

**Characteristics:**
**General Description:**

The single and dual channel DIN Rail Repeater Power Supply, D1010S and D1010D, provides a fully floating dc supply for energizing conventional 2 wires 4-20 mA transmitters, or separately powered 3, 4 wires 4-20, 0-20 mA transmitters located in Hazardous Area, and repeats the current in floating circuit to drive a Safe Area load. The circuit allows bi-directional communication signals, for Hart-Smart transmitters.

**Function:**

1 or 2 channels I.S. analog input for 2 wires loop powered or separately powered Smart transmitters, provides 3 port isolation (input/output/supply) and current (source or sink) or voltage output signal.

**Signalling LED:**

Power supply indication (green).

**Field Configurability:**

mA (source or sink) or V output signal.

**Smart Communication Frequency Band:**

0.5 to 40 KHz within 3 dB (Hart and higher frequency protocols).

**EMC:**

Fully compliant with CE marking applicable requirements.

**Functional Safety Management Certification:**

G.M. International is certified by TUV to conform to IEC61508:2010 part 1 clauses 5-6 for safety related systems up to and included SIL3.


**Technical Data:**
**Supply:**

24 Vdc nom (20 to 30 Vdc) reverse polarity protected, ripple within voltage limits  $\leq 5$  Vpp.

**Current consumption @ 24 V:** 115 mA for 2 channels D1010D, 60 mA for 1 channel D1010S with 20 mA output typical.

**Power dissipation:** 1.9 W for 2 channels D1010D, 1.0 W for 1 channel D1010S with 24 V supply voltage and 20 mA output typical.

**Max. power consumption:** at 30 V supply voltage and short circuit condition, 3.7 W for 2 channels D1010D, 2.0 W for 1 channel D1010S.

**Isolation (Test Voltage):**

I.S. In/Out 1.5 KV; I.S. In/Supply 1.5 KV; I.S. In/I.S. In 500 V; Out/Supply 500 V; Out/Out 500 V.

**Input:**

0/4 to 20 mA (separately powered input, voltage drop  $\leq 0.9$  V) or 4 to 20 mA (2 wire Tx current limited at  $\approx 25$  mA).

**Transmitter line voltage:**

$\geq 15.0$  V at 20 mA with max. 20 mVrms ripple on 0.5 to 40 KHz frequency band.

**Output:**

0/4 to 20 mA, on max. 600  $\Omega$  load in source mode;

V min. 5 V at 0  $\Omega$  load V max. 30 V in sink mode, current limited at  $\approx 23$  mA or 0/1 to 5 V on internal 250  $\Omega$  shunt (or 0/2 to 10 V on internal 500  $\Omega$  shunt on request).

**Response time:** 50 ms (10 to 90 % step change).

**Output ripple:**  $\leq 20$  mVrms on 250  $\Omega$  communication load on 0.5 to 40 KHz band.

**Frequency response:** 0.5 to 40 KHz bidirectional within 3 dB (Hart and higher frequency protocols).

**Performance:**

Ref. Conditions 24 V supply, 250  $\Omega$  load,  $23 \pm 1$  °C ambient temperature.

**Calibration accuracy:**  $\leq \pm 0.1$  % of full scale.

**Linearity error:**  $\leq \pm 0.05$  % of full scale.

**Supply voltage influence:**  $\leq \pm 0.05$  % of full scale for a min to max supply change.

**Load influence:**  $\leq \pm 0.05$  % of full scale for a 0 to 100 % load resistance change.

**Temperature influence:**  $\leq \pm 0.01$  % on zero and span for a 1 °C change.

**Compatibility:**

CE mark compliant, conforms to Directives:

94/9/EC ATEX, 2004/108/CE EMC, 2006/95/EC LVD, 2011/65/EU RoHS

**Environmental conditions:**

**Operating:** temperature limits -20 to +60 °C, relative humidity max 95 %.

**Storage:** temperature limits -45 to +80 °C.

**Safety Description:**


**ATEX:** II (1) G [Ex ia Ga] IIC, I (M1) [Ex ia Ma] I, II (1) D [Ex ia Da] IIC

**IMQ ATEX:** II 3G Ex nA IIC T4 Gc **IMQ IECEx:** Ex nA IIC T4 Gc

**IECEx:** [Ex ia Ga] IIC, Ex ia [Ma] I, [Ex ia Da] IIC

**UL:** AEx nC [ia] IIC **C-UL:** Ex nC [ia] IIC

**FM:** NI / I / 2 / ABCD / T4, AIS / I / II / III / 1 / ABCDEFG

**FM-C:** NI / I / 2 / ABCD / T4, AIS / I, II, III / 1 / ABCDEFG

**GOST R:** [Exia] IIC X, 2ExnAII T4 X. **GOST:** [Ex ia] IIC X, 2ExnAII T4 X associated electrical apparatus.

Uo/Voc = 26.3 V, Io/Isc = 91 mA, Po/Po = 597 mW at terminals 14-15, 10-11.

Uo/Voc = 1.1 V, Io/Isc = 38 mA, Po/Po = 11 mW at terminals 15-16, 11-12.

Ui/Imax = 30 V, Ii/Imax = 104 mA, Ci = 1.05 nF, Li = 0 nH at terminals 15-16, 11-12.

Um = 250 Vrms, -20 °C  $\leq$  Ta  $\leq$  60 °C.

**Approvals:**

DMT 01 ATEX E 042 X conforms to EN60079-0, EN60079-11, EN60079-26, EN50303.

IECEx BVS 07.0027X conforms to IEC60079-0, IEC60079-11, IEC60079-26,

IMQ 09 ATEX 013 X conforms to EN60079-0, EN60079-15,

IECEx IMQ 13.0011X conforms to IEC60079-0, IEC60079-15

UL & C-UL E222308 conforms to UL913, UL 60079-0, UL60079-11, UL60079-15

ANSI/ISA 12.12.01 for UL and CSA-C22.2 No.157-92, CSA-E60079-0, CSA-E60079-11,

CSA-C22.2 No. 213 and CSA-E60079-15 for C-UL, refer to control drawing ISM0125.

FM & FM-C No. 3024643, 3029921C, conforms to Class 3600, 3610, 3611, 3810,

ANSI/ISA 12.12.02, ANSI/ISA 60079-0, ANSI/ISA 60079-11, C22.2 No.142,

C22.2 No.157, C22.2 No.213, E60079-0, E60079-11, E60079-15,

GOST R 12.2.007.0-75, R 51330.0-99, R 51330.10-99

GOST 12.2.007.0.22782.0.22782.5

TUV Certificate No. C-IS-236198-03, SIL 2 conforms to IEC61508:2010 Ed.2.

TUV Certificate No. C-IS-236198-09, SIL 3 Functional Safety Certificate conforms to

IEC61508:2010 Ed.2, for Management of Functional Safety.

DNV No.A-13778 and KR No.MIL20769-EL001 Certificates for marine applications .

**Mounting:**

T35 DIN Rail according to EN50022.

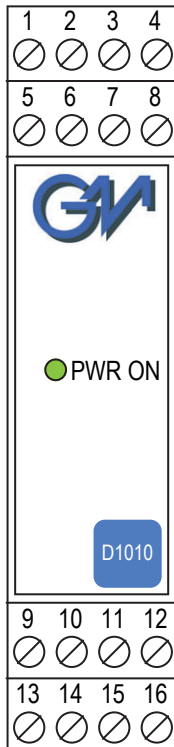
**Weight:** about 175 g D1010D, 125 g D1010S.

**Connection:** by polarized plug-in disconnect screw terminal blocks to accommodate terminations up to 2.5 mm<sup>2</sup>.

**Location:** Safe Area/Non Hazardous Locations or Zone 2, Group IIC T4, Class I, Division 2, Groups A, B, C, D Temperature Code T4 and Class I, Zone 2, Group IIC, IIB, IIA T4 installation.

**Protection class:** IP 20.

**Dimensions:** Width 22.5 mm, Depth 99 mm, Height 114.5 mm.

**Front Panel and Features:**


- SIL 2 according to IEC 61508:2010 Ed. 2 for Tproof = 7 / 10 years (10 / 20 % of total SIF) with active input.
- SIL 2 according to IEC 61508:2010 Ed. 2 for Tproof = 6 / 10 years (10 / 20 % of total SIF) with passive input.
- PFDavg (1 year) 1.30 E-04, SFF 80.51 % with active input.
- PFDavg (1 year) 1.47 E-04, SFF 80.81 % with passive input.
- SIL 3 Systematic capability.
- Input from Zone 0 (Zone 20), Division 1, installation in Zone 2, Division 2.
- 4-20 or 0-20 mA Input, Output Signal.
- Wide Band Smart Communication, Hart compatible.
- Input and Output short circuit proof.
- High Accuracy.
- Three port isolation, Input/Output/Supply.
- EMC Compatibility to EN61000-6-2, EN61000-6-4, EN61326-1
- In-field programmability by DIP Switch.
- ATEX, IECEx, UL & C-UL, FM & FM-C, GOST, TUV Certifications.
- TÜV Functional Safety Certification.
- Type Approval Certificate DNV and KR for marine applications.
- High Reliability, SMD components.
- High Density, two channels per unit.
- Simplified installation using standard DIN Rail and plug-in terminal blocks.
- 250 Vrms (Um) max. voltage allowed to the instruments associated with the barrier.

**Ordering Information:**

Model:	D1010	
1 channel		S
2 channels		D
Power Bus enclosure		/B

Power Bus accessories: Cover and fix MCHP196  
 Terminal block male MOR017 Terminal block female MOR022

**Parameters Table:**

Safety Description	Maximum External Parameters			
	Group Cenelec	Co/Ca ( $\mu$ F)	Lo/La (mH)	Lo/Ro ( $\mu$ H/ $\Omega$ )
Terminals 14-15, 10-11				
Uo/Voc = 26.3 V	IIC	0.095	4.3	59.6
Io/Isc = 91 mA	IIB	0.738	17.2	238.4
Po/Po = 597 mW	IIA	2.508	34.5	476.8
	I	3.950	56.6	782.2
	IIIC	0.738	17.2	238.4
Terminals 15-16, 11-12				
Uo/Voc = 1.1 V	IIC	100	11.3	3490
Io/Isc = 38 mA	IIB	1000	45.3	13963
Po/Po = 11 mW	IIA	1000	90.7	27927
	I	1000	148.8	45820
	IIIC	1000	45.3	13963

NOTE for USA and Canada:

IIC equal to Gas Groups A, B, C, D, E, F and G

IIB equal to Gas Groups C, D, E, F and G

IIA equal to Gas Groups D, E, F and G

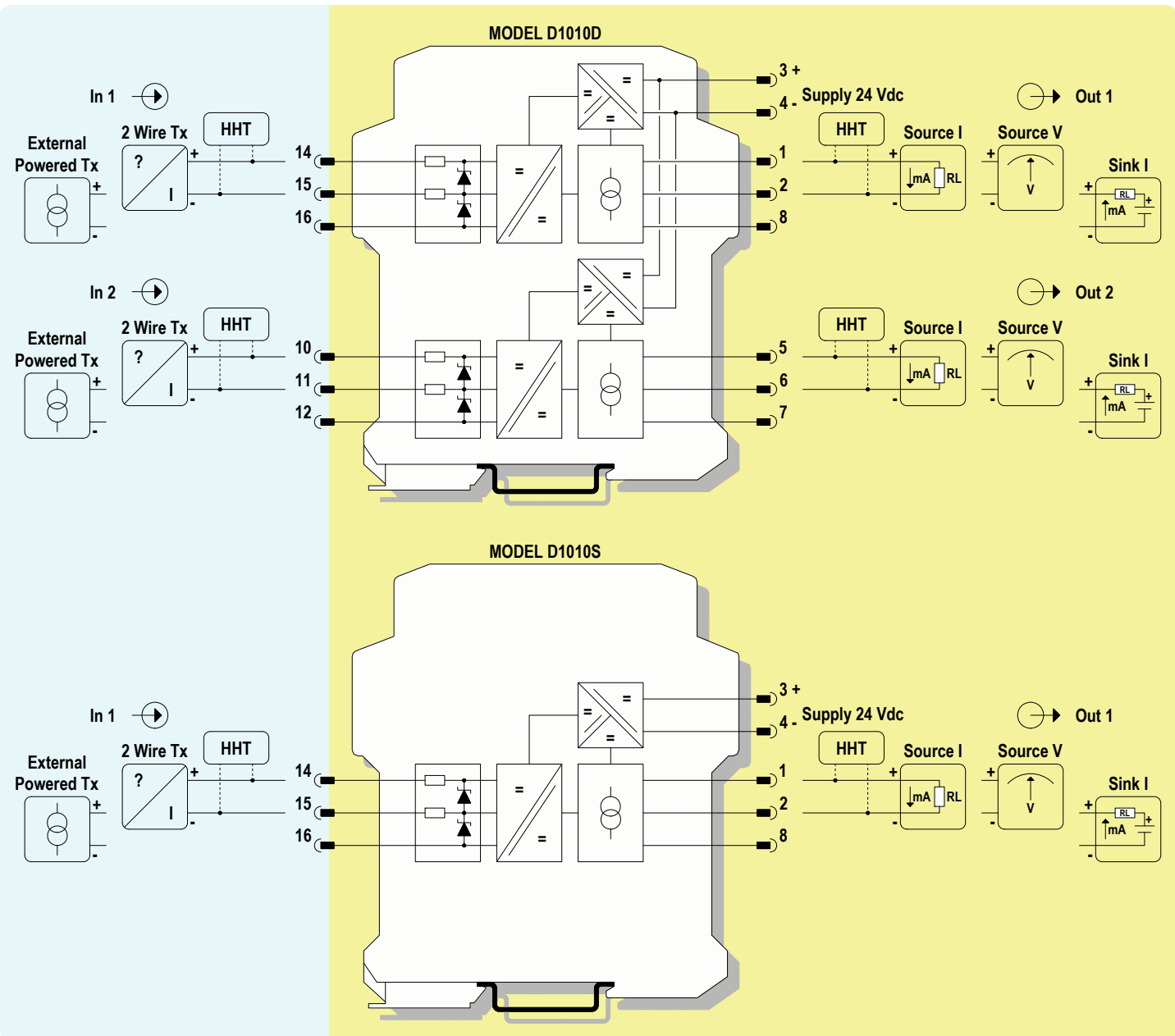
**Image:**



**Function Diagram:**

HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,  
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,  
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,  
CLASS I, ZONE 0, GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4,  
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,  
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4



## Function Diagram:

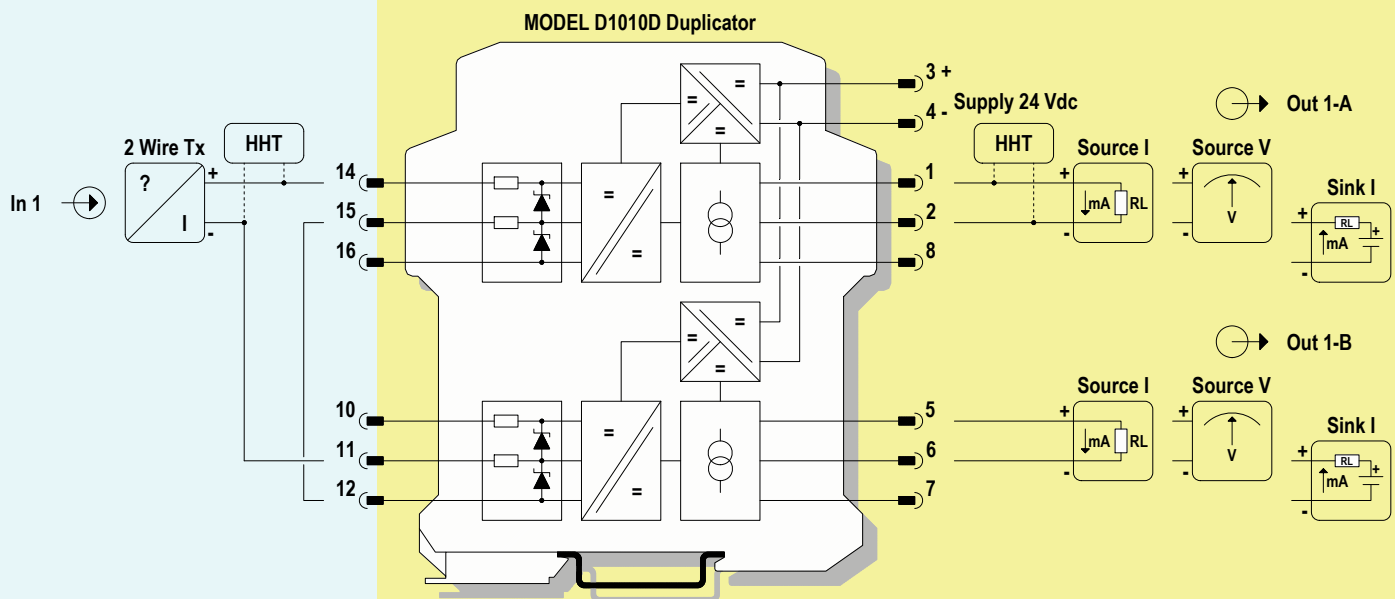
HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,  
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,  
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,  
CLASS I, ZONE 0, GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4,  
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,  
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4

### Safety Description

Terminals 14-11  
(with 15-12 shorted)  
 $U_o/V_{oc} = 27.4 \text{ V}$   
 $I_o/I_{sc} = 91 \text{ mA}$   
 $P_o/P_o = 624 \text{ mW}$

Group	Co/Ca ( $\mu\text{F}$ )	Lo/La (mH)	Lo/Ro ( $\mu\text{H}/\Omega$ )
Cenelec			
IIC	0.085	4.3	54.7
IIB	0.675	17.2	218.9
IIA	2.258	34.5	437.9



### Connections for Duplication of 2 wires Transmitter Input

Restriction on specifications for 2 wires Transmitter Input:

Bidirectional communication for Smart Transmitter is provided only on channel 1

The minimum supply voltage available for Transmitter ( $V_{tx}$ ) is 14.1 V at 20 mA input

The safety parameters must be changed in:  $U_o/V_{oc} = 27.4 \text{ V}$ ,  $I_o/I_{sc} = 91 \text{ mA}$ ,  $P_o/P_o = 624 \text{ mW}$

## Function Diagram:

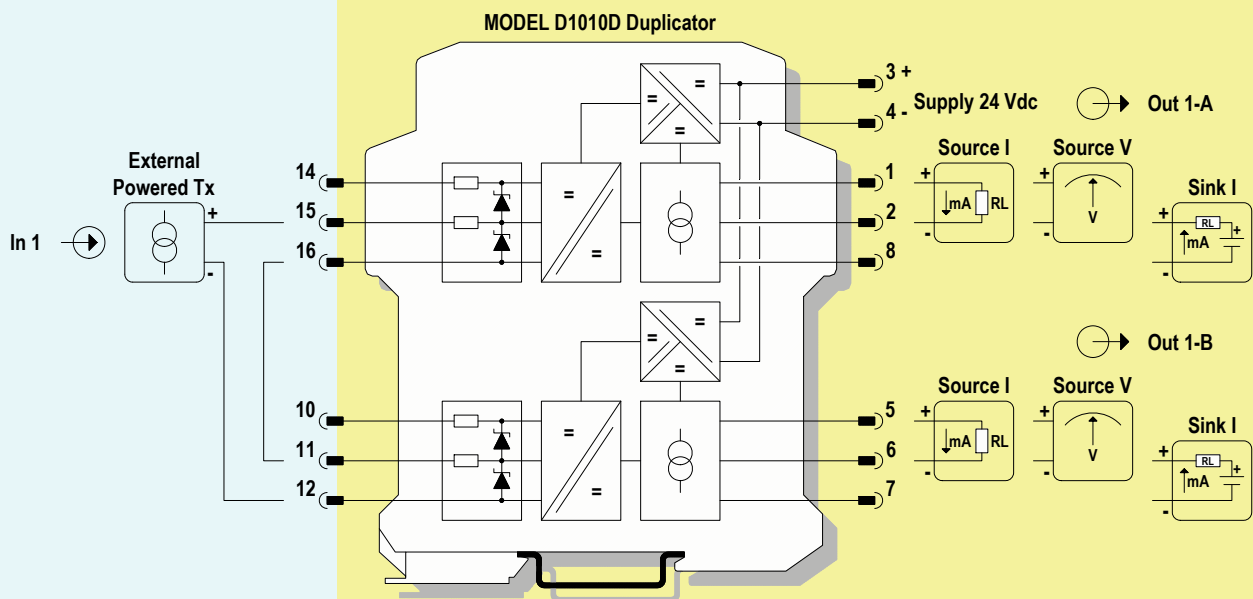
HAZARDOUS AREA ZONE 0 (ZONE 20) GROUP IIC,  
HAZARDOUS LOCATIONS CLASS I, DIVISION 1, GROUPS A, B, C, D,  
CLASS II, DIVISION 1, GROUPS E, F, G, CLASS III, DIVISION 1,  
CLASS I, ZONE 0, GROUP IIC

SAFE AREA, ZONE 2 GROUP IIC T4,  
NON HAZARDOUS LOCATIONS, CLASS I, DIVISION 2,  
GROUPS A, B, C, D T-Code T4, CLASS I, ZONE 2, GROUP IIC T4

### Safety Description

Terminals 15-12  
(with 16-11 shorted)  
 $U_o/V_{oc} = 2.2\text{ V}$   
 $I_o/I_{sc} = 38\text{ mA}$   
 $P_o/P_o = 21\text{ mW}$

Group	Co/Ca ( $\mu\text{F}$ )	Lo/La (mH)	Lo/Ro ( $\mu\text{H}/\Omega$ )
Cenelec			
IIC	100	11.3	849
IIB	1000	45.3	3396
IIA	1000	90.7	6793



### Connections for Duplication of Active Input Signals

Restriction on specifications for external powered Transmitter:

The voltage drop must be changed in 1.8 V maximum

The safety parameters must be changed in:  $U_o/V_{oc} = 2.2\text{ V}$ ,  $I_o/I_{sc} = 38\text{ mA}$ ,  $P_o/P_o = 21\text{ mW}$