HORNER
AUTOMATION GROUP

SMARTBLOCK I/O MODULE DATASHEET

HE579THM100: 4 CHANNEL THERMOCOUPLE
HE579THM200: 8 CHANNEL THERMOCOUPLE

1 TECHNICAL SPECIFICATIONS

GENERAL	
Required Power (Steady State)	60mA
Required Power (Inrush)	< 20A for 1ms
Primary Power Range	10-30VDC
Relative Humidity	5 to 95% Non-condensing
Operating Temp.	0°C to 60°C
Weight	12 oz / 340g
Certifications (CE)	USA: https://hornerautomation.com/certifications/ Europe: http://www.horner-apg.com/en/support/certification.aspx

THERMOCOUPLE SPECIFICATIONS				
Number of Channels	4 (THM100) 8 (THM200)	Cold Junction Compensation	Internal per Channel	
Millivolt Ranges	+/- 25mV, +/- 50mV, +/-100mV, +/-200mV (16 Bit Resolution)	Open Thermocouple Response	High Temperature	
Millivolt Accuracy	0.1% of full scale	Accuracy	Types J, K, T, E, N	+/-1.8°F (+/-1°C)
Safe Input Voltage Range	10VDC: -0.5V to +15V 20mA: -0.5V to +6V RTD / T/C: +/- 24VDC	NOTE: Accuracy specifications not guaranteed below -200°	Types C & B	+/-3.6°F (+/-2°C)
Common Mode Range (wrt field common)	+/- 10VDC Max.		Types R & S	+/-3.6°F (+/-2°C)
A/D Conversion Time	6 channels per second	Thermocouple Type	Input Range Temperature	
Thermocouple Resolution	0.1°C			
Differential Input Impedance	>20Ω clamped @ +/-20 VDC	J	-210°C to 1200°C (-346°F to 2192°F)	
Types Supported	J,K,N,T,E,C,R,S,B	K	-270°C to 1372°C (-454°F to 2502°F)	
Isolation Test Voltage	3kV	N	-270°C to 1300°C (-454°F to 2372°F)	
Continuous Isolation Working Voltage	565V peak	T	-270°C to 400°C (-454°F to 752°F)	
A/D Conversion Type	24 bit Delta Sigma (ΔΣ)	E	-270°C to 1000°C (-454°F to 1832°F)	
Isolation Leakage Resistance	100MΩ	C	0°C to 2320°C (32°F to 4208°F)	
Open Thermocouple Detect Current	50nA	R	0°C to 1768.1°C (32°F to 3215°F)	
		S	0°C to 1768.1°C (32°F to 3215°F)	
Maximum Sustained Differential O/L	Limited by Common Mode Range	B	0°C to 1820°C (32°F to 3308°F)	

2 POWER WIRING

A single 5-pin connector is used to make both a network connection and power input. A quality Class 2 power supply should be used for this product. If the power is run with the network cable, care must be taken so that the voltage does not drop below the lower supply limit on longer runs.

A quality earth ground is required for safe and proper operation. The best ground is achieved by screwing the left grounding location into a grounded back plate. Alternately, a ground can be connected to the spade lug.
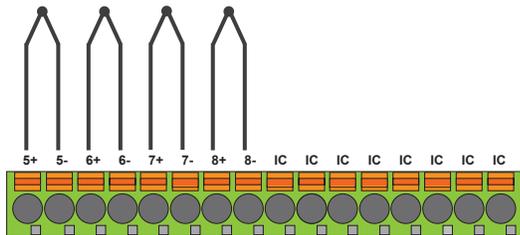
V- CL SH CH V+

CAN

PWR IN

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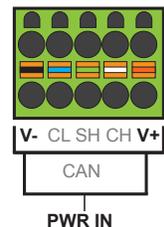
3 PORT CONNECTORS

1. J2 - Thermocouples 5-8 THM200 only
2. CAN and Power Connector
3. Status LEDs
4. Network ID Selector Switches
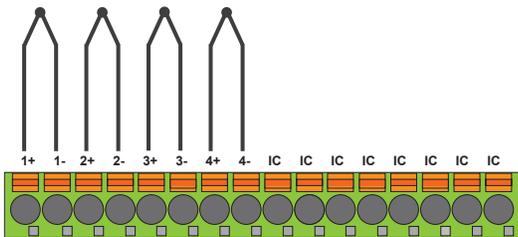5. Earth Ground
6. J1 - Thermocouples 1-4

4 THERMOCOUPLE WIRING

J2 - Top Terminal Channels 5-8

For shielding and grounding recommendations, see diagrams for grounded and ungrounded thermocouple types.
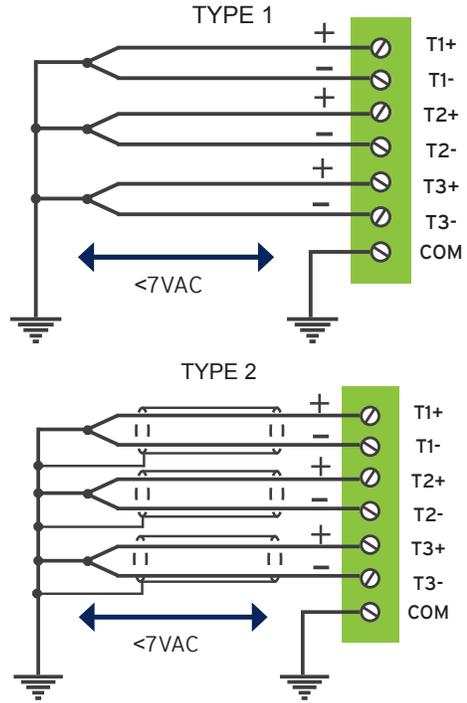
J1 - Bottom Terminal Channels 1-4

Isolated Common (IC) terminal are isolated form Earth Ground Terminal and from the CAN network power.

See Horner manual MAN0799 for details on CAN wiring.

5 THERMOCOUPLES WIRING OPTIONS

Grounded Thermocouples Wiring Options

TYPE 1

TYPE 2

Field ground potential less than 7VAC. Shield connected at one end only may be used to reduce noise.

NOTE: Grounded thermocouples may use Type 3 or 4 shield connections if shield is NOT grounded at field end.

Ungrounded Thermocouple Wiring Options

TYPE 3 - Preferred Shield Connection
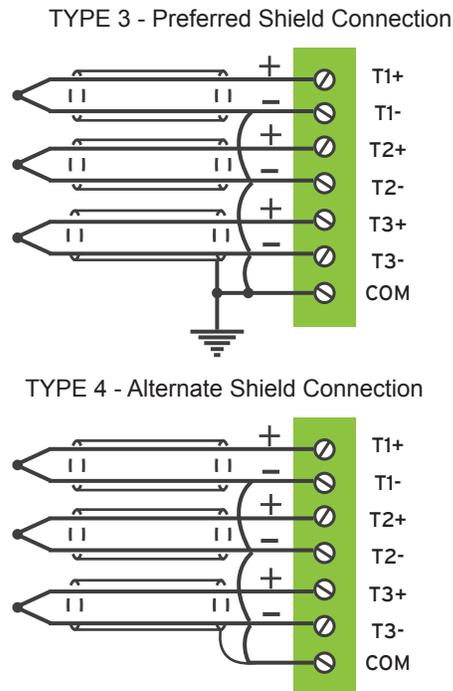
NOTE: Ungrounded thermocouples should have one side tied to isolated common to reduce noise pickup.

TYPE 4 - Alternate Shield Connection

6 CAN COMMUNICATIONS

The CAN port is provided via three connections on the CAN/Power: CAN_LOW (CL), CAN_HIGH (CH), and V- (C). It may be used to communicate with other OCS products using Horner's CsCAN protocol. A 24VDC power source will be required on the CsCAN bus in order to power the expansion I/O modules.

NOTE: 12-24VDC must be supplied to the network.

NOTE: For detailed wiring information, refer to CAN Manual (MAN0799).
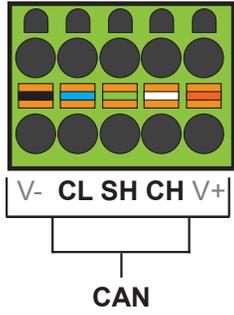
Wiring Details

- Locking Spring-Clamp
- Two-terminators per Conductor
- Torque Rating: 4.5 in-lbs (0.50 N-m)
- SHLD and V+ pins are not internally connected

V- CL SH CH V+

CAN

CAN Port Pins		
PIN	SIGNAL	DESCRIPTION
1	V-	CAN and Device Ground - Black
2	CN L	CAN Data Low - Blue
3	SHLD	Shield Ground - None
4	CN H	CAN Data High - White
5	V+	Positive DC VoltageInput (10-28VDC) - Red

Recommended Cable		
Thick	Max Distance = 500m	Belden 3082A
Thin	Max Distance = 100m	Belden 3084A

7   DIAGNOSTIC LED INDICATORS

Diagnostic LED	State	Meaning
MS indicates fault status of the Module	Solid Red	RAM or ROM test failed
	Flashing Red	I/O test failed
	Flashing Green	Module is in power-up state, no config from OCS
	Solid Green	Module is running normally
NS indicates fault status of the Network	Solid Red	Network Ack or Dup ID test failed
	Flashing Red	Network ID test failed
	Flashing Green	Controlling OCS is offline.
	Green	Network is running normally.

Status LED Indicators - The Power Status LED illuminates **RED** when power is applied to the module. There are I/O status LED indicators for each of the Digital I/O points, which illuminate **RED** when the I/O point is ON.

8 NETWORK DATA - Produced Analog Data

Produced Analog Data - This data is sent from the controller to the SmartBlock to the controller. **Normally this data is mapped into specific registers in the Hardware Configuration in Cscape.** For advanced applications, NetGet functions can be used to obtain this data. Since this data is broadcast to all controllers on the network, additional controllers can use NetGet functions to obtain this data as well.

Word	Function	
Word 1	INT	Thermocouple Input 1
Word 2	INT	Thermocouple Input 2
Word 3	INT	Thermocouple Input 3
Word 4	INT	Thermocouple Input 4
Word 5	INT	Thermocouple Input 5 (THM200 Only)
Word 6	INT	Thermocouple Input 6 (THM200 Only)
Word 7	INT	Thermocouple Input 7 (THM200 Only)
Word 8	INT	Thermocouple Input 8 (THM200 Only)

9 NETWORK DATA - Consumed Digital Data

Consumed Digital Data - This data is sent from the controller to the SmartBlock for typical applications, the Hardware Configuration setup in Cscape will automatically populate this data. For more advanced applications, NetPut functions can be used to for this data.

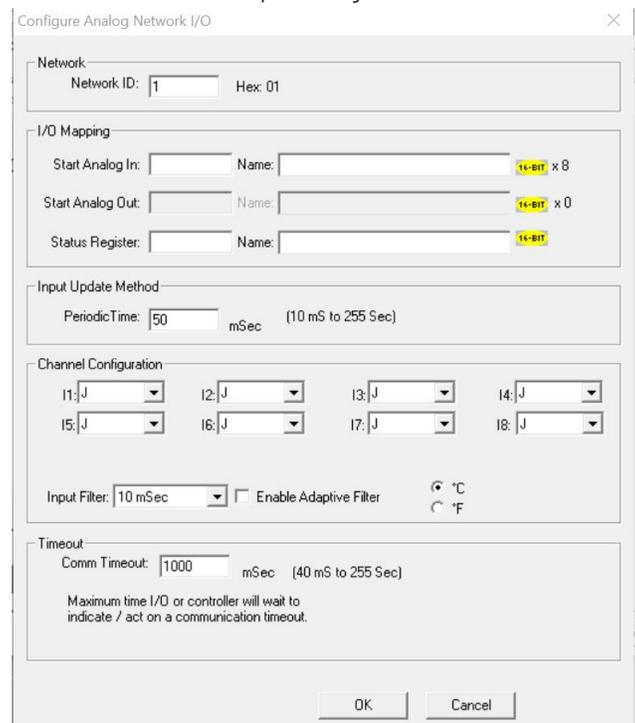| Bit	Description			
12	0 = 0.1°C	1 = 0.1°F		
13-16	Filter			
17-20	Thermocouple Type Channel 1	0 = J, -210°C to 1200°C	12 = 25mV	
21-24	Thermocouple Type Channel 2	1 = K, -200°C to 1372°C	13 = 50mV	
25-28	Thermocouple Type Channel 3	2 = N, -200°C to 1300°C	14 = 100mV	
29-32	Thermocouple Type Channel 4	3 = T, -200°C to 400°C	15 = 200mV	
65-68	Thermocouple Type Channel 5	4 = E, -200°C to 1000°C		
69-72	Thermocouple Type Channel 6	5 = R, -50°C to 1768°C		
73-76	Thermocouple Type Channel 7	6 = S, -50°C to 1768°C		
77-80	Thermocouple Type Channel 8	7 = B, 250°C to 1820°C		
		8= C, 0°C to 2320°C		

10 CSCAPE CONFIGURATION

The HE579THM100 and HE579THM200 SmartBlock modules are configured through the Hardware Configuration menu in Cscape.
To configure module and input settings:

1. Select **Controller** from Cscape the top navigation bar.
2. Select **Hardware Configuration** from dropdown menu.
3. Select **CAN1 (CsCAN) I/O** tab.
4. Click on **Add** button.
5. Select **SmartBlock** tab.
6. Select either **HE579THM100** or **HE579THM200**
7. Click **OK**.

HE579THM200 Cscape Configuration screen

Network ID	The Unique CAN ID of this device. Enter any decimal number between 1 and 253 here and note the translated hexadecimal value. Set the hexadecimal Network ID rotary switches on the device to translated value.
I/O Mapping	These registers define how the OCS controller registers are mapped to the data to and from the SmartBlock I/O. These registers do no have to match the I/O types typically used for I/O such as %AI, Q... Any standard controller registers may be used such as %R, %T and %M.
Input Update Method	This defines how often analog data is sent from the SmartBlock to the CsCAN network. Digital data is transmitted on change of state.
Channel Configuration	This selects how each analog channel is configured including filtering.
Timeout	This sets the time a controller will wait before assuming the host OCS is offline.

11 CSCAN SMARTBLOCK I/O STATUS REGISTER DEFINITION

| Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1
				Version Error	Incorrect Module	Not Configured	Offline
Bit 16	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9
Send						Reconfig (Sticky)	Lifetime (Sticky)

NOTE: The Status Register, viewed in INT format, is designed to be zero if there are no faults and non-zero if faults occur. Moving a value of 0 into the status register clears faults that remain on after they have been remedied, or "sticky".

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12 SETTING ID SWITCHES

Configure SmartBlock in Cscape before this step, then use the hexadecimal number converted during Cscape configuration.

CsCAN Network IDs are set using the hexadecimal number system from 01 to FD. The decimal equivalent is 1-253. Refer to the Conversion Table below, which shows the decimal equivalent of hexadecimal numbers. Set a unique Network ID by inserting a small Phillips screwdriver into the two identical switches.

Network ID Switches
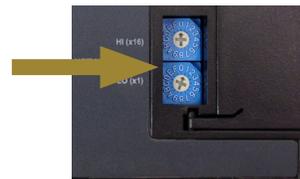
NOTE: The CsCAN Baud Rate for SmartBlock I/O is fixed at 125kBd.

Setting ID Switches - Conversion Chart

Dec	Hex Hi	Hex Lo	Dec	Hex Hi	Hex Lo	Dec	Hex Hi	Hex Lo	Dec	Hex Hi	Hex Lo	Dec	Hex Hi	Hex Lo	Dec	Hex Hi	Hex Lo	Dec	Hex Hi	Hex Lo	Dec	Hex Hi	Hex Lo
1	0	1	29	1	D	57	3	9	85	5	5	113	7	1	141	8	D	169	A	9	197	C	5	225	E	1
2	0	2	30	1	E	58	3	A	86	5	6	114	7	2	142	8	E	170	A	A	198	C	6	226	E	2
3	0	3	31	1	F	59	3	B	87	5	7	115	7	3	143	8	F	171	A	B	199	C	7	227	E	3
4	0	4	32	2	0	60	3	C	88	5	8	116	7	4	144	9	0	172	A	C	200	C	8	228	E	4
5	0	5	33	2	1	61	3	D	89	5	9	117	7	5	145	9	1	173	A	D	201	C	9	229	E	5
6	0	6	34	2	2	62	3	E	90	5	A	118	7	6	146	9	2	174	A	E	202	C	A	230	E	6
7	0	7	35	2	3	63	3	F	91	5	B	119	7	7	147	9	3	175	A	F	203	C	B	231	E	7
8	0	8	36	2	4	64	4	0	92	5	C	120	7	8	147	9	4	176	B	0	204	C	C	232	E	8
9	0	9	37	2	5	65	4	1	93	5	D	121	7	9	149	9	5	177	B	1	205	C	D	233	E	9
10	0	A	38	2	6	66	4	2	94	5	E	122	7	A	150	9	6	178	B	2	206	C	E	234	E	A
11	0	B	39	2	7	67	4	3	95	5	F	123	7	B	151	9	7	179	B	3	207	C	F	235	E	B
12	0	C	40	2	8	68	4	4	96	6	0	124	7	C	152	9	8	180	B	4	208	D	0	236	E	C
13	0	D	41	2	9	69	4	5	97	6	1	125	7	D	153	9	9	181	B	5	209	D	1	237	E	D
14	0	E	42	2	A	70	4	6	98	6	2	126	7	E	154	9	A	182	B	6	210	D	2	238	E	E
15	0	F	43	2	B	71	4	7	99	6	3	127	7	F	155	9	B	183	B	7	211	D	3	239	E	F
16	1	0	44	2	C	72	4	8	100	6	4	128	8	0	156	9	C	184	B	8	212	D	4	240	F	0
17	1	1	45	2	D	73	4	9	101	6	5	129	8	1	157	9	D	185	B	9	213	D	5	241	F	1
18	1	2	46	2	E	74	4	A	102	6	6	130	8	2	158	9	E	186	B	A	214	D	6	2412	F	2
19	1	3	47	2	F	75	4	B	103	6	7	131	8	3	159	9	F	187	B	B	215	D	7	243	F	3
20	1	4	48	3	0	76	4	C	104	6	8	132	8	4	160	A	0	188	B	C	216	D	8	244	F	4
21	1	5	49	3	1	77	4	D	105	6	9	133	8	5	161	A	1	189	B	D	217	D	9	245	F	5
22	1	6	50	3	2	78	4	E	106	6	A	134	8	6	162	A	2	190	B	E	218	D	A	246	F	6
23	1	7	51	3	3	79	4	F	107	6	B	135	8	7	163	A	3	191	B	F	219	D	B	247	F	7
24	1	8	52	3	4	80	5	0	108	6	C	136	8	8	164	A	4	192	C	0	220	D	C	248	F	8
25	1	9	53	3	5	81	5	1	109	6	D	137	8	9	165	A	5	193	C	1	221	D	D	249	F	9
26	1	A	54	3	6	82	5	2	110	6	E	138	8	A	166	A	6	194	C	2	222	D	E	250	F	A
27	1	B	55	3	7	83	5	3	111	6	F	139	8	B	167	A	7	195	C	3	223	D	F	251	F	B
28	1	C	56	3	8	84	5	4	112	7	0	140	8	C	168	A	8	196	C	4	224	E	0	252	F	C
																								253	F	D
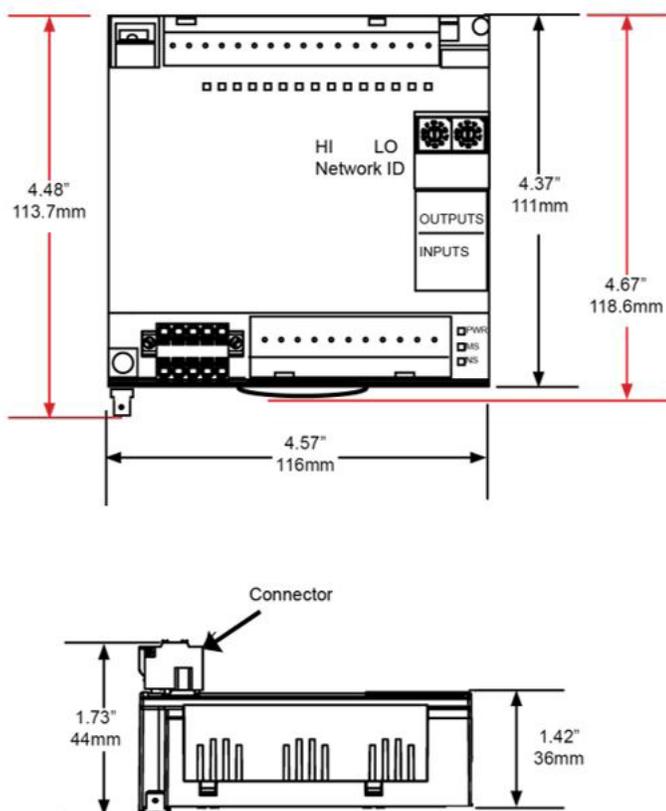
Connector

The SmartBlock modules are suitable for use in the Class I, Division 2, Groups A, B, C and D Hazardous Locations, or nonhazardous locations only.

WARNING - EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

ATTENTION - RISQUE D'EXPLOSION - NE DÉBRANCHEZ PAS L'ÉQUIPEMENT SAUF SI L'ALIMENTATION A ÉTÉ COUPÉE OU SI LA ZONE N'EST PAS DANGEREUSE.

Device shall be installed into an enclosure that is only accessible with the use of a tool.

INSTALLATION PROCEDURE
1. The SmartBlock modules conveniently mount on a DIN rail.
2. Be sure the DIN rail is in a horizontal position before installing the unit.
3. The orientation shown to the right is necessary to prevent the unit from slipping off the DIN rail.
4. Align the unit on the DIN rail then push the DIN rail clip until it clicks into place. Check to ensure that the unit is secure on the DIN rail.
5. Do NOT mount the unit on its side as this may cause the unit from slipping off the DIN rail.

NOTE: The spade connector for grounding and the DIN rail clip add to the overall measurements. The CAN/PWR and LAN connectors also add to the measurements.

WARNINGS
1. To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.
2. To reduce the risk of fire, electrical shock, or physical injury, it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.
3. Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.
4. In the event of repeated failure, do NOT replace the fuse again as repeated failure indicates a defective condition that will NOT clear by replacing the fuse.
5. Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

FCC COMPLIANCE
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation

PRECAUTIONS
All applicable codes and standards need to be followed in the installation of this product. Adhere to the following safety precautions whenever any type of connection is made to the module:
1. Connect the safety (earth) ground on the power connector first before making any other connections.
2. When connecting to the electric circuits or pulse-initiating equipment, open their related breakers.
3. Do NOT make connection to live power lines.
4. Make connections to the module first; then connect to the circuit to be monitored.
5. Route power wires in a safe manner in accordance with good practice and local codes.
6. Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.
7. Ensure hands, shoes, and floor are dry before making any connection to a power line.
8. Make sure the unit is turned OFF before making connection to terminals.
9. Make sure all circuits are de-energized before making connections.
10. Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.
11. Use copper conductors in Field Wiring only, 60/75°C.

14   PART NUMBERS

The global part numbers are **HE579THM100** and **HE579THM200.**

15   TECHNICAL SUPPORT

For assistance and datasheet updates, contact Technical Support at the following locations:

North America
+1 (317) 916-4274
www.hornerautomation.com
techsppt@heapg.com

Europe
+353 (21) 4321-266
www.hornerautomation.eu
technical.support@horner-apg.com

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