

CTS-60

RAILWAY 50...60W SINGLE OUTPUT DC/DC CONVERTERS

GENERAL FEATURES:

- Designed according to EN50155
- Fire and smoke: EN45545-2 approved
- High input-output isolation
- Adjustable output voltage
- Remote sensing
- Output voltage presence LED
- Efficiency up to 85%



	24Vin 14,4V ... 30V	36Vin 21,6V ... 47V	48Vin 28,8V ... 60V	72Vin 43,2V ... 90V	110Vin 66V ... 144V
5Vout	CTS-60-6835 50W	CTS-60-6851 50W	CTS-60-6839 50W	CTS-60-6843 50W	CTS-60-6847 50W
12Vout	CTS-60-6836 60W	CTS-60-6852 60W	CTS-60-6840 60W	CTS-60-6844 60W	CTS-60-6848 60W
16Vout	CTS-60-6856 60W	Availabe upon request	Availabe upon request	Availabe upon request	CTS-60-6855 60W
24Vout	CTS-60-6837 60W	CTS-60-6853 60W	CTS-60-6841 60W	CTS-60-6845 60W	CTS-60-6849 60W
48Vout	CTS-60-6838 60W	CTS-60-6854 60W	CTS-60-6842 60W	CTS-60-6846 60W	CTS-60-6850 60W



INPUT	
Input voltage range	See table
Maximum allowed input ripple	15% $V_{in\ nom}$ (EN50155)
OUTPUT	
Output voltage	See table
Output voltage adjustment range	
$V_i\ min >60\% V_i\ nom$	-10% ... +0% $V_o\ nom$
$V_i\ min >70\% V_i\ nom$	-10% ... +15% $V_o\ nom$
Line regulation ($I_o = nom$)	< 0,2 %
Load regulation ($V_{in} = nom$)	< 0,2 %
Ripple	< 50 mVpp
Noise (BW = 20MHz)	< 100 mVpp
Maximum remote sensing	0,3V / pole
ENVIRONMENTAL	
Storage temperature	-40°C ... 85°C
Operating temperature range at $I_o = 100\%$	-25°C ... 60°C (-40°C ... 60°C, see note-1)
Operating temperature range at $I_o = 75\%$	-25°C ... 70°C (-40°C ... 70°C, see note-1)
Operating temperature range at $I_o = 37,5\%$	-25°C ... 85°C (-40°C ... 85°C, see note-1)
Maximum Relative humidity	95% without condensation
Shock and vibration	EN61373 Category 1 class B body mounted
MTBF	650.000h @ 40°C according to IEC61709
EMC	
Emission	EN50121-4, EN50121-3-2
Immunity	EN50121-4, EN50121-3-2
SAFETY	
Safety	EN-60950-1, EN68368-1, EN50155
Dielectric strength Input / Output	3000Vac, 4200Vdc 1min.
Dielectric strength Input / Earth	1500Vac, 2100Vdc 1min.
Dielectric strength Output / Earth	1500Vac, 2100Vdc 1min.
Fire and smoke	EN45545-2:2013 + A1:2015
MECHANICAL	
Approximate weight	500g
Dimensions	127 x 84.5 x 40mm
PROTECTIONS	
Against overloads and short-circuits	Current limiting
Against reverse input voltage.	Input fuse
Against input under-voltage.	Under-voltage lock-out
Against Input over-currents	Input fuse

Note-1: The unit can start up and work at an ambient temperature of -40°C with the following restrictions:

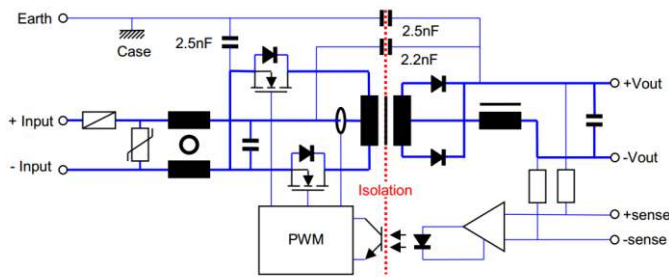
- Do not handle the connection terminals below -25°C
- The output ripple can rise up to 150mVpp at -40°C

**ORDERING CODES**

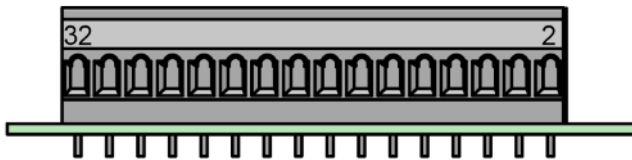
Part Number	Power [W]	Input [V]	Input range [V]	Output [V]	Output current [A]	Efficiency [%]
CTS-60-6835	50	24	14,4 - 30	5	10	78
CTS-60-6836	60	24	14,4 - 30	12	5	83
CTS-60-6856	60	24	14,4 - 30	16	3,75	83
CTS-60-6837	60	24	14,4 - 30	24	2,5	84
CTS-60-6838	60	24	14,4 - 30	48	1,25	85
CTS-60-6851	50	36	21,6 - 47	5	10	78
CTS-60-6852	60	36	21,6 - 47	12	5	83
CTS-60-6853	60	36	21,6 - 47	24	2,5	84
CTS-60-6854	60	36	21,6 - 47	48	1,25	85
CTS-60-6839	50	48	28,8 - 60	5	10	79
CTS-60-6840	60	48	28,8 - 60	12	5	84
CTS-60-6841	60	48	28,8 - 60	24	2,5	85
CTS-60-6842	60	48	28,8 - 60	48	1,25	85
CTS-60-6843	50	72	43,2 - 90	5	10	79
CTS-60-6844	60	72	43,2 - 90	12	5	84
CTS-60-6845	60	72	43,2 - 90	24	2,5	85
CTS-60-6846	60	72	43,2 - 90	48	1,25	85
CTS-60-6847	50	110	66 - 144	5	10	80
CTS-60-6848	60	110	66 - 144	12	5	85
CTS-60-6855	60	110	66 - 144	16	3,75	85
CTS-60-6849	60	110	66 - 144	24	2,5	85
CTS-60-6850	60	110	66 - 144	48	1,25	85

Accessories must be ordered in a separated order line

BLOCKS DIAGRAM

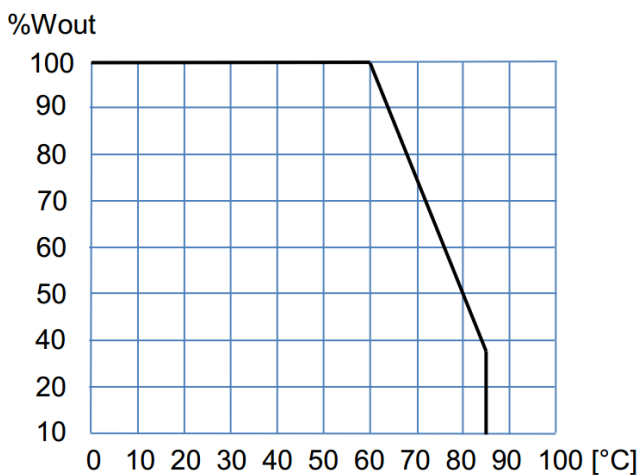


CONNECTIONS



CONNECTION	Terminal
+Vin	8,10
-Vin	2,4,6
Earth	16
+Vout	26,28,30
-Vout	20,22,24
+Sense	32
-Sense	18

POWER DERATING vs AMBIENT TEMP.



DESCRIPTION

The CTS-60 series consists of PWM DC-DC converters, with a galvanic isolation between input and output. The converters operate at a fixed switching frequency and use push-pull converter topology.

Voltage feedback is performed by transferring the error signal from the output to the primary side through an optocoupler, where the PWM circuit changes the pulse width as required to keep the voltage output stable.

For maximum regulation, the remote sensing terminals can be connected to the load. This will allow a power cable voltage drop of up to 0.3 V on each cable to be offset.

The device is protected against overload and short-circuit by means of a current limiting circuit.

The device is also protected against reverse polarity input voltage, and the input fuse blows if an improper connection is made.

When a converter input undervoltage condition occurs, the converter is disabled, thus preventing the battery from becoming totally discharged.

START-UP

Perform connection as per the table. Use of remote sensing is not absolutely necessary, but if this is required, use of a coaxial or a twisted-pair cable is recommended.

WARNING: If the load is connected to the tabs of remote sensing (+/-S) and the connection from the output to this load is missing the remote sensing function could make unusable due to the acting of the internal fuse of protection.

If power levels close to the maximum output are required, make sure the assembly enhances cooling by natural convection and the card is placed in vertical position.

If several converters need to be connected in parallel, do the following:

- Set the output voltage for all converters featuring a mutual difference as small as possible.
- Join the load outputs by using cables with a cross-section no greater than the one required and of equal length.
- Do not use remote sensing.

For safety reasons, the following requirements must be complied with:

- Provide the equipment with some kind of protective enclosure that complies with the electrical safety directives in effect within the country where the equipment is installed.
- Only replace the fuse with another fuse of the same rating and type, and only after disconnecting the converter from DC power.

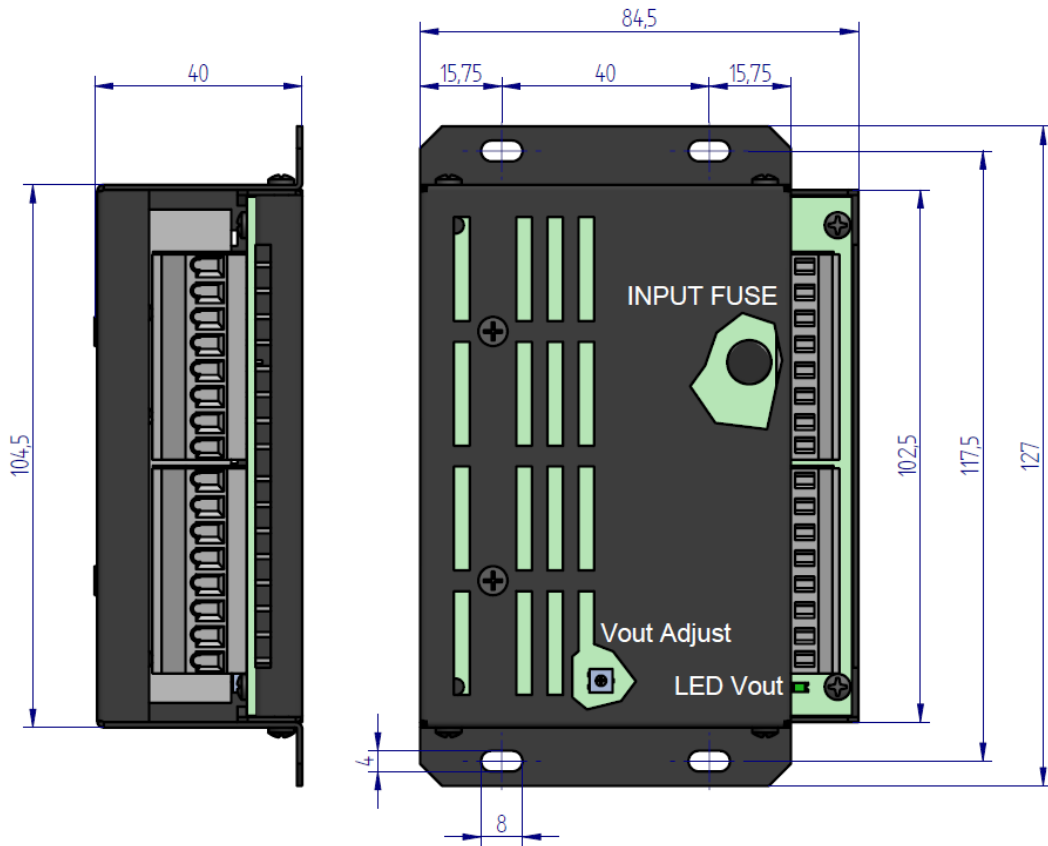
INSTALLATION

Connection: Spring clamp terminal strip

The product can be mounted:

- On a chassis by means of the 4 holes.
- In DIN rail adding the clip accessory **NP-9135**

DIMENSIONS



ACCESSORIES

ACCESSORIES	CODE
Din rail clip	NP-9135
Redundant connection for two units (ORing diodes + alarms contacts)	ACD-15





CE EU DECLARATION OF CONFORMITY

The undersigned, representing the following:

Manufacturer: PREMIUM, S. A.,
Address: C/ DolorsAleu 19-21, 08908 L'Hospitalet de Llobregat, SPAIN

herewith declares that the product:

Type: DC/DC converter
Models: **CTS-60-6835 ... 6855**

is in conformity with the provisions of the following EU directive(s):

2014/35/EU	Low voltage
2014/30/EU	Electromagnetic compatibility
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

and that standards and/or technical specifications referenced overleaf have been applied:

EN 60950-1: 2005	Safety. Information technology equipment
EN 62368-1: 2014	Safety. Audio/video, information and communication technology equipment
EN 61000-6-3: 2007	Generic emission standard
EN 61000-6-2: 2005	Generic immunity standard
EN 50155: 2017*	Railway applications. Electronic equipment used on rolling stock material
EN 50121-3-2: 2016*	Railway applications. EMC Rolling stock equipment
EN 50121-4: 2016*	Railway applications. EMC of the signalling and telecommunications apparatus

* See annexe

CE marking year: **2009**

Notes:

For the fulfillment of this declaration the product must be used only for the aim that has been conceived, considering the limitations established in the instructions manual or datasheet.

L'Hospitalet de Llobregat, 28-08-2019

Jordi Gazo
Chief Executive Officer

PREMIUM S.A. is an ISO9001 and ISO14001
certified company by **Bureau Veritas**

ANNEXE

Applicable values for the different sections of the norm EN50155: 2017																																																																		
4.3.1	Working altitude	Up to 2000m																																																																
4.3.2	Ambient temperature	Class OT1 (-25 to 55°C): load < 100% Class OT2 (-40 to 55°C): load < 100% (Without connectors handling and output ripple <150mVpp) Class OT3 (-25 to 70°C): load <75% Class OT4 (-40 to 70°C): load <75% (Without Connectors handling and output ripple <150mVpp) Class OT5 (-25 to 85°C): load <37.5% Class OT6 (-40 to 85°C): load <37.5% (Without Connectors handling and output ripple <150mVpp)																																																																
4.3.3	Switch-on extended operating temp.	ST1																																																																
4.3.4	Rapid temperature variations	H1																																																																
4.3.5	Shocks and vibrations	According EN61373:2010 Category 1 class B																																																																
4.3.6	EMC Electromagnetic Compatibility EN50121-3-2:2016 EN50121-4:2016	<table border="1"> <thead> <tr> <th>Test</th> <th>Norm</th> <th>Port</th> <th>Frequency</th> <th>Limits</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Radiated emissions</td> <td rowspan="3">IEC55016</td> <td rowspan="3">Case</td> <td>30MHz...230MHz</td> <td>40dB(µV/m) Qpk at 10m</td> </tr> <tr> <td>230MHz...1GHz</td> <td>47dB(µV/m) Qpk at 10m</td> </tr> <tr> <td>1...3GHz</td> <td>Do not apply</td> </tr> <tr> <td rowspan="2">Conducted emissions</td> <td rowspan="2">IEC55016</td> <td rowspan="2">Input</td> <td>3...6GHz</td> <td>Internal freq. < 108MHz</td> </tr> <tr> <td>150kHz...500kHz</td> <td>79dB(µV) Qpk, 66dB(µV) Av</td> </tr> <tr> <td></td> <td></td> <td></td> <td>500kHz...30MHz</td> <td>79dB(µV) Qpk, 60dB(µV) Av</td> </tr> </tbody> </table>	Test	Norm	Port	Frequency	Limits	Radiated emissions	IEC55016	Case	30MHz...230MHz	40dB(µV/m) Qpk at 10m	230MHz...1GHz	47dB(µV/m) Qpk at 10m	1...3GHz	Do not apply	Conducted emissions	IEC55016	Input	3...6GHz	Internal freq. < 108MHz	150kHz...500kHz	79dB(µV) Qpk, 66dB(µV) Av				500kHz...30MHz	79dB(µV) Qpk, 60dB(µV) Av																																						
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4.3.7	Relative humidity	Up to 95%																																																																
5.1.1.2	DC power supply range	From 0.70 to 1.25 Un continuous																																																																
5.1.1.3	Temporary DC power supply fluctuation	From 0.60 to 1.40 Un 0.1s From 1.25 to 1.40 Un 1s without damage																																																																
5.1.1.4	Interruptions of voltage supply	Class S1 (without interruptions)																																																																
5.1.1.6	Input ripple factor	10% peak to peak with a DC Ripple Factor of 5 %																																																																
5.1.3	Supply change-over	0,6 Un duration 100 ms (without interruptions). Performance criterion A																																																																
7.2.7	Input reverse polarity protection	By fuse																																																																
10.7	Protective coating for PCB assemblies	Class PC2																																																																
13.3	Tests list	1 Visual Inspection 2 Performance test 3 Power supply test 4 Insulation test 5 Low temperature storage test 6 Low temperature start-up test 7 Dry heat test 8 Cyclic damp heat test 9 Salt mist test 10 Enclosure protection test (IP code) 11 EMC test 12 Shocks and vibrations test 13 Equipment stress screening test 14 Rapid Temperature variation test	Routine Routine Routine Routine - Type Type Type - - Type Type Routine: 24h at 40°C and load 100% Type																																																															