T_{VJ} = 25^\circ\text{C}$		300	mA
		$I_G = 0.5 \text{ A}; di_G/dt = 0.5 \text{ A}/\mu\text{s}$				
I_H	holding current	$V_D = 6 \text{ V}$ $R_{GK} = \infty$	$T_{VJ} = 25^\circ\text{C}$		200	mA
t_{gd}	gate controlled delay time	$V_D = \frac{1}{2} V_{DRM}$	$T_{VJ} = 25^\circ\text{C}$		2	μs
		$I_G = 0.5 \text{ A}; di_G/dt = 0.5 \text{ A}/\mu\text{s}$				
t_q	turn-off time	$V_R = 100 \text{ V}; I_T = 160 \text{ A}; V = \frac{2}{3} V_{DRM}$ $T_{VJ} = 100^\circ\text{C}$	$di/dt = 10 \text{ A}/\mu\text{s}$ $dv/dt = 20 \text{ V}/\mu\text{s}$ $t_p = 200 \mu\text{s}$	150		μs

Package Y4

Symbol	Definition	Conditions	Ratings			
			min.	typ.	max.	
I_{RMS}	RMS current	per terminal			300	A
T_{VJ}	virtual junction temperature		-40		125	°C
T_{op}	operation temperature		-40		100	°C
T_{stg}	storage temperature		-40		125	°C
Weight				150		g
M_D	mounting torque		2.25		2.75	Nm
M_T	terminal torque		4.5		5.5	Nm
$d_{Spp/App}$	creepage distance on surface / striking distance through air	terminal to terminal	14.0	10.0		mm
$d_{Spb/Apb}$		terminal to backside	16.0	16.0		mm
V_{ISOL}	isolation voltage	$t = 1$ second $t = 1$ minute	3600 50/60 Hz, RMS; $I_{ISOL} \leq 1$ mA	3000		V V



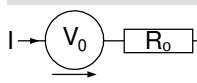
Data Matrix: part no. (1-19), DC + PI (20-25), lot.no.# (26-31),
blank (32), serial no.#(33-36)

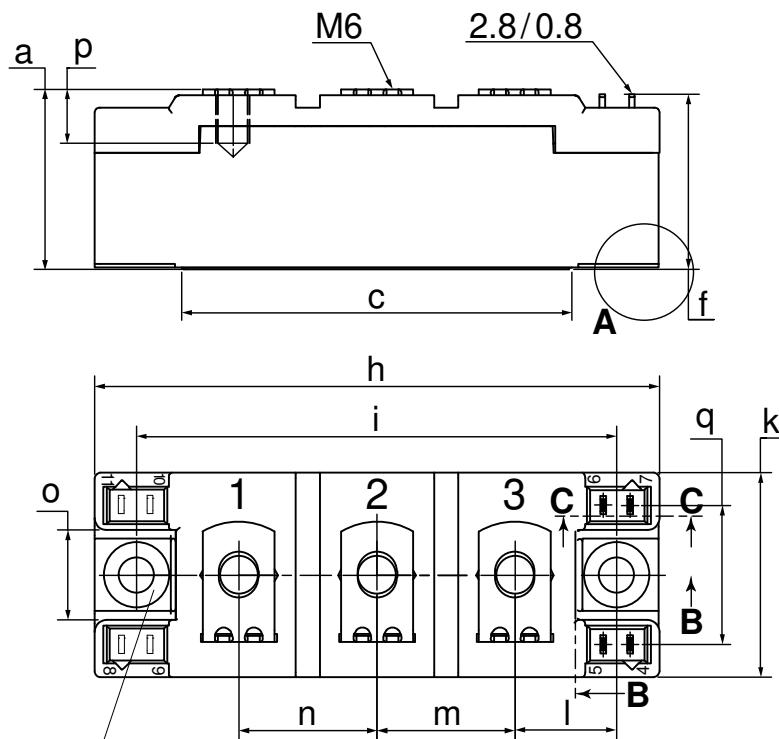
Ordering	Ordering Number	Marking on Product	Delivery Mode	Quantity	Code No.
Standard	MCC132-16io1B	MCC132-16io1B	Box	6	507581

Equivalent Circuits for Simulation

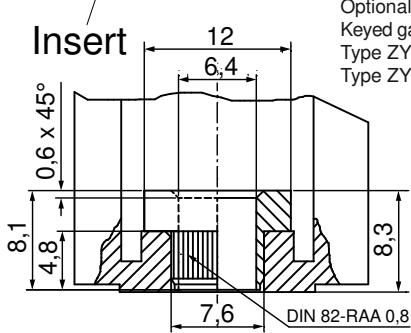
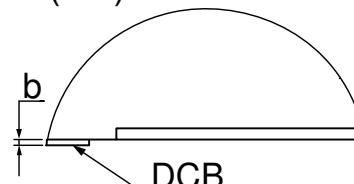
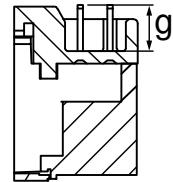
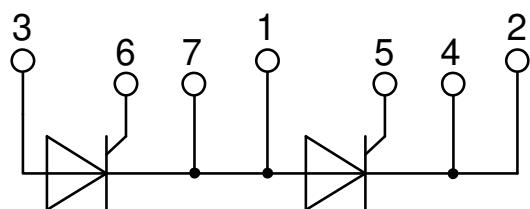
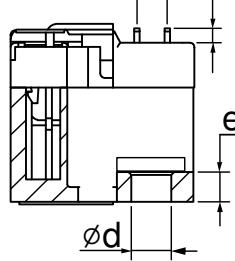
* on die level

$T_{VJ} = 125$ °C

	Thyristor		
$V_{0\ max}$	threshold voltage	0.8	V
$R_{0\ max}$	slope resistance *	0.8	mΩ

Outlines Y4


Dim.	MIN [mm]	MAX [mm]	MIN [inch]	MAX [inch]
a	30.0	30.6	1.181	1.205
b	typ. 0.25		typ. 0.010	
c	64.0	65.0	2.520	2.559
d	typ. 6.4		typ. 0.250	
e	4.9	5.1	0.193	0.201
f	28.6	29.2	1.126	1.150
g	7.3	7.7	0.287	0.303
h	93.5	94.5	3.681	3.720
i	79.5	80.5	3.130	3.169
j	4.8	5.2	0.189	0.205
k	33.4	34.0	1.315	1.339
l	16.7	17.3	0.657	0.681
m	22.7	23.3	0.894	0.917
n	22.7	23.3	0.894	0.917
o	14.0	15.0	0.551	0.591
p	typ. 10.5		typ. 0.413	
q	22.8	23.3	0.898	0.917
r	1.8	2.4	0.071	0.041


A (3:1)

C-C (1:1)

B-B (1:1)


Thyristor

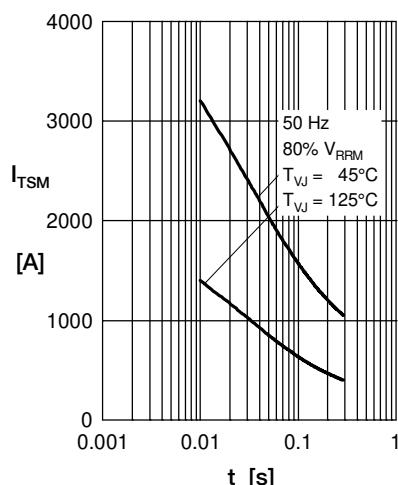


Fig. 1 Surge overload current I_{TSM} ,
 I_{FSM} : Crest value, t : duration

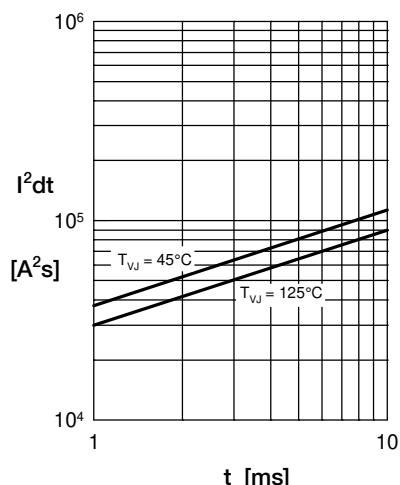


Fig. 2 I^2t versus time (1-10 ms)

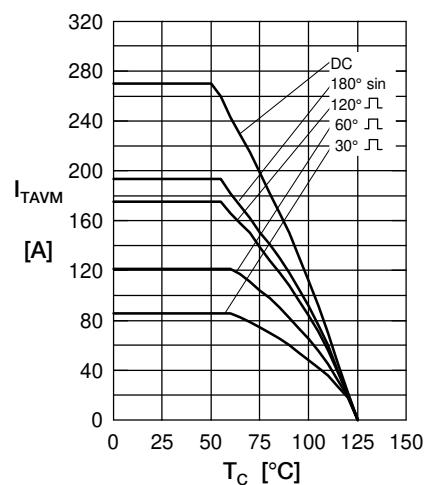


Fig. 3 Max. forward current
at case temperature

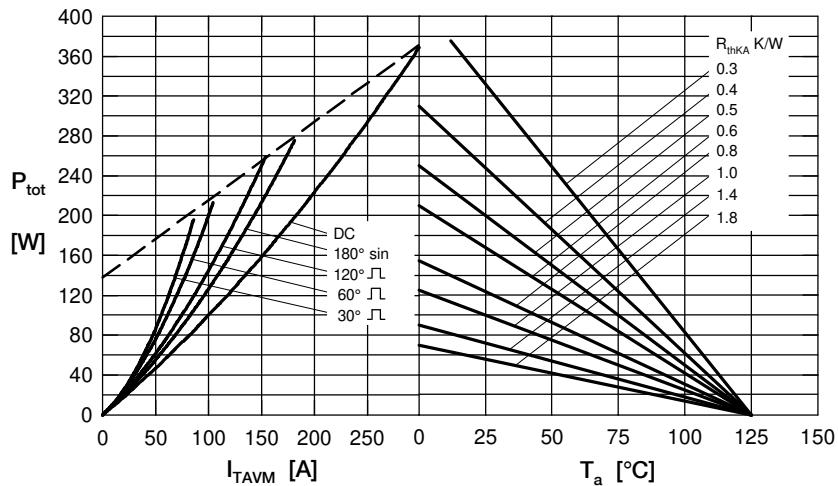


Fig. 4 Power dissipation vs. on-state current & ambient temperature
(per thyristor or diode)

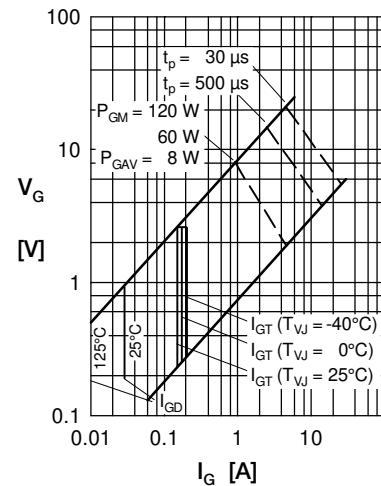


Fig. 5 Gate trigger characteristics

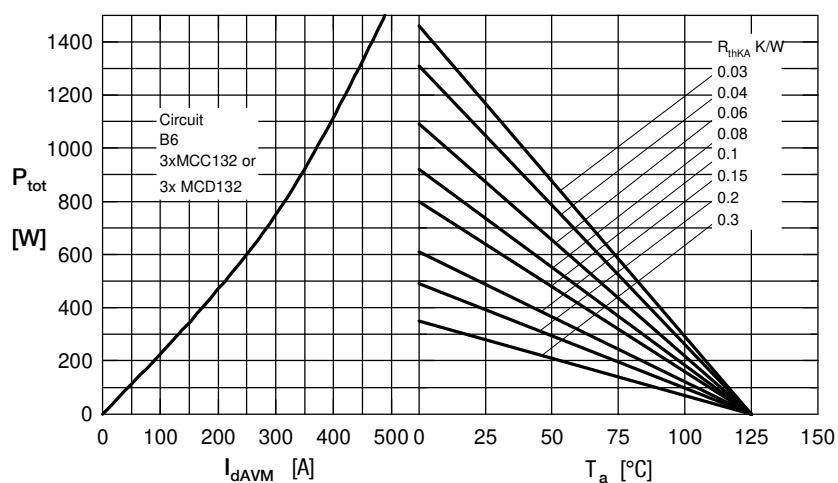


Fig. 6 Three phase rectifier bridge: Power dissipation versus direct output current and ambient temperature

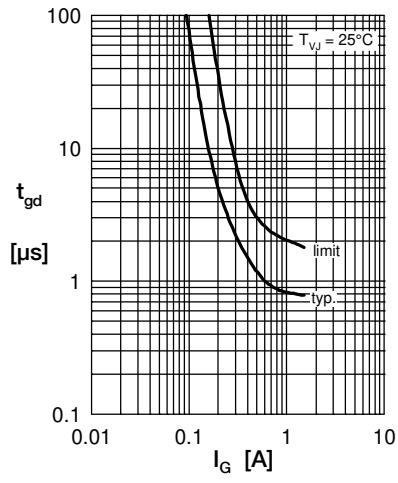


Fig. 7 Gate trigger delay time

Thyristor

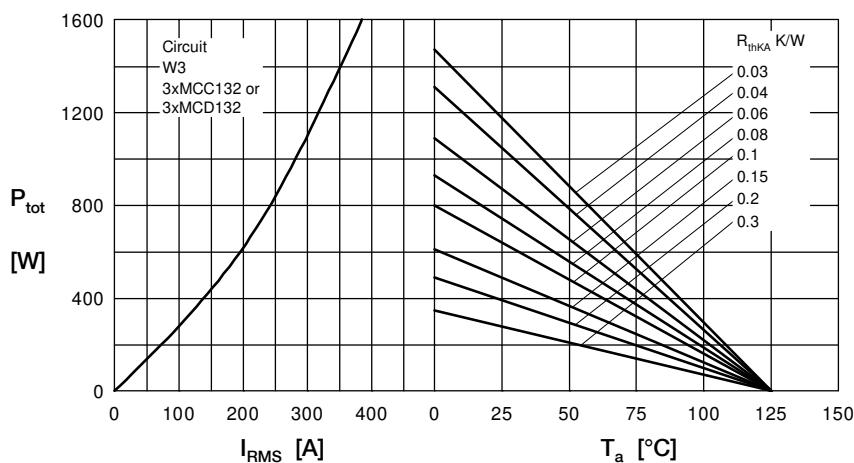


Fig. 8 Three phase AC-controller: Power dissipation versus RMS output current and ambient temperature

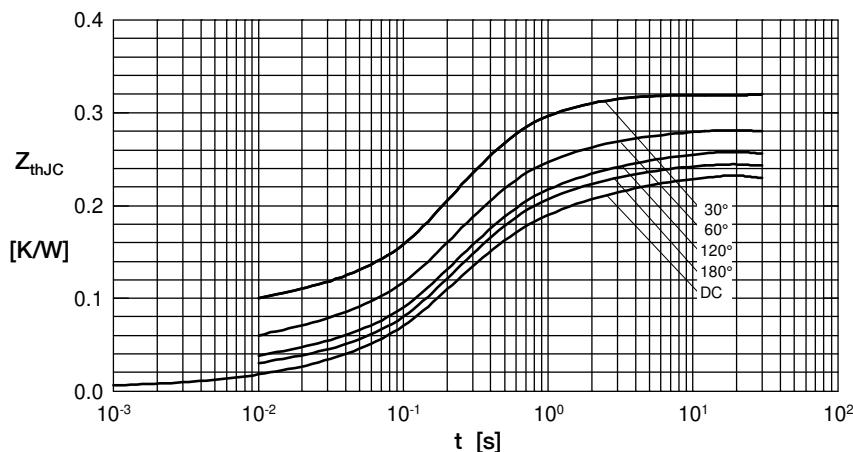


Fig. 9 Transient thermal impedance junction to case (per thyristor/diode)

R_{thJC} for various conduction angles d:

d	R_{thJC} [K/W]
DC	0.230
180°	0.244
120°	0.255
60°	0.283
30°	0.321

Constants for Z_{thJC} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0095	0.001
2	0.0175	0.065
3	0.2030	0.400

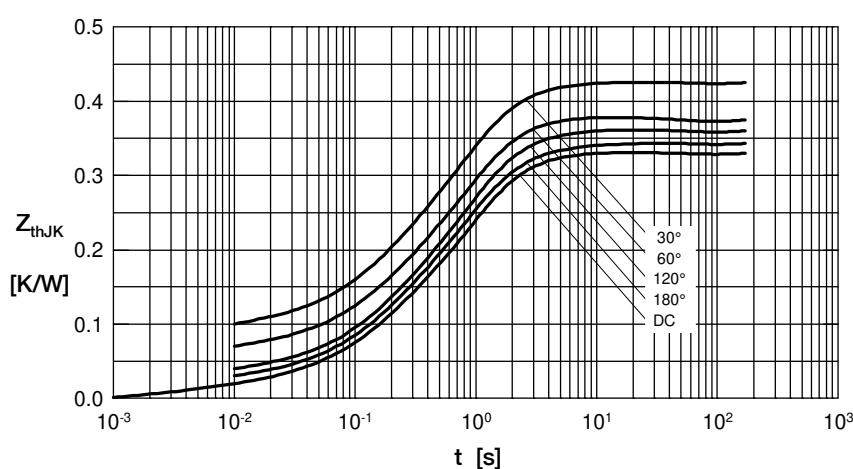


Fig. 10 Transient thermal impedance junction to heatsink (per thyristor/diode)

R_{thJK} for various conduction angles d:

d	R_{thJK} [K/W]
DC	0.330
180°	0.344
120°	0.355
60°	0.383
30°	0.421

Constants for Z_{thJK} calculation:

i	R_{thi} [K/W]	t_i [s]
1	0.0095	0.001
2	0.0175	0.065
3	0.2030	0.400
4	0.1000	1.290



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Электрон
Связь**

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